



YAMAHA

2008

SERVICE MANUAL

YXR70FX

RHINO
FUEL INJECTION
700 FI

RHINO

LIT-11616-21-58

5B4-F8197-10

EBS00001

**YXR70FX
SERVICE MANUAL
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First edition, September 2007
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Printed in U.S.A.
LIT-11616-21-58**

IMPORTANT

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.

TIP:

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

IMPORTANT INFORMATION

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



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

**WARNING**

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

NOTICE

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

TIP:

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

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.

② CLUTCH ENG

①

④

⑤

⑥

⑦

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

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③ CLUTCH ENG

⑧

REMOVING THE CLUTCH

1. Remove:

- clutch housing assembly
- gasket
- dowel pins

TIP:
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

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

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

Universal clutch holder
90890-04086, YM-91042

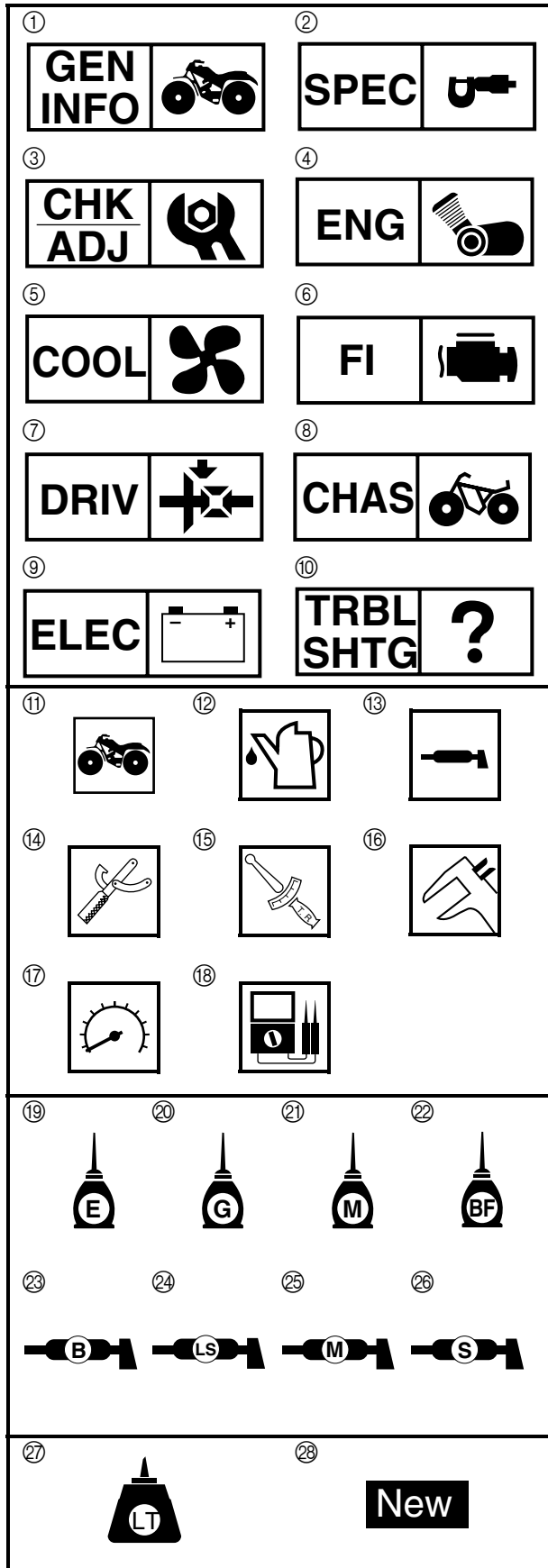
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SYMBOLS

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 ㉖ 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 brake fluid
- ㉓ Apply wheel bearing grease
- ㉔ Apply lithium-soap-based grease
- ㉕ Apply molybdenum disulfide grease
- ㉖ Apply silicone grease

Symbols ㉗ to ㉘ in the exploded diagrams indicate where to apply a locking agent ㉗ and when to install a new part ㉘.

- ㉗ Apply the locking agent (LOCTITE®)
- ㉘ Replace

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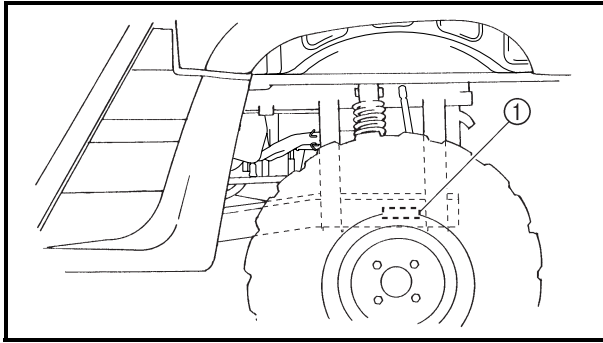
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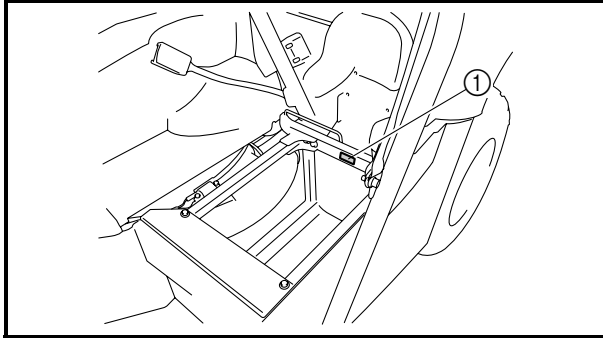
EBS00009

GENERAL INFORMATION VEHICLE IDENTIFICATION

EBS00010

VEHICLE IDENTIFICATION NUMBER

The vehicle identification number ① is stamped into the frame.



EBS00011

MODEL LABEL

The model label ① is affixed to the frame under the driver seat. Record the information on this label in the space provided. This information will be needed to order spare parts.

EAS20170

FEATURES

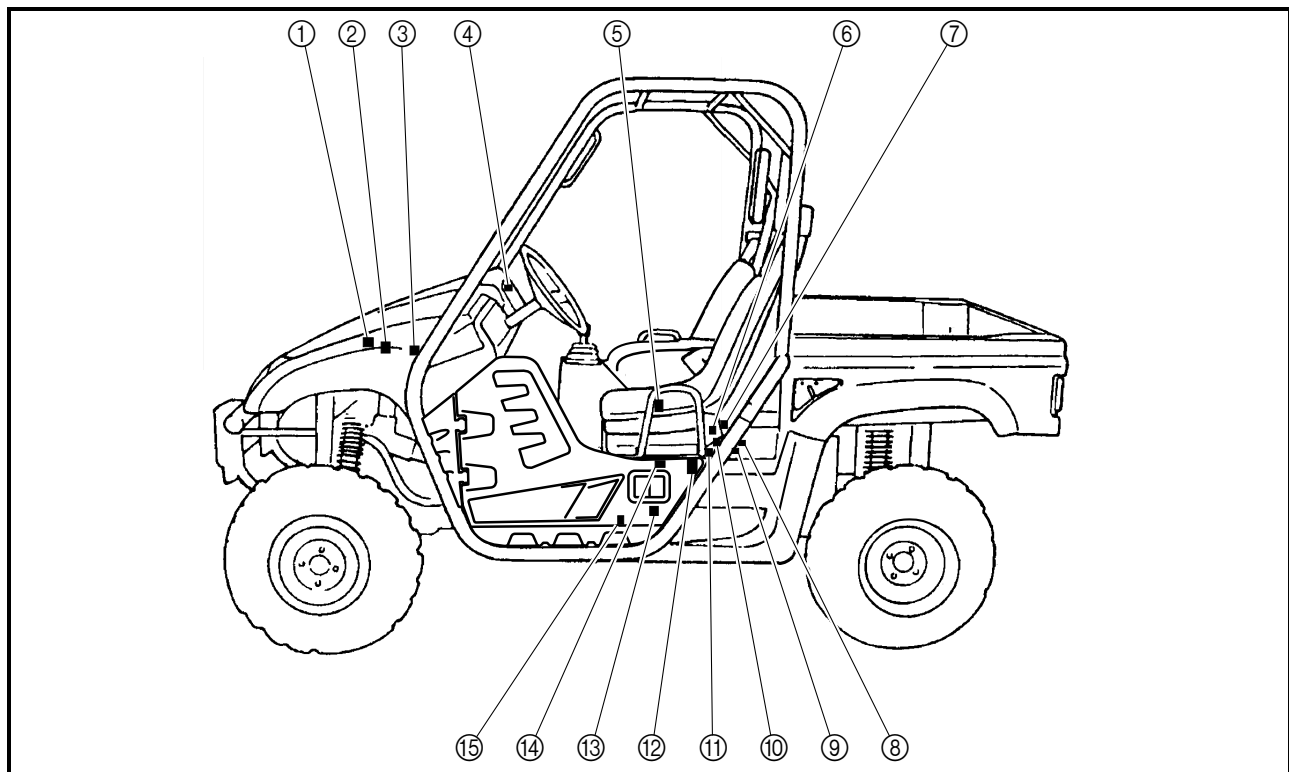
OUTLINE OF THE FI SYSTEM

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.



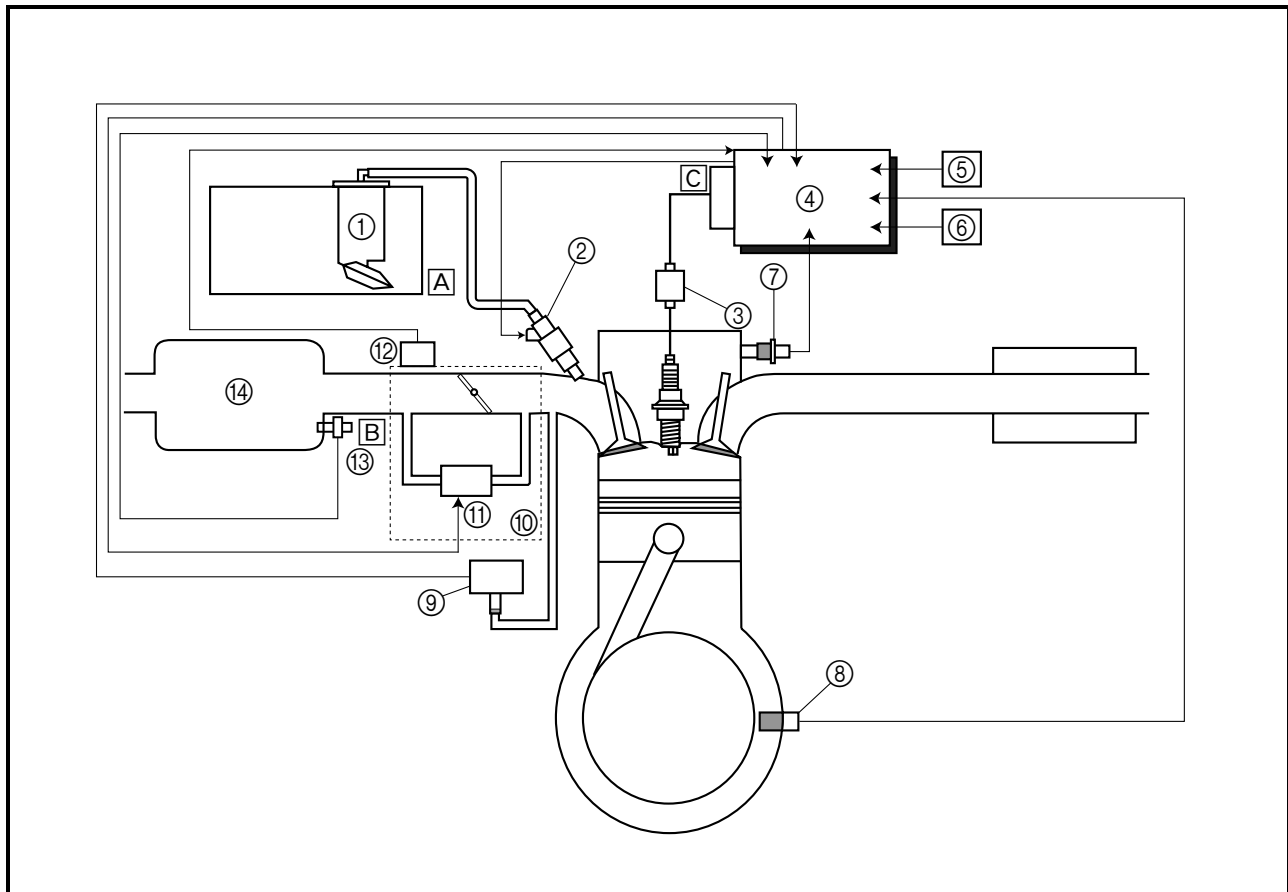
- | | |
|----------------------------------|---------------------------------|
| ① Fuel injection system relay | ⑨ Coolant temperature sensor |
| ② ECU (engine control unit) | ⑩ Fuel injector |
| ③ Lean angle sensor | ⑪ ISC (idle speed control) unit |
| ④ Engine trouble warning light | ⑫ Fuel pump |
| ⑤ Intake air temperature sensor | ⑬ Crankshaft position sensor |
| ⑥ TPS (throttle position sensor) | ⑭ Ignition coil |
| ⑦ Intake air pressure sensor | ⑮ Speed sensor |
| ⑧ Spark plug | |

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/cm², 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.

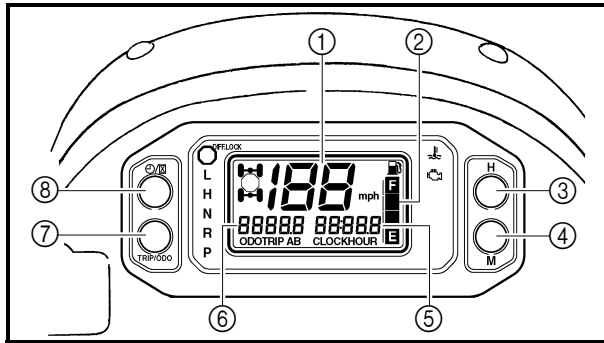
The injection duration and the injection timing are controlled by the ECU. Signals that are input from the throttle position sensor, crankshaft position sensor, intake air pressure sensor, intake air temperature sensor, coolant temperature sensor, lean angle sensor and speed sensor enable the ECU to 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 | ⑪ ISC (idle speed control) unit |
| ② Fuel injector | ⑫ Throttle position sensor |
| ③ Ignition coil | ⑬ Intake air temperature sensor |
| ④ ECU (engine control unit) | ⑭ Air intake duct |
| ⑤ Speed sensor | |
| ⑥ Lean angle sensor | |
| ⑦ Coolant temperature sensor | |
| ⑧ Crankshaft position sensor | |
| ⑨ Intake air pressure sensor | |
| ⑩ Throttle body | |

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



INSTRUMENT FUNCTIONS

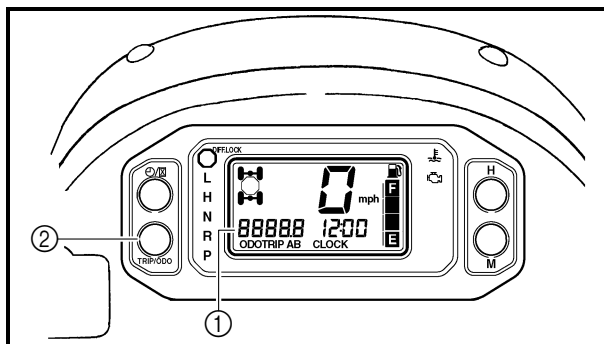
5B410004

Multi-function meter unit

- ① Speedometer
- ② Fuel meter
- ③ “H” button
- ④ “M” button
- ⑤ Clock/Hour meter/Voltage display
- ⑥ Odometer/Tripmeter A/Tripmeter B
- ⑦ “TRIP/ODO” button
- ⑧ Clock/Hour button “⌚/⌚”

The multi-function meter unit 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 engine has been running)
- a voltage display (which shows the battery voltage)
- a fuel meter
- a self-diagnosis device



Odometer and tripmeter modes

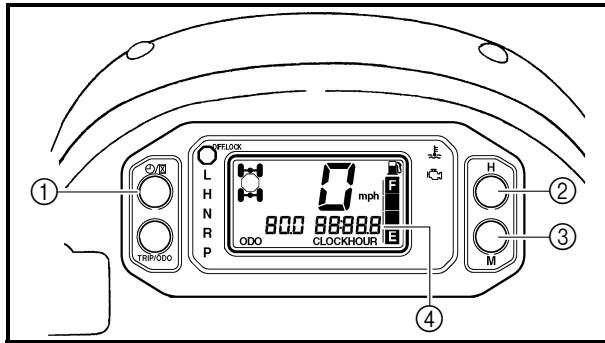
- ① Odometer/Tripmeter A/Tripmeter B
- ② “TRIP/ODO” button

Pushing the “TRIP/ODO” 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 “TRIP/ODO” button, and then hold the “TRIP/ODO” 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.

Pushing and holding in the “TRIP/ODO” button, and turning the key to “ON” while the button is pushed, switches the display between “mph” and “km/h”.



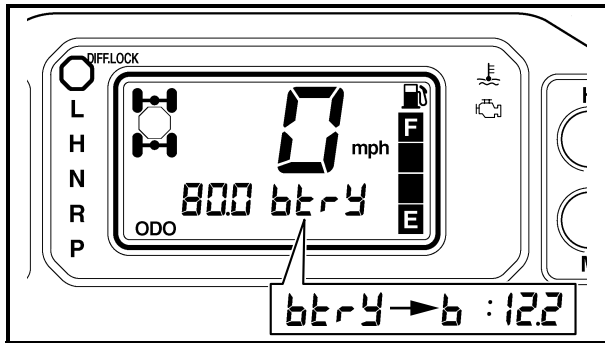
Clock and voltage display modes

- ① Clock/Hour button “⌚/⌚”
- ② “H” button
- ③ “M” button
- ④ Clock/Hour meter/Voltage display

Pushing the “⌚/⌚” button switches the display between the clock mode “CLOCK”, the hour meter mode “HOUR”, and the voltage display mode “btry” in the following order:
CLOCK → HOUR → btry → CLOCK

To set the clock

1. Set the display to the clock.
2. Push the “⌚/⌚” button until the clock starts flashing.
3. Set the hours by pushing the “H” button.
4. Set the minutes by pushing the “M” button.
5. Push the “⌚/⌚” button, and then release it to start the clock.



Voltage display mode

This display shows the battery voltage. “btry” appears for 1 second when the voltage display mode is first selected, and then the battery voltage is shown.

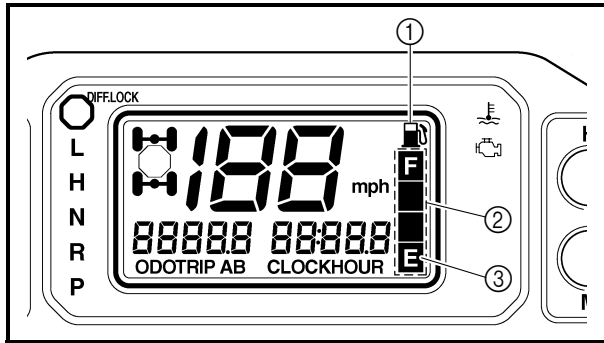
If the battery voltage is less than 10 volts, “LO” is displayed and if the voltage is above 16 volts, “HI” is displayed.

TIP:

“LO” or “HI” is displayed only if the low or high battery voltage is detected for 16 seconds or more.

NOTICE

If the voltage display indicates “LO” or “HI”, there may be trouble with the battery charging circuit or the battery may be faulty. If “LO” or “HI” appears in the display, check the vehicle.



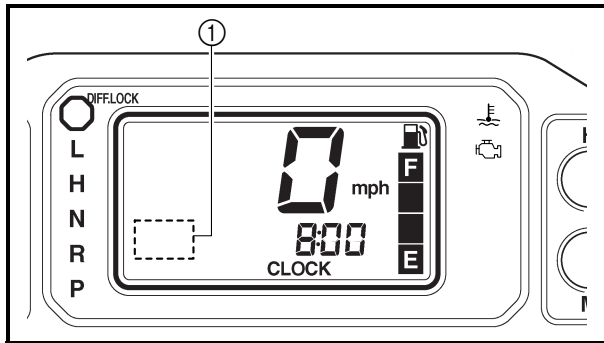
Fuel meter

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

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

TIP:

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



Self-diagnosis device

- ① Error code display

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

If any of those circuits are defective, the engine trouble warning light will come on or flash, and then the multi-function display will indicate a two-digit error code.

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

NOTICE

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

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

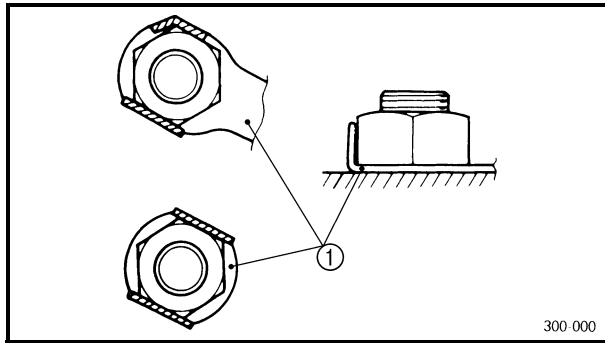
REPLACEMENT PARTS

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

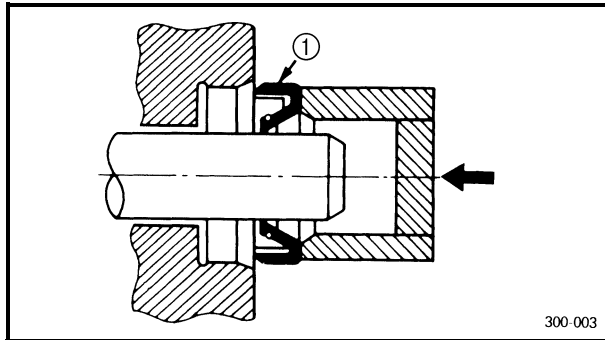
1. When overhauling the engine, replace all gaskets, seals and O-rings. All gasket surfaces, oil seal lips and O-rings must be cleaned.
2. During reassembly properly oil all mating parts and bearings, and lubricate the oil seal lips with grease.



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

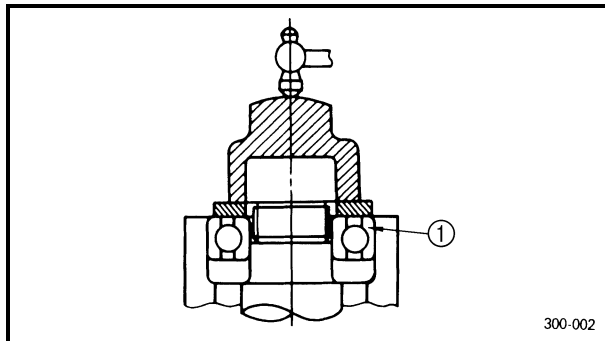
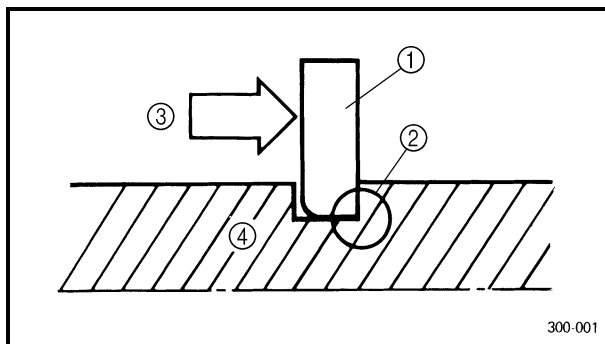
Install bearings and oil seals so that the manufacturer's marks or numbers are visible. When installing oil seals, lubricate the oil seal lips with a light coat of lithium-soap-based grease. Oil bearings liberally when installing, if appropriate.

① Oil seal

NOTICE

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

① Bearing

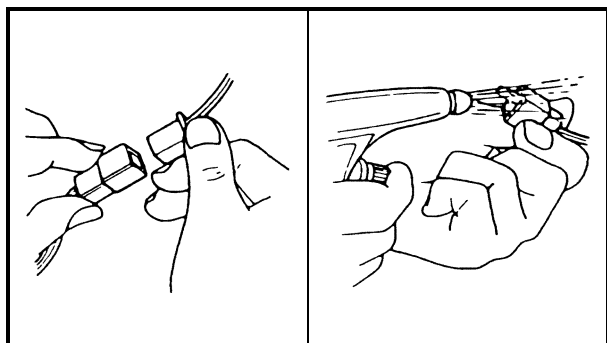
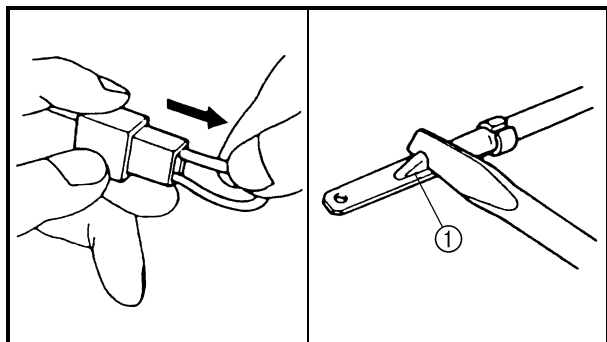


EBS00018

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.

TIP:

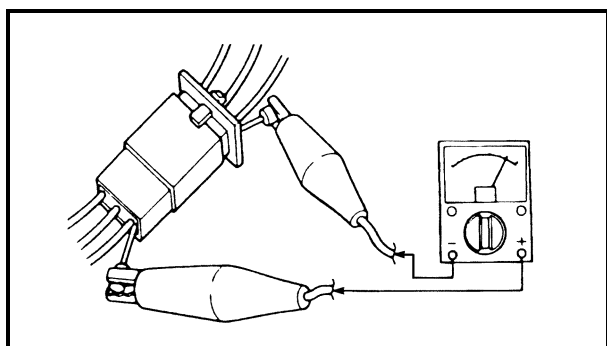
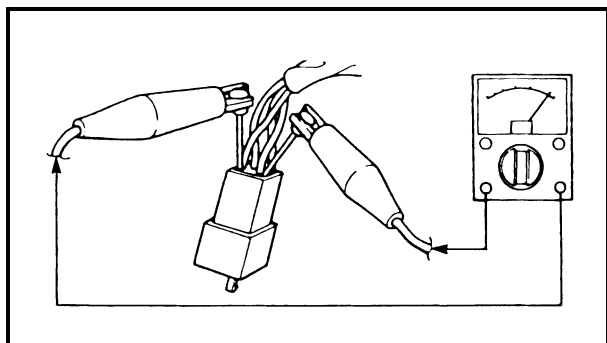
If the pin ① on the terminal is flattened, bend it up.

4. Connect:

- lead
- coupler
- connector

TIP:

Make sure all connections are tight.



5. Check:

- continuity (with the pocket tester)



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

TIP:

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

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.

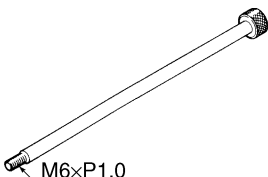
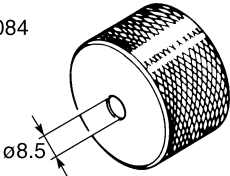
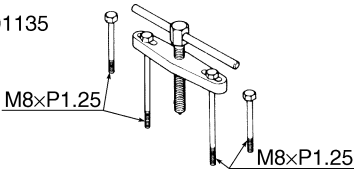
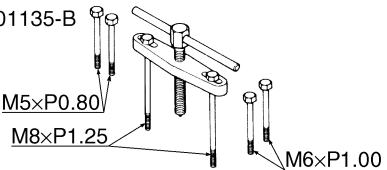
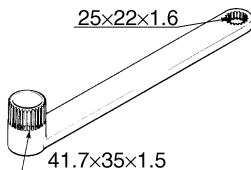
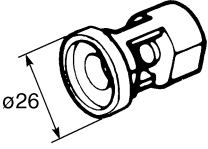
When placing an order, refer to the list provided below to avoid any mistakes.

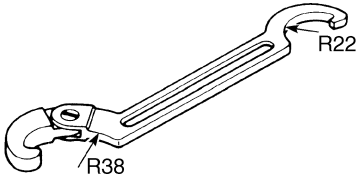
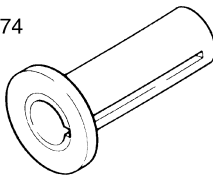
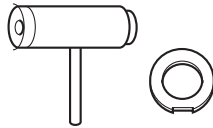
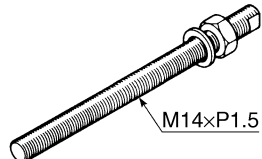
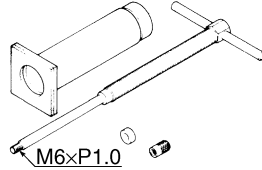
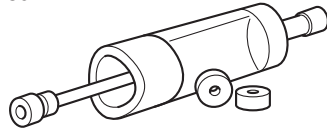
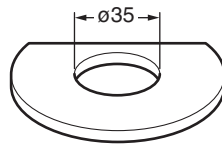
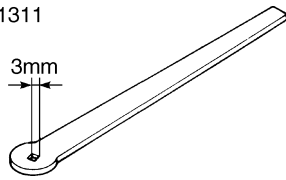
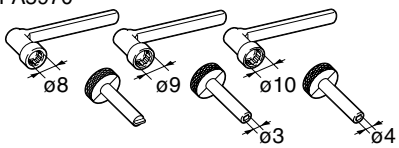
For US and CDN

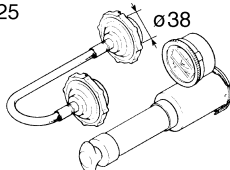
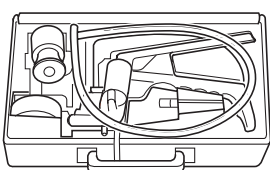
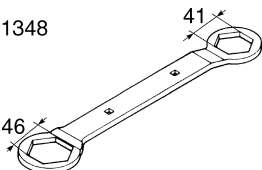
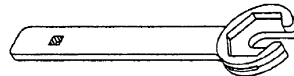
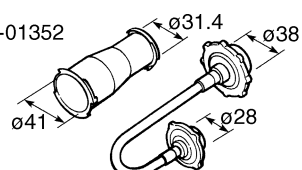
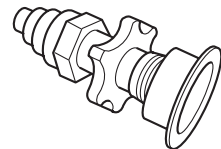
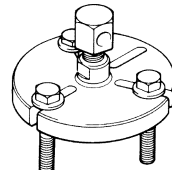
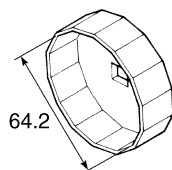
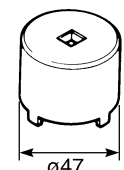
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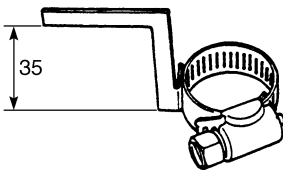
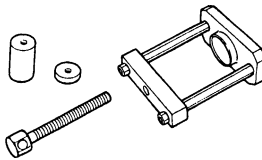
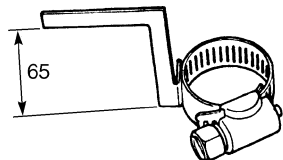
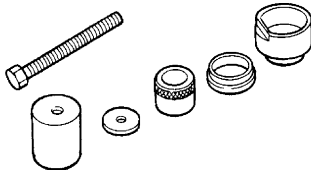
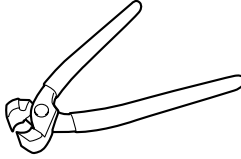
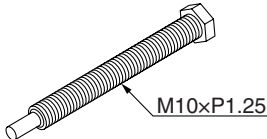
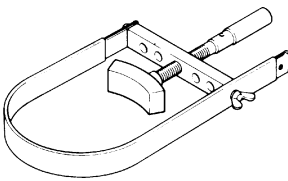
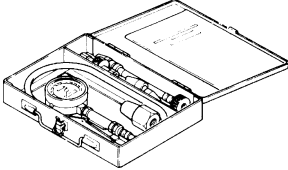
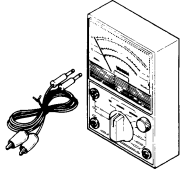
Except for US and CDN

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.	

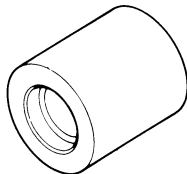
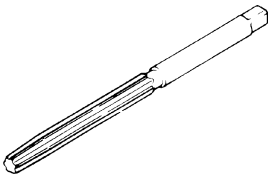
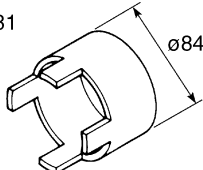
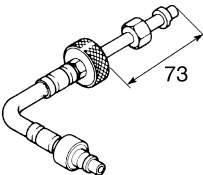
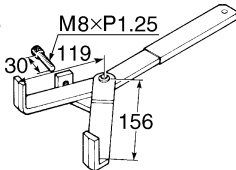
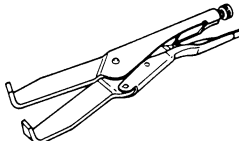
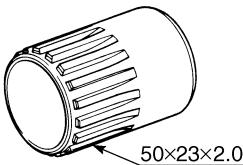
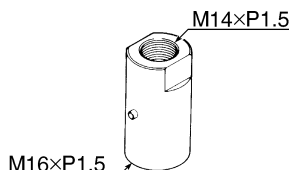
Tool No.	Tool name/How to use	Illustration
90890-01268 YU-01268	Ring nut wrench Spanner wrench This tool is used to loosen or tighten the front and rear shock absorber locknuts.	
90890-01274 YU-90058	Crankshaft installer pot This tool is used to install the crankshaft.	90890-01274 
		YU-90058/YU-90059 
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-A5970	Tappet adjusting tool Six piece tappet set This tool is necessary for adjusting the valve clearance.	90890-01311 
		YM-A5970 

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 remove and install the middle driven shaft bearing retainer.	

Tool No.	Tool name/How to use	Illustration
90890-01467 YM-01467	<p>Gear lash measurement tool</p> <p>This tool is used to measure the gear lash.</p>	
90890-01474 YM-01474	<p>Ball joint remover</p> <p>These tools are used to remove or install the ball joints.</p>	
90890-01475 YM-01475	<p>Gear lash measurement tool Middle drive gear lash tool</p> <p>This tool is used to measure the gear lash.</p>	
90890-01477 YM-01477	<p>Ball joint remover adapter set</p> <p>These tools are used to remove or install the ball joints.</p>	
90890-01526 YM-01526	<p>Boot band installing tool</p> <p>This tool is used to remove or install the boot band.</p>	
90890-01527 YM-01527	<p>Ring gear fix bolt (M10)</p> <p>This tool is used to hold the ring gear.</p>	
90890-01701 YS-01880-A	<p>Sheave holder Primary clutch holder</p> <p>This tool is needed to hold the primary sheave when removing or installing the sheave nuts.</p>	
90890-03081 YU-33223	<p>Compression gauge Engine compression tester</p> <p>This tool is needed to measure engine compression.</p>	
90890-03112 YU-03112-C	<p>Pocket tester Analog pocket tester</p> <p>This instrument is needed for checking the electrical systems.</p>	



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.	
90890-03174 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.	
90890-03180 YU-26900-9	Thickness gauge Feeler gauge set This tool is used to measure the valve clearance.	
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.	
90890-04062 YM-04062	Universal joint holder This tool is needed when removing or installing the universal joint yoke nut.	90890-04062
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.	

Tool No.	Tool name/How to use	Illustration
90890-04065 YM-04065-A	Valve guide installer (ø6) Valve guide installer (6.0 mm) This tool is needed to install the valve guides.	
90890-04066 YM-04066	Valve guide reamer (ø6) Valve guide reamer (6.0 mm) This tool is needed to rebores 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.	



Tool No.	Tool name/How to use	Illustration
90890-04132 YM-33221-A	Mechanical seal installer Water pump seal installer This tool is used to install the water pump seal.	
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

*1 For models equipped with panel wheels and oil damper shock absorbers

*2 For models equipped with cast wheels and oil damper shock absorbers

*3 For models equipped with cast wheels and gas-oil damper shock absorbers

*4 For models equipped with cast wheels, gas-oil damper shock absorbers, and overfenders

Item	Standard
Model code	5B41/5B45/5B48 *1 5B49 *2 5B4B *3 5B4E *4
Dimensions	
Overall length	2,885 mm (113.6 in)
Overall width	1,385 mm (54.5 in) *1, *2, *3 1,516 mm (59.7 in) *4
Overall height	1,853 mm (73.0 in) *1, *2 1,901 mm (74.8 in) *3 1,865 mm (73.4 in) *4
Seat height	818 mm (32.2 in)
Wheelbase	1,910 mm (75.2 in)
Minimum ground clearance	280 mm (11.0 in)
Minimum turning radius	3,900 mm (154 in)
Basic weight	
With oil and fuel	540.0 kg (1,190 lb) *1, *2 548.0 kg (1,208 lb) *3, *4
Engine	
Engine type	Liquid-cooled 4-stroke, SOHC
Cylinder arrangement	Forward-inclined single cylinder
Displacement	686.0 cm ³
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 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	
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)
Total amount	3.00 L (2.64 Imp qt, 3.17 US qt)
Final gear oil	
Periodic oil change	0.25 L (0.22 Imp qt, 0.26 US qt)
Total amount	0.28 L (0.25 Imp qt, 0.30 US qt)
Differential gear case oil	
Periodic oil change	0.18 L (0.16 Imp qt, 0.19 US qt)
Total amount	0.20 L (0.18 Imp qt, 0.21 US qt)
Radiator capacity (including all routes)	2.35 L (2.07 Imp qt, 2.48 US qt)
Air filter	Wet type element
Fuel	
Type	Unleaded gasoline only
Fuel tank capacity	29.3 L (6.45 Imp gal, 7.74 US gal)
Fuel injector	
Type/quantity	E252019/1
Manufacturer	NIPPON INJECTOR
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 × 17/12 × 33/9 (10.142)
Transmission type	V-belt automatic
Operation	Right hand operation
Single speed automatic	2.380 ~ 0.783 : 1
Sub transmission ratio	low 31/16 (1.938)
	high 31/21 (1.476)
Reverse gear	23/14 × 28/23 (2.000)
Chassis	
Frame type	Steel tube frame
Caster angle	5.0°
Camber angle	0°
Kingpin angle	12.0°
Kingpin offset	0 mm (0 in)
Trail	26.0 mm (1.02 in)
Tread (STD)	front 1,115.0 mm (43.90 in)
Tread (STD)	rear 1,105.0 mm (43.50 in)
Toe-in (with tires touching the ground)	15.0 ~ 25.0 mm (0.59 ~ 0.98 in)



Item		Standard
Tire		
Type	front	Tubeless
	rear	Tubeless
Size	front	25 × 8.00-12NHS
	rear	25 × 10.00-12NHS
Manufacturer/model	front	MAXXIS/M951Y
	rear	MAXXIS/M952Y
Tire pressure (cold tire)		
Maximum load*		367.0 kg (809 lb) *1, *2 359.0 kg (791 lb) *3, *4
Off-road riding	front	63 ~ 77 kPa (0.63 ~ 0.77 kg/cm ² , 9 ~ 11 psi)
	rear	91 ~ 105 kPa (0.91 ~ 1.05 kg/cm ² , 13 ~ 15 psi)
*Load is total weight of cargo, rider, passenger, accessories, and tongue		
Brake		
Front brake	type	Dual disc brake
	operation	Foot operation
Rear brake	type	Dual disc brake
	operation	Foot operation
Parking brake	type	Single disc brake
	operation	Right hand operation
Suspension		
Front suspension		Double wishbone
Rear suspension		Double wishbone
Shock absorber		
Front shock absorber		Coil spring/oil damper *1, *2 Coil spring/gas-oil damper *3, *4
Rear shock absorber		Coil spring/oil damper *1, *2 Coil spring/gas-oil damper *3, *4
Wheel travel		
Front wheel travel		180 mm (7.1 in)
Rear wheel travel		180 mm (7.1 in)
Electrical system		
Ignition system		Transistorized coil ignition (digital)
Charging system		AC magneto
Battery		
Model		U1L-11
Battery capacity		12 V 28.0 Ah
Manufacturer		GS YUASA
Bulb type		
		Krypton bulb

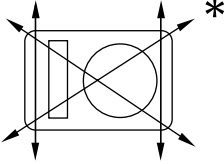
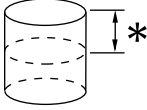
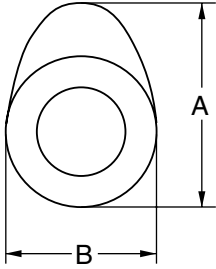
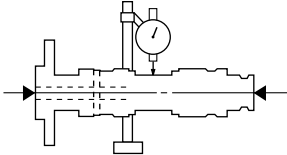


Item	Standard
Bulb voltage/wattage × quantity	
Headlight	12 V 30.0 W/30.0 W × 2
Tail/brake light	12 V 5.0/21.0 W × 2
Indicator light	
Neutral indicator light	LED
Reverse indicator light	LED
Coolant temperature warning light	LED
Engine trouble warning light	LED
Park indicator light	LED
On-command four-wheel drive/differential gear lock indicator	LCD
High-range indicator light	LED
Low-range indicator light	LED
Differential gear lock indicator light	LED

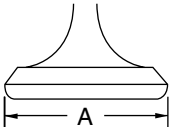
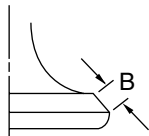
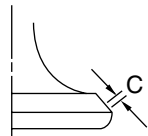
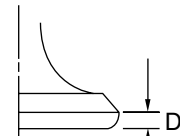


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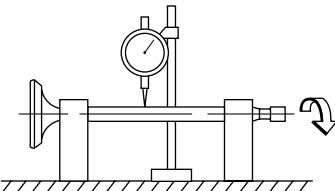
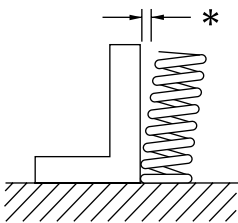
ENGINE SPECIFICATIONS

Item	Standard	Limit
Cylinder head Maximum warpage * 	----	0.03 mm (0.0012 in)
Cylinder Bore Measuring point *  Maximum taper Out of round	102.000 ~ 102.010 mm (4.0157 ~ 4.0161 in) 50.0 mm (1.97 in)	102.080 mm (4.0189 in) ---- 0.05 mm (0.002 in) 0.05 mm (0.002 in)
Camshaft Drive system Camshaft lobe dimensions  Intake measurement “A” “B” Exhaust measurement “A” “B” Maximum camshaft runout 	Chain drive 42.481 ~ 42.581 mm (1.6725 ~ 1.6764 in) 36.950 ~ 37.050 mm (1.4547 ~ 1.4587 in) 43.129 ~ 43.229 mm (1.6980 ~ 1.7019 in) 36.982 ~ 37.082 mm (1.4560 ~ 1.4599 in) ----	---- 42.381 mm (1.6685 in) 36.850 mm (1.4508 in) 43.029 mm (1.6941 in) 36.882 mm (1.4520 in) 0.015 mm (0.0006 in)

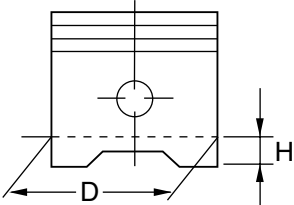
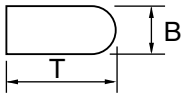
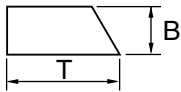


Item	Standard	Limit
Timing chain		
Model/number of links	98XRH2010/126	----
Tensioning system	Automatic	----
Rocker arm/rocker arm shaft		
Rocker arm inside diameter	12.000 ~ 12.018 mm (0.4724 ~ 0.4731 in)	----
Shaft outside diameter	11.981 ~ 11.991 mm (0.4717 ~ 0.4721 in)	----
Rocker-arm-to-rocker-arm-shaft 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)

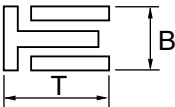
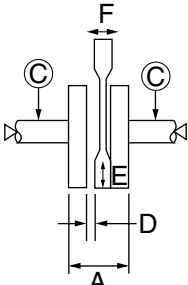


Item	Standard	Limit
Valve-stem-to-valve-guide clearance		
Intake	0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in)	0.080 mm (0.0031 in)
Exhaust	0.025 ~ 0.052 mm (0.0010 ~ 0.0020 in)	0.100 mm (0.0039 in)
Valve stem runout	----	0.040 mm (0.0016 in)
		
Valve spring		
Free length		
Intake	40.38 mm (1.59 in)	38.36 mm (1.51 in)
Exhaust	40.38 mm (1.59 in)	38.36 mm (1.51 in)
Installed length (valve closed)		
Intake	35.00 mm (1.38 in)	----
Exhaust	35.00 mm (1.38 in)	----
Compressed spring force (installed)		
Intake	171 ~ 197 N (17.44 ~ 20.09 kgf, 38.44 ~ 44.29 lb)	----
Exhaust	171 ~ 197 N (17.44 ~ 20.09 kgf, 38.44 ~ 44.29 lb)	----
Spring tilt *		
		
Intake	----	2.5°/1.80 mm (2.5°/0.071 in)
Exhaust	----	2.5°/1.80 mm (2.5°/0.071 in)
Winding direction (top view)		
Intake	Clockwise	----
Exhaust	Clockwise	----



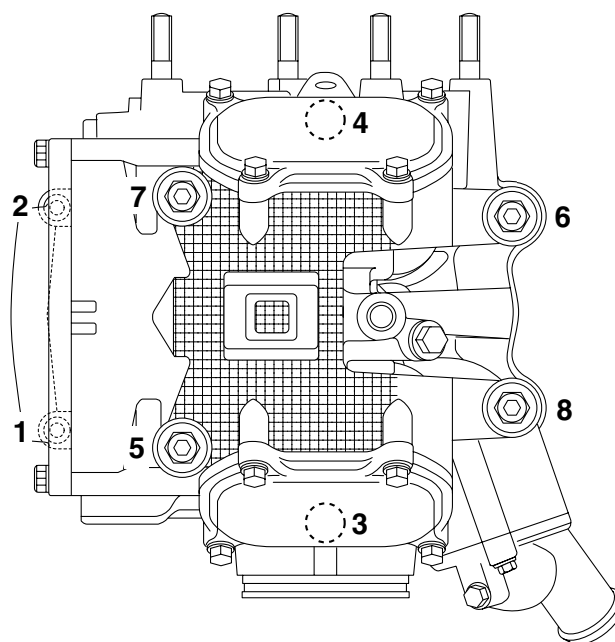
Item	Standard	Limit
Piston		
Piston-to-cylinder clearance	0.030 ~ 0.055 mm (0.0012 ~ 0.0022 in)	0.13 mm (0.0051 in)
		
Diameter "D"	101.955 ~ 101.970 mm (4.0140 ~ 4.0146 in)	----
Height "H"	10.0 mm (0.39 in)	----
Offset	0.50 mm (0.0197 in)	----
Offset direction	Intake side	----
Piston pin bore inside 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) End gap (installed) Ring side clearance	 $2.50 \times 2.80 \text{ mm (} 0.10 \times 0.11 \text{ in)}$ $0.20 \sim 0.70 \text{ mm (} 0.008 \sim 0.028 \text{ in)}$ $0.060 \sim 0.150 \text{ mm (} 0.0024 \sim 0.0059 \text{ in)}$	 ---- ---- ----
Crankshaft  Crank width "A" Maximum runout "C" Big end side clearance "D" Big end radial clearance "E" Small end free play "F"	 $74.95 \sim 75.00 \text{ mm (} 2.951 \sim 2.953 \text{ in)}$ ---- $0.350 \sim 0.650 \text{ mm (} 0.0138 \sim 0.0256 \text{ in)}$ $0.010 \sim 0.025 \text{ mm (} 0.0004 \sim 0.0010 \text{ in)}$ $0.16 \sim 0.40 \text{ mm (} 0.0063 \sim 0.0157 \text{ in)}$	 ---- $0.030 \text{ mm (} 0.0012 \text{ in)}$ $1.0 \text{ mm (} 0.04 \text{ in)}$ ---- ----
Balancer Balancer drive method	Gear	----
Automatic centrifugal clutch Clutch shoe thickness Clutch-in revolution Clutch-stall revolution	 $1.5 \text{ mm (} 0.06 \text{ in)}$ $1,850 \sim 2,250 \text{ r/min}$ $3,500 \sim 4,100 \text{ r/min}$	 $1.0 \text{ mm (} 0.04 \text{ in)}$ ---- ----
V-belt V-belt width	$33.3 \text{ mm (} 1.31 \text{ in)}$	$30.0 \text{ mm (} 1.18 \text{ in)}$
Transmission Maximum main axle runout Maximum drive axle runout	 ---- ----	 $0.06 \text{ mm (} 0.0024 \text{ in)}$ $0.06 \text{ mm (} 0.0024 \text{ in)}$
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	----



Item	Standard	Limit
Throttle body		
Model/manufacturer × quantity	41EHS/MIKUNI × 1	----
Engine idle speed	1,550 ~ 1,650 r/min	----
Intake vacuum	40.0 kPa (300 mmHg, 11.8 inHg)	----
Water temperature	80 ~ 90 °C	----
Oil temperature	60 ~ 70 °C	----
Fuel pump		
Pump type	Electrical	----
Model/manufacturer	5B4/AISAN	----
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	400.0 mm (15.75 in)	----
Height	266.0 mm (10.47 in)	----
Depth	26.0 mm (1.02 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	0.32 L (0.28 Imp qt, 0.34 US qt)	----
From low to full level	0.21 L (0.18 Imp qt, 0.22 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 (0.0039 ~ 0.0118 in)	----
Final gear backlash	0.10 ~ 0.30 mm (0.0039 ~ 0.0118 in)	----
Differential gear backlash	0.05 ~ 0.25 mm (0.0020 ~ 0.0098 in)	----

**Cylinder head tightening sequence**



EBS01003

CHASSIS SPECIFICATIONS

*1 For models equipped with panel wheels and oil damper shock absorbers

*2 For models equipped with cast wheels and oil damper shock absorbers

*3 For models equipped with cast wheels and gas-oil damper shock absorbers

*4 For models equipped with cast wheels, gas-oil damper shock absorbers, and overfenders

Item	Standard	Limit
Steering		
Steering bearing type	Ball and race bearing	----
Front suspension		
Shock absorber stroke	108.0 mm (4.25 in) *1, *2 110.0 mm (4.33 in) *3, *4	---- ----
Spring free length	313.0 mm (12.32 in) *1, *2 336.6 mm (13.25 in) *3, *4	---- ----
Installed length	247.9 mm (9.76 in) *1, *2 260.5 mm (10.26 in) *3, *4	---- ----
Spring rate (K1)	19.40 N/mm (1.98 kgf/mm, 110.77 lb/in)	----
Spring stroke (K1)	0.0 ~ 108.0 mm (0.00 ~ 4.25 in) *1, *2 0.0 ~ 110.0 mm (0.00 ~ 4.33 in) *3, *4	---- ----
Optional spring available	No	----
Rear suspension		
Rear shock absorber assembly	81.0 mm (3.19 in) *1, *2 85.0 mm (3.35 in) *3, *4	---- ----
Spring free length	328.0 mm (12.91 in) *1, *2 286.3 mm (11.27 in) *3, *4	---- ----
Installed length	273.2 mm (10.76 in) *1, *2 235.0 mm (9.25 in) *3, *4	---- ----
Spring rate (K1)	44.10 N/mm (4.50 kgf/mm, 251.81 lb/in)	----
Spring rate (K2)	117.70 N/mm (12.00 kgf/mm, 672.07 lb/in) *1, *2	----
Spring stroke (K1)	0.0 ~ 60.0 mm (0.00 ~ 2.36 in) *1, *2 0.0 ~ 85.0 mm (0.00 ~ 3.35 in) *3, *4	---- ----
Spring stroke (K2)	60.0 ~ 81.0 mm (2.36 ~ 3.19 in) *1, *2	----
Optional spring available	No	----
Front wheel		
Wheel type	Panel wheel *1 Cast wheel *2, *3, *4	---- ----
Rim size	12 × 6.0 AT	----
Rim material	Steel *1 Aluminum *2, *3, *4	---- ----
Max. radial wheel runout	----	2.0 mm (0.08 in)
Max. lateral wheel runout	----	2.0 mm (0.08 in)



Item	Standard	Limit
Rear wheel		
Wheel type	Panel wheel *1 Cast wheel *2, *3, *4	---- ----
Rim size	12 × 7.5 AT	----
Rim material	Steel *1 Aluminum *2, *3, *4	---- ----
Max. radial wheel runout	----	2.0 mm (0.08 in)
Max. lateral wheel runout	----	2.0 mm (0.08 in)
Front disc brake		
Type	Dual	----
Disc outside diameter × thickness	200.0 × 3.5 mm (7.87 × 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	5.2 mm (0.20 in)	1.5 mm (0.06 in)
Pad thickness outer	5.2 mm (0.20 in)	1.5 mm (0.06 in)
Master cylinder inside diameter	17.46 mm (0.69 in)	----
Caliper cylinder inside diameter	27.00 mm (1.06 in)	----
Recommended fluid	DOT 4	----
Rear disc brake		
Type	Dual	----
Disc outside diameter × thickness	184.6 × 3.5 mm (7.27 × 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	5.2 mm (0.20 in)	1.5 mm (0.06 in)
Pad thickness outer	5.2 mm (0.20 in)	1.5 mm (0.06 in)
Caliper cylinder inside diameter	25.40 mm (1.00 in)	----
Recommended fluid	DOT 4	----



Item	Standard	Limit
Parking brake		
Type	Disc	----
Disc outside diameter × thickness	165.0 × 3.5 mm (6.50 × 0.14 in)	----
Brake disc minimum thickness	3.0 mm (0.12 in)	----
Brake disc maximum deflection	0.1 mm (0.004 in)	----
Brake pad lining thickness-inner	3.2 mm (0.13 in)	1.0 mm (0.04 in)
Brake pad lining thickness-outer	3.2 mm (0.13 in)	1.0 mm (0.04 in)
Brake lever and brake pedal		
Accelerator pedal free play	0 mm (0 in)	----
Brake pedal free play	0 mm (0 in)	----
Parking brake cable free play	The maximum free play is equal to one click of the parking brake lever.	----



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)/ gray/black	----
ECU (engine control unit)		
Model/manufacturer	F8T83871/MITSUBISHI	----
Ignition coil		
Model/manufacturer	2JN/YAMAHA	----
Minimum ignition spark gap	6.0 mm (0.24 in)	----
Primary coil resistance	2.16 ~ 2.64 Ω at 20 °C (68 °F)	----
Secondary coil resistance	8.64 ~ 12.96 k Ω at 20 °C (68 °F)	----
Spark plug cap		
Material	Resin	----
Resistance	10.0 k Ω	----
AC magneto		
Model/manufacturer	F004T39372/MITSUBISHI	----
Standard output	14.0 V 33.5 A at 5,000 r/min	----
Stator coil resistance/color	0.099 ~ 0.121 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 (depth)	0.70 mm (0.03 in)	----



Item	Standard	Limit
Starter relay		
Model/manufacture	RC19-080A/MITSUBA	----
Amperage rating	180.0 A	----
Coil winding resistance	4.18 ~ 4.62 Ω at 20 °C (68 °F)	----
Fuel sender		
Sender unit resistance (full)	19.00 ~ 21.00 Ω	----
Sender unit resistance (empty)	137.00 ~ 143.00 Ω	----
Fuel injection system relay		
Model/manufacture	ACM33211/MATSUSHITA	----
Coil resistance	96.0 Ω	----
Radiator fan motor relay		
Model/manufacture	ACM33211/MATSUSHITA	----
Coil resistance	96.0 Ω	----
Load control relay		
Model/manufacture	ACM33211/MATSUSHITA	----
Coil resistance	96.0 Ω	----
Four-wheel-drive motor relay 3		
Model/manufacture	ACM33211/MATSUSHITA	----
Coil resistance	96.0 Ω	----
Headlight relay		
Model/manufacture	G8HN-1C4T-DJ/OMRON	----
Coil resistance	105.0 Ω	----
Four-wheel-drive motor relay 1		
Model/manufacture	G8HN-1C4T-DJ/OMRON	----
Coil resistance	105.0 Ω	----
Four-wheel-drive motor relay 2		
Model/manufacture	G8HN-1C4T-DJ/OMRON	----
Coil resistance	105.0 Ω	----
Circuit breaker		
Circuit breaker type	Fuse	----
Fuses		
Main fuse	40.0 A	----
Headlight fuse	15.0 A	----
Signaling system fuse	10.0 A	----
Ignition fuse	10.0 A	----
Auxiliary DC jack fuse	10.0 A	----
Fuel injection system fuse	10.0 A	----
Four-wheel-drive motor fuse	10.0 A	----
Backup fuse	10.0 A	----
Radiator fan motor fuse	25.0 A	----
Spare fuse	25.0 A	----
	15.0 A	----
	10.0 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	
Cylinder head	Bolt	M9	2	38	3.8	27	
Cylinder head	Bolt	M6	2	10	1.0	7.2	
Spark plug	—	M10	1	13	1.3	9.4	
Oil check bolt	Bolt	M8	1	10	1.0	7.2	
Cylinder	Bolt	M10	4	50	5.0	36	See TIP.
AC magneto rotor	Nut	M16	1	60	6.0	43	
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	
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	
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	3	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	
Oil pipe (dipstick)	Bolt	M6	1	10	1.0	7.2	
Oil delivery pipe 1	Union bolt	M14	2	35	3.5	25	
Oil delivery pipe 1	Union bolt	M10	1	20	2.0	14	
Oil delivery pipe 1	Bolt	M6	1	10	1.0	7.2	
Oil delivery pipe 2	Bolt	M6	2	10	1.0	7.2	
Oil delivery pipe 3	Bolt	M6	2	10	1.0	7.2	
Oil pump	Bolt	M6	3	10	1.0	7.2	
Oil pump driven gear	Nut	M10	1	22	2.2	16	
Timing chain guide	Bolt	M6	2	10	1.0	7.2	
V-belt cooling duct 1	Bolt	M6	2	7	0.7	5.1	
Air filter case	Bolt	M6	4	7	0.7	5.1	

TIGHTENING TORQUES

SPEC



Item	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m · kg	ft · lb	
Air intake duct	Bolt	M6	2	7	0.7	5.1	
Muffler	Bolt	M8	2	20	2.0	14	
Muffler bracket	Bolt	M8	4	30	3.0	22	
Exhaust pipe	Nut	M8	4	20	2.0	14	
Tailpipe	Bolt	M6	3	10	1.0	7.2	
Radiator inlet pipe holder	Bolt	M6	1	7	0.7	5.1	
Radiator outlet pipe holder	Bolt	M6	1	7	0.7	5.1	
Oil cooler inlet pipe 1/oil cooler outlet pipe 1 holder	Bolt	M6	1	7	0.7	5.1	
Oil cooler inlet pipe 2/oil cooler outlet pipe 2 holder	Bolt	M6	2	7	0.7	5.1	
Oil cooler inlet pipe 1/oil cooler outlet pipe 1 and oil cooler	Bolt	M17	2	21	2.1	15	
Oil cooler	Nut	M6	4	7	0.7	5.1	
Radiator	Bolt	M6	2	7	0.7	5.1	
Coolant reservoir	Bolt	M6	2	7	0.7	5.1	
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	
Water pump outlet pipe	Bolt	M6	1	10	1.0	7.2	
Water jacket joint	Bolt	M6	2	10	1.0	7.2	
Crankshaft end accessing screw	Bolt	M36	1	10	1.0	7.2	
Timing mark accessing screw	Bolt	M14	1	6	0.6	4.3	
Drive belt cover	Bolt	M6	12	10	1.0	7.2	
Drive belt case	Bolt	M6	8	10	1.0	7.2	
V-belt cooling duct 1 bracket	Bolt	M6	2	10	1.0	7.2	
Bearing housing (primary sheave assembly)	Bolt	M6	4	10	1.0	7.2	
Bearing retainer (bearing housing)	Bolt	M6	1	10	1.0	7.2	
AC magneto cover	Bolt	M6	11	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	Stake.
Middle drive pinion gear nut	Nut	M22	1	190	19.0	140	Stake.
Middle driven shaft bearing housing	Bolt	M8	4	32	3.2	23	
Middle drive shaft bearing retainer	Screw	M8	4	29	2.9	21	Stake.
Middle driven shaft bearing retainer	Nut	M55	1	80	8.0	58	Left-hand thread

TIGHTENING TORQUES

SPEC



Item	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m · kg	ft · lb	
Middle driven pinion gear bearing retainer	Nut	M60	1	130	13.0	94	Left-hand thread 
Universal joint yoke nut (middle gear side)	Nut	M16	1	150	15.0	110	
Middle driven pinion gear bearing housing	Bolt	M8	4	25	2.5	18	
Drive shaft coupling gear nut (middle gear side)	Nut	M16	1	190	19.0	140	
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 cover	Bolt	M6	4	10	1.0	7.2	
Shift lever 2 assembly	Bolt	M6	1	14	1.4	10	
Shift drum stopper	Bolt	M14	1	18	1.8	13	
Crankcase plug bolt	Bolt	M14	1	18	1.8	13	
Select lever unit	Bolt	M8	3	15	1.5	11	
Shift arm	Bolt	M6	1	14	1.4	10	
Shift rod locknut (select lever unit side)	Nut	M8	1	15	1.5	11	Left-hand thread
Shift rod locknut (shift arm side)	Nut	M8	1	15	1.5	11	
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	

TIP:

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	
Front skid plate and frame	M6	7	0.7	5.1	
Rear skid plate and frame	M6	7	0.7	5.1	
Seat support and frame	M8	16	1.6	11	
Seat support bracket and seat support	M10	32	3.2	23	
Heat protector and frame	M6	8	0.8	5.8	
Upper instrument panel and frame	M6	7	0.7	5.1	
Passenger seat and passenger handhold bracket	M6	8	0.8	5.8	
Passenger handhold strap and passenger handhold bracket	M6	7	0.7	5.1	
Fuel tank holder and frame	M8	30	3.0	22	
Passenger seat damper plate and frame	M8	16	1.6	11	
Side door bracket and side door	M6	7	0.7	5.1	
Frame and hinge	M8	23	2.3	17	
Frame and latch	M6	8	0.8	5.8	
Handle latch and side door	M5	5	0.5	3.6	
Fuel tank and fuel pump	M6	8	0.8	5.8	
Front bumper and frame	M12	59	5.9	43	
	M10	32	3.2	23	
Cargo bed release lever	M8	16	1.6	11	
	M6	7	0.7	5.1	
Gas spring assembly and cargo bed assembly	M8	16	1.6	11	
Gas spring assembly and frame	M8	16	1.6	11	
Gas spring assembly bracket and cargo bed assembly	M6	7	0.7	5.1	
Cargo hook and cargo bed	M6	7	0.7	5.1	
Tailgate cable and cargo bed	M6	7	0.7	5.1	
Tailgate cable and tailgate	M6	7	0.7	5.1	
Cargo bed panel and cargo bed assembly	M6	7	0.7	5.1	
Cargo bed latch and tailgate	M6	9	0.9	6.5	
Tail/brake light and cargo bed assembly	M6	7	0.7	5.1	
Side frame (enclosure) and frame	M10	65	6.5	47	
	M8	22	2.2	16	
Lower support frame (enclosure) and frame	M10	64	6.4	46	
Upper support frame (enclosure) and lower support frame (enclosure)	M8	22	2.2	16	
Support frame (enclosure) and side frame (enclosure)	M10	65	6.5	47	

TIGHTENING TORQUES

SPEC



Part to be tightened	Thread size	Tightening torque			Remarks
		Nm	m · kg	ft · lb	
Top frame (enclosure) and side frame (enclosure)	M10	65	6.5	47	  Stake.   
Headrest and upper support frame	M6	7	0.7	5.1	
Seat belt and frame	M10	59	5.9	43	
Seat belt and side frame (enclosure)	M10	59	5.9	43	
Buckle and lower support frame	M10	59	5.9	43	
Rectifier/regulator and frame	M6	7	0.7	5.1	
Engine ground lead and crankcase	M6	10	1.0	7.2	
Starter motor lead and starter motor	M5	5	0.5	3.6	
ECU (engine control unit) and electrical components tray	M6	7	0.7	5.1	
Ignition coil and frame	M6	7	0.7	5.1	
Steering assembly and steering joint	M8	22	2.2	16	
Steering shaft and steering joint	M8	22	2.2	16	
Steering assembly and frame	M10	48	4.8	35	
Steering shaft and frame	M8	21	2.1	15	
Steering wheel and steering shaft assembly	M12	35	3.5	25	
Tie-rod locknut	M12	40	4.0	29	
Front upper arm and frame	M10	45	4.5	32	
Front lower arm and frame	M10	45	4.5	32	
Front shock absorber and frame	M10	45	4.5	32	
Front shock absorber and front upper arm	M10	45	4.5	32	
Steering knuckle and tie-rod	M12	39	3.9	28	
Steering knuckle and front upper arm	M12	30	3.0	22	
Steering knuckle and front lower arm	M12	30	3.0	22	
Steering knuckle and brake disc guard	M6	7	0.7	5.1	
Front arm protector and front lower arm	M6	7	0.7	5.1	
Front wheel and front wheel hub	M10	55	5.5	40	
Front wheel hub and constant velocity joint	M20	350	35.0	250	
Front brake caliper and steering knuckle	M10	48	4.8	35	
Front brake disc and front wheel hub	M8	30	3.0	22	
Front brake hose union bolt	M10	27	2.7	19	
Front brake hose holder and steering knuckle	M6	7	0.7	5.1	
Front brake hose holder and front upper arm	M6	7	0.7	5.1	
Front brake pad holding bolt	M8	17	1.7	12	
Front brake caliper bleed screw	M6	5	0.5	3.6	
Rear upper arm and frame	M10	45	4.5	32	
Rear lower arm and frame	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 shock absorber and frame	M12	45	4.5	32	
Rear shock absorber and rear lower arm	M12	45	4.5	32	
Rear arm protector and rear lower arm	M6	7	0.7	5.1	
Stabilizer holder and frame	M8	42	4.2	30	

TIGHTENING TORQUES

SPEC



Part to be tightened	Thread size	Tightening torque			Remarks
		Nm	m · kg	ft · lb	
Stabilizer joint and stabilizer	M10	60	6.0	43	Stake.
Stabilizer joint and rear lower arm	M10	60	6.0	43	
Rear wheel and rear wheel hub	M10	55	5.5	40	
Rear wheel hub and constant velocity joint	M20	350	35.0	250	
Rear knuckle and brake disc guard	M6	7	0.7	5.1	
Rear knuckle and plate (for models equipped with cast wheels)	M6	7	0.7	5.1	
Rear brake caliper and rear knuckle	M10	48	4.8	35	
Brake pipe and brake master cylinder	M10	19	1.9	13	
Brake pipe and brake hose joint	M10	19	1.9	13	
Brake hose joint and frame	M6	7	0.7	5.1	
Brake master cylinder and pedal assembly	M8	16	1.6	11	
Pedal assembly and frame	M8	16	1.6	11	
Secondary brake master cylinder kit stopper bolt	M6	9	0.9	6.5	
Brake rod locknut	M8	17	1.7	12	
Rear brake disc and rear wheel hub	M8	30	3.0	22	
Rear brake pad holding bolt	M8	17	1.7	12	
Rear brake caliper bleed screw	M6	5	0.5	3.6	
Rear brake hose union bolt	M10	27	2.7	19	
Parking brake lever assembly and parking brake lever assembly bracket	M6	13	1.3	9.4	
Parking brake lever assembly bracket and frame	M10	32	3.2	23	
Parking brake cable holder and frame	M6	7	0.7	5.1	
Parking brake assembly and final drive gear assembly	M10	40	4.0	29	
Parking brake disc and final drive gear assembly	M6	10	1.0	7.2	
Parking brake pad holding bolt	M10	17	1.7	12	
Parking brake arm nut	M8	17	1.7	12	
Parking brake cable holder	M6	12	1.2	8.7	
Differential gear case assembly and frame	M10	55	5.5	40	
Differential gear case filler plug	M14	23	2.3	17	
Differential gear case drain plug	M10	10	1.0	7.2	
Universal joint yoke and differential drive pinion gear	M14	62	6.2	45	
Differential gear motor and differential gear case cover	M6	11	1.1	8.0	
Differential gear case cover and differential gear case	M8	24	2.4	17	
Final drive gear assembly and frame	M10	70	7.0	50	
Final gear case filler plug	M20	23	2.3	17	
Final gear case drain plug	M10	20	2.0	14	
Final drive pinion gear bearing housing and final gear case	M8	32	3.2	23	

TIGHTENING TORQUES

SPEC



Part to be tightened	Thread size	Tightening torque			Remarks
		Nm	m · kg	ft · lb	
Ring gear bearing housing and final gear case	M10	40	4.0	29	Left-hand thread. 
	M8	23	2.3	17	
Ring gear stopper nut	M8	16	1.6	11	
Bearing retainer and final gear pinion gear bearing housing	M65	170	17.0	125	
Drive shaft coupling gear and final drive pinion gear	M12	80	8.0	58	

HOW TO USE THE CONVERSION TABLE/ GENERAL TIGHTENING TORQUE SPECIFICATIONS



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	7.233	ft · lb
	m · kg	86.794	in · lb
	cm · kg	0.0723	ft · lb
	cm · kg	0.8679	in · lb
Weight	kg	2.205	lb
	g	0.03527	oz
Speed	km/hr	0.6214	mph
Distance	km	0.6214	mi
	m	3.281	ft
	m	1.094	yd
	cm	0.3937	in
	mm	0.03937	in
Volume/ Capacity	cc (cm ³)	0.03527	oz (IMP liq.)
	cc (cm ³)	0.06102	cu · in
	lt (liter)	0.8799	qt (IMP liq.)
	lt (liter)	0.2199	gal (IMP liq.)
Misc.	kg/mm	55.997	lb/in
	kg/cm ²	14.2234	psi (lb/in ²)
	Centigrade (°C)	9/5+32	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 points	Lubricant
Oil seal lips	
Bearings	
O-ring	
Cylinder head bolts	
Crankshaft pin	
Connecting rod big end thrust surface	
Crankshaft sprocket	
Inner race (crankshaft)	
Buffer boss (crankshaft)	
Crankshaft seal	
Piston pin	
Piston and ring grooves	
Valve stems (intake and exhaust)	
Valve stem ends (intake and exhaust)	
Rocker arm shafts	
Camshaft lobes	
Decompressor lever pin	
Decompressor lever spring	
Rocker arms (intake and exhaust)	
Oil pump shaft	
O-ring (oil filter cartridge)	
Water pump impeller shaft	
Dipstick mating surface	
Starter idler gear inner surface	
Starter idler gear shaft	
Starter wheel gear	
Torque limiter	
Clutch housing shaft end	
Clutch carrier assembly	
One-way clutch bearing	
Clutch dog and middle drive gear	
Reverse idle gear shaft	
Middle driven shaft splines	
Shift drum	
Shift forks and shift fork guide bar	
Ball (shift drum stopper)	
Shift lever 2 inner surface	

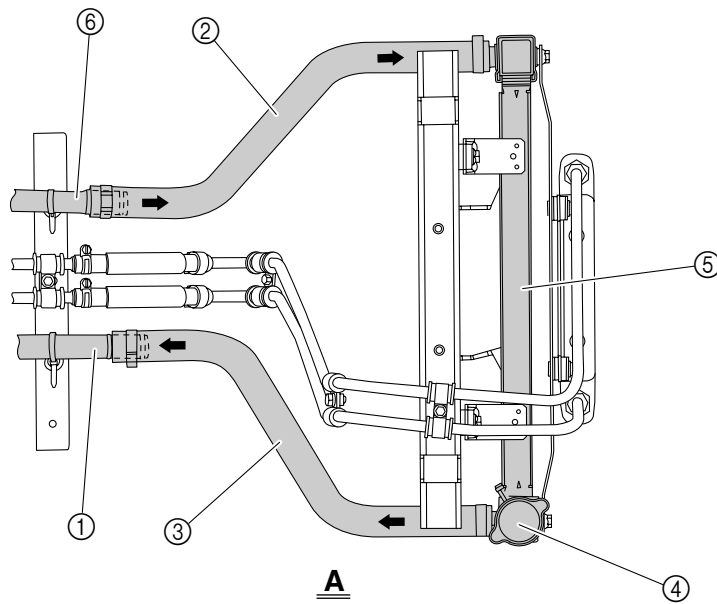
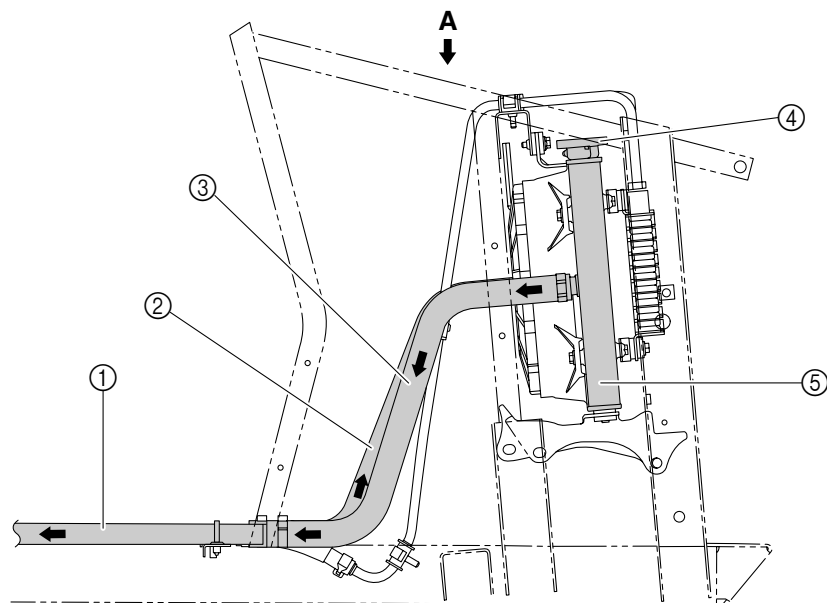
LUBRICATION POINTS AND LUBRICANT TYPES

SPEC

Lubrication points	Lubricant
Shift lever 1	
Shift lever 1 gear teeth and shift lever 2 gear teeth	
AC magneto lead grommet	Yamaha bond No.1215 (Three bond No.1215®)
Crankcase mating surface	Yamaha bond No.1215 (Three bond No.1215®)

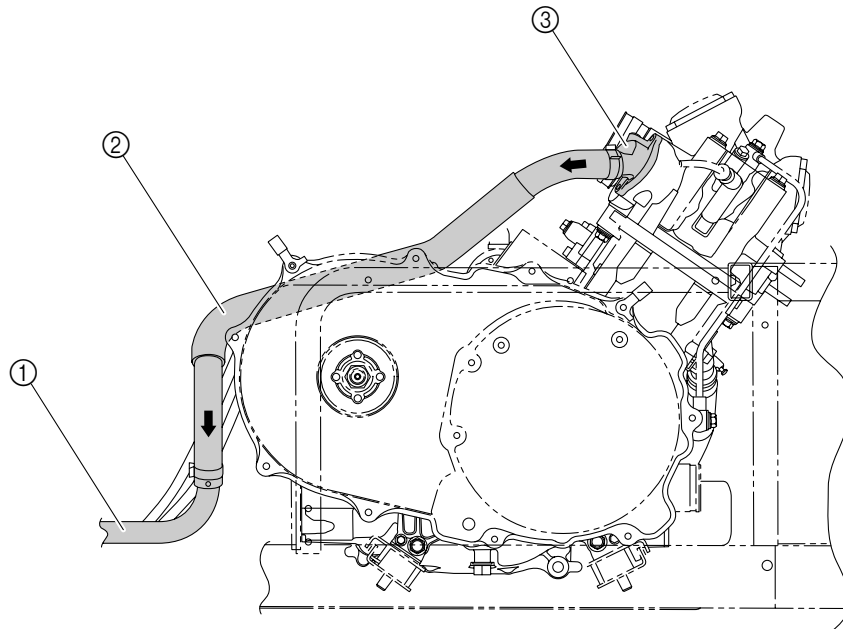
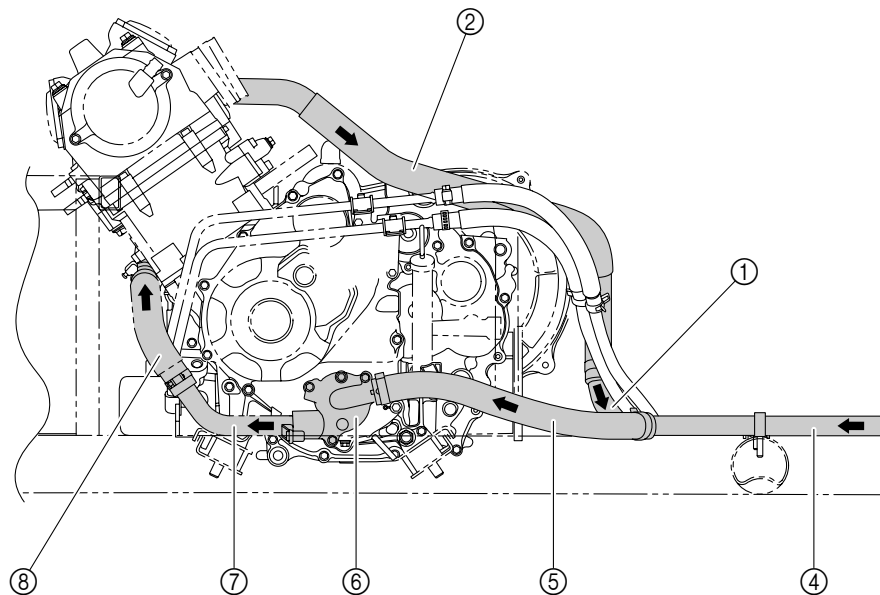
**COOLANT FLOW DIAGRAMS**

- ① Radiator outlet pipe
- ② Radiator inlet hose
- ③ Radiator outlet hose
- ④ Radiator cap
- ⑤ Radiator
- ⑥ Radiator inlet pipe





- ① Radiator inlet pipe
- ② Thermostat outlet hose
- ③ Thermostat
- ④ Radiator outlet pipe
- ⑤ Water pump inlet hose
- ⑥ Water pump
- ⑦ Water pump outlet pipe
- ⑧ Water pump outlet hose

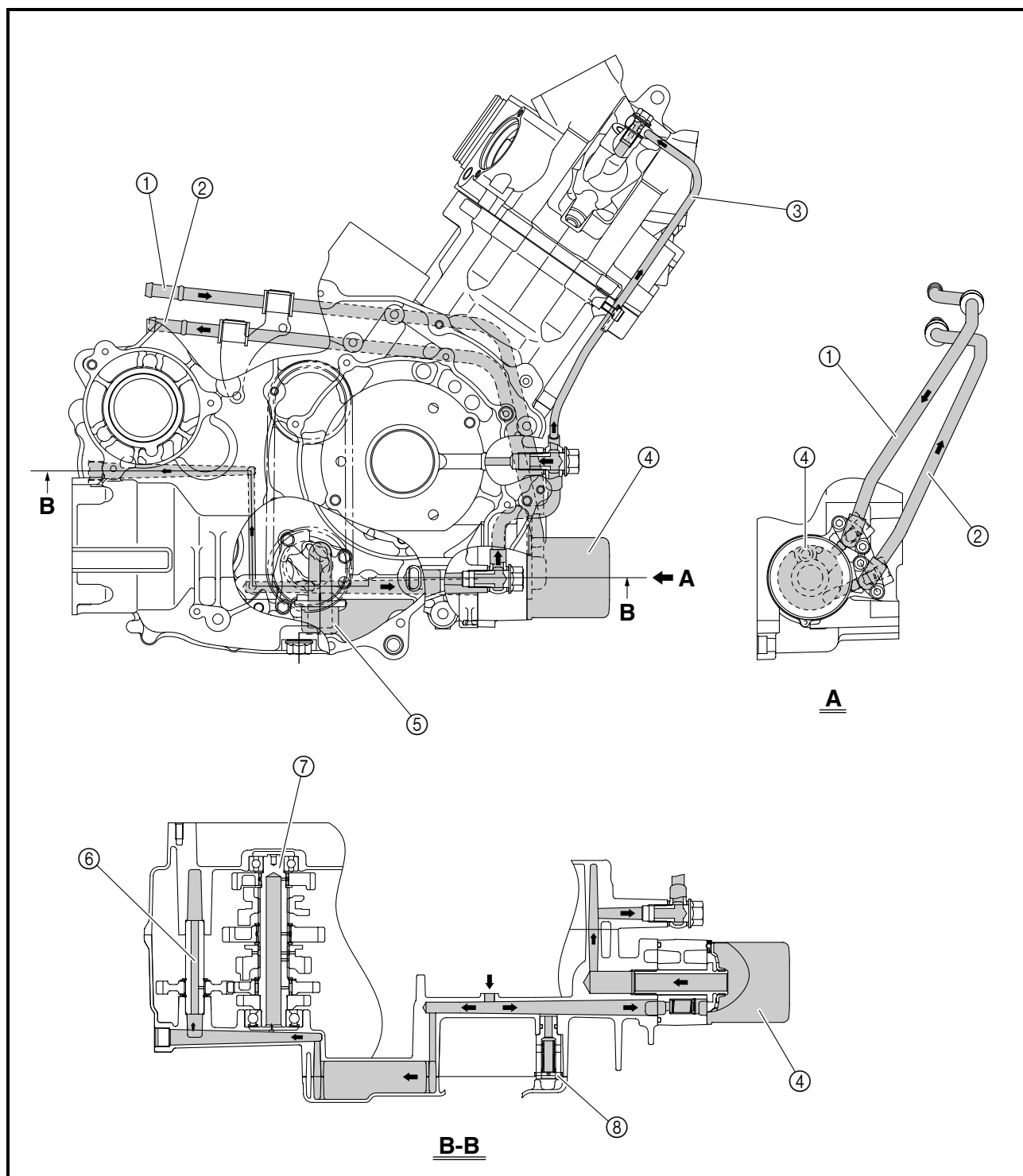




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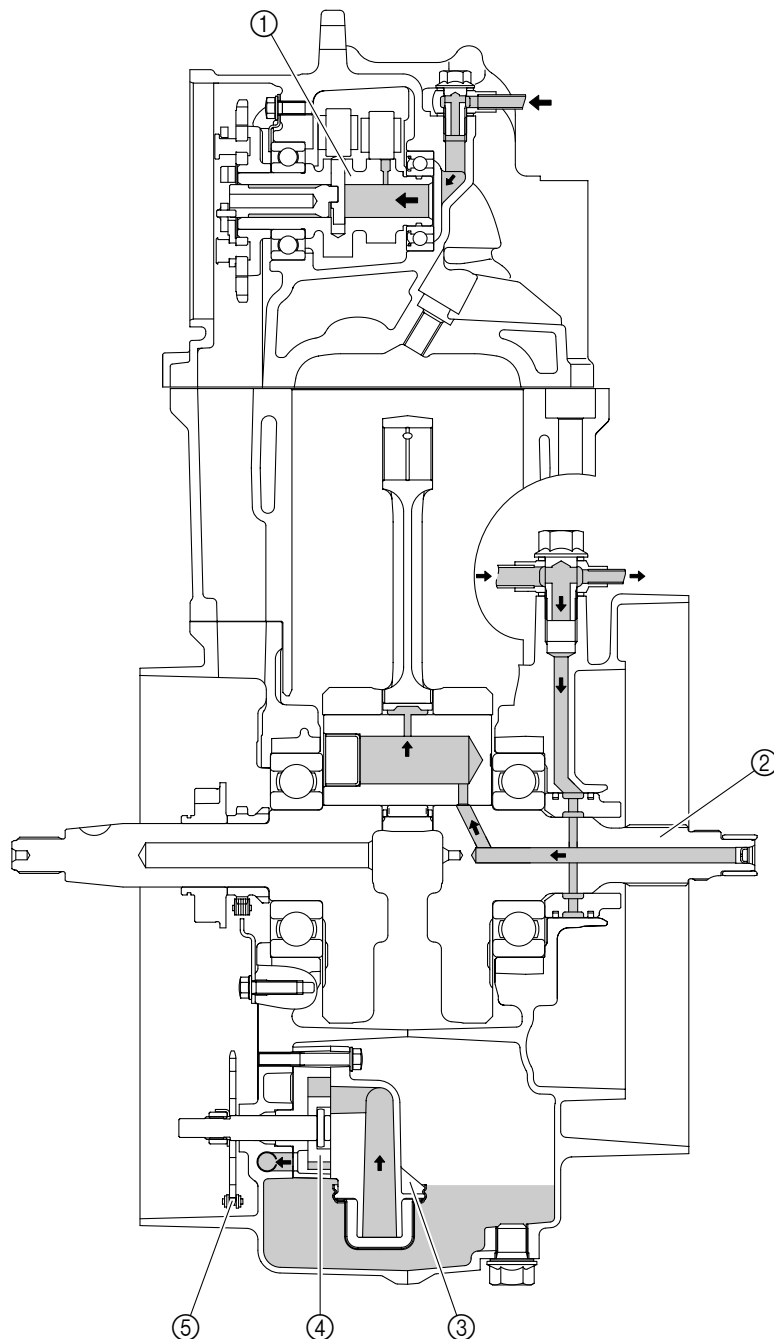
OIL FLOW DIAGRAMS

- ① Oil delivery pipe 2
- ② Oil delivery pipe 3
- ③ Oil delivery pipe 1
- ④ Oil filter cartridge
- ⑤ Oil strainer
- ⑥ Reverse idle gear shaft
- ⑦ Drive axle
- ⑧ Relief valve assembly



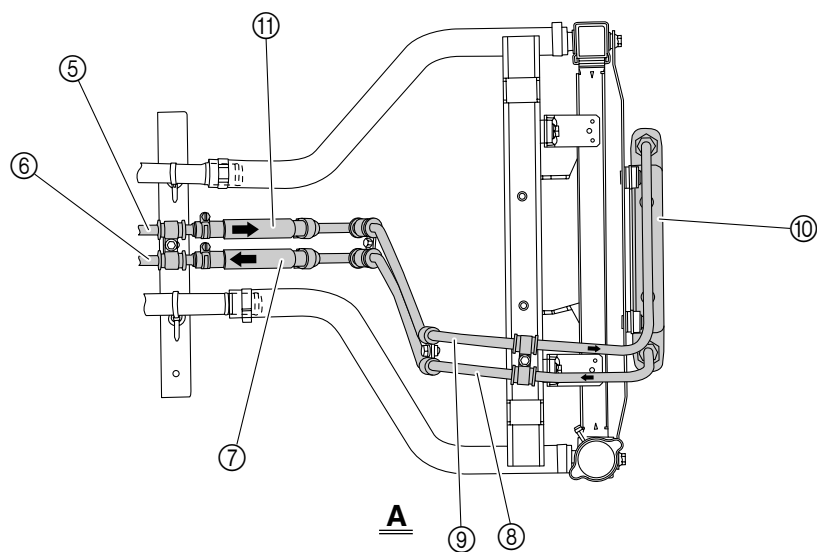
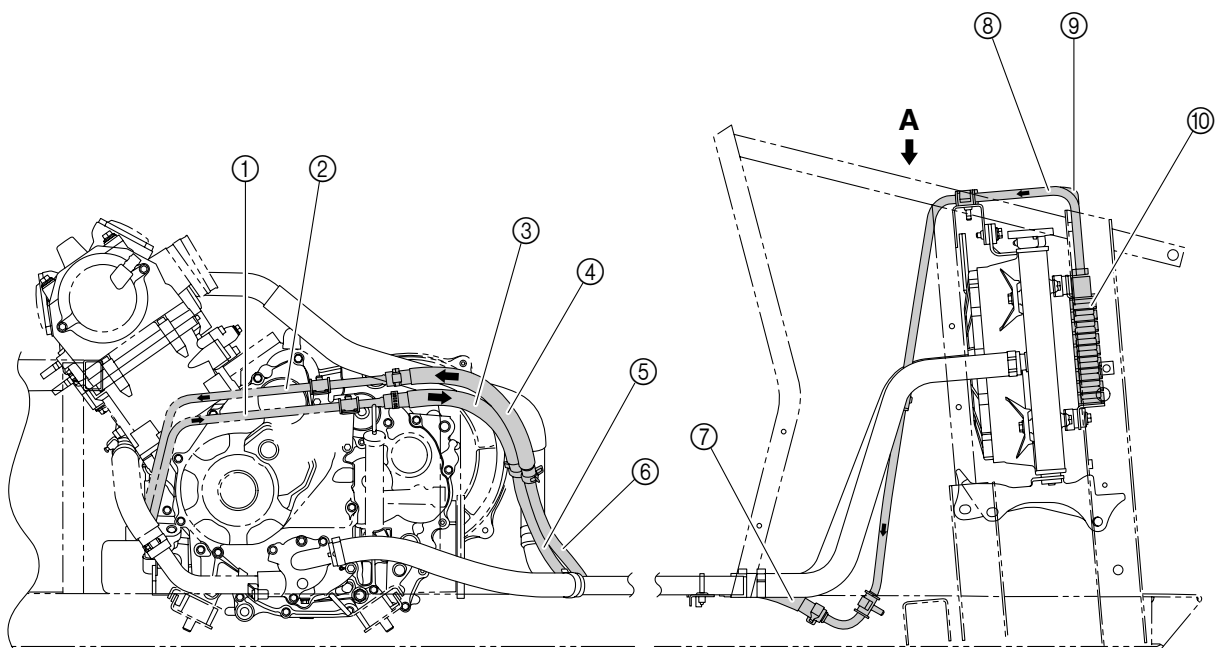


- ① Camshaft
- ② Crankshaft
- ③ Oil strainer
- ④ Oil pump rotor
- ⑤ Oil pump driven gear





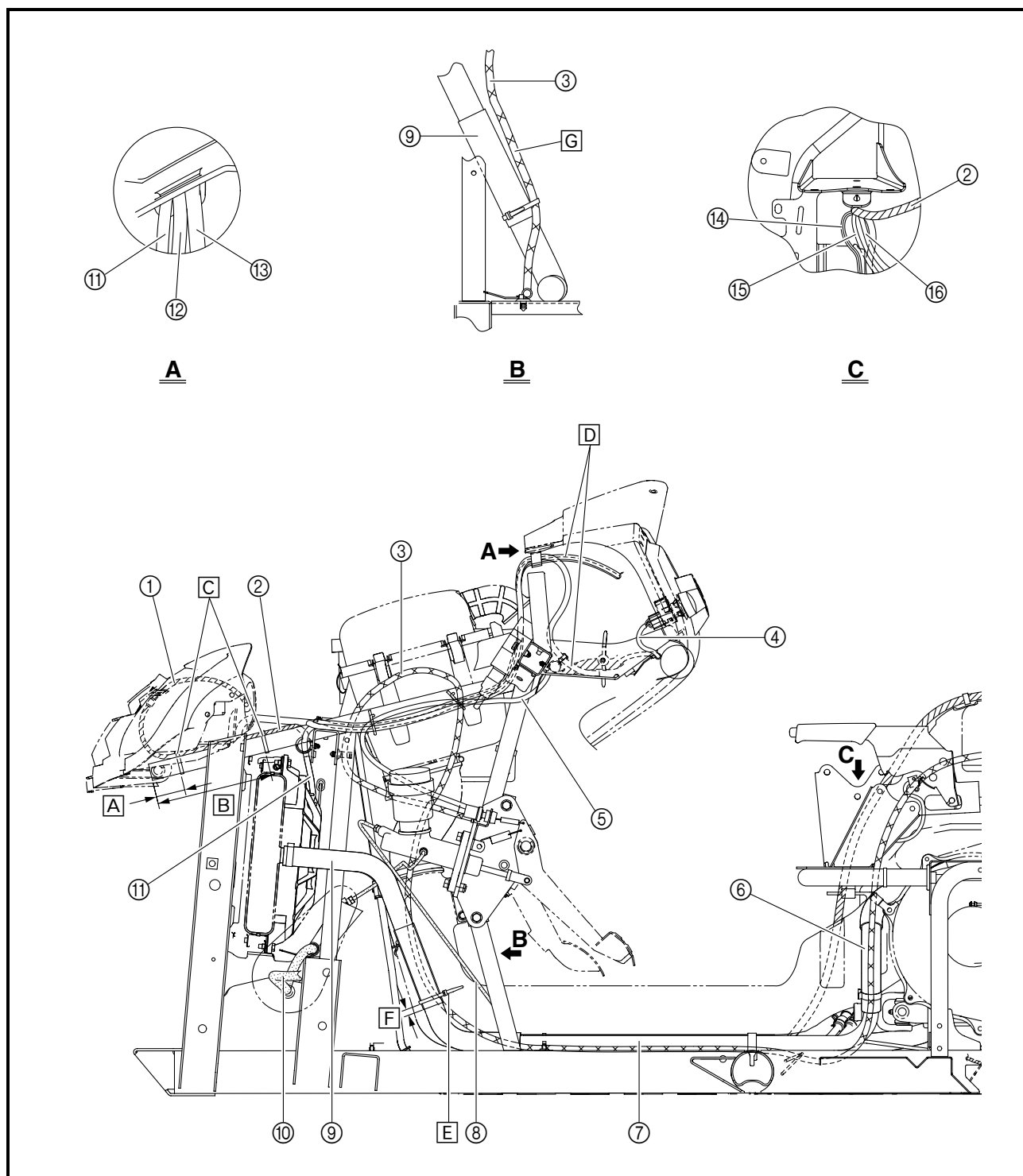
- ① Oil delivery pipe 3
- ② Oil delivery pipe 2
- ③ Oil outlet hose
- ④ Oil inlet hose
- ⑤ Oil cooler inlet pipe 2
- ⑥ Oil cooler outlet pipe 2
- ⑦ Oil cooler outlet hose
- ⑧ Oil cooler outlet pipe 1
- ⑨ Oil cooler inlet pipe 1
- ⑩ Oil cooler
- ⑪ Oil cooler inlet hose





CABLE ROUTING

- | | |
|---------------------------|--|
| ① Left headlight lead | ⑩ Front brake hose |
| ② Wire harness | ⑪ Radiator fan motor breather hose |
| ③ Throttle cable | ⑫ Differential gear case breather hose |
| ④ Light switch lead | ⑬ Coolant reservoir breather hose |
| ⑤ Brake light switch lead | ⑭ Parking brake switch lead |
| ⑥ Thermostat outlet hose | ⑮ Reverse switch lead |
| ⑦ Radiator inlet pipe | ⑯ Gear position switch lead |
| ⑧ Brake pipe | |
| ⑨ Radiator inlet hose | |





A 30 ~ 60 mm (1.18 ~ 2.36 in)

B 160 ~ 190 mm (6.30 ~ 7.48 in)

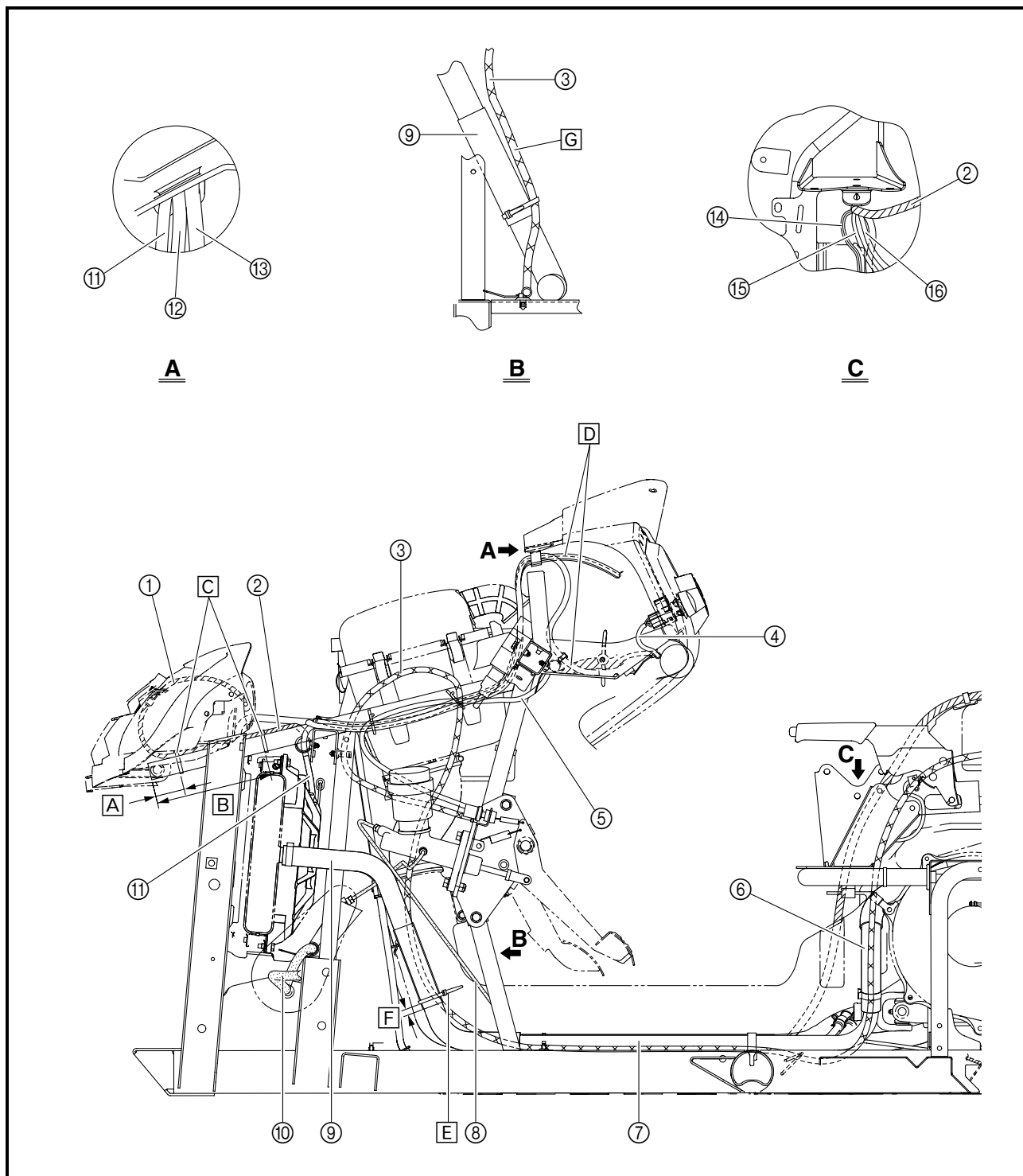
C Fasten the wire harness to the frame with the plastic bands.

D Pull the excess of the hoses through the guide in the upper instrument panel so that there is no slack in the hoses.

E Fasten the radiator inlet hose and throttle cable with the plastic band.

F 10 ~ 20 mm (0.39 ~ 0.79 in)

G Route the throttle cable to the inside of the radiator inlet hose.

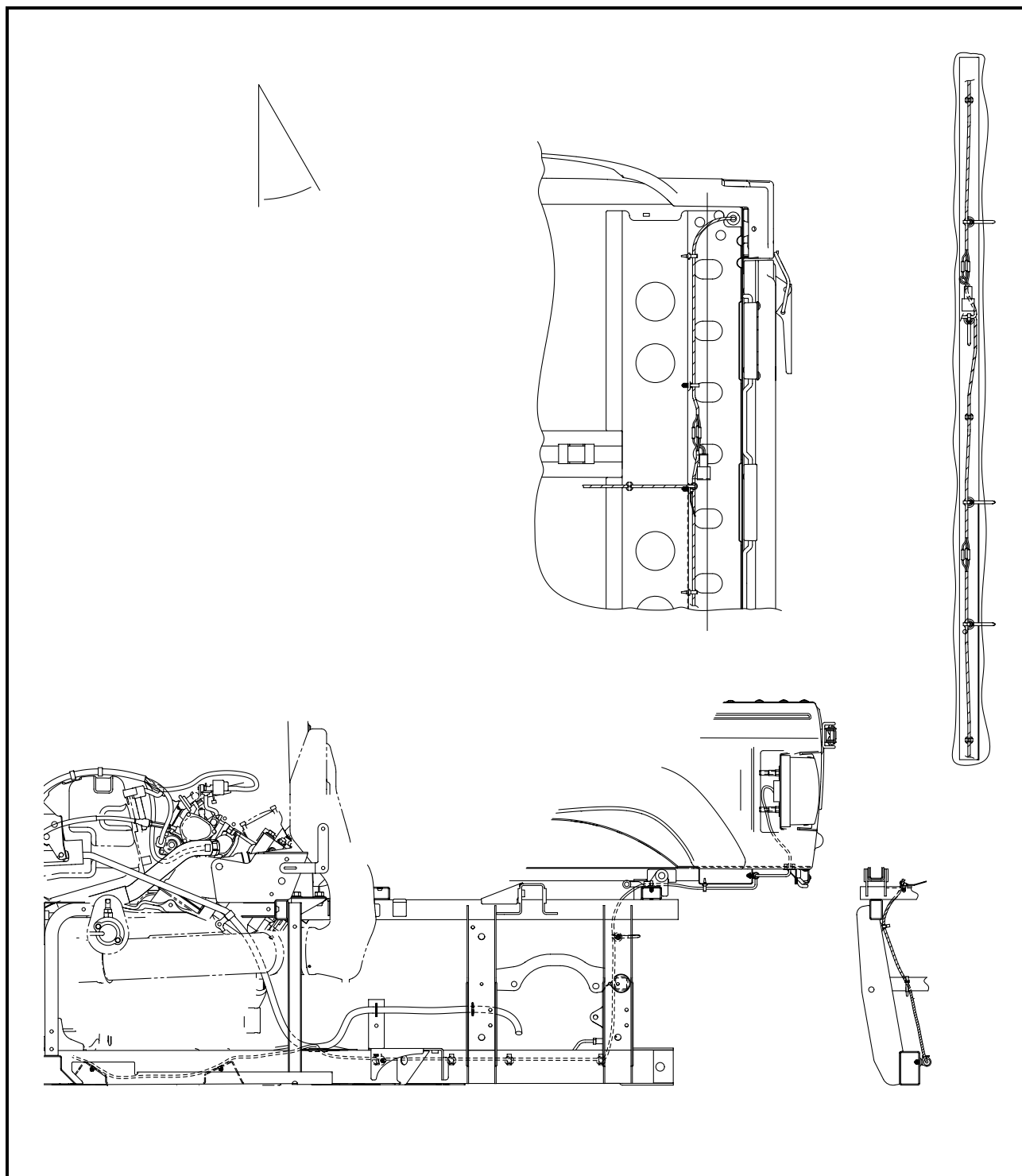




- ① Throttle cable
- ② Wire harness
- ③ Intake air temperature sensor lead
- ④ ISC (idle speed control) unit lead
- ⑤ Intake air pressure sensor lead
- ⑥ Tail/brake light lead
- ⑦ Parking brake cable
- ⑧ Thermostat outlet hose
- ⑨ Coolant temperature sensor lead
- ⑩ Reverse switch lead
- ⑪ Gear position switch lead

- ⑫ Brake pipe

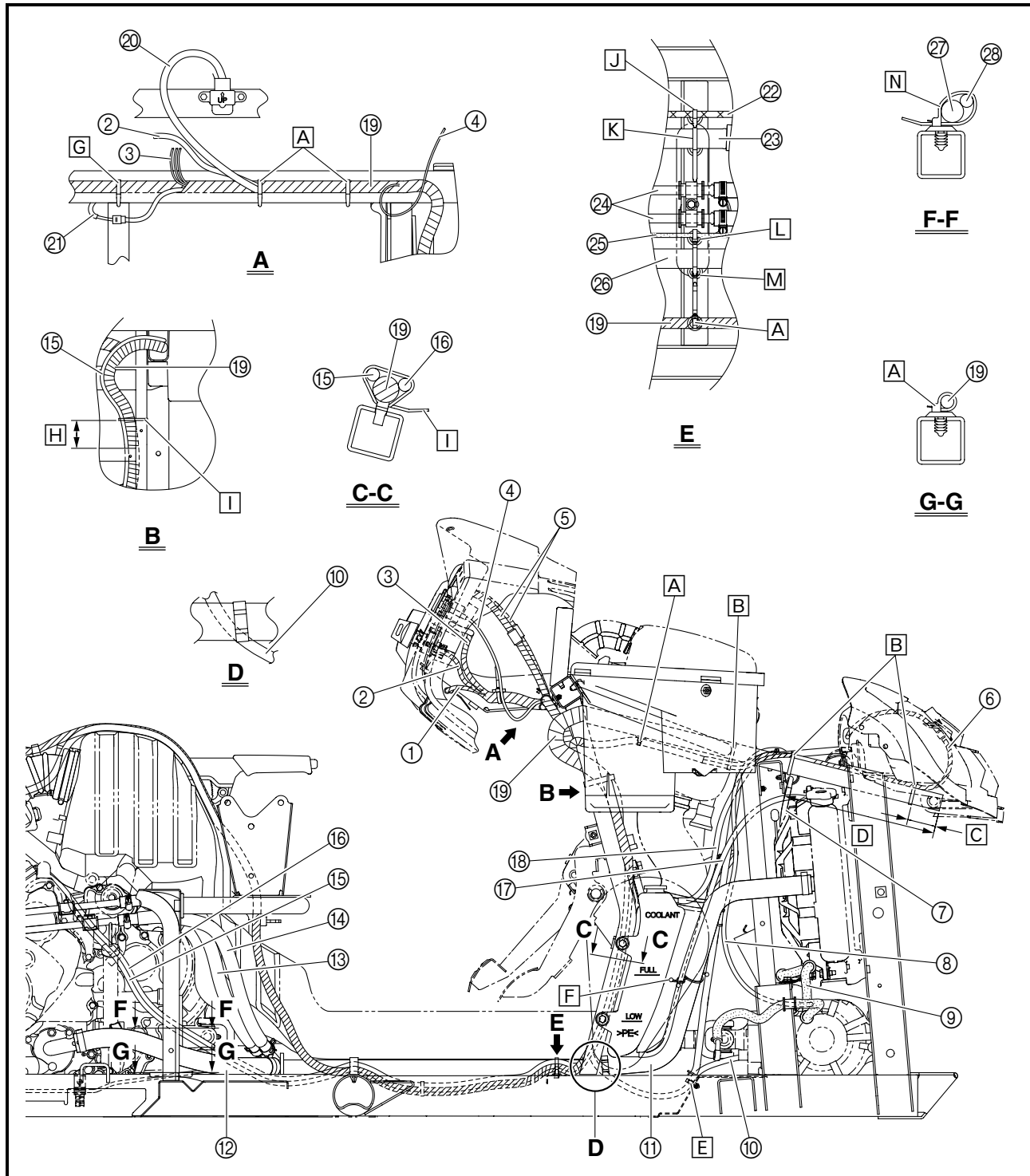
- [A] Fasten the wire harness to the frame with the plastic bands.
- [B] 30°
- [C] Fasten the parking brake cable at the white tape with the holder.
- [D] Route the wire harness through the frame.
- [E] Fasten the brake pipe to the frame with the plastic bands.





- ① Light switch lead
- ② Main switch lead
- ③ Meter assembly lead
- ④ Auxiliary DC jack lead
- ⑤ On-command four-wheel-drive motor switch and differential gear lock switch lead
- ⑥ Right headlight lead
- ⑦ Radiator fan motor breather hose
- ⑧ Differential gear case breather hose
- ⑨ Front brake hose
- ⑩ Differential gear motor lead

- ⑪ Radiator outlet hose
- ⑫ Water pump inlet hose
- ⑬ Oil inlet hose
- ⑭ Oil outlet hose
- ⑮ Ground lead
- ⑯ Starter motor lead
- ⑰ Coolant reservoir hose
- ⑱ Coolant reservoir breather hose
- ⑲ Wire harness
- ⑳ Lean angle sensor lead
- ㉑ Brake light switch lead

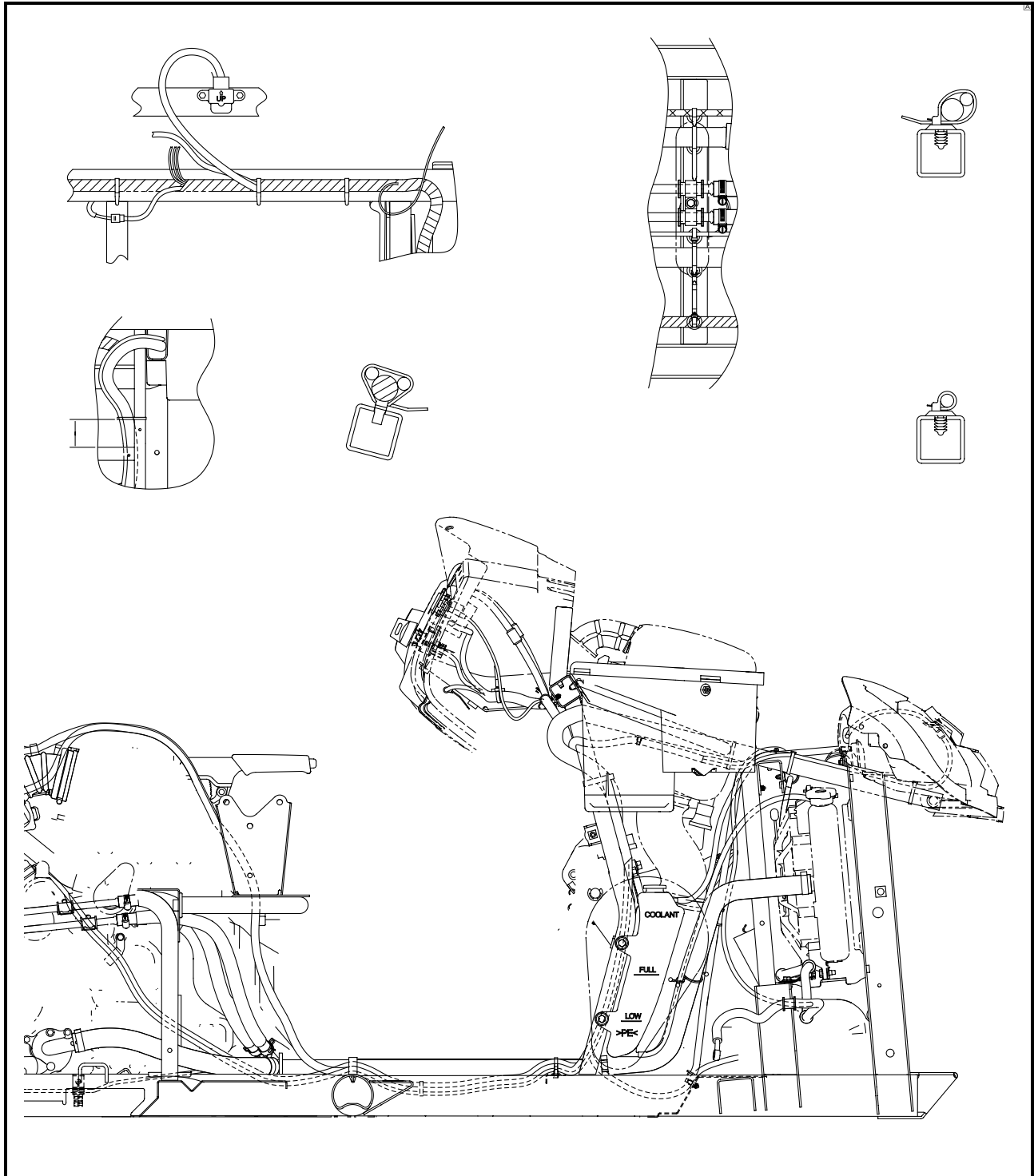




- ② Throttle cable
- ③ Radiator inlet pipe
- ④ Oil cooler inlet pipe 2/oil cooler outlet pipe 2
- ⑤ Brake pipe
- ⑥ Radiator outlet pipe
- ⑦ AC magneto/crankshaft position sensor lead
- ⑧ Fuel pump/fuel sender lead

A Fasten the wire harness with the plastic band.

- B Fasten the left headlight lead, right headlight lead, and radiator fan motor lead to the frame with a plastic band.
- C 30 ~ 60 mm (1.18 ~ 2.36 in)
- D 220 ~ 250 mm (8.66 ~ 9.84 in)
- E Fasten the differential gear motor lead with the plastic band.
- F Fasten the radiator outlet hose and coolant reservoir hose with the plastic clip.
- G Fasten the wire harness and brake light switch lead with a plastic band.





H 85 ~ 105 mm (3.35 ~ 4.13 in)

I Fasten the wire harness, starter motor lead, and ground lead with the plastic band.

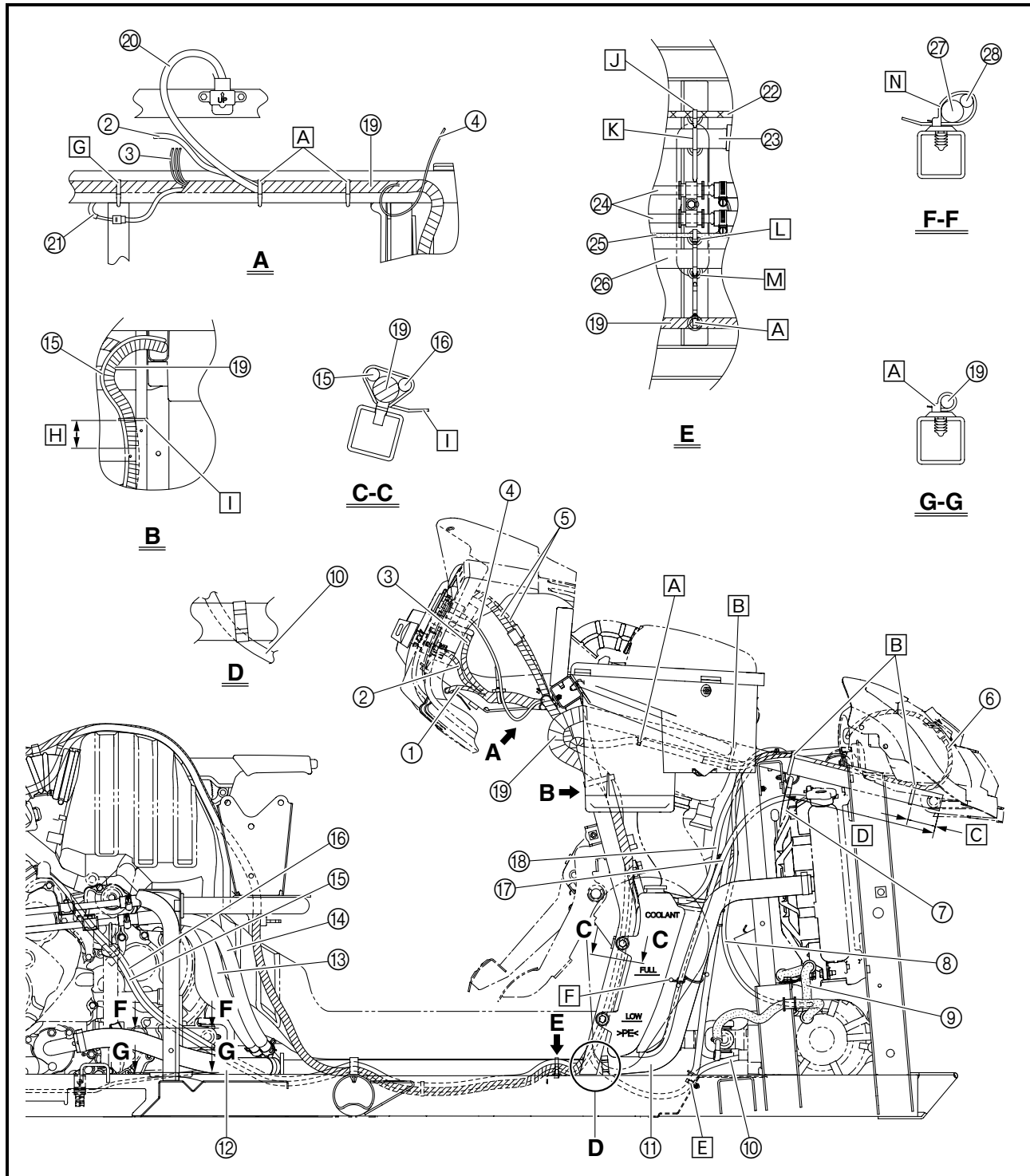
J Fasten the throttle cable with the plastic band.

K Fasten the radiator inlet pipe with the plastic band.

L Fasten the brake pipe with the plastic band.

M Fasten the radiator outlet pipe with the plastic band.

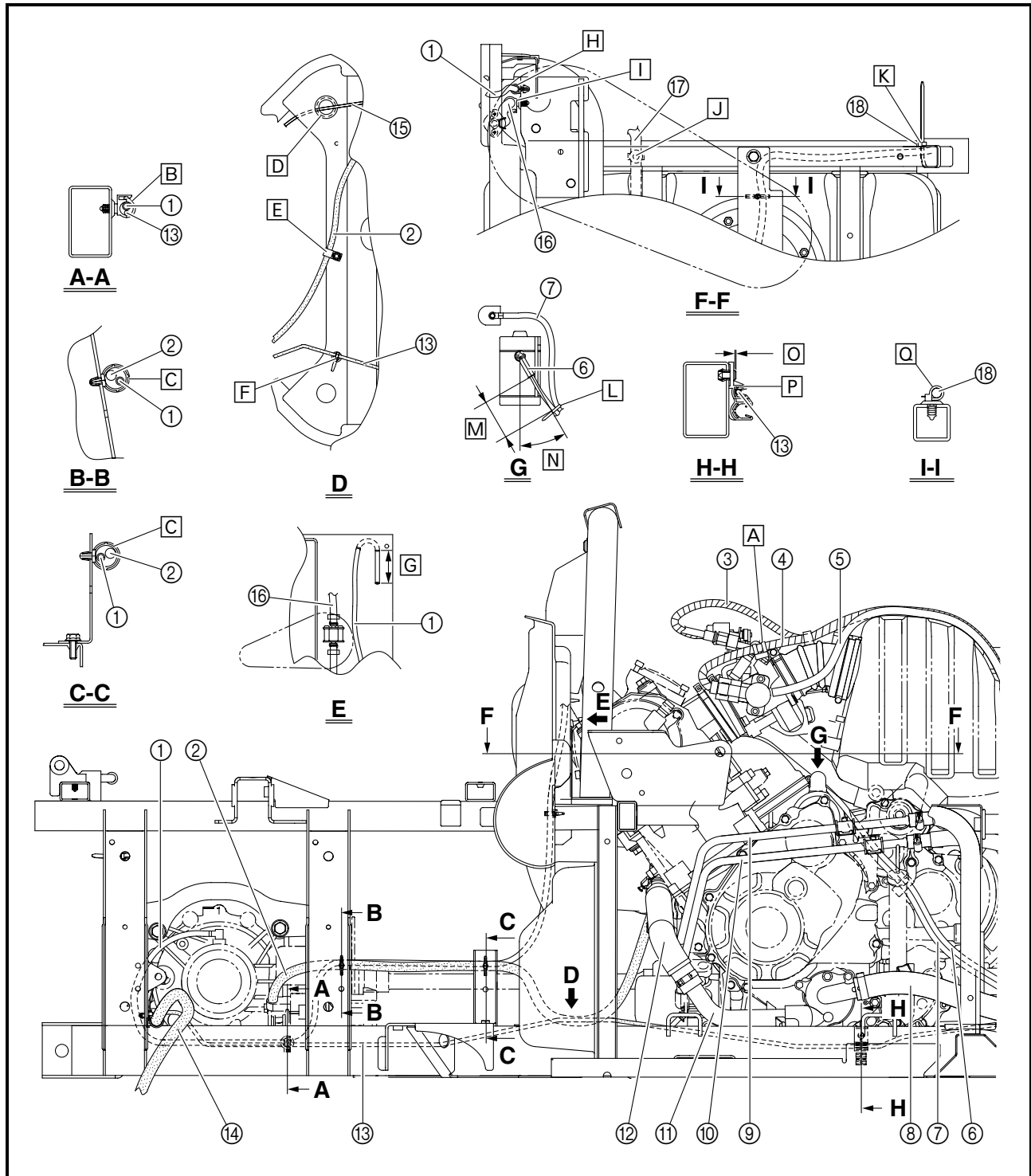
N Fasten the AC magneto/crankshaft position sensor lead and fuel pump/fuel sender lead with the plastic band.





- ① Final gear case breather hose
- ② Parking brake cable
- ③ Intake air pressure sensor lead
- ④ Throttle position sensor lead
- ⑤ Throttle body breather hose
- ⑥ Starter motor lead
- ⑦ Ground lead
- ⑧ Water pump inlet hose
- ⑨ Oil delivery pipe 2
- ⑩ Oil delivery pipe 3

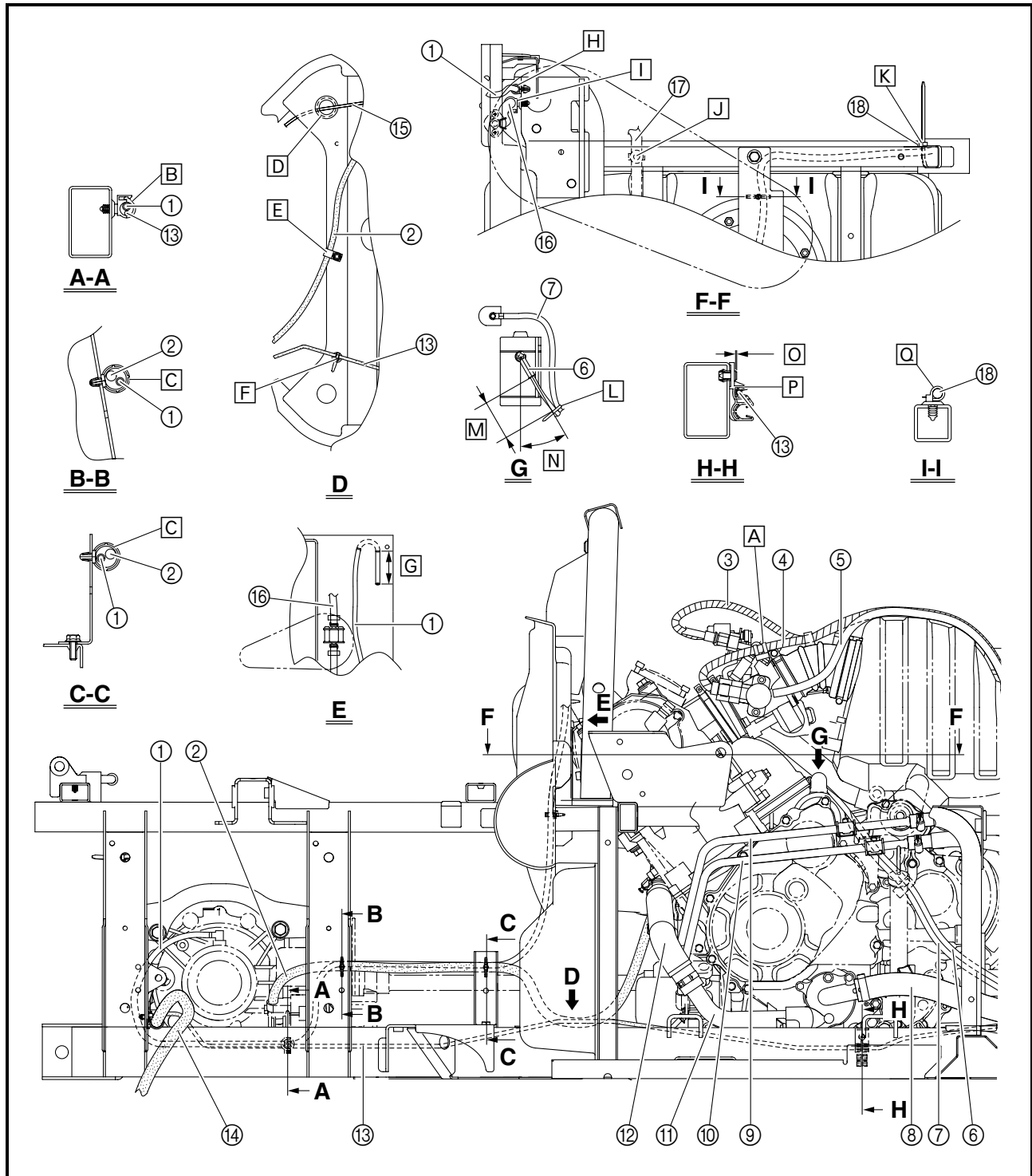
- ⑪ Water pump outlet pipe
- ⑫ Water pump outlet hose
- ⑬ Brake pipe
- ⑭ Rear brake hose
- ⑮ Wire harness
- ⑯ Fuel tank breather hose
- ⑰ Fuel hose
- ⑱ Fuel pump/fuel sender lead





- A** Fasten the throttle position sensor lead with the holder.
- B** Fasten the final gear case breather hose and brake pipe with the plastic holder.
- C** Fasten the final gear case breather hose and parking brake cable with the plastic holder.
- D** Pass the wire harness through the grommet.
- E** Fasten the parking brake cable at the white mark with the holder.
- F** Fasten the brake pipe with the plastic band.
- G** 55 ~ 65 mm (2.17 ~ 2.56 in)

- H** Fasten the final gear case breather hose with the plastic holder.
- I** Fasten the fuel tank breather hose with the plastic holder.
- J** Fasten the fuel hose with the plastic holder.
- K** Fasten the fuel pump/fuel sender lead with the plastic band.
- L** Fasten the starter motor lead and ground lead with the plastic band.
- M** 50 ~ 60 mm (1.97 ~ 2.36 in)



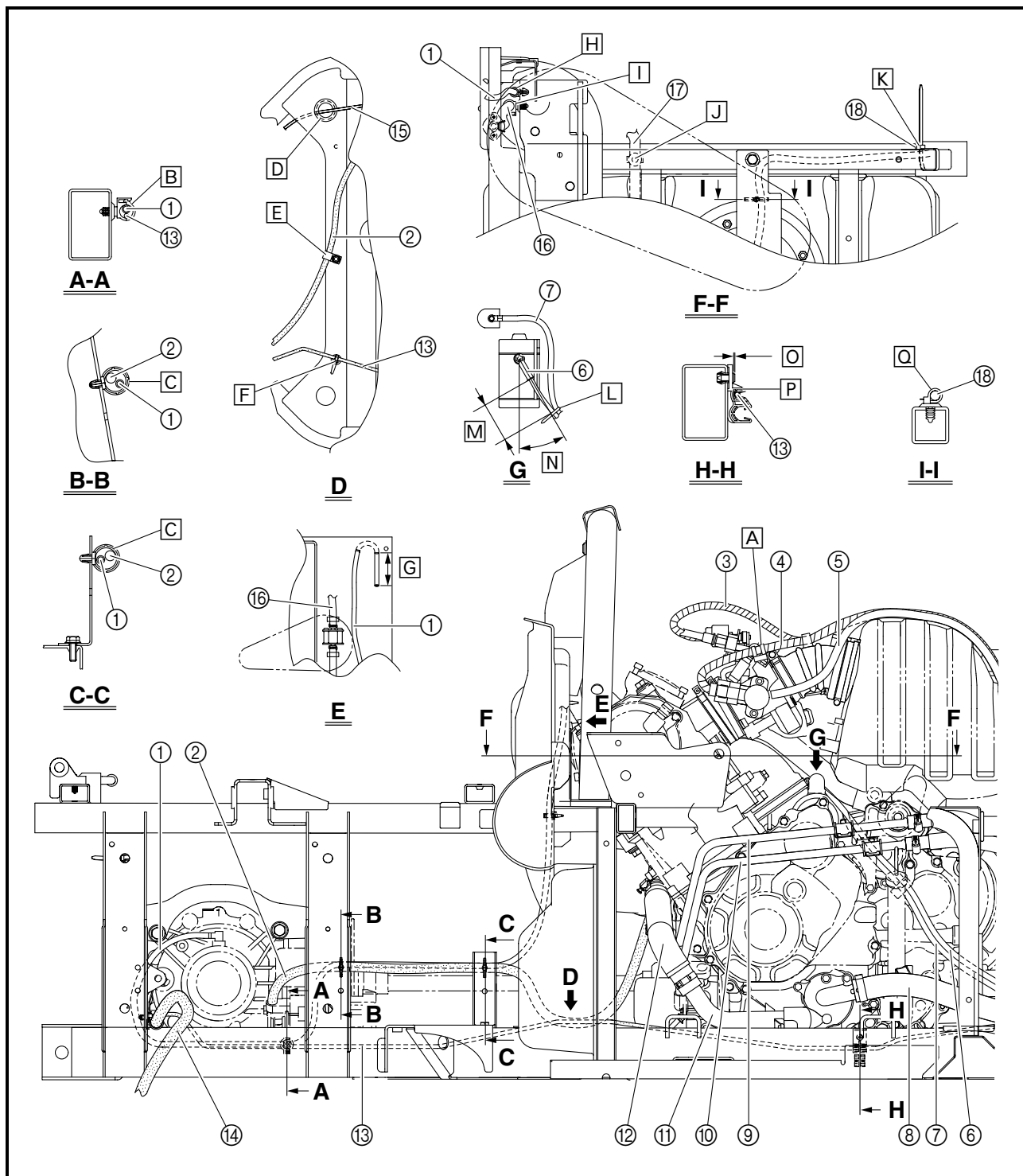


N 20 ~ 40°

O 1 mm (0.04 in) or less

P Fasten the brake pipe with the plastic holder.

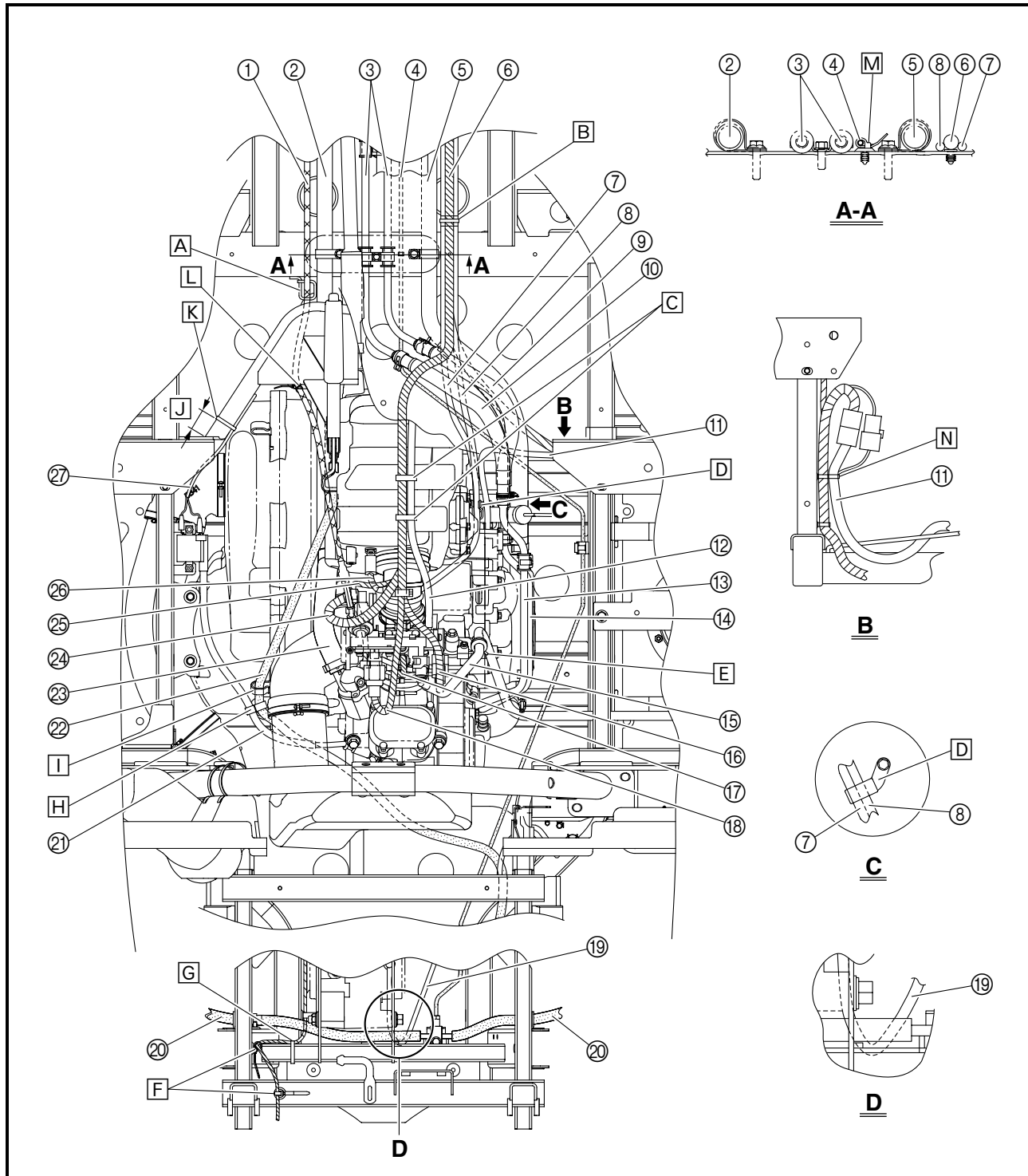
Q Fasten the fuel pump/fuel sender lead with the plastic holder.





- ① Throttle cable
- ② Radiator inlet pipe
- ③ Oil cooler inlet pipe 2/oil cooler outlet pipe 2
- ④ Brake pipe
- ⑤ Radiator outlet pipe
- ⑥ Wire harness
- ⑦ Ground lead
- ⑧ Starter motor lead
- ⑨ Oil outlet hose
- ⑩ Oil inlet hose
- ⑪ AC magneto/crankshaft position sensor lead

- ⑫ Throttle body breather hose
- ⑬ Oil delivery pipe 2
- ⑭ Oil delivery pipe 3
- ⑮ Fuel hose
- ⑯ Throttle position sensor lead
- ⑰ Fuel injector lead
- ⑱ Intake air pressure sensor lead
- ⑲ Final gear case breather hose
- ⑳ Rear brake hose
- ㉑ Spark plug lead
- ㉒ Parking brake cable

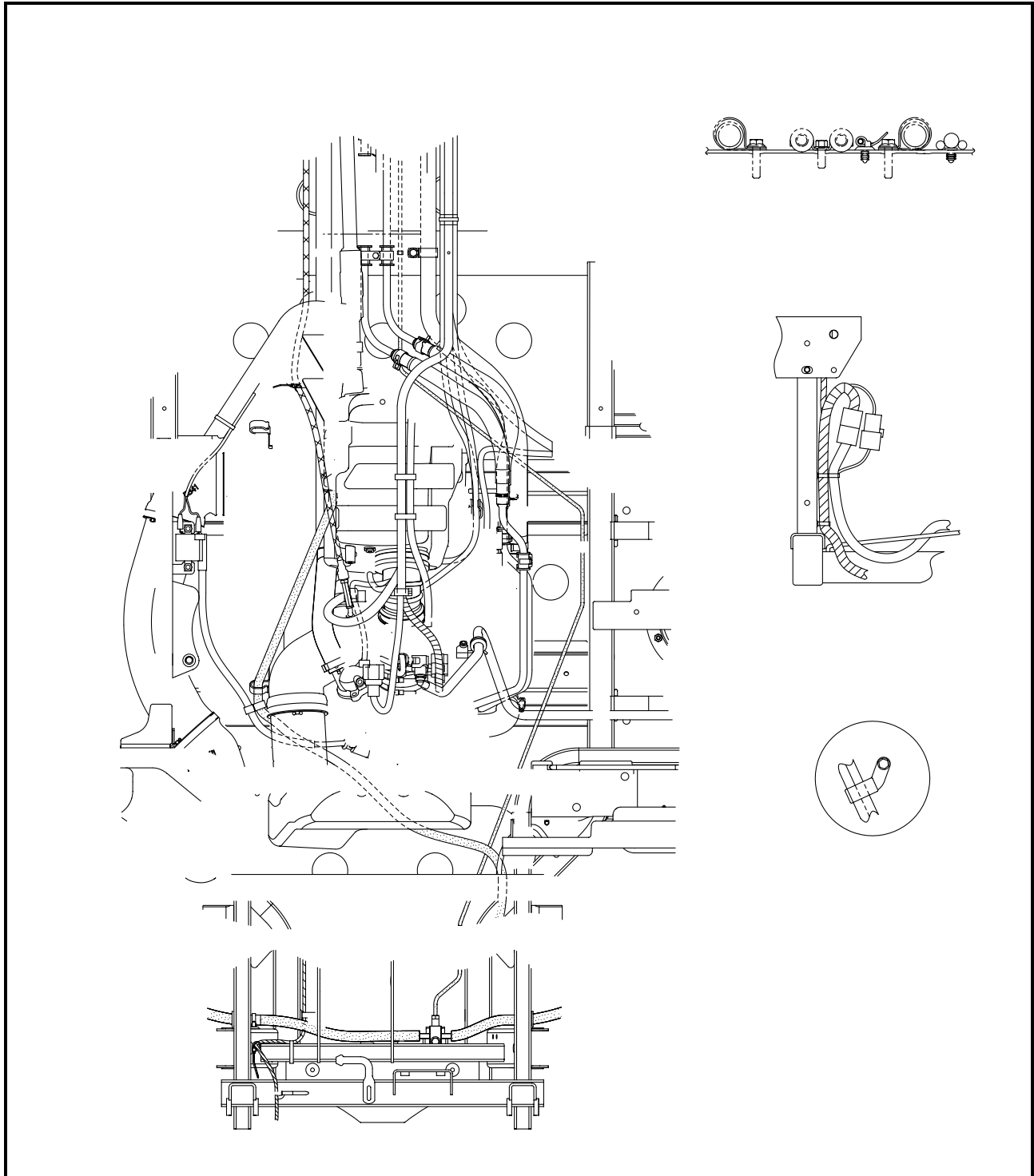




- ②③ Thermostat outlet hose
- ②④ ISC (idle speed control) unit lead
- ②⑤ Coolant temperature sensor lead
- ②⑥ Intake air temperature sensor lead
- ②⑦ Ignition coil lead

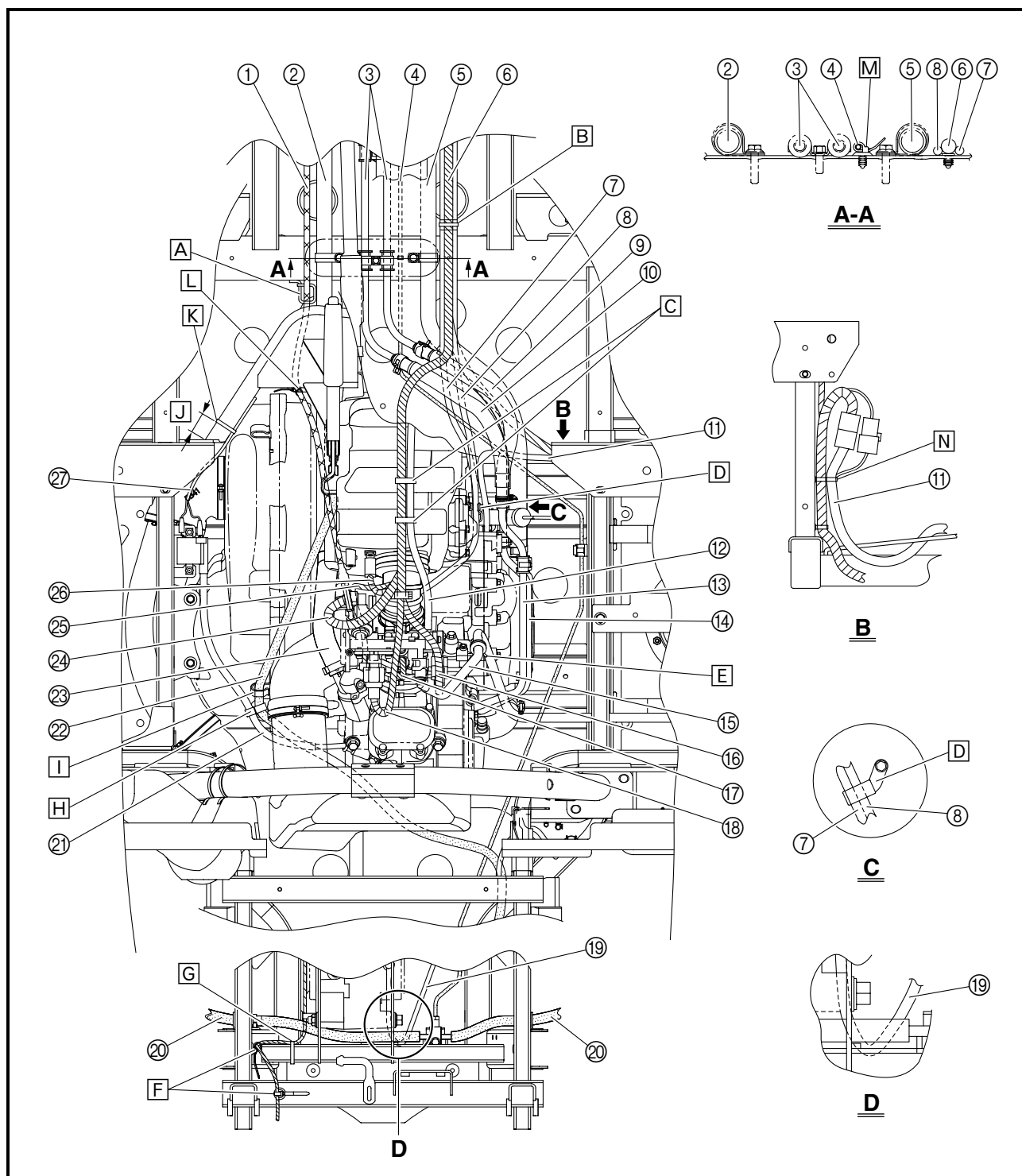
- A Route the throttle cable through the cable guide.
- B Fasten the starter motor lead, wire harness, and ground lead with the plastic band, making sure to align the red tape on the leads and harness with the band.

- C Fasten the throttle body breather hose and wire harness with the plastic band.
- D Fasten the starter motor lead and ground lead with the holder.
- E Fasten the fuel hose with the plastic holder.
- F Make sure that the plastic band is not fastened too tightly around the wire harness.
- G Fasten the wire harness with the plastic band.
- H Fasten the spark plug lead and parking brake cable with the plastic holder.





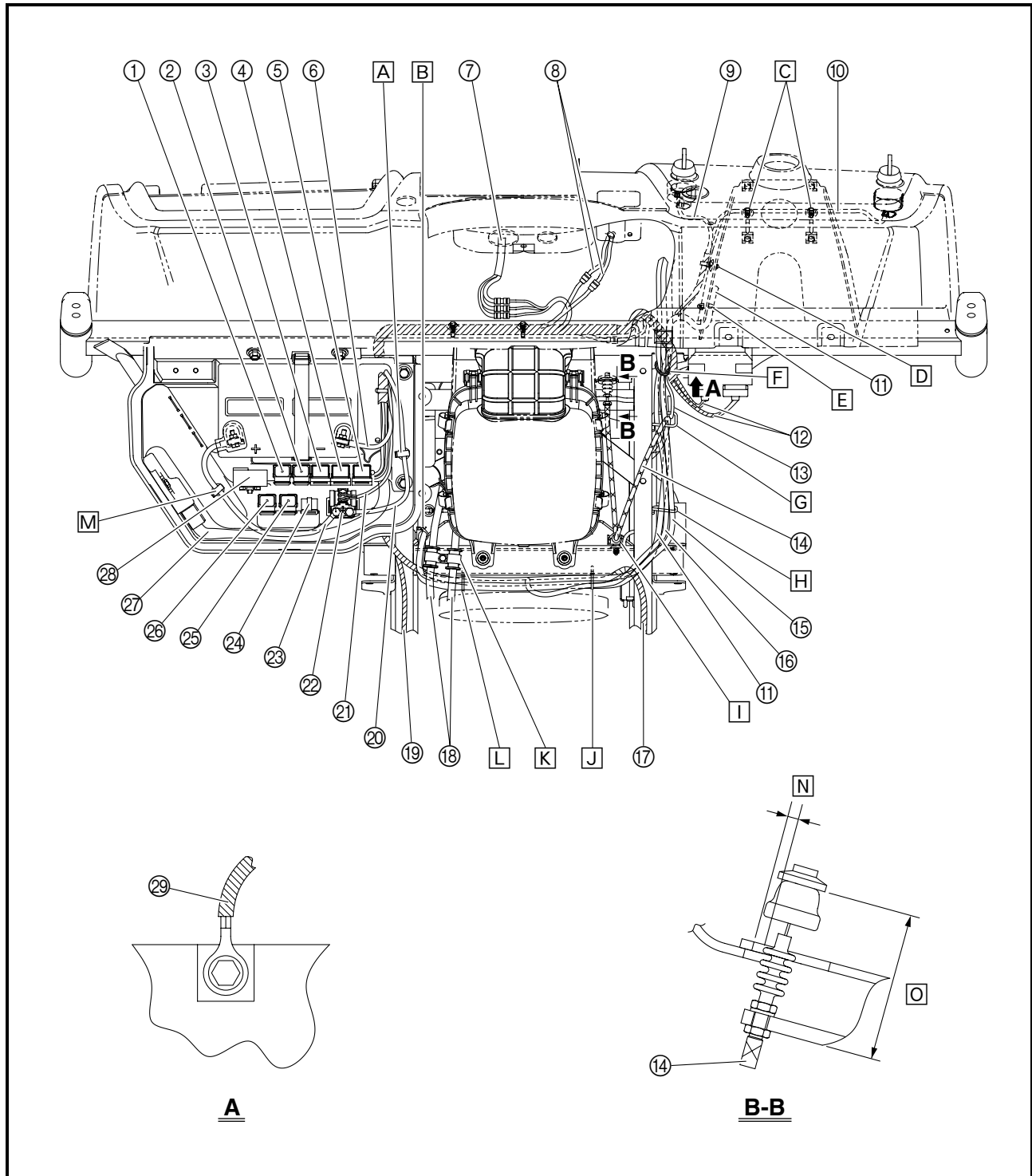
- I** Fasten the parking brake cable with the metal holder.
- J** 20 ~ 40 mm (0.79 ~ 1.57 in)
- K** Fasten the ignition coil lead with the plastic band.
- L** Fasten the throttle cable at the white mark with the plastic band.
- M** Fasten the brake pipe with the plastic band.
- N** Fasten the wire harness and AC magneto/crankshaft position sensor lead with the plastic band.





- ① Radiator fan motor relay
- ② Fuel injection system relay
- ③ Headlight relay
- ④ Four-wheel-drive motor relay 1
- ⑤ Four-wheel-drive motor relay 2
- ⑥ Negative battery lead
- ⑦ Meter assembly lead
- ⑧ On-command four-wheel-drive motor switch and differential gear lock switch lead
- ⑨ Main switch lead
- ⑩ Light switch lead

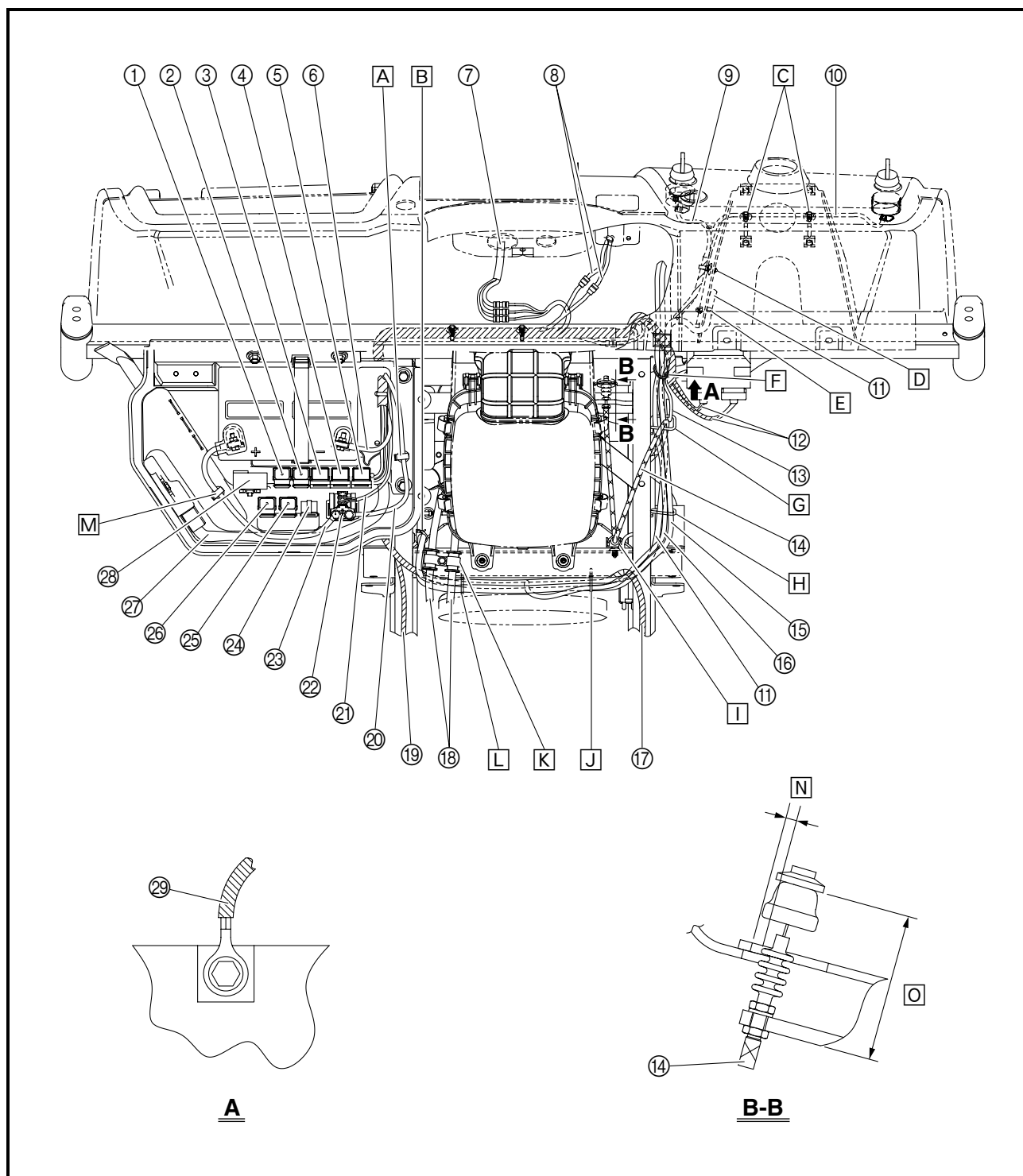
- ⑪ Coolant reservoir breather hose
- ⑫ Rectifier/regulator lead
- ⑬ Brake light switch lead
- ⑭ Throttle cable
- ⑮ Differential gear case breather hose
- ⑯ Radiator fan motor breather hose
- ⑰ Left headlight lead
- ⑱ Oil cooler inlet pipe 2/oil cooler outlet pipe 2
- ⑲ Right headlight lead
- ⑳ Starter motor lead
- ㉑ Starter relay lead





- ② Starter relay
- ③ Positive battery lead
- ④ Main fuse
- ⑤ Load control relay
- ⑥ Four-wheel-drive motor relay 3
- ⑦ ECU lead
- ⑧ Fuse box
- ⑨ Ground lead

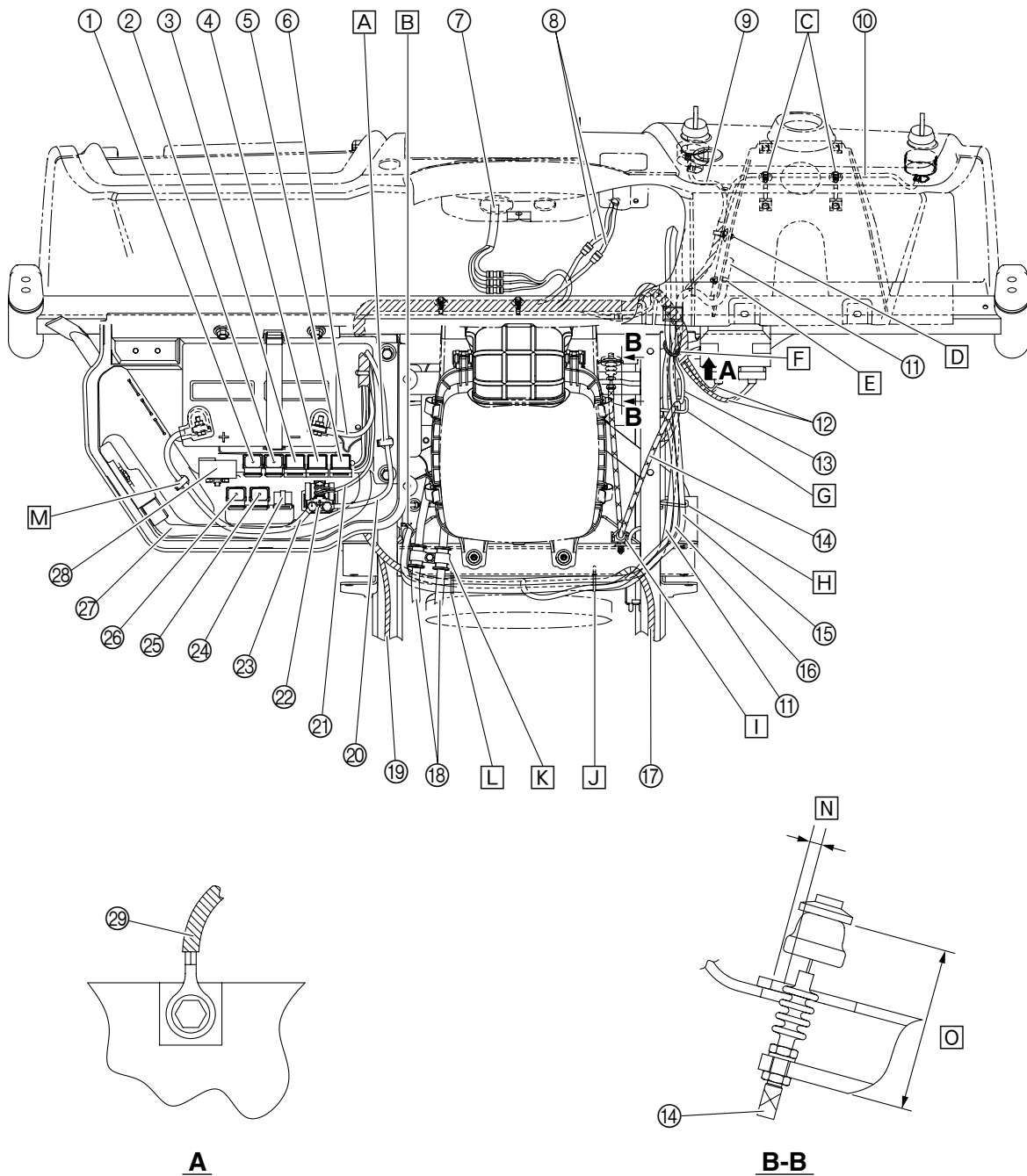
- [A] Fasten the starter motor lead with the plastic holder.
- [B] Fasten the differential gear case breather hose and coolant reservoir breather hose with the plastic holder.
- [C] Fasten the light switch lead with the plastic band.
- [D] Fasten the main switch lead and light switch lead with the plastic holder.
- [E] Fasten the coolant reservoir breather hose with the plastic holder.





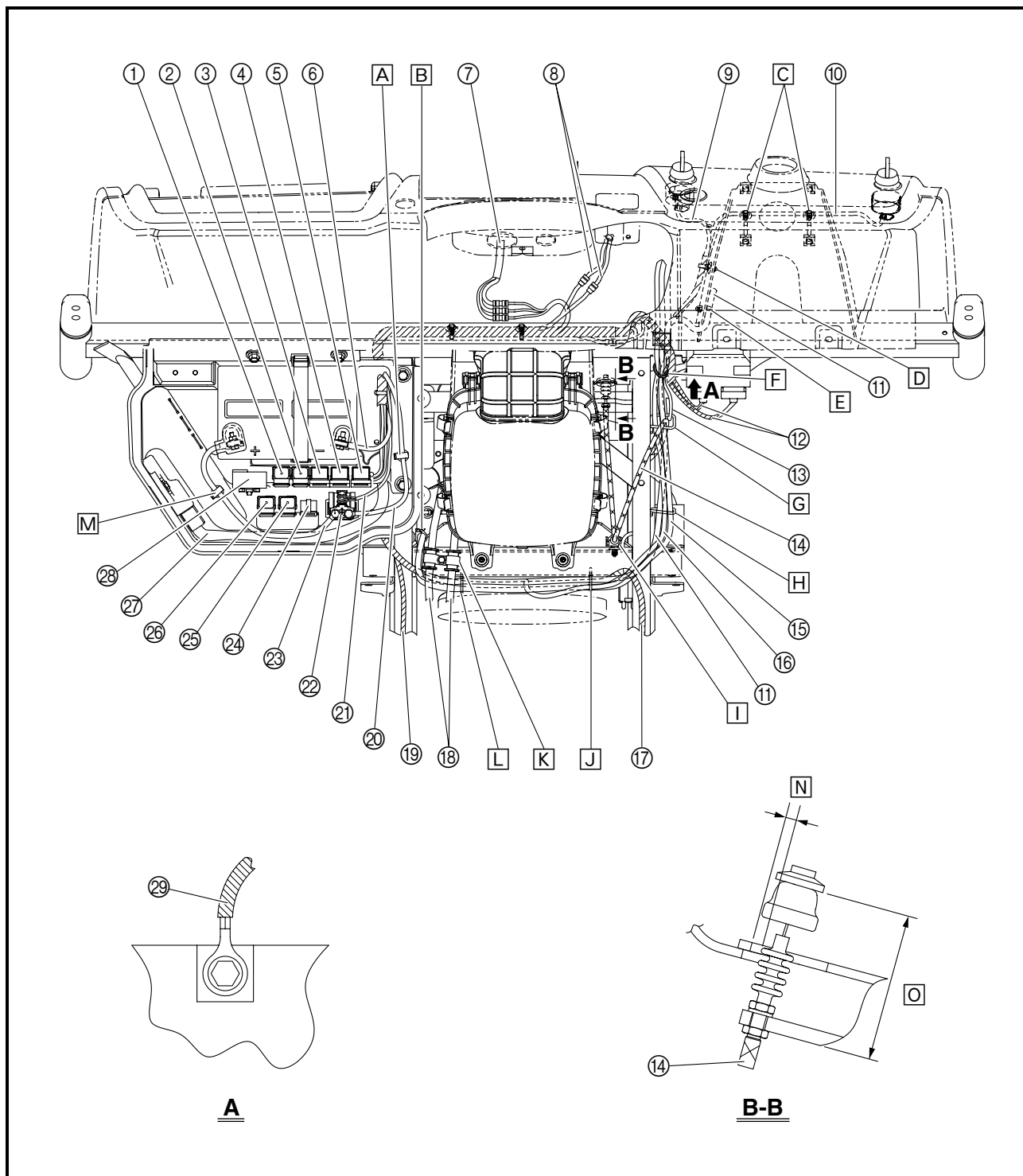
- [F] Fasten the radiator fan motor breather hose, differential gear case breather hose, and coolant reservoir breather hose with the plastic band.
- [G] Route the radiator fan motor breather hose, differential gear case breather hose, throttle cable, brake light switch lead, and coolant reservoir breather hose through the hose guide.
- [H] Route the radiator fan motor breather hose, differential gear case breather hose, brake light switch lead and coolant reservoir breather hose through the hose guide.

- [I] Fasten the throttle cable with the plastic holder.
- [J] Fasten the left headlight lead, radiator fan motor breather hose, differential gear case breather hose, radiator fan motor lead, and coolant reservoir breather hose with the plastic band.
- [K] Fasten the oil cooler inlet pipe 2/oil cooler outlet pipe 2 with the metal holder.





- L** Fasten the right headlight lead, differential gear case breather hose, radiator fan motor lead, and coolant reservoir breather hose with the plastic band.
- M** Fasten the positive battery lead with the plastic holder.
- N** 4 mm (0.16 in) of clearance or more is required around the boot.
- O** 59 ~ 61 mm (2.32 ~ 2.40 in)

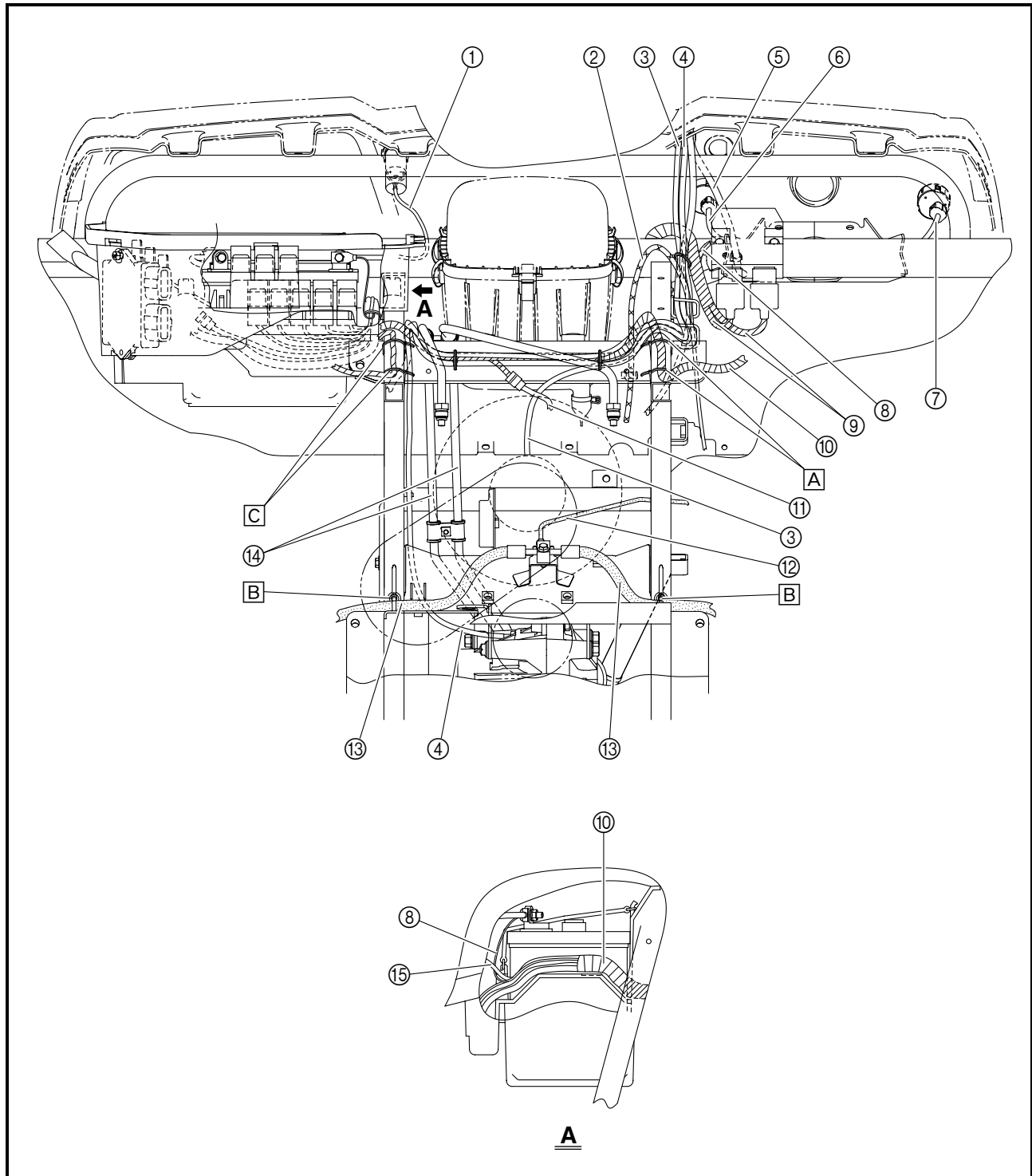




- ① Auxiliary DC jack lead
- ② Throttle cable
- ③ Radiator fan motor breather hose
- ④ Differential gear case breather hose
- ⑤ Coolant reservoir breather hose
- ⑥ Main switch lead
- ⑦ Light switch lead
- ⑧ Ground lead
- ⑨ Rectifier/regulator lead
- ⑩ Wire harness
- ⑪ Radiator fan motor lead

- ⑫ Brake pipe
- ⑬ Front brake hose
- ⑭ Oil cooler inlet pipe 2/oil cooler outlet pipe 2
- ⑮ Starter relay lead

- [A] Fasten the left headlight lead with the plastic band.
- [B] Fasten the front brake hose with the plastic band.
- [C] Fasten the right headlight lead with the plastic band.



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.

PERIODIC MAINTENANCE CHART FOR THE EMISSION CONTROL SYSTEM

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

ITEM	ROUTINE	Whichever comes first ⇒		INITIAL			EVERY	
			month	1	3	6	6	12
			km (mi)	320 (200)	1,200 (750)	2,400 (1,500)	2,400 (1,500)	4,800 (3,000)
			hours	20	75	150	150	300
Fuel line*	<ul style="list-style-type: none">• Check fuel hose for cracks or damage.• Replace if necessary.				○	○	○	
Valves*	<ul style="list-style-type: none">• Check valve clearance.• Adjust if necessary.		○		○	○	○	
Spark plug	<ul style="list-style-type: none">• Check condition.• Adjust gap and clean.• Replace if necessary.		○	○	○	○	○	
Crankcase breather system*	<ul style="list-style-type: none">• Check breather hose for cracks or damage.• Replace if necessary.				○	○	○	
Exhaust system*	<ul style="list-style-type: none">• Check for leakage.• Tighten if necessary.• Replace gasket(s) if necessary.				○	○	○	
Spark arrester	<ul style="list-style-type: none">• Clean.				○	○	○	

GENERAL MAINTENANCE AND LUBRICATION CHART



GENERAL MAINTENANCE AND LUBRICATION CHART

ITEM	ROUTINE	Whichever comes first ⇒		INITIAL			EVERY	
			month	1	3	6	6	12
			km (mi)	320 (200)	1,200 (750)	2,400 (1,500)	2,400 (1,500)	4,800 (3,000)
			hours	20	75	150	150	300
Cooling system	<ul style="list-style-type: none">• Check coolant leakage.• Repair if necessary.• Replace coolant every 24 months.		○	○	○	○	○	
Air filter element	<ul style="list-style-type: none">• Clean.• Replace if necessary.		Every 20–40 hours (More often in wet or dusty areas.)					
Engine oil	<ul style="list-style-type: none">• Replace (warm engine before draining).		○		○	○	○	
Engine oil filter cartridge	<ul style="list-style-type: none">• Replace.		○		○		○	
Final gear oil	<ul style="list-style-type: none">• Check oil level/oil leakage.		○				○	
Differential gear oil	<ul style="list-style-type: none">• Replace.							
Front brake*	<ul style="list-style-type: none">• Check operation/brake pad wear/fluid leakage• Correct if necessary. Replace pads if worn to the limit.		○	○	○	○	○	
Rear brake*	<ul style="list-style-type: none">• Check operation/brake pad wear/fluid leakage• Correct if necessary. Replace pads if worn to the limit.		○	○	○	○	○	
Parking brake*	<ul style="list-style-type: none">• Check operation and free play/brake pad wear.• Correct if necessary. Replace pads if worn to the limit.		○	○	○	○	○	
Accelerator pedal*	<ul style="list-style-type: none">• Check operation and free play.		○	○	○	○	○	
V-belt*	<ul style="list-style-type: none">• Check operation.• Check for wear, cracks, or damage.		○			○	○	
Wheels*	<ul style="list-style-type: none">• Check balance/damage/runout.• Repair if necessary.		○		○	○	○	
Wheel bearings*	<ul style="list-style-type: none">• Check bearing assemblies for looseness/damage.• Replace if damaged.		○		○	○	○	
Front and rear suspension*	<ul style="list-style-type: none">• Check operation and for leakage.• Correct if necessary.				○		○	
Steering system*	<ul style="list-style-type: none">• Check operation and for looseness/Replace if damaged.• Check toe-in/Adjust if necessary.		○	○	○	○	○	
Rear upper and lower knuckle pivots*	<ul style="list-style-type: none">• Lubricate with lithium-soap-based grease.				○	○	○	
Drive shaft universal joint*	<ul style="list-style-type: none">• Lubricate with lithium-soap-based grease.				○	○	○	
Engine mount*	<ul style="list-style-type: none">• Check for cracks or damage.• Check bolt tightness.				○	○	○	
Front and rear axle boots*	<ul style="list-style-type: none">• Check operation.• Replace if damaged.		○				○	
Stabilizer bushings*	<ul style="list-style-type: none">• Check for cracks or damage.				○	○	○	
Fittings and fasteners*	<ul style="list-style-type: none">• Check all chassis fittings and fasteners.• Correct if necessary.		○	○	○	○	○	

Recommended brake fluid: DOT 4

Brake fluid replacement:

- Replace the brake fluid when disassembling the master cylinder or caliper.
- Check the brake fluid level regularly and add fluid as required.
- Replace the oil seals on the inner parts of the master cylinder and caliper every two years.
- Replace the brake hoses every four years, or if cracked or damaged.

EAS00049

ENGINE

ADJUSTING THE VALVE CLEARANCE

The following procedure applies to all of the valves.

TIP:

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

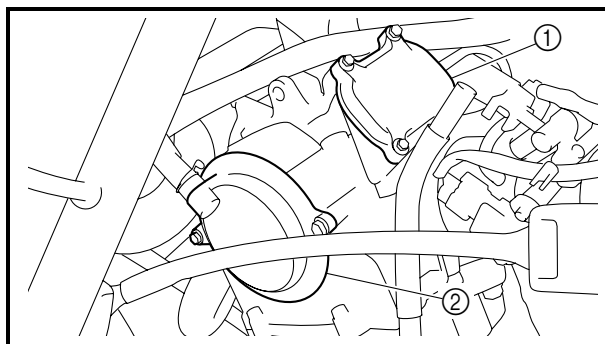
1. Remove:

- seats
- rear console

Refer to "SEATS, REAR CONSOLE AND INSTRUMENT PANELS" in chapter 8.

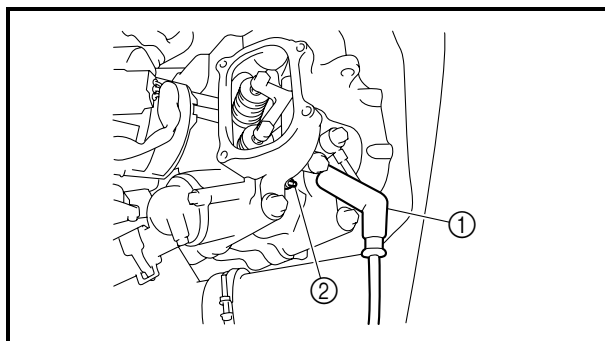
- center protector

Refer to "PANELS AND FRONT CONSOLE" in chapter 8.



2. Remove:

- intake tappet cover ①
- exhaust tappet cover
- camshaft sprocket cover ②

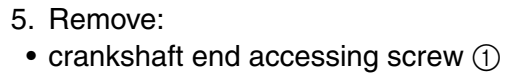
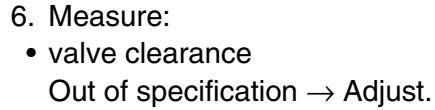
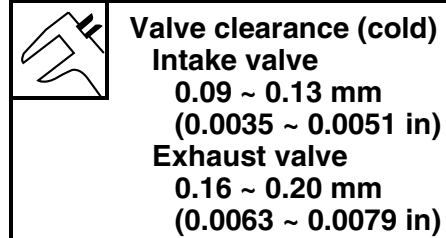


3. Disconnect:

- spark plug cap ①

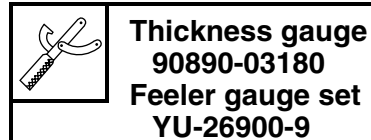
4. Remove:

- spark plug ②

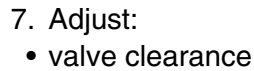


- Turn the crankshaft counterclockwise.
- When the piston is at the top dead center (TDC) on the compression stroke, align the "I" mark **(a)** on the camshaft sprocket with the stationary pointer **(b)** on the cylinder head.

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



Out of specification $\rightarrow$ Adjust.



-

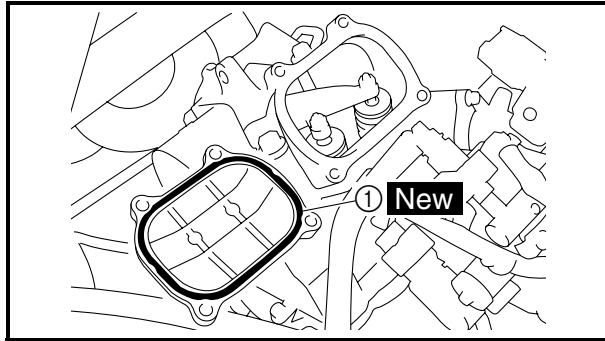
8. Install:

- crankshaft end accessing screw

- 9. Install:
 - spark plug
- 10. Connect:
 - spark plug

 13 Nm (1.3 m · kg, 9.4 ft · lb)

ADJUSTING THE VALVE CLEARANCE/ ADJUSTING THE THROTTLE CABLE



11.Install:

- O-ring **New**
- camshaft sprocket cover

10 Nm (1.0 m · kg, 7.2 ft · lb)

- O-ring ① **New**
- intake tappet cover

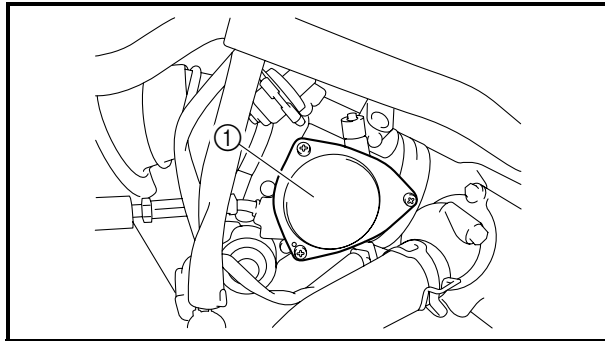
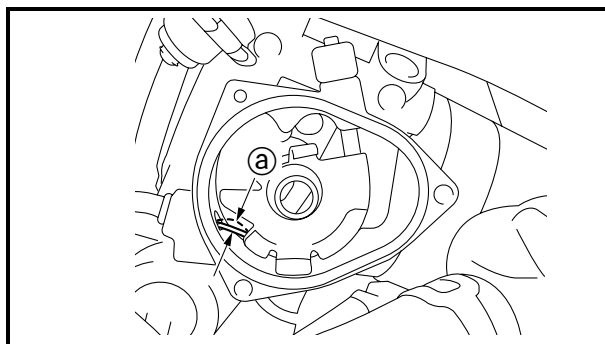
10 Nm (1.0 m · kg, 7.2 ft · lb)

- O-ring **New**
- exhaust tappet cover

10 Nm (1.0 m · kg, 7.2 ft · lb)

12.Install:

- center protector
Refer to “PANELS AND FRONT CONSOLE” in chapter 8.
- rear console
- seats
Refer to “SEATS, REAR CONSOLE AND INSTRUMENT PANELS” in chapter 8.



ADJUSTING THE THROTTLE CABLE

1. Remove:

- seats
- rear console
Refer to “SEATS, ENCLOSURE, HOOD AND CARGO BED” in chapter 8.

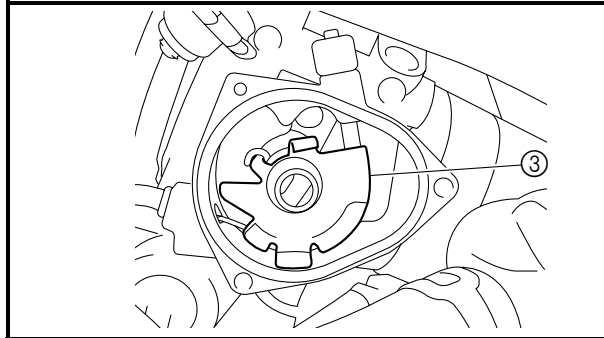
2. Remove:

- throttle valve cover ①

3. Check:

- throttle cable ②
Slack → Remove the slack.

CHK
ADJ



- a. Loosen the locknut ①.
- b. Turn the adjusting nut ② in direction ③ or ④ until the correct free play is obtained.

c. Tighten the locknut.

TIP: After adjusting the throttle cable, depress the accelerator pedal a few times and make sure that the throttle valve ③ closes completely after releasing the accelerator pedal.

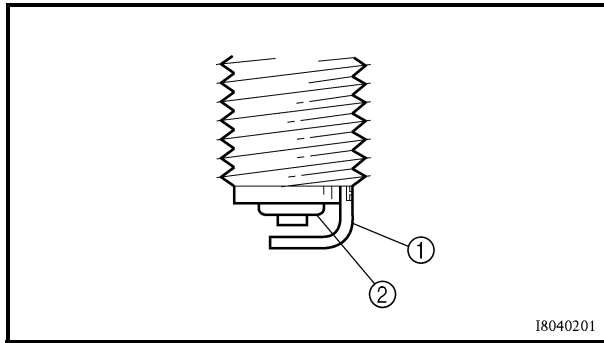
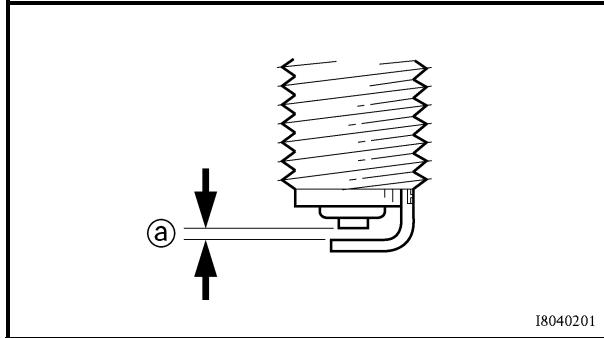
- ## EBS00057
- # CHECKING THE SPARK PLUG

1. Remove:
 - seats
 - rear consoleRefer to “SEATS, ENCLOSURE, HOOD AND CARGO BED” in chapter 8.
2. Disconnect:
 - spark plug cap
3. Remove:
 - spark plug
4. Check:
 - spark plug typeIncorrect → Change.



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CHECKING THE SPARK PLUG



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 ③
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)**

TIP:

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

9. Connect:
 - spark plug cap
10. Install:
 - rear console
 - seats

Refer to “SEATS, ENCLOSURE, HOOD AND CARGO BED” in chapter 8.

CHECKING THE IGNITION TIMING

TIP:

Throttle cable free play should be adjusted properly before checking the ignition timing.

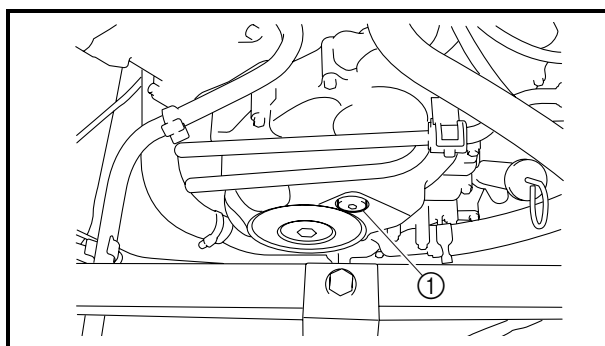
1. Remove:
 - seats
 - rear consoleRefer to “SEATS, REAR CONSOLE AND INSTRUMENT PANELS” in chapter 8.
 - fuel tankRefer to “FUEL PUMP AND FUEL TANK” in chapter 6.
2. Attach:
 - tachometer
 - timing light(to spark plug lead)



Digital tachometer
90890-06760, YU-39951-B

Timing light
90890-03141

Inductive clamp timing light
YU-03141



- 3. Check:
 - ignition timing



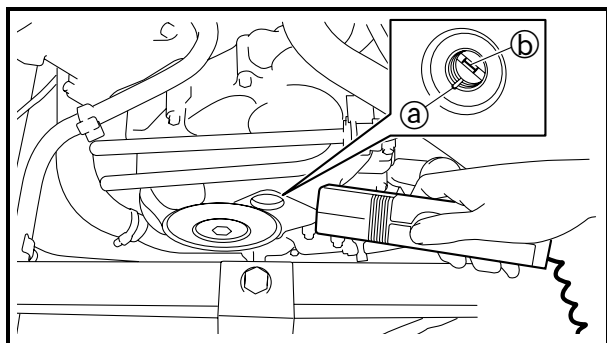
- a. Warm up the engine and keep it at the specified speed.



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

- b. Remove the timing mark accessing screw
①.

CHECKING THE IGNITION TIMING/ MEASURING THE COMPRESSION PRESSURE



- c. Visually check the stationary pointer ① to verify it is within the required firing range ② indicated on the AC magneto rotor.
Incorrect firing range → Check the ignition system.

TIP:

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)

4. Detach:

- timing light
- tachometer

5. Install:

- fuel tank

Refer to “FUEL PUMP AND FUEL TANK” in chapter 6.

- rear console
- seats

Refer to “SEATS, REAR CONSOLE AND INSTRUMENT PANELS” in chapter 8.

EBS00061

MEASURING THE COMPRESSION PRESSURE

TIP:

Insufficient compression pressure will result in a loss of performance.

1. Measure:

- valve clearance

Out of specification → Adjust.

Refer to “ADJUSTING THE VALVE CLEARANCE”.

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

3. Remove:

- seats
- rear console

Refer to “SEATS, REAR CONSOLE AND INSTRUMENT PANELS” in chapter 8.

- NOTICE**

-

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EBS00064

CHECKING THE ENGINE OIL LEVEL

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

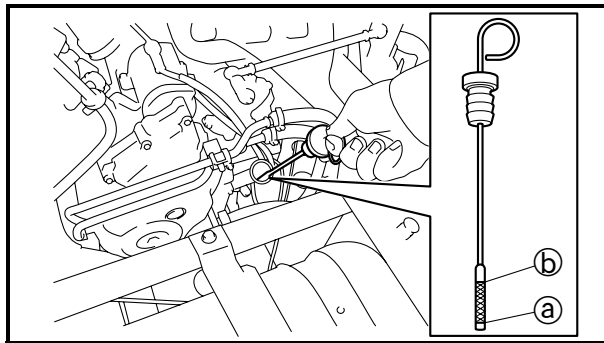
TIP:

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

3. Remove:

- seats
- rear console

Refer to “SEATS, ENCLOSURE, HOOD AND CARGO BED” in chapter 8.



4. Check:

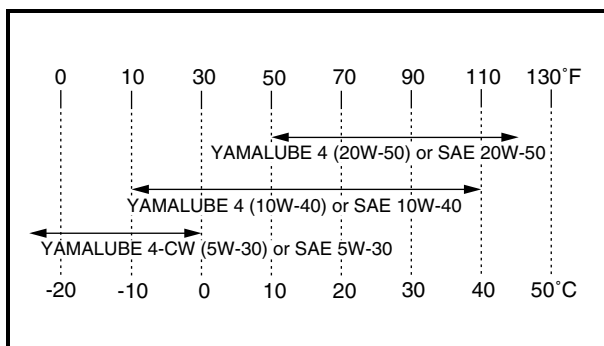
- engine oil level

Oil level should be between the minimum level mark ① and maximum level mark ②.

Oil level low → Add oil to the proper level.

TIP:

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

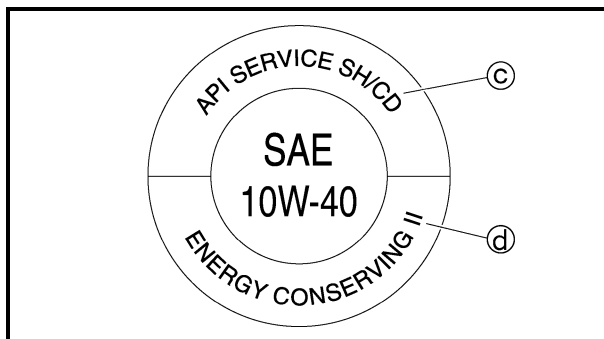


Recommended engine oil type
YAMALUBE 4-CW (5W-30) or
SAE 5W-30, YAMALUBE 4 (10W-
40) or SAE 10W-40, YAMALUBE
4 (20W-50) or SAE 20W-50

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

NOTICE

- Engine oil also lubricates the clutch and the wrong oil types or additives could cause clutch slippage. Therefore, do not add any chemical additives or use engine oils with a grade of CD ③ or higher and do not use oils labeled “ENERGY CONSERVING II” ④.
- Do not allow foreign material to enter the crankcase.



5. Check the engine oil level again.

NOTICE

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

6. Install:

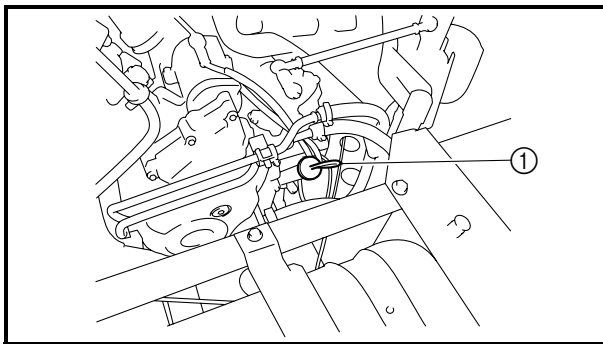
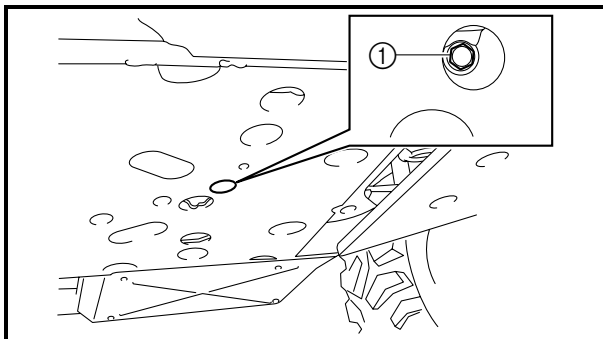
- rear console
- seats

Refer to “SEATS, ENCLOSURE, HOOD AND CARGO BED” in chapter 8.

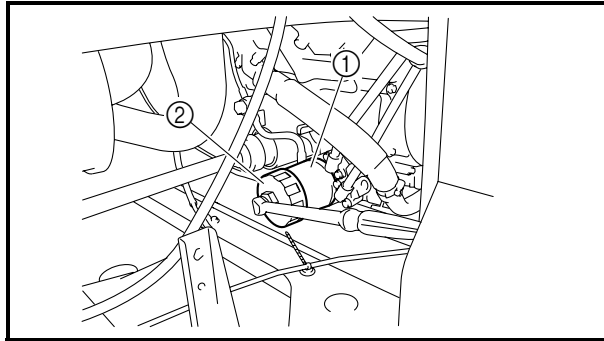
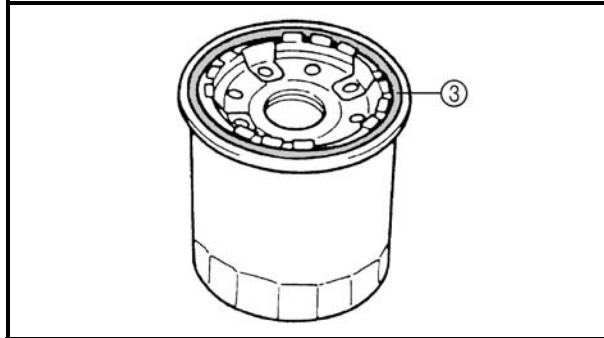
EBS00069

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:
 - seats
 - rear consoleRefer to “SEATS, ENCLOSURE, HOOD AND CARGO BED” in chapter 8.
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.



- Lift the cargo bed up.
- Remove the oil filter cartridge ① with an oil filter wrench ②.



Oil filter wrench
90890-01426, YU-38411

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

NOTICE

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

- 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)

- Lower the cargo bed.



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
3.00 L (2.64 Imp qt, 3.17 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)

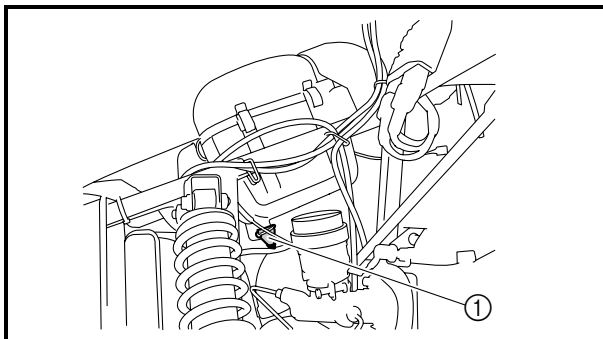
- 11.Install:

- dipstick

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

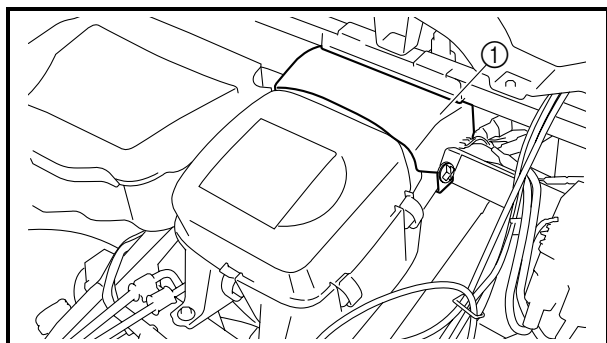
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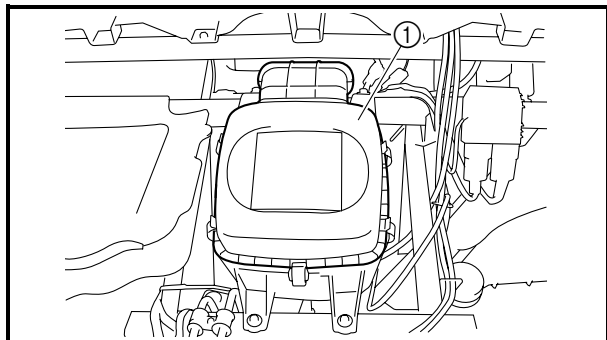
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CLEANING THE AIR FILTER ELEMENT

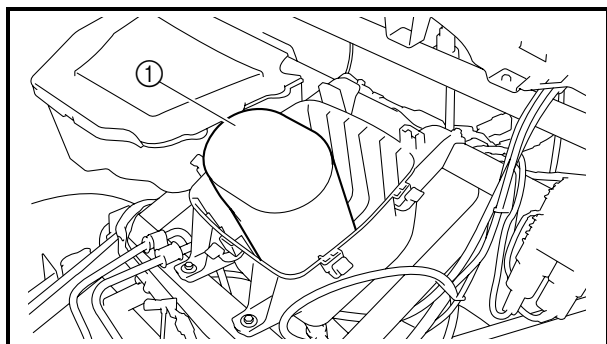
CHK
ADJ



2. Remove:
- air intake duct shroud ①



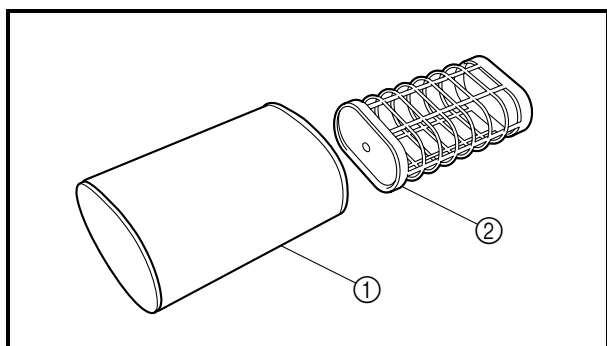
3. Remove:
- air filter case cover ①



4. Remove:
- air filter element ①
 - air filter element frame ②

NOTICE

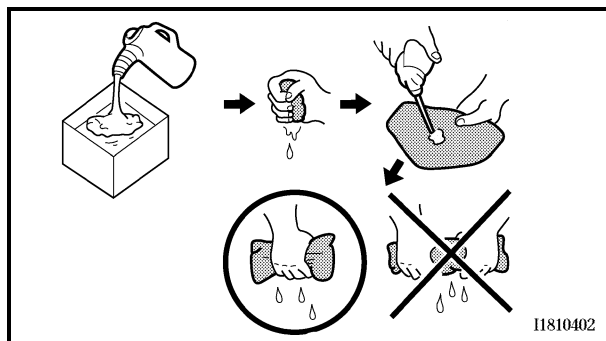
The engine should never be run without the air filter; excessive piston and/or cylinder wear may result.



5. Check:
- air filter element
 - air filter element frame
- Damage → Replace.

CLEANING THE AIR FILTER ELEMENT

CHK
ADJ



6. Clean:

- air filter element

Use compressed air to blow off dust from the inner surface of the element.



- 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.

NOTICE

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.

TIP:

The element should be wet but not dripping.

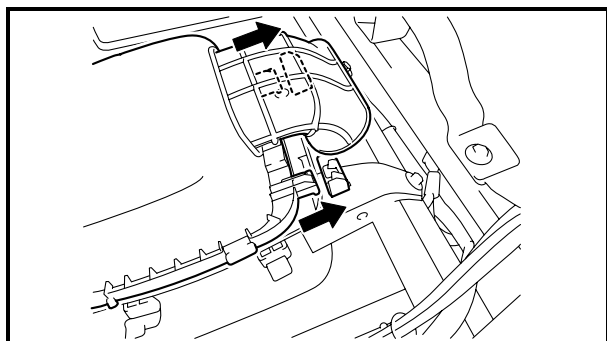


7. Install:

- air filter element frame
- air filter element

TIP:

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



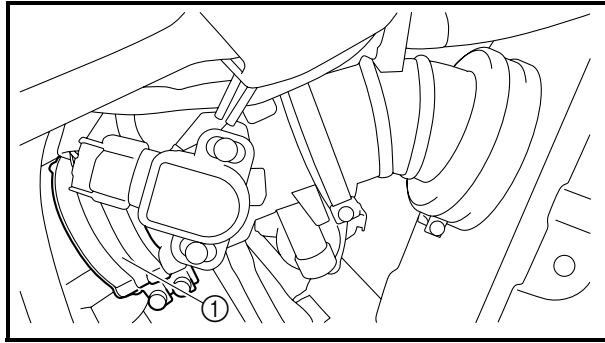
8. Install:

- air filter case cover
- air intake duct shroud

TIP:

Insert the projections on the air filter case cover into the holders on the air filter case, and then install the air filter case cover by hooking the holders onto the cover.

9. Close the hood.



EAS00094

CHECKING THE THROTTLE BODY JOINT

1. Remove:

- seats
- rear console

Refer to “SEATS, REAR CONSOLE AND INSTRUMENT PANELS” in chapter 8.

2. Check:

- throttle body joint ①

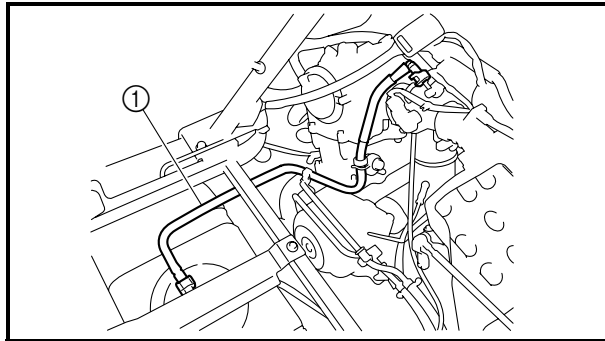
Cracks/damage → Replace.

Refer to “THROTTLE BODY” in chapter 6.

3. Install:

- rear console
- seats

Refer to “SEATS, REAR CONSOLE AND INSTRUMENT PANELS” in chapter 8.



EAS00096

CHECKING THE FUEL HOSE

1. Remove:

- seats
- rear console

Refer to “SEATS, REAR CONSOLE AND INSTRUMENT PANELS” in chapter 8.

2. Check:

- fuel hose ①

Cracks/damage → Replace.

Loose connection → Connect properly.

3. Install:

- rear console
- seats

Refer to “SEATS, REAR CONSOLE AND INSTRUMENT PANELS” in chapter 8.

EAS00098

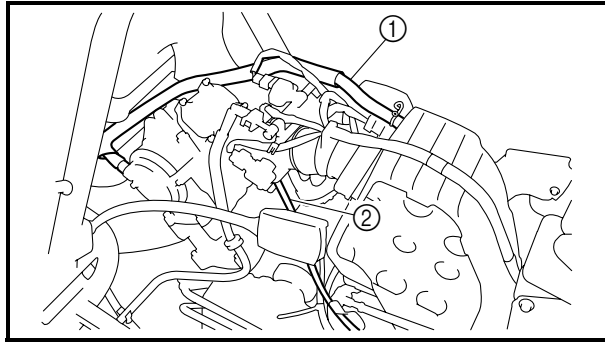
CHECKING THE BREATHER HOSES

1. Remove:

- seats
- rear console

Refer to “SEATS, REAR CONSOLE AND INSTRUMENT PANELS” in chapter 8.

CHECKING THE BREATHER HOSES/ CHECKING THE COOLANT LEVEL

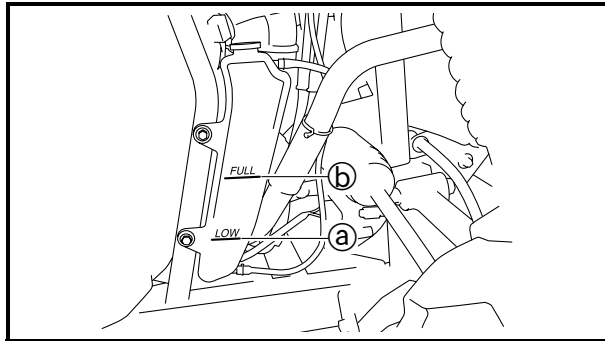


2. Check:
 - cylinder head breather hose ①
 - throttle body breather hose ②Cracks/damage → Replace.
Loose connection → Connect properly.

NOTICE

Make sure the breather hoses are routed correctly.

3. Install:
 - rear console
 - seatsRefer to “SEATS, REAR CONSOLE AND INSTRUMENT PANELS” in chapter 8.



EBS00076

CHECKING THE COOLANT LEVEL

1. Place the vehicle on a level surface.

TIP:

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

2. Check:
 - coolant levelThe coolant level should be between the minimum level mark (a) and maximum level mark (b) in the coolant reservoir.
Below the minimum level mark → Add the recommended coolant to the proper level.

NOTICE

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



Coolant reservoir capacity (up to the maximum level mark):
0.32 L (0.28 Imp qt, 0.34 US qt)

EBS00075

CHANGING THE COOLANT

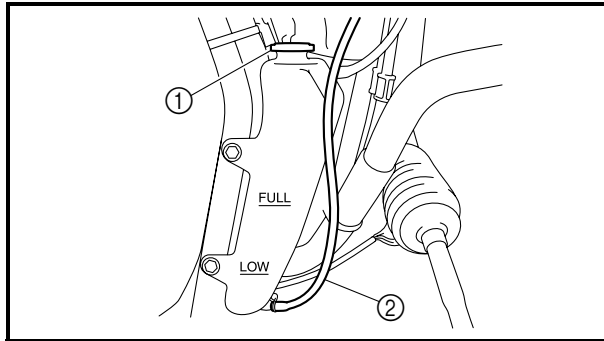
1. Remove:

- seats
- rear console

Refer to “SEATS, REAR CONSOLE AND INSTRUMENT PANELS” in chapter 8.

- fuel tank

Refer to “FUEL PUMP AND FUEL TANK” in chapter 6.



2. Remove:

- coolant reservoir cap ①

3. Disconnect:

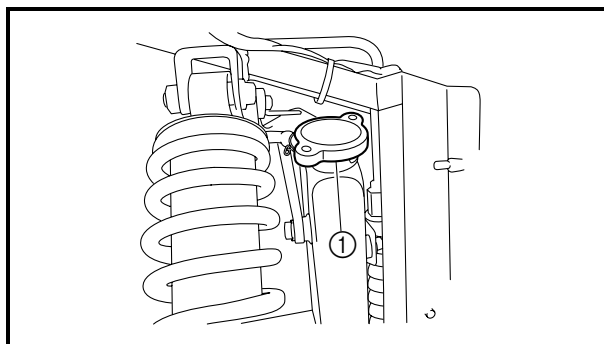
- coolant reservoir hose ②

4. Drain:

- coolant
(from the coolant reservoir)

5. Connect:

- coolant reservoir hose



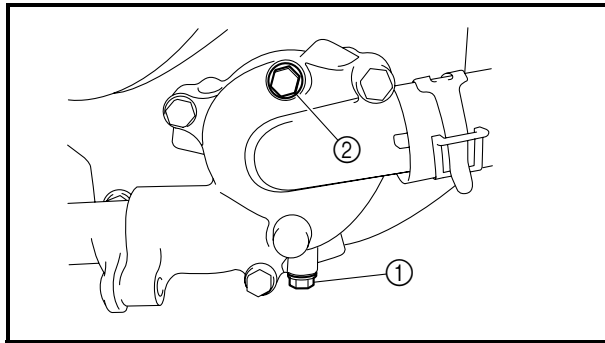
6. Remove:

- radiator cap ①

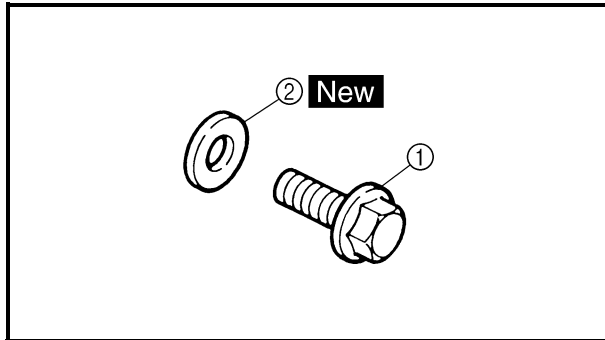
⚠ WARNING

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.

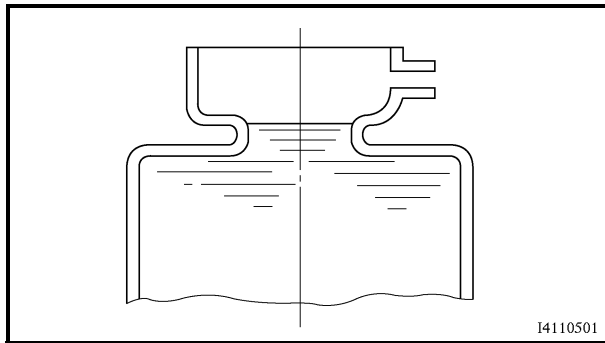


7. Remove:
 - coolant drain bolt ①
(along with the copper washer)
 - air bleeding bolt ②
8. Drain:
 - coolant
(from the engine and radiator)



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

2.35 L

(2.07 Imp qt, 2.48 US qt)

Coolant reservoir capacity (up
to the maximum level mark)

0.32 L

(0.28 Imp qt, 0.34 US qt)

From minimum to maximum
level mark

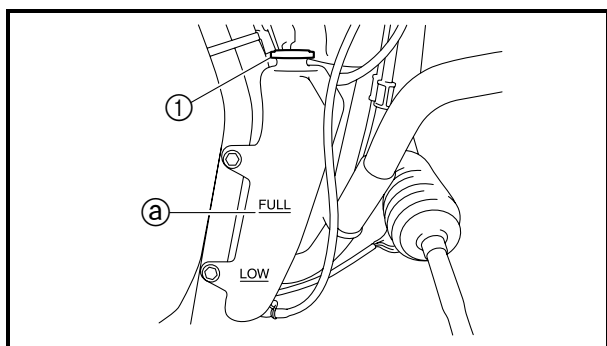
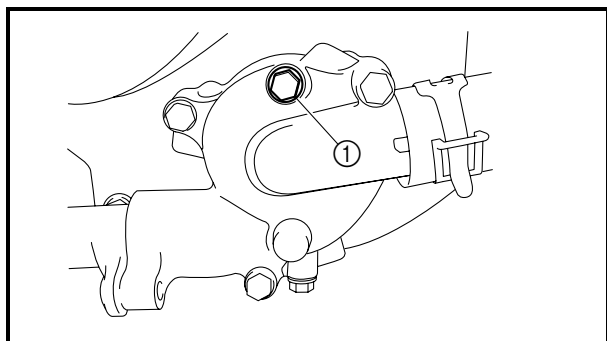
0.21 L

(0.18 Imp qt, 0.22 US qt)

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

- 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.

- **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.**

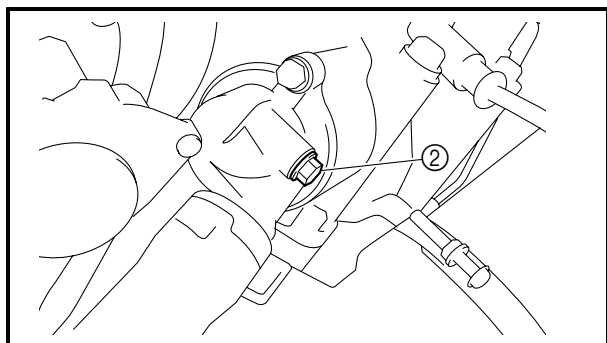


- coolant reservoir
(with the recommended coolant to the maximum level mark @)

- coolant reservoir cap ①

- coolant system

- a. Loosen the water pump air bleed bolt ①, without removing it, to allow all of the air to escape from the air bleed bolt hole.



- 



Thermostat cover air bleed bolt
10 Nm (1.0 m · kg, 7.2 ft · lb)

3 - 24

EAS00104

CHECKING THE COOLING SYSTEM

1. Remove:

- seats
- rear console
- side panels
- front console

Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.

- air intake duct

Refer to "AIR FILTER CASE AND AIR INTAKE DUCT" in chapter 6.

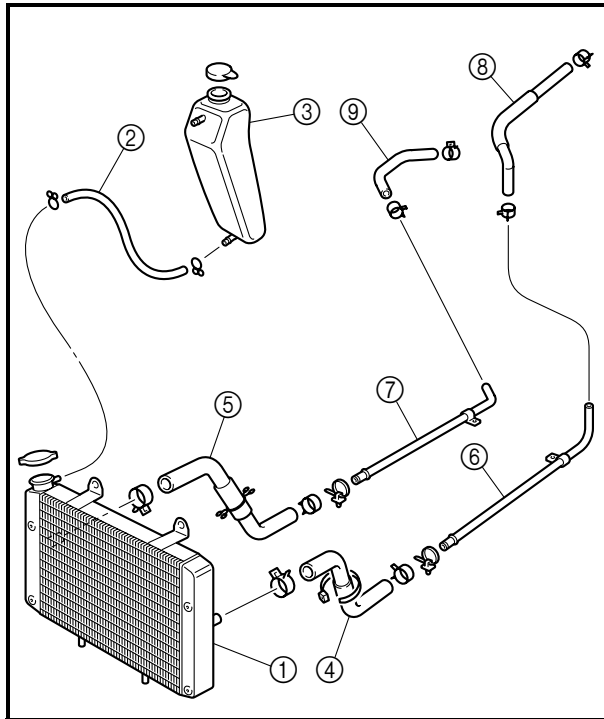
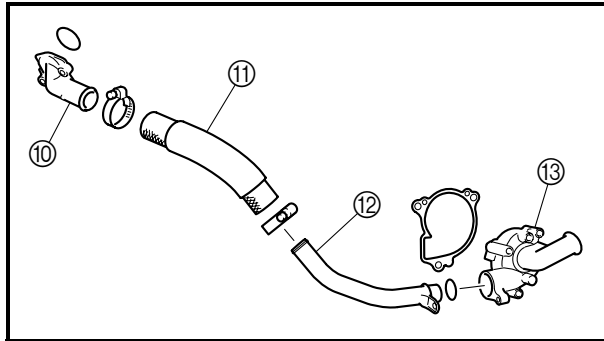
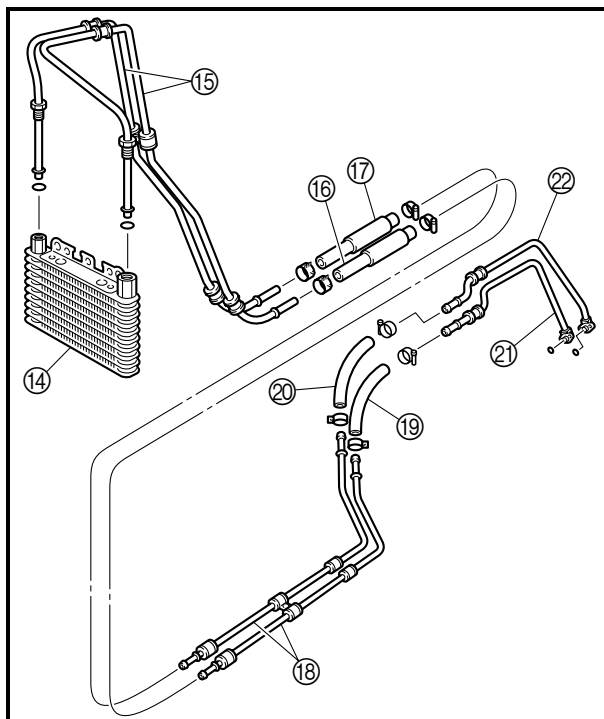
2. Check:

- radiator ①
- coolant reservoir hose ②
- coolant reservoir ③
- radiator inlet hose ④
- radiator outlet hose ⑤
- radiator inlet pipe ⑥
- radiator outlet pipe ⑦
- thermostat outlet hose ⑧
- water pump inlet hose ⑨
- water jacket ⑩
- water pump outlet hose ⑪
- water pump outlet pipe ⑫
- water pump housing ⑬

Cracks/damage → Replace.

Refer to "COOLING SYSTEM" in chapter 5.

- oil cooler ⑭
- oil cooler inlet pipe 1/oil cooler outlet pipe 1 ⑮
- oil cooler inlet hose ⑯
- oil cooler outlet hose ⑰
- oil cooler inlet pipe 2/oil cooler outlet pipe 2 ⑱
- oil outlet hose ⑲
- oil inlet hose ⑳
- oil delivery pipe 3 ㉑
- oil delivery pipe 2 ㉒



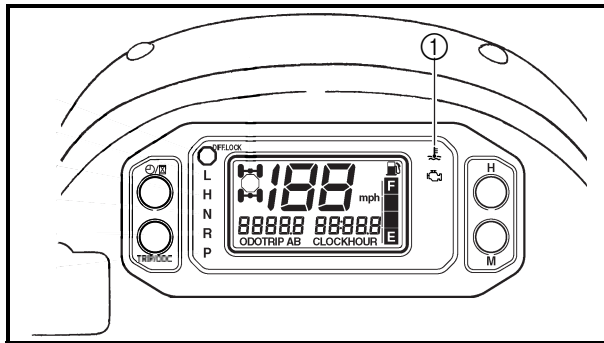
3. Install:

- air intake duct

Refer to “AIR FILTER CASE AND AIR INTAKE DUCT” in chapter 6.

- front console
- side panels
- rear console
- seats

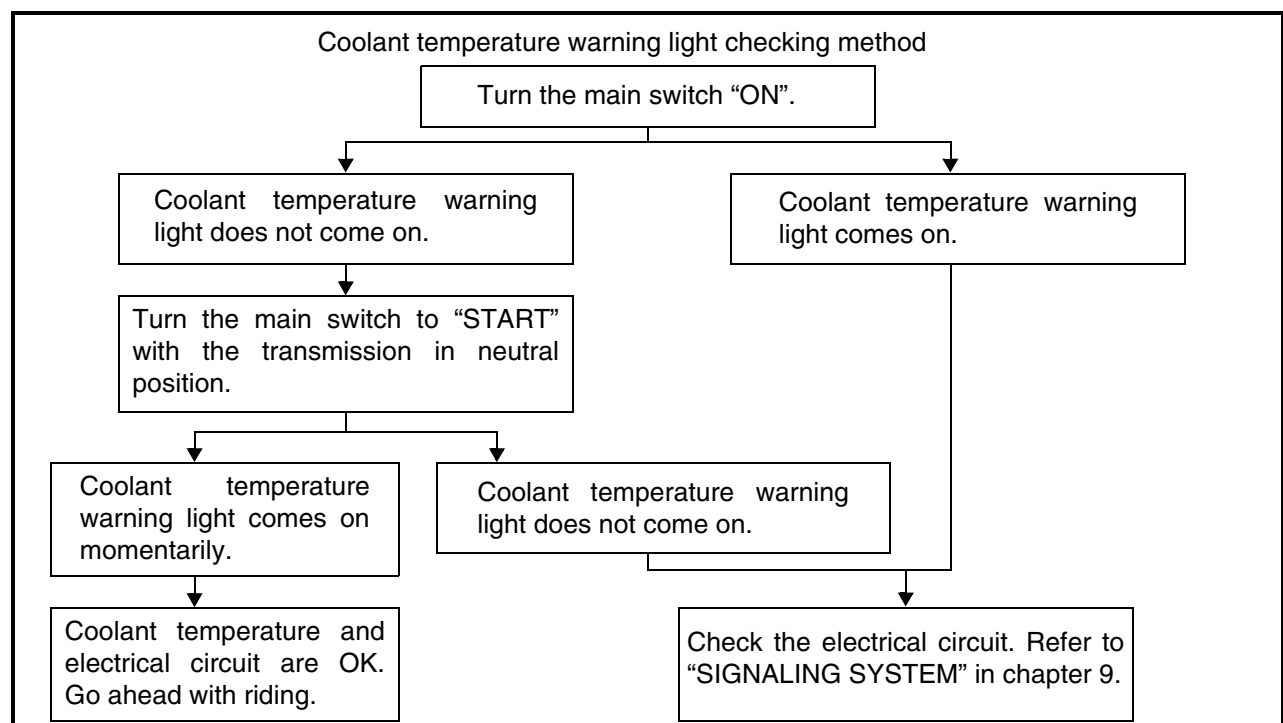
Refer to “SEATS, ENCLOSURE, HOOD AND CARGO BED” in chapter 8.



EBS00077

CHECKING THE COOLANT TEMPERATURE WARNING LIGHT

- ① Coolant temperature warning light





1. Remove:

- drive belt cover

2. Check:

- V-belt ①

Cracks/wear/scaling/chipping → Replace.

3. Measure:

- V-belt width ②

	V-belt width 33.3 mm (1.31 in) <Limit>: 30.0 mm (1.18 in)
---	--

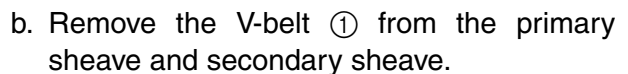


- V-belt

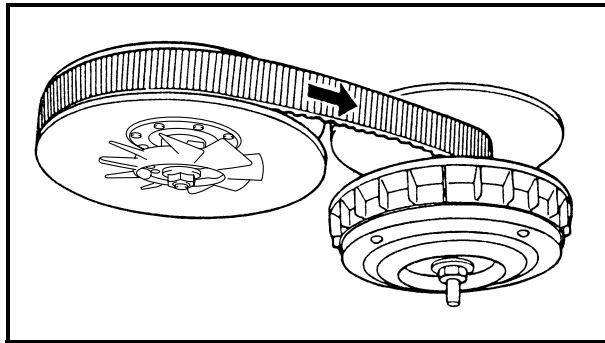
a. Install the bolts ① (90101-06018) into the secondary fixed sheave hold.

TIP:

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



CHECKING AND REPLACING THE V-BELT/ CHECKING THE EXHAUST SYSTEM

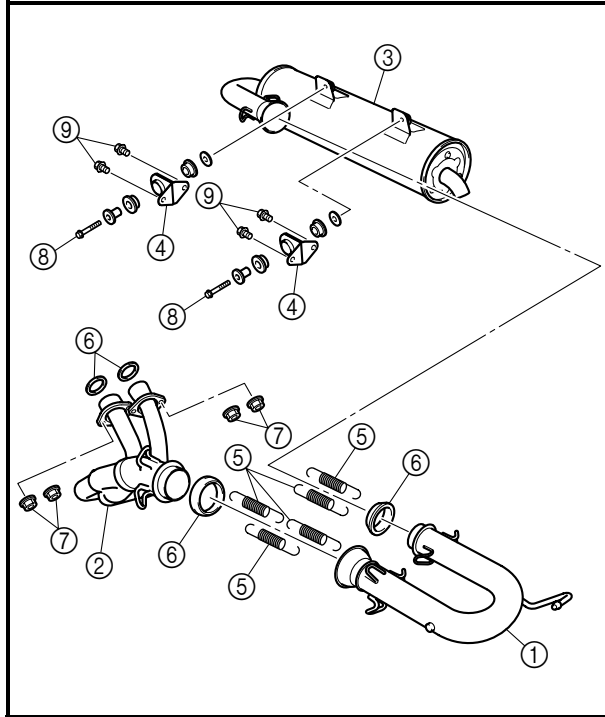


c. Install the new V-belt.

TIP:

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

d. Remove the bolts.



EAS00099

CHECKING THE EXHAUST SYSTEM

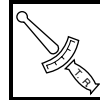
The following procedure applies to all of the exhaust pipe gaskets.

1. Check:

- exhaust pipe 2 ①
- exhaust pipe 1 ②
- muffler ③
- muffler brackets 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 bracket and frame bolt ⑨

30 Nm (3.0 m · kg, 22 ft · lb)

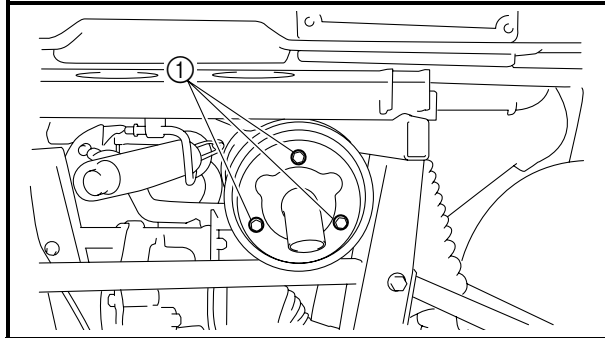
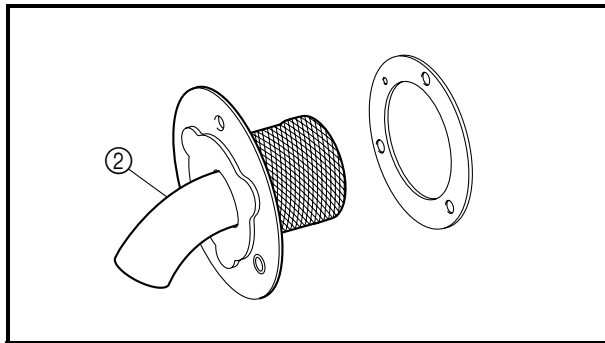
CLEANING THE SPARK ARRESTER

1. Clean:
 - spark arrester



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. 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.
- g. Stop the engine and allow the exhaust pipe to cool.



ADJUSTING THE BRAKE PEDAL

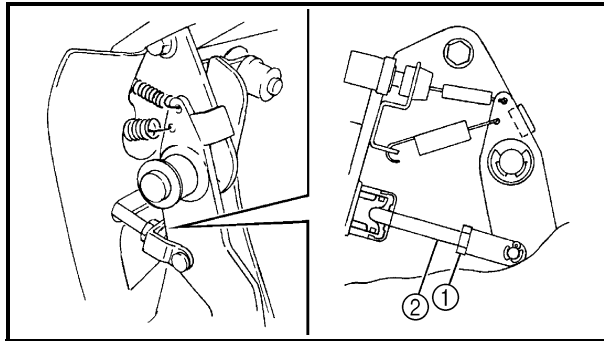
1. Check:
 - brake pedal free play Ⓐ
Out of specification → Adjust.

TIP:

The end of the brake rod ① should lightly contact the brake master cylinder ②.



Brake pedal free play
0 mm (0.0 in)



- 2. Adjust:
 - brake pedal free play

- a. Loosen the locknut ①.
- b. Turn brake rod ② in or out until the correct free play is obtained.

Turning in	Free play is increased.
Turning out	Free play is decreased.

c. Tighten the locknut to specification.



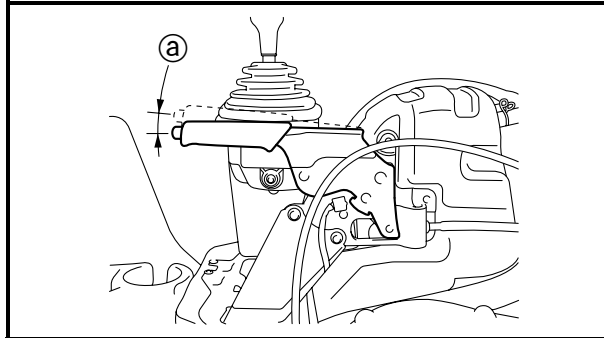
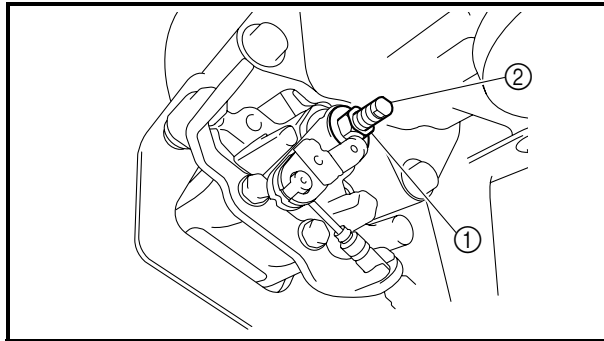
Locknut
17 Nm (1.7 m · kg, 12 ft · lb)

TIP:

Make sure that there is no brake drag on the front or rear wheels.

1. Shift the drive select lever into low gear “L”.
2. Remove:
 - seats
 - rear console

Refer to “SEATS, ENCLOSURE, HOOD AND CARGO BED” in chapter 8.



3. Check:
- parking brake lever free play (a)
The maximum free play is equal to one click of the parking brake lever.
Incorrect → Adjust.

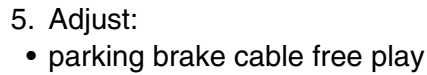
- 4. Adjust:
 - parking brake (mechanical)

- Move the parking brake lever to the released position.
- Remove the spring.
- Loosen the parking brake arm nut ①.
- Turn the push rod ② in fully, and then turn it out 3/4 turn.
- Tighten the parking brake arm nut ①.

 17 Nm (1.7 m · kg, 12 ft · lb)

- f. Install the spring.

CHK
ADJ



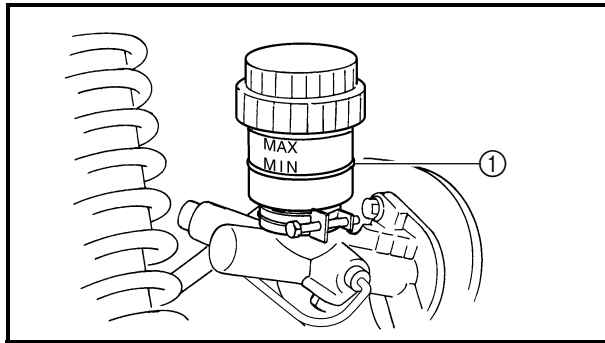
- | | |
|--------------------|--------------------------------|
| Direction ① | Free play is increased. |
| Direction ② | Free play is decreased. |

6. Install:
- rear console
 - seats
- Refer to “SEATS, ENCLOSURE, HOOD AND CARGO BED” in chapter 8.

1. Place the vehicle on a level surface.

2. Lift the hood up.

CHECKING THE BRAKE FLUID LEVEL/ CHECKING THE FRONT BRAKE PADS



3. Check:

- brake fluid level

Fluid level is under “MIN” level line ① → Fill up.



**Recommended brake fluid
DOT 4**

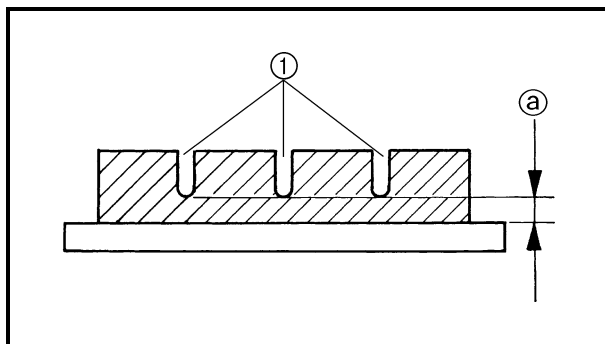
NOTICE

Brake fluid may erode painted surfaces or plastic parts. Always clean up spilled fluid immediately.

⚠ WARNING

- Use only the designed quality brake fluid: otherwise, the rubber seals may deteriorate, causing leakage and poor brake performance.
- Refill with the same type of brake fluid; mixing fluids may result in a harmful chemical reaction and lead to poor performance.
- Be careful that water does not enter the master cylinder when refilling. Water will significantly lower the boiling point of the fluid and may result in a vapor lock.

4. Close the hood.



CHECKING THE FRONT BRAKE PADS

1. Remove:

- front wheels

Refer to “FRONT AND REAR WHEELS” in chapter 8.

2. Check:

- brake pads

Wear indicator grooves ① almost disappeared → Replace the brake pads as a set. Refer to “FRONT AND REAR BRAKES” in chapter 8.



**Brake pad wear limit ②
1.5 mm (0.06 in)**

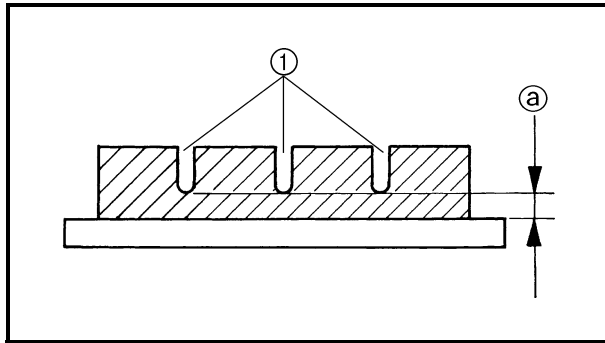
3. Operate the brake pedal.

4. Install:

- front wheels

Refer to “FRONT AND REAR WHEELS” in chapter 8.

CHECKING THE REAR BRAKE PADS/ CHECKING THE PARKING BRAKE PADS



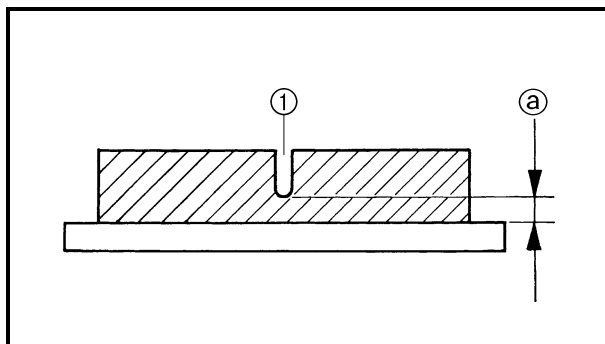
CHECKING THE REAR BRAKE PADS

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



Brake pad wear limit ②
1.5 mm (0.06 in)

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



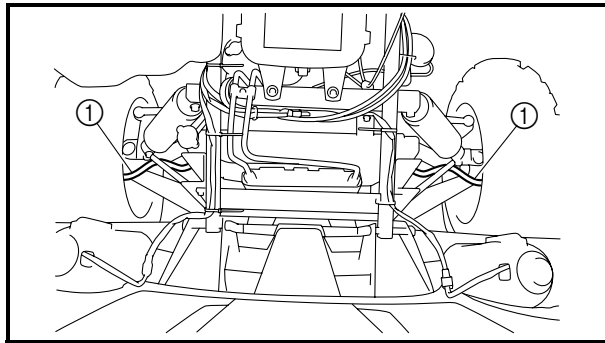
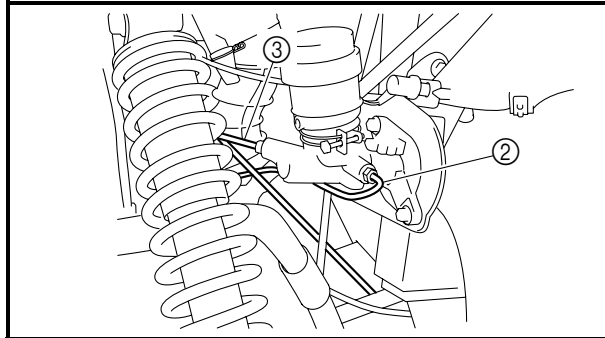
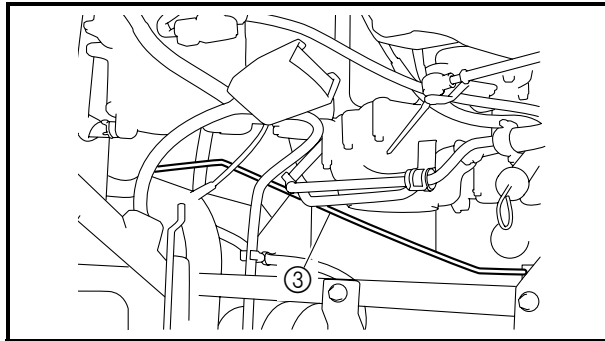
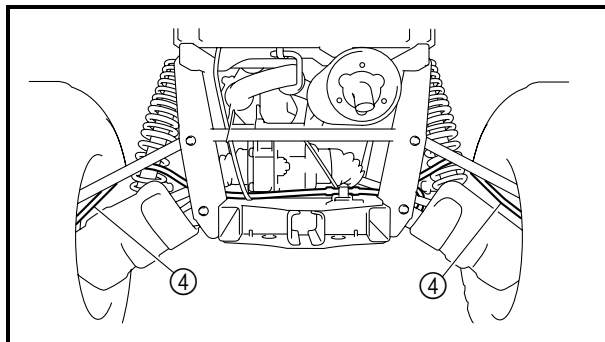
CHECKING THE PARKING BRAKE PADS

1. Check:
 - brake pads
Wear indicator groove ① almost disappeared → Replace the brake pads as a set.
Refer to "PARKING BRAKE" in chapter 8.



Brake pad wear limit ②
1.0 mm (0.04 in)

2. Operate the parking brake.



CHECKING THE BRAKE HOSES AND BRAKE PIPES

1. Remove:

- seats
- rear console

Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.

2. Lift the hood up.

3. Lift the cargo bed.

4. Check:

- front brake hoses ①
- front brake pipe ②
- rear brake pipes ③
- rear brake hoses ④

Cracks/wear/damage → Replace.

Fluid leakage → Replace all damaged parts.

Refer to "FRONT AND REAR BRAKES" in chapter 8.

TIP:

Hold the vehicle in an upright position and apply the brake pedal.

5. Check:

- brake hose holders
- Loosen → Tighten.

6. Lower the cargo bed.

7. Close the hood.

8. Install:

- rear console
- seats

Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.

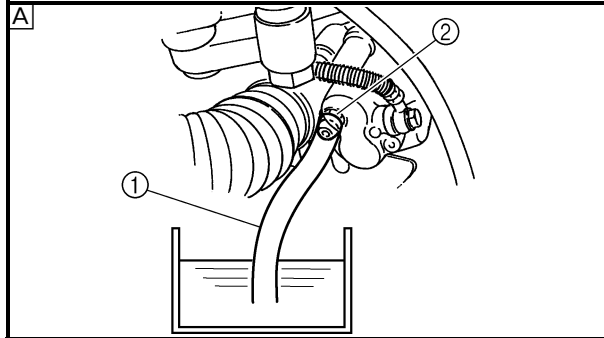
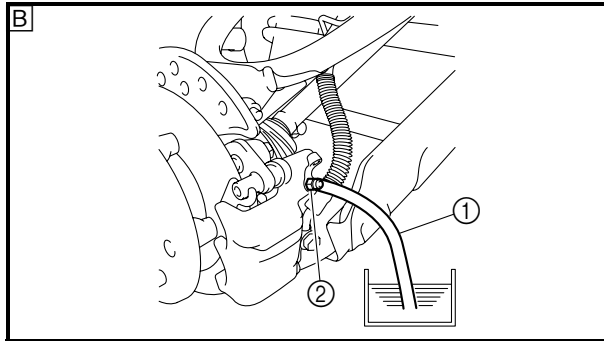
BLEEDING THE HYDRAULIC BRAKE SYSTEM

WARNING

Bleed the brake system if:

- The system has been disassembled.
- A brake hose or brake pipe have been loosened or removed.
- The brake fluid has been very low.
- The brake operation has been faulty.

A loss of braking performance may occur if the brake system is not properly bled.



1. Bleed:
 - brake system



- a. Add the proper brake fluid to the reservoir.
- b. Install the diaphragm. Be careful not to spill any fluid or allow the reservoir to overflow.
- c. Connect a clear plastic hose ① tightly to the caliper bleed screw ②.

A Front

B Rear

- d. Place the other end of the hose into a container.
- e. Slowly apply the brake pedal several times.
- f. Push down on the pedal and hold it.
- g. Loosen the bleed screw and allow the pedal to travel towards its limit.
- h. Tighten the bleed screw when the pedal limit has been reached, then release the pedal.
- i. Repeat steps (e) to (h) until all the air bubbles have disappeared from the fluid.
- j. Tighten the bleed screw.

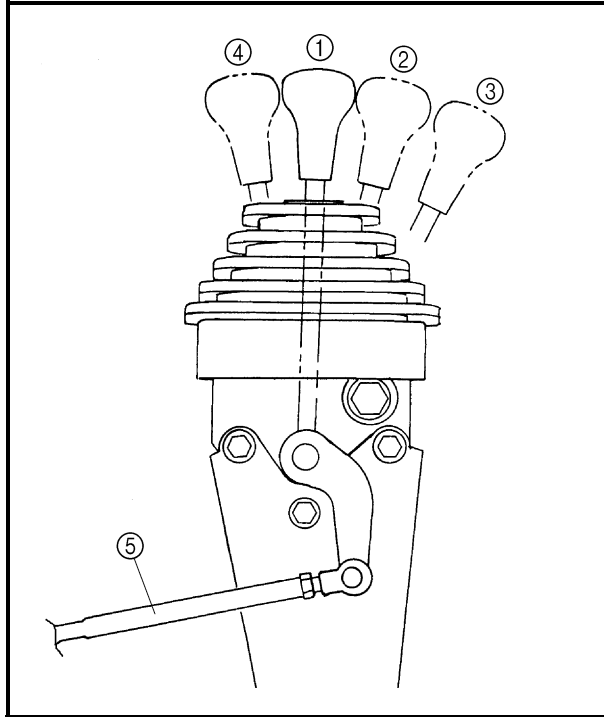
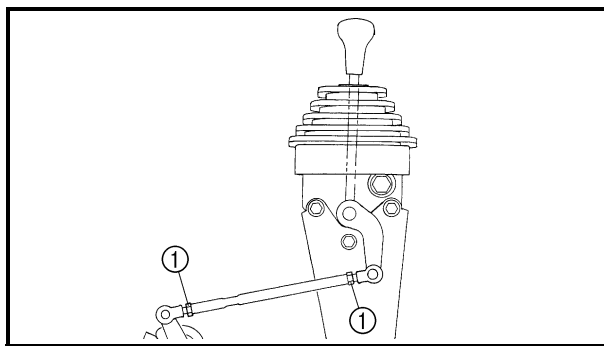


Brake caliper bleed screw
5 Nm (0.5 m · kg, 3.6 ft · lb)

TIP:

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 system have disappeared.

- ⚠ WARNING**



- ① Neutral
- ② High
- ③ Low
- ④ Reverse
- ⑤ Select lever shift rod

Before shifting, you must stop the vehicle and take your foot off the accelerator pedal. Otherwise, the transmission may be damaged.

-

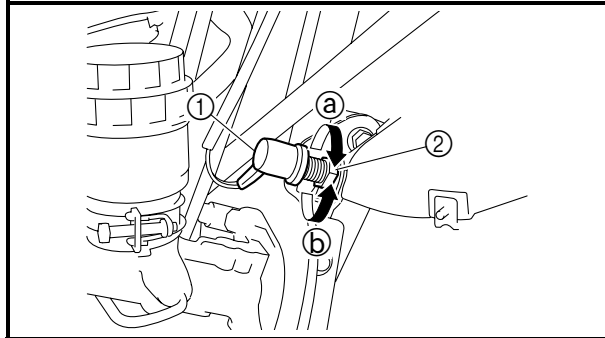
- NOTICE**

- c. Adjust the shift rod length for smooth and correct shifting.
- d. Tighten the locknuts ①.



TIP: —

- The brake light switch is operated by movement of the brake pedal.
- The brake light switch is properly adjusted when the brake light comes on just before the braking effect starts.

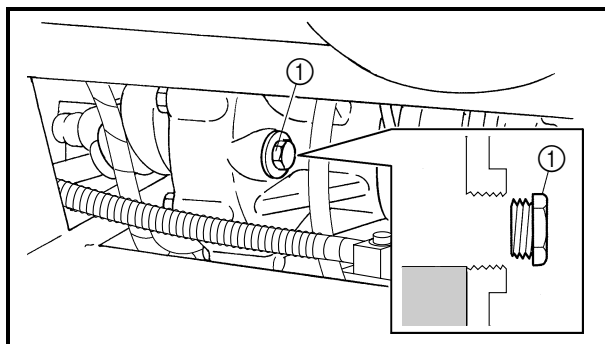


1. Open the hood.
2. Check:
 - brake light operation timing
Incorrect → Adjust.
3. Adjust:
 - brake light operation timing

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

Direction ①	Brake light comes on sooner.
Direction ②	Brake light comes on later.

4. Close the hood.



1. Place the vehicle on a level surface.

2. Remove:
 - oil filler plug ①
3. Check:
 - oil level

Oil level should be up to the brim of the hole.

Oil level low → Add oil to the proper level.



Recommended oil
SAE 80 API "GL-4" Hypoid gear oil

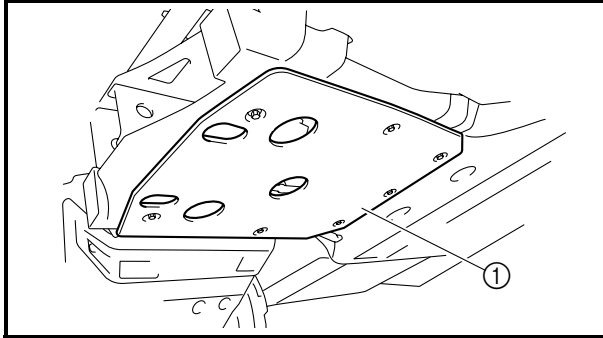
NOTICE

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

4. Install:

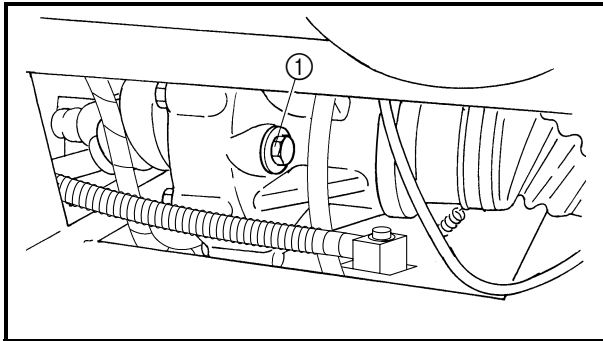
- oil filler plug

 **23 Nm (2.3 m · kg, 17 ft · lb)**



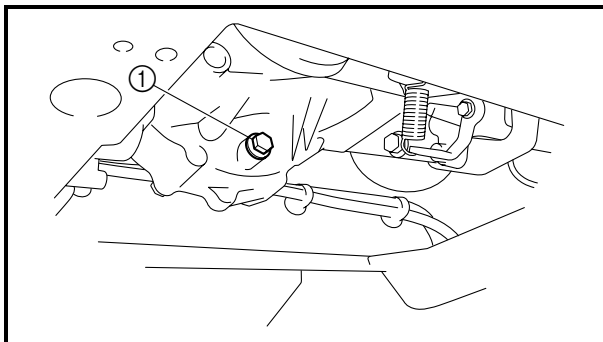
CHANGING THE FINAL GEAR OIL

1. Place the vehicle on a level surface.
2. Remove:
 - rear skid plate ①
3. Place a container under the final gear case to collect the used oil.



4. Remove:

- oil filler plug ①



5. Remove:

- drain plug ①

6. Drain:

- final gear oil

7. Install:

- drain plug

 **20 Nm (2.0 m · kg, 14 ft · lb)**

TIP:

Check the drain plug gasket. If it is damaged, replace it with a new one.

8. Fill:
- final gear case

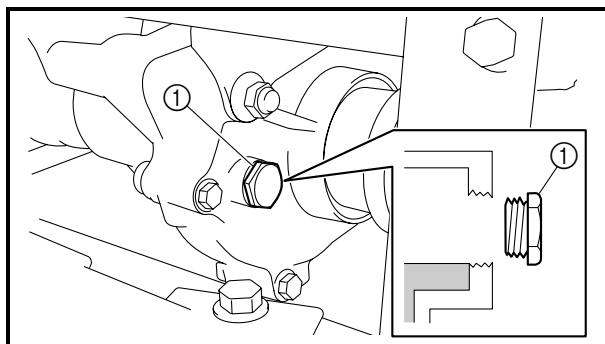


Periodic oil change
0.25 L (0.22 Imp qt, 0.26 US qt)
Total amount
0.28 L (0.25 Imp qt, 0.30 US qt)
Recommended oil
SAE 80 API "GL-4" Hypoid gear oil

NOTICE

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

9. Install:
- oil filler plug  23 Nm (2.3 m · kg, 17 ft · lb)
10. Install:
- rear skid plate  7 Nm (0.7 m · kg, 5.1 ft · lb)



CHECKING THE DIFFERENTIAL GEAR OIL

1. Place the vehicle on a level surface.
2. Remove:
 - oil filler plug ①

3. Check:

- oil level

Oil level should be up to the brim of hole.

Oil level low → Add oil to proper level.



Recommended oil
SAE 80 API "GL-4" Hypoid gear
oil

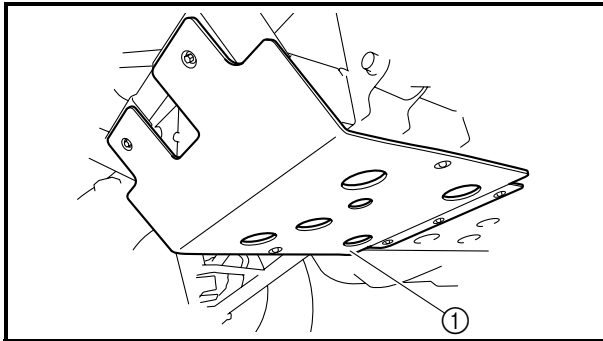
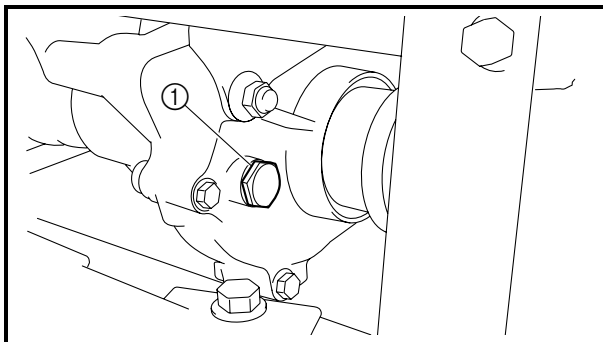
NOTICE

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

4. Install:

- oil filler plug

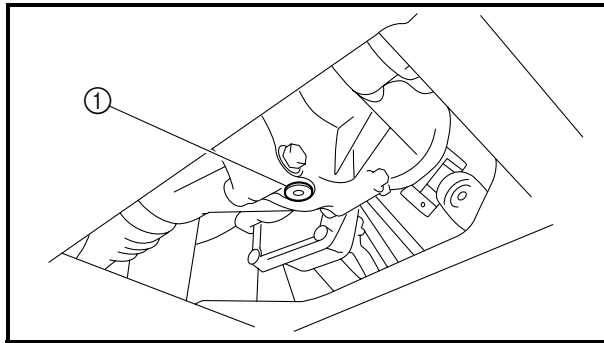
23 Nm (2.3 m · kg, 17 ft · lb)



CHANGING THE DIFFERENTIAL GEAR OIL

1. Place the vehicle on a level surface.
2. Place a receptacle under the differential gear case.
3. Remove:
 - front skid plate ①

4. Remove:
 - oil filler plug ①



5. Remove:
 - drain plug ①
6. Drain:
 - differential gear oil
7. Install:
 - drain plug  **10 Nm (1.0 m · kg, 7.2 ft · lb)**

TIP: _____
Check the gasket (drain plug). If it is damaged, replace it with new one.

8. Fill:
 - differential gear case



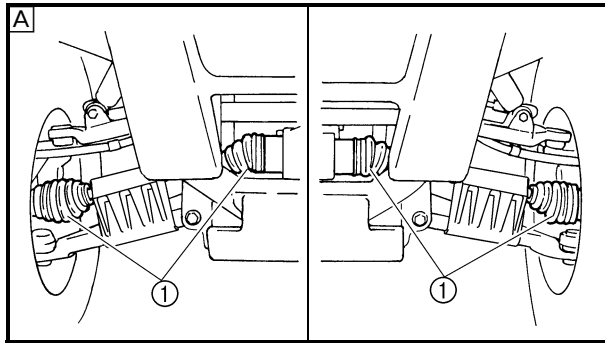
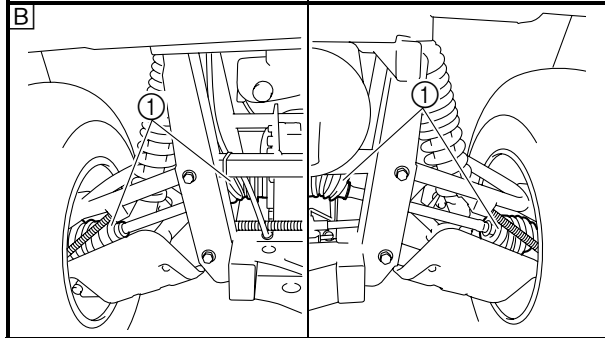
Periodic oil change
0.18 L (0.16 Imp qt, 0.19 US qt)
Total amount
0.20 L (0.18 Imp qt, 0.21 US qt)
Recommended oil
SAE 80 API “GL-4” Hypoid gear oil

NOTICE

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

9. Install:
 - oil filler plug  **23 Nm (2.3 m · kg, 17 ft · lb)**
10. Install:
 - front skid plate  **7 Nm (0.7 m · kg, 5.1 ft · lb)**

CHECKING THE CONSTANT VELOCITY JOINT DUST BOOTS/CHECKING THE STEERING SYSTEM



CHECKING THE CONSTANT VELOCITY JOINT DUST BOOTS

1. Check:

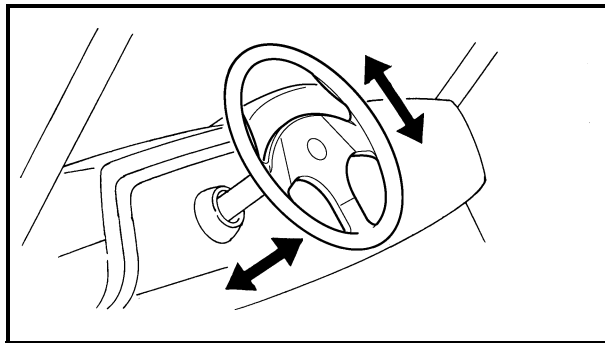
- dust boots ①

Damage → Replace.

Refer to "FRONT CONSTANT VELOCITY JOINTS, DIFFERENTIAL GEAR AND DRIVE SHAFT" in chapter 7.

A Front

B Rear



CHECKING THE STEERING SYSTEM

1. Place the vehicle on a level surface.

2. Check:

- steering assembly bearings

Try to move the steering wheel up and down, and back and forth.

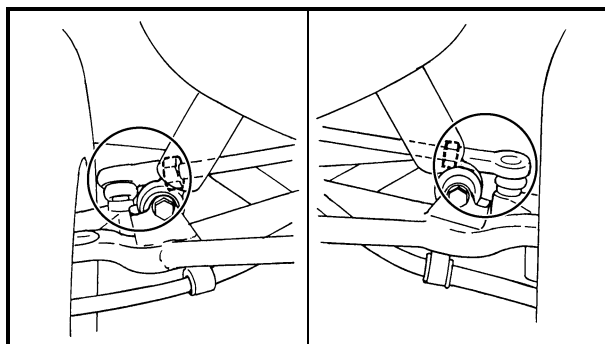
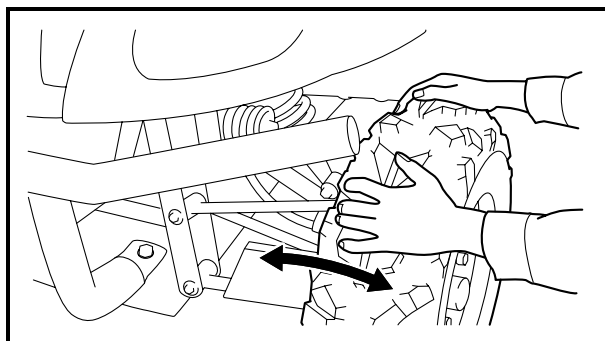
Excessive play → Replace the steering shaft assembly.

3. Check:

- tie-rod ends

Turn the steering wheel to the left and right until it stops completely, and then move the steering wheel slightly in the opposite direction.

Vertical play → Replace the tie-rod end.



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.

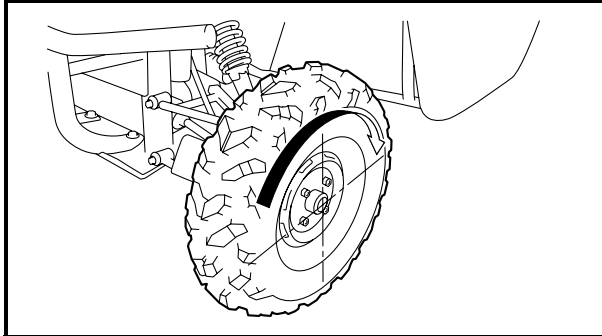
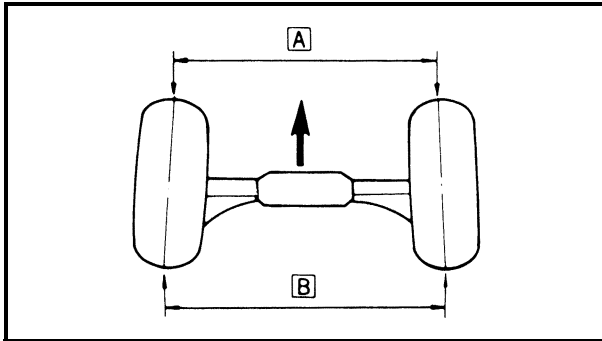
Excessive free play → Replace the front arms (upper and lower) and/or wheel bearings.

ADJUSTING THE TOE-IN

1. Place the vehicle on a level surface.
2. Measure:
 - toe-inOut of specification → Adjust.



Toe-in
15 ~ 25 mm (0.59 ~ 0.98 in)
(with tires touching the ground)



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

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

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

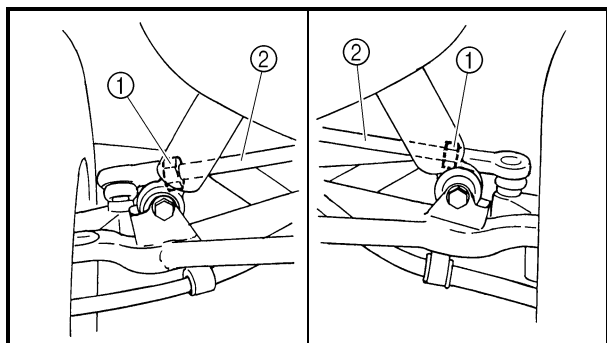
- g. If the toe-in is incorrect, adjust it.

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 steering wheel 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 steering wheel and check that the steering wheel responds correctly. If not, turn either the right or left tie-rod within the toe-in specification.

ADJUSTING THE TOE-IN/ADJUSTING THE FRONT SHOCK ABSORBERS



- Mark both tie-rods ends.
This reference point will be needed during adjustment.
- Loosen the locknut (tie-rod end) ① on each tie-rod.
- 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.
- Tighten the rod end locknut on each tie-rod.



Locknut (rod end)
40 Nm (4.0 m · kg, 29 ft · lb)

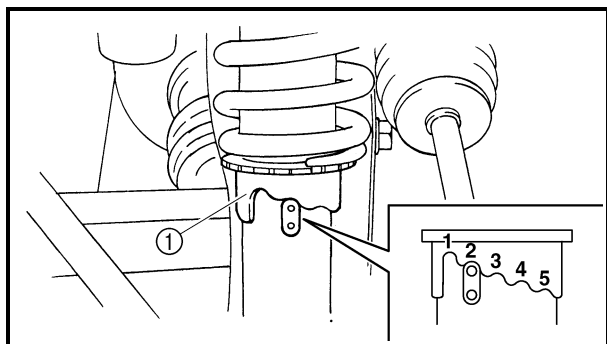


ADJUSTING THE FRONT SHOCK ABSORBERS

For models equipped with oil damper shock absorbers

WARNING

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



TIP:

The spring preload of the shock absorbers can be adjusted to suit the operator's preference, weight, and the operating conditions.

- Adjust:
 - spring preload
Turn the adjuster ① to increase or decrease the spring preload.

Standard position: 2
Minimum (Soft) position: 1
Maximum (Hard) position: 5



Ring nut wrench
90890-01268
Spanner wrench
YU-01268

CHK
ADJ

⚠ WARNING

Always adjust the spring preload, rebound damping force and compression damping force of both front shock absorbers to the same setting. Uneven adjustment can result in poor handling and loss of stability.

- Elevate the front wheels by placing a suitable stand under the frame.
- Loosen the locknut ① with the ring nut wrench ②.



Ring nut wrench
90890-01268
Spanner wrench
YU-01268

- c. Turn the adjusting ring ③ in direction ④ or ⑤.

Direction ①	Spring preload is increased (suspension is harder).
Direction ②	Spring preload is decreased (suspension is softer).

Adjusting length ©
Standard: 67 mm (2.64 in)
Minimum: 62 mm (2.44 in)
Maximum: 77 mm (3.03 in)

TIP: _____

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

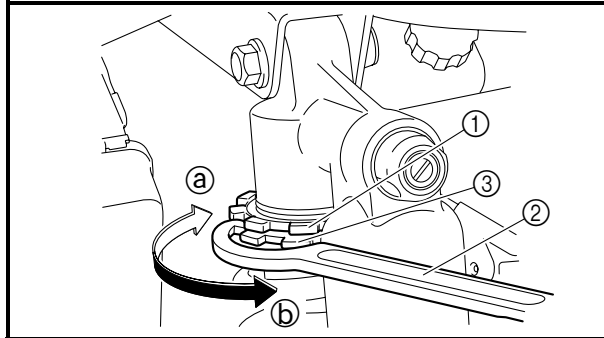
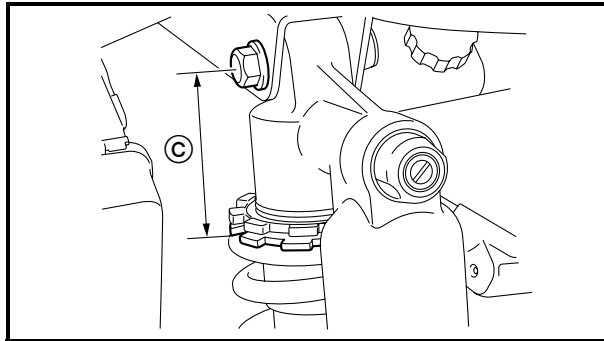
NOTICE

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

- d. Tighten the locknut to specification.



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



CHK
ADJ

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

- rebound damping force

From the fully turned-in position
Standard: 10 clicks out
Minimum: 12 clicks out
Maximum: 9 clicks out

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

- compression damping force

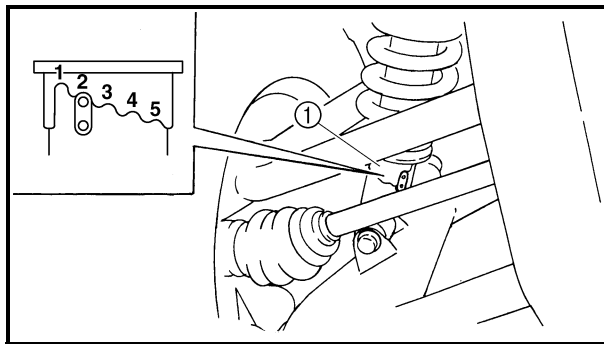
From the fully turned-in position
Standard: 10 clicks out
Minimum: 12 clicks out
Maximum: 9 clicks out

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



⚠ WARNING

The spring preload of the shock absorbers can be adjusted to suit the operator's preference, weight, and the operating conditions.



- Standard position: 2**
Minimum (Soft) position: 1
Maximum (Hard) position: 5



Ring nut wrench
90890-01268
Spanner wrench
YU-01268

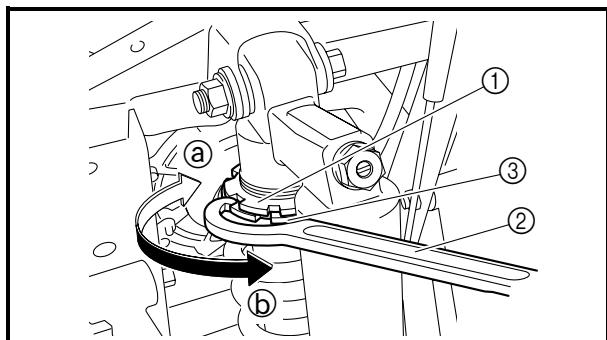
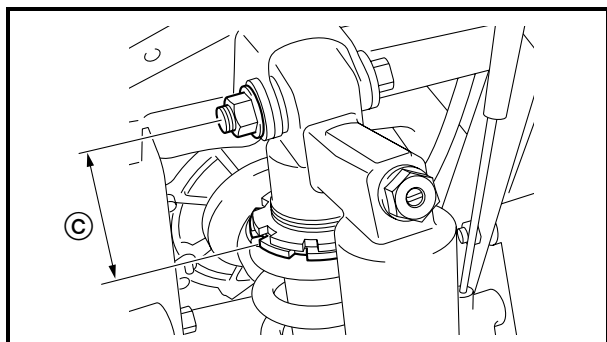
CHK
ADJ

For models equipped with gas-oil damper shock absorbers

⚠ WARNING

Always adjust the spring preload, rebound damping force and compression damping force of both rear shock absorbers to the same setting. Uneven adjustment can result in poor handling and loss of stability.

1. Adjust:
 - spring preload



- a. Elevate the rear wheels by placing a suitable stand under the frame.
- b. Loosen the locknut ① with the ring nut wrench ②.



Ring nut wrench
90890-01268
Spanner wrench
YU-01268

- c. Turn the adjusting ring ③ in direction ④ or ⑤

Direction ①	Spring preload is increased (suspension is harder).
Direction ②	Spring preload is decreased (suspension is softer).

Adjusting length ㉔
Standard: 63.5 mm (2.50 in)
Minimum: 63.5 mm (2.50 in)
Maximum: 78.5 mm (3.09 in)

TIP: —

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

NOTICE

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

- d. Tighten the locknut to specification.



Locknut
42 Nm (4.2 m · kg, 30 ft · lb)

CHK
ADJ

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

- rebound damping force

From the fully turned-in position
Standard: 12 clicks out
Minimum: 20 clicks out
Maximum: 3 clicks out

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

- compression damping force

From the fully turned-in position
Standard: 7 clicks out
Minimum: 12 clicks out
Maximum: 2 clicks out

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



⚠ WARNING

	Manufacturer	Size	Type
Front	MAXXIS	25 × 8.00-12NHS	M951Y
Rear	MAXXIS	25 × 10.00-12NHS	M952Y

3 - 51

• MAXIMUM LOADING LIMIT

1) Vehicle loading limit (total weight of cargo, operator, passenger and accessories, and tongue weight):

For models equipped with oil damper shock absorbers: 367 kg (809 lb)

For models equipped with gas-oil damper shock absorbers: 359 kg (791 lb)

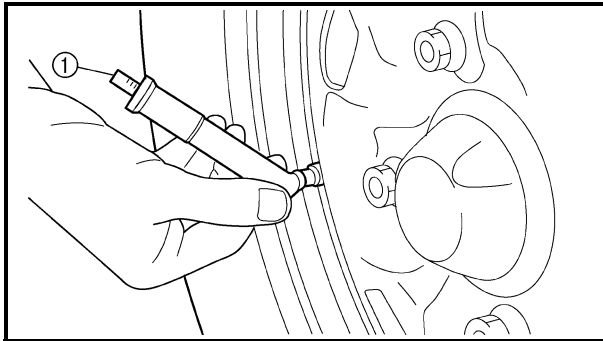
2) Cargo bed: 181 kg (400 lb)

3) Trailer hitch:

Pulling load (total weight of trailer and cargo): 550 kg (1,212 lb)

Tongue weight (vertical weight on trailer hitch point): 50 kg (110 lb)

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



1. Measure:

- tire pressure (cold tire pressure)
Out of specification → Adjust.

TIP:

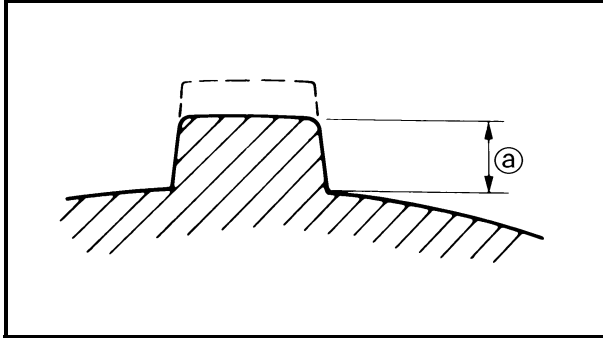
- A tire pressure gauge ① is included as standard equipment.
- If dust or the like is stuck to this gauge, it will not provide the correct readings. Therefore, take two measurements of the tire's pressure and use the second reading.

Cold tire pressure	Front	Rear
Standard	70 kPa (0.70 kg/cm ² , 10 psi)	98 kPa (0.98 kg/cm ² , 14 psi)
Minimum	63 kPa (0.63 kg/cm ² , 9 psi)	91 kPa (0.91 kg/cm ² , 13 psi)
Maximum	77 kPa (0.77 kg/cm ² , 11 psi)	105 kPa (1.05 kg/cm ² , 15 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

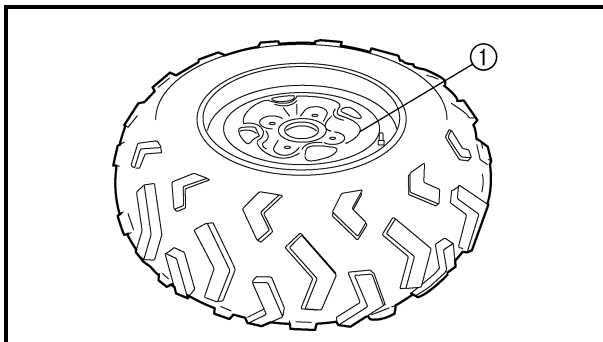
Wear/damage → Replace.



Tire wear limit ^a
Front and rear: 3.0 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.



CHECKING THE WHEELS

1. Check:

- wheels ①

Damage/bends → Replace.

TIP:

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.

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
---	---

TIP:

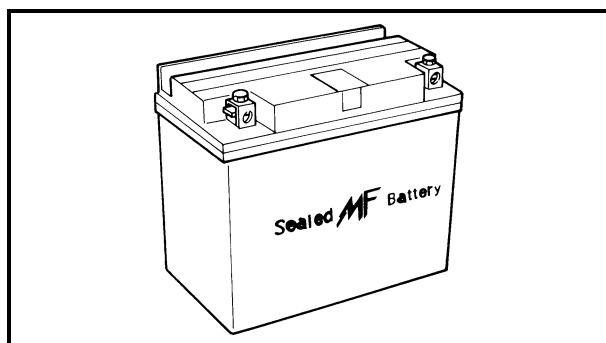
Hold the cable end up and apply several drops of lubricant to the cable.

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

LUBRICATING THE PEDALS, ETC.

1. Lubricate the pivoting parts.

	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

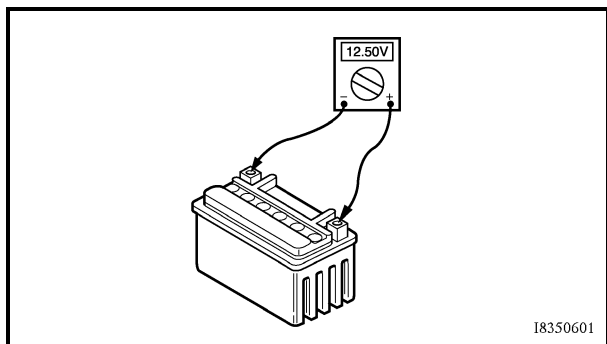
- Drink large quantities of water or milk followed with milk of magnesia, beaten egg or vegetable oil. Get immediate medical attention.

NOTICE

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

CHK
ADJ

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.



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

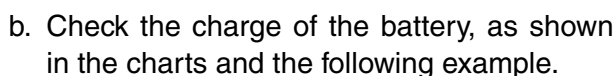
First, disconnect the negative battery lead ①, and then the positive battery lead ②.

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

- a. Connect a pocket tester to the battery terminals.

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

- 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.



- c. Open-circuit voltage = 12.0 V
- d. Charging time = 6.5 hours
- e. Charge of the battery = 20 ~ 30%



Do not quick charge a battery.

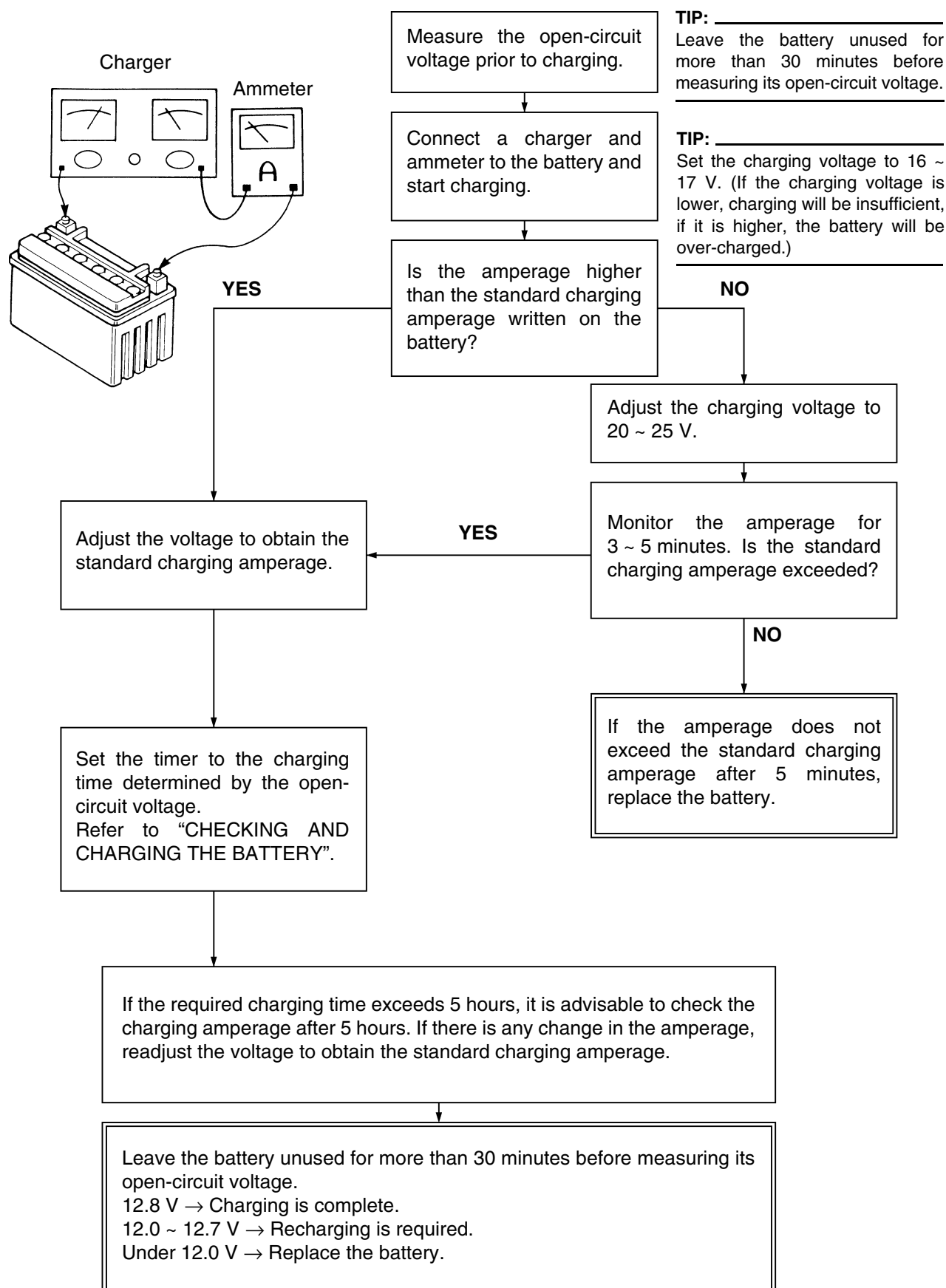


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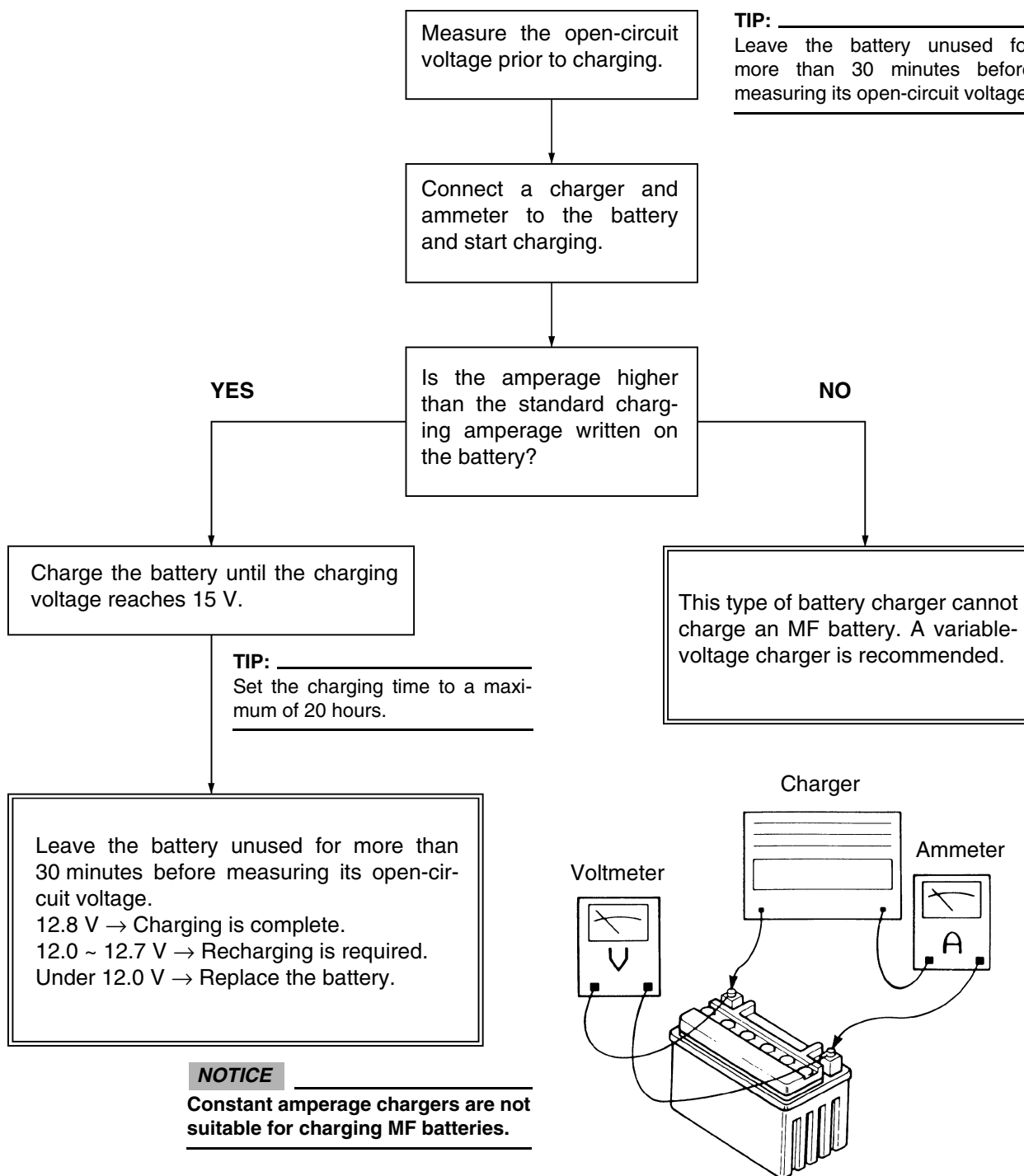


- If the battery becomes hot to the touch at any time during the charging process, disconnect the battery charger and let the battery cool before reconnecting it. Hot batteries can explode!
 - As shown in the following illustration, the open-circuit voltage of an MF battery stabilizes about 30 minutes after charging has been completed. Therefore, wait 30 minutes after charging is completed before measuring the open-circuit voltage.
-

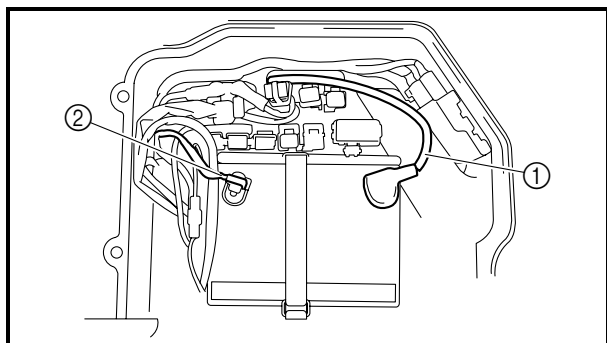
Charging method using a variable-current (voltage) charger



Charging method using a constant voltage charger



CHECKING AND CHARGING THE BATTERY/ CHECKING THE FUSES



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

NOTICE

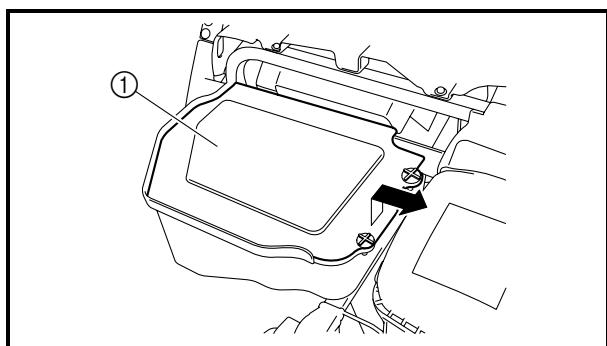
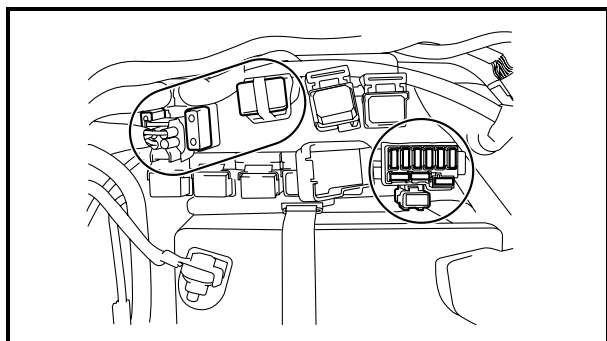
First, connect the positive battery lead ①, and then the negative battery lead ②.

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



Recommended lubricant
Dielectric grease

10. Install:
 - battery cover



EBS00121

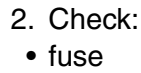
CHECKING THE FUSES

The following procedure applies to all of the fuses.

NOTICE

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

1. Remove:
 - battery cover ①



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

Set the pocket tester selector to “ $\Omega \times 1$ ”.



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

- b. If the pocket tester indicates “∞”, replace the fuse.

3. Replace:
- blown fuse

- Set the main switch to “OFF”.
- Install a new fuse of the correct amperage.
- Set on the switches to verify if the electrical circuit is operational.

- | Items | Amperage rating | Q'ty |
|-----------------------------|-----------------|------|
| Main fuse | 40 A | 1 |
| Backup fuse | 10 A | 1 |
| Fuel injection system fuse | 10 A | 1 |
| Ignition fuse | 10 A | 1 |
| Headlight fuse | 15 A | 1 |
| Four-wheel-drive motor fuse | 10 A | 1 |
| Radiator fan motor fuse | 25 A | 1 |
| Signaling system fuse | 10 A | 1 |
| Auxiliary DC jack fuse | 10 A | 1 |
| Spare fuse | 25 A | 1 |
| | 15 A | 1 |
| | 10 A | 1 |

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.

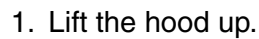
4. Install:

- battery cover



1. Adjust:

- a. Turn the adjusting screw ① in direction ② or ③.

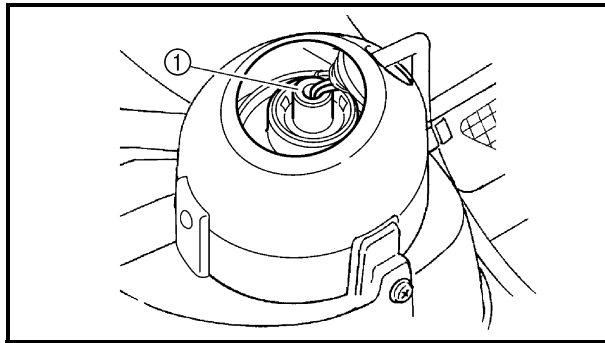
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- cover at the rear of the headlight ①



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CHANGING THE HEADLIGHT BULBS/ CHANGING THE TAIL/BRAKE LIGHT BULB



4. Remove:
 - headlight bulb holder ①
 - bulb

TIP:

Remove the headlight bulb holder by pushing it in and turning it counterclockwise.

⚠ WARNING

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

5. Install:

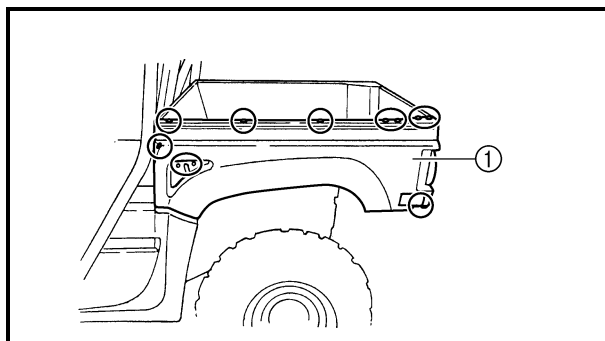
- bulb **New**

Secure the new bulb with the headlight bulb holder.

NOTICE

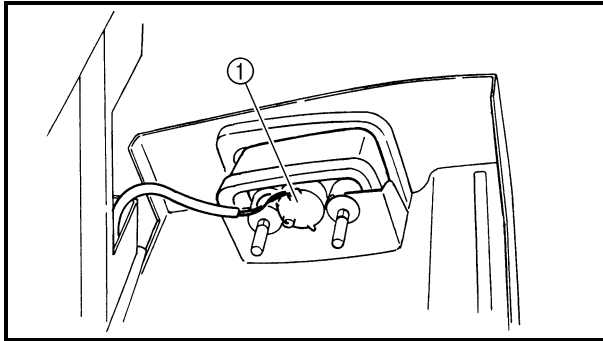
Avoid touching the glass part of the bulb. Keep it free from oil; otherwise, the transparency of the glass, life of the bulb, and luminous flux will be adversely affected. If oil gets on the bulb, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.

6. Install:
 - headlight bulb holder
 - headlight bulb holder cover
 - cover at the rear of the headlight
7. Close the hood.
8. Install:
 - headlight bulb holder (with bulb)
 - headlight bulb holder cover
9. Close the hood.



CHANGING THE TAIL/BRAKE LIGHT BULB

1. Lift the cargo bed up.
2. Remove:
 - cargo bed panel ①



3. Remove:

- tail/brake light bulb holder (with bulb) ①
- bulb

TIP:

Turn the bulb holder counterclockwise and remove the defective bulb.

⚠ WARNING

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

4. Install:

- bulb **New**

Secure the new bulb with the tail/brake light bulb holder.

NOTICE

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.

5. Install:

- tail/brake light bulb holder (with bulb)

6. Install:

- cargo bed panel

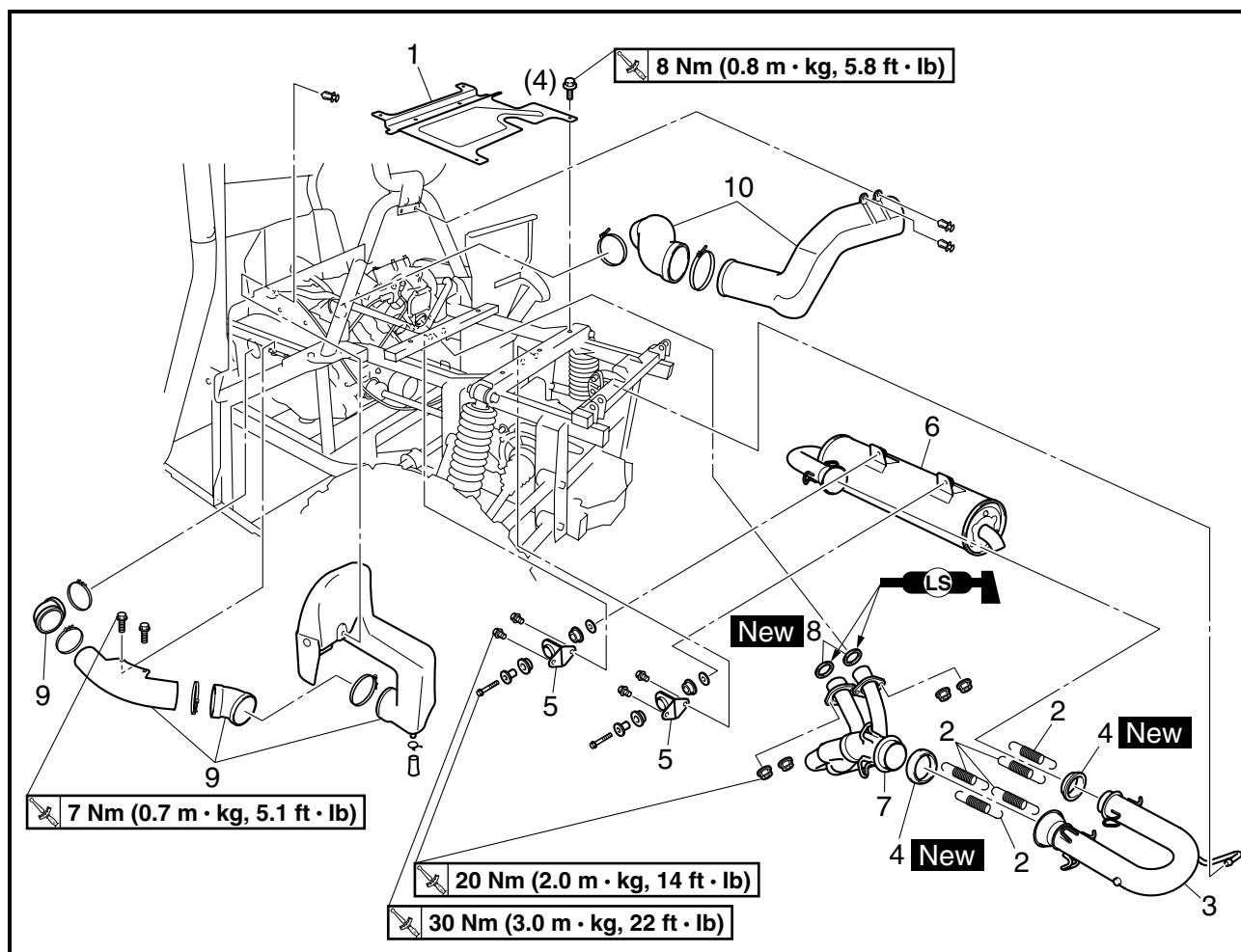
 7 Nm (0.7 m · kg, 5.1 ft · lb)



ENGINE

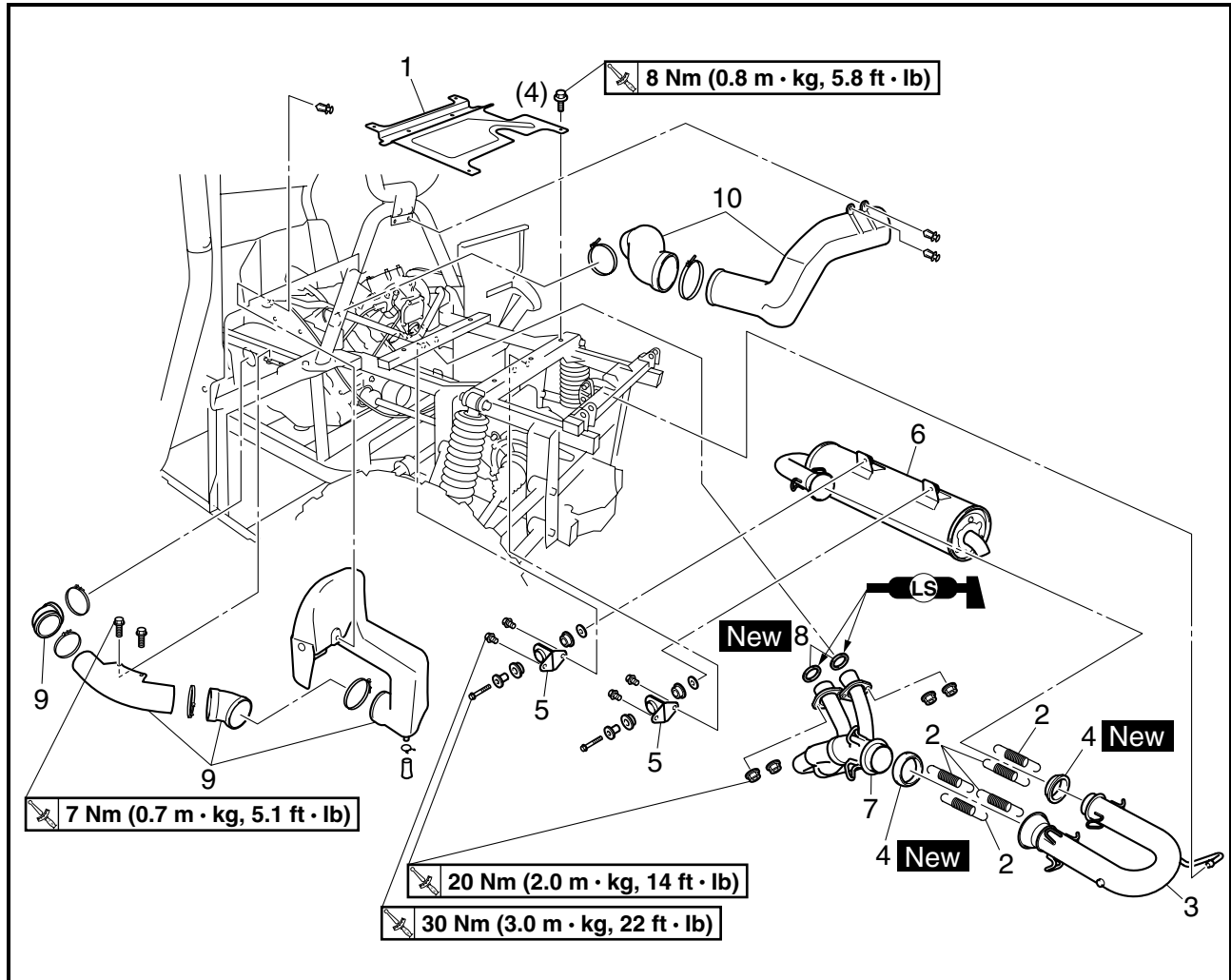
ENGINE REMOVAL

V-BELT COOLING DUCTS, MUFFLER AND EXHAUST PIPES

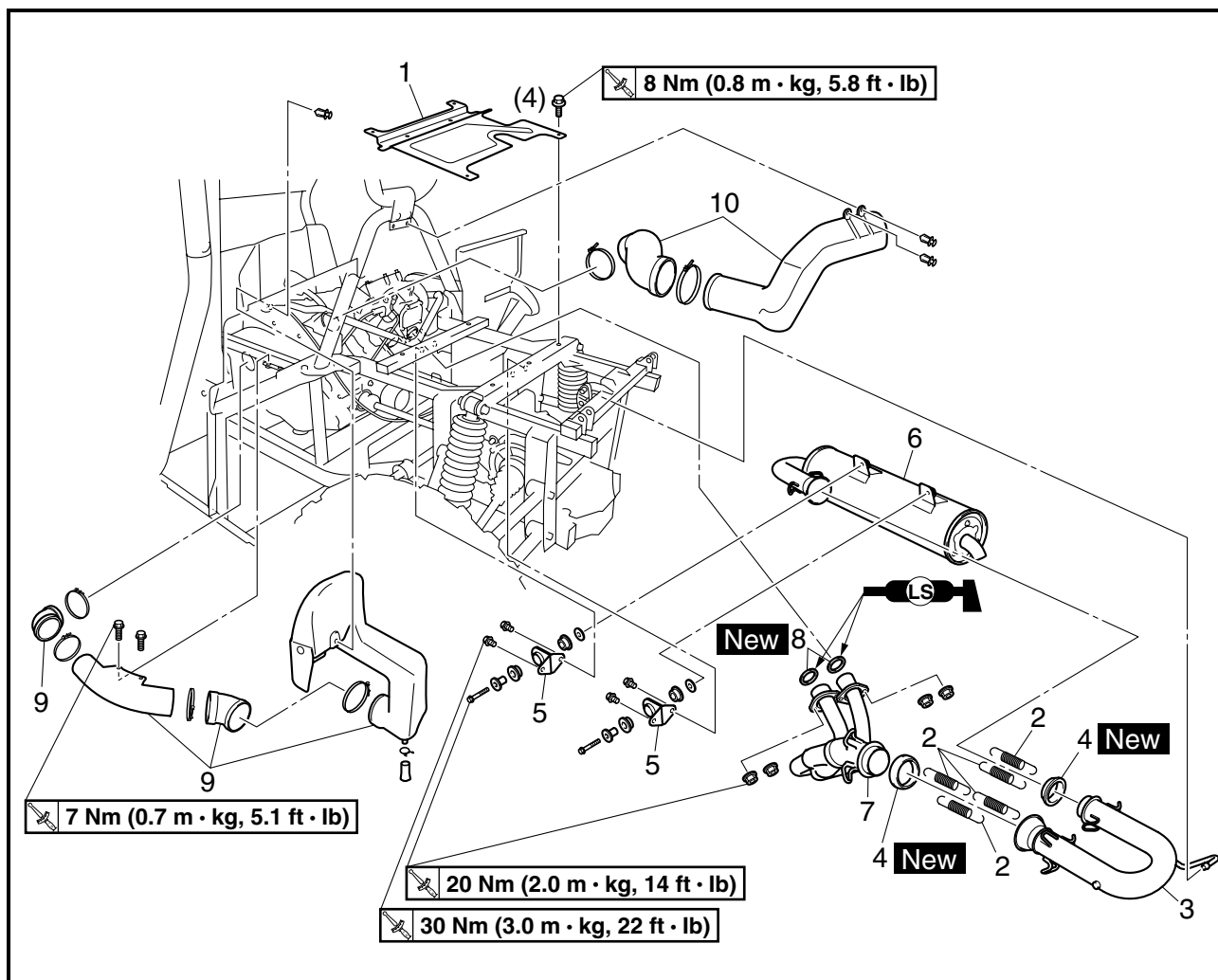


4

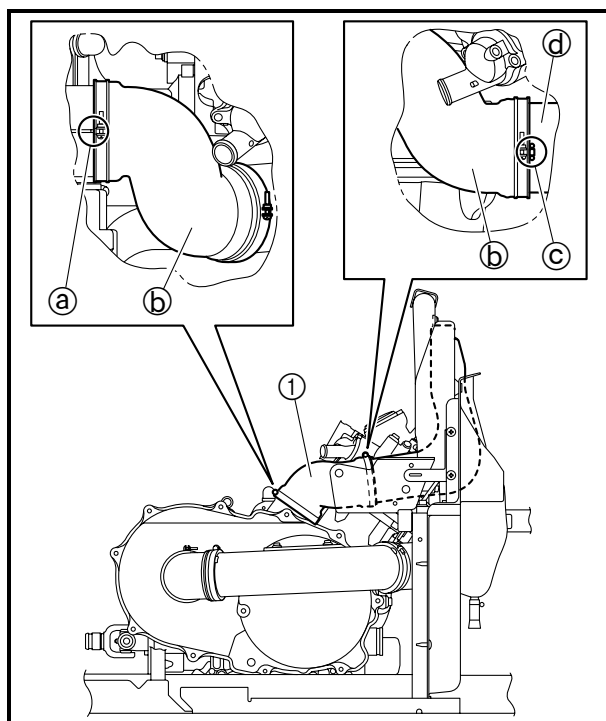
Order	Job/Part	Q'ty	Remarks
	Removing the V-belt cooling ducts, muffler and exhaust pipes		Remove the parts in the order listed.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
	Seats/rear console		Refer to "SEATS, REAR CONSOLE AND INSTRUMENT PANELS" in chapter 8.
	Left protector		Refer to "PANELS AND FRONT CONSOLE" in chapter 8.
	Cargo bed		Refer to "CARGO BED" in chapter 8.
	Air intake duct		Refer to "AIR FILTER CASE AND AIR INTAKE DUCT" in chapter 6.



Order	Job/Part	Q'ty	Remarks
	Throttle body assembly		Refer to "THROTTLE BODY" in chapter 6.
	Fuel tank		Refer to "FUEL PUMP AND FUEL TANK" in chapter 6.
	Front drive shaft		Refer to "FRONT CONSTANT VELOCITY JOINTS, DIFFERENTIAL GEAR AND DRIVE SHAFT" in chapter 7.
	Rear drive shaft		Refer to "REAR CONSTANT VELOCITY JOINTS, FINAL DRIVE GEAR AND DRIVE SHAFT" in chapter 7.
1	Heat protector	1	
2	Spring	5	
3	Exhaust pipe 2	1	
4	Gasket	2	
5	Muffler bracket	2	
6	Muffler	1	



Order	Job/Part	Q'ty	Remarks
7	Exhaust pipe 1	1	For installation, reverse the removal procedure.
8	Gasket	2	
9	V-belt cooling duct 1	1	
10	V-belt cooling duct 2	1	



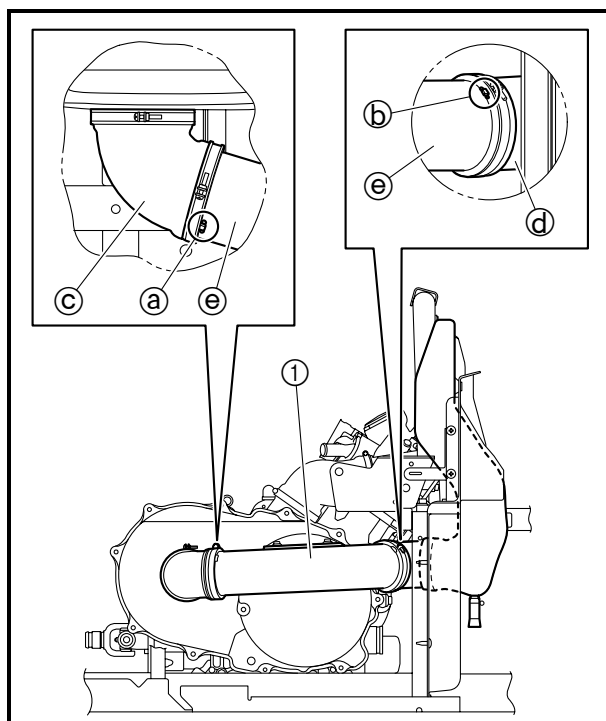
INSTALLING THE V-BELT COOLING DUCTS

1. Install:

- V-belt cooling duct 2 ①

TIP:

Align the projection ① on the section ② of V-belt cooling duct 2 with the rib on the crankcase and fit the projection ③ on the section ④ between the projections on the section ⑤ of the duct.



2. Install:

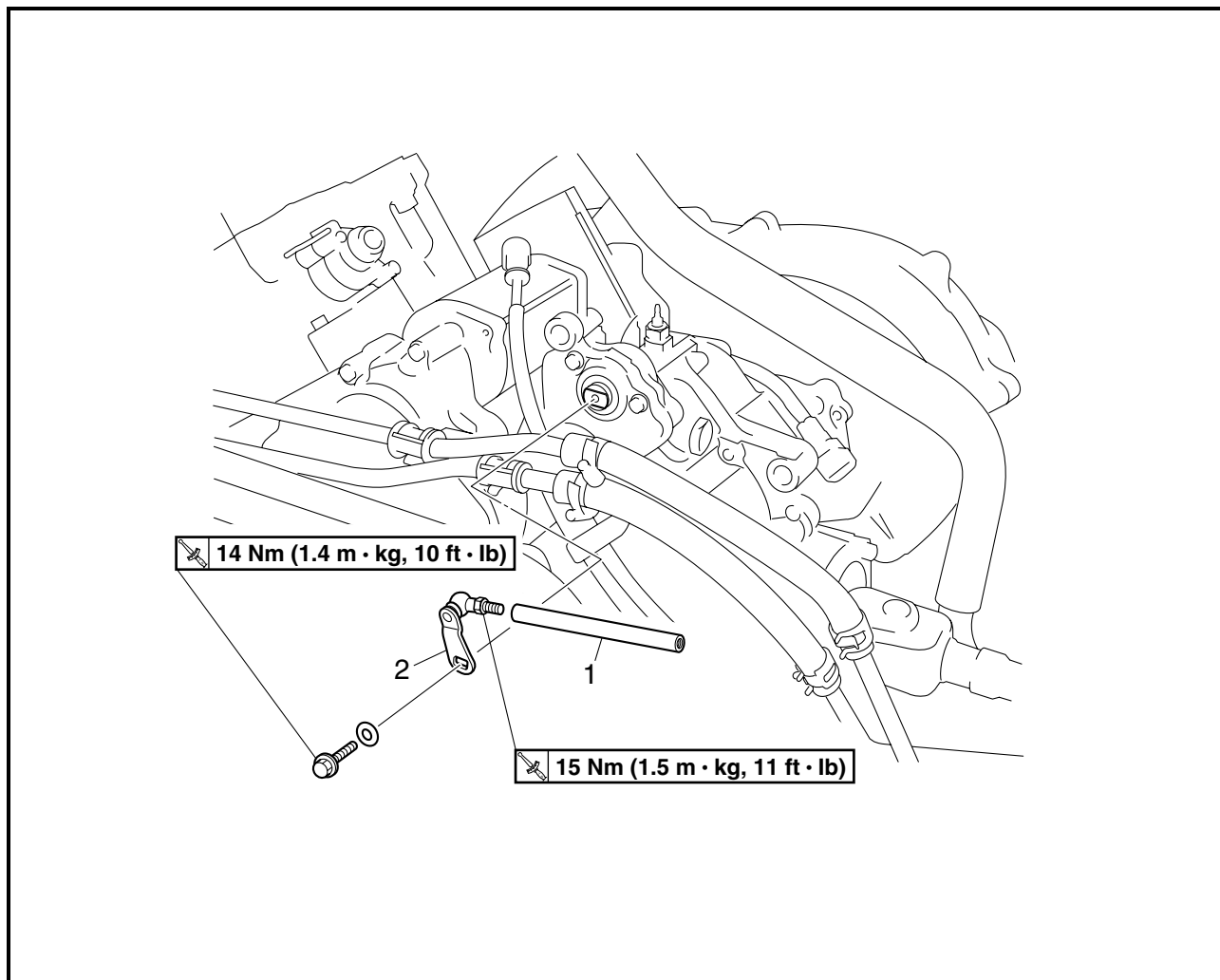
- V-belt cooling duct 1 ①

TIP:

Fit the projections ① and ② on the sections ③ and ④ of V-belt cooling duct 1 between the projections on the section ⑤ of the duct.



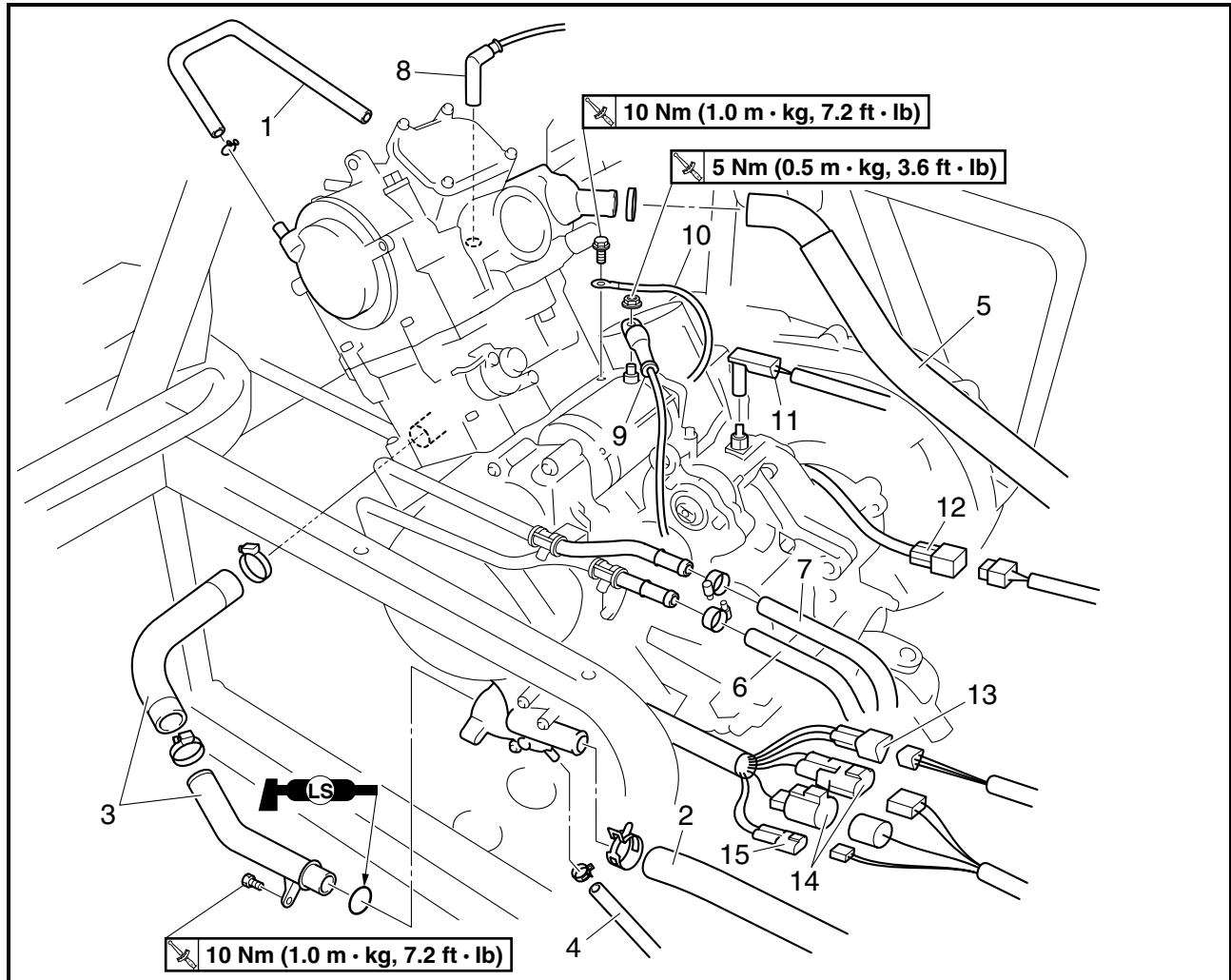
SHIFT ARM



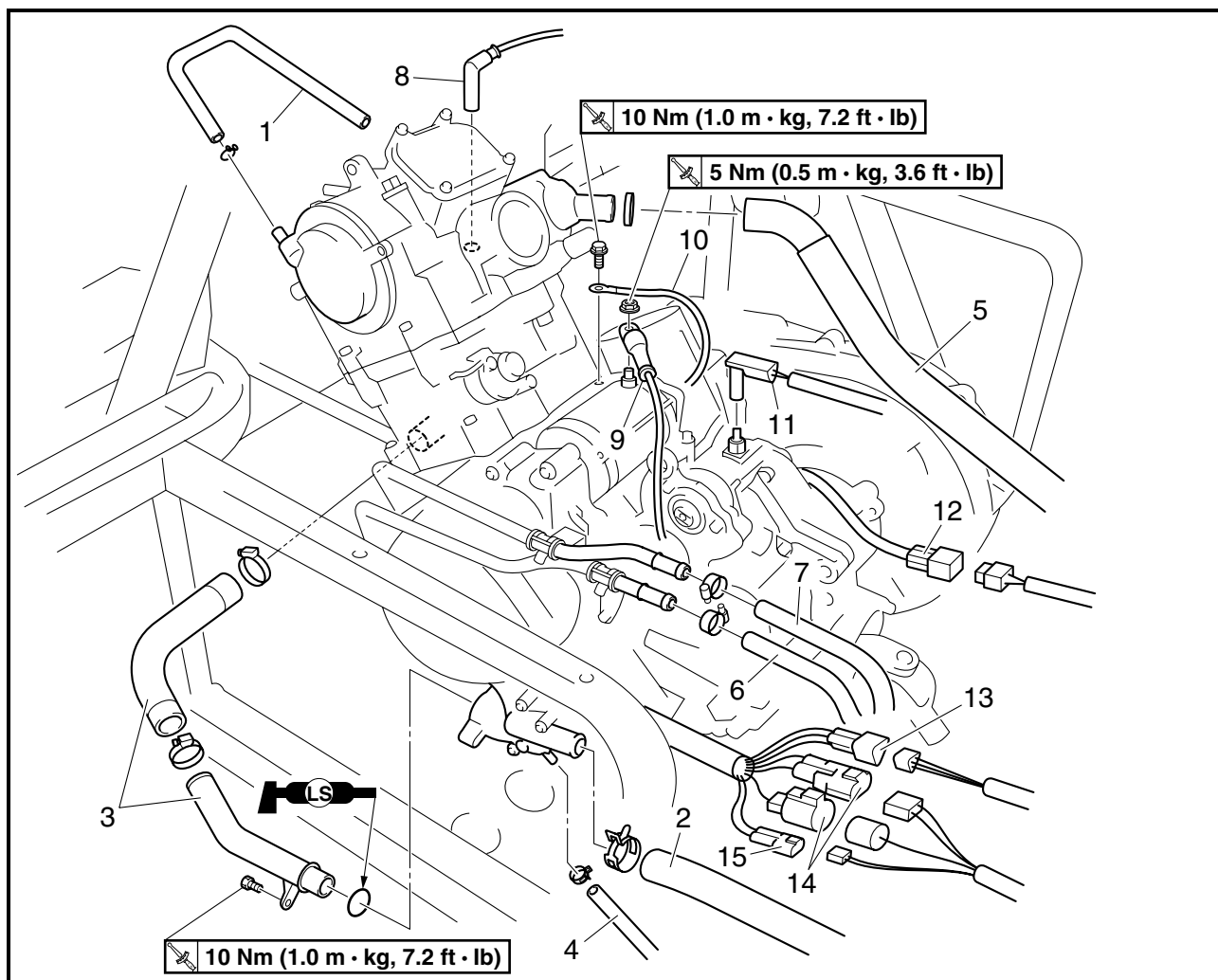
Order	Job/Part	Q'ty	Remarks
	Removing the shift arm		
1	Select lever shift rod	1	Remove the parts in the order listed.
2	Shift arm	1	
			For installation, reverse the removal procedure.



HOSES AND LEADS



Order	Job/Part	Q'ty	Remarks
	Removing the hoses and leads		Remove the parts in the order listed.
1	Cylinder head breather hose	1	
2	Water pump inlet hose	1	Disconnect.
3	Water pump outlet pipe/hose	1/1	
4	Water pump breather hose	1	
5	Thermostat outlet hose	1	Disconnect.
6	Oil outlet hose	1	Disconnect.
7	Oil inlet hose	1	Disconnect.
8	Spark plug cap	1	Disconnect.
9	Starter motor lead	1	Disconnect.
10	Engine ground lead	1	Disconnect.
11	Reverse switch lead	1	Disconnect.
12	Gear position switch coupler	1	Disconnect.
13	Speed sensor coupler	1	Disconnect.

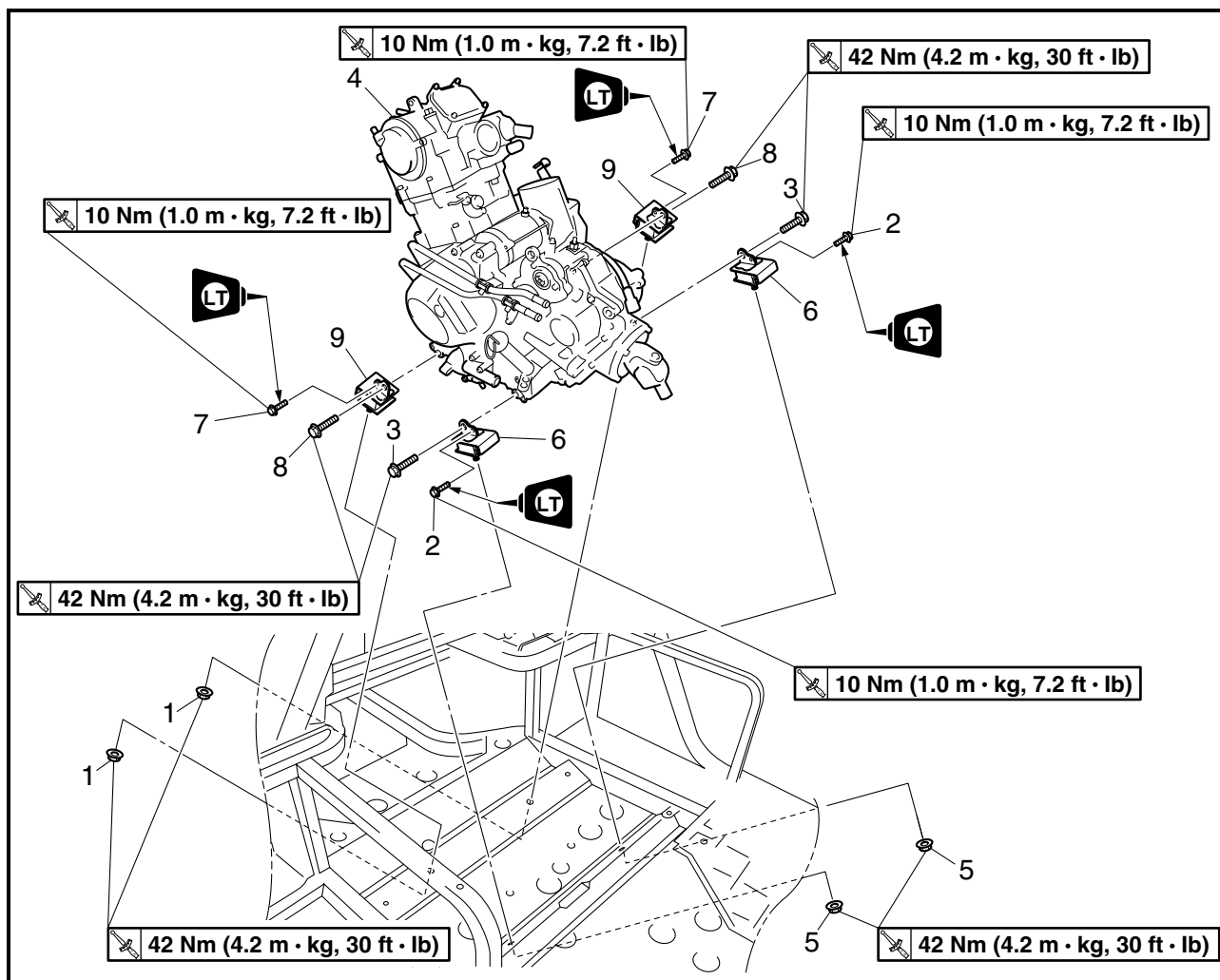


Order	Job/Part	Q'ty	Remarks
14	AC magneto coupler	2	Disconnect.
15	Crankshaft position sensor coupler	1	Disconnect.
			For installation, reverse the removal procedure.

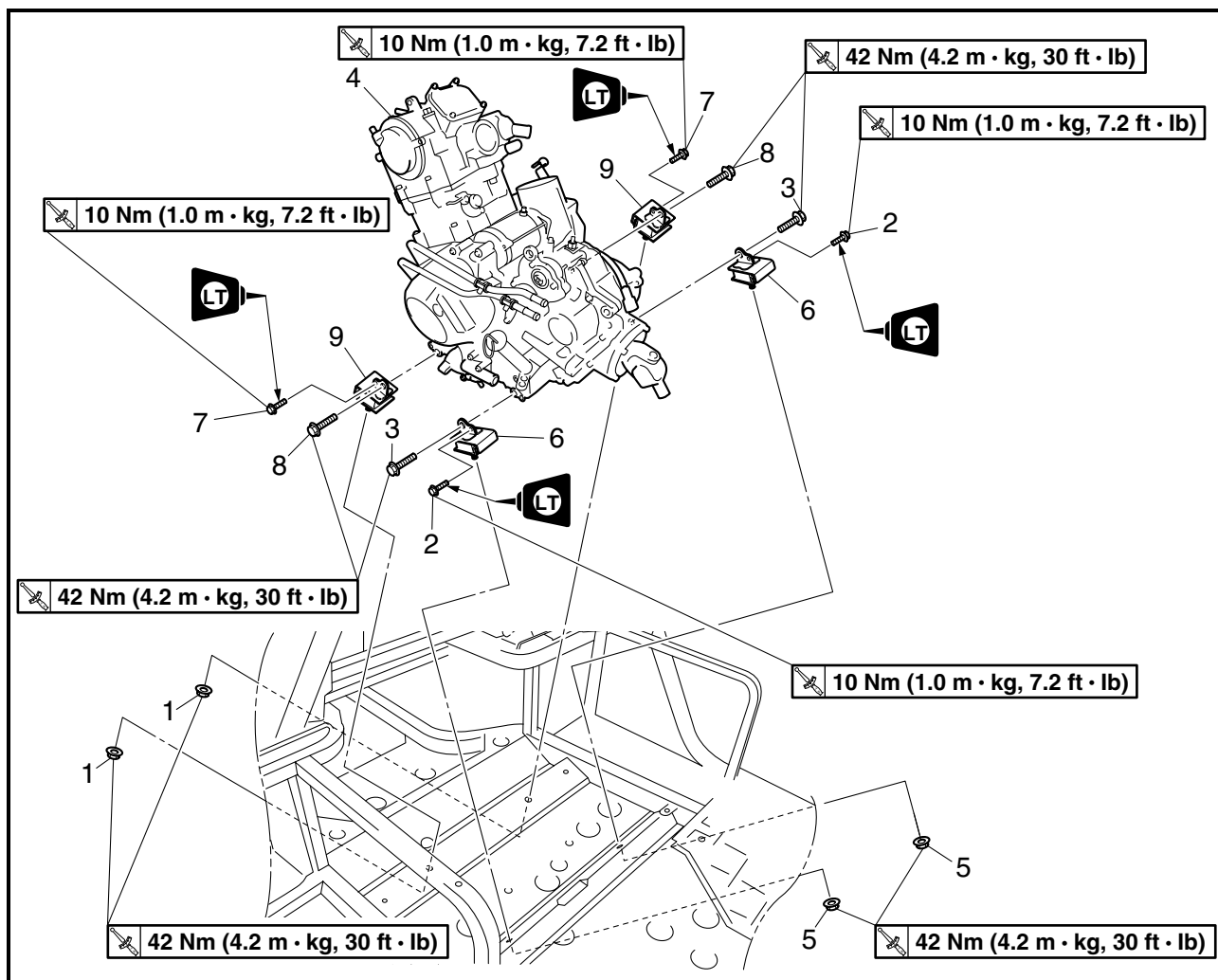


EBS00205

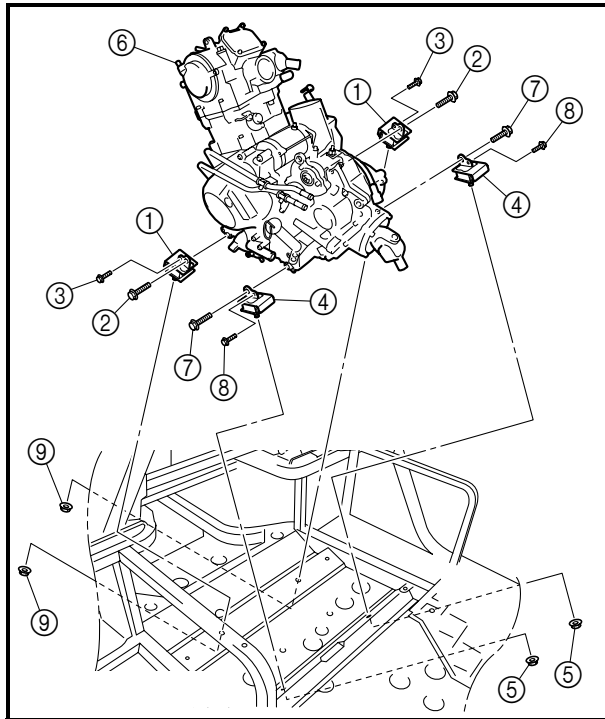
ENGINE MOUNTING BOLTS



Order	Job/Part	Q'ty	Remarks
	Removing the engine mounting bolts		Remove the parts in the order listed.
	Primary and secondary sheave assembly/drive belt case		Refer to "PRIMARY AND SECONDARY SHEAVES".
1	Rubber damper nut (rear side)	2	Refer to "INSTALLING THE ENGINE".
2	Engine mounting bolt (front upper side)	2	
3	Engine mounting bolt (front lower side)	2	
4	Engine	1	
			TIP: _____ Remove the engine from the top of the vehicle.
5	Rubber damper nut (front side)	2	
6	Rubber damper (front side)	2	
7	Engine mounting bolt (rear upper side)	2	
8	Engine mounting bolt (rear lower side)	2	



Order	Job/Part	Q'ty	Remarks
9	Rubber damper (rear side)	2	Refer to "INSTALLING THE ENGINE". For installation, reverse the removal procedure.



EBS00207

INSTALLING THE ENGINE**1. Install:**

- rubber dampers (rear side) ①
- engine mounting bolts (rear lower side) ②
- engine mounting bolts (rear upper side) ③

2. Tighten:

- engine mounting bolts (rear lower side) ②

42 Nm (4.2 m · kg, 30 ft · lb)

- engine mounting bolts (rear upper side) ③

10 Nm (1.0 m · kg, 7.2 ft · lb)
3. Install:

- rubber dampers (front side) ④
- rubber damper nuts (front side) ⑤
- engine ⑥
- engine mounting bolts (front lower side) ⑦
- engine mounting bolts (front upper side) ⑧
- rubber damper nuts (rear side) ⑨

TIP:

Do not fully tighten the bolts and nuts.

4. Tighten:

- rubber damper nuts (front side) ⑤

42 Nm (4.2 m · kg, 30 ft · lb)

- engine mounting bolts (front lower side) ⑦

42 Nm (4.2 m · kg, 30 ft · lb)

- engine mounting bolts (front upper side) ⑧

10 Nm (1.0 m · kg, 7.2 ft · lb)

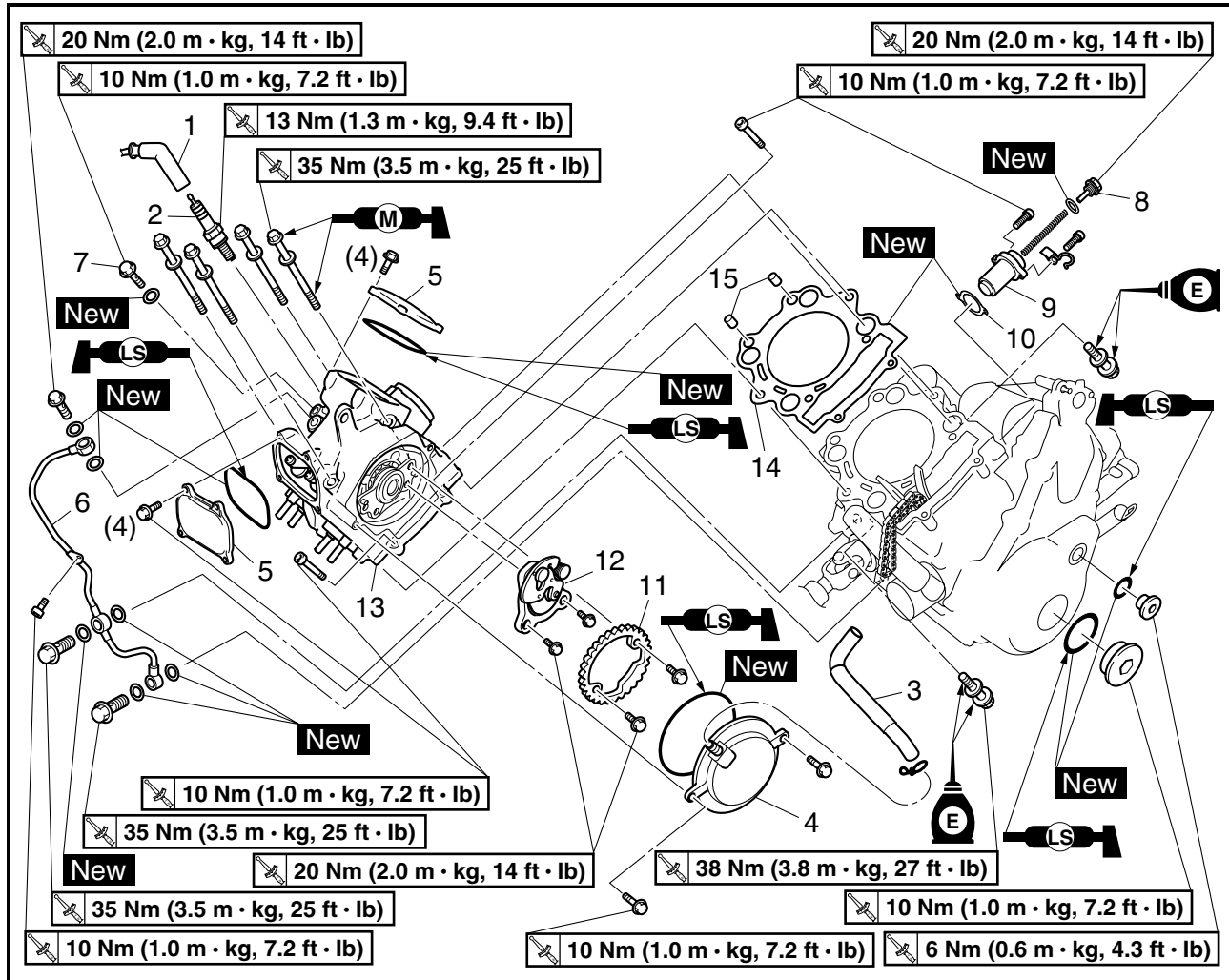
- rubber damper nuts (rear side) ⑨

42 Nm (4.2 m · kg, 30 ft · lb)

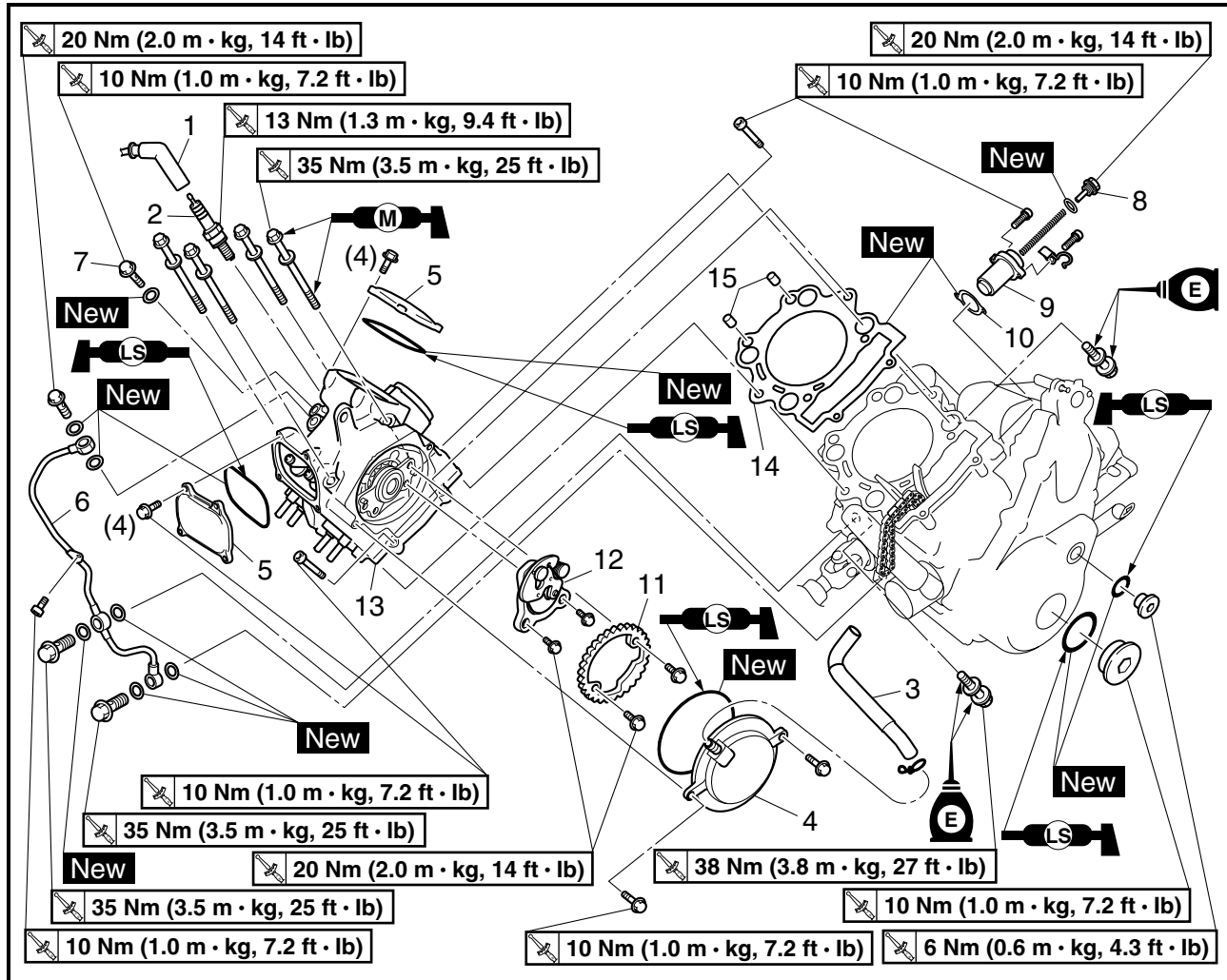


EBS00218

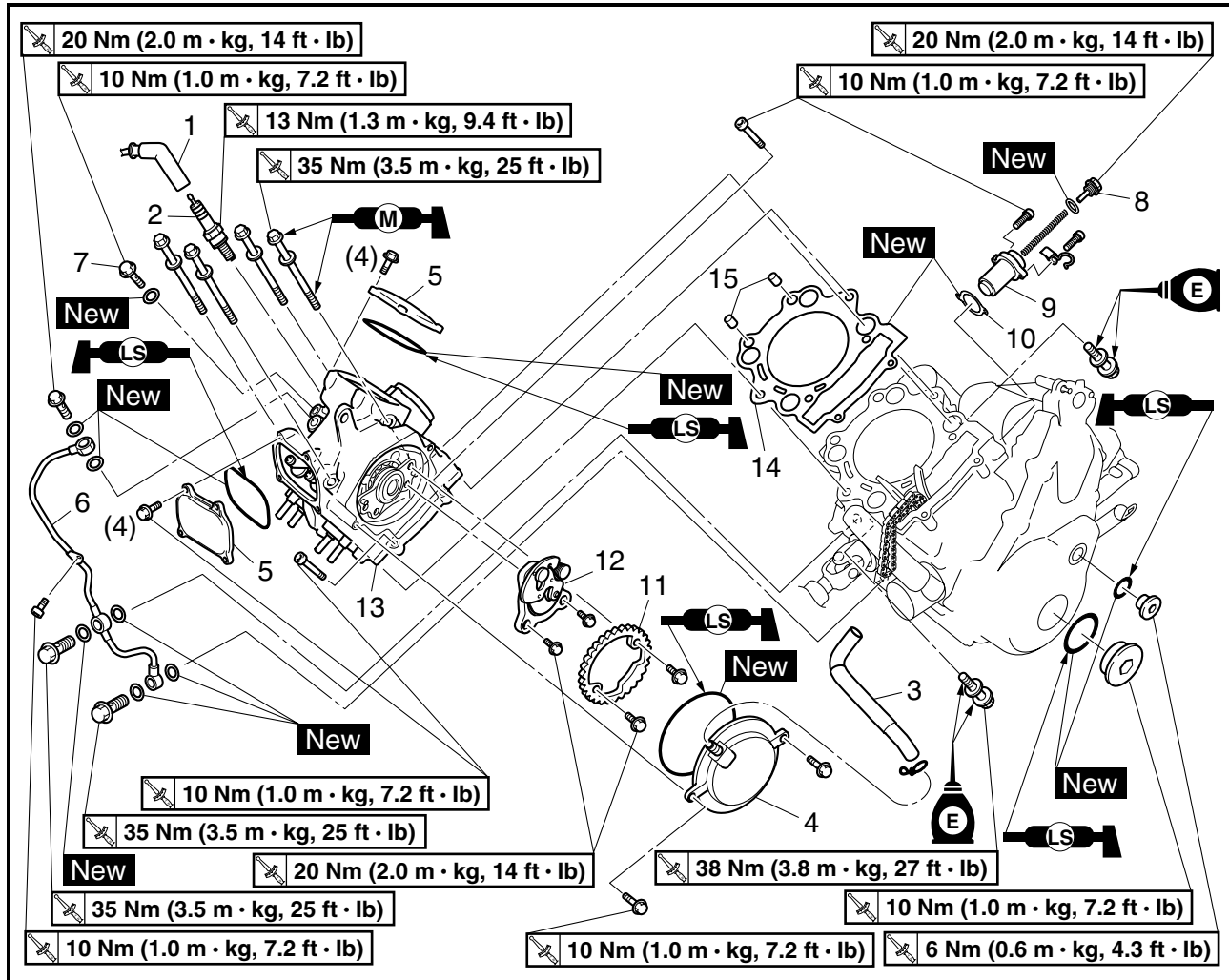
CYLINDER HEAD



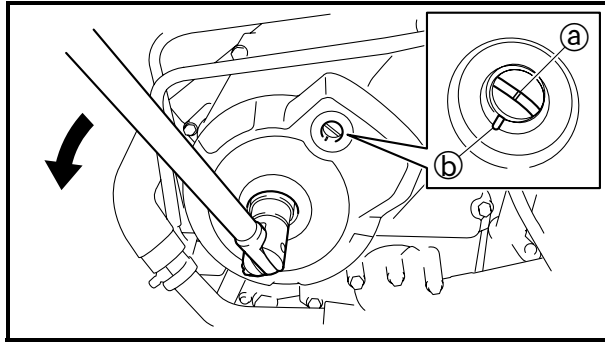
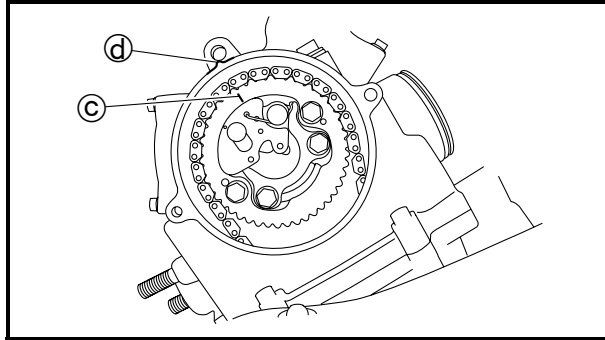
Order	Job/Part	Q'ty	Remarks
	Removing the cylinder head		
	Engine oil		Remove the parts in the order listed. Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
	Seats/rear console		Refer to "SEATS, REAR CONSOLE AND INSTRUMENT PANELS" in chapter 8.
	Center protector		Refer to "PANELS AND FRONT CONSOLE" in chapter 8.
	Throttle body assembly		Refer to "THROTTLE BODY" in chapter 6.
	Fuel tank		Refer to "FUEL PUMP AND FUEL TANK" in chapter 6.



Order	Job/Part	Q'ty	Remarks
	Thermostat/coolant temperature sensor		Refer to "THERMOSTAT" in chapter 5.
	Air ducts/exhaust pipes		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	Oil delivery pipe 1	1	
7	Oil check bolt	1	
8	Timing chain tensioner cap bolt	1	
9	Timing chain tensioner	1	Refer to "REMOVING THE CYLINDER HEAD" and "INSTALLING THE CYLINDER HEAD".
10	Gasket	1	
11	Camshaft sprocket	1	
12	Decompressor assembly	1	



Order	Job/Part	Q'ty	Remarks
13	Cylinder head	1	Refer to "REMOVING THE CYLINDER HEAD" and "INSTALLING THE CYLINDER HEAD".
14	Cylinder head gasket	1	
15	Dowel pin	2	
			For installation, reverse the removal procedure.



EBS00220

REMOVING THE CYLINDER HEAD**1. Align:**

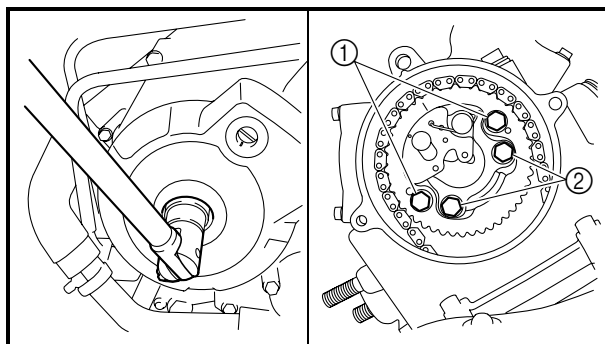
- "I" mark on the AC magneto rotor
(with the stationary pointer on the AC magneto cover)



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

TIP:

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

**2. Loosen:**

- camshaft sprocket bolts (1)
- decompressor assembly bolts (2)

TIP:

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

3. Loosen:

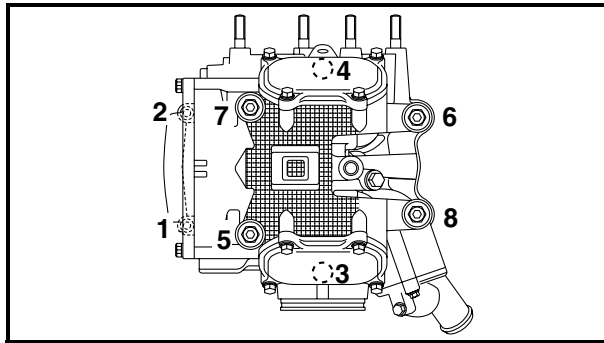
- timing chain tensioner cap bolt

4. Remove:

- timing chain tensioner
(along with the gasket)
- camshaft sprocket
- timing chain

TIP:

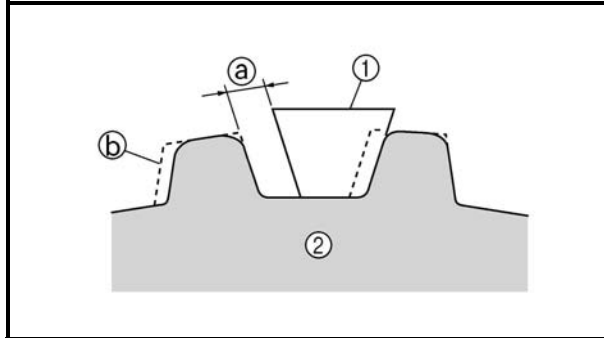
To prevent the timing chain from falling into the crankcase, fasten it with a wire.



5. Remove:
 - cylinder head

TIP:

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



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

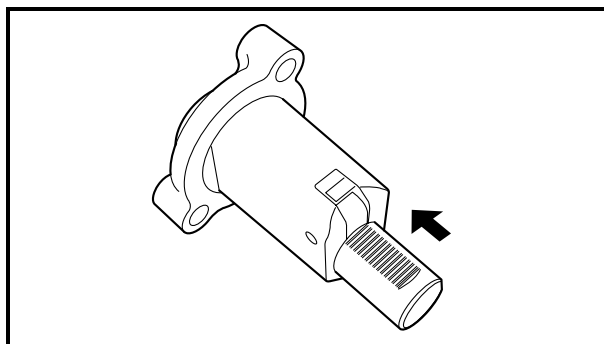
① Roller

② Sprocket

EBS00227

CHECKING THE TAPPET COVERS

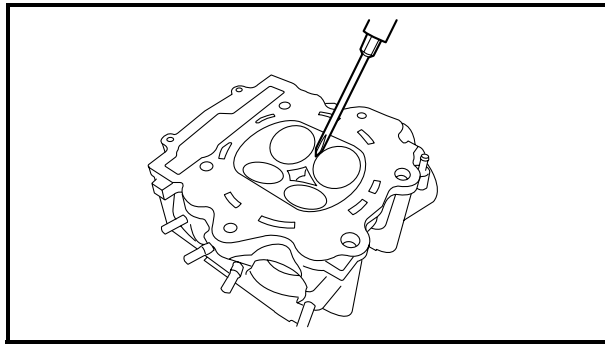
1. Check:
 - tappet covers
 - camshaft sprocket cover
 Cracks/damage → Replace.



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

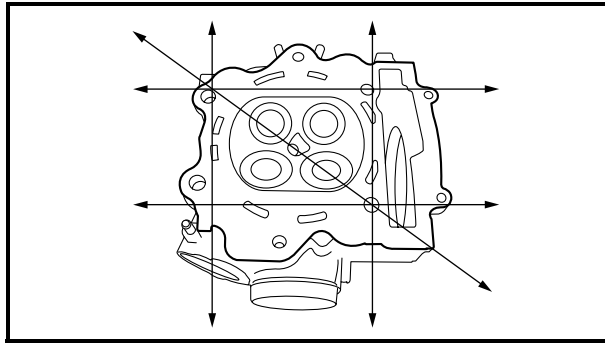
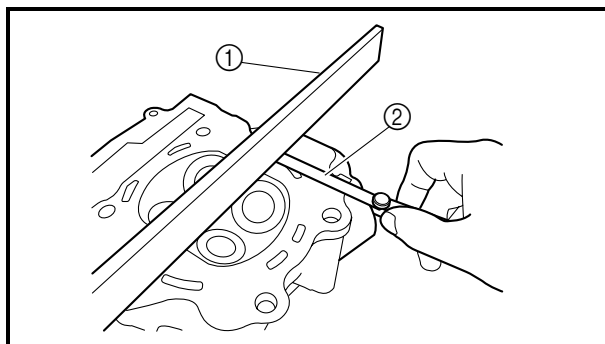
1. Eliminate:
 - combustion chamber carbon deposits (with a rounded scraper)

TIP:

Do not use a sharp instrument to avoid damaging or scratching:

- spark plug bore threads
- valve seats

2. Check:
- cylinder head
Damage/scratches → Replace.
 - cylinder head water jacket
Mineral deposits/rust → Eliminate.



Maximum cylinder head warpage
0.03 mm (0.0012 in)

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

TIP:

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



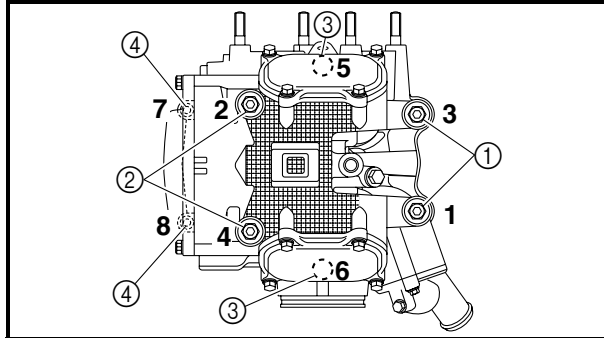
EBS00232

INSTALLING THE CYLINDER HEAD

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

TIP:

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

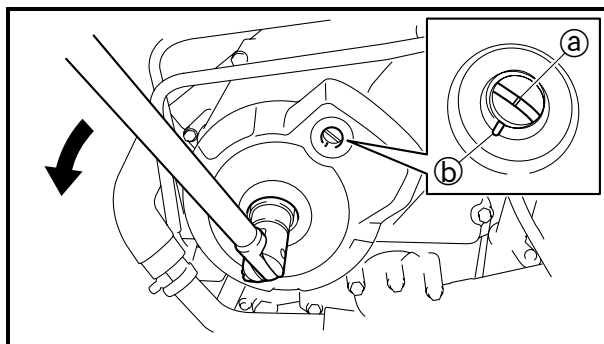
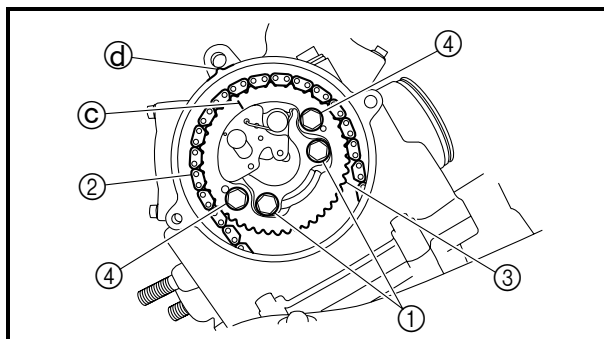


3. Tighten:

- cylinder head bolts ①: $\ell = 135 \text{ mm (5.31 in)}$
 $\rightarrow 35 \text{ Nm (3.5 m} \cdot \text{kg, 25 ft} \cdot \text{lb)}$
- cylinder head bolts ②: $\ell = 145 \text{ mm (5.71 in)}$
 $\rightarrow 35 \text{ Nm (3.5 m} \cdot \text{kg, 25 ft} \cdot \text{lb)}$
- cylinder head bolts ③
 $\rightarrow 38 \text{ Nm (3.8 m} \cdot \text{kg, 27 ft} \cdot \text{lb)}$
- cylinder head bolts ④
 $\rightarrow 10 \text{ Nm (1.0 m} \cdot \text{kg, 7.2 ft} \cdot \text{lb)}$

TIP:

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)



- 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 ③ on the AC magneto rotor with the stationary pointer ④ 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 ③ on the camshaft sprocket with the stationary pointer ④ on the cylinder head.

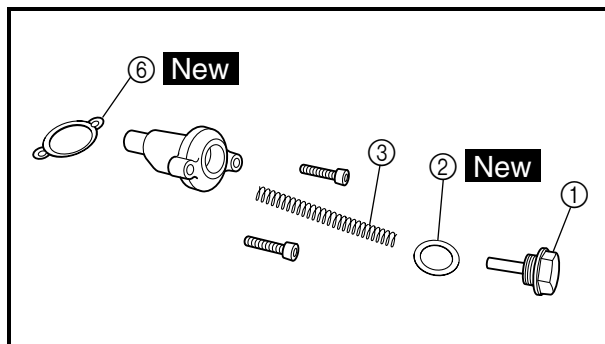
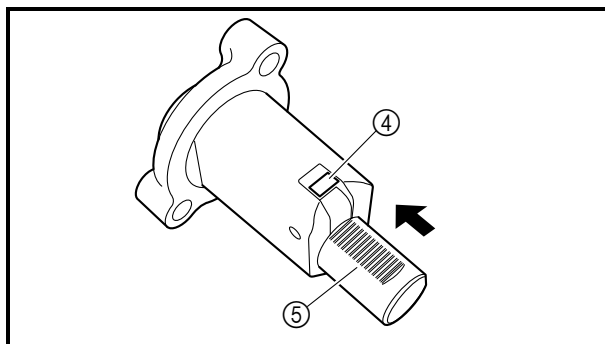
**TIP:**

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

NOTICE

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

- f. Remove the wire from the timing chain.



5. Install:

- timing chain tensioner



- Remove the timing chain tensioner cap bolt ①, copper washer ② and spring ③.
- Release the timing chain tensioner one-way cam ④ and push the timing chain tensioner rod ⑤ all the way into the timing chain tensioner housing.
- Install the timing chain tensioner and gasket ⑥ onto the cylinder.



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

TIP:

Install the gasket with its beaded side facing the timing chain tensioner end.

- Install the spring and timing chain tensioner cap bolt.

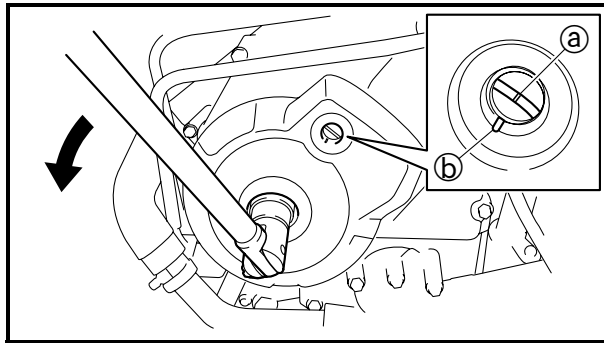


Timing chain tensioner cap bolt
20 Nm (2.0 m · kg, 14 ft · lb)



6. Turn:

- crankshaft
(several turns counterclockwise)



7. Check:

- "I" mark (a)

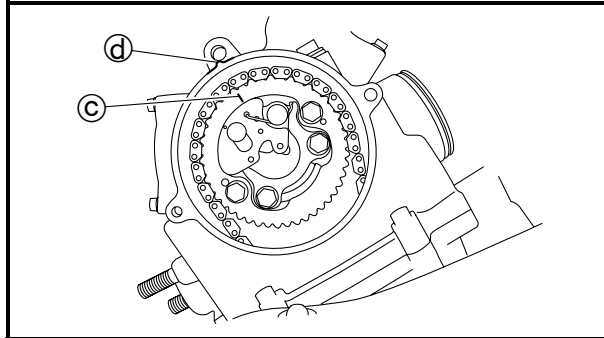
TIP:

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

- "I" mark (c)

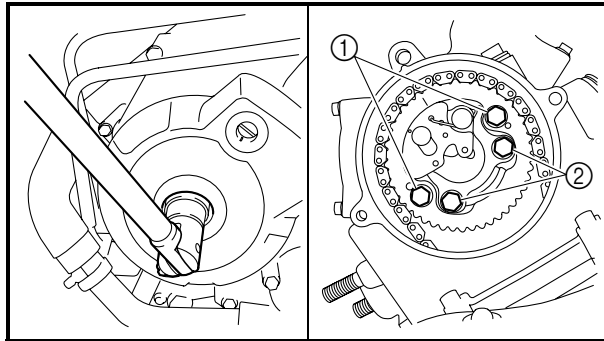
TIP:

Check that the "I" mark on the camshaft sprocket is aligned with the stationary pointer (d) 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)

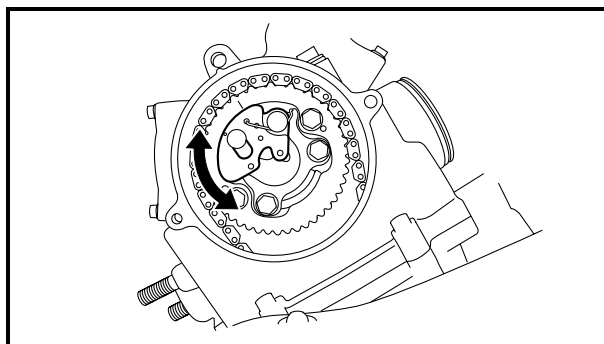
20 Nm (2.0 m · kg, 14 ft · lb)

TIP:

- 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.

NOTICE

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

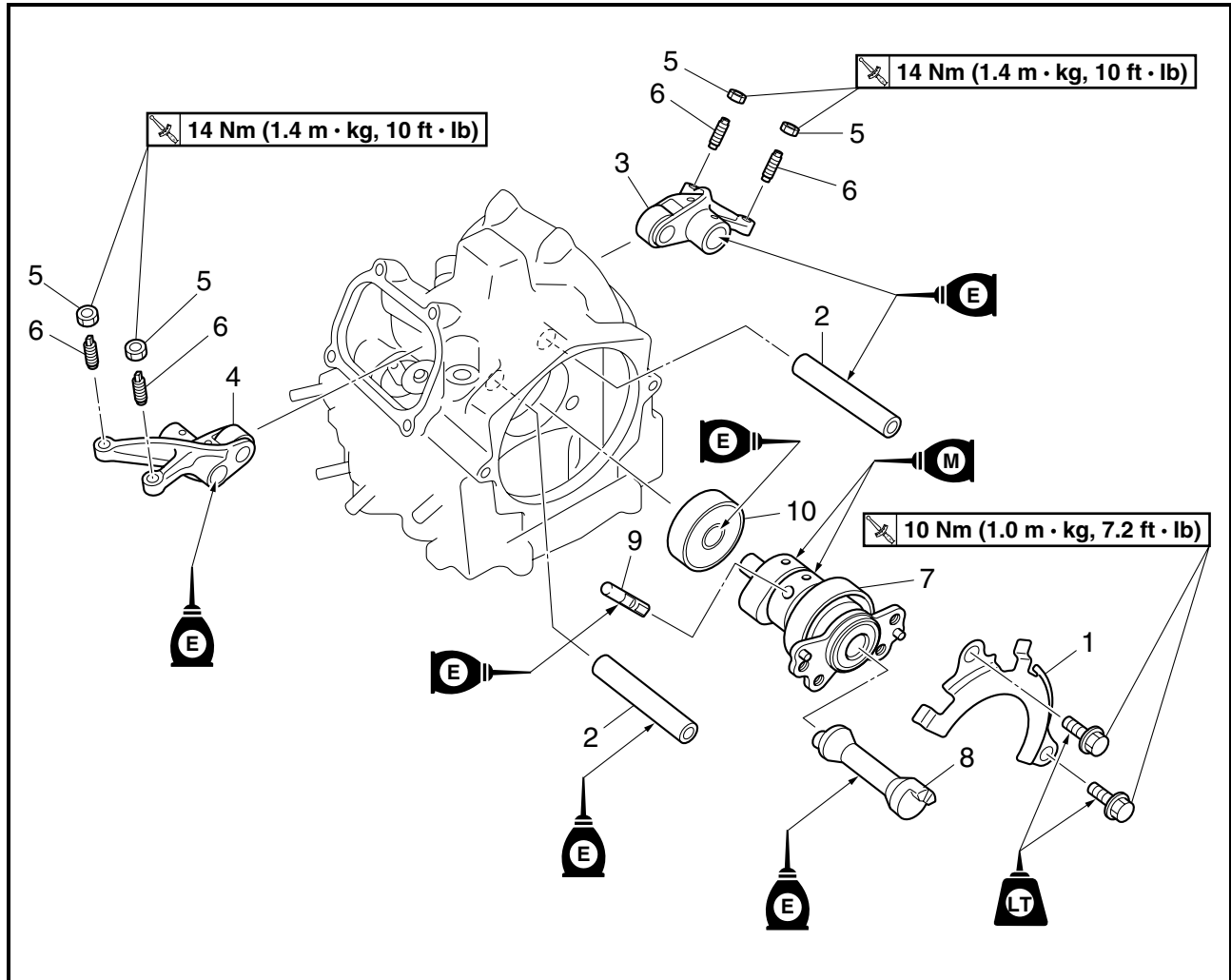
Out of specification → Adjust.

Refer to "ADJUSTING THE VALVE CLEARANCE" in chapter 3.

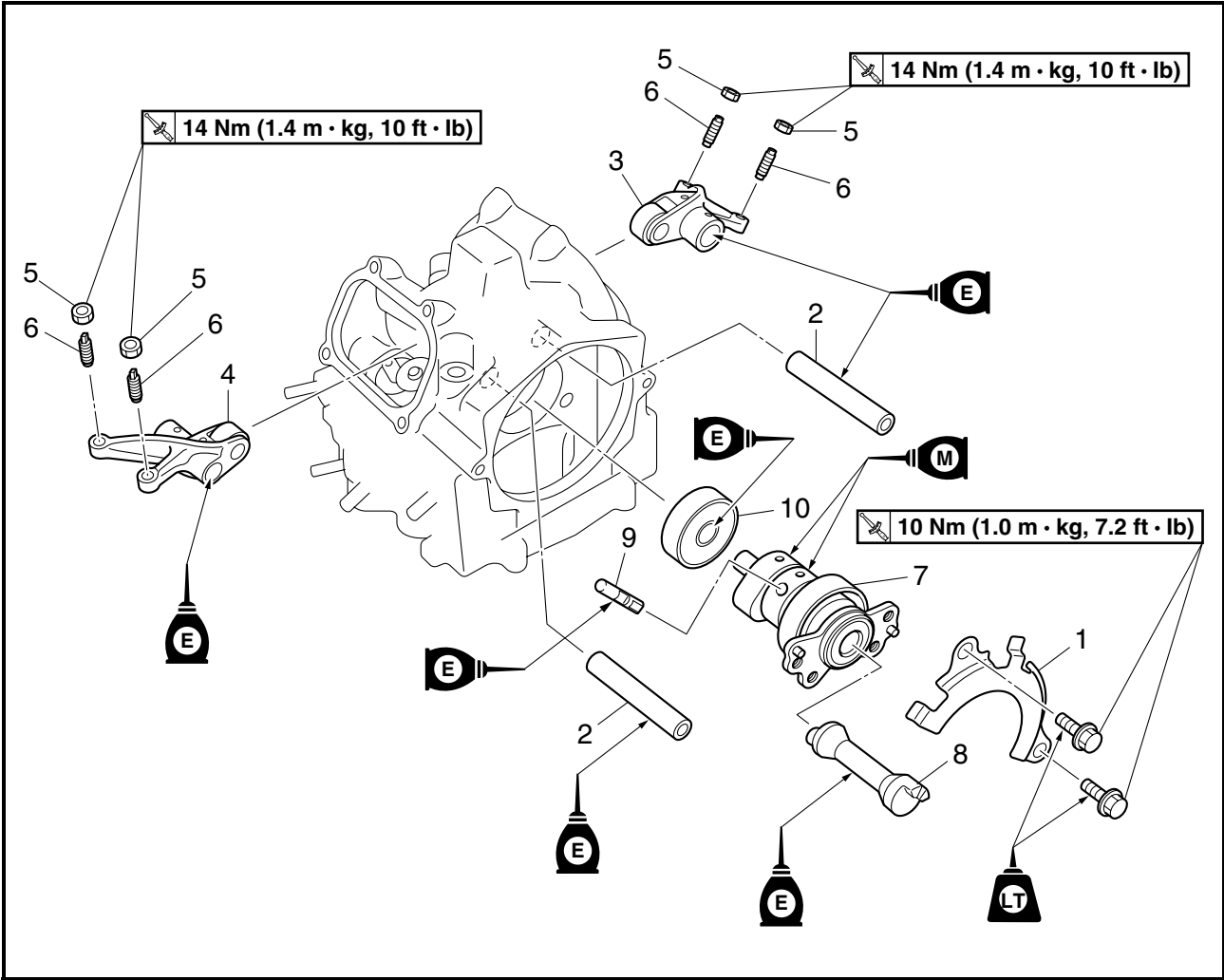


EBS00235

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	Refer to "REMOVING THE ROCKER ARMS AND CAMSHAFT" and "INSTALLING THE CAMSHAFT AND ROCKER ARMS".
2	Rocker arm shaft	2	
3	Intake rocker arm	1	
4	Exhaust rocker arm	1	
5	Locknut	4	
6	Valve adjusting screw	4	
7	Camshaft	1	
			NOTICE _____ 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	



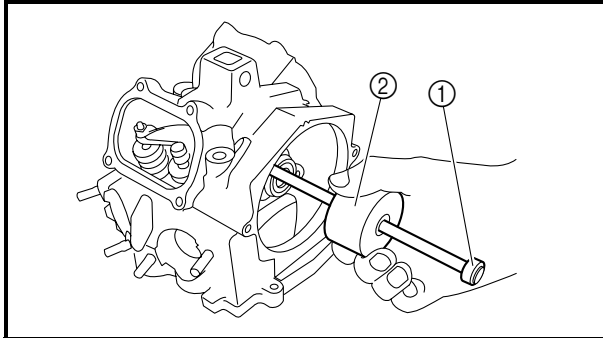
EBS00237

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

TIP:

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

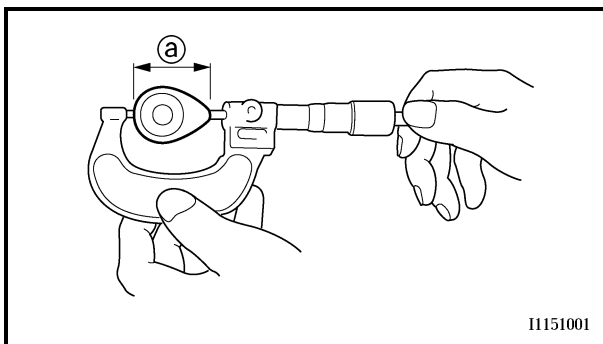
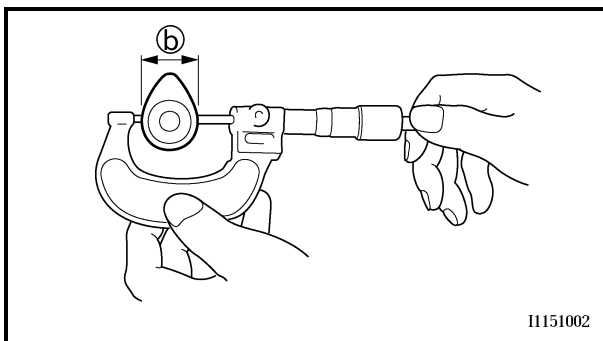
EBS00223

CHECKING THE CAMSHAFT

1. Check:
 - cam lobes

Pitting/scratches/blue discoloration → Replace.
2. Measure:
 - cam lobe dimensions ① and ②

Out of specification → Replace.



Camshaft lobe dimensions

Intake

① 42.481 ~ 42.581 mm
 (1.6725 ~ 1.6764 in)

<Limit>

42.381 mm (1.6685 in)

② 36.950 ~ 37.050 mm
 (1.4547 ~ 1.4587 in)

<Limit>

36.850 mm (1.4508 in)

Exhaust

① 43.129 ~ 43.229 mm
 (1.6980 ~ 1.7019 in)

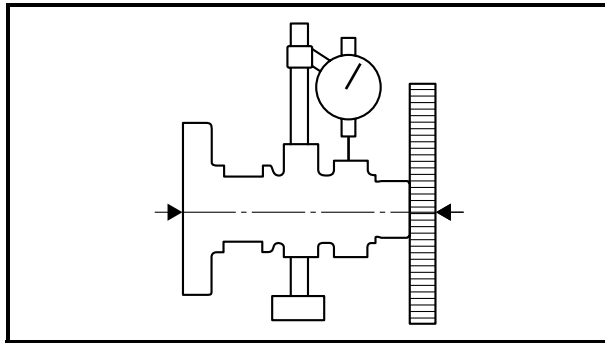
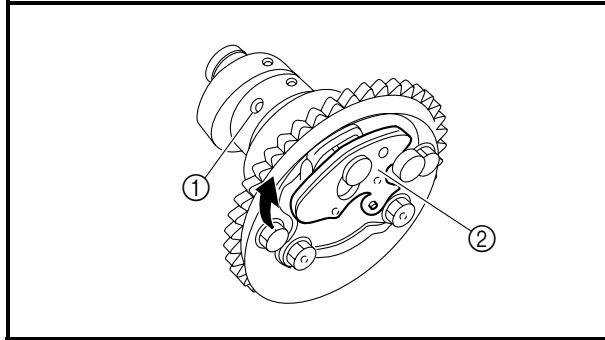
<Limit>

43.029 mm (1.6941 in)

② 36.982 ~ 37.082 mm
 (1.4560 ~ 1.4599 in)

<Limit>

36.882 mm (1.4520 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

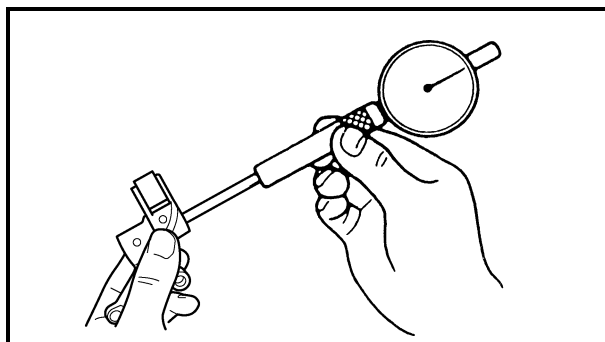
- a. Check the decompression system with the camshaft sprocket installed on the decompressor lever and pin installed in the camshaft.
- b. Check that the decompressor lever pin ① projects from the camshaft.
- c. Check that the decompressor cam ② moves smoothly.

EBS00239

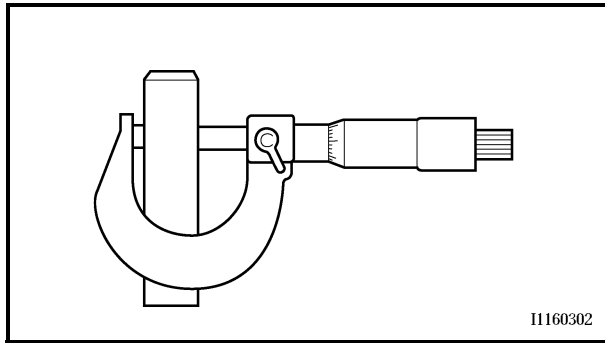
CHECKING THE ROCKER ARMS AND ROCKER ARM SHAFTS

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

TIP:

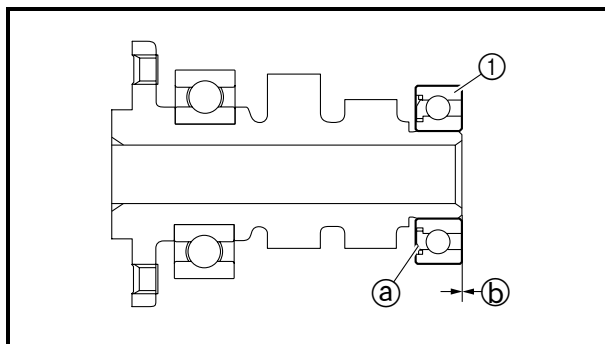
Calculate the clearance by subtracting the rocker arm shaft outside diameter from the rocker arm inside diameter.

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)

TIP:

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



Installed depth (b)
0 mm (0 in)



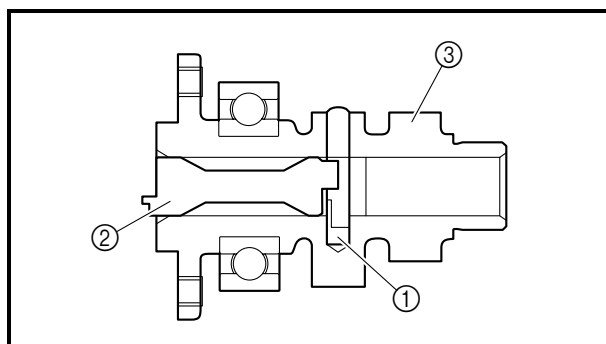
2. Lubricate:

- camshaft

	Recommended lubricant Molybdenum disulfide oil
---	---

- decompressor lever pin
- decompressor lever

	Recommended lubricant Engine oil
---	---

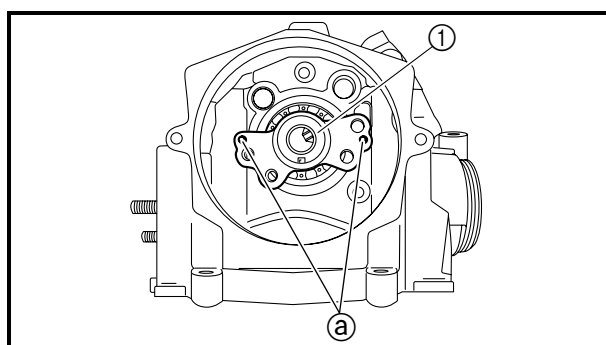


3. Install:

- decompressor lever pin ①
- decompressor lever ②

TIP:

Install the decompressor lever pin ① and decompressor lever ② in the camshaft ③ as shown in the illustration.



4. Install:

- camshaft ①

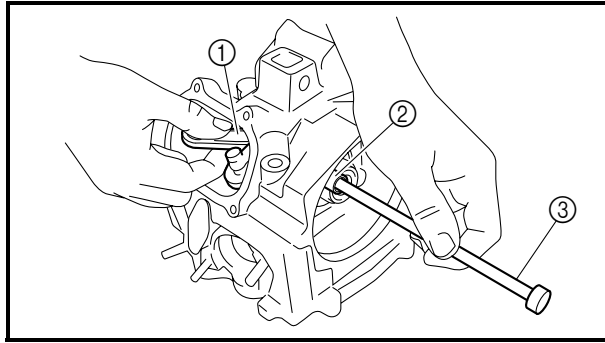
TIP:

Install the camshaft so that its projections ① are aligned horizontally as shown.

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

TIP:

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



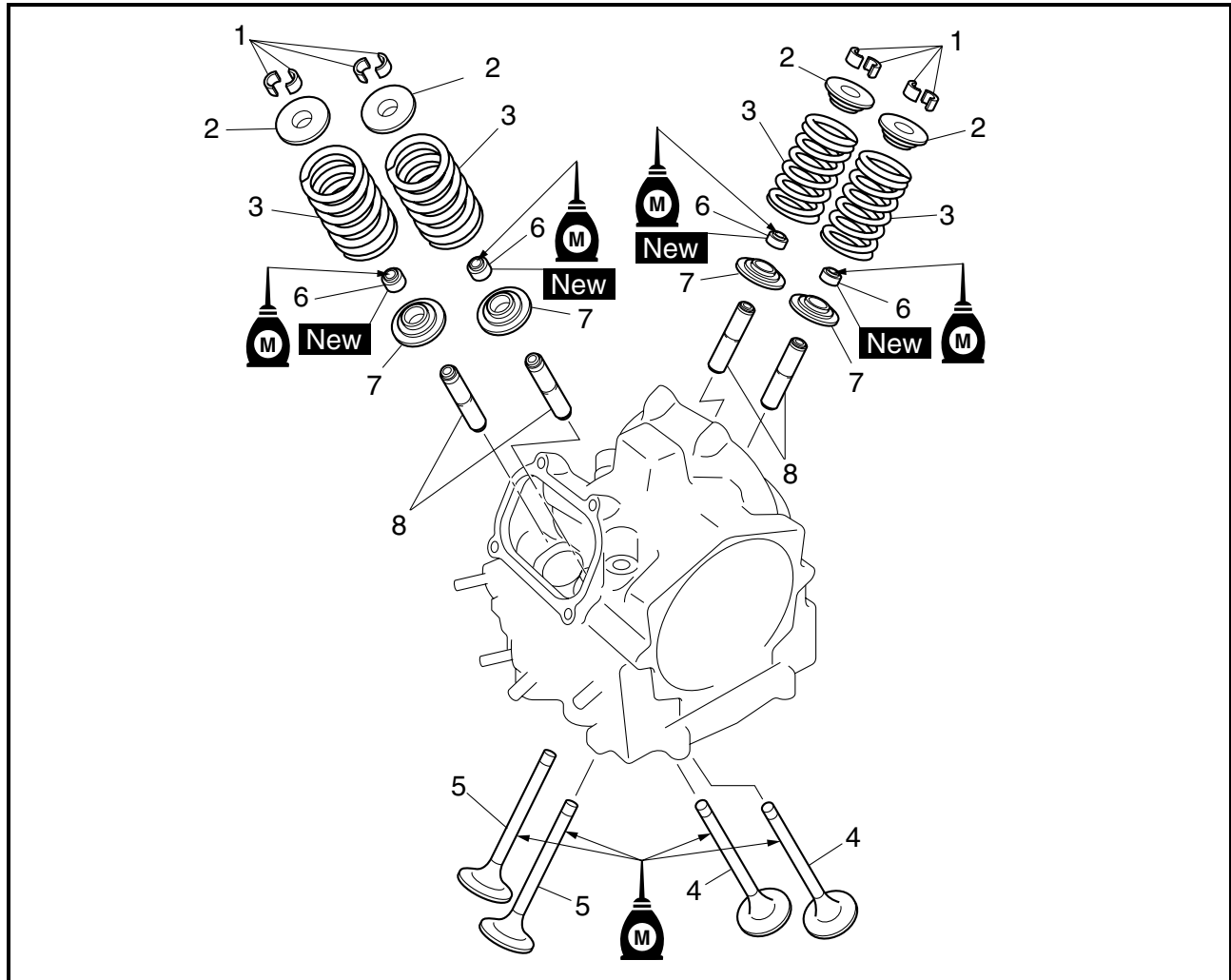
Slide hammer bolt
90890-01083

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/cam-shaft		Refer to "ROCKER ARMS AND CAM-SHAFT".
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.



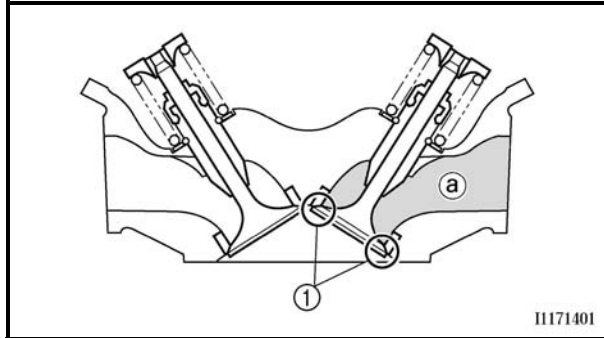
EBS00238

REMOVING THE VALVES AND VALVE SPRINGS

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

TIP:

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



1. Check:

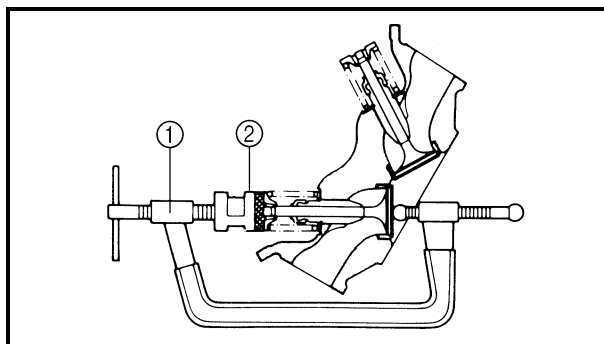
- valve sealing

Leakage at the valve seat → Check the valve face, valve seat, and valve seat width. Refer to “CHECKING THE VALVES AND VALVE SPRINGS”.

- a. Pour a clean solvent ① into the intake and exhaust ports.

b. Check that the valve seals properly.

There should be no leakage at the valve seat ①.



2. Remove:

- valve cotters

TIP:

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



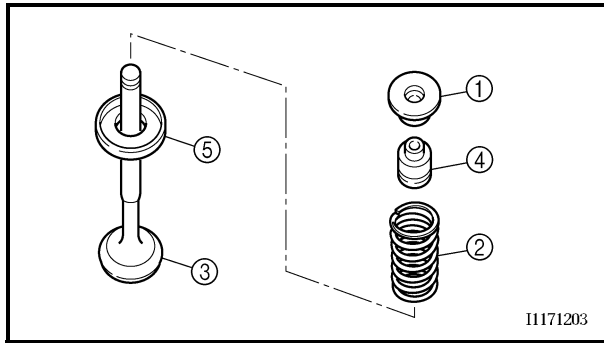
Valve spring compressor
90890-04019, YM-04019

Valve spring compressor attachment

90890-01243

**Valve spring compressor adapter
(26 mm)**

YM-01253-1

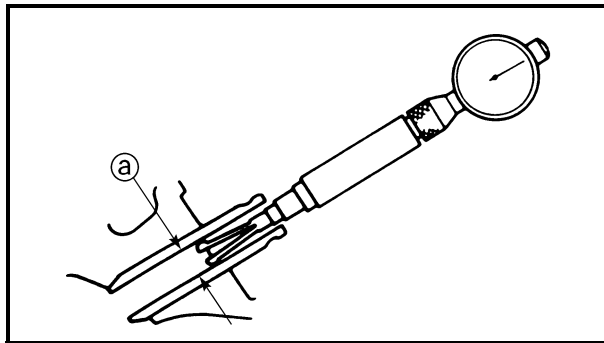
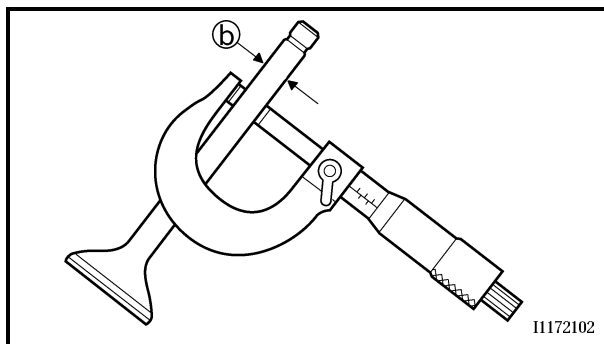


3. Remove:

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

TIP:

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 ① -
valve stem diameter ②

Out of specification → Replace the valve guide.



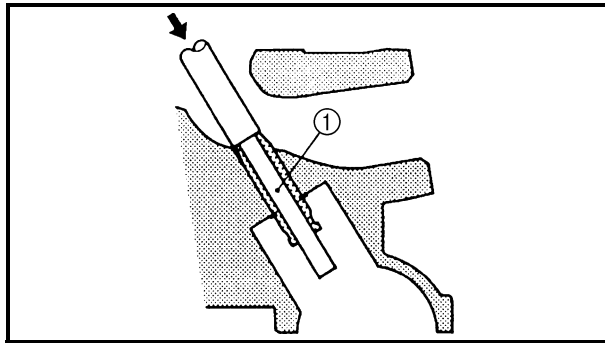
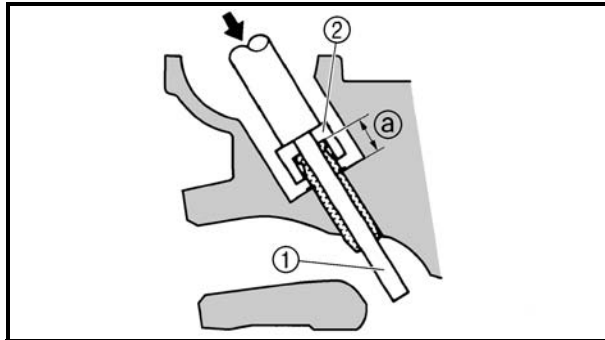
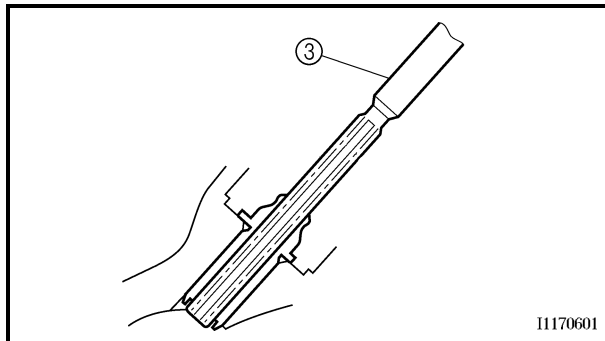
Stem-to-guide clearance

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

TIP:

To ease valve guide removal and installation, and to maintain the correct fit, heat the cylinder head to 100 °C (212 °F) in an oven.



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



Valve guide position ③
12.7 ~ 13.1 mm (0.50 ~ 0.52 in)

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



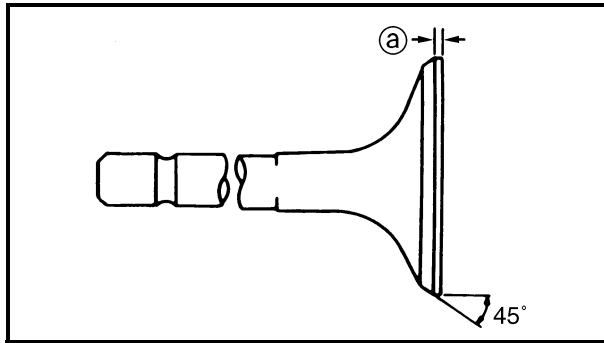
Valve guide remover (ø6)
90890-04064
Valve guide remover (6.0 mm)
YM-04064-A
Valve guide installer (ø6)
90890-04065
Valve guide installer (6.0 mm)
YM-04065-A
Valve guide reamer (ø6)
90890-04066
Valve guide reamer (6.0 mm)
YM-04066

**TIP:**

After replacing the valve guide, reface the valve seat.

3. Check:

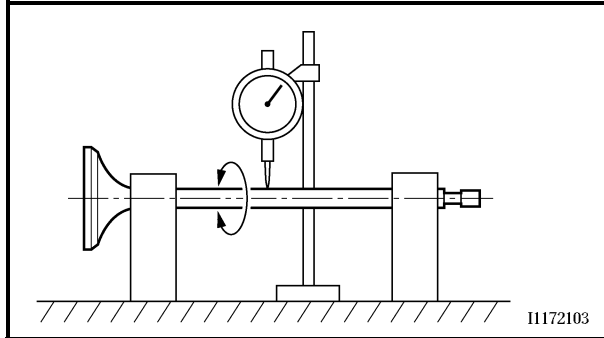
- valve face
Pitting/wear → Grind the face.
- valve stem end
Mushroom shape or diameter larger than the body of the valve stem → Replace.



4. Measure:
- margin thickness (a)
- 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.

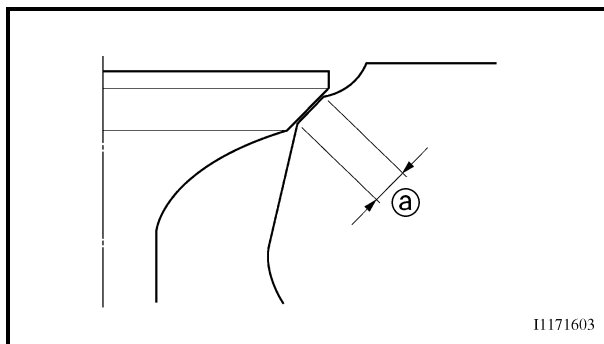


Runout limit
0.040 mm (0.0016 in)

TIP:

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

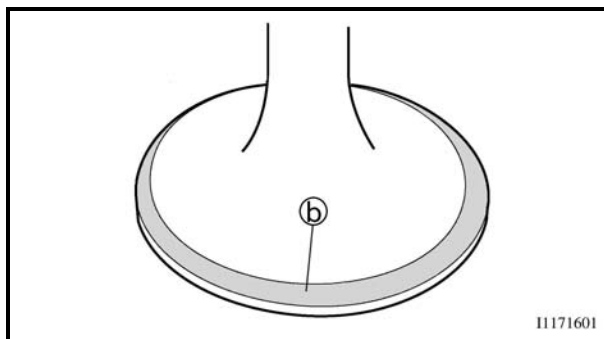
6. Eliminate:
 - carbon deposits
(from the valve face and valve seat)
7. Check:
 - valve seats
Pitting/wear → Reface the valve seat.



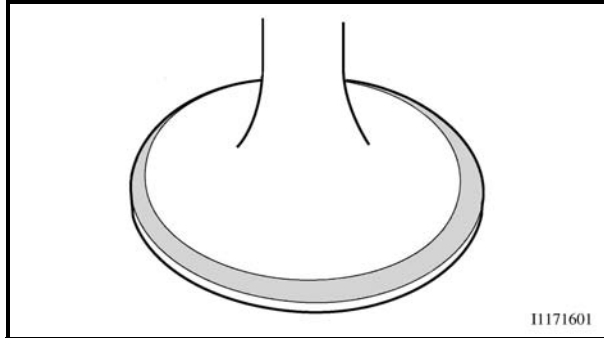
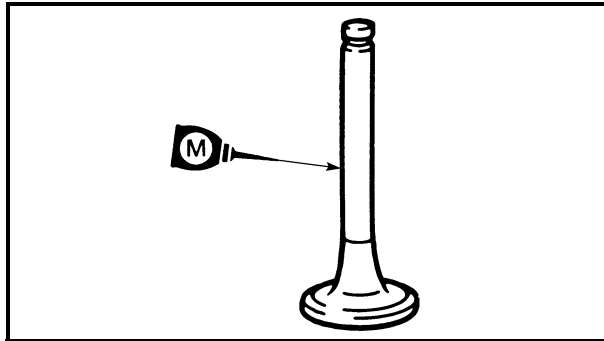
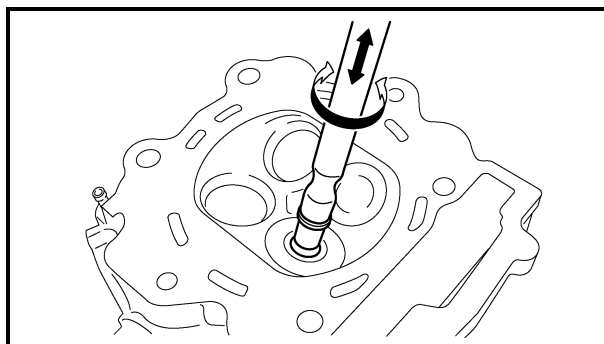
8. Measure:
- valve seat width (a)
Out of specification → Reface the valve seat.



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



- Apply Mechanic's blueing dye (Dykem) **⑥** to the valve face.
- Install the valve into the cylinder head.
- Press the valve through the valve guide and onto the valve seat to make a clear pattern.
- 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.

▲▲▲

9. Lap:
- valve face
 - valve seat

TIP:

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

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

NOTICE

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.

TIP:

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.

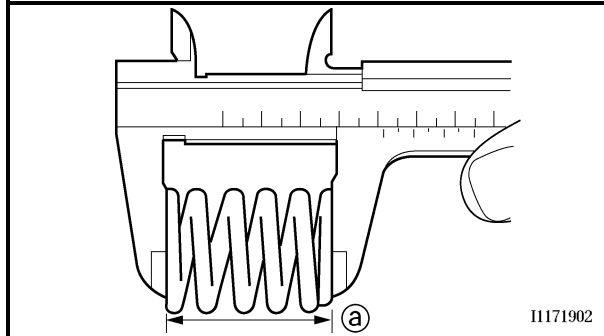
TIP:

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.

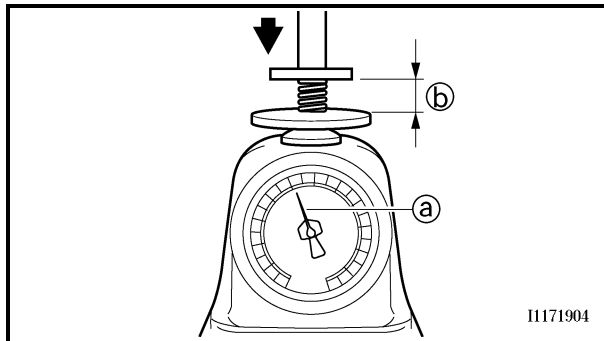


10.Measure:

- valve spring free length (a)
Out of specification → Replace.



Valve spring free length
40.38 mm (1.59 in)
<Limit>: 38.36 mm (1.51 in)



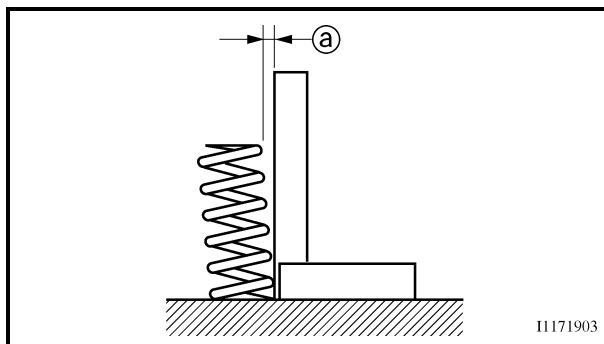
11.Measure:

- compressed spring force (a)
Out of specification → Replace.

(b) Installed length



Compressed spring force
171.0 ~ 197.0 N at 35.00 mm
(17.44 ~ 20.09 kg at 35.00 mm,
38.44 ~ 44.29 lb at 1.38 in)

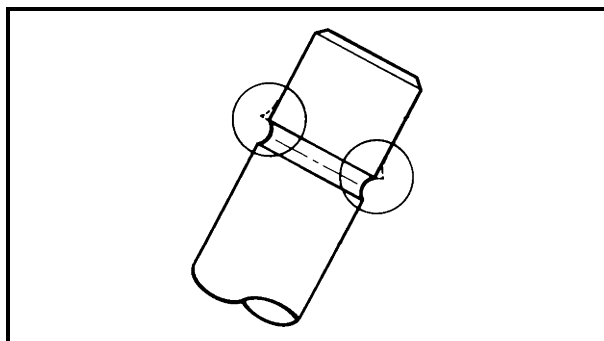


12.Measure:

- spring tilt (a)
Out of specification → Replace.



Spring tilt limit
2.5°/1.80 mm (0.071 in)



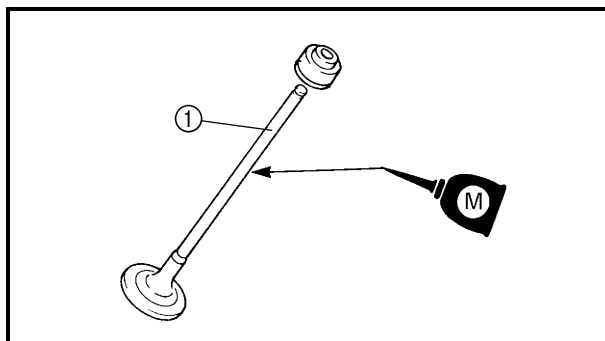
EBS00241

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)

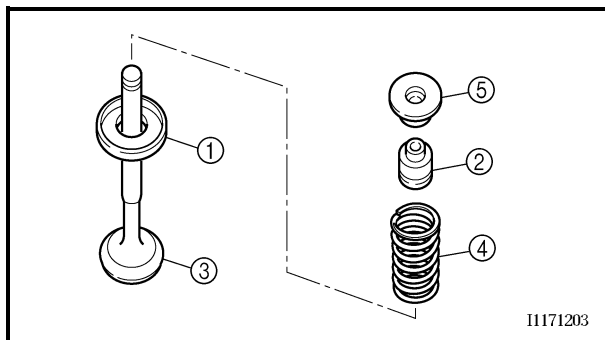


2. Lubricate:

- valve stem ①
(with the recommended lubricant)



Recommended lubricant
Molybdenum disulfide oil



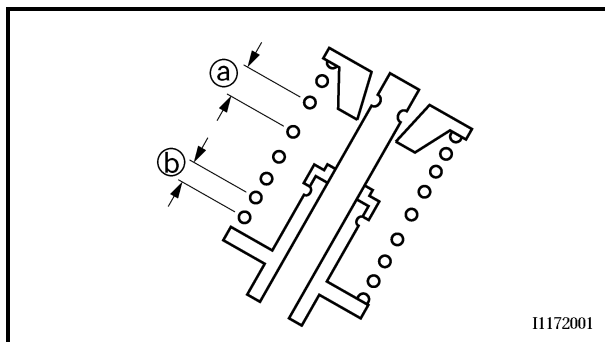
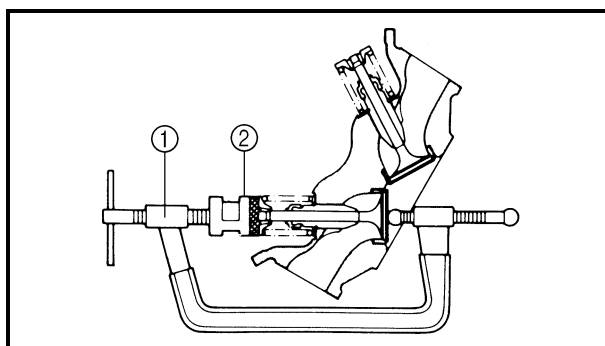
3. Install:

- valve spring seats ①
- valve stem seals ②
- valves ③
- valve springs ④
- valve spring retainers ⑤

TIP:

Install the valve springs with the larger pitch ① facing upwards.

② Smaller pitch



4. Install:

- valve cotteners

TIP:

Install the valve cotteners while compressing the valve spring with the valve spring compressor ① and attachment ②.



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



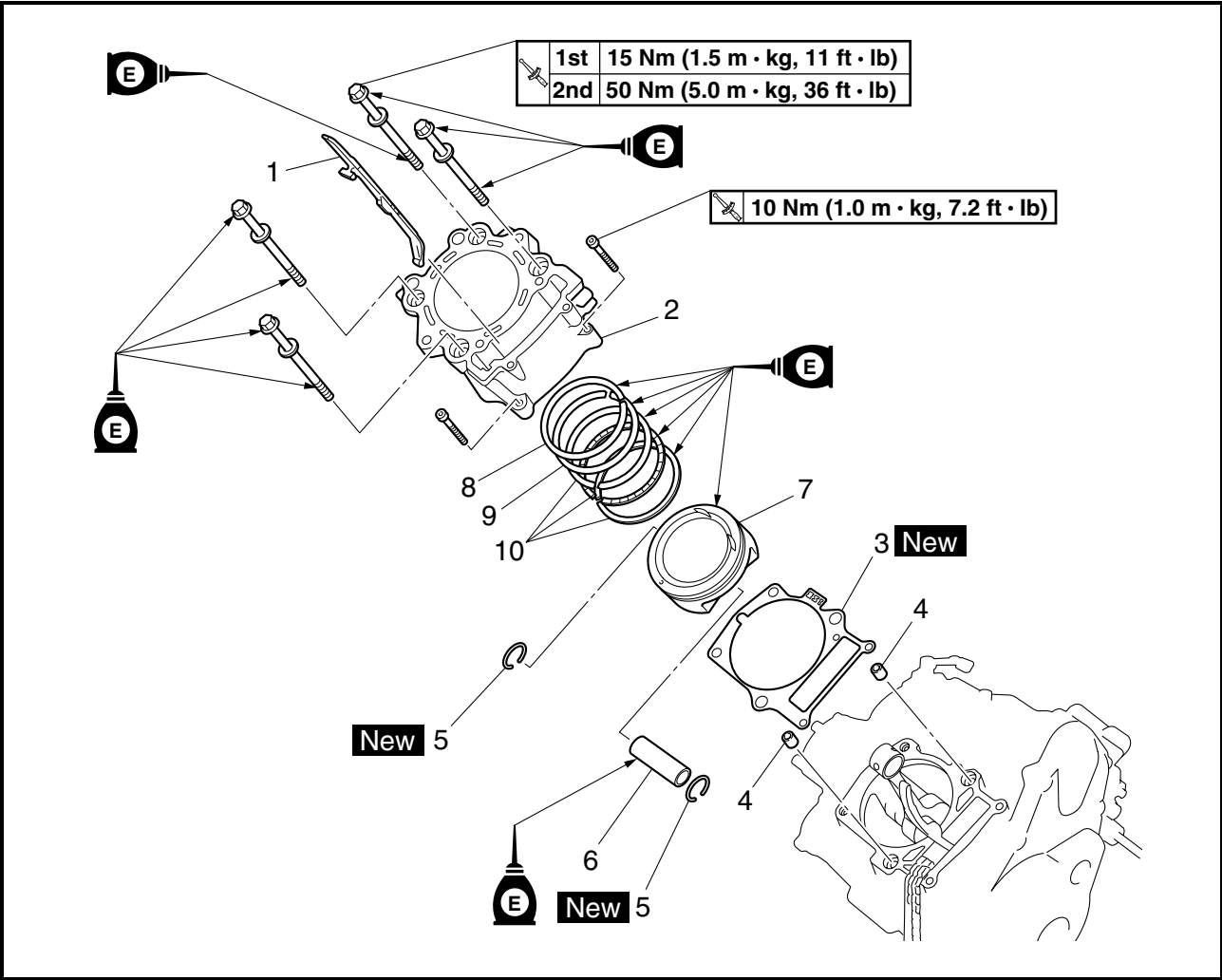
5. To secure the valve cotteners onto the valve stem, lightly tap the valve tip with a mallet.

NOTICE

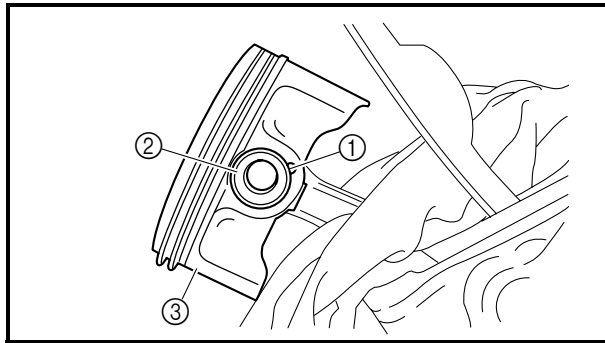
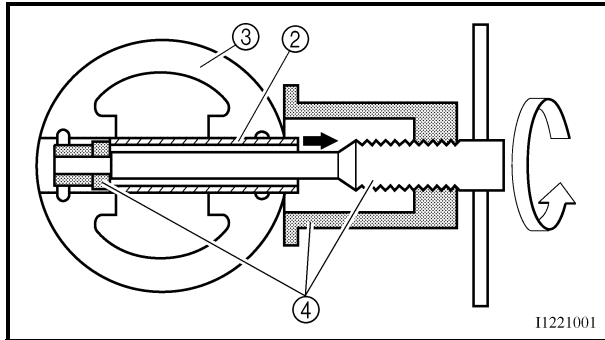
Hitting the valve tip with excessive force could damage the valve.

EBS00245

CYLINDER AND PISTON



Order	Job/Part	Q'ty	Remarks
	Removing the cylinder and piston		
	Cylinder head		Remove the parts in the order listed.
	Water jacket joint		Refer to "CYLINDER HEAD".
			Refer to "WATER PUMP" in chapter 5.
1	Timing chain guide (exhaust side)	1	
2	Cylinder	1	
3	Cylinder gasket	1	Refer to "INSTALLING THE PISTON AND CYLINDER".
4	Dowel pin	2	
5	Piston pin clip	2	
6	Piston pin	1	Refer to "REMOVING THE PISTON" and "INSTALLING THE PISTON AND CYLINDER".
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

TIP:

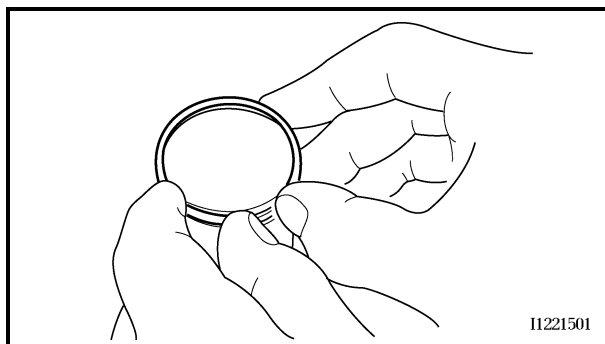
- Before removing the piston pin clips, cover the crankcase opening with a clean rag to prevent the piston pin clips from falling into the crankcase.
- Before removing the piston pin, deburr the piston pin clip grooves and the piston pin bore area. If both areas are deburred and the piston pin is still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



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

NOTICE

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

**2. Remove:**

- piston rings

TIP:

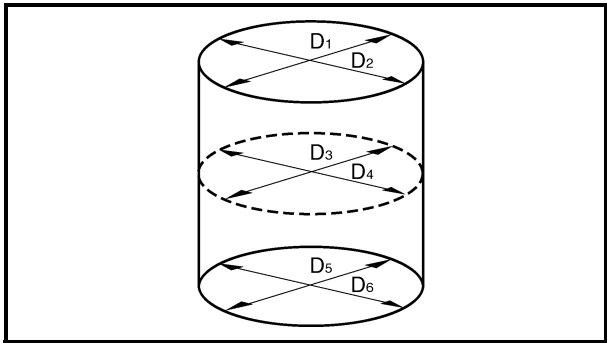
Spread the end gaps apart while at the same time lifting the piston ring over the top of the piston crown, as shown in the illustration.

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



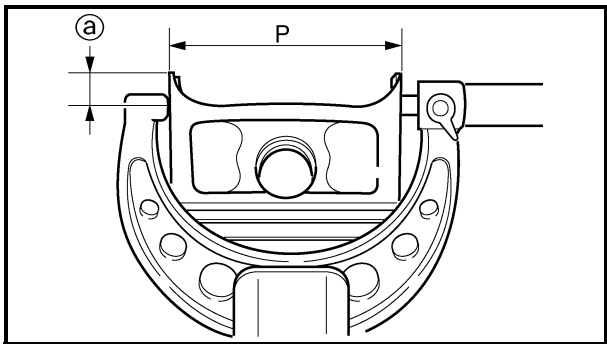
- a. Measure the cylinder bore “C” with a cylinder bore gauge.

TIP: _____

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.
- ① 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)

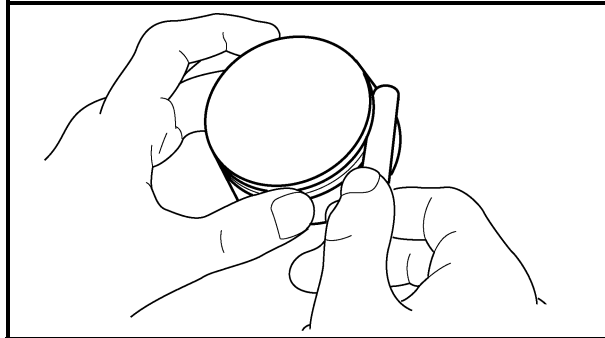
- d. If out of specification, replace the piston and piston rings as a set.
- e. Calculate the piston-to-cylinder clearance with the following formula.

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.



EBS00250

CHECKING THE PISTON RINGS

1. Measure:

- piston ring side clearance

Out of specification → Replace the piston and piston rings as a set.

TIP:

Before measuring the piston ring side clearance, eliminate any carbon deposits from the piston ring grooves and piston rings.



Piston ring side clearance

Top ring

0.030 ~ 0.070 mm

(0.0012 ~ 0.0028 in)

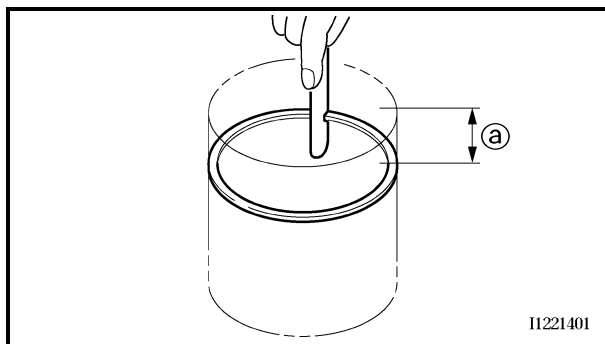
<Limit>: 0.12 mm (0.0047 in)

2nd ring

0.030 ~ 0.070 mm

(0.0012 ~ 0.0028 in)

<Limit>: 0.13 mm (0.0051 in)



11221401

2. Install:

- piston ring
(into the cylinder)

TIP:

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

① 50 mm (1.97 in)

3. Measure:

- piston ring end gap

Out of specification → Replace the piston ring.

TIP:

The oil ring expander spacer's end gap cannot be measured. If the oil ring rail's gap is excessive, replace all three piston rings.

**Piston ring end gap****Top ring**

0.20 ~ 0.35 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

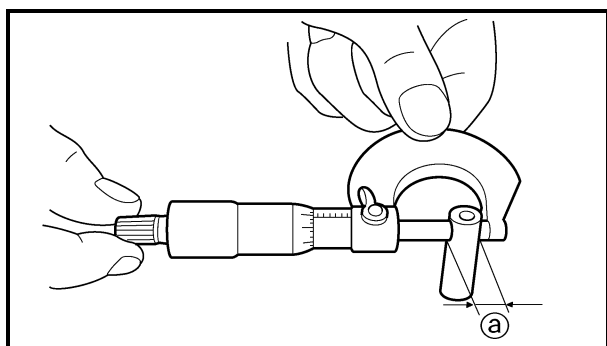
(0.008 ~ 0.028 in)

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 ①

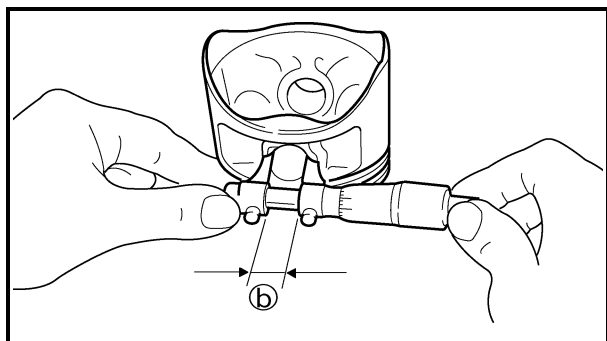
Out of specification → Replace the piston pin.

**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 ②

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:

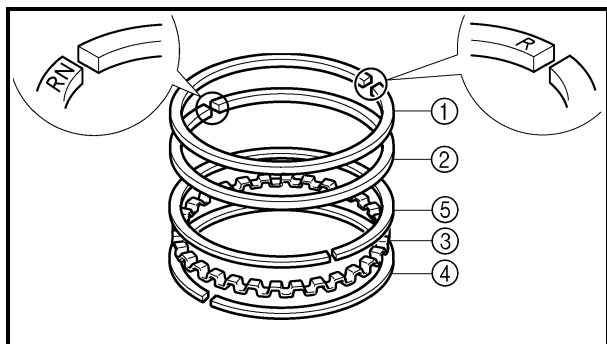
- piston-pin-to-piston-pin-bore clearance

Out of specification → Replace the piston pin and piston as a set.

$$\text{Piston-pin-to-piston-pin-bore clearance} = \text{Piston pin bore diameter } \textcircled{b} - \text{Piston pin outside diameter } \textcircled{a}$$



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



EBS00252

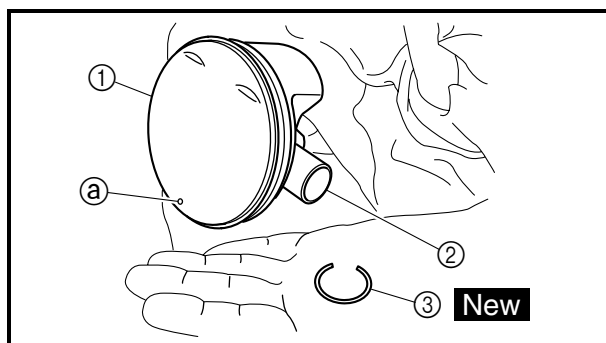
INSTALLING THE PISTON AND CYLINDER

1. Install:

- top ring ①
- 2nd ring ②
- oil ring expander ③
- lower oil ring rail ④
- upper oil ring rail ⑤

TIP:

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



2. Install:

- piston ①
- piston pin ②
- piston pin clips ③ **New**

TIP:

- Apply engine oil to the piston pin.
- Make sure the punch mark (a) on the piston points towards the exhaust side of the cylinder.
- Before installing the piston pin clips, cover the crankcase opening with a clean rag to prevent the clips from falling into the crankcase.

3. Install:

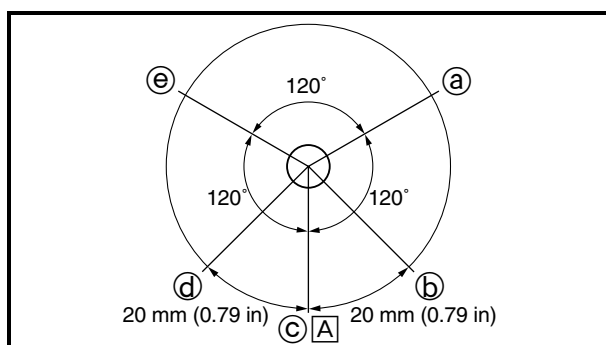
- cylinder gasket **New**
- dowel pins

4. Lubricate:

- piston
- piston rings
- cylinder
(with the recommended lubricant)



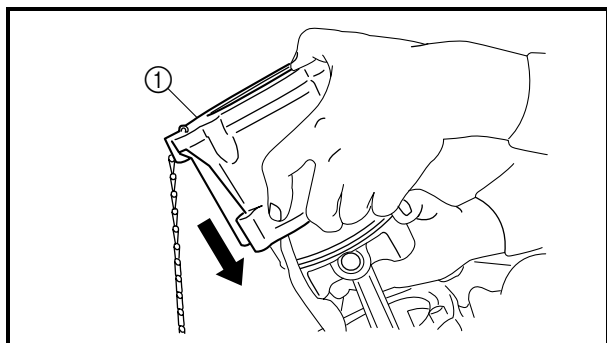
Recommended lubricant
Engine oil



5. Offset:

- piston ring end gaps

- ① Top ring
- ② Upper oil ring rail
- ③ Oil ring expander
- ④ Lower oil ring rail
- ⑤ 2nd ring
- Ⓐ Exhaust side

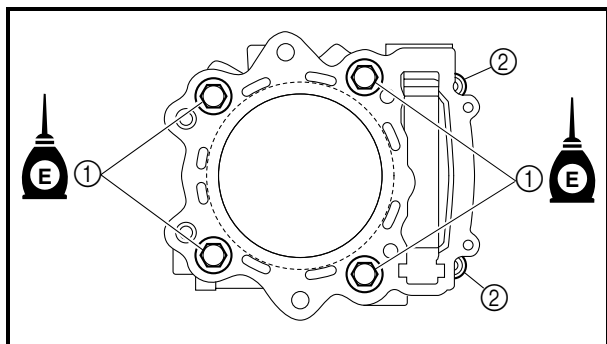


6. Install:

- cylinder ①
- timing chain guide (exhaust side)

TIP:

- While compressing the piston rings with one hand, install the cylinder with the other hand.
- Pass the timing chain and timing chain guide (exhaust side) through the timing chain cavity.



7. Install:

- cylinder bolts

TIP:

Lubricate the threads of the cylinder bolts ① and mating surface with engine oil.

8. Tighten:

- cylinder bolts ① (1st)

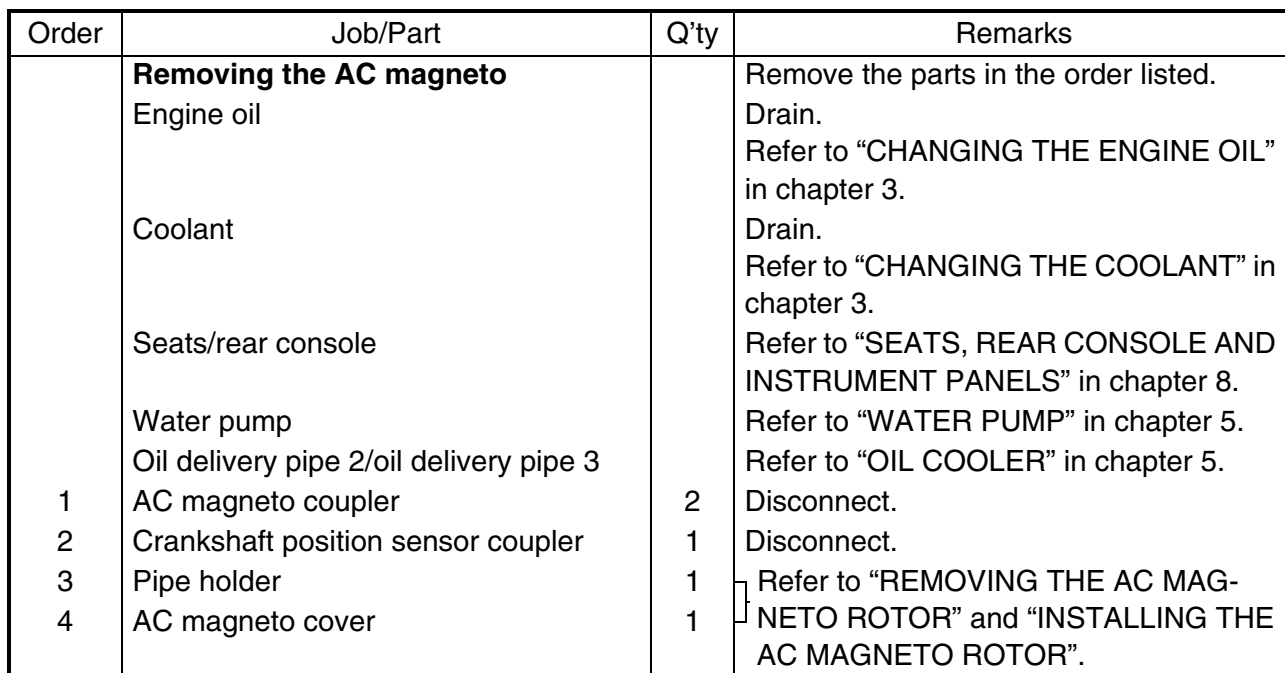
15 Nm (1.5 m · kg, 11 ft · lb)

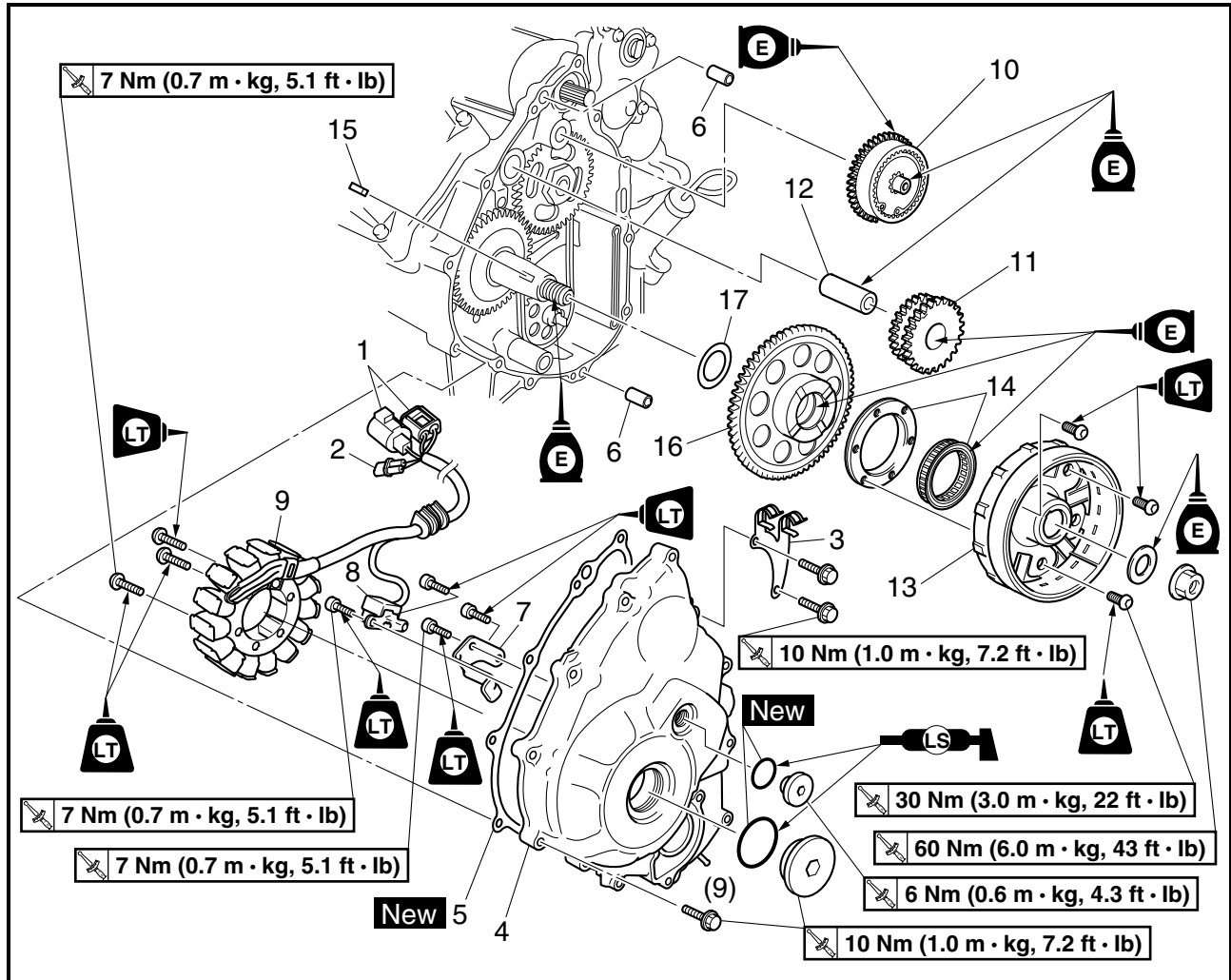
- cylinder bolts ① (2nd)

50 Nm (5.0 m · kg, 36 ft · lb)

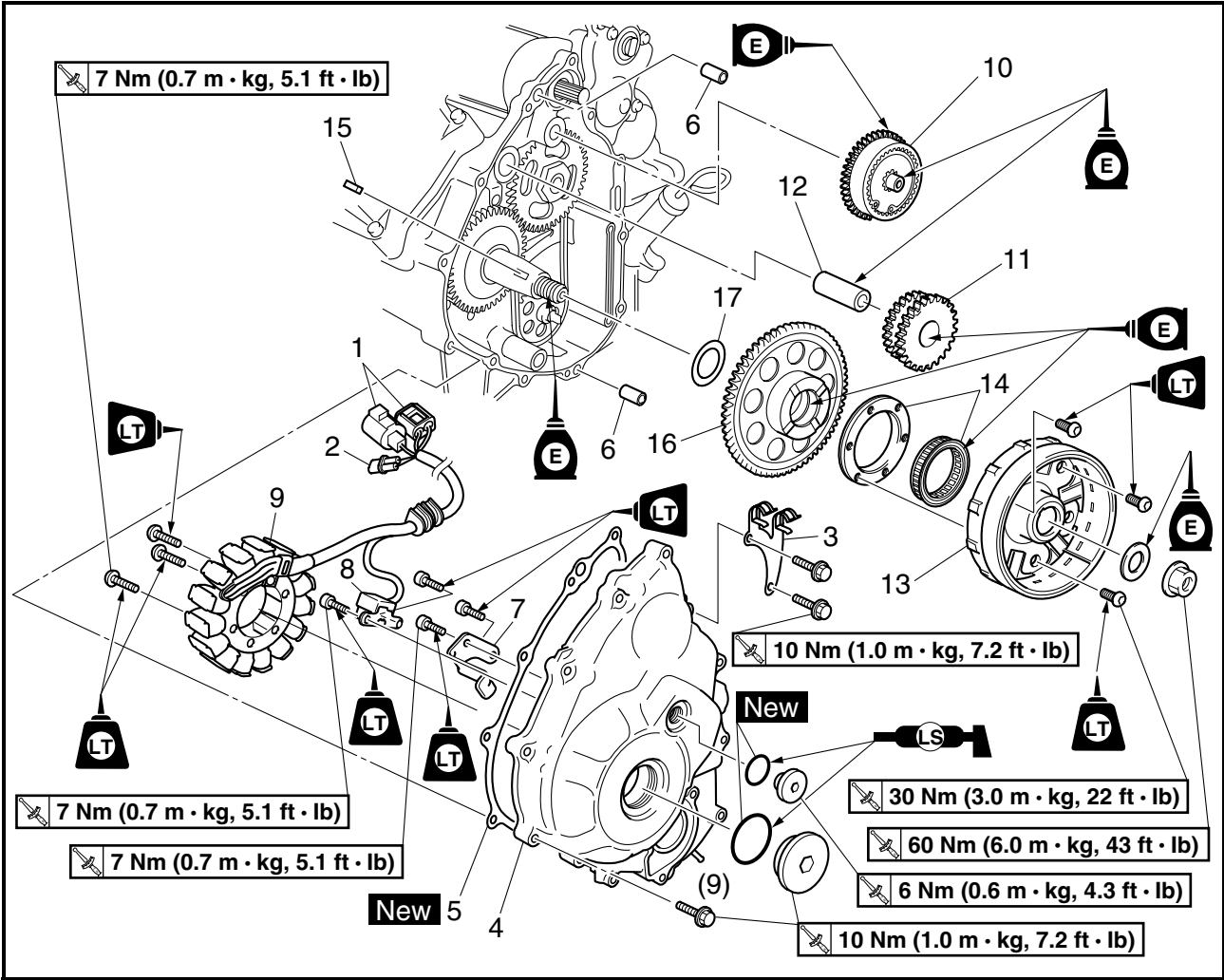
- cylinder bolts (timing chain side) ②

10 Nm (1.0 m · kg, 7.2 ft · lb)

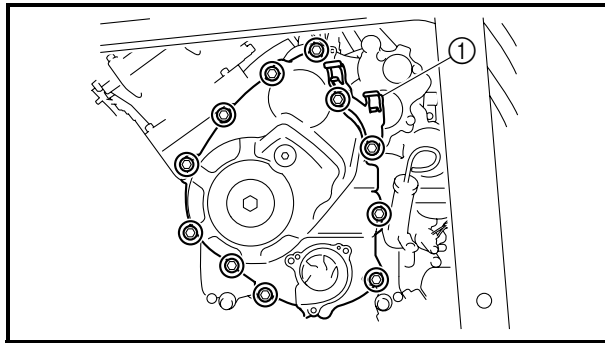




Order	Job/Part	Q'ty	Remarks
5	AC magneto cover gasket	1	Refer to "REMOVING THE AC MAGNETO ROTOR" and "INSTALLING THE AC MAGNETO ROTOR".
6	Dowel pin	2	
7	Lead holder	1	
8	Crankshaft position sensor	1	
9	Stator coil	1	
10	Torque limiter	1	
11	Starter idle gear	1	
12	Starter idle gear shaft	1	
13	AC magneto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



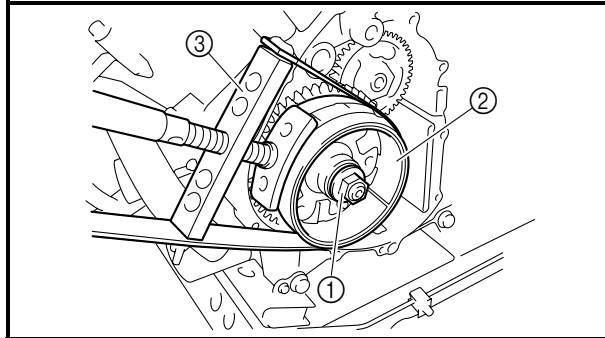
EBS00259

REMOVING THE AC MAGNETO ROTOR**1. Remove:**

- pipe holder ①
- AC magneto cover

TIP:

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

**2. Remove:**

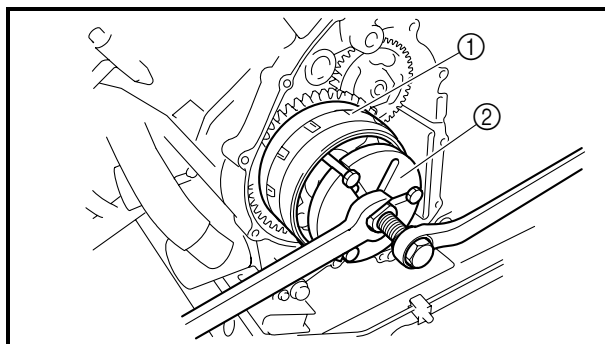
- AC magneto rotor nut ①
- washer

TIP:

- 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

NOTICE

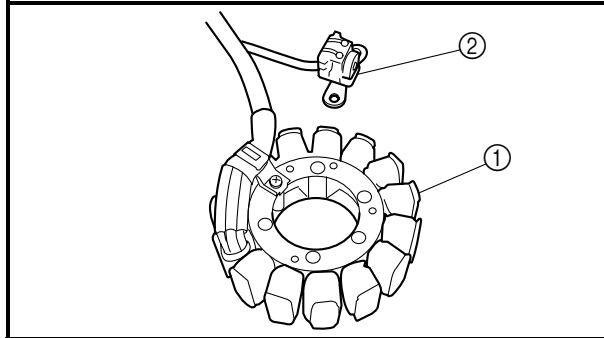
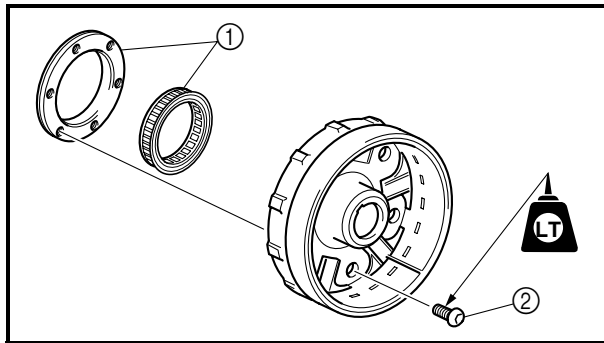
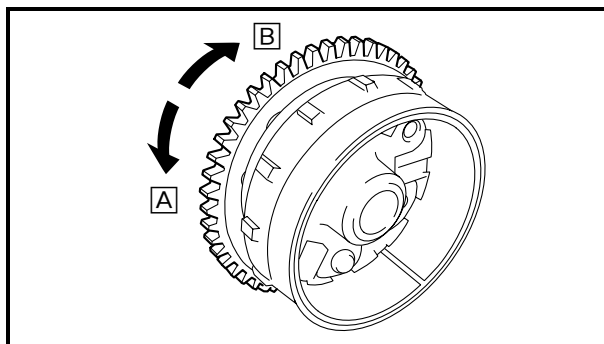
To protect the end of the crankshaft, place an appropriate sized socket between the flywheel puller set center bolt and the crankshaft.

TIP:

- Use the flywheel puller ②.
- 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.

TIP:

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

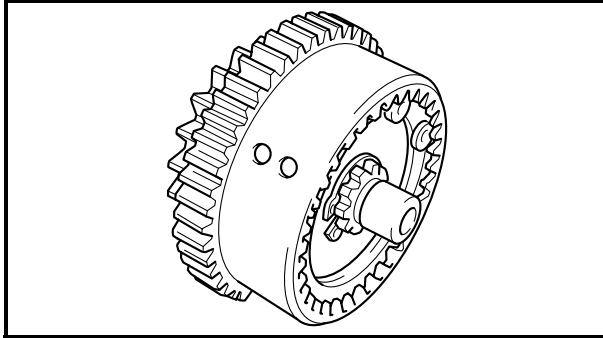


Starter clutch bolt
30 Nm (3.0 m · kg, 22 ft · lb)
LOCTITE®

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



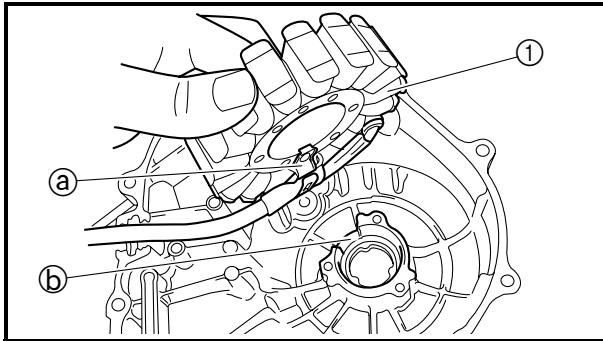
2. Check:
 - starter idle gear teeth
 - starter wheel gear teeth
 Burrs/clips/roughness/wear → Replace.
3. Check:
 - starter wheel gear (contacting surface)
 Damage/pitting/wear → Replace.



CHECKING THE TORQUE LIMITER

1. Check:
 - torque limiter
 Damage/wear → Replace.

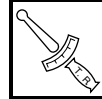
TIP: _____
Do not disassemble the torque limiter.



EBS00268

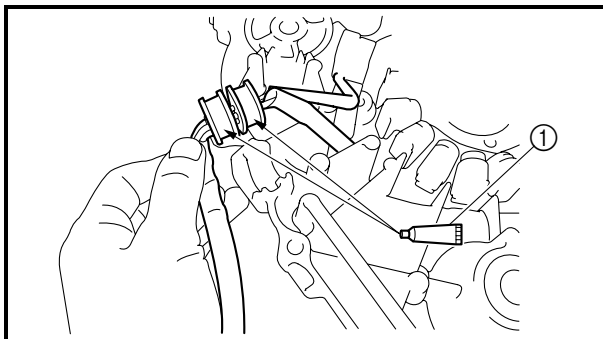
INSTALLING THE AC MAGNETO ROTOR

1. Install:
 - stator coil ①

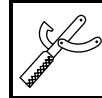


Stator coil bolt
7 Nm (0.7 m · kg, 5.1 ft · lb)
LOCTITE®

TIP: _____
Align the projection ① on the stator coil with the slot ② in the AC magneto cover.



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



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

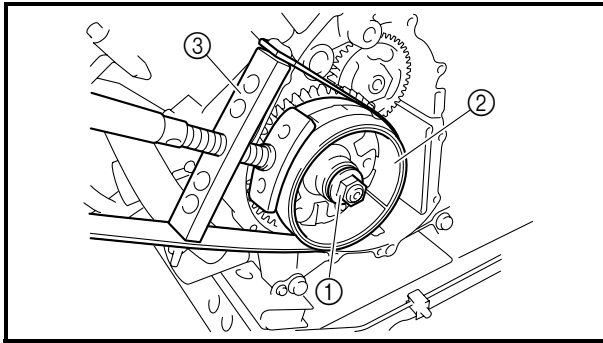


3. Install:

- woodruff key
- AC magneto rotor

TIP:

- 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:

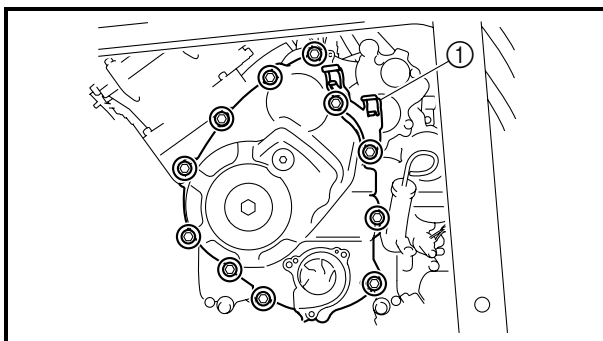
- AC magneto rotor nut ①

60 Nm (6.0 m · kg, 43 ft · lb)**TIP:**

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:

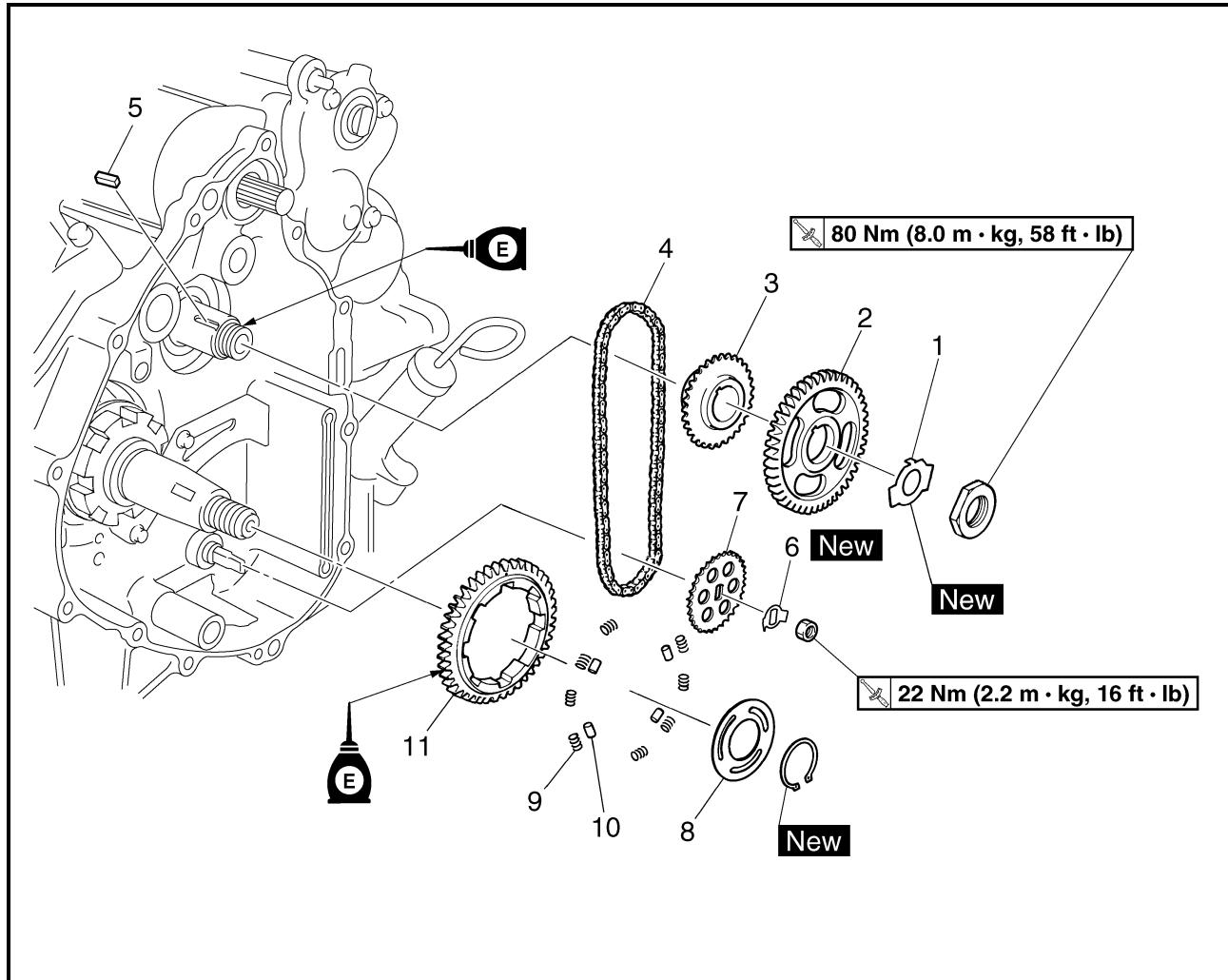
- AC magneto cover
- pipe holder ①
- AC magneto cover bolts

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

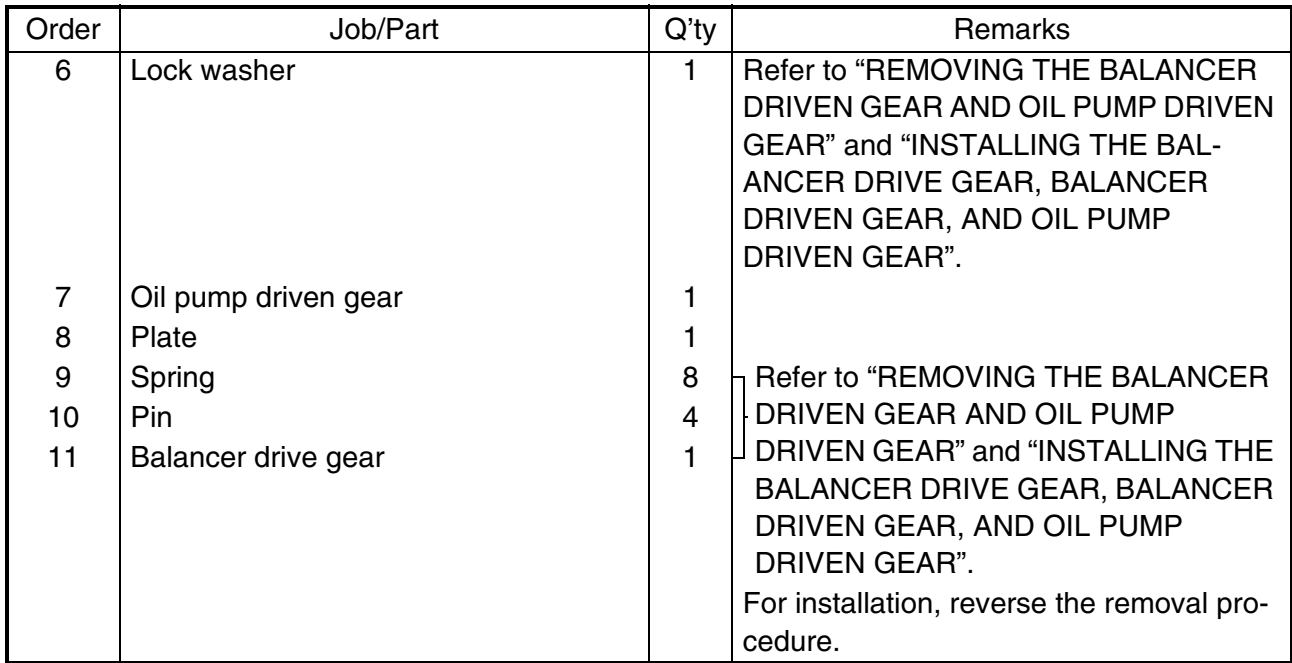
Tighten the AC magneto cover bolts in stages, using a crisscross pattern.

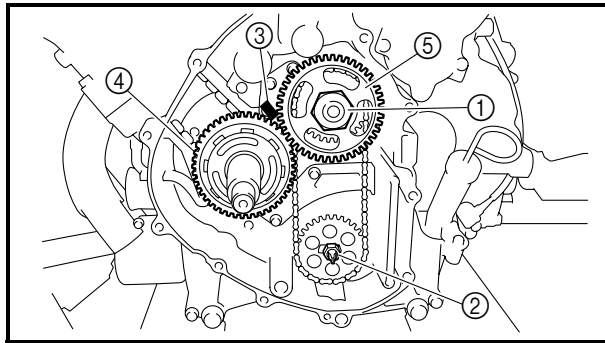


BALANCER GEARS AND OIL PUMP GEARS



Order	Job/Part	Q'ty	Remarks
	Removing the balancer gears and oil pump gears		Remove the parts in the order listed.
1	Starter wheel gear	1	Refer to "AC MAGNETO".
2	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".
	Balancer driven gear	1	
3	Oil pump drive gear	1	
4	Chain	1	
5	Straight key	1	





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

TIP:

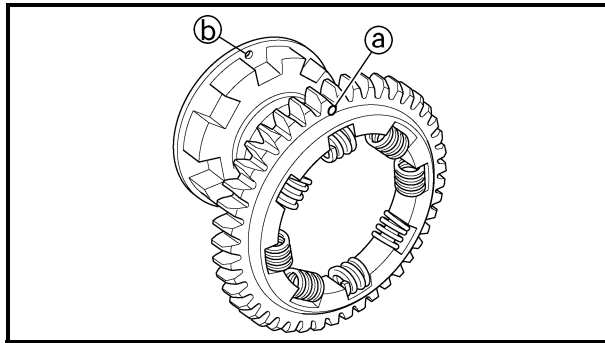
Place an aluminum plate ③ between the teeth of the balancer drive gear ④ and balancer driven gear ⑤, then loosen the nuts.

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.



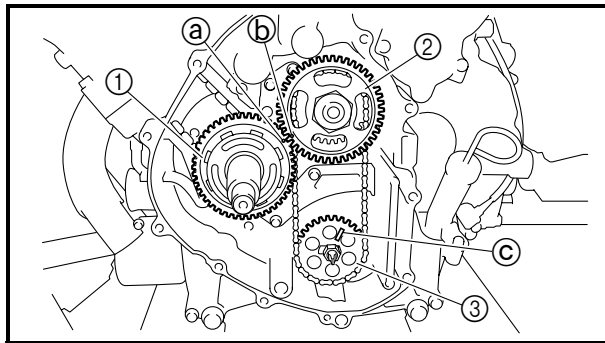
INSTALLING THE BALANCER DRIVE GEAR, BALANCER DRIVEN GEAR, AND OIL PUMP DRIVEN GEAR

1. Install:

- pin
- spring
- balancer drive gear
(onto the buffer boss)

TIP:

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

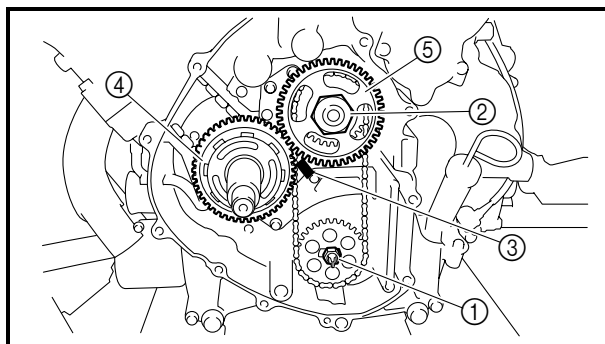


2. Install:

- balancer drive gear (1)
- balancer driven gear (2)
- oil pump driven gear (3)

TIP:

- Align the punch mark (a) on the balancer drive gear with the punch mark (b) on the balancer driven gear.
- Install the oil pump driven gear with the “3B4” mark (c) 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)

TIP:

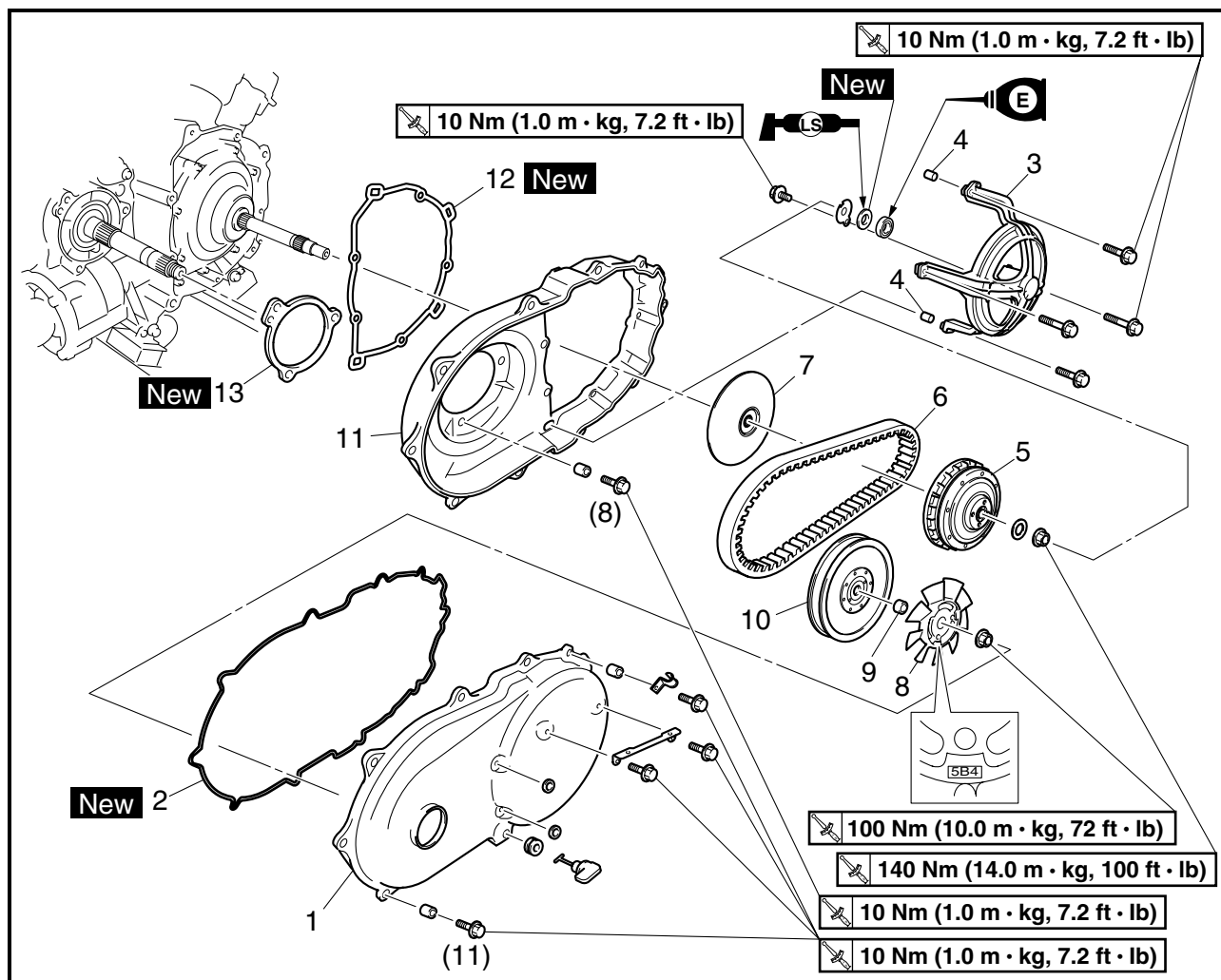
- Place an aluminum plate (3) between the teeth of the balancer drive gear (4) and balancer driven gear (5), then tighten the nuts.
- Apply the engine oil to the thread of axles and nuts.

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

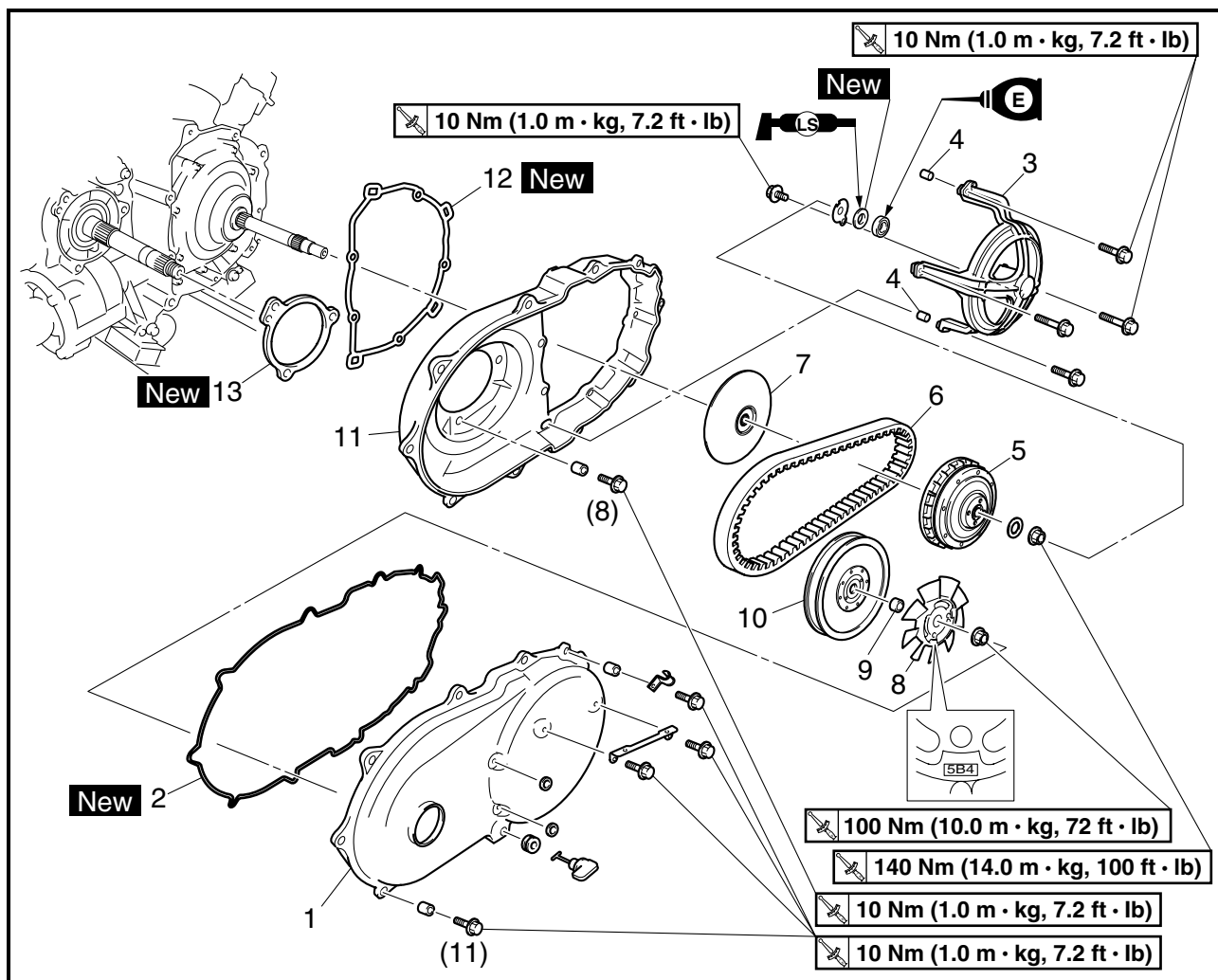


EBS00269

PRIMARY AND SECONDARY SHEAVES



Order	Job/Part	Q'ty	Remarks
	Removing the primary and secondary sheaves		Remove the parts in the order listed.
	Seats/rear console		Refer to "SEATS, REAR CONSOLE AND INSTRUMENT PANELS" in chapter 8.
	Left side panel/left corner panel/driver seat support/seat rail		Refer to "PANELS AND FRONT CONSOLE" in chapter 8.
	V-belt cooling ducts		Refer to "ENGINE REMOVAL".
1	Drive belt cover	1	
2	Rubber gasket	1	
3	Bearing housing	1	
4	Dowel pin	2	

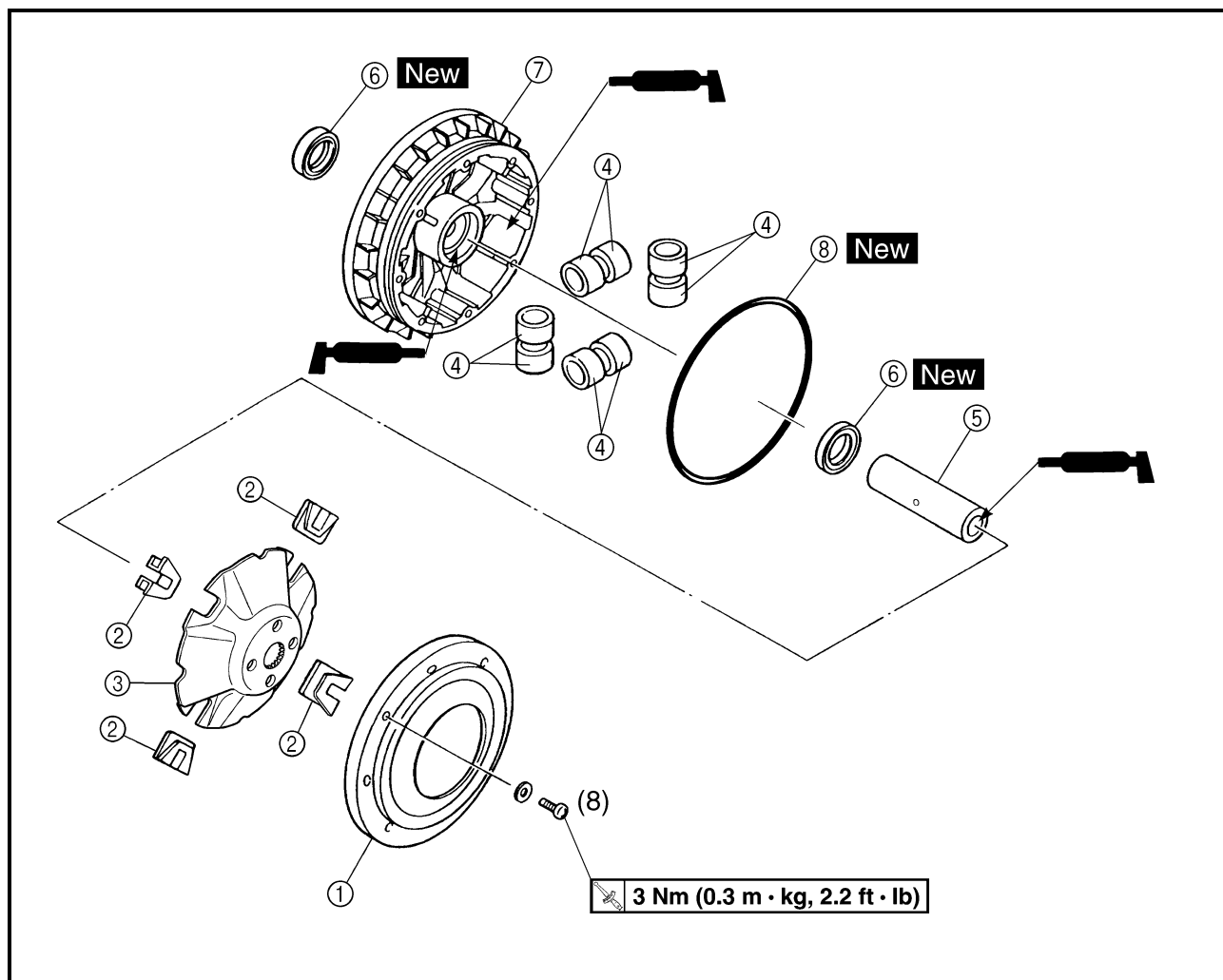


Order	Job/Part	Q'ty	Remarks
5	Primary sheave assembly	1	Refer to "REMOVING THE PRIMARY AND SECONDARY SHEAVES" and "INSTALLING THE PRIMARY AND SECONDARY SHEAVES".
6	V-belt	1	
7	Primary fixed sheave	1	
8	V-belt fan	1	
9	Spacer	1	
10	Secondary sheave assembly	1	
11	Drive belt case	1	
12	Rubber gasket	1	For installation, reverse the removal procedure.
13	Rubber gasket	1	



EBS00270

PRIMARY SHEAVE

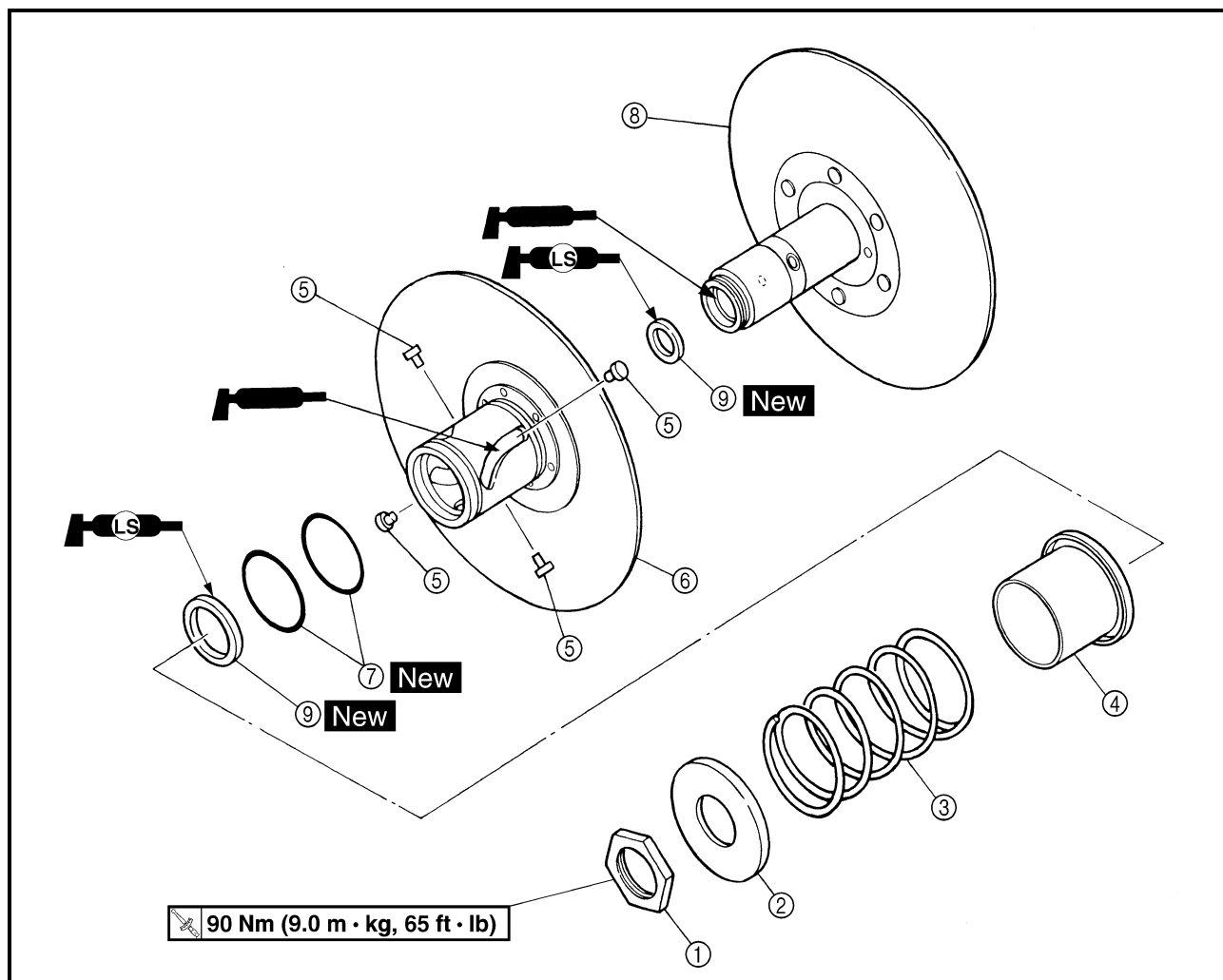


Order	Job/Part	Q'ty	Remarks
	Disassembling the primary sheave		Remove the parts in the order listed.
①	Primary pulley sheave cap	1	Refer to "ASSEMBLING THE PRIMARY SHEAVE".
②	Primary pulley slider	4	
③	Primary pulley cam	1	
④	Primary pulley weight	8	
⑤	Collar	1	
⑥	Oil seal	2	
⑦	Primary sliding sheave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

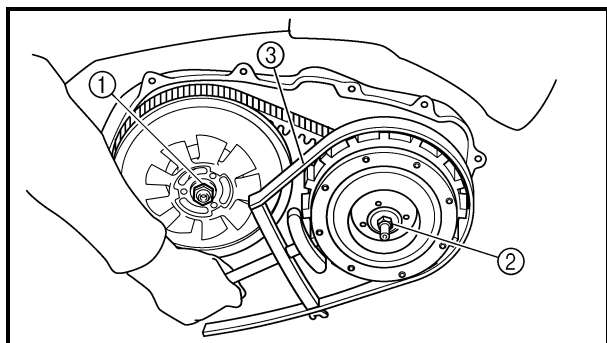


EBS00271

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:

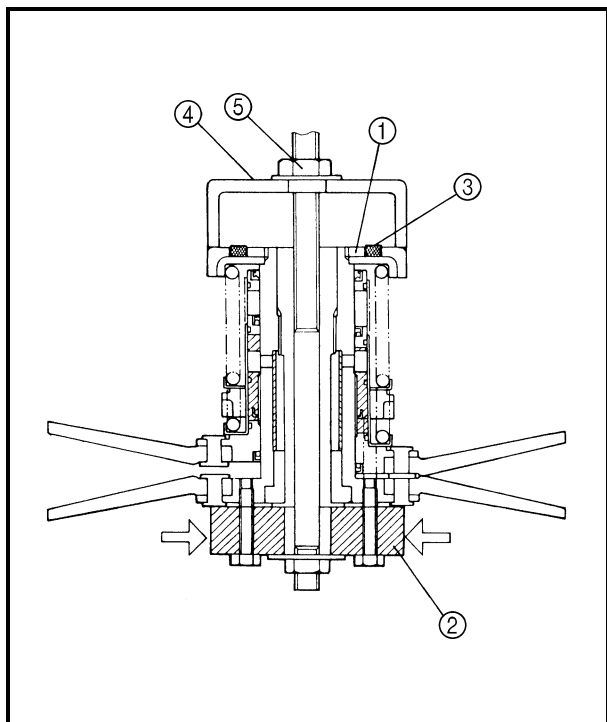
- secondary sheave nut ①
- primary sheave nut ②

TIP:

- 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



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



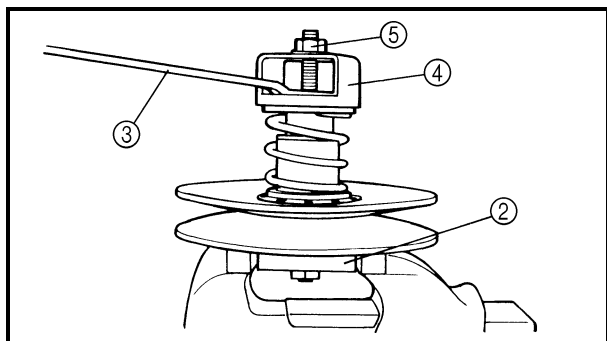
Sheave fixed block
90890-04135

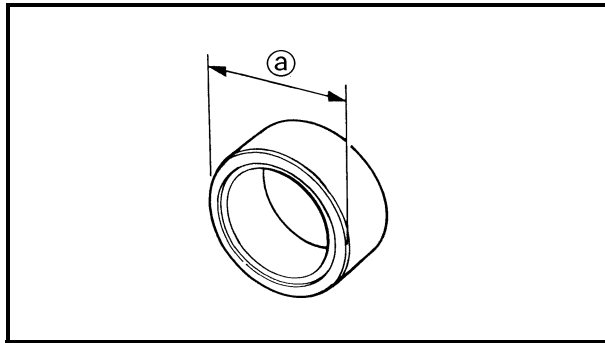
Sheave fixed bracket
YM-04135

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.





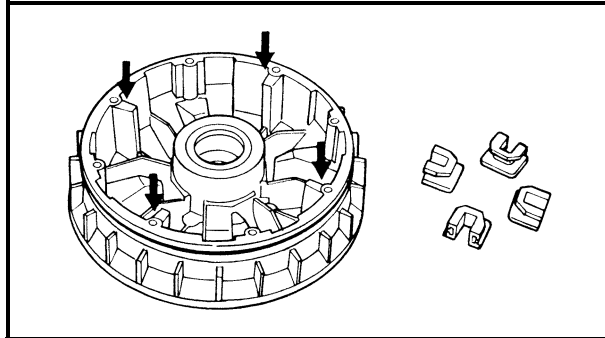
EBS00274

CHECKING THE PRIMARY SHEAVE

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



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

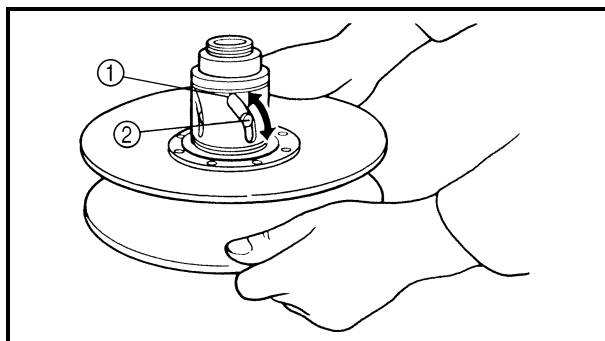


2. Check:
 - primary pulley slider
 - primary sliding sheave splines
Wear/cracks/damage → Replace.
 - primary pulley cam
Cracks/damage → Replace.
3. Check:
 - primary sliding sheave
 - primary fixed sheave
Cracks/damage → Replace.

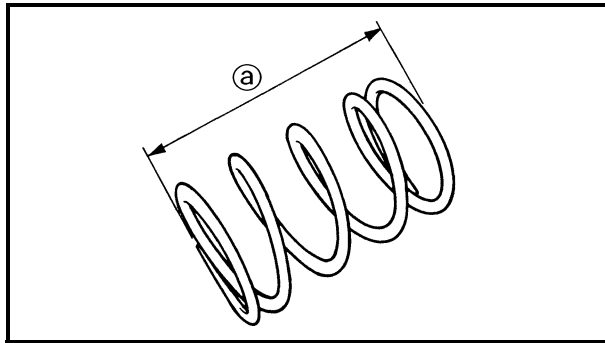
EBS00275

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:

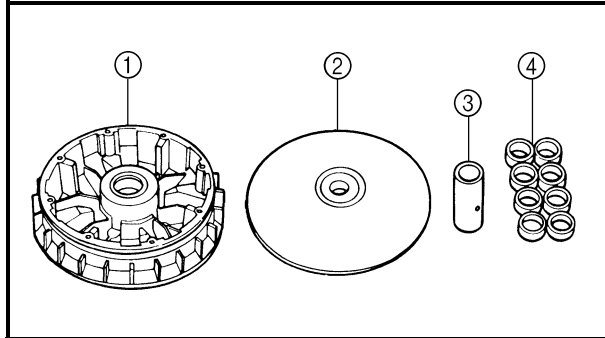
- secondary sheave spring free length (a)
Out of specification → Replace the secondary sheave spring.



Free length

130.6 mm (5.14 in)

<Limit>: 128.0 mm (5.04 in)



EBS00276

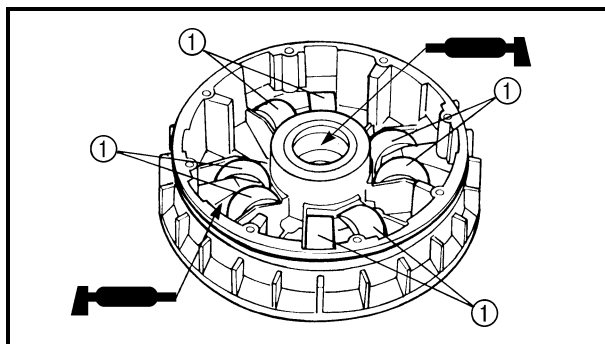
ASSEMBLING THE PRIMARY SHEAVE

1. Clean:

- primary sliding sheave face ①
- primary fixed sheave face ②
- collar ③
- weights ④
- primary sliding sheave cam face

TIP:

Remove any excess grease.

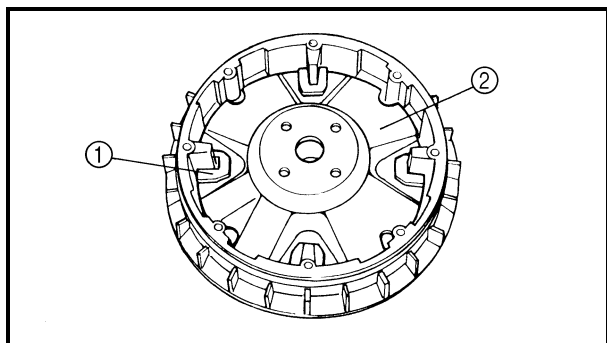


2. Install:

- weights ①

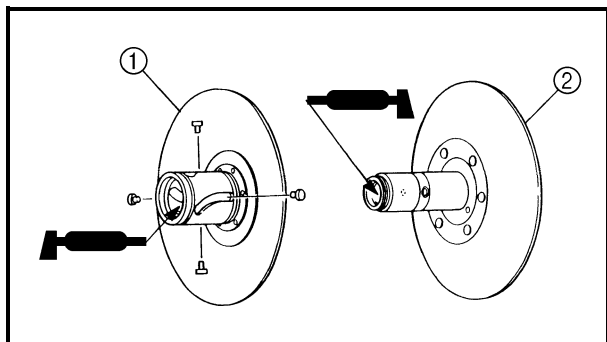
TIP:

- 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

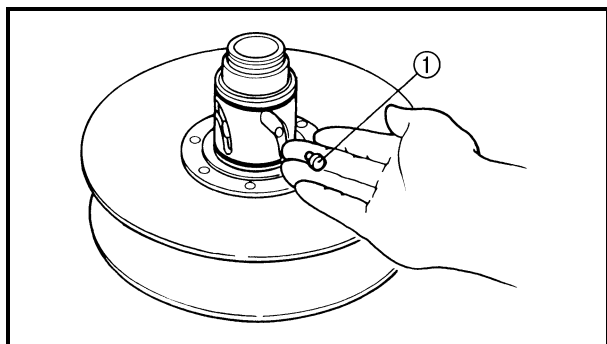
3 Nm (0.3 m · kg, 2.2 ft · lb)



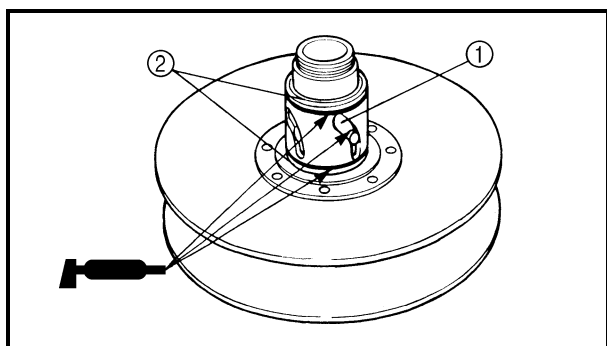
EBS00277

ASSEMBLING THE SECONDARY SHEAVE

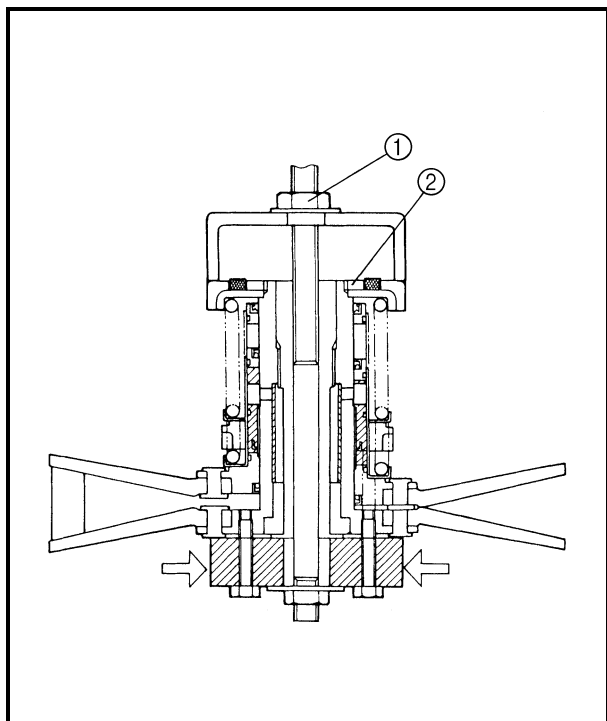
1. Apply:
 - BEL-RAY assembly lube®
(to the secondary sliding sheave ① inner surface and oil seals)
 - BEL-RAY assembly lube®
(to the bearings, oil seals and inner surface of the secondary fixed sheave ②)



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

- 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

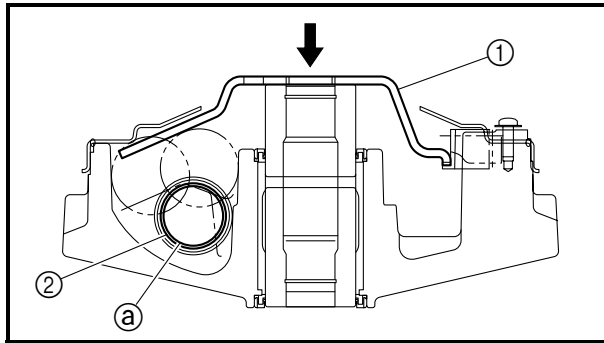
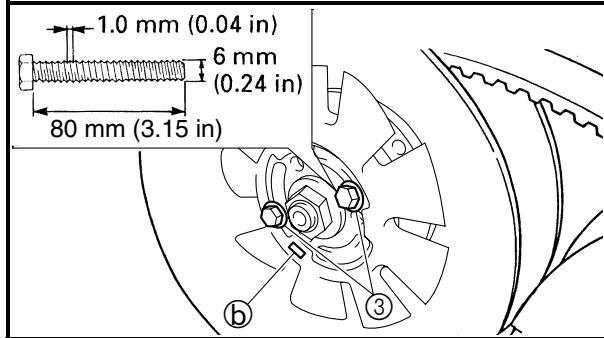
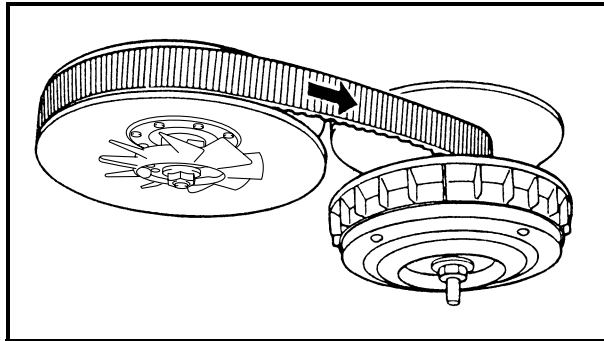
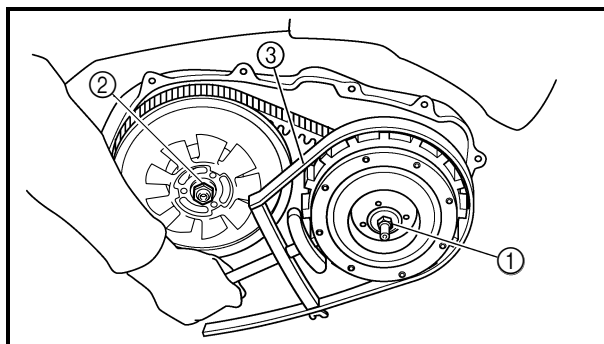
- b. Place the sheave fixed block in a vise and secure it.
- c. Tighten the sheave spring compressor nut ① and compress the spring.
- d. Install the nut ② and tighten it to the specified torque using the locknut wrench.



Nut
90 Nm (9.0 m · kg, 65 ft · lb)

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

[illegible]



EBS00279

INSTALLING THE PRIMARY AND SECONDARY SHEAVES

1. Install:

- secondary sheave
- V-belt fan
- V-belt
- primary sheave

TIP:

- Be sure to push in the primary pulley cam ① when installing the primary sheave so that the primary pulley weights ② will be properly position ③.
- Install the V-belt fan with the embossed characters ④ facing outward.
- Tightening the bolts ⑤ 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)

TIP:

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

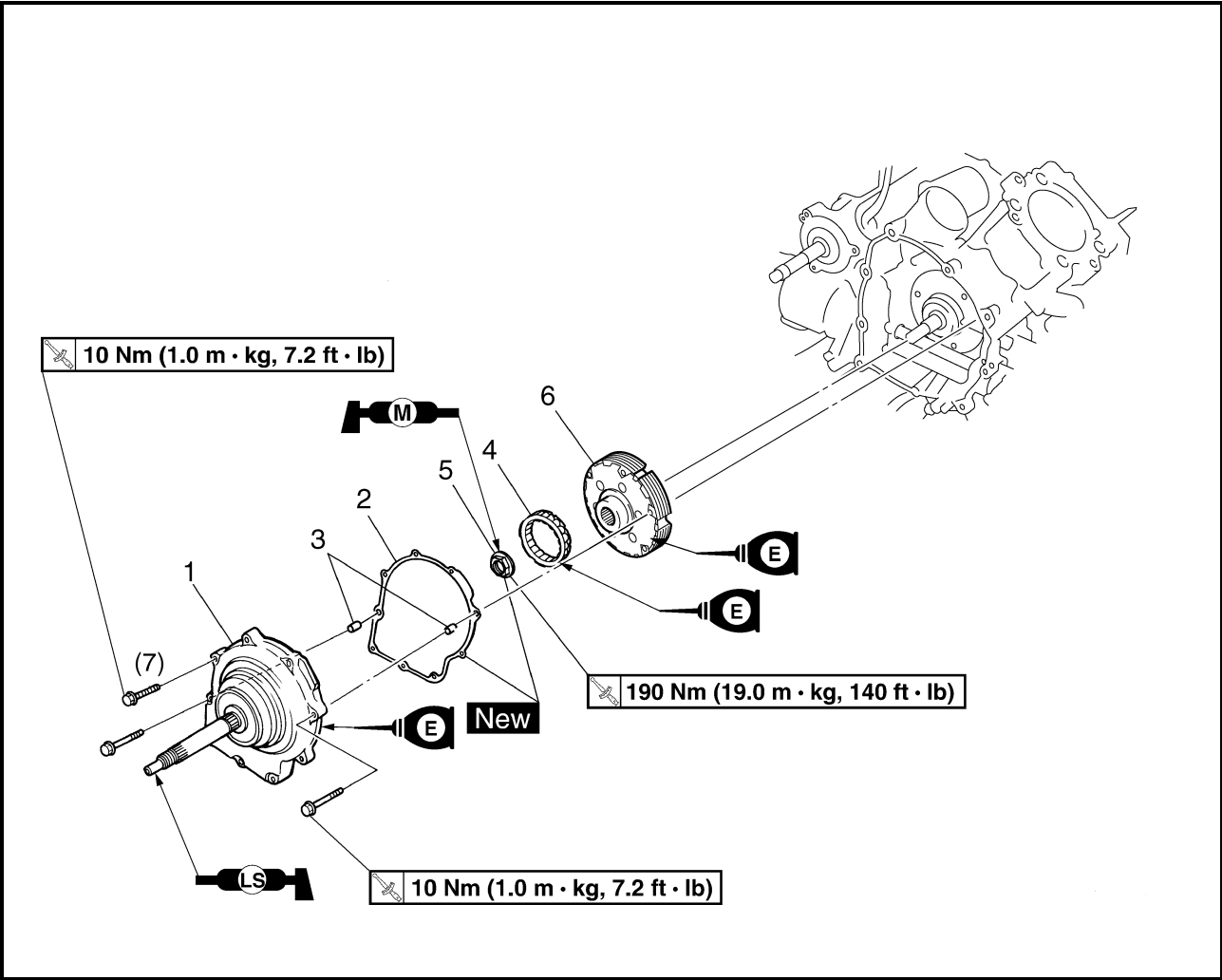


Sheave holder
90890-01701
Primary clutch holder
YS-01880-A



EBS00291

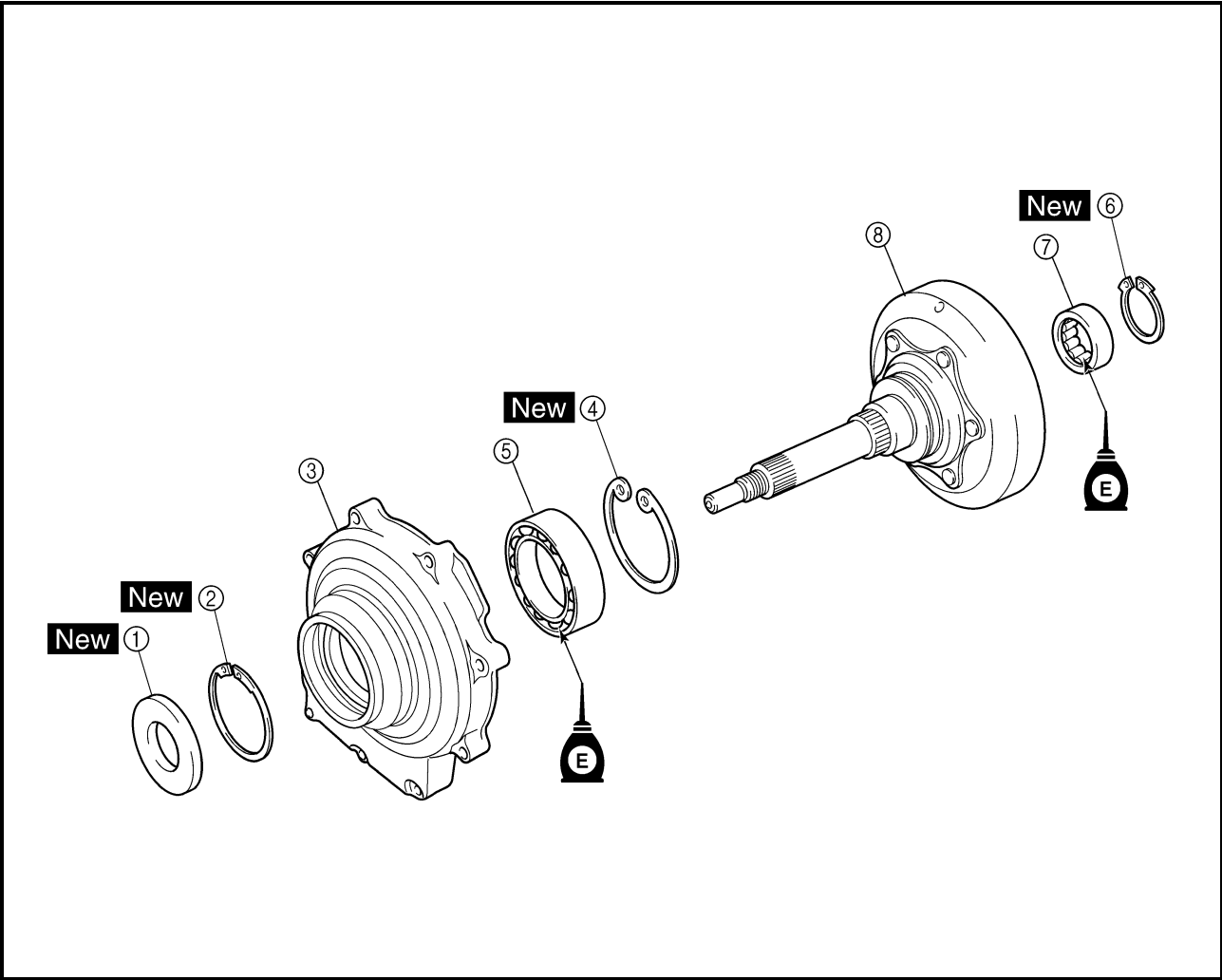
CLUTCH



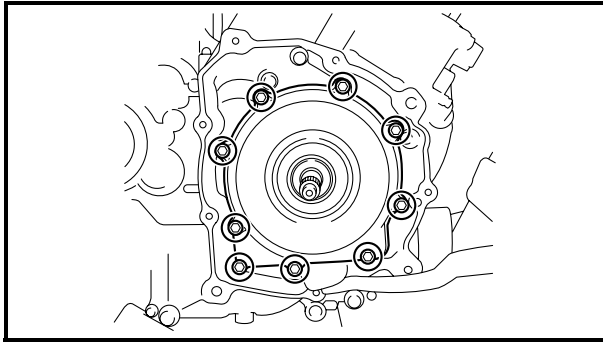
Order	Job/Part	Q'ty	Remarks
	Removing the clutch		
	Primary sheave/secondary sheave		Remove the parts in the order listed. Refer to "PRIMARY AND SECONDARY SHEAVES".
1	Clutch housing assembly	1	Refer to "REMOVING THE CLUTCH" and "INSTALLING THE CLUTCH".
2	Gasket	1	
3	Dowel pin	2	
4	One-way clutch bearing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



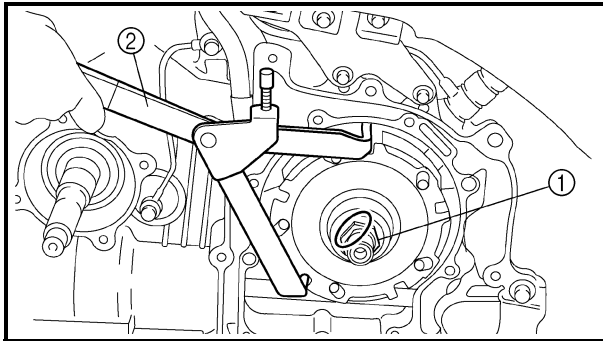
EBS00296

REMOVING THE CLUTCH**1. Remove:**

- clutch housing assembly
- gasket
- dowel pins

TIP:

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

NOTICE

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

TIP:

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



Universal clutch holder
90890-04086, YM-91042



EBS00299

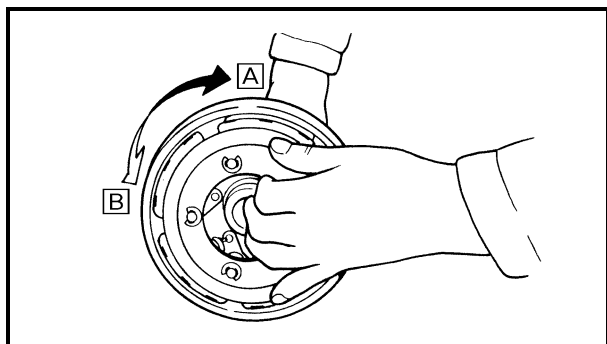
CHECKING THE CLUTCH

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

TIP:

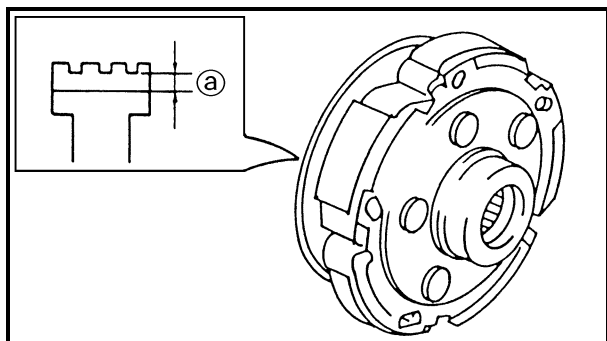
- Replace the one-way clutch assembly and clutch housing as a set.
- The one-way clutch bearing must be installed with the flange side facing in.

- one-way clutch operation



- 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 counter-clockwise B, the clutch housing and crankshaft should be engaged. If not, the one-way clutch assembly is faulty.
Replace it.

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

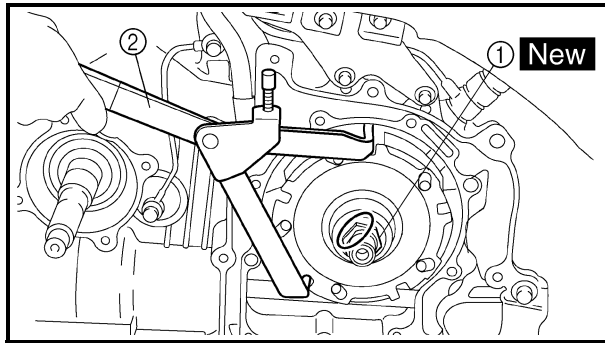


4. Measure:
- clutch shoe thickness
Out of specification → Replace.



Clutch shoe thickness
1.5 mm (0.06 in)

Clutch shoe wear limit (a)
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)
NOTICE

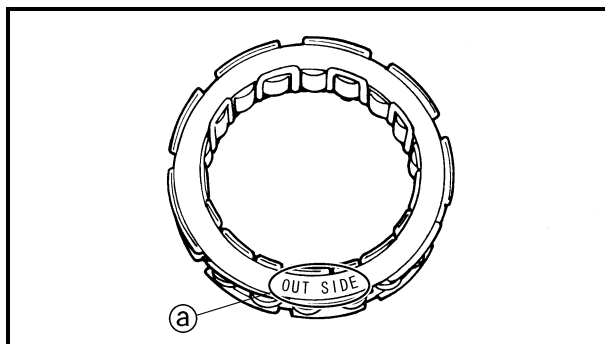
The clutch carrier assembly nut has left-handed threads. To tighten the clutch carrier assembly nut turn it counterclockwise.

TIP:

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

TIP:

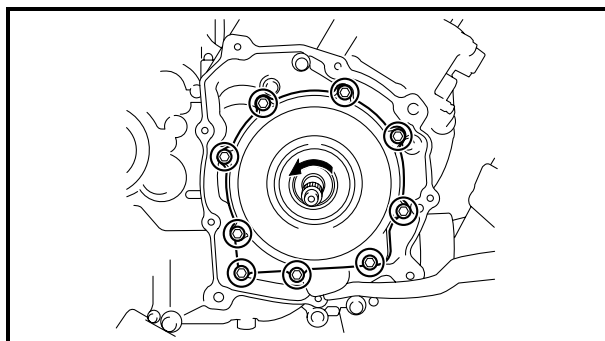
The one-way clutch bearing should be installed in the clutch carrier assembly with the "OUT SIDE" mark (a) facing toward the clutch housing.

4. Install:

- dowel pins
- gasket **New**
- clutch housing assembly

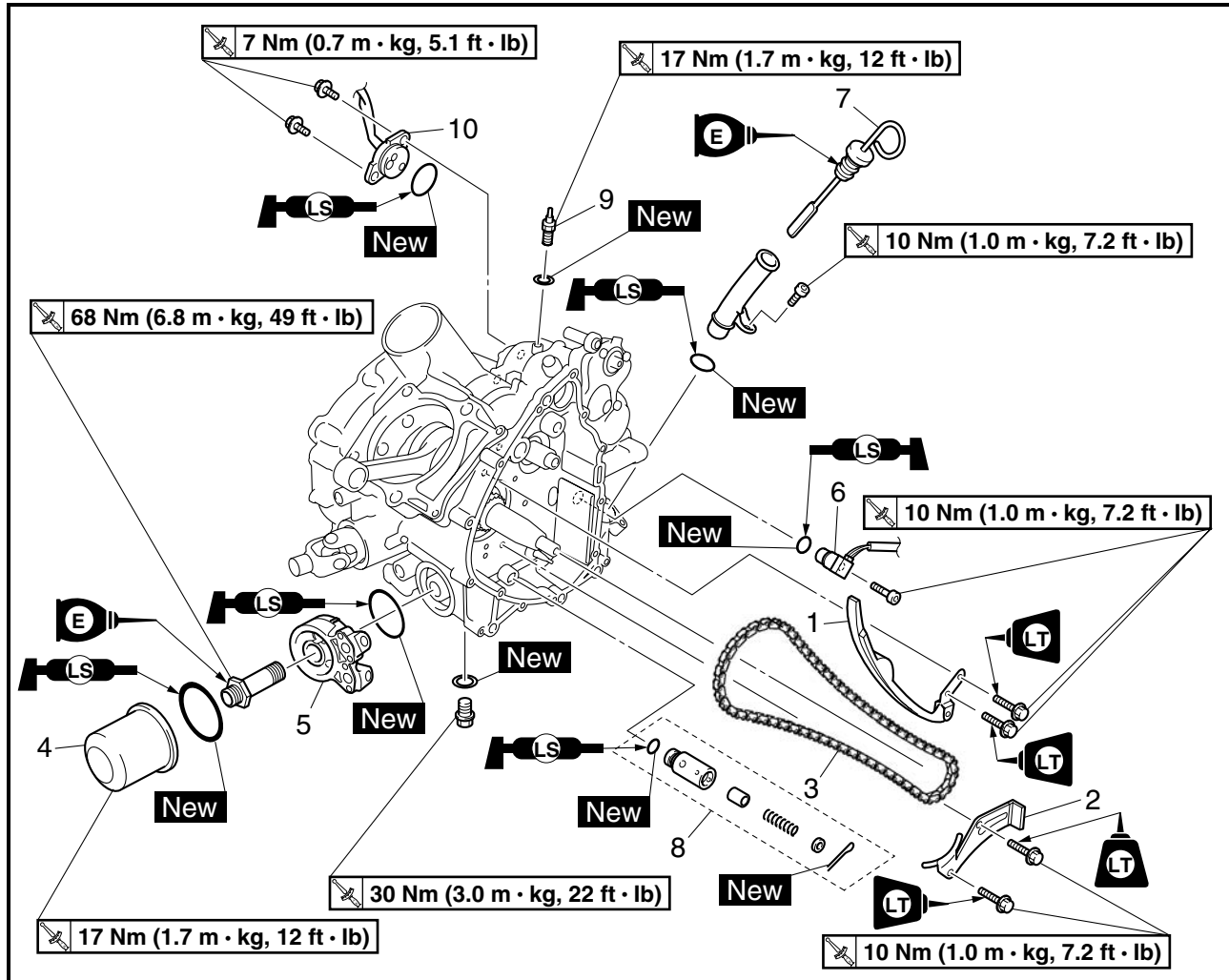
10 Nm (1.0 m · kg, 7.2 ft · lb)
TIP:

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

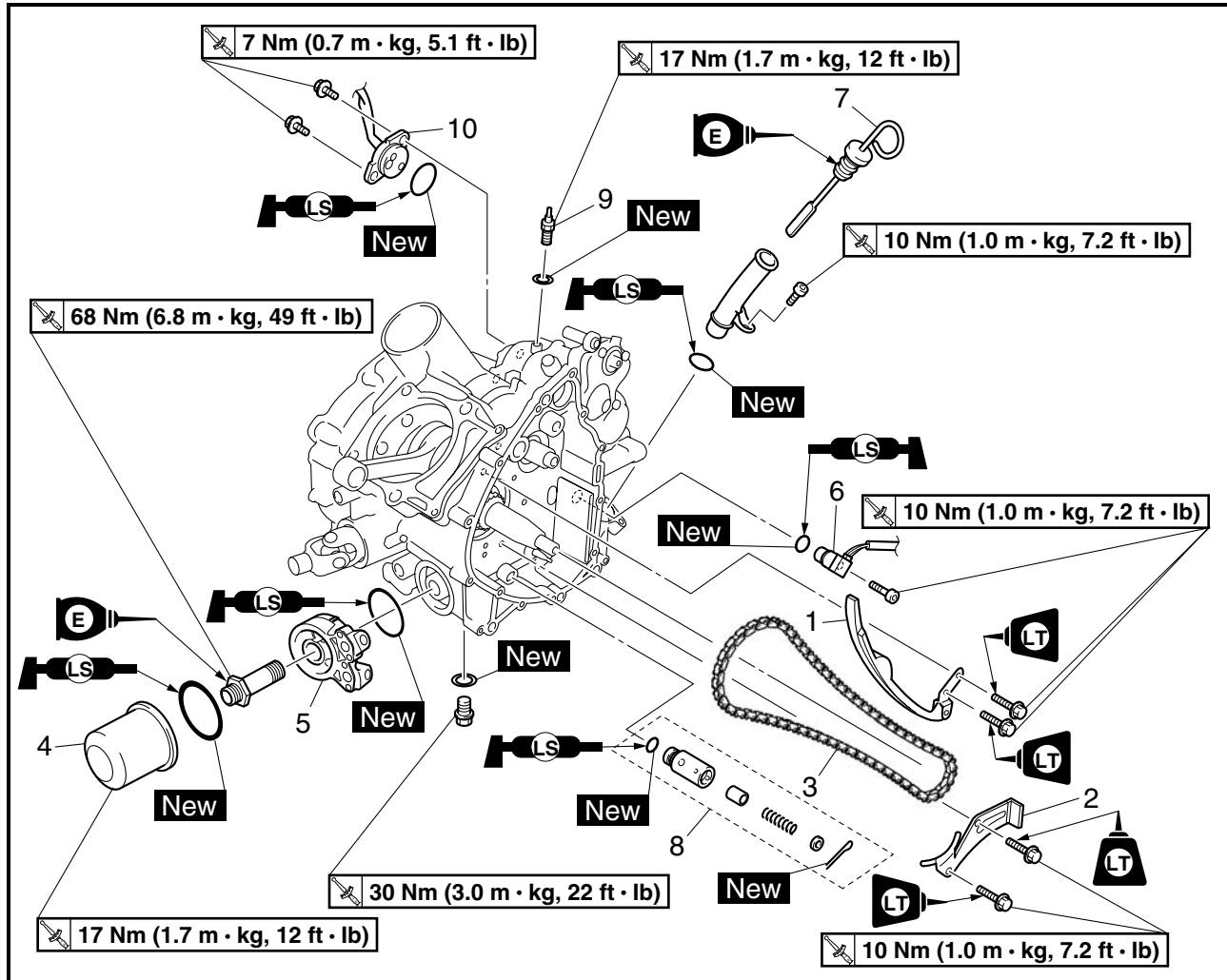




EBS00319

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	

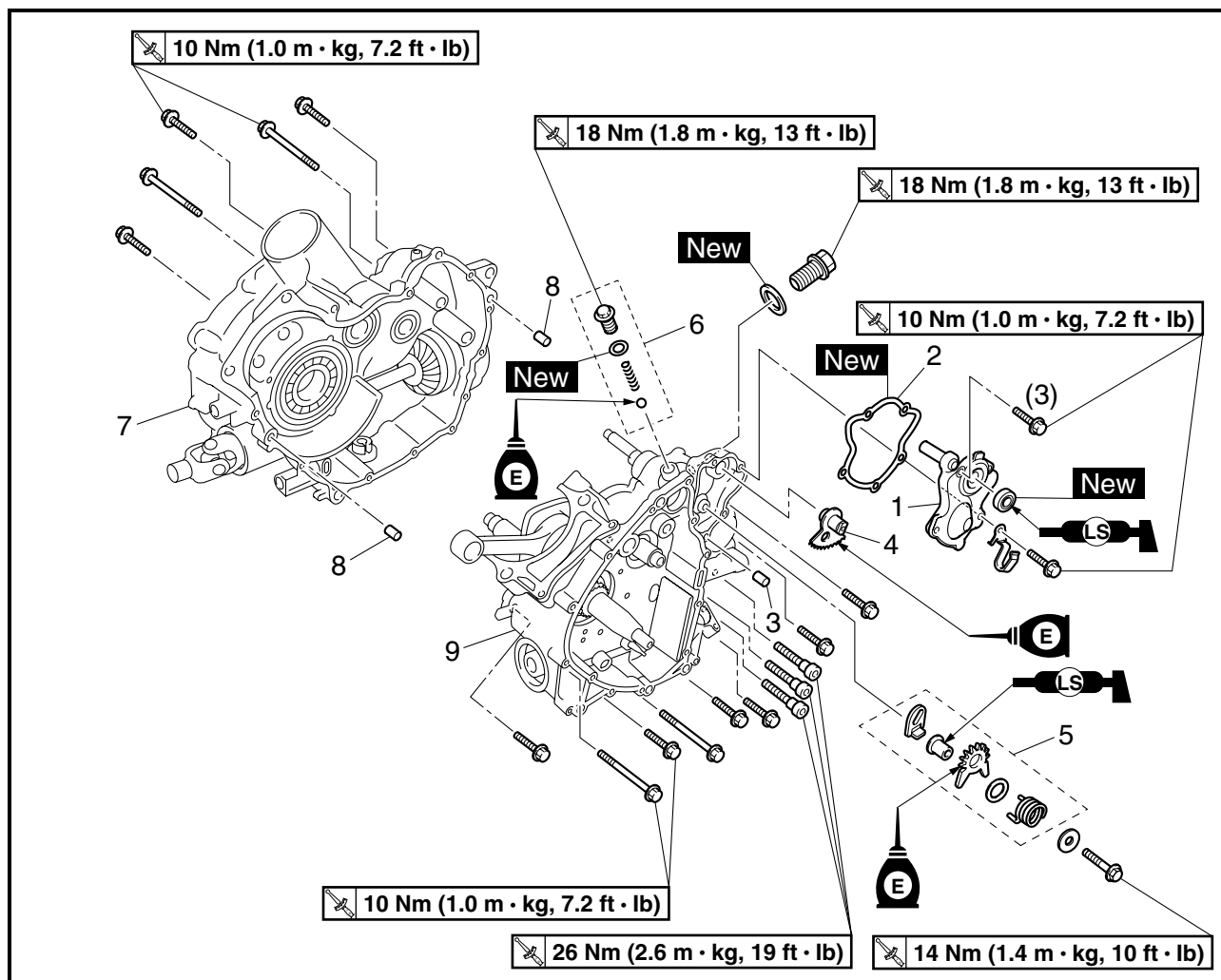


Order	Job/Part	Q'ty	Remarks
4	Oil filter cartridge	1	For installation, reverse the removal procedure.
5	Oil pipe adapter	1	
6	Speed sensor	1	
7	Dipstick	1	
8	Relief valve assembly	1	
9	Reverse switch	1	
10	Gear position switch	1	



EBS00320

CRANKCASE

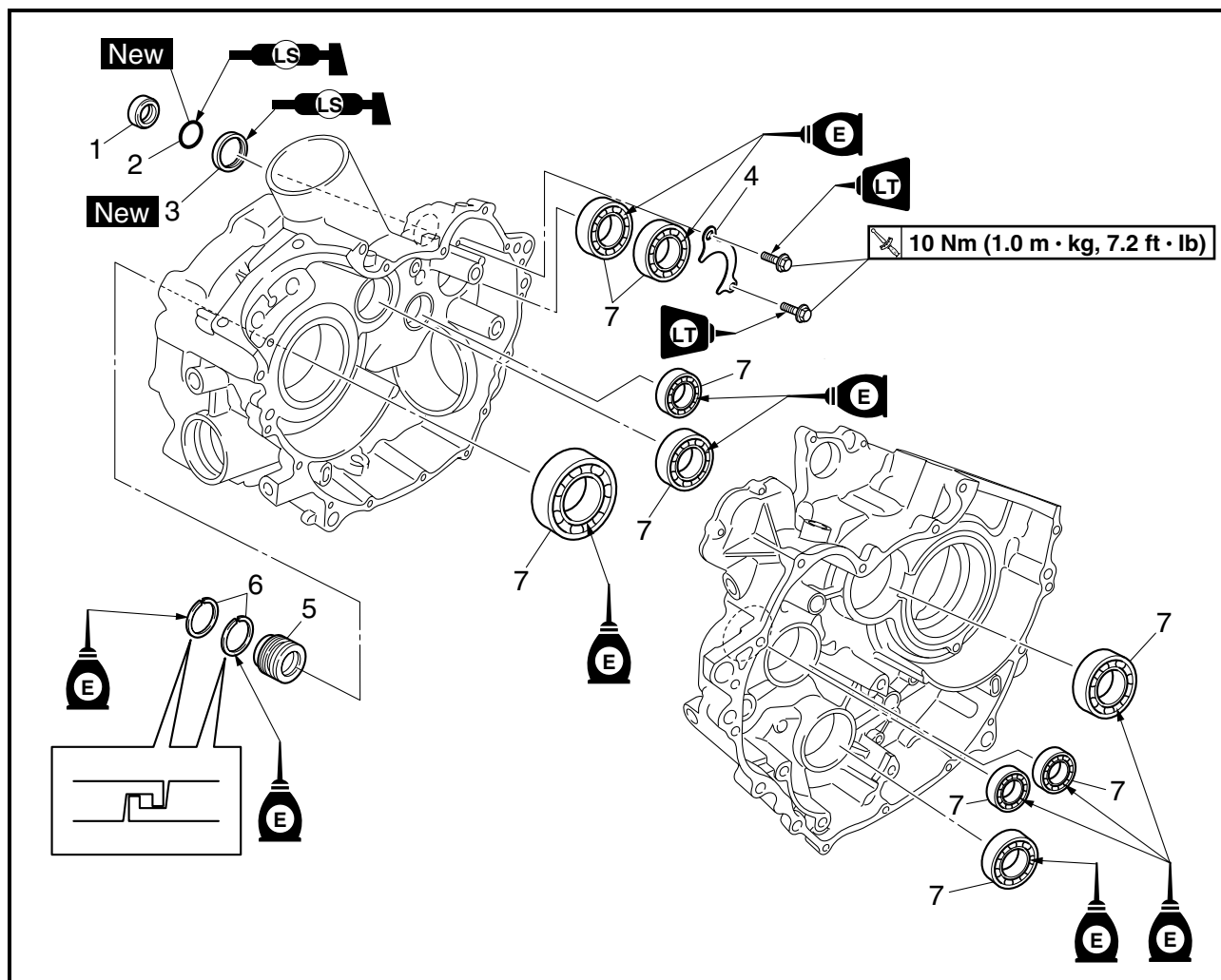


Order	Job/Part	Q'ty	Remarks
	Separating the crankcase		Remove the parts in the order listed.
1	Shift lever cover	1	Refer to "INSTALLING THE SHIFT LEVER".
2	Gasket	1	
3	Dowel pin	1	
4	Shift lever 1	1	
5	Shift lever 2 assembly	1	
6	Shift drum stopper	1	Refer to "SEPARATING THE CRANKCASE" and "ASSEMBLING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



EBS00321

CRANKCASE BEARINGS



Order	Job/Part	Q'ty	Remarks
	Removing the crankcase bearings		
	Crankshaft/oil pump		Remove the parts in the order listed. 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:
 - left crankcase
 - right crankcase

a. Remove the crankcase bolts.

TIP:

- 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 Right crankcase

☐ Right crankcase

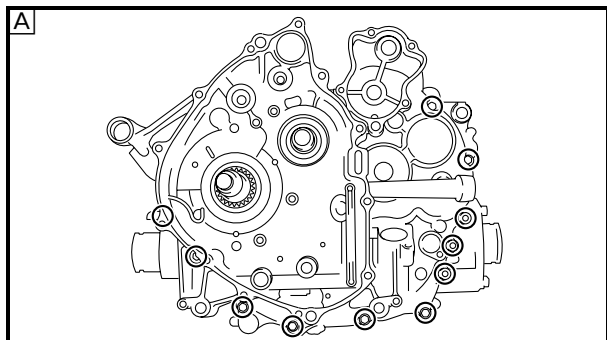
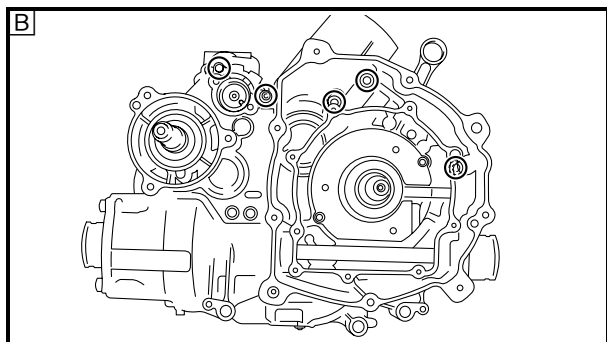
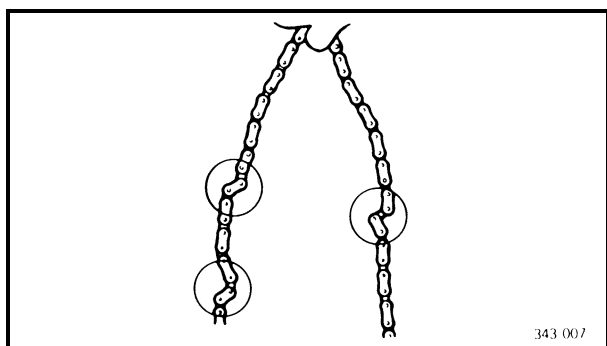
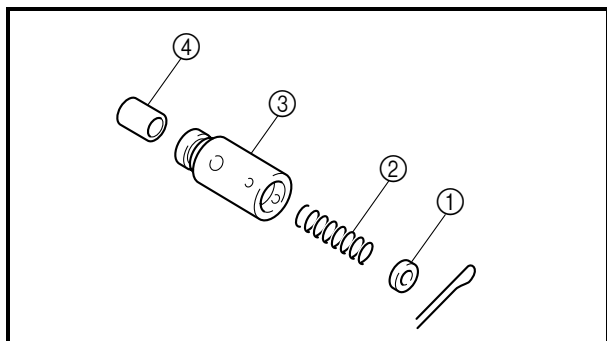
☒ **Left crankcase**

b. Remove the right crankcase.

NOTICE

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.



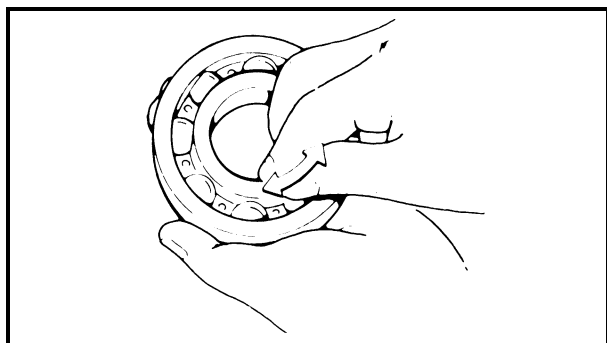
EBS00335

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 ④Damage/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

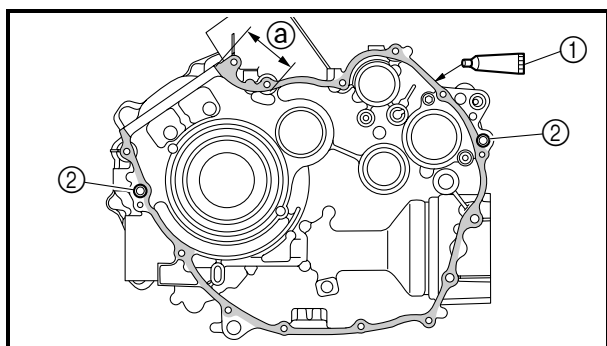
CHECKING THE CRANKCASE

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®)

TIP: _____
Apply two coats of sealant to the area ① shown in the illustration.

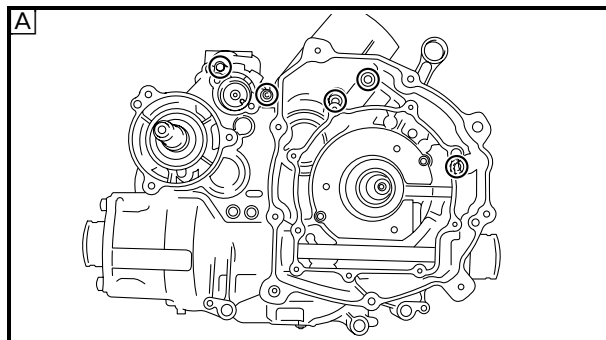
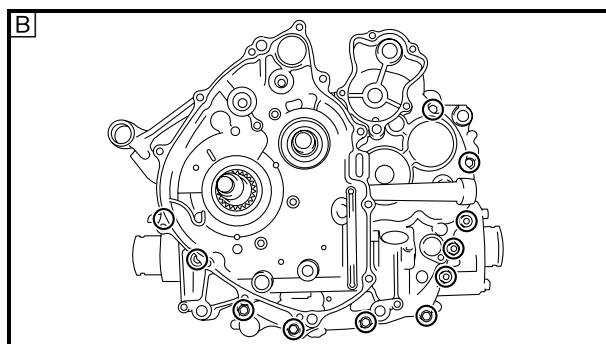
2. Install:
 - dowel pins ②



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

NOTICE

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:
 - crankcase bolts
5. Tighten:
 - crankcase bolts
(follow the proper tightening sequence)

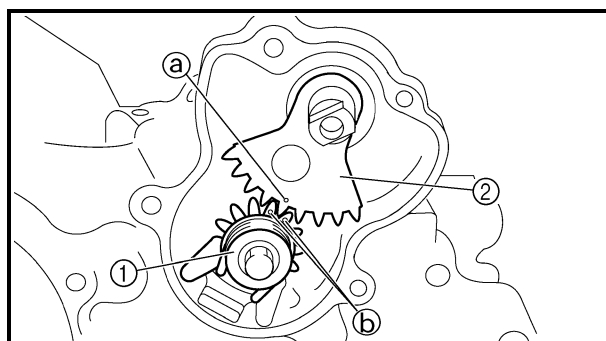
10 Nm (1.0 m · kg, 7.2 ft · lb)

- Left crankcase
- Right crankcase

TIP:

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
 - shift lever 1

14 Nm (1.4 m · kg, 10 ft · lb)

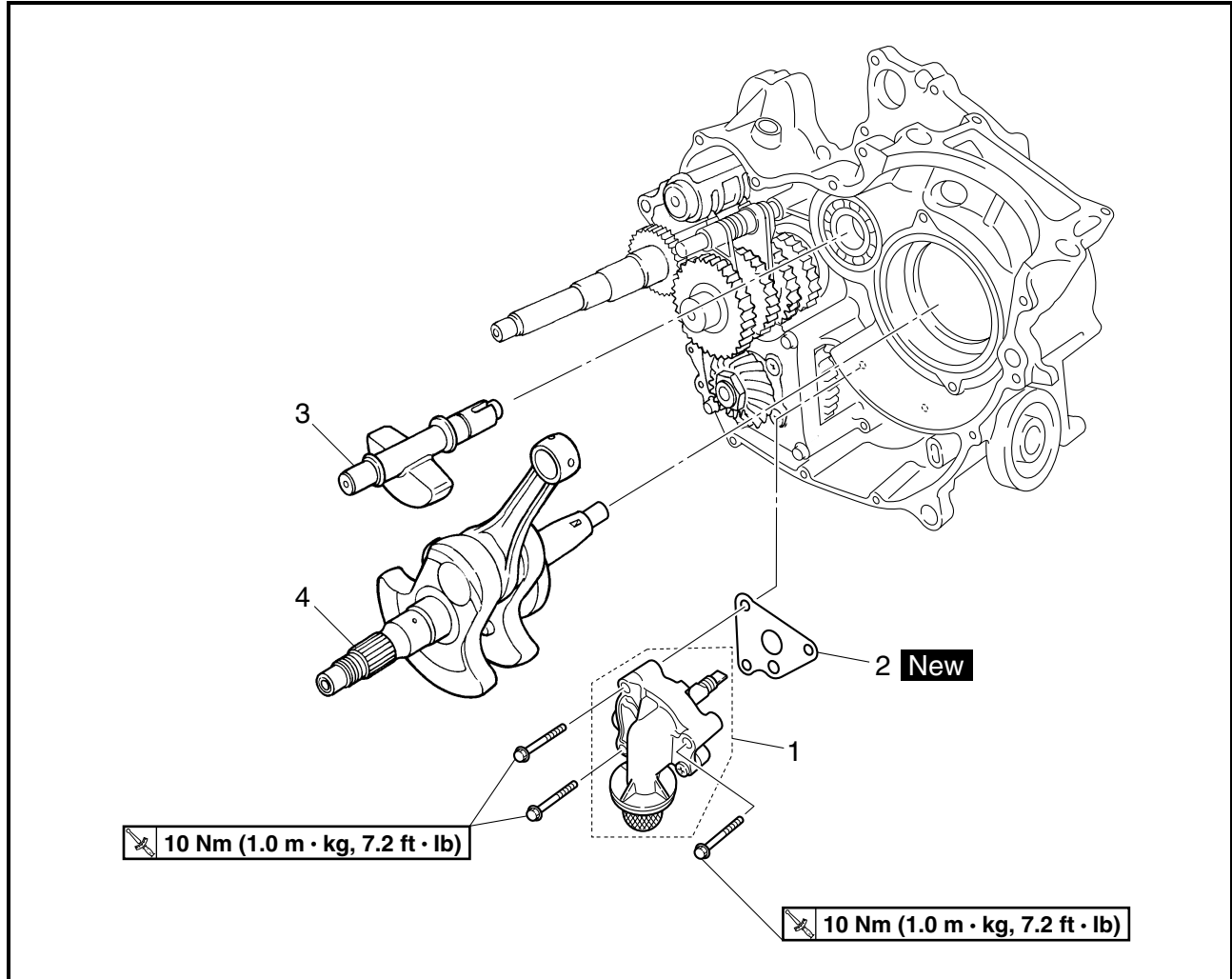
TIP:

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

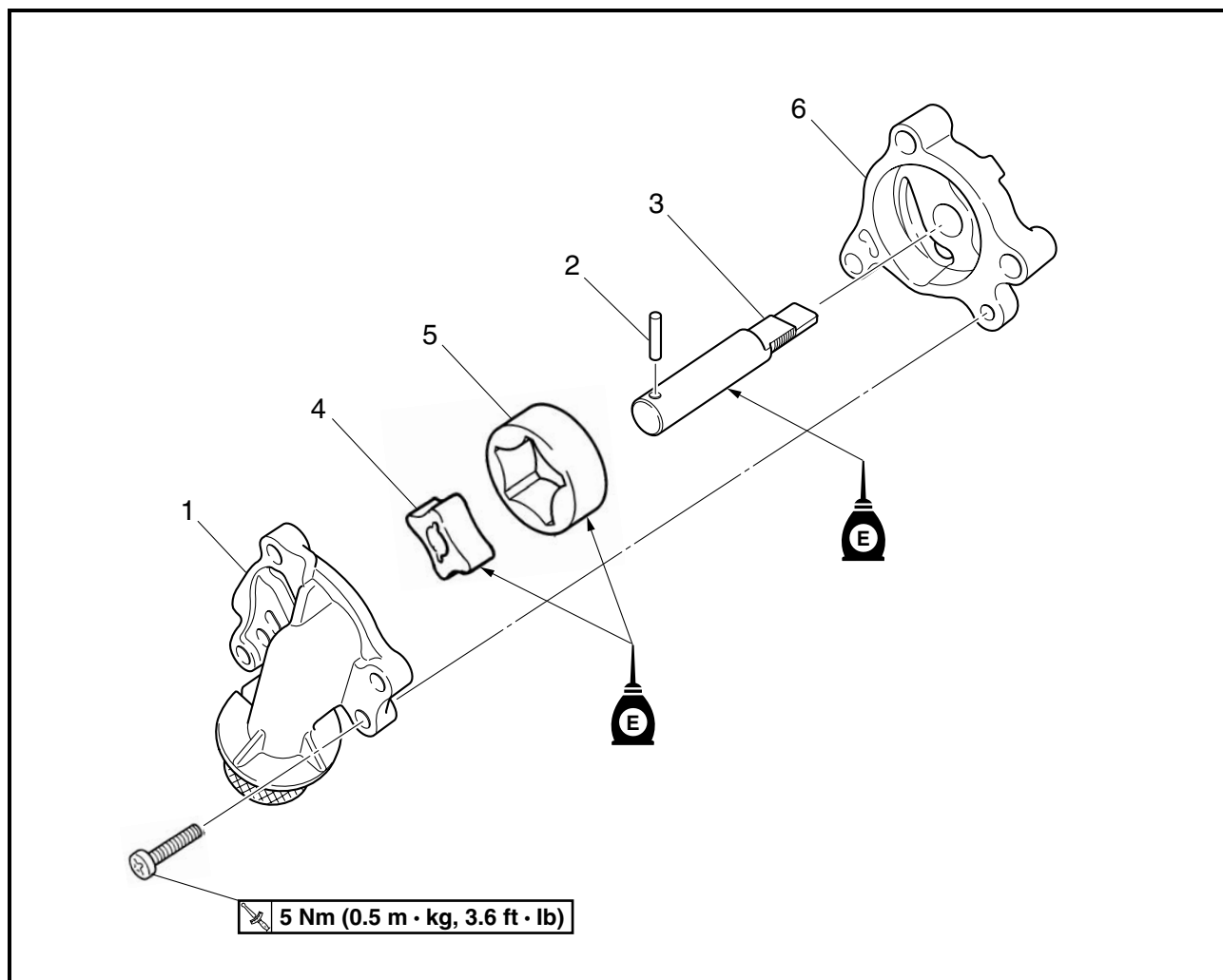


Order	Job/Part	Q'ty	Remarks
	Removing the crankshaft and oil pump		Remove the parts in the order listed.
	Crankcase		Separate. Refer to "CRANKCASE".
1	Oil pump	1	
2	Gasket	1	
3	Balancer	1	
4	Crankshaft	1	Refer to "REMOVING THE CRANK-SHAFT" and "INSTALLING THE CRANK-SHAFT". For installation, reverse the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

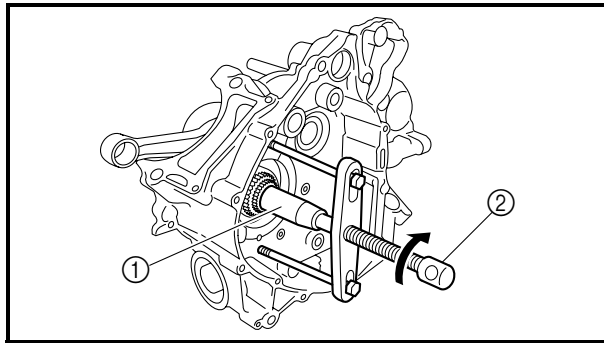


EBS00327

OIL PUMP



Order	Job/Part	Q'ty	Remarks
	Disassembling the oil pump		
1	Oil pump housing cover	1	Remove the parts in the order listed.
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.

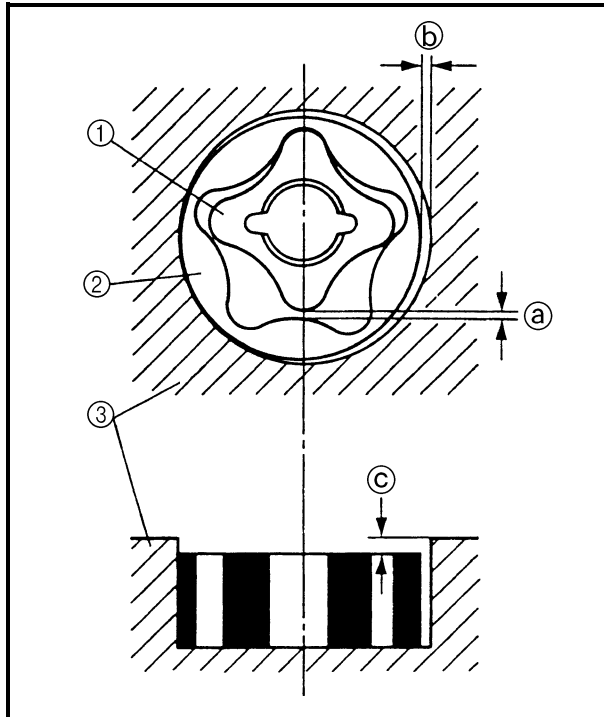


Crankcase separating tool

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 ①
- outer-rotor-to-oil-pump-housing clearance ②
- oil-pump-housing-to-inner-rotor-and-outer-rotor clearance ③

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)

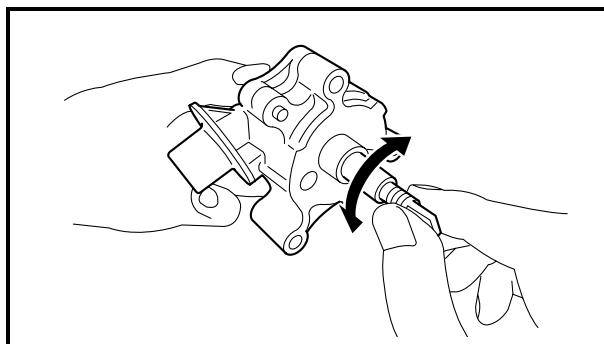
<Limit>: 0.24 mm (0.0094 in)

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

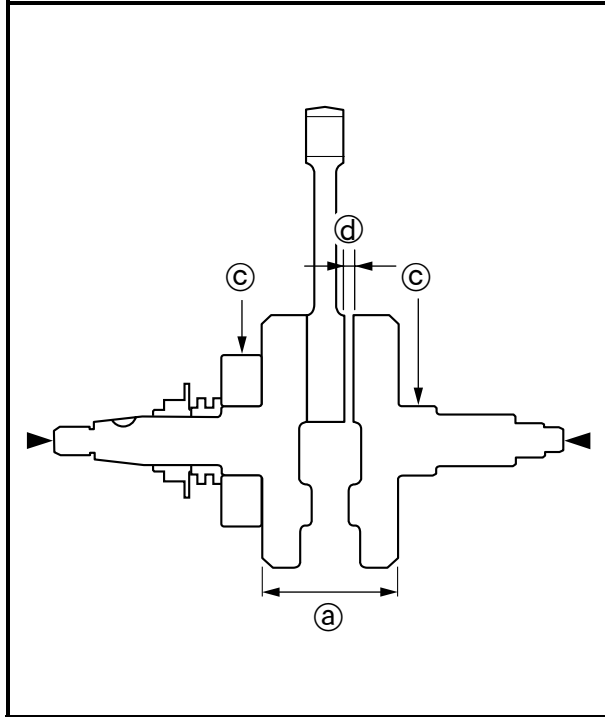
Rough movement → Repeat steps (1) and (2) or replace the defective part(s).



CHECKING THE OIL STRAINER

1. Check:

- oil strainer
Damage → Replace.
Contaminants → Clean with engine oil.



EBS00360

CHECKING THE CRANKSHAFT

1. Measure:

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



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

2. Measure:

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



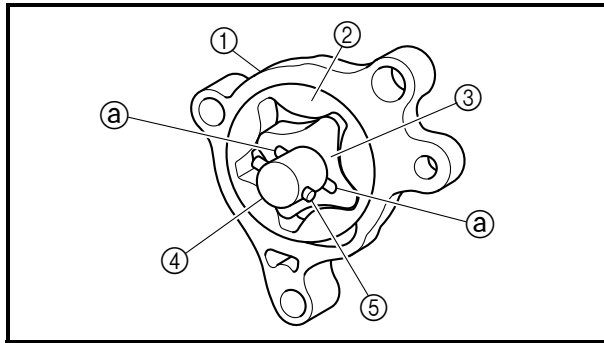
Big end side clearance
0.350 ~ 0.650 mm
(0.0138 ~ 0.0256 in)
<Limit>: 1.0 mm (0.04 in)

3. Measure:

- runout ③
Out of specification → Replace the crankshaft.



Runout limit
0.030 mm (0.0012 in)



EBS00318

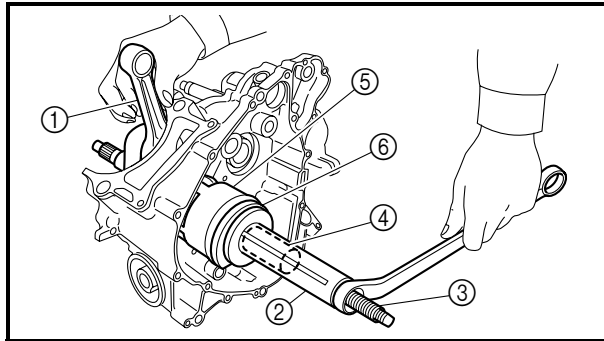
ASSEMBLING THE OIL PUMP

1. Install:

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

TIP:

When installing the oil pump shaft ④ align the pin ⑤ with the groove ② in the inner rotor ③.



EBS00362

INSTALLING THE CRANKSHAFT

1. Install:

- crankshaft ①



Crankshaft installer pot ②

90890-01274

YU-90058

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

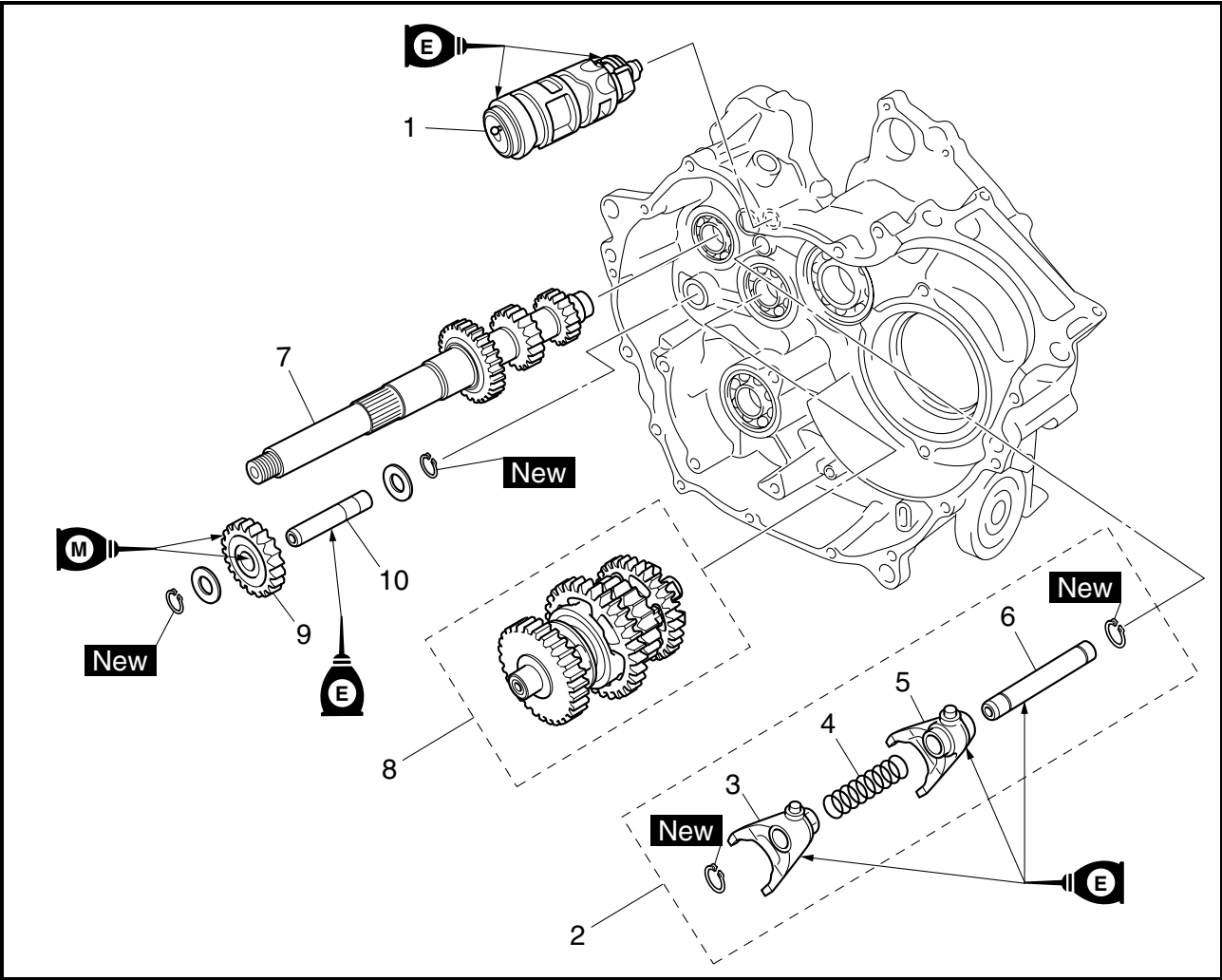
**TIP:**

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.

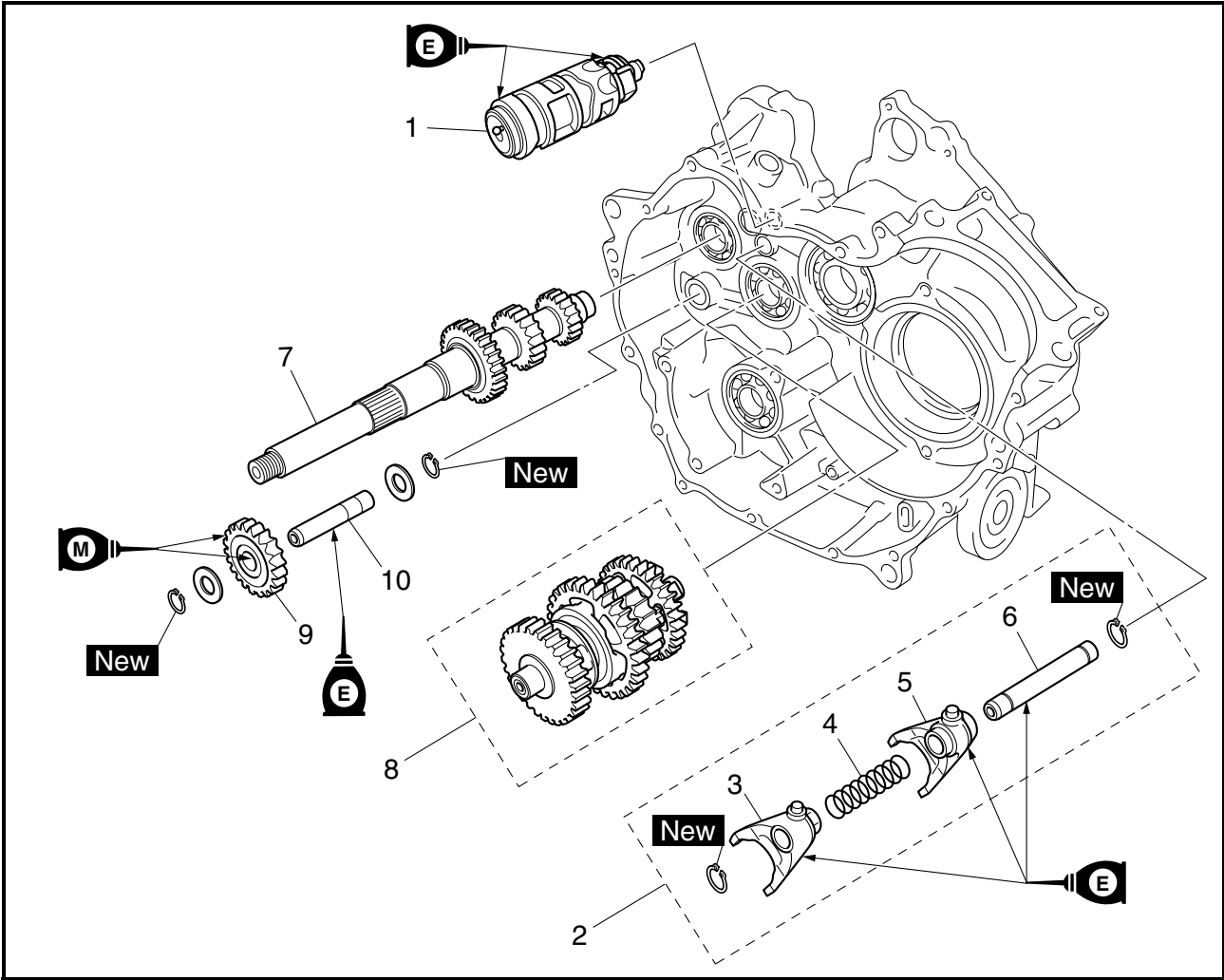
NOTICE

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		
	Crankcase		Remove the parts in the order listed. Separate. Refer to "CRANKCASE".
	Middle driven gear		Refer to "MIDDLE GEAR".
1	Shift drum	1	Refer to "ASSEMBLING THE SHIFT FORK ASSEMBLY". Refer to "REMOVING THE TRANSMISSION" and "INSTALLING THE TRANSMISSION".
2	Shift fork assembly	1	
3	Shift fork "R"	1	
4	Spring	1	
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	

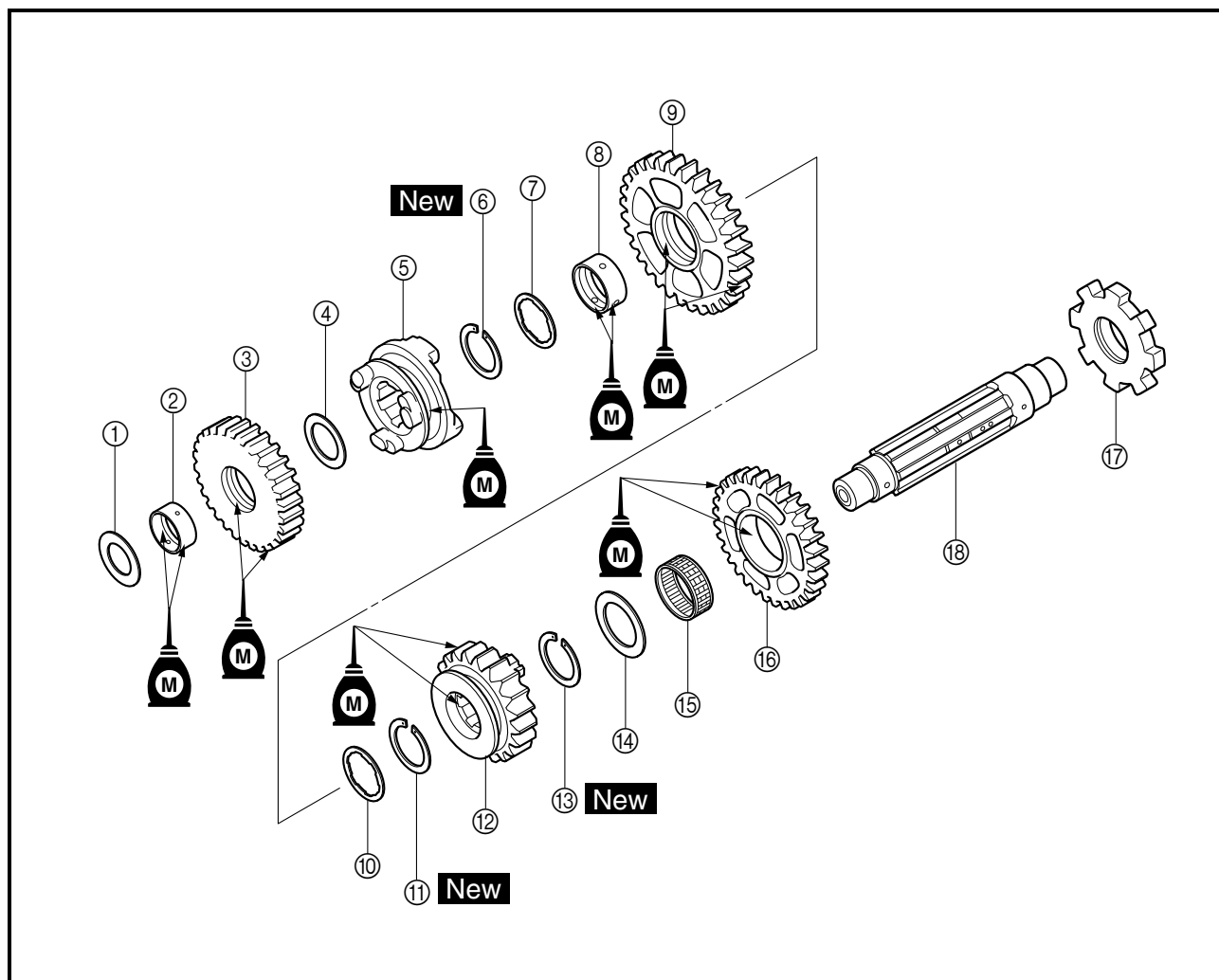


Order	Job/Part	Q'ty	Remarks
10	Reverse idle gear shaft	1	Refer to "REMOVING THE TRANSMISSION" and "INSTALLING THE TRANSMISSION". For installation, reverse the removal procedure.

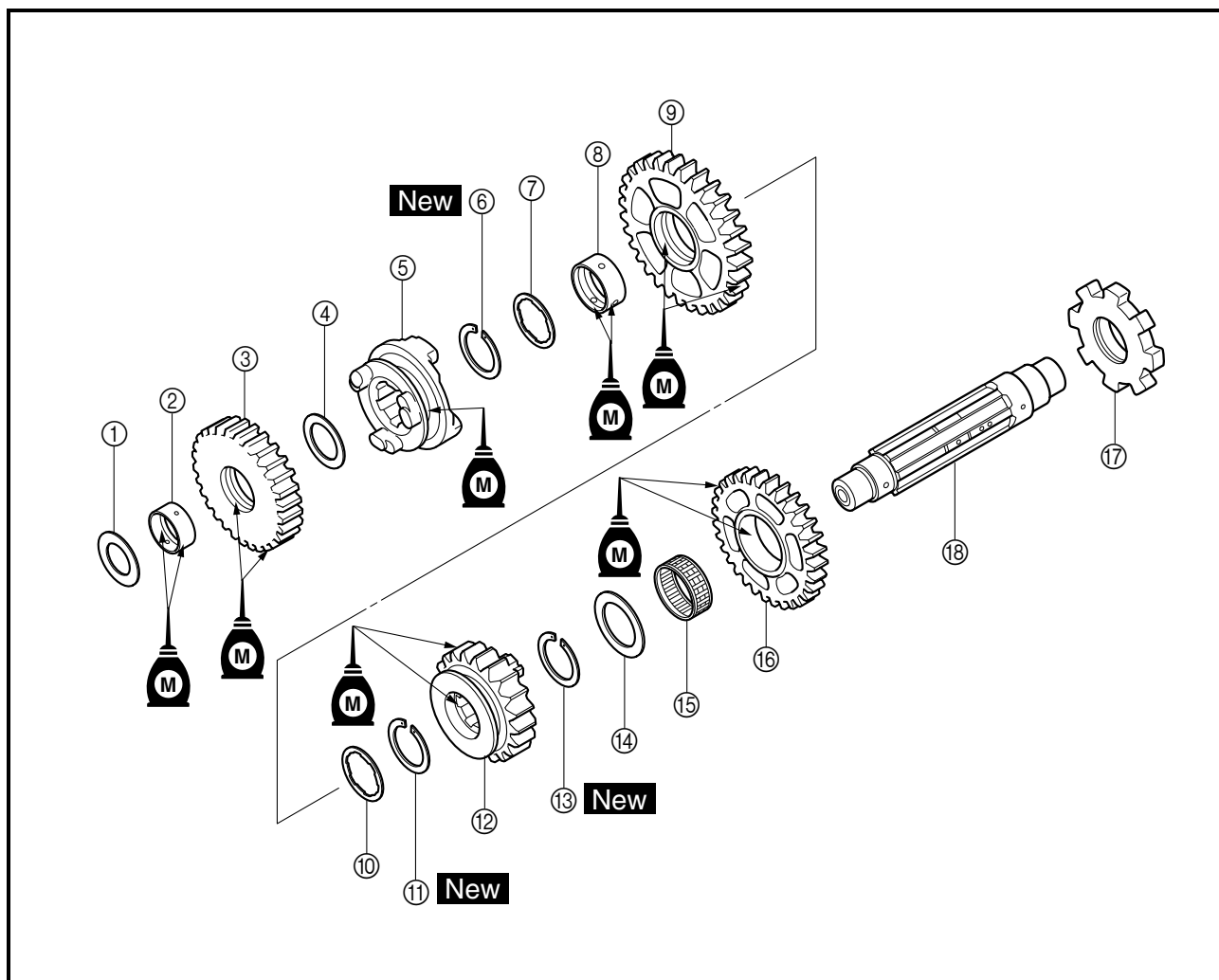


EBS00348

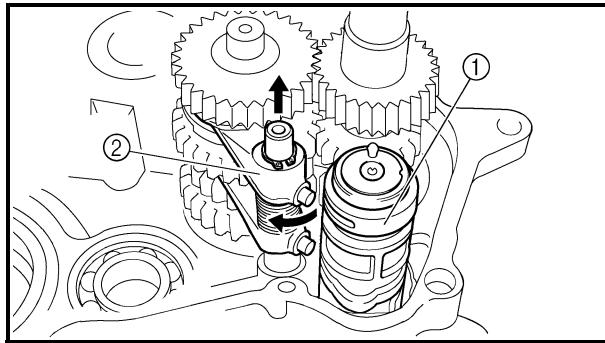
DRIVE AXLE



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	For assembly, reverse the disassembly procedure.
⑮	Bearing	1	
⑯	Reverse wheel gear	1	
⑰	Stopper wheel	1	
⑱	Drive axle	1	

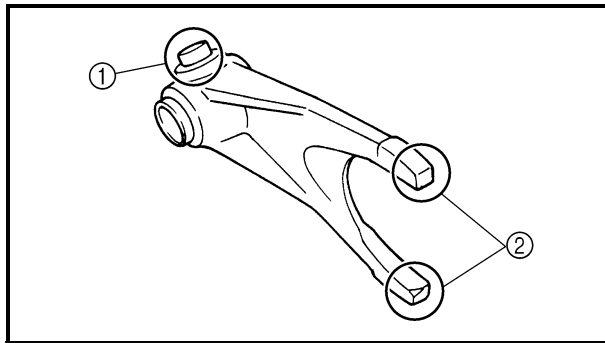


REMOVING THE TRANSMISSION

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



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

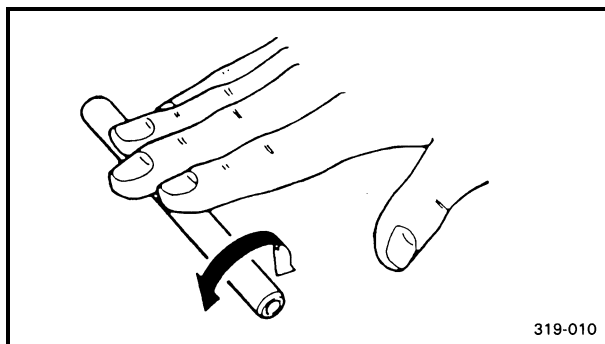


EBS00349

CHECKING THE SHIFT FORKS

The following procedure applies to each shift fork.

1. Check:
 - shift fork cam follower ①
 - shift fork pawl ②Scoring/bends/wear/damage → Replace.

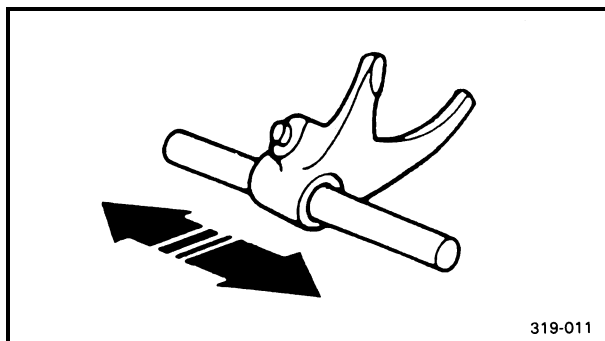


319-010

2. Check:
- guide bar
Roll the guide bar on a flat surface.
Bends → Replace.

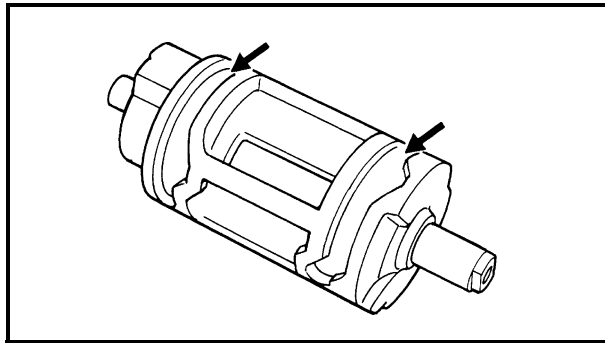
⚠ WARNING

Do not attempt to straighten a bent guide bar.



319-011

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.

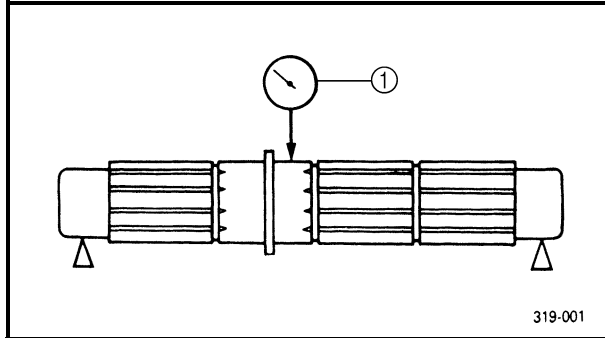


EBS00351

CHECKING THE SHIFT DRUM

1. Check:

- shift drum grooves
Scratches/wear/damage → Replace.



EBS00354

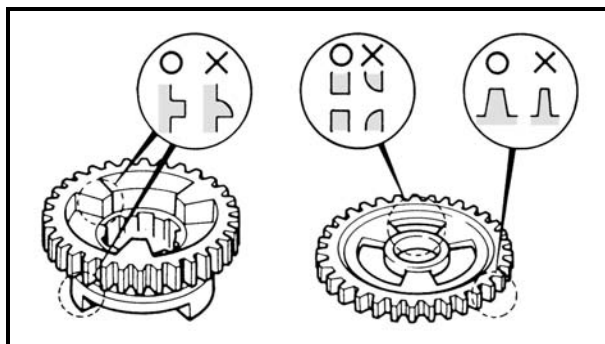
CHECKING THE TRANSMISSION

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:

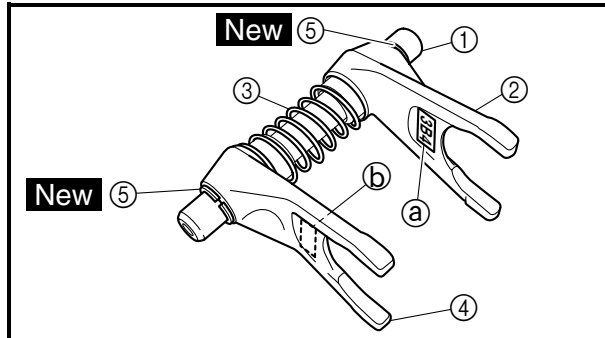
- circlips
Bends/damage/looseness → Replace.



CHECKING THE SECONDARY SHAFT

1. Check:

- gear teeth
Blue discoloration/pitting/wear → Replace.



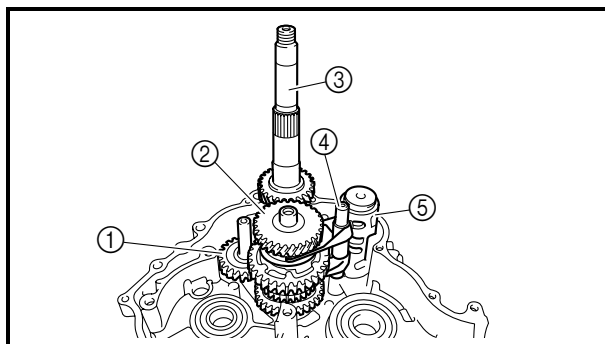
ASSEMBLING THE SHIFT FORK ASSEMBLY

1. Install:

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

TIP:

Install the shift forks with the "3B4" mark ① and "5B4" mark ② facing each other.



EBS00356

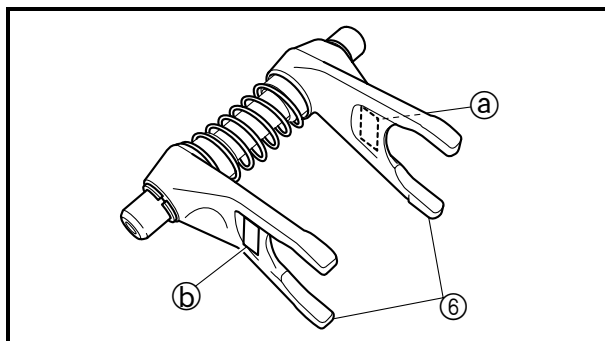
INSTALLING THE TRANSMISSION

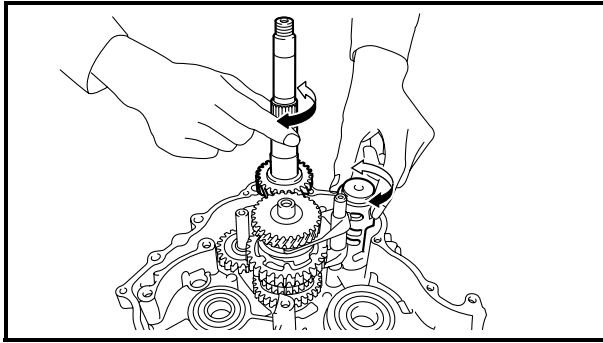
1. Install:

- reverse idle gear ①
- drive axle assembly ②
- secondary shaft ③
- shift fork assembly ④
- shift drum ⑤

TIP:

Install the shift forks ⑥ with the "L" mark ① facing toward the right side of the crankcase and the "R" mark ② facing toward the left side of the crankcase.





2. Check:

- shift operation

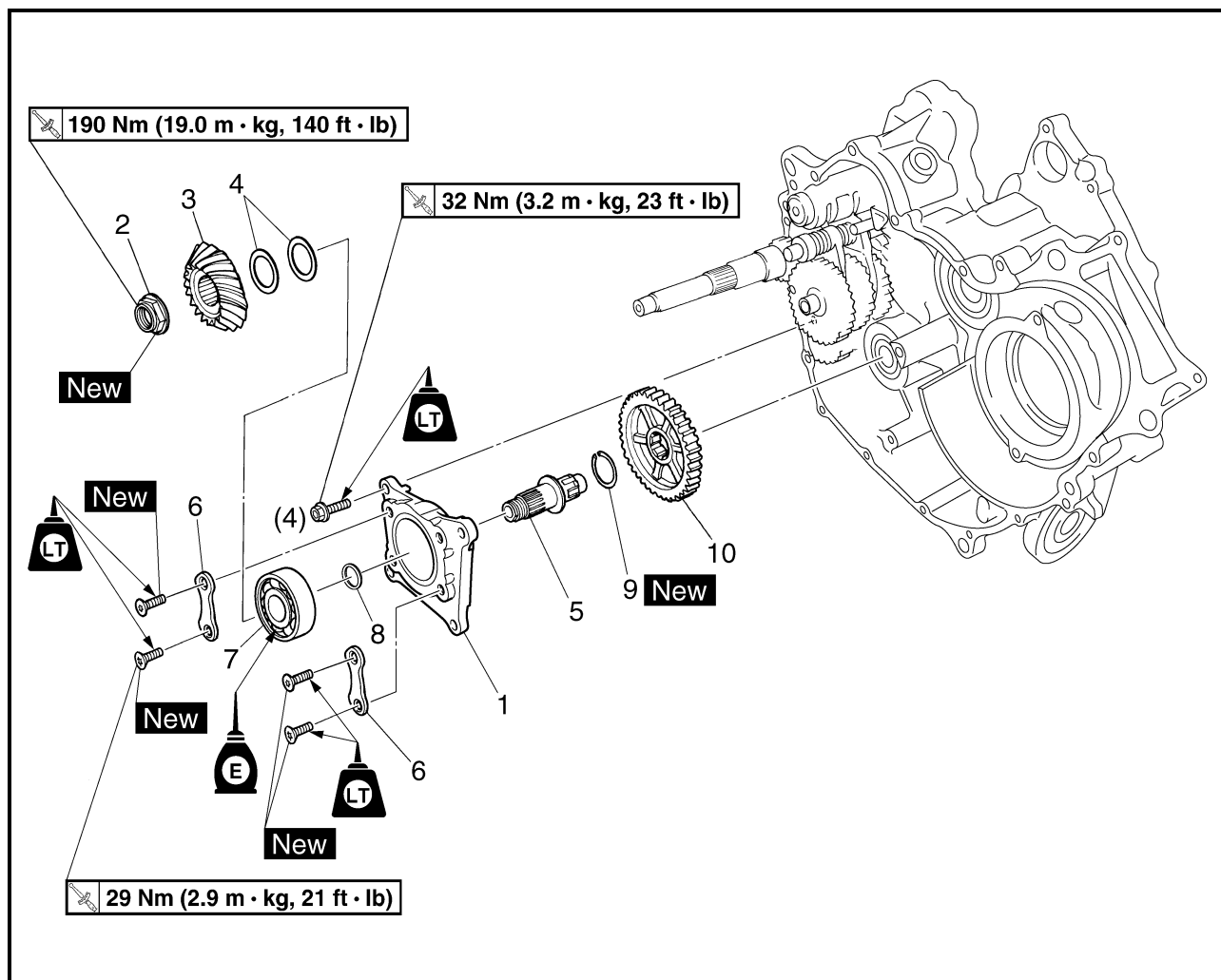
Unsmooth operation → Repair.

TIP:

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



EBS00363

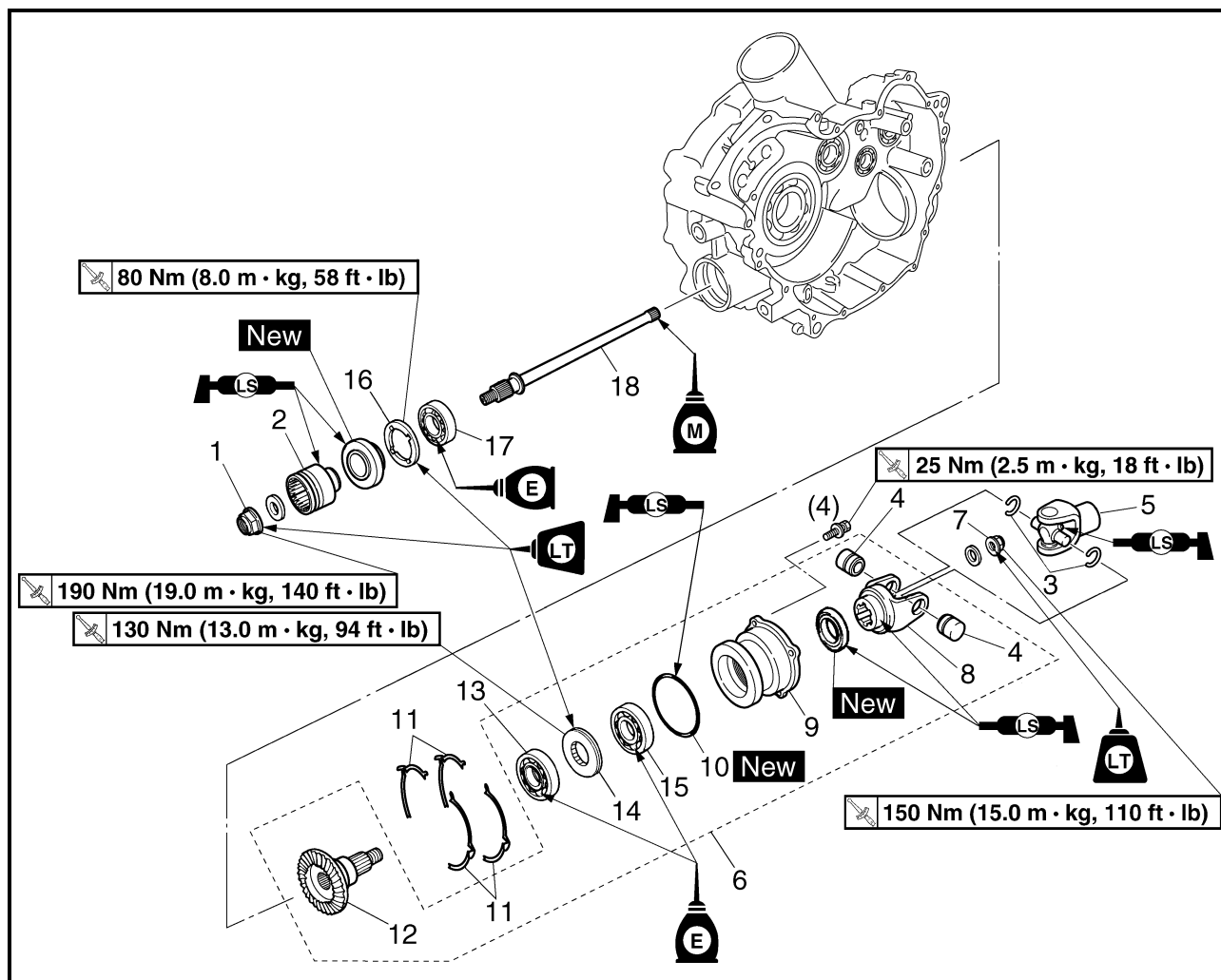
MIDDLE GEAR**MIDDLE DRIVE SHAFT**

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

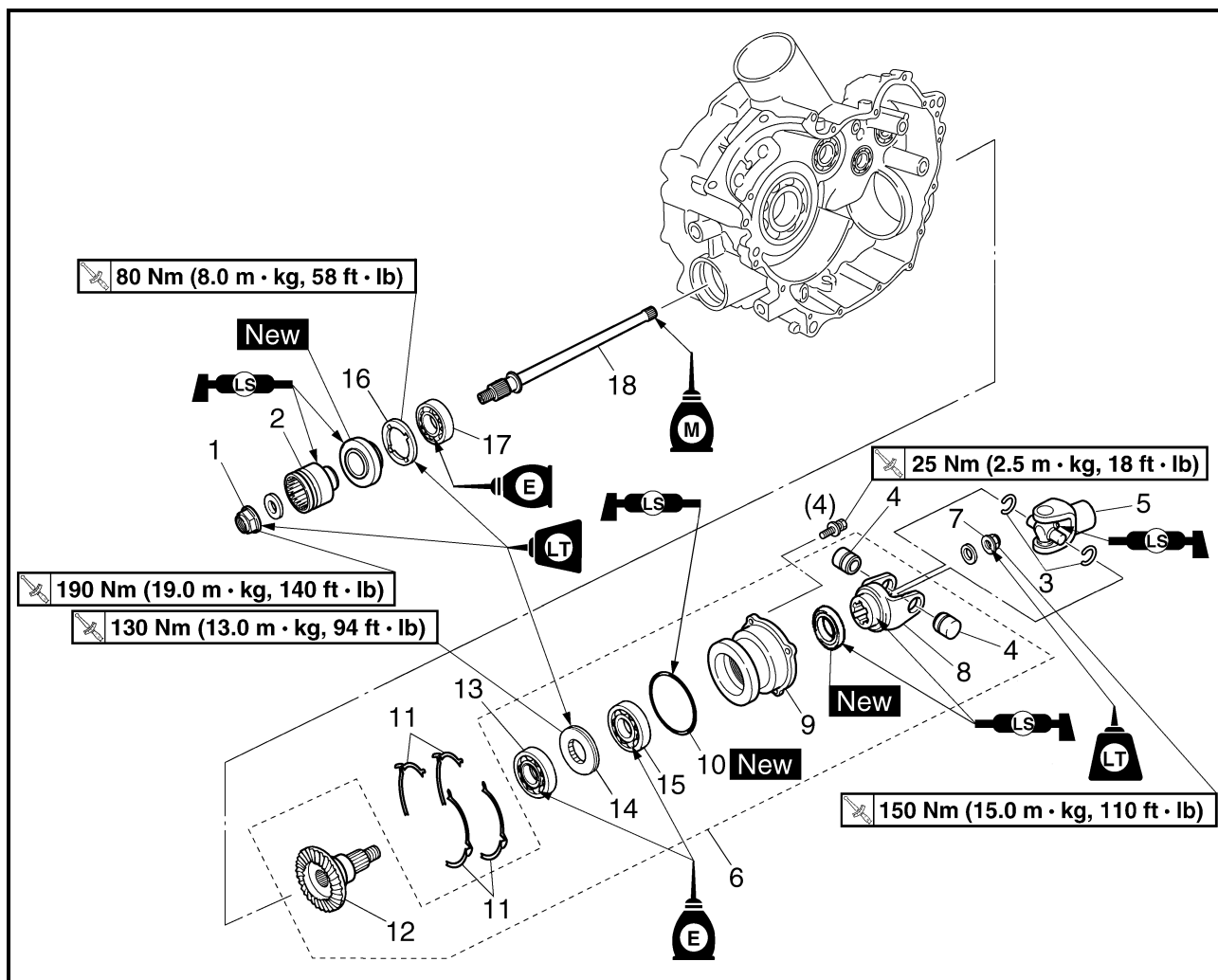


EBS00364

MIDDLE DRIVEN SHAFT



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



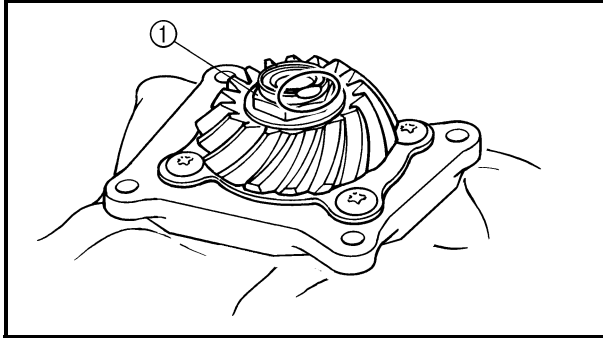
Order	Job/Part	Q'ty	Remarks
10	O-ring	1	Refer to "REMOVING THE MIDDLE DRIVEN SHAFT" and "INSTALLING THE MIDDLE DRIVEN SHAFT".
11	Middle driven gear shim	*	
12	Middle driven pinion gear	1	
13	Bearing	1	
14	Middle driven pinion gear bearing retainer	1	
15	Bearing	1	
16	Middle driven shaft bearing retainer	1	
17	Bearing	1	
18	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:**

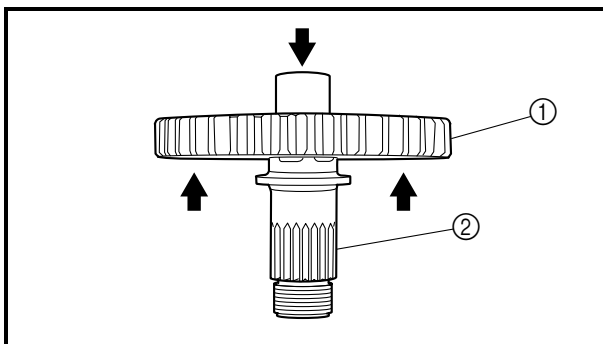
- middle drive pinion gear nut ①

TIP:

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

3. Remove:

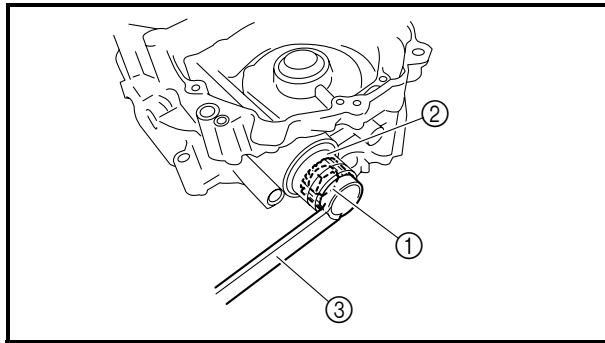
- middle drive pinion gear nut
- middle drive pinion gear
- shim(s)

**4. Remove:**

- middle driven gear ①
- circlip
- middle drive shaft ②

TIP:

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



EBS01020

REMOVING THE MIDDLE DRIVEN SHAFT**1. Remove:**

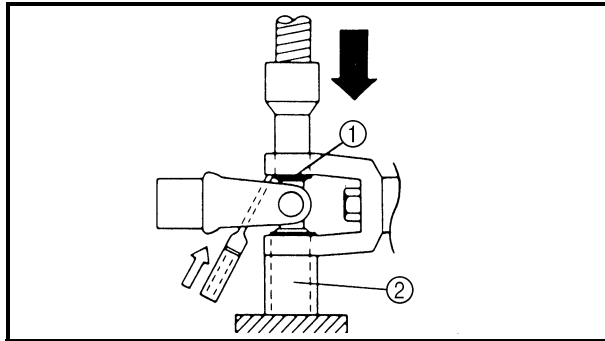
- drive shaft coupling gear nut (middle gear side) ①
- washer ②
- drive shaft coupling gear (middle gear side) ③

TIP:

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:**

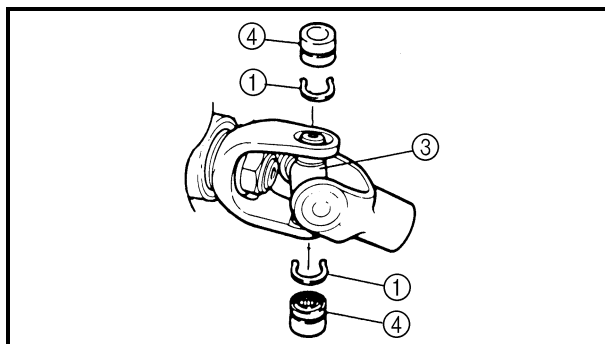
- universal joint (middle gear side)

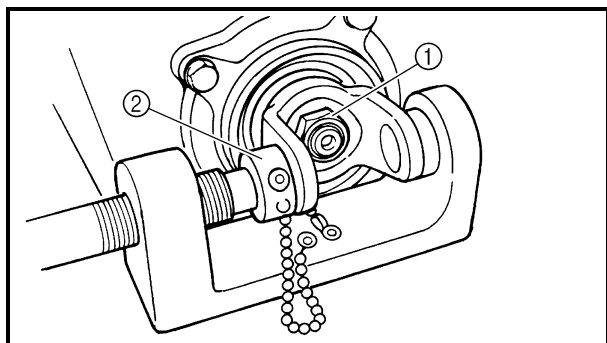
a. Remove the circlips ①.**b. Place the universal joint in a press.****c. With a suitable diameter pipe ② beneath the yoke ③, press the bearing ④ into the pipe as shown.****TIP:**

It may be necessary to lightly tap the yoke with a punch.

d. Repeat the steps for the opposite bearing.**e. Remove the yoke.****TIP:**

It may be necessary to lightly tap the yoke with a punch.





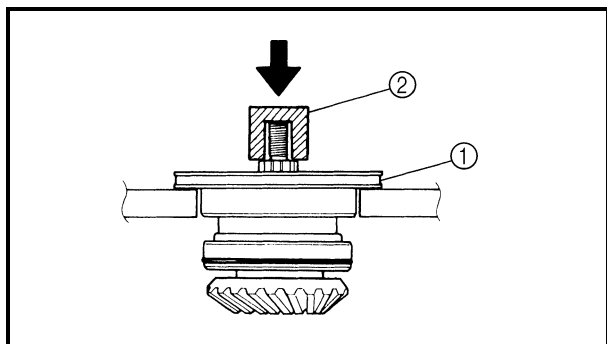
3. Remove:
- universal joint yoke nut (middle gear side)
①
 - washer
 - universal joint yoke (middle gear side)

TIP:

Use the universal joint holder ② to hold the universal joint yoke.



Universal joint holder
90890-04062, YM-04062



4. Remove:
- bearing housing assembly ①

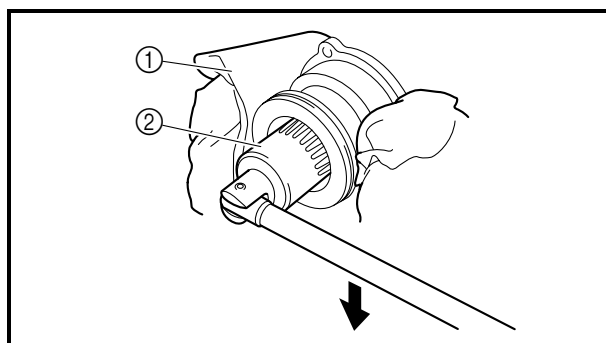
[illegible]

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

NOTICE

- **Never directly press the middle driven pinion gear end with a hydraulic press, this will result in damage to the middle driven pinion gear thread.**
- **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.



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

[illegible]

- Fold a rag around the bearing housing ①.
- Secure the bearing housing edge in the vise.
- Attach the bearing retainer wrench ②.



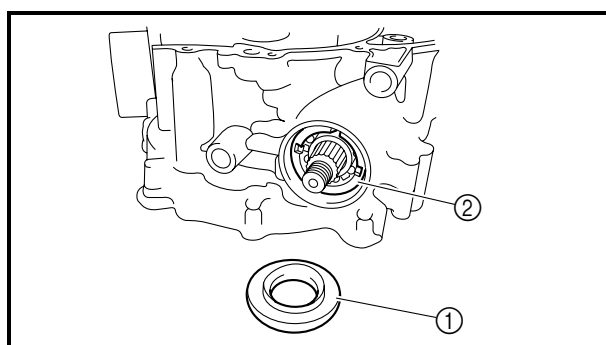
Bearing retainer wrench
90890-04128

Middle gear bearing retainer
YM-04128

NOTICE

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.



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

TIP:

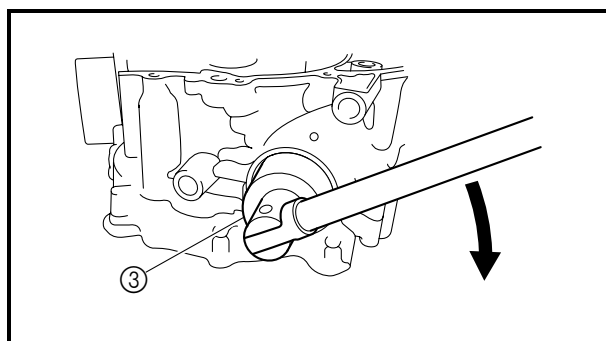
Attach the ring nut wrench ③.

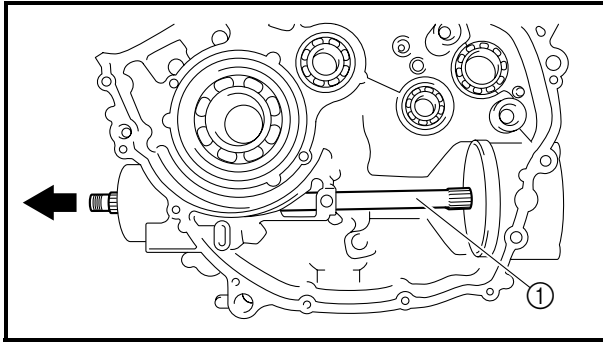


Ring nut wrench
90890-01430, YM-38404

NOTICE

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



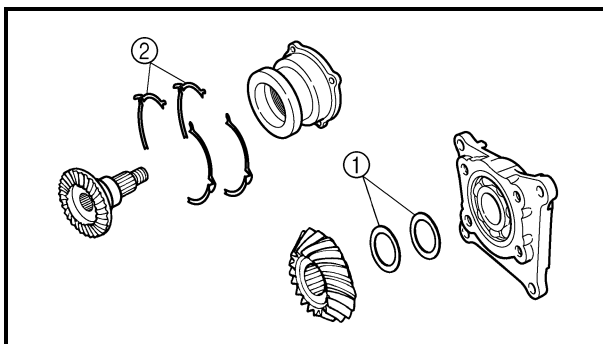


7. Remove:
- middle driven shaft ①
(with bearing)

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



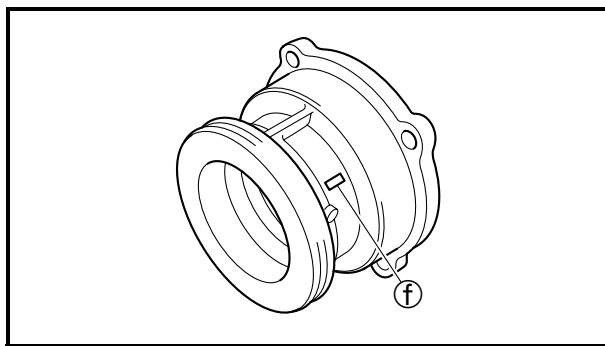
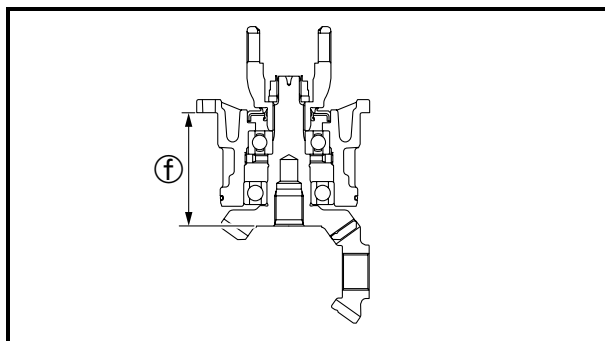
- 8) Round off the hundredth digit and select the appropriate shim(s).

In the example above, the calculated number is 1.38. The chart instructs you to round off 8 to 10 at the hundredth place. Thus, the shim thickness is 1.40 mm (0.055 in).

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:

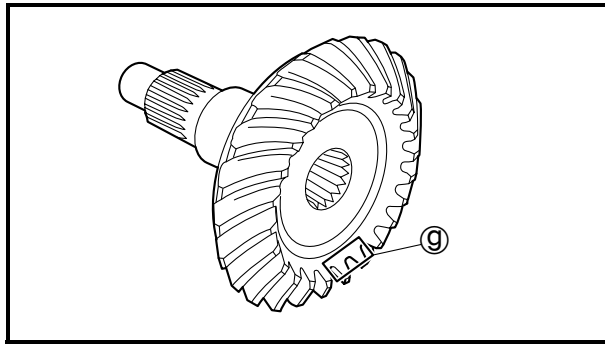
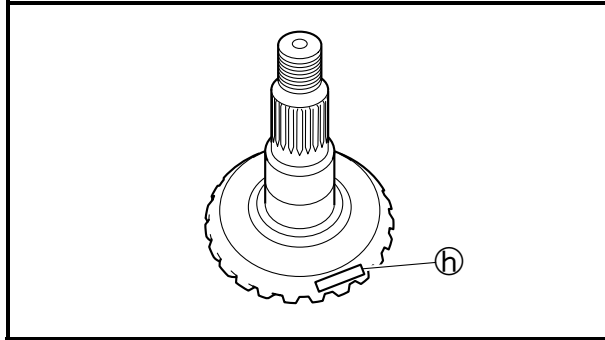
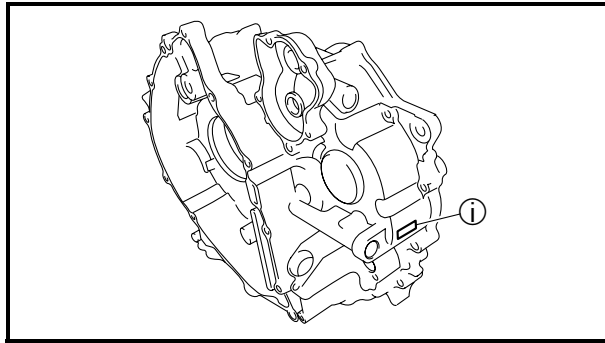
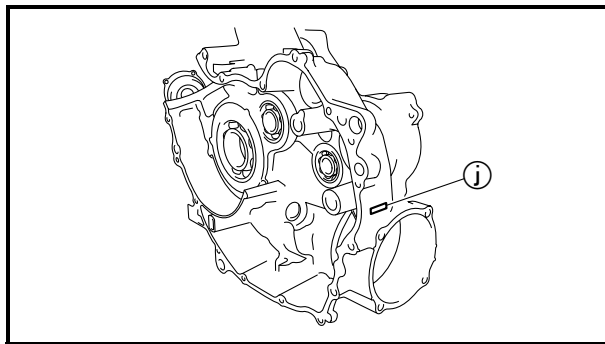
Middle driven pinion gear shim thickness
"B" = f - g + h - i - j - 0.02

Where:

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

TIP:

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



⑨ = a numeral (usually a decimal number) on the middle driven pinion gear is either added to or subtracted from "49.0"

⑨ = a numeral (usually a decimal number) on the middle driven pinion gear is either added to or subtracted from "80.5"

⑩ = a numeral (usually a decimal number) on the right crankcase specifies a thickness of "99.98"

⑩ = a numeral (usually a decimal number) on the left crankcase specifies a thickness of "8.12"

Example:

- 1) If the bearing housing is marked "+03",
..... ⑦ is 77.53
- 2) If the driven pinion gear is marked "+02",
..... ⑨ is 49.02
- 3) If the driven pinion gear is marked "+02",
..... ⑨ is 80.52
- 4) If the right crankcase is marked "99.98",
..... ⑩ is 99.98
- 5) If the left crankcase is marked "8.12",
..... ⑩ is 8.12
- 6) Therefore, the shim thickness is 0.88 mm.

$$\begin{aligned} \text{"B"} &= 77.53 - 49.02 + 80.52 - 99.98 - \\ &\quad 8.12 - 0.02 \\ &= 0.91 \end{aligned}$$

- 7) Round off the hundredth digit and select the appropriate shim(s).

In the example above, the calculated number is 0.91. The chart instructs you to round off 1 to 0. Thus, the shim thickness is 0.90 mm (0.035 in).

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



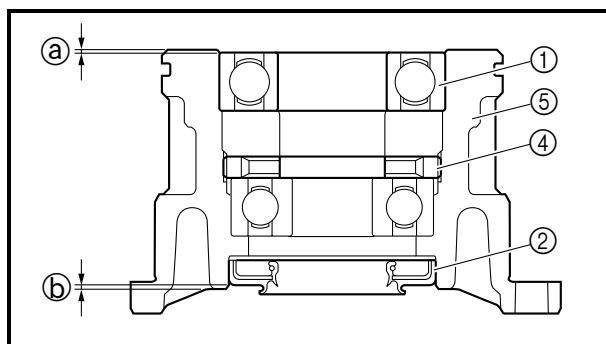
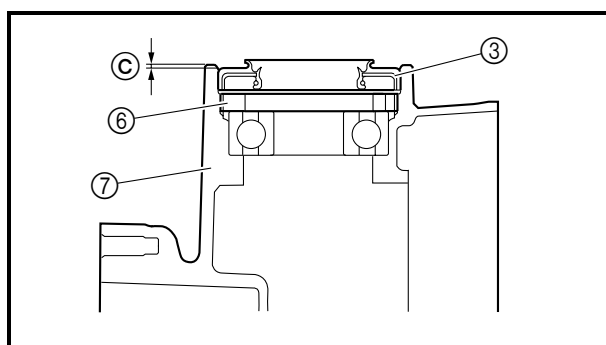
Shims are supplied in the following thickness.



Middle drive pinion gear shim

Thickness (mm)

0.10	0.40
0.15	0.50
0.20	0.60
0.30	



INSTALLING THE BEARING AND OIL SEALS

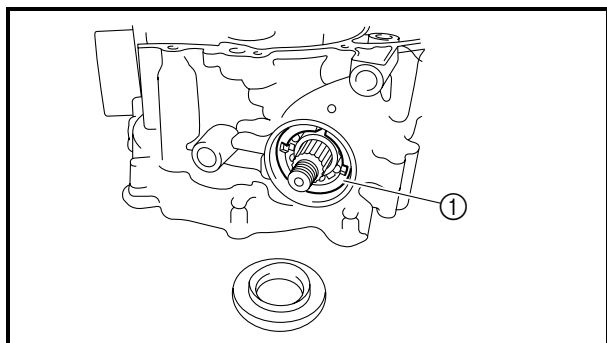
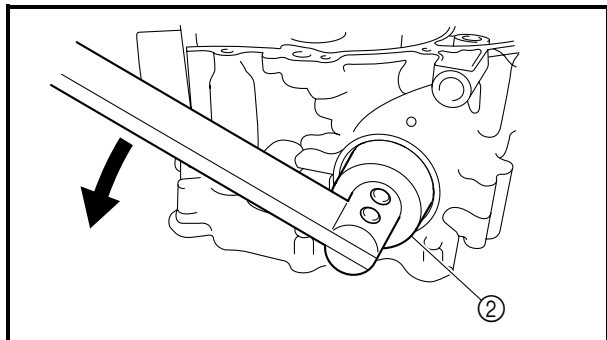
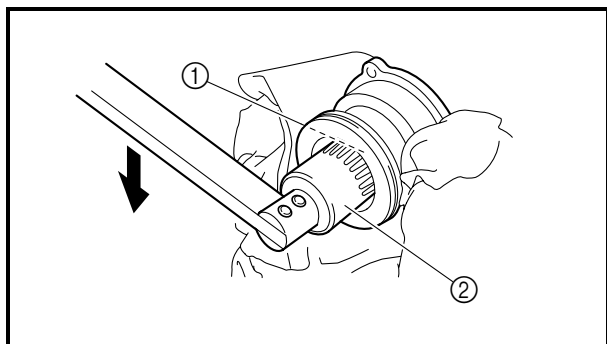
1. Install:

- bearing ①
- oil seal ②
- oil seal ③



Installed depth of bearing ①
0.9 ~ 1.4 mm (0.035 ~ 0.055 in)
Installed depth of oil seal ②
1.0 ~ 1.5 mm (0.039 ~ 0.059 in)
Installed depth of oil seal ③
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

 **80 Nm (8.0 m · kg, 58 ft · lb)**

TIP:

Attach the ring nut wrench ②.



Ring nut wrench
90890-01430, YM-38404

NOTICE

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



- 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.

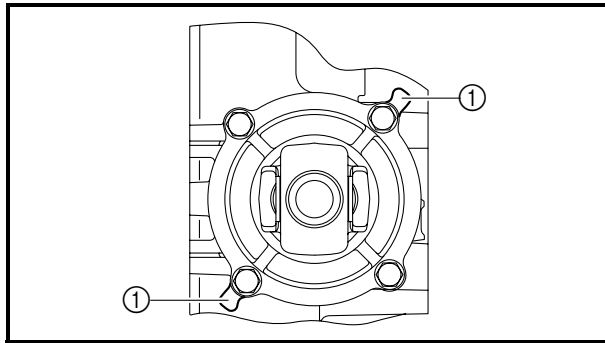
NOTICE

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®



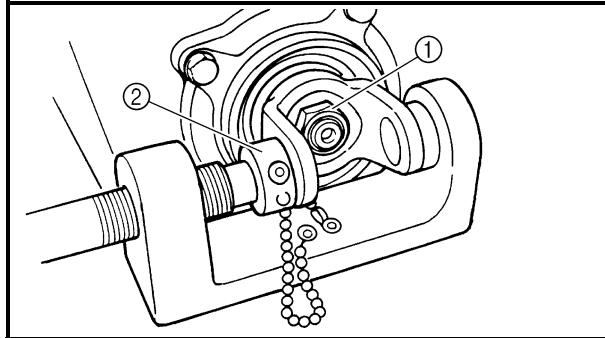


3. Install:

- middle driven gear shim(s) ①
- bearing housing

TIP:

Install the shim(s) so that the tabs are positioned as shown in the illustration.



4. Install:

- universal joint yoke (middle gear side)
- washer
- universal joint yoke nut (middle gear side) ①

TIP:

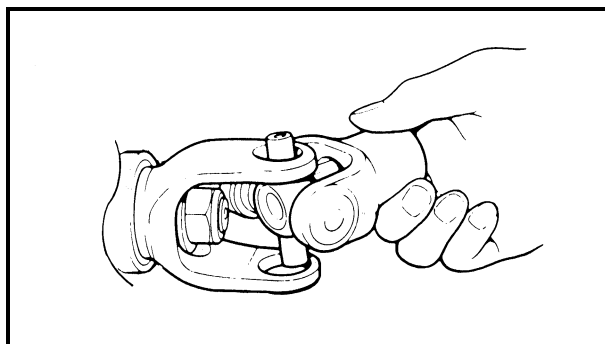
Use the universal joint holder ② to hold the yoke.



Universal joint yoke nut
150 Nm (15.0 m · kg, 110 ft · lb)
LOCTITE®



Universal joint holder
90890-04062, YM-04062



5. Install:

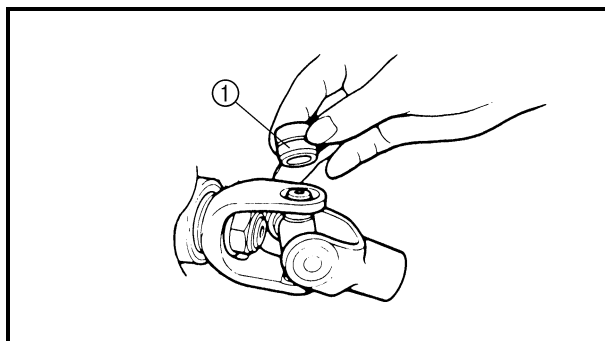
- universal joint (middle gear side)

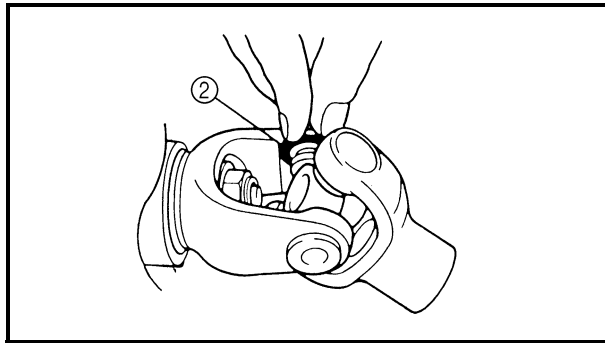


- Install the yoke into the universal joint.
- Apply wheel bearing grease to the bearings.
- Install the bearing ① onto the yoke.

NOTICE

Check each bearing. The needles can easily fall out of their races. Slide the yoke back and forth on the bearings; the yoke will not go all the way onto a bearing if a needle is out of place.



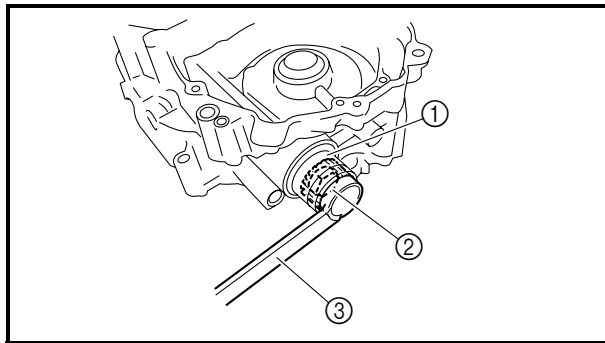


- d. Press each bearing into the universal joint using a suitable socket.

TIP:

The bearing must be inserted far enough into the universal joint so that the circlip can be installed.

- e. Install the circlips (2) into the groove of each bearing.



6. Install:

- drive shaft coupling gear (middle gear side) (1)
- washer
- drive shaft coupling gear nut (middle gear side) (2)



190 Nm (19.0 m · kg, 140 ft · lb)

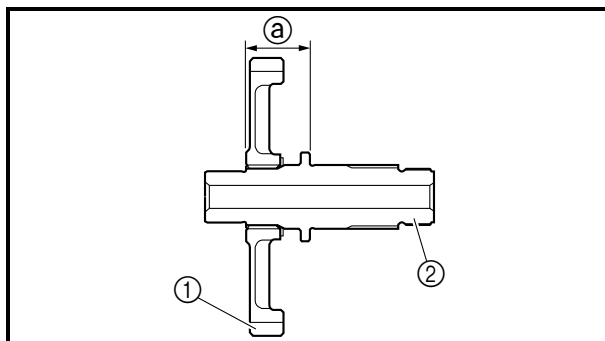
TIP:

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**

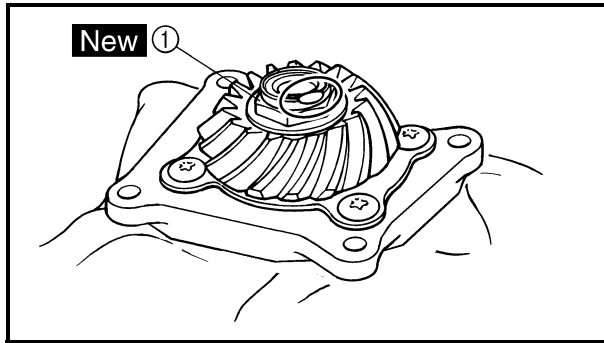
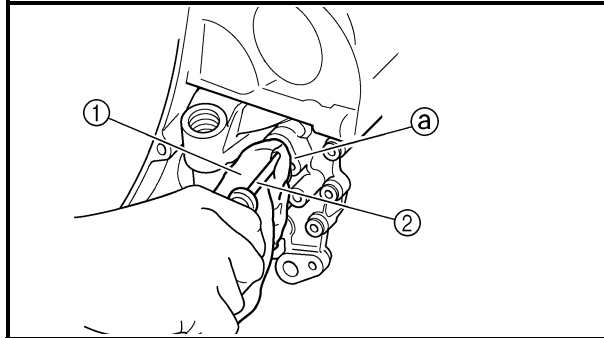
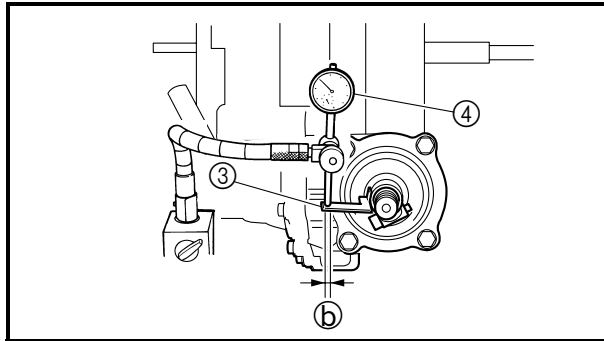
1. Install:

- circlip
- middle driven gear (1)
(to the middle drive shaft (2))



Installed depth of middle driven gear (a)

24.7 ~ 24.9 mm (0.97 ~ 0.98 in)



2. Tighten:

- middle drive pinion gear nut ① **New**

 **190 Nm (19.0 m · kg, 140 ft · lb)**

TIP:

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)

- a. Temporarily install the right crankcase.

- b. Wrap a rag ① around a screwdriver ②, and then insert it into the installation hole ③ of the right crankcase speed sensor to hold the middle driven gear.

- c. Attach the gear lash measurement tool ③ and dial gauge ④.



**Gear lash measurement tool
90890-01467, YM-01467**

- ⑥ 12.3 mm (0.48 in)

- d. Measure the gear lash while rotating the middle driven shaft back and forth.

TIP:

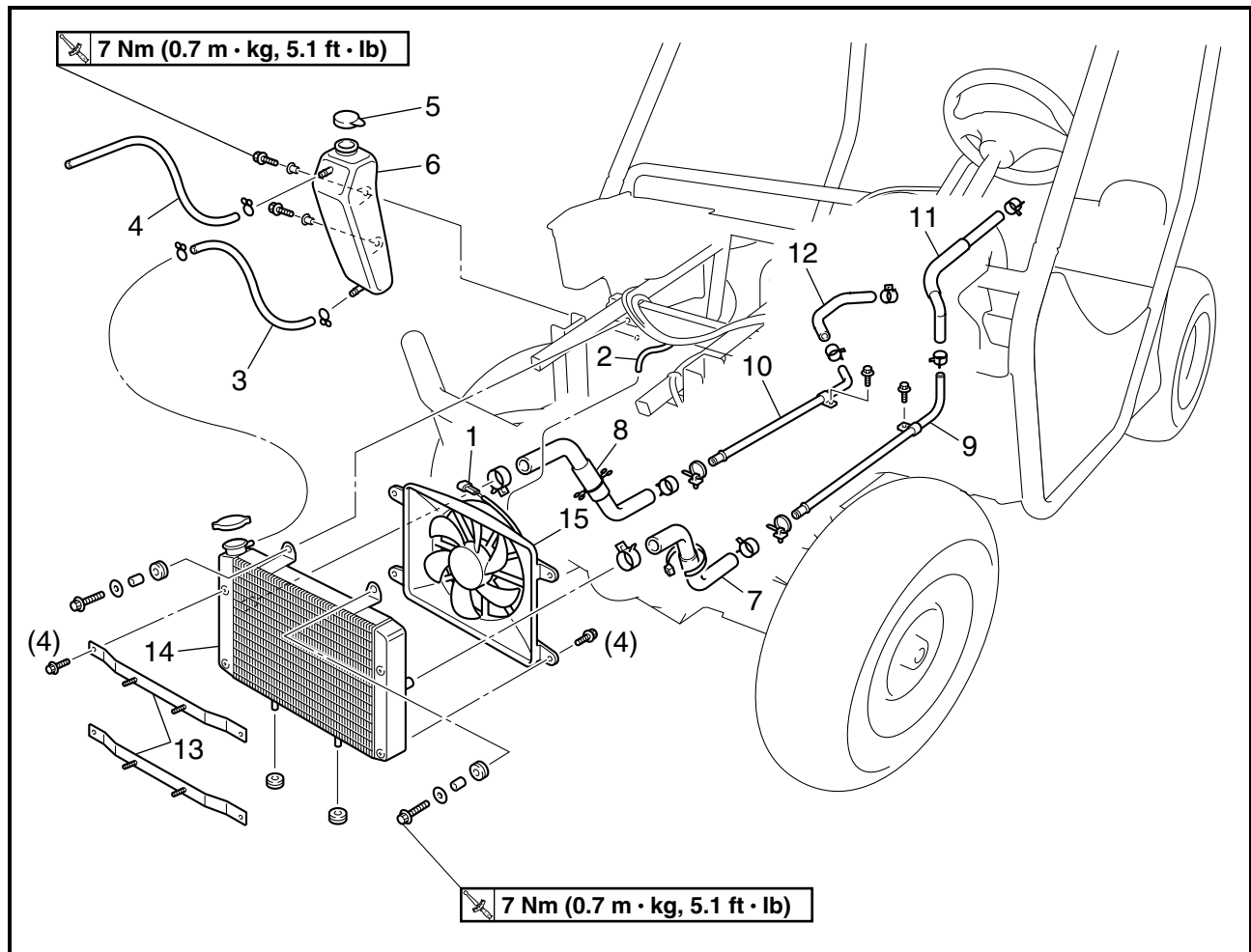
Measure the gear lash at 4 positions. Rotate the middle driven gear 90° each time.

- e. If the gear lash is incorrect, adjust the gear lash with middle driven pinion gear shims and/or middle drive pinion gear shim(s).



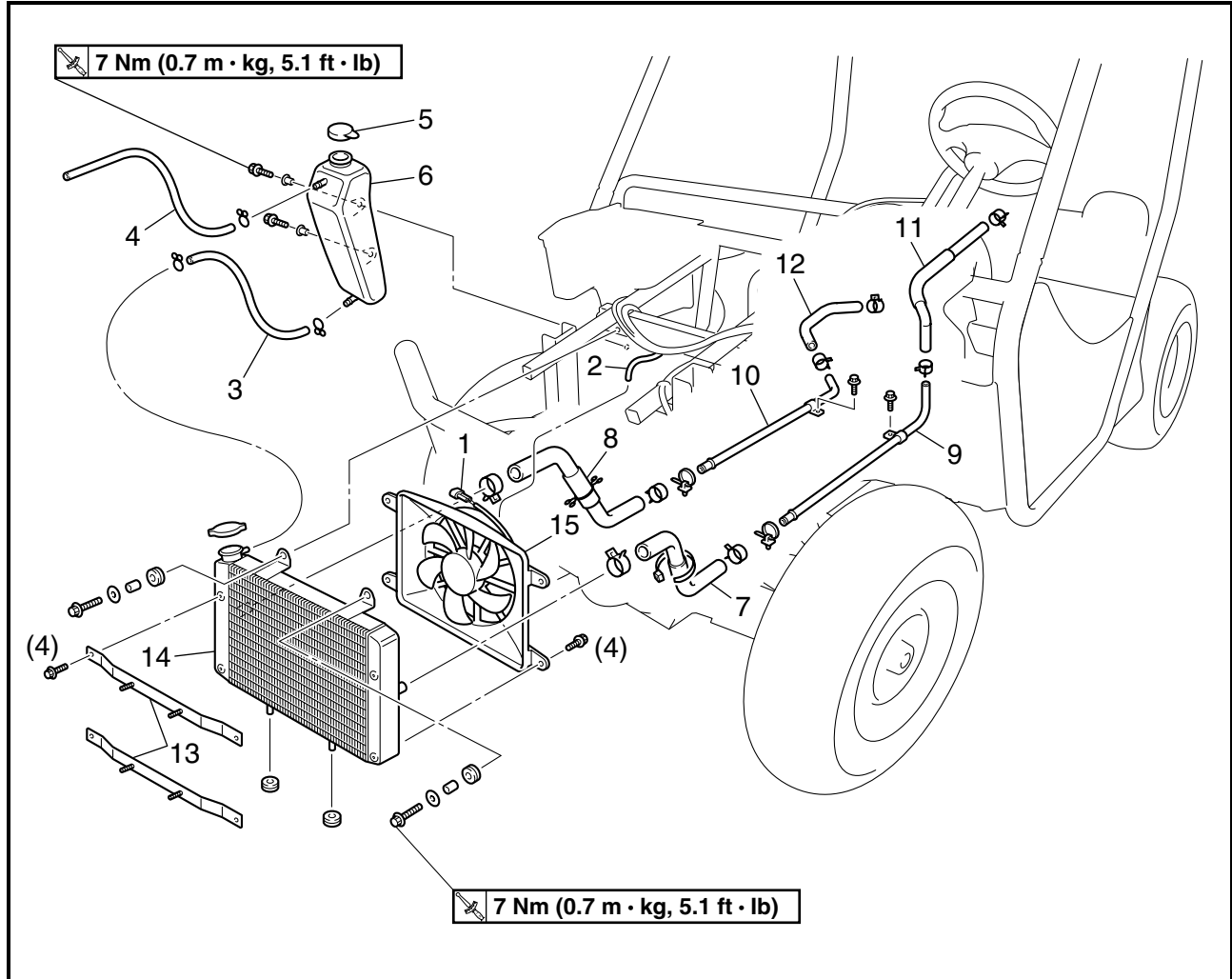
COOLING SYSTEM

RADIATOR AND COOLANT RESERVOIR

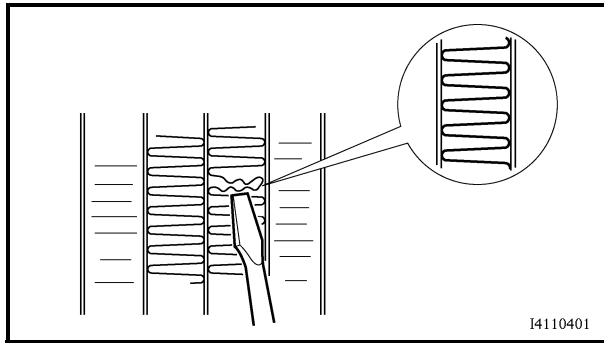


5

Order	Job/Part	Q'ty	Remarks
	Removing the radiator and coolant reservoir		Remove the parts in the order listed.
	Oil cooler		Refer to "OIL COOLER".
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
1	Radiator fan motor coupler	1	Disconnect.
2	Radiator fan motor breather hose	1	Disconnect.
3	Coolant reservoir hose	1	
4	Coolant reservoir breather hose	1	
5	Coolant reservoir cap	1	
6	Coolant reservoir	1	
7	Radiator inlet hose	1	
8	Radiator outlet hose	1	
9	Radiator inlet pipe	1	



Order	Job/Part	Q'ty	Remarks
10	Radiator outlet pipe	1	For installation, reverse the removal procedure.
11	Thermostat outlet hose	1	
12	Water pump inlet hose	1	
13	Oil cooler bracket	2	
14	Radiator	1	
15	Radiator fan	1	



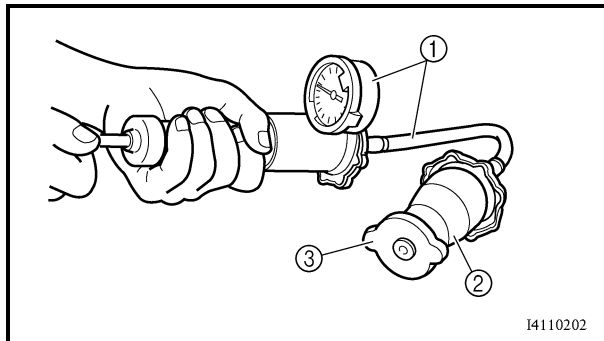
CHECKING THE RADIATOR

1. Check:
 - radiator fins
Obstruction → Clean.
Apply compressed air to the rear of the radiator.
Damage → Repair or replace.

TIP:

Straighten any flattened fins with a thin, flat-head screwdriver.

- 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)

- a. Install the radiator cap tester ① and adapter ② onto 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 that there is no drop in pressure.

4. Check:
- radiator fan
- Damage → Replace.
Malfunction → Check and repair.
Refer to “COOLING SYSTEM” in chapter 9.



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:

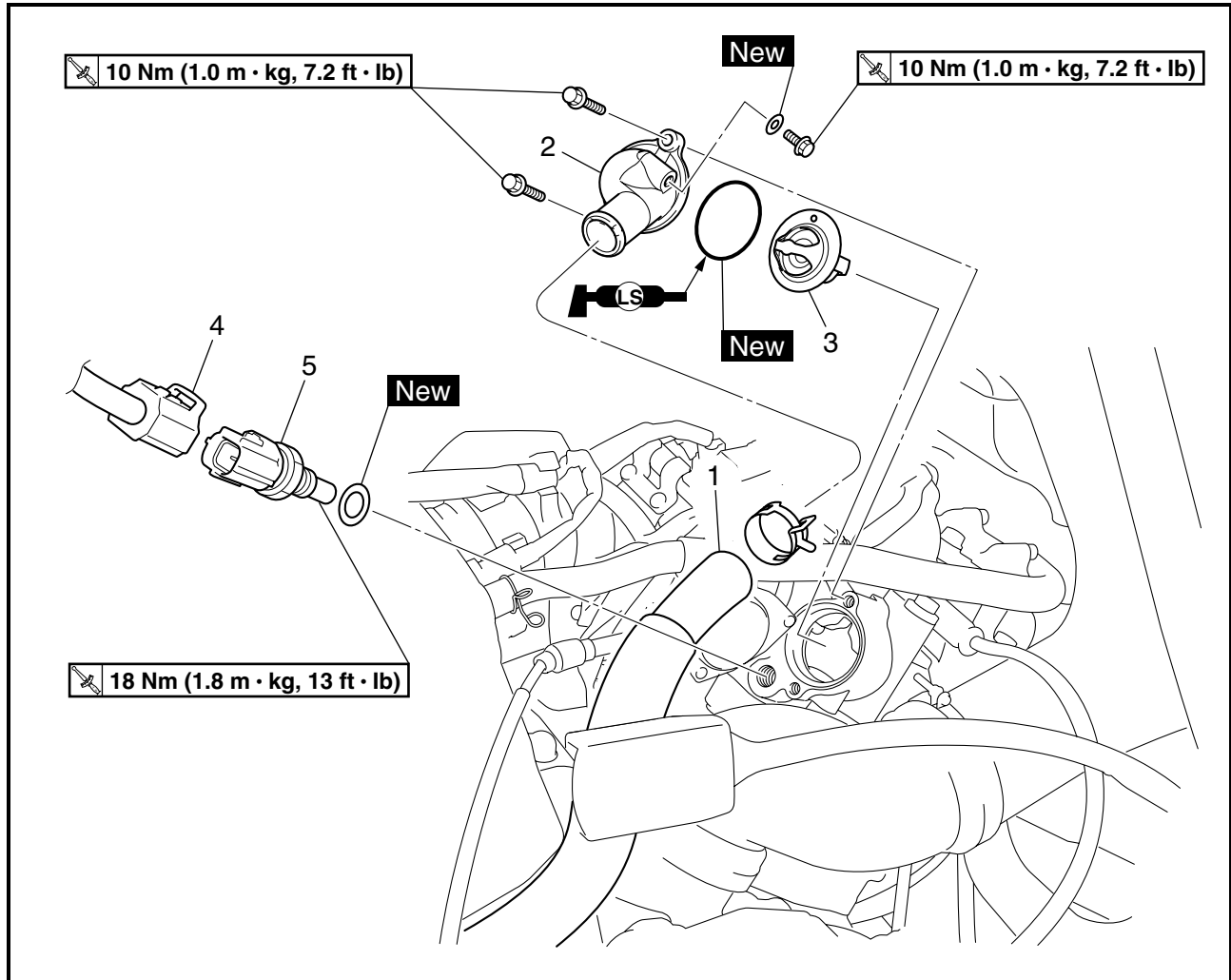
- cooling system

Leaks → Repair or replace any faulty part.

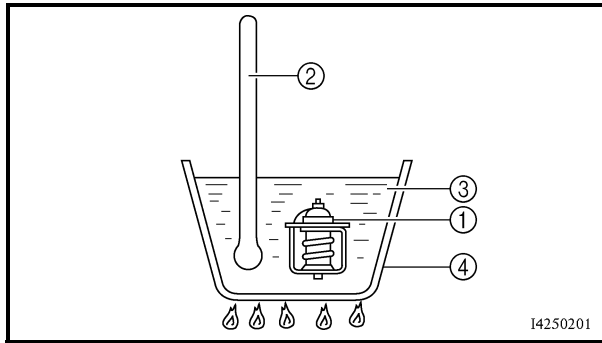
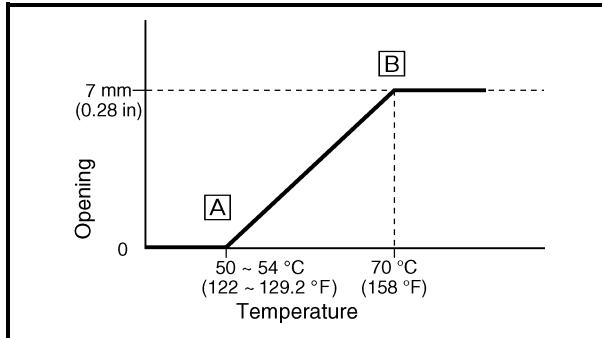


EBS00129

THERMOSTAT



Order	Job/Part	Q'ty	Remarks
	Removing the thermostat		
	Seats/rear console		Remove the parts in the order listed. Refer to "SEATS, REAR CONSOLE AND INSTRUMENT PANELS" in chapter 8.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
1	Thermostat outlet hose	1	Disconnect.
2	Thermostat cover	1	Refer to "INSTALLING THE THERMOSTAT".
3	Thermostat	1	
4	Coolant temperature sensor coupler	1	Disconnect.
5	Coolant temperature sensor	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.

- Suspend the thermostat in a container filled with water.
- Slowly heat the water.
- Place a thermometer in the water.
- While stirring the water, observe the thermostat and thermometer's indicated temperature.

- ① Thermostat
- ② Thermometer
- ③ Water
- ④ Container
- A Fully closed
- B Fully open

TIP:

If the accuracy of the thermostat is in doubt, replace it. A faulty thermostat could cause serious overheating or overcooling.

2. Check:

- thermostat cover
- thermostat housing (cylinder head)
Cracks/damage → Replace.

EBS00133

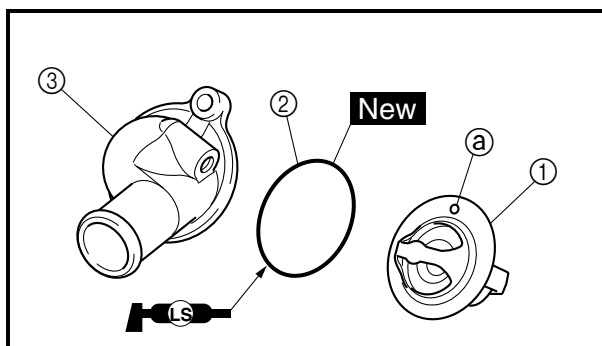
INSTALLING THE THERMOSTAT

1. Install:

- thermostat ①
- O-ring ② **New**
- thermostat cover ③

TIP:

Install the thermostat with its breather hole (a) facing up.



2. Fill:

- cooling system
(with the specified amount of the recommended coolant)
Refer to "CHANGING THE COOLANT" in chapter 3.

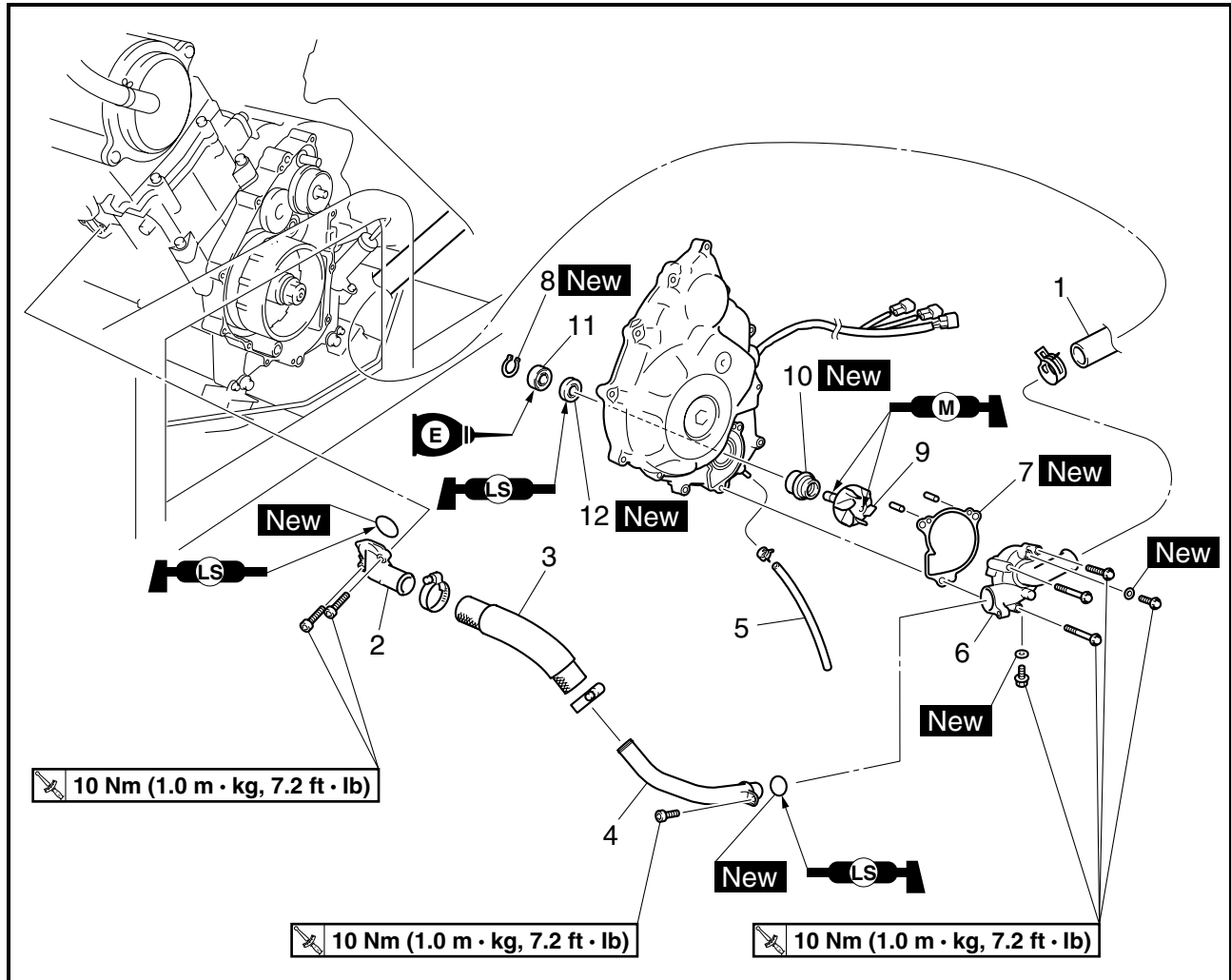
3. Check:

- cooling system
Leak → Repair or replace any faulty part.

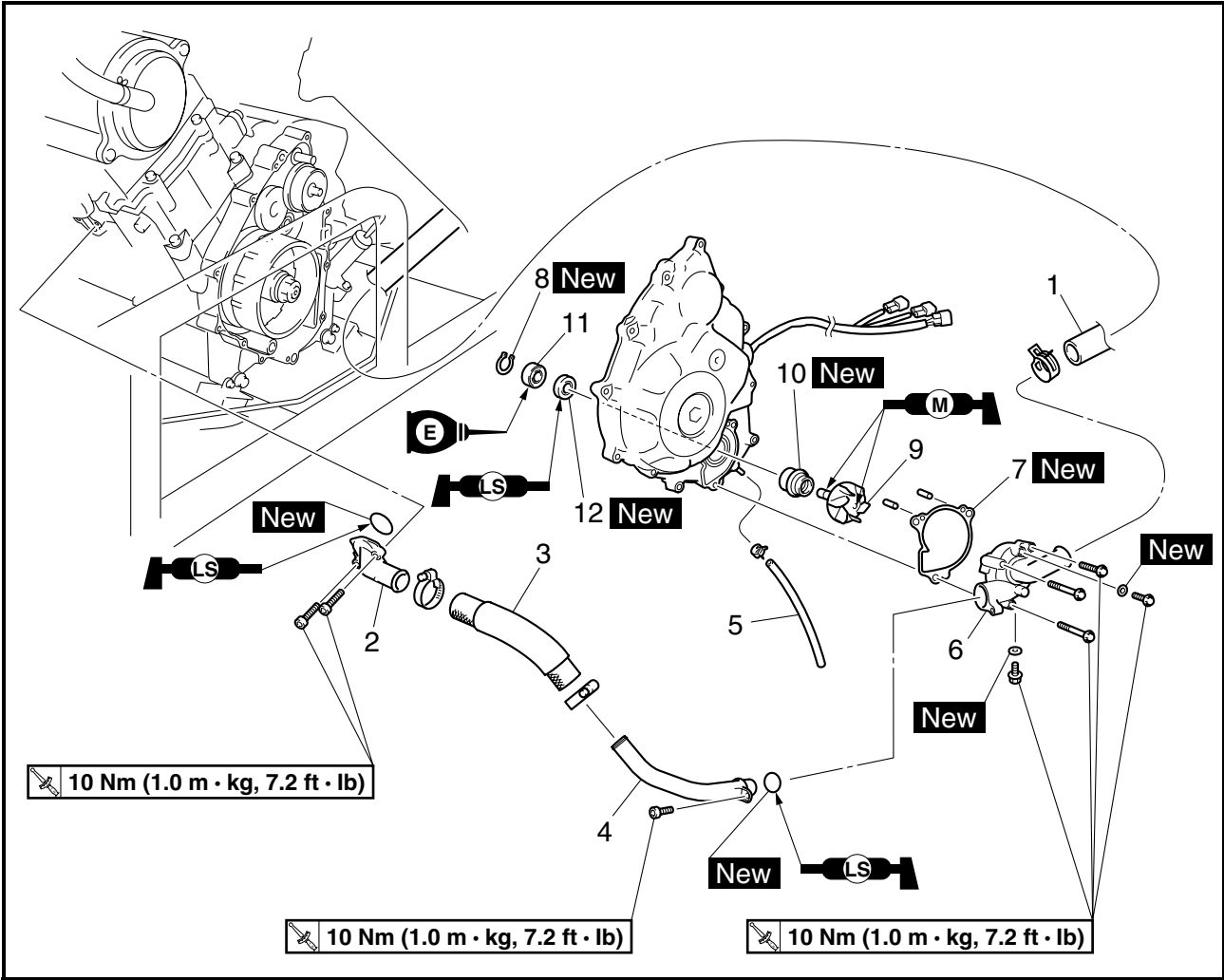


EBS00134

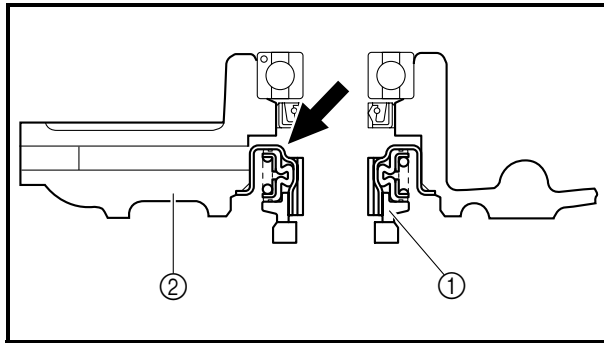
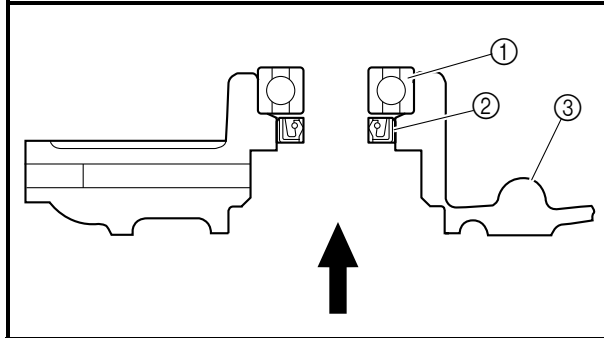
WATER PUMP



Order	Job/Part	Q'ty	Remarks
	Removing the water pump		Remove the parts in the order listed.
	Seats/rear console		Refer to "SEATS, REAR CONSOLE AND INSTRUMENT PANELS" in chapter 8.
	Engine oil		Drain.
			Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Coolant		Drain.
			Refer to "CHANGING THE COOLANT" in chapter 3.
	AC magneto cover		Refer to "AC MAGNETO" in chapter 4.
1	Water pump inlet 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	Refer to "DISASSEMBLING THE WATER PUMP" and "ASSEMBLING THE WATER PUMP". For installation, reverse the removal procedure.
8	Circlip	1	
9	Impeller shaft	1	
10	Water pump seal	1	
11	Bearing	1	
12	Oil seal	1	



EBS00138

DISASSEMBLING THE WATER PUMP

1. Remove:

- water pump seal ①

TIP:

Tap out the water pump seal from the inside of the AC magneto cover ②.

2. Remove:

- bearing ①
- oil seal ②

TIP:

Tap out the bearing and oil seal from the outside of the AC magneto cover ③.

EBS00139

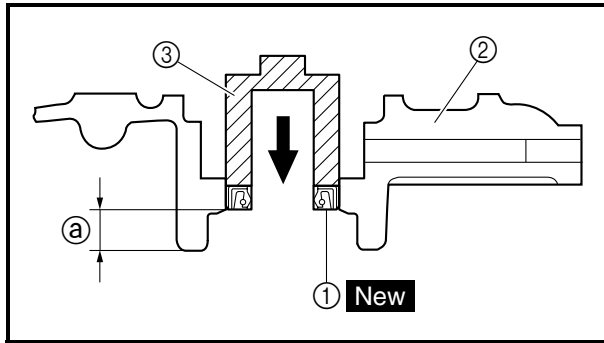
CHECKING THE WATER PUMP

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:

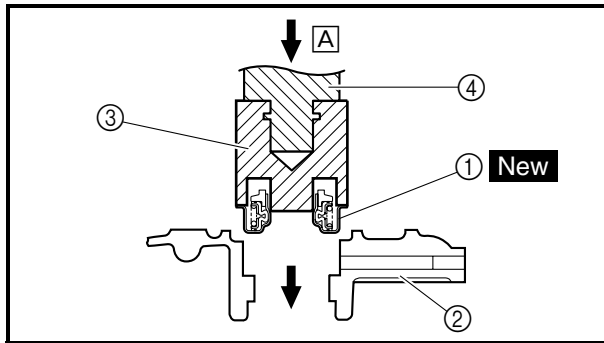
- oil seal ① **New**
(into the AC magneto cover ②)

TIP:

- Before installing the oil seal, apply tap water or coolant onto its outer surface.
- Install the oil seal with a socket ③ that matches its outside diameter.



Installed depth of oil seal ①
8.1 ~ 8.7 mm (0.32 ~ 0.34 in)



2. Install:

- water pump seal ① **New**
(into the AC magneto cover ②)

NOTICE

Never lubricate the water pump seal surface with oil or grease.

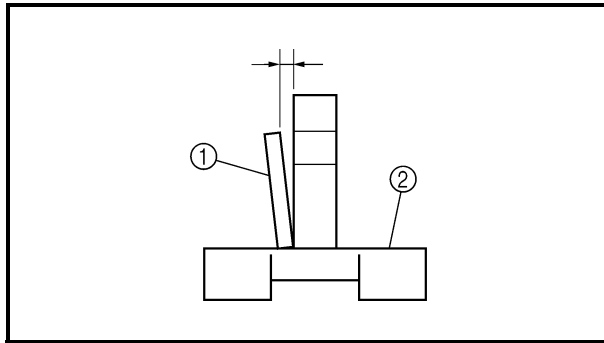
TIP:

Install the water pump seal with the special tools.



Mechanical seal installer 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.

NOTICE

Make sure the rubber damper and rubber damper holder are flush with the impeller.

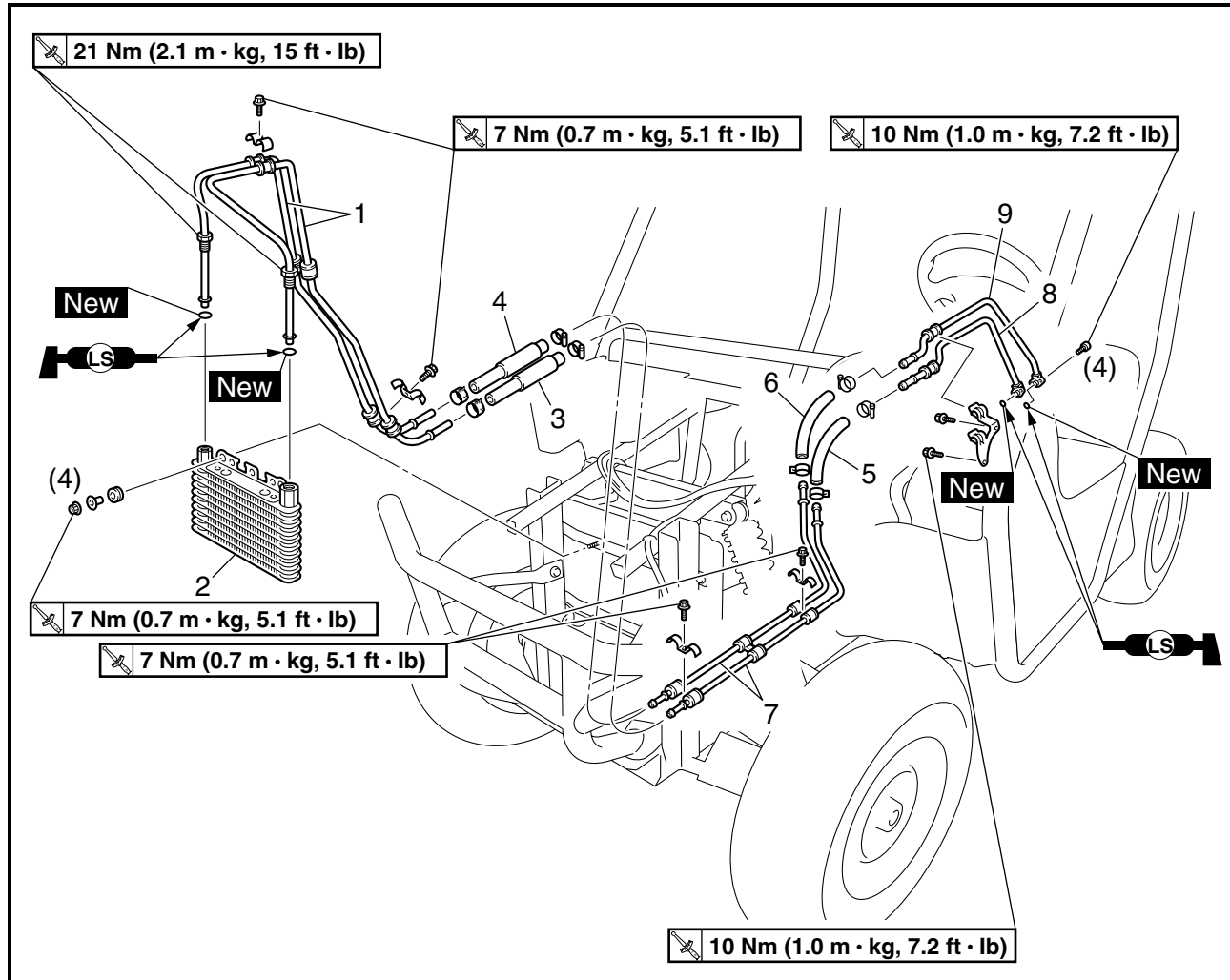


**Impeller shaft tilt limit
0.15 mm (0.006 in)**

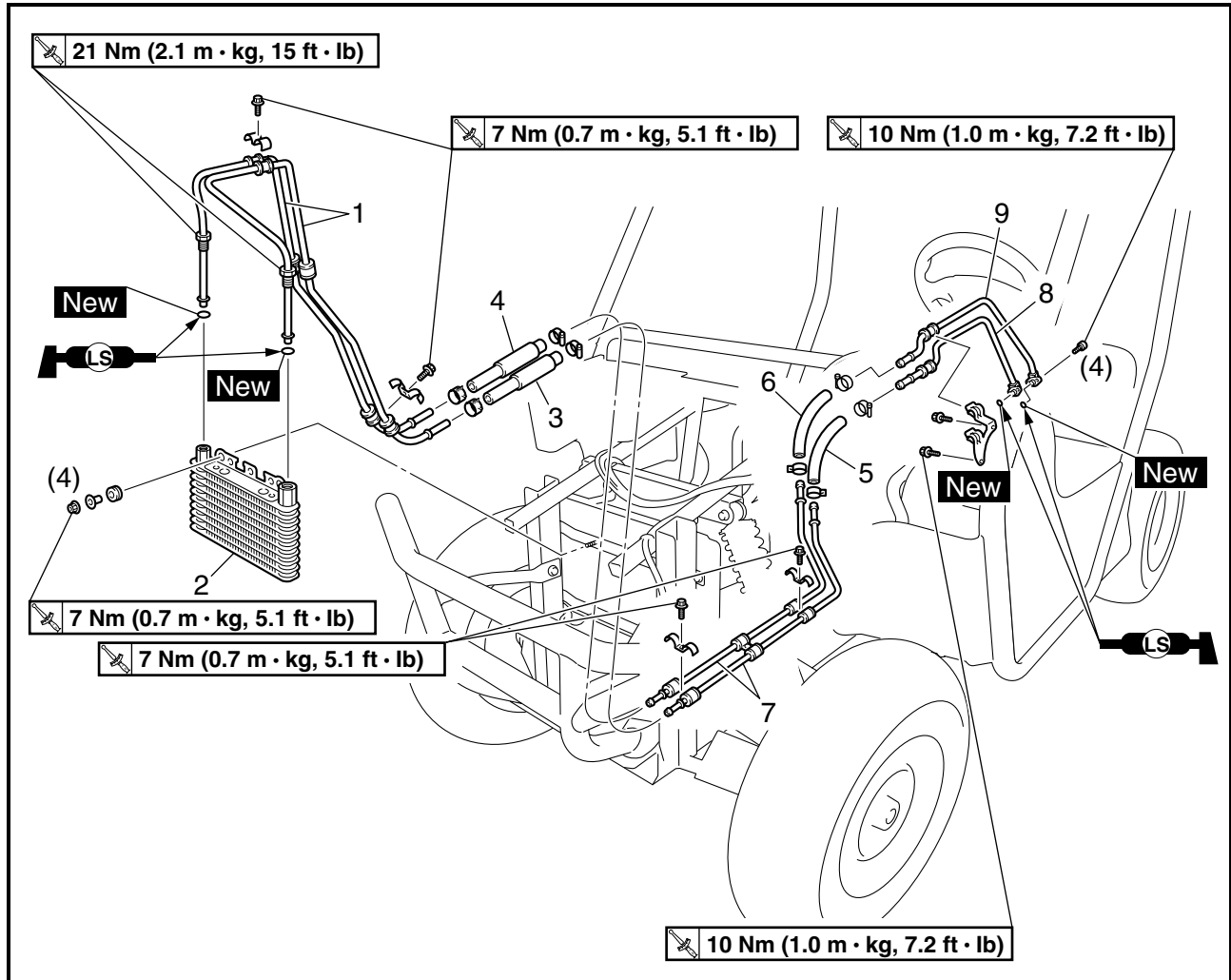
- ① Straightedge
- ② Impeller shaft



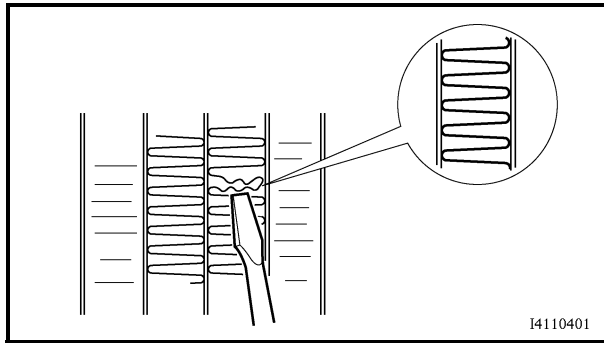
OIL COOLER



Order	Job/Part	Q'ty	Remarks
	Removing the oil cooler		Remove the parts in the order listed.
	Seats/rear console/support side panels/front console		Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.
	Engine oil		Drain.
	Air intake duct		Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Radiator mesh		Refer to "AIR FILTER CASE AND AIR INTAKE DUCT" in chapter 6.
			Refer to "FRONT GUARD AND HOOD" in chapter 8.
1	Oil cooler inlet pipe 1/oil cooler outlet pipe 1	1/1	
2	Oil cooler	1	
3	Oil cooler inlet hose	1	
4	Oil cooler outlet hose	1	



Order	Job/Part	Q'ty	Remarks
5	Oil outlet hose	1	For installation, reverse the removal procedure.
6	Oil inlet hose	1	
7	Oil cooler inlet pipe 2/oil cooler outlet pipe 2	1/1	
8	Oil delivery pipe 3	1	
9	Oil delivery pipe 2	1	

**CHECKING THE OIL COOLER**

1. Check:

- oil cooler

Obstruction → Clean.

Apply compressed air to the rear of the oil cooler.

Damage → Repair or replace the oil cooler.

TIP:

Straighten any flattened fins with a thin, flat-head screwdriver.

2. Check:

- oil hoses

Cracks/damage → Replace.

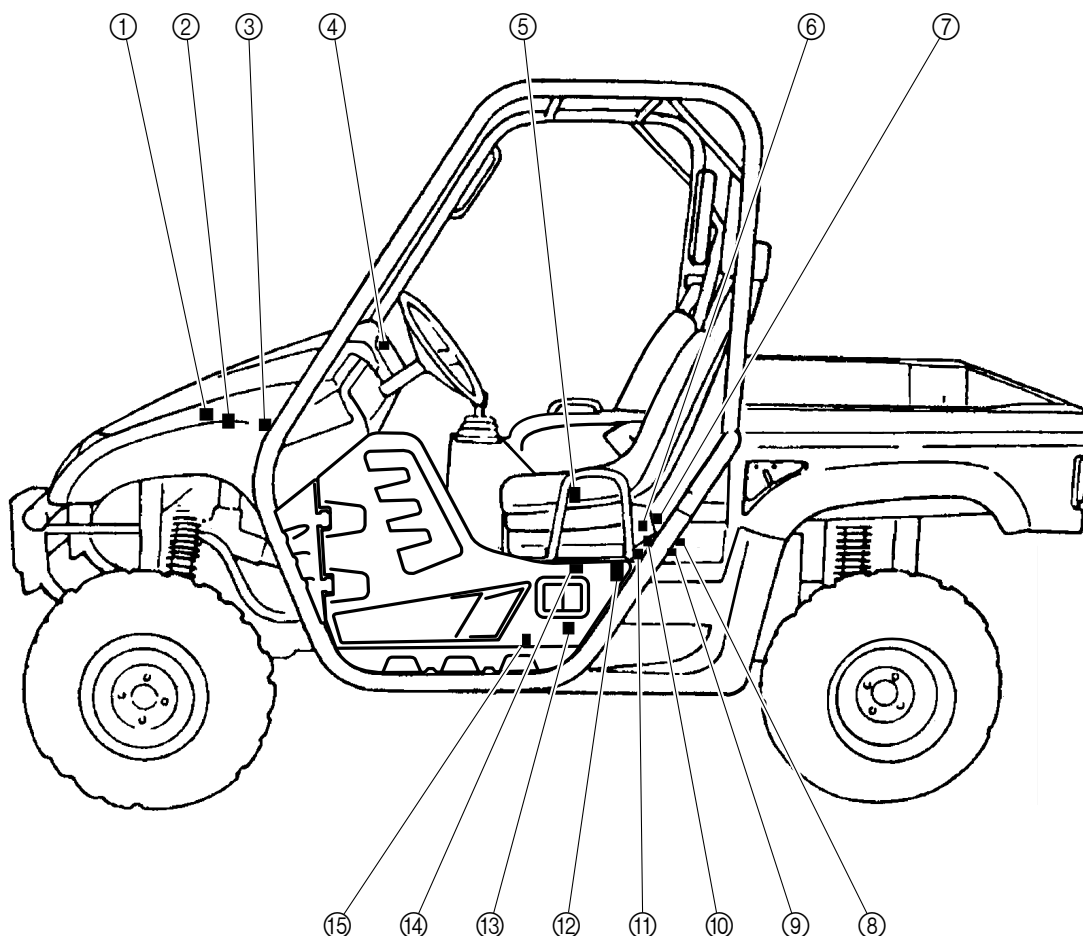


EAS00894

FUEL INJECTION SYSTEM

FUEL INJECTION SYSTEM

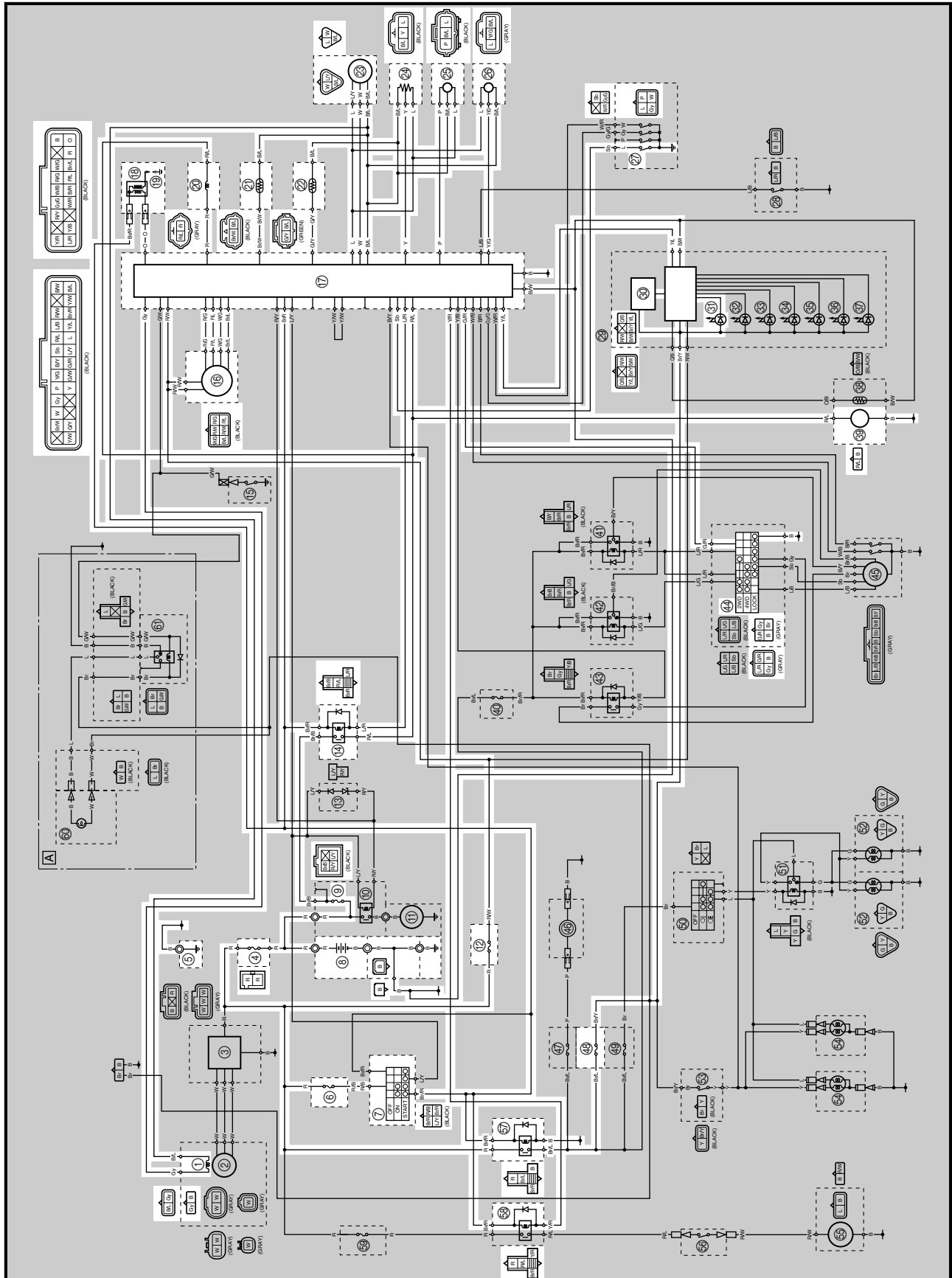
- | | | |
|----------------------------------|---------------------------------|----------------|
| ① Fuel injection system relay | ⑧ Spark plug | ⑮ Speed sensor |
| ② ECU (engine control unit) | ⑨ Coolant temperature sensor | |
| ③ Lean angle sensor | ⑩ Fuel injector | |
| ④ Engine trouble warning light | ⑪ ISC (idle speed control) unit | |
| ⑤ Intake air temperature sensor | ⑫ Fuel pump | |
| ⑥ TPS (throttle position sensor) | ⑬ Crankshaft position sensor | |
| ⑦ Intake air pressure sensor | ⑭ Ignition coil | |





EAS27340

CIRCUIT DIAGRAM



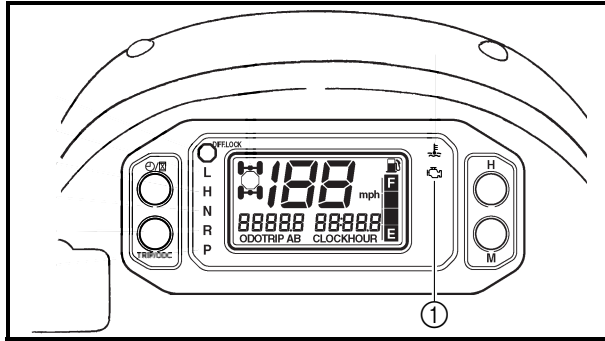


- ① Crankshaft position sensor
- ④ Main fuse
- ⑤ Frame ground
- ⑥ Ignition fuse
- ⑦ Main switch
- ⑧ Battery
- ⑨ Fuel injection system fuse
- ⑫ Backup fuse
- ⑭ Fuel injection system relay
- ⑯ ISC (idle speed control) unit
- ⑰ ECU (engine control unit)
- ⑱ Ignition coil
- ⑲ Spark plug
- ⑳ Fuel injector
- ㉑ Intake air temperature sensor
- ㉒ Coolant temperature sensor
- ㉓ Speed sensor
- ㉔ TPS (throttle position sensor)
- ㉕ Intake air pressure sensor
- ㉖ Lean angle sensor
- ㉗ Gear position switch
- ㉘ Multifunction meter
- ㉙ Engine trouble warning light
- ㉚ Fuel pump
- ㉛ On-command four-wheel-drive motor switch and differential gear lock switch
- ㉜ Signaling system fuse
- ㉝ Load control relay
- ㉞ Radiator fan motor relay



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
37	ISC valve (stuck fully open)	Engine speed is high when the engine is idling	Able	Able
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

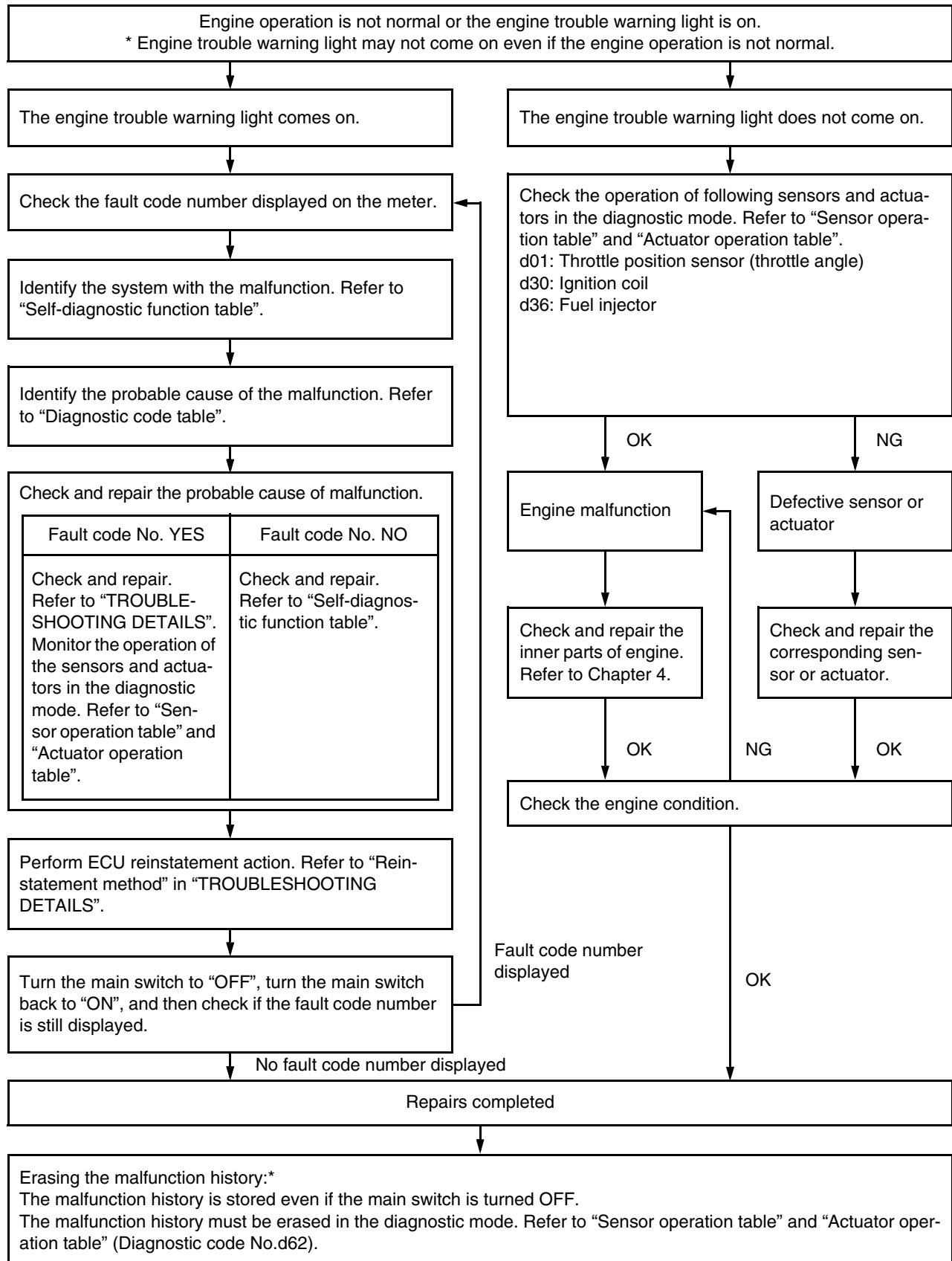
Communication error with the meter

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



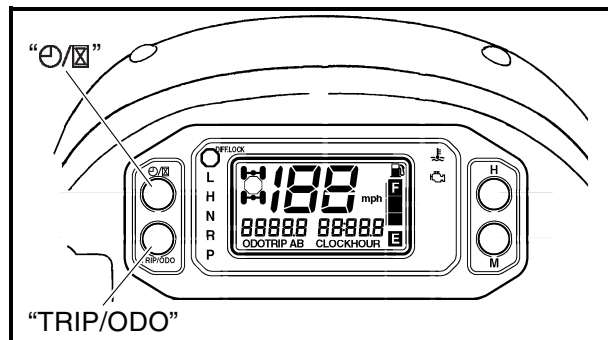
* Operated when the engine trouble warning light is on.



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.

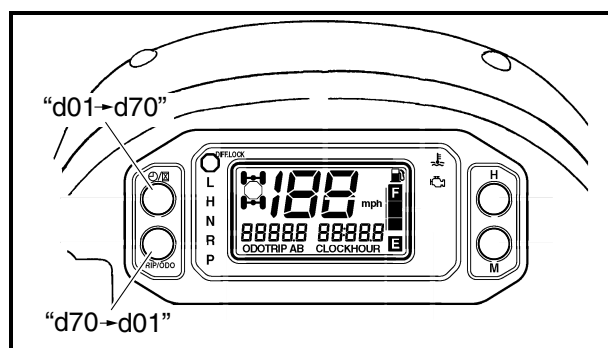


Setting the diagnostic mode

1. Turn the main switch to "OFF".
2. Disconnect the wire harness coupler from the fuel pump.
3. Simultaneously press and hold the "⌚ / ⌚" and "TRIP/ODO" buttons, turn the main switch to "ON", and continue to press the buttons for 8 seconds or more.

TIP:

- All displays on the meter disappear.
- "diag" appears on the LCD meter.



4. Simultaneously press the "⌚ / ⌚" and "TRIP/ODO" 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 "⌚ / ⌚" and "TRIP/ODO" buttons.

TIP:

- The diagnostic code number appears on the LCD meter (01-70).
- To decrease the selected diagnostic code number, press the "TRIP/ODO" button. Press the "TRIP/ODO" button for 1 second or longer to automatically decrease the diagnostic code numbers.
- To increase the selected diagnostic code number, press the "⌚ / ⌚" button. Press the "⌚ / ⌚" 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 differential gear lock switch to "LOCK" to operate the actuator.
 - * If the differential gear lock switch is set to "LOCK", set it to "4WD", and then set it to "LOCK" again.
7. Turn the main switch to "OFF" to cancel the diagnostic mode.

TIP:

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.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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).	<ul style="list-style-type: none"> • Intake air pressure sensor hose is detached, clogged, kinked, or pinched. • Malfunction in ECU. 	d03
15	Throttle position sensor: open or short circuit detected.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • Stuck throttle position sensor. • Malfunction in ECU. 	d01
21	Coolant temperature sensor: open or short circuit detected.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • Overturned. • Malfunction in ECU. 	d08
33	Malfunction detected in the primary lead of the ignition coil.	<ul style="list-style-type: none"> • 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
37	Engine speed is high when the engine is idling.	<ul style="list-style-type: none"> • Open circuit in wire harness. • Malfunction in throttle body. • Malfunction in throttle cables. • ISC valve is stuck fully open due to disconnected ISC unit coupler. (High engine idle speed is detected with the ISC valve stuck fully open even though signals for the valve to close are continuously being transmitted by the ECU.) • Malfunction in ECU. • Backup fuse is blown. 	d54
39	Open circuit detected in a injector.	<ul style="list-style-type: none"> • Open or short circuit in wire harness. • Improperly installed injector. • Defective injector. 	d36
41	Lean angle sensor: open or short circuit detected.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • Open or short circuit in wire harness. • Malfunction in ECU. 	d09
44	Error is detected while reading or writing on EEPROM (CO adjustment value).	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • Malfunction in the charging system. Refer to "CHARGING SYSTEM" in chapter 9. 	—



Fault code No.	Symptom	Probable cause of malfunction	Diagnostic code No.
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.)	<ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> 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.	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 <ul style="list-style-type: none"> Upright Overtuned 	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	Compare with the actually measured battery voltage. (If the battery voltage is lower, perform recharging.)
d21	Gear position switch <ul style="list-style-type: none"> Neutral In gear 	ON OFF	Shift the transmission.
d60	EEPROM fault code display <ul style="list-style-type: none"> No history History exists 	00 01	—
d61	Malfunction history code display <ul style="list-style-type: none"> No history History exists 	00 Fault codes 12-50 <ul style="list-style-type: none"> (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 <ul style="list-style-type: none"> No history History exists 	0 Up to 16 fault codes	— To erase the history, set the differential gear lock switch to "4WD" and then to "LOCK".
d70	Control number	00 ~ 255	—



Actuator operation table

- Actuator operation

Set the differential gear lock switch to “4WD” and then to “LOCK”.

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 injection system relay	Actuates the fuel injection system 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 injection system 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.
d54	ISC valve	Actuates and fully closes the ISC valve, then opens it to the standby opening position when the engine is started. This operation takes approximately 12 seconds until it is completed. Illuminates the engine trouble warning light.	The ISC unit vibrates when the ISC valve operates.

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 <ul style="list-style-type: none"> • Crankshaft position sensor coupler • Main wire harness-ECU coupler 		<ul style="list-style-type: none"> • 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.		<ul style="list-style-type: none"> • 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.		<ul style="list-style-type: none"> • 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 <ul style="list-style-type: none">• Intake air pressure sensor coupler• Main wire harness-ECU coupler		<ul style="list-style-type: none">• 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.		<ul style="list-style-type: none">• 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.		<ul style="list-style-type: none">• 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			<ul style="list-style-type: none">• 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.			<ul style="list-style-type: none">• Check and repair the connection.• Replace it if there is a malfunction.		
3	Connections <ul style="list-style-type: none">• Intake air pressure sensor coupler• Main wire harness-ECU coupler			<ul style="list-style-type: none">• 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.			<ul style="list-style-type: none">• 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.		<ul style="list-style-type: none"> • Check for looseness or pinching. • Check that the sensor is installed in the specified position. 	Turning the main switch to "ON".
2	Connections <ul style="list-style-type: none"> • Throttle position sensor coupler • Main wire harness-ECU coupler 		<ul style="list-style-type: none"> • 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.		<ul style="list-style-type: none"> • 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.		<ul style="list-style-type: none"> • Check for open circuit and replace the throttle position sensor. (yellow-black/blue) 	
5	Defective throttle position sensor.		<ul style="list-style-type: none"> • 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.			<ul style="list-style-type: none">• 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.			<ul style="list-style-type: none">• 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 <ul style="list-style-type: none">Coolant temperature sensor couplerMain wire harness-ECU coupler		<ul style="list-style-type: none">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.		<ul style="list-style-type: none">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.		<ul style="list-style-type: none">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 <ul style="list-style-type: none">• Intake air temperature sensor coupler• Main wire harness-ECU coupler			<ul style="list-style-type: none">• 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.			<ul style="list-style-type: none">• 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.			<ul style="list-style-type: none">• 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 <ul style="list-style-type: none">• Lean angle sensor coupler• Main wire harness-ECU coupler			<ul style="list-style-type: none">• 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.			<ul style="list-style-type: none">• 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 <ul style="list-style-type: none">Ignition coil connector (primary coil side)Main wire harness-ECU coupler			<ul style="list-style-type: none">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.			<ul style="list-style-type: none">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 main switch coupler. (brown/red—brown/red)		
3	Defective ignition coil.			<ul style="list-style-type: none">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.	37	Symptom	Engine speed is high when the engine is idling.	
Diagnostic code No.		d54	ISC valve	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Backup fuse is blown.		<ul style="list-style-type: none">• Check the backup fuse. Refer to “CHECKING THE FUSES” in chapter 3.	ISC valve returns to its original position by turning the main switch to “ON” and back to “OFF”. Reinstated if the engine idle speed is within specification after starting the engine.
2	Throttle valve does not fully close.		<ul style="list-style-type: none">• Check the throttle body. Refer to “THROTTLE BODY”.• Check the throttle cables. Refer to “ADJUSTING THE THROTTLE CABLE” in chapter 3.	
3	ISC valve is stuck fully open due to disconnected ISC unit hose or coupler. (High engine idle speed is detected with the ISC valve stuck fully open even though signals for the valve to close are continuously being transmitted by the ECU.)		<ul style="list-style-type: none">• Check that the ISC unit coupler is not disconnected.• The ISC valve is stuck fully open if it does not operate when the main switch is turned “OFF”. (Touch the ISC unit with your hand and check if it is vibrating to confirm if the ISC valve is operating.)	
4	ISC valve is not moving correctly.		<ul style="list-style-type: none">• Execute the diagnostic mode. (Code No.d54)• After the ISC valve is fully closed, it opens to the standby opening position when the engine is started. This operation takes approximately 12 seconds. Start the engine. If the error recurs, replace the throttle body assembly.	

FUEL INJECTION SYSTEM

FI



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 <ul style="list-style-type: none">• Injector coupler• Main wire harness-ECU coupler• Main wire harness fuel pump coupler		<ul style="list-style-type: none">• 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 the wire harness.		<ul style="list-style-type: none">• Repair or replace if there is an open or short circuit.• Between injector coupler and ECU coupler. (red/blue-red/blue) (red-red)	
3	Defective injector.		<ul style="list-style-type: none">• 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 <ul style="list-style-type: none">• Lean angle sensor coupler• Main wire harness-ECU coupler		<ul style="list-style-type: none">• 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.		<ul style="list-style-type: none">• 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.		<ul style="list-style-type: none">• 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 <ul style="list-style-type: none"> • Speed sensor coupler • Main wire harness-ECU coupler 	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • Replace if defective. Refer to “TRANSMISSION” in chapter 4. 		
4	Defective speed sensor.	<ul style="list-style-type: none"> • Execute the diagnostic mode. (Code No.d07) • Replace if defective. Refer to “SIGNALING SYSTEM” in chapter 9. 		

FUEL INJECTION SYSTEM

FI



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 <ul style="list-style-type: none">Fuel injection system relayMain wire harness-ECU coupler		<ul style="list-style-type: none">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.		<ul style="list-style-type: none">Repair or replace if there is an open or short circuit.Between fuel injection system relay coupler and ECU coupler. (red/blue-red/blue)Between fuel injection system relay coupler and starter relay coupler. (brown/black-brown/black)	
3	Malfunction or open circuit in fuel pump relay.		<ul style="list-style-type: none">Execute the diagnostic mode. (Code No.d09)Replace if defective.If there is no malfunction in the fuel injection system relay, 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.			<ul style="list-style-type: none">• Execute the diagnostic mode. (Code No.d60)• 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		<ul style="list-style-type: none"> • 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.		<ul style="list-style-type: none"> • Replace or charge the battery. Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3. 	
3	Malfunction in rectifier/regulator		<ul style="list-style-type: none"> • Replace if defective. Refer to “CHARGING SYSTEM” in chapter 9. 	
4	Open or short circuit in wire harness.		<ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit. • Between battery lead and main fuse coupler (red–red) • Between main fuse coupler and ignition fuse (red–red) • Between main switch coupler and ignition fuse (red/black–red/black) • Between main switch coupler and ECU coupler (brown/red–brown/red) 	

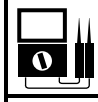
Fault code No.	50	Symptom	Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.)	
Diagnostic code No.	—	—		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Malfunction in ECU.		Replace the ECU. TIP: _____ Do not perform this procedure with the main switch turned to “ON”. _____	Turning the main switch to “ON”.



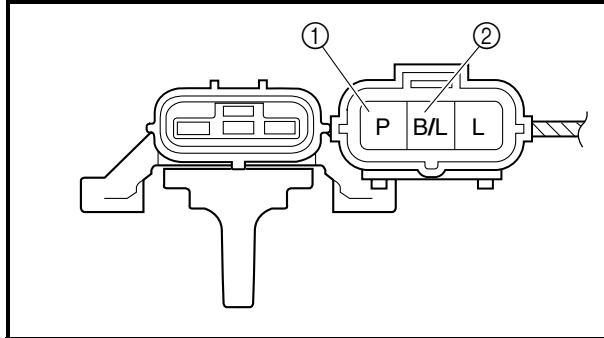
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CHECKING THE INTAKE AIR PRESSURE SENSOR

1. Check:
 - intake air pressure sensor output voltage
Out of specification → Replace.



Intake air pressure sensor output voltage
3.75 ~ 4.25 V



- a. Connect the pocket tester (DC 20 V) to the intake air pressure sensor coupler as shown.



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

Positive tester probe → pink 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.

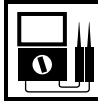
CHECKING THE INTAKE AIR TEMPERATURE SENSOR

1. Remove:
 - intake air temperature sensor

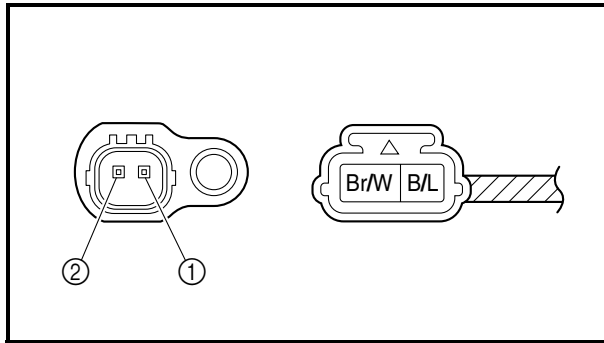


- **Handle the intake air temperature sensor with special care.**
- **Never subject the intake air temperature sensor to strong shocks. If the intake air temperature sensor is dropped, replace it.**

2. Check:
- intake air temperature sensor resistance
Out of specification → Replace.



Intake air temperature sensor resistance
290 ~ 390 Ω at 80 °C (176 °F)

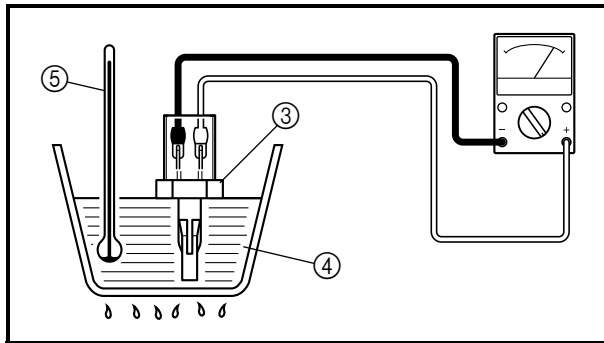


- a. Connect the pocket tester ($\Omega \times 100$) to the intake air temperature sensor terminal as shown.



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

Positive tester probe → brown/white ①
Negative tester probe → black/blue ②



- b. Immerse the air temperature sensor ③ in a container filled with water ④.

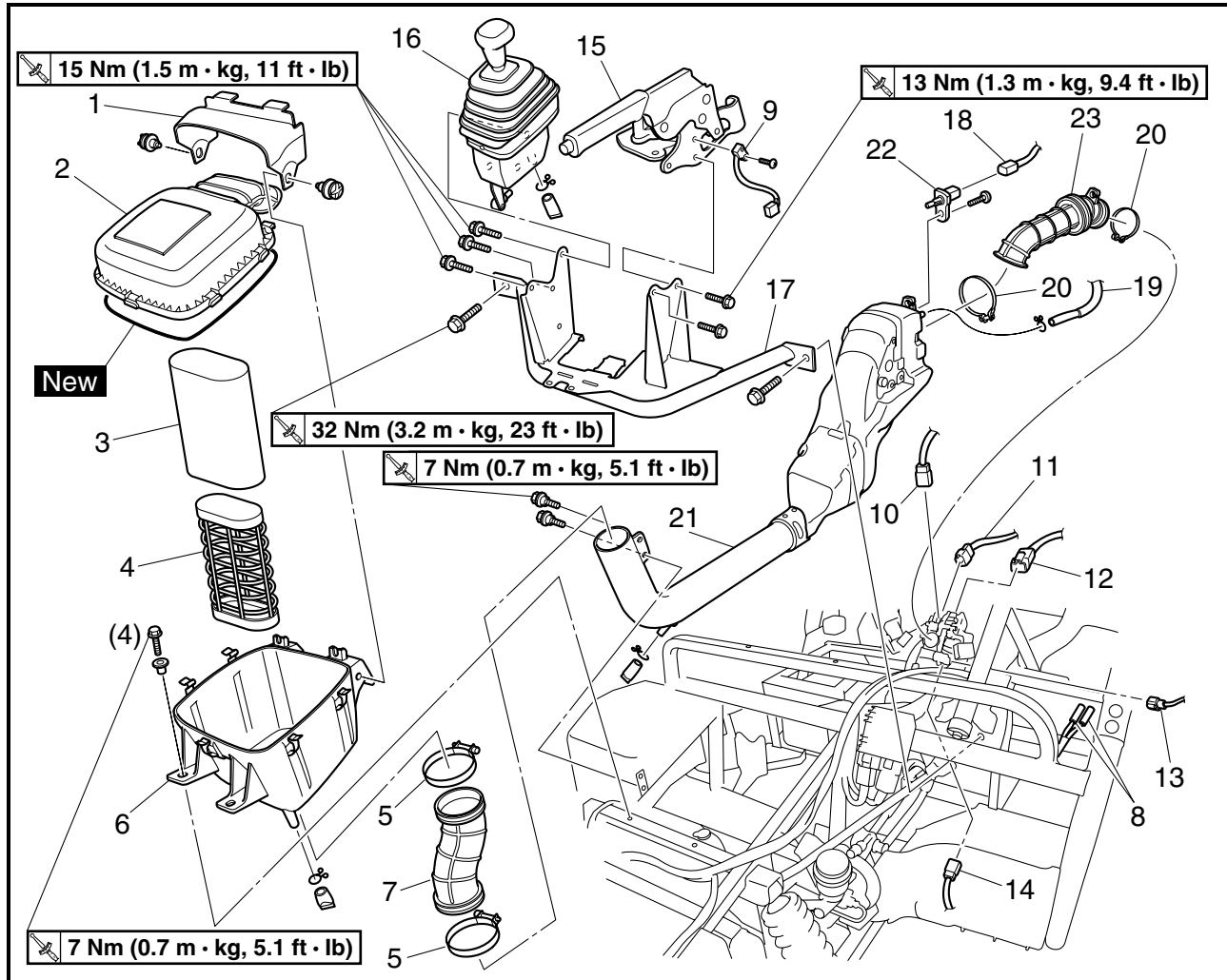
TIP:

Make sure that the air temperature sensor terminals do not get wet.

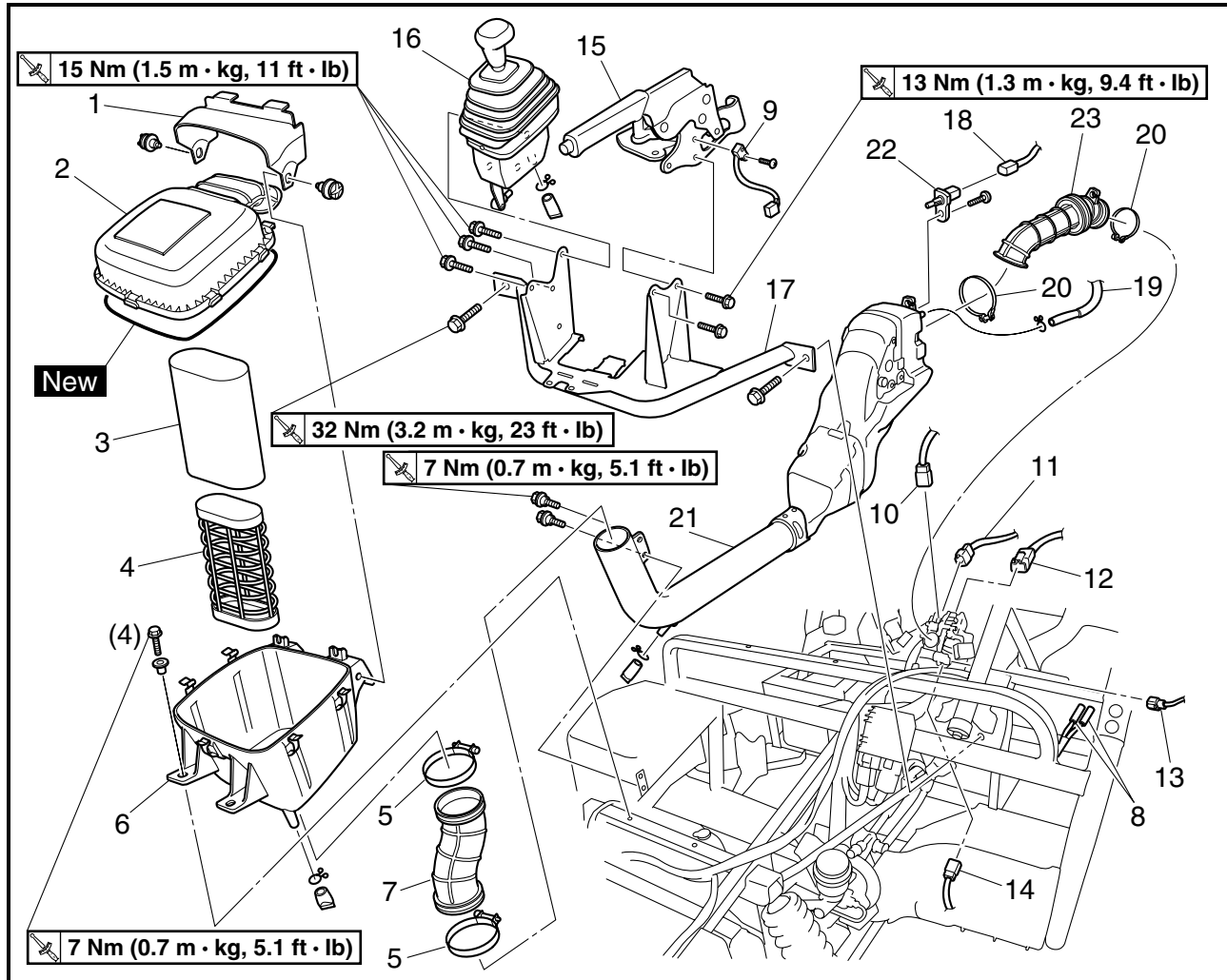
- c. Place a thermometer ⑤ in the water.
- d. Slowly heat the water, then let it cool down to the specified temperature.
- e. Measure the air temperature sensor resistance.



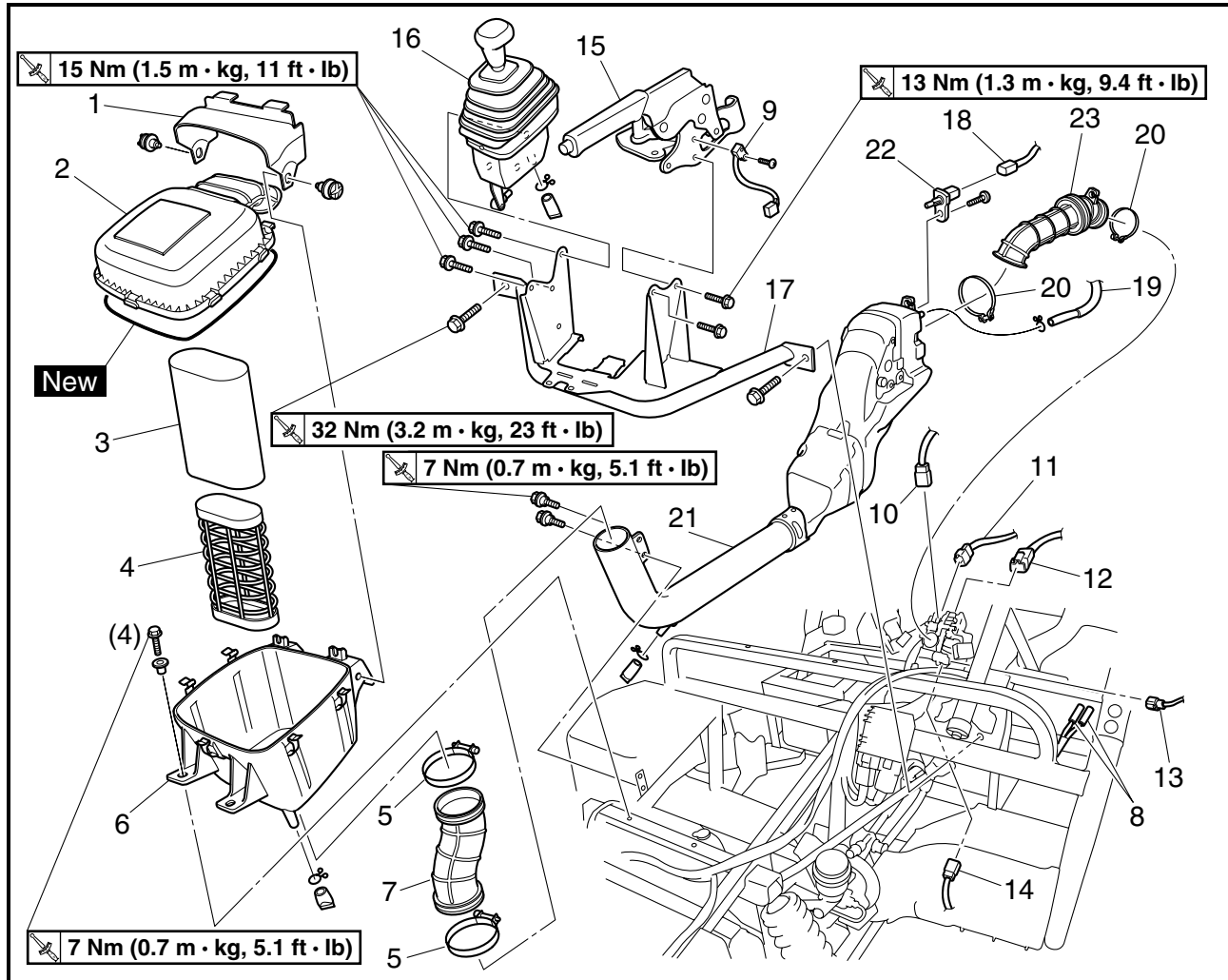
AIR FILTER CASE AND AIR INTAKE DUCT



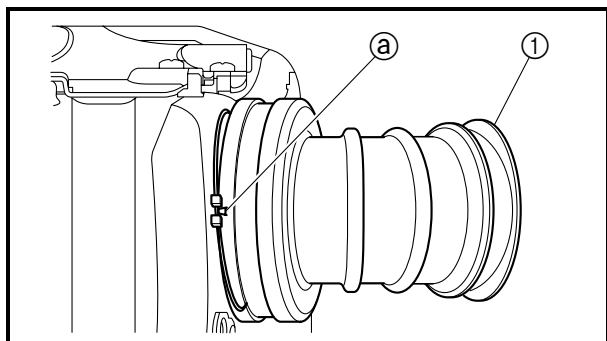
Order	Job/Part	Q'ty	Remarks
	Removing the air filter case and air intake duct		Remove the parts in the order listed.
	Seats/rear console		Refer to "SEATS, REAR CONSOLE AND INSTRUMENT PANELS" in chapter 8.
	Side panels/corner panels/front console		Refer to "PANELS AND FRONT CONSOLE" in chapter 8.
1	Air intake duct shroud	1	Refer to "INSTALLING THE AIR INTAKE DUCT AND AIR FILTER CASE".
2	Air filter case cover	1	
3	Air filter element	1	
4	Air filter element frame	1	
5	Air filter joint clamp	2	
6	Air filter case	1	Disconnect.
7	Air filter joint	1	
8	Ignition coil connector	2	



Order	Job/Part	Q'ty	Remarks
9	Parking brake switch	1	
10	Fuel injector coupler	1	Disconnect.
11	Throttle position sensor coupler	1	Disconnect.
12	Intake air pressure sensor coupler	1	Disconnect.
13	ISC (idle speed control) unit coupler	1	Disconnect.
14	Coolant temperature sensor coupler	1	Disconnect.
15	Parking brake lever	1	
16	Shift lever	1	NOTICE The select lever shift rod locknut (select lever side) has left-handed threads. To loosen the locknut, turn it clockwise.
17	Seat support bracket	1	
18	Intake air temperature sensor coupler	1	Disconnect.
19	Cylinder head breather hose	1	Disconnect.



Order	Job/Part	Q'ty	Remarks
20	Air intake duct joint clamp	2	Refer to "INSTALLING THE AIR INTAKE DUCT AND AIR FILTER CASE".
21	Air intake duct	1	
22	Intake air temperature sensor	1	Refer to "INSTALLING THE AIR INTAKE DUCT AND AIR FILTER CASE". For installation, reverse the removal procedure.
23	Air intake duct joint	1	



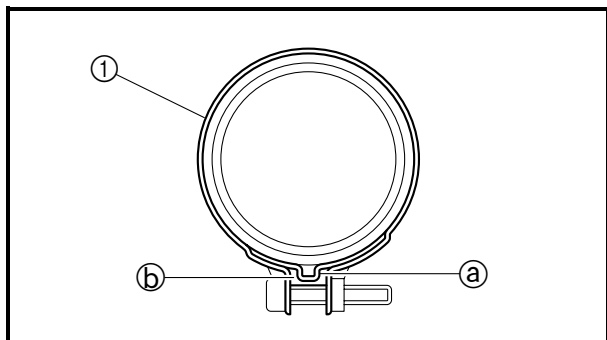
INSTALLING THE AIR INTAKE DUCT AND AIR FILTER CASE

1. Install:

- air intake duct joint ①

TIP:

Fit the projection ① on the air intake duct joint between the projections on the air intake duct.

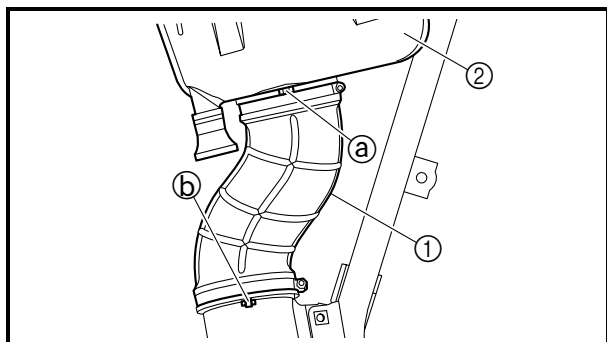


2. Install:

- air intake duct joint clamp ① (throttle body side)

TIP:

Align the projection ① on the air intake duct joint with the gap ② in the air intake duct joint clamp.



3. Install:

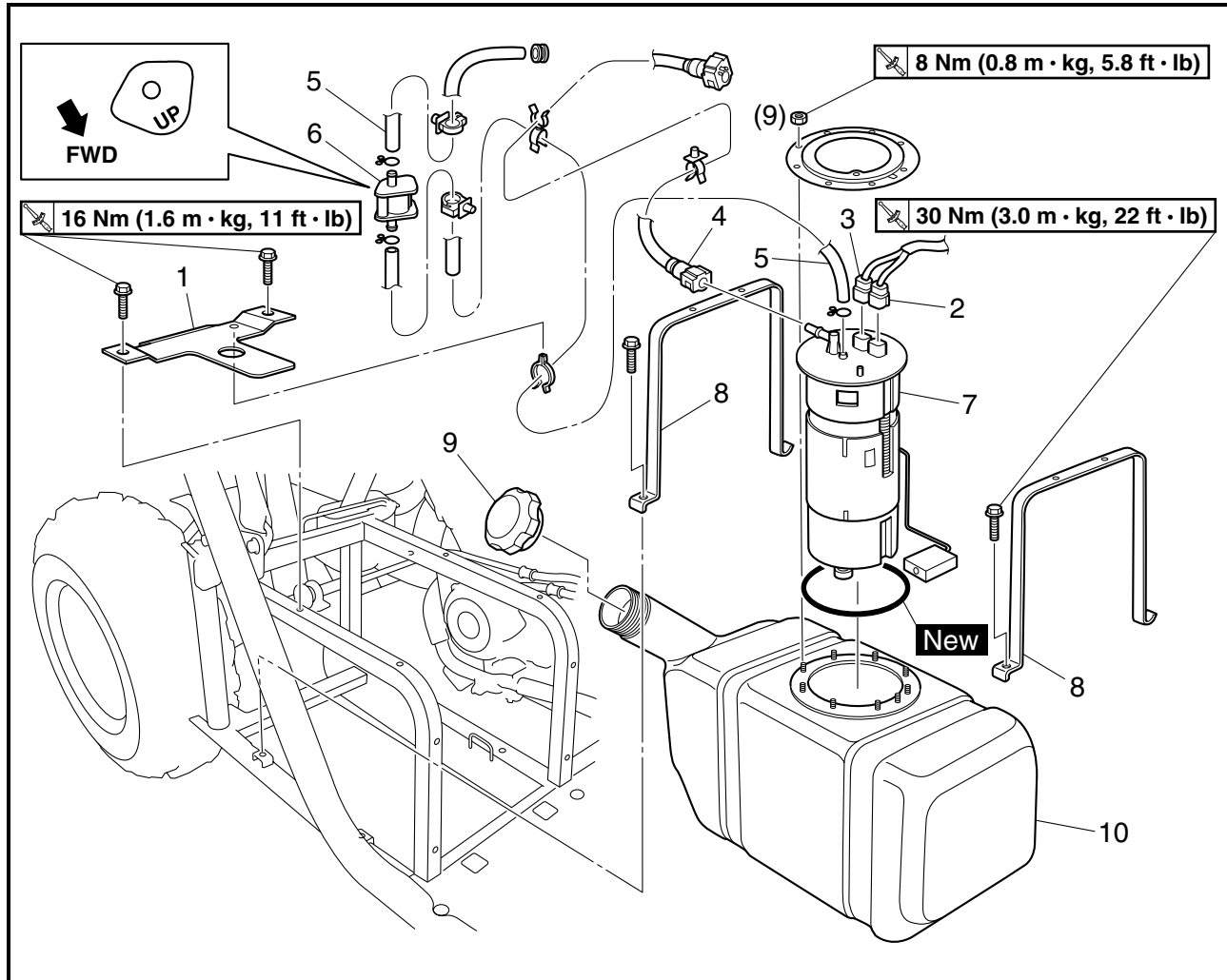
- air filter case joint ①
- air filter case ②

TIP:

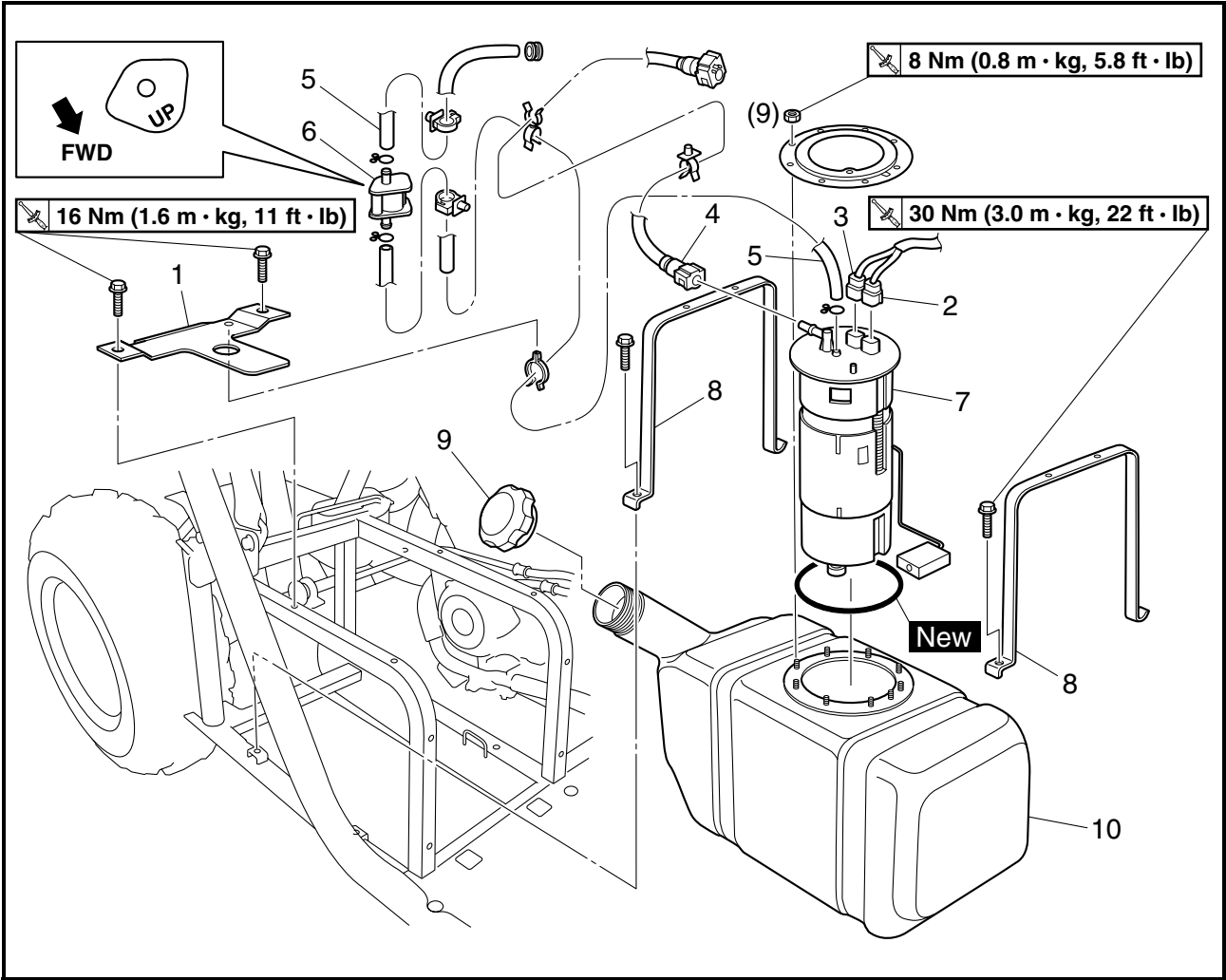
Fit the projections ① and ② on the air filter case joint between the projections on the air intake duct and air filter case.



FUEL PUMP AND FUEL TANK



Order	Job/Part	Q'ty	Remarks
	Removing the fuel pump and fuel tank		Remove the parts in the order listed.
	Seats/rear console		Refer to "SEATS, REAR CONSOLE AND INSTRUMENT PANELS" in chapter 8.
	Right side panel/right corner panel/ right protector/passenger seat support		Refer to "PANELS AND FRONT CON- SOLE" in chapter 8.
1	Damper plate	1	
2	Fuel sender coupler	1	Disconnect.
3	Fuel pump coupler	1	Disconnect.
4	Fuel hose	1	Refer to "REMOVING THE FUEL TANK" and "INSTALLING THE FUEL HOSE".
5	Fuel tank breather hose	2	
6	Rollover valve	1	
7	Fuel pump	1	Refer to "REMOVING THE FUEL PUMP" and "INSTALLING THE FUEL PUMP".



Order	Job/Part	Q'ty	Remarks
8	Fuel tank holder	2	For installation, reverse the removal procedure.
9	Fuel tank cap	1	
10	Fuel tank	1	

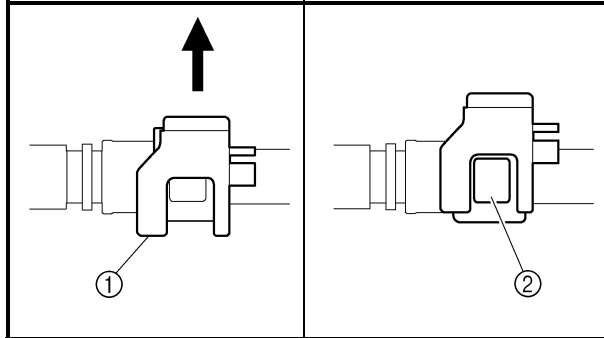


REMOVING THE FUEL TANK

1. Extract the fuel in the fuel tank through the fuel tank cap with a pump.
2. Remove:
 - fuel hose

NOTICE

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



TIP:

- To remove the fuel hose from the throttle body and the fuel tank, slide the fuel hose connector cover ① on the end of the hose in direction of the arrow shown, press the button ② on either side 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

REMOVING THE FUEL PUMP

1. Remove:
 - fuel pump bracket
 - fuel pump
 - fuel pump gasket

NOTICE

- 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

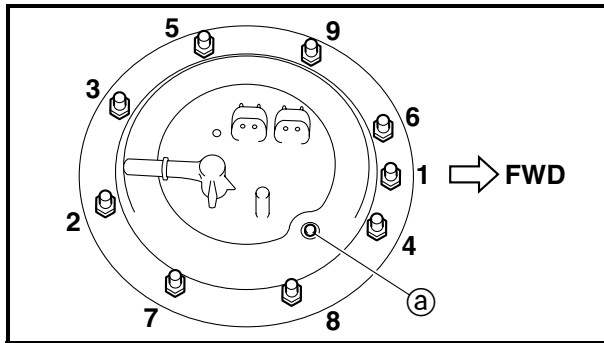
1. Check:

- 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

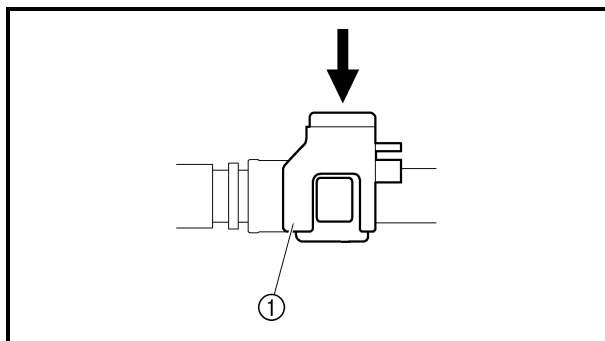
1. Install:

- fuel pump gasket **New**
- fuel pump
- fuel pump bracket

8 Nm (0.8 m · kg, 5.8 ft · lb)

TIP:

- 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 **a** on the fuel pump.
- Tighten the nuts to the specified torque in the proper tightening sequence as shown.



INSTALLING THE FUEL HOSE

1. Install:

- fuel hose
- fuel pump coupler

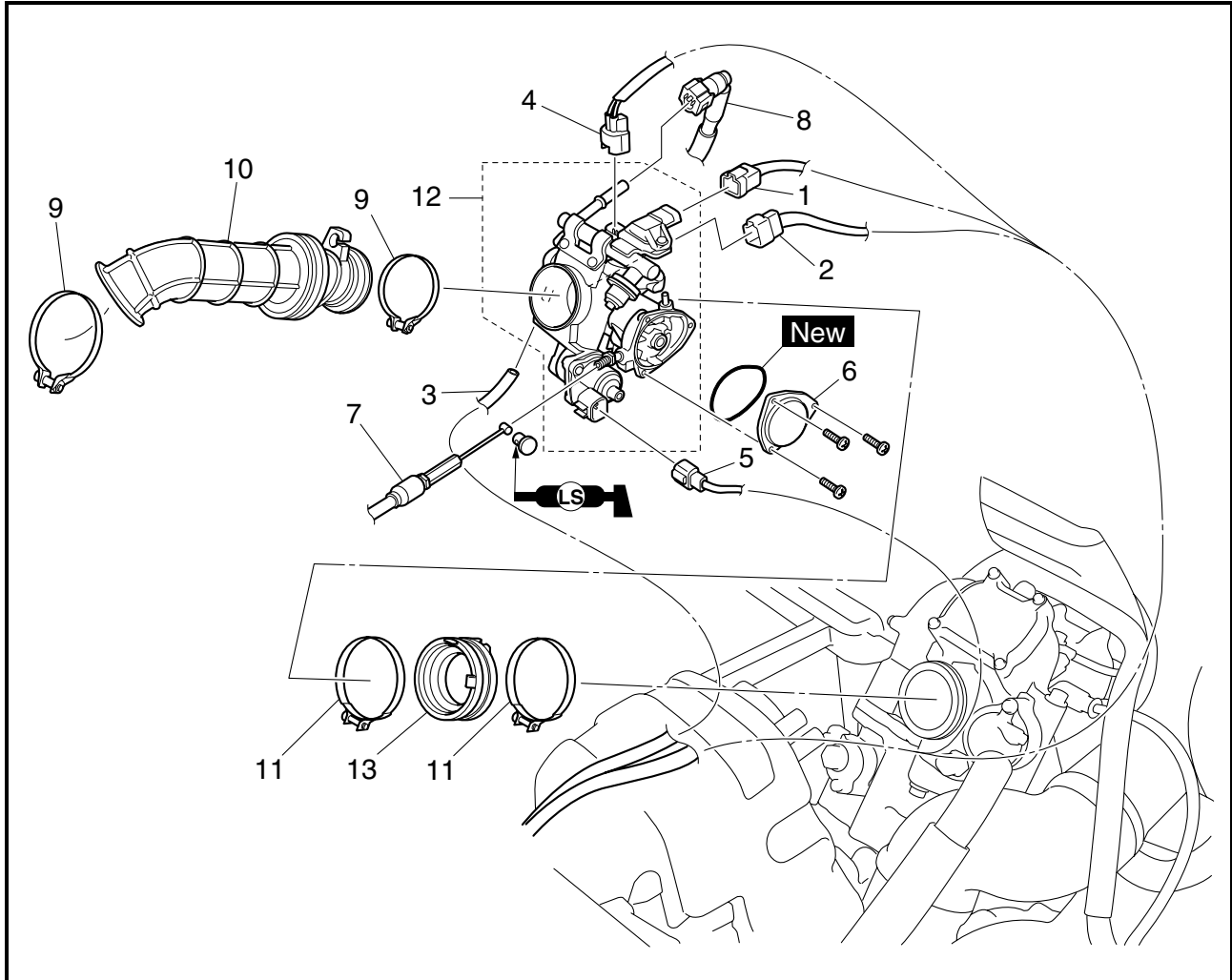
TIP:

To install the fuel hose onto the throttle body and the fuel tank, slide the fuel hose connector cover ① on the end of the hose in direction of the arrow shown.

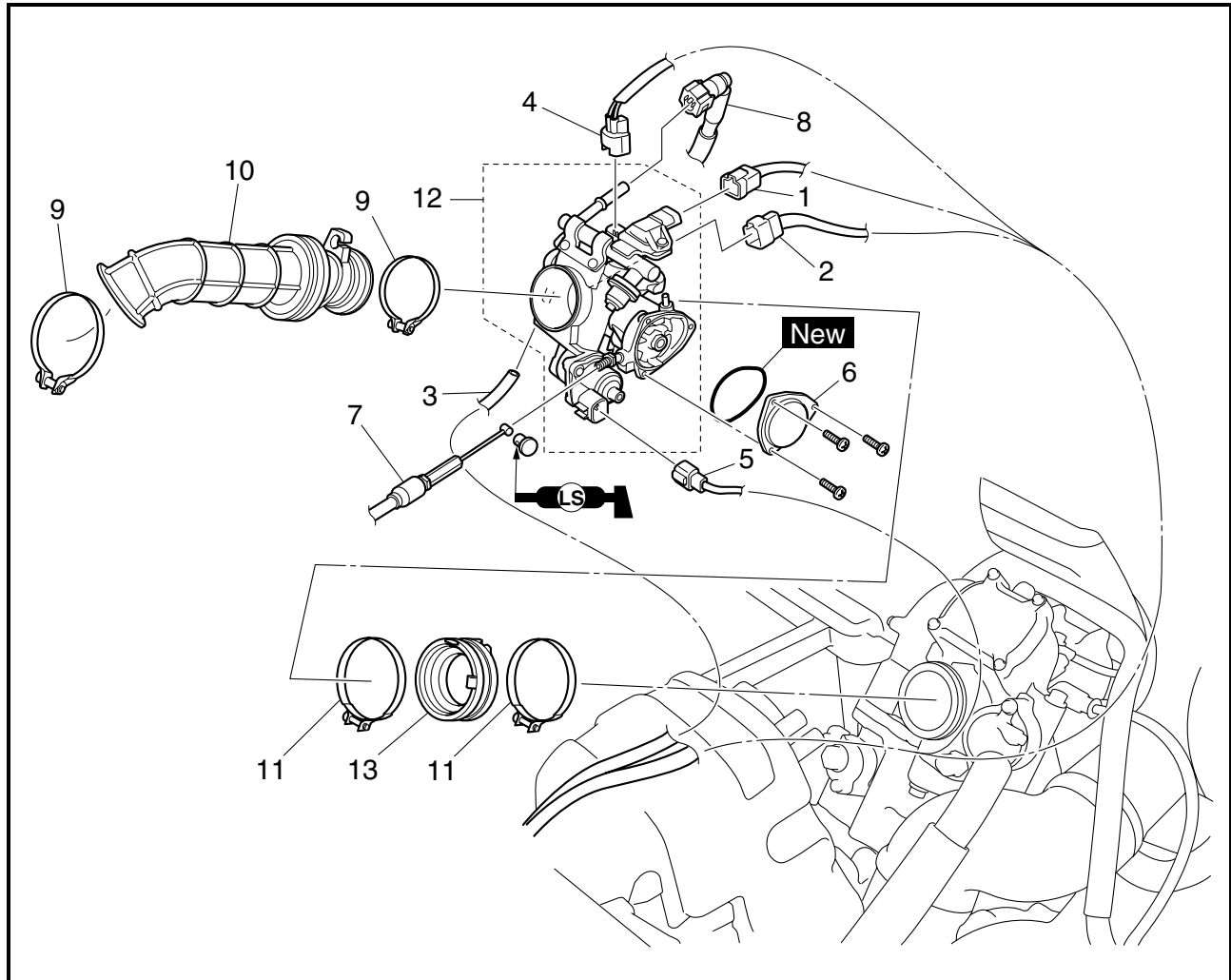


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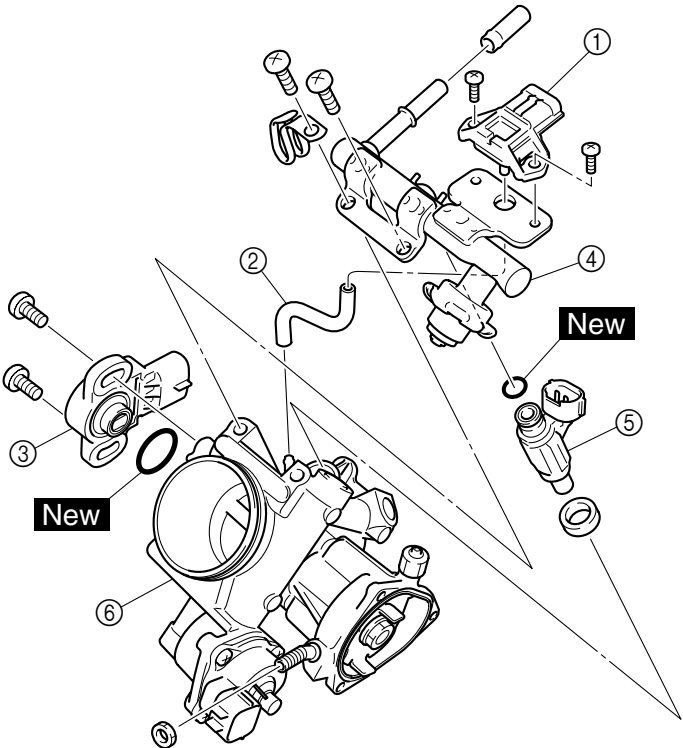
THROTTLE BODY



Order	Job/Part	Q'ty	Remarks
	Removing the throttle body Seats/rear console		Remove the parts in the order listed. Refer to "SEATS, REAR CONSOLE AND INSTRUMENT PANELS" in chapter 8.
1	Intake air pressure sensor coupler	1	Disconnect.
2	Throttle position sensor coupler	1	Disconnect.
3	Throttle body breather hose	1	
4	Fuel injector coupler	1	Disconnect.
5	ISC (idle speed control) unit coupler	1	Disconnect.
6	Throttle cable housing cover	1	
7	Throttle cable	1	Disconnect.



Order	Job/Part	Q'ty	Remarks
8	Fuel hose	1	Disconnect. Refer to "REMOVING THE THROTTLE BODY ASSEMBLY" and "INSTALLING THE THROTTLE BODY ASSEMBLY".
9	Air intake duct joint clamp	2	Refer to "INSTALLING THE THROTTLE BODY ASSEMBLY".
10	Air intake duct joint	1	
11	Throttle body joint clamp	2	
12	Throttle body assembly	1	
13	Throttle body joint	1	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	Throttle body	1	
			NOTICE _____ The throttle body should not be disassembled. _____ For assembly, reverse the disassembly procedure.

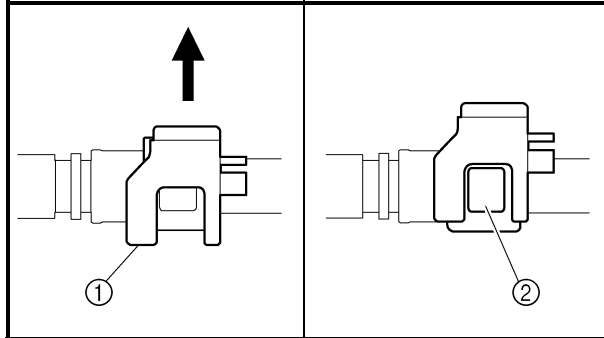


REMOVING THE THROTTLE BODY ASSEMBLY

1. Disconnect:
 - fuel hose

NOTICE

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



TIP:

- To disconnect the fuel hose from the throttle body, slide the fuel hose connector cover ① on the end of the hose in direction of the arrow shown, press the button ② on either side 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.

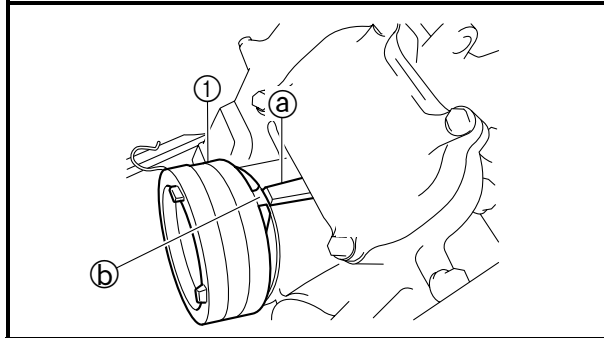
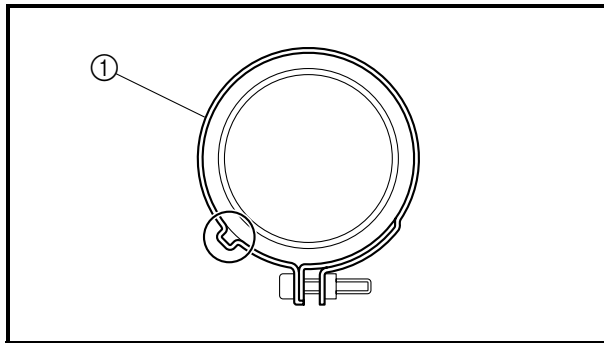
EAS00913

CHECKING THE THROTTLE BODY

1. Check:
 - throttle body
 Cracks/damage → Replace the throttle body.
2. Check:
 - fuel passages
 Obstructions → Clean.



- 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.



INSTALLING THE THROTTLE BODY ASSEMBLY

1. Install:
 - throttle body joint ①

TIP:

Align the projection ① on the cylinder head with the slot ② in the throttle body joint.

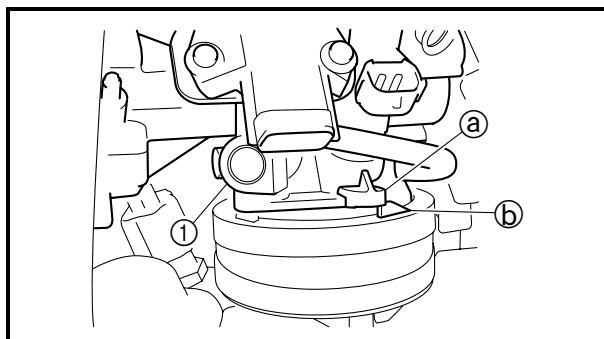
2. Install:
- throttle body joint clamps ①

TIP:

Align the projections on the throttle body joint with the gap in each throttle body joint clamp.

3. Install:
 - air intake duct joint
 - air intake duct joint clamp (throttle body side)

Refer to "AIR FILTER CASE AND AIR INTAKE DUCT".



4. Install:
- throttle body assembly ①

TIP:

Align the projection **(a)** on the throttle body assembly with the tab **(b)** on the throttle body joint.



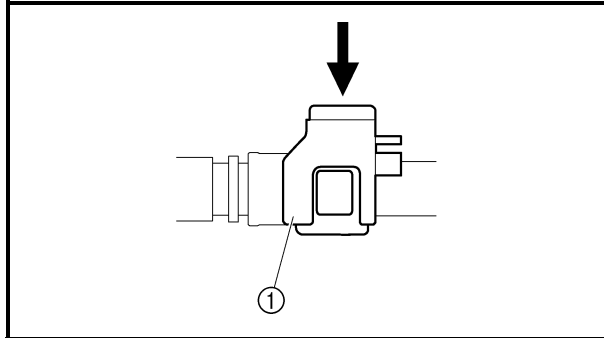
5. Connect:
 - fuel hose

NOTICE

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

TIP:

To connect the fuel hose onto the throttle body, slide the fuel hose connector cover ① on the end of the hose in direction of the arrow shown.



6. Install:
 - throttle cable
7. Check:
 - throttle position sensor
Refer to “CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR”.
8. Adjust:
 - throttle pedal free play
Refer to “ADJUSTING THE THROTTLE CABLE” in chapter 3.



EAS00915

CHECKING THE FUEL PUMP AND PRESSURE REGULATOR OPERATION

1. Check:

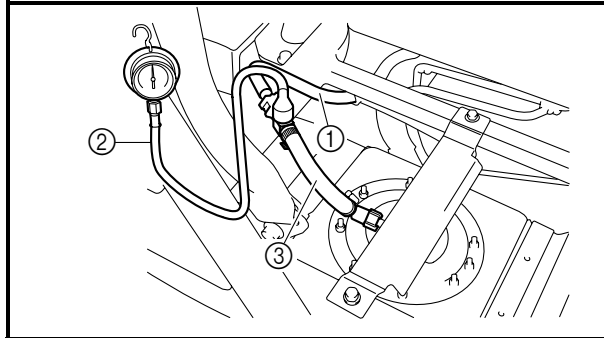
- pressure regulator operation



a. Remove the seat.

Refer to "SEATS, REAR CONSOLE AND INSTRUMENT PANELS" in chapter 8.

b. Disconnect the fuel hose ① from the fuel pump.



TIP:

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

c. Connect the pressure gauge ② and adapter ③ to the fuel pump and fuel hose.



Pressure gauge
90890-03153, YU-03153
Fuel pressure adapter
90890-03176, YM-03176

d. Start the engine.

e. Measure the fuel pressure.



Fuel pressure
324 kPa (3.24 kg/cm², 46.1 psi)

Out of specification → Replace the fuel pump.



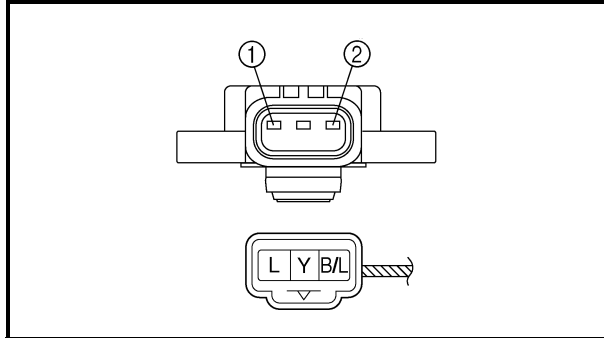


EAS00916

CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR

1. Check:

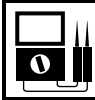
- throttle position sensor



- Disconnect the throttle position sensor coupler from the throttle position sensor.
- Remove the throttle position sensor from the throttle body.
- Connect the pocket tester ($\Omega \times 1k$) to the terminals of the throttle position sensor.

Positive tester probe → blue ①
Negative tester probe → black/blue ②

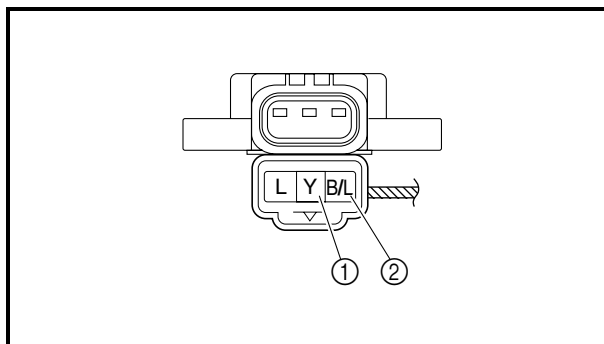
- Measure the maximum throttle position sensor resistance.
 Out of specification → Replace the throttle position sensor.



Maximum throttle position sensor resistance
 3.08 ~ 5.72 k Ω
 (blue-black/blue)

2. Adjust:

- throttle position sensor angle

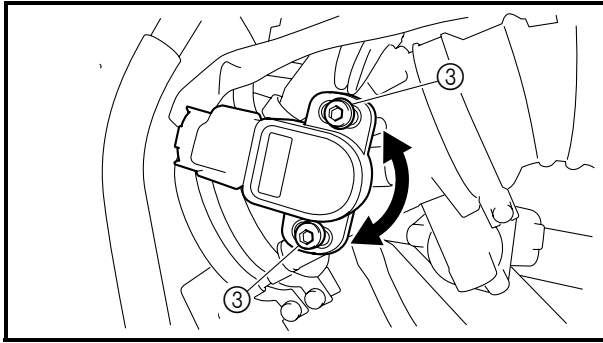


- Connect the throttle position sensor coupler to the throttle position sensor.
- Connect the digital circuit tester to the throttle position sensor coupler.

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
0.68 V (yellow-black/blue)**

- e. After adjusting the throttle position sensor angle, tighten the throttle position sensor screws ③.



The following conditions may indicate damaged shaft drive components:

Symptoms	Possible Causes
<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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.

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.

CHECKING NOISES

1. Investigate any unusual noises.

[illegible]

- (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.

NOTICE

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.

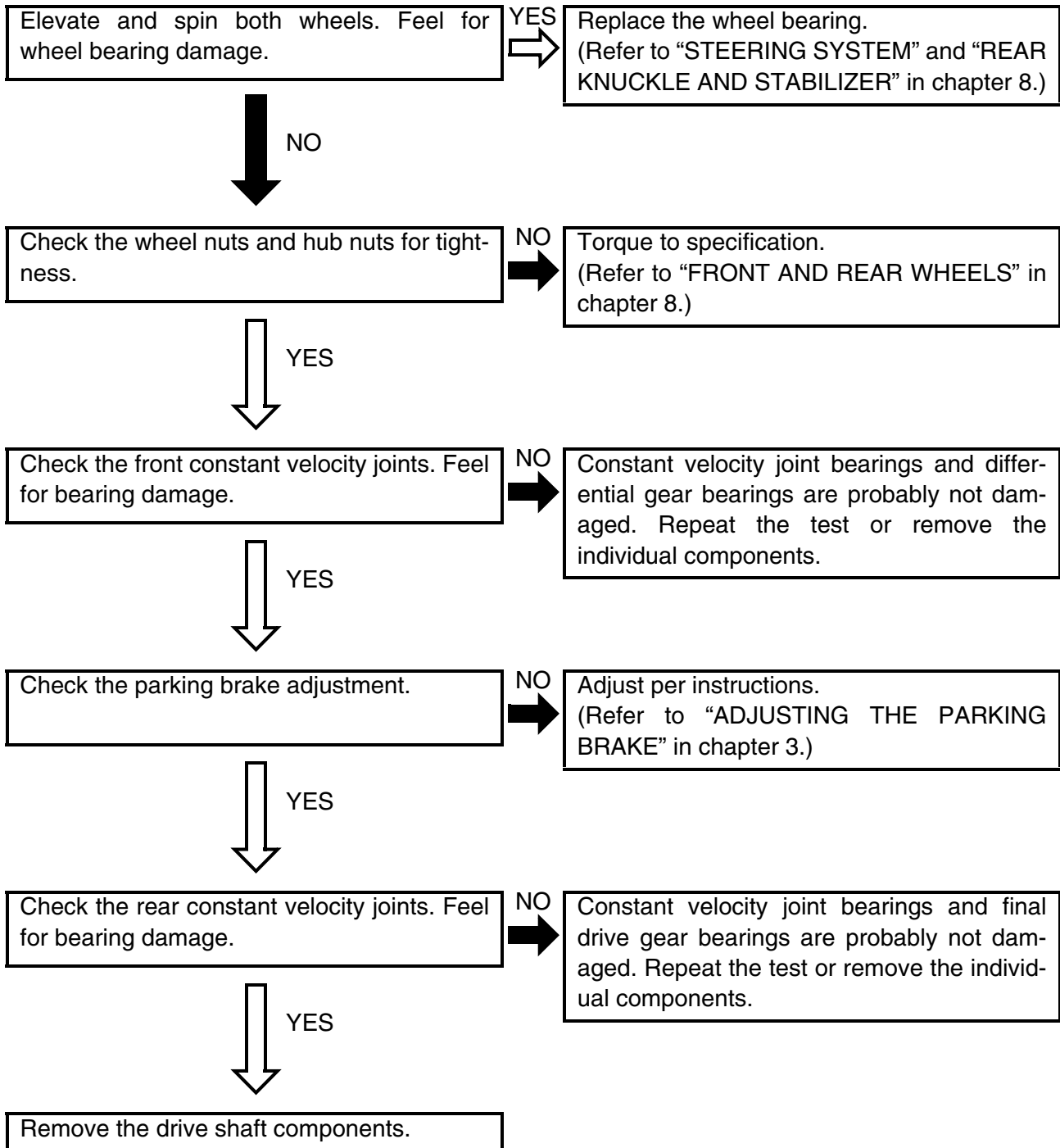
Diagnosis: Possible broken gear teeth.



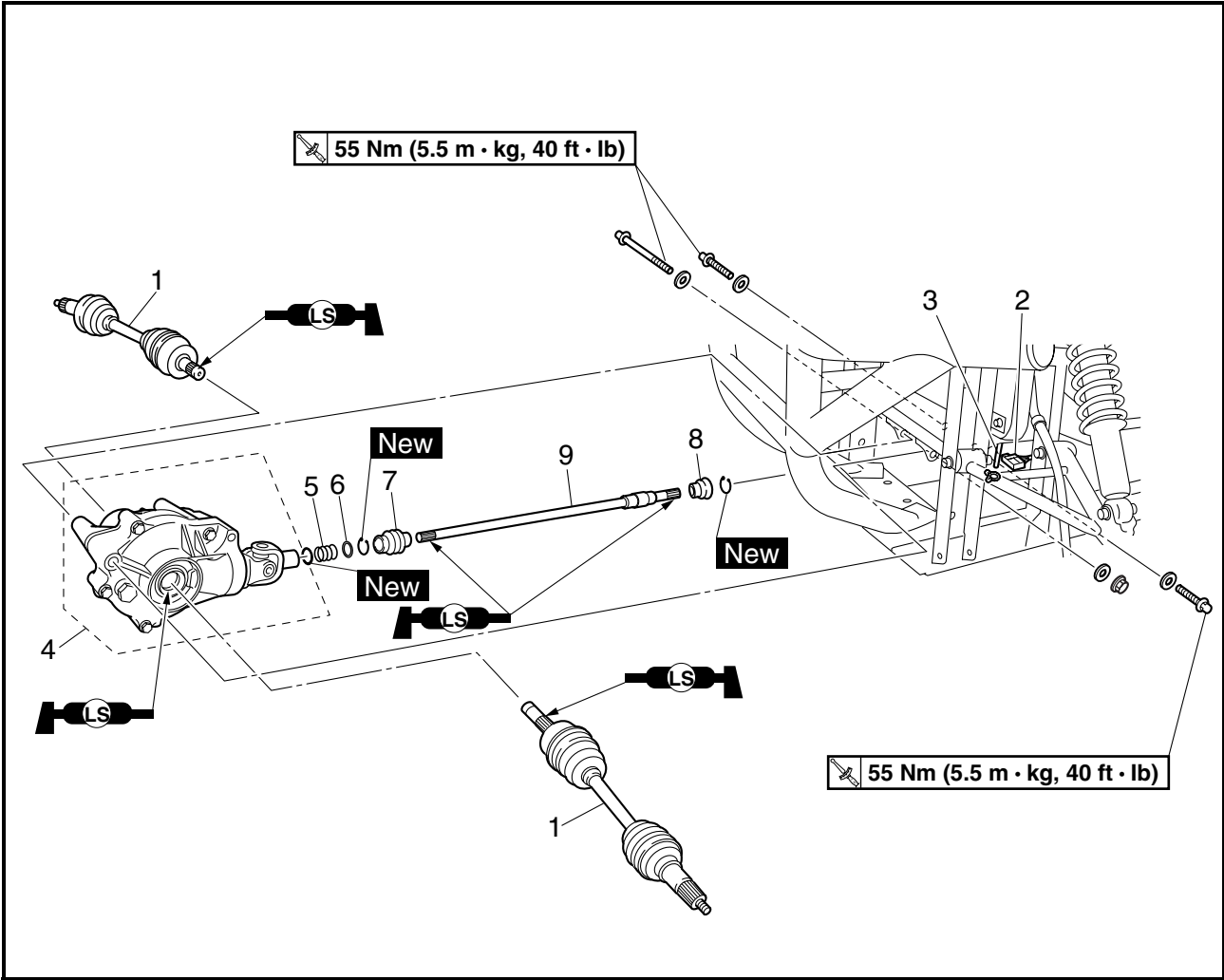
EBS00157

TROUBLESHOOTING CHART

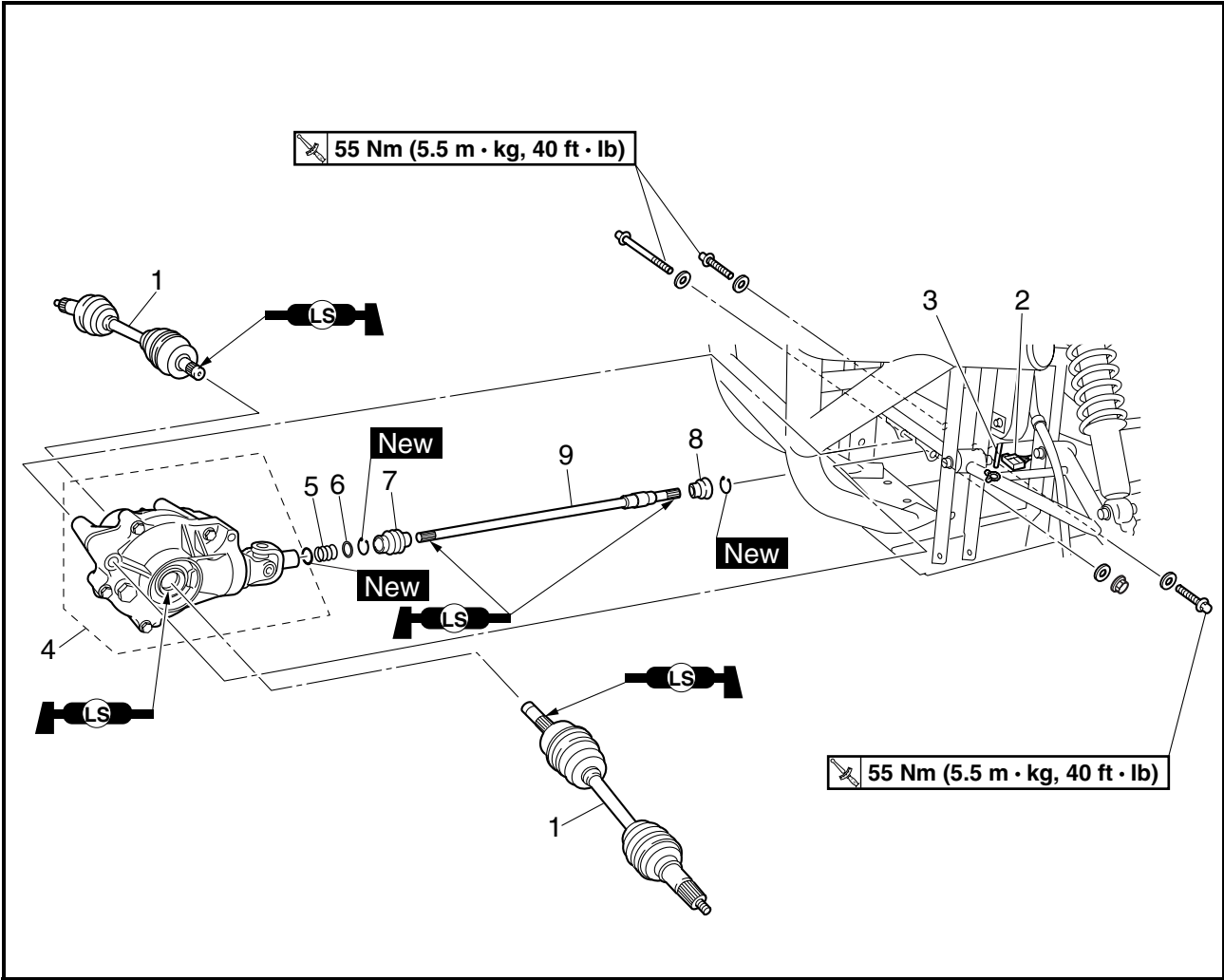
When basic conditions “(a)” and “(b)” exist, check the following points:



FRONT CONSTANT VELOCITY JOINTS, DIFFERENTIAL
GEAR AND DRIVE SHAFT

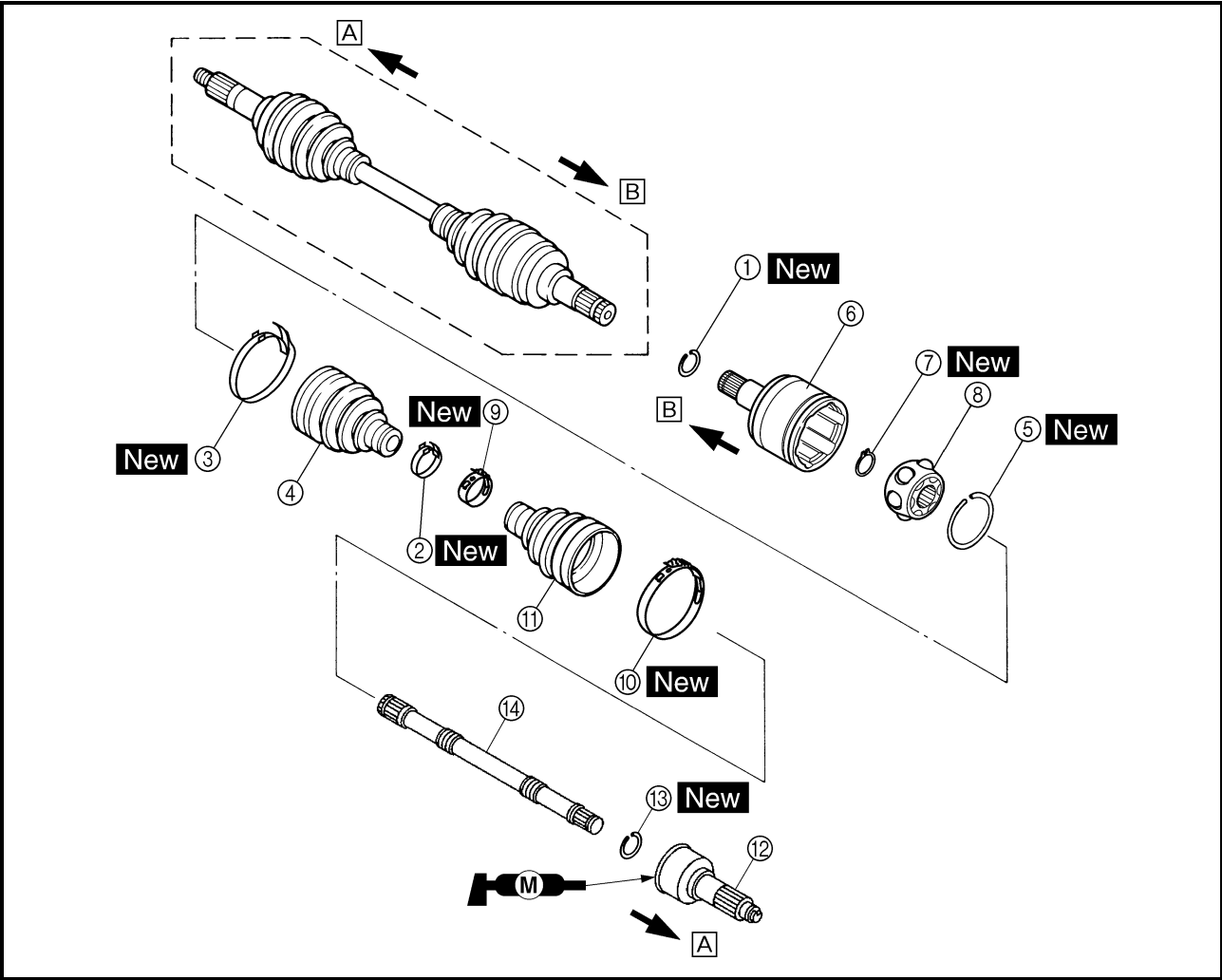


Order	Job/Part	Q'ty	Remarks
	Removing the front constant velocity joints, differential gear and drive shaft		Remove the parts in the order listed.
	Front skid plate		Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.
	Differential gear oil		Drain.
	Steering knuckle		Refer to "STEERING SYSTEM" in chapter 8.
	Front lower arms		Refer to "FRONT ARMS AND FRONT SHOCK ABSORBERS" in chapter 8.
1	Front constant velocity joint	2	
2	Differential gear motor coupler	1	Disconnect.
3	Differential gear case breather hose	1	Disconnect.

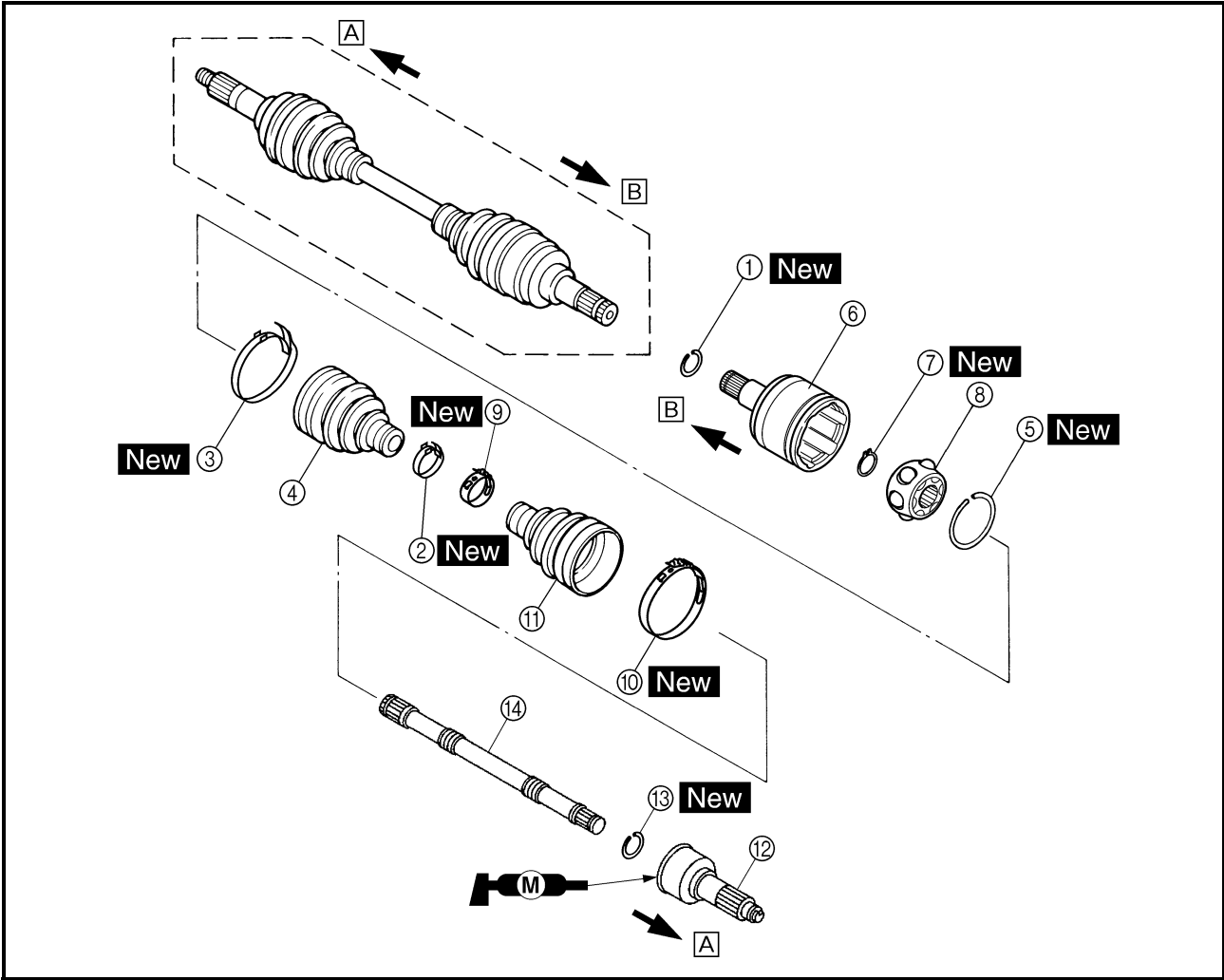


Order	Job/Part	Q'ty	Remarks
4	Differential gear case assembly	1	For installation, reverse the removal procedure.
5	Compression spring	1	
6	Washer	1	
7	Dust seal	1	
8	Dust seal	1	
9	Drive shaft	1	

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	Refer to "DISASSEMBLING THE FRONT CONSTANT VELOCITY JOINTS" and "ASSEMBLING THE FRONT CONSTANT VELOCITY JOINTS".
②	Boot band	1	
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	Boot band	1	
⑪	Dust boot	1	
⑫	Off-set joint	1	



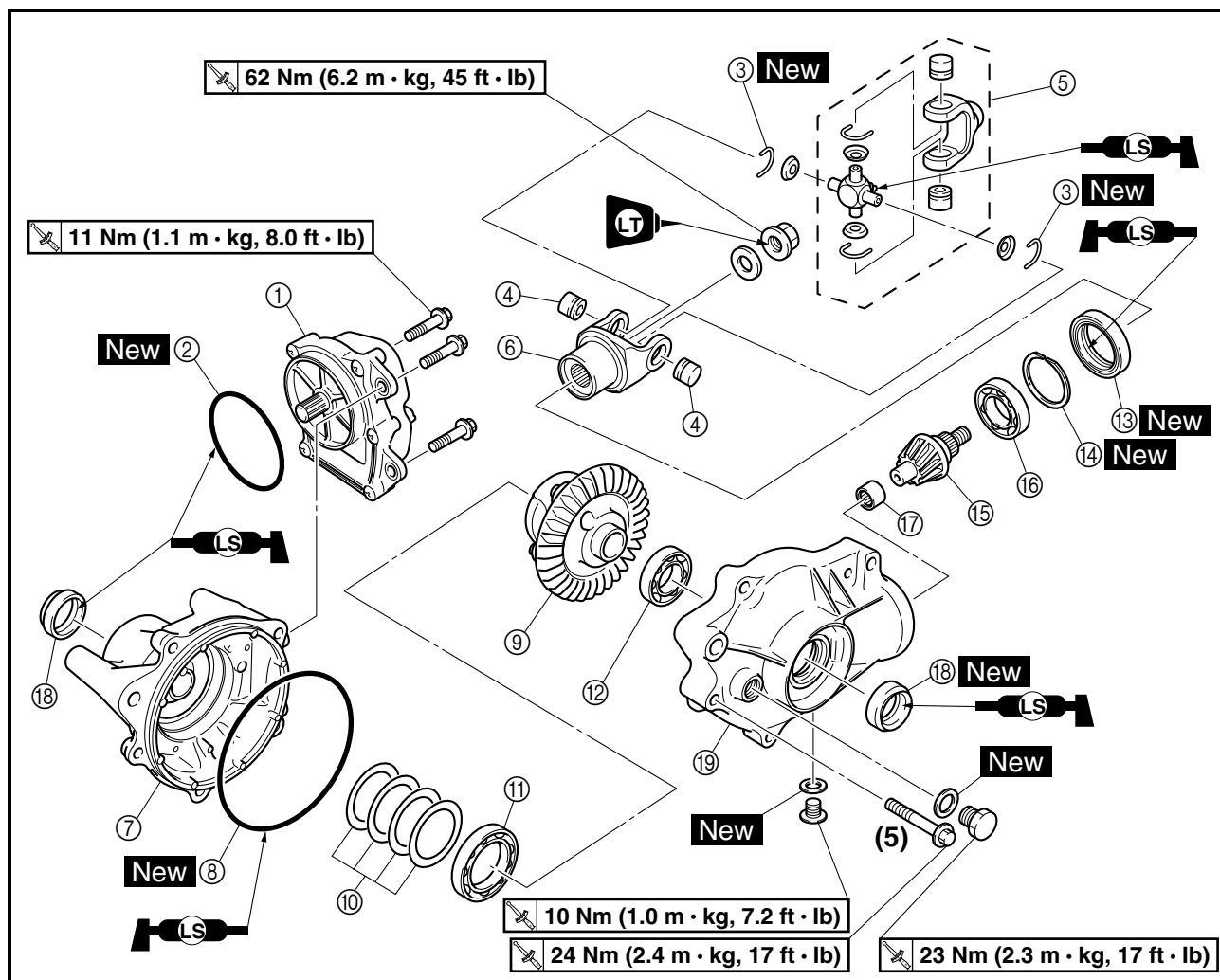
Order	Job/Part	Q'ty	Remarks
⑬	Clip	1	Refer to "DISASSEMBLING THE FRONT CONSTANT VELOCITY JOINTS" and "ASSEMBLING THE FRONT CONSTANT VELOCITY JOINTS". For assembly, reverse the disassembly procedure.
⑭	Joint shaft	1	

A Wheel side
B Gear case side

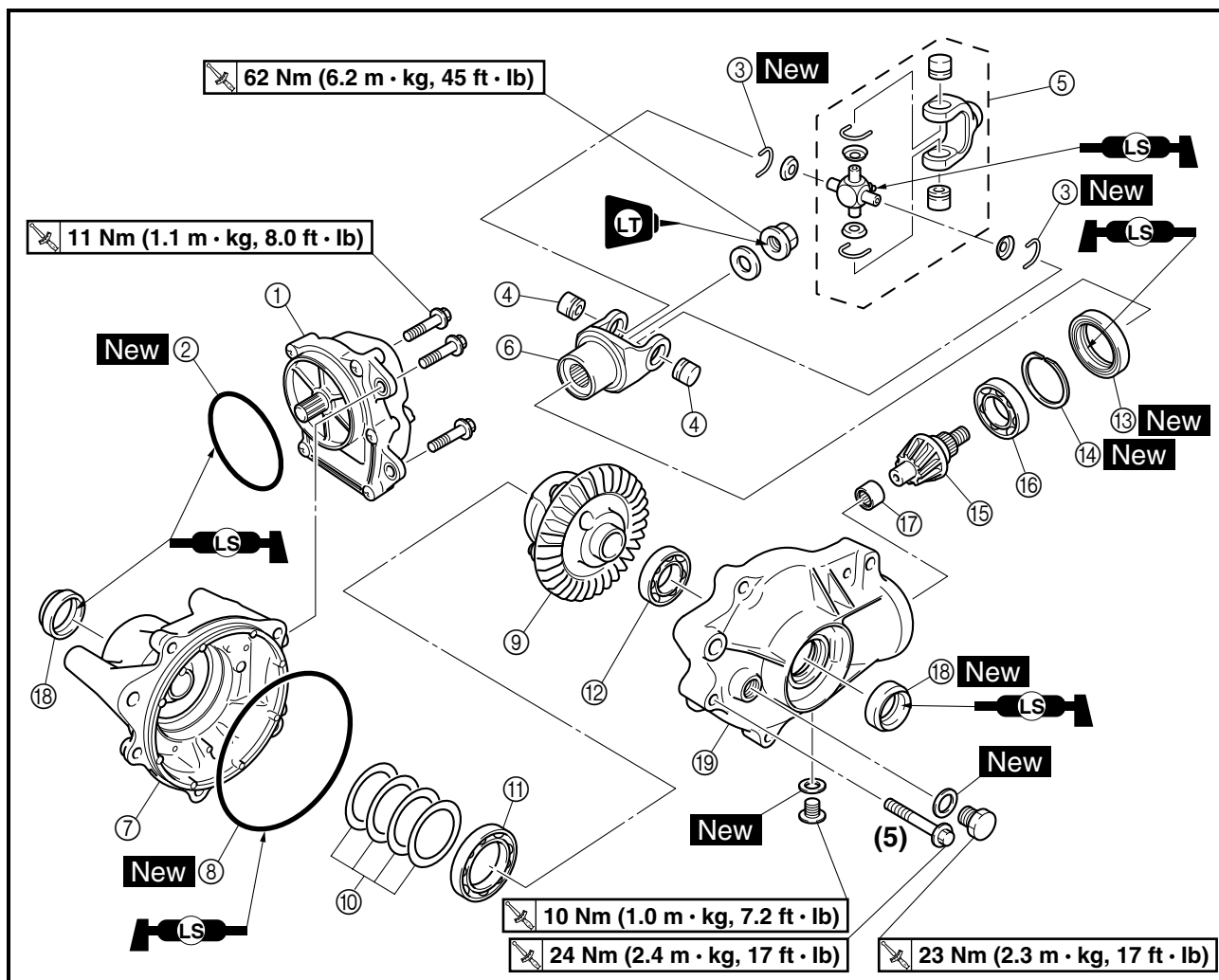
FRONT CONSTANT VELOCITY JOINTS, DIFFERENTIAL GEAR AND DRIVE SHAFT



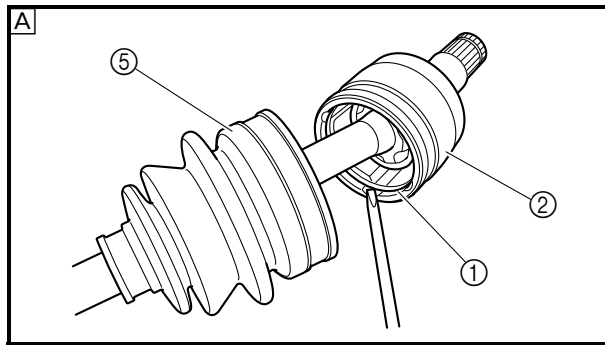
EBS00160



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	Refer to "DISASSEMBLING THE UNIVERSAL JOINT" and "ASSEMBLING THE UNIVERSAL JOINT".
③	Circlip	2	
④	Bearing	2	
⑤	Universal joint	1	
⑥	Universal joint yoke	1	
⑦	Differential gear case cover	1	
⑧	O-ring	1	
⑨	Differential gear assembly	1	
⑩	Differential drive pinion gear shim	*	
⑪	Bearing	1	
⑫	Bearing	1	



Order	Job/Part	Q'ty	Remarks
⑬	Oil seal	1	
⑭	Clip	1	
⑮	Differential drive pinion gear	1	
⑯	Bearing	1	
⑰	Bearing	1	
⑱	Oil seal	2	
⑲	Differential gear case	1	For assembly, reverse the disassembly procedure.



DISASSEMBLING THE FRONT CONSTANT VELOCITY JOINTS

A Gear case side

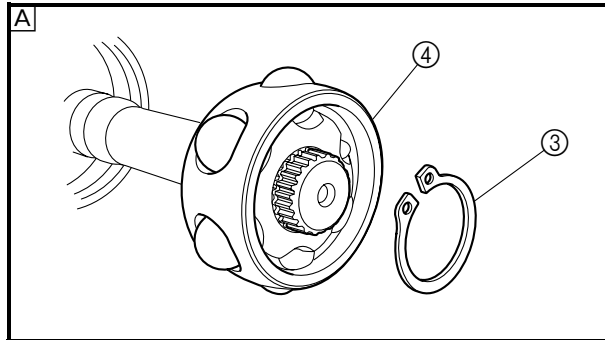
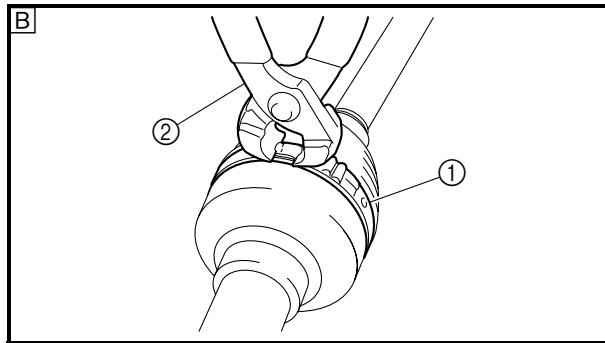
B Wheel side

1. Remove:

- clip ①
- double off-set joint ②
- circlip ③
- ball bearing ④
- dust boot ⑤

TIP:

Before removing the clip ①, slide the dust boot away from the double off-set joint.



2. Remove:

- boot band ①

Use a boot band installing tool ②.



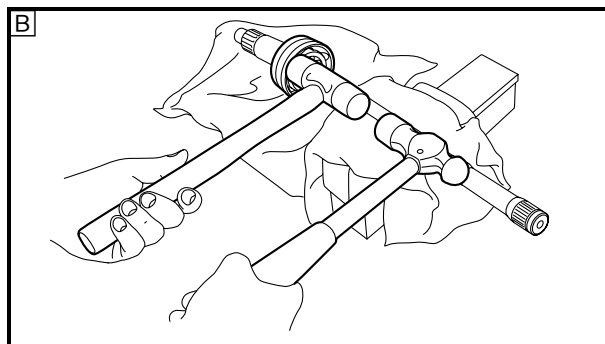
Boot band installing tool
90890-01526, YM-01526

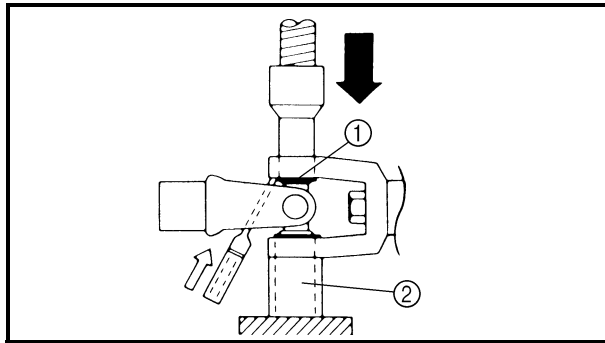
3. Remove:

- off-set joint
- clip
- dust boot

TIP:

Secure the joint shaft in a vise, and then remove the off-set joint using hammers.





DISASSEMBLING THE UNIVERSAL JOINT

1. Remove:

- universal joint

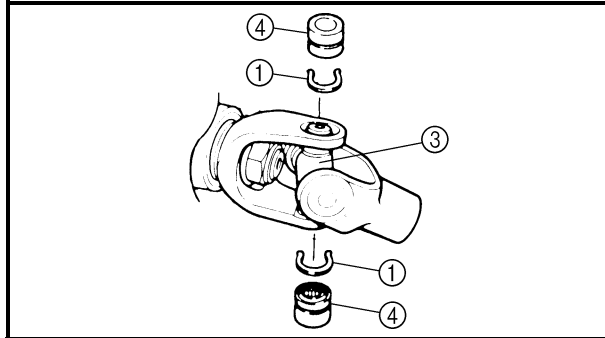


- Remove the circlips ①.
- Place the universal joint in a press.
- With a suitable diameter pipe ② beneath the yoke ③, press the bearing ④ into the pipe as shown.

TIP:

It may be necessary to lightly tap the yoke with a punch.

- Repeat the steps for the opposite bearing.
- Remove the yoke.



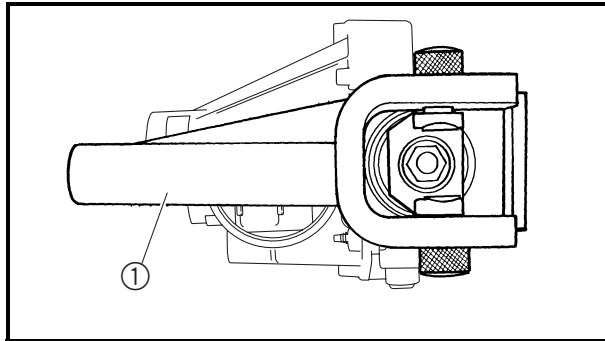
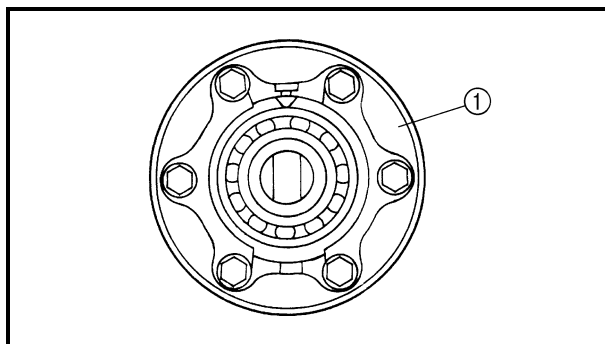
2. Remove:

- universal joint yoke

Use a universal joint holder ①.



Universal joint holder
90890-04062, YM-04062



EBS00163

REMOVING THE DIFFERENTIAL GEAR ASSEMBLY

1. Remove:

- differential gear assembly ①

TIP:

The ring gear and the differential gear should be fastened together. Do not disassemble the differential gear assembly.

NOTICE

The differential gear assembly is 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 splineWear/damage → Replace.
2. Check:
 - dust bootsCracks/damage → Replace.

NOTICE

Always use a new boot band.

3. Check:
 - balls and ball races
 - inner surface of double off-set jointPitting/wear/damage → Replace.

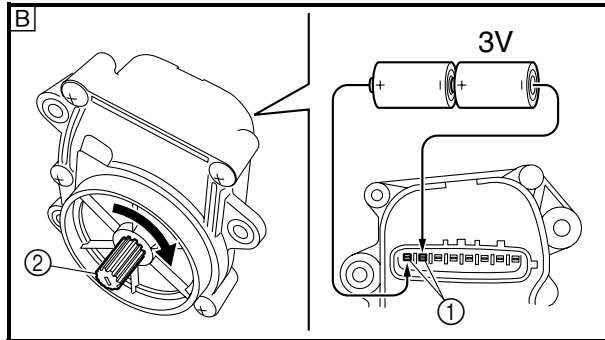
EBS00166

CHECKING THE DIFFERENTIAL GEARS

1. Check:
 - gear teethPitting/galling/wear → Replace.
- bearing
- oil seal
- O-ring
- Damage → Replace.
2. Check:
 - drive shaft splines
 - differential drive pinion gear splinesWear/damage → Replace.
- spring
- Fatigue → Replace.
- Move the spring up and down.
3. Check:
 - drive shaftBends → Replace.

WARNING

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



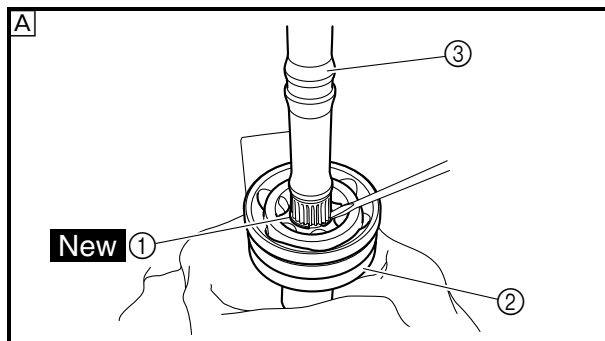
1. Check:
 - differential gear motor

- a. Connect two C size batteries to the gear motor terminals ① (as shown in illustration).

- 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 counter-clockwise.
- B** Check that the pinion gear ② turns clockwise.

Be sure not to disassemble the gear motor and remove the pinion gear.

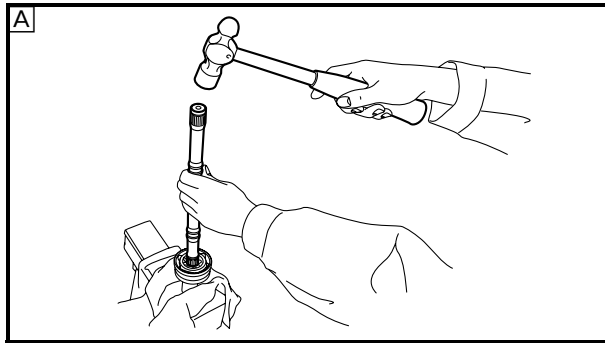


ASSEMBLING THE FRONT CONSTANT VELOCITY JOINTS

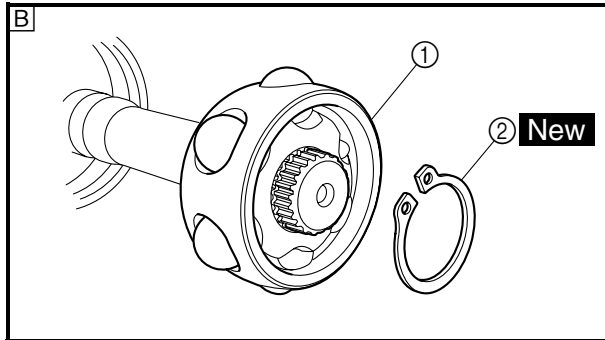
- ☐ A Wheel side
- ☐ B Gear case side

1. Install:
 - dust boot
 - clip ① **New**
 - off-set joint ②
 - joint shaft ③

- Install the clip ①.
- Install the off-set joint ②.

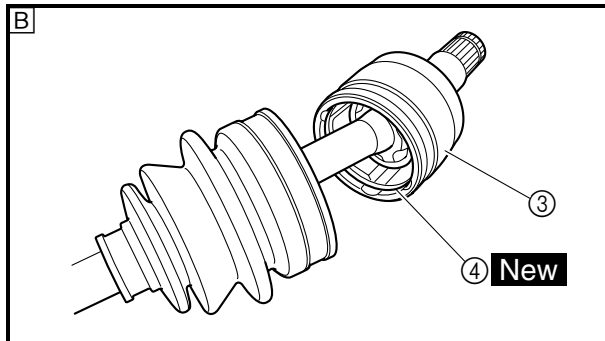


- TIP:** _____
- Install the clip ① into the groove in the joint shaft as shown.
 - Secure the off-set joint in a vise, and then fit the joint shaft into the off-set joint using a hammer.



2. Install:
- dust boot
 - ball bearing ①
 - circlip ② **New**
 - double off-set joint ③
 - clip ④ **New**

- TIP:** _____
- Securely install the circlip into the groove in the joint shaft.
 - Securely install the clip into the groove in the double off-set joint.



3. Apply:
- molybdenum disulfide grease
(into the ball joint assembly)

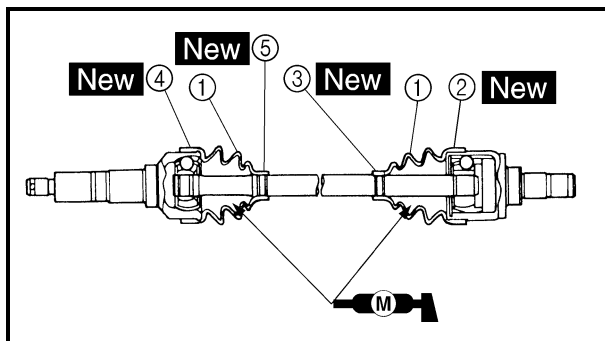
TIP: _____

Molybdenum disulfide grease is included in the repair kit.

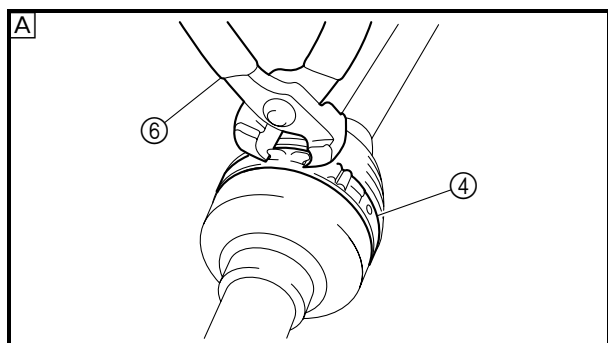
4. Install:
- dust boots ①
 - boot bands ②, ③, ④, ⑤ **New**



- a. Apply molybdenum disulfide grease into the dust boots.



Molybdenum disulfide grease
60 g (2.1 oz) per dust boot (front wheel side)
45 g (1.6 oz) per dust boot (differential gear case side)



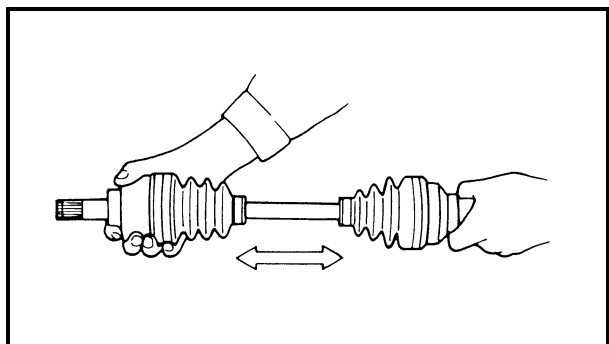
- b. Install the dust boots ①.
- c. Install the dust boot bands ④, ⑤.
Use a boot band installing tool ⑥.



Boot band installing tool
90890-01526, YM-01526

TIP:

- The new boot bands may differ from the original ones.
- The dust boots should be fastened with the boot bands ③ and ⑤ at the grooves in the joint shaft.

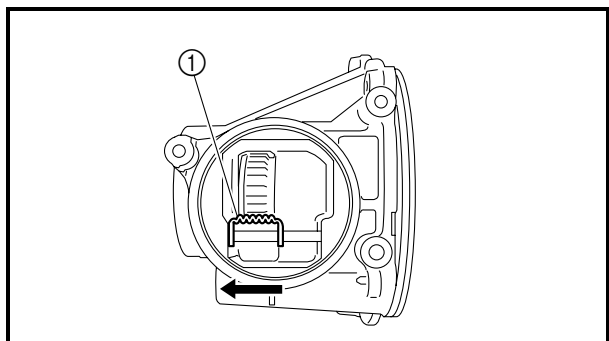


5. Check:
 - thrust movement free play
Excessive play → Replace the joint assembly.

EBS01009

ASSEMBLING THE DIFFERENTIAL GEARS

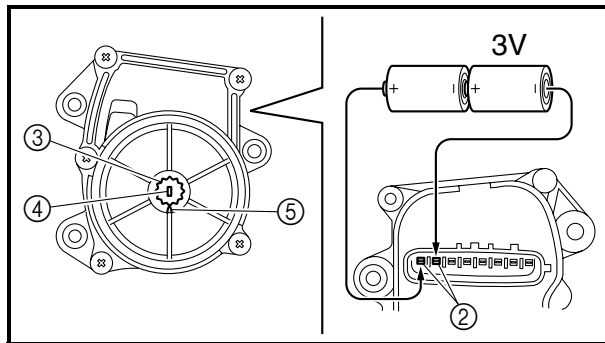
1. Measure:
 - gear lash
Refer to "MEASURING THE DIFFERENTIAL GEAR LASH".



2. Install:
 - differential gear motor



- 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.

NOTICE

Do not use a 12 V battery to operate the pinion gear.

- c. Carefully install the differential gear motor onto the differential gear assembly, making sure that the shift fork sliding gear remains in the 2WD mode position.

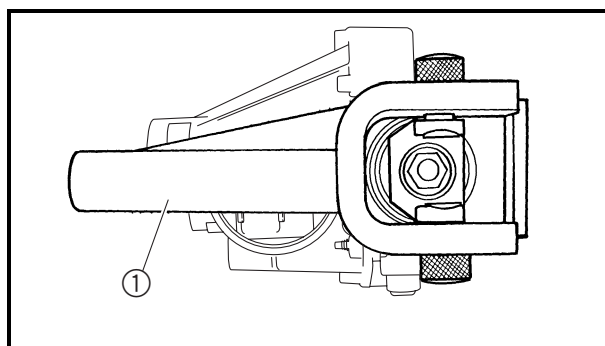
NOTICE

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. Tighten the differential gear motor bolts.



**Differential gear motor bolt
11 Nm (1.1 m · kg, 8.0 ft · lb)**



3. Install:

- universal joint yoke
- washer
- nut

 **62 Nm (6.2 m · kg, 45 ft · lb)**

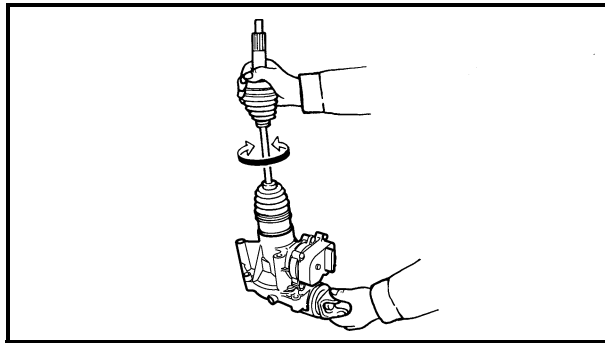
Use a universal joint holder ①.



**Universal joint holder
90890-04062, YM-04062**

TIP:

Apply locking agent (LOCTITE®) to the nut threads.

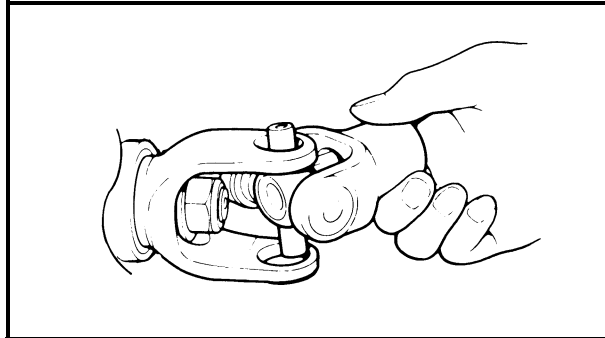


4. Check:

- 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.



ASSEMBLING THE UNIVERSAL JOINT

1. Install:

- universal joint



a. Install the yoke into the universal joint.

b. Apply wheel bearing grease to the bearings.

c. Install the bearing ① onto the yoke.

NOTICE

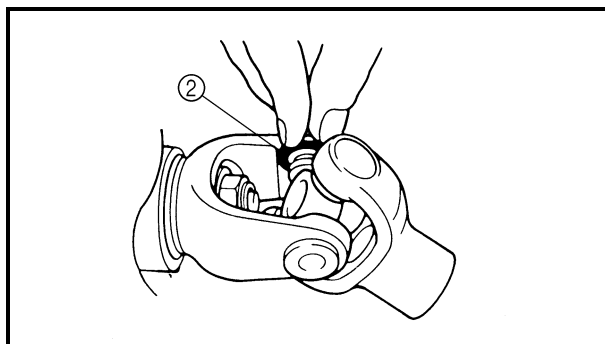
Check each bearing. The needles can easily fall out of their races. Slide the yoke back and forth on the bearings; the yoke will not go all the way onto a bearing if a needle is out of place.

d. Press each bearing into the universal joint using a suitable socket.

TIP:

The bearing must be inserted far enough into the universal joint so that the circlip can be installed.

e. Install the circlips ② into the groove of each bearing.



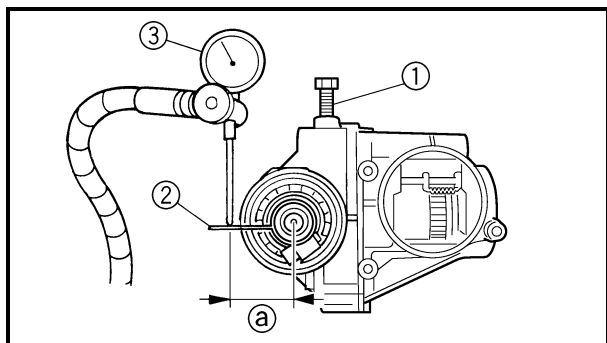
EBS00174

MEASURING THE DIFFERENTIAL GEAR LASH

1. Secure the gear case in a vise or another supporting device.

2. Remove:

- drain plug
- gasket



3. Install:

- ring gear fix bolt (M10) ①
(into the drain plug hole)



Ring gear fix bolt (M10)
90890-01527, YM-01527

NOTICE

Finger tighten the bolt until it holds the ring gear. Otherwise, the ring gear will be damaged.

4. Attach:

- gear lash measurement tool ②
- dial gauge ③



Gear lash measurement tool
90890-01475
Middle drive gear lash tool
YM-01475

② Measuring point is 22.5 mm (0.86 in)

5. Measure:

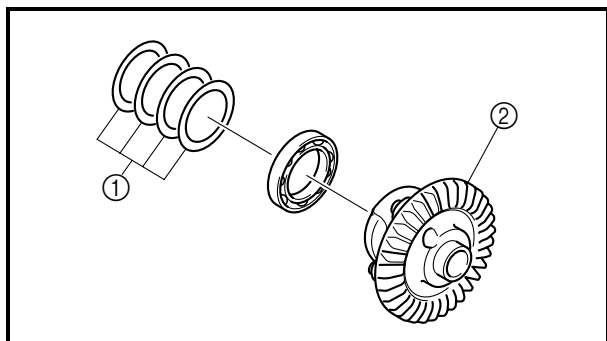
- gear lash
Gently rotate the coupling gear from engagement to engagement.



Differential gear lash
0.05 ~ 0.25 mm
(0.0020 ~ 0.0098 in)

TIP:

Measure the gear lash at four positions. Rotate the shaft 90° each time.



EBS00176

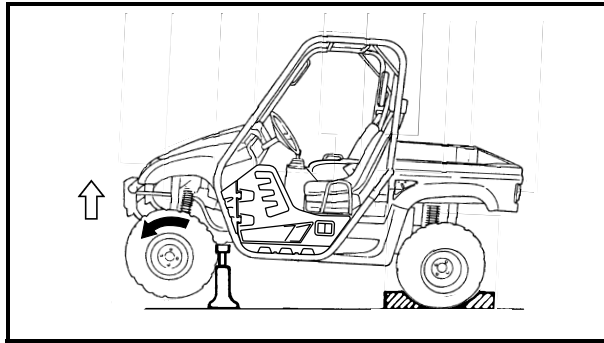
ADJUSTING THE DIFFERENTIAL GEAR LASH

1. Remove:

- differential drive pinion gear shim(s) ①
- differential gear assembly ②

- | | |
|-----------------------------|---------------------------------|
| 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

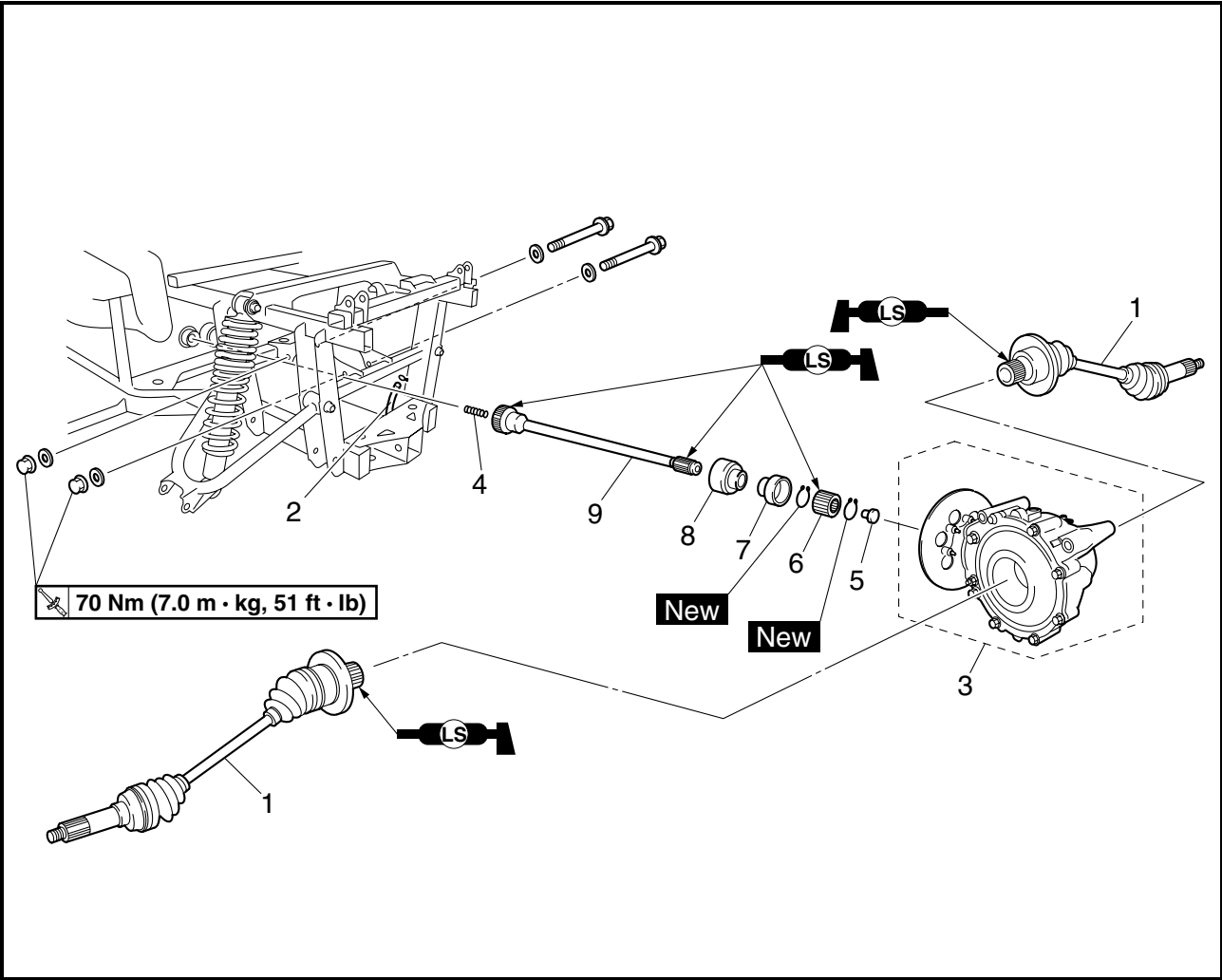


- Repeat this step several times to obtain an average figure.
- During this test, the other front wheel will turn in the opposite direction.

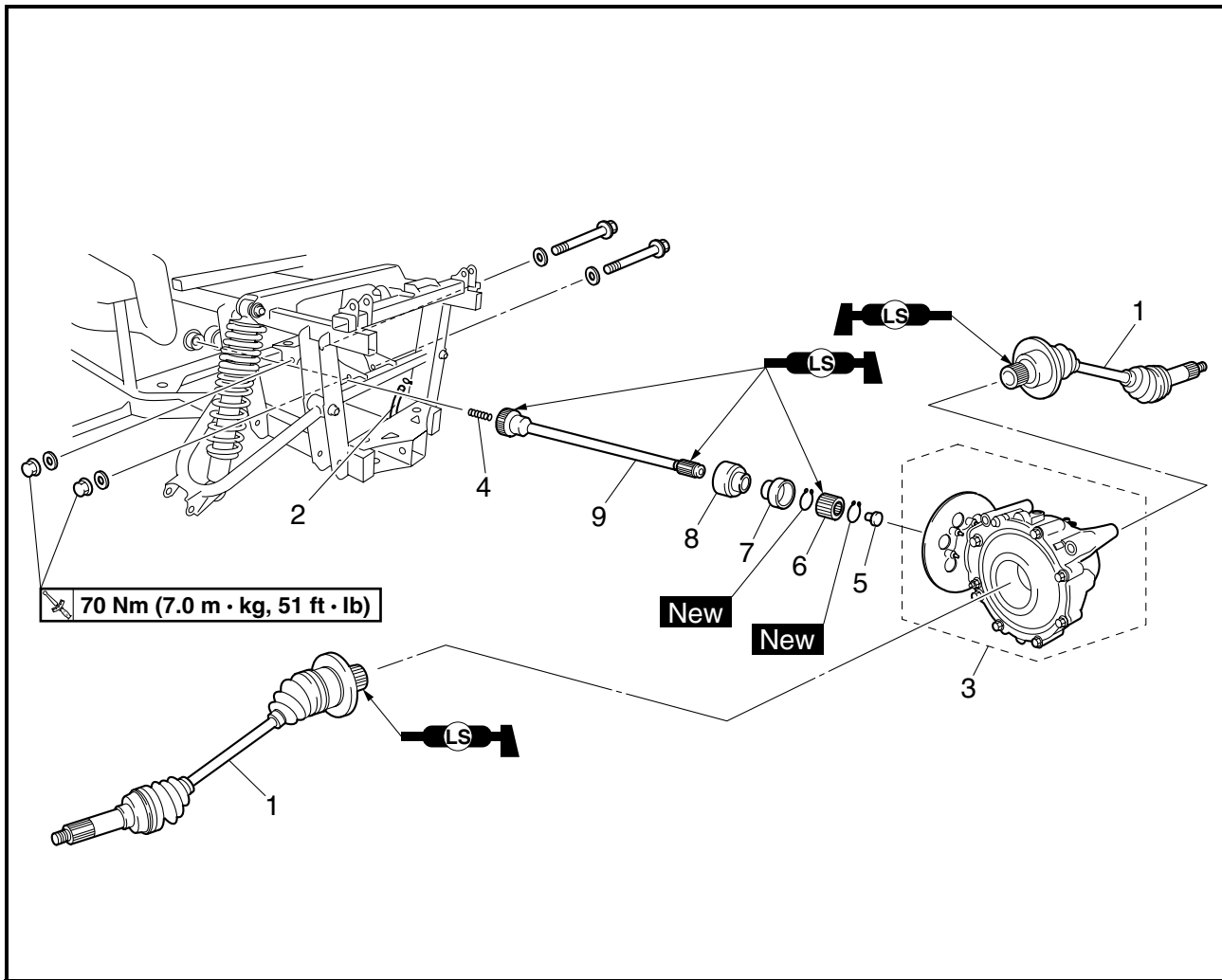
	<p>Front wheel starting torque (differential gear preload)</p> <p>New unit 17 ~ 25 Nm (1.7 ~ 2.5 m · kg, 12 ~ 18 ft · lb)</p> <p>Minimum 10 Nm (1.0 m · kg, 7.2 ft · lb)</p>
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- Downloaded from www.Manualslib.com manuals search engine

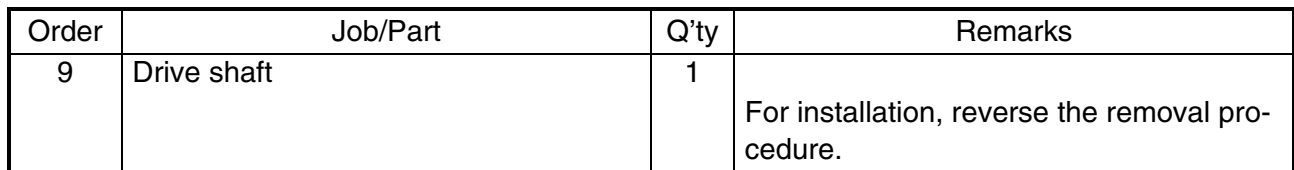
REAR CONSTANT VELOCITY JOINTS, FINAL DRIVE GEAR AND DRIVE
SHAFT

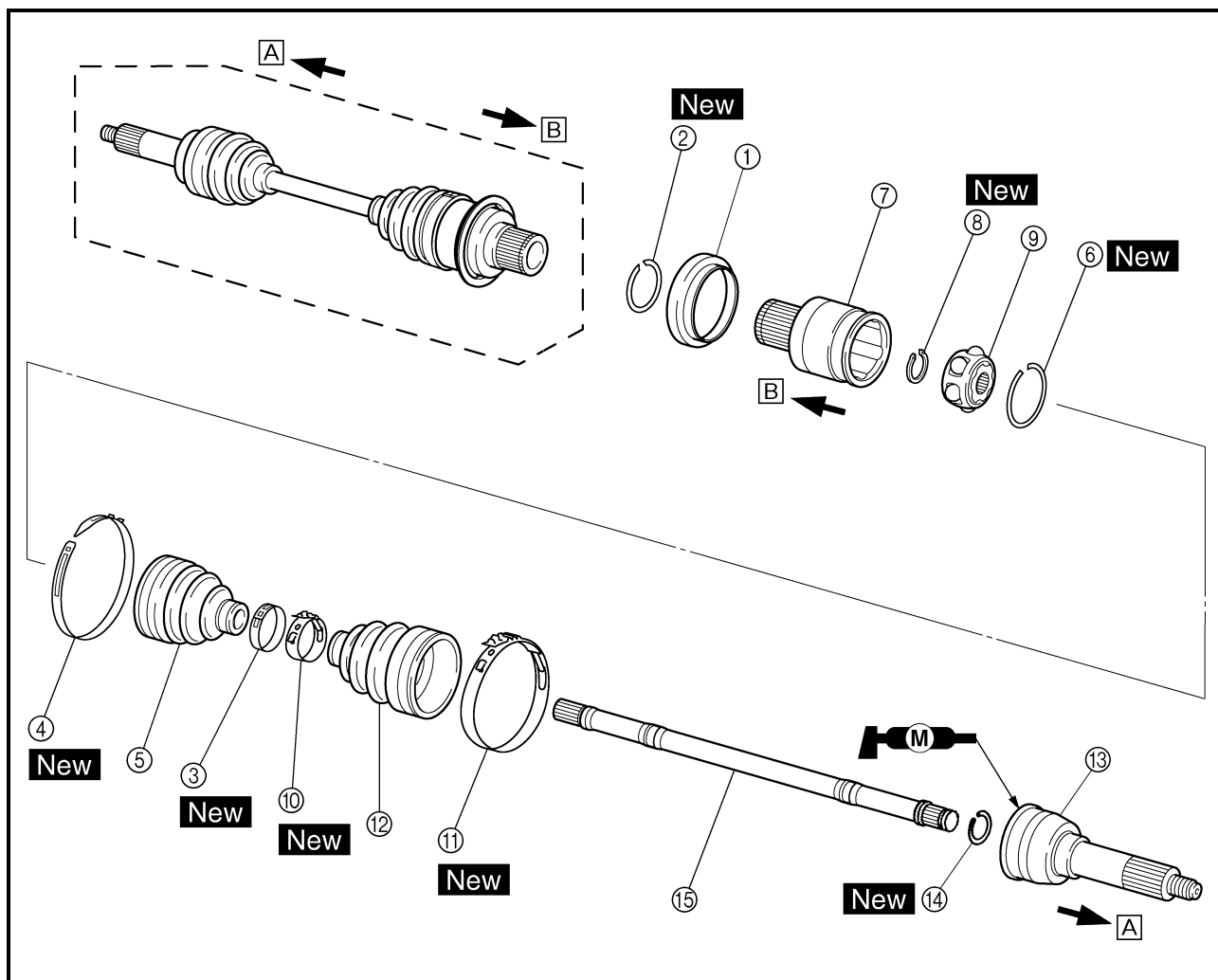


Order	Job/Part	Q'ty	Remarks
	Removing the rear constant velocity joints, final drive gear and drive shaft		Remove the parts in the order listed.
	Rear skid plate		Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.
	Muffler/exhaust pipes		Refer to "ENGINE REMOVAL" in chapter 4.
	Final gear oil		Drain.
	Rear knuckle		Refer to "REAR KNUCKLE AND STABILIZER" in chapter 8.
	Rear lower arm		Refer to "REAR ARMS AND REAR SHOCK ABSORBER" in chapter 8.
	Parking brake assembly		Refer to "PARKING BRAKE" in chapter 8.



Order	Job/Part	Q'ty	Remarks
1	Rear constant velocity joint	2	TIP: Remove the constant velocity joint on the right side of the vehicle, rotate the final gear assembly slightly so that the constant velocity joint on the left side clears the frame, and then remove it.
2	Final gear case breather hose	1	Disconnect.
3	Final gear assembly	1	
4	Compression spring	1	
5	Damper	1	
6	Coupling gear	1	
7	Dust seal	1	
8	Dust seal	1	

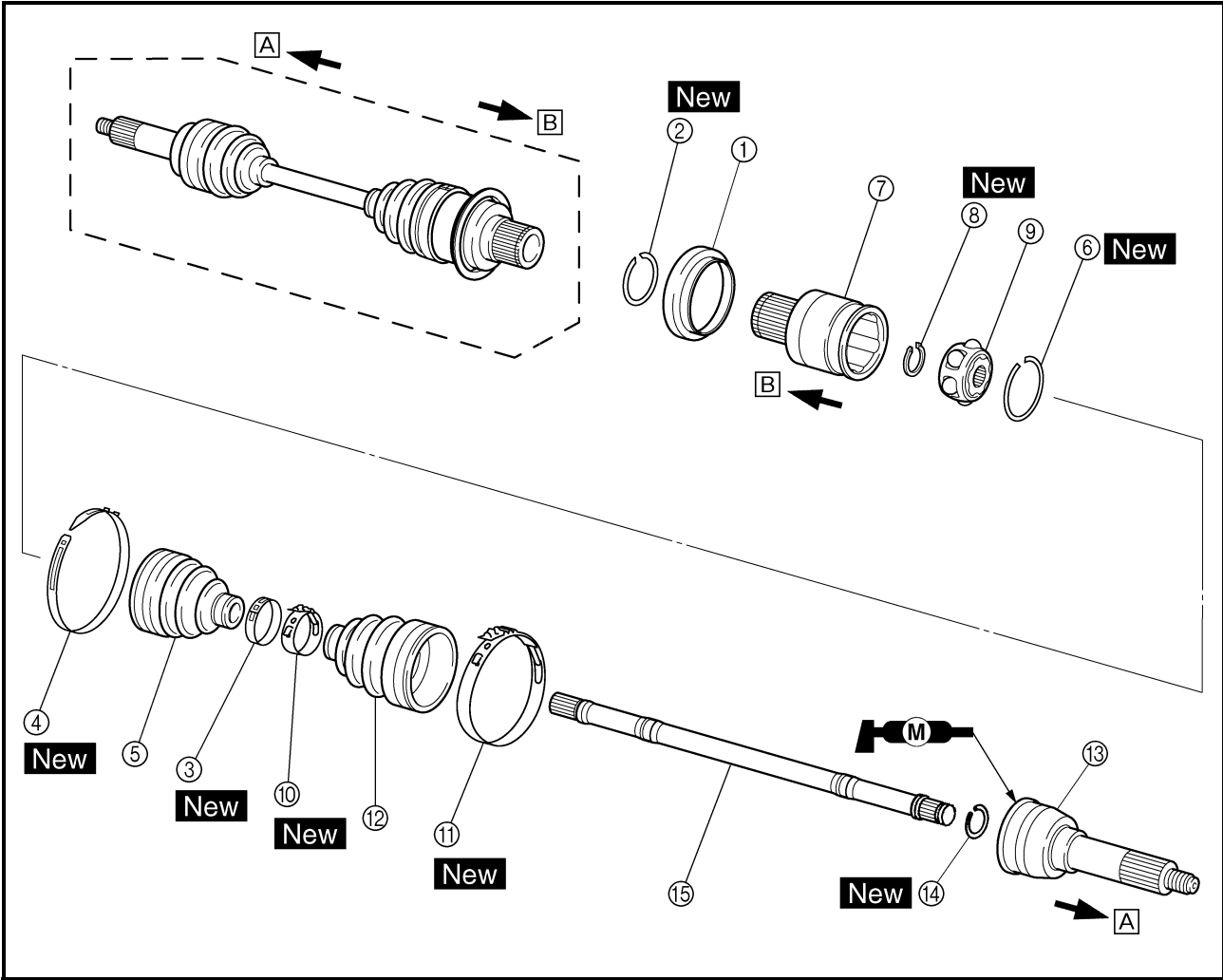




Order	Job/Part	Q'ty	Remarks
	Disassembling the rear constant velocity joints		Remove the parts in the order listed. The following procedure applies to both of the rear constant velocity joints.
①	Dust cover	1	Refer to "DISASSEMBLING THE REAR CONSTANT VELOCITY JOINTS" and "ASSEMBLING THE REAR CONSTANT VELOCITY JOINTS".
②	Clip	1	
③	Boot band	1	
④	Boot band	1	
⑤	Dust boot	1	
⑥	Clip	1	
⑦	Double off-set joint	1	
⑧	Circlip	1	
⑨	Ball bearing	1	
⑩	Boot band	1	
⑪	Boot band	1	
⑫	Dust boot	1	

REAR CONSTANT VELOCITY JOINTS, FINAL DRIVE
GEAR AND DRIVE SHAFT

DRIV

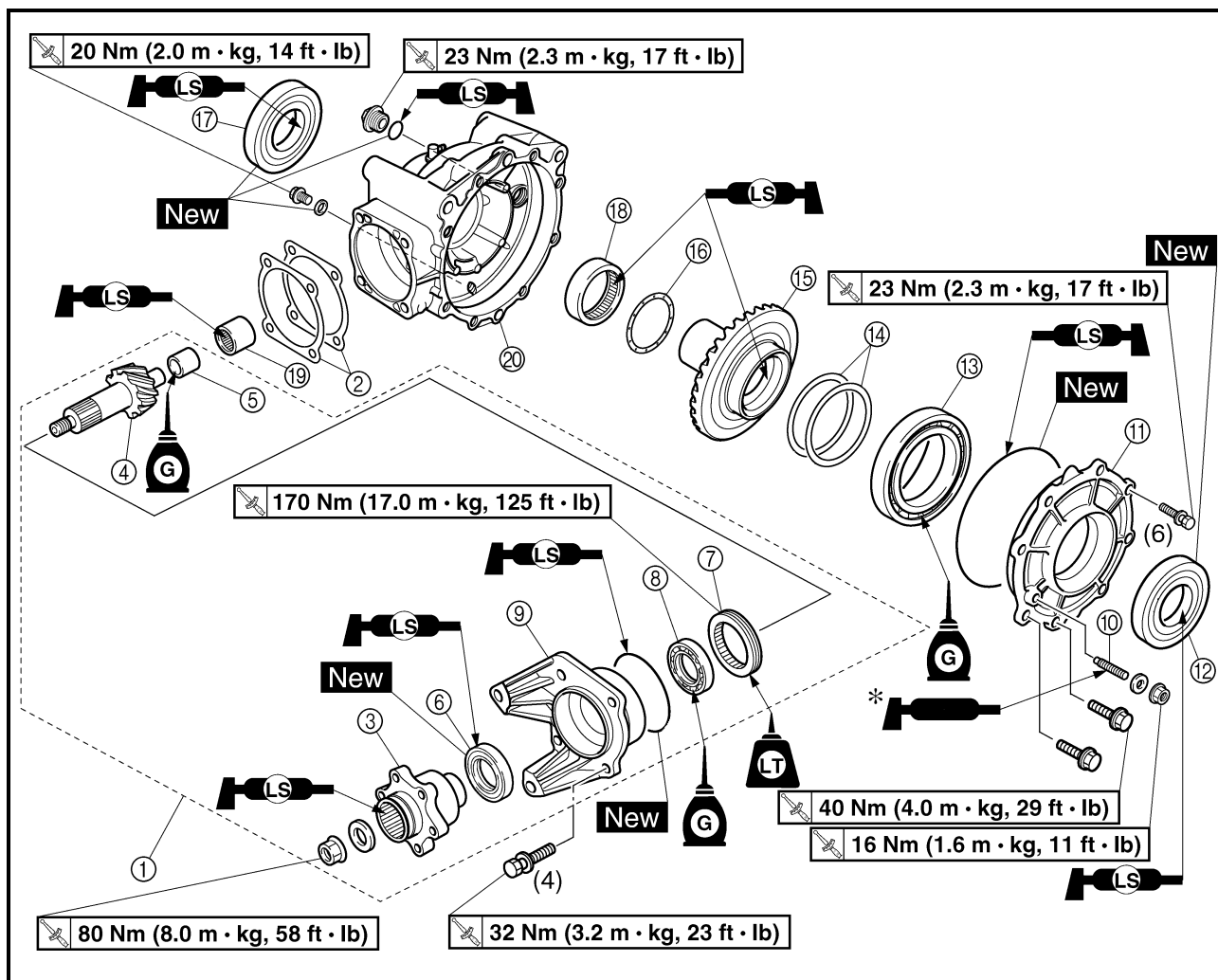


Order	Job/Part	Q'ty	Remarks
⑬	Off-set joint	1	Refer to "DISASSEMBLING THE REAR CONSTANT VELOCITY JOINTS" and "ASSEMBLING THE REAR CONSTANT VELOCITY JOINTS". For assembly, reverse the disassembly procedure.
⑭	Clip	1	
⑮	Joint shaft	1	

A Wheel side
B Gear case side

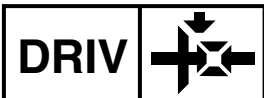
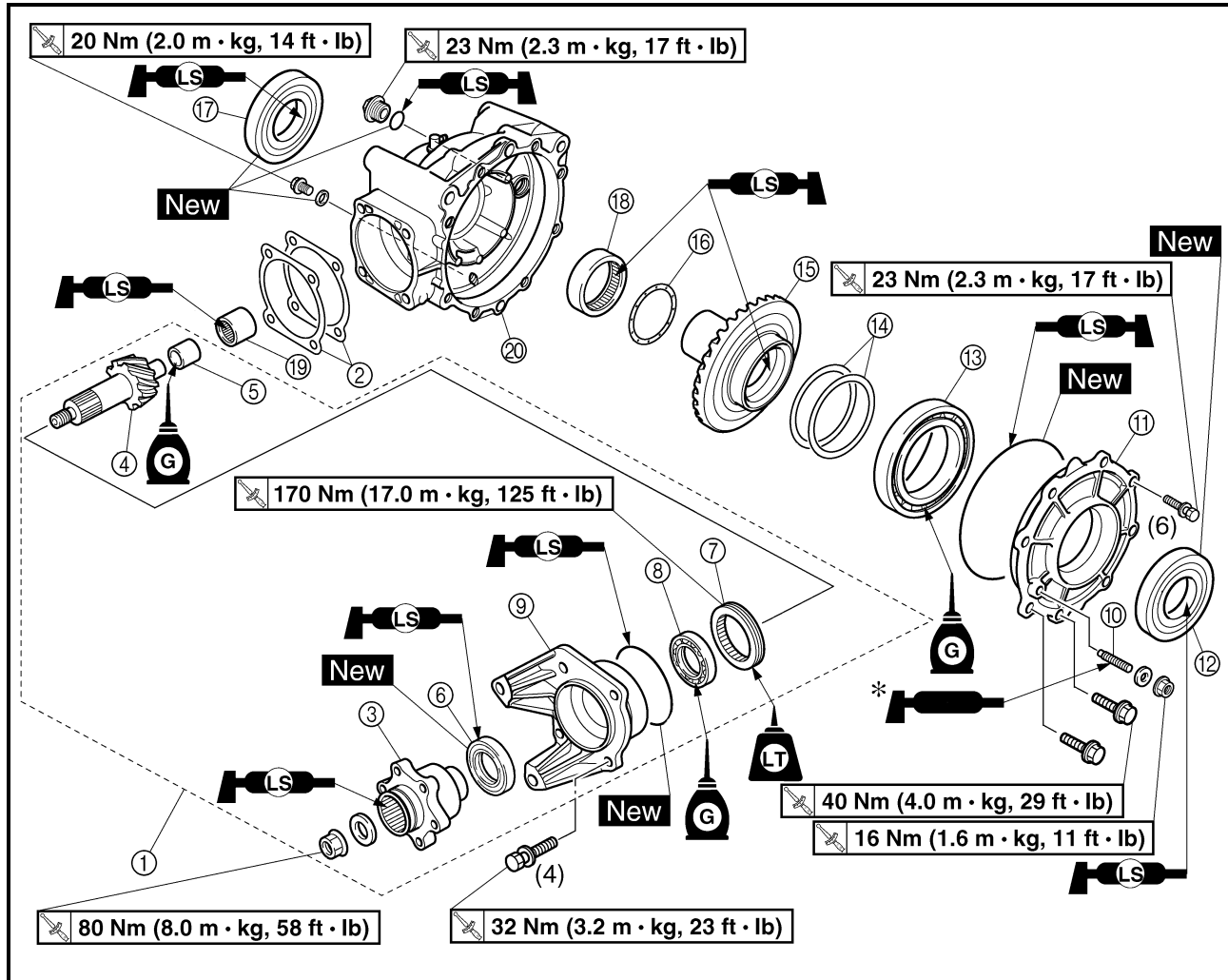
REAR CONSTANT VELOCITY JOINTS, FINAL DRIVE GEAR AND DRIVE SHAFT

DRIV



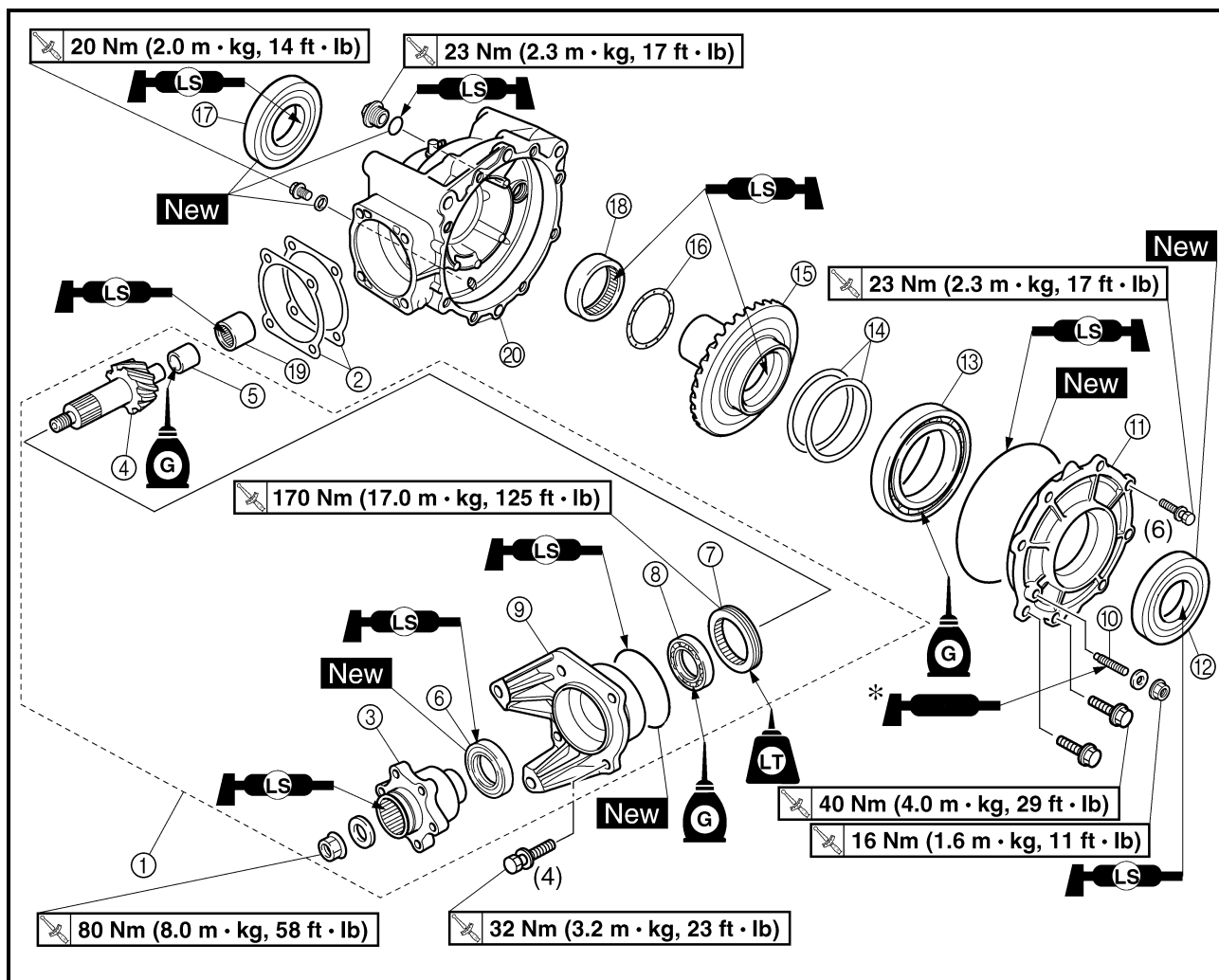
Order	Job/Part	Q'ty	Remarks
	Disassembling the final gear case		Remove the parts in the order listed.
①	Final drive pinion gear assembly	1	Refer to "DISASSEMBLING THE FINAL GEAR CASE" and "ASSEMBLING THE FINAL GEAR CASE".
②	Final drive pinion gear shim	*	
③	Drive shaft coupling gear	1	
④	Final drive pinion gear	1	
⑤	Inner race	1	
⑥	Oil seal	1	
⑦	Bearing retainer	1	
⑧	Bearing	1	
⑨	Final drive pinion gear bearing housing	1	
⑩	Ring gear stopper	1	

REAR CONSTANT VELOCITY JOINTS, FINAL DRIVE GEAR AND DRIVE SHAFT



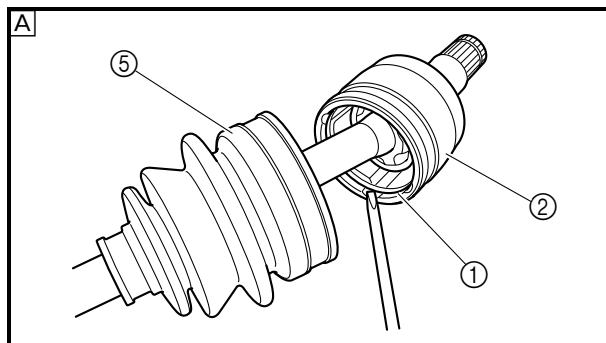
Order	Job/Part	Q'ty	Remarks
⑪	Ring gear bearing housing	1	TIP: _____ Working in a crisscross pattern, loosen each bolt 1/4 of a turn. After all the bolts are loosened, remove them.
⑫	Oil seal	1	
⑬	Bearing	1	
⑭	Ring gear shim	*	
⑮	Ring gear	1	
⑯	Thrust washer	1	
⑰	Oil seal	1	

REAR CONSTANT VELOCITY JOINTS, FINAL DRIVE GEAR AND DRIVE SHAFT



Order	Job/Part	Q'ty	Remarks
⑱	Bearing	1	Refer to "REMOVING THE FINAL DRIVE ROLLER BEARINGS" and "INSTALLING THE FINAL DRIVE ROLLER BEARINGS". For assembly, reverse the disassembly procedure.
⑲	Bearing	1	
⑳	Final gear case	1	

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



DISASSEMBLING THE REAR CONSTANT VELOCITY JOINTS

A Gear case side

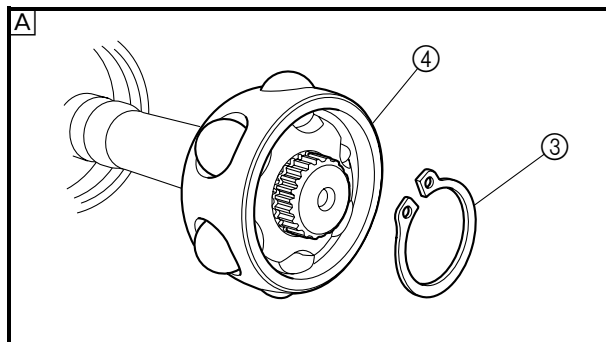
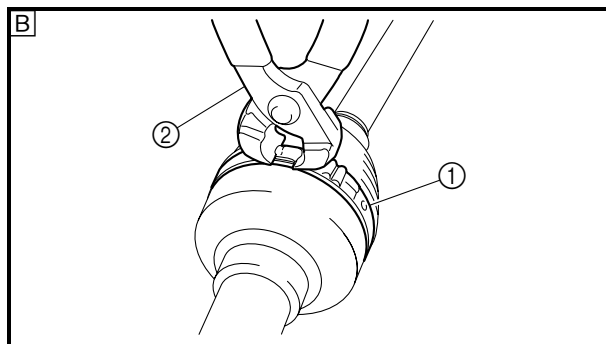
B Wheel side

1. Remove:

- clip ①
- double off-set joint ②
- circlip ③
- ball bearing ④
- dust boot ⑤

TIP:

Before removing the clip ①, slide the dust boot away from the double off-set joint.



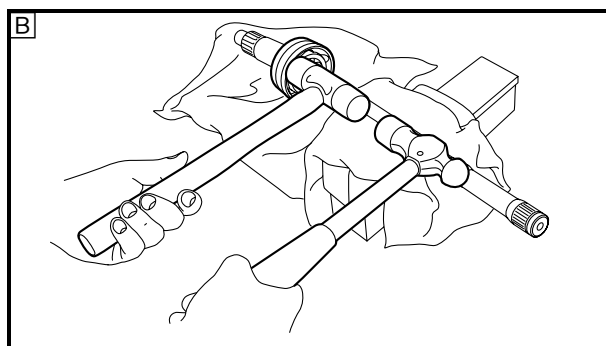
2. Remove:

- boot band ①

Use a boot band installing tool ②.



Boot band installing tool
90890-01526, YM-01526

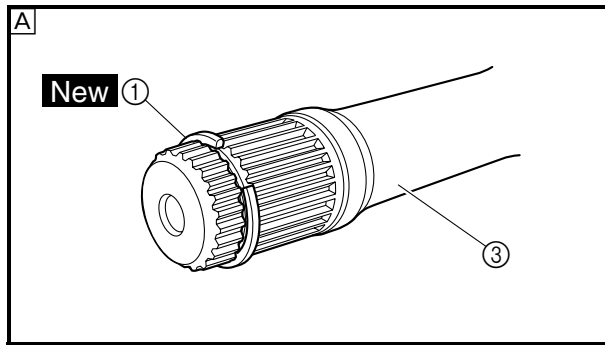


3. Remove:

- off-set joint
- clip
- dust boot

TIP:

Secure the joint shaft in a vise, and then remove the off-set joint using hammers.



ASSEMBLING THE REAR CONSTANT VELOCITY JOINTS

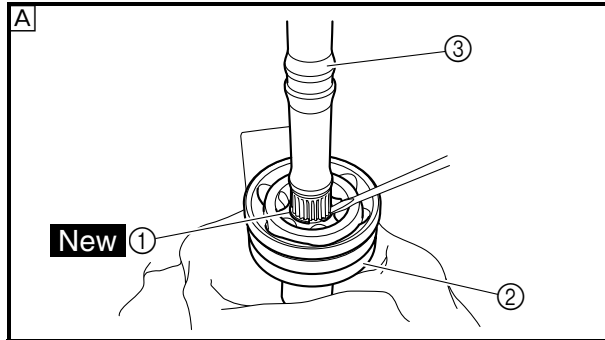
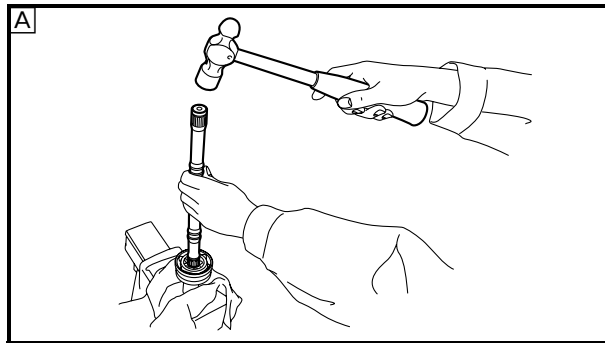
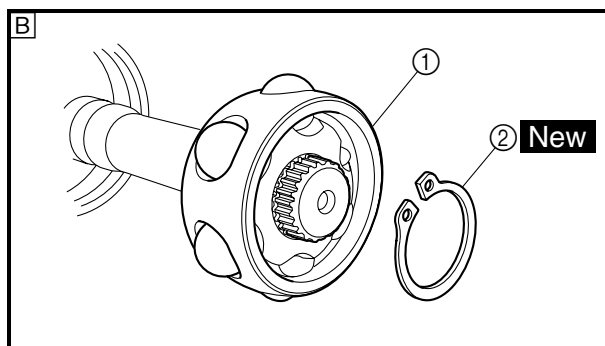
- A** Wheel side
B Gear case side

1. Install:
- dust boot
 - clip ① **New**
 - off-set joint ②
 - joint shaft ③

- a. Install the clip ①.
b. Install the off-set joint ②.

TIP:

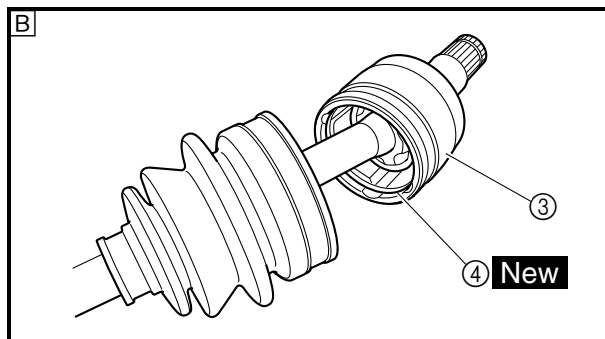
- Install the clip ① into the groove in the joint shaft as shown.
- Secure the off-set joint in a vise, and then fit the joint shaft into the off-set joint using a hammer.



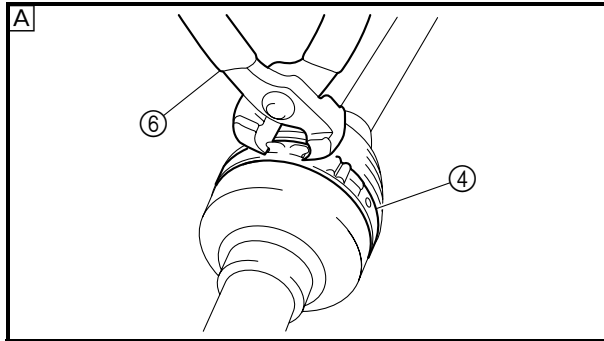
2. Install:
- dust boot
 - ball bearing ①
 - circlip ② **New**
 - double off-set joint ③
 - clip ④ **New**

TIP:

- Securely install the circlip into the groove in the joint shaft.
- Securely install the clip into the groove in the double off-set joint.



- TIP:** _____
Molybdenum disulfide grease is included in the repair kit.

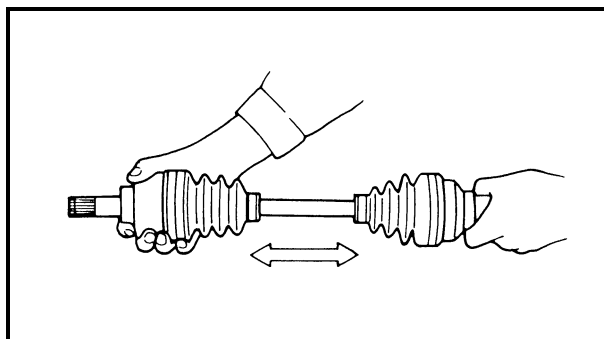


- | | |
|---|--|
|  | <p>Molybdenum disulfide grease
 55 g (1.9 oz) per dust boot (rear wheel side)
 65 g (2.3 oz) per dust boot (final gear case side)</p> |
|---|--|

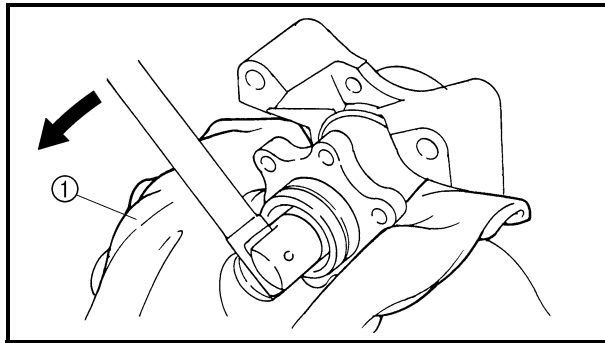
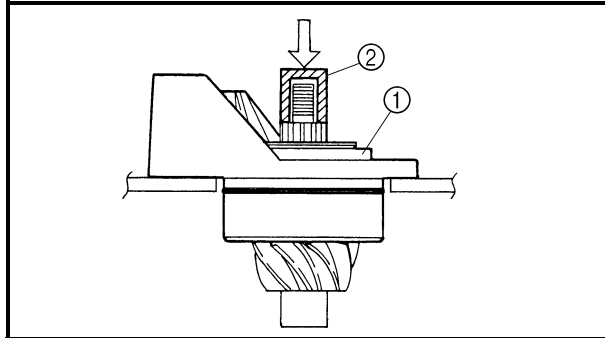
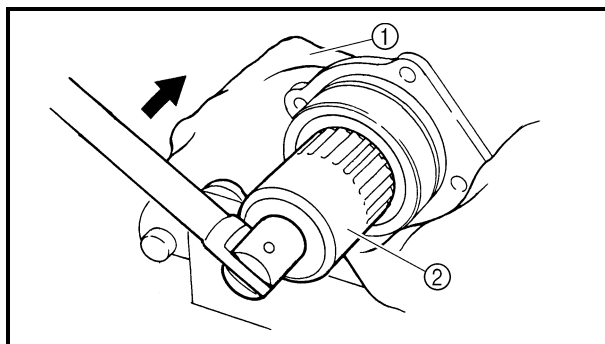
- Boot band installing tool**
90890-01526, YM-01526

TIP: _____

- The new boot bands may differ from the original ones.
- The dust boots should be fastened with the boot bands ③ and ⑤ at the grooves in the joint shaft.



5. Check:
- thrust movement free play
- Excessive play → Replace the joint assembly.



DISASSEMBLING THE FINAL GEAR CASE

1. Remove:

- drive shaft coupling gear nut



- Place a folded rag ①.
- Secure the drive shaft coupling gear edge in the vise.
- Remove the drive shaft coupling gear nut.



2. Remove:

- final drive pinion gear bearing housing assembly ①



- Clean the outside surface of the final drive pinion gear.
- Place the final drive pinion gear in a hydraulic press.

NOTICE

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

- Press the gear end and remove the bearing housing assembly.



3. Remove:

- bearing retainer



- Place a folded rag ①.
- Secure the final drive pinion gear bearing housing edge in the vise.
- Attach the bearing retainer wrench ②.



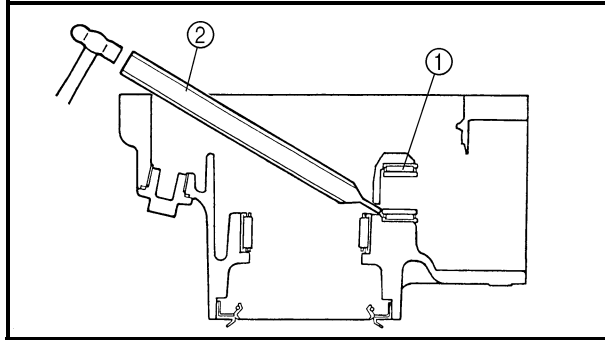
Bearing retainer wrench
90890-04128
Middle gear bearing retainer
YM-04128

- Remove the bearing retainer.

NOTICE

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





- roller bearing (ring gear) ①
Use a suitable press tool ② and an appropriate support for the main housing.

- roller bearing (final drive pinion gear) ①

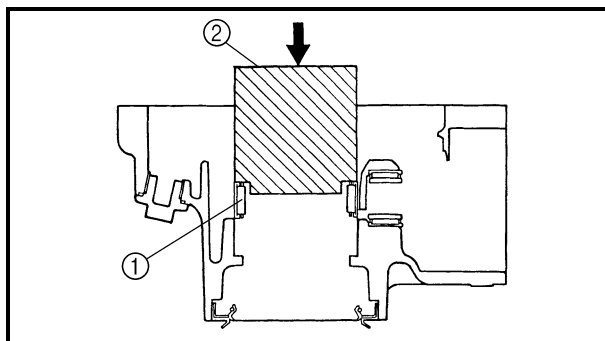
- TIP:**

The removal of the final drive pinion gear roller bearing is difficult and seldom necessary.

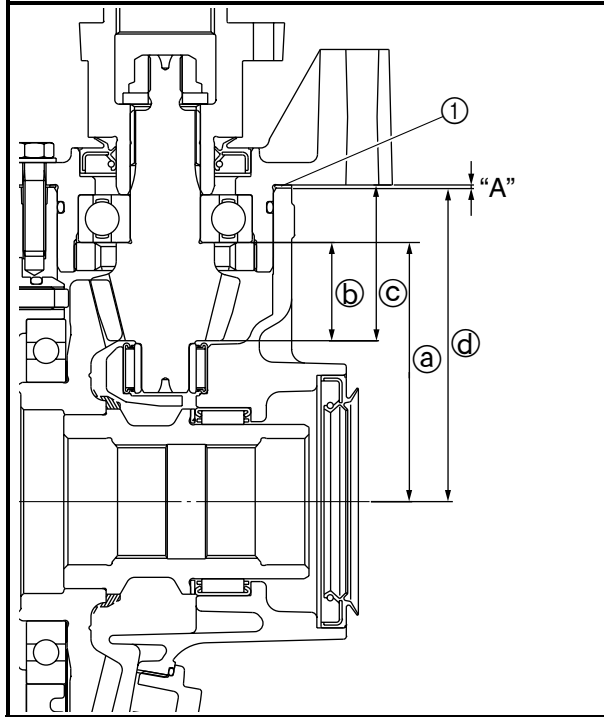
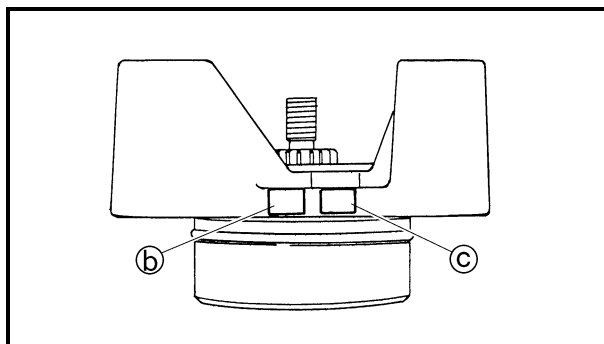
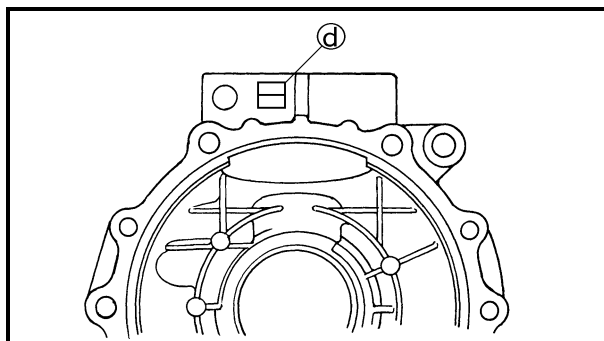
- roller bearing (final drive pinion gear) **New**

- 
- Heat the main housing only to 150 °C (302 °F).
 - Install the roller bearing outer race using the proper adapter.
 - Install the inner race onto the drive pinion gear.

- roller bearing (ring gear) ①
Use a suitable press tool ② and a press to install the above components into the main housing.



When the final drive pinion gear, ring gear, final gear case and/or ring gear bearing housing are replaced, be sure to adjust the positions of the final drive pinion gear and ring gear using the shim(s).



Selecting final drive pinion gear shims

1. Select:
 - final drive pinion gear shim(s) ①

a. To find the final drive pinion gear shim thickness "A", use the following formula.

Final drive pinion gear shim thickness:

$$\text{"A"} = \textcircled{a} + (\textcircled{c} - \textcircled{b}) - \textcircled{d}$$

- Ⓐ = 92.5 mm (3.6 in).
- Ⓑ = a numeral (usually a decimal number) on the final drive pinion gear bearing housing either added to or subtracted from “34”.
- Ⓒ = a numeral (usually a decimal number) on the final drive pinion gear bearing housing either added to or subtracted from “55”.
- Ⓓ = a numeral (usually a decimal number) on the final gear case either added to or subtracted from “112”.

Example:

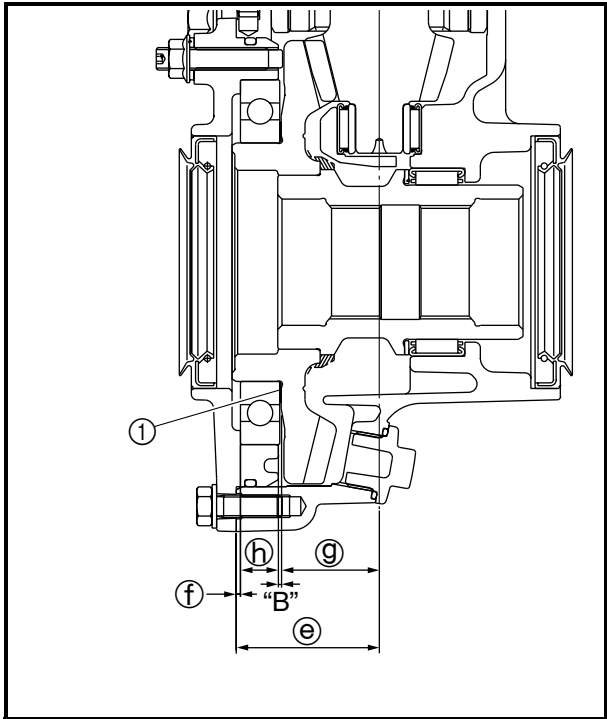
- 1) $\textcircled{a} = 92.5$
- 2) If "98" is stamped on the final drive pinion gear bearing housing,
 $\textcircled{b} = 34 + 0.98$
 $= 34.98$
- 3) If "48" is stamped on the final drive pinion gear bearing housing,
 $\textcircled{c} = 55 + 0.48$
 $= 55.48$
- 4) If "03" is stamped on the final gear case,
 $\textcircled{d} = 112 + 0.03$
 $= 112.03$
- 5) Therefore, "A" is 0.97.
 $\text{"A"} = 92.5 + (55.48 - 34.98) - 112.03$
 $= 0.97$

- 6) Round off the hundredth digit and select the appropriate shim(s).
- In the example above, the calculated number is 0.97. The chart instructs you to round off 7 to 5 at the hundredth place. Thus, the shim thickness is 0.95 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 drive pinion gear shim				
Thickness (mm)	0.25	0.30	0.35	
	0.40	0.45	0.50	



Selecting ring gear shims

1. Select:
- ring gear shim(s) ①

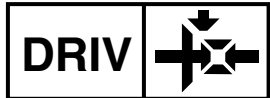
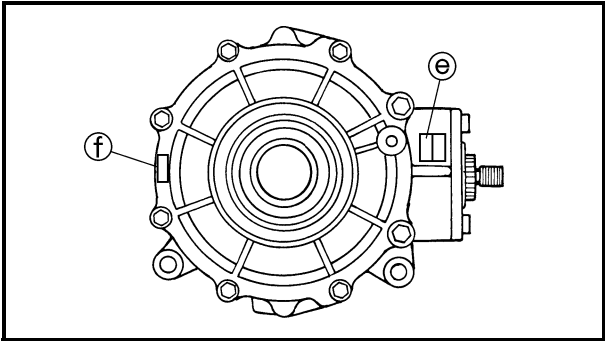
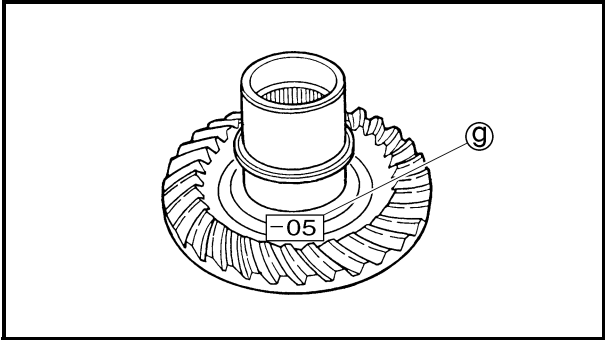


- a. To find the ring gear shim thickness “B”, use the following formula.

Ring gear shim thickness “B” = ⑥ – ① – (⑨ + ④)

- ⑥ = a numeral (usually a decimal number) on the final gear case either added to or subtracted from “50”.
- ① = a numeral (usually a decimal number) on the outside of the ring gear bearing housing and added to 1.
- ⑨ = a numeral (usually a decimal number) on the inside of the ring gear either added to or subtracted from 35.00.

REAR CONSTANT VELOCITY JOINTS, FINAL DRIVE
GEAR AND DRIVE SHAFT



Ⓜ = bearing thickness (considered constant)

Bearing thickness Ⓜ
14.00 mm (0.55 in)

- Example:
- 1) If “98” is stamped on the final gear case,
Ⓜ = 50 + 0.98
= 50.98
 - 2) If “55” is stamped on the ring gear bearing housing,
ⓕ = 1 + 0.55
= 1.55
 - 3) If “-05” is stamped on the ring gear,
ⓖ = 35 - 0.05
= 34.95
 - 4) Ⓜ = 14.00
 - 5) Therefore, shim thickness “B” is 0.48.
“B” = 50.98 - 1.55 - (34.95 + 14.00)
= 49.43 - 48.95
= 0.48
 - 6) Round off the hundredth digit and select the appropriate shim(s).
In the example above, the calculated number is 0.48. The chart instructs you to round off 8 to 10 at the hundredth place.
Thus, the shim thickness is 0.50 mm.

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

Shims are supplied in the following thick-
nesses.

Ring gear shim

Thickness (mm)	0.25	0.30	0.35
	0.40	0.45	0.50





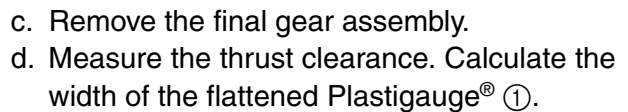
- a. Place four pieces of Plastigauge® between the originally fitted thrust washer and the ring gear.
- b. Install the final gear assembly and tighten the bolts to specification.



M10 bolts (ring gear bearing housing)

40 Nm (4.0 m · kg, 29 ft · lb)

Do not turn the drive pinion gear and ring gear when measuring the clearance with Plastigauge®.



0.1 ~ 0.2 mm (0.004 ~ 0.008 in)

- e. If out of specification, select the correct washer.



CHECKING THE DRIVE SHAFT

1. Check:
 - drive shaft (splines)
 - coupling gear (splines)Wear/damage → Replace.

CHECKING THE FINAL GEAR CASE

1. Check:
 - final gear case
 - ring gear bearing housingCracks/damage → Replace.

TIP: _____
When the final gear case and/or the ring gear bearing housing are replaced, be sure to adjust the shim of the final drive pinion gear and/or ring gear.

2. Check:
 - gear teeth
Pitting/galling/wear → Replace the drive pinion gear and ring gear as a set.
 - oil seals
 - O-rings
Damage → Replace.
3. Check:
 - bearings
Damage → Replace.

TIP: _____

- Roller bearings may be reused, but Yamaha recommends installing new ones. Do not reuse the oil seals.
- When the final drive pinion gear and/or ring gear are replaced, be sure to adjust the shim of the final drive pinion gear and/or ring gear.

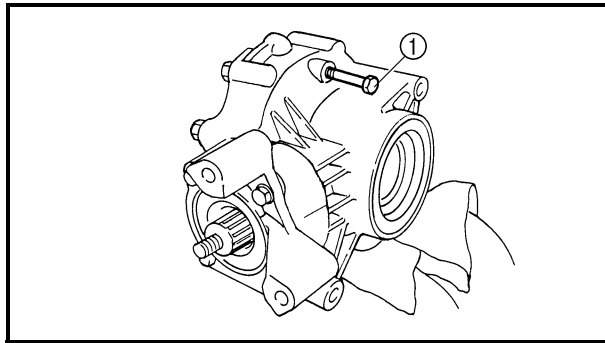
MEASURING AND ADJUSTING THE FINAL GEAR LASH

Measuring the final gear lash

1. Secure the gear case in a vise or another supporting device.
2. Remove:
 - drain plug
 - gasket

REAR CONSTANT VELOCITY JOINTS, FINAL DRIVE GEAR AND DRIVE SHAFT

DRIV



3. Install:

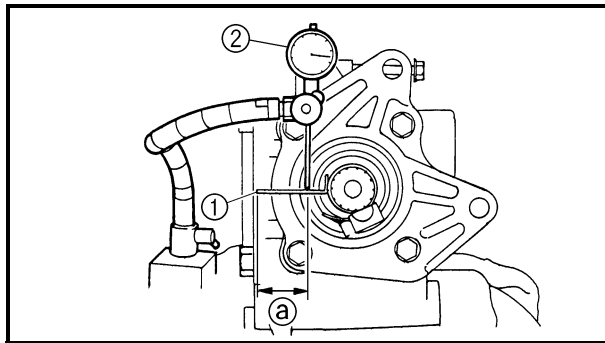
- ring gear fix bolt (M10) ①
(into the drain plug hole)



Ring gear fix bolt (M10)
90890-01527, YM-01527

NOTICE

Finger tighten the bolt until it holds the ring gear. Otherwise, the ring gear will be damaged.



4. Attach:

- gear lash measurement tool ①
- dial gauge ②



Gear lash measurement tool
90890-01467, YM-01467

① Measuring point is 31.1 mm (1.22 in)

5. Measure:

- gear lash
Gently rotate the gear coupling from engagement to engagement.



Final gear lash
0.1 ~ 0.3 mm (0.004 ~ 0.012 in)

TIP:

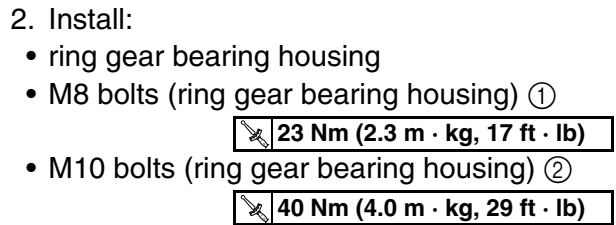
Measure the gear lash at four positions. Rotate the shaft 90° each time.



- a. Select a suitable shim(s) and thrust washer using the following chart.

- b. If increased by more than 0.2 mm (0.008 in):
Reduce the thrust washer thickness by 0.2 mm (0.008 in) for every 0.2 mm of ring gear shim increase.
- c. If reduced by more than 0.2 mm (0.008 in):
Increase the thrust washer thickness by 0.2 mm (0.008 in) for every 0.2 mm that the ring gear shim is decreased.

	Thrust washer		
Thickness (mm)	1.0	1.1	1.2
	1.3	1.4	1.5
	1.6	1.7	1.8
	1.9	2.0	2.1

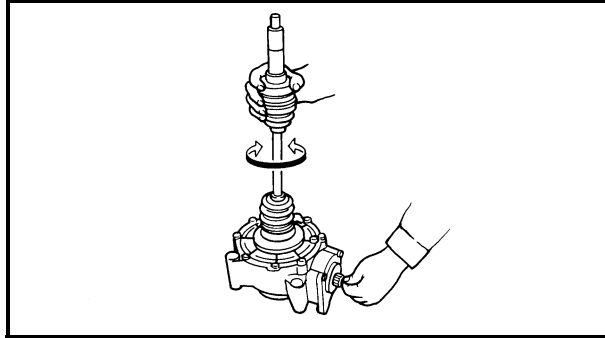


- TIP:** Apply locking agent (LOCTITE®) to the threads of bearing retainer.

- | | |
|---|---|
|  | <p>Bearing retainer wrench
 90890-04128</p> |
| | <p>Middle gear bearing retainer
 YM-04128</p> |

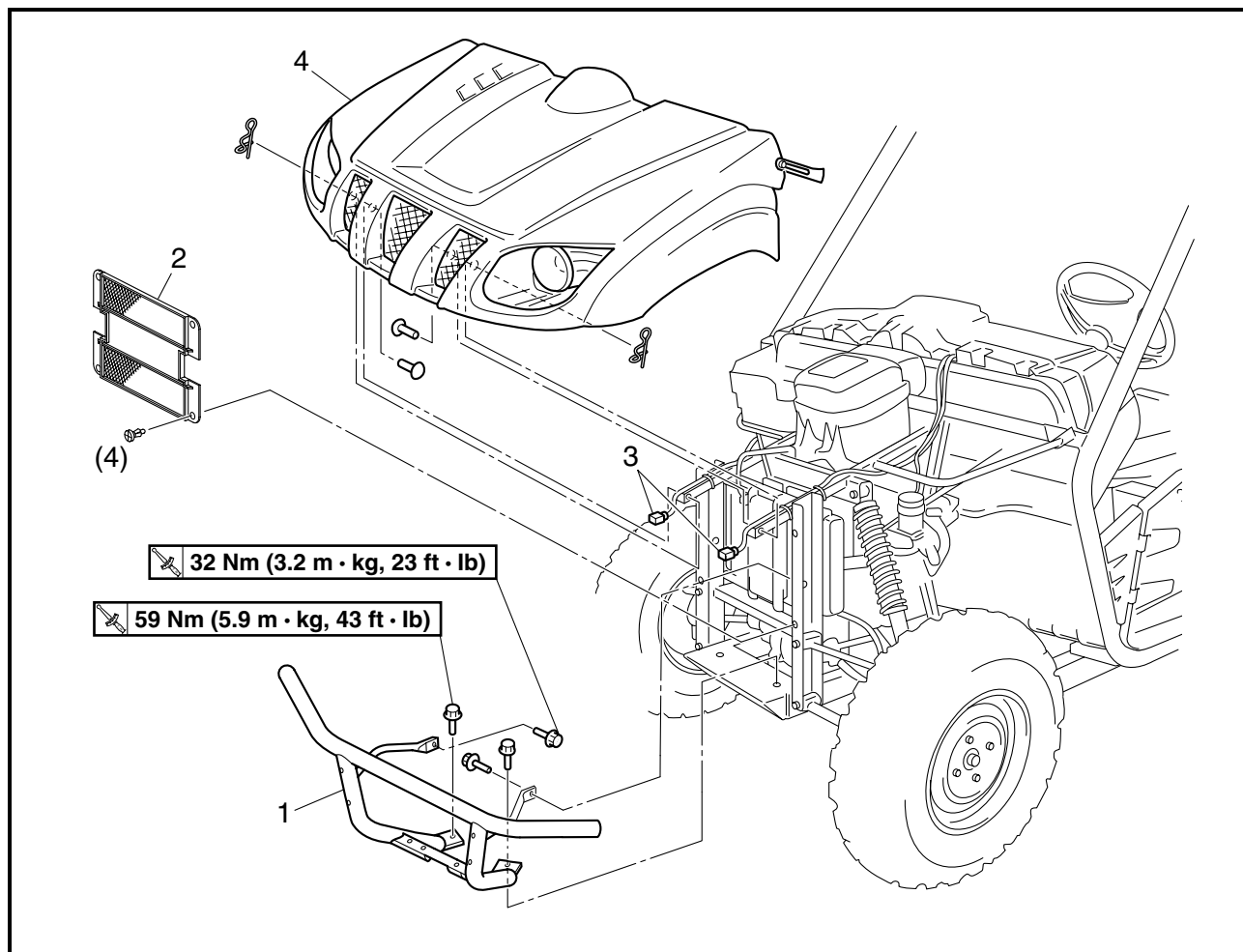
- | | |
|---|--|
|  | Bearing retainer
170 Nm (17.0 m · kg, 125 ft · lb)
LOCTITE® |
|---|--|

The bearing retainer has left-hand threads. Turn the retainer counterclockwise to tighten it.



- | | |
|---|--|
|  | Drive shaft coupling nut
80 Nm (8.0 m · kg, 58 ft · lb) |
|---|--|

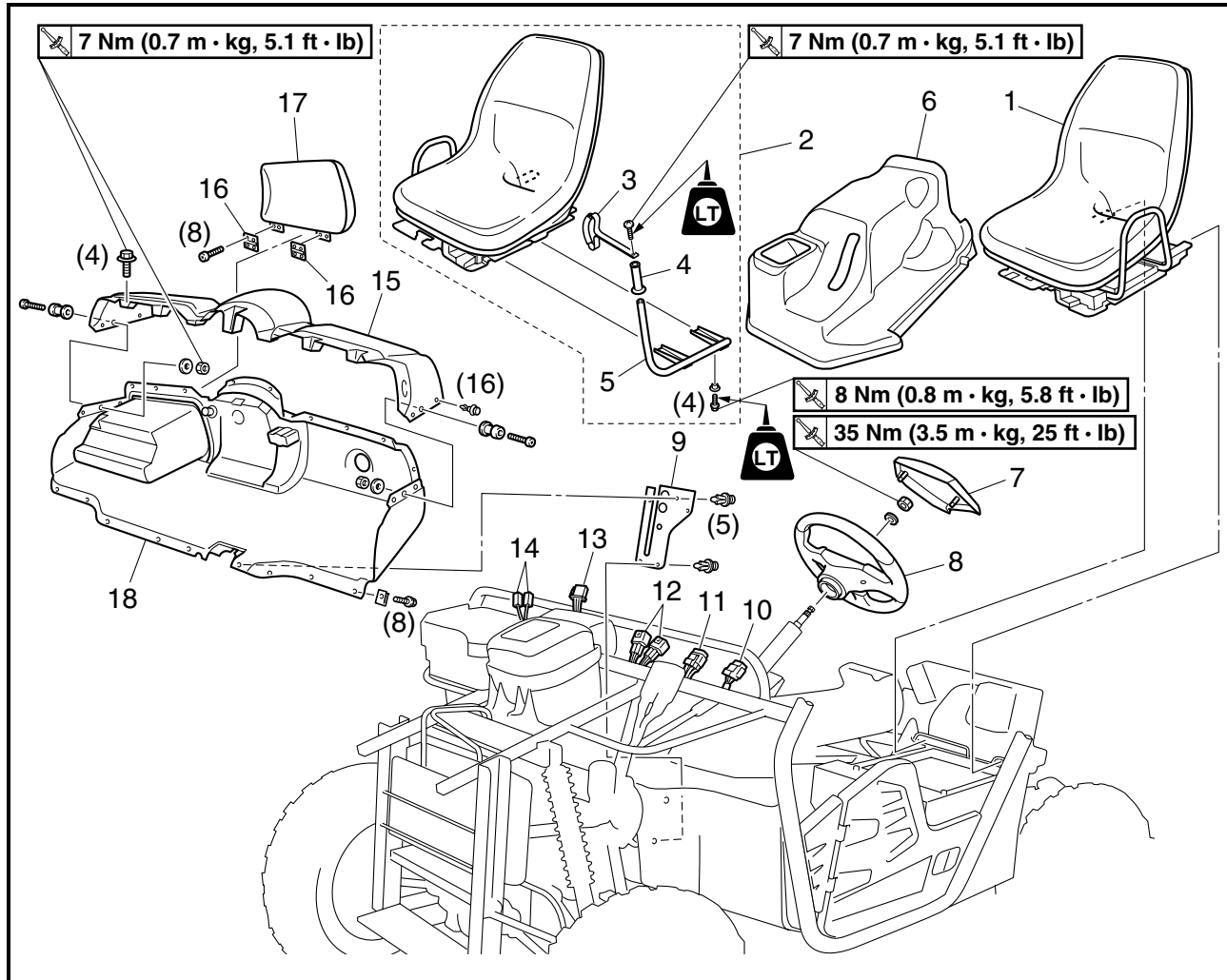
- Downloaded from www.Manualslib.com manuals search engine

**CHASSIS****SEATS, ENCLOSURE, HOOD AND CARGO BED****FRONT GUARD AND HOOD**

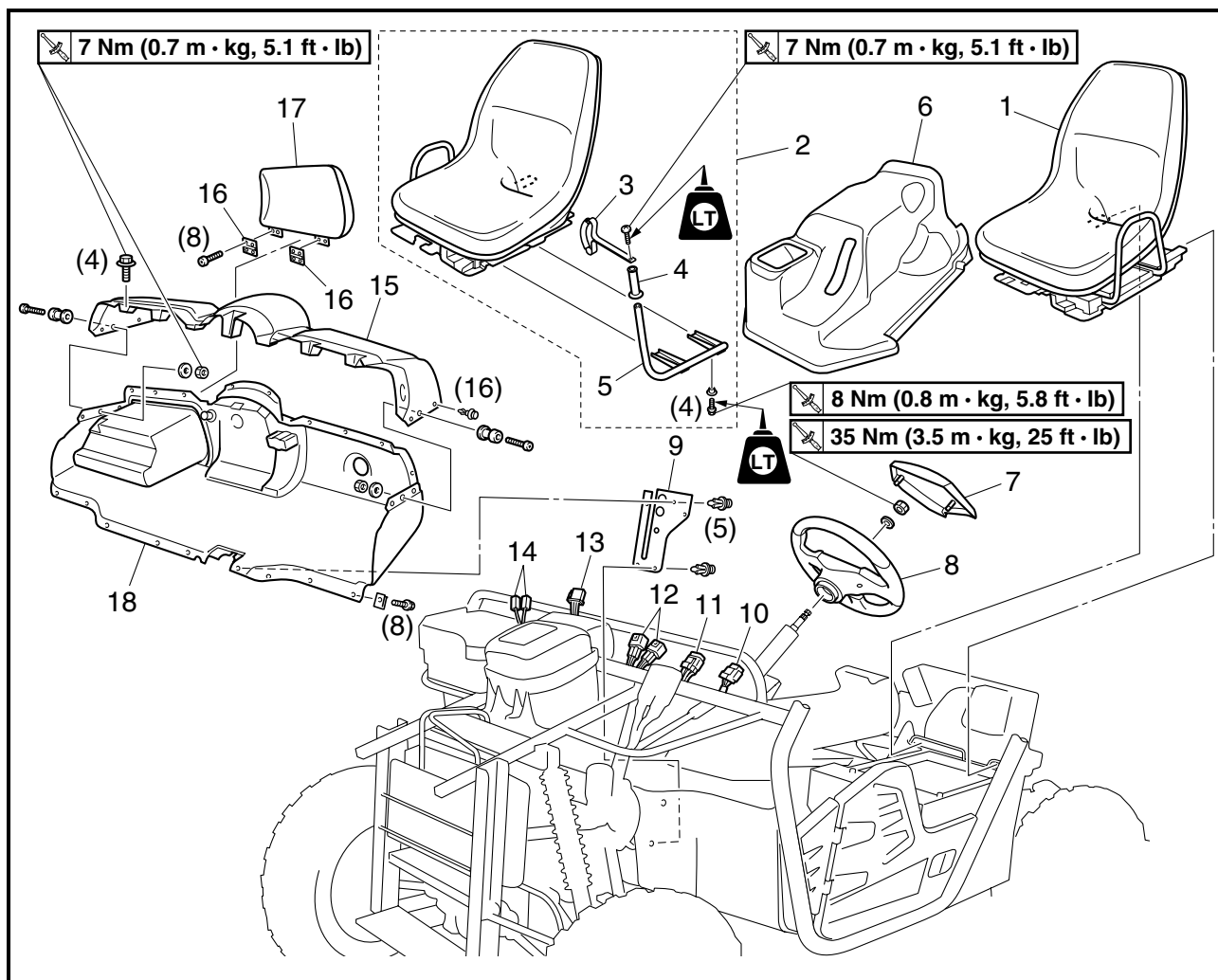
Order	Job/Part	Q'ty	Remarks
	Removing the front guard and hood		Remove the parts in the order listed.
1	Front guard	1	
2	Radiator mesh	1	
3	Headlight coupler	2	Disconnect.
4	Hood	1	
			For installation, reverse the removal procedure.



SEATS, REAR CONSOLE AND INSTRUMENT PANELS



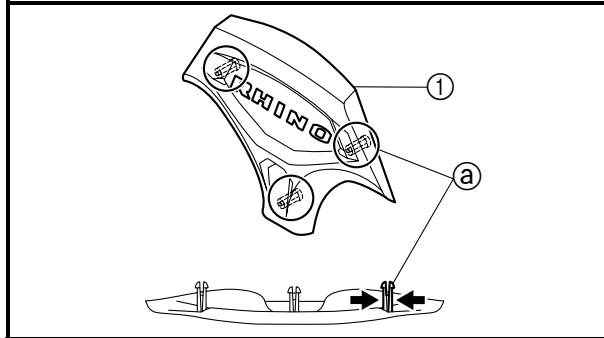
Order	Job/Part	Q'ty	Remarks
	Removing the seats, rear console and instrument panels		Remove the parts in the order listed.
1	Driver seat	1	
2	Passenger seat	1	
3	Passenger handhold strap	1	
4	Passenger handhold grip	1	
5	Passenger handhold bracket	1	
6	Rear console	1	
7	Steering wheel cover	1	Refer to "REMOVING THE STEERING WHEEL" and "INSTALLING THE STEERING WHEEL".
8	Steering wheel	1	
9	Pedal cover	1	
10	Light switch coupler	1	Disconnect.
11	Main switch coupler	1	Disconnect.



Order	Job/Part	Q'ty	Remarks
12	On-Command four-wheel-drive motor switch and differential gear lock switch	2	Disconnect.
13	Meter assembly coupler	1	Disconnect.
14	Auxiliary DC jack connector	2	Disconnect.
15	Upper instrument panel	1	
16	Hinge	2	
17	Glove box lid	1	
18	Lower instrument panel	1	
			For installation, reverse the removal procedure.

**REMOVING THE STEERING WHEEL**

1. Turn the steering wheel so that it is straight and the front wheels are pointing straight ahead.

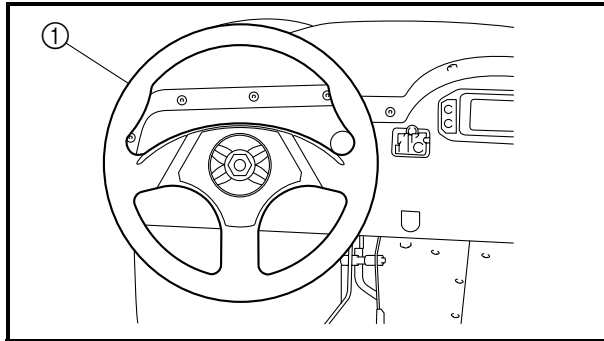


2. Remove:

- steering wheel cover ①
- steering wheel

TIP:

While pushing the ends of the projections (a) together, remove the steering wheel cover from the steering wheel.

**INSTALLING THE STEERING WHEEL**

1. Install:

- steering wheel ①

 **35 Nm (3.5 m · kg, 25 ft · lb)**

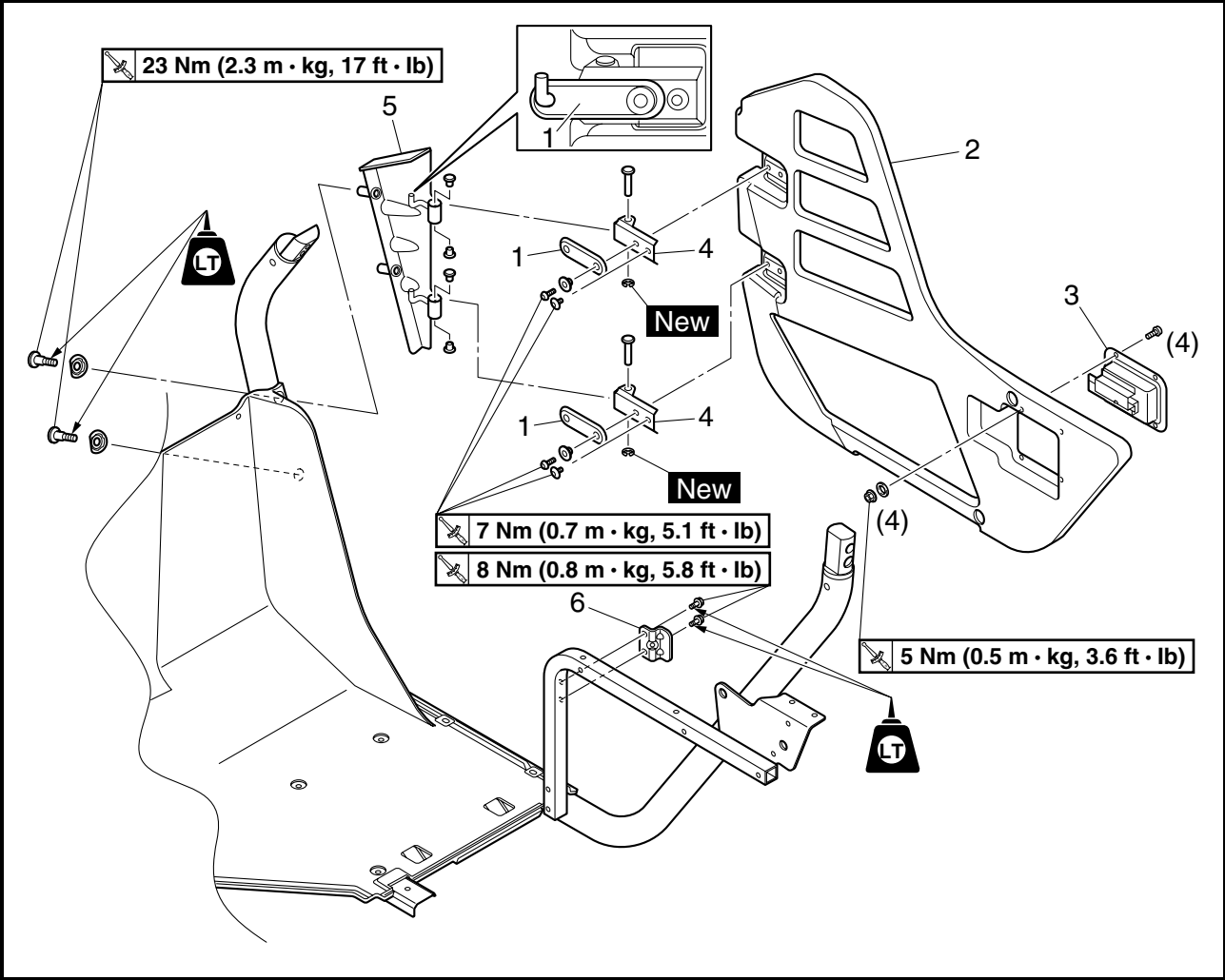
TIP:

Install the steering wheel onto the steering column so that it is straight as shown in the illustration.

2. Operate the vehicle at low speeds and make sure that the steering wheel is straight when the vehicle is advancing straight ahead.
3. Install:
 - steering wheel cover



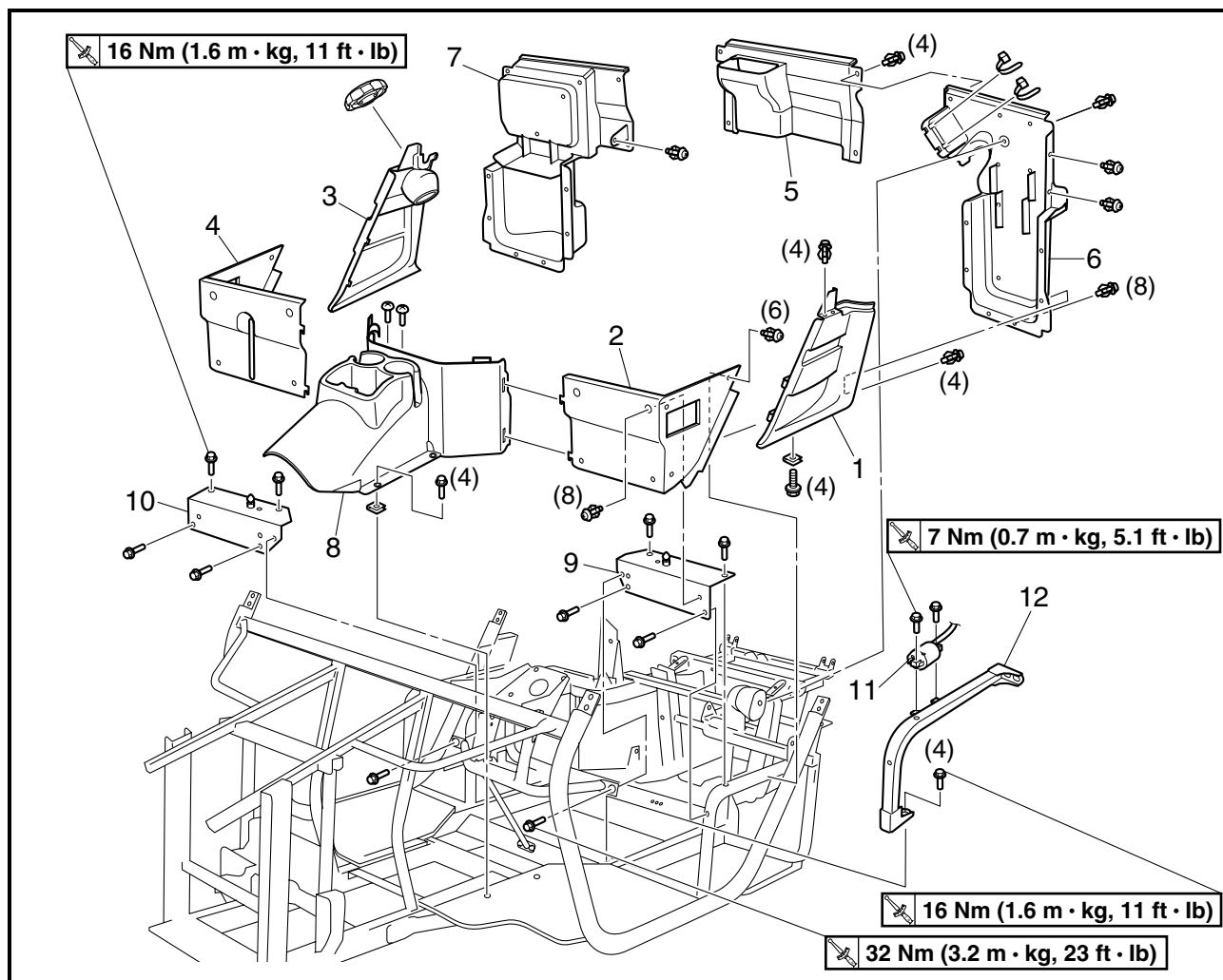
SIDE DOORS



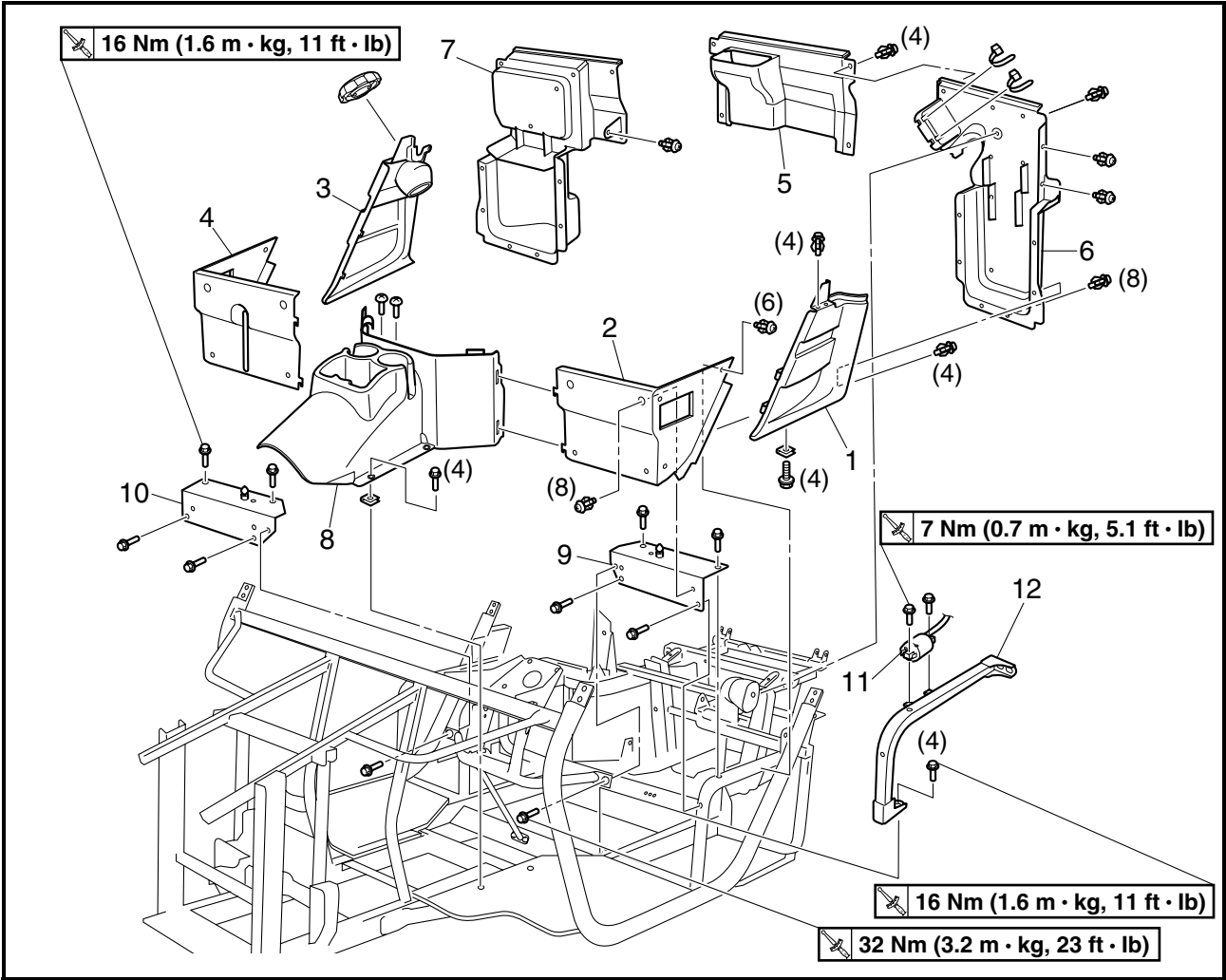
Order	Job/Part	Q'ty	Remarks
	Removing the side doors		Remove the parts in the order listed. The following procedure applies to both of the side doors.
1	Rubber protector	2	
2	Side door	1	
3	Handle latch	1	
4	Side door bracket	2	
5	Hinge	1	
6	Latch	1	
			For installation, reverse the removal procedure.



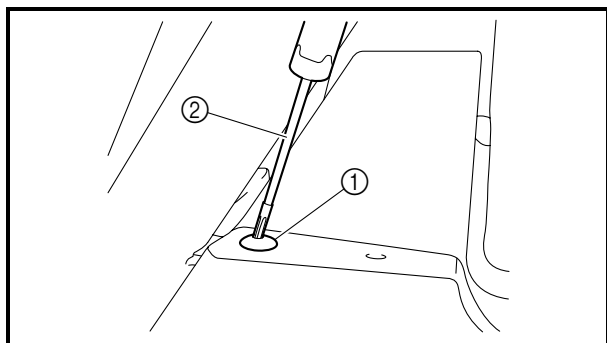
PANELS AND FRONT CONSOLE



Order	Job/Part	Q'ty	Remarks
	Removing the panels and front console		Remove the parts in the order listed.
1	Left side panel	1	Refer to "REMOVING THE SIDE PANELS" and "INSTALLING THE SIDE PANELS".
2	Left corner panel	1	
3	Right side panel	1	
4	Right corner panel	1	
5	Center protector	1	
6	Left protector	1	
7	Right protector	1	
8	Front console	1	
9	Driver seat support	1	
10	Passenger seat support	1	
11	Ignition coil	1	



Order	Job/Part	Q'ty	Remarks
12	Seat rail	1	For installation, reverse the removal procedure.



REMOVING THE SIDE PANELS

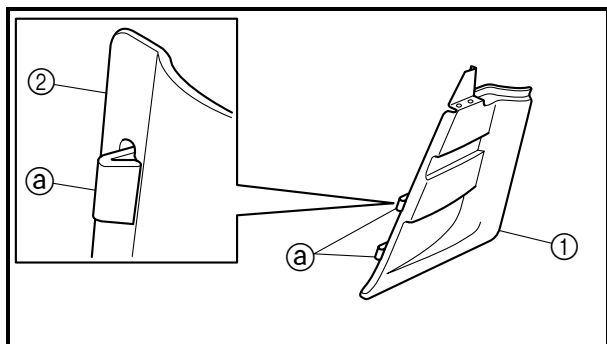
The following procedure applies to both of the side panels.

1. Remove:

- quick fastener ①

TIP:

To remove the quick fastener, push its center with a screwdriver ②, then pull the fastener out.

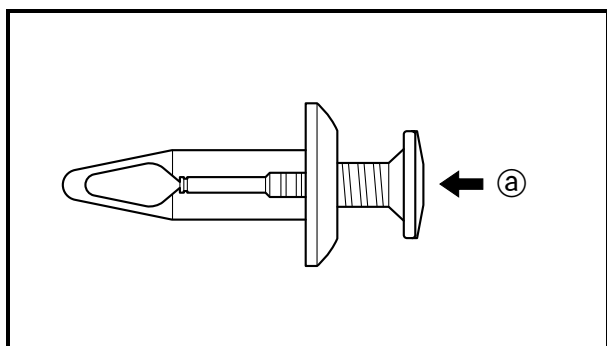


2. Remove:

- side panel ①
- corner panel ②

TIP:

- Remove the side panel and corner panel together from the vehicle, making sure not to break the projections (a).
- Unhook the projections (a) on the side panel from the corner panel.



INSTALL THE SIDE PANELS

1. Install:

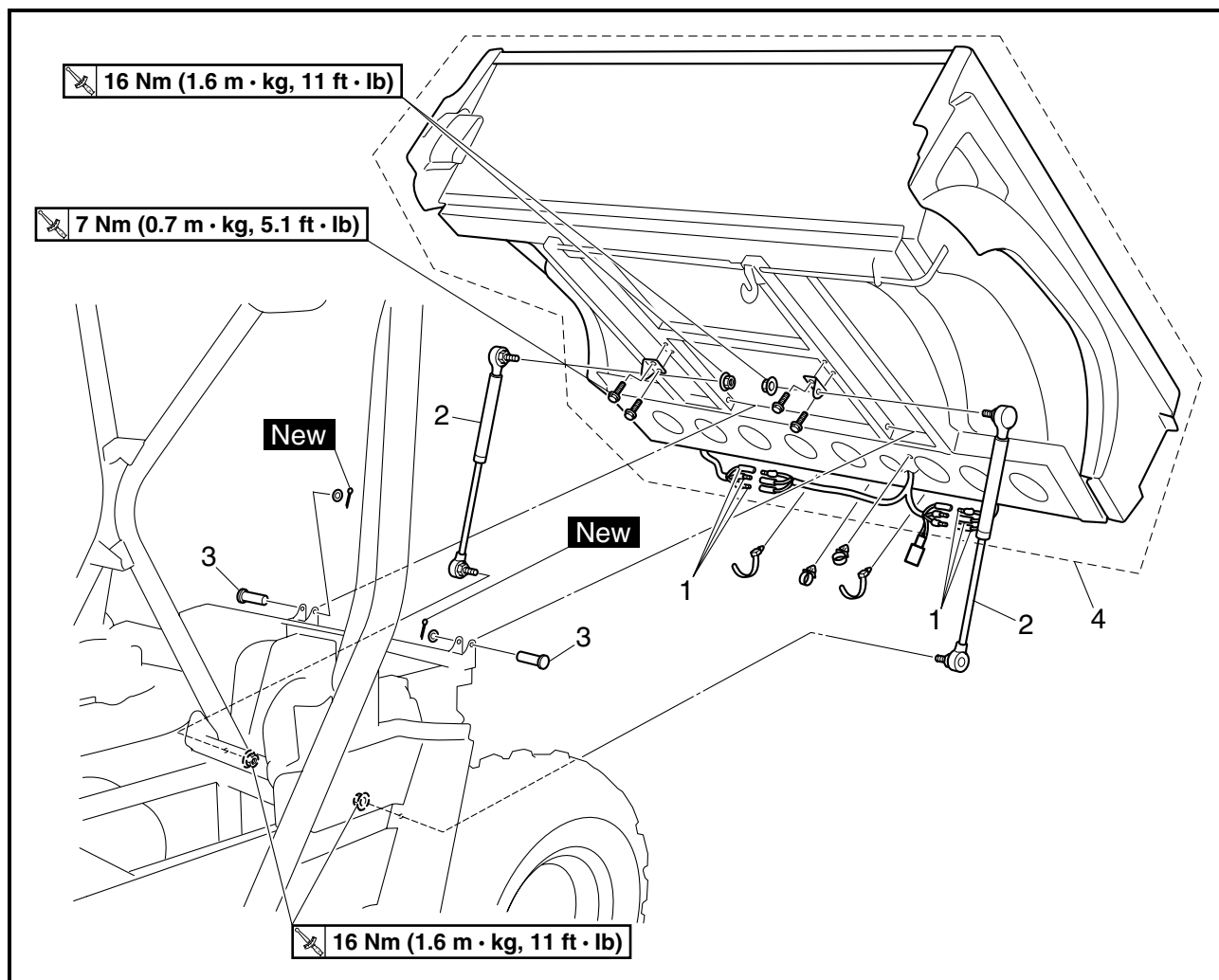
- quick fastener

TIP:

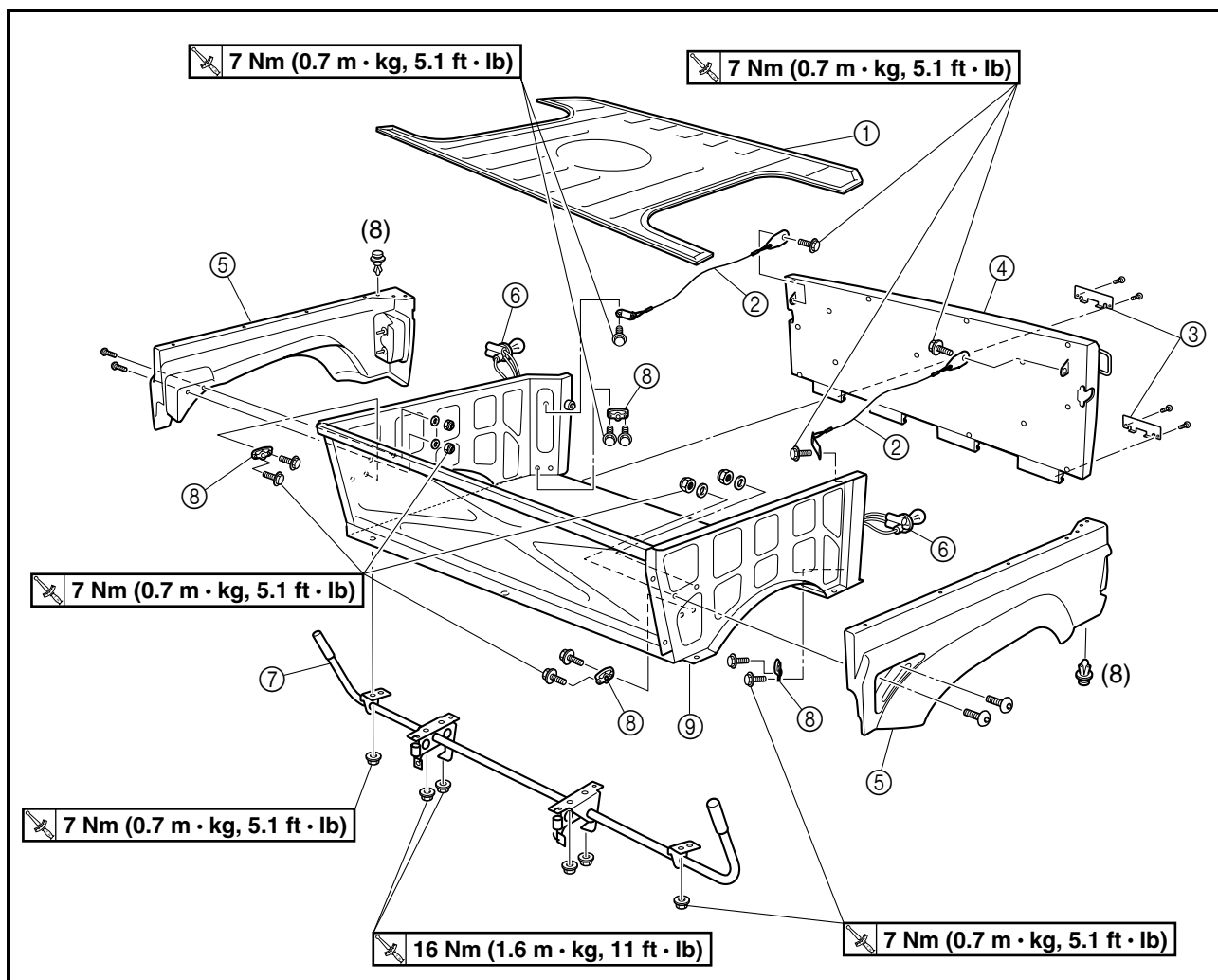
To install the quick fastener, push its pin so that it protrudes from the fastener head, then insert the fastener into the cover and push the pin (a) in with screwdriver. Make sure that the pin is flush with the fastener's head.



CARGO BED

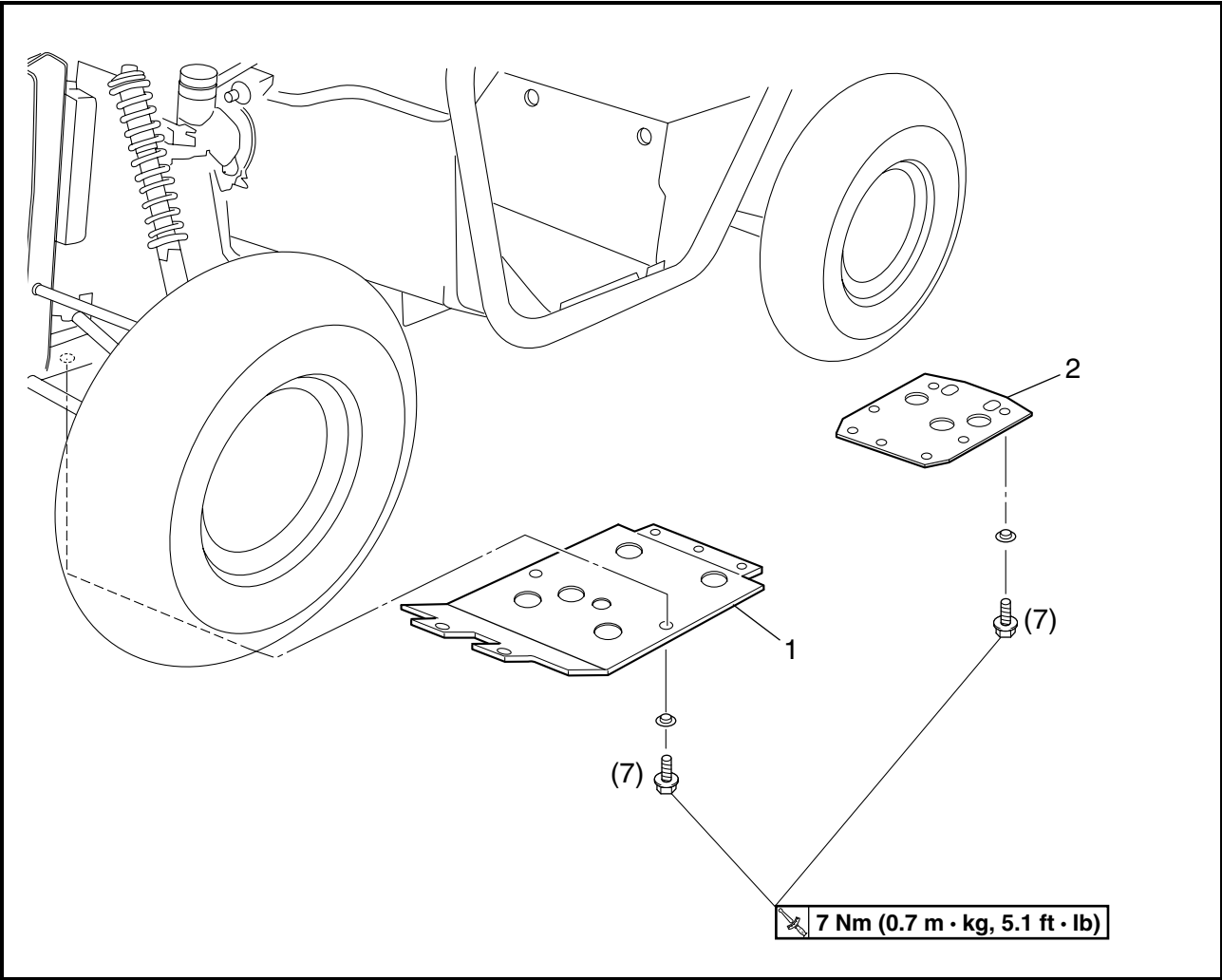


Order	Job/Part	Q'ty	Remarks
	Removing the cargo bed		
1	Tail/brake light connector	6	Remove the parts in the order listed. Disconnect.
2	Gas spring assembly	2	
3	Pin	2	
4	Cargo bed assembly	1	
			For installation, reverse the removal procedure.

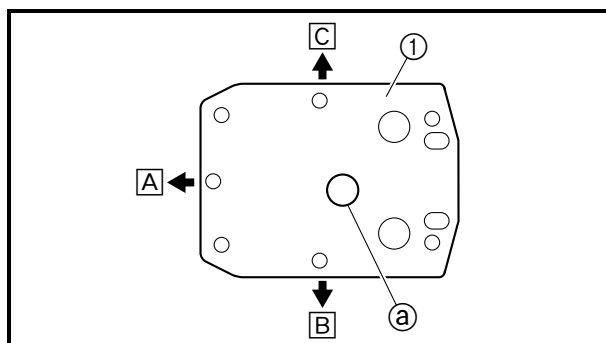


Order	Job/Part	Q'ty	Remarks
	Disassembling the cargo bed		Remove the parts in the order listed.
①	Cargo bed mat	1	
②	Tailgate cable	2	
③	Hinge cover	2	
④	Tailgate	1	
⑤	Cargo bed panel	2	
⑥	Tail/brake light bulb holder	2	
⑦	Cargo bed release lever	1	
⑧	Cargo hook	4	
⑨	Cargo bed	1	
			For assembly, reverse the disassembly procedure.

SKID PLATES



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

**INSTALLING THE REAR SKID PLATE**

1. Install:

- rear skid plate ①

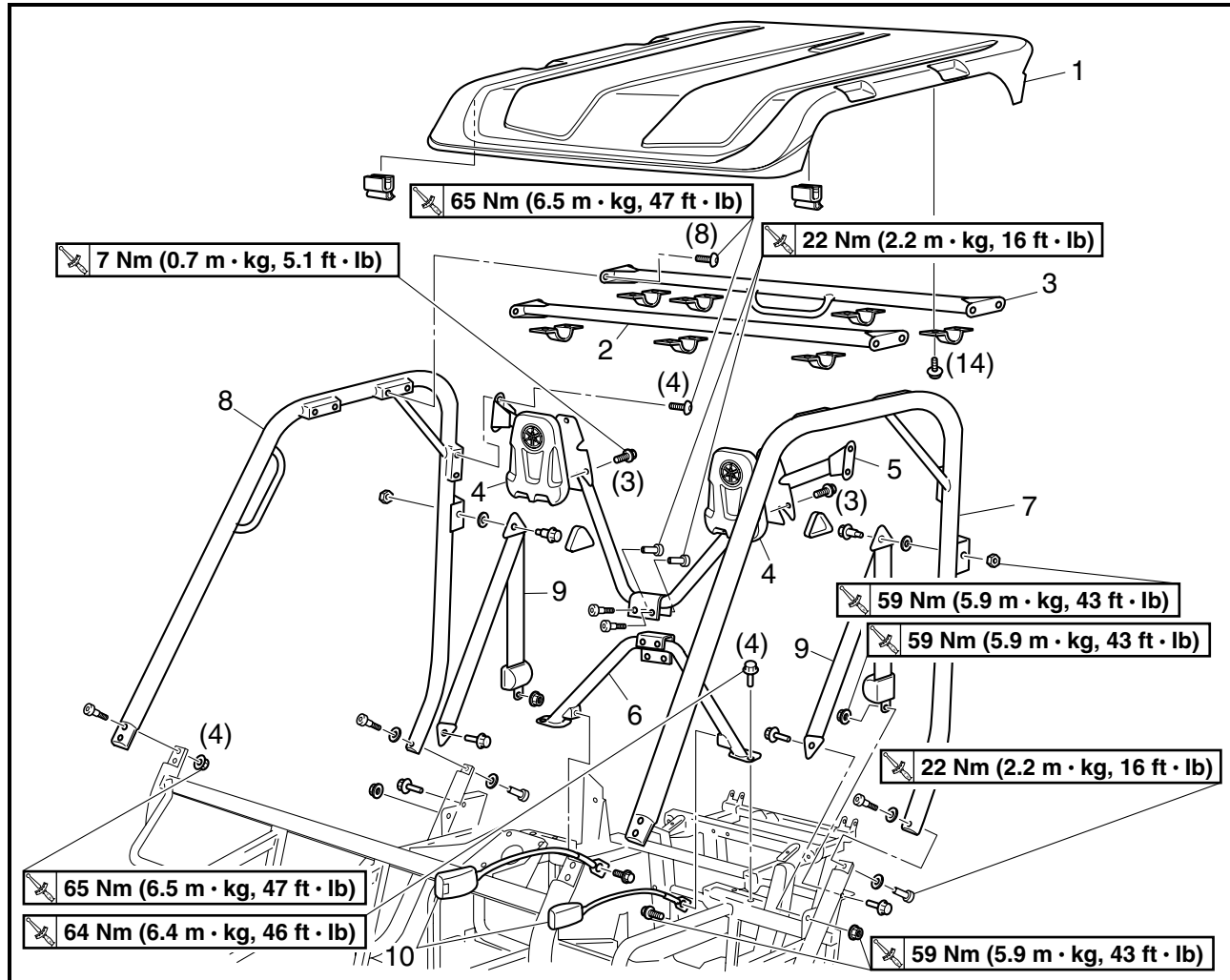
TIP:

Make sure that the hole ② in the rear skid plate ① is towards the left side of the vehicle.

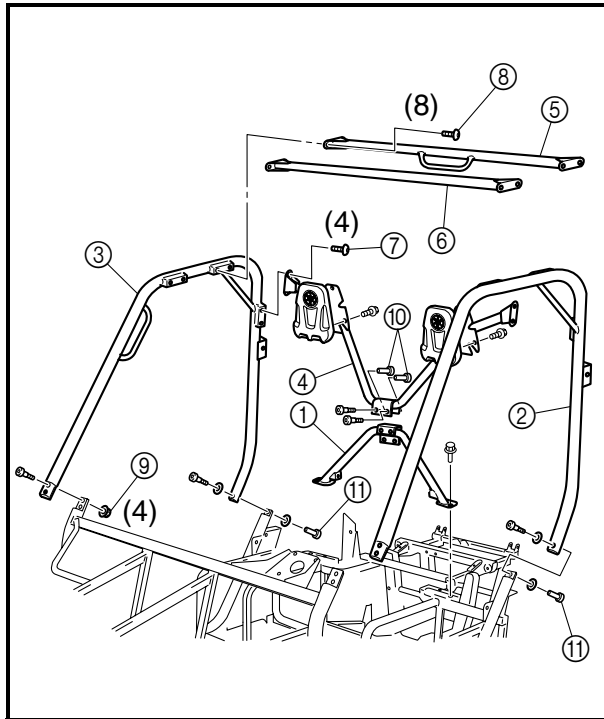
- A** Forward
B Left side
C Right side



ENCLOSURE AND SEAT BELTS



Order	Job/Part	Q'ty	Remarks
	Removing the enclosure and seat belts		Remove the parts in the order listed.
1	Roof	1	For models equipped with a roof
2	Front top frame	1	Refer to "INSTALLING THE ENCLOSURE".
3	Rear top frame	1	
4	Headrest	2	
5	Upper support frame	1	
6	Lower support frame	1	
7	Left side frame	1	
8	Right side frame	1	
9	Seat belt	2	For installation, reverse the removal procedure.
10	Buckle	2	



INSTALLING THE ENCLOSURE

1. Install:

- lower support frame ①

64 Nm (6.4 m · kg, 46 ft · lb)

2. Install:

- left side frame ②
- right side frame ③
- upper support frame ④
- rear top frame ⑤
- front top frame ⑥

TIP:

Do not fully tighten the bolts and nuts.

3. Tighten:

- upper support frame and side frame bolts ⑦

65 Nm (6.5 m · kg, 47 ft · lb)

- top frame and side frame bolts ⑧

65 Nm (6.5 m · kg, 47 ft · lb)

- side frame and frame nuts (front side) ⑨

65 Nm (6.5 m · kg, 47 ft · lb)

- lower support frame and upper support frame nuts ⑩

22 Nm (2.2 m · kg, 16 ft · lb)

- side frame and frame nuts (rear side) ⑪

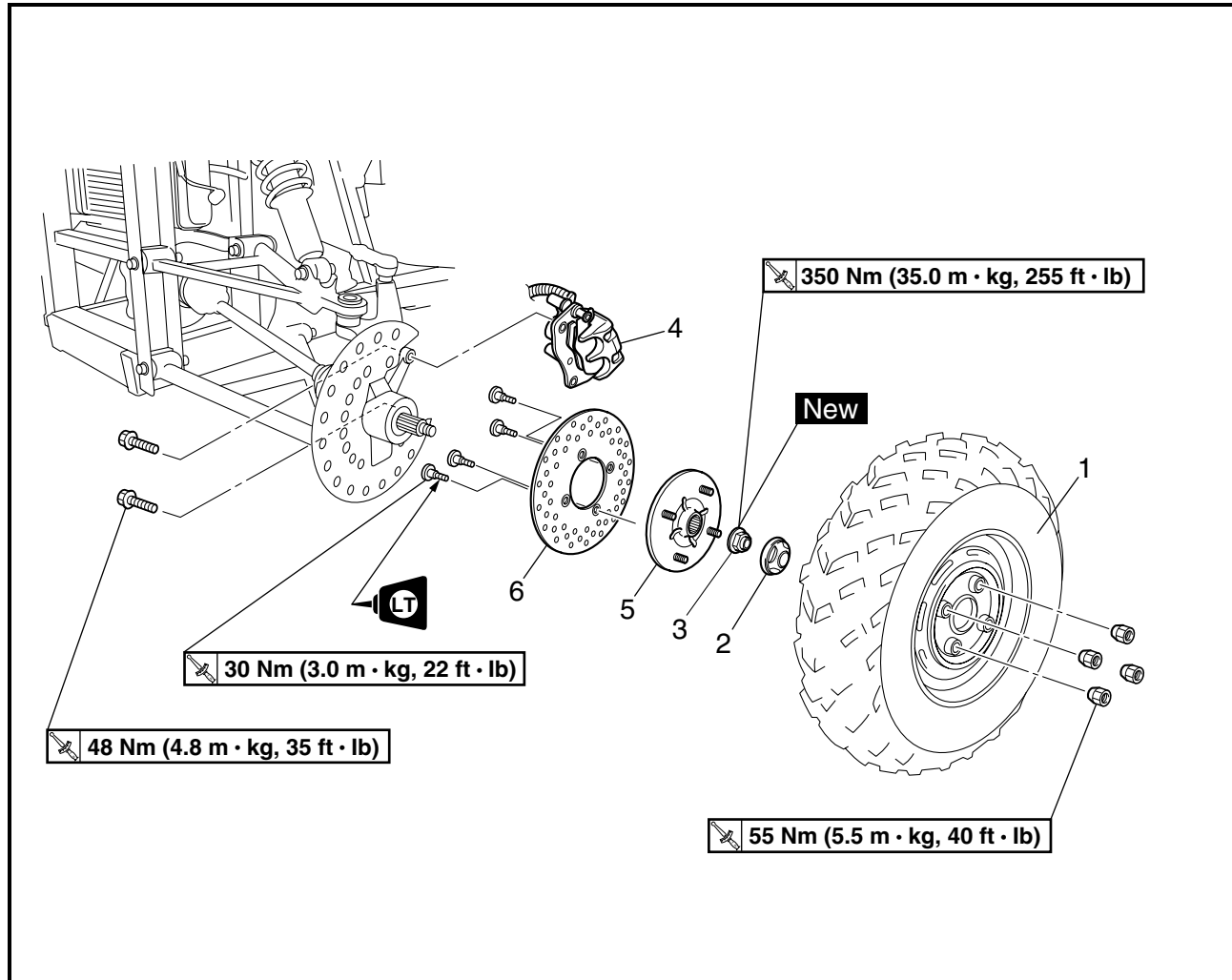
22 Nm (2.2 m · kg, 16 ft · lb)



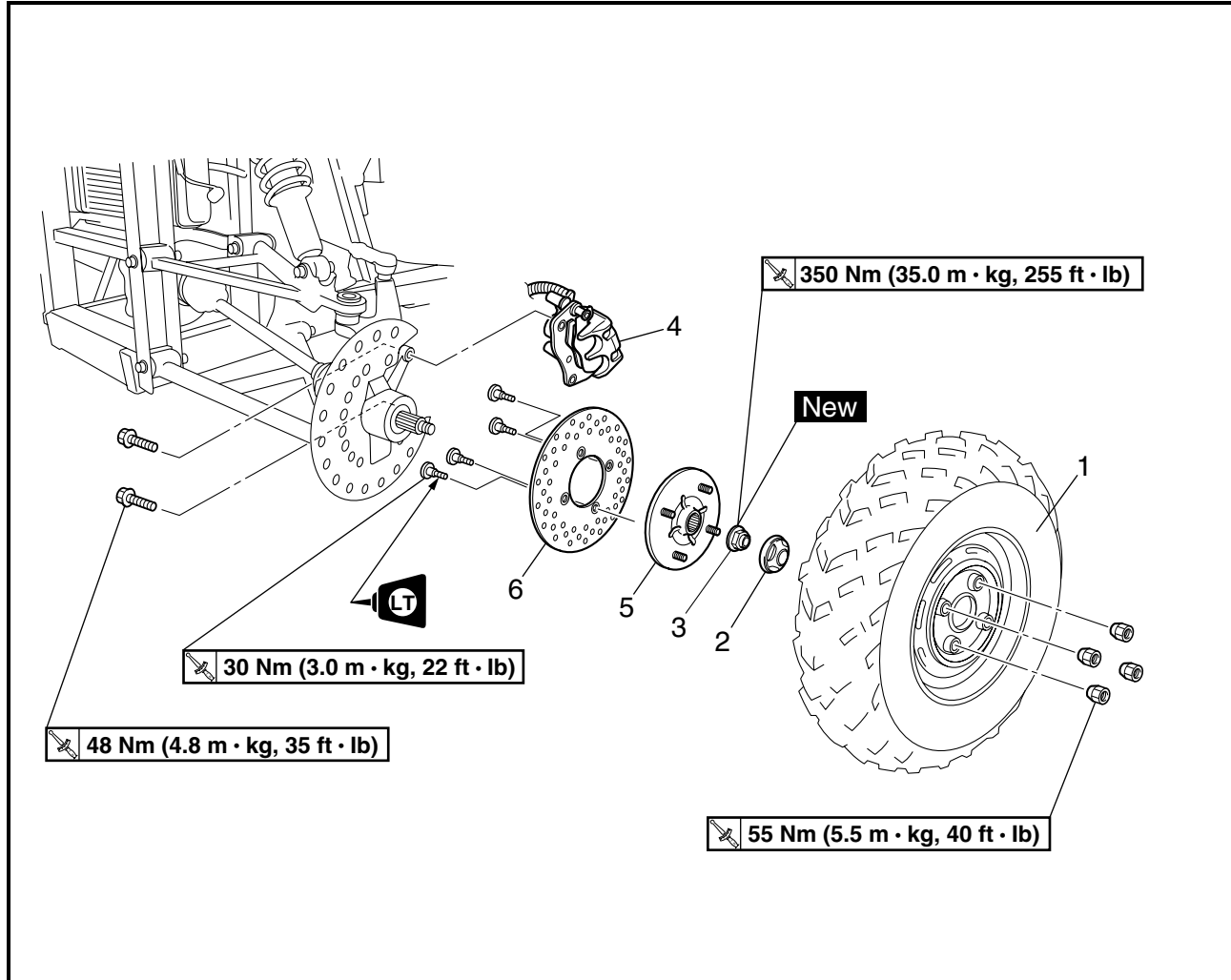
EBS00378

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".

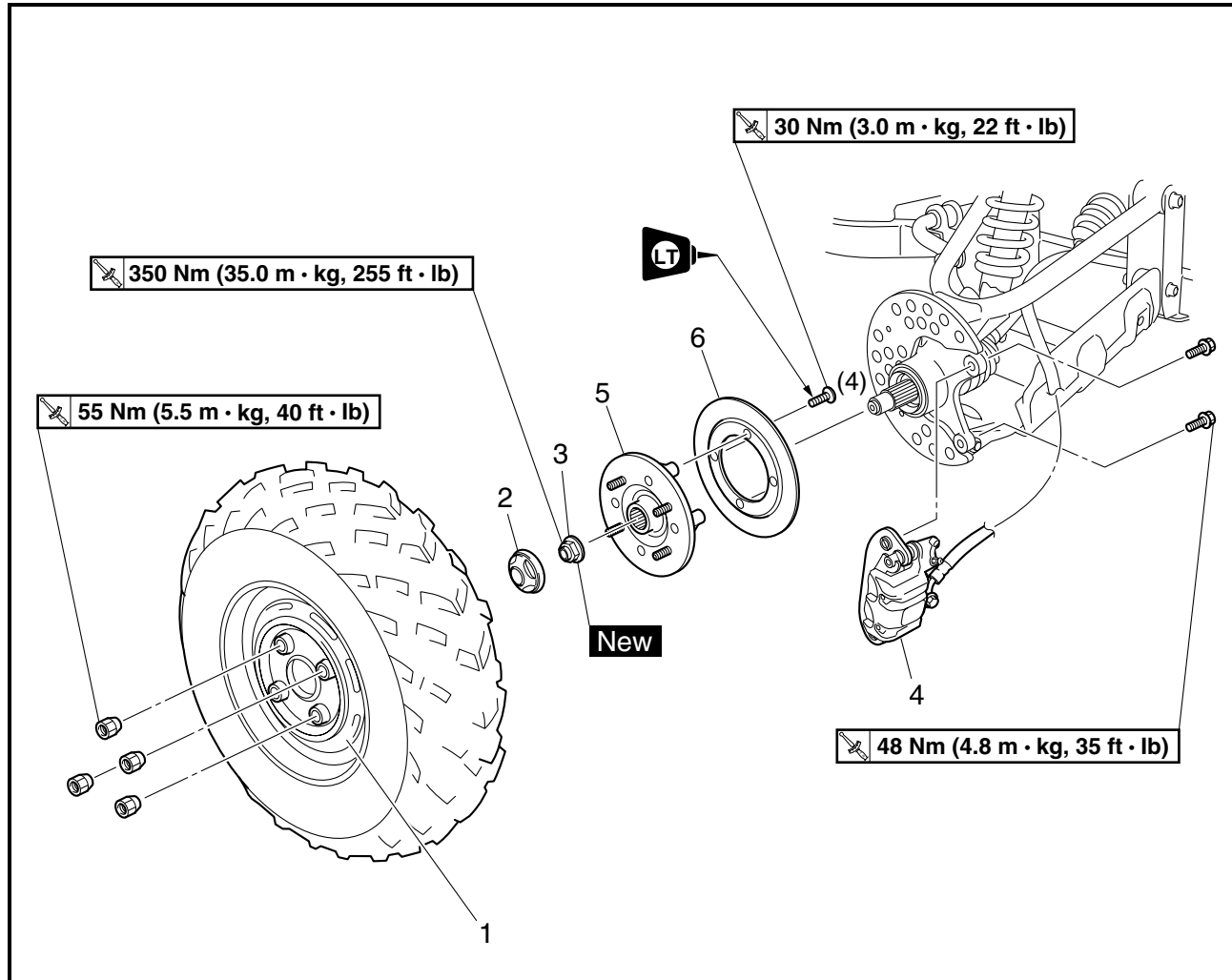


Order	Job/Part	Q'ty	Remarks
4	Front brake caliper assembly	1	TIP: _____ Do not depress the brake pedal when the brake caliper is off of the brake disc as the brake pads will be forced shut.
5	Front wheel hub	1	
6	Front brake disc	1	
			For installation, reverse the removal procedure.

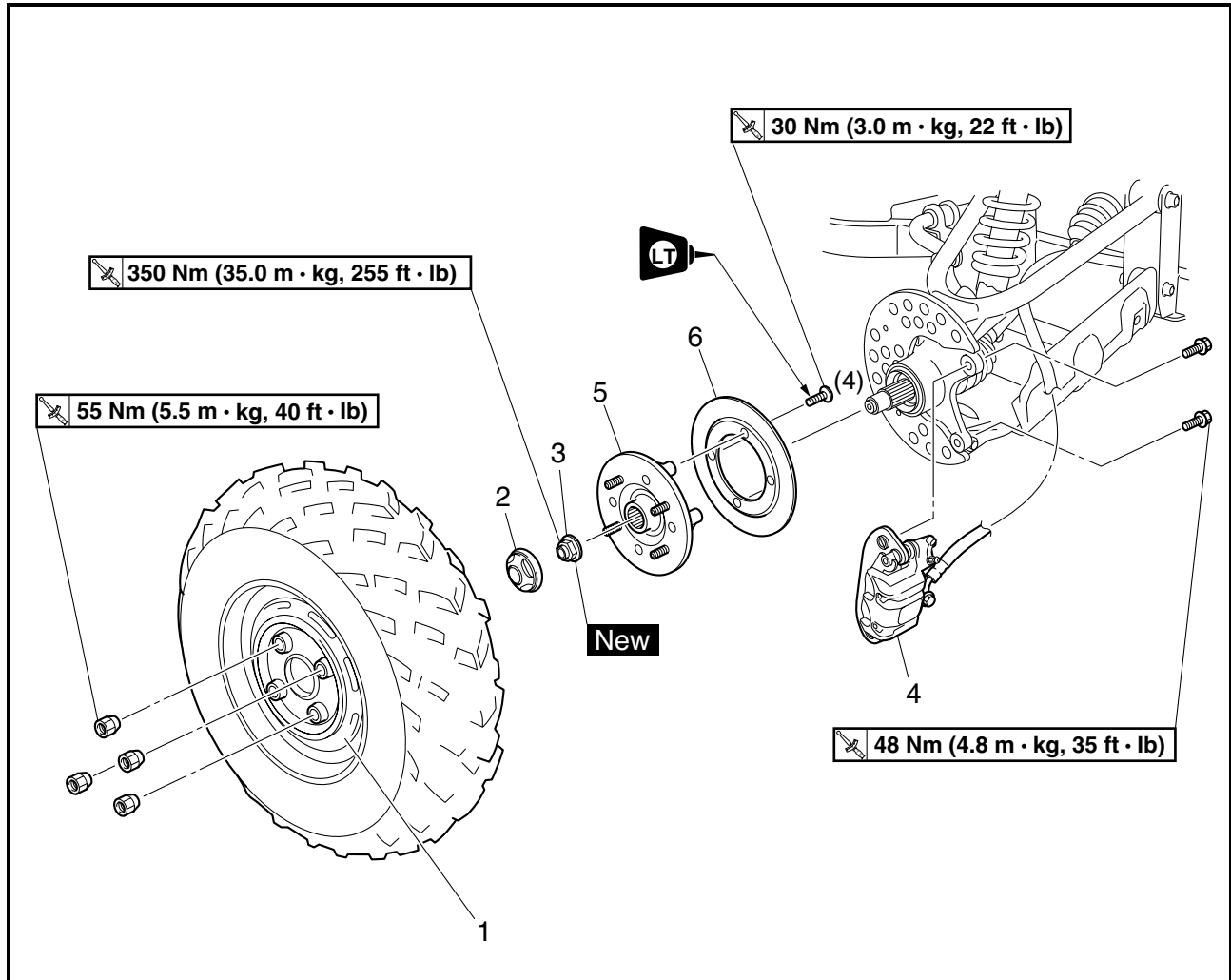


EBS00379

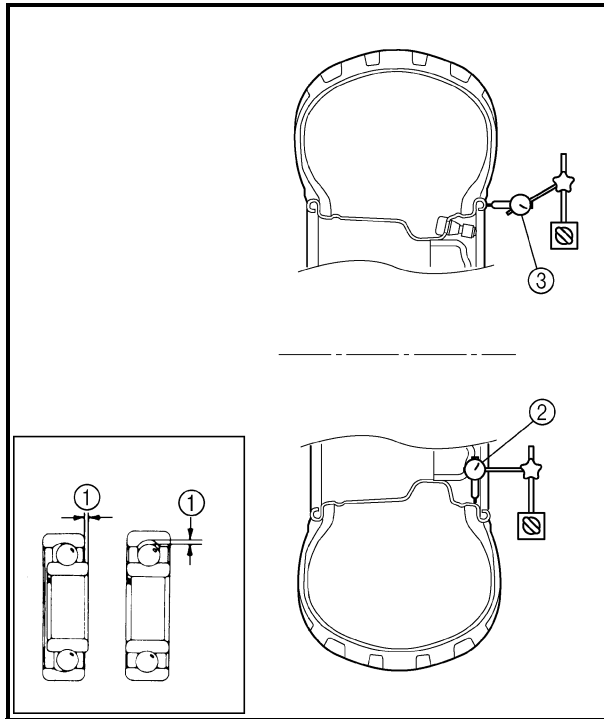
REAR WHEELS



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	TIP: Do not depress the brake pedal when the brake caliper is off of the brake disc as the brake pads will be forced shut. For installation, reverse the removal procedure.
5	Rear wheel hub	1	
6	Rear brake disc	1	



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

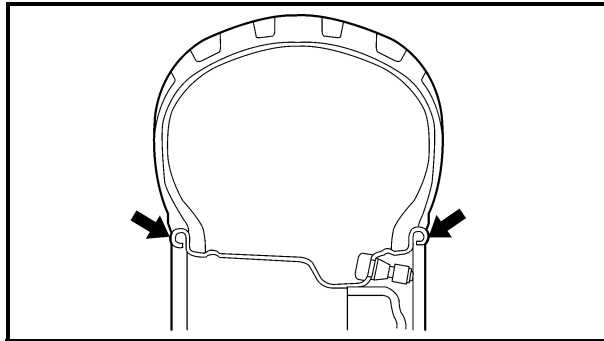
Radial ②: 2.0 mm (0.08 in)

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)



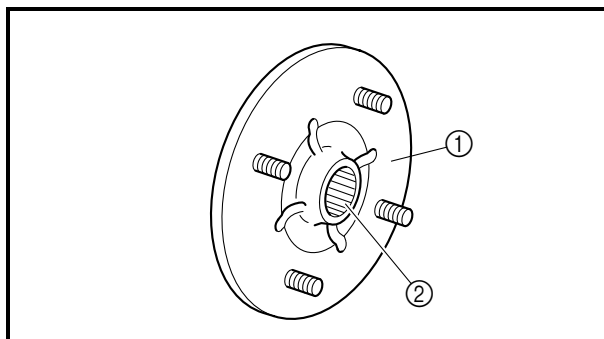
3. Check:

- 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 occupant injury.



EBS00385

CHECKING THE WHEEL HUBS

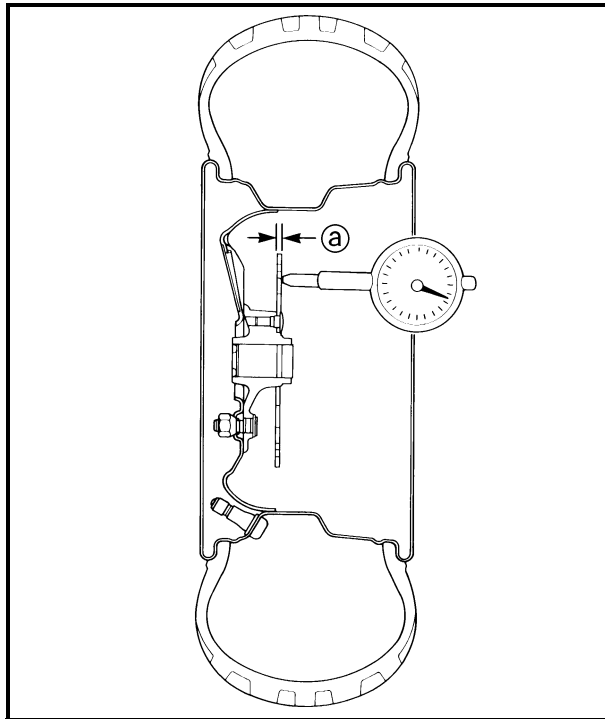
1. Check:

- 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.

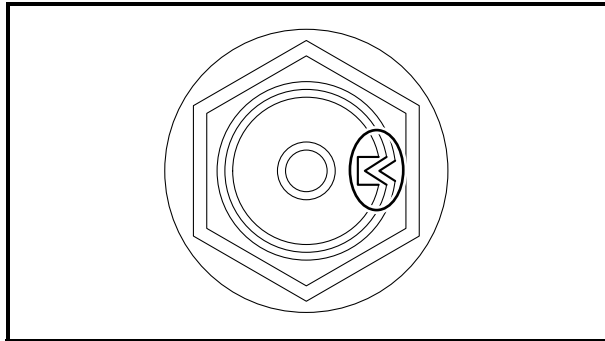


Brake disc maximum deflection
 Front: 0.1 mm (0.004 in)
 Rear: 0.1 mm (0.004 in)

- brake disc thickness @
- Out of specification → Replace.

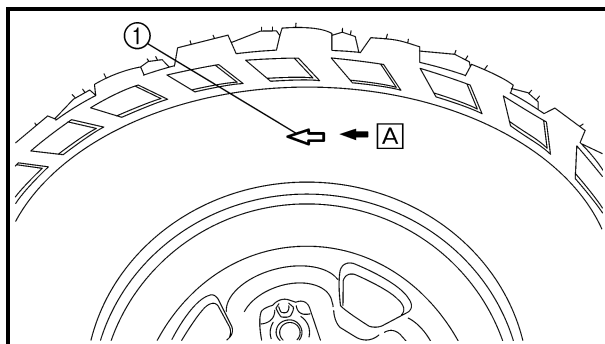


Brake disc minimum thickness
 Front: 3.0 mm (0.12 in)
 Rear: 3.0 mm (0.12 in)



INSTALLING THE WHEEL HUBS

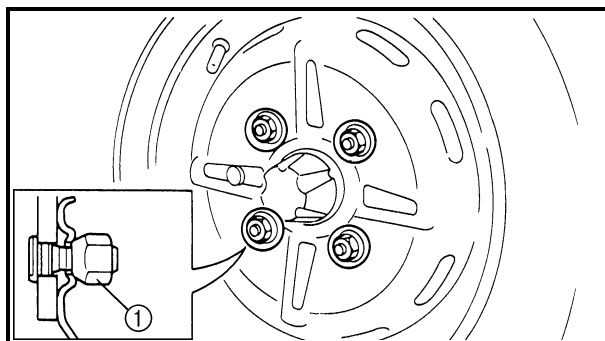
1. Install:
 - wheel axle nut **New**
- 350 Nm (35.0 m · kg, 255 ft · lb)**
- TIP:** _____
- Do not apply oil to the seat of the nut.
 - After tightening the nut, stake the collar of the nut into the notch of the shaft.



EBS00392

INSTALLING THE WHEELS

1. Install:
 - wheels
- TIP:** _____
- 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)

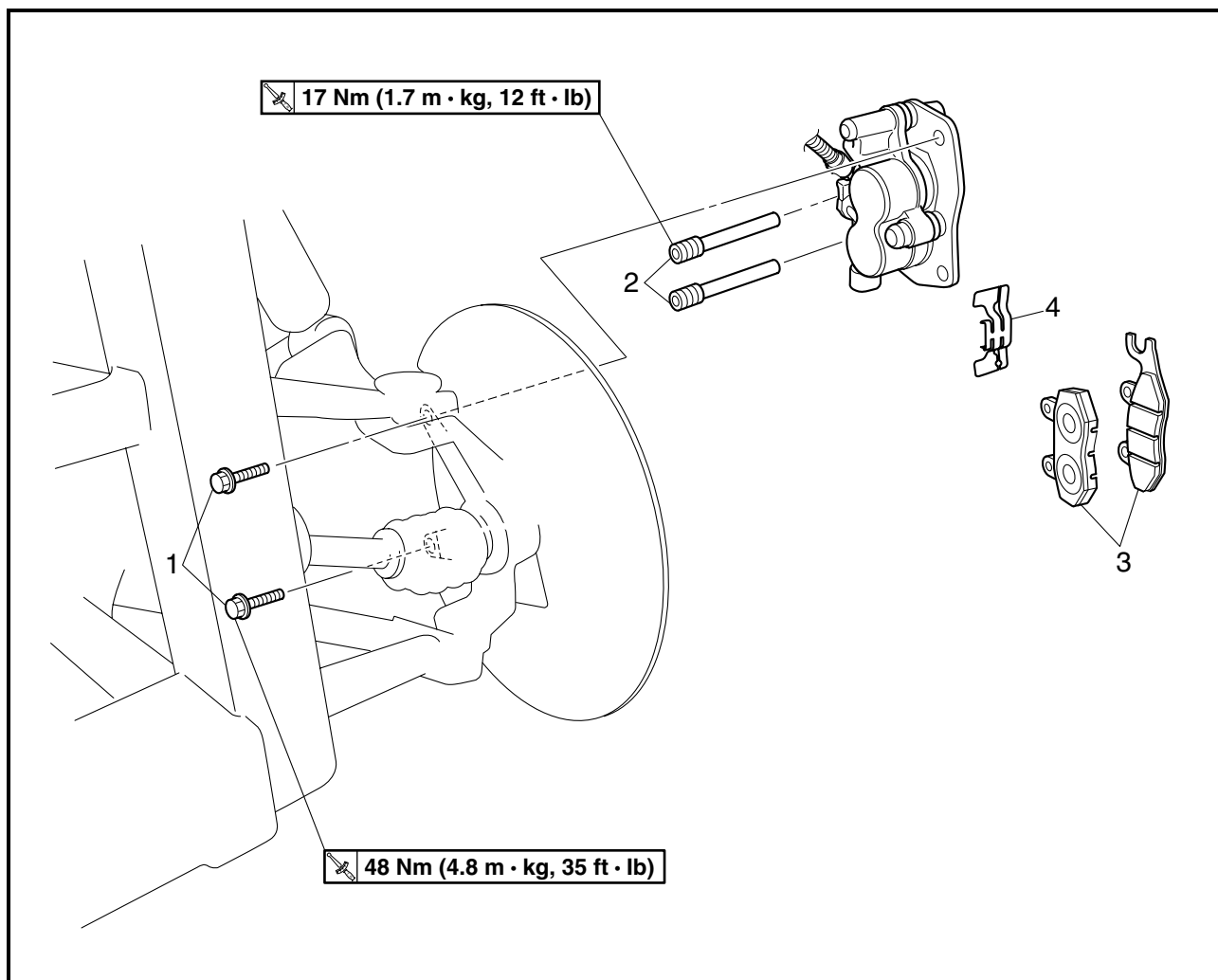
⚠ WARNING

Tapered wheel nuts ① are used for both the front and rear wheels. Install each nut with its tapered side towards the wheel.



FRONT AND REAR BRAKES

FRONT BRAKE PADS

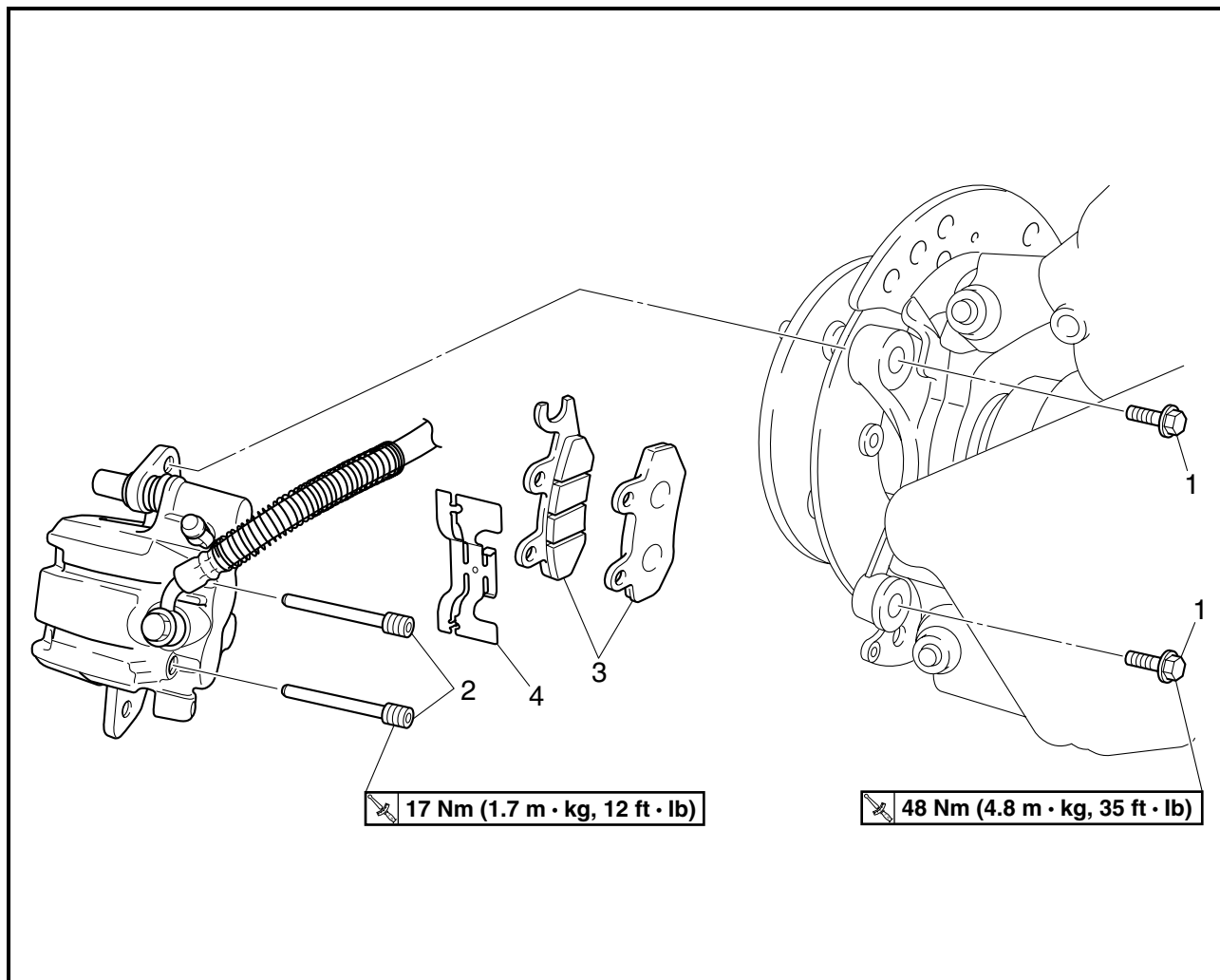


Order	Job/Part	Q'ty	Remarks
	Removing the front brake pads		Remove the parts in the order listed. The following procedure applies to both of the front brake calipers. Refer to "FRONT AND REAR WHEELS".
1	Front wheel	2	Refer to "REPLACING THE FRONT AND REAR BRAKE PADS".
2	Front brake caliper bolt	2	
3	Brake pad holding bolt	2	
4	Front brake pad	2	
	Brake pad spring	1	For installation, reverse the removal procedure.



EBS00401

REAR BRAKE PADS



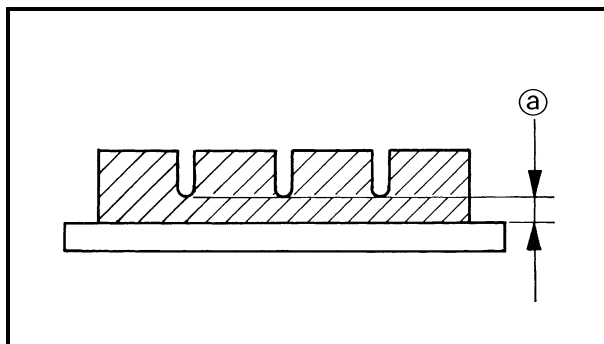
Order	Job/Part	Q'ty	Remarks
	Removing the rear brake pads		Remove the parts in the order listed. The following procedure applies to both of the rear brake calipers. Refer to "FRONT AND REAR WHEELS".
1	Rear wheel	2	Refer to "REPLACING THE FRONT AND REAR BRAKE PADS".
2	Rear brake caliper bolt	2	
3	Brake pad holding bolt	2	
4	Rear brake pad	2	
	Brake pad spring	1	For installation, reverse the removal procedure.

**NOTICE**

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.

**REPLACING THE FRONT AND REAR BRAKE PADS****TIP:**

It is not necessary to disassemble the brake caliper and brake hose to replace the brake pads.

1. Measure:

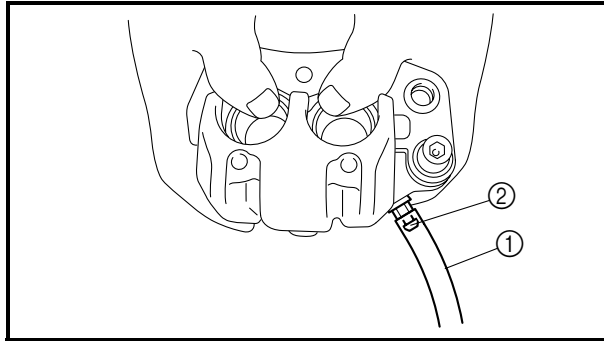
- brake pad wear limit (a)

Out of specification → Replace the brake pads as a set.

**Brake pad wear limit**

Front: 1.5 mm (0.06 in)

Rear: 1.5 mm (0.06 in)



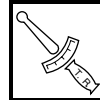
2. Install:
 - brake pads
 - brake pad spring

TIP:

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

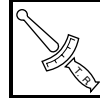


- a. Connect a suitable hose ① tightly to the brake caliper bleed screw ②. Put the other end of this hose into an open container.
- b. Loosen the brake caliper bleed screw and, using a finger, push the caliper piston into the brake caliper.
- c. Tighten the brake caliper bleed screw.



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

- d. Install the new brake pads and a new brake pad spring.
- e. Tighten the brake pad holding bolts and brake caliper bolts.



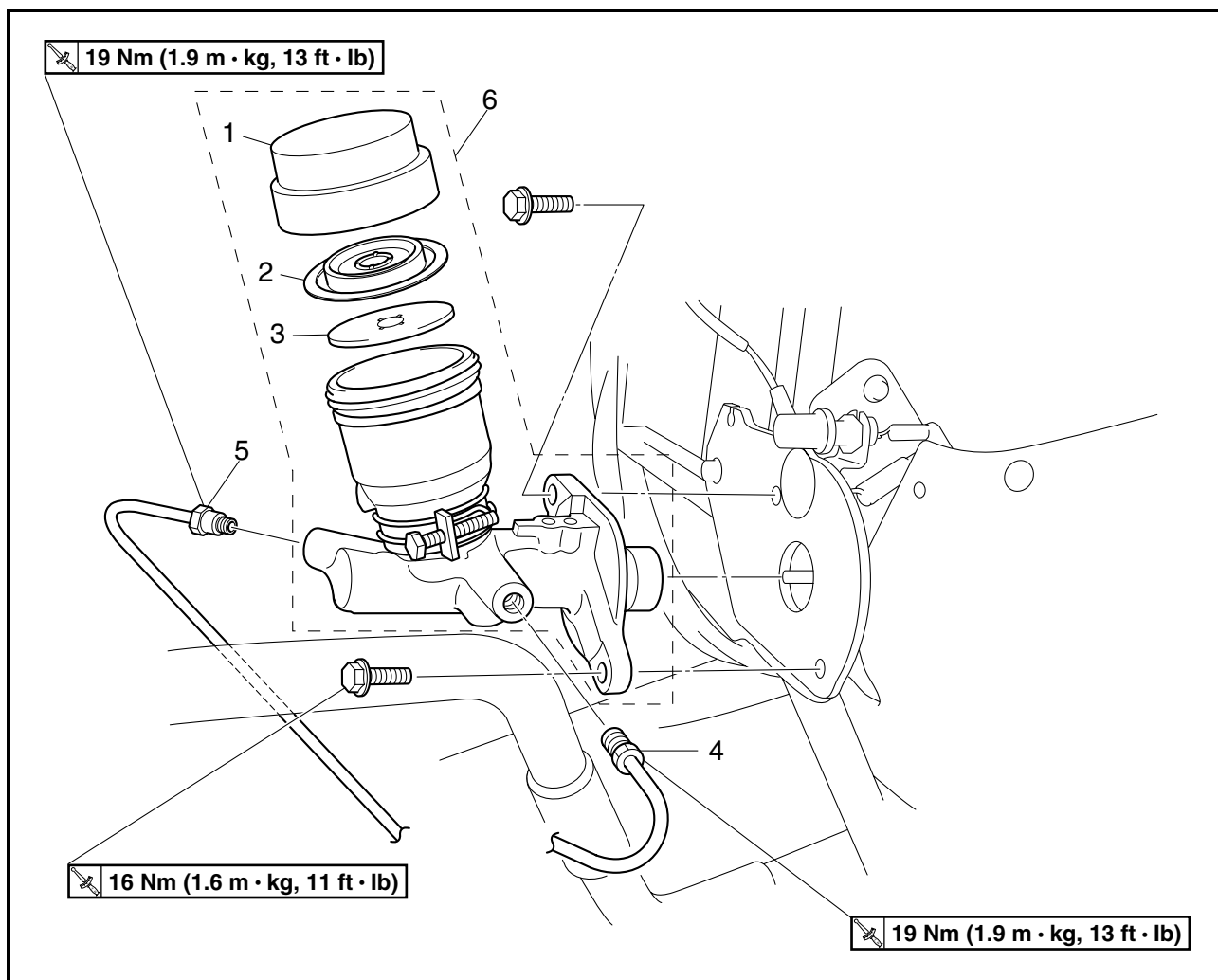
Brake pad holding bolt
17 Nm (1.7 m · kg, 12 ft · lb)
Brake caliper bolt
48 Nm (4.8 m · kg, 35 ft · lb)



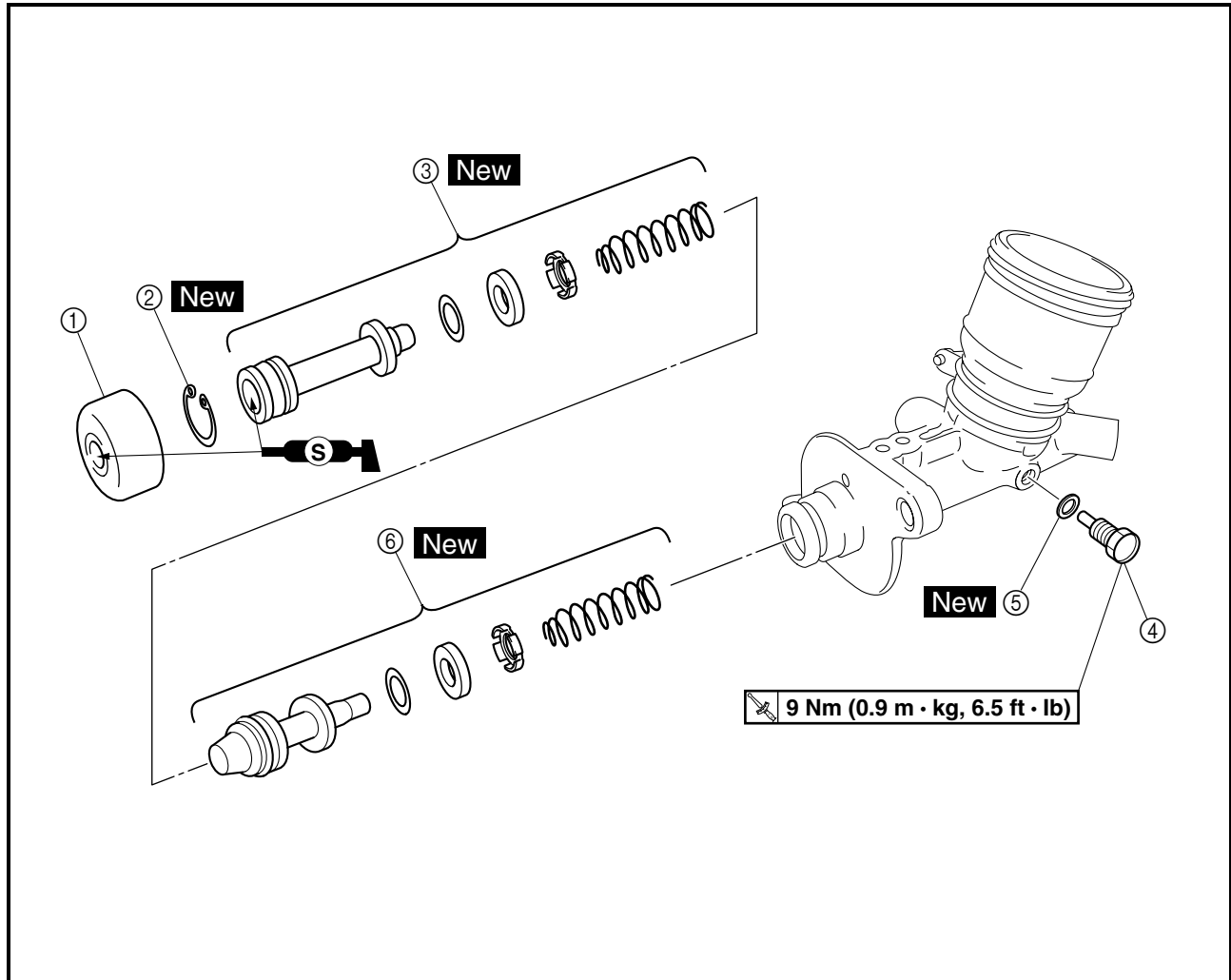
3. Check:
 - brake fluid level
 Refer to “CHECKING THE BRAKE FLUID LEVEL” in chapter 3.
4. Check:
 - brake pedal operation
 Soft or spongy feeling → Bleed the brake system.
 Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.



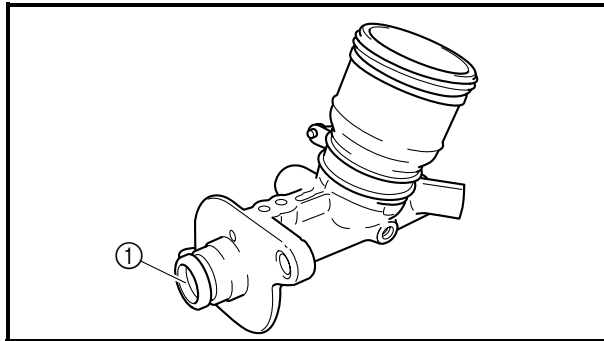
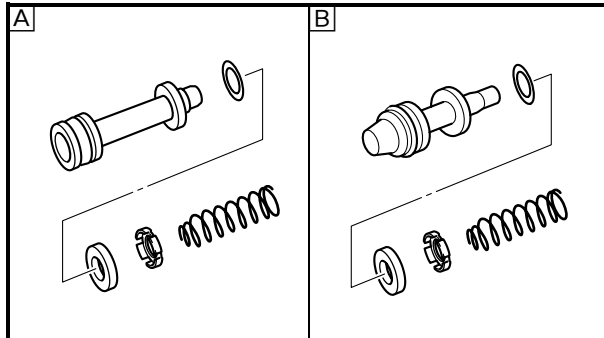
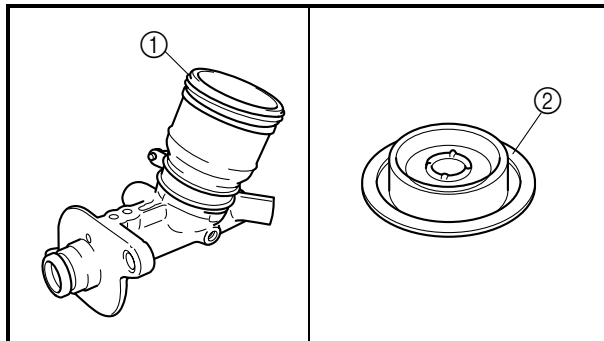
BRAKE MASTER CYLINDER



Order	Job/Part	Q'ty	Remarks
	Removing the brake master cylinder		Remove the parts in the order listed. Drain.
	Brake fluid		
1	Brake fluid reservoir cap	1	Disconnect. } Refer to "INSTALLING Disconnect. } THE BRAKE MASTER } CYLINDER". For installation, reverse the removal procedure.
2	Brake fluid reservoir diaphragm	1	
3	Brake fluid reservoir float	1	
4	Brake pipe	1	
5	Brake pipe	1	
6	Brake master cylinder	1	



Order	Job/Part	Q'ty	Remarks
	Disassembling the brake master cylinder		Remove the parts in the order listed.
①	Dust boot	1	
②	Circlip	1	
③	Primary brake master cylinder kit	1	
④	Secondary brake master cylinder kit stopper	1	
⑤	Gasket	1	
⑥	Secondary brake master cylinder kit	1	
			For assembly, reverse the disassembly procedure.



CHECKING THE MASTER CYLINDER

1. Check:

- brake master cylinder ①
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.

A Primary brake master cylinder kit

B Secondary brake master cylinder kit

3. Check:

- brake fluid reservoir ①
- brake fluid reservoir diaphragm ②
Cracks/damage → Replace.

EB702060

ASSEMBLING THE BRAKE MASTER CYLINDER

⚠ 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.



INSTALLING THE BRAKE MASTER CYLINDER

1. Install:
 - brake master cylinder

 16 Nm (1.6 m · kg, 11 ft · lb)

2. Install:
 - brake pipes

 19 Nm (1.9 m · kg, 13 ft · lb)

WARNING

Proper brake pipe routing is essential to insure safe vehicle operation. Refer to “CABLE ROUTING” in chapter 2.

3. Fill:
 - brake master cylinder reservoir



**Recommended brake fluid
DOT 4**

NOTICE

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 systemRefer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.



5. Check:

- brake fluid level

Brake fluid level is under the “MIN” level line

→ Fill up.

Refer to “CHECKING THE BRAKE FLUID LEVEL” in chapter 3.

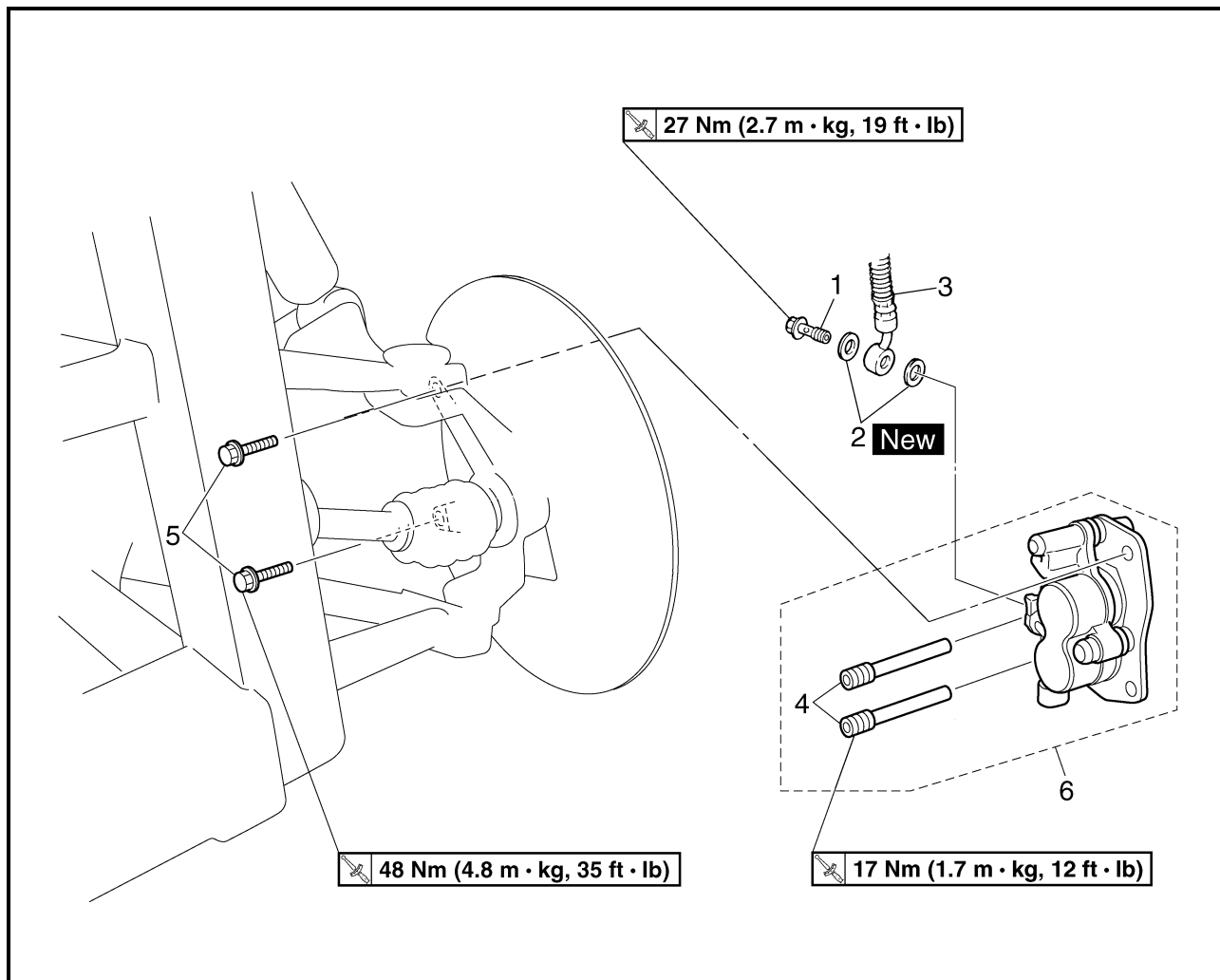
6. Adjust:

- brake pedal free play

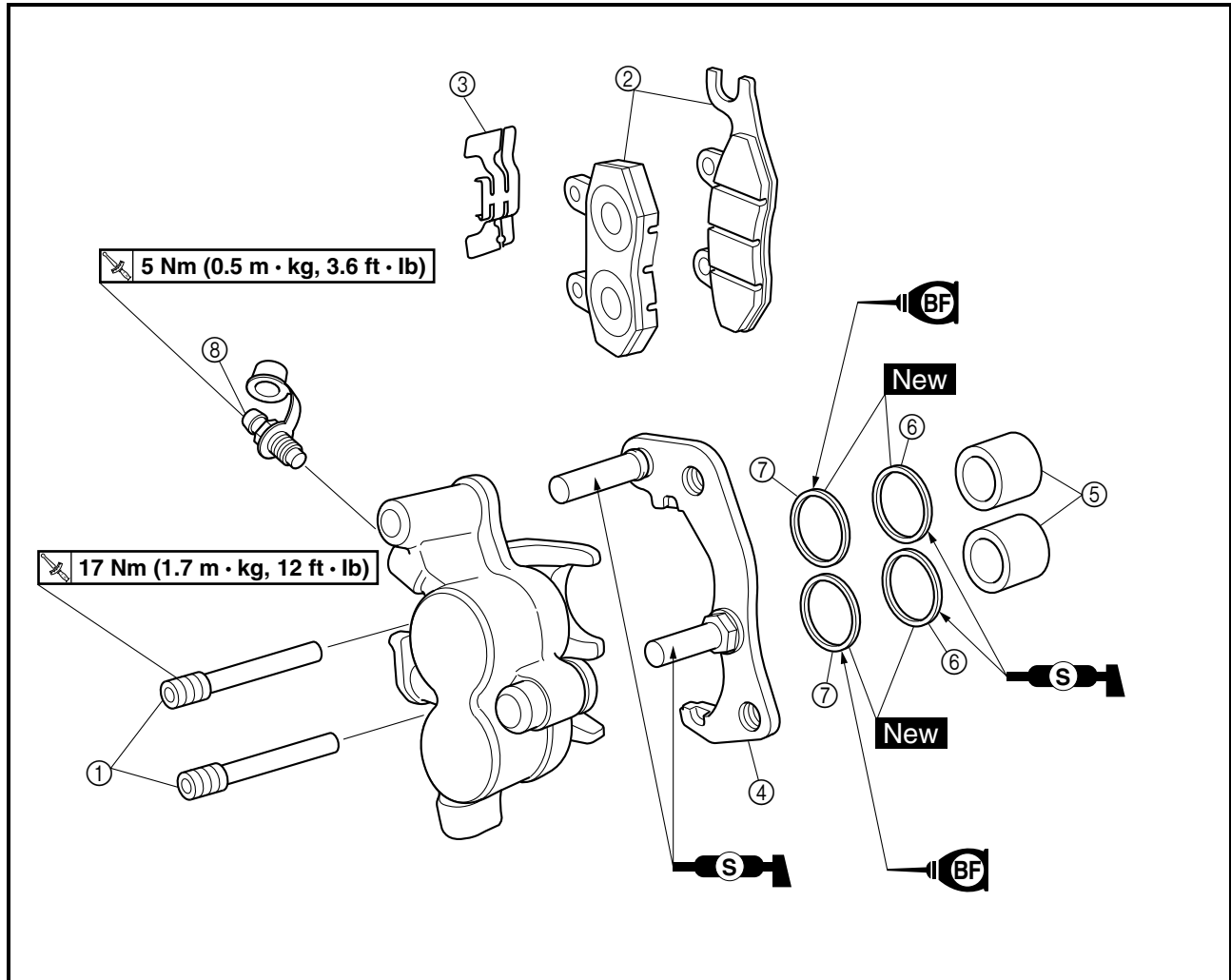
Refer to “ADJUSTING THE BRAKE PEDAL” in chapter 3.



FRONT BRAKE CALIPER



Order	Job/Part	Q'ty	Remarks
	Removing the front brake caliper		
	Brake fluid		Remove the parts in the order listed.
	Front wheel		The following procedure applies to both of the front brake calipers.
1	Union bolt	1	Drain.
2	Copper washer	2	Refer to "FRONT AND REAR WHEELS".
3	Front brake hose	1	Disconnect. Loosen. Refer to "INSTALLING THE FRONT AND REAR BRAKE CALIPERS".
4	Brake pad holding bolt	2	
5	Front brake caliper bolt	2	
6	Front brake caliper assembly	1	For installation, reverse the removal procedure.

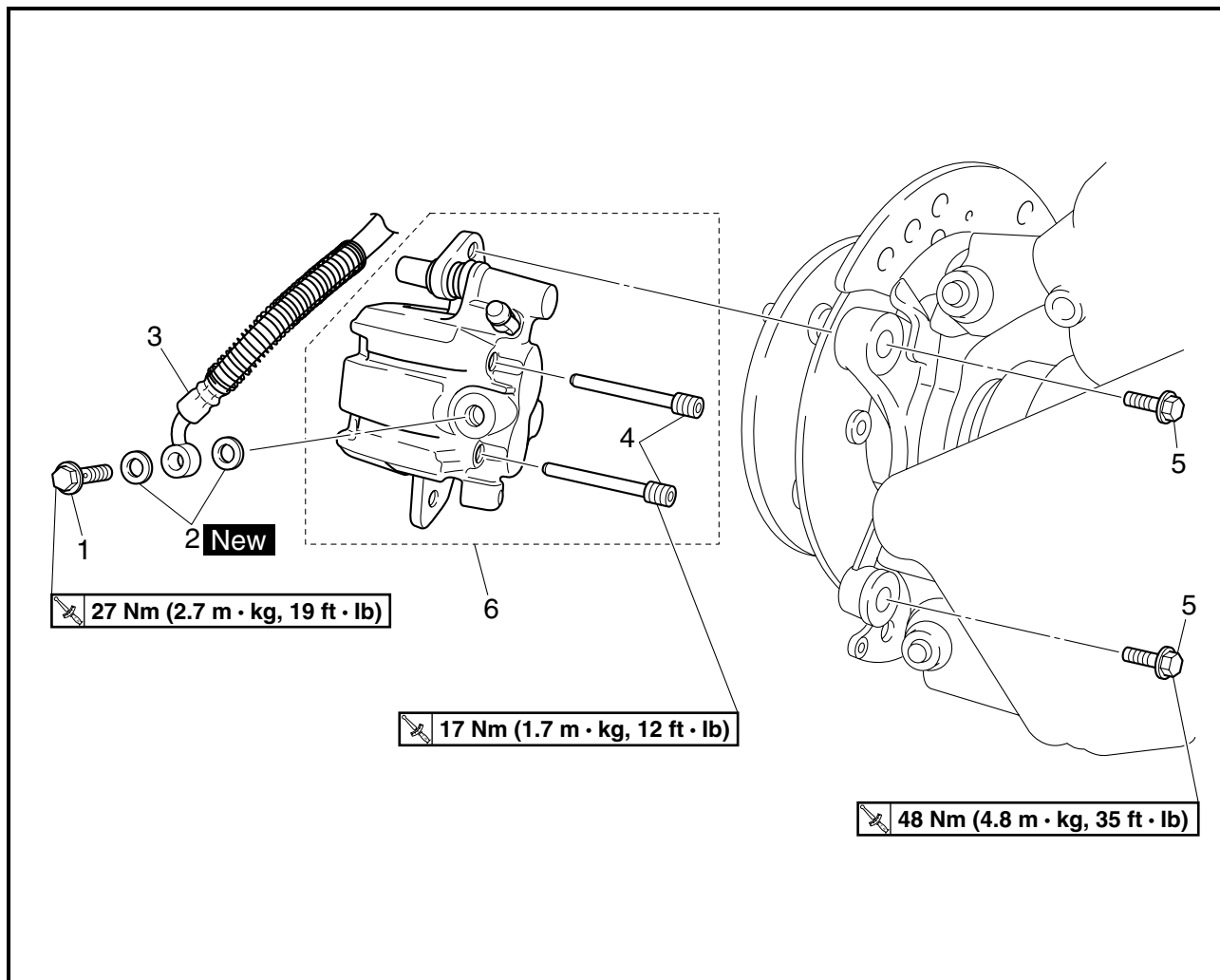


Order	Job/Part	Q'ty	Remarks
	Disassembling the front brake caliper		Remove the parts in the order listed. The following procedure applies to both of the front brake calipers.
①	Brake pad holding bolt	2	Refer to "DISASSEMBLING THE FRONT AND REAR BRAKE CALIPERS".
②	Front brake pad	2	
③	Brake pad spring	1	
④	Brake caliper bracket	1	
⑤	Brake caliper piston	2	
⑥	Brake caliper dust seal	2	
⑦	Brake caliper piston seal	2	
⑧	Bleed screw	1	For assembly, reverse the disassembly procedure.



EBS00424

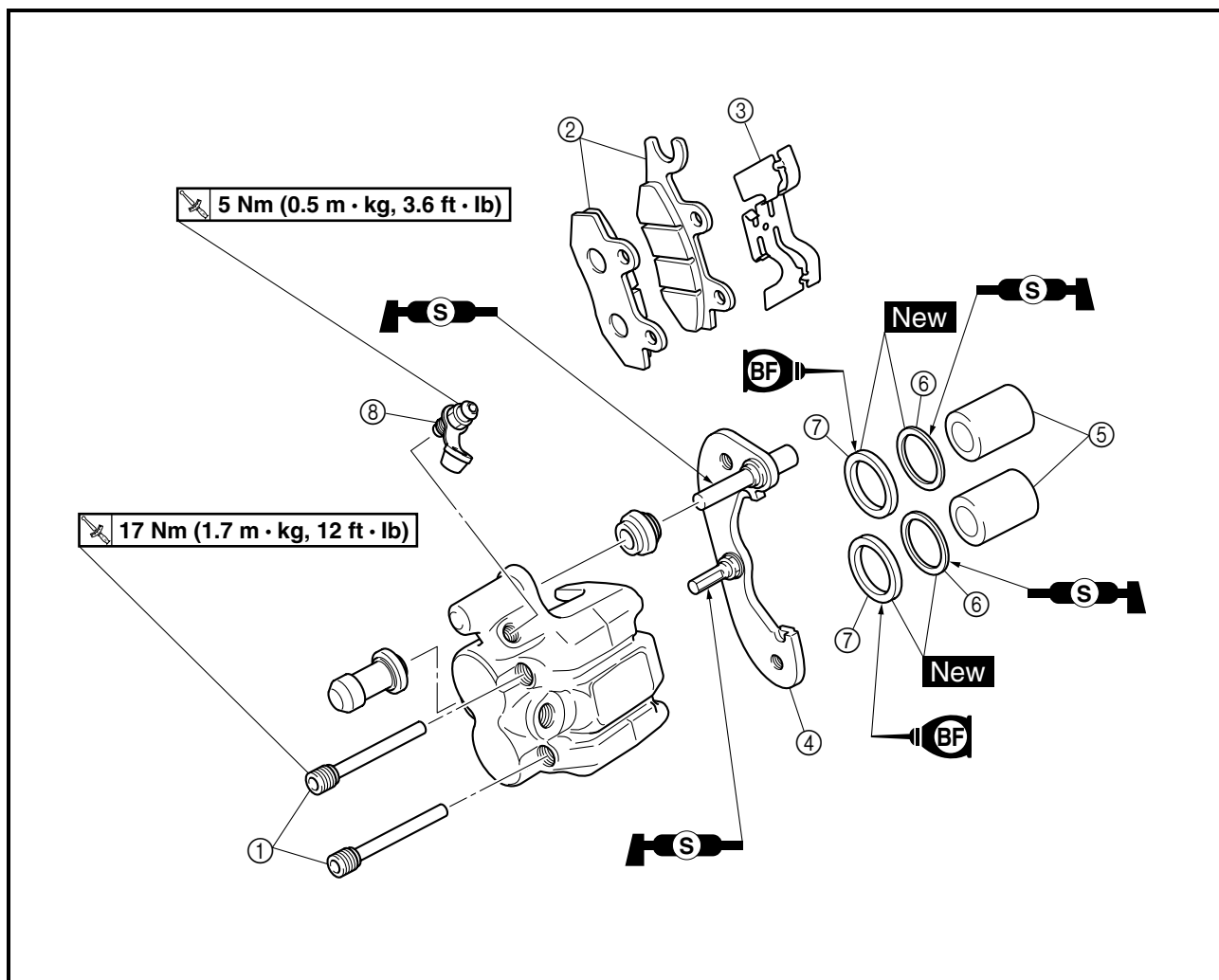
REAR BRAKE CALIPERS



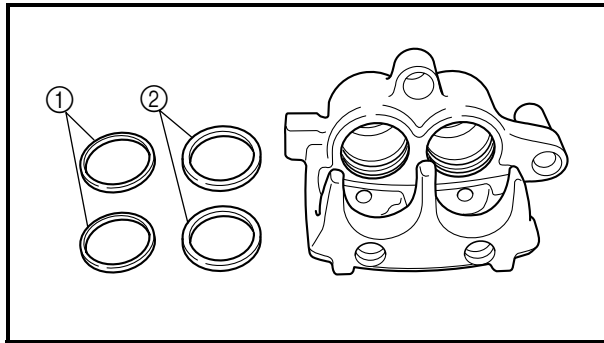
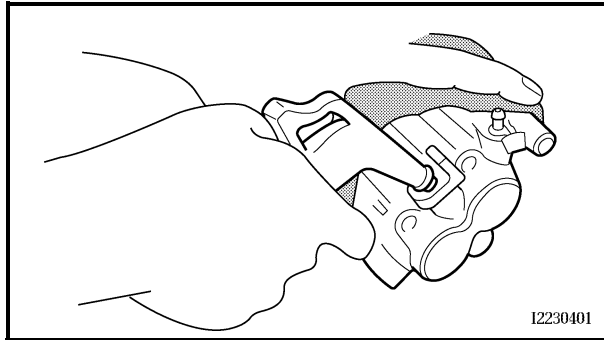
Order	Job/Part	Q'ty	Remarks
	Removing the rear brake calipers		Remove the parts in the order listed. The following procedure applies to both of the rear brake calipers. Drain. Refer to "FRONT AND REAR WHEELS".
1	Brake fluid		Disconnect. } Refer to "INSTALLING THE FRONT AND REAR BRAKE CALIPERS". Loosen.
2	Rear wheel		
1	Union bolt	1	
2	Copper washer	2	
3	Rear brake hose	1	
4	Brake pad holding bolt	2	
5	Rear brake caliper bolt	2	
6	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	2	Refer to "DISASSEMBLING THE FRONT AND REAR BRAKE CALIPERS".
②	Rear brake pad	2	
③	Brake pad spring	1	
④	Brake caliper bracket	1	
⑤	Brake caliper piston	2	
⑥	Brake caliper dust seal	2	
⑦	Brake caliper piston seal	2	
⑧	Bleed screw	1	For assembly, reverse the disassembly procedure.



EBS00427

DISASSEMBLING THE FRONT AND REAR BRAKE CALIPERS

1. Remove:
 - brake caliper pistons
 - brake caliper dust seals ①
 - brake caliper piston seals ②

- 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 a 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 seals and piston seals.

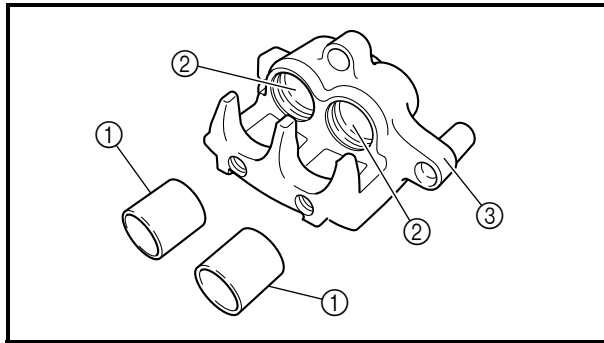
EB702040

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 pistons ①
Scratches/rust/wear → Replace the brake caliper assembly.
- brake caliper cylinders 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 seals and dust seals whenever the brake caliper is disassembled.

EBS00431

ASSEMBLING THE FRONT AND REAR BRAKE CALIPERS

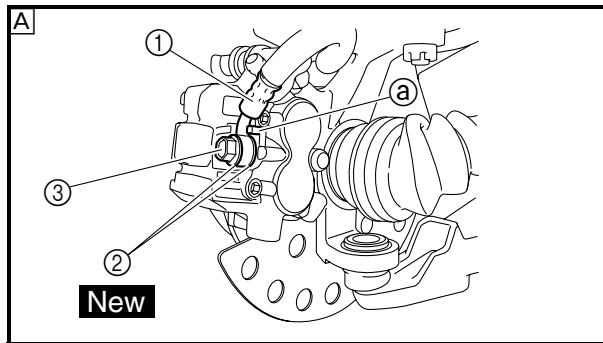
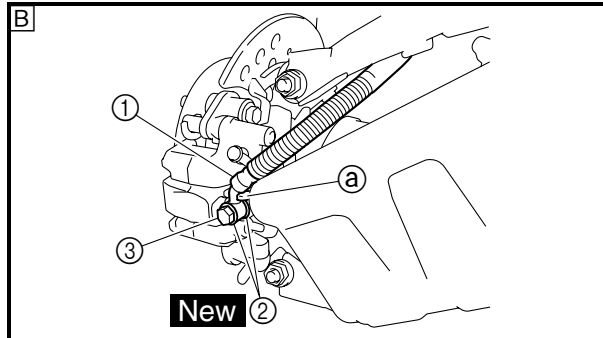
⚠ WARNING

- 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 seals and dust seal whenever a brake caliper is disassembled.



EBS00434

INSTALLING THE FRONT AND REAR BRAKE CALIPERS

1. Install:

- brake caliper assembly
- brake caliper bolts

48 Nm (4.8 m · kg, 35 ft · lb)

- brake hose (1)

- copper washers (2) **New**

- union bolt (3) **27 Nm (2.7 m · kg, 19 ft · lb)**

NOTICE

When installing the brake hose on the brake caliper, make sure that the brake pipe touches the projection (a) 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**

NOTICE

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.

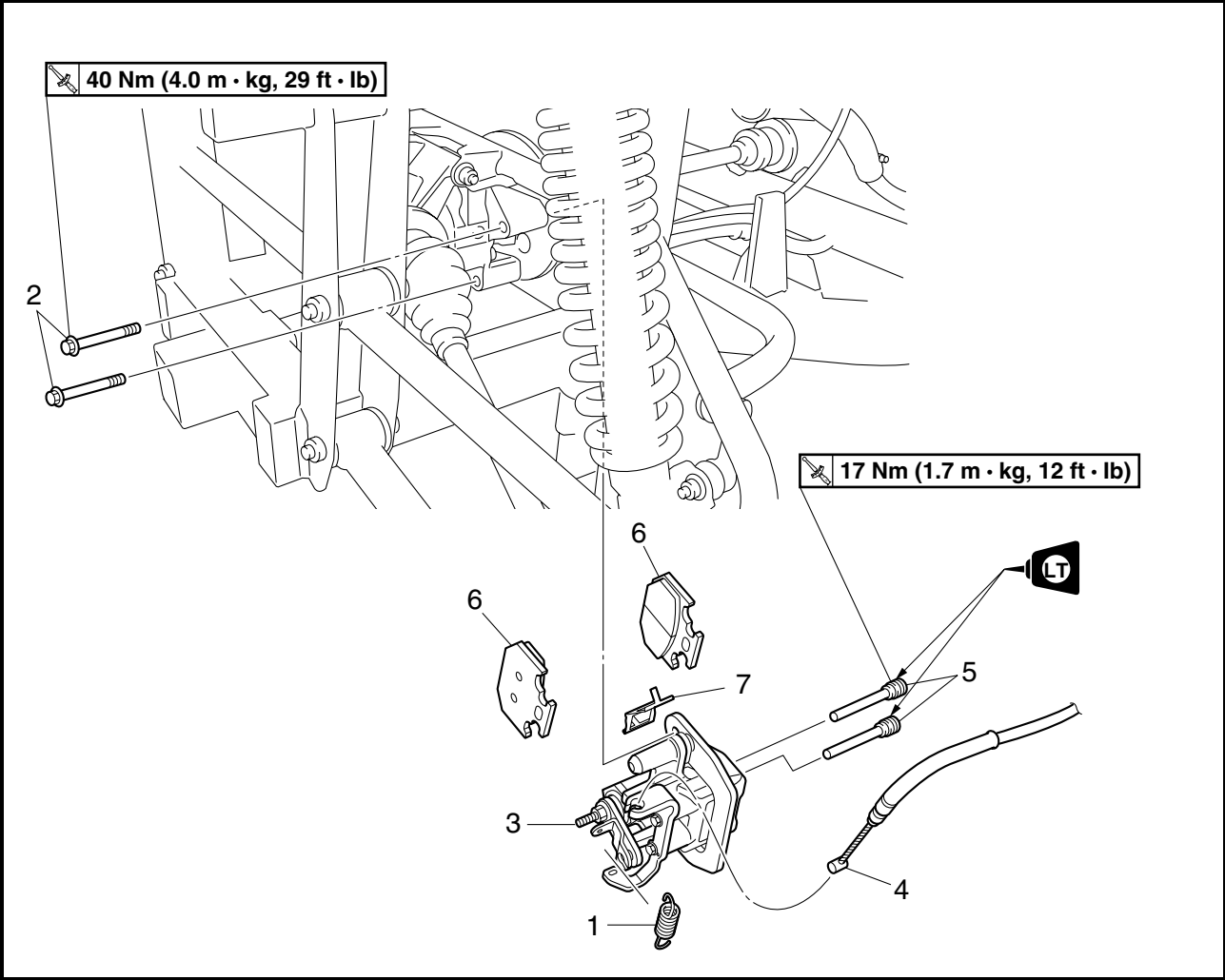
4. Check:

- brake fluid level

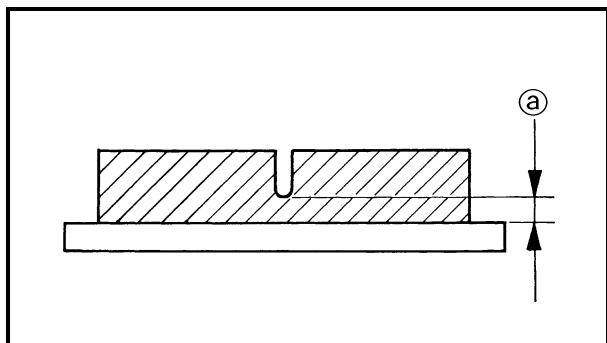
Brake fluid level is below the “MIN” level line
→ Add the recommended brake fluid to the proper level.

Refer to “CHECKING THE BRAKE FLUID LEVEL” in chapter 3.

PARKING BRAKE
PARKING BRAKE PADS



Order	Job/Part	Q'ty	Remarks
	Removing the parking brake pads		
	Rear skid plate		Remove the parts in the order listed.
	Right rear wheel		Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED".
1	Spring	1	Refer to "REAR WHEELS".
2	Parking brake bolt	2	Disconnect. Refer to "REPLACING THE PARKING BRAKE PADS".
3	Parking brake assembly	1	
4	Parking brake cable	1	
5	Parking brake pad holding bolt	2	
6	Parking brake pad	2	
7	Brake pad spring	1	
			For installation, reverse the removal procedure.



REPLACING THE PARKING BRAKE PADS

1. Measure:

- brake pad wear limit (a)

Out of specification → Replace the brake pads as a set.



Brake pad wear limit
1.0 mm (0.04 in)

2. Install:

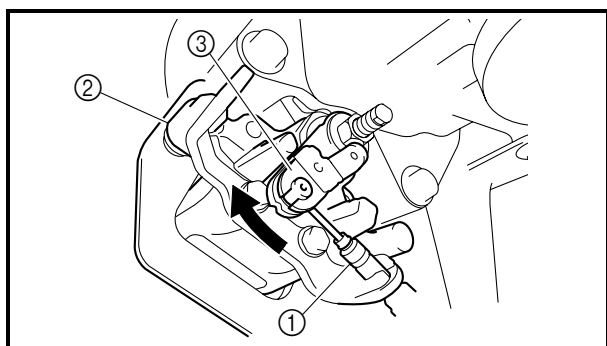
- brake pad spring
- parking brake pads
- parking brake pad holding bolts



Parking brake pad holding bolt
17 Nm (1.7 m · kg, 12 ft · lb)
LOCTITE®

TIP:

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



3. Install:

- parking brake cable (1)
- parking brake assembly (2)
- parking brake bolts

40 Nm (4.0 m · kg, 29 ft · lb)

TIP:

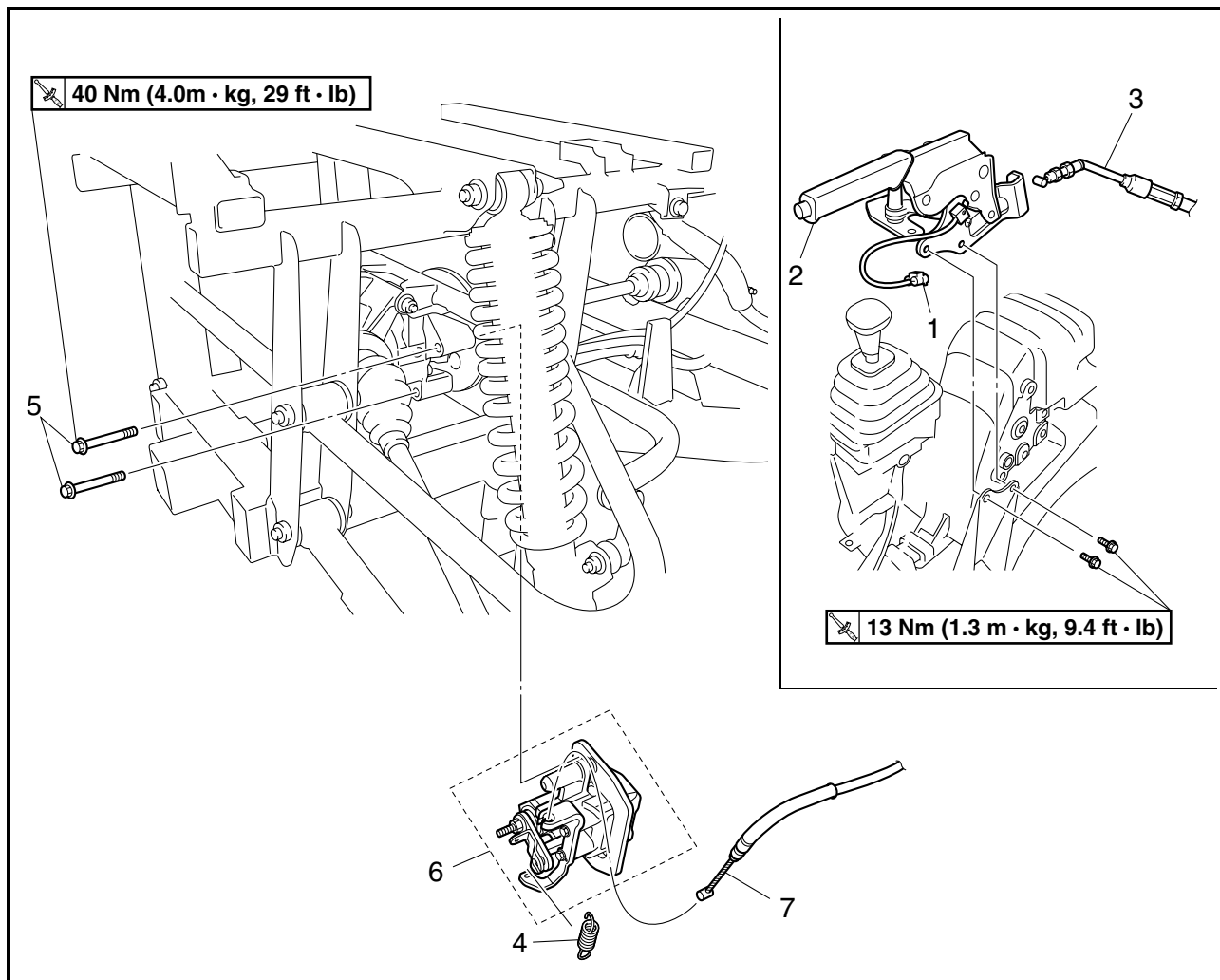
Turn the parking brake lever (3) to the position shown in the illustration so that there is enough space between the parking brake pads, and then install the parking brake assembly.

4. Adjust:

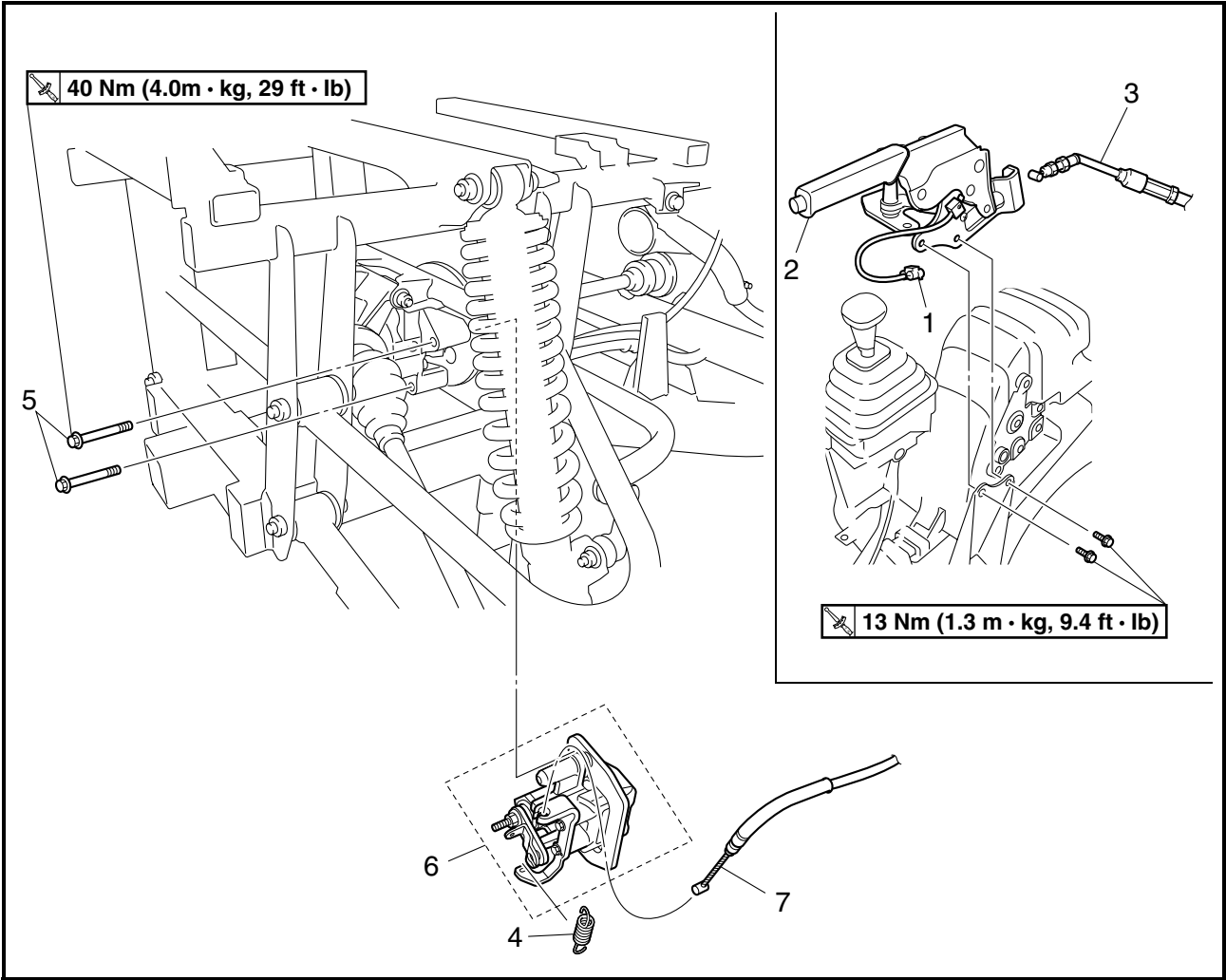
- parking brake cable free play
- Refer to "ADJUSTING THE PARKING BRAKE" in chapter 3.



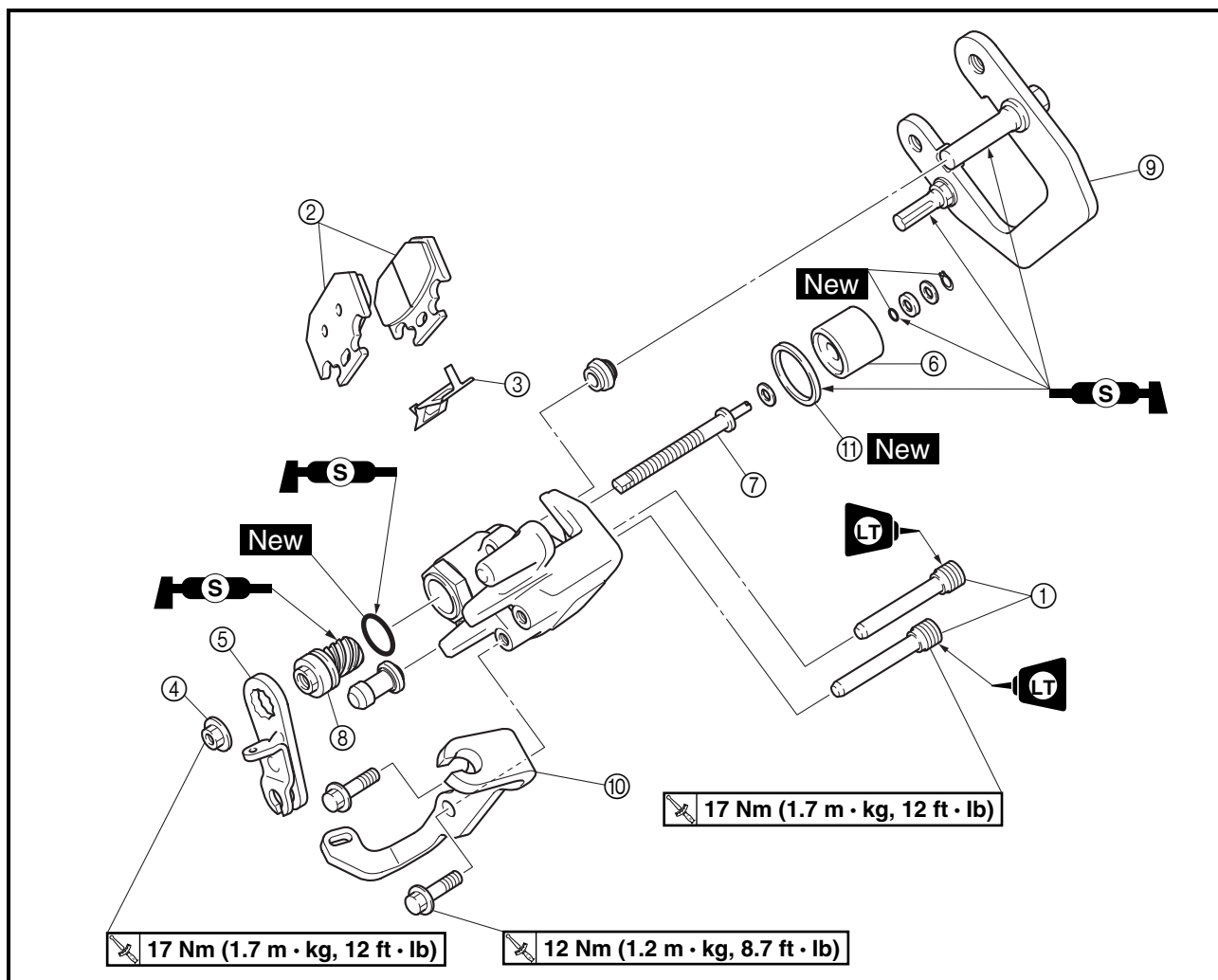
PARKING BRAKE



Order	Job/Part	Q'ty	Remarks
	Removing the parking brake		
	Seats/rear console		Remove the parts in the order listed. Refer to "SEATS, REAR CONSOLE AND INSTRUMENT PANELS".
	Rear skid plate		Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED".
	Right rear wheel		Refer to "REAR WHEELS".
1	Parking brake switch coupler	1	Disconnect.
2	Parking brake lever assembly	1	
3	Parking brake cable (parking brake lever side)	1	Disconnect.
4	Spring	1	
5	Parking brake bolt	2	Refer to "ASSEMBLING THE PARKING BRAKE".
6	Parking brake assembly	1	



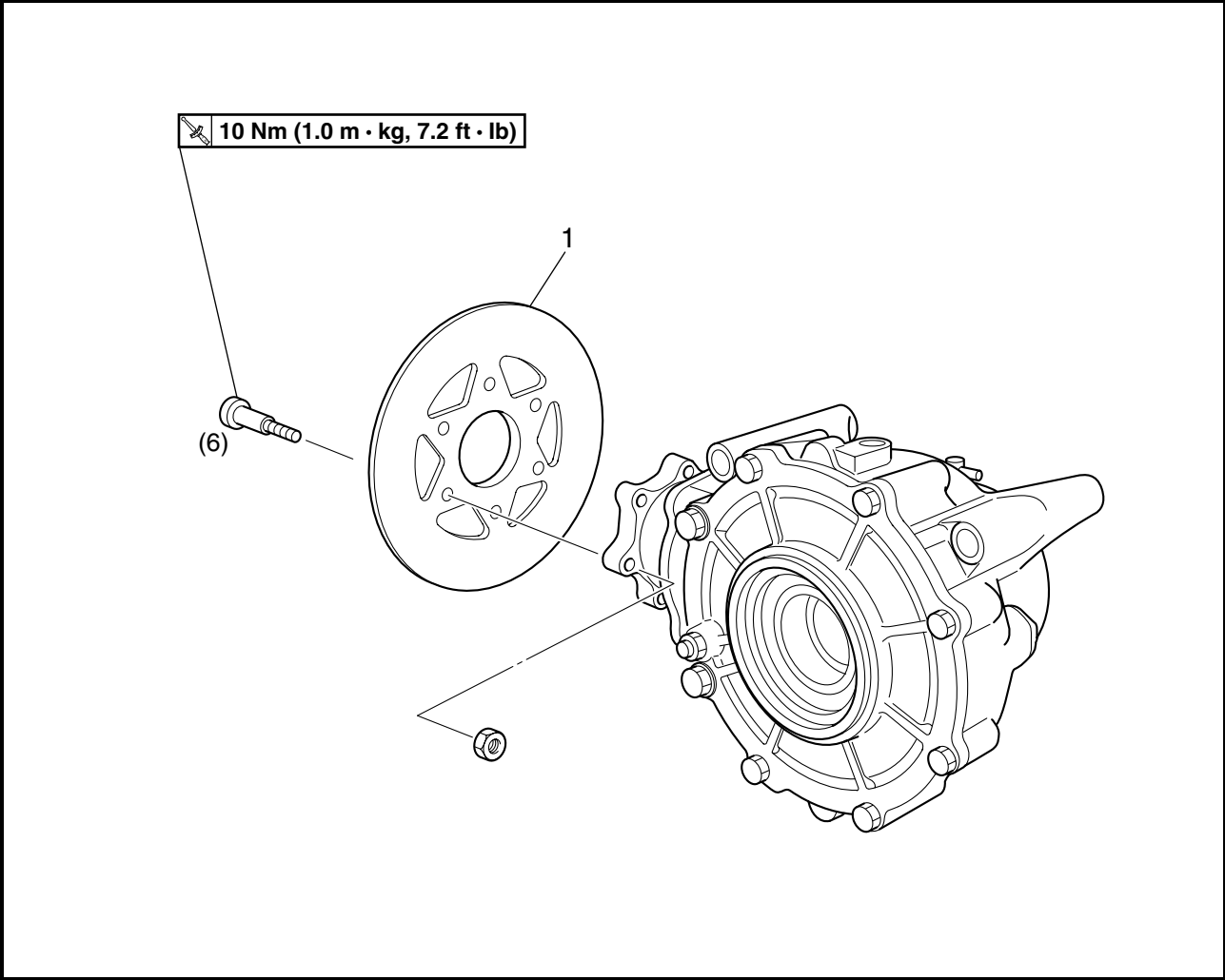
Order	Job/Part	Q'ty	Remarks
7	Parking brake cable (parking brake side)	1	Disconnect. Refer to "ASSEMBLING THE PARKING BRAKE". For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the parking brake		Remove the parts in the order listed.
①	Parking brake pad holding bolt	2	Refer to "ASSEMBLING THE PARKING BRAKE".
②	Parking brake pad	2	
③	Brake pad spring	1	
④	Parking brake arm nut	1	
⑤	Parking brake arm	1	
⑥	Parking brake piston	1	
⑦	Push rod	1	
⑧	Parking brake arm shaft	1	
⑨	Parking brake bracket	1	
⑩	Parking brake cable holder	1	
⑪	Piston seal	1	
			For assembly, reverse the disassembly procedure.



PARKING BRAKE DISC



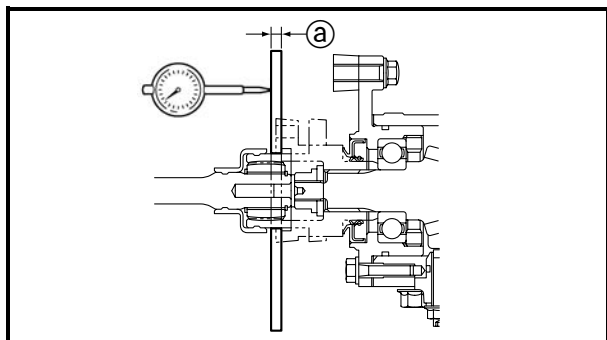
Order	Job/Part	Q'ty	Remarks
1	Removing the parking brake disc	1	Remove the parts in the order listed. Refer to "FRONT AND REAR BRAKES". Refer to "REAR CONSTANT VELOCITY JOINTS, FINAL DRIVE GEAR AND DRIVE SHAFT" in chapter 7.
	Parking brake assembly		
	Final drive gear assembly		
	Parking brake disc		For installation, reverse the removal procedure.



EB702040

CHECKING THE PARKING BRAKE

1. Check:
 - parking brake piston
Scratches/rust/wear → Replace the parking brake assembly.
 - parking brake body
Cracks/damage → Replace.



CHECKING THE PARKING BRAKE DISC

1. Check:
 - brake disc
Galling/damage → Replace.
2. Measure:
 - brake disc deflection
Out of specification → Replace.

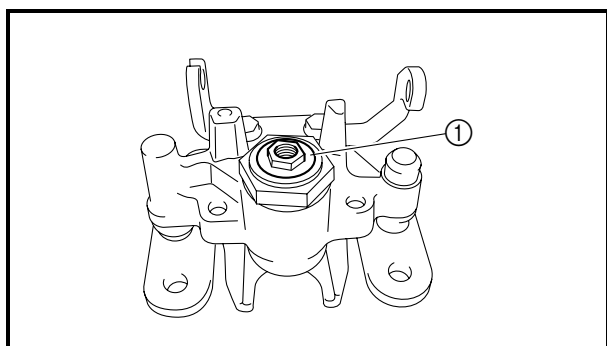


Brake disc maximum deflection
0.10 mm (0.004 in)

- brake disc thickness ①
Out of specification → Replace.



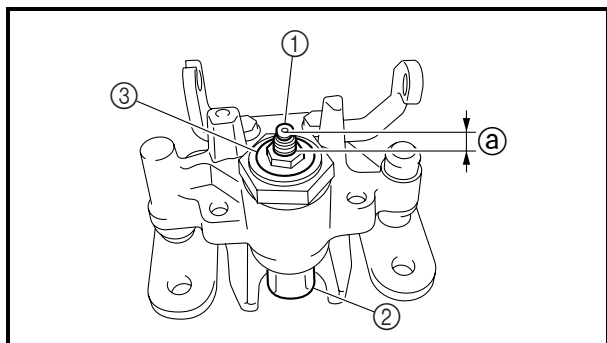
Brake disc minimum thickness
3.0 mm (0.12 in)



ASSEMBLING THE PARKING BRAKE

1. Install:
 - O-ring **New**
 - parking brake arm shaft ①

TIP: Fully turn in the parking brake arm shaft.

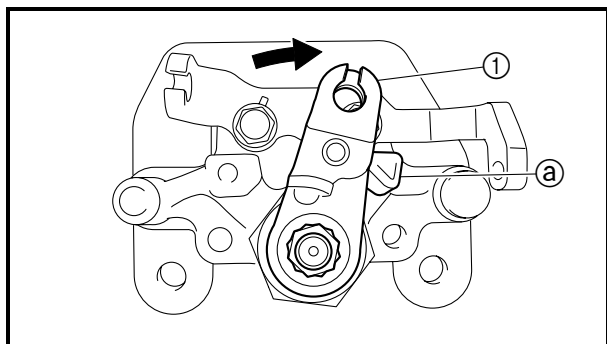


2. Install:
- push rod ①
 - wave washers
 - retainer
 - O-ring **New**
 - parking brake piston ②
 - circlip **New**

TIP:

Turn in the push rod until it protrudes ① from the end of the parking brake arm shaft ③.

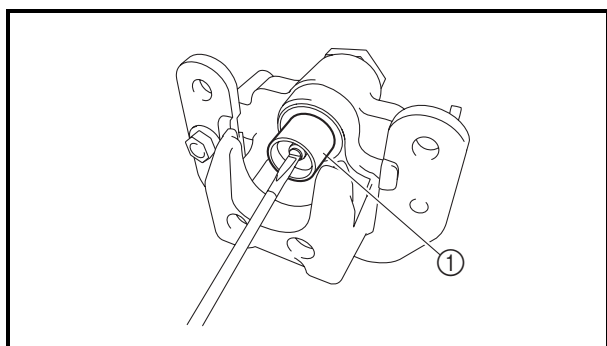
① 5 ~ 6 mm (0.20 ~ 0.24 in)



3. Install:
- parking brake arm ①

TIP:

Install the parking brake arm onto the parking brake arm shaft, and then rotate the arm until it contacts the stopper ①. If the parking brake arm shaft does not rotate, repeat steps 1 and 2.

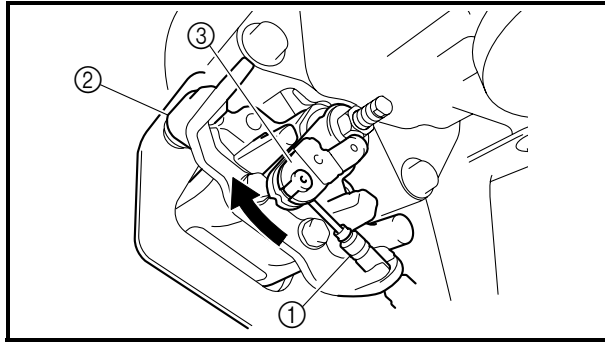


4. Install:
- parking brake arm nut (temporarily tighten)
5. Fully turn in the piston assembly ① using a flathead screwdriver.

6. Install:
- brake pad spring
 - parking brake pads
 - parking brake pad holding bolts



Parking brake pad holding bolt
17 Nm (1.7 m · kg, 12 ft · lb)
LOCTITE®



7. Install:

- parking brake cable ①
- parking brake assembly ②
- parking brake bolts

 40 Nm (4.0 m · kg, 29 ft · lb)

TIP:

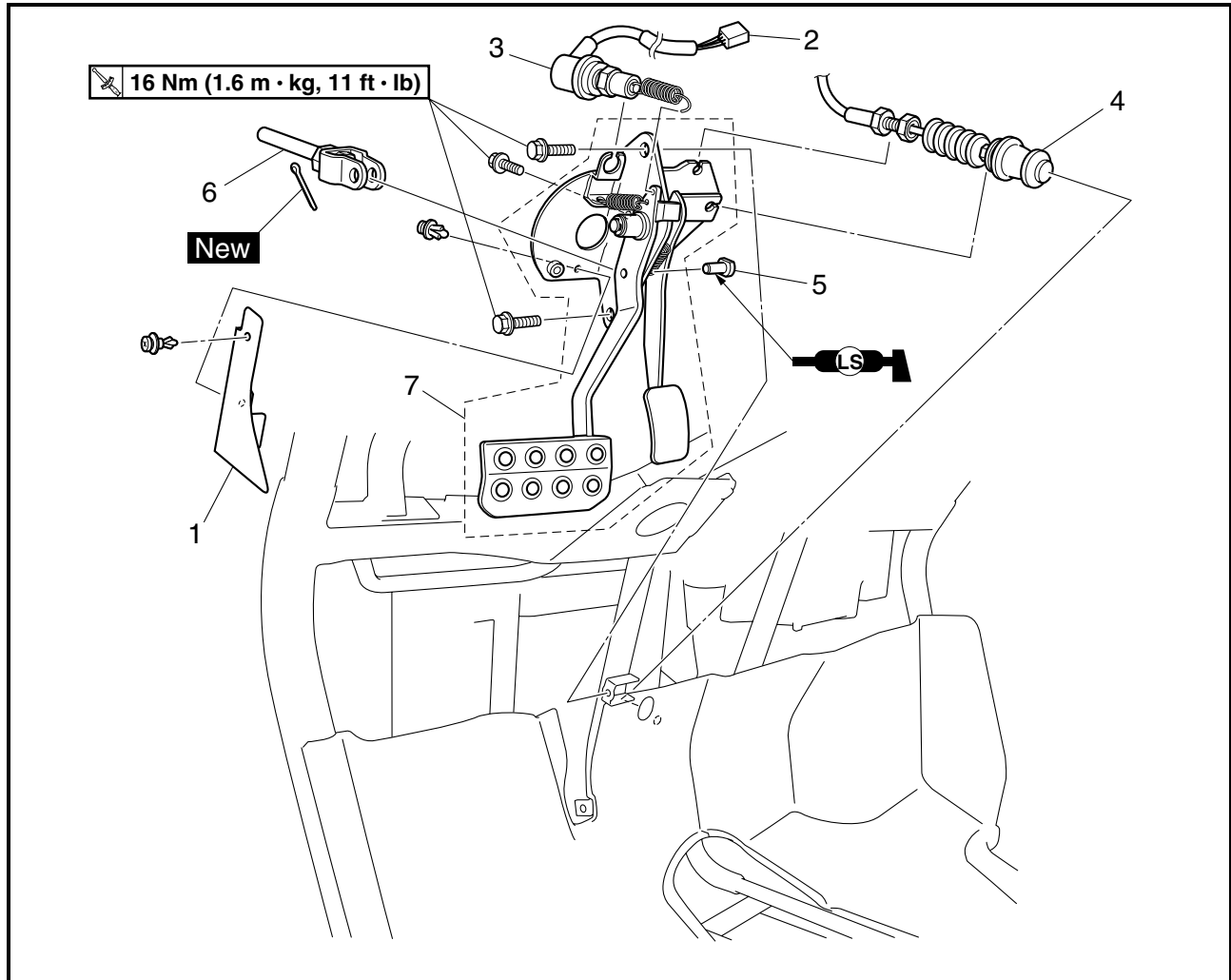
Turn the parking brake lever ③ to the position shown in the illustration so that there is enough space between the parking brake pads, and then install the parking brake assembly.

8. Adjust:

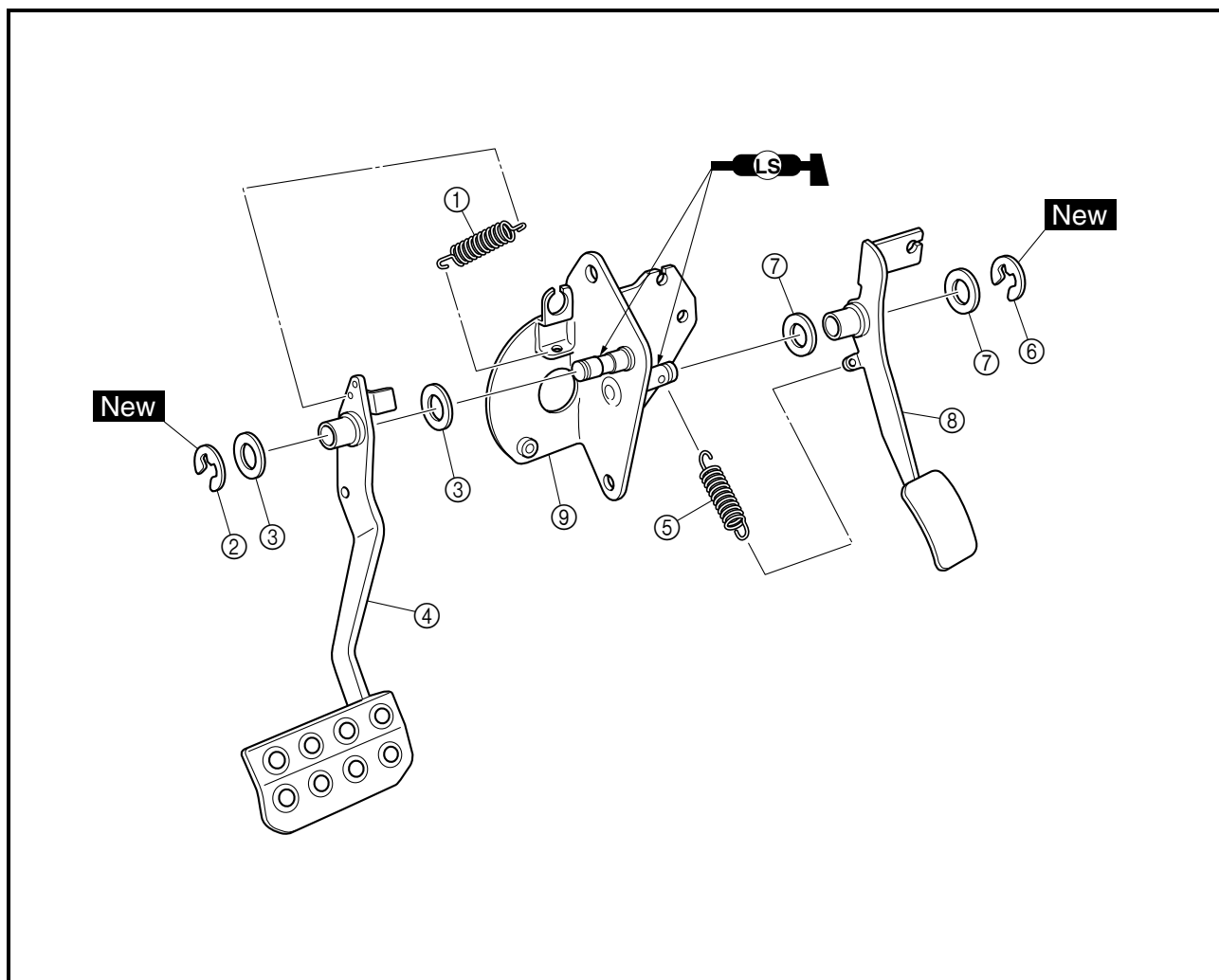
- parking brake cable free play
Refer to “ADJUSTING THE PARKING BRAKE” in chapter 3.



PEDAL ASSEMBLY



Order	Job/Part	Q'ty	Remarks
	Removing the pedal assembly		
	Steering wheel cover/steering wheel/ pedal cover/upper instrument panel/ lower instrument panel		Remove the parts in the order listed. Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED".
	Steering joint		Refer to "STEERING SYSTEM".
	Brake master cylinder		Refer to "FRONT AND REAR BRAKES".
1	Splash plate	1	
2	Brake light switch coupler	1	Disconnect.
3	Brake switch	1	
4	Throttle cable	1	Disconnect.
5	Pin	1	
6	Brake pedal rod	1	
7	Pedal assembly	1	
			For installation, reverse the removal pro- cedure.

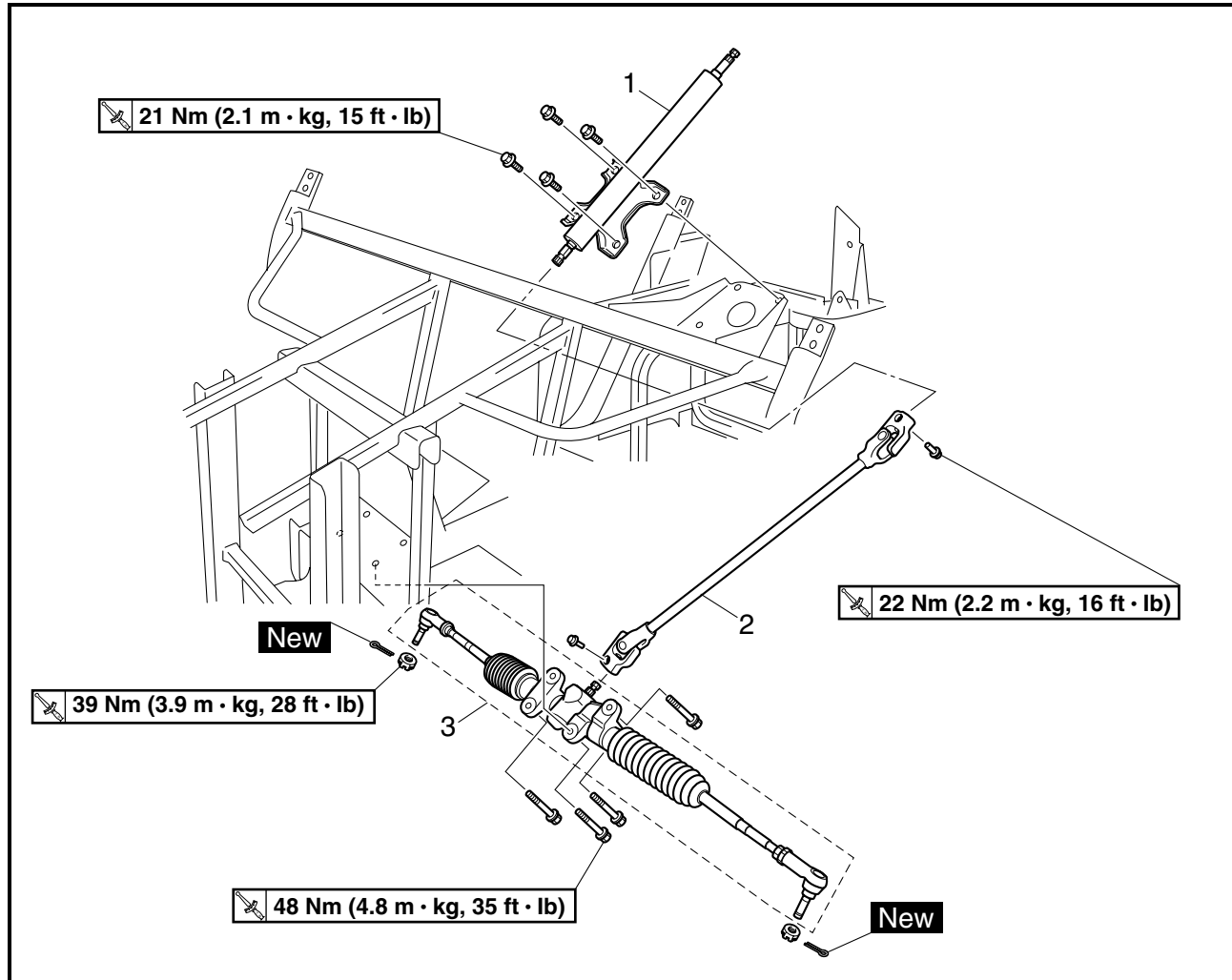


Order	Job/Part	Q'ty	Remarks
	Disassembling the pedal assembly		Remove the parts in the order listed.
①	Spring	1	
②	Circlip	1	
③	Washer	2	
④	Brake pedal	1	
⑤	Spring	1	
⑥	Circlip	1	
⑦	Washer	2	
⑧	Accelerator pedal	1	
⑨	Pedal assembly bracket	1	
			For assembly, reverse the disassembly procedure.

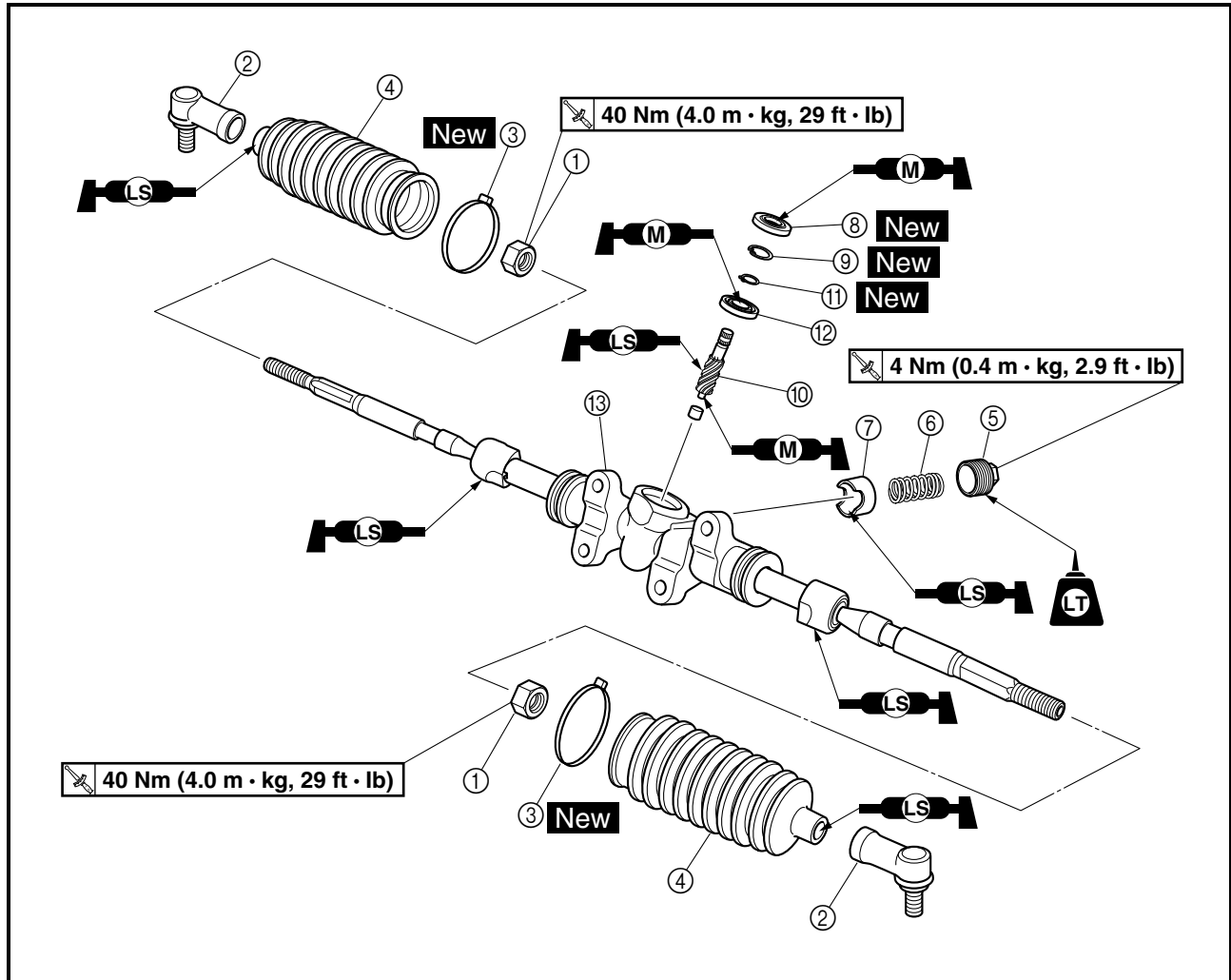


STEERING SYSTEM

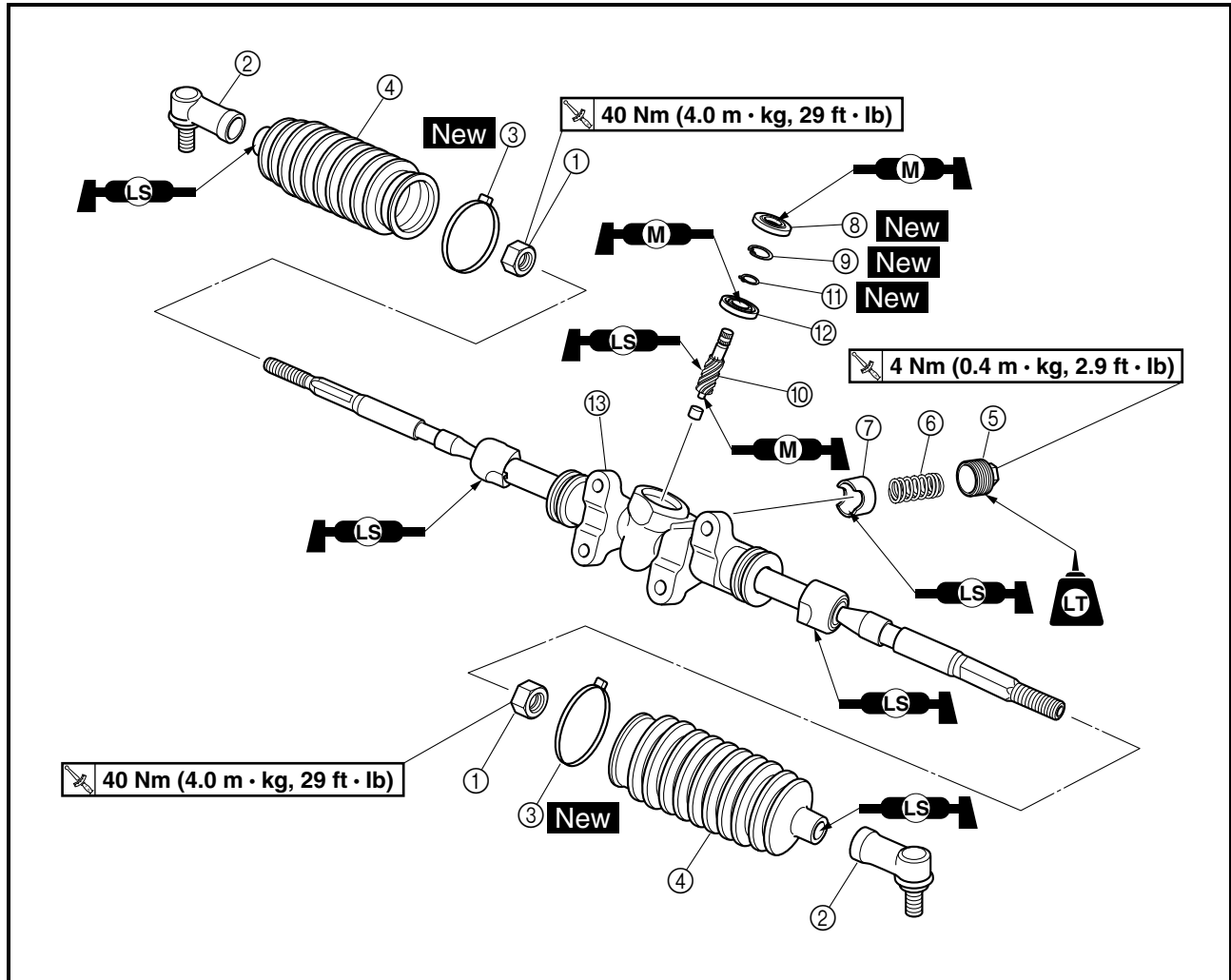
STEERING SHAFT AND STEERING ASSEMBLY



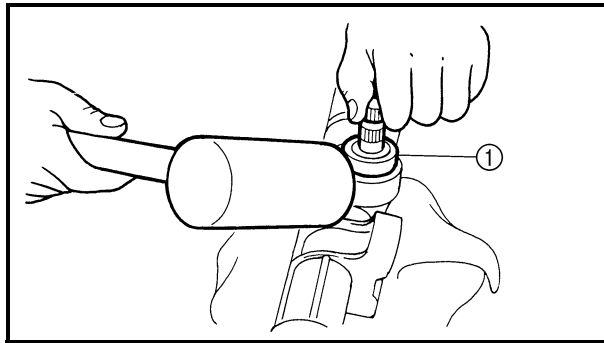
Order	Job/Part	Q'ty	Remarks
	Removing the steering shaft and steering assembly		Remove the parts in the order listed.
	Steering wheel cover/steering wheel/upper instrument panel/lower instrument panel		Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED".
1	Steering shaft	1	
2	Steering joint	1	
3	Steering assembly	1	
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the steering assembly		Remove the parts in the order listed.
①	Tie-rod end locknut	2	Refer to "ASSEMBLING THE STEERING ASSEMBLY".
②	Tie-rod end	2	
③	Plastic locking tie	2	
④	Dust boot	2	
⑤	Adjuster	1	
⑥	Spring	1	Refer to "DISASSEMBLING THE STEERING ASSEMBLY" and "ASSEMBLING THE STEERING ASSEMBLY".
⑦	Pressure pad	1	
⑧	Oil seal	1	
⑨	Circlip	1	
⑩	Pinion gear	1	
⑪	Circlip	1	
⑫	Bearing	1	



Order	Job/Part	Q'ty	Remarks
⑬	Steering rack assembly	1	Refer to "ASSEMBLING THE STEERING ASSEMBLY". For assembly, reverse the disassembly procedure.



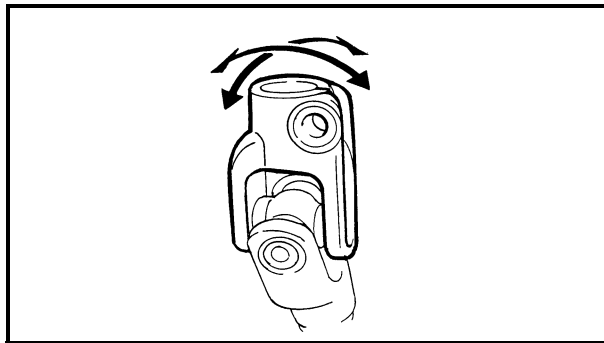
DISASSEMBLING THE STEERING ASSEMBLY

1. Remove:

- oil seal
- circlip
- pinion gear with bearing ①

TIP:

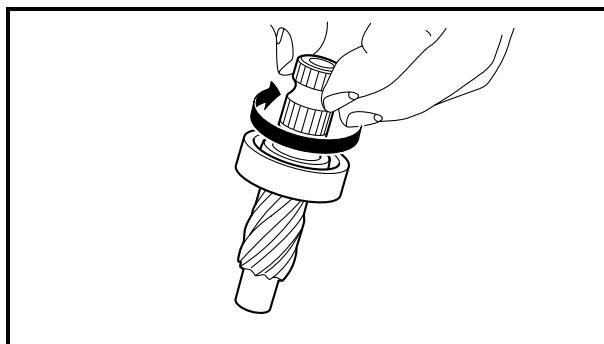
Lightly tap on the steering housing with a soft hammer to remove the pinion gear easily.



CHECKING THE STEERING JOINT

1. Check:

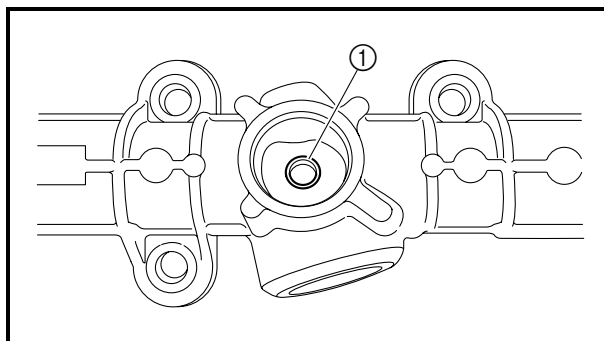
- steering joint
- Rough movement → Replace.



CHECKING THE STEERING ASSEMBLY

1. Check:

- pinion gear bearing
- Check the bearing movement on the pinion gear by rotating with the fingers.
Roughness → Replace.

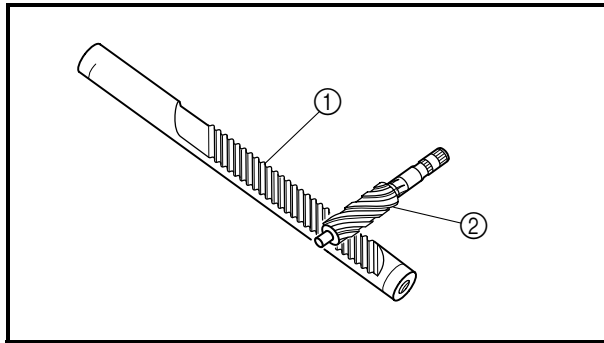


2. Check:

- pinion needle bearing ①
- Damage → Replace.

TIP:

When replacing the pinion needle bearing, it is recommended to replace the steering rack assembly. The steering housing may be subject to damage during removal of the pinion needle bearing.



3. Check:

- rack gear teeth ①
- pinion gear teeth ②

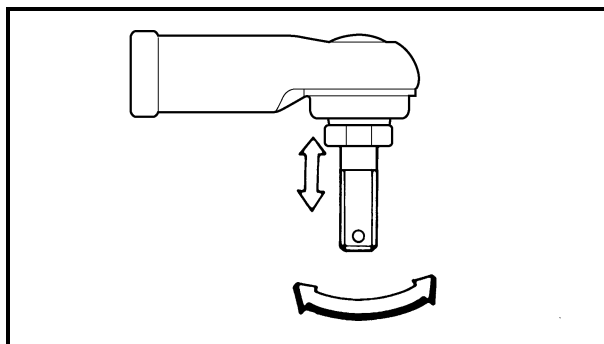
Wear/damage → Replace the steering rack assembly.

TIP:

The wear pattern on the rack and pinion gear teeth should be uniform. An uneven wear pattern may indicate improper adjustment or lack of lubrication.

4. Check:

- pressure pad
Wear/damage → Replace.
- dust boots
Damage → Replace.



5. Check:

- tie-rod free play and movement
Free play → Replace the tie-rod end.
Turns roughly → Replace the tie-rod end.

6. Check:

- tie-rods
Bends/damage → Replace.

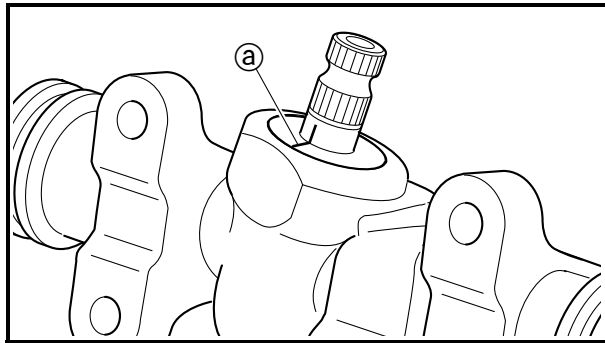
ASSEMBLING THE STEERING ASSEMBLY

1. Lubricate:

- bearing
- rack gear
- pinion gear
- oil seal



Recommended lubricant
Molybdenum disulfide grease



2. Install:
 - bearing
 - circlips **New**
 - pinion gear
 - oil seal **New**

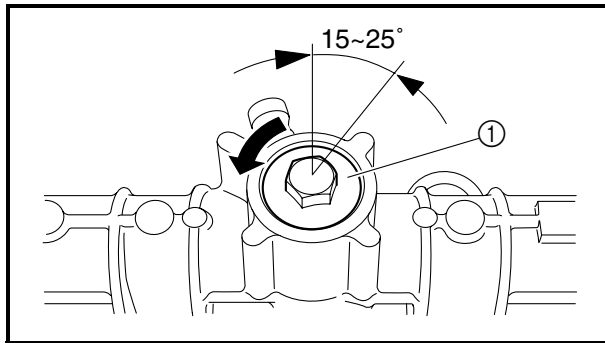
TIP:

After centering the rack gear, make two alignment marks ② on the pinion gear and the steering rack assembly to mark the position of the pinion gear. This is necessary to install the steering joint to the pinion gear properly.

3. Apply lithium-soap-based grease to the gear surface of the rack gear.



Lithium-soap-based grease
5 ~ 10 g (0.2 ~ 0.4 oz)



4. Adjust:
 - rack gear-pinion gear backlash



- a. Install the pressure pad, spring, and adjuster.
- b. Tighten the adjuster ①.



Adjuster
4 Nm (0.4 m · kg, 2.9 ft · lb)
LOCTITE®

- c. Loosen the adjuster 15 ~ 25°.



5. Install:
 - dust boots
 - plastic locking tie **New**
 - tie-rod end
 - tie-rod end locknut

40 Nm (4.0 m · kg, 29 ft · lb)

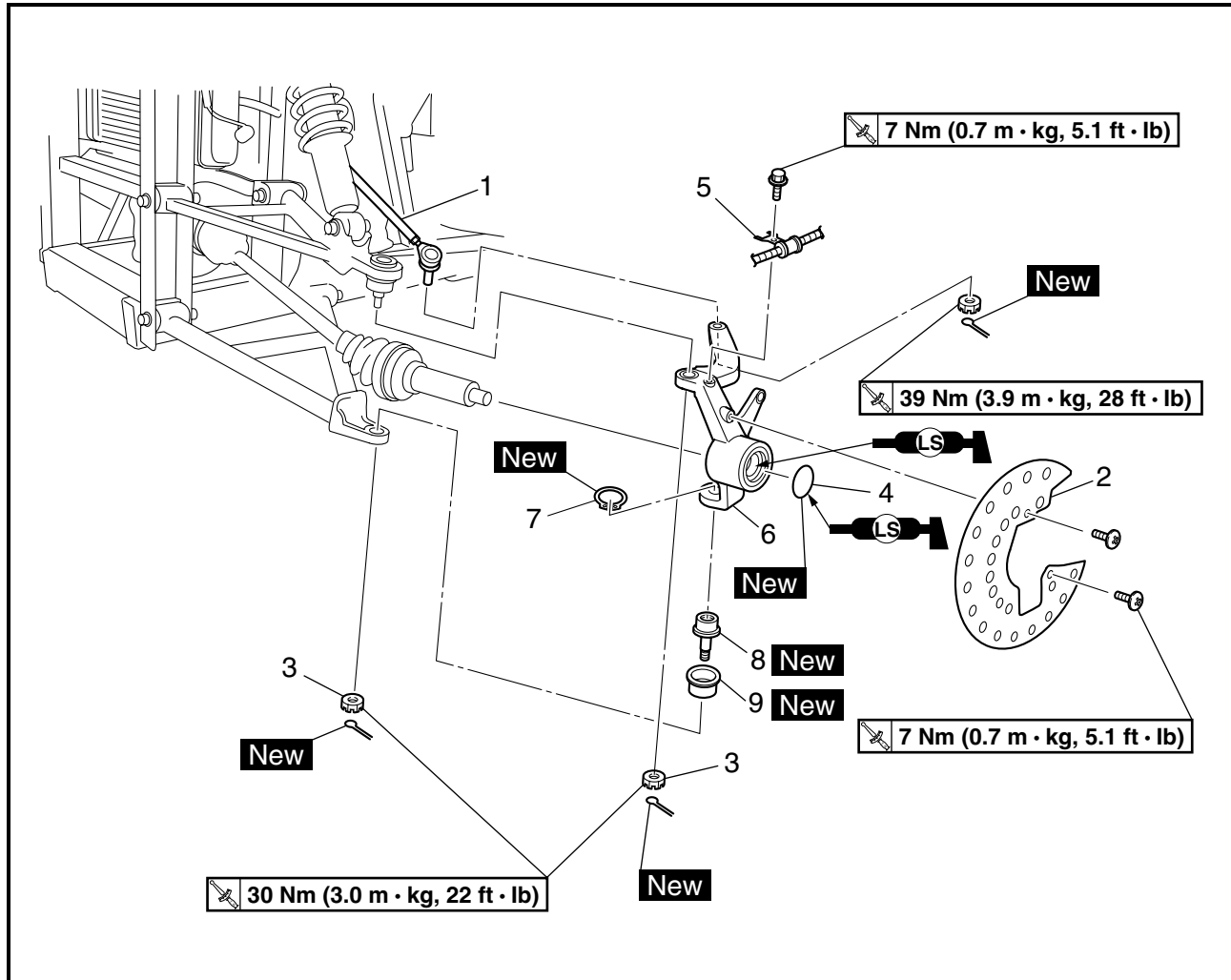
INSTALLING THE STEERING SYSTEM

1. Adjust:
 - toe-in

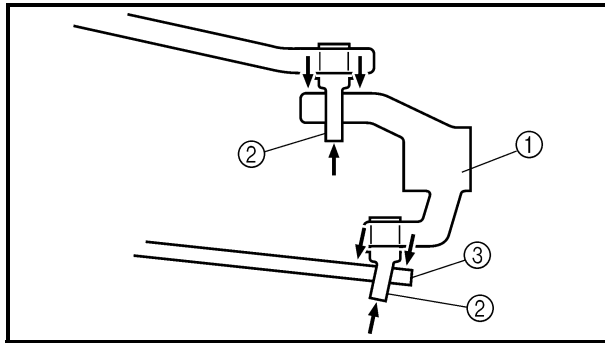
Refer to “ADJUSTING THE TOE-IN” in chapter 3.



TIE-ROD AND STEERING KNUCKLE



Order	Job/Part	Q'ty	Remarks
	Removing the tie-rod and steering knuckle		Remove the parts in the order listed.
	Front wheel/brake disc		Refer to "FRONT AND REAR WHEELS".
1	Tie-rod	1	
2	Brake disc guard	1	
3	Nut	2	
4	O-ring	1	
5	Brake hose holder	1	
6	Steering knuckle	1	Refer to "REMOVING THE STEERING KNUCKLES".
7	Circlip	1	
8	Ball joint	1	
9	Rubber boot	1	
			For installation, reverse the removal procedure.



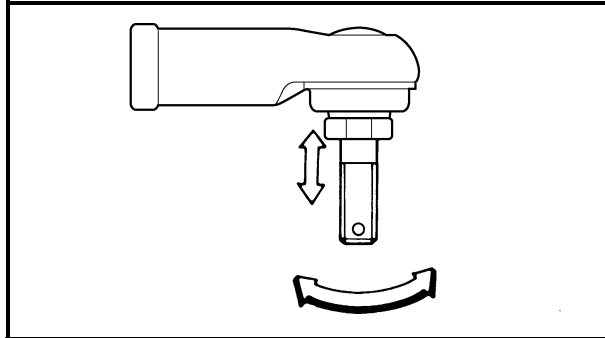
REMOVING THE STEERING KNUCKLES

1. Remove:

- steering knuckle ①

TIP:

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



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.

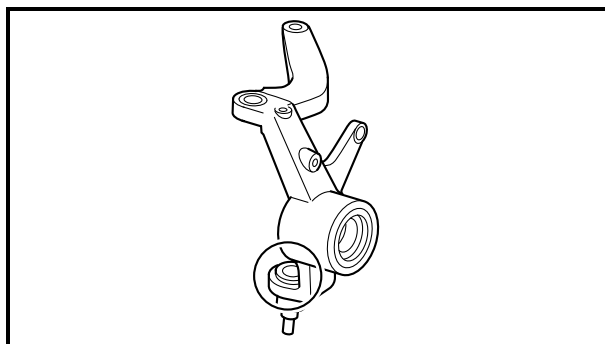
2. Check:

- tie-rods
Bends/damage → Replace.

CHECKING THE STEERING KNUCKLES

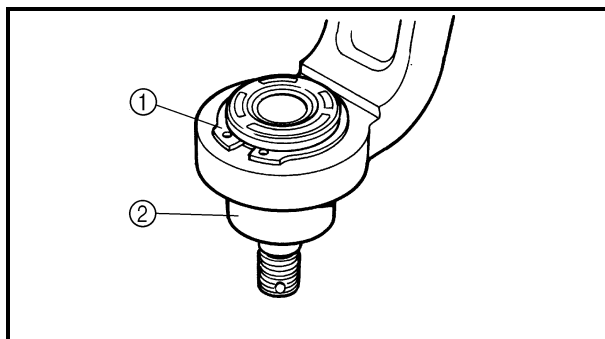
1. Check:

- steering knuckles
Damage/pitting → Replace.

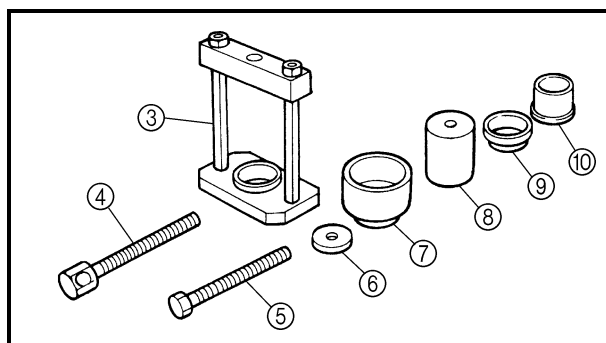
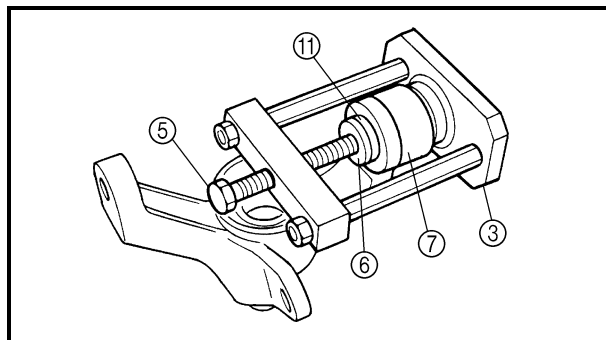
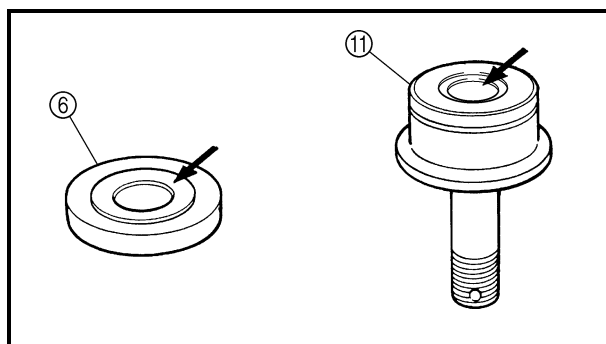
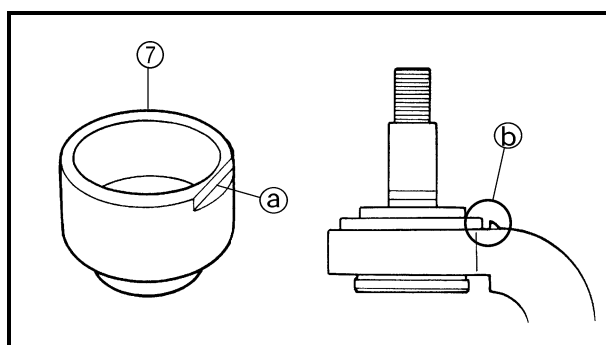
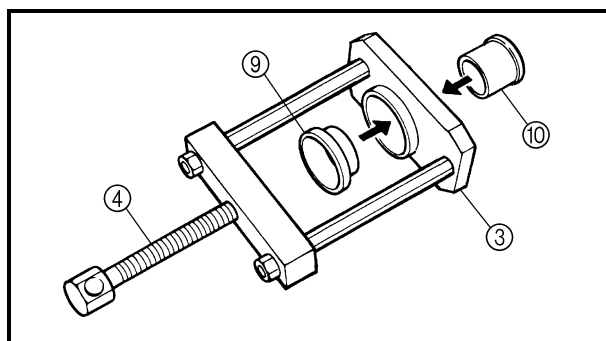


2. Check:

- ball joints
Damage/pitting → Replace the ball joint.
Free play → Replace the ball joint.
Turns roughly → Replace the ball joint.



- Clean the outside of the steering knuckle.
- Remove the steering knuckle oil seal.
- Remove the circlip ① and rubber boot ②.
Use the ball joint remover.



Ball joint remover
90890-01474, YM-01474
Ball joint remover adapter set
90890-01477, YM-01477

③	Body	90890-01474 YM-01474
④	Long bolt	90890-01474 YM-01474
⑤	Short bolt	90890-01477 YM-01477
⑥	Remover washer	90890-01477 YM-01477
⑦	Remover spacer	90890-01477 YM-01477
⑧	Installer attachment	90890-01477 YM-01477
⑨	Installer spacer	90890-01477 YM-01477
⑩	Installer guide	90890-01477 YM-01477

d. Install the body ③, short bolt ⑤, remover washer ⑥ and remover spacer ⑦ onto the ball joint.

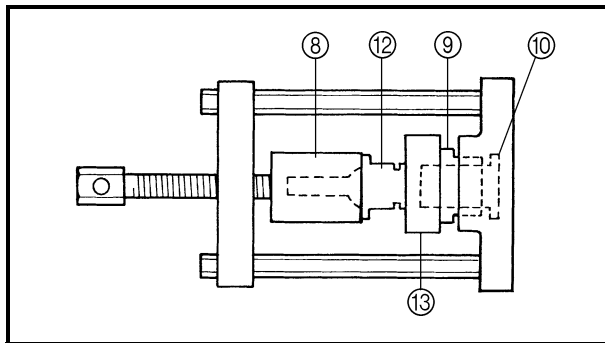
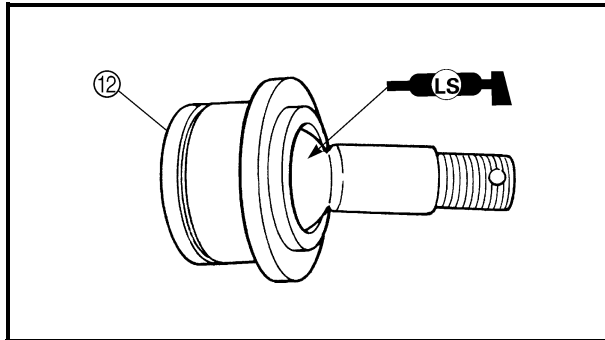
TIP:

- Remover washer ⑥ must be aligned with the projection on the head of the ball joint.
- Surface ① of the remover spacer ⑦ must be aligned with the surface ② of the steering knuckle.

e. Hold the body ③ in place while turning in the short bolt ⑤ to remove the ball joint ⑪ from the steering knuckle.

f. Remove the ball joint remover.

g. Install the long bolt ④, installer spacer ⑨ and installer guide ⑩ onto the body ③.



- h. Attach the assembled ball joint remover, new ball joint ⑫ and installer attachment ⑧ to the steering knuckle ⑬.

TIP:

Do not tap or damage the top of the ball joint.

- i. Hold the body ③ in place while turning in the long bolt ④ to install the new ball joint ⑫ into the steering knuckle ⑬.
j. Remove the ball joint remover.
k. Apply lithium-soap base grease to the new ball joint ⑫.
l. Install a new rubber boot and new circlip.

TIP:

Always use a new ball joint set.

- m. Install a steering knuckle oil seal.



3. Check:

- front wheel bearings
Bearings allow play in the wheel hubs or the wheel turns roughly → Replace.
- oil seals
Damage → Replace.



- a. Clean the outside of the steering knuckle.
b. Remove the oil seals ①.
c. Drive out the bearings ②.

⚠ WARNING

Eye protection is recommended when using striking tools.

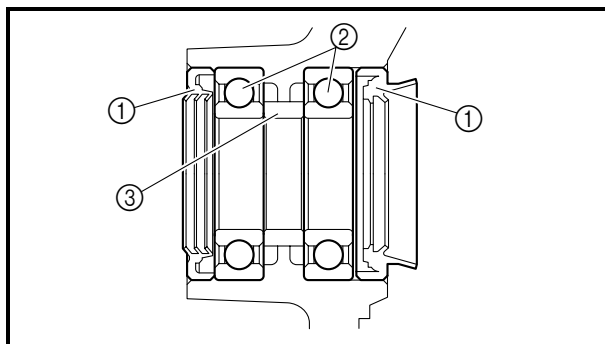
- d. Remove the spacer ③.
e. Apply lithium base grease to the bearings and oil seals.
f. Install the spacer to the steering knuckle.
g. Install the new bearings.

TIP:

Install the outside bearing first.

NOTICE

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

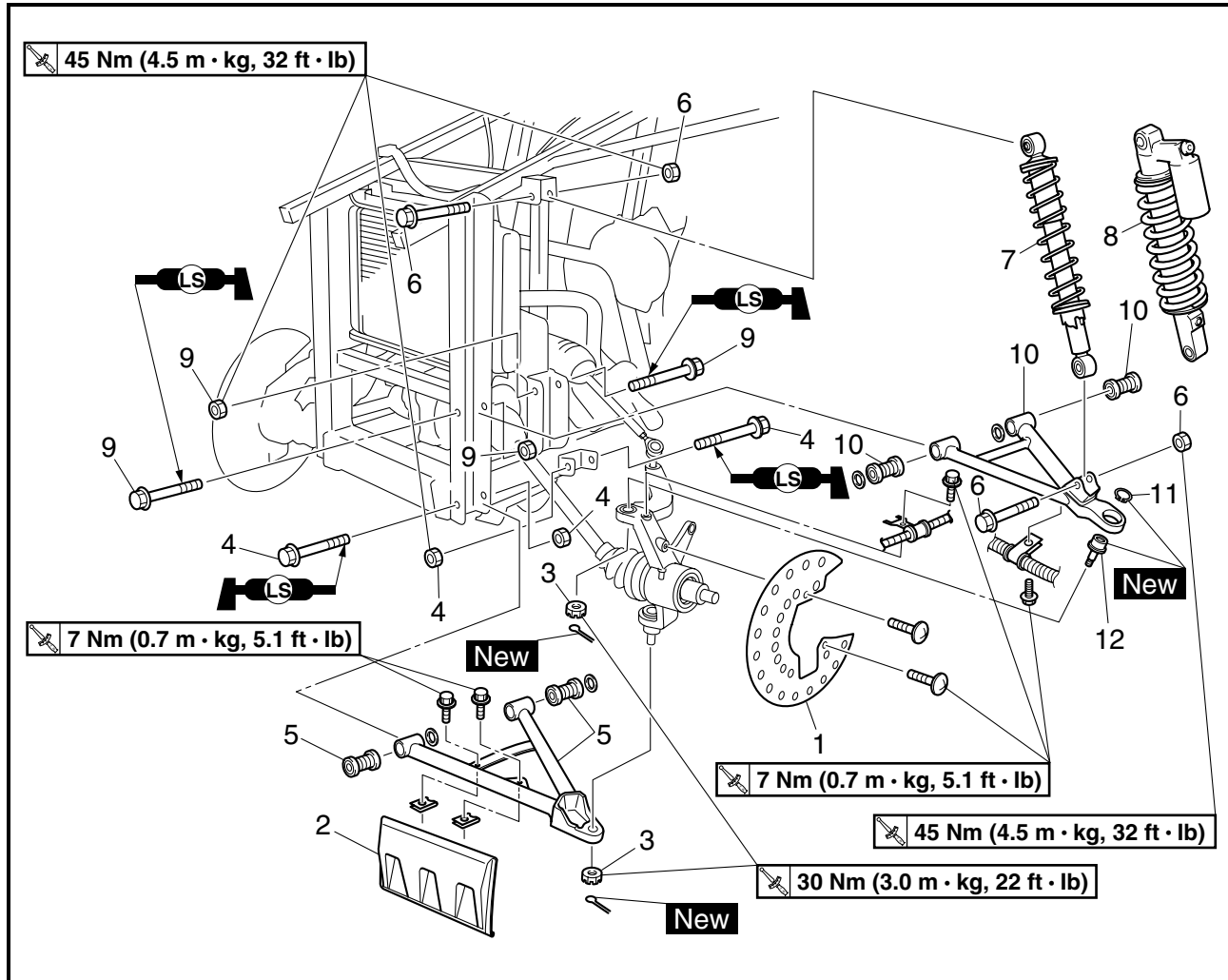


TIP: _____

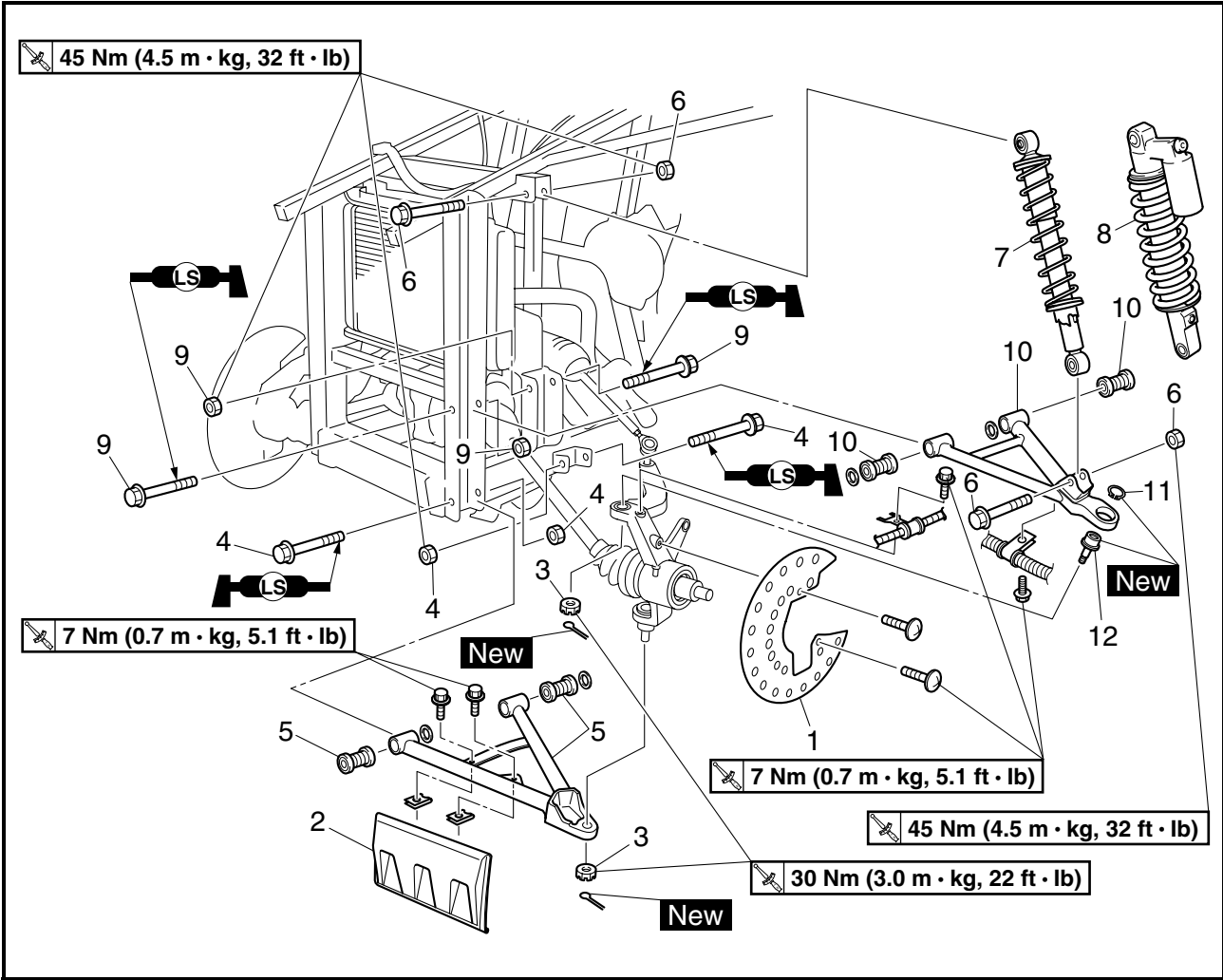




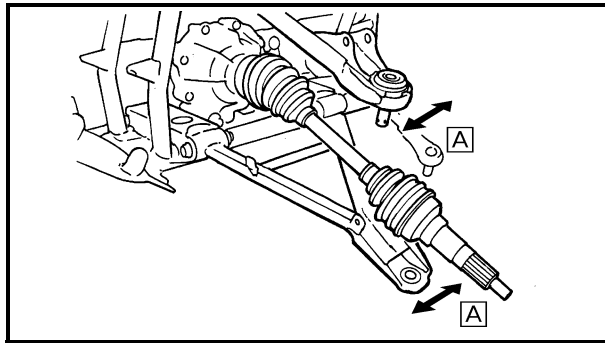
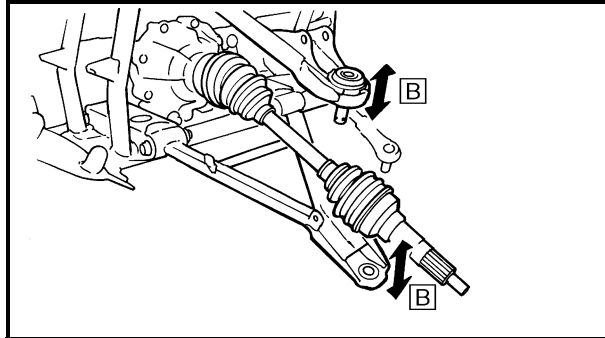
FRONT ARMS AND FRONT SHOCK ABSORBERS



Order	Job/Part	Q'ty	Remarks
	Removing the front arms and front shock absorbers		Remove the parts in the order listed.
	Front wheel/brake disc		Refer to "FRONT AND REAR WHEELS".
1	Brake disc guard	1	
2	Front arm protector	1	
3	Nut	2	Refer to "REMOVING THE FRONT ARMS" and "INSTALLING THE FRONT ARMS AND FRONT SHOCK ABSORBER".
4	Nut/bolt	2/2	
5	Front lower arm/bushing	1/2	
6	Nut/bolt	2/2	
7	Front shock absorber	1	For models equipped with oil damper shock absorbers Refer to "REMOVING THE FRONT ARMS" and "INSTALLING THE FRONT ARMS AND FRONT SHOCK ABSORBER".



Order	Job/Part	Q'ty	Remarks
8	Front shock absorber	1	For models equipped with gas-oil damper shock absorbers Refer to "REMOVING THE FRONT ARMS" and "INSTALLING THE FRONT ARMS AND FRONT SHOCK ABSORBER".
9	Nut/bolt	2/2	
10	Front upper arm/bushing	1/2	
11	Circlip	1	
12	Ball joint	1	
			For installation, reverse the removal procedure.



REMOVING THE FRONT ARMS

1. Check:

- front arm free play



- a. Check the front arm side play [A] by moving it from side to side.

If side play is noticeable, check the bushings.

- b. Check the front arm vertical movement [B] by moving it up and down.

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



2. Remove:

- front arms

CHECKING THE FRONT ARMS

1. Check:

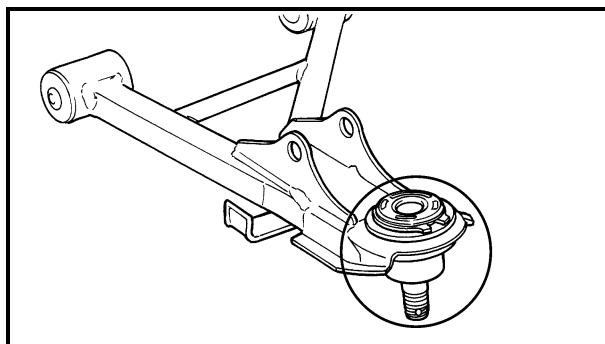
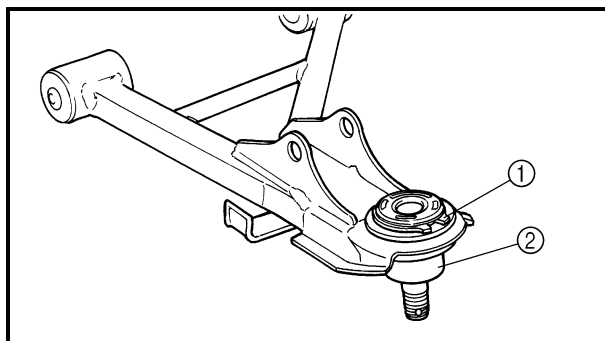
- front arms

Bends/damage → Replace.

2. Check:

- bushings

Wear/damage → Replace.



3. Check:

- ball joint

Damage/pitting → Replace the ball joint.

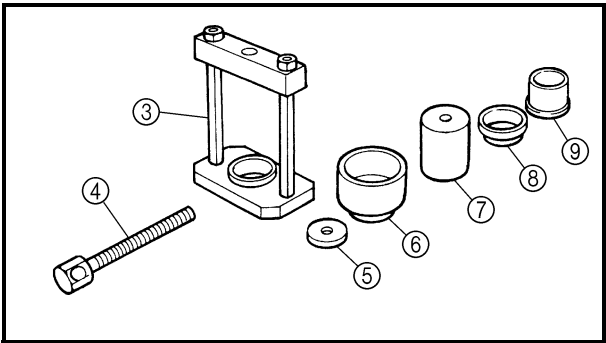
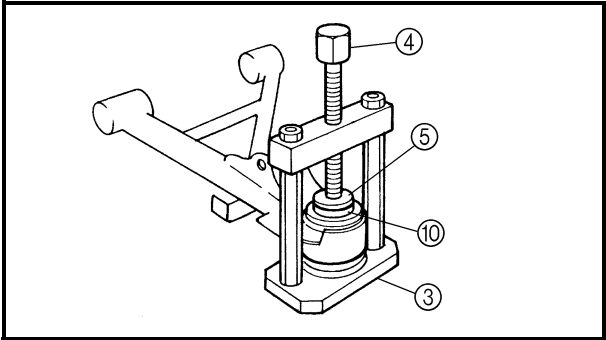
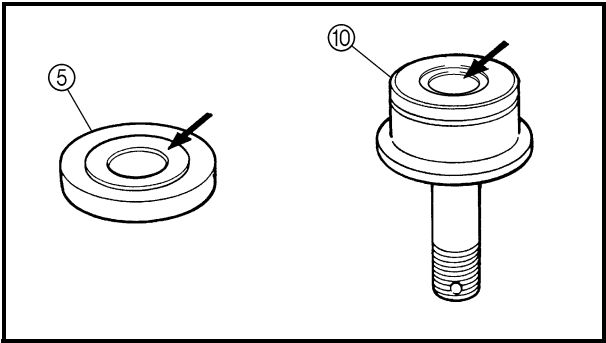
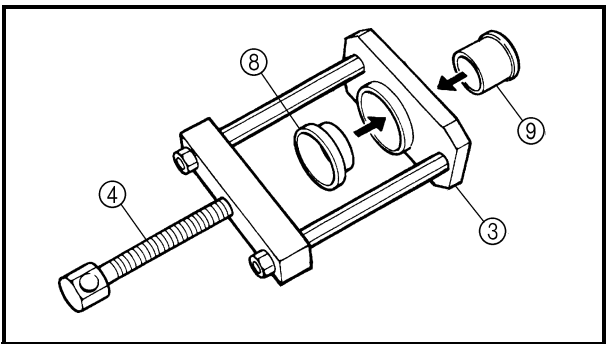
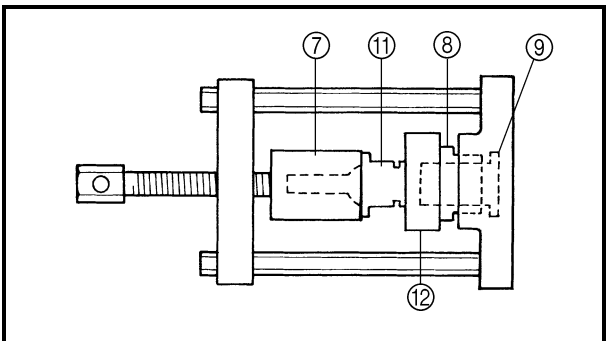
Free play → Replace the ball joint.

Turns roughly → Replace the ball joint.



- a. Clean the outside of the front lower arm.

- b. Remove the circlip ① and rubber boot ②.
Use the ball joint remover.



	Ball joint remover 90890-01474, YM-01474 Ball joint remover adapter set 90890-01477, YM-01477	
③	Body	90890-01474 YM-01474
④	Long bolt	90890-01474 YM-01474
⑤	Remover washer	90890-01477 YM-01477
⑥	Remover spacer	90890-01477 YM-01477
⑦	Installer attachment	90890-01477 YM-01477
⑧	Installer spacer	90890-01477 YM-01477
⑨	Installer guide	90890-01477 YM-01477

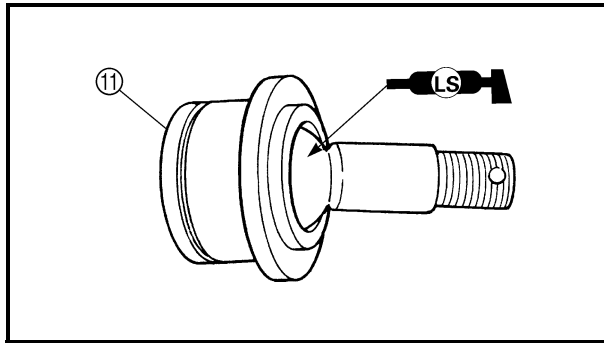
c. Install the body ③, long bolt ④, remover washer ⑤ and remover spacer ⑥ onto ball joint.

TIP: Remover washer ⑤ must be aligned with the projection on the head of the ball joint.

- d. Hold the body ③ in place while turning in the long bolt ④ to remove the ball joint ⑩ from the front lower arm.
- e. Remove the ball joint remover.
- f. Install the long bolt ④, installer spacer ⑧ and installer guide ⑨ onto the body ③.
- g. Attach the assembled ball joint remover, new ball joint ⑪ and installer attachment ⑦ to the front lower arm ⑫.

TIP: Do not tap or damage the top of the ball joint.

- h. Hold the body ③ in place while turning in the long bolt ④ to install the new ball joint ⑪ into the front lower arm ⑫.
- i. Remove the ball joint remover.



j. Apply lithium-soap base grease to the new ball joint ⑪.

k. Install a new rubber boot and new circlip.

TIP:

Always use a new ball joint set.



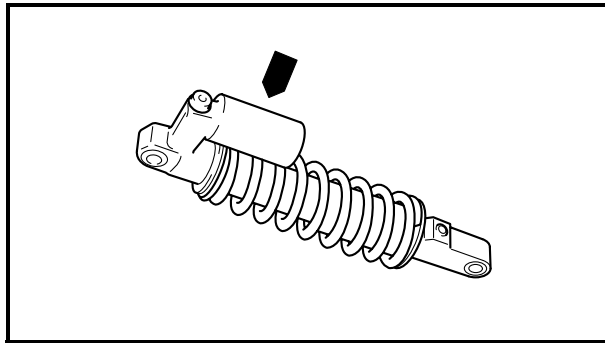
HANDLING THE FRONT SHOCK ABSORBERS AND GAS CYLINDERS

(For models equipped with gas-oil damper shock absorbers)

⚠ WARNING

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

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



EBS00486

DISPOSING OF A FRONT SHOCK ABSORBER AND GAS CYLINDER

(For models equipped with gas-oil damper shock absorbers)

Gas pressure must be released before disposing of a front shock absorber and gas cylinder. To release the gas pressure, press on the gas valve needle with a suitable tool as shown, until all of the gas is released (the hissing has stopped).

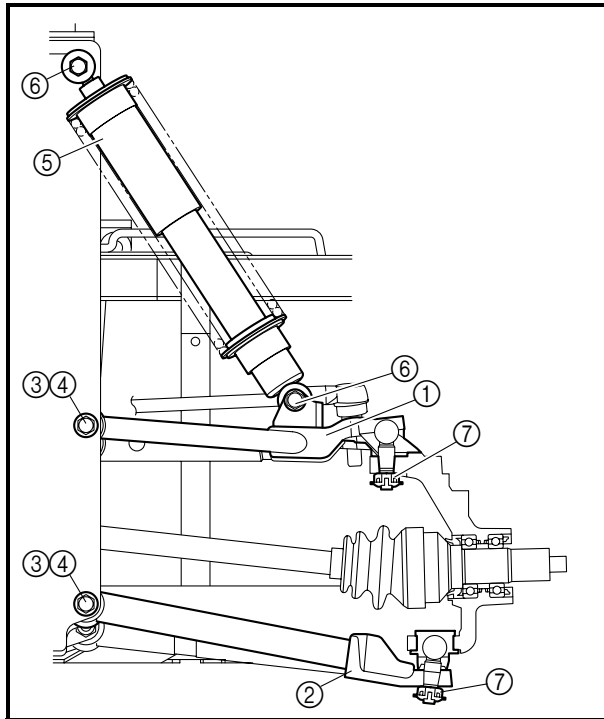
WARNING

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

CHECKING THE FRONT SHOCK ABSORBERS

1. Check:

- shock absorber rod
Bends/damage → Replace the shock absorber assembly.
- shock absorber assembly
Oil leaks → Replace the shock absorber assembly.
- spring
Fatigue → Replace the shock absorber assembly.
Move the spring up and down.



INSTALLING THE FRONT ARMS AND FRONT SHOCK ABSORBER

1. Install:
 - front arms
 - front shock absorber



- a. Install the front upper arm ① and front lower arm ②.

TIP:

- 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 front shock absorber ⑤.



Nut ⑥
45 Nm (4.5 m · kg, 32 ft · lb)

- c. Install the ball joints.



Nut ⑦
30 Nm (3.0 m · kg, 22 ft · lb)

- d. Install the new cotter pins.
- e. Tighten the nuts ④.

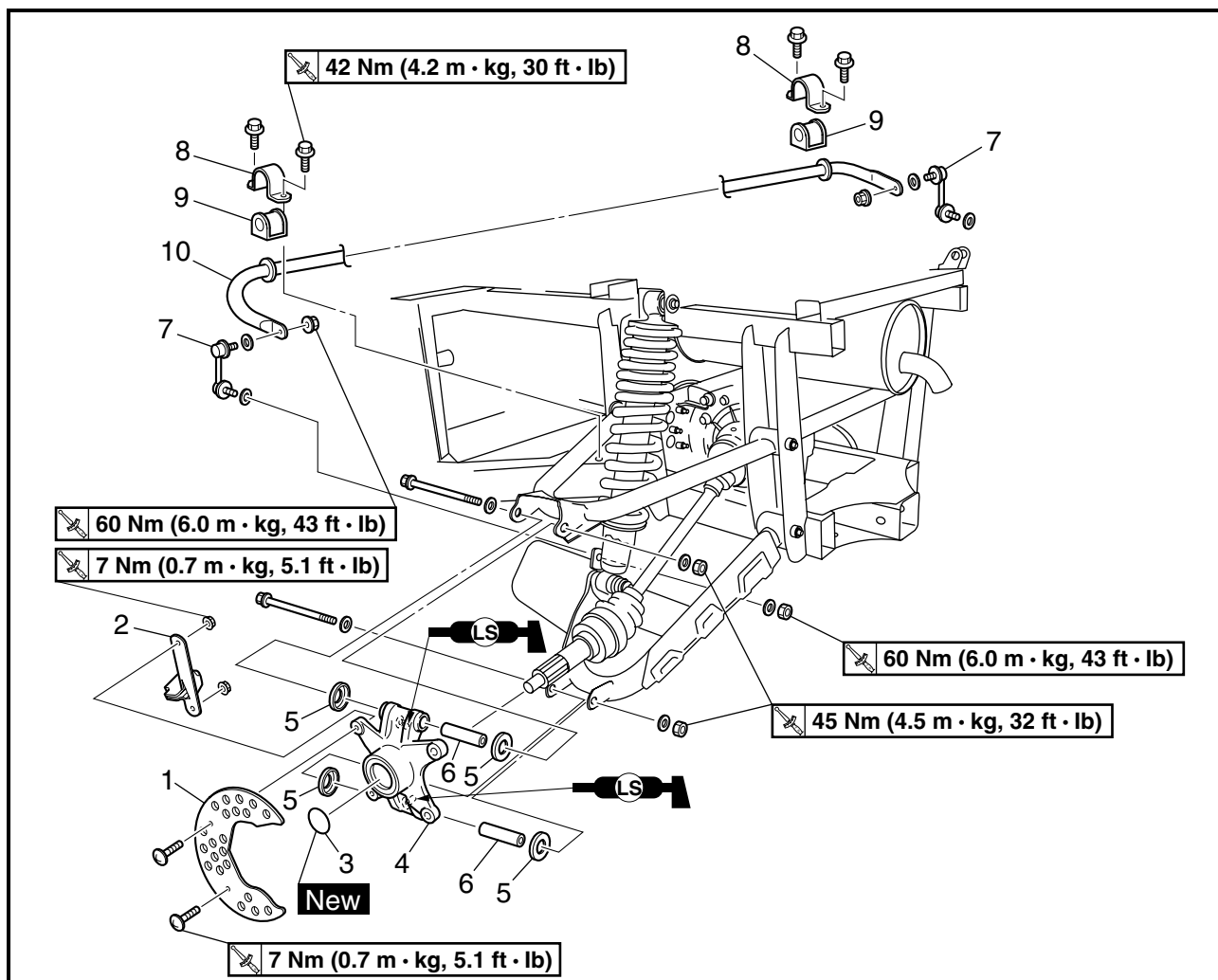


Nut ④
45 Nm (4.5 m · kg, 32 ft · lb)

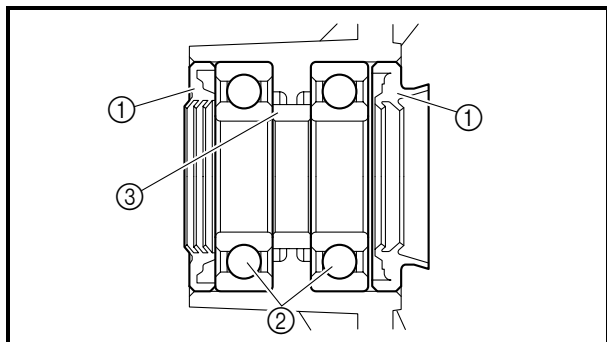




REAR KNUCKLE AND STABILIZER



Order	Job/Part	Q'ty	Remarks
	Removing the rear knuckle and stabilizer		Remove the parts in the order listed.
	Rear wheel hubs		Refer to "FRONT AND REAR WHEELS".
1	Brake disc guard	1	
2	Plate	1	For models equipped with cast wheels
3	O-ring	1	
4	Rear knuckle	1	
5	Spacer cover	4	
6	Spacer	2	
7	Stabilizer joint	2	
8	Stabilizer holder	2	
9	Bushing	2	
10	Stabilizer	1	
			For installation, reverse the removal procedure.



CHECKING THE REAR KNUCKLES

1. Check:
 - rear knuckle
Damage/pitting → Replace.
2. Check:
 - rear wheel bearings
Bearings allow play in the wheel hubs or the wheel turns roughly → Replace.
 - oil seals
Damage → Replace.

- Clean the outside of the rear knuckle.
- Remove the oil seals ①.
- Drive out the bearings ②.

⚠ WARNING

Eye protection is recommended when using striking tools.

- d. Remove the spacer ③.
- e. Apply lithium base grease to the new bearings and oil seals.
- f. Install the spacer to the rear knuckle.
- g. Install the new bearings.

TIP:

Install the outside bearing first.

NOTICE

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

- ### h. Install a new oil seal.

TIP:

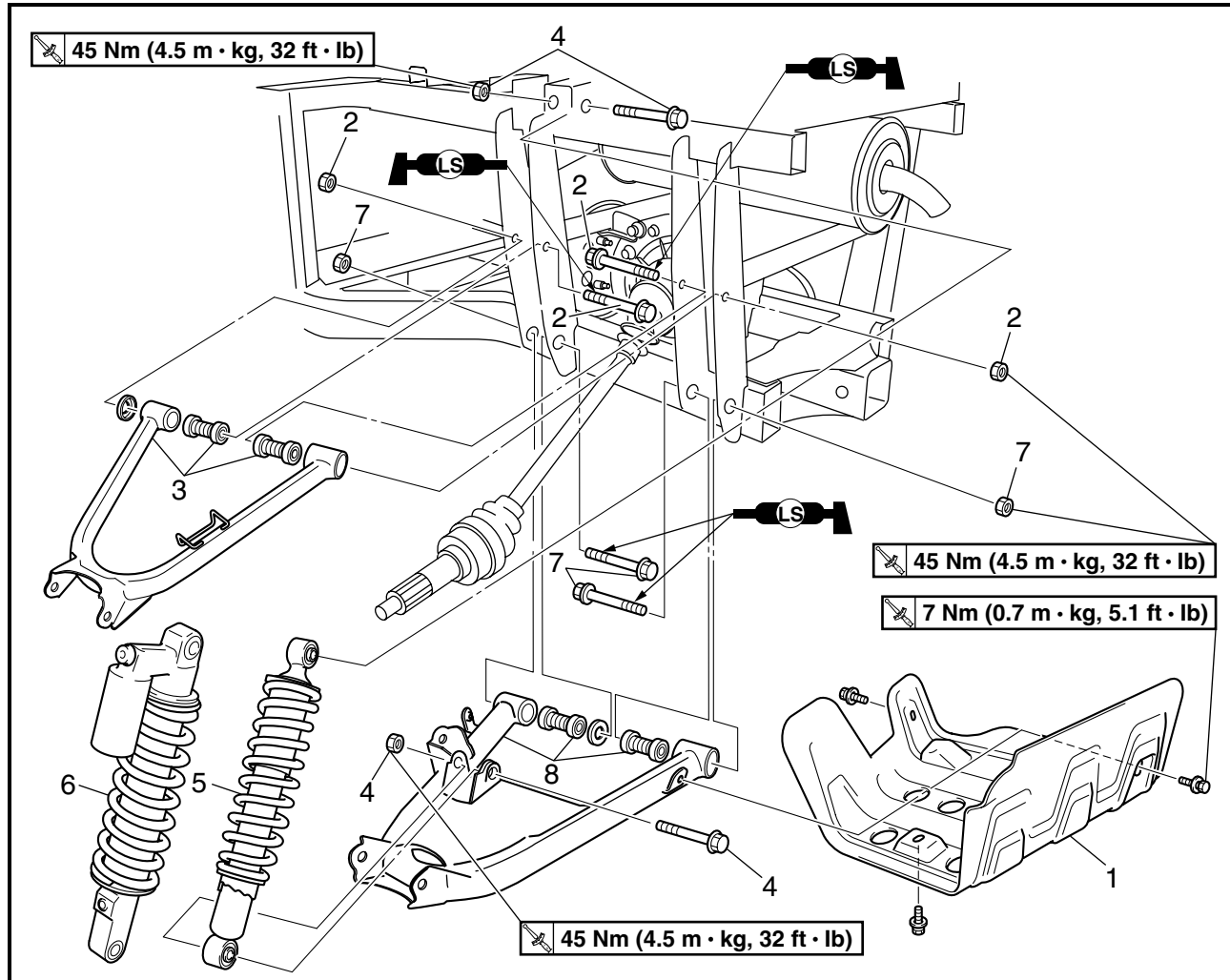
When installing the oil seals, the “seal side” of the oil seal faces out.

CHECKING THE STABILIZER

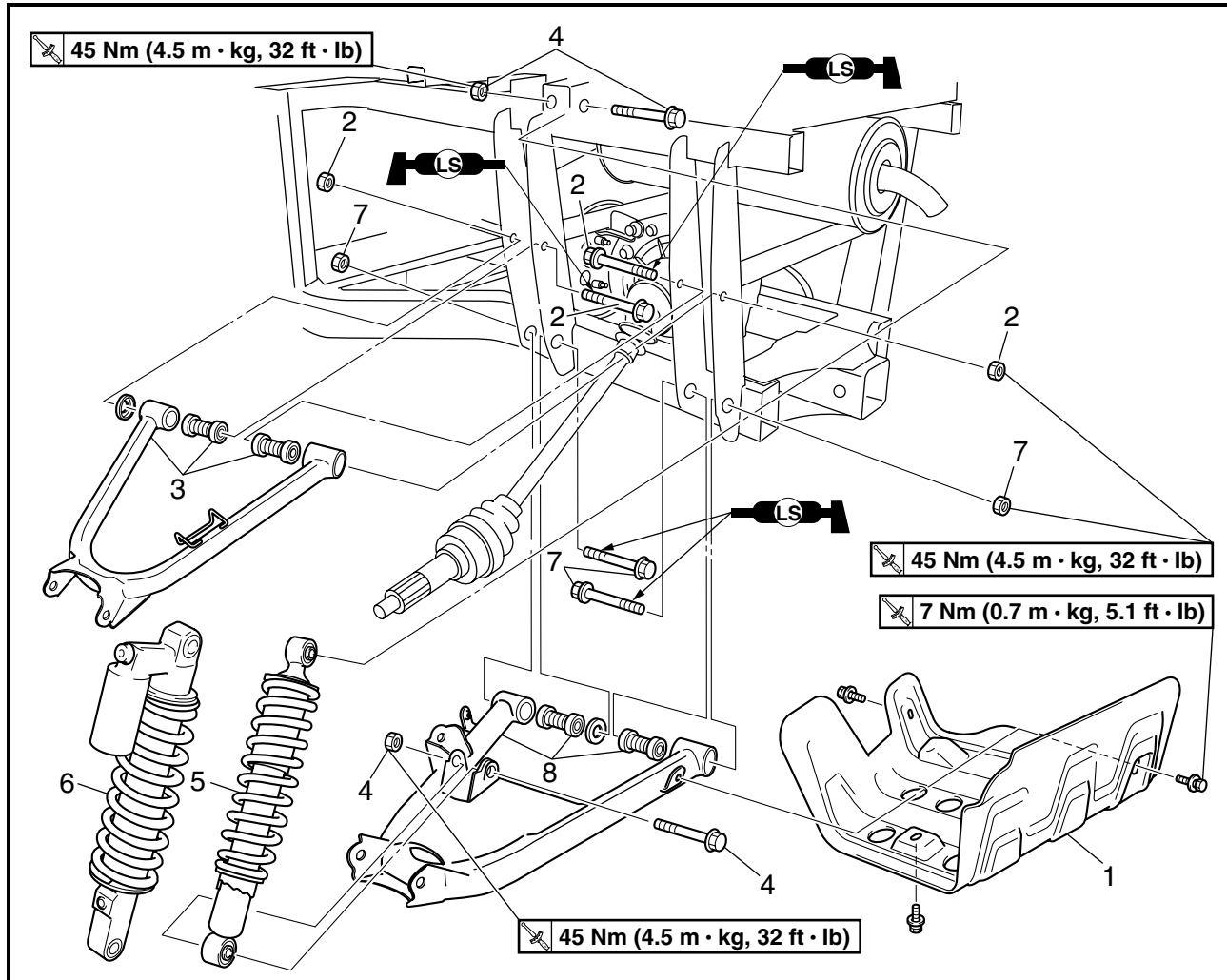
1. Check:
 - stabilizer
Bends/cracks/damage → Replace.



REAR ARMS AND REAR SHOCK ABSORBER



Order	Job/Part	Q'ty	Remarks
	Removing the rear arms and rear shock absorber		Remove the parts in the order listed.
	Rear knuckle/stabilizer		Refer to "REAR KNUCKLE AND STABILIZER".
1	Rear arm protector	1	Refer to "INSTALLING THE REAR ARMS AND REAR SHOCK ABSORBER".
2	Nut/bolt	2/2	
3	Rear upper arm/bushing	1/2	
4	Nut/bolt	2/2	
5	Rear shock absorber	1	For models equipped with oil damper shock absorbers Refer to "INSTALLING THE REAR ARMS AND REAR SHOCK ABSORBER".



Order	Job/Part	Q'ty	Remarks
6	Rear shock absorber	1	For models equipped with gas-oil damper shock absorbers Refer to "INSTALLING THE REAR ARMS AND REAR SHOCK ABSORBER".
7	Nut/bolt	2/2	Refer to "INSTALLING THE REAR ARMS AND REAR SHOCK ABSORBER". For installation, reverse the removal procedure.
8	Rear lower arm/bushing	1/2	



CHECKING THE REAR ARMS

1. Check:
 - rear arms
Bends/damage → Replace.
2. Check:
 - bushings
Wear/damage → Replace.

EBS00485

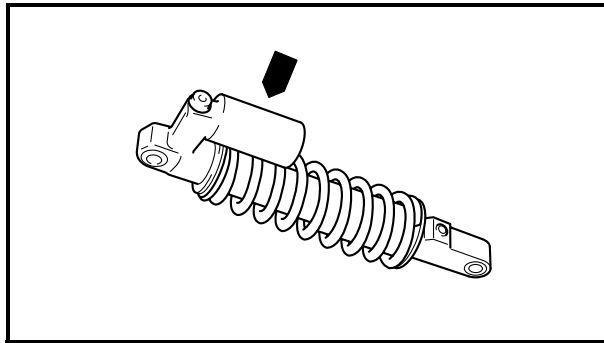
HANDLING THE REAR SHOCK ABSORBERS AND GAS CYLINDERS

(For models equipped with gas-oil damper
shock absorbers)

WARNING

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

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



EBS00486

DISPOSING OF A REAR SHOCK ABSORBER AND GAS CYLINDER

(For models equipped with gas-oil damper shock absorbers)

Gas pressure must be released before disposing of a rear shock absorber and gas cylinder. To release the gas pressure, press on the gas valve needle with a suitable tool as shown, until all of the gas is released (the hissing has stopped).

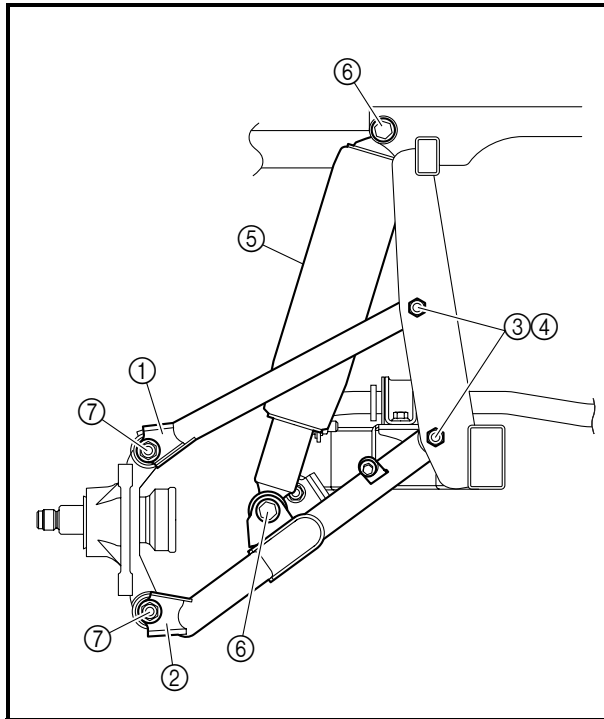
WARNING

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

CHECKING THE REAR SHOCK ABSORBERS

1. Check:

- shock absorber rod
Bends/damage → Replace the shock absorber assembly.
- shock absorber assembly
Oil leaks → Replace the shock absorber assembly.
- spring
Move the spring up and down.
Fatigue → Replace the shock absorber assembly.



INSTALLING THE REAR ARMS AND REAR SHOCK ABSORBER

1. Install:

- rear arms
- rear shock absorber

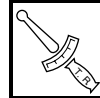


a. Install the rear upper arm ① and rear lower arm ②.

TIP:

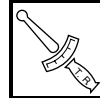
- Lubricate the bolts ③ with lithium-soap-based grease.
- Be sure to position the bolts ③ so that the bolt head faces inward.
- Temporarily tighten the nuts ④.

b. Install the rear shock absorber ⑤.



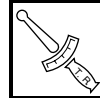
Nut ⑥
45 Nm (4.5 m · kg, 32 ft · lb)

c. Install the rear knuckle.



Nut ⑦
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)



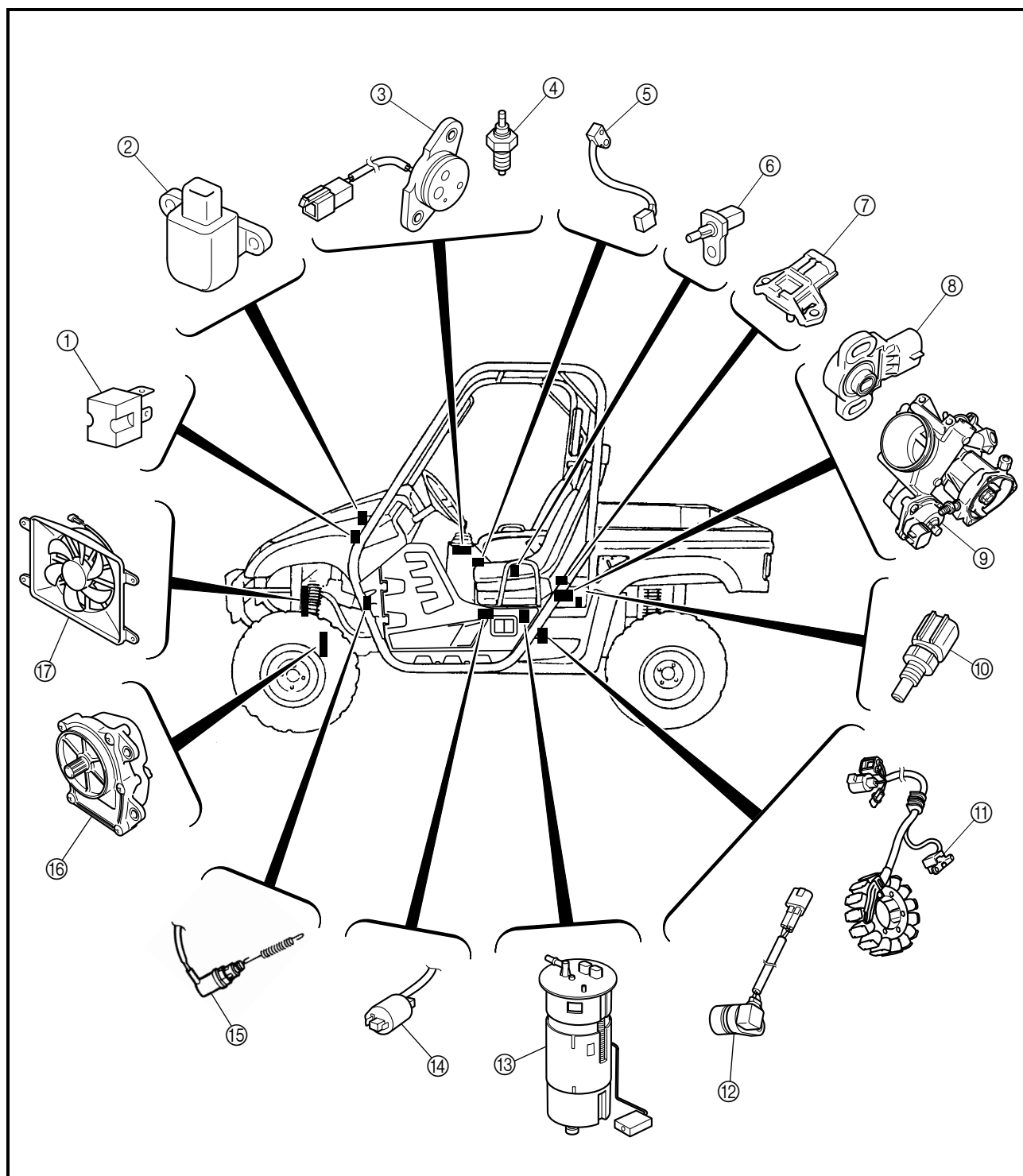


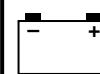
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ELECTRICAL

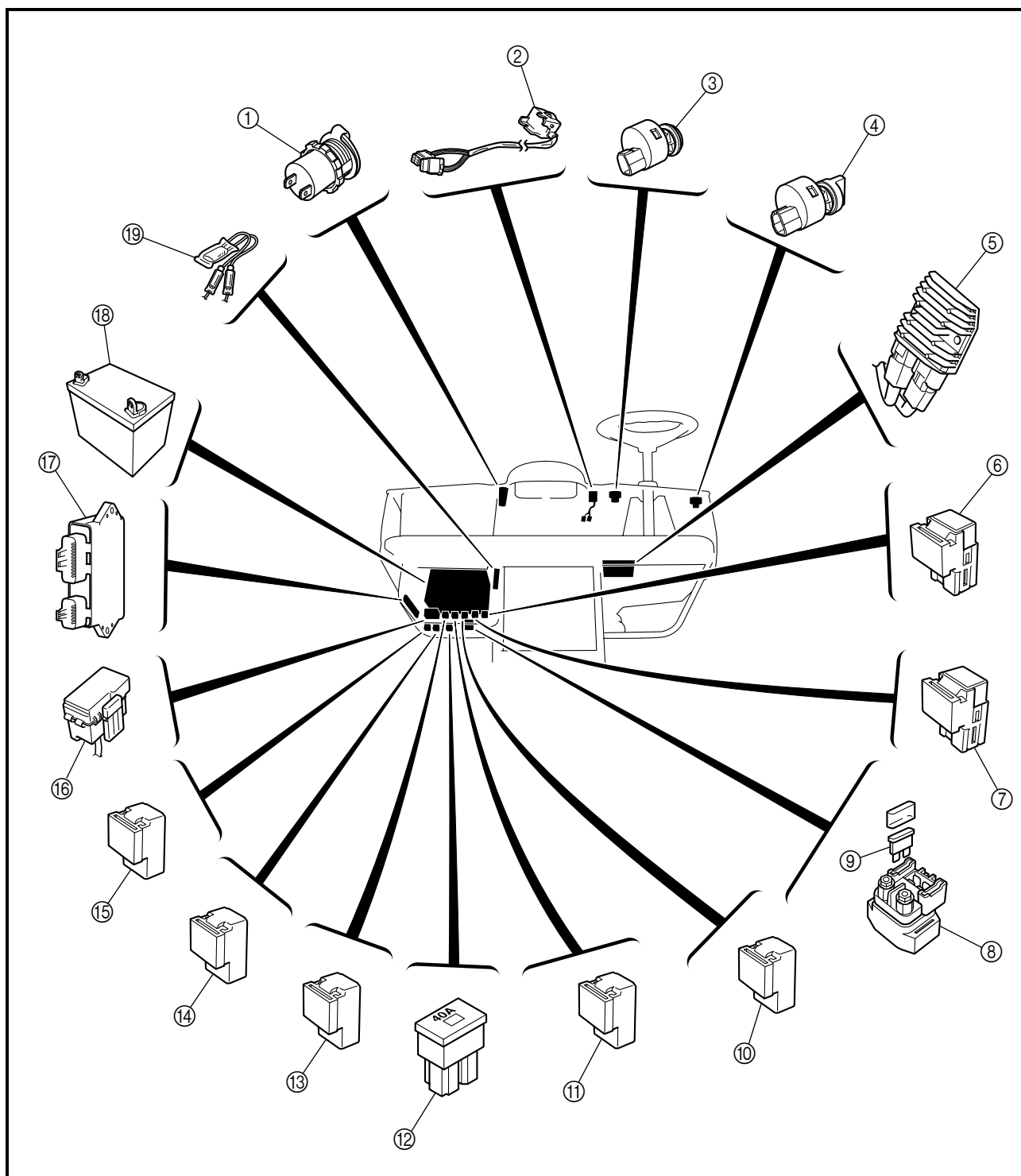
ELECTRICAL COMPONENTS

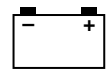
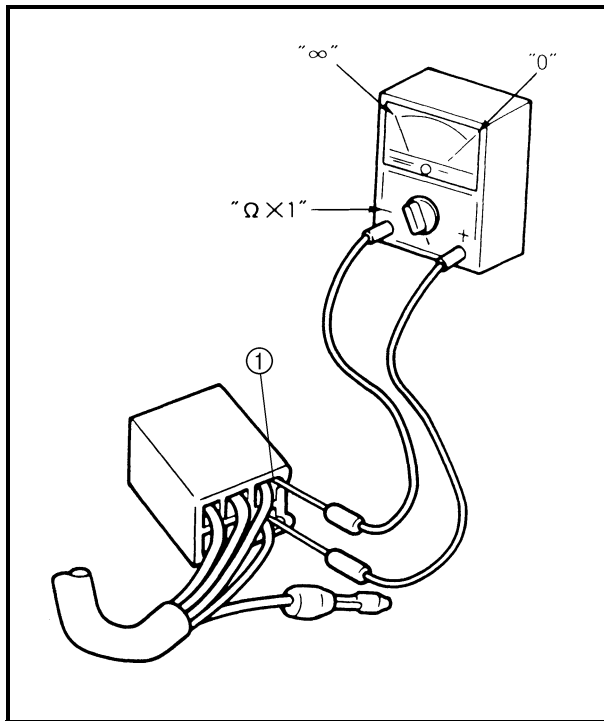
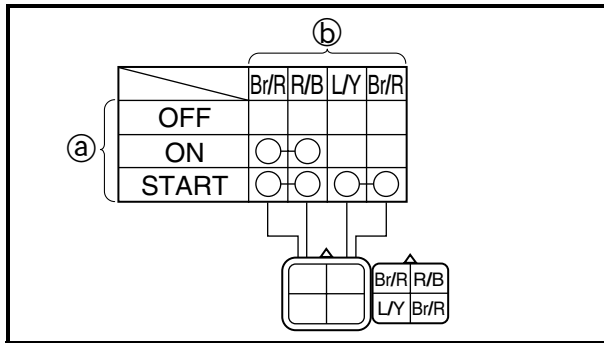
- | | | |
|---------------------------------|----------------------------------|---------------------------|
| ① Diode | ⑧ TPS (throttle position sensor) | ⑮ Brake light switch |
| ② Lean angle sensor | ⑨ ISC (idle speed control) unit | ⑯ Differential gear motor |
| ③ Gear position switch | ⑩ Coolant temperature sensor | ⑰ Radiator fan motor |
| ④ Reverse switch | ⑪ Crankshaft position sensor | |
| ⑤ Parking brake switch | ⑫ Speed sensor | |
| ⑥ Intake air temperature sensor | ⑬ Fuel pump | |
| ⑦ Intake air pressure sensor | ⑭ Ignition coil | |





- | | |
|--|--------------------------------------|
| ① Auxiliary DC jack | ⑪ Fuel injection system relay |
| ② On-Command four-wheel-drive motor switch and differential gear lock switch | ⑫ Main fuse |
| ③ Main switch | ⑬ Radiator fan motor relay |
| ④ Light switch | ⑭ Load control relay |
| ⑤ Rectifier/regulator | ⑮ Four-wheel-drive motor relay 3 |
| ⑥ Four-wheel-drive motor relay 2 | ⑯ Fuse box |
| ⑦ Four-wheel-drive motor relay 1 | ⑰ ECU (engine control unit) |
| ⑧ Starter relay | ⑱ Battery |
| ⑨ Fuel injection system fuse | ⑲ Radiator fan motor circuit breaker |
| ⑩ Headlight relay | |





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.

NOTICE

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

TIP:

- Before checking for continuity, set the pocket tester to "0" and to the " $\Omega \times 1$ " range.
- When checking for continuity, switch back and forth between the switch positions a few times.

The terminal connections for switches (e.g., main switch) are shown in an illustration similar to the one on the left.

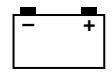
The switch positions ③ are shown in the far left column and the switch lead colors ④ are shown in the top row in the switch illustration.

TIP:

"○—○" indicates a continuity of electricity between switch terminals (i.e., a closed circuit at the respective switch position).

The example illustration on the left shows that:

There is continuity between brown/red and red/black when the switch is set to "ON".



EBS01029

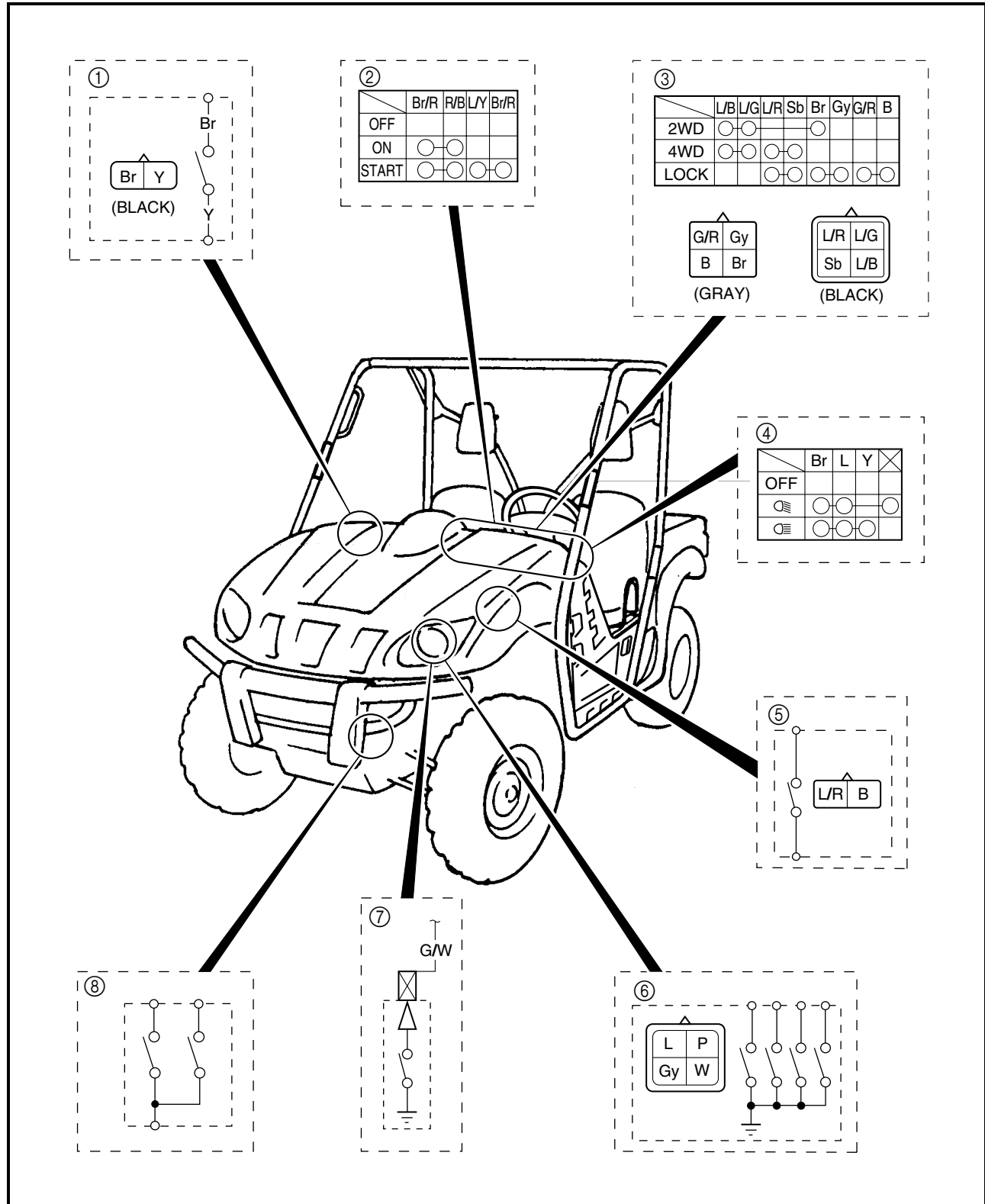
CHECKING THE SWITCHES

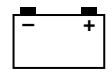
Check each switch for damage or wear, proper connections, and also for continuity between the terminals. Refer to "CHECKING SWITCH CONTINUITY".

Damage/wear → Repair or replace.

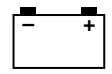
Improperly connected → Properly connect.

Incorrect continuity reading → Replace the switch.





- ① Brake light switch
- ② Main switch
- ③ On-command four-wheel-drive motor switch and differential gear lock switch
- ④ Light switch
- ⑤ Parking brake switch
- ⑥ Gear position switch
- ⑦ Reverse switch
- ⑧ Four-wheel-drive motor switch (differential gear motor)



EBS01030

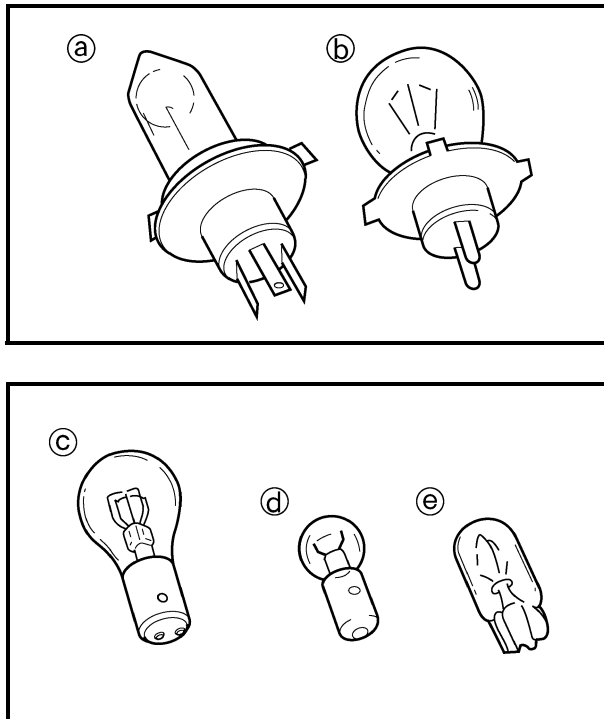
CHECKING THE BULBS AND BULB SOCKETS

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.

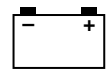
No continuity → Repair or replace the bulb, bulb socket or both.



TYPES OF BULBS

The bulbs used on this vehicle are shown in the illustration on the left.

- Bulbs (a) and (b) are used for the headlights and usually use a bulb holder that must be detached before removing the bulb. The majority of these types of bulbs can be removed from their respective socket by turning them counterclockwise.
- Bulbs (c) are used for turn signal and tail/brake lights and can be removed from the socket by pushing and turning the bulb counterclockwise.
- Bulbs (d) and (e) are used for meter and indicator lights and can be removed from their respective socket by carefully pulling them out.

**CHECKING THE CONDITION OF THE BULBS**

The following procedure applies to all of the bulbs.

1. Remove:

- bulb

⚠ WARNING

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

NOTICE

- Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.
- Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb, and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.

2. Check:

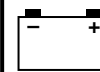
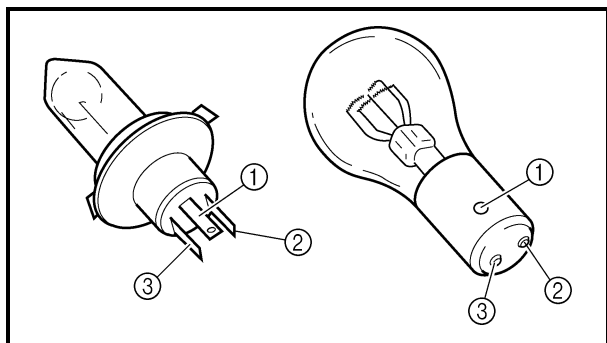
- bulb (for continuity)
(with the pocket tester)
No continuity → Replace.



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

TIP:

Before checking for continuity, set the pocket tester to “0” and to the “ $\Omega \times 1$ ” range.



- 
- a. Connect the positive tester probe to terminal ① and the negative tester probe to terminal ②, and check the continuity.
 - b. Connect the positive tester probe to terminal ① and the negative tester probe to terminal ③, and check the continuity.
 - c. If either of the readings indicate no continuity, replace the bulb.

CHECKING THE CONDITION OF THE BULB SOCKETS

The following procedure applies to all of the bulb sockets.

1. Check:
 - bulb socket (for continuity) (with the pocket tester)
No continuity → Replace.

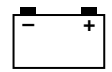


Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

TIP:

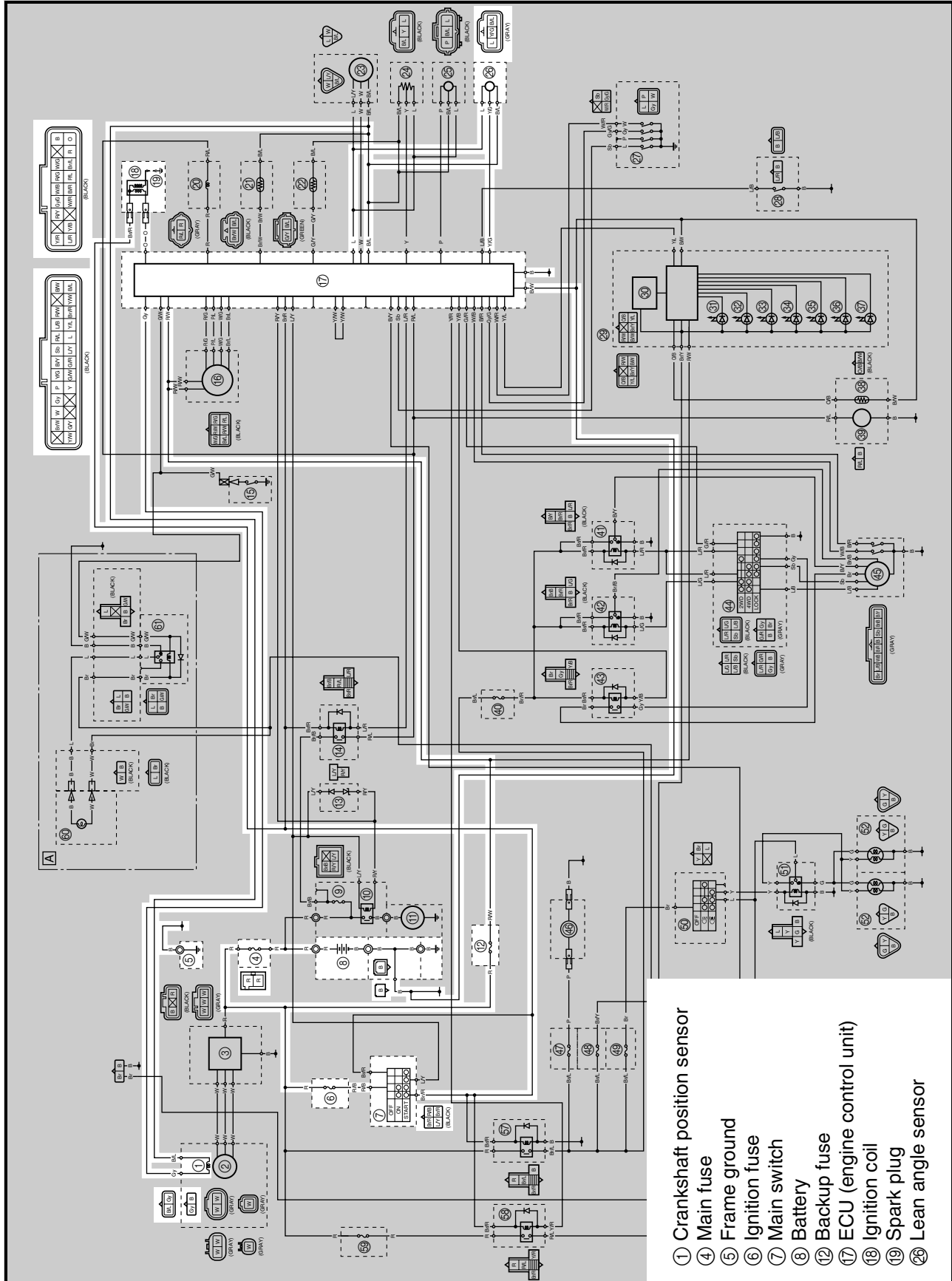
Check each bulb socket for continuity in the same manner as described in the bulb section; however, note the following.

- 
- Install a good bulb into the bulb socket.
 - Connect the pocket tester probes to the respective leads of the bulb socket.
 - Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.

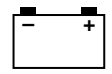


EBS00503

IGNITION SYSTEM CIRCUIT DIAGRAM



- ① Crankshaft position sensor
- ④ Main fuse
- ⑤ Frame ground
- ⑥ Ignition fuse
- ⑦ Main switch
- ⑧ Battery
- ⑫ Backup fuse
- ⑰ ECU (engine control unit)
- ⑱ Ignition coil
- ⑲ Spark plug
- ⑳ Lean angle sensor



EBS01045

TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

Check:

1. main, ignition and backup fuses
2. battery
3. spark plug
4. ignition spark gap
5. spark plug cap resistance
6. ignition coil resistance
7. main switch
8. crankshaft position sensor resistance
9. lean angle sensor
10. wiring connections (of the entire ignition system)

TIP:

- Before troubleshooting, remove the following part(s):
 1. rear console
 2. front console
- 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, ignition and backup fuses

- Check the main, ignition and backup fuses for continuity.
 Refer to “CHECKING THE FUSES” in chapter 3.
- Are the main, ignition and backup 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?

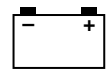


YES



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
CPR7EA-9 (NGK)

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

- Is the spark plug in good condition, is it of the correct type, and is its gap within specification?

YES

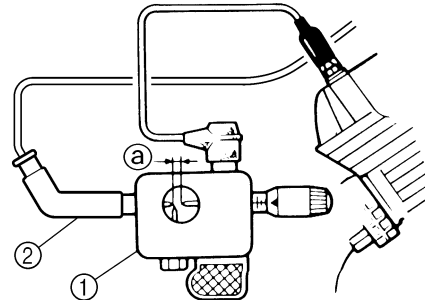
NO

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
- Measure the ignition spark gap ③.
- Crank the engine by setting the main switch to "START" and gradually increase the spark gap until a misfire occurs.



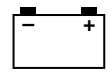
Minimum ignition spark gap
6.0 mm (0.24 in)

- Is there a spark and is the spark gap within specification?

NO

YES

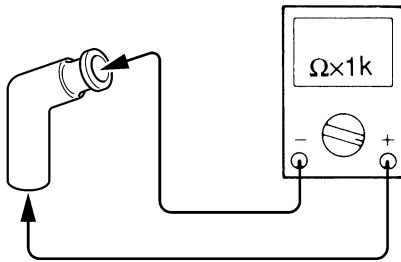
The ignition system
is OK.



EBS01036

5. Spark plug cap resistance

- Remove the spark plug cap from the spark plug lead.
- Connect the pocket tester ($\Omega \times 1k$) to the spark plug cap as shown.
- Measure the spark plug cap resistance.



Spark plug cap resistance
10.0 k Ω at 20 °C (68 °F)

- Is the spark plug cap OK?

YES

NO

Replace the spark plug cap.

EBS01038

6. Ignition coil resistance

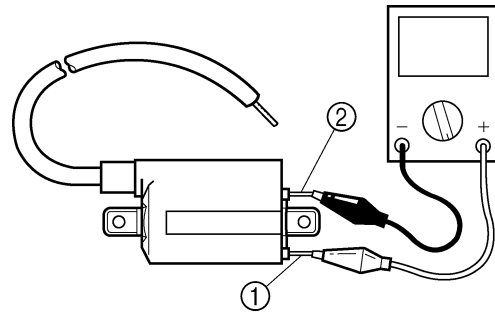
- Disconnect the ignition coil connectors from the ignition coil terminals.
- Connect the pocket tester ($\Omega \times 1$) to the ignition coil as shown.

Positive tester probe →

brown/red lead terminal ①

Negative tester probe →

orange lead terminal ②



- Measure the primary coil resistance.



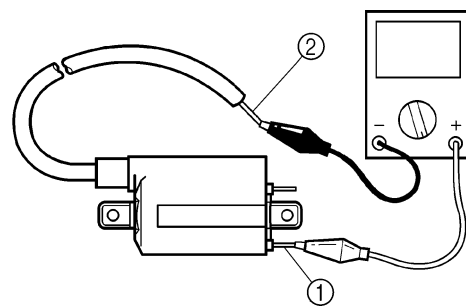
Primary coil resistance
2.16 ~ 2.64 Ω at 20 °C (68 °F)

- Connect the pocket tester ($\Omega \times 1k$) to the ignition coil as shown.

Positive tester probe →

brown/red lead terminal ①

Negative tester probe → spark plug lead ②



- Measure the secondary coil resistance.



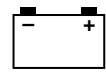
Secondary coil resistance
8.64 ~ 12.96 k Ω at 20 °C (68 °F)

- 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?



Replace the main switch.

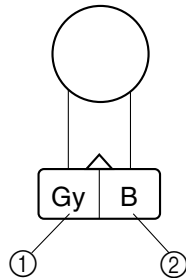
EBS01040

8. 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 → gray 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?



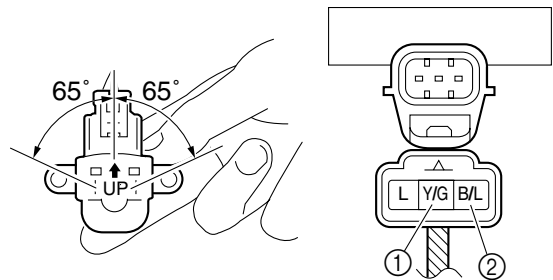
Replace the crankshaft position sensor/stator assembly.

9. 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.

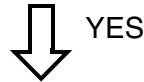


Lean angle sensor voltage

Less than $65^\circ \pm 5^\circ \rightarrow$
3.55 ~ 4.45 V

More than $65^\circ \pm 5^\circ \rightarrow$
0.65 ~ 1.35 V

- Is the lean angle sensor OK?



Replace the lean angle sensor.

EBS01047

10. Wiring

- Check the entire ignition system wiring. Refer to "CIRCUIT DIAGRAM".
- Is the ignition system wiring properly connected and without defects?

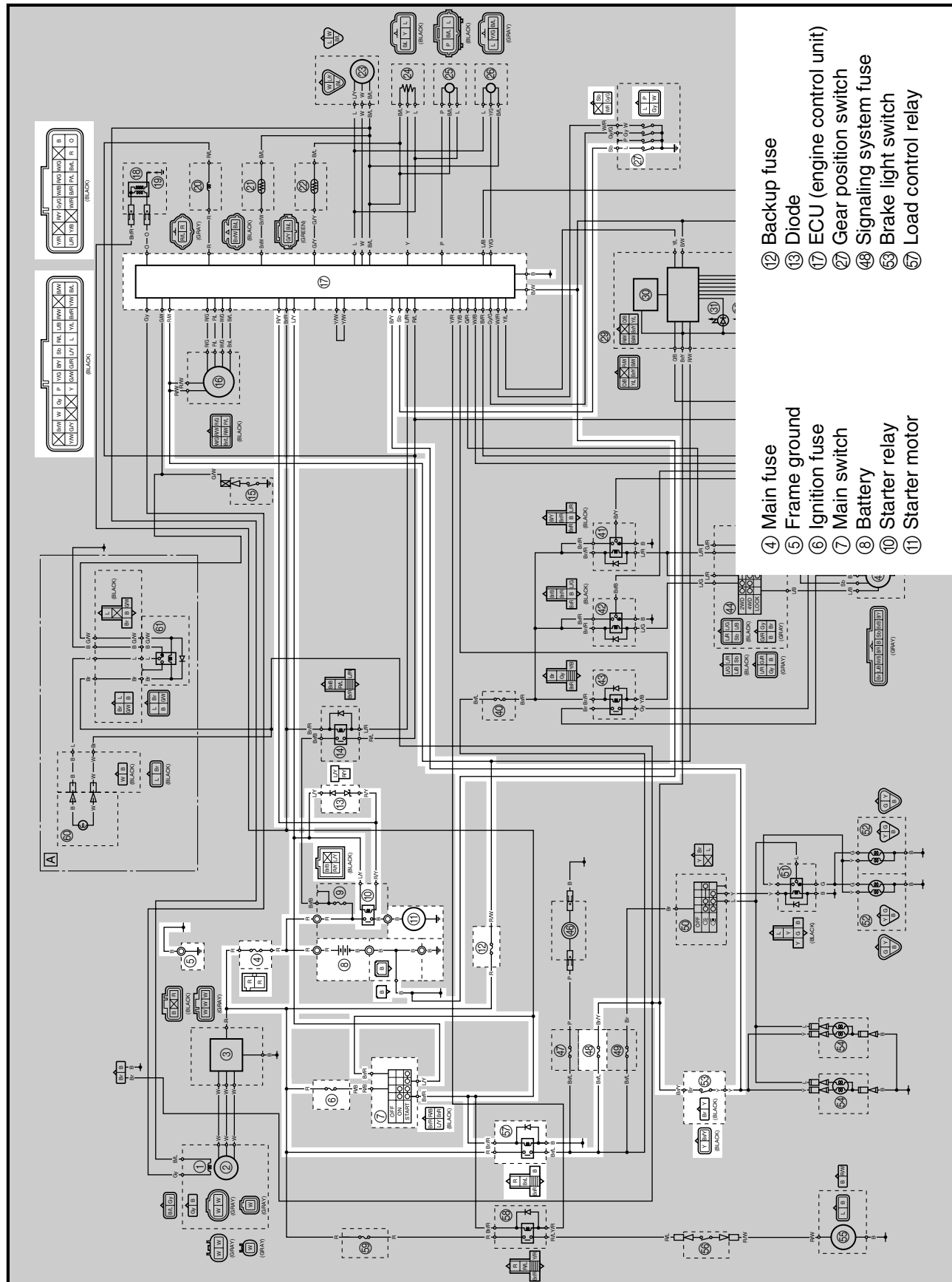


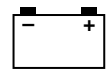
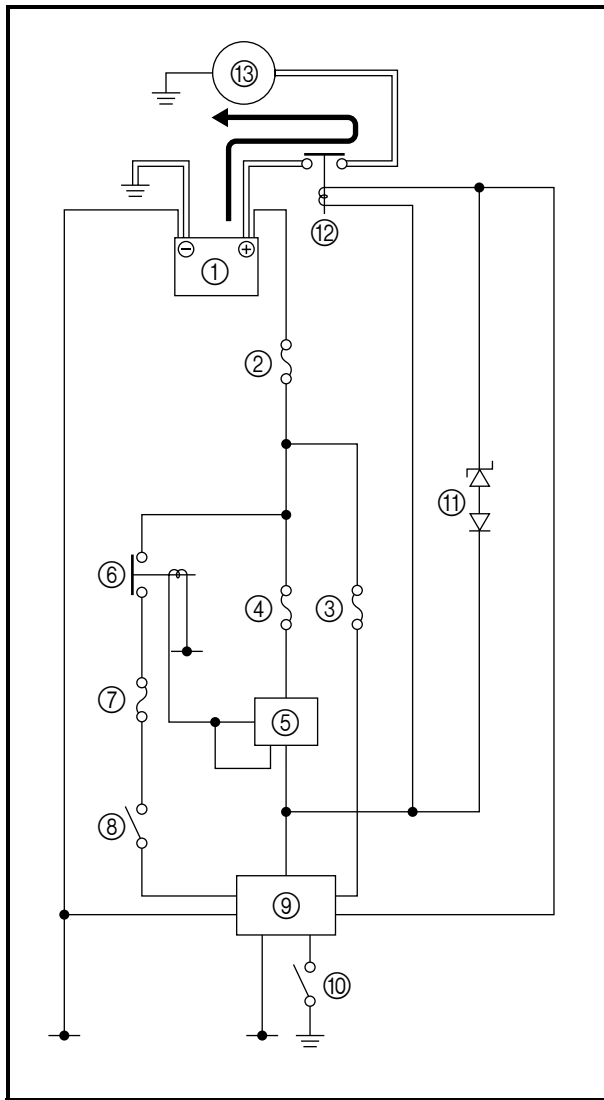
Replace the ECU.

Properly connect or repair the ignition system wiring.

EBS00506

ELECTRIC STARTING SYSTEM CIRCUIT DIAGRAM





EBS00507

STARTING CIRCUIT OPERATION

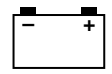
The starting circuit on this model consists of the starter motor, starter relay, load control relay, brake light switch, ECU (engine control unit) and gear position switch. If the main switch is "START" position, the starter motor can be operated only if:

- The transmission is in neutral (the neutral switch circuit of the gear position switch is closed).

or

- The brake pedal is pressed (the brake light switch circuit is closed).

- ① Battery
- ② Main fuse
- ③ Backup fuse
- ④ Ignition fuse
- ⑤ Main switch
- ⑥ Load control relay
- ⑦ Signaling system fuse
- ⑧ Brake light switch
- ⑨ ECU (engine control unit)
- ⑩ Gear position switch
- ⑪ Diode
- ⑫ Starter relay
- ⑬ Starter motor



EBS01048

TROUBLESHOOTING

The starter motor fails to turn.

Check:

1. main, ignition, backup and signaling system fuses
2. battery
3. starter motor
4. starter relay
5. load control relay
6. main switch
7. brake light switch
8. gear position switch
9. wiring connections
(of the entire starting system)

TIP:

- Before troubleshooting, remove the following part(s):
 1. rear console
- Troubleshoot with the following special tool(s).



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

EBS01043

1. Main, ignition, backup and signaling system fuses

- Check the main, ignition, backup and signaling system fuses for continuity. Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main, ignition, backup 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

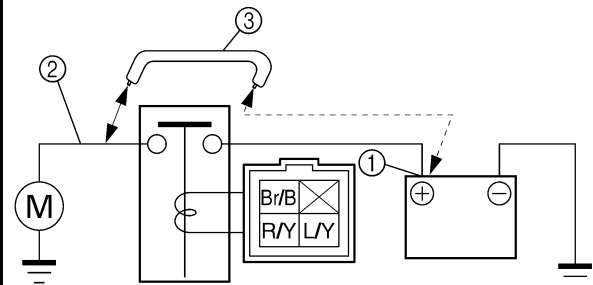
NO

- 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

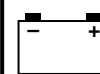
- A wire that is used as a jumper lead must have at least the same capacity or more as that of the battery lead, otherwise the jumper lead may burn.
- This check is likely to produce sparks, therefore make sure nothing flammable is in the vicinity.

- Does the starter motor turn?

YES

NO

Repair or replace the starter motor.



EBS01054

4. Starter relay

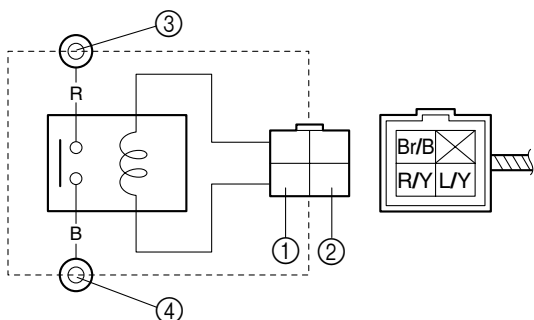
- Remove the starter relay from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the starter relay as shown.

Positive battery terminal → blue/yellow ①

Negative battery terminal → red/yellow 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

5. Load control relay

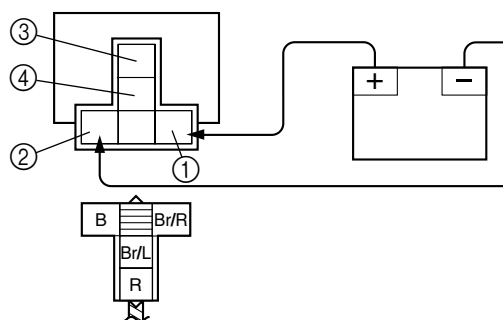
- Remove the load control relay from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the load control relay as shown.

Positive battery terminal → brown/red ①

Negative battery terminal → black ②

Positive tester probe → red ③

Negative tester probe → brown/blue ④



- Does the load control relay have continuity between red and brown/blue?

↓ YES

↓ NO

Replace the load control relay.



EBS01041

6. Main switch

- Check the main switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the main switch OK?

 YES NO

Replace the main switch.

7. Brake light switch

- Check the brake light switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the brake light switch OK?

 YES NO

Replace the brake light switch.

EBS01058

8. 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

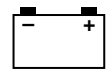
9. Wiring

- Check the entire starting system wiring. Refer to "CIRCUIT DIAGRAM".
- Is the starting system wiring properly connected and without defects?

 YES NO

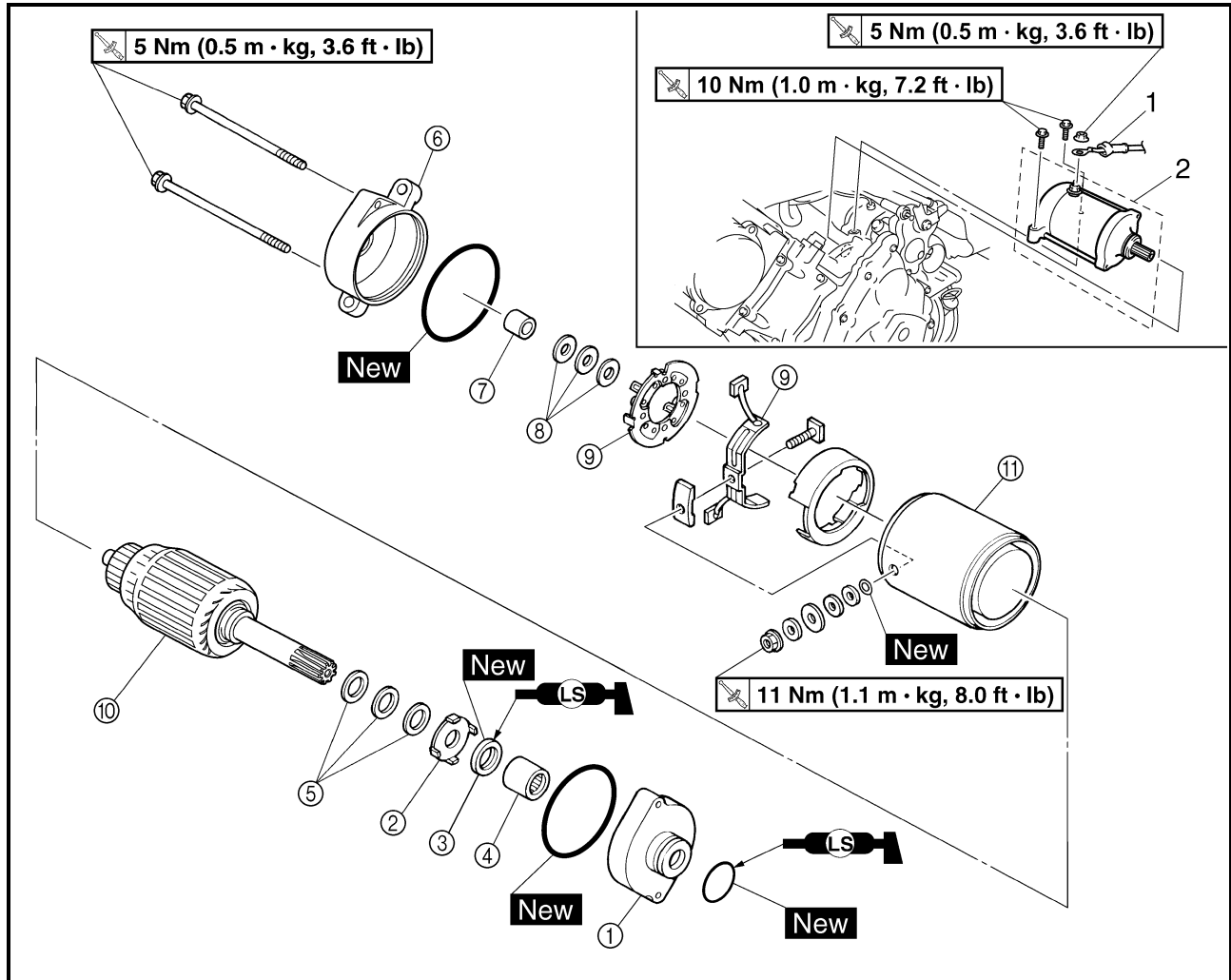
Replace the diode or ECU.

Properly connect or repair the starting system wiring.

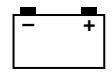
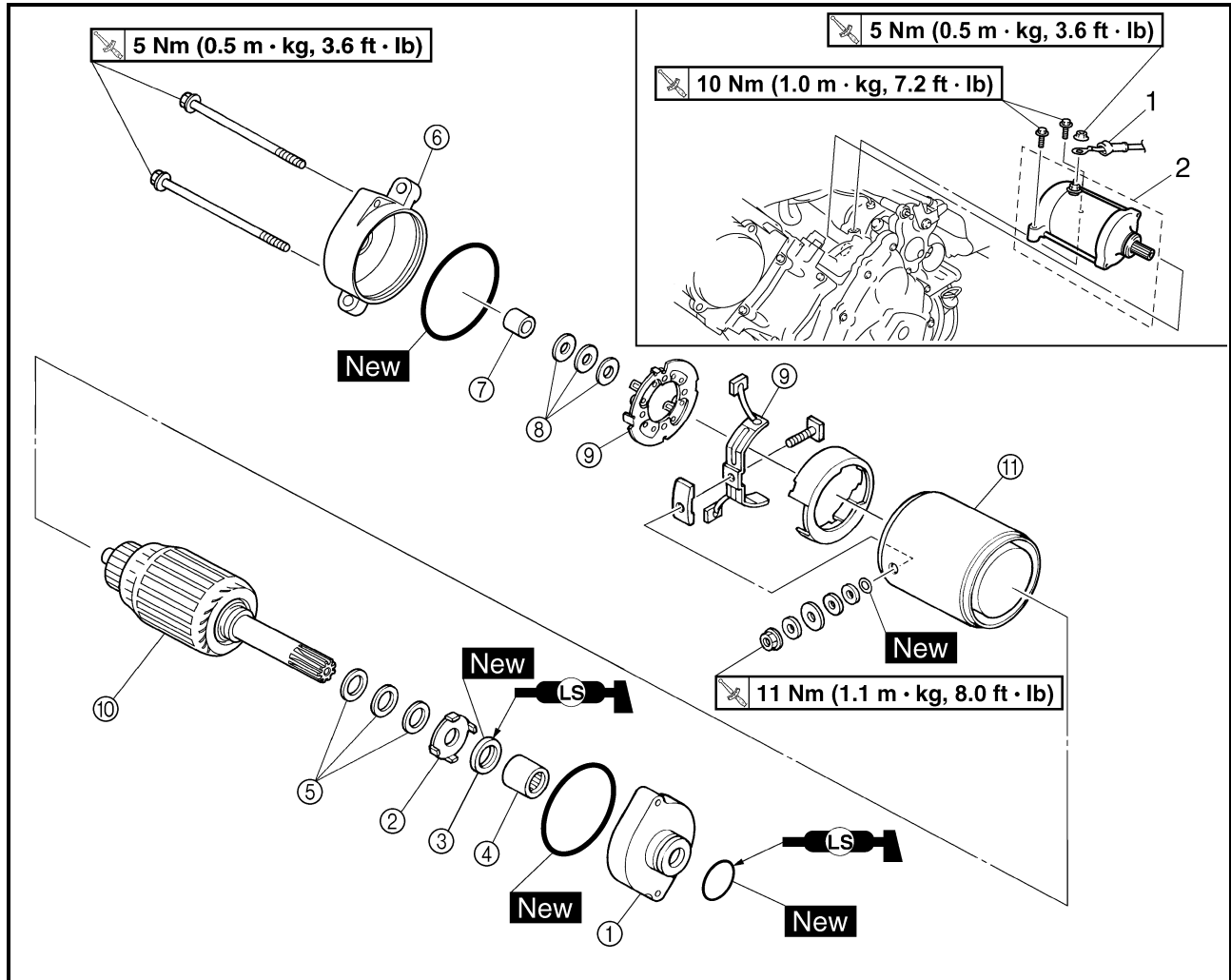


EBS01061

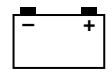
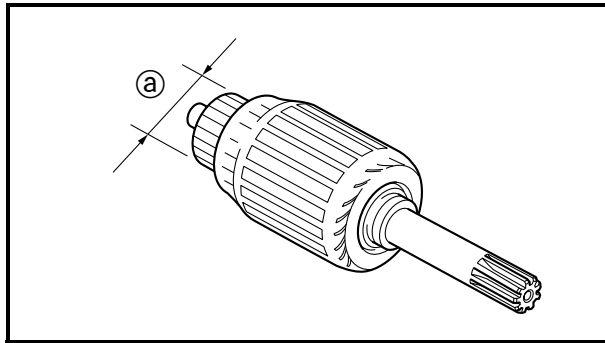
STARTER MOTOR



Order	Job/Part	Q'ty	Remarks
	Removing the starter motor		
	Air intake duct		Remove the parts in the order listed. Refer to "AIR FILTER CASE AND AIR INTAKE DUCT" in chapter 6.
1	Starter motor lead	1	Disconnect.
2	Starter motor	1	For installation, reverse the removal procedure.
	Disassembling the starter motor		
①	Starter motor front cover	1	Remove the parts in the order listed. 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:

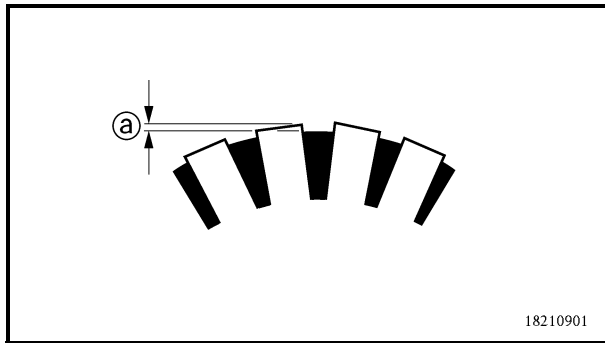
- commutator

Dirt → Clean with 600-grit sandpaper.

2. Measure:

- commutator diameter ①

Out of specification → Replace the starter motor.

**Commutator wear limit**
27 mm (1.06 in)

3. Measure:

- mica undercut ①

Out of specification → Scrape the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.

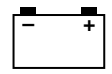
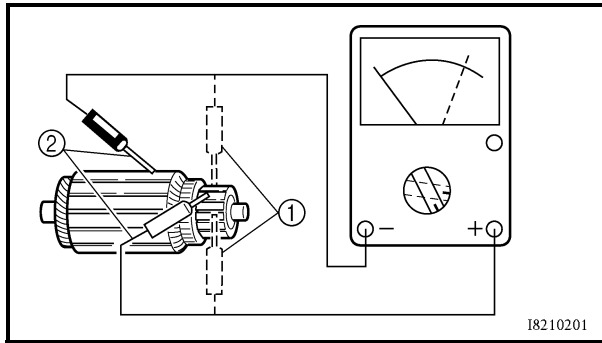
**Mica undercut**
0.70 mm (0.03 in)**TIP:**

The mica of the commutator must be undercut to ensure proper operation of the commutator.

4. Measure:

- armature assembly resistances (commutator and insulation)

Out of specification → Replace the starter motor.



- a. Measure the armature assembly resistances with the pocket tester.

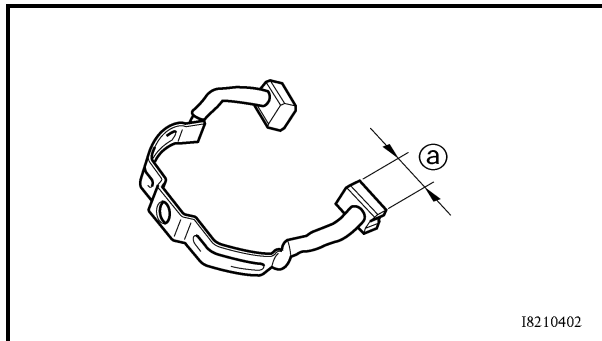


Pocket tester
90890-03112
Analog pocket tester
YU-03112-C



Armature coil
Commutator resistance ①
 0.0250 ~ 0.0350 Ω at
 20 °C (68 °F)
Insulation resistance ②
 Above 1 M Ω at 20 °C (68 °F)

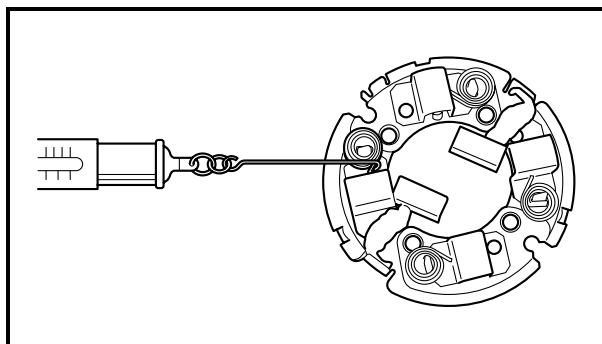
- b. If any resistance is out of specification, replace the starter motor.



5. Measure:
- brush length (a)
Out of specification → Replace the brushes as a set.



Brush length wear limit
5.00 mm (0.20 in)

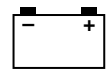
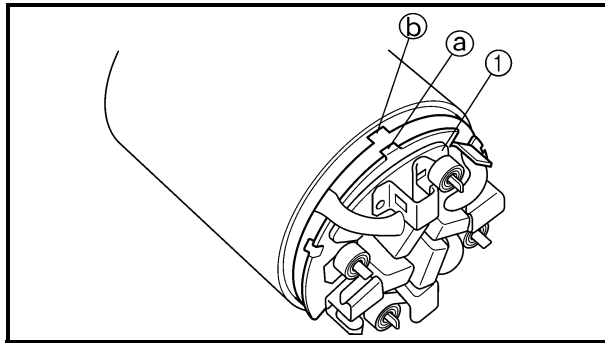


6. Measure:
- brush spring force
- Out of specification → Replace the brush springs as a set.



Brush spring force
7.65 ~ 10.01 N (780 ~ 1021 gf,
27.54 ~ 36.03 oz)

7. Check:
 - gear teethDamage/wear → Replace the gear.
8. Check:
 - bearing
 - oil sealDamage/wear → Replace the defective part(s).



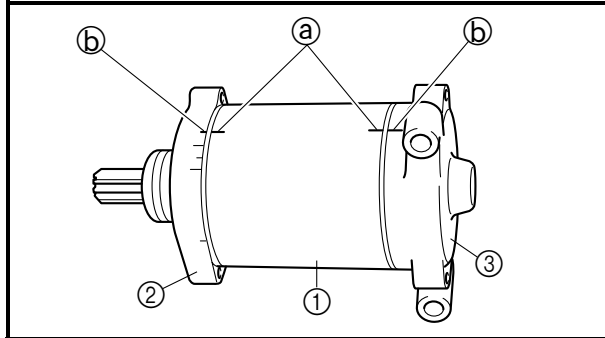
EBS00515

ASSEMBLING THE STARTER MOTOR**1. Install:**

- brush holder set ①

TIP:

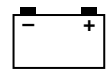
Align the projection (a) on the brush holder set with the slot (b) in the starter motor yoke.

**2. Install:**

- starter motor yoke ①
- starter motor front cover ②
- starter motor rear cover ③

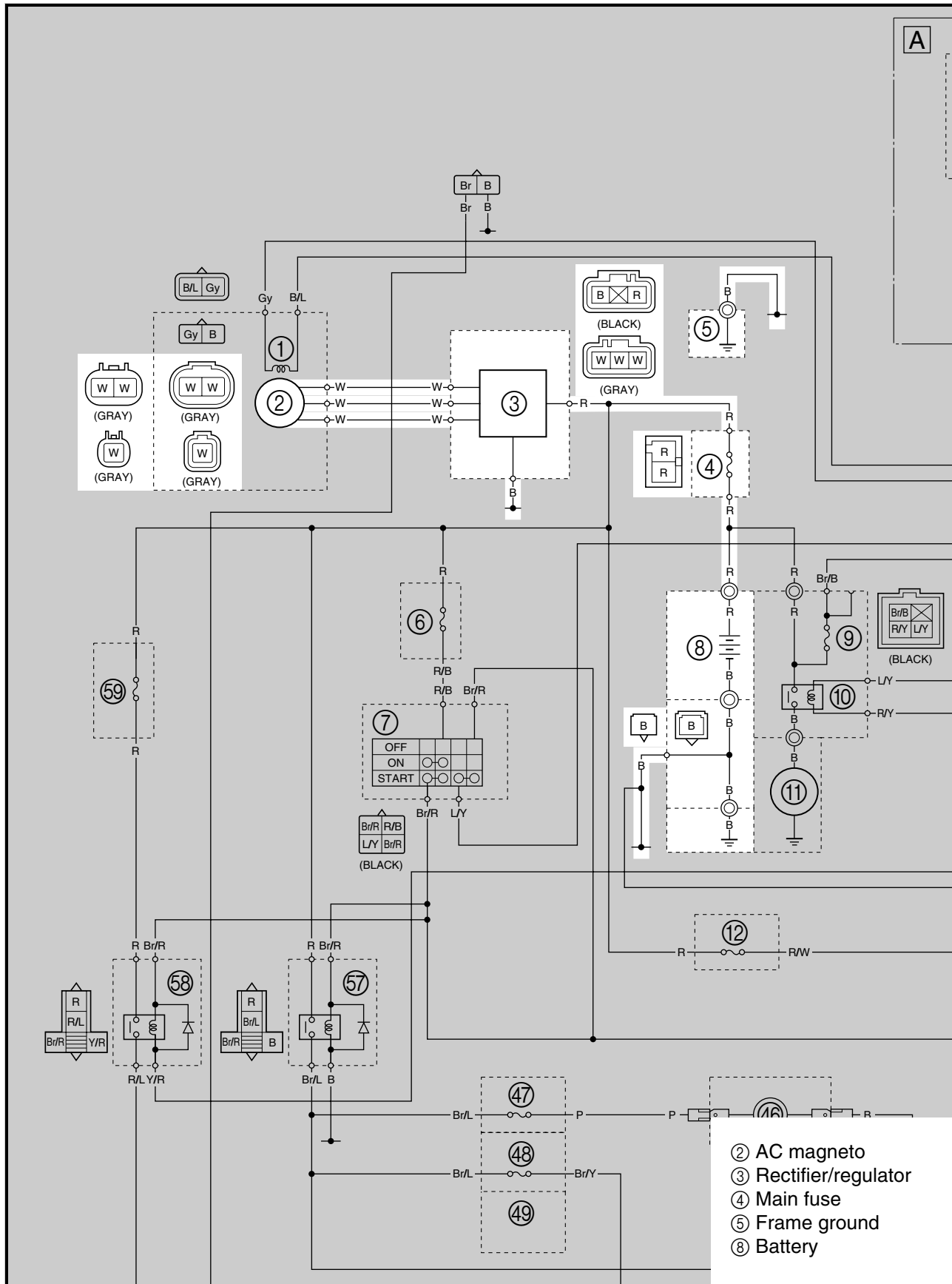
TIP:

Align the match marks (a) on the starter motor yoke with the match marks (b) on the 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)

TIP:

- Before troubleshooting, remove the following part(s):
 1. rear console
 2. front console
- 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.



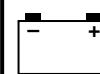
Minimum open-circuit voltage
12.8 V or more at 20 °C (68 °F)

- Is the battery OK?

↓ YES

↓ NO

- Clean the battery terminals.
- Recharge or replace the battery.



EBS01066

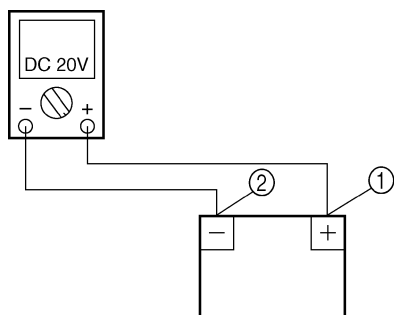
EBS01100

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 5,000 r/min.
- Measure the charging voltage.



Charging voltage
14 V at 5,000 r/min

TIP: _____
Make sure the battery is fully charged.

- Is the charging voltage within specification?

NO

YES

The charging circuit is OK.

4. Stator coil resistance

- Disconnect the AC magneto couplers from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) to the stator coils.

Positive tester probe → **white terminal** ①

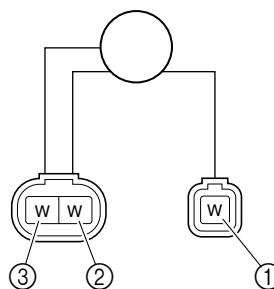
Negative tester probe → **white terminal** ②

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
0.099 ~ 0.121 Ω at 20 °C (68 °F)

YES

NO

Replace the crankshaft position sensor/stator assembly.

5. Wiring

- Check the entire charging system wiring. Refer to "CIRCUIT DIAGRAM".
- Is the charging system wiring properly connected and without defects?

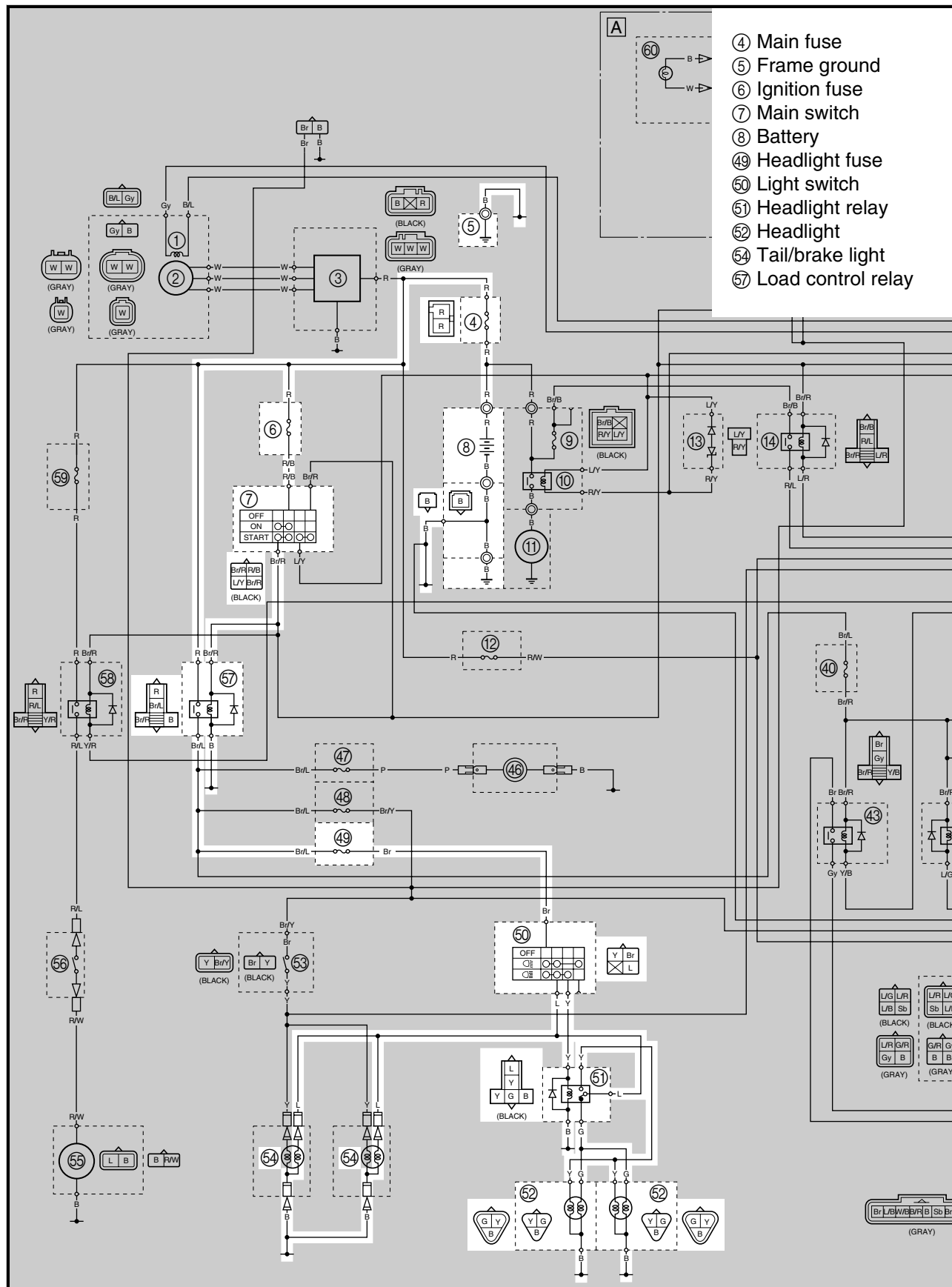
YES

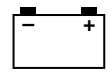
NO

Replace the rectifier/regulator.

Properly connect or repair the charging system wiring.

LIGHTING SYSTEM CIRCUIT DIAGRAM





EBS01067

TROUBLESHOOTING

Any of the following fail to light: headlight, tail/brake light.

Check:

1. main, ignition and headlight fuses
2. battery
3. main switch
4. light switch
5. load control relay
6. wiring connections
(of the entire lighting system)

TIP:

- Before troubleshooting, remove the following part(s):
 1. rear console
- Troubleshoot with the following special tool(s).



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

EBS01043

1. Main, ignition and headlight fuses

- Check the main, ignition and headlight fuses for continuity. Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main, ignition and headlight 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.

EBS01068

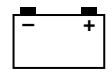
4. Light switch

- Check the light switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the light switch OK?

↓ YES

↓ NO

Replace the light switch.



EBS01054

5. Load control relay

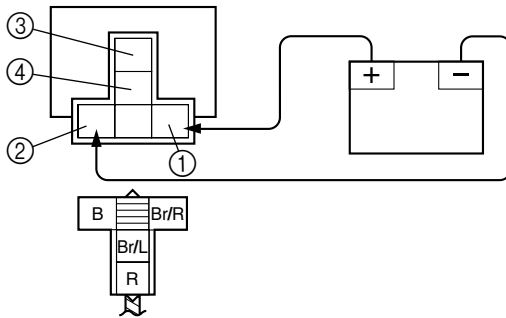
- Remove the load control relay from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the load control relay as shown.

Positive battery terminal → brown/red ①

Negative battery terminal → black ②

Positive tester probe → red ③

Negative tester probe → brown/blue ④



- Does the load control relay have continuity between red and brown/blue?

YES

NO

Replace the load control relay.

EBS01069

6. Wiring

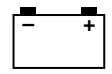
- Check the entire lighting system wiring. Refer to "CIRCUIT DIAGRAM".
- Is the lighting system wiring properly connected and without defects?

YES

NO

Check the condition of each of the lighting system circuits. Refer to "CHECKING THE LIGHTING SYSTEM".

Properly connect or repair the lighting system 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

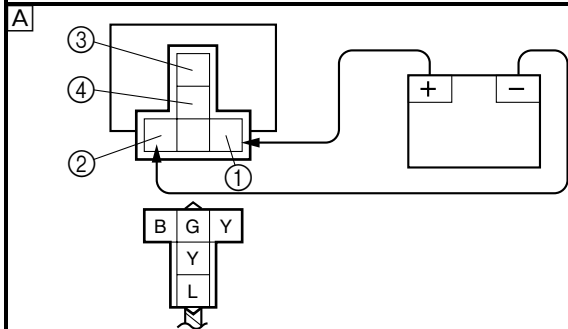
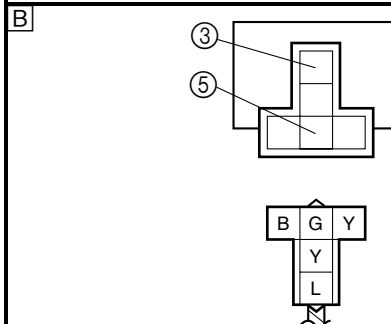


NO

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

- Does the headlight relay have continuity between blue and yellow? **A**

- Does the headlight relay have continuity between blue and green? **B**

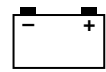


YES



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 "HI".

[B] When the light switch is set to "LO".

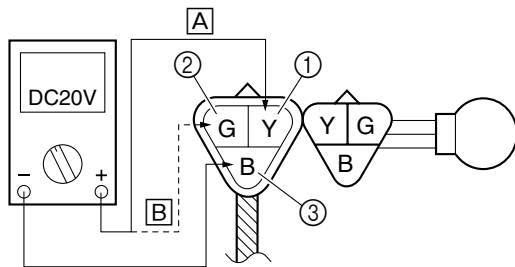
Headlight coupler (wire harness side)

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 (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.

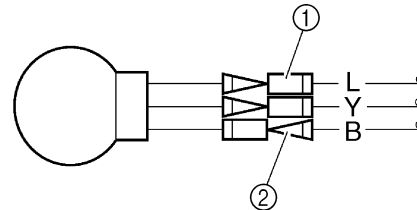
2. Voltage

- 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 (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 is faulty and must be repaired.

2. The taillight fails to come on.

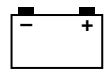
1. Taillight bulb and socket

- Check the taillight bulb and socket for continuity. Refer to "CHECKING THE BULBS AND BULB SOCKETS".
- Are the taillight bulb and socket OK?

YES

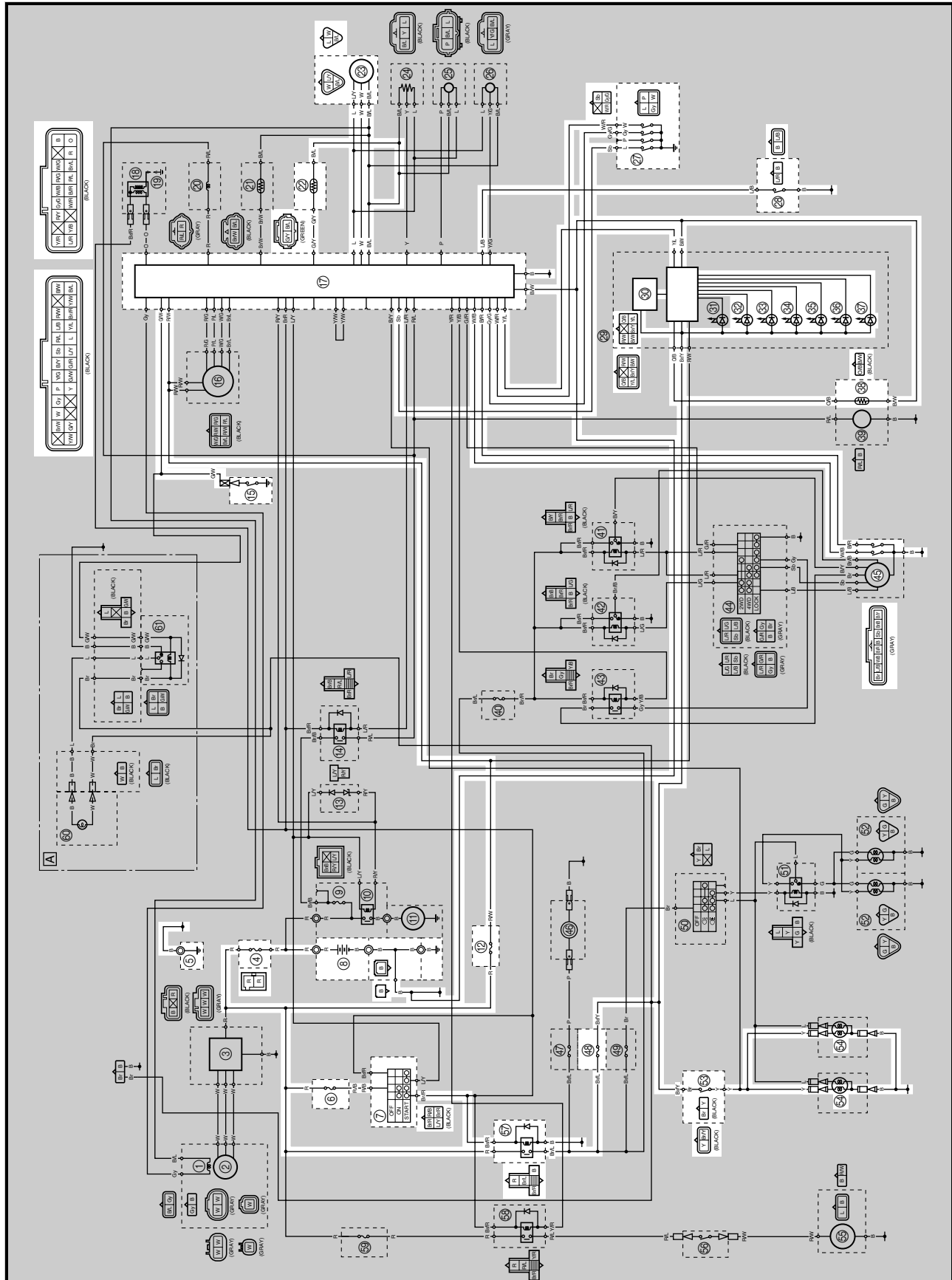
Replace the taillight bulb, socket or both.

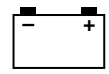
NO



EBS00521

SIGNALING SYSTEM CIRCUIT DIAGRAM





- ④ Main fuse
- ⑤ Frame ground
- ⑥ Ignition fuse
- ⑦ Main switch
- ⑧ Battery
- ⑫ Backup fuse
- ⑮ Reverse switch
- ⑰ ECU (engine control unit)
- ⑳ Coolant temperature sensor
- ㉓ Speed sensor
- ㉗ Gear position switch
- ㉙ Parking brake switch
- ㉚ Multifunction meter
- ㉛ Coolant temperature warning light
- ㉜ Park indicator light
- ㉝ Reverse indicator light
- ㉞ Neutral indicator light
- ㉟ High-range indicator light
- ㊱ Low-range indicator light
- ㊳ Fuel sender
- ㊵ Differential gear motor
- ㊶ Signaling system fuse
- ㊸ Brake light switch
- ㊹ Tail/brake light
- ㊺ Load control relay



EBS01073

TROUBLESHOOTING

Any of the following fail to light: warning light, brake light or an indicator light.

Check:

1. main, backup, signaling system and ignition fuses
2. battery
3. main switch
4. load control relay
5. wiring connections
(of the entire signaling system)

TIP:

- Before troubleshooting, remove the following part(s):
 1. rear console
- Troubleshoot with the following special tool(s).



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

EBS01043

1. Main, backup, signaling system and ignition fuses

- Check the main, backup, signaling system and ignition fuses for continuity. Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main, backup, 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.



EBS01054

4. Load control relay

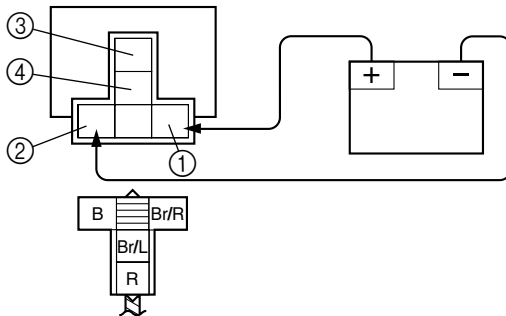
- Remove the load control relay from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the load control relay as shown.

Positive battery terminal → **brown/red** ①

Negative battery terminal → **black** ②

Positive tester probe → **red** ③

Negative tester probe → **brown/blue** ④



- Does the load control relay have continuity between red and brown/blue?

YES

NO

Replace the load control relay.

EBS01074

5. Wiring

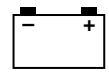
- Check the entire signaling system wiring. Refer to "CIRCUIT DIAGRAM".
- Is the signaling system wiring properly connected and without defects?

YES

NO

Check the condition of each of the signaling system circuits. Refer to "CHECKING THE SIGNALING SYSTEM".

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?



Replace the brake light bulb, bulb socket or both.

2. Brake light switch

- Check the brake light switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the brake light switch OK?



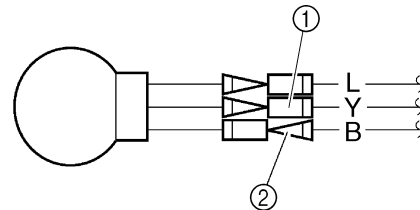
Replace the brake light switch.

3. Voltage

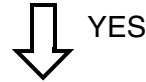
- Connect the pocket tester (DC 20 V) to the tail/brake light connectors (wire harness side) as shown.

Positive tester probe → yellow ①

Negative tester probe → black ②

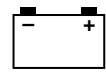


- Set the main switch to "ON".
- Push down on the brake pedal.
- Measure the voltage (12 V) of yellow ① on the tail/brake light connectors (wire harness side).
- Is the voltage within specification?



This circuit is OK.

The wiring circuit from the main switch to the tail/brake light connector is faulty and must be repaired.



EBS01078

2. The neutral, 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. Wiring

- Check the wiring circuit from the gear position switch to ECU and ECU to meter assembly (yellow/blue).
- Is the wiring circuit properly connected and without defects?

YES

NO

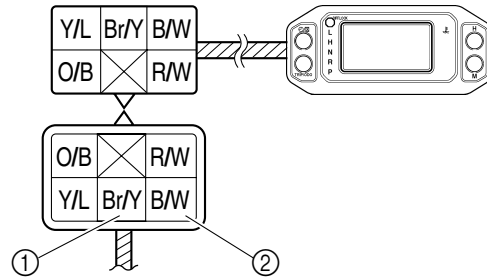
Properly connect or repair the wiring circuit.

3. Voltage

- Connect the pocket tester (DC 20 V) to the meter assembly coupler as shown.

Positive tester probe → brown/yellow ①

Negative tester probe → black/white ②



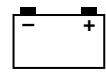
- Set the main switch to "ON".
- Measure the voltage (12 V) of brown/yellow ① and black/white ② at the meter assembly coupler.
- Is the voltage within specification?

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.



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. Wiring

- Check the wiring circuit from the reverse switch to ECU (green/white) and ECU to meter assembly (yellow/blue).
- Is the wiring circuit properly connect and without defects?

YES

NO

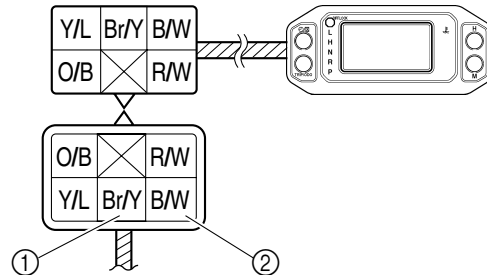
Properly connect or repair the wiring circuit.

3. Voltage

- Connect the pocket tester (DC 20 V) to the meter assembly coupler as shown.

Positive tester probe → brown/yellow ①

Negative tester probe → black/white ②



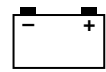
- Set the main switch to "ON".
- Measure the voltage (12 V) of brown/yellow ① and black/white ② at the meter assembly coupler.
- Is the voltage within specification?

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 park indicator light fails to come on.

1. Parking brake switch

- Check the parking brake switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the parking brake switch OK?

YES

NO

Replace the parking brake switch.

2. Wiring

- Check the wiring circuit from the parking brake switch to ECU (blue/black) and ECU to meter assembly (yellow/blue).
- Is the wiring circuit properly connect and without defects?

YES

NO

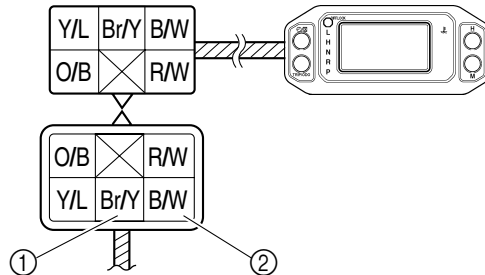
Properly connect or repair the wiring circuit.

3. Voltage

- Connect the pocket tester (DC 20 V) to the meter assembly coupler as shown.

Positive tester probe → brown/yellow ①

Negative tester probe → black/white ②



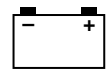
- Set the main switch to "ON".
- Measure the voltage (12 V) of brown/yellow ① and black/white ② at the meter assembly coupler.
- Is the voltage within specification?

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

5. 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. Wiring

- Check the wiring circuit from the four-wheel-drive motor switch to ECU and ECU to meter assembly (yellow/blue).
- Is the wiring circuit properly connect and without defects?

YES

NO

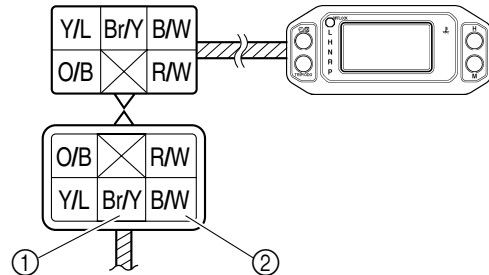
Properly connect or repair the wiring circuit.

3. Voltage

- Connect the pocket tester (DC 20 V) to the meter assembly coupler as shown.

Positive tester probe → brown/yellow ①

Negative tester probe → black/white ②



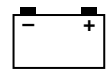
- Set the main switch to "ON".
- Measure the voltage (12 V) of brown/yellow ① and black/white ② at the meter assembly coupler.
- Is the voltage within specification?

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 122 °C (251.6 °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.

TIP:

Make sure the coolant temperature sensor terminals do not get wet.

- Place a thermometer ③ in the coolant.
- Slowly heat the coolant, and then let it cool to the specified temperature indicated in the table.
- Measure the coolant temperature sensor resistance.



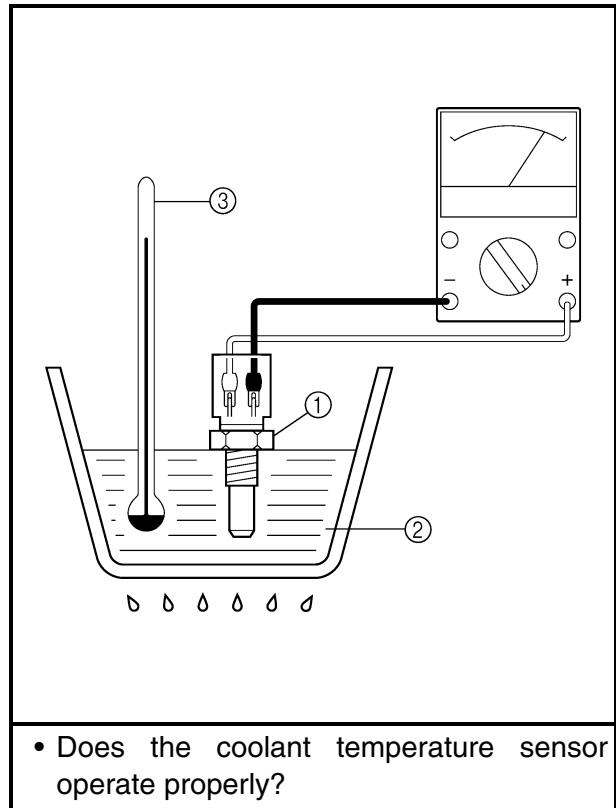
Coolant temperature sensor resistance
290 ~ 354 Ω at 80 °C (176 °F)

⚠ 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)



YES



NO

Replace the coolant temperature sensor.

2. Wiring

- Check the wiring circuit from the coolant temperature sensor to ECU (green/yellow) and ECU to meter assembly (yellow/blue).
- Is the wiring circuit properly connect and without defects?

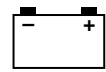


YES



NO

Properly connect or repair the wiring circuit.

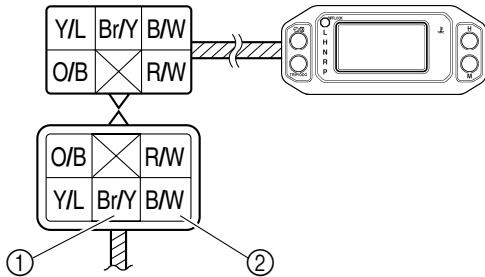


3. Voltage

- Connect the pocket tester (DC 20 V) to the meter assembly coupler as shown.

Positive tester probe → brown/yellow ①

Negative tester probe → black/white ②



- Set the main switch to "ON".
- Measure the voltage (12 V) of brown/yellow ① and black/white ② at the meter assembly coupler.
- Is the voltage within specification?



Replace the meter assembly or ECU.



The wiring circuit from the main switch to the meter assembly coupler is faulty and must be repaired.

7. The fuel meter 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 ($\Omega \times 10$) to the fuel pump terminals as shown.

Positive tester probe → orange/black ①

Negative tester probe → black/white ②

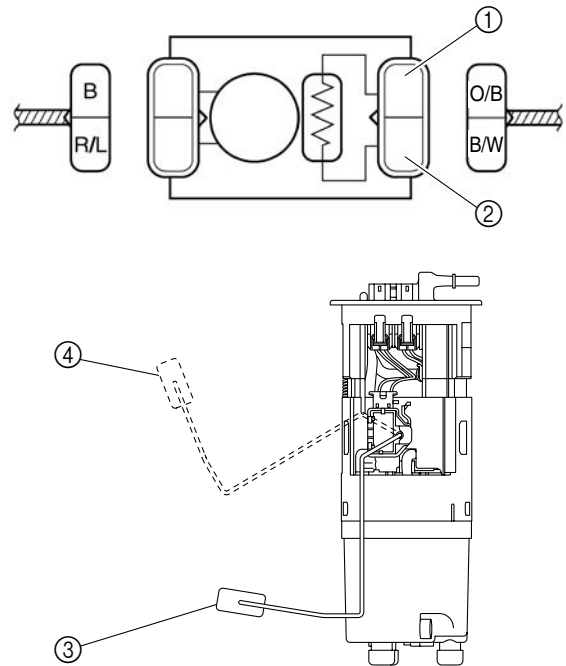
- Move the fuel sender float to the minimum ③ and maximum ④ level positions.
- Measure the fuel sender resistance.



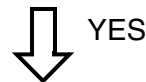
Fuel sender resistance

Minimum ③: 137.0 ~ 143.0 Ω

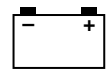
Maximum ④: 19.0 ~ 21.0 Ω



- Is the fuel sender OK?



Replace the fuel pump assembly.



2. Wiring

- Check the wiring circuit from the fuel pump to ECU (brown/white) and fuel pump to meter assembly (orange/black).
- Is the wiring circuit properly connect and without defects?



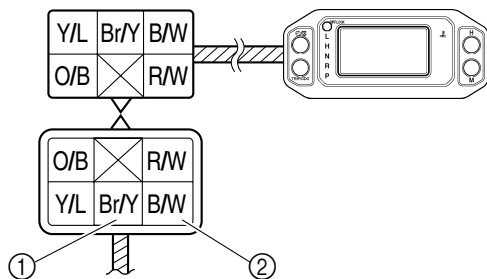
Properly connect or repair the wiring circuit.

3. Voltage

- Connect the pocket tester (DC 20 V) to the meter assembly coupler as shown.

Positive tester probe → **brown/yellow** ①

Negative tester probe → **black/white** ②



- Set the main switch to "ON".
- Measure the voltage (12 V) of brown/yellow ① and black/white ② at the meter assembly coupler.
- Is the voltage within specification?



Replace the meter assembly.

The wiring circuit from the main switch to the meter assembly coupler is faulty and must be repaired.

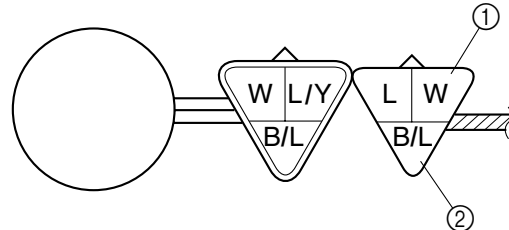
8. The speedometer fails to come on.

1. Speed sensor

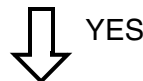
- Connect the pocket tester (DC 20 V) to the speed sensor coupler (wire harness side) as shown.

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?



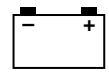
Replace the speed sensor.

2. Wiring

- Check the wiring circuit from the speed sensor to ECU and ECU to meter assembly (yellow/blue).
- Is the wiring circuit properly connect and without defects?



Properly connect or repair the wiring circuit.

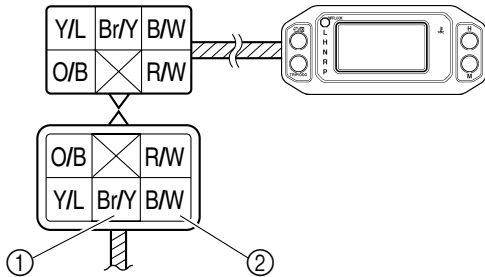


3. Voltage

- Connect the pocket tester (DC 20 V) to the meter assembly coupler as shown.

Positive tester probe → brown/yellow ①

Negative tester probe → black/white ②



- Set the main switch to "ON".
- Measure the voltage (12 V) of brown/yellow 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.

4 Main fuse

5 Frame ground

6 Ignition fuse

7 Main switch

8 Battery

17 ECU (engine control unit)

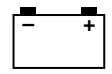
22 Coolant temperature sensor

55 Radiator fan motor

56 Radiator fan motor circuit breaker

58 Radiator fan motor relay

59 Radiator fan motor fuse



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)

TIP:

- Before troubleshooting, remove the following part(s):
 1. rear console
- 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

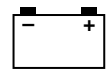
3. Main switch

- Check the main switch for continuity.
Refer to "CHECKING THE SWITCHES".
- Is the main switch OK?

↓ YES

↓ NO

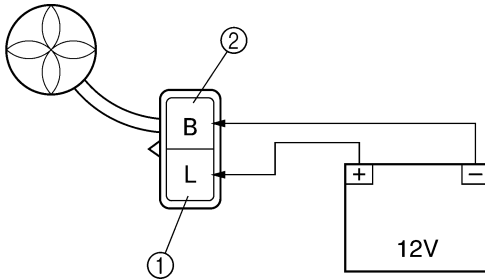
Replace the main switch.



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?

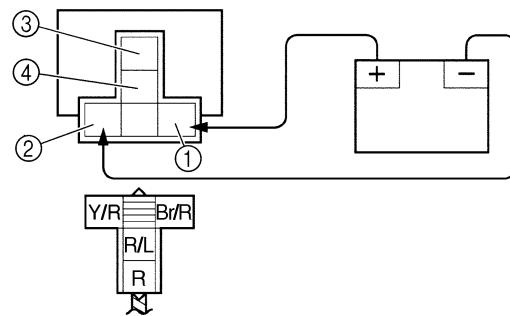
↓ YES

↓ 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 ($\Omega \times 1$) and battery (12 V) to the radiator fan motor relay terminal as shown.
- Check the radiator fan motor relay of continuity.

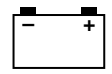
Positive battery lead → brown/red ①**Negative battery lead → yellow/red ②****Positive tester probe → red ③****Negative tester probe → red/blue ④**

- Does the radiator fan motor relay have continuity between red and red/blue?

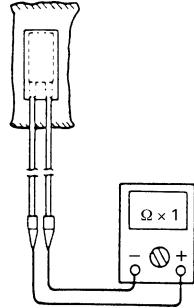
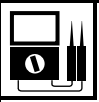
↓ YES

↓ NO

Replace the radiator fan motor relay.

**6. Radiator fan motor circuit breaker**

- Remove the radiator fan motor circuit breaker from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) to the radiator fan motor circuit breaker.



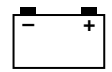
Radiator fan motor circuit breaker resistance

0 ~ 0.05 Ω at 25 °C (77 °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.

TIP:

Make sure the coolant temperature sensor terminals do not get wet.

- Place a thermometer ③ in the coolant.
- Slowly heat the coolant, and then let it cool to the specified temperature indicated in the table.
- Measure the coolant temperature sensor resistance.



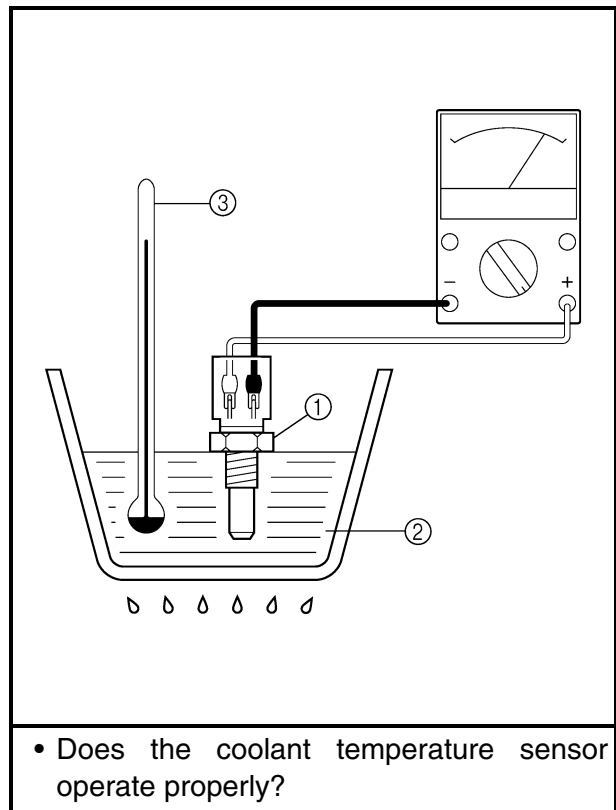
Coolant temperature sensor resistance
290 ~ 354 Ω at 80 °C (176 °F)

⚠ 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)



YES

NO

Replace the coolant temperature sensor.

EBS01090

8. Wiring

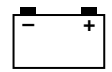
- Check the entire cooling system wiring. Refer to "CIRCUIT DIAGRAM".
- Is the cooling system wiring properly connected and without defects?

YES

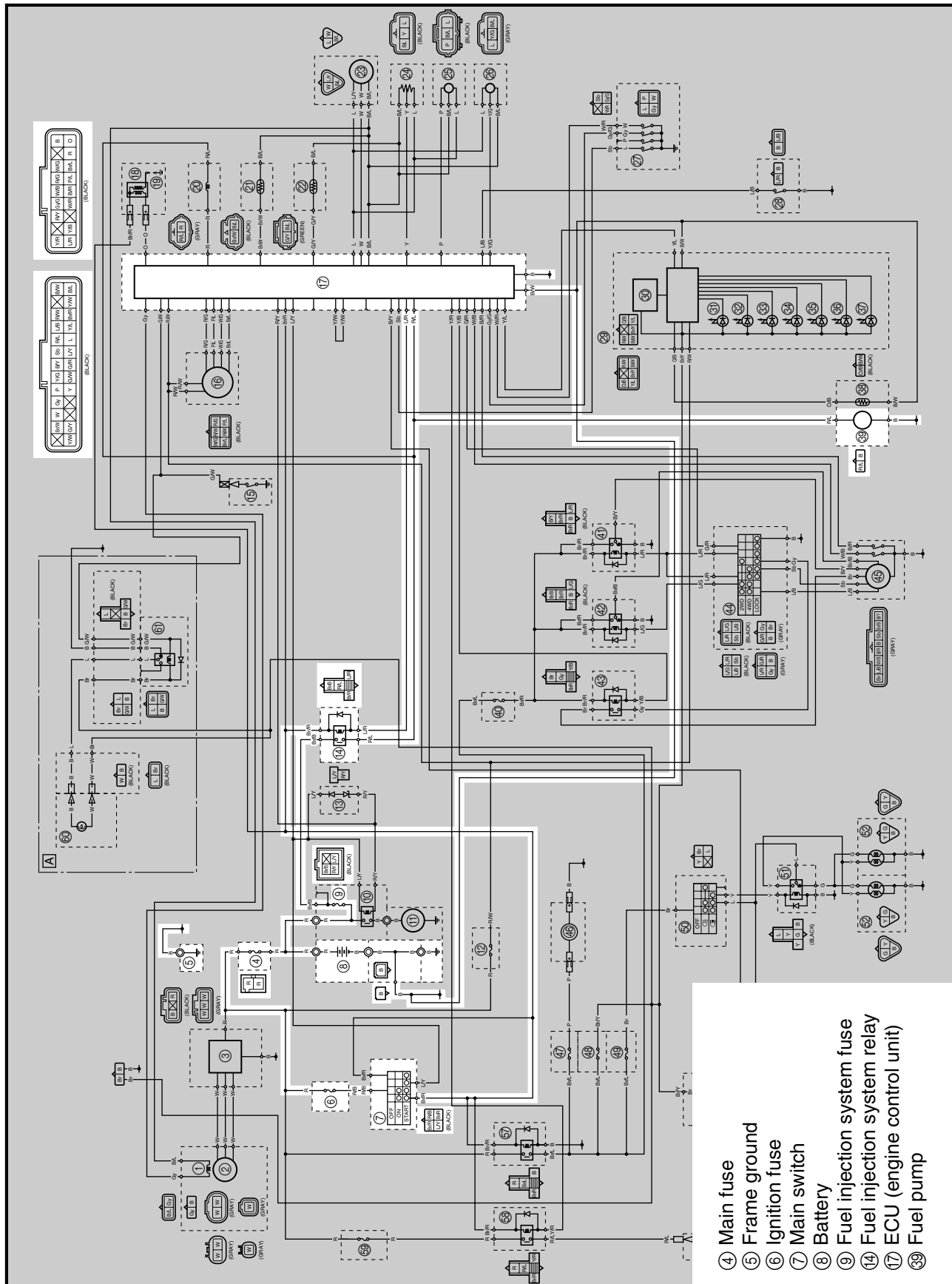
NO

Replace the ECU.

Properly connect or repair the cooling system 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. fuel injection system relay
5. fuel pump
6. wiring connections
(the entire fuel pump system)

TIP:

- Before troubleshooting, remove the following part(s):
 1. rear console
- 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

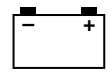
3. Main switch

- Check the main switch for continuity.
Refer to "CHECKING THE SWITCHES".
- Is the main switch OK?

↓ YES

↓ NO

Replace the main switch.



4. Fuel injection system relay

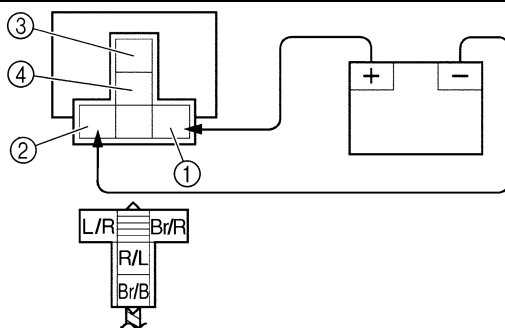
- Remove the fuel injection system relay from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the fuel injection system relay terminal as shown.
- Check the fuel injection system relay of continuity.

Positive battery lead → brown/red 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

Replace the fuel injection system relay.

5. 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.

6. Wiring

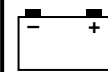
- Check the entire fuel pump system wiring. Refer to "CIRCUIT DIAGRAM".
- Is the fuel pump system wiring properly connected and without defects?

YES

NO

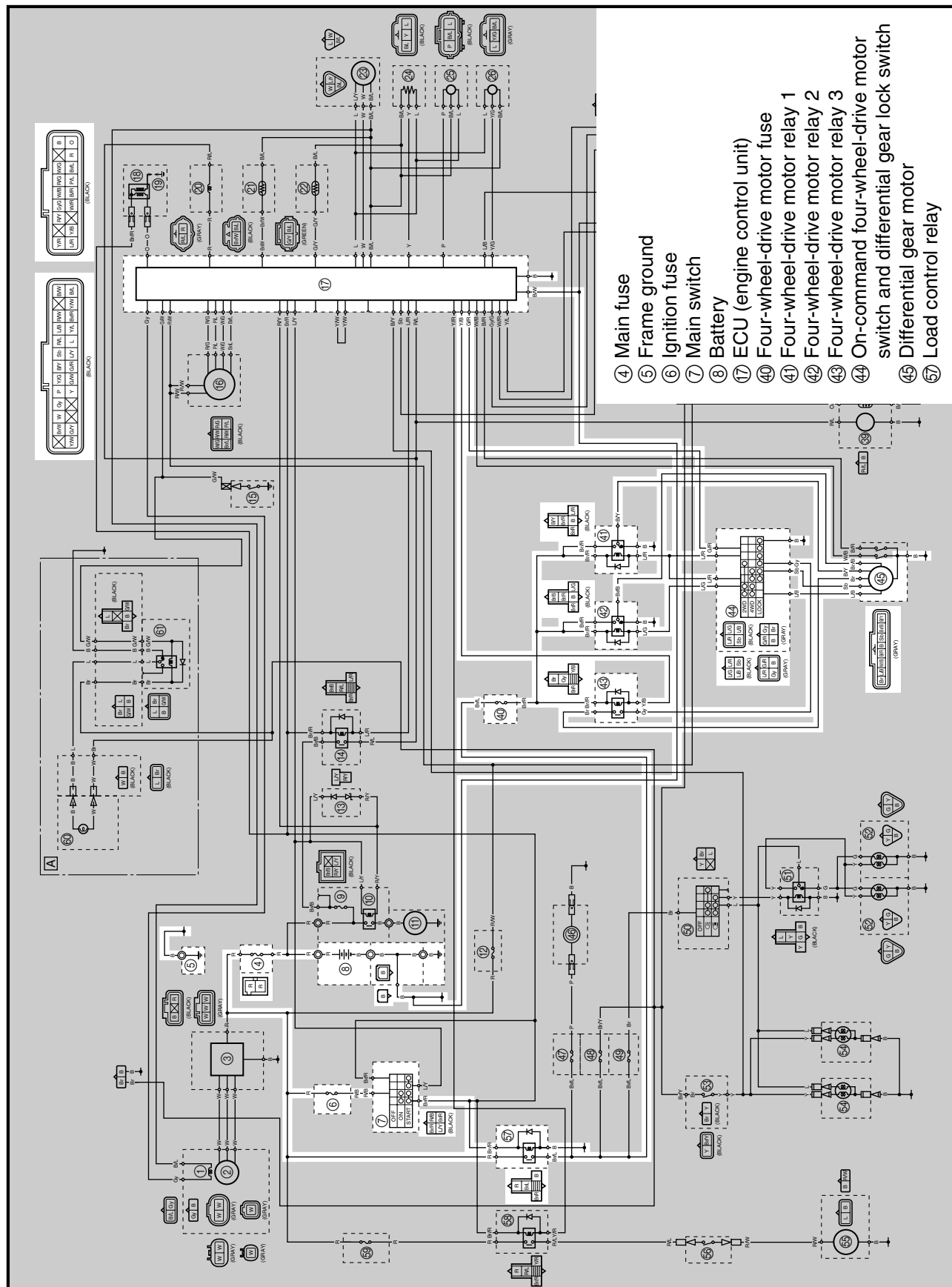
Replace the ECU.

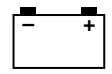
Properly connect or repair the fuel pump system wiring.



EBS00535

2WD/4WD SELECTING SYSTEM CIRCUIT DIAGRAM





EBS01095

TROUBLESHOOTING

The four-wheel-drive motor indicator light fails to come on.

Check:

1. main, ignition 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)

TIP:

- Before troubleshooting, remove the following part(s):
 1. rear console
- Troubleshoot with the following special tool(s).



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

EBS01043

1. Main, ignition and four-wheel-drive motor fuses

- Check the main, ignition and four-wheel-drive motor fuses for continuity. Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main, ignition 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?

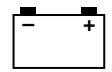


YES



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

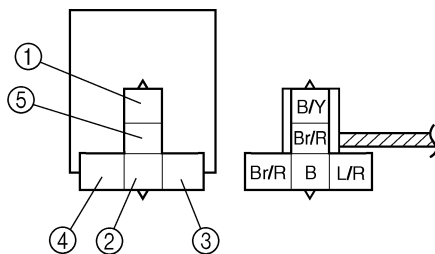
Negative tester probe → black ②

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

↓ NO

Replace the four-wheel-drive motor relay 1.

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

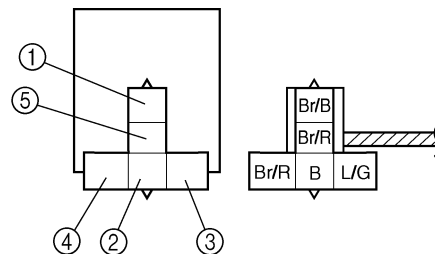
Negative tester probe → black ②

Positive battery terminal → brown/red ③

Negative battery terminal → blue/green ④

Positive tester probe → brown/black ①

Negative tester probe → brown/red ⑤

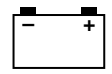


- Check the four-wheel-drive motor relay 2 for continuity.

↓ YES

↓ NO

Replace the four-wheel-drive motor relay 2.



EBS01098

6. Four-wheel-drive motor relay 3

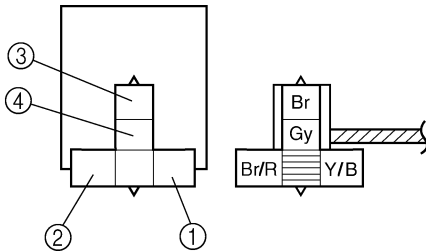
- Remove the four-wheel-drive motor relay 3 from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) and the battery (12 V) to the four-wheel-drive motor relay 3 terminals.

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

↓ NO

Replace the four-wheel-drive motor relay 3.

EBS01092

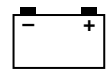
7. On-command four-wheel-drive motor switch and differential gear lock switch

- 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.



EBS01094

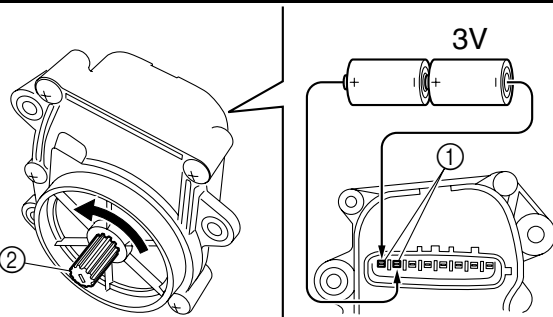
8. Differential gear motor

- Disconnect the differential gear motor coupler.
- Remove the differential gear motor from the differential gear case.
Refer to "FRONT CONSTANT VELOCITY JOINTS, DIFFERENTIAL GEAR AND DRIVE SHAFT" in chapter 7.
- Connect two C size batteries to the differential gear motor terminals ① (as shown illustrations).

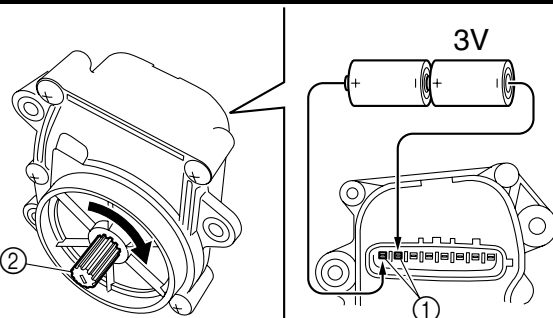
A Check that the pinion gear ② turns counter-clockwise.

B Check that the pinion gear ② turns clockwise.

A



B



- Make sure that the drive gear (shift fork sliding gear) operates correctly.

TIP:

When installing the differential gear motor, refer to "FRONT CONSTANT VELOCITY JOINTS, DIFFERENTIAL GEAR AND DRIVE SHAFT" in chapter 7.

↓ YES

↓ NO

Replace the differential gear motor.

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

Replace the ECU.

↓ NO

Properly connect or repair the 2WD/4WD selecting system wiring.

TROUBLESHOOTING

TIP:

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 breather hoses
- 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
- Broken or shorted wiring
- Faulty gear position switch
- Faulty brake light switch

Starting system

- Faulty starter motor
- Faulty starter 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

Valves, 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
- 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
<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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.

TIP:

Areas A, B, and C above may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal vehicle operating noise. If there is reason to believe these components are damaged, remove the components and check them.

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

Transmission

- Damaged transmission gears

Primary pulley cam and primary pulley slider

- Damaged or worn primary pulley cam
- Damaged or worn primary pulley slider

CLUTCH SLIPPING

Clutch spring

- Damaged, loose or worn clutch shoe spring

Primary sliding sheave

- Seized primary sliding sheave

Clutch shoe

- Damaged or worn clutch shoe

POOR STARTING PERFORMANCE

V-belt

- V-belt slips
- Oil or grease on the V-belt

Clutch shoe

- Bent, damaged or worn clutch shoe

Primary sliding sheave

- Faulty operation
- Worn pin groove
- Worn pin

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
- Disconnect circuit breaker connector

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

Steering wheel

- Improperly installed or bent

Steering

- Incorrect toe-in
- Bent steering shaft
- Improperly installed steering shaft
- 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

YXR70FX 2008 WIRING DIAGRAM

- ① Crankshaft position sensor
- ② AC magneto
- ③ Rectifier/regulator
- ④ Main fuse
- ⑤ Frame ground
- ⑥ Ignition fuse
- ⑦ Main switch
- ⑧ Battery
- ⑨ Fuel injection system fuse
- ⑩ Starter relay
- ⑪ Starter motor
- ⑫ Backup fuse
- ⑬ Diode
- ⑭ Fuel injection system relay
- ⑮ Reverse switch
- ⑯ ISC (idle speed control) unit
- ⑰ ECU (engine control unit)
- ⑱ Ignition coil
- ⑲ Spark plug
- ⑳ Fuel injector
- ㉑ Intake air temperature sensor
- ㉒ Coolant temperature sensor
- ㉓ Speed sensor
- ㉔ TPS (throttle position sensor)
- ㉕ Intake air pressure sensor
- ㉖ Lean angle sensor
- ㉗ Gear position switch
- ㉘ Parking brake switch
- ㉙ Meter assembly
- ㉚ Multifunction meter
- ㉛ Engine trouble warning light
- ㉜ Coolant temperature warning light
- ㉝ Park indicator light
- ㉞ Reverse indicator light
- ㉟ Neutral indicator light
- ㊱ High-range indicator light
- ㊲ Low-range indicator light
- ㊳ Fuel sender
- ㊴ Fuel pump
- ㊵ Four-wheel-drive motor fuse
- ㊶ Four-wheel-drive motor relay 1
- ㊷ Four-wheel-drive motor relay 2
- ㊸ Four-wheel-drive motor relay 3
- ㊹ On-command four-wheel-drive motor switch and differential gear lock switch
- ㊺ Differential gear motor
- ㊻ Auxiliary DC jack
- ㊼ Auxiliary DC jack fuse
- ㊽ Signaling system fuse
- ㊾ Headlight fuse
- ㊿ Light switch
- ① Headlight relay
- ② Headlight
- ③ Brake light switch

- ⑤④ Tail/brake light
- ⑤⑤ Radiator fan motor
- ⑤⑥ Radiator fan motor circuit breaker
- ⑤⑦ Load control relay
- ⑤⑧ Radiator fan motor relay
- ⑤⑨ Radiator fan motor fuse
- ⑥① Backup light
- ⑥② Backup light relay

Ⓐ Optional

COLOR CODE

B.....	Black
Br	Brown
G	Green
Gy	Gray
L	Blue
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/B.....	Orange/Black
P/L.....	Pink/Blue
R/B	Red/Black
R/G.....	Red/Green
R/L	Red/Blue
R/W	Red/White
R/Y	Red/Yellow
W/B	White/Black
W/G.....	White/Green
W/R	White/Red
Y/B	Yellow/Black
Y/G.....	Yellow/Green
Y/L.....	Yellow/Blue
Y/R	Yellow/Red
Y/W	Yellow/White



PRINTED IN U.S.A.

YXR70FX 2008 WIRING DIAGRAM

