YAMAHA

VMX12N(C)

SERVICE MANUAL

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EAS00000

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SERVICE MANUAL

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P/N LIT-11616-14-12

EAS00003

NOTICE

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

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

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

NOTE:

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

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IMPORTANT MANUAL INFORMATION

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

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

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

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

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

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HOW TO USE THIS MANUAL

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

① The manual is divided into chapters. An abbreviation and symbol in the upper right corner of each page indicate the current chapter.
Refer to “SYMBOLS”.

② Each chapter is divided into sections. The current section title is shown at the top of each page, except in chapter 3 (“PERIODIC CHECKS AND ADJUSTMENTS”), where the sub-section title(s) appears.

③ Sub-section titles appear in smaller print than the section title.

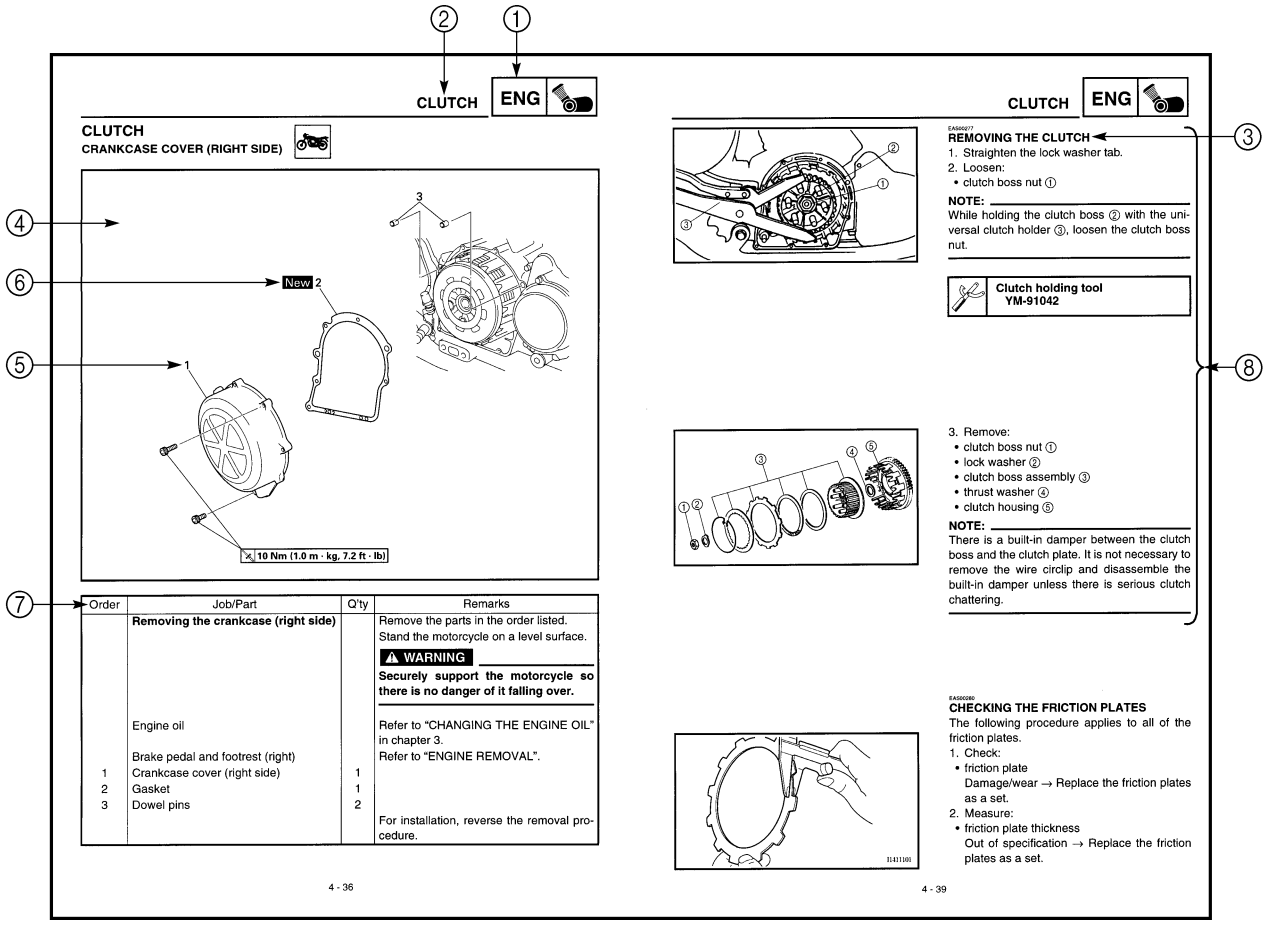
④ To help identify parts and clarify procedure steps, there are exploded diagrams at the start of each removal and disassembly section.

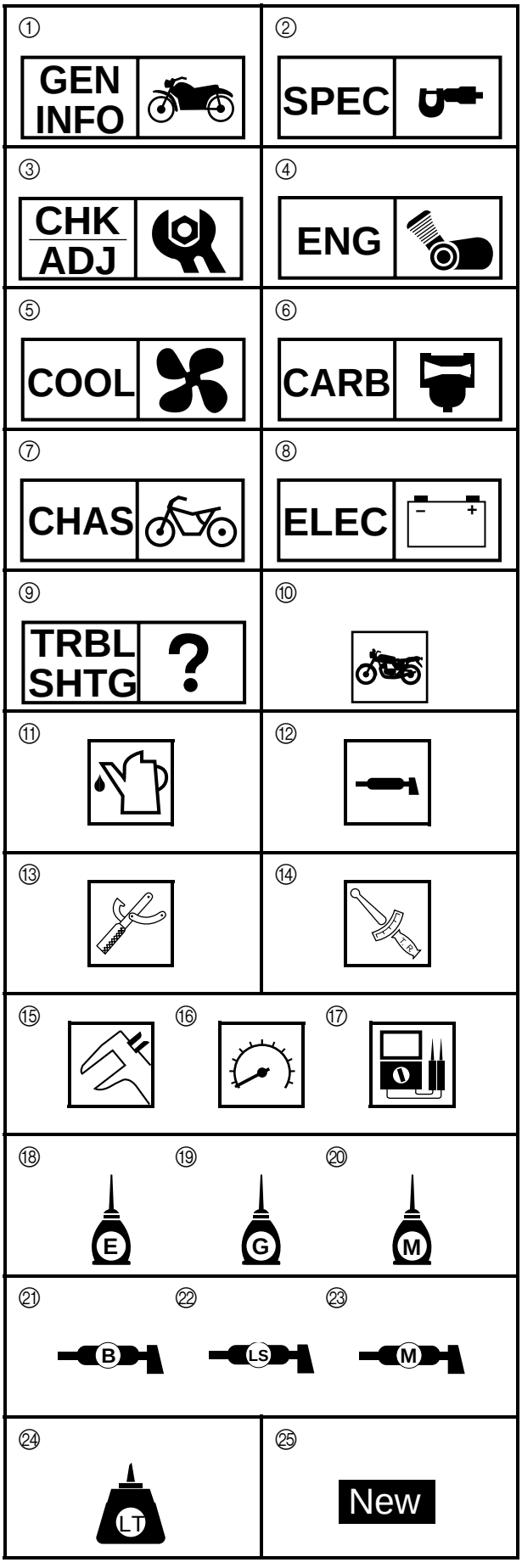
⑤ Numbers are given in the order of the jobs in the exploded diagram. A circled number indicates a disassembly step.

⑥ Symbols indicate parts to be lubricated or replaced.
Refer to “SYMBOLS”.

⑦ A job instruction chart accompanies the exploded diagram, providing the order of jobs, names of parts, notes in jobs, etc.

⑧ Jobs requiring more information (such as special tools and technical data) are described sequentially.





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SYMBOLS

The following symbols are not relevant to every vehicle.
Symbols ① to ⑨ indicate the subject of each chapter.

① General information
② Specifications
③ Periodic checks and adjustments
④ Engine
⑤ Cooling system
⑥ Carburetion
⑦ Chassis
⑧ Electrical system
⑨ Troubleshooting

Symbols ⑩ to ⑰ indicate the following.

⑩ Serviceable with engine mounted
⑪ Filling fluid
⑫ Lubricant
⑬ Special tool
⑭ Tightening torque
⑮ Wear limit, clearance
⑯ Engine speed
⑰ Electrical data

Symbols ⑱ to ㉓ in the exploded diagrams indicate the types of lubricants and lubrication points.

⑱ Engine oil
⑲ Gear oil
⑳ Molybdenum disulfide oil
㉑ Wheel bearing grease
㉒ Lithium soap base grease
㉓ Molybdenum disulfide grease

Symbols ㉔ to ㉕ in the exploded diagrams indicate the following.

㉔ Apply locking agent (LOCTITE®)
㉕ Replace the part

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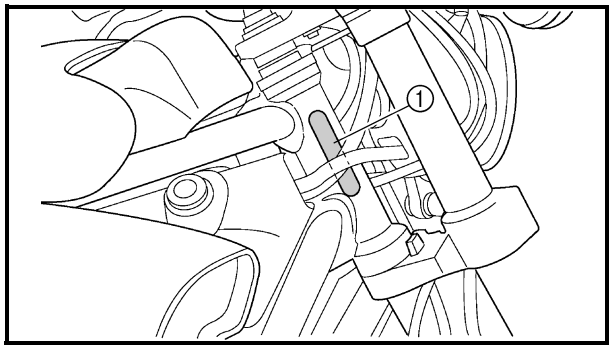
CARBURETION

CHAPTER 7.
CHASSIS

CHAPTER 8.
ELECTRICAL

CHAPTER 9.
TROUBLESHOOTING



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GENERAL INFORMATION

MOTORCYCLE IDENTIFICATION

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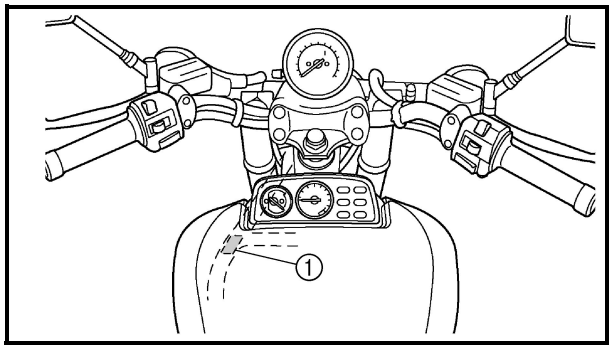
VEHICLE IDENTIFICATION NUMBER

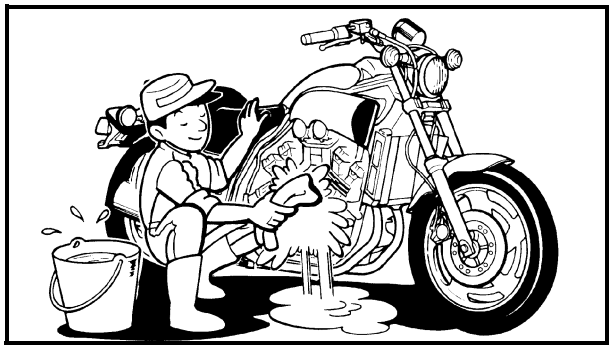
The vehicle identification number ① is stamped into the right side of the steering head pipe.

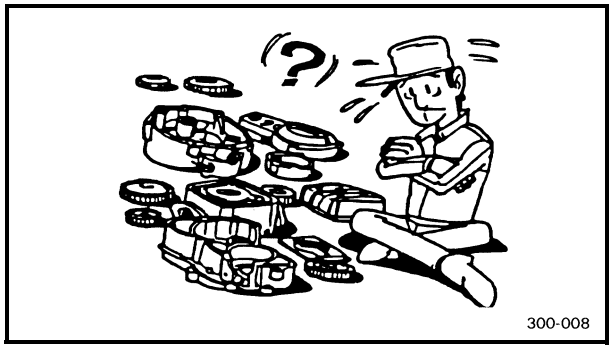


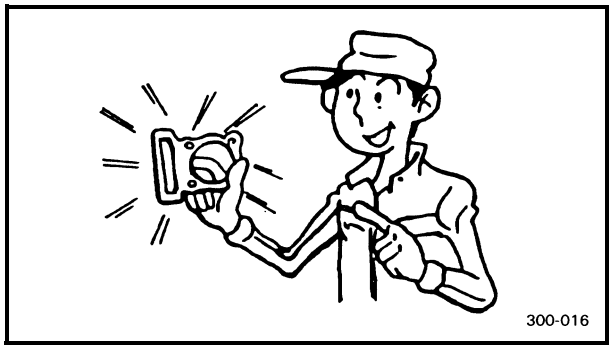
EAS00018

MODEL CODE

The model code label ① is affixed to the frame. This information will be needed to order spare parts.







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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 the “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.

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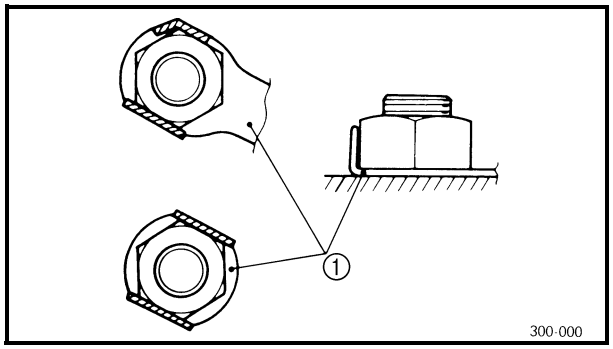
REPLACEMENT PARTS

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

EAS00022

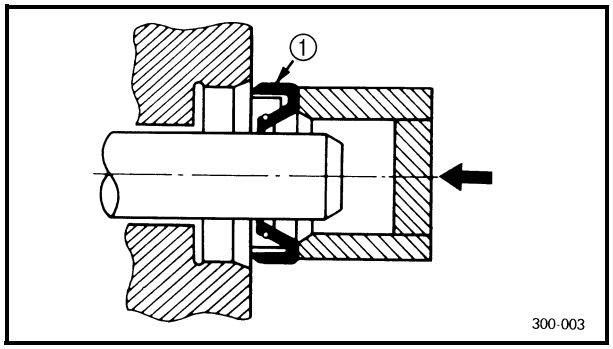
GASKETS, OIL SEALS AND O-RINGS

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.



EAS00023
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.



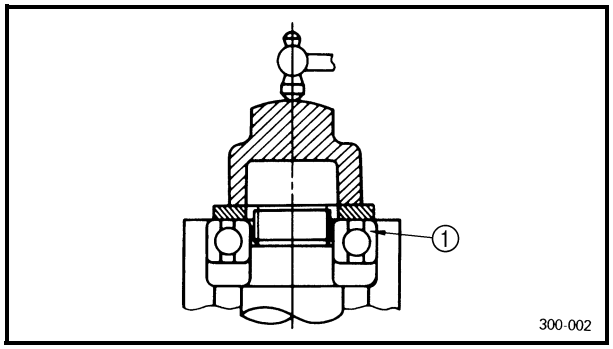
EAS00024
BEARINGS AND OIL SEALS

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 base grease. Oil bearings liberally when installing, if appropriate.

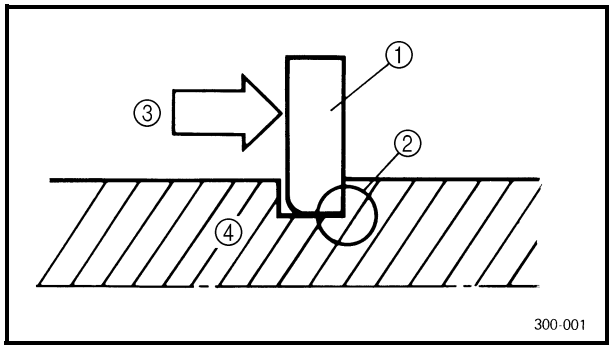
① Oil seal

CAUTION:

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



① Bearing



EAS00025
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.

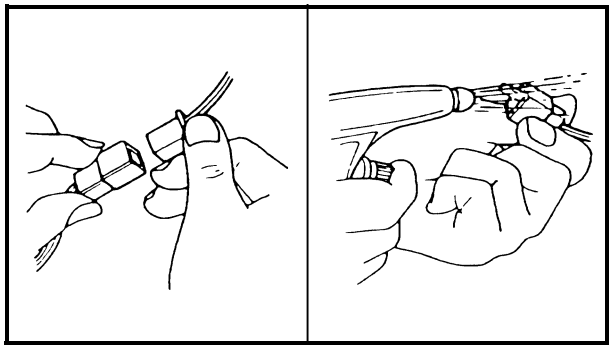
④ Shaft

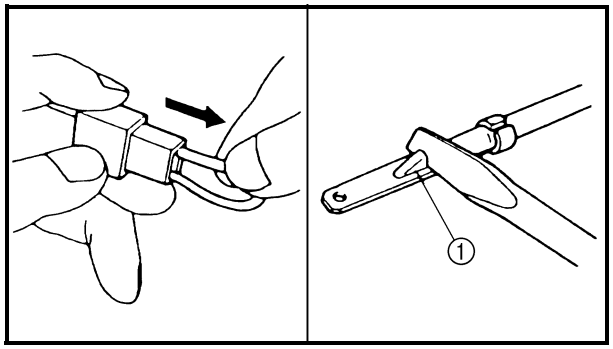
EAS00026
CHECKING THE CONNECTIONS

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

1. Disconnect:
   - lead
   - coupler
   - connector
2. Check:
   - lead
   - coupler
   - connector

   Moisture → Dry with an air blower.
   Rust/stains → Connect and disconnect several times.

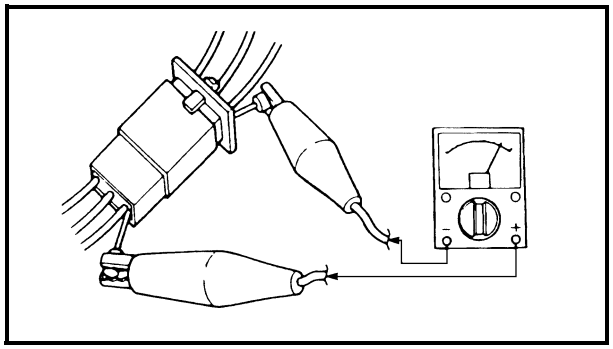




3. Check:
   - all connections

   Loose connection → Connect properly.

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

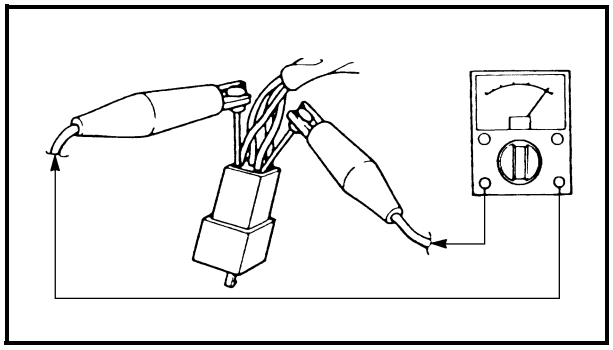


4. Connect:
   - lead
   - coupler
   - connector

NOTE:
Make sure all connections are tight.

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

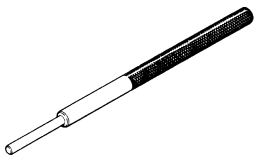
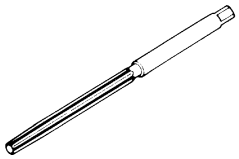
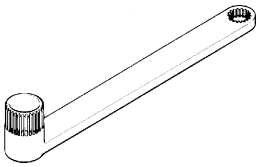
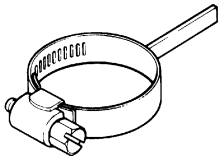
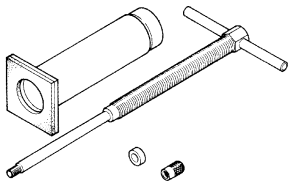
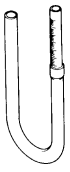
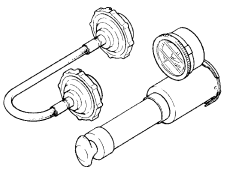
	Pocket tester **YU-03112**

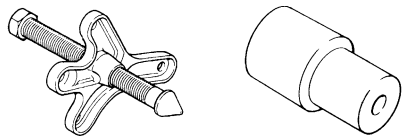
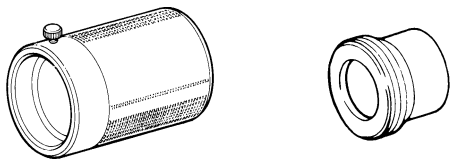
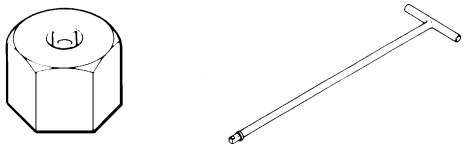
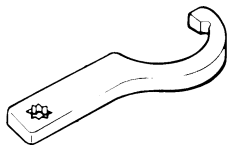
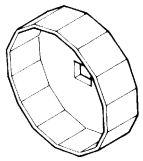
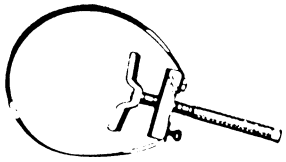
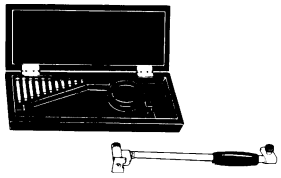
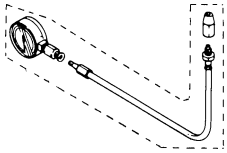


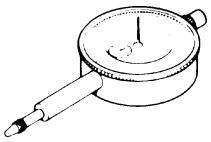
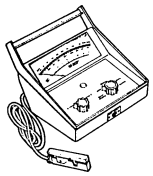
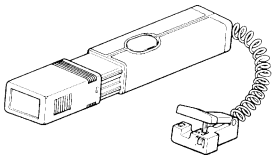
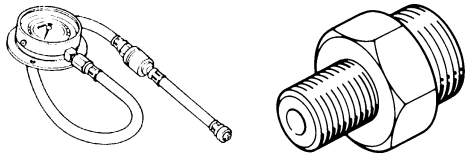
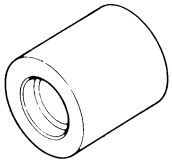
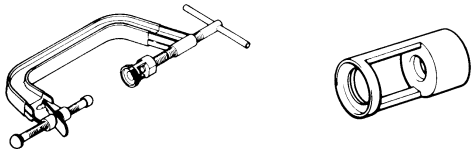
NOTE:
- If there is no continuity, clean the terminals.
- When checking the wire harness, perform steps (1) to (3).
- As a quick remedy, use a contact revitalizer available at most part stores.

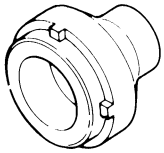
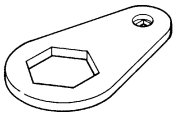
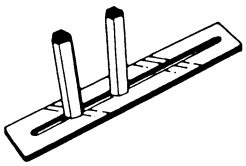
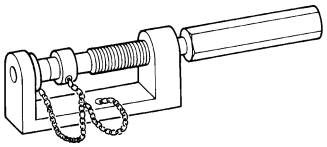
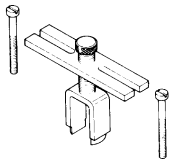
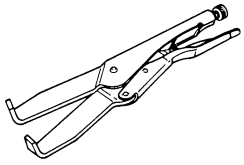
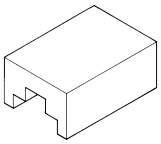
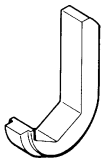
EAS00027
SPECIAL TOOLS

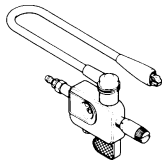
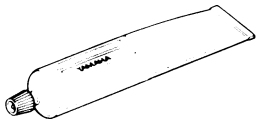
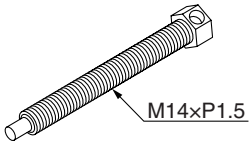
The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools as this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools, part numbers or both may differ depending on the country.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

Tool No.	Tool name/Function	Illustration
YM-01122	Valve guide remover (5.5 mm) This tool is needed to remove and install the valve guide.	
YM-01196	Valve guide reamer (5.5 mm) This tool is needed to rebore the new valve guide.	
YM-01229	Coupling gear/middle shaft tool This tool is needed when removing or installing the coupling gear nut.	
YM-01230	Final gear backlash band This tool is needed when measuring final gear backlash.	
YU-01304	Piston pin puller set This tool is used to remove the piston pin.	
YU-01312-A	Fuel level gauge This gauge is used to measure the fuel level in the float chamber.	
Tester YU-24460-01 Adapter YU-33984	Radiator cap tester Adapter This tester and its adapter are needed for checking the cooling system.	

Tool No.	Tool name/Function	Illustration
Puller YU-33270 Attachment YM-33282	Flywheel puller Attachment These tools are needed to remove the rotor.	
Weight YM-33963 Attachment YM-8020	Fork seal driver weight Attachment (f40) These tools are needed when installing the slide metal, oil seal and dust seal into the fork.	
Rod holder YM-33962 T-handle YM-01326	Damper rod holder (29 mm) T-handle These tools are needed to loosen and tighten the damper rod holding bolt.	
YU-33975	Steering nut wrench This tool is needed to loosen and tighten the steering stem ring nut.	
YU-38411	Oil filter wrench This tool is needed to remove and install the oil filter.	
YU-01701	Sheave holder This tool is needed to hold the rotor when removing or installing the rotor bolt.	
YU-03017	Cylinder bore gauge (50 ~ 100 mm) This tool is used to measure the cylinder bore.	
YU-33223	Compression gauge These tools are needed to measure engine compression.	

Tool No.	Tool name/Function	Illustration
YU-08030-A	Vacuum gauge This gauge is needed for carburetor synchronization.	
YU-03097	Dial gauge This tool is used to measure the middle gear backlash.	
YU-03112	Pocket tester This instrument is needed for checking the electrical system.	
YU-8036-A	Inductive tachometer This tool is needed for observing engine rpm.	
YM-33277-A	Timing light This tool is necessary for checking ignition timing.	
Gauge 90890-03153 Oil pressure adaptor B 90890-03124	Pressure gauge Oil pressure adaptor B These tools are needed to measure engine oil pressure.	
YM-4015	Valve guide installer (5.5 mm) This tool is needed to install the valve guide.	
Compressor YM-04019 Attachment YM-01253-1	Valve spring compressor/attachment These tools are needed to remove and install the valve assemblies.	

Tool No.	Tool name/Function	Illustration
YM-04050	Bearing retainer wrench This tool is needed when removing or installing the final drive shaft bearing.	
YM-04054	Middle drive shaft nut wrench (55 mm) This tool is needed when removing or installing the middle drive shaft nut.	
YM-33222	Middle drive gear holder This tool is needed to remove and install the middle drive pinion gear. This tool is also used for the gear backlash adjustment.	
YM-04062	Universal joint holder This tool is needed when removing or installing the driven pinion gear nut.	
90890-04080	Middle gear backlash tool This tool is needed for the gear backlash adjustment.	
YM-91042	Clutch holding tool This tool is needed to hold the clutch when removing or installing the clutch boss nut.	
YM-33286	Damper spring compressor This tool is needed when removing or installing the damper spring.	
YM-33961	Tappet adjusting tool This tool is needed to rotate the camshaft for access to the valve lifter and valve pad.	

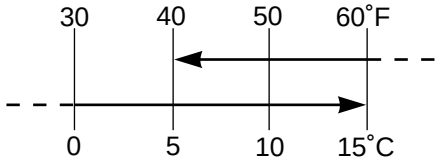
Tool No.	Tool name/Function	Illustration
YM-8037	Piston ring compressor This tool is used to compress the piston rings when installing the piston into the cylinder.	
YM-34487	Ignition checker	
ACC-1100-15-01	Quick gasket® This sealant (bond) is used on crankcase mating surfaces, etc.	
YM-01524	Ring gear fix bolt (M14) This tool is used to measure the gear lash.	

SPECIFICATIONS

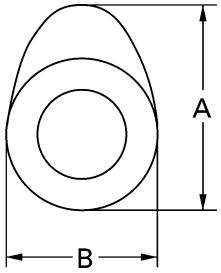
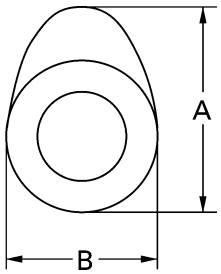
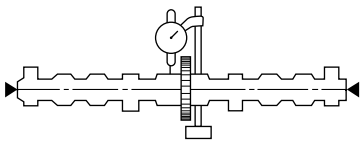
GENERAL SPECIFICATIONS

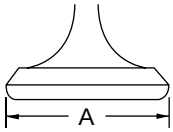
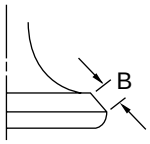
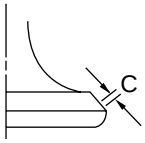
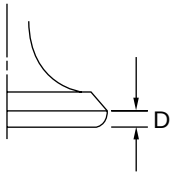
Item	Standard	Limit
Dimensions		
Overall length	2,300 mm (90.6 in)	----
Overall width	795 mm (31.3 in)	----
Overall height	1,160 mm (45.7 in)	----
Seat height	765 mm (30.1 in)	----
Wheelbase	1,590 mm (62.6 in)	----
Minimum ground clearance	145 mm (5.7 in)	----
Minimum turning radius	2,900 mm (114.2 in)	----
Weight		
Wet (with oil and a full fuel tank)	283 kg (624 lb)	----
	284 kg (626 lb) (for California)	----
Dry (without oil and fuel)	263 kg (580 lb)	----
	263 kg (580 lb) (for California)	----
Maximum load (total of cargo, rider, passenger, and accessories)	216 kg (476 lb)	----
	215 kg (474 lb) (for California)	----

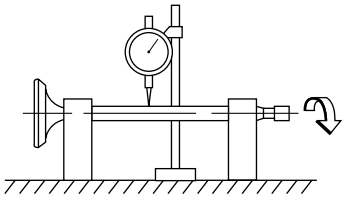
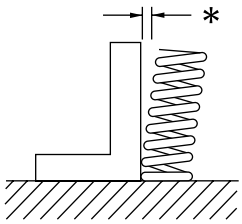
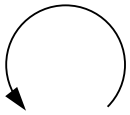
ENGINE SPECIFICATIONS

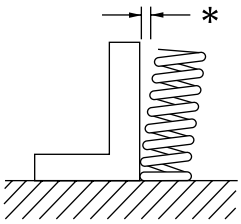
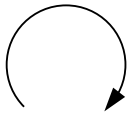
Item	Standard	Limit
Engine		
Engine type	Liquid-cooled, 4-stroke, DOHC	----
Displacement	1,198 cm^3	----
Cylinder arrangement	V-type 4-cylinder	----
Bore × stroke	76 × 66 mm (2.99 × 2.60 in)	----
Compression ratio	10.5 : 1	----
Engine idling speed	950 ~ 1,050 r/min	----
	1,050 ~ 1,150 r/min (for California)	----
Vacuum pressure at engine idling speed	26.7 kPa (200 mm Hg, 7.88 in Hg)	----
	33.3 kPa (250 mm Hg, 9.83 in Hg) (for California)	----
Standard compression pressure (at sea level)	1,450 kPa (14.5 kgf/cm^2, 210 psi) at 350 r/min	----
Fuel		
Recommended fuel	Unleaded fuel	----
Fuel tank capacity		
Total (including reserve)	15 L (13.2 Imp qt, 15.9 US qt)	----
Reserve only	3 L (2.64 Imp qt, 3.17 US qt)	----
Engine oil		
Lubrication system	Wet sump	----
Recommended oil		----
	Yamalube 4 (20W40) or SAE 20W40 type SE motor oil (5 °C/40 °F or above) (Non-Friction modofied) Yamalube 4 (10W30) or SAE 10W30 type SE motor oil (15 °C/60 °F or below) (Non-Friction modofied)	----
Quantity		
Total amount	4 L (3.52 Imp qt, 4.23 US qt)	----
Without oil filter cartridge replacement	3.2 L (2.82 Imp qt, 3.38 US qt)	----
With oil filter cartridge replacement	3.4 L (2.99 Imp qt, 3.59 US qt)	----
Oil pressure (hot)	25 kPa (0.25 kgf/cm^2, 3.6 psi) at 1,000 r/min	----
Relief valve opening pressure	440 ~ 560 kPa (4.4 ~ 5.6 kgf/cm^2, 63.8 ~ 81.2 psi)	----
Final gear oil		
Recommended oil	SAE 80 API “GL-4” Hypoid Gear Oil	----
Final gear case oil		
Total amount	0.2 L (0.18 Imp qt, 0.21 US qt)	----

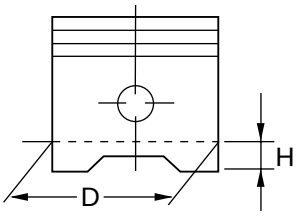
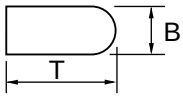
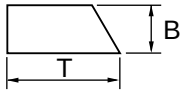
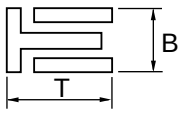
Item	Standard	Limit
Oil filter		
Oil filter type	Cartridge (paper)	----
Bypass valve opening pressure	170 ~ 240 kPa (1.7 ~ 2.4 kgf/cm^2, 24.7 ~ 34.8 psi)	----
Oil pump		
Oil pump type	Trochoid	----
Inner-rotor-to-outer-rotor-tip clearance	0 ~ 0.12 mm (0 ~ 0.005 in)	0.17 mm (0.007 in)
Outer-rotor-to-oil-pump-housing clearance	0.03 ~ 0.08 mm (0.001 ~ 0.003 in)	0.08 mm (0.003 in)
Cooling system		
Radiator capacity	3.05 L (2.68 Imp qt, 3.22 US qt)	----
Radiator cap opening pressure	75 ~ 105 kPa (0.75 ~ 1.05 kgf/cm^2, 10.9 ~ 15.2 psi)	----
Radiator core		
Width	363.8 mm (14.3 in)	----
Height	240 mm (9.4 in)	----
Depth	16 mm (0.63 in)	----
Coolant reservoir		
Capacity	0.3 L (0.26 Imp qt, 0.32 US qt)	----
<From low to full level>	0.2 L (0.18 Imp qt, 0.21 US qt)	----
Water pump		
Water pump type	Single-suction centrifugal pump	----
Reduction ratio	31/21 (1.476)	----
Max. impeller shaft tilt	----	0.15 mm (0.006 in)
Starting system type	Electric starter	----
Spark plugs		
Model (manufacturer) × quantity	DPR8EA-9/X24EPR-U9 (NGK/DENSO) × 4	----
Spark plug gap	0.8 ~ 0.9 mm (0.03 ~ 0.04 in)	----
Cylinder head		
Max. warpage	----	0.03 mm (0.0012 in)

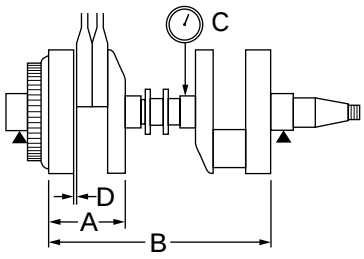
Item	Standard	Limit
Camshafts		
Drive system	Chain drive (center)	----
Camshaft cap inside diameter	25.000 ~ 25.021 mm (0.9843 ~ 0.9851 in)	----
Camshaft journal diameter	24.967 ~ 24.980 mm (0.9830 ~ 0.9835 in)	----
Camshaft-journal-to-camshaft-cap clearance	0.020 ~ 0.054 mm (0.0008 ~ 0.0021 in)	----
Intake camshaft lobe dimensions		
		
Measurement A	36.25 ~ 36.35 mm (1.4272 ~ 1.4311 in)	36.15 mm (1.42 in)
Measurement B	28.02 ~ 28.12 mm (1.1031 ~ 1.1043 in)	27.92 mm (1.1 in)
	27.98 ~ 28.08 mm (1.1016 ~ 1.1055 in) (for California)	27.87 mm (1.1 in)
Exhaust camshaft lobe dimensions		
		
Measurement A	36.25 ~ 36.35 mm (1.4272 ~ 1.4311 in)	36.15 mm (1.42 in)
Measurement B	28.02 ~ 28.12 mm (1.1031 ~ 1.1043 in)	27.92 mm (1.1 in)
	27.98 ~ 28.08 mm (1.1016 ~ 1.1055 in) (for California)	27.87 mm (1.1 in)
Max. camshaft runout	----	0.03 mm (0.0012 in)
		

Item	Standard	Limit
Timing chain		
Model/number of links	219FTS/117	----
Tensioning system	Automatic	----
Valves, valve seats, valve guides		
Valve clearance (cold)		
Intake	0.11 ~ 0.15 mm (0.0043 ~ 0.0059 in)	----
Exhaust	0.26 ~ 0.30 mm (0.0102 ~ 0.0118 in)	----
Valve dimensions		
 Head Diameter	 Face Width	 Seat Width	 Margin Thickness
Valve head diameter A		
Intake	30.4 ~ 30.6 mm (1.1968 ~ 1.2047 in)	----
Exhaust	24.9 ~ 25.1 mm (0.9803 ~ 0.9882 in)	----
Valve face width B		
Intake	2.0 ~ 3.3 mm (0.0787 ~ 0.1299 in)	----
Exhaust	1.9 ~ 2.6 mm (0.0748 ~ 0.1024 in)	----
Valve seat width C		
Intake	0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in)	1.4 mm (0.06 in)
Exhaust	0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in)	1.4 mm (0.06 in)
Valve margin thickness D		
Intake	1.1 ~ 1.5 mm (0.043 ~ 0.059 in)	0.7 mm (0.03 in)
Exhaust	1.1 ~ 1.5 mm (0.043 ~ 0.059 in)	0.7 mm (0.03 in)
Valve stem diameter		
Intake	5.475 ~ 5.490 mm (0.2156 ~ 0.2161 in)	5.445 mm (0.2144 in)
Exhaust	5.460 ~ 5.475 mm (0.2150 ~ 0.2156 in)	5.42 mm (0.2134 in)
Valve guide inside diameter		
Intake	5.500 ~ 5.512 mm (0.2165 ~ 0.2170 in)	5.55 mm (0.2185 in)
Exhaust	5.500 ~ 5.512 mm (0.2165 ~ 0.2170 in)	5.55 mm (0.2185 in)
Valve-stem-to-valve-guide clearance		
Intake	0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in)	0.08 mm (0.0031 in)
Exhaust	0.025 ~ 0.052 mm (0.001 ~ 0.002 in)	0.1 mm (0.004 in)

Item	Standard	Limit
Valve stem runout 	----	0.01 mm (0.0004 in)
Valve seat width		
Intake	0.9 ~ 1.1 mm (0.035 ~ 0.043 in)	----
Exhaust	0.9 ~ 1.1 mm (0.035 ~ 0.043 in)	----
Valve springs		
Inner springs		
Free length		
Intake	39.65 mm (1.56 in)	37.45 mm (1.47 in)
Exhaust	39.65 mm (1.56 in)	37.45 mm (1.47 in)
Installed length (valve closed)		
Intake	31.8 mm (1.25 in)	----
Exhaust	31.8 mm (1.25 in)	----
Compressed spring force (installed)		
Intake	61.7 ~ 72.5 N (6.29 ~ 7.39 kgf, 13.9 ~ 16.3 lb)	----
Exhaust	61.7 ~ 72.5 N (6.29 ~ 7.39 kgf, 13.9 ~ 16.3 lb)	----
Spring tilt 		
Intake	----	2.5° /1.7 mm (2.5° /0.07 in)
Exhaust	----	2.5° /1.7 mm (2.5° /0.07 in)
Winding direction (top view)		
Intake	Counterclockwise	----
Exhaust	Counterclockwise 	----

Item	Standard	Limit
Outer springs		
Free length		
Intake	41.1 mm (1.62 in)	38.9 mm (1.53 in)
Exhaust	41.1 mm (1.62 in)	38.9 mm (1.53 in)
Installed length (valve closed)		
Intake	33.8 mm (1.33 in)	----
Exhaust	33.8 mm (1.33 in)	----
Compressed spring force (installed)		
Intake	130.4 ~ 154.0 N (13.3 ~ 15.7 kgf, 29.3 ~ 34.6 lb)	----
Exhaust	130.4 ~ 154.0 N (13.3 ~ 15.7 kgf, 29.3 ~ 34.6 lb)	----
Spring tilt 		
Intake	----	2.5° /1.8 mm (2.5° /0.07 in)
Exhaust	----	2.5° /1.8 mm (2.5° /0.07 in)
Winding direction (top view)		
Intake	Clockwise	----
Exhaust	Clockwise 	----
Cylinders		
Cylinder arrangement	V-type 4-cylinder	----
Bore × stroke	76 × 66 mm (2.99 × 2.60 in)	----
Compression ratio	10.5 : 1	----
Bore	75.967 ~ 76.016 mm (2.9908 ~ 2.9927 in)	----
Max. taper	----	0.05 mm (0.002 in)
Max. out-of-round	----	0.05 mm (0.002 in)

Item	Standard	Limit
Pistons		
Piston-to-cylinder clearance	0.055 ~ 0.075 mm (0.0022 ~ 0.0030 in)	0.15 mm (0.0059 in)
Diameter D	75.905 ~ 75.955 mm (2.9884 ~ 2.9903 in)	----
		
Height H	6.2 mm (0.24 in)	----
Piston pin bore (in the piston)		
Diameter	19.004 ~ 19.015 mm (0.7482 ~ 0.7486 in)	----
Offset	0 mm (0 in)	----
Piston pins		
Outside diameter	18.991 ~ 19.000 mm (0.7477 ~ 0.7480 in)	----
Piston-pin-to-piston-pin-bore clearance	0.004 ~ 0.024 mm (0.00016 ~ 0.00094 in)	0.072 mm (0.0028 in)
Piston rings		
Top ring		
		
Ring type	Barrel	----
Dimensions (B × T)	1.0 × 3.1 mm (0.04 × 0.12 in)	----
End gap (installed)	0.35 ~ 0.50 mm (0.01 ~ 0.02 in)	0.75 mm (0.03 in)
Ring side clearance	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in)	0.12 mm (0.0047 in)
2nd ring		
		
Ring type	Taper	----
Dimensions (B × T)	1.2 × 3.1 mm (0.05 × 0.12 in)	----
End gap (installed)	0.35 ~ 0.50 mm (0.01 ~ 0.02 in)	0.75 mm (0.03 in)
Ring side clearance	0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in)	0.12 mm (0.0047 in)
Oil ring		
		
Dimensions (B × T)	2.5 × 3.1 mm (0.10 × 0.12 in)	----
End gap (installed)	0.2 ~ 0.8 mm (0.01 ~ 0.03 in)	----

Item	Standard	Limit
Connecting rods		
Crankshaft-pin-to-big-end-bearing clearance	0.021 ~ 0.039 mm (0.0008 ~ 0.0015 in)	----
Bearing color code	1 = Blue 2 = Black 3 = Brown 4 = Green 5 = Yellow 6 = Pink	----
Crankshaft		
		
Width A	83.92 ~ 83.97 mm (3.30 ~ 3.31 in)	----
Width B	242.72 ~ 243.17 mm (9.56 ~ 9.57 in)	----
Max. runout C	----	0.03 mm (0.0012 in)
Big end side clearance D	0.320 ~ 0.924 mm (0.013 ~ 0.036 in)	----
Big end radial clearance	0.021 ~ 0.045 mm (0.0008 ~ 0.0018 in)	----
Crankshaft-journal-to-crankshaft-journal-bearing clearance	0.040 ~ 0.058 mm (0.0016 ~ 0.0023 in)	----
Bearing color code	1 = Blue 2 = Black 3 = Brown 4 = Green 5 = Yellow 6 = Pink 7 = Red	----
Clutch		
Clutch type	Wet, multiple disc	----
Clutch release method	Hydraulic inner push	----
Operation	Left-hand operation	----
Friction plates		
Thickness	2.9 ~ 3.1 mm (0.11 ~ 0.12 in)	2.8 mm (0.110 in)
Plate quantity	8	----
Clutch plates		
Thickness	2.2 ~ 2.4 mm (0.09 ~ 0.09 in)	----
Plate quantity	7	----
Max. warpage	----	0.2 mm (0.008 in)
Clutch springs		
Free length	7 mm (0.28 in)	----
Spring quantity	1 PCS	----
Minimum length	----	6.5 mm (0.26 in)
Clutch housing thrust clearance	0.10 ~ 0.27 mm (0.004 ~ 0.011 in)	----
Clutch housing radial clearance	0.017 ~ 0.053 mm (0.0007 ~ 0.0021 in)	----
Push rod bending limit	----	0.5 mm (0.02 in)

Item	Standard	Limit
Transmission		
Transmission type	Constant mesh, 5-speed	----
Primary reduction system	Spur gear	----
Primary reduction ratio	87/49 (1.775)	----
Secondary reduction system	Shaft drive	----
Secondary reduction ratio	21/27 × 33/09 (2.851)	----
Operation	Left-foot operation	----
Gear ratios		
1st gear	43/17 (2.529)	----
2nd gear	39/22 (1.772)	----
3rd gear	31/23 (1.347)	----
4th gear	28/26 (1.076)	----
5th gear	26/28 (0.928)	----
Max. main axle runout	----	0.08 mm (0.003 in)
Max. drive axle runout	----	0.08 mm (0.003 in)
Shifting mechanism		
Shift mechanism type	Guide bar	----
Max. shift fork guide bar bending	----	0.025 mm (0.001 in)
Installed shift rod length	367.8 mm (14.5 in)	----
Air filter type	Dry element	----
Fuel pump		
Pump type	Electrical	----
Model (manufacturer)	UCV5A (MITSUBISHI)	----
Consumption amperage <max>	1 A	----
Output pressure	18 kPa (0.18 kgf/cm^2, 2.6 psi)	----

Item	Standard	Limit
Carburetors		
Model (manufacturer) × quantity	BDS35 (MIKUNI) × 4	----
Throttle cable free play (at the flange of the throttle grip)	3 ~ 5 mm (0.12 ~ 0.20 in)	----
ID mark	1FK 02	----
	2WF 02 (for California)	----
Main jet	#152.5	----
Main air jet	2.0	----
Jet needle	5EZ43-1	----
	5EZ50-1 (for California)	----
Needle jet	Y-0	----
Pilot air jet 1	#90	----
	#100 (for California)	----
Pilot air jet 2	#170	----
Pilot outlet	0.9	----
Pilot jet	#37.5	----
Bypass 1	0.8	----
Bypass 2	0.8	----
Bypass 3	0.9	----
Valve seat size	1.5	----
Starter jet 1	#45	----
Starter jet 2	0.8	----
Throttle valve size	#125	----
	#130 (for California)	----
Fuel level (below the line on the vacuum chamber)	15 ~ 17 mm (0.59 ~ 0.67 in)	----
Shaft drive		
Middle gear backlash	0.05 ~ 0.12 mm (0 in)	0.3 mm (0.01 in)
Final gear backlash	0.1 ~ 0.2 mm (0 ~ 0.01 in)	0.3 mm (0.01 in)

CHASSIS SPECIFICATIONS

Item	Standard	Limit
Frame		
Frame type	Double cradle	----
Caster angle	29°	----
Trail	119 mm (4.69 in)	----
Front wheel		
Wheel type	Cast wheel	----
Rim		
Size	18 × MT2.15	----
Material	Aluminum	----
Wheel travel	140 mm (5.51 in)	----
Wheel runout		
Max. radial wheel runout	----	1 mm (0.04 in)
Max. lateral wheel runout	----	0.5 mm (0.02 in)
Rear wheel		
Wheel type	Cast wheel	----
Rim		
Size	15M/C × MT3.50	----
Material	Aluminum	----
Wheel travel	100 mm (3.94 in)	----
Wheel runout		
Max. radial wheel runout	----	1 mm (0.04 in)
Max. lateral wheel runout	----	0.5 mm (0.02 in)
Front tire		
Tire type	Tubeless	----
Size	110/90-18 (61V)	----
Model (manufacturer)	G525AW/F20 (BRIDGESTONE/DUNLOP)	----
Tire pressure (cold)		
0 ~ 90 kg (0 ~ 198 lb)	225 kPa (2.25 kg/cm^2, 33 psi)	----
90 ~ 216 kg (198 ~ 476 lb)	225 kPa (2.25 kg/cm^2, 33 psi)	----
High-speed riding	225 kPa (2.25 kg/cm^2, 33 psi)	----
Min. tire tread depth	----	1.0 mm (0.04 in)

Item	Standard	Limit
Rear tire		
Tire type	Tubeless	----
Size	150/90-15M/C (74V)	----
Model (manufacturer)	G526BW/K525 (BRIDGESTONE/DUNLOP)	----
Tire pressure (cold)		
0 ~ 90 kg (0 ~ 198 lb)	225 kPa (2.25 kg/cm^2, 33 psi)	----
90 ~ 197 kg (198 ~ 434 lb)	250 kPa (2.5 kg/cm^2, 36 psi)	----
High-speed riding	250 kPa (2.5 kg/cm^2, 36 psi)	----
Min. tire tread depth	----	1.0 mm (0.04 in)
Front brakes		
Brake type	Dual-disc brake	----
Operation	Right-hand operation	----
Brake lever free play (at lever end)	2 ~ 5 mm (0.08 ~ 0.20 in)	----
Recommended fluid	DOT 4	----
Brake discs		
Diameter × thickness	298 × 5 mm (11.73 ~ 0.20 in)	----
Min. thickness	----	4.5 mm (0.18 in)
Max. deflection	----	0.3 mm (0.012 in)
Brake pad lining thickness	5 mm (0.2 in)	0.5 mm (0.02 in)
Master cylinder inside diameter	15.87 mm (0.62 in)	----
Caliper cylinder inside diameter	33.96 mm (1.34 in) and 30.23 mm (1.19 in)	----
Rear brake		
Brake type	Single-disc brake	----
Operation	Right-foot operation	----
Brake pedal position	20 mm (0.79 in)	----
Recommended fluid	DOT 4	----
Brake discs		
Diameter × thickness	282 × 7.5 mm (11.1 × 0.3 in)	----
Min. thickness	----	7.0 mm (0.28 in)
Max. deflection	----	0.3 mm (0.012 in)
Brake pad lining thickness	5.1 mm (0.2 in)	0.5 mm (0.02 in)
Master cylinder inside diameter	12.7 mm (0.5 in)	----
Caliper cylinder inside diameter	42.85 mm (1.69 in)	----

Item	Standard	Limit
Front suspension		
Suspension type	Telescopic fork	----
Front fork type	Coil air spring/oil damper	----
Front fork travel	140 mm (5.51 in)	----
Spring		
Free length	386.5 mm (15.22 in)	381.5 mm (15.02 in)
Spacer length	245 mm (9.65 in)	----
Installed length	242.4 mm (9.54 in)	----
Spring rate (K1)	3.7 N/mm (0.38 kgf/mm, 21.1 lb/in)	----
Spring stroke (K1)	0 ~ 78 mm (0 ~ 3.07 in)	----
Spring rate (K2)	4.9 N/mm (0.5 kgf/mm, 28.0 lb/in)	----
Spring stroke (K2)	78 ~ 140 mm (3.07 ~ 5.51 in)	----
Optional spring available	No	----
Standard enclosed gas/air pressure	40 kPa (0.4 kgf/cm^2, 5.8 psi)	----
Fork oil	Yamaha fork oil 10 WT	----
Recommended oil	Fork oil 10 W or equivalent	----
Quantity (each front fork leg)	621 cm^3 (21.9 Imp oz, 21.0 US oz)	----
Level (from the top of the inner tube, with the inner tube fully compressed, and without the fork spring)	123 mm (4.84 in)	----
Steering		
Steering bearing type	Taper roller bearing	----
Rear suspension		
Suspension type	Swingarm	----
Rear shock absorber assembly type	Coil spring/oil damper	----
Rear shock absorber assembly travel	85 mm (3.35 in)	----
Spring		
Free length	245.5 mm (9.67 in)	240.5 mm (9.47 in)
Installed length	217.4 mm (8.56 in)	----
Spring rate (K1)	19.1 N/mm (1.95 kgf/mm, 109.1 lb/in)	----
Spring stroke (K1)	0 ~ 50 mm (0 ~ 1.97 in)	----
Spring rate (K2)	26.5 N/mm (2.7 kgf/mm, 151.3 lb/in)	----
Spring stroke (K2)	50 ~ 85 mm (1.97 ~ 3.35 in)	----
Optional spring available	No	----
Swingarm		
Free play (at the end of the swingarm)		
Radial	----	0 mm (0 in)
Axial	----	0 mm (0 in)

ELECTRICAL SPECIFICATIONS

Item	Standard	Limit
System voltage	12 V	----
Ignition system		
Ignition system type	Transistorized coil ignition (digital)	----
Ignition timing	3° BTDC at 1,000 r/min	----
Advanced timing	33° BTDC at 9,000 r/min	----
	43° BTDC at 9,000 r/min (for California)	----
Advancer type	Vacuum and electrical	----
Pickup coil resistance/color	80.8 ~ 121.2 Ω/O–B	----
Transistorized coil ignition unit model (manufacturer)	TID14-93C (HITACHI)	----
Ignition coils		
Model (manufacturer)	CM11-61 (HITACHI)	----
Minimum ignition spark gap	6 mm (0.24 in)	----
Primary coil resistance	2.43 ~ 2.97 Ω	----
Secondary coil resistance	10.56 ~ 15.84 kΩ	----
Spark plug caps		
Material	Resin	----
Resistance	10 kΩ	----
Charging system		
System type	AC magneto	----
Model (manufacturer)	GP9415 (KOKUSAN)	----
Nominal output	14 V/22.5 A at 5,000 r/min	----
Stator coil resistance	0.33 ~ 0.45 Ω	----
Voltage regulator		
Regulator type	Semiconductor, short circuit	----
Model	SH662-12	----
No-load regulated voltage	14.1 ~ 14.9 V	----
Rectifier		
Model	SH662-12	----
Rectifier capacity	18 A	----
Withstand voltage	200 V	----
Battery		
Battery type	YB16AL-A2	----
Battery voltage/capacity	12 V/16 AH	----
Specific gravity	1.280	----
Headlight type	Halogen bulb	----
Indicator light type × quantity	Bulb type × 3	----
Bulbs (voltage/wattage × quantity)		
Headlight	12 V 60 W/55 W × 1	----
Tail/brake light	12 V 27 W/8 W × 2	----
Front turn signal light	12 V 21 W × 2	----
Rear turn signal light	12 V 27 W × 2	
License plate light	12 V 5 W × 2	----
Meter light	14 V 3 W × 2	----

Item	Standard	Limit
Electric starting system		
System type	Constant mesh	----
Starter motor		
Model (manufacturer)	SM-13 (MITSUBA)	----
Power output	0.65 kW	----
Brushes		
Overall length	10 mm (0.40 in)	5 mm (0.20 in)
Spring force	8.82 N (899 gf, 31.8 oz)	----
Commutator resistance	0.025 ~ 0.035 Ω	----
Commutator diameter	28 mm (1.1 in)	27 mm (1.06 in)
Mica undercut	0.7 mm (0.03 in)	----
Starter relay		
Model (manufacturer)	MS5D-341 (HITACHI)	----
Amperage	100 A	----
Coil resistance	3.87 ~ 4.73 Ω	----
Horn		
Horn type	Plane	----
Model (manufacturer) × quantity	YF-12 (NIKKO) × 1	----
Max. amperage	3 A	----
Turn signal relay		
Relay type	Semi-transistor	----
Model (manufacturer)	FB257H (DENSO)	----
Self-cancelling device built-in	Yes	----
Turn signal blinking frequency	75 ~ 95 cycles/min.	----
Wattage	27 W × 2 + 3.4 W	----
Oil level switch model (manufacturer)	1FK (DENSO)	----
Fuel sender		
Model (manufacturer)	1FK (NIPPON SEIKI)	----
Resistance	700 ~ 1,100 Ω at 25 °C (77 °F)	----
Sidestand relay		
Model	1RL-92	----
Coil resistance	72 ~ 88 Ω	----
Fuel pump maximum amperage	1.2 A	----
Fuel pump relay model (manufacturer)	G8D-04Y (OMRON)	----
Radiator fan model (manufacturer)	4XV (TOYO RADIATOR)	----
Thermo switch model (manufacturer)	3LN (NIPPON THERMOSTAT)	----
Temperature sender		
Model (manufacturer)	11H (NIPPON SEIKI)	----
Resistance	153.9 Ω at 50 °C (122 °F)	----
	47.5 ~ 56.8 Ω at 80 °C (176 °F)	----
	26.2 ~ 29.3 Ω at 100 °C (212 °F)	----

Item	Standard	Limit
Fuses (amperage × quantity)		
Main fuse	30 A × 1	----
Headlight fuse	15 A × 1	----
Signaling system fuse	10 A × 1	----
Ignition fuse	10 A × 1	----
Radiator fan fuse	10 A × 1	----
Reserve fuse	30 A, 15 A, 10 A × 1	----

EB201000

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

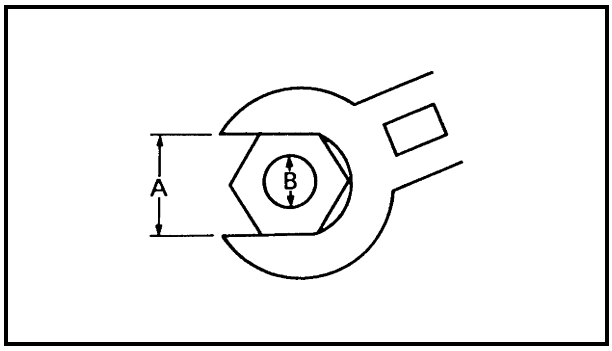
CONVERSION TABLE

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

EAS00030

GENERAL TIGHTENING TORQUE SPECIFICATIONS

This chart specifies tightening torques for standard fasteners with a standard ISO thread pitch. Tightening torque specifications for special components or assemblies are provided for each chapter of this manual. To avoid warpage, tighten multi-fastener assemblies in a 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: Width across flats
B: Thread diameter

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

TIGHTENING TORQUES

ENGINE TIGHTENING TORQUES

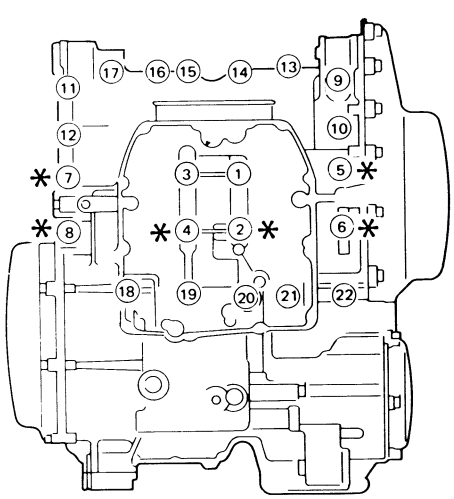
Part to be tightened	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m·kgf	ft·lb	
Camshaft caps	Bolt	M6	32	10	1.0	7.2	
Blind plug	Plug	M20	6	43	4.3	31	
Cylinder head (exhaust pipe)	Stud bolt	M8	8	15	1.5	11	
Spark plugs		M12	4	18	1.8	13	
Cylinder head	Nut	M10	16	43	4.3	31	
Cylinder head cover	Bolt	M6	16	10	1.0	7.2	
Connecting rod caps	Nut	M8	8	36	3.6	25	
AC magneto	Bolt	M12	1	130	13.0	94	
Camshaft sprocket	Bolt	M7	8	24	2.4	17	
Timing chain damper bracket	Bolt	M8	1	24	2.4	17	
Timing chain tensioner	Bolt	M6	4	12	1.2	8.7	
Cap bolt (tensioner)	Bolt	M16	2	20	2.0	14	
Water pump cover	Bolt	M6	5	10	1.0	7.2	
Water pump drain plug	Plug	M14	1	43	4.3	31	
Water pump housing	Bolt	M6	4	10	1.0	7.2	
Thermostat assembly	Bolt	M6	2	10	1.0	7.2	
Thermostat housing cover	Bolt	M6	2	7	0.7	5.1	
Crankcase breather assembly	Bolt	M6	6	10	1.0	7.2	
Crankcase breather cover	Bolt	M6	4	10	1.0	7.2	
Radiator	Bolt	M6	4	7	0.7	5.1	
Radiator side cover	Screw	M6	4	4	0.4	2.9	
Coolant drain cock	Screw	M4	1	3	0.3	2.2	
Radiator cap pipe	Screw	M6	3	7	0.7	5.1	
Conduit	Screw	M6	3	7	0.7	5.1	
Oil strainer housing	Screw	M6	3	7	0.7	5.1	
Oil pump gear housing	Screw	M6	4	7	0.7	5.1	
Oil gallery pipe	Bolt	M6	2	12	1.2	8.7	
Engine oil drain bolt	Plug	M14	1	43	4.3	31	
Oil pan	Bolt	M6	12	10	1.0	7.2	
Oil baffle plate	Bolt	M6	2	12	1.2	8.7	
Oil delivery pipe (head)	Union bolt	M8	2	18	1.8	13	
Oil delivery pipe (cover)	Union bolt	M10	1	20	2.0	14	
Oil pipe	Union bolt	M8	1	18	1.8	13	
Oil pump housing cover 1	Screw	M6	2	7	0.7	5.1	
Oil pump housing cover 1	Bolt	M6	1	10	1.0	7.2	
Stay 1	Bolt	M6	1	12	1.2	8.7	
Oil filter		M20	1	17	1.7	12	
Carburetor joint	Bolt	M6	8	10	1.0	7.2	
Fuel pump	Bolt	M6	2	12	1.2	8.7	
Exhaust pipe joint clamp (#1 and #3)	Bolt	M6	2	7	0.7	5.1	

Part to be tightened	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m·kgf	ft·lb	
Exhaust pipe joint clamp (#2 and #4)	Bolt	M8	1	20	2.0	14	
Exhaust pipe clamp bolt (exhaust chamber)	Bolt	M8	4	20	2.0	14	
Exhaust pipes	Nut	M8	8	20	2.0	14	
Exhaust pipe cover	Bolt	M6	3	7	0.7	5.1	
Exhaust pipe cover	Bolt	M5	6	6	0.6	4.3	
Muffler bracket	Bolt	M6	2	10	1.0	7.2	
Muffler	Bolt	M10	3	25	2.5	18	
Cylinder (cylinder head)	Stud bolt	M10	16	9	0.9	6.5	
Main gallery blind plug	Plug	M20	1	12	1.2	8.7	
Crankcase	Bolt	M6	10	12	1.2	8.7	
Crankcase	Bolt	M8	18	24	2.4	17	
Crankcase	Bolt	M10	8	40	4.0	29	
Middle gear bearing retainer	Screw	M8	4	25	2.5	18	
Main axle bearing retainer	Screw	M6	3	7	0.7	5.1	
Wire lead clamp	Screw	M6	2	7	0.7	5.1	
Generator cover	Bolt	M6	11	10	1.0	7.2	
Crankcase cover plate	Screw	M6	2	7	0.7	5.1	
Middle gear case cover	Bolt	M6	6	10	1.0	7.2	
Clutch cover	Bolt	M6	9	10	1.0	7.2	
Oil baffle plate	Screw	M6	4	7	0.7	5.1	
Oil drain plug (crankcase)	Bolt	M8	1	38	3.8	27	
Starter clutch	Bolt	M8	3	24	2.4	17	
Clutch spring plate	Bolt	M6	6	8	0.8	5.8	
Clutch boss	Nut	M20	1	70	7.0	50	
Clutch release cylinder	Bolt	M6	2	12	1.2	8.7	
Air bleed screw	Screw	M8	1	6	0.6	4.3	
Clutch pipe	Union bolt	M10	1	25	2.5	18	
Middle drive pinion gear	Nut	M44	1	110	11.0	80	
Middle driven pinion gear	Nut	M16	1	90	9.0	65	
Middle driven gear housing	Bolt	M8	3	30	3.0	22	
Shift cam segment	Screw	M6	1	12	1.2	8.7	
Shift cam plate	Screw	M5	1	4	0.4	2.9	
Shift cam retainer	Screw	M6	3	7	0.7	5.1	
Shift shaft spring stopper	Bolt	M8	1	22	2.2	16	
Stopper lever	Bolt	M6	1	10	1.0	7.2	
Shift arm	Bolt	M6	1	10	1.0	7.2	
Shift rod locknut	Nut	M6	1	10	1.0	7.2	
Shift rod locknut	Nut	M6	1	10	1.0	7.2	Left hand thread
Final gear case (rear arm)	Stud bolt	M10	4	18	1.8	13	
Final gear case (bearing housing)	Stud bolt	M8	6	9	0.9	6.5	
Coupling gear	Nut	M16	1	130	13.0	94	

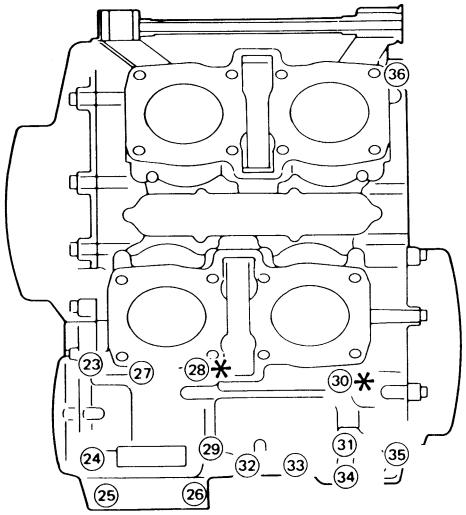
Part to be tightened	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m·kgf	ft·lb	
Bearing housing	Nut	M8	6	23	2.3	17	
Bearing housing	Bolt	M10	2	40	4.0	29	
Drain plug (final gear case)	Plug	M14	1	23	2.3	17	
Filler plug (final gear case)	Plug	M14	1	23	2.3	17	
Stator coil	Screw	M6	3	7	0.7	5.1	
Pickup coil	Screw	M6	4	7	0.7	5.1	
Starter motor	Bolt	M6	2	10	1.0	7.2	
Neutral switch	Screw	M5	3	4	0.4	2.9	
Oil level switch	Bolt	M6	2	10	1.0	7.2	
Thermo unit		M10	1	15	1.5	11	
Thermo switch		M16	1	15	1.5	11	

Crankcase tightening sequence:

Lower case



Upper case



✻ : With washer

CHASSIS TIGHTENING TORQUES

Part to be tightened	Thread size	Tightening torque			Remarks
		Nm	m·kgf	ft·lb	
Upper bracket and inner tube	M8	23	2.3	17	
Upper bracket and steering shaft	M22	110	11.0	80	
Handlebar holder (lower) and handlebar holder (upper)	M8	20	2.0	14	
Ring nut (steering shaft)	M25	3	0.3	2.2	See NOTE
Brake hose joint and lower bracket	M6	7	0.7	5.1	
Front master cylinder cap (brake and clutch)	M4	2	0.2	1.4	
Handlebar holder (lower)	M10	40	4.0	29	
Front master cylinder (brake and clutch)	M6	9	0.9	6.5	
Union bolt (brake hose)	M10	30	3.0	22	
Clutch hose and clutch pipe	M10	19	1.9	13	
Engine mounting:					
Mounting bolt (engine and front frame)	M10	42	4.2	30	
Mounting bolt (engine and rear frame)	M12	70	7.0	50	
Engine bracket and frame	M8	16	1.6	11	
Frame and down tube	M10	45	4.5	32	
Frame and rear cross bar	M8	23	2.3	17	
Swingarm pivot shaft (left)	M25	100	10.0	72	
Swingarm pivot shaft (right)	M25	7	0.7	5.1	
Swingarm pivot shaft locknut (right)	M25	100	10.0	72	
Rear shock absorber and frame	M8	20	2.0	14	
Rear shock absorber and swingarm	M10	35	3.5	25	
Rear shock absorber and final gear case	M10	30	3.0	22	
Swingarm and final gear case	M10	42	4.2	30	
Fuel sender and fuel tank	M6	7	0.7	5.1	
Side cover and frame	M6	7	0.7	5.1	
Sidestand bolt and nut	M10	40	4.0	29	
Left footrest bracket and frame	M8	26	2.6	19	
Left footrest bracket and rear frame pipe	M8	26	2.6	19	
Rear frame pipe and frame	M8	30	3.0	22	
Right footrest bracket and frame	M8	23	2.3	17	
Union bolt (rear brake hose)	M10	30	3.0	22	
Front fender brace	M6	9	0.9	6.5	
Front wheel axle	M14	58	5.8	42	
Front wheel axle pinch bolt	M8	20	2.0	14	
Rear wheel axle nut	M18	150	15.0	110	
Front brake caliper	M10	40	4.0	29	
Rear brake caliper	M10	40	4.0	29	
Brake disc and wheel	M8	23	2.3	17	LT
Caliper bleed screw	M8	6	0.6	4.3	

NOTE:

1.First, tighten the ring nut approximately 52 Nm (5.2 m • kg, 37 ft • lb) by using the torque wrench, then loosen the ring nut completely.
2.Retighten the ring nut to specification.

LUBRICATION POINTS AND LUBRICANT TYPES

ENGINE

Lubrication Point	Symbol
Oil seal lips	LS
O-ring	LS
Bearing	E
Connecting rod bolt/nut	M
Connecting rod small end and big end	E
Crankshaft pin	E
Crankshaft journal/big end	E
Balancer shaft journal	E
Piston surface	E
Piston pin	E
Camshaft cam lobe/journal	E
Timing chain tensioner	E
Valve stem (IN, EX)	M
Valve stem end (IN, EX)	E
Valve lifter	E
Water pump impeller shaft	E
Oil pump rotor (inner/outer), housing	E
Oil strainer assembly	E
Idle gear surface	E
Starter idle gear	E
Starter idle gear shaft	E
Starter clutch (outer/roller)	E
Push rod ball	LS
Pressure plate bearing	E
Transmission gear (wheel/pinion)	M
Shift cam	E
Shift fork/guide bar	E
Shift shaft assembly	LS
Shift pedal	LS
Shift lever joint	LS
Middle drive shaft (drive damper cam/driven damper cam)	E

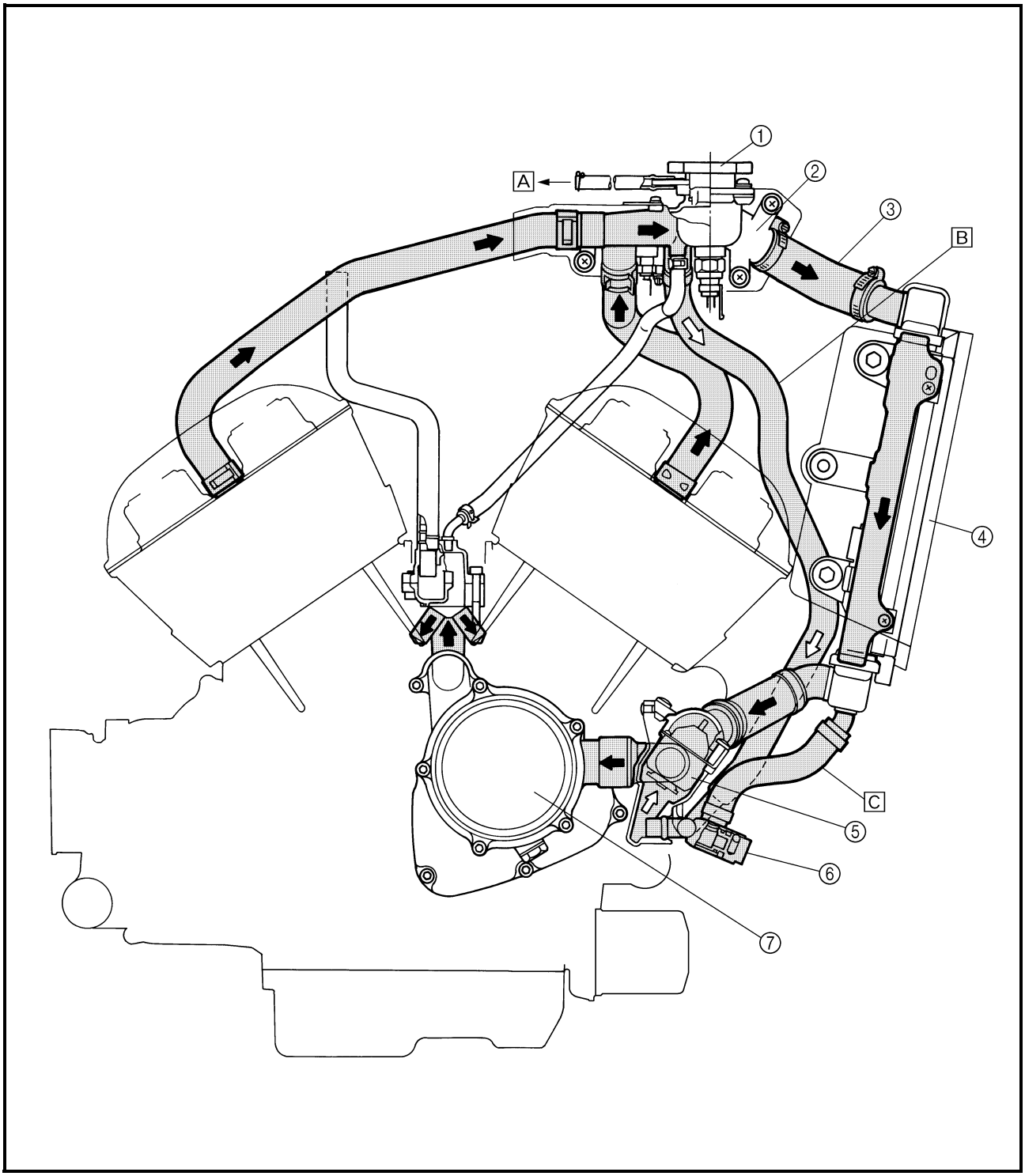
CHASSIS

Lubrication Point	Symbol
Steering bearing (upper/lower)	LS
Steering bearing cover	LS
Steering lock	LS
Steering head pipe lower oil seal	LS
Front wheel oil seal (right/left)	LS
Rear wheel oil seal	LS
Clutch hub fitting area	LS
Rear brake pedal shaft	LS
Shift pedal	LS
Sidestand sliding surface	LS
Centerstand sliding surface	LS
Tube guide (throttle grip) inner surface	LS
Brake lever pivot bolt, contact surface	LS
Clutch lever pivot bolt, contact surface	LS
Swingarm pivot shaft	LS
Swingarm pivot bearing	M
Swingarm pivot oil seal	M
Rear shock absorber bearing (inner)	M

COOLING SYSTEM DIAGRAMS

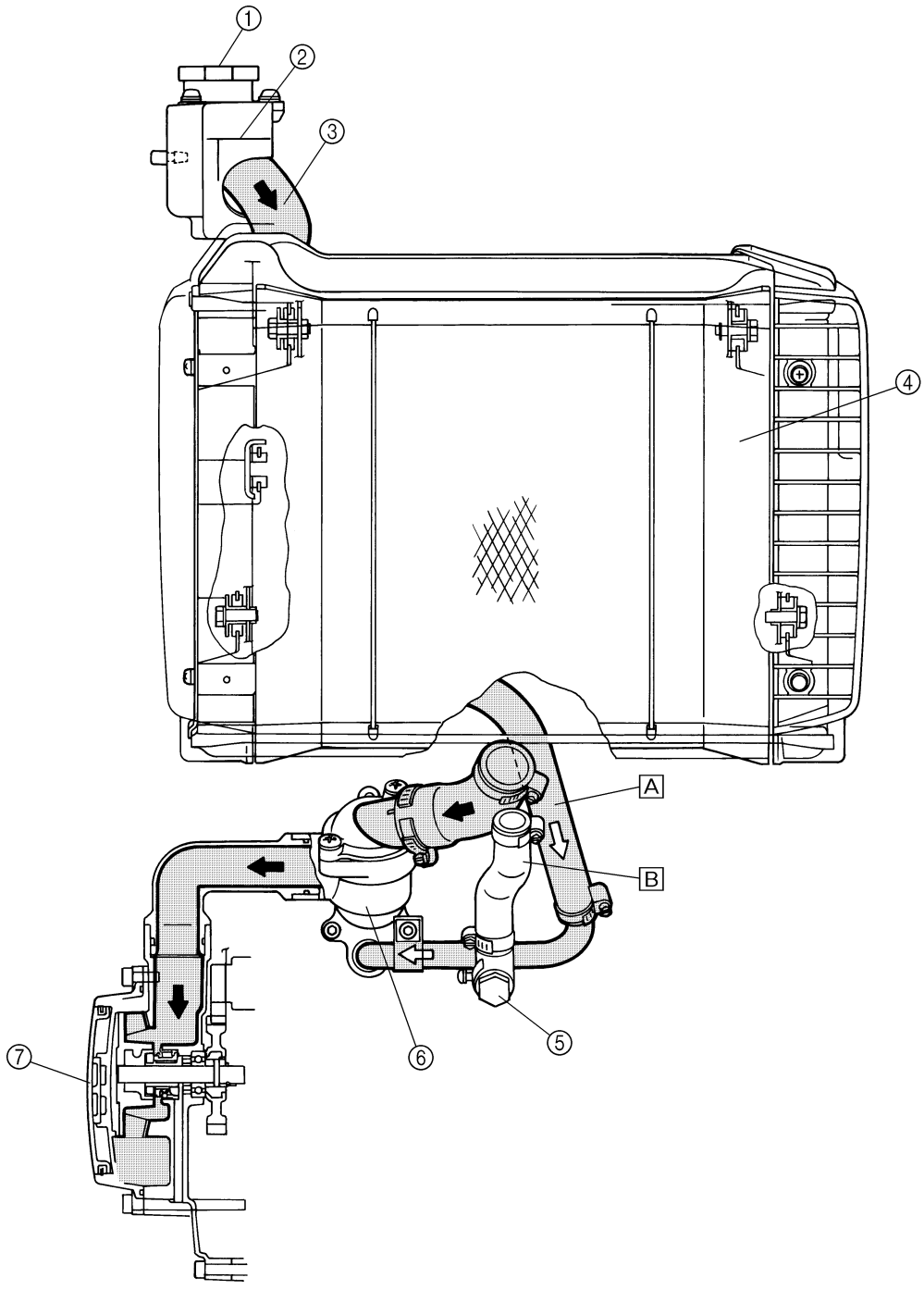
① Radiator cap
② Conduit
③ Radiator hose
④ Radiator
⑤ Thermostatic valve
⑥ Coolant drain cock
⑦ Water pump

[A] To coolant reservoir tank
[B] To thermostatic valve
[C] To coolant drain cock



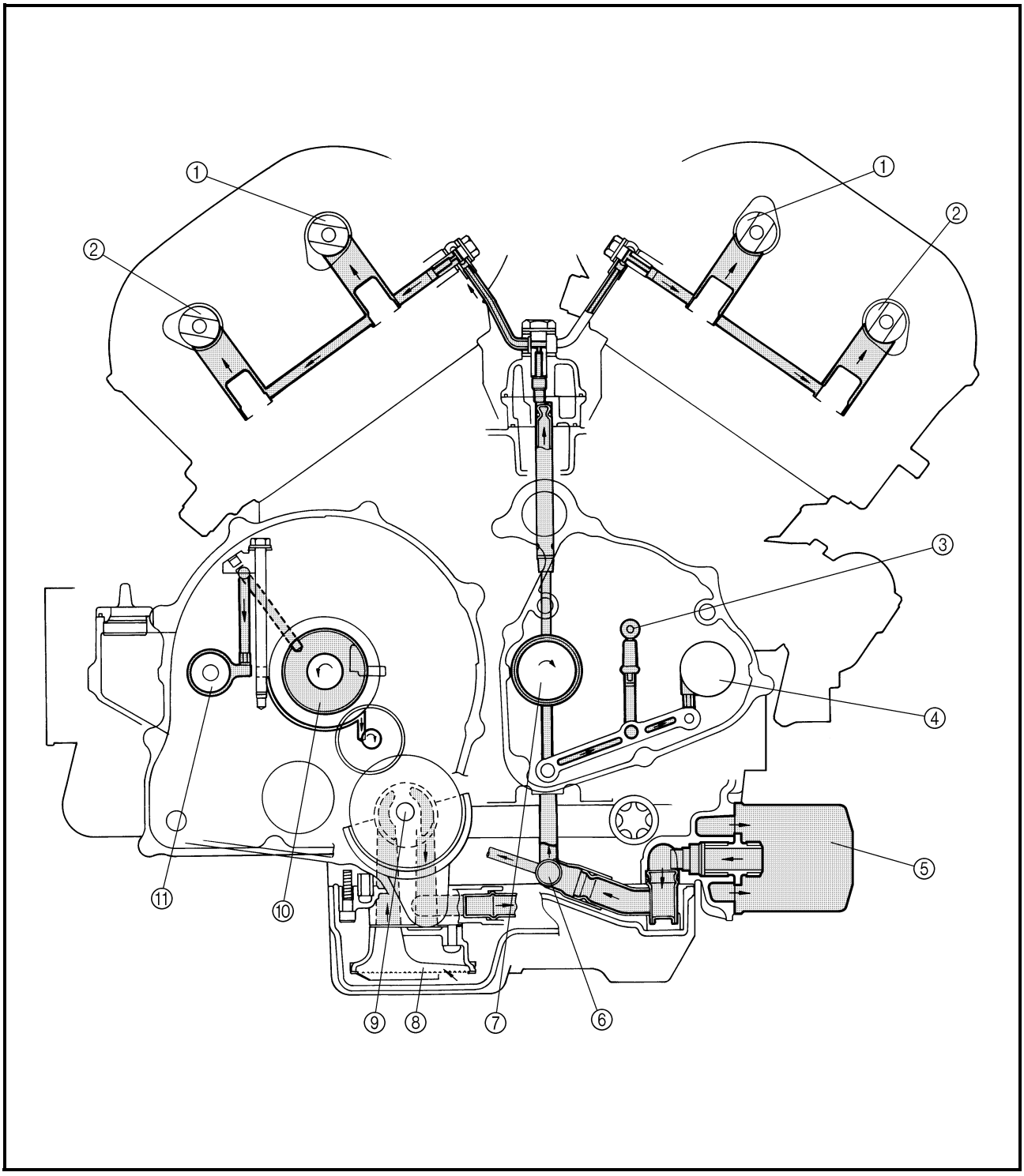
① Radiator cap
② Conduit
③ Radiator hose
④ Radiator
⑤ Coolant drain cock
⑥ Thermostatic valve housing
⑦ Water pump

Ⓐ To thermostatic valve
Ⓑ To coolant drain cock

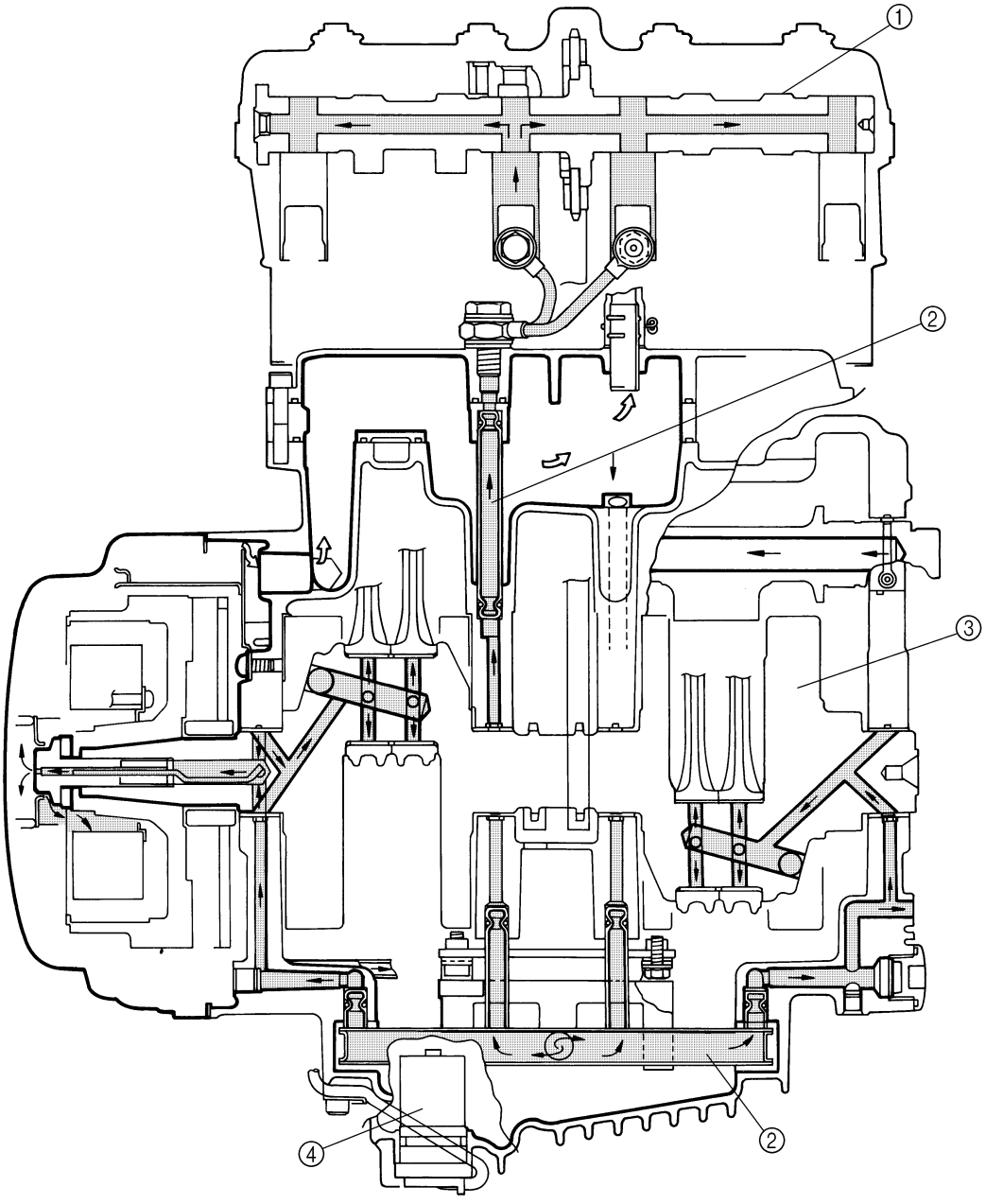


OIL FLOW DIAGRAMS

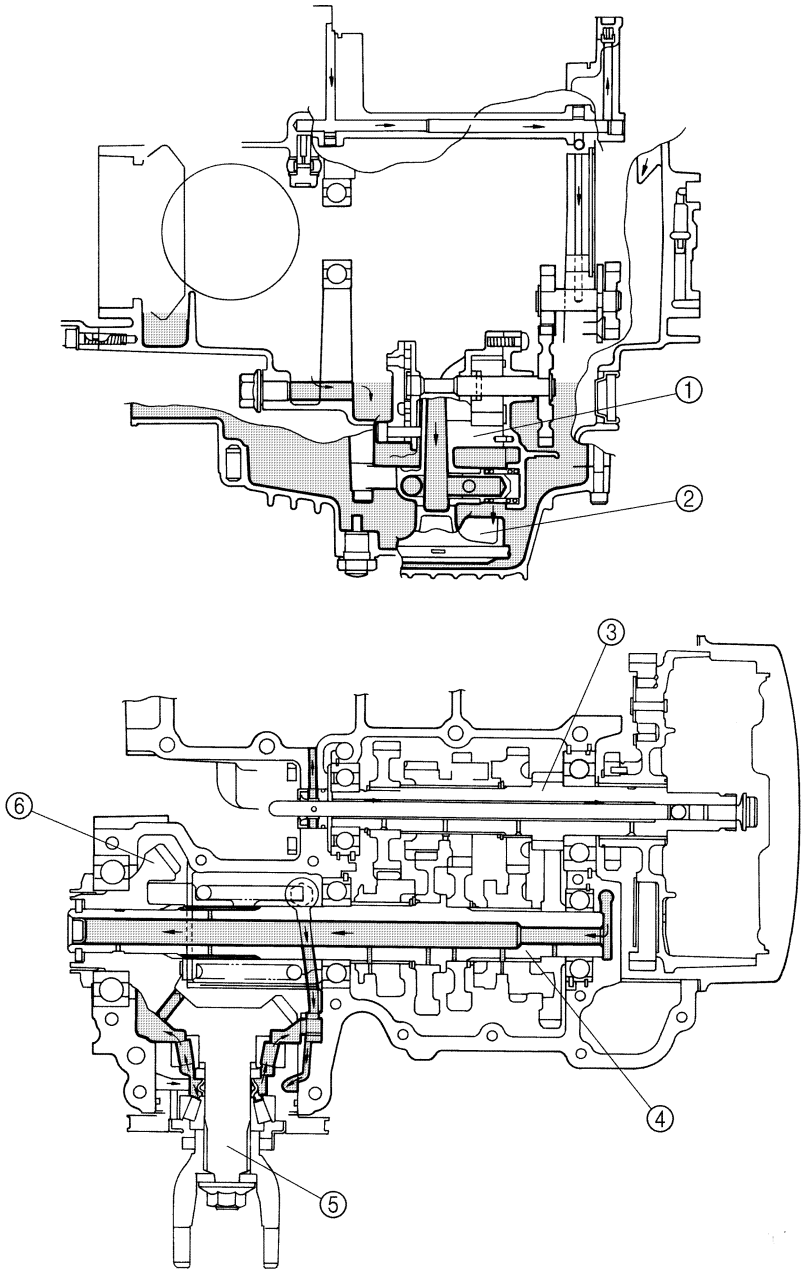
① Camshaft (intake)
② Camshaft (exhaust)
③ Water pump impeller shaft
④ Water pump drive gear
⑤ Oil filter
⑥ Main gallery
⑦ Crankshaft
⑧ Oil strainer
⑨ Oil pump
⑩ Main axle
⑪ Drive axle



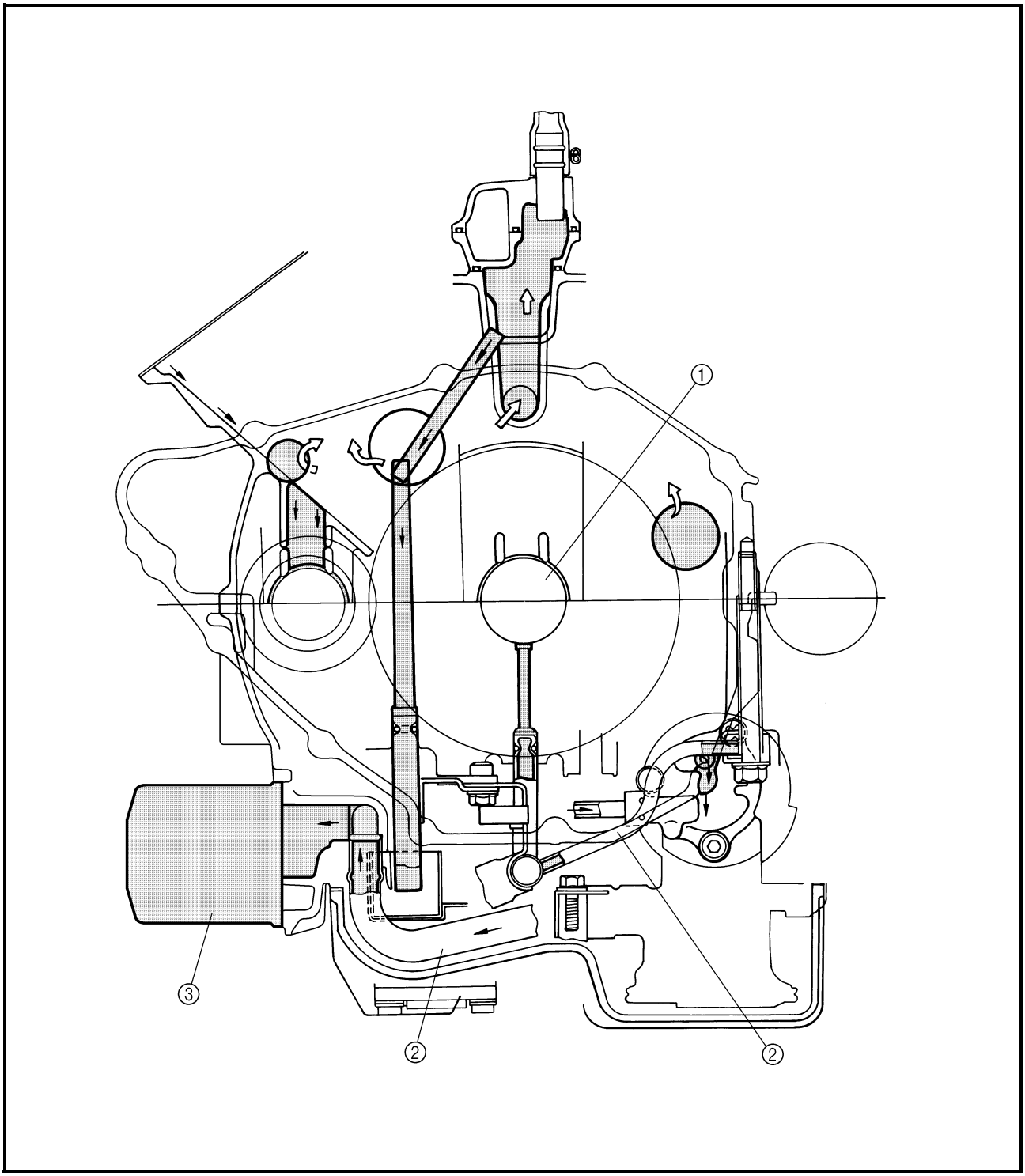
① Camshaft
② Main gallery
③ Crankshaft
④ Oil level switch



① Oil pump
② Oil strainer
③ Main axle
④ Drive axle
⑤ Middle driven pinion gear
⑥ Middle drive pinion gear



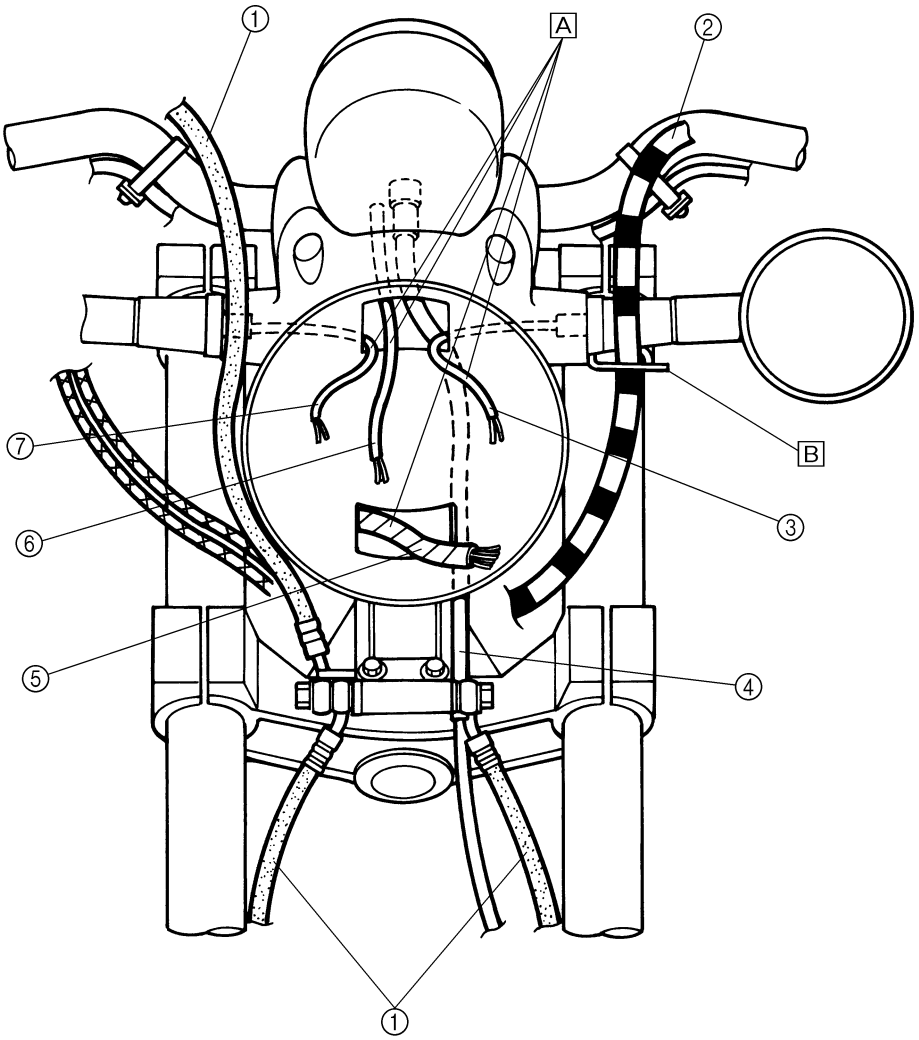
① Crankshaft
② Oil pipe
③ Oil filter



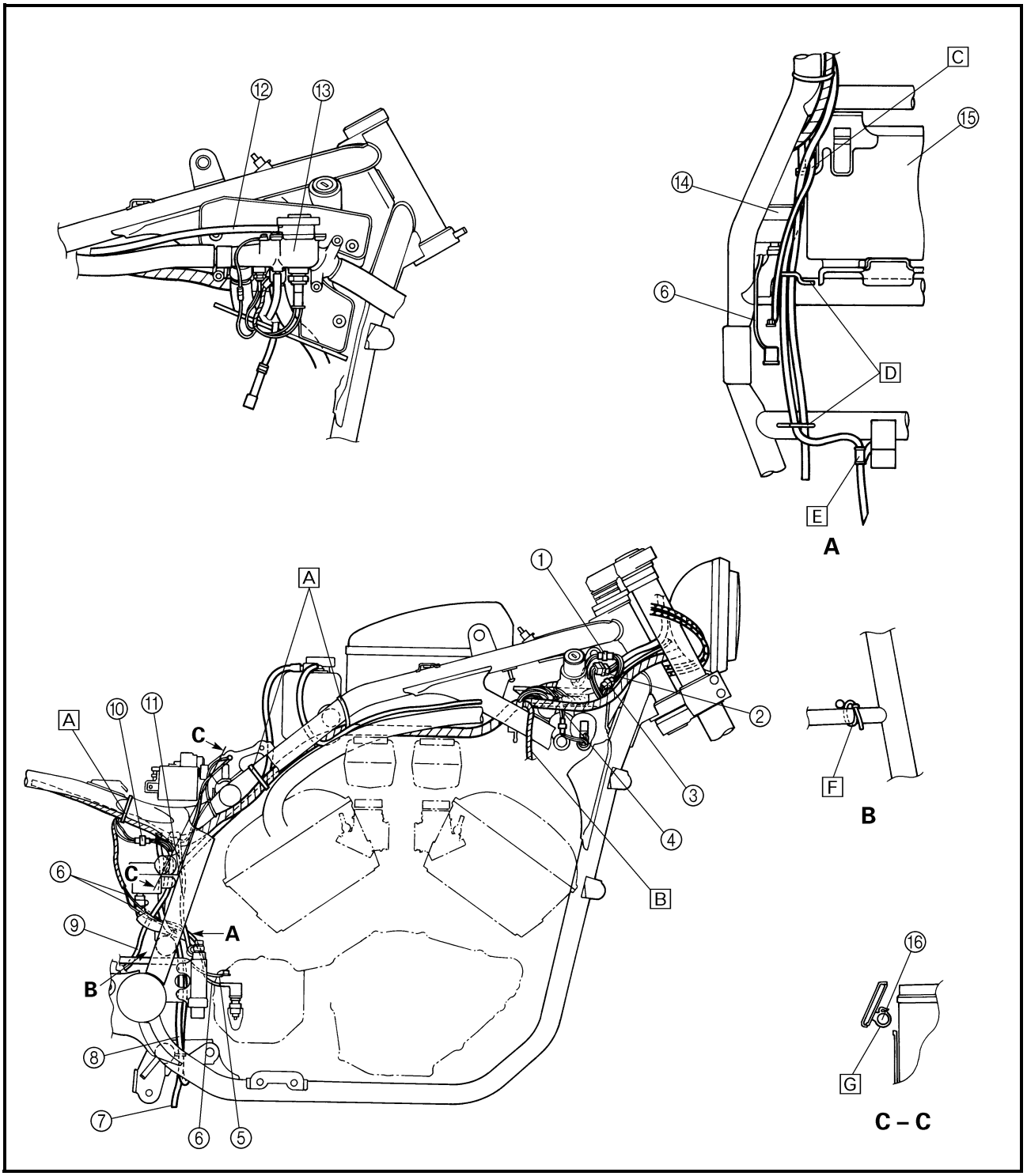
CABLE ROUTING

① Front brake hose
② Clutch hose
③ Front flasher light lead (left)
④ Speedometer cable
⑤ Wire harness
⑥ Speedometer light lead
⑦ Front flasher light lead (right)

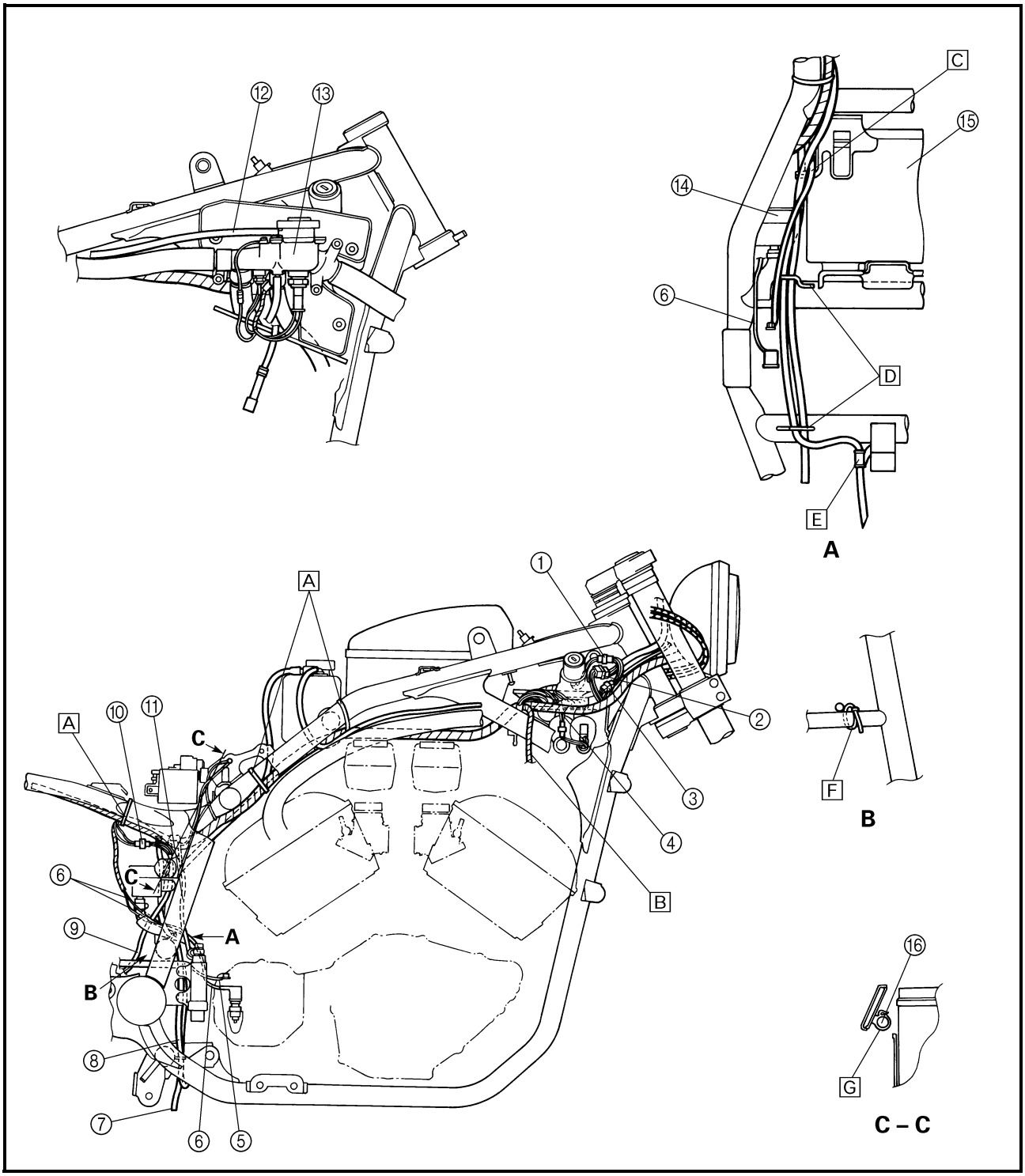
A Insert the wire harness, speedometer light lead and front flasher light leads (left and right) through the hole in the housing at the back of the headlight.
B Pass the clutch hose through the guide.



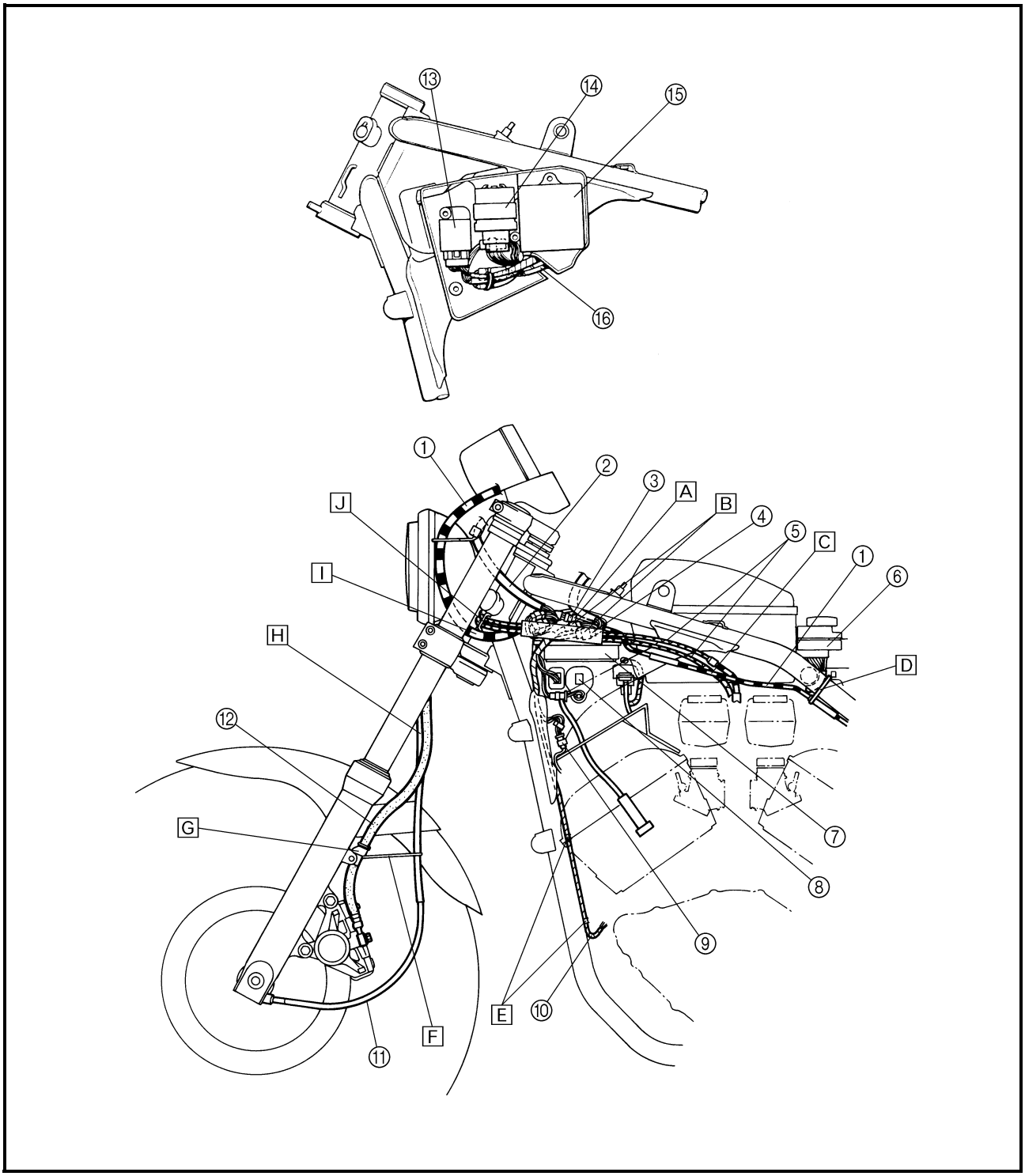
① Main switch coupler
② Handlebar switch coupler
③ Fuel switch coupler
④ Ignition coil lead
⑤ Ground lead
⑥ Rear brake switch lead
⑦ Coolant reservoir tank breather hose
⑧ Battery breather hose
⑨ Fuel sender lead
⑩ Fuel sender coupler
⑪ Battery negative lead
⑫ Coolant breather hose
⑬ Conduit
⑭ Rear brake reservoir tank
⑮ Battery
⑯ Wire harness



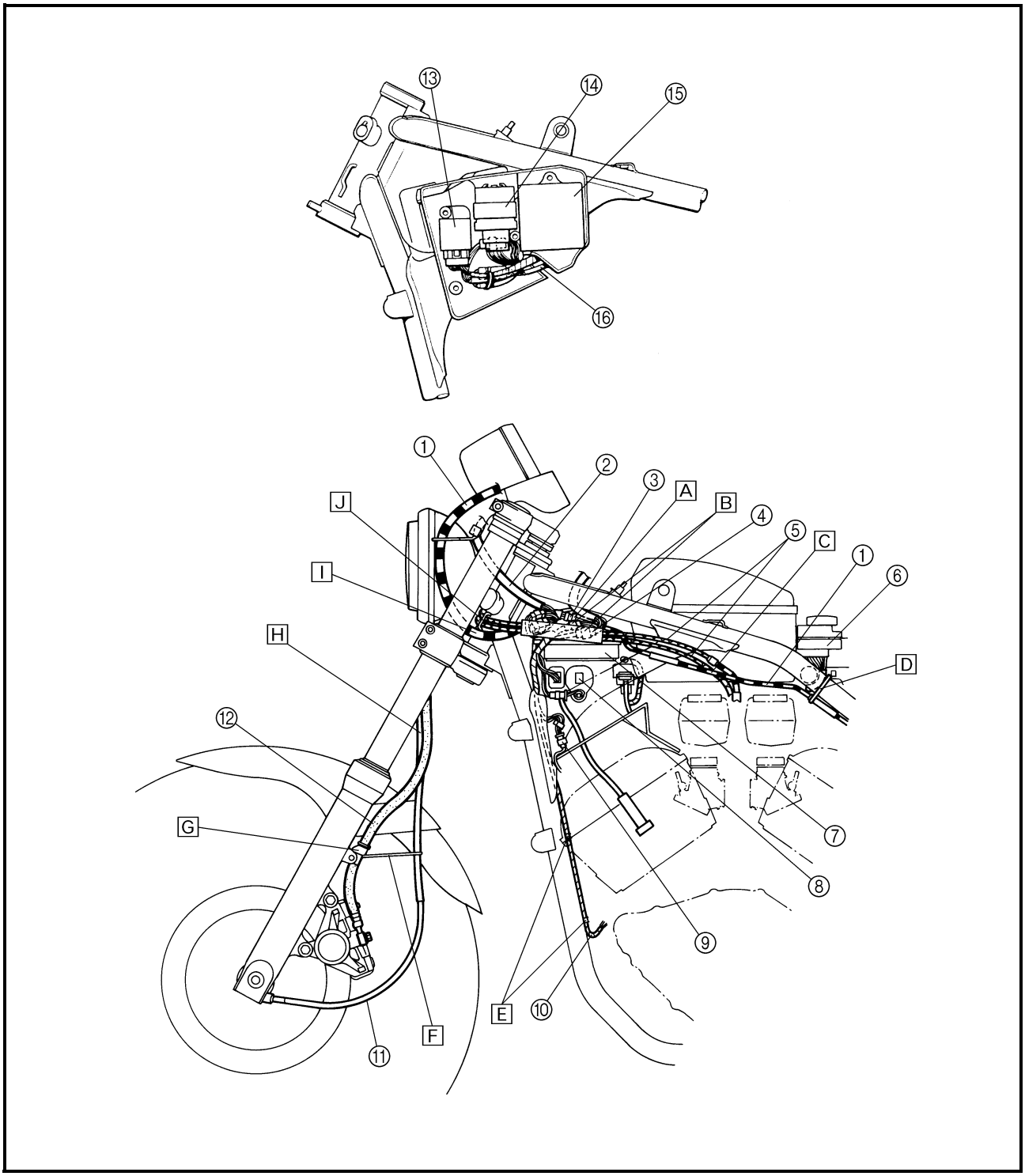
[A] Fasten the wire harness with a plastic locking tie.
[B] To the conduit.
[C] Pass the ground lead outside the coolant reservoir tank breather hose.
[D] Pass the battery breather hose and coolant reservoir tank breather hose through the guide.
[E] Pass the battery breather hose through the clamp.
[F] Fasten the rear brake switch lead with a plastic locking tie.
[G] Pass the wire harness through the clamp.



① Clutch hose
② Handlebar switch lead (left)
③ Clutch hose clump
④ Throttle cable holder
⑤ Throttle cables
⑥ Fuse box
⑦ Ignitor unit
⑧ Ignition coil
⑨ Radiator fan lead coupler
⑩ Horn lead
⑪ Speedometer cable
⑫ Front brake hose
⑬ Fuel pump control unit
⑭ Relay unit
⑮ V-boost control unit
⑯ V-boost control unit lead

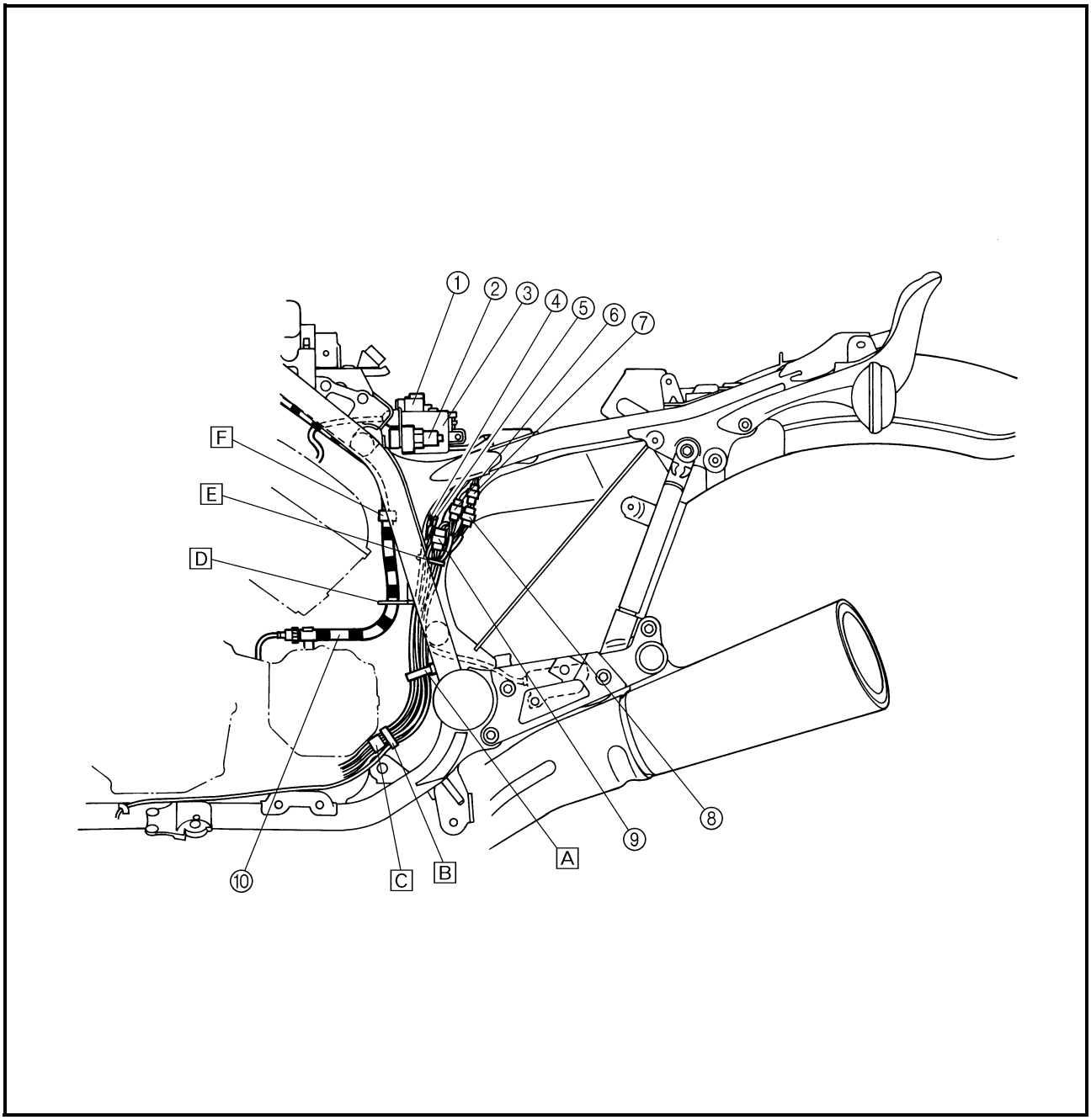


[A] Pass the handlebar switch lead inside the clutch hose.
[B] Pass the meter lead outside the clutch hose.
[C] Pass the clutch hose outside the throttle cable.
[D] Fasten the clutch hose with a plastic locking tie.
[E] Pass the horn lead through the clamp.
[F] Pass the speedometer cable through the guide.
[G] Pass the front brake hose through the clamp.
[H] Pass the front brake hose outside the speedometer cable.
[I] Pass the clutch hose under the throttle cable guide.
[J] Pass the throttle cables through the guide.



① Starter relay
② Main fuse
③ Ignition coil
④ Oil level switch lead
⑤ Neutral switch lead
⑥ Rectifier/regulator lead coupler
⑦ Ground lead coupler
⑧ Sidestand switch lead coupler
⑨ AC generator lead coupler
⑩ Clutch hose

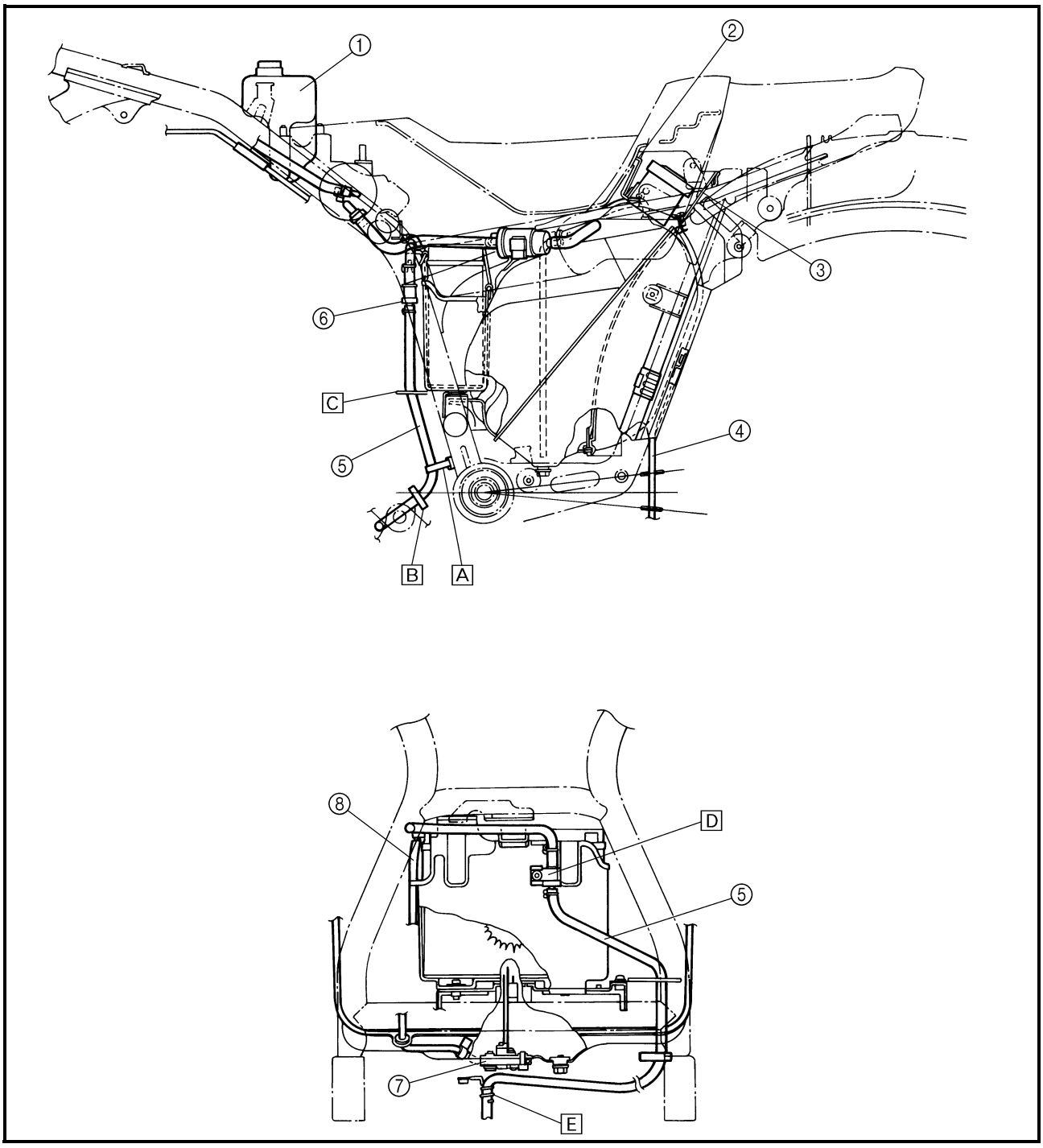
Ⓐ Fasten the oil level switch lead, neutral switch lead, ground lead, sidestand switch lead, overflow hose and AC generator lead with a plastic band to the frame guide.
Ⓑ Fasten the oil level switch lead, neutral switch lead, ground lead, sidestand switch lead, overflow hose and AC generator lead with plastic band.
Ⓒ Pass the oil level switch lead, neutral switch lead, ground lead, and AC generator lead through the clamp.
Ⓓ Pass the clutch hose and overflow hose through the guide.
Ⓔ Fasten the oil level switch lead, neutral switch lead, ground lead, sidestand switch lead and AC generator lead with a plastic locking tie.
Ⓕ Pass the clutch hose through the guide.



① Coolant reservoir tank
② Spring
③ Filler cover
④ Drain hose
⑤ Overflow hose
⑥ Overflow valve
⑦ Fuel sender
⑧ Battery breather hose

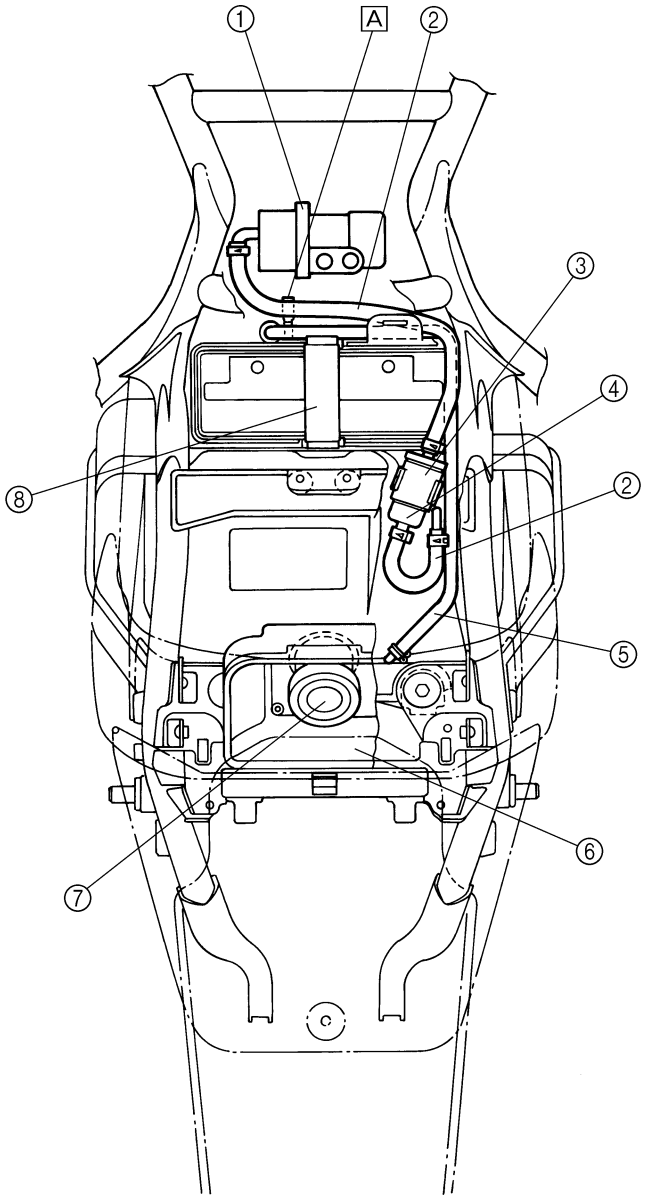
[A] Fasten the oil level switch lead, neutral switch lead, ground lead, sidestand switch lead, overflow hose and AC generator lead with a plastic band.

[B] Fasten the oil level switch lead, neutral switch lead, ground lead, sidestand switch lead, overflow hose and AC generator lead with a plastic band.
[C] Pass the clutch hose and overflow hose through the guide.
[D] Fasten the overflow hose with a plastic clamp.
[E] Pass the overflow hose through the guide.

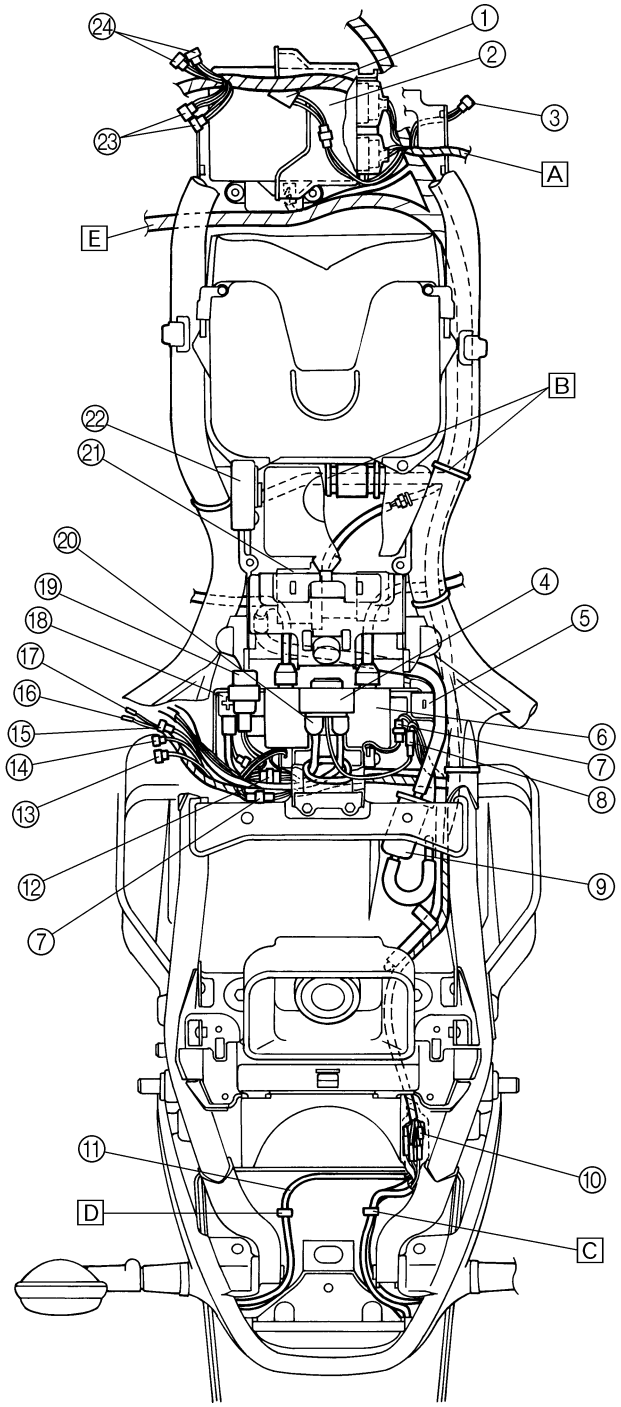


① Fuel pump
② Fuel pipe
③ Fuel filter bracket
④ Fuel filter
⑤ Over flow hose
⑥ Filler cover
⑦ Filler cap
⑧ Battery band

Ⓐ Pass the fuel pipe and overflow hose through the hose holder.

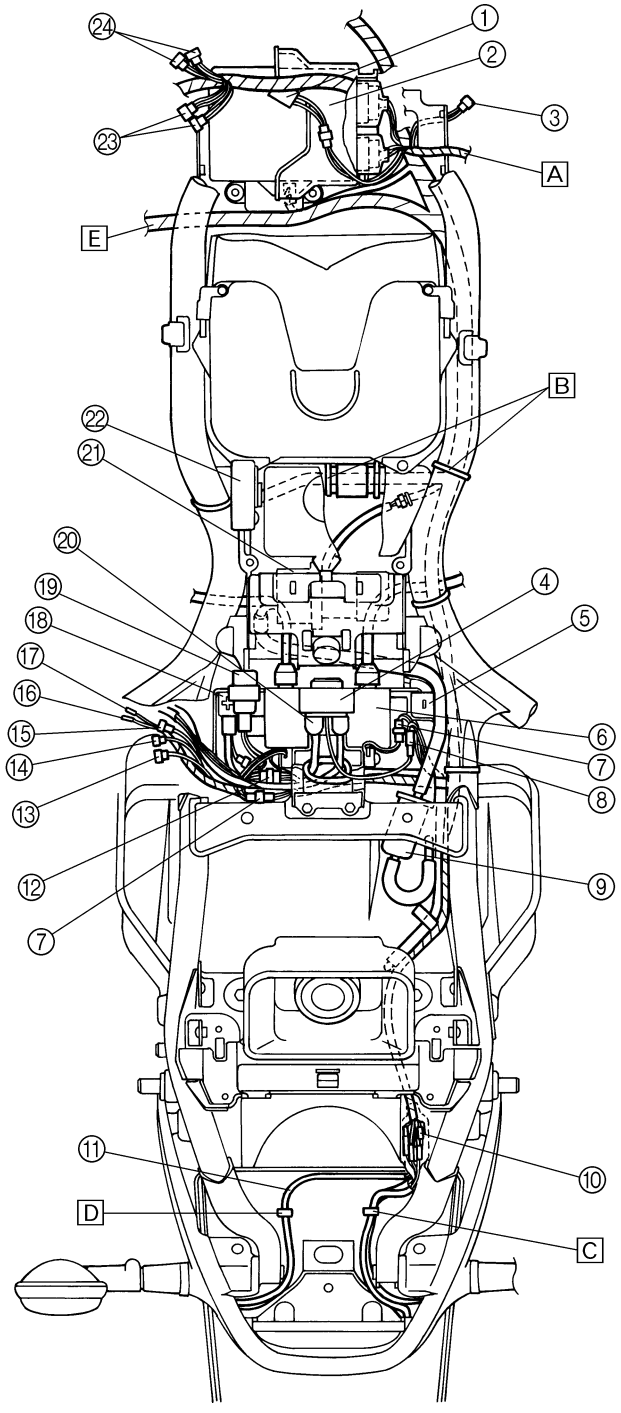


① Diode
② Ignitor unit
③ Ignition coil lead coupler
④ Starter relay
⑤ Battery negative lead
⑥ Ignition coil
⑦ Ignition coil lead coupler
⑧ Starter relay lead coupler
⑨ Fuel filter
⑩ Rubber boot
⑪ Rear flasher light lead (left)
⑫ Pick up coil lead coupler
⑬ Ground lead coupler
⑭ Side stand switch lead coupler
⑮ Rectifier/regulator lead coupler
⑯ Oil level switch lead
⑰ Neutral switch lead
⑱ Battery positive lead
⑲ Main fuse
⑳ Starter motor lead
㉑ Fuel pump



㉒ Fuse box
㉓ Meter lead coupler
㉔ Handlebar switch lead coupler

A To the conduit.
B Fasten the wire harness with a plastic locking tie.
C Clamp the taillight lead and rear flasher light lead (right).
D Clamp the rear flasher light lead (left).
E To V-boost control unit.



EAS00036

PERIODIC CHECKS AND ADJUSTMENTS

INTRODUCTION

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

PERIODIC MAINTENANCE CHART FOR THE EMISSION CONTROL SYSTEM

No.		ITEM	ROUTINE	INITIAL	ODOMETER READINGS				
				600 mi (1,000 km) or 1 month	4,000 mi (7,000 km) or 6 months	8,000 mi (13,000 km) or 12 months	12,000 mi (19,000 km) or 18 months	16,000 mi (25,000 km) or 24 months	20,000 mi (31,000 km) or 30 months
1	*	**Valve clearance**	• Check and adjust valve clearance when engine is cold.	**Every 30,000 mi (42,000 km) or 42 months**					
2		**Spark plugs**	• Check condition. • Adjust gap and clean. • Replace every 8,000 mi (13,000 km) or 12 months and thereafter every 8,000 mi (13,000 km) or 12 months.		√	**Replace.**	√	**Replace.**	√
3	*	**Crankcase ventilation system**	• Check ventilation hose for cracks or damage. • Replace if necessary.		√	√	√	√	√
4	*	**Fuel line**	• Check fuel hoses for cracks or damage. • Replace if necessary.		√	√	√	√	√
5	*	**Fuel filter**	• Replace initial 20,000 mi (31,000 km) or 30 months and thereafter every 20,000 mi (31,000 km) or 30 months.						**Replace.**
6	*	**Exhaust system**	• Check for leakage. • Retighten if necessary. • Replace gasket(s) if necessary.		√	√	√	√	√
7	*	**Carburetor synchronization**	• Adjust synchronization of carburetors.	√	√	√	√	√	√
8	*	**Idle speed**	• Check and adjust engine idle speed. • Adjust cable free play.		√	√	√	√	√
9	*	**Evaporative emission control system (For California only)**	• Check control system for damage. • Replace if necessary.				√		√

* Since these items require special tools, data and technical skills, have a Yamaha dealer perform the service.

GENERAL MAINTENANCE AND LUBRICATION CHART

No.		ITEM	ROUTINE	TYPE	INITIAL	ODOMETER READINGS				
					600 mi (1,000 km) or 1 month	4,000 mi (7,000 km) or 6 months	8,000 mi (13,000 km) or 12 months	12,000 mi (19,000 km) or 18 months	16,000 mi (25,000 km) or 24 months	20,000 mi (31,000 km) or 30 months
1		**Engine oil**	• Replace (warm up engine before draining).	See page 2-2.	√	√	√	√	√	√
2		**Oil filter**	• Replace.	–	√		√		√	
3	*	**Air filter**	• Clean with compressed air. • Replace if necessary.	–		√	√	√	√	√
4	*	**Cooling system**	• Check hose for cracks or damage. • Replace if necessary.	–		√	√	√	√	√
			• Replace coolant every 24 months.	Ethylene glycol antifreeze coolant					**Replace.**	
5	*	**Brake system**	• Adjust free play. • Replace pads if necessary.	–	√	√	√	√	√	√
6	*	**Clutch**	• Check operation and fluid leakage. (See NOTE page 3-3.) • Correct if necessary.	–	√	√	√	√	√	√
7		**Final gear oil**	• Check oil lever and leakage. • Replace every 16,000 mi (25,000 km) or 24 months.	SAE 80 API “GL-4” hypoid gear oil	**Replace.**	√	√	√	**Replace.**	√
8		**Control and meter cable**	• Apply chain lube thoroughly.	Yamaha chain and cable lube or SAE 10W-30 motor oil	√	√	√	√	√	√
9	*	**Swingarm pivot bearing**	• Check bearing assembly for looseness. • Moderately repack every 16,000 mi (25,000 km).	Lithium-soap-based grease			√		**Repack.**	
10		**Brake/clutch lever pivot shaft**	• Apply lithium-soap-based grease (all-purpose grease) lightly.	Lithium-soap-based grease (all-purpose grease)		√	√	√	√	√
11		**Brake pedal and shift pedal shaft**	• Lubricate. • Apply lithium-soap-based grease (all-purpose grease) lightly.	Lithium-soap-based grease (all-purpose grease)		√	√	√	√	√
12	*	**Center/sidestand pivots**	• Check operation and lubricate. • Apply lithium-soap-based grease (all-purpose grease) lightly.	Lithium-soap-based grease (all-purpose grease)		√	√	√	√	√
13	*	**Front fork**	• Check operation and leakage.	–		√	√	√	√	√

3

GENERAL MAINTENANCE AND LUBRICATION CHART

CHK ADJ

No.		ITEM	ROUTINE	TYPE	INITIAL	ODOMETER READINGS				
					600 mi (1,000 km) or 1 month	4,000 mi (7,000 km) or 6 months	8,000 mi (13,000 km) or 12 months	12,000 mi (19,000 km) or 18 months	16,000 mi (25,000 km) or 24 months	20,000 mi (31,000 km) or 30 months
14	*	**Steering bearings**	• Check bearing assembly for looseness. • Moderately repack every 16,000 mi (25,000 km).	Lithium-soap-based grease		√	√	√	**Repack.**	√
15	*	**Wheel bearings**	• Check bearings for smooth rotation.	–		√	√	√	√	√
16	*	**Battery**	• Check specific gravity and breather pipe for proper operation.	–		√	√	√	√	√
17	*	**Sidestand switch**	• Check and clean or replace if necessary.	–	√	√	√	√	√	√

* Since these items require special tools, data and technical skills, they should be serviced by a Yamaha dealer.

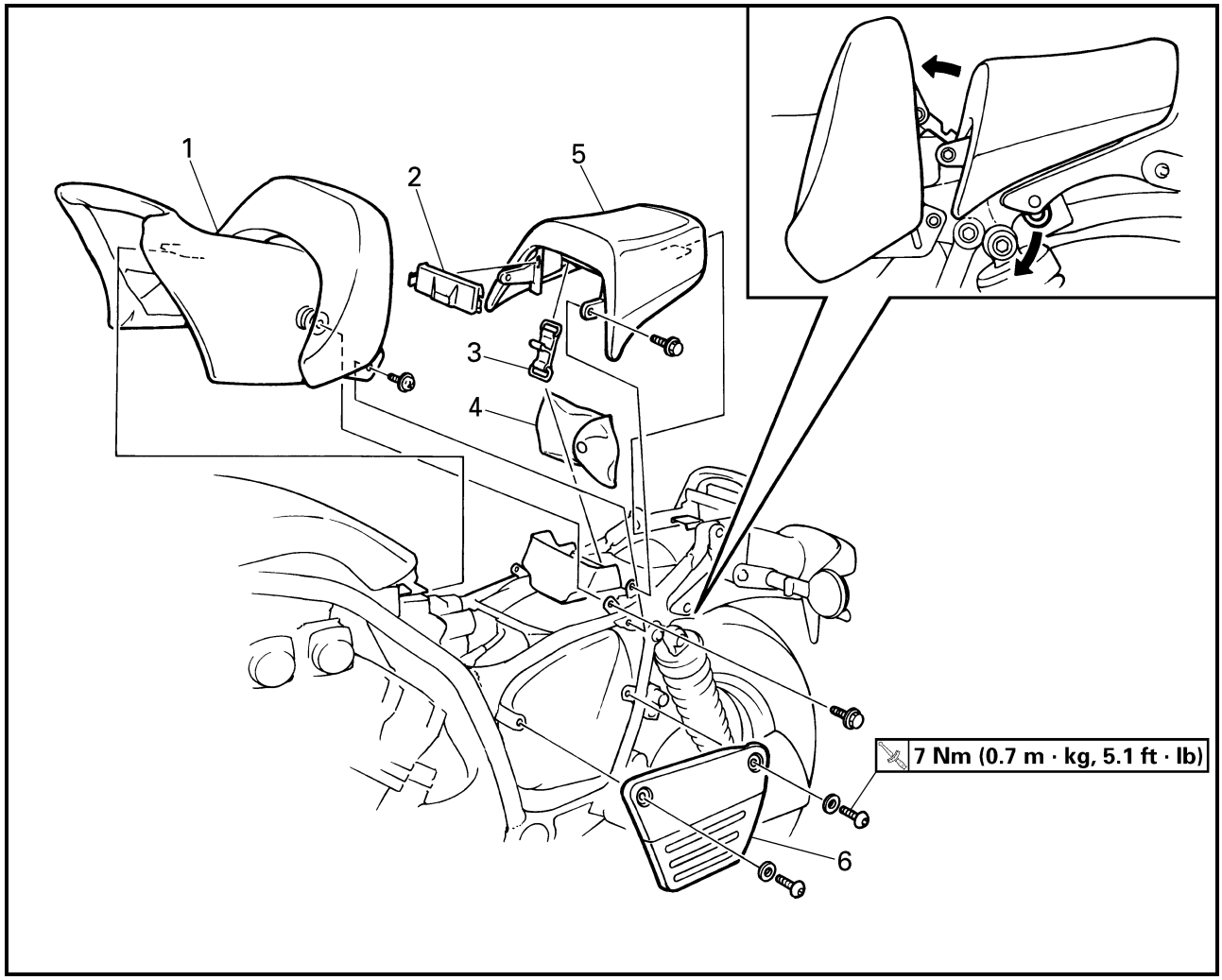
NOTE:

For odometer readings or time periods higher than 20,000 mi (31,000 km) or 30 months, follow the maintenance requirements listed in the maintenance chart under the 4,000 mi (7,000 km) or 6 month interval.

NOTE:

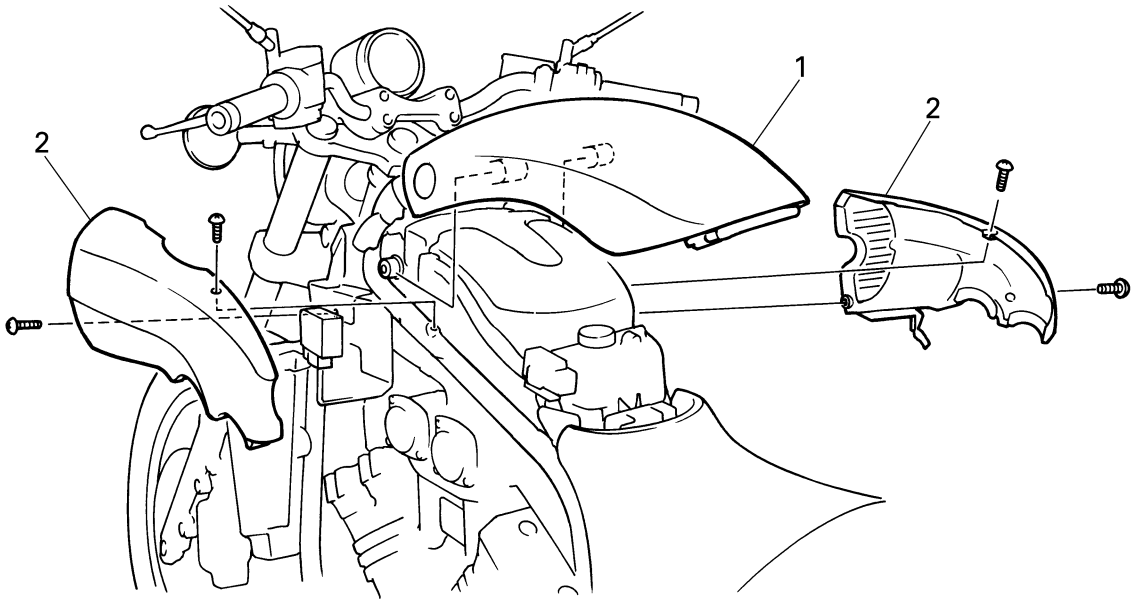
- The air filter needs more frequent service if you are riding in unusually wet or dusty areas.
- Hydraulic brake and clutch systems
- After disassembling the master cylinder, caliper cylinder or clutch release cylinder, always replace the brake fluid.
  Check the brake fluid level of the master cylinder and clutch release cylinder regularly and fill as required.
- Replace the oil seals on the inner parts of the master cylinder, caliper cylinder and clutch release cylinder every two years.
- Replace the brake and clutch hoses every four years or if cracked or damaged.

SEATS AND SIDE COVERS



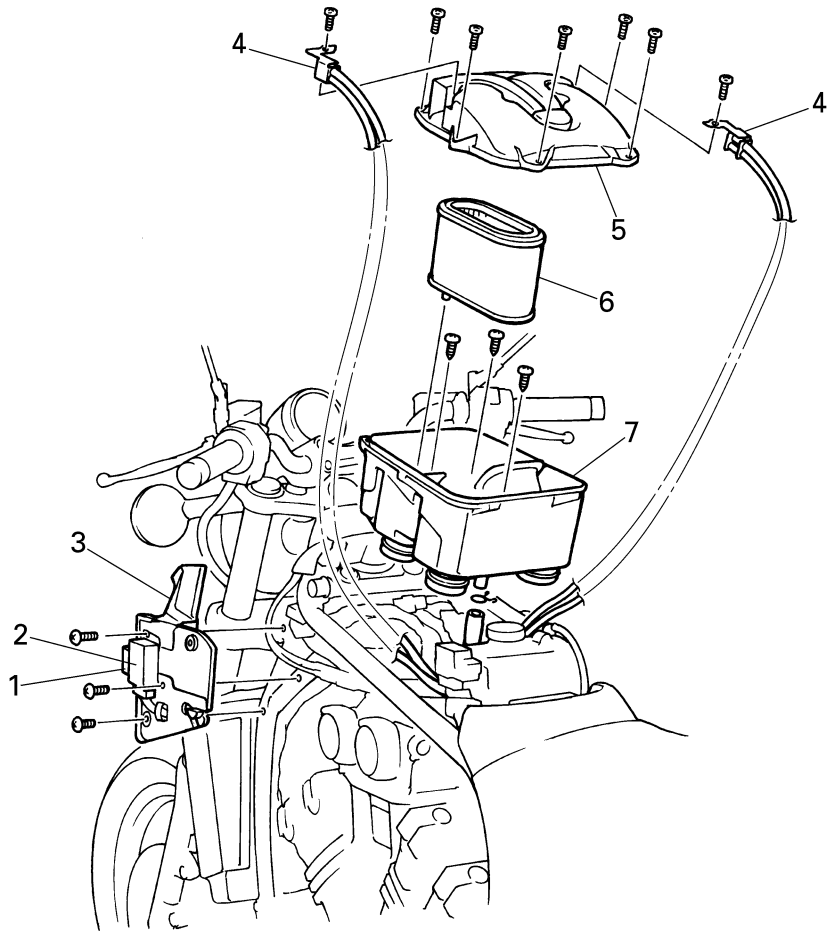
Order	Job/Part	Q'ty	Remarks
	Removing the seats and side covers		Remove the parts in the order listed.
1	Rider seat	1	
2	Tool cover	1	
3	Tool band	1	
4	Tool kit	1	
5	Passenger seat	1	
6	Side covers (left and right)	2	
			For installation, reverse the removal procedure.

TOP COVER AND COVERS



Order	Job/Part	Q'ty	Remarks
	Removing the top cover and covers		Remove the parts in the order listed.
1	Top cover	1	
2	Covers (left and right)	2	
			For installation, reverse the removal procedure.

AIR FILTER CASE AND ELECTRICAL COMPONENTS BOARD



Order	Job/Part	Q'ty	Remarks
	Removing the air filter case and electrical components board		Remove the parts in the order listed.
	Top cover and covers		Refer to "TOP COVER AND COVERS".
1	Fuel pump control unit	1	Disconnect.
2	Relay unit	1	Disconnect.
3	Electrical components board	1	
4	Air vent hose holder	2	
5	Air filter case cover	1	
6	Air filter	1	
7	Air filter case	1	
			For installation, reverse the removal procedure.

EAS00044
ENGINE

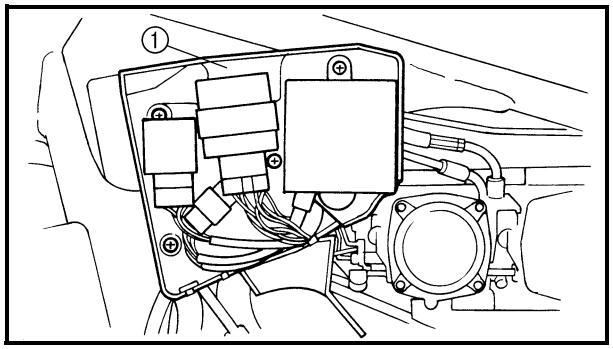
ADJUSTING THE VALVE CLEARANCE

The following procedure applies to all of the valves.

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

1. Remove:
   - top cover
   - covers (left and right)

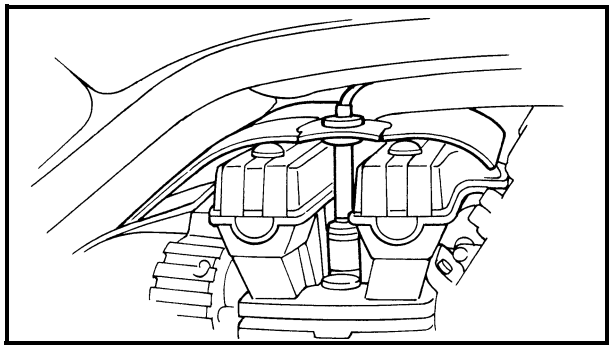
   Refer to “AIR FILTER CASE AND ELECTRICAL COMPONENTS BOARD”.



2. Remove:
   - electrical components board ①
3. Disconnect:
   - all electrical component leads
4. Remove:
   - radiator side covers
   - radiator bolt

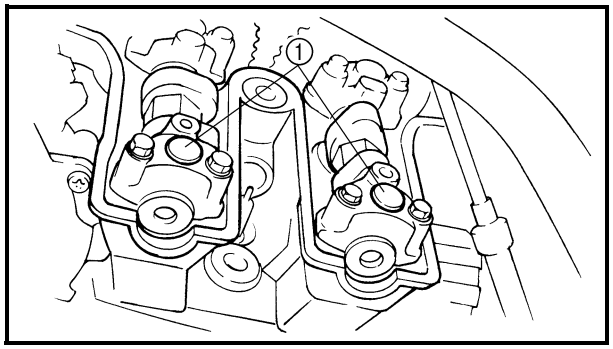
   Refer to “COOLING SYSTEM” in chapter 5.

NOTE:
It is not necessary to remove the radiator completely from the motorcycle.



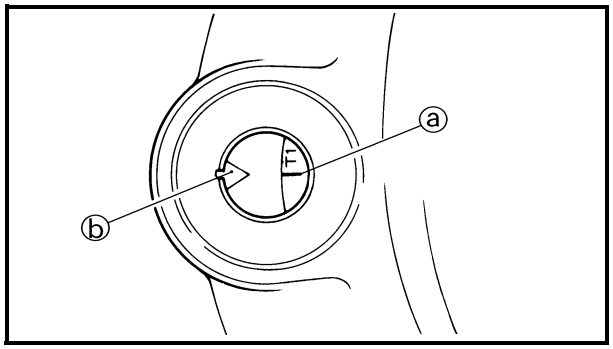
5. Disconnect:
   - spark plug caps
6. Remove:
   - air baffle plate (rear)

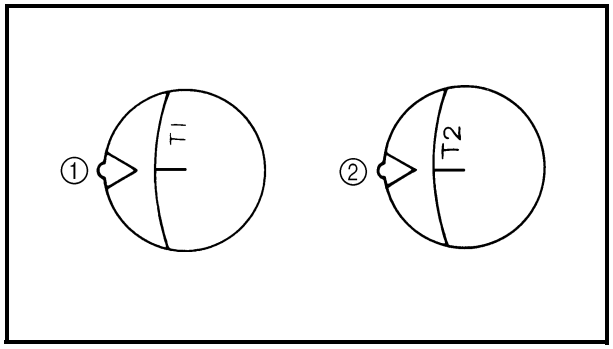
   Refer to “ENGINE REMOVAL” in chapter 4.

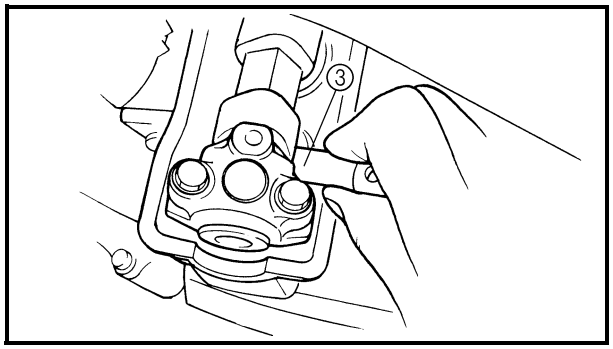


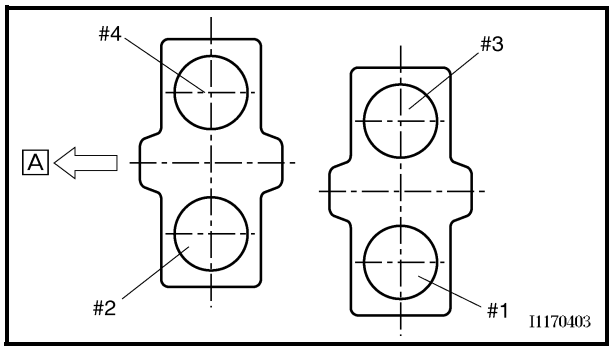
7. Remove:
   - cylinder head covers

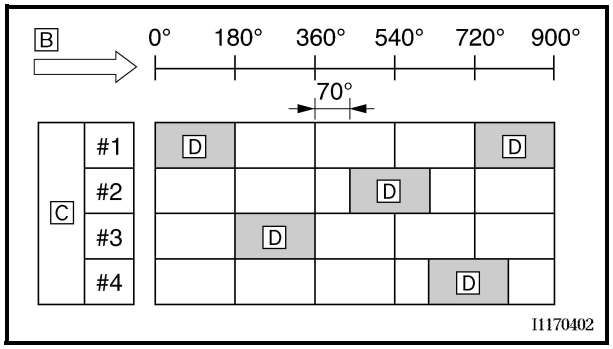
NOTE:
Be sure you do not lose the oil plugs ① on the camshaft caps.











8. Measure:
   - valve clearance
     Out of specification → Adjust.

Valve clearance (cold)
Intake valve
0.11 ~ 0.15 mm (0.0043 ~ 0.0059 in)
Exhaust valve
0.26 ~ 0.30 mm (0.0102 ~ 0.0118 in)

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a. Turn the crankshaft counterclockwise.
b. When piston #1 is at TDC on the compression stroke, align the TDC mark ⓐ with the stationary pointer ⓑ.

NOTE:
TDC on the compression stroke can be found when the camshaft lobes are turned away from each other.

① TDC for No. 1 cylinder
② TDC for No. 2 cylinder

c. Measure the valve clearance with a thickness gauge ③.

NOTE:
- If the valve clearance is incorrect, record the measured reading.
- Measure the valve clearance in the following sequence.

Valve clearance measuring sequence
Cylinder #1 → #3 → #2 → #4

A Front

d. To measure the valve clearances of the other cylinders, starting with cylinder #1 at TDC, turn the crankshaft counterclockwise as specified in the following table.

B Degrees that the crankshaft is turned counterclockwise
C Cylinder
D Combustion cycle

Cylinder #3	**180°**
Cylinder #2	**430°**
Cylinder #4	**610°**

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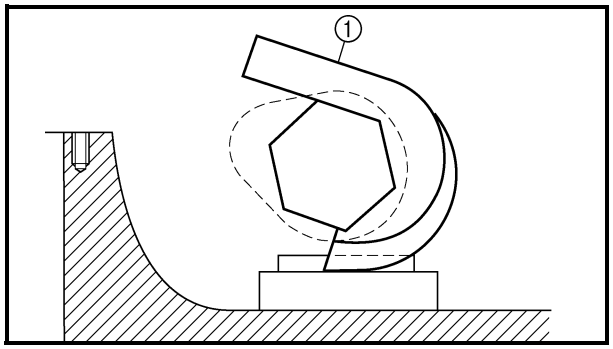

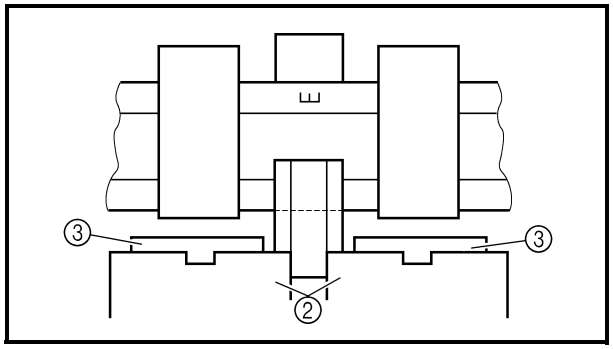

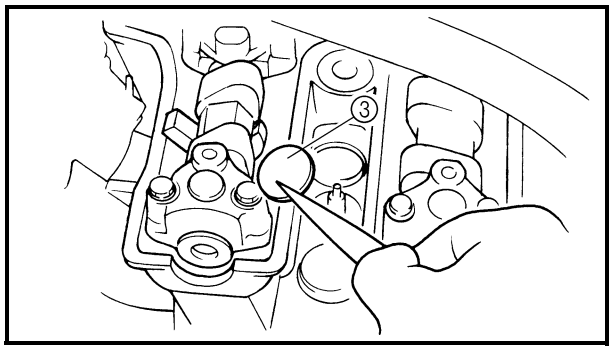

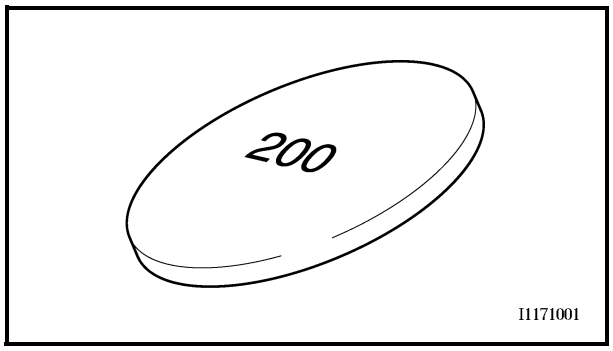

9. Adjust:
   - valve clearance

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a. Align the intake and exhaust valve lifter slots with each other.
b. Install the tappet adjusting tool ① between the camshaft and the valve lifter.

	Tappet adjusting tool **YM-33961**

NOTE:

Make sure the tappet adjusting tool touches only the valve lifter ②, not the valve pad ③.

c. Slowly turn the tappet adjusting tool so that the valve pad can be removed.
d. Remove the valve pad from the valve lifter with a small screwdriver and a pair of tweezers. Make a note of the position of each valve pad and valve pad number so they can be installed in the correct place.
e. Select the proper valve pad from the following table.

Valve pad thickness range		Available valve pads
Nos. 200 ~ 320	2.00 ~ 3.20 mm	25 thicknesses in 0.05 mm increments

NOTE:

- The thickness of each valve pad is marked in hundredths of millimeters on the side that touches the valve lifter (not the camshaft).
- Since valve pads of various sizes are originally installed, the valve pad number must be rounded in order to reach the closest equivalent to the original.

INTAKE

MEASURED CLEARANCE	INSTALLED PAD NUMBER																									
	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320
0.00 ~ 0.05			200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310
0.06 ~ 0.10		200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315
0.11 ~ 0.15	STANDARD CLEARANCE																								
0.16 ~ 0.20	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320	
0.21 ~ 0.25	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320		
0.26 ~ 0.30	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320			
0.31 ~ 0.35	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320				
0.36 ~ 0.40	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320					
0.41 ~ 0.45	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320						
0.46 ~ 0.50	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320							
0.51 ~ 0.55	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320								
0.56 ~ 0.60	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320									
0.61 ~ 0.65	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320										
0.66 ~ 0.70	255	260	265	270	275	280	285	290	295	300	305	310	315	320											
0.71 ~ 0.75	260	265	270	275	280	285	290	295	300	305	310	315	320												
0.76 ~ 0.80	265	270	275	280	285	290	295	300	305	310	315	320													
0.81 ~ 0.85	270	275	280	285	290	295	300	305	310	315	320														
0.86 ~ 0.90	275	280	285	290	295	300	305	310	315	320															
0.91 ~ 0.95	280	285	290	295	300	305	310	315	320																
0.96 ~ 1.00	285	290	295	300	305	310	315	320																	
1.01 ~ 1.05	290	295	300	305	310	315	320																		
1.06 ~ 1.10	295	300	305	310	315	320																			
1.11 ~ 1.15	300	305	310	315	320																				
1.16 ~ 1.20	305	310	315	320																					
1.21 ~ 1.25	310	315	320																						
1.26 ~ 1.30	315	320																							
1.31 ~ 1.35	320																								

VALVE CLEARANCE (cold):
0.11 ~ 0.15 mm (0.004 ~ 0.006 in)
Example: Installed is pad 250
Measured clearance is 0.23 mm (0.009 in)
Replace pad 250 with pad 260
Pad number: (example)
Pad No. 250 = 2.50 mm (0.098 in)
Pad No. 260 = 2.60 mm (0.102 in)
Always install pad with number down.

EXHAUST

MEASURED CLEARANCE	INSTALLED PAD NUMBER																									
	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320
0.00 ~ 0.05						200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295
0.06 ~ 0.10					200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300
0.11 ~ 0.15				200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	**305**
0.16 ~ 0.20			200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	**305**	310
0.21 ~ 0.25		200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	**305**	310	315
0.26 ~ 0.30	STANDARD CLEARANCE																								
0.31 ~ 0.35	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320	
0.36 ~ 0.40	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320		
0.41 ~ 0.45	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320			
0.46 ~ 0.50	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320				
0.51 ~ 0.55	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320					
0.56 ~ 0.60	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320						
0.61 ~ 0.65	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320							
0.66 ~ 0.70	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320								
0.71 ~ 0.75	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320									
0.76 ~ 0.80	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320										
0.81 ~ 0.85	255	260	265	270	275	280	285	290	295	300	305	310	315	320											
0.86 ~ 0.90	260	265	270	275	280	285	290	295	300	305	310	315	320												
0.91 ~ 0.95	265	270	275	280	285	290	295	300	305	310	315	320													
0.96 ~ 1.00	270	275	280	285	290	295	300	305	310	315	320														
1.01 ~ 1.05	275	280	285	290	295	300	305	310	315	320															
1.06 ~ 1.10	280	285	290	295	300	305	310	315	320																
1.11 ~ 1.15	285	290	295	300	305	310	315	320																	
1.16 ~ 1.20	290	295	300	305	310	315	320																		
1.21 ~ 1.25	295	300	305	310	315	320																			
1.26 ~ 1.30	300	305	310	315	320																				
1.31 ~ 1.35	305	310	315	320																					
1.36 ~ 1.40	310	315	320																						
1.41 ~ 1.45	315	320																							
1.46 ~ 1.50	320																								

VALVE CLEARANCE (cold):
0.26 ~ 0.30 mm (0.0102 ~ 0.0118 in)
Example: Installed is pad 250
Measured clearance is 0.32 mm (0.013 in)
Replace pad 250 with pad 255
Pad number: (example)
Pad No. 250 = 2.50 mm (0.098 in)
Pad No. 255 = 2.55 mm (0.100 in)
Always install pad with number down.

f. Round off the original valve pad number according to the following table.

Last digit	Rounded value
0 or 2	0
5	5
8	10

EXAMPLE:
Original valve pad number = 248 (thickness = 2.48 mm)
Rounded value = 250

g. Locate the rounded number of the original valve pad and the measured valve clearance in the valve pad selection table. The point where the column and row intersect is the new valve pad number.

NOTE:
The new valve pad number is only an approximation. The valve clearance must be measured again and the above steps should be repeated if the measurement is still incorrect.

h. Install the new valve pad with the numbered side facing down.
i. Remove the tappet adjusting tool.
j. Measure the valve clearance again.
k. If the valve clearance is still out of specification, repeat all of the valve clearance adjustment steps until the specified clearance is obtained.

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10.Install:
- all removed parts

NOTE:
For installation, reverse the removal procedure. Note the following points.

11.Install:
- cylinder head covers
- spark plugs

	10 Nm (1.0 m · kg, 7.2 ft · lb)
	18 Nm (1.8 m · kg, 13 ft · lb)

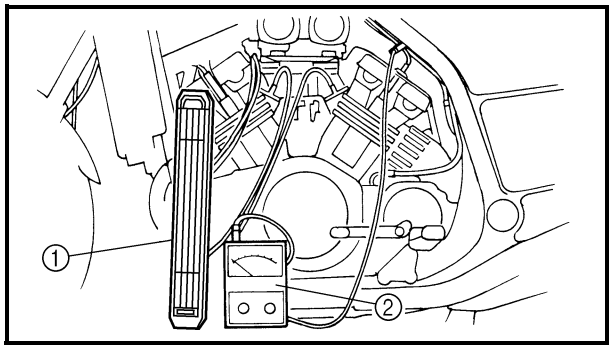
EAS00050
SYNCHRONIZING THE CARBURETORS

NOTE:
Prior to synchronizing the carburetors, the valve clearance and the engine idling speed should be properly adjusted and the ignition timing should be checked.

1. Stand the motorcycle on a level surface.

NOTE:
Place the motorcycle on a suitable stand.

2. Remove:
   - carburetor joint covers (left and right)
   - vacuum plugs (left and right)
   - vacuum hose
     Refer to “CARBURETORS” in chapter 6.

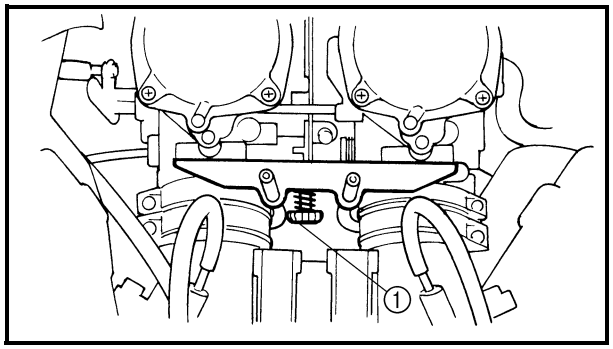


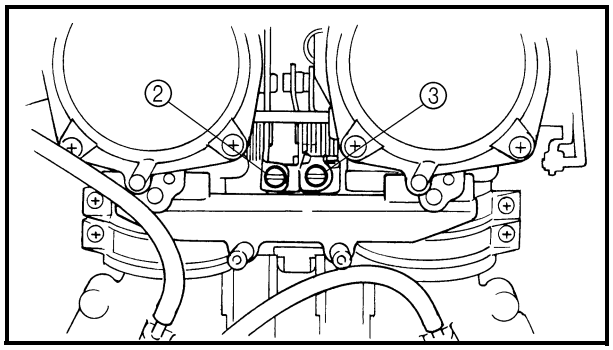
3. Install:
   - vacuum gauge attachment
     (into the bolt holes)
   - vacuum gauge ①
     (onto the vacuum gauge attachments)
   - inductive tachometer ②
     (onto the spark plug lead of cylinder #1)

Vacuum gauge
YU-08030-A
Inductive tachometer
YU-8036-A

4. Start the engine and let it warm up for several minutes.
5. Measure:
   - engine idling speed
     Out of specification → Adjust.
     Refer to “ADJUSTING THE ENGINE IDLING SPEED”.

Engine idling speed
950 ~ 1,050 r/min
1,050 ~ 1,150 r/min
(for California)





6. Adjust:
   • carburetor synchronization

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a. Synchronize carburetor #1 to carburetor #2 by turning the synchronizing screw ① in either direction until both gauges read the same.

NOTE:

After each step, rev the engine two or three times, each time for less than a second, and check the synchronization again.

b. Synchronize carburetor #4 to carburetor #3 by turning the synchronizing screw ② in either direction until both gauges read the same.
c. Synchronize carburetor #2 to carburetor #3 by turning the synchronizing screw ③ in either direction until both gauges read the same.

Vacuum pressure at engine idling speed
26.7 kPa (200 mm Hg, 7.88 in Hg)
33.3 kPa (250 mm Hg, 9.83 in Hg) (for California)

NOTE:

The difference in vacuum pressure between two carburetors should not exceed 1.33 kPa (10 mm Hg, 0.4 in Hg).

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7. Measure:
   • engine idling speed
   Out of specification → Adjust.
8. Stop the engine and remove the measuring equipment.
9. Adjust:
   • throttle cable free play
   Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY”.

Throttle cable free play (at the flange of the throttle grip)
3 ~ 5 mm (0.12 ~ 0.20 in)

10. Install:
   • vacuum hose
   • vacuum plugs (left and right)
   • carburetor joint covers (left and right)
   Refer to “CARBURETORS” in chapter 6.

EAS00053
ADJUSTING THE ENGINE IDLING SPEED

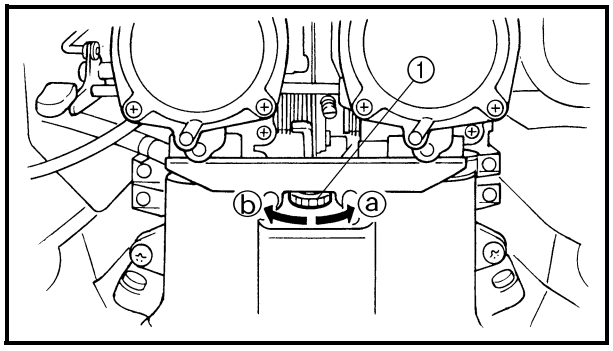
NOTE:
Prior to adjusting the engine idling speed, the carburetor synchronization should be adjusted properly, the air filter element should be clean, and the engine should have adequate compression.

1. Start the engine and let it warm up for several minutes.
2. Attach:
   • engine tachometer
   (onto the spark plug lead of cylinder #1)

	**Inductive tachometer** **YU-8036-A**

3. Measure:
   • engine idling speed
   Out of specification → Adjust.

	**Engine idling speed** **950 ~ 1,050 r/min** **1,050 ~ 1,150 r/min** **(for California)**



4. Adjust:
   • engine idling speed

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

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

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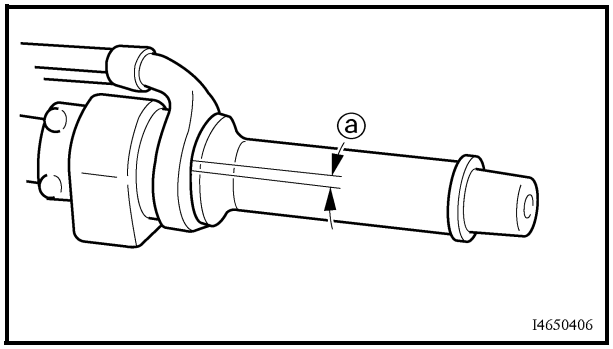
5. Adjust:
   • throttle cable free play
   Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY”.

	**Throttle cable free play (at the flange of the throttle grip)** **3 ~ 5 mm (0.12 ~ 0.20 in)**

EAS00057
ADJUSTING THE THROTTLE CABLE FREE PLAY

NOTE:
Prior to adjusting the throttle cable free play, the engine idling speed and carburetor synchronization should be adjusted properly.



1. Check:
   - throttle cable free play ⓐ
     Out of specification → Adjust.

Throttle cable free play (at the flange of the throttle grip)
3 ~ 5 mm (0.12 ~ 0.20 in)

2. Adjust:
   - throttle cable free play

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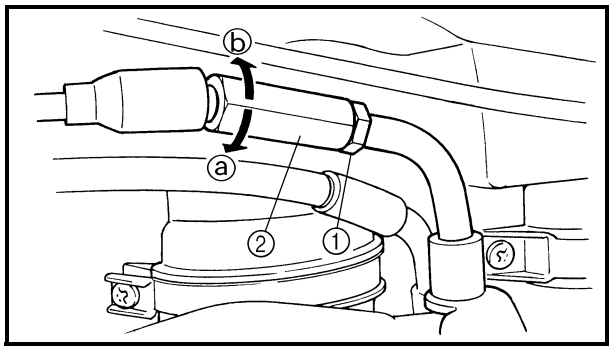
Carburetor side

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



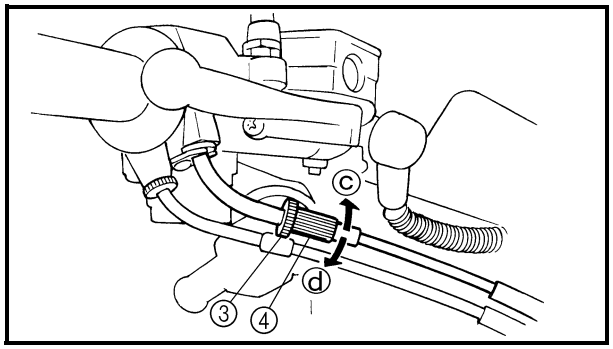
Direction ⓐ	**Throttle cable free play is increased.**
Direction ⓑ	**Throttle cable free play is decreased.**

c. Tighten the locknuts.

NOTE:
If the specified throttle cable free play cannot be obtained on the carburetor side of the cable, use the adjusting nut on the handlebar side.

Handlebar side

a. Loosen the locknut ③.
b. Turn the adjusting nut ④ in direction ⓒ or ⓓ until the specified throttle cable free play is obtained.



Direction ⓒ	**Throttle cable free play is increased.**
Direction ⓓ	**Throttle cable free play is decreased.**

c. Tighten the locknut.

⚠ WARNING

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

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EAS00059

CHECKING THE SPARK PLUGS

The following procedure applies to all of the spark plugs.

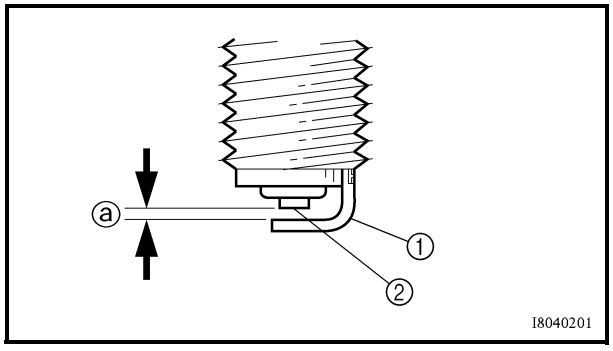
1. Disconnect:
   - spark plug cap
2. Remove:
   - spark plug

CAUTION:

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

3. Check:
   - spark plug type
     Incorrect → Change.

Spark plug type (manufacturer)
DPR8EA-9 (NGK)
X24EPR-U9 (DENSO)



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

Spark plug gap
0.8 ~ 0.9 mm (0.03 ~ 0.04 in)

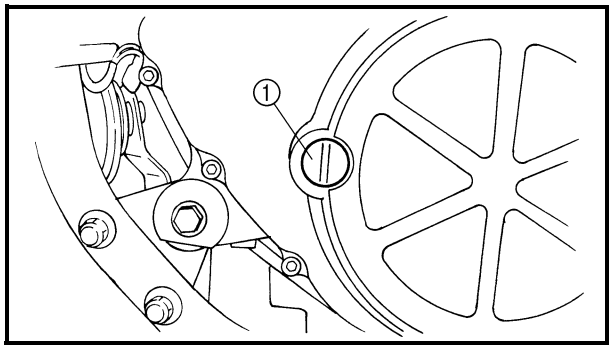
7. Install:
   • spark plug — **18 Nm (1.8 m · kg, 13 ft · lb)**

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

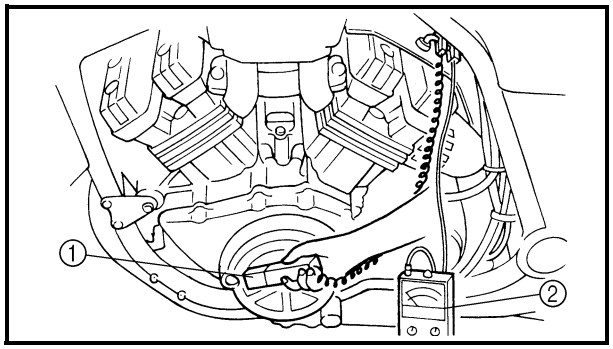
8. Connect:
   • spark plug cap

EAS00064
CHECKING THE IGNITION TIMING

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



1. Remove:
   • timing plug ①



2. Attach:
   • timing light ①
   • engine tachometer ②
   (onto the spark plug lead of cylinder #1)

Timing light
YM-33277-A
Inductive tachometer
YU-8036-A

3. Check:
   • ignition timing

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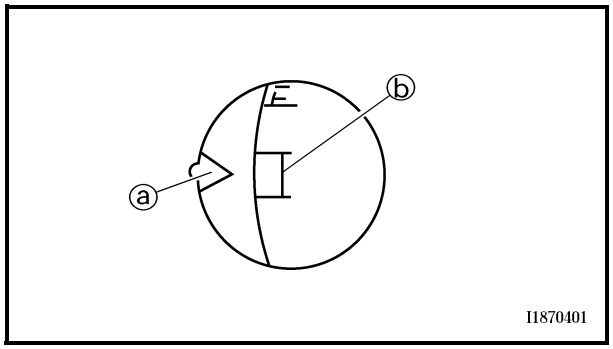
a. Start the engine, warm it up for several minutes, and then let it run at the specified engine idling speed.

Engine idling speed
950 ~ 1,050 r/min
1,050 ~ 1,150 r/min
(for California)



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

NOTE:
The ignition timing is not adjustable.

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4. Install:
• timing plug

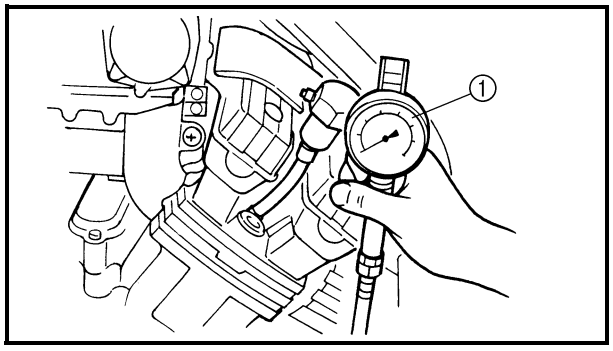
EAS00065
MEASURING THE COMPRESSION PRESSURE

The following procedure applies to all of the cylinders.

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

1. Measure:
• valve clearance
Out of specification → Adjust.
Refer to "ADJUSTING THE VALVE CLEARANCE".
2. Start the engine, warm it up for several minutes, and then turn it off.
3. Disconnect:
• spark plug cap
4. Remove:
• spark plug

CAUTION:
Before removing the spark plugs, use compressed air to blow away any dirt accumulated in the spark plug wells to prevent it from falling into the cylinders.



5. Install:
• compression gauge ①

	Compression gauge **YU-33223**

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

Compression pressure (at sea level)
Minimum
1,200 kPa
(12 kg/cm², 170.6 psi)
Standard
1,400 kPa
(14 kg/cm², 199.1 psi)
Maximum
1,600 kPa
(16 kg/cm², 227.6 psi)

a. Set the main switch to “ON”.
b. With the throttle wide open, crank the engine until the reading on the compression gauge stabilizes.

⚠ WARNING

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

NOTE:
The difference in compression pressure between cylinders should not exceed 100 kPa (1 kg/cm², 14 psi).

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

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

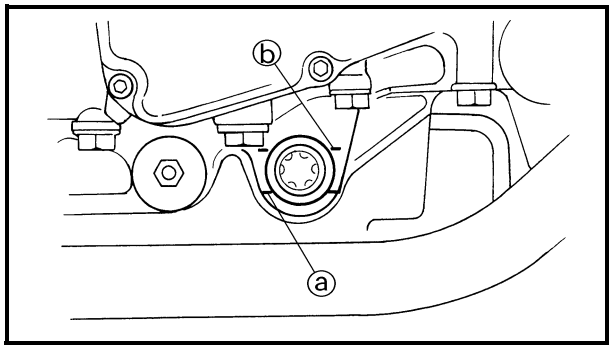
7. Install:
   • spark plug — **18 Nm (1.8 m · kg, 13 ft · lb)**
8. Connect:
   • spark plug cap

EAS00071
CHECKING THE ENGINE OIL LEVEL

1. Stand the motorcycle on a level surface.

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

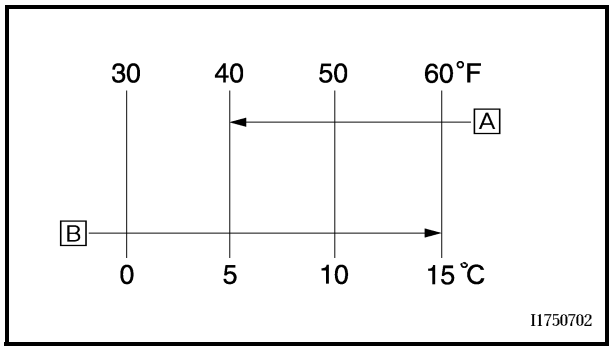
2. Start the engine, warm it up for several minutes, and then turn it off.



3. Check:
   - engine oil level

   The engine oil level should be between the minimum level mark ⓐ and maximum level mark ⓑ.

   Below the minimum level mark → Add the recommended engine oil to the proper level.



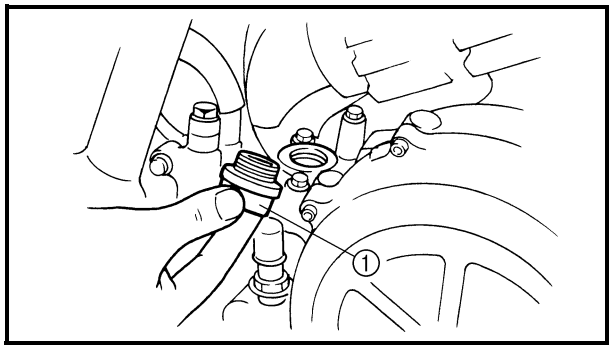
Recommended oil
At 5 °C (40 °F) or higher A
Yamalube 4 (20W40) or
SAE 20W40 type SE motor oil
At 15 °C (60 °F) or lower B
Yamalube 4 (10W30) or
SAE 10W30 type SE motor oil

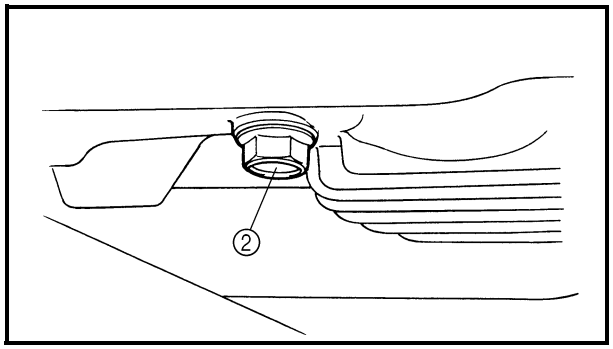
CAUTION:
- **Engine oil also lubricates the clutch and the wrong oil types or additives could cause clutch slippage. Therefore, do not add any chemical additives**
- **Do not allow foreign materials to enter the crankcase.**

NOTE:
- API Service “SE”, “SF” and “SG” type or equivalent (e.g., “SF-SE”, “SF-SE-CC”, “SF-SE-SD”).
- Before checking the engine oil level, wait a few minutes until the oil has settled.

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

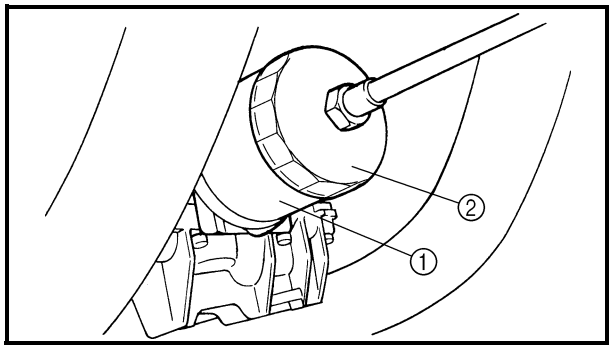
NOTE:
Before checking the engine oil level, wait a few minutes until the oil has settled.





EAS00074
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:
   - engine oil filler cap ①
   - engine oil drain bolt ②
     (along with the gasket)
4. Drain:
   - engine oil
     (completely from the crankcase)



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

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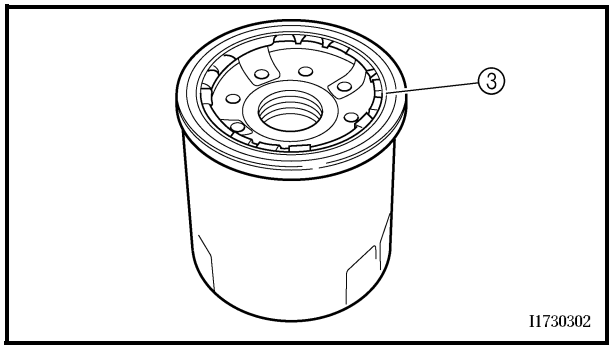
a. Remove the oil filter cartridge ① with an oil filter wrench ②.

	**Oil filter wrench** **YU-38411**



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

CAUTION:

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

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

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

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6. Check:
   - engine oil drain bolt gasket
     Damage → Replace.
7. Install:
   - engine oil drain bolt

	43 Nm (4.3 m · kg, 31 ft · lb)

8. Fill:
   • crankcase
   (with the specified amount of the recommended engine oil)

Quantity
Total amount
4.0 L (3.5 Imp qt, 4.2 US qt)
Without oil filter cartridge replacement
3.2 L (2.8 Imp qt, 3.9 US qt)
With oil filter cartridge replacement
3.4 L (3.0 Imp qt, 3.6 US qt)

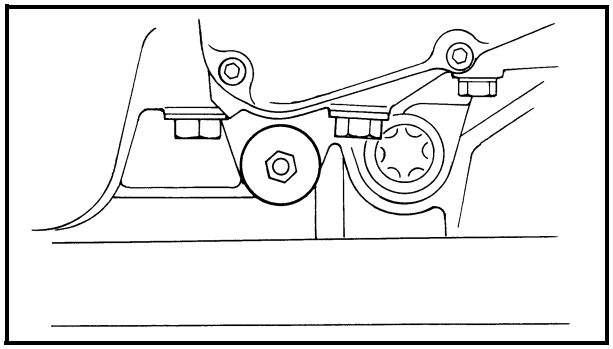
9. Install:
   • engine oil filler cap
10. Start the engine, warm it up for several minutes, and then turn it off.
11. Check:
   • engine
   (for engine oil leaks)
12. Check:
   • engine oil level
   Refer to “CHECKING THE ENGINE OIL LEVEL”.

EAS00077
MEASURING THE ENGINE OIL PRESSURE

1. Check:
   • engine oil level
   Below the minimum level mark → Add the recommended engine oil to the proper level.
2. Start the engine, warm it up for several minutes, and then turn it off.

CAUTION:

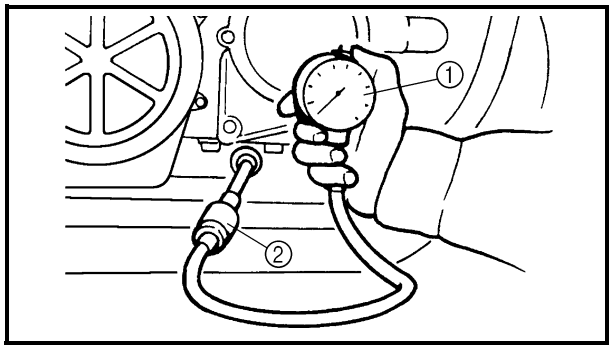
When the engine is cold, the engine oil will have a higher viscosity, causing the engine oil pressure to increase. Therefore, be sure to measure the engine oil pressure after warming up the engine.



3. Remove:
   • main gallery bolt

⚠ WARNING

The engine, muffler and engine oil are extremely hot.



4. Install:
   • pressure gauge ①
   • oil pressure adapter B ②

Pressure gauge
90890-03153
Oil pressure adapter B
90890-03124

5. Measure:
   • engine oil pressure
   (at the following conditions)

Engine oil pressure
25 kPa (0.25 kg/cm², 3.6 psi)

Engine speed
Approx. 1,000 r/min

Engine oil temperature
60 ~ 70 °C (140 ~ 158 °F)

Out of specification → Adjust.

Engine oil pressure	Possible causes
Below specification	• Faulty oil pump • Clogged oil filter • Leaking oil passage • Broken or damaged oil seal
Above specification	• Leaking oil passage • Faulty oil filter • Oil viscosity too high

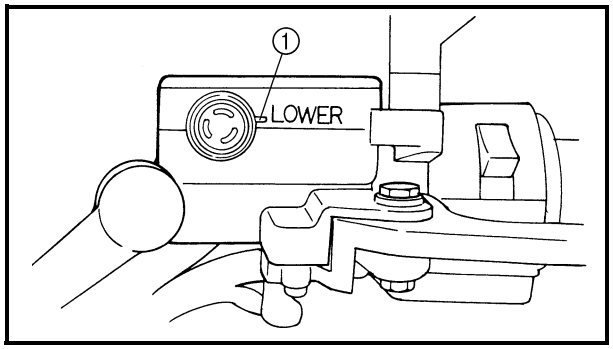
6. Install:
   • main gallery bolt

12 Nm (1.2 m · kg, 8.7 ft · lb)

EAS00083
CHECKING THE CLUTCH FLUID LEVEL

1. Stand the motorcycle on a level surface.

NOTE:
Place the motorcycle on a suitable stand.



2. Check:
   - clutch fluid level
     Below the minimum level mark ① → Add the recommended clutch fluid to the proper level.

Recommended clutch fluid
Brake fluid DOT 4

⚠ WARNING

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

CAUTION:

Clutch fluid may damage painted surfaces or plastic parts. Therefore, always clean up any spilt clutch fluid immediately.

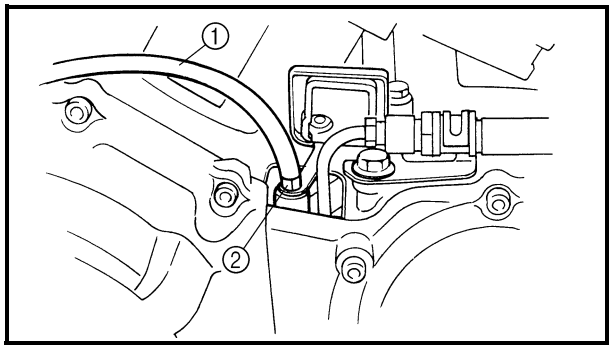
NOTE:
In order to ensure a correct reading of the clutch fluid level, make sure the top of the reservoir is horizontal.

EAS00085
BLEEDING THE HYDRAULIC CLUTCH SYSTEM

⚠ WARNING

Bleed the hydraulic clutch system whenever:
- **the system was disassembled,**
- **a clutch hose was loosened or removed,**
- **the clutch fluid level is very low,**
- **clutch operation is faulty.**

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



1. Bleed:
   - hydraulic clutch system

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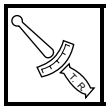
a. Add the recommended clutch fluid to the proper level.
b. Install the clutch fluid reservoir diaphragm.
c. Connect a clear plastic hose ① tightly to the bleed screw ②.
d. Place the other end of the hose into a container.
e. Slowly squeeze the clutch lever several times.
f. Fully squeeze the clutch lever without releasing it.
g. Loosen the bleed screw. This will release the tension and cause the clutch lever to contact the handlebar grip.
h. Tighten the bleed screw and then release the clutch lever.

i. Repeat steps (e) to (h) until all of the air bubbles have disappeared from the clutch fluid in the plastic hose.
j. Tighten the bleed screw to specification.

	**Bleed screw** **6 Nm (0.6 m • kg, 4.3 ft • lb)**

k. Add the recommended clutch fluid to the proper level.
Refer to "CHECKING THE CLUTCH FLUID LEVEL".

⚠ WARNING

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

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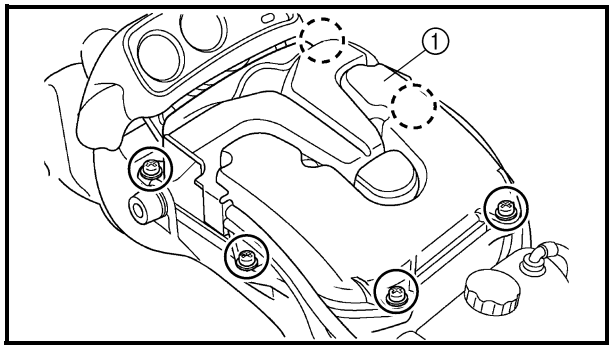
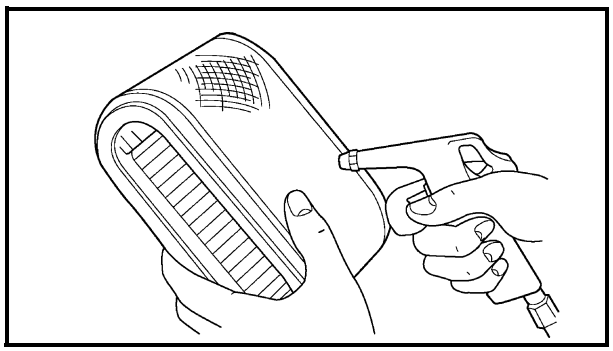


EAS00086
CLEANING THE AIR FILTER ELEMENT

1. Remove:
   • top cover
2. Remove:
   • air filter case cover ①
   • air filter element



3. Clean:
   • air filter element
   Apply compressed air to the outer surface of the air filter element.
4. Check:
   • air filter element
   Damage → Replace.
5. Install:
   • air filter element
   • air filter case cover

CAUTION:

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

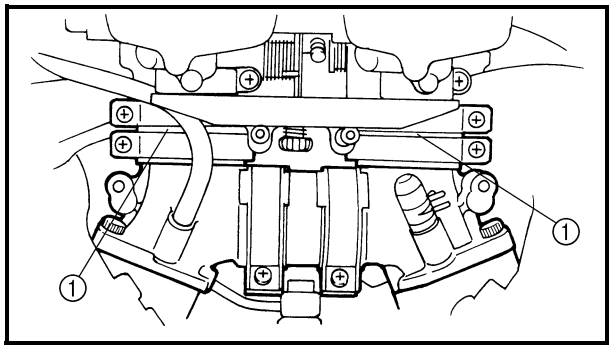
NOTE:
When installing the air filter element into the air filter case cover, make sure their sealing surfaces are aligned to prevent any air leaks.

6. Install:
   • top cover

EAS00095
CHECKING THE CARBURETOR JOINTS

The following procedure applies to all of the carburetor joints and intake manifolds.

1. Remove:
   • carburetor joint covers

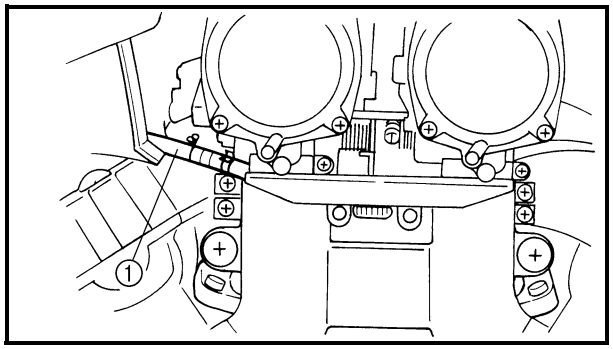


2. Check:
   • carburetor joint ①
   Cracks/damage → Replace.
   Refer to “CARBURETORS” in chapter 6.
3. Install:
   • carburetor joint covers

CHECKING THE VACUUM HOSES

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

1. Remove:
   • covers (left and right)
   Refer to “AIR FILTER CASE AND ELECTRICAL COMPONENTS BOARD”.

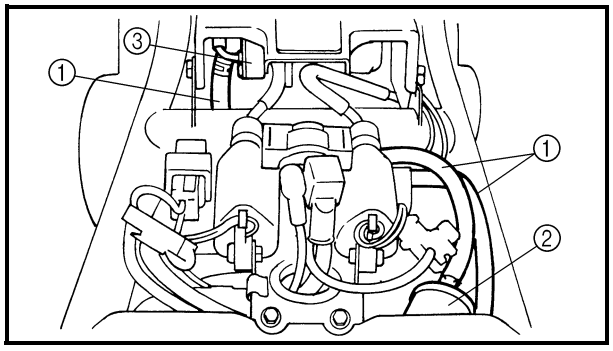


2. Check:
   • vacuum hose ①
   Cracks/damage → Replace.
   Loose connection → Connect properly.
3. Install:
   • covers (left and right)
   Refer to “AIR FILTER CASE AND ELECTRICAL COMPONENTS BOARD”.

EAS00097
CHECKING THE FUEL HOSES AND FUEL FILTER

The following procedure applies to all of the fuel hoses.

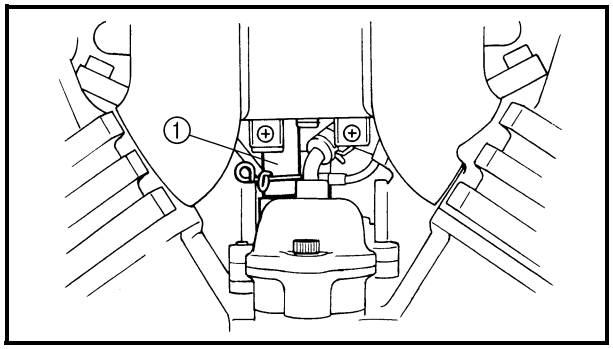
1. Remove:
   - rider seat
     Refer to “SEATS AND SIDE COVERS”.



2. Check:
   - fuel hose ①
     Cracks/damage → Replace.
   - fuel filter ②
     Contaminants/damage → Replace.

NOTE:
- Drain and flush the fuel tank if abrasive damage to any components of the fuel line is evident.
- The arrow mark on the fuel filter must point towards the fuel pump ③ as shown.

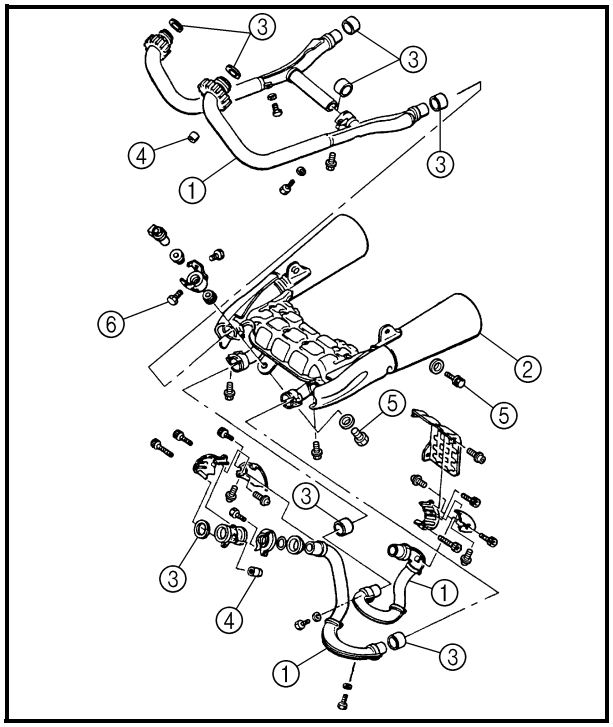
3. Install:
   - rider seat
     Refer to “SEATS AND SIDE COVERS”.



EAS00098
CHECKING THE CRANKCASE BREATHER HOSE

1. Check:
   - crankcase breather hose ①
     Cracks/damage → Replace.
     Loose connection → Connect properly.

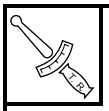
CAUTION:
Make sure the crankcase breather hose is routed correctly.



EAS00100
CHECKING THE EXHAUST SYSTEM

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

1. Check:
   - exhaust pipe ①
   - muffler ②
     Cracks/damage → Replace.
   - gasket ③
     Exhaust gas leaks → Replace.
2. Check:
   - tightening torque



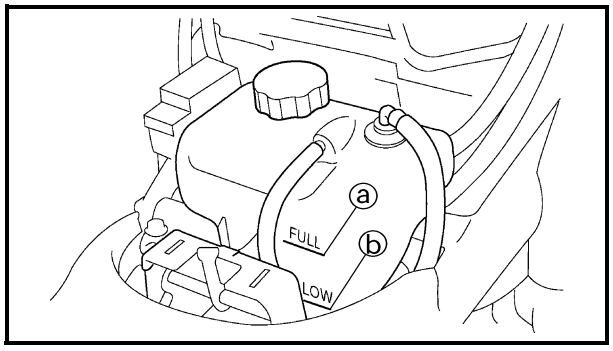
Exhaust pipe nut ④
20 Nm (2.0 m • kg, 14 ft • lb)
Muffler bolt ⑤
25 Nm (2.5 m • kg, 18 ft • lb)
Muffler and muffler bracket bolt ⑥
10 Nm (1.0 m • kg, 7.2 ft • lb)

EAS00102
CHECKING THE COOLANT LEVEL

1. Stand the motorcycle on a level surface.

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

2. Remove:
   - top cover



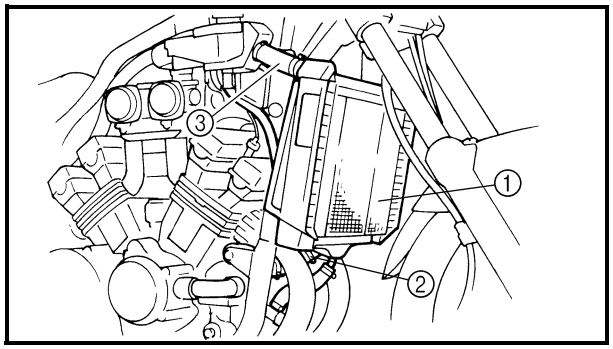
3. Check:
   - coolant level
     The coolant level should be between the maximum level mark ⓐ and minimum level mark ⓑ.
     Below the minimum level mark → Add the recommended coolant to the proper level.

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

4. Start the engine, warm it up for several minutes, and then turn it off.
5. Check:
   • coolant level

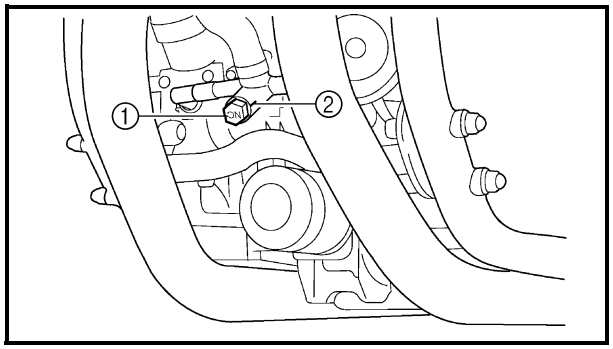
NOTE:
Before checking the coolant level, wait a few minutes until it settles.

6. Install:
   • top cover



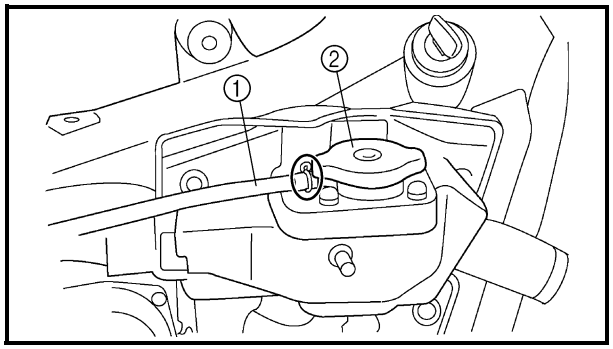
EAS00104
CHECKING THE COOLING SYSTEM

1. Check:
   • radiator ①
   • radiator inlet hose ②
   • radiator outlet hose ③
   Cracks/damage → Replace.
   Refer to “COOLING SYSTEM” in chapter 5.
2. Install:
   • top cover



EAS00105
CHANGING THE COOLANT

1. Turn the coolant drain cock ① to the “ON” position ②.
2. Disconnect:
   • coolant reservoir hose ①
3. Drain:
   • coolant (from the coolant reservoir)
4. Remove:
   • radiator cap ②

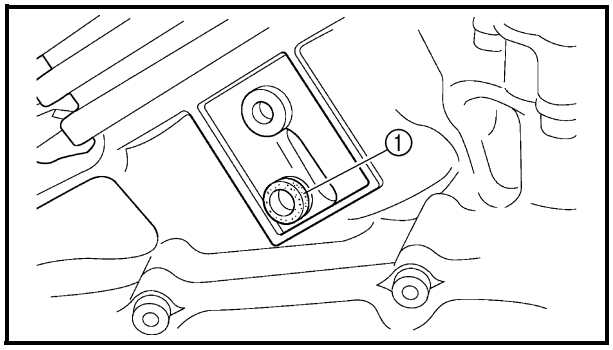


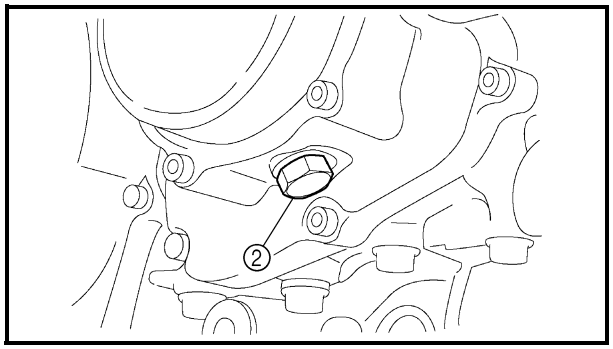
⚠ WARNING

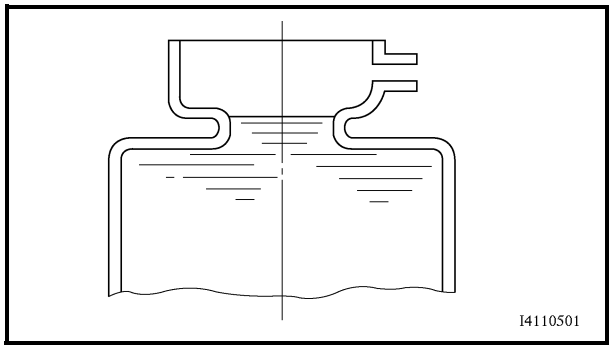
A hot radiator is under pressure. Therefore, do not remove the radiator cap when the engine is hot. Scalding hot fluid and steam may be blown out, which could cause serious injury. When the engine has cooled, open the radiator cap as follows:

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.

The following procedure applies to all of the coolant drain bolts and copper washers.







5. Remove:
   - cover
   - coolant drain plug (engine) ①
   - coolant drain bolt (water pump) ②
6. Drain:
   - coolant (from the engine and radiator)
7. Install:
   - coolant drain plug (engine)
   - cover
   - coolant drain bolt (water pump)

	43 Nm (4.3 m · kg, 31 ft · lb)

8. Connect:
   - coolant reservoir hose

9. 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
3.05 L (2.68 Imp qt, 3.22 US qt)
Coolant reservoir capacity
0.3 L (0.26 Imp qt, 0.21 US qt)
From minimum to maximum level mark
0.2 L (0.18 Imp qt, 0.21 US qt)

Handling notes for coolant

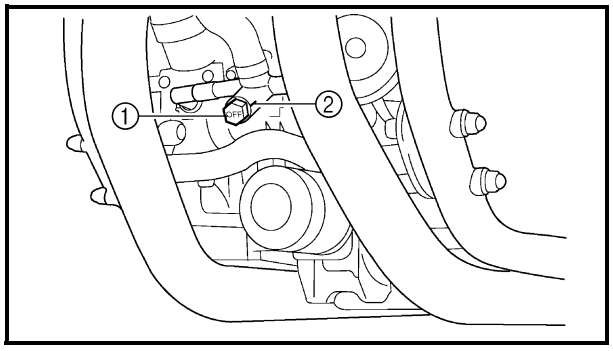
Coolant is potentially harmful and should be handled with special care.

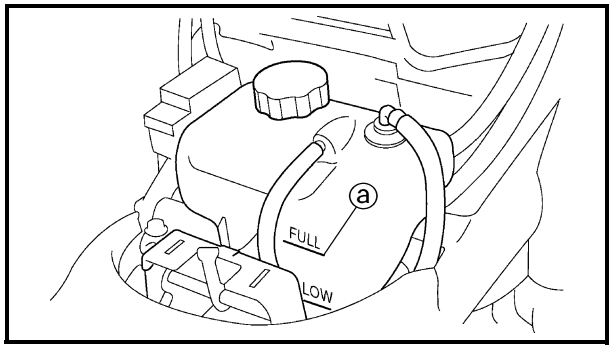
⚠ WARNING

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

CAUTION:

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

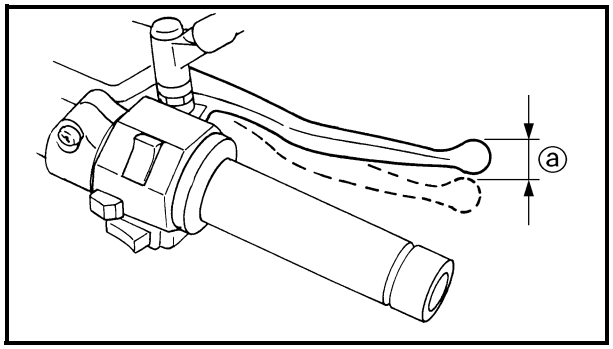


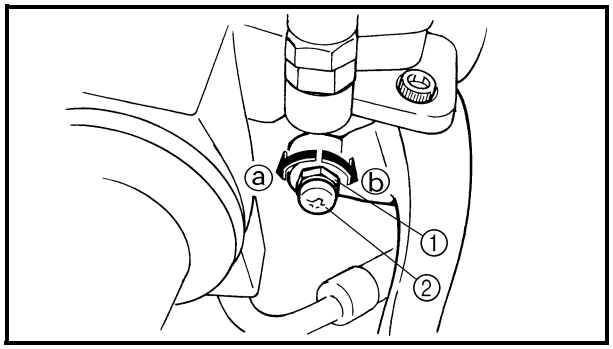


10. Turn the coolant drain cock ① to the “OFF” position ②.
11. Install:
    - radiator cap
12. Fill:
    - coolant reservoir
      (with the recommended coolant to the maximum level mark ⓐ)
13. Install:
    - coolant reservoir cap
14. Start the engine, warm it up for several minutes, and then stop it.
15. Check:
    - coolant level
      Refer to “CHECKING THE COOLANT LEVEL”.

NOTE:

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





EAS00108

CHASSIS

ADJUSTING THE FRONT BRAKE

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

Brake lever free play (at the end of the brake lever)
2 ~ 5 mm (0.08 ~ 0.20 in)

2. Adjust:
   - brake lever free play

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a. Loosen the locknut ①.
b. Turn the adjusting bolt ② in direction ⓐ or ⓑ until the specified brake lever free play is obtained.

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

c. Tighten the locknut.

⚠ WARNING

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

CAUTION:

After adjusting the brake lever free play, make sure there is no brake drag.

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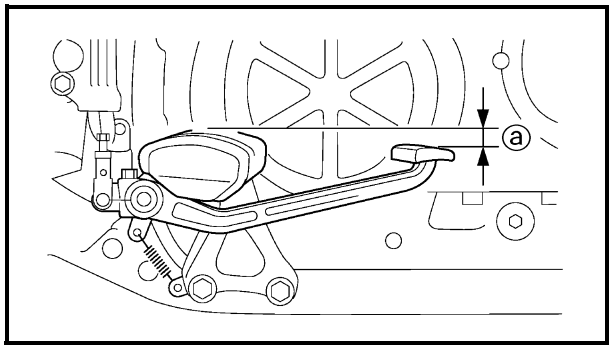

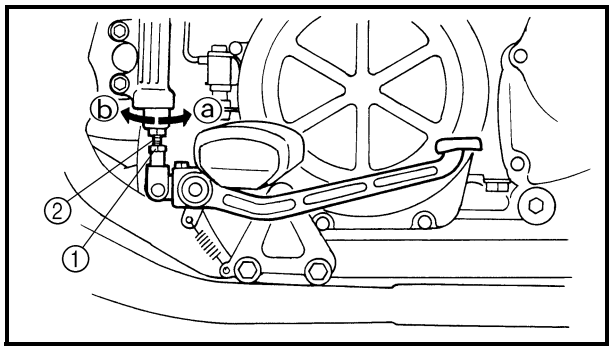

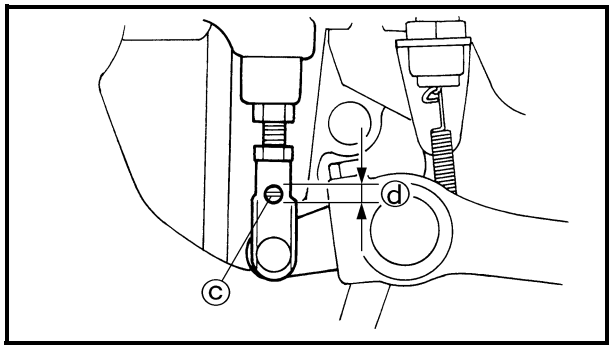

EAS00110
ADJUSTING THE REAR BRAKE

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

Brake pedal position (below the top of the rider footrest)
20 mm (0.79 in)

2. Adjust:
   - brake pedal position

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

Direction ⓐ	**Brake pedal is raised.**
Direction ⓑ	**Brake pedal is lowered.**

⚠ WARNING

After adjusting the brake pedal position, check that the end ⓒ of the adjusting bolt is visible through the hole ⓓ.

c. Tighten the locknut ① to specification.

Locknut
16 Nm (1.6 m • kg, 11 ft • lb)

⚠ WARNING

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

CAUTION:

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

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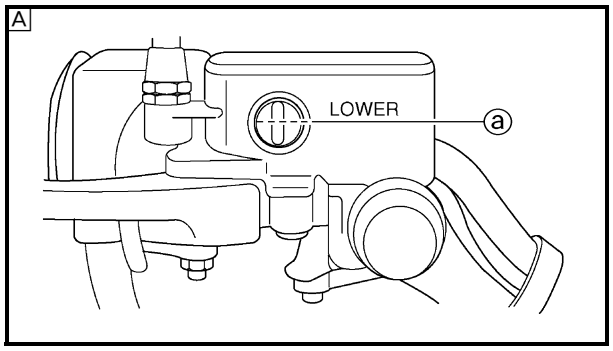
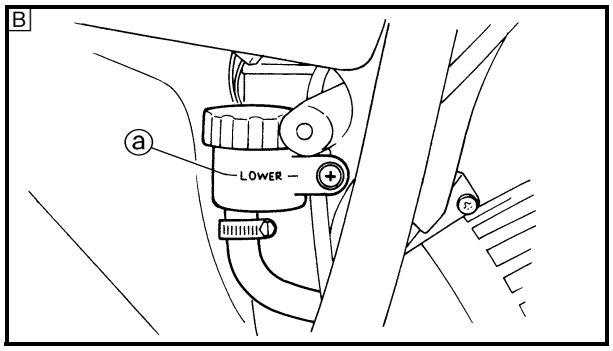
3. Adjust:
   • rear brake light switch
   Refer to “ADJUSTING THE REAR BRAKE LIGHT SWITCH”.

EAS00115
CHECKING THE BRAKE FLUID LEVEL

1. Stand the motorcycle on a level surface.

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





2. Check:
   • brake fluid level
   Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.

Recommended brake fluid
DOT 4

A Front brake
B Rear brake

⚠ WARNING

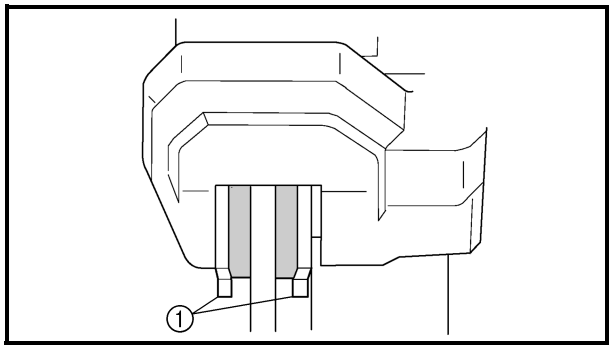
- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor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

CAUTION:

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

NOTE:

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



EAS00119
CHECKING THE BRAKE PADS

The following procedure applies to all of the brake pads.

1. Operate the brake.
2. Check:
   - front brake pad
   - rear brake pad

   Wear indicators ① almost touch the brake disc → Replace the brake pads as a set. Refer to "REPLACING THE FRONT BRAKE PADS" and "REPLACING THE REAR BRAKE PADS" in chapter 7.

EAS00128
ADJUSTING THE REAR BRAKE LIGHT SWITCH

NOTE:

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

1. Check:
   - rear brake light operation timing

   Incorrect → Adjust.

2. Adjust:
   - rear brake light operation timing

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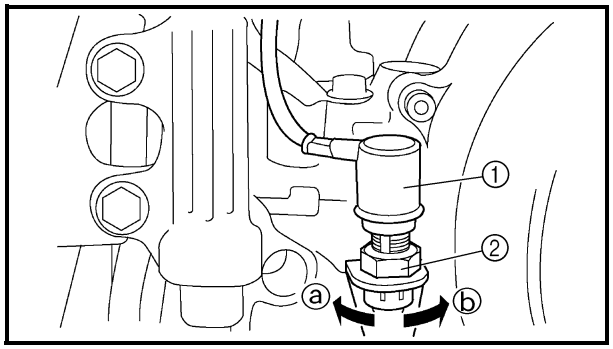
a. Hold the main body ① of the rear brake light switch so that it does not rotate and turn the adjusting nut ② in direction ⓐ or ⓑ until the rear brake light comes on at the proper time.



Direction ⓐ	**Brake light comes on sooner.**
Direction ⓑ	**Brake light comes on later.**

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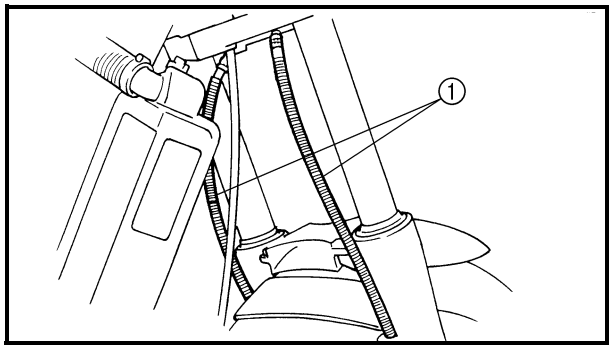
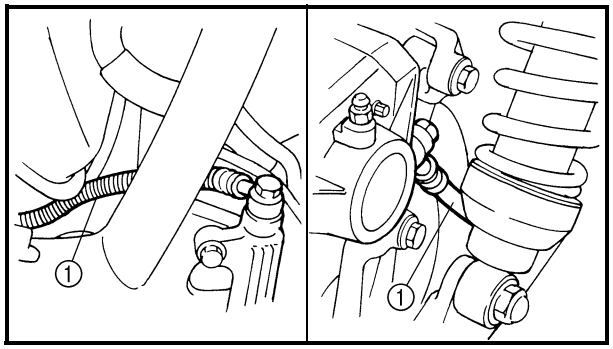




EAS00131
CHECKING THE BRAKE HOSES

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

1. Check:
   - brake hose ①
     Cracks/damage/wear → Replace.
2. Check:
   - brake hose clamp
     Loose → Tighten the clamp bolt.
3. Hold the motorcycle upright and apply the brake several times.
4. Check:
   - brake hose
     Activate the brake several times.
     Brake fluid leakage → Replace the damaged hose.
     Refer to “FRONT AND REAR BRAKES” in chapter 7.

EAS00134
BLEEDING THE HYDRAULIC BRAKE SYSTEM

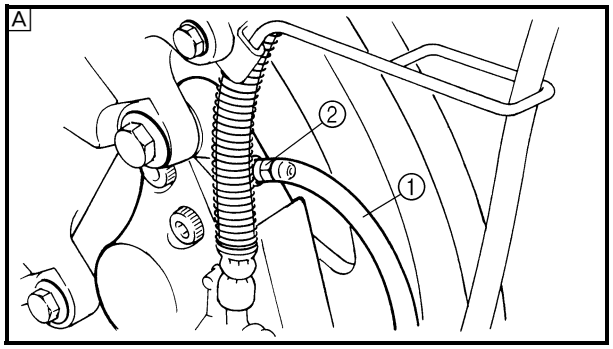
⚠ WARNING

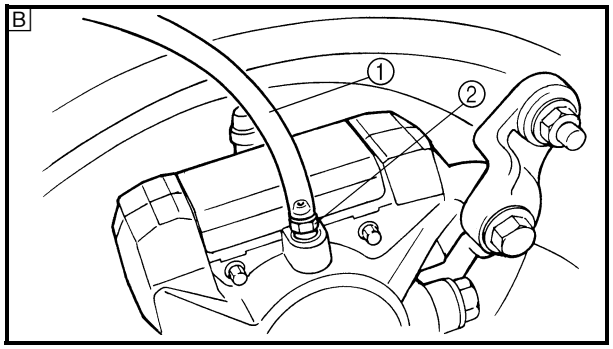
Bleed the hydraulic brake system whenever:

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

NOTE:

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





1. Bleed:
   • hydraulic brake system

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

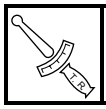
A Front
B Rear

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

NOTE:

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

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

	**Bleed screw** **6 Nm (0.6 m • kg, 4.3 ft • lb)**

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

⚠ WARNING

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

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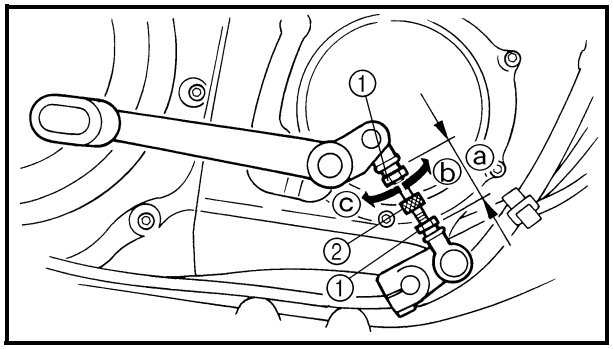

EAS00137
ADJUSTING THE SHIFT PEDAL

NOTE:
The shift pedal position is determined by the installed shift rod length ⓐ.

1. Check:
   • installed shift rod length ⓐ
   Incorrect → Adjust.

Installed shift rod length
30 ~ 34 mm (1.18 ~ 1.34 in)

2. Adjust:
   • installed shift rod length ⓐ

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a. Loosen both locknuts ①.
b. Turn the adjusting bolt ② in direction ⓑ or ⓒ to obtain the correct shift pedal position.

Direction ⓑ	**Installed shift rod length increases.**
Direction ⓒ	**Installed shift rod length decreases.**

c. Tighten both locknuts.
d. Make sure the installed shift rod length is within specification.

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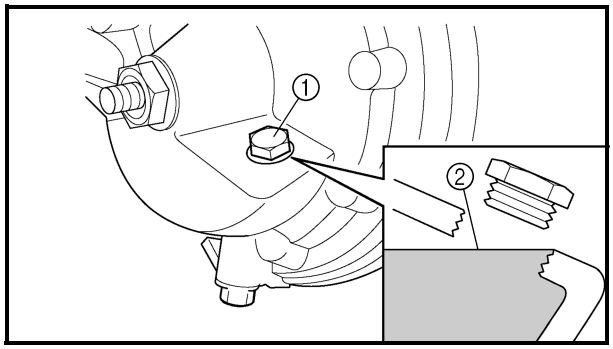
EAS00144
CHECKING THE FINAL DRIVE OIL LEVEL

1. Stand the motorcycle on a level surface.

NOTE:
• Place the motorcycle on a suitable stand.
• Make sure the motorcycle is upright.



2. Remove:
   - final drive housing oil filler bolt ①
3. Check:
   - final drive oil level

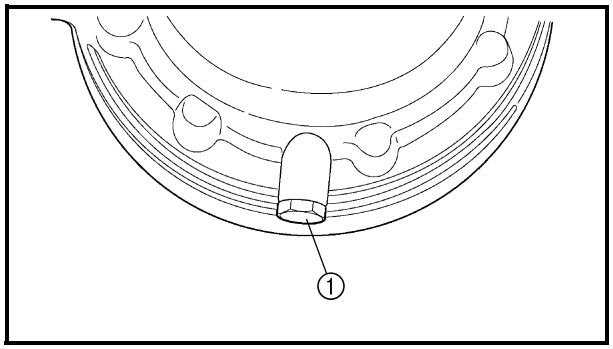
   The final drive oil level should be to the bottom brim ② of the filler hole.

   Below the top brim → Add the recommended final drive oil to the proper level.

Recommended oil
SAE 80 hypoid gear oil graded "GL-4"
multi-purpose SAE 80W90 hypoid gear oil

4. Install:
   - final drive housing oil filler bolt

23 Nm (2.3 m · kg, 17 ft · lb)



EAS00145
CHANGING THE FINAL DRIVE OIL

1. Place a container under the final drive housing.
2. Remove:
   - final drive housing oil filler bolt
   - final drive housing oil drain bolt ①

   Completely drain the final drive housing of its oil.
3. Check:
   - final drive housing oil drain bolt gasket

   Damage → Replace.
4. Install:
   - final drive housing oil drain bolt

23 Nm (2.3 m · kg, 17 ft · lb)

5. Fill:
   - final drive housing

   (with the specified amount of the recommended final drive oil)

Quantity
0.2 L (0.18 Imp qt, 0.21 US qt)

Refer to "CHECKING THE FINAL DRIVE OIL LEVEL".

EAS00146
CHECKING AND ADJUSTING THE STEERING HEAD

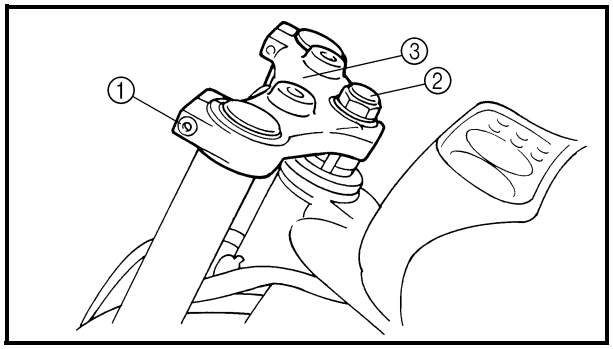
1. Stand the motorcycle on a level surface.

⚠ WARNING

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

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

2. Check:
   - steering head
     Grasp the bottom of the front fork legs and gently rock the front fork.
     Binding/looseness → Adjust the steering head.
3. Remove:
   - headlight body bracket bolt
   - flasher light bracket
   - handlebar holder assembly
4. Loosen:
   - upper bracket pinch bolts ①
5. Remove:
   - steering stem nut ②
   - washer
   - upper bracket ③



6. Adjust:
   - steering head

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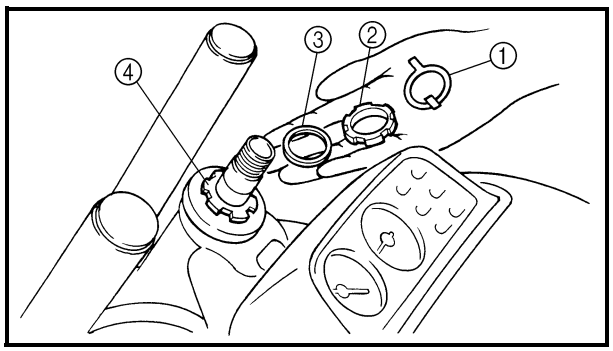
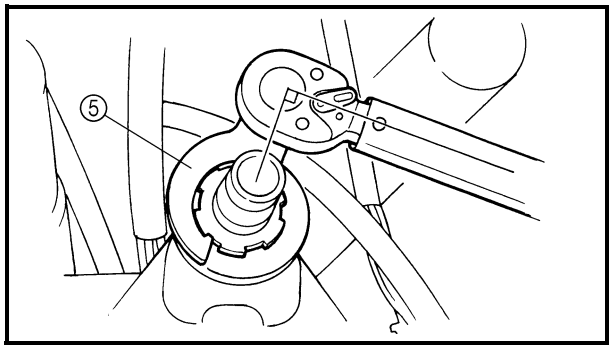
a. Remove the lock washer ①, the upper ring nut ②, and the rubber washer ③.
b. Loosen the lower ring nut ④ and then tighten it to specification with a ring nut wrench ⑤.



NOTE:
Set the torque wrench at a right angle to the ring nut wrench.



	**Steering nut wrench** **YU-33975**
	**Lower ring nut (initial tightening torque)** **50 Nm (5.0 m • kg, 36 ft • lb)**

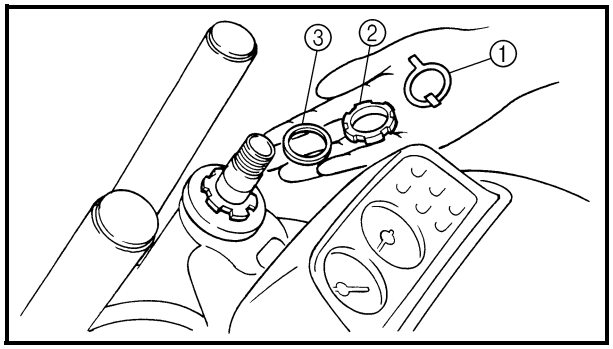
c. Loosen the lower ring nut completely, then tighten it to specification.

⚠ WARNING

Do not overtighten the lower ring nut.

	Lower ring nut (final tightening torque) **3.0 Nm (0.3 m • kg, 22 ft • lb)**

d. Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and check the upper and lower bearings.
Refer to "STEERING HEAD" and "HANDLEBAR" in chapter 7.



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

NOTE:

Make sure the lock washer tabs sit correctly in the ring nut slots.

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7. Install:
   - upper bracket
   - washer
   - steering stem nut

110 Nm (11.0 m · kg, 80 ft · lb)

8. Tighten:
   - upper bracket pinch bolt

20 Nm (2.0 m · kg, 14 ft · lb)

9. Install:
   - handlebar holder assembly
   - flasher light bracket
   - headlight body bracket bolt

40 Nm (4.0 m · kg, 29 ft · lb)

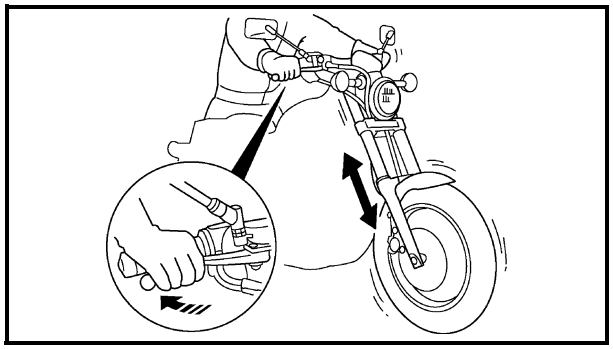
EAS00150
CHECKING THE FRONT FORK

1. Stand the motorcycle on a level surface.

⚠ WARNING

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

2. Check:
   - inner tube
     Damage/scratches → Replace.
   - oil seal
     Oil leakage → Replace.
3. Hold the motorcycle upright and apply the front brake.



4. Check:
   - front fork operation
     Push down hard on the handlebars several times and check if the front fork rebounds smoothly.
     Rough movement → Repair.
     Refer to “FRONT FORK” in chapter 7.

ADJUSTING THE FRONT FORK LEGS

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

⚠ WARNING

- **Always adjust both front fork legs evenly. Uneven adjustment can result in poor handling and loss of stability.**
- **Securely support the motorcycle so that there is no danger of it falling over.**

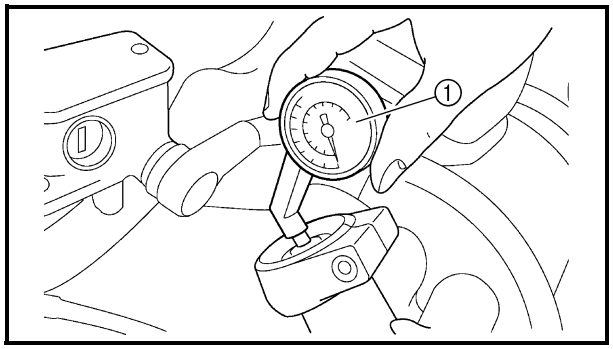
Spring preload

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

NOTE:

When checking and adjusting the air pressure, there should be no weight on the front end of the motorcycle.

2. Remove:
   - front fork air valve cap



3. Regulate:
   • air pressure

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a. Check the front fork leg air pressure with an air pressure gauge ①.

Supplying air	**Spring preload is increased (suspension is harder).**
Releasing air	**Spring preload is decreased (suspension is softer).**

Air pressure
Standard
40 kPa (0.4 kg/cm², 5.8 psi)
Maximum
100 kPa (1.0 kg/cm², 14.2 psi)

⚠ WARNING

The difference in air pressure between the left and right front fork legs should not exceed 10 kPa (0.1 kg/cm², 0.1 bar).

CAUTION:

Exceeding the maximum air pressure may damage the oil seal.

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4. Install:
   • front fork air valve cap

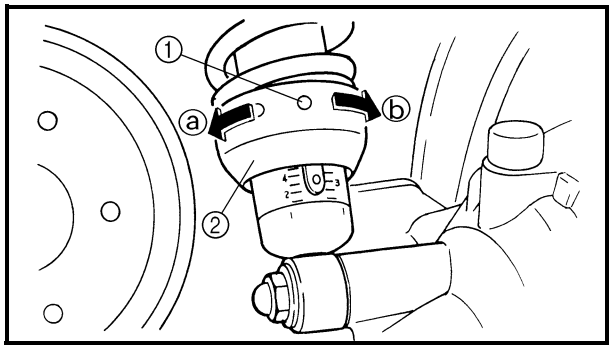
EAS00161

ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLIES

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

⚠ WARNING

- **Securely support the motorcycle so that there is no danger of it falling over.**
- **Always adjust both rear shock absorber assemblies evenly. Uneven adjustment can result in poor handling and loss of stability.**



Spring preload

CAUTION:

Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
   • spring preload

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a. Insert a screwdriver into the hole ① in the spring seat.
b. Turn the spring seat ② in direction ⓐ or ⓑ.

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

Adjusting positions
Minimum: 1
Standard: 1
Maximum: 5

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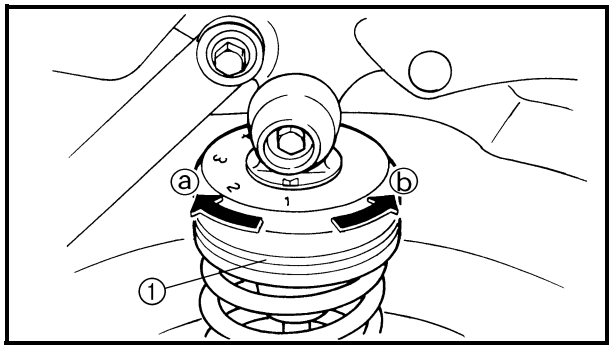
Rebound damping

CAUTION:

Never go beyond the maximum or minimum adjustment positions.



1. Adjust:
   • rebound damping

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

Direction ⓐ	**Rebound damping is increased (suspension is harder).**
Direction ⓑ	**Rebound damping is decreased (suspension is softer).**

Adjusting positions
Minimum: 1
Standard: 1
Maximum: 4

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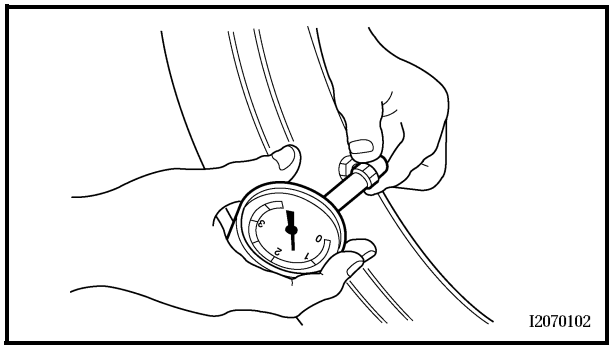


EAS00164
CHECKING THE TIRES

The following procedure applies to both of the tires.

1. Measure:
   - tire pressure
     Out of specification → Regulate.

⚠ WARNING

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

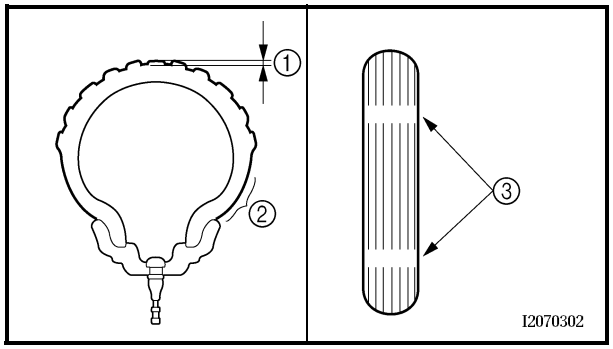
NEVER OVERLOAD THE MOTORCYCLE.

Basic weight (with oil and a full fuel tank)	**283 kg (624 lb) 284 kg (626 lb) (for California)**	
Maximum load*	**216 kg (476 lb) 215 kg (474 lb) (for California)**	
Cold tire pressure	**Front**	**Rear**
Up to 90 kg load*	**225 kPa (2.25 kgf/cm², 33 psi)**	**225 kPa (2.25 kgf/cm², 33 psi)**
90 kg – maximum load*	**225 kPa (2.25 kgf/cm², 33 psi)**	**250 kPa (2.5 kgf/cm², 36 psi)**
High-speed riding	**225 kPa (2.25 kgf/cm², 33 psi)**	**250 kPa (2.5 kgf/cm², 36 psi)**

* total of cargo, rider, passenger and accessories

⚠ WARNING

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



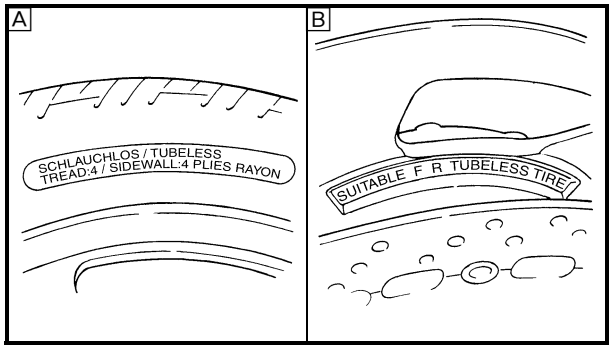
2. Check:
   • tire surfaces
   Damage/wear → Replace the tire.

	Minimum tire tread depth 1.0 mm (0.04 in)

① Tire tread depth
② Sidewall
③ Wear indicator

⚠ WARNING

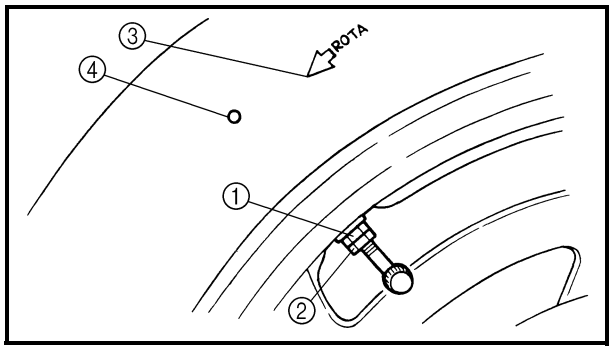
- **Do not use a tubeless tire on a wheel designed only for tube tires to avoid tire failure and personal injury from sudden deflation.**
- **When using tube tires, be sure to install the correct tube.**
- **Always replace a new tube tire and a new tube as a set.**
- **To avoid pinching the tube, make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



A Tire
B Wheel

Tube wheel	**Tube tire only**
Tubeless wheel	**Tube or tubeless tire**

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



Front tire

Manufacturer	Model	Size
BRIDGESTON	G525AW	110/90-18 (61 V)
DUNLOP	F20	110/90-18 (61 V)

Rear tire

Manufacturer	Model	Size
BRIDGESTON	G526BW	150/90-15MC (74 V)
DUNLOP	K525	150/90-15MC (74 V)

⚠ WARNING

- **New tires have a relatively low grip on the road surface until they have been slightly worn. Therefore, approximately 100 km should be traveled at normal speed before any high-speed riding is done.**
- **After a tire has been repaired or replaced, be sure to tighten the tire air valve stem nut ① and locknut ② to specification.**

NOTE:

For tires with a direction of rotation mark ③:

- Install the tire with the mark pointing in the direction of wheel rotation.
- Align the mark ④ with the valve installation point.

Tire air valve stem
Vlave stem nut
1.6 Nm (0.16 m • kg, 11 ft • lb)
Valve stem locknut
1.6 Nm (0.16 m • kg, 11 ft • lb)

EAS00168

CHECKING THE WHEELS

The following procedure applies to both of the wheels.

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

⚠ WARNING

Never attempt to make any repairs to the wheel.

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

EAS00170
CHECKING AND LUBRICATING THE CABLES

The following procedure applies to all of the cable sheaths and cables.

⚠ WARNING

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

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

Recommended lubricant
Engine oil or a suitable cable lubricant

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

EAS00171
LUBRICATING THE LEVERS AND PEDALS

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

Recommended lubricant
Lithium soap base grease

EAS00172
LUBRICATING THE SIDESTAND
Lubricate the pivoting point and metal-to-metal moving parts of the sidestand.

	Recommended lubricant **Lithium soap base grease**

EAS00173
LUBRICATING THE CENTERSTAND
Lubricate the pivoting point and metal-to-metal moving parts of the centerstand.

	Recommended lubricant **Lithium soap base grease**

EAS00174
LUBRICATING THE REAR SUSPENSION
Lubricate the pivoting point and metal-to-metal moving parts of the rear suspension.

	Recommended lubricant **Molybdenum disulfide grease**

EAS00176
ELECTRICAL SYSTEM
CHECKING 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.**

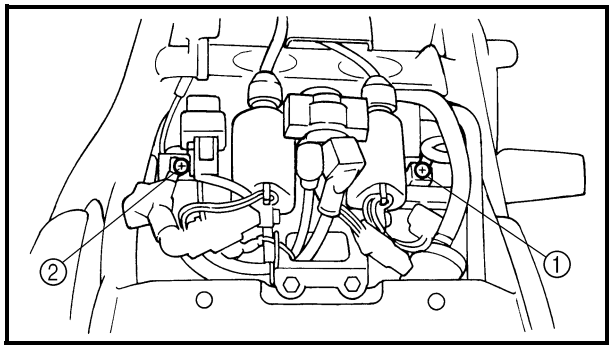
FIRST AID IN CASE OF BODILY CONTACT:
EXTERNAL
- **Skin — Wash with water.**
- **Eyes — Flush with water for 15 minutes and get immediate medical attention.**

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

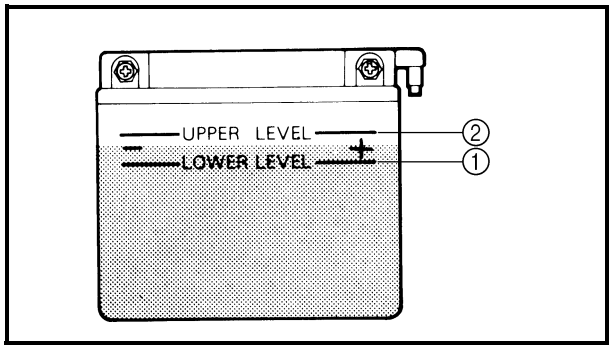
1. Remove:
   - rider seat
   Refer to “SEATS AND SIDE COVERS”.
2. Disconnect:
   - battery leads
   (from the battery terminals)

CAUTION:

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



3. Remove:
   - battery



4. Check:
   • electrolyte level
   The electrolyte level should be between the minimum level mark ① and the maximum level mark ②.
   Below the minimum level mark → Add distilled water to the proper level.

CAUTION:

Add only distilled water. Tap water contains minerals which are harmful to the battery.

5. Check:
   • specific gravity
   Less than 1.280 → Recharge the battery.

Specific gravity
1.280 at 20 °C (68 °F)

6. Charge:
   • battery

Battery charging amperage and time
1.4 amps/10 hrs

⚠ WARNING

Do not quick charge a battery.

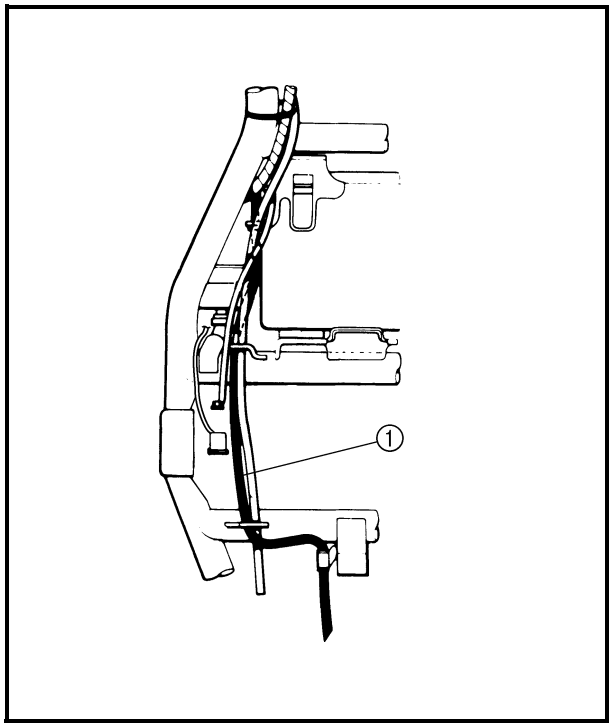
CAUTION:

- **Loosen the battery sealing caps.**
- **Make sure the battery breather hose and battery vent are free of obstructions.**
- **To ensure maximum performance, always charge a new battery before using it.**
- **Do not use a high-rate battery charger. They force a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.**
- **If it is impossible to regulate the charging current on the battery charger, be careful not to overcharge the battery.**
- **When charging a battery, be sure to remove it from the motorcycle. (If charging has to be done with the battery mounted on the motorcycle, disconnect the negative lead from the battery terminal.)**

- **To reduce the chance of sparks, do not plug in the battery charger until the battery charger leads are connected to the battery.**
- **Before removing the battery charger lead clips from the battery terminals, be sure to turn off the battery charger.**
- **Make sure the battery charger lead clips are in full contact with the battery terminal and that they are not shorted. A corroded battery charger lead clip may generate heat in the contact area and a weak clip spring may cause sparks.**
- **If the battery becomes hot to the touch at any time during the charging process, disconnect the battery charger and let the battery cool before reconnecting it. Hot batteries can explode!**

NOTE:

Replace the battery whenever:
- battery voltage does not rise to specification or bubbles fail to rise during charging,
- sulphation of one or more battery cells occurs (as indicated by the battery plates turning white or material accumulating in the bottom of the battery cell),
- specific gravity readings after a long, slow charge indicate that one battery cell's charge is lower than the rest,
- warpage or buckling of the battery plates or insulators is evident.

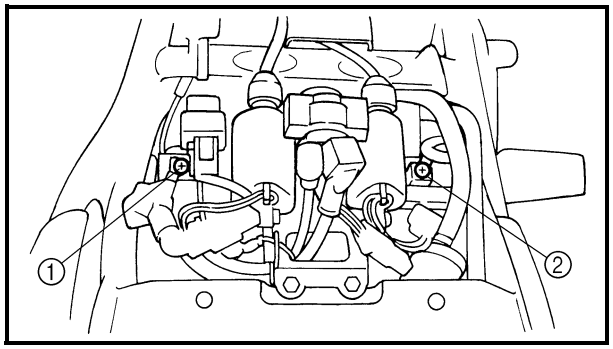


7. Check:
   - battery breather hose and battery vent
     Obstruction → Clean.
     Damage → Replace.
8. Connect:
   - battery breather hose ①
9. Install:
   - battery
10. Connect:
    - battery breather hose ①

CAUTION:

- **When checking the battery, make sure the battery breather hose is properly installed and routed correctly. If the battery breather hose is positioned so as to allow electrolyte or hydrogen gas from the battery to contact the frame, the motorcycle and its finish may be damaged.**
- **Make sure the battery breather hose is properly routed away from the drive chain and from below the swingarm.**

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



12.Connect:
- battery leads
  (to the battery terminals)

CAUTION:

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

13.Lubricate:
- battery terminals

	Recommended lubricant **Dielectric grease**

14.Install:
- rider seat
  Refer to “SEATS AND SIDE COVERS”.

EAS00181
CHECKING THE FUSES

The following procedure applies to all of the fuses.

CAUTION:

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

1. Remove:
   - rider seat
     Refer to "SEATS AND SIDE COVERS".
2. Check:
   - continuity

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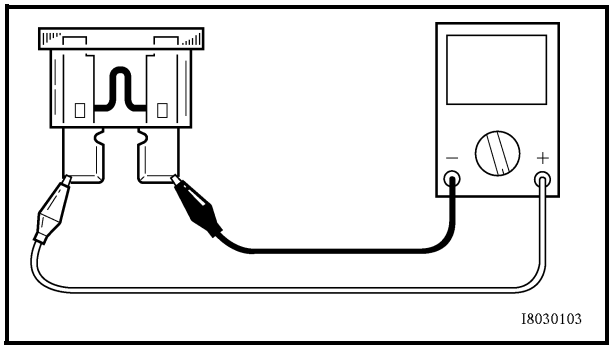
a. Connect the pocket tester to the fuse and check the continuity.

NOTE:

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



Pocket tester
YU-03112

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

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3. Replace:
   - blown fuse

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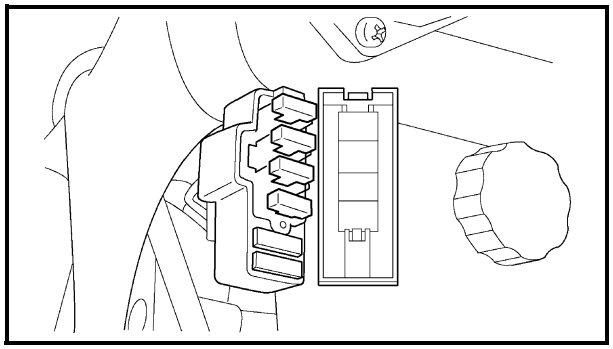
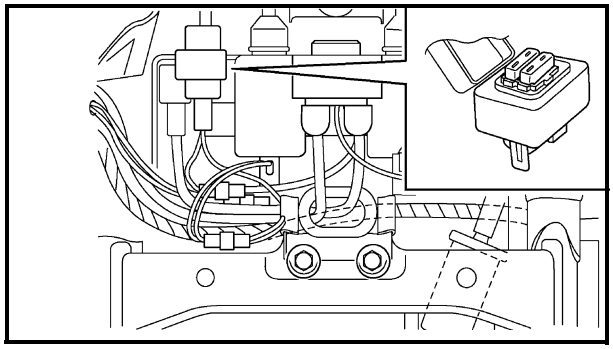
a. Set the main switch to "OFF".
b. Install a new fuse of the correct amperage.
c. Set on the switches to verify if the electrical circuit is operational.
d. If the fuse immediately blows again, check the electrical circuit.





Items	Amperage rating	Q'ty
Main fuse	30 A	1
Headlight fuse	15 A	1
Signaling system fuse	10 A	1
Ignition fuse	10 A	1
Radiator fan motor fuse	10 A	1
Reserve fuse	30 A	1
Reserve fuse	15 A	1
Reserve fuse	10 A	1

⚠ WARNING

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

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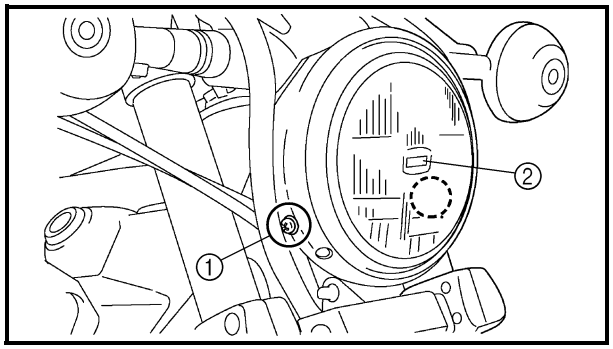
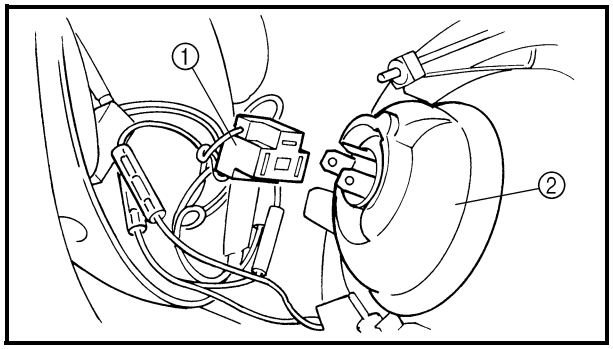
4. Install:
   - rider seat
     Refer to "SEATS AND SIDE COVERS".

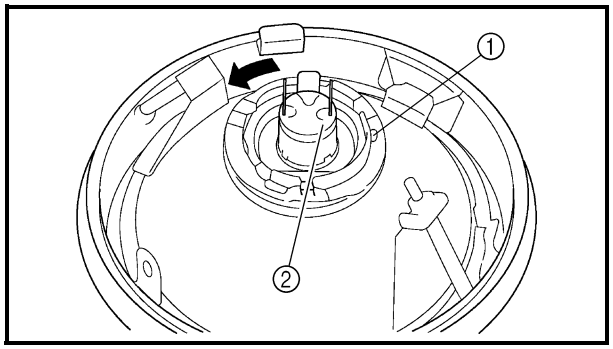


EAS00182
REPLACING THE HEADLIGHT BULB

1. Remove:
   - screw ①
   - headlight lens unit ②



2. Disconnect:
   • headlight coupler ①
3. Remove:
   • headlight bulb holder cover ②



4. Detach:
   • headlight bulb holder ①
5. Remove:
   • headlight bulb ②

⚠ WARNING

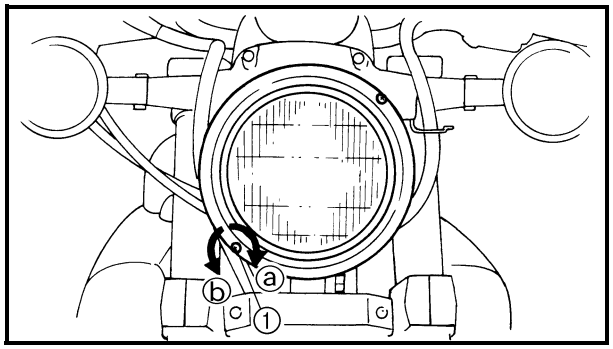
Since the headlight bulb gets extremely hot, keep flammable products and your hands away from the bulb until it has cooled down.

6. Install:
   • headlight bulb
   Secure the new headlight bulb with the headlight bulb holder.

CAUTION:

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.

7. Attach:
   • headlight bulb holder
8. Install:
   • headlight bulb holder cover
9. Connect:
   • headlight coupler
10. Install:
   • headlight lens unit
   • screws



ADJUSTING THE HEADLIGHT BEAM

1. Adjust:
   - headlight beam (vertically)

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

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

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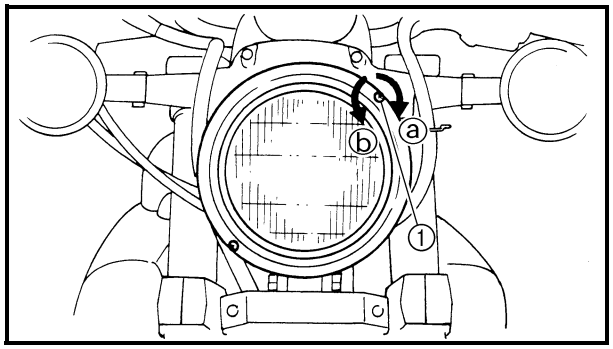

2. Adjust:
   - headlight beam (horizontally)

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

Direction ⓐ	**Headlight beam moves to the right.**
Direction ⓑ	**Headlight beam moves to the left.**

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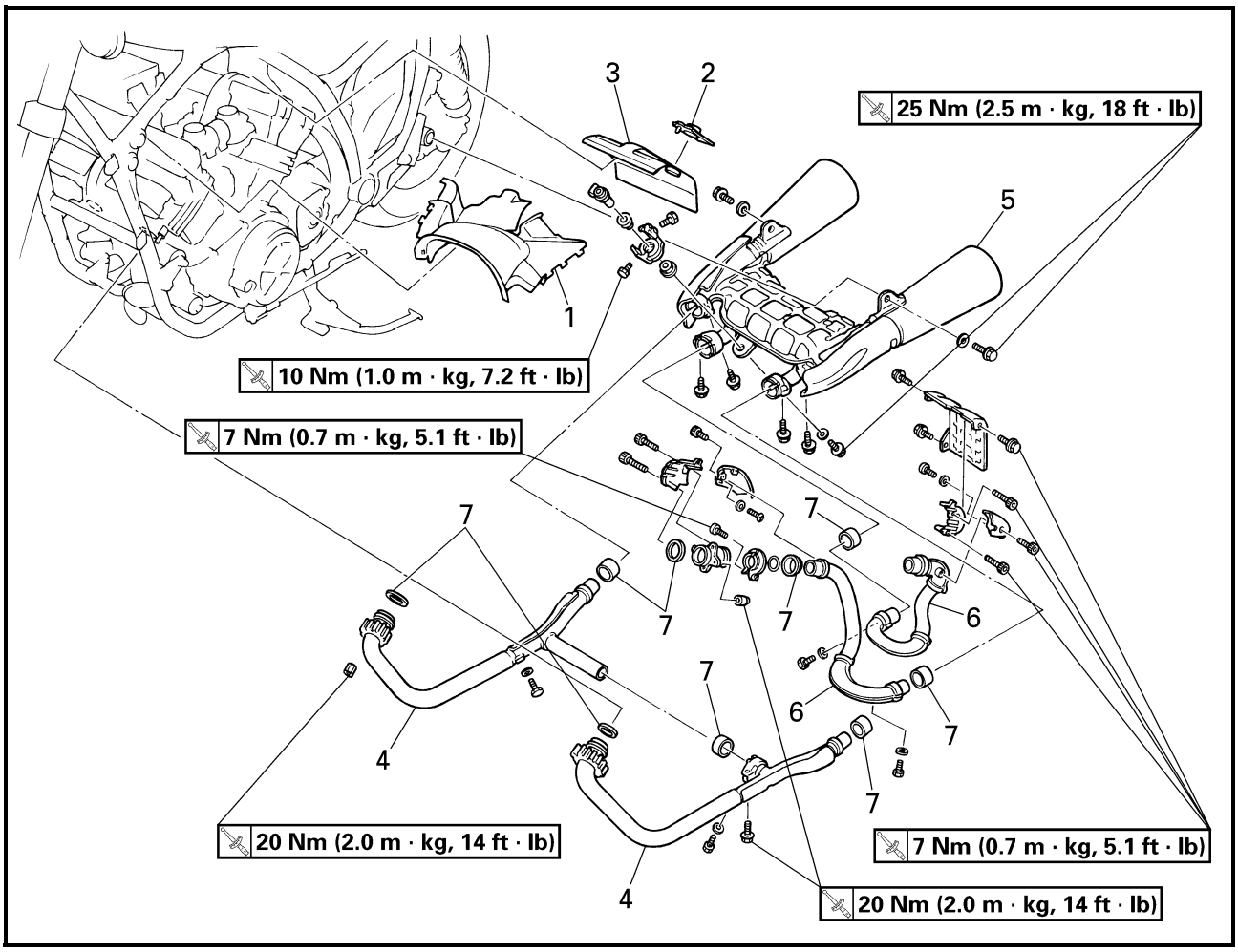
ENGINE

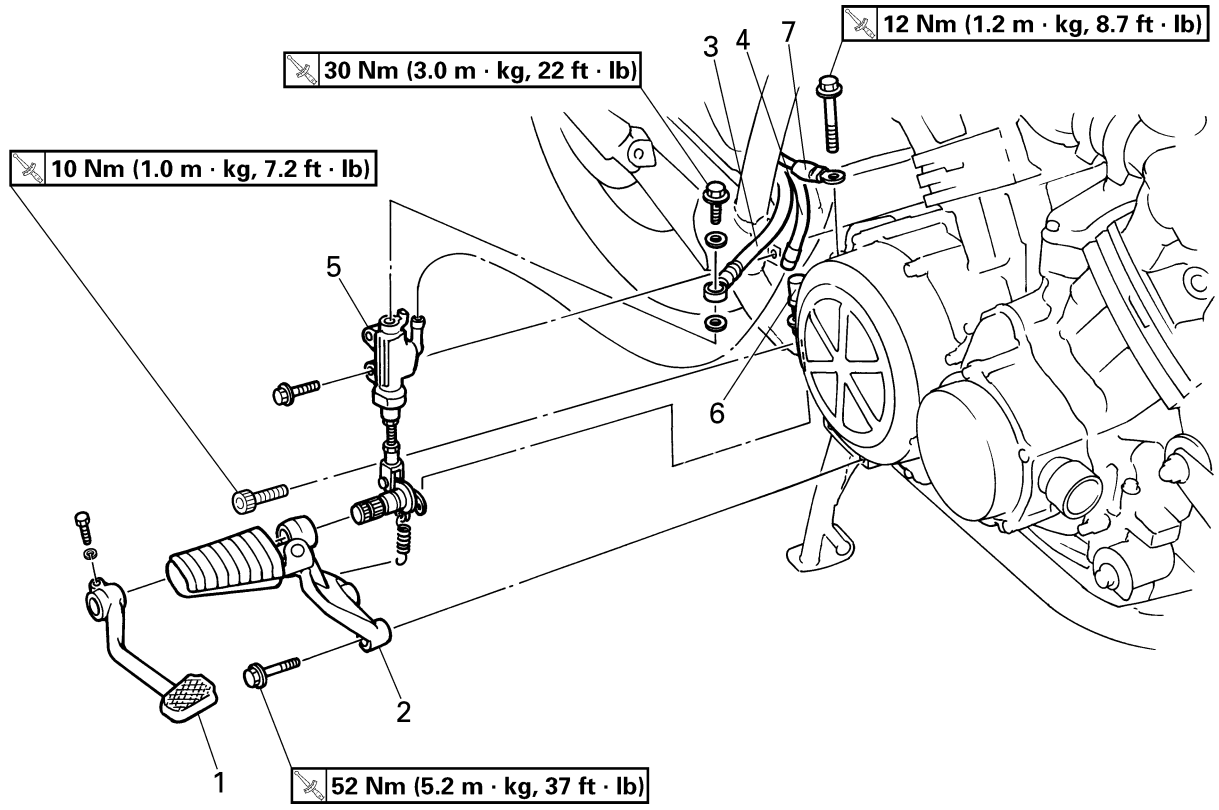
ENGINE REMOVAL

EXHAUST PIPES, MUFFLER AND AIR BAFFLE PLATES



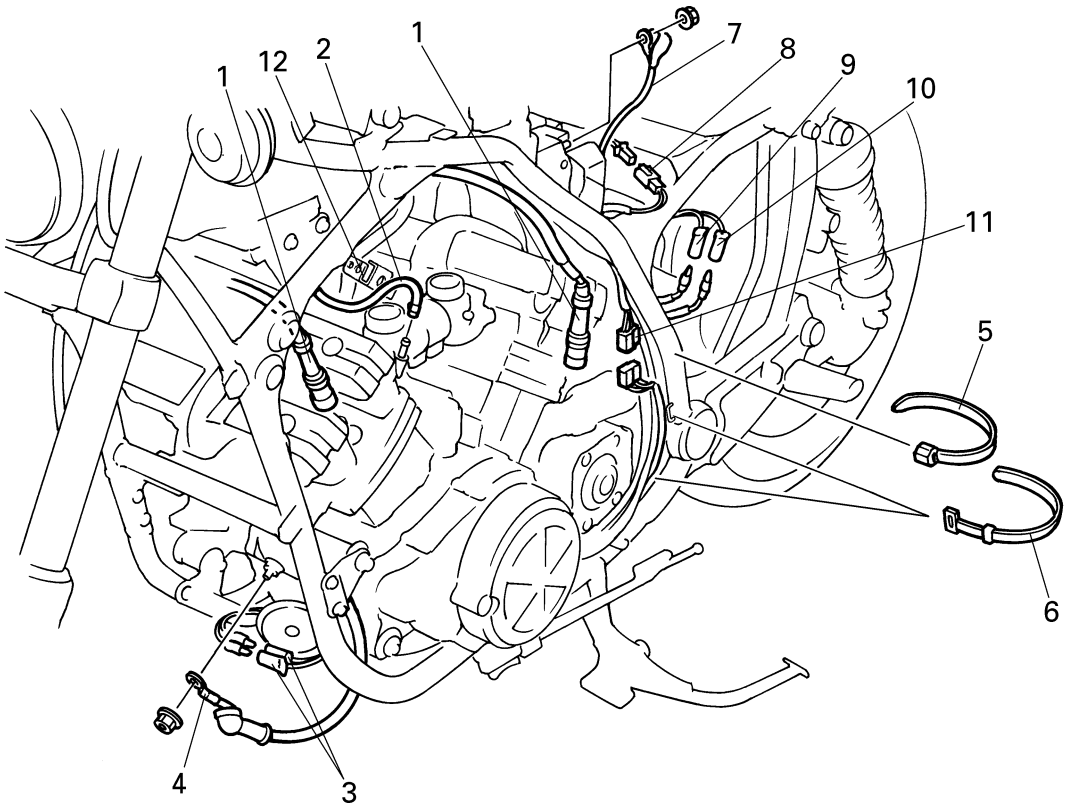
Order	Job/Part	Q'ty	Remarks
	Removing the exhaust pipes, muffler and air baffle plates		Remove the parts in the order listed.
	Carburetors		Refer to "REMOVING THE CARBURETOR" in chapter 6.
	Radiator		Refer to "REMOVING THE RADIATOR" in chapter 5.
	Middle gear case cover		Refer to "SHIFT SHAFT".
1	Air baffle plate (front)	1	
2	Plate cover	2	
3	Air baffle plate (rear)	1	
4	Front exhaust pipes	2	
5	Muffler	1	
6	Rear exhaust pipes	2	
7	Gaskets	11	
			For installation, reverse the removal procedure.

BRAKE PEDAL, FOOTREST (RIGHT), MASTER CYLINDER AND GROUND LEAD



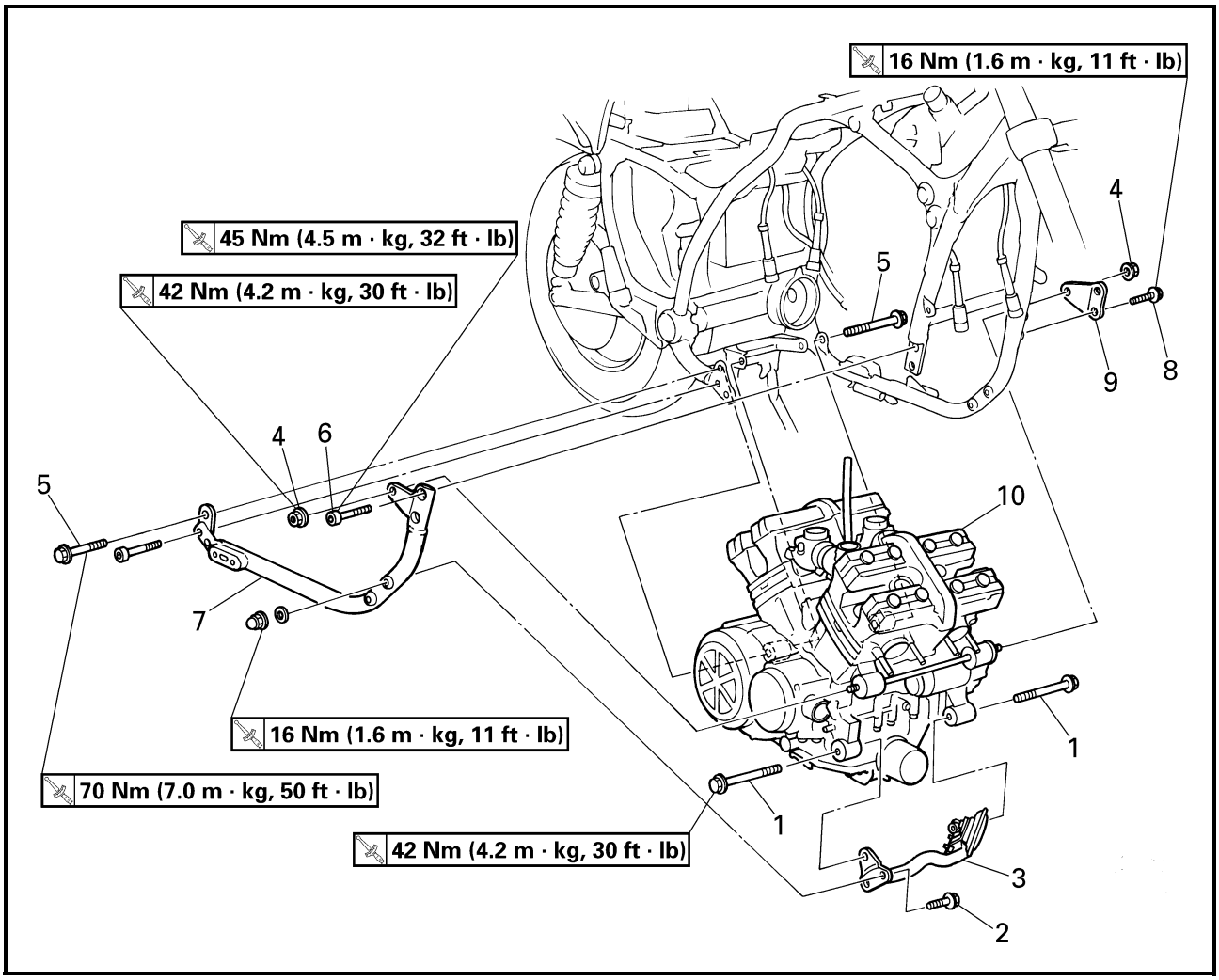
Order	Job/Part	Q'ty	Remarks
	Removing the brake pedal, footrest (right), master cylinder and ground lead		Remove the parts in the order listed.
1	Brake pedal	1	
2	Footrest (right)	1	
3	Rear brake hose	1	Disconnect.
4	Brake fluid reservoir hose	1	Disconnect.
5	Brake master cylinder	1	
6	Rear brake switch	1	
7	Ground lead	1	
			For installation, reverse the removal procedure.

LEADS, CABLES AND HOSES

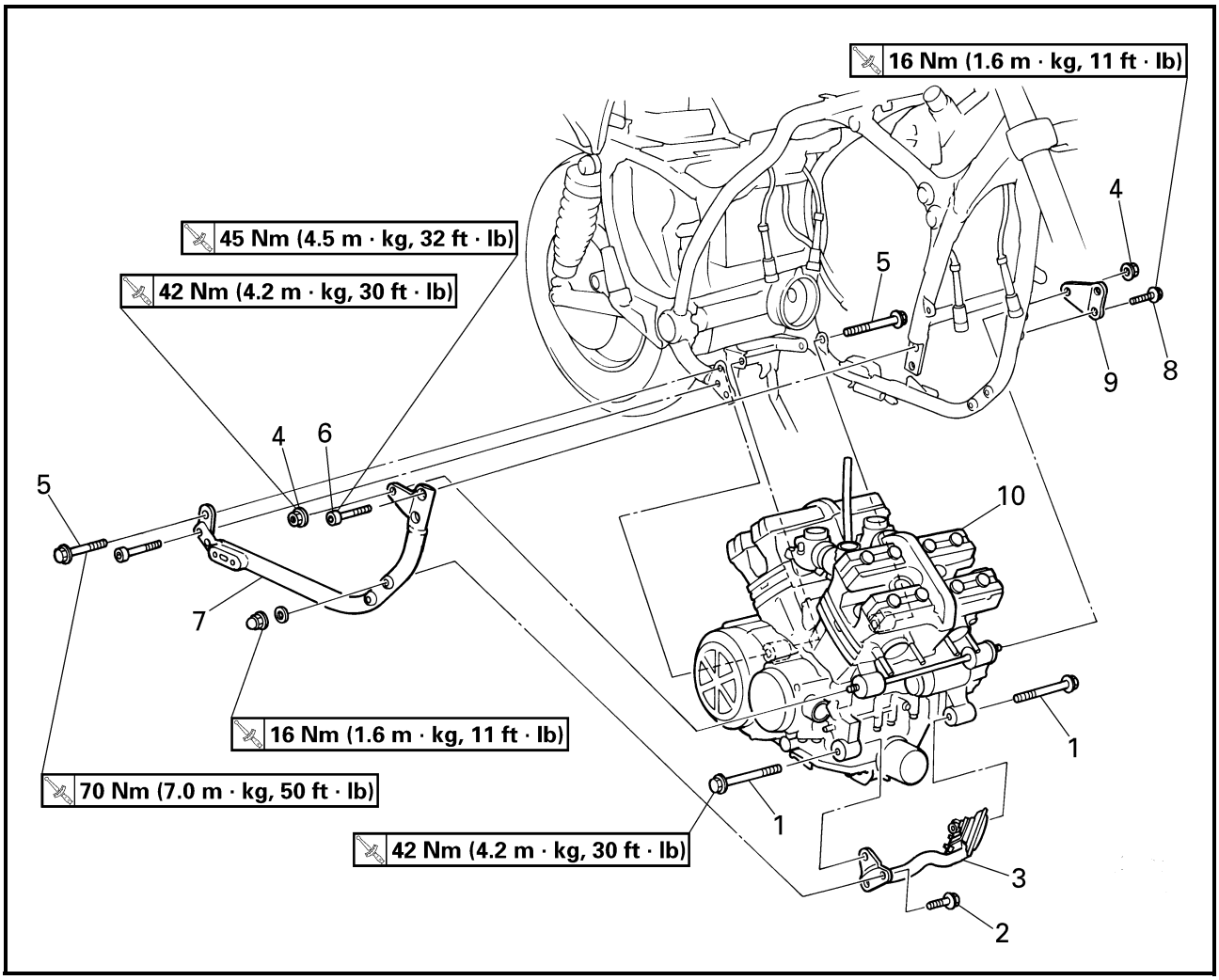


Order	Job/Part	Q'ty	Remarks
	Removing the leads, cables and hoses		Remove the parts in the order listed.
1	Spark plug leads	4	Disconnect.
2	Vacuum hose	1	Disconnect.
3	Horn lead	2	Disconnect.
4	Starter lead (starter motor)	1	Disconnect.
5	Plastic locking tie	1	
6	Plastic band	2	
7	Starter lead (starter relay)	1	Disconnect.
8	Pickup coil coupler	1	Disconnect.
9	Neutral switch lead	1	Disconnect.
10	Oil level switch lead	1	Disconnect.
11	Rectifier/regulator coupler	1	Disconnect.
12	V-boost control cable	1	Disconnect.
			For installation, reverse the removal procedure.

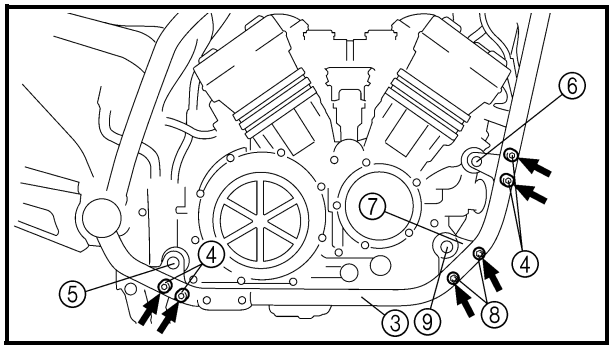
ENGINE MOUNTING BOLTS

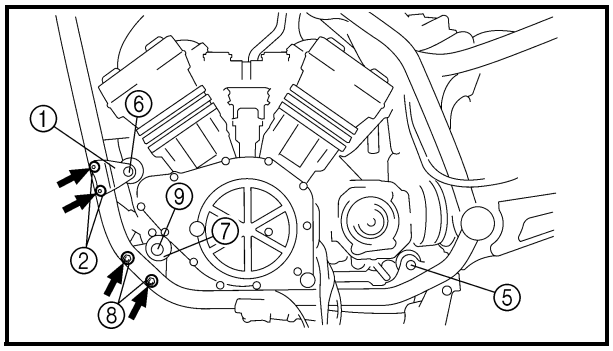


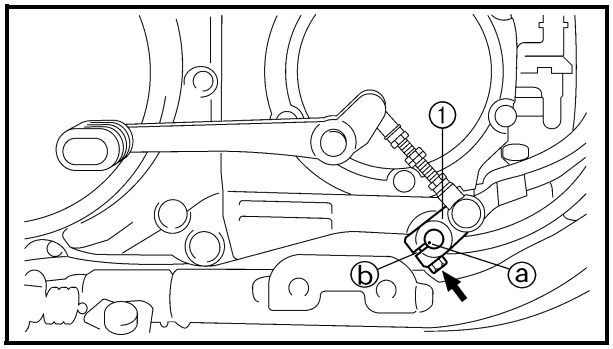
Order	Job/Part	Q'ty	Remarks
	Removing the engine		Remove the parts in the order listed. **NOTE:** Place a suitable stand under the frame and engine. **⚠ WARNING** **Securely support the motorcycle so there is no danger of it falling over.**
1	Bolts (front-lower)	2	
2	Bolts (engine bracket)	4	
3	Engine bracket	1	
4	Nuts (front-upper)	2	
5	Bolts (rear)	2	
6	Bolts (down tube)	4	



Order	Job/Part	Q'ty	Remarks
7	Down tube (right side)	1	
8	Bolts (engine stay)	2	
9	Engine stay	1	
10	Engine assembly	1	**NOTE:** Remove the engine assembly from the right side of the motorcycle. For installation, reverse the removal procedure.







EAS00192
INSTALLING THE ENGINE

1. Install:
   - engine stay ①
   - bolt (engine stay) ②

     16 Nm (1.6 m · kg, 11 ft · lb)
   - down tube (right) ③
   - bolt (down tube) ④

     45 Nm (4.5 m · kg, 32 ft · lb)
   - bolt (rear) ⑤ **70 Nm (7.0 m · kg, 50 ft · lb)**
   - nut (front-upper) ⑥

     42 Nm (4.2 m · kg, 30 ft · lb)
   - engine bracket ⑦
   - bolt (engine bracket) ⑧

     16 Nm (1.6 m · kg, 11 ft · lb)
   - bolt (front-lower) ⑨

     42 Nm (4.2 m · kg, 30 ft · lb)

NOTE:

Do not fully tighten the bolts.

2. Install:
   - shift pedal link ①

     10 Nm (1.0 m · kg, 7.2 ft · lb)

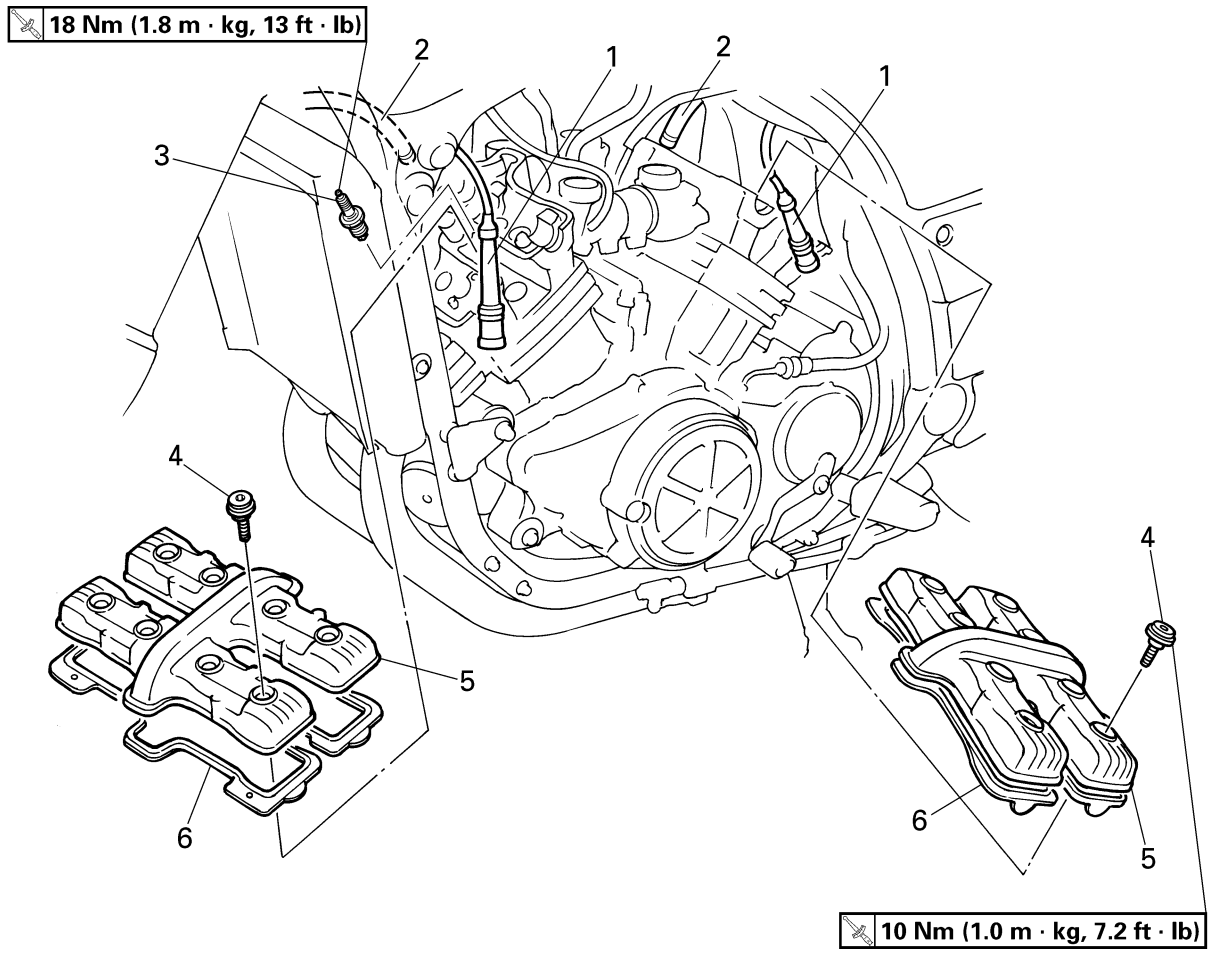
NOTE:

- Align the punch mark ⓐ in the shift shaft with the slot ⓑ in the shift pedal link.
- Align the bottom edge of the shift pedal with the mark on the frame-to-swingarm bracket.

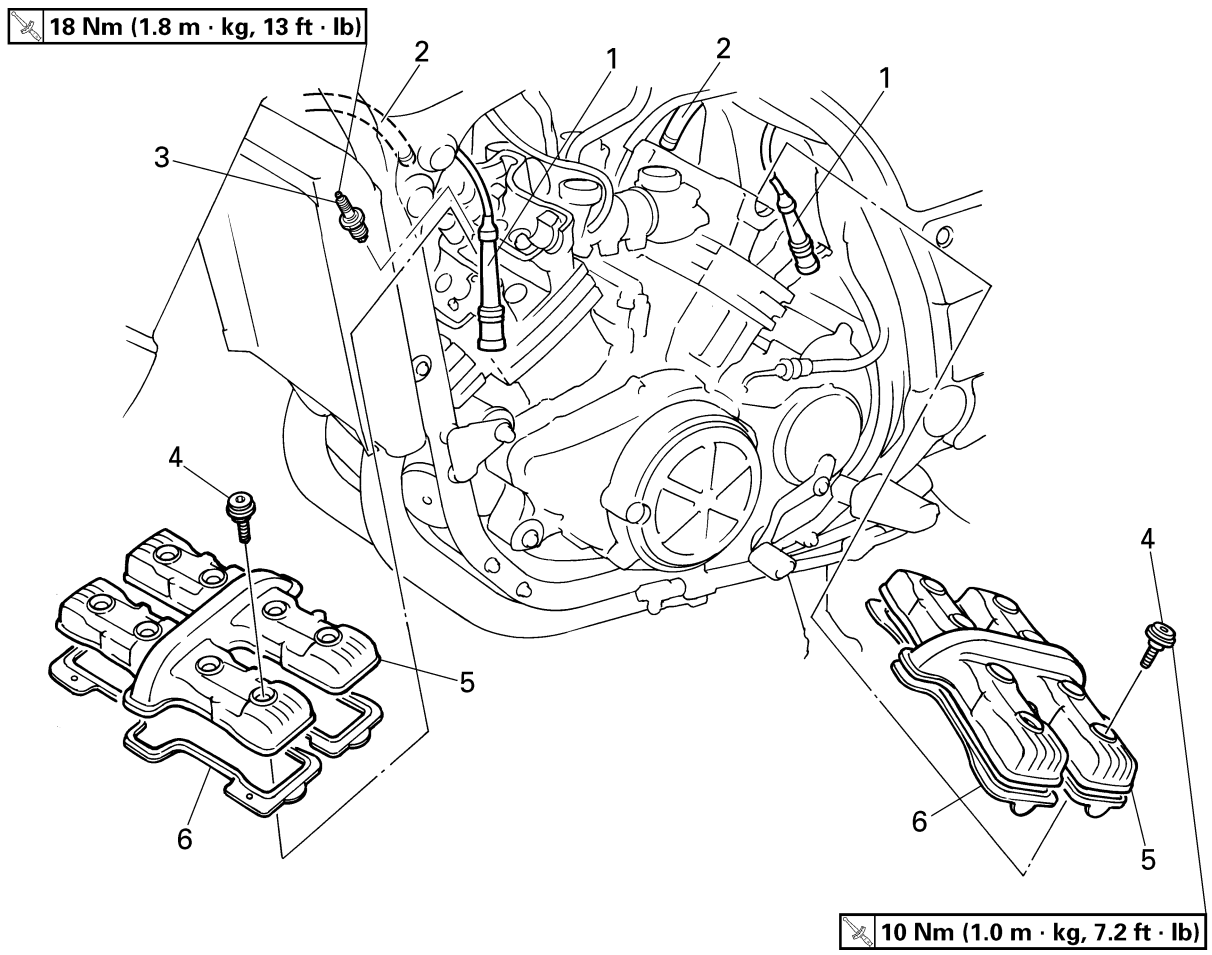
4

CAMSHAFTS

CYLINDER HEAD COVERS

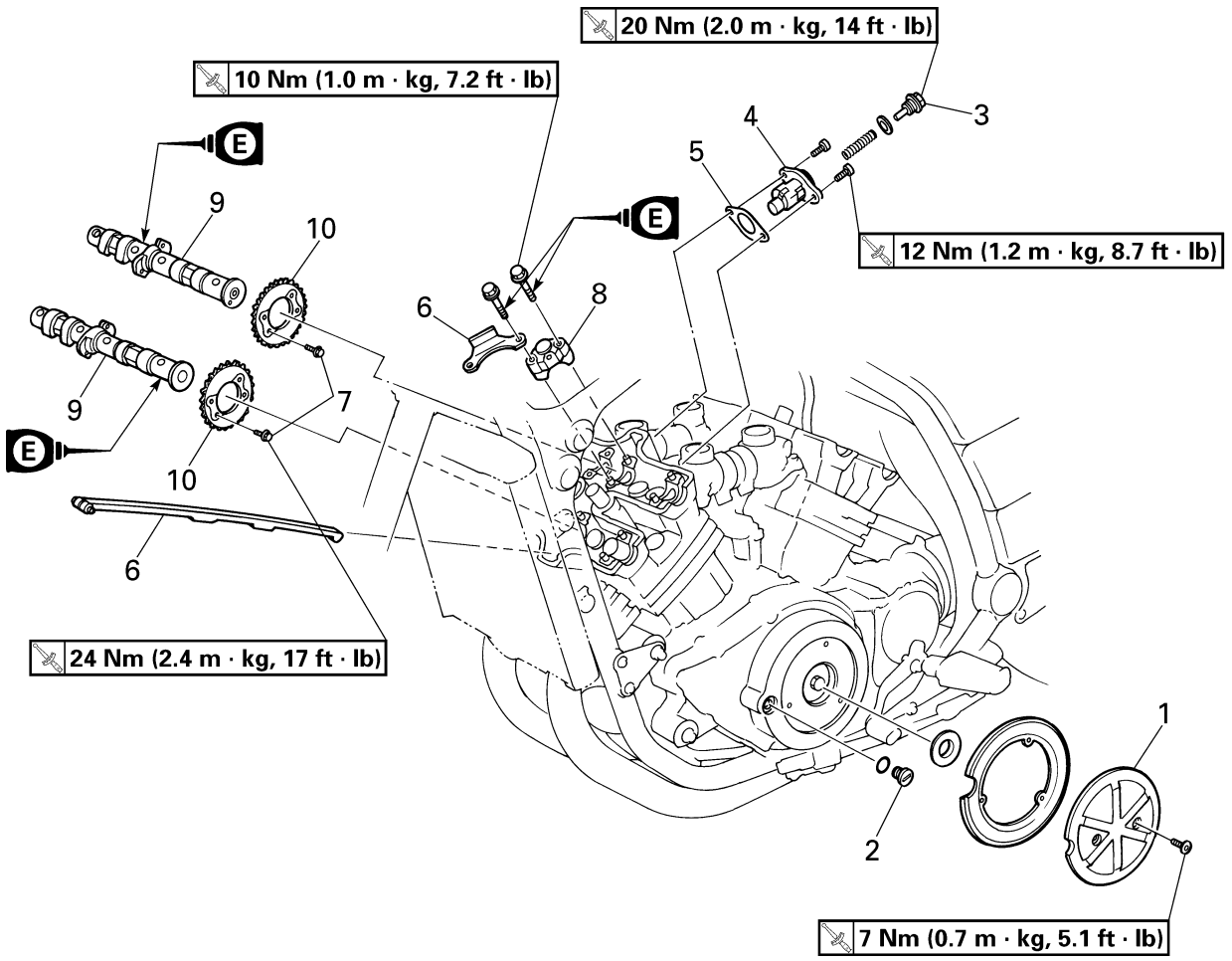


Order	Job/Part	Q'ty	Remarks
	Removing the cylinder head covers		Remove the parts in the order listed. Stand the motorcycle on a level surface. **⚠ WARNING** **Securely support the motorcycle so there is no danger of it falling over.**
	Top cover and covers		Refer to "TOP COVER AND COVERS" in chapter 3.
	Air filter case and electrical components board		Refer to "AIR FILTER CASE AND ELECTRICAL COMPONENTS BOARD" in chapter 3.
	Carburetors		Refer to "REMOVING THE CARBURETOR" in chapter 6.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.

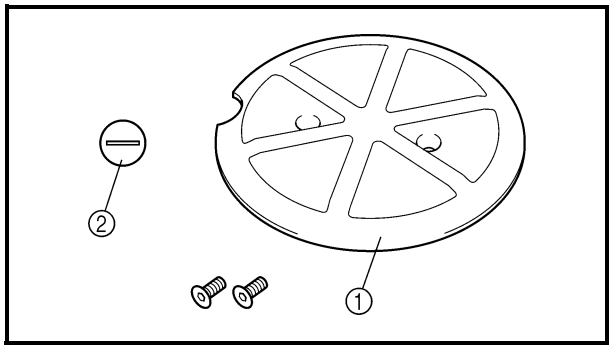


Order	Job/Part	Q'ty	Remarks
1	Spark plug cap	4	Disconnect.
2	Coolant hoses (to cylinder head)	2	Disconnect.
3	Spark plugs	4	
4	Cylinder head covers bolts	16	
5	Cylinder head covers	2	
6	Cylinder head covers gaskets	2	
			For installation, reverse the removal procedure.

EAS00196
CAMSHAFTS

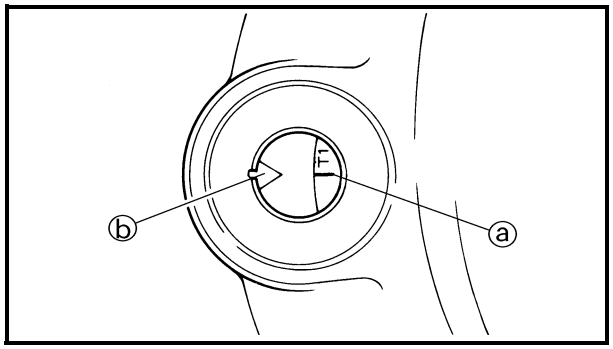


Order	Job/Part	Q'ty	Remarks
	Removing the camshafts		Remove the parts in the order listed.
	Cylinder head covers		Refer to "CYLINDER HEAD COVERS".
1	Crankcase cover plate	1	
2	Timing plug	1	
3	Tensioners cap bolts	2	
4	Timing chain tensioners	2	
5	Gaskets	2	
6	Timing chain guides	4	Refer to "Rear cylinder".
7	Camshaft sprockets bolts	8	
8	Camshaft caps	16	
9	Camshafts	4	
10	Camshaft sprockets	4	
			For installation, reverse the removal procedure.



EAS00199
REMOVING THE CAMSHAFTS

1. Remove:
   - timing mark accessing screw ①
   - crankshaft end cover ②



2. Align:
   - "T1" mark on the flywheel
     (with the stationary pointer on the crankcase cover)

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a. Turn the crankshaft counterclockwise.
b. When piston #1 is at TDC on the compression stroke, align the "T1" mark ⓐ with the stationary pointer ⓑ.

NOTE:

TDC on the compression stroke can be found when the camshaft lobes are turned away from each other.

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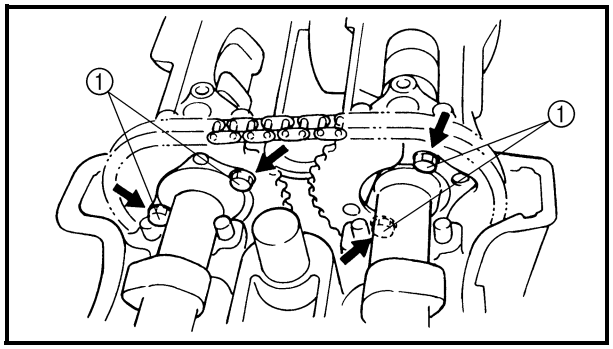
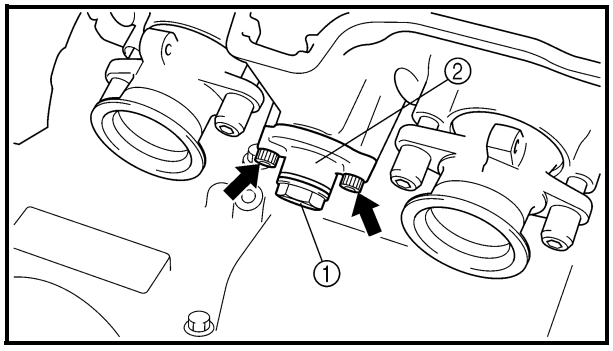
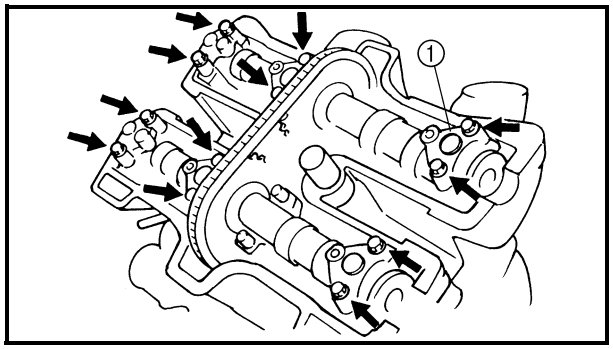
3. Remove:
   - timing chain guide (top side)



4. Loosen:
   - camshaft sprocket bolts ①



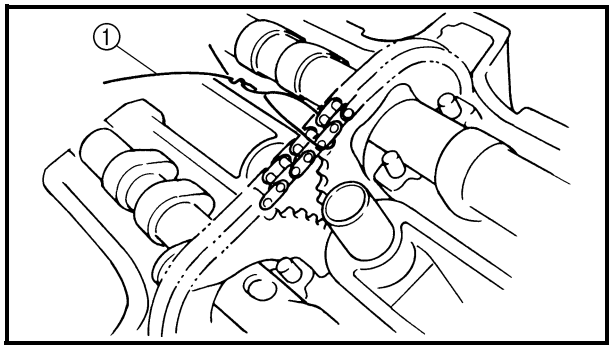
5. Loosen:
   - cap bolt ①
6. Remove:
   - timing chain tensioner ②
   - gasket



7. Remove:
   - timing chain guide (exhaust side)
   - camshaft caps ①
   - dowel pins

NOTE:
For reference during installation, put identification marks on each camshaft cap.

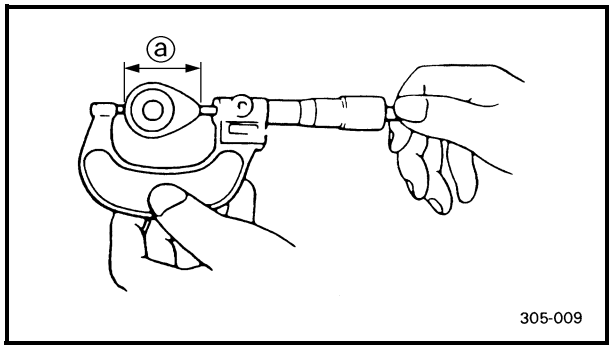
CAUTION:
To prevent damage to the cylinder head, camshafts or camshaft caps, loosen the camshaft cap bolts in stages and in a criss-cross pattern, working from the outside in.

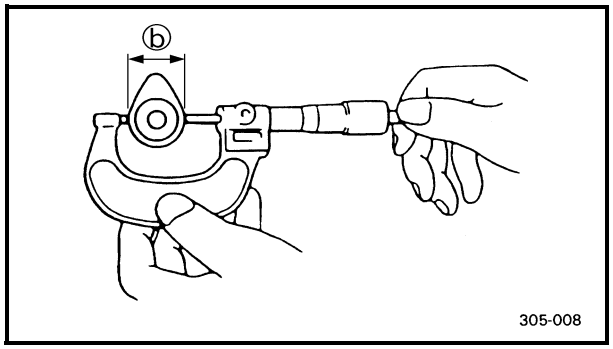


8. Remove:
   - camshafts

NOTE:
To prevent the timing chain from falling into the crankcase, fasten it with a wire ①.

9. Remove:
   - camshaft sprockets





EAS00204
CHECKING THE CAMSHAFTS

1. Check:
   - camshaft lobes
     Blue discoloration/pitting/scratches → Replace the camshaft.
2. Measure:
   - camshaft lobe dimensions ⓐ and ⓑ
     Out of specification → Replace the camshaft.

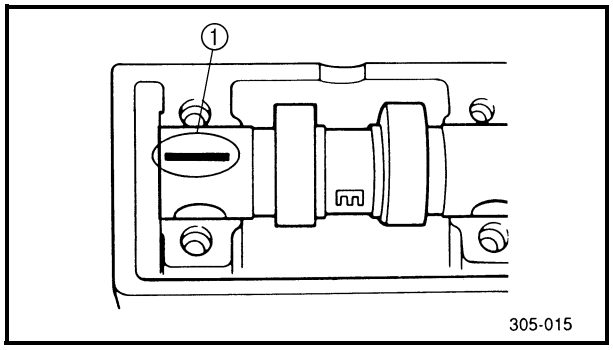
Camshaft lobe dimension limit
Intake camshaft
ⓐ 36.15 mm (1.42 in)
ⓑ 27.92 mm (1.1 in)
27.87 mm (1.1 in)
(for California)
Exhaust camshaft
ⓐ 36.15 mm (1.42 in)
ⓑ 27.92 mm (1.1 in)
27.87 mm (1.1 in)
(for California)

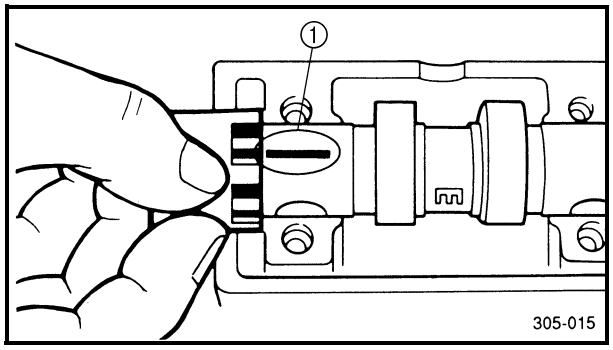
3. Measure:
   • camshaft runout
   Out of specification → Replace.

Camshaft runout limit
0.03 mm (0.0012 in)

4. Measure:
   • camshaft-journal-to-camshaft-cap clearance
   Out of specification → Measure the camshaft journal diameter.

Camshaft-journal-to-camshaft-cap clearance
0.020 ~ 0.054 mm
(0.0008 ~ 0.0021 in)





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a. Install the camshaft into the cylinder head (without the dowel pins and camshaft caps).
b. Position a strip of Plastigauge® ① onto the camshaft journal as shown.
c. Install the dowel pins and camshaft caps.

NOTE:

- Tighten the camshaft cap bolts in stages and in a crisscross pattern, working from the inner caps out.
- Do not turn the camshaft when measuring the camshaft journal-to-camshaft cap clearance with the Plastigauge®.

Camshaft cap bolt
10 Nm (1.0 m • kg, 7.2 ft • lb)

d. Remove the camshaft caps and then measure the width of the Plastigauge® ①.

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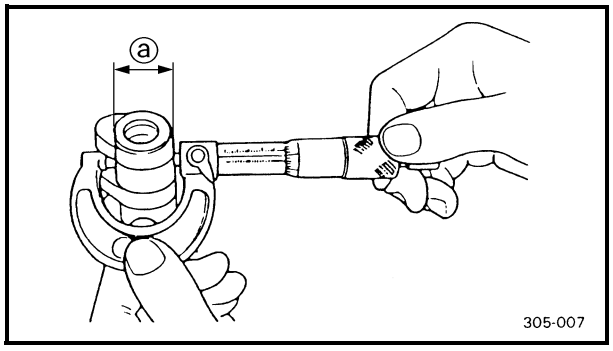
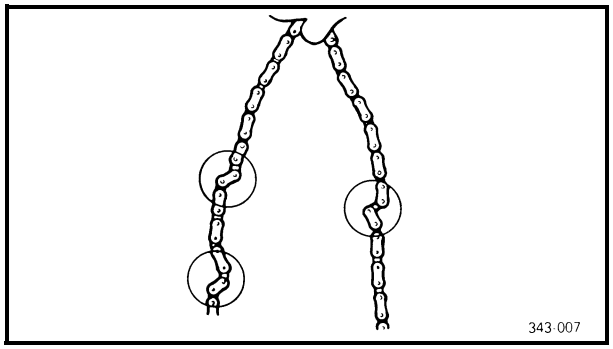
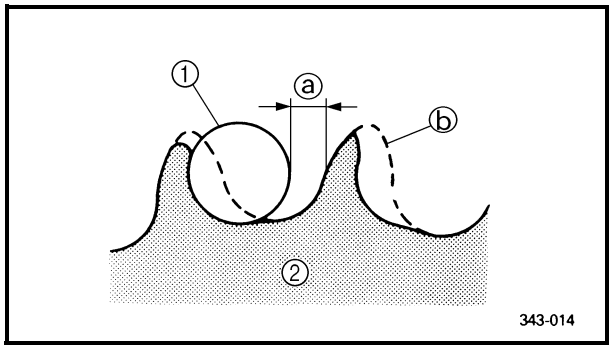


5. Measure:
   • camshaft journal diameter ⓐ
   Out of specification → Replace the camshaft.
   Within specification → Replace the cylinder head and the camshaft caps as a set.

Camshaft journal diameter
24.967 ~ 24.980 mm
(0.9830 ~ 0.9835 in)





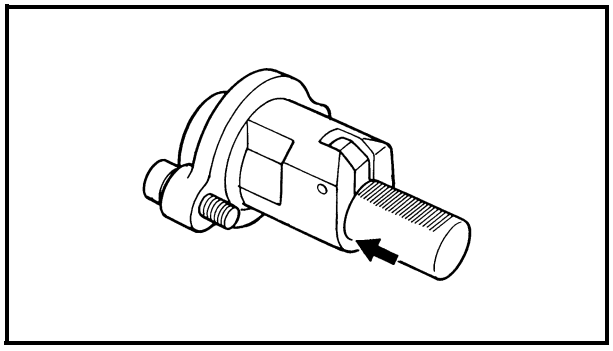
EAS00208
CHECKING THE TIMING CHAIN, CAMSHAFT SPROCKETS, AND TIMING CHAIN GUIDES

The following procedure applies to all of the camshaft sprockets and timing chain guides.

1. Check:
   - timing chain
     Damage/stiffness → Replace the timing chain and camshaft sprockets as a set.
2. Check:
   - camshaft sprocket
     More than 1/4 tooth wear ⓐ → Replace the camshaft sprockets and the timing chain as a set.

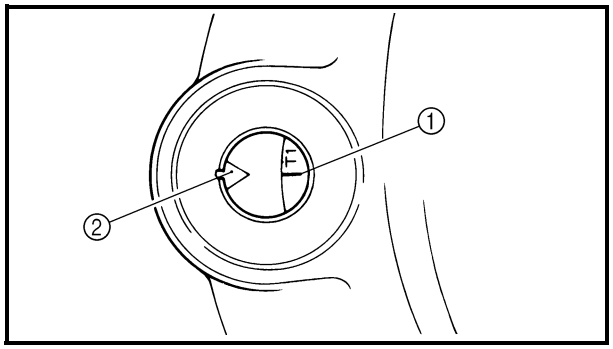
ⓐ 1/4 tooth
ⓑ Correct
① Timing chain roller
② Camshaft sprocket

3. Check:
   - timing chain guide (exhaust side)
   - timing chain guide (top side)
     Damage/wear → Replace the defective part(s).



EAS00210
CHECKING THE TIMING CHAIN TENSIONER

1. Check:
   - timing chain tensioner
     Cracks/damage → Replace.
   - one-way cam operation
     Rough movement → Replace the timing chain tensioner housing.
2. Check:
   - cap bolt
   - copper washer
   - spring
   - one-way cam
   - gasket
   - timing chain tensioner rod
     Damage/wear → Replace the defective part(s).



EAS00218
INSTALLING THE CAMSHAFTS

1. Align:
   - "T1" marks on the flywheel (with the stationary pointer on the crankcase cover)

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a. Turn the crankshaft counterclockwise.
b. When piston #1 is at TDC on the compression stroke, align the "T1" marks ① on the generator rotor with the stationary pointer ②.

CAUTION:

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

NOTE:

First, install the rear cylinder camshafts, camshaft sprockets, timing chain, and timing chain tensioner. Then, install the front cylinder camshafts and related parts.

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Rear cylinder

1. Install:
   - intake camshaft
   - exhaust camshaft

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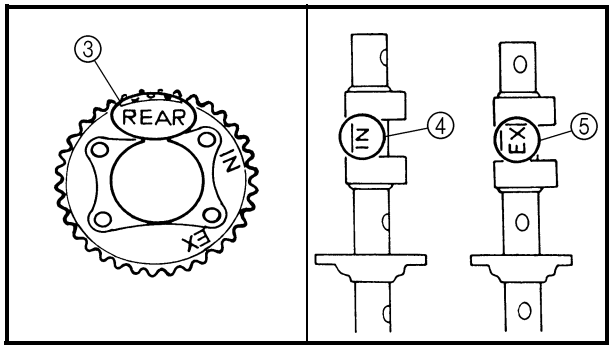
CAUTION:

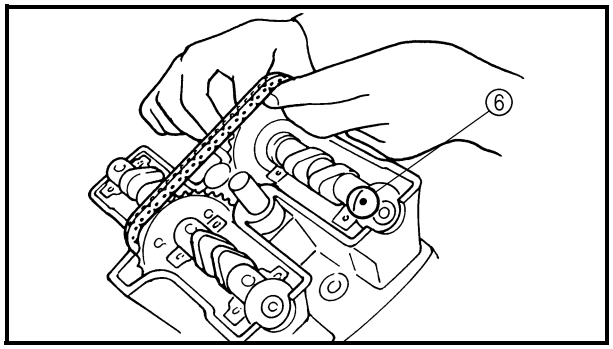
Do not turn the crankshaft when installing the camshafts to avoid damage or improper valve timing.

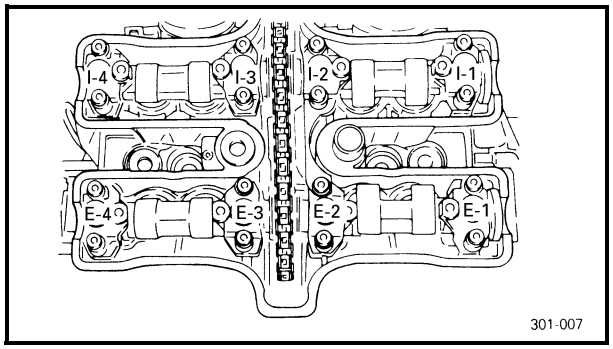


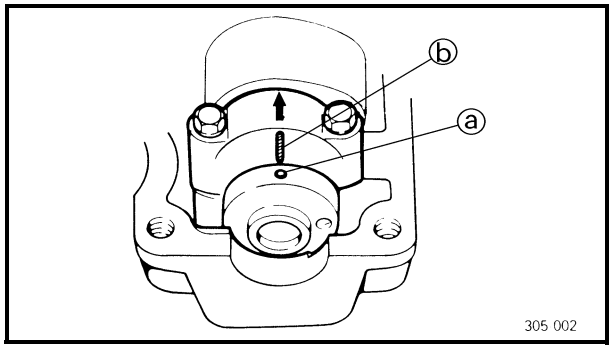
a. Install the camshaft sprockets onto the camshafts.
   Refer to the camshaft sprocket installation steps below.

NOTE:

Make sure the "REAR" marks ③ on the camshaft sprockets face away from the "IN" ④ and "EX" marks ⑤ on the camshafts.







b. First, install the exhaust camshaft, and then the intake camshaft.

NOTE:

- Be sure to install the camshafts in the correct place as shown.

"IN" mark = intake camshaft
"EX" mark = exhaust camshaft

- Make sure the timing marks ⑥ (o: small hole) in the camshaft face up.
- Be sure to keep the timing chain as tight as possible on the exhaust side.
- Remove the wire from the timing chain.

CAUTION:

Do not turn the camshaft, as damage could occur to the pistons and valves.

c. Install intake and exhaust camshaft caps #1, #3, and finally #4.

NOTE:

At this point, do not install intake camshaft cap #2, exhaust camshaft cap #2, and the timing chain guide (top side).

d. Align the mark ⓐ on the camshaft with the mark ⓑ camshaft cap.

NOTE:

Cylinder #1 is at TDC when the small hole in the camshaft is aligned with the camshaft cap mark.

e. Lubricate the camshaft cap bolts with engine oil.
f. Tighten the camshaft cap bolts.

NOTE:

- The camshaft caps are numbered from right to left.
- First, tighten intake and exhaust camshaft cap bolts #3, #1, and finally #4.
- Tighten the camshaft cap bolts in stages and in a crisscross pattern, working from the inner caps out.

CAUTION:

The camshaft cap bolts must be tightened evenly or damage to the cylinder head, camshaft caps, and camshafts will result.

	Camshaft cap bolt **10 Nm (1.0 m • kg, 7.2 ft • lb)**

g. Lubricate the camshaft bearing surfaces, camshaft lobes, and camshaft journals with engine oil.

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2. Install:
   - intake camshaft sprocket
   - exhaust camshaft sprocket
   (onto the camshafts)

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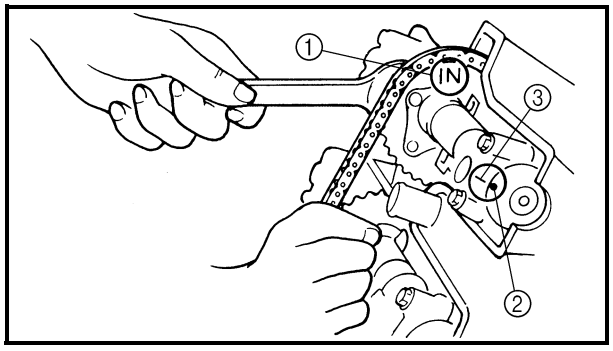
CAUTION:

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

a. Install the timing chain onto the intake camshaft sprocket.
b. Install the intake camshaft sprocket with the "REAR" mark facing out, and then finger tighten the camshaft sprocket bolts.

NOTE:

Align the "IN" mark ① hole in the intake camshaft sprocket with the thread hole in the camshaft.



c. Turn the intake camshaft so that the camshaft timing mark ② (o: small hole) is aligned with the camshaft cap mark ③.
d. To remove the timing chain slack, force the intake camshaft counterclockwise.
e. Install the timing chain onto the exhaust camshaft sprocket.
f. Install the exhaust camshaft sprocket with the "REAR" mark facing out, and then finger tighten the camshaft sprocket bolts.

NOTE:

Align the "EX" mark hole in the exhaust camshaft sprocket with the thread hole in the camshaft.

g. Turn the exhaust camshaft so that the mark (o: small hole) on the camshaft is aligned with the mark on the camshaft cap.
h. To remove the timing chain slack, force the exhaust camshaft clockwise.
i. Insert your finger into the timing chain tensioner hole and push the timing chain guide (intake side) in.
j. When pushing the timing chain guide (intake side), make sure the camshaft cap marks and camshaft timing marks stay aligned.
k. If the camshaft cap marks and camshaft timing marks are not aligned, change the meshing position of the camshaft sprockets and timing chain.

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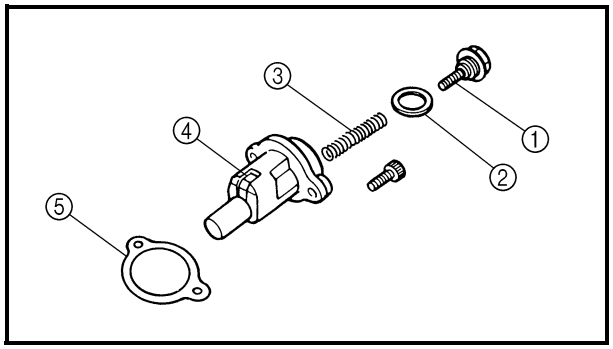

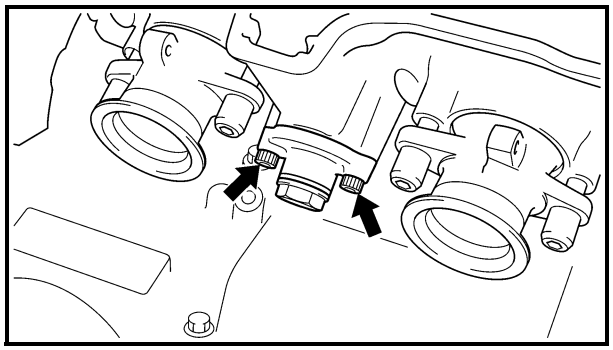

3. Install:
   • timing chain tensioner

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a. Remove the cap bolt ①, washer ② and spring ③.
b. Release the timing chain tensioner one-way cam ④.
c. Install the timing chain tensioner and gasket ⑤ onto the cylinder block.

⚠ WARNING

Always use a new gasket.

	Timing chain tensioner bolt **12 Nm (1.2 m • kg, 18.7 ft • lb)**

d. Install the spring ③, washer ②, and cap bolt ①.

	Cap bolt **20 Nm (2.0 m • kg, 14 ft • lb)**

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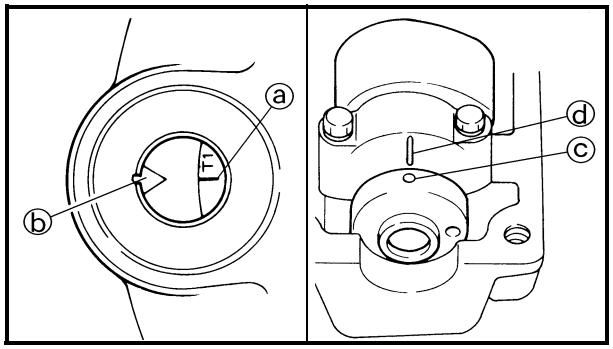
4. Turn:
   • crankshaft
   (several turns counterclockwise)

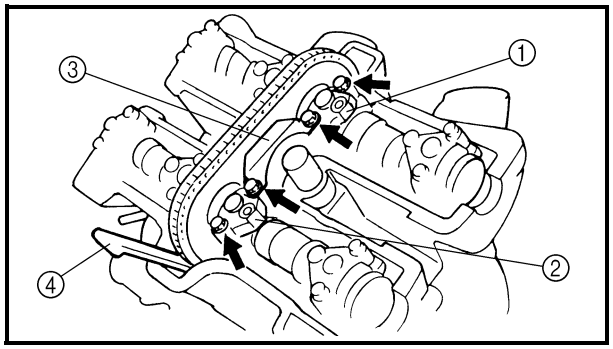


5. Check:
   - TDC mark ⓐ
     Make sure the TDC mark on the generator rotor is aligned with the stationary pointer ⓑ.
   - camshaft timing punch mark ⓒ (o: small hole)
     Make sure the punch marks in the camshafts are aligned with the marks ⓓ on the camshaft caps.
     Out of alignment → Adjust.
     Refer to the camshaft installation steps above.
6. Tighten:
   - camshaft sprocket bolts

	24 Nm (2.4 m · kg, 17 ft · lb)

CAUTION:

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



7. Install:
   - camshaft caps “I-2” ①
   - camshaft caps “E-2” ②
   - timing chain guide (top side) ③

	10 Nm (1.0 m · kg, 7.2 ft · lb)

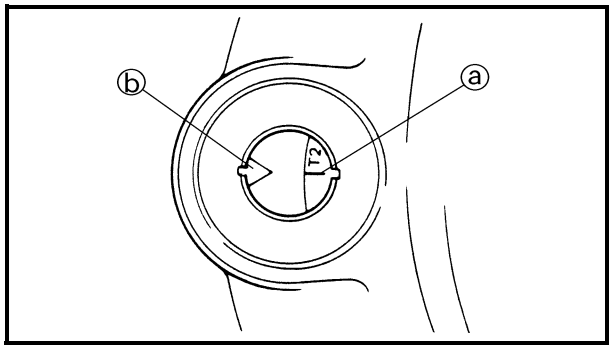
   - timing chain guide (exhaust side) ④
8. Lubricate:
   - timing chain
   - camshaft sprockets
   - camshafts
   - valve pads

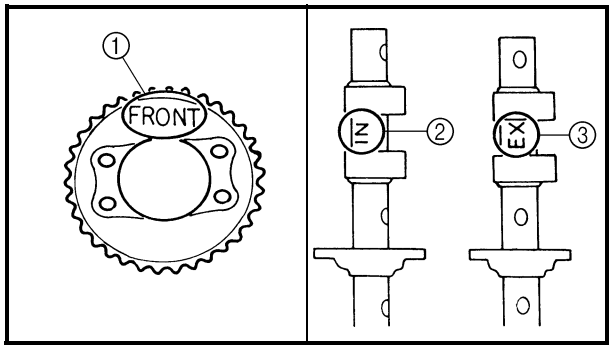
	Recommended lubricant **Engine oil**

Front cylinder

NOTE:

When installing the front cylinder camshafts, repeat the rear cylinder camshaft installation procedure. However, note the following points.





1. Install:
   - exhaust camshaft
   - intake camshaft

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a. From the “T1” marks, turn the crankshaft counterclockwise 430° (i.e., 360° plus an additional 70°).
b. When piston #2 is at TDC on the compression stroke, align the “T2” mark ⓐ with the stationary pointer ⓑ.
c. Install the camshaft sprockets onto the camshafts.
   Refer to the camshaft sprocket installation steps below.

NOTE:

Make sure the “FRONT” marks ① on the camshaft sprockets face away from the “IN” ② and “EX” marks ③ on the camshafts.

d. Turn the camshafts by hand so that the camshaft timing marks (o: big hole) face up.

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2. Install:
   - intake camshaft sprocket
   - exhaust camshaft sprocket
     (onto the camshafts)

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a. Align the “T2” mark on the generator rotor with the stationary pointer.
b. Install the camshaft sprocket with the “FRONT” mark facing out, and then finger tighten the camshaft sprocket bolts.
c. Turn the intake and exhaust camshafts and align the camshaft timing marks (o: big hole) with the camshaft cap marks.

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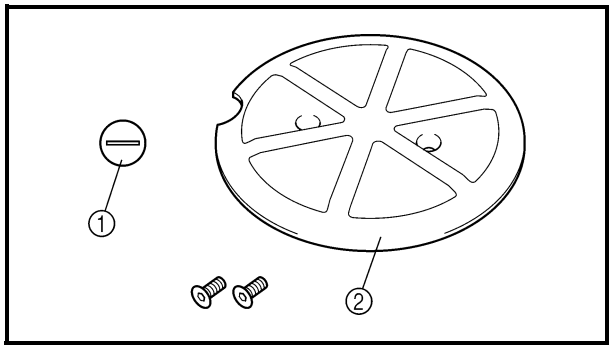
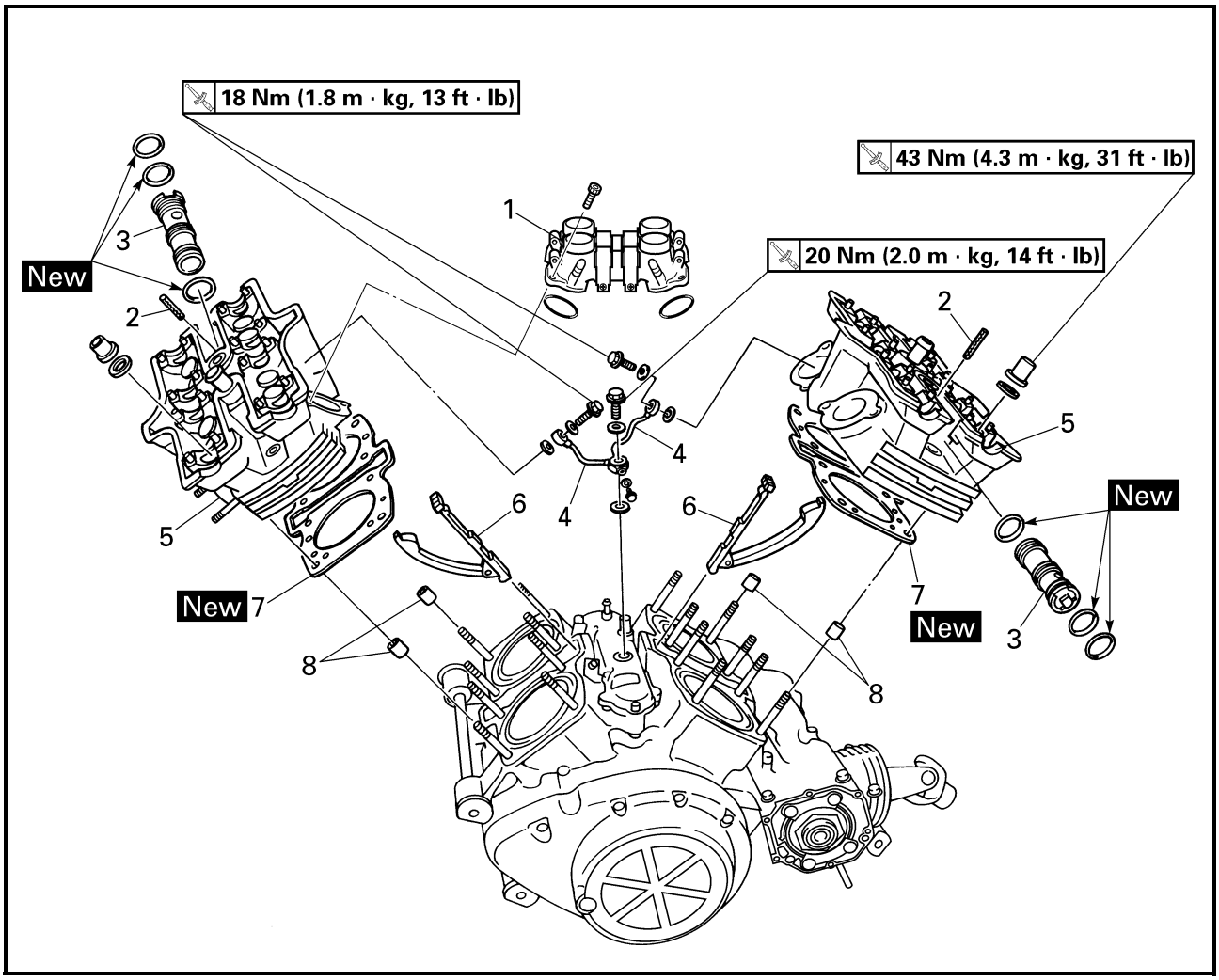
3. Measure:
   - valve clearance
     Out of specification → Adjust.
     Refer to “ADJUSTING THE VALVE CLEARANCE” in chapter 3.



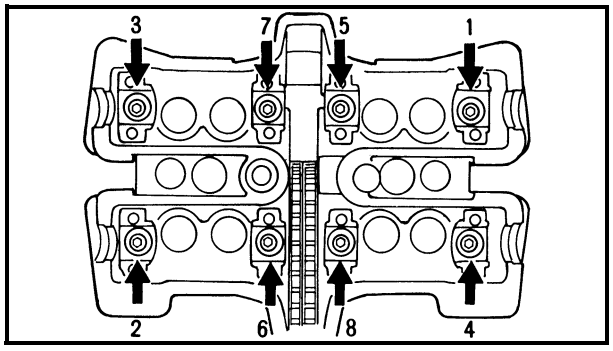
4. Install:
   - timing mark accessing screw ①
   - crankshaft end cover ②

	7 Nm (0.7 m · kg, 5.1 ft · lb)

CYLINDER HEADS



Order	Job/Part	Q'ty	Remarks
	Removing the cylinder head		Remove the parts in the order listed.
	Engine assembly		Refer to "ENGINE REMOVAL".
	Cylinder head covers		Refer to "CYLINDER HEAD COVERS".
	Camshafts		Refer to "CAMSHAFTS".
1	Intake manifold	2	
2	Lock pins	2	
3	Water jacket joints	2	
4	Oil delivery pipes	2	
5	Cylinder heads	2	
6	Timing chain dampers	2	
7	Gaskets (cylinder heads)	2	
8	Dowel pins	4	
			For installation, reverse the removal procedure.

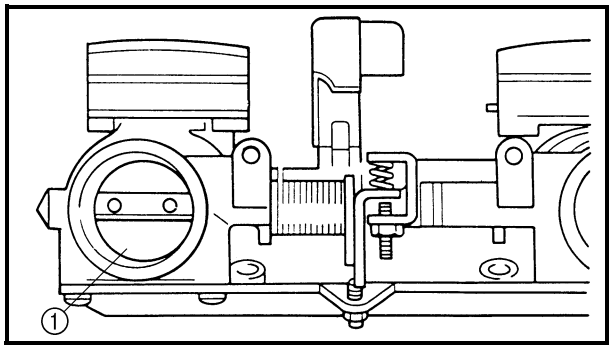


EAS00223
REMOVING THE CYLINDER HEADS

1. Remove:
   • cylinder head nuts

NOTE:

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



CHECKING THE V-BOOST

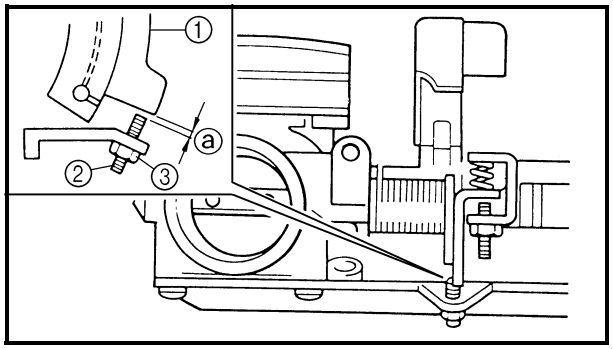
1. Check:
   • V-boost body
     Dirt → Clean.
     Wash the V-boost body in a petroleum based solvent.
   • butterfly valves ①
     Damage/wear → Replace the V-boost assembly.

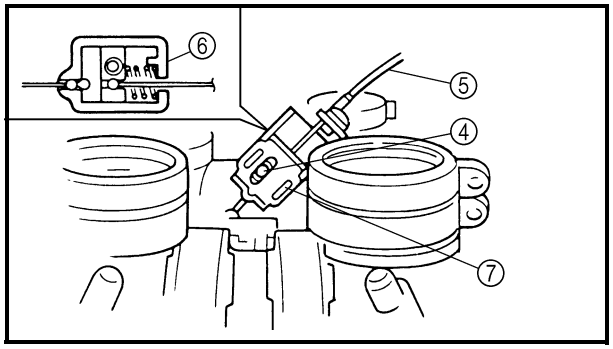
ADJUSTING THE BUTTERFLY SHAFT LEVER-TO-ADJUSTING BOLT CLEARANCE

NOTE:

This adjustment should only be made when replacing the following part(s).
• servomotor
• control cable
• control cable joint
• carburetor joint

1. Set the main switch to “ON”.





2. Measure:
   - butterfly shaft lever-to-adjusting bolt clearance ⓐ
     Out of specification → Adjust.

Butterfly shaft lever-to-adjusting bolt clearance
0.2 ~ 0.4 mm (0.008 ~ 0.016 in)

① Butterfly shaft lever
② Adjusting bolt

3. Adjust:
   - butterfly shaft lever-to-adjusting bolt clearance

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NOTE:
Do not loosen the locknut ③ at this stage of adjustment.

a. Loosen the lock bolt ④.
b. Set the main switch to “ON”.

NOTE:
By performing these steps the proper tension of the control cable ⑤ can be obtained with the spring ⑥ located in the control cable joint ⑦.

c. Tighten the lock bolt to the specified torque.

Lock bolt
3.5 Nm (0.35 m • kg, 2.5 ft • lb)

d. Measure the clearance again.
e. If the butterfly shaft lever-to-adjusting bolt clearance is still out of specification, perform the following steps.
f. Loosen the locknut ③.
g. Turn the adjusting bolt ② clockwise or counterclockwise until the specified clearance is obtained.
h. Tighten the locknut ③.

NOTE:
Apply locking agent (LOCTITE®) to the locknut.

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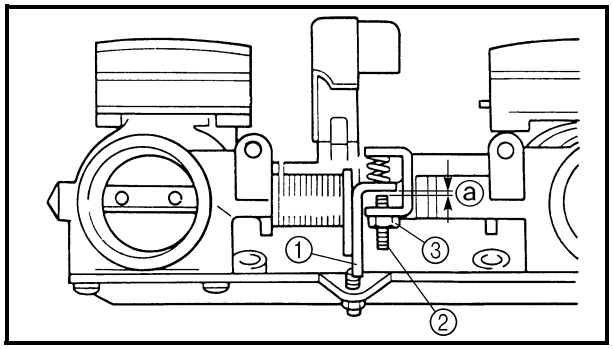

SYNCHRONIZING THE V-BOOST

NOTE:
Before synchronizing the V-boost, the butterfly shaft lever-to-adjusting bolt clearance should be adjusted properly.

1. Measure:
   • butterfly shaft lever-to-adjusting bolt clearance ⓐ
   Out of specification → Adjust.

Butterfly shaft lever-to-adjusting bolt clearance
0.3 ~ 0.5 mm (0.012 ~ 0.020 in)

① Butterfly shaft lever
② Adjusting bolt

2. Adjust:
   • butterfly shaft lever-to-adjusting bolt clearance

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a. Loosen the locknut ③.
b. Turn the adjusting bolt ② clockwise or counterclockwise until the specified clearance is obtained.
c. Tighten the locknut.

NOTE:
Apply locking agent (LOCTITE®) to the locknut.

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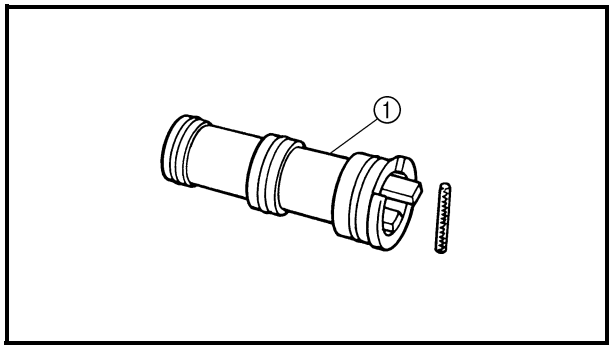
EAS00230
CHECKING THE CYLINDER HEADS

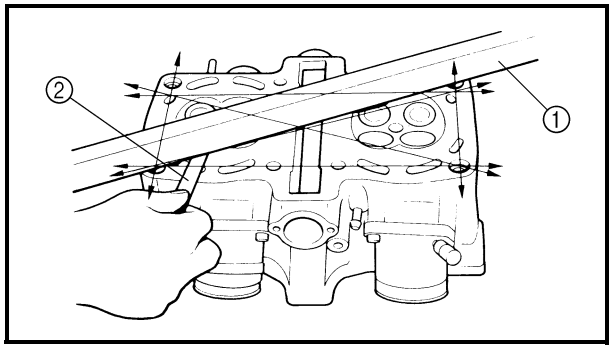
The following procedure applies to all of the cylinder heads.

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

NOTE:

Do not use a sharp instrument to avoid damaging or scratching:
- spark plug bore threads
- valve seats





2. Check:
   - cylinder head
     Damage/scratches → Replace.
   - cylinder head water jacket ①
     Mineral deposits/rust → Eliminate.
3. Measure:
   - cylinder head warpage
     Out of specification → Resurface the cylinder head.

Maximum cylinder head warpage
0.03 mm (0.0012 in)

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a. Place a straightedge ① and a thickness gauge ② across the cylinder head.
b. Measure the warpage.
c. If the limit is exceeded, resurface the cylinder head as follows.

d. Place a 400 ~ 600 grit wet sandpaper on the surface plate and resurface the cylinder head using a figure-eight sanding pattern.

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

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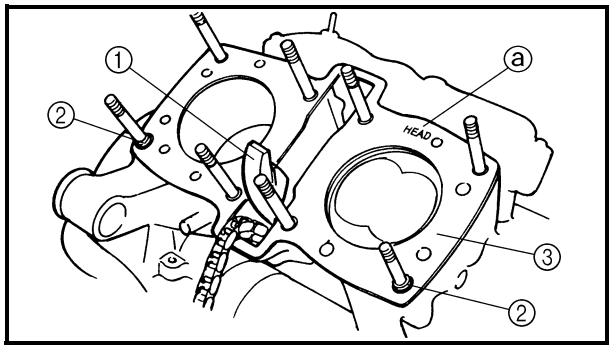
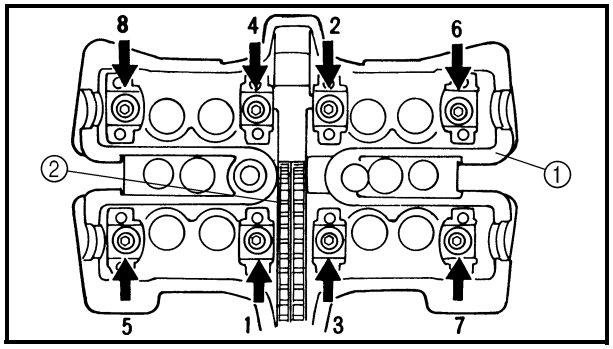




EAS00233
INSTALLING THE CYLINDER HEAD

1. Install:
   - timing chain dampers ①
2. Install:
   - dowel pins ②
   - gasket ③ New

NOTE:
The “HEAD” mark ⓐ on the gasket must face up.

3. Install:
   - cylinder head ①

NOTE:
Pass the timing chain ② through the timing chain cavity.

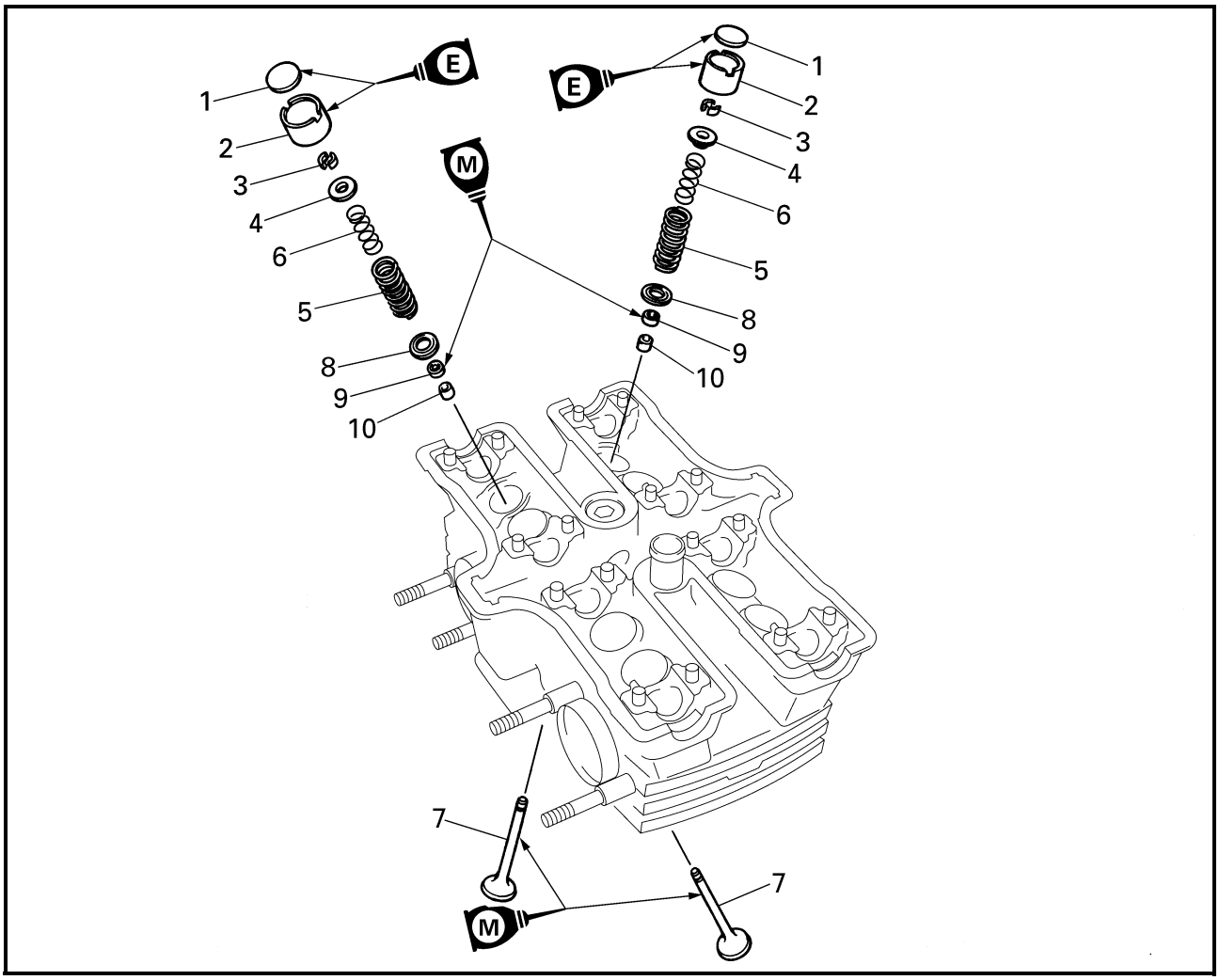
4. Tighten:
   - cylinder head nuts

43 Nm (4.3 m · kg, 31 ft · lb)

NOTE:
- Lubricate the cylinder head nuts with engine oil.
- Tighten the cylinder head nuts in the proper tightening sequence as shown and torque them in two stages.

5. Install:
   - exhaust camshaft
   - intake camshaft
   Refer to “INSTALLING THE CAMSHAFTS”.

VALVES AND VALVE SPRINGS



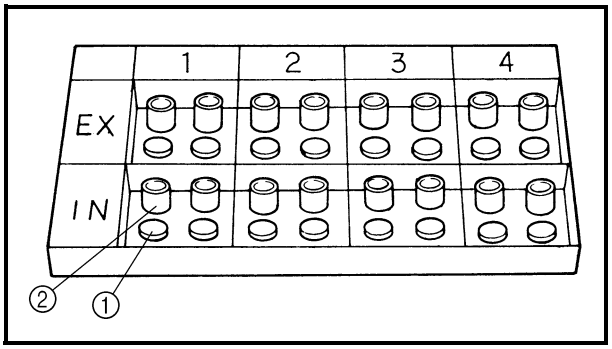
Order	Job/Part	Q'ty	Remarks
	Removing the valves and valve springs		Remove the parts in the order listed.
	Engine assembly		Refer to "ENGINE REMOVAL".
	Camshafts		Refer to "CAMSHAFTS".
	Cylinder heads		Refer to "CYLINDER HEADS".
1	Valve pads	16	
2	Valve lifters	16	
3	Valve cotters	32	
4	Spring retainer	16	
5	Outer valve springs	16	
6	Inner valve springs	16	
7	Valves (intake/exhaust)	8/8	
8	Spring seat	16	
9	Oil seal	16	
10	Valve guide	16	
			For installation, reverse the removal procedure.

EAS00238
REMOVING THE VALVES

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

NOTE:

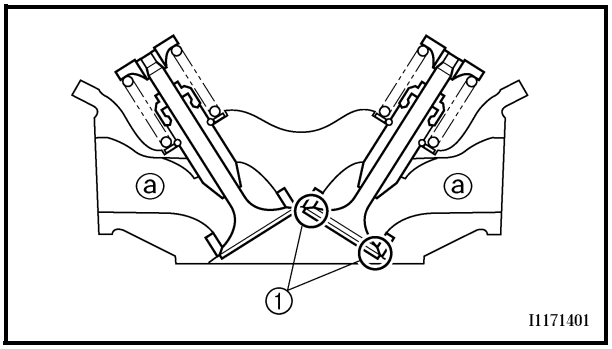
Before removing the internal parts of the cylinder head (e.g., valves, valve springs, valve seats), make sure the valves properly seal.



1. Remove:
   - valve pad ①
   - valve lifter ②

NOTE:

Make a note of the position of each valve lifter ② and valve pad ① so that they can be reinstalled in their original place.



2. Check:
   - valve (for leakage)
     Leakage at the valve seat → Check the valve face, valve seat, and valve seat width. Refer to "CHECKING THE VALVE SEATS".

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

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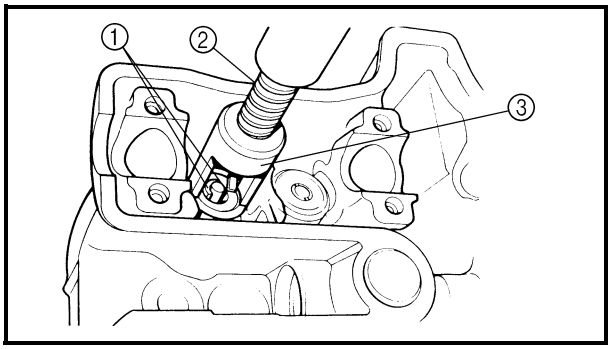
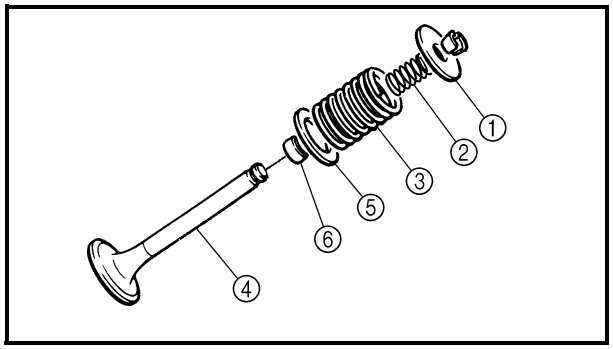


3. Remove:
   - valve cotters ①

NOTE:

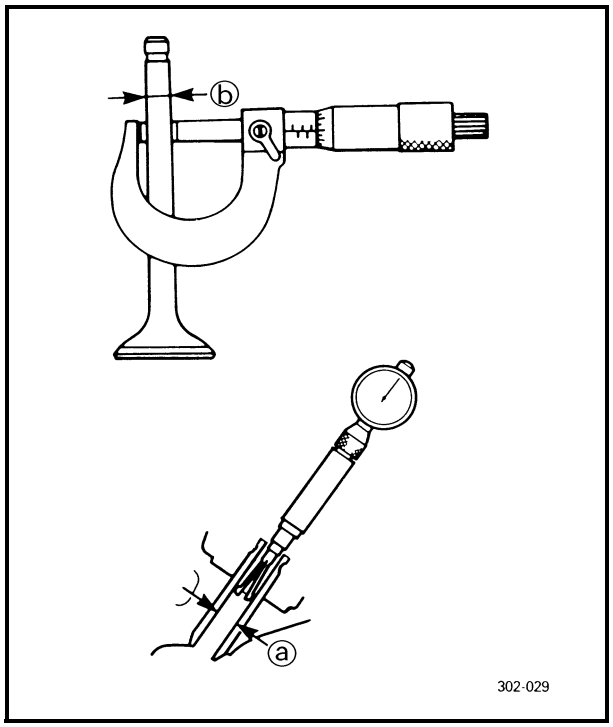
Remove the valve cotters by compressing the valve springs with the valve spring compressor ② and attachment ③.

Valve spring compressor
YM-04019
Attachment
YM-01253-1



4. Remove:
   - spring retainer ①
   - inner valve springs ②
   - outer valve springs ③
   - valve ④
   - spring seat ⑤
   - oil seal ⑥

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



EAS00239
CHECKING THE VALVES AND VALVE GUIDES

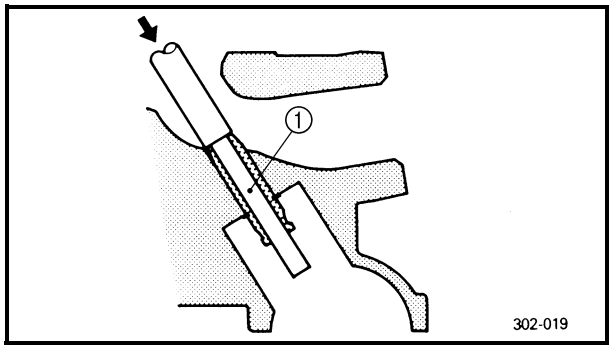
The following procedure applies to all of the valves and valve guides.

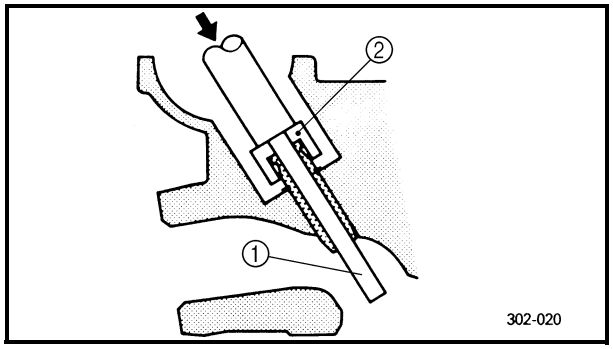
1. Measure:
   - valve-stem-to-valve-guide clearance

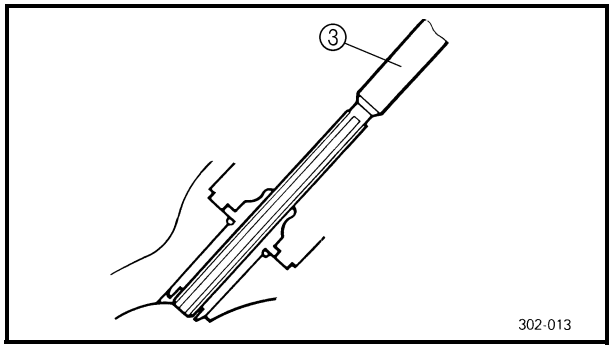
Valve-stem-to-valve-guide clearance =
Valve guide inside diameter ⓐ –
Valve stem diameter ⓑ

Out of specification → Replace the valve guide.

Valve-stem-to-valve-guide clearance
Intake
0.010 ~ 0.037 mm
(0.0004 ~ 0.0015 in)
<Limit>: 0.08 mm (0.0031 in)
Exhaust
0.025 ~ 0.052 mm
(0.0006 ~ 0.0020 in)
<Limit>: 0.1 mm (0.004 in)







2. Replace:
   • valve guide

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NOTE:

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

a. Remove the valve guide with the valve guide remover ①.
b. Install the new valve guide with the valve guide installer ② and valve guide remover ①.
c. After installing the valve guide, bore the valve guide with the valve guide reamer ③ to obtain the proper valve-stem-to-valve-guide clearance.

NOTE:

After replacing the valve guide, reface the valve seat.

Valve guide remover (5.5 mm)
YM-01122
Valve guide installer (5.5 mm)
YM-4015
Valve guide reamer (5.5 mm)
YM-01196

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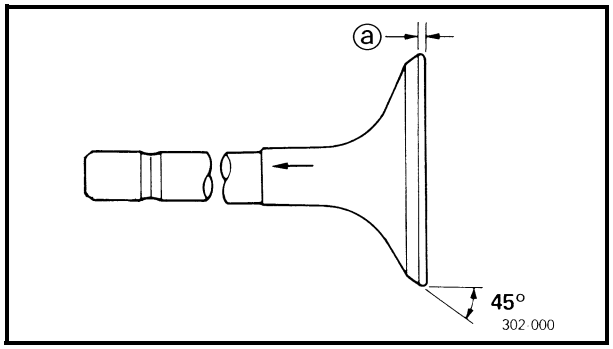
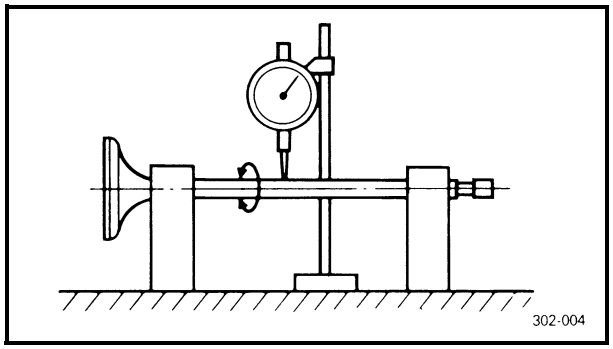
3. Eliminate:
   • carbon deposits
   (from the valve face and valve seat)
4. Check:
   • valve face
   Pitting/wear → Grind the valve face.
   • valve stem end
   Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.



5. Measure:
   • valve margin thickness ⓐ
   Out of specification → Replace the valve.

Valve margin thickness
1.1 ~ 1.5 mm (0.043 ~ 0.059 in)
<Limit>: 0.7 mm (0.03 in)



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

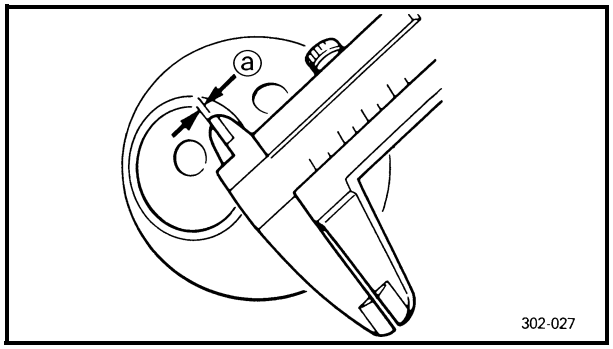
NOTE:
- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, always replace the oil seal.

Valve stem runout
0.01 mm (0.0004 in)

EAS00240
CHECKING THE VALVE SEATS

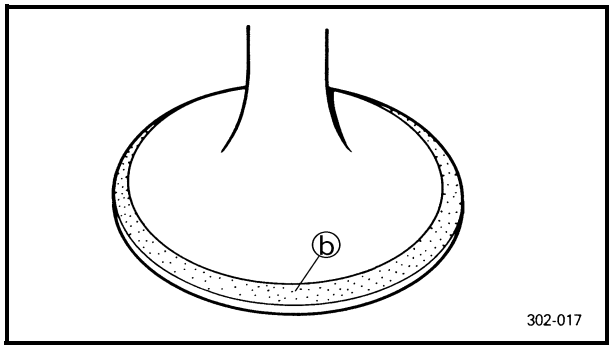
The following procedure applies to all of the valves and valve seats.

1. Eliminate:
   • carbon deposits
   (from the valve face and valve seat)
2. Check:
   • valve seat
   Pitting/wear → Replace the cylinder head.



3. Measure:
   • valve seat width ⓐ
   Out of specification → Replace the cylinder head.

Valve seat width
Intake
0.9 ~ 1.1 mm (0.035 ~ 0.043 in)
Exhaust
0.9 ~ 1.1 mm (0.035 ~ 0.043 in)



a. Apply Mechanic's blueing dye (Dykem) ⓑ onto the valve face.
b. Install the valve into the cylinder head.
c. Press the valve through the valve guide and onto the valve seat to make a clear impression.
d. Measure the valve seat width.

NOTE:
Where the valve seat and valve face contacted one another, the blueing will have been removed.

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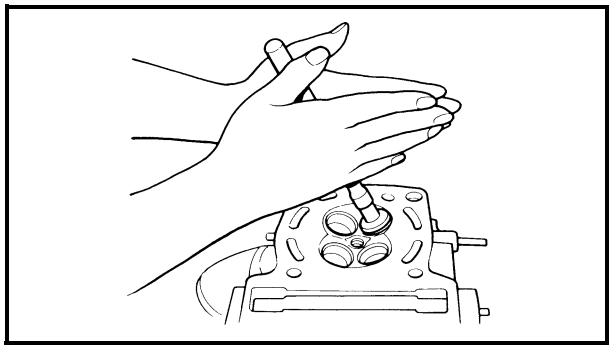
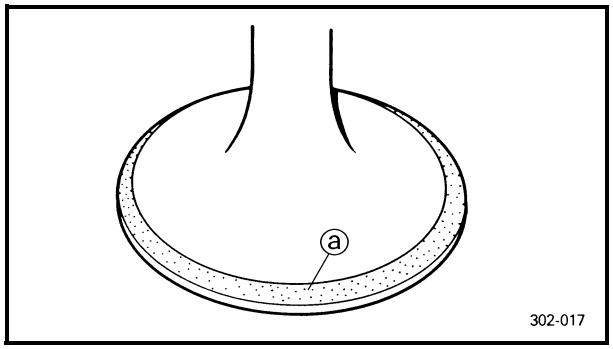


4. Lap:
   - valve face
   - valve seat

NOTE:
After replacing the cylinder head or replacing the valve and valve guide, the valve seat and valve face should be lapped.



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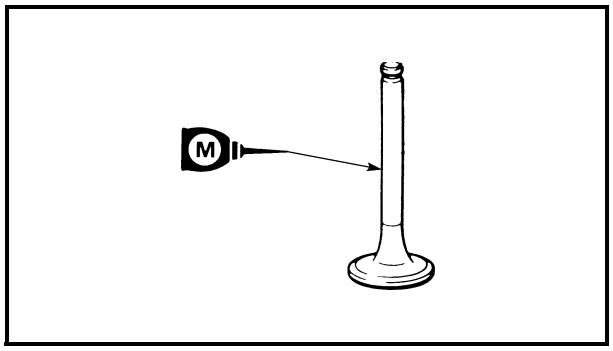
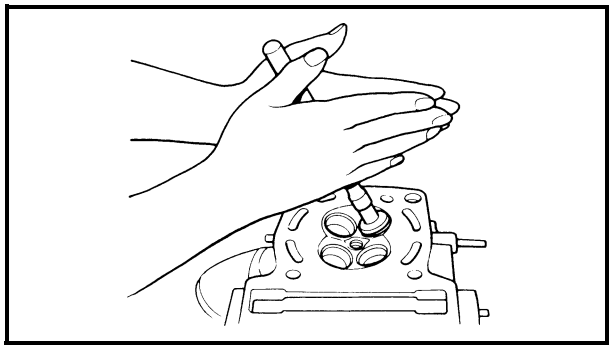
a. Apply a coarse lapping compound ⓐ to the valve face.

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



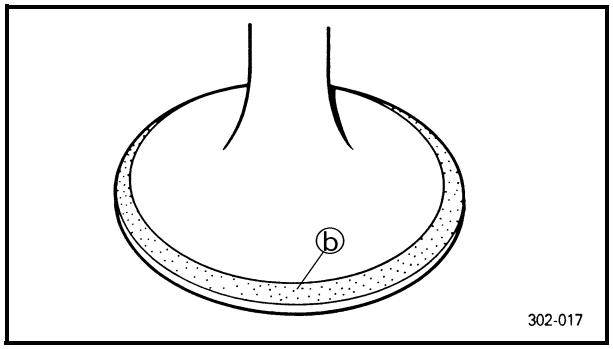
b. Apply molybdenum disulfide oil onto the valve stem.
c. Install the valve into the cylinder head.
d. Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the lapping compound.

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

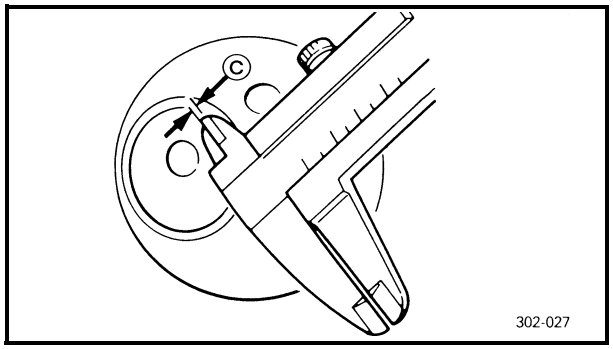


e. Apply a fine lapping compound to the valve face and repeat the above steps.
f. After every lapping procedure, be sure to clean off all of the lapping compound from the valve face and valve seat.

4



g. Apply Mechanic's blueing dye (Dykem) ⓑ onto the valve face.
h. Install the valve into the cylinder head.
i. Press the valve through the valve guide and onto the valve seat to make a clear impression.



j. Measure the valve seat width ⓒ again. If the valve seat width is out of specification, reface and lap the valve seat.

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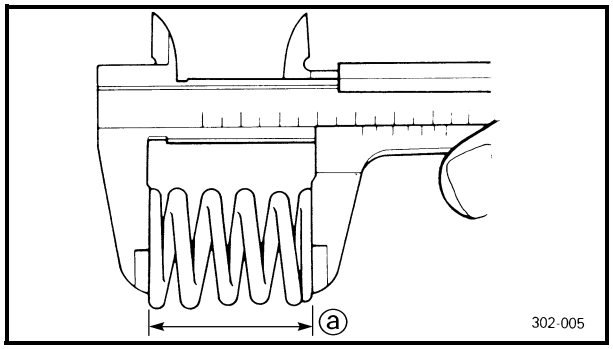
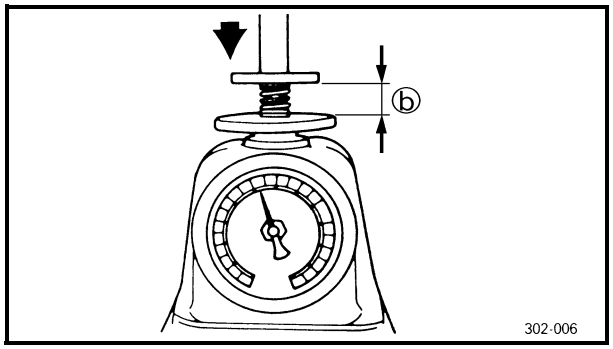
EAS00241
CHECKING THE VALVE SPRINGS

The following procedure applies to all of the valve springs.

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



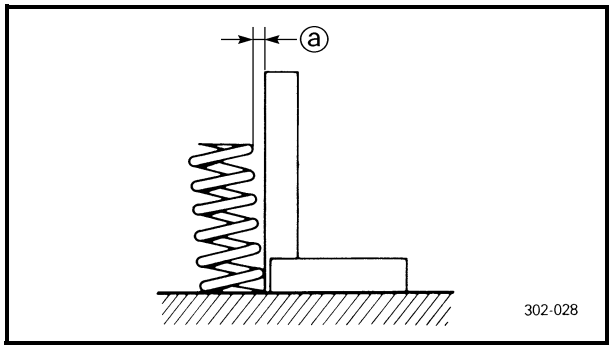
Valve spring free length limit (intake and exhaust)
Inner valve spring
37.45 mm (1.47 in)
Outer valve spring
38.90 mm (1.53 in)

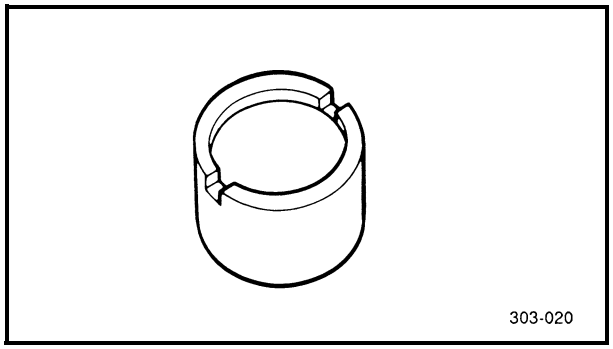


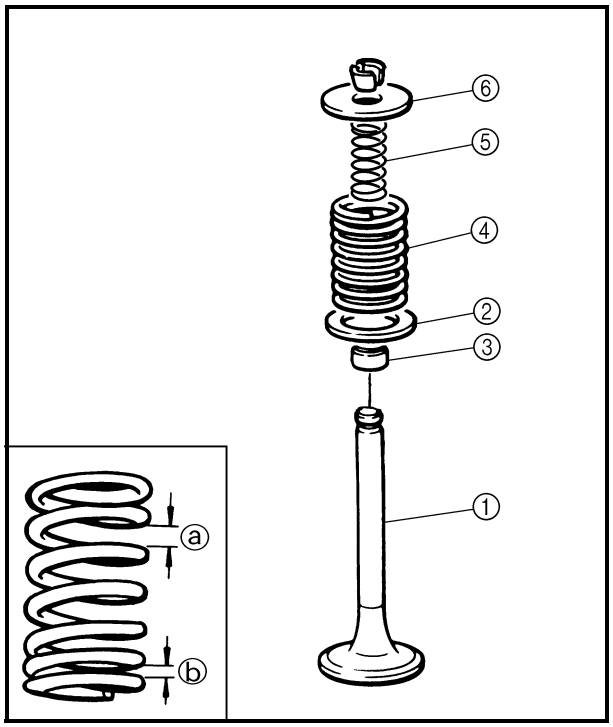
2. Measure:
   • compressed valve spring force
   Out of specification → Replace the valve spring.

ⓑ Installed length

Compressed valve spring force (installed)
Intake and exhaust inner valve spring
6.29 ~ 7.39 kg at 31.8 mm
(13.9 ~ 16.3 lb at 1.25 in)
Intake and exhaust outer valve spring
13.3 ~ 15.7 kg at 33.8 mm
(29.3 ~ 34.6 lb at 1.33 in)







3. Measure:
   • valve spring tilt ⓐ
   Out of specification → Replace the valve spring.

Spring tilt limit
Intake and exhaust inner valve spring
1.7 mm (0.067 in)
Intake and exhaust outer valve spring
1.8 mm (0.071 in)

EAS00242
CHECKING THE VALVE LIFTERS

The following procedure applies to all of the valve lifters.
1. Check:
   • valve lifter
   Damage/scratches → Replace the valve lifters and cylinder head.

EAS00250
INSTALLING THE VALVES

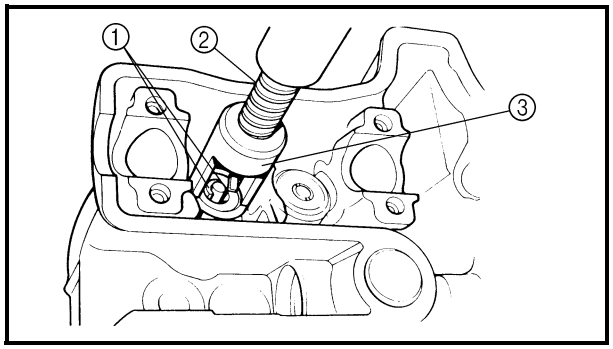
The following procedure applies to all of the valves and related components.
1. Deburr:
   • valve stem end
   (with an oil stone)
2. Lubricate:
   • valve stem
   • oil seal
   (with the recommended lubricant)

Recommended lubricant
Molybdenum disulfide oil

3. Install:
   • valve ①
   • spring seat ②
   • oil seal ③
   • outer valve springs ④
   • inner valve springs ⑤
   • spring retainer ⑥
   (into the cylinder head)

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

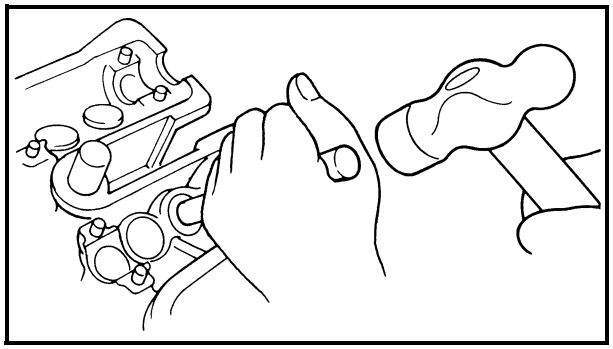
ⓑ Smaller pitch



4. Install:
   • valve cotters ①

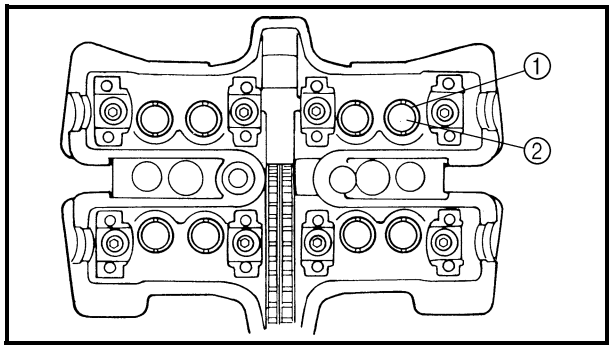
NOTE:
Install the valve cotters by compressing the valve springs with the valve spring compressor ② and attachment ③.

Valve spring compressor
YM-04019
Attachment
YM-01253-1



5. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a soft-face hammer.

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



6. Lubricate:
   • valve lifter ①
   (with the recommended lubricant)
   • valve pad ②

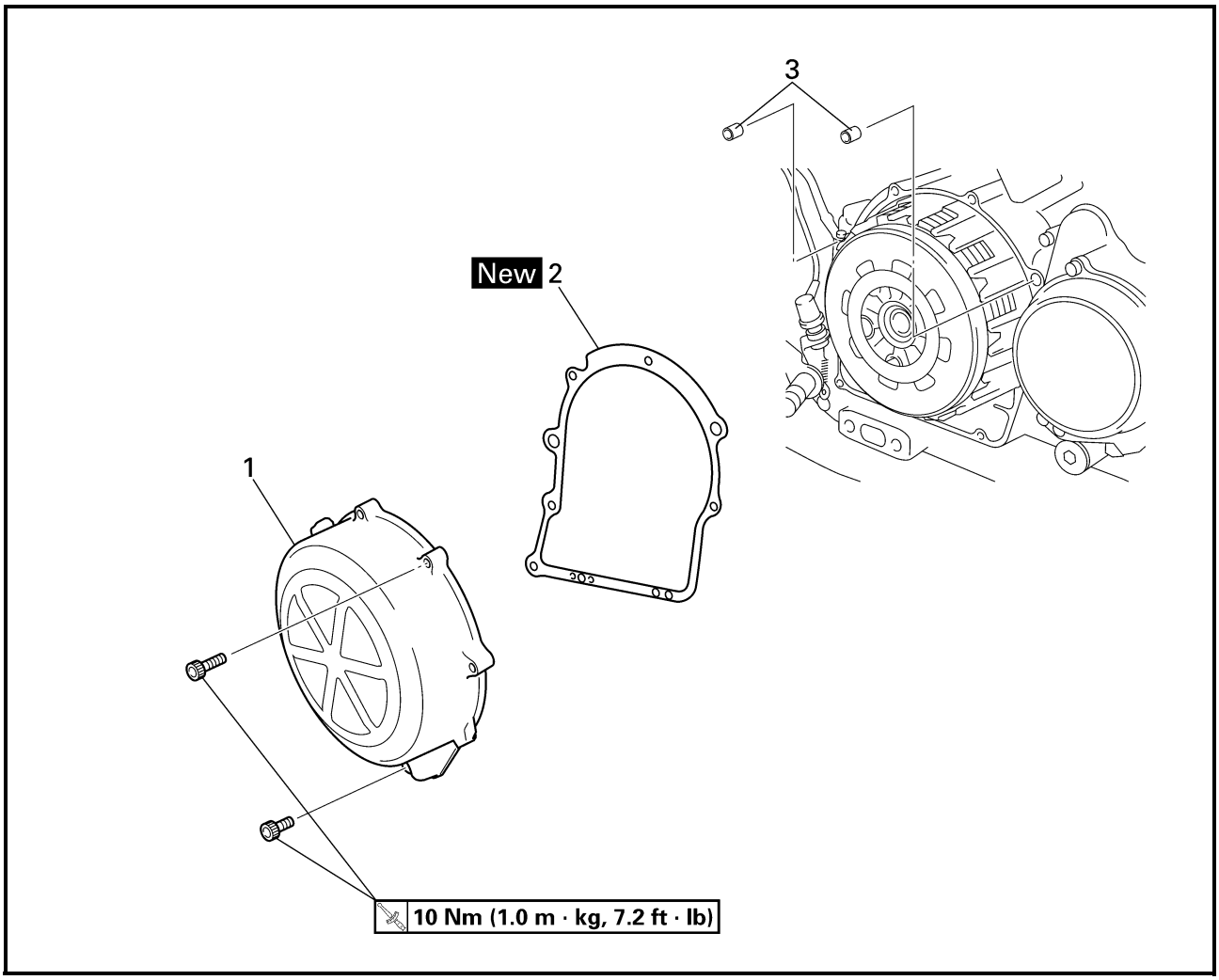
Recommended lubricant
Molybdenum disulfide oil

7. Install:
   • valve lifter
   • valve pad

NOTE:
- The valve lifter must move smoothly when rotated with a finger.
- Each valve lifter and valve pad must be reinstalled in its original position.

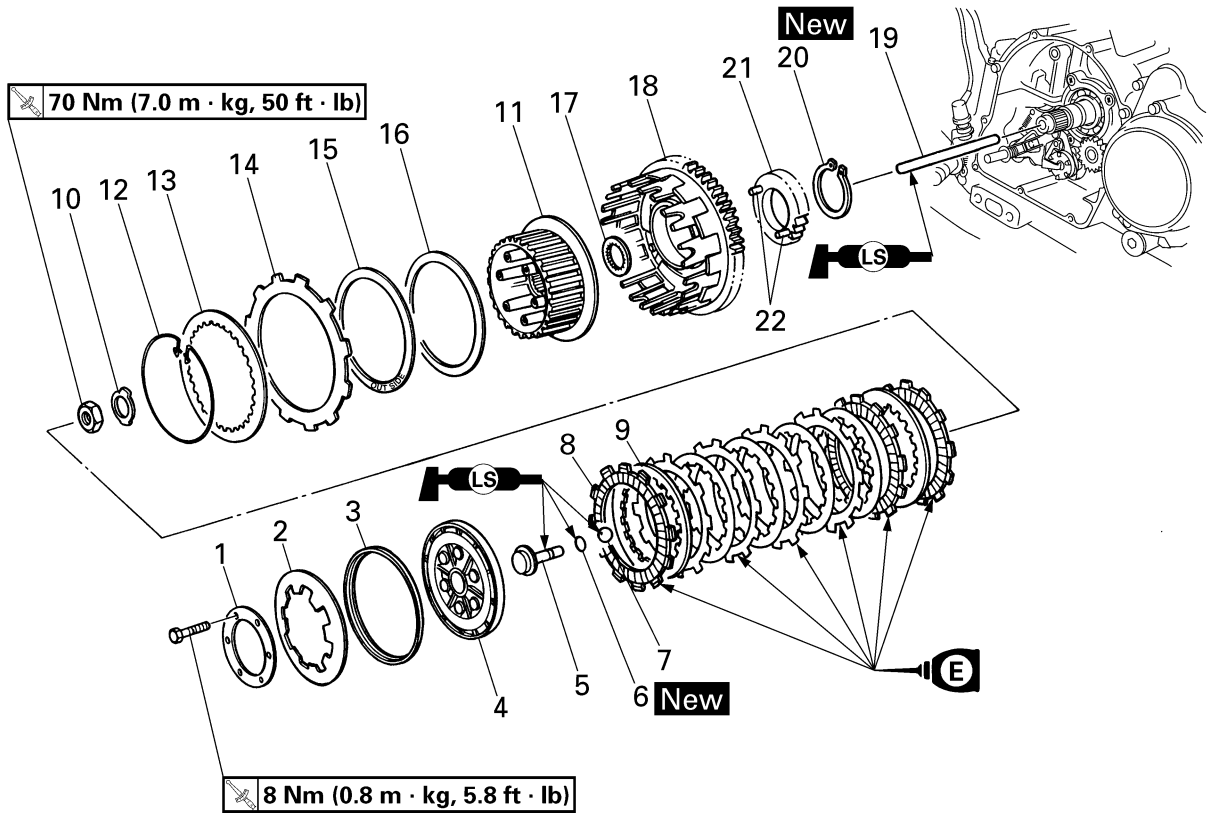
CLUTCH

CRANKCASE COVER (RIGHT SIDE)

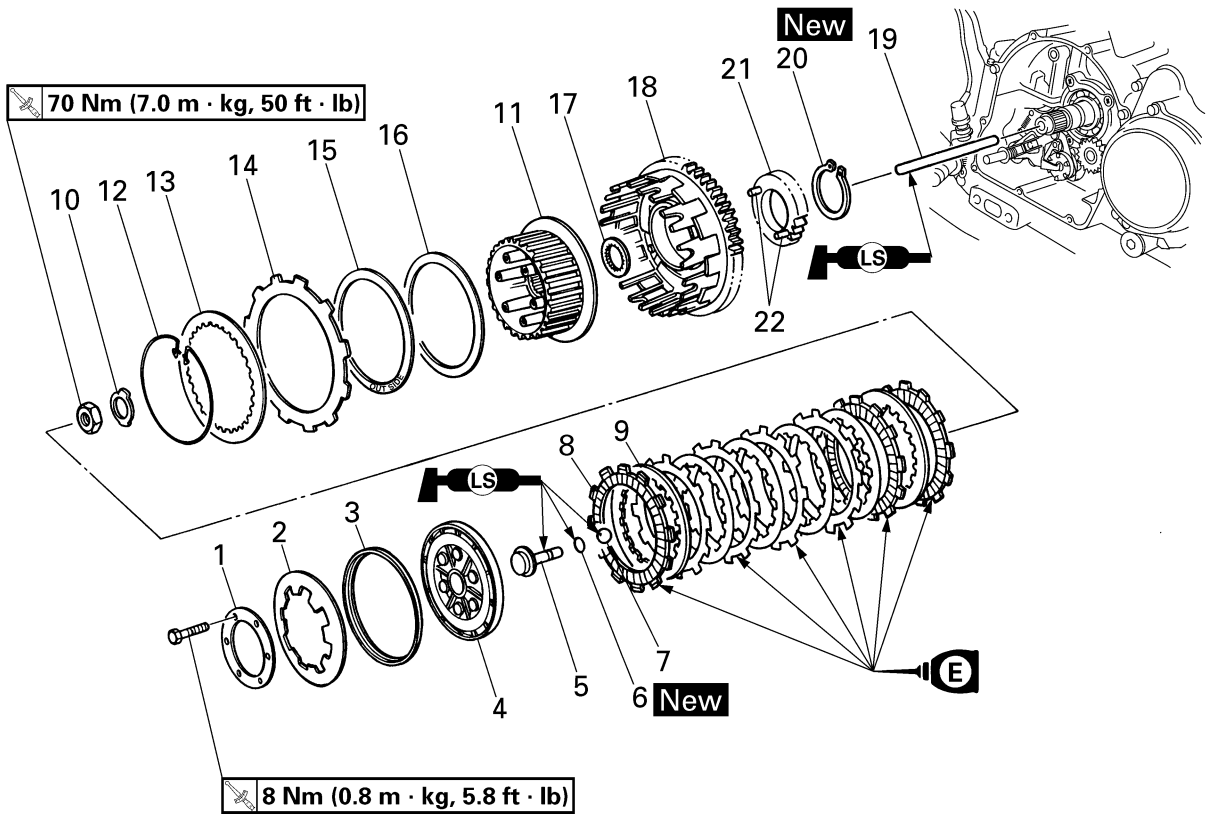


Order	Job/Part	Q'ty	Remarks
	Removing the crankcase (right side)		Remove the parts in the order listed. Stand the motorcycle on a level surface. **⚠ WARNING** **Securely support the motorcycle so there is no danger of it falling over.**
	Engine oil		Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Brake pedal and footrest (right)		Refer to "ENGINE REMOVAL".
1	Crankcase cover (right side)	1	
2	Gasket	1	
3	Dowel pins	2	
			For installation, reverse the removal procedure.

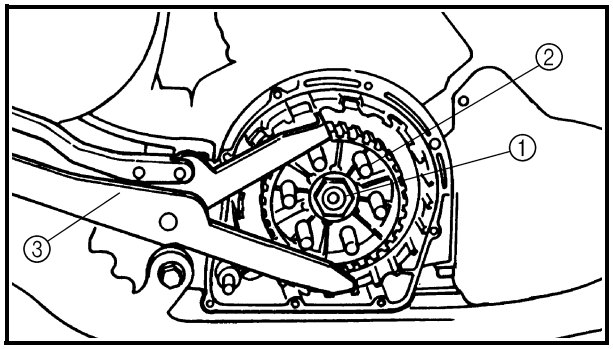
CLUTCH ASSEMBLY



Order	Job/Part	Q'ty	Remarks
	Removing the clutch		Remove the parts in the order listed.
1	Clutch spring plate retainer	1	
2	Clutch spring plate	1	
3	Clutch spring plate seat	1	
4	Pressure plate	1	
5	Short clutch push rod	1	
6	O-ring	1	
7	Ball	1	
8	Friction plates	7	
9	Clutch plates	6	
10	Lock washer	1	
11	Clutch boss	1	
12	Wire circlip	1	



Order	Job/Part	Q'ty	Remarks
13	Clutch plate	1	
14	Friction plate	1	
15	Clutch damper spring	1	
16	Clutch damper spring seat	1	
17	Thrust washer	1	
18	Clutch housing	1	
19	Long clutch push rod	1	
20	Circlip	1	
21	Oil pump drive gear	1	
22	Dowel pins	2	
			For installation, reverse the removal procedure.



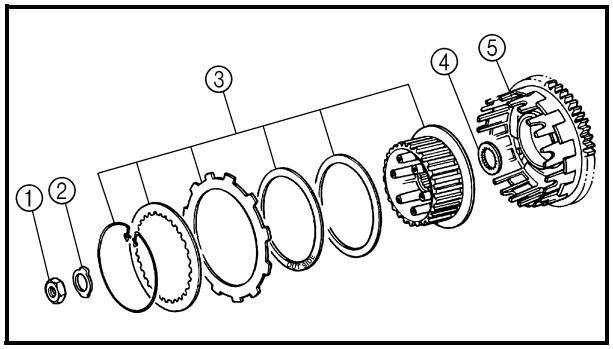
EAS00277
REMOVING THE CLUTCH

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

NOTE:

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

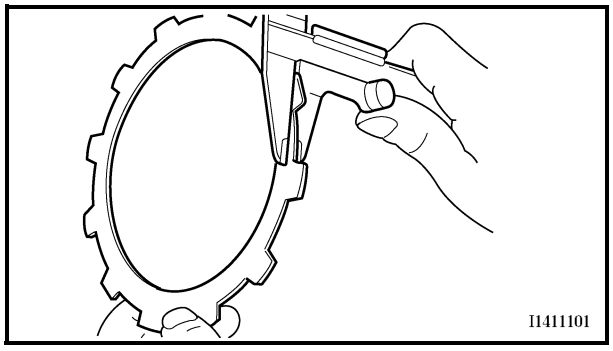
	Clutch holding tool **YM-91042**



3. Remove:
   - clutch boss nut ①
   - lock washer ②
   - clutch boss assembly ③
   - thrust washer ④
   - clutch housing ⑤

NOTE:

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



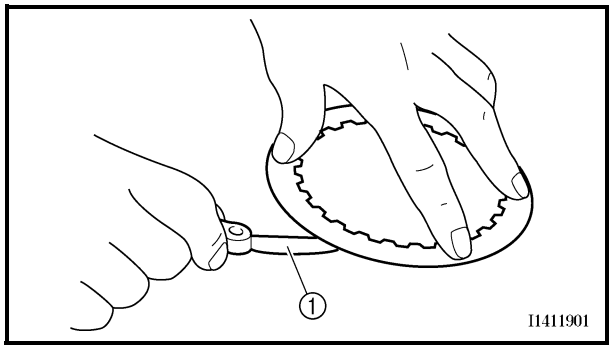
EAS00280
CHECKING THE FRICTION PLATES

The following procedure applies to all of the friction plates.

1. Check:
   - friction plate
     Damage/wear → Replace the friction plates as a set.
2. Measure:
   - friction plate thickness
     Out of specification → Replace the friction plates as a set.

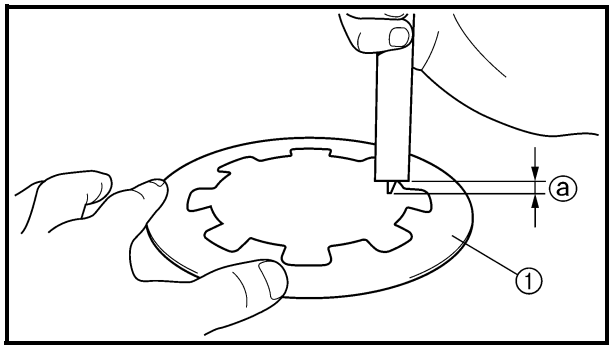
NOTE:
Measure the friction plate at four places.

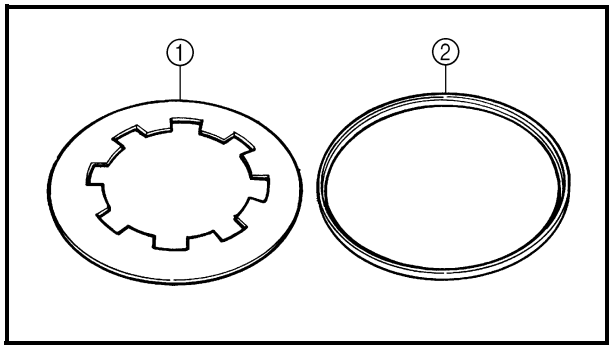
Friction plate thickness
2.9 ~ 3.1 mm
(0.114 ~ 0.122 in)
<Limit>: 2.8 mm (0.110 in)



EAS00281
CHECKING THE CLUTCH PLATES
The following procedure applies to all of the clutch plates.
1. Check:
   - clutch plate
     Damage → Replace the clutch plates as a set.
2. Measure:
   - clutch plate warpage
     (with a surface plate and thickness gauge ①)
     Out of specification → Replace the clutch plates as a set.

Clutch plate warpage limit
0.2 mm (0.008 in)

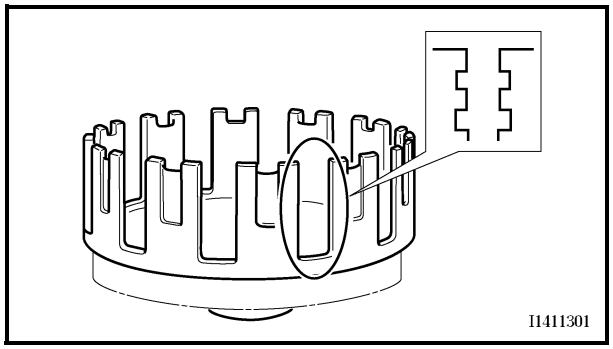




EAS00283
CHECKING THE CLUTCH SPRING PLATE
1. Check:
   - clutch spring plate ①
     Damage → Replace.
2. Measure:
   - clutch spring free height ⓐ
     Out of specification → Replace the clutch spring plate.

Clutch spring free height
7 mm (0.28 in)
<Limit>: 6.5 mm (0.26 in)

3. Check:
   - clutch spring plate seat ②
     Damage → Replace.

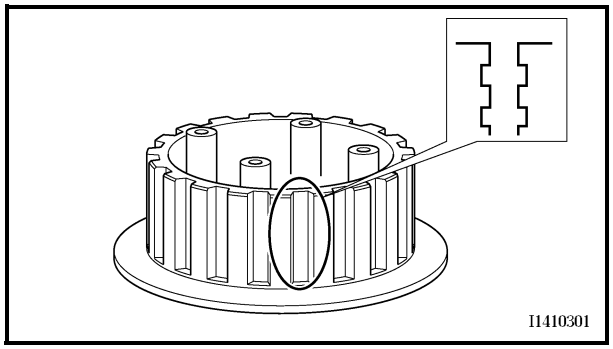


EAS00284
CHECKING THE CLUTCH HOUSING

1. Check:
   - clutch housing dogs
     Damage/pitting/wear → Deburr the clutch housing dogs or replace the clutch housing.

NOTE:
Pitting on the clutch housing dogs will cause erratic clutch operation.

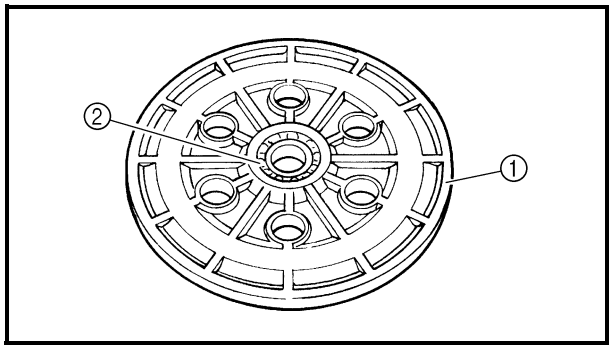
2. Check:
   - bearing
     Damage/wear → Replace the bearing and clutch housing.



EAS00285
CHECKING THE CLUTCH BOSS

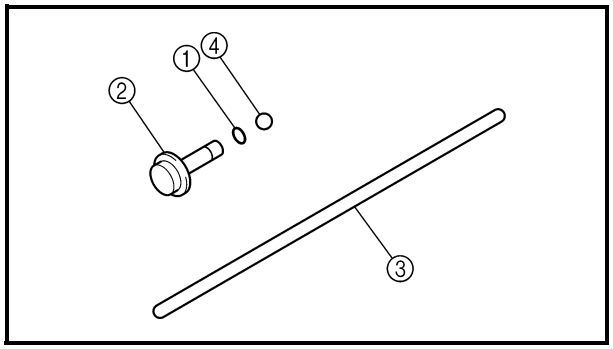
1. Check:
   - clutch boss splines
     Damage/pitting/wear → Replace the clutch boss.

NOTE:
Pitting on the clutch boss splines will cause erratic clutch operation.



EAS00286
CHECKING THE PRESSURE PLATE

1. Check:
   - pressure plate ①
     Cracks/damage → Replace.
   - bearing ②
     Damage/wear → Replace.



EAS00288
CHECKING THE CLUTCH PUSH RODS

1. Check:
   - O-ring ①
   - short clutch push rod ②
   - long clutch push rod ③
   - ball ④

   Cracks/damage/wear → Replace the defective part(s).
2. Measure:
   - long clutch push rod bending limit

   Out of specification → Replace the long clutch push rod.

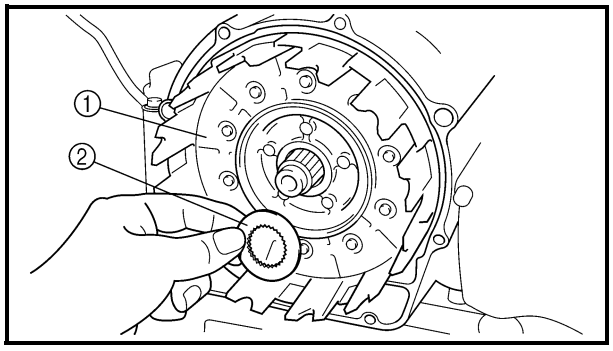
Long clutch push rod bending limit
0.5 mm (0.26 in)

EAS00292
CHECKING THE PRIMARY DRIVE

1. Check:
   - primary drive gear
   - primary driven gear

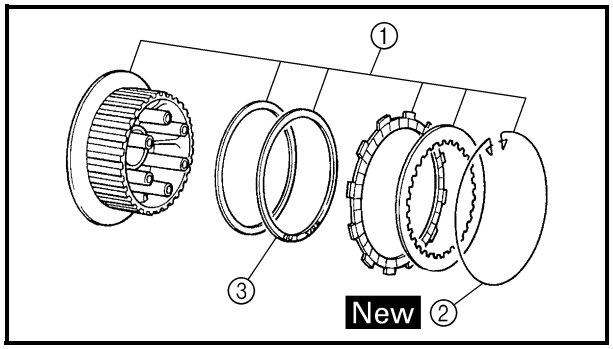
   Damage/wear → Replace the primary drive and primary driven gears as a set.
   Excessive noise during operation → Replace the primary drive and primary driven gears as a set.
2. Check:
   - primary-drive-gear-to-primary-driven-gear free play

   Free play exists → Replace the primary drive and primary driven gears as a set.



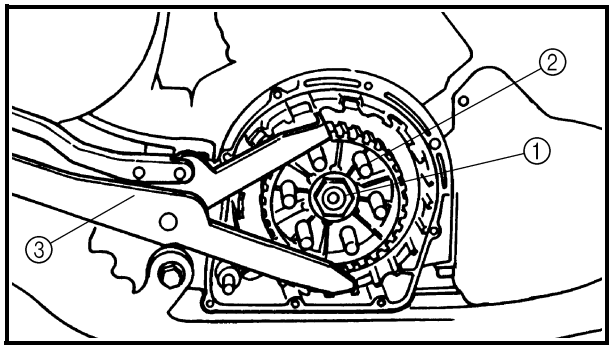
EAS00296
INSTALLING THE CLUTCH

1. Install:
   - clutch housing ①
   - thrust washer ②



2. Install:
   • clutch boss assembly ①

NOTE:
- If the wire circlip ② has been removed, carefully install a new one as shown.
- Install the clutch spring plate ③ with the "OUTSIDE" mark facing out.



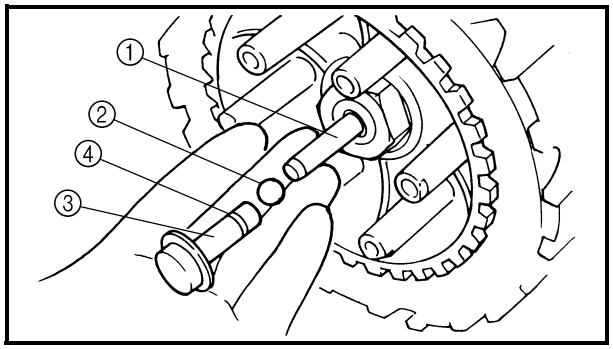
3. Install:
   • clutch boss ①
   • lock washer New
   • clutch boss nut ②

70 Nm (7.0 m · kg, 50 ft · lb)

NOTE:
While holding the clutch boss with the universal clutch holder ③, tighten the clutch boss nut.

Clutch holding tool
YM-91042

4. Bend the lock washer tab along a flat side of the nut.



5. Lubricate:
   • long clutch push rod ①
   • ball ②
   • short clutch push rod ③
   (with the recommended lubricant)

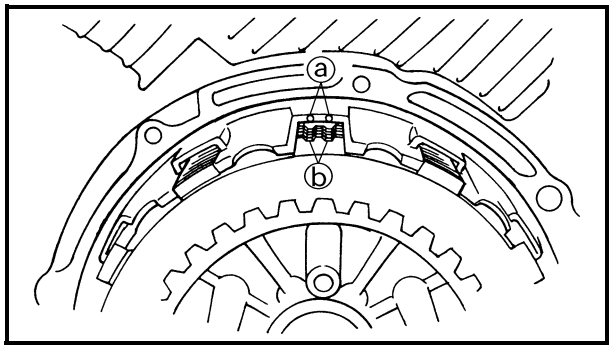
Recommended lubricant
Lithium soap base grease

6. Install:
   • long clutch push rod
   • ball
   • short clutch push rod
   (along with the O-ring ④)

NOTE:
Insert the rounded end of the long clutch push rod into the clutch boss first.

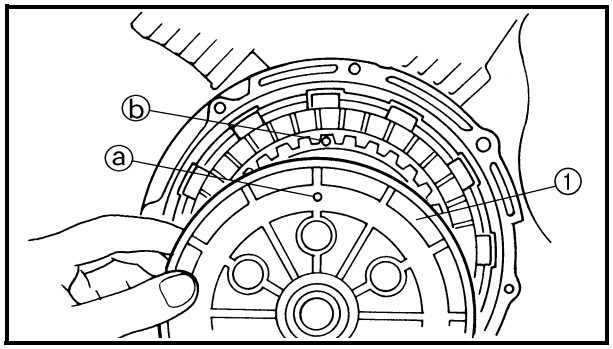
7. Lubricate:
   - friction plates
   - clutch plates
   (with the recommended lubricant)

	Recommended lubricant **Engine oil**



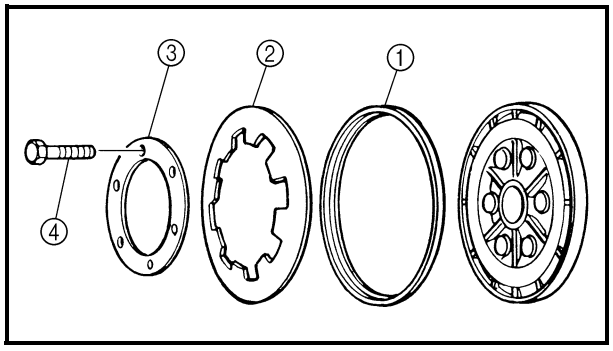
8. Install:
   - friction plates
   - clutch plates

NOTE:
- First, install a friction plate and then alternate between a clutch plate and a friction plate.
- Align the two embosed mark ⓐ on the clutch housing with the two semicircular slots ⓑ in the friction plates.



9. Install:
   - pressure plate ①

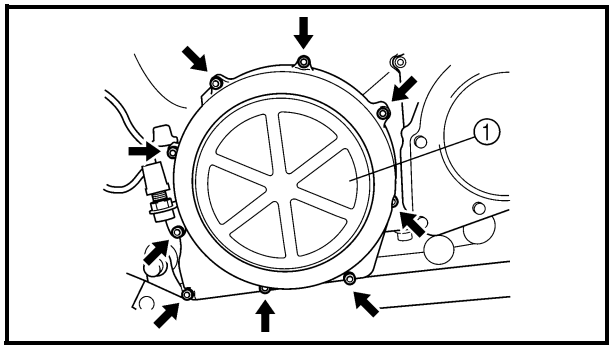
NOTE:
Align the punch mark ⓐ on the pressure plate with the punch mark ⓑ on the clutch boss.



10. Install:
   - clutch spring plate seat ①
   - clutch spring plate ②
   - clutch spring plate retainer ③
   - clutch spring bolts ④

8 Nm (0.8 m · kg, 5.8 ft · lb)

NOTE:
Tighten the clutch spring bolts in stages and in a crisscross pattern.



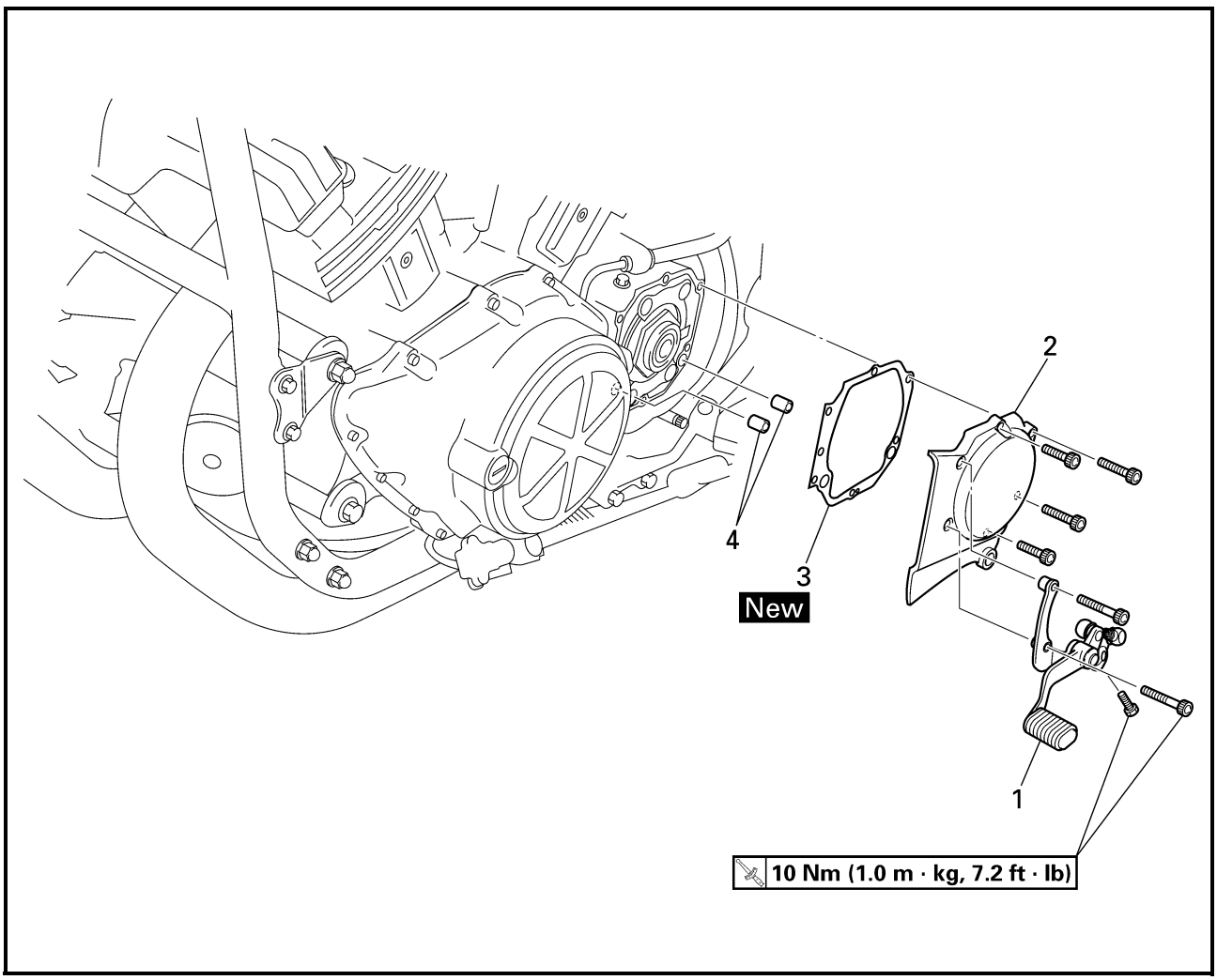
11. Install:
   - clutch cover ①

10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
Tighten the clutch cover bolts in stages and in a crisscross pattern.

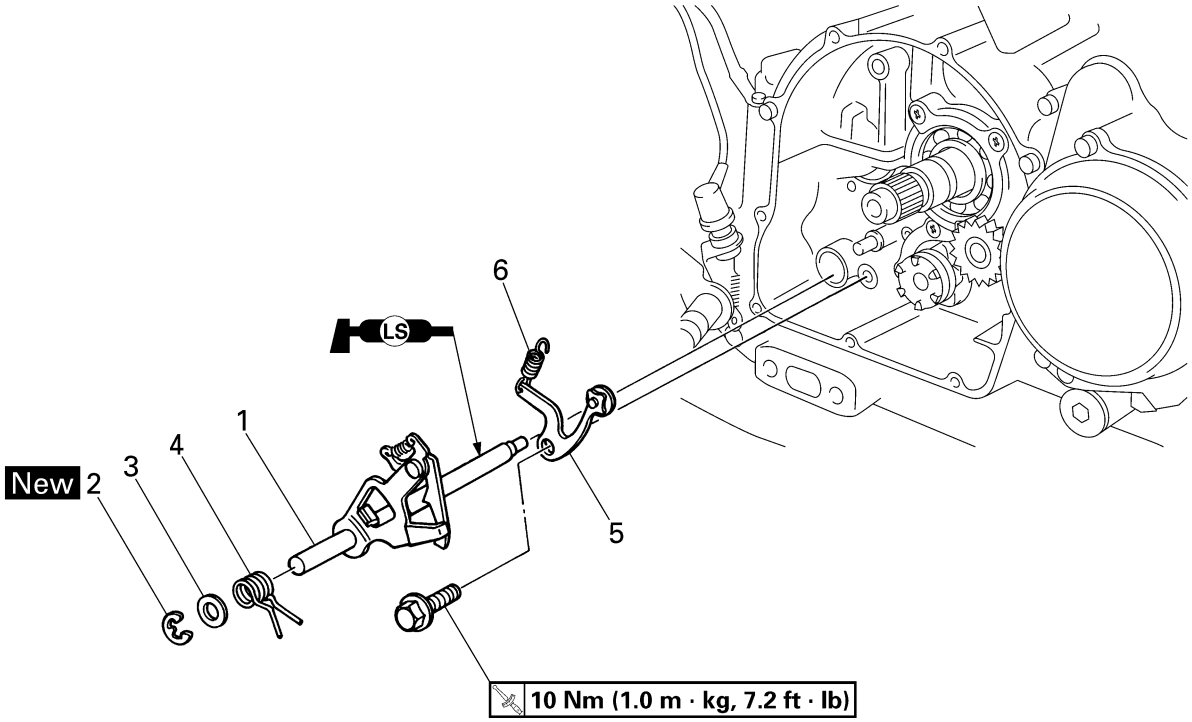
SHIFT SHAFT

GENERATOR ROTOR COVER

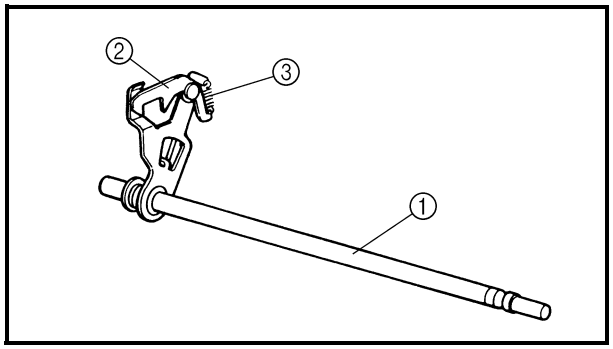


Order	Job/Part	Q'ty	Remarks
	Removing the generator rotor cover		Remove the parts in the order listed.
	Engine oil		Refer to "CHANGING THE ENGINE OIL" in chapter 3.
1	Shift pedal	1	
2	Middle gear case cover	1	**NOTE:** Loosen the bolts in stages and in a criss-cross pattern.
3	Gasket	1	
4	Dowel pins	2	
			For installation, reverse the removal procedure.

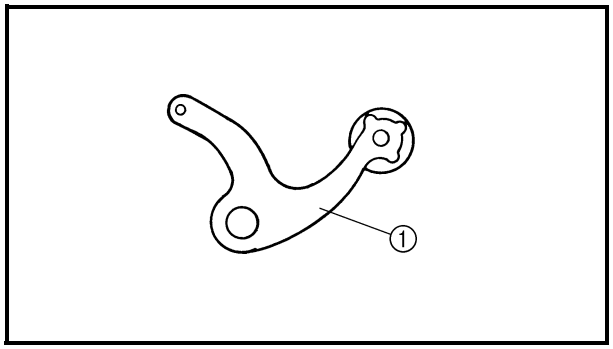
SHIFT SHAFT AND STOPPER LEVER



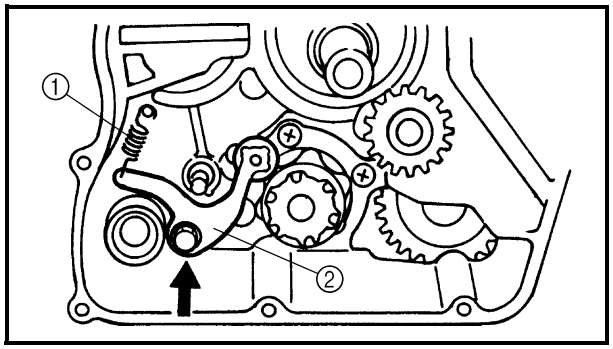
Order	Job/Part	Q'ty	Remarks
	Removing the shift shaft and stopper lever		Remove the parts in the order listed.
	Clutch assembly		Refer to "CLUTCH".
1	Shift shaft assembly	1	
2	Circlip	1	
3	Washer	1	
4	Torsion spring	1	
5	Stopper lever	1	
6	Return spring	1	
			For installation, reverse the removal procedure.



EAS00328
CHECKING THE SHIFT SHAFT
1. Check:
   - shift shaft ①
   - shift lever ②
     Bends/damage/wear → Replace.
   - shift lever spring ③
     Damage/wear → Replace.



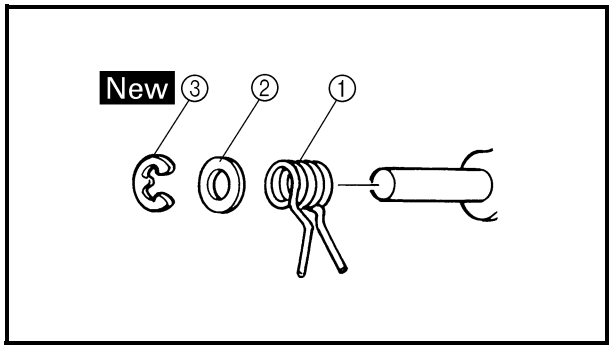
EAS00330
CHECKING THE STOPPER LEVER
1. Check:
   - stopper lever ①
     Bends/damage → Replace.
     Roller turns roughly → Replace the stopper lever.



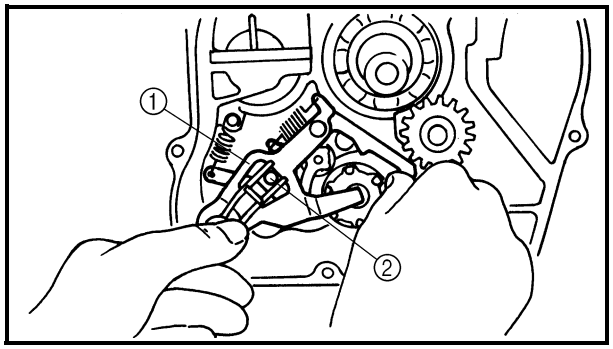
EAS00336
INSTALLING THE SHIFT SHAFT
1. Install:
   - stopper lever spring ①
   - stopper lever ②

10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
- Hook the ends of the stopper lever spring onto the stopper lever and the crankcase boss.
- Mesh the stopper lever with the shift drum segment assembly.



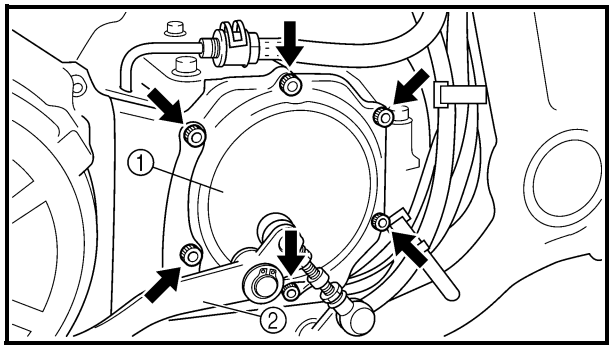
2. Install:
   - shift lever spring ①
   - washer ②
   - circlip ③ New



3. Install:
   • shift shaft ①

NOTE:
- Lubricate the oil seal lips with lithium soap base grease.
- Hook the end of the shift shaft spring onto the shift shaft spring stopper ②.

4. Install:
   • clutch
   • clutch cover
   Refer to “INSTALLING THE CLUTCH”.



5. Install:
   • dowel pins
   • gasket New
   • middle gear cover ①
   • shift pedal ②

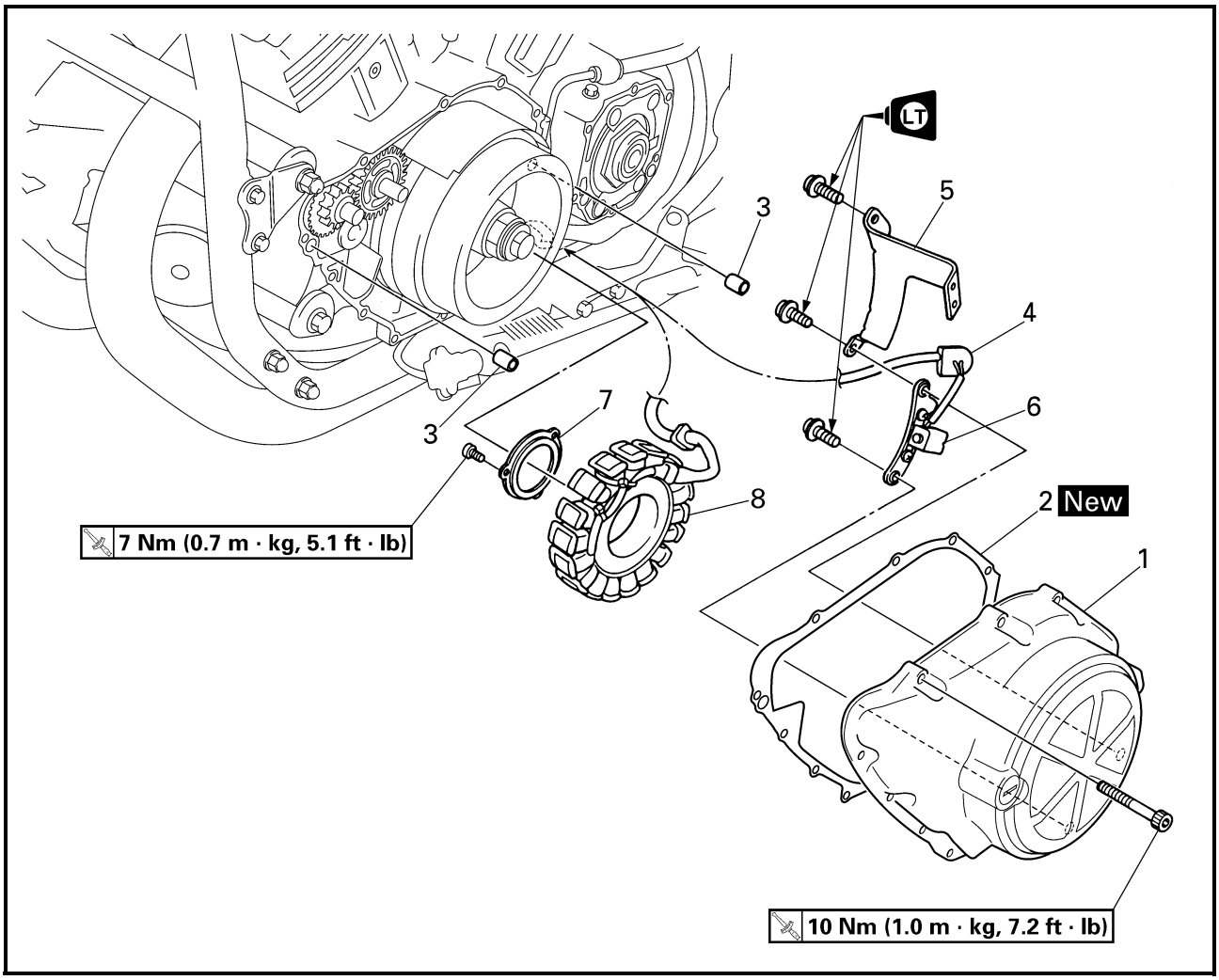
⚠ WARNING

Always use a new copper washer on the lower bolt.

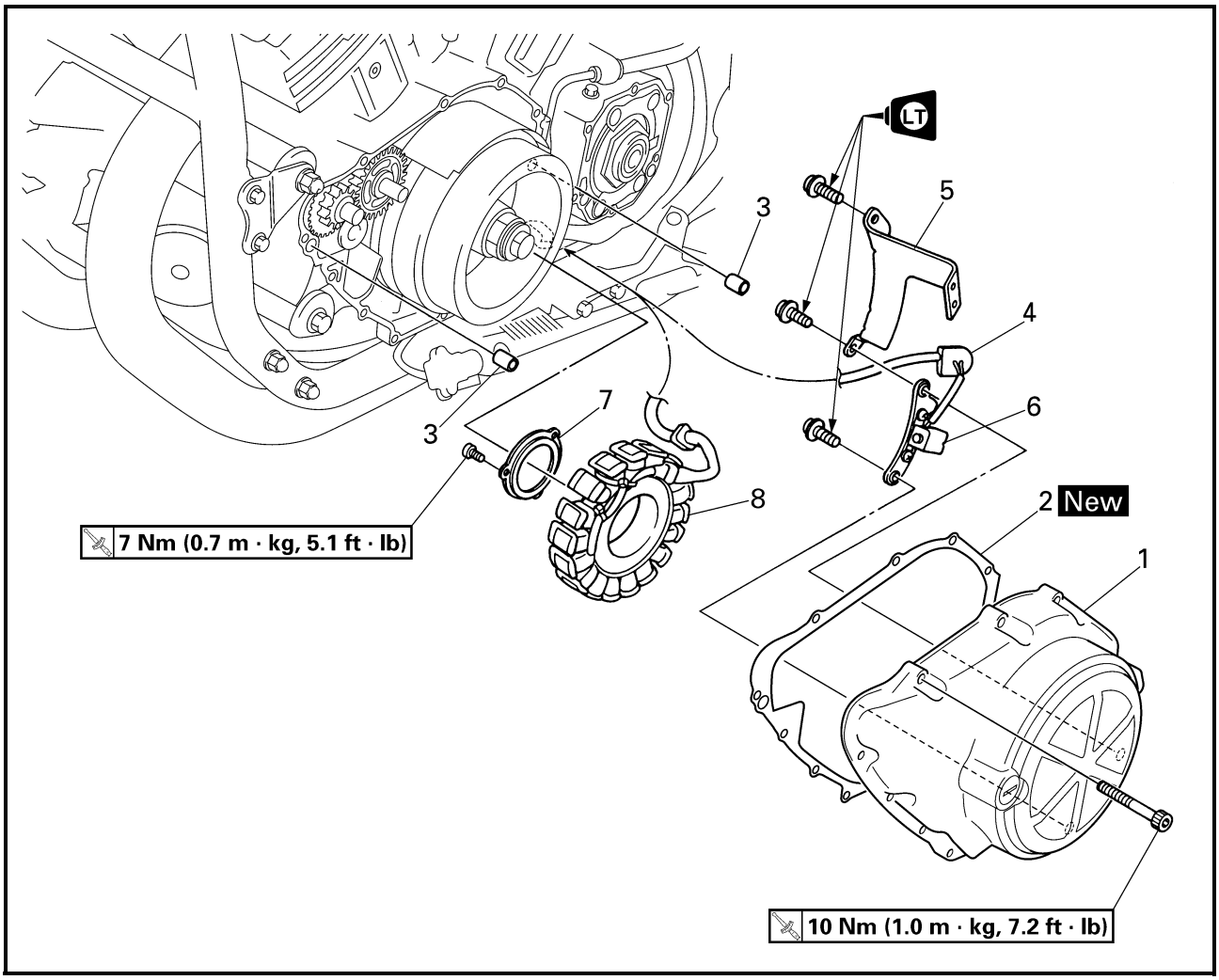
NOTE:
Tighten the middle gear cover bolts in stages and in a crisscross pattern.

GENERATOR

STATOR COIL ASSEMBLY

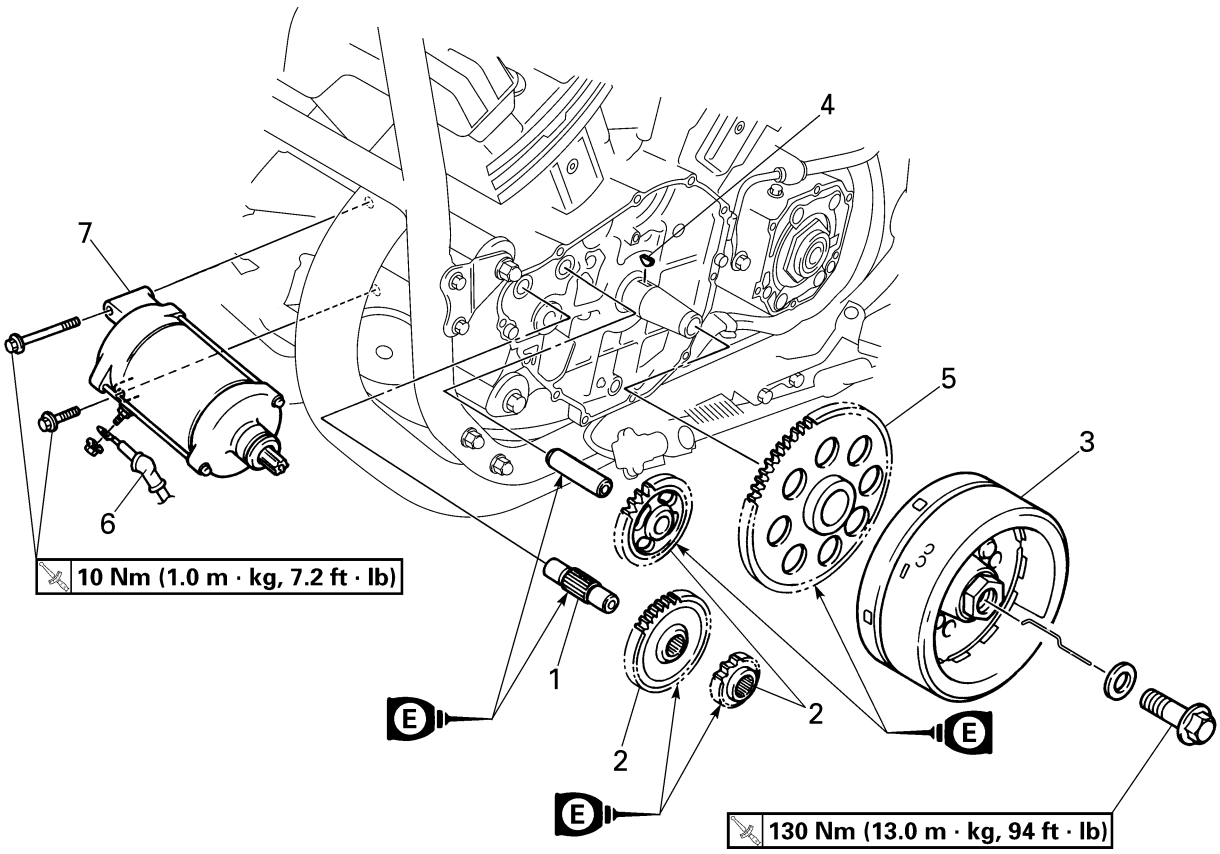


Order	Job/Part	Q'ty	Remarks
	Removing the stator coil assembly		Remove the parts in the order listed.
	Engine oil		Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Muffler and exhaust pipes		Refer to "ENGINE REMOVAL".
	Thermostat assembly		Refer to "THERMOSTAT ASSEMBLY AND CONDUIT" in chapter 5.
	Middle gear case cover		Refer to "SHIFT SHAFT".
1	Generator cover	1	
2	Gasket	1	
3	Dowel pins	2	
4	Pickup coil lead and stator coil lead	1/1	Remove from the cable clamp.
5	Cable holder	1	
6	Pickup coil	1	

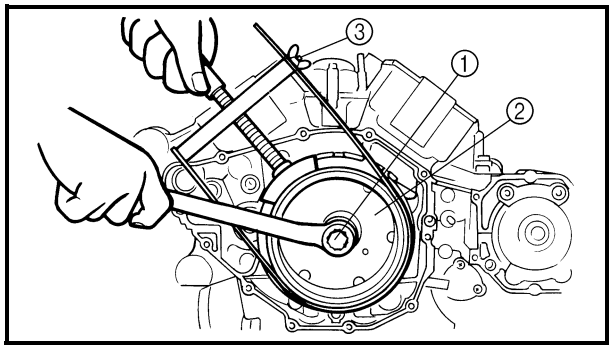


Order	Job/Part	Q'ty	Remarks
7	Plate (stator coil)	1	
8	Stator coil assembly	1	
			For installation, reverse the removal procedure.

GENERATOR



Order	Job/Part	Q'ty	Remarks
	Removing the generator rotor		Remove the parts in the order listed.
1	Starter clutch idle gear shaft	2	
2	Starter clutch idle gear	3	
3	Generator rotor	1	
4	Woodruff key	1	
5	Starter clutch gear	1	
6	Starter motor lead	1	Disconnect.
7	Starter motor	1	
			For installation, reverse the removal procedure.



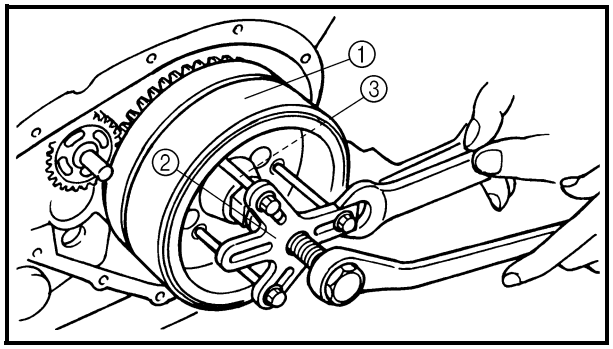
EAS00347
REMOVING THE GENERATOR

1. Remove:
   - generator rotor bolt ①
   - washer

NOTE:

- While holding the generator rotor ② with the sheave holder ③, loosen the generator rotor bolt.
- Do not allow the sheave holder to touch the projection on the generator rotor.

	Sheave holder **YU-01701**



2. Remove:
   - generator rotor ①
     (with the flywheel puller set ② and adapter ③)
   - woodruff key

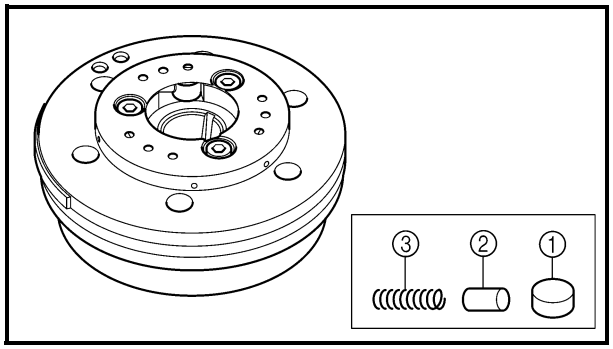
CAUTION:

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

NOTE:

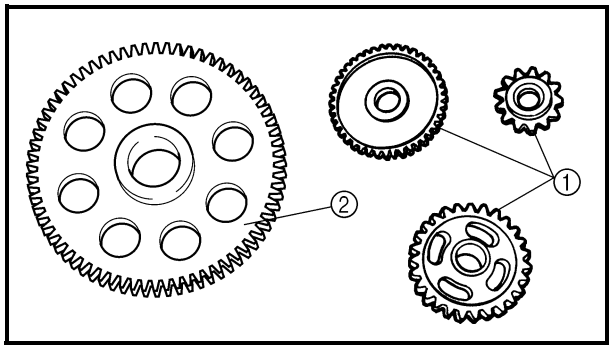
Make sure the flywheel puller is centered over the generator rotor.

	Flywheel puller **YU-33270** **Attachment** **YM-33282**

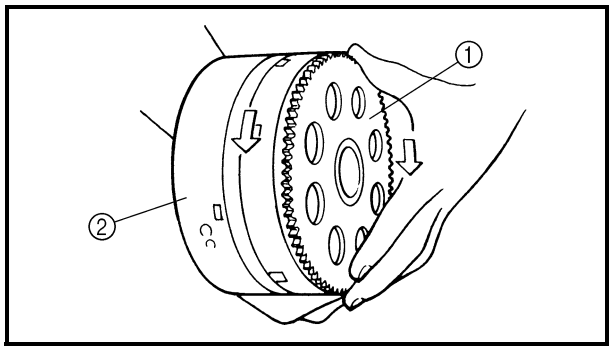


EAS00350
CHECKING THE STARTER CLUTCH

1. Check:
   - starter clutch rollers ①
     Damage/wear → Replace.
   - starter clutch spring cap ②
   - starter clutch spring ③



2. Check:
   - starter clutch idle gear ①
   - starter clutch gear ②
     Burrs/chips/roughness/wear → Replace the defective part(s).
3. Check:
   - starter clutch gear's contacting surfaces
     Damage/pitting/wear → Replace the starter clutch gear.
4. Check:
   - starter clutch operation



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a. Install the starter clutch gear ① onto the starter clutch ② and hold the starter clutch.
b. When turning the starter clutch gear clockwise, the starter clutch and the starter clutch gear should engage, otherwise the starter clutch is faulty and must be replaced.
c. When turning the starter clutch drive gear counterclockwise, it should turn freely, otherwise the starter clutch is faulty and must be replaced.

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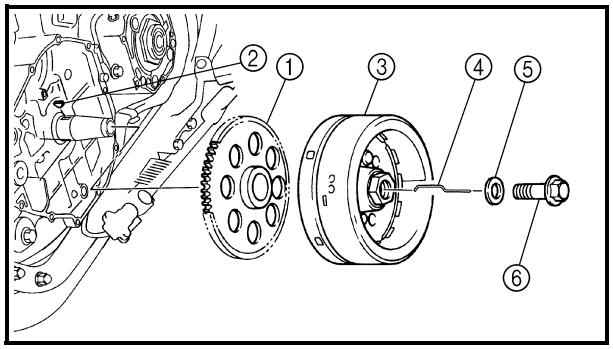
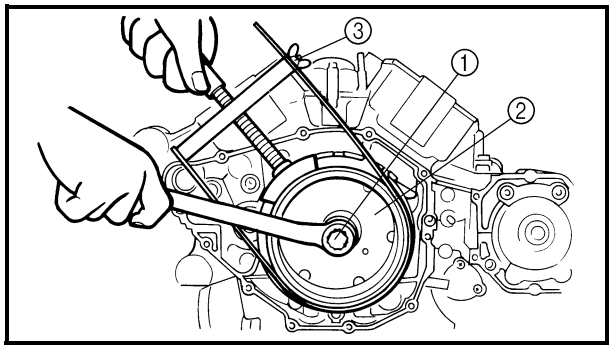
5. Check:
   - starter clutch shafts
     Bends/damage/wear → Replace.



EAS00354
INSTALLING THE GENERATOR

1. Install:
   - starter clutch gear ①
   - woodruff key ②
   - generator rotor ③
   - pin ④
   - washer ⑤
   - generator rotor bolt ⑥

NOTE:
- Clean the tapered portion of the crankshaft and the generator rotor hub.
- When installing the generator rotor, make sure the woodruff key is properly seated in the keyway of the crankshaft.



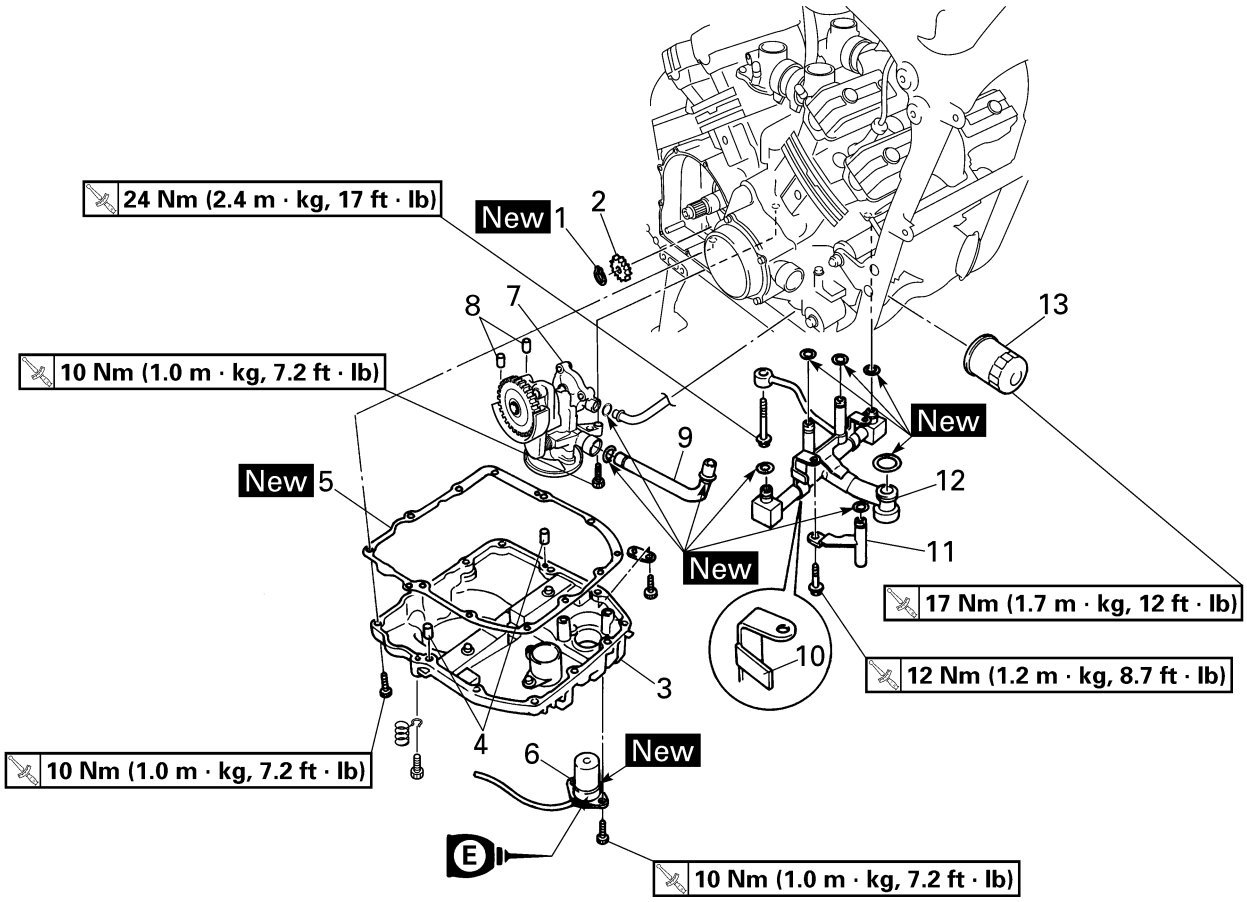
2. Tighten:
   - generator rotor bolt ①

130 Nm (13.0 m · kg, 94 ft · lb)

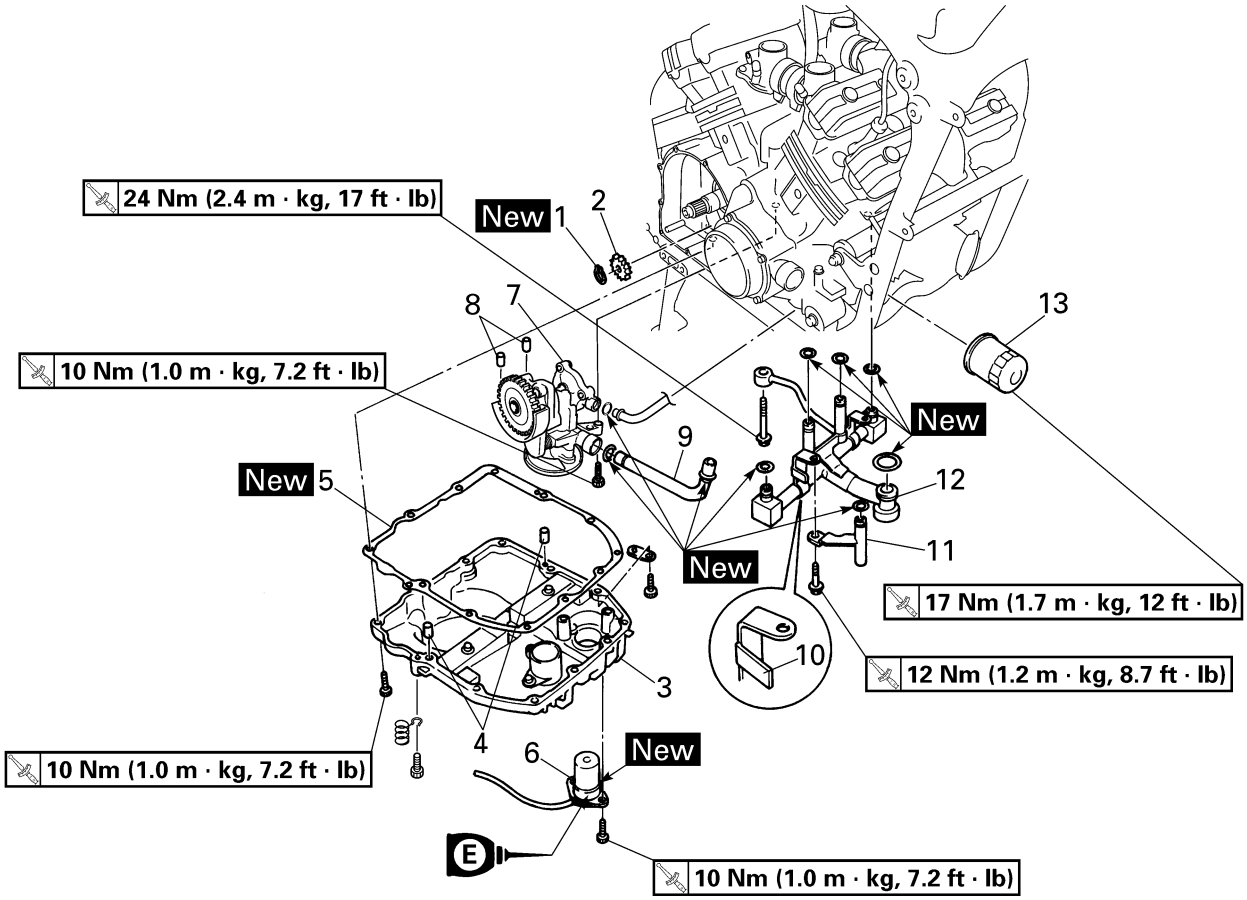
NOTE:
- While holding the generator rotor ② with the sheave holder ③, tighten the generator rotor bolt.
- Do not allow the sheave holder to touch the projection on the generator rotor.

	Sheave holder **YU-01701**

OIL PAN AND OIL PUMP

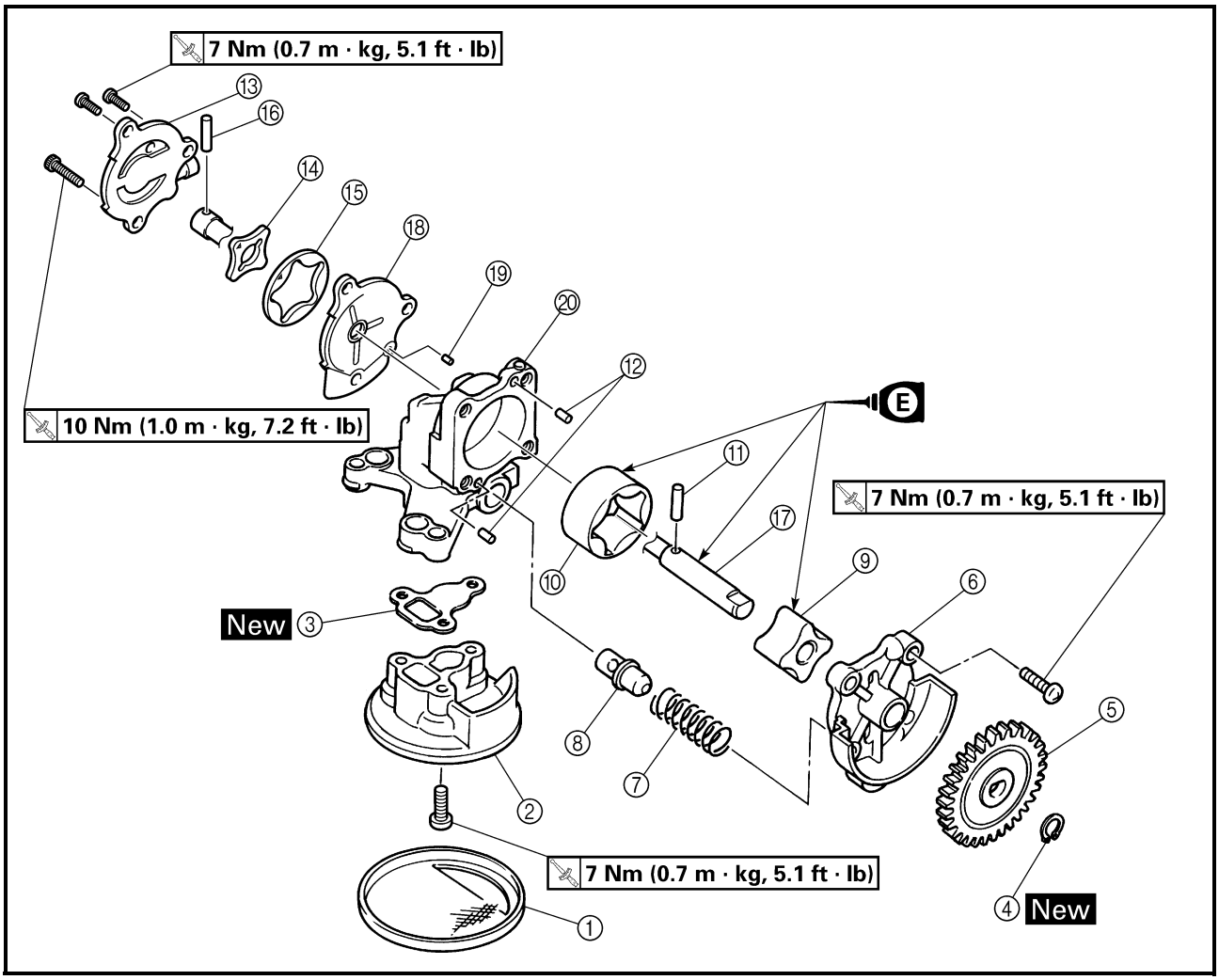


Order	Job/Part	Q'ty	Remarks
	Removing the oil pan and oil pump		Remove the parts in the order listed.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Muffler and exhaust pipes		Refer to "ENGINE REMOVAL".
	Clutch assembly		Refer to "CLUTCH".
1	Circlip	1	
2	Oil pump drive gear	1	
3	Oil pan	1	
4	Dowel pins	2	
5	Gasket	1	
6	Oil level switch	1	
7	Oil pump assembly	1	
8	Dowel pins	2	
9	Oil pump pipe	1	

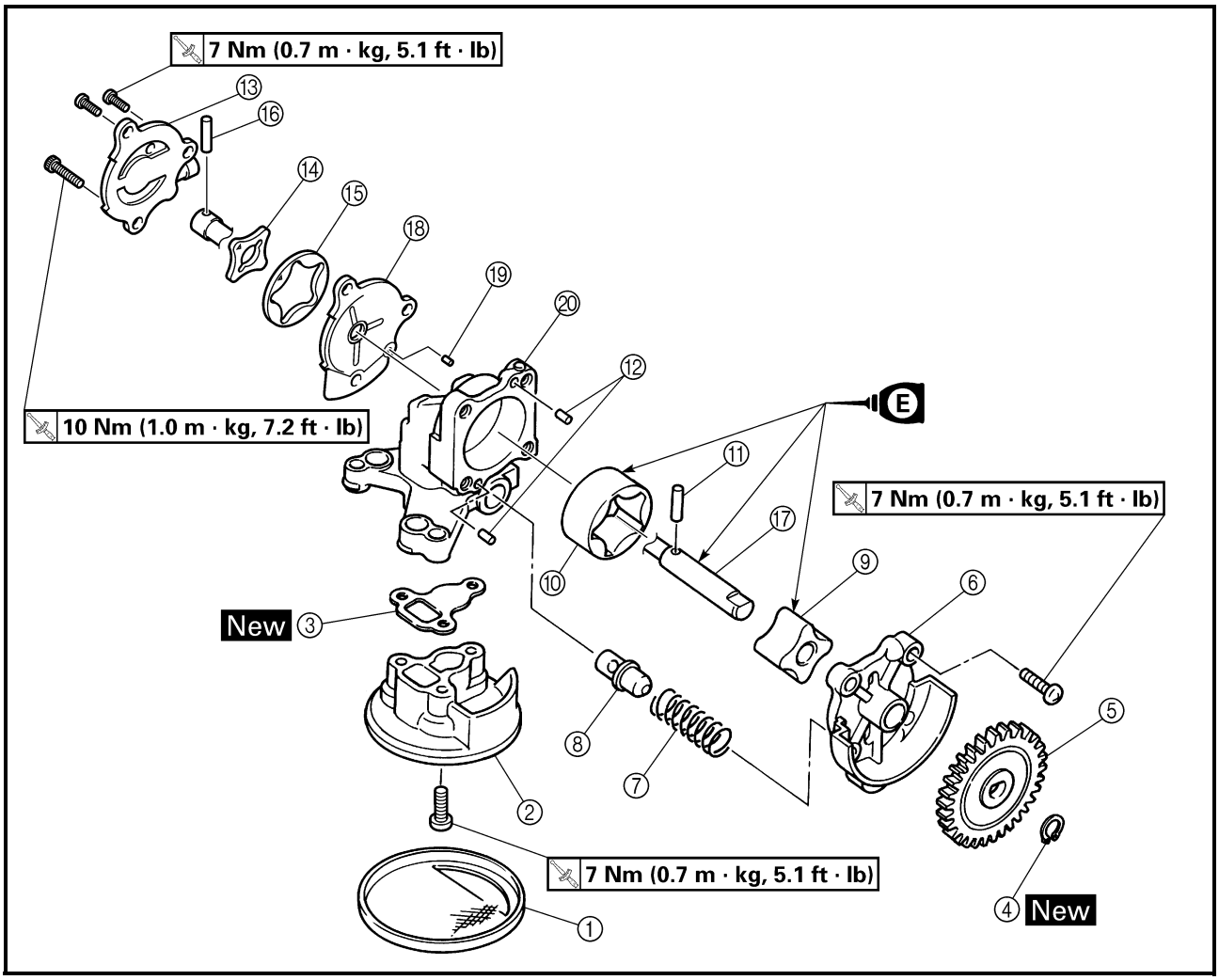


Order	Job/Part	Q'ty	Remarks
10	Bracket tabs	2	Straighten.
11	Oil pipe	1	
12	Oil gallery pipe	1	
13	Oil filter	1	
			For installation, reverse the removal procedure.

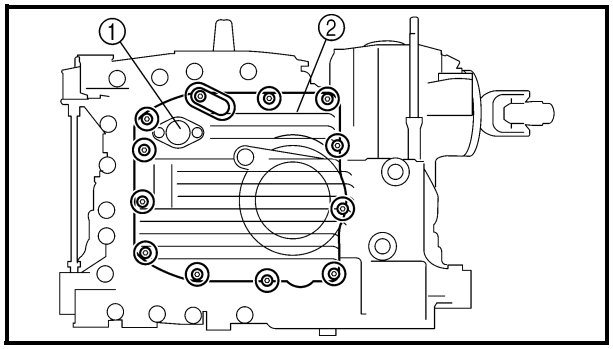
OIL PUMP



Order	Job/Part	Q'ty	Remarks
	Disassembling the oil pump		Remove the parts in the order listed.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Oil pan and oil pump assembly		Refer to "OIL PAN AND OIL PUMP".
①	Oil strainer	1	
②	Oil strainer housing	1	
③	Gasket	1	
④	Circlip	1	
⑤	Oil pump driven gear	1	
⑥	Oil pump gear housing	1	
⑦	Spring	1	
⑧	Relief valve	1	
⑨	Inner rotor 1	1	
⑩	Outer rotor 1	1	



Order	Job/Part	Q'ty	Remarks
⑪	Pin	1	
⑫	Dowel pins	2	
⑬	Oil pump housing cover 1	1	
⑭	Inner rotor 2	1	
⑮	Outer rotor 2	1	
⑯	Pin	1	
⑰	Oil pump shaft	1	
⑱	Oil pump housing cover 2	1	
⑲	Dowel pin	1	
⑳	Oil pump housing	1	
			For assembly, reverse the disassembly procedure.

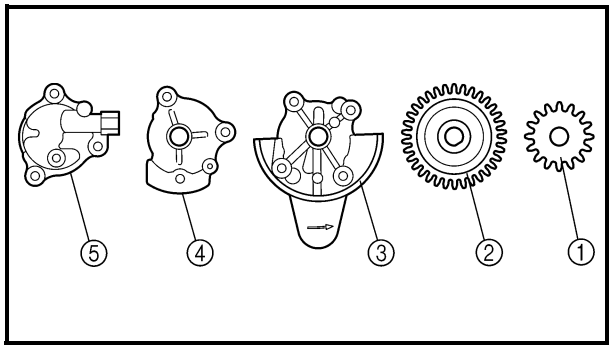


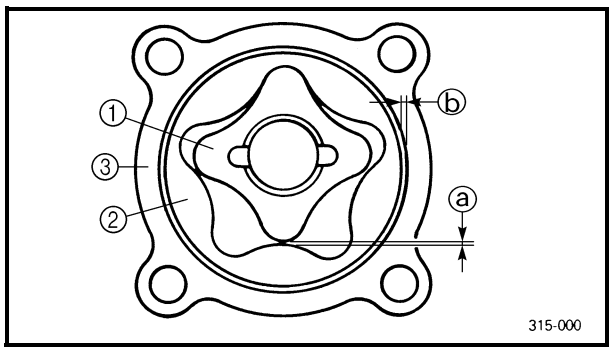
EAS00362
REMOVING THE OIL PAN

1. Remove:
   - oil level switch ①
   - oil pan ②
   - gasket
   - dowel pins

NOTE:

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





EAS00364
CHECKING THE OIL PUMP

1. Check:
   - oil pump drive gear ①
   - oil pump driven gear ②
   - oil pump gear housing ③
   - oil pump housing cover 1 ④
   - oil pump housing cover 2 ⑤

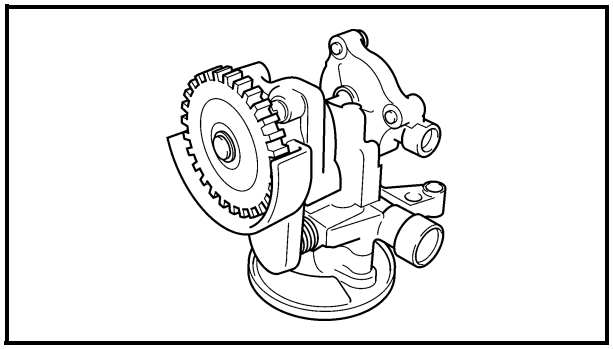
   Cracks/damage/wear → Replace the defective part(s).

2. Measure:
   - inner-rotor-to-outer-rotor-tip clearance ⓐ
   - outer-rotor-to-oil-pump-housing clearance ⓑ

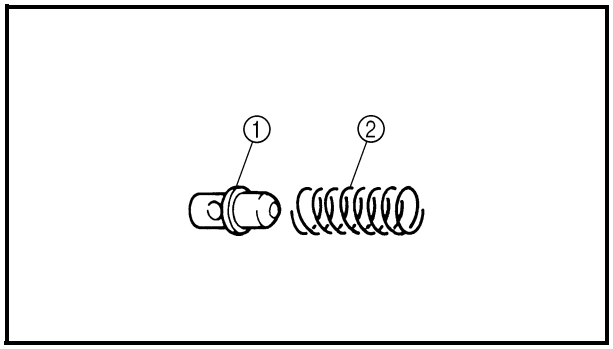
   Out of specification → Replace the oil pump.

① Inner rotor
② Outer rotor
③ Oil pump housing

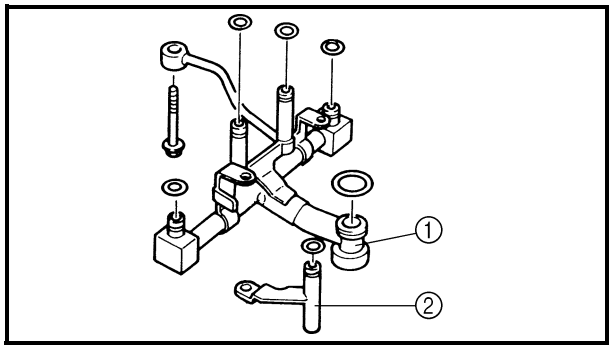
Inner-rotor-to-outer-rotor-tip clearance
0 ~ 0.12 mm (0 ~ 0.005 in)
Outer-rotor-to-oil-pump-housing clearance
0.03 ~ 0.08 mm (0.001 ~ 0.003 in)



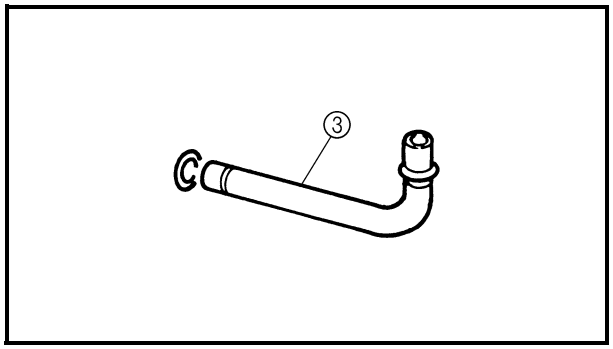
3. Check:
   • oil pump operation
   Rough movement → Repeat steps (1) and (2) or replace the defective part(s).

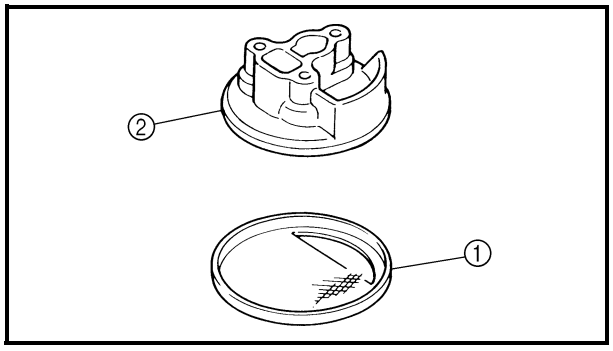


EAS00365
CHECKING THE RELIEF VALVE
1. Check:
   • relief valve ①
   • spring ②
   Damage/wear → Replace the defective part(s).

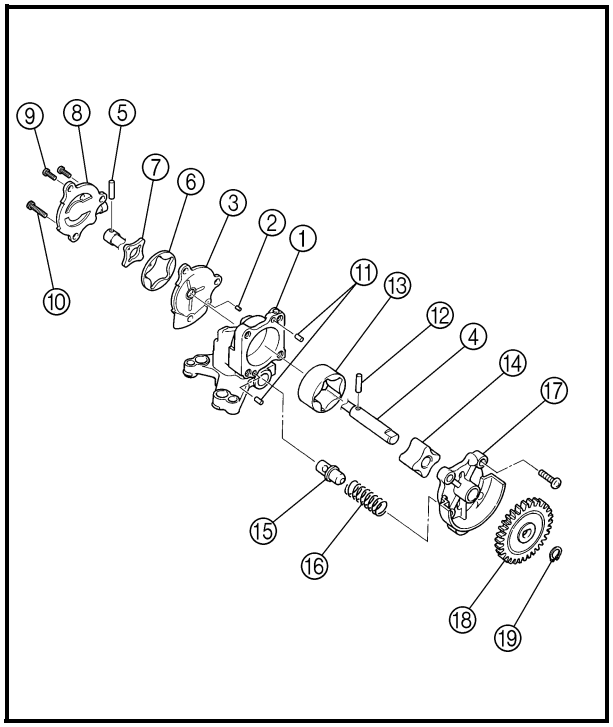


EAS00366
CHECKING THE OIL DELIVERY PIPE
1. Check:
   • oil gallery pipe ①
   • oil pipe ②
   • oil pump pipe ③
   Damage → Replace.
   Obstruction → Wash and blow out with compressed air.





EAS00368
CHECKING THE OIL STRAINER
1. Check:
   • oil strainer ①
   • oil strainer housing ②
   Damage → Replace.
   Contaminants → Clean with engine oil.



ASSEMBLING THE OIL PUMP

1. Lubricate:
   - inner rotor 1
   - outer rotor 1
   - inner rotor 2
   - outer rotor 2
   - oil pump shaft
     (with the recommended lubricant)

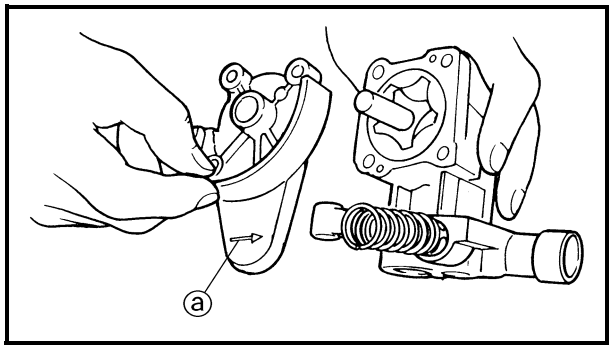
	Recommended lubricant **Engine oil**

2. Install:
   - oil pump housing ①
   - dowel pin ②
   - oil pump housing cover 2 ③
   - oil pump shaft ④
   - pin ⑤
   - outer rotor 2 ⑥
   - inner rotor 2 ⑦
   - oil pump housing cover 1 ⑧
   - oil pump housing cover 1 screw ⑨

     7 Nm (0.7 m · kg, 5.1 ft · lb)
   - oil pump housing cover 1 bolt ⑩

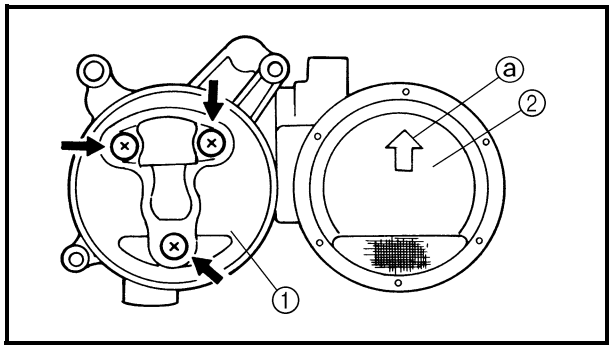
     10 Nm (1.0 m · kg, 7.2 ft · lb)
   - dowel pins ⑪
   - pin ⑫
   - outer rotor 2 ⑬
   - inner rotor 2 ⑭
   - relief valve ⑮
   - spring ⑯
   - oil pump gear housing ⑰

     7 Nm (0.7 m · kg, 5.1 ft · lb)
   - oil pump driven gear ⑱
   - circlip ⑲



NOTE:
- When installing the inner rotor, align the pin in the oil pump shaft with the groove in the inner rotor.
- The arrow ⓐ on the gear housing faces toward the front of the engine.

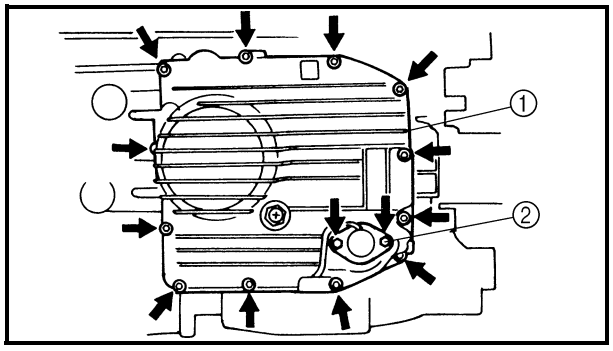
3. Check:
   - oil pump operation
     Refer to “CHECKING THE OIL PUMP”.



EAS00378
INSTALLING THE OIL STRAINER

1. Install:
   - oil strainer housing ①
     7 Nm (0.7 m · kg, 5.1 ft · lb)
   - oil strainer cover ②

NOTE:
The arrow ⓐ on the oil strainer cover must point towards the rear of the engine.

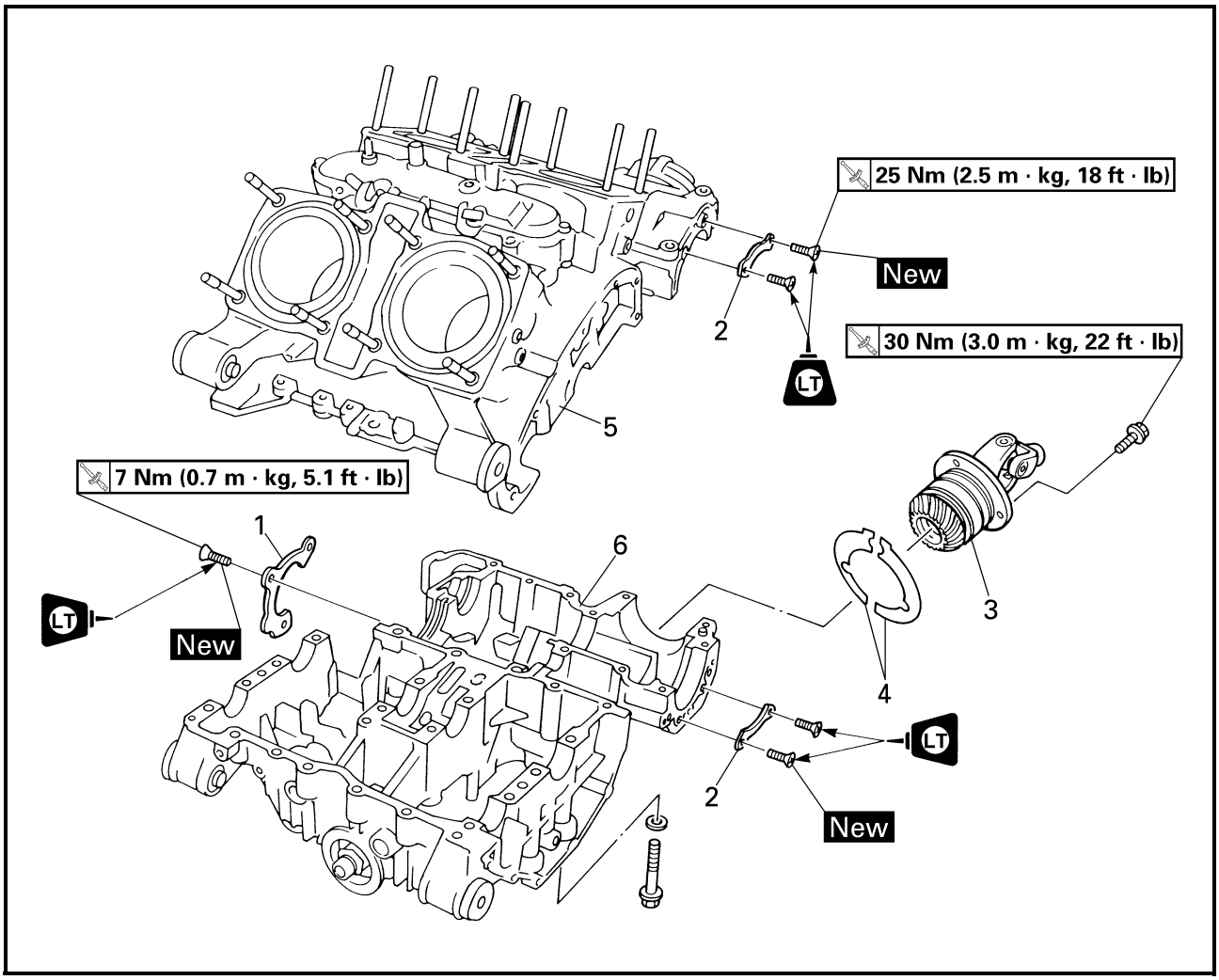


EAS00380
INSTALLING THE OIL PAN

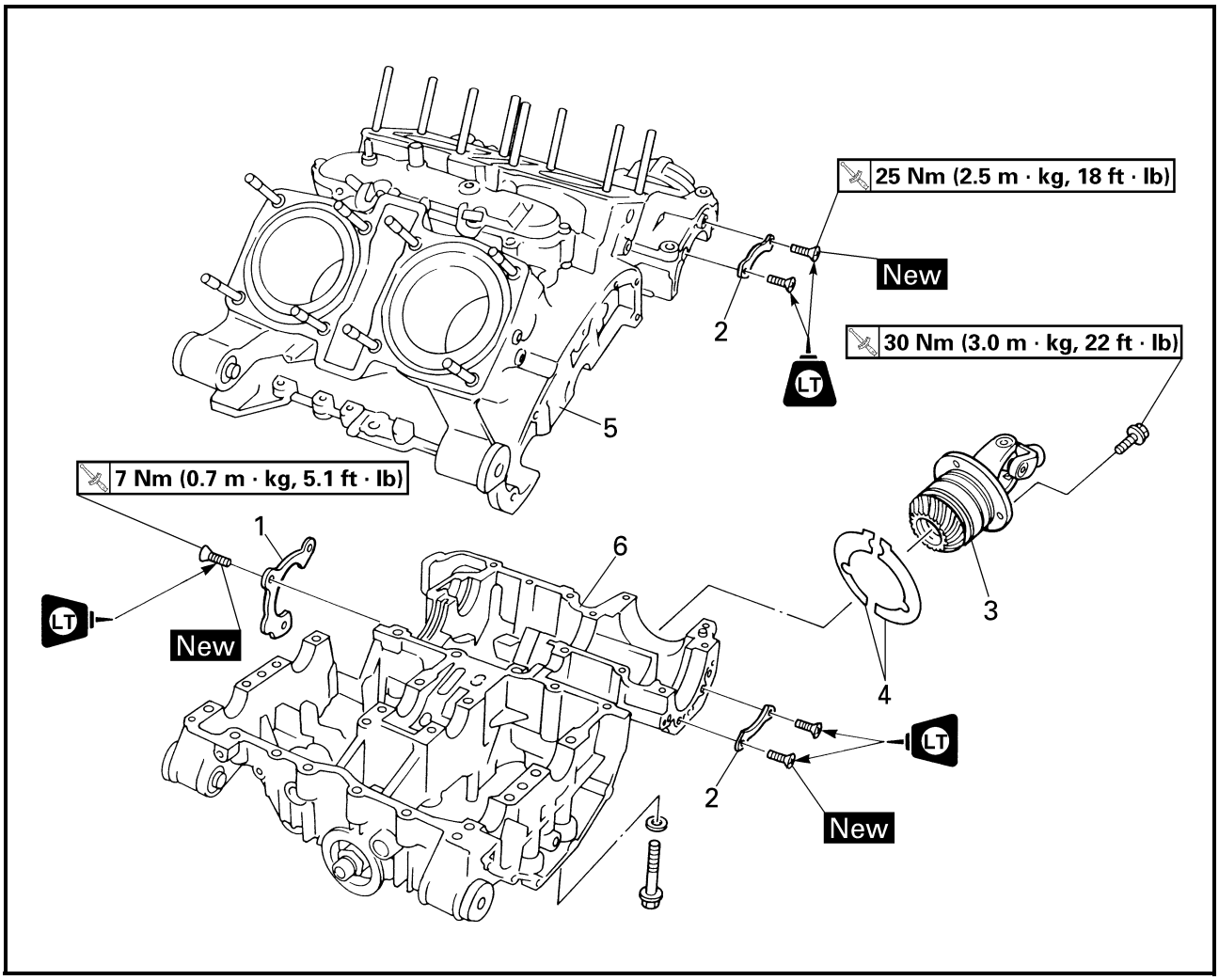
1. Install:
   - dowel pins
   - gasket New
   - oil pan ①
     10 Nm (1.0 m · kg, 7.2 ft · lb)
   - oil level switch ②
     10 Nm (1.0 m · kg, 7.2 ft · lb)
   - engine oil drain bolt
     43 Nm (4.3 m · kg, 31 ft · lb)

NOTE:
- Tighten the oil pan bolts in stages and in a crisscross pattern.
- Lubricate the oil level switch O-ring with engine oil.

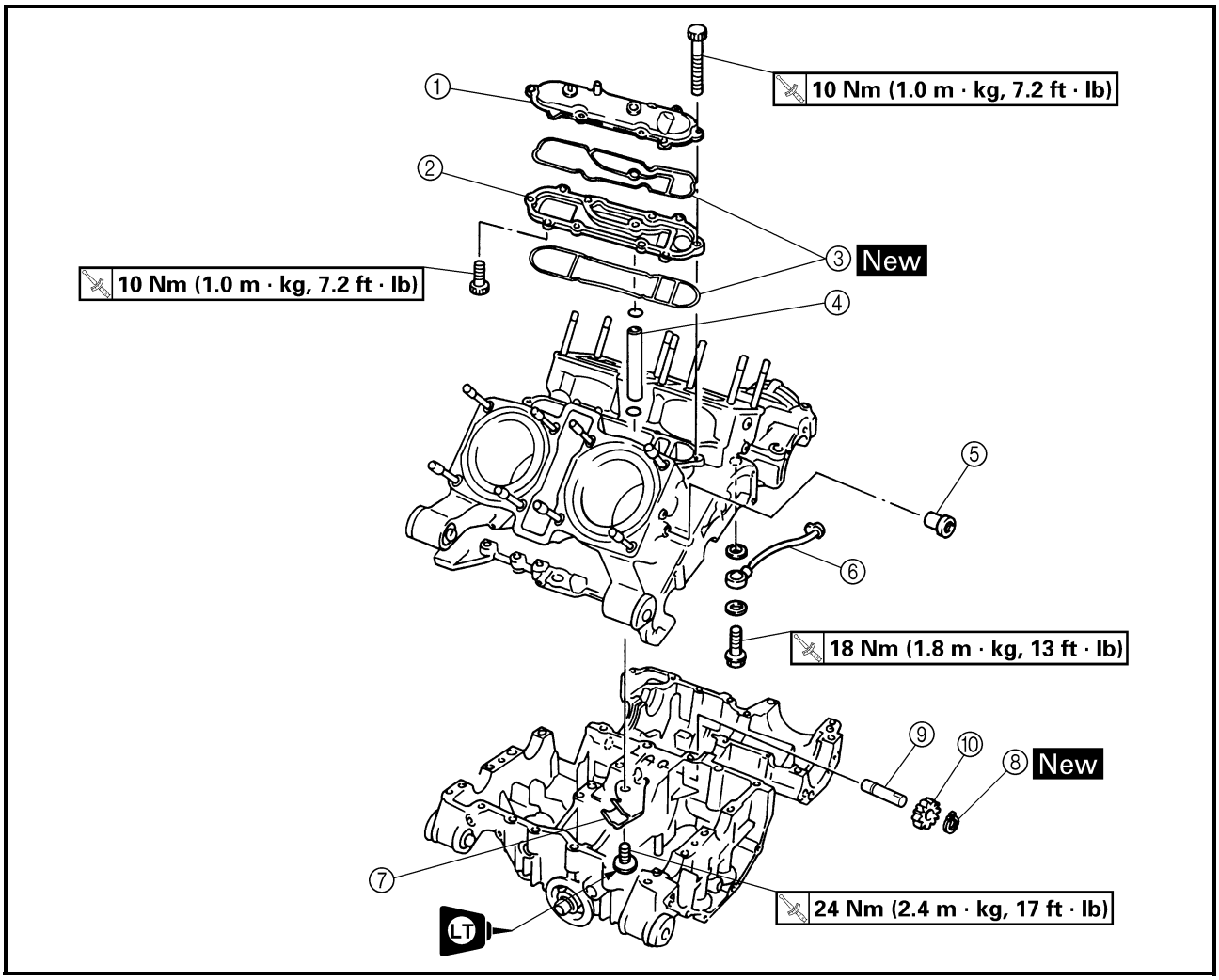
CRANKCASE



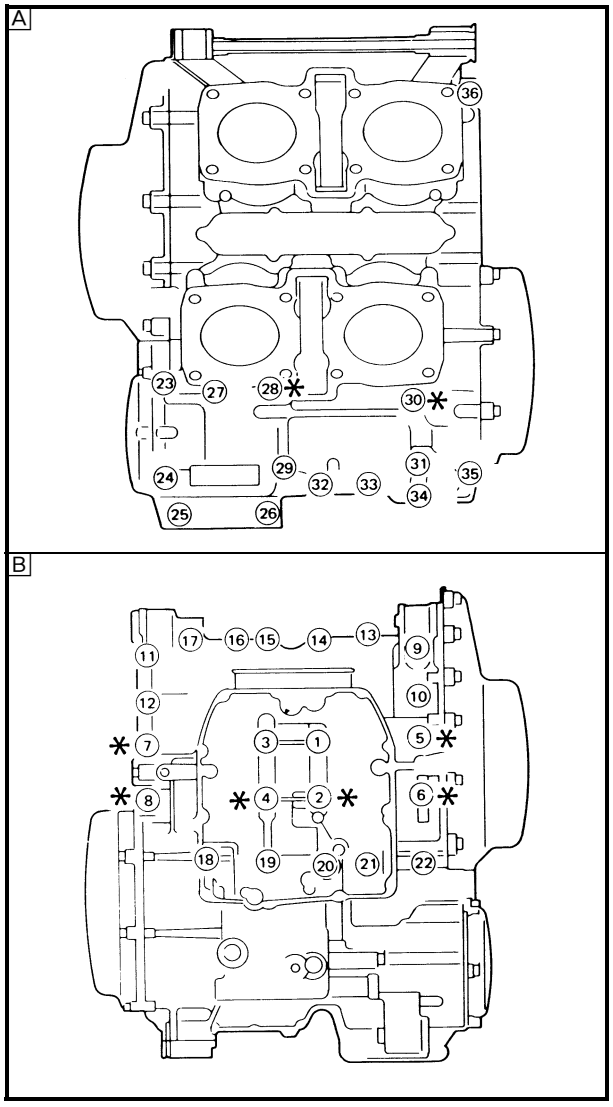
Order	Job/Part	Q'ty	Remarks
	Separating the crankcase		Remove the parts in the order listed.
	Engine assembly		Refer to "ENGINE REMOVAL".
	Cylinder head		Refer to "CYLINDER HEAD COVERS".
	Water pump		Refer to "WATER PUMP" in chapter 5.
	Clutch assembly		Refer to "CLUTCH ASSEMBLY".
	Shift shaft, stopper lever		Refer to "SHIFT SHAFT AND STOPPER LEVER".
	Clutch release cylinder		Refer to "DISASSEMBLING THE CLUTCH RELEASE CYLINDER" in chapter 7.
	Generator		Refer to "GENERATOR".
	Oil pan and oil pump assembly		Refer to "OIL PAN AND OIL PUMP".
	Connecting rods and pistons		Refer to "CONNECTING RODS AND PISTONS".

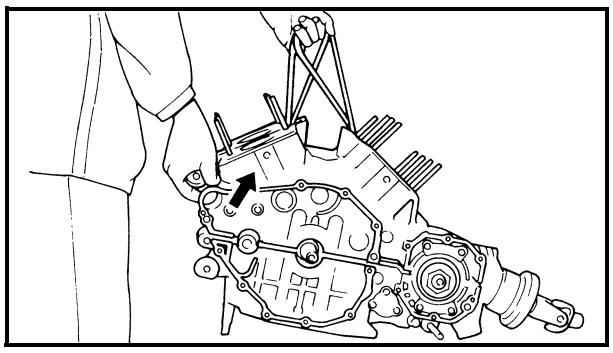


Order	Job/Part	Q'ty	Remarks
1	Retainer (main axle bearing)	1	
2	Retainers (middle gear bearing)	2	
3	Middle driven gear assembly	1	
4	Shims	2/4	
5	Crankcase (upper)	1	Refer to "SEPARATING THE CRANKCASE".
6	Crankcase (lower)	1	
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the crankcase		Remove the parts in the order listed.
	Engine assembly		Refer to "ENGINE REMOVAL".
	Crankcase separation		Refer to "CRANKCASE".
	Crankshaft		Refer to "CRANKSHAFT".
	Transmission		Refer to "TRANSMISSION".
①	Crankcase breather cover	1	
②	Crankcase breather spacer	1	
③	Rubber gaskets	2	
④	Oil pipe	1	
⑤	Drain plugs (cylinders)	4	
⑥	Oil pipe	1	
⑦	Bracket (timing chain damper)	1	
⑧	Circlip	1	
⑨	Oil pump drive shaft	1	
⑩	Idler gear (oil pump)	1	
			For assembly, reverse the disassembly procedure.





SEPARATING THE CRANKCASE

1. Remove:
   - crankcase bolts

NOTE:

- Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.
- Loosen the bolts in decreasing numerical order (refer to the numbers in the illustration).
- The numbers embossed on the crankcase indicate the crankcase tightening sequence.

* With a washer

2. Place the engine upside down.
3. Separate:

A Upper crankcase
B Lower crankcase

NOTE:

While pulling up on the timing chains separate the upper crankcase from the lower crankcase.

CAUTION:

Tap on one side of the crankcase with a soft-face hammer. Tap only on reinforced portions of the crankcase, not on the crankcase mating surfaces. Work slowly and carefully and make sure the crankcase halves separate evenly.

4. Remove:
   - dowel pins
   - O-ring
5. Remove:
   - crankshaft journal lower bearing (from the lower crankcase)

NOTE:

Identify the position of each crankshaft journal lower bearing so that it can be reinstalled in its original place.

EAS00417
ASSEMBLING THE CRANKCASE

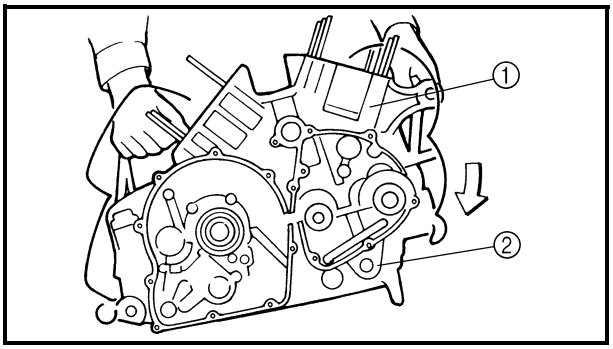
1. Lubricate:
   • crankshaft journal bearings
   (with the recommended lubricant)

	Recommended lubricant **Engine oil**

2. Apply:
   • sealant
   (onto the crankcase mating surfaces)

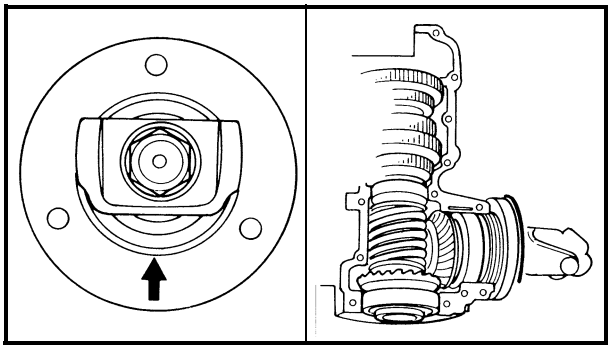
	Quick Gasket® **ACC-1100-15-01**

NOTE:
Do not allow any sealant to come into contact with the oil gallery or crankshaft journal bearings. Do not apply sealant to within 2 ~ 3 mm of the crankshaft journal bearings.



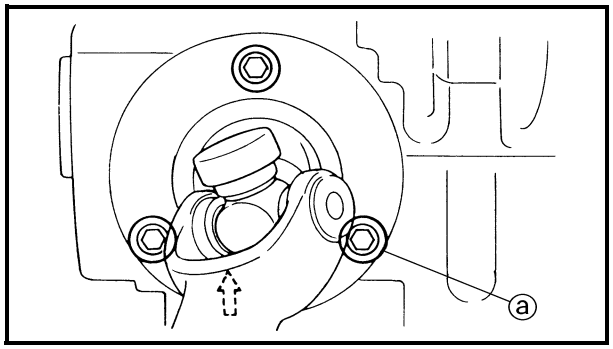
3. Install:
   • upper crankcase ①
   (onto the lower crankcase ②)

CAUTION:
Before tightening the crankcase bolts, make sure the transmission gears shift correctly when the shift drum assembly is turned by hand.



4. Install:
   • final drive assembly
   Refer to “MIDDLE GEAR”.

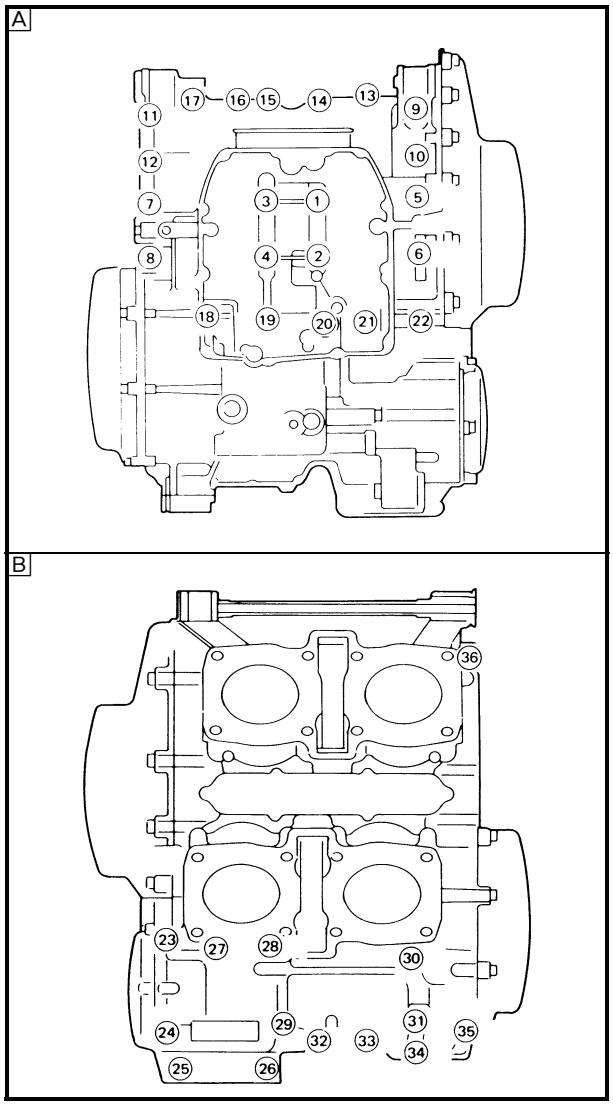
NOTE:
The arrow on the final drive assembly must point towards the upper crankcase.



5. Install:
   - middle driven shaft bearing housing bolts

	30 Nm (3.0 m · kg, 22 ft · lb)

NOTE:
The bolt with the washer goes in the lower right hole ⓐ of the middle driven shaft bearing housing.



6. Tighten:
   - upper crankcase bolts
   - lower crankcase bolts

⚠ WARNING

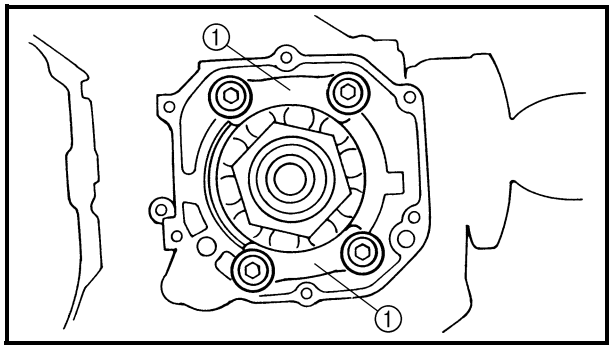
Always use new copper washers.

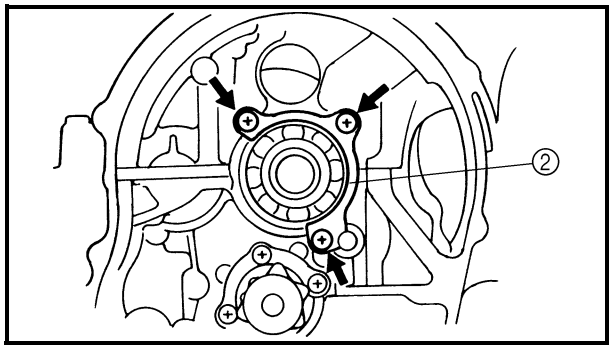
NOTE:
- Tighten the bolts in the tightening sequence cast on the crankcase.
- Install copper washers on bolts ㉘ and ㉚.
- Install the cable holder on bolts ㉒ and ㉜.
- Install the washers on bolts ② and ④ ~ ⑧.

A Lower crankcase
B Upper crankcase

(M10 bolt)	**40 Nm (4.0 m · kg, 29 ft · lb)**
(M8 bolt)	**24 Nm (2.4 m · kg, 17 ft · lb)**
(M6 bolt)	**12 Nm (1.2 m · kg, 8.7 ft · lb)**

4





7. Install:
   - middle driven shaft bearing housing retainers ① **25 Nm (2.5 m · kg, 18 ft · lb)**
   - main axle bearing retainer ② **7 Nm (0.7 m · kg, 5.1 ft · lb)**

⚠ WARNING

Always use new screws.

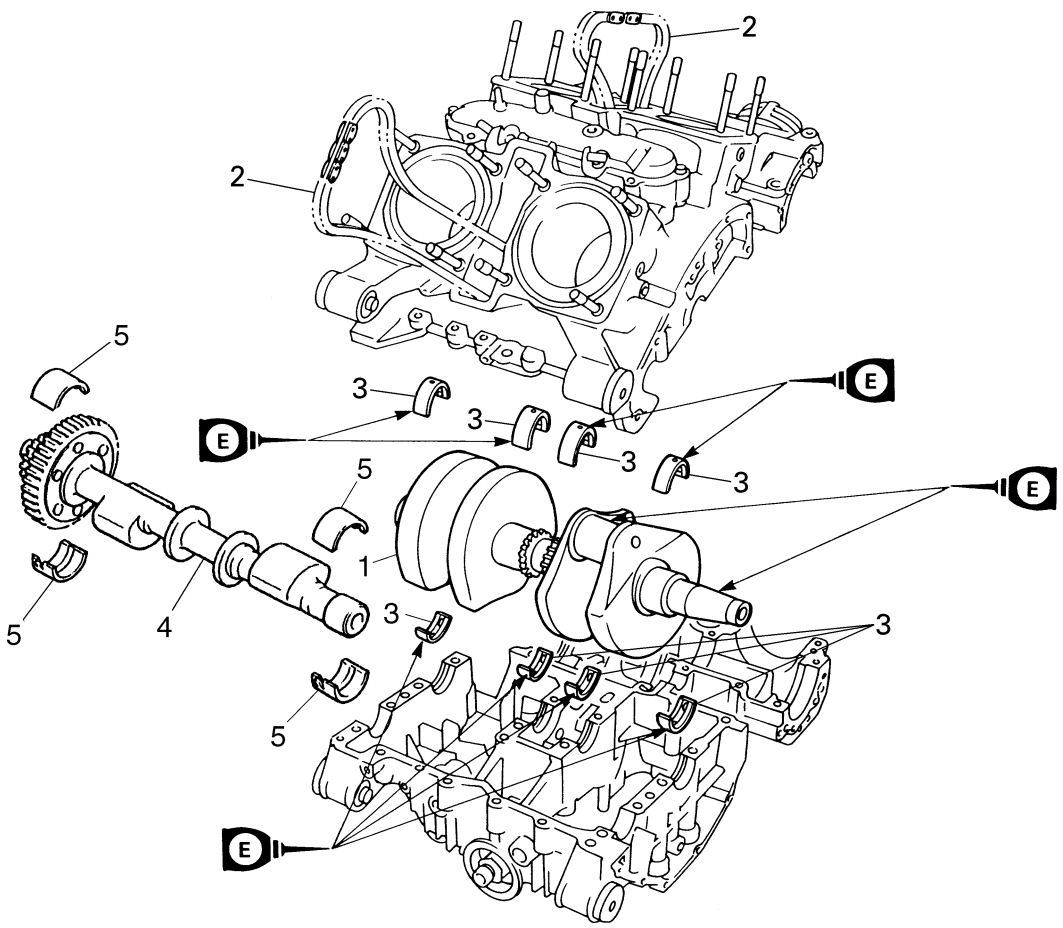
NOTE:

Apply LOCTITE® to the middle gear and main bearing retainer screws.

CAUTION:

After tightening the middle driven shaft bearing housing retainer screws, be sure to stake them with a center punch.

CRANKSHAFT



Order	Job/Part	Q'ty	Remarks
	Removing the crankshaft		Remove the parts in the order listed.
	Engine assembly		Refer to "ENGINE REMOVAL".
	Crankcase separation		Refer to "CRANKCASE".
1	Crankshaft	1	
2	Timing chains	2	
3	Main journal bearings	8	
4	Balancer shaft	1	
5	Main journal bearings	4	
			For installation, reverse the removal procedure.

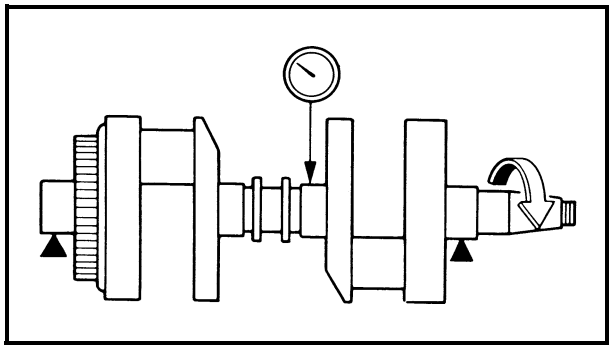
EAS00387
REMOVING THE CRANKSHAFT ASSEMBLY

1. Remove:
   - crankshaft assembly
   - crankshaft journal upper bearings (from the upper crankcase)

NOTE:
Identify the position of each crankshaft journal upper bearing so that it can be reinstalled in its original place.

EAS00396
CHECKING THE CRANKSHAFT

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

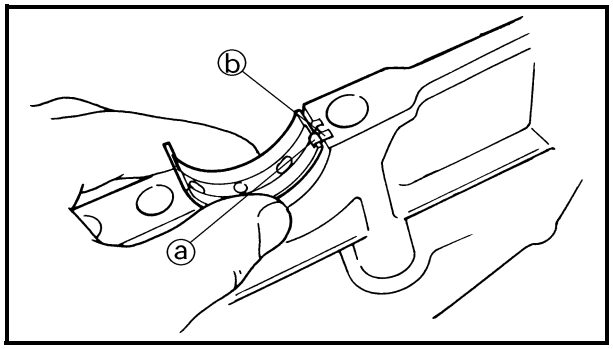


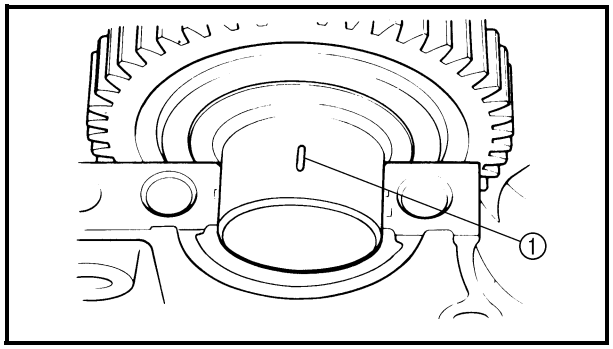
Crankshaft runout
Less than 0.03 mm (0.0012 in)

2. Check:
   - crankshaft journal surfaces
   - crankshaft pin surfaces
   - bearing surfaces
     Scratches/wear → Replace the crankshaft.
3. Measure:
   - crankshaft-journal-to-crankshaft-journal-bearing clearance
     Out of specification → Replace the crankshaft journal bearings.

Crankshaft-journal-to-crankshaft-journal-bearing clearance
0.040 ~ 0.058 mm
(0.0016 ~ 0.0023 in)

CAUTION:
Do not interchange the crankshaft journal bearings. To obtain the correct crankshaft-journal-to-crankshaft-journal-bearing clearance and prevent engine damage, the crankshaft journal bearings must be installed in their original positions.





a. Clean the crankshaft journal bearings, crankshaft journals, and bearing portions of the crankcase.
b. Place the upper crankcase upside down on a bench.
c. Install the crankshaft journal upper bearings and the crankshaft into the upper crankcase.

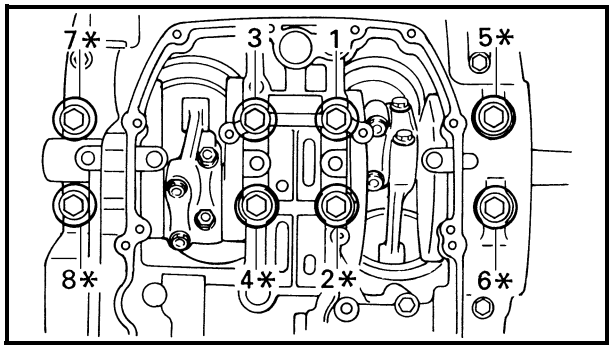
NOTE:
Align the projections ⓐ of the crankshaft journal upper bearings with the notches ⓑ in the upper crankcase.

d. Put a piece of Plastigauge® ① on each crankshaft journal.

NOTE:
Do not put the Plastigauge® over the oil hole in the crankshaft journal.

e. Install the crankshaft journal lower bearings into the lower crankcase and assemble the crankcase halves.

NOTE:
- Align the projections of the crankshaft journal lower bearings with the notches in the lower crankcase.
- Do not move the crankshaft until the clearance measurement has been completed.

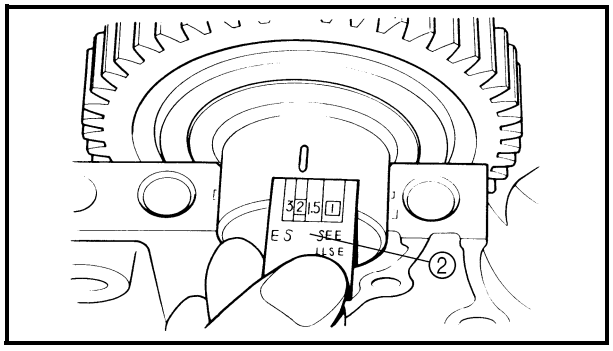


f. Tighten the bolts to specification in the tightening sequence cast on the crankcase.

	Crankcase bolt **40 Nm (4.0 m • kg, 29 ft • lb)**

* With a washer

NOTE:
Lubricate the bolt threads with engine oil.



g. Remove the lower crankcase and the crankshaft journal lower bearings.
h. Measure the compressed Plastigauge® width ② on each crankshaft journal. If the crankshaft-journal-to-crankshaft-journal-bearing clearance is out of specification, select replacement crankshaft journal bearings.

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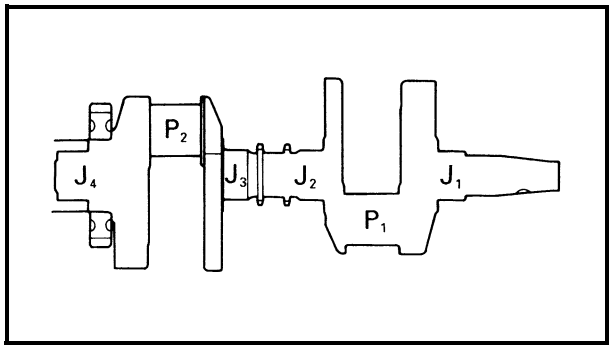

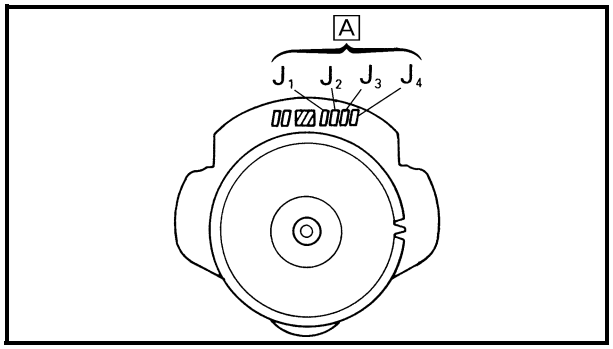

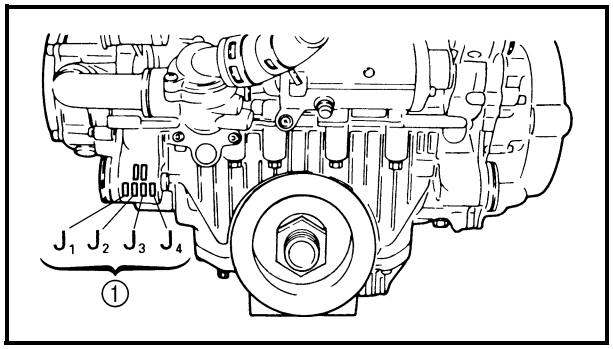

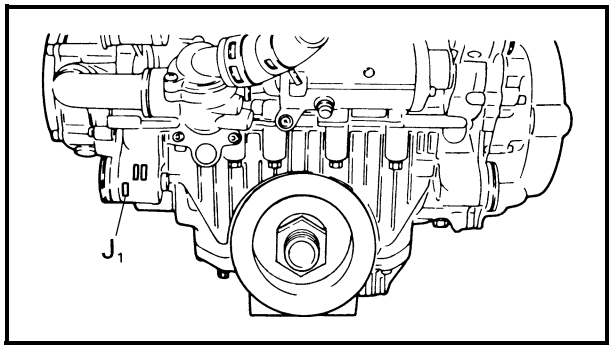

4. Select:
   • crankshaft journal bearings ($J_1 \sim J_4$)

NOTE:
- The numbers Ⓐ stamped into the crankshaft web and the numbers ① stamped into the lower crankcase are used to determine the replacement crankshaft journal bearing sizes.
- "$J_1 \sim J_4$" refer to the bearings shown in the crankshaft illustration.
- If "$J_1 \sim J_4$" are the same, use the same size for all of the bearings.

For example, if the crankcase "J_1" and crankshaft web "J_1" numbers are "6" and "2" respectively, then the bearing size for "J_1" is:

Bearing size of J_1:
"J_1" (crankcase) – "J_1" (crankshaft web)
6 – 2 = 4 (green)

BEARING COLOR CODE	
1	blue
2	black
3	brown
4	green
5	yellow
6	pink
7	red

NOTE:
If the size is the same for all "J_1 to J_4", one digit for that size is indicated. (crankcase side only)

CHECKING THE BALANCER SHAFT

1. Measure:
   - balancer shaft-journal-to-balancer shaft-journal-bearing clearance
     Out of specification → Replace the balancer shaft journal bearings.

balancer shaft-journal-to-balancer shaft-journal-bearing clearance
0.020 ~ 0.048 mm
(0.0008 ~ 0.0019 in)

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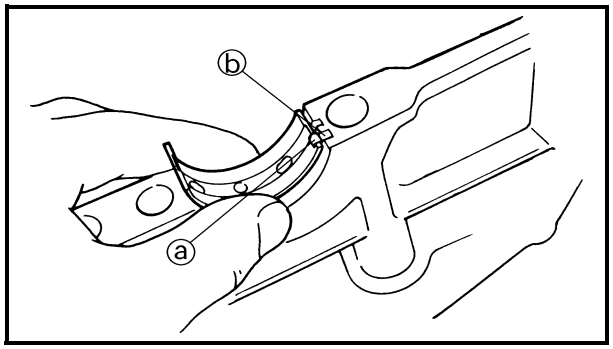
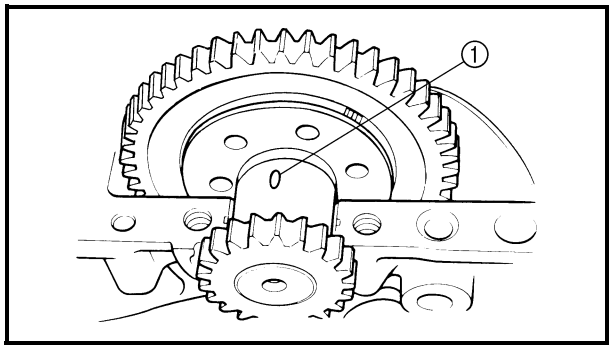
CAUTION:

Do not interchange the balancer shaft journal bearings. To obtain the correct balancer shaft-journal-to-balancer shaft-journal-bearing clearance and prevent engine damage, the balancer shaft journal bearings must be installed in their original positions.

a. Clean the balancer shaft journal bearings, balancer shaft journals, and bearing portions of the crankcase.
b. Place the upper crankcase upside down on a bench.
c. Install the balancer shaft journal upper bearings and the balancer shaft into the upper crankcase.



NOTE:
Align the projections ⓐ of the balancer shaft journal upper bearings with the notches ⓑ in the upper crankcase.

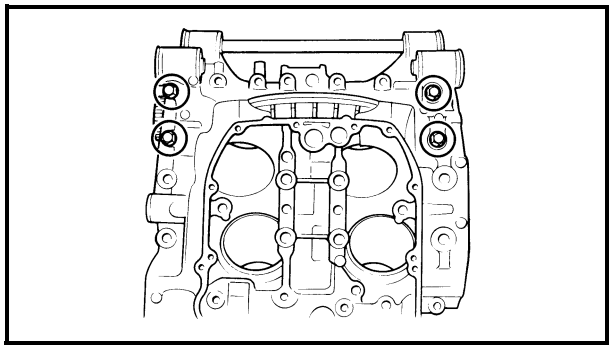


d. Put a piece of Plastigauge® ① on each balancer shaft journal.

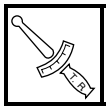
NOTE:
Do not put the Plastigauge® over the oil hole in the balancer shaft journal.

e. Install the balancer shaft journal lower bearings into the lower crankcase and assemble the crankcase halves.

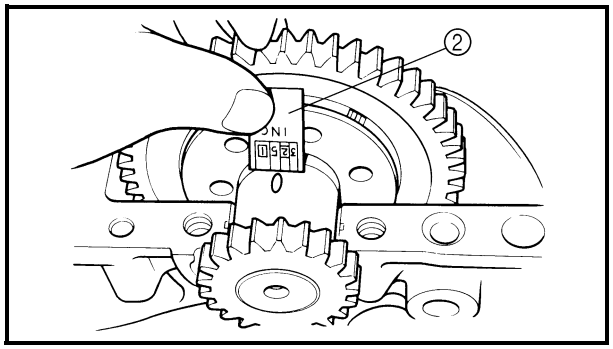
NOTE:
- Align the projections of the balancer shaft journal lower bearings with the notches in the lower crankcase.
- Do not move the crankshaft until the clearance measurement has been completed.



f. Tighten the bolts to specification in the tightening sequence cast on the crankcase.

	**Crankcase bolt** **24 Nm (2.4 m • kg, 17 ft • lb)**

NOTE:
Lubricate the bolt threads with engine oil.



g. Remove the lower crankcase and the balancer shaft journal lower bearings.
h. Measure the compressed Plastigauge® width ② on each balancer shaft journal. If the balancer shaft-journal-to-balancer shaft-journal-bearing clearance is out of specification, select replacement balancer shaft journal bearings.

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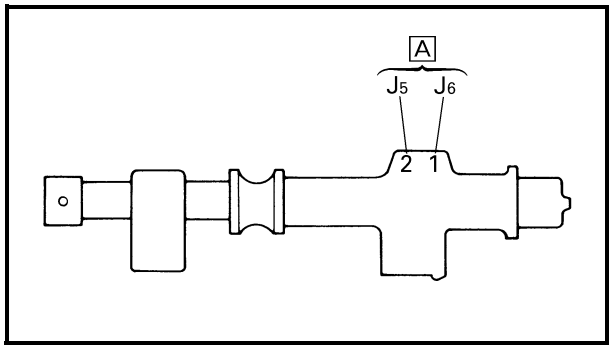
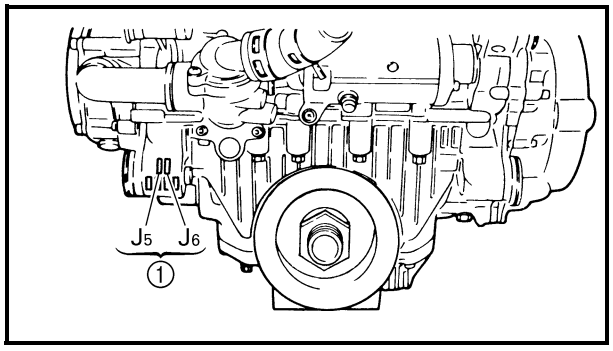
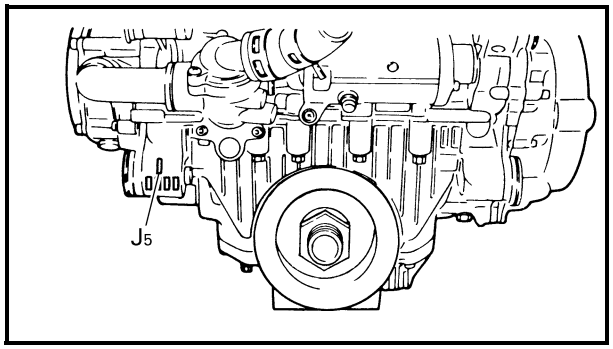


2. Select:
   - balancer shaft journal bearings (J_5 ~ J_6)

NOTE:
- The numbers A stamped into the balancer shaft web and the numbers ① stamped into the lower crankcase are used to determine the replacement balancer shaft journal bearing sizes.
- "J_5 ~ J_6" refer to the bearings shown in the balancer shaft illustration.
- If "J_5 ~ J_6" are the same, use the same size for all of the bearings.



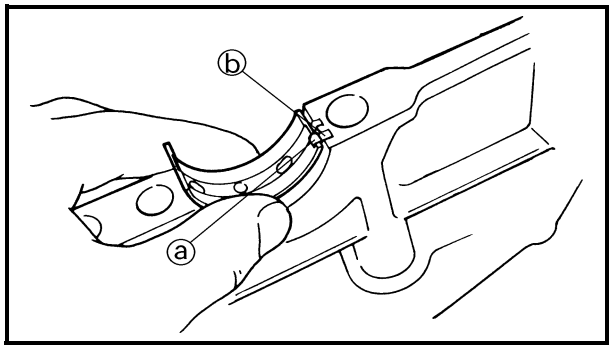
For example, if the crankcase "J_5" and balancer shaft web "J_5" numbers are "6" and "2" respectively, then the bearing size for "J_5" is:



Bearing size of J_1:
"J_5" (crankcase) – "J_5" (balancer shaft web)
6 – 2 = 4 (green)

BEARING COLOR CODE	
1	blue
2	black
3	brown
4	green
5	yellow
6	pink
7	red

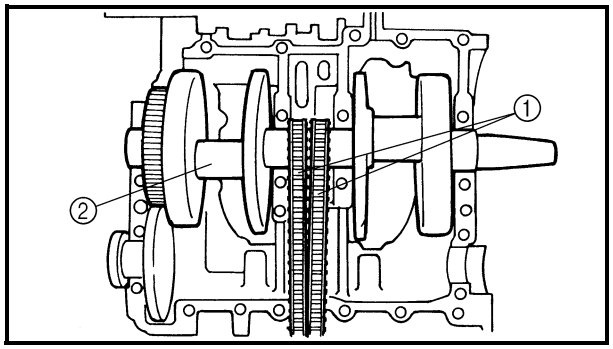
NOTE:
If the size is the same for all "J_5 and J_6", one digit for that size is indicated. (crankcase side only)



EAS00407
INSTALLING THE CRANKSHAFT

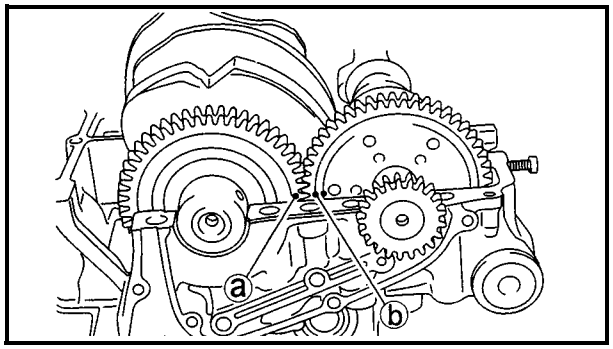
1. Install:
   - crankshaft journal upper bearings (into the upper crankcase)

NOTE:
- Align the projections ⓐ on the crankshaft journal upper bearings with the notches ⓑ in the upper crankcase.
- Be sure to install each crankshaft journal upper bearing in its original place.



2. Install:
   • timing chain ①
     (onto the crankshaft sprocket)
   • crankshaft assembly ②

NOTE:
- Pass the timing chain through the timing chain cavity.
- To prevent the timing chain from falling into the crankcase, fasten it with a wire.

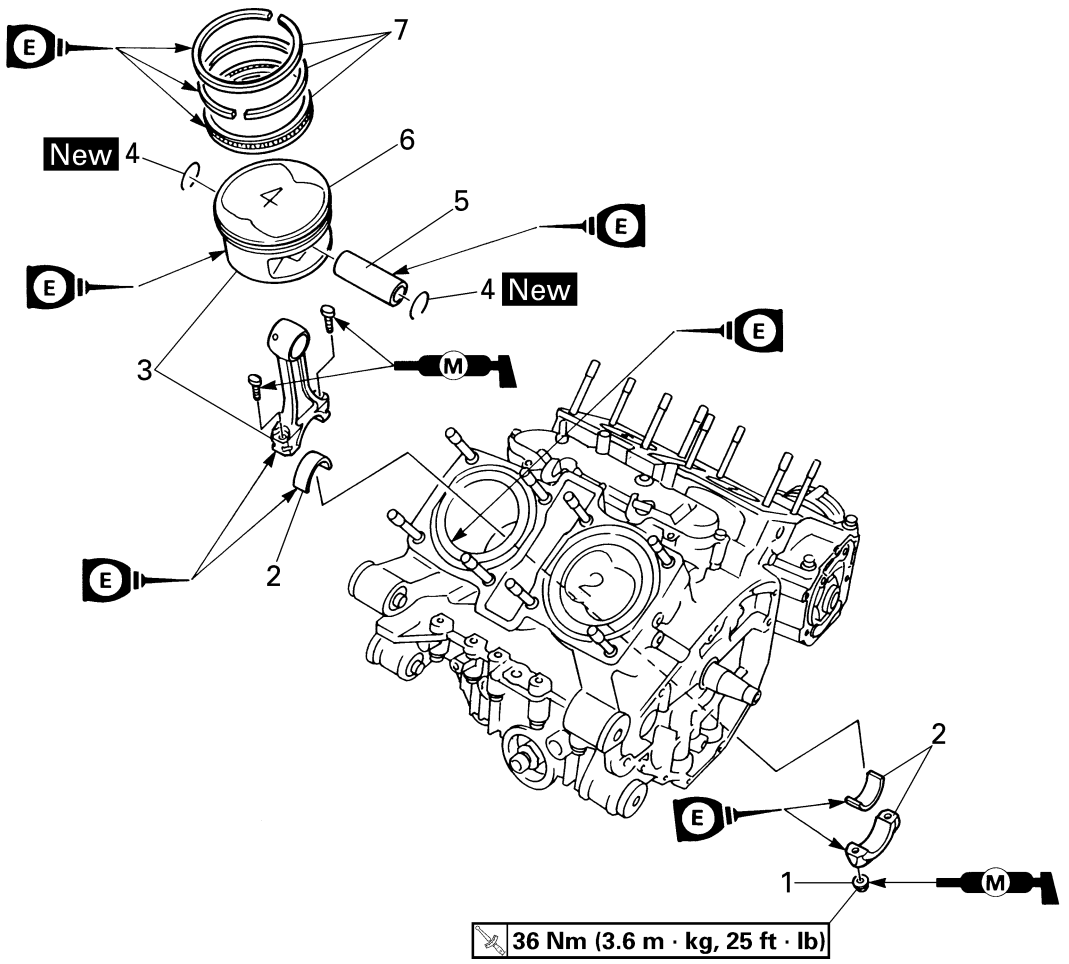


EAS00410
INSTALLING THE BALANCER SHAFT

1. Install:
   • balancer shaft

NOTE:
Align the punch mark ⓐ in the balancer shaft drive gear with the punch mark ⓑ in the balancer shaft driven gear.

CONNECTING RODS AND PISTONS



Order	Job/Part	Q'ty	Remarks
	Removing the connecting rod and piston		Remove the parts in the order listed.
	Engine assembly		Refer to "ENGINE REMOVAL".
	Cylinder heads		Refer to "CYLINDER HEAD COVERS".
	Oil pan and oil pump assembly		Refer to "OIL PAN AND OIL PUMP".
1	Nuts (connecting rod caps)	8	
2	Connecting rod caps and plain bearings	4/8	
3	Connecting rods with pistons	4	
4	Piston pin clips	8	
5	Piston pins	4	
6	Pistons	4	
7	Piston rings	12	
			For installation, reverse the removal procedure.

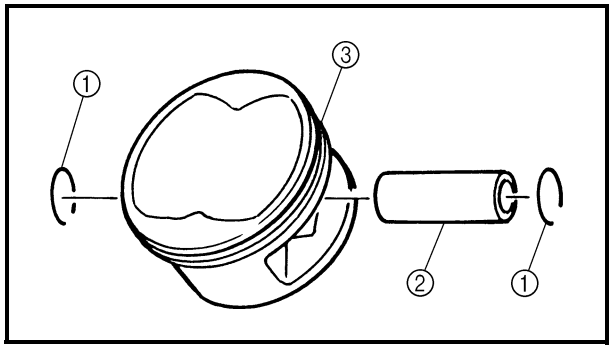
EAS00393
REMOVING THE CONNECTING RODS AND PISTONS

The following procedure applies to all of the connecting rods and pistons.

1. Remove:
   - connecting rod
   - big end bearings

NOTE:

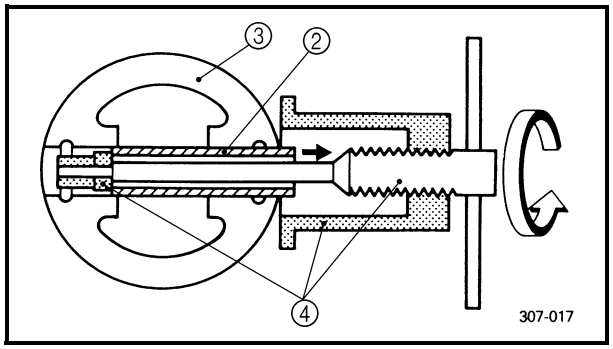
Identify the position of each big end bearing so that it can be reinstalled in its original place.



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

CAUTION:

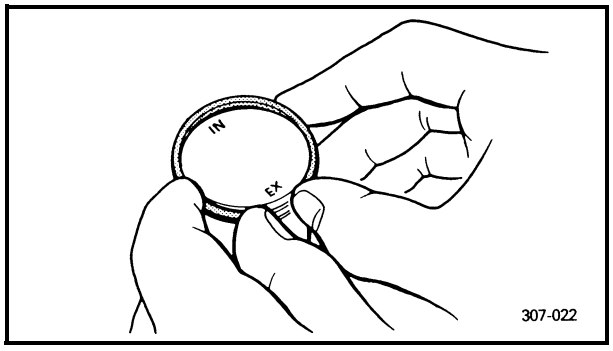
Do not use a hammer to drive the piston pin out.



NOTE:

- For reference during installation, put identification marks on the piston crown.
- Before removing the piston pin, deburr the piston pin clip's groove and the piston's pin bore area. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller ④.

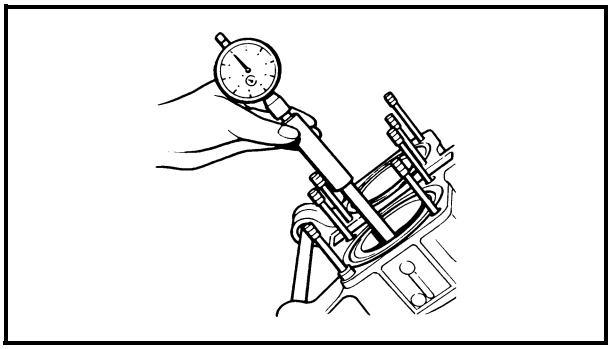
Piston pin puller set
YU-01304

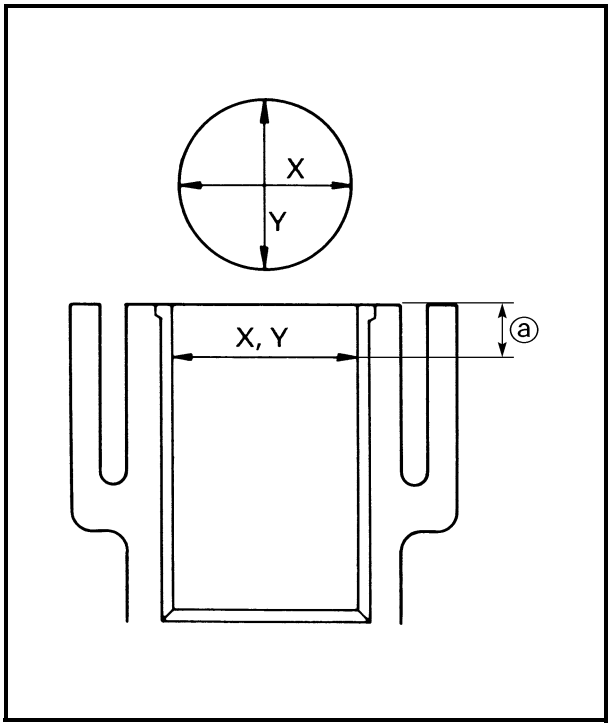


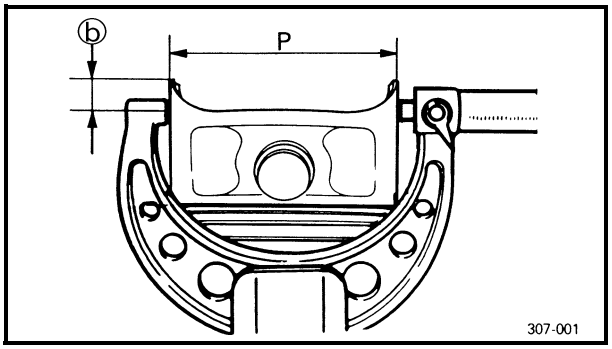
3. Remove:
   - top ring
   - 2nd ring
   - oil ring

NOTE:

When removing a piston ring, open the end gap with your fingers and lift the other side of the ring over the piston crown.







EAS00255
CHECKING THE CYLINDERS AND PISTONS

1. Check:
   - piston wall
   - cylinder wall
   Vertical scratches → Rebore or replace the cylinder, and replace the piston and piston rings as a set.
2. Measure:
   - piston-to-cylinder clearance

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

ⓐ 40 mm from the top of the cylinder

NOTE:

Measure cylinder bore “C” by taking side-to-side and front-to-back measurements of the cylinder. Then, find the average of the measurements.

	Cylinder bore gauge (50 ~ 100 mm) YU-03017

	Standard	Wear limit
Cylinder bore “C”	**75.967 ~ 76.016 mm (2.9908 ~ 2.9927 in)**	**76.1 mm (2.9961 in)**

$$C = \frac{X + Y}{2}$$

b. If out of specification, rebore or replace the cylinder, and replace the piston and piston rings as a set.

c. Measure piston skirt diameter “P” with the micrometer.

ⓑ 6.2 mm (0.24 in) from the bottom edge of the piston

	Piston size “P”
Standard	**75.905 ~ 75.955 mm (2.9884 ~ 2.9903 in)**
Oversize 1	**76.25 mm (3.0021 in)**
Oversize 2	**76.50 mm (3.0118 in)**

4

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
0.055 ~ 0.075 mm
(0.0022 ~ 0.0030 in)
<Limit>: 0.15 mm (0.0059 in)

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

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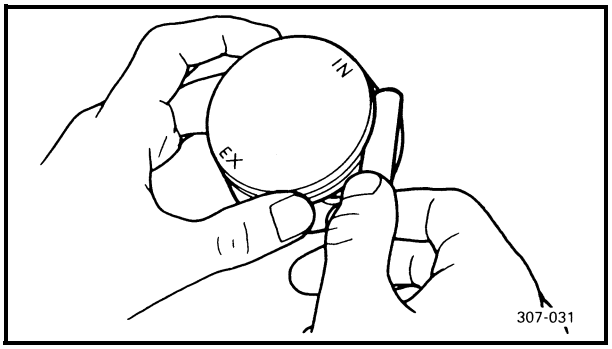
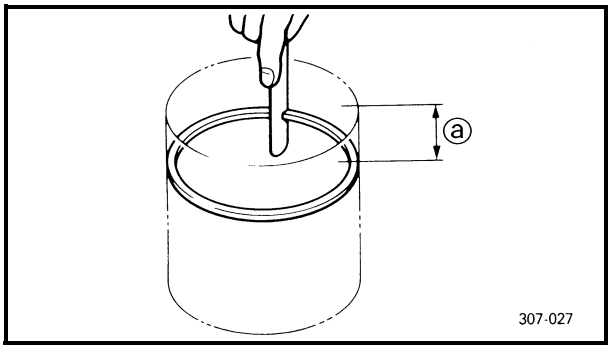


EAS00264
CHECKING THE PISTON RINGS

1. Measure:
   • piston ring side clearance
   Out of specification → Replace the piston and piston rings as a set.

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

Piston ring side clearance
Top ring
0.03 ~ 0.07 mm
(0.0012 ~ 0.0028 in)
<Limit>: 0.12 mm (0.0047 in)
2nd ring
0.02 ~ 0.06 mm
(0.0008 ~ 0.0024 in)
<Limit>: 0.12 mm (0.0047 in)



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

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

ⓐ 20 mm (0.79 in)

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

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

Piston ring end gap
Top ring
0.35 ~ 0.50 mm (0.01 ~ 0.02 in)
<Limit>: 0.75 mm (0.03 in)
2nd ring
0.35 ~ 0.50 mm (0.01 ~ 0.02 in)
<Limit>: 0.75 mm (0.03 in)
Oil ring
0.2 ~ 0.8 mm (0.01 ~ 0.03 in)

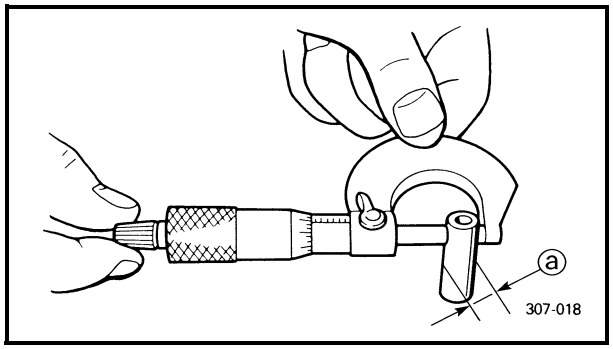
Piston ring oversize
   • Top and 2nd piston rings
     The size of the top and 2nd oversize piston rings is stamped on the top of each ring.

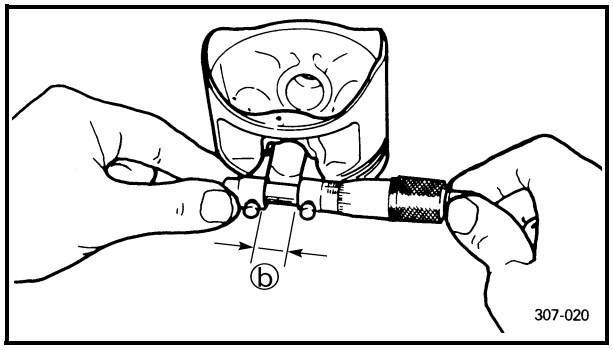
Oversize 1	**0.25 mm (0.0098 in)**
Oversize 2	**0.50 mm (0.0197 in)**

   • Oil ring
     The expander spacer of the oil ring is color-coded for size identification.

Size	Mark
Oversize 1	**25**
Oversize 2	**50**

EAS00266
CHECKING THE PISTON PINS
The following procedure applies to all of the piston pins.
1. Check:
   • piston pin
     Blue discoloration/grooves → Replace the piston pin and then check the lubrication system.





2. Measure:
   • piston pin outside diameter ⓐ
   Out of specification → Replace the piston pin.

Piston pin outside diameter
18.991 ~ 19.000 mm
(0.7477 ~ 0.7480 in)

3. Calculate:
   • piston-pin-to-piston clearance
   Out of specification → Replace the piston pin.

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

Piston-pin-to-piston clearance
0.004 ~ 0.024 mm
(0.00016 ~ 0.00094 in)
<Limit>: 0.072 mm (0.0028 in)

4. Measure:
   • crankshaft-pin-to-big-end-bearing clearance
   Out of specification → Replace the big end bearings.

Crankshaft-pin-to-big-end-bearing clearance
0.021 ~ 0.039 mm
(0.0008 ~ 0.0015 in)

The following procedure applies to all of the connecting rods.

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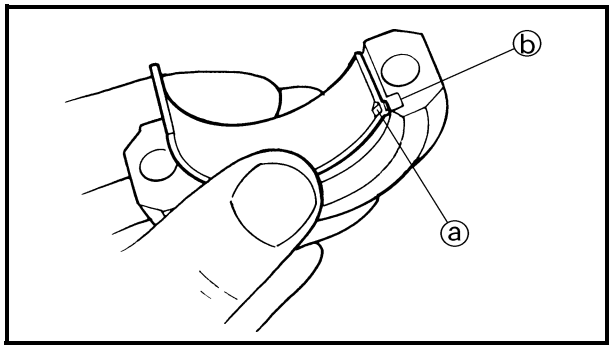
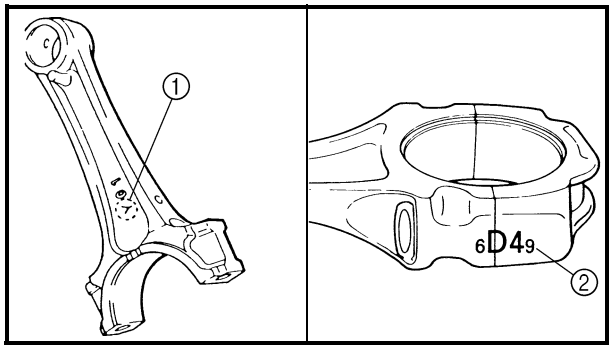
CAUTION:

Do not interchange the big end bearings and connecting rods. To obtain the correct crankshaft-pin-to-big-end-bearing clearance and prevent engine damage, the big end bearings must be installed in their original positions.

a. Clean the big end bearings, crankshaft pins, and the inside of the connecting rod halves.
b. Install the big end upper bearing into the connecting rod and the big end lower bearing into the connecting rod cap.





NOTE:
Align the projections ⓐ on the big end bearings with the notches ⓑ in the connecting rod and connecting rod cap.

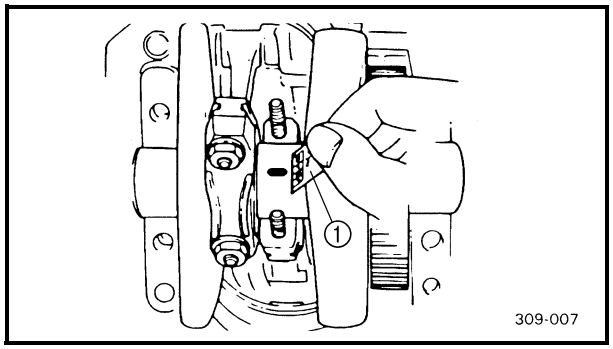
c. Put a piece of Plastigauge® on the crankshaft pin.
d. Assemble the connecting rod halves.

NOTE:
- Do not move the connecting rod or crankshaft until the clearance measurement has been completed.
- Lubricate the bolts threads and nut seats with molybdenum disulfide grease.
- Make sure the "Y" mark ① on the connecting rod faces towards the left side of the crankshaft.
- Make sure the characters ② on both the connecting rod and connecting rod cap are aligned.

e. Tighten the connecting rod nuts.
Refer to "INSTALLING THE PISTONS AND CYLINDERS".

	Connecting rod nut **36 Nm (3.6 m • kg, 25 ft • lb)**

f. Remove the connecting rod and big end bearings.
Refer to "REMOVING THE CONNECTING RODS AND PISTONS".



g. Measure the compressed Plastigauge® width ① on the crankshaft pin. If the crankshaft-pin-to-big-end-bearing clearance is out of specification, select replacement big end bearings.

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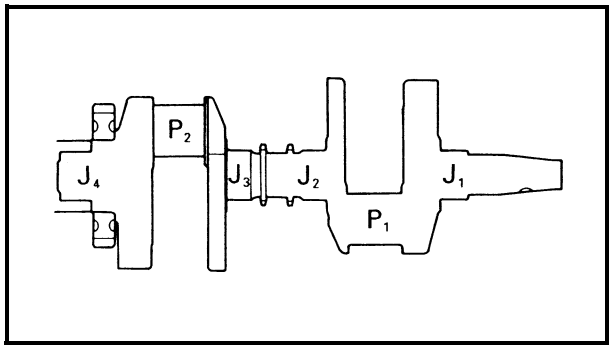
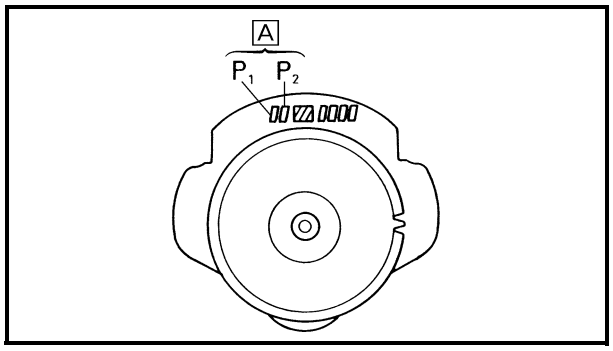
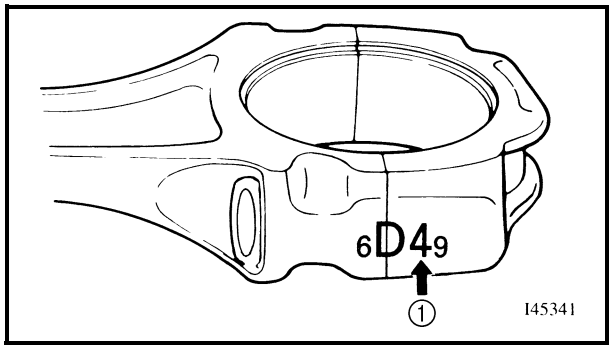
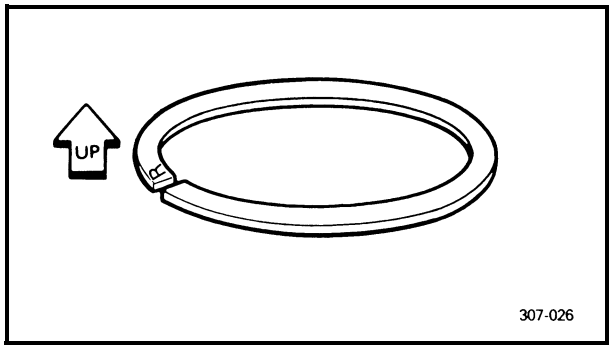








6. Select:
   - big end bearings (P_1 ~ P_2)

NOTE:
- The numbers Ⓐ stamped into the crankshaft web and the numbers ① on the connecting rods are used to determine the replacement big end bearing sizes.
- "P_1" ~ "P_2" refer to the bearings shown in the crankshaft illustration.

For example, if the connecting rod "P_1" and the crankshaft web "P_1" numbers are "4" and "1" respectively, then the bearing size for "P_1" is:

Bearing size of P_1:
"P_1" (connecting rod) – "P_1" (crankshaft web)
4 – 1 = 3 (brown)

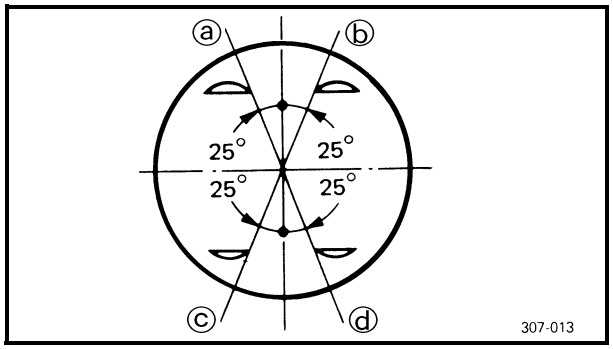
BEARING COLOR CODE	
1	blue
2	black
3	brown
4	green
5	yellow
6	pink

EAS00270
INSTALLING THE PISTONS AND CYLINDERS

The following procedure applies to all of the pistons and cylinders.

1. Install:
   - top ring
   - 2nd ring
   - oil ring

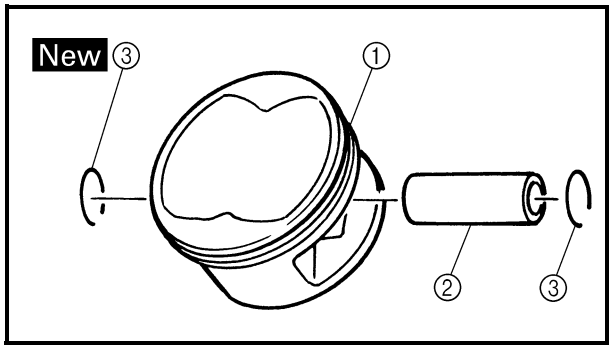
NOTE:
- Be sure to install the piston rings so that the manufacturer's marks or numbers are located on the upper side of the rings.
- Lubricate the piston and piston rings liberally with engine oil.



2. Position:
   - top ring
   - 2nd ring
   - oil ring

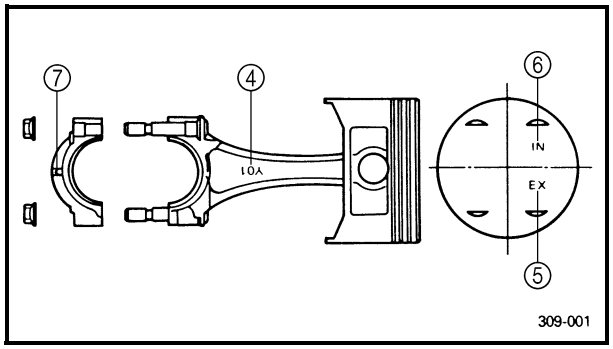
   Offset the piston ring end gaps as shown.

ⓐ Top ring end
ⓑ Lower oil ring end
ⓒ Upper oil ring end
ⓓ 2nd ring end

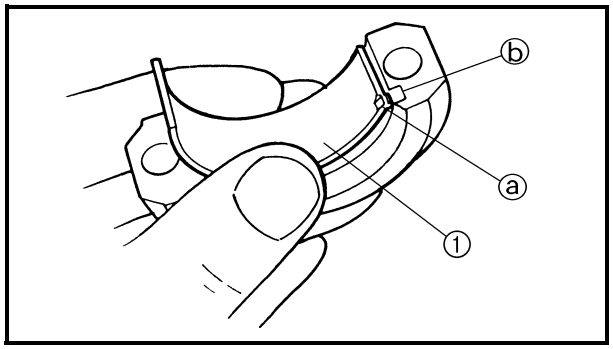


3. Install:
   - piston ①
   - piston pin ②
   - piston pin clip ③ New

NOTE:
- Apply engine oil onto the piston pin.
- Be sure that the piston is positioned correctly, as shown in the illustration.



④ "Y" mark
⑤ "EX" exhaust side
⑥ "IN" exhaust side
⑦ Projection



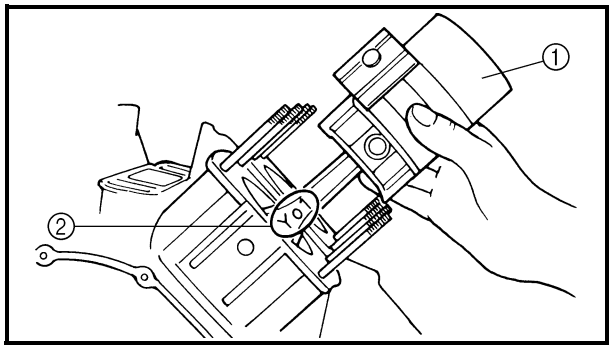
4. Install:
   - big end bearings ①

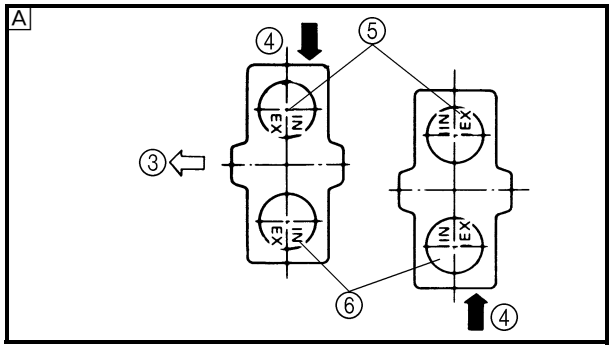
NOTE:
- Align the projections ⓐ on the big end bearings with the notches ⓑ in the connecting rods and connecting rod caps.
- Be sure to reinstall each big end bearing in its original place.

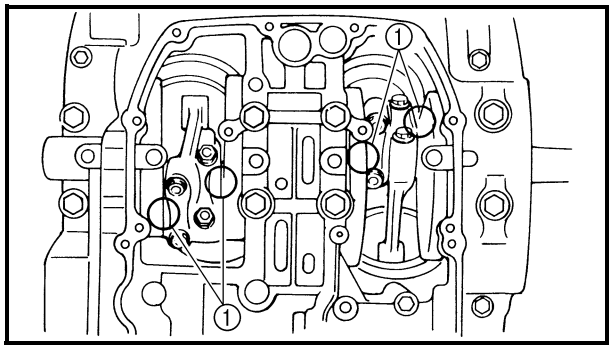
5. Lubricate:
   - piston
   - piston rings
   - cylinder

   (with the recommended lubricant)

	Recommended lubricant **Engine oil**







6. Attach:
   • piston ring compressors ①

	Piston ring compressor YM-8037

7. Install:
   • connecting rod and piston assembly

NOTE:

- The stamped "Y" mark ② on the No. 2 and No. 4 connecting rods should face towards the right side of the crankcase.
- The stamped "Y" mark ② on the No. 1 and No. 3 connecting rods should face towards the left side of the crankcase.

A Top view
③ Front
④ "Y" mark facing direction
⑤ Piston exhaust mark
⑥ Piston intake mark

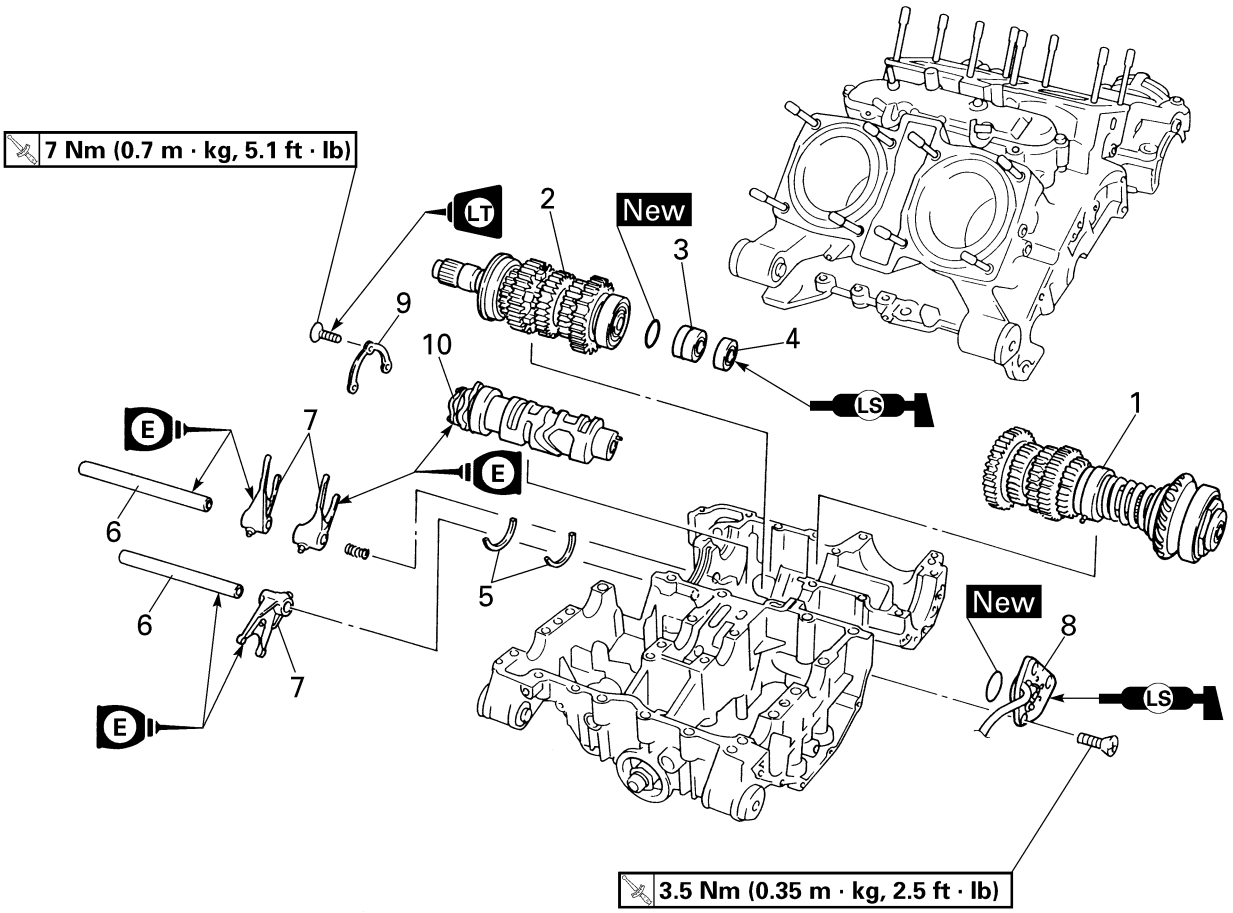
8. Align:
   • bolt heads ①
   (with the connecting rod caps)
9. Tighten:
   • connecting rod nuts

36 Nm (3.6 m · kg, 25 ft · lb)

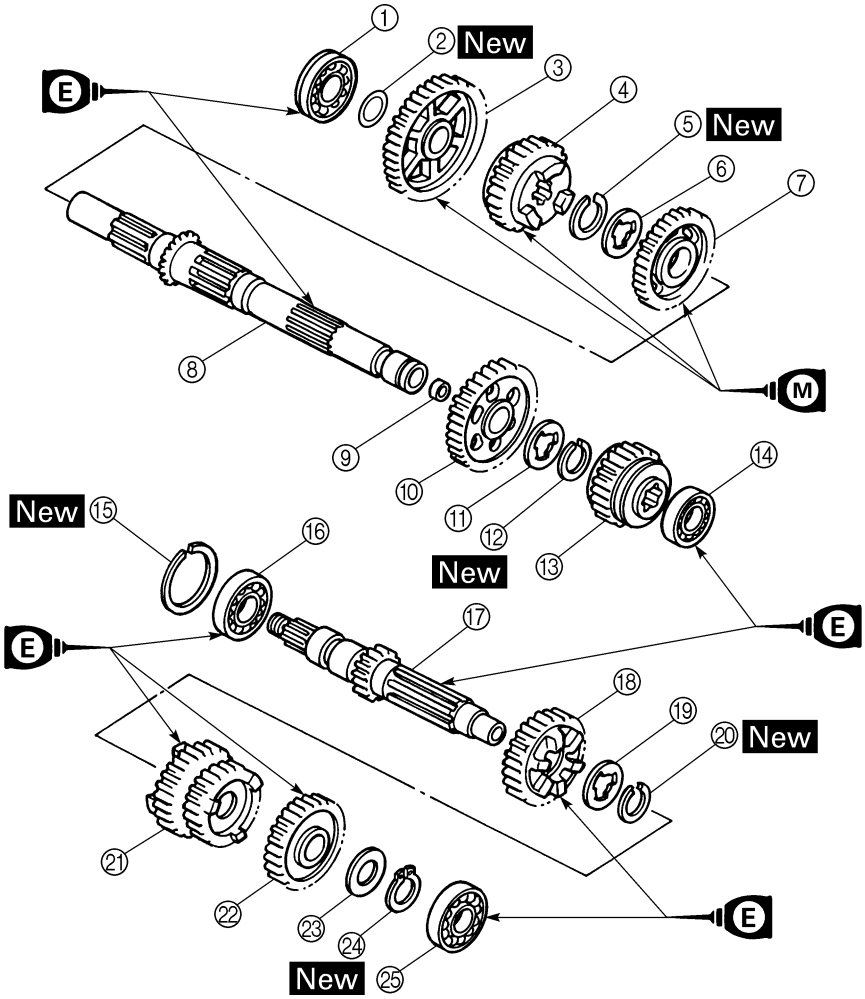
CAUTION:

- **When tightening the connecting rod nuts, be sure to use an F-type torque wrench.**
- **Without pausing, tighten the connecting rod nuts to the specified torque. Apply continuous torque between 3.0 and 3.6 m • kg (22 and 25 ft • lb). Once you reach 3.0 m • kg (22 ft • lb) DO NOT STOP TIGHTENING until the specified torque is reached. If the tightening is interrupted between 3.0 and 3.6 m • kg (22 and 25 ft • lb), loosen the connecting rod nut to less than 3.0 m • kg (22 ft • lb) and start again.**

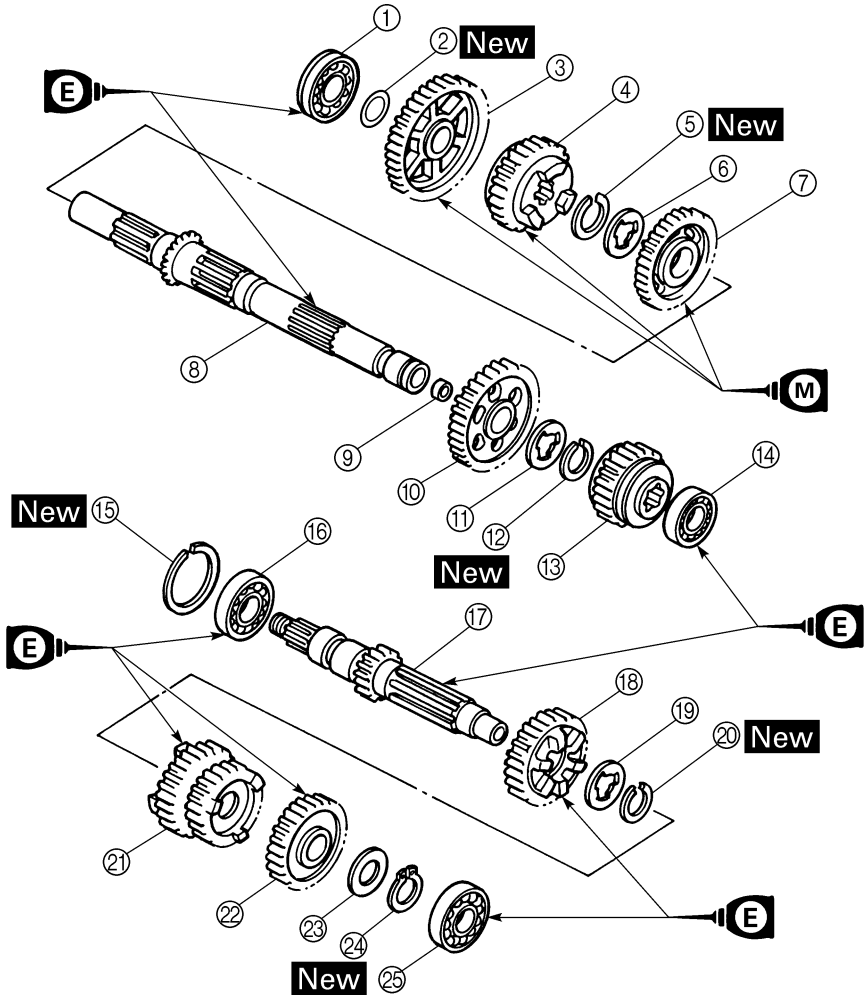
TRANSMISSION



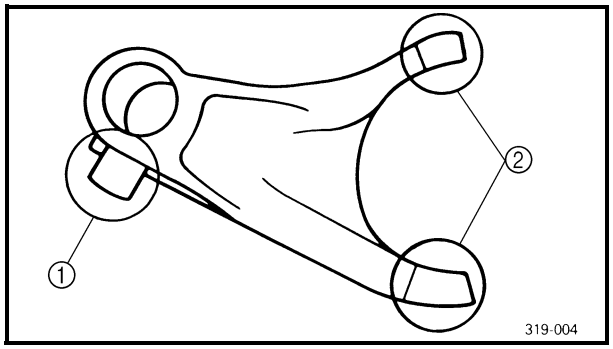
Order	Job/Part	Q'ty	Remarks
	Removing the transmission		Remove the parts in the order listed.
	Crankcase separation		Refer to "CRANKCASE".
1	Drive axle assembly	1	
2	Main axle assembly	1	
3	Push rod bearing	1	
4	Oil seal	1	
5	Bearing stoppers	2	
6	Shift fork guide bars	2	
7	Shift forks	3	
8	Neutral switch	1	
9	Shift drum retainer	1	
10	Shift drum	1	
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the transmission		Remove the parts in the order listed.
	Middle drive pinion gear assembly		Refer to "MIDDLE GEAR".
①	Bearing	1	
②	Shim	1	
③	1st wheel gear	1	
④	4th wheel gear	1	
⑤	Circlip	1	
⑥	Washer	1	
⑦	3rd wheel gear	1	
⑧	Drive axle	1	
⑨	Plug	1	
⑩	2nd wheel gear	1	
⑪	Washer	1	
⑫	Circlip	1	



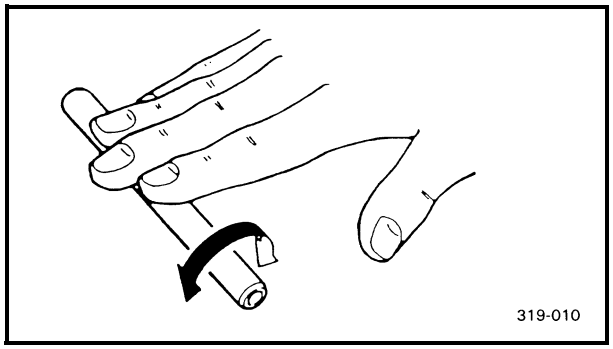
Order	Job/Part	Q'ty	Remarks
⑬	5th wheel gear	1	
⑭	Bearing	1	
⑮	Circlip	1	
⑯	Bearing	1	
⑰	Main axle	1	
⑱	4th pinion gear	1	
⑲	Washer	1	
⑳	Circlip	1	
㉑	2nd, 3rd pinion gear	1	
㉒	5th pinion gear	1	
㉓	Washer	1	
㉔	Circlip	1	
㉕	Bearing	1	
			For assembly, reverse the disassembly procedure.



EAS00421
CHECKING THE SHIFT FORKS

The following procedure applies to all of the shift forks.

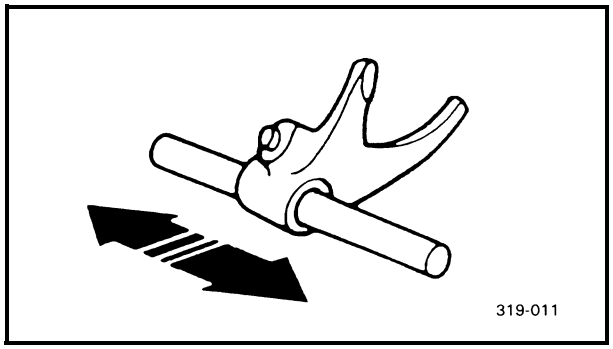
1. Check:
   - shift fork cam follower ①
   - shift fork pawl ②
     Bends/damage/scoring/wear → Replace the shift fork.



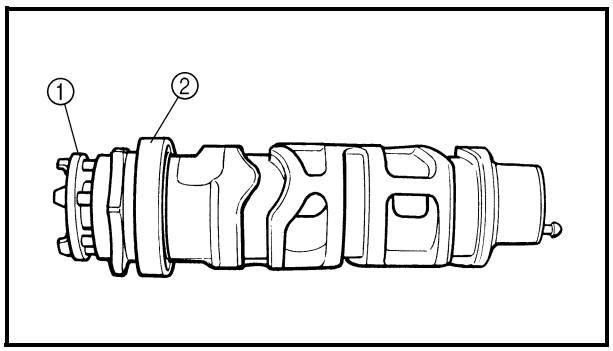
2. Check:
   - shift fork guide bar
     Roll the shift fork guide bar on a flat surface.
     Bends → Replace.

⚠ WARNING

Do not attempt to straighten a bent shift fork guide bar.

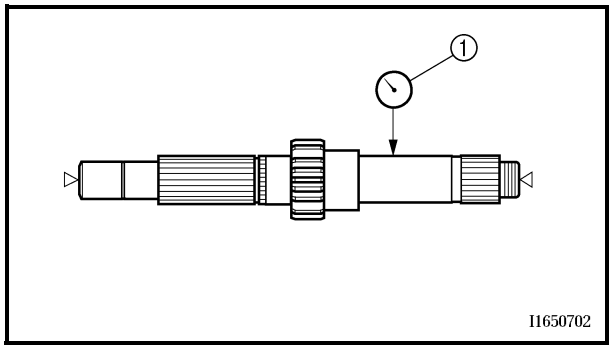


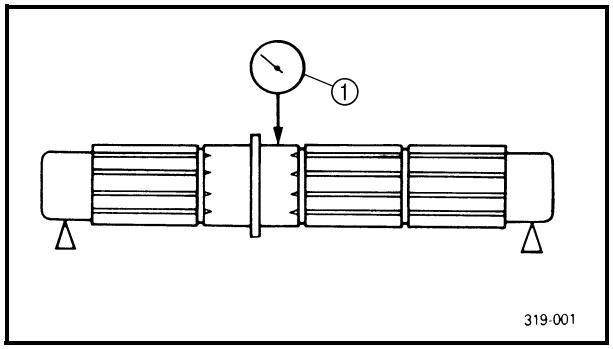
3. Check:
   - shift fork movement
     (along the shift fork guide bar)
     Rough movement → Replace the shift forks and shift fork guide bar as a set.

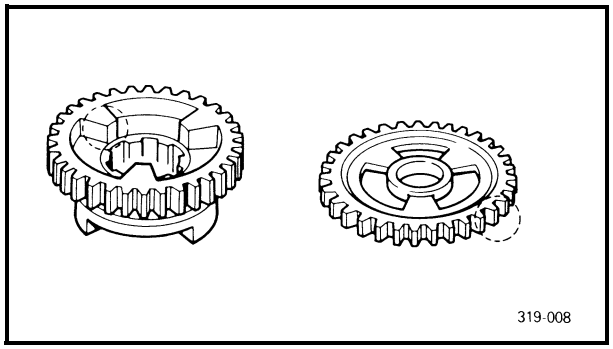


EAS00422
CHECKING THE SHIFT DRUM ASSEMBLY

1. Check:
   - shift drum grooves
     Damage/scratches/wear → Replace the shift drum assembly.
   - shift drum segment ①
     Damage/wear → Replace the shift drum assembly.
   - shift drum bearing ②
     Damage/pitting → Replace the shift drum assembly.







EAS00425
CHECKING THE TRANSMISSION

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

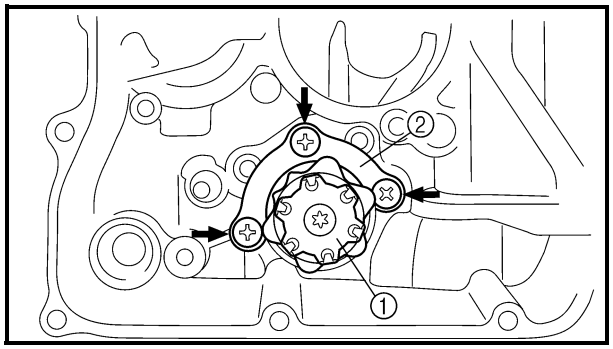
Main axle runout limit
0.08 mm (0.003 in)

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

Drive axle runout limit
0.08 mm (0.003 in)

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

4

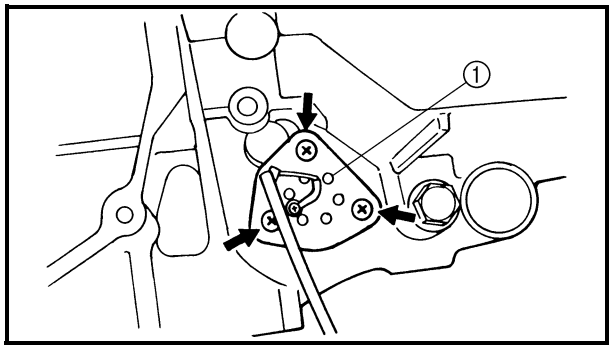


EAS00430
INSTALLING THE TRANSMISSION

1. Install:
   - shift drum assembly ①
   - shift drum retainer ②

7 Nm (0.7 m · kg, 5.1 ft · lb)

NOTE:
- Apply LOCTITE® #648 to the shift drum retainer screws.
- Turn the shift drum assembly to the neutral position.



2. Lubricate:
   - neutral switch
     (with the recommended lubricant)

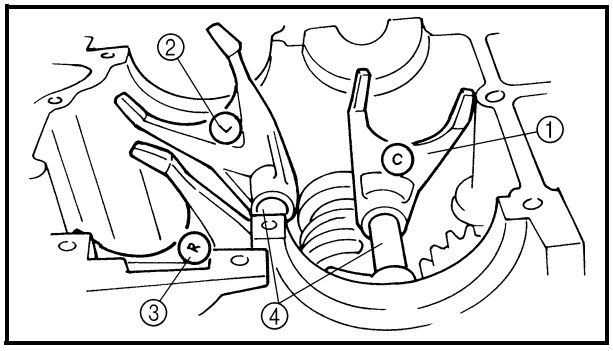
Recommended lubricant
Lithium soap base grease

3. Install:
   - neutral switch ①

3.5 Nm (0.35 m · kg, 25 ft · lb)

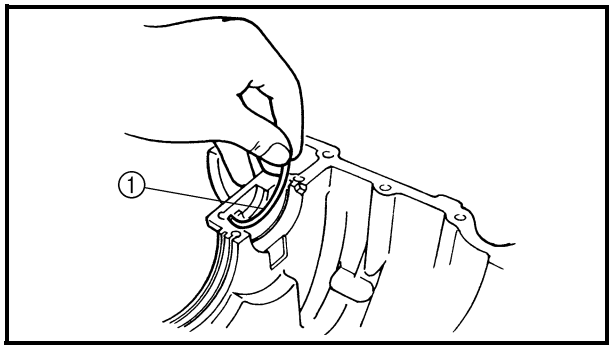
⚠ WARNING

Always use a new O-ring.



4. Install:
   - shift fork "C" ①
   - shift fork "L" ②
   - shift fork "R" ③
   - shift fork guide bars ④

NOTE:
The embossed marks on the shift forks should face towards the right side of the engine and be in the following sequence: "R", "C", "L".

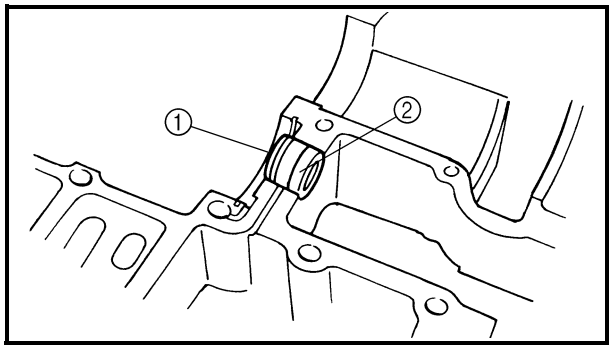


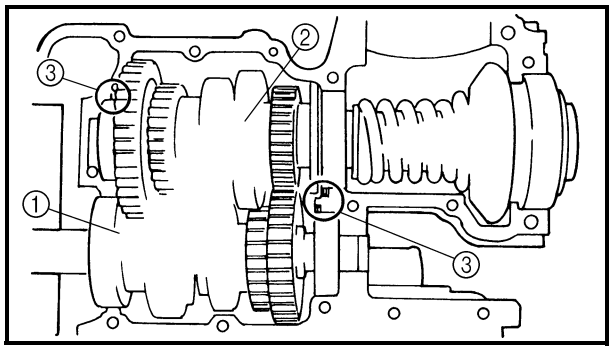
5. Install:
   • bearing stoppers ①

NOTE:
Insert the bearing stoppers completely into the grooves in the lower crankcase.

6. Lubricate:
   • oil seal lips
   (with a thin coat of the recommended lubricant)

	Recommended lubricant **Lithium soap base grease**





7. Install:
   • push rod bearing ①
   • oil seal ②

⚠ WARNING
Always use a new O-ring.

NOTE:
- Insert the bearing pin into the hole in the crankcase.
- Position the oil seal against the push rod bearing.

8. Install:
   • main axle assembly ①
   • drive axle assembly ②

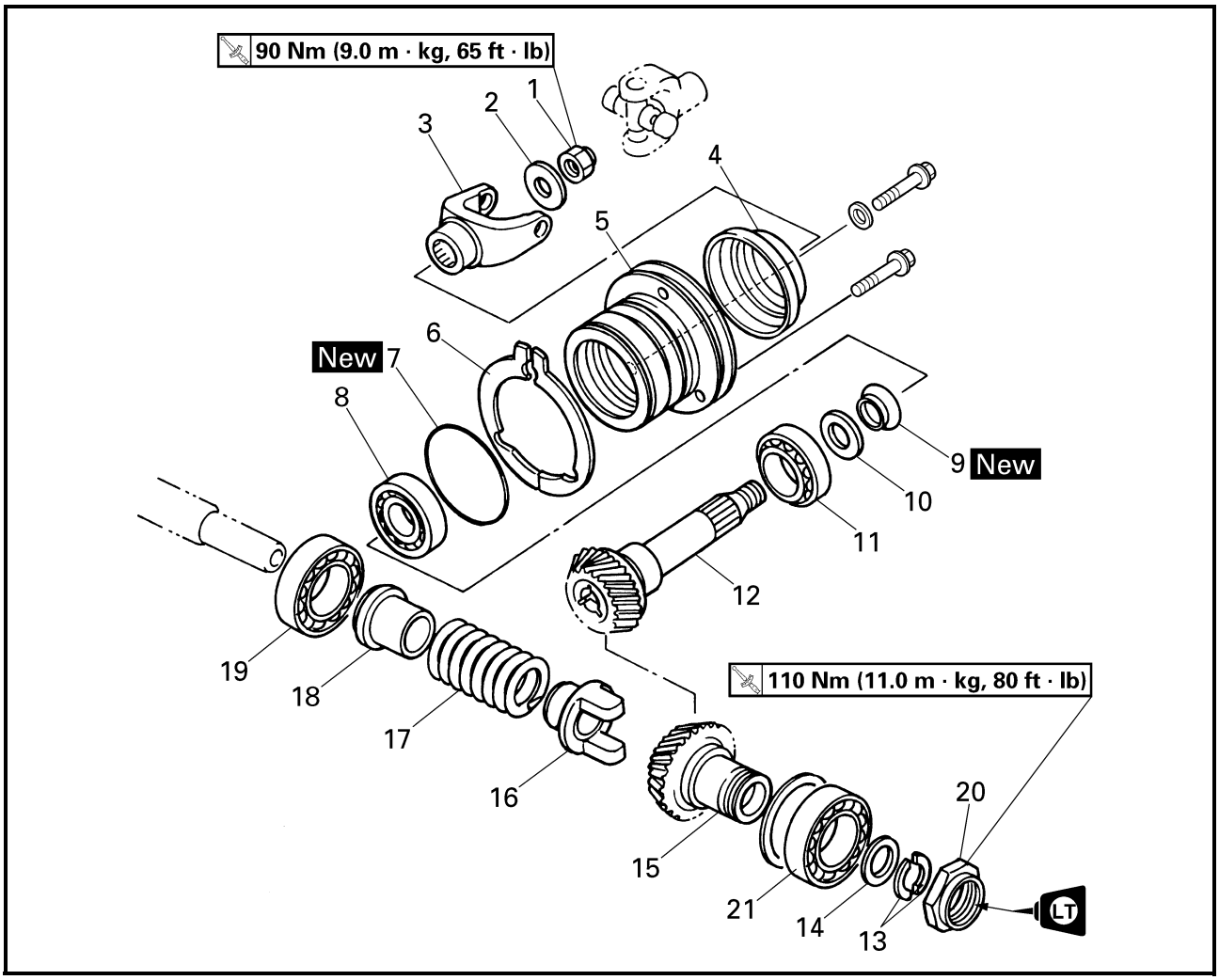
⚠ WARNING
Always use new circlips.

NOTE:
Position the bearing pins ③ as shown.

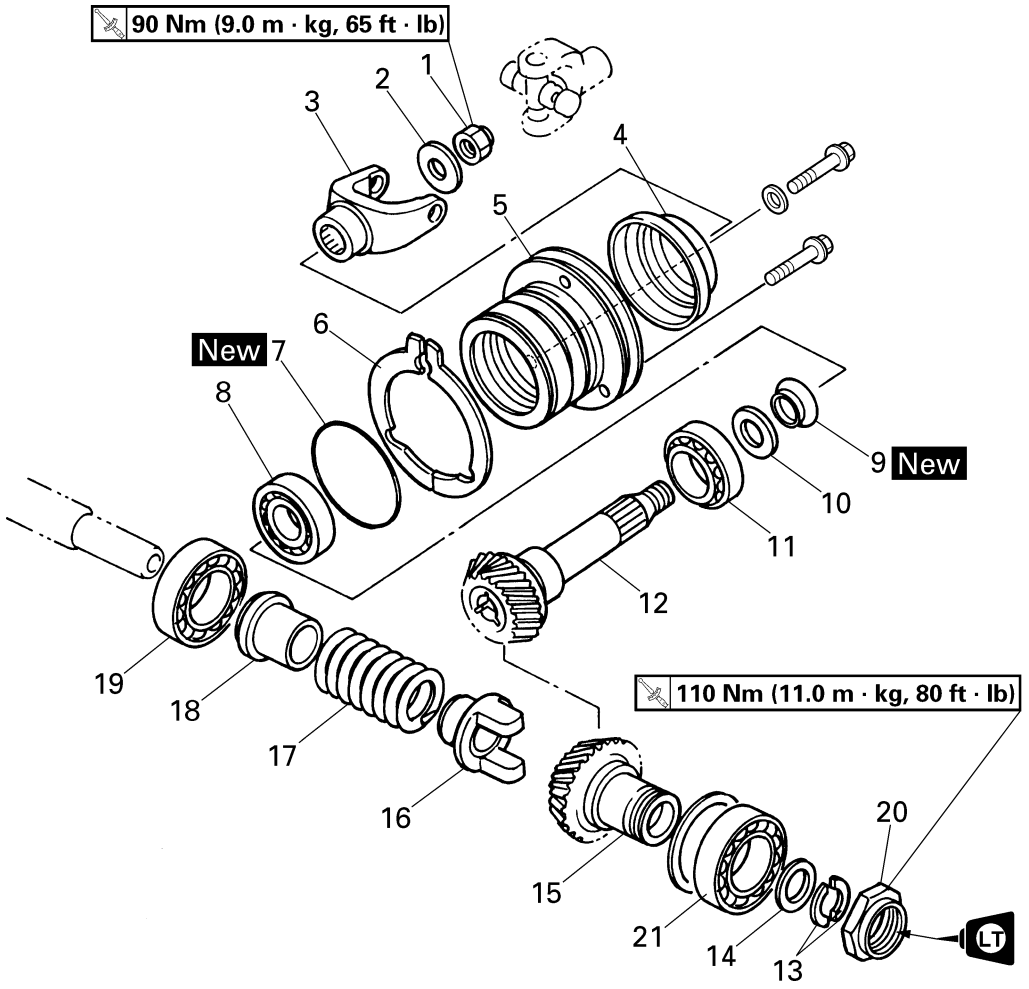
9. Check:
   • transmission
   Rough movement → Repair.

NOTE:
Oil each gear, shaft, and bearing thoroughly.

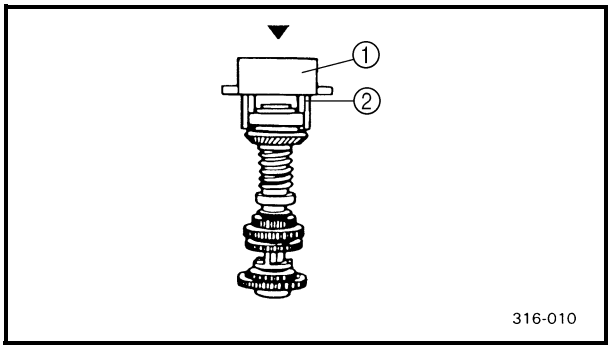
MIDDLE GEAR



Order	Job/Part	Q'ty	Remarks
	Removing the middle gear		Remove the parts in the order listed.
	Crankcase separation		Refer to "CRANKCASE".
	Drive axle assembly		Refer to "TRANSMISSION".
1	Nut	1	
2	Washer	1	
3	Universal joint (yoke)	1	
4	Dust seal	1	
5	Middle driven shaft bearing housing	1	
6	Shims	2	
7	O-ring	1	
8	Bearing	1	
9	Collapsible collar	1	
10	Spacer	1	
11	Bearing	1	



Order	Job/Part	Q'ty	Remarks
12	Middle driven shaft	1	
13	Retainer	1	
14	Thrust washer	1	
15	Middle drive pinion gear	1	
16	Damper cam	1	
17	Damper spring	1	
18	Spring seat	1	
19	Bearing	1	
20	Nut	1	
21	Bearing	1	
			For installation, reverse the removal procedure.



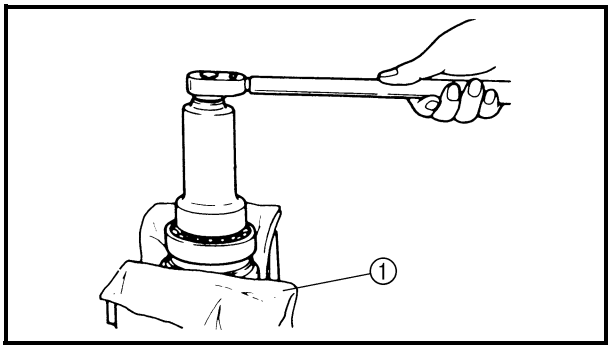
EAS00435
DISASSEMBLING THE MIDDLE DRIVE SHAFT ASSEMBLY

1. Remove:
   • spring retainers

NOTE:
While holding the spring with the middle drive gear holder ①, compress the spring with the damper spring compressor ②, and then remove the spring retainers.

Middle gear backlash tool
90890-04080
Damper spring compressor
YM-33286

2. Remove:
   • middle drive shaft nut
   • bearing
   • shim(s)



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a. Wrap the end of the middle drive shaft in a folded rag ①.
b. Secure the middle drive shaft in a vice.
c. Attach the middle drive shaft nut wrench as shown.

Middle drive shaft nut wrench (55 mm)
YM-04054

d. Remove the middle drive shaft nut, bearing, and shim(s).

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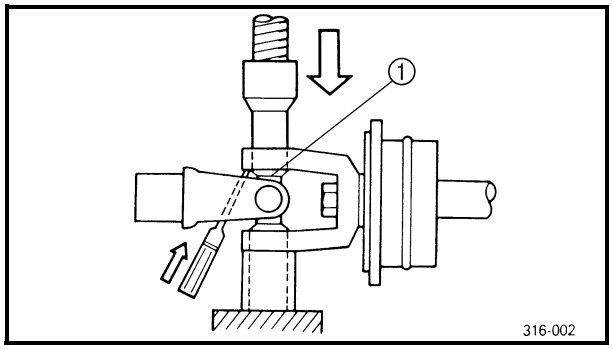
EAS00437
DISASSEMBLING THE MIDDLE DRIVEN SHAFT ASSEMBLY

NOTE:
The following procedure should only be performed if the middle drive gear or middle driven shaft bearing(s) has to be replaced.



1. Remove:
   • universal joint

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a. Remove the circlips ①.
b. Place the universal joint in a press.
c. With a pipe of the proper diameter positioned beneath the universal joint driven yoke as shown, press the bearing into the pipe.

NOTE:

It may be necessary to lightly tap the universal joint driven yoke with a center punch.

d. Repeat the above steps to remove the opposite side's bearing.
e. Separate the universal joint yokes.

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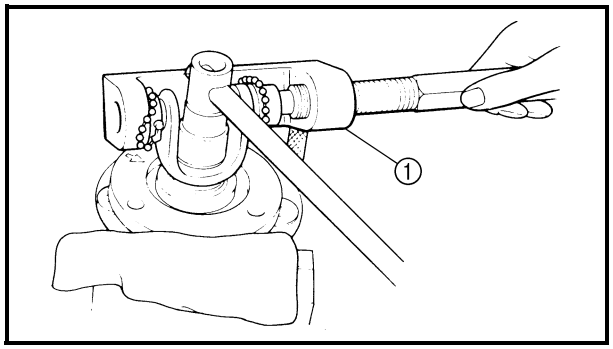
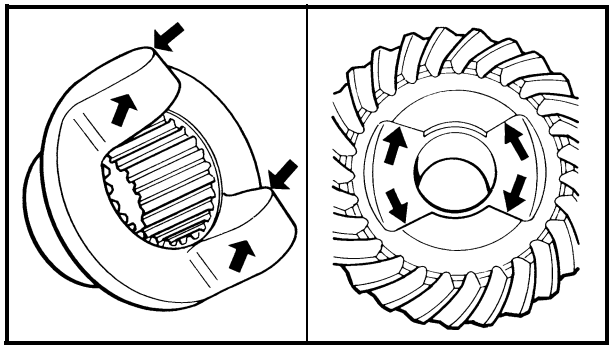


2. Loosen:
   • middle driven shaft nut

NOTE:

While holding the universal joint driven yoke with the universal joint holder ①, loosen the middle driven shaft nut.

	**Universal joint holder** **YM-04062**



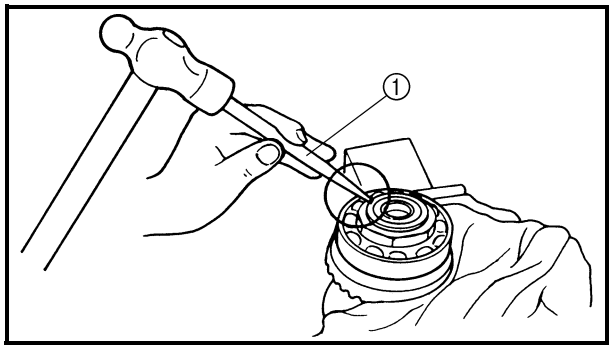
EAS00438

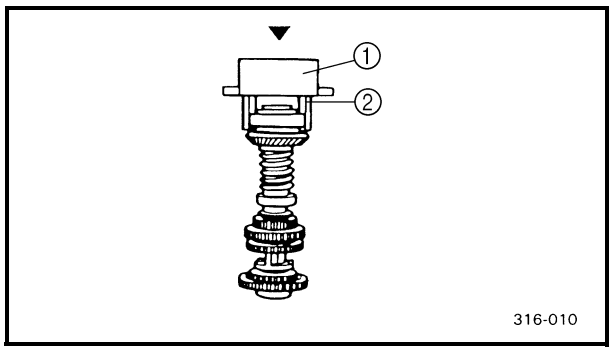
CHECKING THE MIDDLE DRIVE SHAFT ASSEMBLY

1. Check:
   • damper cam surface
   Scratches/wear → Replace the damper cam.
2. Check:
   • spring
   Cracks/damage → Replace.

EAS00439
CHECKING THE MIDDLE DRIVEN SHAFT ASSEMBLY

1. Check:
   - middle driven gear
     Galling/pitting/wear → Replace the middle driven shaft assembly.
2. Check:
   - bearings
     Damage/pitting → Replace the middle drive shaft bearing housing assembly.
3. Check:
   - O-ring
   - oil seal
     Damage → Replace the defective part(s).
4. Check:
   - universal joint movement
     Rough movement → Replace the universal joint.





EAS00441
ASSEMBLING THE MIDDLE DRIVE SHAFT ASSEMBLY

1. Tighten:
   - middle drive shaft nut

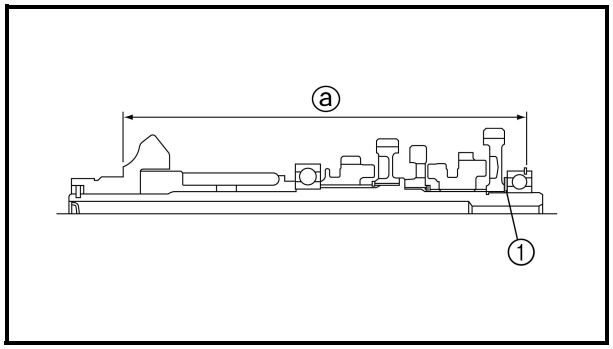
110 Nm (11.0 m · kg, 80 ft · lb)

NOTE:
- Apply LOCTITE® #620 or #201 to the middle drive pinion gear nut.
- Lock the threads on the middle drive shaft nut by staking them with a center punch ①.

2. Install:
   - spring retainers

NOTE:
While holding the spring with the middle drive gear holder ②, compress the spring with the damper spring compressor ①, and then install the spring retainers.

Middle gear backlash tool
90890-04080
Damper spring compressor
YM-33286



3. Measure:
   • drive axle assembly length ⓐ
   Out of specification → Add shim ①.

Drive axle assembly length
253.81 ~ 254.37 mm
(9.9924 ~ 10.0145 in)

Length ⓐ	Shim thickness
252.66 ~ 253.00 mm (9.9472 ~ 9.9606 in)	1.3 mm (0.0512 in)
253.01 ~ 253.40 mm (9.9610 ~ 9.9764 in)	0.9 mm (0.0354 in)
253.41 ~ 253.80 mm (9.9768 ~ 9.9921 in)	0.5 mm (0.0197 in)

EAS00443
ASSEMBLING THE MIDDLE DRIVEN SHAFT ASSEMBLY

NOTE:
The following points are critical when assembling the middle gears:
- The collapsible collar must be replaced whenever the middle driven shaft assembly is removed from the middle driven shaft bearing housing.
- When performing this procedure for the first time, be sure to have at least one extra collapsible collar on hand.
- If there is insufficient preload on the bearings, the middle driven shaft can move slightly, allowing oil to leak past the seal. In addition to torquing the middle driven shaft nut to specification, you must also check the spinning torque (bearing preload).

1. Install:
   • bearing outer race
   (into the middle driven shaft bearing housing)

⚠ WARNING

Do not press the bearing outer race. During installation, always press the bearing inner race carefully.

2. Tighten:
   • middle driven shaft nut

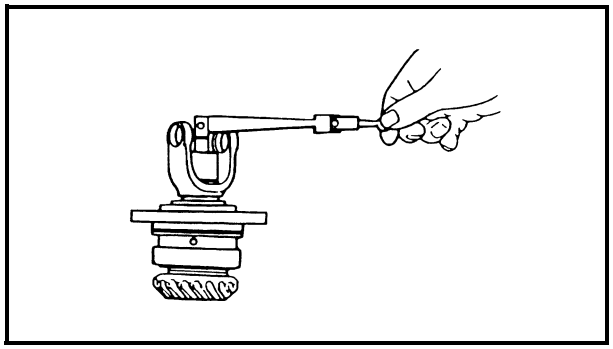
	90 Nm (9.0 m · kg, 65 ft · lb)

   While holding the universal joint driven yoke with the universal joint holder, tighten the middle driven shaft nut.

	Universal joint holder **YM-04062**

CAUTION:

Tighten the middle driven shaft nut in small increments, checking the torque it takes to keep the middle driven gear turning in the middle driven shaft bearing housing - not the torque it takes to start it turning.



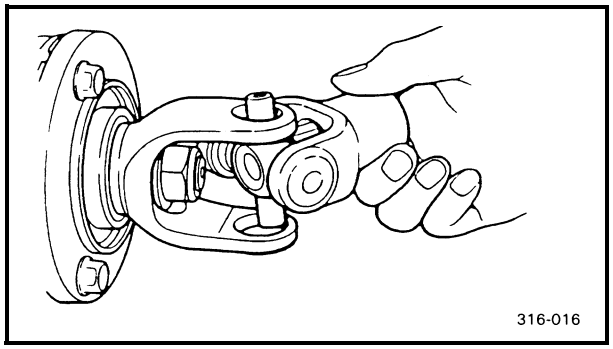
3. Measure:
   • middle driven gear spinning torque
   (with the beam-type torque wrench)

	Middle driven gear spinning torque **0.4 ~ 0.5 Nm** **(0.04 ~ 0.05 m · kg,** **0.29 ~ 0.36 ft · lb)**

   Under specification → Repeat steps (2) and (3).

CAUTION:

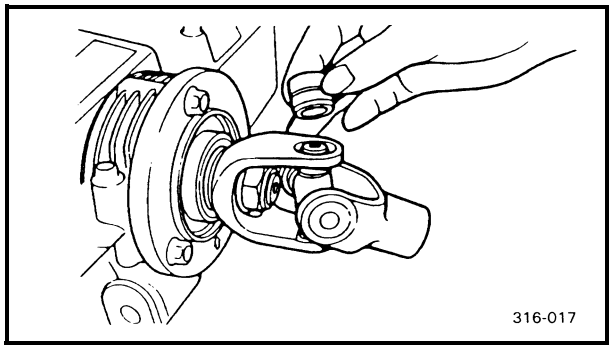
- **Never exceed the standard spinning torque.**
- **If the spinning torque is not high enough, tighten the middle driven shaft nut slightly and check the spinning torque again. Repeat these steps until the proper spinning torque is obtained.**
- **If the spinning torque specification is exceeded, remove the middle driven shaft assembly, install a new collapsible collar, and repeat steps (1) ~ (3).**



4. Install:
   • universal joint driven yoke/cross joint
   (into the universal joint drive yoke)

CAUTION:

Do not hammer the universal joint drive yoke or the collapsible collar may be distorted. This will result in a change in the standard spinning torque, requiring replacement of the collapsible collar and reassembly of the middle driven shaft assembly.



5. Install:
   • bearings
   (onto the universal joint driven yoke/cross joint)

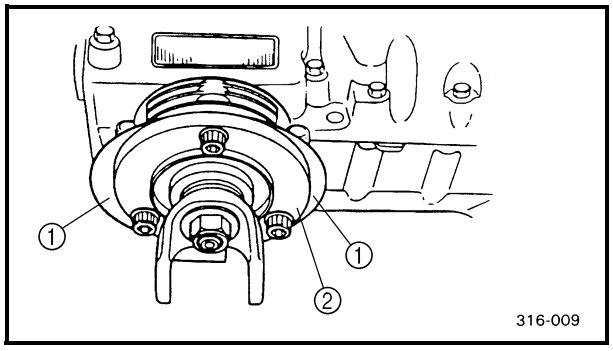
CAUTION:

The needles can easily fall out of their races, so check each bearing carefully. Slide the universal joint driven yoke assembly back and forth on the bearings. If a needle is out of place, the yoke will not go all the way onto the bearings.

6. Press each bearing into the universal joint driven yoke assembly with a socket of the proper size.

NOTE:

The bearings must be inserted far enough into the universal joint driven yoke assembly so that circlips can be installed.



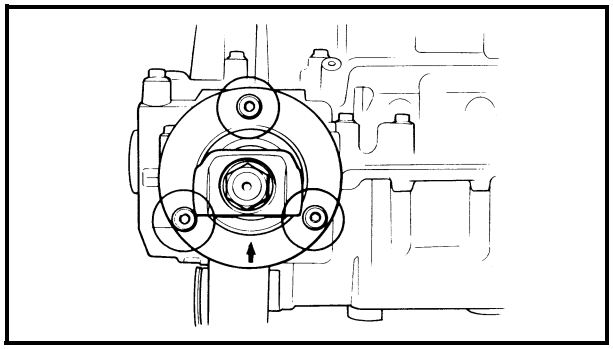
EAS00446

INSTALLING THE MIDDLE GEAR

1. Install:
   • shim(s) ①
   • middle driven shaft housing ②

NOTE:

Finger tighten the middle driven shaft housing bolts.



2. Tighten:
   - crankcase bolts

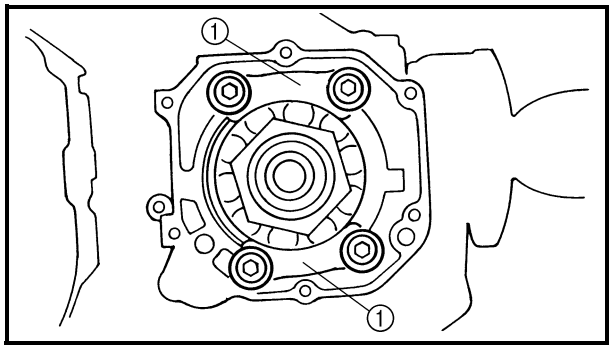
     24 Nm (2.4 m · kg, 17 ft · lb)
   - middle driven shaft housing bolts

     30 Nm (3.0 m · kg, 22 ft · lb)

NOTE:

Before tightening the bolts:

1. Adjust the middle gear backlash.
   Refer to "ADJUSTING THE MIDDLE GEAR BACKLASH".
2. Check that the middle driven gear turns smoothly.
3. Make sure the arrow on the middle driven shaft bearing housing points towards the upper crankcase.



3. Install:
   - bearing retainers ①

     25 Nm (2.5 m · kg, 18 ft · lb)

NOTE:

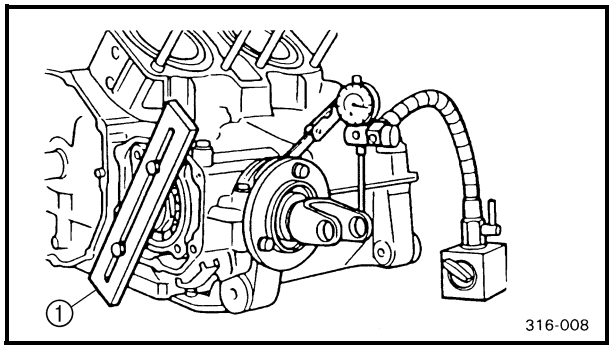
Apply LOCTITE® to the middle gear bearing retainer screws.

⚠ WARNING

Always use new screws.

CAUTION:

After tightening the bearing retainer screws, stake them with a center punch.



EAS00451

ADJUSTING THE MIDDLE GEAR BACKLASH

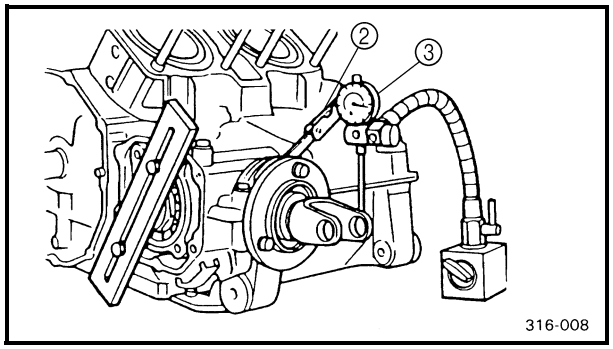
1. Install:
   - middle gear backlash tool ①

	Middle gear backlash tool 90890-04080

2. Loosen:
   • middle driven shaft bearing housing bolts
3. Remove:
   • shim(s)
4. Tighten:
   • middle driven shaft bearing housing bolts

CAUTION:

Do not overtighten the middle driven shaft bearing housing bolts or you may obtain too little middle gear backlash, and damage the middle gears and collapsible collar. If the bolts are overtightened, replace the collapsible collar. Then, repeat all of the previous steps until the crankcase-to-middle-driven-shaft-bearing-housing clearance is within specification.



NOTE:

- Tighten the middle driven shaft bearing housing bolts carefully, one thread turn at a time only. Push in the middle driven shaft bearing housing and then tighten the bolts to specification.
- Clearance between the crankcase and the middle driven shaft bearing housing should be approximately 2 mm, when measured with a thickness gauge ②.

5. Position:
   • dial gauge ③
   (onto the outside edge of the universal joint)

	Dial gauge **YU-03097**

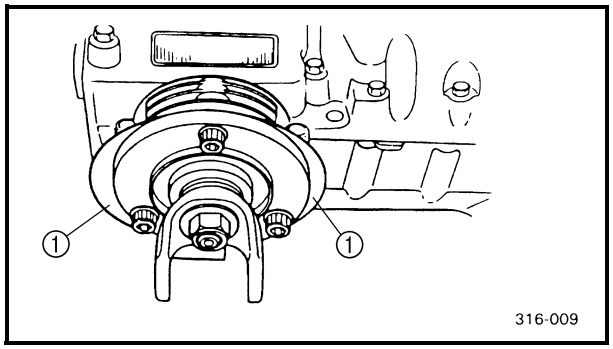
NOTE:

Be sure that the gauge is positioned over the centerline of the yoke bearing hole.

6. Turn:
   • universal joint drive yoke

NOTE:
While carefully tightening the middle driven shaft bearing housing bolts in stages and in a crisscross pattern, turn the universal joint drive yoke back and forth until the dial gauge reads 0.05 ~ 0.12 mm.

7. Measure:
   • crankcase-to-middle-driven-shaft-bearing-housing clearance (with a thickness gauge)



8. Select:
   • shim(s) ①

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a. Shims can only be selected in 0.05 mm increments, therefore round off to the hundredth's digit of the calculated thickness and select the appropriate shim(s) with the following chart.
b. For example, the clearance between the crankcase and the middle driven shaft bearing housing is 0.46 mm. Therefore, the chart instructs you to round off the 6 to 5. Thus, you should use one 0.15 mm and one 0.30 shim.

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

Shims are supplied in the following thicknesses.

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

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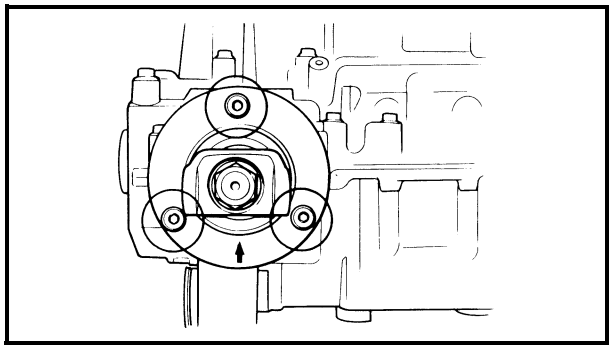
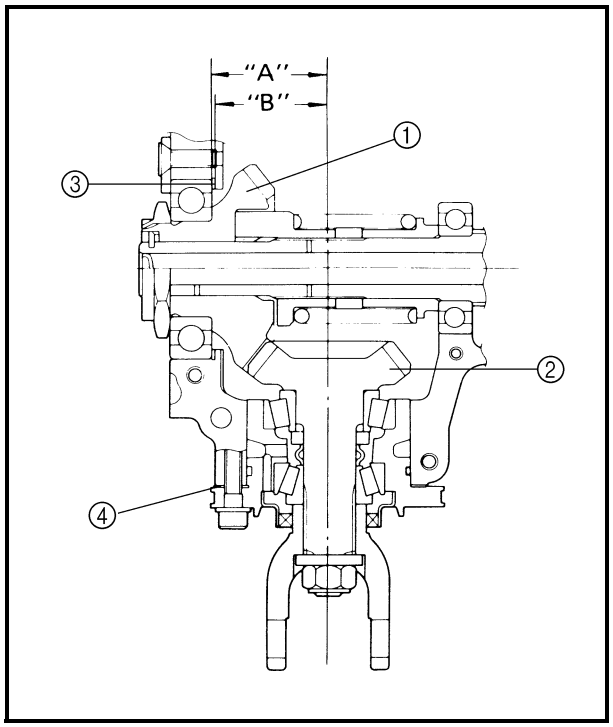


9. Loosen:
   • middle driven shaft bearing housing bolts
10. Install:
   • shim(s)
11. Tighten:
   • middle driven shaft bearing housing bolts

	30 Nm (3.0 m · kg, 22 ft · lb)

NOTE:
Before tightening the middle driven shaft bearing housing bolts, make sure the arrow on the middle driven shaft bearing housing points towards the upper crankcase.

12. Measure:
   • middle gear backlash



EAS00453
ALIGNING THE MIDDLE GEAR

NOTE:
Aligning the middle gear is necessary when any of the following parts are replaced:
- Crankcase
- Middle driven shaft
- Middle driven shaft bearing housing

① Drive pinion gear
② Driven pinion gear
③ Drive pinion gear shim
④ Driven pinion gear shim

1. Select:
   • drive pinion gear

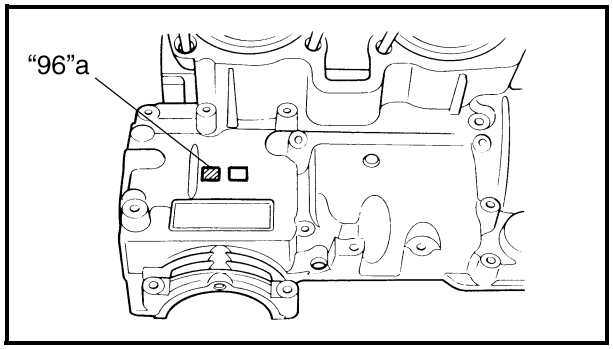
▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Position the drive pinion gear with the appropriate shim(s) ③. Calculate the respective thicknesses from the information marked on the crankcase.

b. To find drive pinion gear shim thickness “T”, use the following formula:

Drive pinion gear shim thickness
T = A – B

Where:
A = 54.5 + (constant number)
B = 53 + (a/100)



a = a numeral stamped on the left-side of the upper crankcase, divided by 100.
If the left-side of the upper crankcase is stamped “96”:
B = 53 + (96/100)
= 53 + 0.96
= 53.96
Therefore:
T = A – B
= 54.5 – 53.96
= 0.54
Therefore, the calculate drive pinion gear shim thickness is 0.54.

Since the shims are only available in 0.10- or 0.15-mm increments, round off the hundredths' digit.

Hundredth's digit	Rounded value
0, 1, 2	0
3, 4, 5, 6	5
7, 8, 9	10

In the example above, the calculated drive pinion gear shim thickness is 0.54 mm. The chart instructs you to round off to 0.55 mm. Thus, 0.15 mm and 0.4 mm should be used as indicated in the following chart.

	Drive pinion gear shim
Thickness (mm)	0.15 0.30 0.40 0.50

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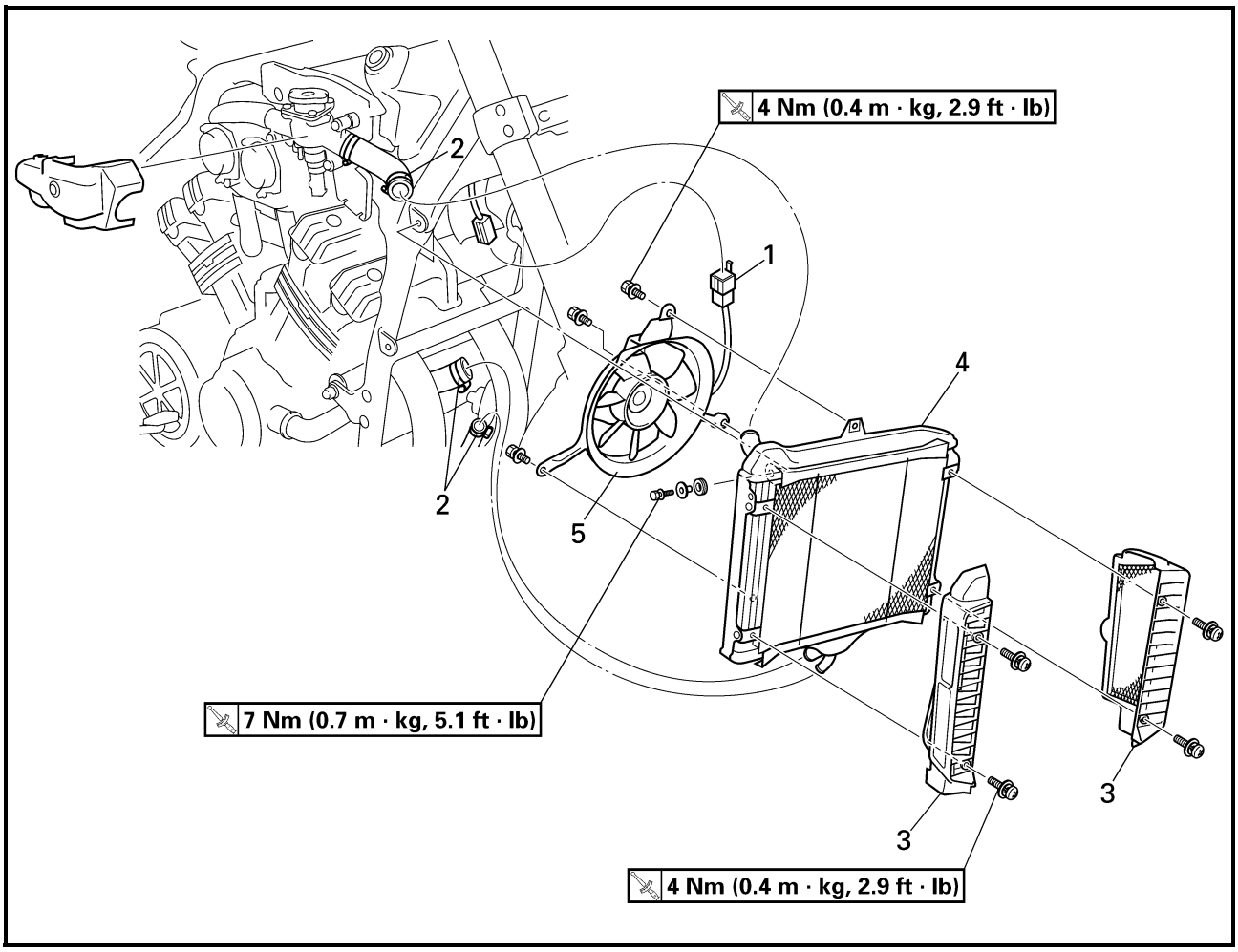
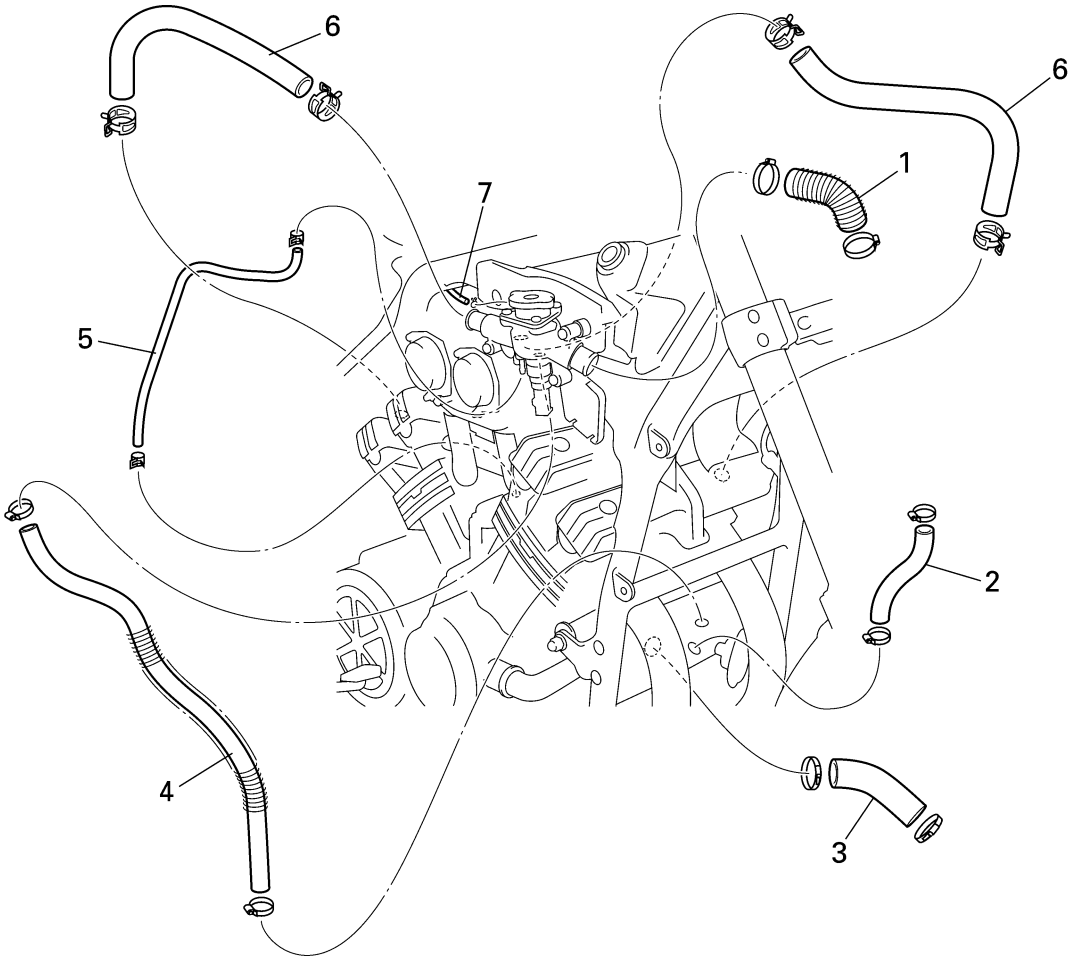
EAS00454

COOLING SYSTEM

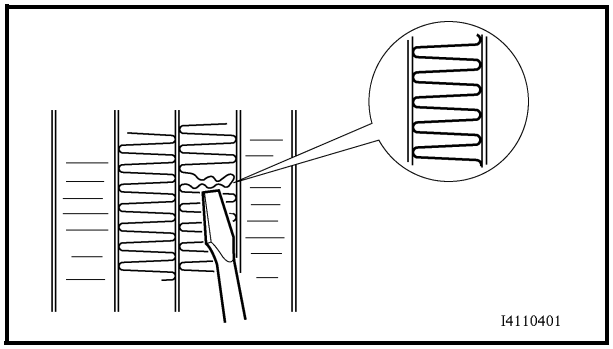
RADIATOR AND RADIATOR HOSES



Order	Job/Part	Q'ty	Remarks
	Removing the radiator		Remove the parts in the order listed.
	Top cover and covers		Refer to "TOP COVER AND COVERS" in chapter 3.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
1	Radiator fan motor coupler	1	Disconnect.
2	Radiator hose clamps	3	Loosen.
3	Radiator side panels	2	
4	Radiator	1	
5	Fan motor	1	
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Removing the radiator hoses		Remove the parts in the order listed.
1	Radiator inlet hose	1	
2	Coolant drain cock assembly hose	1	
3	Radiator outlet hose	1	
4	Thermostat assembly breather hose	1	
5	Conduit breather hose	1	
6	Conduit inlet hoses	2	
7	Coolant breather hose	1	
			For installation, reverse the removal procedure.

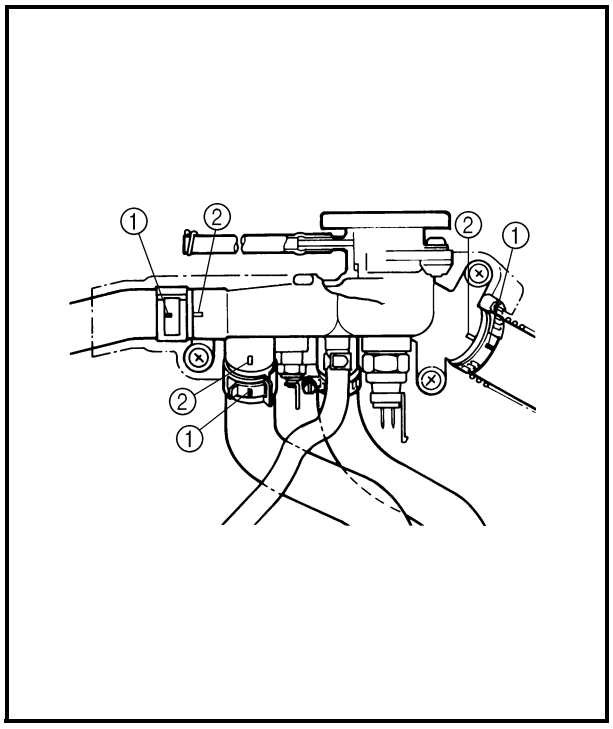


EAS00455
CHECKING THE RADIATOR

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

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

2. Check:
   - radiator hoses
   - radiator pipes
     Cracks/damage → Replace.
3. Check:
   - radiator fan
     Damage → Replace.
     Malfunction → Check and repair.
     Refer to “COOLING SYSTEM” in chapter 8.



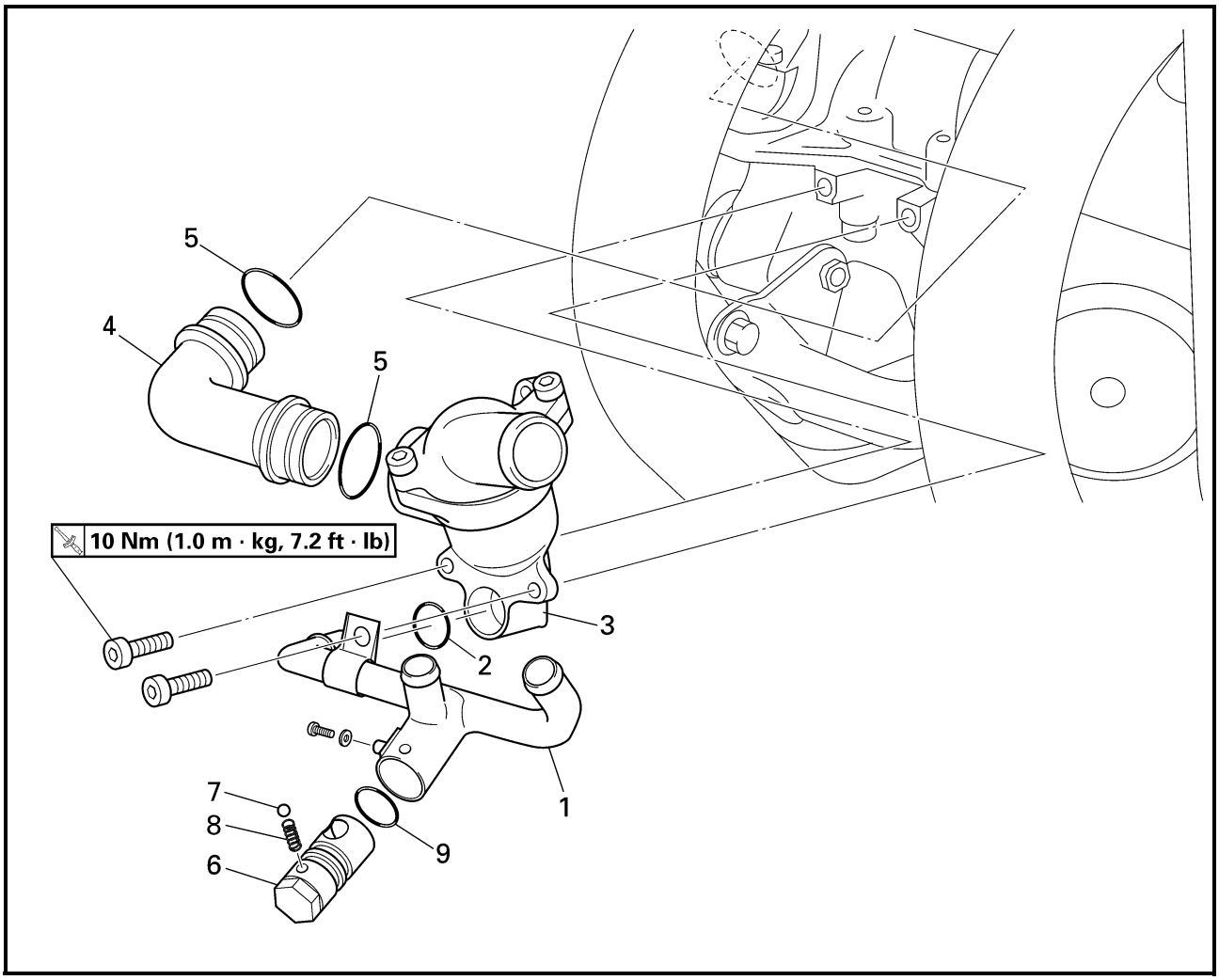
EAS00456
INSTALLING THE RADIATOR

1. Install:
   - radiator hoses

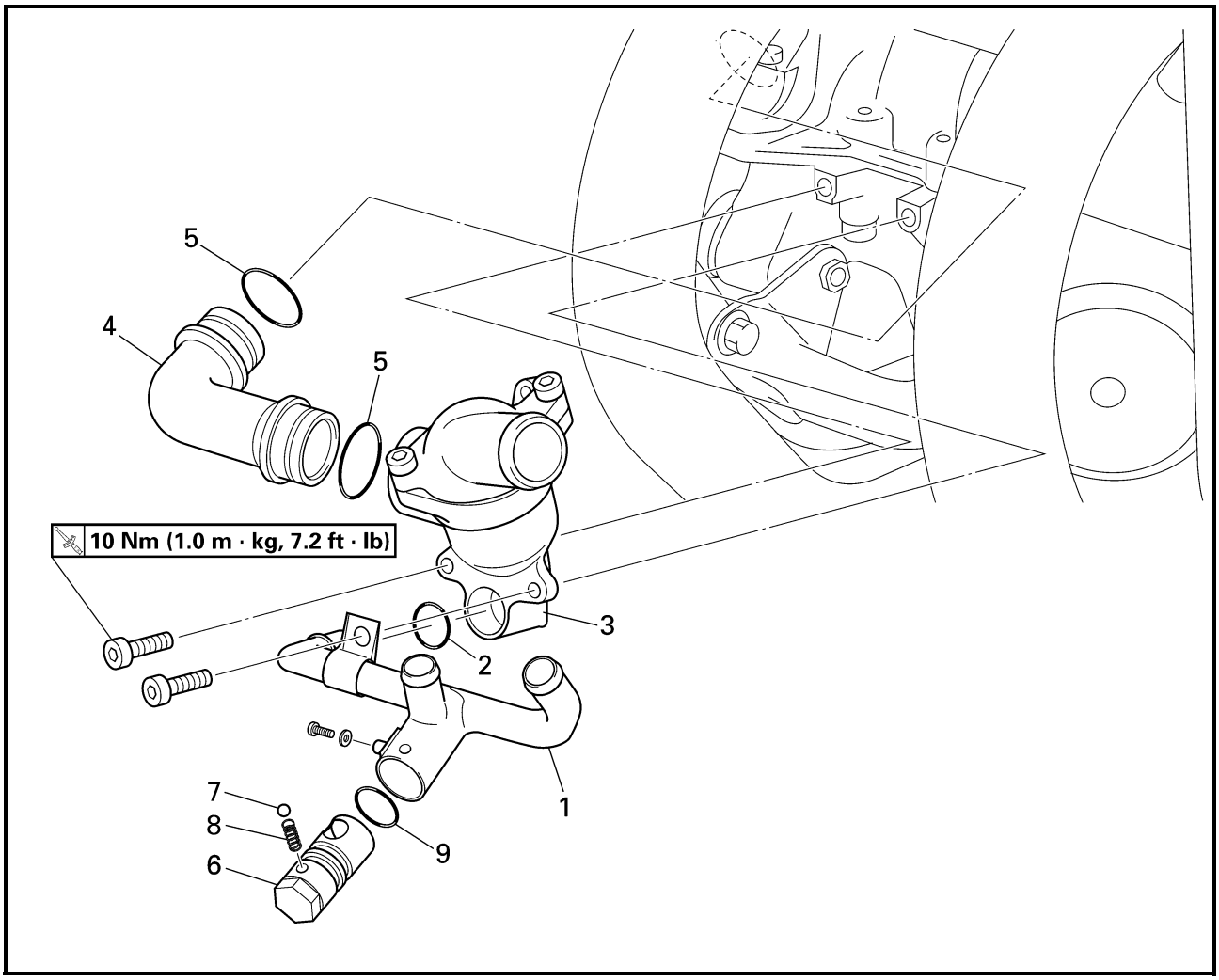
NOTE:
Align the hose match marks ① with the match marks ② on the conduit.

2. Fill:
   - cooling system
     (with the specified amount of the recommended coolant)
     Refer to “CHANGING THE COOLANT” in chapter 3.
3. Check:
   - cooling system
     Leaks → Repair or replace any faulty part.
4. Measure:
   - radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.
     Refer to “CHECKING THE RADIATOR CAP”.

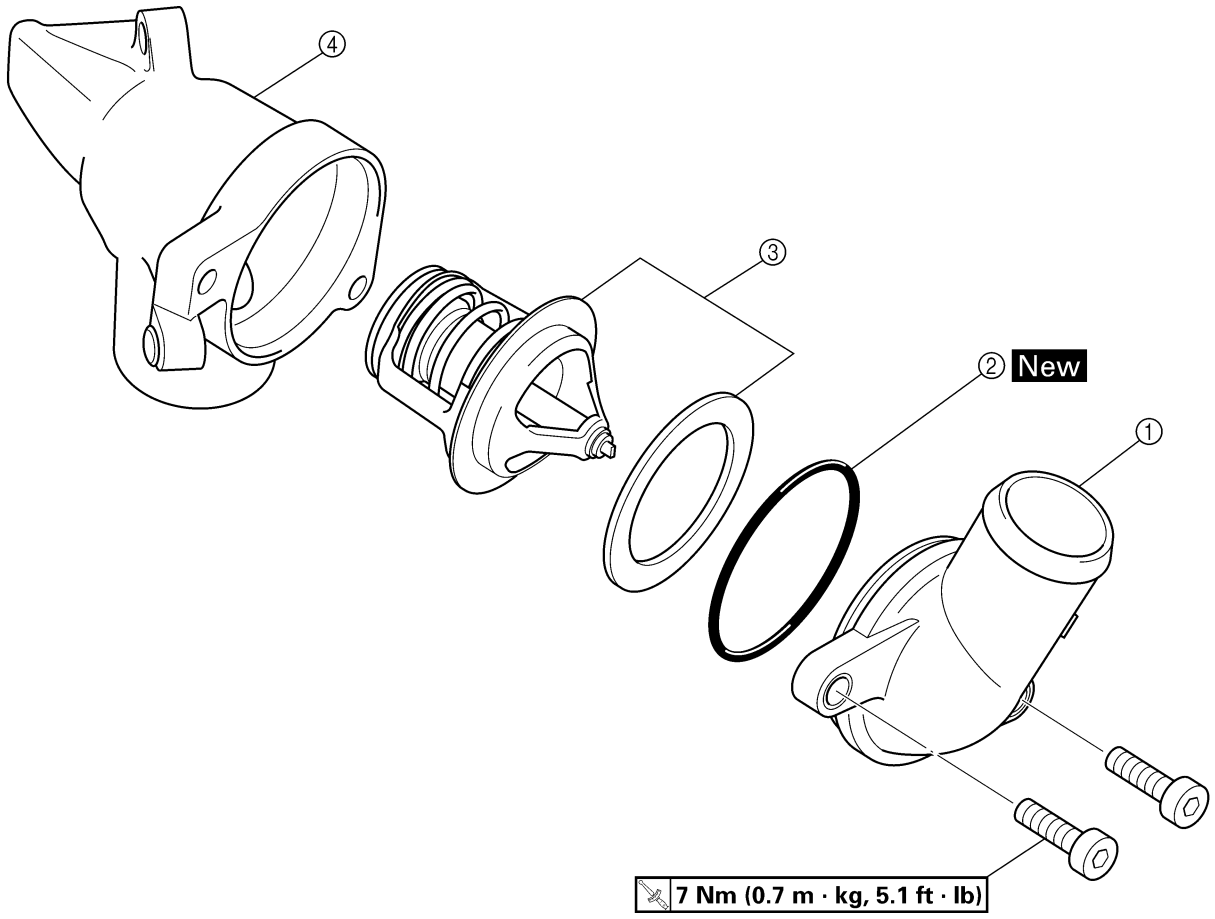
EAS00460
THERMOSTAT ASSEMBLY AND CONDUIT



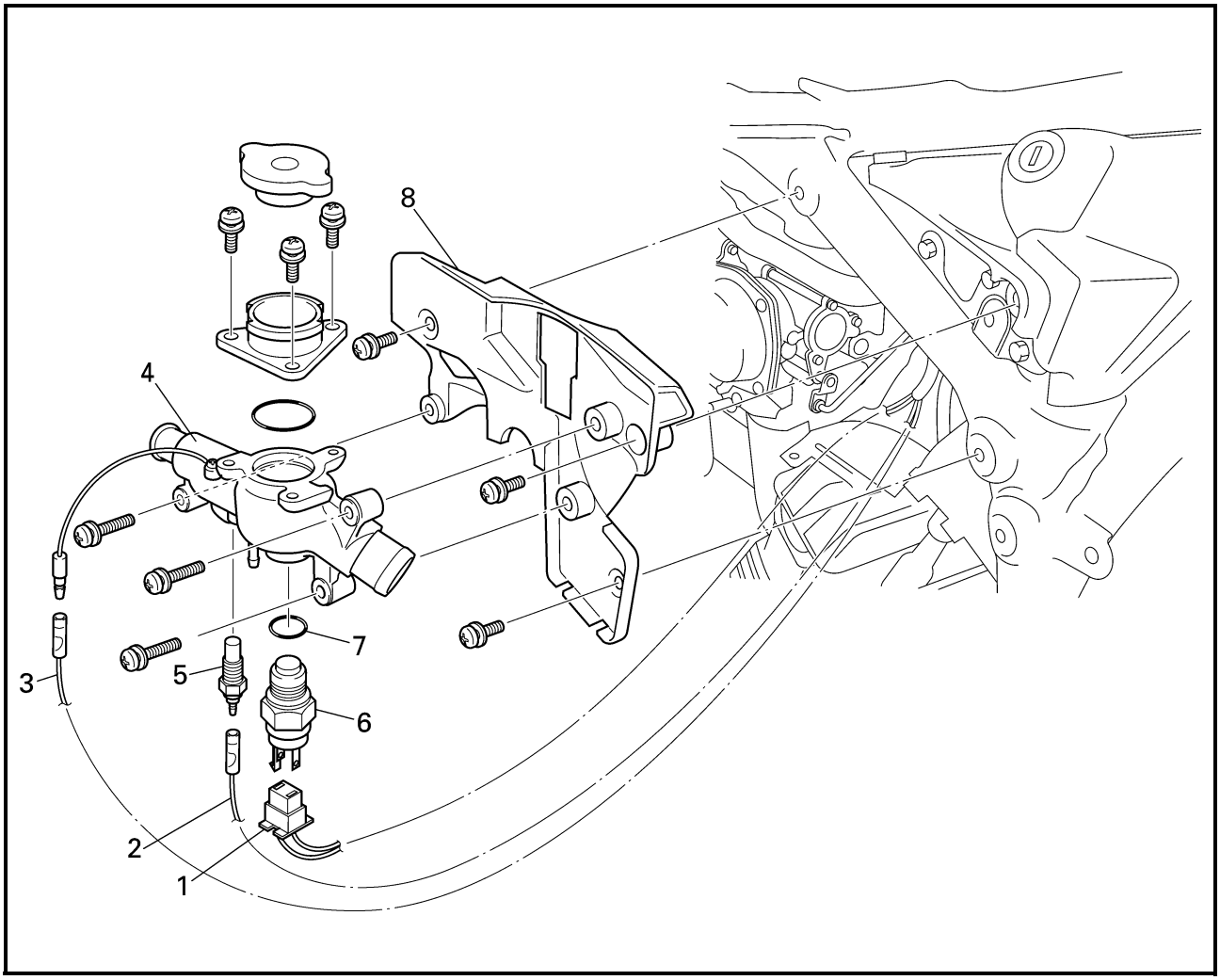
Order	Job/Part	Q'ty	Remarks
	Removing the thermostat assembly		Remove the parts in the order listed.
	Top cover and covers		Refer to "TOP COVER AND COVERS" in chapter 3.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
	Radiator assembly and hoses		Refer to "RADIATOR AND RADIATOR HOSES".
1	Coolant drain cock assembly	1	
2	O-ring	1	
3	Thermostat assembly	1	
4	Water pump inlet pipe	1	
5	O-ring	2	
6	Coolant drain cock	1	
7	Stopper ball	1	



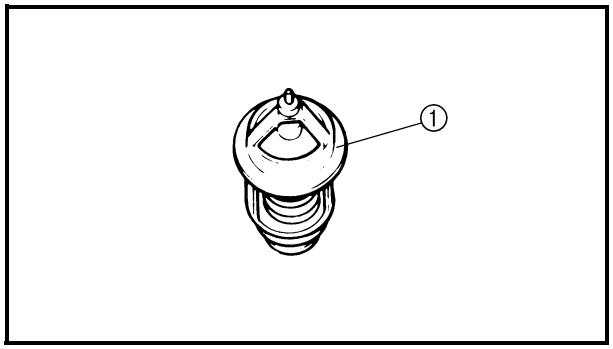
Order	Job/Part	Q'ty	Remarks
8	Spring	1	
9	O-ring	1	
			For installation, reverse the removal procedure.

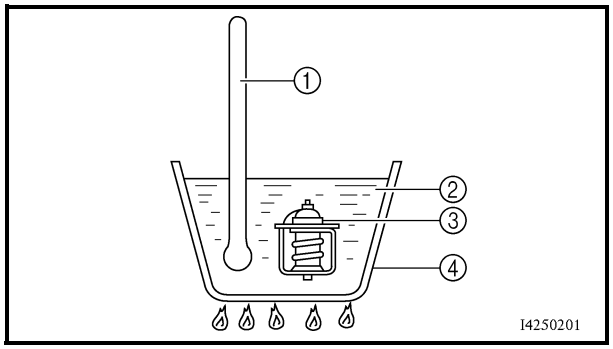


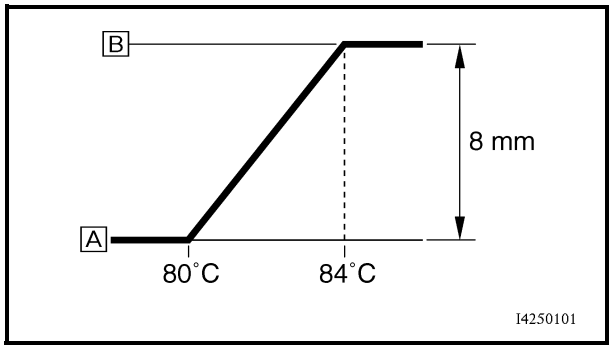
Order	Job/Part	Q'ty	Remarks
	Disassembling the thermostat assembly		Remove the parts in the order listed.
①	Thermostat housing cover	1	
②	O-ring	1	
③	Thermostat	1	
④	Thermostat housing	1	
			For assembly, reverse the disassembly procedure.



Order	Job/Part	Q'ty	Remarks
	Removing the conduit assembly		Remove the parts in the order listed.
1	Thermo switch coupler	1	Disconnect.
2	Temperature sender lead	1	Disconnect.
3	Ground lead	1	Disconnect.
4	Conduit	1	
5	Temperature sender	1	
6	Thermo switch	1	
7	O-ring	1	
8	Conduit board	1	
			For installation, reverse the removal procedure.







EAS00463
CHECKING THE THERMOSTAT

1. Check:
   - thermostat ①
     Does not open at 80 ~ 84 °C (178.0 ~ 183.2 °F) → Replace.

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

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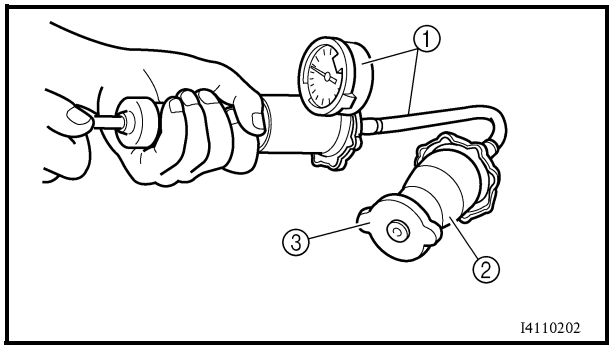
① Thermometer
② Water
③ Thermostat
④ Container

A Fully closed
B Fully open

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

2. Check:
   - thermostat housing cover
   - thermostat housing
     Cracks/damage → Replace.
3. Check:
   - thermostat housing cover O-ring
   - thermostat housing inlet pipe O-ring
   - water pump inlet pipe
     Damage → Replace.



CHECKING THE RADIATOR CAP

1. Measure:
   - radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.

Radiator cap opening pressure
75 ~ 105 kPa
(0.75 ~ 1.05 kg/cm², 10.9 ~ 15.2 psi)

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a. Install the radiator cap tester ① and adapter ② to the radiator cap ③.

Radiator cap tester
YU-24460-01
Adapter
YU-33984

b. Apply the specified pressure for ten seconds and make sure there is no drop in pressure.

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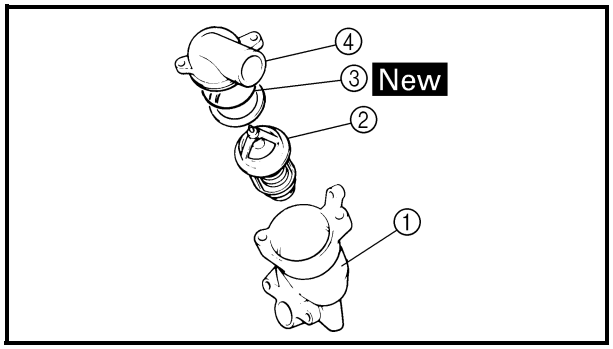
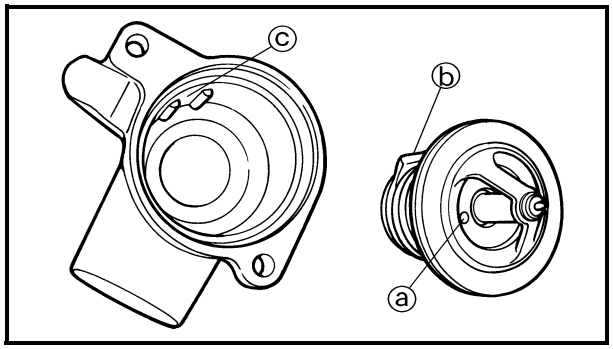


EAS00464

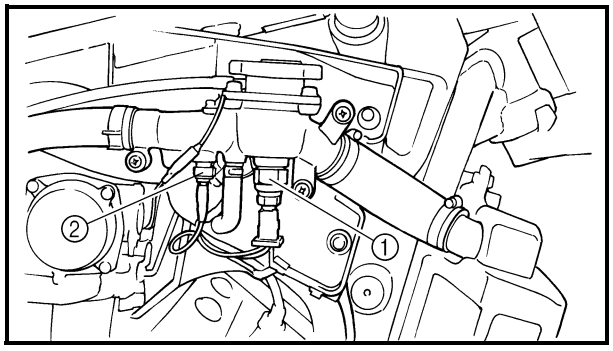
ASSEMBLING THE THERMOSTAT ASSEMBLY

1. Install:
   - thermostat housing ①
   - thermostat ②
   - O-ring ③ New
   - thermostat housing cover ④



NOTE:

- Install the thermostat with its breather hole ⓐ facing up.
- Align the projection ⓑ on the thermostat with the slot ⓒ on the thermostat housing.



2. Install:
   - thermo switch ①

15 Nm (1.5 m · kg, 11 ft · lb)

   - temperature sender ②

15 Nm (1.5 m · kg, 11 ft · lb)

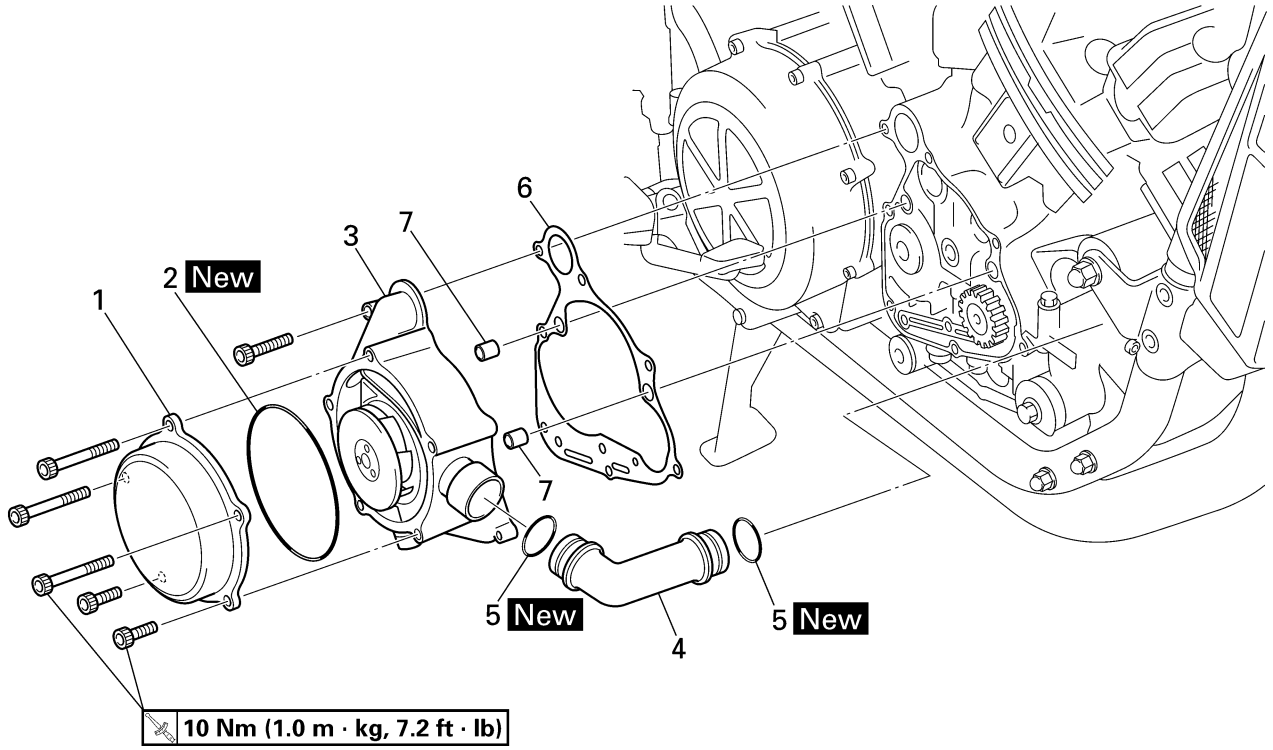
CAUTION:

Use extreme care when handling the thermo switch and temperature sender. Replace any part that was dropped or subjected to a strong impact.

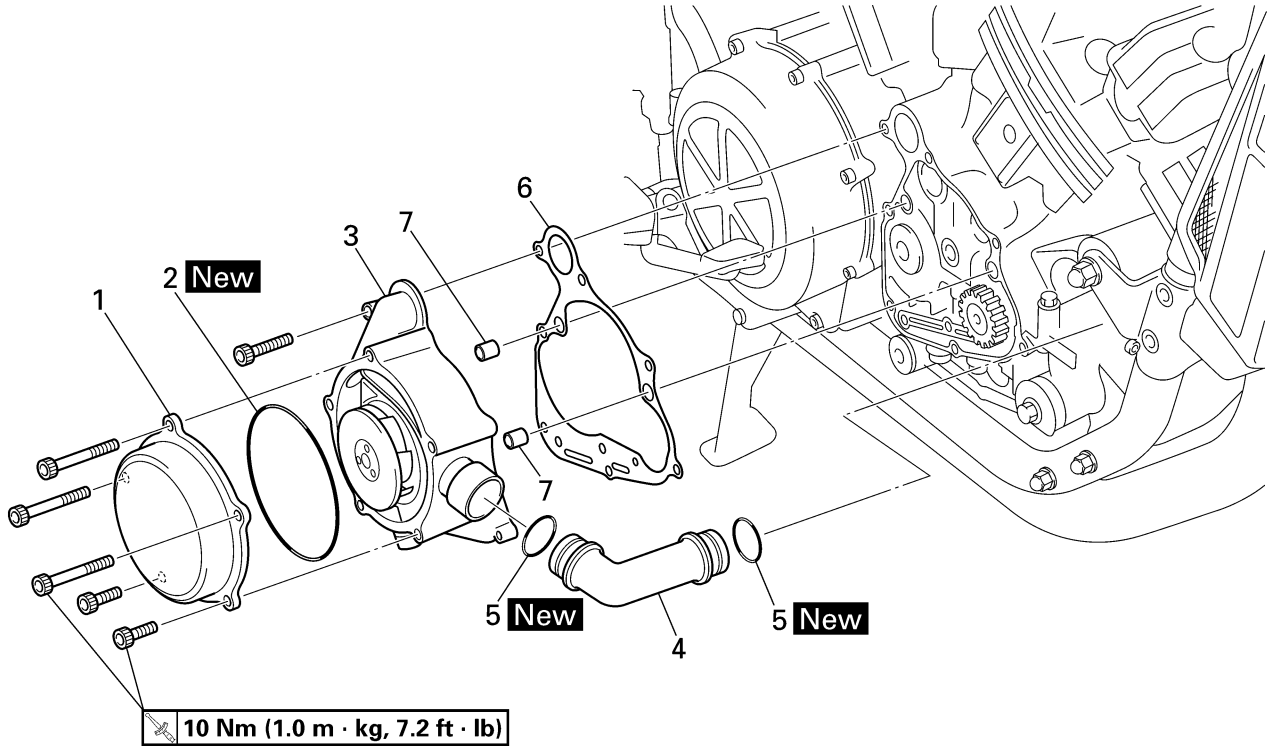
EAS00467
INSTALLING THE THERMOSTAT ASSEMBLY

1. Fill:
   - cooling system
     (with the specified amount of the recommended coolant)
     Refer to “CHANGING THE COOLANT” in chapter 3.
2. Check:
   - cooling system
     Leaks → Repair or replace any faulty part.
3. Measure:
   - radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.
     Refer to “CHECKING THE RADIATOR CAP”.

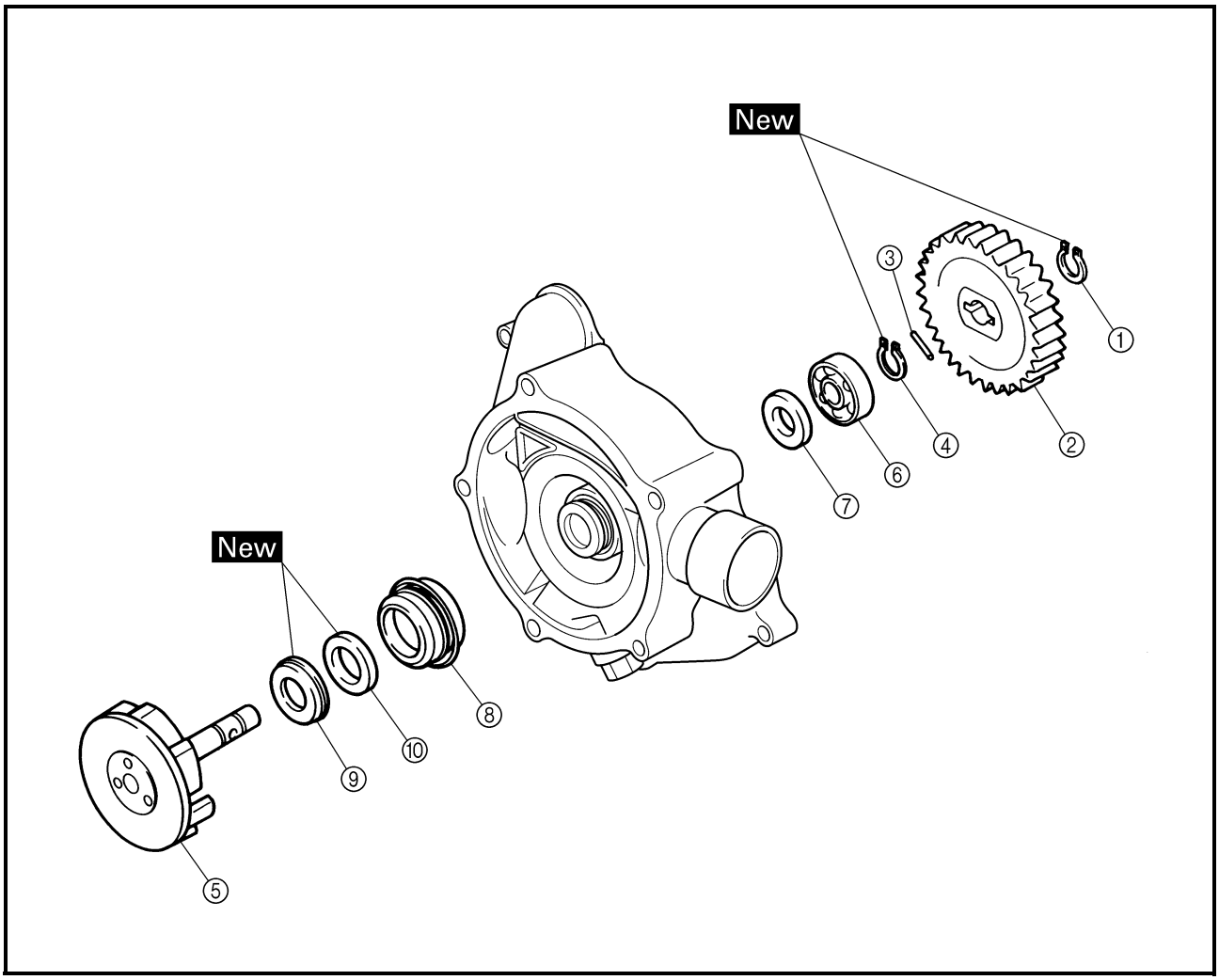
EAS00468
WATER PUMP



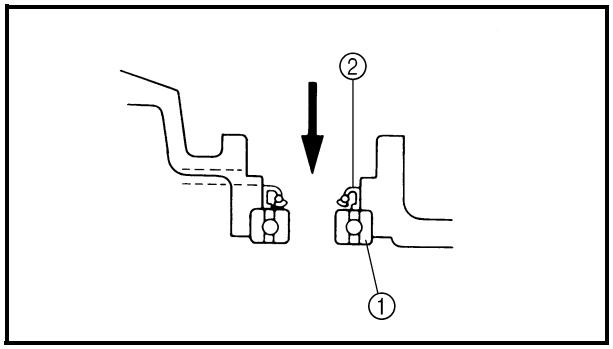
Order	Job/Part	Q'ty	Remarks
	Removing the water pump		Remove the parts in the order listed. **NOTE:** It is not necessary to remove the water pump unless the coolant level is extremely low or the coolant contains engine oil.
	Coolant		Refer to "CHANGING THE COOLANT" in chapter 3.
	Engine oil		Refer to "CHANGING THE ENGINE OIL" in chapter 3.
1	Water pump cover	1	
2	O-ring	1	
3	Water pump housing	1	
4	Water pump inlet pipe	1	



Order	Job/Part	Q'ty	Remarks
5	O-ring	1	
6	Gasket	1	
7	Dowel pins	2	
			For installation, reverse the removal procedure.



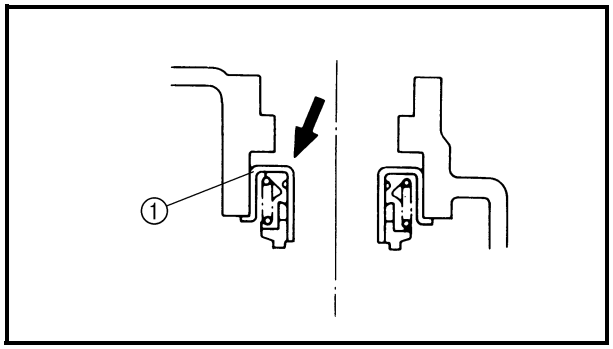
Order	Job/Part	Q'ty	Remarks
	Disassembling the water pump		Remove the parts in the order listed.
①	Circlip	1	
②	Driven gear	1	
③	Gear stopper pin	1	
④	Circlip	1	
⑤	Impeller	1	
⑥	Bearing	1	Refer to "DISASSEMBLING THE WATER PUMP".
⑦	Oil seal	1	
⑧	Water pump seal	1	
⑨	Rubber damper	1	
⑩	Rubber damper holder	1	
			For assembly, reverse the disassembly procedure.



EAS00470
DISASSEMBLING THE WATER PUMP

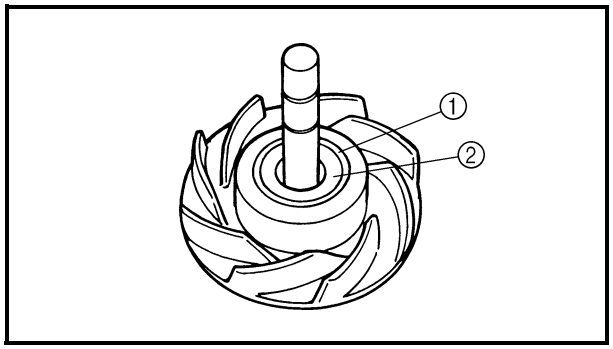
1. Remove:
   - bearing ①
   - oil seal ②

NOTE:
Tap out the bearing and oil seal from the outside of the water pump housing.



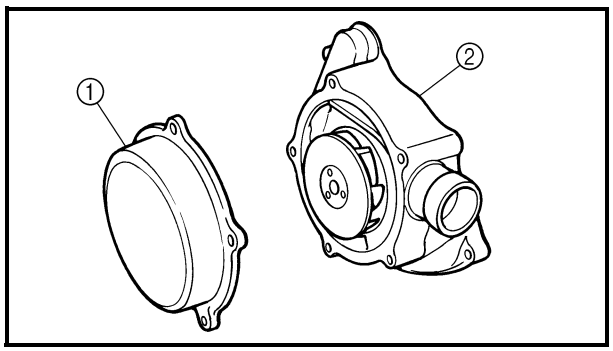
2. Remove:
   - water pump seal ①

NOTE:
Tap out the water pump seal from the inside of the water pump housing.



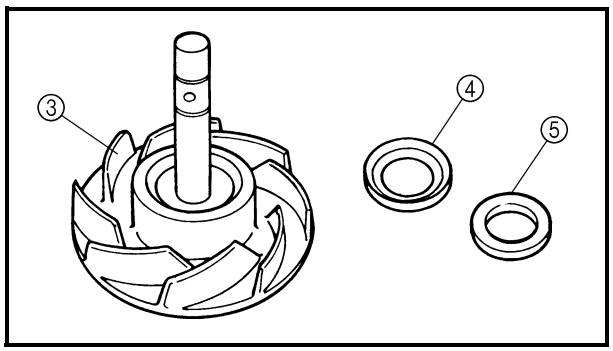
3. Remove:
   - rubber damper holder ①
   - rubber damper ②
     (from the impeller, with a thin, flat-head screwdriver)

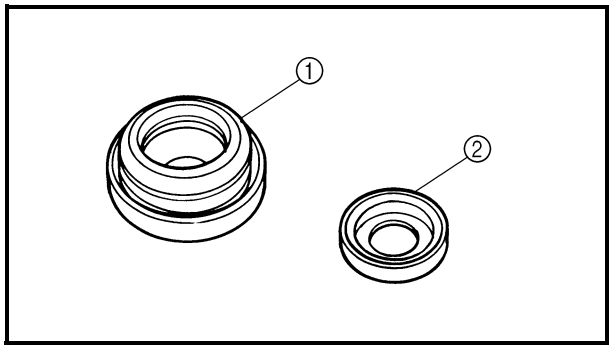
NOTE:
Do not scratch the impeller shaft.



EAS00474
CHECKING THE WATER PUMP

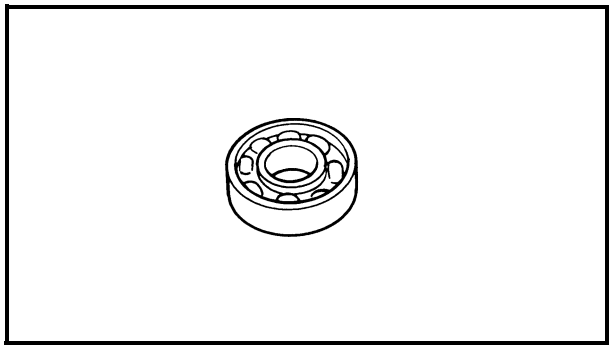
1. Check:
   - water pump housing cover ①
   - water pump housing ②
   - impeller ③
   - rubber damper ④
   - rubber damper holder ⑤
     Cracks/damage/wear → Replace.





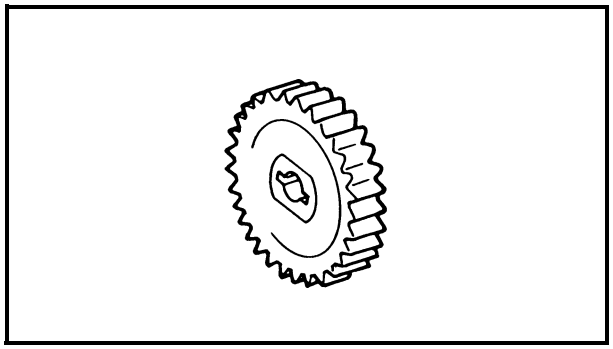
2. Check:
   - water pump seal ①
   - oil seal ②

   Cracks/damage/wear → Replace.



3. Check:
   - bearing

   Rough movement → Replace.

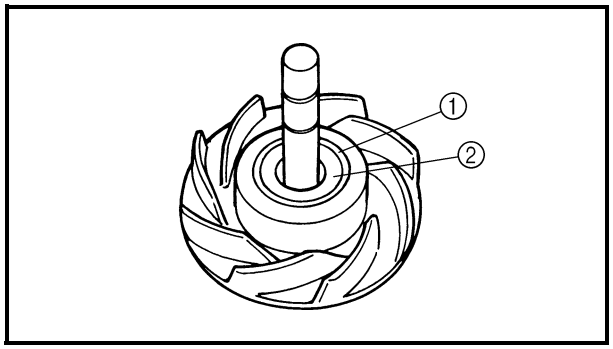


4. Check:
   - water pump driven gear

   Pitting/wear → Replace.

5. Check:
   - water pump inlet pipe

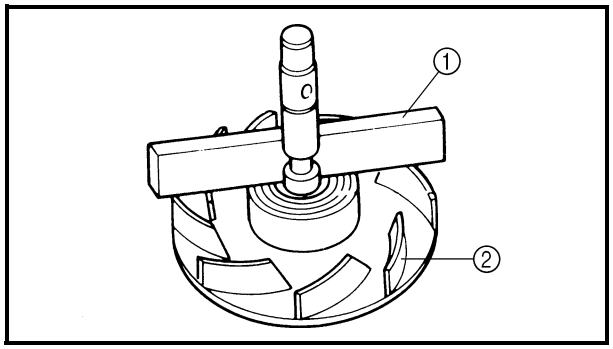
   Cracks/damage/wear → Replace.



EAS00476
ASSEMBLING THE WATER PUMP

1. Install:
   - rubber damper ①
   - rubber damper holder ②

NOTE:
Before installing the rubber damper, apply tap water or coolant onto its outer surface.

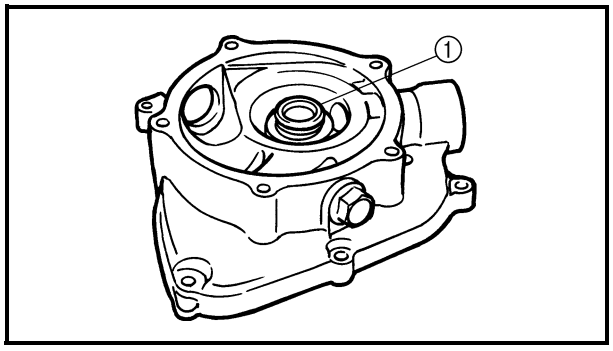


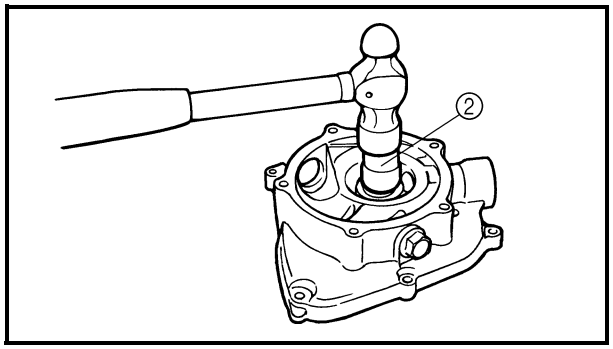
2. Measure:
   - impeller shaft tilt
     Out of specification → Repeat step 1.

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

Impeller shaft tilt limit
0.15 mm (0.006 in)

① Straightedge
② Impeller

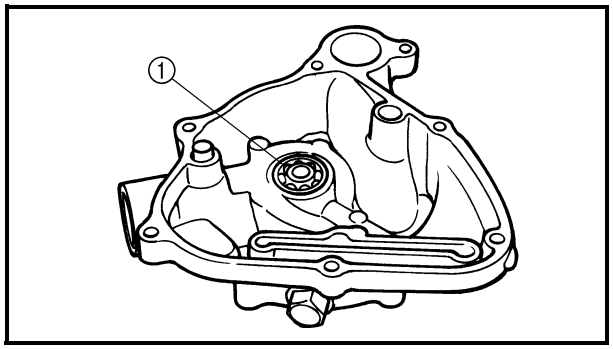




3. Install:
   - water pump seal ①

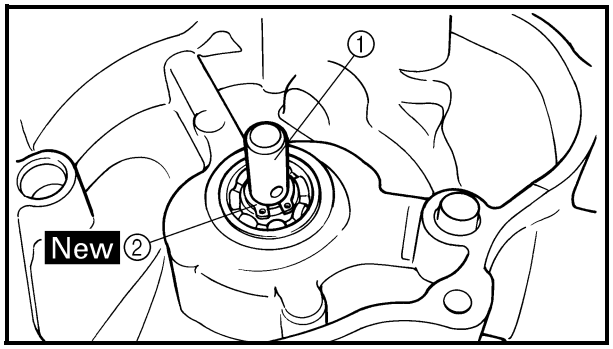
CAUTION:
Never lubricate the water pump seal surface with oil or grease.

NOTE:
- Install the water pump seal from the outside of the water pump housing.
- Install the water pump seal with a socket ② that matches its outside diameter.

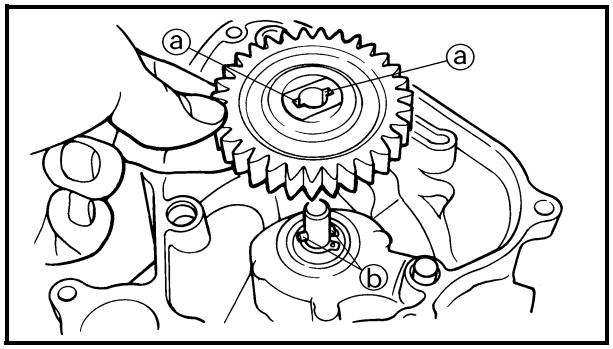


4. Install:
   - oil seal
   - bearing ①

NOTE:
- Install the oil seal and bearing from the inside of the water pump housing.
- Make sure the side of the bearing with the number faces up.
- Gently tap the bearing into place until it is flush with the water pump housing.

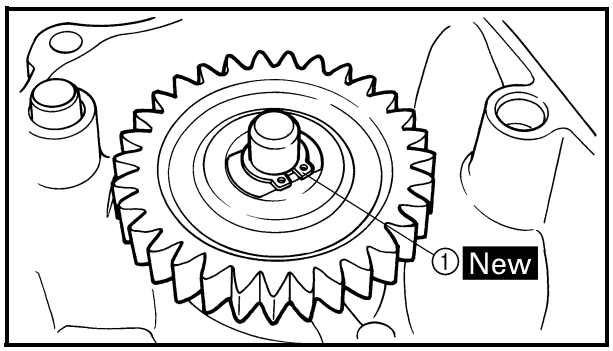


5. Install:
   - impeller ①
   - circlip ② New

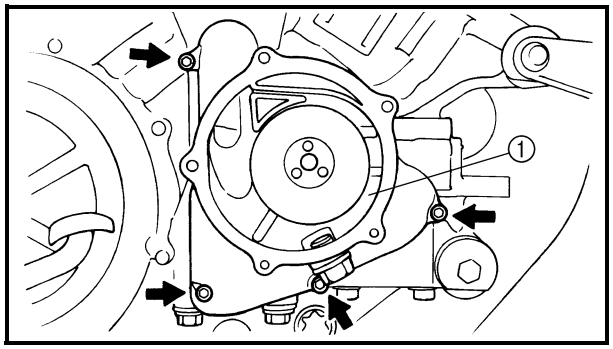


6. Install:
   - key
   - water pump driven gear

NOTE:
Align the slot ⓐ in the water pump driven gear with the pin ⓑ.



7. Install:
   - circlip ① New

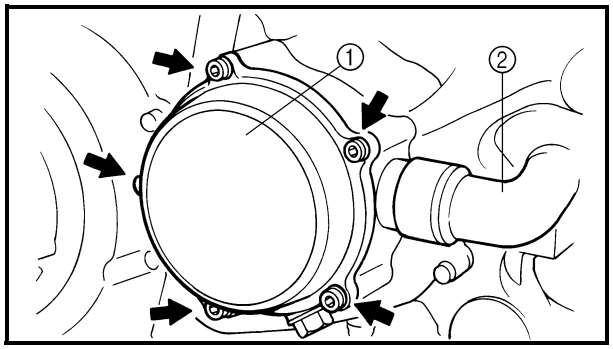


INSTALLING THE WATER PUMP

1. Install:
   - water pump housing ①

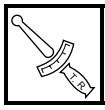
⚠ WARNING

Always use a new gasket.



2. Install:
   - O-ring New
   - water pump housing cover ①
   - O-rings New
   - water pump inlet pipe ②

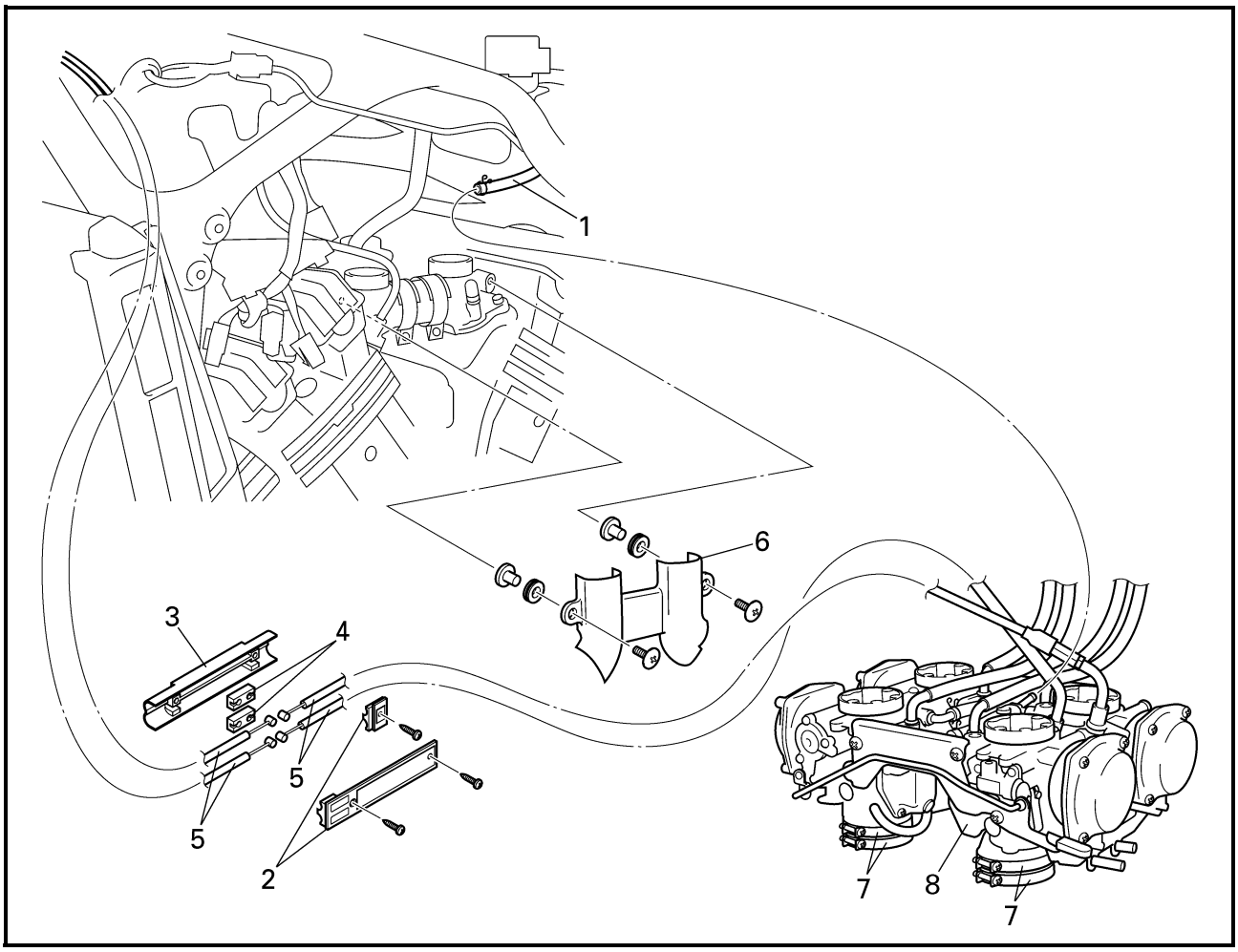
NOTE:
Before installing the water pump outlet pipe ②, lubricate the O-rings with a thin coat of lithium soap base grease.

	**Water pump housing cover bolt** **10 Nm (1.0 m • kg, 7.2 ft • lb)**

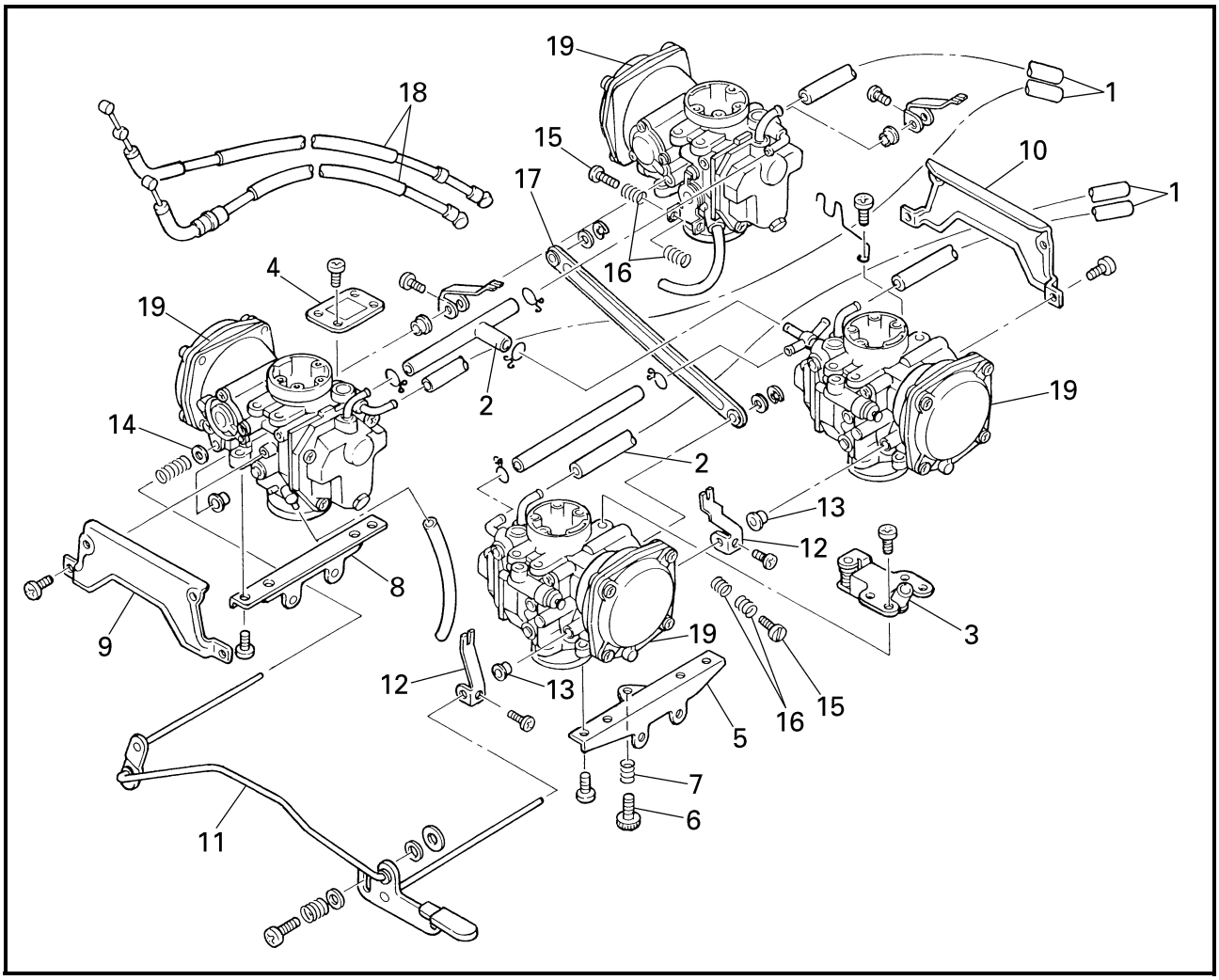
3. Fill:
   - cooling system
     (with the specified amount of the recommended coolant)
     Refer to “CHANGING THE COOLANT” in chapter 3.
4. Check:
   - cooling system
     Leaks → Repair or replace the faulty part.
5. Measure:
   - radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.
     Refer to “CHECKING THE RADIATOR CAP”.

CARBURETION

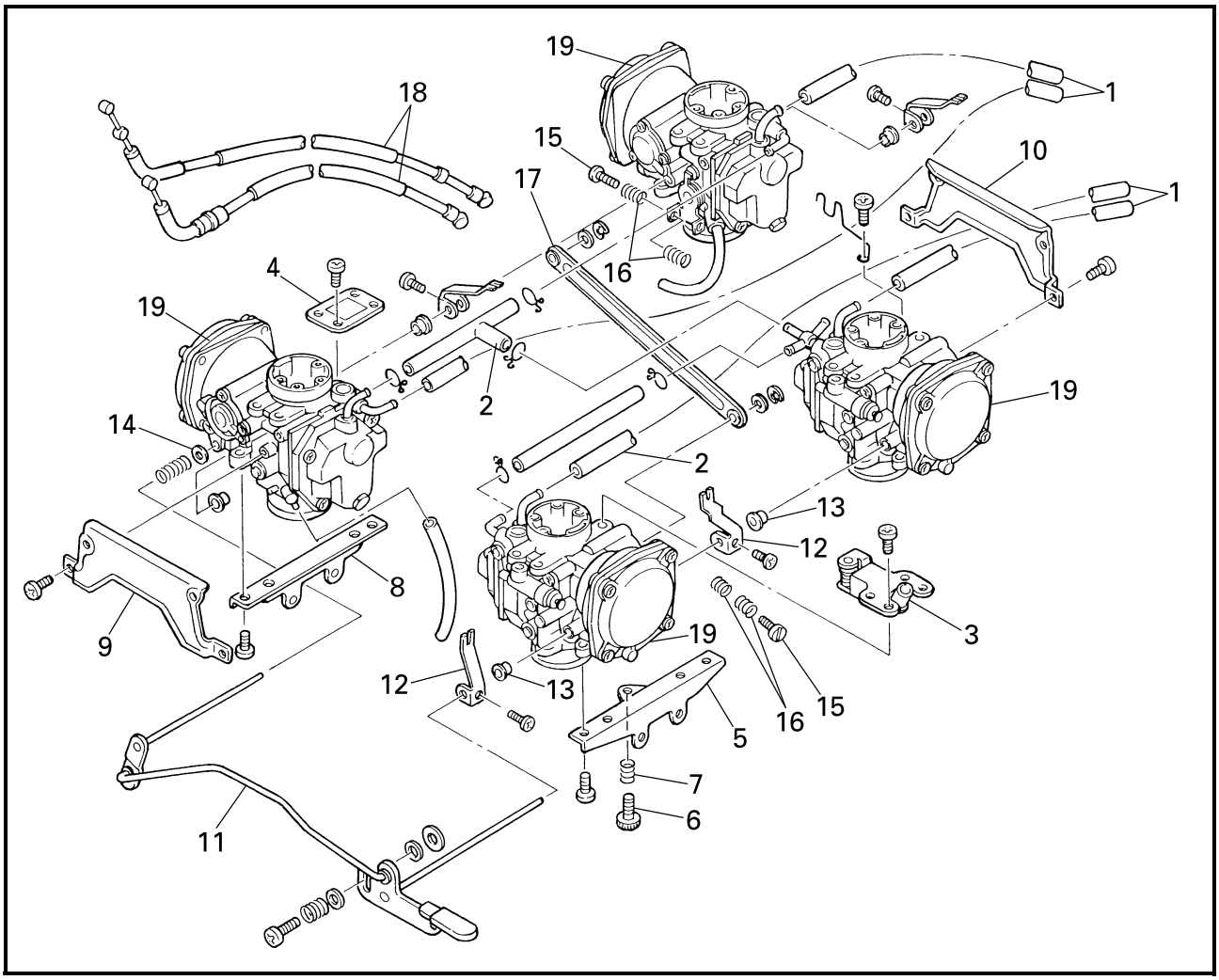
CARBURETORS



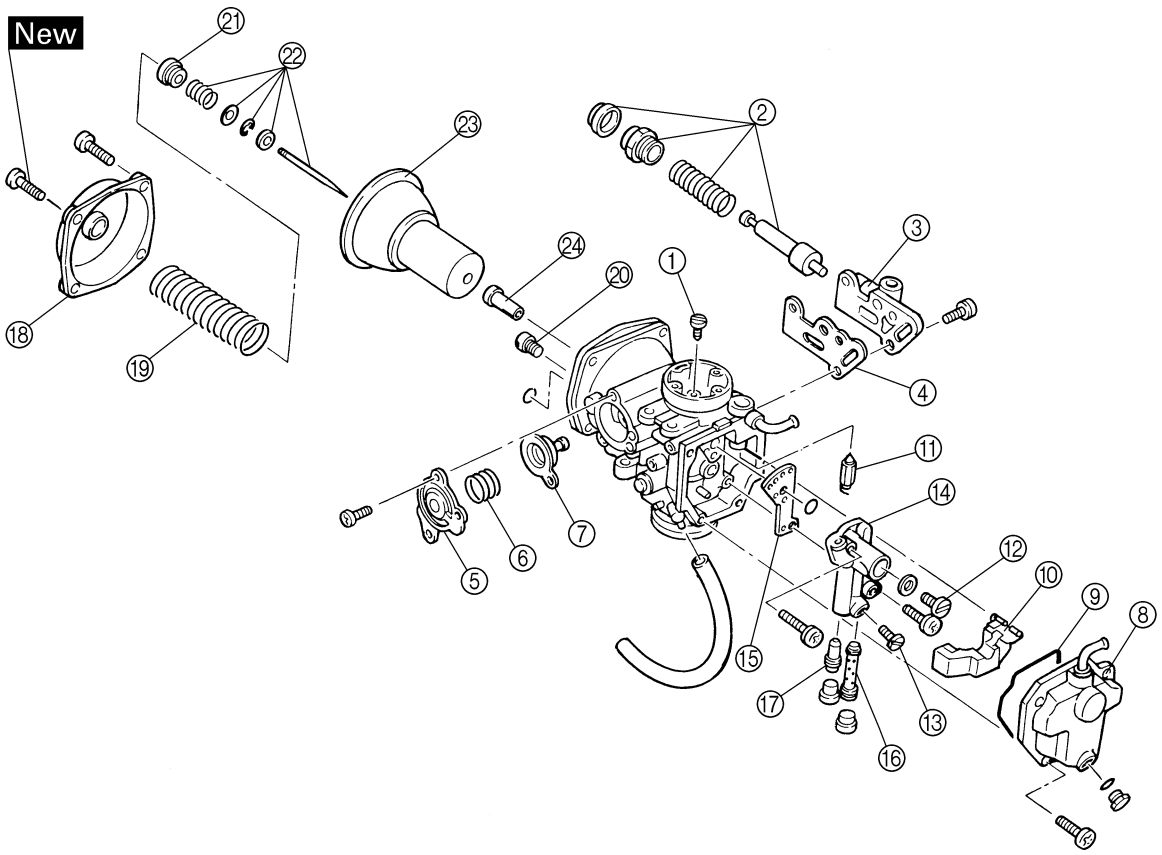
Order	Job/Part	Q'ty	Remarks
	Removing the carburetor		Remove the parts in the order listed.
	Top cover and covers		Refer to "TOP COVER AND COVERS" in chapter 3.
	Air filter case and electrical components board		Refer to "AIR FILTER CASE AND ELECTRICAL COMPONENTS BOARD" in chapter 3.
1	Fuel hose	1	Disconnect.
2	Throttle cable holder cover	2	
3	Throttle cable holder	1	
4	Throttle cable joint	2	
5	Throttle cables	2	Disconnect.
6	Carburetor joint covers (left and right)	2	
7	Clamps (carburetor joints)	8	Loosen.
8	Carburetor assembly	1	
			For installation, reverse the removal procedure.



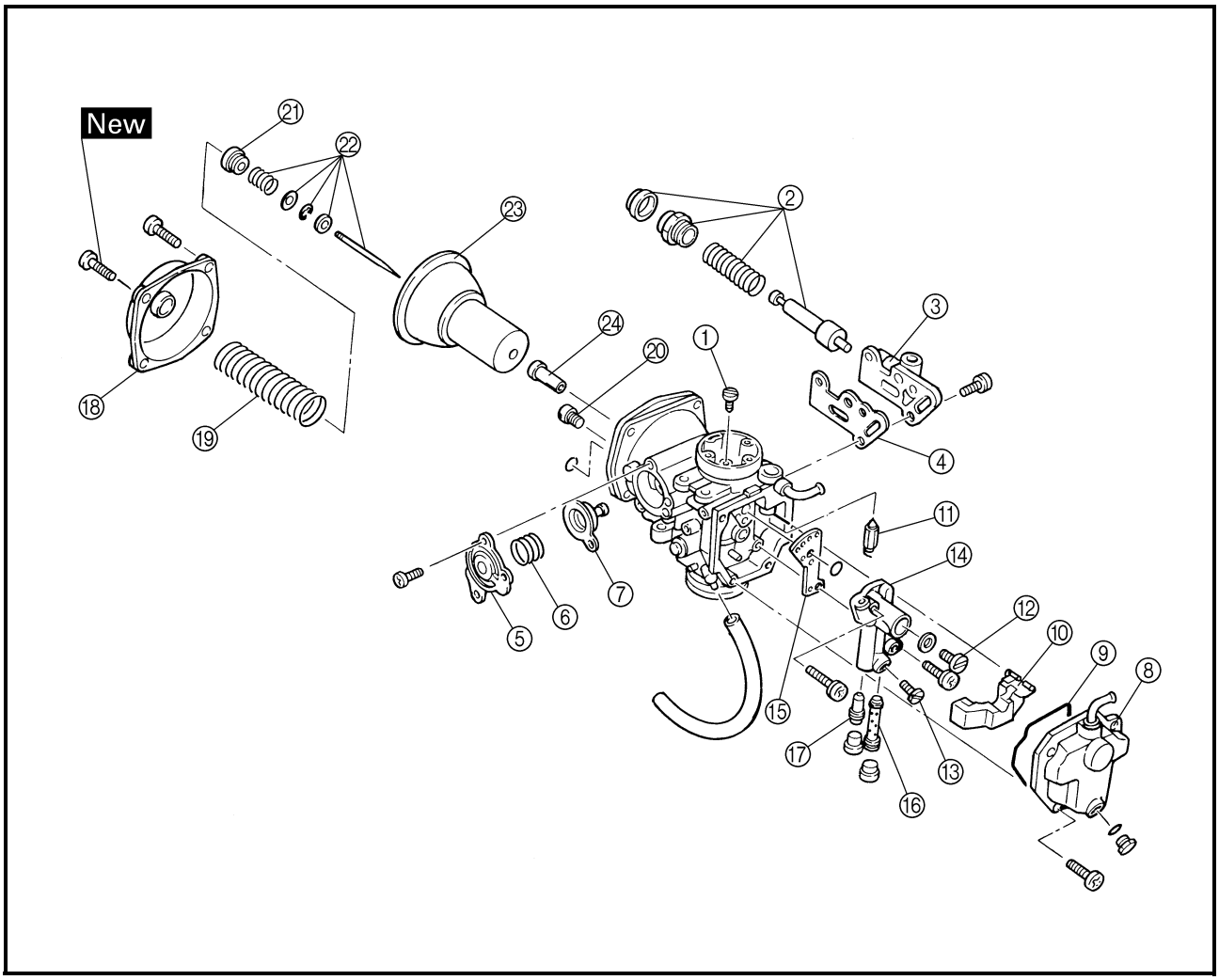
Order	Job/Part	Q'ty	Remarks
	Separating the carburetors		Remove the parts in the order listed.
1	Fuel overflow hose	2	
2	Fuel feed joint	2	
3	Upper bracket (left)	1	
4	Upper bracket (right)	1	
5	Throttle stop screw bracket	1	
6	Throttle stop screw	1	
7	Throttle stop screw spring	1	
8	Lower bracket	1	
9	Side bracket (front)	1	
10	Side bracket (rear)	1	
11	Starter lever shaft	1	
12	Starter lever shaft bracket	4	
13	Plastic bushings	4	
14	Plastic washer	1	



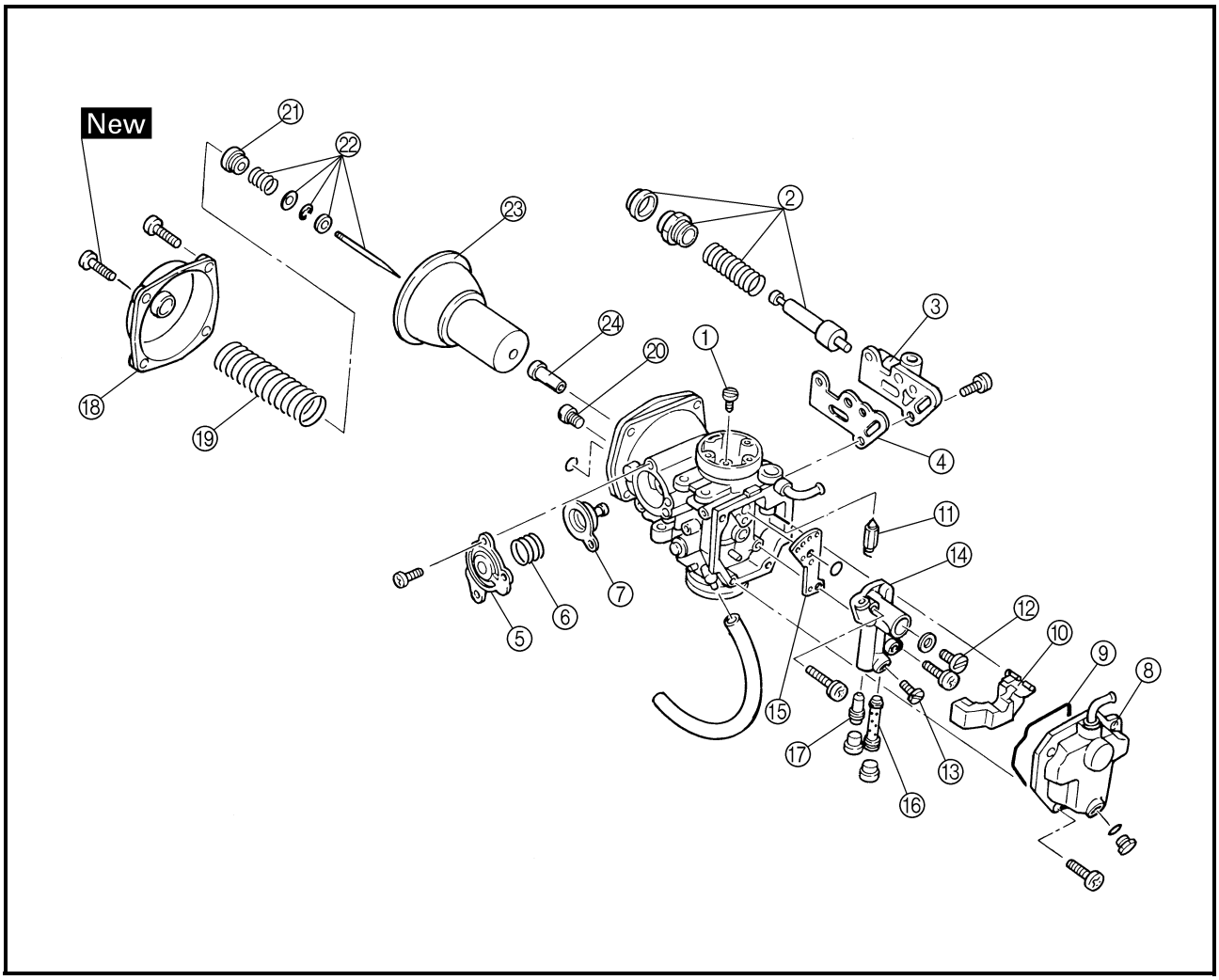
Order	Job/Part	Q'ty	Remarks
15	Synchronization screw	1	
16	Synchronization screw spring	1	
17	Synchronization rod	1	
18	Throttle cable	2	
19	Carburetor	4	
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the carburetor		Remove the parts in the order listed. **NOTE:** • The remaining steps should be followed for all four of the carburetors. • Before disassembling the carburetor, make sure to note the number of times the pilot screw is turned out from the seated position to its set position.
①	Pilot air jet No. 1	1	
②	Starter plunger assembly	1	
③	Starter body	1	
④	Gasket	1	
⑤	Coasting enricher cover	1	
⑥	Coasting enricher spring	1	
⑦	Coasting enricher	1	



Order	Job/Part	Q'ty	Remarks
⑧	Float chamber	1	
⑨	Float chamber rubber gasket	1	
⑩	Float	1	
⑪	Needle valve	1	
⑫	Needle jet screw	1	
⑬	Main jet	1	
⑭	Jet block	1	
⑮	Gasket	1	
⑯	Main bleed pipe	1	
⑰	Pilot jet	1	
⑱	Vacuum chamber cover	1	
⑲	Piston valve spring	1	
⑳	Pilot air jet No. 2	1	
㉑	Plastic screw	1	
㉒	Jet needle kit	1	



Order	Job/Part	Q'ty	Remarks
㉓	Piston valve	1	
㉔	Needle jet	1	
			For assembly, reverse the disassembly procedure.

6

EAS00486
CHECKING THE CARBURETORS

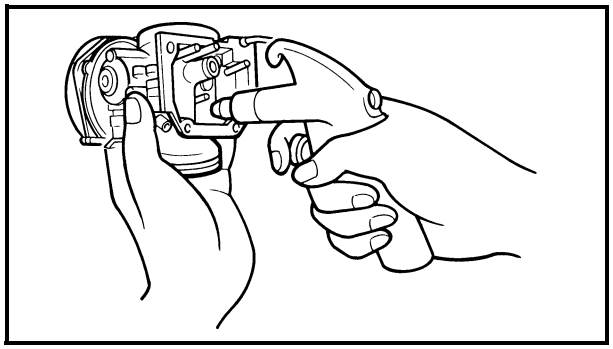
The following procedure applies to all of the carburetors.

NOTE:

Before disassembling the carburetor, make sure to note the number of times the pilot screw is turned out from the seated position to its set position.

1. Check:
   - carburetor body
   - float chamber
   - jet housing

   Cracks/damage → Replace.



2. Check:
   - fuel passages

   Obstruction → Clean.

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a. Wash the carburetor in a petroleum-based solvent. Do not use any caustic carburetor cleaning solution.
b. Blow out all of the passages and jets with compressed air.

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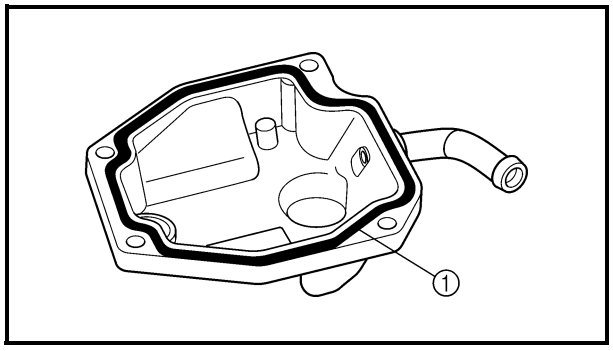
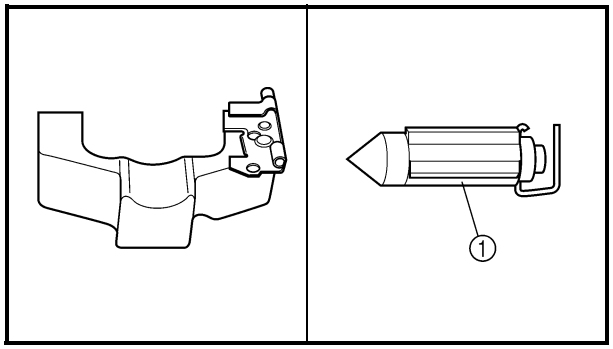


3. Check:
   - float chamber body

   Dirt → Clean.
4. Check:
   - float chamber rubber gasket ①

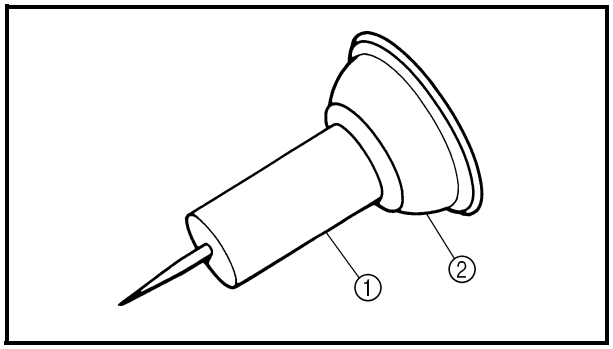
   Cracks/damage/wear → Replace.



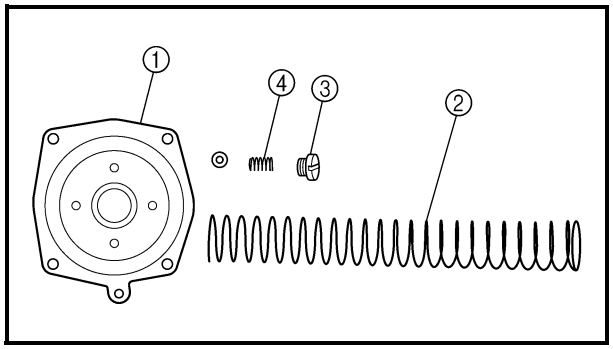
5. Check:
   - float

   Damage → Replace.
6. Check:
   - needle valve ①

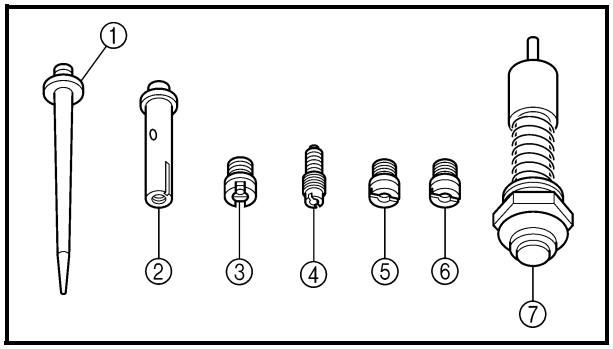
   Damage/obstruction/wear → Replace the needle valve.



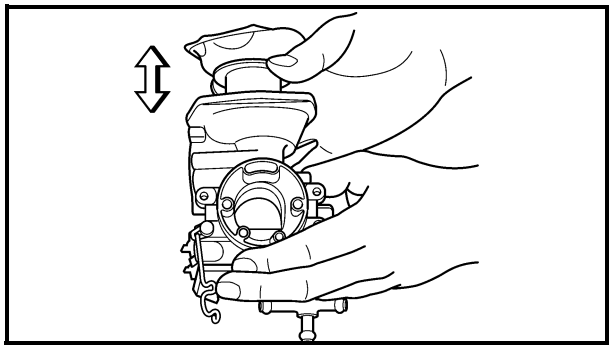
7. Check:
   - piston valve ①
     Damage/scratches/wear→ Replace.
   - piston valve diaphragm ②
     Cracks/tears → Replace.



8. Check:
   - vacuum chamber cover ①
   - piston valve spring ②
   - jet needle holder ③
   - jet needle spring ④
     Cracks/damage → Replace.



9. Check:
   - jet needle kit ①
   - needle jet ②
   - main jet ③
   - pilot jet ④
   - pilot air jet No. 1 ⑤
   - pilot air jet No. 2 ⑥
   - starter plunger assembly ⑦
     Bends/damage/wear → Replace.
     Obstruction → Clean.
     Blow out the jets with compressed air.



10. Check:
    - piston valve movement
      Insert the piston valve into the carburetor body and move it up and down.
      Tightness → Replace the piston valve.
11. Check:
    - fuel feed hoses
    - fuel hoses
      Cracks/damage/wear → Replace.
      Obstruction → Clean.
      Blow out the hoses with compressed air.

EAS00488
ASSEMBLING THE CARBURETORS

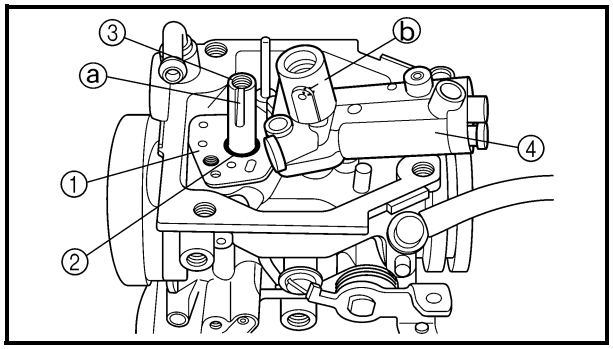
The following procedure applies to all of the carburetors.

NOTE:

Before assembling the carburetor, make sure to turn out the pilot screw the same number of times, as noted before disassembly, from the seated position to the set position.

CAUTION:

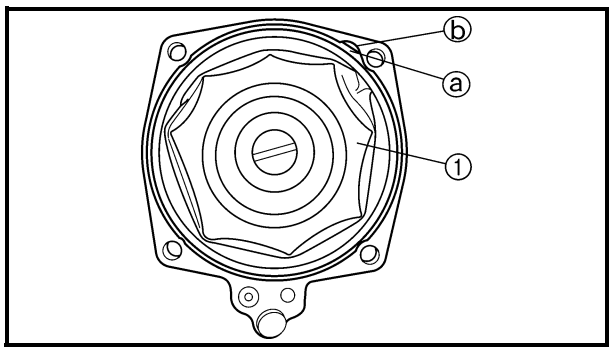
- **Before assembling the carburetors, wash all of the parts in a petroleum-based solvent.**
- **Always use a new gasket.**



1. Install:
   - gasket ①
   - O-ring ②
   - needle jet ③
   - jet block ④

NOTE:

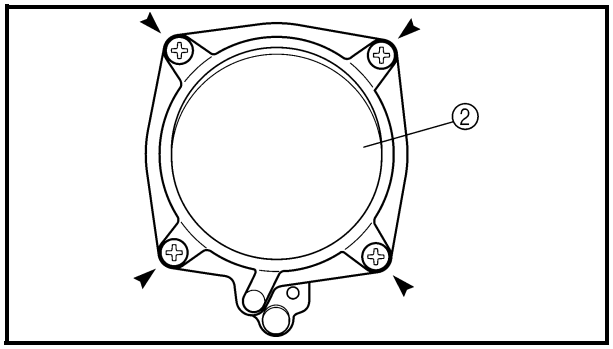
Align the slot ⓐ on the needle jet with the projection ⓑ on the jet block.

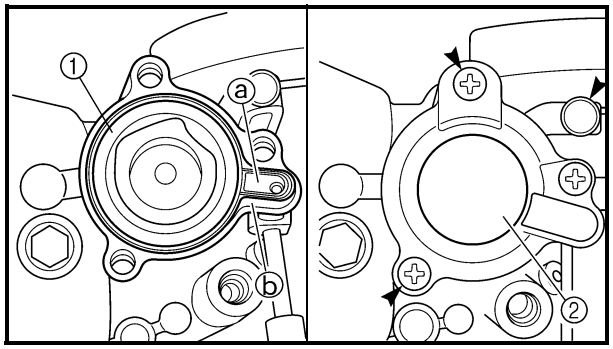


2. Install:
   - piston valve ①
   - jet needle kit
   - jet needle holder
   - piston valve spring
   - vacuum chamber cover ②

NOTE:

- Install the end of the piston valve spring onto the spring guide on the vacuum chamber cover.
- Align the tab ⓐ on the piston valve diaphragm with the recess ⓑ in the carburetor body.





3. Install:
   - coasting enricher ①
   - coasting enricher spring
   - coasting enricher cover ②

NOTE:
Align the tab ⓐ on the coasting enricher with the recess ⓑ in the carburetor body.

EAS00493
INSTALLING THE CARBURETORS

1. Adjust:
   - carburetor synchronization
     Refer to "SYNCHRONIZING THE CARBURETORS" in chapter 3.
2. Adjust:
   - engine idling speed

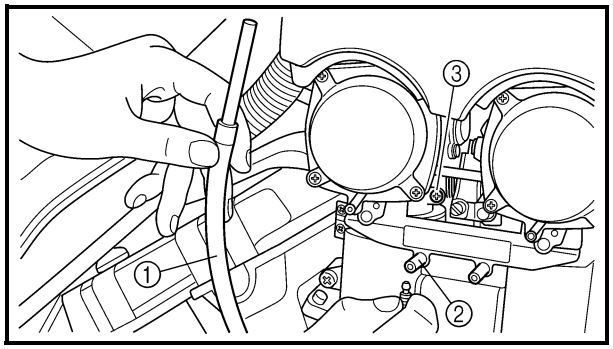
Engine idling speed
950 ~ 1,050 r/min
1,050 ~ 1,150 r/min
(for California)

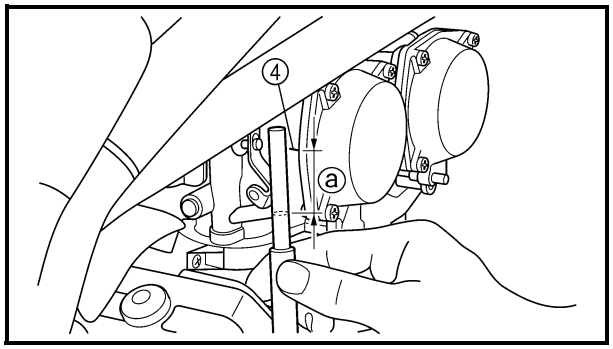
Refer to "ADJUSTING THE ENGINE IDLING SPEED" in chapter 3.

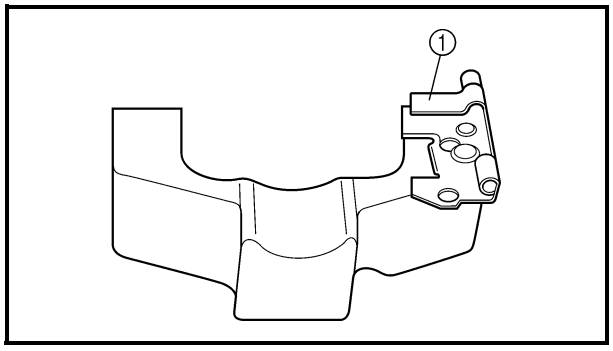
3. Adjust:
   - throttle cable free play

Throttle cable free play
(at the flange of the throttle grip)
3 ~ 5 mm (0.12 ~ 0.20 in)

Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY" in chapter 3.







EAS00495
MEASURING AND ADJUSTING THE FUEL LEVEL

1. Measure:
   - fuel level ⓐ
     Out of specification → Adjust.

Fuel level
(below the line on the vacuum chamber)
15 ~ 17 mm (0.59 ~ 0.67 in)

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a. Stand the motorcycle on a level surface.
b. Place the motorcycle on a suitable stand to ensure that the motorcycle is standing straight up.
c. Install the fuel level gauge ① onto the fuel drain pipe ②.

Fuel level gauge
YU-01312-A

d. Loosen the fuel drain screw ③.
e. Hold the fuel level gauge vertically next to the line on the vacuum chamber ④.
f. Measure the fuel level ⓐ on both sides of the carburetor assembly.

NOTE:
The fuel level readings should be equal on both sides.

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2. Adjust:
   - fuel level

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a. Remove the carburetor assembly.
b. Check the needle valve seat and needle valve.
c. If either is worn, replace them as a set.
d. If both are fine, adjust the float level by slightly bending the float tang ①.
e. Install the carburetor assembly.
f. Measure the fuel level again.
g. Repeat steps (a) to (f) until the fuel level is within specification.

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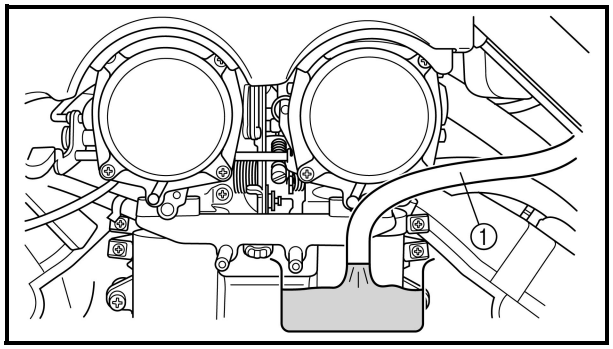

EAS00504
CHECKING THE FUEL PUMP

1. Check:
   • fuel pump

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a. Remove the top cover and air filter case. Refer to “TOP COVER AND COVERS” and “AIR FILTER CASE AND ELECTRICAL COMPONENTS BOARD” in chapter 3.
b. Disconnect the fuel hose (fuel pump to carburetor) ① from the carburetor.
c. Place a container under the end of the fuel hose.
d. Install the top cover and air filter case. Refer to “TOP COVER AND COVERS” and “AIR FILTER CASE AND ELECTRICAL COMPONENTS BOARD” in chapter 3.
e. Start the engine and check if fuel flows from the fuel hose ①.

Fuel flows.	**Fuel pump is OK.**
Fuel does not flow.	**Replace the fuel pump.**

f. Stop the engine and check if the fuel stops flowing from the fuel hose ①.

Fuel stops flowing.	**Fuel pump is OK.**
Fuel flows.	**Replace the fuel pump.**

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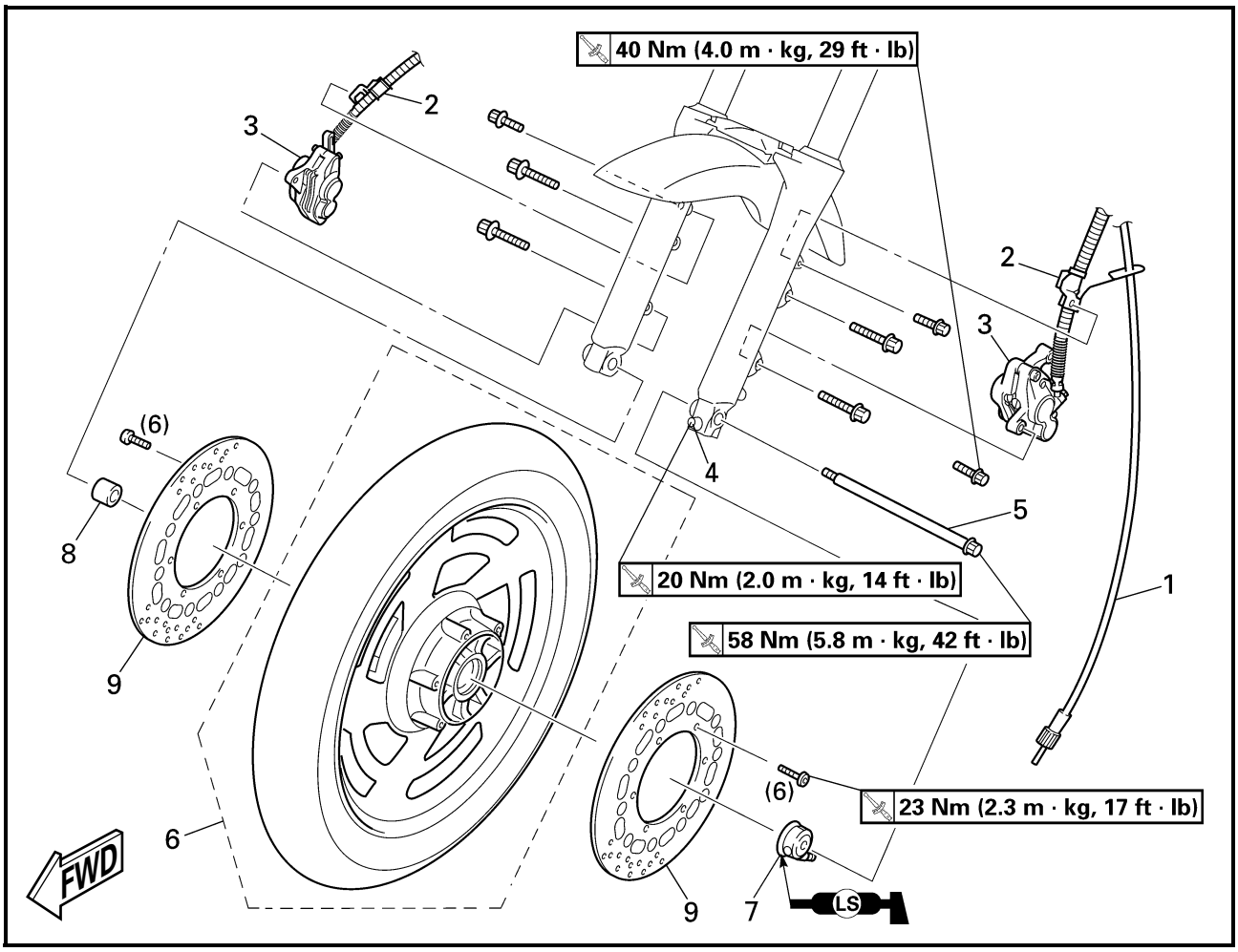
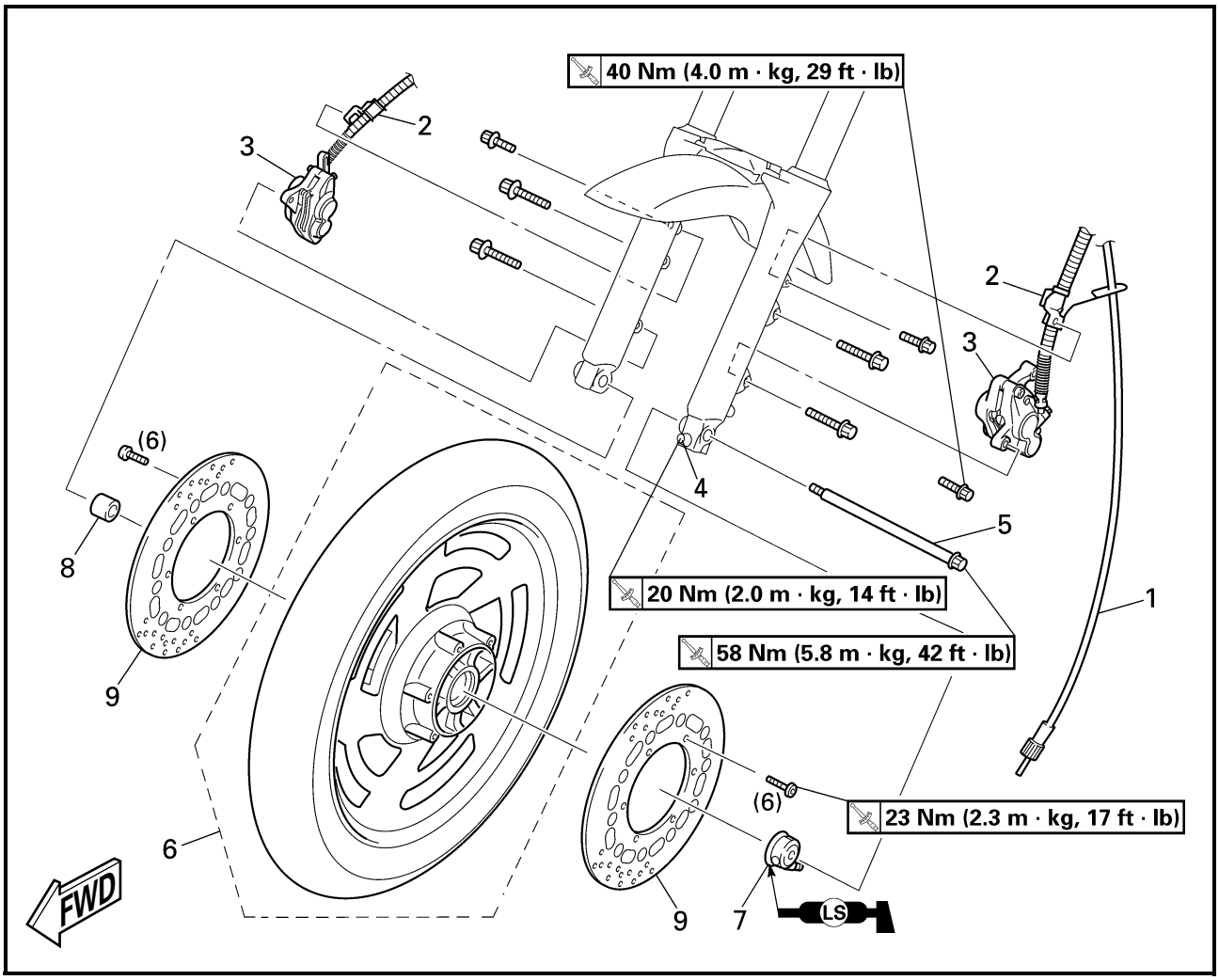
EAS00514

CHASSIS

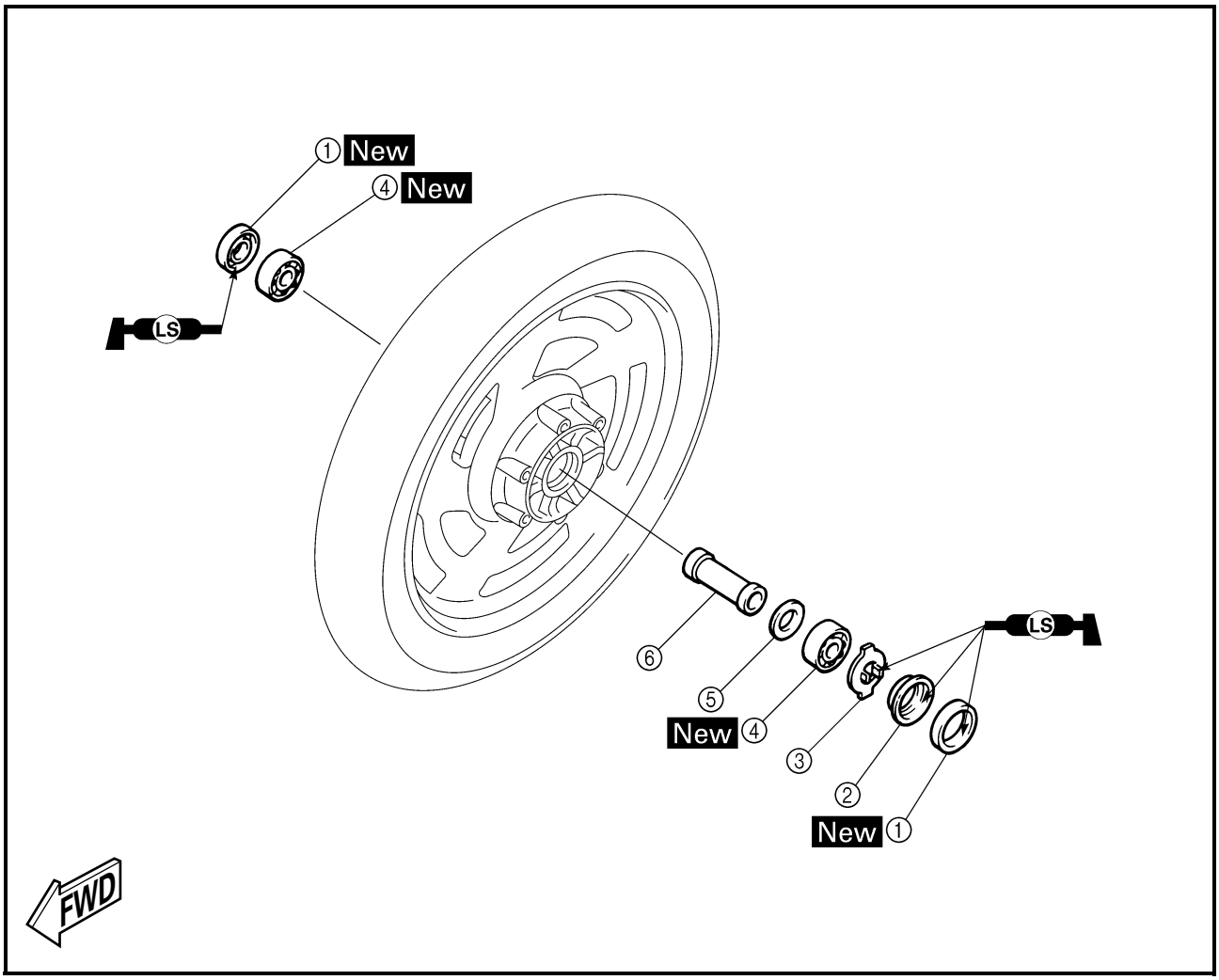
FRONT WHEEL AND BRAKE DISCS



Order	Job/Part	Q'ty	Remarks
	Removing the front wheel and brake discs		Remove the parts in the order listed. **NOTE:** Place the motorcycle on a suitable stand so that the front wheel is elevated.
1	Speedometer cable	1	
2	Brake hose holder (left and right)	2	
3	Brake caliper (left and right)	2	
4	Wheel axle pinch bolt	1	Loosen.
5	Front wheel axle	1	Refer to "REMOVING THE FRONT WHEEL" and "INSTALLING THE FRONT WHEEL".
6	Front wheel	1	



Order	Job/Part	Q'ty	Remarks
7	Speedometer gear unit	1	Refer to "INSTALLING THE FRONT WHEEL".
8	Collar	1	
9	Brake disc (left and right)	2	
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the front wheel		Remove the parts in the order listed.
①	Oil seal (left and right)	2	Refer to "DISASSEMBLING THE FRONT WHEEL" and "ASSEMBLING THE FRONT WHEEL".
②	Speedometer clutch retainer	1	
③	Speedometer clutch	1	
④	Wheel bearing (left and right)	2	Refer to "DISASSEMBLING THE FRONT WHEEL" and "ASSEMBLING THE FRONT WHEEL".
⑤	Spacer flange	1	
⑥	Spacer	1	
			For assembly, reverse the disassembly procedure.

EAS00521
REMOVING THE FRONT WHEEL

1. Stand the motorcycle on a level surface.

⚠ WARNING

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

NOTE:

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

2. Remove:
   - left brake caliper
   - right brake caliper

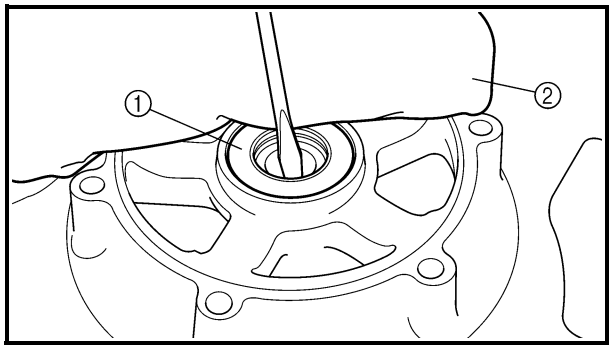
NOTE:

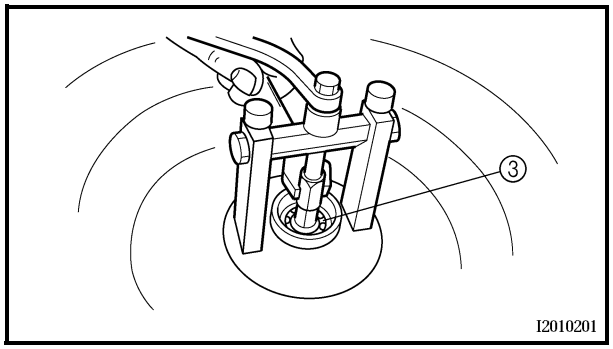
Do not squeeze the brake lever when removing the brake calipers.

3. Elevate:
   - front wheel

NOTE:

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





EAS00523
DISASSEMBLING THE FRONT WHEEL

1. Remove:
   - oil seals
   - wheel bearings

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

NOTE:

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

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

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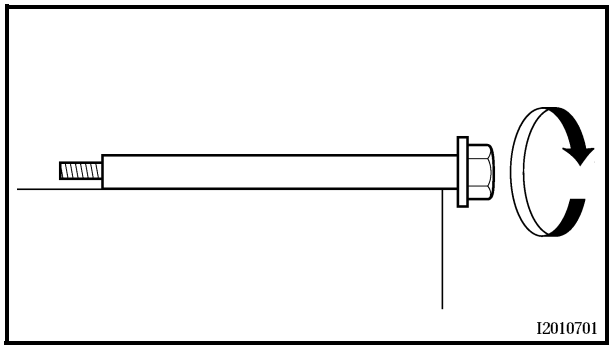

I2010701

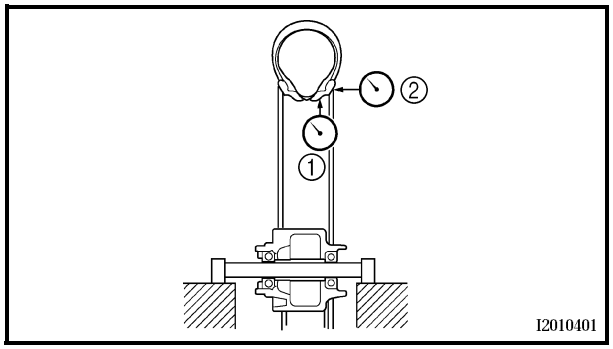
EAS00525
CHECKING THE FRONT WHEEL

1. Check:
   - front wheel axle
     Roll the front wheel axle on a flat surface.
     Bends → Replace.

⚠ WARNING

Do not attempt to straighten a bent front wheel axle.

2. Check:
   - tire
   - front wheel
     Damage/wear → Replace.
     Refer to "CHECKING THE TIRES" and "CHECKING THE WHEELS" in chapter 3.

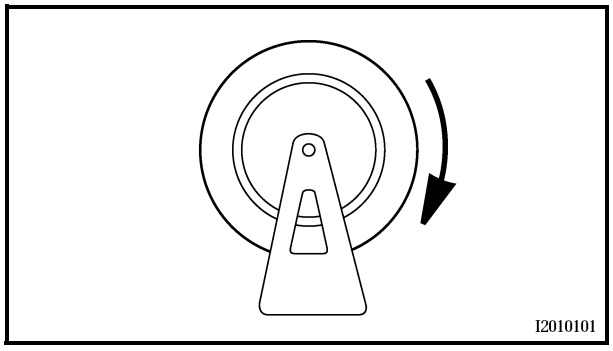


I2010401

3. Measure:
   - radial wheel runout ①
   - lateral wheel runout ②
     Over the specified limits → Replace.

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

4. Check:
   - collar
     Damage/wear → Replace.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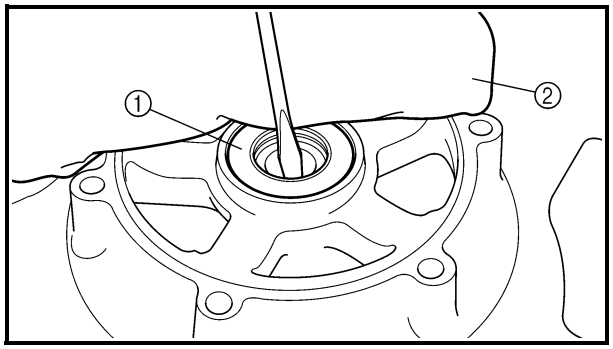
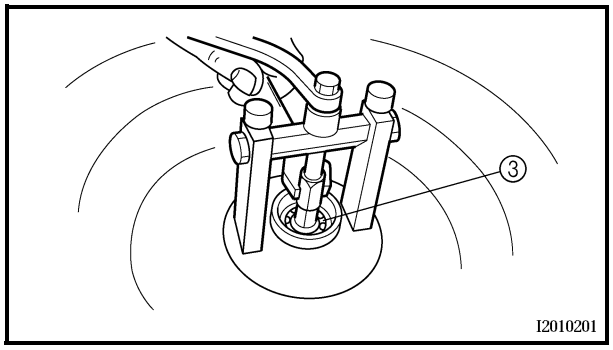
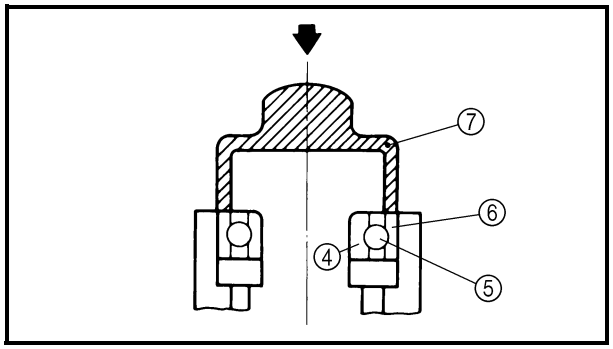
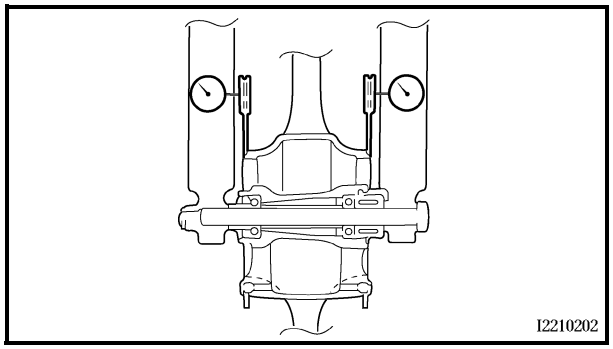
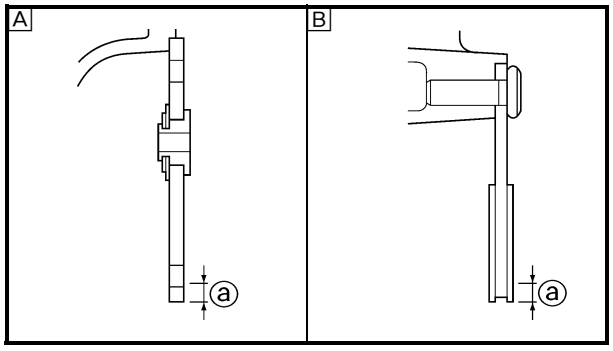
5. Check:
   - wheel bearings
     Front wheel turns roughly or is loose → Replace the wheel bearings.
   - oil seals
     Damage/wear → Replace.











6. Replace:
   - wheel bearings **New**
   - oil seals **New**

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

NOTE:

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

c. Remove the wheel bearings ③ with a general bearing puller.
d. Install the new wheel bearings and oil seals in the reverse order of disassembly.

CAUTION:

Do not contact the wheel bearing inner race ④ or balls ⑤. Contact should be made only with the outer race ⑥.

NOTE:

Use a socket ⑦ that matches the diameter of the wheel bearing outer race and oil seal.

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EAS00531
CHECKING THE BRAKE DISCS

The following procedure applies to all of the brake discs.

1. Check:
   - brake disc
     Damage/galling → Replace.
2. Measure:
   - brake disc deflection
     Out of specification → Correct the brake disc deflection or replace the brake disc.

Brake disc deflection limit (maximum)
Front: 0.3 mm (0.012 in)
Rear: 0.15 mm (0.006 in)

A Front
B Rear
ⓐ 1.5 mm (0.006 in) from the edge of the brake discs.

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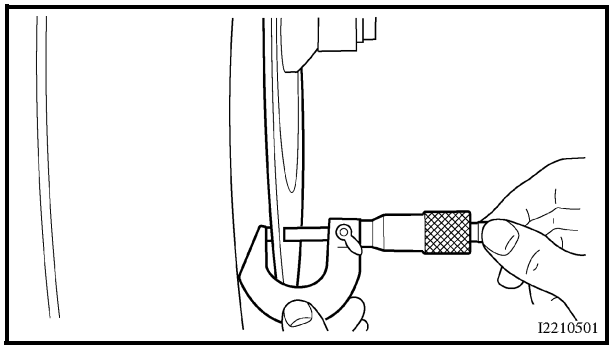

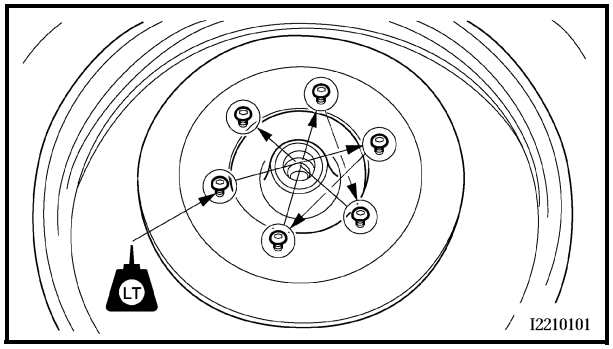

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a. Place the motorcycle on a suitable stand so that the wheel is elevated.
b. Before measuring the front brake disc deflection, turn the handlebar to the left or right to ensure that the front wheel is stationary.
c. Remove the brake caliper.
d. Hold the dial gauge at a right angle against the brake disc surface.
e. Measure the deflection 2 ~ 3 mm (0.08 ~ 0.12 in) below the edge of the brake disc.

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3. Measure:
   • brake disc thickness
   Measure the brake disc thickness at a few different locations.
   Out of specification → Replace.

Brake disc thickness limit (minimum)
Front: 4.5 mm (0.18 in)
Rear: 7.0 mm (0.02 in)

4. Adjust:
   • brake disc deflection

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

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

Brake disc bolt
23 Nm (2.3 m • kg, 17 ft • lb)
LOCTITE®

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

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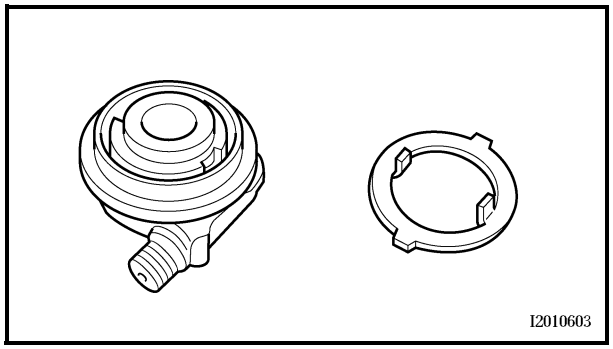
I2010603

EAS00535
CHECKING THE SPEEDOMETER GEAR UNIT

1. Check:
   - speedometer clutch
     Bends/damage/wear → Replace.
2. Check:
   - speedometer gear unit
     Damage/wear → Replace.

EAS00539
ASSEMBLING THE FRONT WHEEL

1. Install:
   - wheel bearings New
   - oil seals New

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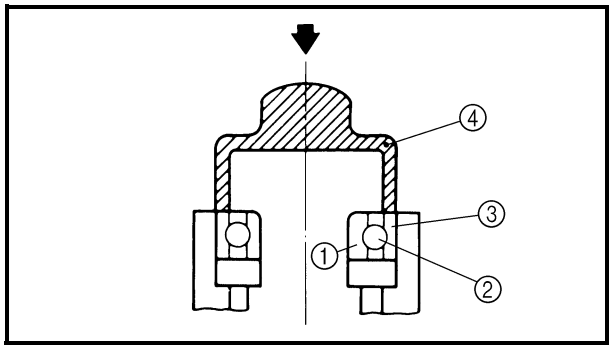
a. Install the new wheel bearings and oil seals in the reverse order of disassembly.

CAUTION:

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



NOTE:

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

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EAS00542
INSTALLING THE FRONT WHEEL

1. Lubricate:
   - wheel axle
   - wheel bearings
   - oil seal lips
   - speedometer gear unit

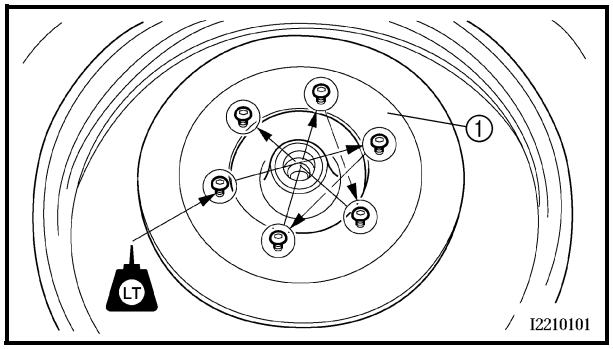
	Recommended lubricant **Lithium soap base grease**

2. Install:
   - brake discs ①

23 Nm (2.3 m · kg, 17 ft · lb)

NOTE:

- Apply the locking agent (LOCTITE®) to the threads of the brake disc bolts.
- Tighten the brake disc bolts in stages and in a crisscross pattern.



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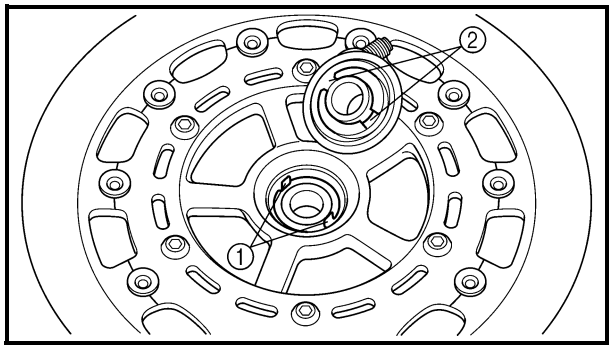
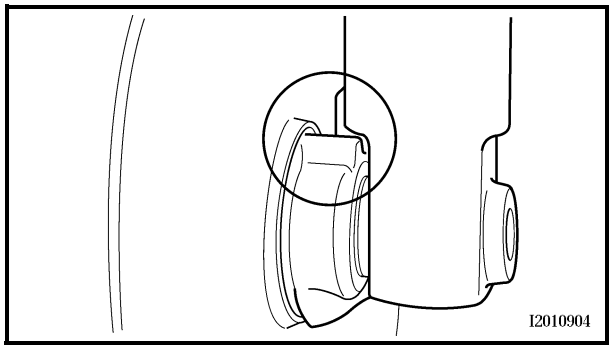


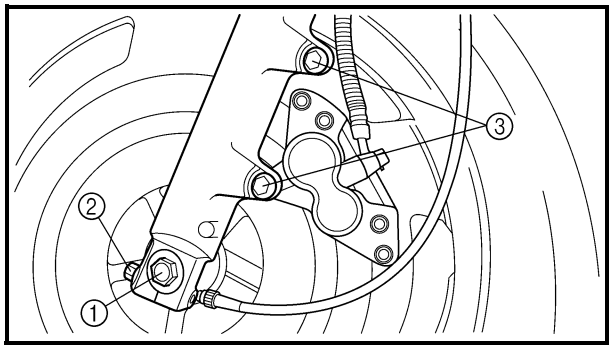
3. Install:
   • speedometer gear unit

NOTE:
Make sure the speedometer gear unit and the wheel hub are installed with the two projections ① meshed into the two slots ② respectively.



4. Install:
   • collar
5. Install:
   • front wheel

NOTE:
Make sure the slot in the speedometer gear unit fits over the stopper on the outer tube.



6. Tighten:
   • front wheel axle ①

	58 Nm (5.8 m · kg, 42 ft · lb)

   • wheel axle pinch bolt ②

	20 Nm (2.0 m · kg, 14 ft · lb)

   • brake caliper bolts ③

	40 Nm (4.0 m · kg, 29 ft · lb)

⚠ WARNING

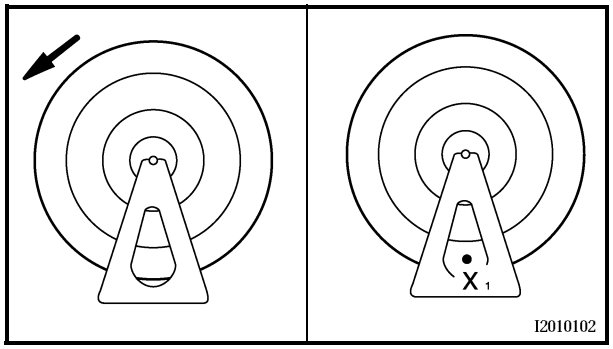
Make sure the brake cable is routed properly.

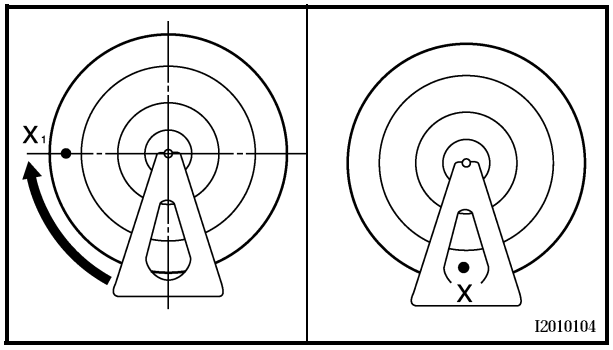
CAUTION:

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

EAS00549
ADJUSTING THE FRONT WHEEL STATIC BALANCE

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





1. Remove:
   • balancing weight(s)
2. Find:
   • front wheel's heavy spot

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NOTE:
Place the front wheel on a suitable balancing stand.

a. Spin the front wheel.
b. When the front wheel stops, put an "X" mark at the bottom of the wheel.
c. Turn the front wheel 90° so that the "X" mark is positioned as shown.
d. Release the front wheel.
e. When the wheel stops, put an "X" mark at the bottom of the wheel.
f. Repeat steps (d) through (f) several times until all the marks come to rest at the same spot.
g. The spot where all the marks come to rest is the front wheel's heavy spot "X".

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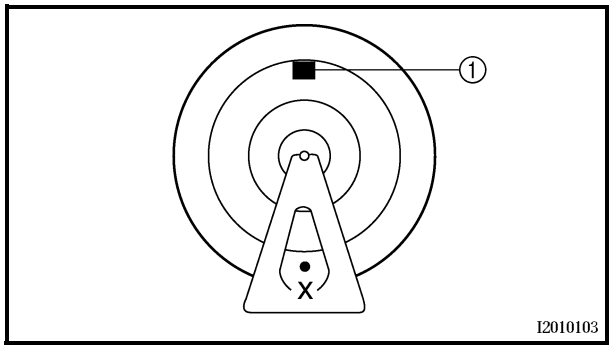

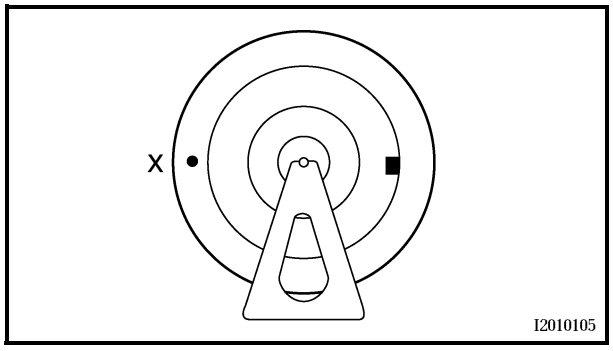

3. Adjust:
   • front wheel static balance

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

NOTE:
Start with the lightest weight.

b. Turn the front wheel 90° so that the heavy spot is positioned as shown.
c. If the heavy spot does not stay in that position, install a heavier weight.
d. Repeat steps (b) and (c) until the front wheel is balanced.

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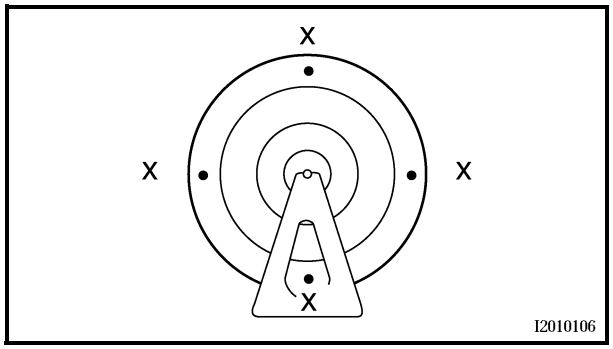

4. Check:
   • front wheel static balance

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a. Turn the front wheel and make sure it stays at each position shown.
b. If the front wheel does not remain stationary at all of the positions, rebalance it.

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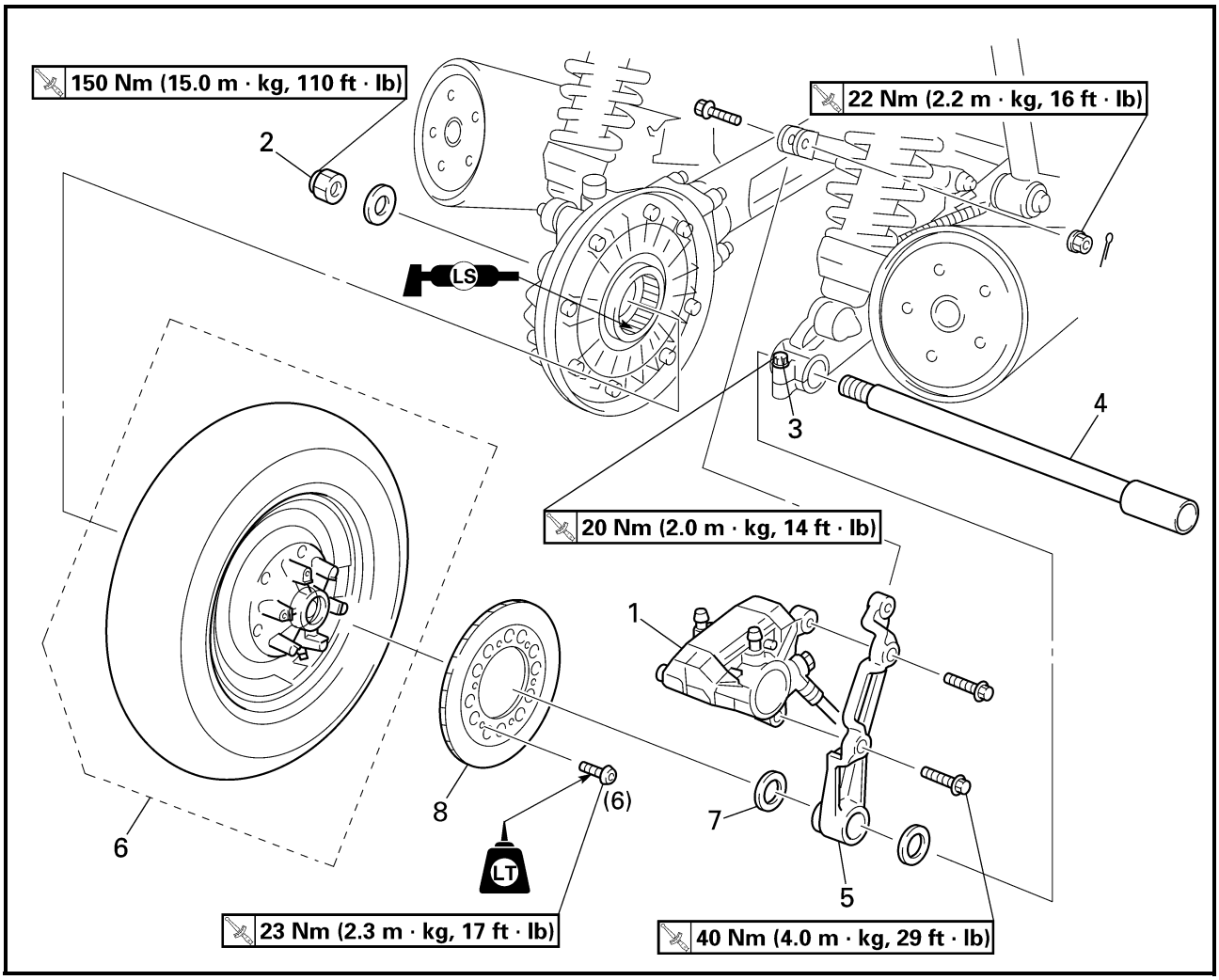
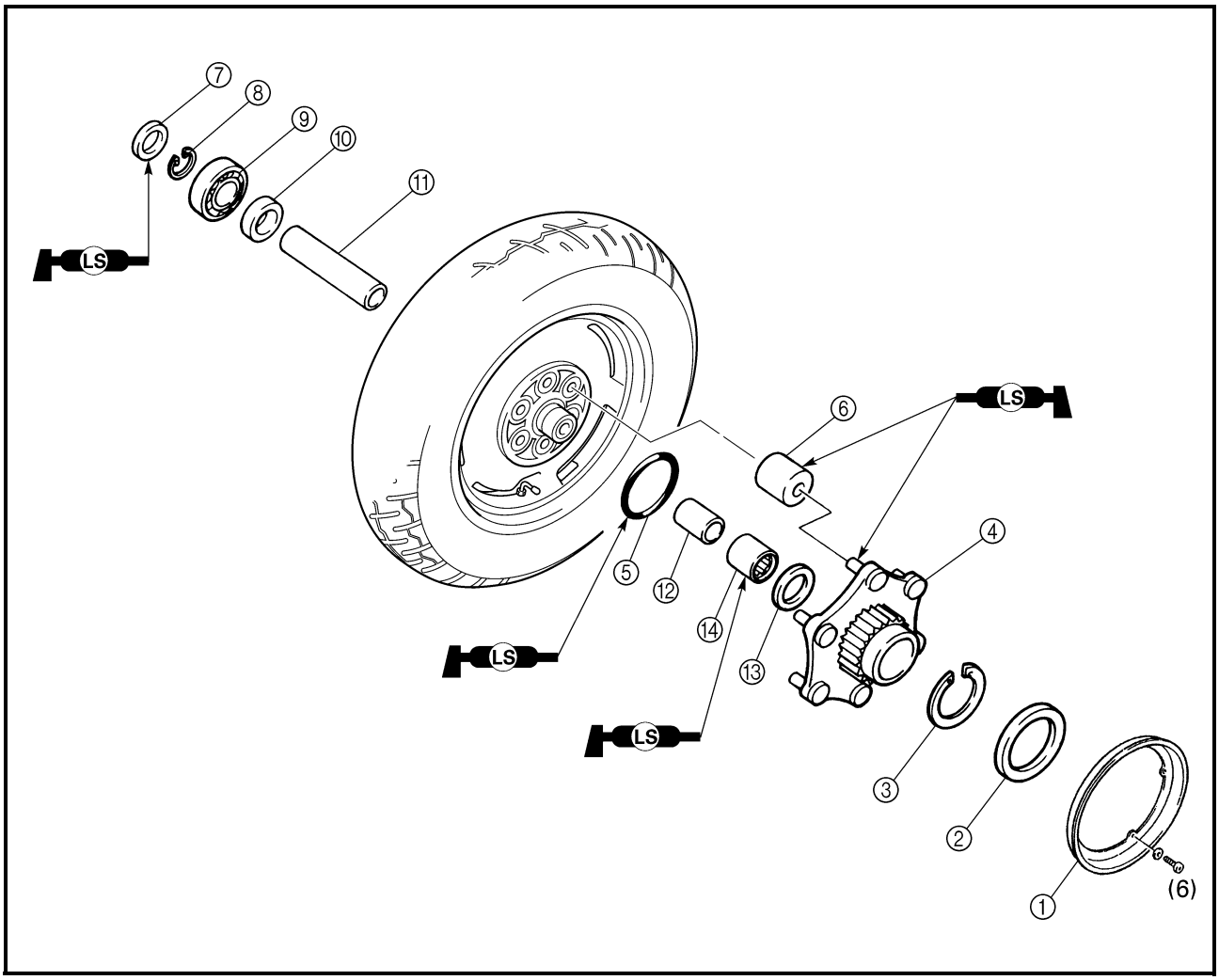
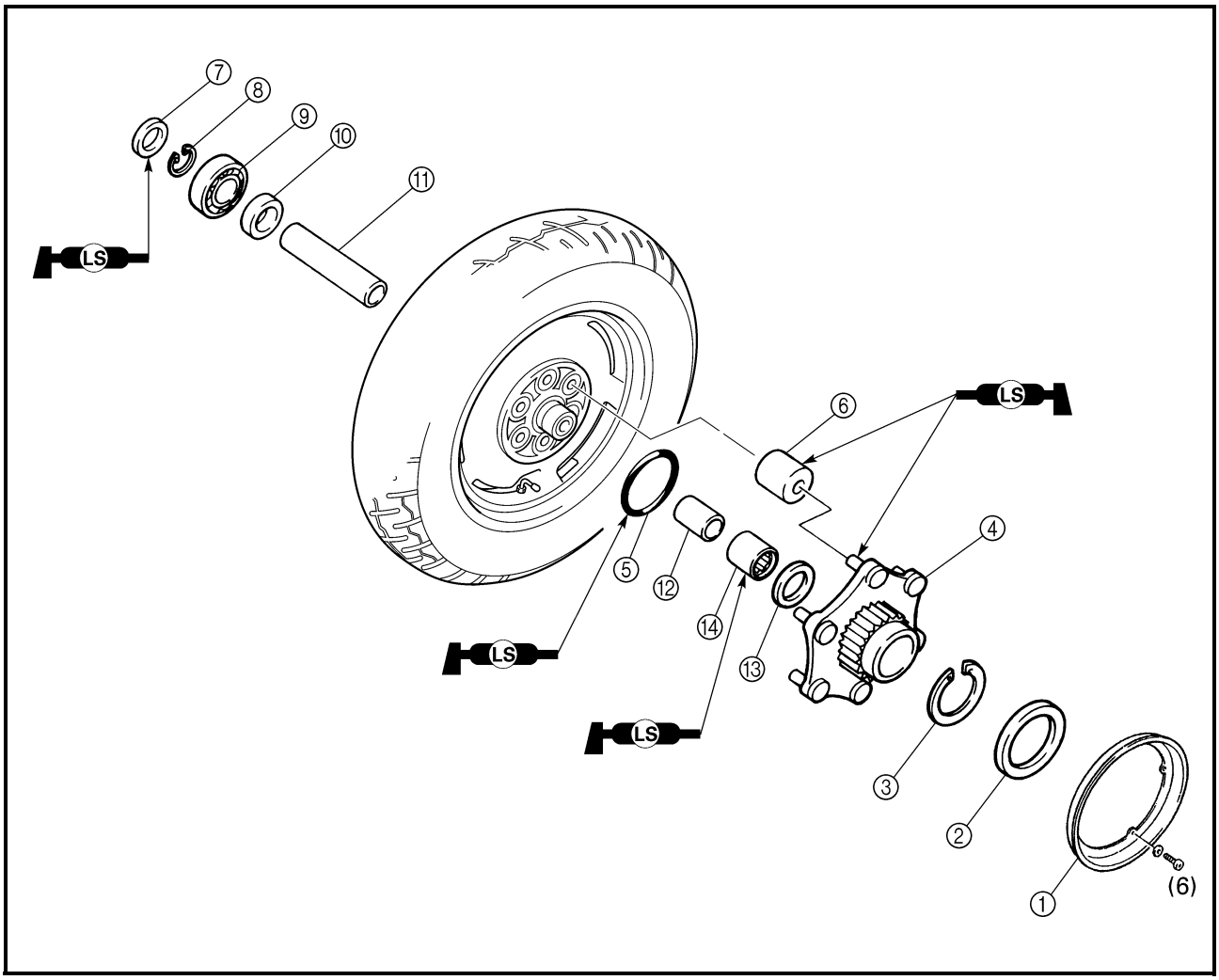
EAS00551
REAR WHEEL AND BRAKE DISC



Order	Job/Part	Q'ty	Remarks
	Removing the rear wheel and brake disc		Remove the parts in the order listed. **NOTE:** Place the motorcycle on a suitable stand so that the rear wheel is elevated.
1	Brake caliper	1	
2	Wheel axle nut	1	
3	Pinch bolt	1	Loosen. Refer to "REMOVING THE REAR WHEEL" and "INSTALLING THE REAR WHEEL".
4	Rear wheel axle	1	
5	Brake caliper bracket	1	
6	Rear wheel	1	
7	Collar	1	
8	Brake disc	1	
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the rear wheel		Remove the parts in the order listed.
①	Dust cover	1	
②	Hub dust seal	1	
③	Circuit	1	
④	Clutch hub	1	
⑤	O-ring	1	
⑥	Damper	6	
⑦	Oil seal	1	
⑧	Circlip	1	
⑨	Bearing	1	
⑩	Flange spacer	1	



Order	Job/Part	Q'ty	Remarks
⑪	Spacer	1	
⑫	Collar	1	
⑬	Oil seal	1	
⑭	Bearing	1	
			For assembly, reverse the disassembly procedure.

EAS00562
REMOVING THE REAR WHEEL

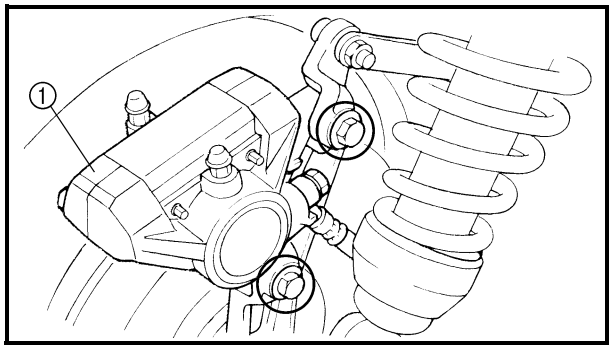
1. Stand the motorcycle on a level surface.

⚠ WARNING

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

NOTE:

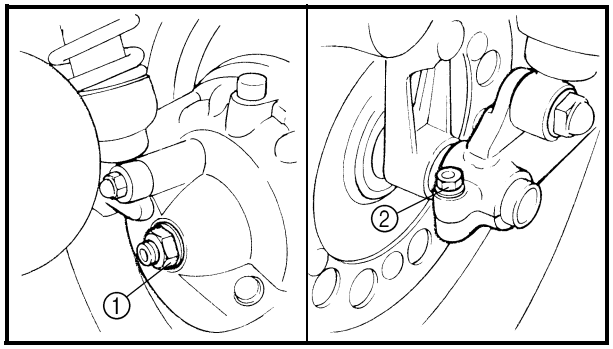
Place the motorcycle on a suitable stand so that the rear wheel is elevated.



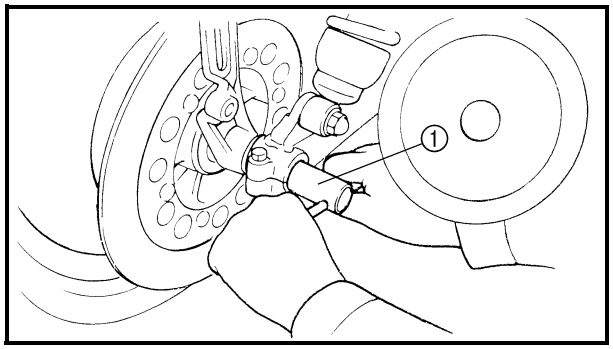
2. Remove:
   - brake caliper ①

NOTE:

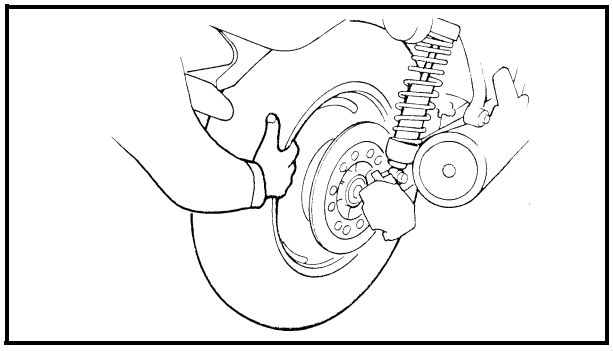
Do not depress the brake pedal when removing the brake caliper.



3. Loosen:
   - wheel axle nut ①
   - pinch bolt ②



4. Remove:
   - wheel axle nut
   - washer
   - wheel axle ①
   - washer



5. Remove:
   - rear wheel

   Move the rear wheel to the right to separate it from the final drive housing.

EAS00565
CHECKING THE REAR WHEEL

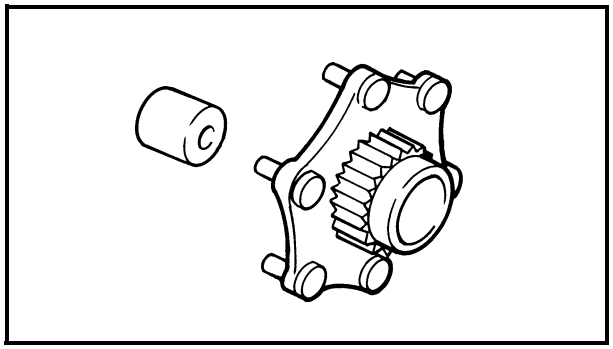
1. Check:
   - wheel axle
   - rear wheel
   - wheel bearings
   - oil seals

   Refer to “FRONT WHEEL AND BRAKE DISCS”.
2. Check:
   - tire
   - rear wheel

   Damage/wear → Replace.

   Refer to “CHECKING THE TIRES” and “CHECKING THE WHEELS” in chapter 3.
3. Measure:
   - radial wheel runout
   - lateral wheel runout

   Refer to “FRONT WHEEL AND BRAKE DISCS”.



EAS00567
CHECKING THE REAR WHEEL DRIVE HUB

1. Check:
   - rear wheel drive hub

     Cracks/damage → Replace.
   - rear wheel drive hub dampers

     Damage/wear → Replace.

EAS00572
INSTALLING THE REAR WHEEL

1. Lubricate:
   - wheel axle
   - wheel bearings
   - oil seal lips

	Recommended lubricant **Lithium soap base grease**

2. Tighten:
   - wheel axle nut

     150 Nm (15.0 m · kg, 110 ft · lb)
   - pinch bolt

     20 Nm (2.0 m · kg, 14 ft · lb)
   - brake caliper bolts

     40 Nm (4.0 m · kg, 29 ft · lb)
   - brake torque rod nut

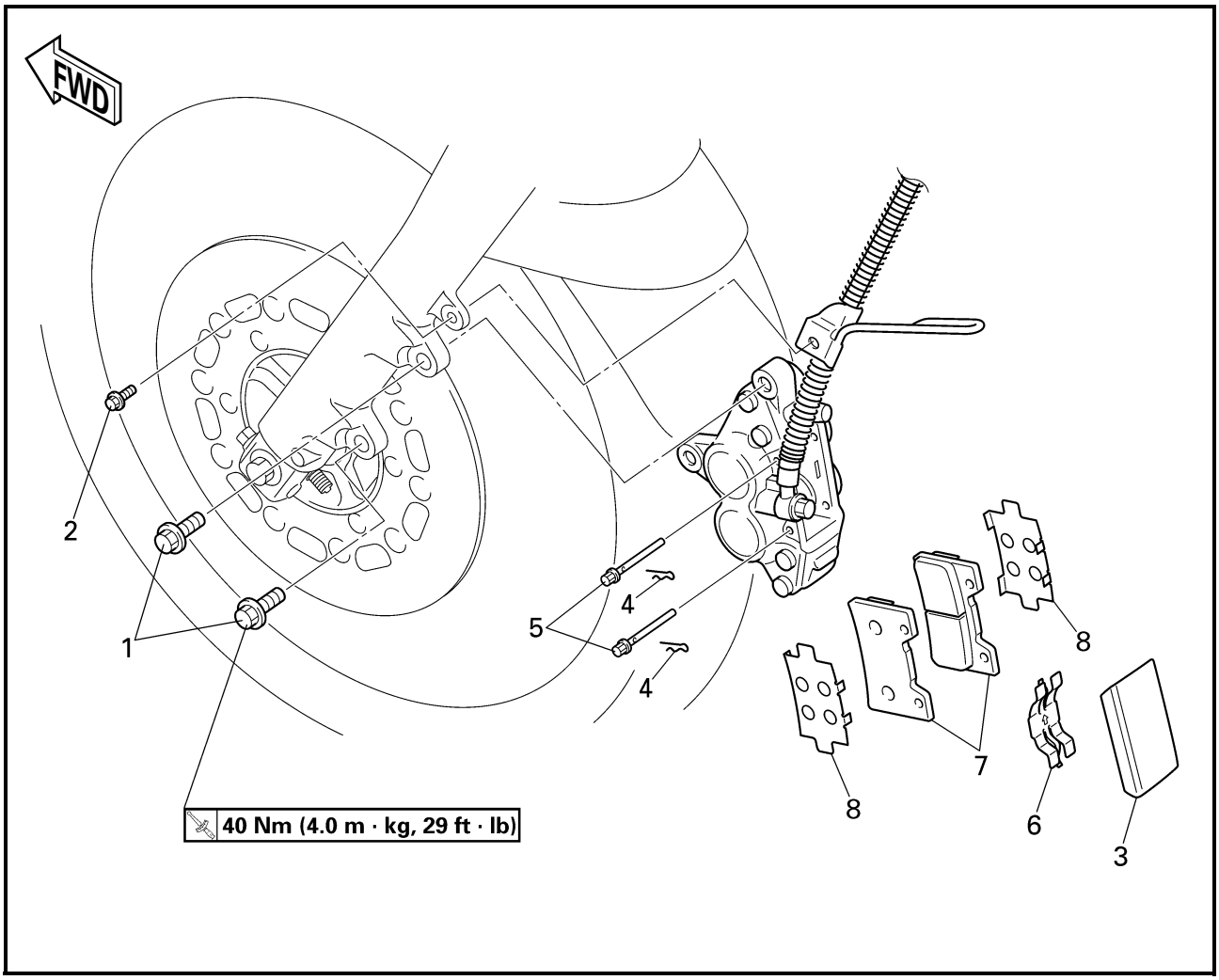
     22 Nm (2.2 m · kg, 16 ft · lb)

EAS00575
ADJUSTING THE REAR WHEEL STATIC BALANCE

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

1. Adjust:
   - rear wheel static balance
     Refer to “FRONT WHEEL AND BRAKE DISCS”.

EAS00577
FRONT AND REAR BRAKES



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.
1	Brake caliper bolt	2	
2	Brake hose holder bolt	1	
3	Brake pad cover	1	
4	Brake pad clip	2	Refer to "REPLACING THE FRONT BRAKE PADS".
5	Brake pad pin	2	
6	Brake pad spring	1	
7	Brake pad	2	
8	Brake pad shim (left and right)	2	
			For installation, reverse the removal procedure.

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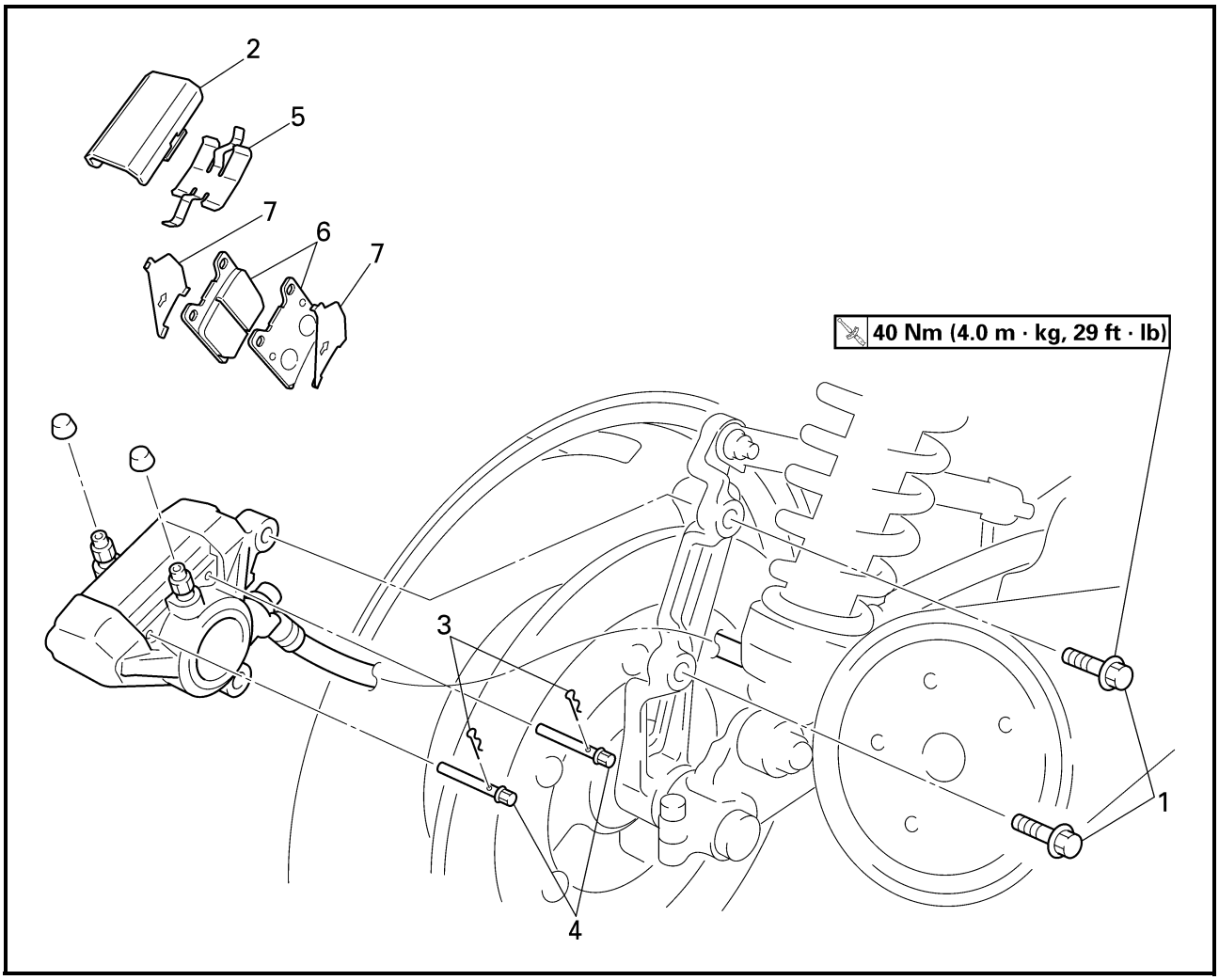


Order	Job/Part	Q'ty	Remarks
	Removing the rear brake pads		Remove the parts in the order listed.
1	Brake caliper bolt	2	
2	Brake pad cover	1	
3	Brake pad clip	2	
4	Brake pad pin	2	Refer to "REPLACING THE REAR BRAKE PADS".
5	Brake pad spring	1	
6	Brake pad	2	
7	Brake pad shim (left and right)	2	
			For installation, reverse the removal procedure.

EAS00579

CAUTION:

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

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

FIRST AID FOR BRAKE FLUID ENTERING THE EYES:

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

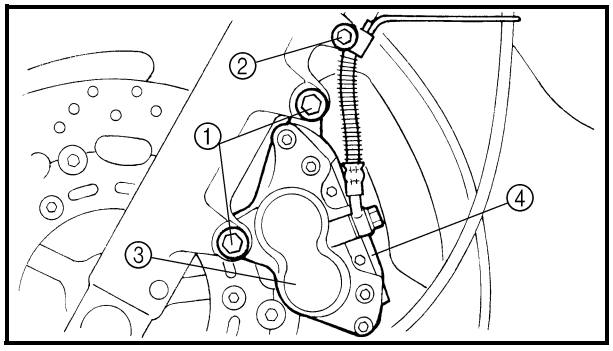
EAS00582

REPLACING THE FRONT BRAKE PADS

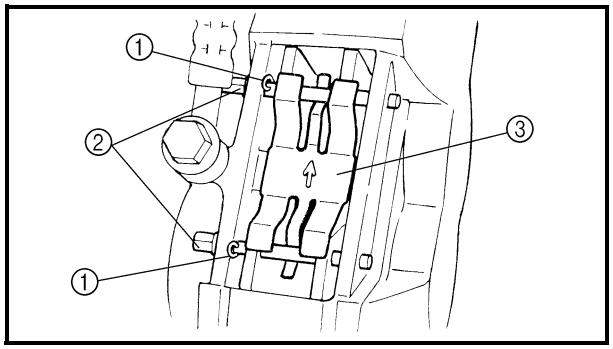
The following procedure applies to both brake calipers.

NOTE:

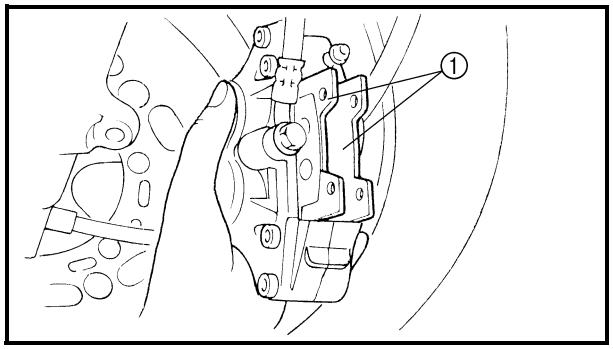
When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.



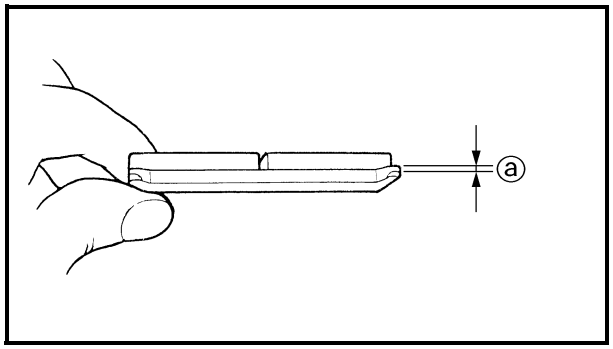
1. Remove:
   - brake caliper bolt ①
   - brake hose holder bolt ②
   - brake caliper ③
   - brake pad cover ④



2. Remove:
   - brake pad clips ①
   - brake pad pins ②
   - brake pad spring ③



3. Remove:
   - brake pads ①
     (along with the brake pad shims)

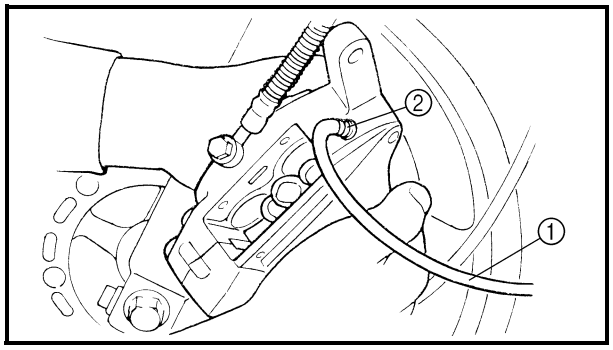


4. Measure:
   - brake pad wear limit ⓐ
     Out of specification → Replace the brake pads as a set.

Brake pad wear limit
0.5 mm (0.02 in)

5. Install:
   - brake pad shims
     (onto the brake pads)
   - brake pads
   - brake pad spring

NOTE:
Always install new brake pads, brake pad shims, and a brake pad spring as a set.



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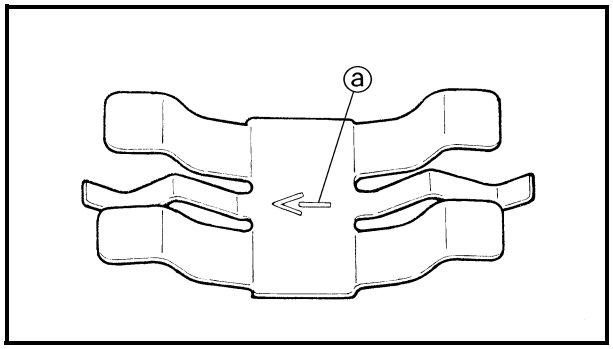
a. Connect a clear plastic hose ① tightly to the bleed screw ②. Put the other end of the hose into an open container.
b. Loosen the bleed screw and push the brake caliper pistons into the brake caliper with your finger.
c. Tighten the bleed screw.

Bleed screw
6 Nm (0.6 m • kg, 4.3 ft • lb)



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

NOTE:
The arrow ⓐ on the brake pad spring must point in the direction of disc rotation.

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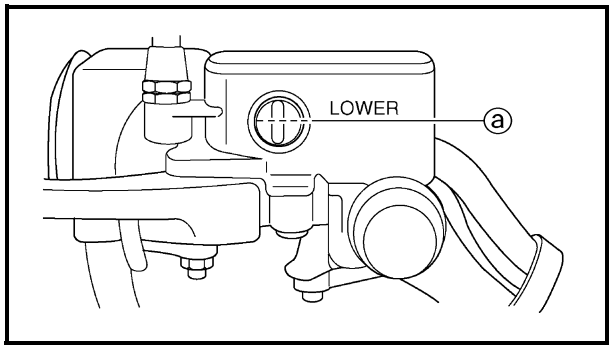
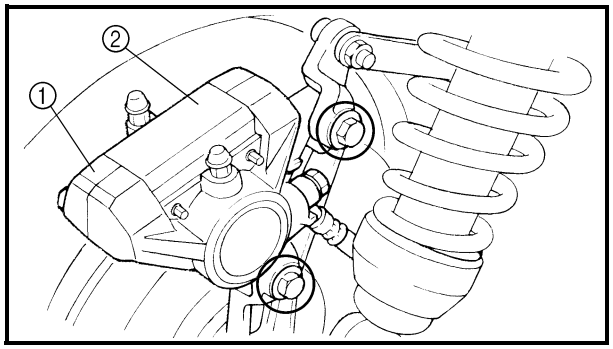
6. Install:
   - brake pad pins
   - brake pad clips
   - brake pad cover
   - brake caliper **40 Nm (4.0 m · kg, 29 ft · lb)**



7. Check:
   - brake fluid level
     Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
     Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

8. Check:
   - brake lever operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.

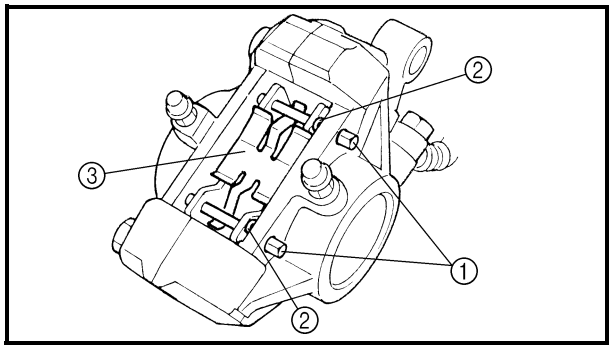
7



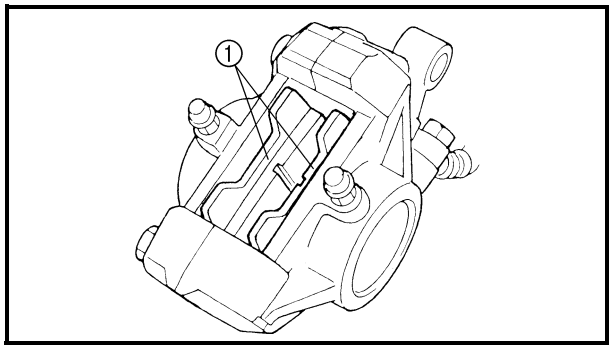
EAS00583
REPLACING THE REAR BRAKE PADS

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

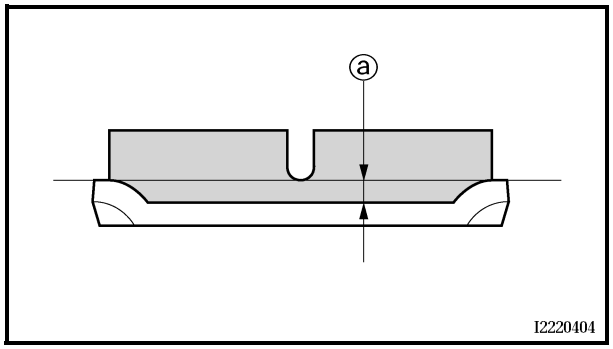
1. Remove:
   - brake caliper ①
   - brake pad cover ②



2. Remove:
   - brake pad clips ①
   - brake pad pins ②
   - brake pad spring ③



3. Remove:
   - brake pads ①
     (along with the brake pad shims)

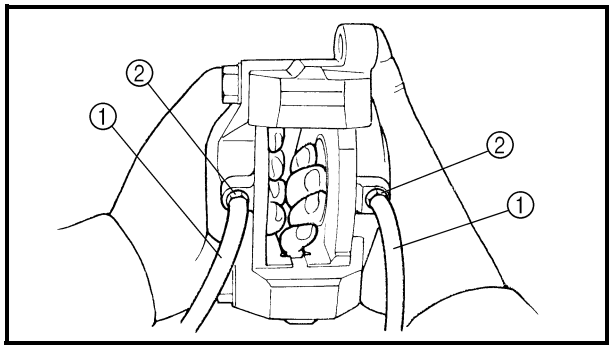


4. Measure:
   - brake pad wear limit ⓐ
     Out of specification → Replace the brake pads as a set.

Brake pad wear limit
0.5 mm (0.02 in)

5. Install:
   - brake pad shims
     (onto the brake pads)
   - brake pads
   - brake pad spring

NOTE:
Always install new brake pads, brake pad shims, and a brake pad spring as a set.



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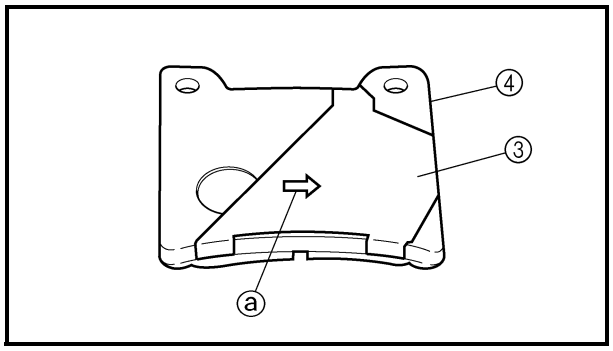
a. Connect a clear plastic hose ① tightly to the bleed screw ②. Put the other end of the hose into an open container.
b. Loosen the bleed screw and push the brake caliper pistons into the brake caliper with your finger.
c. Tighten the bleed screw.

Bleed screw
6 Nm (0.6 m • kg, 4.3 ft • lb)



d. Install a new brake pad shim ③ onto each new brake pad ④.

NOTE:
The arrow ⓐ on the brake pad shim must point in the direction of disc rotation.

e. Install new brake pads and a new brake pad spring ⑤.

NOTE:
The longer tangs ⓑ of the brake pad spring must point in the direction of disc rotation.

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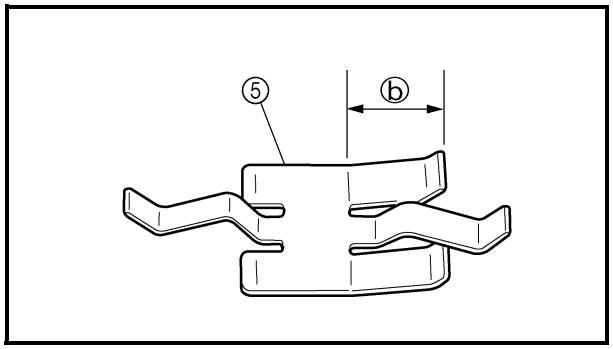
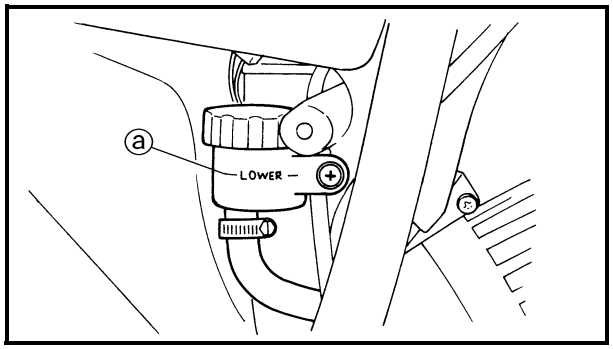
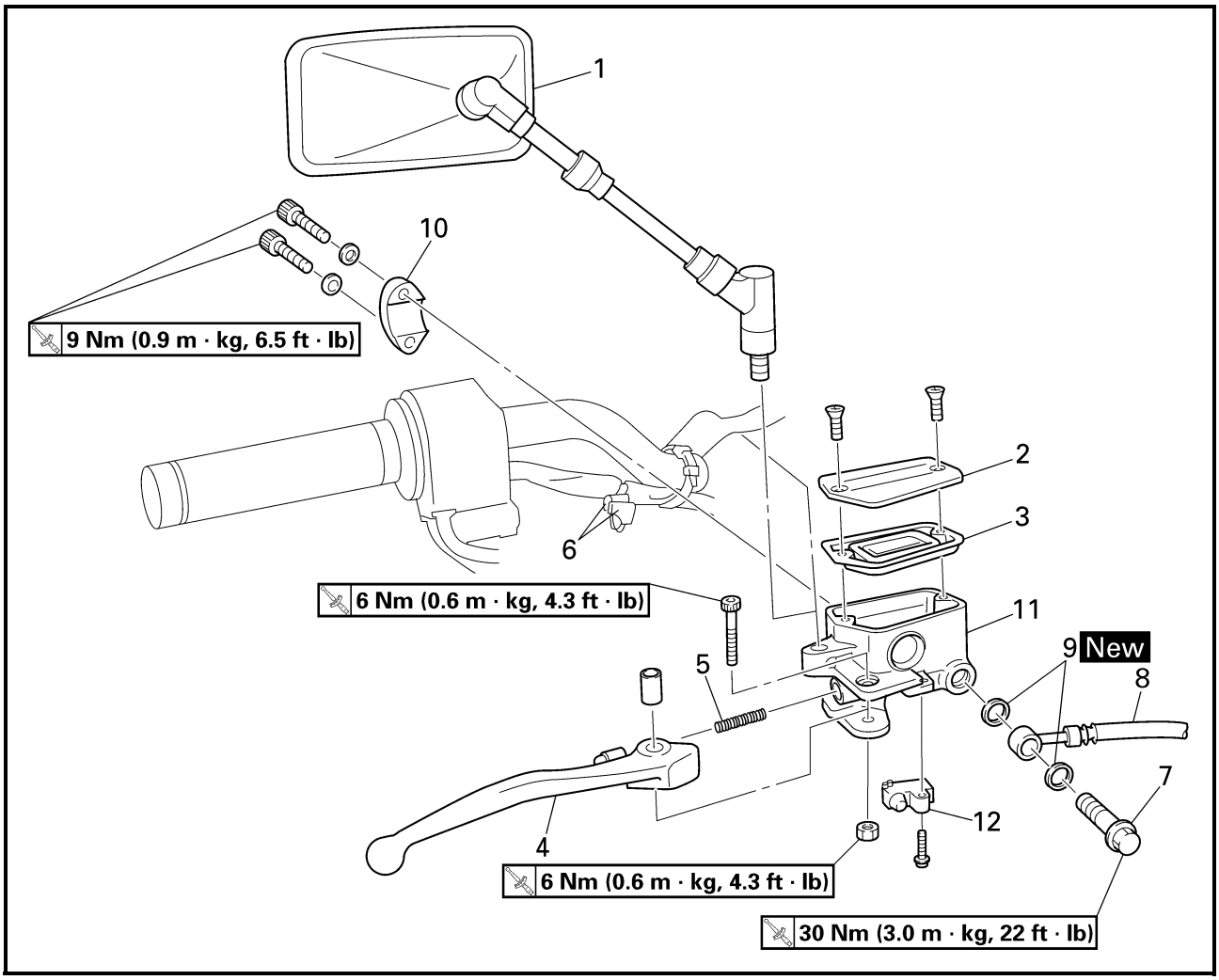


6. Install:
   - brake pad pins
   - brake pad clips
   - brake pad cover
   - brake caliper **40 Nm (4.0 m · kg, 29 ft · lb)**

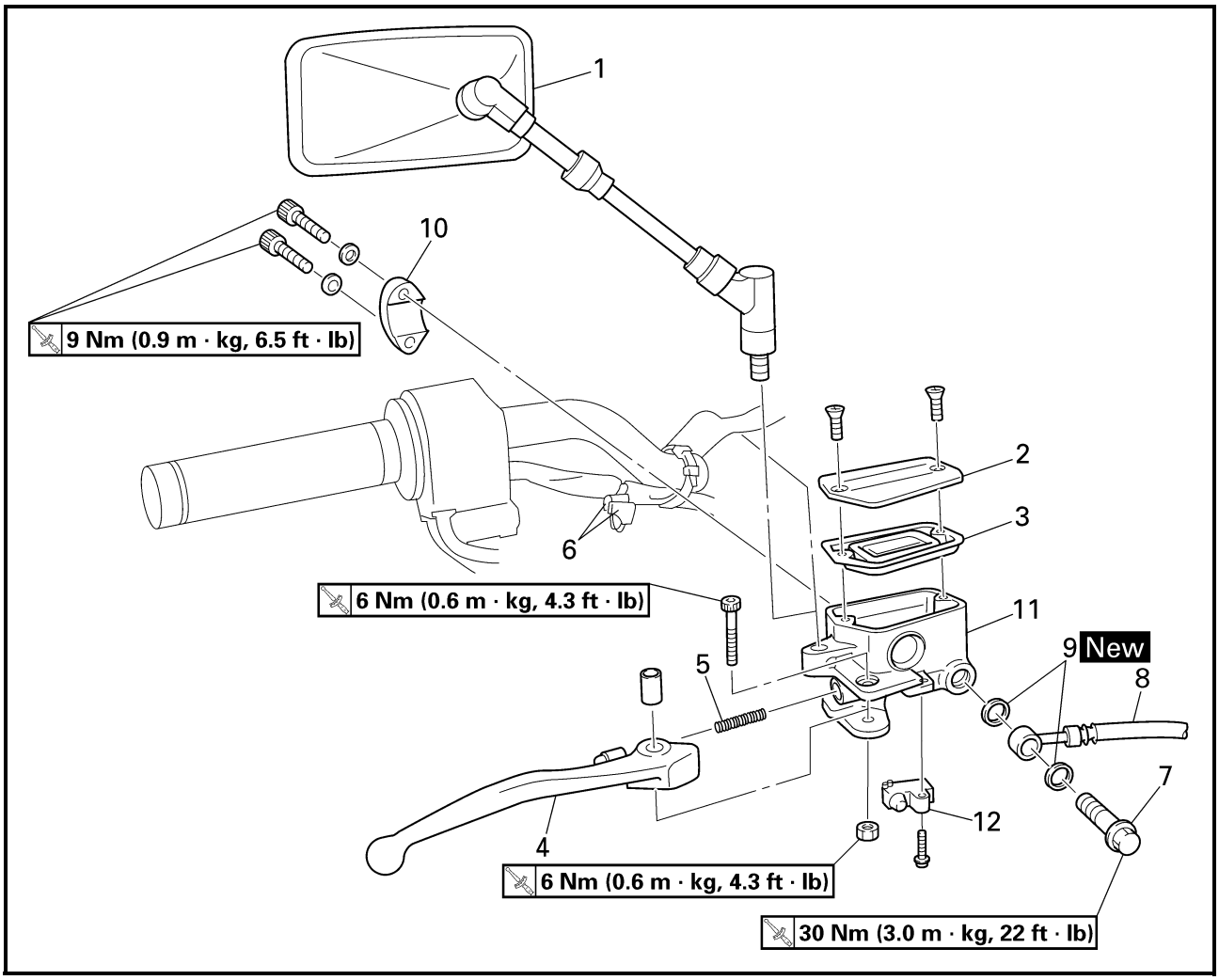


7. Check:
   - brake fluid level
     Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
     Refer to “CHECKING THE BRAKE FLUID LEVEL” in chapter 3.

8. Check:
   - brake pedal operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.

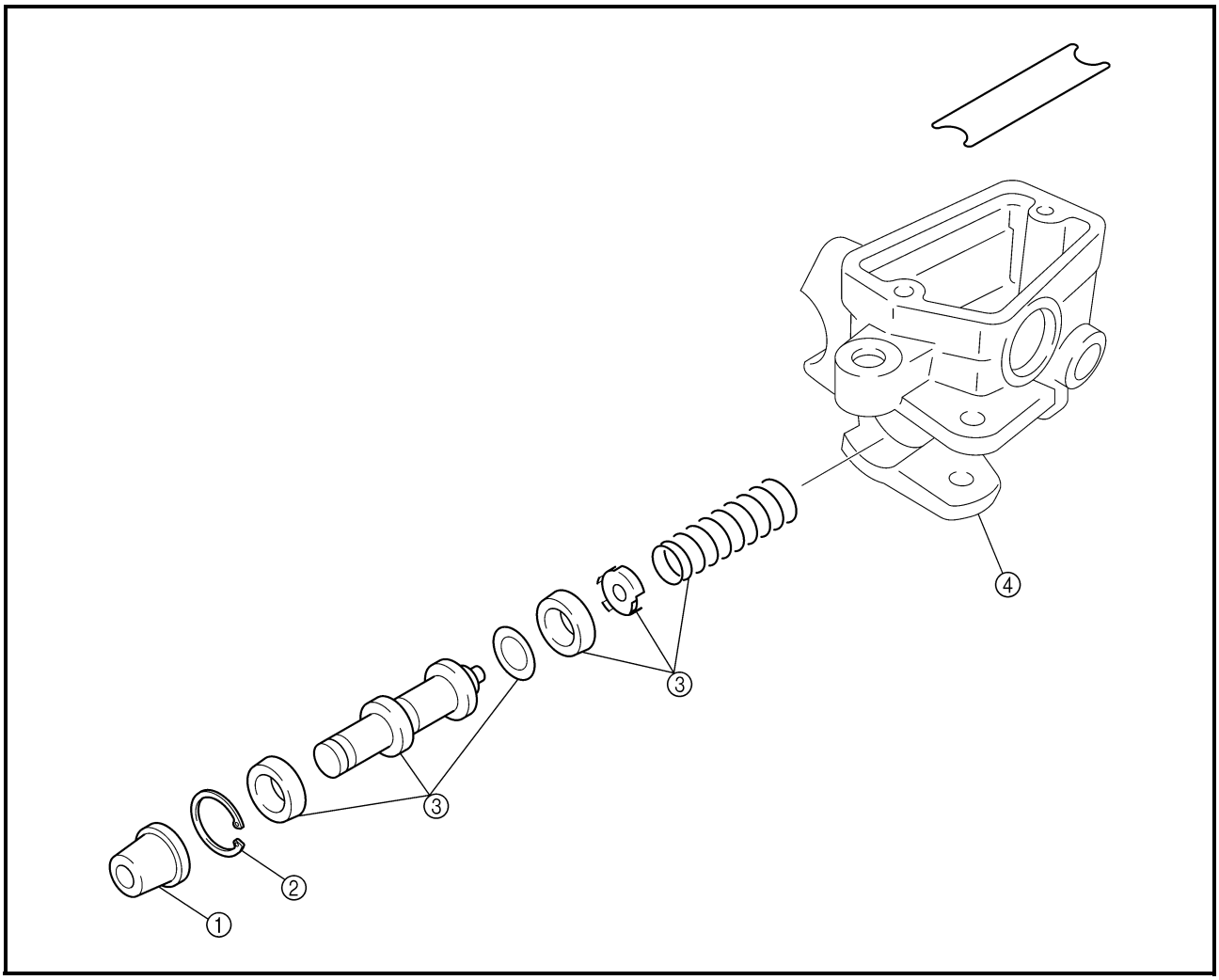


Order	Job/Part	Q'ty	Remarks
	Removing the front brake master cylinder		Remove the parts in the order listed.
	Brake fluid		Drain.
1	Rear view mirror	1	
2	Brake master cylinder reservoir cap	1	
3	Brake master cylinder reservoir diaphragm	1	
4	Brake lever	1	
5	Brake lever spring	1	
6	Front brake light switch connector	2	Disconnect.
7	Union bolt	1	Refer to "DISASSEMBLING THE FRONT BRAKE MASTER CYLINDER" and " ASSEMBLING AND INSTALLING THE FRONT BRAKE MASTER CYLINDER".
8	Brake hose	1	Disconnect.
9	Copper washer	2	

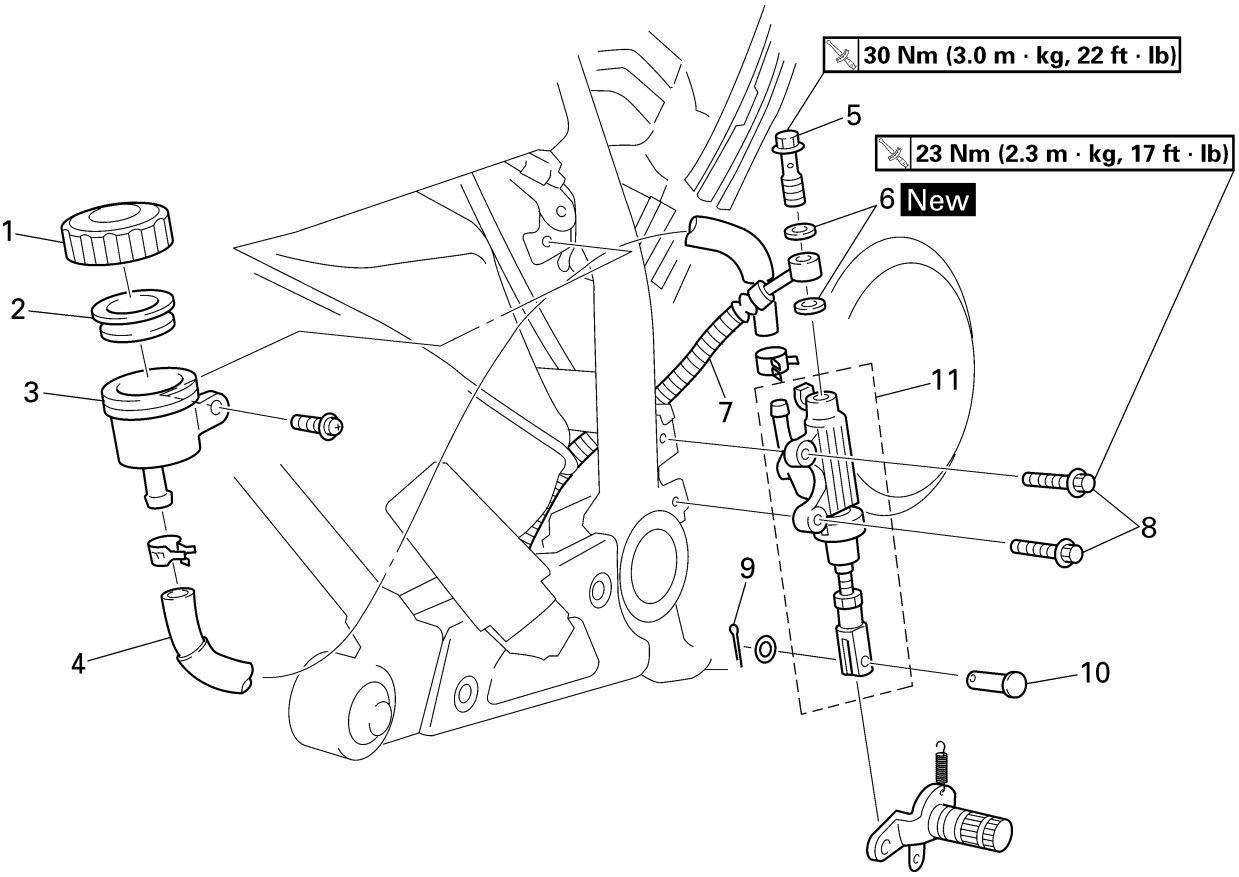


Order	Job/Part	Q'ty	Remarks
10	Brake master cylinder holder	1	Refer to "ASSEMBLING AND INSTALLING THE FRONT BRAKE MASTER CYLINDER".
11	Brake master cylinder	1	
12	Front brake light switch	1	
			For installation, reverse the removal procedure.

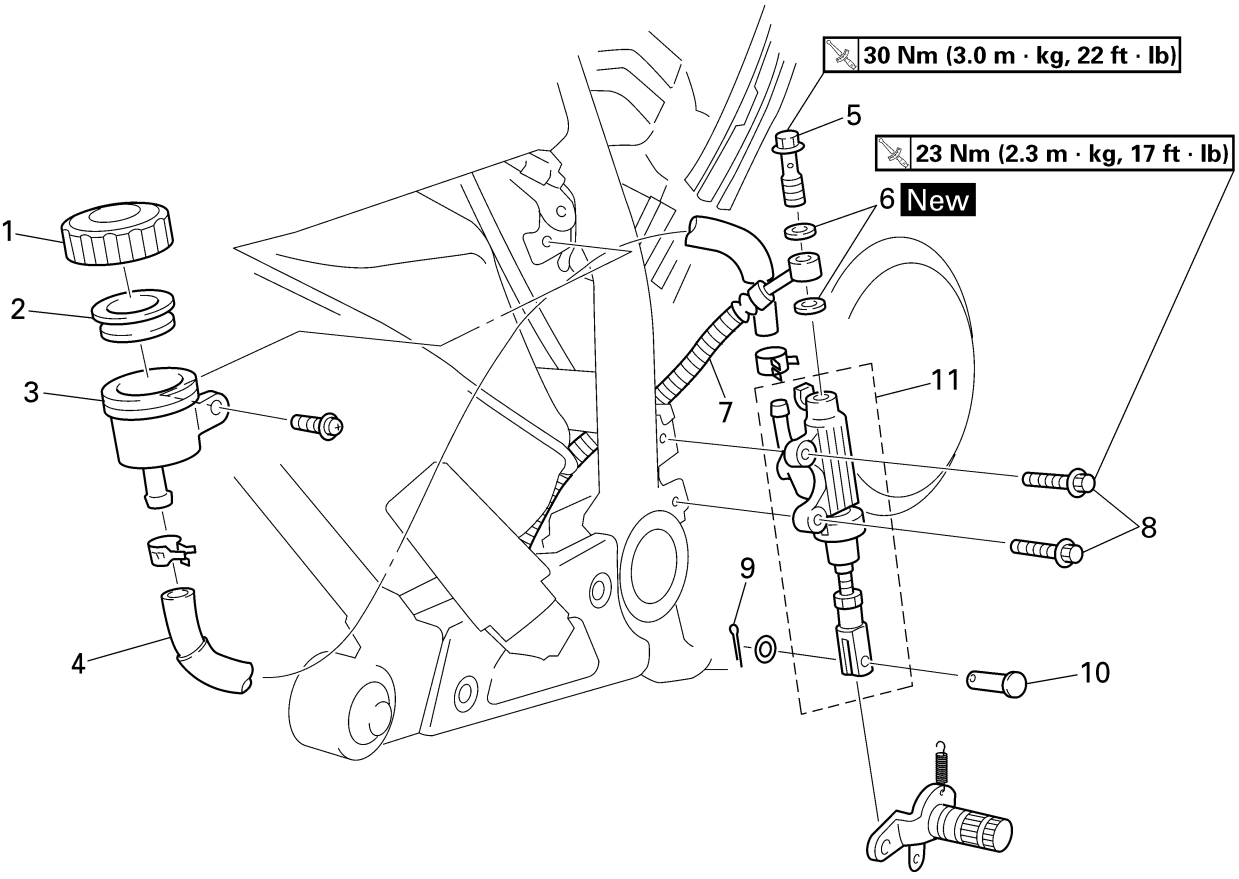
7



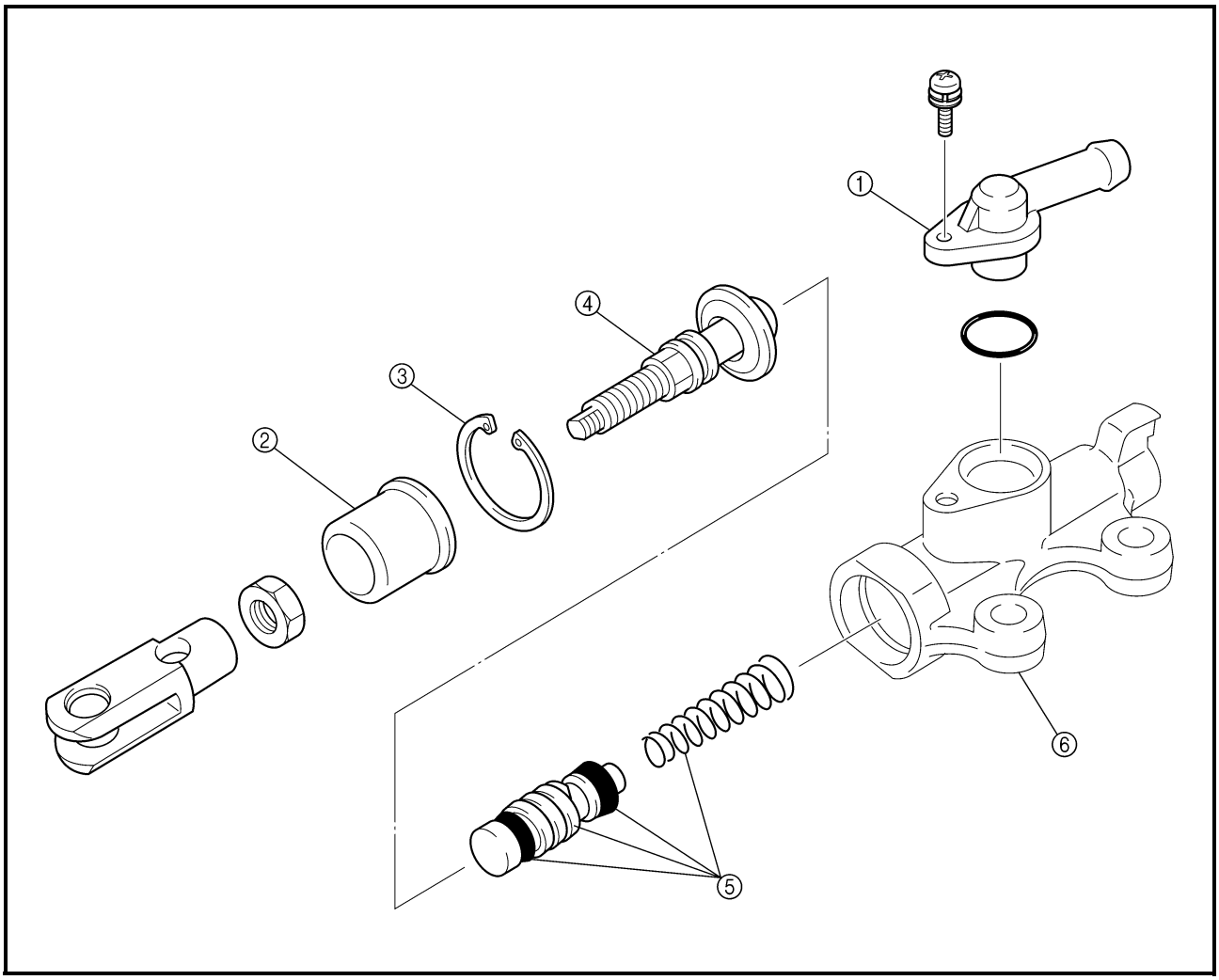
Order	Job/Part	Q'ty	Remarks
	Disassembling the front brake master cylinder		Remove the parts in the order listed.
①	Dust boot	1	
②	Circlip	1	
③	Brake master cylinder kit	1	
④	Brake master cylinder	1	
			For assembly, reverse the disassembly procedure.



Order	Job/Part	Q'ty	Remarks
	Removing the rear brake master cylinder		Remove the parts in the order listed.
	Right side cover		Refer to "SEATS AND SIDE COVERS" in chapter 3.
	Right rider footrest		Refer to "ENGINE" in chapter 4.
	Brake fluid		Drain.
1	Brake fluid reservoir cap	1	
2	Brake fluid reservoir diaphragm	1	
3	Brake fluid reservoir	1	
4	Brake fluid reservoir hose	1	
5	Union bolt	1	Disconnect. Refer to "DISASSEMBLING THE REAR BRAKE MASTER CYLINDER" and "ASSEMBLING AND INSTALLING THE REAR BRAKE CALIPER".
6	Copper washer	2	
7	Brake hose	1	
8	Brake master cylinder bolt	2	
9	Cotter pin	1	



Order	Job/Part	Q'ty	Remarks
10	Pin	1	
11	Brake master cylinder	1	For installation, reverse the removal procedure.

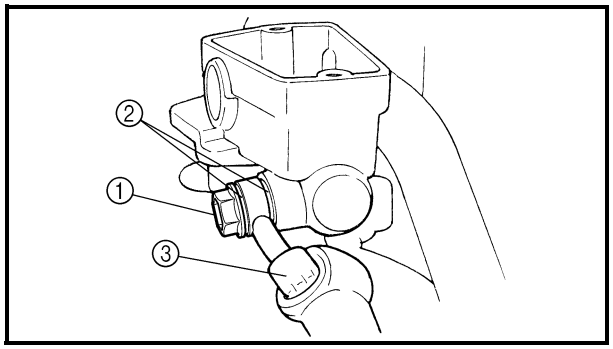


Order	Job/Part	Q'ty	Remarks
	Disassembling the rear brake master cylinder		Remove the parts in the order listed.
①	Hose joint	1	
②	Dust boot	1	
③	Circlip	1	
④	Brake master cylinder push rod	1	
⑤	Brake master cylinder kit	1	
⑥	Brake master cylinder	1	
			For assembly, reverse the disassembly procedure.

7

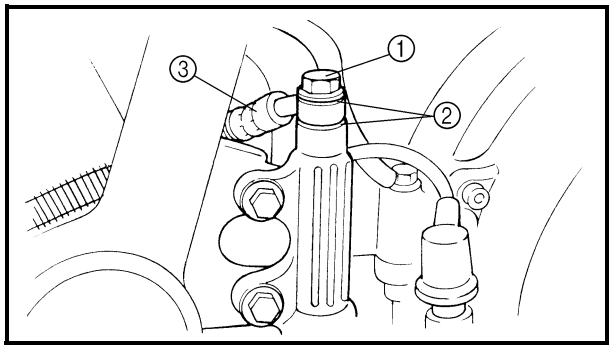
EAS00588
DISASSEMBLING THE FRONT BRAKE MASTER CYLINDER

NOTE:
Before disassembling the front brake master cylinder, drain the brake fluid from the entire brake system.



1. Remove:
   - union bolt ①
   - copper washers ②
   - brake hose ③

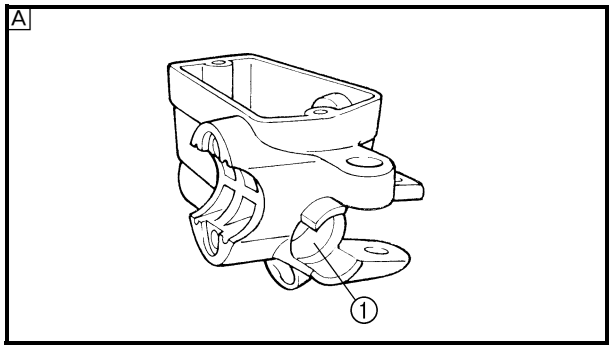
NOTE:
To collect any remaining brake fluid, place a container under the master cylinder and the end of the brake hose.

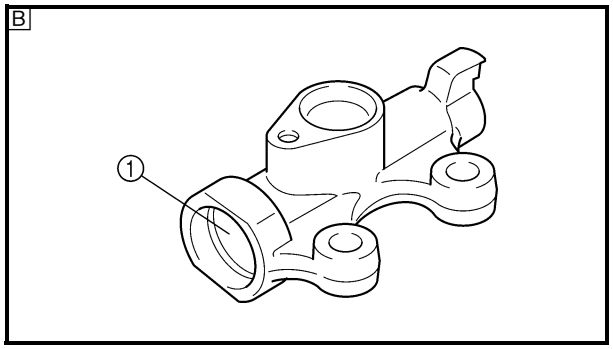


EAS00589
DISASSEMBLING THE REAR BRAKE MASTER CYLINDER

1. Remove:
   - union bolt ①
   - copper washers ②
   - brake hose ③

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



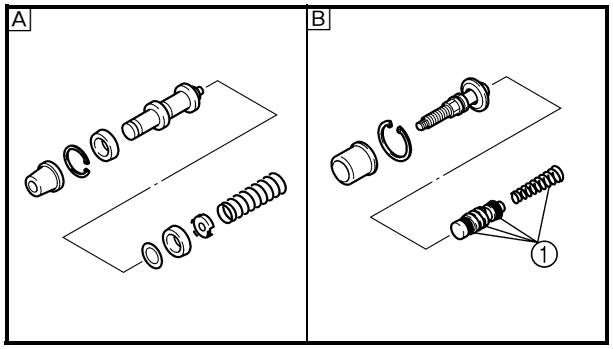


EAS00592
CHECKING THE FRONT AND REAR BRAKE MASTER CYLINDERS

The following procedure applies to the both of the brake master cylinders.

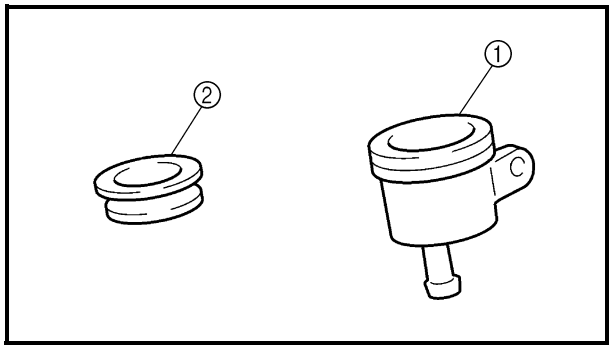
1. Check:
   - brake master cylinder ①
     Damage/scratches/wear → Replace.
   - brake fluid delivery passages
     (brake master cylinder body)
     Obstruction → Blow out with compressed air.

A Front
B Rear

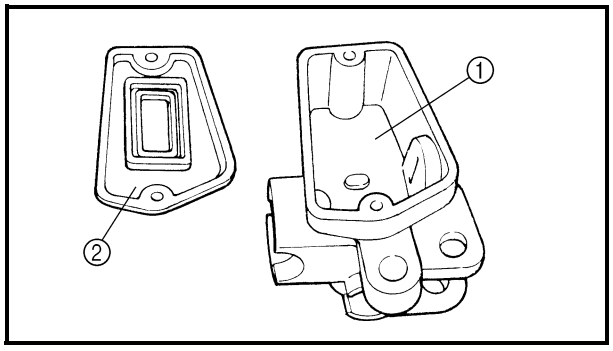


2. Check:
   - brake master cylinder kit ①
     Damage/scratches/wear → Replace.

A Front
B Rear



3. Check:
   - rear brake fluid reservoir ①
     Cracks/damage → Replace.
   - rear brake fluid reservoir diaphragm ②
     Cracks/damage → Replace.



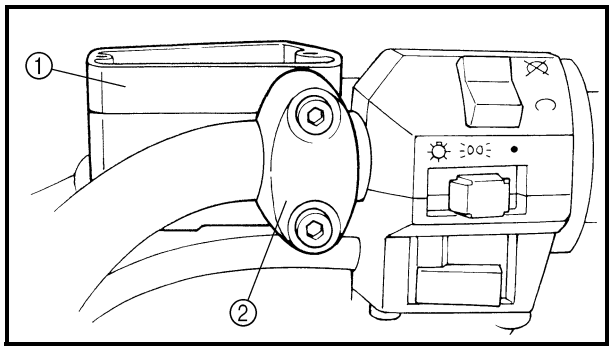
4. Check:
   - front brake master cylinder reservoir ①
     Cracks/damage → Replace.
   - front brake master cylinder reservoir diaphragm ②
     Damage/wear → Replace.
5. Check:
   - brake hoses
     Cracks/damage/wear → Replace.

7

EAS00598
ASSEMBLING AND INSTALLING THE FRONT BRAKE MASTER CYLINDER

⚠ WARNING

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



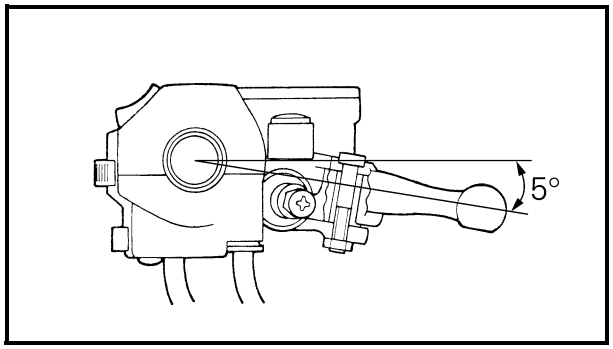
Recommended brake fluid
DOT 4

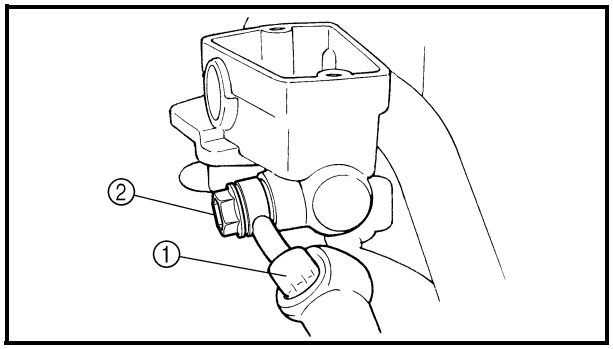
1. Install:
   - brake master cylinder ①
   - brake master cylinder holder ②

9 Nm (0.9 m · kg, 6.5 ft · lb)

NOTE:

- Adjust the brake master cylinder to the proper angle, as shown.
- First, tighten the upper bolt, then the lower bolt.

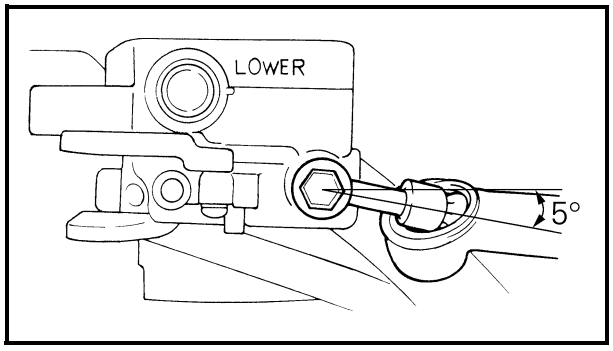




2. Install:
   - copper washers New
   - brake hose ①
   - union bolt ② **30 Nm (3.0 m · kg, 22 ft · lb)**

⚠ WARNING

Proper brake hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".



NOTE:

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

3. Fill:
   • brake master cylinder reservoir
   (with the specified amount of the recommended brake fluid)

Recommended brake fluid
DOT 4

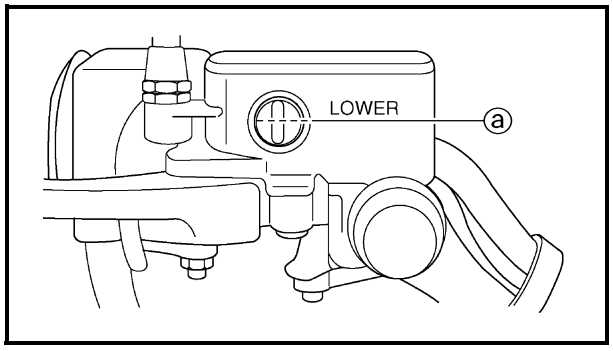
⚠ WARNING

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

CAUTION:

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

4. Bleed:
   • brake system
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.



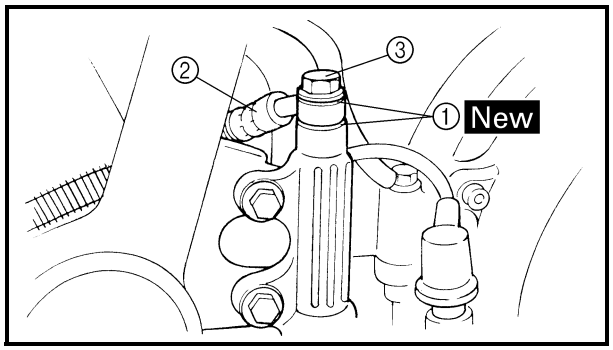
5. Check:
   • brake fluid level
   Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
   Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

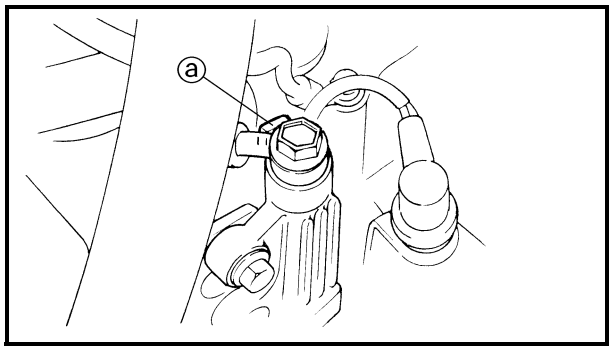
6. Check:
   • brake lever operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.

EAS00608
ASSEMBLING AND INSTALLING THE REAR BRAKE MASTER CYLINDER

⚠ WARNING

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





Recommended brake fluid
DOT 4

1. Install:
   • copper washers ① New
   • brake hose ②
   • union bolt ③ **30 Nm (3.0 m · kg, 22 ft · lb)**

⚠ WARNING

Proper brake hose routing is essential to insure safe motorcycle operation. Refer to “CABLE ROUTING”.

CAUTION:

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

2. Fill:
   • brake fluid reservoir

Recommended brake fluid
DOT 4

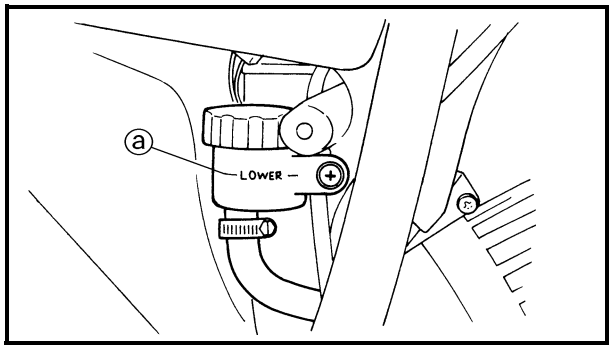
⚠ WARNING

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

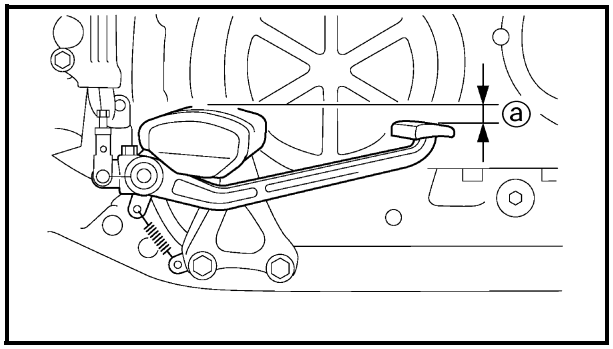
CAUTION:

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

3. Bleed:
   - brake system
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.



4. Check:
   - brake fluid level
     Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
     Refer to “CHECKING THE BRAKE FLUID LEVEL” in chapter 3.

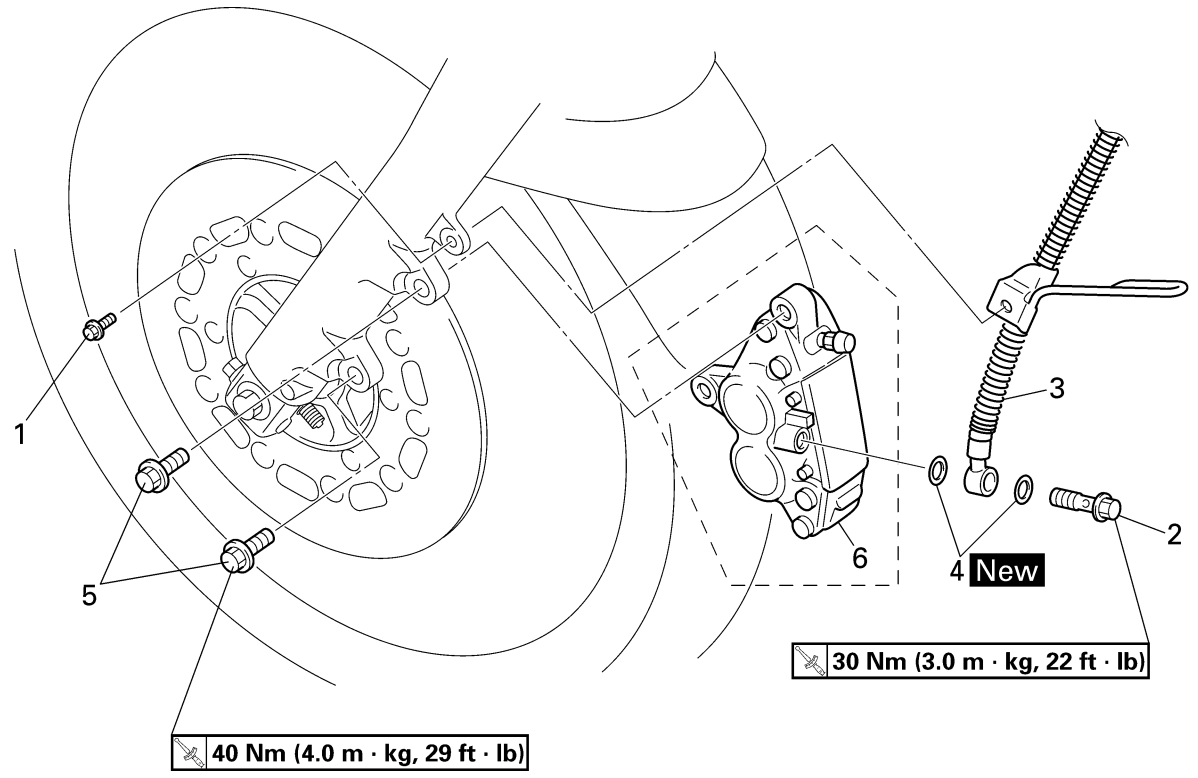


5. Adjust:
   - brake pedal position ⓐ
     Refer to “ADJUSTING THE REAR BRAKE” in chapter 3.

Brake pedal position (below the top of the rider footrest)
20 mm (0.79 in)

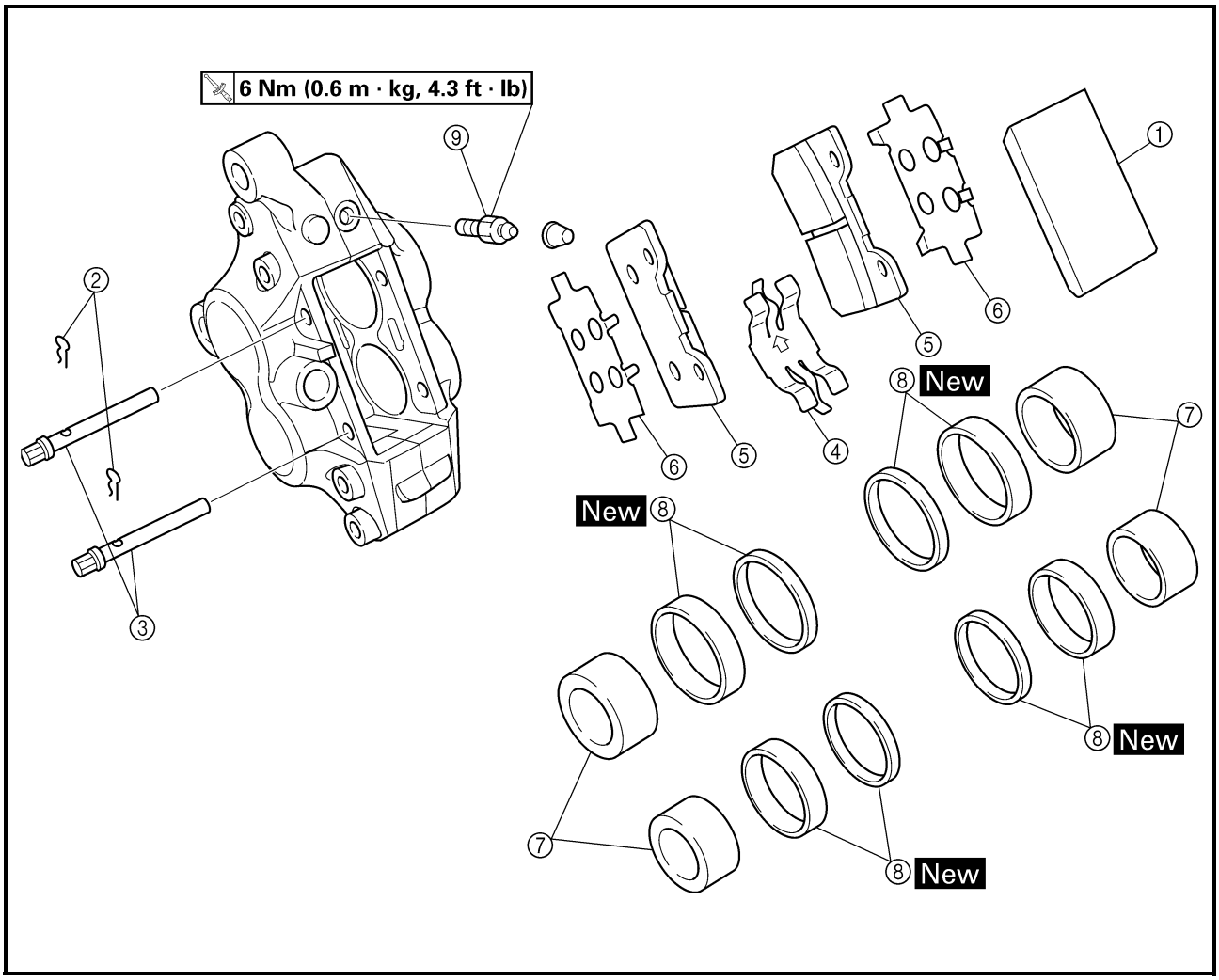
6. Adjust:
   - rear brake light operation timing
     Refer to “ADJUSTING THE REAR BRAKE LIGHT SWITCH” in chapter 3.

EAS00615

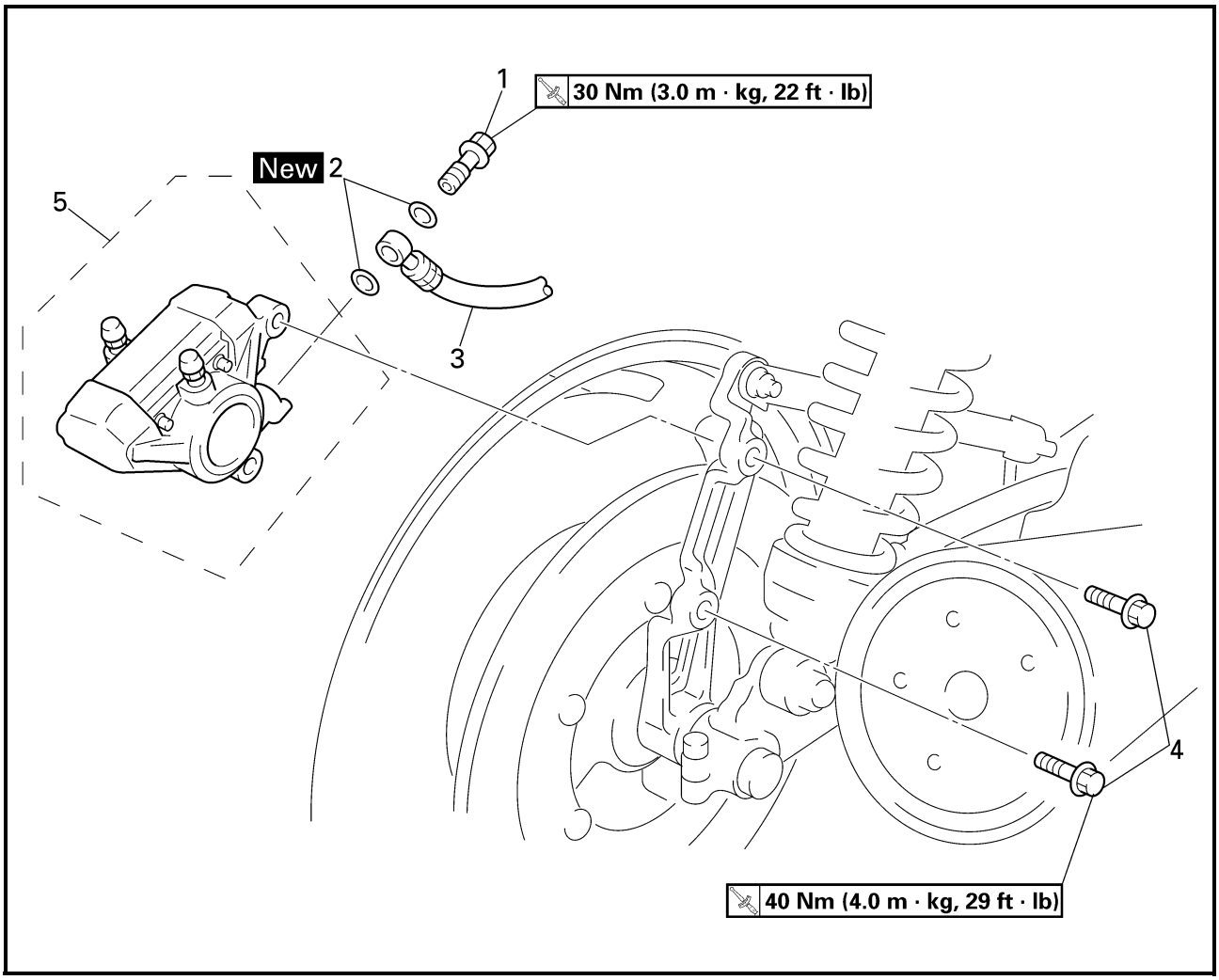


Order	Job/Part	Q'ty	Remarks
	Removing the front brake calipers		Remove the parts in the order listed. The following procedure applies to both of the front brake calipers.
	Brake fluid		Drain.
1	Brake hose holder bolt	1	Refer to "DISASSEMBLING THE FRONT BRAKE CALIPERS" and "ASSEMBLING AND INSTALLING THE FRONT BRAKE CALIPERS".
2	Union bolt	1	
3	Brake hose	1	Disconnect.
4	Copper washer	2	
5	Brake caliper bolt	2	
6	Brake caliper	1	
			For installation, reverse the removal procedure.

7

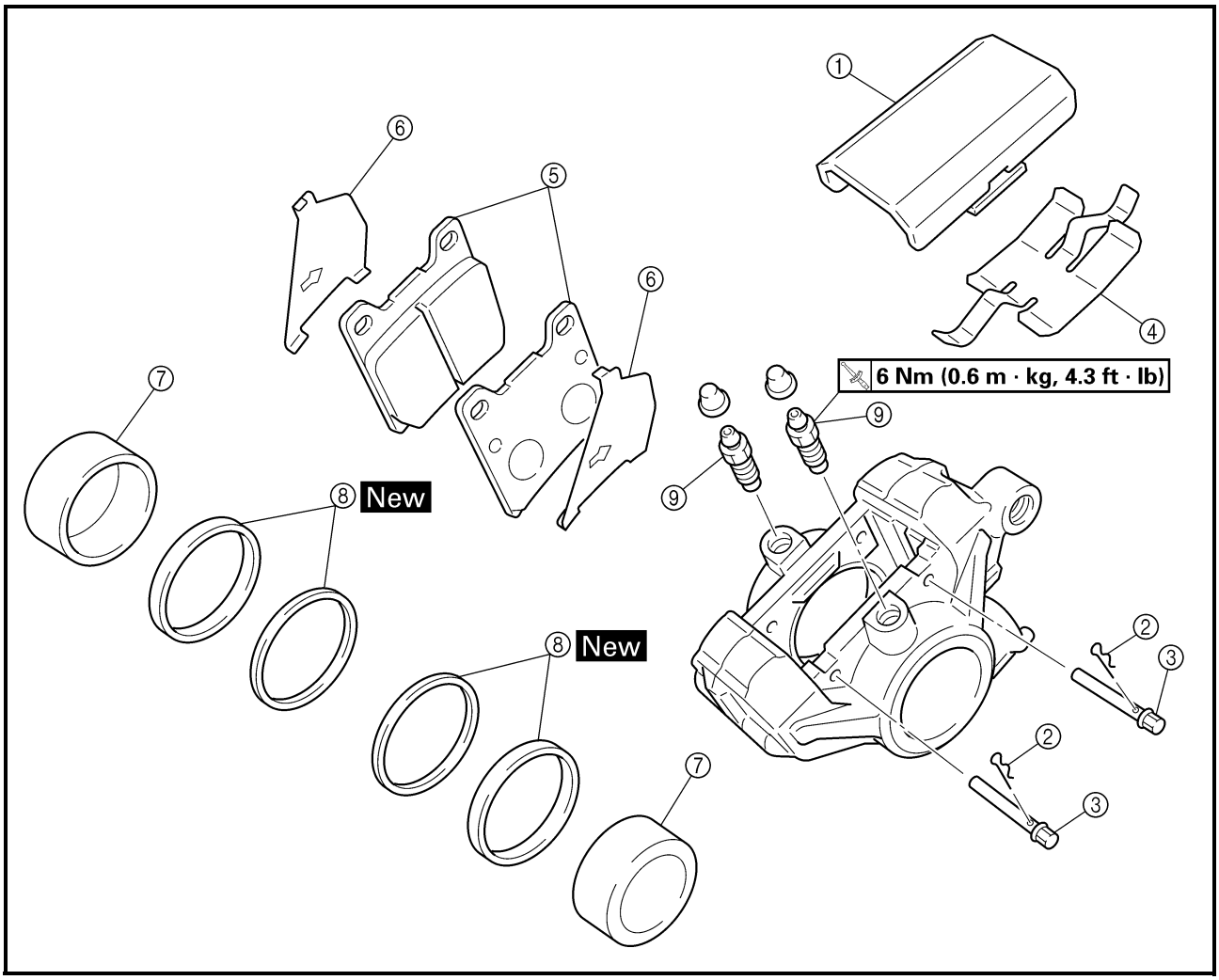


Order	Job/Part	Q'ty	Remarks
	Disassembling the front brake calipers		Remove the parts in the order listed. The following procedure applies to both of the front brake calipers.
①	Brake pad cover	1	
②	Brake pad clip	2	
③	Brake pad pin	2	
④	Brake pad spring	1	
⑤	Brake pad	2	
⑥	Brake pad shim (left and right)	2	
⑦	Brake caliper piston	4	Refer to "DISASSEMBLING THE FRONT BRAKE CALIPERS".
⑧	Brake caliper piston seal	8	
⑨	Bleed screw	1	
			For assembly, reverse the disassembly procedure.



Order	Job/Part	Q'ty	Remarks
	Removing the rear brake caliper		Remove the parts in the order listed.
	Brake fluid		Drain.
1	Union bolt	1	Refer to "DISASSEMBLING THE REAR BRAKE CALIPER" and "ASSEMBLING AND INSTALLING THE REAR BRAKE CALIPER".
2	Copper washer	2	
3	Brake hose	1	Disconnect.
4	Brake caliper bolt	2	
5	Brake caliper	1	
			For installation, reverse the removal procedure.

7



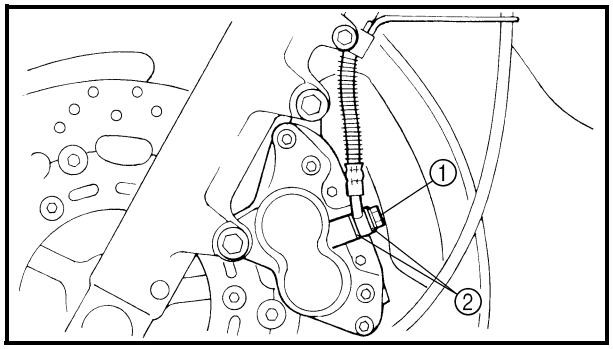
Order	Job/Part	Q'ty	Remarks
	Disassembling the rear brake caliper		Remove the parts in the order listed.
①	Brake pad cover	1	
②	Brake pad clip	2	
③	Brake pad pin	2	
④	Brake pad spring	1	
⑤	Brake pad	2	
⑥	Brake pad shim (left and right)	2	
⑦	Brake caliper piston	2	Refer to "DISASSEMBLING THE REAR BRAKE CALIPER".
⑧	Brake caliper piston seal	4	
⑨	Bleed screw	2	
			For assembly, reverse the disassembly procedure.

EAS00625
DISASSEMBLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

NOTE:

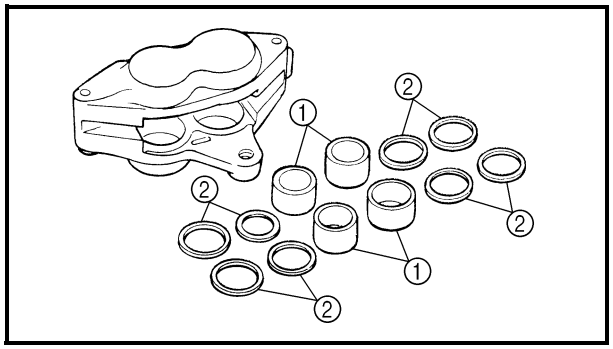
Before disassembling either brake caliper, drain the brake fluid from the entire brake system.



1. Remove:
   - union bolt ①
   - copper washers ②
   - brake hose

NOTE:

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



2. Remove:
   - brake caliper pistons ①
   - brake caliper piston seals ②

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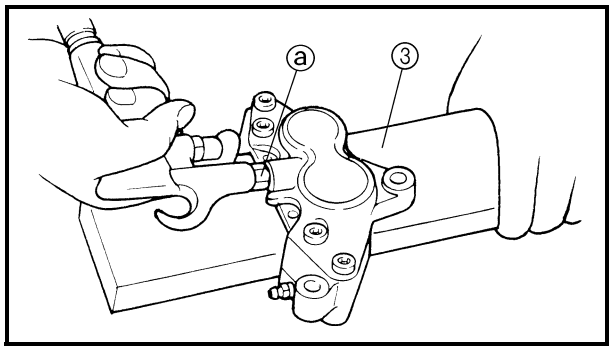
a. Secure the right side brake caliper pistons with a piece of wood ③.
b. Blow compressed air into the brake hose joint opening ⓐ to force out the left side pistons from the brake caliper.



⚠ WARNING

- **Never try to pry out the brake caliper pistons.**
- **Do not loosen the bolts ④.**

c. Remove the brake caliper piston seals.
d. Repeat the previous steps to force out the right side pistons from the brake caliper.

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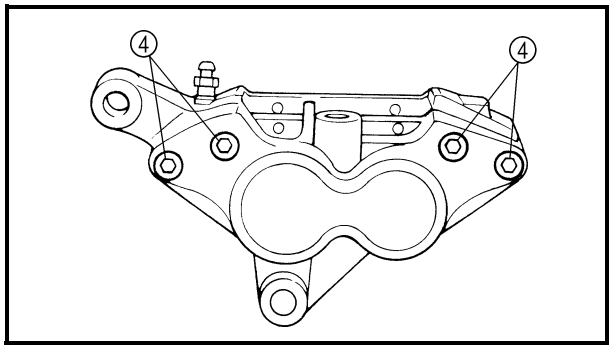
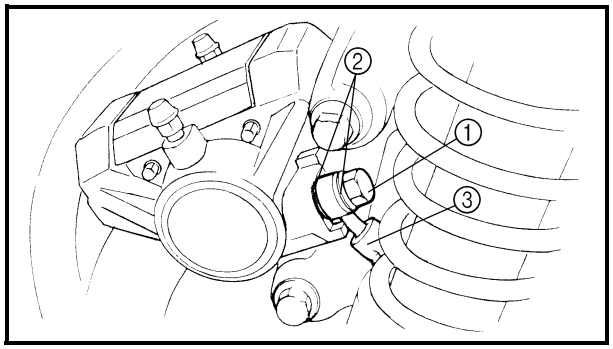


7

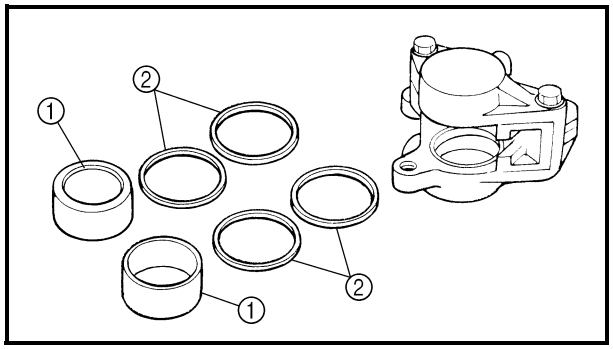
EAS00629
DISASSEMBLING THE REAR BRAKE CALIPER

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



1. Remove:
   - union bolt ①
   - copper washers ②
   - brake hose ③

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



2. Remove:
   - brake caliper pistons ①
   - brake caliper piston seals ②

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a. Secure the right side brake caliper piston with a piece of wood ③.
b. Blow compressed air into the brake hose joint opening ⓐ to force out the left side piston from the brake caliper.

⚠ WARNING

- **Never try to pry out the brake caliper pistons.**
- **Do not loosen the bolts ④.**

c. Remove the brake caliper piston seals.
d. Repeat the previous steps to force out the right side pistons from the brake caliper.

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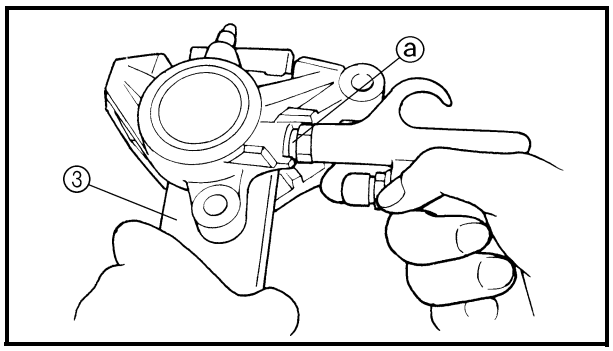
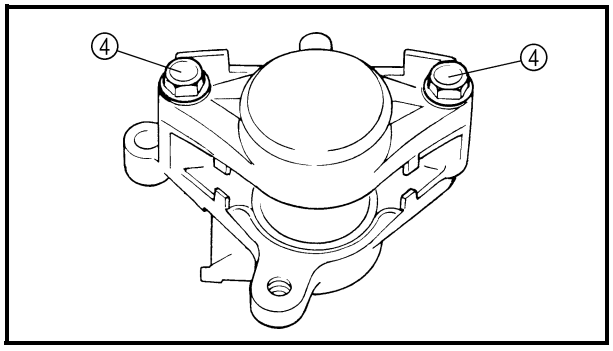
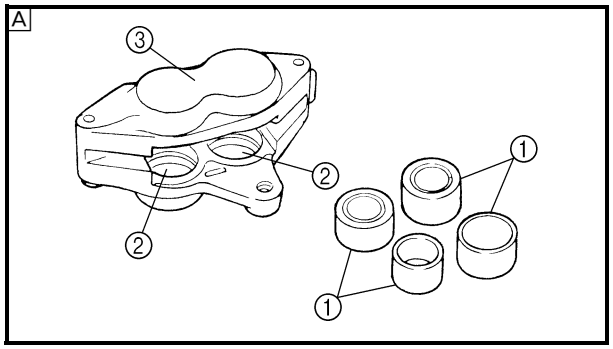




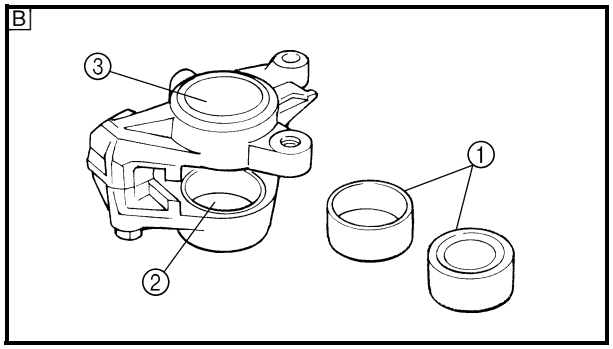
EAS00633
CHECKING THE FRONT AND REAR BRAKE CALIPERS

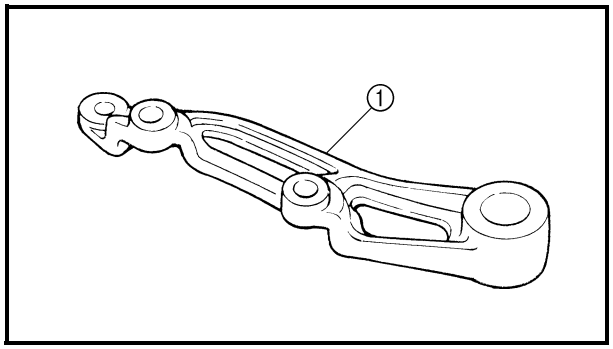
Recommended brake component replacement schedule	
Brake pads	**If necessary**
Piston seals	**Every two years**
Brake hoses	**Every two years**
Brake fluid	**Every two years and whenever the brake is disassembled**

A



B





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

⚠ WARNING

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

A Front
B Rear

2. Check:
   - rear brake caliper bracket ①
     Cracks/damage → Replace.

7

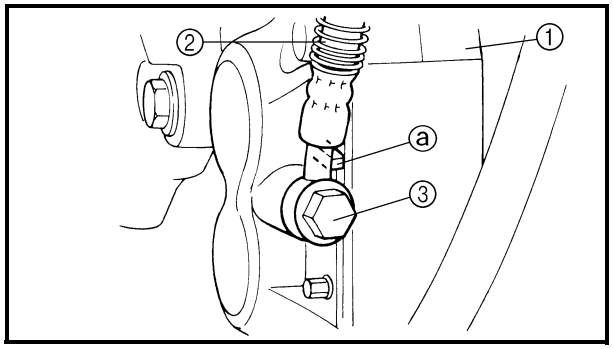
EAS00638
ASSEMBLING AND INSTALLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

⚠ WARNING

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

Recommended brake fluid
DOT 4



1. Install:
   - brake caliper ① (temporarily)
   - copper washers New
   - brake hose ②
   - union bolt ③ **30 Nm (3.0 m · kg, 22 ft · lb)**

⚠ WARNING

Proper brake hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".

CAUTION:

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

2. Remove:
   - brake caliper
3. Install:
   - brake pads
   - brake pad spring
   - brake pad pins
   - brake pad clips
   - brake caliper **40 Nm (4.0 m · kg, 29 ft · lb)**
   - brake hose holder
     Refer to "REPLACING THE FRONT BRAKE PADS".

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

Recommended brake fluid
DOT 4

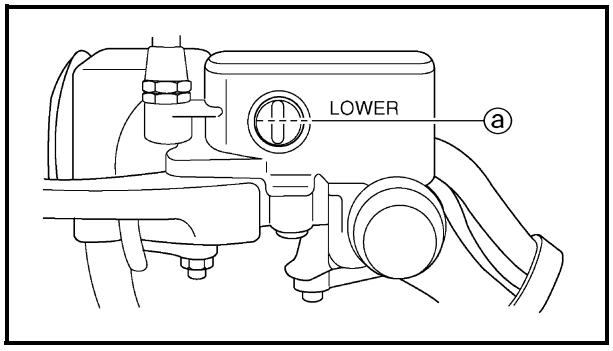
⚠ WARNING

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

CAUTION:

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

5. Bleed:
   • brake system
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.



6. Check:
   • brake fluid level
   Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
   Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

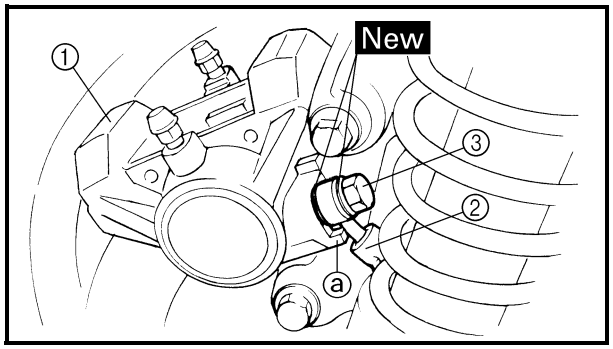
7. Check:
   • brake lever operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.

EAS00642
ASSEMBLING AND INSTALLING THE REAR BRAKE CALIPER

⚠ WARNING

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

Recommended brake fluid
DOT 4



1. Install:
   • brake caliper ① (temporarily)
   • copper washers New
   • brake hose ②
   • union bolt ③ **30 Nm (3.0 m · kg, 22 ft · lb)**

⚠ WARNING

Proper brake hose routing is essential to insure safe motorcycle operation. Refer to “CABLE ROUTING”.

CAUTION:

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

2. Remove:
   • brake caliper
3. Install:
   • brake pads
   • brake pad spring
   • brake caliper **40 Nm (4.0 m · kg, 29 ft · lb)**
   Refer to “REPLACING THE REAR BRAKE PADS”.

4. Fill:
   • brake fluid reservoir
   (with the specified amount of the recommended brake fluid)

Recommended brake fluid
DOT 4

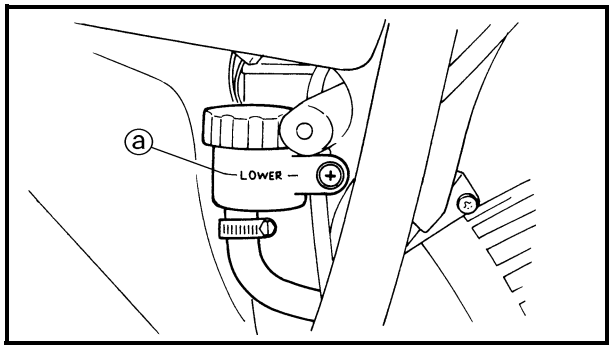
⚠ WARNING

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

CAUTION:

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

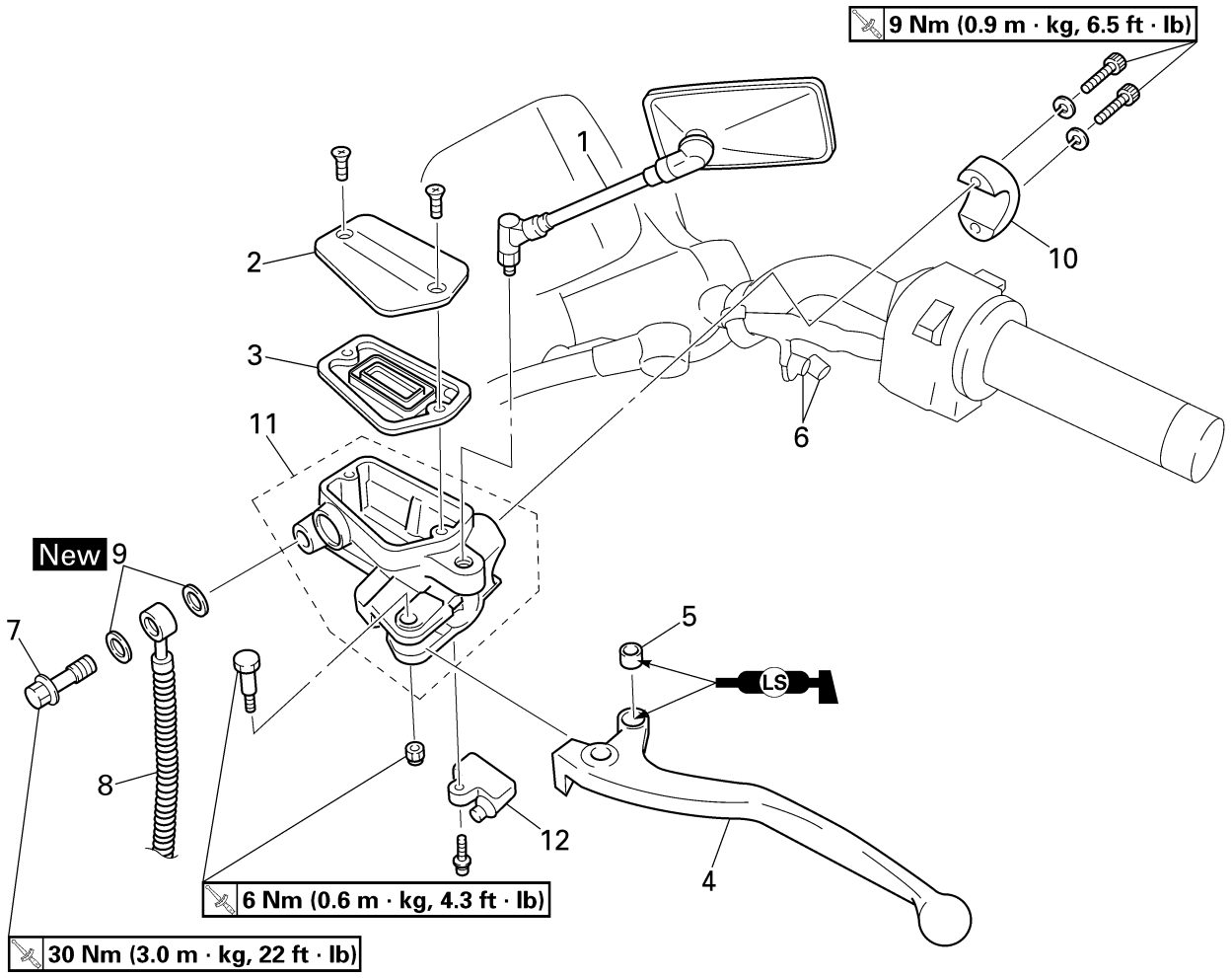
5. Bleed:
   • brake system
   Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.



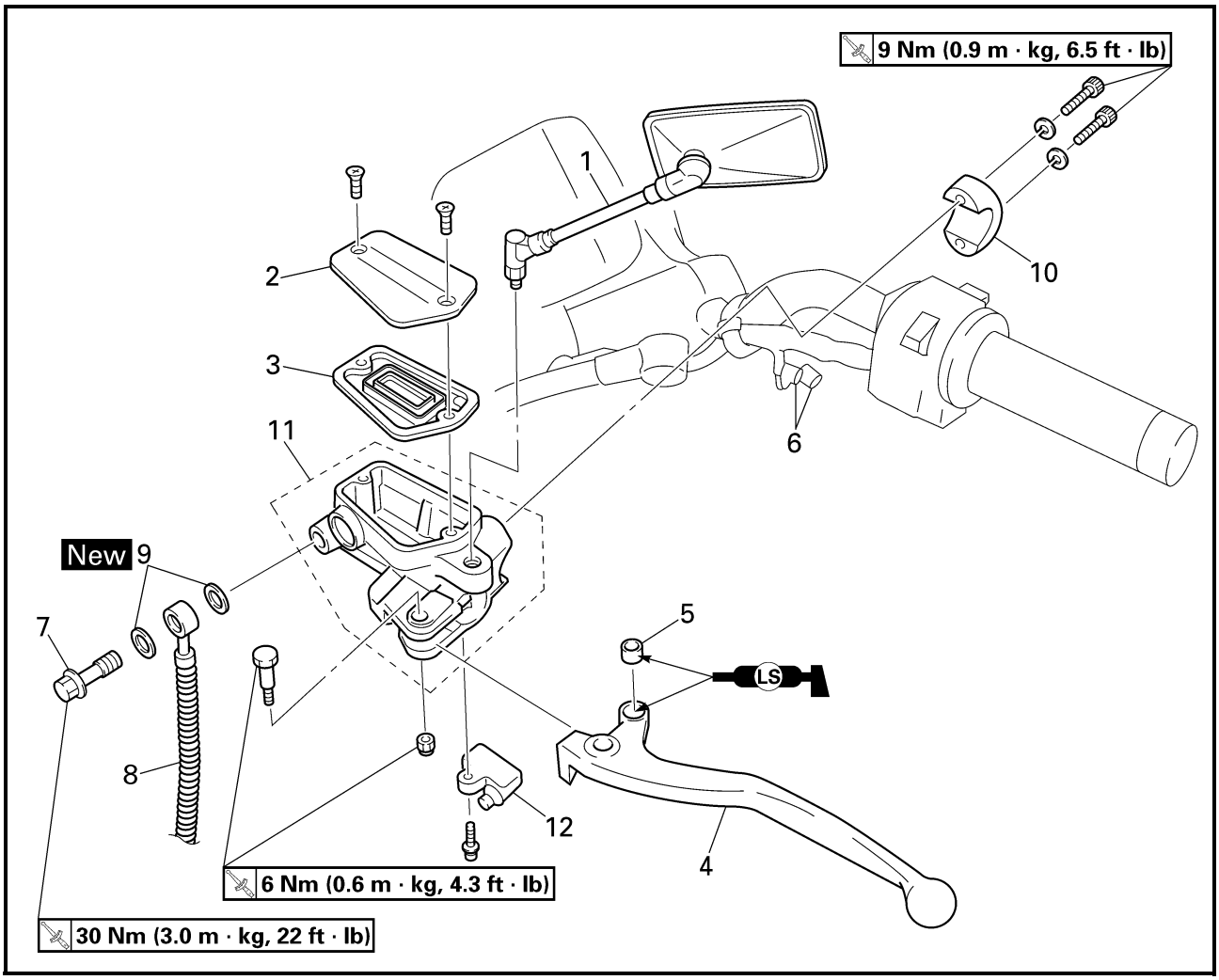
6. Check:
   • brake fluid level
   Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
   Refer to “CHECKING THE BRAKE FLUID LEVEL” in chapter 3.

7. Check:
   • brake pedal operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.

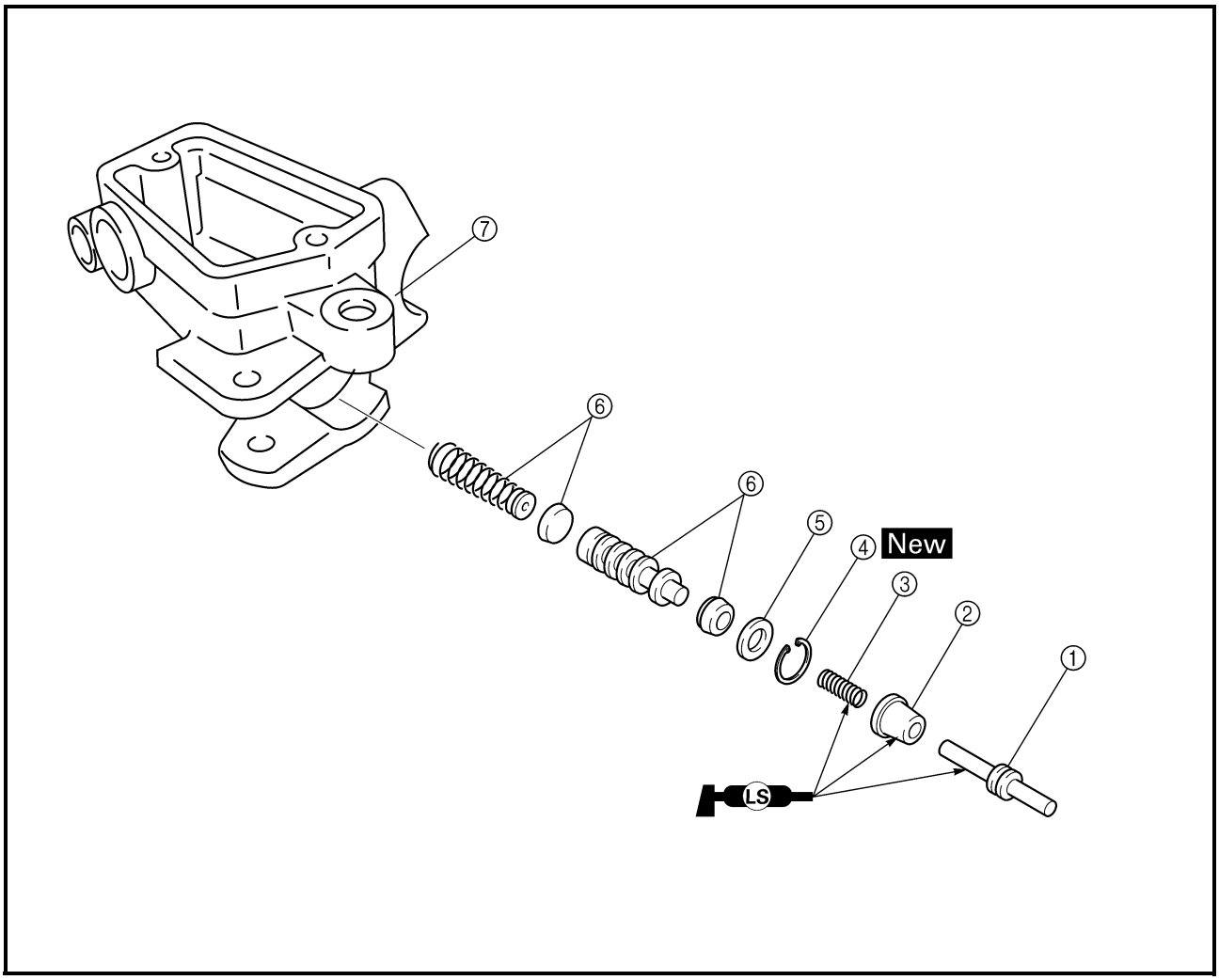
EAS00305
HYDRAULIC CLUTCH



Order	Job/Part	Q'ty	Remarks
	Removing the clutch master cylinder		Remove the parts in the order listed.
	Clutch fluid		Drain.
1	Rear view mirror	1	
2	Clutch master cylinder reservoir cap	1	
3	Clutch master cylinder reservoir diaphragm	1	
4	Clutch lever	1	Refer to "ASSEMBLING AND INSTALLING THE CLUTCH MASTER CYLINDER".
5	Clutch push rod holder	1	
6	Clutch switch connector	2	Disconnect.
7	Union bolt	1	Disconnect. Refer to "DISASSEMBLING THE CLUTCH MASTER CYLINDER" and "ASSEMBLING AND INSTALLING THE CLUTCH MASTER CYLINDER".
8	Clutch hose	1	
9	Copper washer	2	



Order	Job/Part	Q'ty	Remarks
10	Clutch master cylinder holder	1	Refer to "ASSEMBLING AND INSTALLING THE CLUTCH MASTER CYLINDER".
11	Clutch master cylinder	1	
12	Clutch switch	1	
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the clutch master cylinder		Remove the parts in the order listed.
①	Clutch master cylinder push rod	1	
②	Dust boot	1	
③	Spring	1	
④	Circlip	1	
⑤	Washer	1	
⑥	Clutch master cylinder kit	1	
⑦	Clutch master cylinder	1	
			For assembly, reverse the disassembly procedure.

EAS00307

CAUTION:

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

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

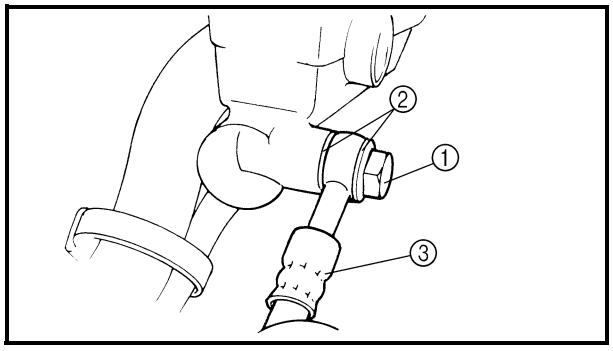
FIRST AID FOR CLUTCH FLUID ENTERING THE EYES:

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

DISASSEMBLING THE CLUTCH MASTER CYLINDER

NOTE:

Before disassembling the clutch master cylinder, drain the clutch fluid from the entire clutch system.



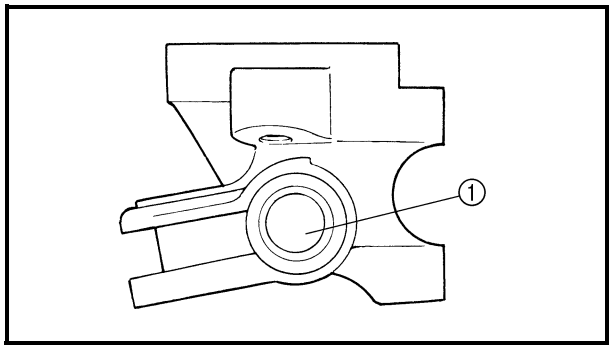
1. Remove:
   - union bolt ①
   - copper washers ②
   - clutch hose ③

NOTE:

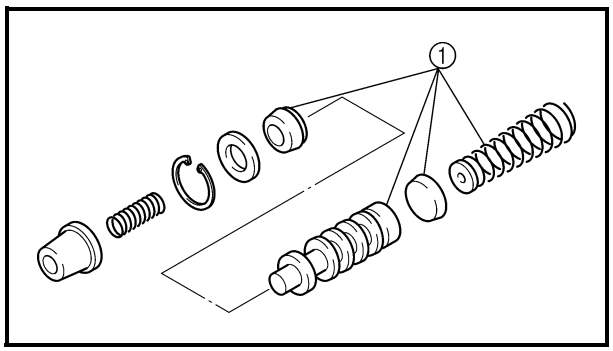
To collect any remaining clutch fluid, place a container under the master cylinder and the end of the clutch hose.

EAS00308
CHECKING THE CLUTCH MASTER CYLINDER

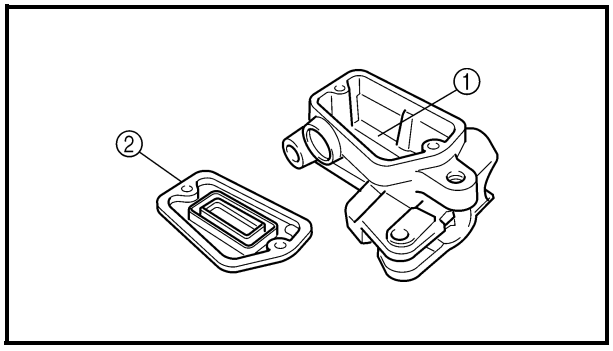
Recommended clutch component replacement schedule	
Piston seals	**Every two years**
Clutch hose	**Every two years**
Clutch fluid	**Every two years and whenever the clutch is disassembled**



1. Check:
   - clutch master cylinder ①
     Damage/scratches/wear → Replace.
   - clutch fluid delivery passage
     (clutch master cylinder body)
     Obstruction → Blow out with compressed air.



2. Check:
   - clutch master cylinder kit ①
     Damage/scratches/wear → Replace.
   - clutch hose
     Cracks/damage/wear → Replace.



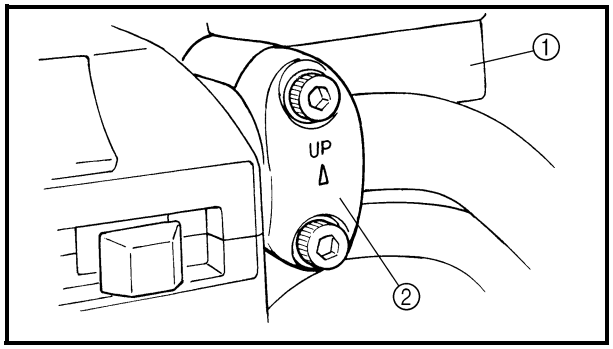
3. Check:
   - clutch master cylinder reservoir ①
     Cranks/damage → Replace.
   - clutch master cylinder reservoir diaphragm ②
     Damage/wear → Replace.
4. Check:
   - clutch hose
     Cracks/damage/wear → Replace.

EAS00309
ASSEMBLING AND INSTALLING THE CLUTCH MASTER CYLINDER

⚠ WARNING

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

Recommended clutch fluid
Brake fluid DOT 4

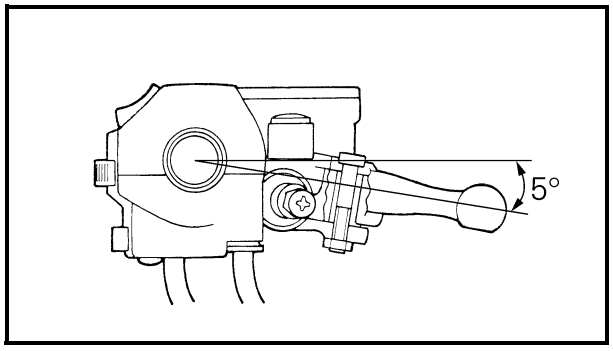


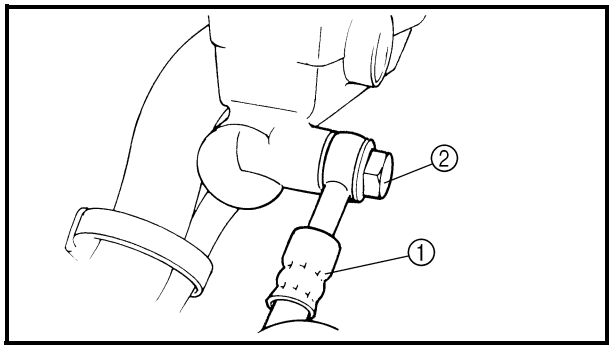
1. Install:
   - clutch master cylinder ①
   - clutch master cylinder holder ②

9 Nm (0.9 m · kg, 6.5 ft · lb)

NOTE:

- Install the clutch master cylinder holder with the “UP” mark facing up.
- Adjust the clutch master cylinder to the proper angle, as shown.
- First, tighten the upper bolt, then the lower bolt.

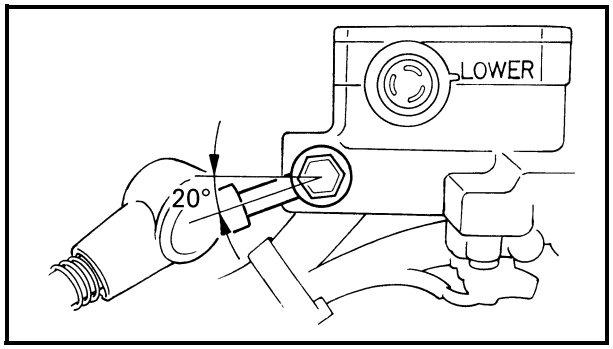




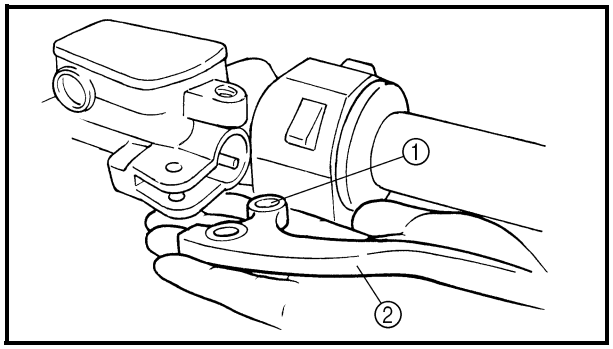
2. Install:
   - copper washers New
   - clutch hose ①
   - union bolt ② **30 Nm (3.0 m · kg, 22 ft · lb)**

⚠ WARNING

Proper clutch hose routing is essential to insure safe motorcycle operation. Refer to “CABLE ROUTING”.



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



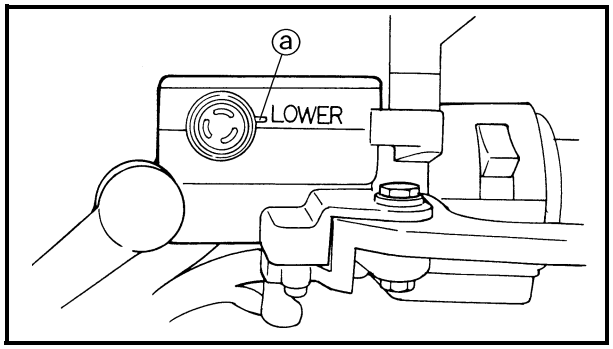
3. Install:
   - clutch push rod holder ①
   - clutch lever ②

NOTE:
Lubricate the clutch lever pivot with lithium soap base grease.

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

Recommended clutch fluid
Brake fluid DOT 4

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

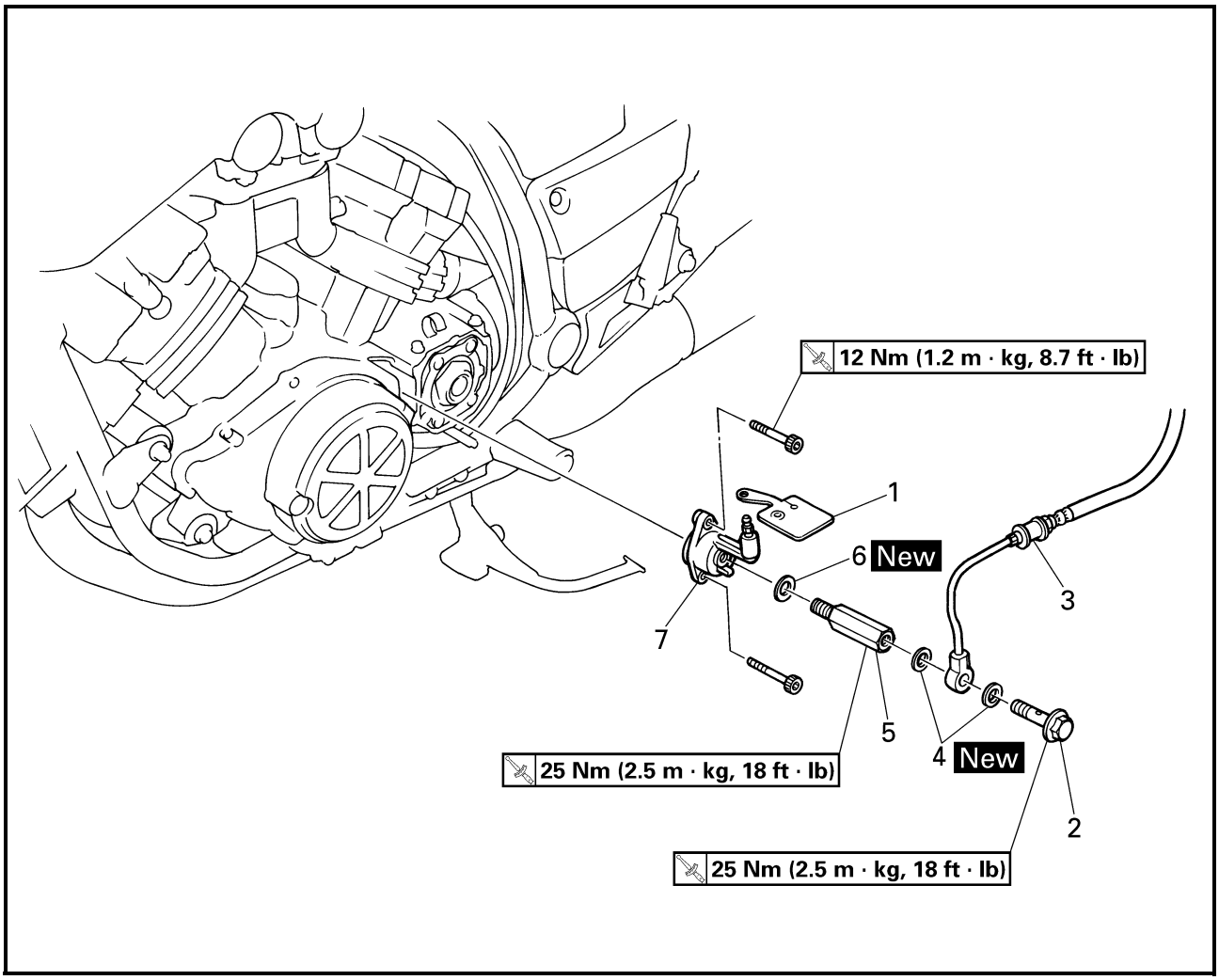


CAUTION:

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

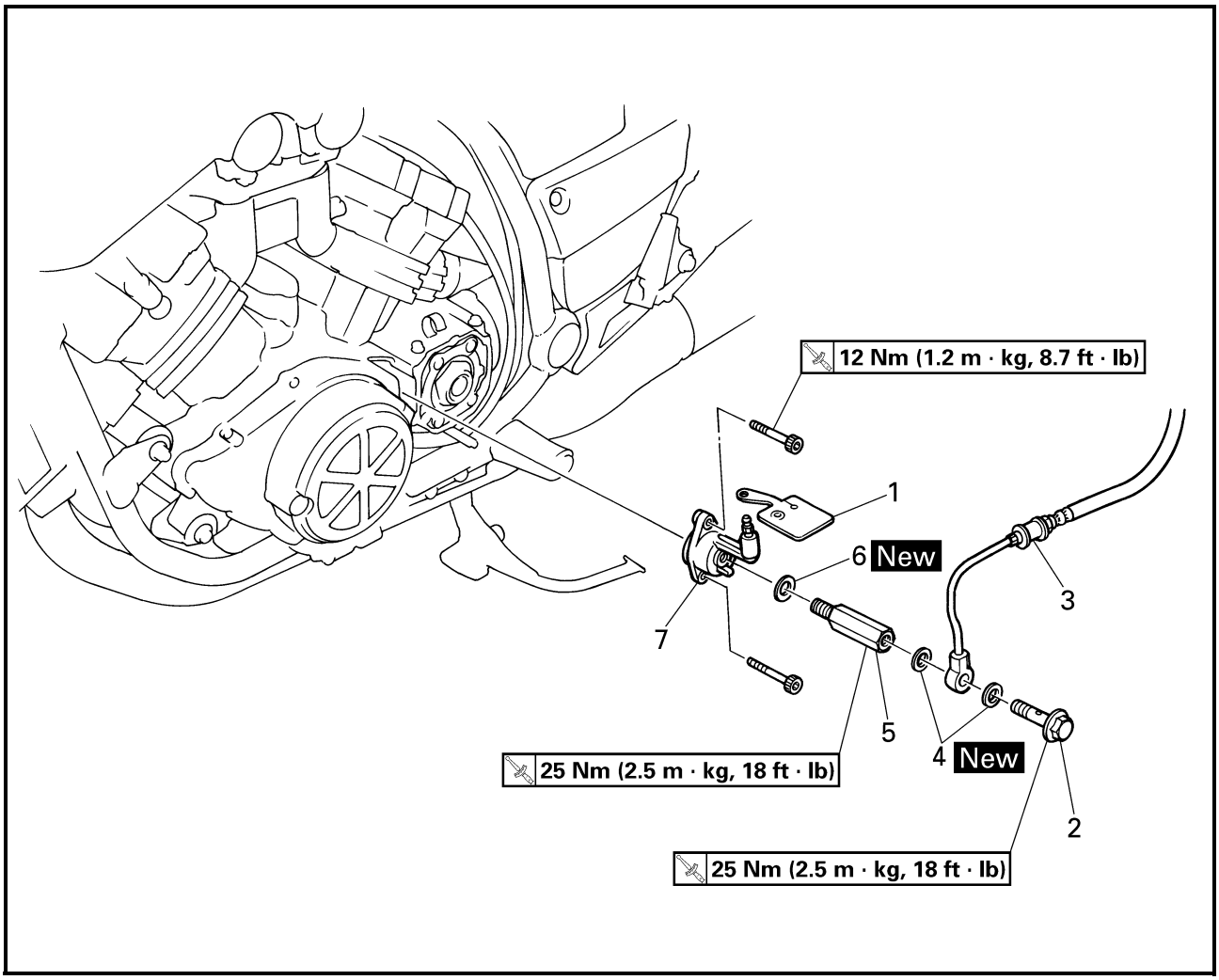
5. Bleed:
   - clutch system
     Refer to “BLEEDING THE HYDRAULIC CLUTCH SYSTEM” in chapter 3.
6. Check:
   - clutch fluid level
     Below the minimum level mark ⓐ → Add the recommended clutch fluid to the proper level.
     Refer to “CHECKING THE CLUTCH FLUID LEVEL” in chapter 3.
7. Check:
   - clutch lever operation
     Soft or spongy feeling → Bleed the clutch system.
     Refer to “BLEEDING THE HYDRAULIC CLUTCH SYSTEM” in chapter 3.

EAS00311

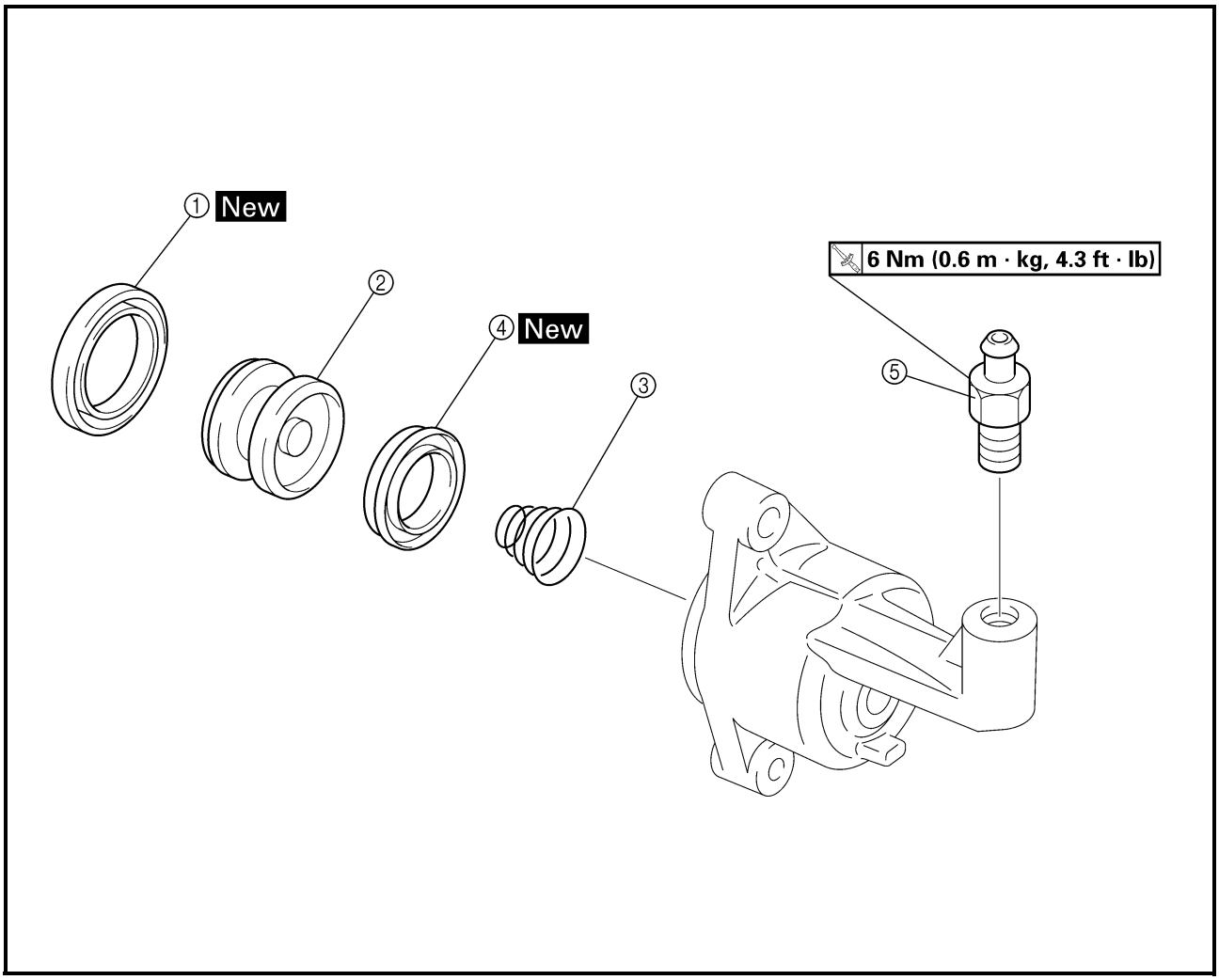


Order	Job/Part	Q'ty	Remarks
	Removing the clutch release cylinder		Remove the parts in the order listed.
	Engine oil		Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Middle gear case cover, shift pedal assembly		Refer to "SHIFT SHAFT" in chapter 4.
	Clutch fluid		Drain.
1	Rubber cover	1	
2	Union bolt	1	Disconnect. Refer to "DISASSEMBLING THE CLUTCH RELEASE CYLINDER" and "ASSEMBLING AND INSTALLING THE CLUTCH RELEASE CYLINDER".
3	Clutch hose	1	
4	Copper washer	2	

7



Order	Job/Part	Q'ty	Remarks
5	Joint	1	Refer to "ASSEMBLING AND INSTALLING THE CLUTCH RELEASE CYLINDER".
6	Copper washer	1	
7	Clutch release cylinder	1	
			For installation, reverse the removal procedure.

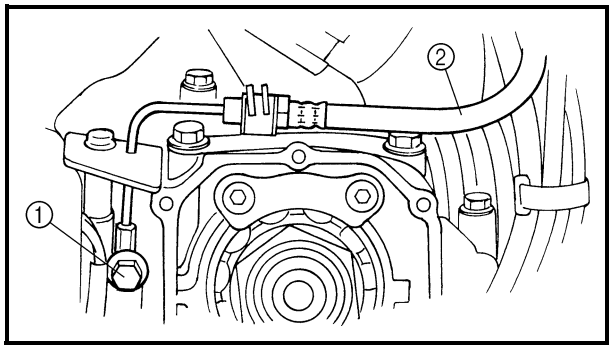


Order	Job/Part	Q'ty	Remarks
	Disassembling the clutch release cylinder		Remove the parts in the order listed.
①	Oil seal	1	
②	Clutch release cylinder piston	1	Refer to "DISASSEMBLING THE CLUTCH RELEASE CYLINDER".
③	Spring	1	
④	Clutch release cylinder piston seal	1	
⑤	Bleed screw	1	
			For assembly, reverse the disassembly procedure.

7

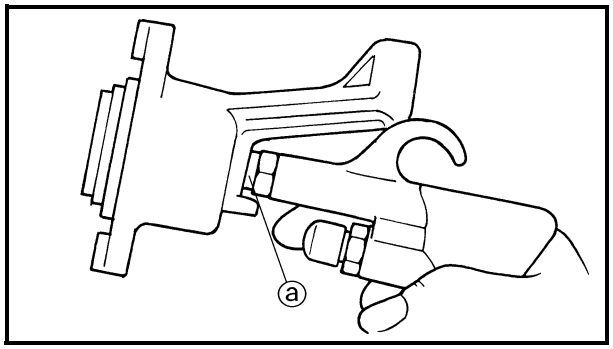
EAS00313
DISASSEMBLING THE CLUTCH RELEASE CYLINDER

NOTE:
Before disassembling the clutch release cylinder, drain the clutch fluid from the entire clutch system.



1. Remove:
   - union bolt ①
   - copper washers
   - clutch hose ②

NOTE:
Put the end of the clutch hose into a container and pump out the clutch fluid carefully.



2. Remove:
   - oil seal
   - clutch release cylinder piston
   - spring
   - clutch release cylinder piston seal

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a. Blow compressed air into the joint opening ⓐ to force out the piston from the clutch release cylinder.

⚠ WARNING

- **Cover the clutch release cylinder with a rag. Be careful not to get injured when the piston is expelled from the clutch release cylinder.**
- **Never try to pry out the clutch release cylinder piston.**

b. Remove the clutch release cylinder piston seal.

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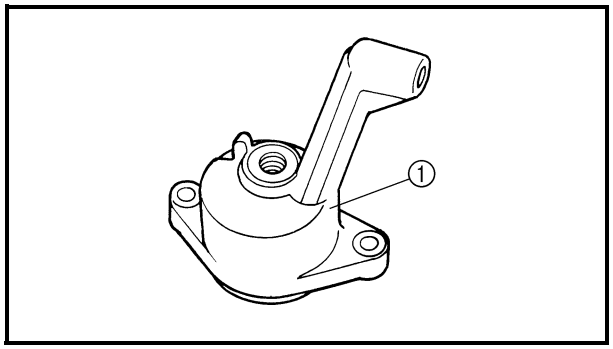
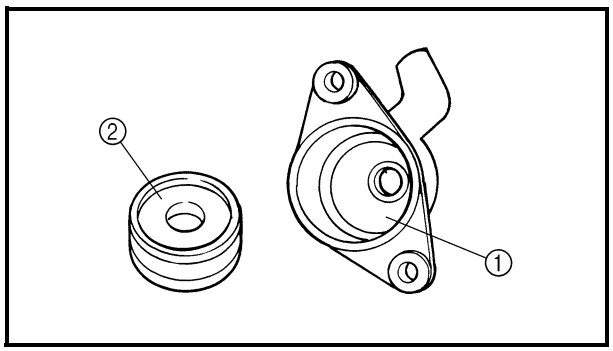
EAS00314
CHECKING THE CLUTCH RELEASE CYLINDER

Recommended clutch component replacement schedule	
Piston seals	**Every two years**
Clutch hose	**Every two years**
Clutch fluid	**Every two years and whenever the clutch is disassembled**



1. Check:
   - clutch release cylinder body ①
     Cracks/damage → Replace the clutch release cylinder.



2. Check:
   - clutch release cylinder ①
   - clutch release cylinder piston ②
     Rust/scratches/wear → Replace the clutch release cylinder and clutch release cylinder piston as a set.

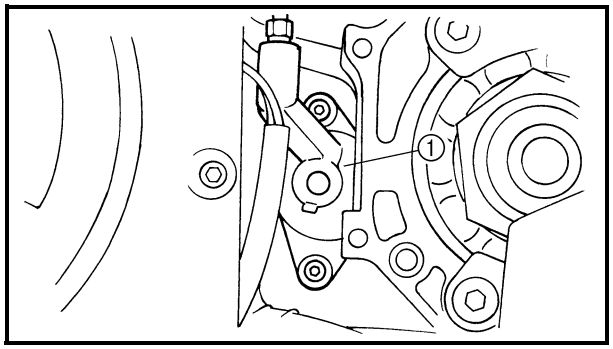
7

ASSEMBLING AND INSTALLING THE CLUTCH RELEASE CYLINDER

⚠ WARNING

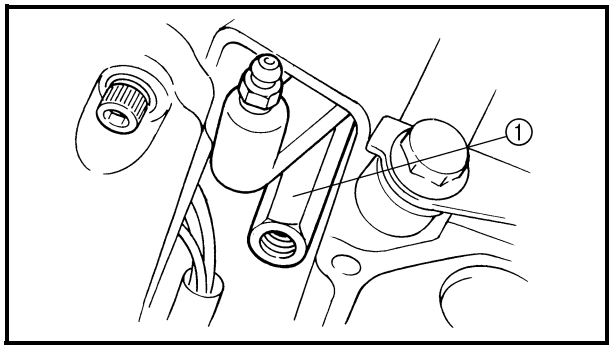
- **Before installation, all internal clutch components should be cleaned and lubricated with clean or new clutch fluid.**
- **Never use solvents on internal clutch components as they will cause the piston seal to swell and distort.**
- **Whenever a clutch master cylinder is disassembled, replace the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

Recommended clutch fluid
Brake fluid DOT 4



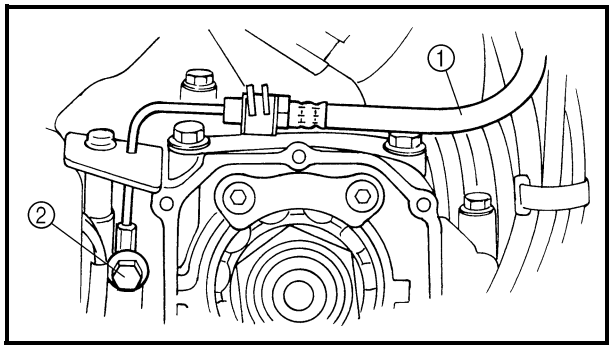
1. Install:
   - clutch release cylinder ①

12 Nm (1.2 m · kg, 8.7 ft · lb)



2. Install:
   - copper washer New
   - joint ①

25 Nm (2.5 m · kg, 18 ft · lb)



3. Install:
   - copper washers New
   - clutch hose ①
   - union bolt ②

25 Nm (2.5 m · kg, 18 ft · lb)

⚠ WARNING

Proper clutch hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING" in chapter 2.

4. Fill:
   • clutch master cylinder reservoir
   (with the specified amount of the recommended clutch fluid)

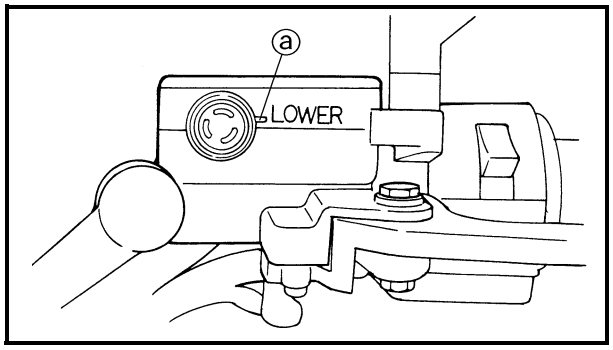
Recommended clutch fluid
Brake fluid DOT 4

⚠ WARNING

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

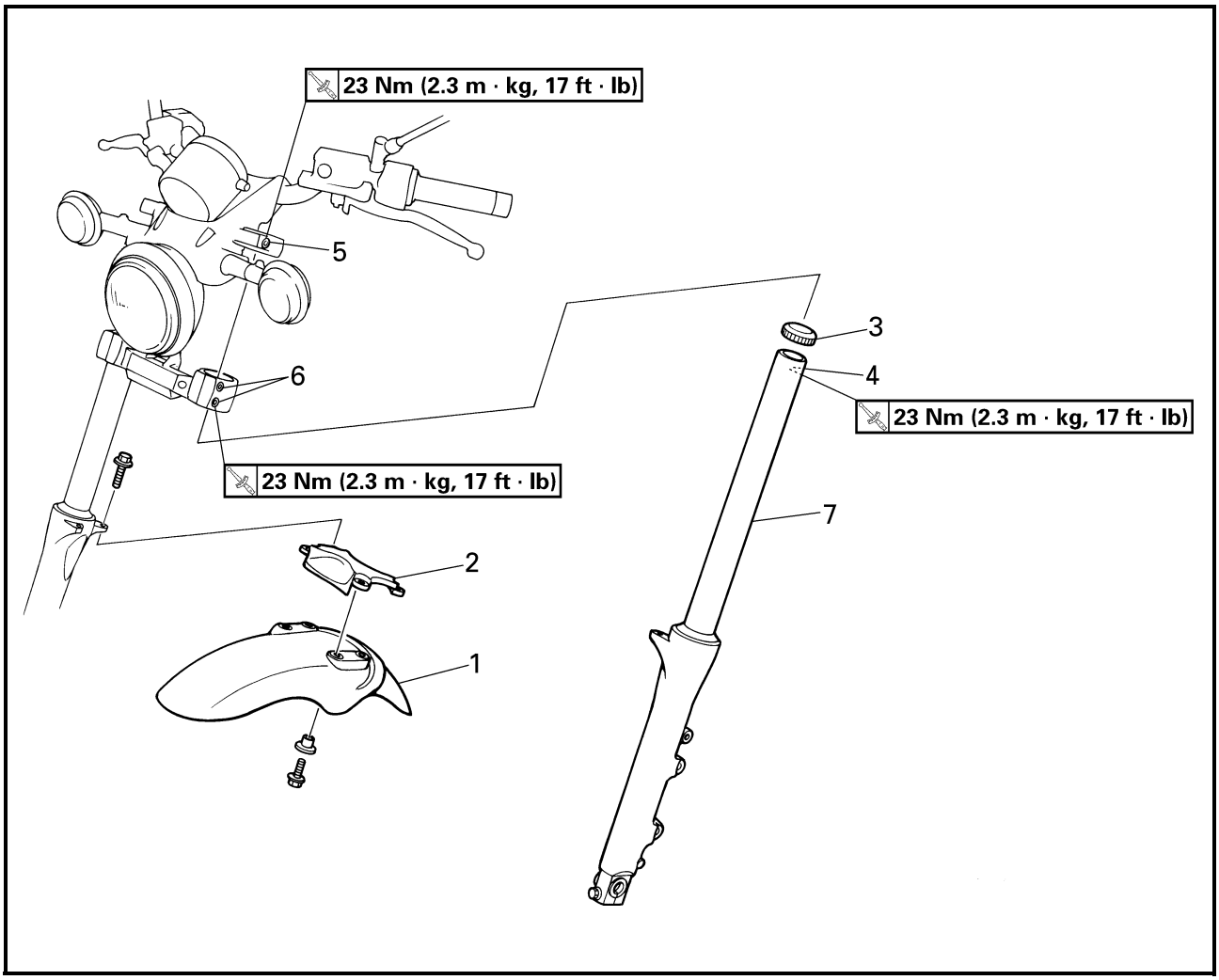
CAUTION:

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

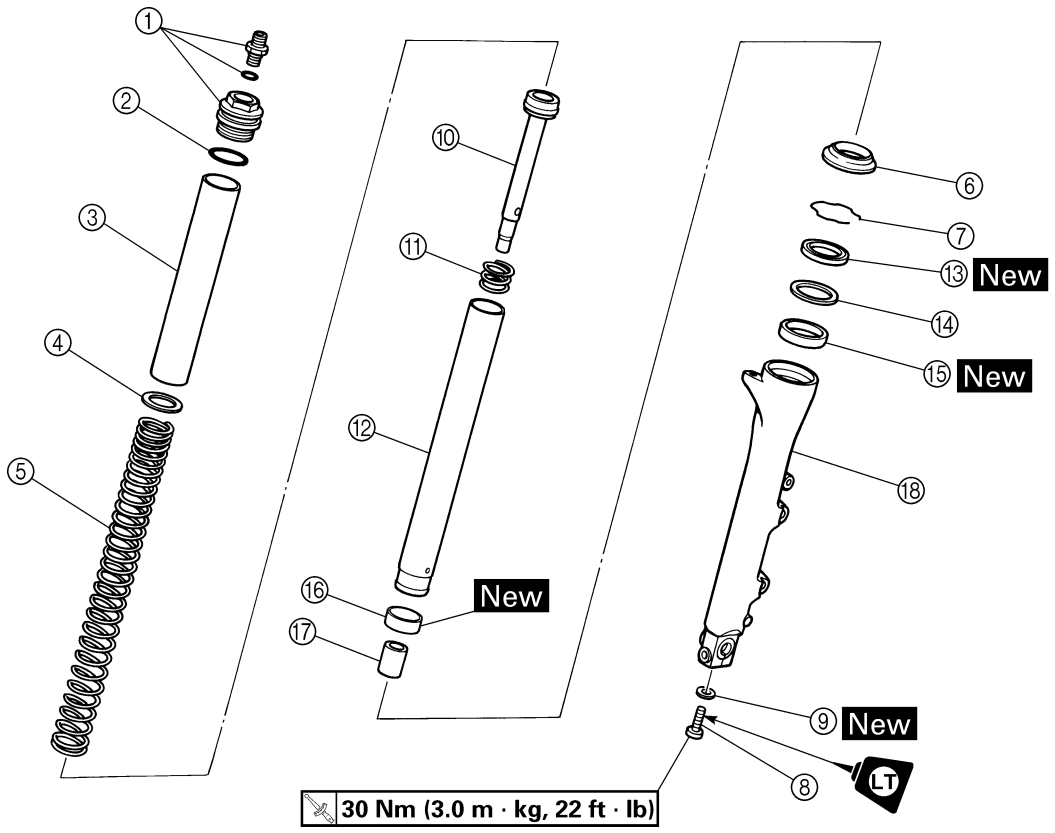


5. Bleed:
   • clutch system
   Refer to “BLEEDING THE HYDRAULIC CLUTCH SYSTEM” in chapter 3.
6. Check:
   • clutch fluid level
   Below the minimum level mark ⓐ → Add the recommended clutch fluid to the proper level.
   Refer to “CHECKING THE CLUTCH FLUID LEVEL” in chapter 3.
7. Check:
   • clutch lever operation
   Soft or spongy feeling → Bleed the clutch system.
   Refer to “BLEEDING THE HYDRAULIC CLUTCH SYSTEM” in chapter 3.

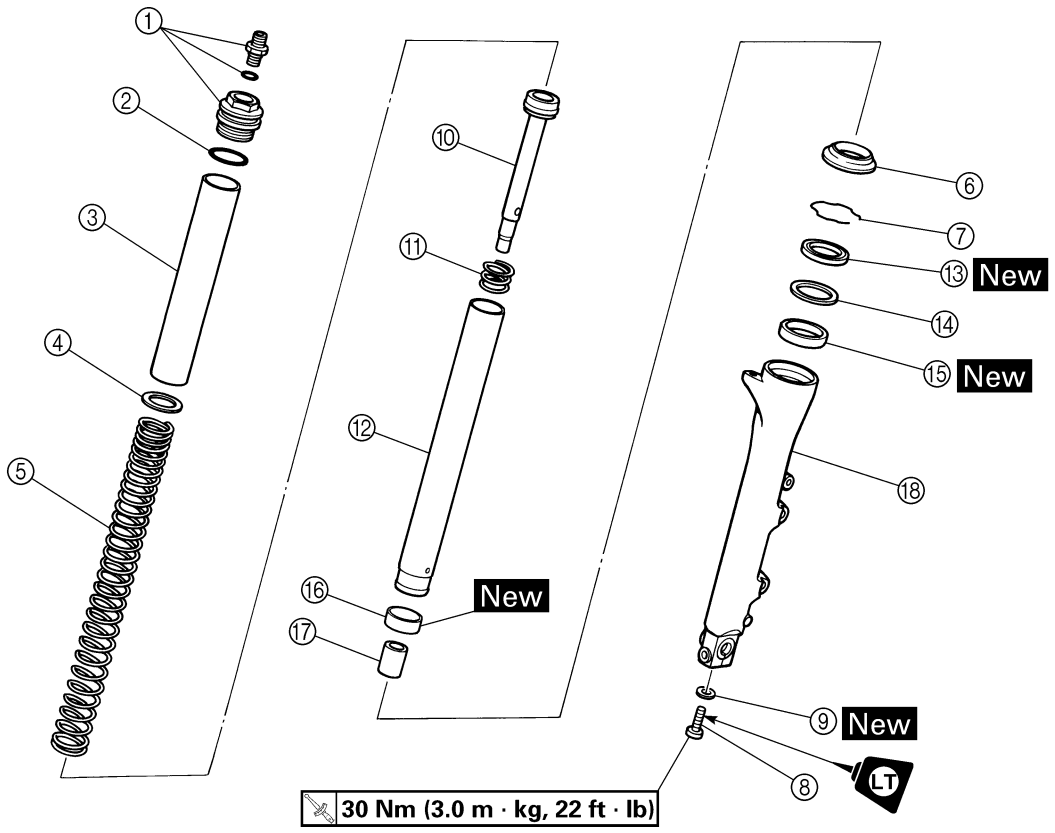
EAS00647
FRONT FORK



Order	Job/Part	Q'ty	Remarks
	Removing the front fork legs		Remove the parts in the order listed. The following procedure applies to both of the front fork legs.
	Front wheel		Refer to "FRONT WHEEL AND BRAKE DISCS".
1	Front fender	1	
2	Front fender brace	1	
3	Front fork air valve cap	1	
4	Cap bolt	1	Loosen.
5	Upper bracket pinch bolt	1	Loosen.
6	Lower bracket pinch bolt	2	Loosen.
7	Front fork leg	1	Refer to "REMOVING THE FRONT FORK LEGS" and "INSTALLING THE FRONT FORK LEGS".
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the front fork legs		Remove the parts in the order listed. The following procedure applies to both of the front fork legs.
①	Cap bolt	1	Refer to "ASSEMBLING THE FRONT FORK LEGS".
②	O-ring	1	
③	Collar	1	
④	Spring seat	1	
⑤	Fork spring	1	
⑥	Dust seal	1	Refer to "DISASSEMBLING THE FRONT FORK LEGS" and "ASSEMBLING THE FRONT FORK LEGS".
⑦	Oil seal clip	1	
⑧	Damper rod bolt	1	
⑨	Copper washer	1	



Order	Job/Part	Q'ty	Remarks
⑩	Damper rod	1	Refer to "DISASSEMBLING THE FRONT FORK LEGS" and "ASSEMBLING THE FRONT FORK LEGS".
⑪	Damper rod spring	1	
⑫	Inner tube	1	
⑬	Oil seal	1	Refer to "ASSEMBLING THE FRONT FORK LEGS".
⑭	Seal spacer	1	
⑮	Outer tube bushing	1	
⑯	Inner tube bushing	1	
⑰	Oil flow stopper	1	
⑱	Outer tube	1	
			For assembly, reverse the disassembly procedure.

EAS00650
REMOVING THE FRONT FORK LEGS

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

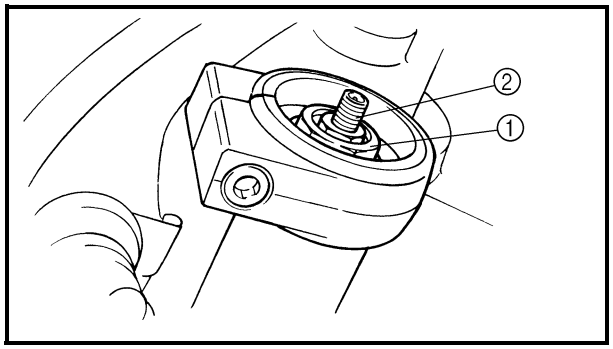
1. Stand the motorcycle on a level surface.

⚠ WARNING

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

NOTE:

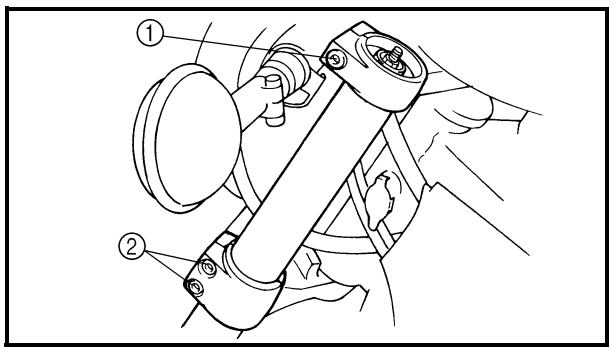
Place the motorcycle on a suitable stand so that the front wheel is elevated.



2. Loosen:
   - cap bolt ①

NOTE:

Release the air pressure the front fork leg by pressing down on the front fork air valve ②.

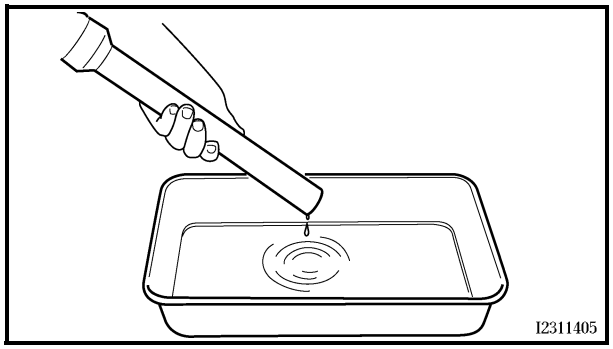


3. Loosen:
   - upper bracket pinch bolt ①
   - lower bracket pinch bolts ②

⚠ WARNING

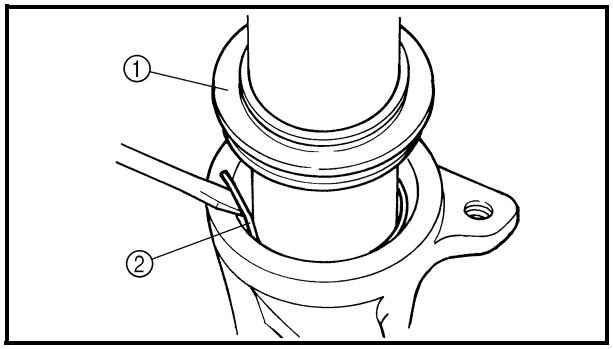
Before loosening the upper and lower bracket pinch bolts, support the front fork leg.

4. Remove:
   - front fork leg



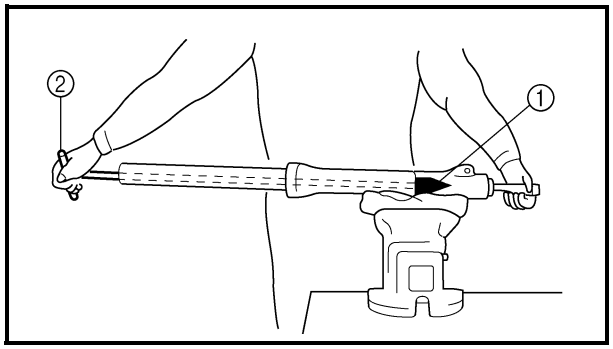
EAS00653
DISASSEMBLING THE FRONT FORK LEGS
The following procedure applies to both of the front fork legs.
1. Drain:
   • fork oil

NOTE:
Stroke the outer tube several times while draining the fork oil.



2. Remove:
   • dust seal ①
   • oil seal clip ②
   (with a flat-head screwdriver)

CAUTION:
Do not scratch the inner tube.



3. Remove:
   • damper rod bolt
   • damper rod

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

Damper rod holder (29 mm)
YM-33962
T-handle
YM-01326

4. Remove:
   • inner tube

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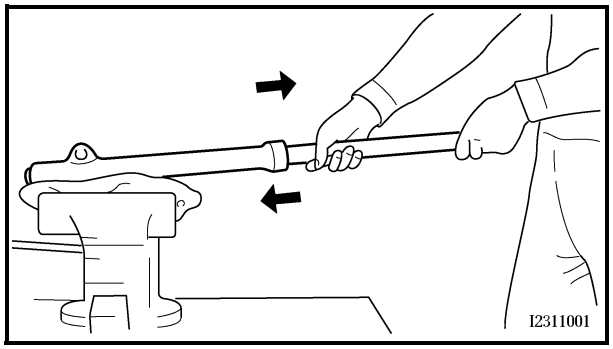
a. Hold the front fork leg horizontally.
b. Securely clamp the brake caliper bracket in a vise with soft jaws.
c. Separate the inner tube from the outer tube by pulling the inner tube forcefully but carefully.



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

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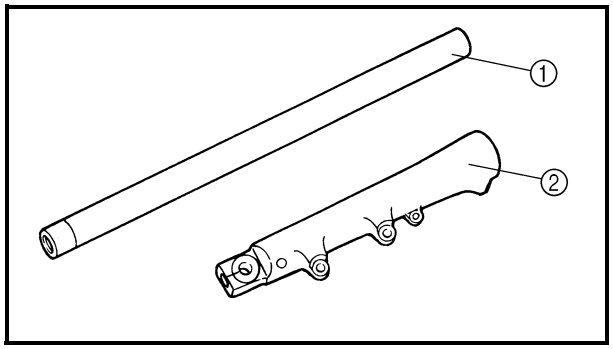


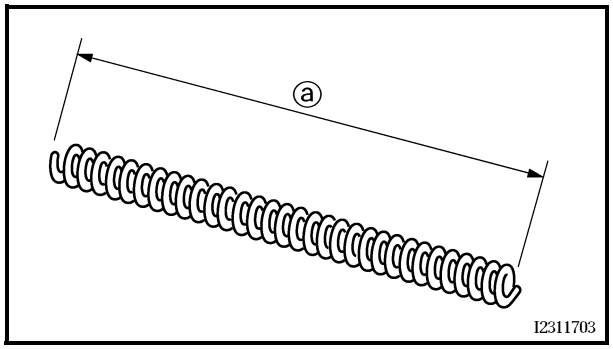
EAS00657
CHECKING THE FRONT FORK LEGS

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

1. Check:
   - inner tube ①
   - outer tube ②
     Bends/damage/scratches → Replace.

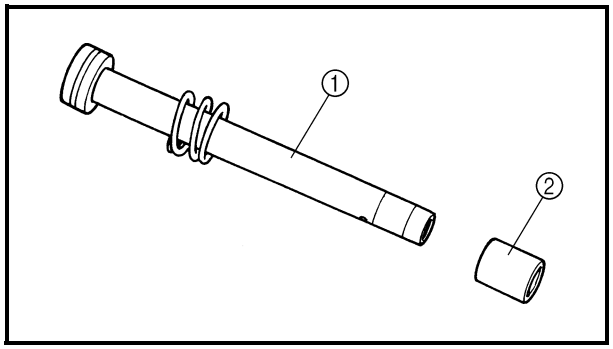
⚠ WARNING

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



2. Measure:
   - fork spring free length ⓐ
     Out of specification → Replace.

Spring free length limit
381.5 mm (15.02 in)



3. Check:
   - damper rod ①
     Damage/wear → Replace.
     Obstruction → Blow out all of the oil passages with compressed air.
   - oil flow stopper ②
     Damage → Replace.

4. Check:
   - cap bolt O-ring
     Damage/wear → Replace.

EAS00659
ASSEMBLING THE FRONT FORK LEGS

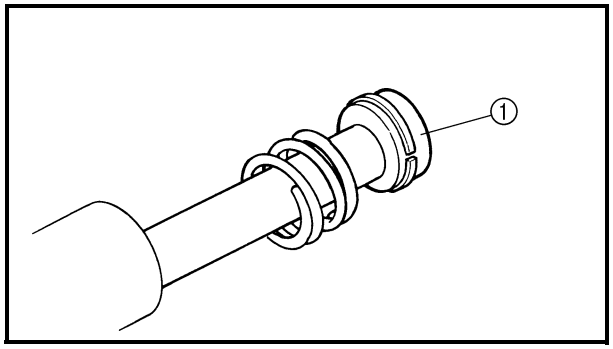
The following procedure applies to both of the front fork legs.

⚠ WARNING

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

NOTE:

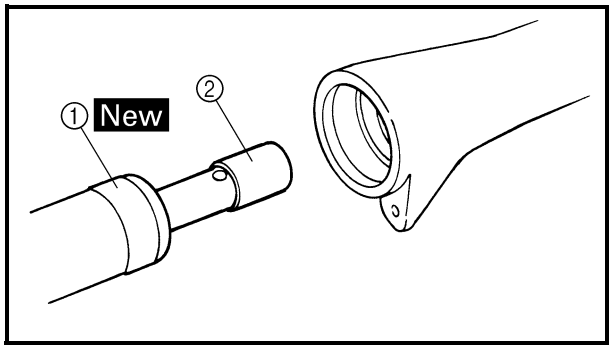
- When assembling the front fork leg, be sure to replace the following parts:
  - inner tube bushing
  - outer tube bushing
  - oil seal
  - dust seal
- Before assembling the front fork leg, make sure all of the components are clean.



1. Install:
   - damper rod ①

CAUTION:

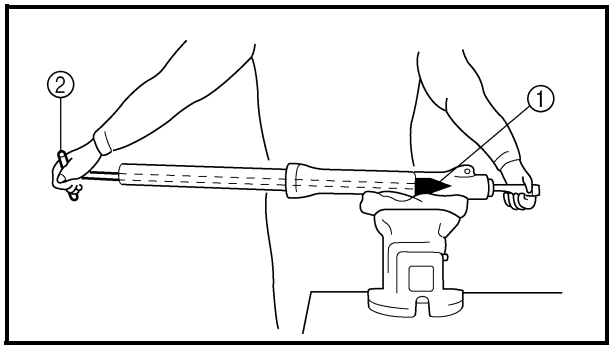
Allow the damper rod to slide slowly down the inner tube until it protrudes from the bottom of the inner tube. Be careful not to damage the inner tube.



2. Install:
   - inner tube bushing ① New
   - oil flow stopper ②
3. Lubricate:
   - inner tube's outer surface

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

4. Install:
   - outer tube (on to inner tube)
   - copper washer New
   - damper rod bolt

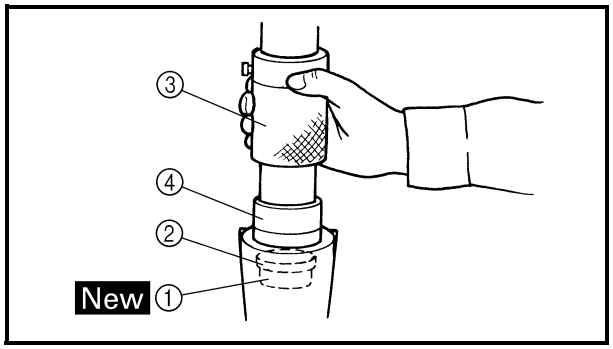


5. Tighten:
   • damper rod bolt

	30 Nm (3.0 m · kg, 22 ft · lb)

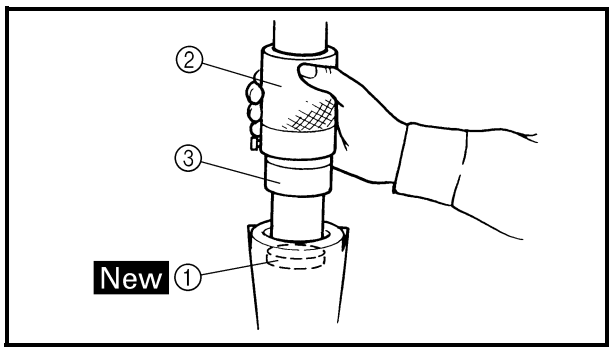
NOTE:
- Apply the locking agent (LOCTITE®) to the threads of the damper rod bolt.
- While holding the damper rod assembly with the damper rod holder ① and T-handle ②, tighten the damper rod assembly bolt.

	Damper rod holder (29 mm) **YM-33962** **T-handle** **YM-01326**



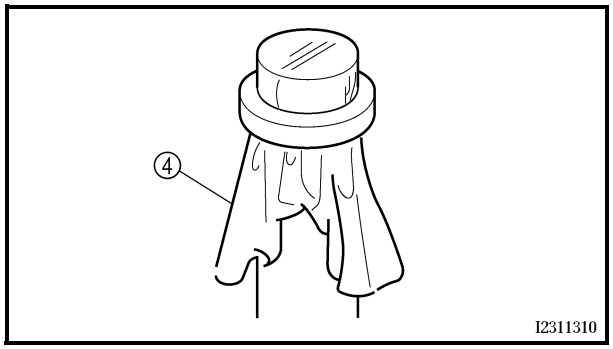
6. Install:
   • outer tube bushing ① New
   • seal spacer ②
   (with the fork seal driver weight ③ and fork seal driver attachment ④)

	Fork seal driver weight **YM-33963** **Attachment (f40)** **YM-8020**

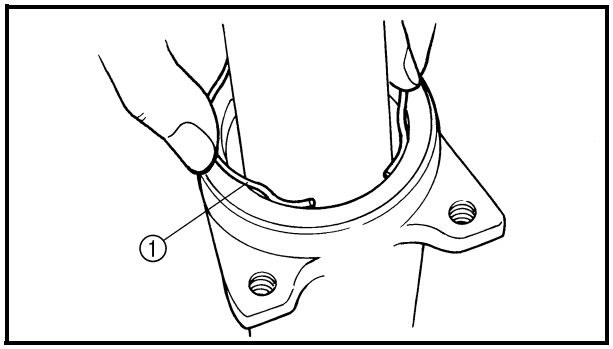


7. Install:
   • washer
   • oil seal ① New
   (with the fork seal driver weight ② and fork seal driver attachment ③)

CAUTION:
Make sure the numbered side of the oil seal faces up.

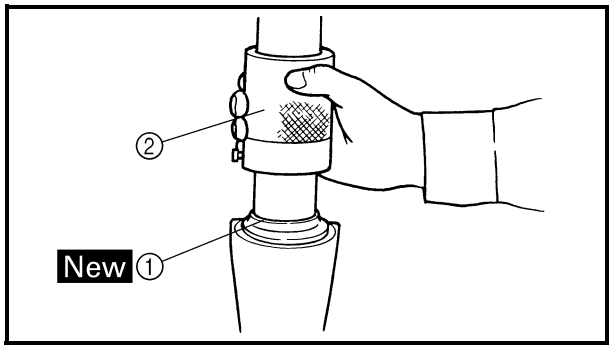


NOTE:
- Before installing the oil seal, lubricate its lips with lithium soap base grease.
- Lubricate the outer surface of the inner tube with fork oil.
- Before installing the oil seal, cover the top of the front fork leg with a plastic bag ④ to protect the oil seal during installation.

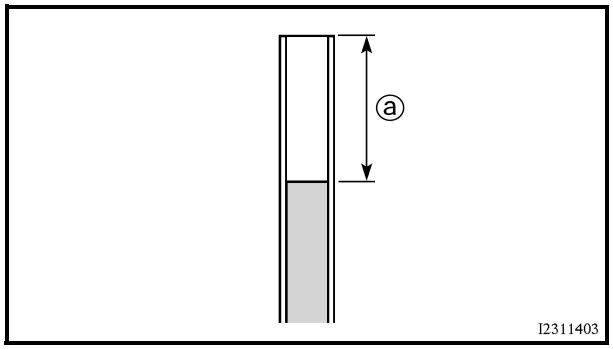


8. Install:
   • oil seal clip ①

NOTE:
Adjust the oil seal clip so that it fits into the outer tube's groove.



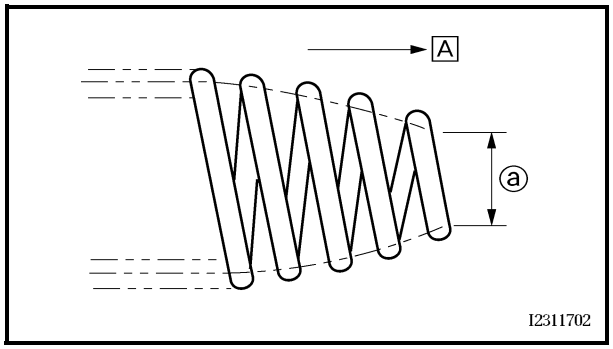
9. Install:
   • dust seal ① New
   (with the fork seal driver weight ②)

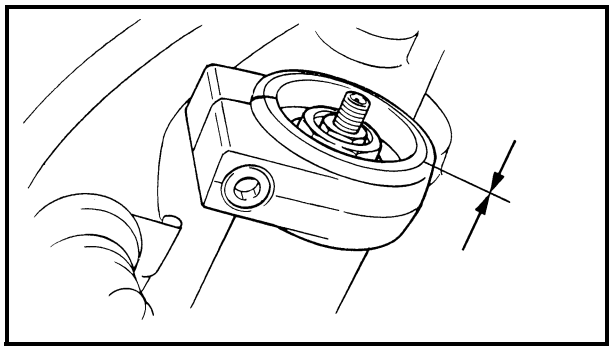


10. Fill:
   • front fork leg
   (with the specified amount of the recommended fork oil)

Quantity (each front fork leg)
621 cm³ (21.9 Imp oz, 21.0 US oz)
Recommended oil
Yamaha fork oil 10W or equivalent
Front fork leg oil level ⓐ
(from the top of the inner tube, with the inner tube fully compressed and without the fork spring)
123 mm (4.84 in)

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





11.Install:
- fork spring
- spring seat
- collar
- cap bolt

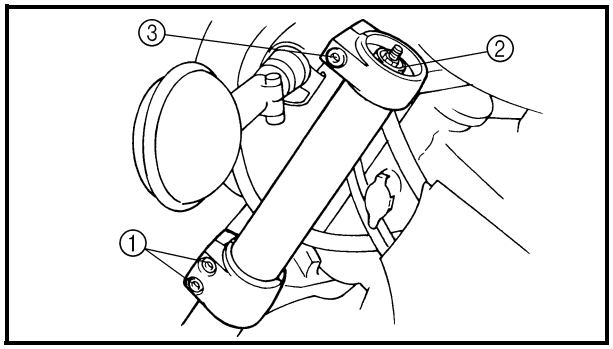
NOTE:
- Install the spring with the smaller pitch ⓐ facing up A.
- Before installing the cap bolt, lubricate its O-ring with grease.
- Temporarily tighten the cap bolt.

EAS00662
INSTALLING THE FRONT FORK LEGS

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

1. Install:
   - front fork leg

NOTE:
- Make sure the inner tube is flush with the top of the upper bracket.
- Temporarily tighten the upper and lower bracket pinch bolts.



2. Tighten:
   - lower bracket pinch bolts ①

	23 Nm (2.3 m · kg, 17 ft · lb)

   - cap bolt ②

	23 Nm (2.3 m · kg, 17 ft · lb)

   - upper bracket pinch bolt ③

	23 Nm (2.3 m · kg, 17 ft · lb)

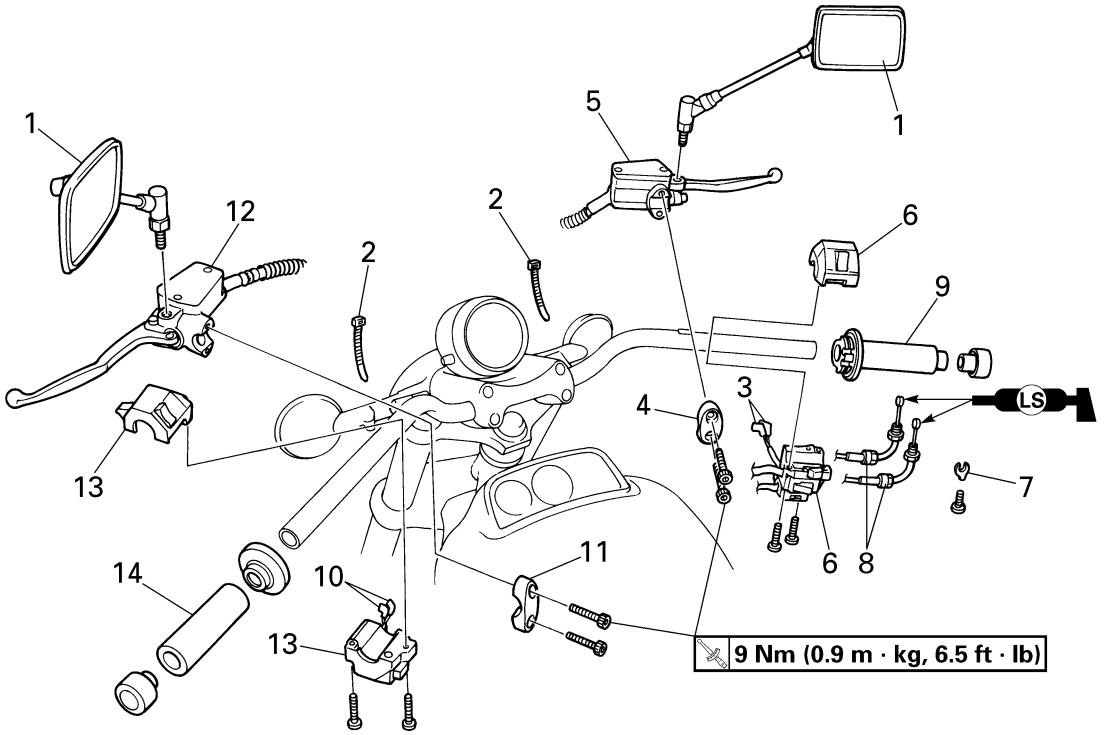
⚠ WARNING

Make sure the brake hoses and clutch hose are routed properly.

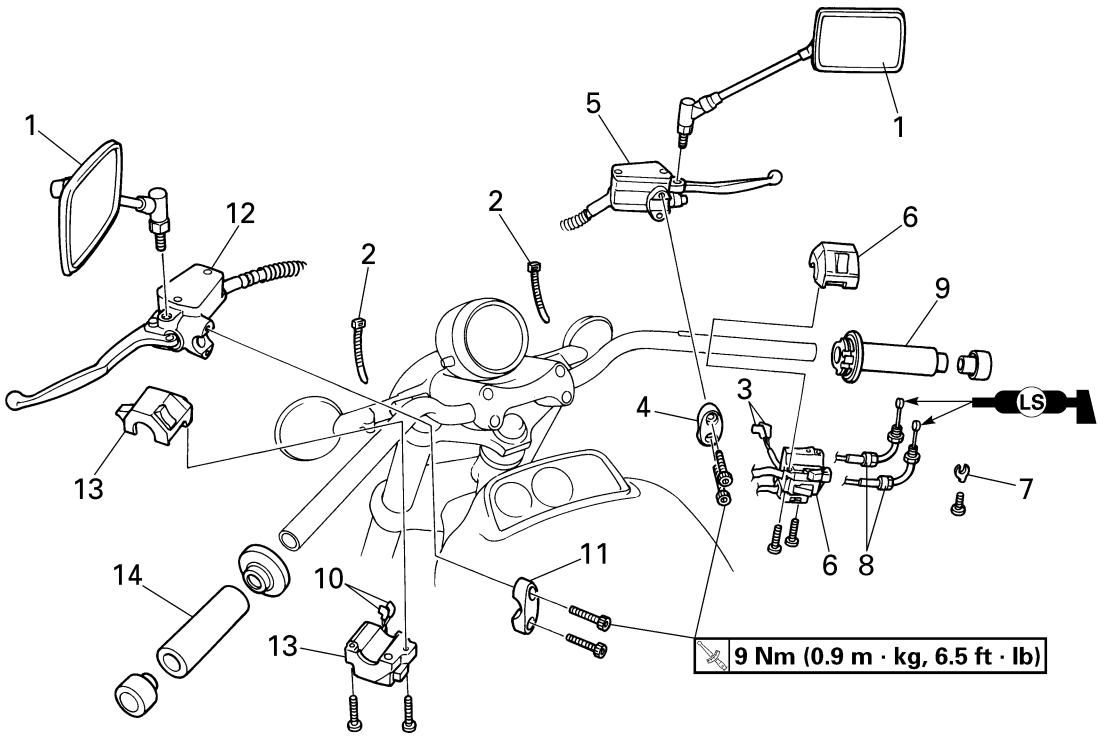
3. Install:
   - front fender brace
   - front fender
4. Adjust:
   - compression damping
     Refer to “ADJUSTING THE FRONT FORK LEGS” in chapter 3.

7

EAS00664
HANDLEBAR

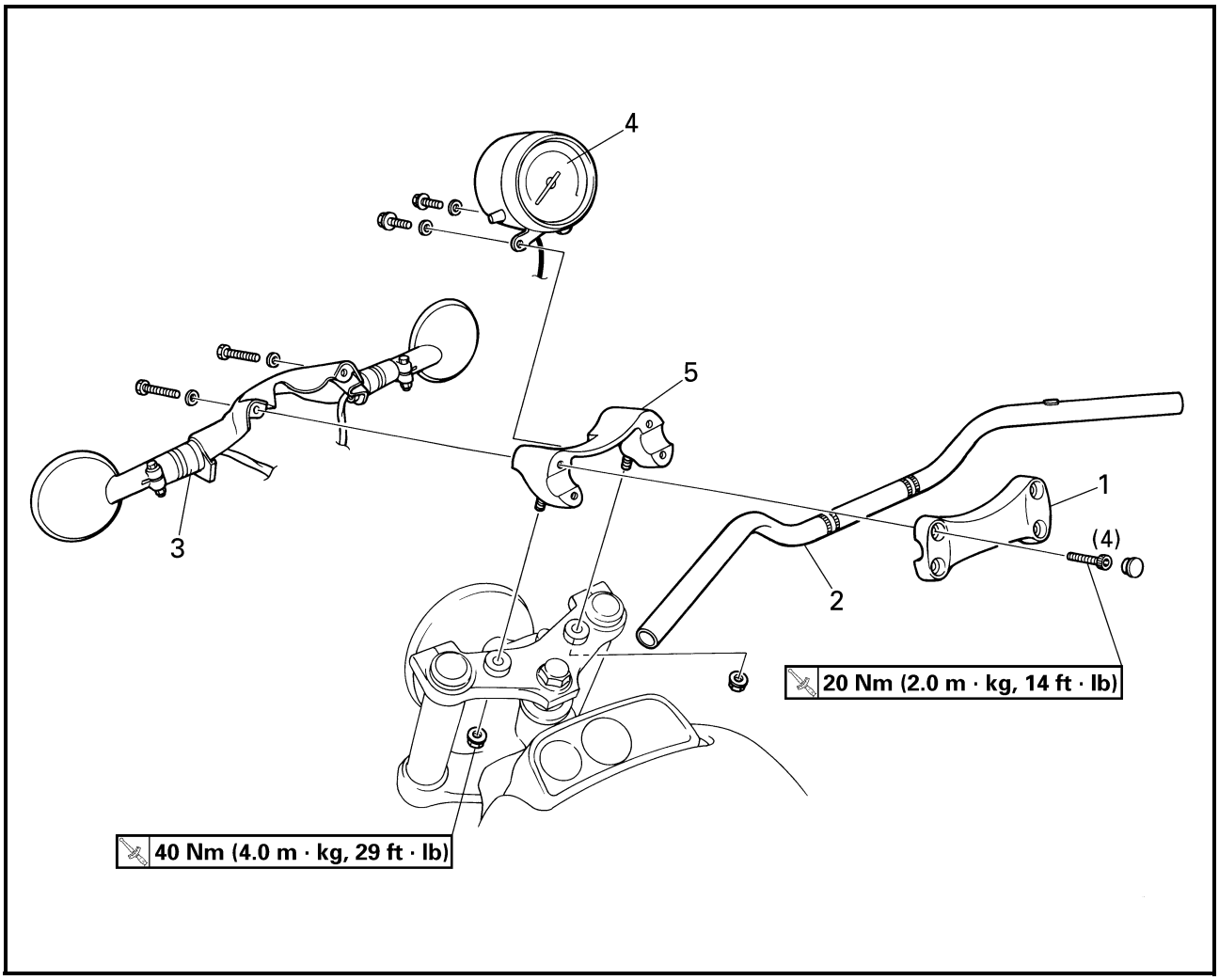


Order	Job/Part	Q'ty	Remarks
	Removing the master cylinders, handlebar switches and handlebar grips		Remove the parts in the order listed.
1	Rear view mirror (left and right)	2	
2	Plastic band	2	
3	Front brake light switch connector	2	Disconnect.
4	Brake master cylinder holder	1	
5	Brake master cylinder	1	Refer to "INSTALLING THE HANDLE-BAR".
6	Right handlebar switch	1	
7	Throttle cable holder	1	
8	Throttle cable	2	Disconnect.
9	Throttle grip	1	Refer to "REMOVING THE HANDLE-BAR" and "INSTALLING THE HANDLE-BAR".
10	Clutch switch connector	2	Disconnect.



Order	Job/Part	Q'ty	Remarks
11	Clutch master cylinder holder	1	
12	Clutch master cylinder	1	Refer to "INSTALLING THE HANDLEBAR".
13	Left handlebar switch	1	
14	Handlebar grip	1	Refer to "REMOVING THE HANDLEBAR" and "INSTALLING THE HANDLEBAR". For installation, reverse the removal procedure.

7



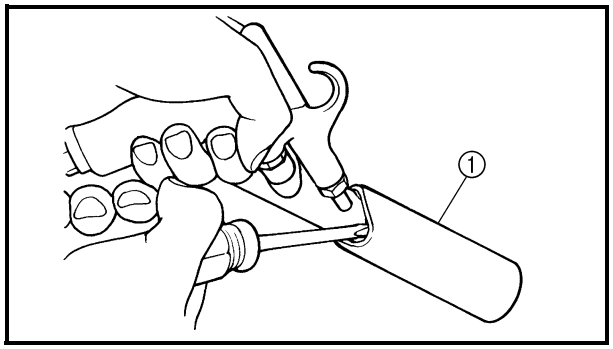
Order	Job/Part	Q'ty	Remarks
	Removing the handlebar		Remove the parts in the order listed.
1	Upper handlebar holder	1	Refer to "INSTALLING THE HANDLEBAR".
2	Handlebar	1	
3	Turn signal light bracket assembly	1	
4	Speedometer assembly	1	
5	Lower handlebar holder	1	
			For installation, reverse the removal procedure.

EAS00666
REMOVING THE HANDLEBAR

1. Stand the motorcycle on a level surface.

⚠ WARNING

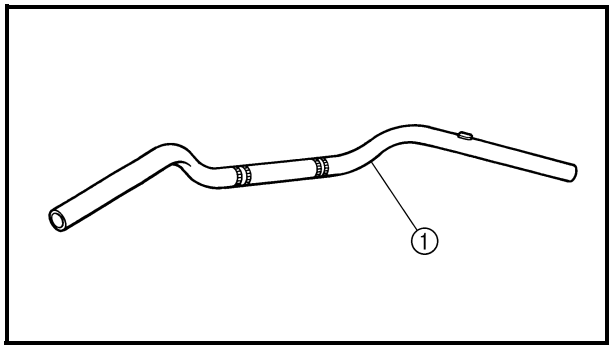
Securely support the motorcycle so that there is no danger of it falling over.



2. Remove:
   - handlebar grip ①

NOTE:

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



EAS00668
CHECKING THE HANDLEBAR

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

⚠ WARNING

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

2. Install:
   - handlebar grip

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

⚠ WARNING

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

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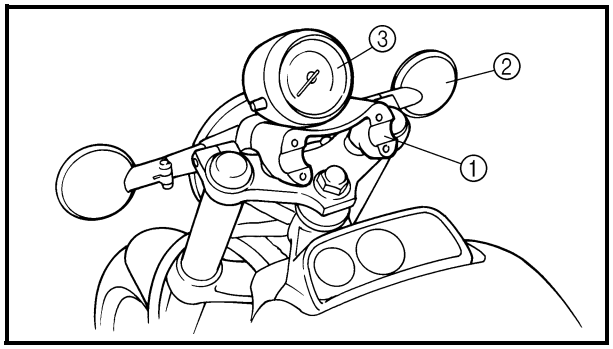

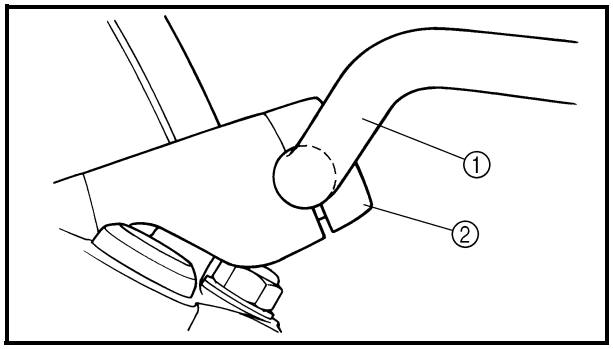

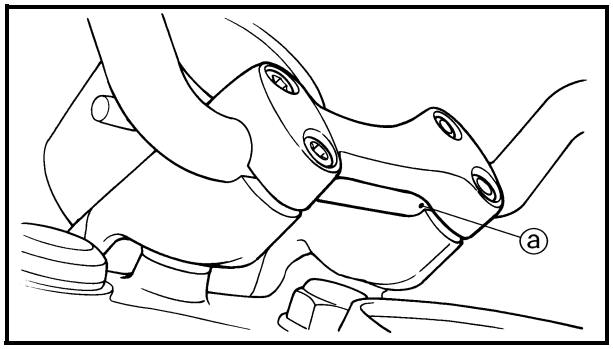

EAS00670
INSTALLING THE HANDLEBAR

1. Install:
   - lower handlebar holder ①

     40 Nm (4.0 m · kg, 29 ft · lb)
   - turn signal light bracket assembly ②
   - speedometer assembly ③

2. Install:
   - handlebar ①
   - upper handlebar holder ②

     20 Nm (2.0 m · kg, 14 ft · lb)

CAUTION:

- **First, tighten the bolts on the front side of the handlebar holder, and then on the rear side.**
- **Turn the handlebar all the way to the left and right. If there is any contact with the top cover, adjust the handlebar position.**

NOTE:

- Install upper handlebar holder as shown.
- Align the match marks ⓐ on the handlebar with the upper surface of the lower handlebar holder.

3. Install:
   - handlebar grip

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

⚠ WARNING

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

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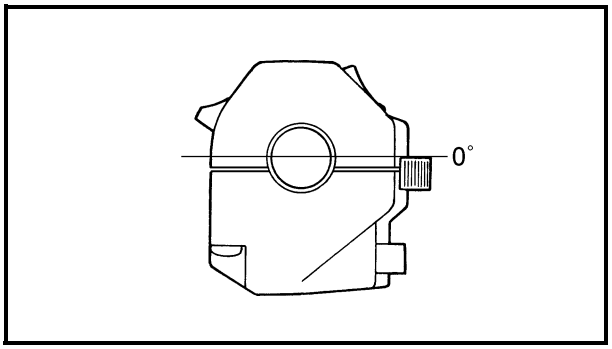
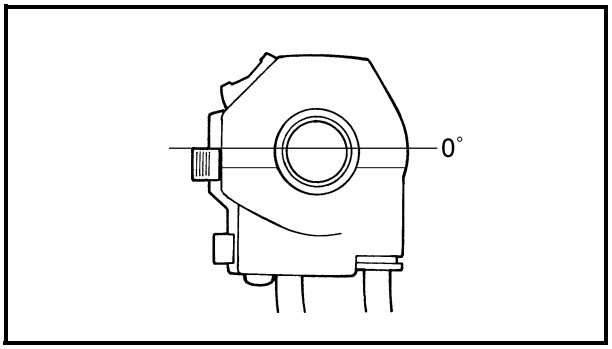




4. Install:
   • left handlebar switch

NOTE:
Install the left handlebar switch as shown.

5. Install:
   • clutch master cylinder
   Refer to “HYDRAULIC CLUTCH”.

6. Install:
   • right handlebar switch

NOTE:
Install the right handlebar switch as shown.

7. Install:
   • front brake master cylinder
   Refer to “FRONT AND REAR BRAKES”.

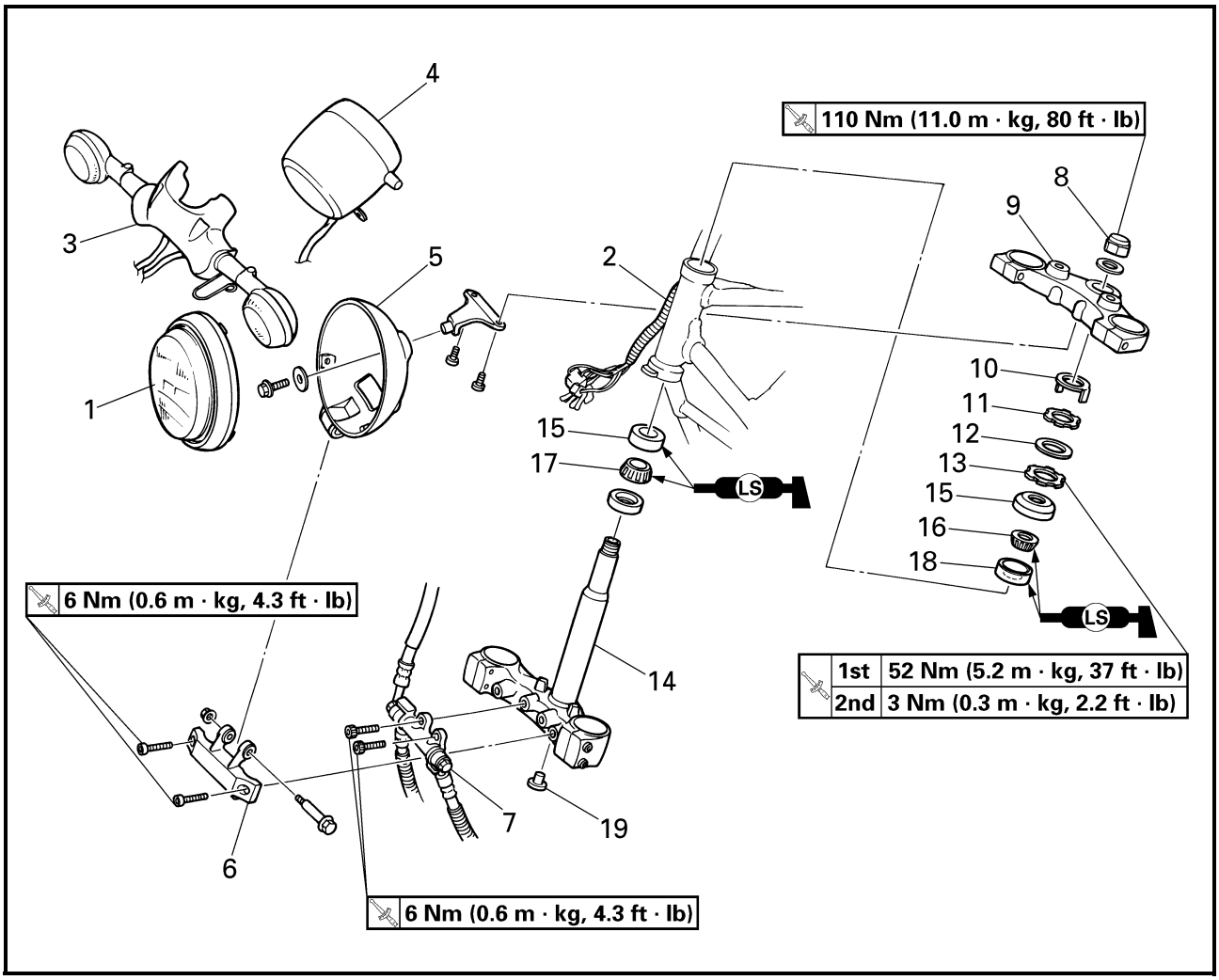
8. Adjust:
   • brake lever free play
   Refer to “ADJUSTING THE FRONT BRAKE” in chapter 3.

Brake lever free play (at the end of the brake lever)
2 ~ 5 mm (0.08 ~ 0.20 in)

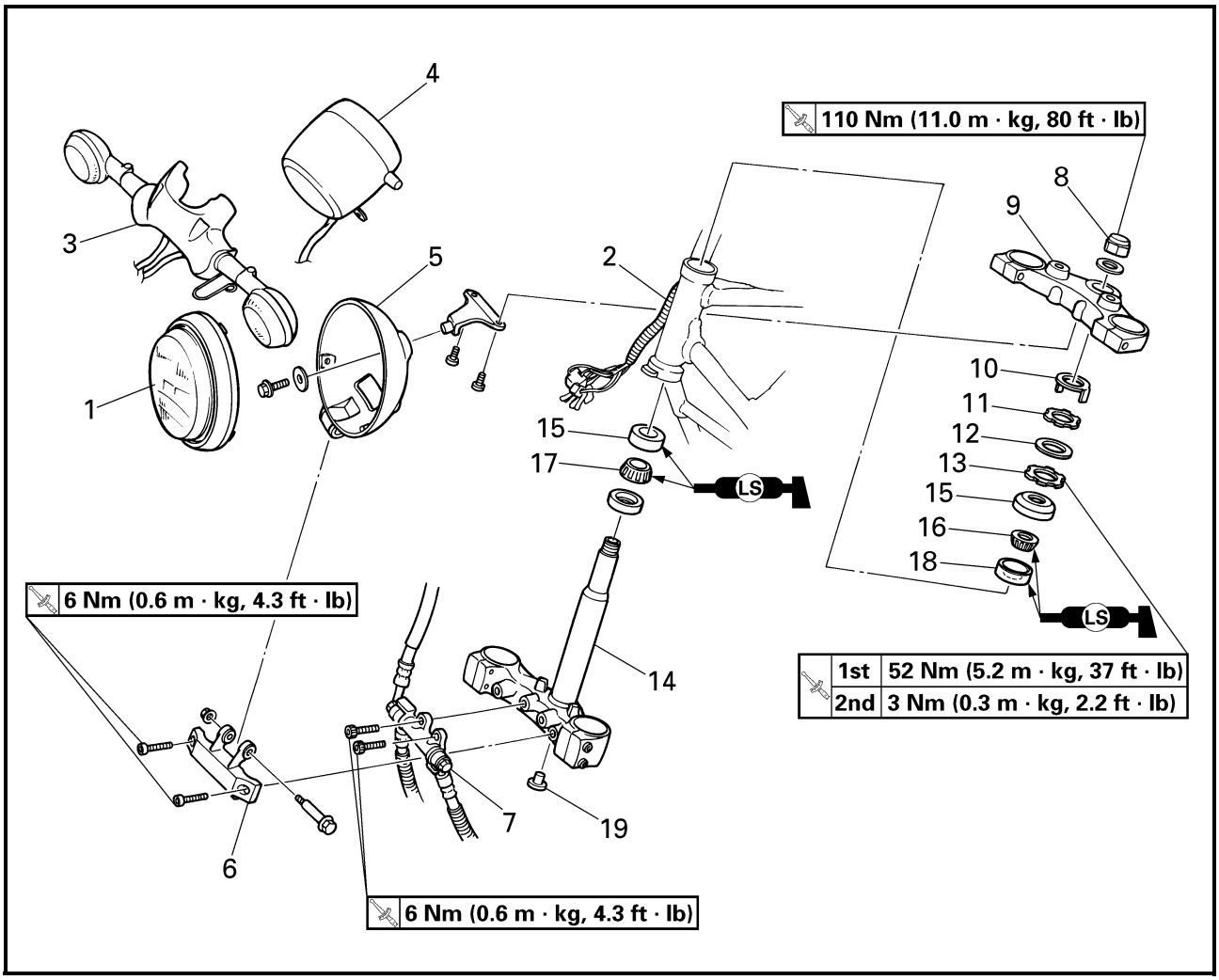
9. Adjust:
   • throttle cable free play
   Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY” in chapter 3.

Throttle cable free play (at the flange of the throttle grip)
3 ~ 5 mm (0.12 ~ 0.20 in)

EAS00676
STEERING HEAD



Order	Job/Part	Q'ty	Remarks
	Removing the lower bracket		Remove the parts in the order listed.
	Handlebar/handlebar holders		Refer to "HANDLEBAR".
	Front fork legs		Refer to "FRONT FORK".
1	Headlight lens unit	1	
2	Lead (in the headlight body)	1	Disconnect.
3	Turn signal light bracket assembly	1	
4	Speedometer assembly	1	
5	Headlight body	1	
6	Hose joint cover	1	Refer to "INSTALLING THE STEERING HEAD".
7	Brake hose joint	1	
8	Steering stem nut	1	



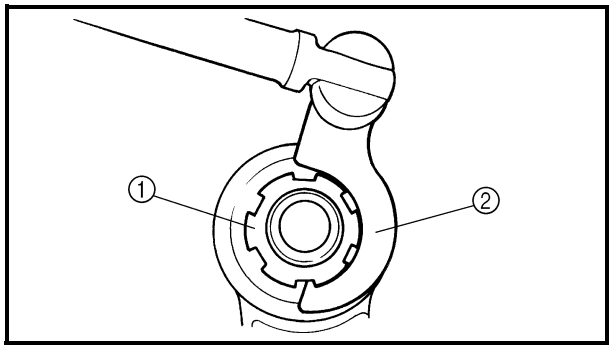
Order	Job/Part	Q'ty	Remarks
9	Upper bracket	1	
10	Lock washer	1	Refer to "INSTALLING THE STEERING HEAD".
11	Upper ring nut	1	
12	Rubber washer	1	
13	Lower ring nut	1	Refer to "REMOVING THE LOWER BRACKET" and "INSTALLING THE STEERING HEAD".
14	Lower bracket	1	
15	Bearing cover	1	
16	Upper bearing	1	
17	Lower bearing	1	
18	Bearing outer race	2	
19	Rubber seal	1	
			For installation, reverse the removal procedure.

EAS00677
REMOVING THE LOWER BRACKET

1. Stand the motorcycle on a level surface.

⚠ WARNING

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



2. Remove:
   - lower ring nut ①
     (with the steering nut wrench ②)
   - lower bracket

	**Steering nut wrench** **YU-33975**

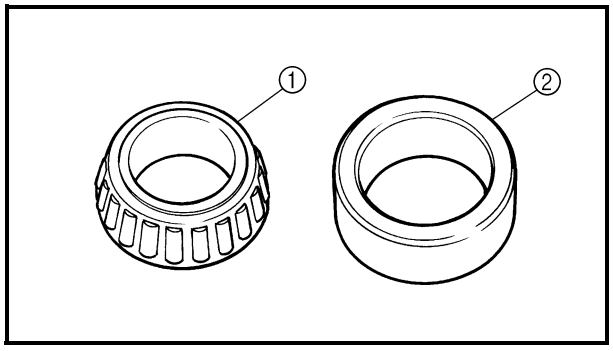
⚠ WARNING

Securely support the lower bracket so that there is no danger of it falling.

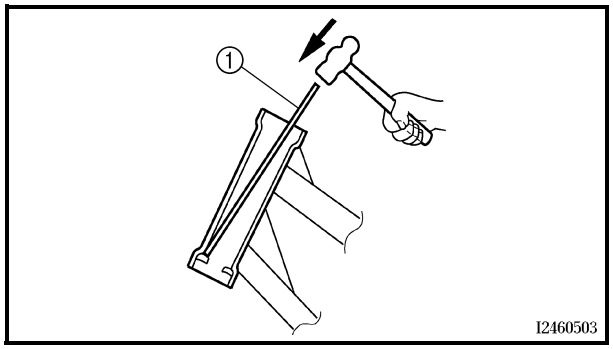
EAS00681
CHECKING THE STEERING HEAD

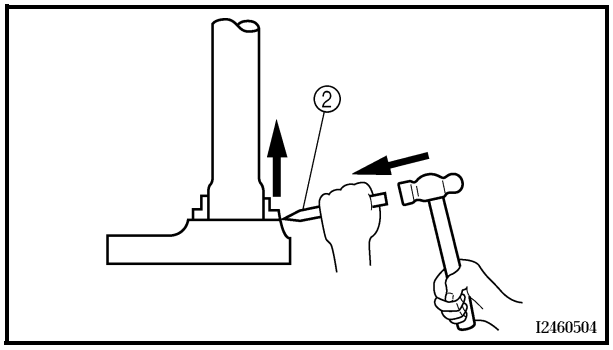
1. Wash:
   - bearings
   - bearing races

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



2. Check:
   - bearings ①
   - bearing races ②
     Damage/pitting → Replace.





3. Replace:
   - bearings
   - bearing races

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a. Remove the bearing races from the steering head pipe with a long rod ① and hammer.
b. Remove the bearing race from the lower bracket with a floor chisel ② and hammer.
c. Install a new rubber seal and new bearing races.

CAUTION:

If the bearing race is not installed properly, the steering head pipe could be damaged.

NOTE:

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

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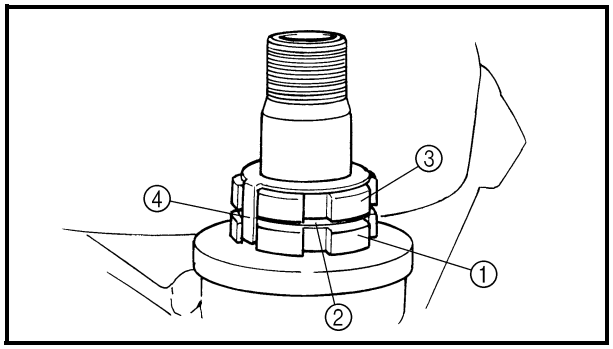
4. Check:
   - upper bracket
   - lower bracket
     (along with the steering stem)
     Bends/cracks/damage → Replace.

EAS00683
INSTALLING THE STEERING HEAD

1. Lubricate:
   - upper bearing
   - lower bearing
   - bearing races

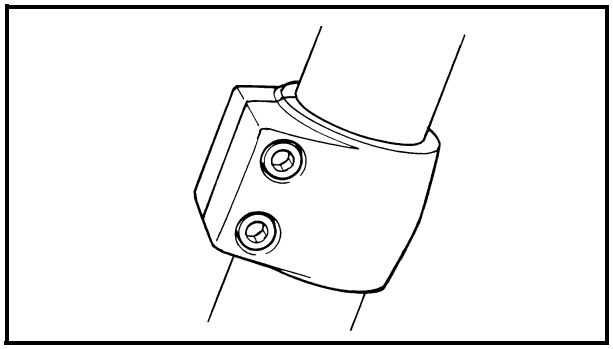
	Recommended lubricant **Lithium soap base grease**



2. Install:
   - lower bracket
   - lower ring nut ①
   - rubber washer ②
   - upper ring nut ③
   - lock washer ④
     Refer to “CHECKING AND ADJUSTING THE STEERING HEAD” in chapter 3.

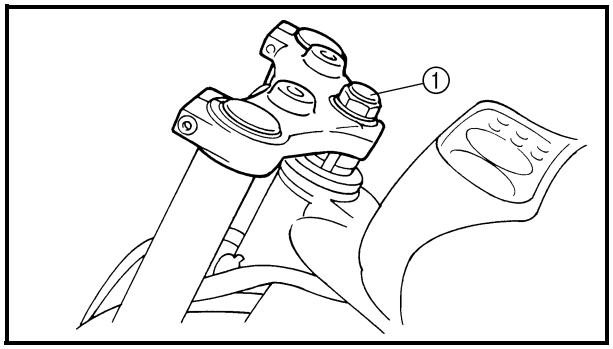
3. Install:
   - upper bracket
   - steering stem nut

NOTE:
Temporarily tighten the steering stem nut.



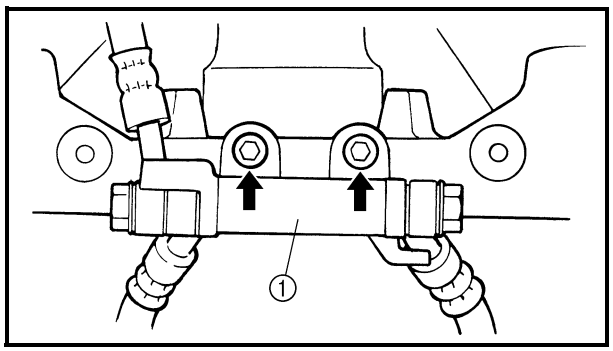
4. Install:
   - front fork legs

NOTE:
Temporarily tighten the lower bracket pinch bolts.



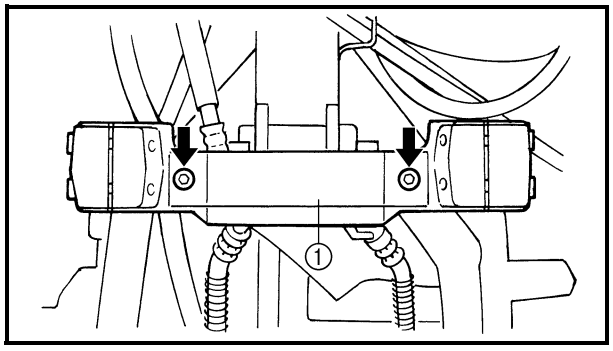
5. Tighten:
   - steering stem nut ①

110 Nm (11.0 m · kg, 80 ft · lb)



6. Install:
   - brake hose joint ①

6 Nm (0.6 m · kg, 4.3 ft · lb)

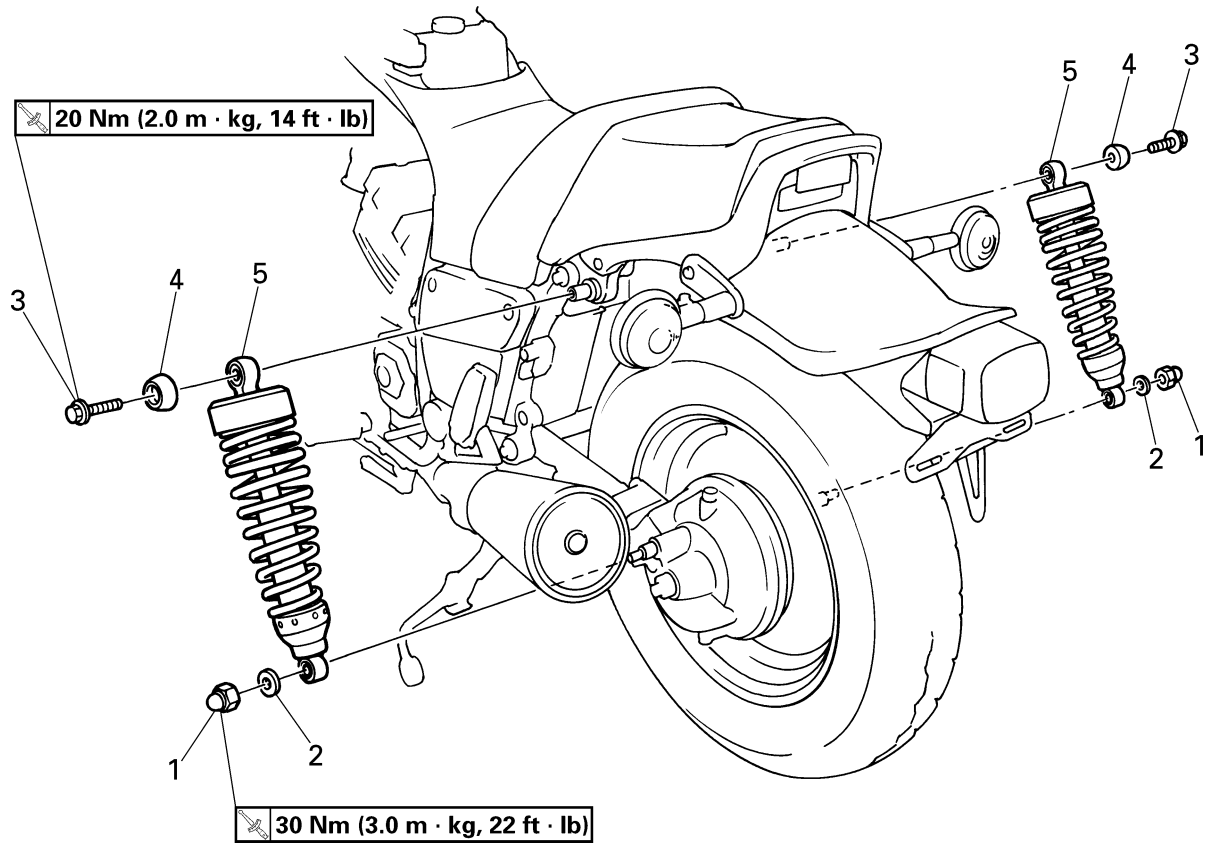


7. Install:
   - hose joint cover ①

6 Nm (0.6 m · kg, 4.3 ft · lb)

8. Install:
   - front fork legs
     Refer to “FRONT FORK”.

REAR SHOCK ABSORBER



Order	Job/Part	Q'ty	Remarks
	Removing the rear shock absorbers		Remove the parts in the order listed.
1	Nut (left and right)	2	Refer to "REMOVING THE REAR SHOCK ABSORBER ASSEMBLIES" and "INSTALLING THE REAR SHOCK ABSORBER ASSEMBLIES".
2	Washer (left and right)	2	
3	Bolt (left and right)	2	
4	Spacer (left and right)	2	
5	Rear shock absorber (left and right)	2	
			For installation, reverse the removal procedure.

7

EAS00686
HANDLING THE REAR SHOCK ABSORBER

⚠ WARNING

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

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

EAS00691
REMOVING THE REAR SHOCK ABSORBER ASSEMBLIES

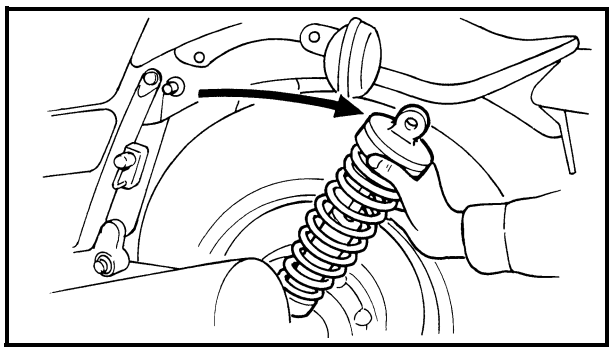
1. Stand the motorcycle on a level surface.

⚠ WARNING

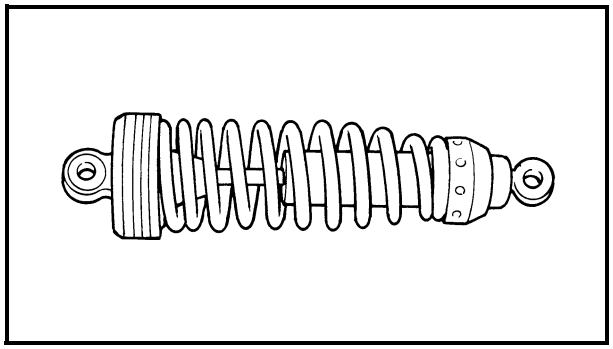
Securely support the motorcycle so that there is no danger of it falling over.

NOTE:

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



2. Remove:
   - rear shock absorber upper bolt
   - rear shock absorber lower nut
3. Pull out the rear shock absorber top, and turn the rear shock absorber backward.
4. Remove:
   - rear shock absorber



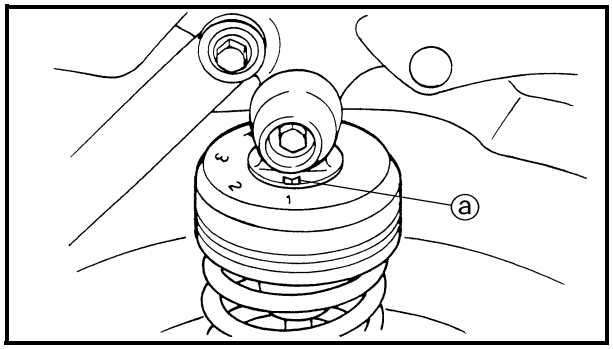
EAS00695
CHECKING THE REAR SHOCK ABSORBER ASSEMBLIES

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

EAS00699
INSTALLING THE REAR SHOCK ABSORBER ASSEMBLIES

1. Lubricate:
   - rear shock absorber mounting pivot

	Recommended lubricant **Molybdenum disulfide grease**



2. Install:
   - rear shock absorber

NOTE:
The rear shock absorber should be installed so that mark ⓐ on the rear shock absorber faces outward.

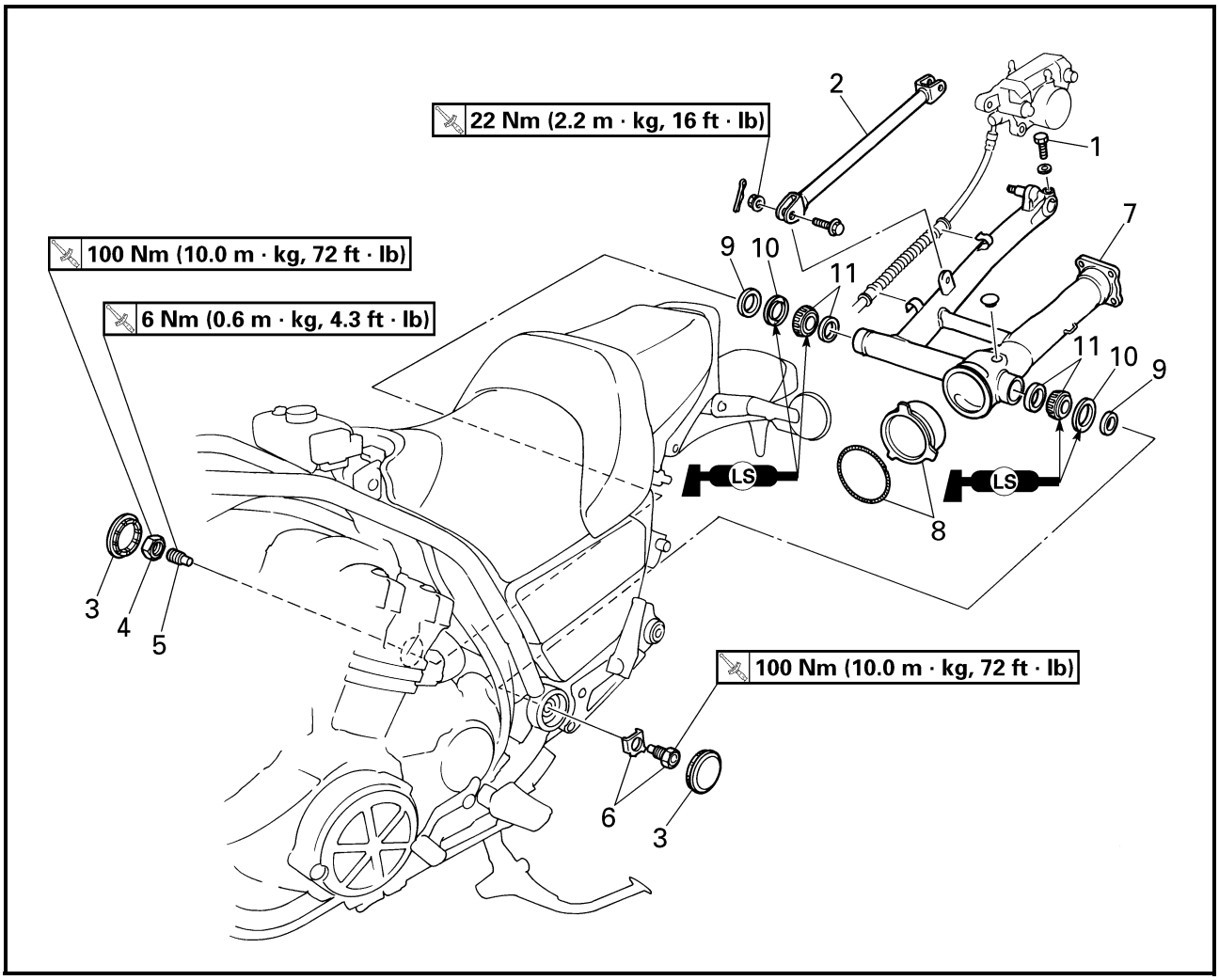
3. Tighten:
   - rear shock absorber upper bolt

	20 Nm (2.0 m · kg, 14 ft · lb)

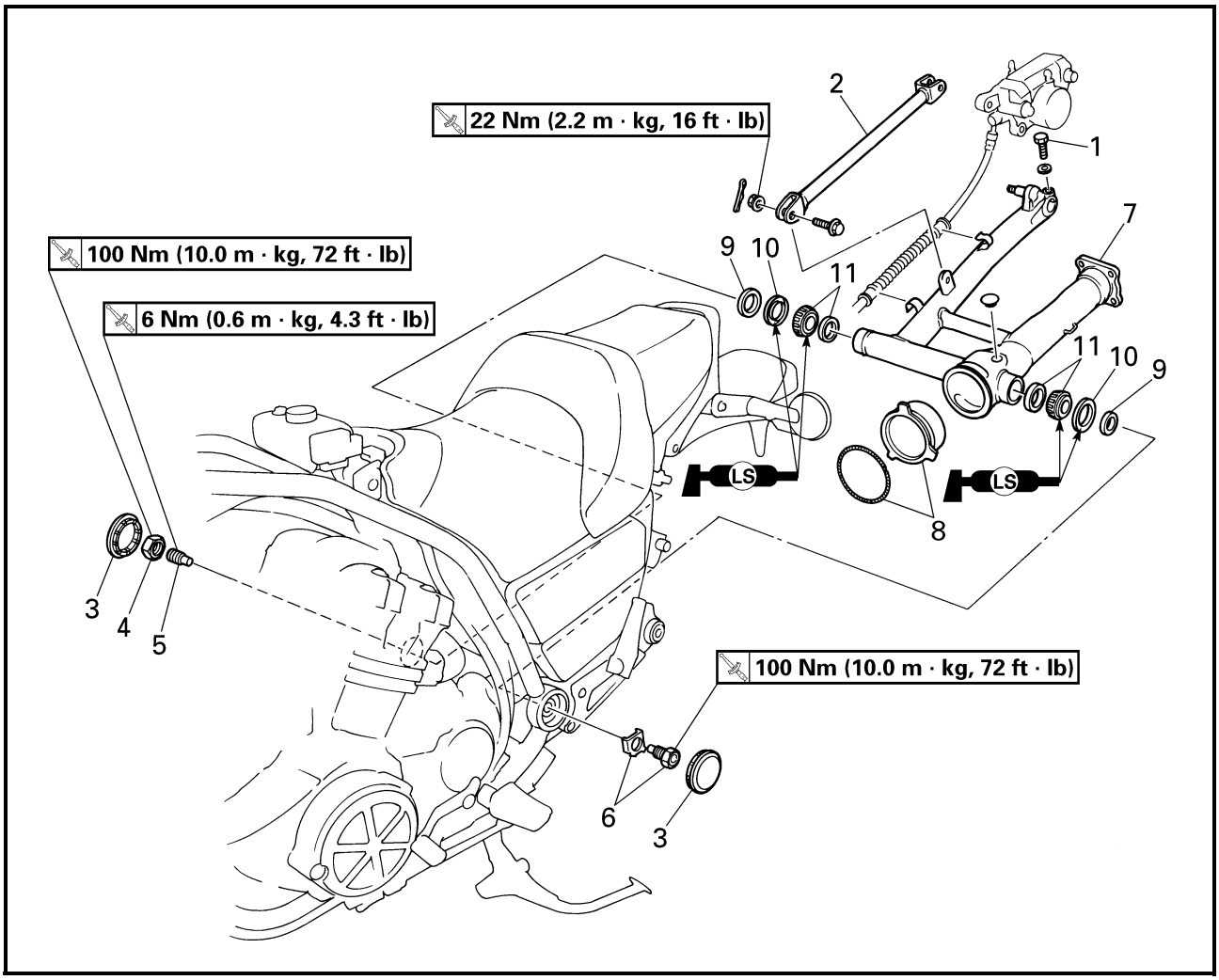
   - rear shock absorber lower nut

	30 Nm (3.0 m · kg, 22 ft · lb)

EAS00701
SWINGARM



Order	Job/Part	Q'ty	Remarks
	Removing the swingarm		Remove the parts in the order listed.
	Muffler		Refer to "ENGINE" in chapter 4.
	Rear shock absorbers		Refer to "REAR SHOCK ABSORBER".
	Final drive assembly		Refer to "SHAFT DRIVE".
1	Pinch bolt	1	
2	Brake torque rod	1	Refer to "INSTALLING THE SWINGARM".
3	Pivot bolt cover (left and right)	2	
4	Locknut	1	
5	Right pivot bolt	1	Refer to "REMOVING THE SWINGARM" and "INSTALLING THE SWINGARM".
6	Left pivot bolt/lock washer	1/1	
7	Swingarm	1	



Order	Job/Part	Q'ty	Remarks
8	Rubber boot/spring	1/1	Refer to "INSTALLING THE SWINGARM".
9	Spacer (left and right)	2	
10	Oil seal (left and right)	2	
11	Bearing (left and right)/ bearing race (left and right)	2/2	
			For installation, reverse the removal procedure.

EAS00702
REMOVING THE SWINGARM

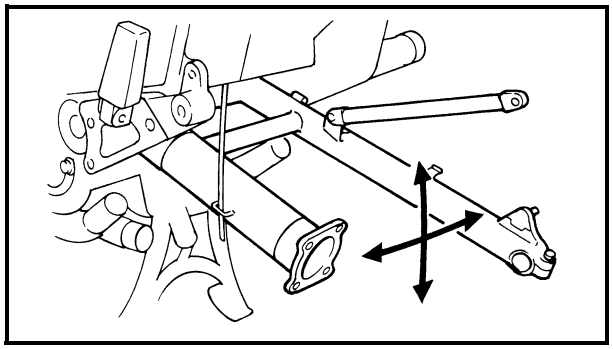
1. Stand the motorcycle on a level surface.

⚠ WARNING

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

NOTE:

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



2. Measure:
   - swingarm side play
   - swingarm vertical movement

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a. Measure the tightening torque of the swingarm pivot bolts and locknut.

Left pivot bolt
100 Nm (10.0 m • kg, 72 ft • lb)
Locknut
100 Nm (10.0 m • kg, 72 ft • lb)
Right pivot bolt
6 Nm (0.6 m • kg, 4.3 ft • lb)

b. Measure the swingarm side play by moving the swingarm from side to side.
c. If the swingarm side play is out of specification, check the spacers and bearings.

Swingarm side play (at the end of the swingarm)
0 mm (0 in)

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

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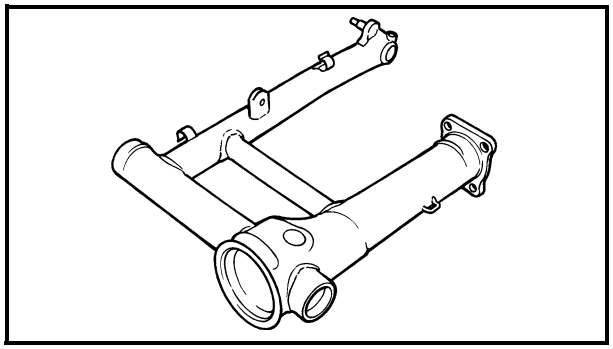


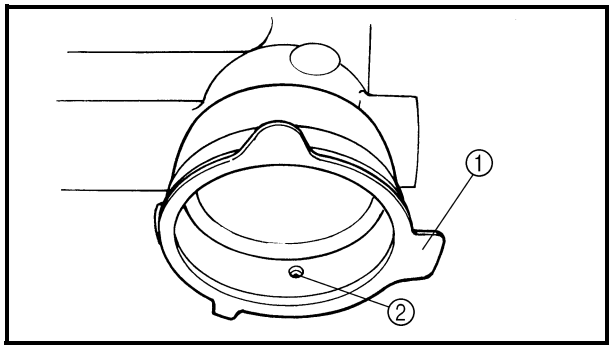
EAS00708
CHECKING THE SWINGARM

1. Check:
   - swingarm
     Bends/cracks/damage → Replace.
2. Check:
   - left pivot bolt
   - right pivot bolt
     Damage/wear → Replace.
3. Check:
   - spacers
   - oil seals
   - bearings
   - pivot bolt covers
     Damage/wear → Replace.

EAS00712
INSTALLING THE SWINGARM

1. Lubricate:
   - bearings
   - spacers
   - oil seals

	Recommended lubricant **Lithium soap base grease**



2. Install:
   - rubber boot ①

NOTE:
Make sure the hole ② on the rubber boot is facing downward.

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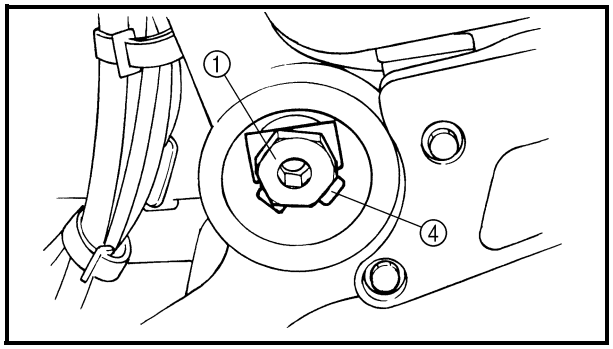

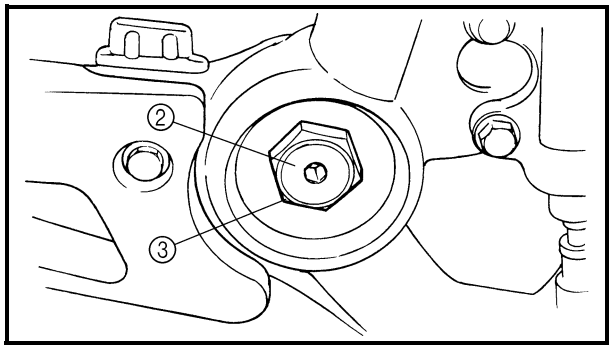

3. Tighten:
   - left pivot bolt ①
   - right pivot bolt ②
   - locknut ③

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a. Tighten the left pivot bolt ① to specification.

	Left pivot bolt **100 Nm (10.0 m • kg, 72 ft • lb)**

b. Tighten the right pivot bolt ② to specification.

	Right pivot bolt **6 Nm (0.6 m • kg, 4.3 ft • lb)**

c. Tighten the locknut ③ to specification.

	Locknut **100 Nm (10.0 m • kg, 72 ft • lb)**

d. Bend the lock washer tab ④ along a flat side of the locknut.

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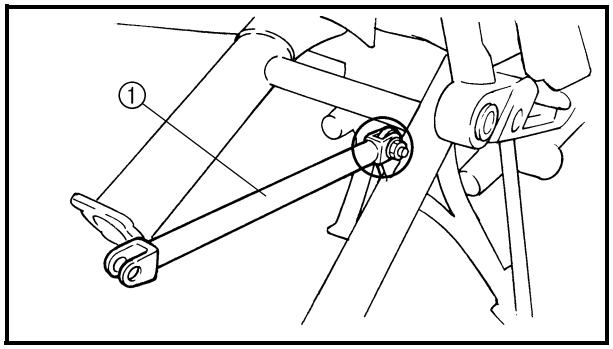

4. Install:
   - brake torque rod ①

	22 Nm (2.2 m · kg, 16 ft · lb)

⚠ WARNING

Always use a new cotter pin.

5. Install:
   - rear wheel

   Refer to “REAR WHEEL AND BRAKE DISC”.

EAS00715
SHAFT DRIVE
TROUBLESHOOTING

A	Symptom	B	Possible cause
1.	A pronounced hesitation or jerky movement during acceleration, deceleration or sustained speeds. (not to be confused with engine surging or transmission-related movements.)	A.	Bearing damage
2.	A rolling “rumble” noticeable at low speeds, a high-pitched whine or a “clunk” from a shaft drive component, or from the vicinity of the shaft drive.	B.	Improper gear backlash
3.	The shaft drive is locked up or no power is transmitted from the engine to the rear wheel.	C.	Damaged gear teeth
		D.	Broken drive shaft
		E.	Broken gear teeth
		F.	Seizure due to lack of lubrication
		G.	Small foreign objects lodged between moving parts

NOTE:
Causes A, B, and C may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal operating noises. If there is reason to believe that these components are damaged, remove them and check them individual.

Inspection notes

1. Inves tigate any unusual noises.

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The following noises may indicate a mechanical defect:

a. A rolling “rumble” during coasting, acceleration or deceleration (increases with the rear wheel speed, but 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 or too little gear backlash

⚠ WARNING

Insufficient gear backlash is extremely destructive to the gear teeth. If a test ride, following reassembly, indicates these symptoms, stop riding immediately to minimize gear damage.

c. A slight “clunk” evident at low speed operation (not to be confused with normal motorcycle operation).
   Diagnosis: Possible broken gear teeth

⚠ WARNING

Stop riding immediately if broken gear teeth are suspected. This condition could result in the shaft drive assembly locking up, causing a loss of control and possible injury to the rider.

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EAS00716
Troubleshooting chart

When causes (A) or (B) shown in the table at the beginning of the “TROUBLESHOOTING” section exist, check the following points.

Place the motorcycle on a suitable stand so that the front wheel is elevated and then spin the front wheel. Is the wheel bearing damaged?

YES ⇨ Replace the wheel bearing.
Refer to “FRONT WHEEL AND BRAKE DISCS”.

NO ↓

Place the motorcycle on a suitable stand so that the rear wheel is elevated and then spin the rear wheel. Is the wheel bearing damaged?

NO ➡ Rear wheel bearings and shaft drive bearings are probably not damaged. Repeat the test or remove and check the components.

YES ↓

Remove the rear wheel. Is the wheel bearing damaged?

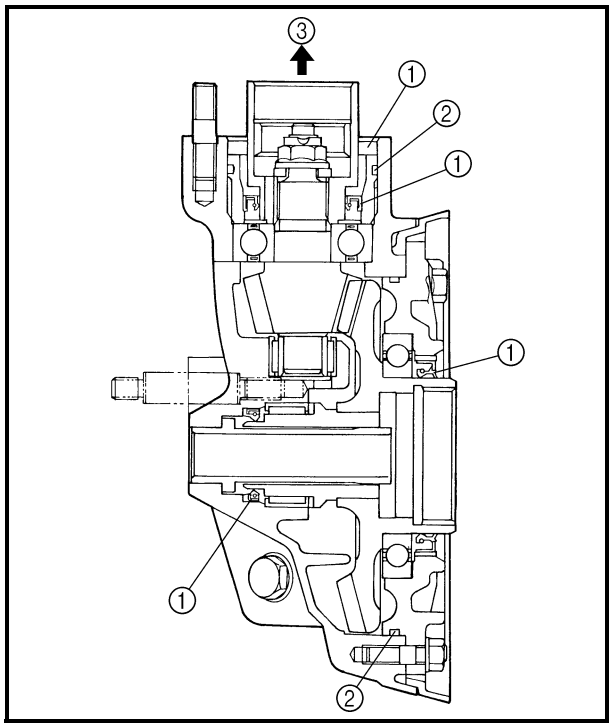
YES ⇨ Replace the rear wheel bearing.
Refer to “REAR WHEEL AND BRAKE DISCS”.

NO ↓

Remove and check the drive shaft components.

EAS00717
CHECKING THE FINAL DRIVE OIL FOR CONTAMINATION AND CHECKING THE SHAFT DRIVE FOR LEAKS

1. Drain:
   - final drive oil
     (from the final drive housing)
     Refer to “CHANGING THE FINAL DRIVE OIL” in chapter 3.



2. Check:
   - final drive oil
     Large amount of metal particles → Check for bearing seizure.

NOTE:
A small amount of metal particles in the final drive oil is normal.

3. Check:
   - shaft drive housing
     (for oil leaks)

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a. Thoroughly clean the entire motorcycle and then completely dry it.
b. Apply a leak-locating compound or dry powder spray to the shaft drive.
c. Test ride the motorcycle long enough to locate a leak.
   Oil leak → Repair or replace the faulty part(s).

① Oil seal
② O-ring
③ Forward

NOTE:
- What may appear to be an oil leak on a new or fairly new motorcycle, may result from the application of a rust preventive coating or excessive seal lubrication.
- Always clean the motorcycle and recheck the area where the leak is thought to originate from.

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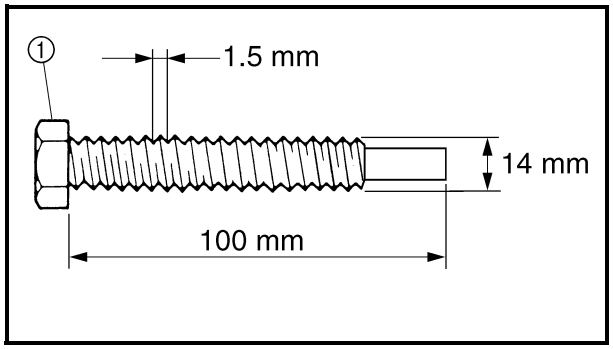
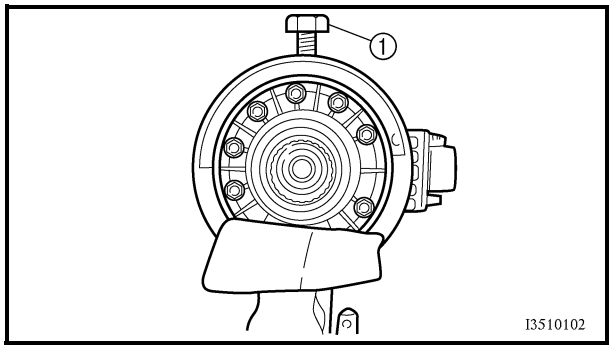
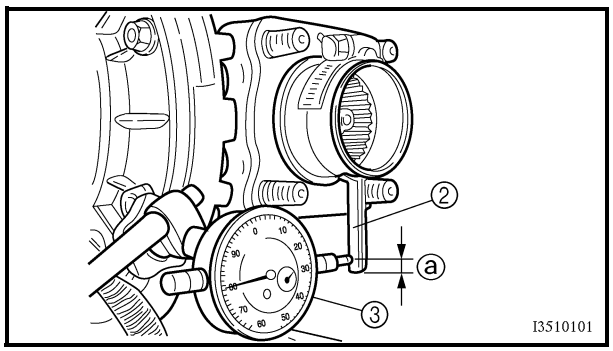
EAS00719
MEASURING THE RING GEAR BACKLASH

1. Secure the final drive assembly in a vise.
2. Remove:
   - final drive oil drain bolt
3. Drain:
   - final drive oil
     (from the final drive assembly)







4. Measure:
   - ring gear backlash
     Out of specification → Adjust.

	Ring gear backlash **0.1 ~ 0.2 mm (0.0039 ~ 0.0079 in)**

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a. Install the ring gear fix bolt ①, into the final gear oil drain hole.

	Ring gear fix bolt (M14) **YM-01524**

b. Finger tighten the bolt until it stops the ring gear from moving.

NOTE:
Do not overtighten the bolt.

c. Install the final gear backlash band ② and dial gauge ③.

	Final gear backlash band **YM-01230**

ⓐ Dial-gauge-plunger contact point

d. Gently rotate the gear coupling from engagement to engagement.
e. Record the reading on the dial gauge.
f. Remove the dial gauge, final gear backlash band, and bolt.
g. Rotate the final drive pinion gear 90°.
h. Reinstall the bolt, special tool, and dial gauge.
i. Repeat steps (d) to (h) three more times (for a total of four measurements).
j. If any of the readings are over specification, adjust the ring gear backlash.

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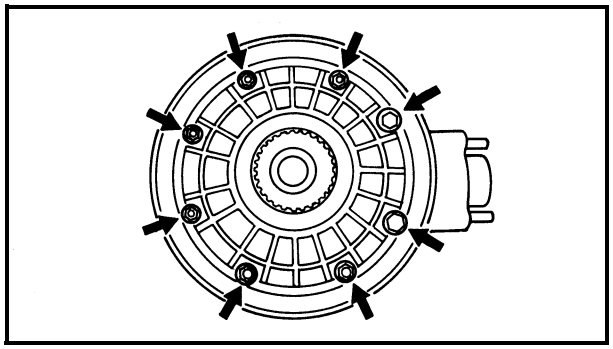

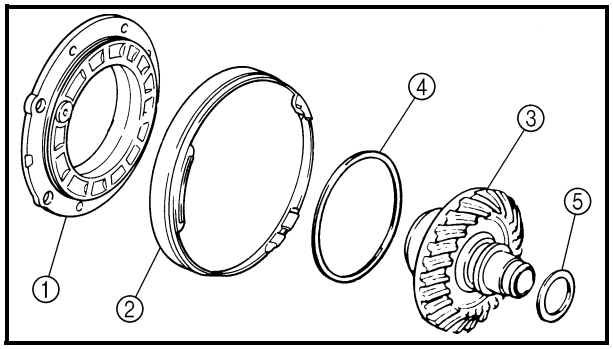

EAS00720
ADJUSTING THE RING GEAR BACKLASH

1. Remove:
   - ring gear bearing housing nuts
   - ring gear bearing housing bolts

NOTE:
Working in a crisscross pattern, loosen each nut 1/4 of a turn. After all of the nuts are fully loosened, remove them and the bolts.

2. Remove:
   - ring gear bearing housing ①
   - dust cover ②
   - ring gear ③
   - ring gear shim(s) ④
   - thrust washer ⑤
3. Adjust:
   - ring gear backlash

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a. Select the suitable shim(s) and thrust washer with the following chart.

Thinner shim	**Ring gear backlash is increased.**
Thicker shim	**Ring gear backlash is decreased.**

b. If it is necessary to increase the ring gear backlash by more than 0.2 mm, reduce the thrust washer thickness by 0.2 mm for every 0.2 mm increase of ring gear shim thickness.
c. If it is necessary to reduce the ring gear backlash by more than 0.2 mm, increase the thrust washer thickness by 0.2 mm for every 0.2 mm decrease of ring gear shim thickness.

Ring gear shims	
Thickness (mm)	**0.25 0.30 0.40 0.50**

Thrust washers	
Thickness (mm)	**1.2 1.4 1.6 1.8 2.0**

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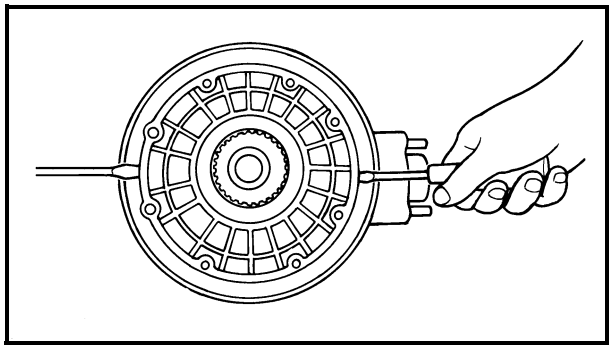
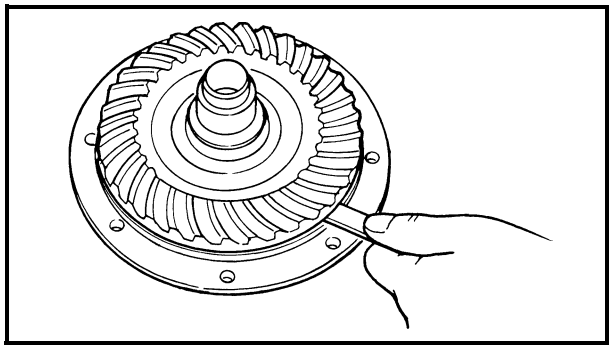


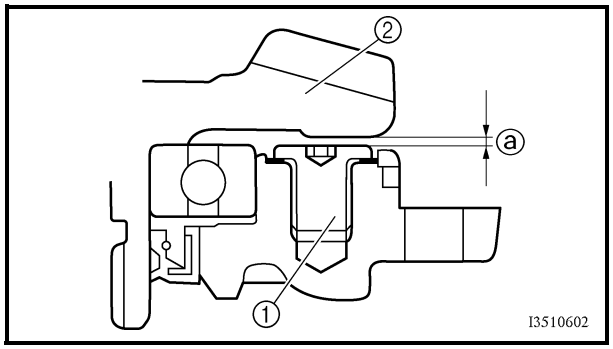
EAS00721
MEASURING THE RING-GEAR-TO-STOPPER-BOLT CLEARANCE

1. Remove:
   - ring gear bearing housing (along with the ring gear)
     Refer to "ADJUSTING THE RING GEAR BACKLASH".



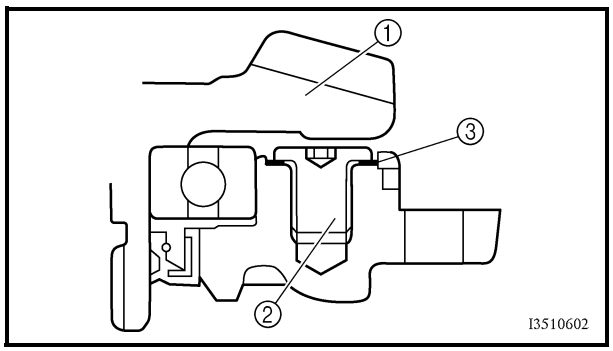
2. Measure:
   - ring-gear-to-stopper-bolt clearance ⓐ
     Out of specification → Adjust.

	Ring-gear-to-stopper-bolt clearance **0.30 ~ 0.60 mm** **(0.0118 ~ 0.0236 in)**



① Stopper bolt
② Ring gear

3. Install:
   - ring gear bearing housing (along with the ring gear)



EAS00722
ADJUSTING THE RING-GEAR-TO-STOPPER-BOLT CLEARANCE

1. Remove:
   - ring gear ①
   - stopper bolt ②
   - stopper bolt shim(s) ③
   - ring gear bearing housing
2. Select:
   - stopper bolt shim(s)

	Stopper bolt shims
Thickness (mm)	**0.15 0.20**

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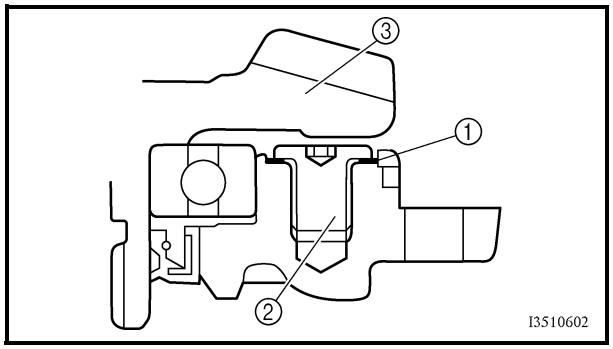


3. Install:
   - stopper bolt shim(s) ①
   - stopper bolt ②

	9 Nm (0.9 m · kg, 6.5 ft · lb)

   - ring gear ③
   - ring gear bearing housing

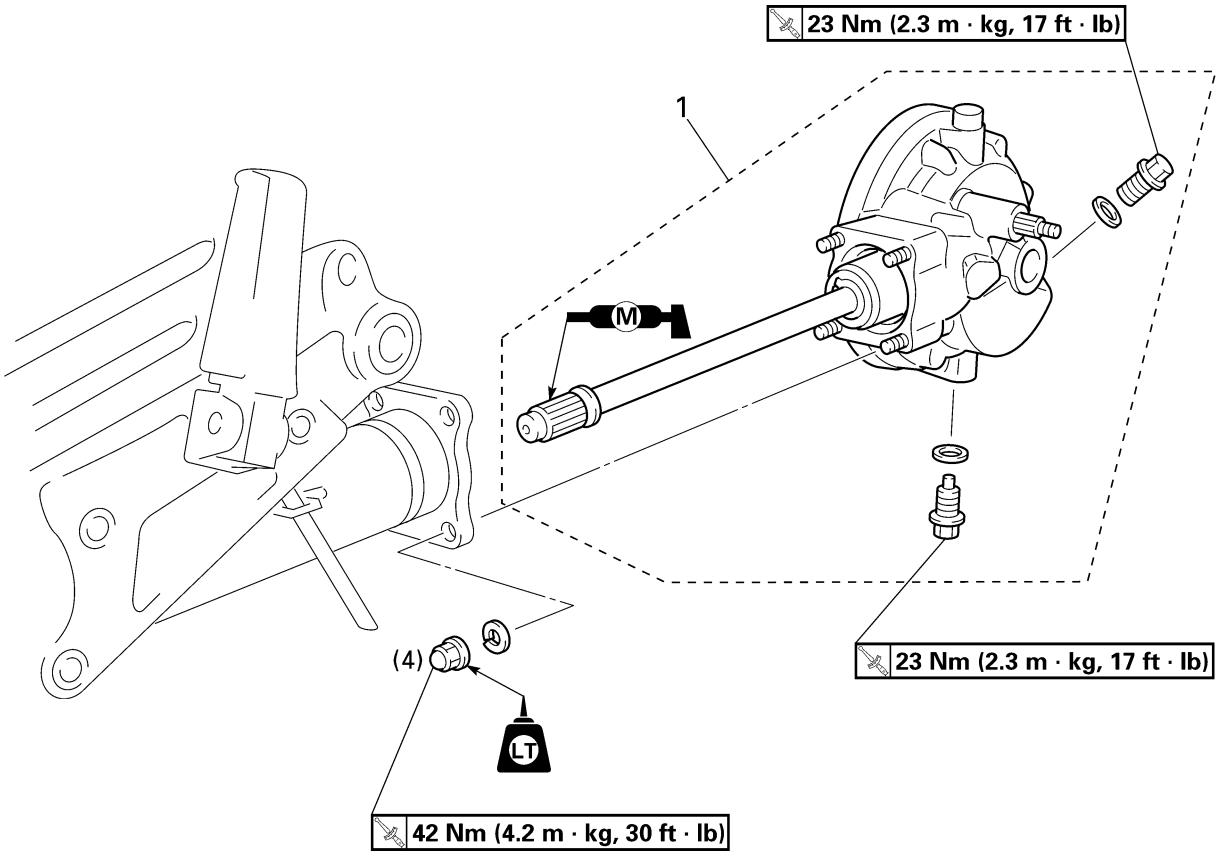
CAUTION:

- **The stopper bolt has left-hand threads. To tighten the stopper bolt, turn it counter-clockwise.**
- **Apply LOCTITE® onto the stopper bolt.**

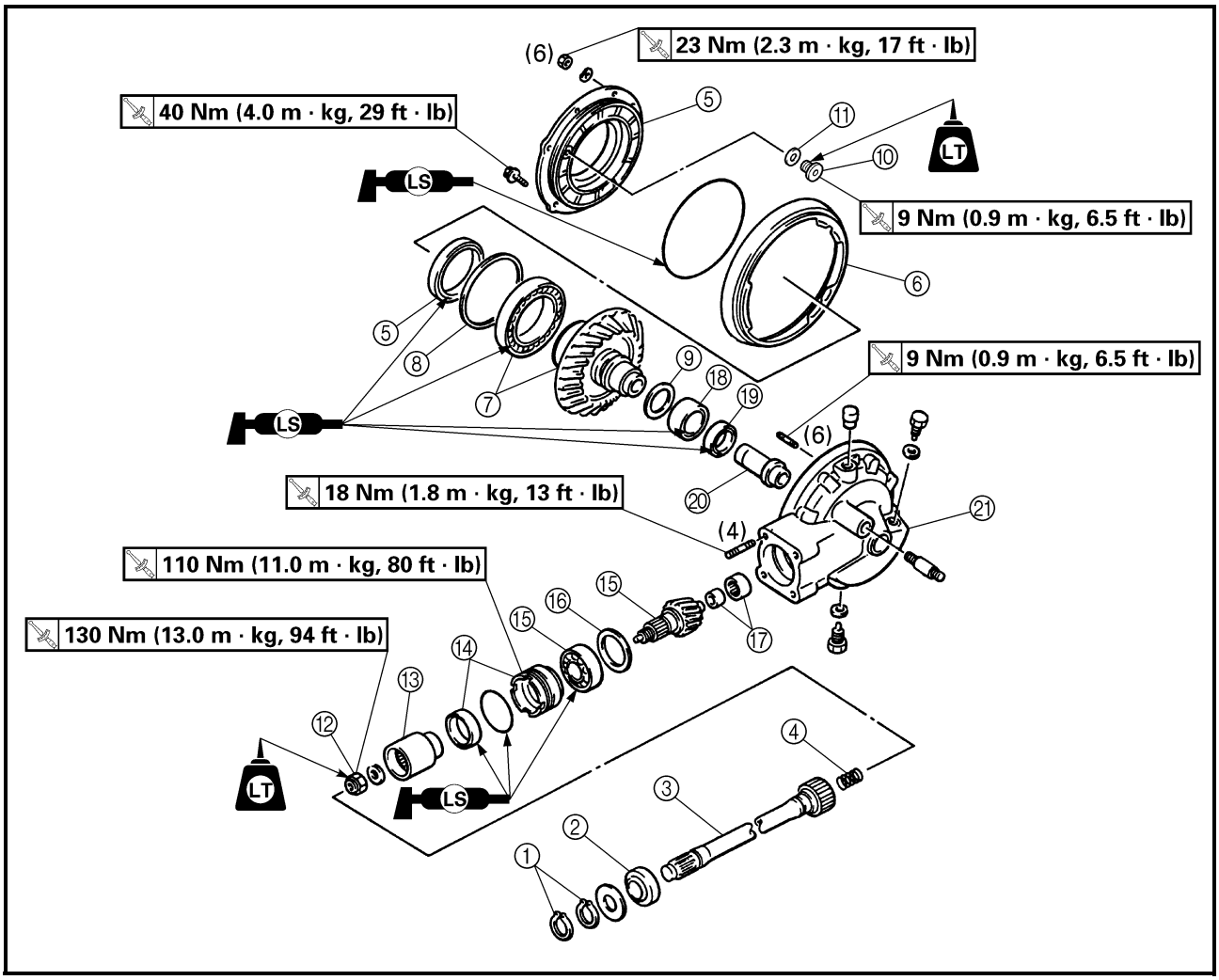
4. Measure:
   - ring-gear-to-stopper-bolt clearance

NOTE:

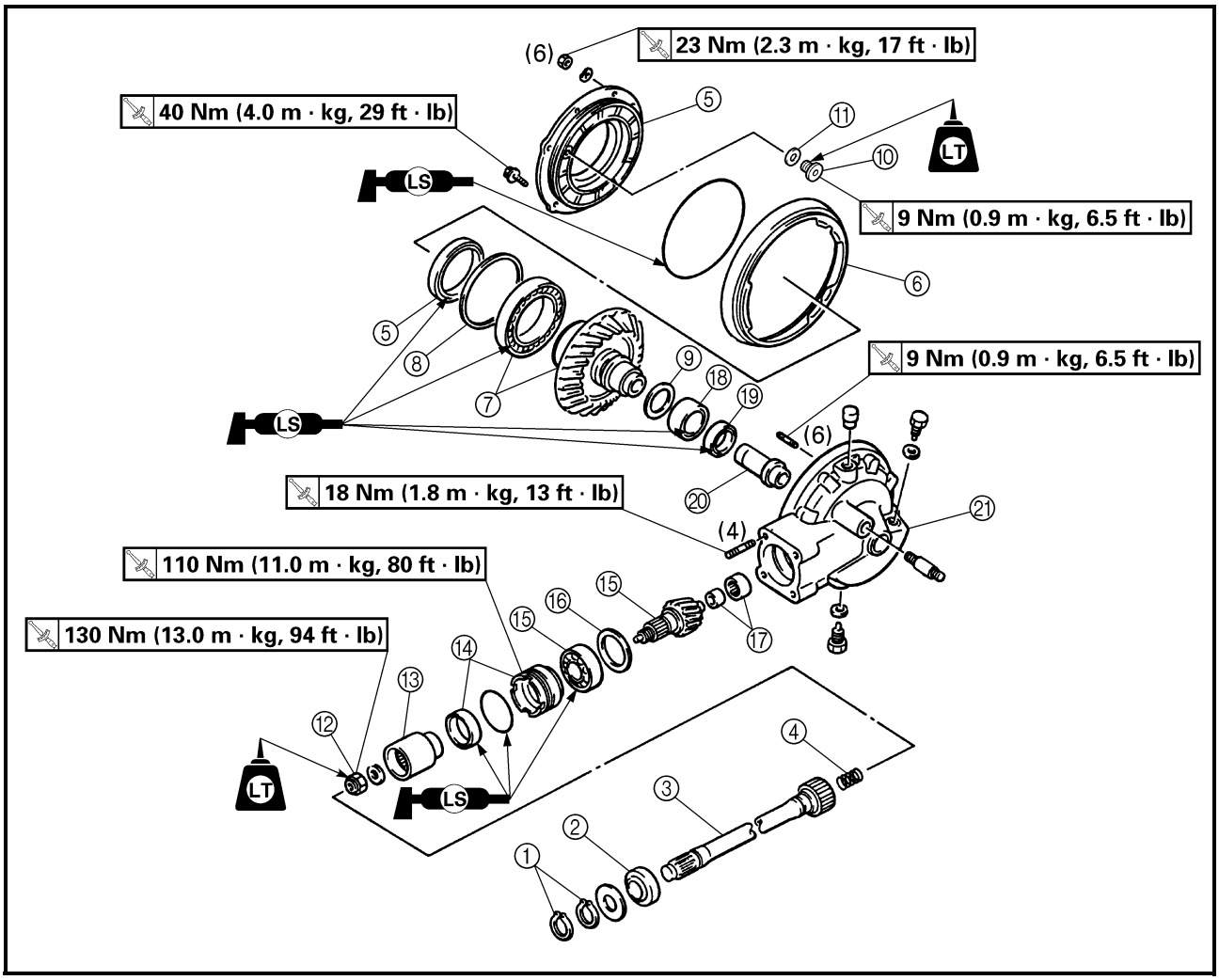
If the ring-gear-to-stopper-bolt clearance is out of specification, repeat the above procedure.



Order	Job/Part	Q'ty	Remarks
	Removing the final drive assembly		Remove the parts in the order listed.
	Final gear oil		Drain.
	Rear wheel		Refer to "REAR WHEEL AND BRAKE DISC".
	Rear shock absorber (left)		Refer to "REAR SHOCK ABSORBER".
1	Final drive assembly	1	Refer to "INSTALLING THE FINAL DRIVE ASSEMBLY". For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the final drive assembly		Remove the parts in the order listed.
①	Circlip	2	
②	Oil seal	1	
③	Drive shaft	1	
④	Spring	1	
⑤	Ring gear bearing housing/oil seal	1/1	Refer to "ALIGNING THE FINAL DRIVE PINION GEAR AND RING GEAR".
⑥	Dust cover	1	
⑦	Ring gear/bearing	1/1	
⑧	Ring gear shim(s)		
⑨	Thrust washer	1	
⑩	Stopper bolt	1	
⑪	Stopper bolt shim(s)		



Order	Job/Part	Q'ty	Remarks
⑫	Nut	1	Left-hand threads.
⑬	Gear coupling	1	
⑭	Bearing retainer/oil seal	1/1	Left-hand threads.
⑮	Final drive pinion gear/bearing	1/1	
⑯	Final drive pinion gear shim(s)		
⑰	Bearing	1	
⑱	Bearing	1	
⑲	Oil seal	1	
⑳	Collar	1	
㉑	Final drive housing	1	
			For assembly, reverse the disassembly procedure.

Refer to "DISASSEMBLING THE FINAL DRIVE ASSEMBLY" and "ALIGNING THE FINAL DRIVE PINION GEAR AND RING GEAR".

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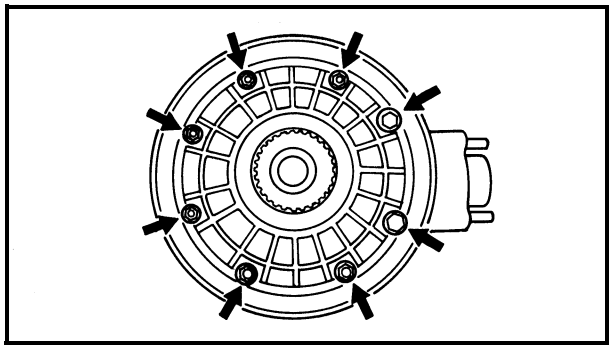
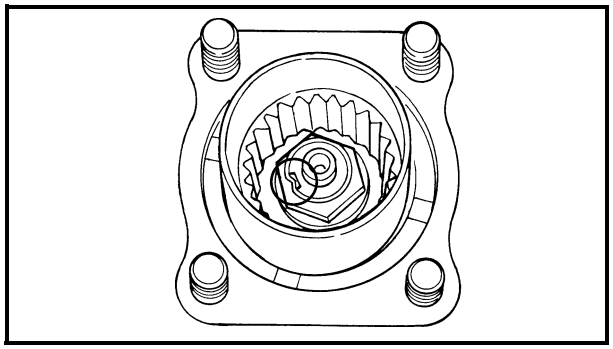


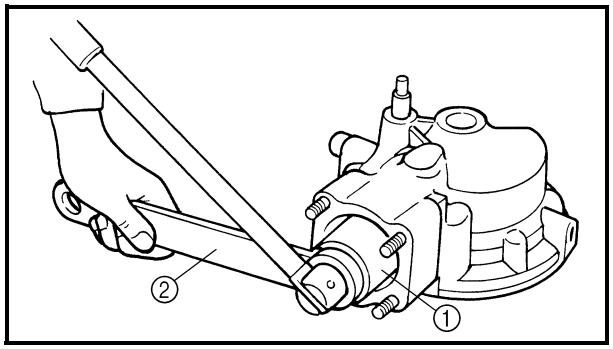
EAS00724
DISASSEMBLING THE FINAL DRIVE ASSEMBLY

1. Remove:
   - ring gear bearing housing nuts
   - ring gear bearing housing bolts

NOTE:
Working in a crisscross pattern, loosen each nut 1/4 of a turn. After all of the nuts are fully loosened, remove them and the bolts.

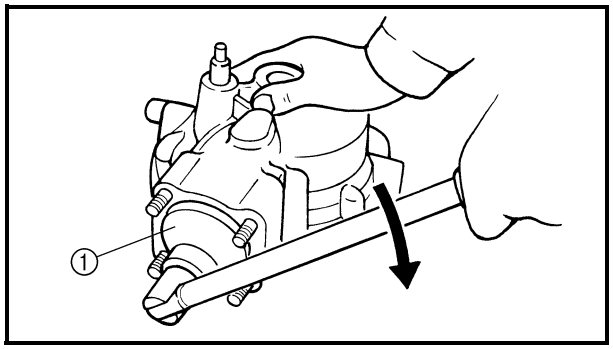


2. Straighten:
   - punched portion of the nut



3. Remove:
   - nut
   - gear coupling ①
     (with the coupling gear/middle shaft tool ②)

	**Coupling gear/middle shaft tool YM-01229**



4. Remove:
   - bearing retainer
     (with the bearing retainer wrench ①)

	**Bearing retainer wrench YM-04050**

CAUTION:
The bearing retainer has left-hand threads. To loosen the bearing retainer, turn it clockwise.

5. Remove:
   - final drive pinion gear

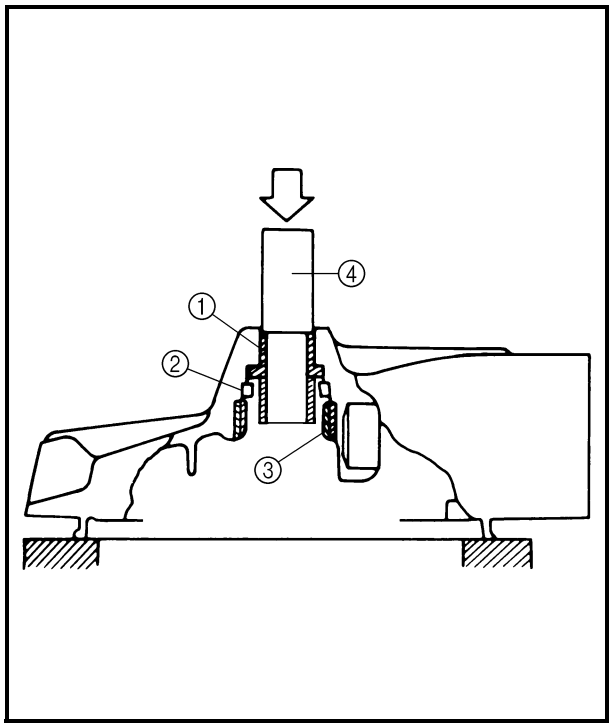
⚠ WARNING
Always use new bearings.

CAUTION:

The final drive pinion gear should only be removed if ring gear replacement is necessary.

NOTE:

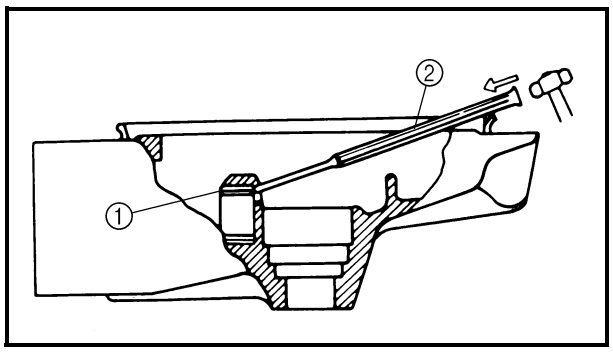
Lightly tap on the end of the final drive pinion gear with a soft hammer.



EAS00725

REMOVING AND INSTALLING THE RING GEAR BEARINGS

1. Remove:
   - collar ①
   - oil seal ②
   - bearing ③
     (with an suitable press tool ④ and an appropriate support for the final drive housing)
2. Check:
   - bearing
     Damage → Replace.



3. Remove:
   - bearing ①

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a. Heat the final drive housing to approximately 150 °C (302 °F).
b. Remove the bearing outer races with an appropriately shaped punch ②.
c. Remove the inner race from the final drive pinion gear.

NOTE:

The removal of the final drive pinion gear bearing is a difficult procedure and is rarely necessary.

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4. Install:
   • bearing New

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a. Heat the final gear case to approximately 150 °C (302 °F).
b. Install the bearing outer races with a socket or appropriate tool that matches the diameter of the races.
c. Install the inner race onto the final drive pinion gear.

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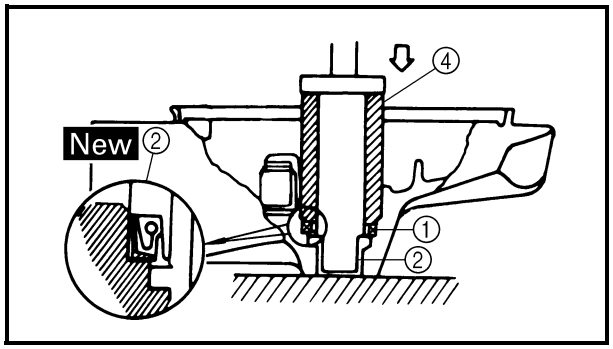
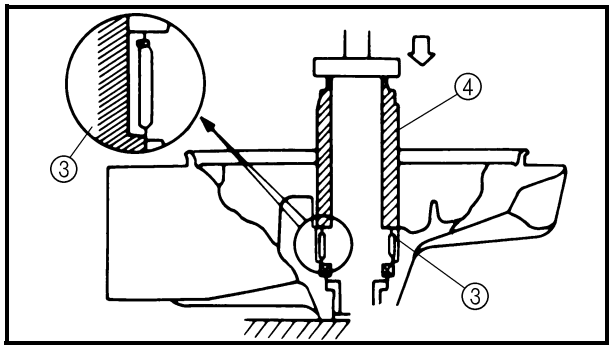




5. Install:
   • collar ①
   • oil seal ② New
   • bearing ③
   (with a suitable press tool ④ and an appropriate support for the final drive housing)

NOTE:

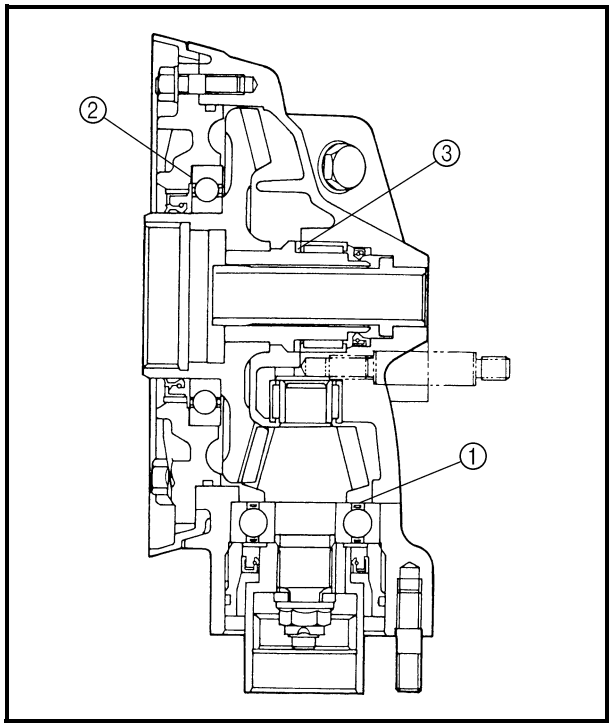
The bearing can be reused, but Yamaha recommends installing a new one.

EAS00726

ALIGNING THE FINAL DRIVE PINION GEAR AND RING GEAR

NOTE:

Aligning the final drive pinion gear and ring gear is necessary when any of the following parts are replaced:
• Final drive housing
• Ring gear bearing housing
• Any bearing



1. Select:
   - final drive pinion gear shim(s) ①
   - ring gear shim(s) ②

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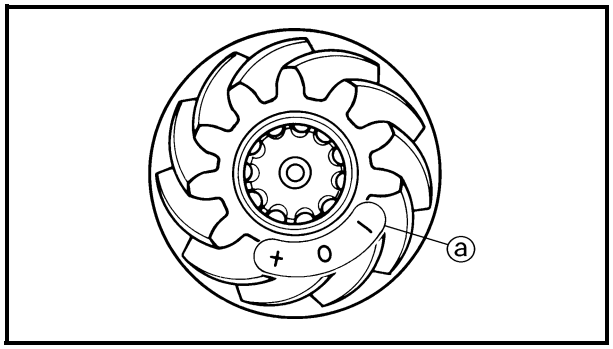
a. Position the final drive pinion gear and the ring gear with shims ① and ②. Calculate the respective thicknesses from information marked on the final drive housing and the drive pinion gear.

① Final drive pinion gear shim
② Ring gear shim
③ Thrust washer



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

Final drive pinion gear shim thickness
A = (84 + ⓐ/100) – (83 + ⓑ/100)

Where:

ⓐ = a numeral (positive or negative) on the ring gear, to be divided by 100 and added to "84".

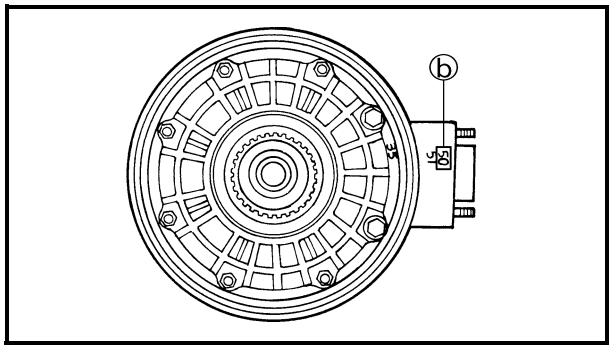
ⓑ = a numeral on the final drive housing, to be divided by 100 and added to "83".

Example:

If the final drive pinion gear is marked "+01" and the final drive housing is marked "50":

A = (84 + 1/100) – (83 + 50/100)
= (84 + 0.01) – (83 + 0.50)
= 84.01 – 83.50
= 0.51

Therefore, the calculated final drive pinion gear shim thickness is 0.51 mm. Shim sizes are supplied in the following thicknesses.



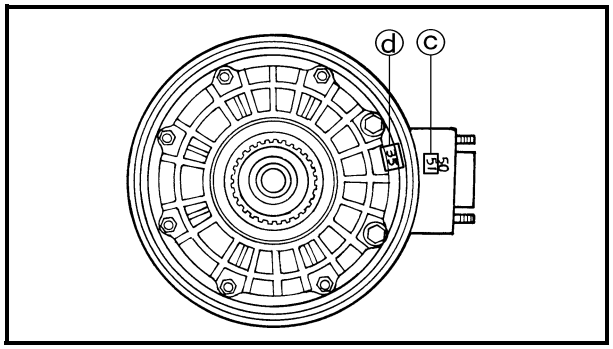
	Final drive pinion gear shims
Thickness (mm)	**0.30 0.40 0.50**

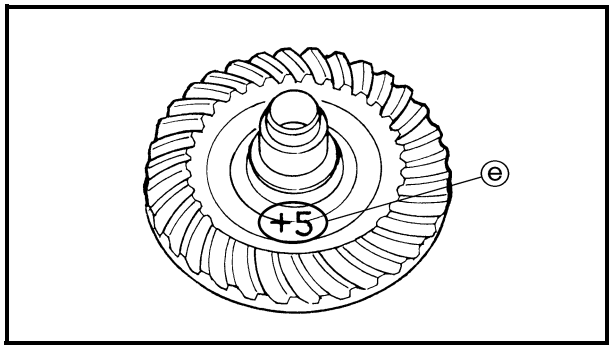
7

Since the final drive pinion gear shims are only available in 0.10 mm increments, round off to the hundredths digit.

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

In the example above, the calculated final drive pinion gear shim thickness is 0.51 mm. The chart instructs you to round off the 1 to 0. Thus, you should use a 0.50 mm final drive pinion gear shim.





c. To find ring gear shim thickness “B”, use the following formula:

Ring gear shim thickness
B = (45 + ⓒ/100) + (3 + ⓓ/100) – [(35.40 – ⓔ/100) + ⓕ]

Where:
ⓒ = a numeral on the final drive housing, to be divided by 100 and added to “45”.
ⓓ = a numeral usually on the outside of the ring gear bearing housing, to be divided by 100 and added to “3”.
ⓔ = a numeral (positive or negative) on the inside of the ring gear, to be divided by 100 and added to “35.40”.
ⓕ = the ring gear bearing thickness constant.

Ring gear bearing thickness “ⓕ”
13.00 mm (0.5118 in)

Example:

If the final drive housing is marked “51”, the ring gear bearing housing is marked “35”, the ring gear is marked “– 05”, and “ⓕ” is 13.00:

B = (45 + 51/100) + (3 + 35/100) –
[(35.40 – 5/100) + 13]
= (45 + 0.51) + (3 + 0.35) –
[(35.40 - 0.05) + 13]
= 45.51 + 3.35 – [(35.40 – 0.05) + 13]
= 48.86 – [35.35 + 13]
= 48.86 – 48.35
= 0.51

Therefore, the calculated ring gear shim thickness is 0.51 mm.

Shim sizes are supplied in the following thicknesses.

	**Ring gear shims**
Thickness (mm)	**0.25 0.30 0.40 0.50**

Since the ring gear shims are only available in 0.10 mm increments, round off the hundredths digit.

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

In the example above, the calculated ring gear shim thickness is 0.51 mm (0.0200 in). The chart instructs you to round off the 1 to 0. Thus, you should use a 0.50 mm (0.0197 in) ring gear shim.

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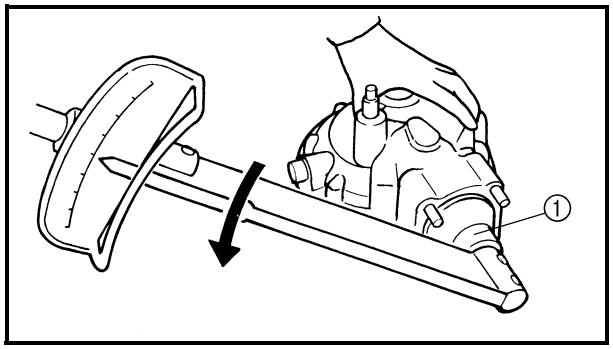


2. Install:
   - shims (as calculated)
   - final drive pinion gear
   - bearing retainer

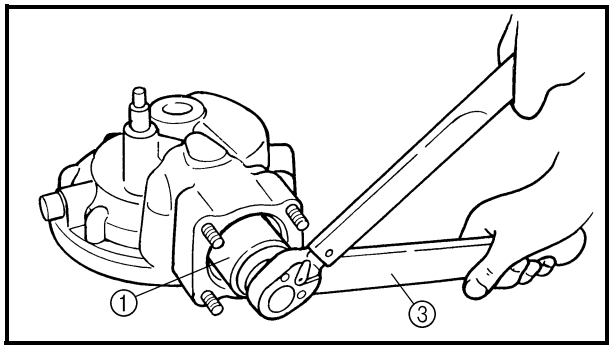
   110 Nm (11.0 m · kg, 80 ft · lb)

   (with the bearing retainer wrench ①)

CAUTION:

The bearing retainer has left-hand threads. To tighten the bearing retainer, turn it counterclockwise.

	Bearing retainer wrench YM-04050



3. Install:
   - gear coupling ①
   - nut ②

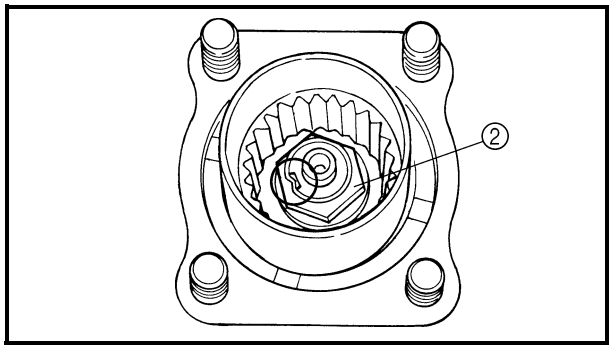
   130 Nm (13.0 m · kg, 94 ft · lb)

   (with the coupling gear/middle shaft tool ③)

	Coupling gear/middle shaft tool YM-01229

CAUTION:

Apply LOCTITE® to the nut.



4. Lock the threads with a drift punch.

5. Install:
   - ring gear bearing housing
     (along with the ring gear, but without the thrust washer)
6. Adjust:
   - ring gear backlash
     Refer to “MEASURING THE RING GEAR BACKLASH” and “ADJUSTING THE RING GEAR BACKLASH”.

7. Measure:
   • ring-gear-to-thrust-washer clearance

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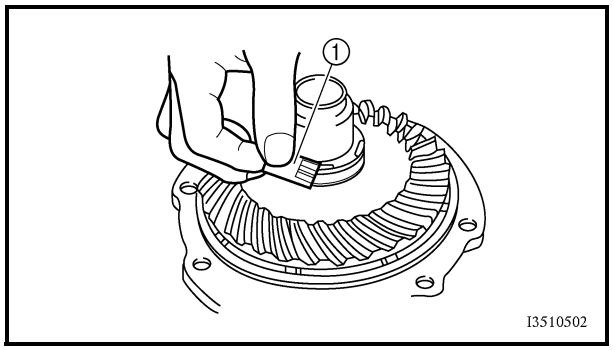
a. Remove the ring gear bearing housing (along with the ring gear).
b. Place four pieces of Plastigauge® between the original thrust washer and the ring gear.
c. Install the ring gear bearing housing and tighten the bolts and nuts to specification.

Ring gear bearing housing bolt
40 Nm (4.0 m • kg, 29 ft • lb)
Ring gear bearing housing nut
23 Nm (2.3 m • kg, 17 ft • lb)

NOTE:
Do not turn the final drive pinion gear and ring gear while measuring the ring-gear-to-thrust-washer clearance with Plastigauge®.



d. Remove the ring gear bearing housing.
e. Measure the width of the flattened Plastigauge® ①.

Ring-gear-to-thrust-washer clearance
0.10 ~ 0.20 mm (0.0039 ~ 0.0079 in)

f. If the ring-gear-to-thrust-washer clearance is within specification, install the ring gear bearing housing (along with the ring gear).
g. If the ring-gear-to-thrust-washer clearance is out of specification, select the correct thrust washer as follows.
h. Select the suitable thrust washer from the following chart.

Thrust washers	
Thickness (mm)	**1.2 1.4 1.6 1.8 2.0**

i. Repeat the measurement steps until the ring-gear-to-thrust-washer clearance is within the specified limits.

Ring-gear-to-thrust-washer clearance
0.10 ~ 0.20 mm (0.0039 ~ 0.0079 in)

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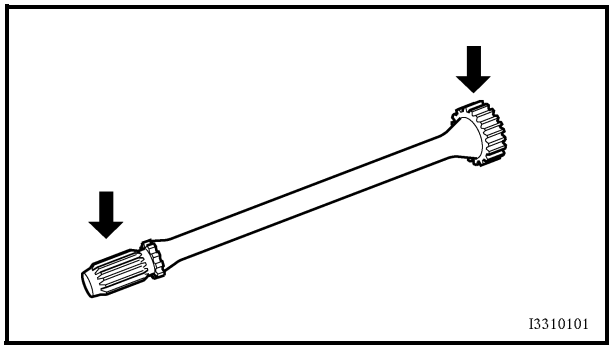
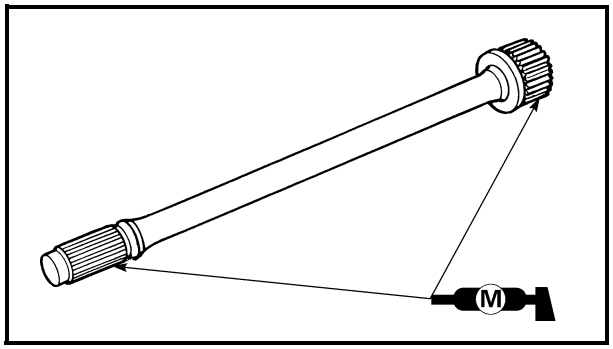


EAS00727
CHECKING THE DRIVE SHAFT

1. Check:
   - drive shaft splines
     Damage/wear → Replace the drive shaft.



EAS00728
INSTALLING THE FINAL DRIVE ASSEMBLY

1. Lubricate:
   - drive shaft splines

	Recommended lubricant **Molybdenum disulfide grease**

2. Install:
   - final drive assembly

NOTE:
Align the drive shaft splines with the driven yoke of the universal joint.

3. Tighten:
   - final drive assembly nuts

	42 Nm (4.2 m · kg, 30 ft · lb)

NOTE:
Apply locking agent (LOCTITE®) to the threads of the final gear assembly nuts.

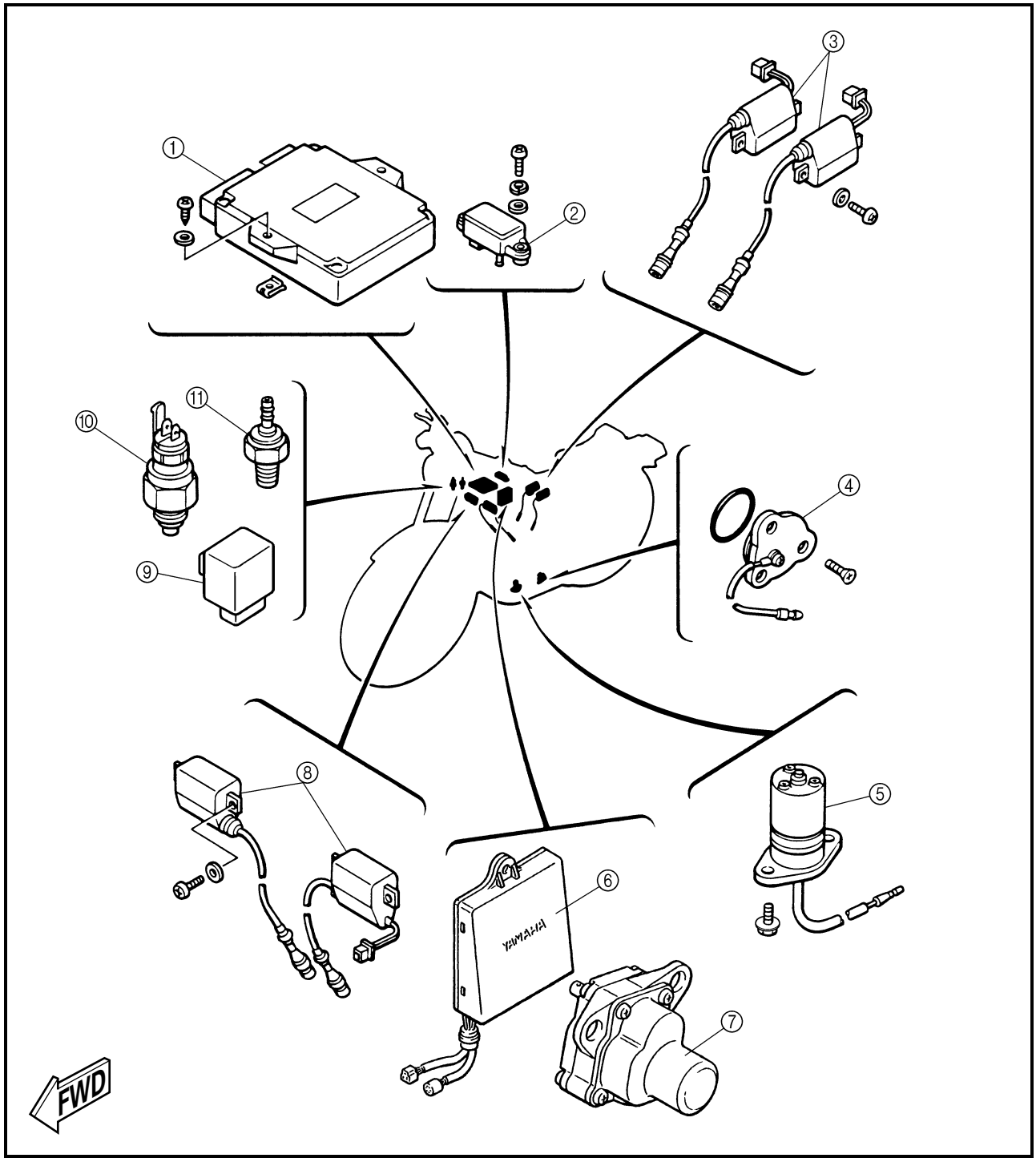
4. Install:
   - rear shock absorber (left)
     Refer to “REAR SHOCK ABSORBER”.
   - rear wheel
     Refer to “REAR WHEEL AND BRAKE DISC”.
5. Fill:
   - final drive assembly
     Refer to “CHECKING THE FINAL DRIVE OIL LEVEL” in chapter 3.

EAS00729

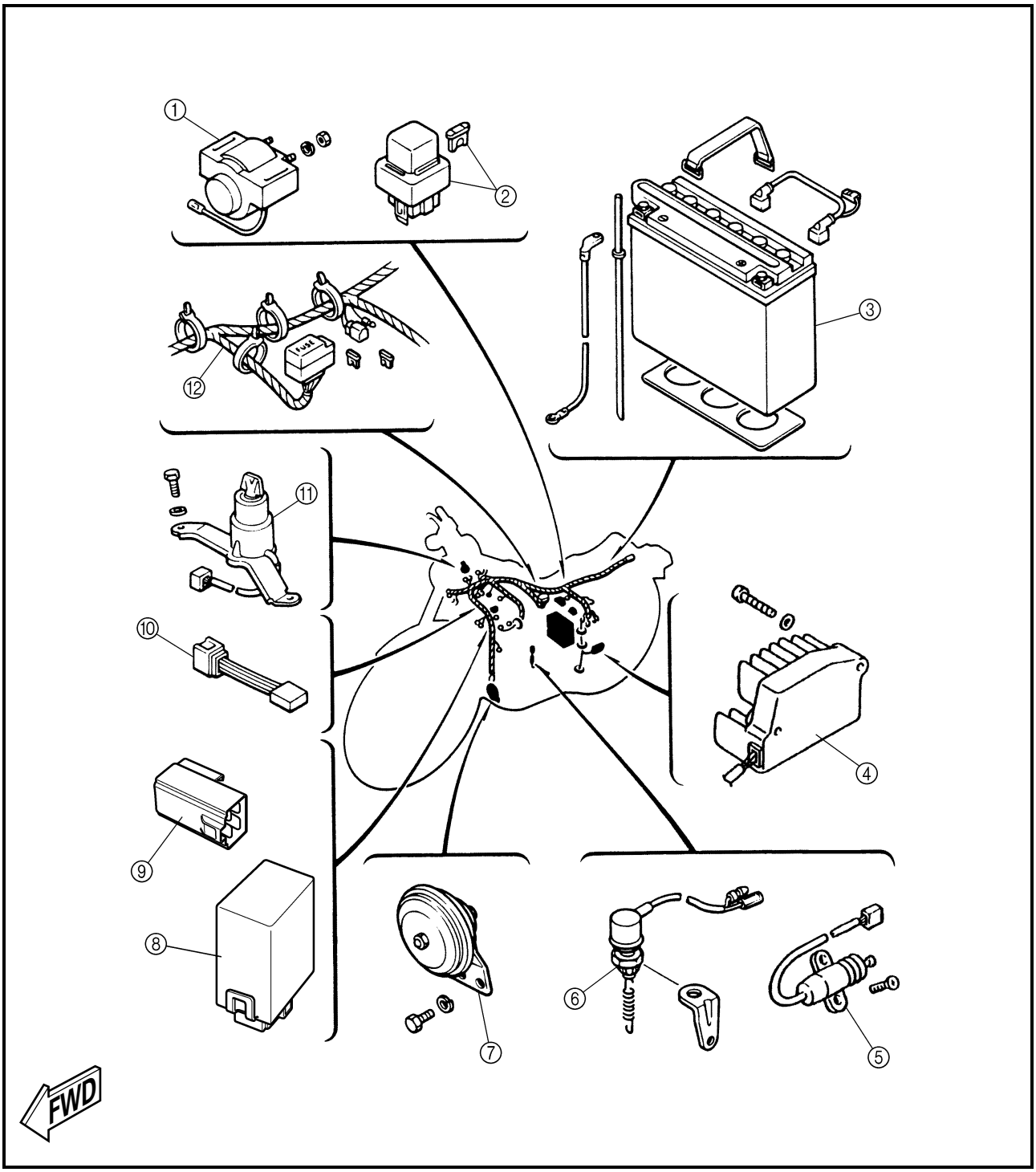
ELECTRICAL

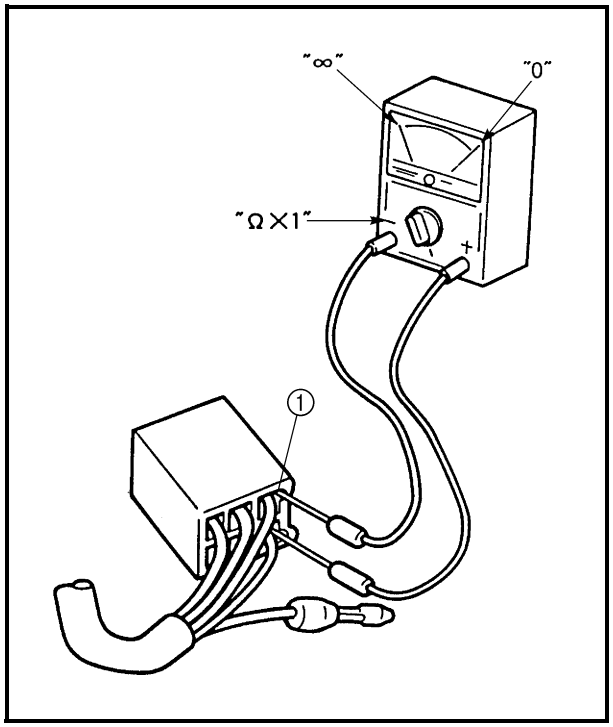
ELECTRICAL COMPONENTS

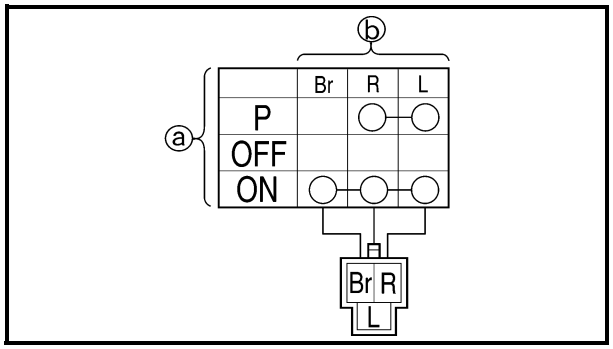
① Ignitor unit
② Pressure sensor
③ Ignition coil (#1 & #3)
④ Neutral switch
⑤ Oil level gauge
⑥ V-boost control unit
⑦ V-boost servo motor
⑧ Ignition coil (#2 & #4)
⑨ Fuel pump relay
⑩ Thermo switch
⑪ Temperature sender



① Starter relay
② Main fuse
③ Battery
④ Rectifier/regulator
⑤ Sidestand switch
⑥ Rear brake light switch
⑦ Horn
⑧ Turn signal relay
⑨ Starting circuit cutoff relay
⑩ Diode assembly
⑪ Main switch
⑫ Wire harness







EAS00730

SWITCHES

CHECKING SWITCH CONTINUITY

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, check the wiring connections and if necessary, replace the switch.

CAUTION:

Never insert the tester probes into the coupler terminal slots ①. Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.

Pocket tester
YU-03112

NOTE:

- Before checking for continuity, set the pocket tester to "0" and to the "Ω × 1" range.
- When checking for continuity, switch back and forth between the switch positions a few times.

The terminal connections for switches (e.g., main switch, engine stop switch) are shown in an illustration similar to the one on the left.
The switch positions ⓐ are shown in the far left column and the switch lead colors ⓑ are shown in the top row in the switch illustration.

NOTE:

"○—○" terminals (i.e., a closed circuit at the respective switch position).

The example illustration on the left shows that:

There is no continuity between all terminals when the switch is set to "OFF".
There is continuity between red and brown when the switch is set to "ON".

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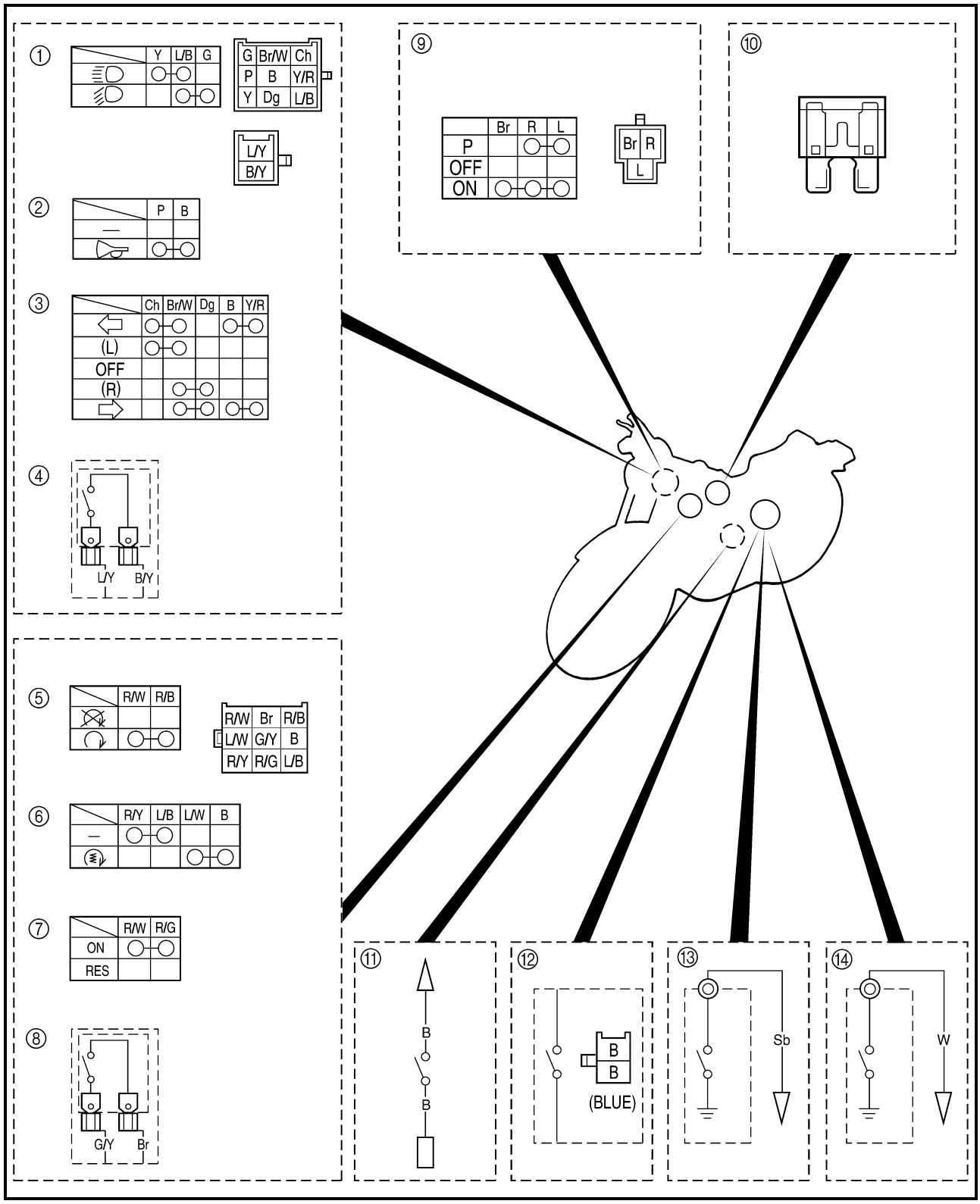
EAS00731
CHECKING THE SWITCHES

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 Dimmer switch
② Horn switch
③ Turn signal switch
④ Clutch switch
⑤ Engine stop switch
⑥ Start switch
⑦ Fuel reserve switch
⑧ Front brake light switch
⑨ Main switch
⑩ Fuse
⑪ Rear brake light switch
⑫ Sidestand switch
⑬ Neutral switch
⑭ Oil level switch

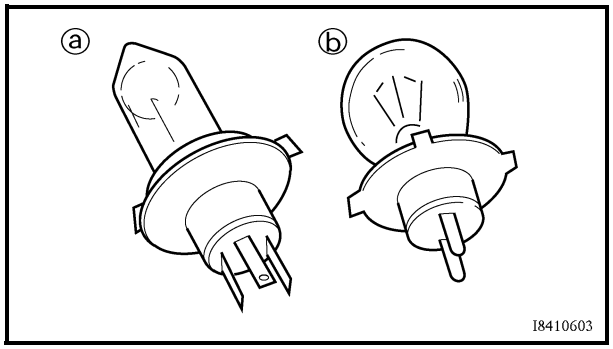
EAS00732
CHECKING THE BULBS AND BULB SOCKETS

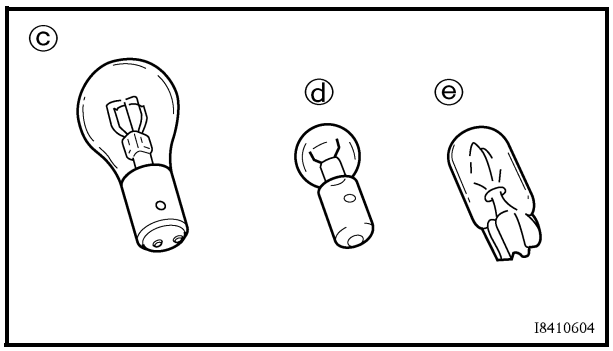
Check each bulb and bulb socket for damage or wear, proper connections, and also for continuity between the terminals.

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 motorcycle are shown in the illustration on the left.

- Bulbs ⓐ and ⓑ are used for the headlights and usually use a bulb holder that must be detached before removing the bulb. The majority of these types of bulbs can be removed from their respective socket by turning them counterclockwise.
- Bulbs ⓒ is used for turn signal and tail/brake lights and can be removed from the socket by pushing and turning the bulb counterclockwise.
- Bulbs ⓓ and ⓔ are used for meter and indicator lights and can be removed from their respective socket by carefully pulling them out.

CHECKING THE CONDITION OF THE BULBS

The following procedure applies to all of the bulbs.

1. Remove:
   - bulb

⚠ WARNING

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

CAUTION:

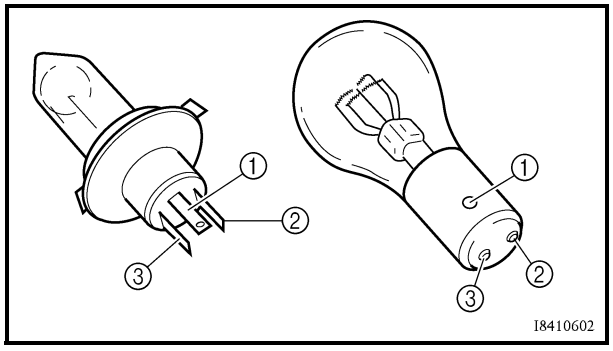
- **Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.**
- **Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb, and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.**

2. Check:
   - bulb (for continuity)
     (with the pocket tester)
     No continuity → Replace.

	**Pocket tester** **YU-03112**

NOTE:

Before checking for continuity, set the pocket tester to "0" and to the "Ω × 1" range.



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a. Connect the positive tester probe to terminal ① and the negative tester probe to terminal ②, and check the continuity.
b. Connect the positive tester probe to terminal ① and the negative tester probe to terminal ③, and check the continuity.
c. If either of the readings indicate no continuity, replace the bulb.

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CHECKING THE CONDITION OF THE BULB SOCKETS

The following procedure applies to all of the bulb sockets.

1. Check:
   - bulb socket (for continuity)
     (with the pocket tester)
     No continuity → Replace.

Pocket tester
YU-03112

NOTE:

Check each bulb socket for continuity in the same manner as described in the bulb section; however, note the following.

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a. Install a good bulb into the bulb socket.
b. Connect the pocket tester probes to the respective leads of the bulb socket.
c. Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.

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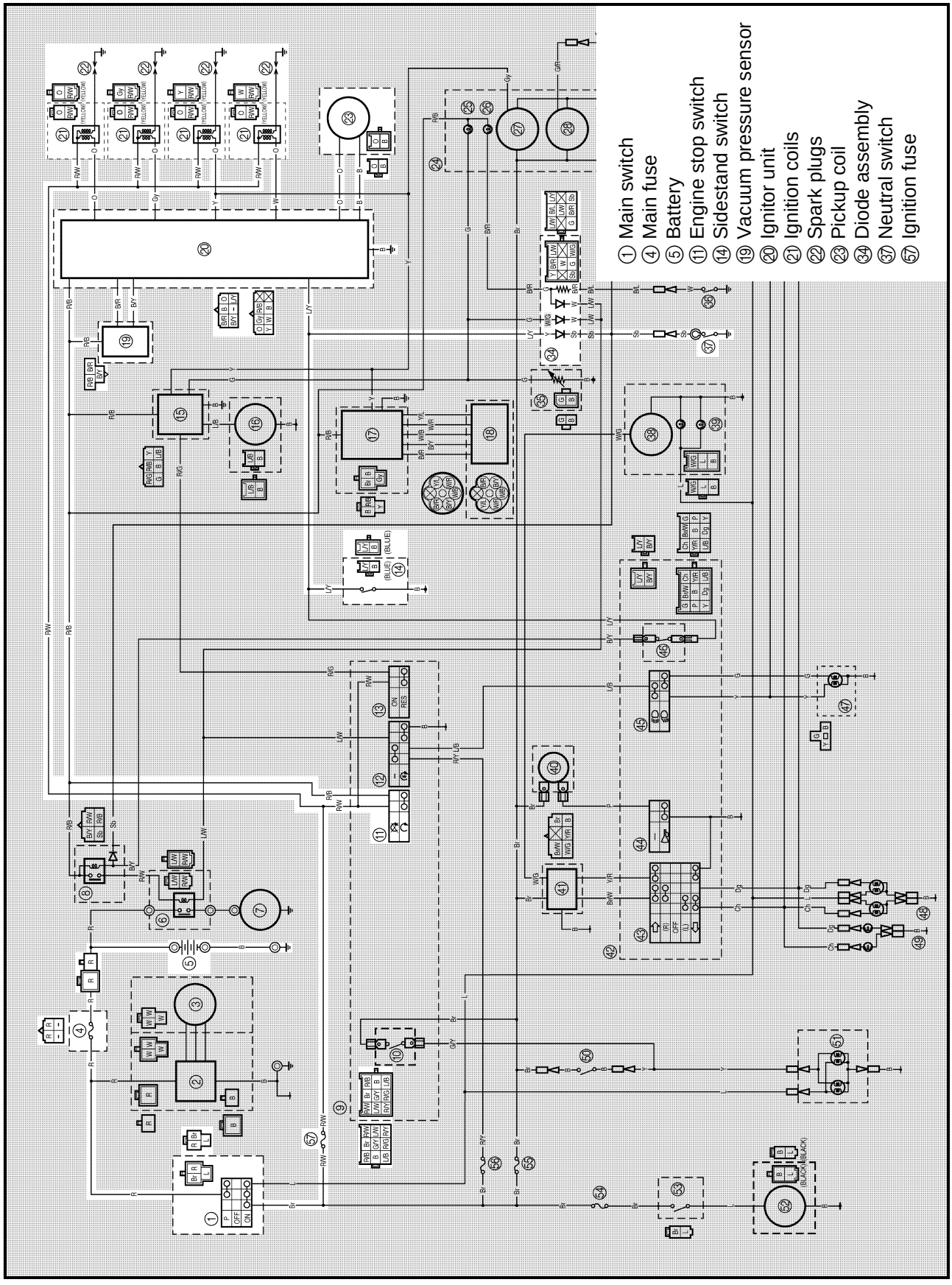
EAS00735

IGNITION SYSTEM

CIRCUIT DIAGRAM



EAS00737
TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

Check:
1. main and ignition fuses
2. battery
3. spark plugs
4. ignition spark gap
5. spark plug cap resistance
6. ignition coil resistance
7. pickup coil resistance
8. main switch
9. engine stop switch
10. neutral switch
11. sidestand switch
12. diode assembly
13. vacuum pressure sensor
14. wiring connections (of the entire ignition system)

NOTE:
- Before troubleshooting, remove the following part(s):

1) top cover
2) electrical components board
3) left side cover
4) rider seat
5) main switch cover

- Troubleshoot with the following special tool(s).

Ignition checker
YM-34487
Pocket tester
YU-03112

EAS00738

1. Main and ignition fuses

- Check the main and ignition fuses for continuity.
  Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main and ignition fuses OK?

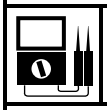
YES

NO → Replace the fuse(s).

EAS00739

2. Battery

- Check the condition of the battery.
  Refer to "CHECKING 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.

EAS00741

3. Spark plugs

The following procedure applies to all of the spark plugs.
- Check the condition of the spark plug.
- Check the spark plug type.
- Measure the spark plug gap.
  Refer to "CHECKING THE SPARK PLUGS" in chapter 3.

Standard spark plug
DPR8EA-9 (NGK)
X24EPR-U9 (DENSO)
Spark plug gap
0.8 ~ 0.9 mm (0.03 ~ 0.04 in)

- Is the spark plug in good condition, is it of the correct type, and is its gap within specification?

YES

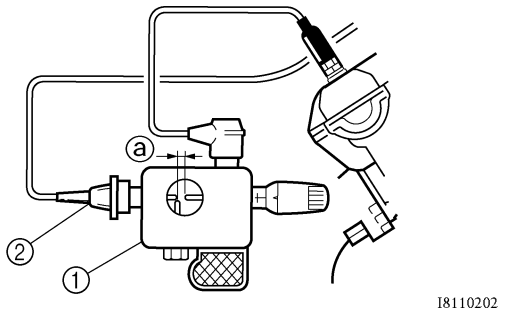
NO → Re-gap or replace the spark plug.

EAS00743

4. Ignition spark gap

The following procedure applies to all of the spark plugs.
- Disconnect the spark plug cap from the spark plug.
- Connect the dynamic spark tester ① as shown.

② Spark plug cap
- Set the main switch to "ON".
- Measure the ignition spark gap ⓐ.
- Crank the engine by pushing the starter switch and gradually increase the spark gap until a misfire occurs.



I8110202

Minimum ignition spark gap
6 mm (0.24 in)

- Is there a spark and is the spark gap within specification?

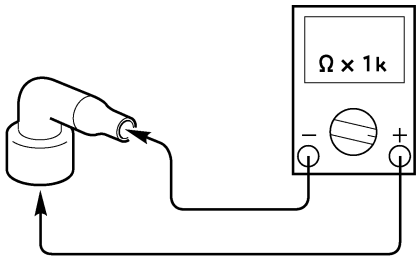
NO → Replace the spark plug cap.

YES → The ignition system is OK.

EAS00745

5. Spark plug cap resistance

The following procedure applies to all of the spark plug caps.
- Remove the spark plug cap from the spark plug lead.
- Connect the pocket tester (Ω × 1k) to the spark plug cap as shown.
- Measure the spark plug cap resistance.



I8040101

Spark plug cap resistance
10 kΩ at 20 °C (68 °F)

- Is the spark plug cap OK?

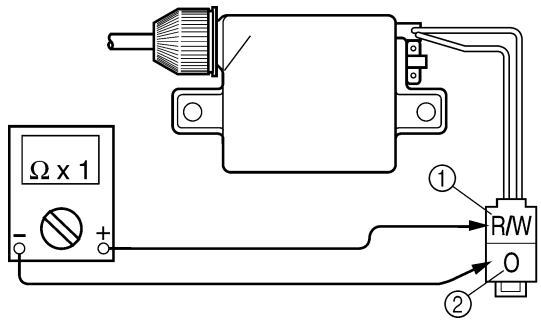
YES → NO → Replace the spark plug cap.

EAS00747

6. Ignition coil resistance

The following procedure applies to all of the ignition coils.
- Disconnect the ignition coil leads from the wire harness.
- Connect the pocket tester (Ω × 1) to the ignition coil as shown.

Positive tester probe → red/white ①
Negative tester probe → orange ②



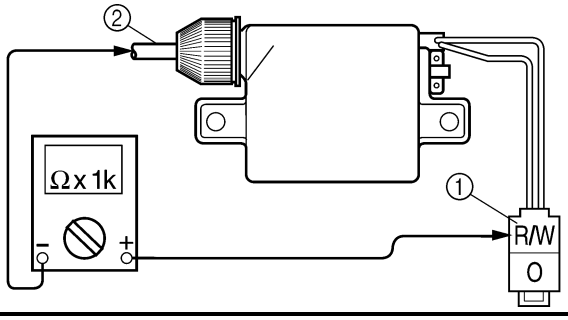
- Measure the primary coil resistance.

Primary coil resistance
2.43 ~ 2.97 Ω at 20 °C (68 °F)

- Connect the pocket tester (Ω × 1k) to the ignition coil as shown.

Negative tester probe → red/white ①
Positive tester probe → spark plug lead ②

8



• Measure the secondary coil resistance.

Secondary coil resistance
10.56 ~ 15.84 kΩ at 20 °C (68 °F)

• Is the ignition coil OK?

YES

NO

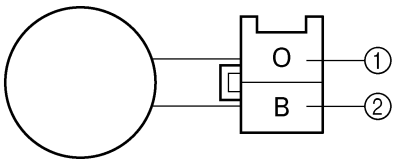
Replace the ignition coil.

EAS00748

7. Pickup coil resistance

• Disconnect the pickup coil coupler from the wire harness.
• Connect the pocket tester (Ω × 100) to the pickup coil terminal as shown.

Positive tester probe → orange ①
Negative tester probe → black ②



• Measure the pickup coil resistance.

Pickup coil resistance
80.8 ~ 121.2 Ω at 20 °C (68 °F)
(between orange and black)

• Is the pickup coil OK?

YES

NO

Replace the pickup coil.

EAS00749

8. Main switch

• Check the main switch for continuity. Refer to “CHECKING THE SWITCHES”.
• Is the main switch OK?

YES

NO

Replace the main switch.

EAS00750

9. Engine stop switch

• Check the engine stop switch for continuity. Refer to “CHECKING THE SWITCHES”.
• Is the engine stop switch OK?

YES

NO

Replace the right handlebar switch.

EAS00751

10.Neutral switch

• Check the neutral switch for continuity. Refer to “CHECKING THE SWITCHES”.
• Is the neutral switch OK?

YES

NO

Replace the neutral switch.

EAS00752

11.Sidestand switch

• Check the sidestand switch for continuity. Refer to “CHECKING THE SWITCHES”.
• Is the sidestand switch OK?

YES

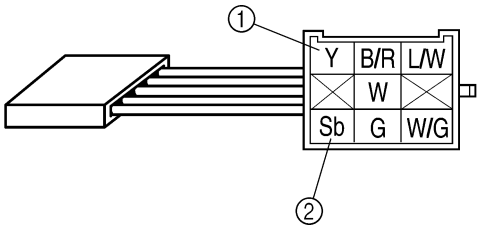
NO

Replace the side-stand switch.

12.Diode assembly

- Disconnect the diode assembly coupler from the wire harness.
- Connect the pocket tester (Ω × 1) to the diode assembly coupler as shown.
- Check the diode assembly for continuity.

Positive tester probe → **sky blue ①** **Negative tester probe →** **yellow ②**	**Continuity**
Positive tester probe → **yellow ②** **Negative tester probe →** **sky blue ①**	**No continuity**



NOTE:
When you switch the positive and negative tester probes, the readings in the above chart will be reversed.

- Are the tester readings correct?

YES → NO

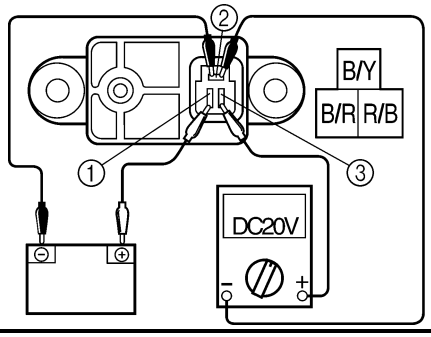
Replace the diode assembly.

13.Vacuum pressure sensor

- Disconnect the vacuum pressure sensor coupler from the wire harness.
- Connect the pocket tester (DC 20 V) and battery (12 V) to the vacuum pressure sensor terminals as shown.

Battery positive terminal → red/black ①
Battery negative terminal → black/yellow ②

Tester positive probe → black/red ③
Tester negative probe → black/yellow ②



- Measure the vacuum pressure sensor output voltage.

Vacuum pressure sensor out put voltage
2.0 V at 0 Pa (0 psi)

- Is the vacuum pressure sensor OK?

YES → NO

Replace the vacuum pressure sensor.

EAS00754

14.Wiring connections

- Check the entire ignition system's wiring. Refer to "CIRCUIT DIAGRAM".
- Is the ignition system's wiring properly connected and without defects?

YES → NO

Replace the ignitor unit.

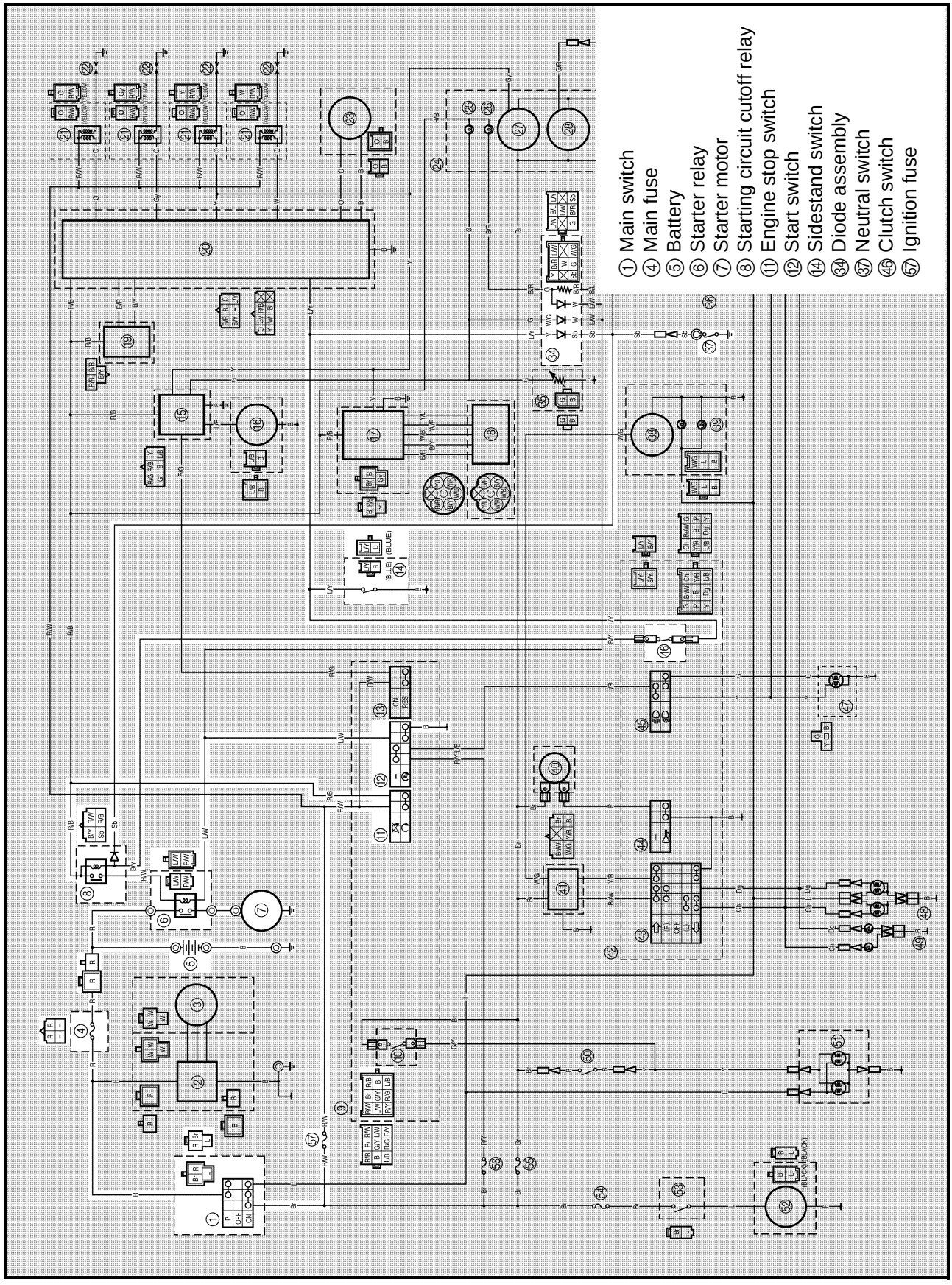
Properly connect or repair the ignition system's wiring.

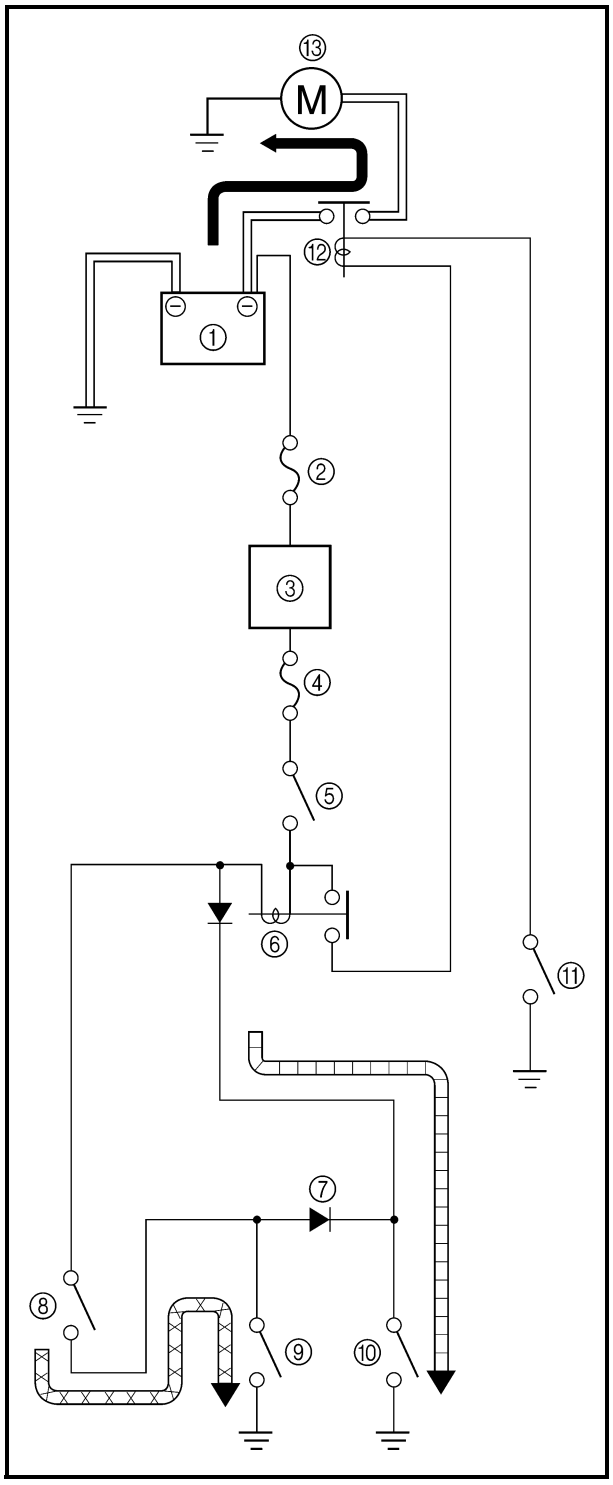
8

EAS00755

ELECTRIC STARTING SYSTEM

CIRCUIT DIAGRAM





EAS00756
STARTING CIRCUIT CUTOFF SYSTEM OPERATION

If the engine stop switch is set to " " and the main switch is set to "ON" (both switches are closed), the starter motor can only operate if at least one of the following conditions is met:

- The transmission is in neutral (the neutral switch is closed).
- The clutch lever is pulled to the handlebar (the clutch switch is closed) and the sidestand is up (the sidestand switch is closed).

The starting circuit cutoff relay prevents the starter motor from operating when neither of these conditions has been met. In this instance, the starting circuit cutoff relay is open so current cannot reach the starter motor. When at least one of the above conditions has been met the starting circuit cutoff relay is closed and the engine can be started by pressing the starter switch.

WHEN THE TRANSMISSION IS IN NEUTRAL

WHEN THE SIDESTAND IS UP AND THE CLUTCH LEVER IS PULLED TO THE HANDLEBAR

① Battery
② Main fuse
③ Main switch
④ Ignition fuse
⑤ Engine stop switch
⑥ Starting circuit cutoff relay
⑦ Diode assembly
⑧ Clutch switch
⑨ Sidestand switch
⑩ Neutral switch
⑪ Start switch
⑫ Starter relay
⑬ Starter motor

EAS00757
TROUBLESHOOTING

The starter motor fails to turn.

Check:
1. main and ignition fuses
2. battery
3. starter motor
4. starting circuit cutoff relay
5. starter relay
6. main switch
7. engine stop switch
8. neutral switch
9. sidestand switch
10. clutch switch
11. start switch
12. diode assembly
13. wiring connections (of the entire starting system)

NOTE:
- Before troubleshooting, remove the following part(s):

1) top cover
2) electrical components board
3) left side cover
4) rider seat
5) main switch cover

- Troubleshoot with the following special tool(s).

Pocket tester
YU-03112

EAS00738
1. Main and ignition fuses

- Check the main and ignition fuses for continuity. Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main and ignition fuses OK?

YES

NO → Replace the fuse(s).

EAS00739
2. Battery

- Check the condition of the battery. Refer to "CHECKING THE BATTERY" in chapter 3.

Minimum open-circuit voltage
12.8 V or more at 20 °C (68 °F)

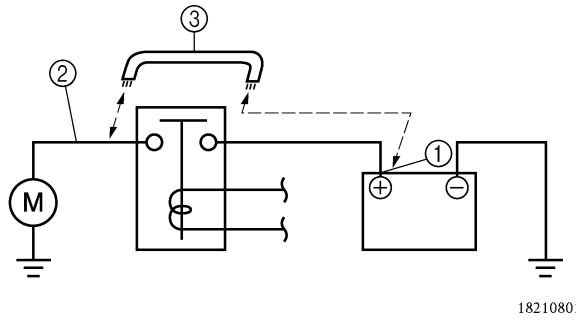
- Is the battery OK?

YES

NO →
- Clean the battery terminals.
- Recharge or replace the battery.

EAS00758
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.

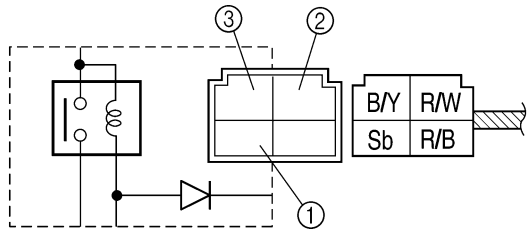
EAS00759

4. Starting circuit cutoff relay

- Disconnect the starting circuit cutoff relay coupler from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the starting circuit cutoff relay coupler as shown.

Positive battery terminal → **red/black** ①
Negative battery terminal → **black/yellow** ②

Positive tester probe → **red/black** ①
Negative tester probe → **red/white** ③



- Does the starting circuit cutoff relay have continuity between red/black and red/white?

YES → Replace the starting circuit cutoff relay.
NO

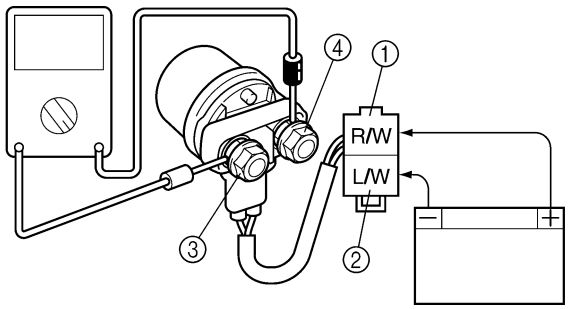
EAS00761

5. Starter relay

- Disconnect the starter relay coupler from the coupler.
- Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the starter relay coupler as shown.

Positive battery terminal → **red/white** ①
Negative battery terminal → **blue/white** ②

Positive tester probe → **red** ③
Negative tester probe → **black** ④



- Does the starter relay have continuity between red and black?

YES
NO → Replace the starter relay.

EAS00749

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.

8

EAS00750

7. Engine stop switch

- Check the engine stop switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the engine stop switch OK?

YES

NO → Replace the right handlebar switch.

EAS00751

8. Neutral switch

- Check the neutral switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the neutral switch OK?

YES

NO → Replace the neutral switch.

EAS00752

9. Sidestand switch

- Check the sidestand switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the sidestand switch OK?

YES

NO → Replace the sidestand switch.

EAS00763

10.Clutch switch

- Check the clutch switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the clutch switch OK?

YES

NO → Replace the clutch switch.

EAS00764

11.Start switch

- Check the start switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the start switch OK?

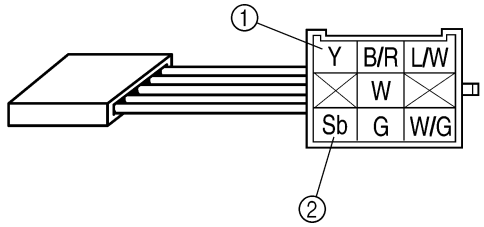
YES

NO → Replace the right handlebar switch.

12.Diode assembly

- Disconnect the diode assembly coupler from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) to the diode assembly coupler as shown.
- Check the diode assembly for continuity.

Positive tester probe → **sky blue ①** **Negative tester probe →** **yellow ②**	**Continuity**
Positive tester probe → **yellow ②** **Negative tester probe →** **sky blue ①**	**No continuity**



NOTE:
When you switch the positive and negative tester probes, the readings in the above chart will be reversed.

- Are the tester readings correct?

YES

NO → Replace the diode assembly.

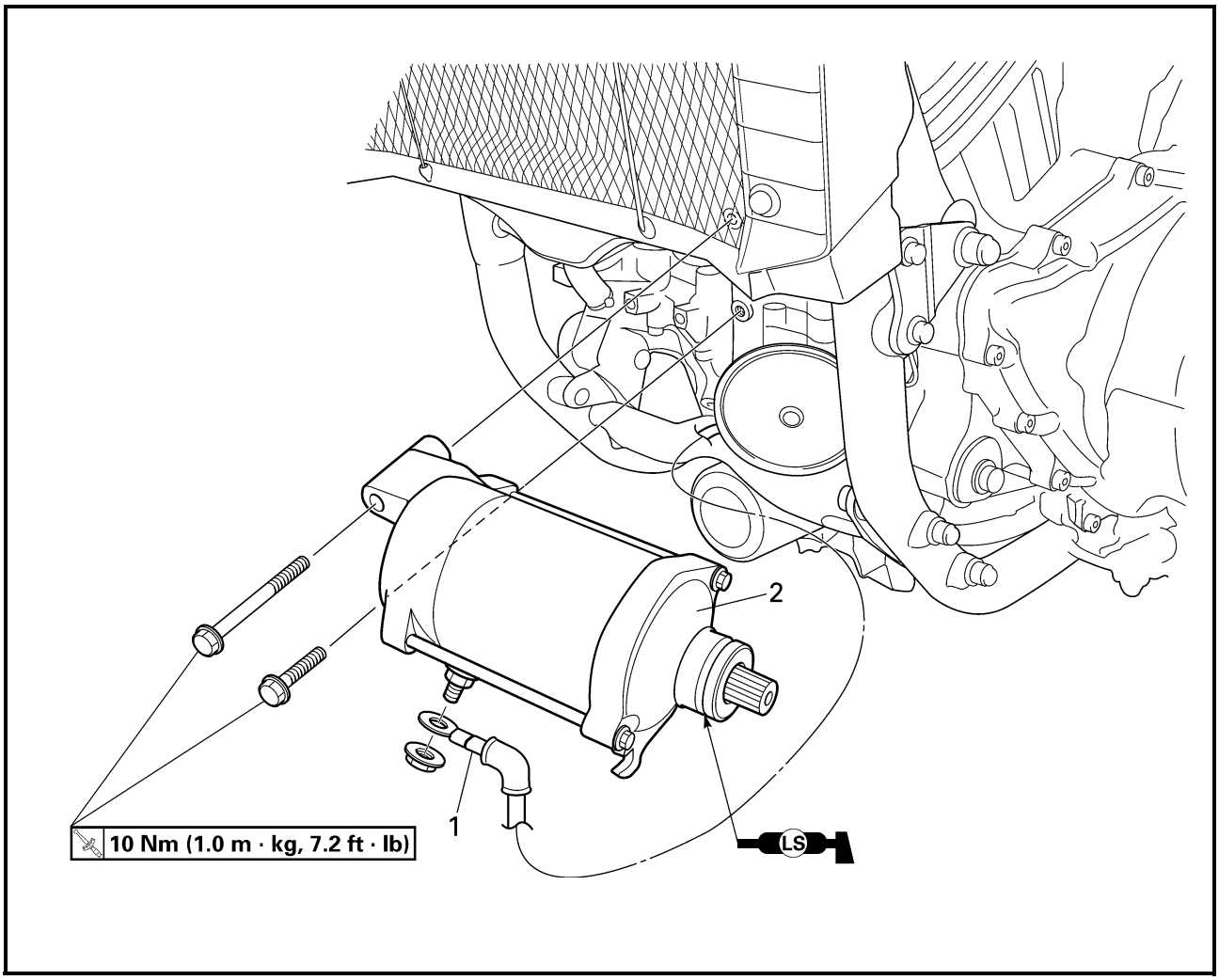
13.Wiring connections

- Check the entire starting system's wiring. Refer to "CIRCUIT DIAGRAM".
- Is the starting system's wiring properly connected and without defects?

YES → This circuit is OK.

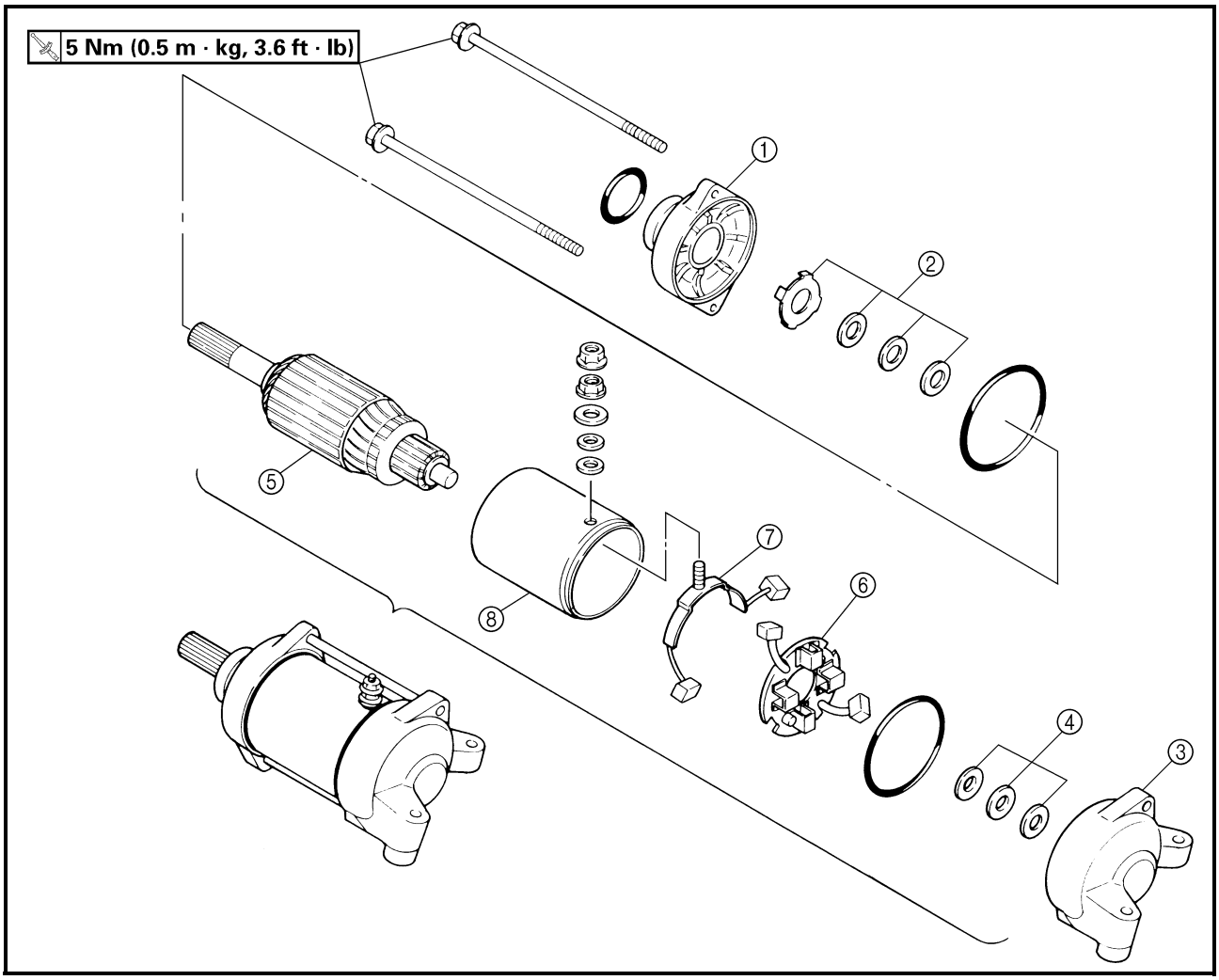
NO → Properly connect or repair the starting system's wiring.

EAS00767
STARTER MOTOR

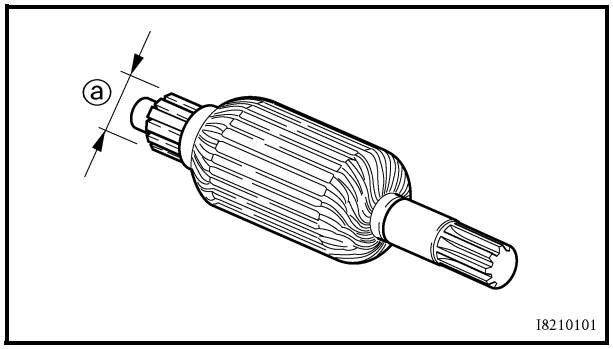


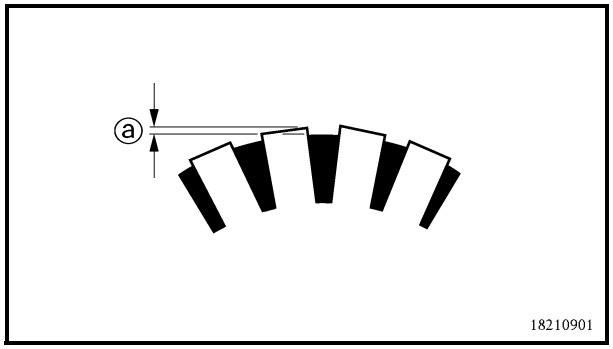
Order	Job/Part	Q'ty	Remarks
	Removing the starter motor		Remove the parts in the order listed.
	Coolant drain cock assembly		Refer to "THERMOSTAT ASSEMBLY AND CONDUIT" in chapter 5.
1	Starter motor lead	1	
2	Starter motor assembly	1	
			For installation, reverse the removal procedure.

EAS00768



Order	Job/Part	Q'ty	Remarks
	Disassembling the starter motor		Remove the parts in the order listed.
①	Starter motor front cover	1	
②	Washer kit	1	
③	Starter motor rear cover	1	
④	Washer kit	1	
⑤	Armature coil	1	
⑥	Brush seat	1	
⑦	Brush holder	1	
⑧	Starter motor yoke	1	
			For assembly, reverse the disassembly procedure.





EAS00770
CHECKING THE STARTER MOTOR

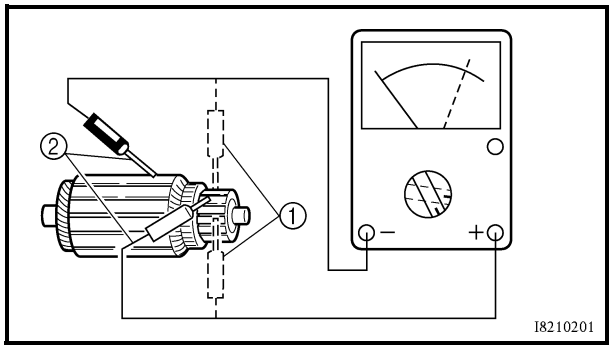
1. Check:
   - commutator
     Dirt → Clean with 600 grit sandpaper.
2. Measure:
   - commutator diameter ⓐ
     Out of specification → Replace the starter motor.

Commutator wear limit
27 mm (1.06 in)

3. Measure:
   - mica undercut ⓐ
     Out of specification → Scrape the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.

Mica undercut
0.7 mm (0.03 in)

NOTE:
The mica of the commutator must be undercut to ensure proper operation of the commutator.



4. Measure:
   - armature assembly resistances (commutator and insulation)
     Out of specification → Replace the starter motor.

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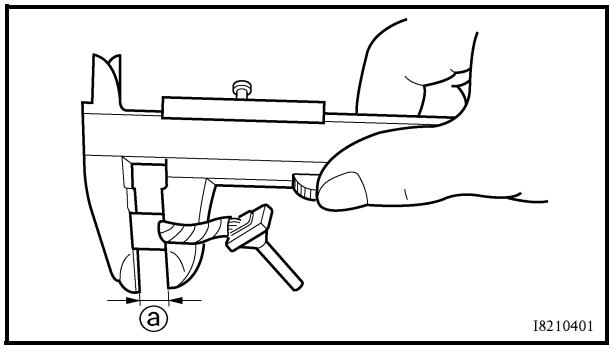
a. Measure the armature assembly resistances with the pocket tester.

Pocket tester
YU-03112

Armature coil
Commutator resistance ①
0.025 ~ 0.035 Ω at 20 °C (68 °F)
Insulation resistance ②
Above 1 MΩ at 20 °C (68 °F)

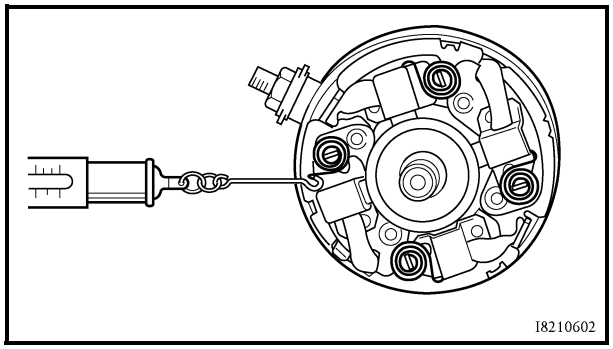
b. If any resistance is out of specification, replace the starter motor.

▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲



5. Measure:
   • brush length ⓐ
   Out of specification → Replace the brushes as a set.

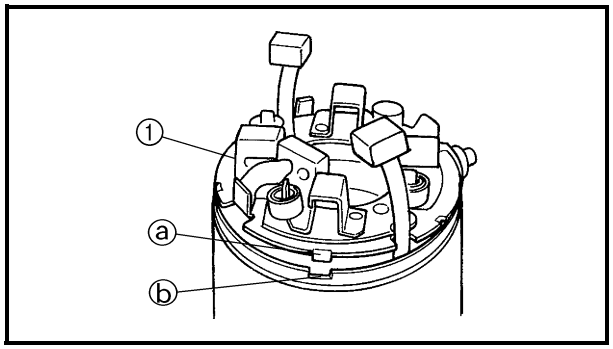
Brush length wear limit
5 mm (0.20 in)



6. Measure:
   • brush spring force
   Out of specification → Replace the brush springs as a set.

Brush spring force
8.82 N (899 gf, 31.8 oz)

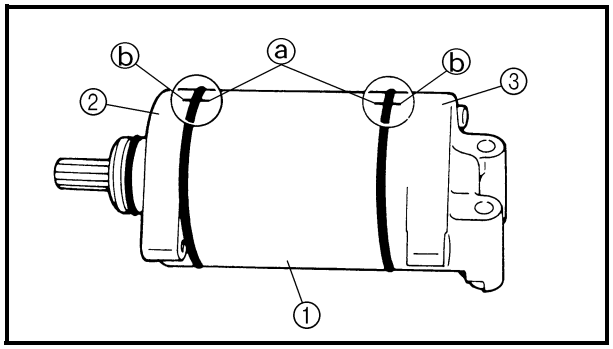
7. Check:
   • gear teeth
   Damage/wear → Replace the gear.
8. Check:
   • bearing
   • oil seal
   Damage/wear → Replace the defective part(s).



EAS00772
ASSEMBLING THE STARTER MOTOR

1. Install:
   • brush seat ①

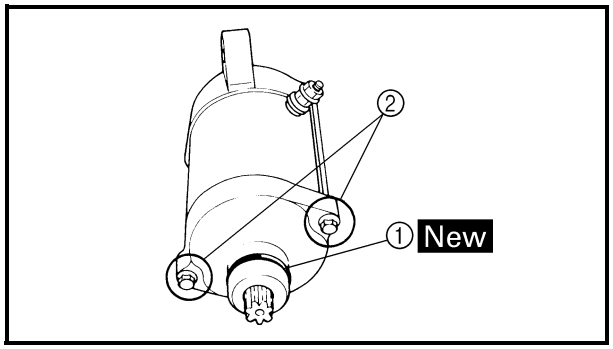
NOTE:
Align the tab ⓐ on the brush seat with the slot ⓑ in the starter motor yoke.



2. Install:
   • starter motor yoke ①
   • starter motor front cover ②
   • starter motor rear cover ③

NOTE:
Align the match marks ⓐ on the starter motor yoke with the match marks ⓑ on the front and starter motor rear cover.

8

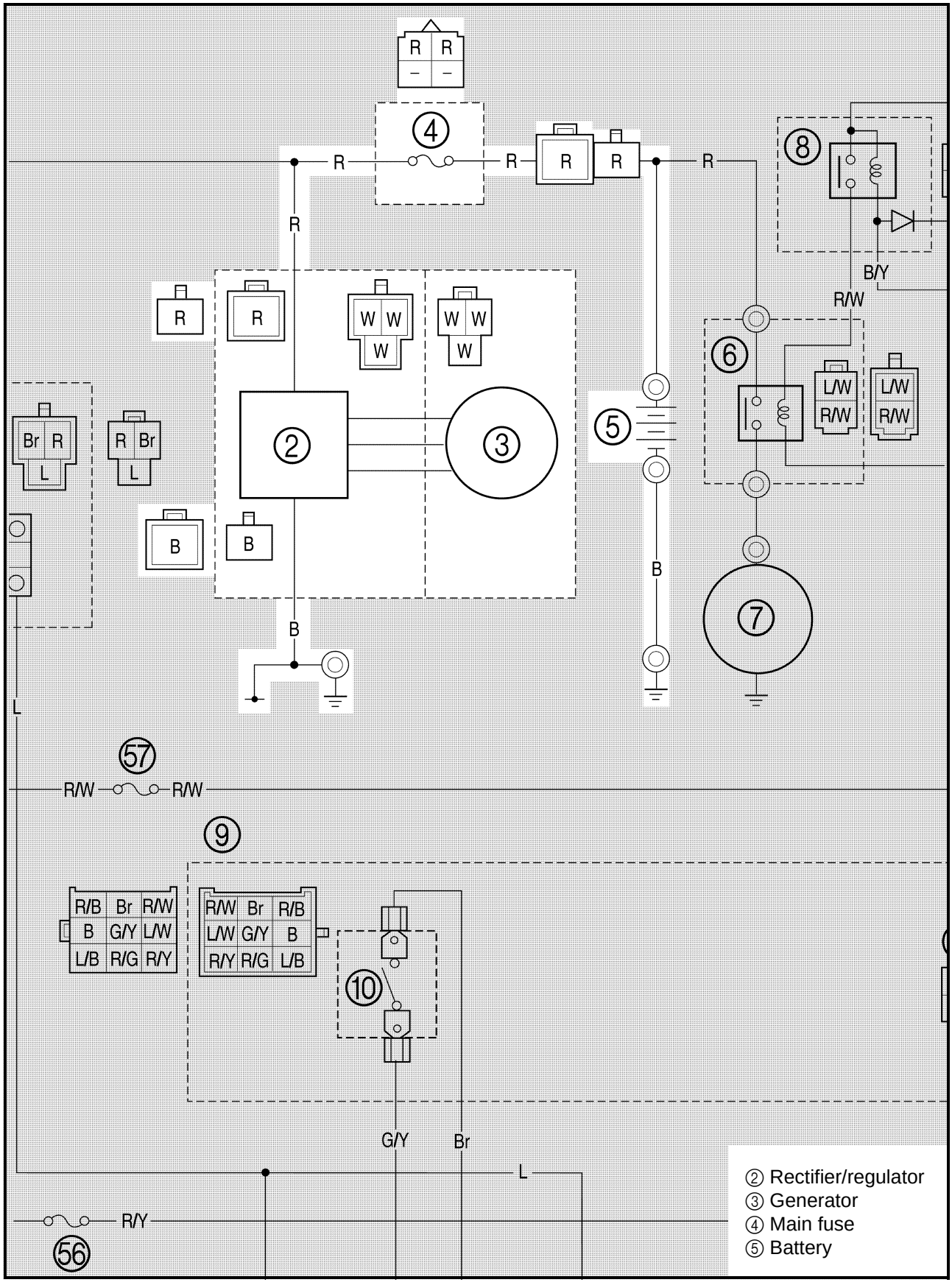


3. Install:
   - O-rings ① New
   - bolts ② 5 Nm (0.5 m · kg, 36 ft · lb)

EAS00773

CHARGING SYSTEM

CIRCUIT DIAGRAM



EAS00774
TROUBLESHOOTING

The battery is not being charged.

Check:
1. main fuse
2. battery
3. charging voltage
4. stator coil resistance
5. wiring connections (of the entire charging system)

NOTE:
- Before troubleshooting, remove the following part(s):

1) left side cover
2) rider seat

- Troubleshoot with the following special tool(s).

Inductive tachometer
YU-8036-A
Pocket tester
YU-03112

EAS00738
1. Main fuse

- Check the main fuse for continuity.
  Refer to “CHECKING THE FUSES” in chapter 3.
- Is the main fuse OK?

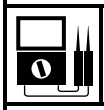
YES ⇩

NO ⇩

Replace the fuse.

EAS00739
2. Battery

- Check the condition of the battery.
  Refer to “CHECKING THE BATTERY” in chapter 3.



Minimum open-circuit voltage
12.8 V or more at 20 °C (68 °F)

- Is the battery OK?

YES ⇩

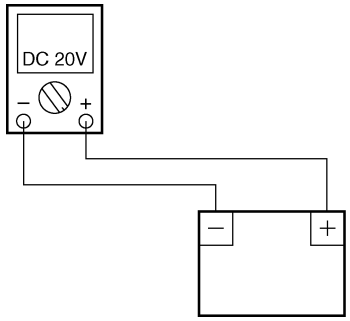
NO ⇩

- Clean the battery terminals.
- Recharge or replace the battery.

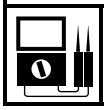
EAS00775
3. Charging voltage

- Connect the inductive tachometer to the spark plug lead of cylinder #1.
- Connect the pocket tester (DC 20 V) to the battery as shown.

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



- 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

NOTE:
Make sure the battery is fully charged.

- Is the charging voltage within specification?

NO

YES

The charging circuit is OK.

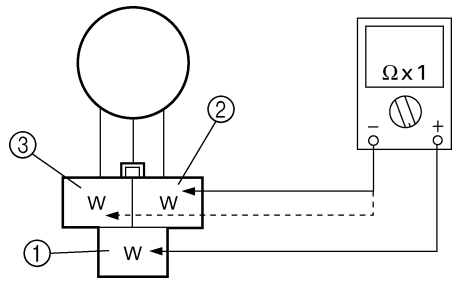
EAS00776

4. Stator coil resistance

- Disconnect the stator coils coupler from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) to the stator coils coupler as shown.

Positive tester probe → white ①
Negative tester probe → white ②

Positive tester probe → white ①
Negative tester probe → white ③



- Measure the stator coil resistances.

Stator coil resistance
0.33 ~ 0.45 Ω at 20 °C (68 °F)

- Is the stator coil OK?

YES

NO

Replace the stator coil assembly.

EAS00779

5. Wiring

- Check the wiring connections of the entire charging system.
  Refer to “CIRCUIT DIAGRAM”.
- Is the charging system’s wiring properly connected and without defects?

YES

NO

Replace the rectifier/ regulator.

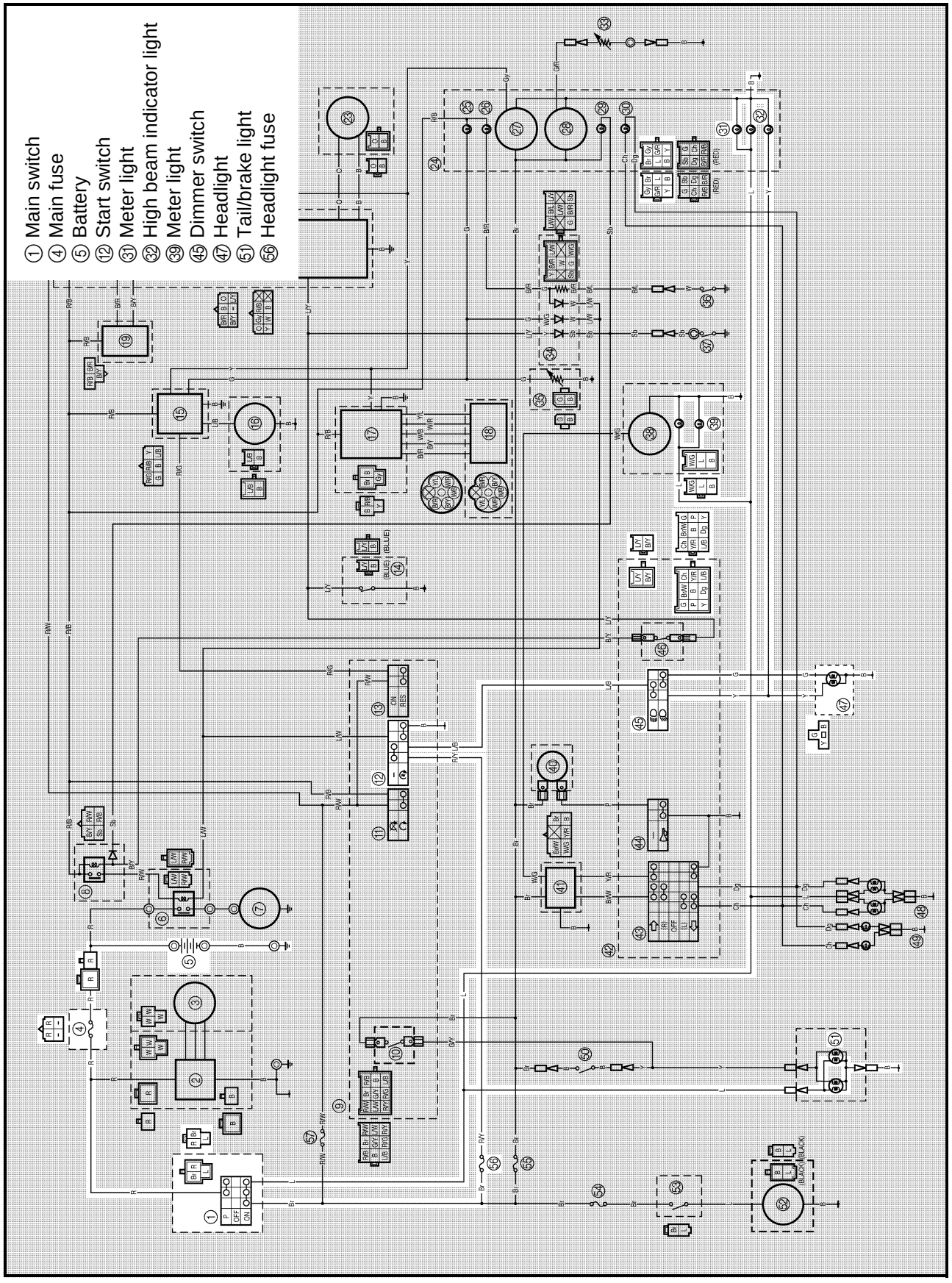
Properly connect or repair the charging system’s wiring.

8

EAS00780

LIGHTING SYSTEM

CIRCUIT DIAGRAM



EAS00781
TROUBLESHOOTING

Any of the following fail to light: headlight, high beam indicator light, taillight, auxiliary light or meter light.

Check:
1. main and headlight fuses
2. battery
3. main switch
4. dimmer switch
5. wiring connections (of the entire lighting system)

NOTE:
- Before troubleshooting, remove the following part(s):

1) top cover
2) electrical components board
3) rider seat
4) main switch cover
5) headlight lens unit

- Troubleshoot with the following special tool(s).

Pocket tester
YU-03112

EAS00738
1. Main and headlight fuses

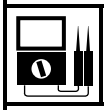
- Check the main and headlight fuses for continuity.
  Refer to “CHECKING THE FUSES” in chapter 3.
- Are the main and headlight fuses OK?

YES → NO

Replace the fuse(s).

EAS00739
2. Battery

- Check the condition of the battery.
  Refer to “CHECKING 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.

EAS00749
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.

8

EAS00784

4. Dimmer switch

- Check the dimmer switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the dimmer switch OK?

YES

NO

- The dimmer switch is faulty.
- Replace the left handlebar switch.

EAS00787

5. Wiring

- Check the entire lighting system’s wiring. Refer to “CIRCUIT DIAGRAM”.
- Is the lighting system’s wiring properly connected and without defects?

YES

NO

Check the condition of each of the lighting system’s circuits. Refer to “CHECKING THE LIGHTING SYSTEM”.

Properly connect or repair the lighting system’s wiring.

EAS00788

CHECKING THE LIGHTING SYSTEM

1. The headlight and the high beam indicator light 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”.
- Is the headlight bulb and socket OK?

YES

NO

Replace the headlight bulb, socket or both.

2. High beam indicator light bulb and socket

- Check the high beam indicator light bulb and socket for continuity. Refer to “CHECKING THE BULBS AND BULB SOCKETS”.
- Is the high beam indicator light bulb and socket OK?

YES

NO

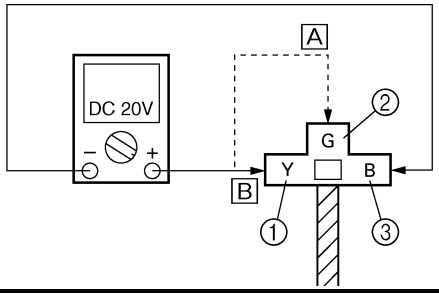
Replace the high beam indicator light bulb, socket or both.

3. Voltage

- Connect the pocket tester (DC 20 V) to the headlight and high beam indicator light couplers as shown.

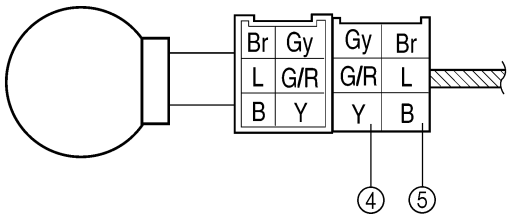
A When the dimmer switch is set to “ ”
B When the dimmer switch is set to “ ”

Headlight coupler (wire harness side)



Headlight
Positive tester probe →
yellow ① or green ②
Negative tester probe → black ③
High beam indicator light
Positive tester probe → yellow ④
Negative tester probe → black ⑤

Meter light coupler (wire harness side)



- Set the main switch to "ON".
- Set the dimmer switch to " ≣D " or " ≣D ".
- Measure the voltage (12 V) of yellow ① or green ② on the headlight coupler and yellow ④ on the meter light 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 and meter light coupler is faulty and must be repaired.

EAS00789
2. The meter light fails to come on.

1. Meter light bulb and socket

- Check the meter light bulb and socket for continuity.
  Refer to "CHECKING THE BULBS AND BULB SOCKETS".
- Are the meter light bulb and socket OK?

YES

NO

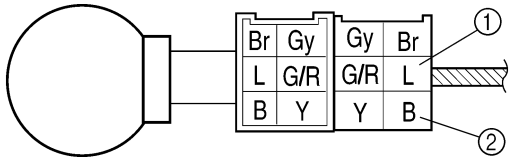
Replace the meter light bulb, socket or both.

2. Voltage

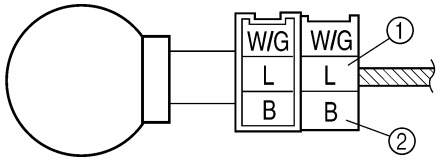
- Connect the pocket tester (DC 20 V) to the meter light coupler (wire harness side) as shown.

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

Tachometer coupler



Speedometer coupler



- Set the main switch to "ON".
- Measure the voltage (12 V) of blue ① on the meter light coupler (wire harness side).
- Is the voltage within specification?

YES

This circuit is OK.

NO

The wiring circuit from the main switch to the meter light coupler is faulty and must be repaired.

8

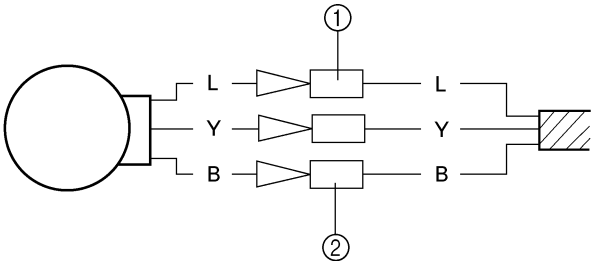
EAS00790
3. The tail/brake light fails to come on.

1. Tail/brake light bulb and socket
• Check the tail/brake light bulb and socket for continuity. Refer to “CHECKING THE BULBS AND BULB SOCKETS”. • Are the tail/brake light bulb and socket OK?

YES

NO

Replace the tail/brake light bulb, socket or both.

2. Voltage
• Connect the pocket tester (DC 20 V) to the tail/brake light coupler (wire harness side) as shown.
Positive tester probe → blue ① **Negative tester probe → black** ②

• Set the main switch to “ON”. • Measure the voltage (12 V) of blue ① on the tail/brake light connectors (wire harness side). • Is the voltage within specification?

YES

NO

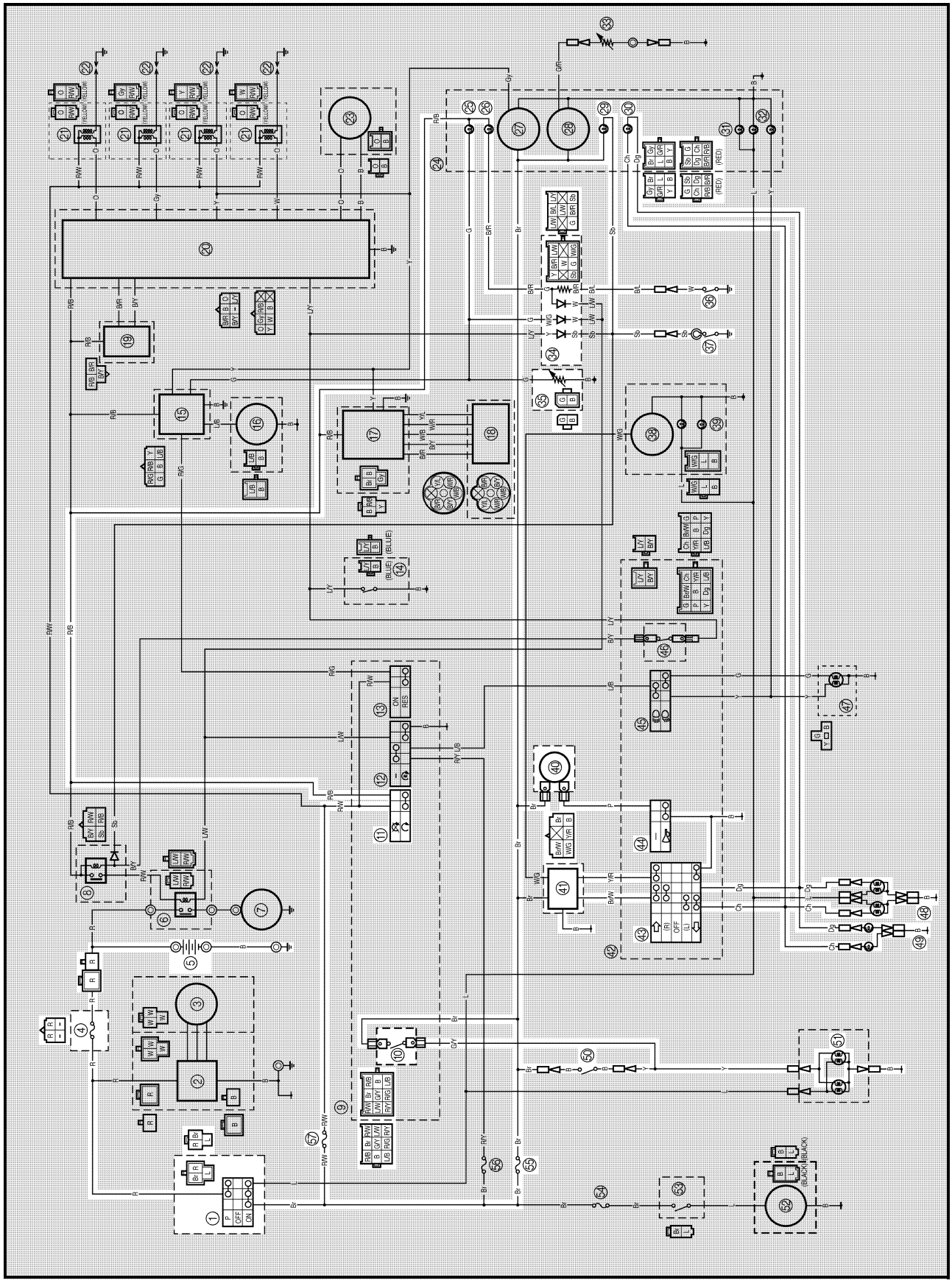
This circuit is OK.

The wiring circuit from the main switch to the tail/brake light connectors is faulty and must be repaired.

EAS00793

SIGNALING SYSTEM

CIRCUIT DIAGRAM



① Main switch
④ Main fuse
⑤ Battery
⑩ Front brake light switch
⑪ Engine stop switch
㉕ Fuel level indicator light
㉖ Oil level warning light
㉙ Neutral indicator light
㉚ Turn signal indicator light
㉞ Diode assembly
㉟ Fuel sender
㊱ Engine oil level switch
㊲ Neutral switch
㊵ Horn
㊶ Turn signal relay
㊸ Turn signal switch
㊹ Horn switch
㊽ Front turn signal/position light
㊾ Rear turn signal light
㊿ Rear brake light switch
(51) Tail/brake light
(55) Signaling system fuse
(57) Ignition fuse

EAS00794
TROUBLESHOOTING

- **Any of the following fail to light: flasher light, brake light or an indicator light.**
- **The horn fails to sound.**

Check:
1. main, ignition, and signaling system fuses
2. battery
3. main switch
4. wiring connections (of the entire signaling system)

NOTE:
- Before troubleshooting, remove the following part(s):

1) top cover
2) electrical components board
3) rider seat
4) main switch cover
5) left side cover

- Troubleshoot with the following special tool(s).

Pocket tester
YU-03112

EAS00738
1. Main, ignition, and signaling system fuses

- Check the main, ignition, and signaling system fuses for continuity.
  Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main, ignition, and signaling system fuses OK?

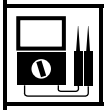
YES ⇩

NO ⇩

Replace the fuse(s).

EAS00739
2. Battery

- Check the condition of the battery.
  Refer to "CHECKING 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.

EAS00749
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.

EAS00795
4. Wiring connections

- Check the entire signaling system's wiring.
  Refer to "CIRCUIT DIAGRAM".
- Is the signaling system's wiring properly connected and without defects?

YES ⇩

NO ⇩

Check the condition of each of the signaling system's circuits.
Refer to "CHECKING THE SIGNALING SYSTEM".

Properly connect or repair the signaling system's wiring.

8

EAS00796
CHECKING THE SIGNALING SYSTEM

1. The horn fails to sound.

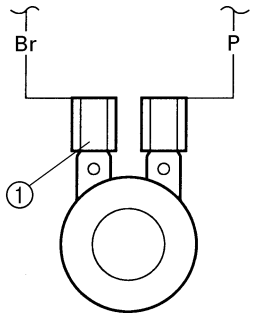
1. Horn switch
- Check the horn switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the horn switch OK?

YES

NO → Replace the left handlebar switch.

2. Voltage
- Connect the pocket tester (DC 20 V) to the horn connector at the horn terminal as shown.

Positive tester probe → brown ①
Negative tester probe → ground

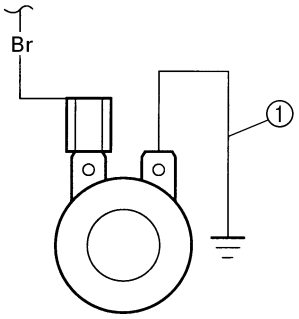


- Set the main switch to “ON”.
- Measure the voltage (12 V) of brown at the horn terminal.
- Is the voltage within specification?

YES

NO → The wiring circuit from the main switch to the horn connector is faulty and must be repaired.

3. Horn
- Disconnect the pink connector at the horn terminal.
- Connect a jumper lead ① to the horn terminal and ground the jumper lead.
- Set the main switch to “ON”.
- Does the horn sound?

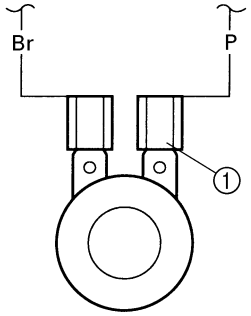


NO

YES → The horn is OK.

4. Voltage
- Connect the pocket tester (DC 20 V) to the horn connector at the pink terminal as shown.

Positive tester probe → pink ①
Negative tester probe → ground



- Set the main switch to “ON”.
- Measure the voltage (12 V) of pink ① at the horn terminal.
- Is the voltage within specification?

YES → Repair or replace the horn.

NO → Replace the horn.

EAS00797
2. The tail/brake light fails to come on.

1. Tail/brake light bulb and socket
- Check the tail/brake light bulb and socket for continuity.
  Refer to “CHECKING THE BULBS AND BULB SOCKETS”.
- Are the tail/brake light bulb and socket OK?

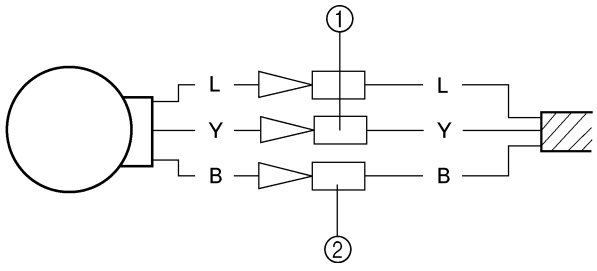
YES → 2. Brake light switches
NO → Replace the tail/brake light bulb, socket or both.

2. Brake light switches
- Check the brake light switches for continuity.
  Refer to “CHECKING THE SWITCHES”.
- Is the brake light switch OK?

YES → 3. Voltage
NO → 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”.
- Pull in the brake lever or 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?

YES → This circuit is OK.
NO → The wiring circuit from the main switch to the meter light coupler is faulty and must be repaired.

EAS00799
3. The turn signal light, turn signal indicator light or both fail to blink.

1. Turn signal indicator light bulb and socket
- Check the turn signal light bulb and socket for continuity.
  Refer to “CHECKING THE BULBS AND BULB SOCKETS”.
- Are the turn signal light bulb and socket OK?

YES → 2. Turn signal switch
NO → Replace the turn signal light bulb, socket or both.

2. Turn signal switch
- Check the turn signal switch for continuity.
  Refer to “CHECKING THE SWITCHES”.
- Is the turn signal switch OK?

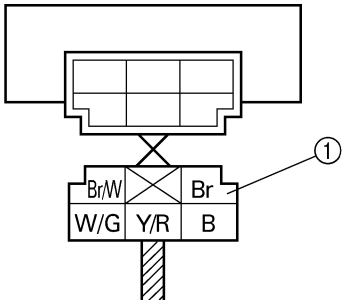
YES →
NO → Replace the left handlebar switch.

8

3. Voltage

- Connect the pocket tester (DC 20 V) to the turn signal relay coupler (wire harness side) as shown.

Positive tester probe → brown ①
Negative tester probe → ground



- Set the main switch to "ON".
- Measure the voltage (12 V) on brown ① at the turn signal relay coupler (wire harness side).
- Is the voltage within specification?

YES

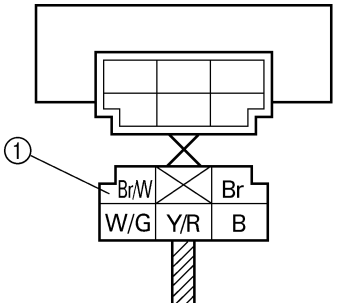
NO

The wiring circuit from the main switch to the turn signal relay coupler is faulty and must be repaired.

4. Voltage

- Connect the pocket tester (DC 20 V) to the turn signal relay coupler (wire harness side) as shown.

Positive tester probe → brown/white ①
Negative tester probe → ground



- Set the main switch to "ON".
- Set the turn signal switch to "⇦" or "⇨".
- Measure the voltage (12 V) on brown/white ① at the turn signal relay coupler (wire harness side).
- Is the voltage within specification?

YES

NO

The turn signal relay is faulty and must be replaced.

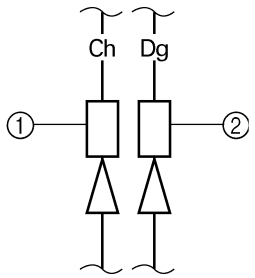
5. Voltage

- Connect the pocket tester (DC 20 V) to the turn signal light connector or tachometer coupler (wire harness side) as shown.

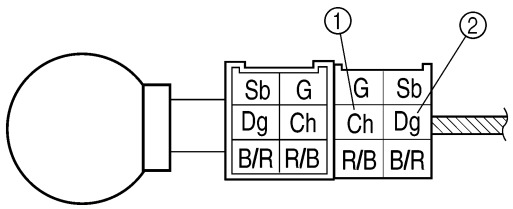
Ⓐ Turn signal light
Ⓑ Turn signal indicator light

Left turn signal light
Positive tester probe → chocolate ①
Negative tester probe → ground
Right turn signal light
Positive tester probe → dark green ②
Negative tester probe → ground

Ⓐ



Ⓑ



- Set the main switch to “ON”.
- Set the turn signal switch to “⇦” or “⇨”.
- Measure the voltage (12 V) of the chocolate ① or dark green ② at the turn signal light connector (wire harness side).
- Is the voltage within specification?

YES → This circuit is OK.

NO → The wiring circuit from the main switch to the tachometer coupler is faulty and must be repaired.

EAS00800

4. The neutral indicator light fails to come on.

1. Neutral indicator light bulb and socket

- Check the neutral indicator light bulb and socket for continuity.
  Refer to “CHECKING THE BULBS AND BULB SOCKETS”.
- Are the neutral indicator light bulb and socket OK?

YES

NO → Replace the neutral indicator light bulb, socket or both.

2. Neutral switch

- Check the neutral switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the neutral switch OK?

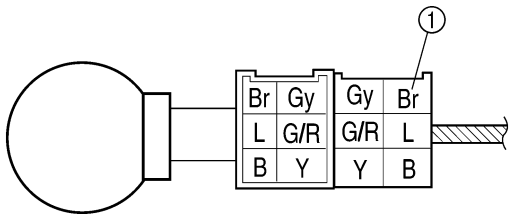
YES

NO → Replace the neutral switch.

3. Voltage

- Connect the pocket tester (DC 20 V) to the tachometer coupler (wire harness side) as shown.

Positive tester probe → brown ①
Negative tester probe → ground



- Set the main switch to “ON”.
- Measure the voltage (12 V).
- Is the voltage within specification?

YES → This circuit is OK.

NO → The wiring circuit from the main switch to the tachometer coupler is faulty and must be repaired.

EAS00802

5. The oil level warning light fails to come on.

1. Oil level warning light bulb and socket

- Check the oil level warning light bulb and socket for continuity.
  Refer to “CHECKING THE BULBS AND BULB SOCKETS”.
- Are the oil level warning light bulb and socket OK?

YES

NO → Replace the oil level warning light bulb, socket or both.

8

2. Engine stop switch

- Check the engine stop switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the engine stop switch OK?

YES

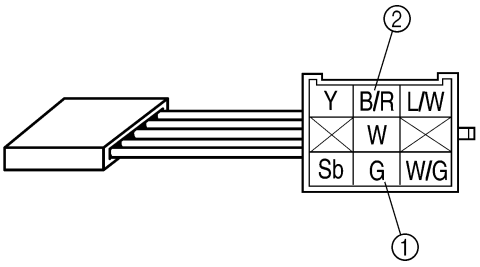
NO

Replace the right handlebar switch.

3. Diode assembly

- Disconnect the diode assembly coupler from the wire harness.
- Connect the pocket tester (Ω × 1) to the diode assembly coupler as shown.
- Measure the resistor resistance.

Positive tester probe → green ①
Negative tester probe → black/red ②



Resistor resistance
8.2 Ω at 20 °C (68 °F)

- Is the resistor resistance within specification?

YES

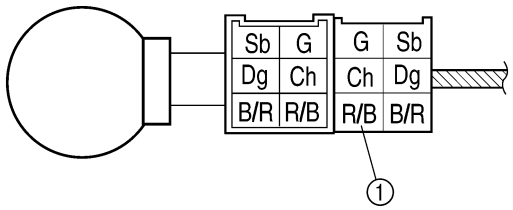
NO

Replace the diode assembly.

4. Voltage

- Connect the pocket tester (DC 20 V) to the tachometer coupler (wire harness side) as shown.

Positive tester probe → red/black ①
Negative tester probe → ground



- Set the main switch to “ON”.
- Set the engine stop switch to “ ”.
- Measure the voltage (12 V) of brown ① at the tachometer coupler.
- Is the voltage within specification?

YES

NO

The wiring circuit from the main switch to the tachometer coupler is faulty and must be repaired.

5. Engine oil level switch

- Check the oil level warning light bulb and socket for continuity.
- Are the oil level warning light bulb and socket OK?
- Drain the engine oil and remove the engine oil level switch from the oil pan.
- Check the engine oil level switch for continuity.
  Refer to “CHECKING THE SWITCHES”.
- Is the engine oil level switch OK?

YES

NO

This circuit is OK.

Replace the engine oil level switch.

EAS00803
6. The fuel level indicator light fails to come on.

1. Fuel level indicator light bulb and socket
- Check the fuel level indicator light bulb and socket for continuity.
  Refer to “CHECKING THE BULBS AND BULB SOCKETS”.
- Are the fuel level indicator light bulb and socket OK?

YES / NO

Replace the fuel level indicator light bulb, socket or both.

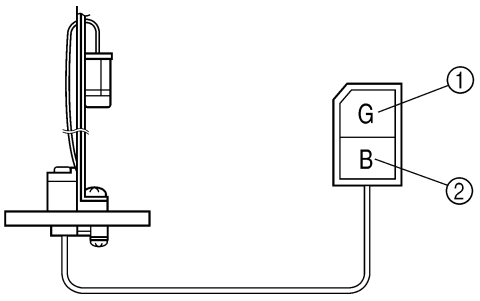
2. Engine stop switch
- Check the engine stop switch for continuity.
  Refer to “CHECKING THE SWITCHES”.
- Is the engine stop switch OK?

YES / NO

Replace the right handlebar switch.

3. Fuel sender
- Drain the fuel from the fuel tank and remove the fuel sender from the fuel tank.
- Disconnect the fuel sender coupler from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) to the fuel sender coupler as shown.

Positive tester probe → green ①
Negative tester probe → black ②



- Measure the fuel sender resistances.

Fuel sender resistance
($\Omega \times 100$)
700 ~ 1,100 Ω at 25 °C (68 °F)

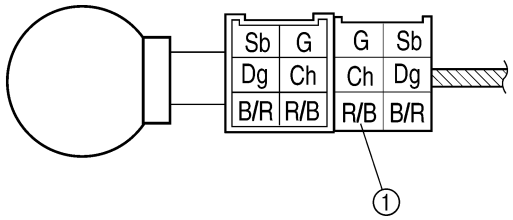
- Is the fuel sender OK?

YES / NO

Replace the fuel sender.

4. Voltage
- Connect the pocket tester (DC 20 V) to the tachometer coupler (wire harness side) as shown.

Positive tester probe → red/black ①
Negative tester probe → ground



- Set the main switch to “ON”.
- Set the engine stop switch to “ ”.
- Measure the voltage (12 V) of red/black ① at the tachometer coupler.
- Is the voltage within specification?

YES / NO

This circuit is OK.

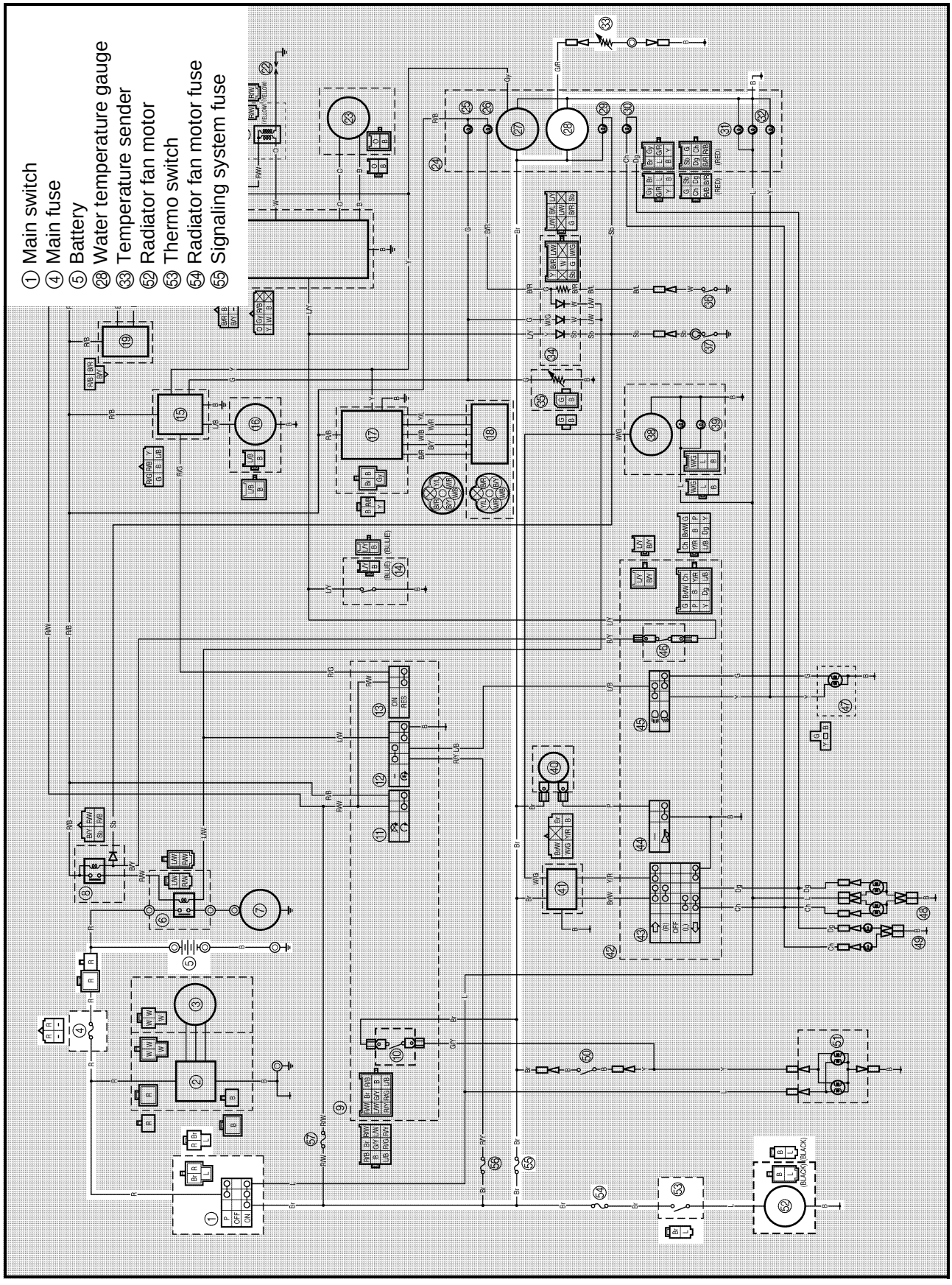
The wiring circuit from the main switch to the tachometer coupler is faulty and must be repaired.

8

EAS00807

COOLING SYSTEM

CIRCUIT DIAGRAM



EAS00808
TROUBLESHOOTING

- **The radiator fan motor fails to turn.**
- **The water temperature gauge needle fails to move when the engine is warm.**

Check:
1. main, signaling system, and radiator fan motor fuses
2. battery
3. main switch
4. radiator fan motor
5. thermo switch
6. temperature sender
7. wiring connections (the entire cooling system)

NOTE:
- Before troubleshooting, remove the following part(s):

1) top cover
2) electrical components board
3) rider seat
4) main switch cover

- Troubleshoot with the following special tool(s).

Pocket tester
YU-03112

EAS00738
1. Main, signaling system, and radiator fan motor fuses

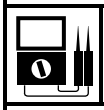
- Check the main, signaling system, and radiator fan motor fuses for continuity.
  Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main, signaling system, and radiator fan motor fuses OK?

YES ⇩ NO ⇩

Replace the fuse(s).

EAS00739
2. Battery

- Check the condition of the battery.
  Refer to "CHECKING 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.

EAS00749
3. Main switch

- Check the main switch for continuity.
  Refer to "CHECKING THE SWITCHES".
- Is the main switch OK?

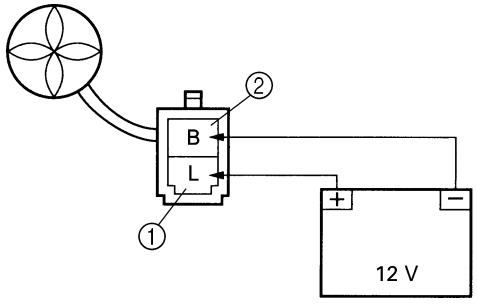
YES ⇩ NO ⇩

Replace the main switch.

EAS00809
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



8

• Does the radiator fan motor turn?

YES ↓

NO ↓

The radiator fan motor is faulty and must be replaced.

EAS00811

5. Thermo switch

- Remove the thermo switch from the conduit.
- Connect the pocket tester (Ω × 1) to the thermo switch ① as shown.
- Immerse the thermo switch in a container filled with coolant ②.
- Place a thermometer ③ in the coolant.
- Slowly heat the coolant, then let it cool down to the specified temperature.
- Check the thermo switch for continuity at the temperatures indicated below.

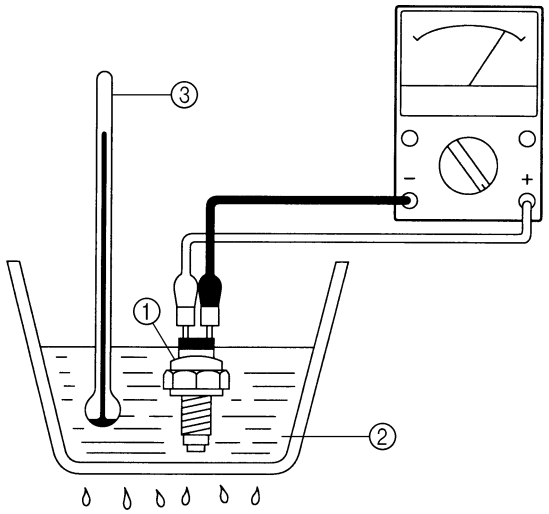
Test step	Coolant temperature / Thermo switch	Continuity
1	0 ~ 105 ± 3 °C (0 ~ 221 ± 37.4 °F)	NO
2	More than 102 ~ 108 °C (215.6 ~ 226.4 °F)	YES
3*	108 to 98 °C (226.4 to 208.4 °F)	YES
4*	Less than 98 °C (208.4 °F)	NO

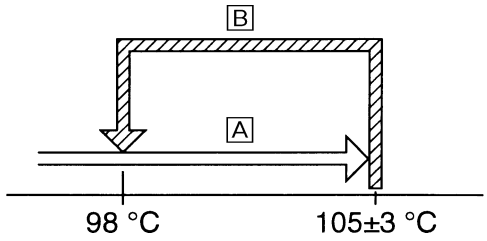
Steps 1 & 2: Heating phase
Steps 3* & 4*: Cooling phase

⚠ WARNING

- **Handle the thermo switch with special care.**
- **Never subject the thermo switch to strong shocks. If the thermo switch is dropped, replace it.**

Thermo switch
15 Nm (1.5 m • kg, 11 ft • lb)
Three bond sealock®10





A The thermo switch circuit is open and the radiator fan is off.
B The thermo switch circuit is closed and the radiator fan is on.

• Does the thermo switch operate properly as described above?

YES ↓

NO ↓

Replace the thermo switch.

EAS00812

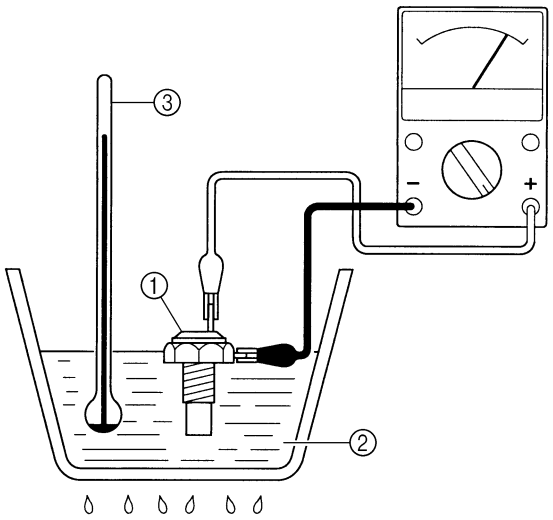
6. Temperature sender

- Remove the temperature sender from the radiator.
- Connect the pocket tester (Ω × 10) to the temperature sender ① as shown.
- Immerse the temperature sender in a container filled with coolant ②.

NOTE:
Make sure the temperature sender 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.
- Check the temperature sender for resistance at the temperatures indicated below.

Temperature sender resistance
50 °C (122 °F): 153.9 Ω
80 °C (176 °F): 47.5 ~ 56.8 Ω
100 °C (212 °F): 26.2 ~ 29.3 Ω



I4210101

⚠ WARNING

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

Temperature sender
15 Nm (1.5 m • kg, 11 ft • lb)
Three bond sealock®10

- Does the temperature sender operate properly?

YES

NO

Replace the temperature sender.

EAS00813

7. Wiring

- Check the entire cooling system's wiring. Refer to "CIRCUIT DIAGRAM".
- Is the cooling system's wiring properly connected and without defects?

YES

NO

This circuit is OK.

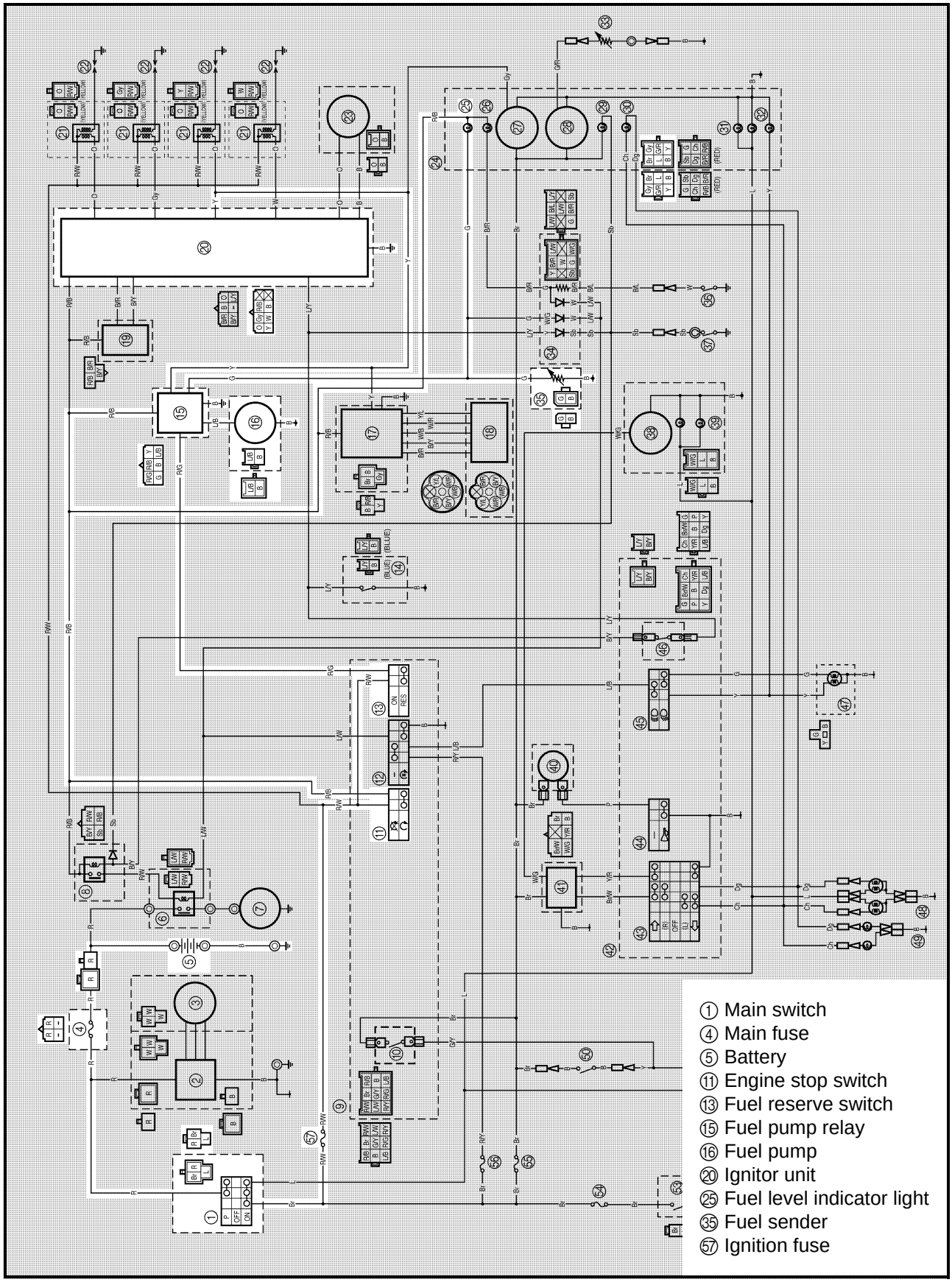
Properly connect or repair the cooling system's wiring.

8

EAS00814

FUEL PUMP SYSTEM

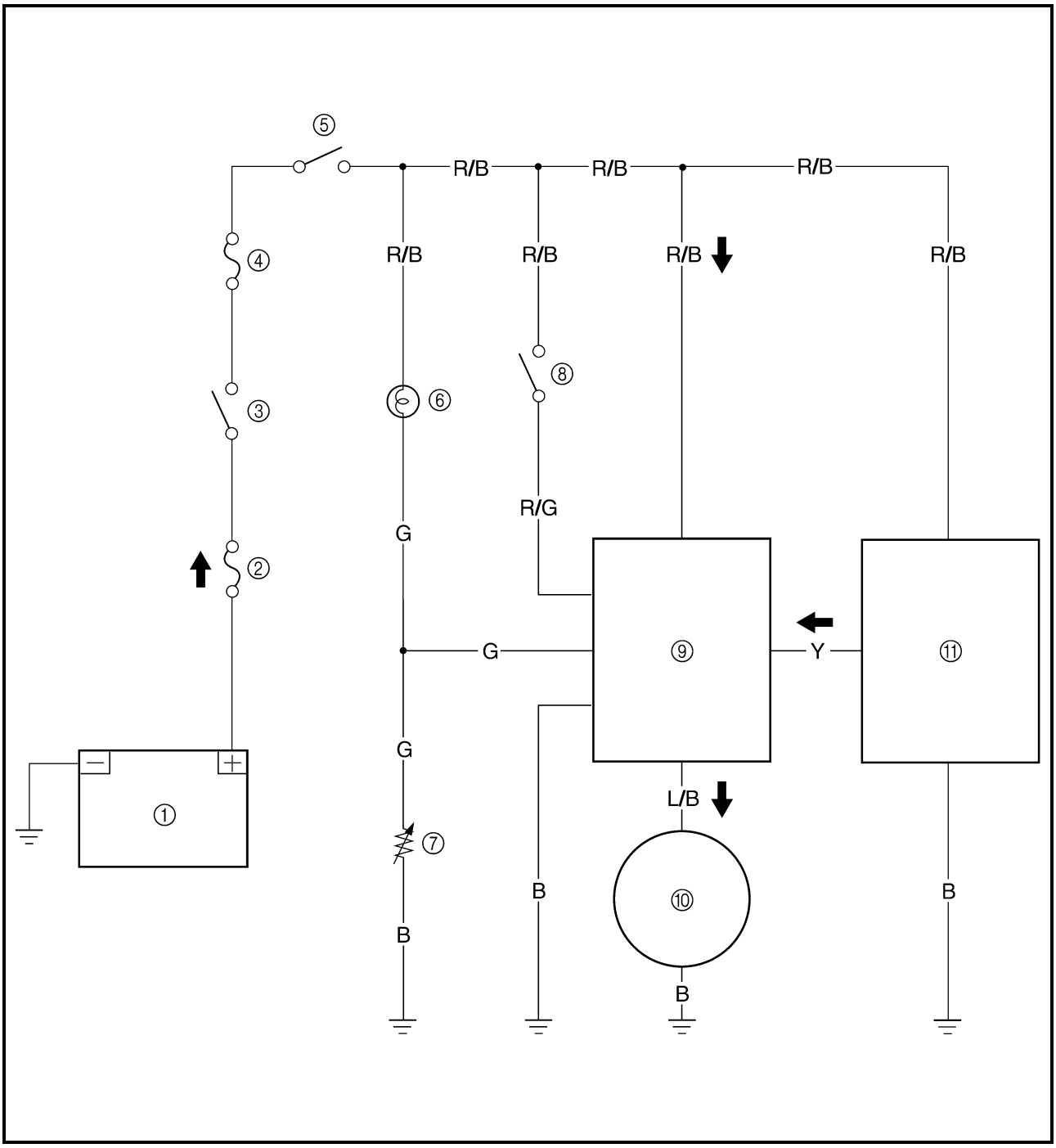
CIRCUIT DIAGRAM



EAS00815
FUEL PUMP CIRCUIT OPERATION

The ignitor unit includes the control unit for the fuel pump.

① Battery
② Main fuse
③ Main switch
④ Ignition fuse
⑤ Engine stop switch
⑥ Fuel level indicator light
⑦ Fuel sender
⑧ Fuel reserve switch
⑨ Fuel pump relay
⑩ Fuel pump
⑪ Ignitor unit



EAS00816
TROUBLESHOOTING

If the fuel pump fails to operate.

Check:
1. main and ignition fuses
2. battery
3. main switch
4. engine stop switch
5. fuel reserve switch
6. fuel level indicator light bulb and socket
7. fuel sender
8. fuel pump relay
9. fuel pump resistance
10. wiring connections (the entire fuel system)

NOTE:
- Before troubleshooting, remove the following part(s):

1) top cover
2) rider seat
3) main switch cover

- Troubleshoot with the following special tool(s).

Pocket tester
YU-03112

EAS00738
1. Main and ignition fuses

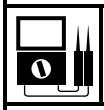
- Check the main and ignition fuses for continuity.
  Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main and ignition fuses OK?

YES → NO

Replace the fuse(s).

EAS00739
2. Battery

- Check the condition of the battery.
  Refer to "CHECKING 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.

EAS00749
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.

EAS00750
4. Engine stop switch

- Check the engine stop switch for continuity.
  Refer to "CHECKING THE SWITCHES".
- Is the engine stop switch OK?

YES → NO

Replace the right handlebar switch.

5. Fuel reserve switch

- Check the fuel reserve switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the fuel reserve switch OK?

YES

NO → Replace the fuel reserve switch.

Fuel sender resistance
(Ω × 100)
700 ~ 1,100 Ω at 25 °C (77 °F)

- Is the fuel sender OK?

YES

NO → Replace the fuel sender.

6. Fuel level indicator light bulb and socket

- Check the fuel level indicator light bulb and socket for continuity.
  Refer to “CHECKING THE BULBS AND BULB SOCKETS”.
- Are the fuel level indicator light bulb and socket OK?

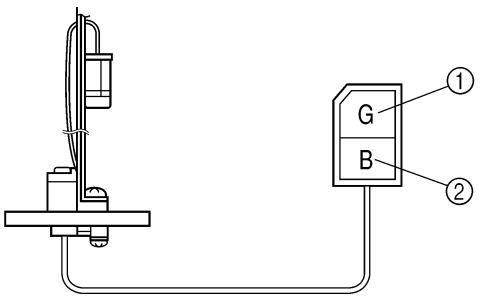
YES

NO → Replace the fuel level indicator light bulb, socket or both.

7. Fuel sender

- Drain the fuel from the fuel tank and remove the fuel sender from the fuel tank.
- Disconnect the fuel sender coupler from the wire harness.
- Connect the pocket tester (Ω × 1) to the fuel sender coupler as shown.

Positive tester probe → green ①
Negative tester probe → black ②

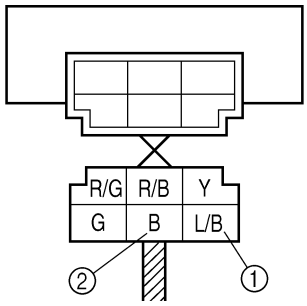


- Measure the fuel sender resistances.

8. Fuel pump relay

- Connect the pocket tester (DC 20 V) to the fuel pump relay as shown.

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



- Start the engine.
- Measure the fuel pump relay output voltage.

Fuel pump relay output voltage
12 V

- Is the fuel pump control unit OK?

YES

NO → Replace the fuel pump relay.

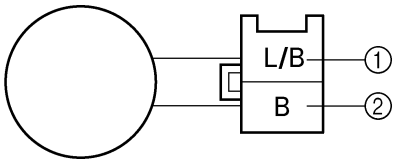
8

EAS00817

9. Fuel pump resistance

- Disconnect the fuel pump coupler from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) to the fuel pump coupler as shown.

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



- Measure the fuel pump resistance.

Fuel pump resistance
1 ~ 10 Ω at 20 °C (68 °F)

- Is the fuel pump OK?

YES → NO

Replace the fuel pump.

EAS00818

10. Wiring connections

- Check the entire fuel pump system's wiring. Refer to "CIRCUIT DIAGRAM".
- Is the fuel system's wiring properly connected and without defects?

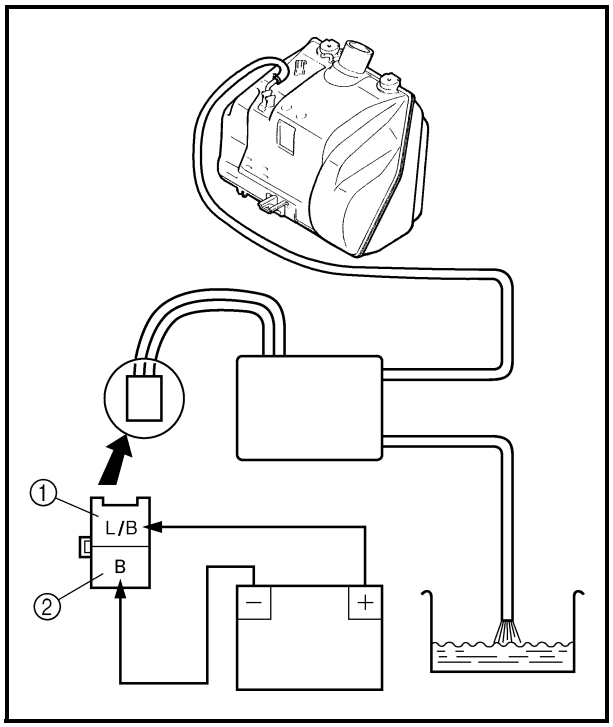
YES → Replace the ignitor unit.

NO → Properly connect or repair the fuel system's wiring.

EAS00819
CHECKING THE FUEL PUMP

⚠ WARNING

Gasoline is extremely flammable and under certain circumstances there can be a danger of an explosion or fire. Be extremely careful and note the following points:
- **Stop the engine before refueling.**
- **Do not smoke, and keep away from open flames, sparks, or any other source of fire.**
- **If you do accidentally spill gasoline, wipe it up immediately with dry rags.**
- **If gasoline touches the engine when it is hot, a fire may occur. Therefore, make sure the engine is completely cool before performing the following test.**



1. Check:
   - Fuel pump operation

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Fill the fuel tank.
b. Put the end of the fuel hose into an open container.
c. Connect the battery (12 V) to the fuel pump coupler as shown.

Positive battery lead → blue/black ①
Negative battery lead → black ②

d. If fuel flows out of the fuel hose, the fuel pump is OK. If fuel does not flow, replace the fuel pump.

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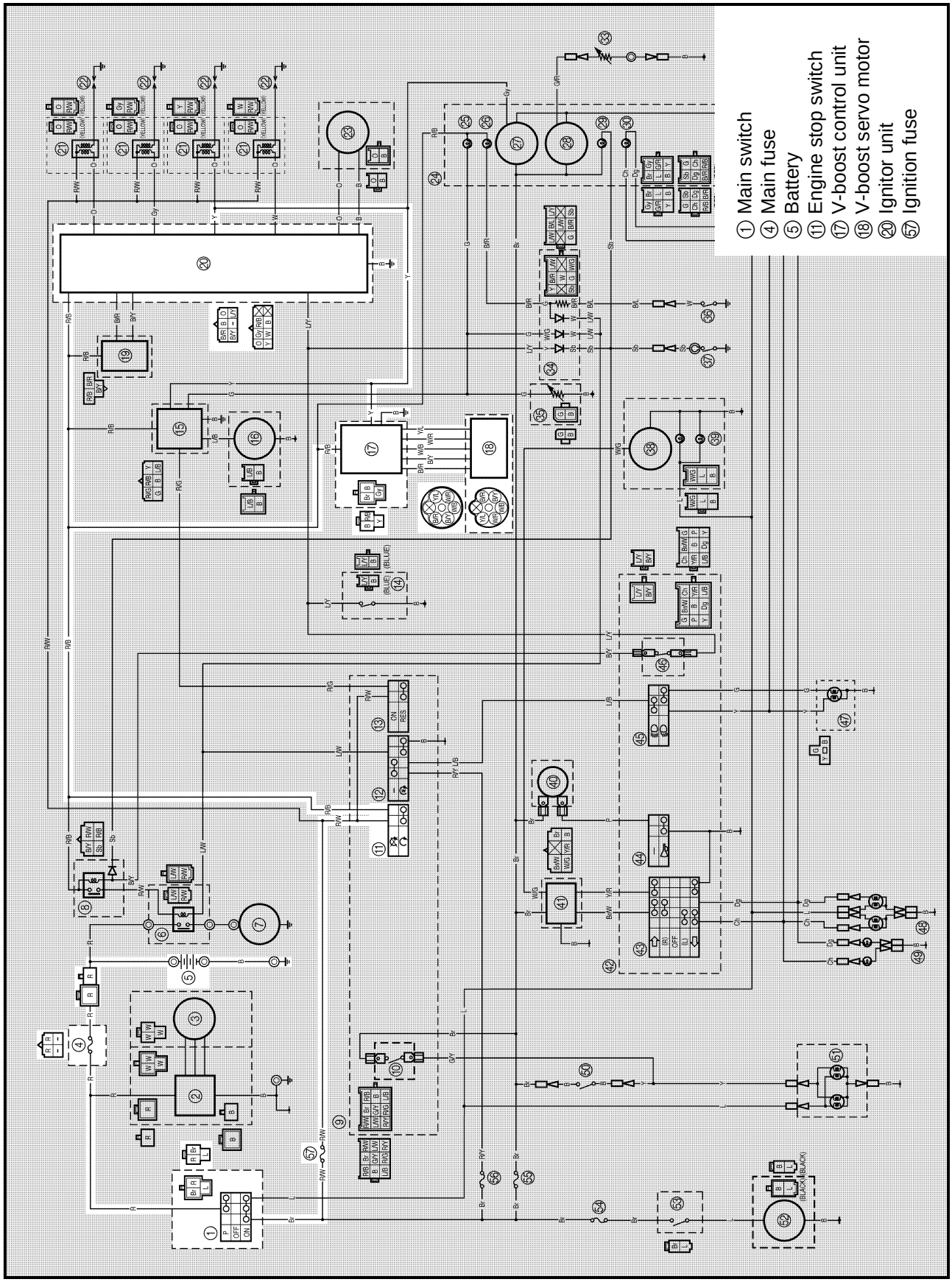
8

V-BOOST SYSTEM

CIRCUIT DIAGRAM



TROUBLESHOOTING

When the engine speed changes, the V-BOOST servomotor does not operate.

Procedure 1

Check:

1. V-boost servomotor operation
   (with the V-boost servomotor coupler connected to the wire harness)
2. voltage (V-boost control unit)
3. voltage (servo motor)
4. V-boost servomotor operation
   (with the V-boost servomotor coupler disconnected from the wire harness)
5. V-boost servomotor resistance
6. wiring
   (the entire V-boost system)

Procedure 2

Check:

1. main and ignition fuses
2. battery
3. main switch
4. engine stop switch
5. wiring
   (the entire EXUP system)

NOTE:

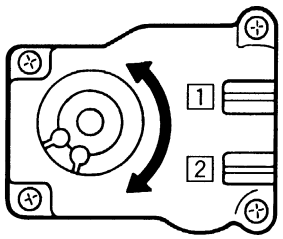
- Before troubleshooting, remove the following part(-s):
  1) rider seat
  2) fuel tank
  3) bottom cowling
- Troubleshoot with the following special tool(-s).

Pocket tester
YU-03112

Procedure 1

1. V-boost servomotor operation (with the V-boost servomotor coupler connected to the wire harness)

- Disconnect the V-boost cables from the V-boost servomotor pulley.
- Set the main switch to “ON”.



- Does the V-boost servomotor pulley turn?

NO

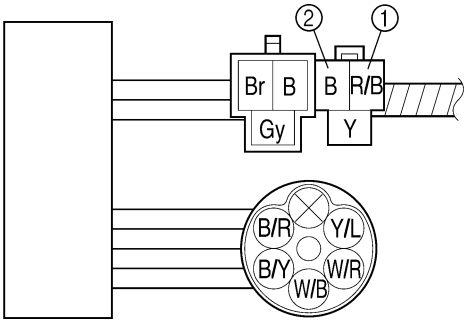
YES

Check that the V-boost cables are properly installed. If OK, check the V-boost valve and cables. Refer to “ENGINE” in chapter 4.

2. voltage (V-boost control unit)

- Connect the pocket tester (DC 20 V) to the V-boost control unit coupler (wire harness side) as shown.

Tester positive probe → red/black ①
Tester negative probe → black ②



- Set the main switch to “ON” and engine stop switch to “ ”.
- Measure the voltage (12 V) between red/black ① and black ② (wire harness side).
- Is the voltage within specification?

YES

NO

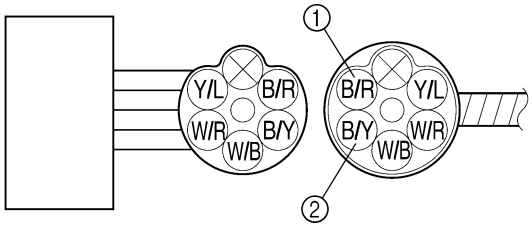
Go to “Procedure 2”.

8

3. Voltage (servo motor)

- Connect the pocket tester (DC 20 V) to the V-boost servomotor coupler (wire harness side) as shown.

Tester positive probe → black/red ①
Tester negative probe → black/yellow ②



- Set the main switch to "ON" and engine stop switch to "".
- Measure the voltage (12 V) between black/red ① and black/yellow ② (wire harness side).
- Is the voltage within specification?

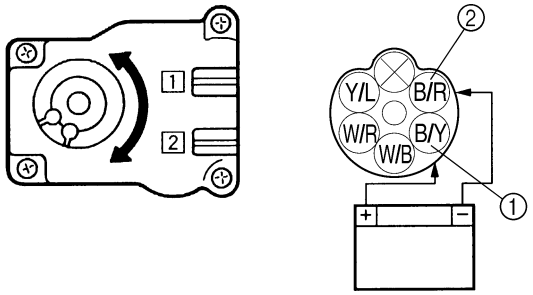
YES

NO → Replace the V-boost control unit.

4. V-boost servomotor operation (with the servomotor coupler disconnected from the wire harness)

- Disconnect the V-boost cables from the V-boost servomotor pulley.
- Disconnect the V-boost servomotor coupler from the wire harness.
- Connect the battery leads to the V-boost servomotor coupler (servomotor side) as shown.

Battery positive terminal → black/yellow ①
Battery negative terminal → black/red ②



- Check that the V-boost servomotor pulley rotates several times.

CAUTION:

To prevent damaging the V-boost servomotor, perform this test within a few seconds of connecting the battery.

- Does the V-boost servomotor pulley turn?

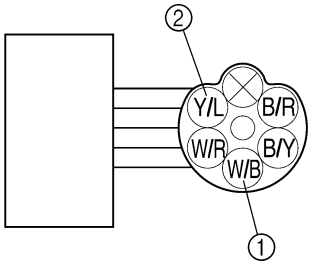
YES

NO → Replace the V-boost servomotor.

5. V-boost servomotor resistance

- Disconnect the V-boost servomotor coupler from the wire harness.
- Connect the pocket tester (Ω × 1k) to the V-boost servomotor coupler.

Tester positive probe → white/black ①
Tester negative probe → yellow/blue ②

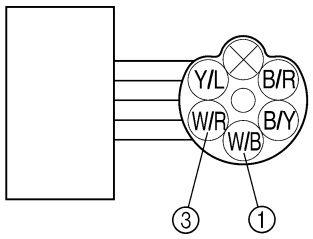


- Measure the V-boost servomotor resistance.

V-boost servomotor resistance
5.3 ~ 9.8 kΩ
(between white/black and yellow/blue)

• Connect the pocket tester (Ω × 1 k) to the V-boost servomotor coupler.

Tester positive probe → white/black ①
Tester negative probe → white/red ③



• While slowly turning the V-boost servomotor pulley by hand, measure the V-boost servomotor resistance.

V-boost servomotor resistance (when the pulley is turned one full rotation)
0 ~ approximately 7.5 kΩ (between white/black and white/red)

• Is the V-boost servomotor OK?

YES → NO

The V-boost servomotor is faulty and must be replaced.

6. Wiring

• Check the entire V-boost system's wiring. Refer to "CIRCUIT DIAGRAM".
• Is the V-boost system's wiring properly connected and without defects?

YES → Replace the ignitor unit.

NO → Properly connect or repair the V-boost system's wiring.

Procedure 2

1. Main and ignition fuses

• Check the main and ignition fuses for continuity.
Refer to "CHECKING THE FUSES" in chapter 3.
• Are the main and ignition fuses OK?

YES

NO → Replace the fuse(-s).

2. Battery

• Check the condition of the battery.
Refer to "CHECKING THE BATTERY" in chapter 3.

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.

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.

8

4. Engine stop switch

- Check the engine stop switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the engine stop switch OK?

YES → Go to “5. Wiring”.

NO → Replace the right handlebar switch.

5. Wiring

- Check the entire V-boost system’s wiring. Refer to “CIRCUIT DIAGRAM”.
- Is the V-boost system’s wiring properly connected and without defects?

YES → Go to “Procedure 1”.

NO → Properly connect or repair the V-boost system’s wiring.

EAS00844

TROUBLESHOOTING

NOTE:

The following guide for troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to basic troubleshooting. Refer to the relative procedure in this manual for checks, adjustments, and replacement of parts.

STARTING PROBLEMS

ENGINE

Cylinder(s) and cylinder head(s)

- Loose spark plug
- Loose cylinder head
- Damaged cylinder head gasket
- Worn or damaged cylinder
- Incorrect valve clearance
- Improperly sealed valve
- Incorrect valve-to-valve-seat contact
- Incorrect valve timing
- Faulty valve spring
- Seized valve

Piston(s) and piston ring(s)

- Improperly installed piston ring
- Damaged, worn or fatigued piston ring
- Seized piston ring
- Seized or damaged piston

Air filter

- Improperly installed air filter
- Clogged air filter element

Crankcase and crankshaft

- Improperly assembled crankcase
- Seized crankshaft

FUEL SYSTEM

Fuel tank

- Empty fuel tank
- Clogged fuel filter
- Clogged fuel strainer
- Clogged fuel tank drain hose
- Clogged rollover valve
- Clogged rollover valve hose
- Deteriorated or contaminated fuel

Fuel pump

- Faulty fuel pump
- Faulty fuel pump relay

Carburetor(s)

- Deteriorated or contaminated fuel
- Clogged pilot jet
- Clogged pilot air passage
- Sucked-in air
- Damaged float
- Worn needle valve
- Improperly installed needle valve seat
- Incorrect fuel level
- Improperly installed pilot jet
- Clogged starter jet
- Faulty starter plunger
- Improperly adjusted starter cable

ELECTRICAL SYSTEMS

Battery
- Discharged battery
- Faulty battery

Fuse(s)
- Blown, damaged or incorrect fuse
- Improperly installed fuse

Spark plug(s)
- Incorrect spark plug gap
- Incorrect spark plug heat range
- Fouled spark plug
- Worn or damaged electrode
- Worn or damaged insulator
- Faulty spark plug cap

Ignition coil(s)
- Cracked or broken ignition coil
- Broken or shorted primary or secondary coils
- Faulty spark plug lead

Ignition system
- Faulty ignitor unit
- Faulty pickup coil
- Broken generator rotor woodruff key

Switches and wiring
- Faulty main switch
- Faulty engine stop switch
- Broken or shorted wiring
- Faulty neutral switch
- Faulty start switch
- Faulty sidestand switch
- Faulty clutch switch
- Improperly grounded circuit
- Loose connections

Starting system
- Faulty starter motor
- Faulty starter relay
- Faulty starting circuit cutoff relay
- Faulty starter clutch

EAS00846
INCORRECT ENGINE IDLING SPEED

ENGINE

Cylinder(s) and cylinder head(s)
- Incorrect valve clearance
- Damaged valve train components

Air filter
- Clogged air filter element

FUEL SYSTEM

Carburetor(s)
- Faulty starter plunger
- Loose or clogged pilot jet
- Loose or clogged pilot air jet
- Damaged or loose carburetor joint
- Improperly synchronized carburetors
- Improperly adjusted engine idling speed (throttle stop screw)
- Improper throttle cable free play
- Flooded carburetor

ELECTRICAL SYSTEMS

Battery
- Discharged battery
- Faulty battery

Spark plug(s)
- Incorrect spark plug gap
- Incorrect spark plug heat range
- Fouled spark plug
- Worn or damaged electrode
- Worn or damaged insulator
- Faulty spark plug cap

Ignition coil(s)
- Broken or shorted primary or secondary coils
- Faulty spark plug lead
- Cracked or broken ignition coil

Ignition system
- Faulty ignitor unit
- Faulty pickup coil
- Broken generator rotor woodruff key

EAS00849

POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE

Refer to “STARTING PROBLEMS”.

ENGINE

Air filter
- Clogged air filter element

Air intake system
- Bent, clogged or disconnected carburetor air vent hose
- Clogged or leaking air duct

FUEL SYSTEM

Carburetor(s)
- Faulty diaphragm
- Incorrect fuel level
- Loose or clogged main jet

Fuel pump
- Faulty fuel pump

EAS00850

FAULTY GEAR SHIFTING

SHIFTING IS DIFFICULT

Refer to “CLUTCH DRAGS”.

SHIFT PEDAL DOES NOT MOVE

Shift shaft
- Improperly adjusted shift rod
- Bent shift shaft

Shift drum and shift forks
- Foreign object in a shift drum groove
- Seized shift fork
- Bent shift fork guide bar

Transmission
- Seized transmission gear
- Foreign object between transmission gears
- Improperly assembled transmission

JUMPS OUT OF GEAR

Shift shaft
- Incorrect shift pedal position
- Improperly returned stopper lever

Shift forks
- Worn shift fork

Shift drum
- Incorrect axial play
- Worn shift drum groove

Transmission
- Worn gear dog

EAS00852

FAULTY CLUTCH

CLUTCH SLIPS

Clutch
- Improperly assembled clutch
- Improperly assembled clutch master cylinder
- Improperly assembled clutch release cylinder
- Incorrect clutch fluid level
- Damaged clutch hose
- Loose or fatigued clutch spring
- Loose union bolt
- Worn friction plate
- Worn clutch plate
- Damaged clutch release cylinder

Engine oil
- Incorrect oil level
- Incorrect oil viscosity (low)
- Deteriorated oil

CLUTCH DRAGS

Clutch
- Air in hydraulic clutch system
- Unevenly tensioned clutch springs
- Warped pressure plate
- Bent clutch plate
- Swollen friction plate
- Bent clutch push rod
- Damaged clutch boss
- Burnt primary driven gear bushing
- Damaged clutch release cylinder
- Match marks not aligned

Engine oil
- Incorrect oil level
- Incorrect oil viscosity (high)
- Deteriorated oil

EAS00855
OVERHEATING

ENGINE

Clogged coolant passages
- Cylinder head(s) and piston(s)
- Heavy carbon buildup

Engine oil
- Incorrect oil level
- Incorrect oil viscosity
- Inferior oil quality

COOLING SYSTEM

Coolant
- Low coolant level

Radiator
- Damaged or leaking radiator
- Faulty radiator cap
- Bent or damaged radiator fin

Water pump
- Damaged or faulty water pump

Thermostat
- Thermostat stays closed

Hose(s) and pipe(s)
- Damaged hose
- Improperly connected hose
- Damaged pipe
- Improperly connected pipe

FUEL SYSTEM

Carburetor(s)
- Incorrect main jet setting
- Incorrect fuel level
- Damaged or loose carburetor joint

Air filter
- Clogged air filter element

CHASSIS

Brake(s)
- Dragging brake

ELECTRICAL SYSTEMS

Spark plug(s)
- Incorrect spark plug gap
- Incorrect spark plug heat range

Ignition system
- Faulty ignitor unit

EAS00856
OVERCOOLING

COOLING SYSTEM

Thermostat
- Thermostat stays open

EAS00857
POOR BRAKING PERFORMANCE
- Worn brake pad
- Worn brake disc
- Air in hydraulic brake system
- Leaking brake fluid
- Faulty brake caliper seal
- Loose union bolt
- Damaged brake hose
- Oil or grease on the brake disc
- Oil or grease on the brake pad
- Incorrect brake fluid level

EAS00860
FAULTY FRONT FORK LEGS

LEAKING OIL
- Bent, damaged or rusty inner tube
- Cracked or damaged outer tube
- Improperly installed oil seal
- Damaged oil seal lip
- Incorrect oil level (high)
- Loose damper rod assembly bolt
- Damaged damper rod assembly bolt copper washer
- Cracked or damaged cap bolt O-ring
- Loose drain bolt
- Damaged drain bolt gasket

MALFUNCTION
- Bent or damaged inner tube
- Bent or damaged outer tube
- Damaged fork spring
- Worn or damaged outer tube bushing
- Bent or damaged damper rod
- Incorrect oil viscosity
- Incorrect oil level

EAS00862
UNSTABLE HANDLING

Handlebar
- Bent or improperly installed handlebar

Steering head components
- Improperly installed upper bracket
- Improperly installed lower bracket (improperly tightened ring nut)
- Bent steering stem
- Damaged ball bearing or bearing race

Front fork leg(s)
- Uneven oil levels (both front fork legs)
- Unevenly tensioned fork spring (both front fork legs)
- Broken fork spring
- Bent or damaged inner tube
- Bent or damaged outer tube

Swingarm
- Worn bearing or bushing
- Bent or damaged swingarm

Rear shock absorber assemblies
- Faulty rear shock absorber spring
- Leaking oil or gas

Tire(s)
- Uneven tire pressures (front and rear)
- Incorrect tire pressure
- Uneven tire wear

Wheel(s)
- Incorrect wheel balance
- Deformed cast wheel
- Damaged wheel bearing
- Bent or loose wheel axle
- Excessive wheel runout

Frame
- Bent frame
- Damaged steering head pipe
- Improperly installed bearing race

EAS00866

FAULTY LIGHTING OR SIGNALING SYSTEM

HEADLIGHT DOES NOT LIGHT
- Wrong headlight bulb
- Too many electrical accessories
- Hard charging
- Incorrect connection
- Improperly grounded circuit
- Poor contacts (main or light switch)
- Burnt-out headlight bulb

HEADLIGHT BULB BURNT OUT
- Wrong headlight bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded circuit
- Faulty main switch
- Faulty light switch
- Headlight bulb life expired

TAIL/BRAKE LIGHT DOES NOT LIGHT
- Wrong tail/brake light bulb
- Too many electrical accessories
- Incorrect connection
- Burnt-out tail/brake light bulb

TAIL/BRAKE LIGHT BULB BURNT OUT
- Wrong tail/brake light bulb
- Faulty battery
- Incorrectly adjusted rear brake light switch
- Tail/brake light bulb life expired

TURN SIGNAL DOES NOT LIGHT
- Faulty turn signal switch
- Faulty turn signal relay
- Burnt-out turn signal bulb
- Incorrect connection
- Damaged or faulty wire harness
- Improperly grounded circuit
- Faulty battery
- Blown, damaged or incorrect fuse

TURN SIGNAL BLINKS SLOWLY
- Faulty turn signal relay
- Faulty main switch
- Faulty turn signal switch
- Incorrect turn signal bulb

TURN SIGNAL REMAINS LIT
- Faulty turn signal relay
- Burnt-out turn signal bulb

TURN SIGNAL BLINKS QUICKLY
- Incorrect turn signal bulb
- Faulty turn signal relay
- Burnt-out turn signal bulb

HORN DOES NOT SOUND
- Improperly adjusted horn
- Damaged or faulty horn
- Faulty main switch
- Faulty horn switch
- Faulty battery
- Blown, damaged or incorrect fuse
- Faulty wire harness

YAMAHA MOTOR CO., LTD.
2500 SHINGAI IWATA SHIZUOKA JAPAN

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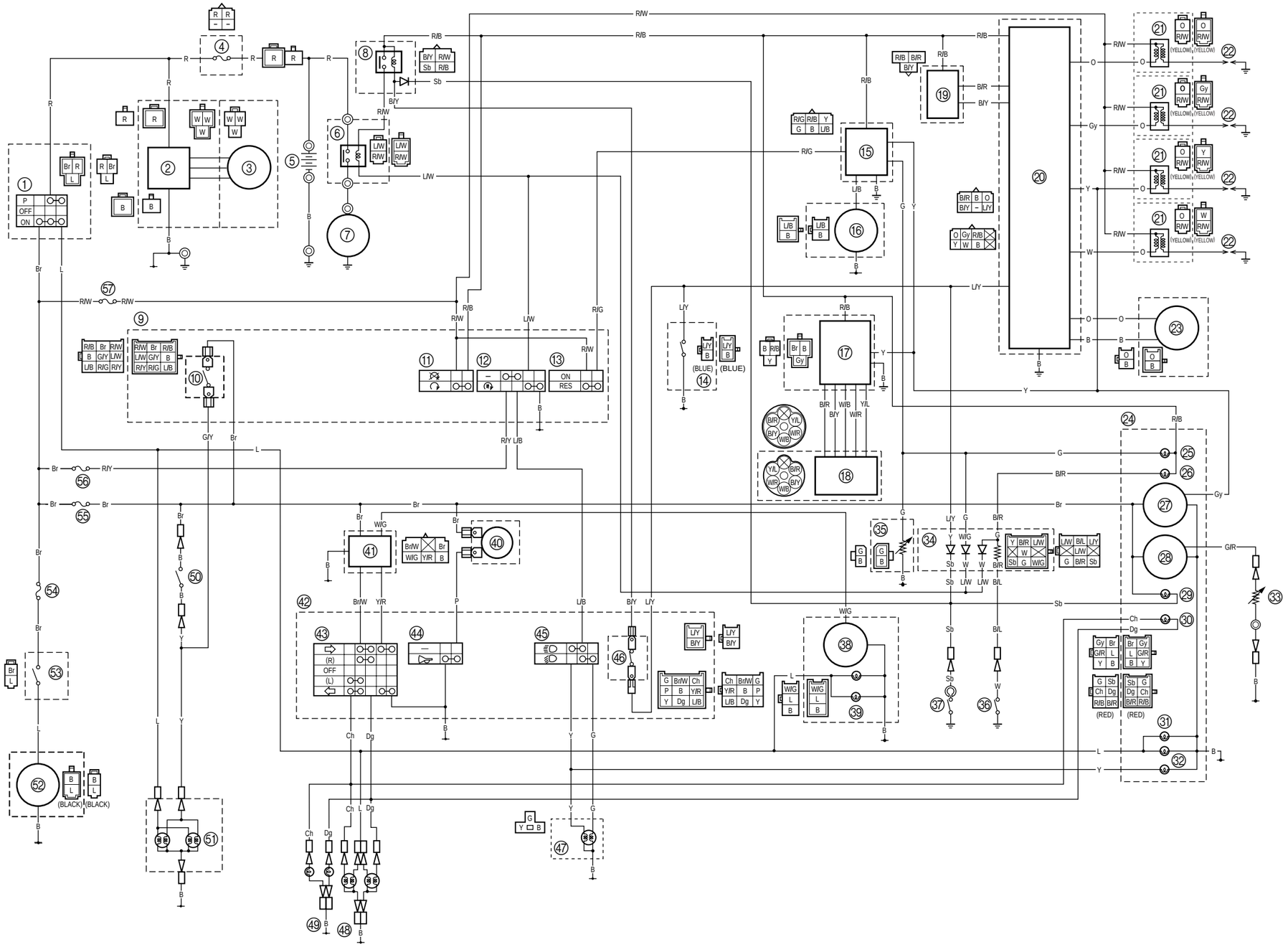
VMX12N(C) WIRING DIAGRAM



① Main switch
② Rectifier/regulator
③ Generator
④ Main fuse
⑤ Battery
⑥ Starter relay
⑦ Starter motor
⑧ Starting circuit cutoff relay
⑨ Right handlebar switch
⑩ Front brake light switch
⑪ Engine stop switch
⑫ Start switch
⑬ Fuel reserve switch
⑭ Sidestand switch
⑮ Fuel pump relay
⑯ Fuel pump
⑰ V-boost control unit
⑱ V-boost servo motor
⑲ Vacuum pressure sensor
⑳ Ignitor unit
㉑ Ignition coil
㉒ Spark plug
㉓ Pickup coil
㉔ Meter assembly
㉕ Fuel level indicator light
㉖ Oil level warning light
㉗ Tachometer
㉘ Water temperature gauge
㉙ Neutral indicator light
㉚ Turn signal indicator light
㉛ Meter light
㉜ High beam indicator light
㉝ Temperature sender
㉞ Diode assembly
㉟ Fuel sender
㊱ Oil level switch
㊲ Neutral switch
㊳ Speedometer
㊴ Meter light
㊵ Horn
㊶ Turn signal relay
㊷ Left handlebar switch
㊸ Turn signal switch
㊹ Horn switch
㊺ Dimmer switch
㊻ Clutch switch
㊼ Headlight
㊽ Front turn signal light
㊾ Rear turn signal light
㊿ Rear brake light switch
(51) Tail/brake light
(52) Radiator fan motor
(53) Thermo switch
(54) Radiator fan motor fuse
(55) Signaling system fuse
(56) Headlight fuse
(57) Ignition fuse

COLOR CODE

B .....black	L ..... blue	Y .....yellow	G/Y..... green/yellow	R/G ..... red/green	Y/L .....yellow/blue
Br .....brown	O ..... orange	B/L ..... black/blue	L/B ..... blue/black	R/W ..... red/white	Y/R.....yellow/red
Ch .....chocolate	P..... pink	B/R.....black/red	L/R ..... blue/red	R/Y ..... red/yellow	
Dg .....dark green	R..... red	B/Y.....black/yellow	L/W ..... blue/white	W/G ..... white/green	
G .....green	Sb..... sky blue	Br/W.....brown/white	L/Y ..... blue/yellow	W/B ..... white/black	
Gy .....gray	W..... white	G/R .....green/red	R/B..... red/black	W/R ..... white/red	