YAMAHA

XVZ13A
XVZ13AT

H

4NK-AE1

SERVICE MANUAL

EB000000

XVZ13A/XVZ13AT H
SERVICE MANUAL

First edition, September 1995

EB001000

NOTICE

This manual was produced by the Yamaha Motor Company primarily for use by Yamaha dealers and their qualified mechanics. It is not possible to include all the knowledge of a mechanic in one manual, so it is assumed that anyone who uses this book to perform maintenance and repairs on Yamaha motorcycles has a basic understanding of the mechanical ideas and the procedures of motorcycle repair. Repairs attempted by anyone without this knowledge are likely to render the motorcycle unsafe and unfit for use.

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

NOTE:
Designs and specifications are subject to change without notice.

IMPORTANT INFORMATION

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

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

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

EB002000

HOW TO USE THIS MANUAL

MANUAL ORGANIZATION

This manual consists of chapters for the main categories of subjects. (See "Illustrated symbols")

1st title ①: This is the title of the chapter with its symbol in the upper right corner of each page.

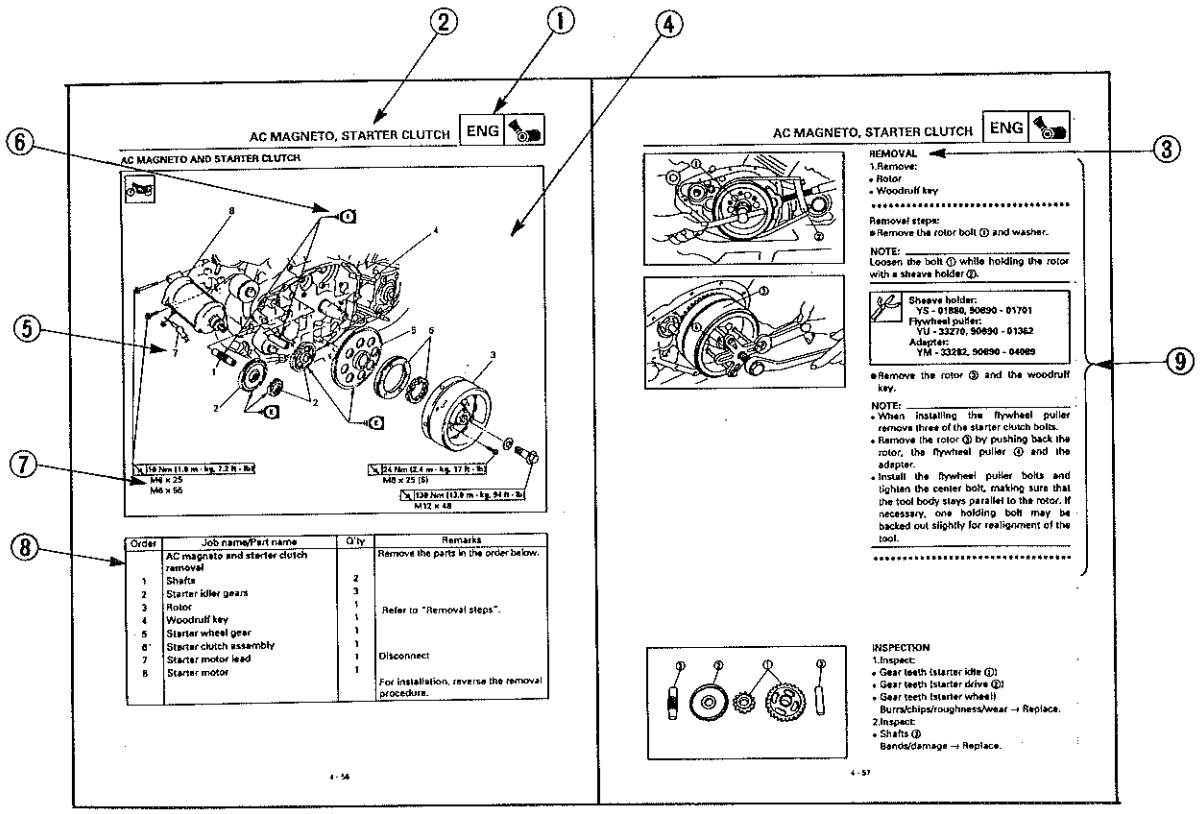
2nd title ②: This title indicates the section of the chapter and only appears on the first page of each section. It is located in the upper left corner of the page.

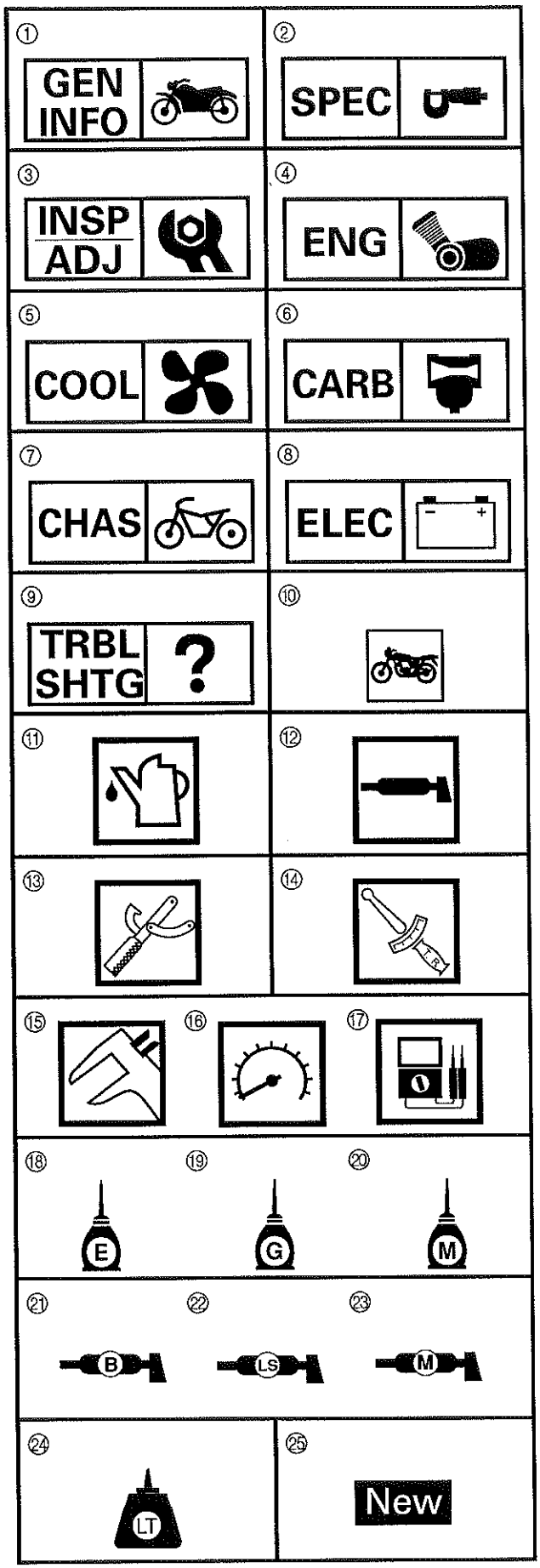
3rd title ③: This title indicates a sub-section that is followed by step-by-step procedures accompanied by corresponding illustrations.

EXPLODED DIAGRAMS

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

1. An easy-to-see exploded diagram ④ is provided for removal and disassembly jobs.
2. Numbers ⑤ are given in the order of the jobs in the exploded diagram. A number that is enclosed by a circle indicates a disassembly step.
3. An explanation of jobs and notes is presented in an easy-to-read way by the use of symbol marks ⑥. The meanings of the symbol marks are given on the next page.
4. Dimension figures and the number of parts ⑦ are given for bolts and screws that have a required tightening torque.
5. A job instruction chart ⑧ accompanies the exploded diagram, providing the order of jobs, names of parts, notes in jobs, etc.
6. For jobs requiring more information, the step-by-step format supplements ⑨ are given in addition to the exploded diagram and the job instruction chart.





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ILLUSTRATED SYMBOLS

Illustrated symbols ① to ⑨ are printed on the top right of each page and indicate the subject of each chapter.

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

Illustrated symbols ⑩ to ⑰ are used to identify the specifications appearing in the text.

⑩ Can be serviced with engine mounted
⑪ Filling fluid
⑫ Lubricant
⑬ Special tool
⑭ Torque
⑮ Wear limit, clearance
⑯ Engine speed
⑰ Ω, V, A

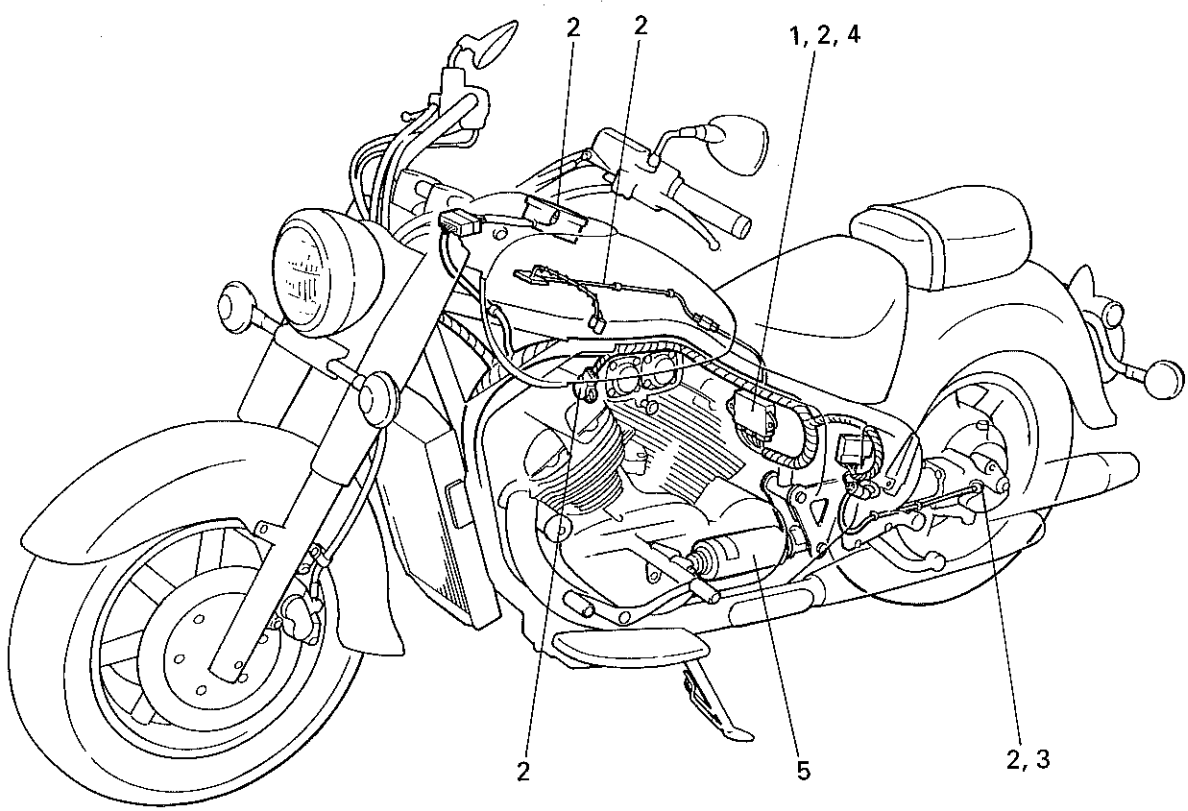
Illustrated symbols ⑱ to ㉓ in the exploded diagrams indicate the types of lubricants and lubrication points.

⑱ Apply engine oil
⑲ Apply gear oil
⑳ Apply molybdenum disulfide oil
㉑ Apply wheel bearing grease
㉒ Apply lightweight lithium-soap base grease
㉓ Apply molybdenum disulfide grease

Illustrated symbols ㉔ to ㉕ in the exploded diagrams indicate where to apply a locking agent ㉔ and when to install new parts ㉕.

㉔ Apply locking agent (LOCTITE®)
㉕ Replace

NEW FEATURES

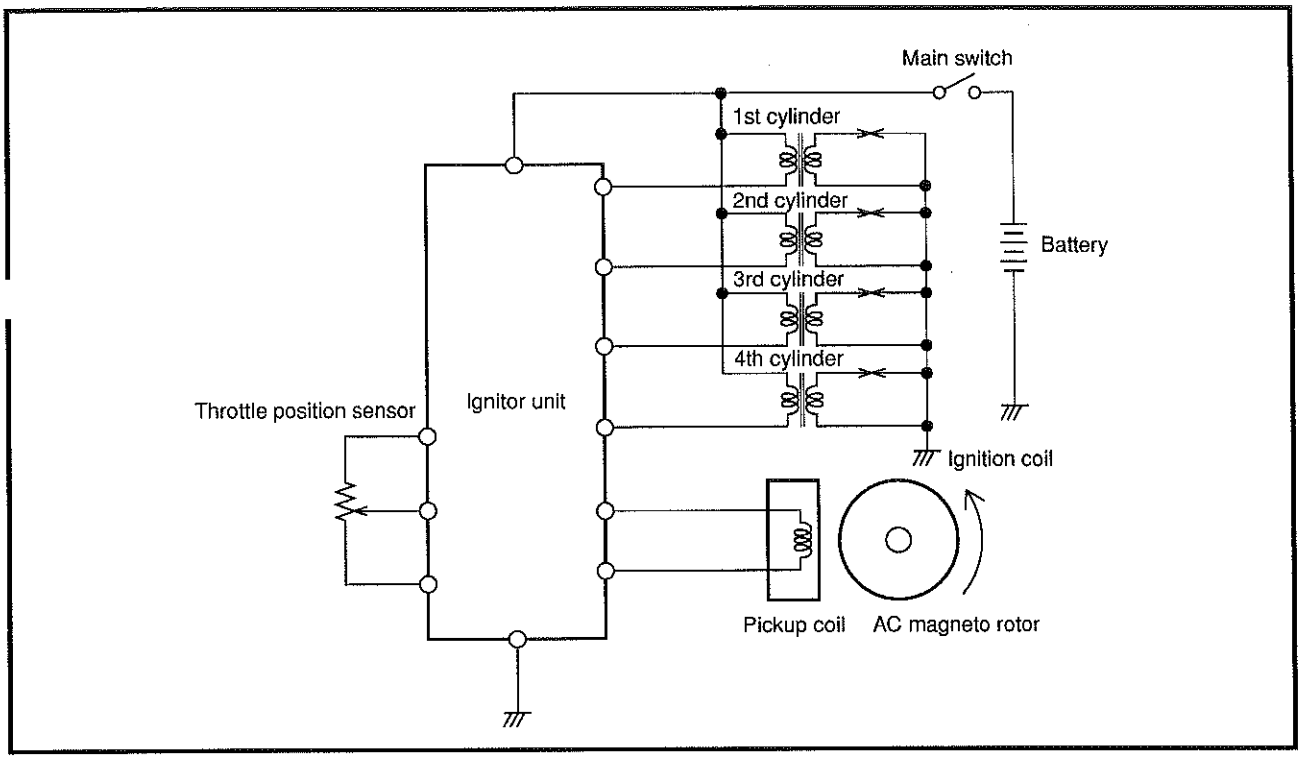


1. Map-controlled ignitor unit
2. Self-diagnosing system
3. Speed sensor
4. Speed limiter
5. Horizontal rear shock absorber

MAP-CONTROLLED IGNITOR UNIT

A map-controlled, fully-transistorized ignition system is used in the XVZ13A/XVZ13AT.

The microcomputer in the ignitor unit detects the engine speed and throttle position, thus determining the optimum ignition timing through the entire operating range. In this way, quick throttle response can be achieved according to various riding conditions.

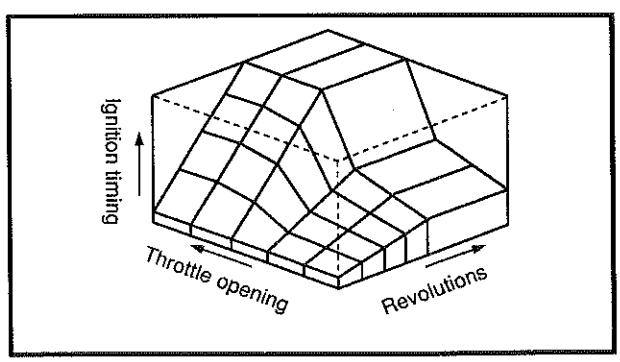


■ Function of Component

Component	Function
Throttle position sensor	Detects throttle valve opening and inputs it into the computer in the ignitor unit as a throttle opening signal.
Pickup coil	Detects signal rotor revolutions and inputs them into the computer in the ignitor unit as engine revolution signals.
Ignitor unit	The signals of the throttle position sensor and pickup coil sensor are analyzed by the computer in the ignitor unit, which then adjusts ignition timing for the operation requirements.

■ Principal of 3-Dimensional Control

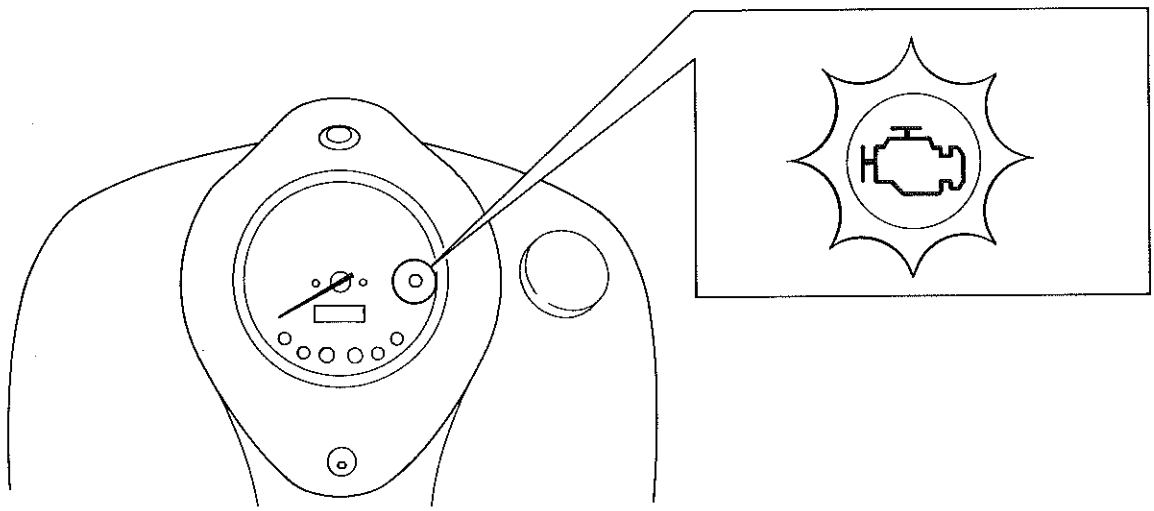
Conventionally, ignition timing was controlled only by engine revolutions (2-dimensional control).
However, ignition timing needs advancement also by engine load. Thus, accurate ignition timing can be determined by adding throttle opening to determine ignition timing (3-dimensional control).

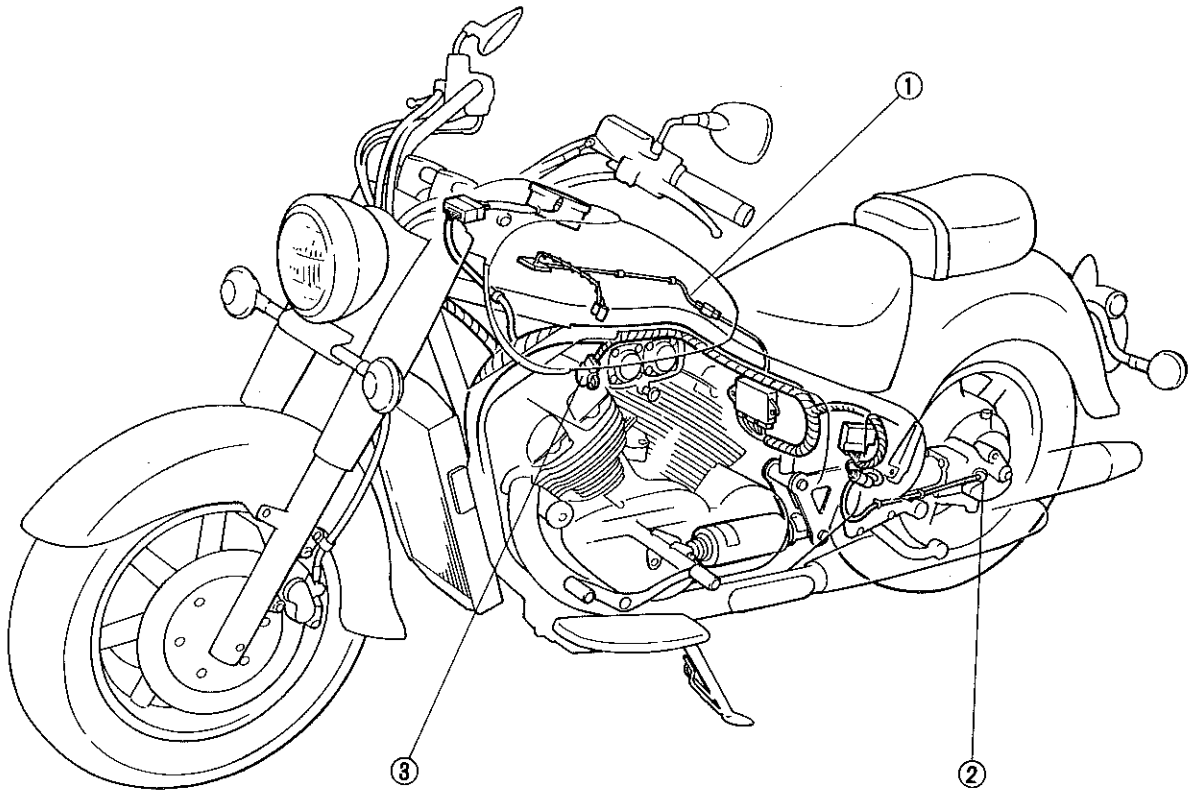


3-D Image Map of Ignition Timing
(different from actual characteristics)

SELF-DIAGNOSIS

The XVZ13A/XVZ13AT features a self-diagnosing system.
In the XVZ13A/XVZ13AT, when the main switch is turned on the "Engine indicator light" in the speedometer comes on for 1.4 seconds then goes off. However, if there is a malfunction, it comes on for 1.4 seconds, goes off and then begins flashing. (However, it is on while the engine is running.)





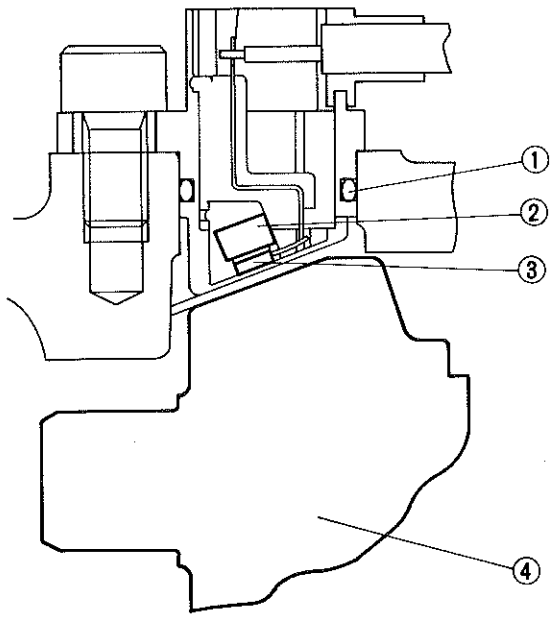
① Fuel light system
② Speed sensor
③ T.P.S
(Throttle position sensor)

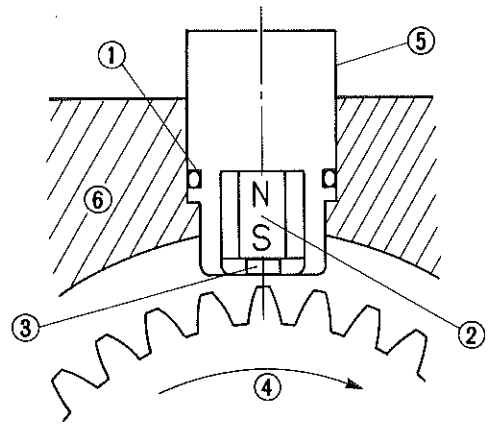
SPEED SENSOR

The XVZ13A/XVZ13AT speed sensor is installed near the drive pinion gear of the final drive gear and outputs an electrical signal equal to the number of teeth on the gear rotating past it.

CONSTRUCTION

The IC, which is attached to the final drive gear case by the speed sensor and positioned near the gear, detects the magnetic flux change received by the bias magnet. Then, the magnetic flux difference, which is equal to the number of teeth on the gear, is converted into an electrical signal.

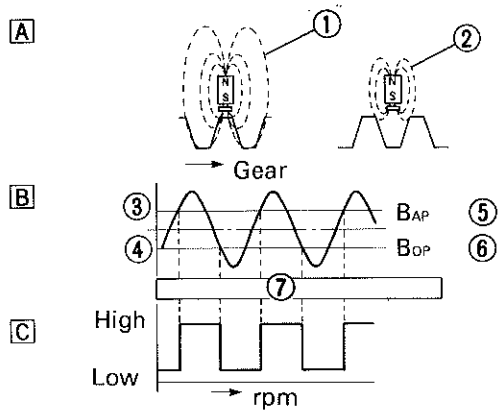




① O-ring
② Magnet
③ IC
④ Drive pinion gear
⑤ Sensor
⑥ Housing

OPERATION

The magnetic flux density, which passes through the magnetic induction element (IC), changes according to the gear's position. This causes the switch in the IC to be activated and output a wave equal to the number of teeth on the gear rotating past it.



A Magnetic circuit
① Large magnetic flux density
② Small magnetic flux density
B Magnetic flux distribution
③ Large magnetic flux density
④ Small magnetic flux density
⑤ (Activating point)
⑥ (Reversing point)
⑦ Magnetic flux changes and the activation of the IC switch (Magnetic flux change → voltage)
C Output voltage

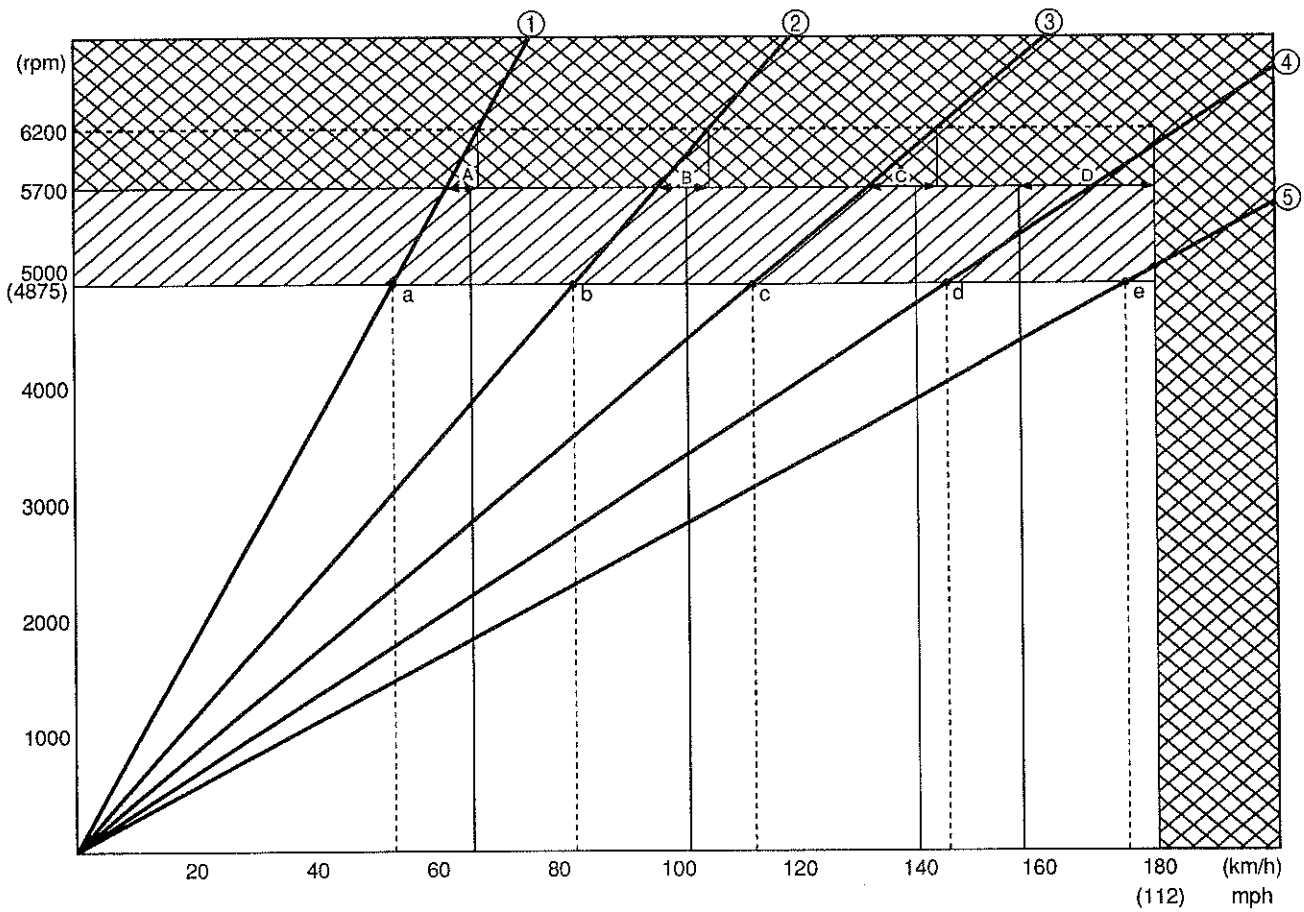
FEATURES

1) Since the sensor contains no moving parts and is not in contact with other parts, it will have a long service life. In addition, since a driving force is not necessary for its operation, there is no torque or other losses.
2) Since the semiconductor detects the speed based on the IC's measurements, speeds from the slowest to the fastest can be determined.

OPERATION OF THE SPEED LIMITER

In this model, there are two functions which activate the speed limiter: one detects the engine speed during normal operation and the other detects the speed measured by the speed sensor.

However, if the CDI unit detects that the speed sensor is malfunctioning *, the speed limiter will be activated whenever a gear rotates at more than 4875 rpm, as shown in the graph below.



① 1st gear
② 2nd gear
③ 3rd gear
④ 4th gear
⑤ 5th gear

A:41mph (66 km/h)
B:63mph (102 km/h)
C:87mph (140 km/h)
D:98mph (158 km/h)
Speed limiter operating speeds for each gear during normal operation

a:33mph (53 km/h)
b:52mph (83 km/h)
c:70mph (113 km/h)
d:90mph (145 km/h)
e:109mph (175 km/h)
Speed limiter operating speeds for each gear during a speed sensor malfunction

Speed limiter activating range during normal operation

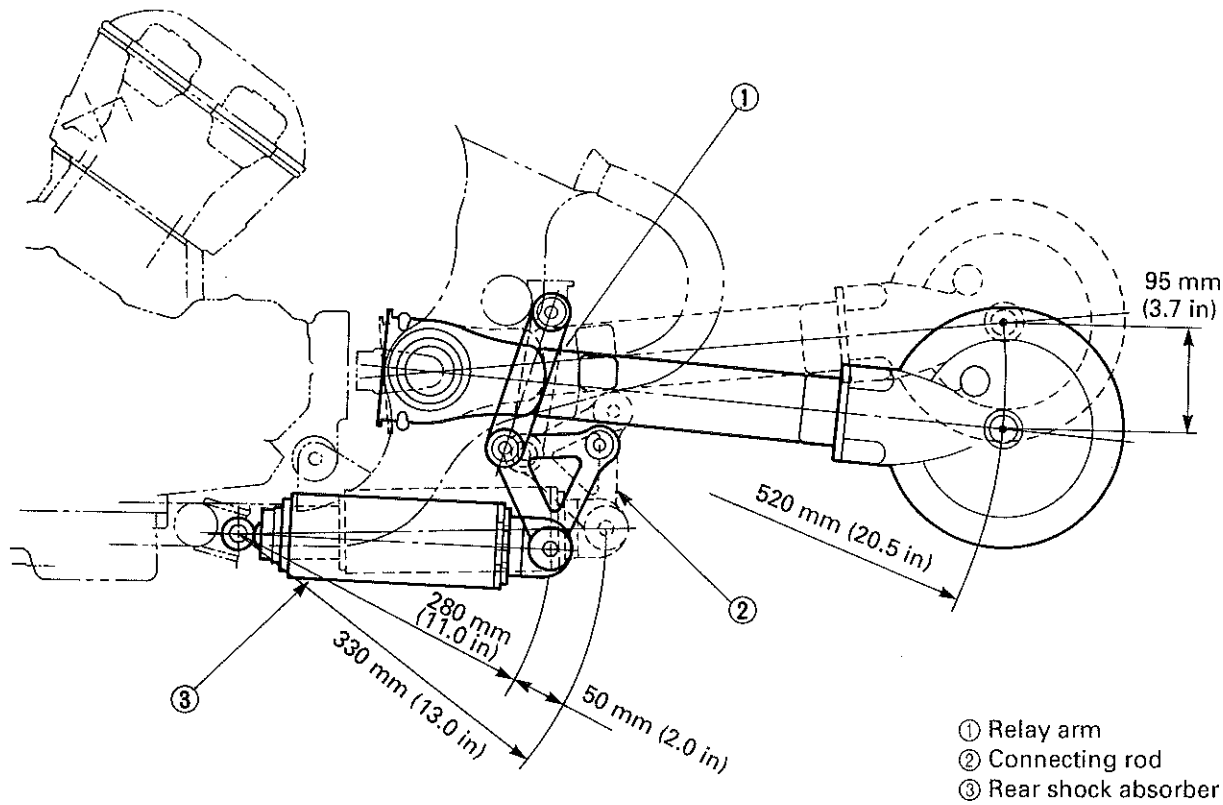
The speed limiter is activated when the engine speed is between 5700 and 6200 rpm or the speed is more than 112 mph (180 km/h).

Speed limiter activating range during a speed sensor malfunction *

* If the speed sensor is malfunctioning and a pulse is not output when the gear speed is more than 2000 rpm for 8 seconds, the speed limiter is activated when the gear speed reaches more than 4875 rpm. The speed sensor lead may be disconnected, causing it to malfunction. (Otherwise, the self-diagnosing system may be on.)

HORIZONTAL REAR SHOCK ABSORBER

In order to lower the center of gravity of the vehicle, the parts near the rear fender of the XVZ13A/XVZ13AT have been simplified and a horizontal rear shock absorber has been installed.

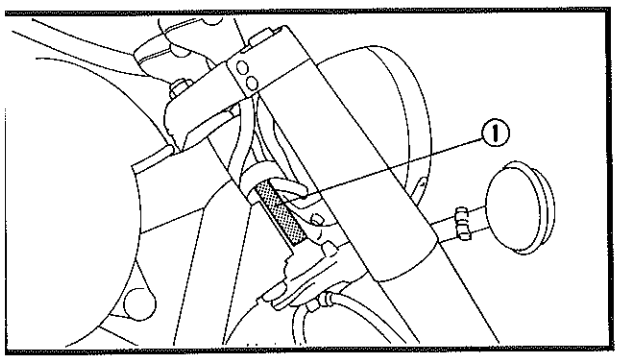


① Relay arm
② Connecting rod
③ Rear shock absorber

EB004000

CHAPTER TITLES

CONTENTS
GENERAL INFORMATION

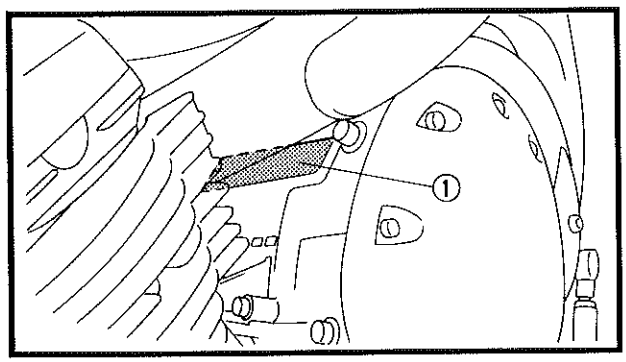


EB100000
GENERAL INFORMATION
MOTORCYCLE IDENTIFICATION

EB100010
VEHICLE IDENTIFICATION NUMBER
The vehicle identification number ① is stamped into the right side of the steering head.

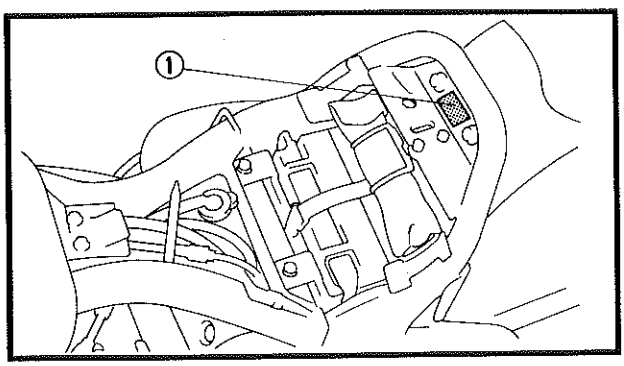
Initial serial number:
XVZ13AH(C)
JYA4NKE0*TA000101(for USA)
JYA4NKC0*TA010101(for California)
JYA4NKN0*TA012101(for Canada)
XVZ13ATH(C)
JYA4NLE0*TA000101(for USA)
JYA4NLC0*TA006101(for California)
JYA4NLN0*TA007101(for Canada)

NOTE:
The vehicle identification number is used to identify your motorcycle and may be used to register your motorcycle with the licensing authority in your country.

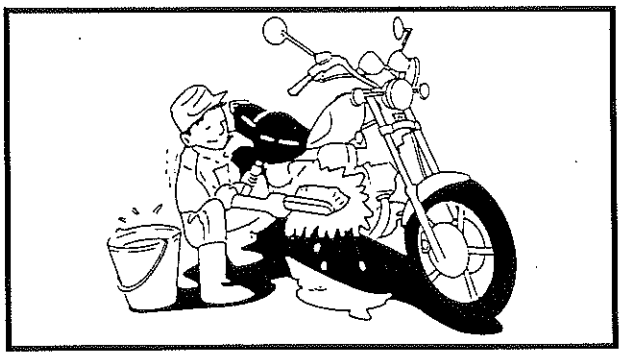


EB100030
ENGINE SERIAL NUMBER
The engine serial number ① is stamped into the crankcase.

Initial serial number:
XVZ13AH(C)
4NK-000101(for USA)
4NK-010101(for California)
4NK-012101(for Canada)
XVZ13ATH(C)
4NL-000101(for USA)
4NL-006101(for California)
4NL-007101(for Canada)

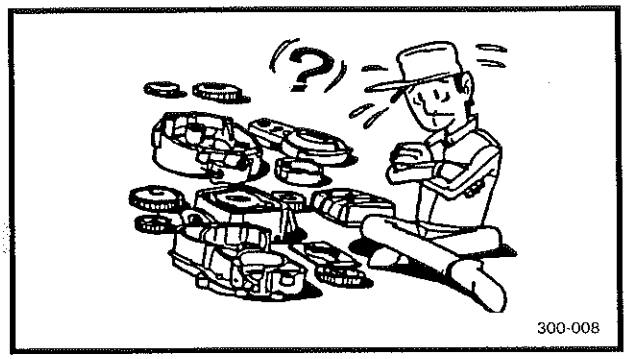


MODEL LABEL
The model label ① is affixed to the frame. This information will be needed to order spare parts.

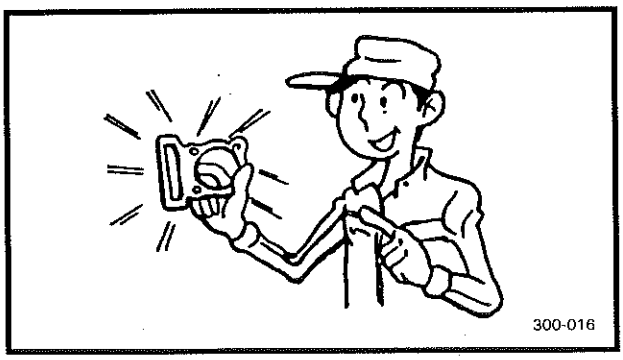


EB101000
IMPORTANT INFORMATION
PREPARATION FOR REMOVAL PROCEDURES

1. Remove all dirt, mud, dust and foreign material before removal and disassembly.



2. Use proper tools and cleaning equipment. Refer to the "SPECIAL TOOLS" section.
3. When disassembling the machine, 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 machine disassembly, clean all 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.

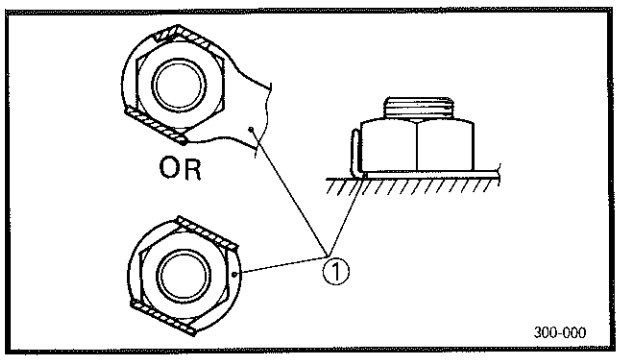


EB101010
REPLACEMENT PARTS

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

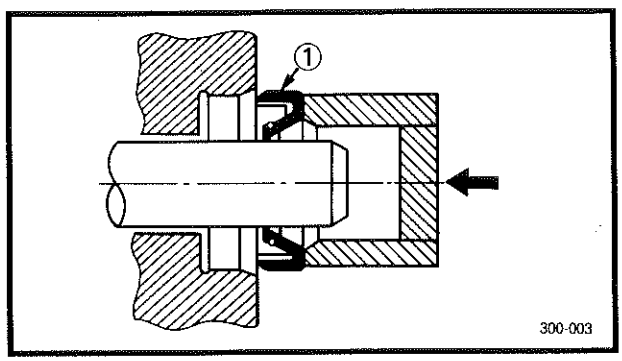
EB101020
GASKETS, OIL SEALS AND O-RINGS

1. Replace all gaskets, seals and O-rings when overhauling the engine. All gasket surfaces, oil seal lips and O-rings must be cleaned.
2. Properly oil all mating parts and bearings during reassembly. Apply grease to the oil seal lips.



EB101030
LOCK WASHERS/PLATES AND COTTER PINS

1. Replace all lock washers/plates ① and cotter pins after removal. Bend lock tabs along the bolt or nut flats after the bolt or nut has been tightened to specification.



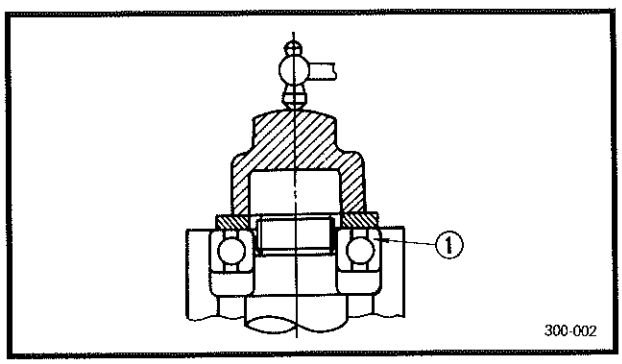
EB101040
BEARINGS AND OIL SEALS

1. Install bearings and oil seals so that the manufacturer's marks or numbers are visible. When installing oil seals, apply a light coating of lightweight lithium base grease to the seal lips. Oil bearings liberally when installing, if appropriate.

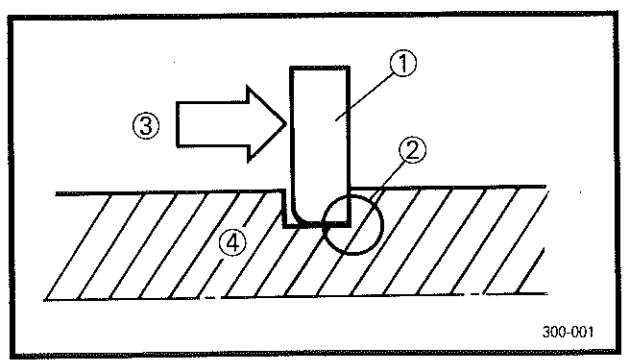
① Oil seal

CAUTION:

Do not use compressed air to spin the bearings dry. This will damage the bearing surfaces.



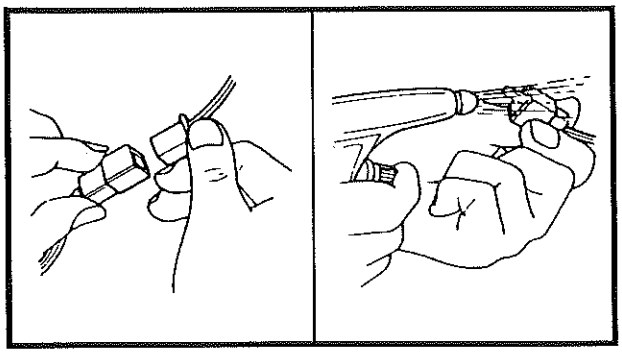
① Bearing

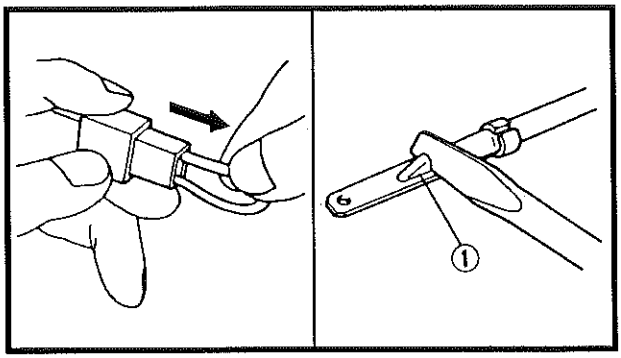


EB101050
CIRCLIPS

1. Check all circlips carefully before reassembly. Always replace piston pin clips after one use. Replace distorted circlips. When installing a circlip ①, make sure that the sharp-edged corner ② is positioned opposite the thrust ③ it receives. See sectional view.

④ Shaft





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CHECKING OF CONNECTIONS

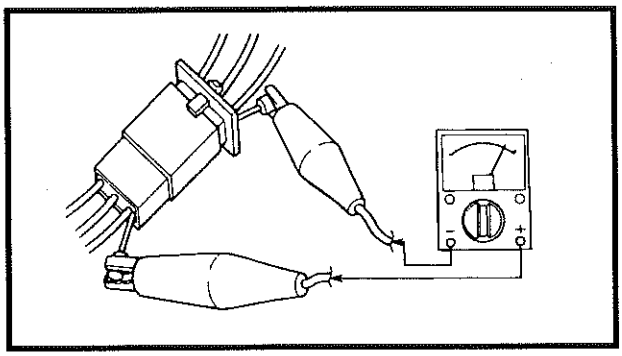
Check the connectors for stains, rust, moisture, etc.

1. Disconnect:
   - Connector
2. Check:
   - Connector

   Moisture → Dry each terminal with an air blower.

   Stains/rust → Connect and disconnect the terminals several times.
3. Check:
   - Connector leads

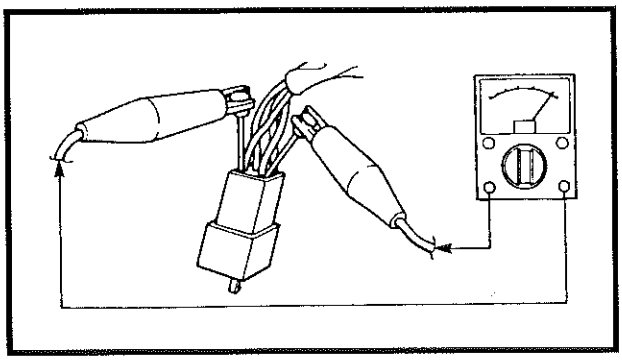
   Looseness → Bend up the pin ① and connect the terminals.



4. Connect:
   - Connector terminals

NOTE:

The two terminals "click" together.



5. Check:
   - Continuity (using a pocket tester)

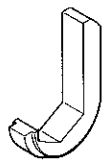
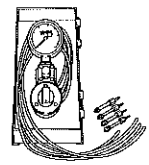
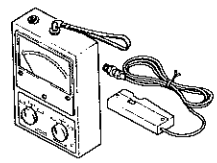
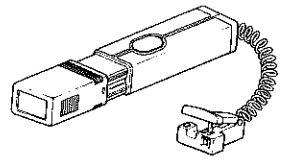
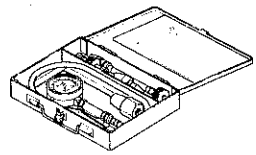
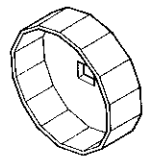
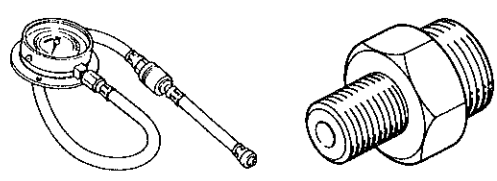
NOTE:

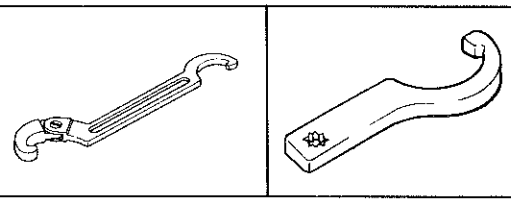
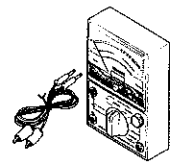
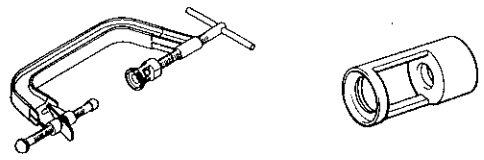
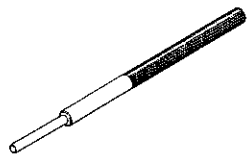
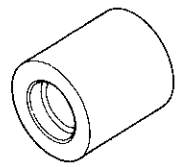
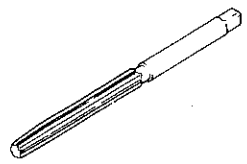
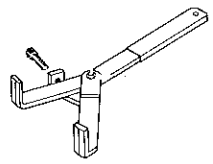
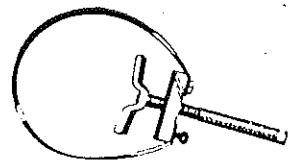
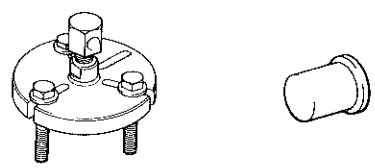
- If there is no continuity, clean the terminals.
- When checking the wire harness be sure to perform steps 1 to 3.
- As a quick remedy, use a contact revitalizer available at most part stores.
- Check the connector with a pocket tester as shown.

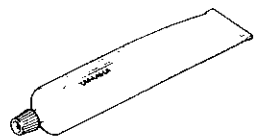
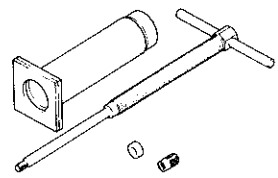
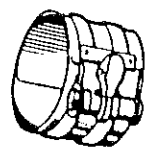
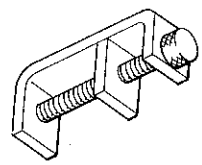
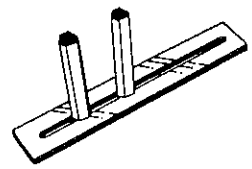
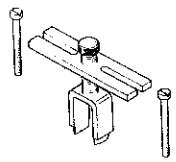
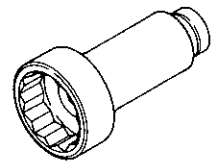
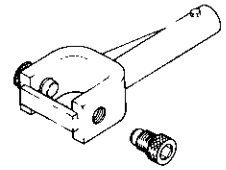
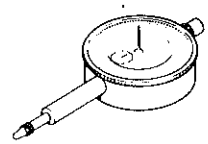
EB102001
SPECIAL TOOLS

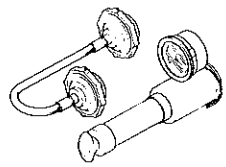
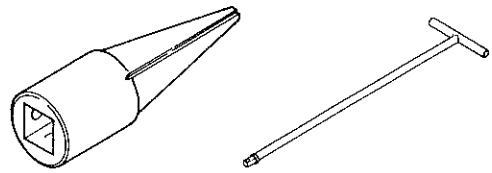
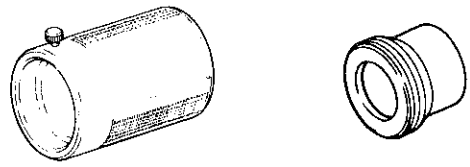
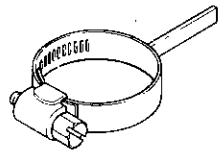
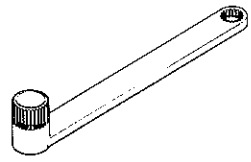
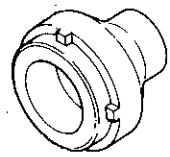
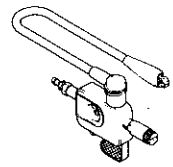
The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools; this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools may differ by shape and part number from country to country.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

P/N.YM-, YU-
For US, CDN
YS-, YK- ACC-
P/N.90890-
Except for US, CDN

Tool No.	Tool name / How to use	Illustration
YM-33961 90890-04105	Tappet adjusting tool. This tool is needed to rotate the cam-shaft for access to the valve lifter and valve pad	
YU-08030-A 90890-03094	Vacuum gauge This gauge is needed for carburetor synchronization.	
YU-08036-A 90890-03113	Engine tachometer This tool is needed for observing engine rpm.	
YU-33277-A 90890-03141	Timing light This tool is necessary for checking ignition timing.	
YU-33223 90890-03081	Compression gauge / Set These tools are needed to measure engine compression.	
YU-38411 90890-01426	Oil filter wrench This tool is needed to remove and install the oil filter.	
Gauge 90890-03153 Adapter 90890-03124	Pressure gauge / adapter These tools are needed to measure engine oil pressure.	

Tool No.	Tool name / How to use	Illustration
YU-01268 90890-01268 YU-33975 90890-01403	Ring nut wrench This tool is needed to loosen and tighten the steering stem ring nut.	
YU-03112 90890-03112	Pocket tester This instrument is needed for checking the electrical system.	
Compressor YM-04019 90890-04019 Adapter YM-01253-1 90890-04114	Valve spring compressor / adapter These tools are needed to remove and install the valve assemblies.	
YM-4064-A 90890-04064	Valve guide remover (6.0 mm) This tool is needed to remove and install the valve guide.	
YM-04065-A 90890-04065	Valve guide installer (6.0 mm) This tool is needed to install the valve guide.	
YM-04066 90890-04066	Valve guide reamer (6.0 mm) This tool is needed to rebore the new valve guide.	
YM-91042 90890-04086	Universal clutch holder This tool is needed to hold the clutch when removing or installing the clutch boss nut.	
YS-01880 90890-01701	Sheave holder This tool is needed to hold the rotor when removing or installing the rotor bolt.	
Puller YU-33270 90890-01362 Adapter YM-33282 90890-04089	Flywheel puller / adapter These tools are needed to remove the rotor.	

Tool No.	Tool name / How to use	Illustration
ACC-1100 -15-01 90890-85505	Quick gasket® Yamaha Bond No. 1215 This sealant (bond) is used on crankcase mating surfaces, etc.	
YU-01304 90890-01304	Piston pin puller This tool is used to remove the piston pin.	
YM-8037 90890-05158	Piston ring compressor This tool is used to compress the piston rings when installing the piston into the cylinder.	
YM-33286 90890-04090	Damper spring compressor This tool is needed when removing or installing the damper spring.	
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.	
90890-04080	Middle drive gear holder This tool is needed for the gear backlash adjustment.	
YM-04054 90890-04054	Offset wrench (55 mm) This tool is needed when removing or installing the middle drive gear nut.	
YM-04062 90890-04062	Universal joint holder This tool is needed when removing or installing the driven pinion gear nut.	
YU-03097 90890-03097	Dial gauge This tool is used to measure the middle gear backlash.	

Tool No.	Tool name / How to use	Illustration
Tester YU -24460 - 01 90890-01325 Adapter YU - 33984	Radiator cap tester / adapter This tester and its adapter are needed for checking the cooling system.	
YM-01312-A 90890-01312	Fuel level gauge This gauge is used to measure the fuel level in the float chamber.	
Rod holder YM-01300-1 90890-01294 T-handle YM-01326 90890-01326	Damper rod holder / T - handle These tools are needed to loosen and tighten the damper rod holding bolt.	
Weight YM-33963 90890-01367 Adapter YM-8020 90890-01374	Fork seal driver weight / adapter These tools are needed when installing the slide metal, oil seal and dust seal into the fork.	
YM-01230 90890-01230	Final gear backlash band This tool is needed when measuring final gear backlash.	
YM-01229 90890-01229	Coupling gear / middle shaft tool This tool is needed when removing or installing the coupling gear nut.	
YM-04050 90890-04050	Bearing retainer wrench This tool is needed when removing or installing the final drive shaft bearing.	
YM-34487 90890-06754	Dynamic spark tester Ignition checker	

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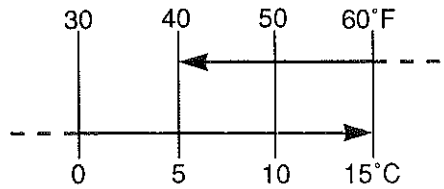
SPECIFICATIONS

SPECIFICATIONS

GENERAL SPECIFICATIONS

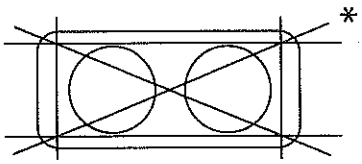
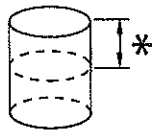
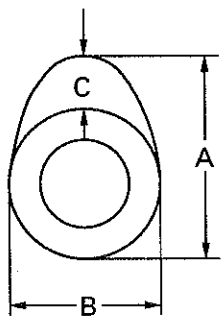
Item	Standard
Model code:	XVZ13AH:4NK1 (For USA) 4NK3 (For Canada) XVZ13AHC:4NK2 (For California) XVZ13ATH:4NL1 (For USA) 4NL3 (For Canada) XVZ13ATHC:4NL2 (For California)
Engine starting number:	4NK-000101:4NK1 (For USA) 4NK-010101:4NK2 (For California) 4NK-012101:4NK3 (For Canada) 4NL-000101:4NL1 (For USA) 4NL-006101:4NL2 (For California) 4NL-007101:4NL3 (For Canada)
Vehicle identification number:	JYA4NKE0*TA000101:4NK1 (For USA) JYA4NKC0*TA010101:4NK2 (For California) JYA4NKN0*TA012101:4NK3 (For Canada) JYA4NLE0*TA000101:4NL1 (For USA) JYA4NLC0*TA006101:4NL2 (For California) JYA4NLN0*TA007101:4NL3 (For Canada)
Dimensions: Overall length Overall width Overall height Seat height Wheelbase Minimum ground clearance Minimum turning radius	 2,480 mm (97.7 in):4NK1, 4NK2, 4NK3 2,485 mm (97.8 in):4NL1, 4NL2, 4NL3 910 mm (35.8 in) 1,160 mm (45.6 in):4NK1, 4NK2, 4NK3 1,475 mm (58.0 in):4NL1, 4NL2, 4NL3 715 mm (28.2 in):4NK1, 4NK2, 4NK3 725 mm (28.6 in):4NL1, 4NL2, 4NL3 1,695 mm (66.7 in) 150 mm (5.9 in) 3,400 mm (133.9 in)
Basic weight: With oil and a full fuel tank	 330 kg (728 lb):4NK1, 4NK2, 4NK3 354 kg (780 lb):4NL1, 4NL2, 4NL3
Engine: Engine type Cylinder arrangement Displacement Bore × stroke Compression ratio Compression pressure (STD) Starting system	 Liquid-cooled 4-stroke, DOHC V type 4-cylinder 1,294 cm^3 79 × 66 mm (3.11 × 2.60 in) 10:1 1,520 kPa (15.2 kg/cm^2, 216 psi) at 175 r/min Electric starter
Lubrication system:	Wet sump

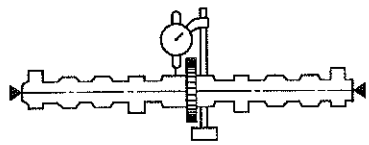
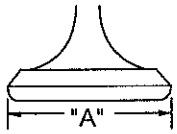
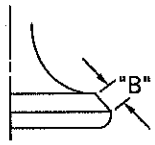
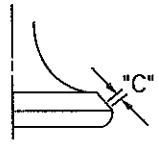
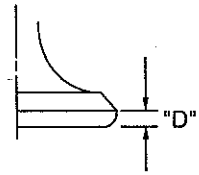
Item	Standard
Oil type or grade: Engine oil  	 Yamalube 4 (20W40) or SAE20W40 type SE motor oil (40°F/5°C or above) Yamalube 4 (10W30) or SAE10W30 type SE motor oil (60°F/15°C or below)
Final gear oil:	SAE80API "GL-4" Hypoid Gear Oil
Engine oil	
Periodic oil change	3.5 L (3.1 Imp qt, 3.7 US qt)
With oil filter replacement	3.7 L (3.3 Imp qt, 3.9 US qt)
Total amount	4.3 L (3.8 Imp qt, 4.5 US qt)
Final gear case oil	
Total amount	0.2 L (0.18 Imp qt, 0.21 US qt)
Radiator capacity (including all routes):	2.9 L (2.55 Imp qt, 3.07 US qt)
Air filter:	Dry type element
Fuel:	
Type	Unleaded fuel recomended
Fuel tank capacity	18 L (4.0 Imp gal, 4.8 US gal)
Fuel reserve amount	3.5 L (0.8 Imp gal, 0.9 US gal)
Carburetor:	
Type / quantity	BDS28/4
Manufacturer	MIKUNI
Spark plug:	
Type	DPR7EA-9/X22EPR-U9
Manufacturer	NGK/NIPPONDENSO
Spark plug gap	0.8 ~ 0.9 mm (0.031 ~ 0.035 in)
Clutch type:	Wet, multiple-disc
Transmission:	
Primary reduction system	Spur gear
Primary reduction ratio	85/51(1.666)
Secondary reduction system	Shaft drive
Secondary reduction ratio	21/27 × 33/10(2.566)
Transmission type	Constant mesh 5-speed
Operation	Left foot operation
Gear ratio 1st	39/16(2.437)
2nd	30/19(1.578)
3rd	29/25(1.160)
4th	29/32(0.906)
5th	21/28(0.750)
Chassis:	
Frame type	Double cradle
Caster angle	30°
Trail	126 mm (5.0 in)
Tire:	
Type	Tubeless
Size front	150/80-16 71H
rear	150/90-15M/C 74H

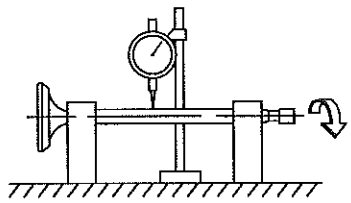
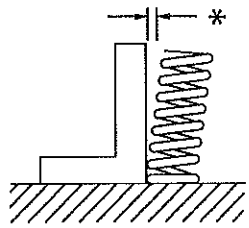
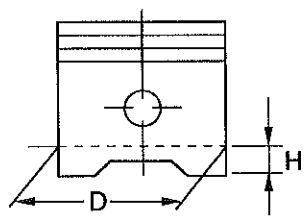
Item		Standard
Manufacturer	front	BRIDGESTONE/DUNLOP (Use only Dunlop tires on the 4NL1, 4NL2, 4NL3)
	rear	BRIDGESTONE/DUNLOP
Type	front	G703/D404F
	rear	G702/D404
Tire pressure (cold tire):		
Maximum load-except motorcycle		203 kg (448 lb):4NK1, 4NK2, 4NK3 179 kg (395 lb):4NL1, 4NL2, 4NL3
0 ~ 90 kg (0 ~198 lb) load *		
	front	250 kPa (2.50 kg/cm^2, 36 psi)
	rear	250 kPa (2.50 kg/cm^2, 36 psi)
90 kg (198 lb) ~ Maximum load *		
	front	250 kPa (2.50 kg/cm^2, 36 psi)
	rear	280 kPa (2.80 kg/cm^2, 41 psi) * Load is the total weight of the cargo, rider, passenger and accessories.
Brake:		
Front brake	type	Dual disc brake
	operation	Right hand operation
Rear brake	type	Single disc brake
	operation	Right foot operation
Suspension:		
Front suspension		Telescopic fork
Rear suspension		Swingarm (link suspension)
Shock absorber:		
Front shock absorber		Coil spring / Oil damper
Rear shock absorber		Coil spring / Gas-oil damper
Wheel travel:		
Front wheel travel		140 mm (5.5 in)
Rear wheel travel		95 mm (3.7 in)
Electrical:		
Ignition system		T.C.I. (Digital)
Generator system		A.C. magneto generator
Battery type		YTX20L-BS
Battery capacity		12 V 18 AH
Headlight type:		Quartz bulb (Halogen)
Bulb wattage × quantity:		
Headlight		12 V 60 W / 55 W
Tail / brake light		12 V 8 W / 27 W
Rear turn signal		12 V 27 W × 2
Front turn signal/front position light		12 V 27 W / 8 W × 2
Meter light		12 V 1.7 W × 2
Neutral indicator light		12 V 1.7 W × 1
Turn indicator light		12 V 1.7 W × 1
High beam indicator light		12 V 1.7 W × 1
Fuel level indicator light		12 V 3.0 W × 1
Oil level indicator light		12 V 1.7 W × 1
Engine overheat indicator light		12 V 1.7 W × 1
Engine indicator light		12 V 1.7 W × 1

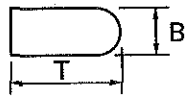
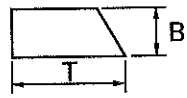
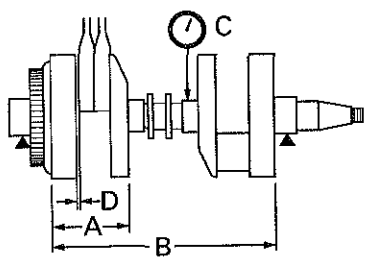
MAINTENANCE SPECIFICATIONS

ENGINE

Item	Standard	Limit
Cylinder head:		
Warp limit	0.03 mm (0.0012 in)	0.10 mm (0.004 in)
		
Cylinder:		
Bore size	78.967 ~ 79.016 mm (3.1089 ~ 3.1109 in)	----
Measuring point *	40 mm (1.57 in)	----
		
Out of round limit	----	0.05 mm (0.0020 in)
Camshaft:		
Drive method	Chain drive (Center)	----
Cam cap inside diameter	25.000 ~ 25.021 mm (0.9843 ~ 0.9851 in)	----
Camshaft outside diameter	24.967 ~ 24.980 mm (0.9830 ~ 0.9835 in)	----
Shaft-to-cap clearance	0.020 ~ 0.054 mm (0.0008 ~ 0.0021 in)	----
Cam dimensions		
		
Intake "A"	34.65 ~ 34.75 mm (1.364 ~ 1.368 in)	<34.55mm (1.360 in)>
"B"	27.95 ~ 28.05 mm (1.100 ~ 1.104 in)	<27.85 mm (1.096 in)>
Exhaust "A"	35.75 ~ 35.85 mm (1.407 ~ 1.411 in)	<35.65 mm (1.404 in)>
"B"	27.95 ~ 28.05 mm (1.100 ~ 1.104 in)	<27.85 mm (1.096 in)>

Item		Standard	Limit
Camshaft runout limit			0.03 mm (0.0012 in)
			
Cam chain:			
Cam chain type / No. of links		BF05M/118	
Cam chain adjustment method		Automatic	
Valve, valve seat, valve guide:			
Valve clearance (cold)	IN	0.11 ~ 0.15 mm (0.004 ~ 0.006 in)	
	EX	0.16 ~ 0.20 mm (0.006 ~ 0.008 in)	
Valve dimensions:			
 Head Dia		 Face Width	 Seat Width
 Margin Thickness			
"A" head diameter	IN	28.9 ~ 29.1 mm (1.138 ~ 1.146 in)	
	EX	23.9 ~ 24.1 mm (0.941 ~ 0.949 in)	
"B" face width	IN	1.3 ~ 3.1 mm (0.051 ~ 0.122 in)	
	EX	1.3 ~ 2.4 mm (0.051 ~ 0.094 in)	
"C" seat width	IN	0.9 ~ 1.1 mm (0.035 ~ 0.043 in)	<1.4 mm (0.06 in)>
	EX	0.9 ~ 1.1 mm (0.035 ~ 0.043 in)	<1.4 mm (0.06 in)>
"D" margin thickness	IN	1.1 ~ 1.5 mm (0.043 ~ 0.059 in)	<0.7 mm (0.028 in)>
	EX	1.1 ~ 1.5 mm (0.043 ~ 0.059 in)	<0.7 mm (0.028 in)>
Stem outside diameter	IN	5.975 ~ 5.990 mm (0.2352 ~ 0.2358 in)	<5.945 mm (0.234 in)>
	EX	5.960 ~ 5.975 mm (0.2346 ~ 0.2352 in)	<5.92 mm (0.233 in)>
Guide inside diameter	IN	6.000 ~ 6.012 mm (0.2362 ~ 0.2367 in)	<6.05 mm (0.238 in)>
	EX	6.000 ~ 6.012 mm (0.2362 ~ 0.2367 in)	<6.05 mm (0.238 in)>
Stem-to-guide clearance	IN	0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in)	<0.08 mm (0.003 in)>
	EX	0.025 ~ 0.052 mm (0.0010 ~ 0.0020 in)	<0.1 mm (0.004 in)>

Item		Standard	Limit
Stem runout limit			0.01 mm (0.0004 in)
			
Valve spring:			
Free length	IN	54.29 mm (2.14 in)	<52.29 mm (2.06 in)>
	EX	54.29 mm (2.14 in)	<52.29 mm (2.06 in)>
Set length (valve closed)	IN	33.45 mm (1.3 in)	----
	EX	33.45 mm (1.3 in)	----
Compressed pressure (installed)	IN	13.9 ~ 16.1 kg (30.57 ~ 35.52 lb)	----
	EX	13.9 ~ 16.1 kg (30.57 ~ 35.52 lb)	----
Tilt limit *	IN		2.5°/2.4 mm (2.5°/0.094 in)
	EX		2.5°/2.4 mm (2.5°/0.094 in)
			
Direction of winding (top view)	IN	Clockwise	----
	EX	Clockwise	----
Piston:			
Piston to cylinder clearance		0.055 ~ 0.069 mm (0.0022 ~ 0.0027 in)	<0.15 mm (0.0059 in)>
Piston size "D"		78.926 ~ 78.933 mm (3.107 ~ 3.108 in)	----
			
Measuring point "H"		4 mm (0.157 in)	----
Piston off-set		0 mm (0.00 in)	----
Piston pin bore inside diameter		19.004 ~ 19.015 mm (0.7482 ~ 0.7486 in)	----
Piston pin outside diameter		18.991 ~ 19.000 mm (0.7477 ~ 0.7480 in)	----

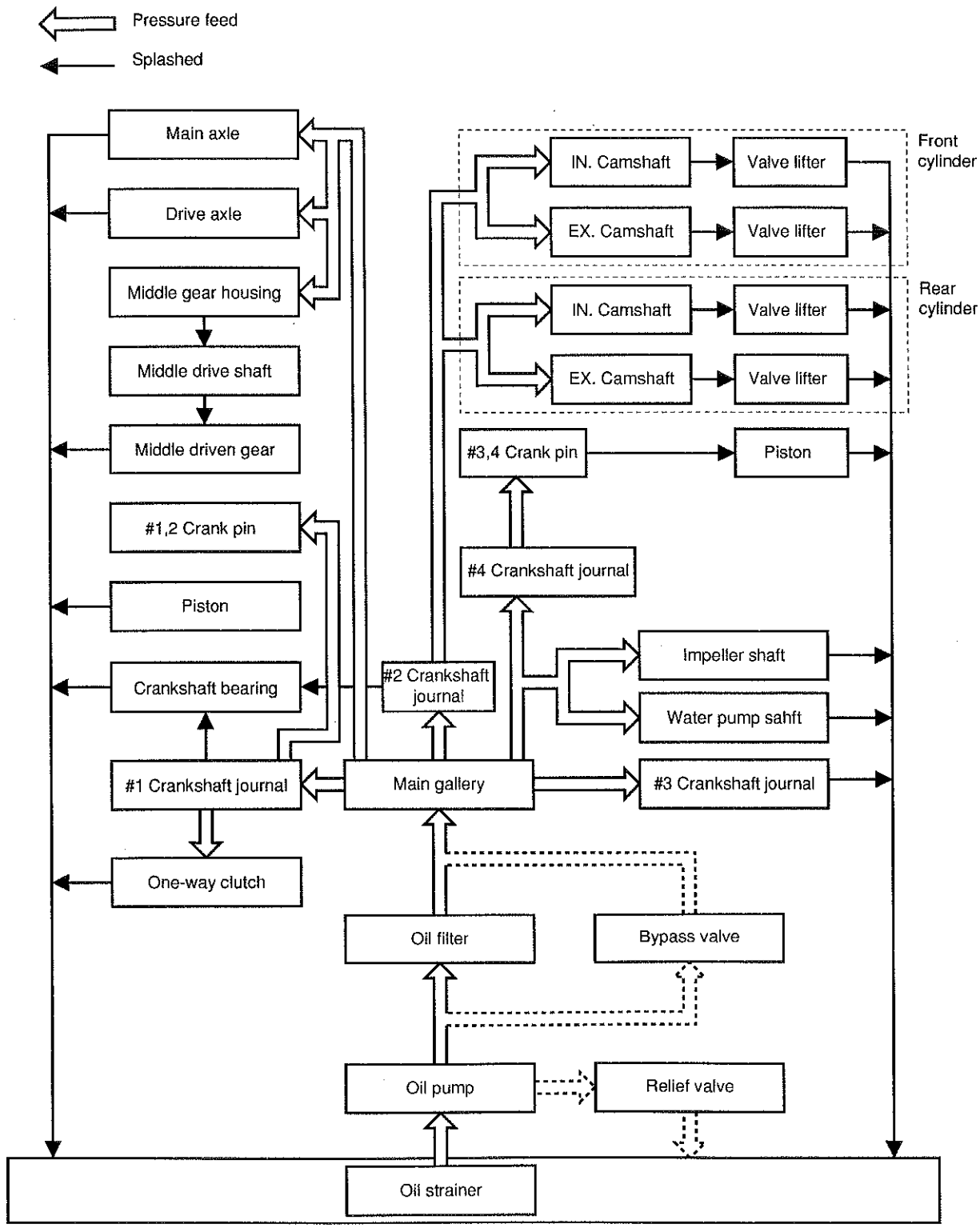
Item	Standard	Limit
Piston rings:		
Top ring:		
		
Type	Barrel	----
Dimensions (B × T)	3.1 × 1.0 mm (0.122 × 0.039 in)	----
End gap (installed)	0.20 ~ 0.35 mm (0.008 ~ 0.014 in)	<0.55 mm (0.022 in)>
Side clearance (installed)	0.03 ~ 0.07 mm (0.001 ~ 0.003 in)	<0.12 mm (0.005 in)>
2nd ring:		
		
Type	Taper	----
Dimensions (B × T)	3.1 × 1.2 mm (0.122 × 0.047 in)	----
End gap (installed)	0.35 ~ 0.50 mm (0.014 ~ 0.020 in)	<0.8 mm (0.031 in)>
Side clearance	0.02 ~ 0.06 mm (0.001 ~ 0.002 in)	<0.12 mm (0.005 in)>
Oil ring:		
		
Dimensions (B × T)	3.1 × 2.5 mm (0.122 × 0.098 in)	----
End gap (installed)	0.3 ~ 0.9 mm (0.012 ~ 0.035 in)	----
Connecting rod:		
Oil clearance	0.021 ~ 0.039 mm (0.001 ~ 0.002 in)	----
Color code (corresponding size)	① Blue ② Black ③ Brown ④ Green ⑤ Yellow	----
Crankshaft:		
		
Crank width "A"	83.92 ~ 83.97 mm (3.304 ~ 3.306 in)	----
Assembly width "B"	242.72 ~ 243.17 mm (9.556 ~ 9.574 in)	----
Runout limit "C"	----	0.03 mm (0.0012 in)
Big end side clearance "D"	0.160 ~ 0.264 mm (0.006 ~ 0.010 in)	----
Big end radial clearance	0.021 ~ 0.039 mm (0.0008 ~ 0.0015 in)	----
Journal oil clearance	0.020 ~ 0.038 mm (0.0008 ~ 0.0015 in)	----

Item		Standard	Limit
Color code (corresponding size)		① Blue ② Black ③ Brown ④ Green ⑤ Yellow	----
Clutch:			
Friction plate thickness		2.9 ~ 3.1 mm (0.114 ~ 0.122 in)	----
Quantity		8	----
Friction plate wear limit		----	2.8 mm (0.11 in)
Clutch plate thickness		2.2 ~ 2.4 mm (0.087 ~ 0.094 in)	----
Quantity		7	----
Warp limit		----	0.2 mm (0.008 in)
Clutch spring free length		7 mm (0.28 in)	----
Quantity		1	----
Minimum length		----	6.5 mm (0.26 in)
Clutch housing thrust clearance		0.10 ~ 0.37 mm (0.004 ~ 0.015 in)	----
Clutch housing radial clearance		0.017 ~ 0.053 mm (0.0007 ~ 0.0021 in)	----
Clutch release method		Hydraulic inner push	----
Push rod bending limit		----	0.5 mm (0.020 in)
Transmission:			
Main axle deflection limit		----	0.08 mm (0.003 in)
Drive axle deflection limit		----	0.08 mm (0.003 in)
Shifter:			
Shifter type		Guide bar	----
Guide bar bending limit		----	0.025 mm (0.001 in)
Carburetor:			
I. D. mark		4NK 00:4NK1, 4NK3, 4NL1, 4NL3,	----
		4NK 10:4NK2, 4NL2.	----
Main jet	(M.J)	#95	----
Main air jet	(M.A.J)	#120	----
Jet needle	(J.N)	4CL25	----
Needle jet	(N.J)	O-0	----
Pilot air jet	(P.A.J.1)	#115	----
Pilot outlet	(P.O)	0.8	----
Pilot jet	(P.J)	#20	----
Bypass 1	(B.P.1)	0.8	----
Bypass 2	(B.P.2)	0.8	----
Bypass 3	(B.P.3)	0.9	----
Valve seat size	(V.S)	1.5	----
Starter jet	(G.S.1)	#22.5	----
Starter jet	(G.S.2)	0.5	----
Throttle valve size	(Th.V)	#115	----
Fuel level	(F.L)	25.9 ~ 26.9 mm (1.02 ~ 1.06 in)	----
Engine idle speed		950 ~ 1,050 r/min	----
Intake vacuum		40.0 kPa (300 mmHg, 11.8 inHg)	----

Item	Standard	Limit
Fuel pump:		
Type	Electrical type	----
Model / manufacturer	4NK/MITSUBISHI	----
Consumption amperage <max>	1 A	----
Output pressure	20 kPa (0.2 kg/cm², 3 psi)	----
Lubrication system:		
Oil filter type	Paper type	----
Oil pump type	Trochoid type	----
Tip clearance "A" or "B"	0 ~ 0.12 mm (0.000 ~ 0.005 in)	<0.17 mm (0.007 in)>
Side clearance	0.03 ~ 0.08 mm (0.001 ~ 0.003 in)	<0.08 mm (0.003 in)>
Bypass valve setting pressure	78.4 ~ 117.6 kPa (0.8 ~ 1.2 kg/cm², 11.15 ~ 16.72 psi)	----
Relief valve operating pressure	431 ~ 549 kPa (4.4 ~ 5.6 kg/cm², 61.3 ~ 78.1 psi)	----
Oil pressure (hot)	58 kPa (0.6 kg/cm², 8.25 psi) at 1,000 r/min	----
Cooling system:		
Radiator core size		
Width	238 mm (9.4 in)	----
Height	360 mm (14.17 in)	----
Thickness	24 mm (0.94 in)	----
Radiator cap opening pressure	93.3 ~ 122.7 kPa (0.95 ~ 1.25 kg/cm², 13.27 ~ 17.45 psi)	----
Reservoir tank capacity	0.84 L (0.74 Imp qt, 0.89 US qt)	----
<From low to full level>	<0.25 L (0.22 Imp qt, 0.26 US qt)>	----
Water pump		
Type	Single suction centrifugal pump	----
Reduction ratio	31/21(1.476)	----
Shaft drive:		
Middle gear backlash	0.05 ~ 0.12 mm (0.002 ~ 0.005 in)	<0.3 mm (0.012 in)>
Final gear backlash	0.1 ~ 0.2 mm (0.004 ~ 0.008 in)	<0.3 mm (0.012 in)>

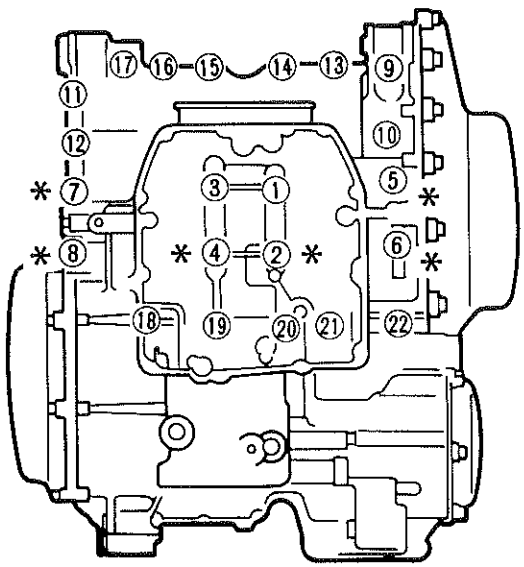
Item	Standard

Lubrication chart:

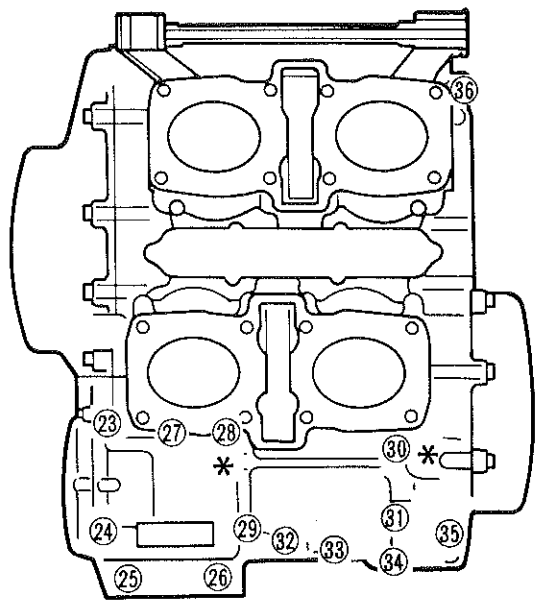


Item	Standard
Crankcase tightening sequence:	

Lower Case



Upper Case



*: With washer

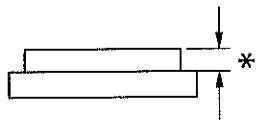
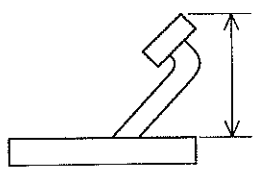
Tightening torques

Part to be tightened	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m·kg	ft·lb	
Camshaft cap	Bolt	M6×1.0	32	10	1.0	7.2	
Blind plug	Plug	M18×1.5	6	55	5.5	40	LT
Exhaust pipe	Stud bolt	M8×1.25	8	15	1.5	11	
Spark plug		M12×1.25	4	18	1.8	13	
Cylinder head	Nut	M10×1.25	16	43	4.3	31	
Cylinder head cover	Bolt	M6×1.0	16	10	1.0	7.2	
Chrome cover	Bolt	M6×1.0	16	10	1.0	7.2	
Connecting rod	Nut	M8×0.75	8	36	3.6	25	M
AC magneto	Bolt	M12×1.25	1	130	13.0	94	
Camshaft sprocket	Bolt	M7×1.0	8	20	2.0	14	
Timing chain damper bracket	Bolt	M8×1.25	1	24	2.4	17	LT
Timing chain tensioner	Bolt	M6×1.0	4	12	1.2	8.7	
Cap bolt (tensioner)	Bolt	M16	2	20	2.0	14	
Water pump drain plug	Plug	M14	1	43	4.3	31	
Radiator	Bolt	M6×1.0	2	7	0.7	5.1	
Radiator side cover	Bolt	M6×1.0	4	10	1.0	7.2	
Radiator cap pipe	Bolt	M6×1.0	2	10	1.0	7.2	
Reflector	Nut	M5×0.8	2	5	0.5	3.6	
Oil filter mounting bolt	Union bolt	M20×1.5	1	50	5.0	36	
Oil delivery pipe	Bolt	M6×1.0	2	12	1.2	8.7	
Oil drain plug	Plug	M14	1	43	4.3	31	
Oil baffle plate	Bolt	M6×1.0	2	12	1.2	8.7	
Oil gallery bolt	Screw	M5×0.8	1	5	0.5	3.6	
Oil delivery pipe (head)	Union bolt	M8×1.25	2	18	1.8	13	
Oil delivery pipe (cover)	Union bolt	M10×1.25	1	20	2.0	14	
Oil pipe	Union bolt	M8×1.25	1	18	1.8	13	
Stay 1	Bolt	M6×1.0	1	12	1.2	8.7	
Oil filter		M20×1.5	1	17	1.7	12	
Clamp bolt (clutch hose)	Bolt	M5×0.8	1	4	0.4	2.9	
Carburetor joint	Screw	M4×0.8	4	3	0.3	2.2	
Air filter joint	Screw	M4×0.8	4	3	0.3	2.2	
Air filter case cover	Screw	M5	13	3	0.3	2.2	
Clamp bolt (exhaust pipe)	Bolt	M8×1.25	4	25	2.5	18	
Exhaust pipe	Nut	M8×1.25	8	20	2.0	14	
Cylinder	Stud bolt	M10×1.25	16	9	0.9	6.5	
Main gallery blind plug	Plug	M20	1	12	1.2	8.7	
Crankcase	Bolt	M10×1.25	8	40	4.0	29	E
Middle gear bearing retainer	Screw	M8×1.25	4	25	2.5	18	LT
Main axle bearing retainer	Screw	M6×1.0	3	7	0.7	5.1	LT
Wire lead clamp	Screw	M6×1.0	1	7	0.7	5.1	
Crankcase cover plate	Screw	M6×1.0	2	7	0.7	5.1	

Part to be tightened	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m·kg	ft·lb	
Oil drain plug (crankcase)	Bolt	M8×1.25	1	38	3.8	27	
Starter clutch	Bolt	M8×1.25	6	24	2.4	17	
Clutch spring plate	Bolt	M6×1.0	6	8	0.8	5.8	
Clutch boss	Nut	M20×1.0	1	70	7.0	50	
Clutch release cylinder	Bolt	M6×1.0	2	12	1.2	8.7	
Air bleed screw	Screw	M8×1.25	1	6	0.6	4.3	
Clutch pipe	Union bolt	M10×1.25	1	25	2.5	18	
Middle drive pinion gear	Nut	M44×1.5	1	110	11.0	80	LT
Middle driven pinion gear	Nut	M16×1.5	1	90	9.0	65	LT
Middle driven gear housing	Bolt	M8×1.25	3	30	3.0	22	
Shift cam segment	Torx	M6×1.0	1	12	1.2	8.7	LT
Shift cam plate	Screw	M5×0.8	1	4	0.4	2.9	LT
Shift cam retainer	Screw	M6×1.0	3	7	0.7	5.1	LT
Shift shaft spring stopper	Bolt	M8×1.25	1	22	2.2	16	
Stopper lever	Bolt	M6×1.0	1	10	1.0	7.2	LT
Shift pedal bracket	Screw	M6×1.0	1	7	0.7	5.1	
Shift arm	Bolt	M6×1.0	1	10	1.0	7.2	
Shift rod	Nut	M6×1.0	1	10	1.0	7.2	
Shift rod	Nut	M6×1.0	1	10	1.0	7.2	Left hand thread
Shift pedal link	Bolt	M6×1.0	1	10	1.0	7.2	
Shift lever assembly	Bolt	M6×1.0	1	18	1.8	13	LT
Final gear case (rear arm)	Stud bolt	M10×1.25	4	18	1.8	13	
Final gear case (bearing housing)	Stud bolt	M8×1.25	6	9	0.9	6.5	
Coupling gear	Nut	M8×1.25	1	110	11.0	80	
Bearing housing	Nut	M8×1.25	6	23	2.3	17	
	Bolt	M10×1.25	2	40	4.0	29	
Drain plug (final gear case)	Plug	M14×1.5	1	23	2.3	17	
Filler plug (final gear case)	Plug	M14×1.5	1	23	2.3	17	
Stator coil	Screw	M6×1.0	3	7	0.7	5.1	LT
Starter motor	Bolt	M6×1.0	2	10	1.0	7.2	
Neutral switch	Screw	M5×0.8	3	4	0.4	2.9	
Oil level switch	Bolt	M6×1.0	2	10	1.0	7.2	
Thermo unit		M10×1.25	1	8	0.8	5.8	
Thermo switch		M16×1.5	1	23	2.3	17	

CHASSIS

Item		Standard	Limit
Steering system:			
Steering bearing type		Taper roller bearing	----
Front suspension:			
Front fork travel		140 mm (5.51 in)	----
Fork spring free length		534.4 mm (21.0 in)	<529.4 mm (20.8 in)>
Collar length		50 mm (2.0 in)	----
Spring rate	(K1)	5.9 N/mm (0.59 kg/mm 33.0 lb/in)	----
	(K2)	9.8 N/mm (0.98 kg/mm 54.9 lb/in)	----
Stroke	(K1)	0 ~ 90 mm (0.00 ~ 3.54 in)	----
	(K2)	90 ~ 140 mm (3.54 ~ 5.51 in)	----
Optional spring		No	----
Oil capacity		533 cm^3 (18.8 Imp oz, 18.0 US oz)	----
Oil level		127 mm (5.00 in)	----
Oil grade		Yamaha fork shock oil 5WT	----
Rear suspension:			
Shock absorber travel		50 mm (1.97 in)	----
Spring free length		163 mm (6.42 in)	<158 mm (6.22 in)>
Fitting length		145 mm (5.71 in)	----
Spring rate	(K1)	118 N/mm (11.8 kg/mm 661 lb/in)	----
Stroke	(K1)	0 ~ 50 mm (0.00 ~ 1.97 in)	----
Optional spring		No	----
Enclosed gas / air pressure	(STD)	3,920 kPa (39.2 kg/cm^2, 557 psi)	----
Swingarm:			
Free play limit	end	----	0 mm (0.00 in)
	side	----	0 mm (0.00 in)
Front wheel:			
Type		Cast wheel	----
Rim size		16 × MT3.50	----
Rim material		Aluminum	----
Rim runout limit	radial	----	1 mm (0.04 in)
	lateral	----	0.5 mm (0.02 in)
Rear wheel:			
Type		Cast wheel	----
Rim size		15M/C × MT4.00	----
Rim material		Aluminum	----
Rim runout limit	radial	----	1 mm (0.04 in)
	lateral	----	0.5 mm (0.02 in)

Item	Standard	Limit
Front disc brake:		
Type	Dual	----
Disc outside diameter × thickness	298 × 5 mm (11.7 × 0.20 in)	----
Pad thickness inner	7.5 mm (0.30 in)	<0.5 mm (0.02 in)>
Pad thickness outer	7.5 mm (0.30 in)	<0.5 mm (0.02 in)>
		
Master cylinder inside diameter	15.87 mm (0.62 in)	----
Caliper cylinder inside diameter	32.1 mm (1.26 in)	----
Caliper cylinder inside diameter	32.1 mm (1.26 in)	----
Brake fluid type	DOT 4	----
Rear disc brake:		
Type	Single	----
Disc outside diameter × thickness	320 × 7 mm (12.6 × 0.28 in)	----
Pad thickness inner	7.5 mm (0.30 in)	<0.5 mm (0.02 in)>
Pad thickness outer	7.5 mm (0.30 in)	<0.5 mm (0.02 in)>
		
Master cylinder inside diameter	12.7 mm (0.50 in)	----
Caliper cylinder inside diameter	33.9 mm (1.33 in)	----
Caliper cylinder inside diameter	30.2 mm (1.19 in)	----
Brake fluid type	DOT 4	----
Brake lever & brake pedal:		
Brake lever free play (at lever end)	2 ~ 5 mm (0.08 ~ 0.20 in)	----
Brake pedal position	100 mm (3.9 in)	----
		
Brake pedal free play	0 mm (0.0 in)	----

Tightening torques

Part to be tightened	Thread size	Tightening torque			Remarks
		Nm	m·kg	ft·lb	
Upper bracket and inner tube	M6	10	1.0	7.2	
Upper bracket and steering shaft	M22	130	13.0	94	
Handlebar holder (lower) and handlebar holder (upper)	M8	23	2.3	17	
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)	M12	40	4.0	29	
Front master cylinder (brake and clutch)	M6	10	1.0	7.2	
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	40	4.0	29	
Mounting bolt (engine and rear frame)	M12	78	7.8	56	
Frame and down tube	M10	45	4.5	32	
Frame and rear fender stay	M10	48	4.8	35	
Muffler stay and muffler	M10	30	3.0	22	
Ignitor unit	M6	7	0.7	5.1	
Ignition coil	M5	4	0.4	2.9	
Ignition bracket	M6	7	0.7	5.1	
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	
Relay arm and frame	M10	48	4.8	35	
Relay arm and connecting rod	M12	50	5.0	36	
Connecting rod and swingarm	M12	50	5.0	36	
Rear shock absorber and frame	M12	59	5.9	43	
Rear shock absorber and connecting rod	M12	50	5.0	36	
Fuel petcock and fuel tank	M6	7	0.7	5.1	
Fuel sender and fuel tank	M5	4	0.4	2.9	
Fuel tank (front) and frame	M6	7	0.7	5.1	
Fuel tank (rear) and frame	M6	7	0.7	5.1	
Fuel pump bracket and bridge plate	M6	7	0.7	5.1	
Meter cover and fuel tank	M6	7	0.7	5.1	
Canister and frame (XVZ13AT (C))	M6	7	0.7	5.1	
Side cover and frame	M6	7	0.7	5.1	
Starter relay and battery positive lead	M6	7	0.7	5.1	
Starter relay and starter motor lead	M6	7	0.7	5.1	

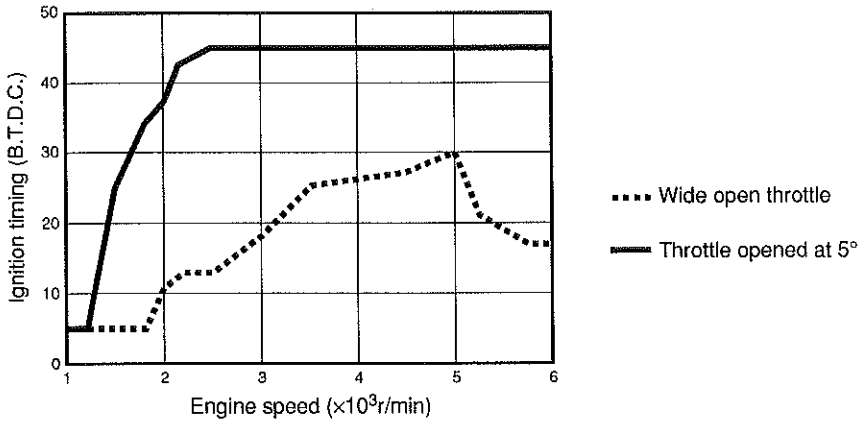
Part to be tightened	Thread size	Tightening torque			Remarks
		Nm	m·kg	ft·lb	
Rear fender side mold and rear fender stay	M8	30	3.0	22	
Main switch and frame	M6	7	0.7	5.1	
Sidestand bolt and nut	M10	40	4.0	29	
Footrest bracket and frame	M10	52	5.2	37	
Rear footrest and frame	M8	23	2.3	17	
Rear master cylinder and rear brake bracket	M8	23	2.3	17	
Rear master cylinder and brake hose joint	M10	30	3.0	22	
Brake hose joint and brake hose	M10	26	2.6	19	
Rear brake reservoir tank	M6	4	0.4	2.9	
Union bolt (rear brake hose)	M10	30	3.0	22	
Footrest bracket and rear brake bracket	M8	23	2.3	17	
Footrest bracket and shift rod bracket	M8	23	2.3	17	
Front wheel axle	M18	78	7.8	56	
Front wheel axle pinch bolt	M8	19	1.9	13	
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.

ELECTRICAL

Item	Standard	Limit
Voltage:	12 V	----
Ignition system:		
Ignition timing (B.T.D.C.)	5° at 1,000 r/min	----
Advanced timing (B.T.D.C.)	45° at 5,000 r/min	----
Advancer type		



T.C.I.:		
Pickup coil resistance / color	189 ~ 231 Ω at 20°C (68°F) / White/Red – Black/Blue	----
T.C.I. unit model / manufacturer	J4T063/MITSUBISHI	----
Ignition coil:		
Model / manufacturer	F6T507/MITSUBISHI	----
Minimum spark gap	6 mm (0.24 in)	----
Primary winding resistance	3.57 ~ 4.83 Ω at 20°C (68°F)	----
Secondary winding resistance	10.71 ~ 14.49 kΩ at 20°C (68°F)	----
Spark plug cap:		
Type	Resin type	----
Resistance	10 kΩ	----
Charging system:		
Type	A.C. magneto generator	----
Model / manufacturer	F4T650/MITSUBISHI	----
Nominal output	14 V 23 A at 5,000 r/min	----
Stator coil resistance / color	1.69 ~ 2.07 Ω at 20°C (68°F) / White – White	----
Voltage regulator:		
Type	Semi-conductor, short-circuit type	----
Model / manufacturer	SH545A/SHINDENGEN	----
No load regulated voltage	14 ~ 15 V	----

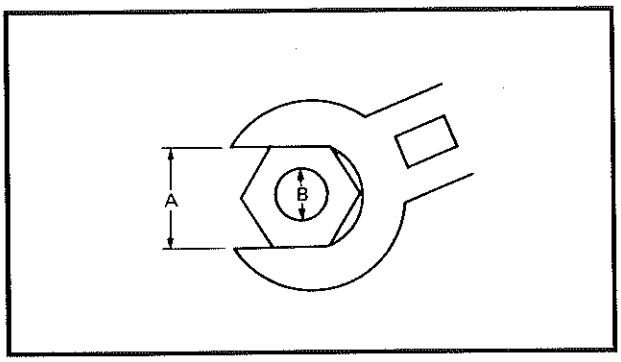
Item	Standard	Limit
Rectifier:		
Model / manufacturer	SH650/SHINDENGEN	----
Capacity	25 A	----
Withstand voltage	240 V	----
Battery:		
Specific gravity	1.320	----
Electric starter system:		
Type	Constant mesh type	----
Starter motor:		
Model / manufacturer	SM-13/MITSUBA	----
I.D. number	SM-13	----
Output	0.8 kW	----
Brush overall length	12.5 mm (0.49 in)	<5 mm (0.20 in)>
Commutator diameter	28 mm (1.10 in)	<27 mm (1.06 in)>
Mica undercut	0.7 mm (0.03 in)	----
Starter relay:		
Model / manufacturer	MS5F/JIDECO	----
Amperage rating	100 A	----
Coil winding resistance	4.18 ~ 4.62 Ω at 20°C (68°F)	----
Horn:		
Type	Eddy type	----
Quantity	1	----
Model / manufacturer	YP-12/NIKKO	----
Maximum amperage	4 A	----
Flasher relay:		
Type	Full transistor type	----
Model / manufacturer	FE246/NIPPONDENSO	----
Self cancelling device	No	----
Flasher frequency	75 ~ 95 cycle/min	----
Wattage	27 W × 2	----
Oil level switch:		
Model / manufacturer	1FK/NIPPONDENSO	----
Fuel sender:		
Model / manufacturer	4NK/NIPPON SEIKI	----
Sidestand relay:		
Model / manufacturer	G8R-30Y/OMRON	----
Coil winding resistance	202.5 ~ 247.5 Ω	----
Diode	Yes	----
Fuel pump relay:		
Model / manufacturer	G8R-30Y/OMRON	----
Electric fan:		
Model / manufacturer	4NK/NIPPONDENSO	----

Item	Standard	Limit
Thermo switch:		
Model / manufacturer	3LN/NIPPON THERMOSTAT	----
Thermo unit:		
Model / manufacturer	3YX/NIPPON SEIKI	----
Circuit breaker:		
Type	Fuse	----
Amperage for individual circuit		
MAIN	30 A × 1	----
HEAD	15 A × 1	----
SIGNAL	10 A × 1	----
IGNITION	10 A × 1	----
FAN	10 A × 1	----
Back up (odometer)	5 A × 1	----
Reserve	10 A × 1	----
Reserve	15 A × 1	----
Reserve	5 A × 1	----

EB202001

GENERAL TORQUE SPECIFICATIONS

This chart specifies torque for standard fasteners with standard I.S.O. pitch threads. Torque specifications for special components or assemblies are provided for each chapter of this manual. To avoid warpage, tighten multi-fastener assemblies in a criss-cross fashion, in progressive stages, until the specified torque is reached. Unless otherwise specified, torque specifications require clean, dry threads. Components should be at room temperature.



A: Distance between flats
B: Outside thread diameter

A (nut)	B (bolt)	General torque specifications		
		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

EB203000
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
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

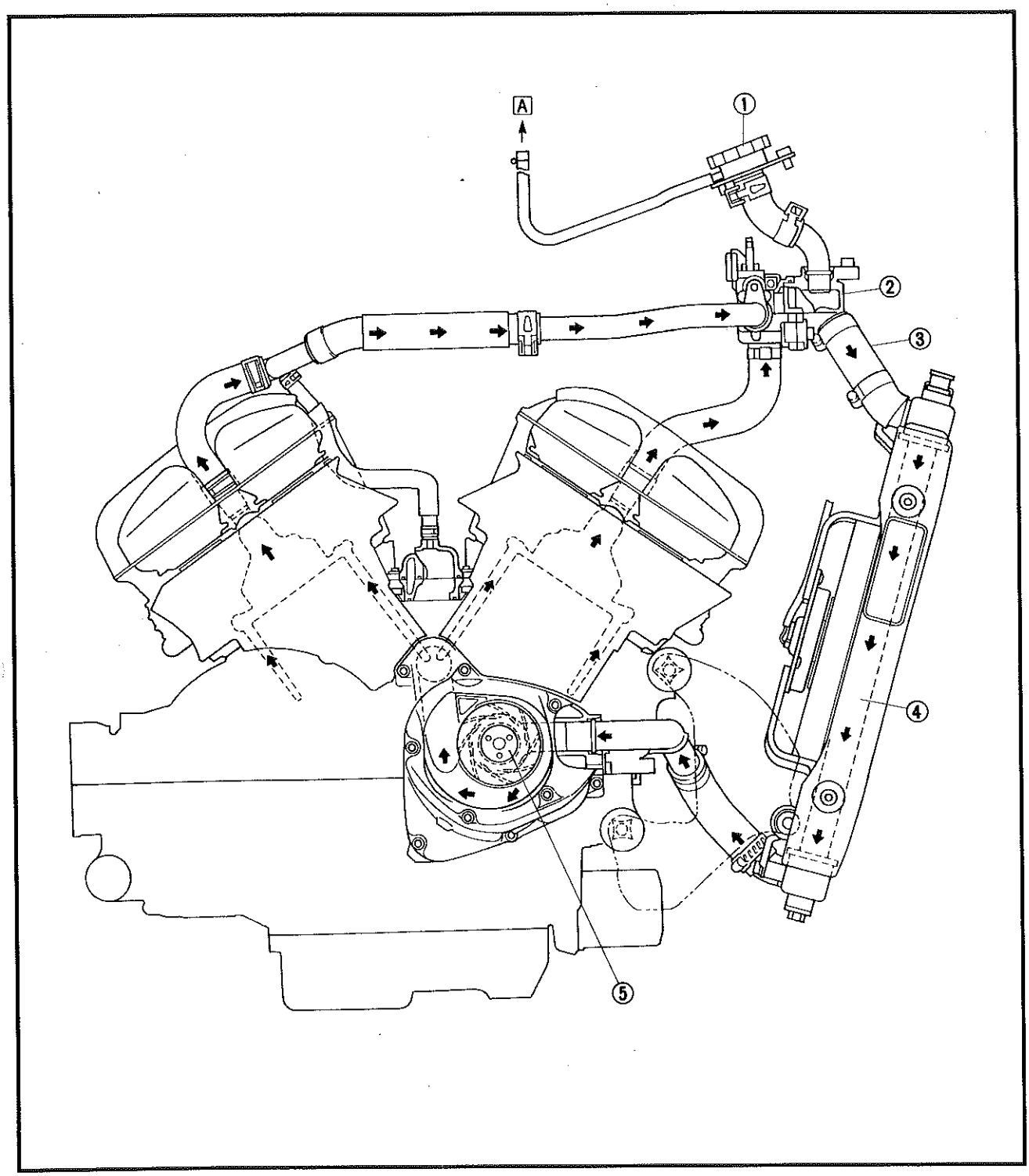
EB203010
CHASSIS

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
Front footrest pivot	LS
Rear footrest pivot	LS
Sidestand 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
Relay arm bearing (inner)	M
Rear shock absorber bearing (inner)	M
Connecting rod bearing (inner)	M

EB204000
COOLING SYSTEM DIAGRAMS

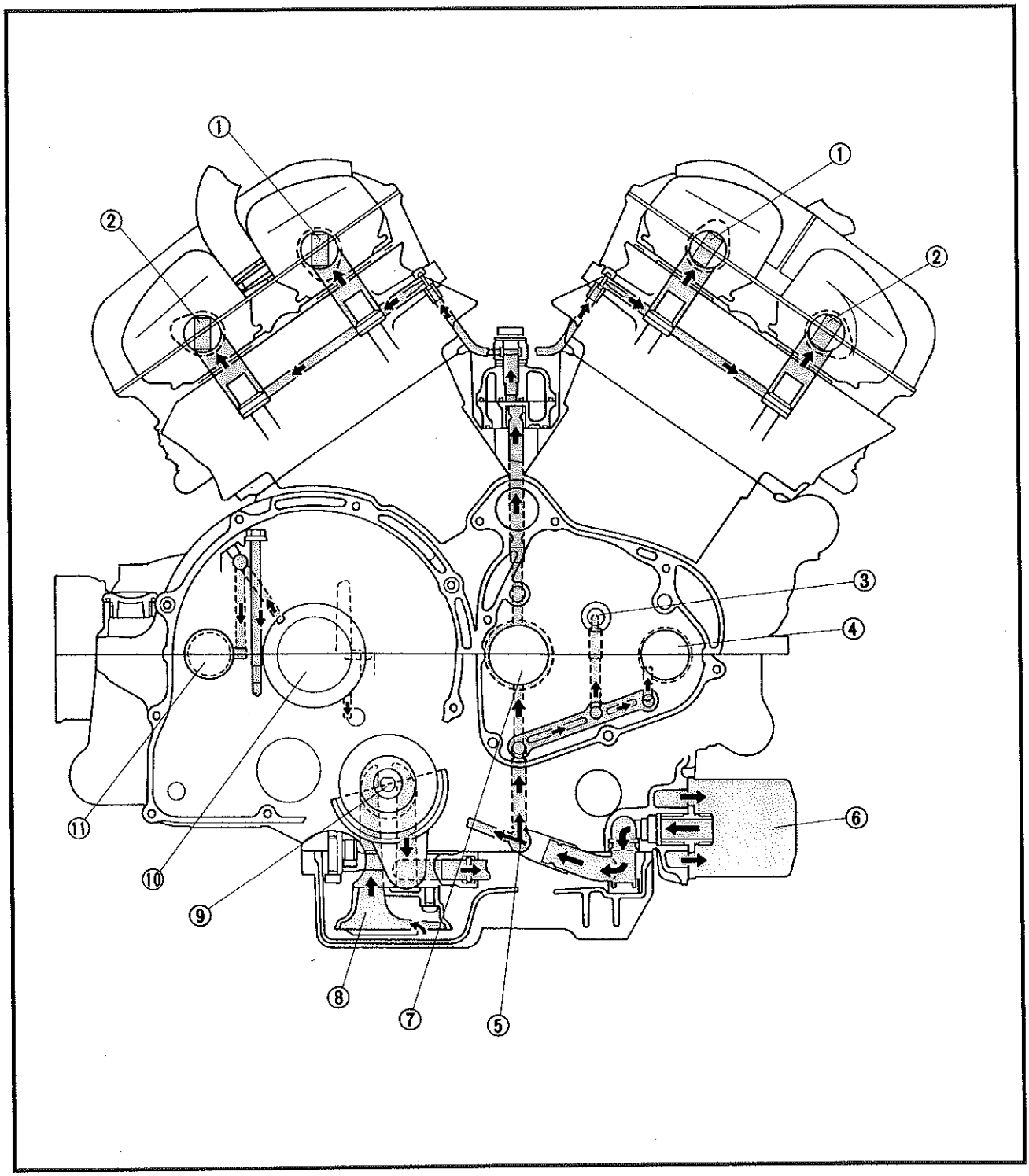
① Radiator cap
② Thermostatic valve housing
③ Radiator hose
④ Radiator
⑤ Water pump

[A] To coolant reservoir tank.

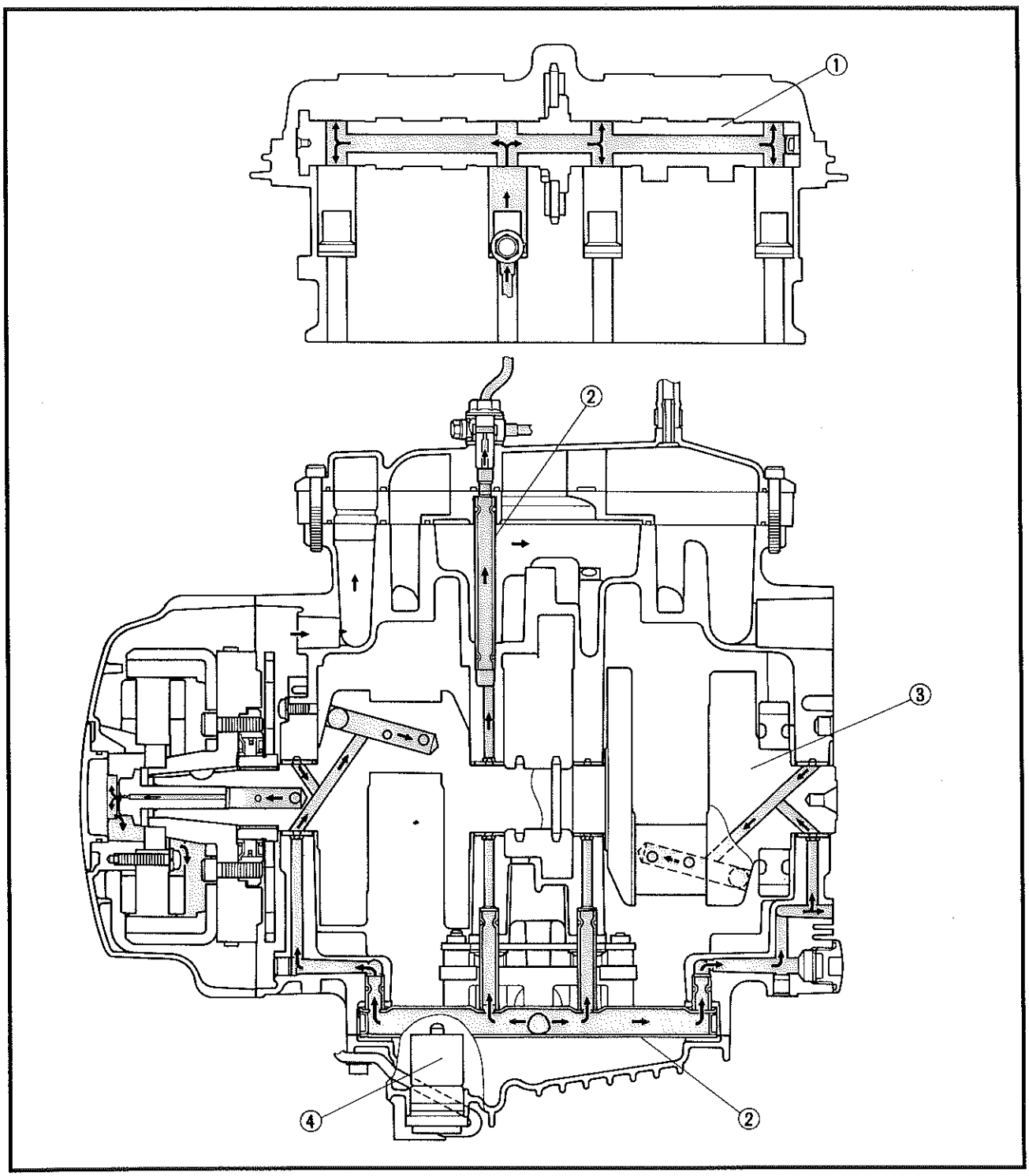


EB205000
LUBRICATION DIAGRAMS

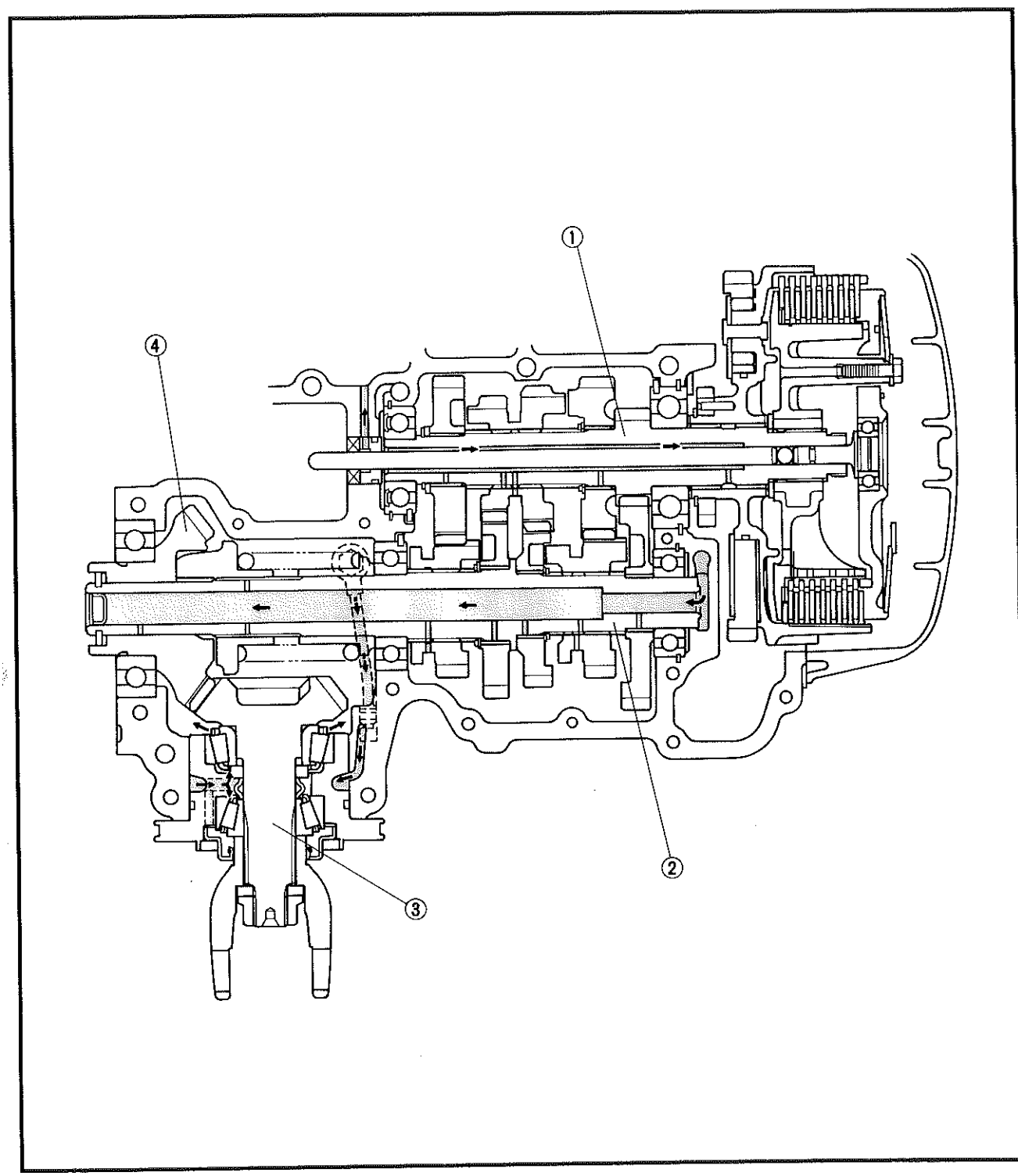
① Camshaft (intake)
② Camshaft (exhaust)
③ Water pump impeller shaft
④ Water pump drive gear
⑤ Main gallery
⑥ Oil filter
⑦ Crankshaft
⑧ Oil strainer
⑨ Oil pump
⑩ Main axle
⑪ Drive axle



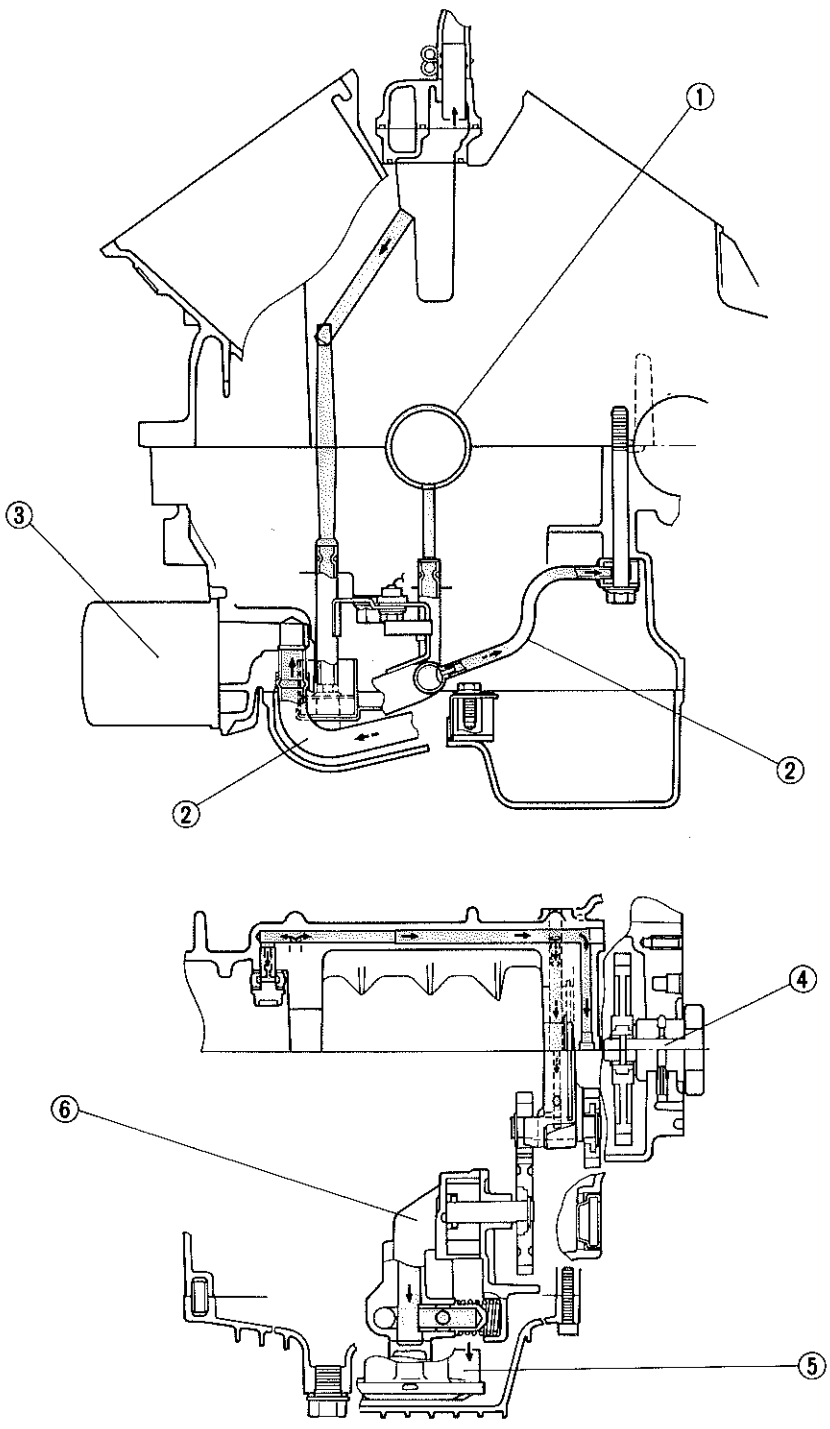
① Camshaft
② Main gallery
③ Crankshaft
④ Oil level switch



① Main axle
② Drive axle
③ Middle driven pinion gear
④ Middle drive pinion gear



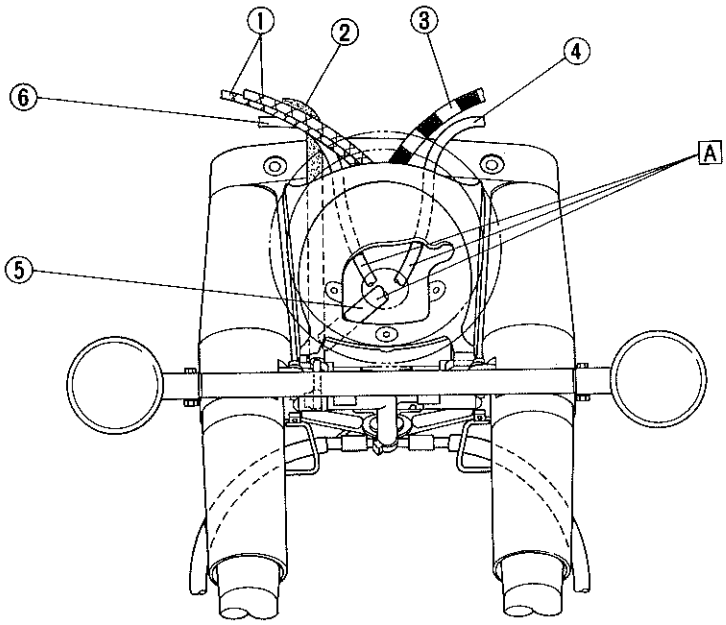
① Crankshaft
② Oil pipe
③ Oil filter
④ Water pump drive gear
⑤ Oil strainer
⑥ Oil pump

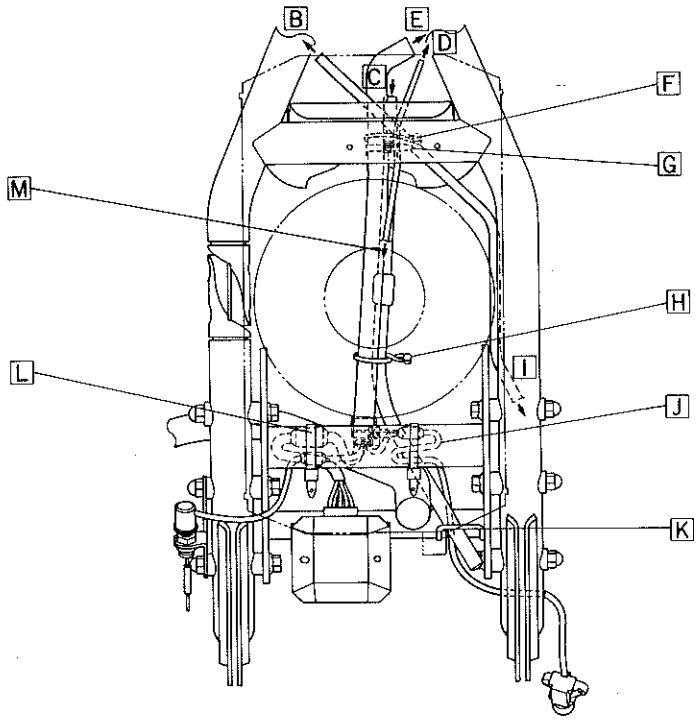


EB206000
CABLE ROUTING

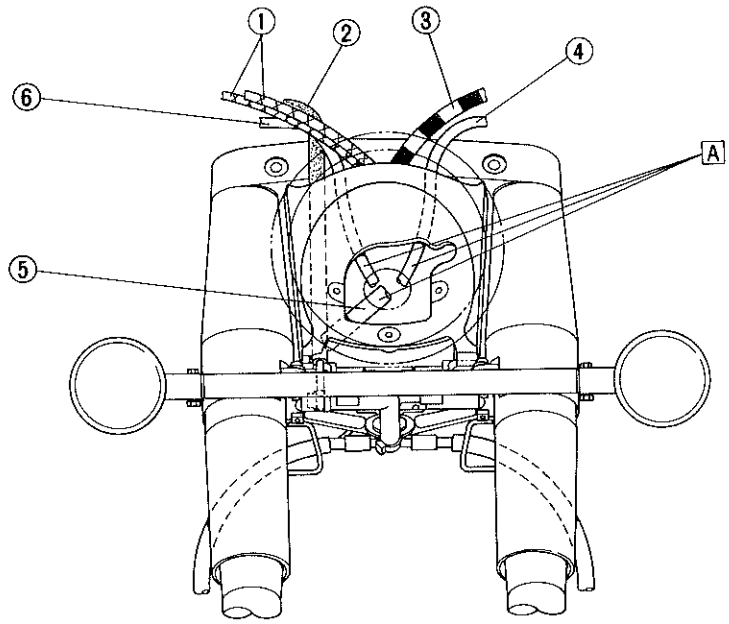
① Throttle cables
② Front brake hose
③ Clutch hose
④ Handlebar switch lead (left)
⑤ Wire harness
⑥ Handlebar switch lead (right)

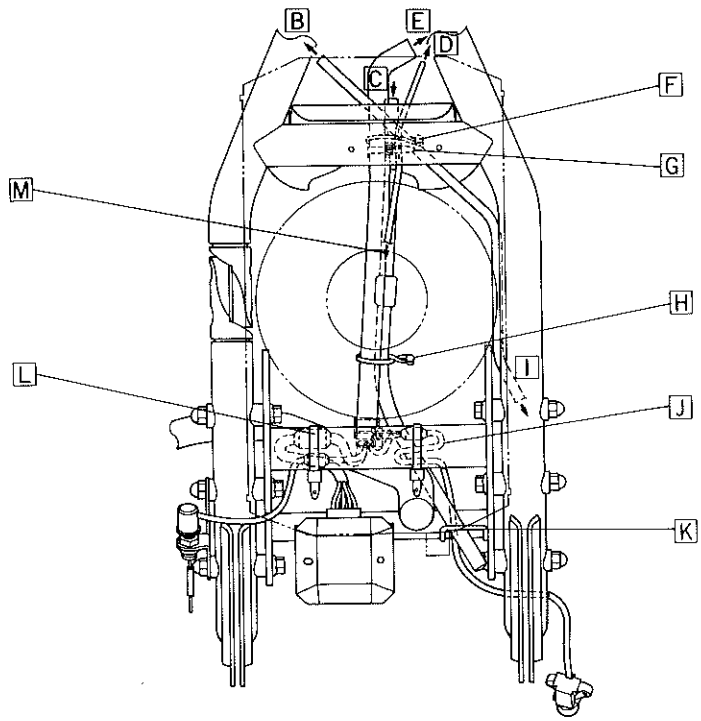
[A] Insert the wire harness and handlebar switch leads (left and right) through the hole in the housing at the back of the headlight.
[B] To the clutch master cylinder.
[C] From the air filter case.
[D] To the wire harness from the fan motor.
[E] To the wire harness.
[F] Fasten a plastic clip (with the ends toward the left side of the motorcycle).





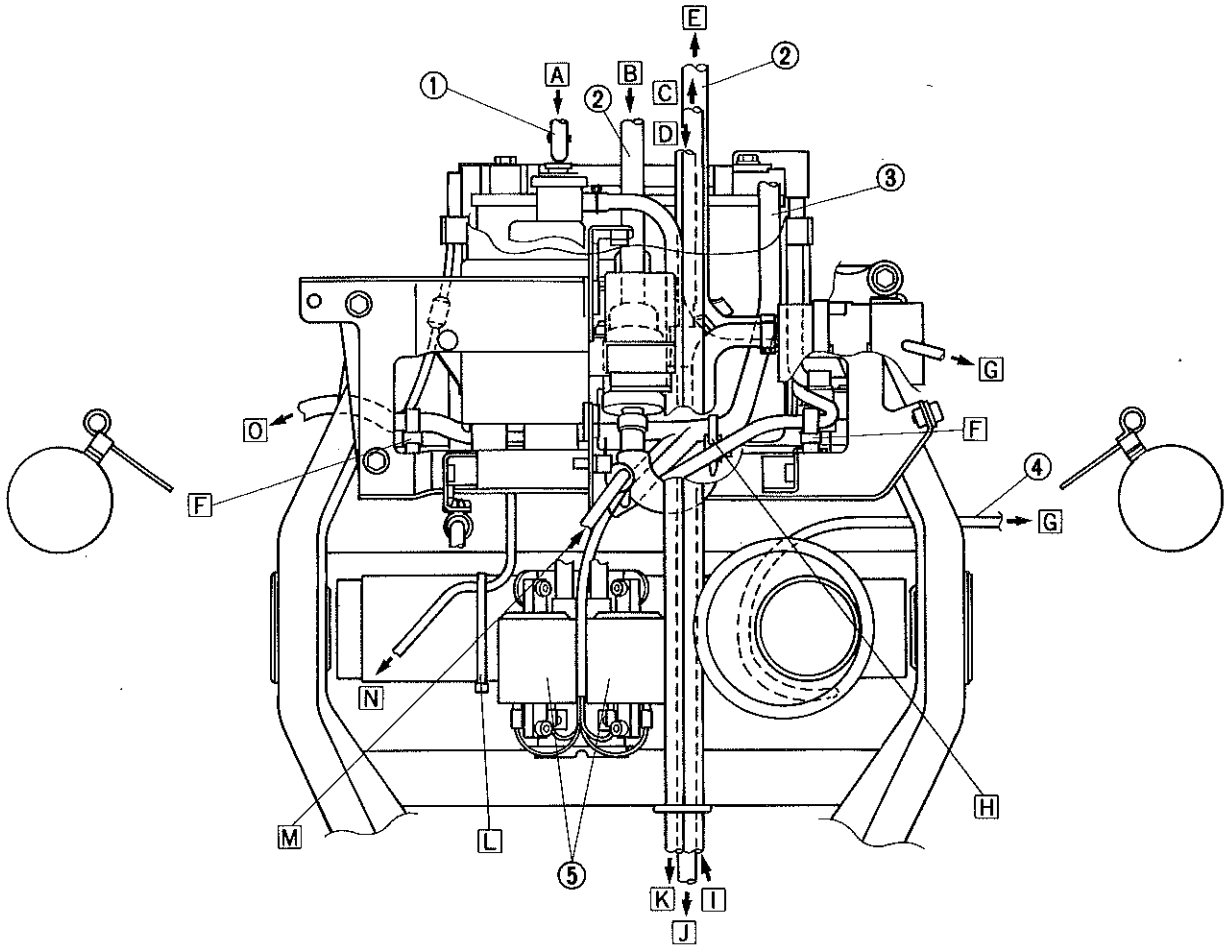
[G] Fasten the wire harness with a plastic band (with the end toward the left side of the motorcycle).
[H] Fasten the air filter case breather hose and wire harness with a plastic clip (with the end toward the left side of the motorcycle).
[I] To the engine.
[J] To remove any slack, fold the sidestand lead and fasten it to the back of the cross tube with a plastic band.
[K] Pass the sidestand switch lead and air filter case breather hose through the guide.
[L] To remove any slack, fold the rectifier/regulator lead and the rear brake switch lead. Then, fasten them to the back of the cross tube with a plastic band.
[M] To the fan motor.





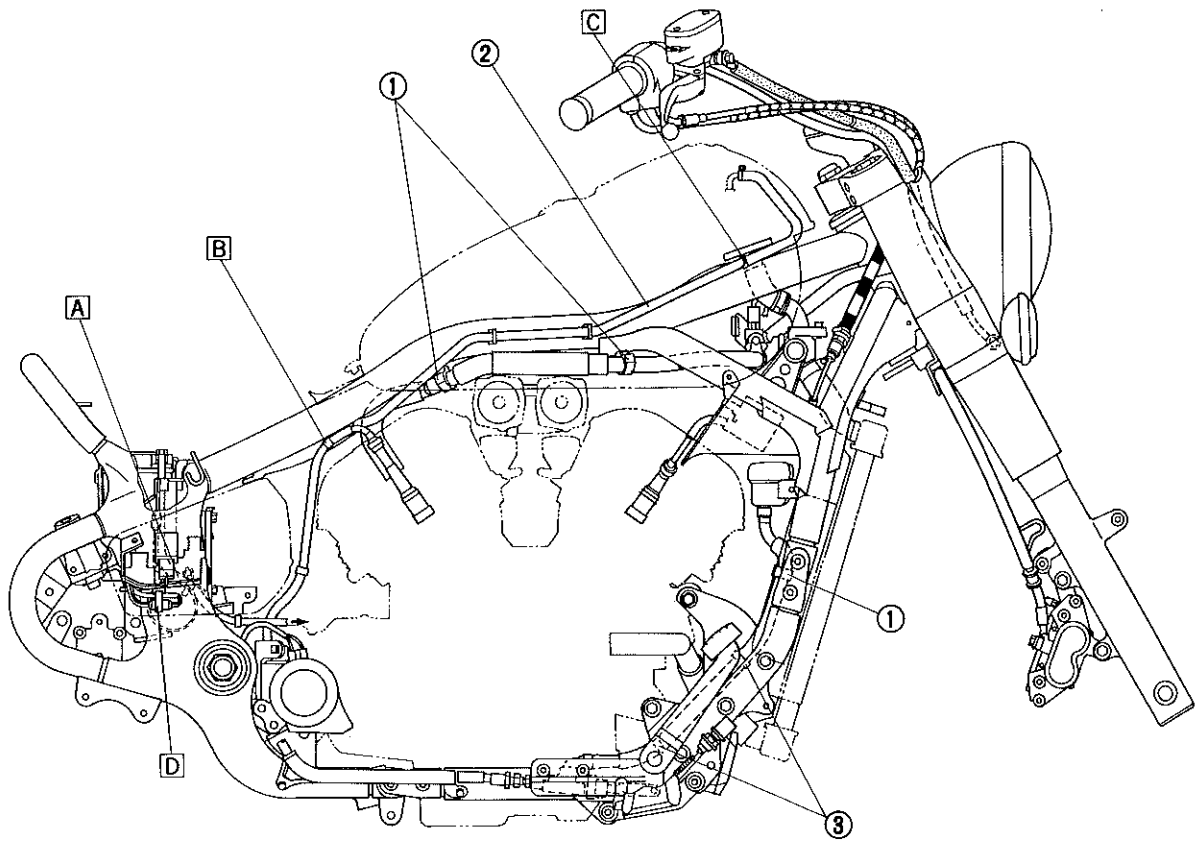
① Radiator breather hose
② Fuel hose
③ Wire harness
④ Speed sensor lead
⑤ Ignition coil

[A] From the radiator.
[B] From the fuel tank.
[C] From the fuel tank (for California).
[D] To the carburetor (for California).
[E] To the carburetor.
[F] Fasten the starter motor lead with a plastic band (with the end facing forward).
[G] To the wire harness.
[H] Fasten the wire harness with a plastic band (with the end forward).
[I] From the canister (for California).
[J] To the canister (for California).
[K] From the coolant reservoir.
[L] Fasten the horn lead with a plastic band.
[M] From the engine.
[N] To the horn.
[O] To the relay and main switch.



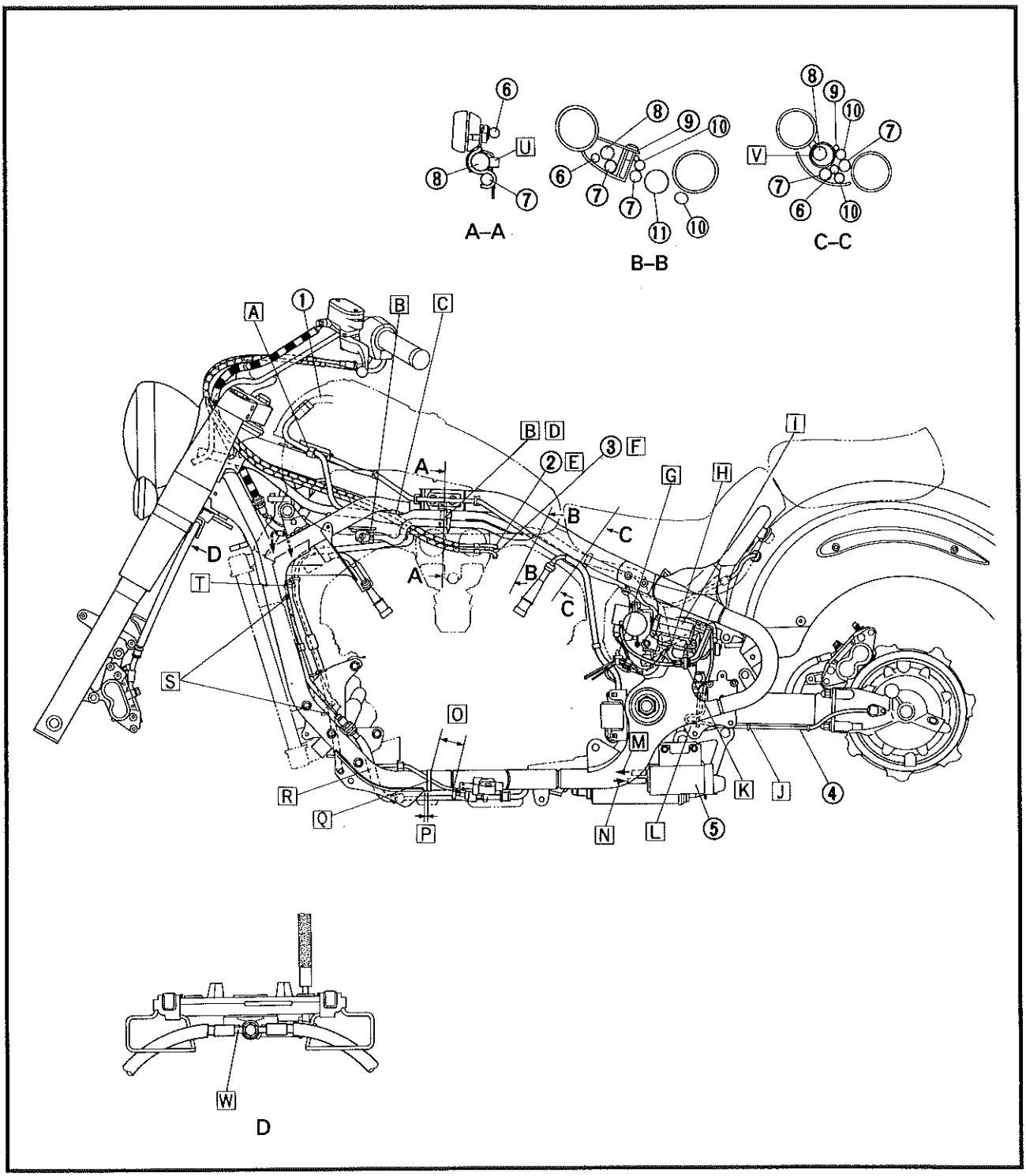
① Plastic clamp
② Fuel tank breather hose (for California)
③ Plastic band

[A] Pass the ground lead between the wire harness and cross tube.
[B] Connect the spark plug lead that has white tape attached to it to the spark plug of cylinder #3.
[C] Align the white mark on the fuel tank breather hose with the metal guide (for California).
[D] Fasten the wire harness and main switch lead with a plastic band.

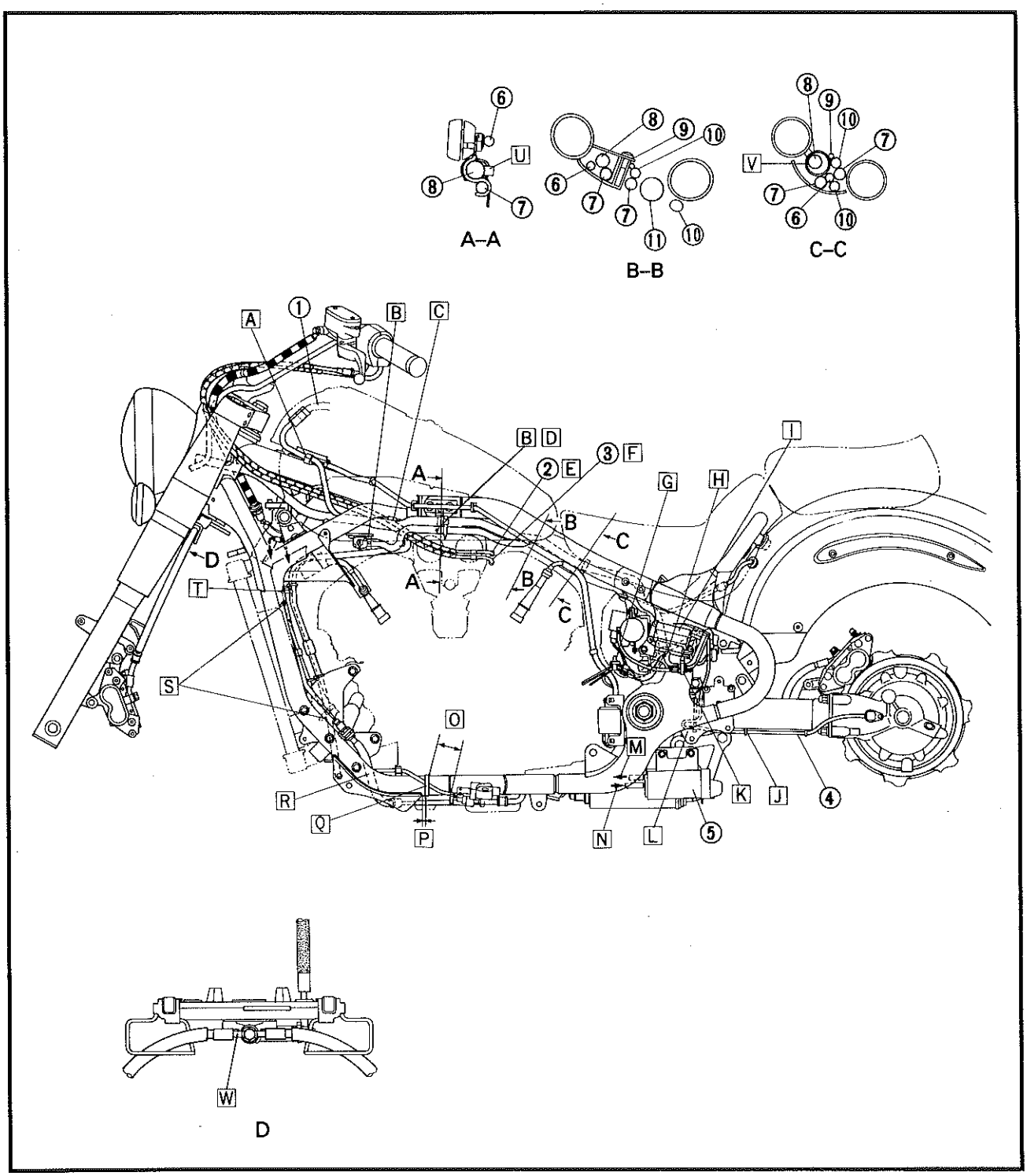


① Meter lead
② Throttle cable #2
③ Throttle cable #1
④ Speed sensor lead
⑤ Canister (for California)
⑥ Coolant reservoir hose
⑦ Fuel hose
⑧ Wire harness
⑨ Fuel sender leads
⑩ Canister hose (for California)
⑪ Radiator hose

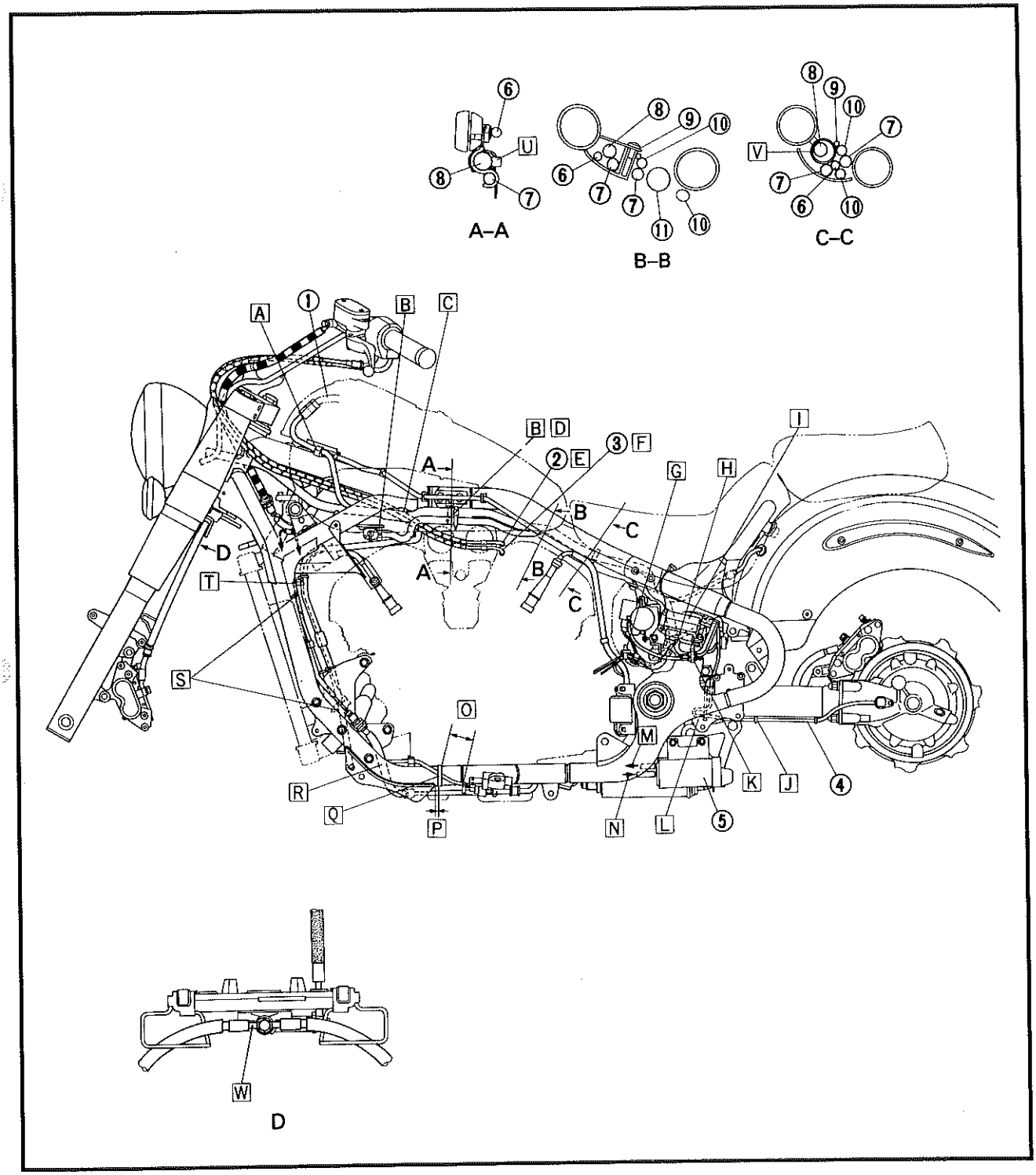
[A] At the white tape on the wire harness attach a plastic clamp.
[B] Install the fuel hose (with the white mark toward the left side of the motorcycle).
[C] Wire harness installing reference (plastic T-bar).
[D] Align the white mark on the fuel hose with the front of the guide.
[E] The nut (L=14) should be on the inside of the throttle cable holder.
[F] The nut (L=14) should be on the outside of the throttle cable holder.



[G] Fasten the starter motor lead, pick-up coil lead, A.C. magneto lead, neutral switch lead, ignition coil lead and oil level gauge lead with a plastic band.
[H] Pass the wire harness behind the ignitor unit.
[I] Fasten the speed sensor lead and wire harness with a plastic band. Pass the end of the plastic band through the side cover stay hole and over the fuse box.
[J] Pass the speed sensor lead through the three metal guides on the swing arm.
[K] Fasten the speed sensor lead and fuel pump lead with a plastic band (with the end facing up).
[L] To remove any slack, fold the speed sensor lead and fasten it to the back of the rear arm clamp with a plastic tie.
[M] To the carburetor (for California).
[N] From the roll over valve (for California).
[O] There should be no slack in the sidestand switch lead.
[P] Within 5 mm (0.02 in.)

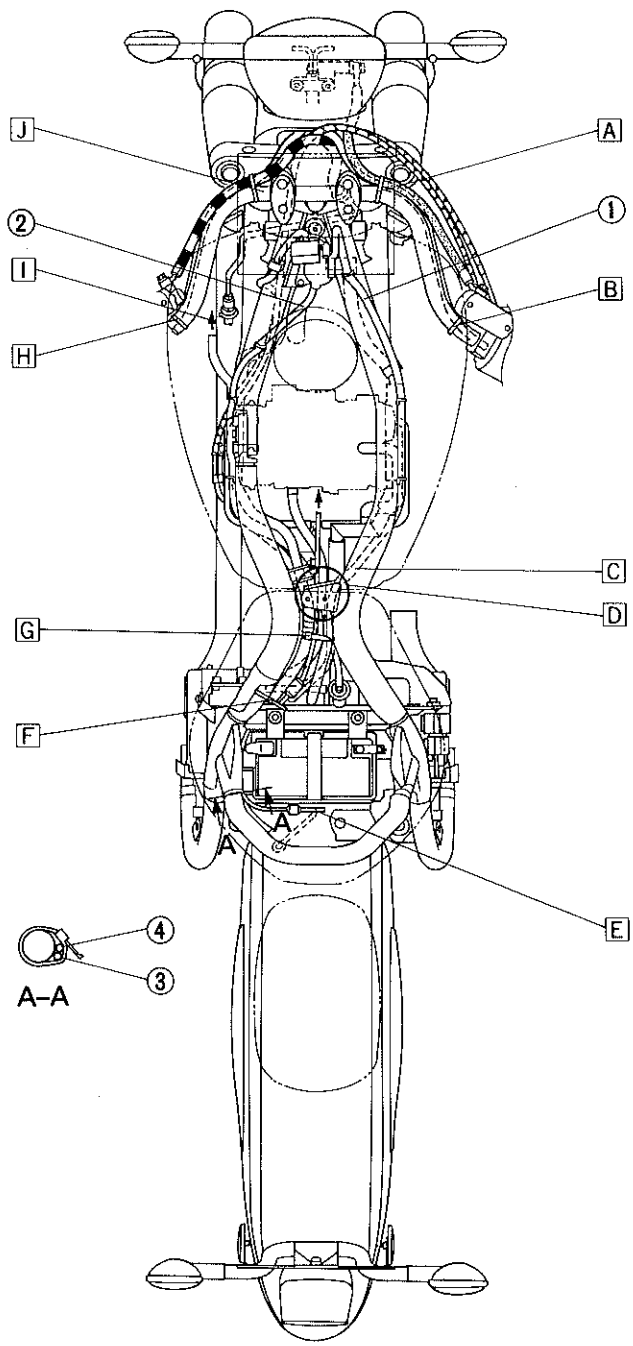


[Q] Fasten the sidestand switch lead with a plastic locking tie (with the end facing downward).
[R] Pass the clutch hose between the down tube and sidestand switch lead.
[S] Fasten the wire harness with a plastic band.
[T] Pass the clutch pipe through the plastic guide.
[U] Fasten the wire harness to the metal clamp using a plastic band.
[V] Fasten the wire harness with a plastic band.
[W] Install the brake hoses with the white paint mark facing towards the radiator (the white paint mark will either be on the right or left side).

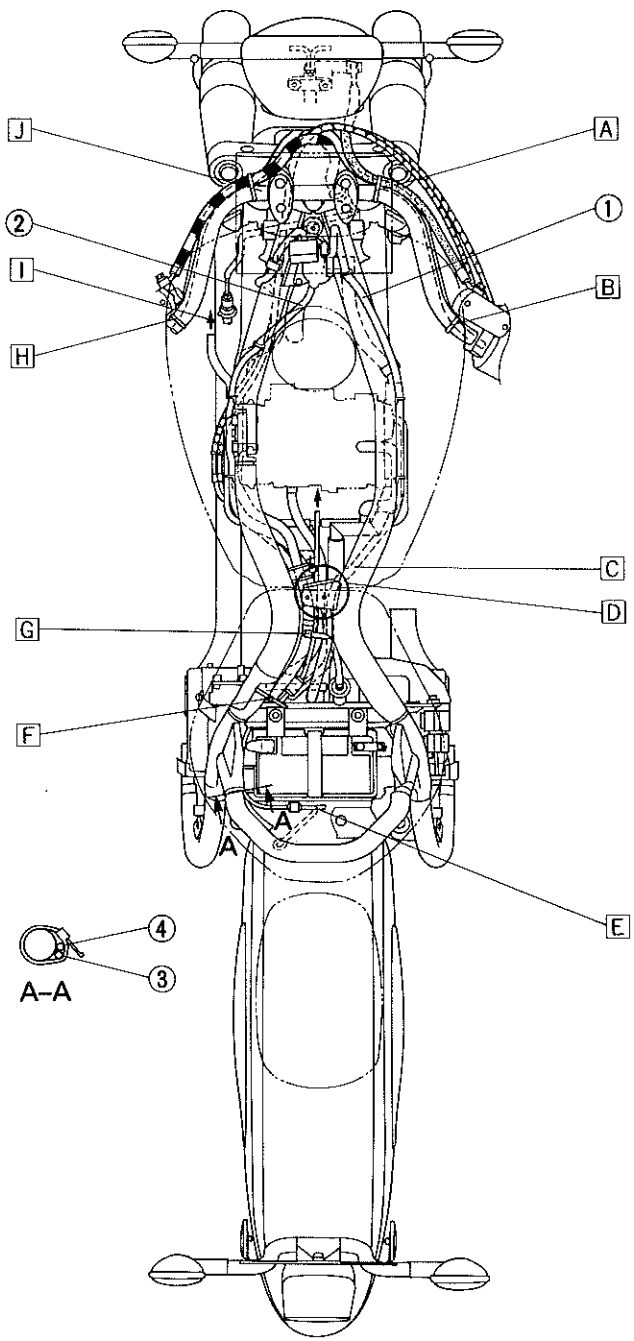


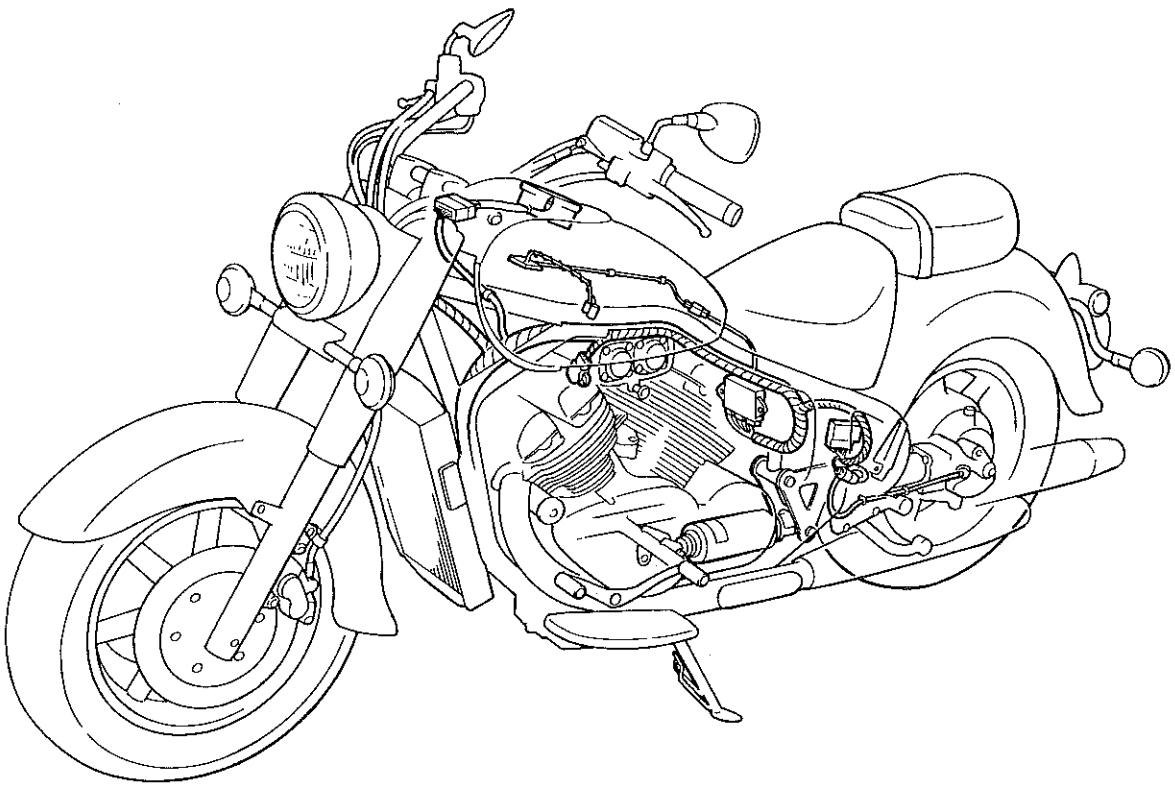
① Fuel tank breather hose (for California)
② Coolant reservoir hose
③ Seat lock cable
④ Wire harness side of tail/brake light lead

[A] Fasten the handlebar switch lead (right) and rubber hose around the brake hose with a plastic locking tie.
[B] Fasten the handlebar switch lead (right) with a plastic locking tie.
[C] Be sure the rear inner cover or any other part is not exerting pressure on the fuel tank breather hose.
[D] Pass the wire harness and hoses under the fuel tank mounting bracket. Be sure not to squeeze them when installing the fuel tank.
[E] Pass the tail/brake light lead through the hole in the cover at the back of the frame.
[F] The end of the plastic locking tie should face towards the inside of the motorcycle. Do not pinch the fuel sender leads.



[G] Fasten the fuel sender lead to the wire harness with a plastic band (with the end towards the right side of the motorcycle).
[H] Fasten the handlebar switch lead (left) and clutch switch lead with a plastic locking tie.
[I] To the fuel petcock.
[J] Fasten the handlebar switch lead (left) and rubber hose around the clutch switch with a plastic locking tie.





CONTENTS
PERIODIC INSPECTIONS AND ADJUSTMENTS

EB300000

PERIODIC INSPECTIONS AND ADJUSTMENTS

INTRODUCTION

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

EB301000

PERIODIC MAINTENANCE/LUBRICATION CHART

No.		ITEM	ROUTINE	TYPE	BREAK-IN	EVERY	
					1,000 km	6,000 km or 6 months	12,000 km or 12 months
1	*	Valve clearance	• Check and adjust valve clearance when engine is cold.	–	Every 42,000 km		
2		Spark plug	• Check condition. • Adjust gap and clean.	See page 3-17.		○	Replace
3	*	Crankcase ventilation system	• Check ventilation hose for cracks or damage. • Replace if necessary.	–		○	○
4	*	Fuel line	• Check fuel hose and vacuum pipe for cracks or damage. • Replace if necessary.	–		○	○
5	*	Fuel filter	• Replace.	–	Replace every 30,000 km		
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		Engine oil	• Replace	See page 3-22.	○		○
10	*	Oil filter	• Replace	–	○		○
11	*	Air filter (See NOTE.)	• Clean with compressed air. • Replace if necessary.	–		○	○
12	*	Cooling system	• Check hoses for cracks or damage, replace if necessary.	–		○	○
			• Replace coolant.	Ethylene glycol antifreeze coolant	Replace every 24 months		
13	*	Brake system	• Adjust free play. • Check and replace pads if necessary. • Replace brake fluid every 24,000 km or 24 months.	–	○	○	○
14	*	Final gear oil	• Check oil level and for leakage. • Replace every 24,000 km or 24 months.	SAE 80 API "GL-4" hypoid gear oil	Replace		○
15	*	Control cable	• Apply chain lube thoroughly.	Yamaha chain and cable lube or SAE 10W30 motor oil	○	○	○

Items marked with an asterisk (*) require special tools, data and technical skills for servicing.

PERIODIC MAINTENANCE/LUBRICATION CHART

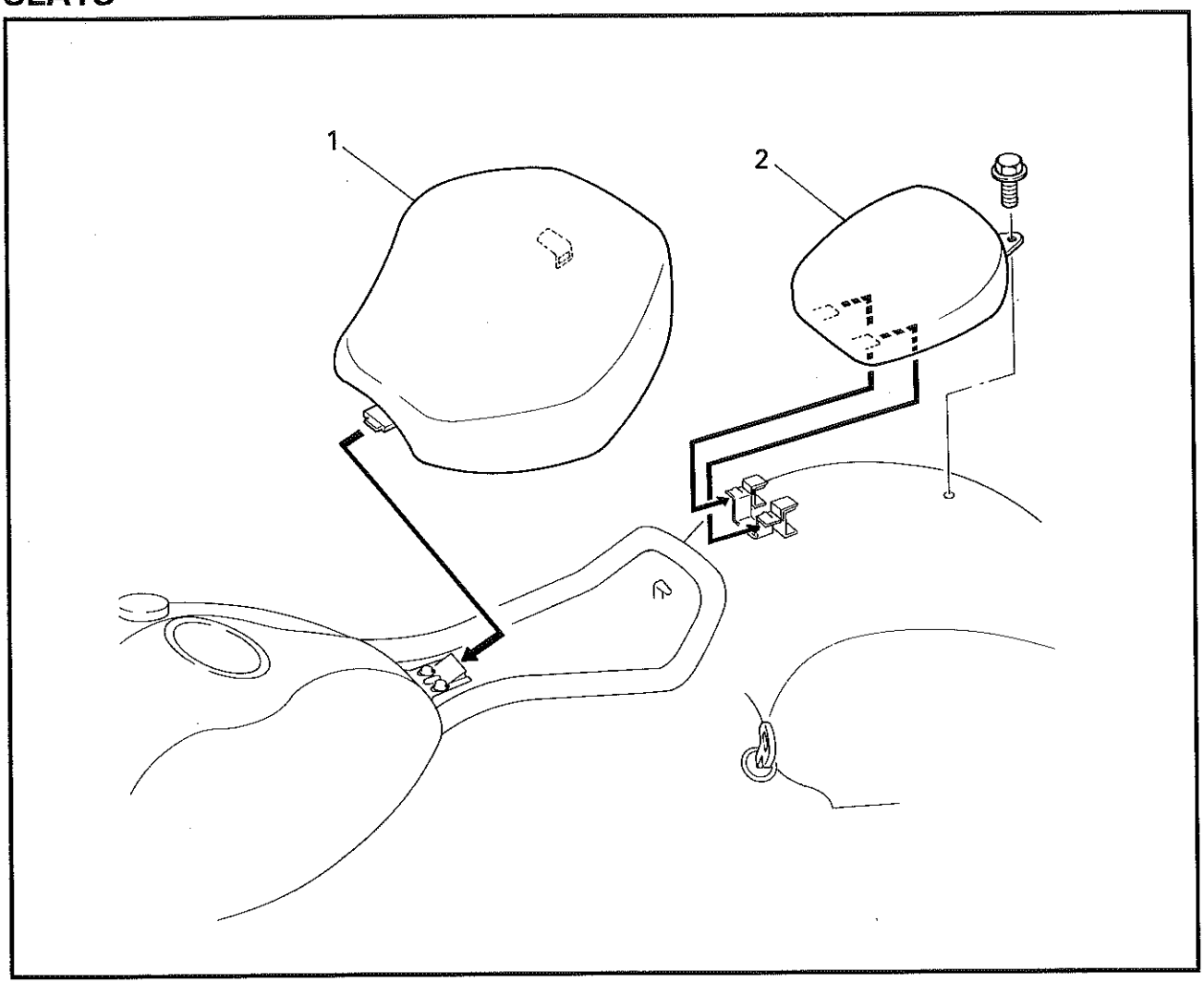
INSP ADJ

No.		ITEM	ROUTINE	TYPE	BREAK-IN	EVERY	
					1,000 km	6,000 km or 6 months	12,000 km or 12 months
16	*	Rear arm pivot bearing	• Check bearing assembly for looseness. • Moderately repack every 18,000 km.	Medium weight wheel bearing grease	Replace every 18,000 km		
17		Brake/ Clutch lever pivot shaft	• Apply chain lube lightly.	Yamaha chain and cable lube or SAE 10W30 motor oil		○	○
18		Brake pedal and shift pedal shaft	• Lubricate • Apply chain lube lightly.	Yamaha chain and cable lube or SAE 10W30 motor oil		○	○
19	*	Sidestand pivot	• Check operation and lubricate. • Apply chain lube lightly.	Yamaha chain and cable lube or SAE 10W30 motor oil		○	○
20	*	Sidestand switch	• Check and clean or replace if necessary.	–	○	○	○
21	*	Front fork	• Check operation and for leakage.	–		○	○
22	*	Steering bearings	• Check bearing assembly for looseness. • Moderately repack every 24,000 km or 24 months.	Medium weight wheel bearing grease.		○	○
23	*	Wheel bearings	• Check bearings for smooth rotation.	–		○	○
24	*	Rear suspension link pivots	• Apply grease lightly.	Molybdenum disulfide grease	Apply grease every 18,000 km		

Items marked with an asterisk (*) require special tools, data and technical skills for servicing.

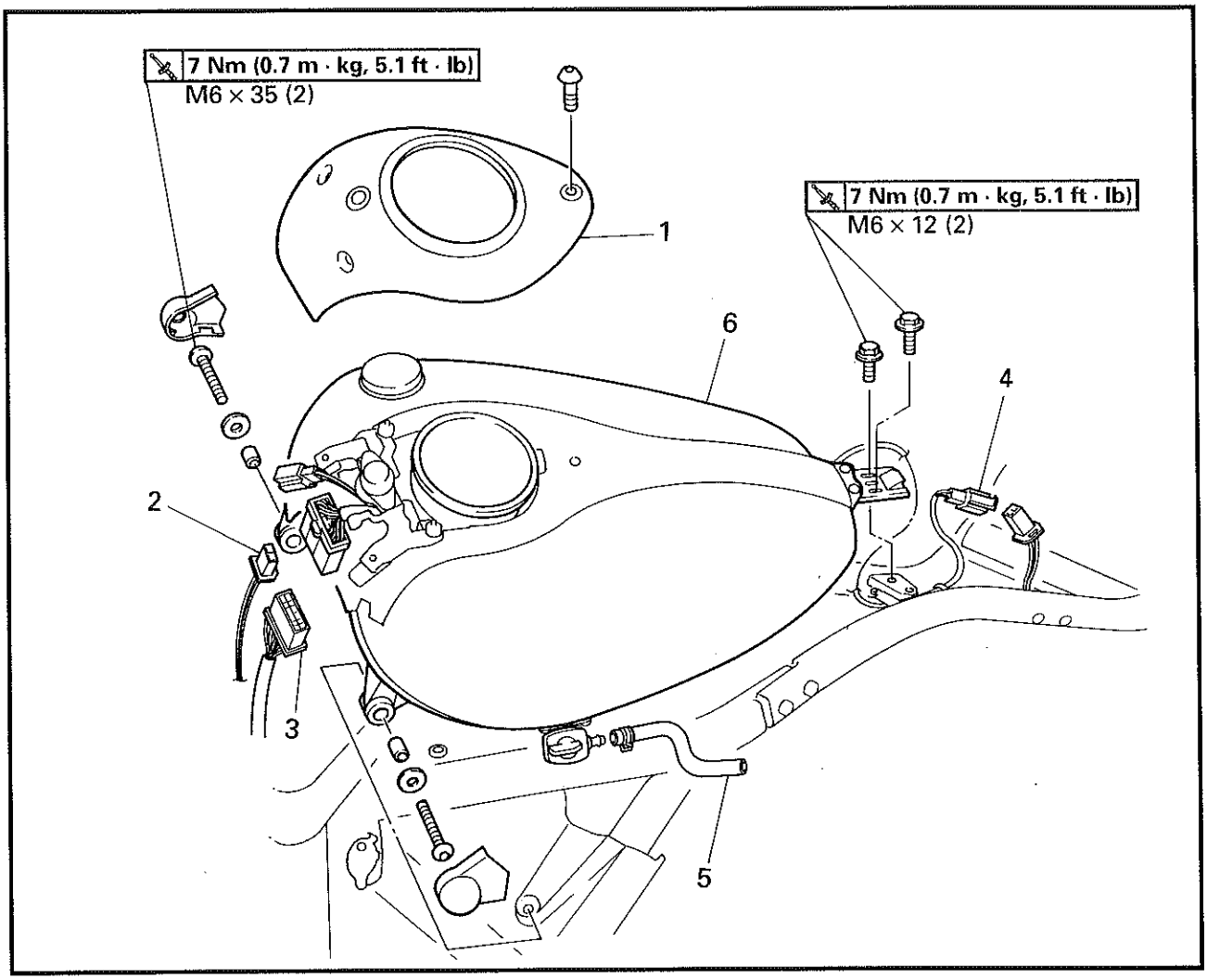
NOTE:
The air filter needs more frequent service if you are riding in unusually wet or dusty areas.

EB302001
SEATS



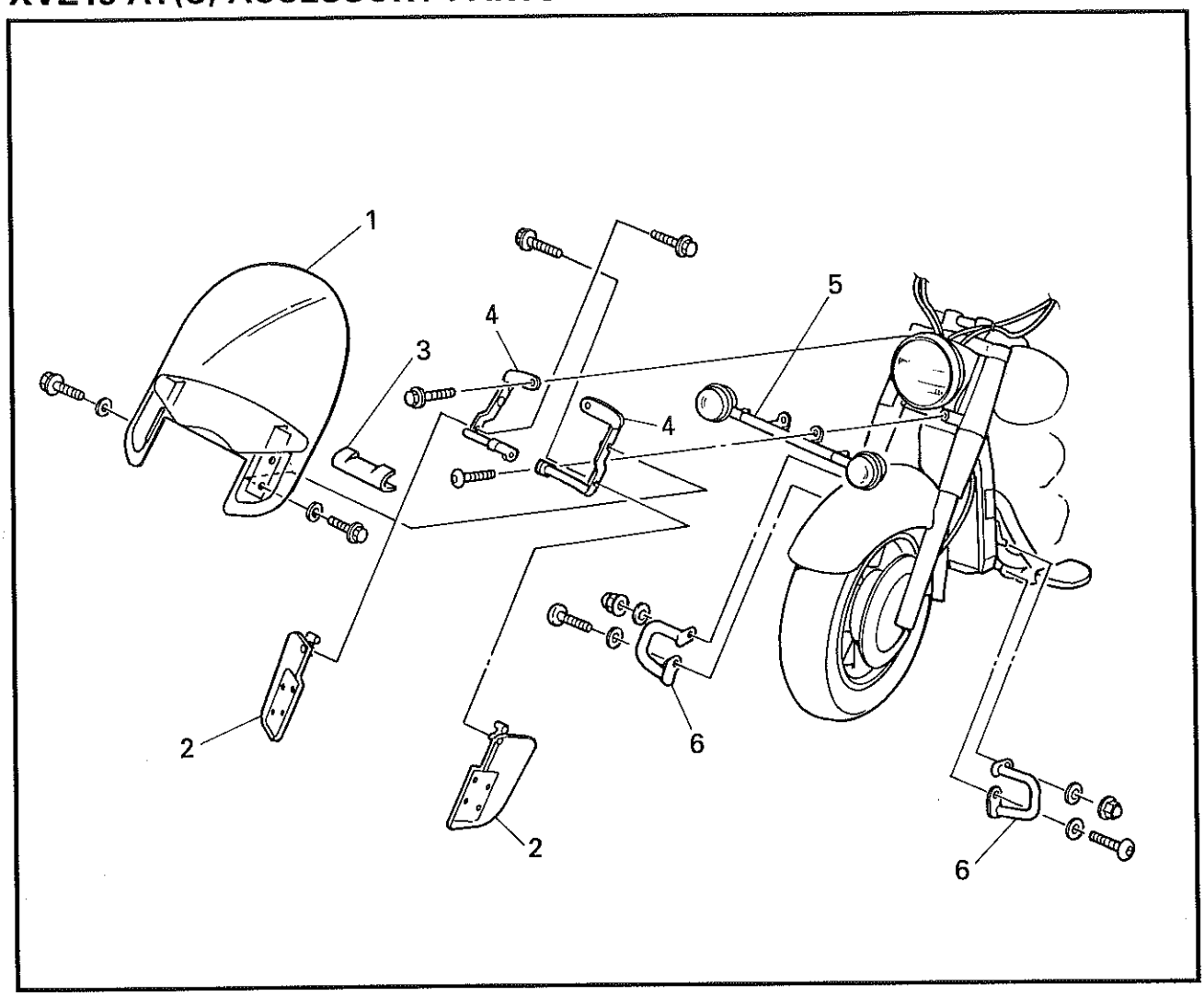
Order	Job name/Part name	Q'ty	Remarks
	Seat removal		Remove the parts in the order below.
1	Rider seat	1	
2	Passenger seat	1	
			For installation, reverse the removal procedure.

EB302002
FUEL TANK

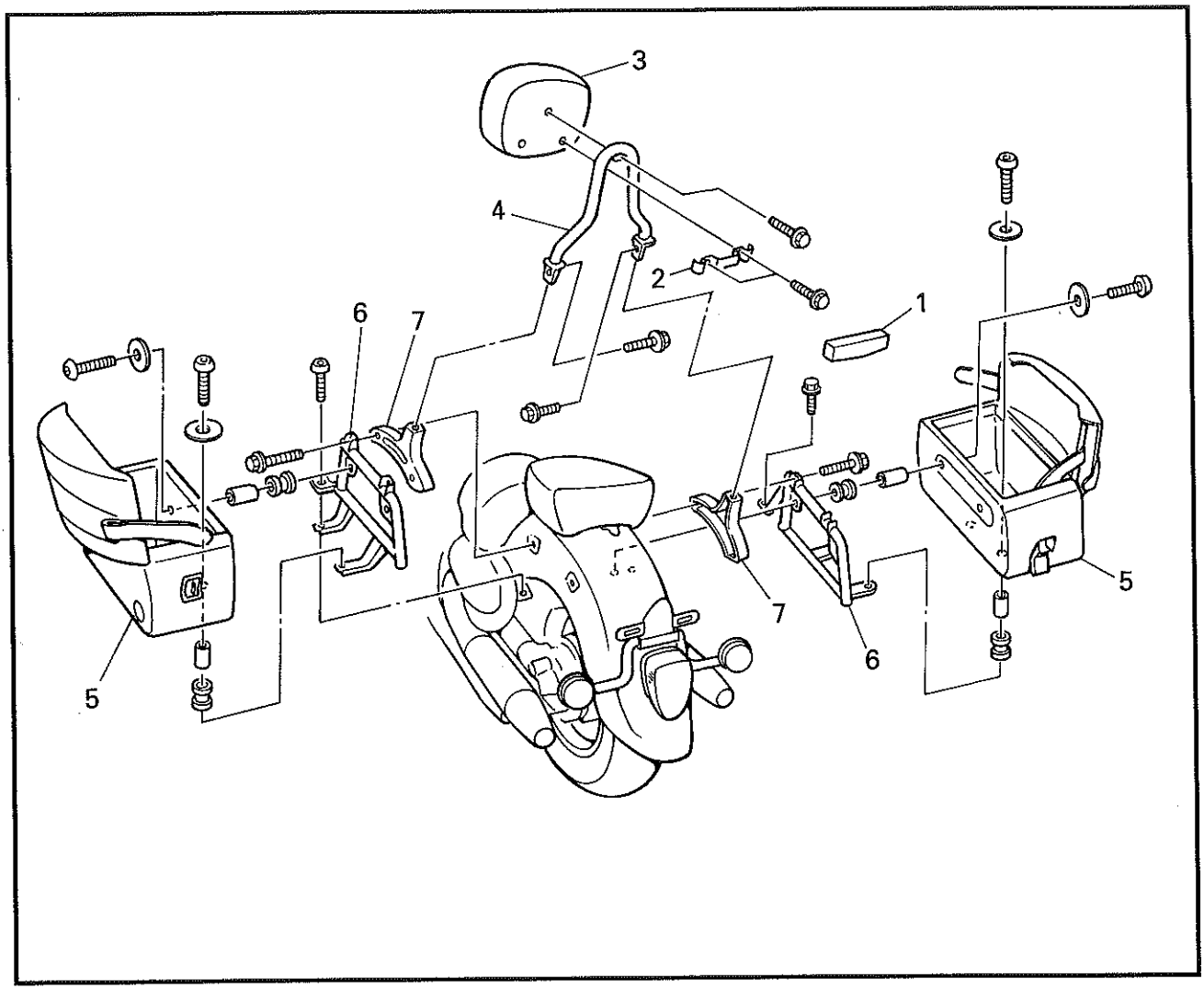


Order	Job name/Part name	Q'ty	Remarks
	Fuel tank removal		Remove the parts in the order below.
	Rider seat		Refer to "SEATS".
1	Speedometer cover	1	
2	Trip meter switch lead coupler	1	Disconnect
3	Meter wire harness coupler	1	Disconnect
4	Fuel sender lead coupler	1	Disconnect
5	Fuel hose	1	Disconnect **NOTE:** Before disconnecting the hose, turn the fuel petcock to "OFF".
6	Fuel tank	1	For installation, reverse the removal procedure.

XVZ13 AT(C) ACCESSORY PARTS



Order	Job name/Part name	Q'ty	Remarks
	Accessory parts removal (front)		Remove the parts in the order below.
1	Front windshield	1	
2	Side windshields	2	
3	Chrome flasher bracket cover	1	
4	Windshield stays	2	
5	Flasher light bracket assembly	1	
6	Engine guards	2	
			For installation, reverse the removal procedure.



Order	Job name/Part name	Q'ty	Remarks
	Accessory parts removal (rear)		Remove the parts in the order below.
1	Emblem	1	
2	Backrest holder	1	
3	Backrest	1	
4	Backrest stay	1	
5	Saddlebags	2	
6	Saddlebag stays	2	
7	Grips	2	
			For installation, reverse the removal procedure.

EB303000
ENGINE
VALVE CLEARANCE ADJUSTMENT

NOTE:
- Valve clearance adjustment should be made with the engine cool, at room temperature.
- When the valve clearance is to be measured or adjusted, the piston must be at Top Dead Center (T.D.C.) on the compression stroke.

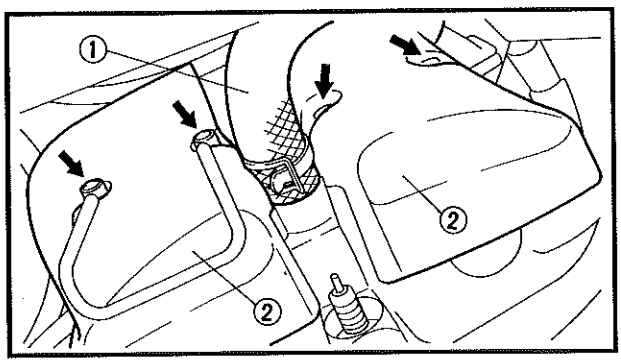
1.Remove:
- Rider seat
- Fuel tank

  Refer to "SEATS" and "FUEL TANK".
- Air cleaner case
- Carburetor assembly

  Refer to "CARBURETOR" in CHAPTER 6.

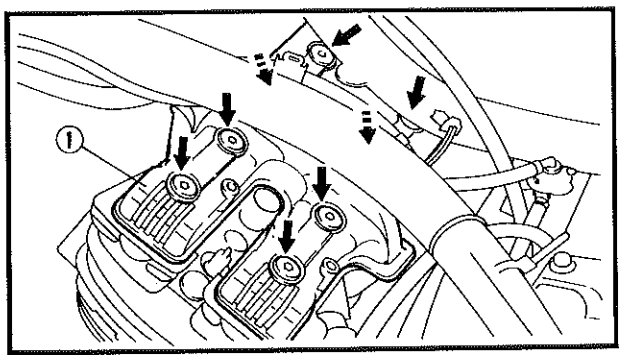
2.Drain:
- Coolant

  Refer to "COOLANT REPLACEMENT".



3.Disconnect:
- Spark plug leads
- Coolant hose ①

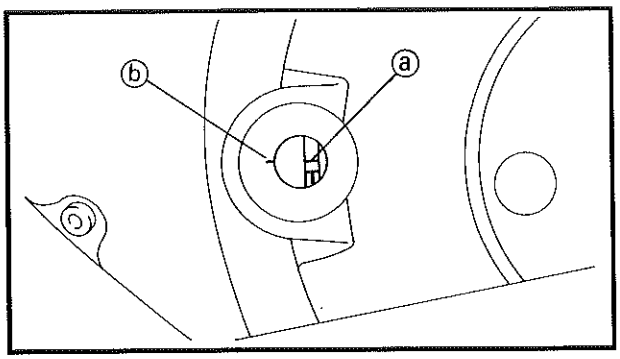
4.Remove:
- Chrome cylinder head covers ②



5.Remove:
- Spark plugs
- Cylinder head cover ①

6.Measure:
• Valve clearance
Out of specification → Adjust.

Valve clearance (cold):
Intake valve:
0.11 ~ 0.15 mm (0.004 ~ 0.006 in)
Exhaust valve:
0.16 ~ 0.20 mm (0.006 ~ 0.008 in)



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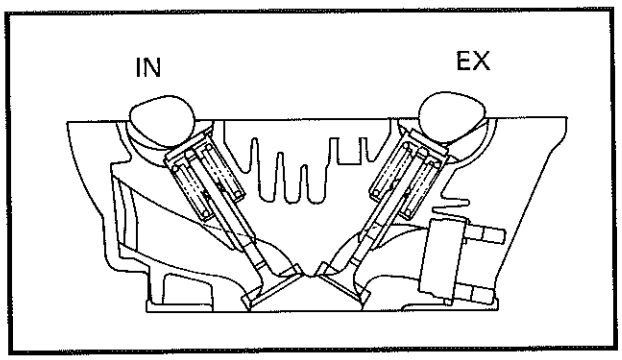
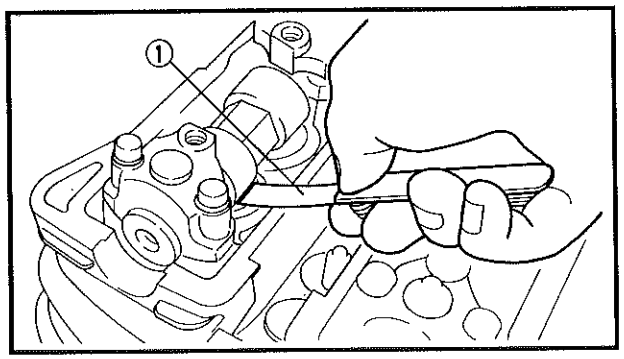
Measuring steps:
- Turn the crankshaft counterclockwise with a wrench.
- When the #1 piston is at TDC on the compression stroke, align the TDC mark ⓐ with the stationary pointer ⓑ.

NOTE:
TDC on the compression stroke can be found when the cam lobes are facing opposite one another, as shown.

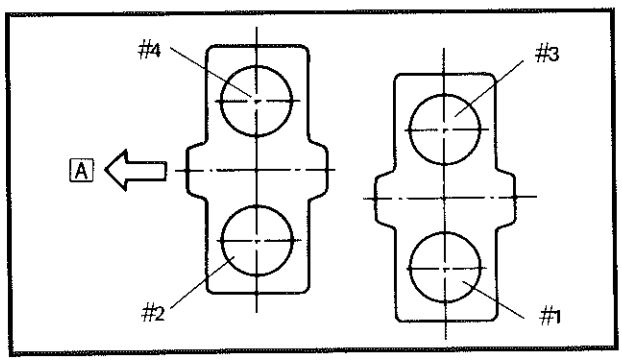




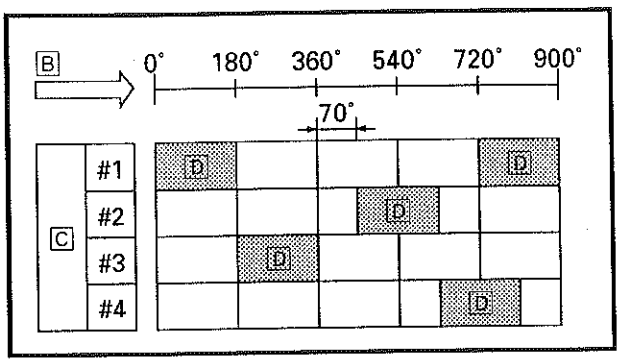
- Measure the valve clearance using a feeler gauge ①.

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

Measuring sequence:
#1 → #3 → #2 → #4



A Front
- Turn the crankshaft counterclockwise from the #1 cylinder TDC by the angles indicated below.



B Crankshaft counterclockwise turning angle
C Cylinder number
D Combustion

#3 Cylinder	180 degrees
#2 Cylinder	430 degrees
#4 Cylinder	610 degrees

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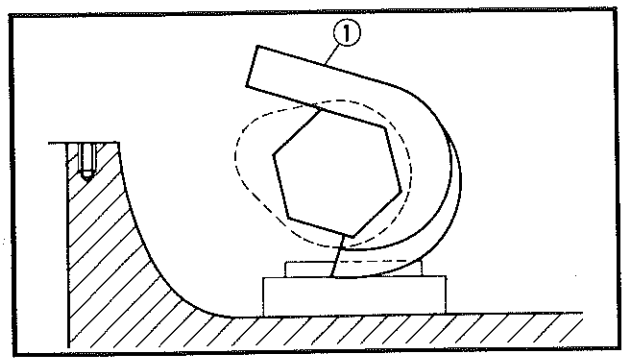
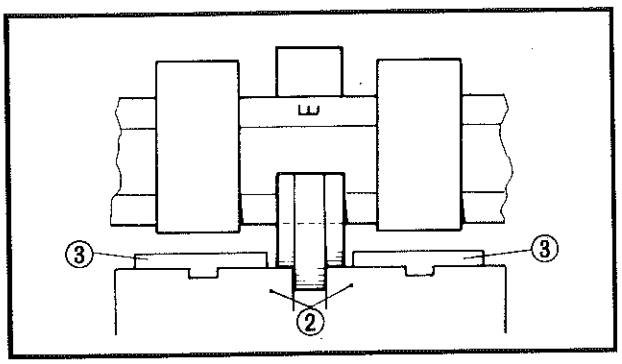


7. Adjust:
- Valve clearance

****

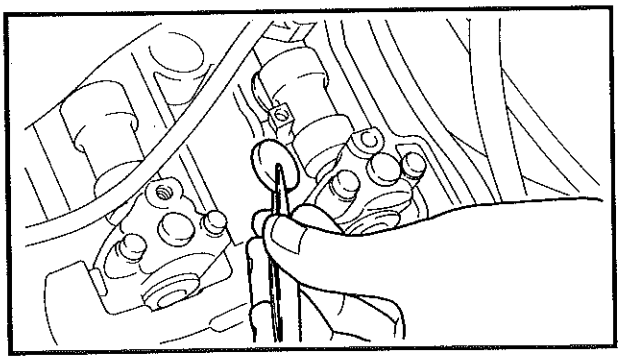
Adjustment steps:
- Position the valve lifter slots (intake and exhaust) opposite one another.
- Attach the tappet adjusting tool ①.

Tappet adjusting tool:
YM - 33961, 90890 - 04105

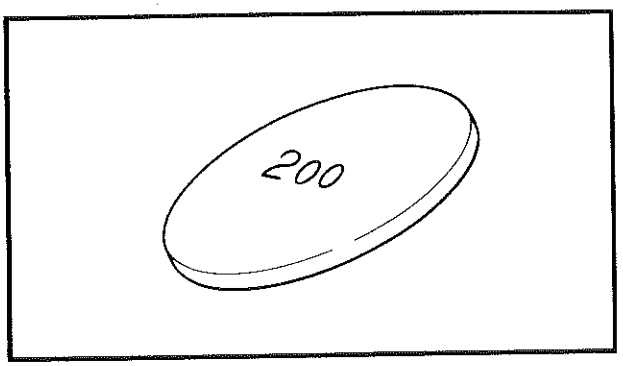


NOTE:
Make sure that the tool touches only the valve lifter ②, not the pad ③.

- Slowly turn the tappet adjusting tool so that the pads can be removed.
- Remove the pads from the valve lifters. Use a small screwdriver and a pair of tweezers for removal. Note the pad numbers.
- Select the proper pad from the following chart.



Pad range		Pad sizes: 25 thicknesses
No.200 ~ No.320	2.00 mm ~ 3.20 mm	Thickness increases in 0.05 mm increments



NOTE:
The thickness of each pad is marked on the pad face that touches the valve lifter (not the cam).

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
Example: Installed is pad 250
Measured clearance is 0.23 mm
Replace pad 250 with pad 260
Pad number: (example)
Pad No. 250 = 2.50 mm
Pad No. 260 = 2.60 mm
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	300	305
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
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	310	315
0.16 ~ 0.20	STANDARD CLEARANCE																								
0.21 ~ 0.25	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320	
0.26 ~ 0.30	210	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	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	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	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320					
0.46 ~ 0.50	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320						
0.51 ~ 0.55	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320							
0.56 ~ 0.60	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320								
0.61 ~ 0.65	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320									
0.66 ~ 0.70	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320										
0.71 ~ 0.75	255	260	265	270	275	280	285	290	295	300	305	310	315	320											
0.76 ~ 0.80	260	265	270	275	280	285	290	295	300	305	310	315	320												
0.81 ~ 0.85	265	270	275	280	285	290	295	300	305	310	315	320													
0.86 ~ 0.90	270	275	280	285	290	295	300	305	310	315	320														
0.91 ~ 0.95	275	280	285	290	295	300	305	310	315	320															
0.96 ~ 1.00	280	285	290	295	300	305	310	315	320																
1.01 ~ 1.05	285	290	295	300	305	310	315	320																	
1.06 ~ 1.10	290	295	300	305	310	315	320																		
1.11 ~ 1.15	295	300	305	310	315	320																			
1.16 ~ 1.20	300	305	310	315	320																				
1.21 ~ 1.25	305	310	315	320																					
1.26 ~ 1.30	310	315	320																						
1.31 ~ 1.35	315	320																							
1.36 ~ 1.40	320																								

VALVE CLEARANCE (cold):
0.16 ~ 0.20 mm
Example: Installed is pad 250
Measured clearance is 0.32 mm
Replace pad 250 with pad 265
Pad number: (example)
Pad No. 250 = 2.50 mm
Pad No. 265 = 2.65 mm
Always install pad with number down.

- Round off the hundredths digit of the original pad number to the nearest 0.05 mm increment.

Hundredths digit	Rounded value
0 or 2	0
5	DO NOT ROUND OFF
8	10

EXAMPLE:
Original pad number = 248 (2.48 mm)

- Locate in the chart the number of the pad previously installed and the measured valve clearance. The point where the column and row intersect is the new pad number.

NOTE:
Use the new pad number for the valve clearance adjustment exclusively.

- Install the new pad with the numbered side down.
- Remove the tappet adjusting tool.
- Measure the valve clearance again.
- If the clearance is still incorrect, repeat all clearance adjustment steps until the specified clearance is obtained.

****

8.Install:
- All removed parts

NOTE:
Install all removed parts in the reverse order of their disassembly. Note the following points.

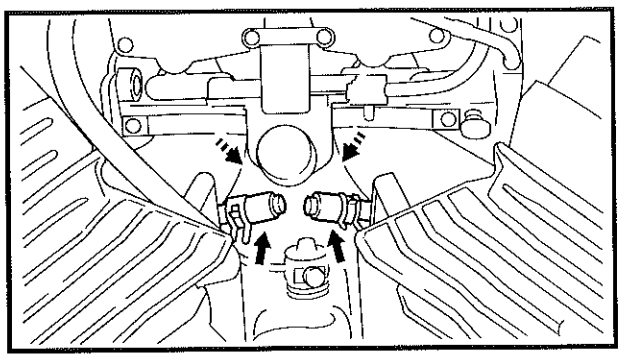
9.Install:
- Cylinder head cover — 10Nm (1.0 m · kg, 7.2 ft · lb)
- Spark plugs — 18Nm (1.8 m · kg, 13 ft · lb)
- Chrome cylinder head cover — 10Nm (1.0 m · kg, 7.2 ft · lb)

EB303010
CARBURETOR SYNCHRONIZATION

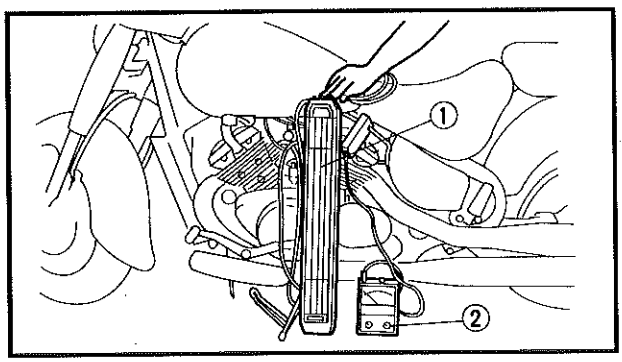
NOTE:
Prior to synchronizing the carburetors, the valve clearance should be properly adjusted and the ignition timing should be checked.

1.Stand the motorcycle on a level surface.

NOTE:
Place the motorcycle on a suitable stand.



2.Remove:
- Vacuum plugs



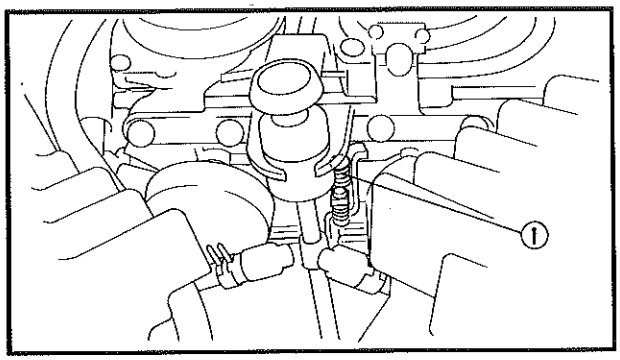
3.Attach:
- Vacuum gauge ①
- Engine tachometer ②
  (to the #1 spark plug lead)

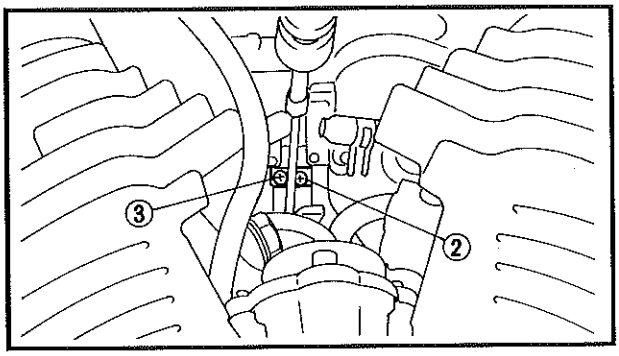
Vacuum gauge:
YU-08030-A, 90890 - 03094
Engine tachometer:
YU-08036-A, 90890 - 03113

4.Start the engine and let it warm up for several minutes.

5.Check:
- Engine idling speed
  Out of specification → Adjust.
  Refer to "IDLING SPEED ADJUSTMENT".

	Engine idling speed: **950 ~ 1,050 r/min**





6.Adjust:
- Carburetor synchronization

****

Adjustment steps:
- Synchronize carburetor #1 to carburetor #2 by turning the synchronizing screw ① until both gauges read the same.
- Rev the engine two or three times, each time for less than a second, and check the synchronization again.
- Repeat the above steps and synchronize carburetor #4 to carburetor #3 by turning the synchronizing screw ② until both gauges read the same.
- Repeat the same steps and synchronize carburetor #2 to carburetor #4 by turning the synchronizing screw ③ until both gauges read the same.

Vacuum pressure at idle speed:
40.0 kPa (300 mm Hg, 11.8 in Hg)

NOTE:
The difference between the two carburetors should not exceed 1.33 kPa (10 mm Hg, 0.4 in Hg).

****

7.Check:
- Engine idling speed
  Out of specification → Adjust.

8.Stop the engine and detach the measuring equipment.

9.Adjust:
- Throttle cable free play
  Refer to "THROTTLE CABLE ADJUSTMENT".

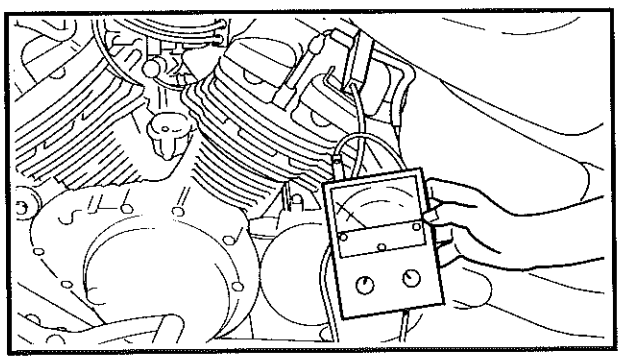
Free play (throttle cable):
4 ~ 6 mm (0.16 ~ 0.24 in)
At throttle grip flange

10.Install:
- Vacuum plugs

EB303021
IDLING SPEED ADJUSTMENT

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

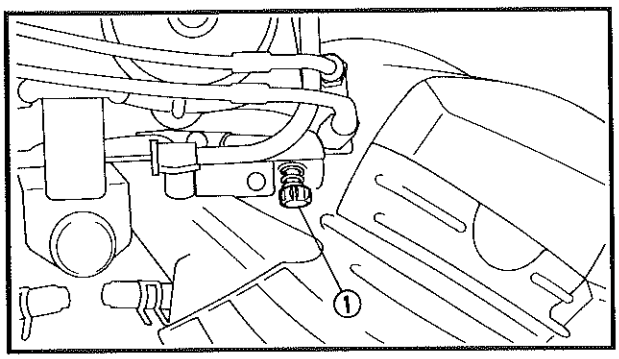
1.Start the engine and let it warm up for several minutes.
2.Attach:
- Engine tachometer
  (to the #1 spark plug lead)



Engine tachometer:
YU- 08036 - A, 90890 - 03113

3.Check:
- Engine idling speed
  Out of specification → Adjust.

Engine idling speed:
950 ~ 1,050 r/min



4.Adjust:
- Engine idling speed

****

Adjustment steps:

- Turn the throttle stop screw ① in or out until the specified idling speed is obtained.

Turning in:	**idling speed is increased.**
Turning out:	**idling speed is decreased.**

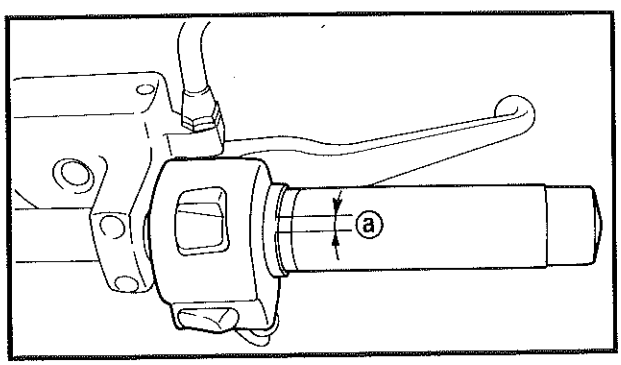
****

5.Adjust:
- Throttle cable free play
  Refer to "THROTTLE CABLE ADJUSTMENT".

Free play (throttle cable):
4 ~ 6 mm (0.16 ~ 0.24 in)
At throttle grip flange

EB303030
THROTTLE CABLE ADJUSTMENT

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

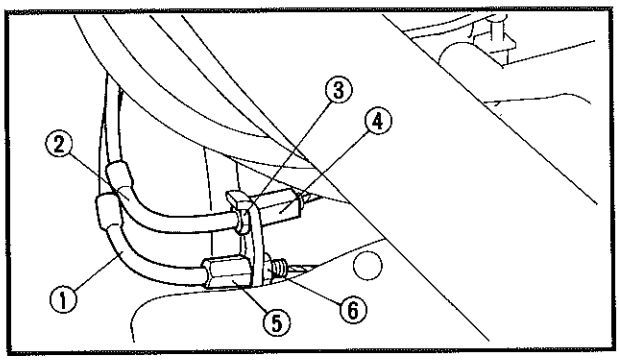


1.Check:
- Throttle cable free play ⓐ
  Out of specification → Adjust.

Free play (throttle cable):
4 ~ 6 mm (0.16 ~ 0.24 in)
At throttle grip flange

2.Remove:
- Rider seat
- Fuel tank

Refer to "SEATS" and "FUEL TANK".



3.Adjust:
- Throttle cable free play

****

Adjustment steps:

NOTE:
When the motorcycle is accelerating, throttle cable #1 ① is pulled and throttle cable #2 ② is pushed.

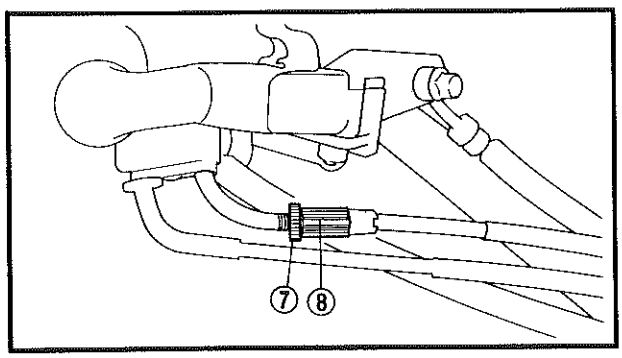
1st step:
- Loosen the locknut ③ on throttle cable #2.
- Turn the adjuster ④ in or out to take up any slack on throttle cable #2.

2nd step:
- Loosen the locknut ⑤ on throttle cable #1.
- Turn the adjuster ⑥ in or out until the specified free play is obtained.

Turning in:	**free play is increased.**
Turning out:	**free play is decreased.**

- Tighten the locknuts.

NOTE:
If the specified free play cannot be obtained on the carburetor end of the cable, use the adjuster on the handlebar end.



Additional step:
- Loosen the locknut ⑦.
- Turn the adjuster ⑧ in or out until the specified free play is obtained.

Turning in:	**free play is increased.**
Turning out:	**free play is decreased.**

● Tighten the locknut.

⚠ WARNING

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

****

4.Install:
- Fuel tank
- Rider seat

Refer to "FUEL TANK" and "SEATS".

EB303040
SPARK PLUG INSPECTION

1.Remove:
- Spark plug caps
- Spark plugs

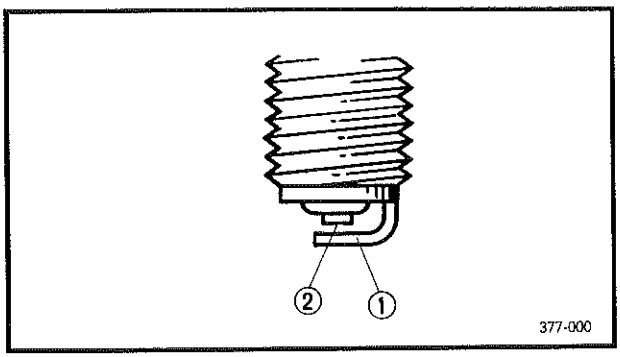
CAUTION:

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.

2.Check:
- Spark plug type

Incorrect → Replace.

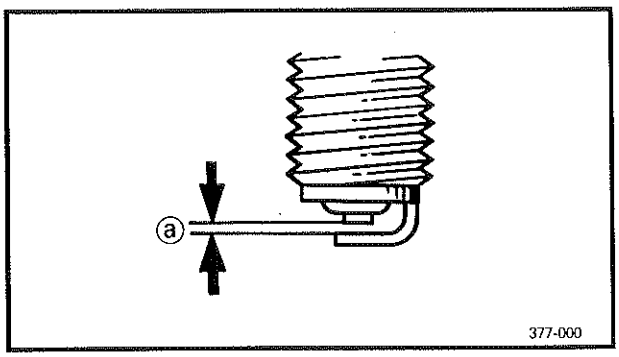
Standard spark plug:
DPR7EA - 9 (NGK)
X22EPR - U9 (NIPPONDENSO)



3.Inspect:
- Electrode ①

Wear/damage → Replace.
- Insulator ②

Abnormal color → Replace.
Normal color is a medium-to-light tan color.



4.Clean:
- Spark plug
  (with spark plug cleaner or wire brush)

5.Measure:
- Spark plug gap ⓐ
  (with a wire gauge)
  Out of specification → Adjust gap.

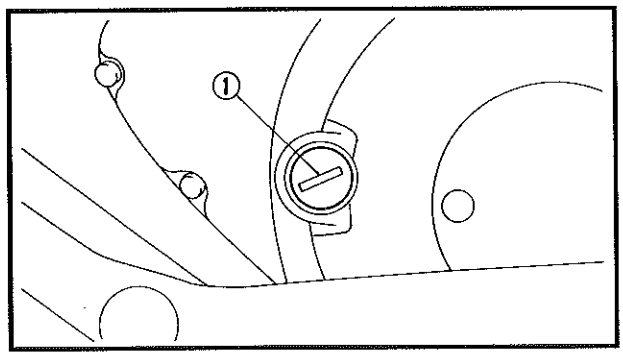
Spark plug gap:
0.8 ~ 0.9 mm (0.031 ~ 0.035 in)

6.Install:
- Spark plug — 18Nm (1.8 m · kg, 13 ft · lb)

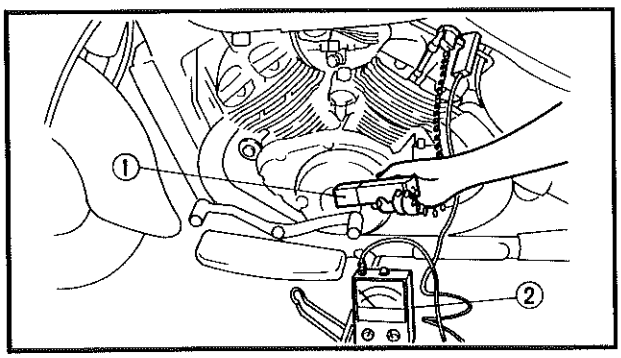
NOTE:
Before installing a spark plug, clean the gasket surface and the plug surface.

EB303051
IGNITION TIMING CHECK

NOTE:
Prior to checking the ignition timing, check all electrical connections related to the ignition system. Make sure all connections are tight and free of corrosion and that all ground connections are tight.

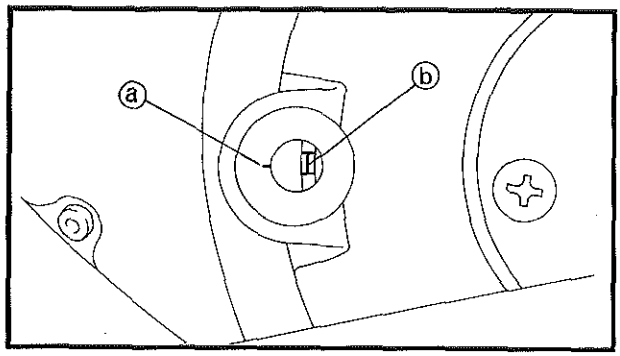


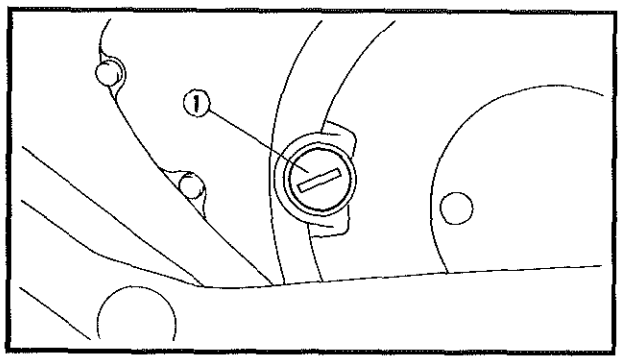
1.Remove:
- Timing plug ①



2.Attach:
- Timing light ①
- Engine tachometer ②
  (to the #1 spark plug lead)

Timing light:
YU - 33277 - A, 90890 - 03141
Engine tachometer:
YU - 08036 - A, 90890 - 03113





3.Check:
• Ignition timing

****

Checking steps:

● Start the engine and let it warm up for several minutes. Let the engine run at the specified speed.

	Engine idling speed: **950 ~ 1,050 r/min**

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

****

NOTE:
Ignition timing is not adjustable.

4.Install:
• Timing plug ①

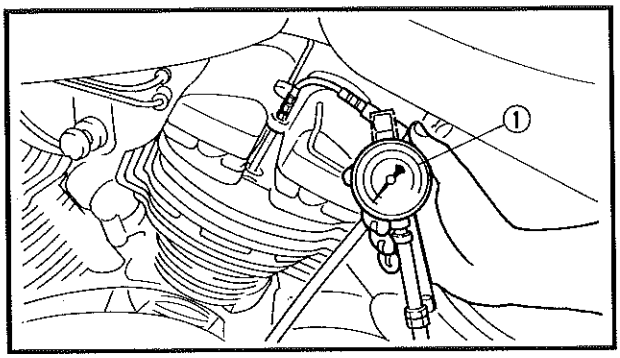
EB303060
COMPRESSION PRESSURE MEASUREMENT

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

1.Check:
• Valve clearance
Out of specification → Adjust.
Refer to "VALVE CLEARANCE ADJUSTMENT".
2.Start the engine and let it warm up for several minutes.
3.*Stop the engine.*

4.Remove:
- Spark plug caps
- Spark plugs

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.Attach:
- Compression gauge ①

Compression gauge set:
YU - 33223, 90890 - 03081

6.Measure:
- Compression pressure
  If it exceeds the maximum pressure allowed → Inspect the cylinder head, valve surfaces and piston crown for carbon deposits.
  If it is below the minimum pressure → Squirt a few drops of oil into the affected cylinder and measure again.
- Refer to the table below.

Compression pressure (with oil applied in the cylinder)	
Reading	**Diagnosis**
Higher than without oil	**Worn or damaged pistons → Repair.**
Same as without oil	**Possible defective ring(s), valves, cylinder head gasket or piston → Repair.**

Compression pressure (at sea level)
Standard:
1,520 kPa (15.2 kg/cm², 216 psi)
Minimum:
1,300 kPa (13.0 kg/cm², 185 psi)
Maximum:
1,700 kPa (17.0 kg/cm², 242 psi)

****

Measurement steps:

- Crank the engine with the throttle wide open until the reading on the compression gauge stabilizes.

⚠ WARNING

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

- Repeat the previous steps for the other cylinders.

NOTE:

The difference in compression pressure between the highest and lowest cylinder compression readings should not exceed 100 kPa (1 kg/cm², 14 psi).

****

7. Install:
   - Spark plugs — 18Nm (1.8 m · kg, 13 ft · lb)
   - Spark plug caps

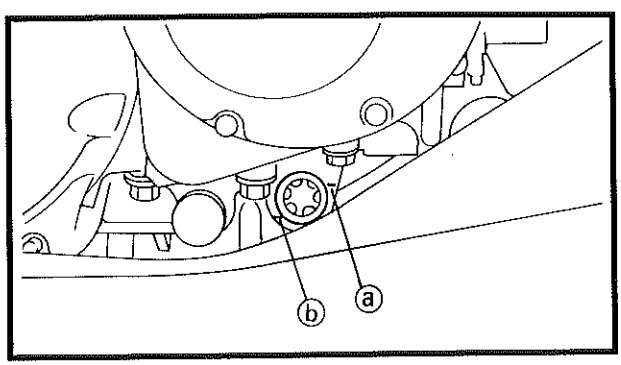
EB303071

ENGINE OIL LEVEL INSPECTION

1. Stand the motorcycle on a level surface.

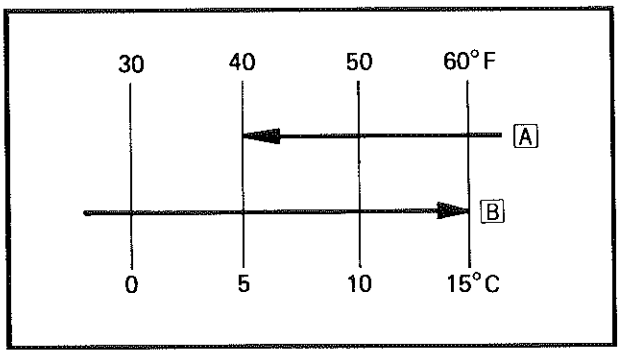
NOTE:

- Make sure the motorcycle is upright when inspecting the oil level.
- Place the motorcycle on a suitable stand.



2. Inspect:
   - Oil level

   Oil level should be between the maximum ⓐ and minimum ⓑ marks.
   Oil level is below the minimum mark → Add oil up 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:
- **Do not add any chemical additives. Engine oil also lubricates the clutch and additives could cause clutch slippage.**
- **Do not allow foreign material to enter the crankcase.**

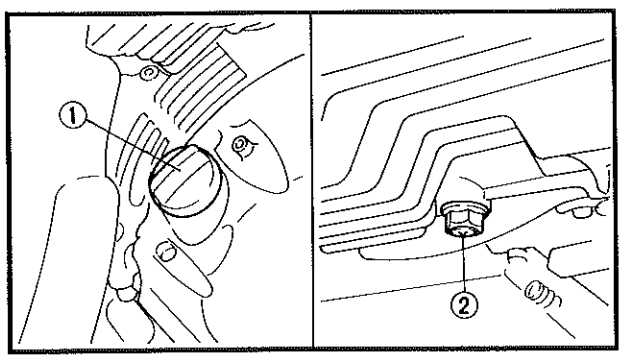
NOTE:
Recommended engine oil classification; API Service "SE", "SF" type or equivalent (e.g. "SF-SE", "SF-SE-CC", "SF-SE-SD" etc.).

3. Start the engine and let it warm up for several minutes.
4. Turn off the engine and inspect the oil level again.

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

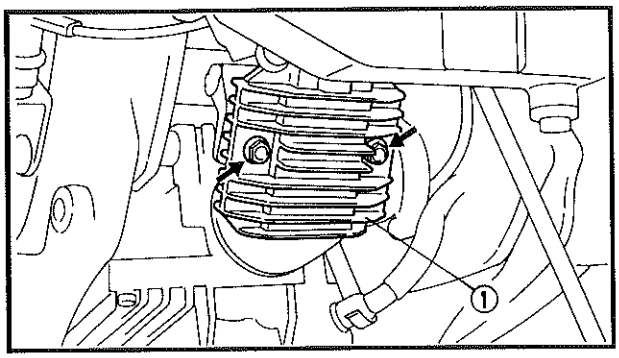
EB303080
ENGINE OIL REPLACEMENT

1. Start the engine and let it warm up for several minutes.
2. Turn off the engine and place a container under the drain bolt.

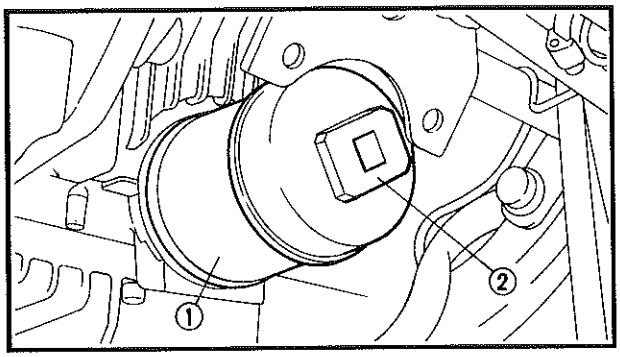


3. Remove:
- Oil filler cap ①
- Drain bolt ②

Drain the crankcase of its oil.



4.Remove:
- Rectifier/regulator ①



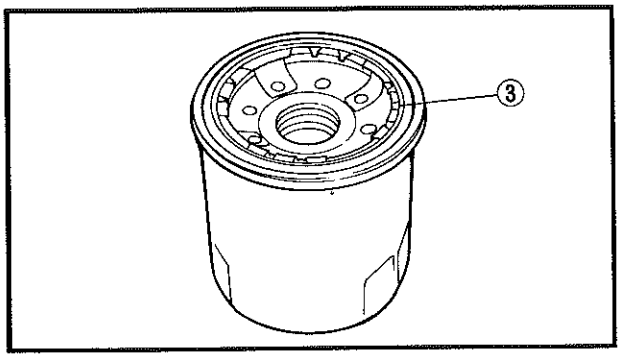
5.If the oil filter is to be replaced during this procedure, remove the following parts and reinstall them afterwards.

****

Replacement steps:

- Remove the oil filter ① with an oil filter wrench ②.

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



- Apply engine oil to the O-ring ③ of the new oil filter.

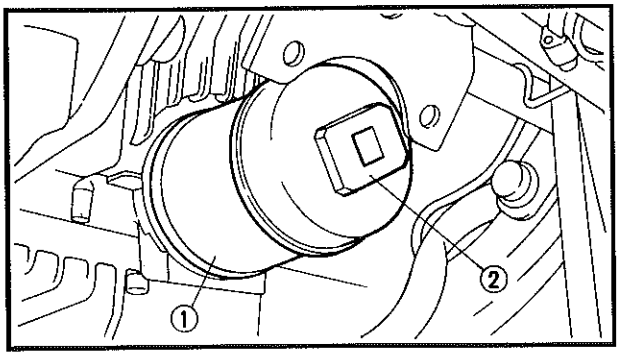
⚠ WARNING

Make sure the O-ring ③ is positioned correctly.

- Tighten the new oil filter with an oil filter wrench.

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

****



6.Install:
- Drain bolt 43Nm (4.3 m · kg, 31 ft · lb)

NOTE:

Inspect the drain bolt gasket. If it is damaged, replace it.

7.Fill:
- Crankcase

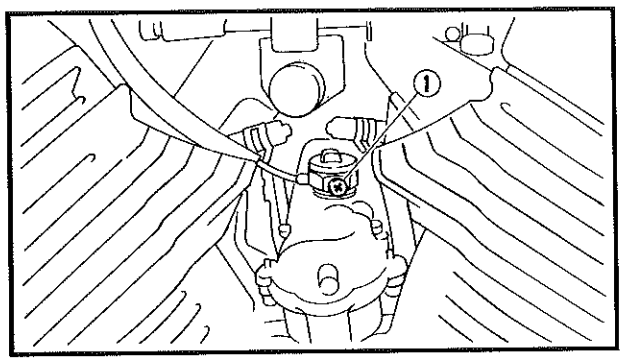
Refer to "ENGINE OIL LEVEL INSPECTION".

Oil quantity:
Total amount:
4.3 L (3.8 Imp qt, 4.5 US qt)
Periodic oil change:
3.5 L (3.1 Imp qt, 3.7 US qt)
With oil filter replacement:
3.7 L (3.3 Imp qt, 3.9 US qt)

8.Install:
- Oil filler cap

9.Warm up the engine for a few minutes, then turn it off.

10.Check:
- Engine (for oil leaks)
- Oil level



11.Check:
- Oil pressure

****

Checking steps:
- Slightly loosen the oil gallery bolt ①.
- Start the engine and keep it idling until oil starts to seep from the oil gallery bolt. If no oil comes out after one minute, turn the engine off so that it will not seize.
- Check the oil passages, oil filter and oil pump for damage or leakage. Refer to "INSPECTION AND REPAIR" in CHAPTER 4.
- Start the engine after solving the problem(s) and check the oil pressure again.
- Tighten the oil gallery bolt to specification.

Bolt (oil gallery):
5 Nm (0.5 m • kg, 3.6 ft • lb)

****

ENGINE OIL PRESSURE INSPECTION

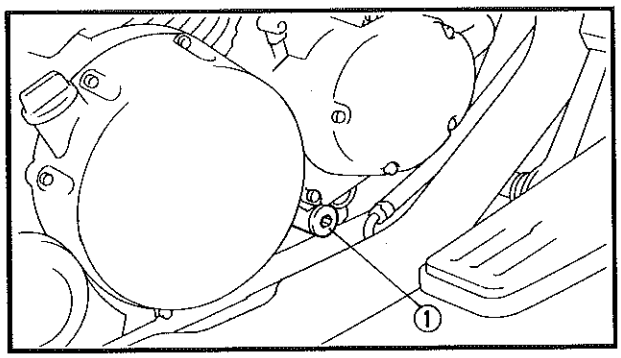
1.Check:
- Oil level

  Oil level low → Add oil to the proper level.

2.Start the engine and let it warm up. Then, stop the engine.

CAUTION:

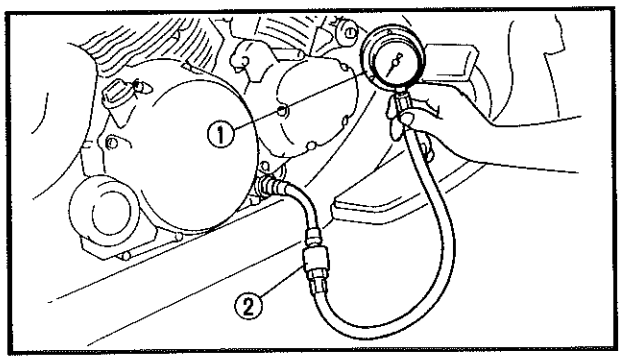
When the engine is cold, the oil will have a higher viscosity, causing the oil pressure to increase. After warming-up the engine be sure to measure the pressure.



3.Remove:
- Main gallery bolt ①

⚠ WARNING

The engine, muffler or engine oil may be extremely hot.



4.Attach:
- Pressure gauge ①
- Adapter ②

Pressure gauge:
90890 - 03153
Adapter:
90890 - 03124

5.Measure:
- The oil pressure at the following conditions:

Engine oil pressure:
250 ~ 350 Kpa (2.5 ~ 3.5 kg/cm², 36 ~ 50 psi)
Engine speed:
Approximately 5,000 r/min
Oil temperature:
100°C (212°F)

- Out of specification
  Check the following:

Oil pressure	Possible causes
When the oil pressure is less than the specification.	• Faulty oil pump • Clogged oil filter • Leaking oil passage • Broken or damaged oil seal
When the oil pressure is greater than the specification.	• Leaking oil passage • Faulty oil filter • Very viscous engine oil

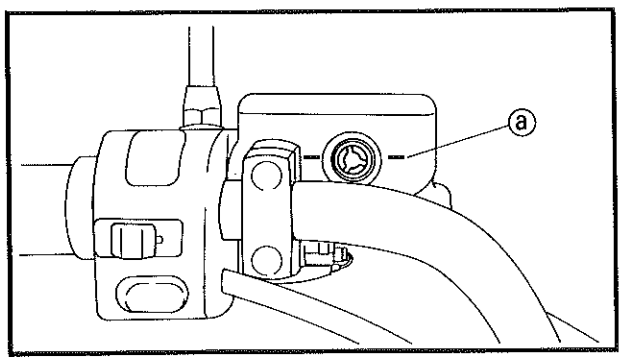
6.Install:
- Main gallery bolt

12Nm (1.2 m · kg, 8.7 ft · lb)

EB303100
CLUTCH FLUID LEVEL INSPECTION

1.Stand the motorcycle on a level surface.

NOTE:
Place the motorcycle on a suitable stand.



2.Inspect:
- Clutch fluid level
  Clutch fluid level is below the "LOWER" level line ⓐ → Fill to the proper level.

Recommended clutch fluid:
DOT 4

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

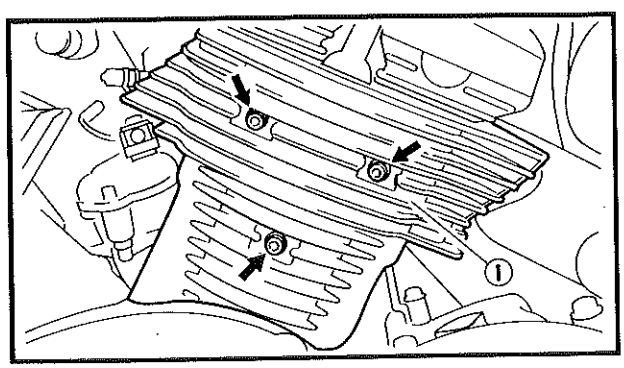
CAUTION:
Clutch fluid may corrode painted surfaces or plastic parts. Always clean up any spilt fluid immediately.

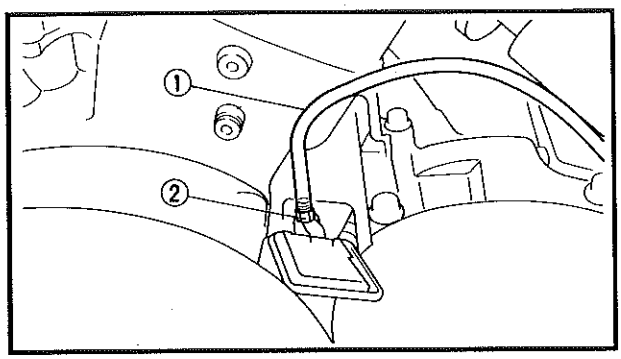
⚠ WARNING
- **Use only the designated clutch fluid. Other fluids may cause the rubber seals to deteriorate, causing leakage and poor clutch performance.**
- **Refill with the same type of fluid. Mixing fluids may result in a harmful chemical reaction leading to poor clutch performance.**
- **When refilling,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

EB303110
AIR BLEEDING (HYDRAULIC CLUTCH SYSTEM)

⚠ WARNING
Bleed the clutch system whenever:
- **The system is disassembled.**
- **A clutch hose is loosened or removed.**
- **The clutch fluid level is very low.**
- **Clutch operation is faulty.**

1.Remove:
- Left rear cylinder side cover ①





2.Bleed:
• Clutch system

****

Air bleeding steps:

a.Fill the reservoir with the proper clutch fluid.
b.Install the diaphragm. Be careful not to spill any fluid or allow the reservoir to overflow.
c.Connect a clear plastic hose ① tightly to the bleed screw ②.
d.Place the other end of the hose into a container.
e.Slowly apply the clutch lever several times.
f. Pull the lever in and hold it in position.
g.Loosen the bleed screw and allow the lever to travel slowly towards the handlebar.
h.Tighten the bleed screw when the lever is touching the handlebar grip, then release the lever.
i. Repeat steps (e) to (h) until all air bubbles have disappeared from the clutch fluid.

NOTE:
When bleeding the clutch system, make sure that there is always enough clutch fluid before applying the clutch lever. Ignoring this precaution could allow air to enter the clutch system, considerably lengthening the bleeding procedure.

j. Tighten the bleed screw.

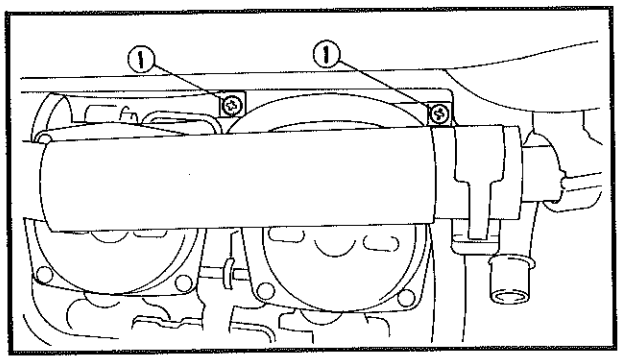
	**Bleed screw:** **6 Nm (0.6 m • kg, 4.3 ft • lb)**

NOTE:
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 clutch system have disappeared.

k.Fill the clutch fluid reservoir up to the proper level.
Refer to "CLUTCH FLUID LEVEL INSPECTION".

⚠ WARNING
Check clutch operation after bleeding the clutch system.

****

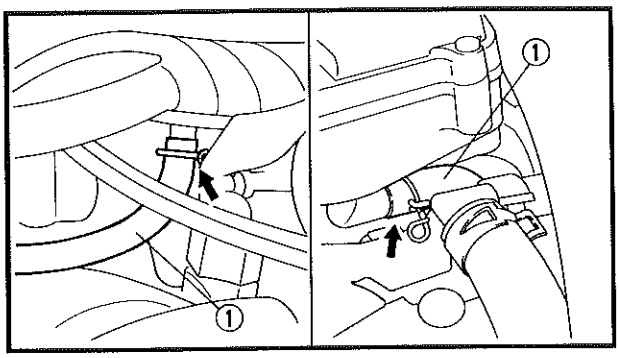


EB303120
AIR FILTER CLEANING

1.Remove:
- Rider seat
- Fuel tank

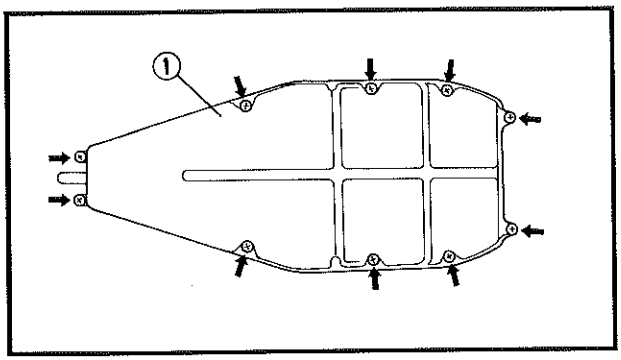
Refer to "SEATS" and "FUEL TANK".

2.Loosen:
- Air filter case clamps ①



3.Disconnect:
- Breather hoses ①

4.Remove:
- Air filter case

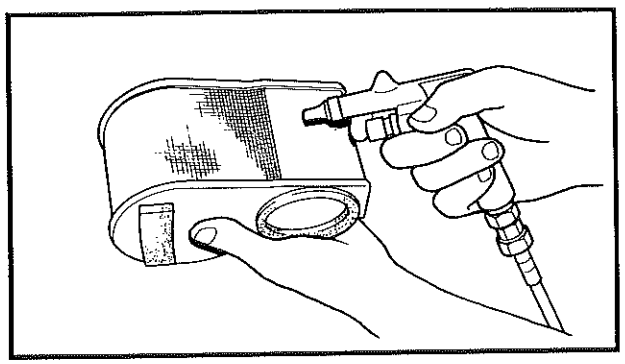


5.Remove:
- Air filter case cover ①

6.Remove:
- Air filter element

CAUTION:

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



7.Inspect:
- Air filter element

Damage → Replace.

8.Clean:
- Air filter element

Blow off the dust from the outside of the element using compressed air.

9.Install:
- Air filter element
- Air filter case cover

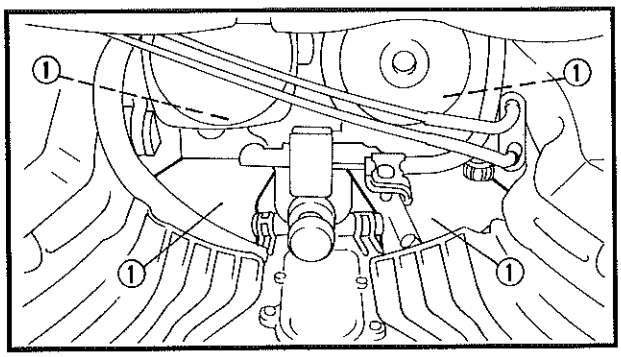
NOTE:
When installing the element in its case, make sure its sealing surface matches the sealing surface of the filter case so that no air can leak out.

10.Install:
- Air filter case

11.Connect:
- Breather hoses

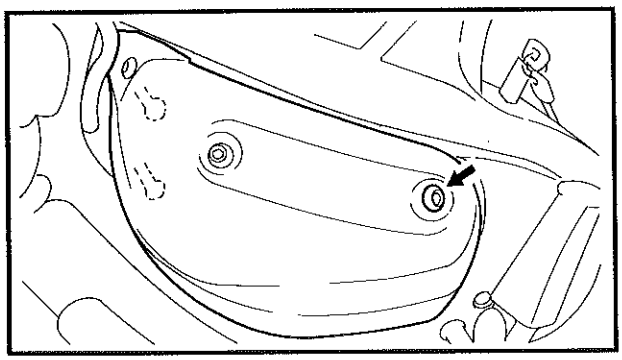
12.Install:
- Fuel tank
- Rider seat

Refer to "FUEL TANK" and "SEATS".



EB303130
CARBURETOR JOINT INSPECTION

1.Inspect:
- Carburetor joints ①
  Cracks/damage → Replace.
  Refer to "CARBURETOR" in CHAPTER 6.

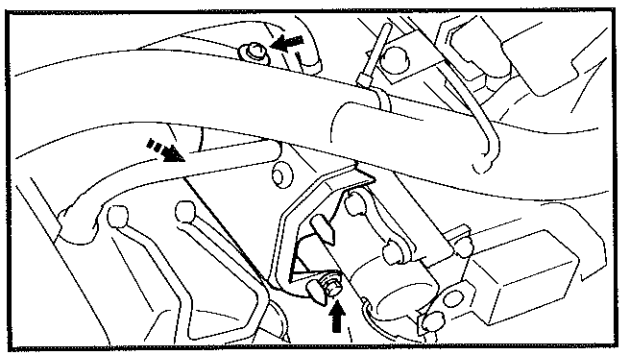


EB303140
FUEL LINE INSPECTION

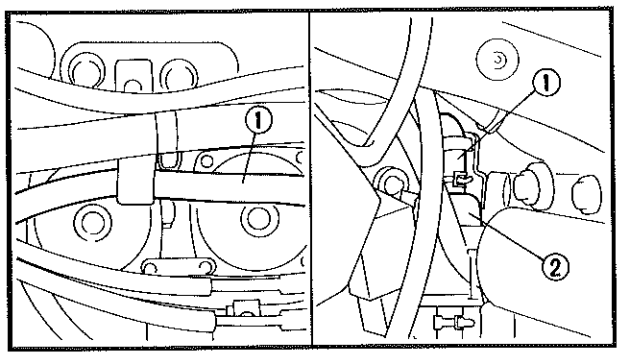
1.Remove:
- Rider seat
- Fuel tank

Refer to "SEATS" and "FUEL TANK".

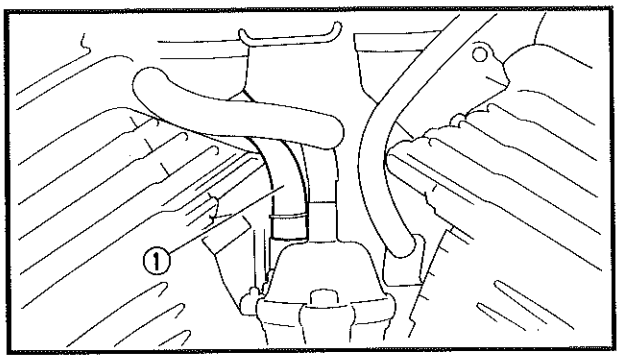
2.Remove:
- Left side cover
- Right side cover



3.Remove:
- Rear inner cover



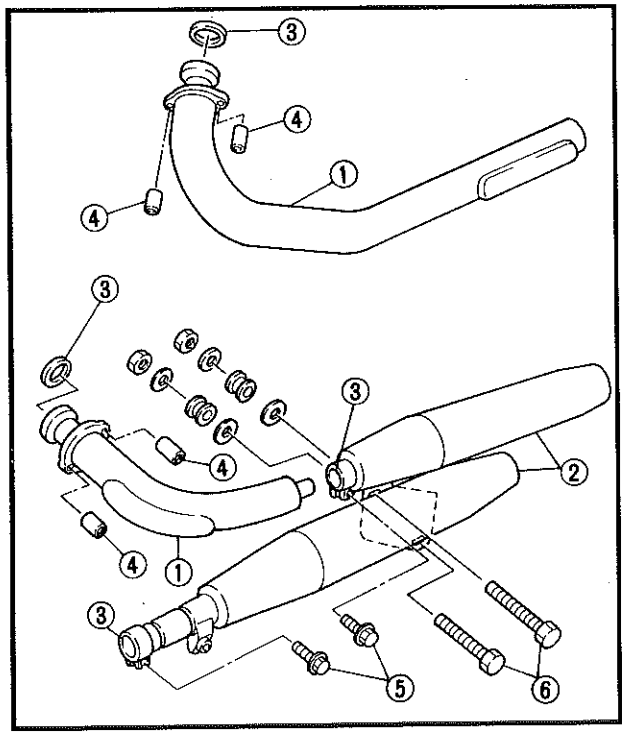
4.Inspect:
- Fuel hose ①
  Cracks/damage → Replace.
- Fuel filter ②
  Contamination/damage → Replace.



EB303150
CRANKCASE BREATHER HOSE INSPECTION

1.Inspection:
- Crankcase breather hose ①
  Cracks/damage → Replace.
  Loose connection → Connect properly.

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



EB303160
EXHAUST SYSTEM INSPECTION

1.Inspect:
- Exhaust pipes ①
- Muffler ②
  Cracks/damage → Replace.
- Gaskets ③
  Exhaust gas leaks → Replace.

2.Check:
- Exhaust pipe nut ④ — 20Nm (2.0 m · kg, 14 ft · lb)
- Clamp bolt ⑤ — 25Nm (2.5 m · kg, 18 ft · lb)
- Muffler bolt ⑥ — 30Nm (3.0 m · kg, 22 ft · lb)

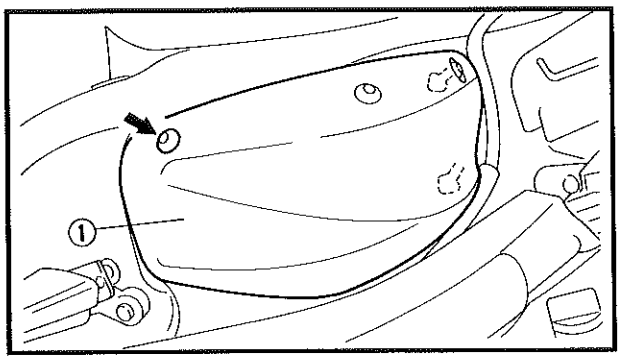
EB303170

COOLANT LEVEL INSPECTION

1.Stand the motorcycle on a level surface.

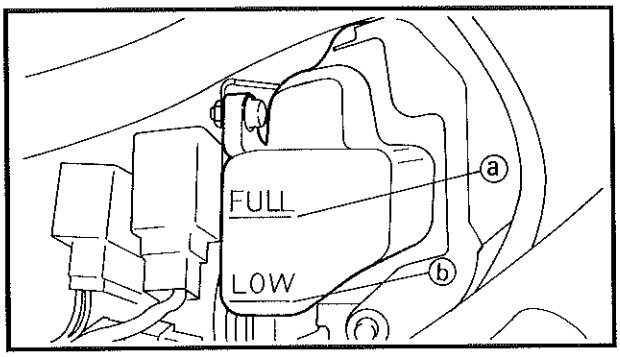
NOTE:

- Make sure the motorcycle is upright when inspecting the coolant level.
- Place the motorcycle on a suitable stand.



2.Remove:

- Right side cover ①



3.Inspect:

- Coolant level
  Coolant level should be between the maximum ⓐ and minimum ⓑ marks.
  Coolant level is below the "LOWER" level line → Add soft water (tap water) up to the proper level.

CAUTION:

- **Hard water or salt water is harmful to engine parts. If soft water is not available use only distilled water.**
- **If you use tap water, make sure it is soft water.**

4.Start the engine and let it warm up for several minutes.

5.Turn off the engine and inspect the coolant level again.

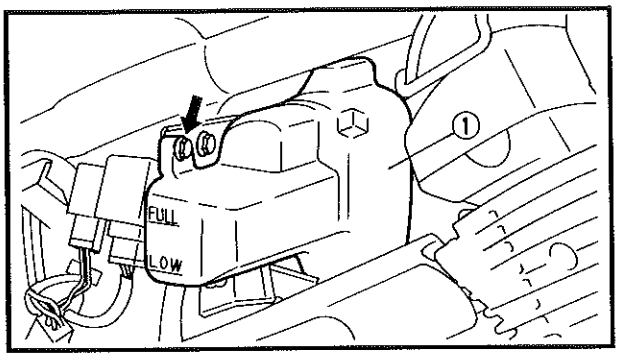
NOTE:

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

EB303180
COOLANT REPLACEMENT

1.Remove:
- Rider seat
- Fuel tank

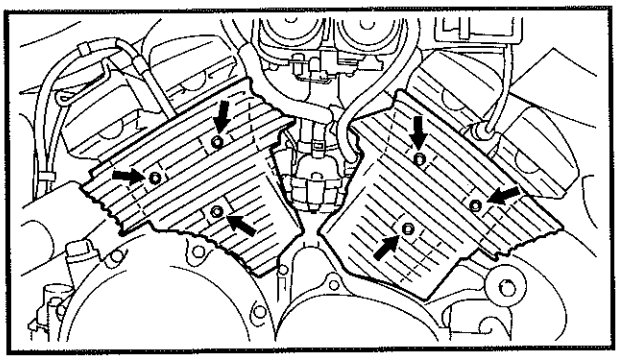
Refer to "SEATS" and "FUEL TANK".



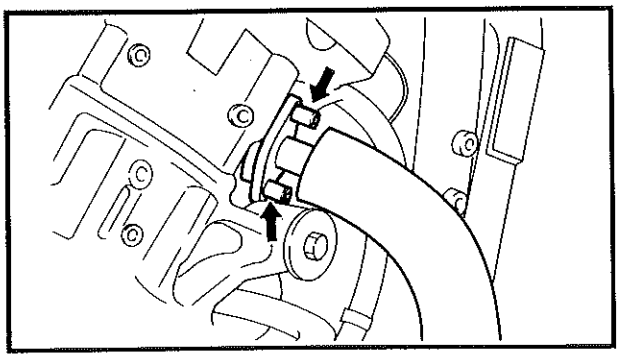
2.Remove:
- Left side cover
- Right side cover
- Rear inner cover

3.Remove:
- Reservoir tank ①

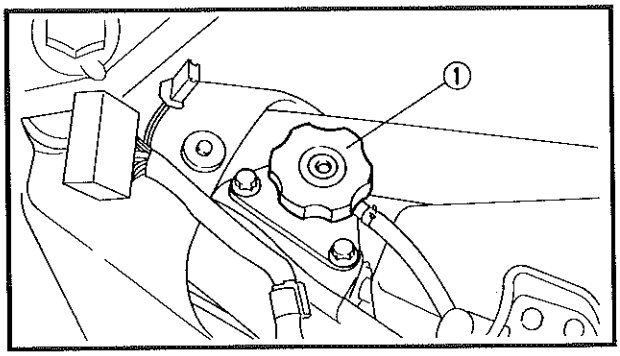
Drain the reservoir tank of its coolant.



4.Remove:
- Cylinder side covers



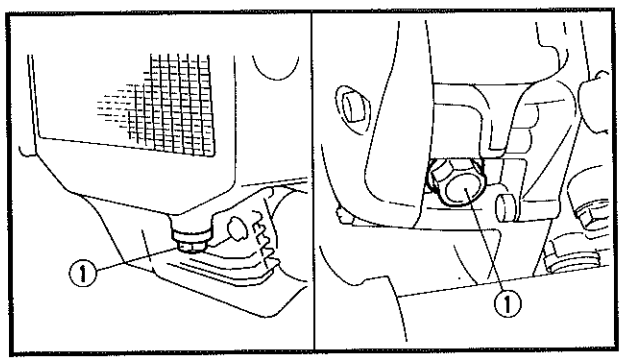
5.Remove:
- Mufflers (right)
- Exhaust pipe (#4 cylinder)



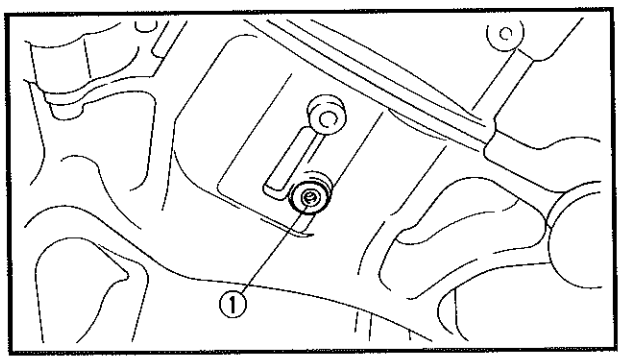
6.Remove:
- Radiator cap ①

⚠ WARNING

Do not remove the radiator cap when the engine and radiator are hot. Scalding hot fluid and steam may be blown out under pressure, 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. Slowly rotate the cap counterclockwise toward the detent. This allows any residual pressure to escape. When the hissing sound has stopped, press down on the cap while turning counterclockwise and remove it.

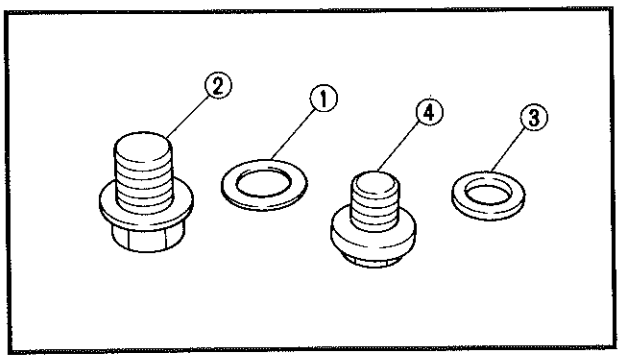


7.Remove:
- Drain bolts (with gasket) ①
  Drain the radiator and the water pump housing of its coolant.



8.Remove:
- Drain plugs (cylinders) ①
  Drain the coolant.

NOTE:
To remove the drain plug (cylinder) screw a spark plug into the threaded hole and pull on the spark plug.



9.Inspect:
- Gasket ① (water pump drain bolt ②)
- Gasket ③ (radiator drain bolt) ④
  Damage → Replace.

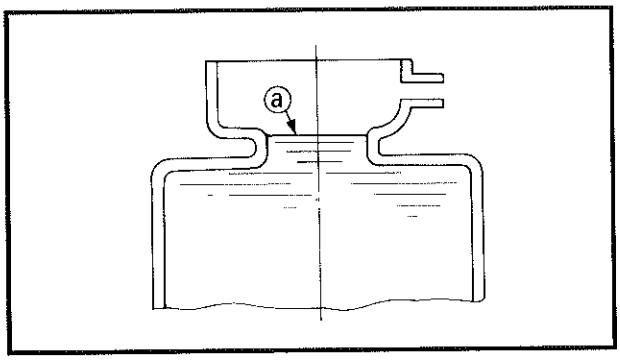
10.Install:
- Drain plugs (cylinder)
- Drain bolt (water pump)

43Nm (4.3 m · kg, 31 ft · lb)

- Drain bolt (radiator)

11.Install:
- Exhaust pipe (#4 cylinder)
- Mufflers (right)
- Cylinder side covers
- Coolant reservoir tank

7Nm (0.7 m · kg, 5.1 ft · lb)



12.Fill:
- Cooling system (radiator and engine) (to specified level ⓐ)

Recommended coolant:
High quality ethylene glycol anti-freeze containing corrosion inhibitors for aluminum engines
Coolant and water mix ratio:
50% - 50%
Cooling system total capacity:
2.9 L (2.55 Imp qt, 3.07 US qt)
Reservoir tank capacity:
0.84 L (0.74 Imp qt, 0.89 US qt)
From lower to upper level:
0.25 L (0.22 Imp qt, 0.26 US qt)

****

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

⚠ WARNING

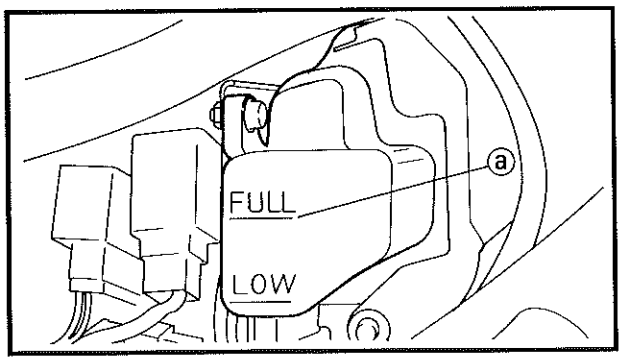
- **If coolant splashes in your eyes: thoroughly wash your eyes with water and consult a doctor.**
- **If coolant splashes on your clothes: quickly wash it away with water and then with both soap and water.**
- **If coolant is swallowed: induce vomiting and get immediate medical attention.**

****

CAUTION:

- **Hard water or salt water is harmful to engine parts. If soft water is not available use only distilled water.**
- **If you use tap water, make sure it is soft water.**
- **Do not use water containing impurities or oil.**
- **If coolant comes into contact with painted surfaces, immediately wash them with water.**
- **With aluminium engines, do not mix different types of ethylene glycol antifreeze (containing corrosion inhibitors).**

13.Install:
- Radiator cap



14.Fill:
- Reservoir tank (to upper level mark ⓐ)

15.Install:
- Reservoir tank cap

16.Install:
- Rear inner cover
- Right side cover
- Left side cover

17.Install:
- Fuel tank
- Rider seat

Refer to "FUEL TANK" and "SEATS".

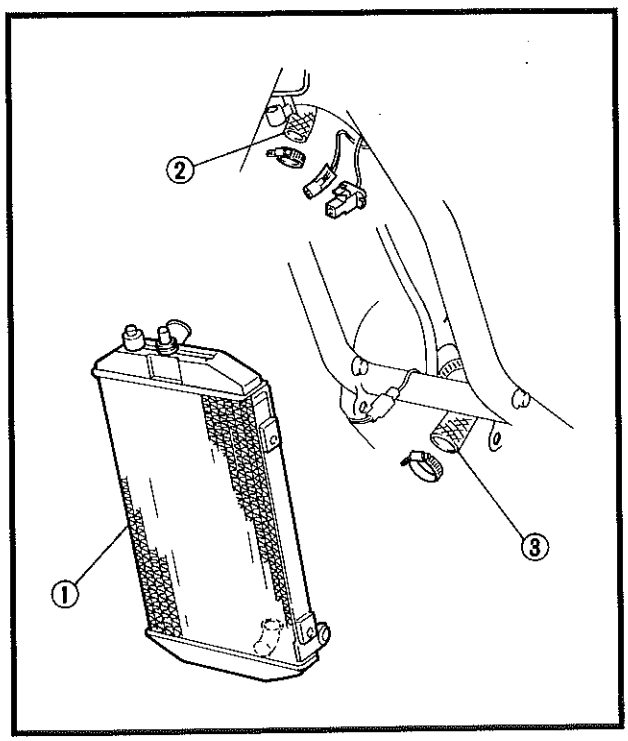
18.Start the engine and let it warm up for several minutes.
19.Turn off the engine and inspect the coolant level.
Refer to "COOLANT LEVEL INSPECTION".

NOTE:
Before inspecting the coolant level, wait a few minutes until the coolant has settled.

EB303190
COOLING SYSTEM INSPECTION

1.Remove:
- Rider seat
- Fuel tank

Refer to "SEATS" and "FUEL TANK".

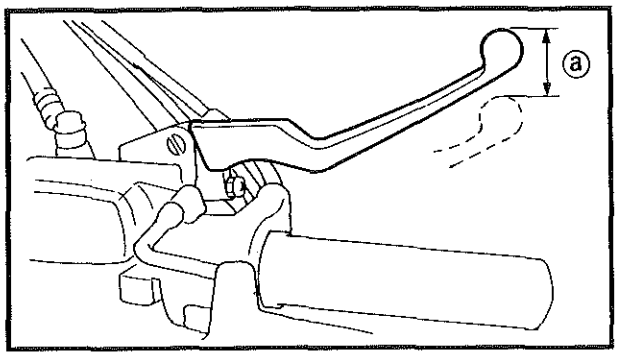


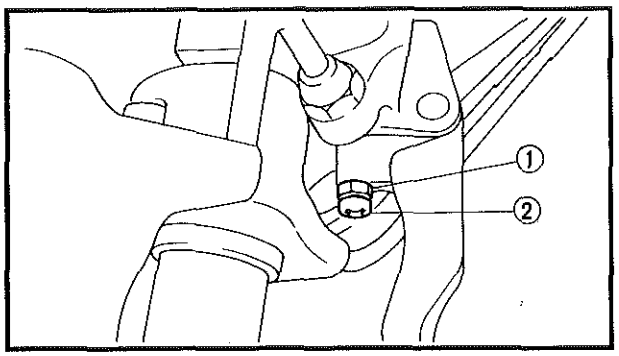
2.Inspect:
- Radiator ①
- Radiator hose (inlet) ②
- Radiator hose (outlet) ③

Cracks/damage → Replace.
Refer to "COOLING SYSTEM" in CHAPTER 5.

3.Install:
- Fuel tank
- Rider seat

Refer to "FUEL TANK" and "SEATS".





EB304002
CHASSIS

FRONT BRAKE ADJUSTMENT

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

Free play (brake lever):
2 ~ 5mm (0.08 ~ 0.20 in)
at brake lever end

2.Adjust:
- Brake lever free play

****

Adjustment steps:
- Loosen the locknut ①.
- Turn the adjuster ② in or out until the specified free play is obtained.

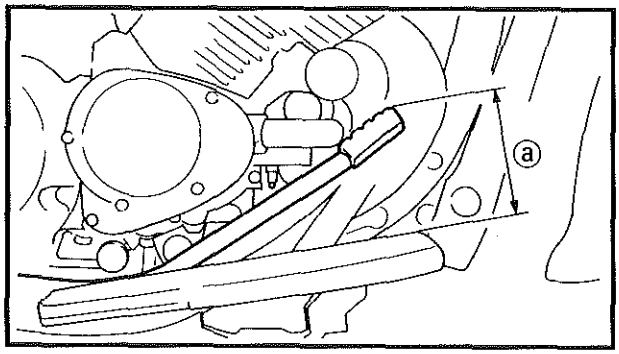
Turning in:	**brake lever free play is decreased.**
Turning out:	**brake lever free play is increased.**

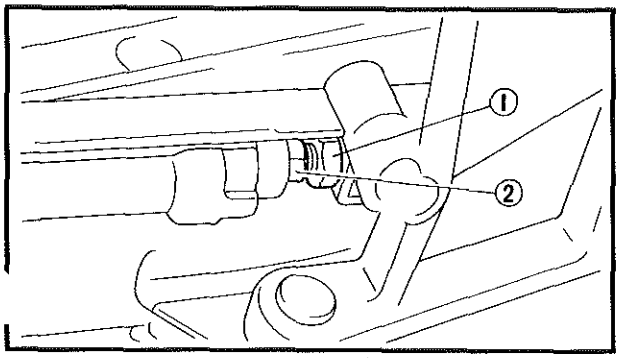
- Tighten the locknut.

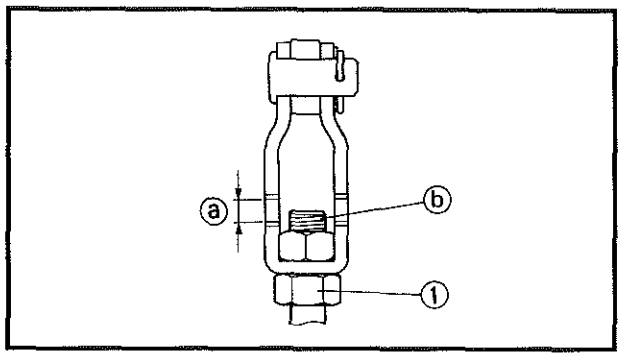
CAUTION:
After adjusting the front brake lever free play, make sure that there is no brake drag.

⚠ WARNING
A soft or spongy feeling in the brake lever can indicate the presence of air in the brake system. This air must be removed by bleeding the brake system before the motorcycle is operated. Air in the brake system will considerably reduce braking performance and could result in a loss of control and possibly an accident. Inspect and if necessary, bleed the brake system.

****







EB304010

REAR BRAKE ADJUSTMENT

1. Check:
- Brake pedal height ⓐ
  Out of specification → Adjust.

Brake pedal height:
100 mm (3.9 in)
above the top of the footrest

2. Adjust:
- Brake pedal height

****

Adjustment steps:
- *Loosen the locknut* ①.
- Turn the adjuster ② in or out until the specified pedal height is obtained.

Turning in:	**brake pedal height is decreased.**
Turning out:	**brake pedal height is increased.**

⚠ WARNING

After adjusting the brake pedal height, check that the adjuster end ⓑ is in the center of the projections ⓐ.

- Tighten the locknut ①.

Locknut:
26 Nm (2.6 m • kg, 19 ft • lb)

CAUTION:

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

⚠ WARNING

A soft or spongy feeling in the brake pedal may indicate the presence of air in the brake system. This air must be removed by bleeding the brake system before the motorcycle is operated. Air in the brake system will considerably reduce braking performance and can result in a loss of control and possibly an accident. Inspect and if necessary, bleed the brake system.

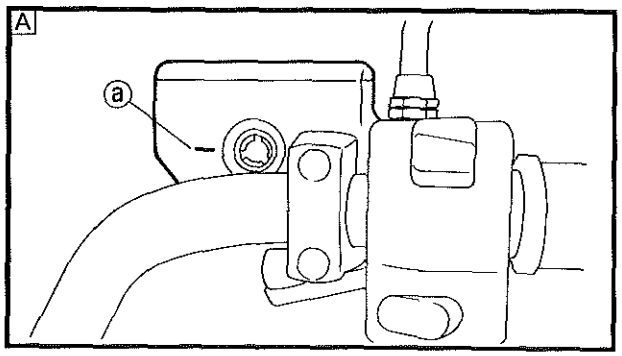
****

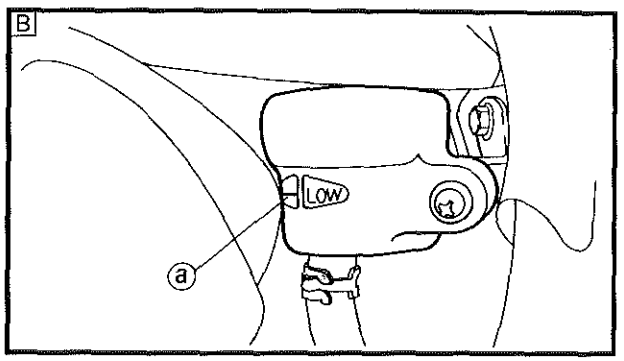
3.Adjust:
- Brake light switch
  Refer to "BRAKE LIGHT SWITCH ADJUSTMENT".

EB304020
BRAKE FLUID LEVEL INSPECTION

1.Stand the motorcycle on a level surface.

NOTE:
- When inspecting the brake fluid level, make sure the motorcycle is upright.
- Place the motorcycle on a suitable stand.





2.Inspect:
- Brake fluid level
  Brake fluid level is below the "LOWER" level line ⓐ → Fill to proper level.

Recommended brake fluid:
DOT 4

A Front brake
B Rear brake

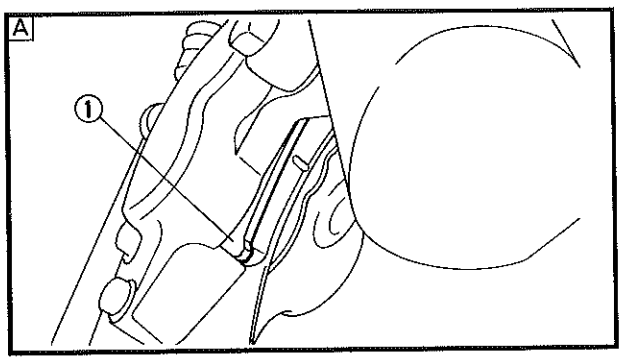
NOTE:
For a correct reading of the brake fluid level, make sure the top of the handlebar brake fluid reservoir is horizontal.

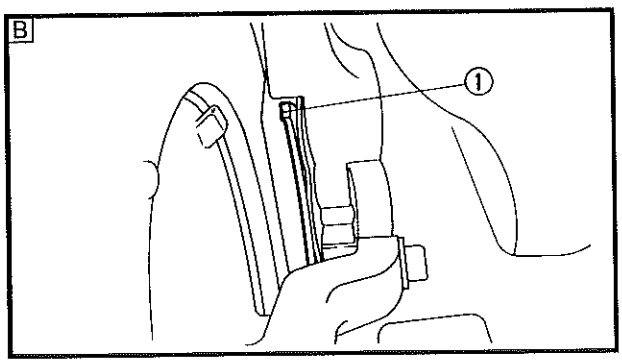
CAUTION:

Brake fluid may corrode painted surfaces or plastic parts. Always clean up any spilt fluid immediately.

⚠ WARNING

- **Use only the designated brake fluid. Other fluids may deteriorate the rubber seals, causing leakage and poor brake performance.**
- **Refill with the same type of fluid. Mixing 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 fluid and may cause vapor lock.**





EB304030
BRAKE PAD INSPECTION

1. Operate the brake lever or brake pedal.
2. Inspect:
   - Brake pad (front)
   - Brake pad (rear)

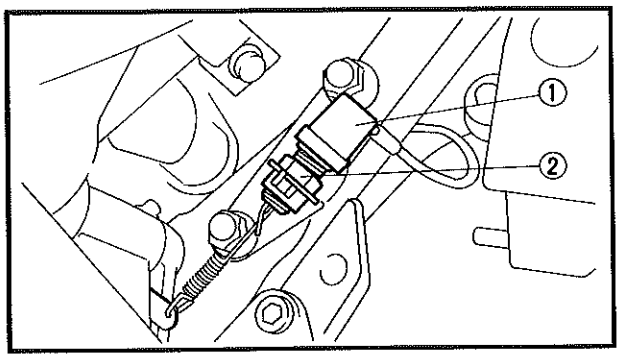
   Wear indicators ① almost touch the brake disc → Replace the brake pads as a set. Refer to "FRONT AND REAR BRAKE" in CHAPTER 6.

[A] Front
[B] Rear

EB304050
BRAKE LIGHT SWITCH ADJUSTMENT

NOTE:
The brake light switch is operated by movement of the brake pedal.
Adjustment is correct when the brake light comes on just before the braking effect starts.

1.Check:
- Brake light operation timing
  Incorrect → Adjust.



2.Adjust:
- Brake light operation timing

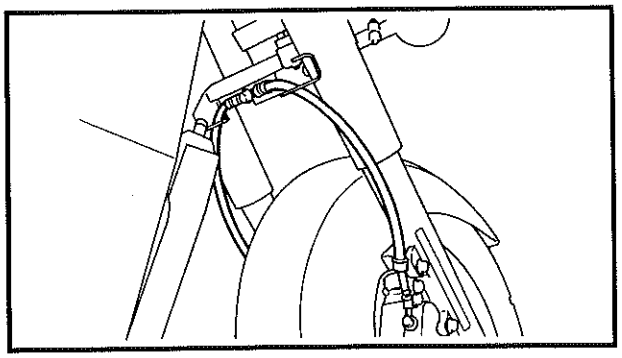
****

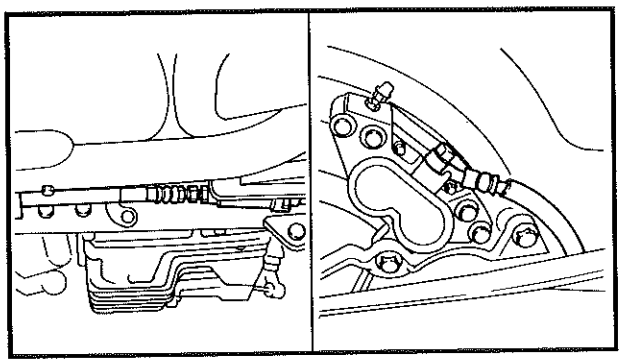
Adjustment steps:

- Hold the main body ① of the switch so that it does not rotate, and turn the adjuster ② in or out until the proper operation timing is obtained.

Turning in:	**brake light comes on later.**
Turning out:	**brake light comes on sooner.**

****





EB304060

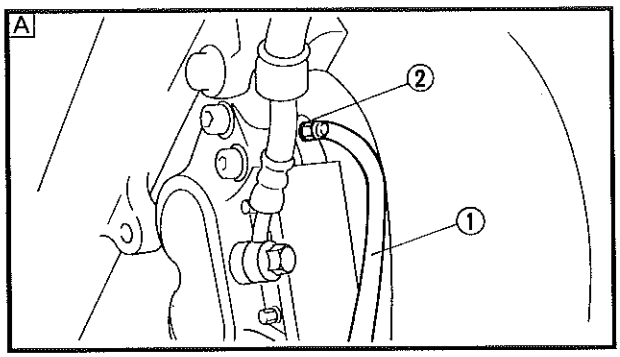
BRAKE HOSE INSPECTION

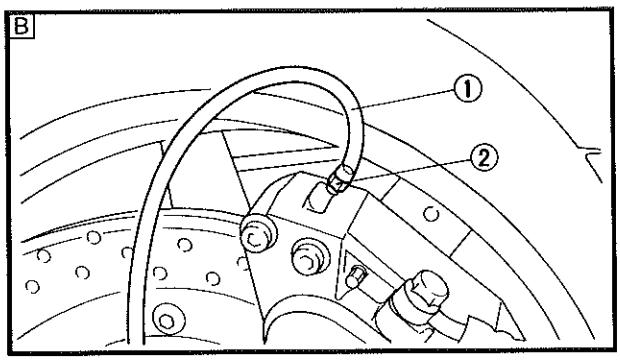
1.Inspect:
- Brake hose(s)
  Cracks/wear/damage → Replace.

2.Check:
- Brake hose clamp(s)
  Loose → Tighten.

3.Hold the motorcycle upright and apply the front or rear brake.

4.Check:
- Brake hose(s)
  Activate the brake lever or pedal several times.
  Brake fluid leakage → Replace the faulty hose.
  Refer to "FRONT AND REAR BRAKE" in CHAPTER 6.





EB304070

AIR BLEEDING (HYDRAULIC BRAKE SYSTEM)

⚠ WARNING

Bleed the brake system whenever:
- **the system is disassembled**
- **a brake hose is loosened or removed**
- **the brake fluid level is very low**
- **brake operation is faulty**

If the brake system is not properly bled, a loss of braking performance may occur.

1. Bleed:
- Brake system

****

Air bleeding steps:

a. Fill the reservoir with the proper brake fluid.
b. Install the diaphragm. Be careful not to spill any fluid or allow the reservoir to overflow.
c. Connect a clear plastic hose ① tightly to the caliper bleed screw ②.
   [A] Front [B] Rear
d. Place the other end of the hose into a container.
e. Slowly apply the brake lever or pedal several times.
f. Pull the lever in or push down on the pedal. Hold the lever or pedal in position.
g. Loosen the bleed screw and allow the lever or pedal to travel towards its limit.
h. Tighten the bleed screw when the lever or pedal limit has been reached, then release the lever or pedal.
i. Repeat steps (e) to (h) until all the air bubbles have disappeared from the brake fluid.

NOTE:

When bleeding the brake system, make sure that there is always enough brake fluid in the brake fluid reservoir, before applying the brake lever or pedal. Ignoring this precaution could allow air to enter the brake system, lengthening the bleeding procedure, considerably.

j. Tighten the bleed screw.

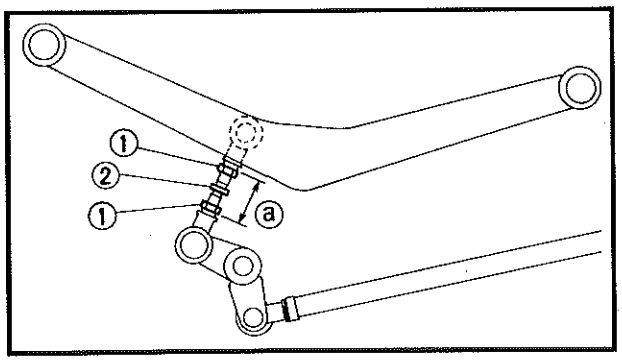
	Bleed screw: **6 Nm (0.6 m • kg, 4.3 ft • lb)**

NOTE:
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 brake system have disappeared.

k. Fill the brake fluid reservoir to the proper level.
Refer to "BRAKE FLUID LEVEL INSPECTION".

⚠ WARNING
After bleeding the brake system check the brake operation.

****



EB304080
SHIFT PEDAL ADJUSTMENT

1. Check:
- Shift pedal position
  Check the shift pedal rod length ⓐ.
  If the position is incorrect → Adjust.

	Shift pedal rod length: **26.8 mm (1.06 in)**

2. Adjust:
- Shift pedal position

****

Adjustment steps:
- Loosen both locknuts ①.
- To obtain the correct pedal position turn the shift pedal rod ② in or out.

Turning in:	shift pedal is lowered.
Turning out:	shift pedal is raised.

● Tighten both locknuts.

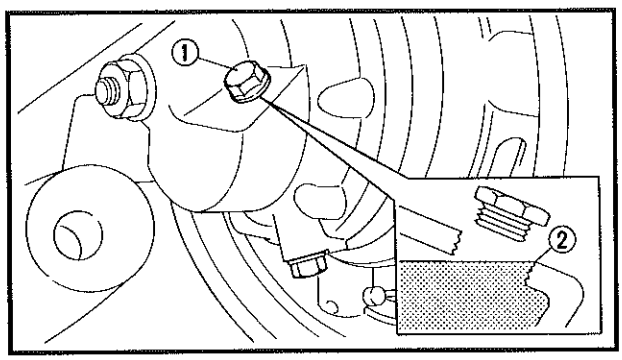
****

EB304110

FINAL GEAR OIL LEVEL INSPECTION

1. Stand the motorcycle on a level surface.

NOTE:
- When inspecting the final gear oil level, make sure the motorcycle is upright.
- Place the motorcycle on a suitable stand.



2. Remove:
- Oil filler bolt ①

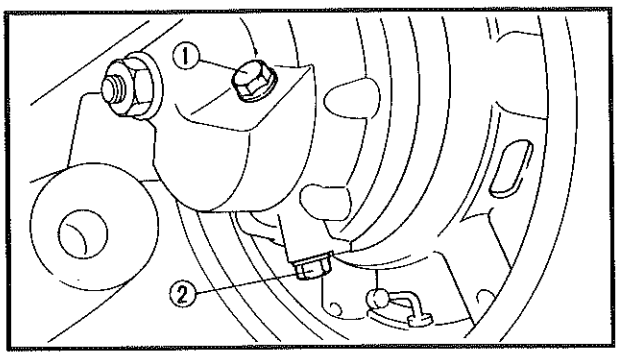
3. Inspect:
- Oil level

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

Recommended oil:
SAE 80 API "GL-4" Hypoid gear oil
If necessary an SAE 80W90 hypoid gear oil may be used for all conditions.

NOTE:
"GL-4" is a quality and additive rating. "GL-5" or "GL-6" rated hypoid gear oils may also be used.

4. Install:
- Oil filler bolt 23Nm (2.3 m · kg, 17 ft · lb)



EB304120
FINAL GEAR OIL REPLACEMENT

1. Place a container under the final gear case.
2. Remove:
   - Oil filler bolt ①
   - Drain plug ②

   Drain the final gear case of its oil.
3. Install:
   - Drain plug **23Nm (2.3 m · kg, 17 ft · lb)**

NOTE:
Check the drain plug gasket. If it is damaged, replace it.

4. Fill:
   - Final gear case

	Oil quantity: **0.2 L (0.18 Imp qt, 0.21 US qt)**

   Refer to "FINAL GEAR OIL LEVEL INSPECTION".
5. Install:
   - Oil filler bolt **23Nm (2.3 m · kg, 17 ft · lb)**

EB304130
STEERING HEAD INSPECTION

⚠ WARNING

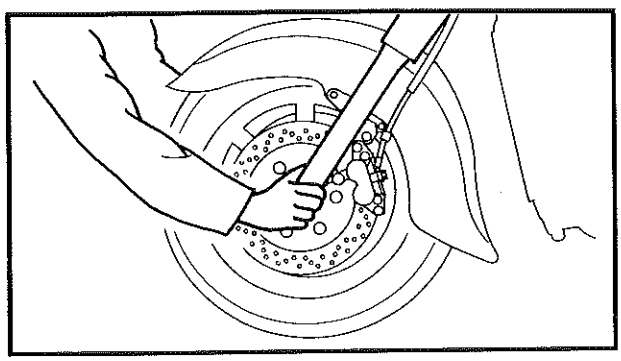
Securely support the motorcycle so that there is no danger of it falling over.

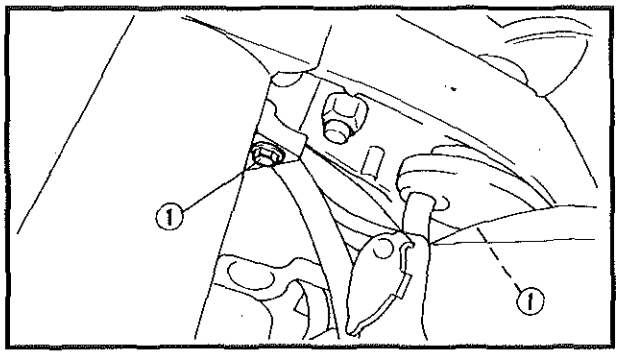
1. Stand the motorcycle on a level surface.

NOTE:
Place the motorcycle on a suitable stand.

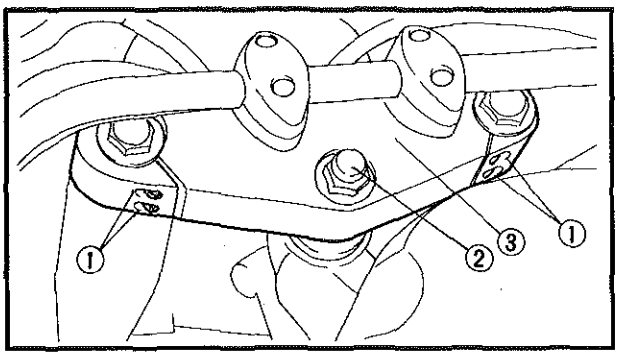
2. Elevate the front wheel by placing a suitable stand under the engine.
3. Check:
   - Steering assembly bearings

   Grasp the bottom of the lower front fork tubes and gently rock the fork assembly.
   Looseness → Adjust the steering head.



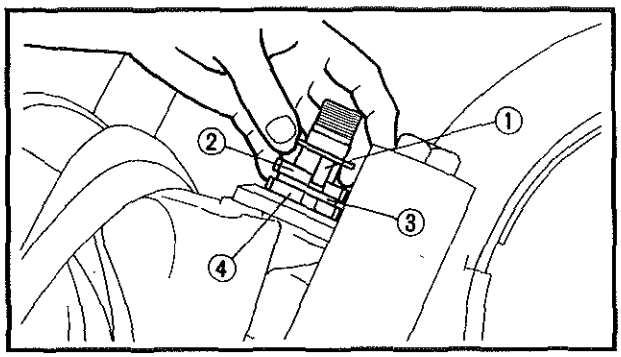


4.Remove:
- Headlight stay upper bolts ①



5.Loosen
- Front fork pinch bolts (upper) ①

6.Remove
- Steering stem nut ②
- Upper bracket ③

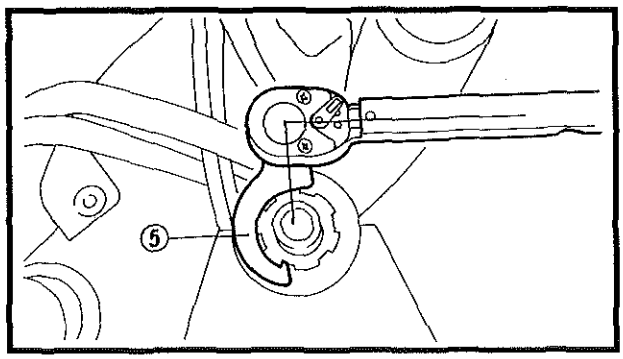


7.Adjust:
- Steering head

****

Adjustment steps:

- Remove the lock washer ①, the upper ring nut ② and the rubber washer ③.
- Loosen the lower ring nut ④.
- Tighten the lower ring nut using the ring nut wrench ⑤.

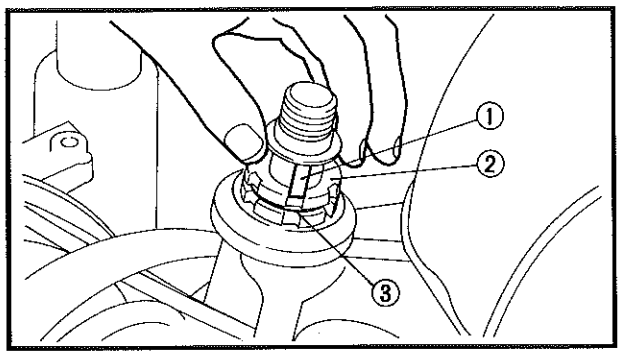


NOTE:

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

	**Ring nut wrench:** **YU - 33975, 90890 - 01403**
	***Lower ring nut:*** ***(initial tightening):*** **52 Nm (5.2 m • kg, 37 ft • lb)**

- Loosen the lower ring nut ④ completely, then tighten it to specification.



⚠ WARNING

Do not overtighten the ring nut.

Lower ring nut:
(final tightening):
3 Nm (0.3 m • kg, 2.2 ft • lb)

- Check the steering head for looseness or binding by turning it all the way, in both directions. If it binds, remove the steering stem assembly and inspect the steering bearings.
  Refer to "STEERING HEAD AND HANDLEBAR" in CHAPTER 6.
- Install the rubber washer ③.
- Install the upper ring nut ②.
- 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.
- Install the lock washer ①.

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

****

8.Install:
- Upper bracket
- Steering stem nut
  130Nm (13.0 m · kg, 94 ft · lb)
- Front fork pinch bolts (upper)
  10Nm (1.0 m · kg, 7.2 ft · lb)

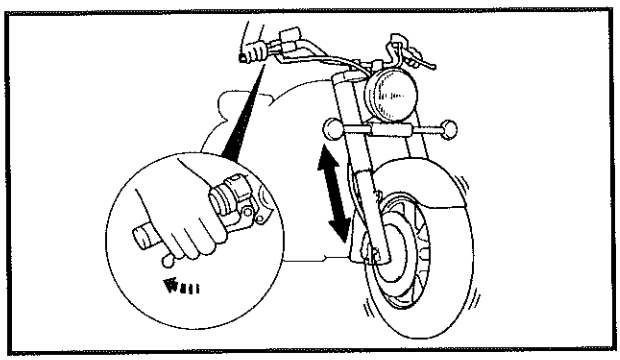
9.Install:
- Headlight stay upper bolts

EB304140
FRONT FORK INSPECTION

⚠ WARNING

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

1.Stand the motorcycle on a level surface.



2.Hold the motorcycle upright and apply the front brake
3.Check:
- Operation
  Push down hard on the handlebars several times.
  Unsmooth operation → Repair.
  Refer to "FRONT FORK" in CHAPTER 6.

4.Check:
- Inner tube
  Scratches/damage → Replace.
- Oil seal
  Excessive oil leakage → Replace.

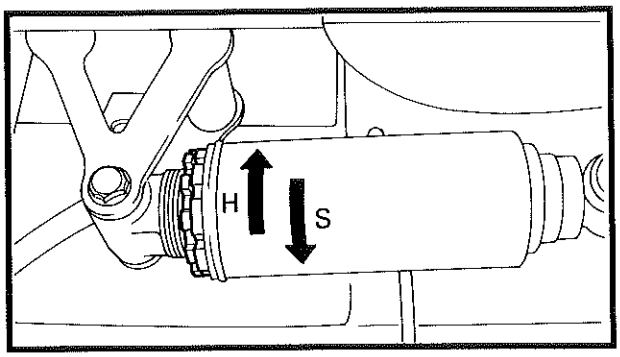
EB304160
REAR SHOCK ABSORBER ADJUSTMENT

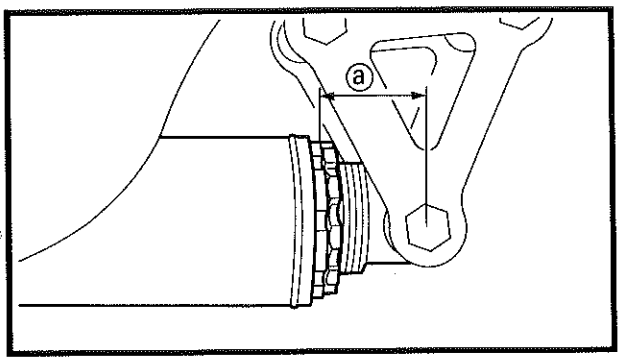
⚠ WARNING

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

Spring preload
1.Adjust:
- Spring preload

NOTE:
Use the special wrench and extension bar included in the owner's tool kit to adjust the spring preload.





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Adjustment steps:

- Loosen the locknut ①
- Turn the adjuster ② in the "H" or "S" direction.

"H" direction:	**spring preload is harder.**
"S" direction:	**spring preload is softer.**

NOTE:

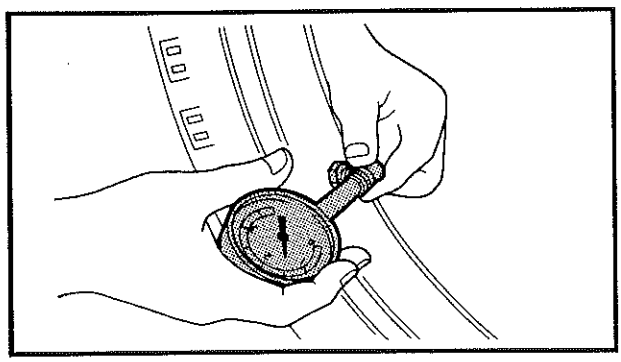
The length of the spring (installed) changes 8 mm (0.31 in) per turn of the adjuster.

Measurement length ⓐ:
Standard: 45.5 mm (1.79 in)
Minimum: 42.5 mm (1.67 in)
Maximum: 50.5 mm (1.98 in)

CAUTION:

Never turn the adjuster beyond the maximum or minimum setting.

****



EB304170

TIRE INSPECTION

1. Measure:
- Tire inflation pressure
  Out of specification → Adjust.

⚠ WARNING

- **Tire inflation pressure should only be checked and adjusted when the tire temperature equals the ambient air temperature. Tire inflation pressure and suspension must be adjusted according to the total weight of the cargo, rider, passenger and accessories (fairing, saddlebags, etc.if approved for this model), and according to whether the motorcycle will be operated at high speed or not.**

TIRE INSPECTION

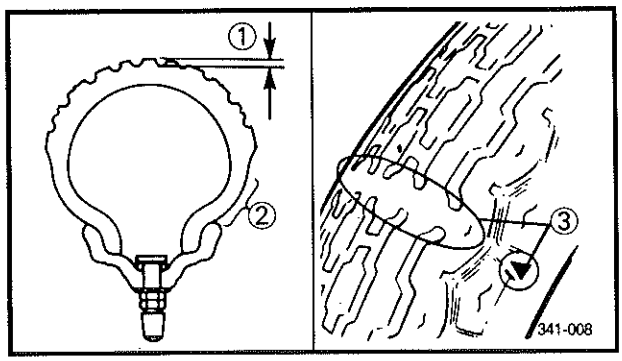
INSP ADJ

NEVER OVERLOAD THE MOTORCYCLE.

- **Operation of an overloaded motorcycle could cause tire damage, an accident or injury.**

Basic weight: With oil and full fuel tank	**330 kg (728 lb) XVZ13A(C) 354 kg (780 lb) XVZ13AT(C)**	
Maximum load*:	**203 kg (448 lb) XVZ13A(C) 179 kg (395 lb) XVZ13AT(C)**	
Cold tire pressure:	**Front**	**Rear**
Up to 90 kg load*	**250 kPa (2.50 kgf/cm², 36 psi)**	**250 kPa (2.50 kgf/cm², 36 psi)**
90 kg ~ maximum load*	**250 kPa (2.50 kgf/cm², 36 psi)**	**280 kPa (2.80 kgf/cm², 41 psi)**
High speed riding	**250 kPa (2.50 kgf/cm², 36 psi)**	**280 kPa (2.80 kgf/cm², 41 psi)**

* Load is the total weight of the cargo, rider, passenger and accessories.



2.Inspect:

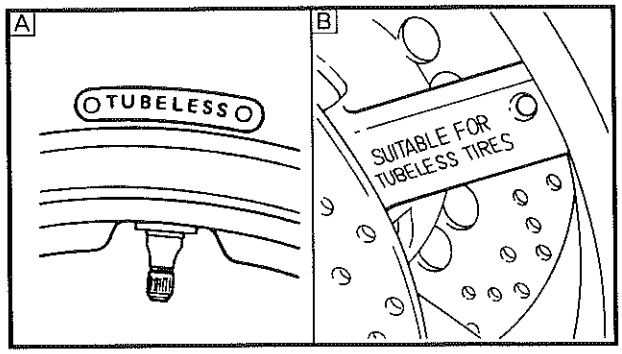
- Tire surfaces
  Wear/damage → Replace.

Minimum tire tread depth: (front and rear): 1.0 mm (0.04 in)

① Tread depth
② Side wall
③ Wear indicator

⚠ WARNING

- **It is dangerous to ride with a worn-out tire. When the tire tread begins to show signs of wear, replace the tire immediately.**



- **Do not use tubeless tires on a wheel designed for tube type tires only. Tire failure and personal injury may result from sudden deflation.**

A Tire B Wheel

Tube type wheel:	**tube type tire only**
Tubeless type wheel:	**tube type or tubeless tire**

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

FRONT TIRE:

Manufacturer	Size	Type
BRIDGESTONE	150/80-16 71H	G703
DUNLOP*	150/80-16 71H	D404F

REAR TIRE:

Manufacturer	Size	Type
BRIDGESTONE	150/90-15M/C 74H	G702
DUNLOP*	150/90-15M/C 74H	D404

* Use only Dunlop tires on the XVZ13AT.

⚠ WARNING

After mounting a tire, ride conservatively for a while to give the tire time to seat itself properly in the rim. Failure to do so could lead to an accident with possible injury to the rider or damage to the motorcycle.

EB304180
WHEEL INSPECTION

1.Inspect:
- Wheels
  Bends/damage → Replace.

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

⚠ WARNING
Never attempt to make any repairs to the wheels.

EB304200
CABLE INSPECTION AND LUBRICATION

⚠ WARNING
Damaged cable sheaths may cause corrosion and interfere with cable movements. Replace damaged cable sheaths and cables as soon as possible.

1.Inspect:
- Cable sheaths
  Damage → Replace.

2.Check:
- Cable operation
  Unsmooth operation → Lubricate.

	Recommended lubricant: SAE 20W40 motor oil

NOTE:
Hold the cable end upright and pour a few drops of lubricant into the cable sheath.

EB304210
LEVER AND PEDAL LUBRICATION

Lubricate the pivoting points on the levers and pedals.

	**Recommended lubricant:** **Lithium soap base grease**

EB304220
SIDESTAND LUBRICATION

Lubricate the pivoting point and the contact surfaces on the sidestand.

	**Recommended lubricant:** **Lithium soap base grease**

EB305000
ELECTRICAL
BATTERY INSPECTION

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

CAUTION:
CHARGING METHOD
- **This is a sealed type battery. Never remove the sealing caps. If the sealing caps have been removed, the balance will not be maintained and battery performance will deteriorate.**
- **Charging time, charging current and charging voltage for the MF battery are different from those of general type batteries. The MF battery should be charged as explained in "CHARGING METHOD". If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.**

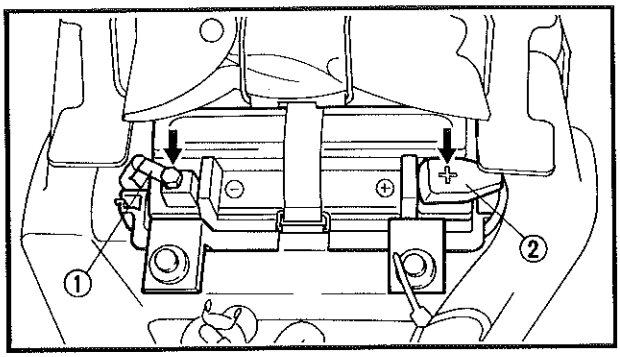
⚠ WARNING
Battery electrolyte is dangerous; it contains sulfuric acid which is poisonous and highly caustic.
Always follow these preventive measures:
- **Avoid bodily contact with electrolyte as it can cause severe burns or permanent eye injury.**
- **Wear protective eye gear when handling or working near batteries.**

Antidote (EXTERNAL):
- **SKIN - Wash with water.**
- **EYES - Flush with water for 15 minutes and get immediate medical attention.**

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

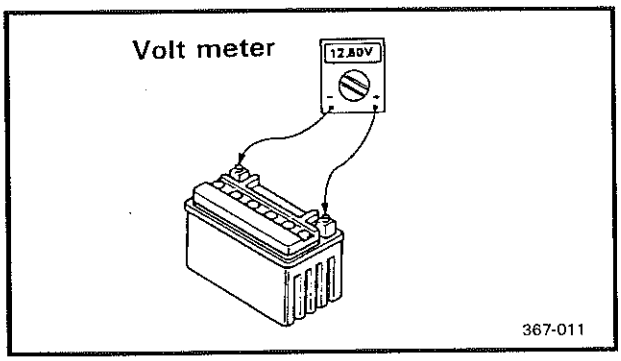
Batteries generate explosive hydrogen gas. Always follow these preventive measures:
- **Charge batteries in a well-ventilated area.**
- **Keep batteries away from fire, sparks or open flames (e.g., welding equipment, lighted cigarettes, etc.)**
- **DO NOT SMOKE when charging or handling batteries.**

KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.



1. Remove:
- Rider seat
  Refer to "SEATS".
2. Disconnect:
- Battery leads

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

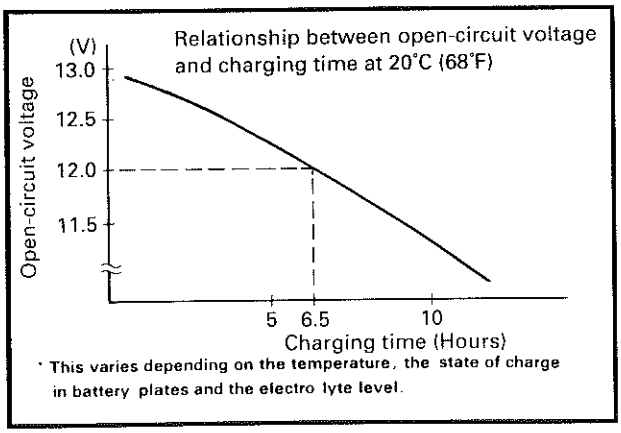


3. Remove:
- Battery
4. Check:
- Battery condition

****

Battery condition checking steps:
- Connect a digital voltmeter to the battery terminals.

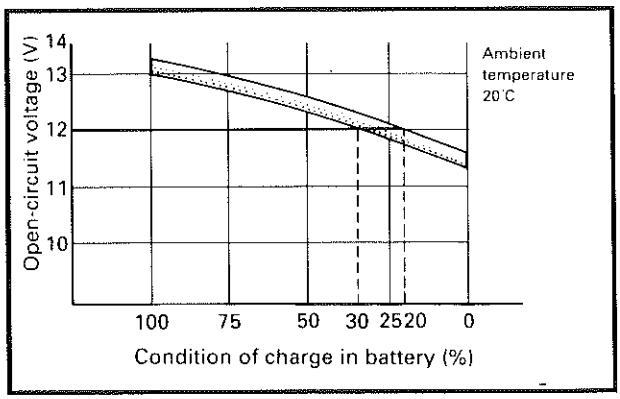
Tester (+) lead → battery (+) terminal **Tester (–) lead → battery (–) terminal**

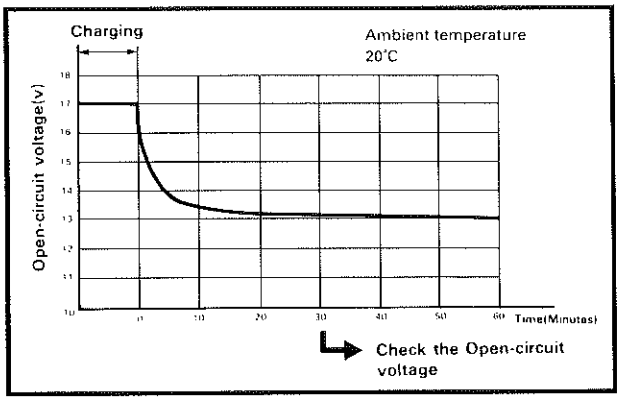


NOTE:
The charge state of an MF battery can be checked by measuring the open-circuit voltage (i.e. the voltage when the positive terminal is disconnected).

Open-circuit voltage	Charging time
12.8V or higher	No charging is necessary.

- Check the condition of the battery using the following charts.





Example:

- Open-circuit voltage = 12.0V
- Charging time = 6.5 hours
- Charge condition of the battery = 20 ~ 30%
- Charging method for MF batteries

CAUTION:

- **If it is impossible to set the standard charging current, be careful not to overcharge.**
- **When charging the battery, be sure to remove it from the motorcycle. (If charging has to be done with the battery mounted on the motorcycle, be sure to disconnect the wire at the negative terminal.)**
- **Never remove the sealing caps of an MF battery.**
- **Make sure that the charging clips are in full contact with the terminal and that they are not shorted together. (A corroded clip on the charger may cause the battery to generate heat in the contact area. A weak clip spring may cause sparks.)**
- **Before removing the clips from the battery terminals, be sure to turn off the charger's power switch.**
- **The open-circuit voltage variation for the MF battery, after charging, is shown below. As shown in the figure, the open-circuit voltage stabilizes about 30 minutes after charging has been completed. Therefore, wait 30 minutes after charging is completed before measuring the open-circuit voltage.**

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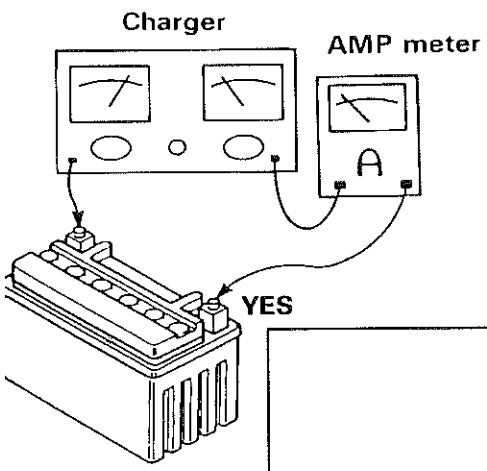
Charging method using a variable-current (voltage) type charger



Measure the open-circuit voltage prior to charging.

NOTE:
Voltage should be measured 30 minutes after the machine is stopped.

Connect a charger and AMP meter to the battery and start charging.

NOTE:
Set the charging voltage at 16 ~ 17 V. (If the setting is lower, charging will be insufficient. If too high, the battery will be over-charged.)

Make sure the current is higher than the standard charging current written on the battery.

YES

NO

By turning the charging voltage adjust dial, set the charging voltage at 20 ~ 25 V.

Monitor the amperage for 3 ~ 5 minutes to check if the standard charging current is reached.

YES

Adjust the voltage so that current is at standard charging level.

NO

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

Set the timer according to the charging time suitable for the open-circuit voltage.
Refer to "Battery condition checking steps."

In case that charging requires more than 5 hours, it is advisable to check the charging current after a lapse of 5 hours. If there is any charge in the amperage, readjust the voltage to obtain the standard charging current.

Measure the battery open-circuit voltage after having left the battery unused for more than 30 minutes.
12.8 V or more --- Charging is complete.
12.7 V or less --- Recharging is required.
Under 12.0 V --- Replace the battery.

Charging method using a constant-voltage type charger

Measure the open-circuit voltage prior to charging.

NOTE:
Voltage should be measured 30 minutes after the machine is stopped.

Connect a charger and AMP meter to the battery and start charging.

Make sure the current is higher than the standard charging current written on the battery.

YES

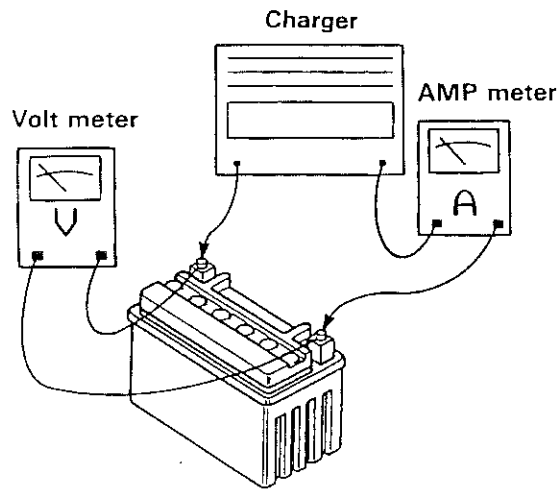
Charge the battery until the battery's charging voltage is 15 V.

NOTE:
Set the charging time at 20 hours (maximum).

Measure the battery open-circuit voltage after having left the battery unused for more than 30 minutes.
12.8 V or more --- Charging is complete.
12.7 V or less --- Recharging is required.
Under 12.0 V --- Replace the battery.

NO

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

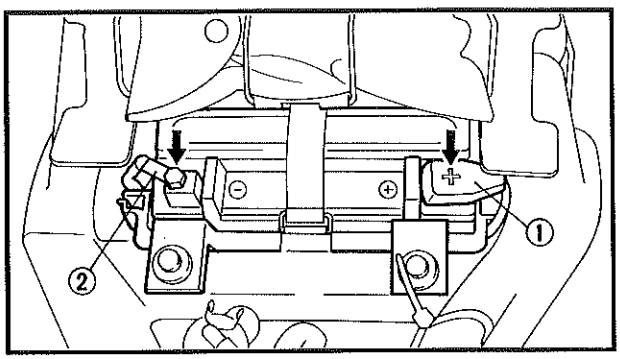


Charging method using a constant-current type charger

This type of battery charger cannot charge the MF battery.

5.Inspect:
- Battery terminals
  Dirty → Clean with a wire brush.
  Poor connection → Correct.

NOTE:
After cleaning the terminals, apply a light coat of grease.



6.Install:
- Battery

7.Connect:
- Battery leads

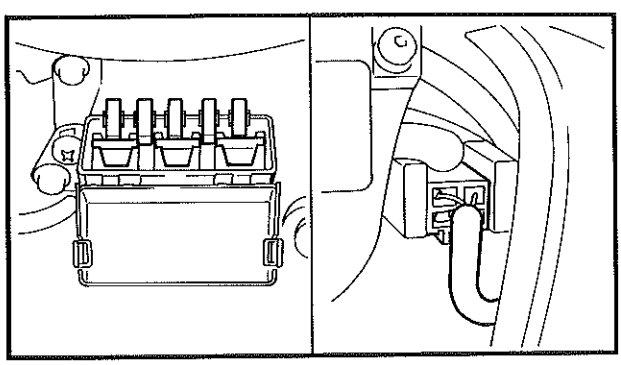
CAUTION:
First, connect the positive lead ①, then connect the negative lead ②.

8.Install:
- Rider seat
  Refer to "SEATS".

EB305010
FUSE INSPECTION

CAUTION:
When checking or replacing the fuse always turn off the main switch. Otherwise, a short circuit may occur.

1.Remove:
- Left side cover



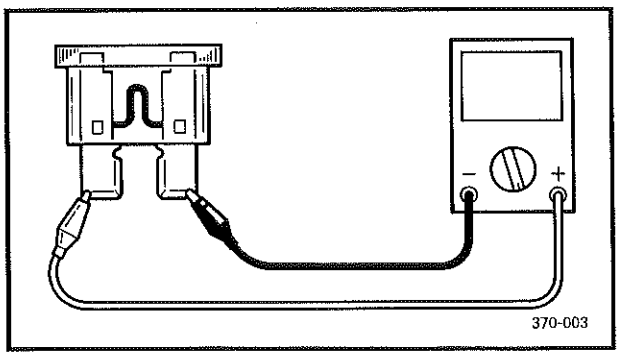
2.Inspect:
- Fuses

****

Inspection steps:
- Connect the pocket tester and check the fuse for continuity.

FUSE INSPECTION

INSP ADJ



NOTE:
Set the tester selector to "Ω × 1".

Pocket tester:
YU- 03112, 90890-03112

- If the tester indicates ∞, replace the fuse.

****

3.Replace:
- Blown fuse

****

Replacement steps:
- Turn off the main switch.
- Install a new fuse with the proper current rating.
- Turn on switches to verify operation of related electrical devices.
- If the fuse blows again, immediately check the electrical circuit.

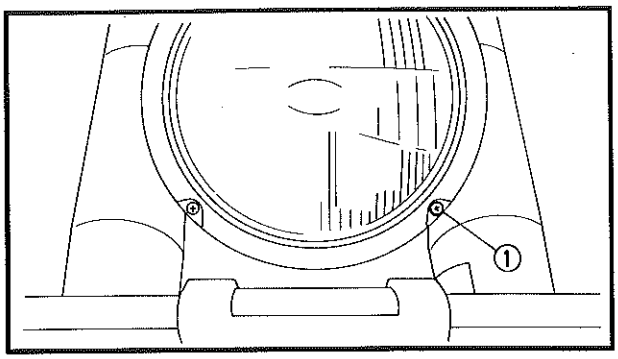
****

Description	Current rating	Quantity
Main	30A	1
Headlight	15A	1
Signals	10A	1
Ignition	10A	1
Fan	10A	1
Back up	5A	1

⚠ WARNING

Never use a fuse with a rating other than that specified. Never use other materials in place of a fuse. An improper fuse may cause extensive damage to the electrical system, a malfunction of the lighting and ignition systems and could possibly cause a fire.

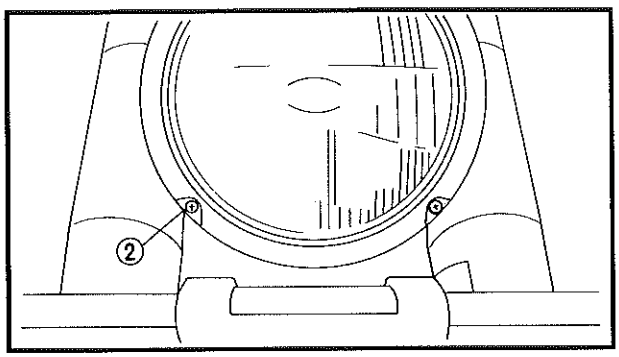
4.Install:
- Left side cover



EB305020
HEADLIGHT BEAM ADJUSTMENT

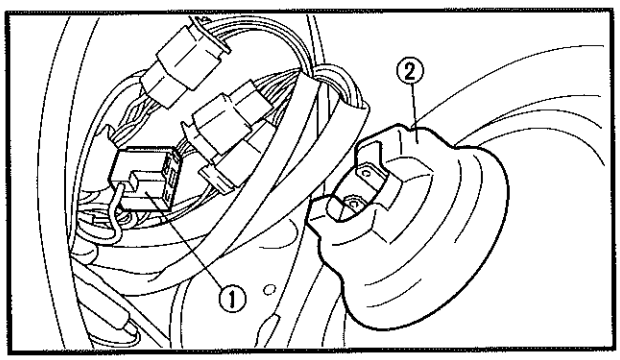
1.Adjust:
- Headlight beam (vertically)
  Turn the adjuster ① in or out.

Turning in:	**headlight beam is raised.**
Turning out:	**headlight beam is lowered.**



2.Adjust:
- Headlight beam (horizontally)
  Turn the adjuster ② in or out.

Turning in:	**headlight beam to the left.**
Turning out:	**headlight beam to the right.**

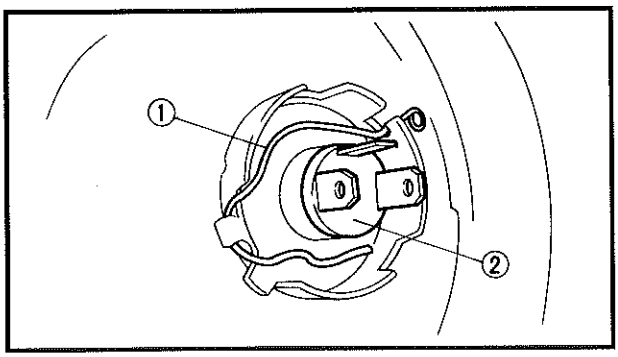


EB305030
HEADLIGHT BULB REPLACEMENT

1.Remove:
- Headlight lens

2.Disconnect:
- Headlight leads ①

3.Remove:
- Bulb cover ②



4.Unhook:
- Bulb holder ①

5.Remove:
- Bulb ②

⚠ WARNING

Since the bulb may be hot, keep flammable products and your hands away from it. Do not touch the bulb until it has cooled down.

6.Install:
- Bulb (new)
  Secure the new bulb with the bulb holder.

CAUTION:

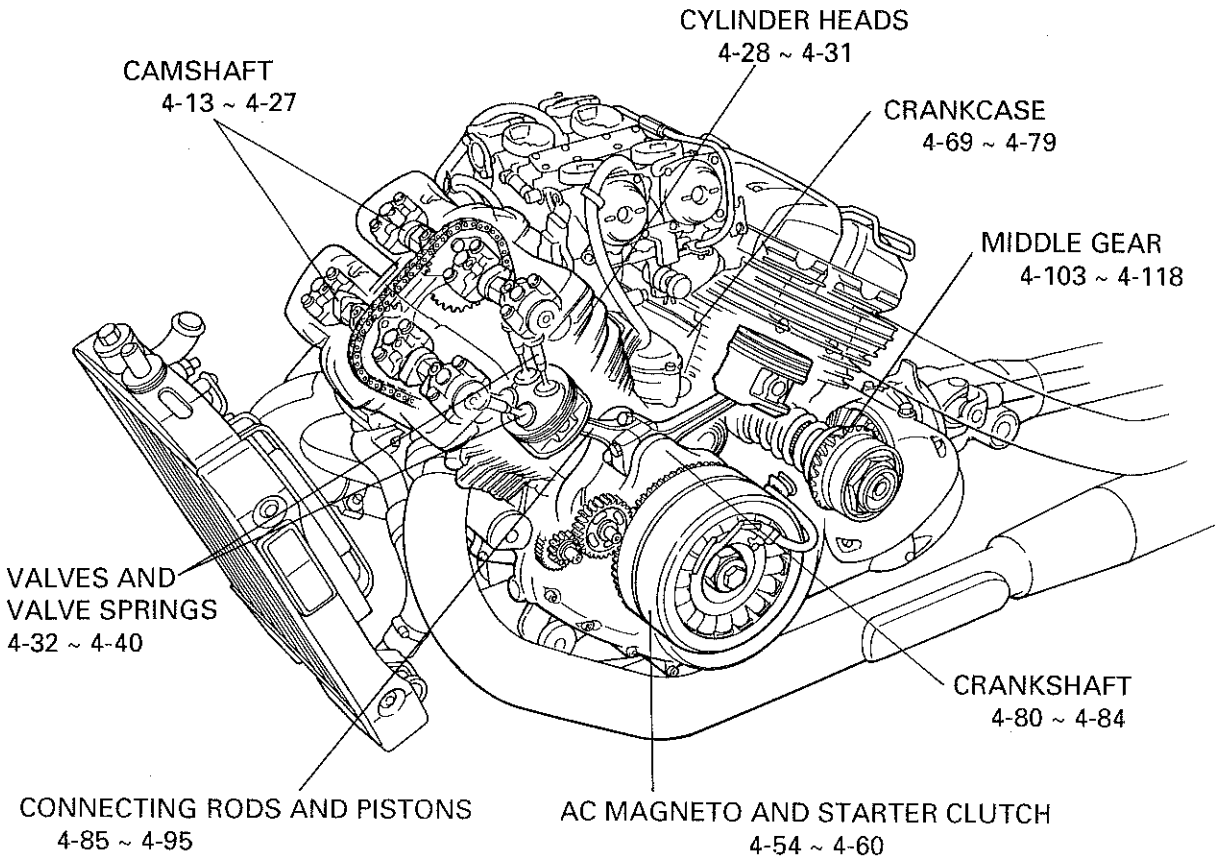
Avoid touching the glass part of the bulb. Keep it free from oil, otherwise the transparency of the glass, life of the bulb and the luminous flux will be adversely affected. If oil gets on the bulb, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.

7.Hook up:
- Bulb holder

8.Install:
- Bulb cover

9.Connect:
- Headlight leads

10.Install:
- Headlight

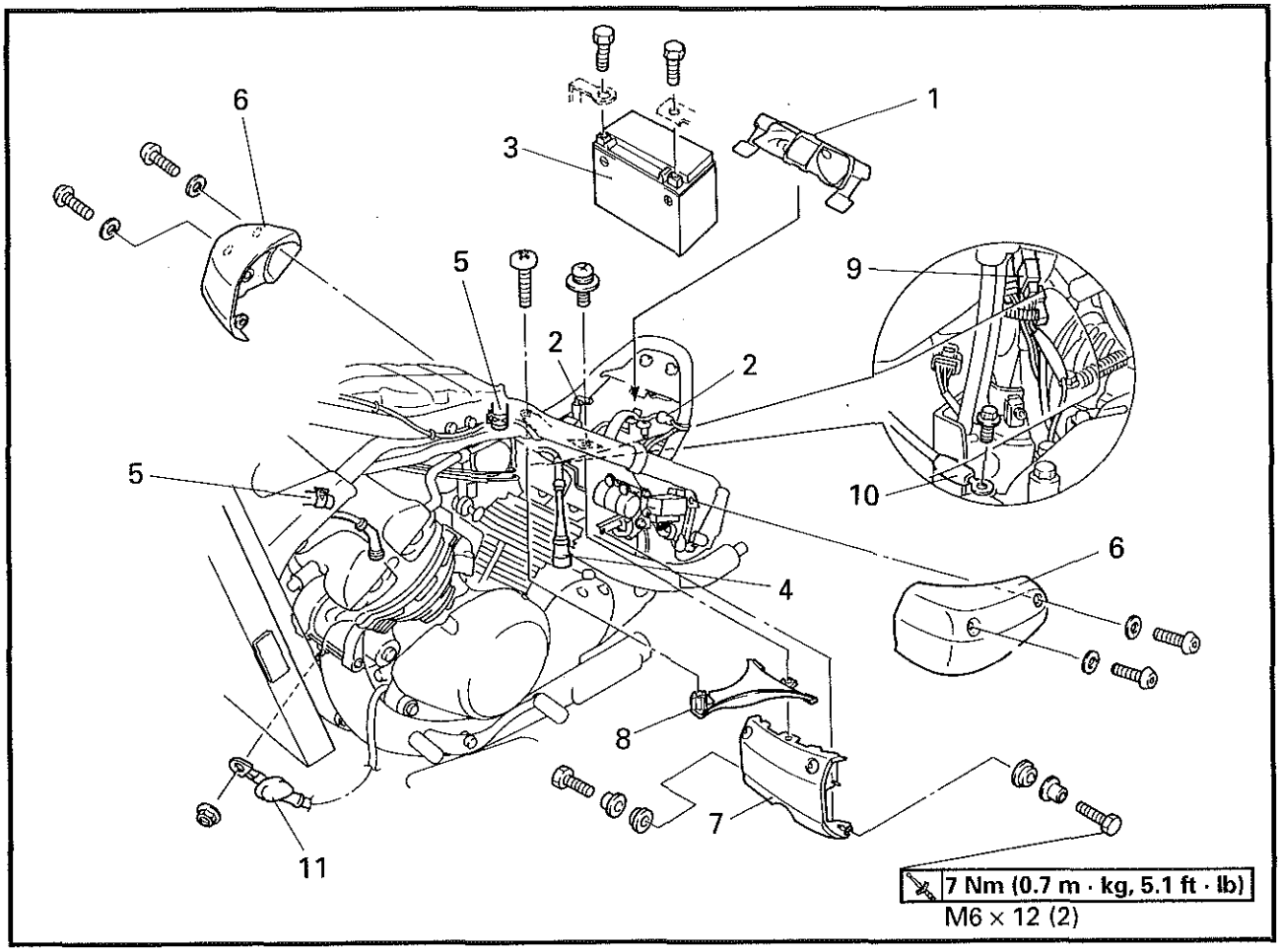


CONTENTS
ENGINE

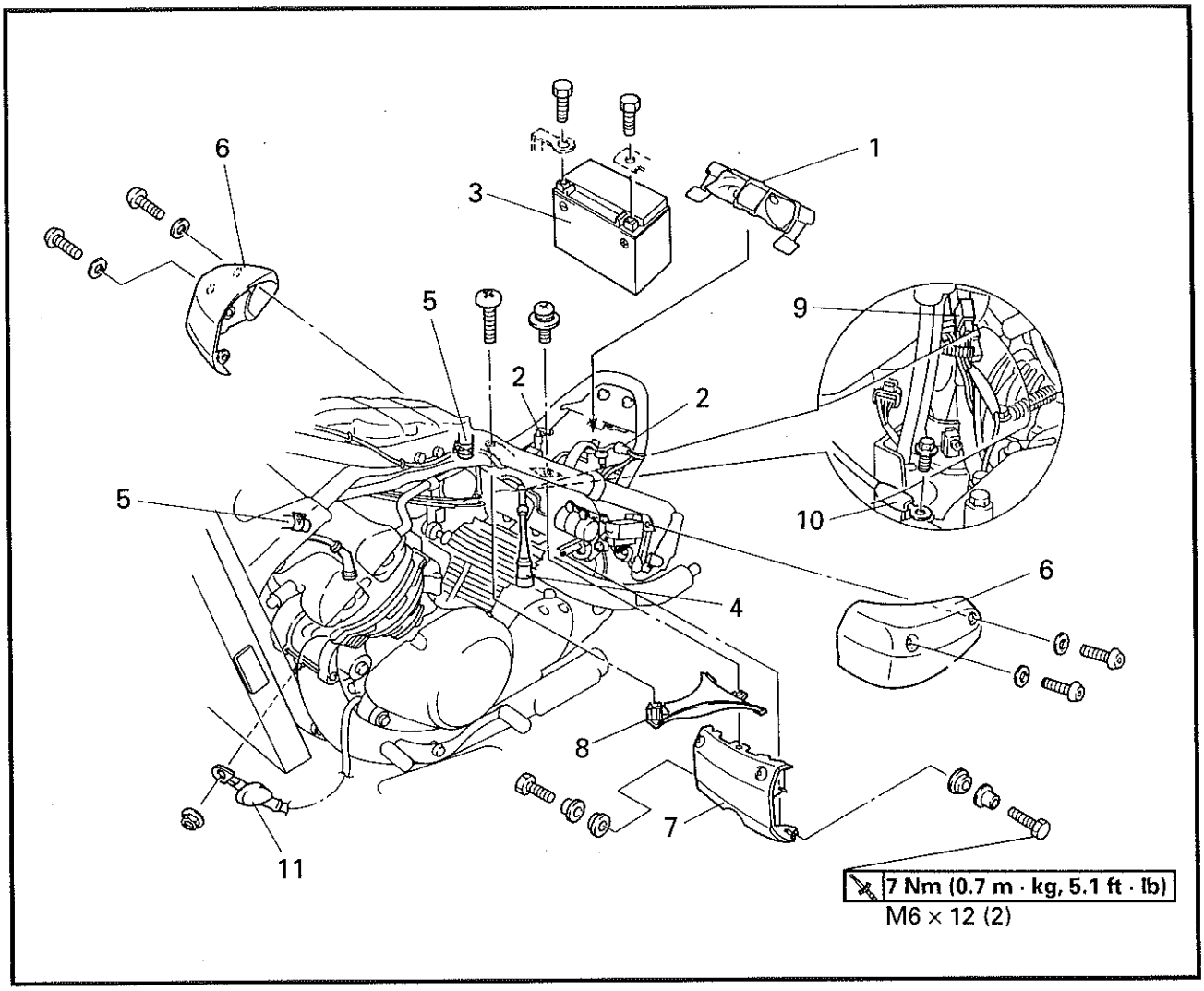
ENGINE

ENGINE REMOVAL

LEADS, CABLES AND HOSES

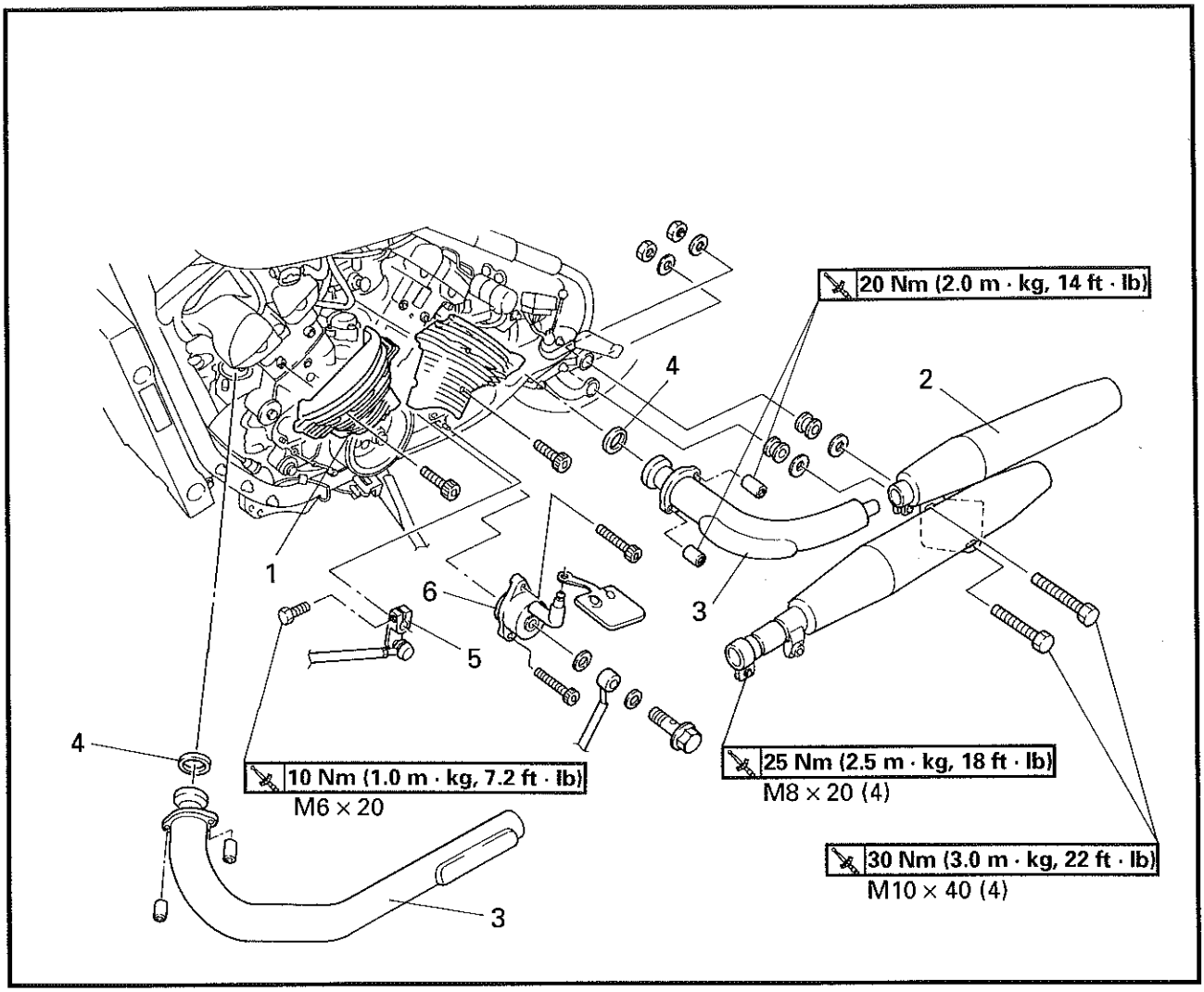


Order	Job name/Part name	Q'ty	Remarks
	Lead, cable and hose removal		*Remove the parts in the order below.* Stand the motorcycle on a level surface. **⚠ WARNING** **Securely support the motorcycle so *there is no danger of it falling over.***
	Engine oil		Drain Refer to "ENGINE OIL REPLACEMENT" in CHAPTER 3.
	Coolant		Drain Refer to "COOLANT REPLACEMENT" in CHAPTER 3.
	Clutch fluid		Drain
	Rider seat, fuel tank		Refer to "SEATS" and "FUEL TANK" in CHAPTER 3.



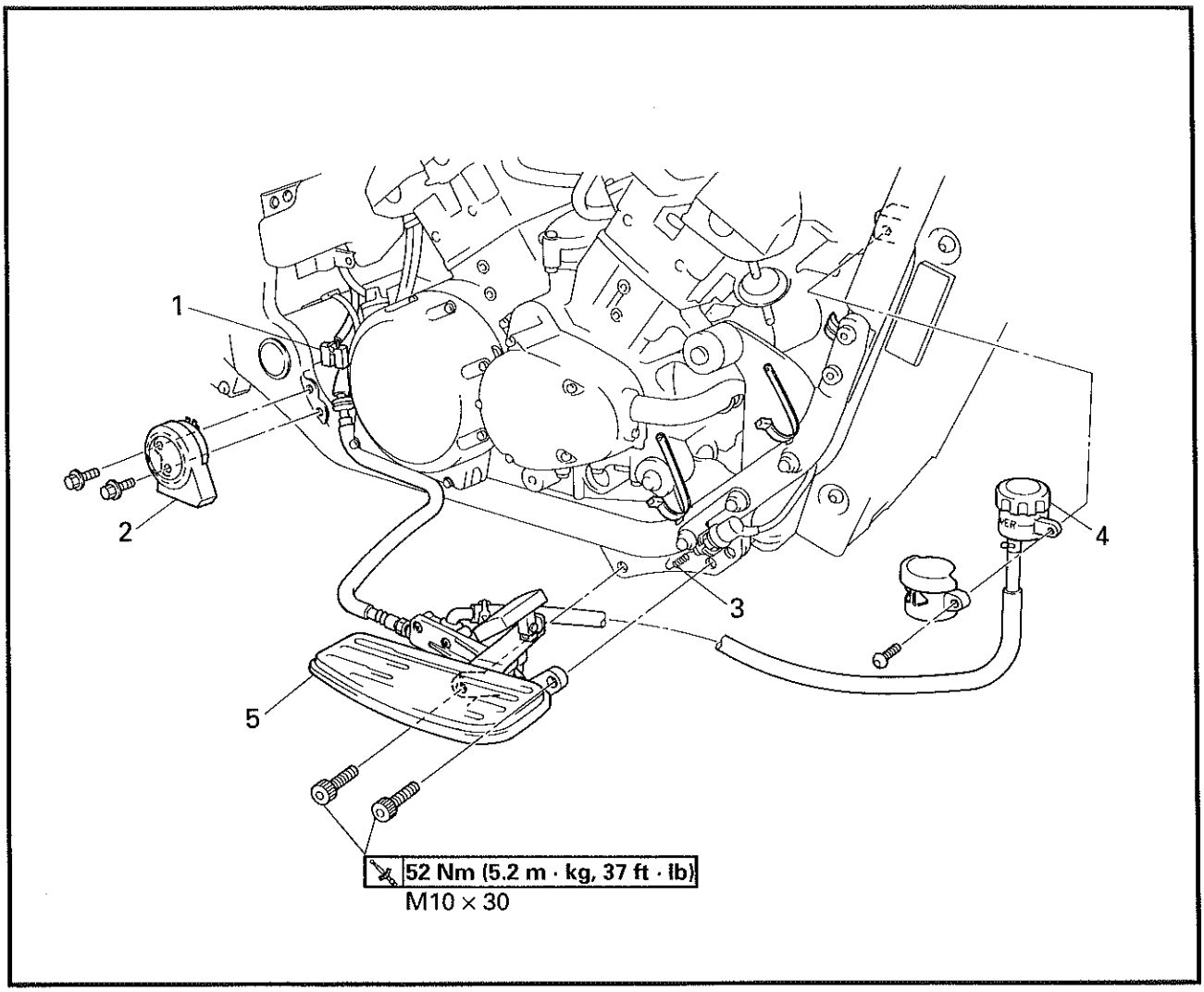
Order	Job name/Part name	Q'ty	Remarks
1	Toolkit	1	
2	Battery leads	2	Disconnect **NOTE:** First, disconnect the negative lead, then disconnect the positive lead.
3	Battery	1	
4	Spark plug leads	4	Disconnect
5	Hoses (coolant)	2	Disconnect
6	Side covers (left and right)	2	
7	Rear inner cover	1	
8	Plastic shroud	1	
9	Leads (by coolant reservoir)	4	Disconnect
10	Engine ground lead	1	Disconnect
11	Starter lead	1	Disconnect For installation, reverse the removal procedure.

MUFFLERS AND EXHAUSTS



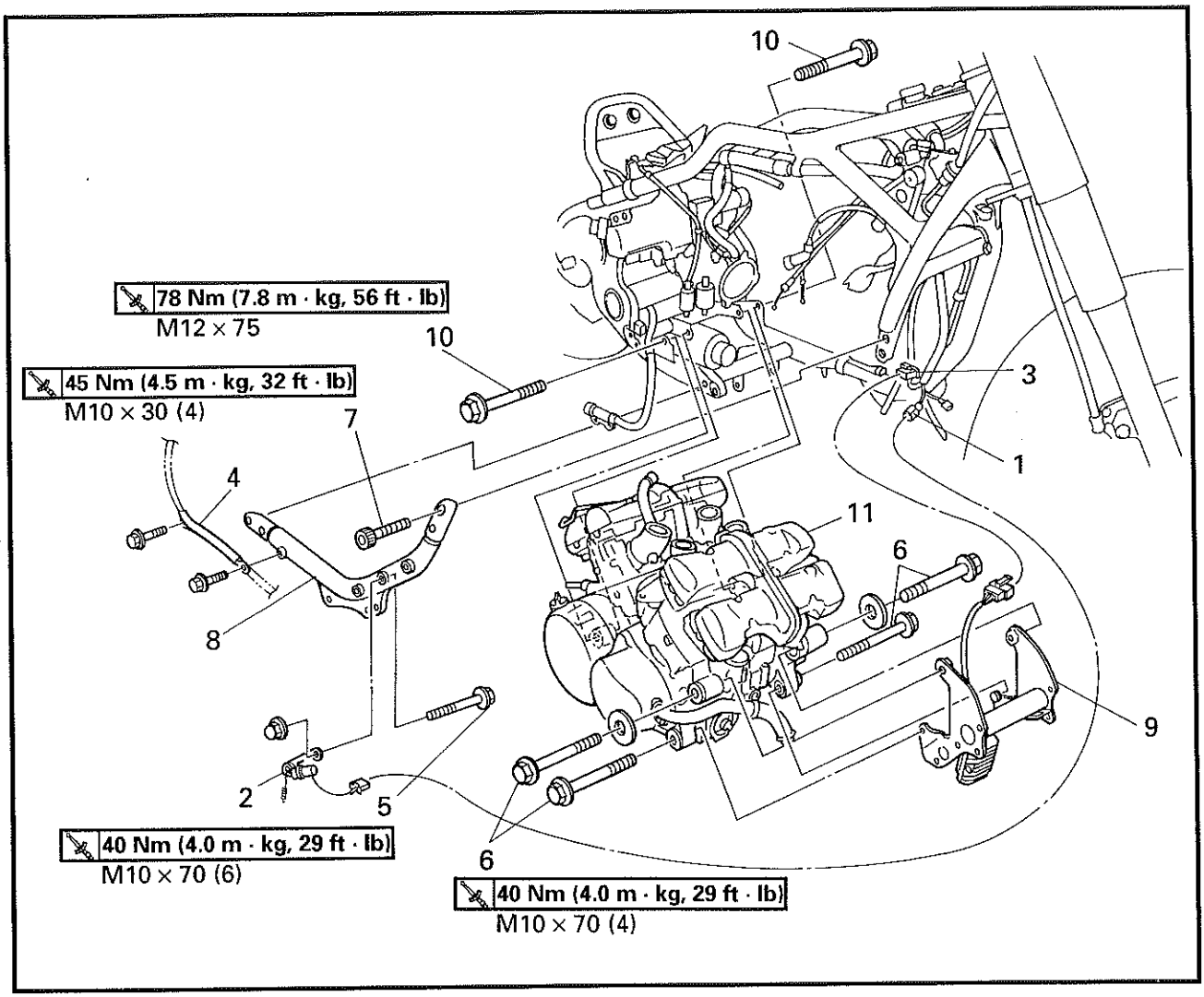
Order	Job name/Part name	Q'ty	Remarks
	Muffler and exhaust removal		Remove the parts in the order below.
	Carburetors		Refer to "CARBURETOR REMOVAL" in CHAPTER 6.
	Radiator		Refer to "RADIATOR REMOVAL" in CHAPTER 5.
1	Cylinder side covers	4	
2	Muffler assemblies	2	
3	Exhaust pipes	4	
4	Copper gaskets	4	
5	Shift pedal link	1	Disconnect
6	Clutch release cylinder	1	Refer to "CLUTCH RELEASE CYLINDER REMOVAL" in CHAPTER 7.
			For installation, reverse the removal procedure.

HORN AND BRAKE PEDAL

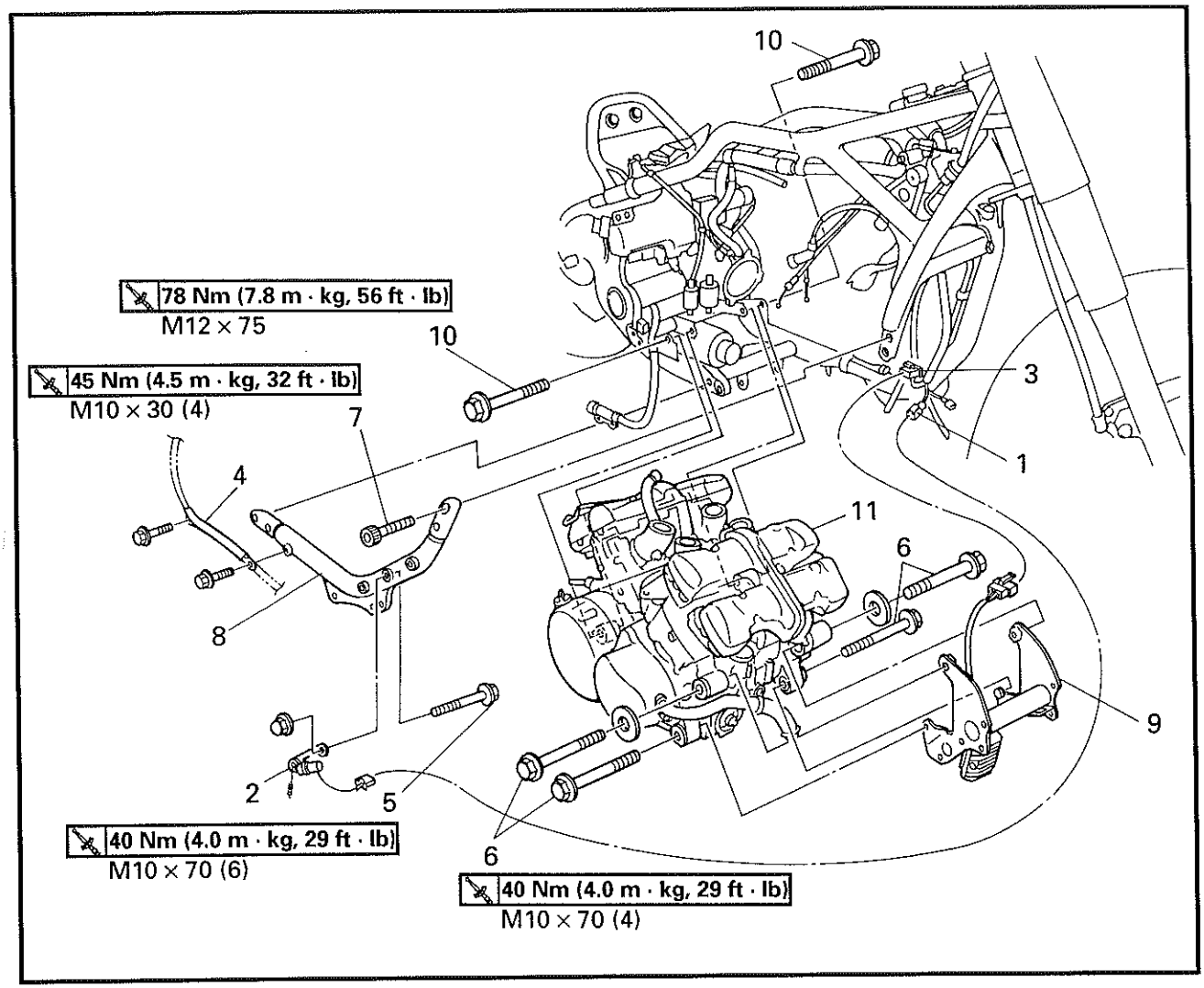


Order	Job name/Part name	Q'ty	Remarks
	Horn and brake pedal removal		Remove the parts in the order below.
1	Horn leads	2	Disconnect
2	Horn	1	
3	Spring (rear brake switch)	1	Disconnect
4	Reservoir tank (rear brake)	1	
5	Brake pedal assembly	1	Refer to "MASTER CYLINDER REMOVAL (REAR BRAKE)" in CHAPTER 7. For installation, reverse the removal procedure.

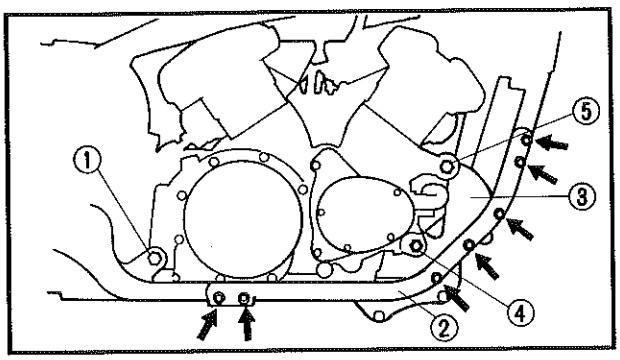
ENGINE MOUNTING BOLTS

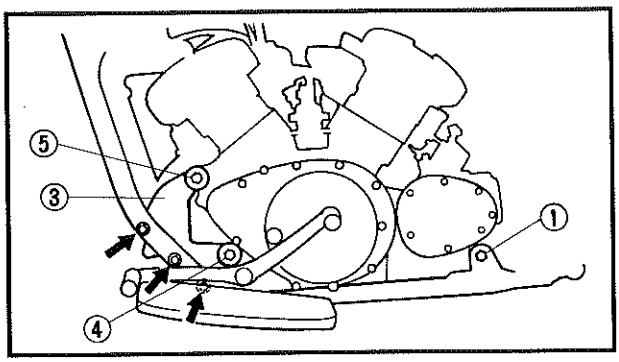


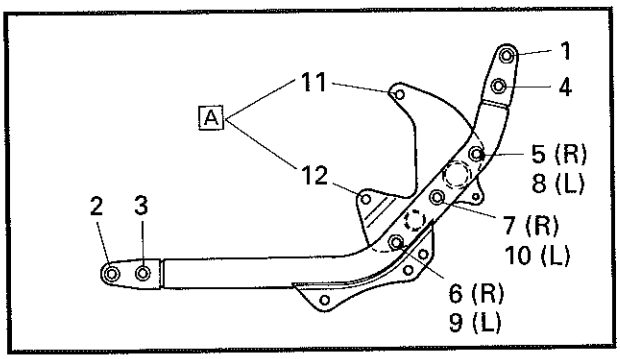
Order	Job name/Part name	Q'ty	Remarks
	Engine mounting bolt removal		Remove the parts in the order below. Place a suitable stand under the frame and engine. **⚠ WARNING** **Securely support the motorcycle so there is no danger of it falling over.**
1	Rear brake switch leads	2	Disconnect
2	Rear brake switch	1	
3	Rectifier/regulator coupler	1	Disconnect
4	Rear brake hose protector	1	
5	Bolts (engine bracket)	6	
6	Bolts (front-lower/upper)	4	
7	Bolts (down tube)	4	
8	Down tube (right side)	1	



Order	Job name/Part name	Q'ty	Remarks
9	Engine bracket	1	
10	Bolts (rear)	2	
11	Engine assembly	1	**NOTE:** Remove the engine assembly from the right side of the motorcycle. For installation, reverse the removal procedure.







REMOUNTING

1.Install:
- Engine assembly
  (from the right side of the motorcycle)

2.Install:
- Bolts (rear) ①

78 Nm (7.8 m · kg, 56 ft · lb)

- Down tube (right) ②

45 Nm (4.5 m · kg, 32 ft · lb)

CAUTION:

Install all of the bolts and then tighten them to full torque specifications. Refer to the illustration for the tightening order.

A Either side (left or right) can be tightened first.

R: Right side L: Left side

- Engine bracket ③

40 Nm (4.0 m · kg, 29 ft · lb)

- Rear brake switch
- Bolts (front-upper) ④

40 Nm (4.0 m · kg, 29 ft · lb)

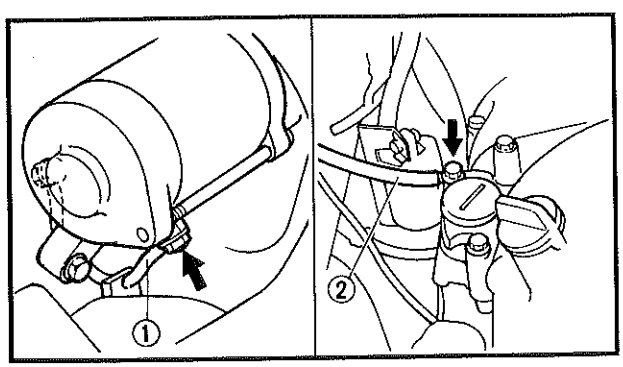
- Bolts (front-lower) ⑤

40 Nm (4.0 m · kg, 29 ft · lb)

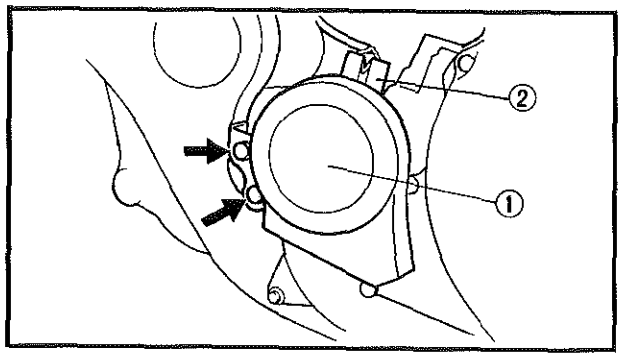
3.Connect:
- Rectifier/regulator coupler
- Rear brake switch leads

4.Install:
- Brake pedal assembly
- Reservoir tank (rear brake)
  Refer to "MASTER CYLINDER ASSEMBLY (REAR BRAKE)" in CHAPTER 7.

5.Connect:
- Spring (rear brake switch)

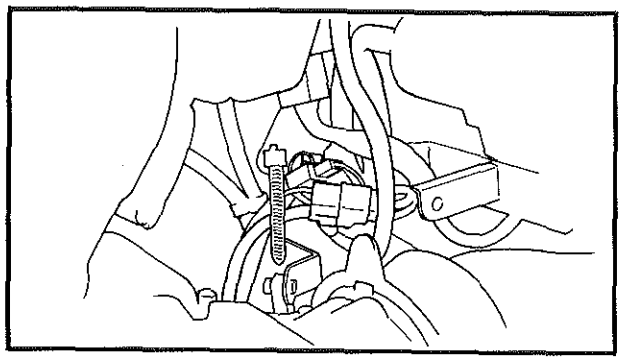


6.Connect:
- Starter lead ①
- Engine ground lead ②



7.Install:
- Horn ①

8.Connect:
- Horn leads ②

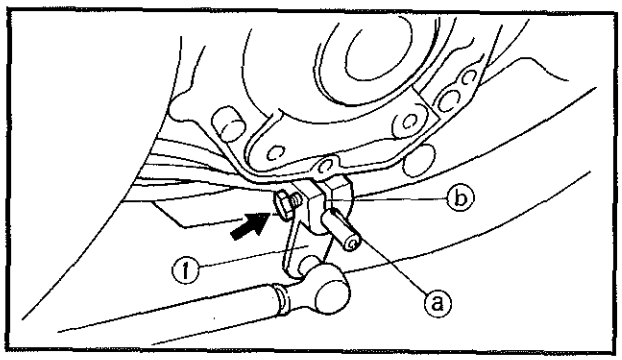


9.Connect:
- Leads (by coolant reservoir)

10.Install:
- Rear inner cover
- Side covers (left and right)
- Plastic shroud

11.Install:
- Clutch release cylinder

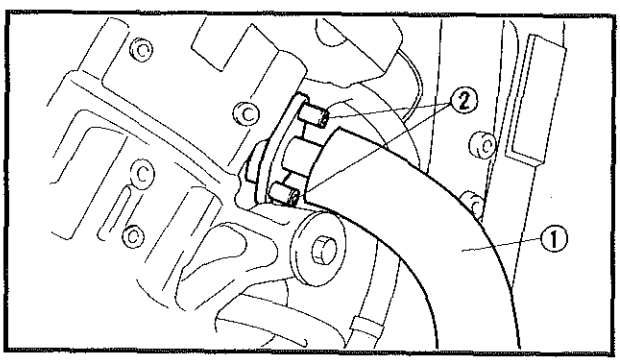
  Refer to "Clutch release cylinder" in CHAPTER 7.



12.Connect
- Shift pedal link ①

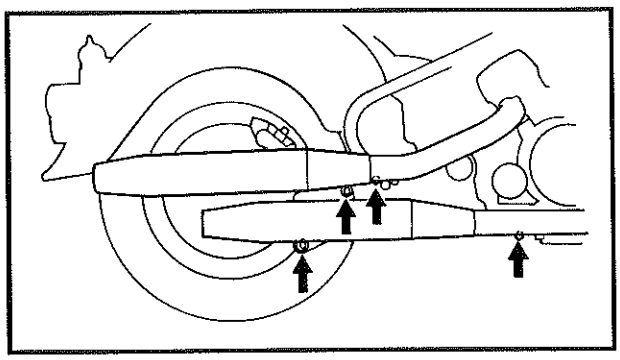
10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
Align the punch mark ⓐ on the shift rod with the slot ⓑ on the shift pedal link.



13.Install:
- Gaskets
- Exhaust pipes ⓕ
- Nuts ②

20 Nm (2.0 m · kg, 14 ft · lb)

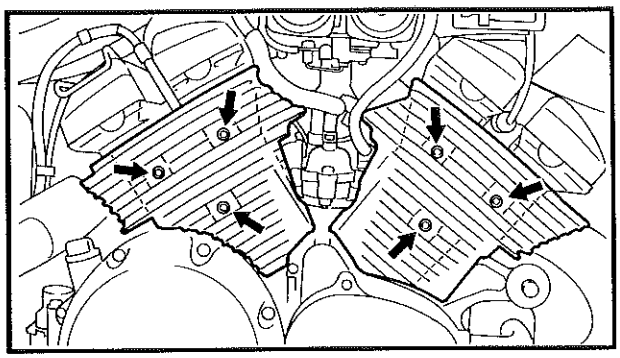


14.Install:
- Muffler assemblies ①

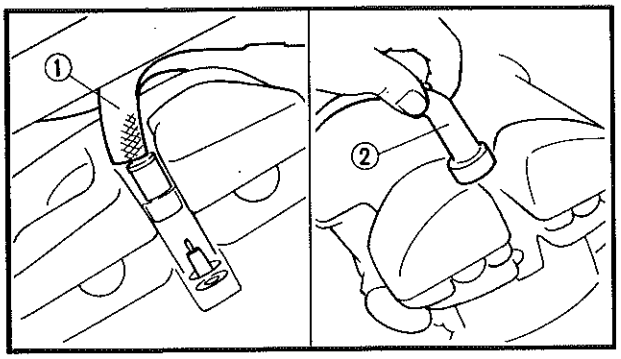
30 Nm (3.0 m · kg, 22 ft · lb)

15.Tighten:
- Clamp bolts ②

25 Nm (2.5 m · kg, 18 ft · lb)



16.Install:
- Cylinder side covers



17.Install:
- Radiator

Refer to "RADIATOR" in CHAPTER 5.

18.Connect:
- Coolant hoses ①
- Spark plug leads ②

19.Install:
- Carburetor 3 Nm (0.3 m · kg, 2.2 ft · lb)

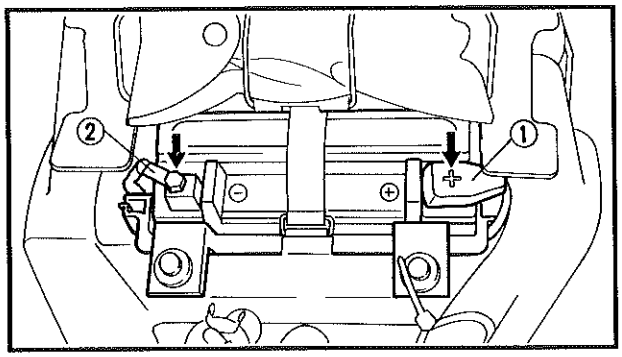
Refer to "CARBURETOR" in CHAPTER 5.

20.Install:
- Air filter case 3 Nm (0.3 m · kg, 2.2 ft · lb)

Refer to "AIR FILTER CLEANING" in CHAPTER 3.

21.Install:
- Fuel tank

Refer to "FUEL TANK" in CHAPTER 3.



22.Install:
- Battery

23.Connect:
- Battery leads

CAUTION:
First, connect the positive lead ① then connect the negative lead ②.

24.Install:
- Toolkit
- Rider seat

Refer to "SEATS" in CHAPTER 3.

25.Fill:
- Crankcase

Refer to "ENGINE OIL REPLACEMENT" in CHAPTER 3.

	Total amount: **4.3 L (3.8 Imp qt, 4.6 US qt)**

26.Fill:
- Cooling system

Refer to "COOLANT REPLACEMENT" in CHAPTER 3.

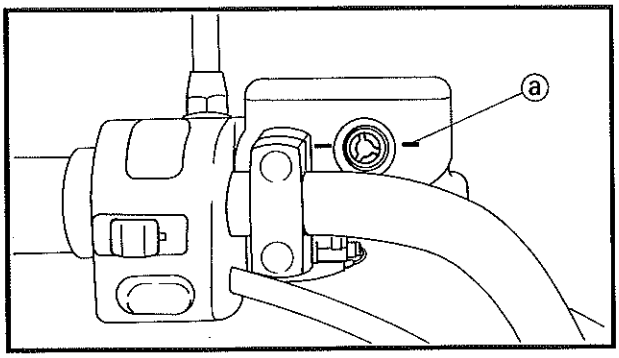
27.Inspect:
- Cooling system

Decrease of pressure (leaks) → Repair as required.
Refer to "Inspection steps" in CHAPTER 5.

28.Fill:
- Clutch reservoir tank

	Recommended brake fluid: **DOT #4**

29.Air bleed:
- Clutch system
  Refer to "AIR BLEEDING" in CHAPTER 3.



30.Inspect:
- Clutch fluid level
  Fluid level is under the "LOWER" level line → Fill.
  Refer to 'CLUTCH FLUID LEVEL INSPECTION" in CHAPTER 3.
  ⓐ"LOWER" level line

31.Adjust:
- Idle speed
  Refer to "IDLING SPEED ADJUSTMENT" in CHAPTER 3.

	Idle speed: **950 ~ 1,050 r/min**

32.Adjust:
- Throttle cable free play
  Refer to "THROTTLE CABLE ADJUSTMENT" in CHAPTER 3.

	Throttle cable free play: **4 ~ 6 mm (0.16 ~ 0.24 in)** **At throttle grip flange**

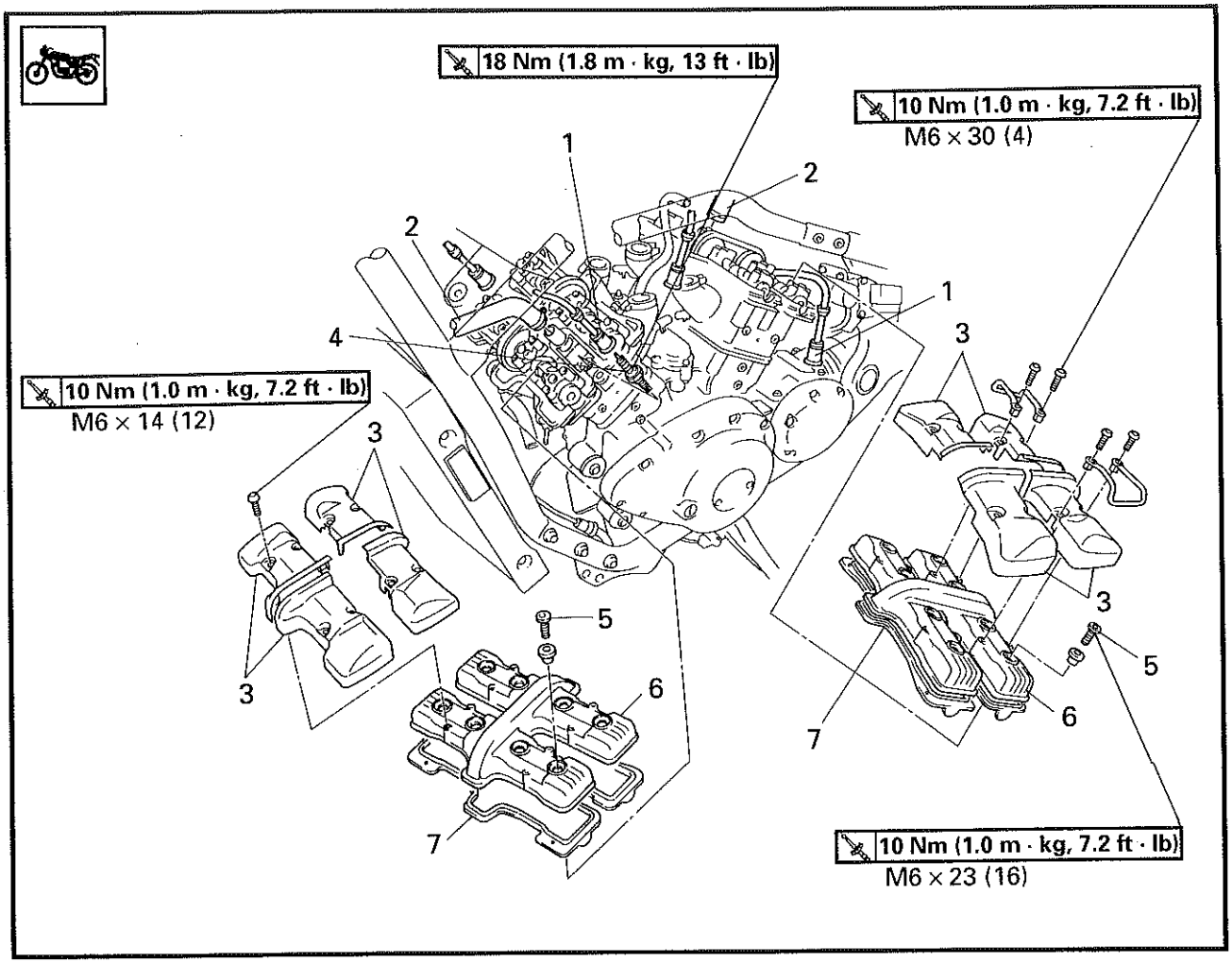
33.Adjust:
- Brake pedal height
  Refer to "REAR BRAKE ADJUSTMENT" in CHAPTER 3.

Brake pedal height:
100 mm (3.9 in)
Below top of footrest.

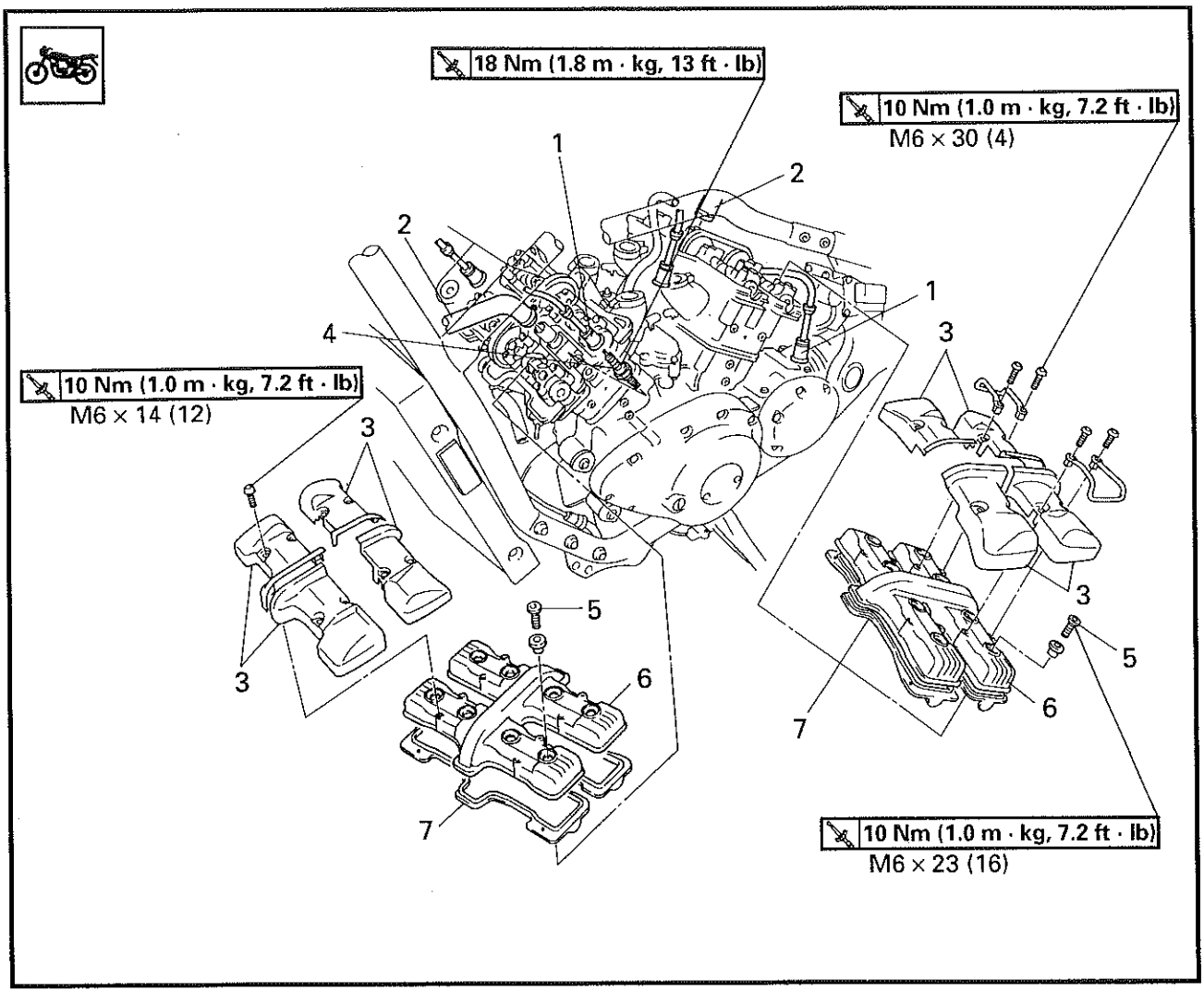
34.Adjust:
- Brake light switch
  Refer to "BRAKE LIGHT SWITCH ADJUSTMENT" in CHAPTER 3.

CAMSHAFTS

CYLINDER HEAD COVERS

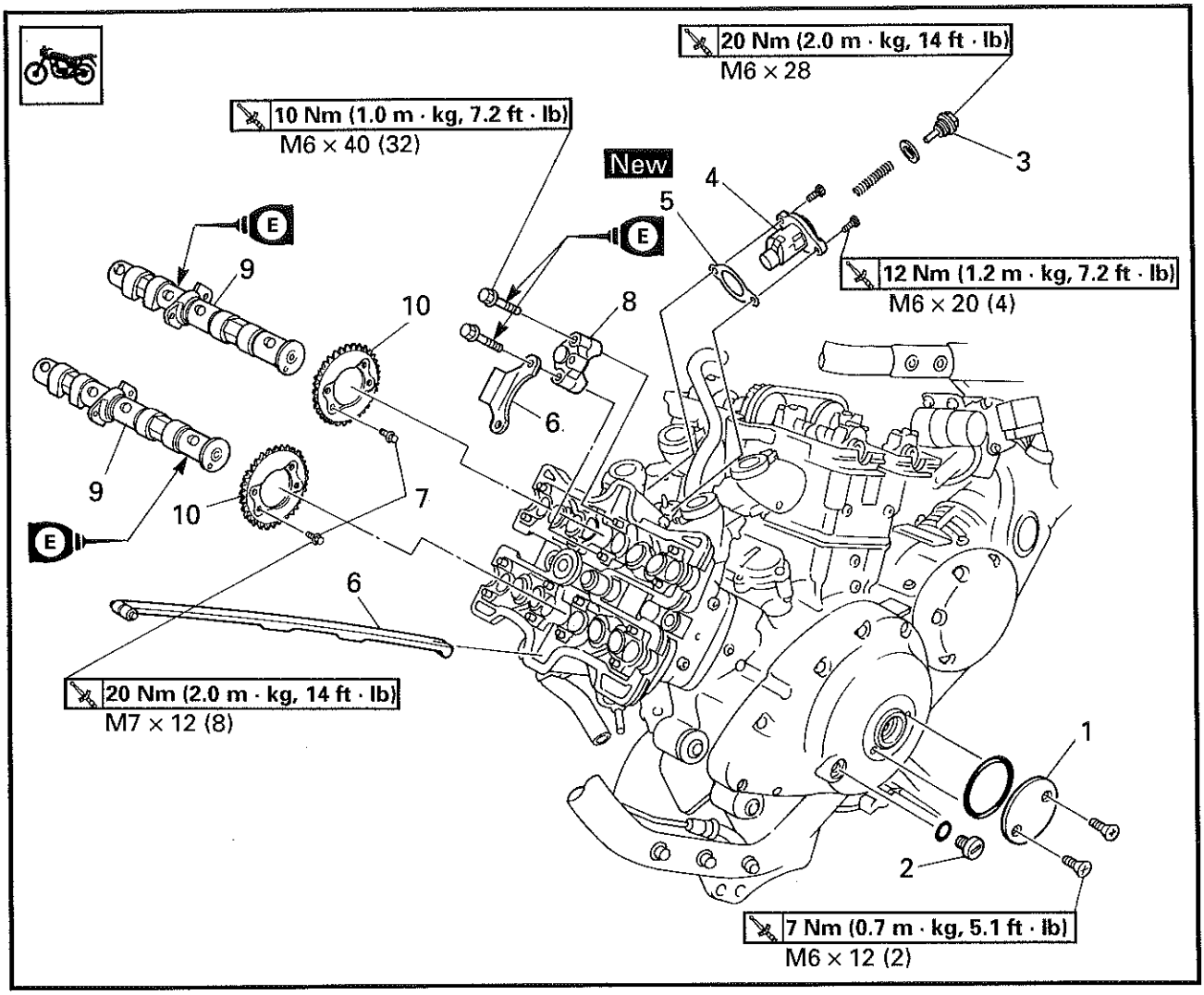


Order	Job name/Part name	Q'ty	Remarks
	Cylinder head cover removal		Remove the parts in the order below. Stand the motorcycle on a level surface. **⚠ WARNING** **Securely support the motorcycle so there is no danger of it falling over.**
	Rider seat and fuel tank		Refer to "SEATS" and "FUEL TANK" in CHAPTER 3.
	Air filter case		Refer to "AIR FILTER CLEANING" in CHAPTER 3.
	Carburetors		Refer to "CARBURETORS REMOVAL" in CHAPTER 6.
	Coolant		Drain Refer to "COOLANT REPLACEMENT" in CHAPTER 3.



Order	Job name/Part name	Q'ty	Remarks
1	Spark plug leads	4	Disconnect
2	Coolant hoses (to cylinder head)	2	Disconnect
3	Chrome cylinder head covers	8	
4	Spark plugs	4	
5	Bolts (cylinder head covers)	16	
6	Cylinder head covers	2	
7	Gaskets (cylinder head covers)	2	
			For installation, reverse the removal procedure.

CAMSHAFTS



Order	Job name/Part name	Q'ty	Remarks
	Camshaft removal		Remove the parts in the order below.
	Cylinder head covers		Refer to "CYLINDER HEAD COVERS".
1	Crankcase cover plate	1	
2	Timing plug	1	
3	Cap bolts (tensioners)	2	
4	Timing chain tensioners	2	
5	Gaskets	2	
6	Timing chain guides (metal and rubber)	4	Refer to "Rear cylinder head".
7	Bolts (camshaft sprockets)	8	
8	Camshaft caps	16	
9	Camshafts (intake and exhaust)	4	
10	Camshaft sprockets	4	
			For installation, reverse the removal procedure.

REMOVAL

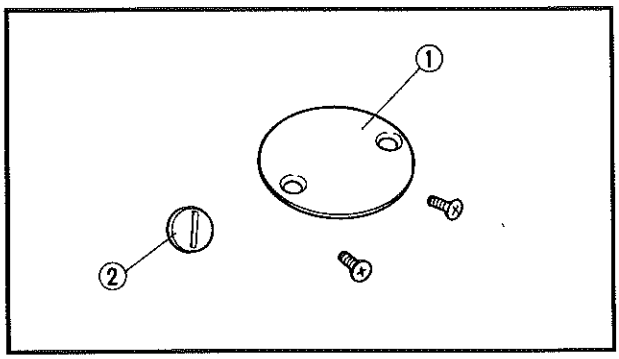
Rear cylinder head

1.Remove:
- Spark plugs
- Cylinder head cover
- Gasket (cylinder head cover)

Refer to "CYLINDER HEAD COVERS".

NOTE:

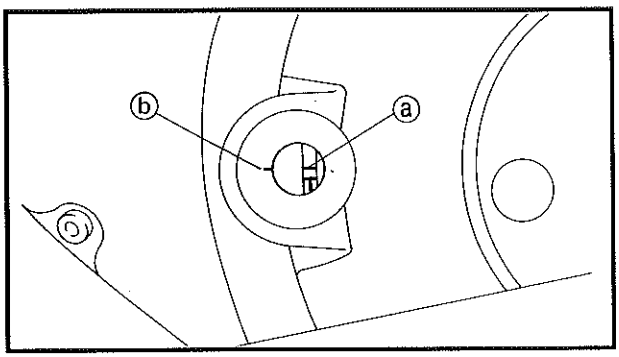
Loosen each bolt 1/4 of a turn in a criss-cross pattern. After all the bolts are loosened, remove them.



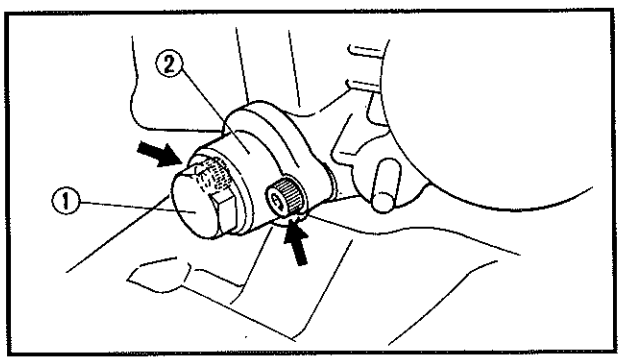
2.Remove:
- Crankcase cover plate ①
- Timing plug ②

3.Align:
- "-" and "I" marks (with the stationary pointer)

For the rear cylinder head camshafts removal.

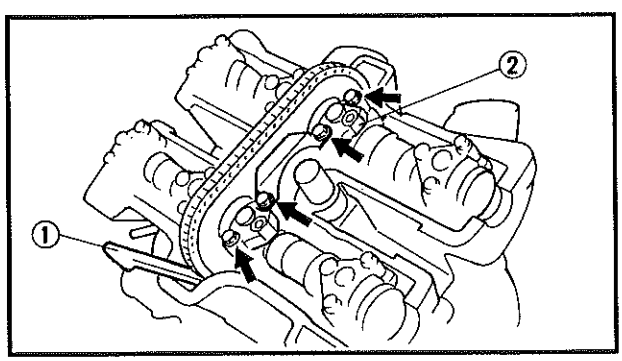


NOTE:
- Turn the crankshaft counterclockwise and align the "-" and "I" marks ⓐ with the crankcase edge ⓑ when the #1 piston is at TDC on the compression stroke.
- The #1 piston is at TDC on the compression stroke when the cam lobes are opposite one another, as shown.

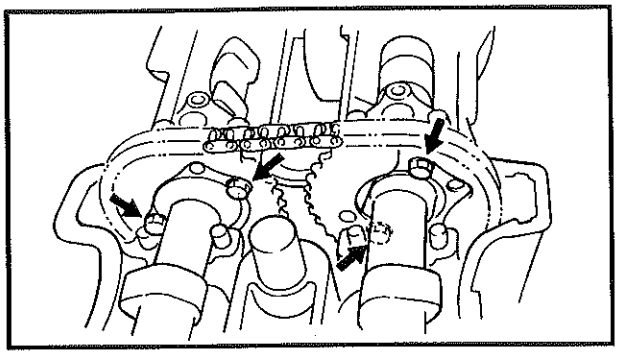


4.Loosen:
- Cap bolt (tensioner) ①

5.Remove:
- Timing chain tensioner ②
- Gasket

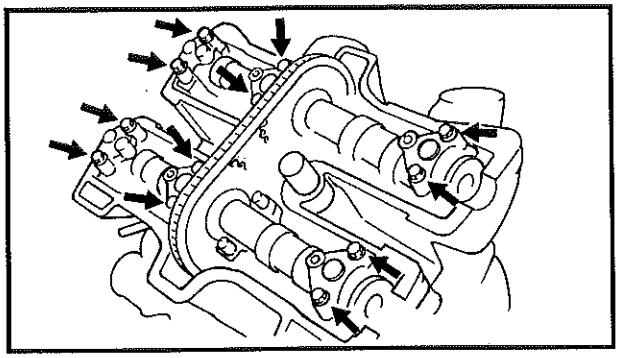


6.Remove:
- Timing chain guides (metal and rubber) ①
- Camshaft caps (#2) ②



7.Remove:
- Bolts (camshaft sprockets)

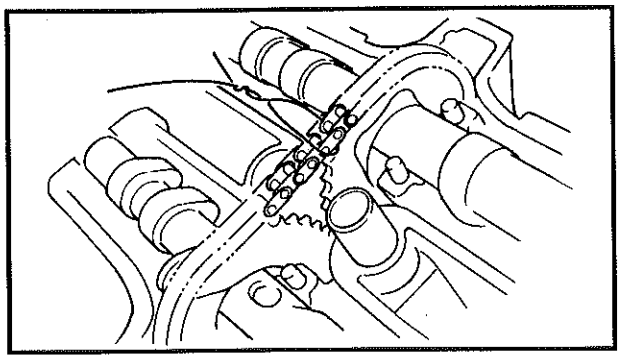
NOTE:
Use a 22 mm wrench to hold the camshafts.



8.Remove:
- Camshaft caps

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

NOTE:
When loosening the camshaft cap bolts, be sure that the camshaft cam lobes do not touch the valve lifters.



9.Remove:
- Camshafts

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

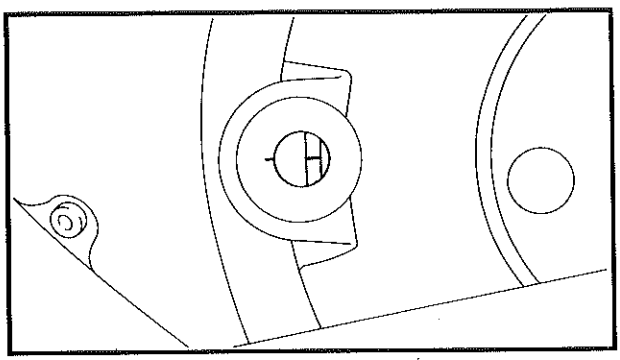
10.Remove:
- Camshaft sprockets

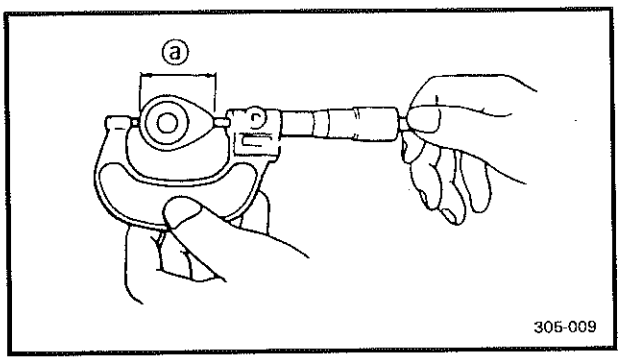
Front cylinder head

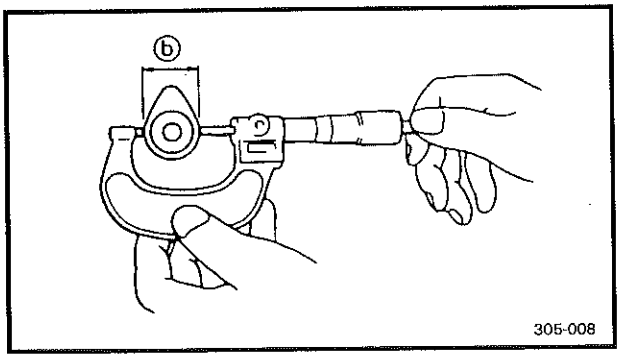
NOTE:
When removing the front cylinder head camshafts, repeat the rear cylinder head camshafts removal procedures. However, note the following points.

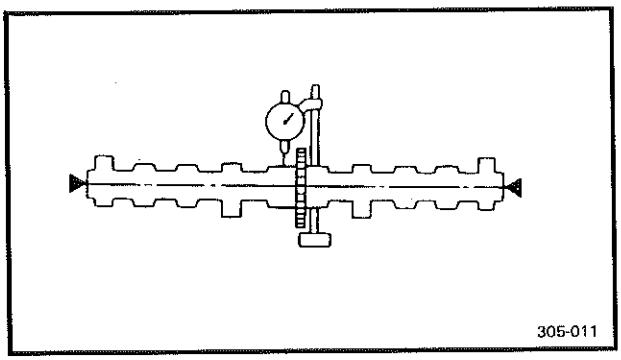
1.Rotate:
- Crankshaft
  Counterclockwise 360° plus an additional 70° (430° total) from the "-" and "I" marks.

2.Align:
- "-" mark (with the stationary pointer)









INSPECTION

1.Inspect:
- Cam lobes
  Pitting/scratches/blue discoloration → Replace.

2.Measure:
- Cam lobes length ⓐ and ⓑ
  Out of specification → Replace.

Cam lobe length limit:
Intake:
ⓐ 34.55 mm (1.360 in)
ⓑ 27.85 mm (1.096 in)
Exhaust:
ⓐ 35.65 mm (1.404 in)
ⓑ 27.85 mm (1.096 in)

3.Measure:
- Runout (camshaft)
  Out of specification → Replace.

Runout (camshaft):
Less than 0.03 mm (0.0012 in)

4.Measure:
- Camshaft-to-cap clearance
  Out of specification → Measure the diameter (camshaft bearing)

Clearance (camshaft to cap):
0.020 ~ 0.054 mm
(0.0008 ~ 0.0021 in)

****

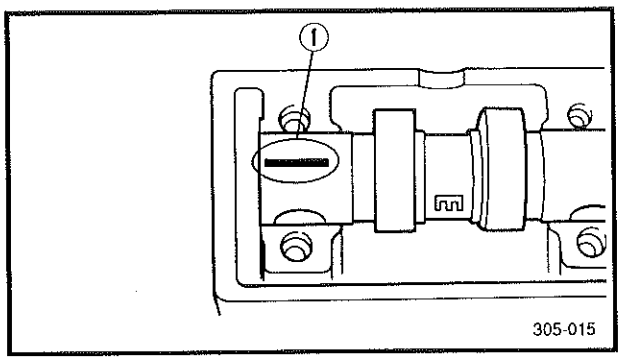
Measurement steps:
- Install the camshaft onto the cylinder head.
- Position a strip of Plastigauge® ① onto the camshaft.
- Install the camshaft caps.

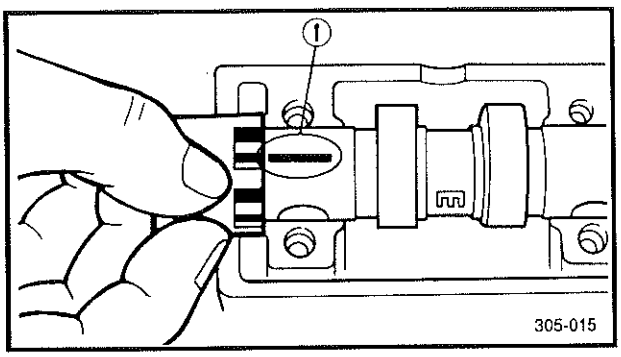
Bolts (camshaft caps):
10 Nm (1.0 m • kg, 7.2 ft • lb)

NOTE:
- Tighten the camshaft cap bolts in a criss-cross pattern tightening from the inner caps outward.
- When measuring clearance with the Plastigauge® do not turn the camshaft.

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

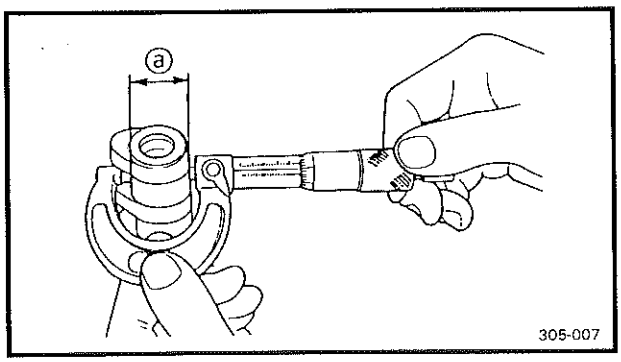
****

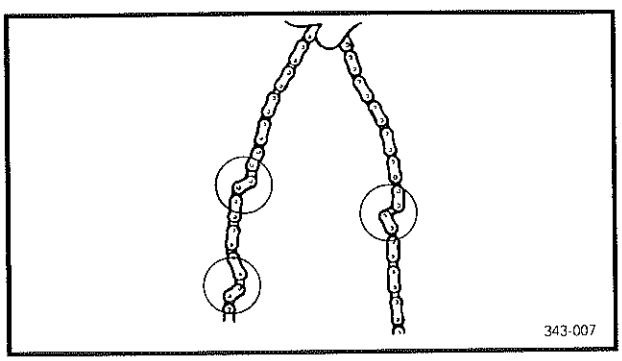




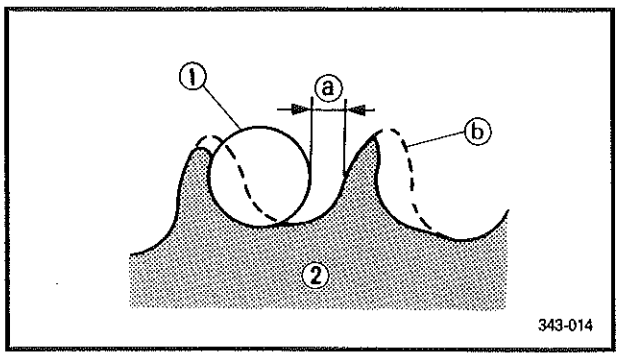
5.Measure:
- Diameter (camshaft bearing) ⓐ
  Out of specification → Replace the camshaft.
  Within specification → Replace the cylinder head and the camshaft caps as a set.

Diameter (camshaft bearing):
24.967 ~ 24.980 mm
(0.9830 ~ 0.9835 in)





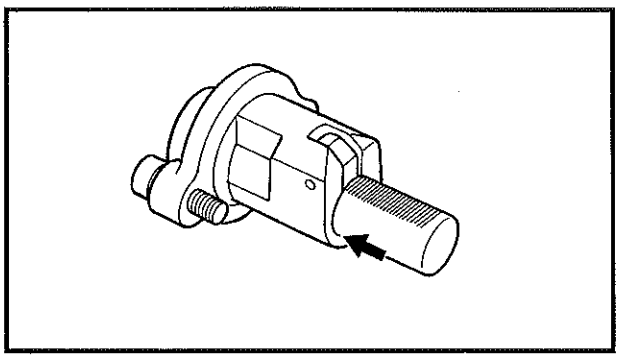
6.Inspect:
- Timing chain
  Stiffness/damage → Replace the chain and the sprockets as a set.



7.Inspect:
- Camshaft sprockets
  Wear/damage → Replace the camshaft sprockets and the timing chain as a set.

ⓐ 1/4 tooth
ⓑ Correct
① Roller
② Sprocket

8.Inspect:
- Timing chain guide (metal)
- Timing chain guide (rubber)
  Wear/damage → Replace.



9.Check:
- One-way cam operation (tensioner)
  Unsmooth operation → Replace.

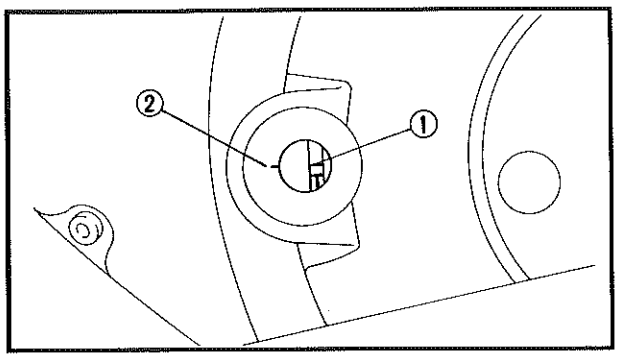
10.Inspect:
- Gasket (cylinder head cover)
  Cracks/damage → Replace.

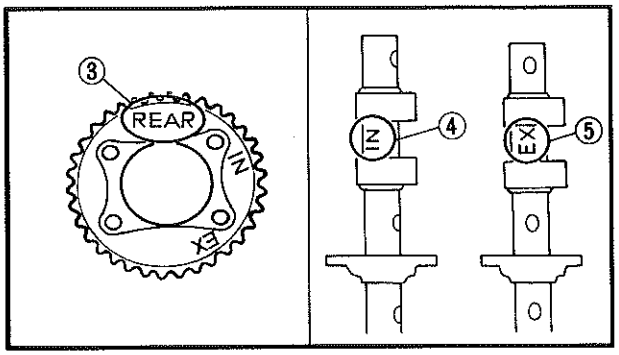
INSTALLATION

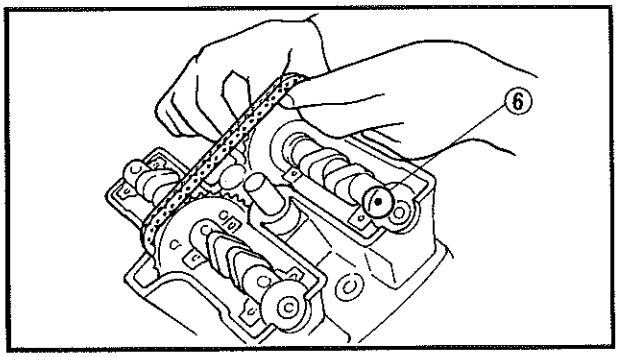
Rear cylinder head

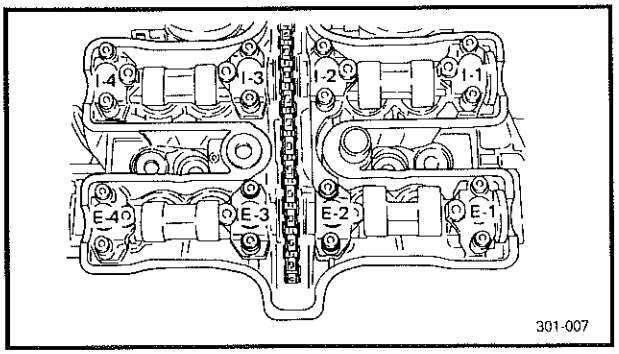
1.Install:
- Camshafts (intake and exhaust)

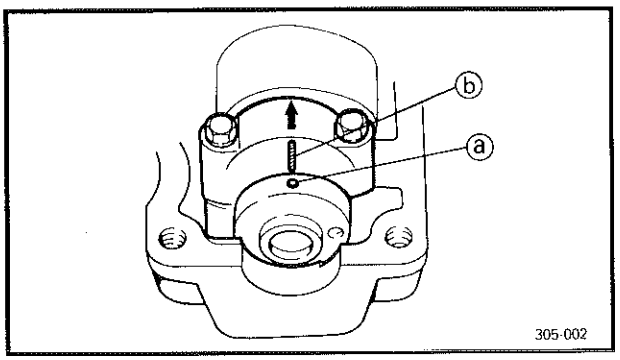
NOTE:
First, install the rear cylinder head camshafts, camshaft sprockets, timing chain and timing chain tensioner. Then install the front cylinder head camshafts and related parts.











****

Installation steps:

- Turn the crankshaft counterclockwise and align the "-" and "I" marks ① with the crankcase edge ② when the #1 piston is at TDC on the compression stroke.

CAUTION:

Do not turn the crankshaft during the camshafts installation.

- Install the camshaft sprockets onto the camshafts.
  Refer to "Camshaft sprocket installation".

NOTE:

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

- Lubricate the camshaft bearing surfaces, cam lobes and cam journals with engine oil.
- First, install the exhaust camshaft, then install the intake camshaft.

NOTE:

- Be sure to install the camshafts in the correct place: "IN" mark = intake camshaft, "EX" mark = exhaust camshaft.
- Make sure the timing marks ⑥ (o: small hole) on the camshaft face upward.
- Keep the timing chain as tight as possible on the exhaust side.
- Remove the retaining wire.

CAUTION:

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

- Install the camshaft caps (#1,#3 and #4).

NOTE:

At this point, do not install #2 intake and #2 exhaust cam caps and chain guide (metal).

- Align the camshaft timing marks ⓐ with the camshaft cap marks ⓑ.

NOTE:

Cylinder #1 is at TDC when the small holes on the camshaft are in-line with the alignment marks on the camshaft caps.

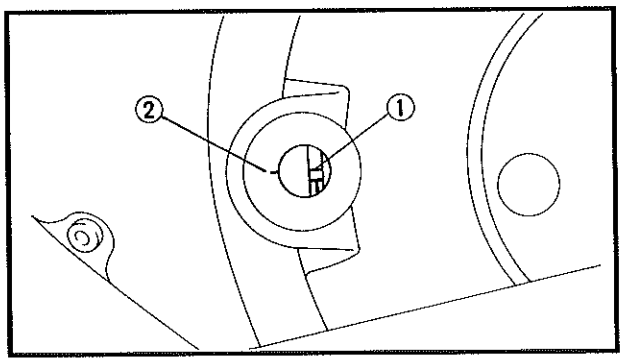
● Tighten the camshaft cap bolts.

	Bolts (camshaft caps): 10 Nm (1.0 m • kg, 7.2 ft • lb)

NOTE:
- The camshaft caps are numbered from right to left.
- Apply engine oil onto the camshaft cap bolt threads.
- Tighten the camshaft caps in a crisscross pattern working from the center out.
- First, tighten cap bolt #3, then #1 and finally cap bolt #4.

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

****



2. Install:
- Camshaft sprockets

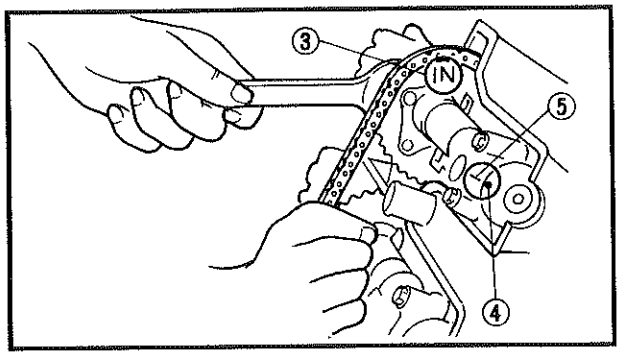
****

Installation steps:

● Turn the crankshaft counterclockwise and align the "-" and "I" mark ① on the magneto with the crankcase end ② when #1 piston is at TDC.

CAUTION
Do not turn the crankshaft during the sprocket installation.

● Place the timing chain onto the intake sprocket.
● Install the sprocket with "REAR" facing outward and finger tighten the sprocket bolts.



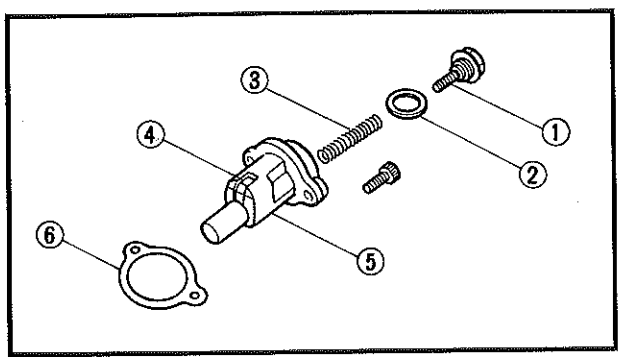
NOTE:
Align the "IN" mark ③ hole on the sprocket with the thread hole on the camshaft

- Rotate the intake camshaft to align the timing mark ④ (o: small hole) on the camshaft with the embossed match mark ⑤ on the camshaft cap.
- Force the intake camshaft counterclockwise to remove the timing chain slack.
- Place the timing chain onto the exhaust sprocket.
- Install the sprocket with the punch mark "REAR" facing outward and finger tighten the sprocket bolt.

NOTE:
Align the "EX" mark hole on the sprocket with the thread hole on the camshaft.

- Rotate the exhaust camshaft to align the timing mark (o: small hole) on the camshaft with the embossed match mark on the camshaft cap.
- Force the exhaust camshaft clockwise to remove all the timing chain slack.
- Insert your finger into the timing chain tensioner hole and push the timing chain guide inward.
- While pushing the timing chain guide, be sure that the camshaft embossed match marks align with the timing marks on the camshaft.
- If the marks do not align, change the meshing position of the sprocket and the timing chain.

****



3.Install:
- Timing chain tensioner

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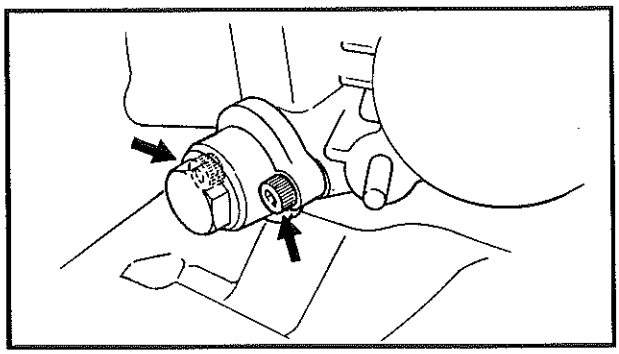
Installation steps:
- Remove the tensioner cap bolt ①, washer ② and spring ③.
- Release the timing chain tensioner one-way cam ④.



● Install the tensioner ⑤ and the gasket ⑥ onto the cylinder.

	Bolts (timing chain tensioner): 12 Nm (1.2 m • kg, 8.7 ft • lb)

⚠ WARNING

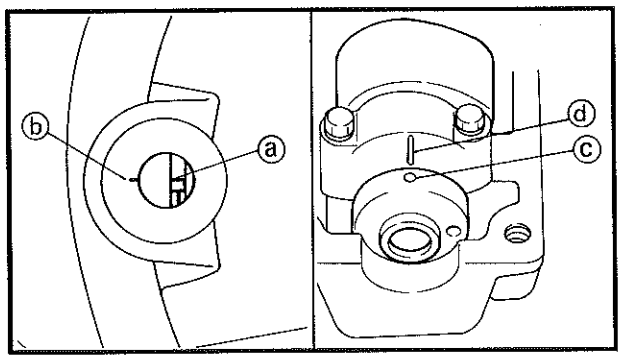
Always use a new gasket.

● Install the spring, washer and cap bolt.

	Cap bolt (timing chain tensioner): 20 Nm (2.0 m • kg, 14.0 ft • lb)

****

4. Turn:
- Crankshaft
  (several turns counterclockwise)



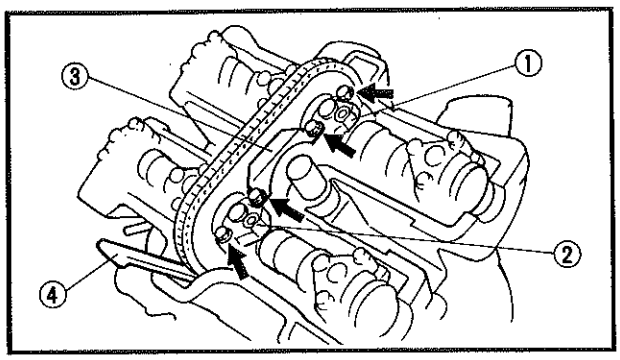
5. Check:
- TDC mark ⓐ
  (align with the crankcase edge ⓑ)
- Camshaft timing punch mark ⓒ (o: small hole)
  (align with the camshaft cap mark ⓓ)
  Out of alignment → Adjust.
  Refer to "Camshaft installation steps".

6. Tighten:
- Bolts (camshaft sprocket)

	20 Nm (2.0 m · kg, 14 ft · lb)

CAUTION:

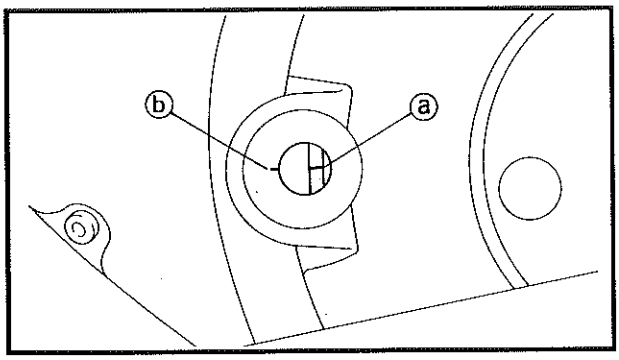
Be sure to tighten the sprocket bolts to the specified torque to avoid the possibility of the sprocket bolts coming loose and causing damage to the engine.

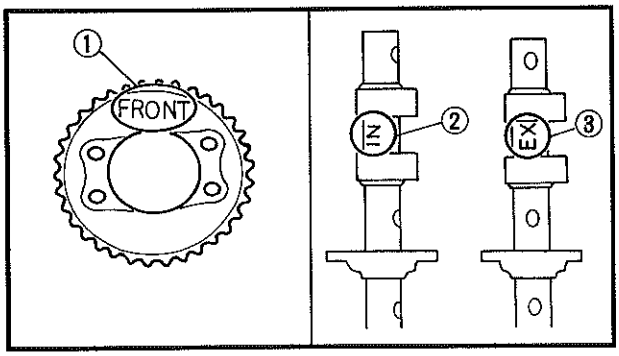


7.Install:
- Cam caps ("I-2"and "E-2") ①, ②
- Timing chain guides (metal ③, rubber ④)

10 Nm (1.0 m · kg, 7.2 ft · lb)

8.Apply:
- Engine oil
  To the timing chain, sprockets, camshafts and pads.





Front cylinder head

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

1.Install:
- Camshafts

1) Rotate the crankshaft counterclockwise 360° plus an additional 70° (430° total) from the "-" and "I" marks.
2) Align the "-" mark ⓐ with the crankcase edge ⓑ when the #2 piston is at TDC on the compression stroke.
3) Install the camshaft sprockets onto the camshafts.

NOTE:
Make sure that the "FRONT" mark ① on the camshaft sprockets face away from the "IN" mark ② and "EX" mark ③ on the camshafts.

4) Turn the camshafts by hand so that the timing marks (o: big hole) on the camshafts face upward.

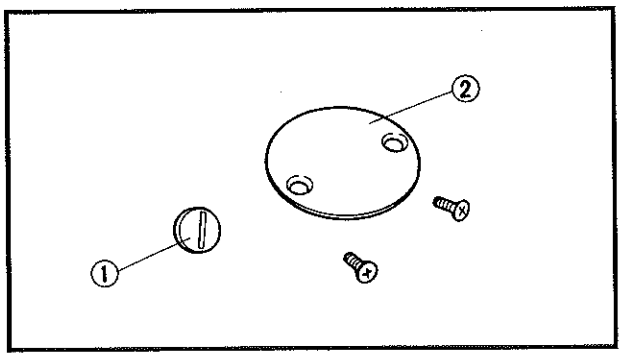
2.Install:
- Camshaft sprocket

1) Align the "-" mark with the crankcase edge.
2) Install the sprocket with the punch mark "FRONT" facing outward and finger tighten the sprocket bolts.
3) Rotate the intake and exhaust camshafts to align the timing marks (o: big hole) on the camshafts with the embossed match marks on the camshaft caps.

3.Measure
- Valve clearance

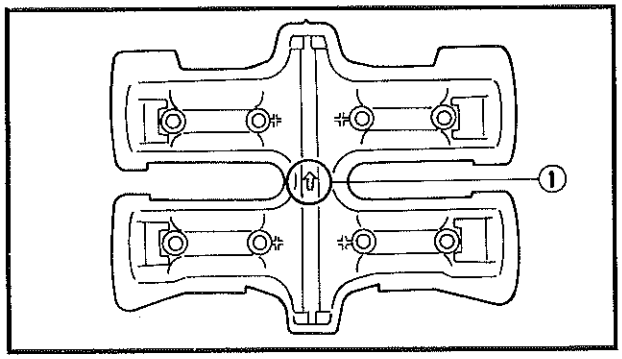
Out of specification → Adjust.
Refer to "VALVE CLEARANCE ADJUSTMENT" in CHAPTER 3.

Valve clearance (cold):
Intake valve:
0.11 ~ 0.15 mm (0.004 ~ 0.006 in)
Exhaust valve:
0.16 ~ 0.20 mm (0.006 ~ 0.008 in)



4.Install:
- Timing plug ①
- Crankcase cover plate ②

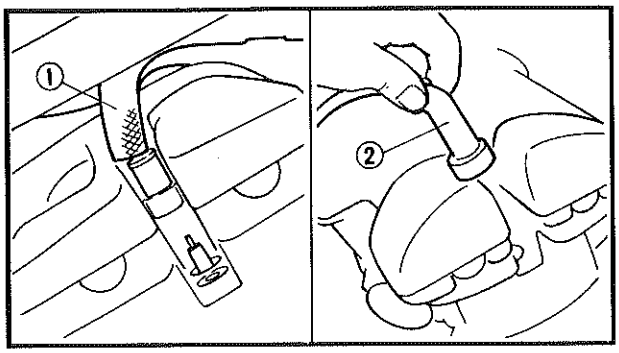
7 Nm (0.7 m · kg, 5.1 ft · lb)



5.Install:
- Gasket (cylinder head cover)
- Cylinder head cover

10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
The arrow mark ① on the cylinder head cover should face toward the exhaust side.



6.Install:
- Spark plugs — 18 Nm (1.8 m · kg, 13 ft · lb)

7.Connect:
- Coolant hoses (to the cylinder head) ①
- Spark plug leads ②

8.Install:
- Chrome cylinder head covers — 10 Nm (1.0 m · kg, 7.2 ft · lb)

9.Fill:
- Cooling system
  Refer to "COOLANT REPLACEMENT" in CHAPTER 3.

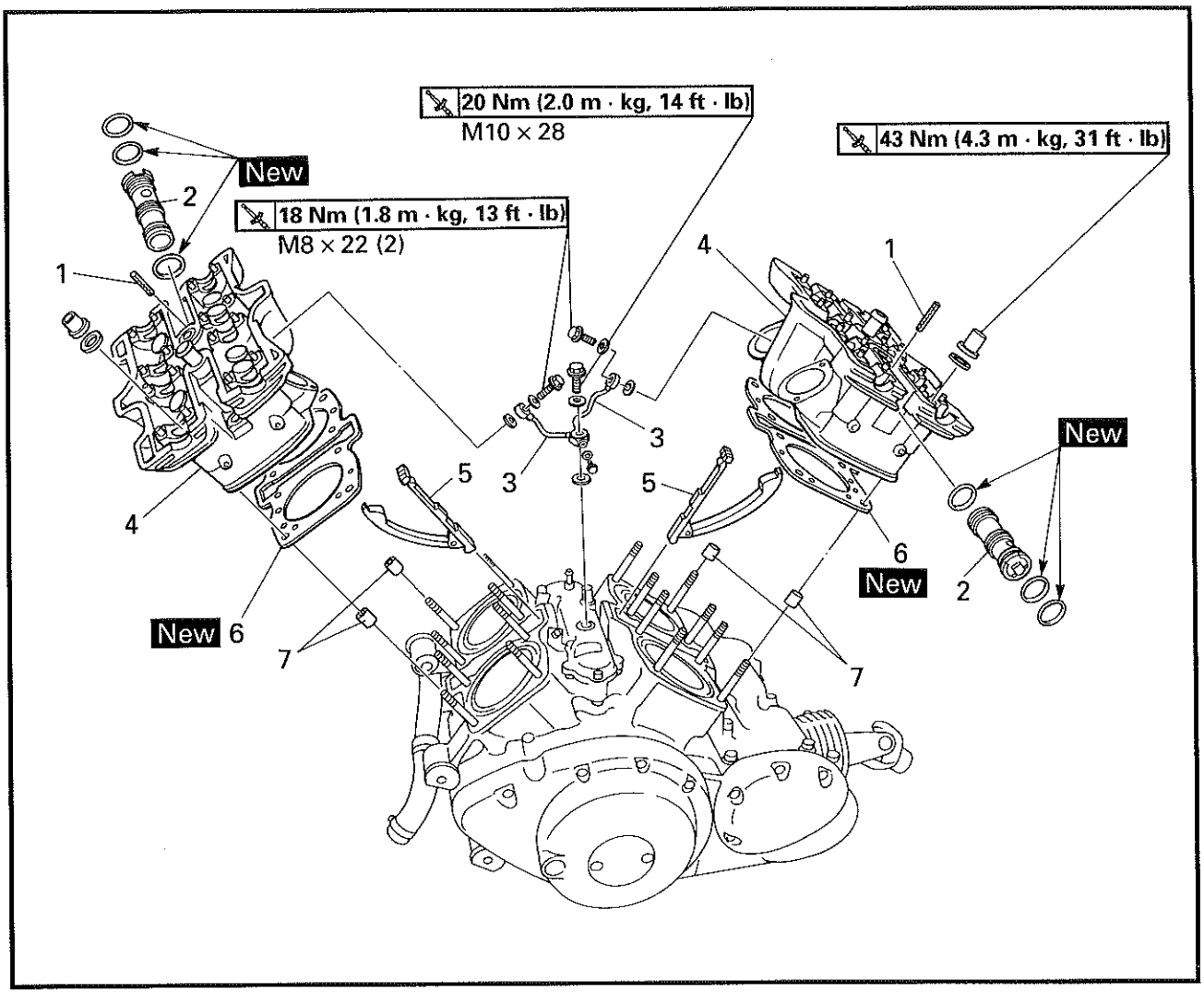
10.Inspect:
- Cooling system
  Decrease of pressure (leaks) → Repair as required.
  Refer to "RADIATOR" in CHAPTER 5.

11.Install:
- Carburetors
  Refer to "CARBURETORS" in CHAPTER 6.

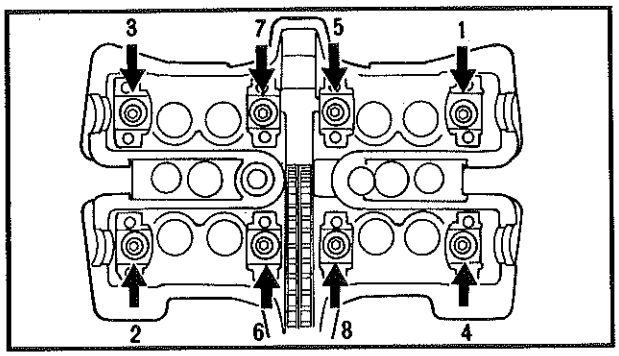
12.Install:
- Air filter case
  Refer to "AIR FILTER CLEANING" in CHAPTER 3.

13.Install:
- Fuel tank
- Rider seat
  Refer to "FUEL TANK" and "SEATS" in CHAPTER 3.

CYLINDER HEADS



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



REMOVAL

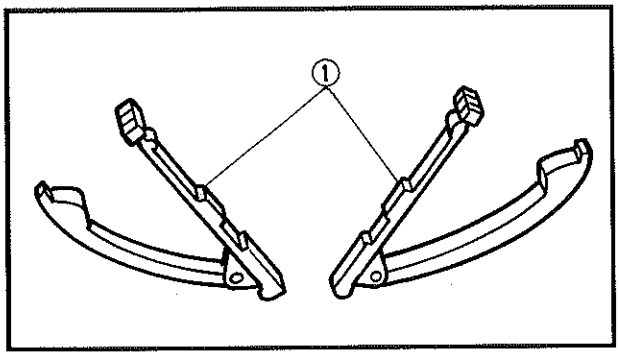
1.Remove:
- Nuts/washers (cylinder heads)

NOTE:
Follow the numerical order shown in the illustration. Start by loosening each nut 1/2 of a turn until all are loosened, then remove the nuts.

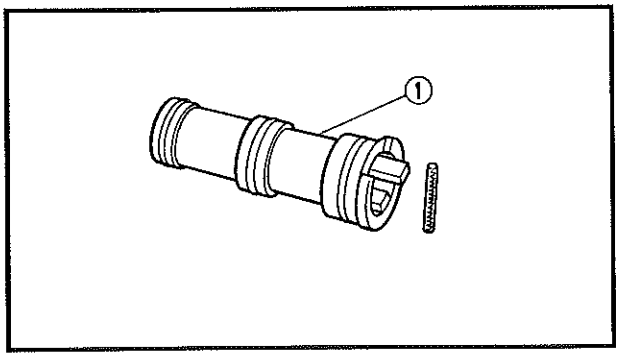
INSPECTION

1.Eliminate:
- Carbon deposits (from the combustion chambers)
  Use a rounded scraper.

NOTE:
Do not use a sharp instrument to avoid damaging or scratching:
- Spark plug threads
- Valve seats



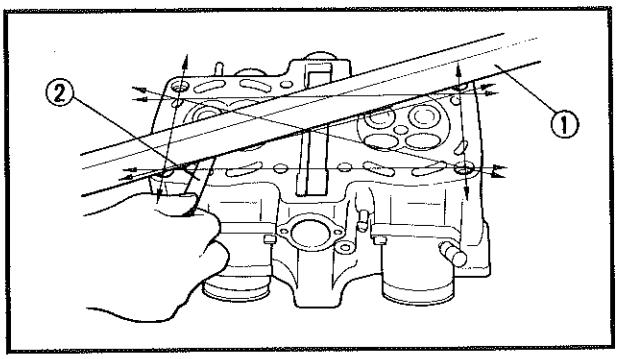
2.Inspect:
- Timing chain dampers ①
  Wear/damage → Replace.



3.Inspect:
- Cylinder head
  Scratches/damage → Replace.
- Water jacket ①
  Minerals/rust → Eliminate.

4.Measure:
- Cylinder head warpage
  Out of specification → Resurface.

Cylinder head warpage:
Less than 0.10 mm (0.004 in)



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Warpage measurement and resurfacement steps:

- Place a straightedge ① and a feeler gauge ② across the cylinder head.
- Use a feeler gauge to measure the warpage.
- If the warpage is out of specification, resurface the cylinder head.
- Place a 400 ~ 600 grit wet sandpaper on the surface plate, and resurface the head using a figure-eight sanding pattern.

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

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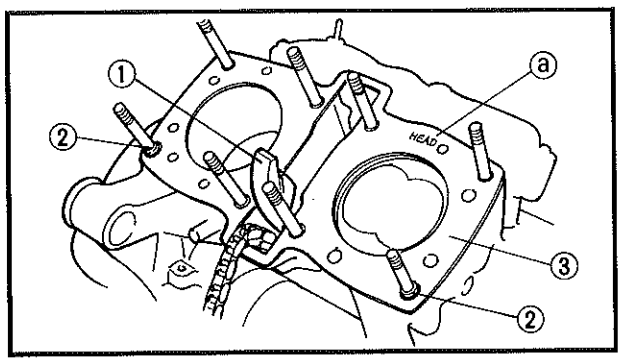
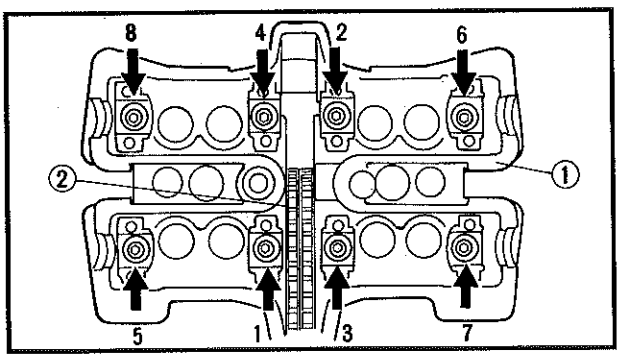




INSTALLATION

1.Install:
- Timing chain dampers ①

2.Install:
- Dowel pins ②
- Gasket (cylinder head) ③ New

NOTE:
The "HEAD" mark ⓐ on the gasket must face up and towards the intake side of the cylinder.

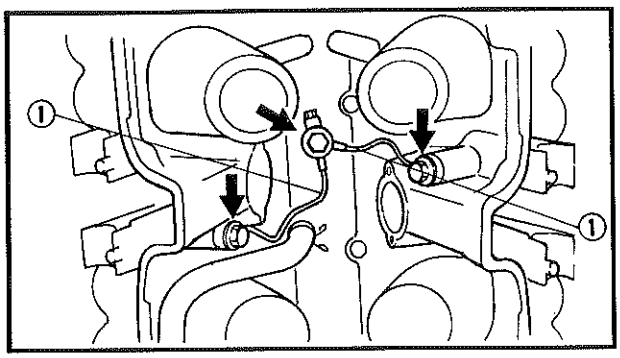
3.Install:
- Cylinder head ①

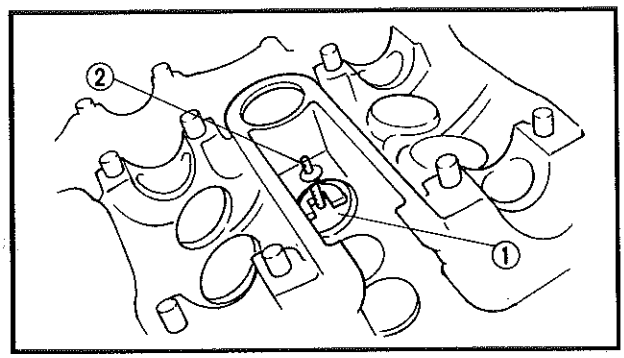
  Pass the timing chain ② through the timing chain cavity.

4.Tighten:
- Nuts/washers (cylinder head)

43 Nm (4.3 m · kg, 31 ft · lb)

NOTE:
- Never apply engine oil onto the nut threads.
- Tighten the nuts in the proper tightening sequence and torque them in two stages.





5.Install:
- Copper washers **New**
- Oil delivery pipes ①
- Union bolt (M8)

18Nm (1.8 m · kg, 13 ft · lb)

- Union bolt (M10)

20Nm (2.0 m · kg, 14 ft · lb)

NOTE:
Tighten the three union bolts evenly, then torque all three to specifications.

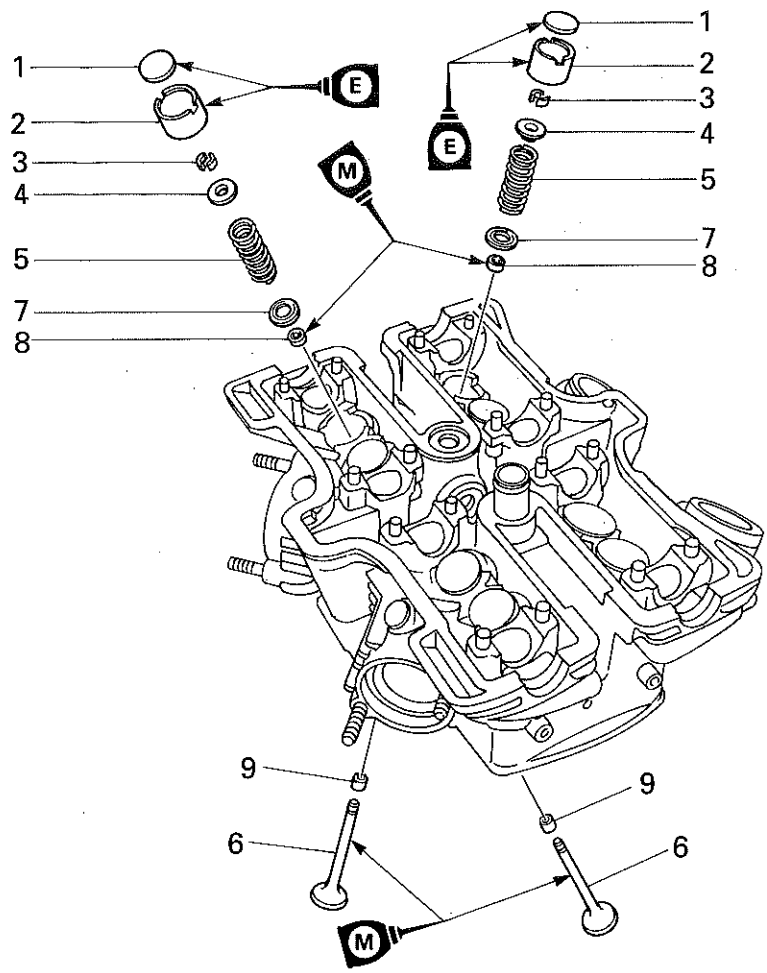
6.Install:
- Water jacket joints ①
- Lock pins ②

⚠ WARNING
Always use new O-rings.

7.Install:
- Camshafts (intake and exhaust)
- Cylinder head covers
  Refer to "CAMSHAFTS".

8.Install:
- Engine assembly
  Refer to "ENGINE REMOVAL".

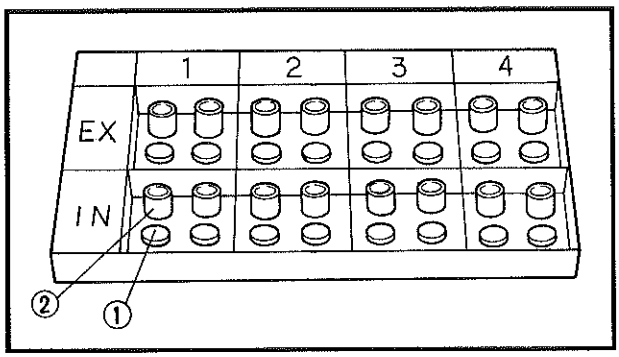
VALVES AND VALVE SPRINGS



Order	Job name/Part name	Q'ty	Remarks
	Valve and valve spring removal		Remove the parts in the order below.
	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 keepers	32	
4	Valve spring retainers	16	
5	Valve springs	16	
6	Valves (intake / exhaust)	8/8	
7	Valve spring seats	16	
8	Oil seals	16	
9	Valve guides	16	
			For installation, reverse the removal procedure.

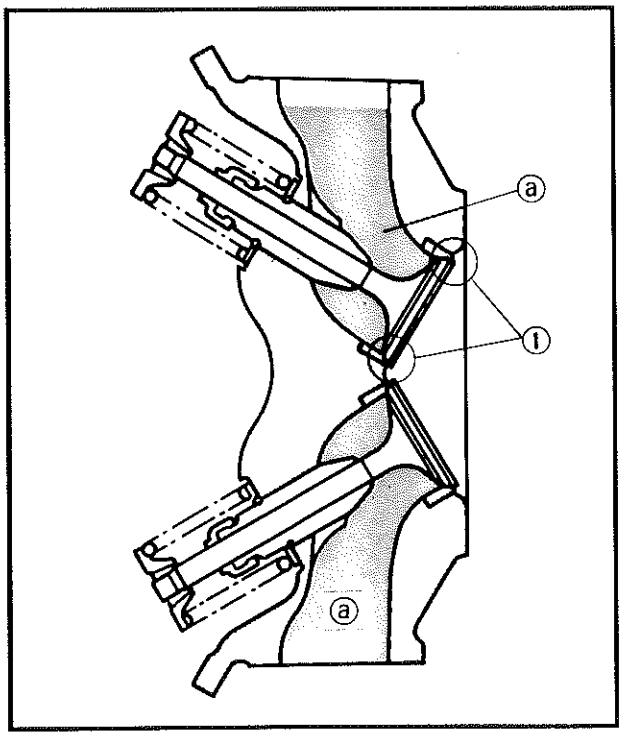
REMOVAL

NOTE:
Prior to removing the internal parts (valves, valve springs, valve seats etc.) of the cylinder head check that the valves seal properly.



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

NOTE:
Identify the position of each valve pad ① and valve lifter ② very carefully so that they can be reinstalled in their original place.

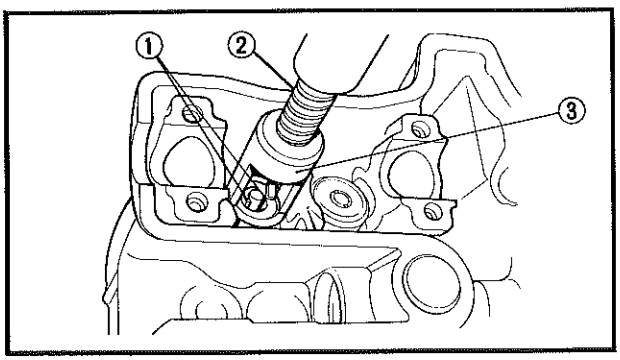


2.Check:
- Valve sealing
  Leakage at valve seat → Inspect the valve face, valve seat and valve seat width.
  Refer to "INSPECTION".

****

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

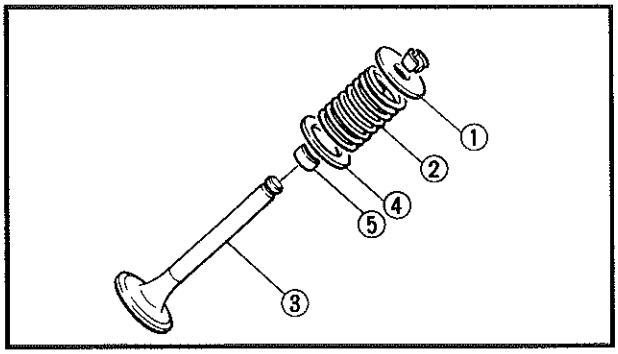
****



3.Remove:
- Valve keepers ①

NOTE:
While compressing the valve spring with a valve spring compressor ② and its attachment ③ remove the valve keepers.

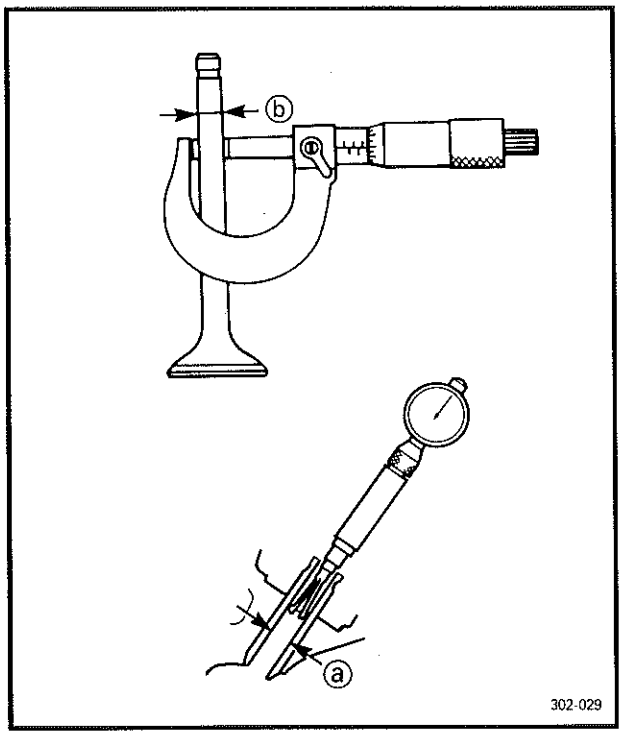
Valve spring compressor:
YM - 04019, 90890 - 04019
Attachment:
YM - 01253 - 1, 90890 - 04114



4.Remove:
- Valve spring retainer ①
- Valve spring ②
- Valve ③
- Valve spring seat ④
- Oil seal ⑤

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

5.Remove:
- Valve guide
  Refer to "Replacement steps".



INSPECTION

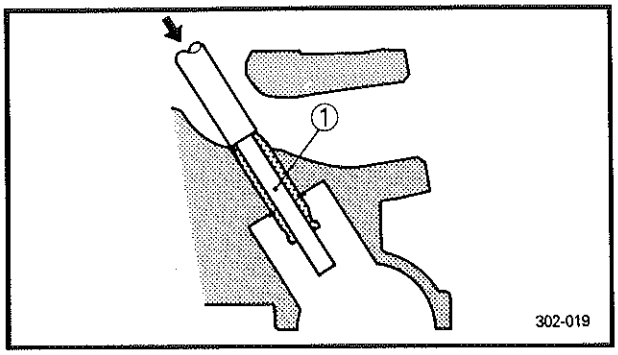
1.Measure:
- Stem-to-guide clearance

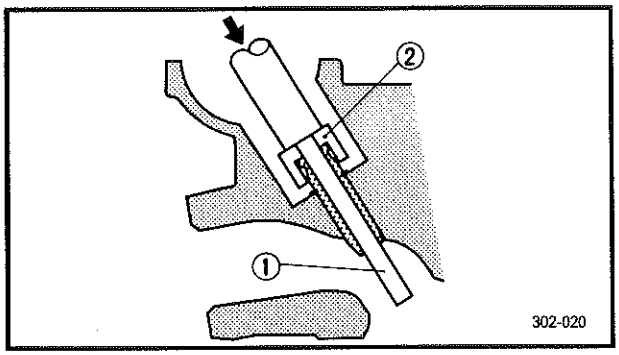
Stem-to-guide clearance =
valve guide inside diameter ⓐ –
valve stem diameter ⓑ

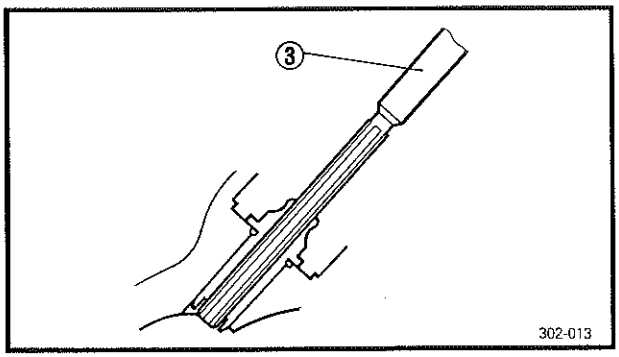
Out of specification → Replace the valve guide.

Clearance (stem to guide):
Intake:
0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in)
<Limit>: 0.08 mm (0.003 in)
Exhaust:
0.025 ~ 0.052 mm (0.0010 ~ 0.0020 in)
<Limit>: 0.10 mm (0.004 in)

2.Replace:
- Valve guide







****

Replacement steps:

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

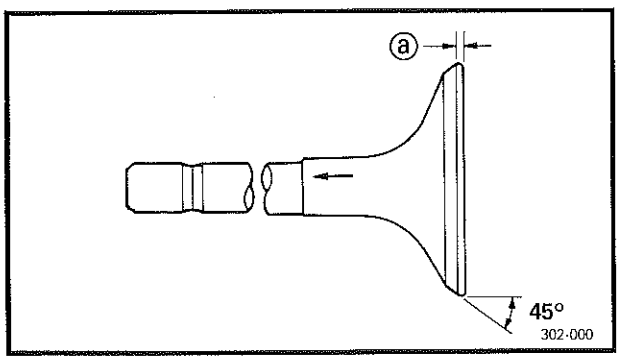
- Remove the valve guide using a valve guide remover ①.
- Install the new valve guide using a valve guide remover ① and valve guide installer ②.
- After installing the valve guide, bore the valve guide using a valve guide reamer ③ to obtain proper stem-to-guide clearance.

Valve guide remover (6.0 mm):
YM - 4064 - A, 90890 - 04064
Valve guide installer (6.0 mm):
YM - 04065 - A, 90890 - 04065
Valve guide reamer (6.0 mm):
YM - 04066, 90890 - 04066

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

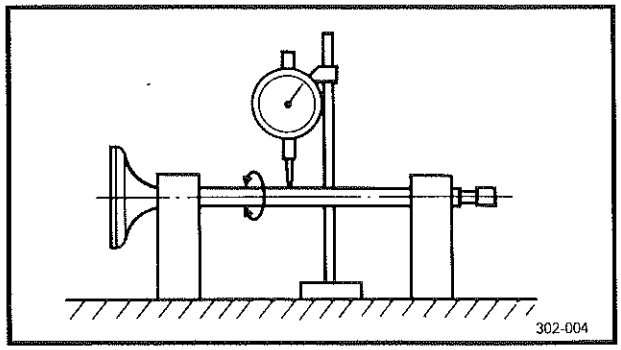
****

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



4.Measure:
- Margin thickness ⓐ
  Out of specification → Replace.

Margin thickness:
1.1 ~ 1.5 mm (0.043 ~ 0.059 in)
<Limit>: 0.7 mm (0.028 in)



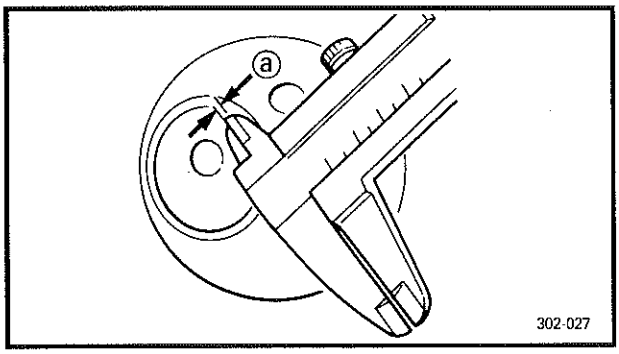
5.Measure:
- Runout (valve stem)
  Out of specification → Replace.

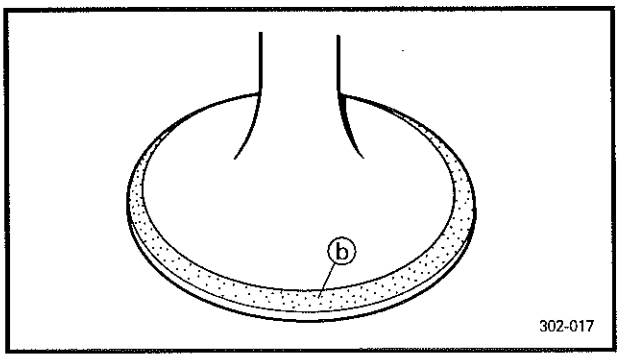
Runout limit:
0.01 mm (0.0004 in)

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

6.Eliminate:
- Carbon deposits
  (from the valve face and valve seat)

7.Inspect:
- Valve seats
  Pitting/wear → Reface the valve seat.





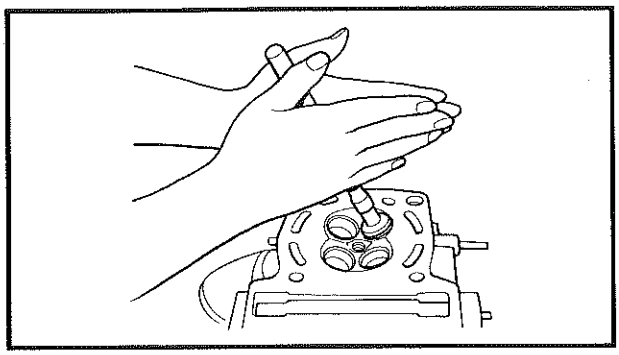
8.Measure:
- Valve seat width ⓐ
  Out of specification → Reface the valve seat.

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)

****

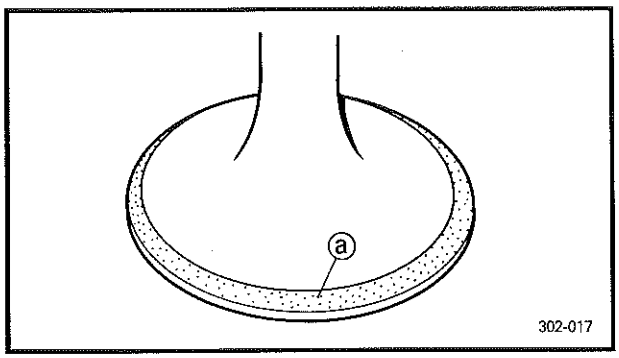
Measurement steps:
- Apply Mechanic's blueing dye (Dykem) ⓑ to the valve face.
- Install the valve into the cylinder head.
- Press the valve through the valve guide and onto the valve seat to make a clear pattern.
- Measure the valve seat width. Where the valve seat and valve face made contact, blueing will have been removed.
- If the valve seat is too wide, too narrow, or the seat is not centered, the valve seat must be refaced.

****



9.Lap:
- Valve face
- Valve seat

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



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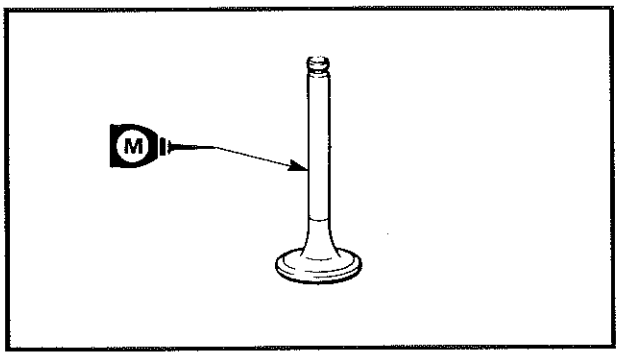
Lapping steps:

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

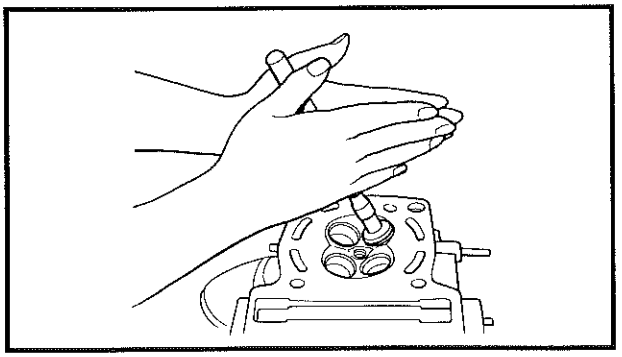
CAUTION:
Do not let the compound enter the gap between the valve stem and the guide.

- Apply molybdenum disulfide oil to the valve stem.
- Install the valve into the cylinder head.
- Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the compound.

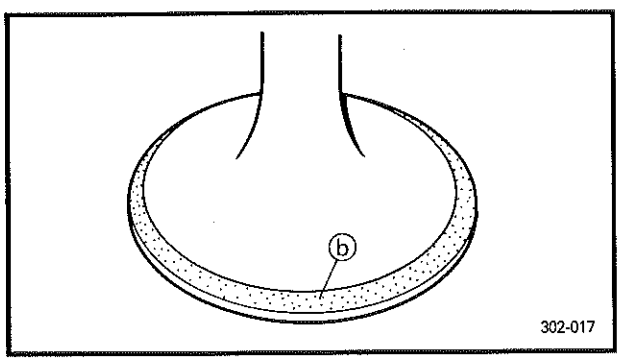


NOTE:
For best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.

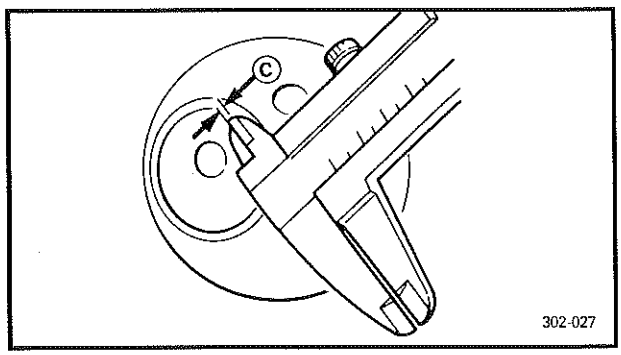
- Apply a fine lapping compound to the valve face and repeat the above steps.



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

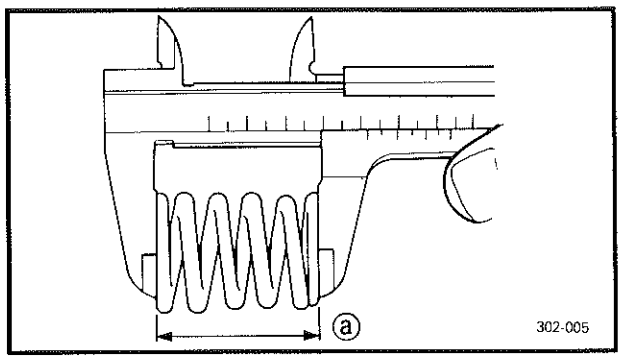


- Apply Mechanic's blueing dye (Dykem) ⓑ to the valve face.
- Install the valve into the cylinder head.
- Press the valve through the valve guide and onto the valve seat to make a clear pattern.



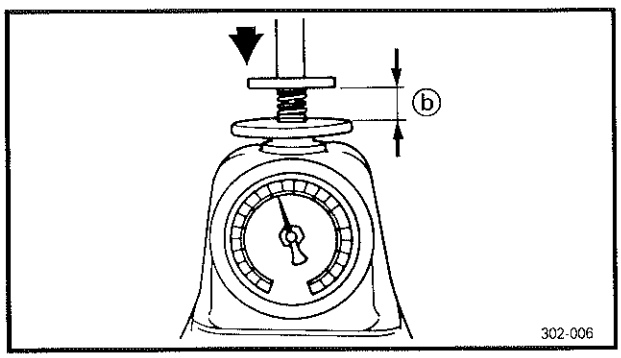
● Measure the valve seat width ⓒ again. If the valve seat width is out of specification, reface and relap the valve seat.

****



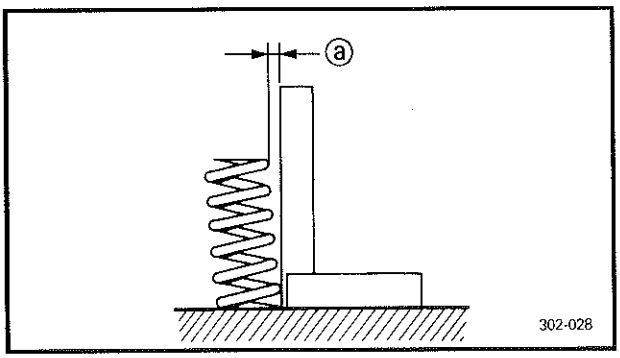
10. Measure:
- Valve spring free length ⓐ
  Out of specification → Replace.

Free length (valve spring):
54.29 mm (2.14 in)



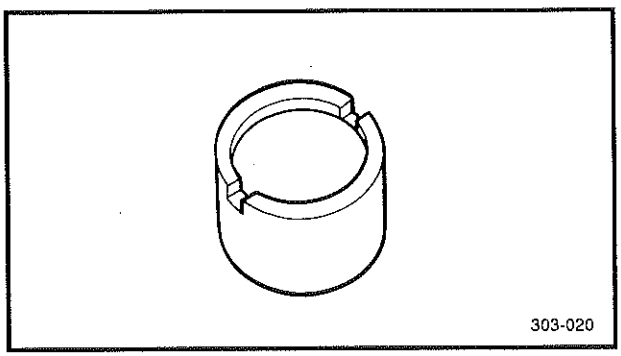
11. Measure:
- Compressed spring force ⓐ
  Out of specification → Replace.
  ⓑ Installed length

Compressed spring force:
13.9 ~ 16.1 kg (30.57 ~ 35.52 lb)
at 33.45 mm (1.3 in)



12. Measure:
- Spring tilt ⓐ
  Out of specification → Replace.

Spring tilt limit:
2.5°/2.4 mm (2.5°/0.094 in)



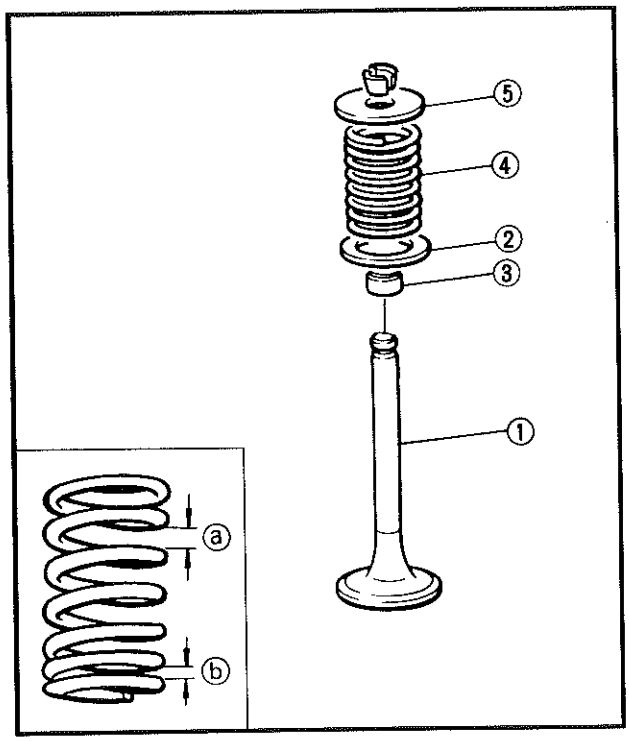
13. Inspect:
- Valve lifters
  Scratches/damage → Replace the lifters and cylinder head.

INSTALLATION

1.Deburr:
- Valve stem end
  Use an oil stone to smooth the stem end.

2.Apply:
- Molybdenum disulfide oil
  (onto the valve stem and oil seal)

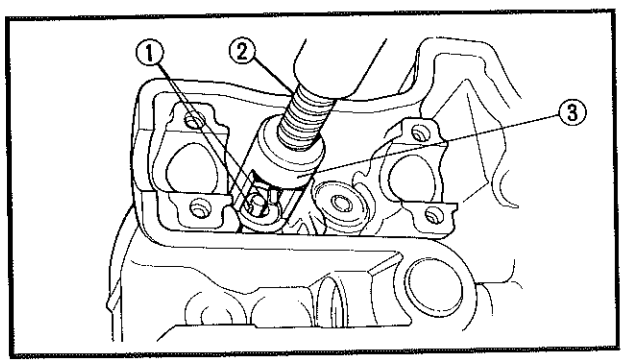
3.Install:
- Valve guide
  Refer to "Replacement steps".



4.Install:
- Valve ①
- Valve spring seat ②
- Oil seal ③
- Valve spring ④
- Valve spring retainer ⑤
  (into the cylinder head)

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

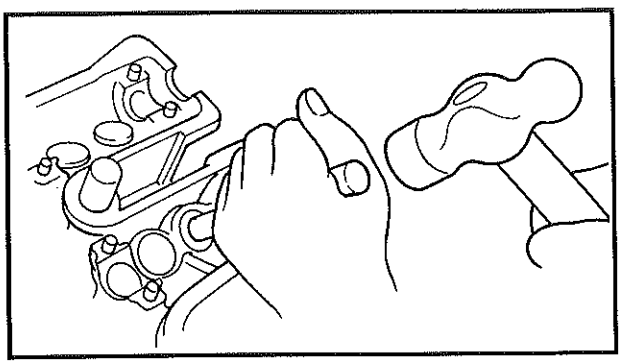
ⓑ Smaller pitch



5.Install:
- Valve keepers ①

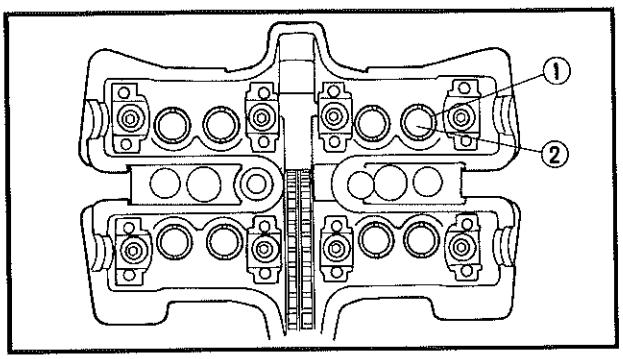
NOTE:
While compressing the valve spring with a valve spring compressor ② and its attachment ③ install the valve keepers.

Valve spring compressor:
YM - 04019, 90890 - 04019
Attachment:
YM - 01253 - 1, 90890 - 04114



6.To secure the valve keepers onto the valve stem lightly tap the valve tip with a piece of wood.

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



7.Install:
- Valve lifter ①
- Valve pad ②

NOTE:
- Apply engine oil to the valve lifter and pad.
- When rotated with a finger, the valve lifter should move smoothly.
- Each valve lifter and pad must be reinstalled in their original position.
- The number on the valve pad should face down.

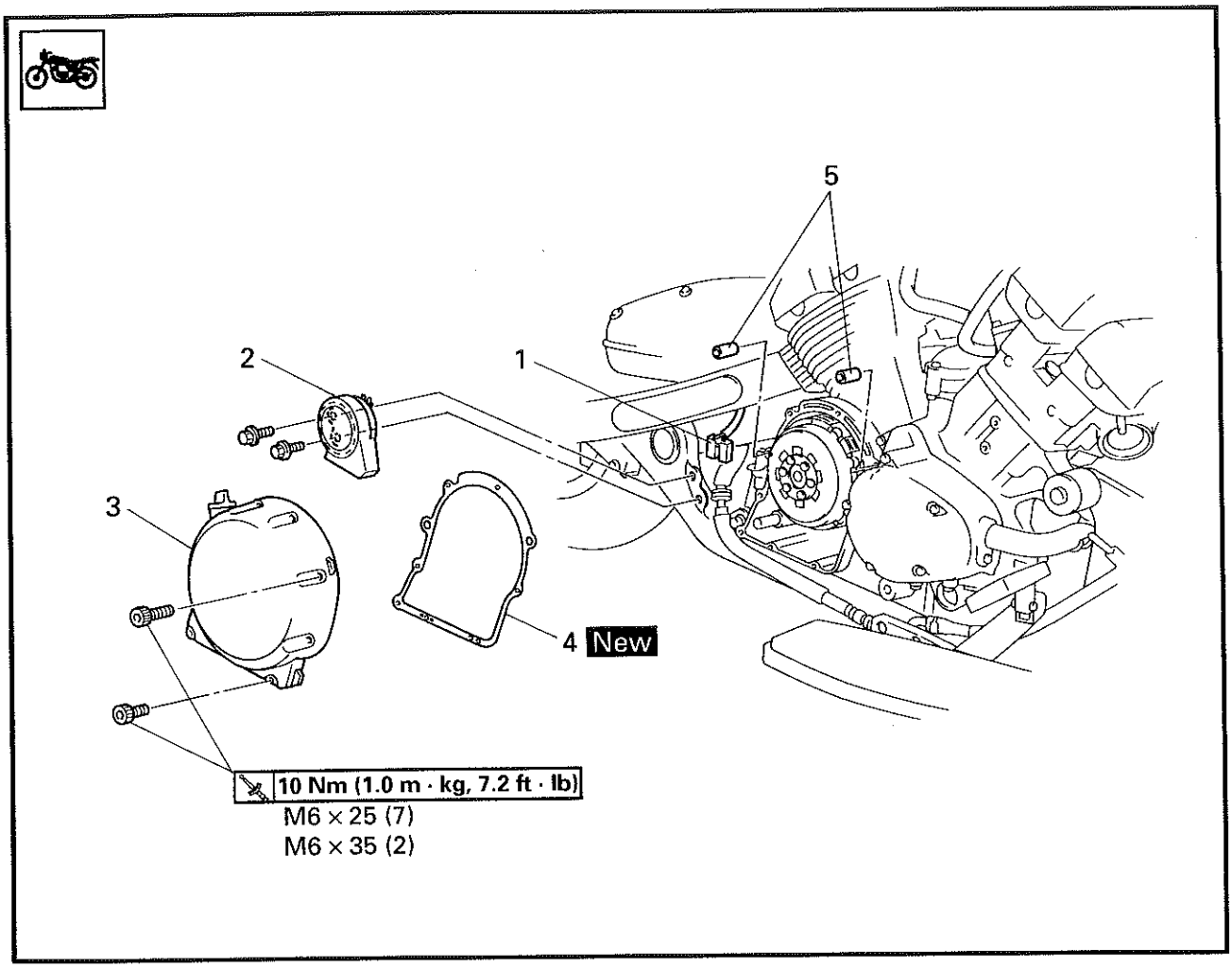
8.Install:
- Cylinder heads
  Refer to "CYLINDER HEADS".

9.Install:
- Camshafts
  Refer to "CAMSHAFTS".

10.Install:
- Engine assembly
  Refer to "ENGINE REMOVAL".

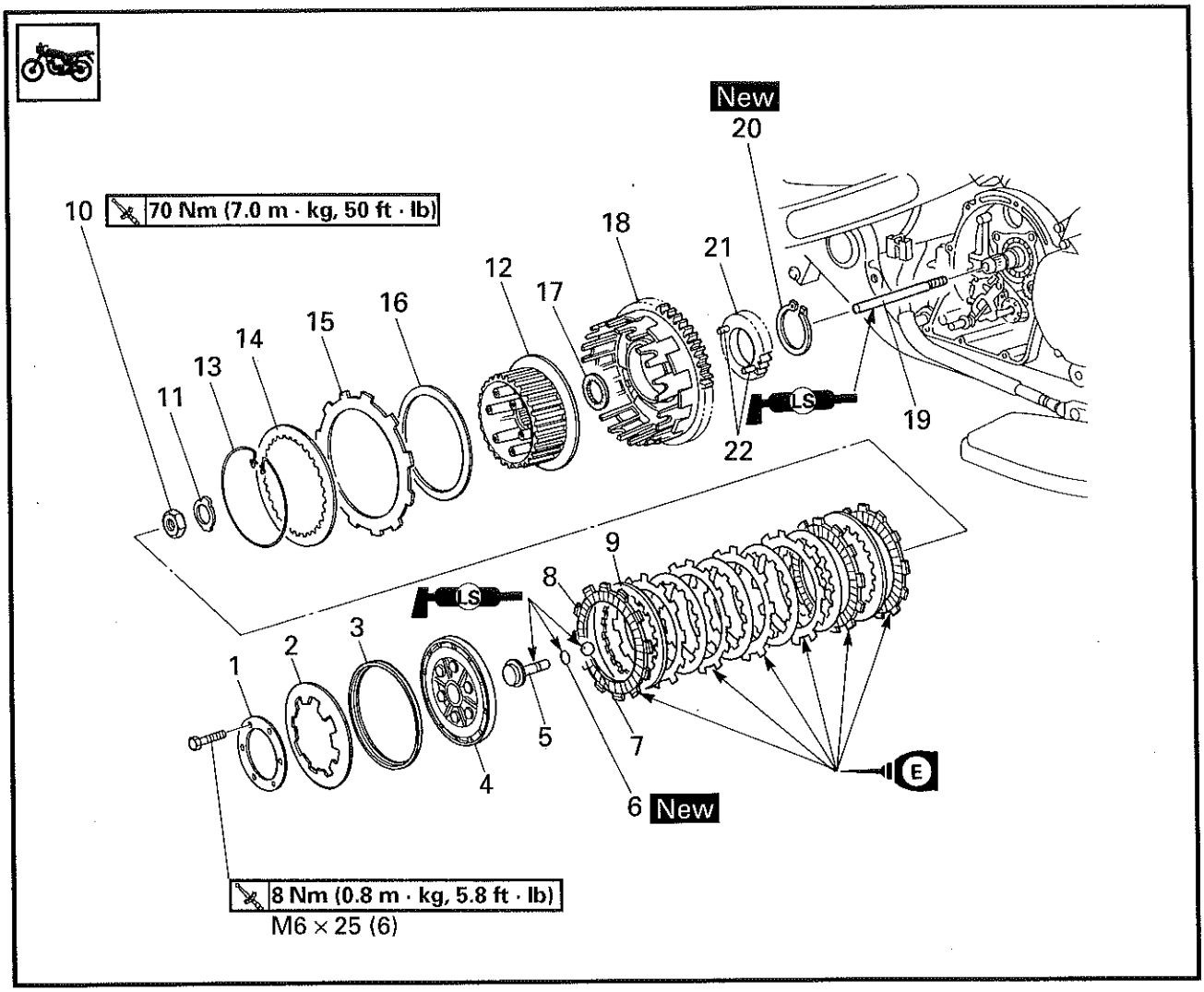
CLUTCH

CRANKCASE COVER (RIGHT SIDE)

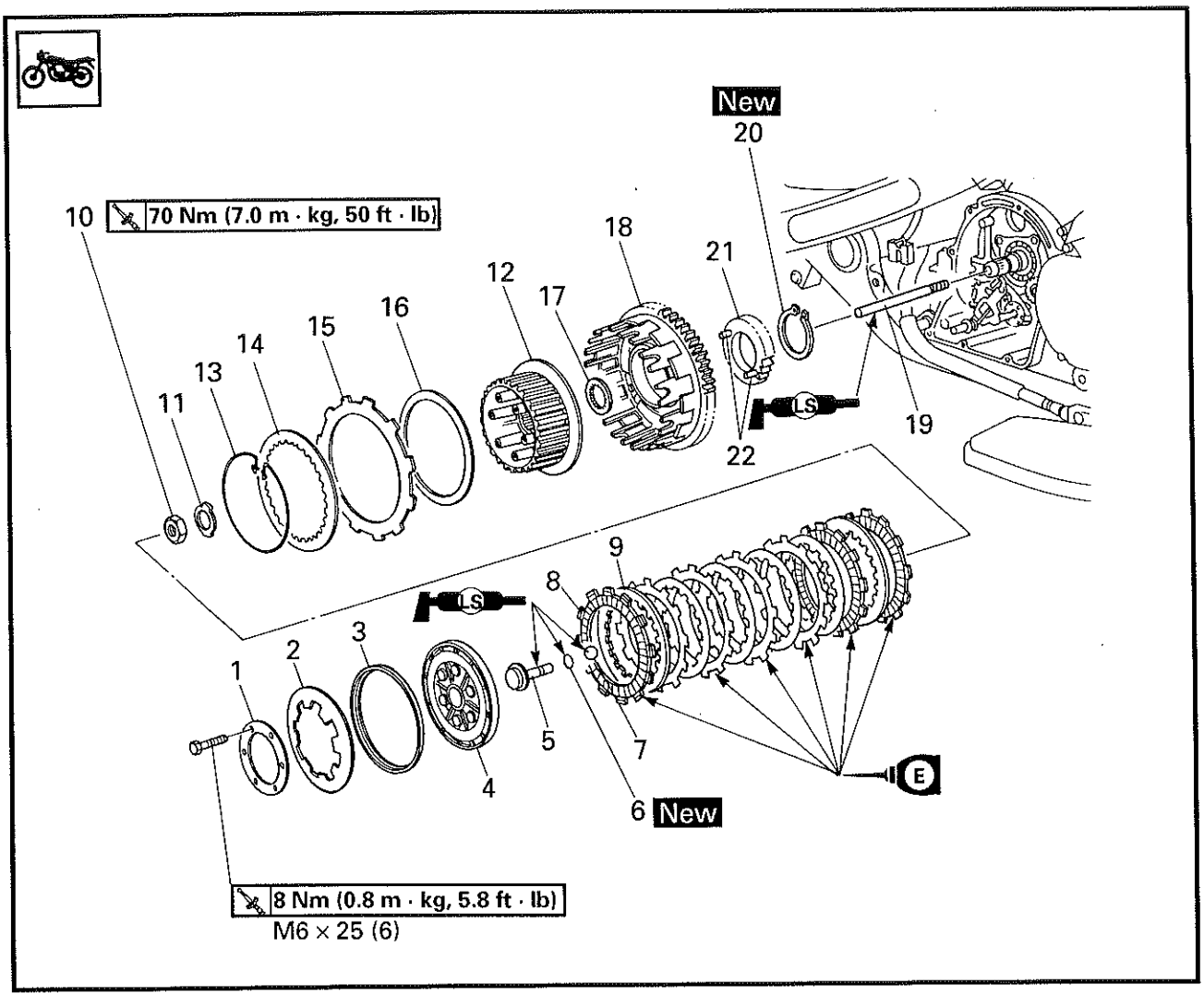


Order	Job name/Part name	Q'ty	Remarks
	Crankcase cover (right side) removal		Remove the parts in the order below. Stand the motorcycle on a level surface. **⚠ WARNING** **Securely support the motorcycle so there is no danger of it falling over.**
	Engine oil		Refer to "ENGINE OIL REPLACEMENT" in CHAPTER 3.
	Muffler assembly (right side), exhaust pipe (#4 cylinder)		Refer to "ENGINE REMOVAL".
1	Horn leads	2	Disconnect
2	Horn	1	
3	Crankcase cover (right side)	1	
4	Gasket	1	
5	Dowel pins	2	
			For installation, reverse the removal procedure.

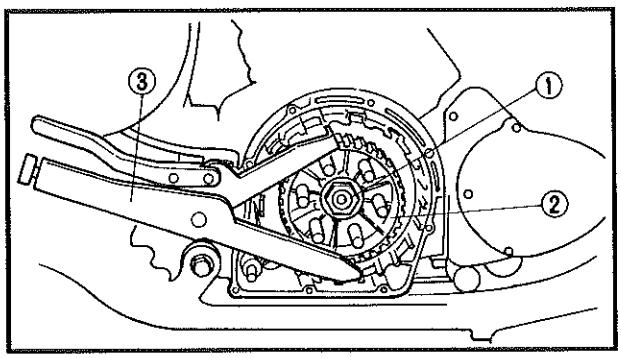
CLUTCH ASSEMBLY



Order	Job name/Part name	Q'ty	Remarks
	Clutch assembly removal		Remove the parts in the order below.
1	Clutch spring plate	1	
2	Clutch spring	1	
3	Clutch spring seat	1	
4	Pressure plate	1	
5	Push rod #2	1	
6	O-ring	1	
7	Ball	1	
8	Friction plates	7	
9	Clutch plates	6	
10	Nut	1	Refer to "REMOVAL".
11	Lock washer	1	
12	Clutch boss	1	
13	Retaining wire	1	
14	Clutch plate	1	



Order	Job name/Part name	Q'ty	Remarks
15	Friction plate	1	
16	Spring plate	1	
17	Washer	1	
18	Clutch housing	1	
19	Push rod #1	1	
20	Circlip	1	
21	Oil pump drive gear	1	
22	Dowel pins	2	
			For installation, reverse the removal procedure.



REMOVAL

1.Straighten:
- Lock washer tab

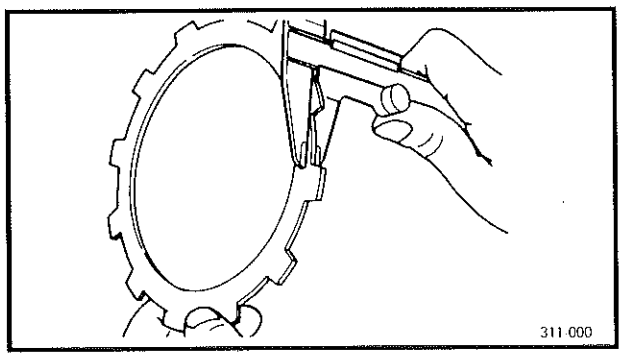
2.Loosen:
- Nut (clutch boss) ①

NOTE:
Loosen the nut ① (clutch boss) while holding the clutch boss ② with the universal clutch holder ③.

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

INSPECTION

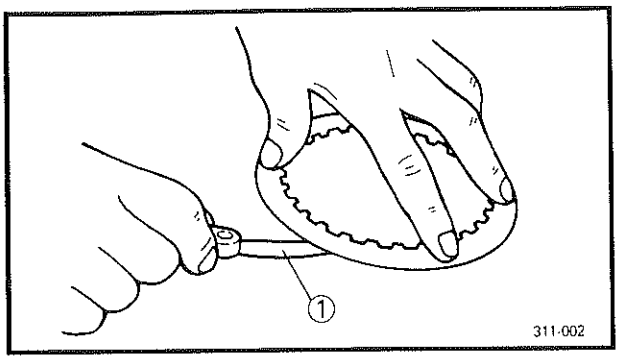
1.Inspect:
- Friction plates
  Wear/damage → Replace the friction plates as a set.



2.Measure:
- Friction plate thickness
  Out of specification → Replace the friction plates as a set.
  Measure at four places.

	Thickness (friction plate): **2.9 ~ 3.1 mm (0.114 ~ 0.122 in)** **<Wear limit>: 2.8 mm (0.11 in)**

3.Inspect:
- Clutch plate
  Damage → Replace the clutch plates as a set.



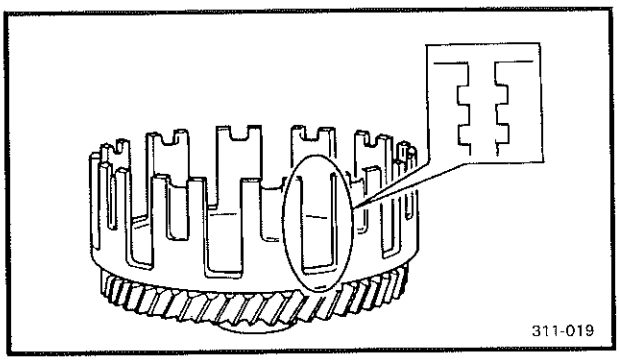
4.Measure:
- Clutch plate warpage
  Out of specification → Replace the clutch plates as a set.
  Use a surface plate and a feeler gauge ①.

Warp limit (clutch plate):
Less than 0.2 mm (0.008 in)

5.Inspect:
- Primary drive gear teeth
  Wear/damage → Replace the clutch housing.

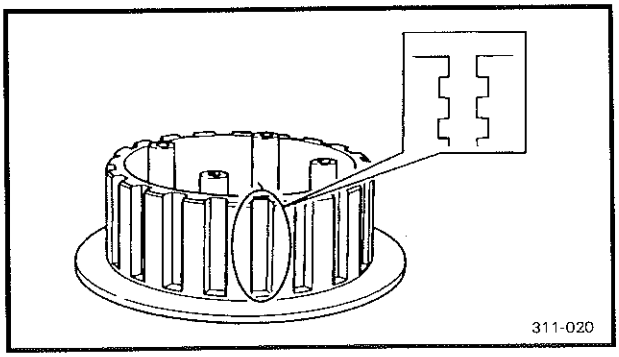
6.Check:
- Circumferential play
  Free play → Replace the clutch housing.

7.Inspect:
- Clutch spring
  Damage → Replace the clutch spring.



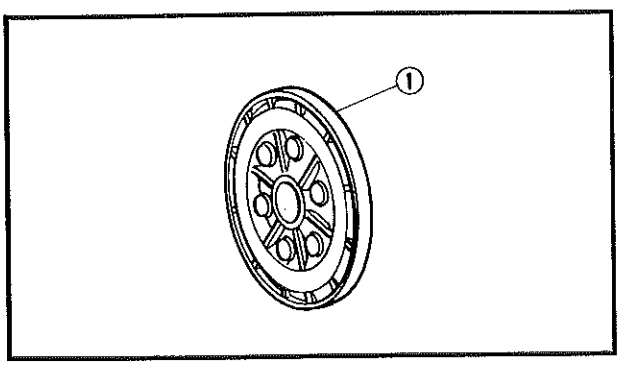
8.Inspect:
- Dogs (on the clutch housing)
  Pitting/wear/damage → Deburr or replace.
- Clutch housing bearing
  Wear/damage → Replace the clutch housing.

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

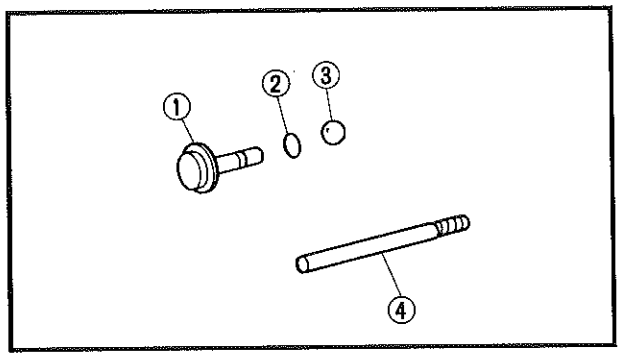


9.Inspect:
- Clutch boss splines
  Pitting/wear/damage → Replace the clutch boss.

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

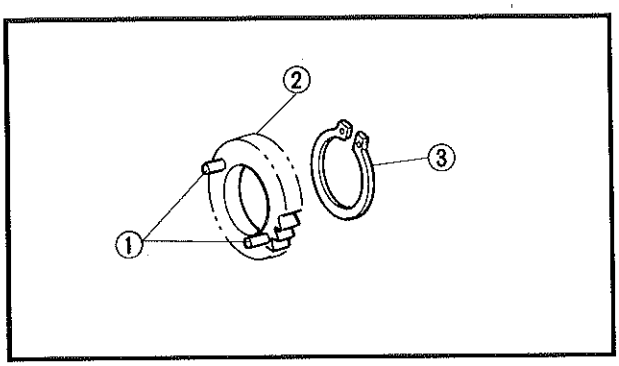


10.Inspect:
- Pressure plate ①
  Cracks/damage → Replace.



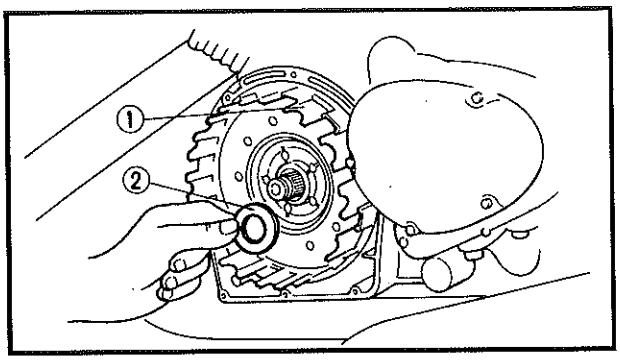
11.Inspect:
- Push rod #2 ①
- O-ring ② New
- Ball ③
- Push rod #1 ④

Cracks/wear/damage → Replace.

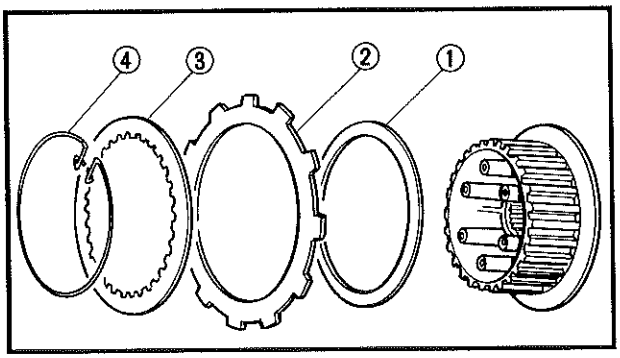


INSTALLATION

1.Install:
- Dowel pins ①
- Oil pump drive gear ②
- Circlip ③ New

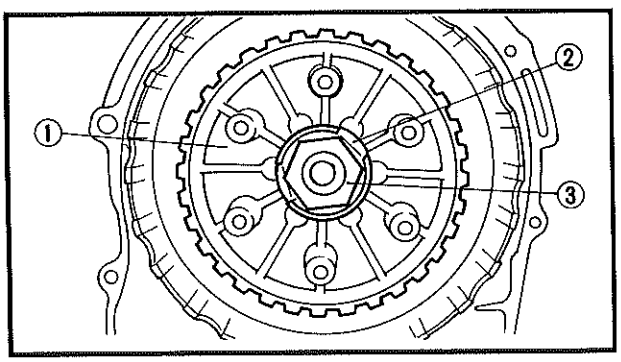


2.Install:
- Clutch housing ①
- Washer ②

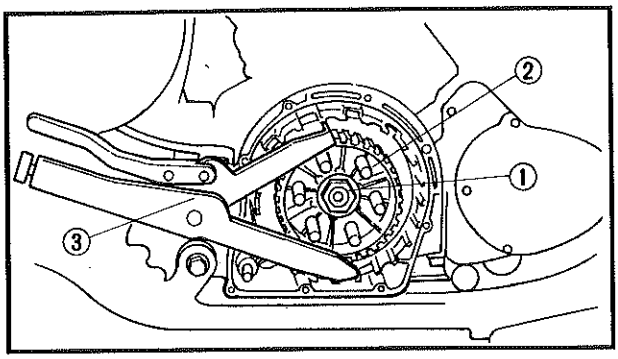


3.Install:
- Spring plate ①
- Friction plate ②
- Clutch plate ③
- Retaining wire ④

NOTE:
Install the spring plate with the "OUTSIDE" mark facing towards the outside of the engine.



4.Install:
- Clutch boss ①
- Lock washer ② New
- Nut (clutch boss) ③



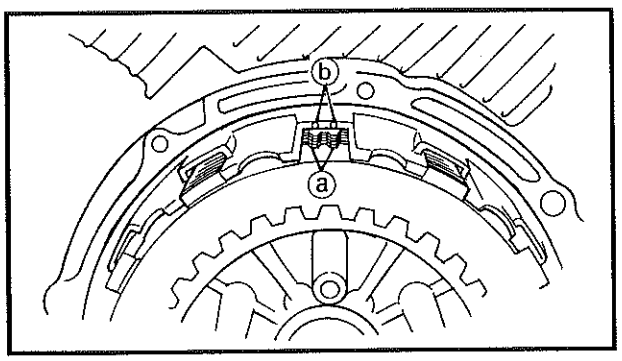
5.Tighten:
- Nut (clutch boss) ①

70 Nm (7.0 m · kg, 50 ft · lb)

NOTE:
Tighten the clutch boss nut ① while holding the clutch boss ② with a universal clutch holder ③.

Universal clutch holder:
YM - 91042, 90890 - 04086

6.Bend:
- Lock washer tab (along a flat side of the nut)



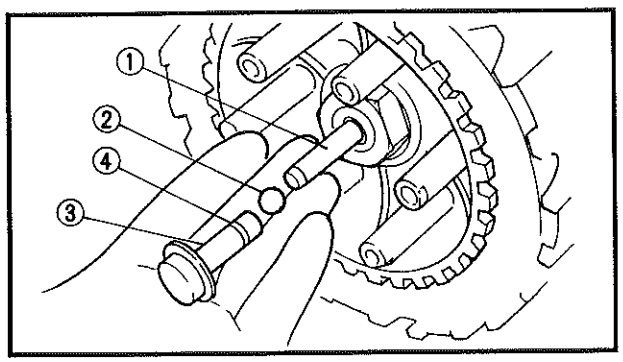
7.Install:
- Friction plates
- Clutch plates

****

Installation steps:
- Install one friction plate and one clutch plate alternately.

NOTE:
- Apply engine oil onto the friction plates.
- Align the two slots ⓐ on the friction plates with the two punch marks ⓑ on the clutch housing.

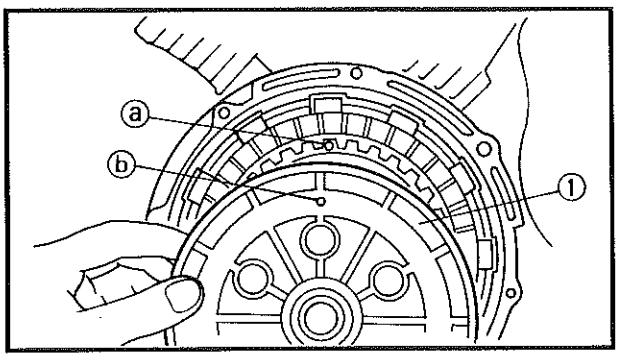
****



8.Install:
- Push rod #1 ①
- Ball ②
- Push rod #2 ③ (with O-ring ④)

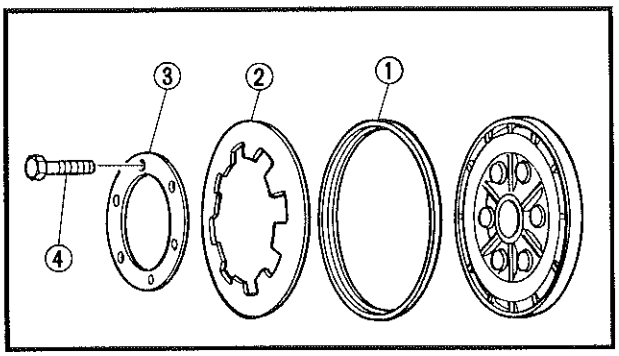
NOTE:
Apply lithium soap base grease onto the push rod and the ball.

⚠ WARNING
Always use a new O-ring.



9.Install:
- Pressure plate ①

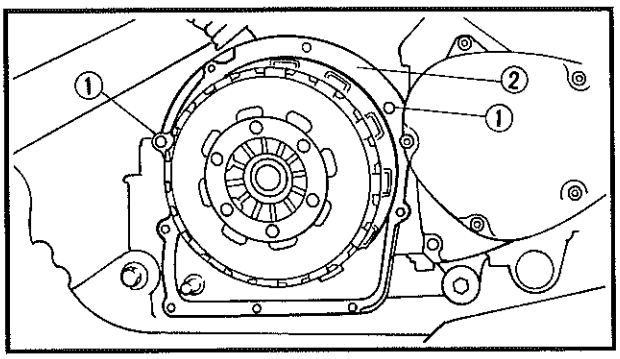
NOTE:
Align the punch mark ⓐ on the clutch boss with the punch mark ⓑ on the pressure plate.



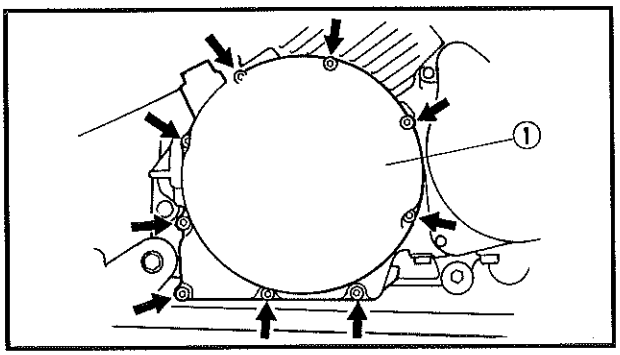
10.Install:
- Clutch spring seat ①
- Clutch spring ②
- Clutch spring plate ③
- Bolts (clutch spring plate)

8Nm (0.8 m · kg, 5.8 ft · lb)

NOTE:
Tighten the clutch spring plate bolts in stages, using a crisscross pattern.



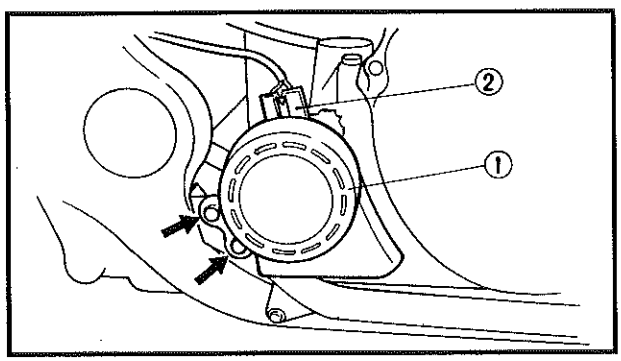
11.Install:
- Dowel pins ①
- Gasket ② New



12.Install:
- Crankcase cover (right side) ①

10Nm (1.0 m · kg, 7.2 ft · lb)

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



13.Install:
- Horn ①

14.Connect:
- Horn leads ②

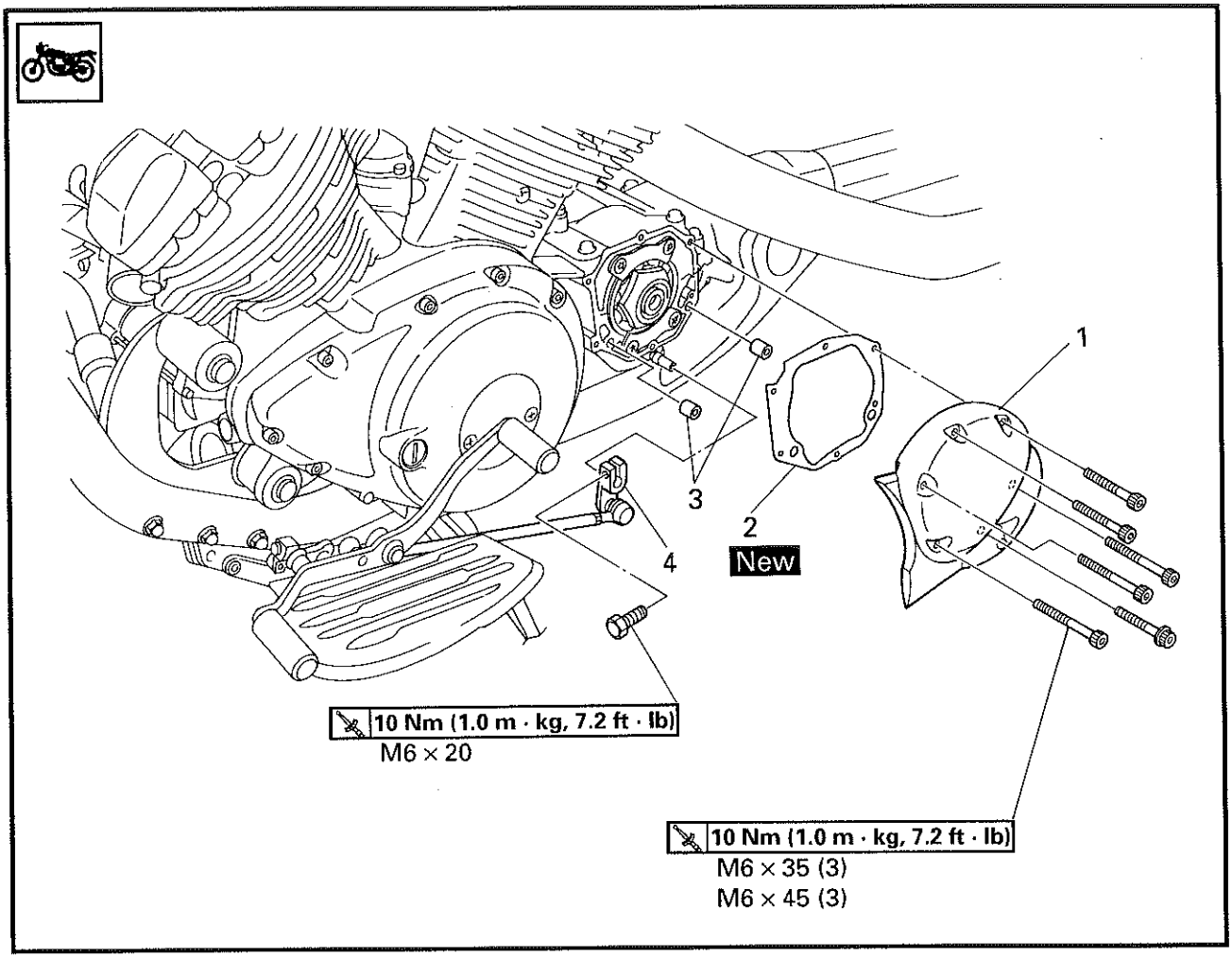
15.Install:
- Exhaust pipe (#4 cylinder)
- Muffler (right side)
  Refer to "ENGINE REMOVAL".

16.Fill:
- Crankcase
  Refer to "ENGINE OIL REPLACEMENT" in CHAPTER 3.

	**Total amount:** **4.3 L (3.8 Imp qt, 4.5 US qt)**

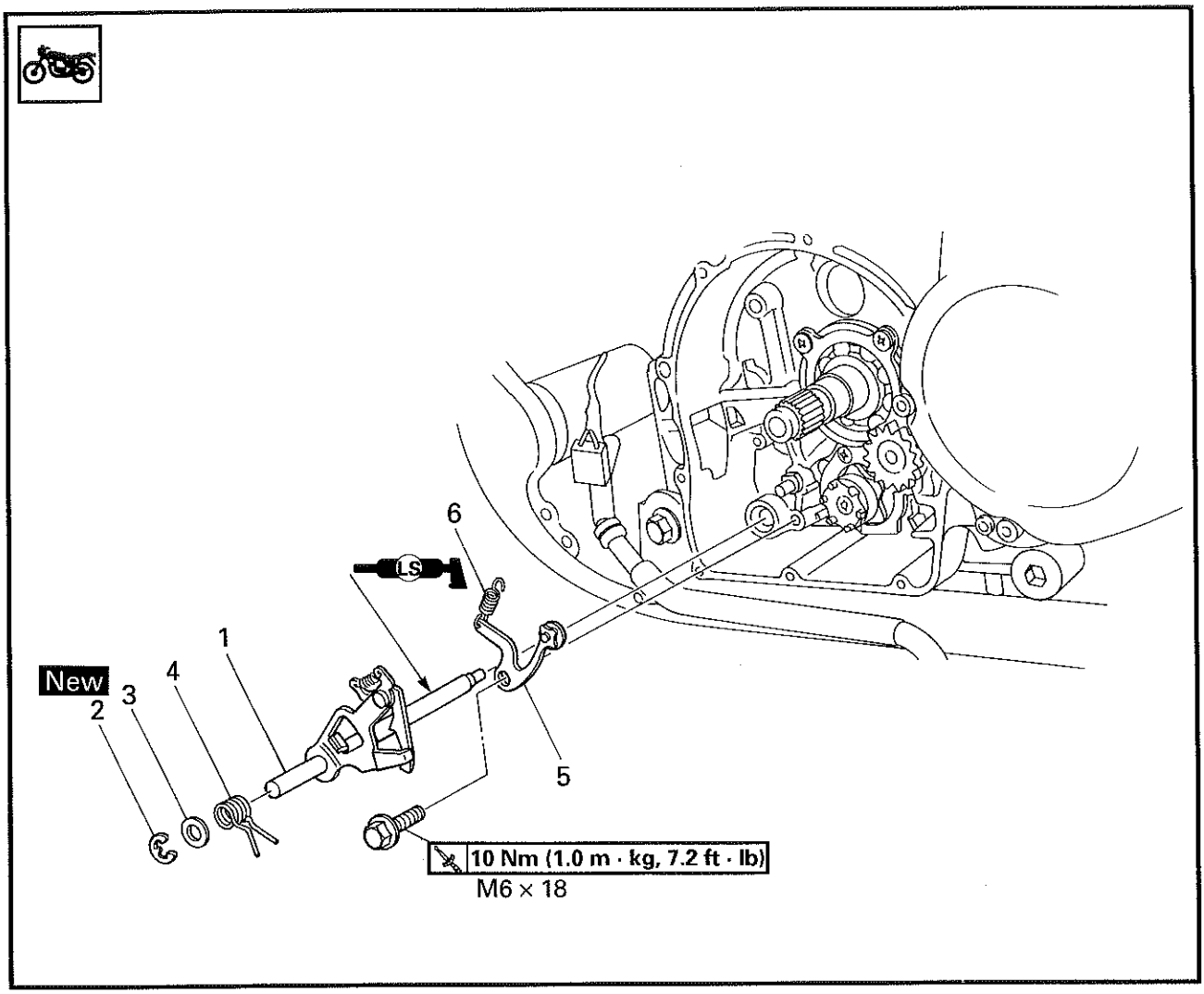
SHIFT SHAFT

SHIFT SHAFT AND STOPPER LEVER (A)

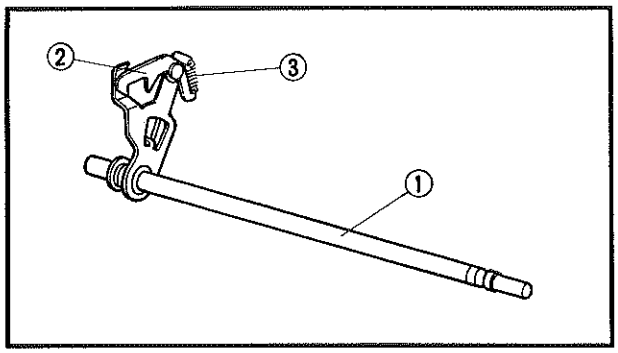


Order	Job name/Part name	Q'ty	Remarks
	Shift shaft and stopper lever removal (A)		Remove the parts in the order below.
	Engine oil		Refer to "ENGINE OIL REPLACEMENT" in CHAPTER 3.
	Muffler assembly (left side), exhaust pipe (#2 cylinder)		Refer to "ENGINE REMOVAL".
1	Middle gear case cover	1	**NOTE:** Loosen the bolts in a crisscross pattern.
2	Gasket	1	
3	Dowel pins	2	
4	Shift pedal link	1	Disconnect For installation, reverse the removal procedure.

SHIFT SHAFT AND STOPPER LEVER (B)

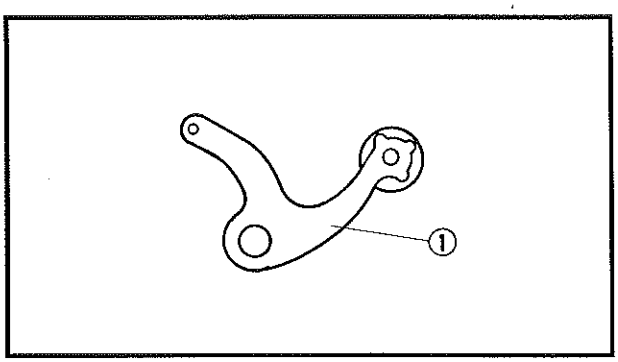


Order	Job name/Part name	Q'ty	Remarks
	Shift shaft and stopper lever removal (B)		Remove the parts in the order below.
1	Shift shaft assembly	1	
2	Circlip	1	
3	Washer	1	
4	Torsion spring	1	
5	Stopper lever	1	
6	Return spring	1	
			For installation, reverse the removal procedure.

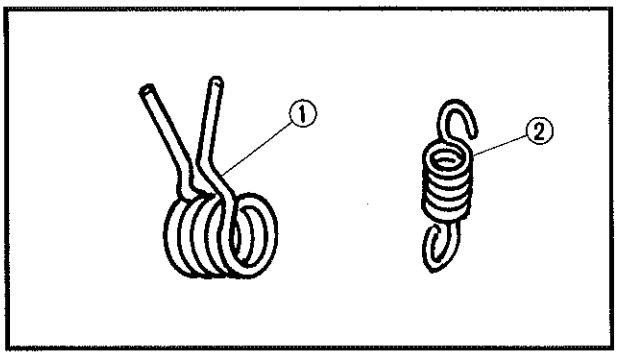


INSPECTION

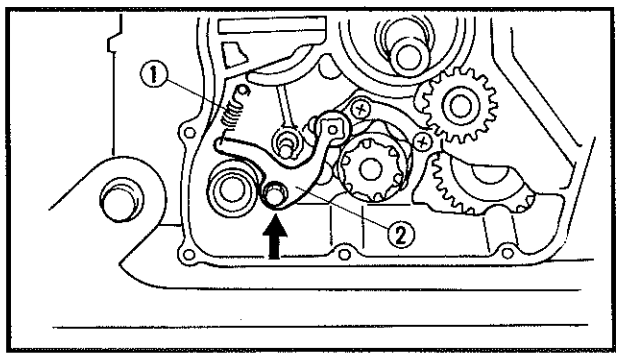
1.Inspect:
- Shift shaft ①
- Shift lever ②
- Return spring (shift arm) ③
  Bends/wear/damage → Replace.



2.Inspect:
- Stopper lever ①
  Roller turns roughly → Replace.
  Bends/damage → Replace.



3.Inspect:
- Torsion spring ①
- Return spring ②
  Wear/damage → Replace.

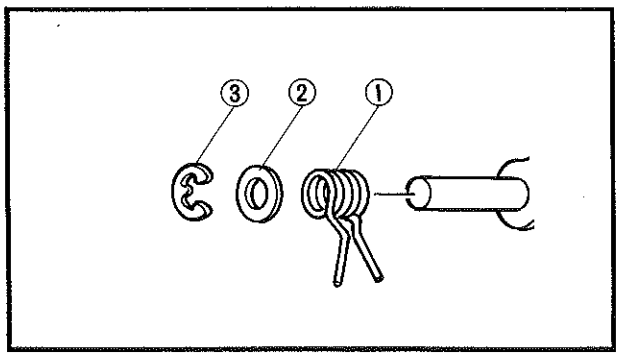


INSTALLATION

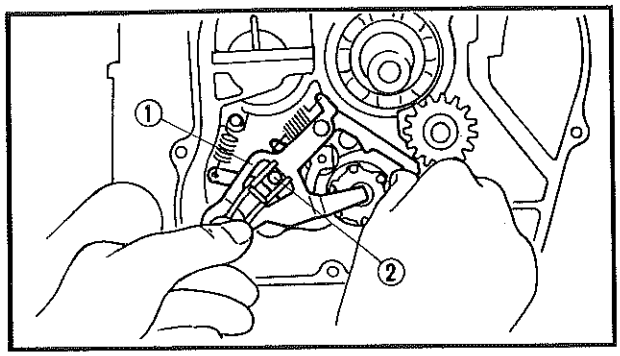
1.Install:
- Return spring ①
- Stopper lever ②

10Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
- Hook the spring ends on the stopper lever and the crankcase boss.
- Mesh the stopper lever with the shift cam stopper.



2.Install:
- Torsion spring ①
- Washer ②
- Circlip ③ New

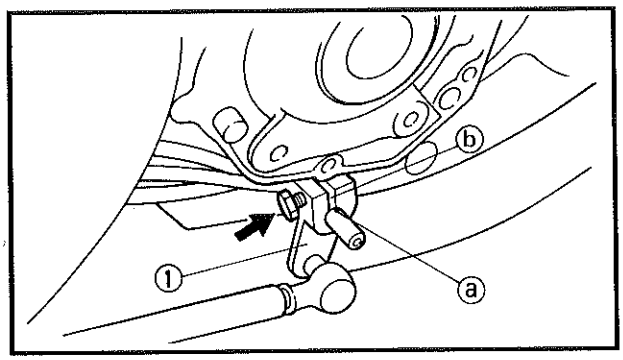


3.Install:
- Shift shaft assembly ①

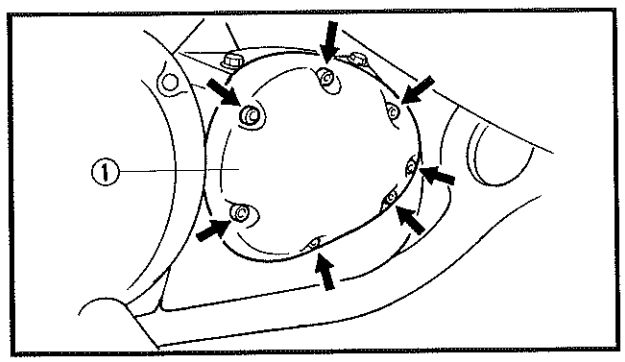
NOTE:
- Apply grease to the oil seal lips.
- Hook the spring ends onto the stopper ②.

4.Install:
- Clutch
- Crankcase cover (right side)
  Refer to "CLUTCH".

5.Connect:
- Shift pedal link ①



NOTE:
Align the punch mark ⓐ on the shift shaft with the slot ⓑ on the shift pedal link.



6.Install:
- Dowel pins
- Gasket New
- Middle gear case cover ①

NOTE:
Tighten the middle gear case cover bolts in stages, using a crisscross pattern.

⚠ WARNING

Always use a new copper washer on the lower bolt.

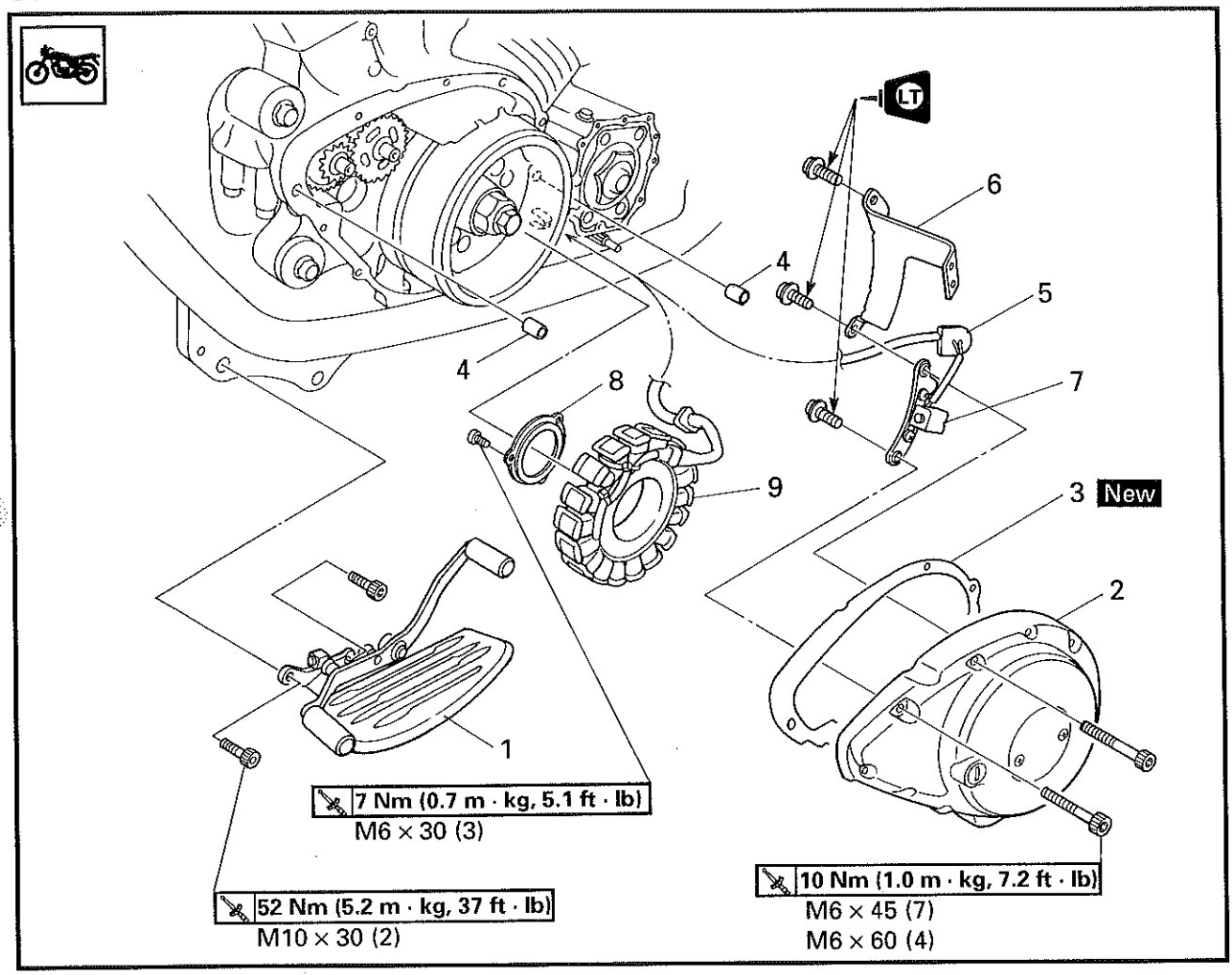
7.Install:
- Exhaust pipe (#2 cylinder)
- Muffler assembly (left side)
  Refer to "ENGINE REMOVAL".

8.Fill:
- Crankcase
  Refer to "ENGINE OIL REPLACEMENT" in CHAPTER 3.

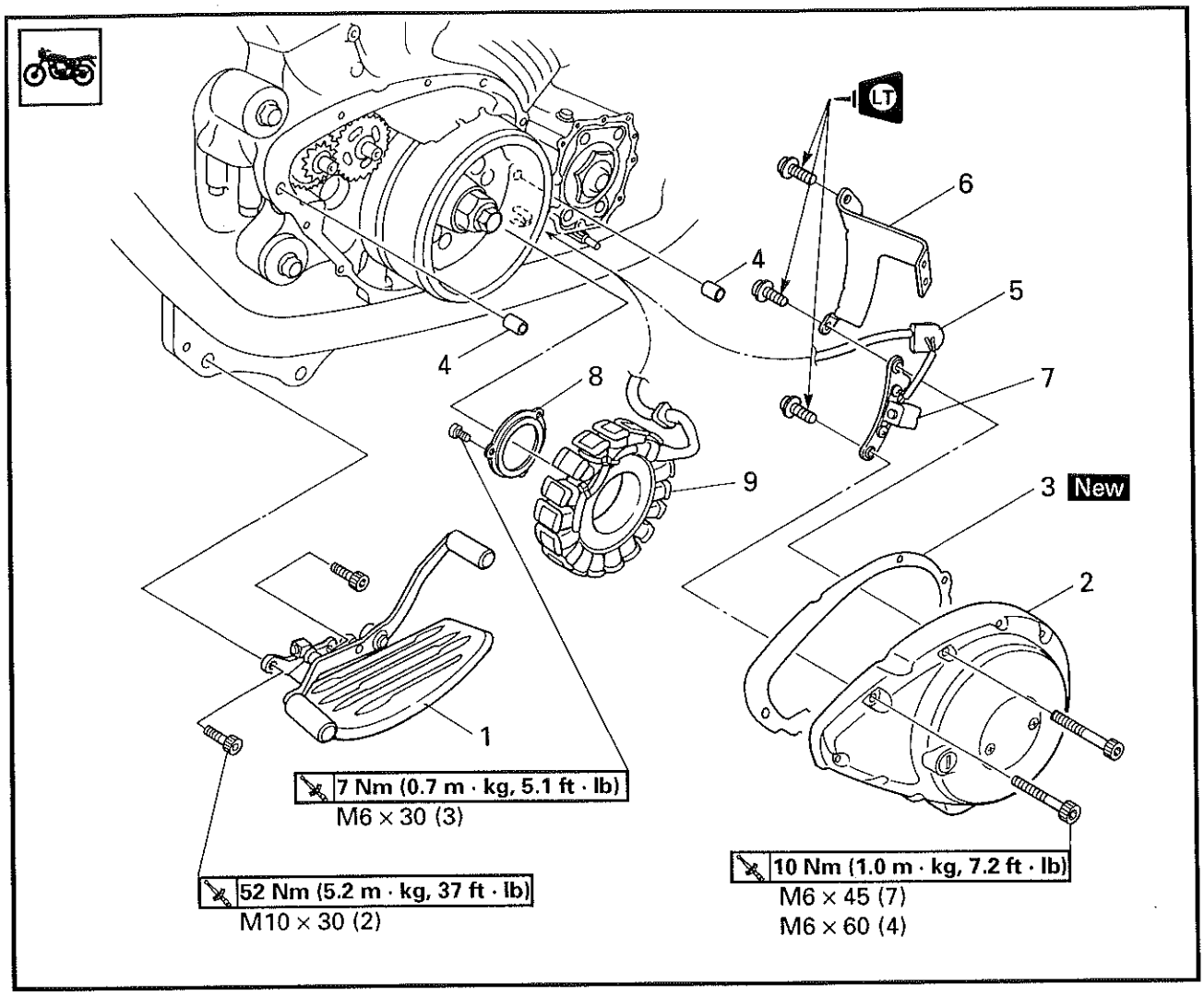
	Total amount: **4.3 L (3.8 imp qt, 4.5 US qt)**

AC MAGNETO AND STARTER CLUTCH

STATOR

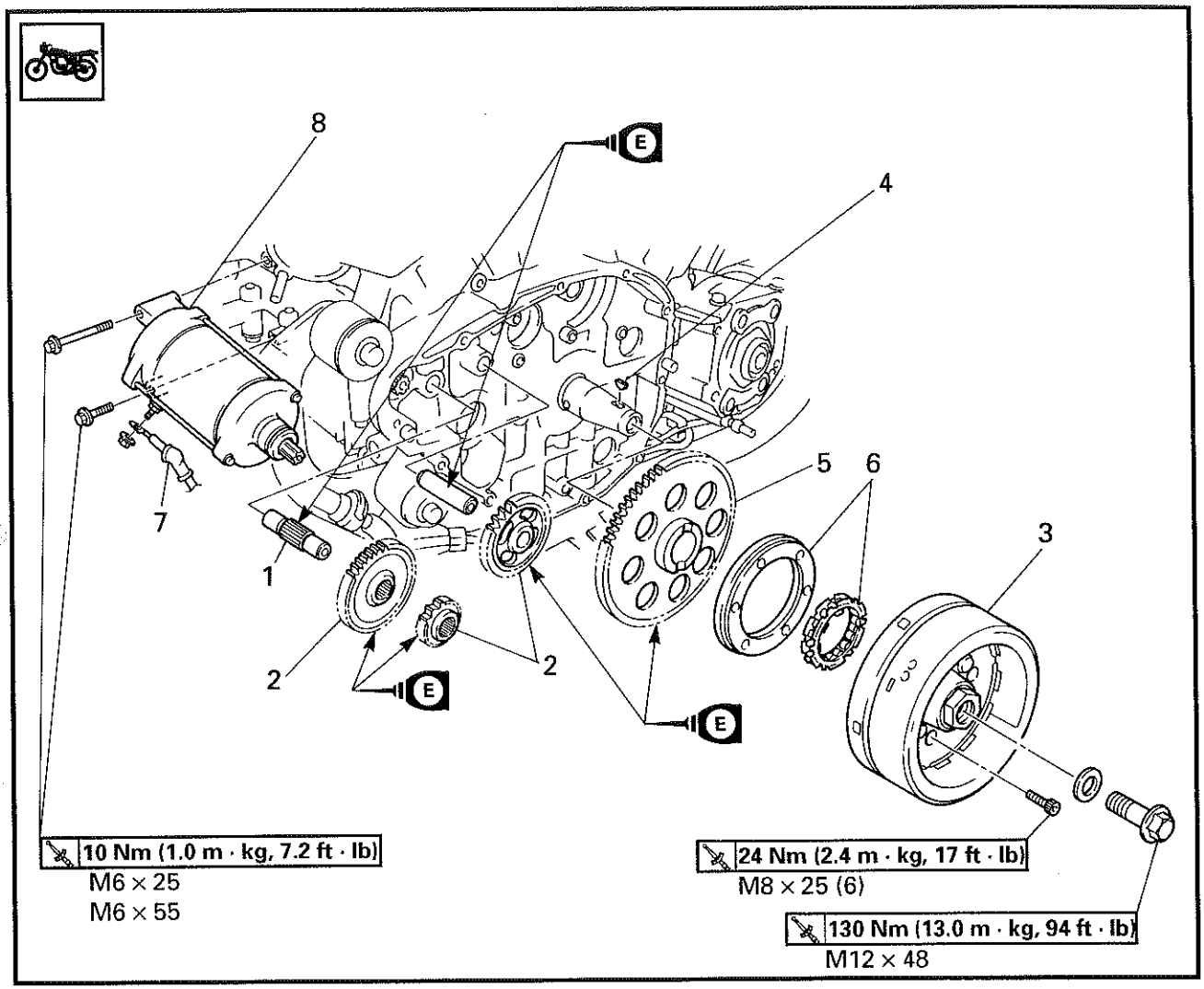


Order	Job name/Part name	Q'ty	Remarks
	Stator removal		Remove the parts in the order below.
	Engine oil		Refer to "ENGINE OIL REPLACEMENT" in CHAPTER 3.
	Muffler assembly (left side), exhaust pipe (#2 cylinder)		Refer to "ENGINE REMOVAL".
	Middle gear case cover, shift pedal link		Refer to "SHIFT SHAFT AND STOPPER LEVER (A)".
1	Shift pedal assembly	1	
2	Crankcase cover (left side)	1	Refer to "CRANKCASE COVER (LEFT SIDE)".
3	Gasket	1	
4	Dowel pins	2	
5	Pickup coil lead, stator coil lead	1/1	Remove from the cable clamp.
6	Cable holder	1	
7	Pickup coil	1	

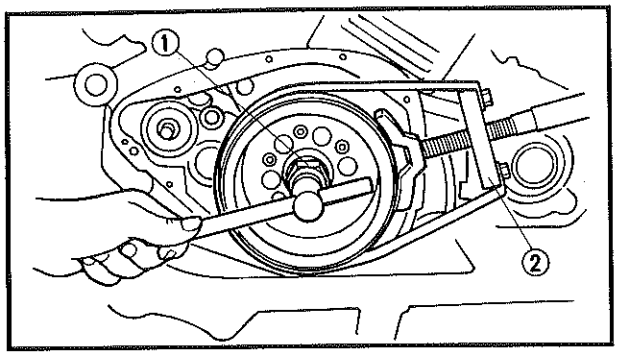


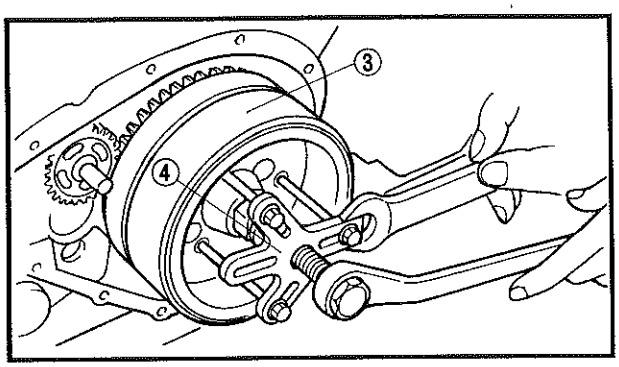
Order	Job name/Part name	Q'ty	Remarks
8	Plate (stator coil)	1	
9	Stator coil	1	For installation, reverse the removal procedure.

AC MAGNETO AND STARTER CLUTCH



Order	Job name/Part name	Q'ty	Remarks
	AC magneto and starter clutch removal		Remove the parts in the order below.
1	Shafts	2	
2	Starter idler gears	3	
3	Rotor	1	Refer to "Removal steps".
4	Woodruff key	1	
5	Starter wheel gear	1	
6	Starter clutch assembly	1	
7	Starter motor lead	1	Disconnect
8	Starter motor	1	
			For installation, reverse the removal procedure.





REMOVAL

1.Remove:
- Rotor
- Woodruff key

****

Removal steps:

● Remove the rotor bolt ① and washer.

NOTE:

Loosen the bolt ① while holding the rotor with a sheave holder ②.

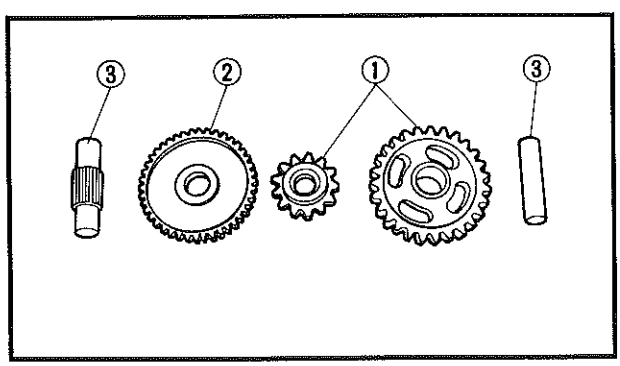
Sheave holder:
YS - 01880, 90890 - 01701
Flywheel puller:
YU - 33270, 90890 - 01362
Adapter:
YM - 33282, 90890 - 04089

● Remove the rotor ③ and the woodruff key.

NOTE:

- When installing the flywheel puller remove three of the starter clutch bolts.
- Remove the rotor ③ by pushing back the rotor, the flywheel puller ④ and the adapter.
- Install the flywheel puller bolts and tighten the center bolt, making sure that the tool body stays parallel to the rotor. If necessary, one holding bolt may be backed out slightly for realignment of the tool.

****

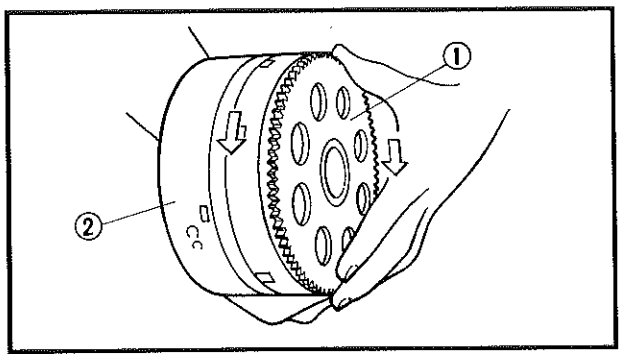


INSPECTION

1.Inspect:
- Gear teeth (starter idle ①)
- Gear teeth (starter drive ②)
- Gear teeth (starter wheel)
  Burrs/chips/roughness/wear → Replace.

2.Inspect:
- Shafts ③
  Bends/damage → Replace.

3.Inspect:
- Oil passage (rotor bolt)
  Clogged → Blow out with compressed air.



4.Check:
- Starter clutch assembly operation

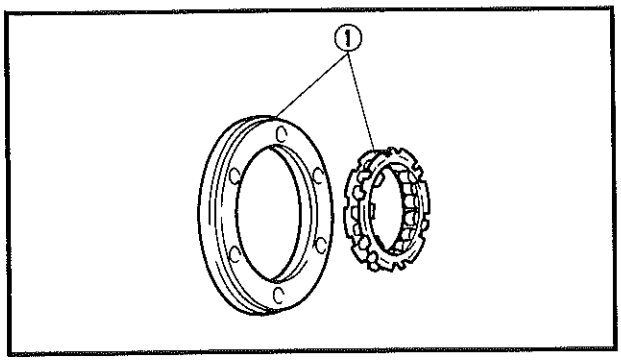
****

Clutch operation checking steps:
- Install the starter wheel gear ① to the starter clutch ②, and hold the starter clutch.
- When turning the starter wheel gear clockwise [A], the starter clutch and the starter wheel gear should be engaged.
  If not, the starter clutch is faulty. Replace it.
- When turning the starter wheel gear counterclockwise [B], the starter wheel gear should turn freely.
  If not, the starter clutch is faulty. Replace it.

****

5.Inspect:
- Stator coil
  Damage → Replace.

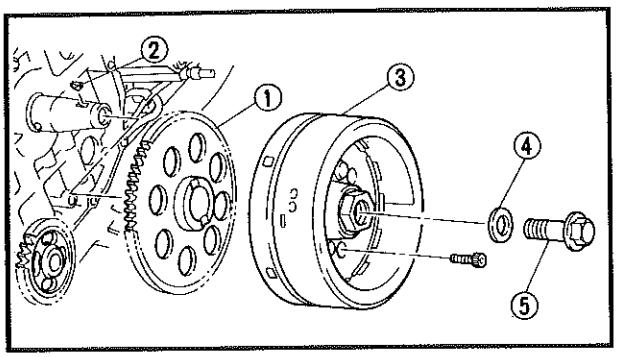
6.Inspect:
- Lead (starter motor)
  Damage → Replace.



INSTALLATION

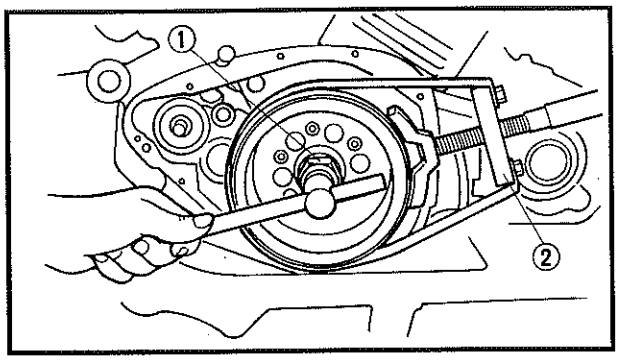
1.Install:
- Starter clutch assembly ①

24 Nm (2.4 m · kg, 17 ft · lb)



2.Install:
- Starter wheel gear ①
- Woodruff key ②
- Rotor ③
- Washer ④
- Bolt (rotor) ⑤

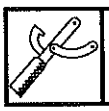
NOTE:
- Clean the tapered portion of the crankshaft and the rotor hub.
- When installing the magneto rotor, make sure the woodruff key is properly seated in the key way of the crankshaft.



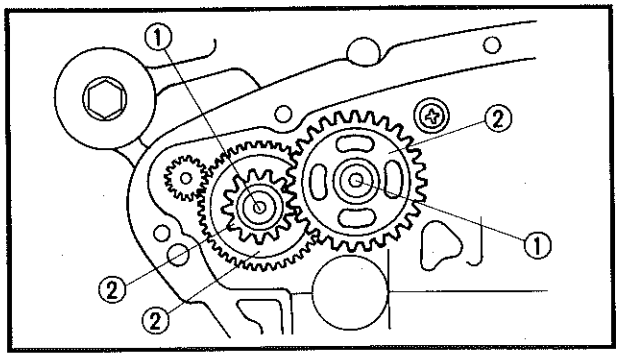
3.Tighten:
- Bolt (rotor) ①

130Nm (13.0 m · kg, 94 ft · lb)

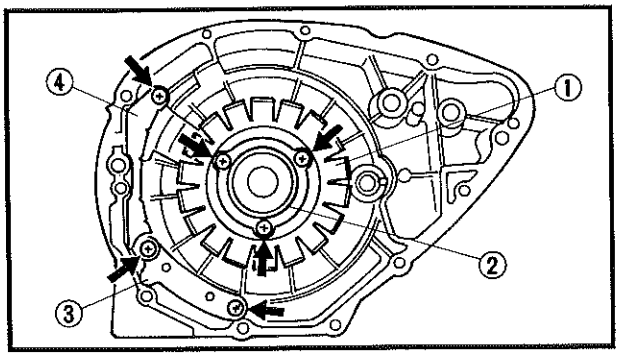
NOTE:
Tighten the rotor bolt ① while holding the magneto rotor ② with a sheave holder ③.



Sheave holder:
YS - 01880, 90890 - 01701



4.Install:
- Shafts ①
- Starter idler gears ②



5.Install:
- Stator coil ①
- Plate (stator coil) ②

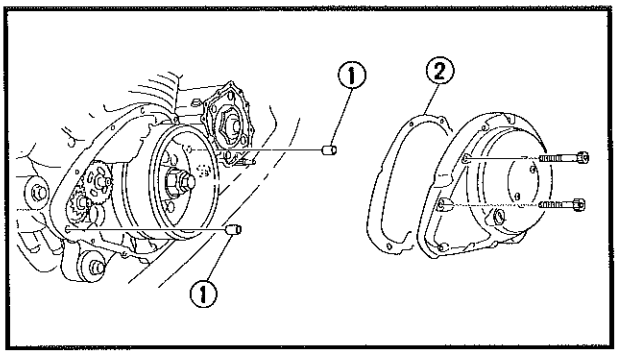
7Nm (0.7 m · kg, 5.1 ft · lb)

- Pickup coil ③
- Cable holder ④

NOTE:
Apply LOCTITE® #648 to the screws.

6.Apply:
- Sealant (to the rubber mounts)

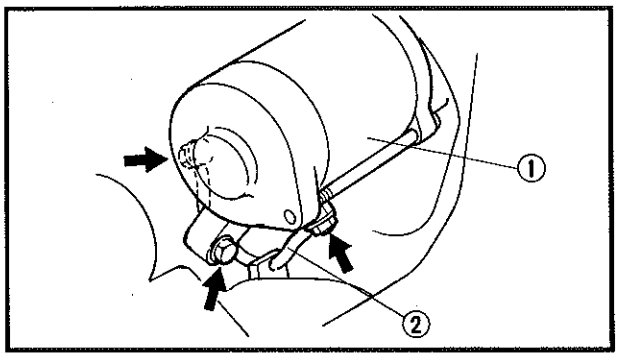
7.Install:
- Grommet (stator coil leads)
- Grommet (pickup coil leads)



8.Install:
- Dowel pins ①
- Gasket ② New
- Crankcase cover (left side)

10Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
Tighten the bolts in stages, using a criss-cross pattern.



9.Install:
- Starter motor ①

10Nm (1.0 m · kg, 7.2 ft · lb)

10.Connect:
- Lead (starter motor) ②

11.Install:
- Shift pedal assembly

12.Connect:
- Shift pedal link
  Refer to "SHIFT SHAFT AND STOPPER LEVER".

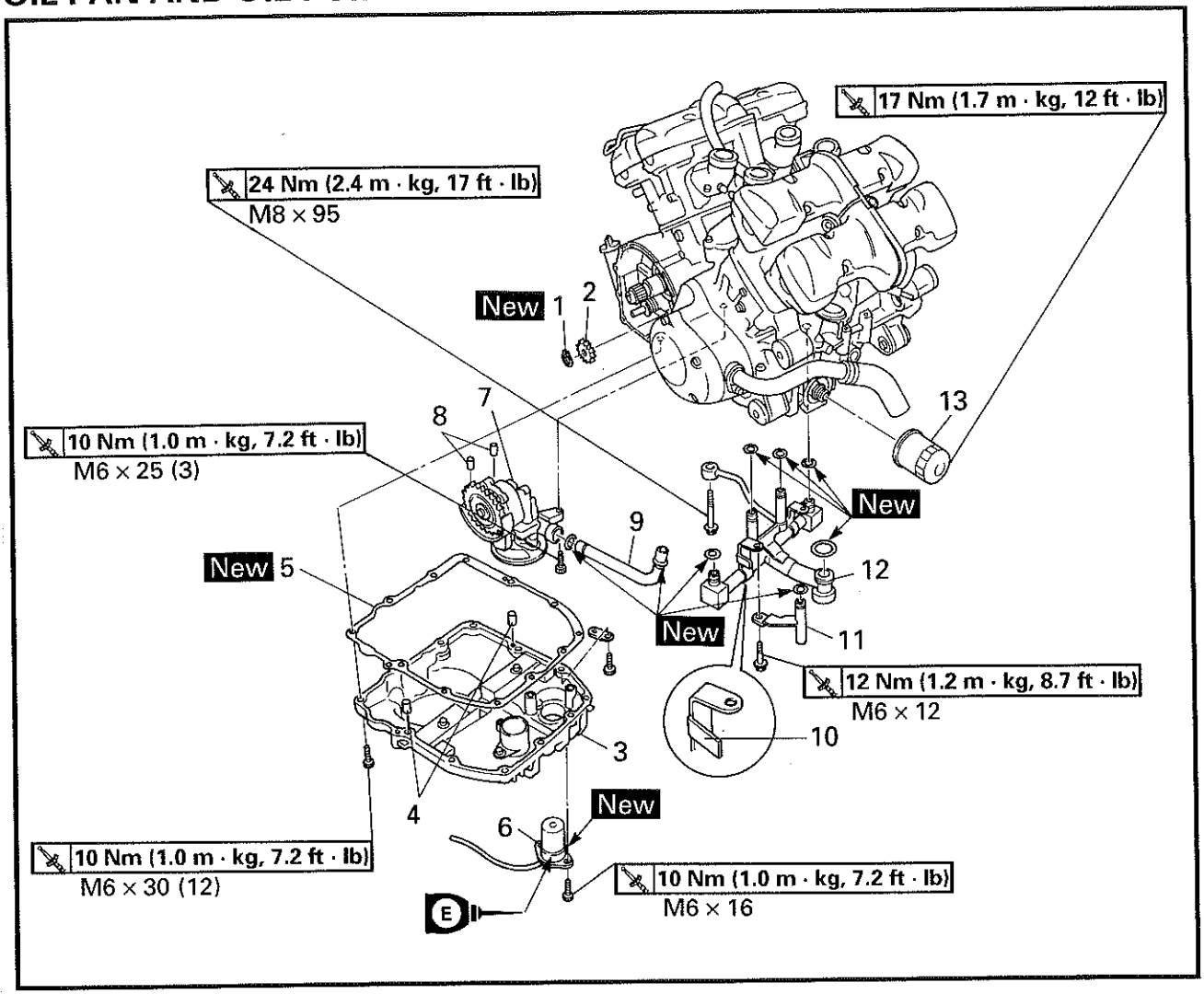
13.Install:
- Middle gear case cover

14.Install:
- Exhaust pipe (#2 cylinder)
- Muffler assembly (left side)
  Refer to "ENGINE REMOVAL".

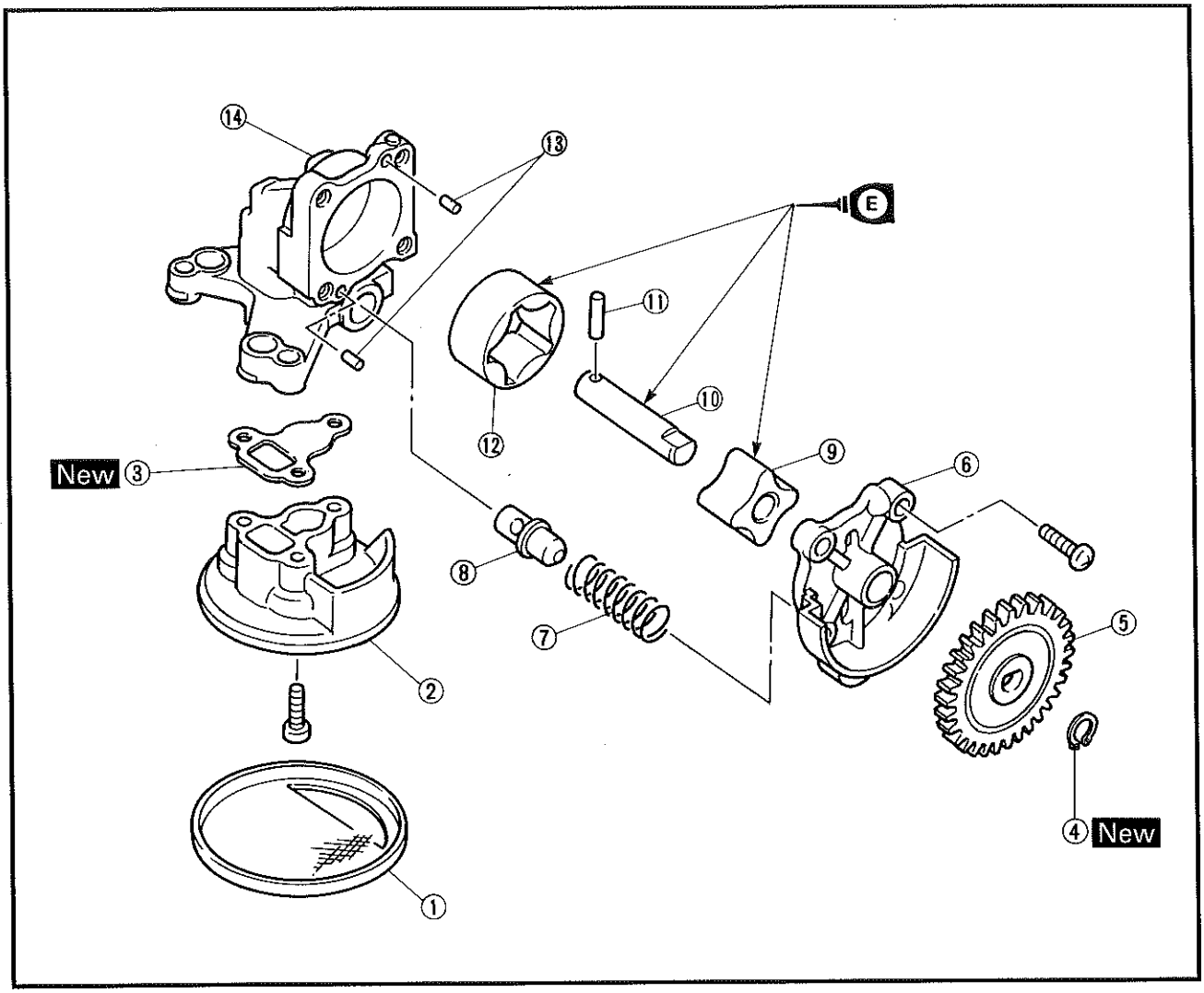
15.Fill:
- Crankcase
  Refer to "ENGINE OIL REPLACEMENT" in CHAPTER 3.

Total amount:
4.3 L (3.8 Imp qt, 4.5 US qt)

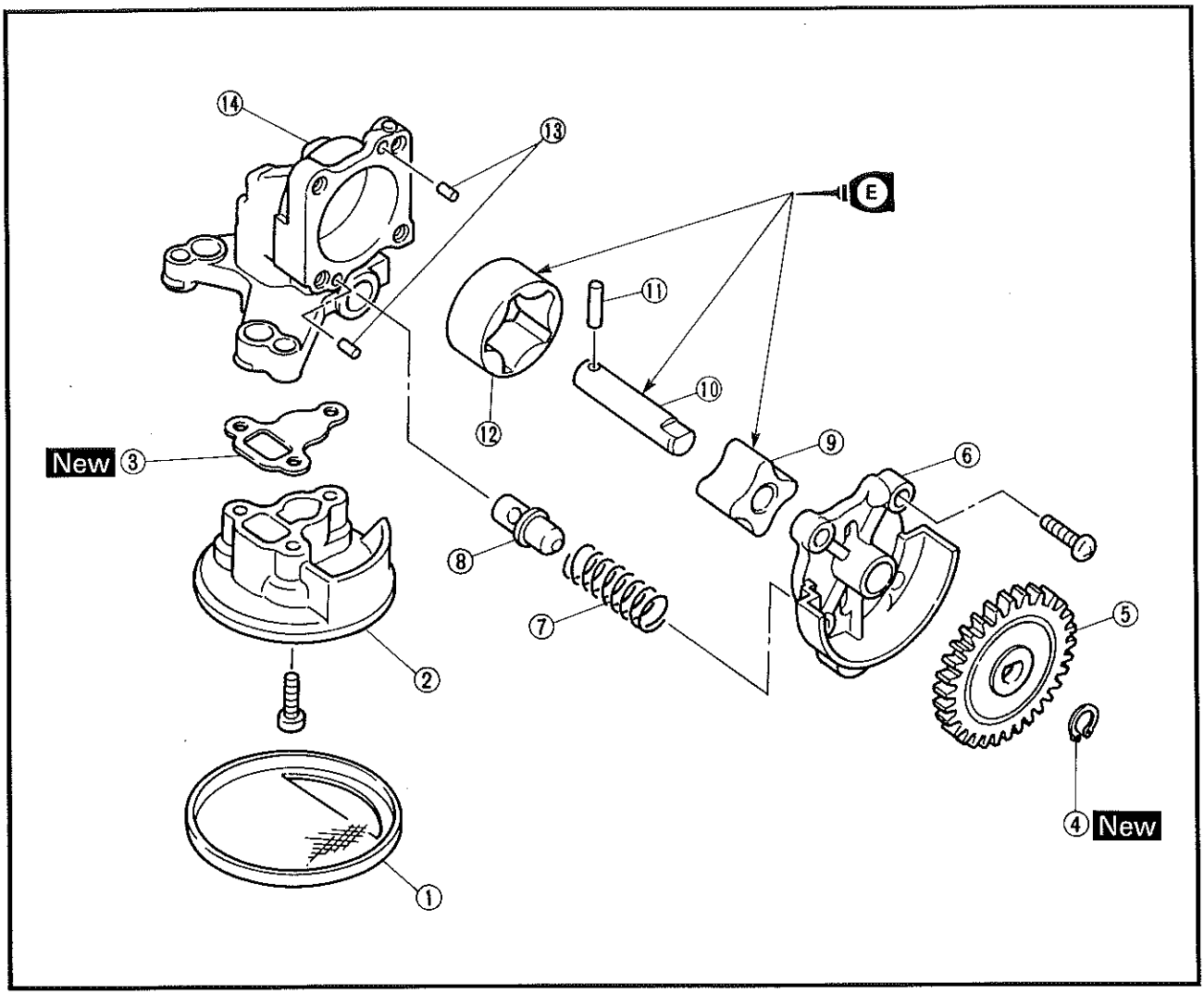
OIL PAN AND OIL PUMP



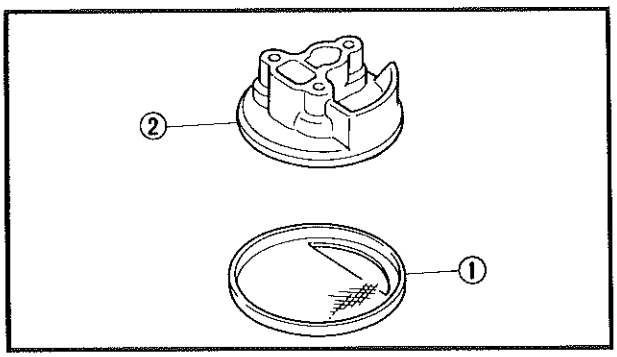
Order	Job name/Part name	Q'ty	Remarks
	Oil pan and oil pump removal		Remove the parts in the order below.
	Engine assembly		Refer to "ENGINE REMOVAL".
	Clutch assembly		Refer to "CLUTCH ASSEMBLY".
1	Circlip	1	
2	Idler gear (oil pump)	1	
3	Oil pan	1	
4	Dowel pins	2	
5	Gasket	1	
6	Oil level switch	1	
7	Oil pump assembly	1	
8	Dowel pins	2	
9	Oil pump pipe	1	
10	Bracket tabs	2	Straighten
11	Oil pipe	1	
12	Oil gallery pipe	1	
13	Oil filter	1	
			For installation, reverse the removal procedure.



Order	Job name/Part name	Q'ty	Remarks
	Oil pump disassembly		Remove the parts in the order below.
	Engine assembly		Refer to "ENGINE REMOVAL".
	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	Driven gear (oil pump)	1	
⑥	Gear housing	1	
⑦	Spring	1	
⑧	Relief valve	1	
⑨	Inner rotor	1	
⑩	Shaft	1	
⑪	Pin	1	
⑫	Outer rotor	1	

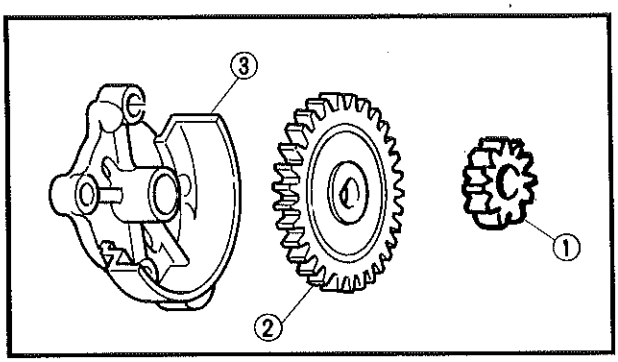


Order	Job name/Part name	Q'ty	Remarks
⑬	Dowel pins	2	
⑭	Oil pump housing	1	For assembly, reverse the disassembly procedure.

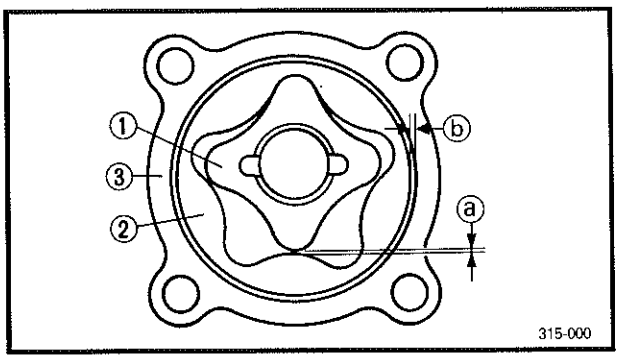


INSPECTION

1.Inspect:
- Oil strainer ①
- Oil strainer housing ②
  Cracks/wear/damage → Replace.

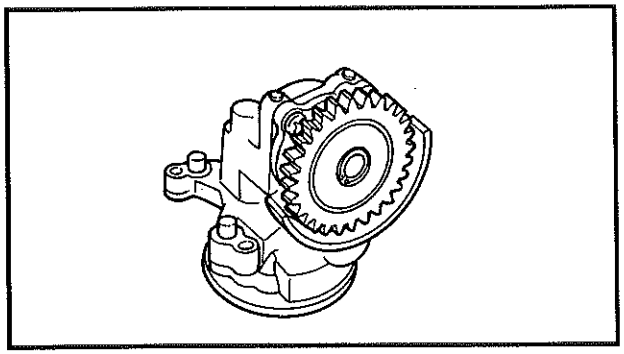


2.Inspect:
- Idler gear (oil pump) ①
- Driven gear (oil pump) ②
- Gear housing ③
  Cracks/wear/damage → Replace.

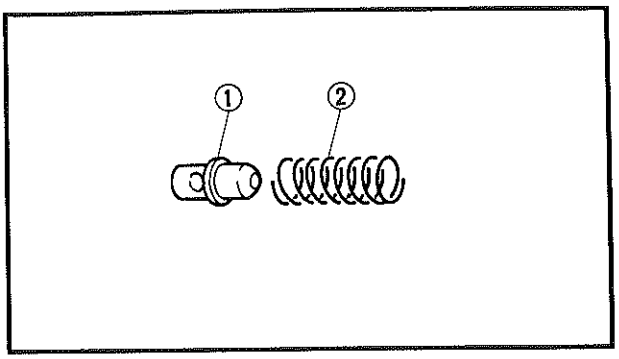


3.Measure:
- Tip clearance ⓐ
  (between the inner rotor ① and the outer rotor ②)
- Side clearance ⓑ
  (between the outer rotor ② and the pump housing ③)
  Out of specification → Replace the oil pump assembly.

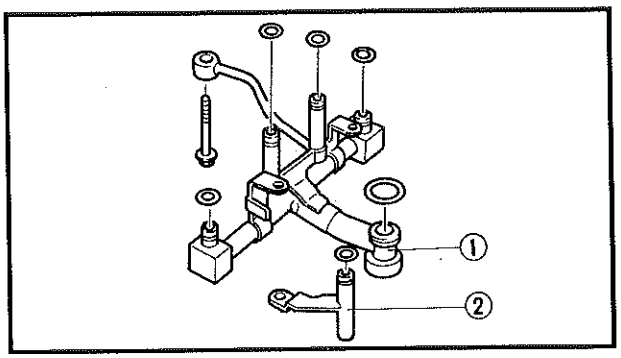
Tip clearance:
0 ~ 0.12 mm (0.000 ~ 0.005 in)
Side clearance:
0.03 ~ 0.08 mm
(0.001 ~ 0.003 in)



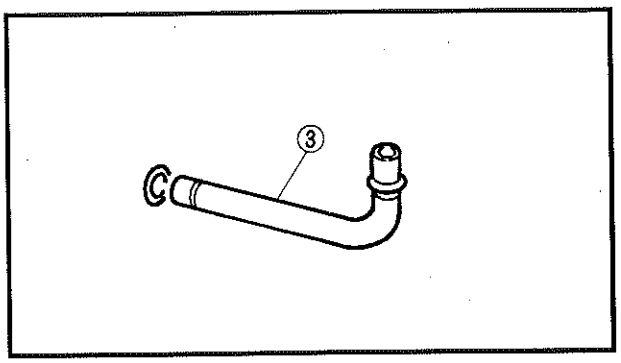
4.Check:
- Oil pump operation
  Unsmooth → Repeat steps #1 and #2 or replace the defective parts.



5.Inspect:
- Relief valve ①
- Spring ②
  Wear/damage → Replace.



6.Inspect:
- Oil gallery pipe ①
- Oil pipe ②
- Oil pump pipe ③
  Cracks/damage → Replace.
  Blockage → Wash the pipe and blow it out with compressed air.



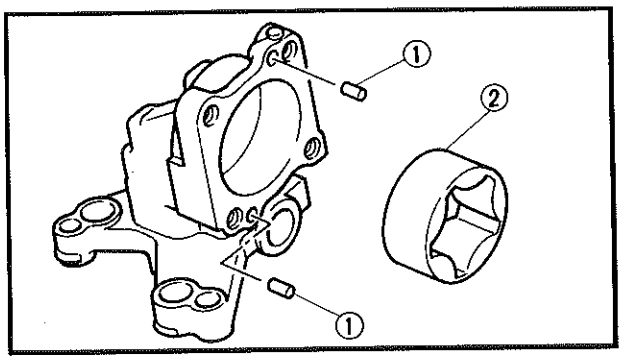
7.Inspect:
- Shaft (oil pump)
  Bends/wear/damage → Replace.

8.Inspect:
- Oil level switch
  Damage → Replace.

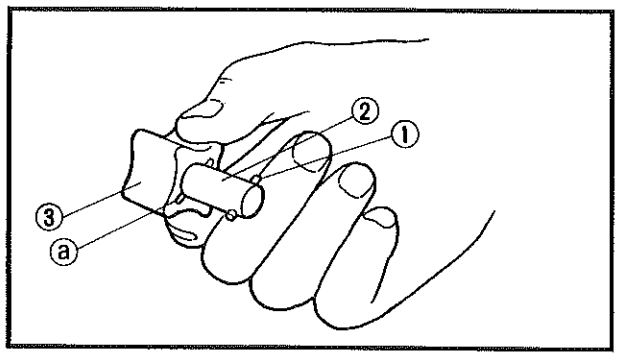
INSTALLATION

1.Lubricate:
- Inner rotor
- Outer rotor
- Pump shaft

Recommended lubricant:
SAE 20W40 motor oil

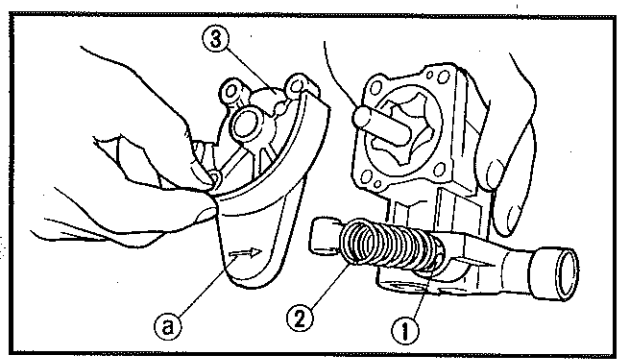


2.Install:
- Dowel pins ①
- Outer rotor ②



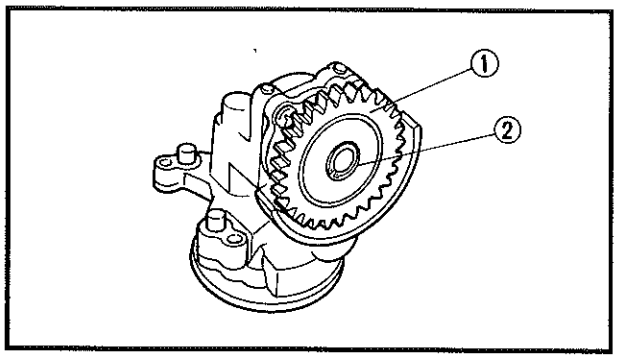
3.Install:
- Pin ①
- Shaft ②
- Inner rotor ③

NOTE:
When installing the inner rotor, align the pin ① in the pump shaft with the groove ⓐ on the inner rotor ③.

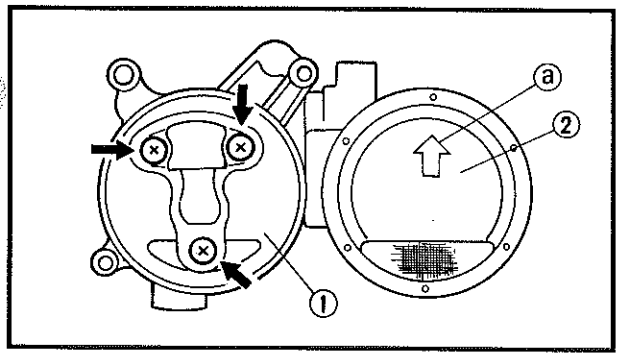


4.Install:
- Relief valve ①
- Spring ②
- Gear housing ③

NOTE:
The arrow ⓐ on the gear housing ③ faces towards the front of the engine.



5.Install:
- Driven gear (oil pump) ①
- Circlip ② New



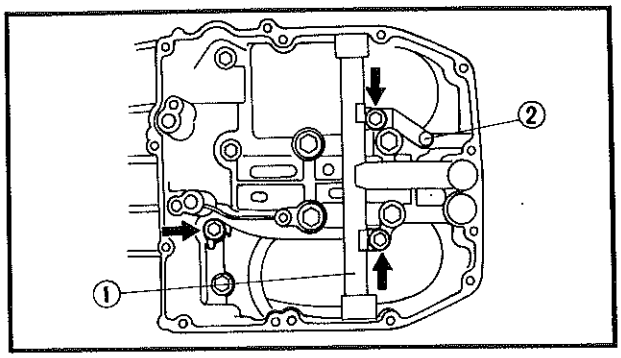
6.Install:
- Gasket New
- Oil strainer housing ①
- Oil strainer ②

NOTE:
The arrow ⓐ on the oil strainer faces towards the rear of the engine.

7.Check:
- Oil pump operation
  Refer to "INSPECTION".

8.Install:
- Oil filter — 17 Nm (1.7 m · kg, 12 ft · lb)

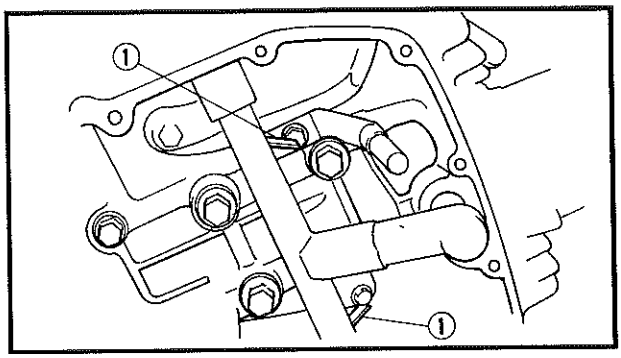
	Oil filter wrench: **YU - 38411, 90890 - 01426**



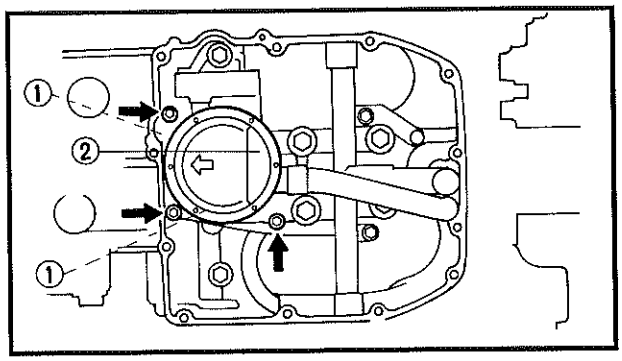
9.Install:
- Oil gallery pipe ①
- Oil pipe ②

⚠ WARNING

Always use new O-rings.

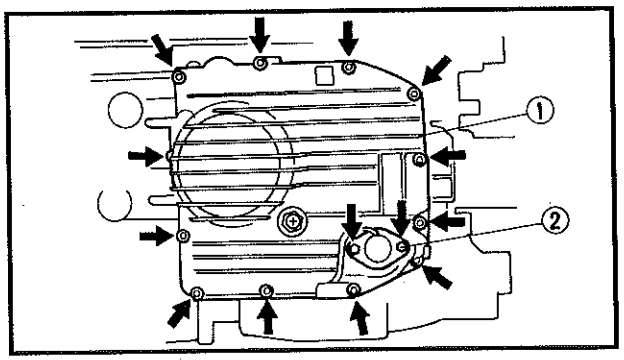


10.Bend:
- Bracket tabs ①



11.Install:
- Dowel pins ①
- Oil pump assembly ②

10 Nm (1.0 m · kg, 7.2 ft · lb)

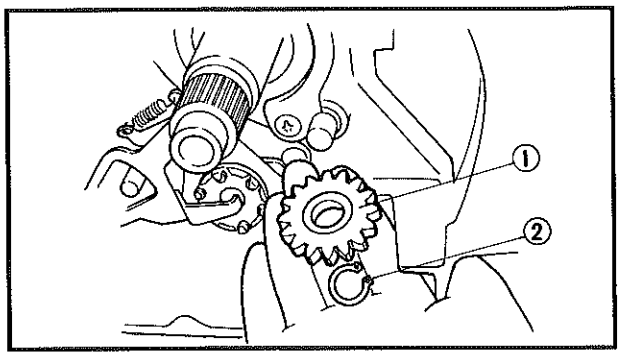


12.Install:
- Gasket New
- Dowel pins
- Oil pan ① 10 Nm (1.0 m · kg, 7.2 ft · lb)
- Oil level switch ② 10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
- Tighten the oil pan bolts in a crisscross pattern.
- Apply engine oil onto the oil level switch O-ring.

⚠ WARNING

Always use a new O-ring.

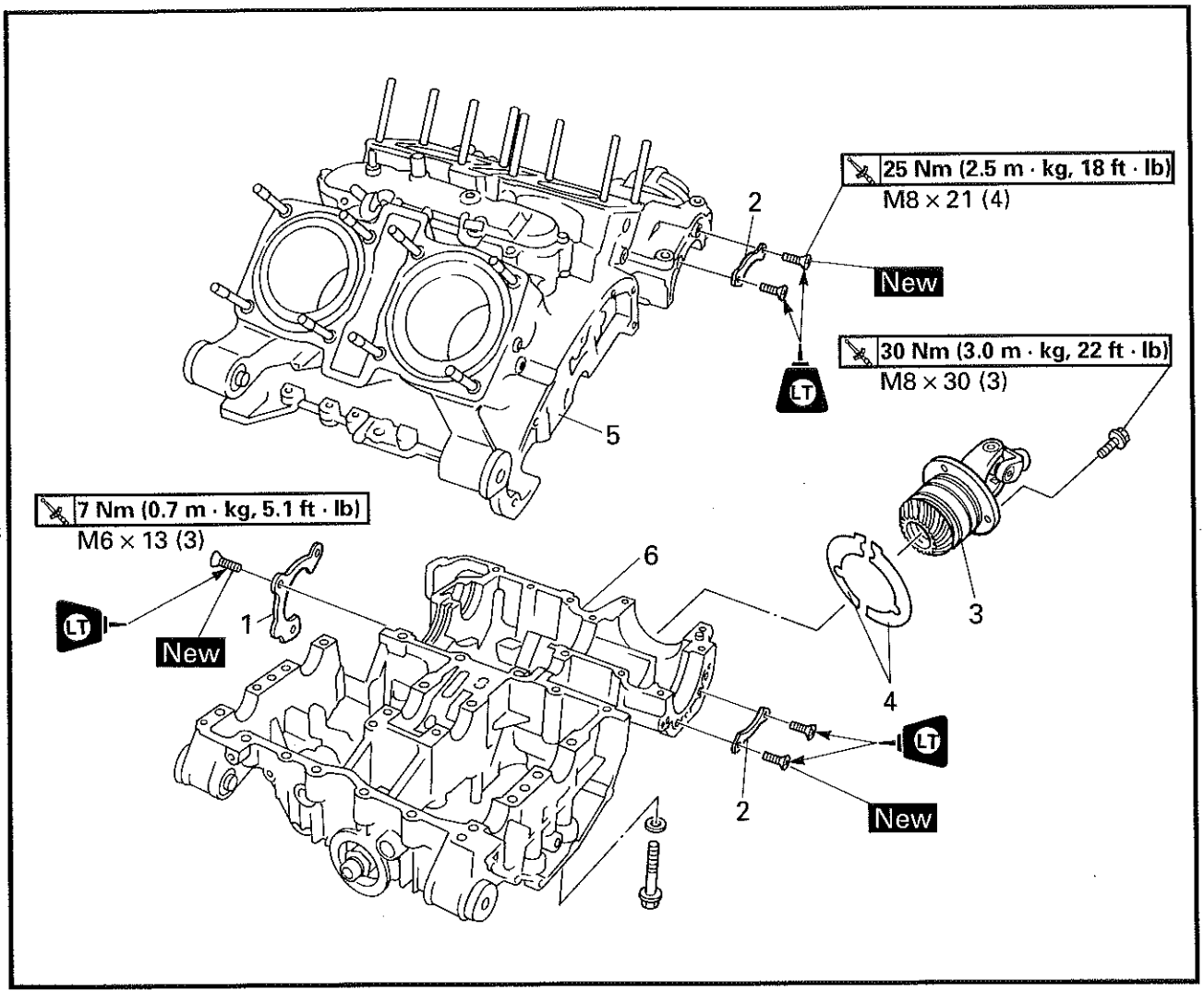


13.Install:
- Idler gear (oil pump) ①
- Circlip ② New

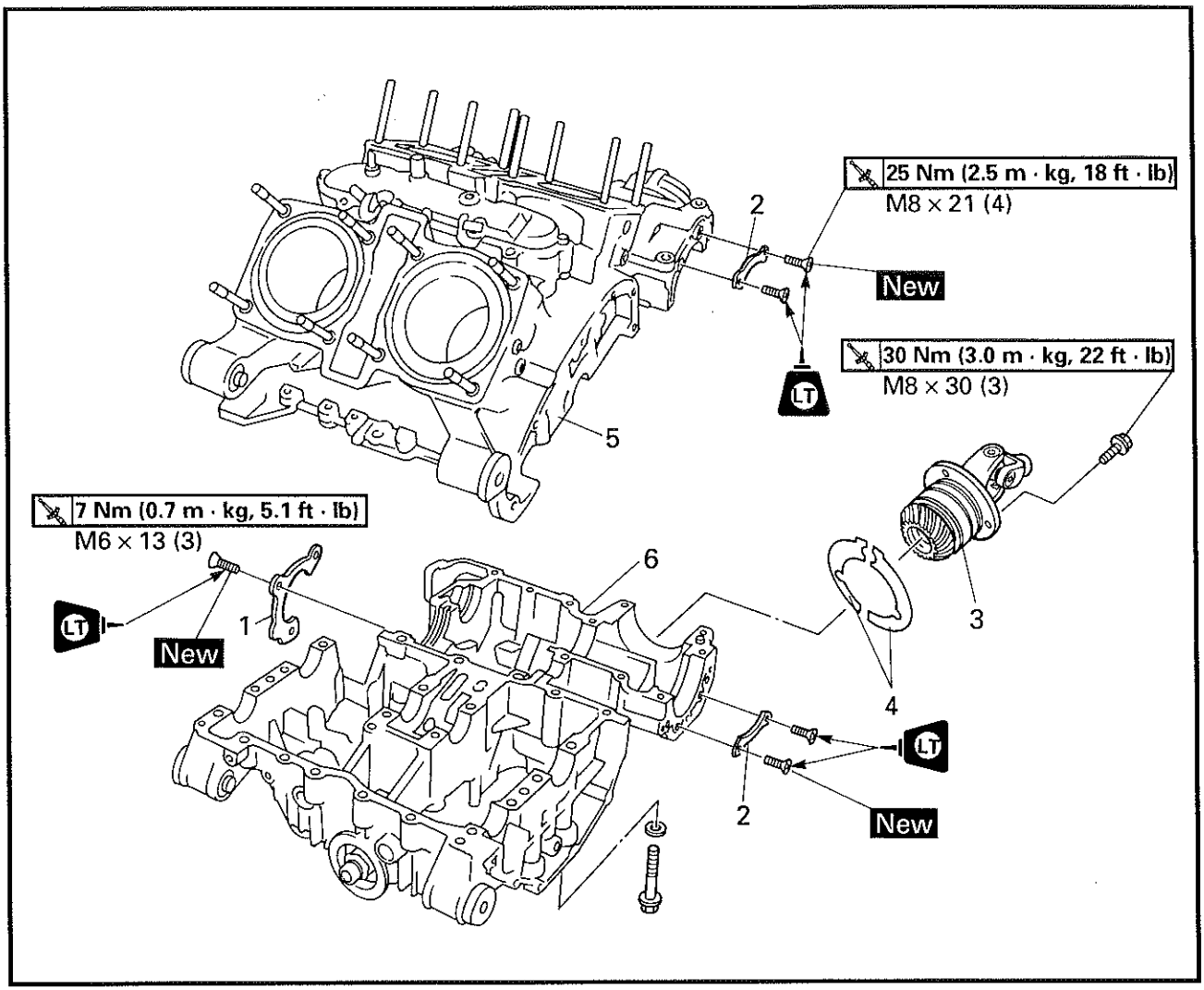
14.Install:
- Clutch assembly
  Refer to "CLUTCH".

15.Install:
- Engine assembly
  Refer to "ENGINE REMOVAL".

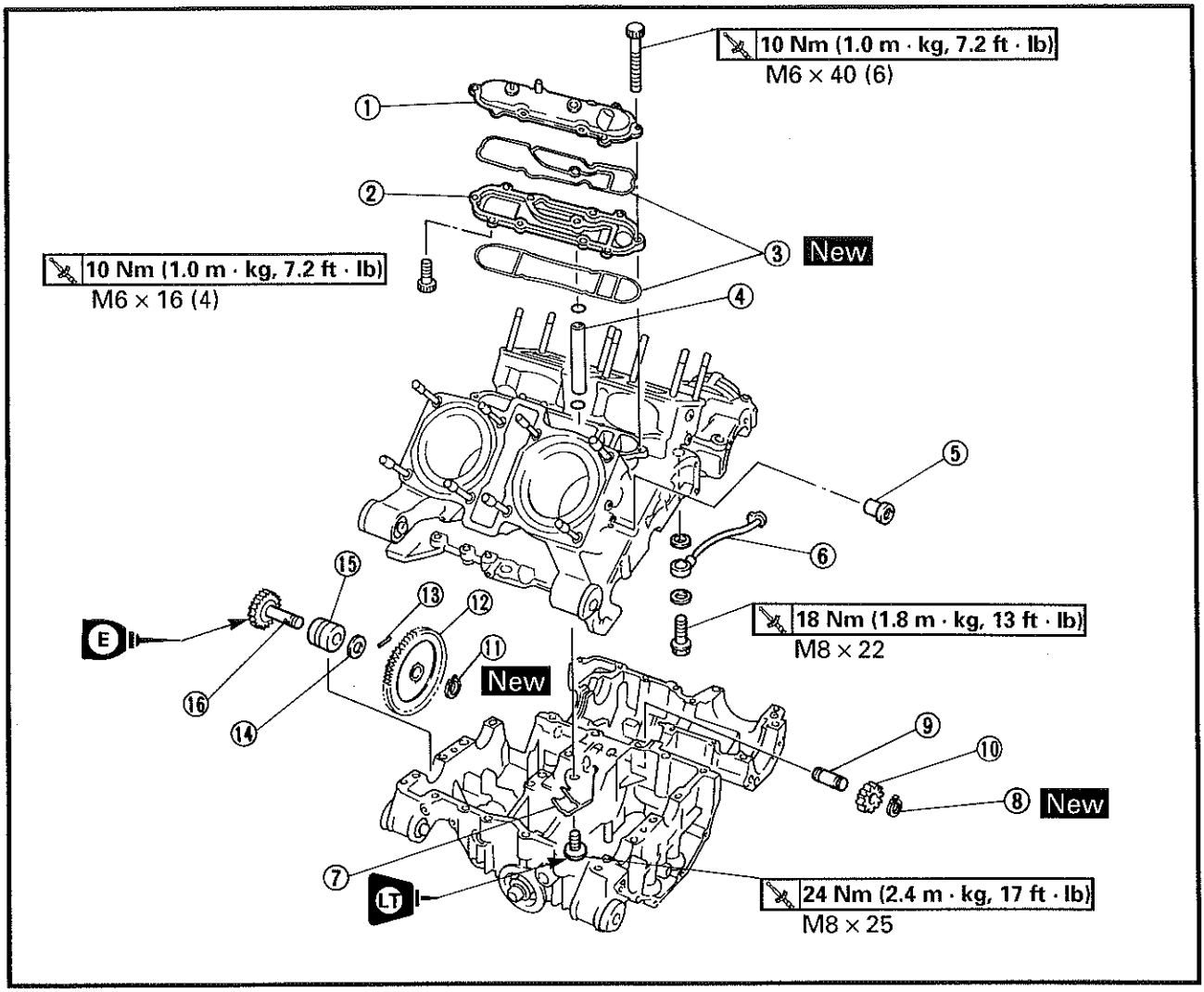
CRANKCASE



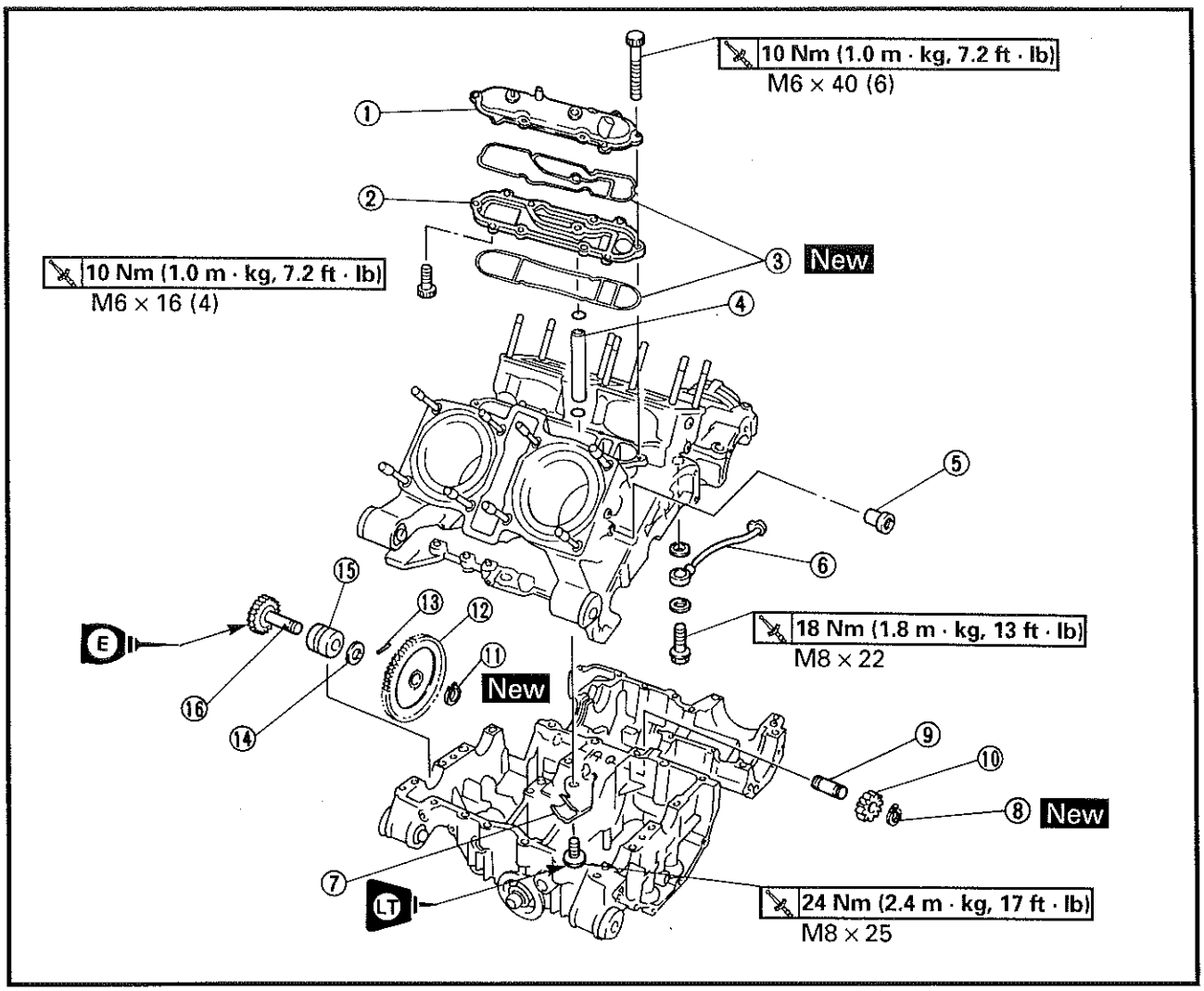
Order	Job name/Part name	Q'ty	Remarks
	Crankcase separation		Remove the parts in the order below.
	Engine assembly		Refer to "ENGINE REMOVAL".
	Cylinder head		Refer to "CYLINDER HEADS".
	Water pump		Refer to "WATER PUMP" in CHAPTER 5.
	Clutch assembly		Refer to "CLUTCH ASSEMBLY".
	Shift shaft, stopper lever		Refer to "SHIFT SHAFT AND STOPPER LEVER".
	Clutch release cylinder		Refer to "CLUTCH RELEASE CYLINDER" in CHAPTER 7.
	AC Magneto		Refer to "AC MAGNETO AND STARTER CLUTCH".
	Oil pan and oil pump assembly		Refer to "OIL PAN AND OIL PUMP".
	Connecting rods and pistons		Refer to "CONNECTING RODS AND PISTONS".



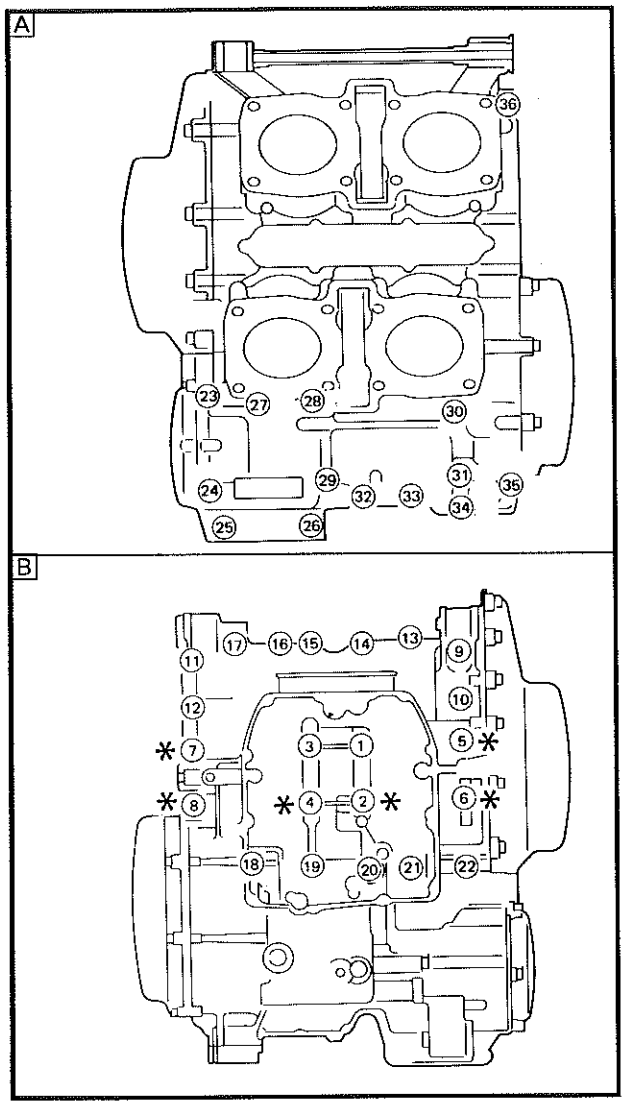
Order	Job name/Part name	Q'ty	Remarks
1	Retainer (main axle bearing)	1	
2	Retainers (middle gear bearing)	2	
3	Middle driven gear assembly	1	
4	Shims	2/4	
5	Crankcase (upper)	1	Refer to "SEPARATION".
6	Crankcase (lower)	1	
			For installation, reverse the removal procedure.

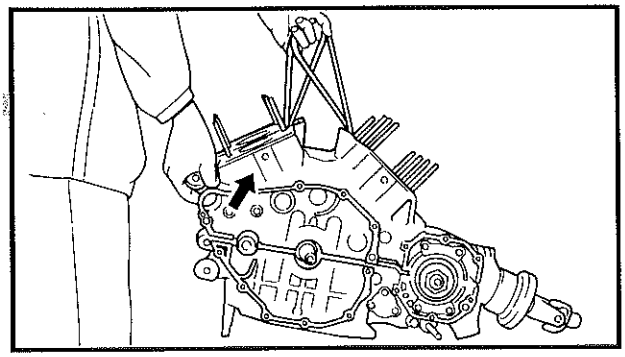


Order	Job name/Part name	Q'ty	Remarks
	Crankcase disassembly		Remove the parts in the order below.
	Engine assembly		Refer to "ENGINE REMOVAL".
	Crankcase separation		Refer to "CRANKCASE".
	Crankshaft		Refer to "CRANKSHAFT".
	Transmission		Refer to "TRANSMISSION".
①	Crankcase breather cover	1	
②	Crankcase 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	



Order	Job name/Part name	Q'ty	Remarks
⑪	Circlip	1	
⑫	Idler gear (water pump)	1	
⑬	Pin	1	
⑭	Washer	1	
⑮	Bushing	1	
⑯	Drive shaft/drive gear (water pump)	1	
			For assembly, reverse the disassembly procedure.





SEPARATION

1. Separate:
- Upper crankcase
- Lower crankcase

****

Separation steps:

● Remove the crankcase bolts.

NOTE:

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

*With washer
A Upper crankcase
B Lower crankcase

● Remove the upper crankcase.

NOTE:

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

CAUTION:

Use a soft hammer to tap on one side of the crankcase. Tap only on reinforced portions of the crankcase. Do not tap on the crankcase mating surfaces. Work slowly and carefully. Make sure that the crankcase halves separate evenly.

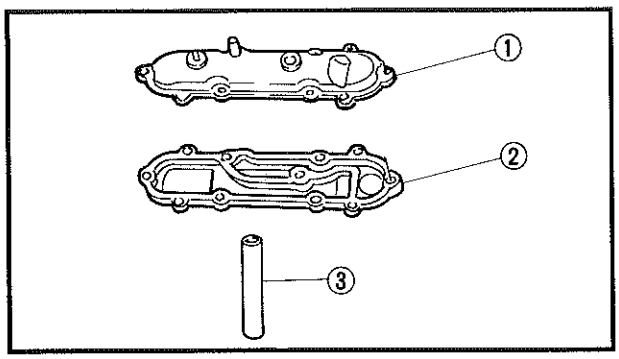
● Remove the dowel pin.

****

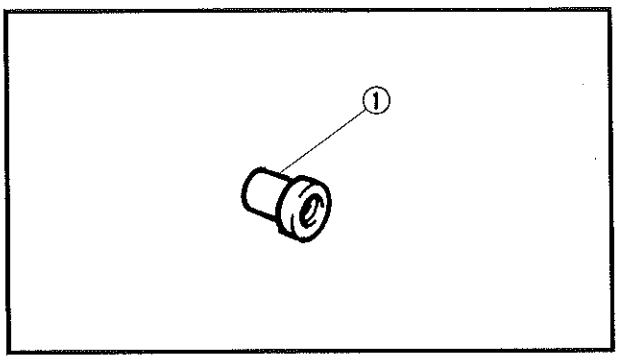
INSPECTION

1. Thoroughly wash the crankcase halves in mild solvent.
2. Thoroughly clean all the gasket mating surfaces and crankcase mating surfaces.

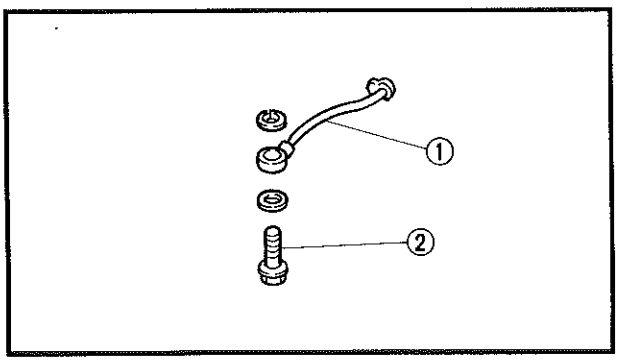
3.Inspect:
- Crankcase
  Cracks/damage → Replace.
- Oil delivery passages
  Blockage → Blow out the passages with compressed air.



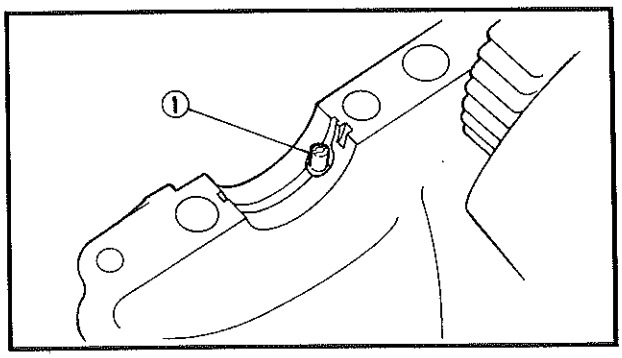
4.Inspect:
- Crankcase breather cover ①
- Crankcase breather spacer ②
  Cracks/damage → Replace.
- Oil pipe (crankcase breather) ③
  Blockage → Blow out the passages with compressed air.



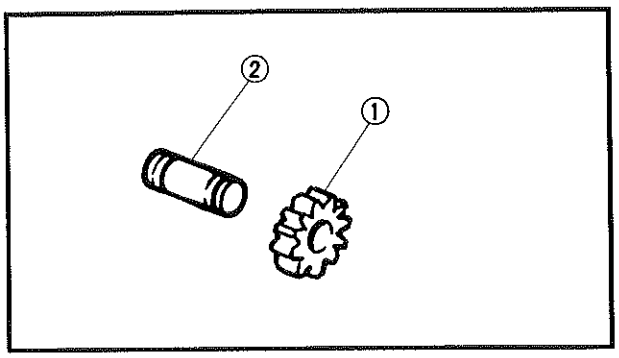
5.Inspect:
- Drain plugs (cylinders) ①
  Cracks/wear/damage → Replace.



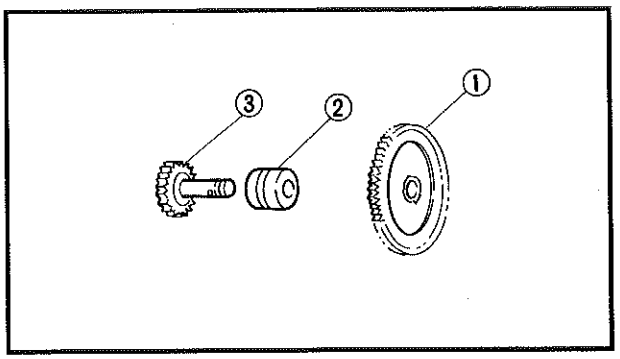
6.Inspect:
- Oil pipe ①
  Blockage → Blow out the passages with compressed air.
- Union bolt ②
  Blockage → Blow out the passages with compressed air.



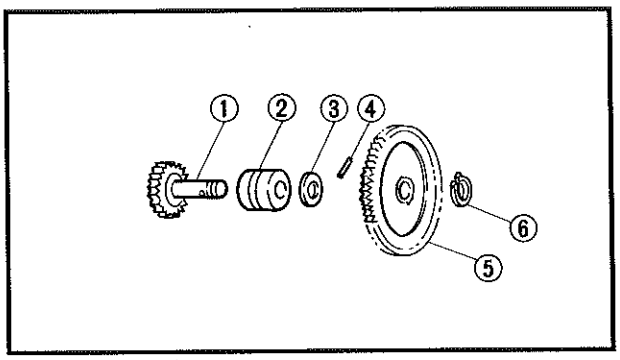
7.Inspect:
- Oil jet ①
  Blockage → Blow out the passages with compressed air.



8.Inspect:
- Idler gear (oil pump) ①
- Shaft ②
  Bends/wear/damage → Replace.

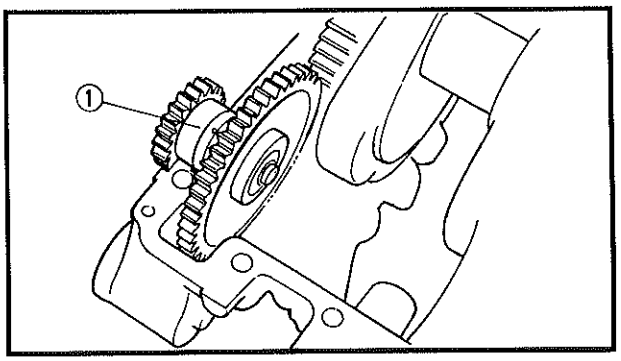


9.Inspect:
- Idler gear (water pump) ①
  Wear/damage → Replace.
- Bushing ②
  Wear/damage → Replace.
- Drive shaft/drive gear (water pump) ③
  Bends/wear/damage → Replace.

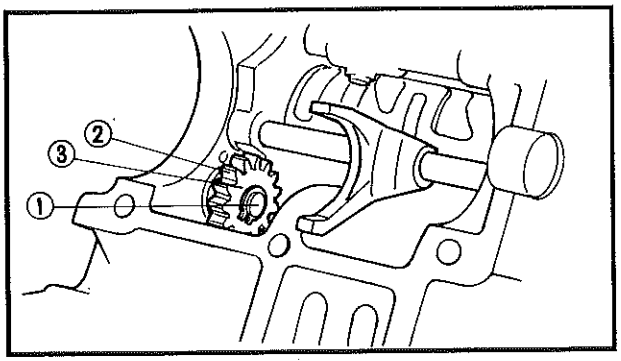


ASSEMBLY

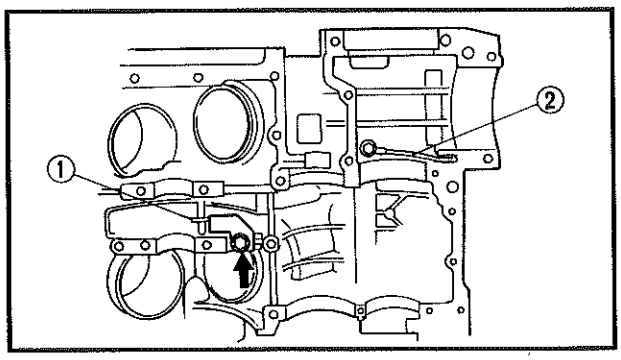
1.Assemble:
- Drive shaft/drive gear (water pump) ①
- Bushing ②
- Washer ③
- Pin ④
- Idler gear (water pump) ⑤
- Circlip ⑥ New



2.Install:
- Drive gear assembly (water pump) ①

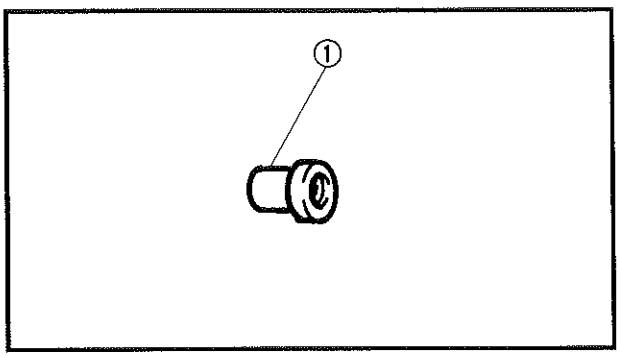


3.Install:
- Shaft ①
- Idler gear (oil pump) ②
- Circlip ③ New

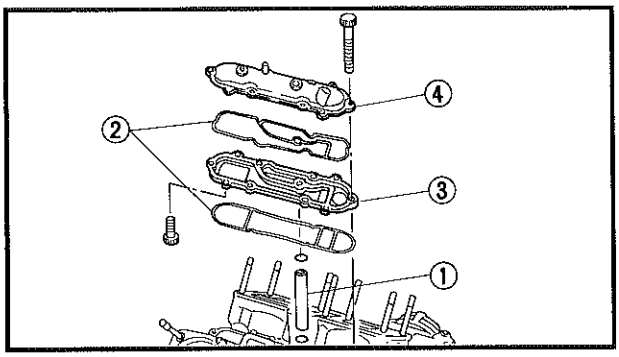


4.Install:
- Bracket (timing chain damper) ①
  24 Nm (2.4 m · kg, 17 ft · lb)
- Oil pipe ②
  18 Nm (1.8 m · kg, 13 ft · lb)

NOTE:
Apply LOCTITE® to the bracket bolt.

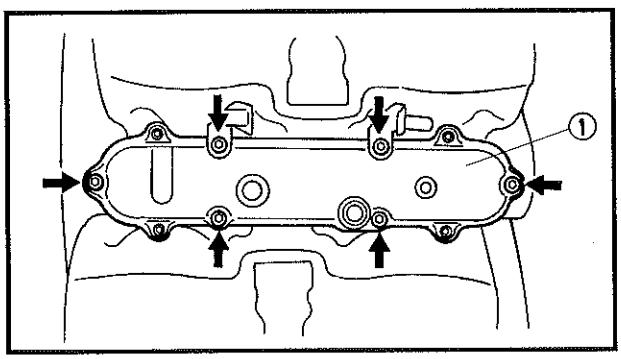


5.Install:
- Drain plugs (cylinders) ①



6.Assemble:
- Oil pipe ①
- Rubber gaskets ② New
- Crankcase breather spacer ③
- Crankcase breather cover ④

⚠ WARNING
Always use new O-rings.



7.Install:
- Crankcase breather assembly ①
  10Nm (1.0 m · kg, 7.2 ft · lb)

8.Install:
- Transmission
  Refer to "TRANSMISSION".

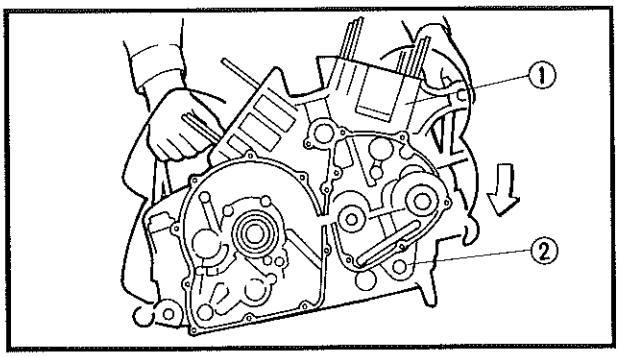
9.Install:
- Crankshaft
  Refer to "CRANKSHAFT".

10.Apply:
- Engine oil
  (onto the main journal bearings)
- Sealant
  (onto the crankcase mating surfaces)

Quick gasket®:
ACC-11001-15-01
Yamaha Bond No. 1215:
90890 - 85505

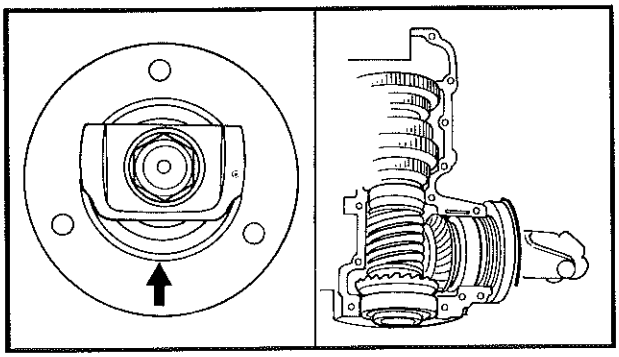
NOTE:
DO NOT ALLOW any sealant to come in contact with the oil gallery or crankshaft bearings. Do not apply sealant to within 2 ~ 3 mm of the bearings.

11.Install:
- Dowel pin



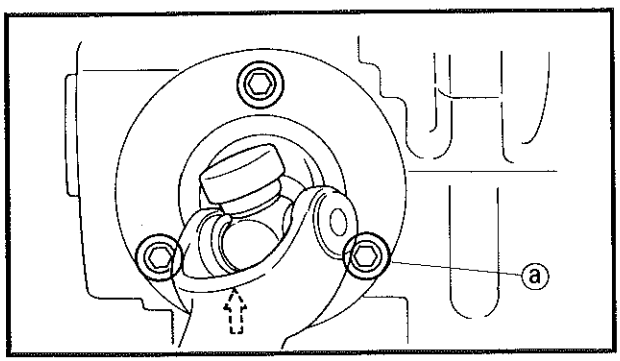
12.Install:
- Upper crankcase ①
  (onto the lower crankcase ②)

CAUTION:
Before tightening the crankcase bolts:
- **Make sure the gears shift correctly when the shift cam is turned by hand.**



13.Install:
- Middle driven gear assembly
  Refer to "MIDDLE GEAR".

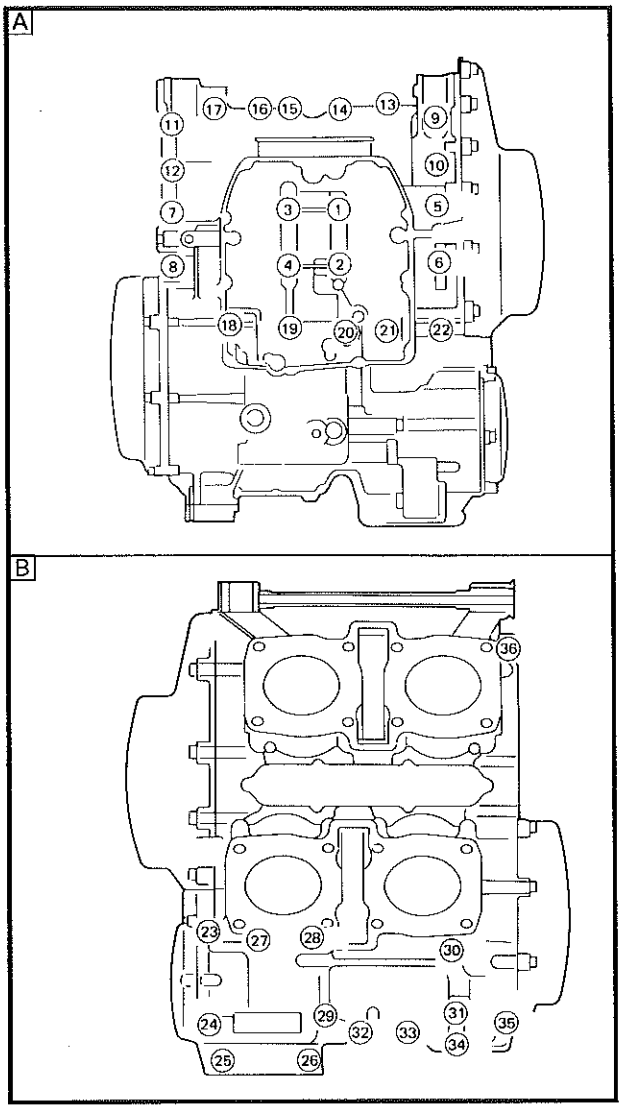
NOTE:
The arrow mark on the bearing housing points to the upper crankcase



14.Install:
- Bolts (middle driven gear housing)

30Nm (3.0 m · kg, 22 ft · lb)

NOTE:
The bolt with the washer goes in the lower right hole ⓐ.



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

NOTE:
The numbers embossed on the crankcase indicate the crankcase tightening sequence.

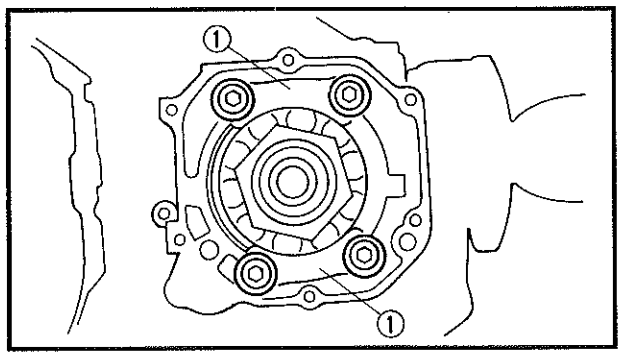
- Lower crankcase bolts

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

A Upper crankcase
B Lower crankcase

NOTE:
- Lubricate the bolt threads with engine oil.
- Tighten the bolts in increasing numerical order.
- Install the copper washers on bolts No.28 & No.30.
- Install the cable holder on bolts No.22 & No.32.
- Install the washers on bolts No.2, No.4~ No.8.

⚠ WARNING
Always use new copper washers.



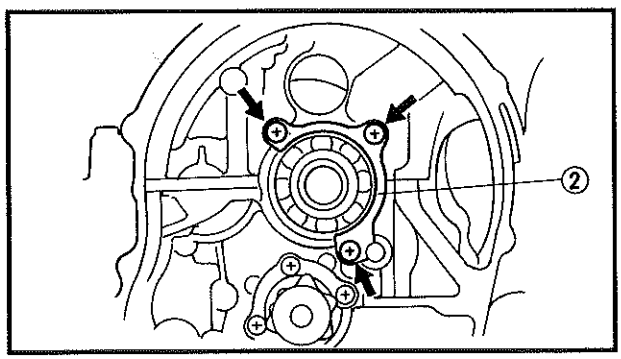
16.Install:
- Retainers (middle gear bearing) ①

25Nm (2.5 m · kg, 18 ft · lb)

- Retainer (main axle bearing) ②

7Nm (0.7 m · kg, 5.1 ft · lb)

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



CAUTION:
After tightening the retainer screws (middle gear bearing retainers), be sure to stake them with a center punch.

⚠ WARNING
Always use new screws.

17.Install:
- Connecting rods and pistons
  Refer to "CONNECTING RODS AND PISTONS".

18.Install:
- Oil pan and oil pump assembly
  Refer to "OIL PAN AND OIL PUMP".

19.Install:
- Shift shaft
- Stopper lever
  Refer to "SHIFT SHAFT".

20.Install:
- Clutch assembly
  Refer to "CLUTCH".

21.Install:
- Water pump
  Refer to "WATER PUMP" in CHAPTER 5.

22.Install:
- Clutch release cylinder
  Refer to "HYDRAULIC CLUTCH" in CHAPTER 7.

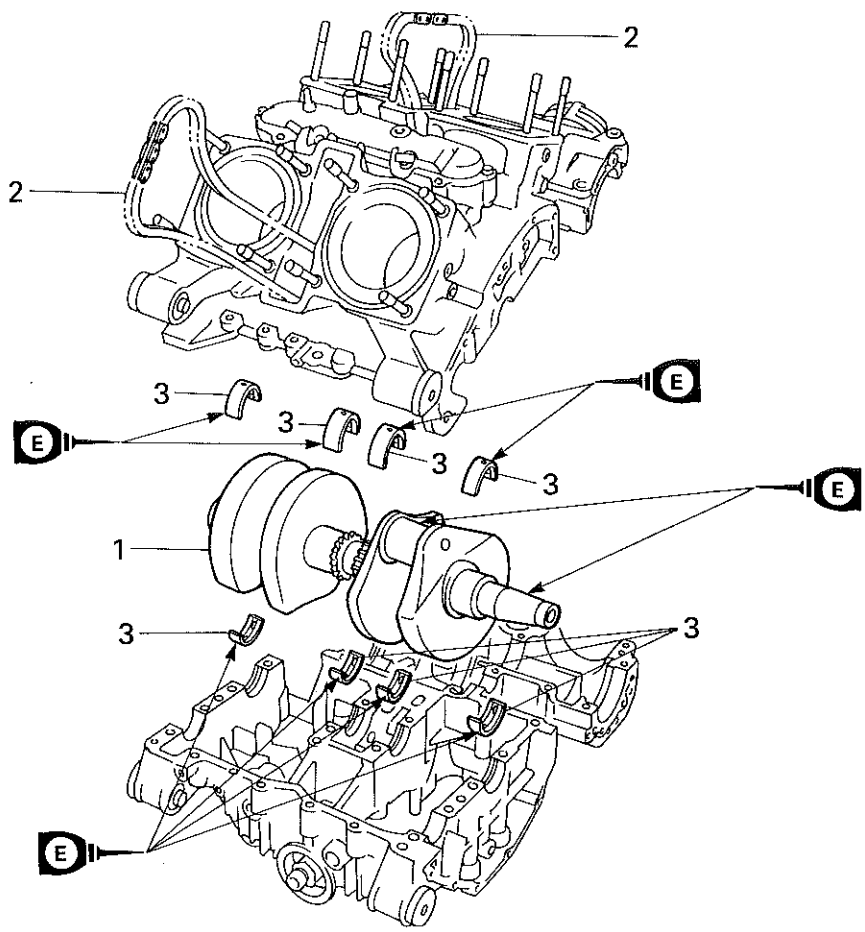
23.Install:
- AC Magneto
  Refer to "AC MAGNETO AND STARTER CLUTCH".

24.Install:
- Timing chain dampers

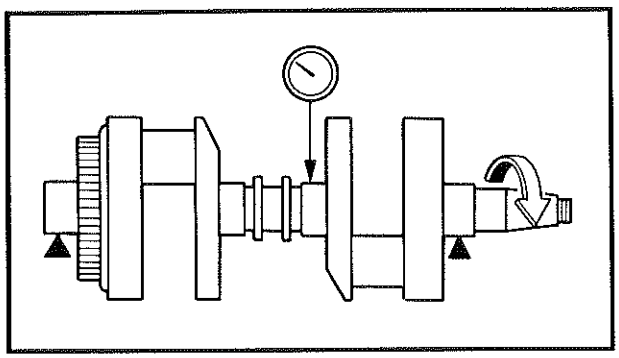
25.Install:
- Cylinder head
  Refer to "CYLINDER HEADS".

26.Install:
- Engine assembly
  Refer to "ENGINE REMOVAL".

CRANKSHAFT



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



INSPECTION

1.Measure:
- Runout (crankshaft)
  Out of specification → Replace.

Runout (crankshaft):
Less than 0.03 mm (0.0012 in)

2.Inspect:
- Main journal surfaces
- Crank pin surfaces
- Bearing surfaces
  Wear/scratches → Replace.

3.Measure:
- Oil clearance (main journal)
  Out of specification → Replace the bearing.

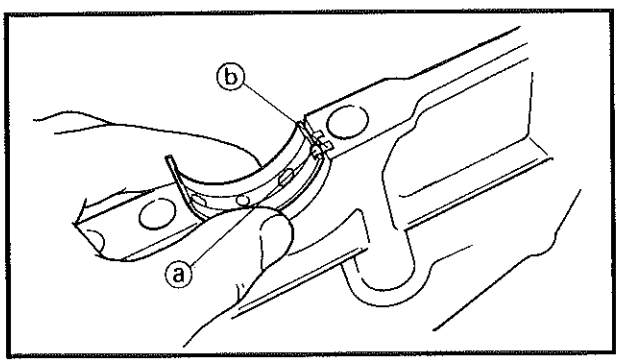
Oil clearance (main journal):
0.020 ~ 0.038 mm
(0.0008 ~ 0.0015 in)

****

Measurement steps:

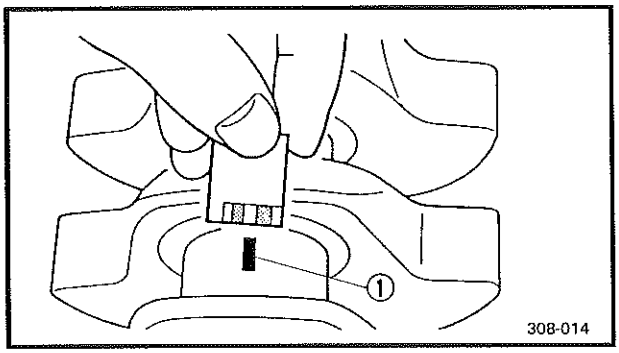
CAUTION:

Do not interchange the bearings. To obtain the correct oil clearance and to prevent engine damage they must be installed in their original positions.



- Clean the bearings, main journals and bearing portions of the crankcase.
- Place the upper crankcase upside down on a bench.
- Install the upper half of the bearings and the crankshaft into the upper crankcase.

NOTE:
Align the projection ⓐ of the bearing with the notch ⓑ in the crankcase.

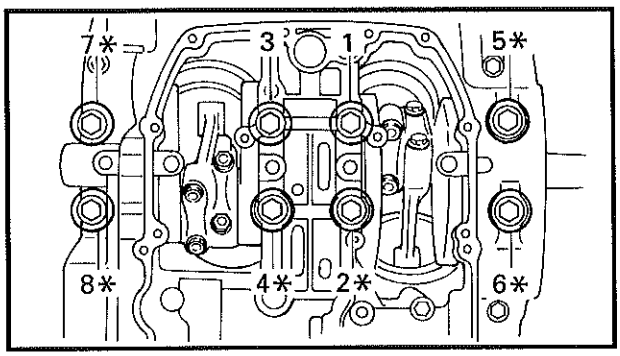


● Put a piece of Plastigauge® ① on each main journal.

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

● Install the lower half of the bearing into the lower crankcase and assemble the crankcase halves.

NOTE:
- Align the projection of the bearing with the notch in the crankcase.
- Do not move the crankshaft until the oil clearance measurement has been completed.



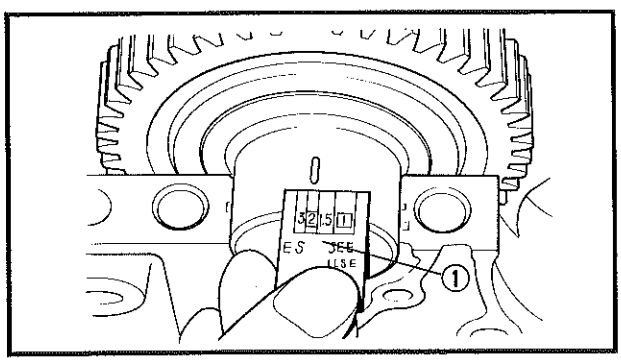
● Tighten the bolts to specification in the tightening sequence shown in the illustration.

	Bolt (crankcase): **40 Nm (4.0 m • kg, 29 ft • lb)**

*With a washer

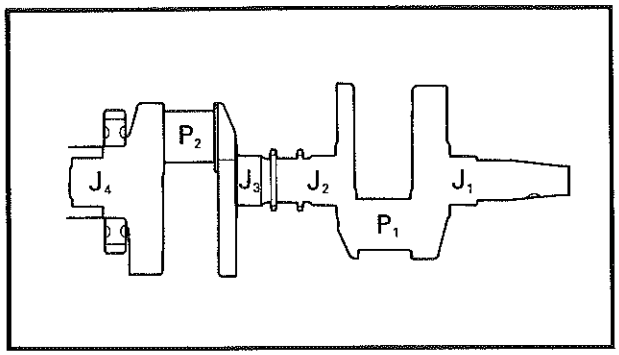
NOTE:
Lubricate the bolt threads with engine oil.

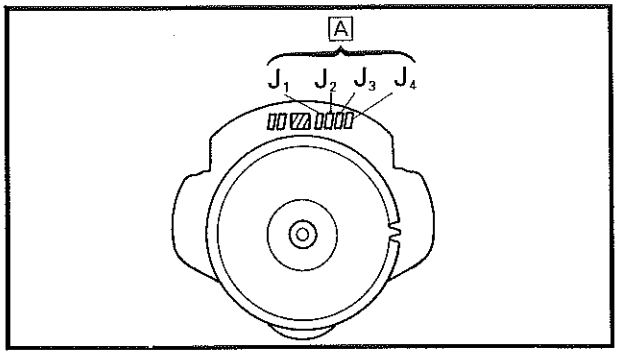
● Remove the lower crankcase and the lower half of the bearings.

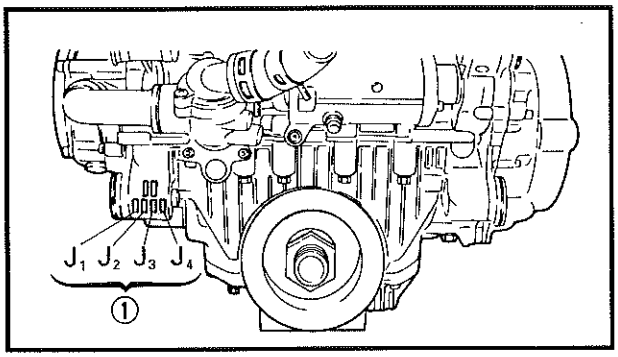


● On each main journal measure the width of the compressed Plastigauge® ①.
If the oil clearance is out of specification, select a replacement bearing.

****







4.Select:
- Main journal bearing ($J_1 \sim J_4$)

NOTE:
- Numbers used to indicate crankshaft journal sizes are stamped on the crankweb. The four main bearing journal numbers [A] starting with the left journal are indicated as shown in the illustration.
- The front left boss of the lower crankcase has a series of four numbers that designate the specific journal ① as shown in the illustration
- If "J_1 - J_4" are the same size use the "J_1" bearing size number.

****

Selection of main journal bearings:

- If the crankcase "J_1" and crankshaft "J_1" sizes are "4" and "1", respectively, the bearing size number is:

Bearing size of J_1:
Crankcase J_1 – Crankweb J_1 =
4 – 1 = 3 (brown)

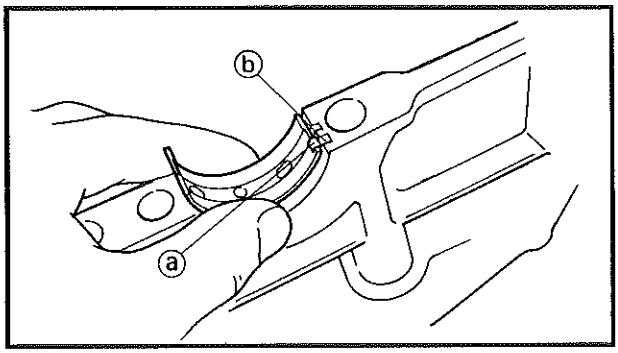
BEARING COLOR CODE	
1	blue
2	black
3	brown
4	green
5	yellow
6	pink
7	red

****

INSTALLATION

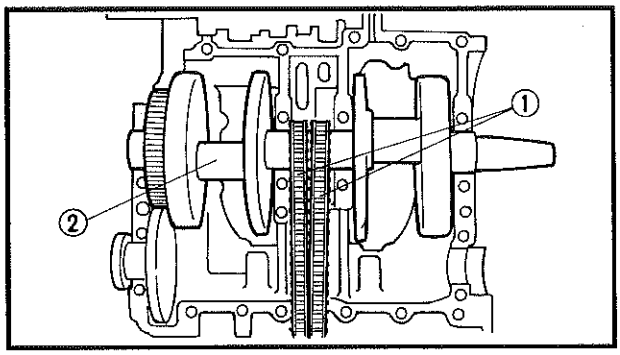
1.Install:
- Main journal bearings
  (onto the upper crankcase)

2.Apply:
- Engine oil
  (onto the crank pins and crank pin bearings.)



3.Install:
- Main journal bearings
  (onto the lower crankcase)

NOTE:
- Align the projection ⓐ of the bearings with the notches ⓑ in the crankcase.
- Install each bearing in its original place.

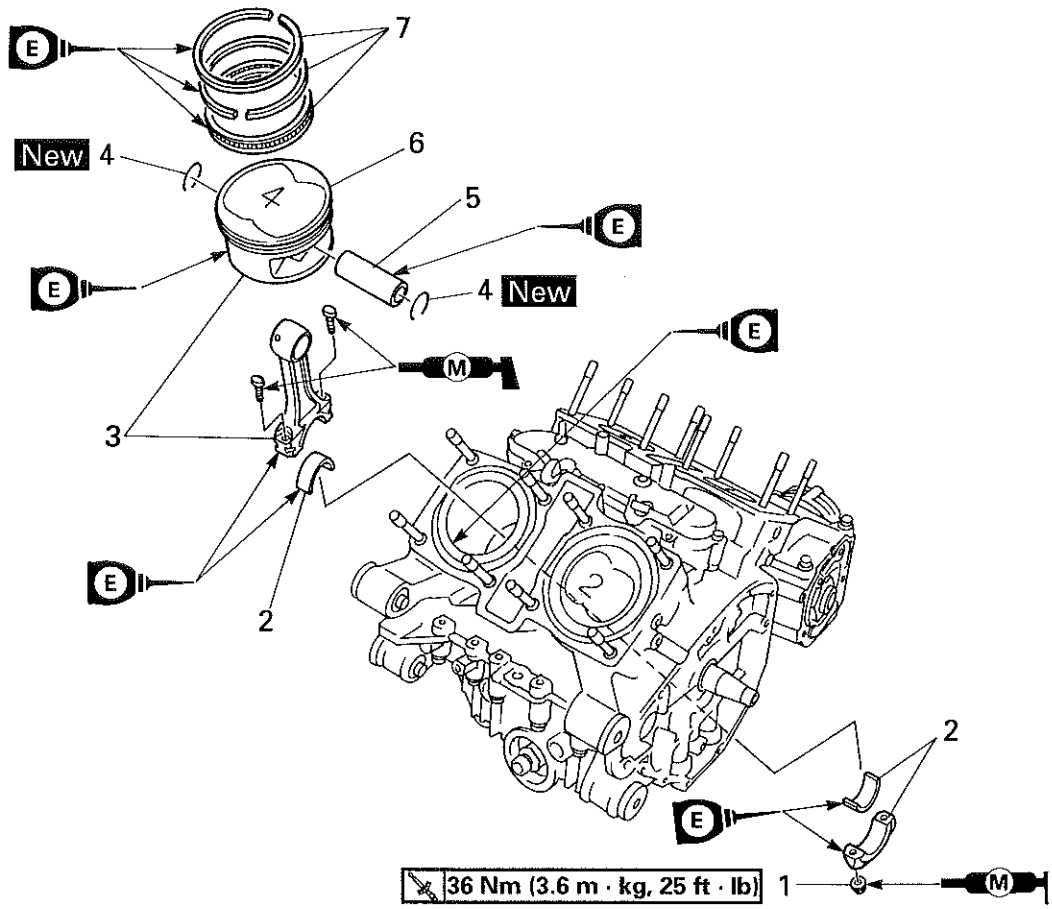


4.Install:
- Timing chains ①
- Crankshaft ②

5.Assemble:
- Crankcase
  Refer to "CRANKCASE".

6.Install:
- Engine assembly
  Refer to "ENGINE REMOVAL".

CONNECTING RODS AND PISTONS

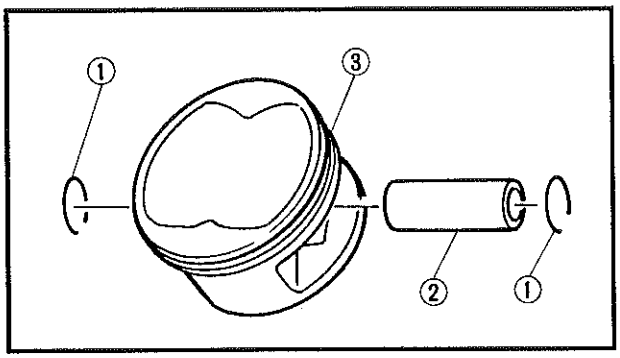


Order	Job name/Part name	Q'ty	Remarks
	Connecting rod and piston removal		Remove the parts in the order below.
	Engine assembly		Refer to "ENGINE REMOVAL".
	Cylinder heads		Refer to "CYLINDER HEADS".
	Oil pan and oil pump assembly		Refer to "OIL PAN AND OIL PUMP".
1	Nuts (connecting rod caps)	8	
2	Connecting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

REMOVAL

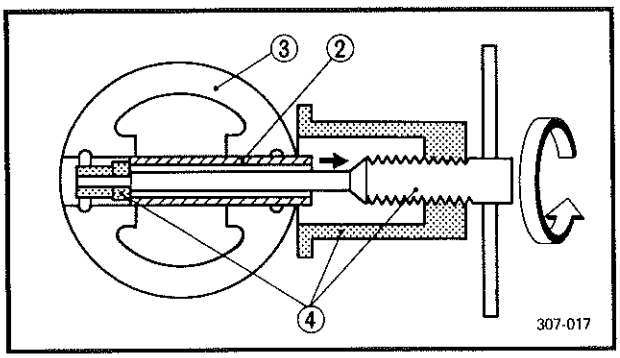
1.Remove:
- Connecting rod bearings

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



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

NOTE:
- Put identification marks on each piston head for reference during reinstallation.
- Before removing each piston pin, deburr the clip groove and pin hole area. If the piston pin groove is deburred and the piston pin is still difficult to remove, use the piston pin puller ④.

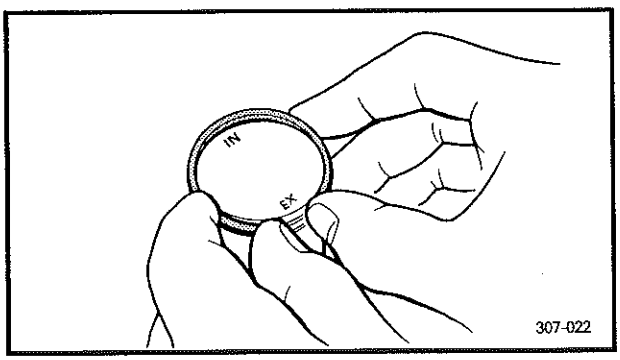


Piston pin puller:
YU-01304, 90890 - 01304

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

3.Remove:
- Piston rings

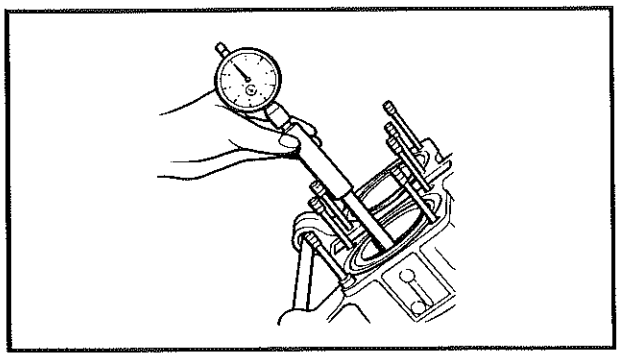
NOTE:
Spread the end gaps apart while at the same time lifting the piston ring over the top of the piston crown, as shown in the illustration.

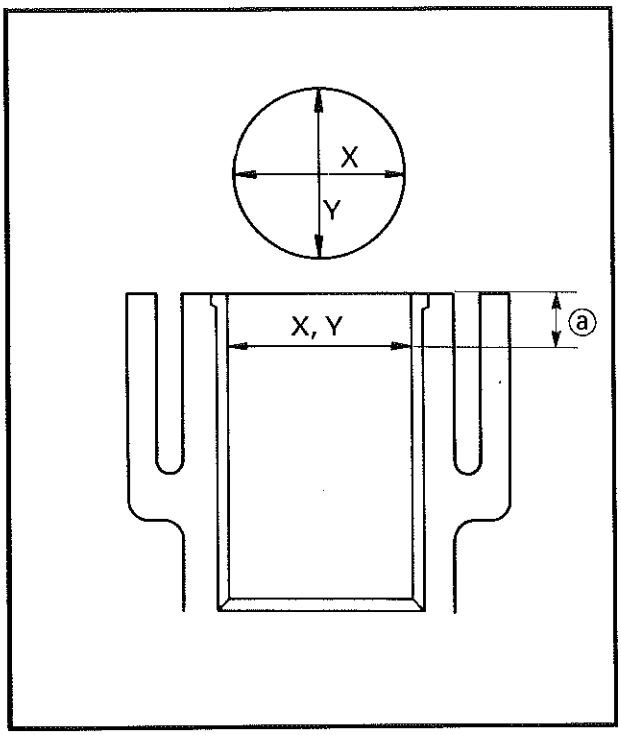


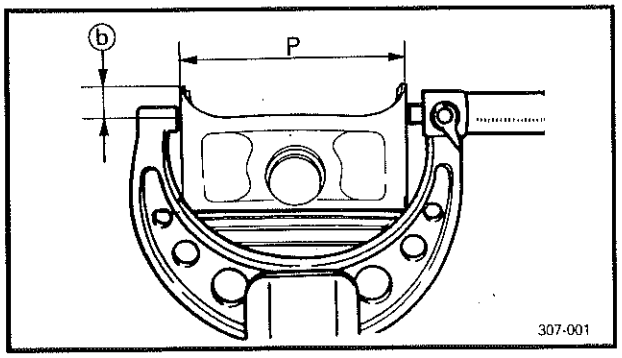
INSPECTION

1.Inspect:
- Cylinder and piston walls
  Vertical scratches → Rebore or replace the cylinder and the piston.

2.Measure:
- Piston-to-cylinder clearance







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Measurement steps:

1st step:

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

ⓐ 40 mm (1.57 in) from the top of the cylinder

NOTE:

Measure the cylinder bore "C" horizontally and laterally.

	Standard	Wear limit
Cylinder bore C:	78.967 ~ 79.016 mm (3.1089 ~ 3.1109 in)	79.1 mm (3.114 in)
$C = \frac{X + Y}{2}$		

- Find the average of the measurements.
- If out of specification, rebore or replace the cylinder and replace the piston and piston rings as a set.

2nd step:

- Measure the piston skirt diameter "P" with a micrometer.

ⓑ 4 mm (0.157 in) from the piston bottom edge.

	Piston size P
Standard	78.926 ~ 78.933 mm (3.107 ~ 3.108 in)
Oversize 1	79.25 mm (3.120 in)
Oversize 2	79.50 mm (3.130 in)

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

3rd step:

- Use the following formula to calculate the piston-to-cylinder clearance:

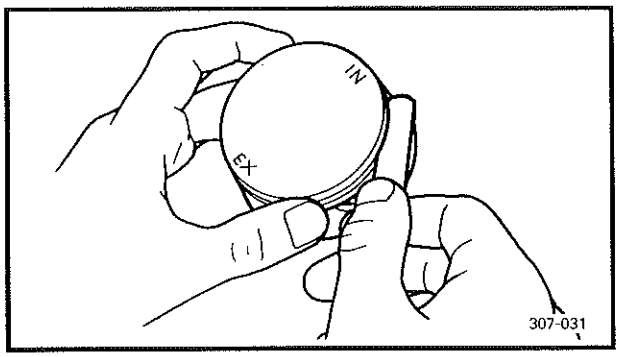
Piston-to-cylinder clearance =
Cylinder bore "C" –
Piston skirt diameter "P"

Clearance (piston to cylinder):
0.055 ~ 0.069 mm
(0.0022 ~ 0.0027 in)
<Limit>: 0.15 mm (0.0059 in)

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

****

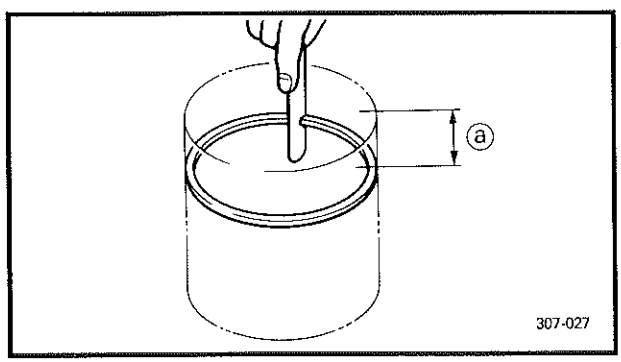
3. Inspect:
• Cylinder and piston walls
  Vertical scratches → Rebore or replace the cylinder and the piston.



4. Measure:
• Side clearance (piston to piston rings)
  Out of specification → Replace the piston and the piston rings as a set.

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

Side clearance (piston ring):
Top ring:
0.03 ~ 0.07 mm
(0.001 ~ 0.003 in)
<Limit>: 0.12 mm (0.005 in)
2nd ring:
0.02 ~ 0.06 mm
(0.001 ~ 0.002 in)
<Limit>: 0.12 mm (0.005 in)



5. Position:
• Piston ring
  (into the cylinder)

NOTE:
Using the piston crown push the ring into the cylinder so that the ring will be at a right angle to the cylinder bore.

ⓐ 20 mm (0.8 in)

6.Measure:
- End gap
  Out of specification → Replace.

NOTE:
You cannot measure the end gap on the expander spacer of the oil ring. If the oil ring rails show excessive gap, replace all three rings.

End gap:
Top ring:
0.20 ~ 0.35 mm
(0.008 ~ 0.014 in)
<Limit>: 0.55 mm (0.022 in)
2nd ring:
0.35 ~ 0.50 mm
(0.014 ~ 0.020 in)
<Limit>: 0.8 mm (0.031 in)
Oil ring:
0.3 ~ 0.9 mm (0.012 ~ 0.035 in)

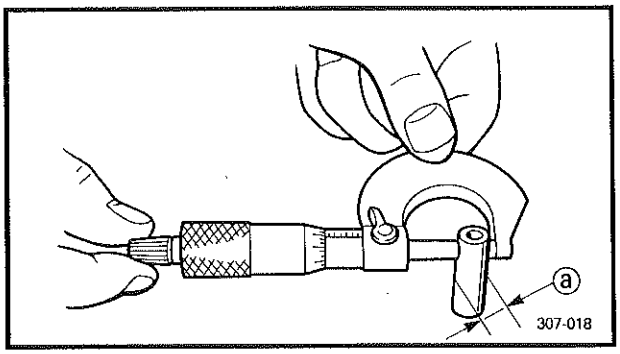
Piston ring oversize
- Top and 2nd piston ring
  The oversize top and 2nd ring size is stamped on top of the ring.

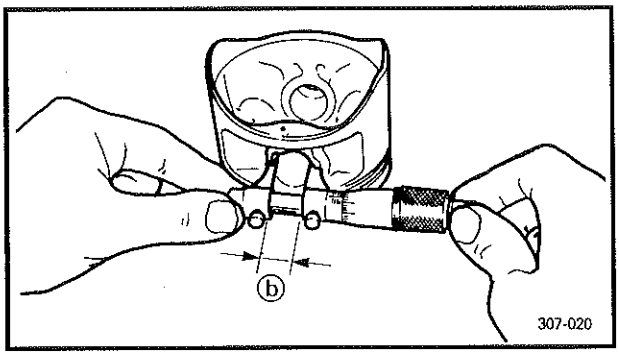
Oversize 1	**0.25 mm (0.0098 in)**
Oversize 2	**0.50 mm (0.0197 in)**

- Oil ring
  The expander spacer of the oil ring is color-coded to identify sizes. The color mark is painted on the expander spacer

Size	Color
Oversize 1	**Blue (Two)**
Oversize 2	**Red (One)**

7.Inspect:
- Piston pin
  Blue discoloration/grooves → Replace, then inspect the lubrication system.





8.Measure:
• Piston pin-to-piston clearance

****

Measurement steps:

● Measure the piston pin outside diameter ⓐ.
If out of specification, replace the piston pin.

Outside diameter (piston pin):
18.991 ~ 19.000 mm
(0.7477 ~ 0.7480 in)

● Measure the piston inside diameter ⓑ.
● Calculate the piston pin-to-piston clearance using the following formula:

Piston pin-to-piston clearance =
Bore size (piston pins) ⓑ –
Outside diameter (piston pins) ⓐ

● If out of specification, replace the piston.

Clearance (piston pin to piston):
0.004 ~ 0.024 mm
(0.00016 ~ 0.0009 in)
<Limit>: 0.07 mm (0.0028 in)

****

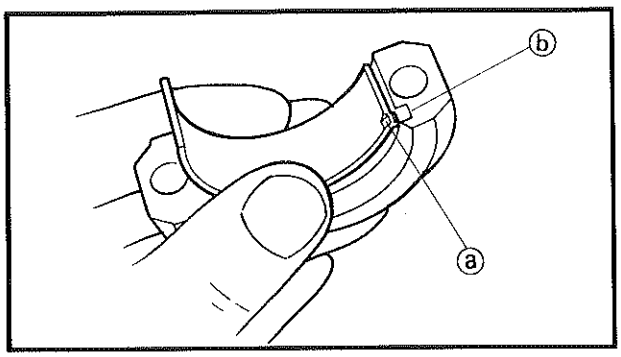
9.Measure:
• Oil clearance (crank pin)
Out of specification → Replace the bearing.

Oil clearance (crank pin):
0.021 ~ 0.039 mm
(0.001 ~ 0.002 in)

****

Measurement steps:

CAUTION:
Do not interchange the bearings and connecting rods. To obtain the correct oil clearance and to prevent engine damage they must be installed in their original positions.

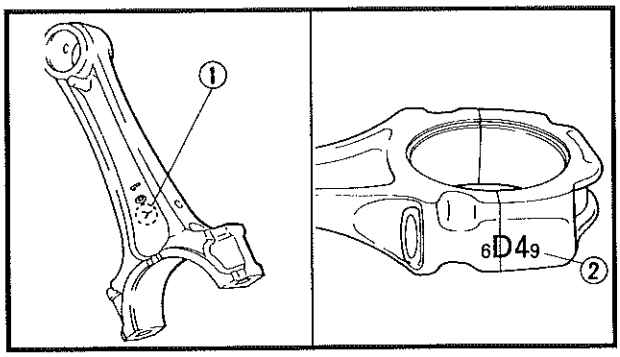


● Clean the bearings, crank pins and bearing portions of the connecting rods.
● Install the upper half of the bearing into the connecting rod and the lower half of the bearing into the connecting rod cap.

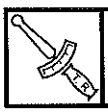
NOTE:
Align the projection ⓐ of the bearing with the notch ⓑ of the connecting rod and its cap.

● Put a piece of Plastigauge® on the crank pin.
● Assemble the connecting rod halves.

NOTE:
- Do not move the connecting rod or crankshaft until the oil clearance measurement has been completed.
- Apply molybdenum disulfide grease to the bolts, threads and nut seats.
- The stamped "Y" mark ① on the No. 2 and No. 4 connecting rods should face towards the right side of the crankcase.
- The stamped "Y" mark ① on the No. 1 and No. 3 connecting rods should face towards the left side of the crankcase.
- Be sure that the characters ② on the side of the cap and connecting rod are aligned.

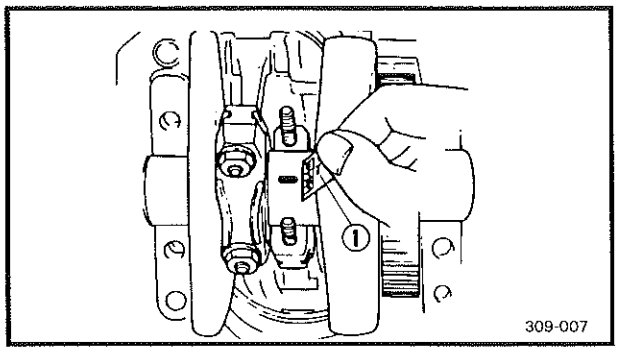


● Tighten the nuts.

	**Nuts (connecting rod caps): 36 Nm (3.6 m • kg, 25 ft • lb)**

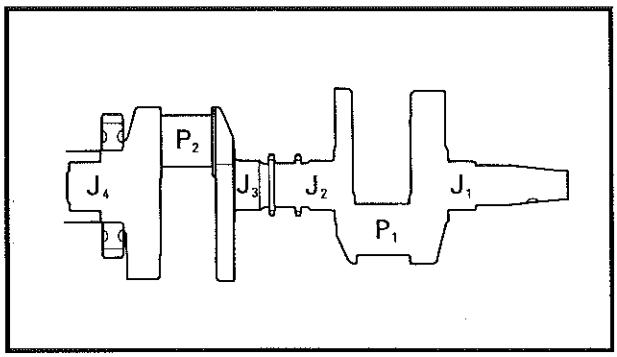
CAUTION:
- **When tightening the nuts be sure to use an F-type torque wrench.**
- **Without pausing tighten to full torque specifications. Apply continuous torque between 3.0 and 3.6 m • kg. Once you reach 3.0 m • kg DO NOT STOP TIGHTENING until final torque is reached. If the tightening is interrupted between 3.0 and 3.6 m • kg, loosen the nut to less than 3.0 m • kg and start again.**

● Remove the connecting rods and bearings.
Refer to "CONNECTING RODS AND PISTONS REMOVAL".



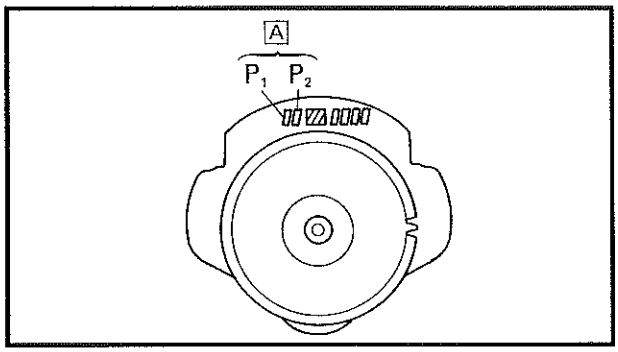
● On each crank pin measure the width of the compressed Plastigauge® ①.
If the oil clearance is out of specification, select a replacement bearing.

****



10. Select:
• Crank pin bearing (P_1 ~ P_2)

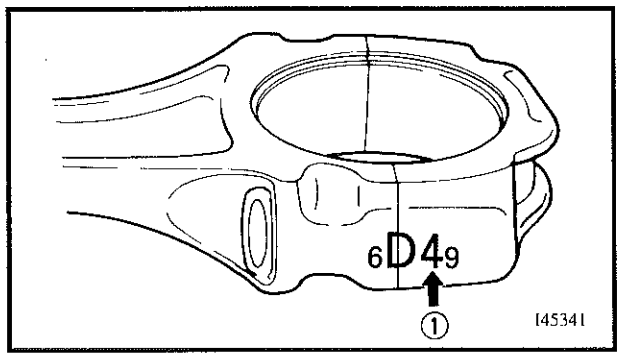
NOTE:
• Numbers used to indicate crankshaft journal sizes are stamped on the crankweb. The first two [A] are rod bearing journal numbers, starting with the left journal, as shown in the illustration
• The numbers ① are stamped in ink on the connecting rod and connecting rod cap, as shown in the illustration



****

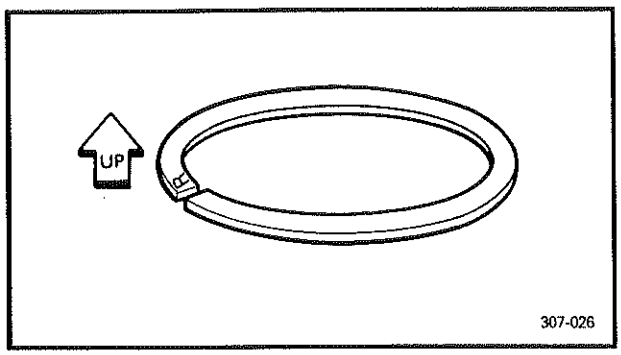
Selection of crank pin bearings:
● If "P_1" on the connecting rod is "5" and "P_1" on the crankweb is "1", then the bearing size for "P_1" is:

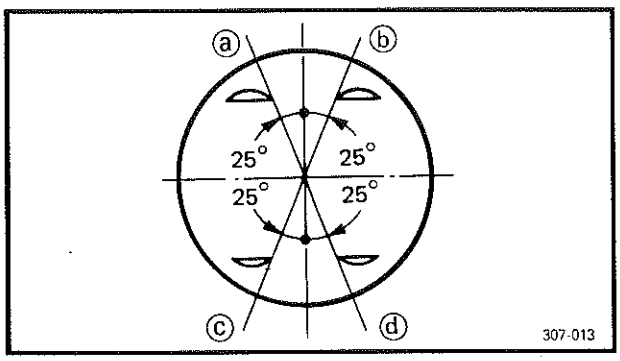
Bearing size of P_1:
Connecting rod P_1 – Crankweb P_1 = 5 – 1 = 4 (green)

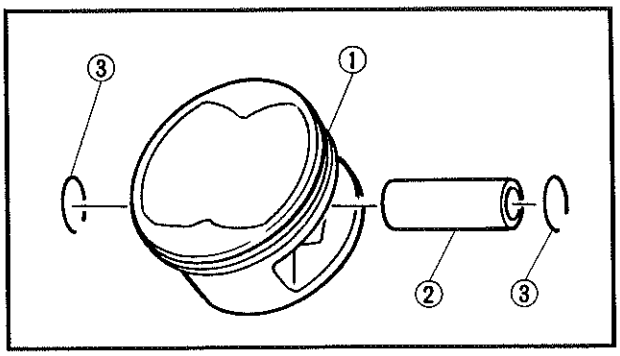


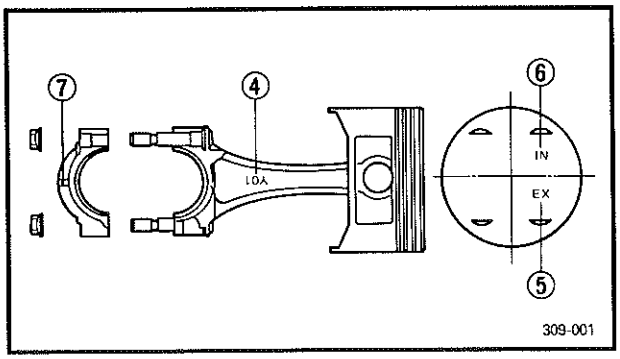
BEARING COLOR CODE	
1	blue
2	black
3	brown
4	green
5	yellow
6	pink

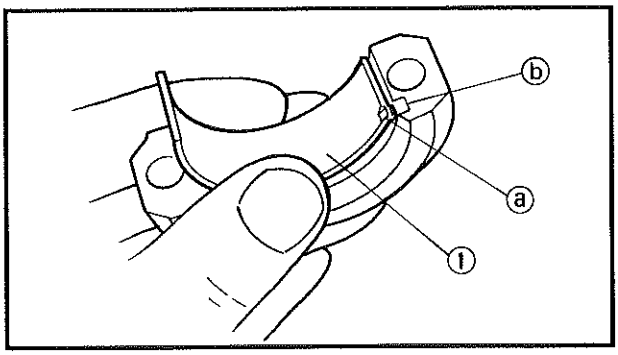
****











INSTALLATION

1.Install:
- Piston rings

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
ⓑ Oil ring end (lower)
ⓒ Oil ring end (upper)
ⓓ 2nd ring end

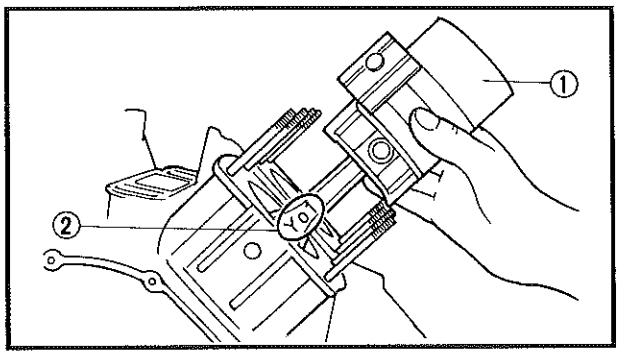
3.Install:
- Piston ①
- Piston pin ②
- Piston pin clips ③ New

NOTE:
- Apply engine oil onto the piston pin, piston ring and piston.
- 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:
- Plain bearings ①

NOTE:
- Align the projection ⓐ of the bearings with the notches ⓑ in the connecting rod cap.
- Install each bearing in its original place.

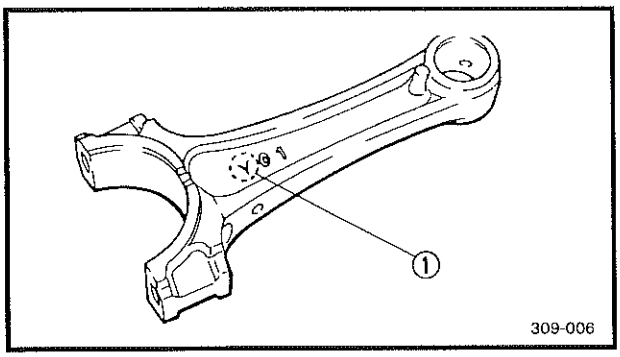


5.Attach:
- Piston ring compressor ①

	Piston ring compressor: **YM - 8037, 90890 - 05158**

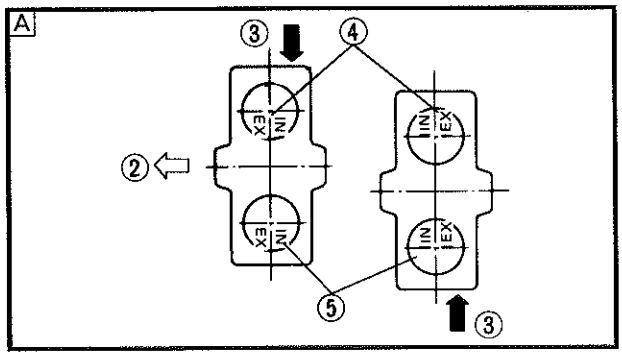
6.Lubricate:
- Piston
- Piston rings
- Cylinder

NOTE:
Apply a liberal coating of engine oil.



7.Install:
- Connecting rod and piston assembly

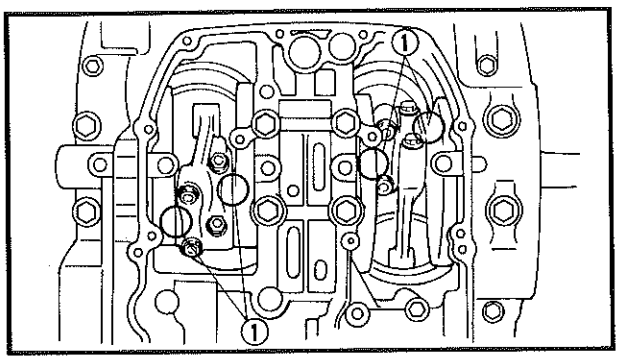
NOTE:
- The stamped "Y" mark ① on the No. 2 and No. 4 connecting rods should face towards the right side of the crankcase.
- The stamped "Y" mark ① on the No. 1 and No. 3 connecting rods should face towards the left side of the crankcase.



A Top view
② Front
③ "Y" mark facing direction
④ Piston exhaust mark
⑤ Piston intake mark

8.Install:
- Connecting rod cap

NOTE:
Be sure that the characters on the side of the cap and connecting rod are aligned.



9. Tighten:
- Nuts (connecting rod cap)

36 Nm (3.6 m · kg, 25 ft · lb)

NOTE:
- Apply Molybdenum disulfide grease to the rod cap bolt threads and nut surfaces.
- The projection ① on the connecting rod cap should face toward the crankshaft web.

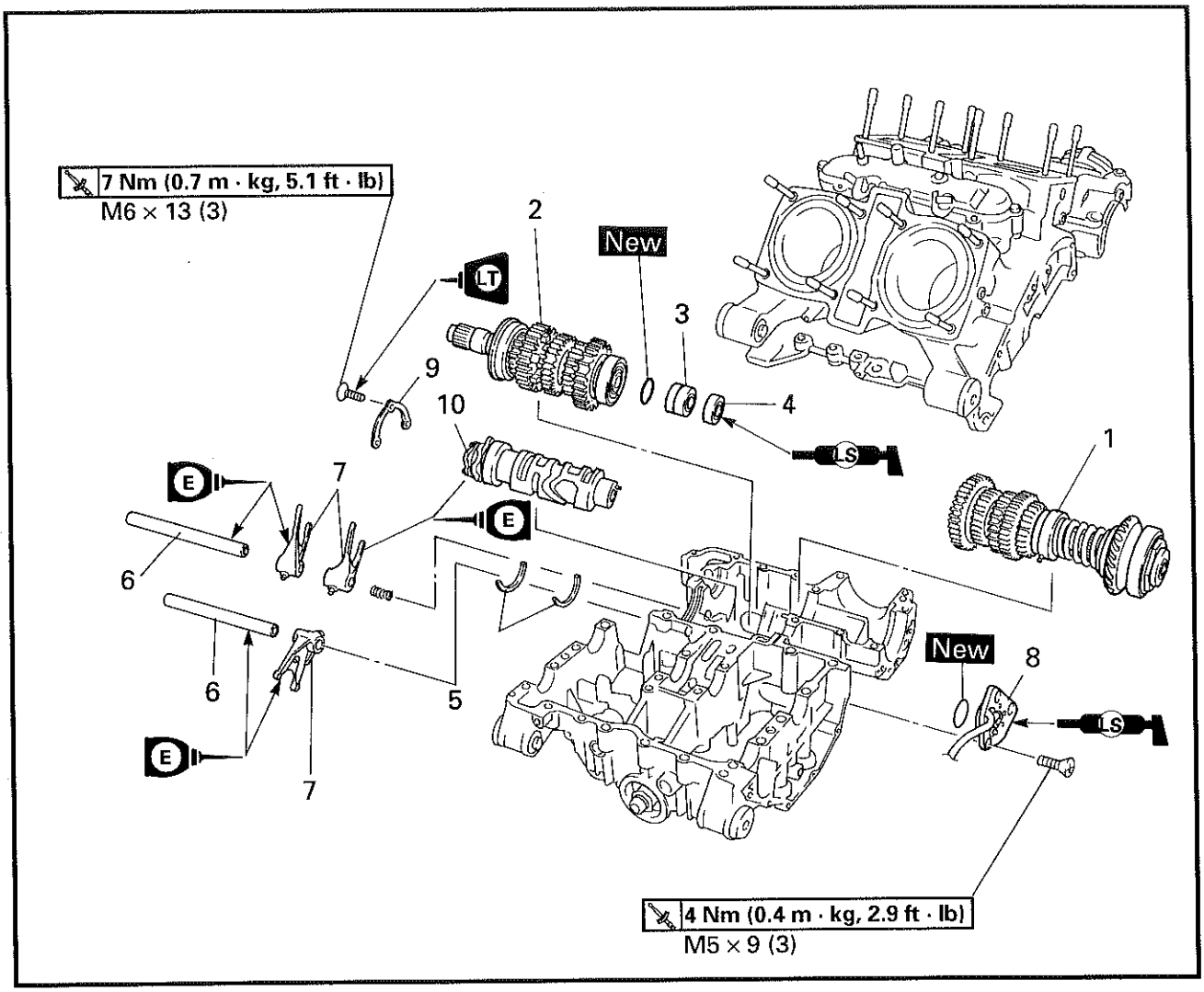
CAUTION:
- **When tightening the nuts be sure to use an F-type torque wrench.**
- **Without pausing tighten to full torque specification. Apply continuous torque between 3.0 and 3.6 m • kg. Once you reach 3.0 m • kg DO NOT STOP TIGHTENING until final torque is reached. If the tightening is interrupted between 3.0 and 3.6 m • kg, loosen the nut to less than 3.0 m • kg and start again.**

10. Install:
- Oil pan and oil pump assembly
  Refer to "OIL PAN AND OIL PUMP".

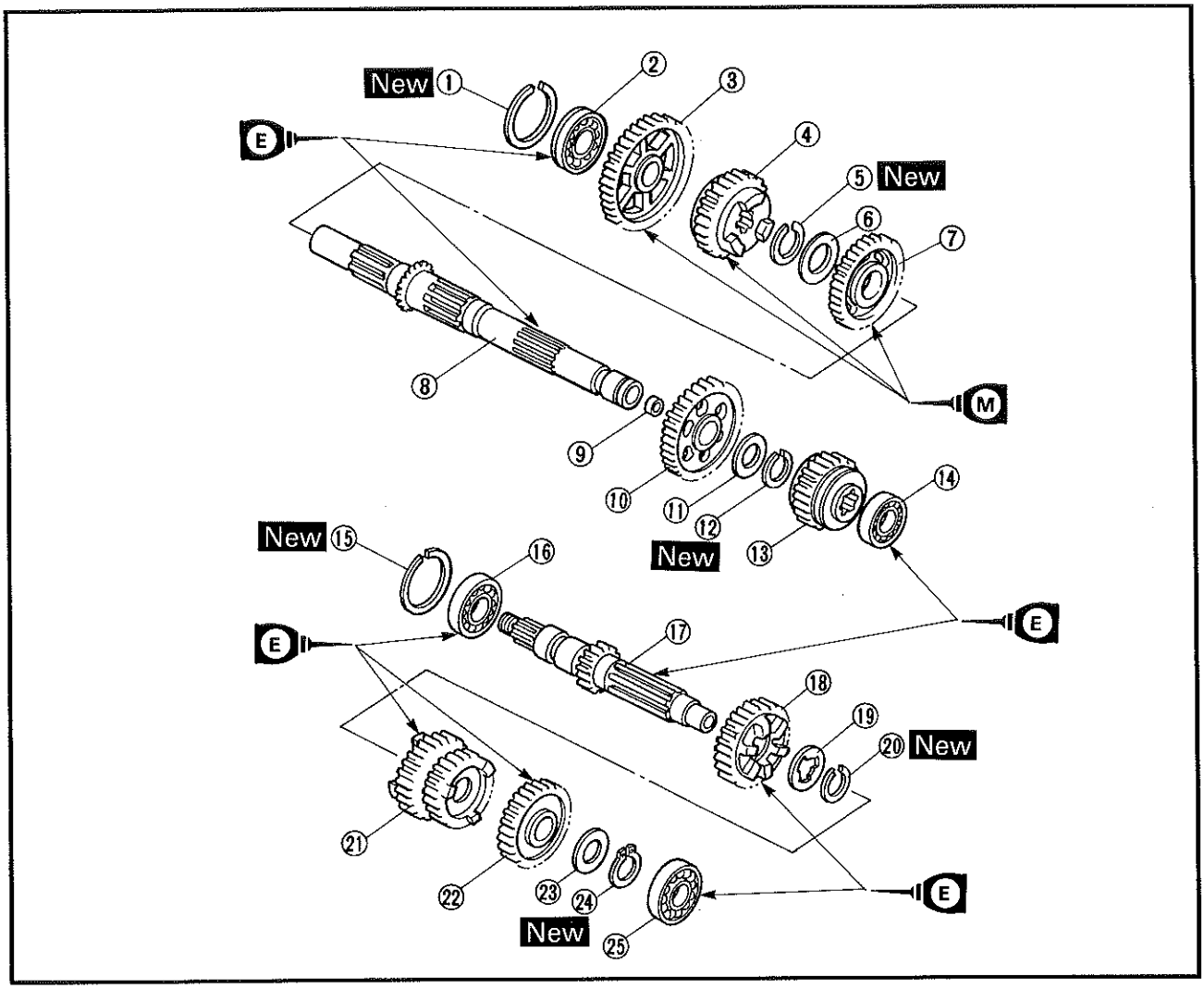
11. Install:
- Cylinder heads
  Refer to "CYLINDER HEADS".

12. Install:
- Engine assembly
  Refer to "ENGINE REMOVAL".

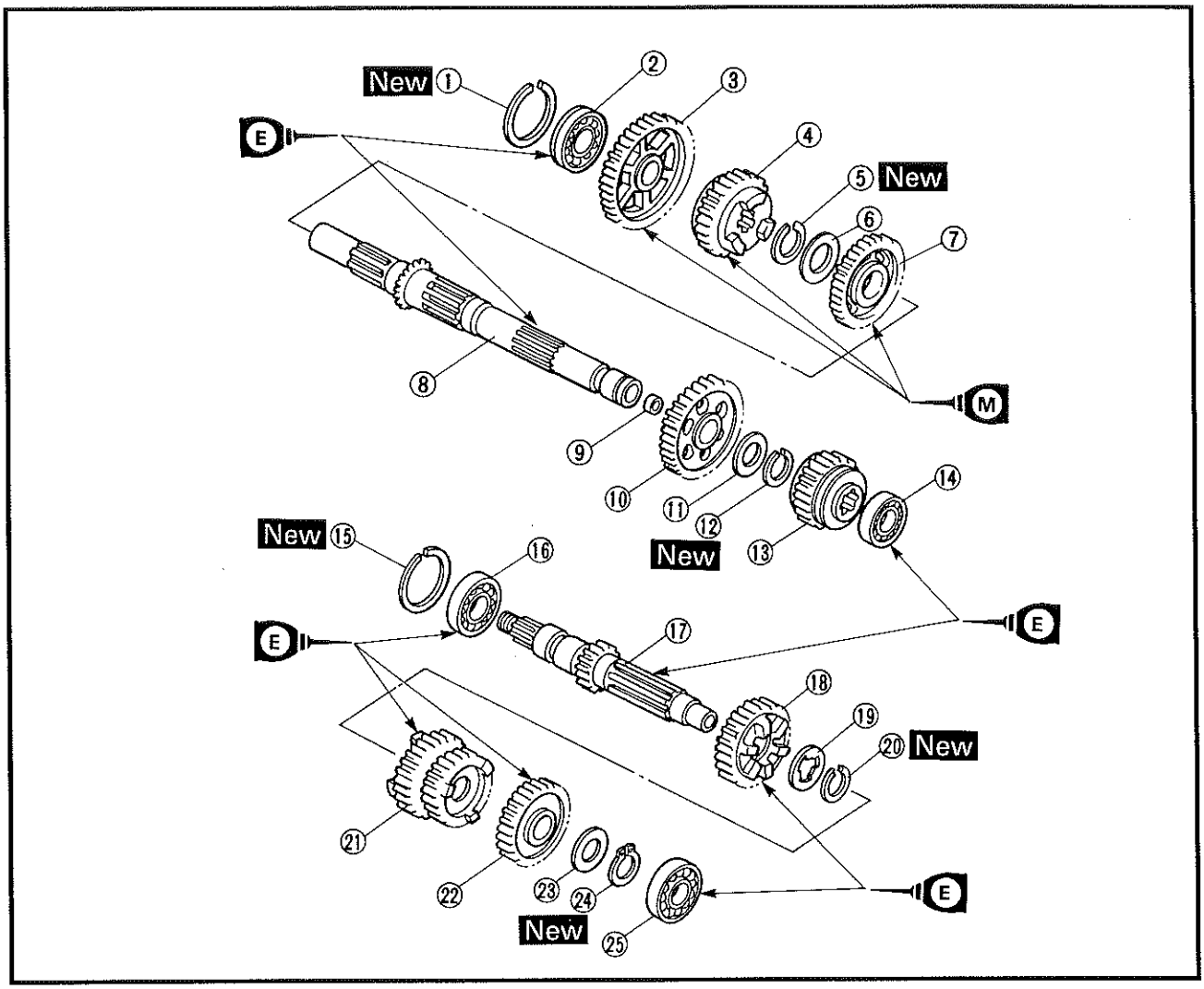
TRANSMISSION



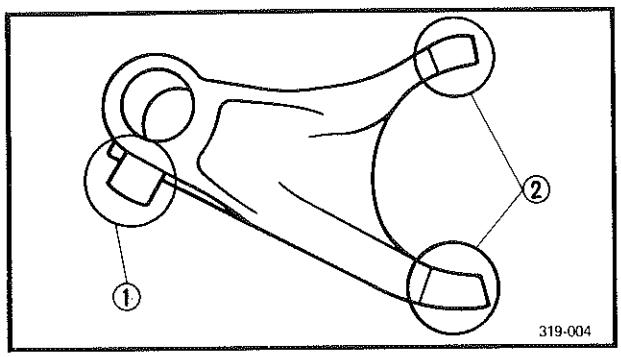
Order	Job name/Part name	Q'ty	Remarks
	Transmission removal		Remove the parts in the order below.
	Crankcase separation		Refer to "CRANKCASE".
1	Drive axle assembly	1	
2	Main axle assembly	1	
3	Push rod support bearing	1	
4	Oil seal	1	
5	Bearing circlips	2	
6	Guide bars	2	
7	Shift forks	3	
8	Neutral switch	1	
9	Shift cam retainer	1	
10	Shift cam	1	
			For installation, reverse the removal procedure.



Order	Job name/Part name	Q'ty	Remarks
	Transmission disassembly		Remove the parts in the order below.
	Middle drive pinion gear assembly		Refer to "MIDDLE GEAR".
①	Circlip	1	
②	Bearing	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	



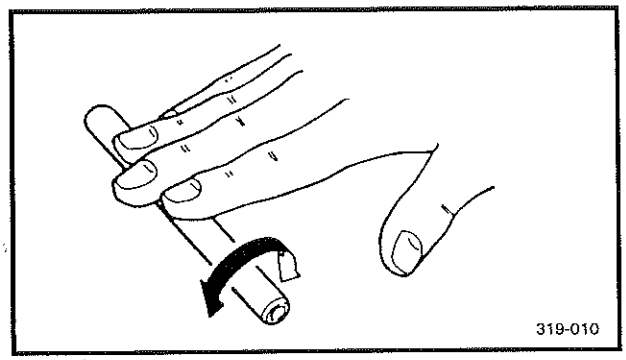
Order	Job name/Part name	Q'ty	Remarks
⑬	5th wheel gear	1	
⑭	Bearing	1	
⑮	Circlip	1	
⑯	Bearing	1	
⑰	Main axle	1	
⑱	4th pinion gear	1	
⑲	Washer	1	
⑳	Circlip	1	
㉑	2nd, 3rd pinion gear	1	
㉒	5th pinion gear	1	
㉓	Washer	1	
㉔	Circlip	1	
㉕	Bearing	1	
			For installation, reverse the disassembly procedure.



INSPECTION

1.Inspect:
- Shift fork cam follower ①
- Shift fork pawl ②

Scoring/bends/wear/damage → Replace.

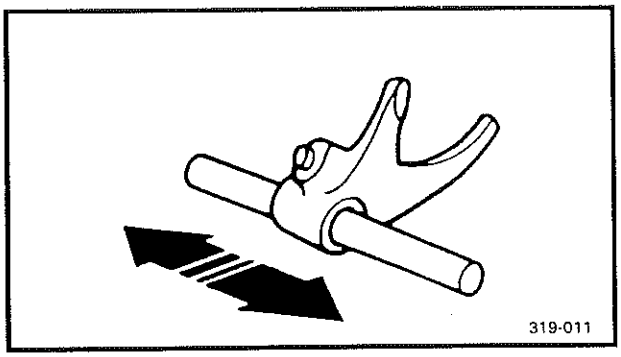


2.Inspect:
- Guide bar

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

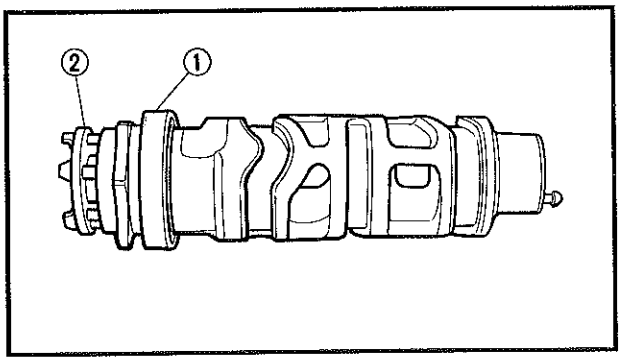
⚠ WARNING

Do not attempt to straighten a bent guide bar.



3.Check:
- Shift fork movement

(on the guide bar)
Unsmooth operation → Replace the shift fork and the guide bar.

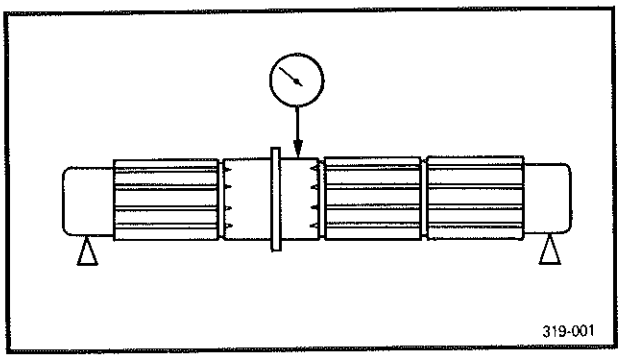


4.Inspect:
- Shift cam grooves

Scratches/wear/damage → Replace.
- Shift cam segment ①

Wear/damage → Replace.
- Shift cam bearing ②

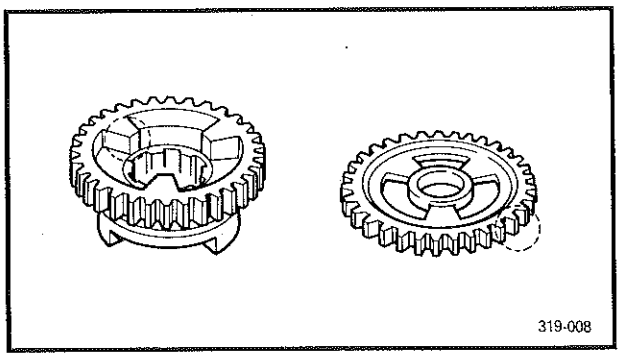
Pitting/damage → Replace.



5.Measure:
- Axle runout

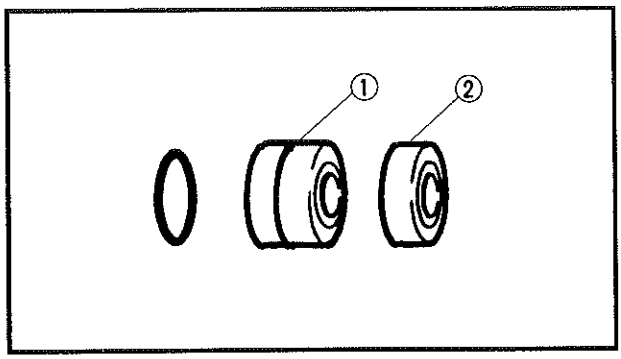
Use a centering device and a dial gauge.
Out of specification → Replace the bent axle.

Runout limit (main and drive axle):
0.08 mm (0.003 in)

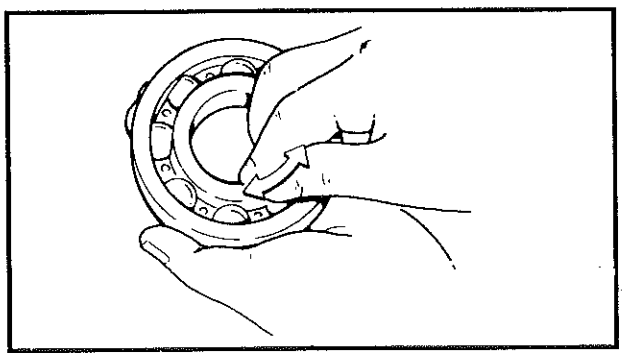


6.Inspect:
- Gear teeth
  Blue discoloration/pitting/wear → Replace.
- Mated dogs
  Rounded edges/cracks/missing portions → Replace.

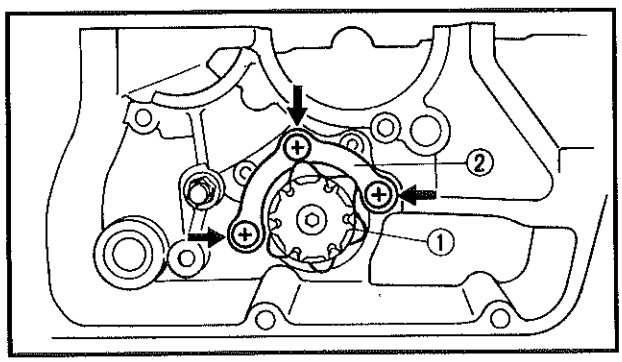
7.Check:
- Proper pinion gear engagement (each gear to its counter part)
  Incorrect → Reassemble.
- Gear movement
  Roughness → Replace.



8.Inspect:
- Push rod support bearing ①
- Oil seal ②
  Cracks/wear/damage → Replace.
  Blockage → Blow out the passages with compressed air.



9.Inspect:
- Bearings
  Unsmooth → Replace.

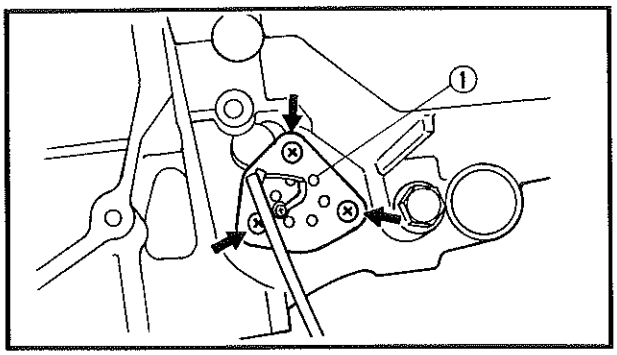


INSTALLATION

1.Install:
- Shift cam ①
- Shift cam retainer ②

7 Nm (0.7 m · kg, 5.1 ft · lb)

NOTE:
- Apply LOCTITE® #648 to the shift cam retainer screws.
- Rotate the shift cam to the neutral position.

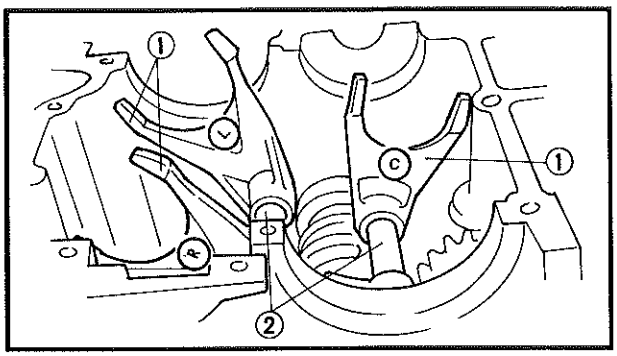


2.Install:
- Neutral switch ①

4 Nm (0.4 m · kg, 2.9 ft · lb)

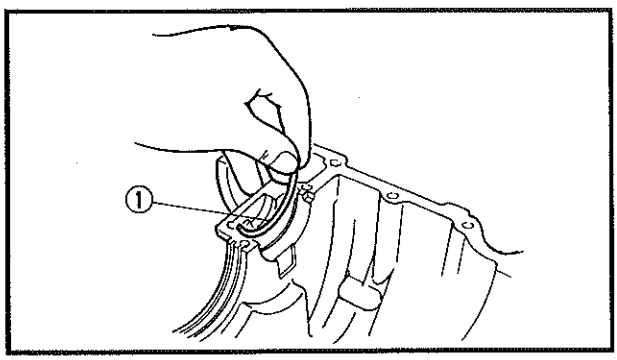
NOTE:
Apply grease to the neutral switch.

⚠ WARNING
Always use a new O-ring.



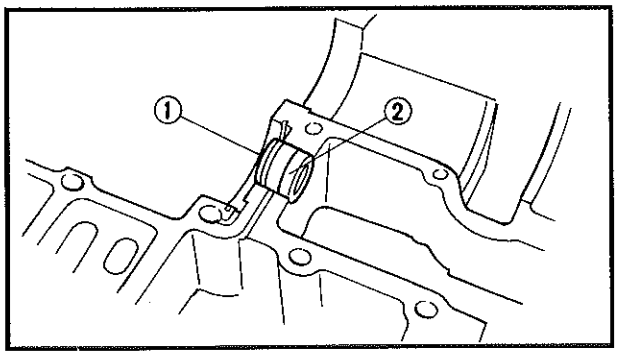
3.Install:
- Shift forks ①
- Guide bars ②

NOTE:
The numbers on the shift forks should face towards the right side of the engine and be in sequence (R, C, L).



4.Install:
- Bearing circlips

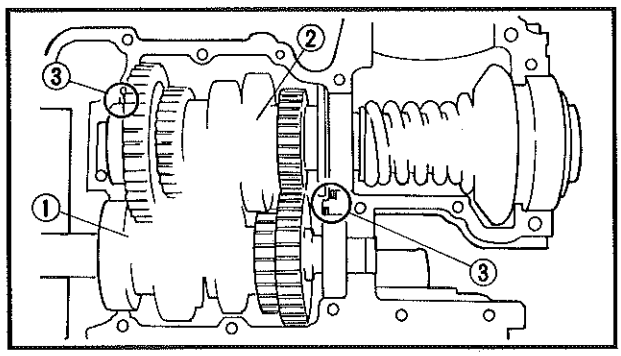
NOTE:
Insert the bearing circlips ① completely into the lower crankcase positioning grooves.



5.Install:
- Push rod support bearing ①
- Oil seal ②

NOTE:
- Insert the bearing pin into the crankcase hole.
- Lightly apply grease to the oil seal lips.
- Position the oil seal against the bearing.

⚠ WARNING
Always use a new O-ring.



6.Install:
- Main axle assembly ①
- Drive axle assembly ②

NOTE:
Position the bearing pins ③ as shown.

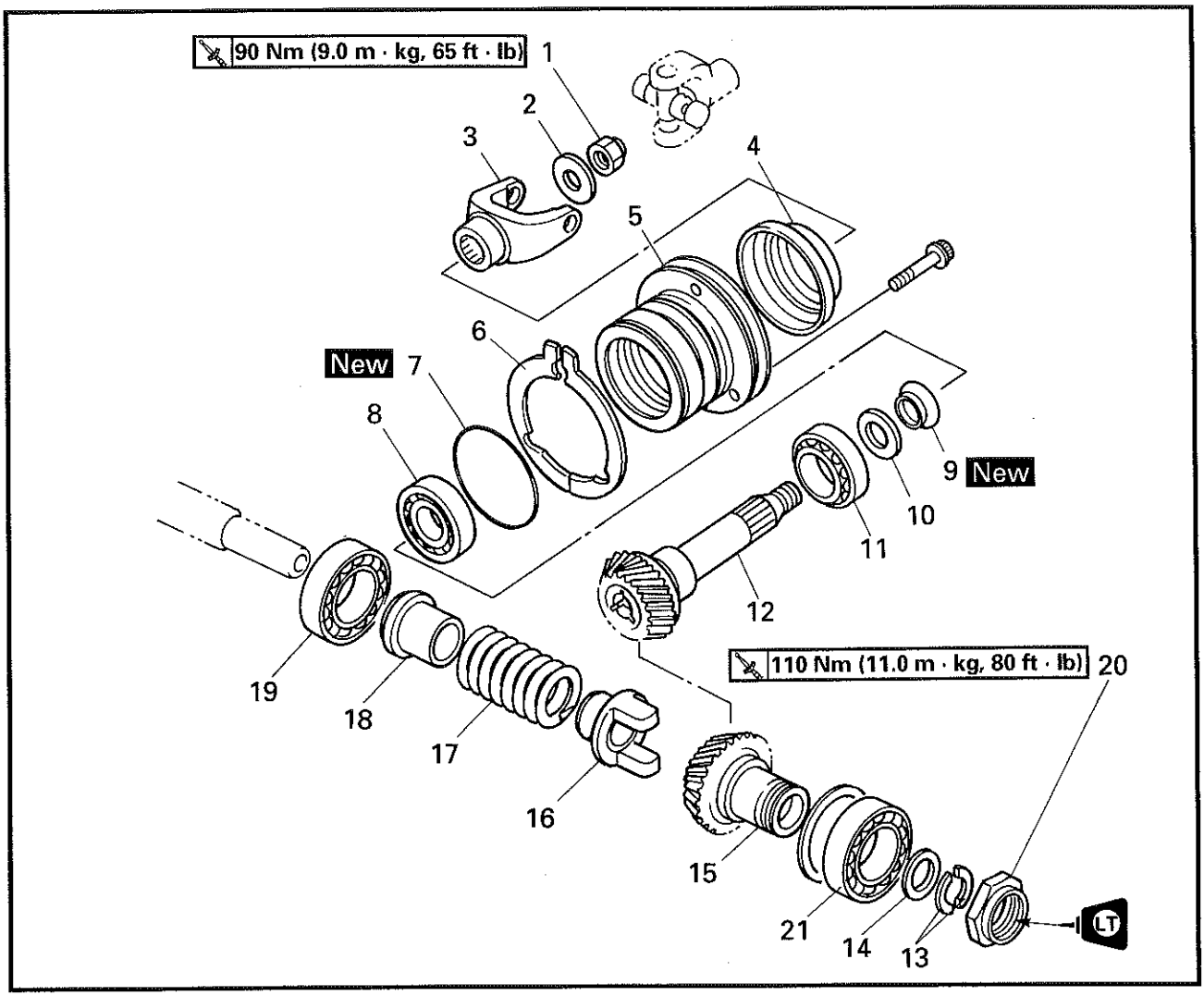
⚠ WARNING
Always use new circlips

7.Check:
- Transmission operation
  Unsmooth rotation → Repair.

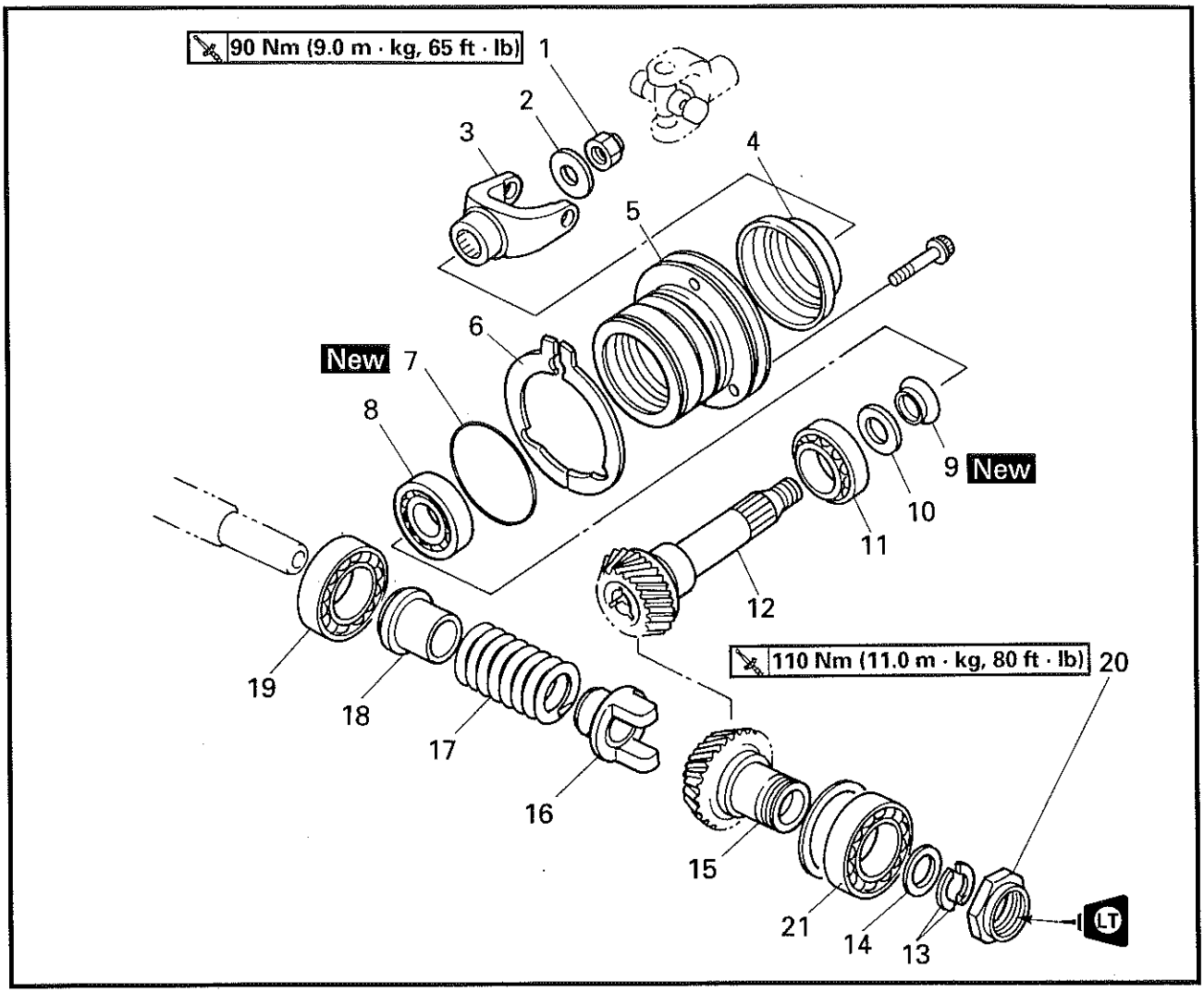
NOTE:
Oil each gear, shaft and bearing thoroughly.

8.Assemble:
- Crankcase
  Refer to "CRANKCASE".

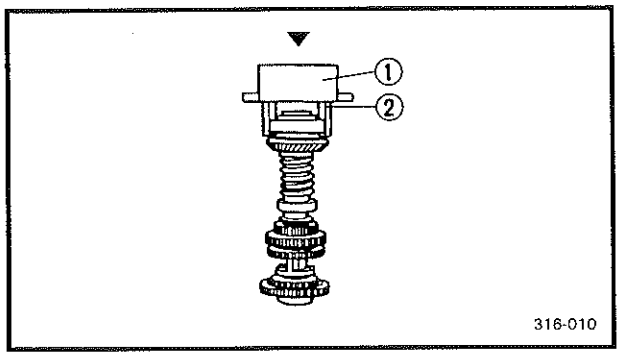
MIDDLE GEAR



Order	Job name/Part name	Q'ty	Remarks
	Middle gear removal		Remove the parts in the order below.
	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 gear housing	1	
6	Shims	2	
7	O-ring	1	
8	Bearing	1	
9	Collapsible collar	1	
10	Spacer	1	
11	Bearing	1	
12	Middle drive shaft	1	
13	Retainer	1	



Order	Job name/Part name	Q'ty	Remarks
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.



MIDDLE DRIVE SHAFT ASSEMBLY

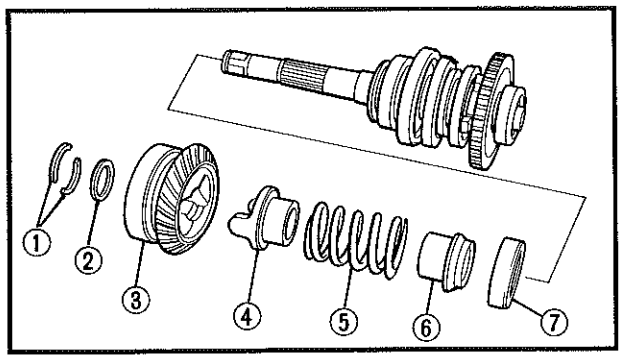
Disassembly

1.Attach:
- Damper spring compressor (onto the drive pinion)

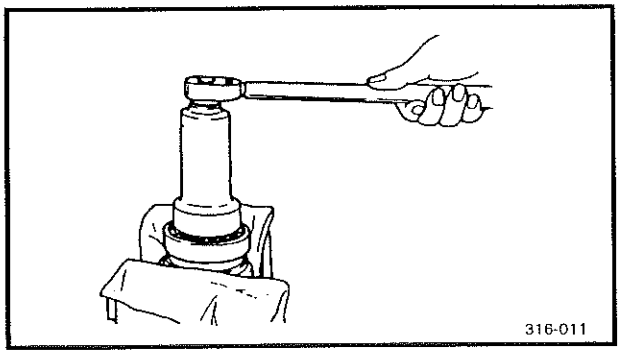
	Damper spring compressor: ① **YM - 33286, 90890 - 04090** **Middle drive gear holder: ②** **YM - 33222**

2.Position
- Drive axle shaft assembly (onto a hydraulic press)

NOTE:
Compress the damper spring onto the drive axle shaft assembly.



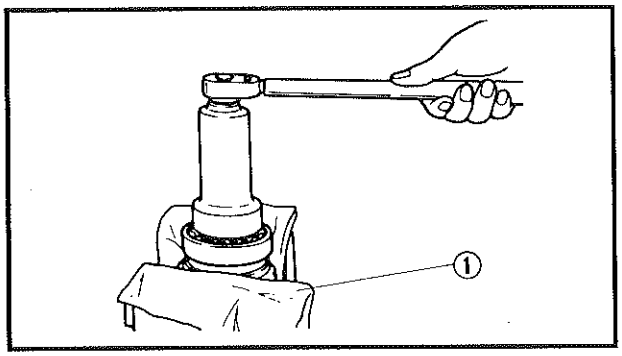
3.Remove:
- Spring retainers ①
- Washer ②
- Middle drive pinion gear ③
- Damper cam ④
- Damper spring ⑤
- Spring seat ⑥
- Bearing ⑦



4.Attach:
- Offset wrench

	Offset wrench: **YM - 04054, 90890 - 04054**

5.Remove:
- Nut (middle drive pinion gear)
- Bearing
- Shim(s)

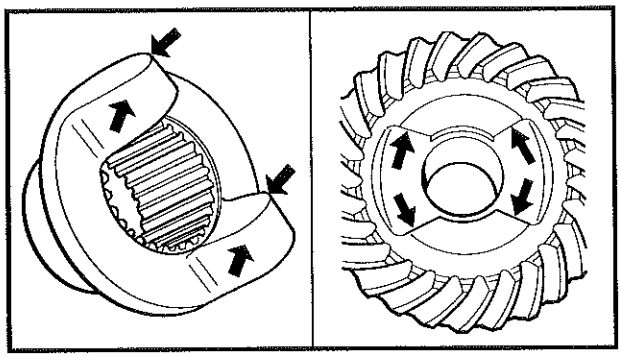


****

Disassembly steps:

- Wrap the middle drive shaft end in a folded rag ①.
- Secure the middle drive shaft end in a vise.
- Remove the middle drive pinion gear nut, bearing and shim(s).

****



Inspection

1.Inspect:

- Damper cam surface
  Wear/scratches → Replace the damper cam as a set.

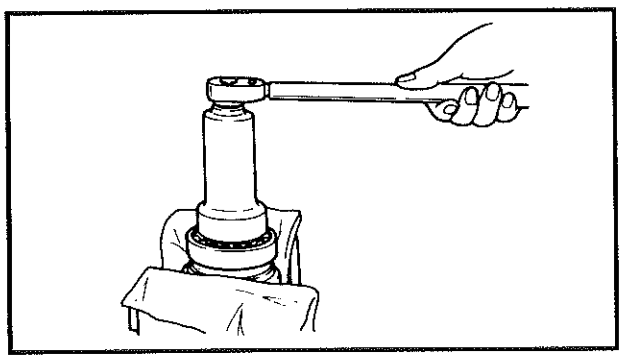
2.Inspect:

- Damper spring
  Damage/cracks → Replace.

Assembly

1.Install:

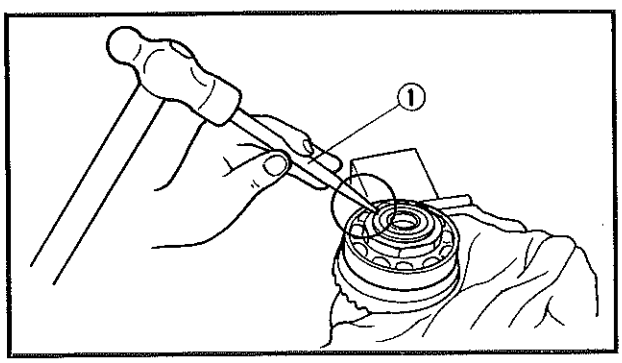
- Shim(s)
- Bearing
- Nut (middle drive pinion gear)



2.Attach:

- Offset wrench

	Offset wrench: **YM - 04054, 90890 - 04054**



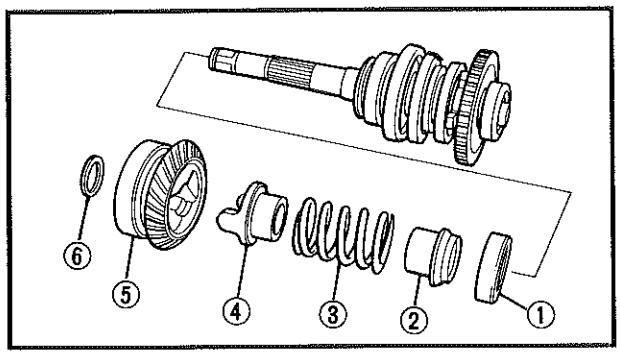
3.Tighten:

- Nut (middle drive pinion gear)

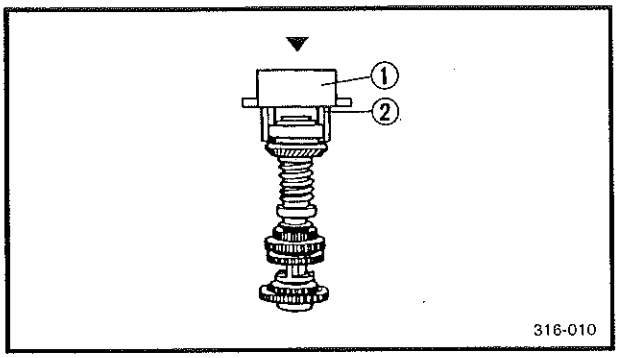
110 Nm (11.0 m · kg, 80 ft · lb)

NOTE:

- Apply LOCTITE® #620 or #201 to the middle drive pinion gear nut.
- To lock the threads stake them with a center punch ①.



4.Install:
- Bearing ①
- Spring seat ②
- Damper spring ③
- Damper cam ④
- Middle drive pinion gear ⑤
- Washer ⑥



5.Attach:
- Damper spring compressor.

Damper spring compressor: ①
YM - 33286, 90890 - 04090
Middle drive gear holder: ②
YM - 33222

6.Position:
- Drive axle shaft assembly (onto a hydraulic press)

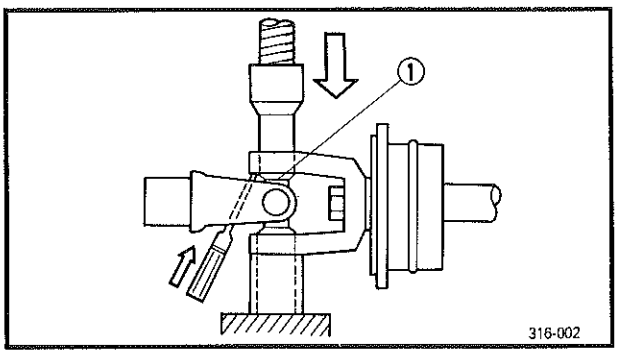
NOTE:
Compress the damper spring onto the drive axle assembly.

7.Install:
- Spring retainers (into drive axle shaft groove)
- Drive axle shaft assembly (onto the crankcase)

MIDDLE DRIVEN SHAFT ASSEMBLY

Disassembly

NOTE:
The following procedures should be performed only if the middle gear or middle drive shaft bearing(s) have to be replaced.



1.Remove:
- Universal joint

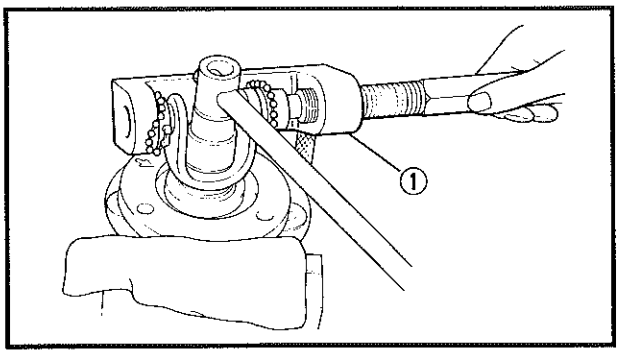
****

Disassembly steps:
- Remove the circlips ①.
- Place the universal joint in a press.
- Using a suitable diameter pipe beneath the yoke, press the bearing into the pipe as shown.

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

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

****



2.Attach:
- Universal joint holder ①
  (onto the universal joint yoke)

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

3.Loosen:
- Nut (middle driven pinion gear)

4.Remove:
- Nut (middle driven pinion gear)
- Washer
- Yoke
- Dust seal
- Middle driven gear housing
- Bearing
- O-ring
- Collapsible collar
- Spacer
- Bearing
- Middle drive shaft

Inspection

1.Inspect:
- Middle gear teeth
  Pitting/galling/wear → Replace the middle gear as a set.

2.Inspect:
- Bearings
  Pitting/damage → Replace the bearing housing assembly.

3.Inspect:
- O-ring
- Dust seal
  Damage → Replace.

4.Check:
- Universal joint movement
  Roughness → Replace the universal joint.

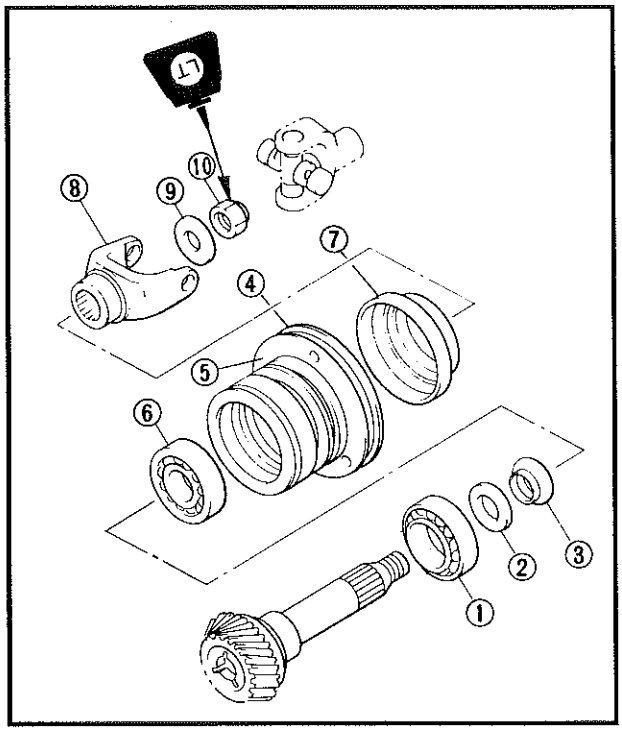
Assembly

NOTE:
The following points are critical when assembling the middle gear:
- The collapsible collar must be replaced whenever the driven pinion gear is removed from the bearing housing.
- When doing 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 driven gear shaft can move slightly allowing oil to leak past the seal. In addition to torquing the middle driven pinion gear nut to specifications you must check the spinning torque (bearing preload).

1.Install:
- Bearing outer race
  (into the middle driven gear housing)

⚠ WARNING

Do not press the bearing outer race. Always press the inner race with care when installing.



2.Install:
- Inner bearing ①
- Spacer ②
- Collapsible collar ③ (new)
- O-ring ④ New
- Middle driven gear housing ⑤
- Outer bearing ⑥
- Dust seal ⑦
- Yoke ⑧
- Washer ⑨
- Nut (middle driven pinion gear) ⑩

3.Attach:
- Universal joint holder
  (onto the universal joint yoke)

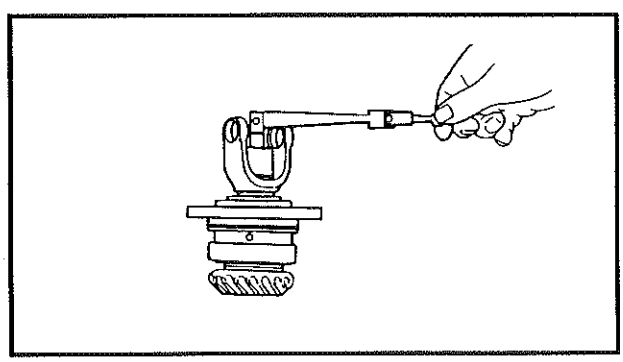
	Universal joint holder: **YM - 04062, 90890 - 04062**

4.Tighten:
- Nut (middle driven pinion gear)

90 Nm (9.0 m · kg, 65 ft · lb)

CAUTION:

Tighten the drive pinion gear nut in small steps, checking the torque it takes to keep the driven pinion gear turning in the bearing housing - not the torque it takes to start it turning.



5.Measure:
- Spinning torque (driven pinion gear)

	Spinning torque: **0.4 ~ 0.5 Nm (0.04 ~ 0.05 m • kg, 0.29 ~ 0.36 ft • lb)**

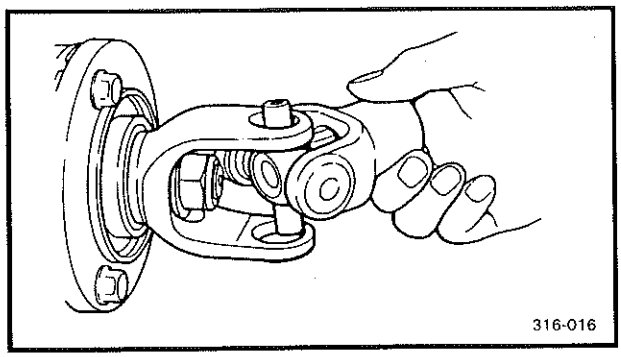
Use a beam-type torque wrench.

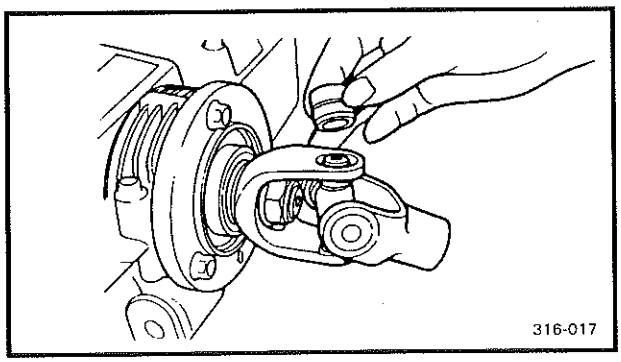
	Beam-type torque wrench: **J7754 - C**

Under specification → Repeat steps #4 and #5.

CAUTION:

- **Never exceed the standard spinning torque.**
- **If the spinning torque is not high enough, tighten the driven pinion gear 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 driven pinion gear and install a new collapsible collar. Start over from the beginning.**


316-016


316-017

6.Position:
- Universal joint yoke
  (into the universal joint holder)

7.Lubricate:
- Bearings

8.Install:
- Bearings
  (onto the universal joint yoke)

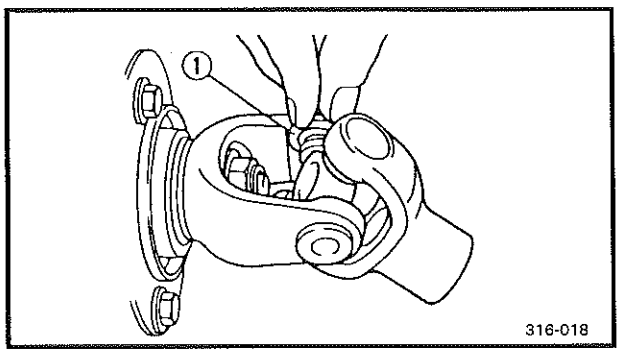
CAUTION:

The needles can easily fall out of their races, so check each bearing. Slide the universal joint yoke back and forth on the bearings. If a needle is out of place the yoke will not go all the way onto the bearing.

9.Using a suitable socket press each bearing into the universal joint holder.

NOTE:

The bearings must be inserted far enough into the universal joint holder so that the circlips can be installed.

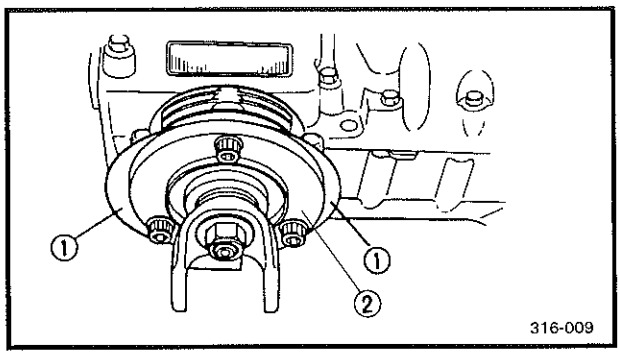


10.Install:
- Circlips ①
  (into the groove of each bearing)

EB403050
Installation

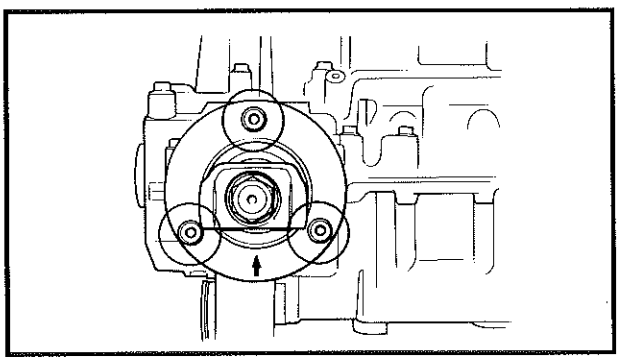
1.Install:
- Drive axle assembly
  Refer to "TRANSMISSION".

2.Assemble:
- Crankcase
  Refer to "CRANKCASE".



3.Install:
- Shims ①
- Middle driven gear housing ②

NOTE:
Just finger tighten the bolts at this stage.



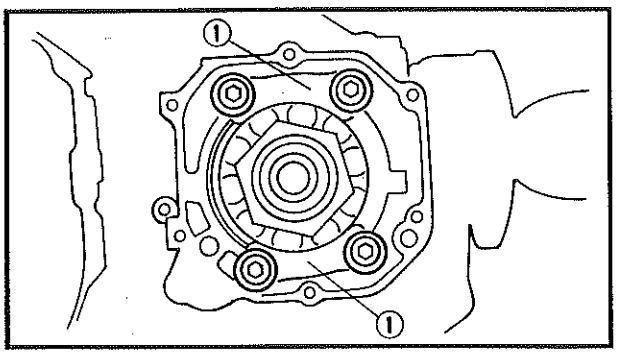
4.Tighten:
- Bolts (crankcase)

24 Nm (2.4 m · kg, 17 ft · lb)

5.Tighten:
- Bolts (middle driven gear housing)

30 Nm (3.0 m · kg, 22 ft · lb)

NOTE:
Before tightening the bolts:
1.Adjust the gear lash of the middle gear. Refer to "GEAR BACKLASH ADJUSTMENT".
2.Check the operation of the middle driven gear.
3.Make sure that the arrow on the bearing housing points to the upper crankcase.



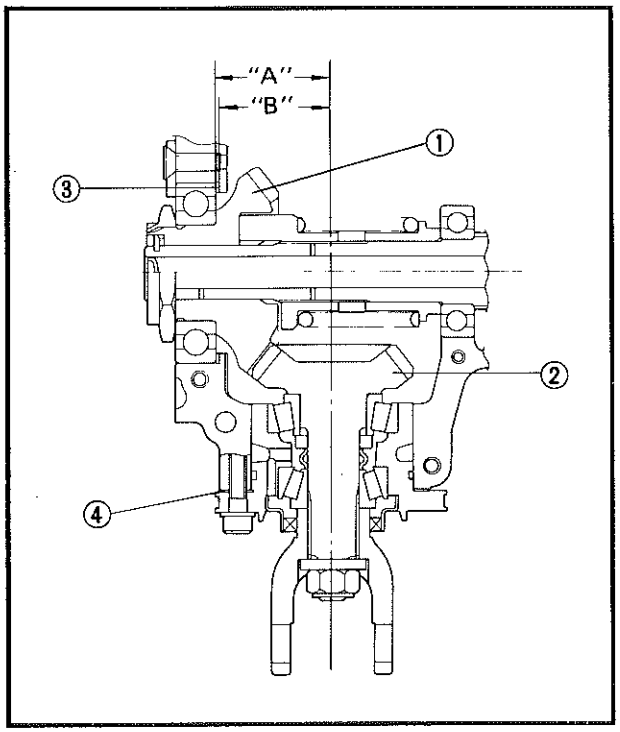
6.Install:
- Retainers (middle gear bearing) ①

25 Nm (2.5 m · kg, 18 ft · lb)

NOTE:
Apply LOCTITE® to the middle gear bearing retainer screws.

CAUTION:
After tightening the bearing holder screws, make sure that you stake them with a center punch.

⚠ WARNING
Always use new screws.



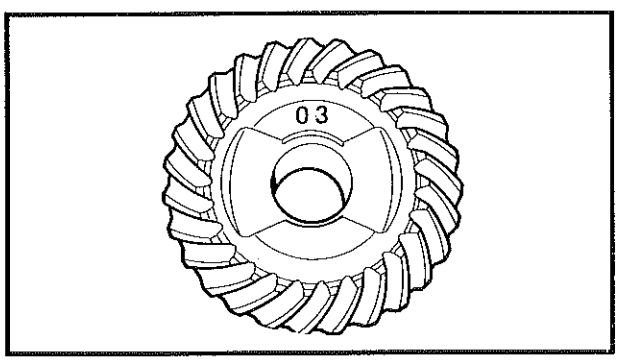
EB403080
MIDDLE DRIVE GEAR AND DRIVEN GEAR POSITIONING

NOTE:
Gear positioning is necessary when any of the following parts are replaced.
- Crankcase assembly
- Middle drive shaft
- Middle gear bearing housing

① Drive pinion gear
② Driven pinion gear
③ Drive pinion gear shim
④ Driven pinion gear shim

1.Select:
- Middle drive gear shim

"A" = 54.5 plus or minus the number stamped on the drive pinion gear ①.
"B" = 53 plus the number stamped on the left-side of the upper crankcase ②.



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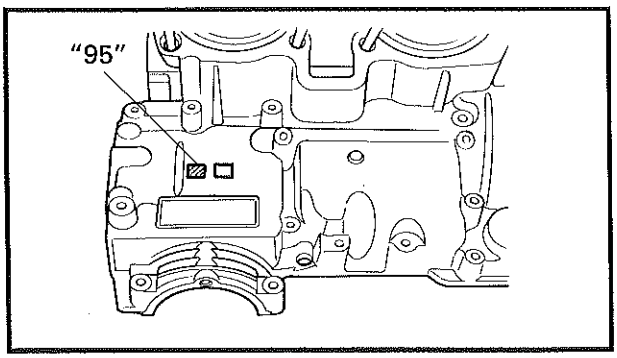
Middle drive gear shim selection steps:
- Position the middle drive gear by using shims ③ with their respective thickness calculated from information marked on the crankcase and the drive gear end.

③Shim thickness = Distance "A"- Distance "B"



- If the drive pinion gear is stamped "03" (a positive number (+.03) is implied here since only the negative (-) designations are stamped alongside the numbers), then:
  "A" = 54.5 + 0.03 = 54.53

NOTE:
All stamped numbers are in hundredths of a mm.

- If the rear left-side of the upper crankcase is stamped "95", then:
  "B" = 53 + 0.95 = 53.95
  Therefore:
  T = A - B
  = 54.53 - 53.95
  = 0.58 mm
- The calculated shim thickness is 0.58 mm. Because shims can be selected in 0.10 or 0.15 mm increments, use the following chart to round off the hundredths digit of the calculated thickness and select the appropriate shim.

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

- Using the above example, the calculated shim thickness of 0.58 mm is rounded off to 0.60 mm. Therefore, you may choose either 4 - 0.15 mm shims, 2 - 0.30 mm shims or 1 - 0.30 mm and 2 - 0.15 mm shims as selected from the shim thickness chart below. Shim sizes are supplied in the following thicknesses.

Middle drive pinion gear shim:	
Thickness (mm)	0.15 0.30 0.50

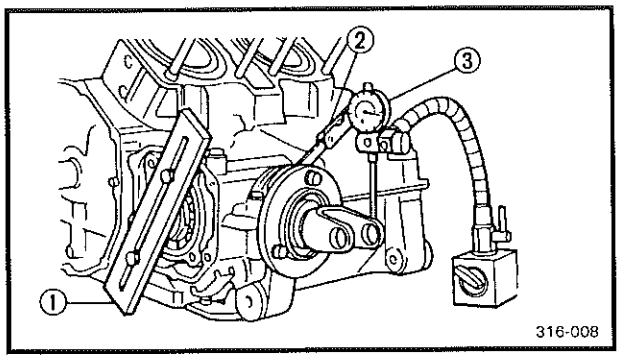
****

GEAR BACKLASH ADJUSTMENT

1.Install:
- Middle drive gear holder ①

NOTE:
This tool will prevent the drive axle from turning.

	Middle drive gear holder: **YM - 33222, 90890 - 04080**



2.Install:
- Bolts (driven gear bearing housing)

NOTE:
- Just finger tighten the bolts at this stage.
- Clearance between the crankcase and the driven bearing housing should be about 2 mm.
- Measure the gap with a feeler gauge ②.

3.Position:
- Dial gauge ③
  (onto the outside edge of the universal joint)

	Dial gauge **YU - 03097, 90890 - 03097**

NOTE:
Be sure that the gauge is positioned over the centerline of the yoke bearing hole.

4.Rotate:
- Universal joint

NOTE:
Move the universal joint gently back and forth.

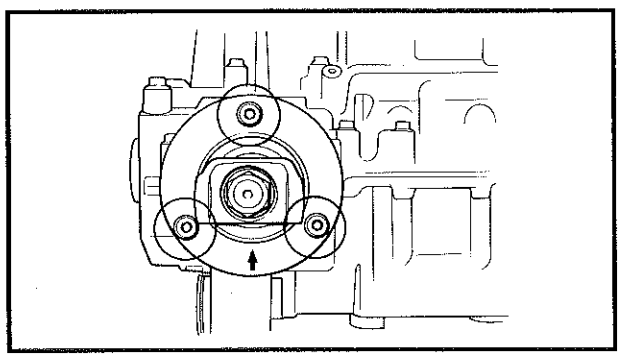
5.Measure:
- Gear backlash

Over specification → Follow the next steps
Under or same specification → Incorrect
Check for faulty parts and/or reassemble the bearing housing.

Backlash (gear):
0.05 ~ 0.12 mm
(0.002 ~ 0.005 in)

CAUTION:
Do not hammer the universal joint or the collapsible collar of the driven pinion gear may be distorted. This will result in a change in the standard spinning torque, requiring replacement of the collapsible collar and reassembly of the driven gear assembly.

NOTE:
Check the gear backlash at four positions. Rotate the universal joint 90° each time and repeat the gear backlash check.



6.Tighten:
- Bolts (driven gear bearing housing)

30 Nm (3.0 m · kg, 22 ft · lb)

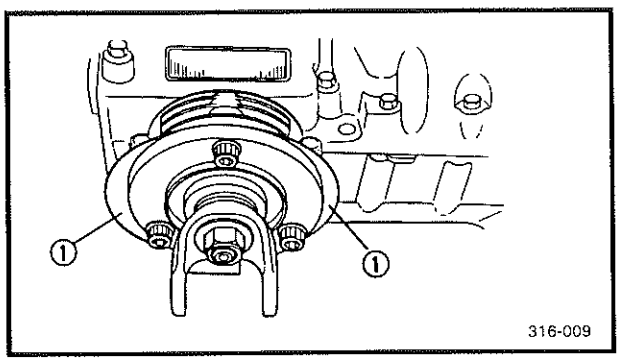
NOTE:
Tighten the bolts carefully, one thread turn at a time, only. Push in the bearing housing and tighten the bearing housing bolts.

CAUTION:
Do not overtighten the bearing housing bolts or you may obtain too little gear backlash and cause damage to the gears. If over tightened, loosen the three bolts so that the crankcase/bearing housing clearance is about 2 mm (0.08 in) and repeat all previous steps.

7.Repeat steps #4 and #5 until the correct gear backlash is achieved.

Backlash (gear):
0.05 ~ 0.12 mm
(0.002 ~ 0.005 in)

8.Measure:
- Crankcase/bearing housing clearance
  Use a feeler gauge



9.Select:
- Shim(s) ①

****

Selection steps:

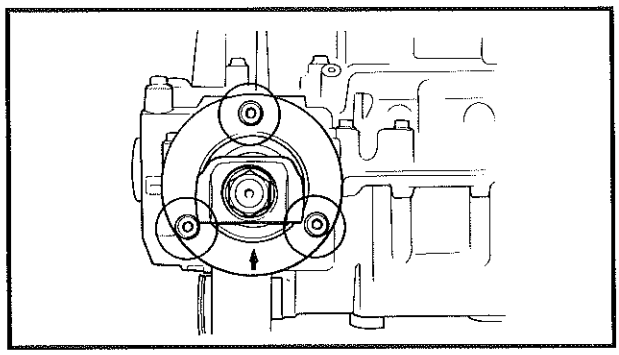
- For example, the clearance between the crankcase and the bearing housing is 0.46 mm.
- The shim can only be selected in 0.05 mm increments, round off the hundredths digit and select the appropriate shim(s).

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

- In the above example, the measured shim thickness is 0.46 mm. The chart instructs you, however, to round off the 6 to a 5. Thus you should use 1 - 0.15 mm and 1 - 0.30 mm shim.
- Shim sizes are supplied in the following thicknesses.

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

****

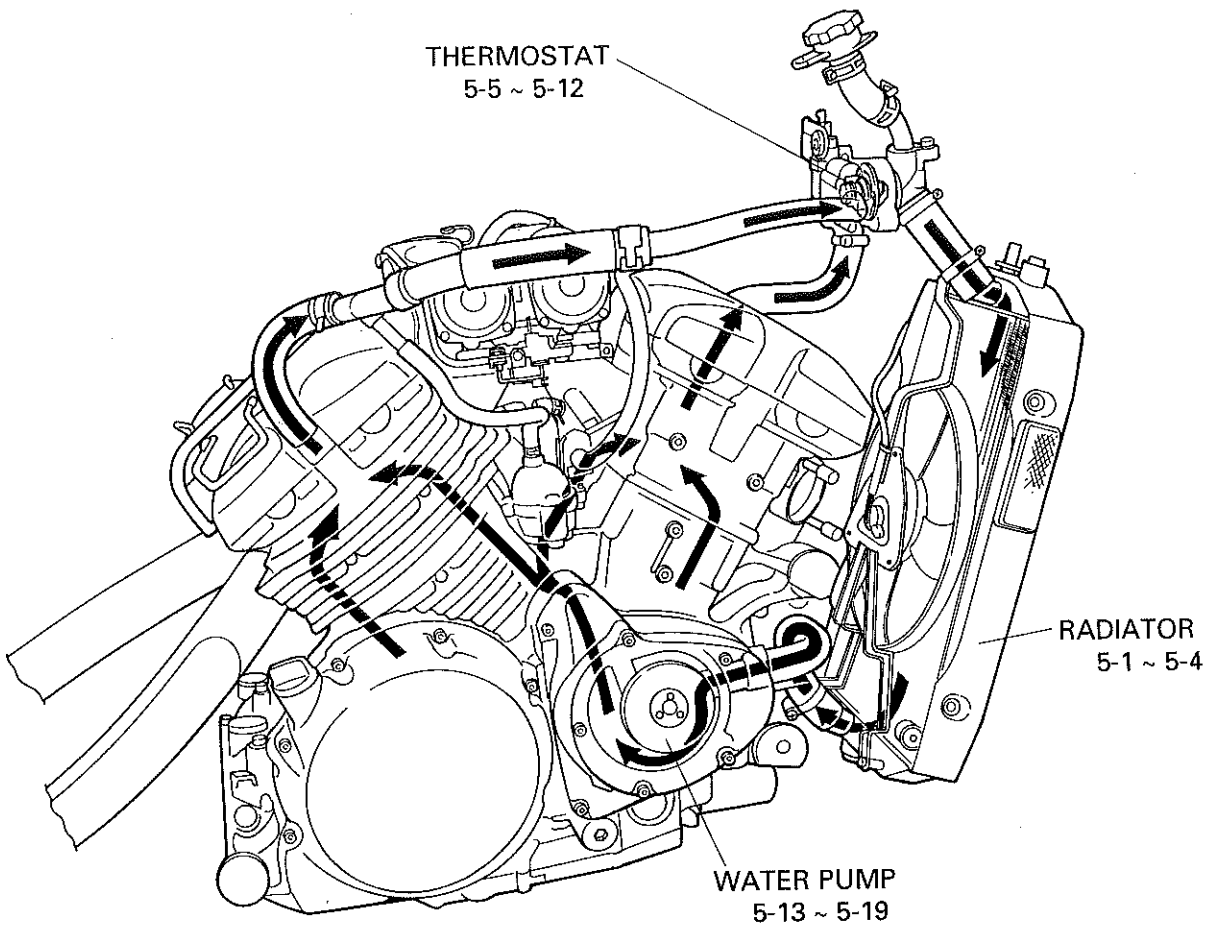


10.Tighten:
- Bolts (driven gear bearing housing)

30 Nm (3.0 m · kg, 22 ft · lb)

NOTE:
Before tightening the bolts, make sure that the arrow on the bearing housing points towards the upper crankcase.

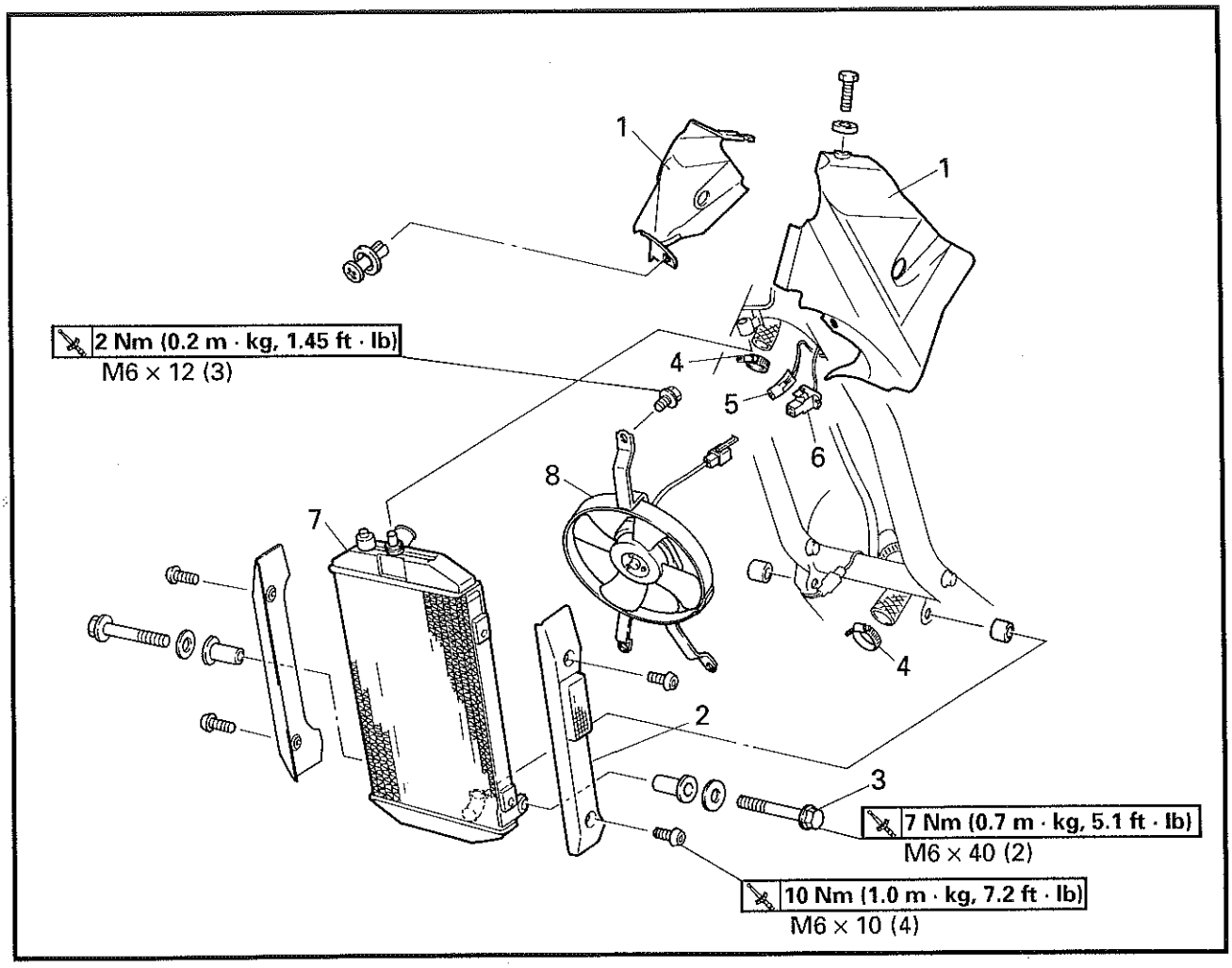
11.Measure:
- Gear backlash



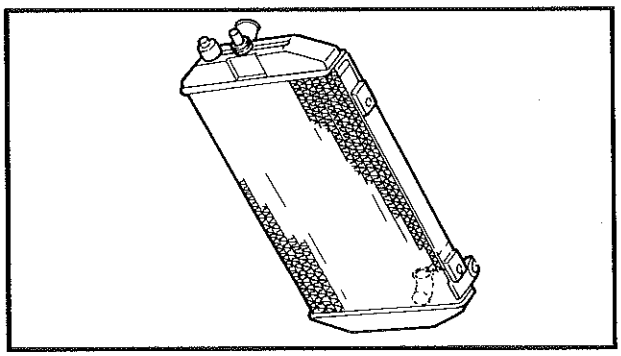
CONTENTS
COOLING SYSTEM

COOLING SYSTEM

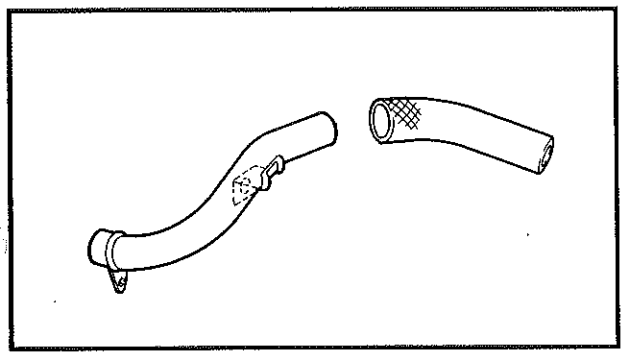
RADIATOR



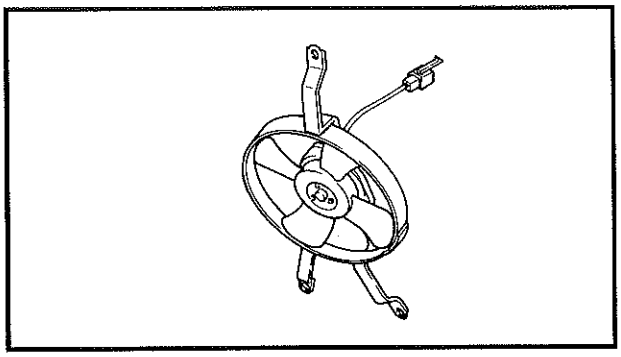
Order	Job name/Part name	Q'ty	Remarks
	Radiator removal		Remove the parts in the order below.
	Rider seat, fuel tank		Refer to "SEATS" and "FUEL TANK" in CHAPTER 3.
	Coolant		Refer to "COOLANT REPLACEMENT" in CHAPTER 3.
1	Steering head side covers	2	
2	Radiator side panels	2	
3	Lower radiator bolts	2	
4	Radiator hose clamps (upper and lower)	2	Loosen
5	Thermo unit lead	1	Disconnect
6	Fan lead	1	Disconnect
7	Radiator	1	
8	Fan motor	1	
			For installation, reverse the removal procedure.



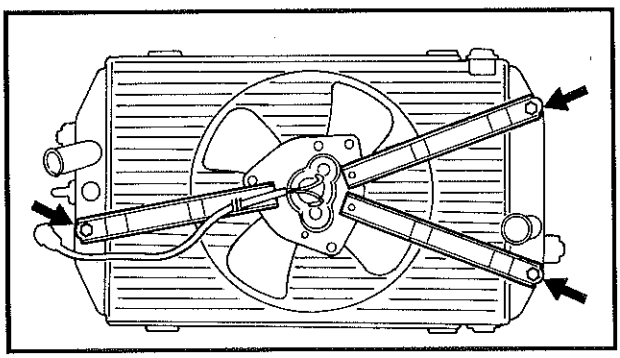
EB500030
INSPECTION
1.Inspect:
- Radiator core
  Obstruction → Blow out with compressed air through the rear of the radiator.
  Flattened fins → Repair or replace.



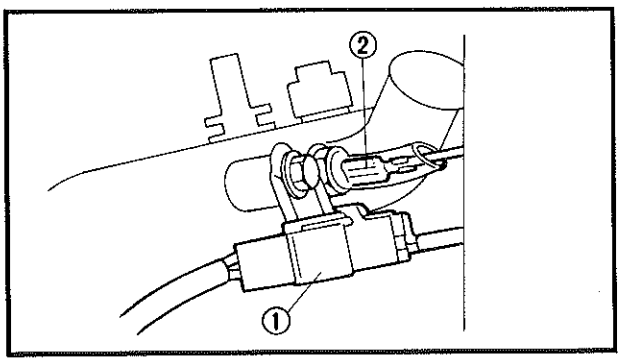
2.Inspect:
- Radiator hoses
- Radiator pipes
  Cracks/damage → Replace.



3.Inspect:
- Fan motor assembly
  Damage → Replace.
  Malfunction → Check and repair.
  Refer to "COOLING SYSTEM" in CHAPTER 8.

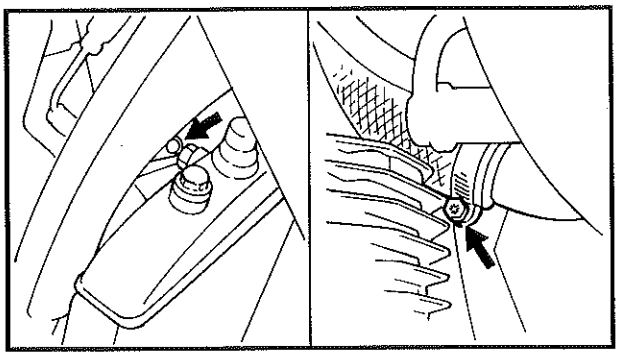


EB500040
INSTALLATION
1.Install:
- Fan motor — 2Nm (0.2 m · kg, 1.45 ft · lb)



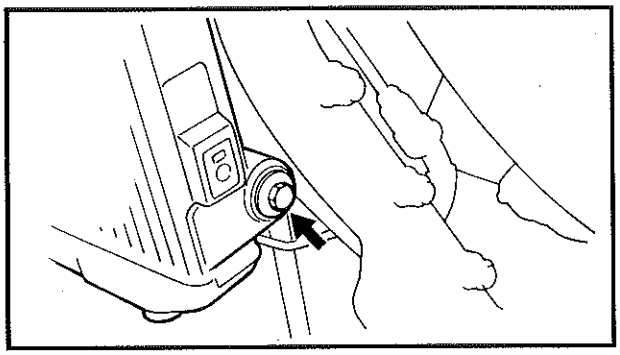
2.Install:
- Radiator

3.Connect:
- Fan leads ①
- Thermo unit lead ②



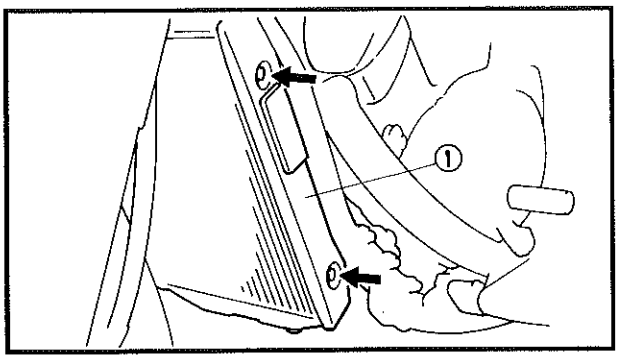
4.Install:
- Radiator hoses (upper and lower)

5.Tighten:
- Radiator hose clamps (upper and lower)



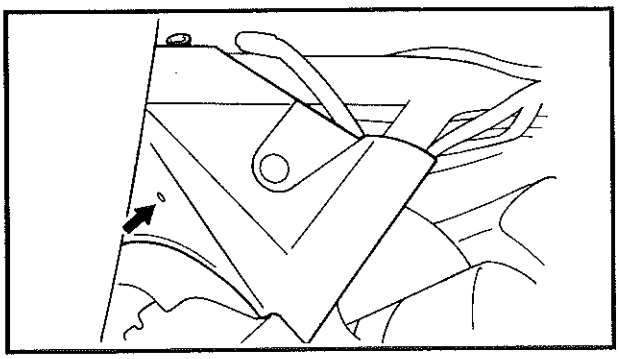
6.Install:
- Lower radiator bolts

7Nm (0.7 m · kg, 5.1 ft · lb)



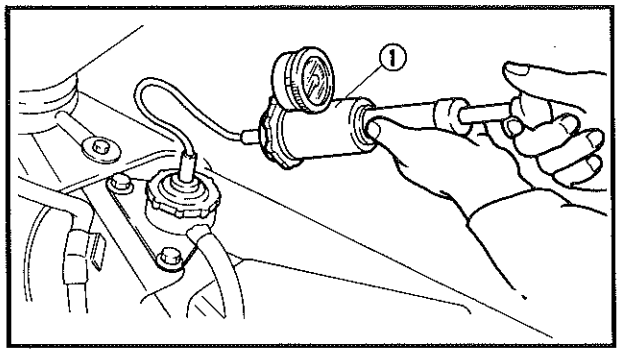
7.Install:
- Radiator side panels ①

10Nm (1.0 m · kg, 7.2 ft · lb)



8.Install:
- Steering head side covers

9.Fill:
- Cooling system
  Refer to "COOLANT REPLACEMENT" in CHAPTER 3.

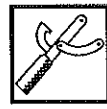


10.Inspect:
- Cooling system
  Decrease of pressure (leaks) → Repair as required.

****

Inspection steps:

- Attach the radiator cap tester ① to the radiator.

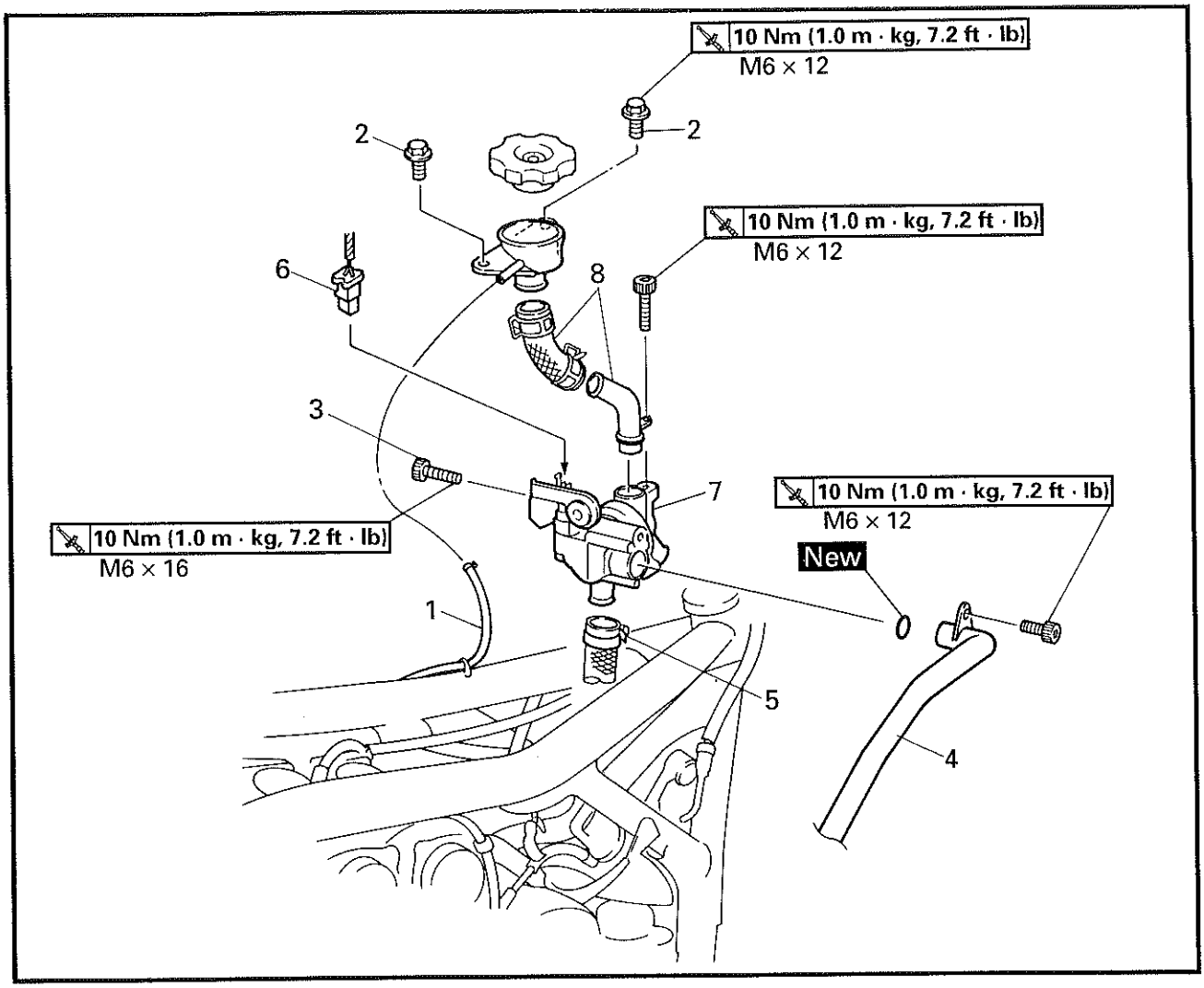
	**Radiator cap tester:** **YU-24460-01, 90890 - 01325**

- Apply 100 kPa (1.0 kg/cm^2, 14 psi) pressure.

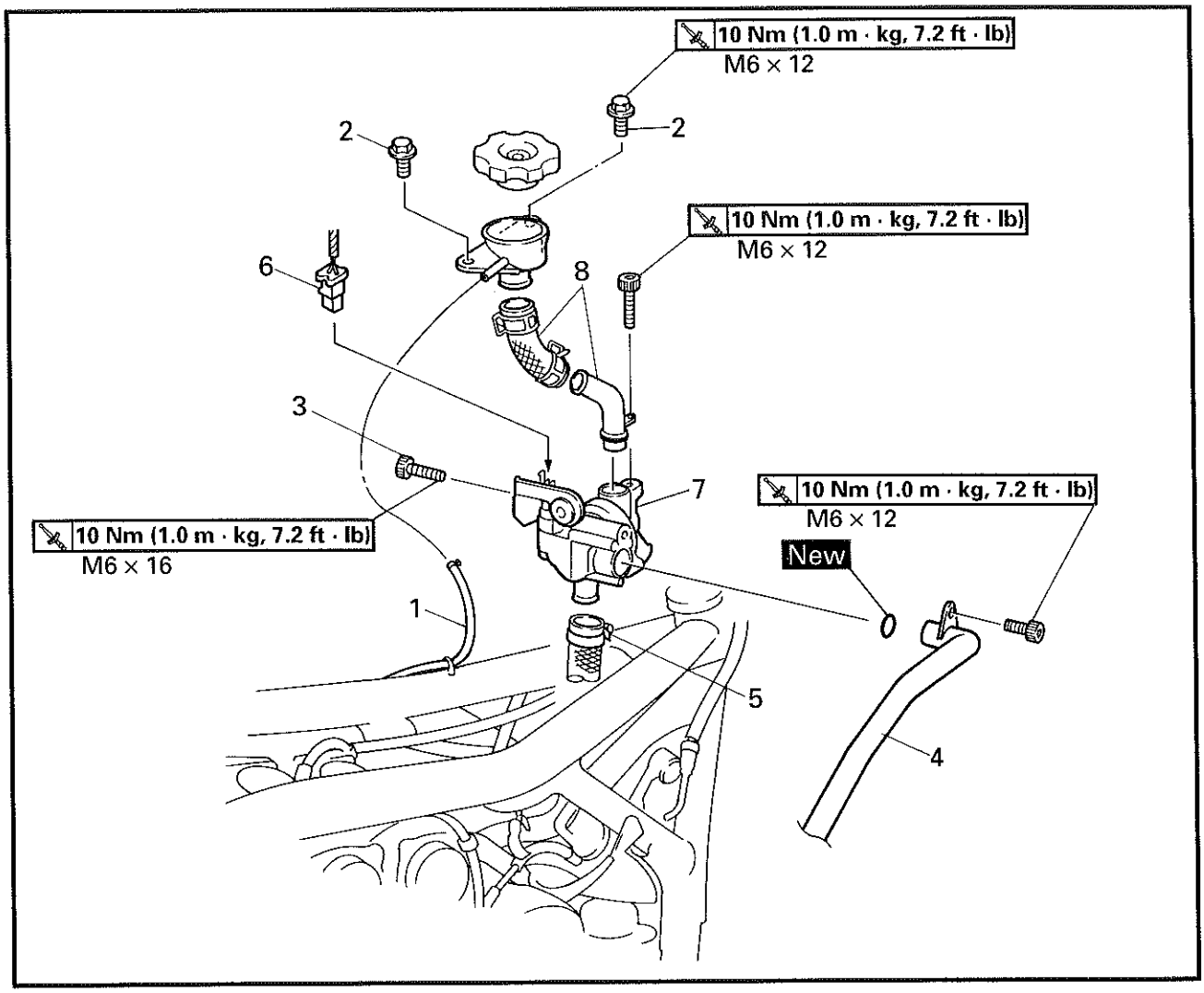
****

11.Install:
- Fuel tank
- Rider seat
  Refer to "FUEL TANK" and "SEATS" in CHAPTER 3.

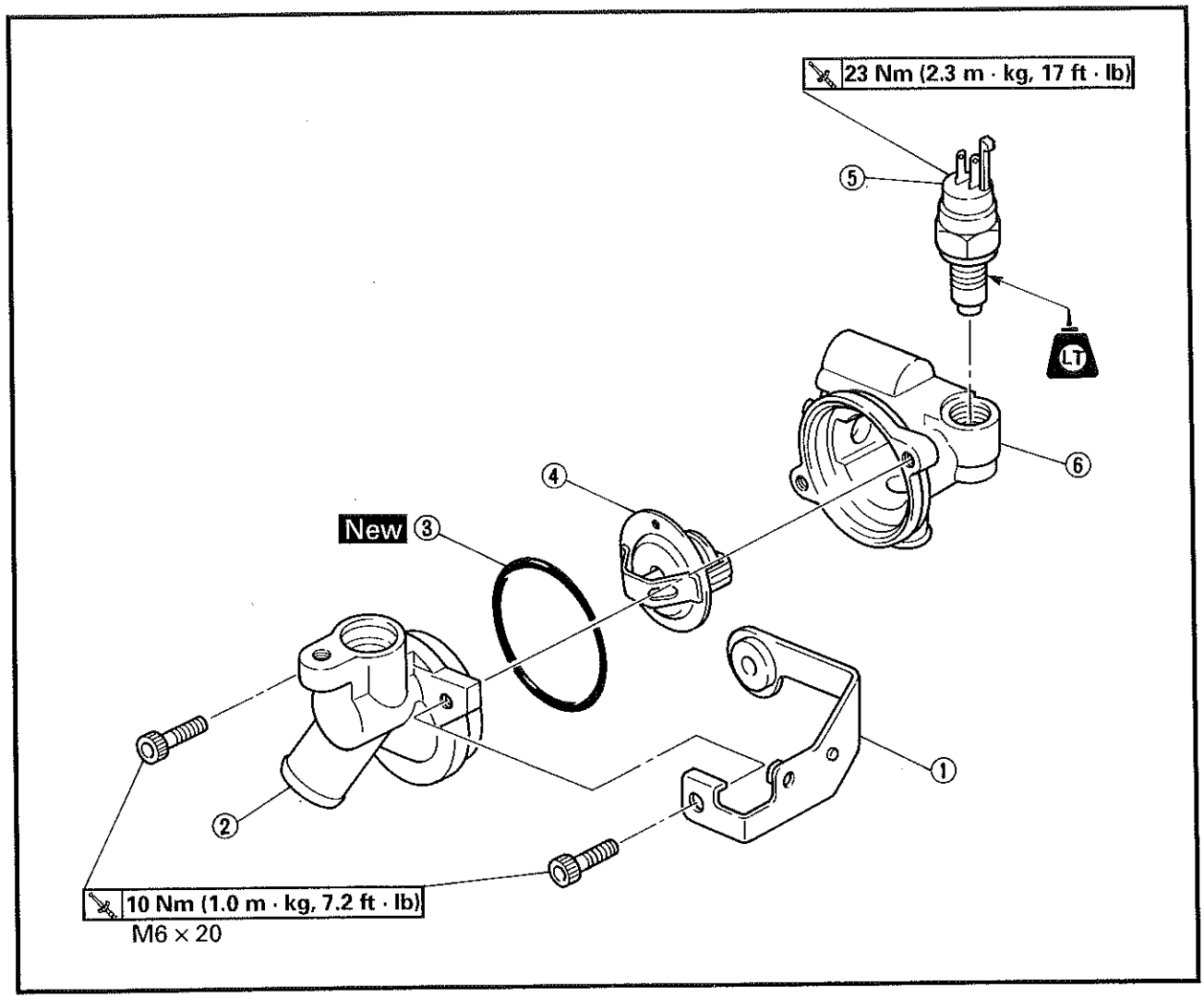
THERMOSTAT



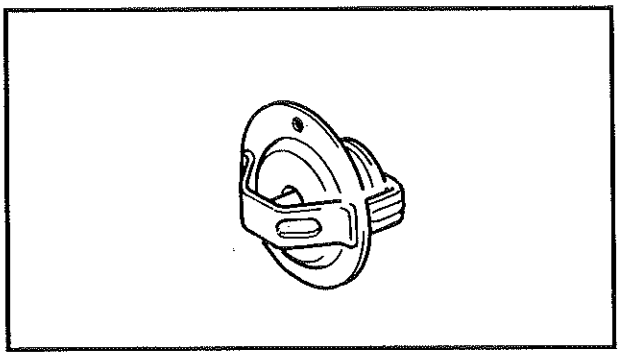
Order	Job name/Part name	Q'ty	Remarks
	Thermostat removal		Remove the parts in the order below.
	Rider seat, fuel tank		Refer to "SEATS" and "FUEL TANK" in CHAPTER 3.
	Coolant		Refer to "COOLANT REPLACEMENT" in CHAPTER 3.
	Air filter case		Refer to AIR FILTER CLEANING" in CHAPTER 3.
	Steering head side covers		Refer to "RADIATOR REMOVAL".
1	Overflow hose	1	Disconnect
2	Bolts (radiator cap assembly)	2	
3	Bolt (left side of thermostat)	1	
4	Coolant pipe (right)	1	
5	Thermostatic hose clamp (lower)	2	Loosen
6	Thermo switch lead	1	Disconnect
7	Thermostat	1	



Order	Job name/Part name	Q'ty	Remarks
8	Radiator cap pipe	1	For installation, reverse the removal procedure.

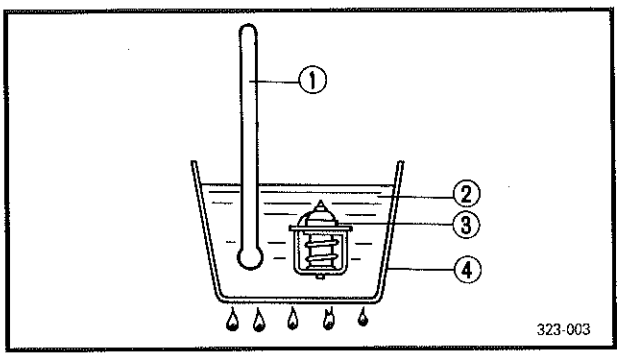


Order	Job name/Part name	Q'ty	Remarks
	Thermostat disassembly		Disassemble the parts in the order below.
①	Thermostat stay	1	
②	Thermostat housing cover	1	
③	O-ring (housing cover)	1	
④	Thermostatic valve	1	
⑤	Thermo switch	1	
⑥	Thermostat housing	1	For assembly, reverse the disassembly procedure.



EB502010
INSPECTION

1.Inspect:
- Thermostatic valve ①
  Valve does not open at 80.5 ~ 83.5°C (177 ~ 182°F) → Replace.

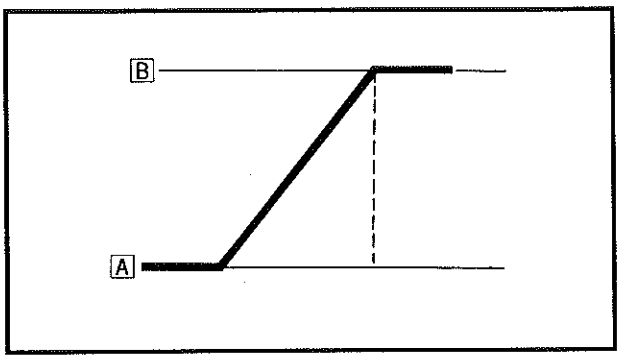


****

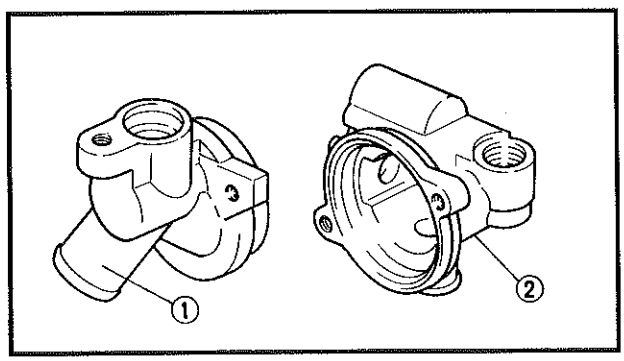
Inspection steps:
- Suspend the thermostatic valve in a vessel.
- Place an accurate thermometer in the water.
- While stirring the water observe the thermometer's indicated temperature.

****

① Thermometer
② Water
③ Thermostatic valve
④ Vessel
A CLOSE
B OPEN



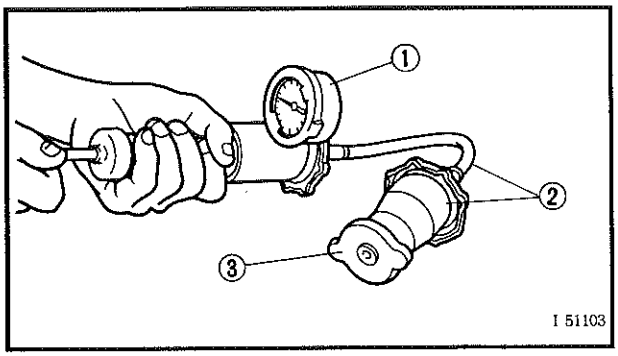
NOTE:
The thermostatic valve is sealed and its setting requires specialized work. If its accuracy is in doubt, replace it. A faulty unit could cause serious overheating or overcooling.



2.Inspect:
- Thermostatic housing cover ①
- Thermostatic valve housing ②
  Cracks/damage → Replace.

3.Measure:
- Radiator cap opening pressure
  Radiator cap opens at a pressure below the specified pressure → Replace.

Radiator cap opening pressure:
93.3 ~ 122.7 kPa
(0.933 ~ 1.227 kg/cm², 13.27 ~ 17.45 psi)



****

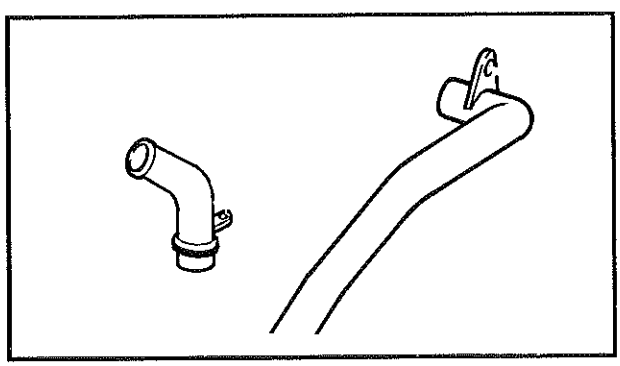
Measurement steps:
- Attach the radiator cap tester ① and adapter ② to the radiator cap ③.

Radiator cap tester:
YU-24460-01, 90890 - 01325
Adapter:
YU-33984

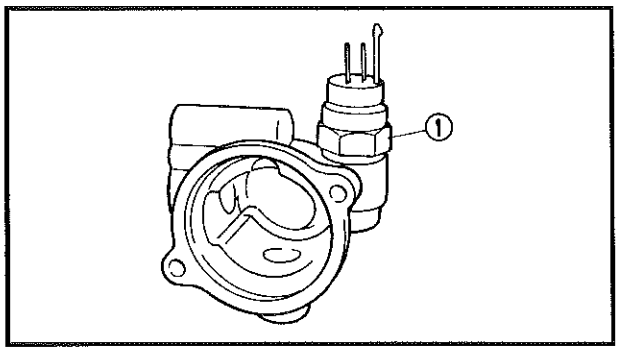
- Apply the specified pressure for ten seconds and make sure that there is no pressure drop.

****

4.Inspect:
- O-ring (thermostatic housing cover)
- O-ring (pipe going to the radiator cap)
  Cracks/damage → Replace.



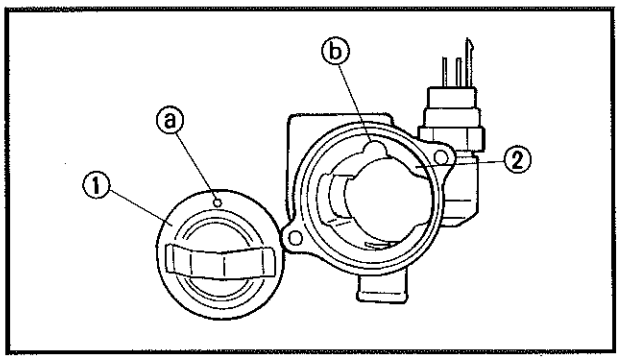
5.Inspect:
- Pipe (going to the radiator cap)
- Coolant pipe (right)
  Cracks/damage → Replace.



ASSEMBLY

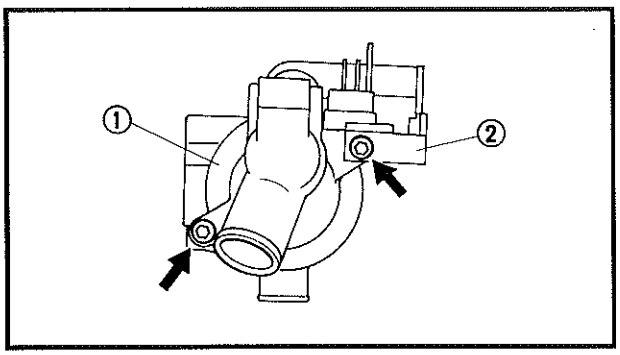
1. Install:
- Thermo switch ①

23Nm (2.3 m · kg, 17 ft · lb)



2.Install:
- Thermostatic valve ①
  (into the thermostatic valve housing ②)

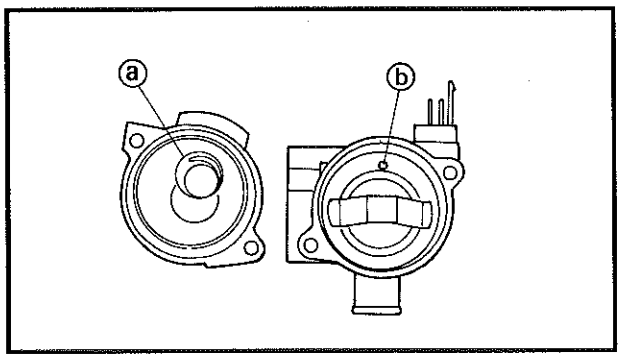
NOTE:
The thermostatic valve must be installed with the breather hole ⓐ aligned with the projection ⓑ on the housing.



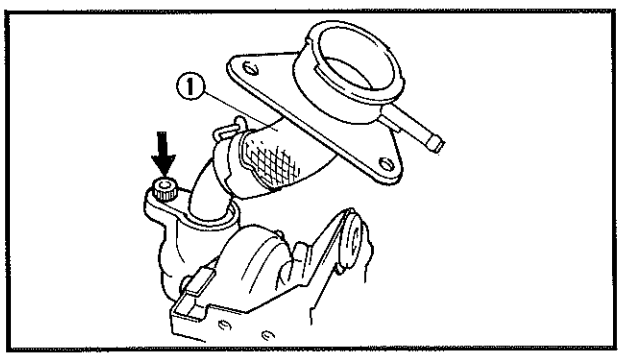
3.Install:
- Thermostatic valve housing cover ①
- Thermostat stay ②

10Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
- Align the opening ⓐ for the pipe (going to the radiator cap) with the breather hole ⓑ on the thermostatic valve.
- Before installing the thermostatic valve housing cover, apply a thin coat of lithium-soap base grease to the O-ring.



⚠ WARNING
Always use a new O-ring.

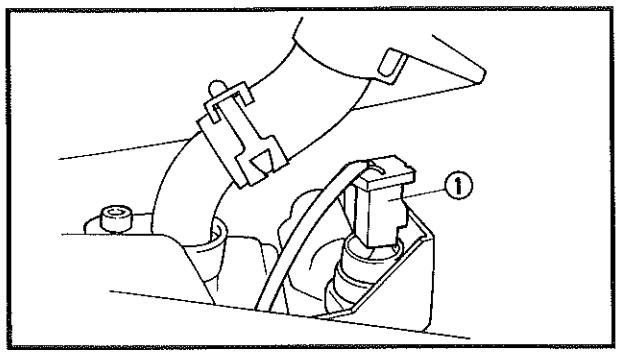


EB502021
INSTALLATION

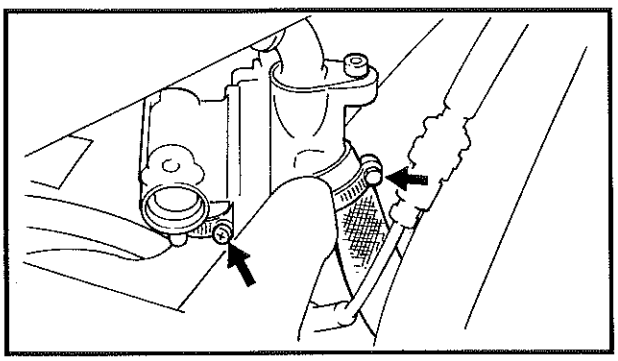
1.Install:
- Radiator cap pipe ①

10Nm (1.0 m · kg, 7.2 ft · lb)

- Thermostat

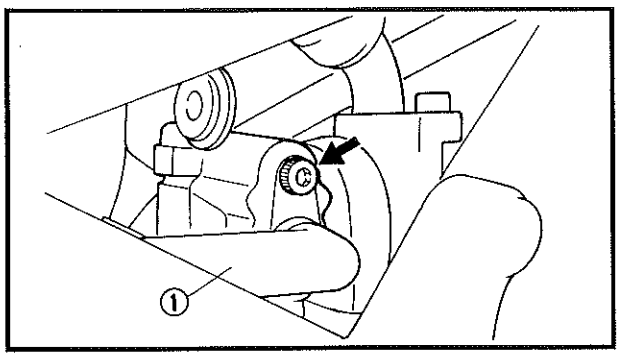


2.Connect:
- Thermo switch lead ①

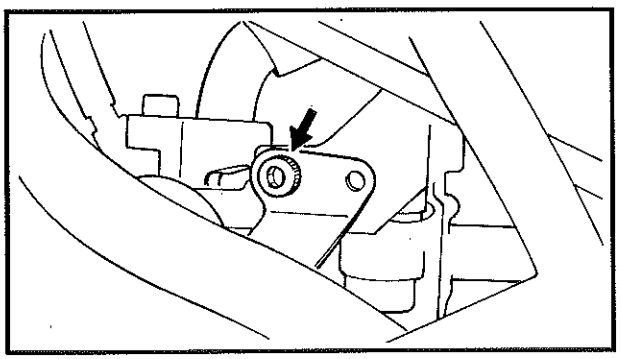


3.Install:
- Thermostatic hoses (lower)

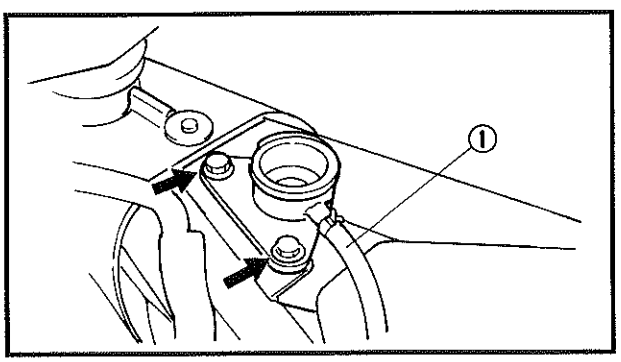
4.Tighten:
- Hose clamps (lower thermostatic hose)



5.Install:
- Coolant pipe (right) ①



6.Install:
- Bolt (left) 10Nm (1.0 m · kg, 7.2 ft · lb)



7.Install:
- Bolts (radiator cap assembly) 10Nm (1.0 m · kg, 7.2 ft · lb)

8.Connect:
- Overflow hose ①

9.Fill:
- Cooling system
  Refer to "COOLANT REPLACEMENT" in CHAPTER 3.

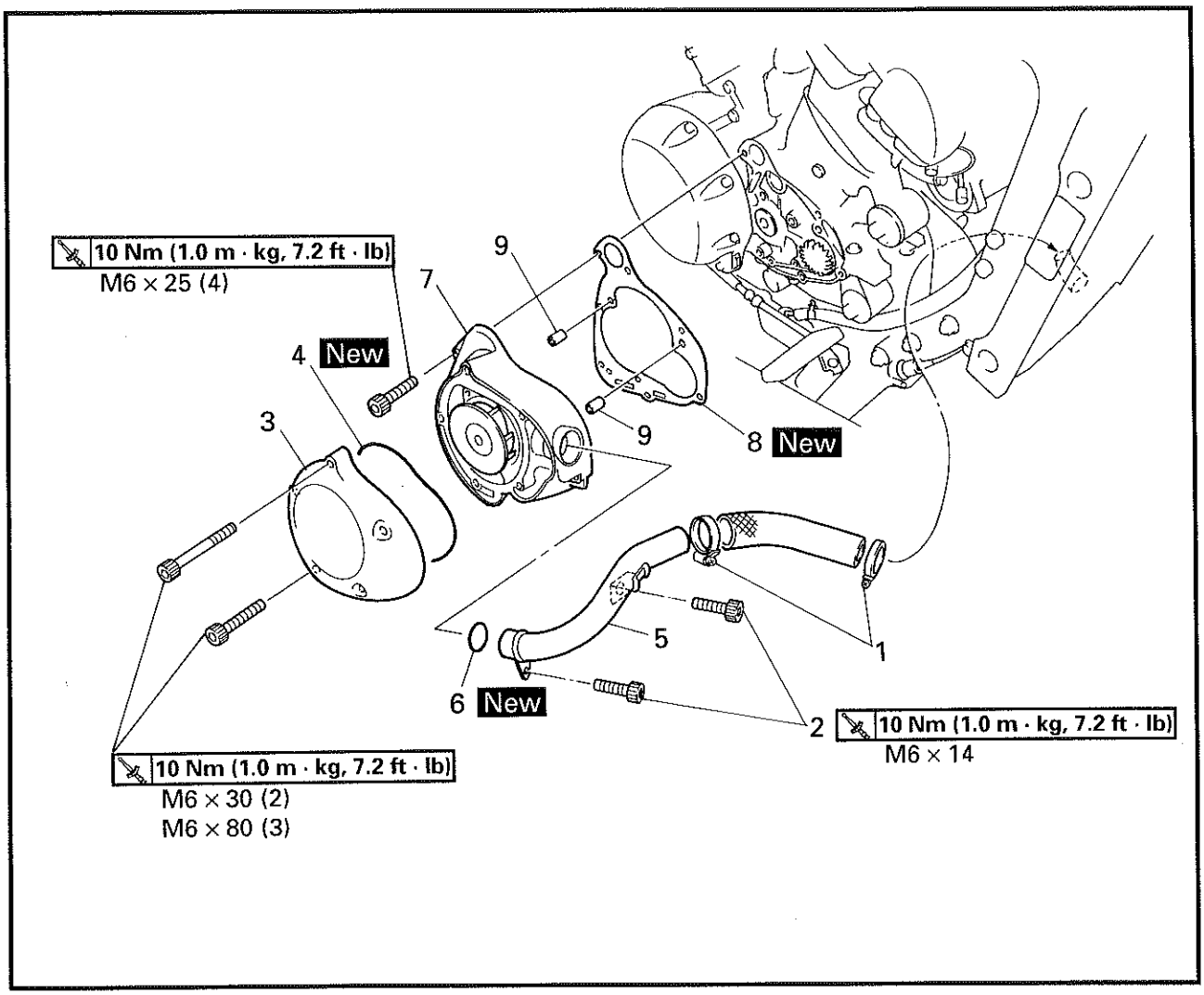
10.Inspect:
- Cooling system
  Decrease in pressure (leaks) → Repair.

11.Install:
- Steering head side covers
  Refer to "RADIATOR REMOVAL".

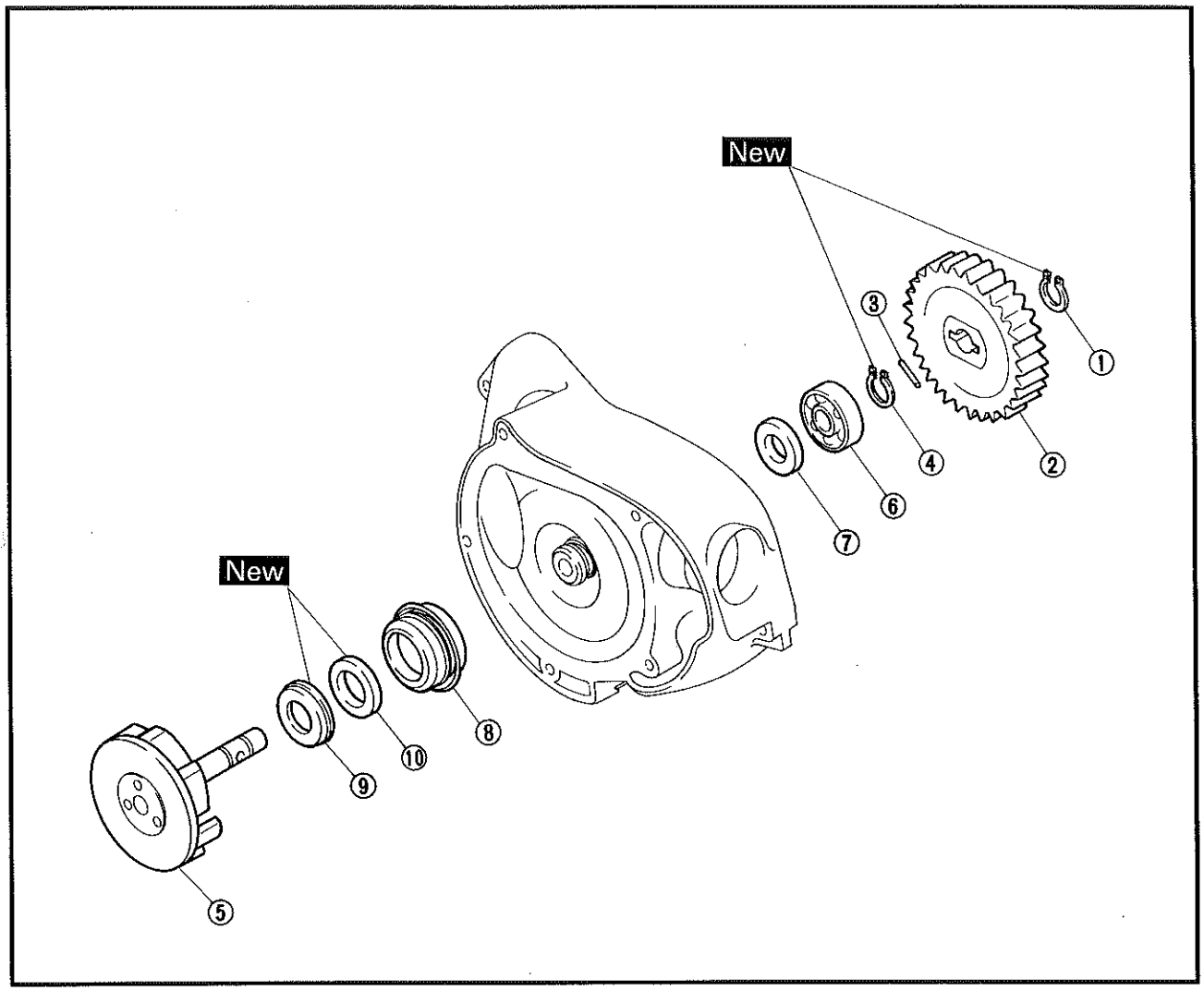
12.Install:
- Air filter case
  Refer to "AIR FILTER CLEANING" in CHAPTER 3.

13.Install:
- Fuel tank
- Rider seat
  Refer to "FUEL TANK" and "SEATS" in CHAPTER 3.

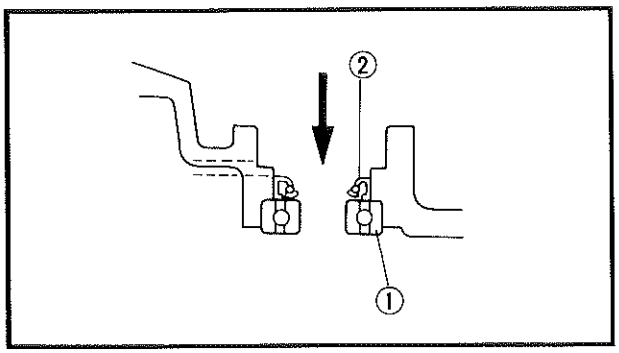
WATER PUMP



Order	Job name/Part name	Q'ty	Remarks
	Water pump removal		Remove the parts in the order below.
	Coolant		Refer to "COOLANT REPLACEMENT" in CHAPTER 3.
1	Radiator hose clamp (lower)	1	Loosen
2	Bolts (water pump inlet pipe)	2	
3	Water pump cover	1	
4	O-ring	1	
5	Water pump inlet pipe	1	
6	O-ring	1	
7	Water pump housing	1	
8	Gasket	1	
9	Dowel pins	2	
			For installation, reverse the removal procedure.

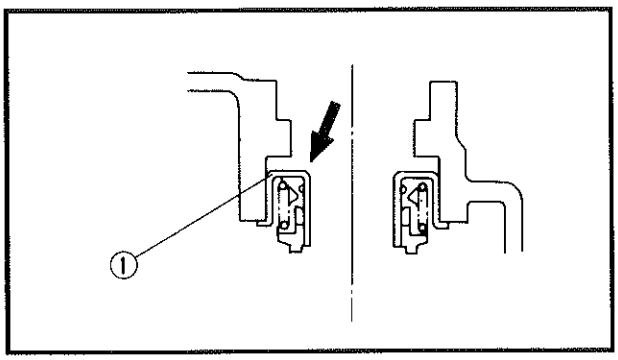


Order	Job name/Part name	Q'ty	Remarks
	Water pump disassembly		Disassemble the parts in the order below.
①	Circlip	1	
②	Driven gear	1	
③	Gear stopper pin	1	
④	Circlip	1	
⑤	Impeller	1	
⑥	Bearing	1	Refer to "DISASSEMBLY".
⑦	Oil seal	1	
⑧	Water pump seal	1	
⑨	Damper rubber	1	
⑩	Slip ring	1	
			For assembly, reverse the disassembly procedure.

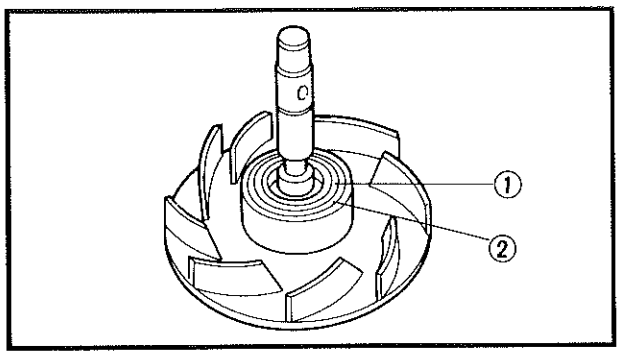


DISASSEMBLY

1.Remove:
- Bearing ①
  Use a bearing puller kit.
- Oil seal ②
  Pry out with a thin, flat head screwdriver.

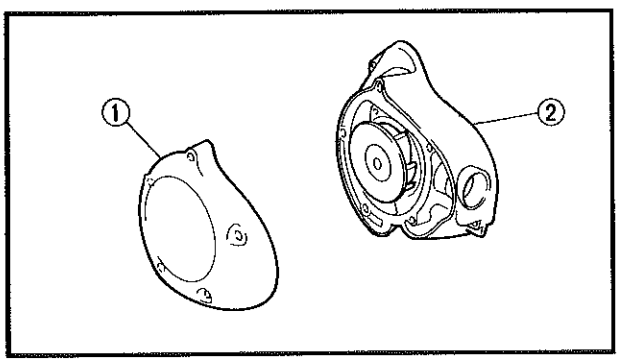


2.Remove:
- Water pump seal ①
  Tap out from the bearing side.



3.Remove:
- Slip ring ①
- Damper rubber ②
  (from the impeller)
  Pry out with a thin, flat head screwdriver.

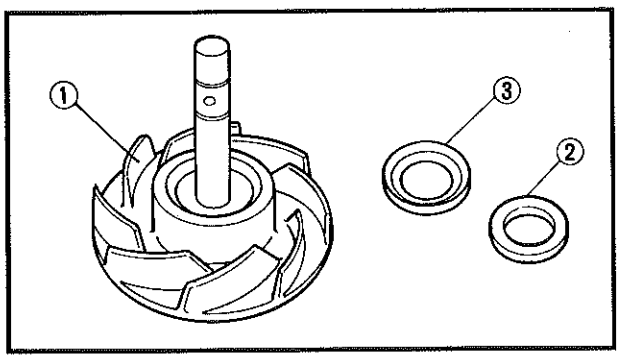
NOTE:
Be careful not to scratch the impeller shaft.



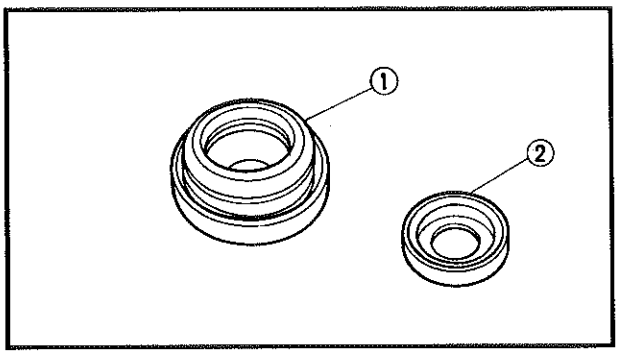
EB503011

INSPECTION

1.Inspect:
- Water pump cover ①
- Water pump housing ②
  Cracks/damage → Replace.

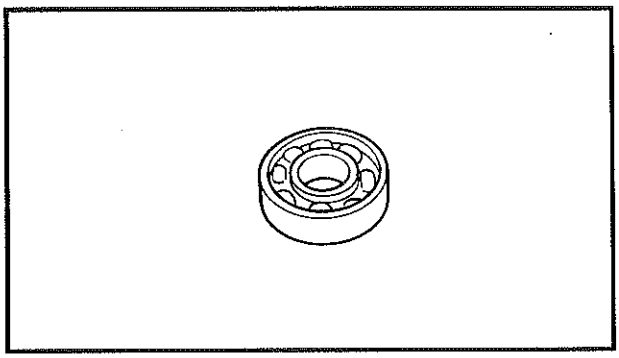


2.Inspect:
- Impeller ①
- Damper rubber ②
- Slip ring ③
  Cracks/wear/damage → Replace.



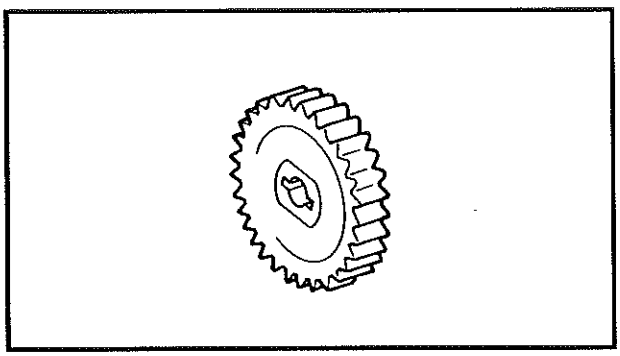
3.Inspect:
- Water pump seal ①
- Oil seal ②

Cracks/wear/damage → Replace.



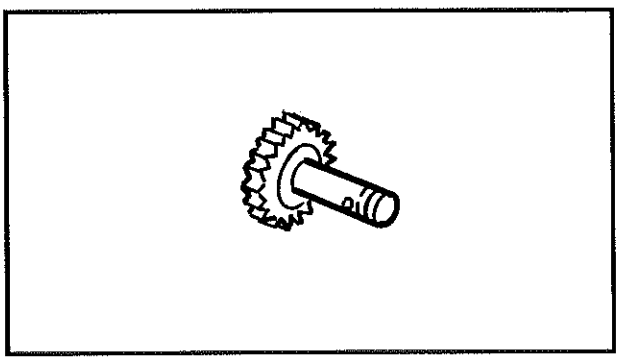
4.Inspect:
- Bearing

Roughness → Replace.



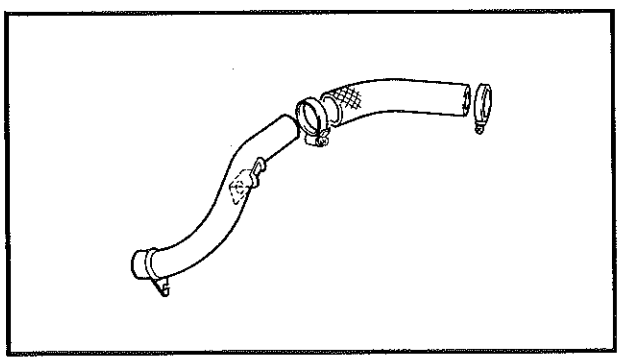
5.Inspect:
- Driven gear teeth

Pitting/wear → Replace.



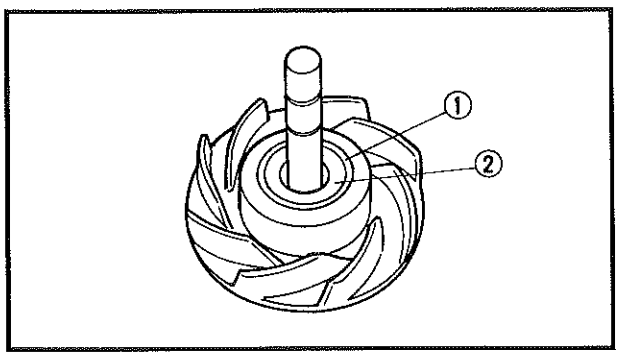
6.Inspect:
- Drive gear teeth

Blue discoloration/pitting/wear → Replace.



7.Inspect:
- Inlet pipe (water pump)
- Coolant hoses

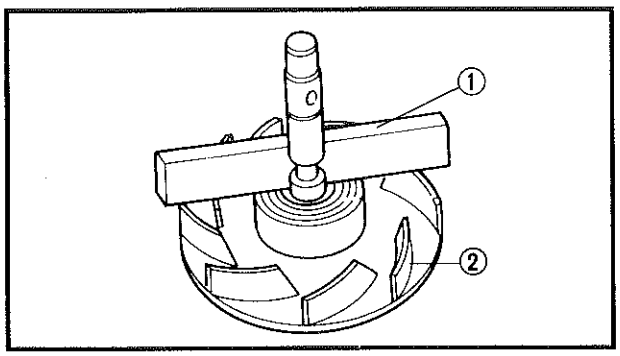
Cracks/wear/damage → Replace.



ASSEMBLY

1.Install:
- Damper rubber ① New
- Slip ring ② New

NOTE:
Apply tap water or coolant onto the outer surface of the damper rubber.

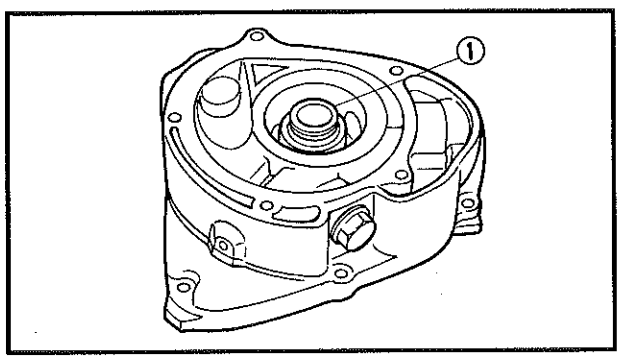


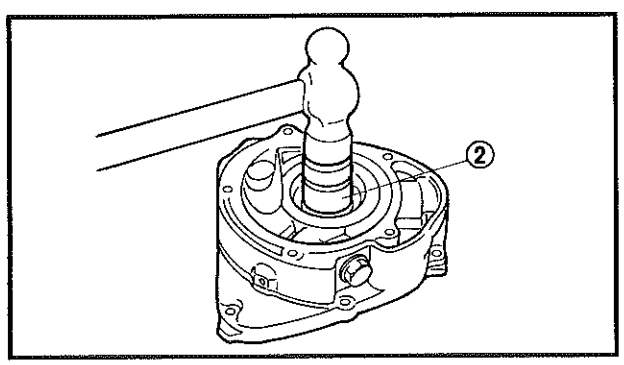
2.Measure:
- Tilt
  Out of specification → Repeat step 1.

CAUTION:
Make sure the damper rubber and slip ring fit squarely.

Tilt limit:
0.15 mm (0.006 in)

① Straight edge
② Impeller

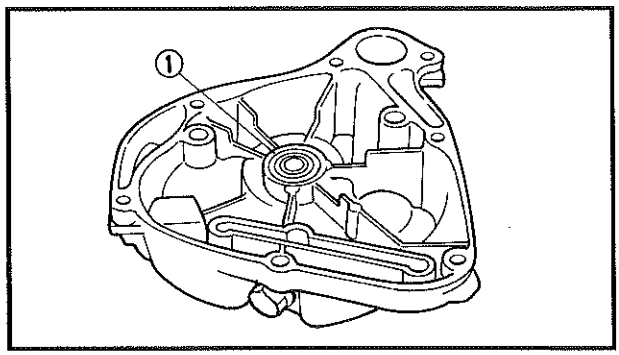




3.Install:
- Water pump seal ①

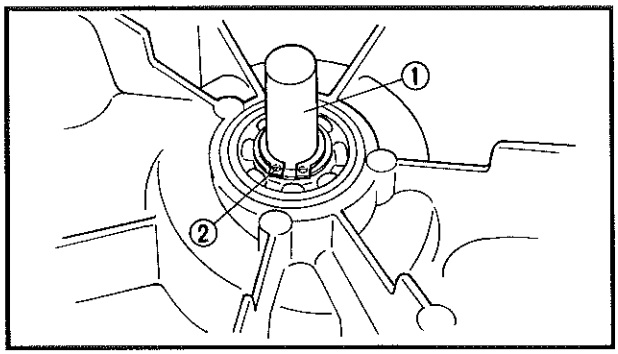
NOTE:
- When installing the rubber seal use a socket ② that matches the outside diameter of the rubber seal.
- Tap the seal in from the seal side.

CAUTION:
Never apply oil or grease onto the water pump seal surfaces.

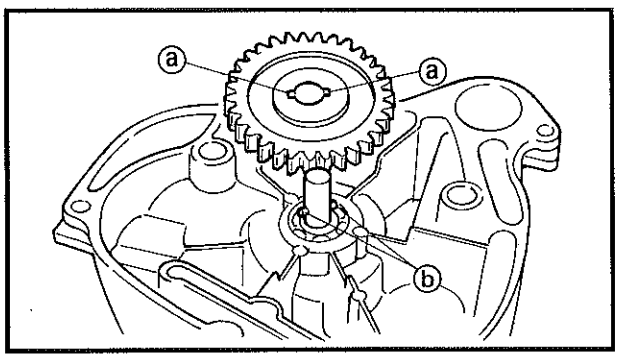


4.Install:
- Oil seal
- Bearing ①

NOTE:
- The side of the bearing with the number faces up.
- Gently tap the bearing into place until it's flush with the housing.

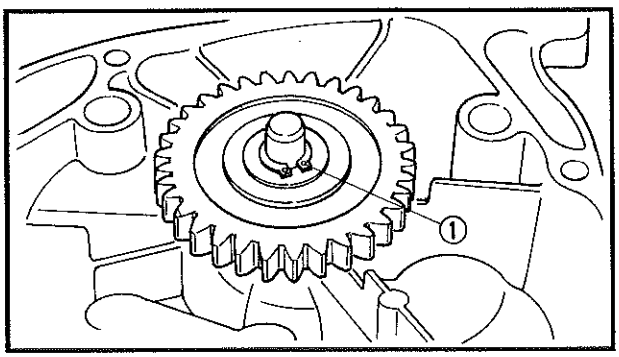


5.Install:
- Impeller ①
- Circlip ② New

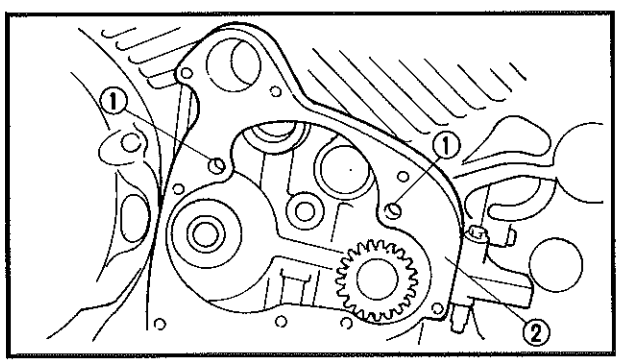


6.Install:
- Key
- Driven gear

NOTE:
Align the driven gear slot ⓐ with the key ⓑ.

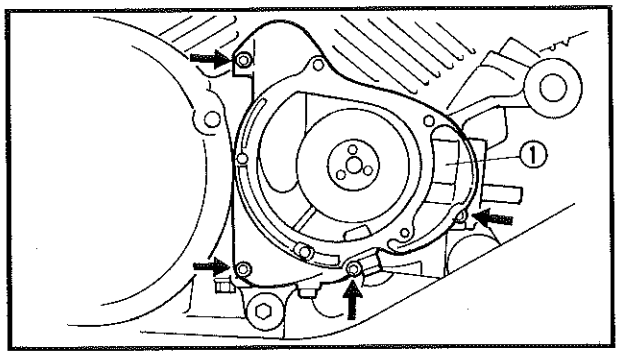


7.Install:
- Circlip ① New



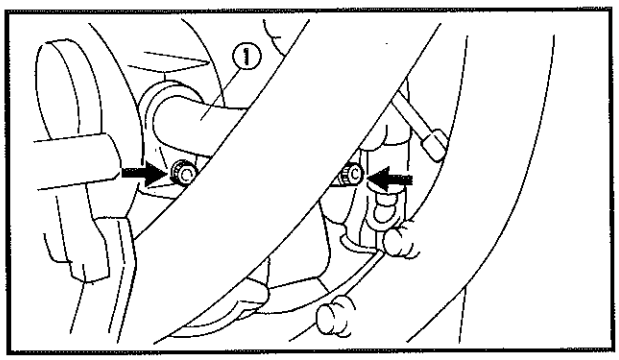
INSTALLATION

1.Install:
- Dowel pins ①
- Gasket (onto the crankcase) ② New



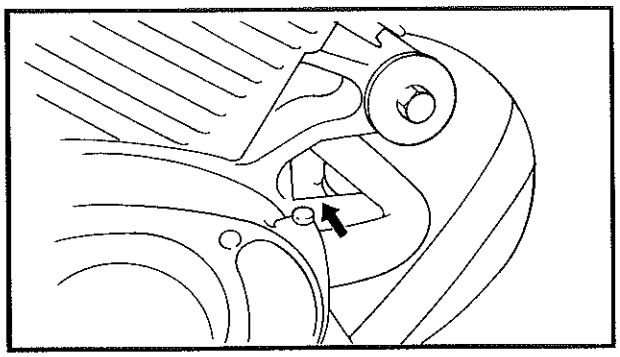
2.Install:
- Water pump housing ①

10 Nm (1.0 m · kg, 7.2 ft · lb)

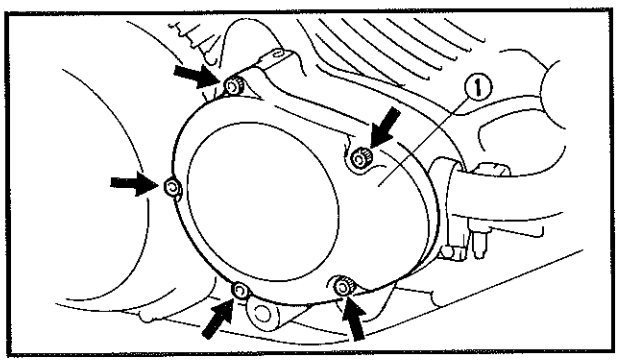


3.Install:
- O-ring New
- Water pump inlet pipe ①

10 Nm (1.0 m · kg, 7.2 ft · lb)



4.Tighten:
- Lower radiator hose clamp



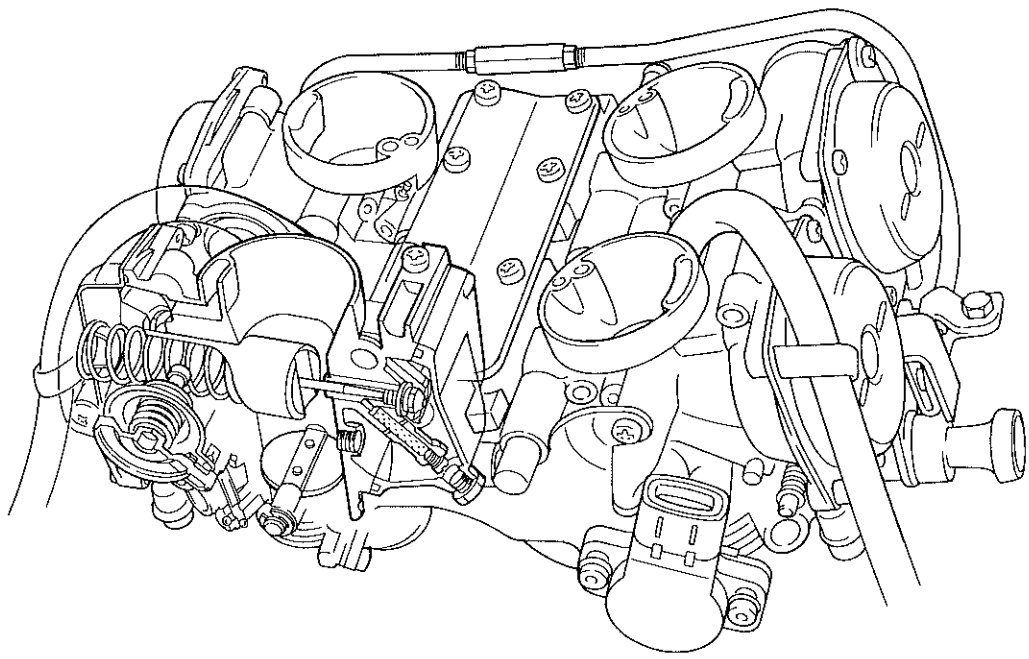
5.Install:
- O-ring New
- Water pump cover ①

10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
Apply a thin coat of grease onto the O-ring.

6.Fill:
- Cooling system
  Refer to "COOLANT REPLACEMENT" in CHAPTER 3.

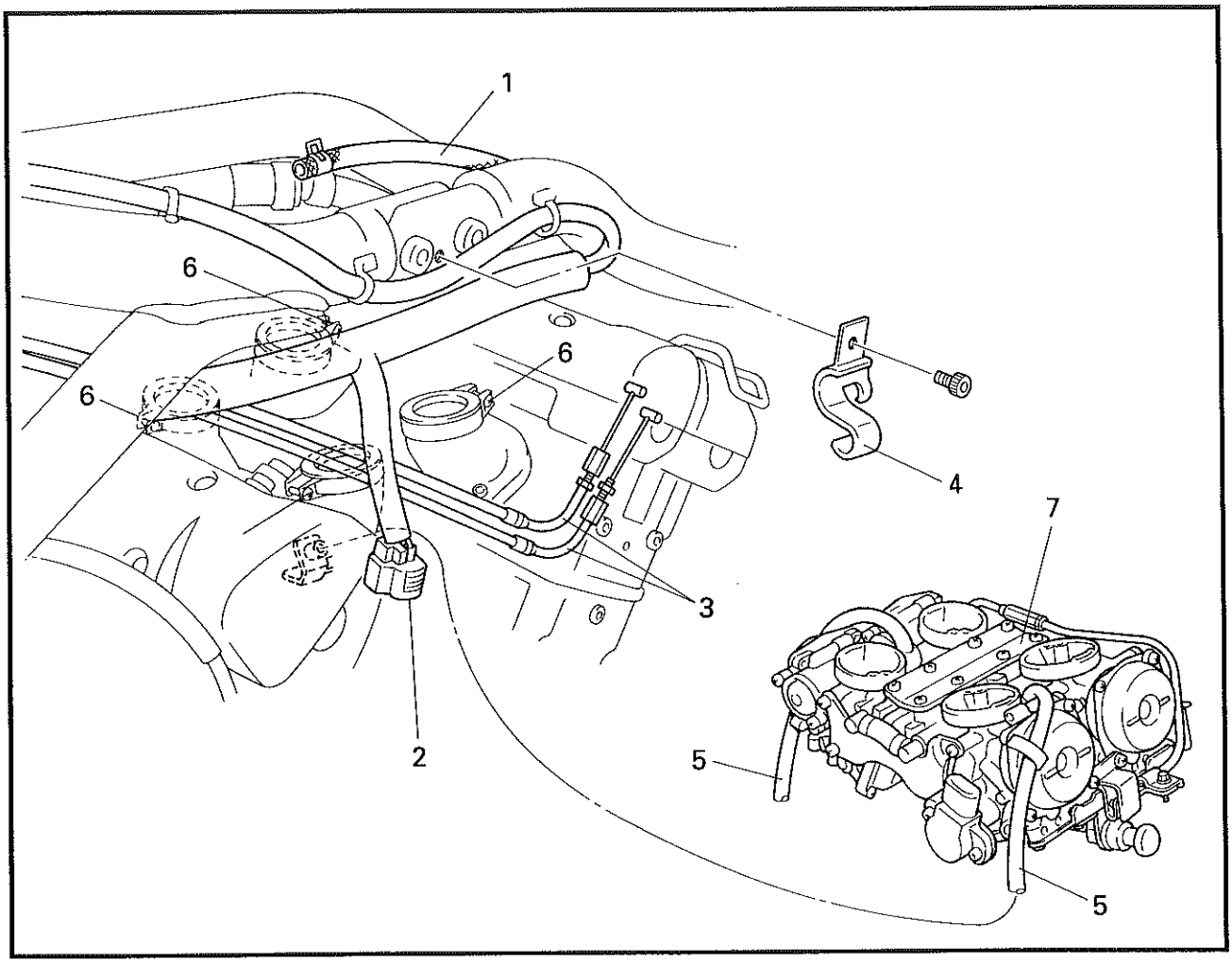
7.Inspect:
- Cooling system
  Decrease of pressure (leaks) → Repair as required.



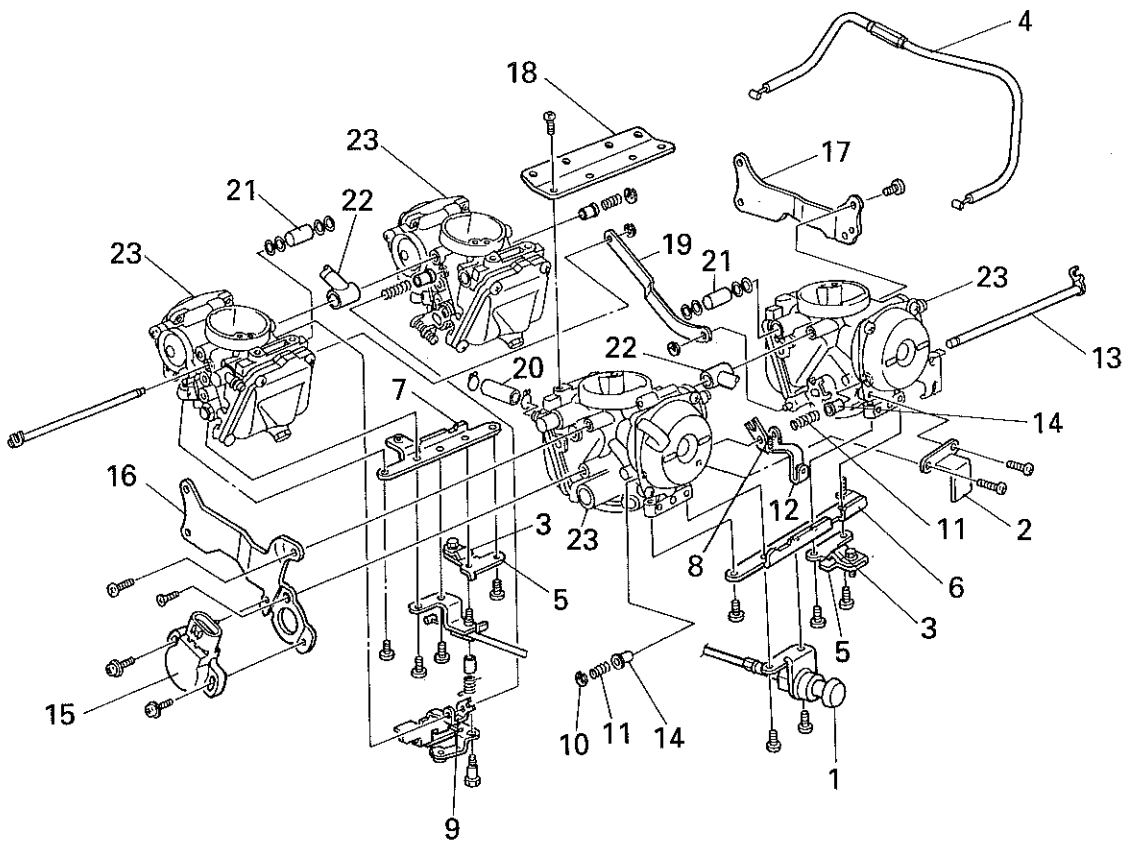
CONTENTS
CARBURETION

CARBURETION

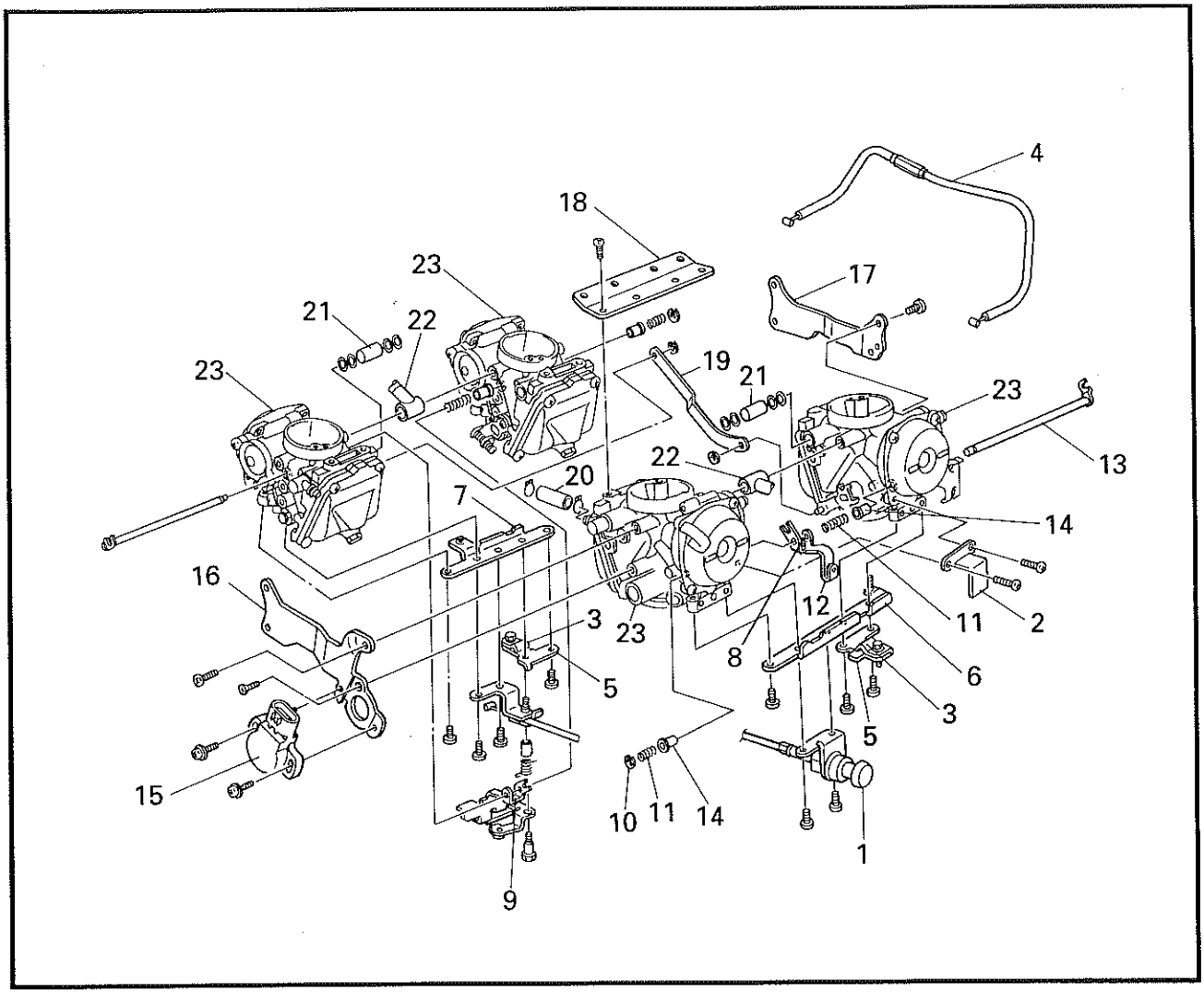
CARBURETOR



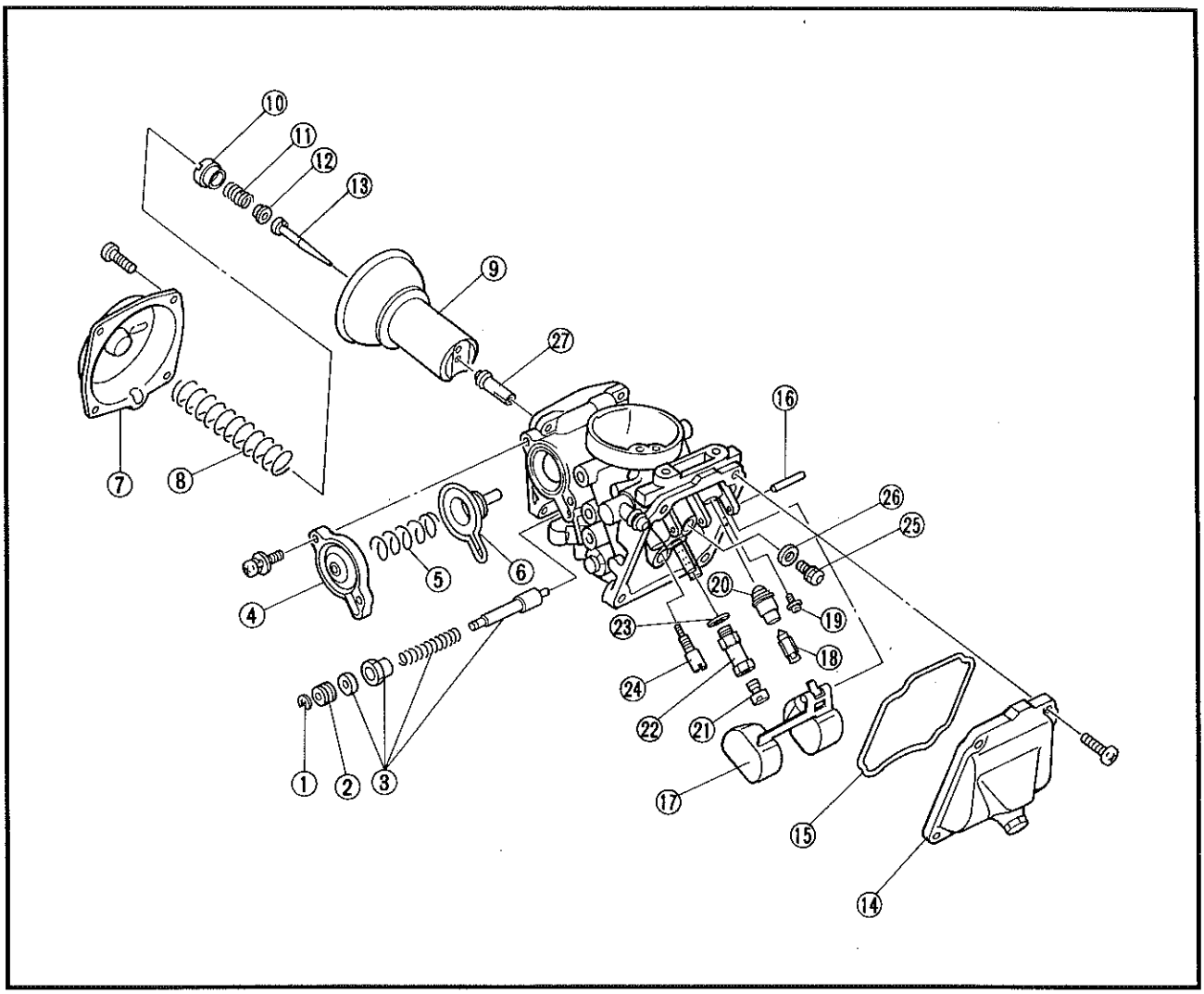
Order	Job name/Part name	Q'ty	Remarks
	Carburetor removal		Remove the parts in the order below.
	Rider seat, fuel tank		Refer to "SEATS" and "FUEL TANK" in CHAPTER 3.
	Air filter case		Refer to "AIR FILTER CLEANING" in CHAPTER 3.
1	Fuel hose	1	Disconnect
2	Leads (throttle position sensor)	1	Disconnect
3	Throttle cables	2	Disconnect
4	Metal clamp (left side)	1	
5	Air vent hoses	2	Disconnect
6	Clamps (carburetor joints)	4	Loosen
7	Carburetor assembly	1	For installation, reverse the removal procedure.



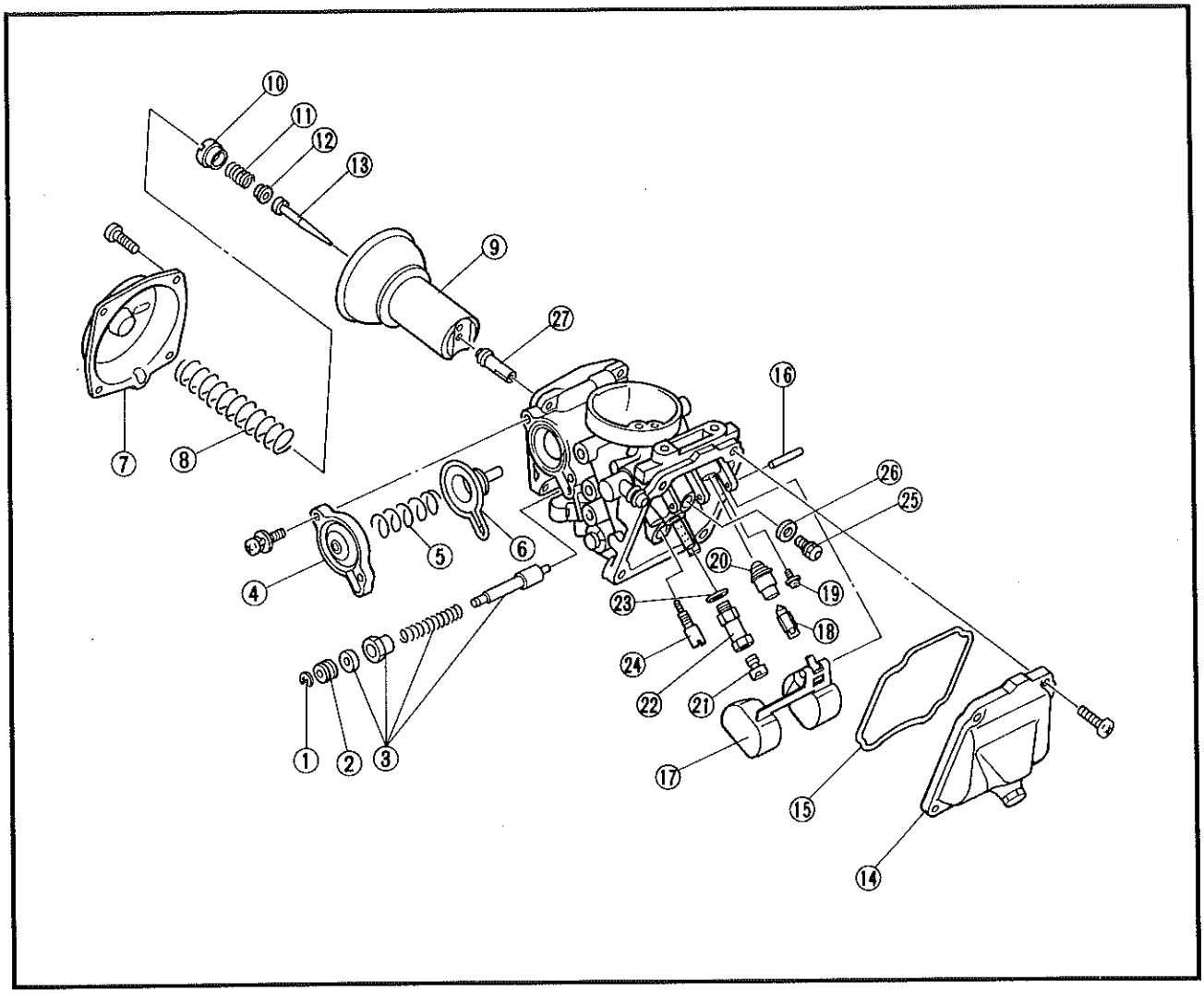
Order	Job name/Part name	Q'ty	Remarks
	Separation of the carburetors		Remove the parts in the order below.
1	Choke knob assembly	1	
2	Choke cable protector	1	
3	Cable clamps (left and right)	2	Loosen
4	Choke cable #2	1	
5	Cable holders	2	
6	Bracket (throttle stop screw)	1	
7	Bracket (choke lever)	1	
8	Screw (choke rod bracket)	1	Loosen
9	Screw (choke lever bracket)	1	Cannot be removed.
10	Circlips	2	
11	Springs	4	
12	Brackets	2	
13	Choke rods	2	
14	Plastic bushings	4	



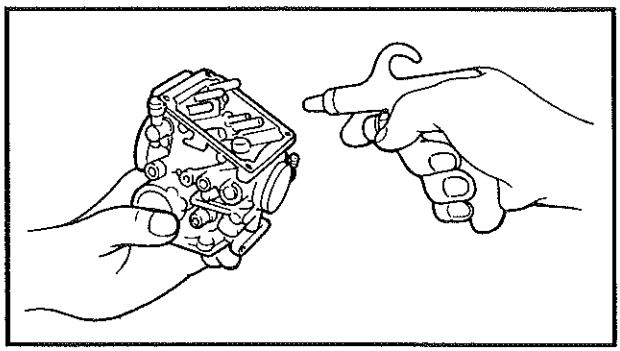
Order	Job name/Part name	Q'ty	Remarks
15	Throttle position sensor	1	
16	Front bracket	1	
17	Rear bracket	1	
18	Upper bracket	1	
19	Synchronization rod	1	
20	Fuel delivery hose	1	
21	Joint (fuel feed)	2	
22	Air vent hoses	2	
23	Carburetors	4	
			For assembly, reverse the disassembly procedure.



Order	Job name/Part name	Q'ty	Remarks
	Carburetor disassembly		Disassemble the parts in the order below. **NOTE:** The remaining steps should be followed for all four of the carburetors.
①	Circlip	1	
②	Guide	1	
③	Starter plunger assembly	1	
④	Coasting enrichment cover	1	
⑤	Spring	1	
⑥	Diaphragm	1	
⑦	Vacuum chamber cover	1	
⑧	Spring	1	
⑨	Vacuum piston	1	
⑩	Plastic screw	1	
⑪	Spring	1	
⑫	Plastic bushing	1	



Order	Job name/Part name	Q'ty	Remarks
⑬	Jet needle	1	
⑭	Float chamber cover	1	
⑮	Gasket	1	
⑯	Float pin	1	
⑰	Float	1	
⑱	Needle valve	1	
⑲	Holding screw (valve seat)	1	
⑳	Valve seat	1	
㉑	Main jet	1	
㉒	Main jet holder	1	
㉓	Copper washer	1	
㉔	Pilot jet	1	
㉕	Needle jet cover	1	
㉖	Washer	1	
㉗	Needle jet	1	
			For assembly, reverse the disassembly procedure.



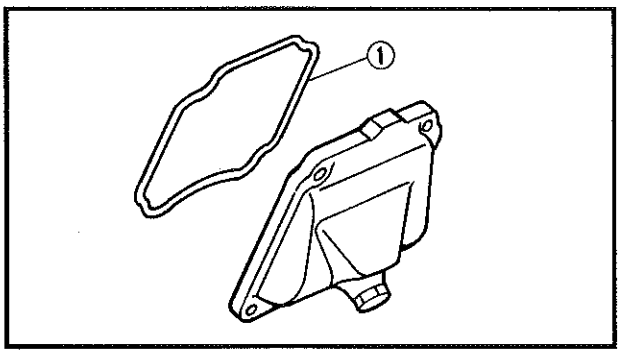
INSPECTION

1.Inspect:
- Carburetor body
- Float chamber
- Jet housing
  Cracks/damage → Replace.
- Fuel passages
  Blockage → Clean as indicated.
- Carburetor float chamber body
  Contamination → Clean.

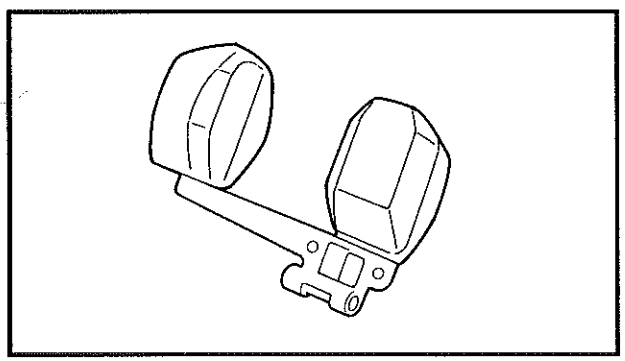
****

Cleaning steps:
- Wash the carburetor in petroleum based solvent. (Do not use any caustic carburetor cleaning solution.)
- Blow out all of the passages and jets with compressed air.

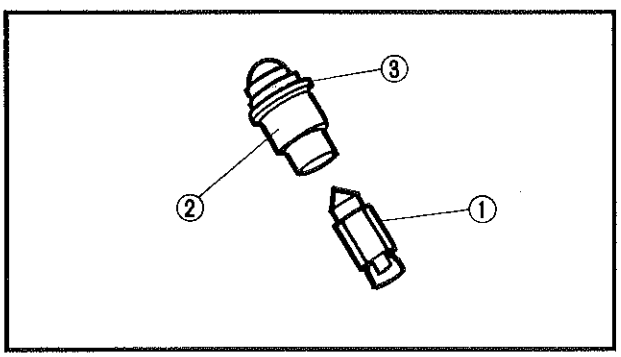
****



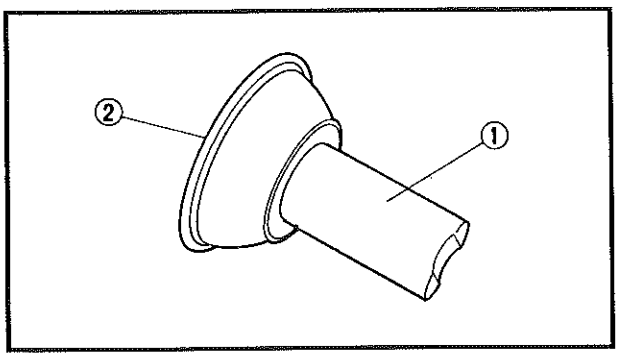
2.Inspect:
- Rubber gasket (float chamber cover) ①
  Cracks/wear/damage → Replace.



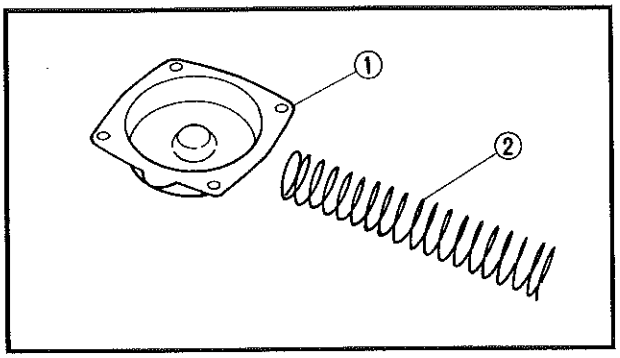
3.Inspect:
- Floats
  Damage → Replace.



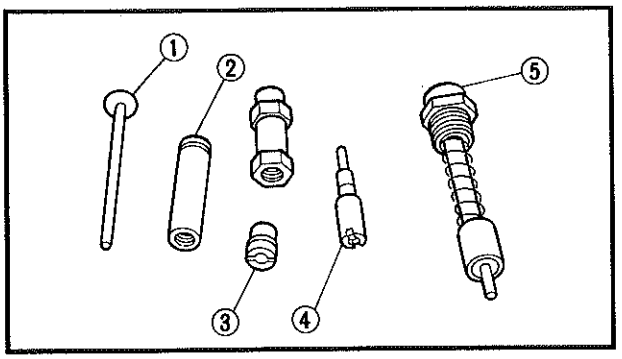
4.Inspect:
- Needle valve ①
- Valve seat ②
- O-ring ③
  Blockage/wear/damage → Replace as a set.



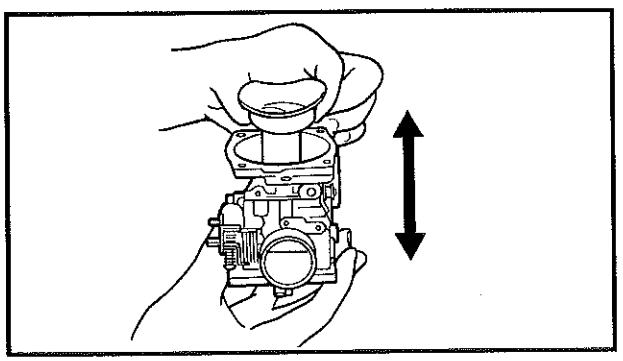
5.Inspect:
- Vacuum piston ①
  Scratches/wear/damage → Replace.
- Rubber diaphragm ②
  Tears → Replace.



6.Inspect:
- Vacuum chamber cover ①
- Spring ②
  Cracks/damage → Replace.

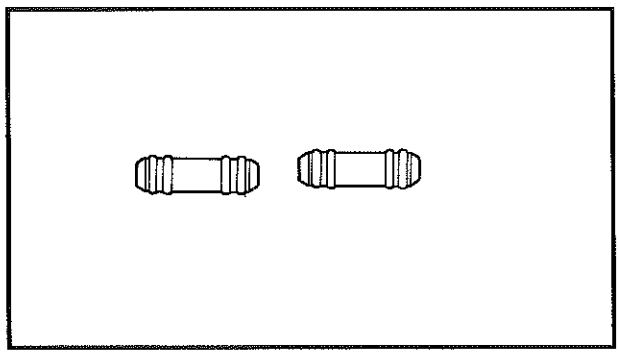


7.Inspect:
- Jet needle ①
- Needle jet ②
- Main jet ③
- Pilot jet ④
- Starter plunger ⑤
  Bends/wear/damage → Replace.
  Blockage → Blow out the jets with compressed air.



8.Check:
- Clearance
  Insert the vacuum piston into the carburetor body and check the clearance.
  Sticks/tight → Replace.

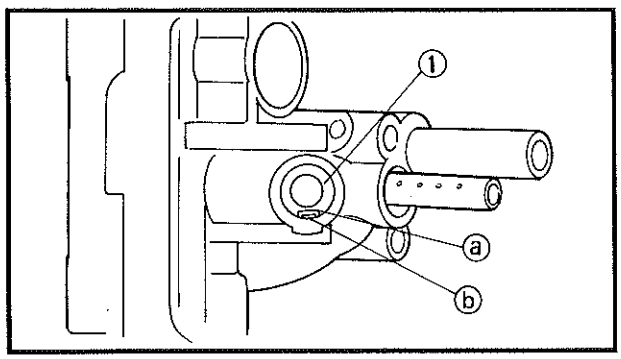
9.Inspect:
- Fuel delivery hoses
- Fuel hoses
  Cracks/wear/damage → Replace.
  Blockage → Blow out the hoses with compressed air.



10.Inspect:
- Joint (fuel feed)
  Cracks/damage → Replace.

ASSEMBLY

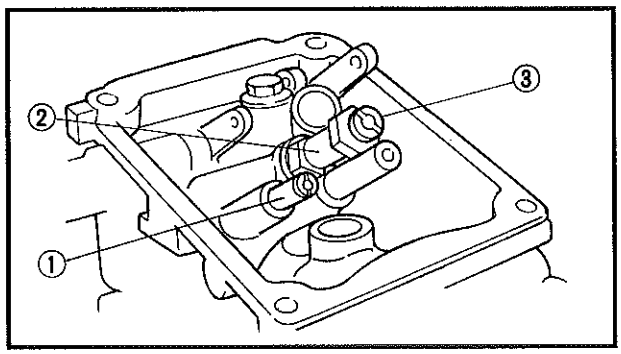
CAUTION:
- **Before reassembling, wash all of the parts in a clean petroleum based solvent.**
- **Always use a new gasket.**



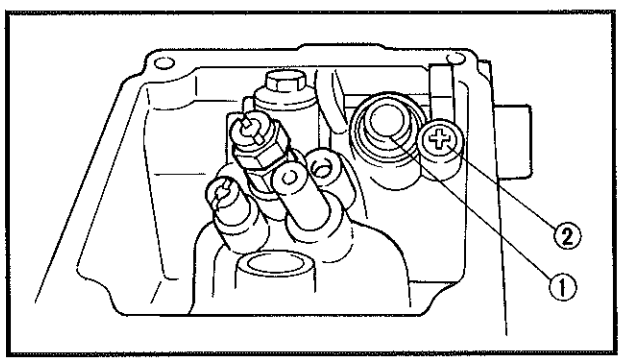
1.Install:
- Needle jet ①

NOTE:
Align the slot ⓐ on the needle jet ① with the projection ⓑ on the carburetor body.

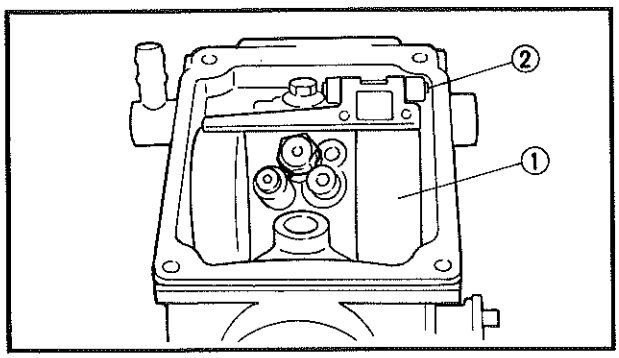
- Washer
- Needle jet cover



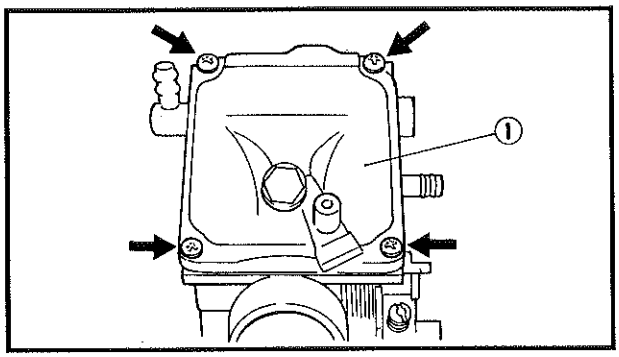
2.Install:
- Pilot jet ①
- Copper washer
- Main jet holder ②
- Main jet ③



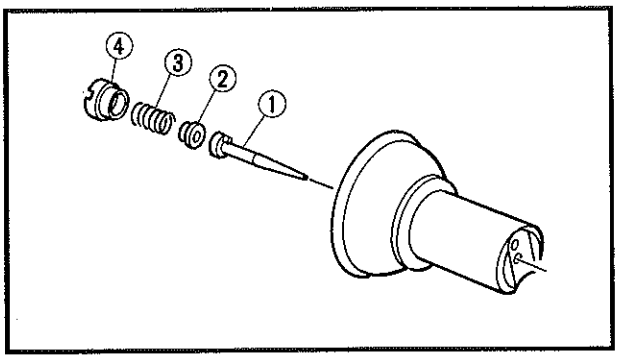
3.Install:
- Valve seat ①
- Holding screw (valve seat) ②



4.Install:
- Needle valve
- Float ①
- Float pin ②

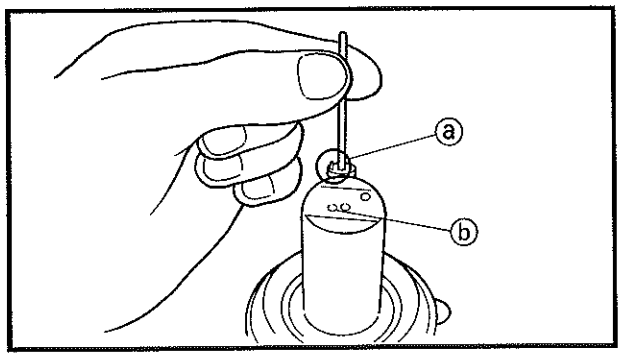


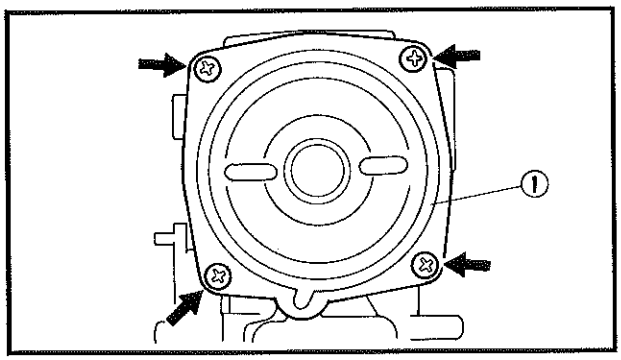
5.Install:
- Gasket
- Float chamber cover ①



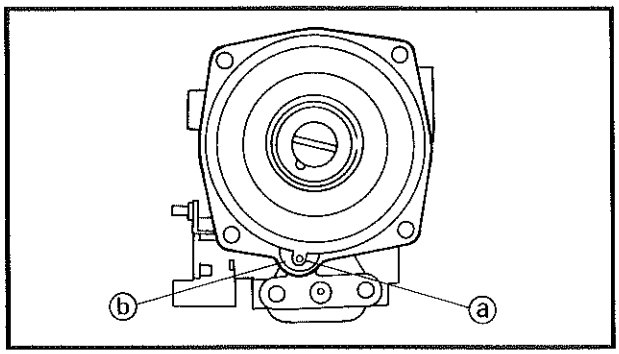
6.Install:
- Jet needle ①
- Plastic bushing ②
- Spring ③
- Plastic screw ④

NOTE:
Align the projection ⓐ on the plastic stopper with the hole ⓑ in the vacuum piston.

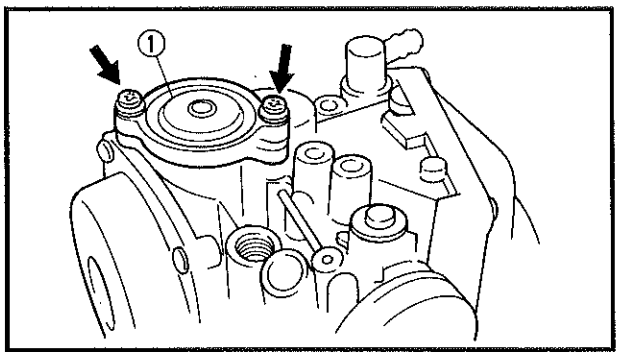




7.Install:
- Vacuum piston
- Spring
- Vacuum chamber cover ①

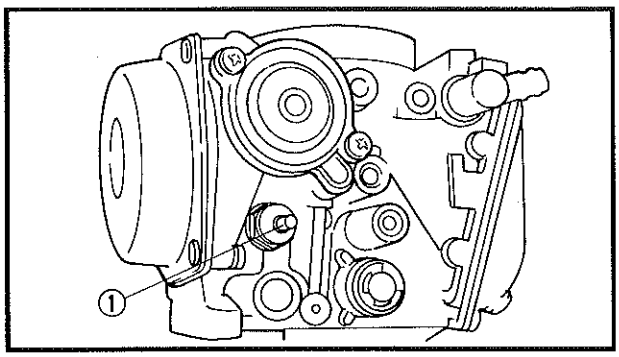


NOTE:
- Match the tab ⓐ on the diaphragm to the hole ⓑ in the carburetor body.
- Insert the spring end onto the spring guide on the vacuum chamber cover.

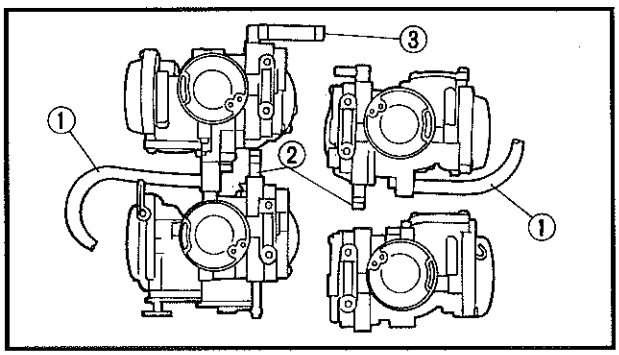


8.Install:
- Diaphragm
- Spring
- Coasting enrichment cover ①

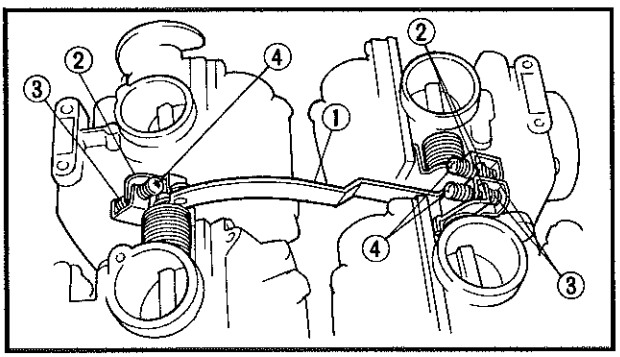
NOTE:
Match the tab on the diaphragm to the recess in the carburetor body.



9.Install:
- Starter plunger assembly ①
- Guide
- Circlip

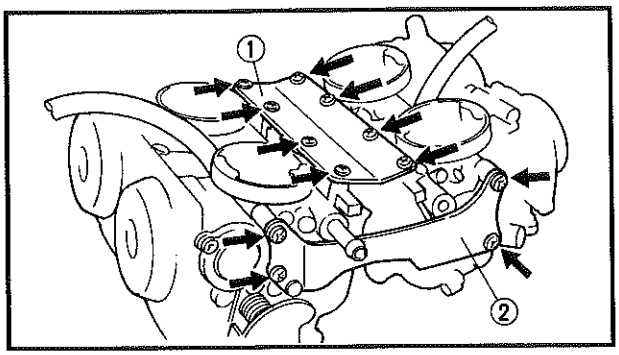


10.Install:
- Breather hoses ①
- Joint (fuel feed) ②
- Fuel delivery hose ③

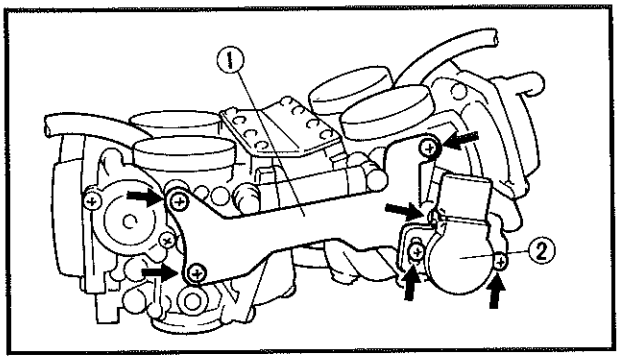


11.Install:
- Synchronization rod ①
- Synchronization screws

NOTE:
Insert the throttle arm ② (on #1, #2 and #4 carburetors) between the spring ③ and the synchronizing screw ④.

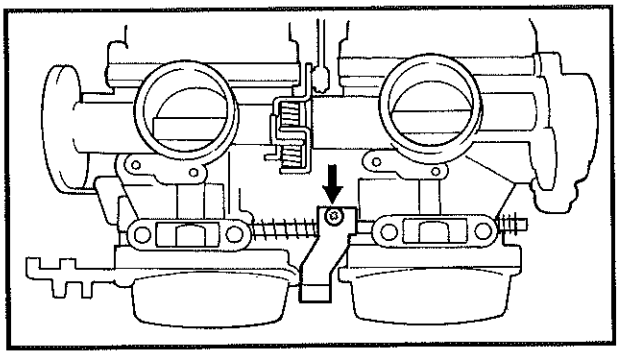


12.Install:
- Upper bracket ①
- Rear bracket ②



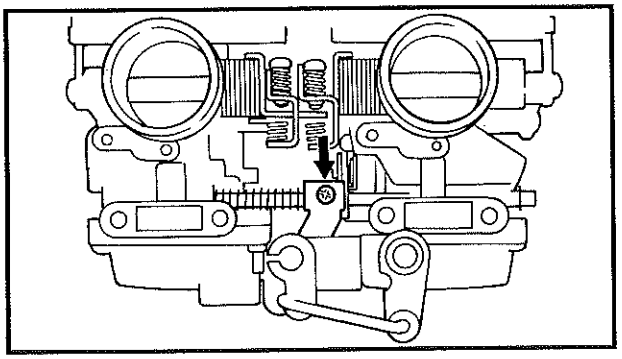
13.Install:
- Front bracket ①
- Throttle position sensor ②

NOTE:
Temporarily tighten the throttle position sensor and after assembly adjust its position.



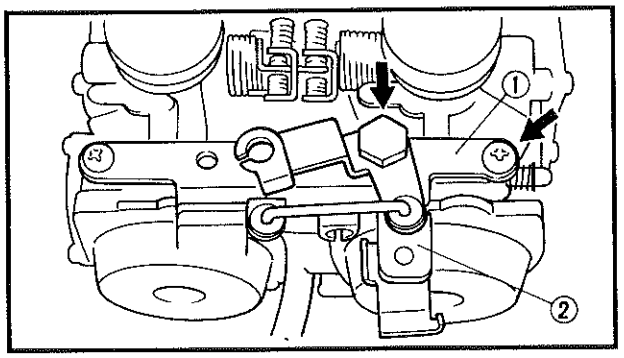
14.Install:
- Plastic bushings
- Choke rod (front)
- Bracket
- Springs
- Circlip

15.Tighten:
- Choke rod screw (front)
  (into the notch on the choke rod)

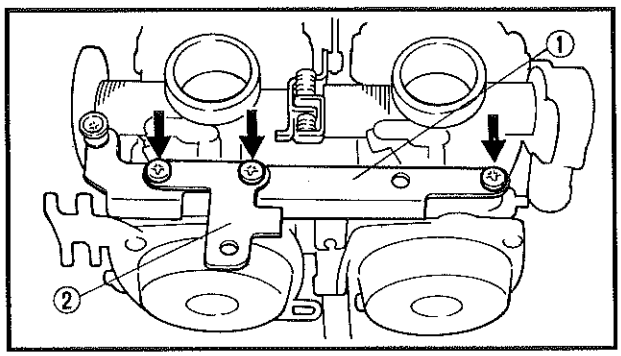


16.Install:
- Plastic bushings
- Choke rod (rear)
- Bracket
- Springs
- Circlip

17.Tighten:
- Choke rod screw (rear)
  (into the notch on the choke rod)



18.Install:
- Bracket (choke lever) ①
- Choke cable holder ②

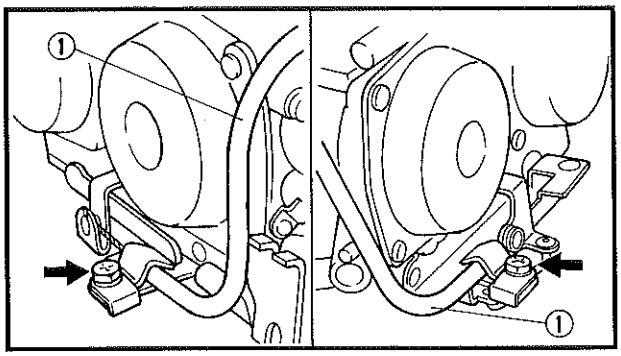


19.Install:
- Bracket (throttle stop screw) ①

4Nm (0.4 m · kg, 2.9 ft · lb)

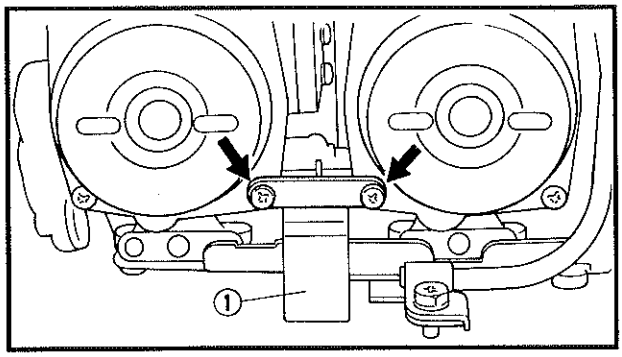
- Choke cable holder ②

NOTE:
Apply LOCTITE® #290 to the screw of the throttle stop screw bracket.

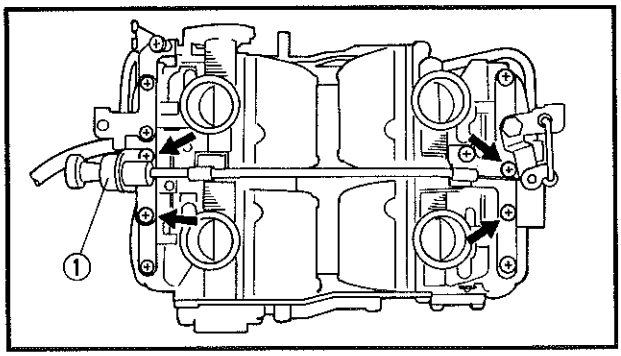


20.Install:
- Choke cable #2 ①

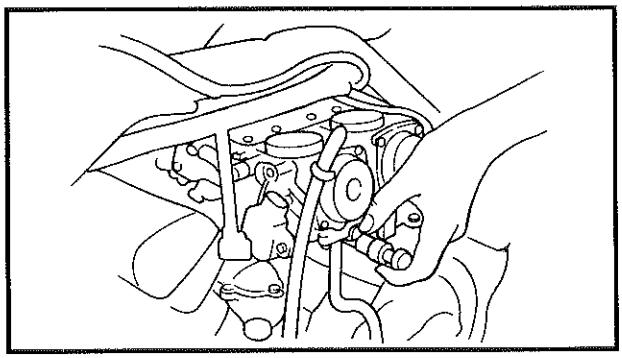
21.Tighten
- Choke cable clamps (left and right)



22.Install:
- Choke cable protector (front) ①

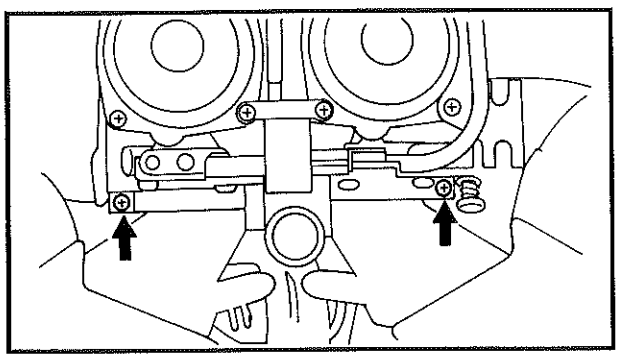


23.Install:
- Choke knob assembly ①

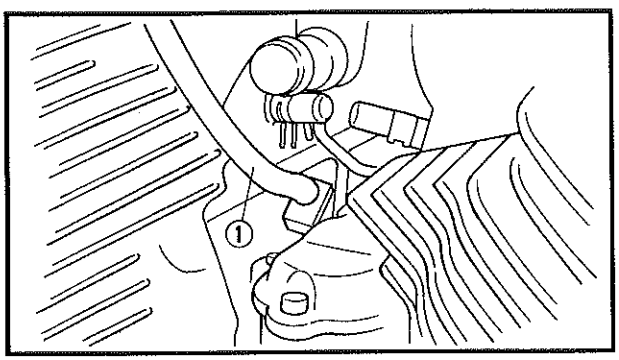


EB600050
INSTALLATION

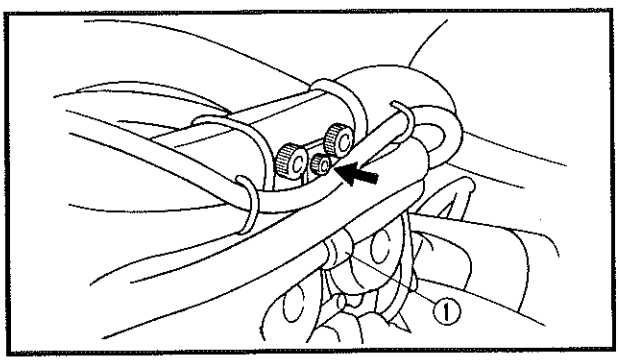
1.Install:
- Carburetor assembly
  (from the left side of the motorcycle)
  (push the carburetor assembly into the intake manifolds)



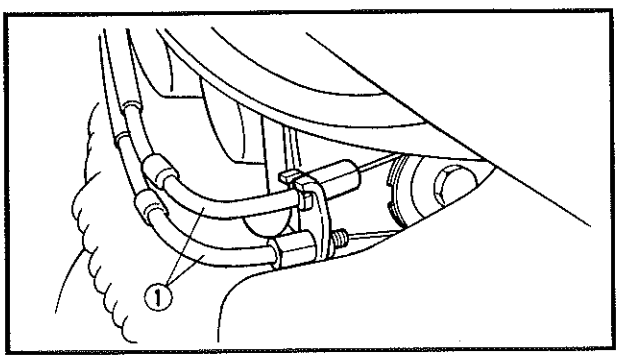
2.Tighten:
- Clamps (carburetor joints)



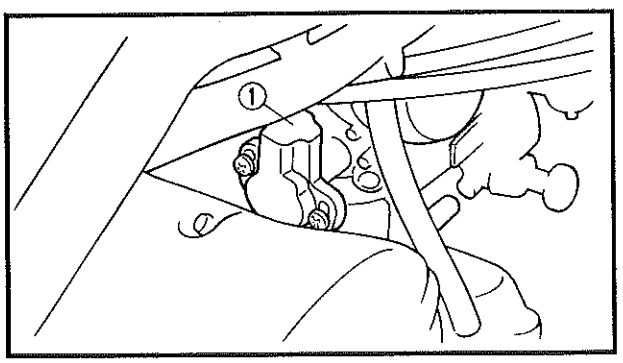
3.Connect:
- Air vent hoses ①



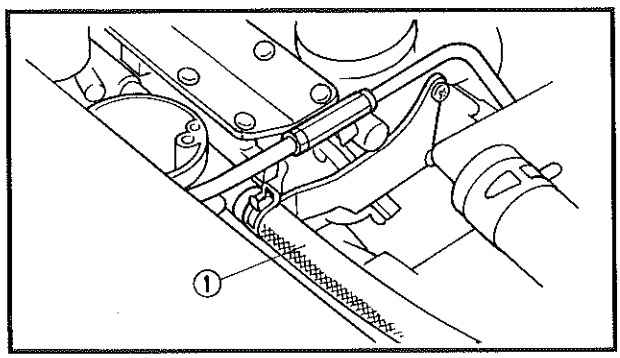
4.Install:
- Metal clamp (left side) ①



5.Connect:
- Throttle cables ①



6.Connect:
- Leads (throttle position sensor) ①



7.Connect:
- Fuel hose ①

8.Adjust:
- Carburetor synchronization
  Refer to "CARBURETOR SYNCHRONIZATION" in CHAPTER 3.

9.Adjust:
- Idling speed

	Engine idling speed: **950 ~ 1,050 r/min**

Refer to "IDLING SPEED ADJUSTMENT" in CHAPTER 3.

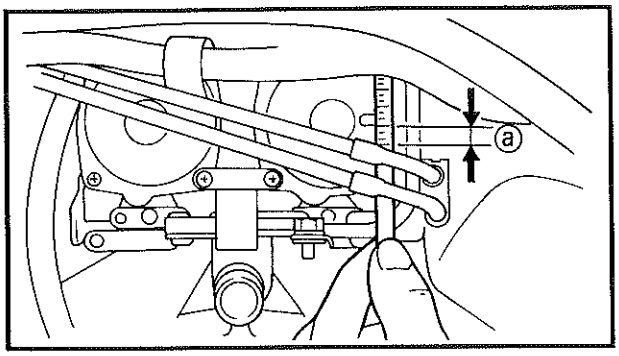
10.Adjust:
- Throttle cable free play

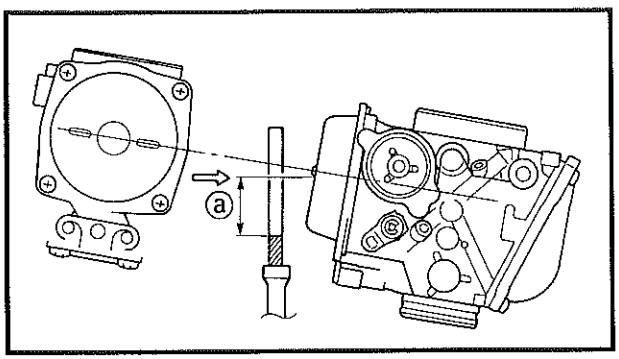
	Throttle cable free play: **4 ~ 6 mm (0.16 ~ 0.24 in)**

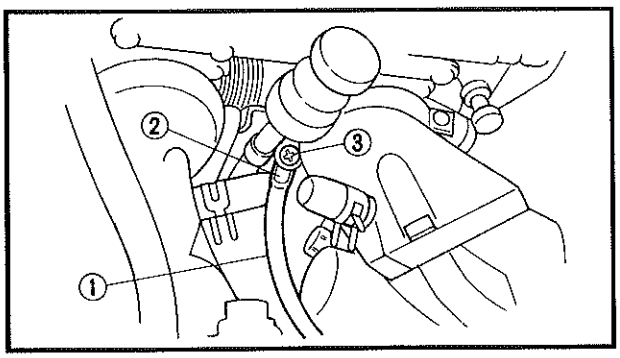
Refer to "THROTTLE CABLE ADJUSTMENT" in CHAPTER 3.

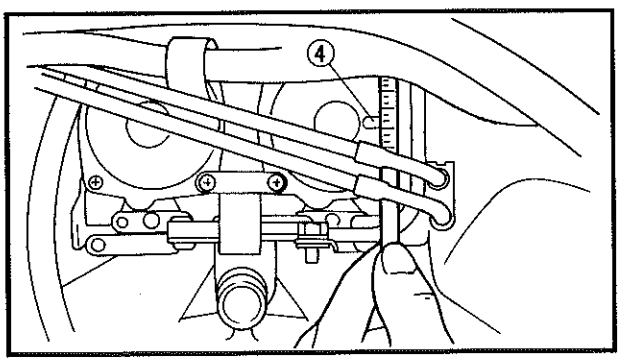
11.Install:
- Air filter case
  Refer to "AIR FILTER CLEANING" in CHAPTER 3.

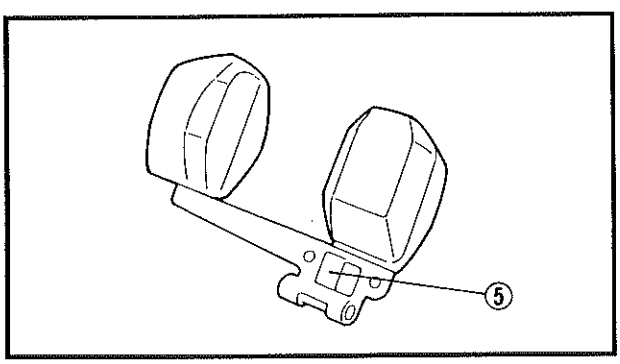
12.Install:
- Fuel tank
- Rider seat
  Refer to "FUEL TANK" and "SEATS" in CHAPTER 3.











EB600061
FUEL LEVEL ADJUSTMENT

1. Measure:
- Fuel level ⓐ
  Out of specification → Adjust

Fuel level:
24.9 ~ 25.9 mm (0.98 ~ 1.02 in)
Below the vacuum chamber cover line

****

Measurement and adjustment steps:
- Place the motorcycle on a level surface.
- Put a suitable stand under the engine to ensure that the carburetors are positioned vertically.
- Connect the fuel level gauge ① to the drain pipe ②.

Fuel level gauge:
YM - 01312 - A, 90890 - 01312

- Loosen the drain screw ③.
- Hold the gauge vertically next to the vacuum chamber line ④.
- Measure the fuel level with the gauge.

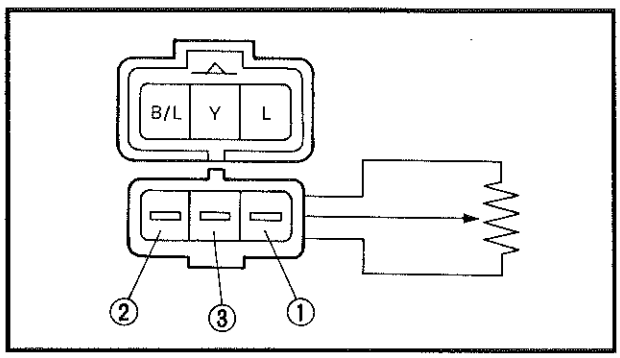
NOTE:
Fuel level readings should be equal on both sides of the carburetor line.

- If the fuel level is incorrect, adjust it.
- Remove the carburetor.
- Inspect the valve seat and needle valve.
- If either is worn, replace them both.
- If both are fine, adjust the float level by slightly bending the float tang ⑤.
- Install the carburetor.
- Check the fuel level again.

****

EB600070
TPS (THROTTLE POSITION SENSOR) ADJUSTMENT AND INSPECTION

NOTE:
Before adjusting the throttle position sensor's position the idling speed should be adjusted to specifications.



1. Adjust:
- Throttle position sensor's position

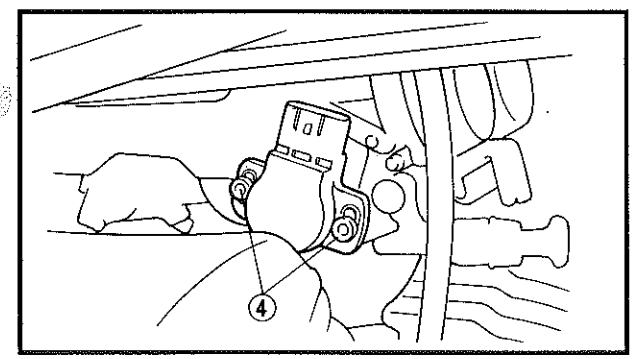
****

Adjustment steps:
- Disconnect the throttle position sensor coupler.
- Connect the pocket tester (Ω × 1k) to the throttle position sensor coupler.

Tester (+) lead → Blue/blue terminal ①
Tester (–) lead → Black terminal ②

- Measure the maximum throttle position sensor resistance.
- Calculate the throttle position sensor's resistance at idle.

Idle throttle position sensor resistance = Max. resistance (0.13 ~ 0.15)



Example:
- If max. resistance is 5 kΩ, then idle throttle resistance is:
  5 kΩ × (0.13 ~ 0.15) = 650 ~ 750 Ω
- Lift the carburetors slightly out of the intake manifolds.
- Loosen the throttle position sensor screws ④.
- Connect the pocket tester (Ω × 100) to the throttle sensor coupler.

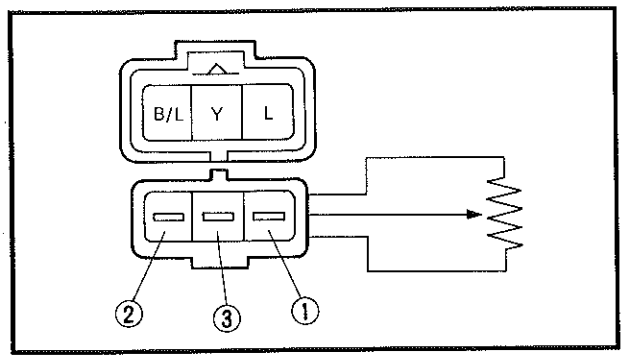
Tester (+) lead → Yellow terminal ③
Tester (–) lead → Blue terminal ①

● Adjust the throttle position sensor to the specified resistance.

Throttle position sensor resistance:
650 ~ 750 Ω
(yellow - blue)

● After adjusting the angle, tighten the throttle position sensor screws.

****



2. Inspect:
• Throttle position sensor

****

Inspection steps:

● Disconnect the throttle position sensor coupler.
● Remove the throttle position sensor from the carburetor.
● Connect the pocket tester (Ω × 1k) to the throttle position sensor coupler.

Tester (+) lead → Blue terminal ①
Tester (–) lead → Black/blue terminal ②

● Check the throttle position sensor resistance.

Throttle position sensor resistance:
4.0 ~ 6.0 kΩ at 20°C
(Blue — Black/blue)

● Out of specification → Replace the throttle position sensor.
● Connect the pocket tester (Ω × 1k) to the throttle position sensor coupler.

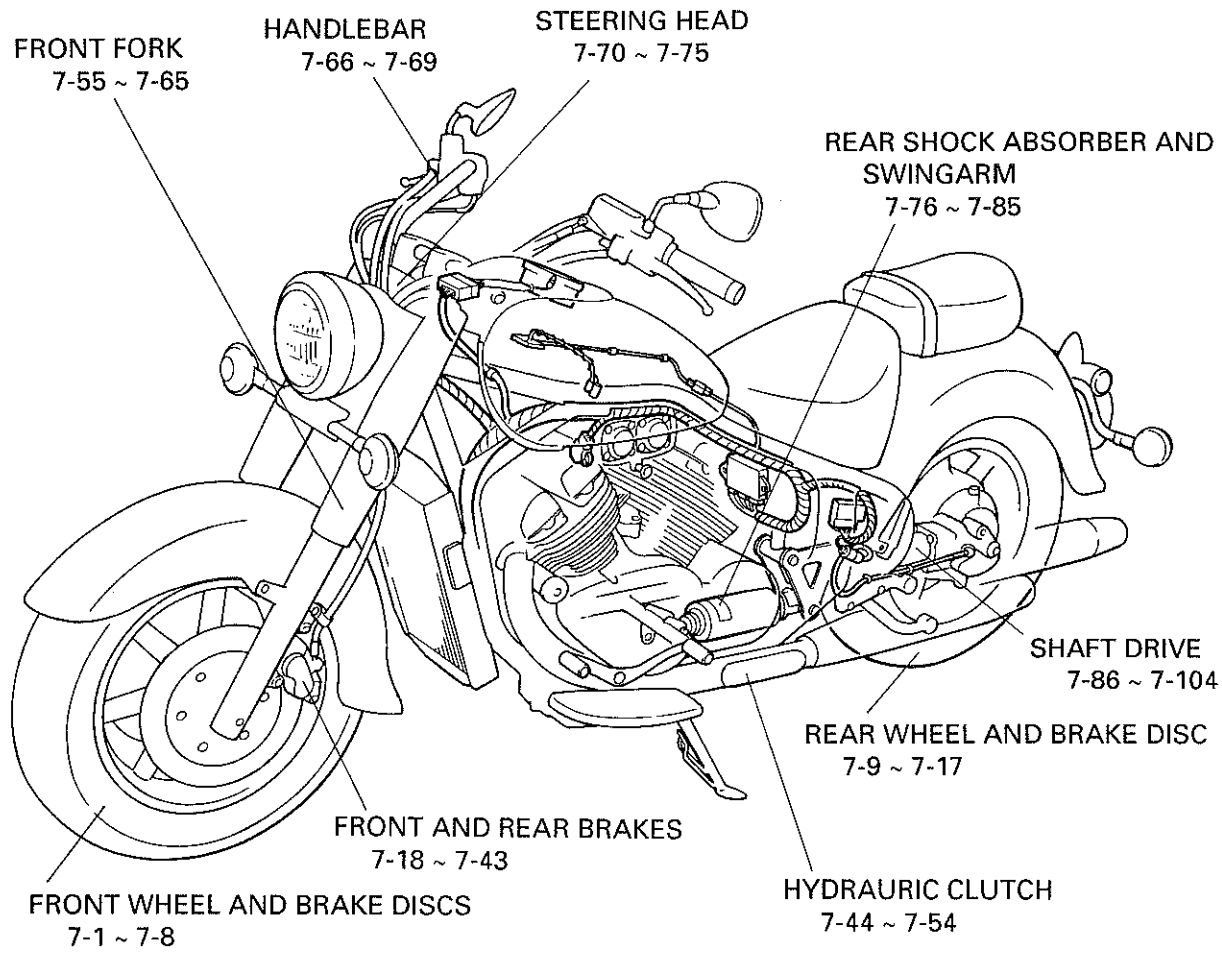
Tester (+) lead → Yellow terminal ③
Tester (–) lead → Black/blue terminal ②

● While slowly turning the throttle check the resistance of the throttle position sensor.

Throttle position sensor resistance:
0 ~ 5±1.0 kΩ at 20°C
(Yellow — Black/blue)

Out of specification → Replace the throttle position sensor.

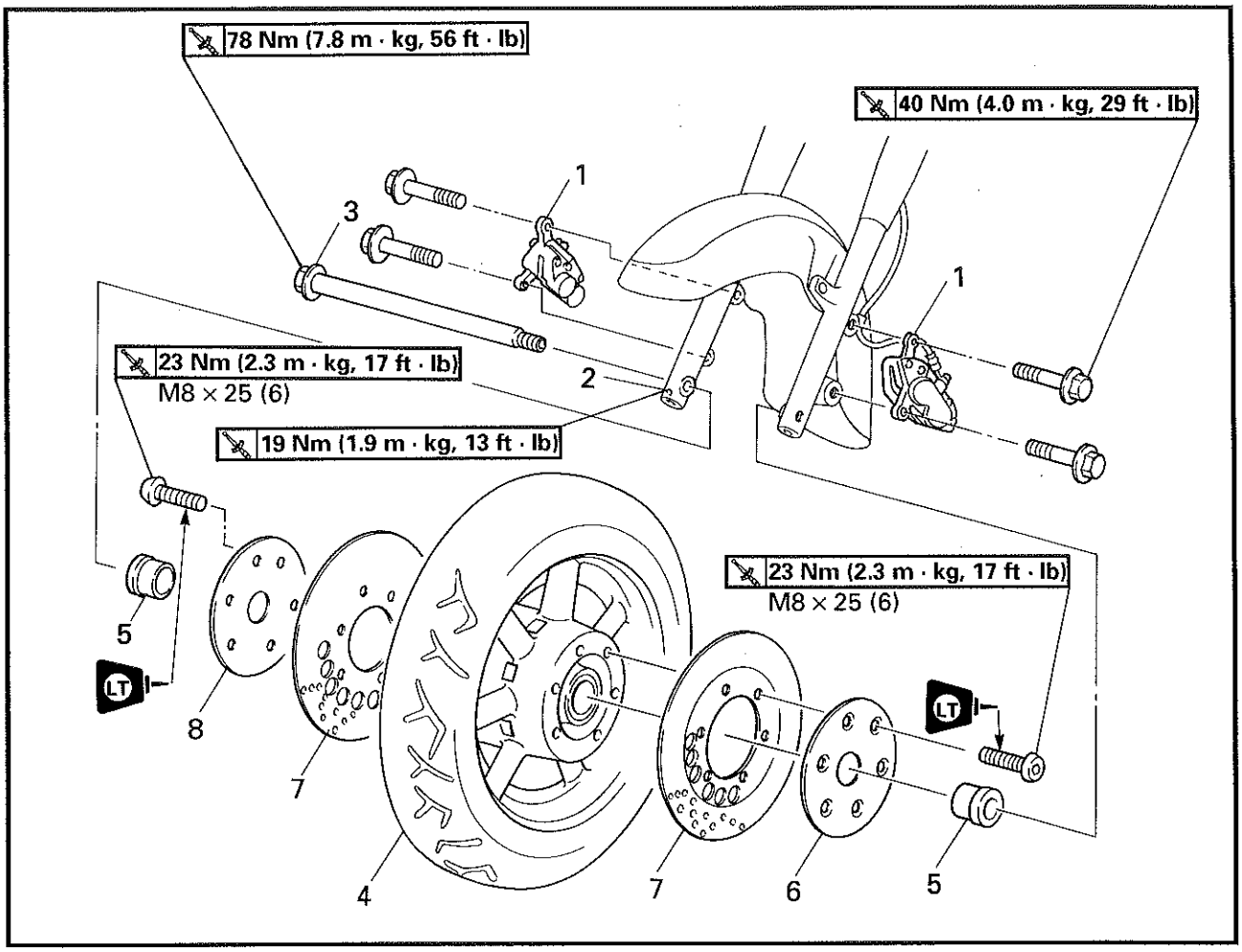
****



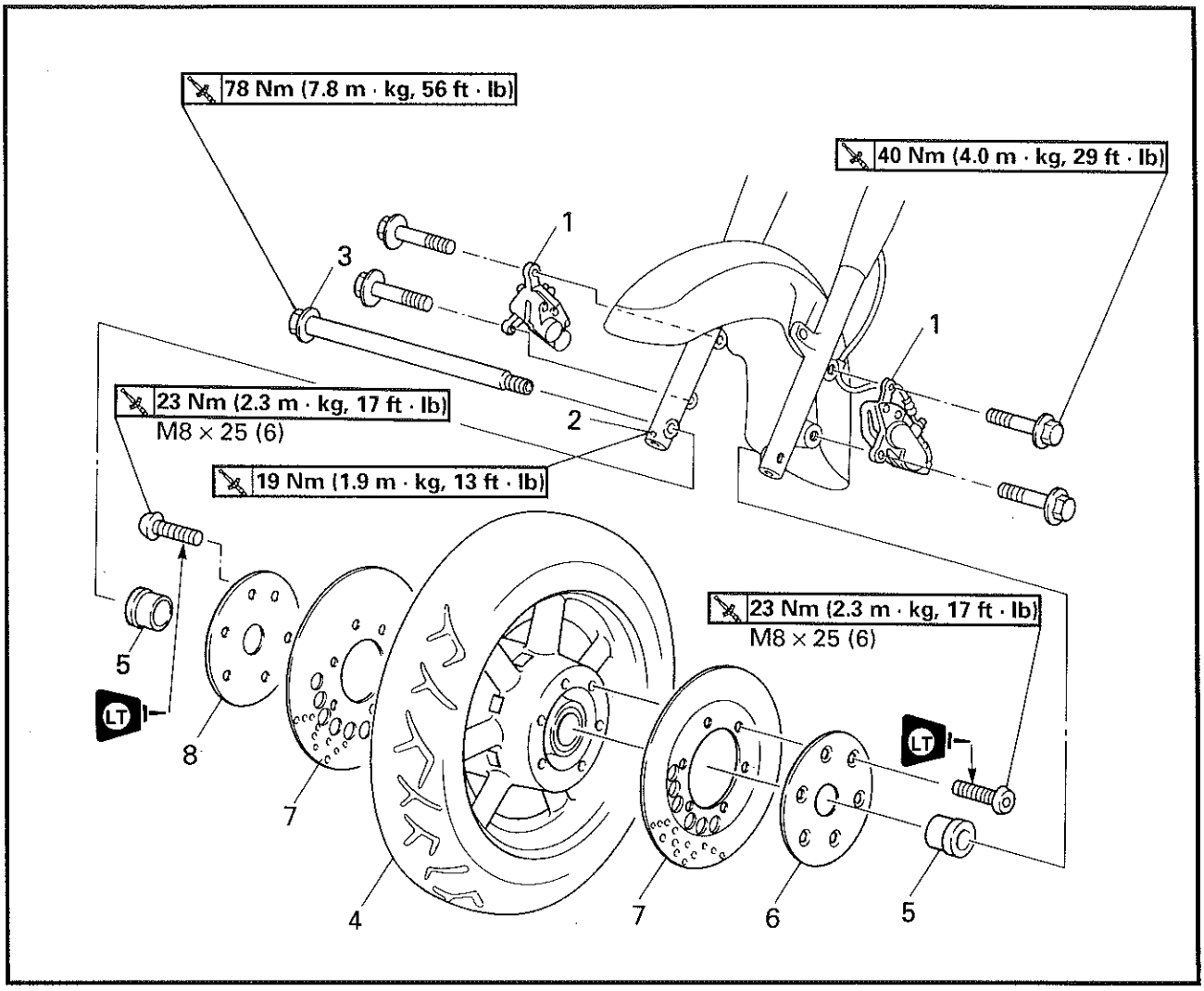
CONTENTS
CHASSIS

CHASSIS

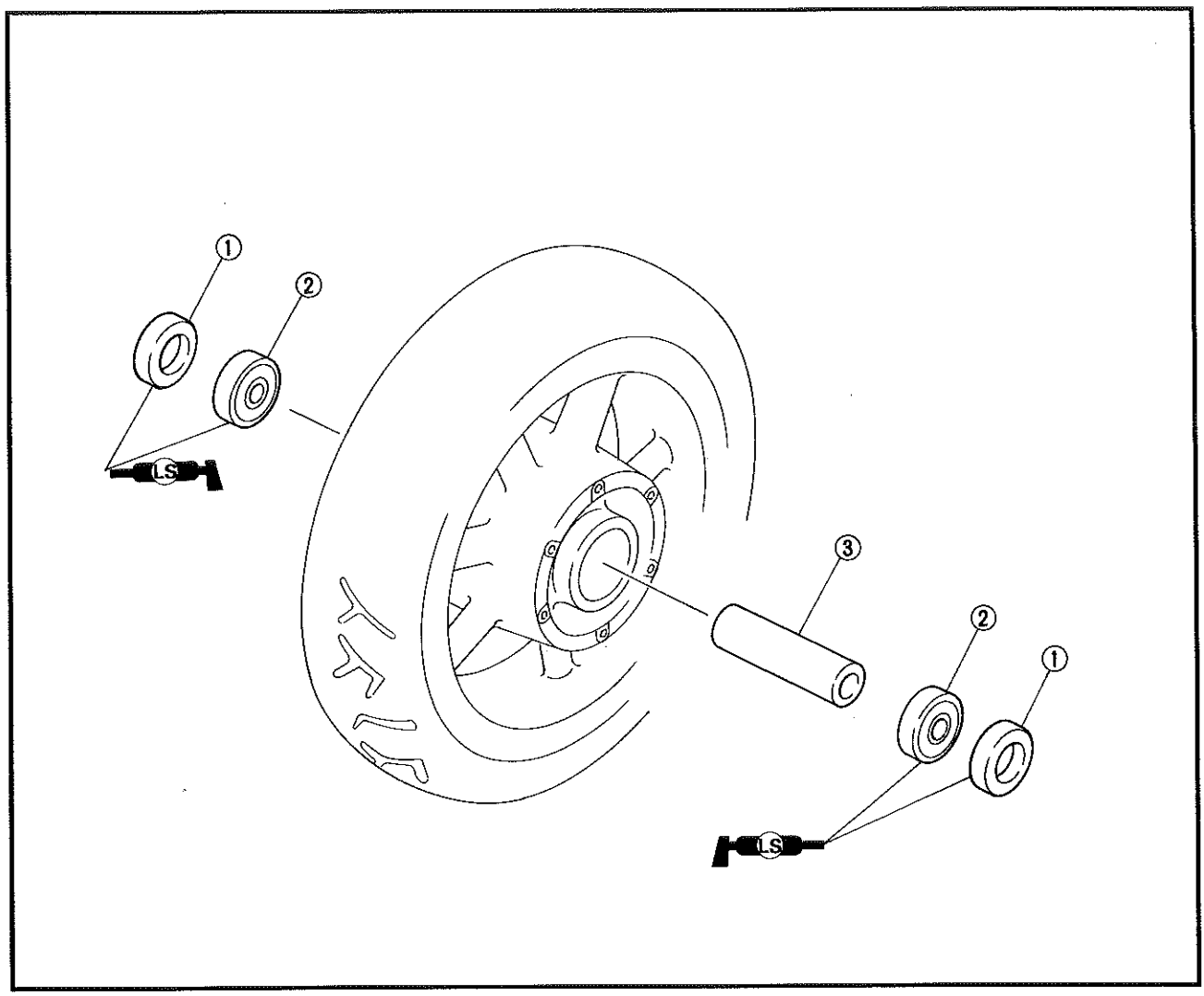
FRONT WHEEL AND BRAKE DISCS



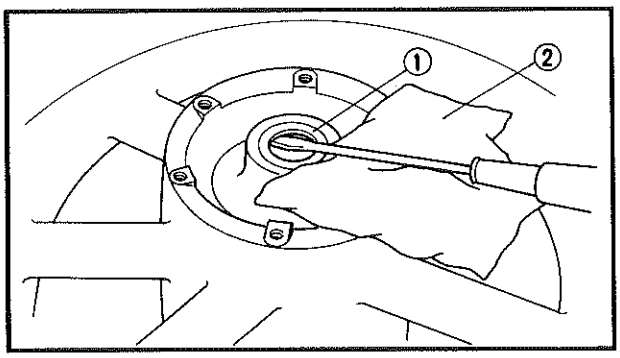
Order	Job name/Part name	Q'ty	Remarks
	Front wheel and brake disc removal		Remove the parts in the order below. Stand the motorcycle on a level surface. **⚠ WARNING** **Securely support the motorcycle so there is no danger of it falling over.**
1	Front brake calipers (left and right)	2	**NOTE:** Do not depress the brake lever when the wheel is off of the motorcycle as the brake pads will be forced shut.
2	Pinch bolt (front wheel axle)	1	Loosen
3	Front wheel axle	1	Elevate the front wheel. Place a suitable stand under the engine.
4	Front wheel	1	

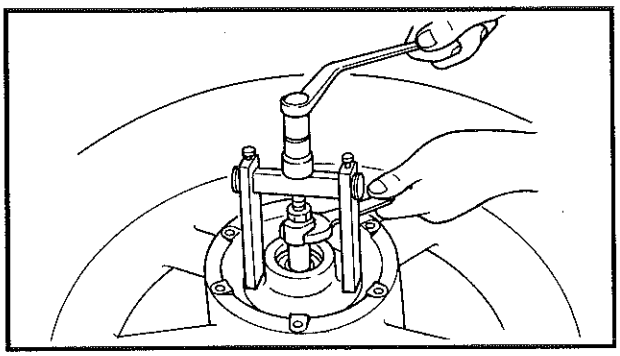


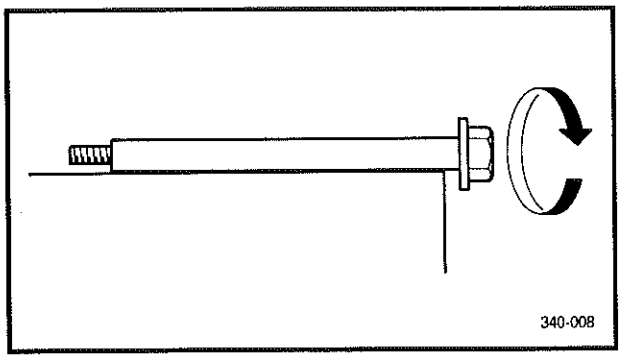
Order	Job name/Part name	Q'ty	Remarks
5	Collars	2	
6	Brake disc cover (left)	1	
7	Brake discs	2	
8	Brake disc cover (right - with weight)	1	
			For installation, reverse the removal procedure.



Order	Job name/Part name	Q'ty	Remarks
	Front wheel disassembly		Disassemble the parts in the order below.
①	Oil seals	2	Refer to "DISASSEMBLY".
②	Bearings	2	
③	Spacer	1	
			For assembly, reverse the disassembly procedure.







DISASSEMBLY

1.Remove:
- Oil seals
- Bearings

****

Removal:
- Clean the outside of the front wheel hub.
- Use a flat-head screwdriver to remove the oil seals ①.

NOTE:
To prevent damage place a rag ② between the screwdriver and the wheel surface.

- Remove the bearings using a standard bearing puller.

****

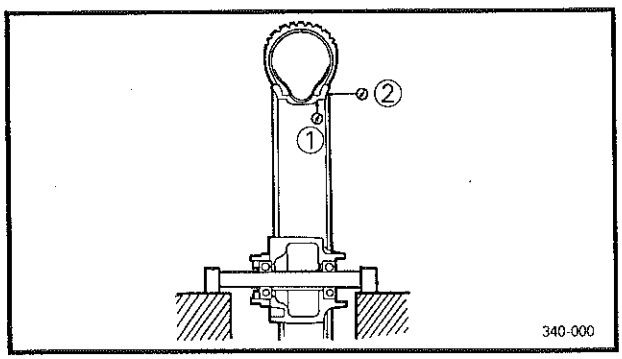
EB700020
INSPECTION

1.Inspect:
- Front wheel axle
  (by rolling it on a flat surface)
  Bent → Replace.

⚠ WARNING

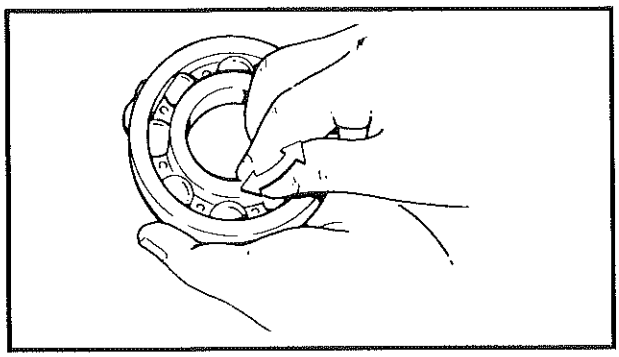
Do not attempt to straighten a bent axle.

2.Inspect:
- Front tire
  Wear/damage → Replace.
  Refer to "TIRE INSPECTION" in CHAPTER 3.
- Front wheel
  Refer to "WHEEL INSPECTION" in CHAPTER 3.

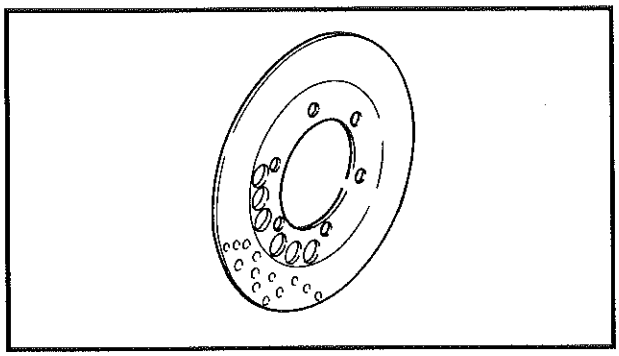


3.Measure:
- Front wheel runout
  Over the specified limits → Replace.

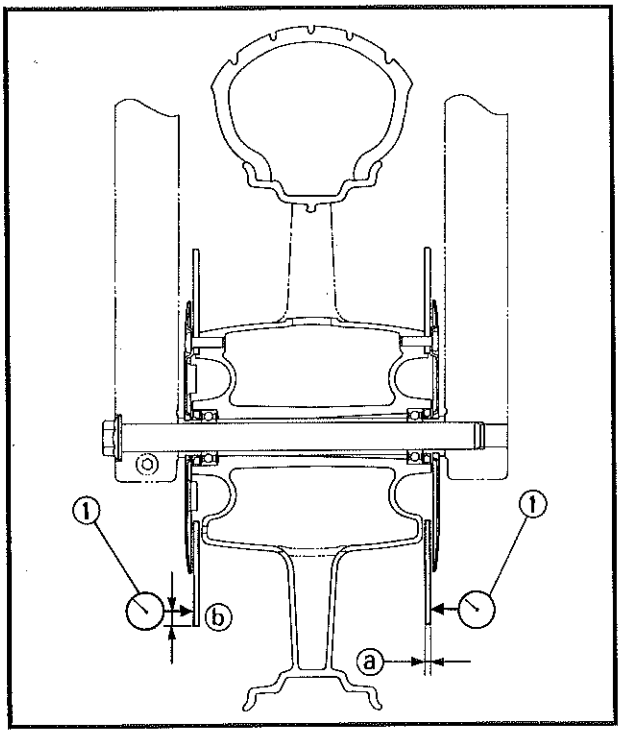
Front wheel runout limits:
Radial ①: 1.0 mm (0.04 in)
Lateral ②: 0.5 mm (0.02 in)



4.Inspect:
- Front wheel bearings
  Bearings allow free play in the wheel hub or the wheel does not turn smoothly → Replace.
- Oil seals
  Wear/damage → Replace.



5.Inspect:
- Brake discs
  Galling/damage → Replace.



6.Measure:
- Brake disc deflection
  Out of specification → Inspect the wheel runout.
  If wheel runout is within the limits, replace the brake disc(s).

Brake disc maximum deflection: 0.15 mm (0.006 in)

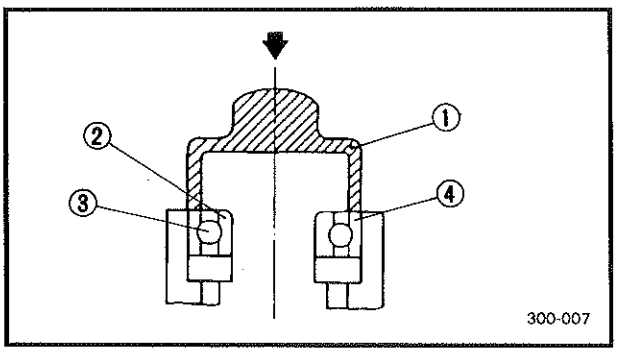
- Brake disc thickness ⓐ
  Out of specification → Replace.

Brake disc minimum thickness: 4.5 mm (0.18 in)

① Dial gauge
ⓑ Measuring point 2 mm (0.08 in)

ASSEMBLY

1.Install:
- Bearings
- Oil seals



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Installation steps:

● Install the new bearings and oil seals by reversing the removal steps.

NOTE:

Use a socket ① that matches the diameter of the outer bearing race and the oil seal.

CAUTION:

Do not contact the bearing center race ② or balls ③. Contact should be made only with the outer race ④.

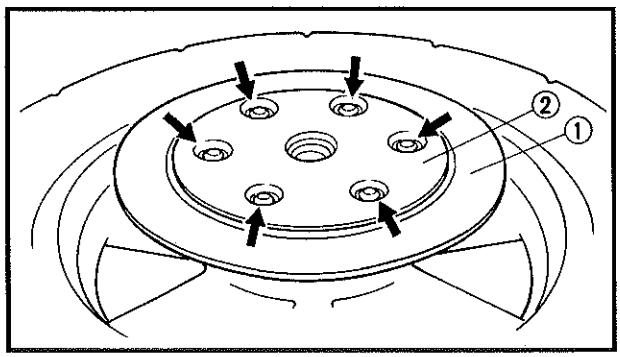
****

EB700030

INSTALLATION

1. Lubricate:
   - Front wheel axle
   - Oil seal (lips)

	Recommended lubricant: Lithium soap base grease

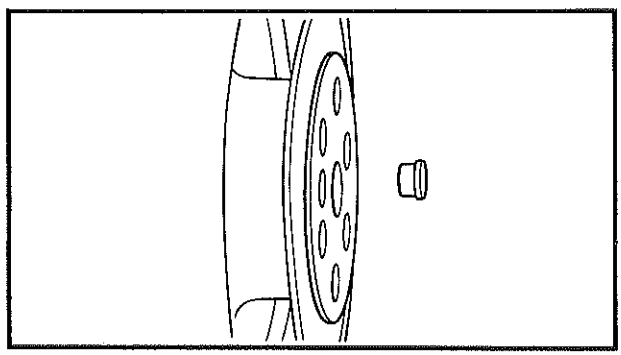


2. Install:
   - Brake discs ①
   - Brake disc covers ②

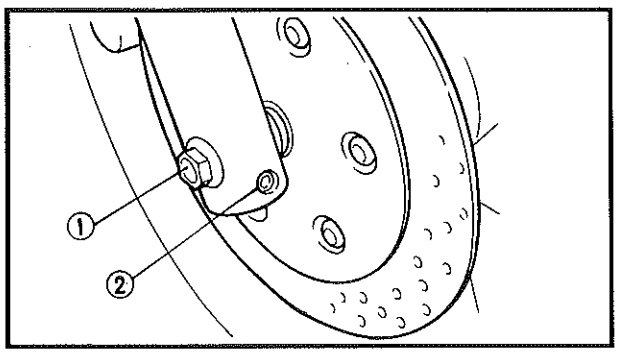
23 Nm (2.3 m · kg, 17 ft · lb)

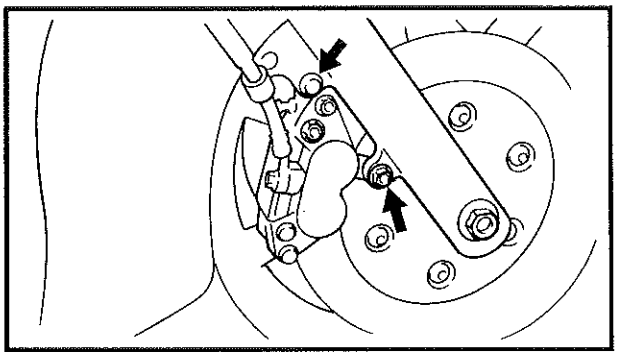
NOTE:

- Apply LOCTITE® #648 to the threads of the brake disc bolts.
- Tighten the brake disc bolts in stages using a crisscross pattern.



3. Install:
   - Collars
4. Install:
   - Front wheel





5.Tighten:
- Front wheel axle ①

78 Nm (7.8 m · kg, 56 ft · lb)

- Pinch bolt (front wheel axle) ②

19 Nm (1.9 m · kg, 13 ft · lb)

CAUTION:

Before tightening the pinch bolt, stroke the front fork several times to check for proper fork operation.

6.Install:
- Brake calipers

40 Nm (4.0 m · kg, 29 ft · lb)

⚠ WARNING

Make sure that the brake hose is routed properly.

EB700040

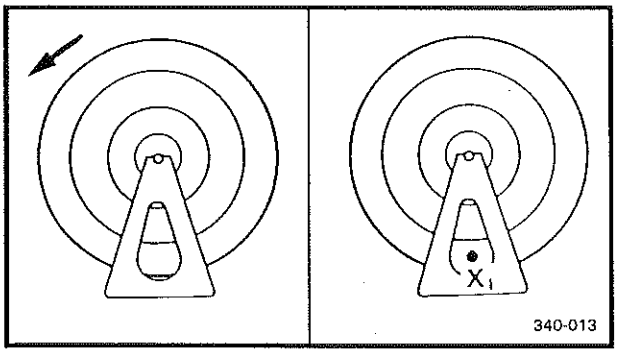
FRONT WHEEL STATIC BALANCE ADJUSTMENT

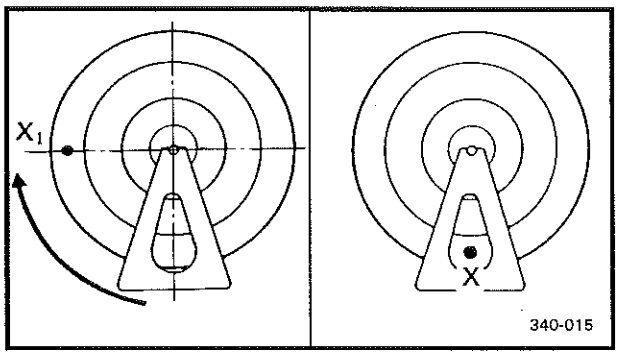
NOTE:
- After replacing the tire and/or rim, the wheel static balance should be adjusted.
- Adjust the front wheel static balance with the brake discs installed.

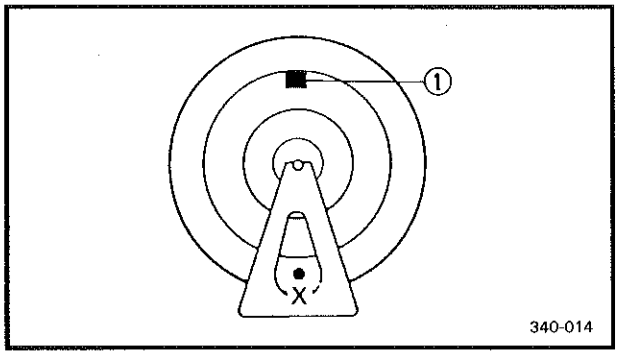
1.Remove:
- Balancing weight

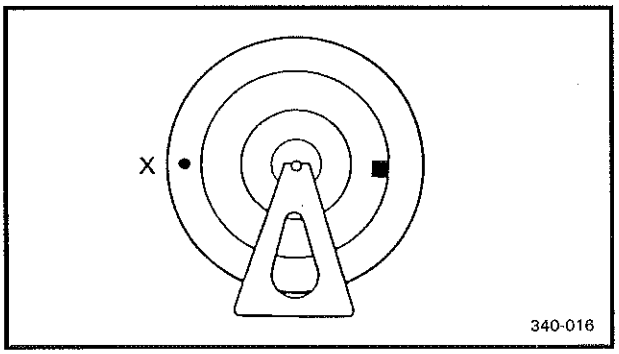
2.Set:
- Front wheel (on a suitable stand)

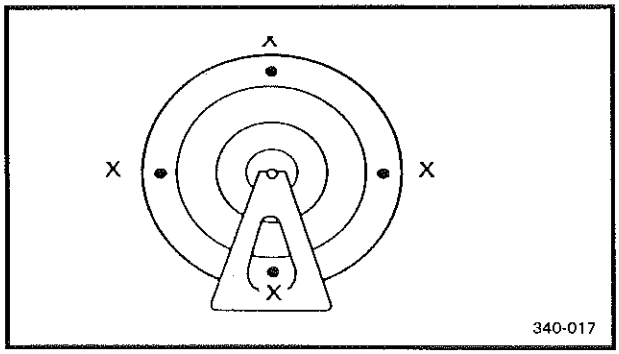
3.Find:
- Heavy spot











****

Procedure:

a. Spin the wheel and wait for it to rest.
b. Put an "X_1" mark on the wheel's bottom spot.
c. Turn the wheel so that the "X_1" mark is 90° up.
d. Release the wheel and wait for it to rest. Put an "X_2" mark on the wheel's bottom spot.
e. Repeat steps (b), (c) and (d) several times until all the marks come to the same spot.
f. This spot is the wheel's heavy spot "X".

****

4. Adjust:
- Front wheel static balance

****

Adjusting steps:

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

NOTE:
Start with the smallest weight.

- Turn the wheel so that the heavy spot is 90° up.
- Check that the heavy spot is at rest there. If not, try another weight until the wheel is balanced.

****

5. Check:
- Front wheel static balance

****

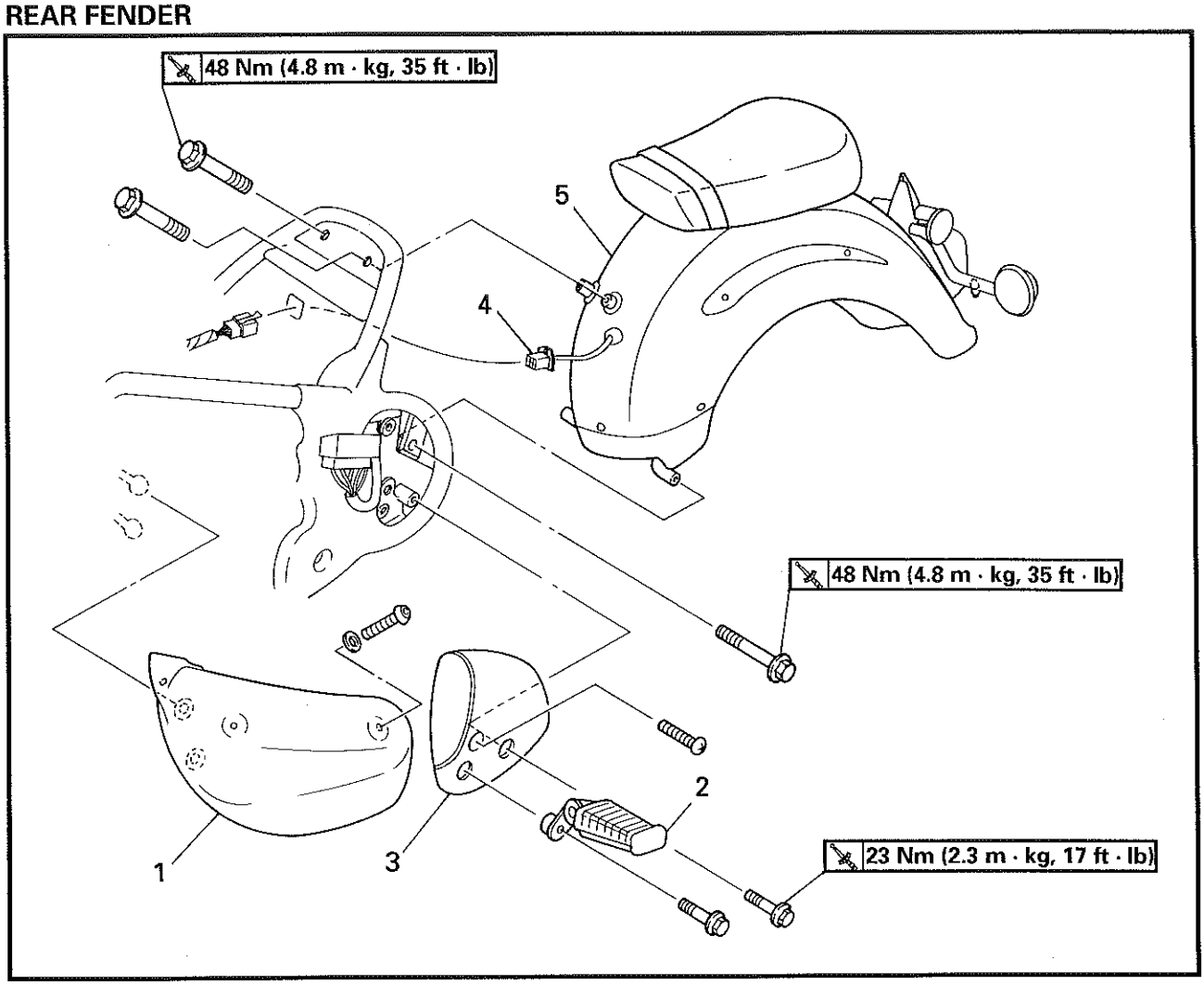
Checking steps:

- Turn the wheel so that it comes to each point as shown.
- Check that the wheel is at rest at each point. If not, readjust the front wheel static balance.

****

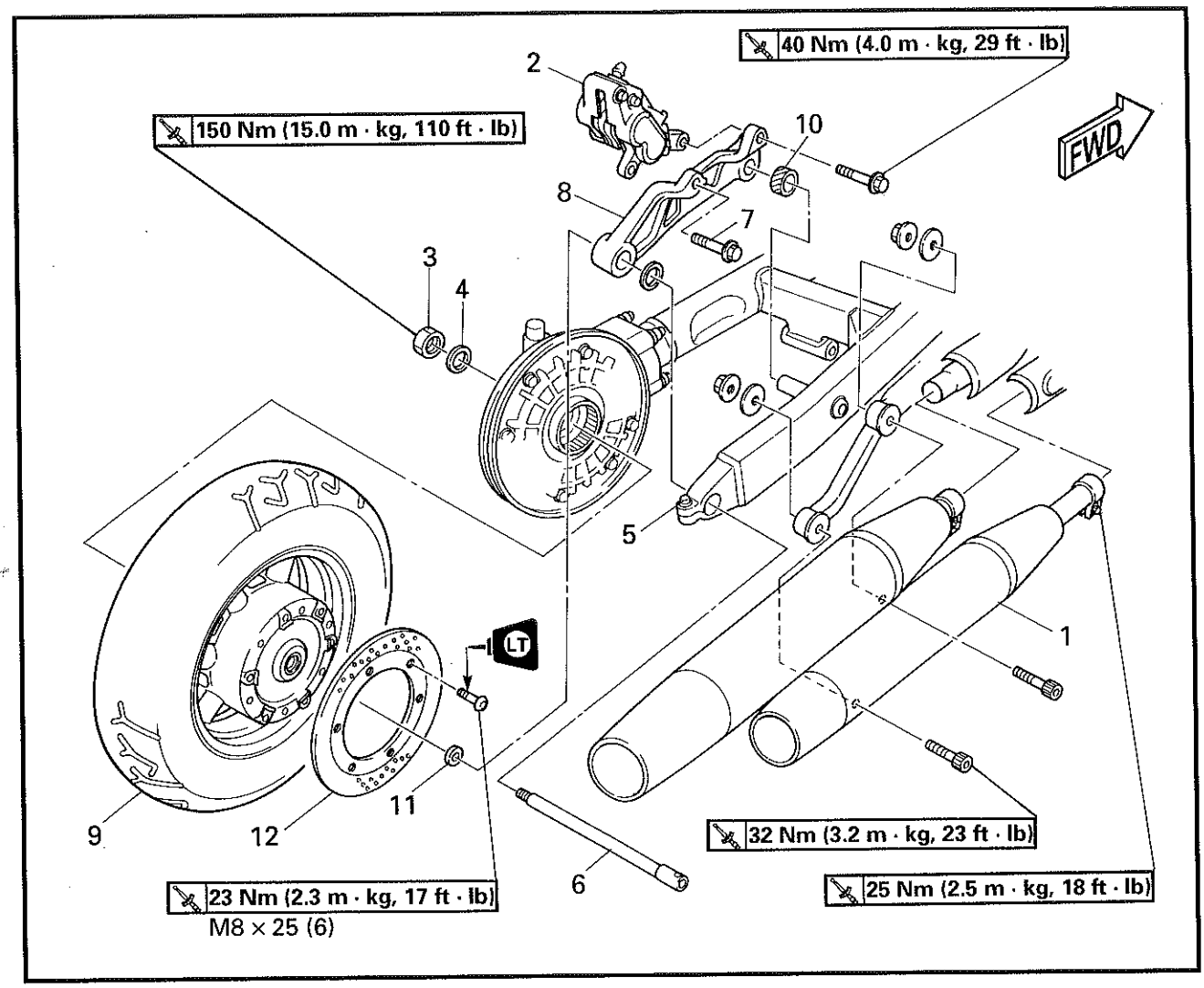
REAR WHEEL AND BRAKE DISC

REAR FENDER

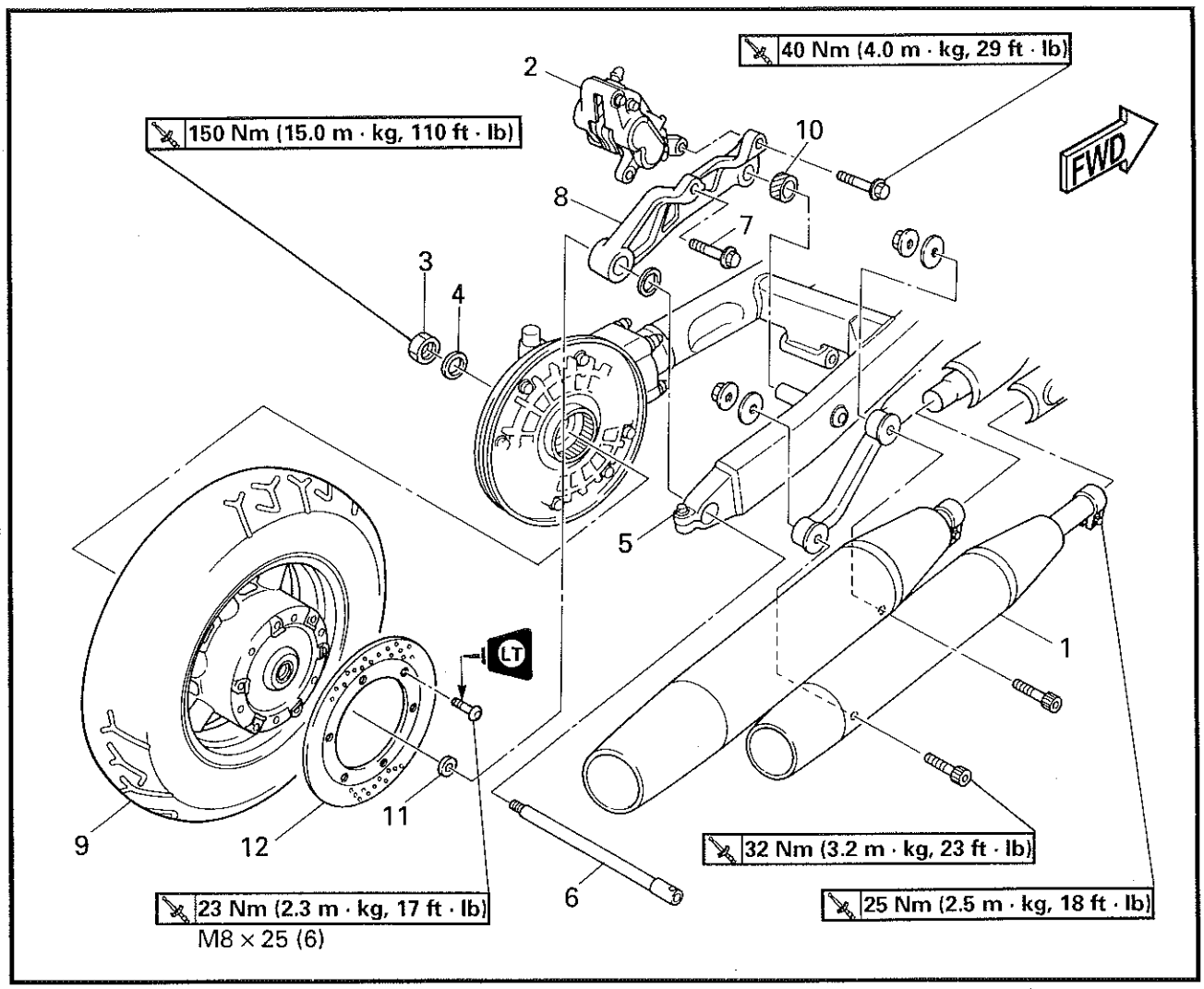


Order	Job name/Part name	Q'ty	Remarks
	Rear fender removal		Remove the parts in the order below. Stand the motorcycle on a level surface. **⚠ WARNING** **Securely support the motorcycle so there is no danger of it falling over.**
	Rider seat		Refer to "SEATS" in CHAPTER 3.
1	Side covers (left and right)	2	
2	Passenger footrests (left and right)	2	
3	Passenger footrest panels (left and right)	2	
4	Tail/brake and flasher lights lead coupler	1	Disconnect
5	Rear fender assembly	1	For installation, reverse the removal procedure.

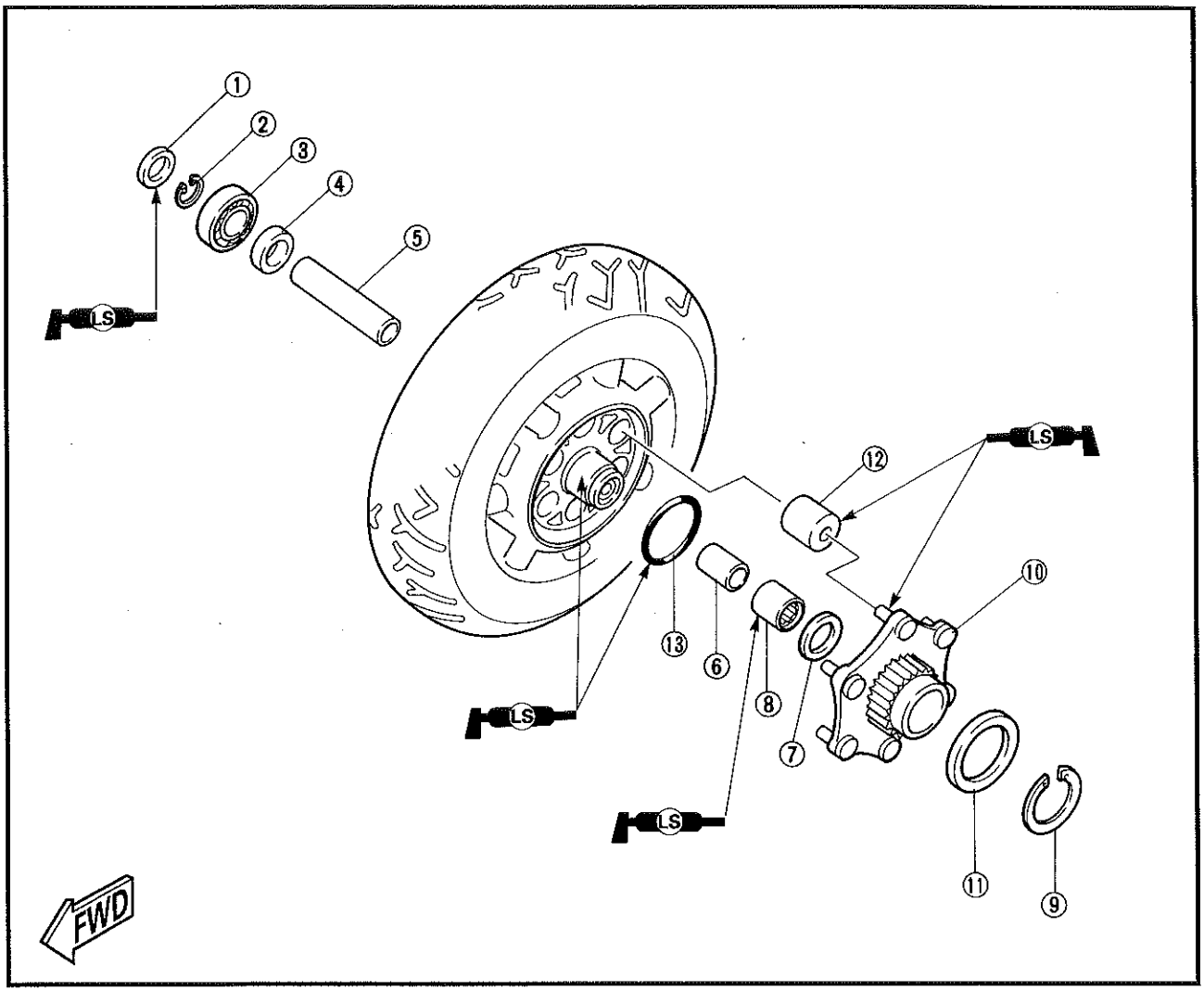
REAR WHEEL AND BRAKE DISC



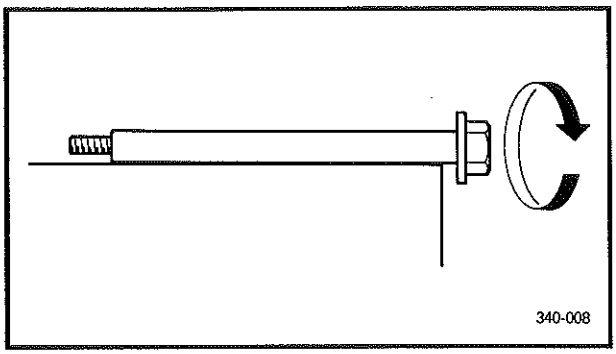
Order	Job name/Part name	Q'ty	Remarks
	Rear wheel and brake disc removal		Remove the parts in the order below.
	Rider seat		Refer to "SEATS" in CHAPTER 3.
	Rear fender assembly		Refer to "REAR FENDER REMOVAL".
1	Muffler (right)	1	
2	Rear brake caliper	1	**NOTE:** Do not depress the brake pedal when removing the rear brake caliper.
3	Rear wheel axle nut	1	
4	Washer	1	
5	Pinch bolt	1	Loosen



Order	Job name/Part name	Q'ty	Remarks
6	Rear wheel axle	1	**NOTE:** • Elevate the rear wheel. Place a suitable stand under the engine. • Move the wheel to the right to separate it from the final gear case.
7	Washer	1	
8	Rear brake caliper bracket	1	
9	Rear wheel	1	
10	Rubber damper	1	
11	Collar	1	
12	Brake disc	1	
			For installation, reverse the removal procedure.



Order	Job name/Part name	Q'ty	Remarks
	Rear wheel disassembly		Disassemble the parts in the order below.
①	Oil seal	1	
②	Circlip	1	
③	Bearing	1	
④	Flange spacer	1	
⑤	Collar	1	
⑥	Collar	1	
⑦	Oil seal	1	
⑧	Bearing	1	
⑨	Circlip	1	
⑩	Clutch hub	1	
⑪	Hub dust seal	1	
⑫	Damper	6	
⑬	O-ring	1	
			For assembly, reverse the disassembly procedure.



EB701020
INSPECTION

1.Inspect:
- Rear wheel axle
  (by rolling it on a flat surface)
  Bent → Replace.

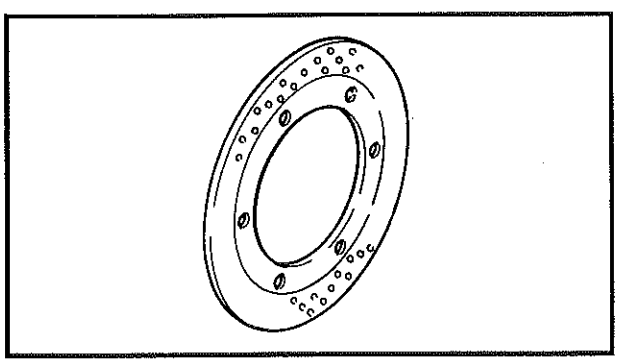
⚠ WARNING

Do not attempt to straighten a bent axle.

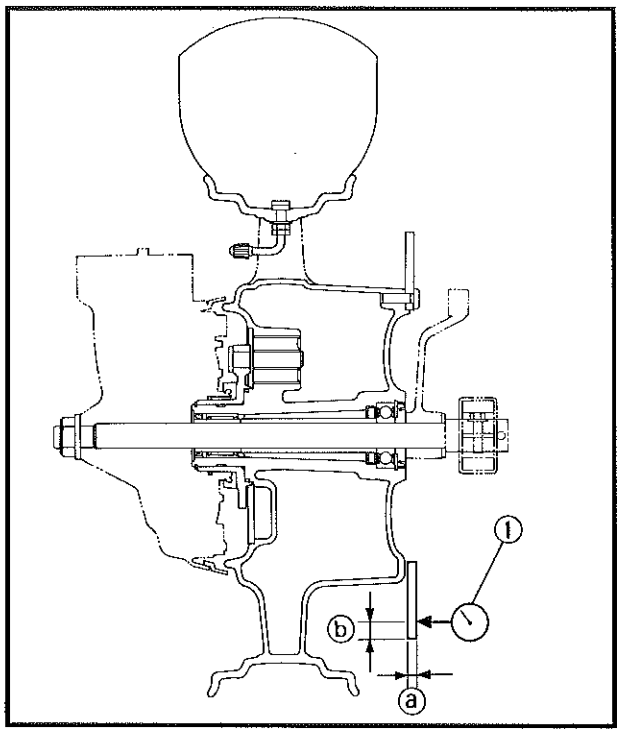
2.Inspect:
- Rear tire
  Wear/damage → Replace.
  Refer to "TIRE INSPECTION" in CHAPTER 3.
- Rear wheel
  Refer to "WHEEL INSPECTION" in CHAPTER 3.

3.Measure:
- Rear wheel runout
  Refer to "FRONT WHEEL".

4.Inspect:
- Rear wheel bearings
- Oil seals
  Refer to "FRONT WHEEL".



5.Inspect:
- Brake discs (front and rear)
  Refer to "FRONT WHEEL".



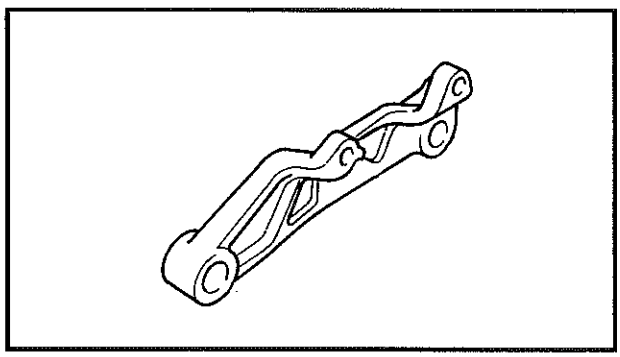
6.Measure:
- Brake disc deflection
  Out of specification → Inspect the wheel runout.
  If wheel runout is within the limits, replace the brake disc(s).

Brake disc maximum deflection: 0.15 mm (0.006 in.)

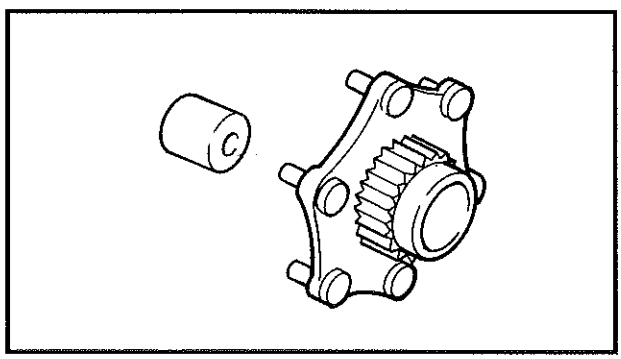
- Brake disc thickness ⓐ
  Out of specification → Replace.

Brake disc minimum thickness: 6.5 mm (0.26 in)

① Dial gauge
ⓑ Measuring point 2 mm



7.Inspect:
- Caliper bracket

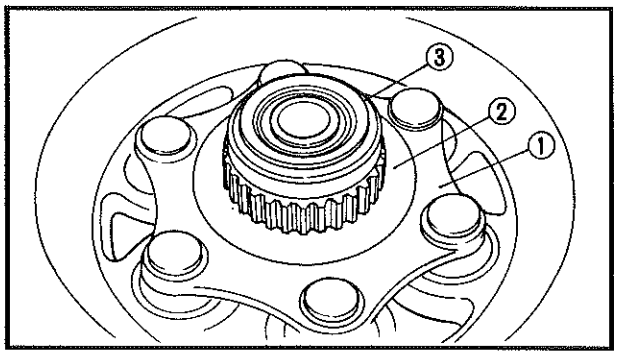


8.Inspect:
- Clutch hub
  Wear/cracks/damage→ Replace.
- Damper
  Wear/damage→ Replace.

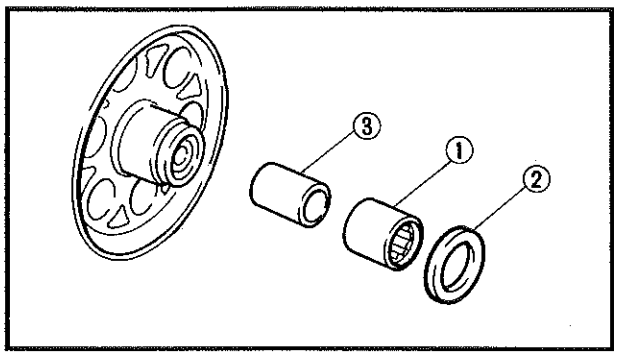
ASSEMBLY

1.Lubricate:
- Rear wheel bearings
- Oil seals (lips)
- O-ring
- Splines

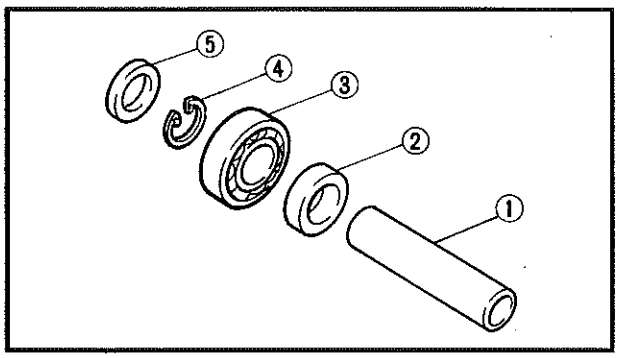
Recommended lubricant: Lithium soap base grease



2.Install:
- O-ring
- Damper
- Clutch hub ①
- Hub dust seal ②
- Circlip ③



3.Install:
- Bearing ①
- Oil seal ②
- Collar ③

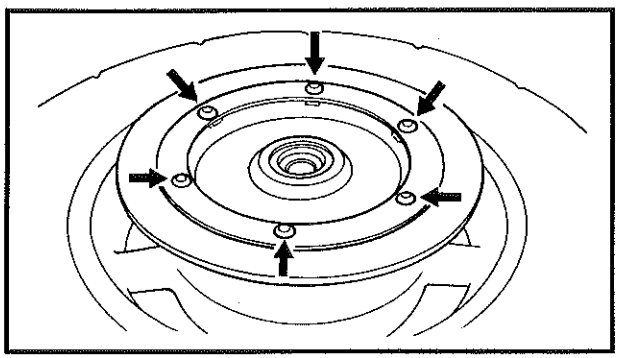


4.Install:
- Collar ①
- Flange spacer ②
- Bearing ③
- Circlip ④
- Oil seal ⑤

EB701030
INSTALLATION

1.Lubricate:
- Rear wheel axle

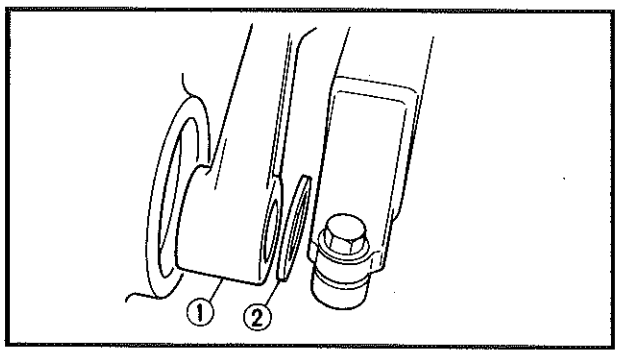
	Recommended lubricant: Lithium soap base grease



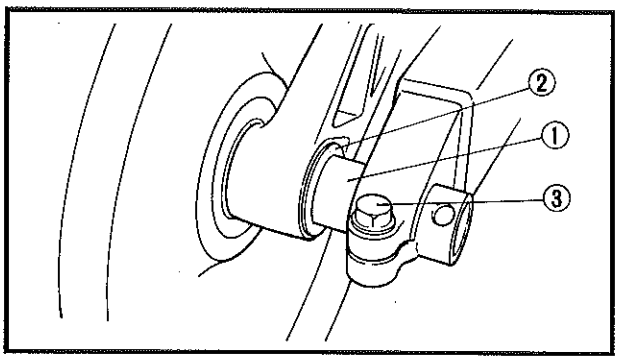
2.Install:
- Brake disc

NOTE:
- Apply LOCTITE® #648 to the threads of the brake disc bolts.
- Tighten the brake disc bolts in stages using a crisscross pattern.

- Collar
- Rubber damper



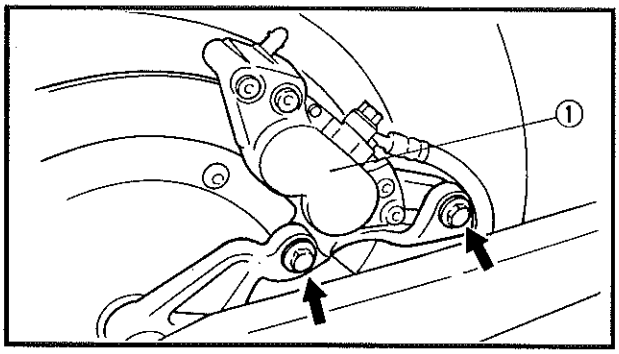
3.Install
- Rear wheel
- Brake caliper bracket ①
- Washer ②



4.Install:
- Rear wheel axle ①
- Washer ②
- Rear wheel axle nut

150 Nm (15.0 m · kg, 110 ft · lb)

5.Tighten:
- Pinch bolt (rear wheel axle) ③

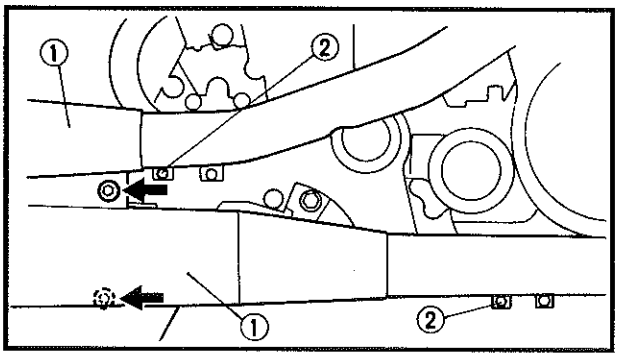


6.Install:
- Brake caliper ①

40 Nm (4.0 m · kg, 29 ft · lb)

⚠ WARNING

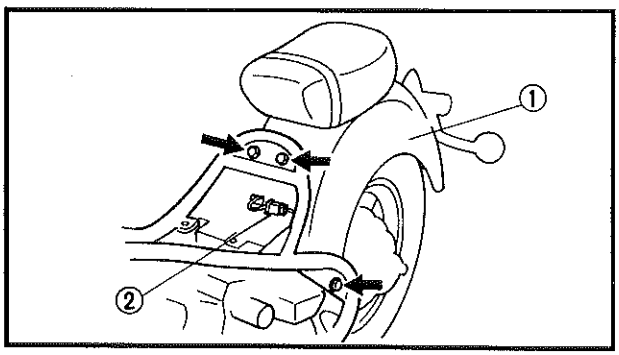
Make sure that the brake hose is routed properly.



7.Install:
- Right side mufflers ①

32 Nm (3.2 m · kg, 23 ft · lb)

8.Tighten:
- Clamp bolts ② 25 Nm (2.5 m · kg, 18 ft · lb)

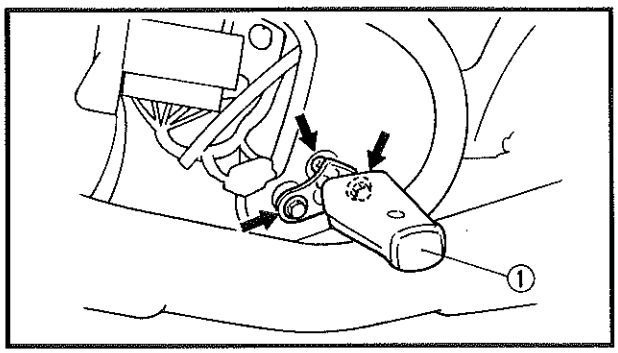


9.Install:
- Rear fender assembly ①

48 Nm (4.8 m · kg, 35 ft · lb)

NOTE:

After securing the rear fender assembly connect the taillight leads ②.



10.Install:
- Passenger footrest panels (left and right)
- Passenger footrests (left and right) ①

23 Nm (2.3 m · kg, 17 ft · lb)

11.Install:
- Side covers (left and right)

12.Install:
- Rider seat
  Refer to "SEATS" in CHAPTER 3.

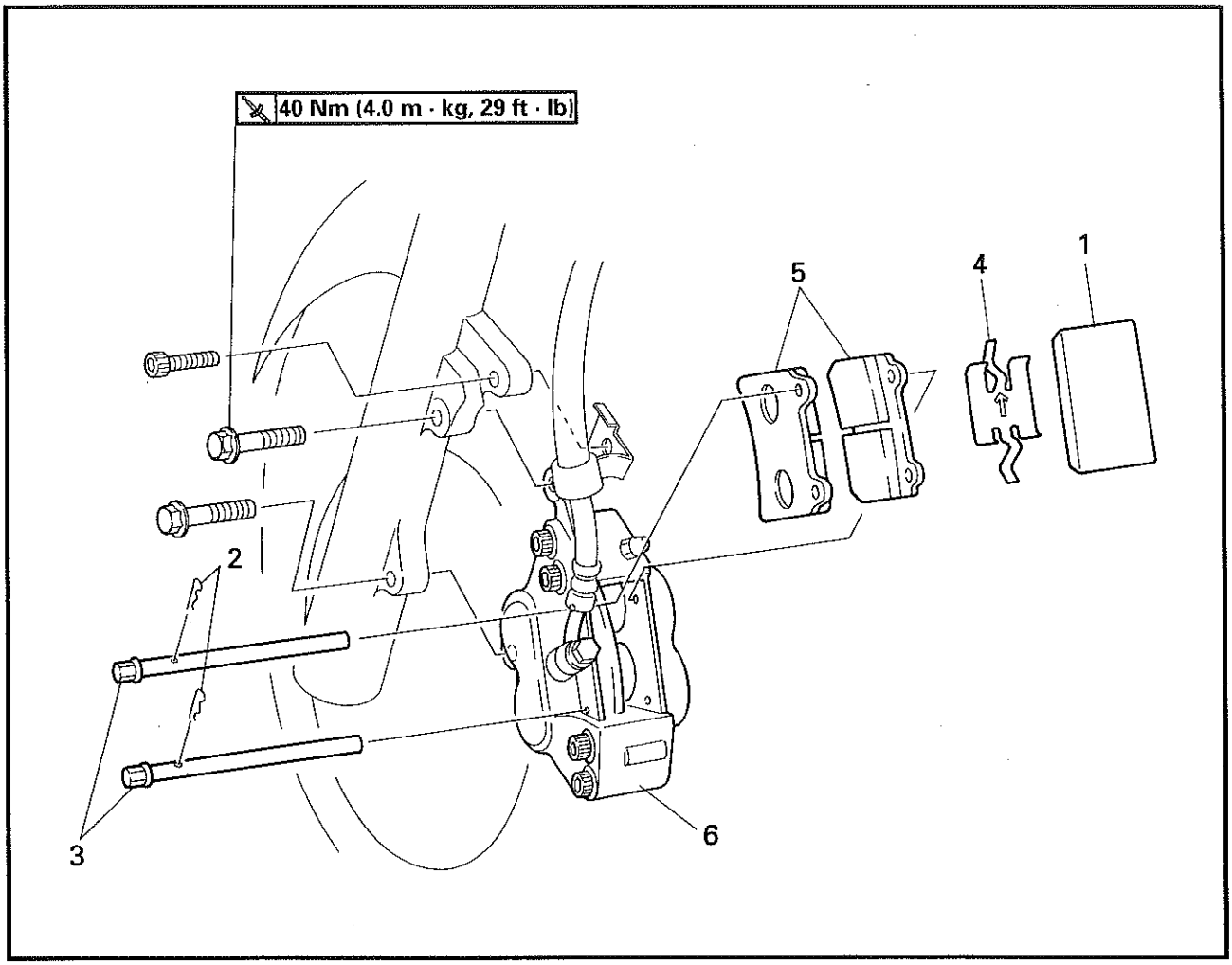
EB701040
REAR WHEEL STATIC BALANCE ADJUSTMENT

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

1.Adjust:
- Rear wheel static balance
  Refer to "FRONT WHEEL".

FRONT AND REAR BRAKES

FRONT BRAKE PADS

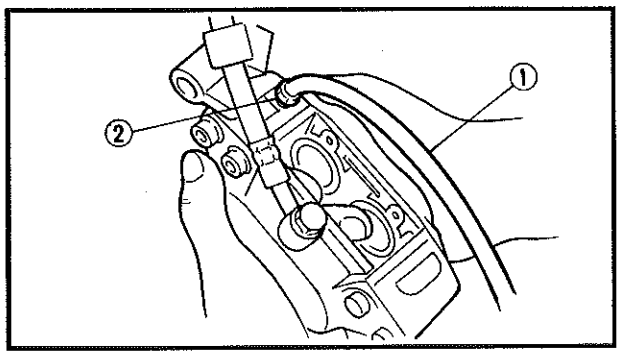


Order	Job name/Part name	Q'ty	Remarks
	Front brake pad removal		Remove the parts in the order below.
1	Brake pad covers	2	
2	Retaining clips	4	
3	Retaining pins	4	
4	Brake pad springs	2	
5	Brake pads	4	**NOTE:** • When the brake pads have to be replaced install a new brake pad spring. • Replace the brake pads as a set if either is found to be worn to the wear limit.
6	Brake calipers	2	For installation, reverse the removal procedure.

CAUTION:

Disc brake components rarely require disassembly. DO NOT:

- **disassemble components unless absolutely necessary;**
- **use solvents on internal brake components;**
- **use spent brake fluid for cleaning; (use only clean brake fluid)**
- **allow brake fluid to come in contact with the eyes, as this may cause eye injury;**
- **splash brake fluid onto painted surfaces or plastic parts, as this may cause damage;**
- **disconnect any hydraulic connection, as this would require the entire brake system to be disassembled, drained, cleaned, properly filled and bled after reassembly.**



INSTALLATION

1.Install:

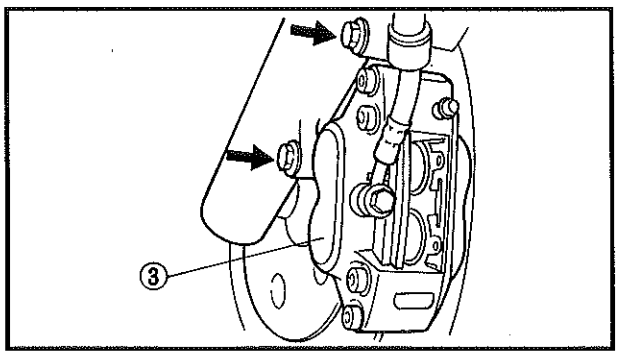
- Brake pads
- Brake pads spring

****

Installation steps:

- Connect a suitable hose ① tightly to the brake caliper bleed screw ②. Put the other end of this hose into an open container.
- Loosen the brake caliper bleed screw and using a finger push the caliper pistons into the brake caliper.
- Tighten the brake caliper bleed screw ②.

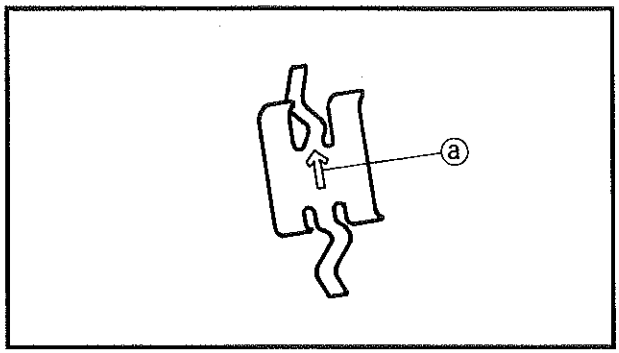
	Brake caliper bleed screw: 6 Nm (0.6 m • kg, 4.3 ft • lb)



● Install the brake calipers ③.

	Bolt (brake caliper): **40 Nm (4.0 m • kg, 29 ft • lb)**

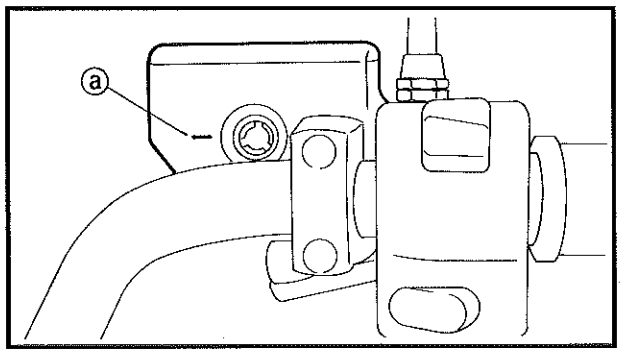
● Install new brake pads and a new brake pad spring.



NOTE:
The arrow mark ⓐ on the brake pad spring must point in the direction of disc rotation.

****

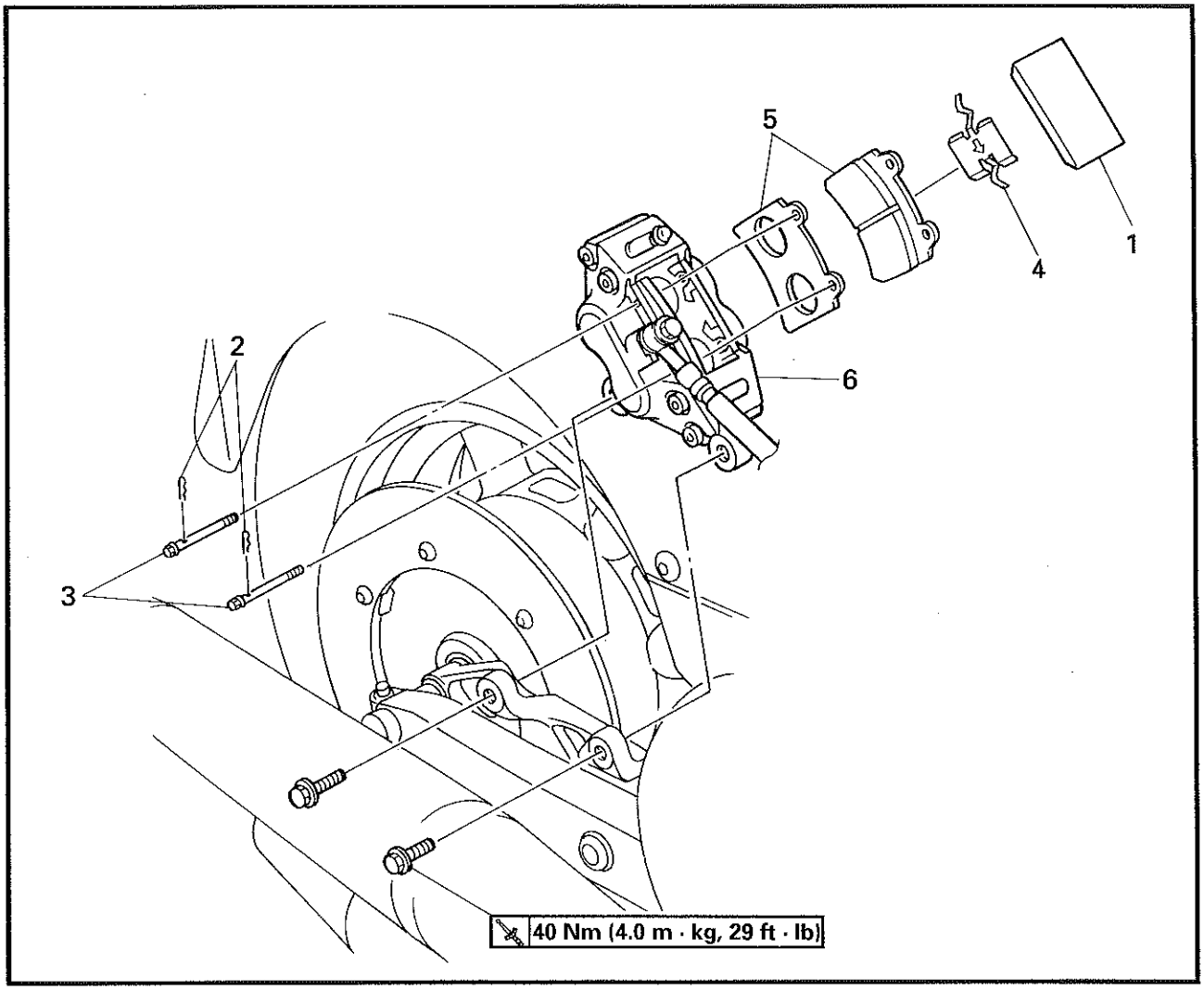
2.Install:
- Retaining pins
- Retaining clips
- Brake pads cover



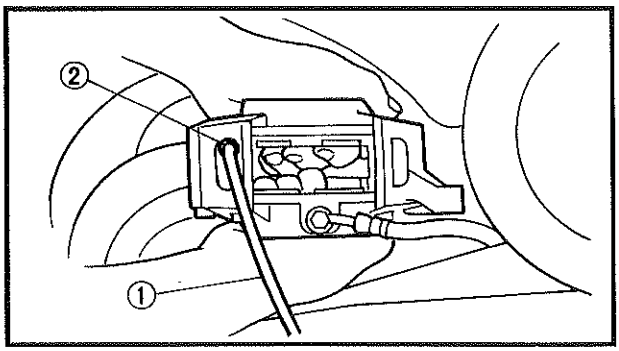
3.Inspect:
- Brake fluid level
  Refer to "BRAKE FLUID INSPECTION" in CHAPTER 3.
  ⓐ "LOWER" level line

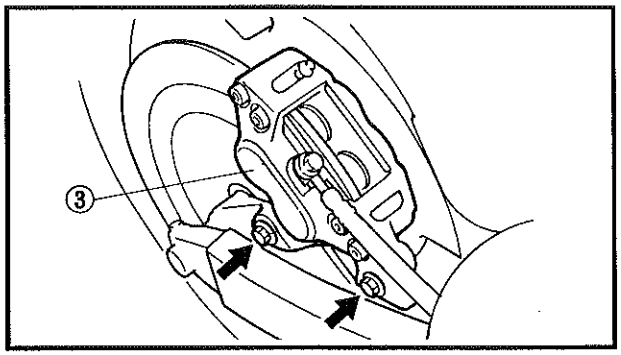
4.Check:
- Brake lever operation
  Soft or spongy feeling → Bleed the brake system.
  Refer to "AIR BLEEDING (HYDRAULIC BRAKE SYSTEM)" in CHAPTER 3.

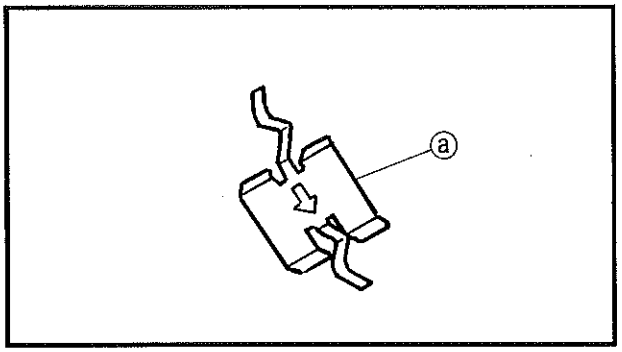
REAR BRAKE PADS

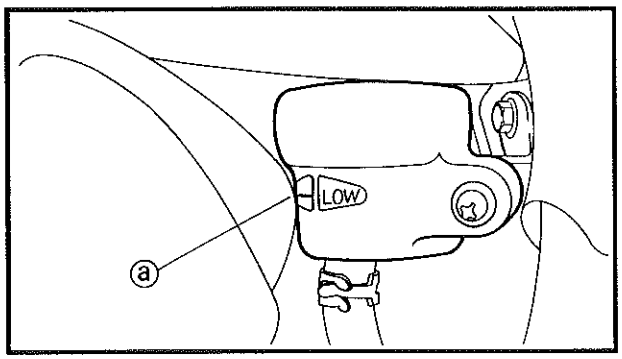


Order	Job name/Part name	Q'ty	Remarks
	Rear brake pad removal		Remove the parts in the order below.
1	Brake pad cover	1	
2	Retaining clips	2	
3	Retaining pins	2	
4	Brake pad spring	1	
5	Brake pads	2	**NOTE:** • When the brake pads have to be replaced install a new brake pad spring. • Replace the brake pads as a set if either is found to be worn to the wear limit.
6	Brake caliper	1	For installation, reverse the removal procedure.









INSTALLATION

1.Install:
- Brake pads
- Brake pads spring

****

Installation steps:

- Connect a suitable hose ① tightly to the brake caliper bleed screw ②. Put the other end of the hose into an open container.
- Loosen the brake caliper bleed screw and push (with your fingers) the caliper pistons into the brake caliper.
- Tighten the brake caliper bleed screw ②.

	Brake caliper bleed screw: 6 Nm (0.6 m • kg, 4.3 ft • lb)

- Install the brake caliper ③.

	Bolt (brake caliper): 40 Nm (4.0 m • kg, 29 ft • lb)

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

NOTE:
The arrow mark ⓐ on the brake pad spring must point in the direction of the brake disc rotation.

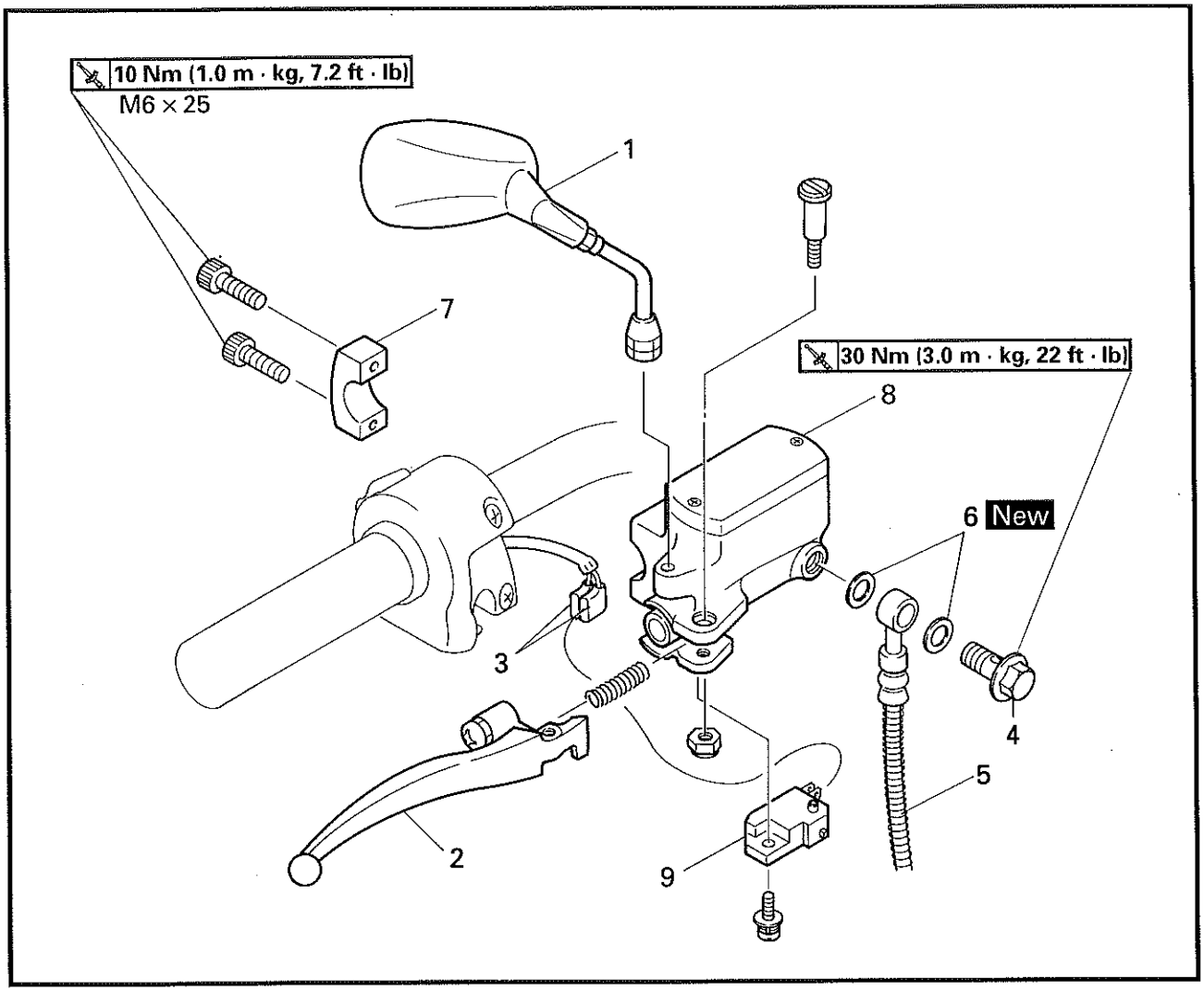
****

2.Install:
- Retaining pins
- Retaining clips
- Brake pads cover

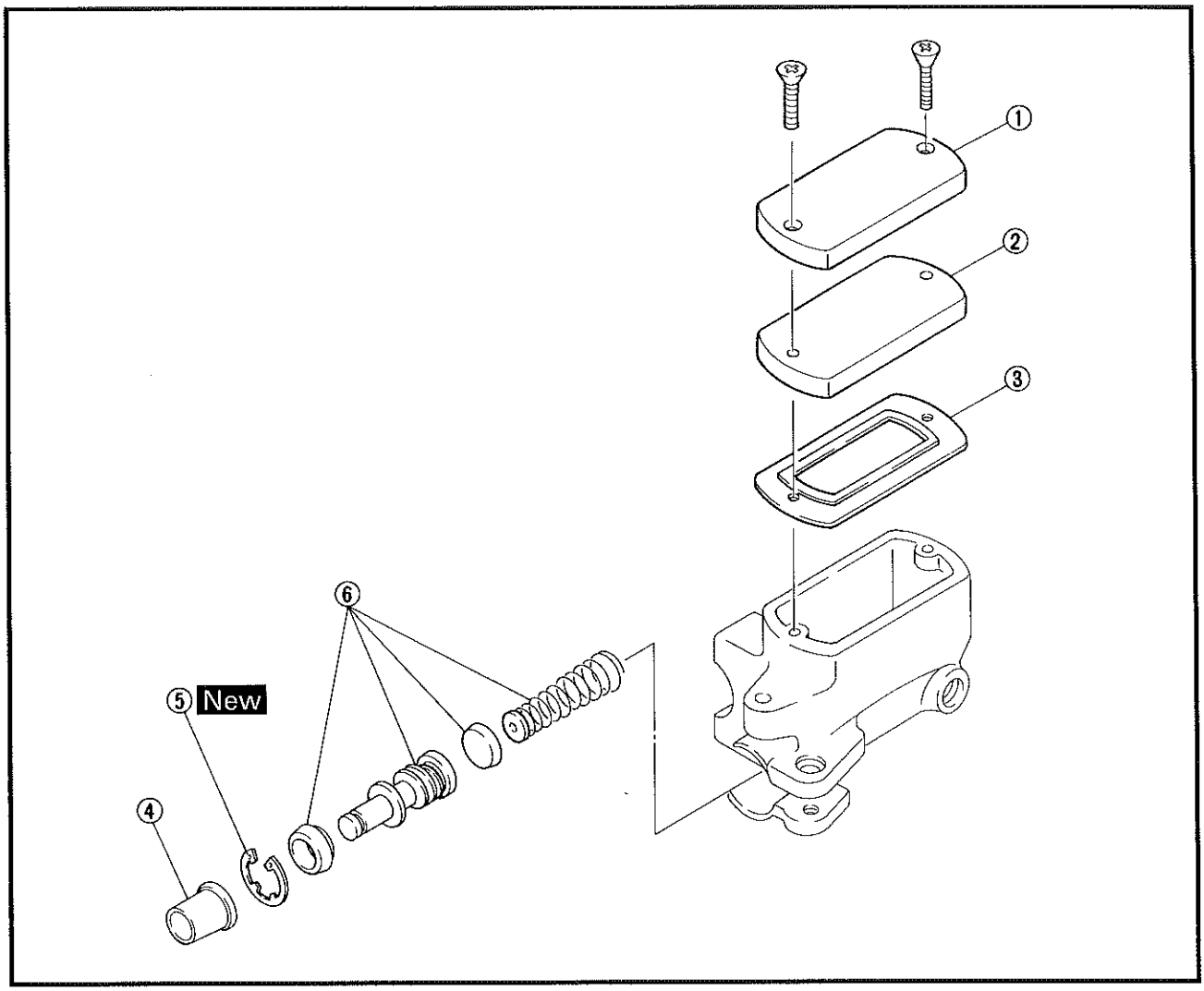
3.Inspect:
- Brake fluid level
  Refer to "BRAKE FLUID LEVEL INSPECTION" in CHAPTER 3.
  ⓐ"LOWER" level line

4.Check:
- Brake pedal operation
  Soft or spongy feeling → Bleed the brake system.
  Refer to "AIR BLEEDING (HYDRAULIC BRAKE SYSTEM)" in CHAPTER 3.

MASTER CYLINDER (FRONT BRAKES)

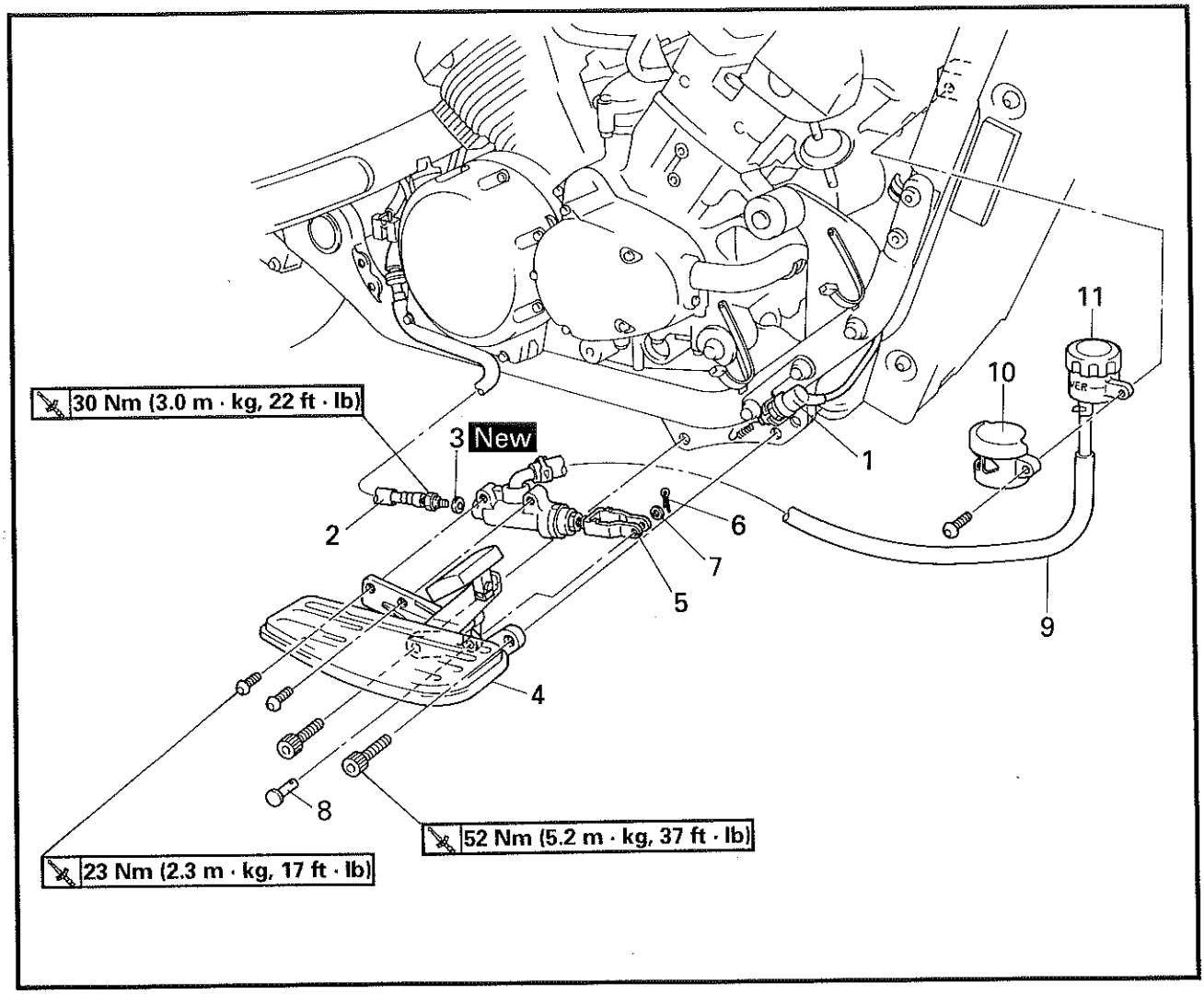


Order	Job name/Part name	Q'ty	Remarks
	Master cylinder removal		Remove the parts in the order below.
			NOTE: Before removing the master cylinder, drain the brake fluid from the entire brake system.
1	Rear view mirror	1	
2	Brake lever	1	
3	Front brake switch leads	2	Disconnect
4	Union bolt	1	
5	Brake hose	1	Disconnect
6	Copper washers	2	
7	Master cylinder bracket	1	
8	Master cylinder	1	
9	Front brake switch	1	
			For installation, reverse the removal procedure.

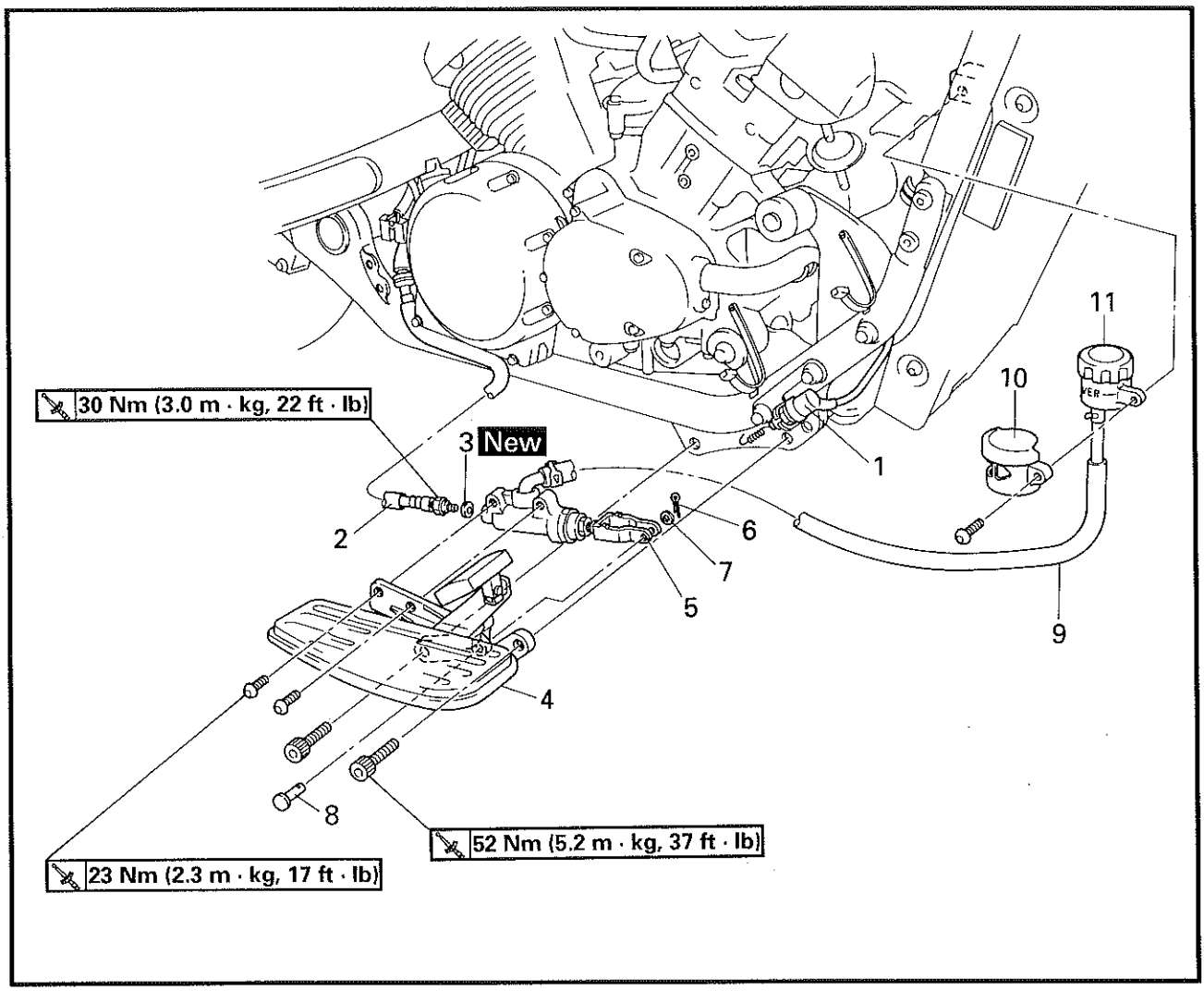


Order	Job name/Part name	Q'ty	Remarks
	Master cylinder disassembly		Disassemble the parts in the order below.
①	Master cylinder cap	1	
②	Holder (diaphragm)	1	
③	Master cylinder diaphragm	1	
④	Dust boot	1	
⑤	Circlip	1	
⑥	Master cylinder kit	1	
			For assembly, reverse the disassembly procedure.

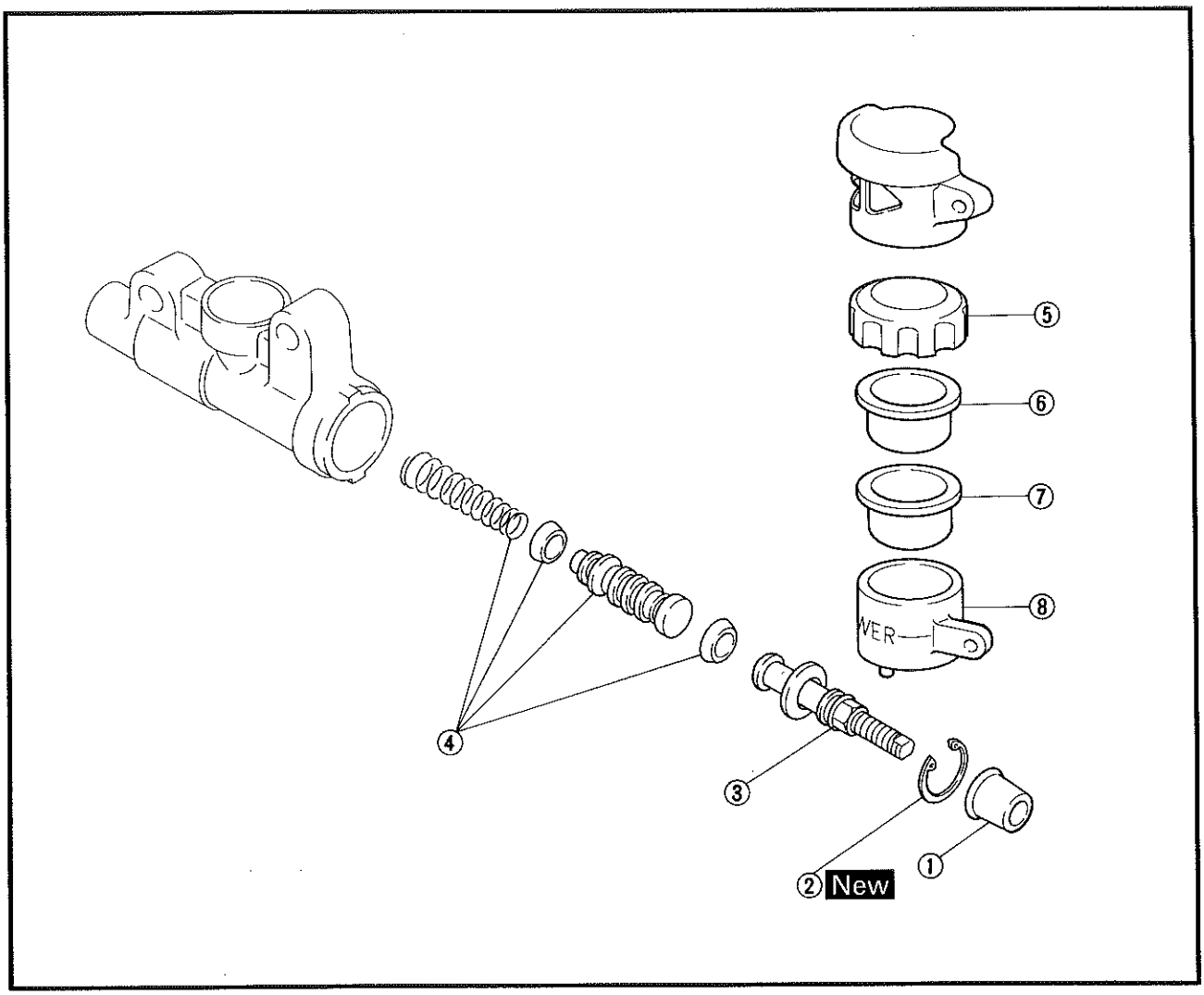
MASTER CYLINDER (REAR BRAKE)



Order	Job name/Part name	Q'ty	Remarks
	Master cylinder removal		Remove the parts in the order below. **NOTE:** Before removing the master cylinder, drain the brake fluid from the entire brake system.
	Muffler assembly (right side)		
	Exhaust pipe (#4 cylinder)		
1	Rear brake switch	1	Disconnect
2	Brake hose	1	Disconnect
3	Copper washer	1	
4	Brake pedal assembly	1	
5	Master cylinder	1	
6	Cotter pin	1	
7	Washer	1	



Order	Job name/Part name	Q'ty	Remarks
8	Clevis pin	1	
9	Reservoir hose	1	Unhook from the clamps.
10	Reservoir tank cover	1	
11	Reservoir tank	1	
			For installation, reverse the removal procedure.



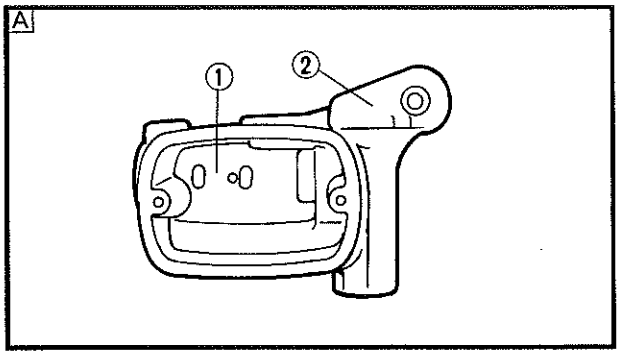
Order	Job name/Part name	Q'ty	Remarks
	Master cylinder disassembly		Disassemble the parts in the order below.
①	Dust boot	1	
②	Circlip	1	
③	Brake pedal push rod	1	
④	Master cylinder kit	1	
⑤	Cap (reservoir tank)	1	
⑥	Holder (diaphragm)	1	
⑦	Diaphragm	1	
⑧	Reservoir tank	1	
			For assembly, reverse the disassembly procedure.

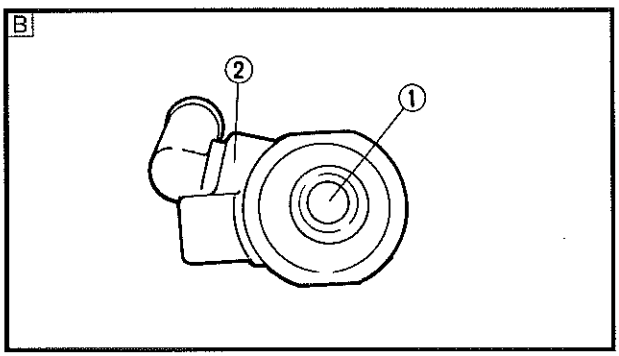
EB702040
INSPECTION AND REPAIR

Recommended brake component replacement schedule:	
Brake pads	As required
Piston seals, dust seal	Every two years
Brake hoses	Every two years
Brake fluid	Replace when brakes are disassembled.

⚠ WARNING

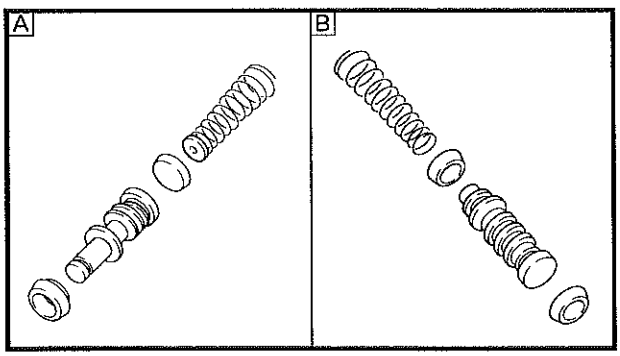
All internal brake components should be cleaned in new brake fluid only. Do not use solvents as they will cause seals to swell and distort.





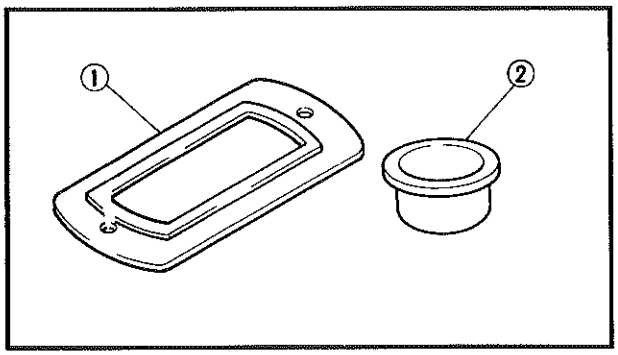
1. Inspect:
- Master cylinder ①
  Wear/scratches → Replace the master cylinder assembly.
- Master cylinder body ②
  Cracks/damage → Replace.
- Oil delivery passage
  (master cylinder body)
  Blockage → Blow out with compressed air.

A Front
B Rear



2. Inspect:
- Master cylinder kit ①
  Scratches/wear/damage → Replace as a set.

A Front
B Rear



3.Inspect:
- Reservoir tank
  Cracks/damage → Replace.
- Diaphragm (front) ①
- Diaphragm (rear) ②
  Wear/damage → Replace.

4.Inspect:
- Brake hoses
  Cracks/wear/damage → Replace.

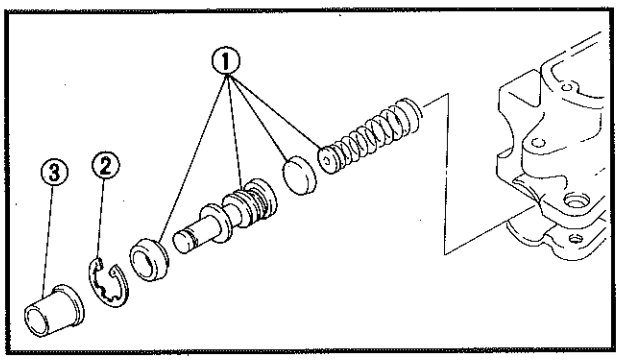
EB702060
ASSEMBLY AND INSTALLATION

⚠ WARNING

- **All internal brake components should be cleaned and lubricated with new brake fluid only before installation.**

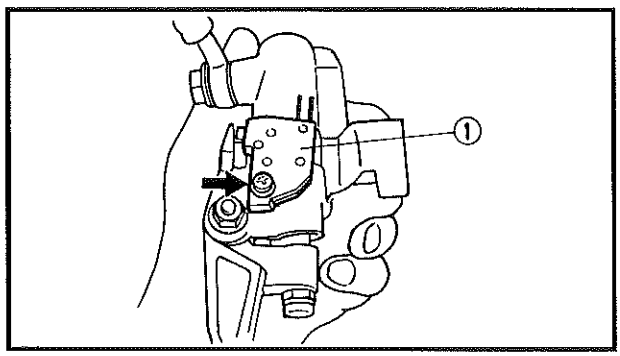
	Recommended brake fluid: DOT #4

- **Whenever a master cylinder is disassembled replace the piston seals and dust seals.**

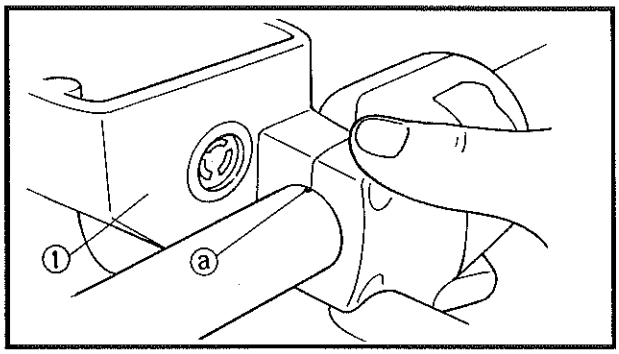


Front brake

1.Install:
- Master cylinder kit ①
- Circlip ② New
- Dust boot ③

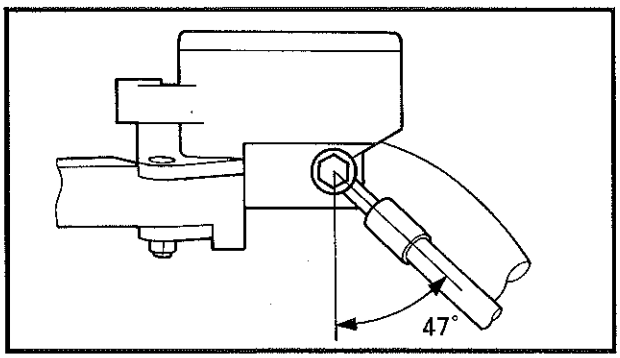


2.Install:
- Front brake switch ①



3.Install:
- Master cylinder ①

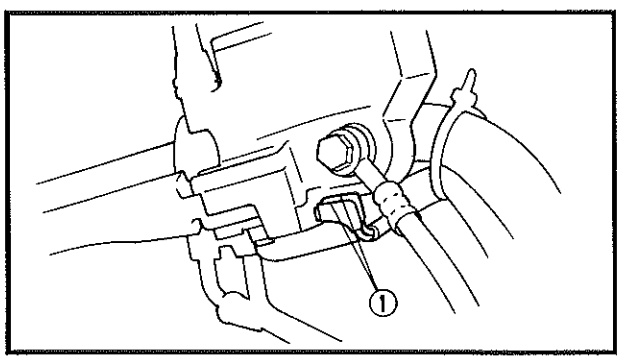
CAUTION
- **Install the master cylinder holder with the "UP" mark facing upward.**
- **Align the end of the holder with the punch mark ⓐ on the handlebar.**
- **First, tighten the upper bolt, then tighten the lower bolt.**



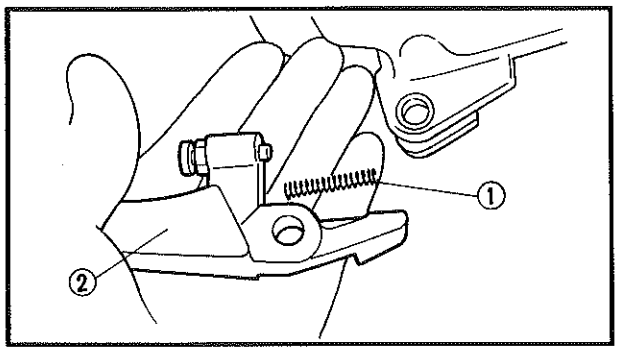
4.Install:
- Copper washers New
- Brake hose
- Union bolt

NOTE:
- Tighten the union bolt while holding the brake hose as shown.
- Turn the handlebar to the left and to the right to check that the brake hose does not touch other parts (throttle cable, wire harness, leads, etc.). Correct if necessary.

⚠ WARNING
- **Proper brake hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".**
- **Always use new copper washers.**



5.Connect:
- Front brake switch leads ①



6.Install:
- Spring ①
- Brake lever ②
- Rear view mirror

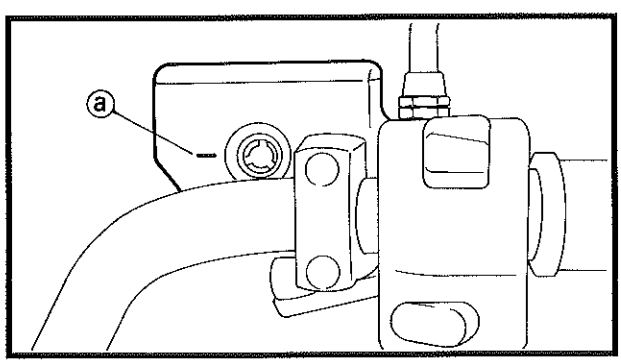
7.Fill:
- Reservoir tank

	Recommended brake fluid: DOT #4

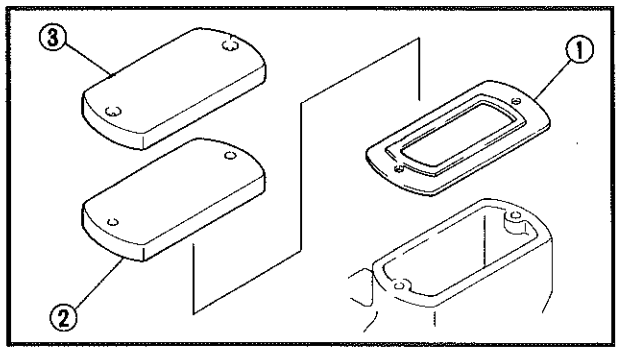
CAUTION:
Brake fluid may damage painted surfaces or plastic parts. Always clean up spilled brake fluid immediately.

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

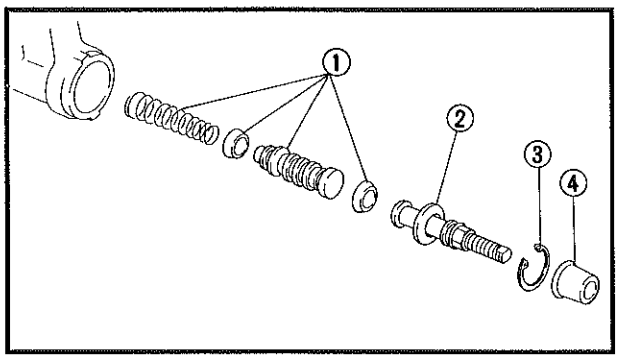
8.Air bleed:
- Brake system
  Refer to "AIR BLEEDING (HYDRAULIC BRAKE SYSTEM)" in CHAPTER 3.



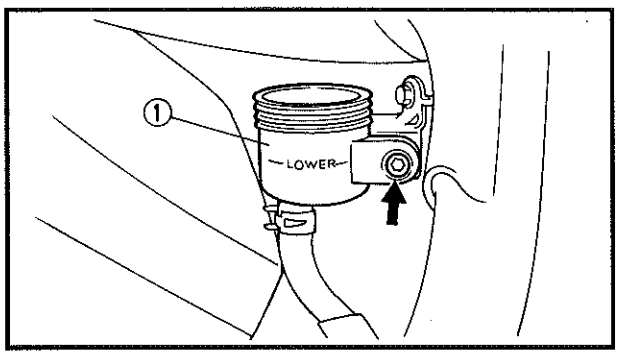
9.Inspect:
- Brake fluid level
  Brake fluid level is under the "LOWER" level line → Fill up.
  Refer to "BRAKE FLUID LEVEL INSPECTION" in CHAPTER 3.
  ⓐ"LOWER" level line



10.Install:
- Master cylinder diaphragm ①
- Holder (diaphragm) ②
- Master cylinder cap ③

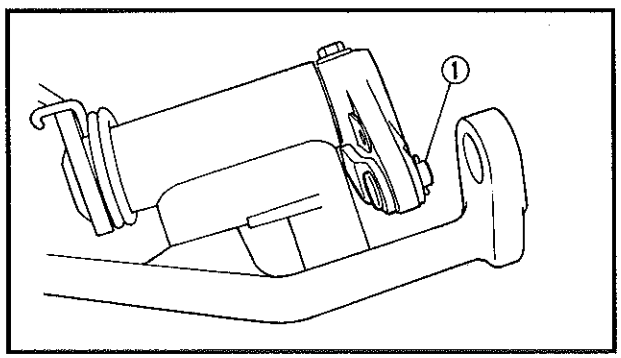


EB702061
Rear brake
1.Install:
- Master cylinder kit ①
- Brake pedal push rod ②
- Circlip ③ New
- Dust boot ④

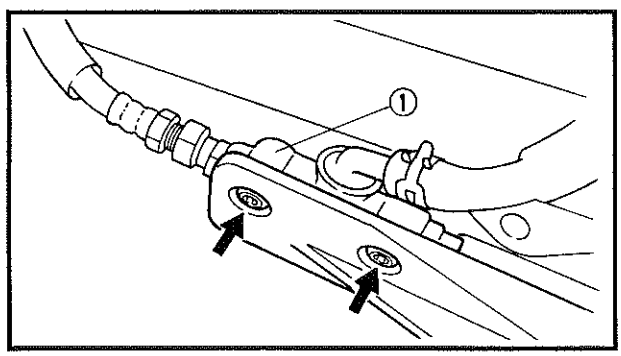


2.Install:
- Reservoir tank ①

NOTE:
Temporarily install the reservoir tank.

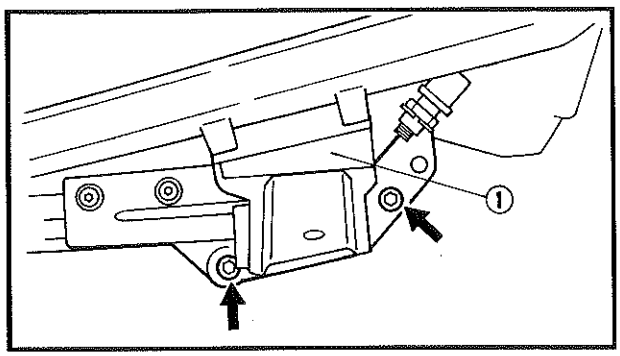


3.Install:
- Clevis pin ①
- Washer
- Cotter pin New



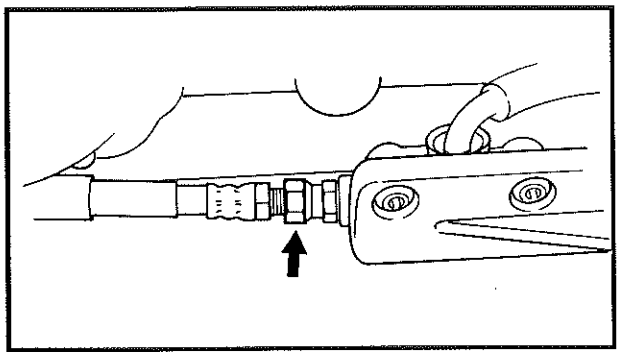
4.Install:
- Master cylinder ①

23 Nm (2.3 m · kg, 17 ft · lb)



5.Install:
- Brake pedal assembly ①

52 Nm (5.2 m · kg, 37 ft · lb)



6.Install:
- Copper washer New
- Brake hose

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".

7.Fill:
- Reservoir tank

	Recommended brake fluid: DOT #4

CAUTION:

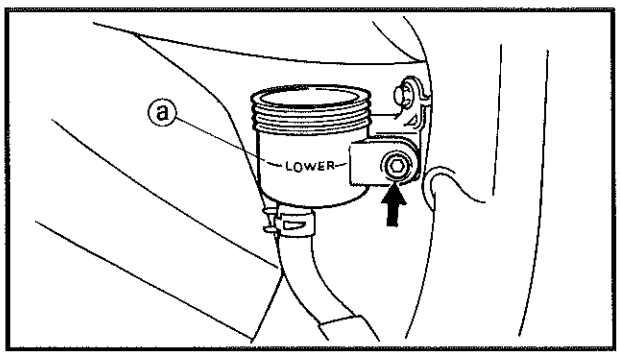
Brake fluid may damage painted surfaces or plastic parts. Always clean up spilled brake fluid immediately.

⚠ WARNING

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

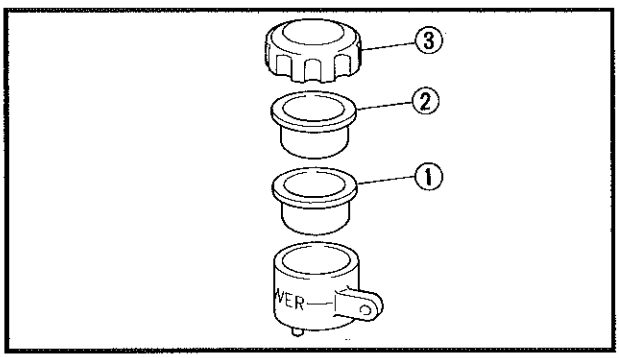
8.Air bleed:
- Brake system

Refer to "AIR BLEEDING (HYDRAULIC BRAKE SYSTEM)" in CHAPTER 3.

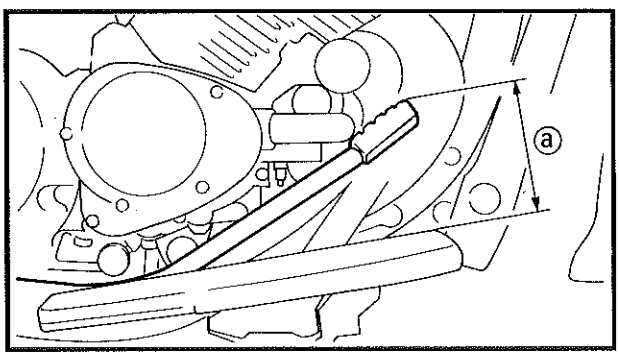


9.Inspect:
- Brake fluid level

Brake fluid level is under the "LOWER" level line → Fill up.
Refer to "BRAKE FLUID LEVEL INSPECTION" in CHAPTER 3.
ⓐ"LOWER" level line



10.Install:
- Diaphragm ①
- Holder (diaphragm) ②
- Cap (reservoir tank) ③
- Reservoir tank cover



11.Adjust:
- Brake pedal height ⓐ

Refer to "REAR BRAKE ADJUSTMENT" in CHAPTER 3.

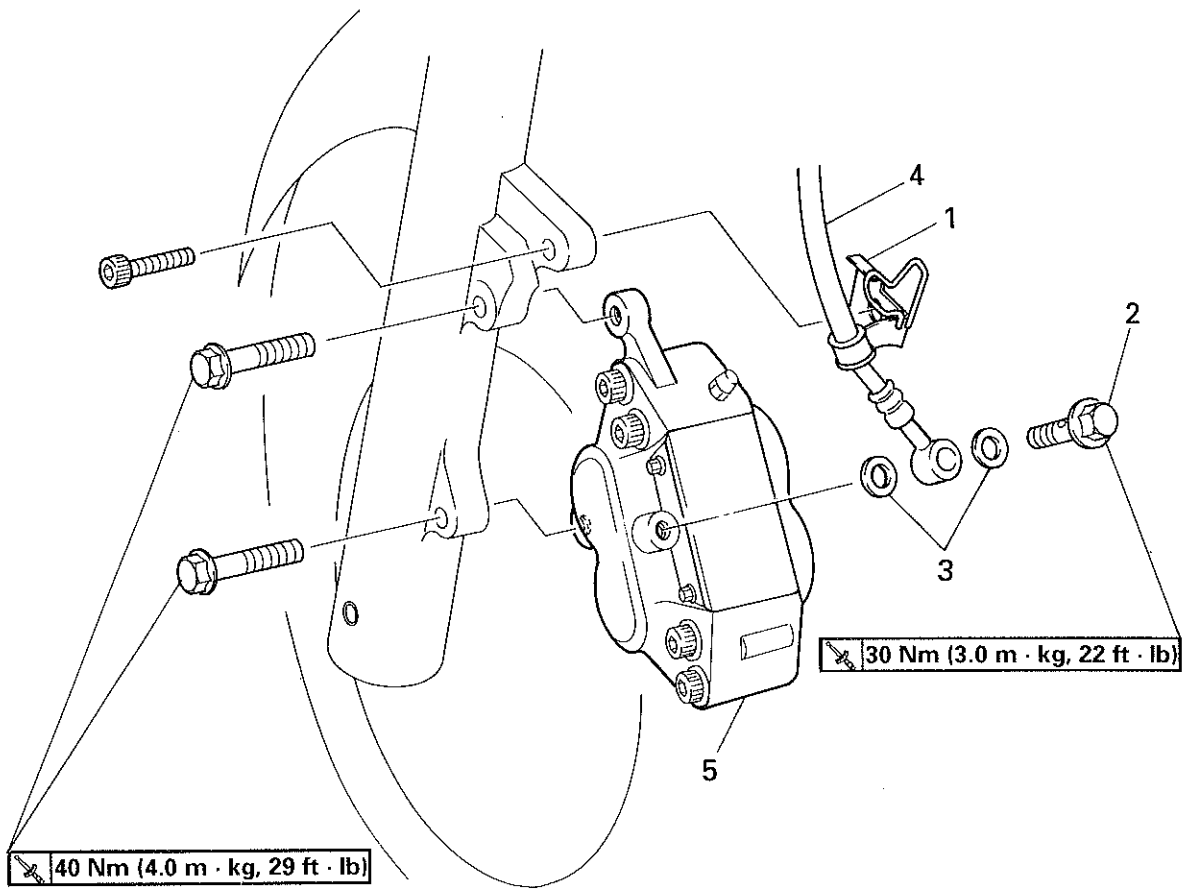
Brake pedal height:
100 mm (3.9 in)
Below top of footrest.

12.Adjust:
- Brake light switch

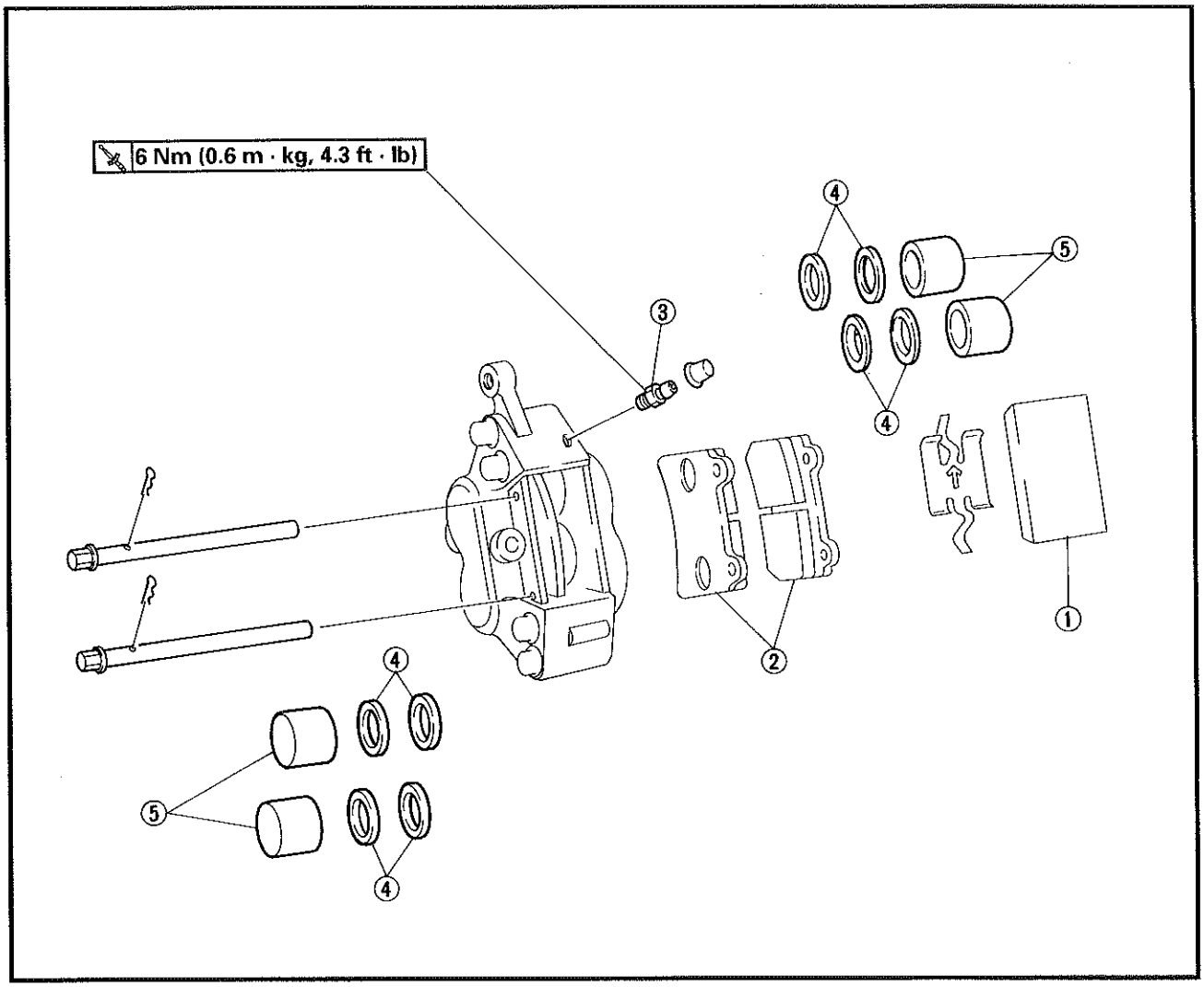
Refer to "BRAKE LIGHT SWITCH ADJUSTMENT" in CHAPTER 3.

13.Install:
- Exhaust pipe (#4 cylinder)
- Muffler assembly (right side)

FRONT BRAKE CALIPERS

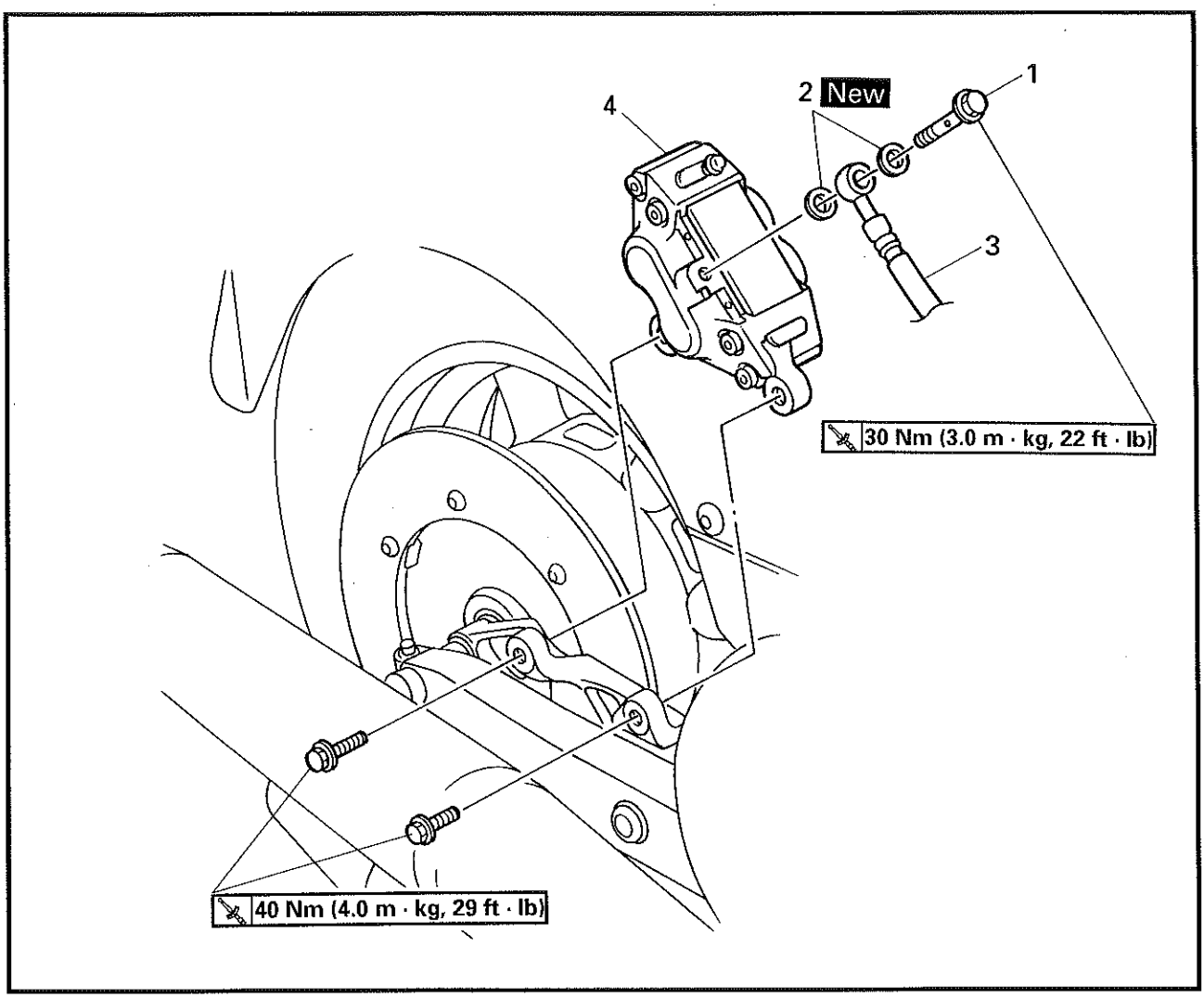


Order	Job name/Part name	Q'ty	Remarks
	Front brake caliper removal		Remove the parts in the order below.
			NOTE: Before removing the brake caliper, drain the brake fluid from the entire brake system.
1	Brake hose holders	2	
2	Union bolts	2	
3	Copper washers	4	
4	Brake hoses	2	**NOTE:** Put the brake hose end into a container and pump out the brake fluid carefully.
5	Front brake calipers	2	For installation, reverse the removal procedure.

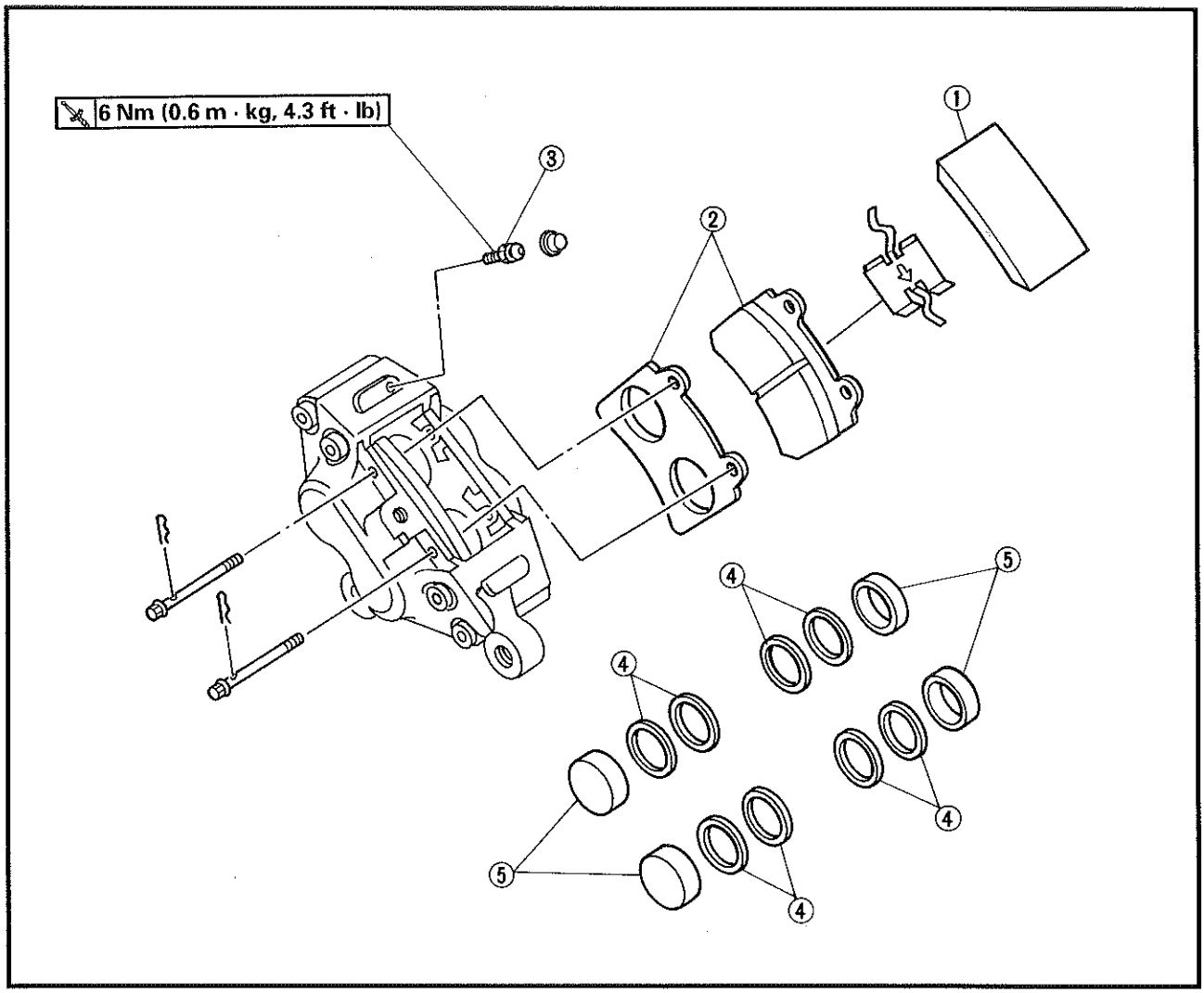


Order	Job name/Part name	Q'ty	Remarks
	Front brake caliper disassembly		Disassemble the parts in the order below.
①	Brake pads cover	1	
②	Brake pads	2	Refer to "FRONT BRAKE PADS".
③	Air bleed screw	1	
④	Caliper piston seals	8	Refer to "DISASSEMBLY".
⑤	Caliper pistons	4	
			For assembly, reverse the disassembly procedure.

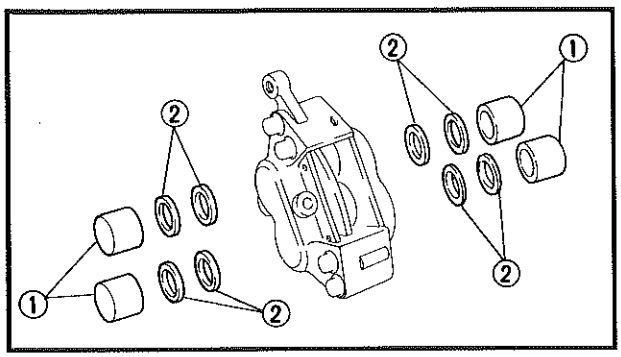
REAR BRAKE CALIPER

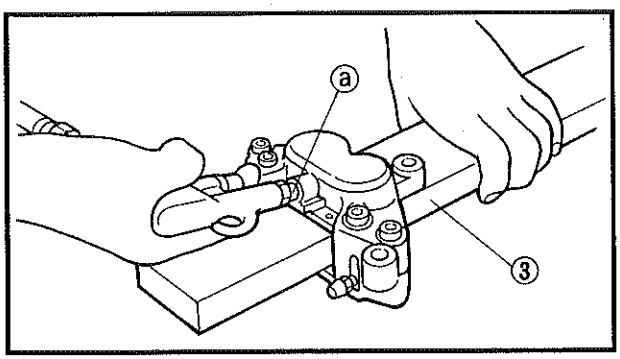


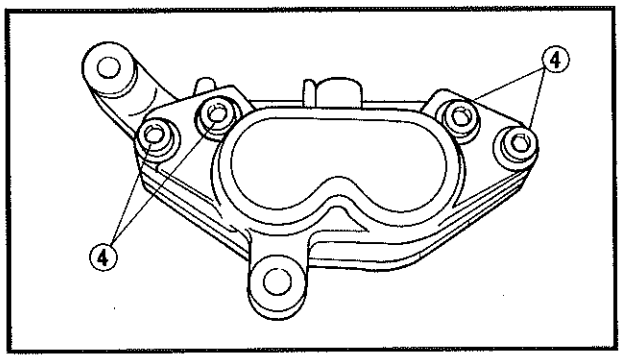
Order	Job name/Part name	Q'ty	Remarks
	Rear brake caliper removal		Remove the parts in the order below. **NOTE:** Before removing the master cylinder, drain the brake fluid from the entire brake system.
1	Union bolt	1	
2	Copper washers	2	
3	Brake hose	1	**NOTE:** Put the brake hose end into a container and pump out the brake fluid carefully.
4	Rear brake caliper	1	For installation, reverse the removal procedure.



Order	Job name/Part name	Q'ty	Remarks
	Rear brake caliper disassembly		Disassemble the parts in the order below.
①	Brake pads cover	1	
②	Brake pads	2	Refer to "REAR BRAKE PADS".
③	Air bleed screw	1	
④	Caliper piston seals	8	Refer to "DISASSEMBLY".
⑤	Caliper pistons	4	
			For assembly, reverse the disassembly procedure.







DISASSEMBLY

1.Remove:
- Brake caliper pistons ①
- Caliper piston seals ②

****

Removal steps:

- Use a piece of wood ③ to secure the right side caliper piston.
- Blow compressed air into the hose joint opening ⓐ to force out the left side caliper piston from the brake caliper body.
- Remove the caliper piston seals and reinstall the left side caliper piston.
- Repeat the previous steps to force out the right side caliper piston from the brake caliper body.

⚠ WARNING

- **Never try to pry out the caliper pistons.**
- **Do not loosen the bolts ④.**

****

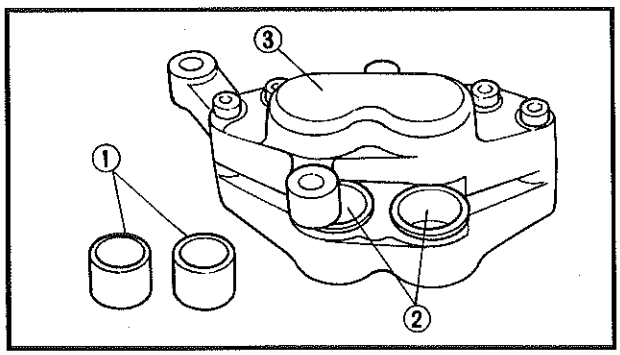
EB702040

INSPECTION AND REPAIR

Recommended brake component replacement schedule:	
Brake pads	As required
Piston seals, dust seal	Every two years
Brake hoses	Every two years
Brake fluid	Replace when brakes are disassembled.

⚠ WARNING

All internal brake components should be cleaned in new brake fluid only. Do not use solvents as they will cause seals to swell and distort.



1.Inspect:
- Brake caliper piston ①
  Scratches/rust/wear → Replace the brake caliper assembly.
- Brake caliper cylinder ②
  Wear/scratches → Replace the brake caliper assembly.
- Brake caliper body ③
  Cracks/damage → Replace.
- Oil delivery passage (brake caliper body)
  Blockage → Blow out with compressed air.

⚠ WARNING

Replace the caliper piston seal whenever the brake caliper is disassembled.

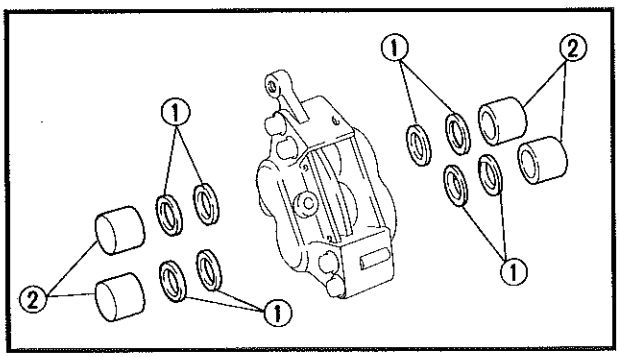
EB702051
ASSEMBLY AND INSTALLATION

⚠ WARNING

- **All internal brake components should be cleaned and lubricated with new brake fluid only before installation.**

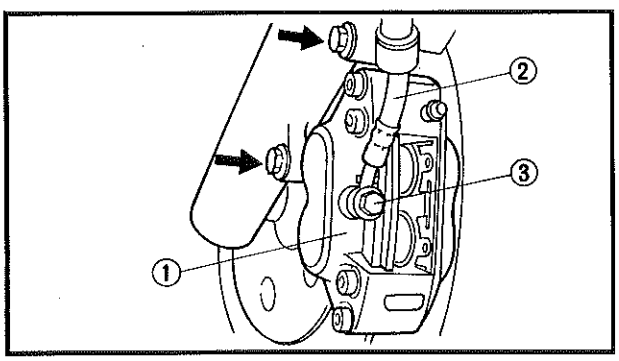
Recommended brake fluid:
DOT #4

- **Replace the caliper piston seals whenever a brake caliper is disassembled.**

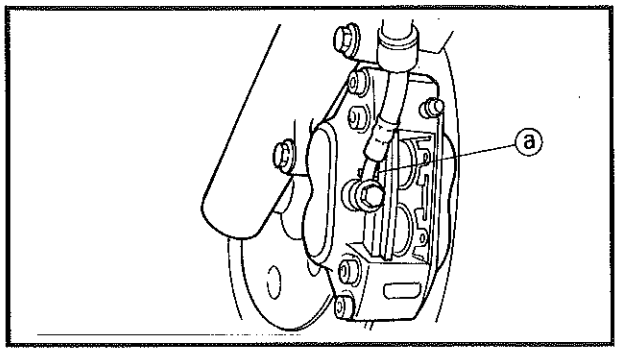


Front brake

1.Install:
- Caliper piston seals ① New
- Brake caliper pistons ②



2.Install:
- Brake caliper ① 40 Nm (4.0 m · kg, 29 ft · lb)
- Copper washers New
- Brake hose ②
- Union bolt ③
- Brake hose holder



CAUTION:
When installing the brake hose on the brake caliper ①, make sure that the brake pipe touches the projection ⓐ on the brake caliper.

⚠ WARNING
Proper brake hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".

3.Install:
- Brake pads
- Brake pads spring
- Retaining pins
- Retaining clips
- Brake pads cover

Refer to "BRAKE PAD REPLACEMENT".

4.Fill:
- Reservoir tank

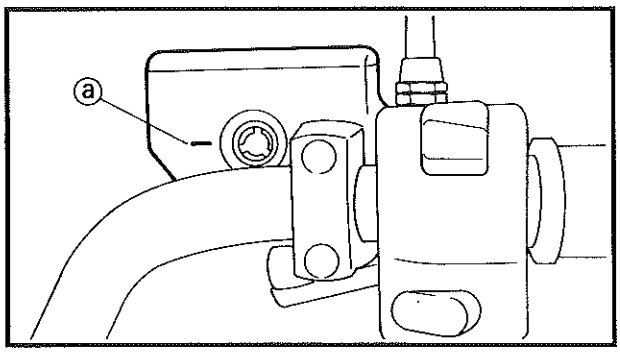
	Recommended brake fluid: DOT #4

CAUTION:
Brake fluid may damage painted surfaces or plastic parts. Always clean up spilled brake fluid immediately.

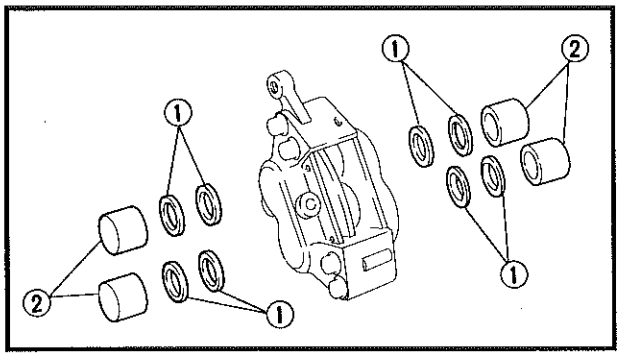
⚠ WARNING
- **Use only the designated quality brake fluid: other brake fluids may deteriorate the rubber seals, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid: mixing brake fluids may result in a harmful chemical reaction and lead to poor brake performance.**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

5.Air bleed
- Brake system

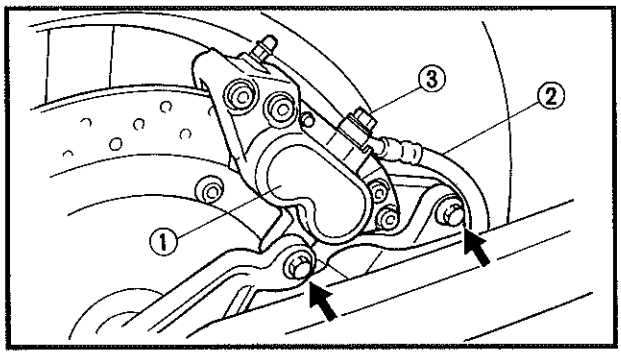
Refer to "AIR BLEEDING" in CHAPTER 3.



6.Inspect:
- Brake fluid level
  Brake fluid level is under the "LOWER" level line → Fill up.
  Refer to "BRAKE FLUID INSPECTION" in CHAPTER 3.
  ⓐ "LOWER" level line

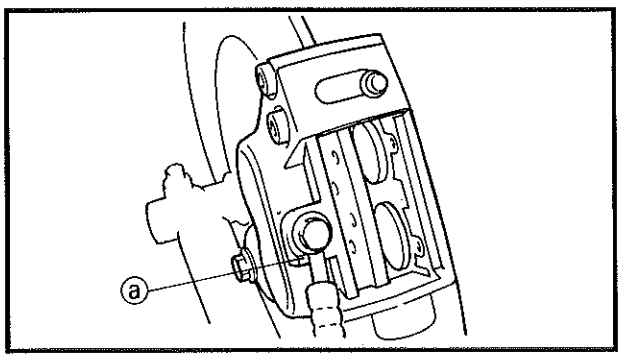


EB702053
Rear brake
1.Install:
- Caliper piston seals ① New
- Brake caliper pistons ②



2.Install:
- Brake caliper ①
- Copper washer New
- Brake hose ②
- Union bolt ③

CAUTION
When installing the brake hose on the brake caliper, make sure that the brake pipe touches the projection ⓐ on the brake caliper.



⚠ WARNING
Proper brake hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".

3.Install:
- Brake pads
- Brake pads spring
- Retaining pins
- Retaining clips
- Brake pads cover
  Refer to "BRAKE PAD REPLACEMENT".

4.Fill:
- Reservoir tank

	Recommended brake fluid: DOT #4

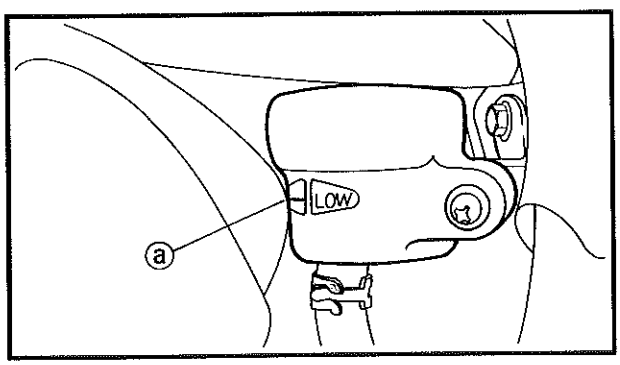
CAUTION

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

⚠ WARNING

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

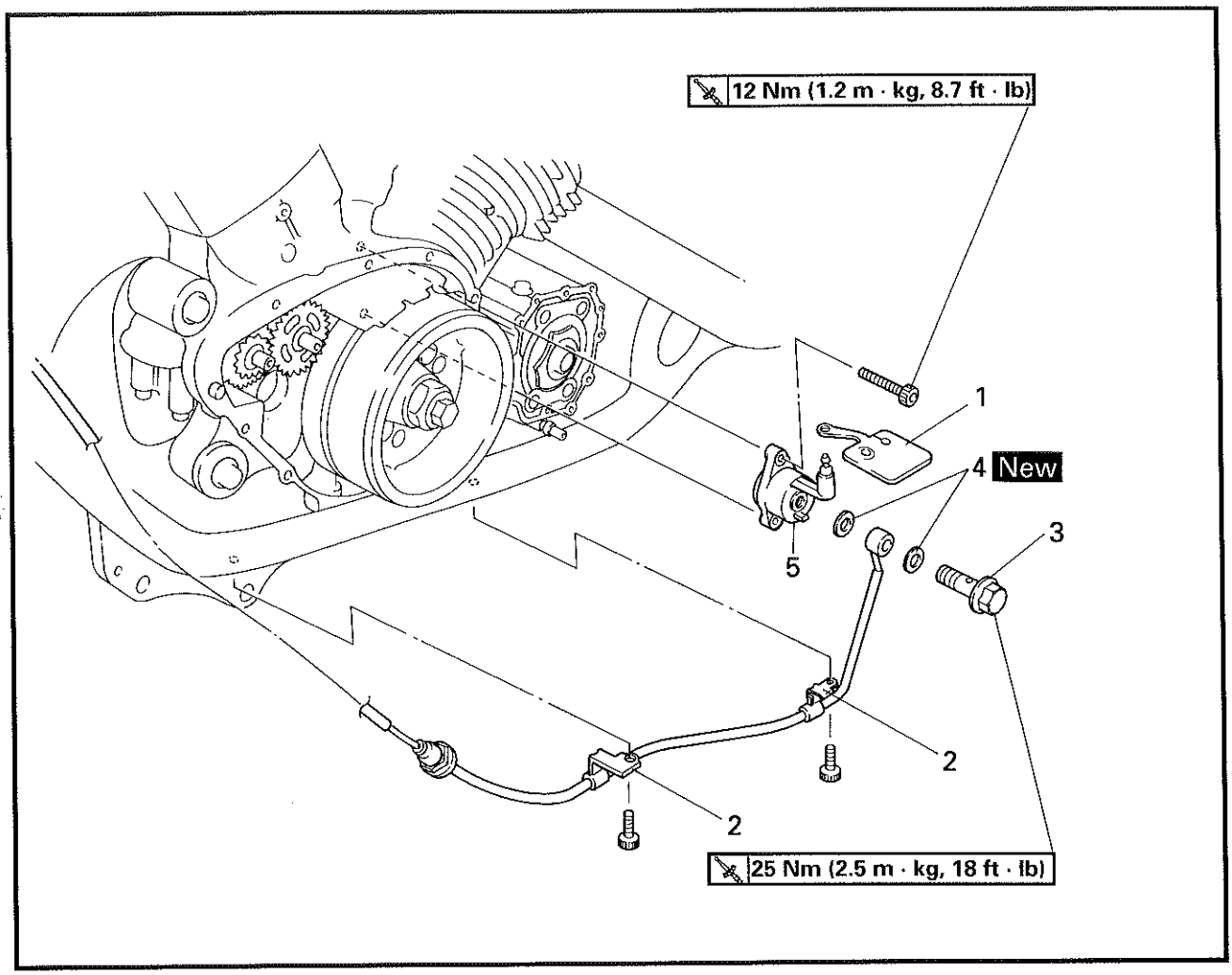
5.Air bleed:
- Brake system
  Refer to "AIR BLEEDING (HYDRAULIC BRAKE SYSTEM)" in CHAPTER 3.



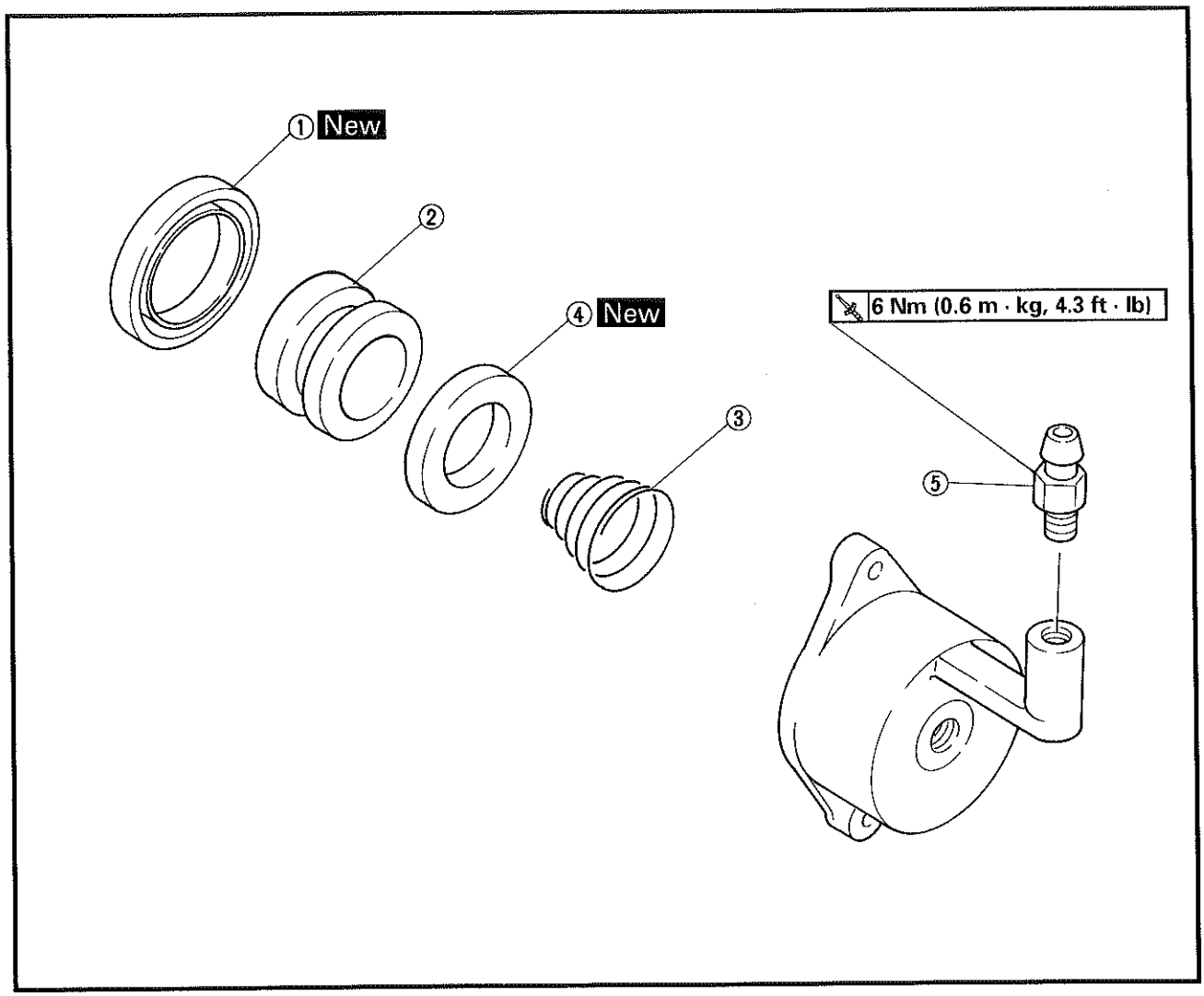
6.Inspect:
- Brake fluid level
  Brake fluid level is under the "LOWER" level line → Fill up.
  Refer to "BRAKE FLUID LEVEL INSPECTION" in CHAPTER 3.
  ⓐ "LOWER" level line

HYDRAULIC CLUTCH

CLUTCH RELEASE CYLINDER

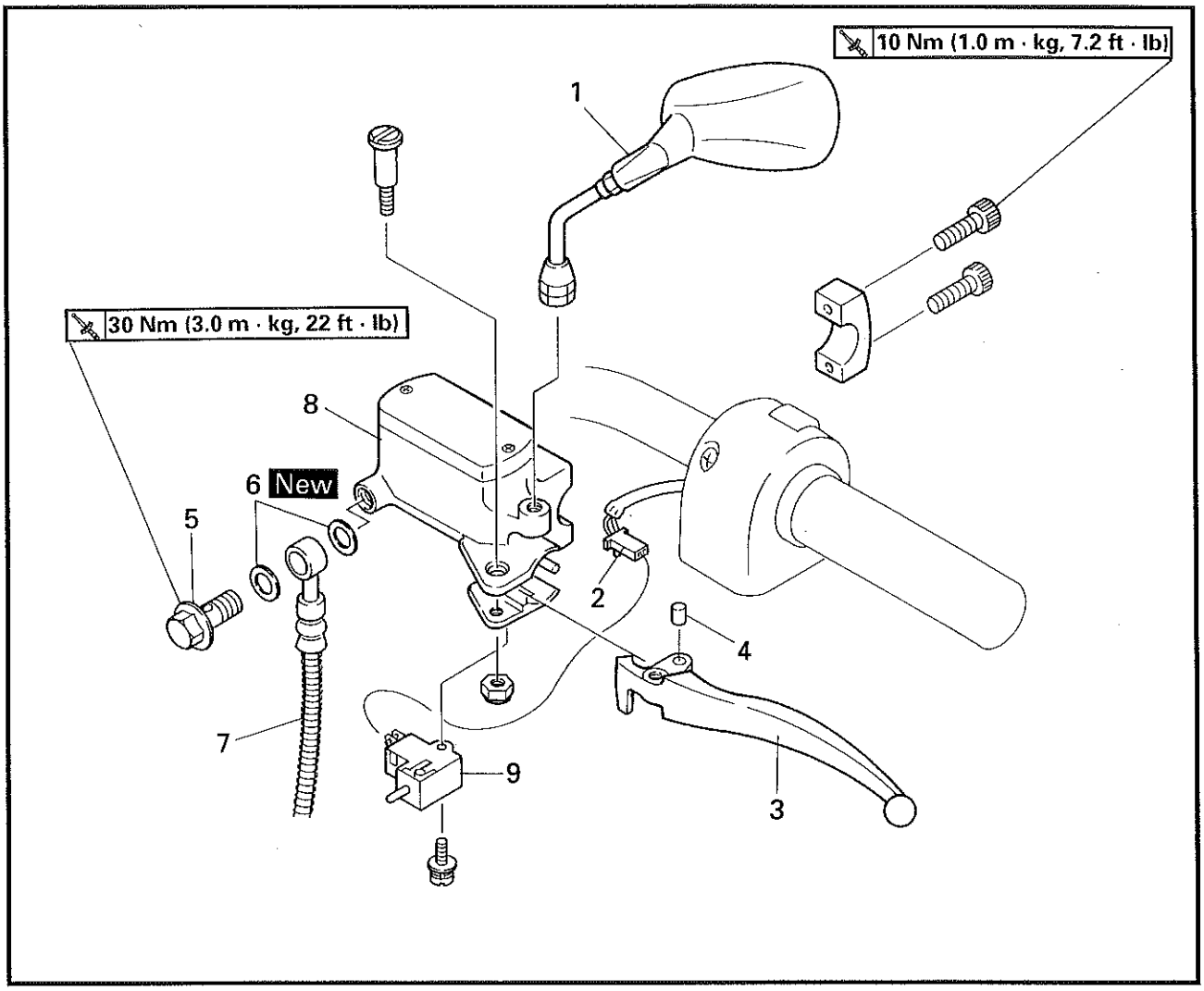


Order	Job name/Part name	Q'ty	Remarks
	Clutch release cylinder removal		Remove the parts in the order below.
			NOTE: Before removing the clutch release cylinder or the master cylinder, drain the clutch fluid from the entire clutch system.
	Engine oil		Refer to "ENGINE OIL REPLACEMENT" in CHAPTER 3.
	Middle gear case cover, shift pedal assembly, crankcase cover (left side)		Refer to "AC MAGNETO AND STARTER CLUTCH" in CHAPTER 4.
1	Rubber cover	1	
2	Clutch pipe clamps	2	
3	Union bolt	1	
4	Copper washers	2	
5	Clutch release cylinder	1	
			For installation, reverse the removal procedure.

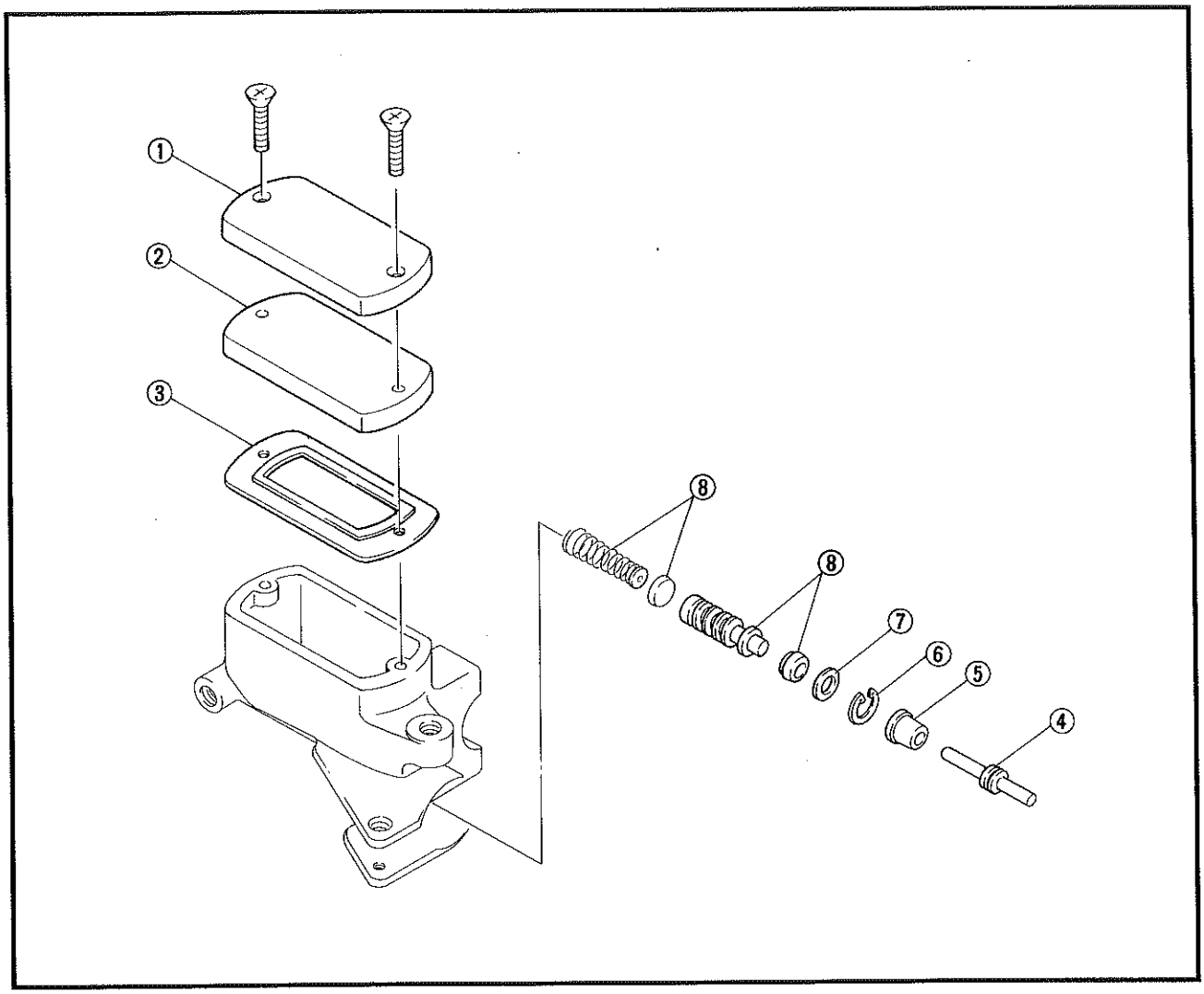


Order	Job name/Part name	Q'ty	Remarks
	Clutch release cylinder disassembly		Disassemble the parts in the order below.
①	Oil seal	1	
②	Piston (release cylinder)	1	
③	Spring	1	
④	Piston seal	1	**CAUTION:** **Never attempt to pry out the piston.**
⑤	Air bleed screw	1	For assembly, reverse the disassembly procedure.

MASTER CYLINDER



Order	Job name/Part name	Q'ty	Remarks
	Master cylinder removal		Remove the parts in the order below. **NOTE:** Before removing the master cylinder, drain the clutch fluid from the entire clutch system.
1	Rear view mirror	1	
2	Coupler (clutch switch)	1	Disconnect
3	Clutch lever	1	
4	Holder (push rod)	1	
5	Union bolt	1	
6	Copper washers	2	
7	Clutch hose	1	
8	Master cylinder	1	
9	Clutch switch	1	
			For installation, reverse the removal procedure.



Order	Job name/Part name	Q'ty	Remarks
	Master cylinder disassembly		Disassemble the parts in the order below.
①	Master cylinder cap	1	
②	Holder (diaphragm)	1	
③	Diaphragm	1	
④	Push rod	1	
⑤	Dust boot	1	
⑥	Circlip	1	
⑦	Washer	1	
⑧	Master cylinder kit	1	
			For assembly, reverse the disassembly procedure.

CAUTION:

Hydraulic clutch components rarely require disassembly. DO NOT:

- **disassemble components unless absolutely necessary;**
- **use solvents on internal clutch components;**
- **use spent clutch fluid for cleaning; (use only clean clutch fluid)**
- **allow clutch fluid to come in contact with the eyes, as this may cause eye injury;**
- **splash clutch fluid onto painted surfaces or plastic parts, as this may cause damage;**
- **disconnect any hydraulic connection, as this would require the entire clutch system to be disassembled, drained, cleaned, properly filled and bled after reassembly.**

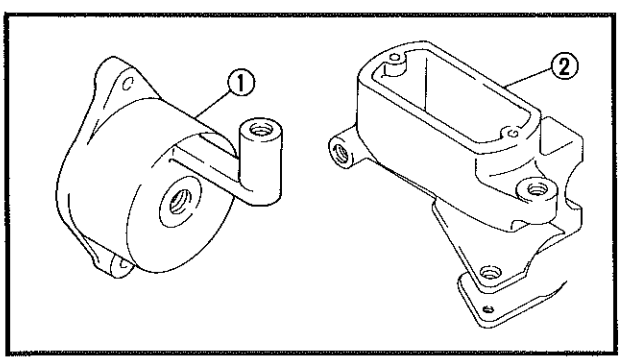
EB702040

INSPECTION AND REPAIR

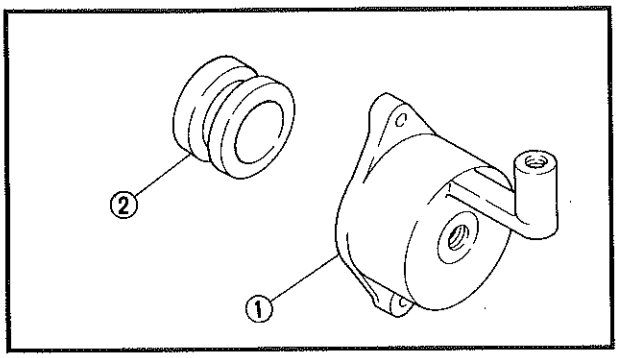
Recommended clutch component replacement schedule:	
Piston seals, dust seal	Every two years
Clutch hose	Every two years
Clutch fluid (brake fluid)	Replace only when clutch is disassembled.

⚠ WARNING

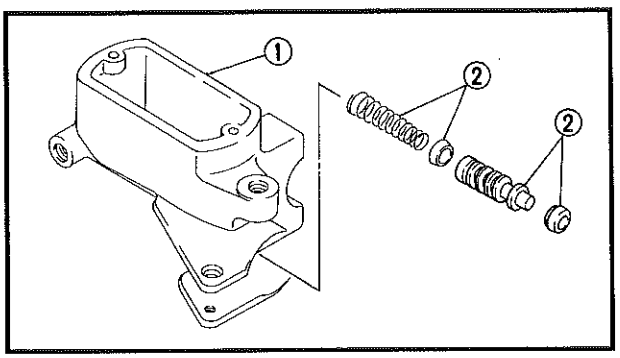
All internal clutch components should be cleaned in new fluid only. Do not use solvents as they will cause seals to swell and distort.



1. Inspect:
- Release cylinder body ①
- Master cylinder body ②
  Cracks/damage → Replace.
- Oil delivery passage
  (master cylinder body)
  Blockage → Blow out with compressed air.



2.Inspect:
- Release cylinder ①
- Piston ② (release cylinder)
  Scratches/wear/rust → Replace as a set.



3.Inspect:
- Master cylinder ①
- Master cylinder kit ②
  Scratches/wear/rust → Replace as a set.

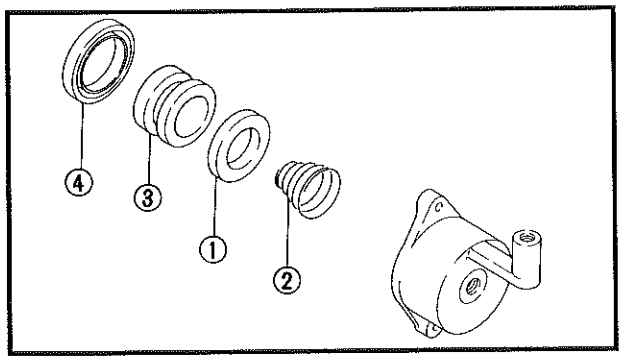
4.Inspect:
- Clutch hose
  Cracks/wear/damage → Replace.

EB702060
ASSEMBLY AND INSTALLATION

⚠ WARNING
- **All internal parts should be cleaned in new fluid only.**
- **During installation internal parts should be lubricated with new fluid.**

Recommended brake fluid:
DOT #4

- **Replace the piston seal and oil seal whenever the clutch release and master cylinder are disassembled.**

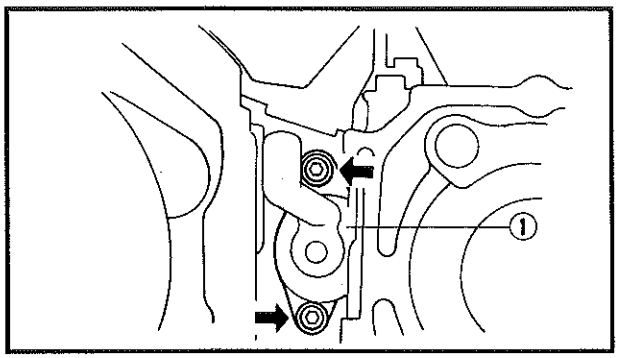


Clutch release cylinder

1.Install:
- Piston seal ① New
- Spring ②
- Piston (release cylinder) ③
- Oil seal ④ New

2.Apply:
- Grease
  (to the clutch push rod)

	Recommended lubricant: Lithium soap base grease

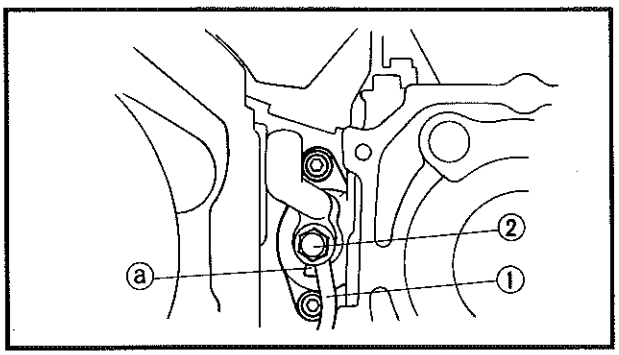


3.Install:
- Clutch release cylinder ①

12 Nm (1.2 m · kg, 8.7 ft · lb)

⚠ WARNING

Use sealant on the upper bolt.



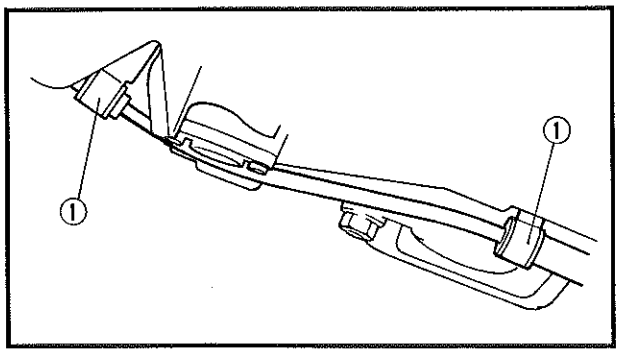
4.Install:
- Copper washers New
- Clutch hose ①
- Union bolt ②

CAUTION:

When installing the clutch hose onto the clutch release cylinder, take care that the pipe touches the projection ⓐ.

⚠ WARNING

Proper hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".



5.Install:
- Clutch hose clamps ①

19 Nm (1.9 m · kg, 13 ft · lb)

- Rubber cap

6.Install:
- Crankcase cover (left)
- Shift pedal assembly
- Middle gear case cover
  Refer to "AC MAGNETO AND STARTER CLUTCH" in CHAPTER 4.

7.Install:
- Mufflers and exhausts (left side)
  Refer to "ENGINE REMOVAL" in CHAPTER 4.

8.Fill:
- Crankcase
  Refer to "ENGINE OIL LEVEL INSPECTION" in CHAPTER 3.

9.Fill:
- Master cylinder reservoir

Recommended brake fluid:
DOT #4

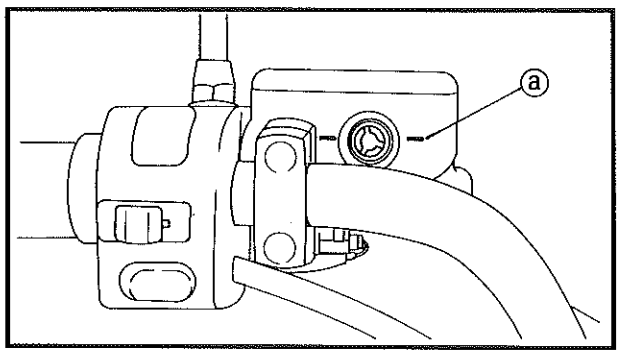
CAUTION:

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

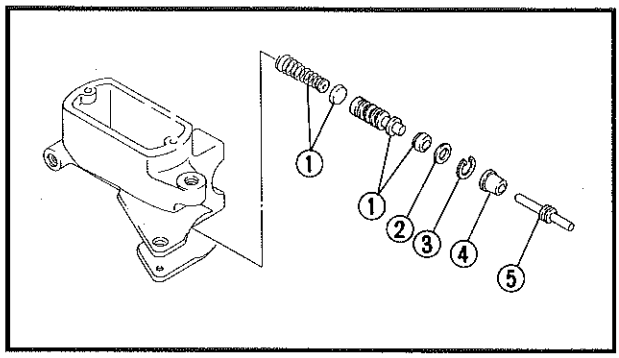
⚠ WARNING

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

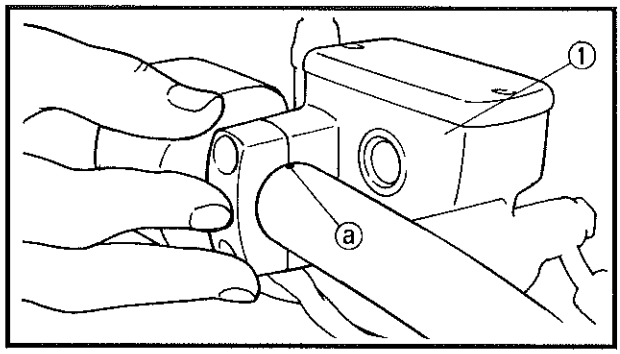
10.Air bleed:
- Clutch system
  Refer to "AIR BLEEDING" in CHAPTER 3.



11.Inspect:
- Clutch fluid level
  Fluid level is under the "LOWER" level line → Fill.
  Refer to 'CLUTCH FLUID LEVEL INSPECTION" in CHAPTER 3.
  ⓐ "LOWER" level line

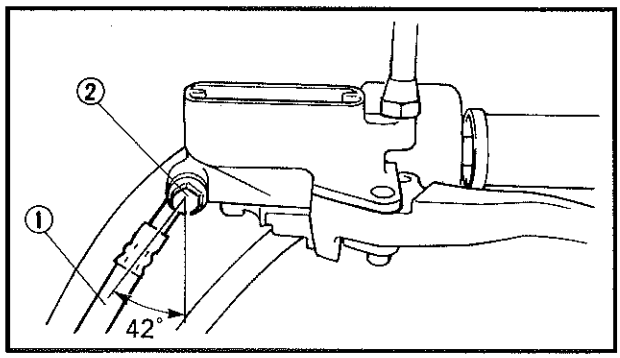


Master cylinder
1.Install:
- Master cylinder kit ①
- Washer ②
- Circlip ③ New
- Dust boot ④
- Push rod ⑤



2.Install:
- Master cylinder ①

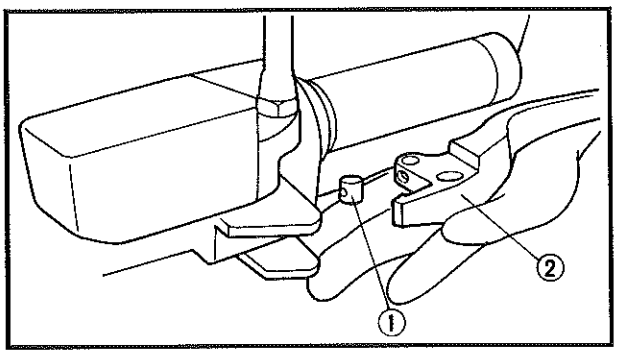
⚠ WARNING
- **Install the master cylinder holder with the "UP" mark facing up.**
- **Align the end of the holder with the punch mark ⓐ on the handlebar.**
- **First, tighten the upper bolt, then tighten the lower bolt.**



3.Install:
- Copper washers New
- Clutch hose ①
- Union bolt ② 30 Nm (3.0 m · kg, 22 ft · lb)

NOTE:
Tighten the union bolt while holding the clutch hose, as shown in the illustration.

⚠ WARNING
Proper hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".



4.Install:
- Holder (push rod) ①
- Clutch lever ②

NOTE:
Apply lithium soap base grease to the clutch lever pivot.

5.Connect:
- Coupler (clutch switch)

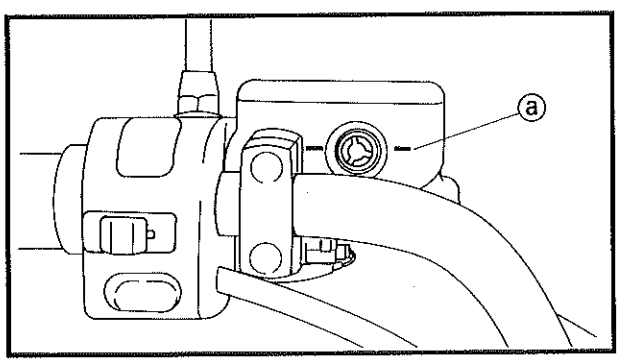
6.Fill:
- Master cylinder reservoir

Recommended fluid:
DOT #4

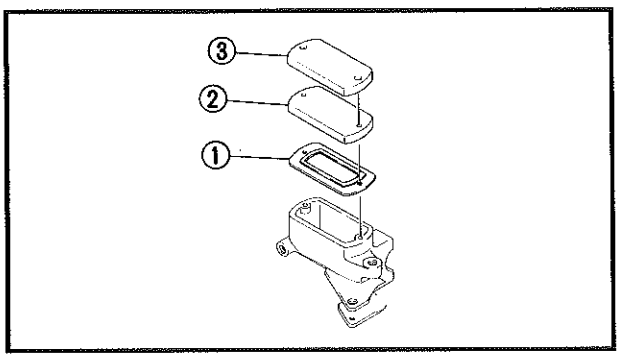
CAUTION:
Clutch fluid may damage painted surfaces or plastic parts. Always clean up spilled fluid immediately.

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

7.Air bleed:
- Clutch system
  Refer to "AIR BLEEDING" in CHAPTER 3.

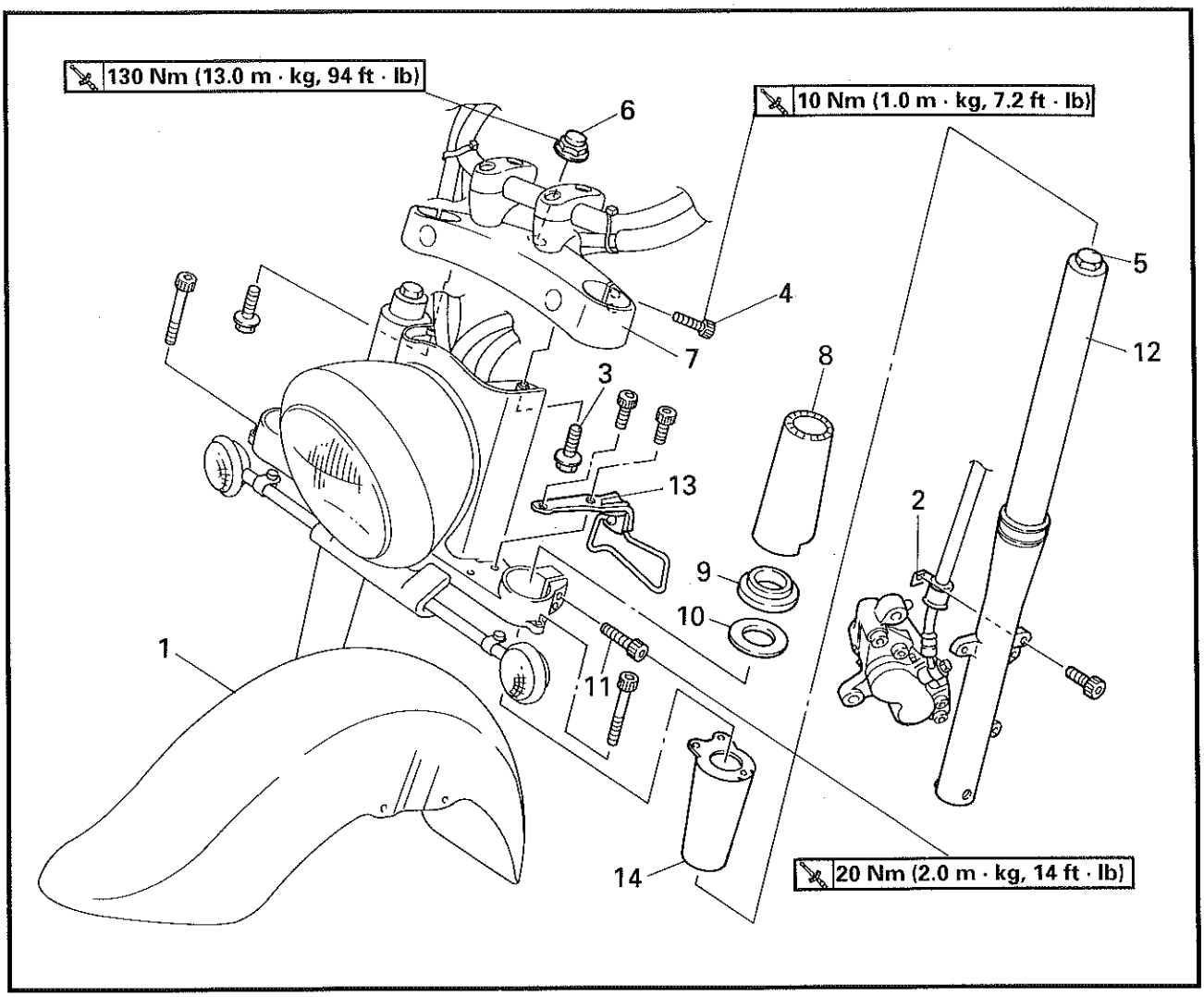


8.Inspect:
- Clutch fluid level
  Fluid level is under the "LOWER" level line → Fill.
  Refer to "CLUTCH FLUID LEVEL INSPECTION" in CHAPTER 3.
  ⓐ "LOWER" level line

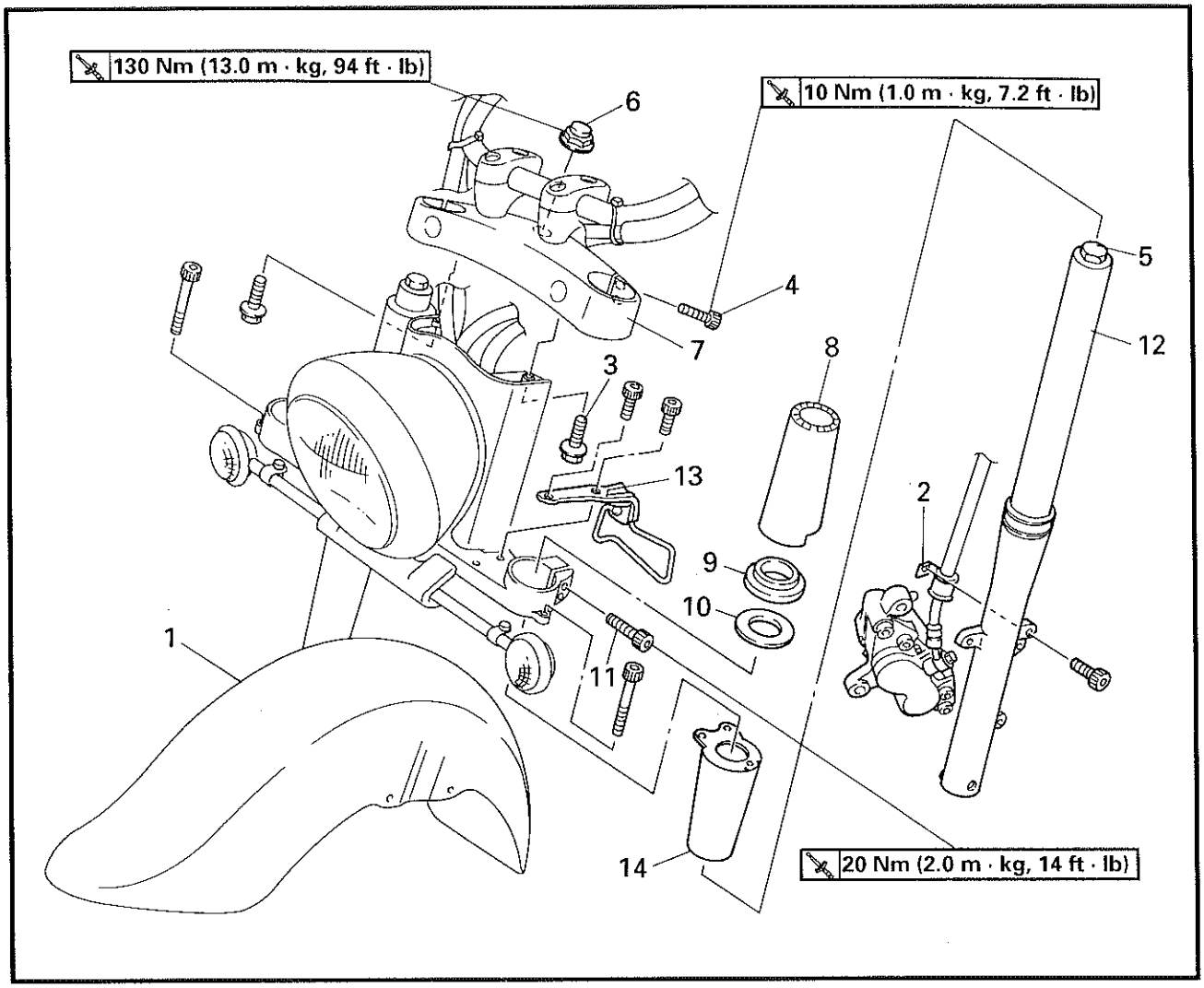


9.Install:
- Diaphragm ①
- Holder (diaphragm) ②
- Cap (master cylinder) ③

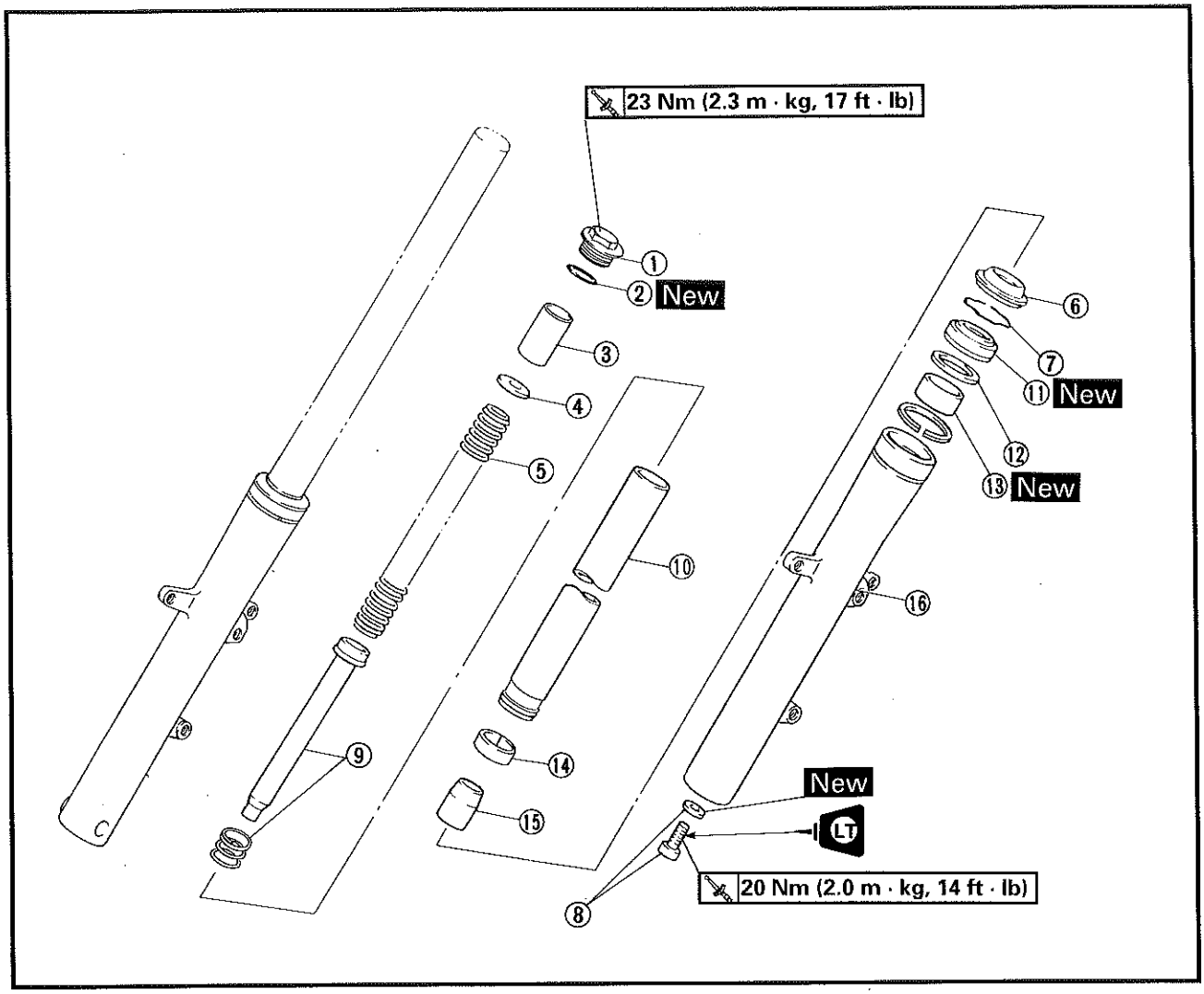
FRONT FORK



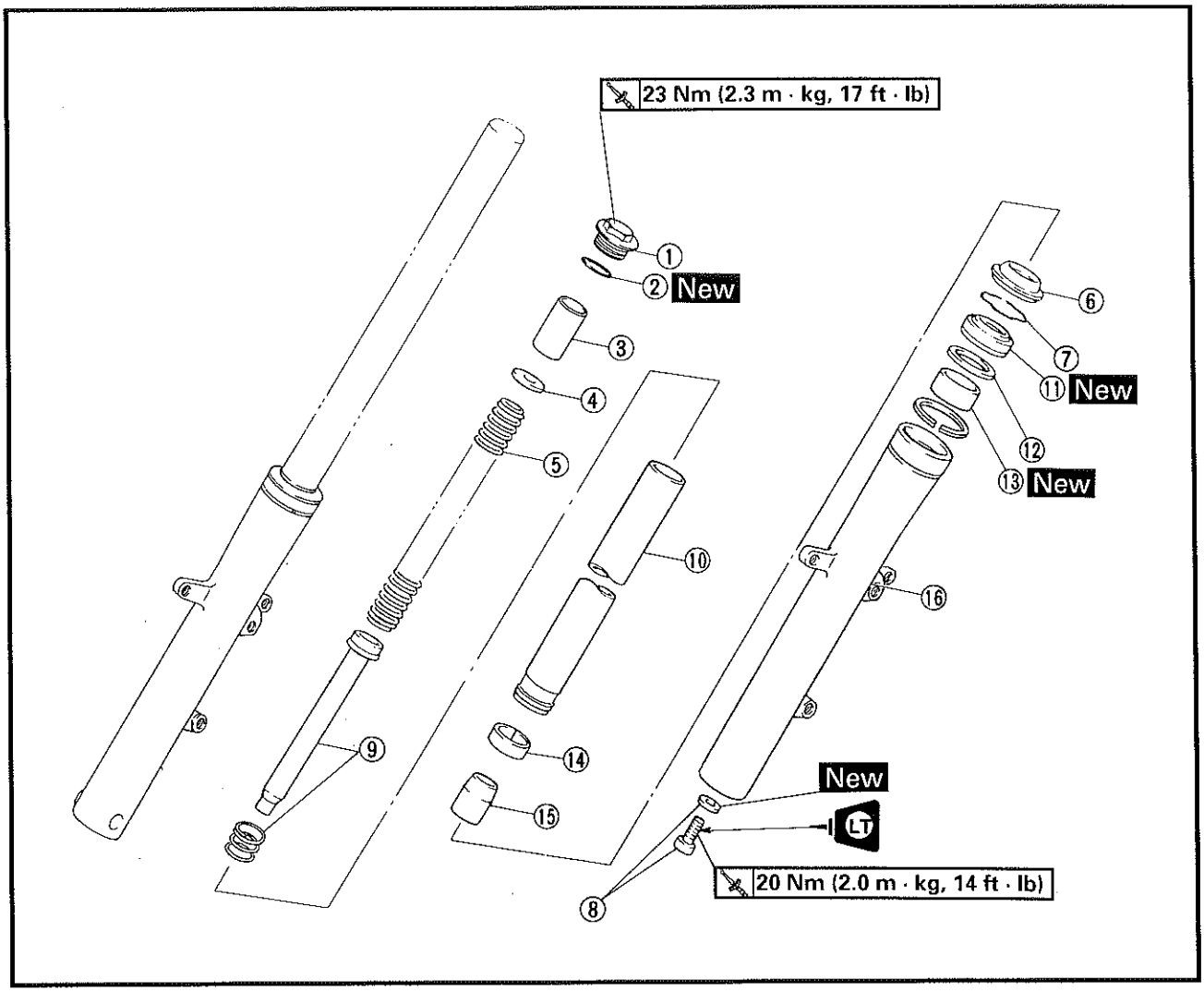
Order	Job name/Part name	Q'ty	Remarks
	Front fork removal		Remove the parts in the order below. Stand the motorcycle on a level surface. **⚠ WARNING** **Securely support the motorcycle so there is no danger of it falling over.**
	Front brake calipers (left and right)		Refer to "FRONT BRAKE CALIPERS".
	Front wheel		Refer to "FRONT WHEEL".
1	Front fender	1	
2	Brake hose holder	1	
3	Headlight stay upper bolts	2	
4	Front fork pinch bolts (upper)	4	Loosen
5	Cap bolts	2	Loosen
6	Steering stem nut	1	



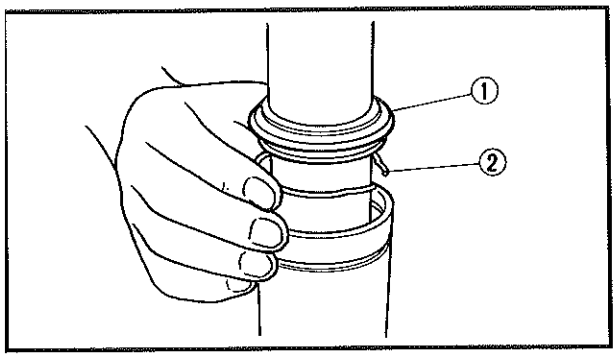
Order	Job name/Part name	Q'ty	Remarks
7	Upper bracket	1	Refer to "STEERING HEAD INSPECTION" in CHAPTER 3.
8	Upper fork covers	2	
9	Upper fork cover spacers	2	
10	Upper fork cover washers	2	
11	Front fork pinch bolts (lower)	4	Loosen
12	Front forks	2	
13	Brake hose guides	2	
14	Lower fork covers	2	
			For installation, reverse the removal procedure.



Order	Job name/Part name	Q'ty	Remarks
	Front fork disassembly		Disassemble the parts in the order below.
①	Cap bolt	1	
②	O-ring	1	
③	Collar	1	
④	Spring seat	1	
⑤	Fork spring	1	Drain the fork oil. Pump the fork tube several times to remove the fork oil.
⑥	Dust seal	1	
⑦	Retaining clip	1	
⑧	Bolt/gasket	1/1	
⑨	Damper rod/rebound spring	1/1	Refer to "DISASSEMBLY".
⑩	Inner tube	1	
⑪	Oil seal	1	
⑫	Seal spacer	1	



Order	Job name/Part name	Q'ty	Remarks
⑬	Slide metal	1	
⑭	Piston metal	1	
⑮	Oil lock piece	1	
⑯	Outer tube	1	
			For assembly, reverse the disassembly procedure.

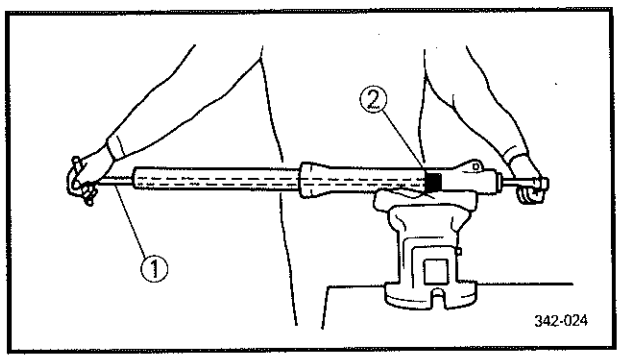


DISASSEMBLY

1.Remove:
- Dust seal ①
- Retaining clip ②
  (use a slotted-head screwdriver)

CAUTION:

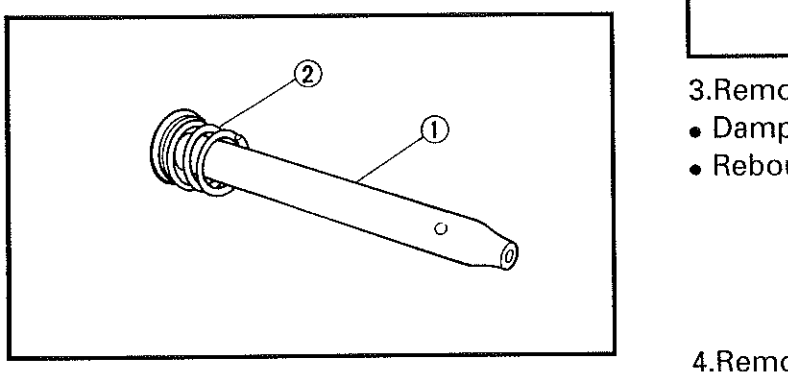
Take care not to scratch the inner tube.



2.Remove:
- Bolt (damper rod)

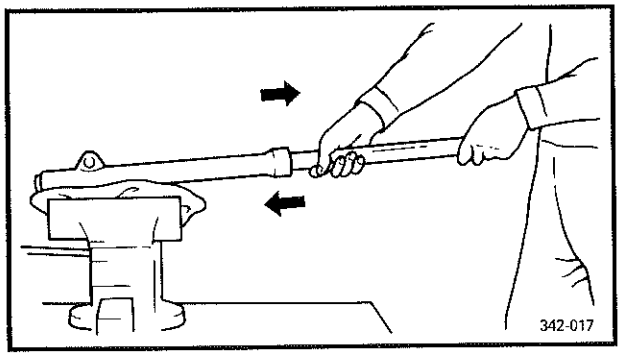
NOTE:

Loosen the damper rod bolt while holding the damper rod with the T-handle ① and the damper rod holder ②.



T-Handle:
YM - 01326, 90890 - 01326
Damper rod holder:
YM - 01300 - 1, 90890 - 01294

3.Remove:
- Damper rod ①
- Rebound spring ②



4.Remove
- Inner tube

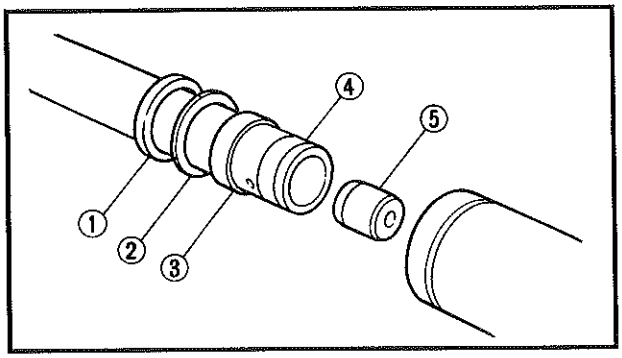
****

Removal steps:
- Hold the fork leg horizontally.
- Securely clamp the caliper mounting boss of the outer tube in a vise with soft jaws.
- Separate the inner tube from the outer tube by pulling forcefully but carefully on the inner tube.

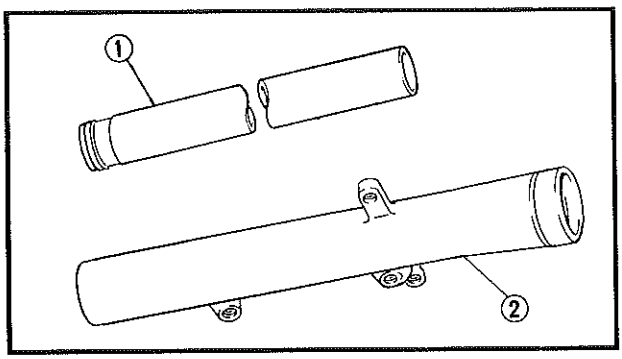
CAUTION:

- **Excessive force will damage the oil seal and/or the slide metal. A damaged oil seal and metal must be replaced.**
- **Avoid bottoming the inner tube into the outer tube during the above procedure, as the oil lock piece will be damaged.**

****



5.Remove:
- Oil seal ①
- Seal spacer ②
- Slide metal ③
- Piston metal ④
- Oil lock piece ⑤



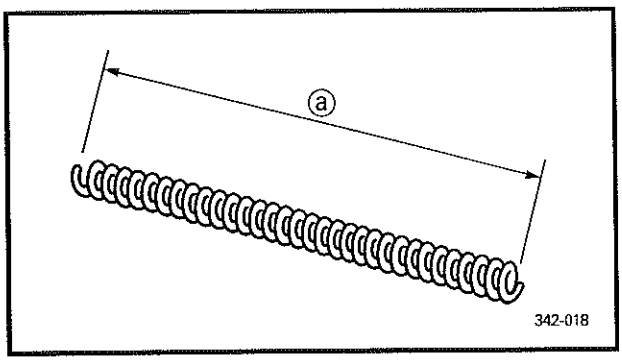
EB703030
INSPECTION

1.Inspect:
- Inner tube ①
- Outer tube ②

Scratches/bends/damage → Replace.

⚠ WARNING

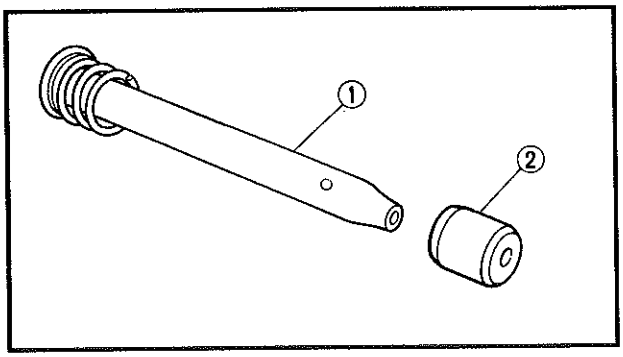
Do not attempt to straighten a bent inner tube as this may dangerously weaken the tube.



2.Measure:
- Fork spring length ⓐ

Over the specified limit → Replace.

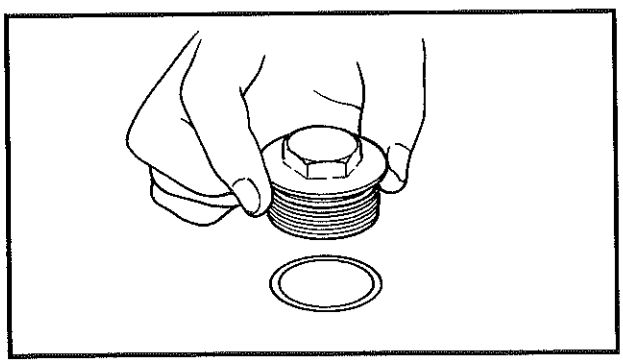
Fork spring free length (limit): 533.4 mm (21.0 in)



3.Inspect:
- Damper rod ①

Wear/damage → Replace.
Contamination → Blow out all of the oil passages with compressed air.
- Oil lock piece ②

Damage → Replace.

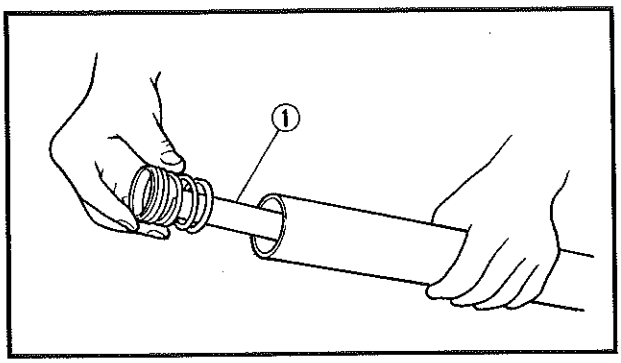


4.Inspect:
- O-ring (cap bolt)

Wear/damage → Replace.

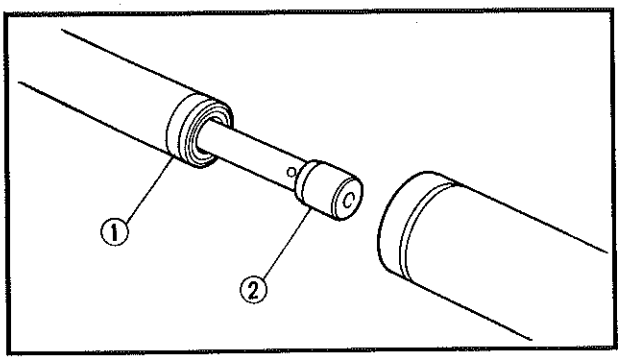
EB703040
ASSEMBLY

NOTE:
- When reassembling the front fork, replace the following parts.
  *Piston metal
  *Slide metal
  *Oil seal
  *Dust seal
- Before reassembly make sure that all the components are clean.



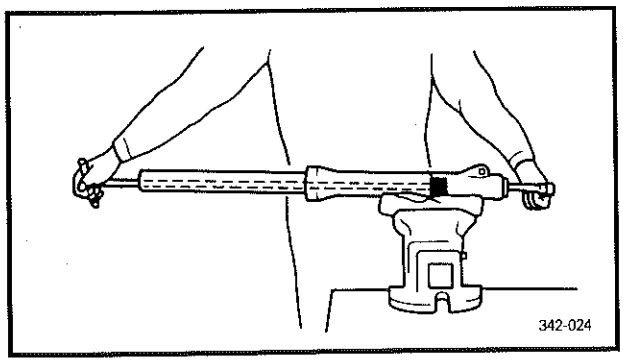
1.Install:
- Damper rod ①

CAUTION:
Allow the damper rod to slide slowly down the inner tube until it protrudes from the bottom, being careful not to damage the inner tube.



2.Lubricate:
- Inner tube (outer surface)

Recommended lubricant:
Yamaha fork and shock oil 5WT or equivalent

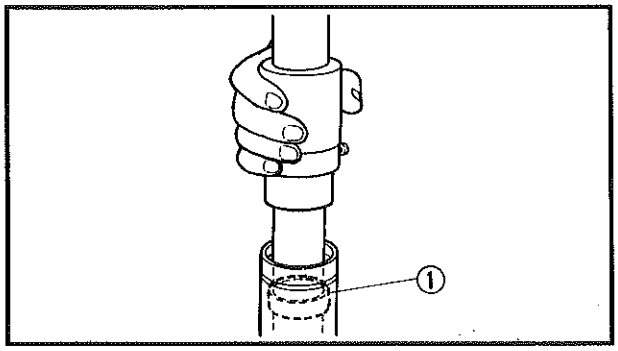


3.Install:
- Piston metal ①
- Oil lock piece ②
  (to inner tube)
- Inner tube
  (to outer tube)

4.Tighten:
- Bolt (damper rod)

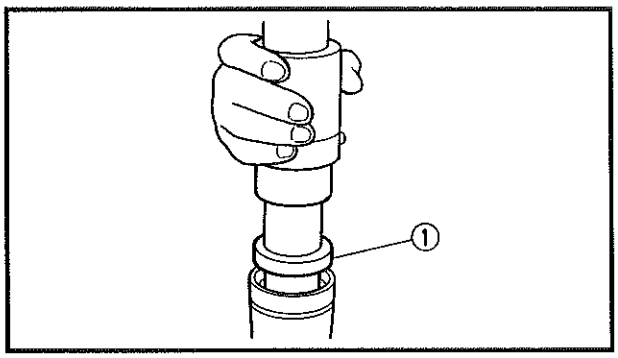
NOTE:
- Apply LOCTITE® #204 to the threads of the damper rod bolt.
- Tighten the damper rod bolt while holding the damper rod with a T-handle and a damper rod holder.

T-handle:
YM - 01326, 90890 - 01326
Damper rod holder:
YM - 01300 - 1, 90890 - 01294



5.Install:
- Slide metal ① New
  Use a fork seal driver weight and an adapter.

Fork seal driver weight:
YM - 33963, 90890 - 01367
Adapter:
YM - 8020, 90890 - 01374

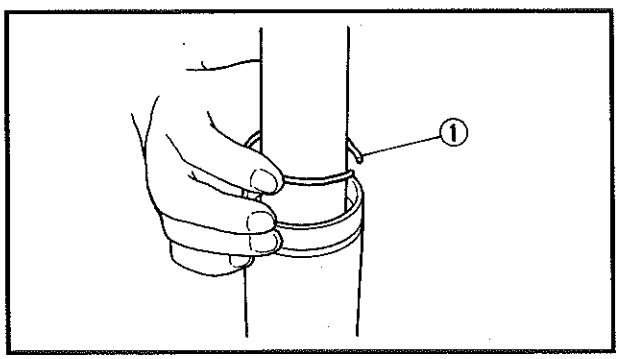


6.Install:
- Seal spacer
- Oil seal ① New
  Use the fork seal driver weight and the adapter.

Fork seal driver weight:
YM - 33963, 90890 - 01367
Adapter:
YM - 8020, 90890 - 01374

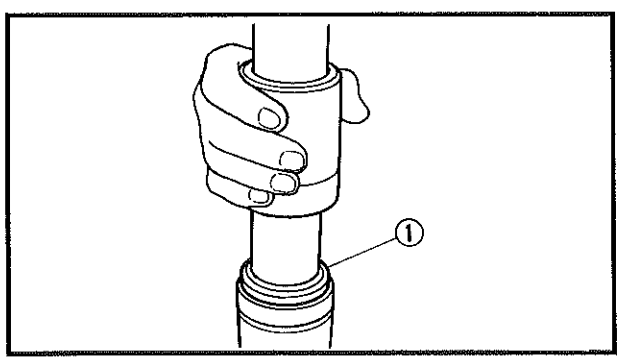
NOTE:
Before installing the oil seal, apply lithium soap base grease onto the oil seal lips.

CAUTION:
Make sure that the numbered side of the oil seal faces up.



7.Install:
- Retaining clip ①

NOTE:
Adjust the retaining clip so that it fits into the outer tube groove.



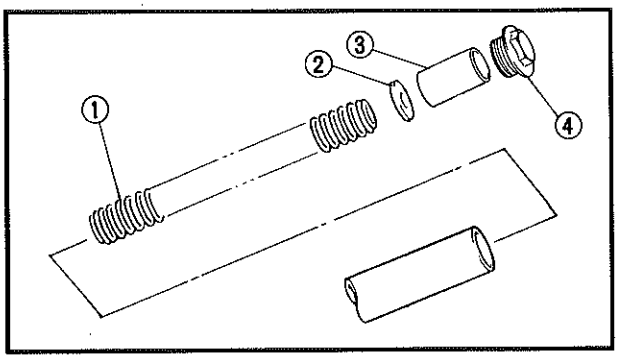
8.Install:
- Dust seal ①
  Use the fork seal driver weight.

Fork seal driver weight:
YM - 33963, 90890 - 01367

9.Fill:
- Fork oil

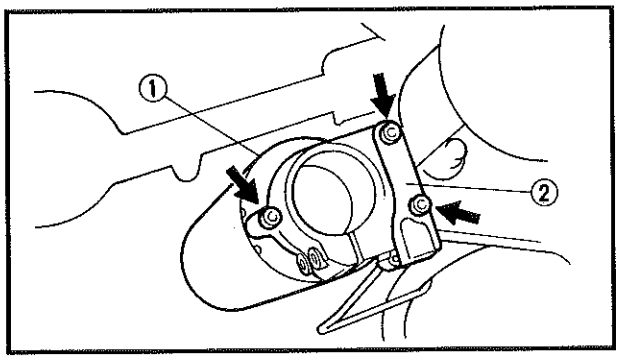
Each fork:
533 cm³ (18.8 Imp oz, 18.0 US oz)
Yamaha fork and shock oil 5WT or equivalent. After filling up, slowly pump the fork up and down to distribute the fork oil.
Oil level:
127 mm (5.00 in)
(from the top of the inner tube fully compressed and without the fork spring)

NOTE:
Hold the fork in an upright position.



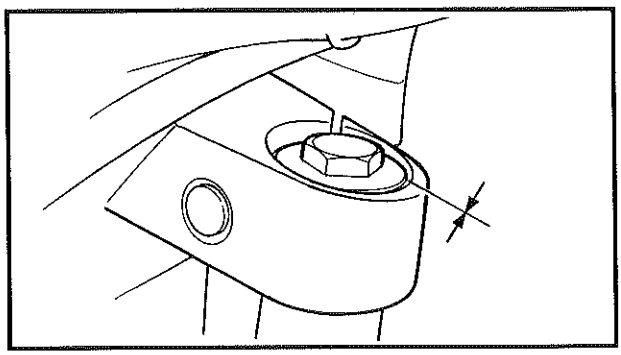
10.Install:
- Fork spring ①
- Spring seat ②
- Spacer collar ③
- Cap bolt ④

NOTE:
- Install the fork spring with its smaller pitch downward.
- Before installing the cap bolt, apply grease to the O-ring.
- Temporarily tighten the cap bolt.



EB703050
INSTALLATION

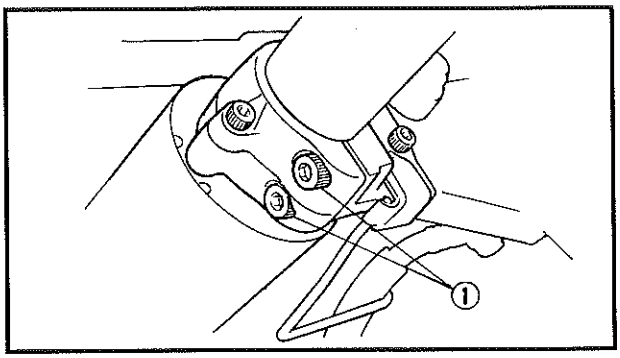
1.Install:
- Lower fork covers ①
- Brake hose guides ②
- Front forks
  Temporarily tighten the lower bracket pinch bolts.



2.Install:
- Upper bracket
- Steering stem nut

130 Nm (13.0 m · kg, 94 ft · lb)

NOTE:
- When aligning the fork tubes do not install the upper fork covers.
- Make sure that the inner tube end is flush with the top of the handlebar crown.



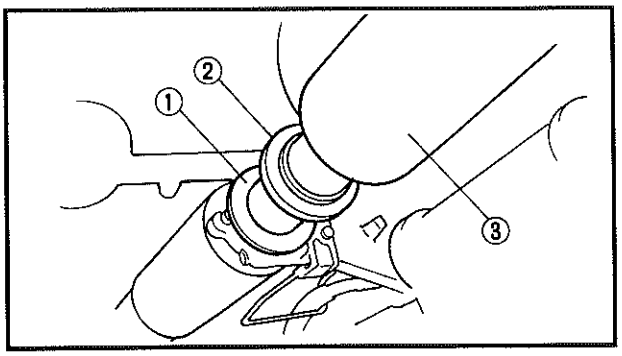
3.Tighten:
- Front fork pinch bolts (lower) ①

20 Nm (2.0 m · kg, 14 ft · lb)

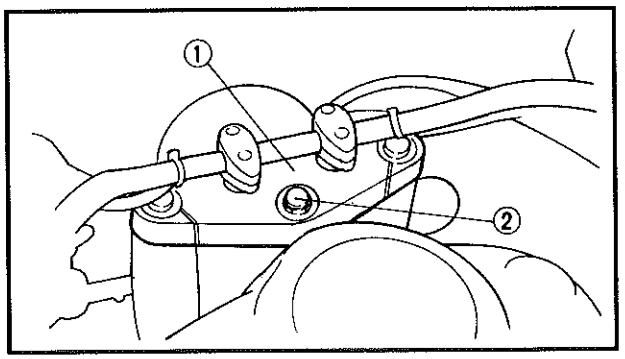
- Cap bolts

23 Nm (2.3 m · kg, 17 ft · lb)

4.Remove:
- Steering stem nut
- Upper bracket

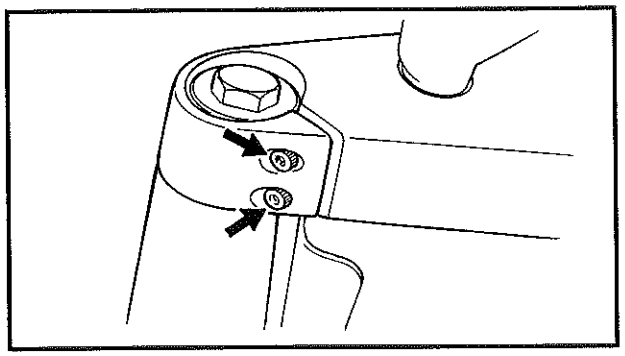


5.Install:
- Upper fork cover washers ①
- Upper fork cover spacers ②
- Upper fork covers ③



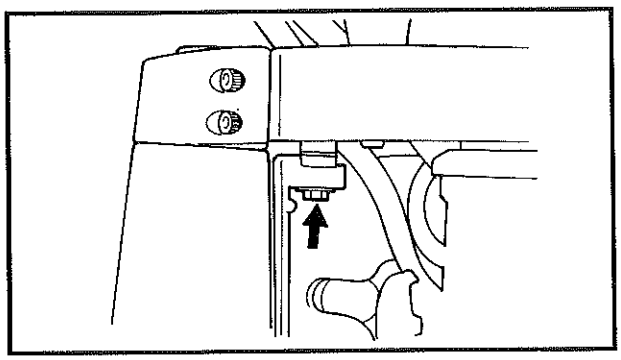
6.Install:
- Upper bracket ①
- Steering stem nut ②

130 Nm (13.0 m · kg, 94 ft · lb)

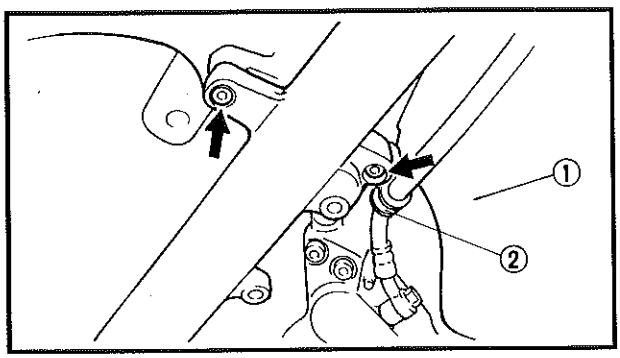


7.Tighten:
- Front fork pinch bolts (upper)

10 Nm (1.0 m · kg, 7.2 ft · lb)



8.Install:
- Headlight stay upper bolts



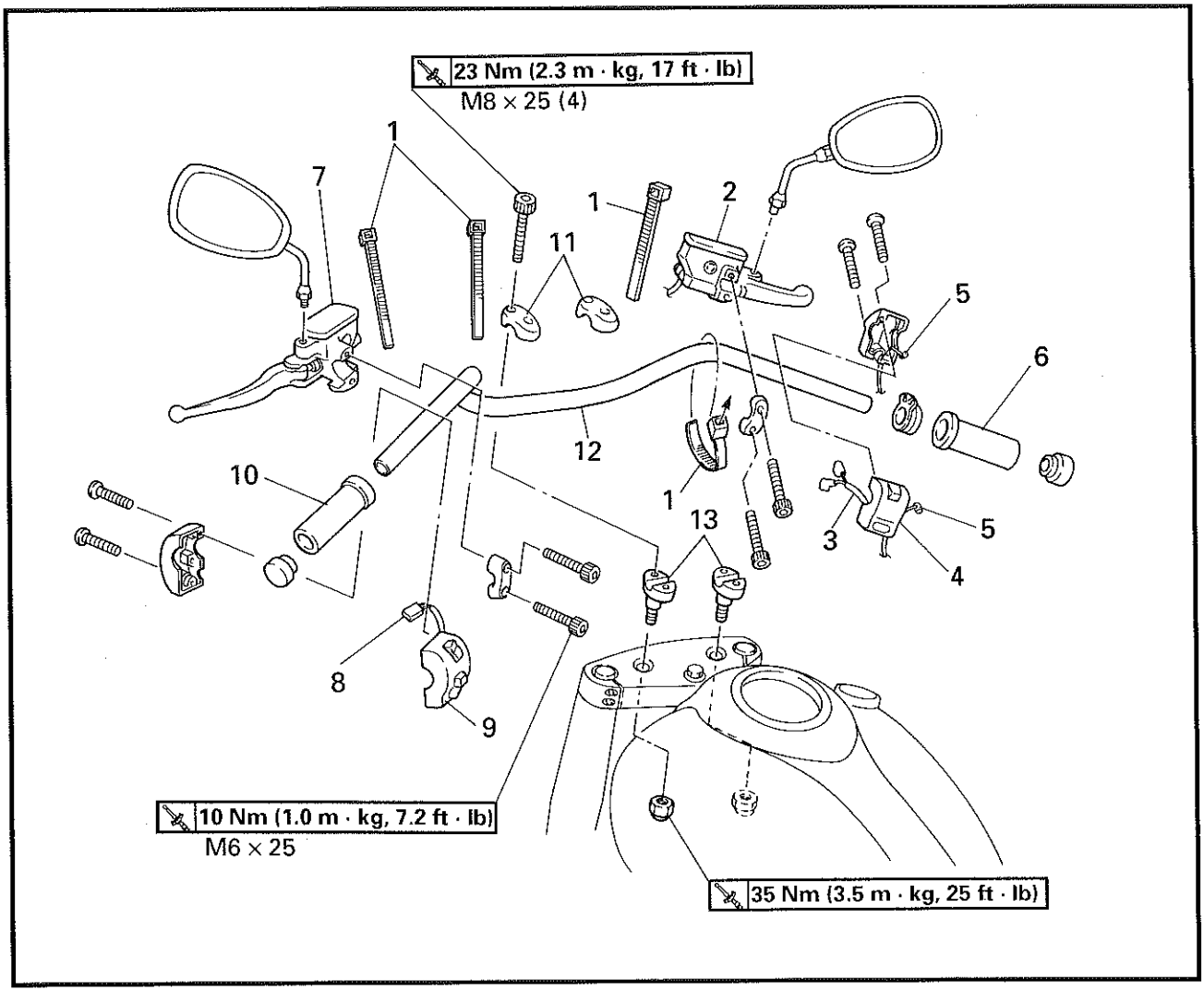
9.Install:
- Front fender ①
- Brake hose holders ②

10.Install:
- Front wheel
- Brake caliper
  Refer to "FRONT WHEEL".

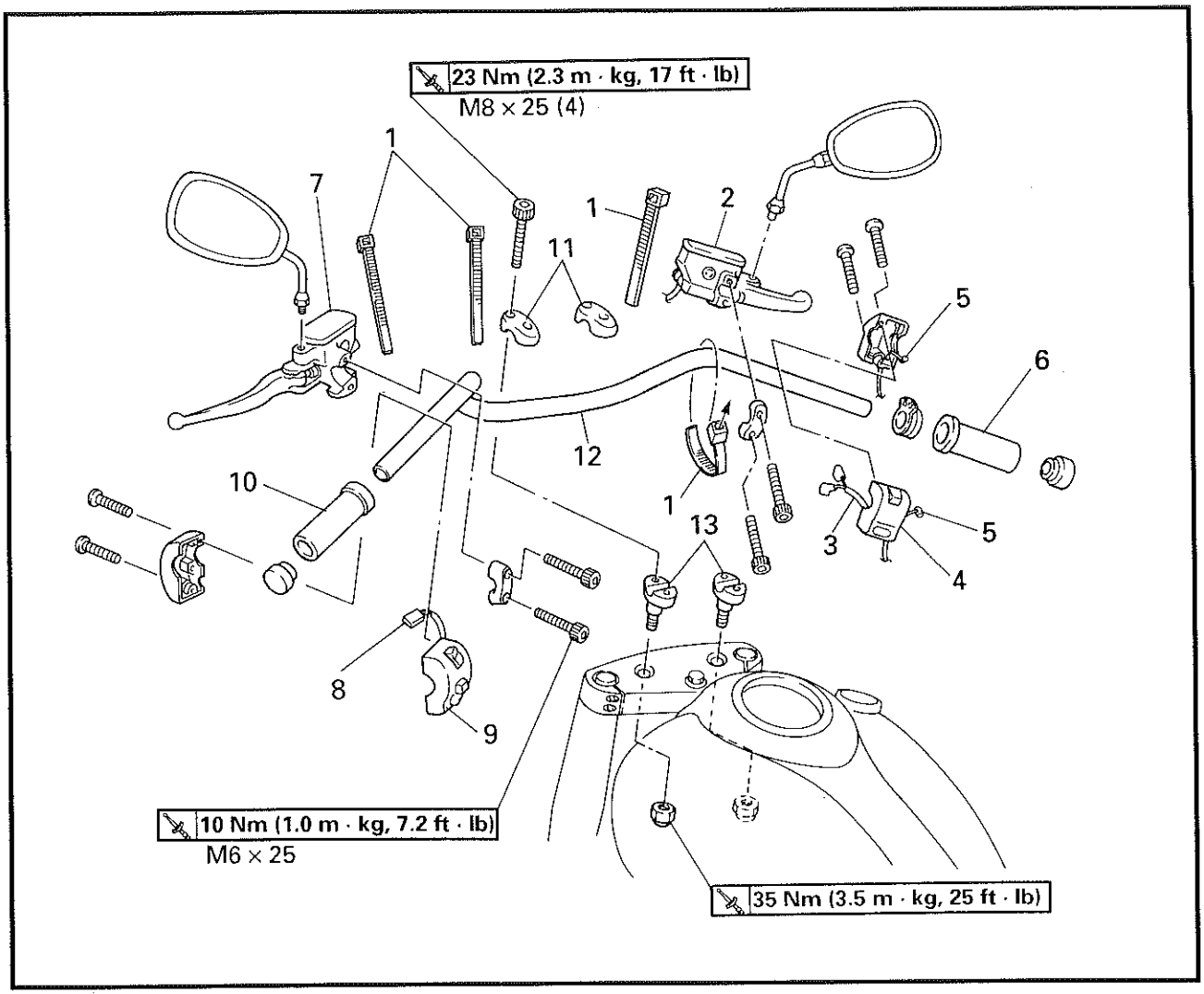
⚠ WARNING

Make sure that the brake hoses are routed properly.

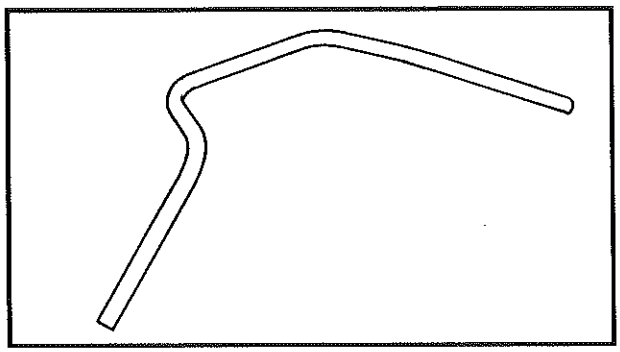
HANDLEBAR



Order	Job name/Part name	Q'ty	Remarks
	Handlebar removal		Remove the parts in the order below. Stand the motorcycle on a level surface. **⚠ WARNING** **Securely support the motorcycle so that there is no danger of it falling over.**
1	Plastic locking ties	4	
2	Front brake master cylinder	1	Refer to "MASTER CYLINDER (FRONT BRAKES)".
3	Front brake switch leads	2	Disconnect
4	Handlebar switches (right)	1	
5	Throttle cables	2	Disconnect
6	Throttle grip	1	



Order	Job name/Part name	Q'ty	Remarks
7	Clutch master cylinder	1	Refer to "HYDRAULIC CLUTCH".
8	Clutch switch coupler	1	Disconnect
9	Handlebar switches (left)	1	
10	Grip (left)	1	
11	Handlebar bracket (upper)	2	
12	Handlebar	1	
13	Handlebar bracket (lower)	2	
			For installation, reverse the removal procedure.



INSPECTION

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

CAUTION:

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

****

Left handlebar grip replacement steps:
- Remove the handlebar grip.
- Apply a light coat of rubber adhesive on the end of the handlebar.
- Install the handlebar grip.

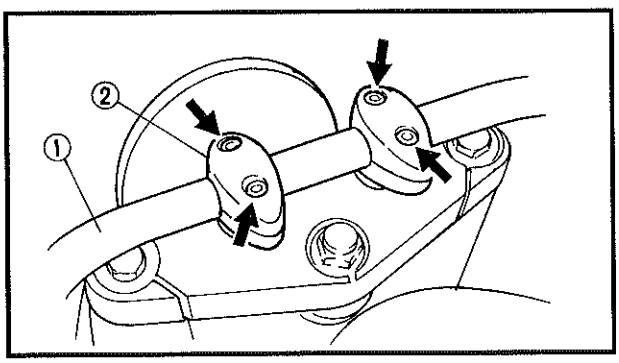
NOTE:

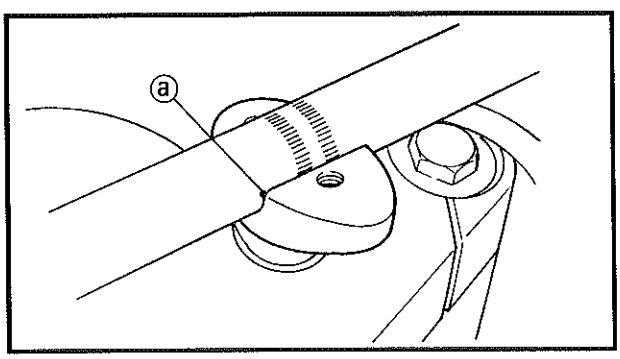
Wipe off excess adhesive with a clean rag.

⚠ WARNING

Do not touch the grip until the adhesive has set.

****



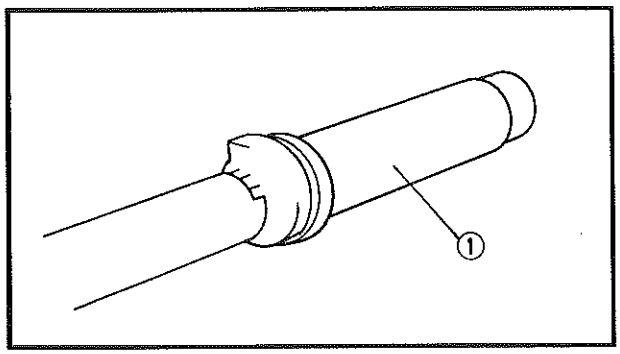


INSTALLATION

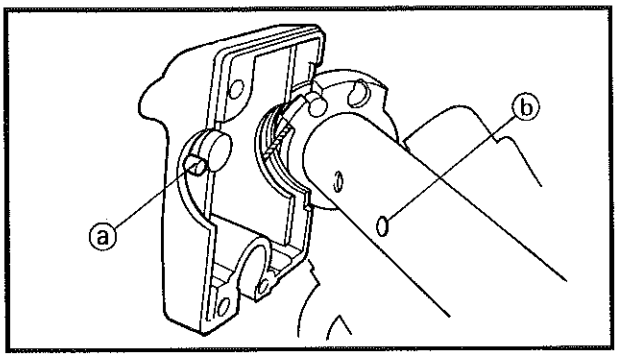
1.Install:
- Handlebar ①
- Handlebar holders ②

NOTE:
- Apply a light coat of lithium soap base grease onto the right end of the handlebar.
- Align the match marks ⓐ on the handlebar with the lower handlebar holder bolt hole.

CAUTION:
- **First tighten the bolts on the front side of the handlebar holder, and then tighten the bolts on the rear side.**
- **Check the handlebar by turning it all the way to the left and then to the right. If there is any contact with the fuel tank, adjust the handlebar position.**



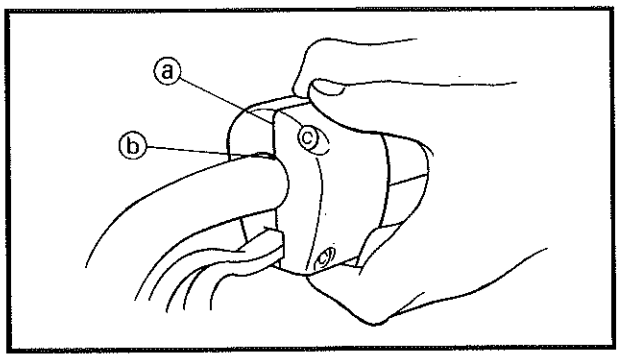
2.Install:
- Throttle grip ①



3.Connect:
- Throttle cable

4.Install:
- Handlebar switch (right)

NOTE:
Align the projection ⓐ on the handlebar switch with the hole ⓑ in the handlebar.



5.Install:
- Handlebar switch (left)

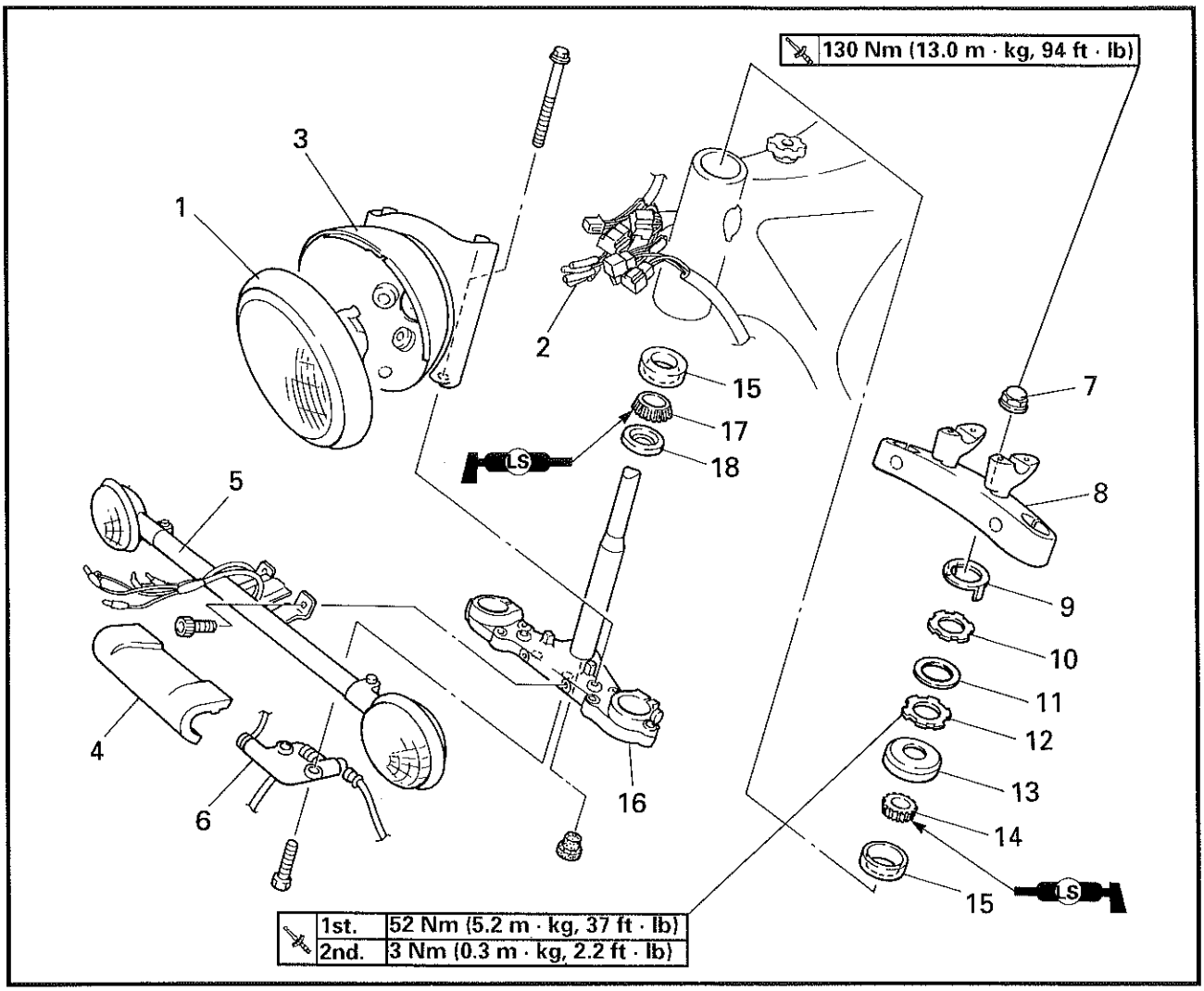
NOTE:
Align the end ⓐ of the handlebar switch with the punch mark ⓑ on the handlebar.

6.Install:
- Master cylinder (front brakes)
  Refer to "MASTER CYLINDER (FRONT BRAKES)".

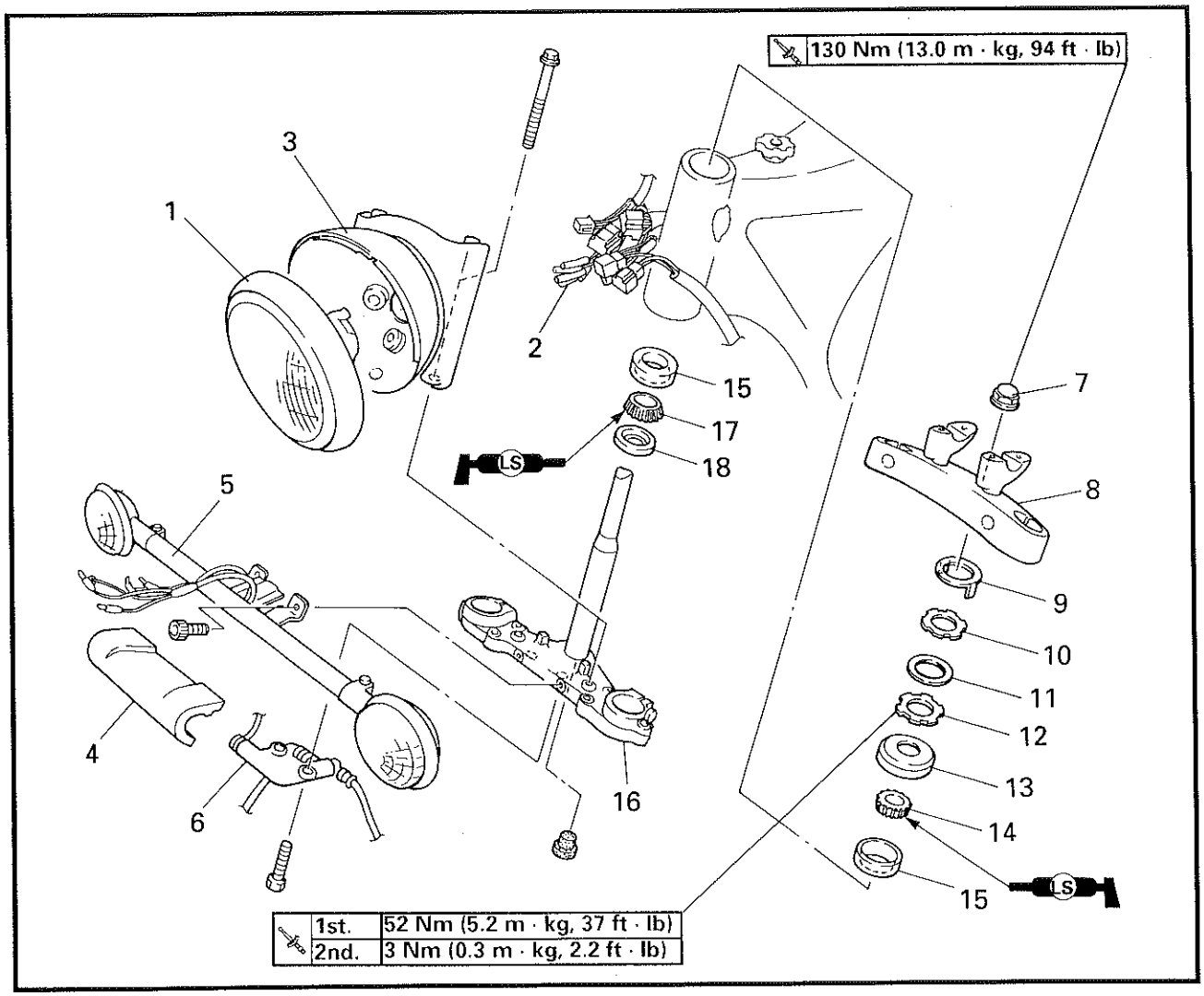
7.Install:
- Master cylinder (clutch)
  Refer to "HYDRAULIC CLUTCH".

8.Adjust:
- Throttle cable free play
  Refer to "THROTTLE CABLE ADJUSTMENT".

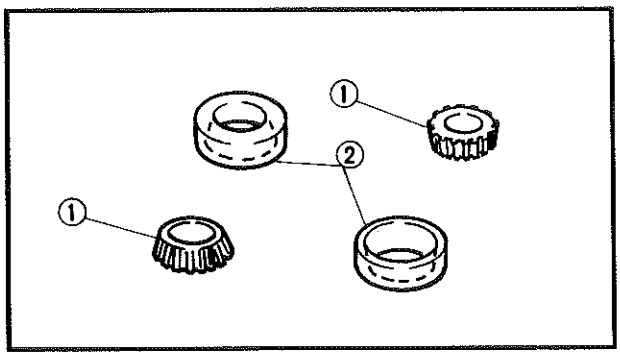
STEERING HEAD



Order	Job name/Part name	Q'ty	Remarks
	Steering head removal		Remove the parts in the order below. Stand the motorcycle on a level surface. **⚠ WARNING** **Securely support the motorcycle so that there is no danger of it falling over.**
	Rider seat, fuel tank		Refer to "SEATS" and "FUEL TANK" in CHAPTER 3.
	Handlebar		Refer to "HANDLEBAR".
	Front wheel, front forks		Refer to "FRONT FORK".
1	Headlight lens unit	1	
2	Leads (in the headlight body)		Disconnect
3	Headlight body	1	
4	Chrome flasher bracket cover	1	

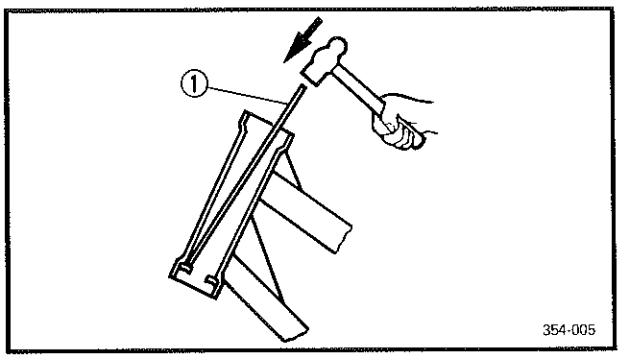


Order	Job name/Part name	Q'ty	Remarks
5	Flasher light bracket assembly	1	
6	Brake hose joint	1	
7	Steering stem nut	1	
8	Upper bracket	1	
9	Lock washer	1	
10	Upper ring nut	1	
11	Rubber washer	1	
12	Lower ring nut	1	
13	Bearing cover	1	
14	Bearing (upper)	1	
15	Bearing races	2	
16	Lower bracket	1	
17	Bearing (lower)	1	
18	Rubber seal	1	
			For installation, reverse the removal procedure.



EB704020
INSPECTION

1.Wash the bearings and the bearing races with a solvent.
2.Inspect:
- Bearings ①
- Bearing races ②
  Pitting/damage → Replace.

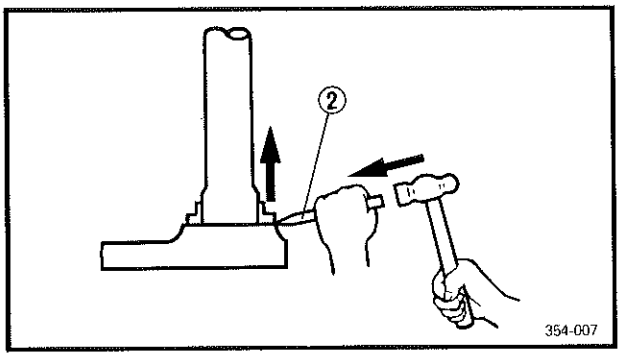


****

Bearing and bearing race replacement steps:

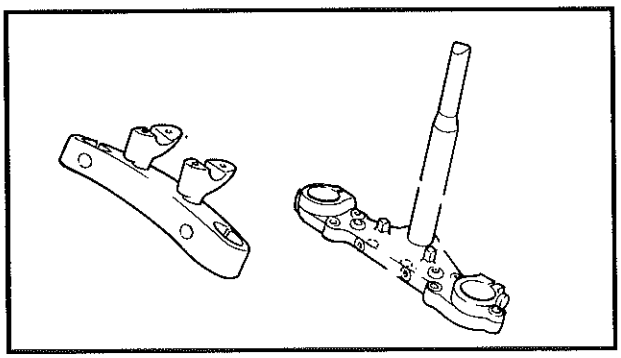
- Remove the bearing races from the steering head pipe using a long rod ① and a hammer, as shown.
- Remove the bearing race on the lower bracket using a floor chisel ② and a hammer, as shown.
- Install the new rubber seal and races.

****



NOTE:
- Always replace the bearings and bearing races as a set.
- Whenever the steering head is disassembled replace the rubber seal.

CAUTION:
If the bearing race is not fitted squarely, the steering head pipe could be damaged.

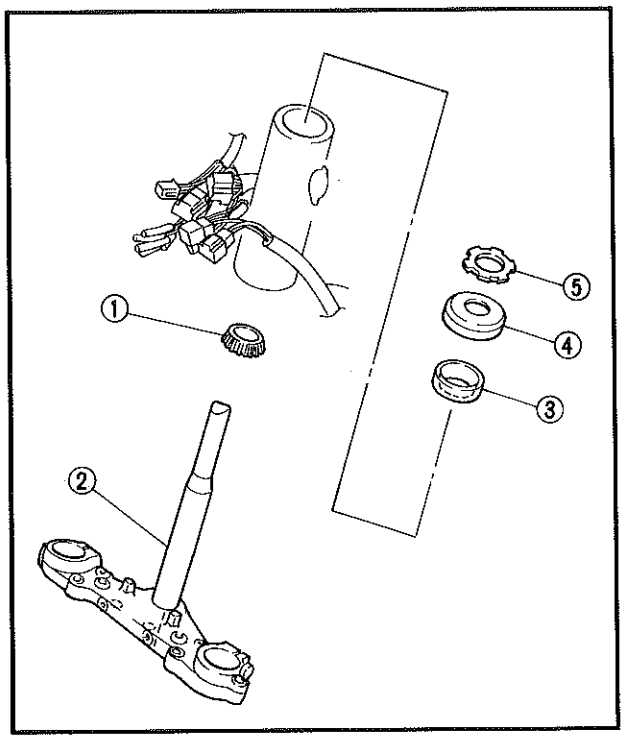


3.Inspect:
- Upper bracket
- Lower bracket
  (with the steering stem)
  Cracks/bends/damage → Replace.

EB704030
INSTALLATION

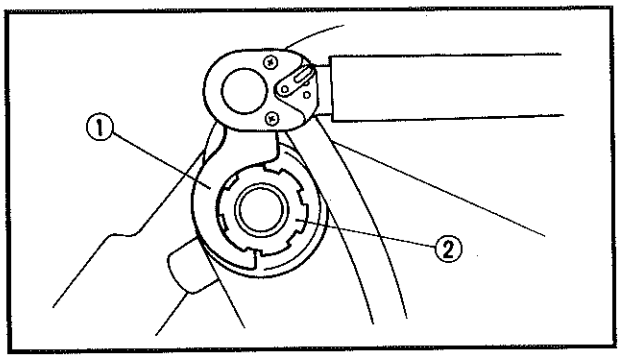
1.Lubricate:
- Bearings (upper and lower)
- Bearing races

	Recommended lubricant: Lithium soap base grease



2.Install:
- Bearing (lower) ①
- Lower bracket ②
- Bearing (upper) ③
- Bearing cover ④
- Ring nut (lower) ⑤

CAUTION:
Hold the steering stem until it is secured.

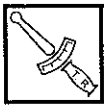


3.Tighten:
- Ring nuts (lower and upper)

****

Tightening steps:
- Using a ring nut wrench ① tighten the lower ring nut ②.

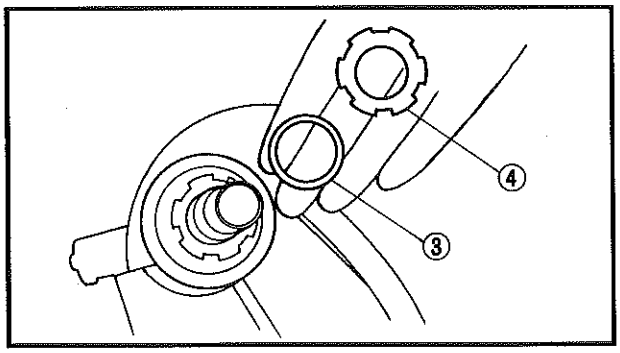
NOTE:
Set the torque wrench at a right angle to the ring nut wrench.

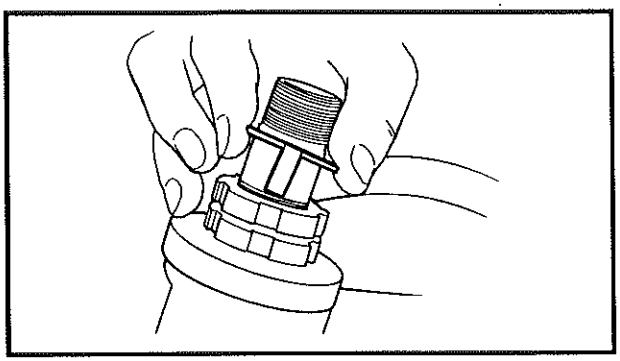
	**Ring nut wrench: YU-33975, 90890 - 01403**
	**Ring nut (initial tightening): 52 Nm (5.2 m • kg, 37 ft • lb)**

- Turn the steering stem several times to the left and to the right.
- Loosen the ring nut completely and then retighten it to specification.

⚠ WARNING
Do not overtighten the ring nut.

	**Ring nut (final tightening): 3 Nm (0.3 m • kg, 2.2 ft • lb)**

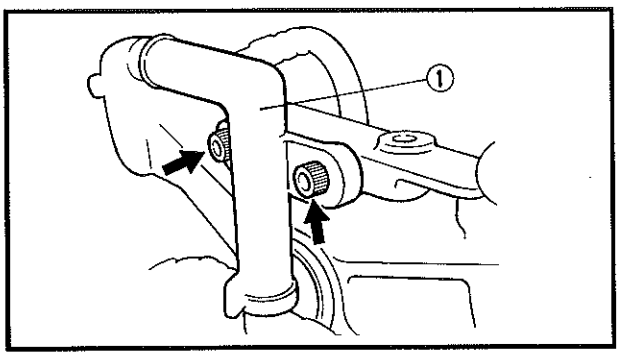




- Check the steering stem by turning it all the way to the left and then to the right. If there is any binding, remove the steering stem assembly and inspect the steering bearings.
- Install the rubber washer ③.
- Install the ring nut (upper) ④.
- Finger tighten the ring nut, then align the slots of both ring nuts. If they are not aligned, hold the lower ring nut and tighten the upper one until they are aligned.
- Install the lock washer.

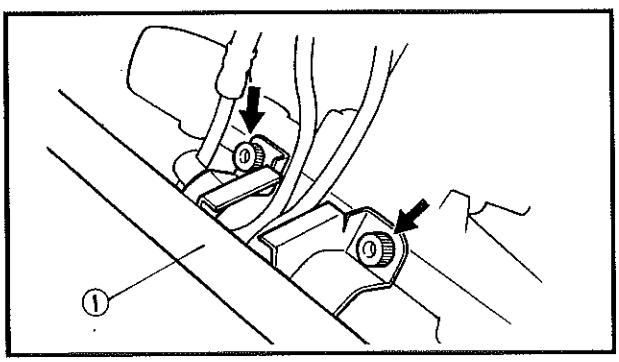
NOTE:
Make sure that the lock washer tabs are inserted into the slots.

****

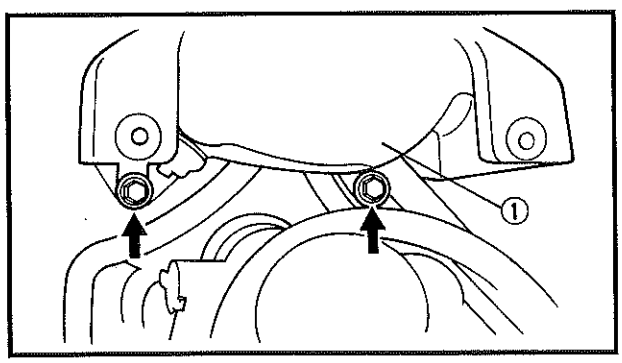


4.Install:
- Brake hose joint ①

7 Nm (0.7 m · kg, 5.1 ft · lb)

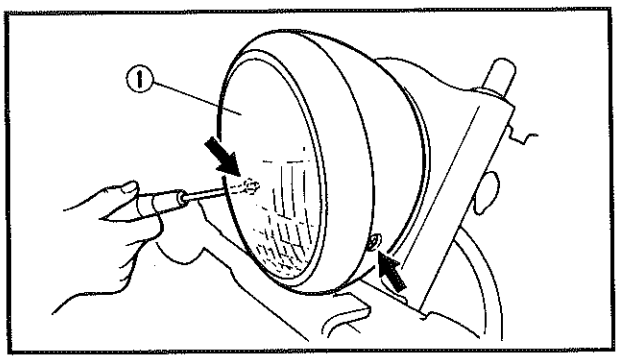


5.Install:
- Flasher light bracket assembly ①
- Chrome flasher bracket cover



6.Install:
- Headlight body ①

7.Connect:
- Leads
  (in the headlight body)



8.Install:
- Headlight lens unit ①

9.Install:
- Front fork
  Refer to "FRONT FORK".

NOTE:
Temporarily tighten the front fork pinch bolts.

10.Tighten:
- Nut (steering stem)
  130 Nm (13.0 m · kg, 94 ft · lb)
- Front fork pinch bolts (lower)
  20 Nm (2.0 m · kg, 14 ft · lb)
- Front fork pinch bolts (upper)
  10 Nm (1.0 m · kg, 7.2 ft · lb)

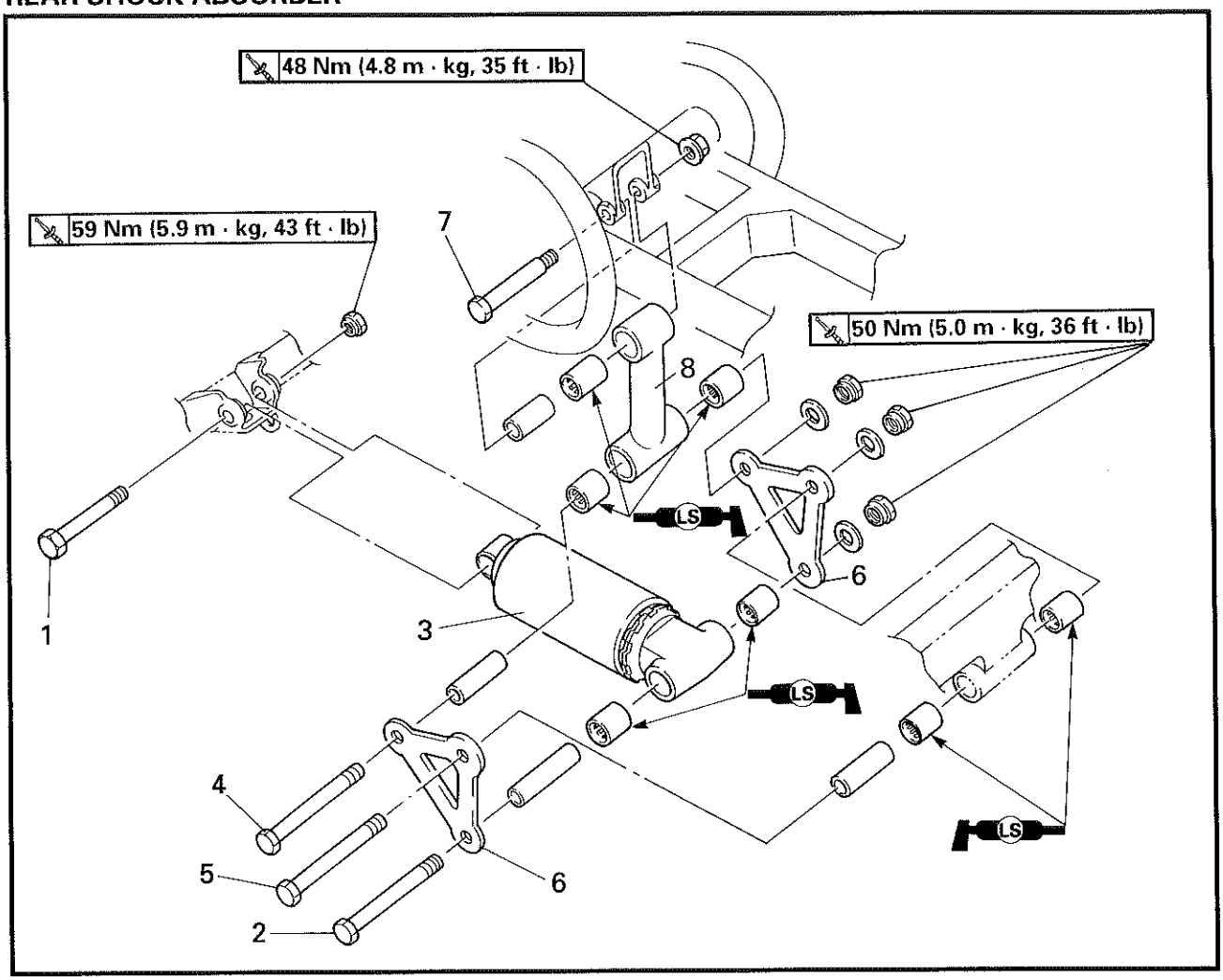
11.Install:
- Handlebar
  Refer to "HANDLEBAR".

12.Install:
- Front wheel
  Refer to "FRONT WHEEL".

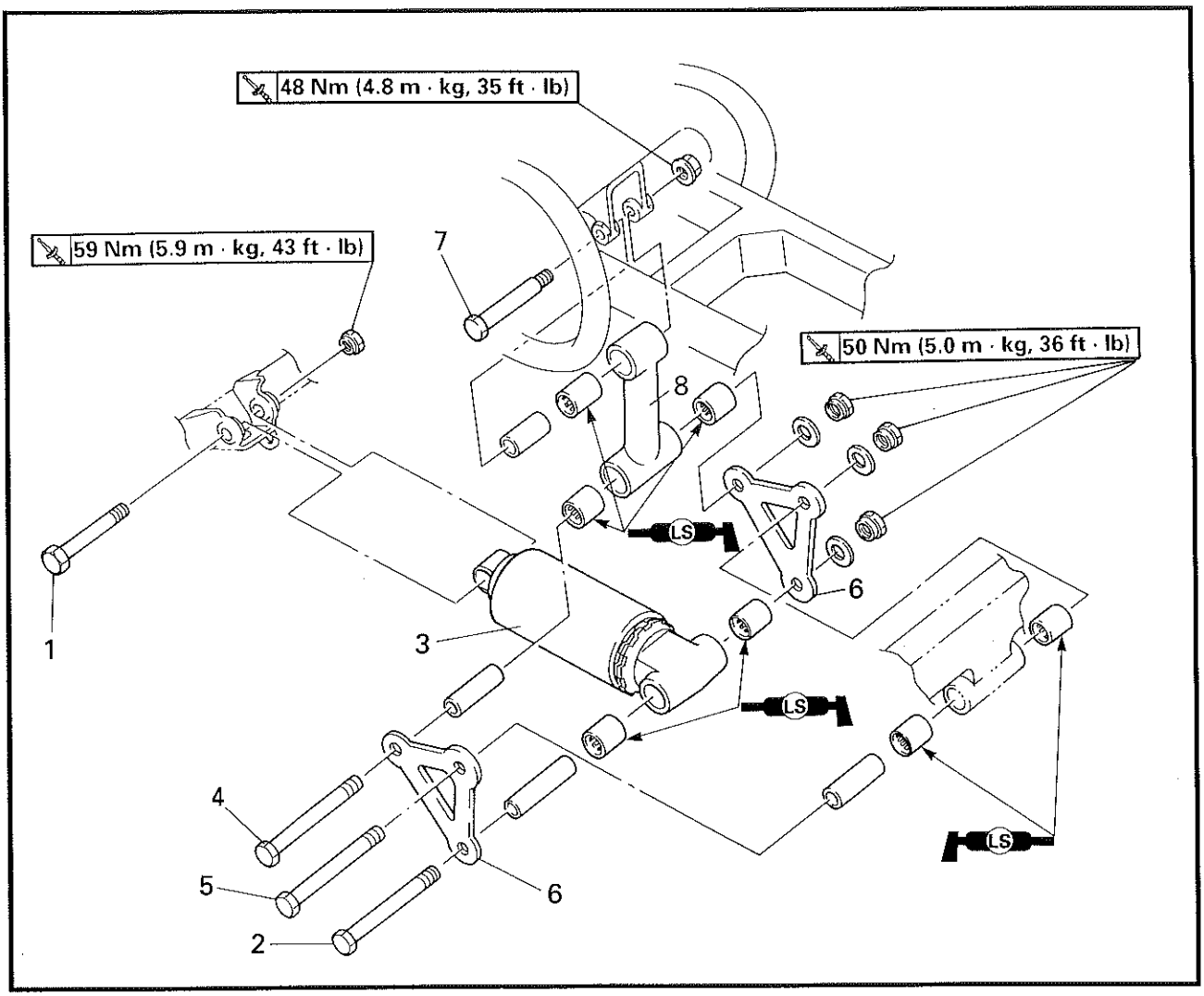
13.Install:
- Fuel tank
- Rider seat
  Refer to "FUEL TANK" and "SEATS" in CHAPTER 3.

REAR SHOCK ABSORBER AND SWINGARM

REAR SHOCK ABSORBER

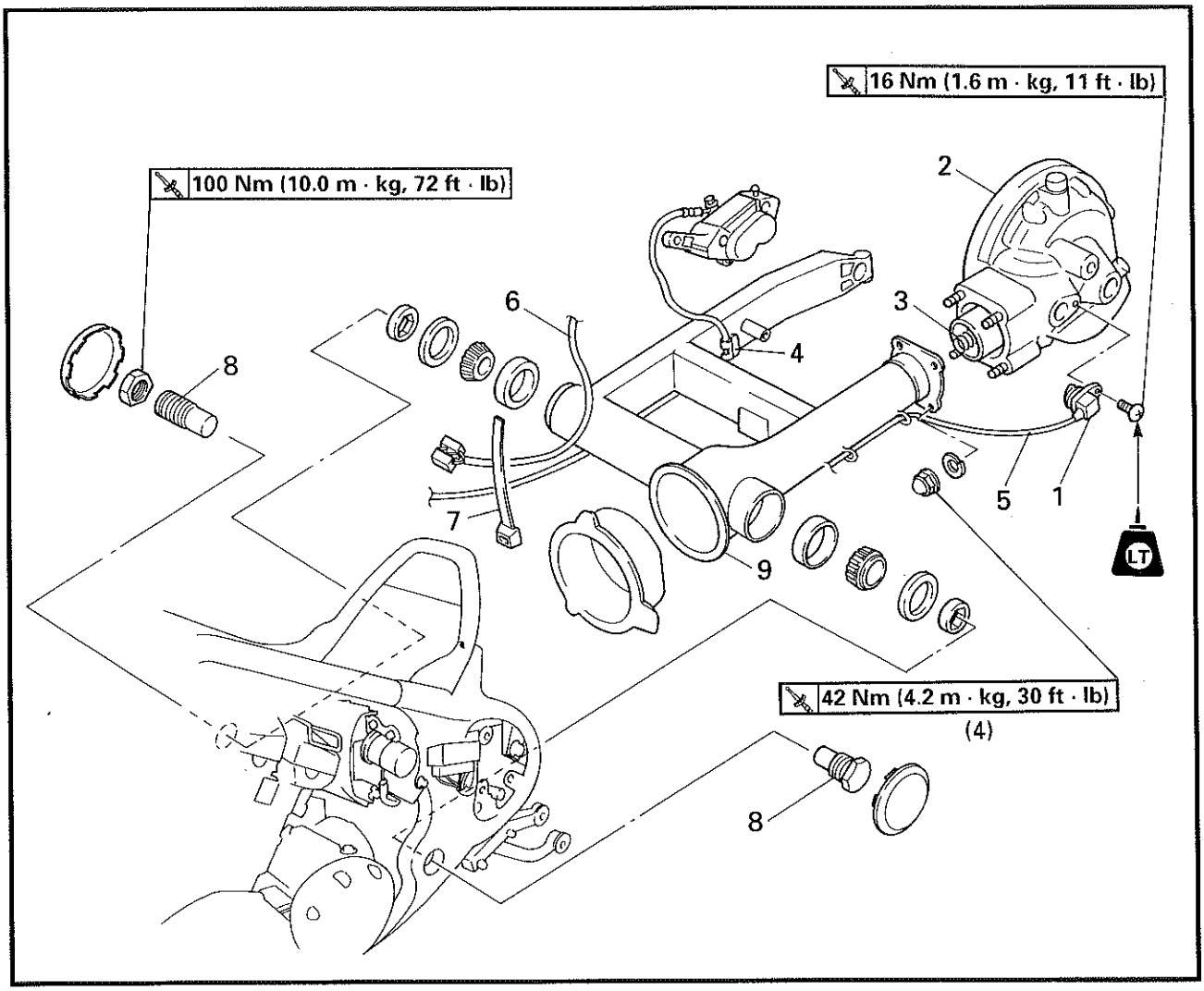


Order	Job name/Part name	Q'ty	Remarks
	Rear shock absorber removal		Remove the parts in the order below. Stand the motorcycle on a level surface. **⚠ WARNING** **Securely support the motorcycle so there is no danger of it falling over.**
	Rear fender and rear wheel		Refer to "REAR WHEEL".
	Muffler		Refer to "ENGINE REMOVAL" in CHAPTER 4.
1	Bolt (shock absorber- frame)	1	
2	Bolt (shock absorber - connecting rod)	1	
3	Rear shock absorber	1	
4	Bolt (connecting rod - relay arm)	1	
5	Bolt (connecting rod - swingarm)	1	

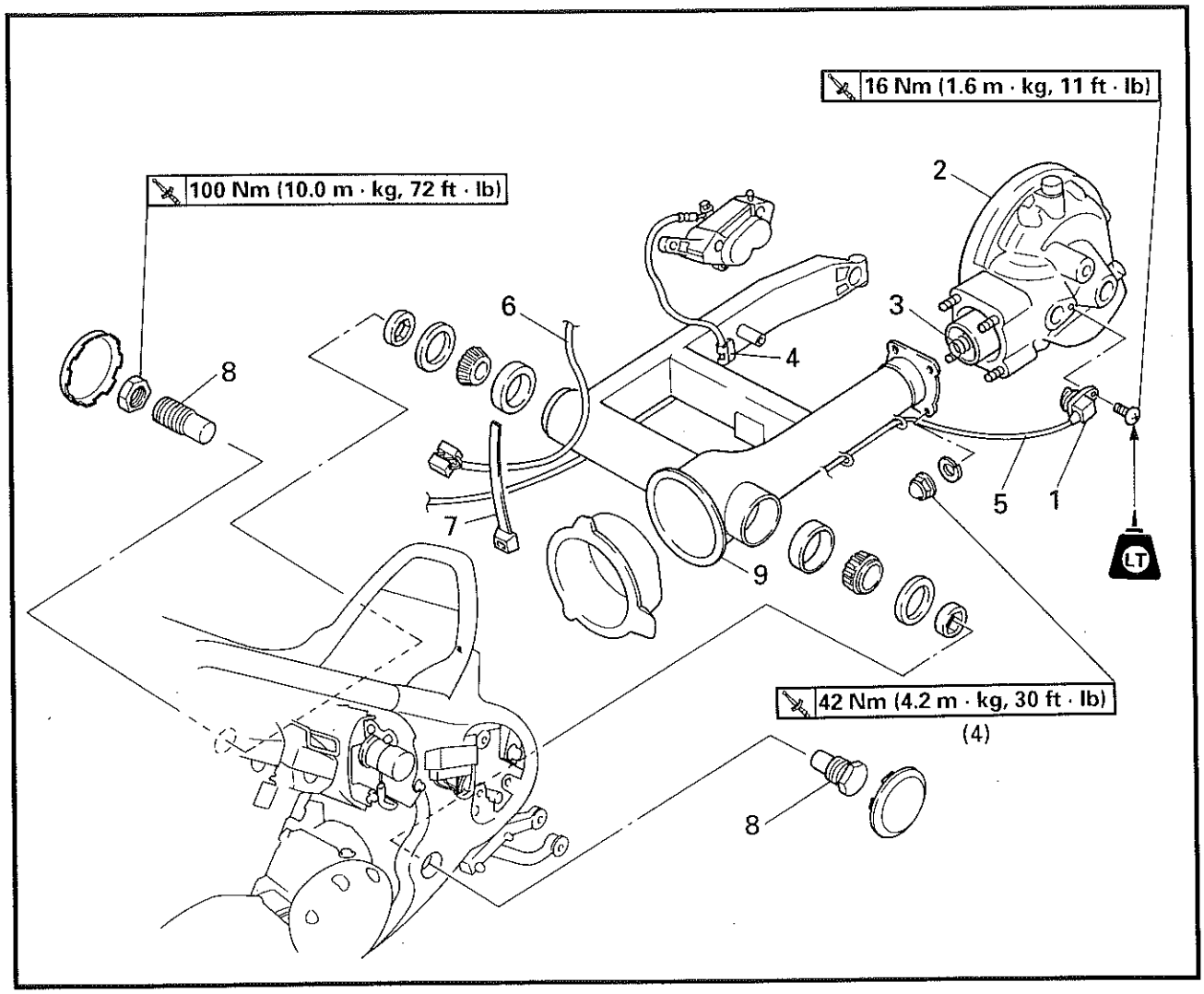


Order	Job name/Part name	Q'ty	Remarks
6	Connecting rods	2	
7	Bolt (relay arm -frame)	1	
8	Relay arm	1	
			For installation, reverse the removal procedure.

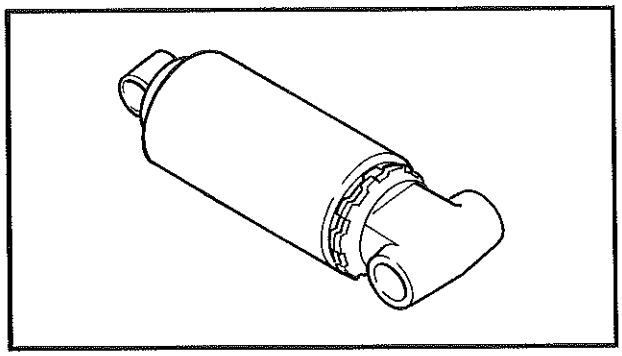
SWINGARM

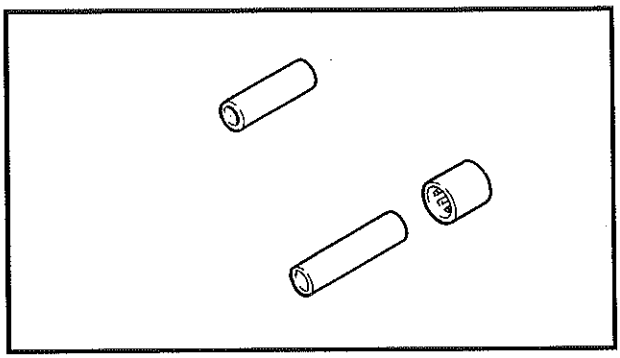


Order	Job name/Part name	Q'ty	Remarks
	Swingarm removal		Remove the parts in the order below. Stand the motorcycle on a level surface. **⚠ WARNING** **Securely support the motorcycle so there is no danger of it falling over.**
	Rear fender and rear wheel		Refer to "REAR WHEEL".
	Rear shock absorber		Refer to "REAR SHOCK ABSORBER".
1	Speedometer sensor	1	
2	Final gear case	1	
3	Drive shaft	1	
4	Brake hose holder	1	
5	Speedometer sensor leads	1	Unhook from the cable guide.
6	Horn leads	2	



Order	Job name/Part name	Q'ty	Remarks
7	Plastic locking tie	1	
8	Pivot shafts (right and left)	2	
9	Swingarm	1	For installation, reverse the removal procedure.





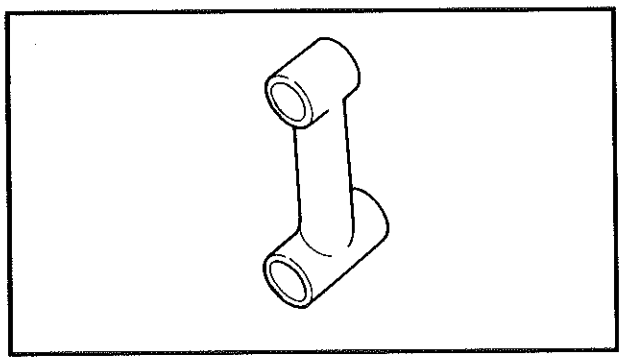
EB705040
INSPECTION

Rear shock absorber

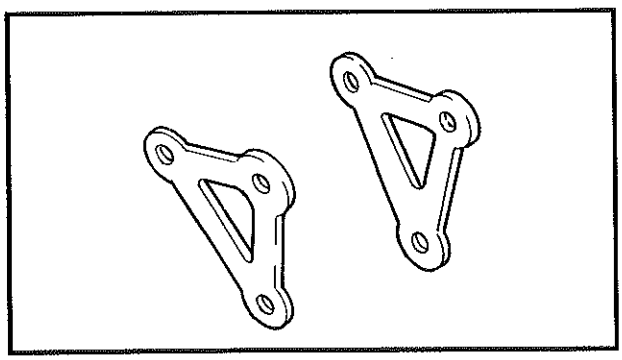
1.Inspect:
- Rear shock absorber rod
  Bends/damage → Replace the rear shock absorber assembly.
- Rear shock absorber
  Oil leaks/gas leaks → Replace the rear shock absorber assembly.
- Spring
  Wear/damage → Replace the rear shock absorber assembly.

2.Inspect:
- Bushing
- Bearing
  Pitting/damage → Replace.
- Collar
  Damage/scratches → Replace.

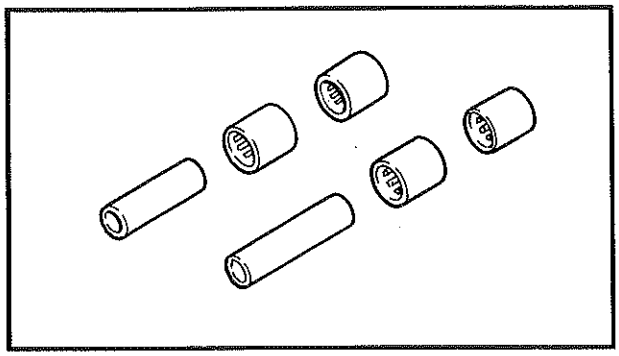
3.Inspect:
- Dust seals
  Wear/damage → Replace.
- Bolts
  Wear/bends/damage → Replace.



4.Inspect:
- Relay arm
  Cracks/damage → Replace.

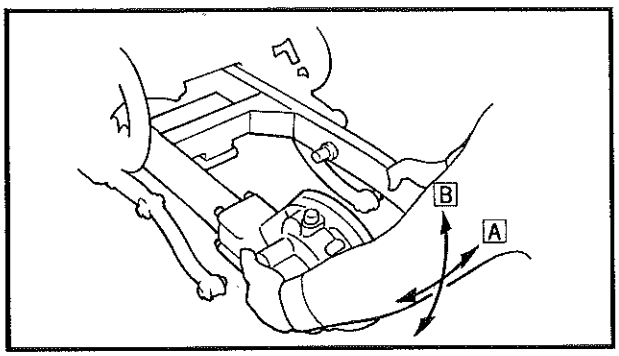


5.Inspect:
- Connecting rods
  Cracks/damage → Replace.



6.Inspect:
- Bearings
  Pitting/damage → Replace.

7.Inspect:
- Collars
  Damage/scratches → Replace.



EB705042
Swingarm

1.Check:
- Swingarm free play

****

Inspection steps:

- Check the tightening torque of the swingarm pivot shaft securing nuts.

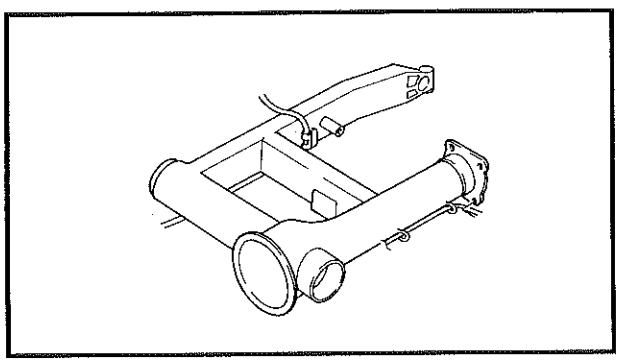
Securing nut (swingarm pivot shaft):
Left:
100 Nm (10 m • kg, 72 m • kg)
Right:
7 Nm (0.7 m • kg, 5.1 m • kg)
Right - locknut:
100 Nm (10 m • kg, 72 m • kg)

- Check the swingarm side play A by moving the swingarm from side to side.
  If side play is noticeable, check the inner collar, bearing, washer and thrust cover.

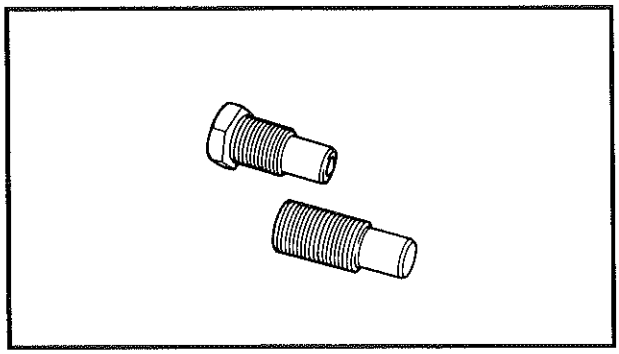
Side play (at swingarm end):
Zero mm (Zero in)

- Check the swingarm vertical movement B by moving it up and down.
  If vertical movement is not smooth or if there is binding, check the inner collar, bearing, washer and thrust cover.

****

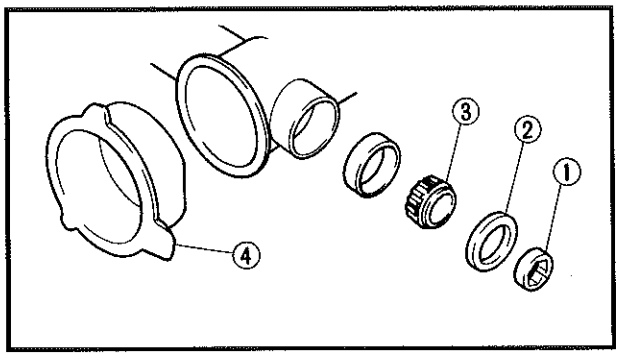


2.Inspect:
- Swingarm
  Cracks/bends/damage → Replace.



3.Inspect:
- Pivot shafts
  Damage/wear → Replace.

NOTE:
Wash the swingarm pivoting parts in a solvent.



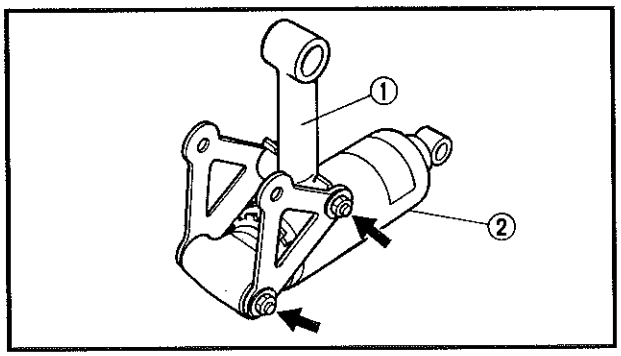
4.Inspect:
- Collar ①
- Oil seal ②
- Bearing ③
- Rubber boot ④
  Wear/damage → Replace.

EB705050
INSTALLATION

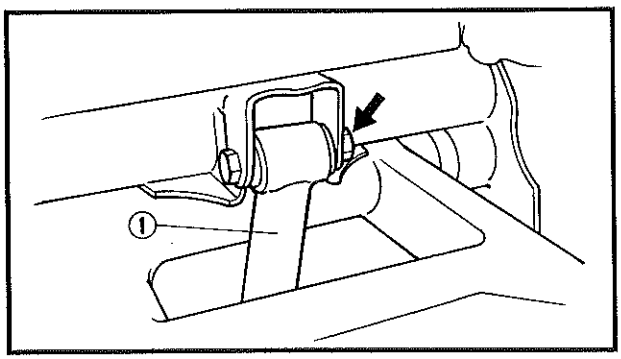
Rear shock absorber

1.Lubricate:
- Collars
- Bearings

	Recommended lubricant: Molybdenum disulfide grease

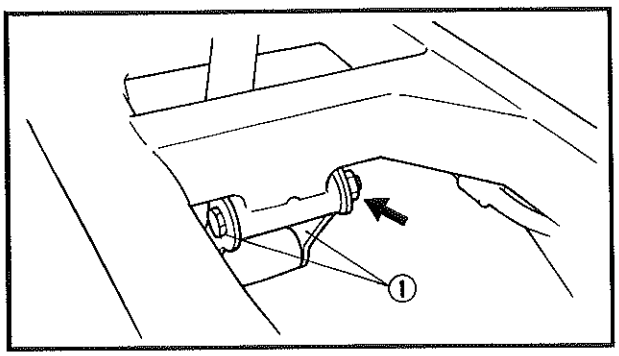


2.Install:
- Relay arm ① **50 Nm (5.0 m · kg, 36 ft · lb)**
- Rear shock absorber ②
  (to the connecting rod)



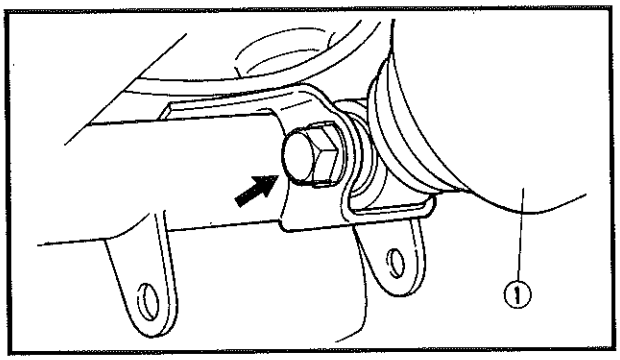
3.Install:
- Relay arm ① **48 Nm (4.8 m · kg, 35 ft · lb)**
  (to the frame)

CAUTION:
Insert the relay arm bolt ② from the left.



4.Install:
- Connecting rod ①
  (to the swingarm)

50 Nm (5.0 m · kg, 36 ft · lb)



5.Install:
- Rear shock absorber ①
  (to the frame) 59 Nm (5.9 m · kg, 43 ft · lb)

NOTE:
Lift up the swingarm to install the relay arm, connecting rod and rear shock absorber.

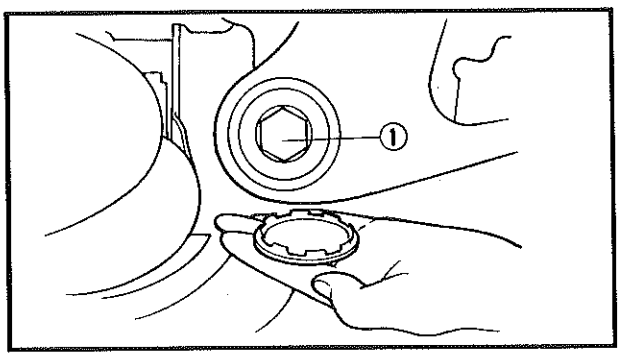
6.Install:
- Rear wheel
- Rear fender
  Refer to "REAR WHEEL".

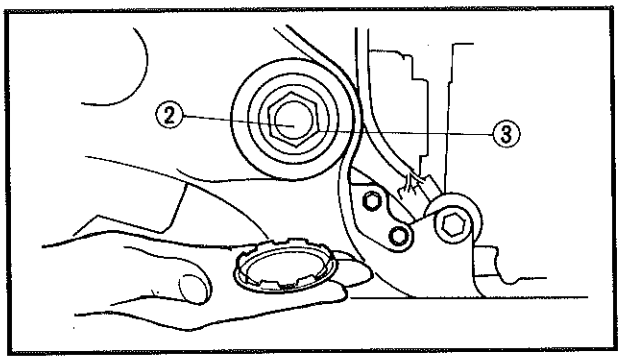
EB705051
Swingarm
1.Lubricate:
- Drive shaft splines

	Recommended lubricant: Lithium soap base grease

2.Lubricate:
- Bearings
- Collars
- Oil seals

	Recommended lubricant: Molybdenum disulfide grease





3.Install:
- Swingarm
- Pivot shaft (left)
- Pivot shaft (right)
- Pivot shaft nut

****

Tightening steps:

●Tighten the pivot shaft (left) ① to specification.

	Pivot shaft (left): 100 Nm (10 m·kg, 72 ft·lb)

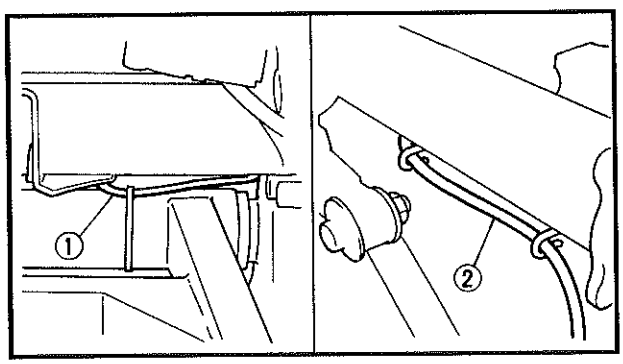
●Tighten the pivot shaft (right) ② until it contacts the collar.

	Pivot shaft (right): 7 Nm (0.7 m·kg, 5.1 ft·lb)

●Tighten the pivot shaft locknut (right) ③ to specification.

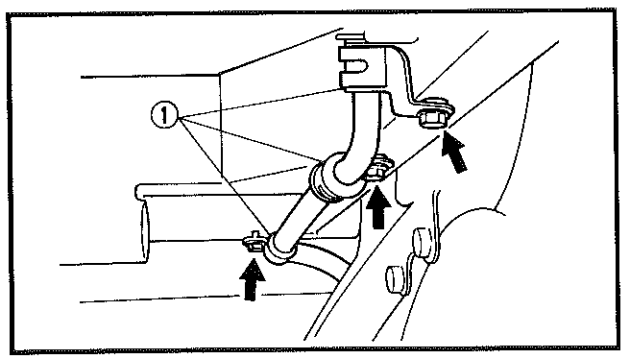
	Pivot shaft locknut (right): 100 Nm (10 m·kg, 72 ft·lb)

****

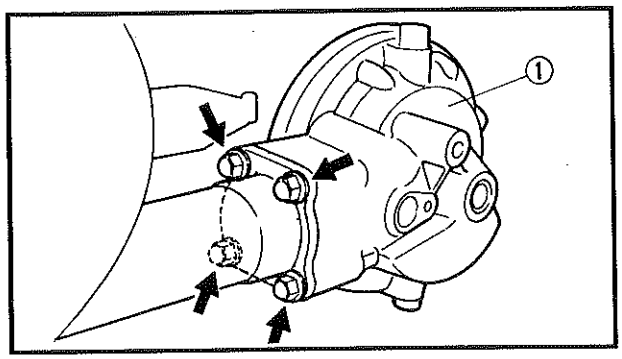


4.Install:
- Horn leads ①
- Speedometer sensor lead ②

NOTE:
When attaching the horn leads use a new plastic locking tie.



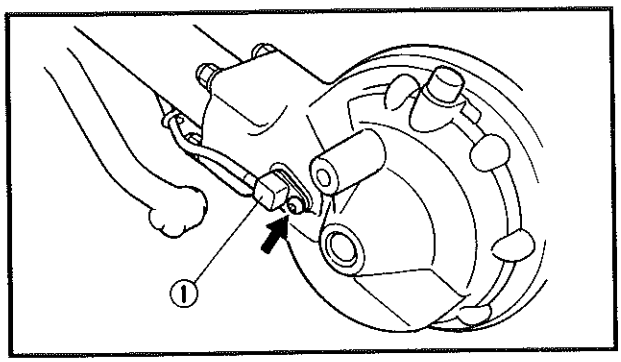
5.Install:
- Brake hose holder ①



6.Install:
- Drive shaft
- Final gear case assembly ①

42 Nm (4.2 m · kg, 30 ft · lb)

NOTE:
Align the drive shaft splines with the universal joint.



7.Install:
- Speedometer sensor ①

16 Nm (1.6 m · kg, 11 ft · lb)

8.Install:
- Rear shock absorber assembly
  Refer to "REAR SHOCK ABSORBER".

9.Install:
- Rear wheel
- Rear fender
  Refer to "REAR WHEEL".

SHAFT DRIVE

EB707010
TROUBLESHOOTING

The following conditions may indicate damaged shaft drive components:

A	Symptoms	B	Possible Causes
1.A pronounced hesitation or jerky movement during acceleration, deceleration, or sustained speeds (This must not be confused with engine surging or transmission-related movements.) 2.A rolling "rumble" noticeable at low speeds, a high-pitched whine, or a "clunk" from a shaft drive component or area 3.A locked-up condition of the shaft drive mechanism or no power transmitted from the engine to the rear wheel		A.Bearing damage B.Improper gear lash 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 these components are damaged, remove them for individual inspection.

Inspection notes

1.Investigate any unusual noises.

****

The following noises may indicate a mechanical defect:

a.A rolling "rumble" during coasting, acceleration, or deceleration. The noise increases with 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, too little gear lash

CAUTION:

Insufficient gear lash is extremely destructive to the gear teeth. If a test ride following reassembly indicates this condition, stop riding immediately to minimize gear damage.

c.A slight "clunk" evident at low speed operation. This noise must be distinguished from normal motorcycle operation.
Diagnosis: Possible broken gear teeth

⚠ WARNING

Stop riding immediately if broken gear teeth are suspected. This condition could result in a locking of the shaft drive assembly, causing loss of control of the motorcycle and possible injury to the rider.

****

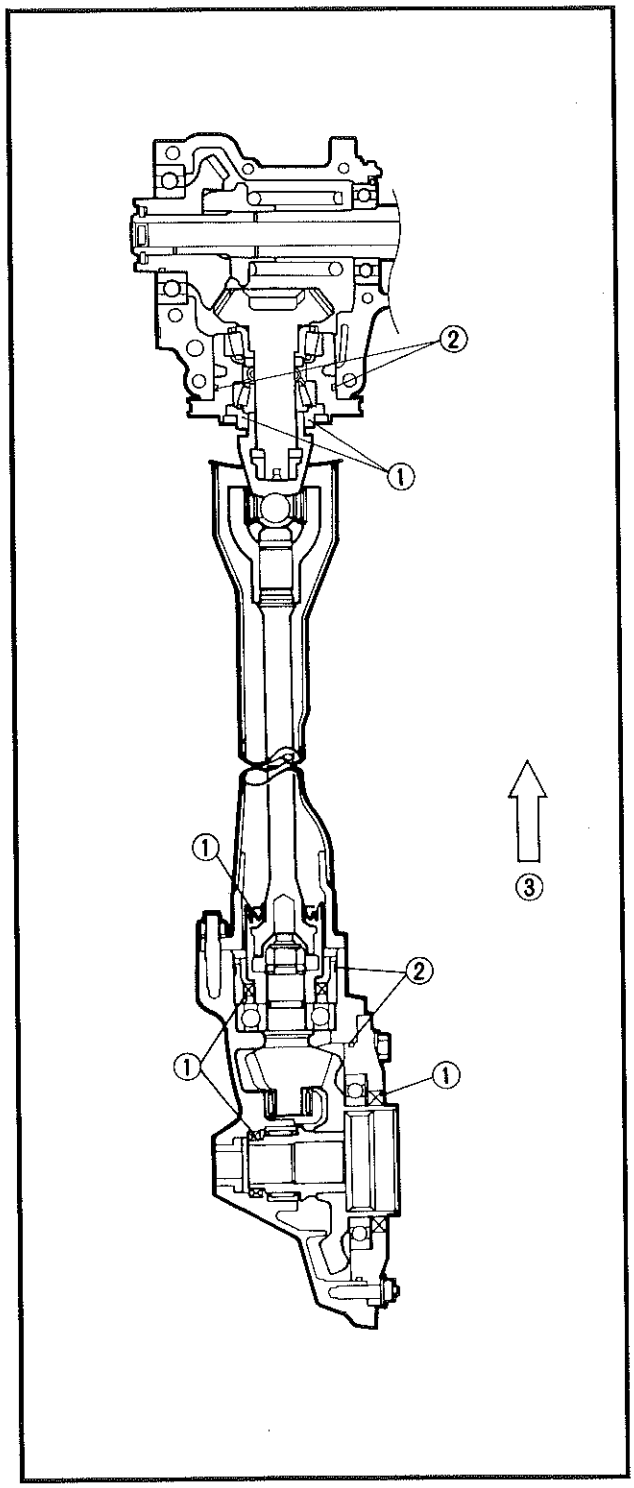
2.Inspect:

- Drained oil
  Drained oil contains a large amount of metal particles → Check the bearing for seizure.

NOTE:

A small amount of metal particles in the oil is normal.

3.Inspect:
• Oil leakage



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Inspection steps:

- Clean the entire motorcycle thoroughly, then dry it.
- Apply a leak-locating compound or dry powder spray to the shaft drive.
- Road test the motorcycle for the distance necessary to locate the leak.
  Leakage → Inspect the component housing, gasket and/or seal for damage.
  Damage → Replace the component.

① Oil seal
② O-ring
③ Forward

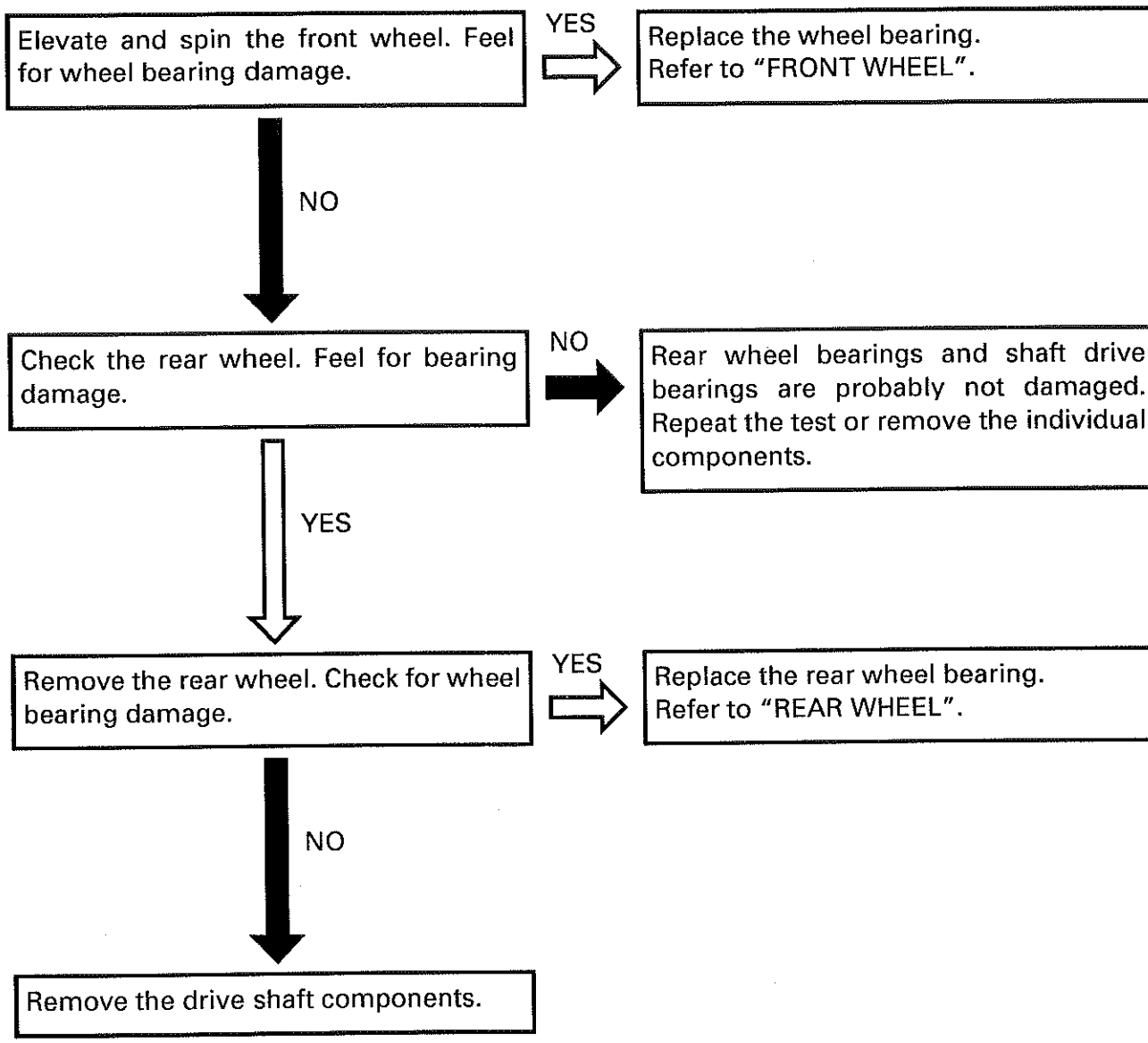
NOTE:

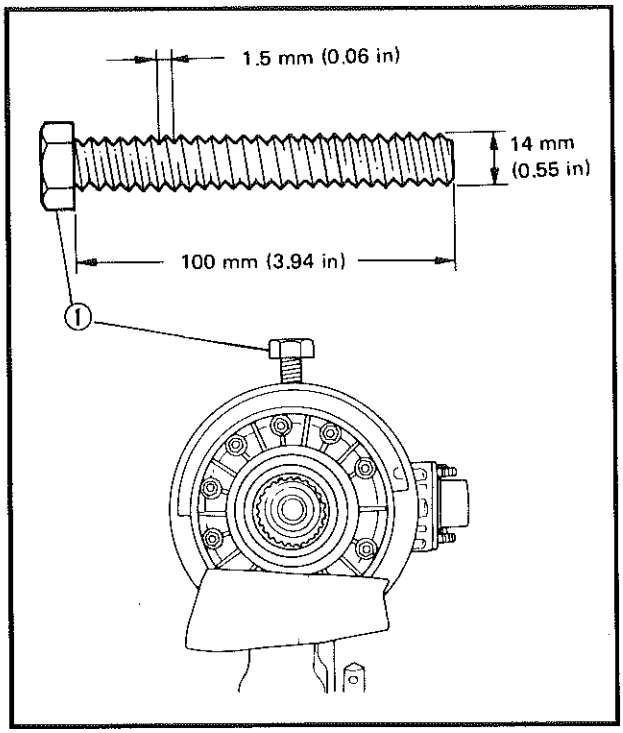
- An apparent oil leak on a new or nearly new motorcycle may result from the application of a rust preventive coating or excessive seal lubrication.
- Always clean the motorcycle and recheck the suspected location of an apparent leak.

****

Troubleshooting Chart

When causes A and B shown in the chart at the beginning of the "TROUBLESHOOTING" section exist, check the following points:





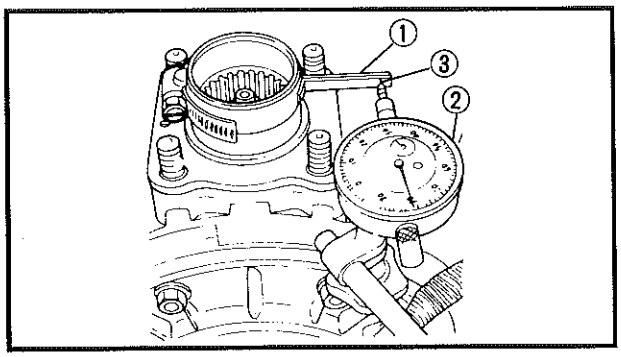
EB707030
FINAL GEAR BACKLASH MEASUREMENT

1.Secure the final drive gear case in a vise or a similar supporting device.
2.Remove:
- Drain plug
  Drain the oil.

3.Install:
- Specified bolt ①
  (into the drain plug hole)

4.Finger tighten the bolt until it holds the ring gear.

NOTE:
Do not overtighten the bolt; just finger-tighten it.



5.Attach:
- Final gear backlash band ①
- Dial gauge ②

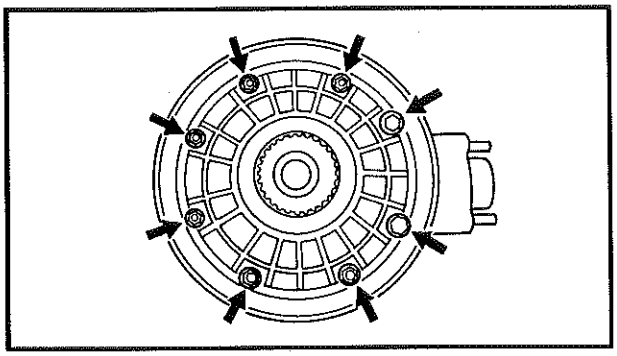
	Final gear backlash band: **YM - 01230, 90890 - 01230**

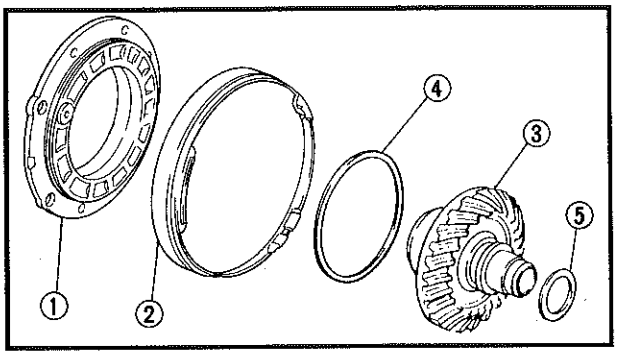
- Position mark ③

6.Measure:
- Final gear backlash
  Gently rotate the final drive gear coupling from engagement to engagement.
  Over the specified limit → Adjust.

	Final gear backlash: **0.1 ~ 0.2 mm (0.004 ~ 0.008 in)**

NOTE:
Measure the final gear backlash at four positions. Rotate the final drive shaft 90° each time.





EB707031
FINAL GEAR BACKLASH ADJUSTMENT

1.Remove:
- Nuts (bearing housing)
- Bolts (bearing housing)

NOTE:
Working in a crisscross pattern, loosen each nut 1 /4 of a turn. After all the nuts are loosened, remove them.

2.Remove:
- Bearing housing ①
- Dust cover ②
- Ring gear ③
- Shim(s) ④
- Thrust washer ⑤

3.Adjust:
- Final gear backlash

****

Adjustment steps:

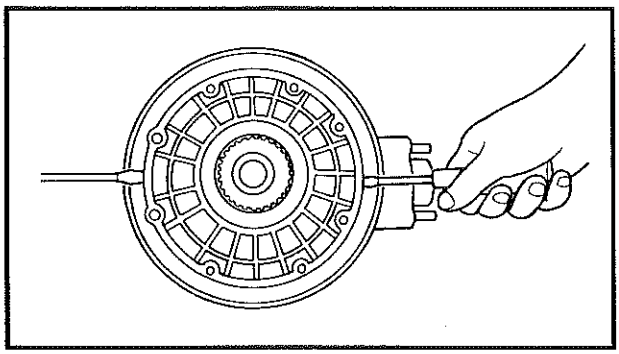
- Use the following chart to select the suitable shims and thrust washer.

Reducing the shim thickness:	**gear backlash is increased.**
Increasing the shim thickness:	**gear backlash is decreased.**

- If it is necessary to increase the final 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.
- If it is necessary to reduce the final 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.

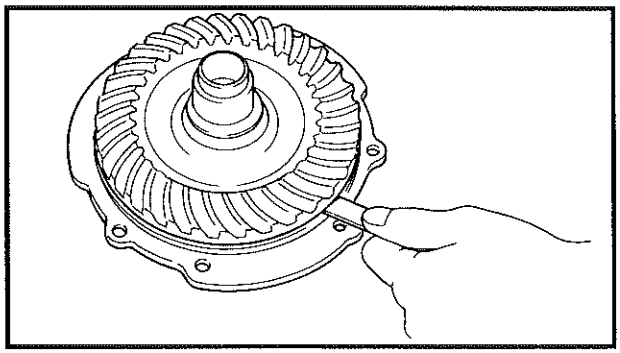
	Ring gear shim
Thickness (mm)	**0.30, 0.40, 0.50**

	Thrust washer
Thickness (mm)	**1.2, 1.4, 1.6, 1.8, 2.0**



RING GEAR STOPPER CLEARANCE MEASUREMENT

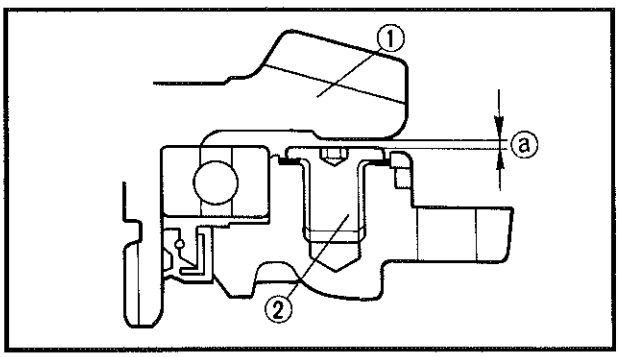
1.Remove:
- Bearing housing with ring gear
  Refer to the "Final gear backlash adjustment" section.



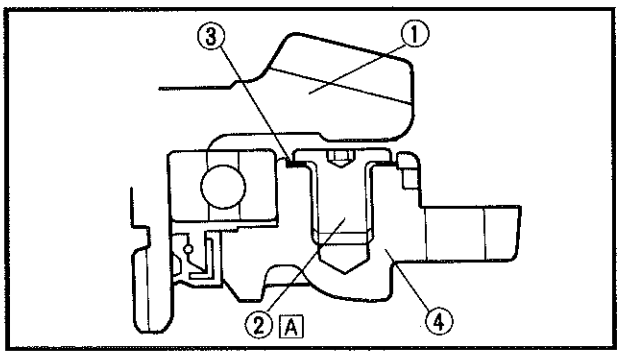
2.Measure:
- Ring gear stopper clearance ⓐ
  Out of specification → Adjust

	Ring gear stopper clearance: 0.3 ~ 0.6 mm (0.012 ~ 0.024 in)

① Ring gear stopper
② Ring gear



3.Install:
- Bearing housing with ring gear



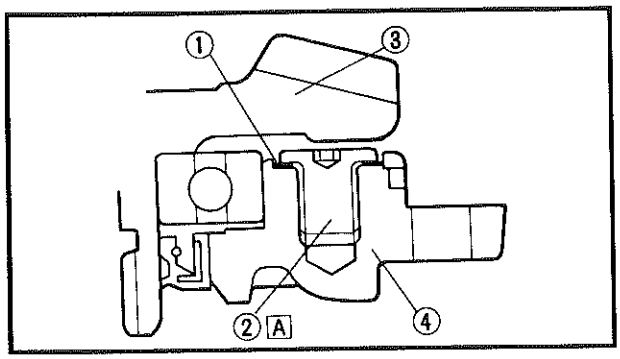
RING GEAR STOPPER CLEARANCE ADJUSTMENT

1.Remove:
- Ring gear ①
- Ring gear stopper ②
- Shim(s) ③

④ Bearing housing
A Left-hand threads

2.Select:
- Suitable shim(s)
  Use the following chart

	Ring gear shim
Thickness (mm)	0.10, 0.15, 0.20, 0.30, 0.40, 0.50



3.Install:
- Shim(s) ①
- Ring gear stopper ②

9 Nm (0.9 m · kg, 6.5 ft · lb)

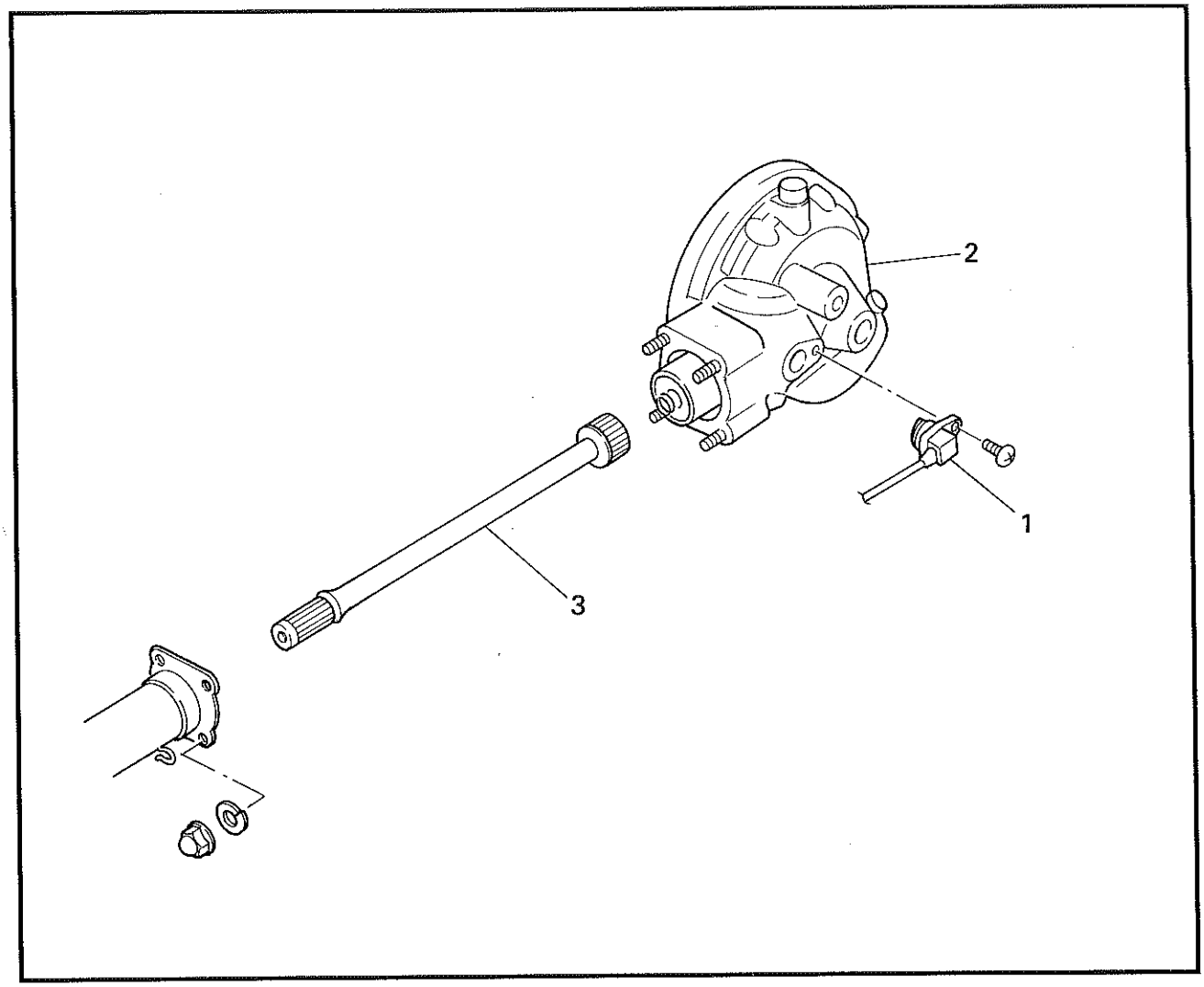
- Ring gear ③

④ Bearing housing
A Left-hand threads

NOTE:
Use LOCTITE® on the ring gear stopper.

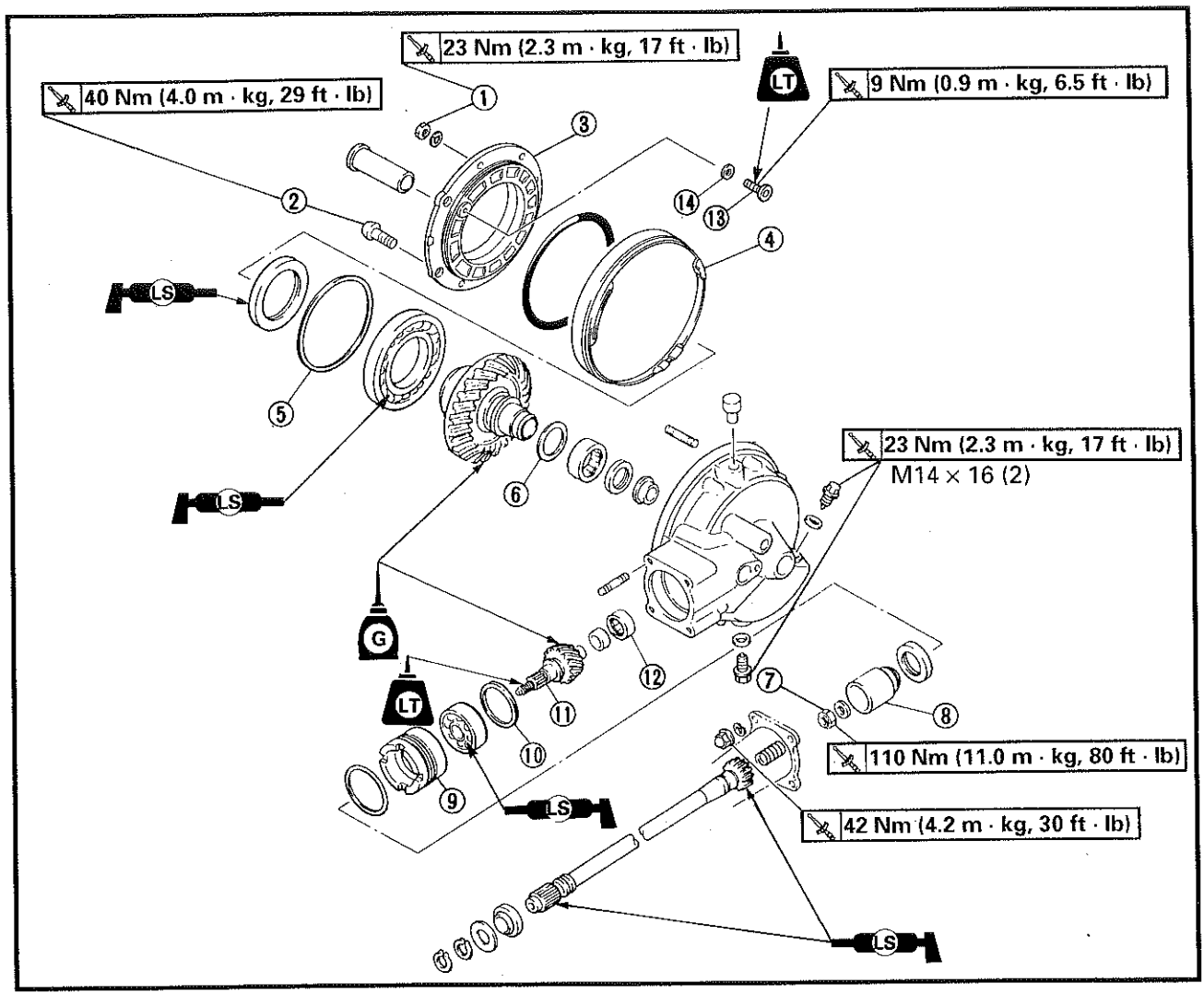
4.Measure:
- Ring gear stopper clearance

DRIVE SHAFT

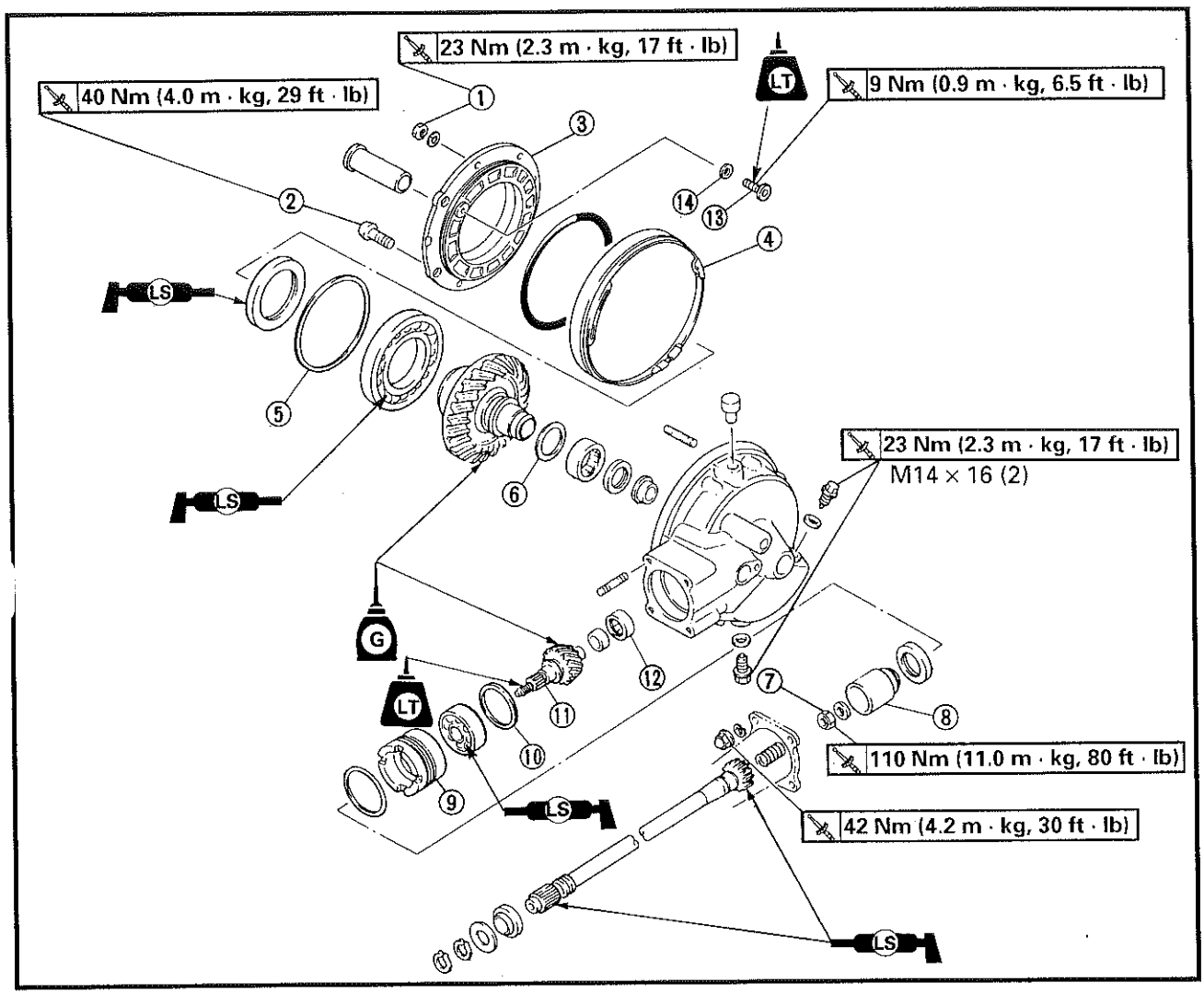


Order	Job name/Part name	Q'ty	Remarks
	Drive shaft removal		Remove the parts in the order below. Stand the motorcycle on a level surface. **⚠ WARNING** **Securely support the motorcycle so there is no danger of it falling over.**
	Rear fender and rear wheel		Refer to "REAR WHEEL".
1	Speedometer sensor	1	
2	Final gear assembly	1	
3	Drive shaft	1	
			For installation, reverse the removal procedure.

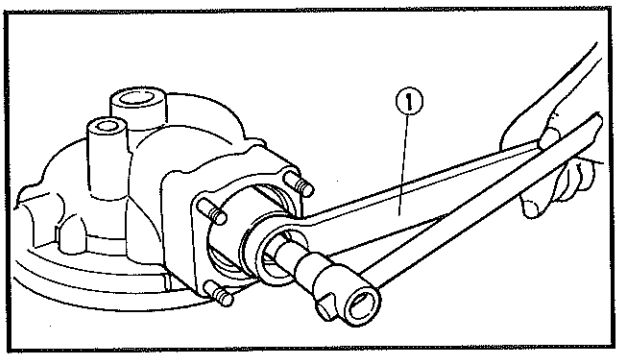
FINAL GEAR

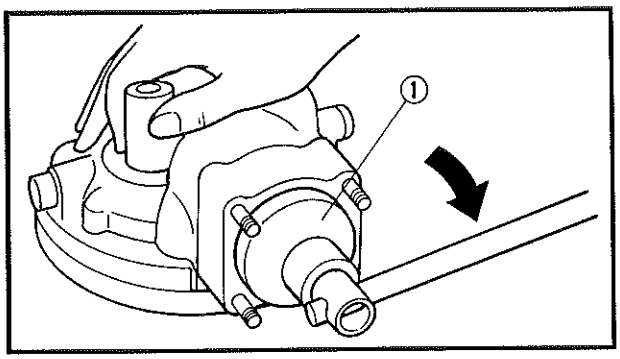


Order	Job name/Part name	Q'ty	Remarks
	Final gear disassembly		Disassemble the parts in the order below.
①	Nuts (bearing housing)		
②	Bolts (bearing housing)		**NOTE:** Working in a crisscross pattern, loosen each bolt 1 /4 of a turn. After all the bolts are loosened, remove them.
③	Bearing housing	1	
④	Dust cover	1	
⑤	Shim(s)		
⑥	Thrust washer	1	
⑦	Self-locking nut (gear coupling)	1	Refer to "FINAL DRIVE GEAR DISASSEMBLY".
⑧	Gear coupling	1	
⑨	Bearing retainer (final drive shaft)	1	



Order	Job name/Part name	Q'ty	Remarks
⑩	Shim(s)		
⑪	Final drive shaft assembly	1	
⑫	Final drive shaft roller bearing	1	Refer to "FINAL DRIVE ROLLER BEARING REMOVAL AND REASSEMBLY".
⑬	Ring gear stopper	1	
⑭	Shim(s)		
			For assembly, reverse the disassembly procedure.





FINAL DRIVE GEAR DISASSEMBLY

1.Remove:
- Self locking nut (coupling gear)
- Coupling gear
  Use a coupling gear/middle shaft tool ①.

	Coupling gear/middle shaft tool: YM - 01229, 90890 - 01229

2.Remove:
- Bearing retainer (final drive shaft)
  Use a bearing retainer wrench ①.

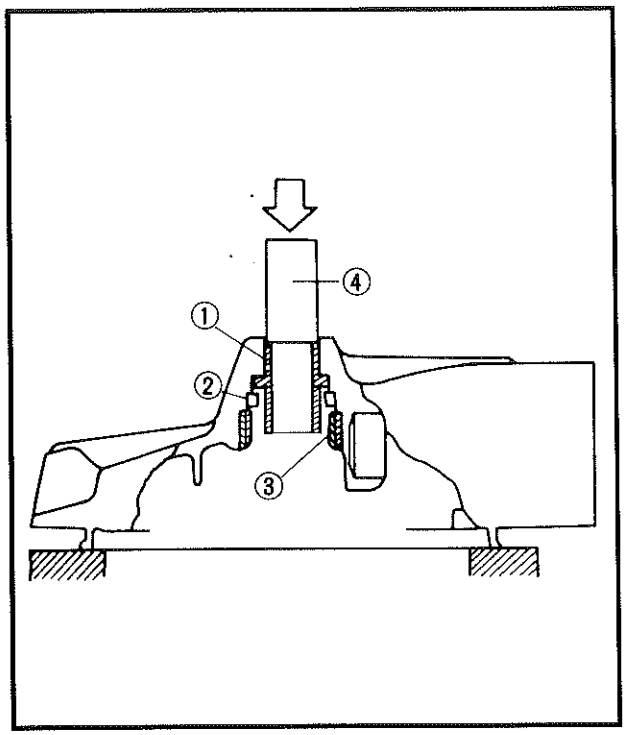
	Bearing retainer wrench: YM - 04050, 90890 - 04050

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

3.Remove:
- Final drive shaft assembly
  With a soft hammer lightly tap on the final drive shaft end.

CAUTION:
Removal of the final drive shaft should only be performed if gear replacement is necessary.

⚠ WARNING
Always use new bearings and races.



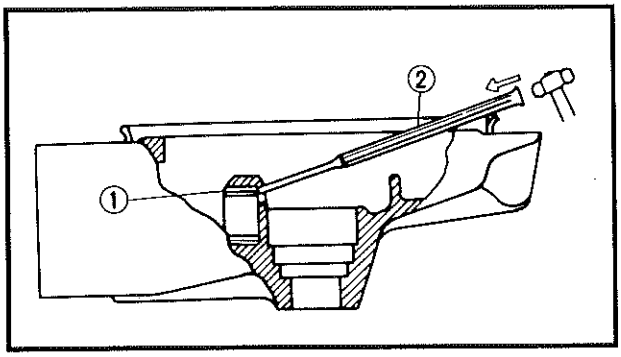
EB707033
FINAL DRIVE ROLLER BEARING REMOVAL AND REASSEMBLY

1.Remove:
- Guide collar ①
- Oil seal ②
- Roller bearing ③

Use a suitable press tool ④ and an appropriate support for the final gear case.

2.Inspect:
- Final drive roller bearing

NOTE:
The roller bearing can be reused, but Yamaha recommends installation of a new bearing. Do not reuse the oil seal.



3.Remove:
- Final drive roller bearing ①

****

Removal steps:
- Heat the final gear case to 150°C.
- Using an appropriately shaped punch ② remove the roller bearing outer races.
- Remove the inner race from the final drive shaft.

NOTE:
The removal of the final drive shaft roller bearing is a difficult procedure and is rarely necessary.

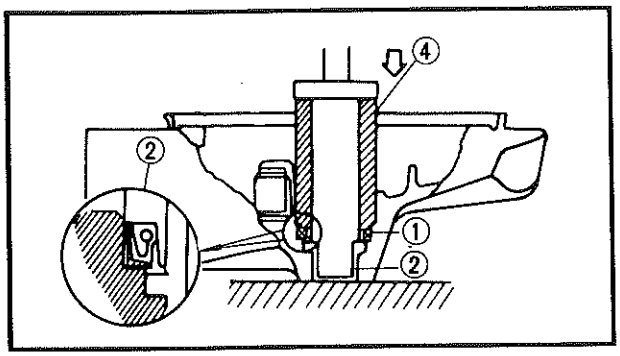
****

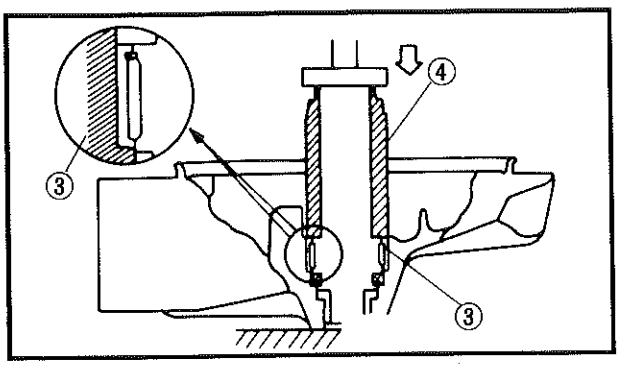
4.Install:
- Final drive roller bearing (new)

****

Installation steps:
- Heat the final gear case to 150°C.
- Install the roller bearing outer races using the proper adapter.
- Install the inner race onto the drive shaft.

****



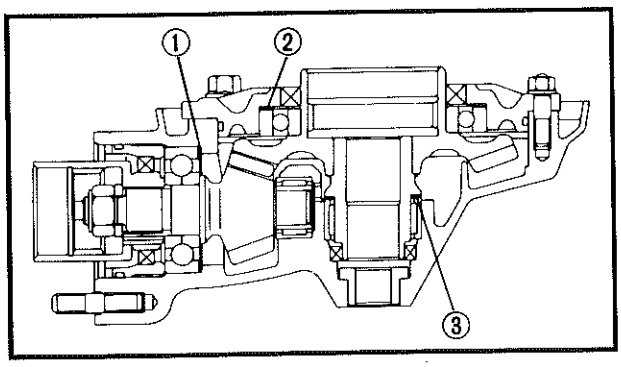


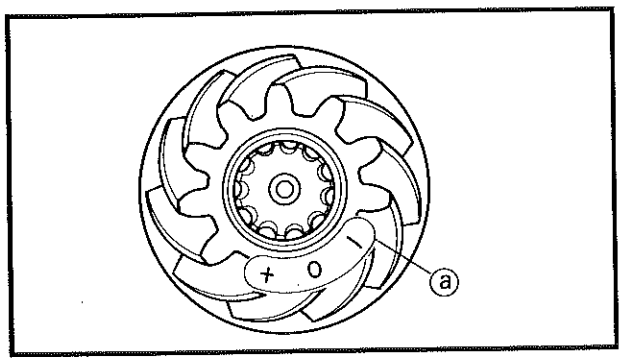
5.Install:
- Guide collar ①
- Oil seal (new) ②
- Roller bearing (outer race) ③

To install the above components into the final gear case use a suitable press tool ④ and a press.

EB707034
FINAL DRIVE/RING GEAR POSITIONING

NOTE:
Ring gear positioning is necessary when any of the following parts are replaced:
- Final gear case
- Ring gear bearing housing
- Bearing(s)





1.Select:
- Final drive gear shim ①
- Ring gear shim ②

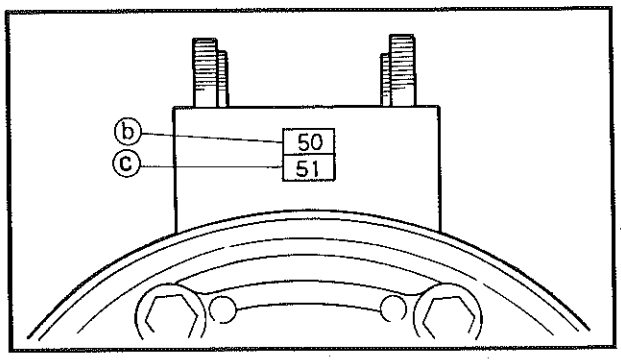
****

Selection steps:
- Position the final drive gear and the ring gear by using shims ① and ② with their respective thicknesses calculated from information marked on the final gear case and the drive gear end.

① Final drive gear shim thickness "A"
② Ring gear shim thickness "B"
③ Thrust washer "C"

- To find the final drive gear shim thickness "A", use the following formula

Final drive gear shim thickness:
A = ⓐ − ⓑ



Where:
ⓐ =a numeral (positive or negative) on the ring gear. This numeral is either added to or subtracted from "87".
ⓑ =a numeral on the final drive gear case (i.e.86.50)

Example:
If the final drive shaft has no mark.....ⓐ is 87.00.
If the final drive shaft is marked "+01".....ⓐ is 87.01.
If the final gear case is marked "50".....ⓑ is 86.50.

"A" = 87.01 – 86.50
= 0.51
Therefore, final drive gear shim thickness is 0.51 mm. Shim sizes are supplied in the following thickness.

	Final drive gear shim
Thickness (mm)	**0.30, 0.40, 0.50**

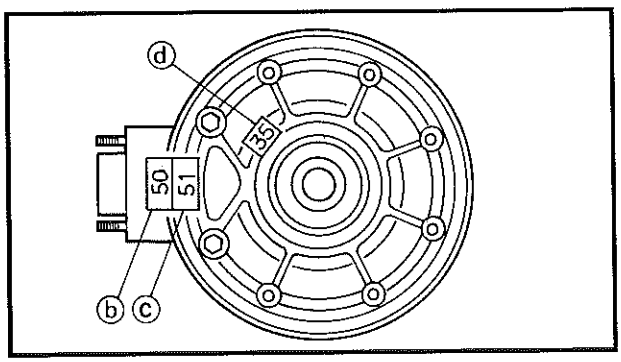
Since final drive gear shims can only be selected in 0.10 mm increments, round off the hundredths digit and select the appropriate shim(s).

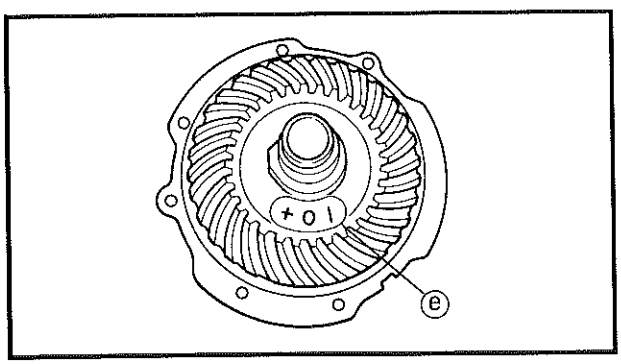
Hundredths	Rounded value
0, 1, 2, 3, 4	0
5, 6, 7, 8, 9	10

In the example above, the calculated final drive 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 gear shim.

- To find the ring gear shim thickness "B", use the following formula.

Ring gear shim thickness:
B = ⓒ + ⓓ – (ⓔ + ⓕ)





Where:
ⓒ =a numeral on the final gear case (i.e.45.51)
ⓓ =a numeral (usually a decimal number) on the outside of the ring gear bearing housing (i.e.3.35).

ⓔ =a numeral (positive or negative) on the inside of the ring gear either added to or subtracted from "35.40".
ⓕ =the ring gear bearing thickness (considered constant).

	**Ring gear bearing thickness ⓕ: 13 mm (0.51 in)**

Example:
If the final gear case is marked "51".....ⓒ is 45.51
If the ring gear bearing housing is marked "35".....ⓓ is 3.35.
If the ring gear is marked "–05".....ⓔ is 35.35
ⓕ is 13.00
"B" = 45.51 + 3.35 – (35.35 + 13.00)
= 48.86 – (48.35)
= 0.51
Therefore, the ring gear shim thickness is 0.51 mm. Shim sizes are supplied in the following thickness.

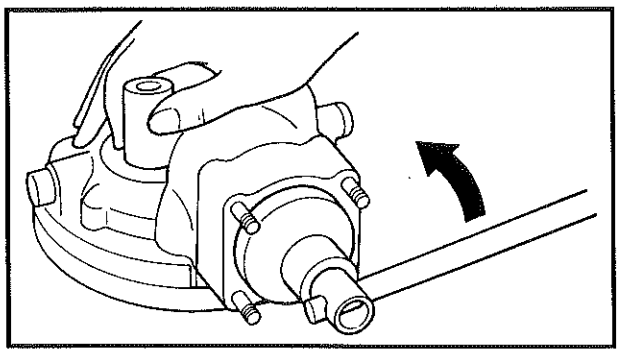
	**Ring gear shim**
Thickness (mm)	**0.30, 0.40, 0.50**

Since ring gear shims can only be selected in 0.10 mm increments, round off the hundredths digit and select the appropriate shim(s).

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

In the example above, the calculated ring 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 ring gear shim.

****



2.Install:
- Shims (proper size as calculated)
- Final drive shaft assembly
- Bearing retainer (final drive shaft)

110 Nm (11.0 m · kg, 80 ft · lb)

Use a bearing retainer wrench.

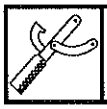
CAUTION:
The final drive shaft bearing retainer has left-hand threads. Turn the retainer counterclockwise to tighten it.

	**Bearing retainer wrench: YM - 04050, 90890 - 04050**

3.Install:
- Gear coupling
- Self-locking nut (gear coupling)

110 Nm (11.0 m · kg, 80 ft · lb)

Use a coupling gear/middle shaft tool.

	**Coupling gear/middle shaft tool: YM - 01229, 90890 - 01229**

CAUTION:
Apply LOCTITE® to the self-locking nut.

4.Install:
- Ring gear assembly (without the thrust washer)

5.Adjust:
- Gear backlash

Refer to "Final gear backlash measurement" and "Final gear backlash adjustment".

6.Measure/Select:
- Ring gear thrust washer clearance

****

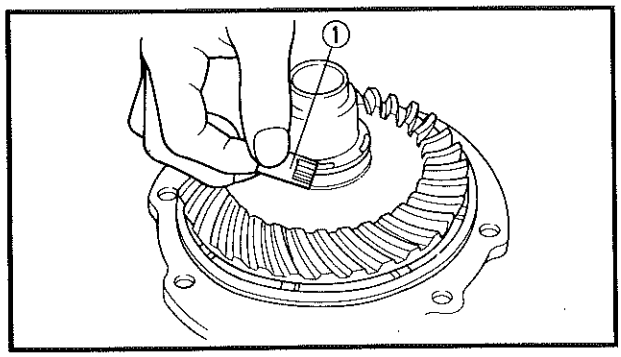
Ring gear thrust washer clearance measurement steps:

- Remove the ring gear assembly.
- Place four pieces of Plastigauge® between the originally installed ring gear thrust washer and the ring gear.
- Install the ring gear assembly and tighten the bolts and nuts to specification.

	Bolt (bearing housing): **40 Nm (4.0 m • kg, 29 lb • ft)** **Nut (bearing housing):** **23 Nm (2.3 m • kg, 17 lb • ft)**

NOTE:
When using Plastigauge® to measure the ring gear thrust washer clearance do not turn the shaft drive and ring gear.

- Remove the ring gear assembly.
- Measure the ring gear thrust washer clearance and the width of the flattened Plastigauge® ①.



	Ring gear thrust washer clearance: **0.1 ~ 0.2 mm (0.004 ~ 0.008 in)**

- If the clearance is correct, install the ring gear assembly.
- If out of specification, select the correct thrust washer.

Ring gear thrust washer selection steps:

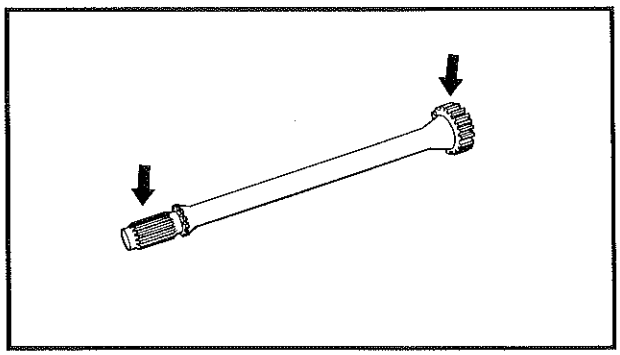
- Using the following chart select the suitable thrust washer.

	Thrust washer
Thickness (mm)	**1.2, 1.4, 1.6, 1.8, 2.0**

- Repeat the measurement steps until the ring gear thrust washer clearance is within the specified limits.

	Ring gear thrust washer clearance: **0.1 ~ 0.2 mm (0.004 ~ 0.008 in)**

****



EB707040
INSPECTION

1.Inspect:
- Drive shaft splines
  Wear/damage → Replace.

EB707050
INSTALLATION

1.Lubricate:
- Drive shaft splines

	Recommended lubricant: **Molybdenum disulfide grease**

2.Apply:
- Sealant
  (onto the mating surface of both final gear case halves)

	Quick gasket®: **ACC-11001-15-01** **Yamaha Bond No. 1215:** **90890 - 85505**

3.Install:
- Drive shaft to final drive gear

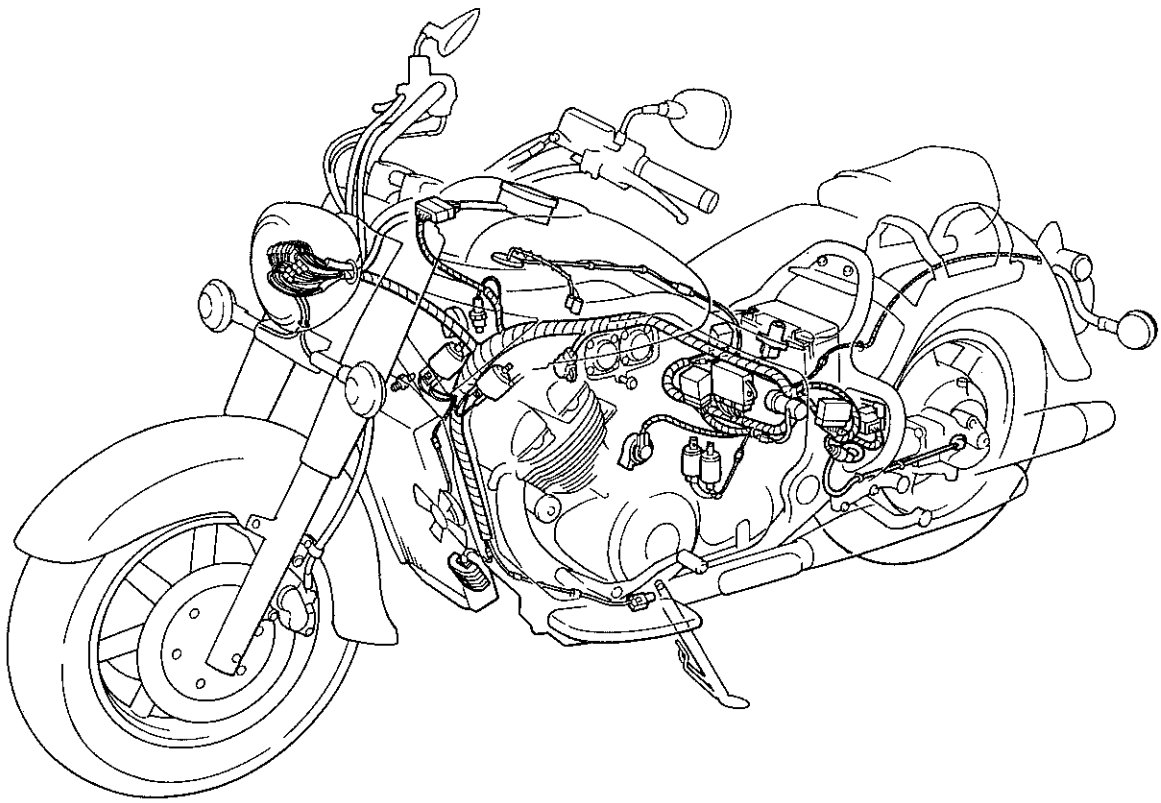
4.Install
- Drive shaft

NOTE:
Align the drive shaft splines with the universal joint.

5.Tighten:
- Nuts (final gear case)

23 Nm (2.3 m · kg, 17 ft · lb)

6.Install:
- Rear wheel
- Rear fender
  Refer to "REAR WHEEL".



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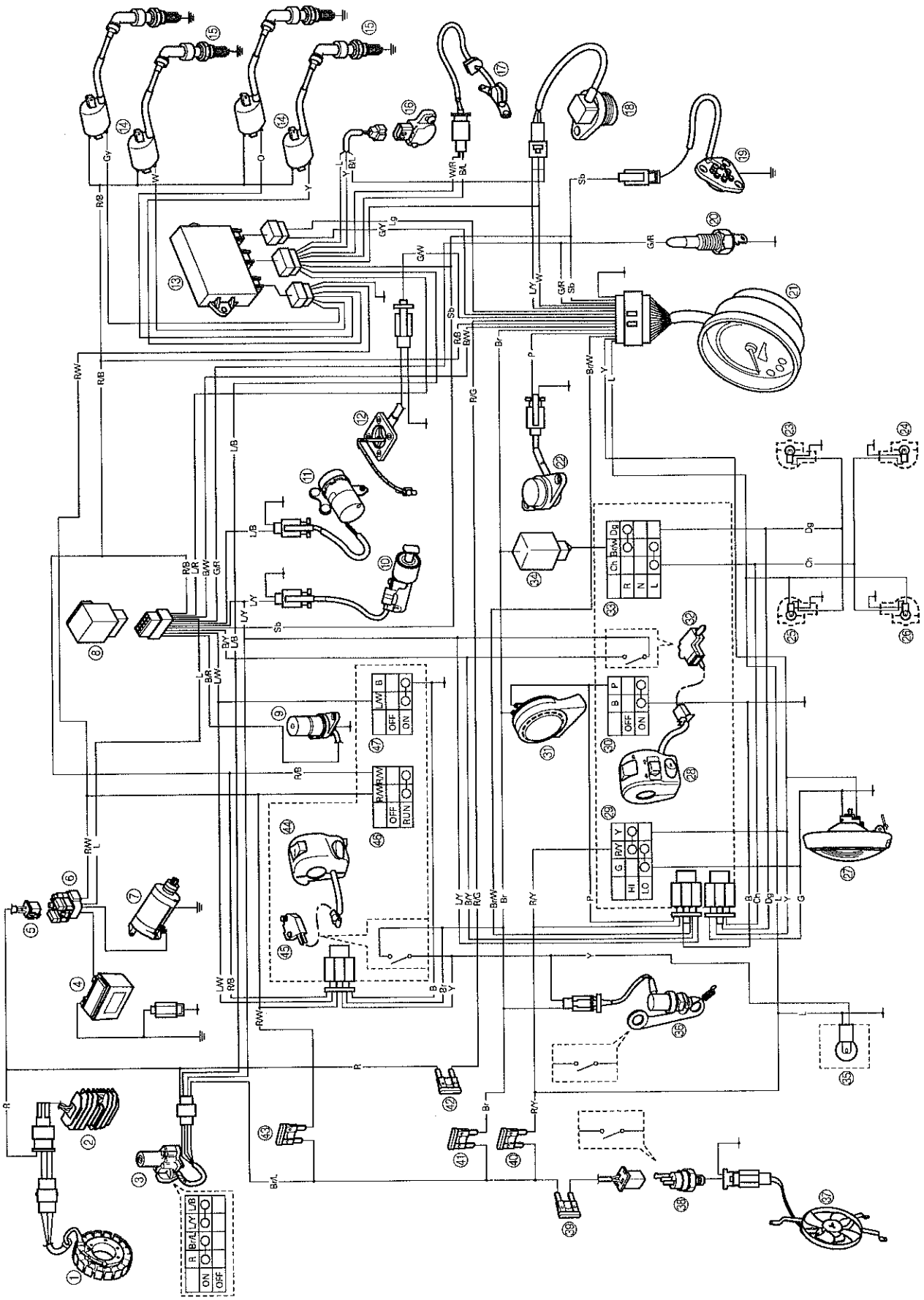
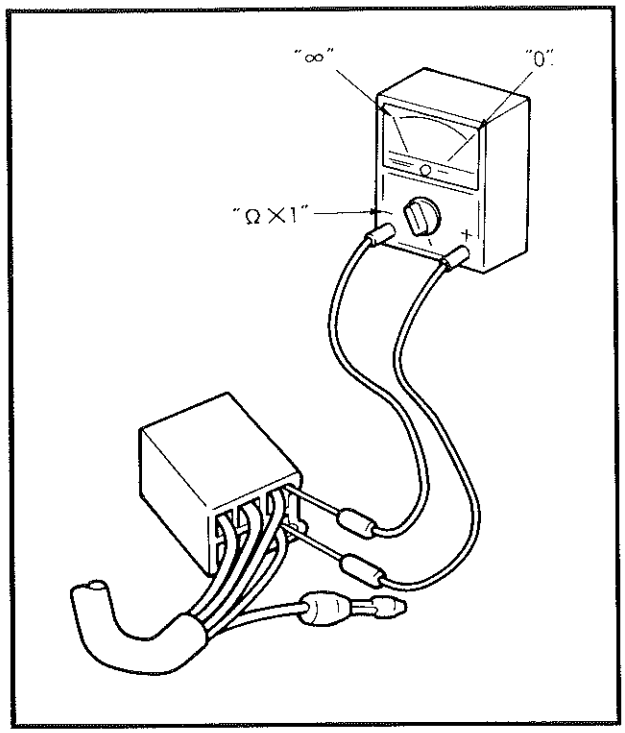
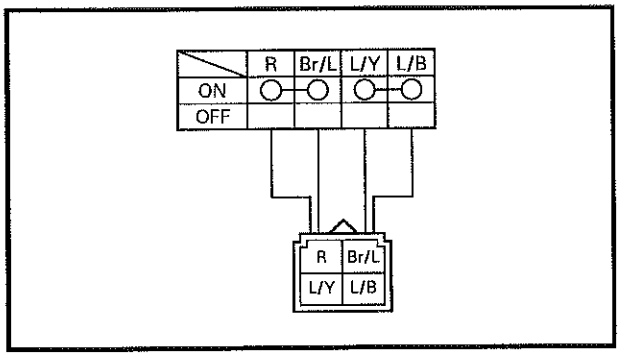
ELECRICAL

CIRCUIT DIAGRAM



① Stator coil
② Rectifier/regulator
③ Main switch
④ Battery
⑤ Fuse (main)
⑥ Starter relay
⑦ Starter motor
⑧ Starting circuit cut-off relay
⑨ Oil level switch
⑩ Sidestand switch
⑪ Fuel pump
⑫ Fuel sender
⑬ Ignitor unit
⑭ Ignition coil
⑮ Spark plug
⑯ TPS (throttle position sensor)
⑰ Pickup coil
⑱ Speed sensor
⑲ Neutral switch
⑳ Thermo unit
㉑ Speedometer assembly
㉒ Trip button
㉓ Rear flasher light (right)
㉔ Rear flasher light (left)
㉕ Front flasher light (right)
㉖ Front flasher light (left)
㉗ Headlight
㉘ Right handlebar switch
㉙ Dimmer switch
㉚ Horn switch
㉛ Horn
㉜ Clutch switch
㉝ Turn switch
㉞ Flasher relay
㉟ Tail/brake light
㊱ Rear brake switch
㊲ Fan motor
㊳ Thermo switch
㊴ Fuse (fan)
㊵ Fuse (head)
㊶ Fuse (signal)
㊷ Fuse (back up)
㊸ Fuse (ignition)
㊹ Left handlebar switch
㊺ Front brake switch
㊻ Engine stop switch
㊼ Start switch





SWITCH INSPECTION

SWITCH INSPECTION

Use a pocket tester to check the terminals for continuity. If the continuity is faulty at any point, replace the switch.

Pocket tester:
YU - 03112, 90890-03112

NOTE:

- Set the pocket tester to "0" before starting the test.
- When testing the switch for continuity the pocket tester should be set to the "× 1" Ω range.
- When checking the switch turn it on and off a few times.

INSPECTING A SWITCH SHOWN IN THE MANUAL

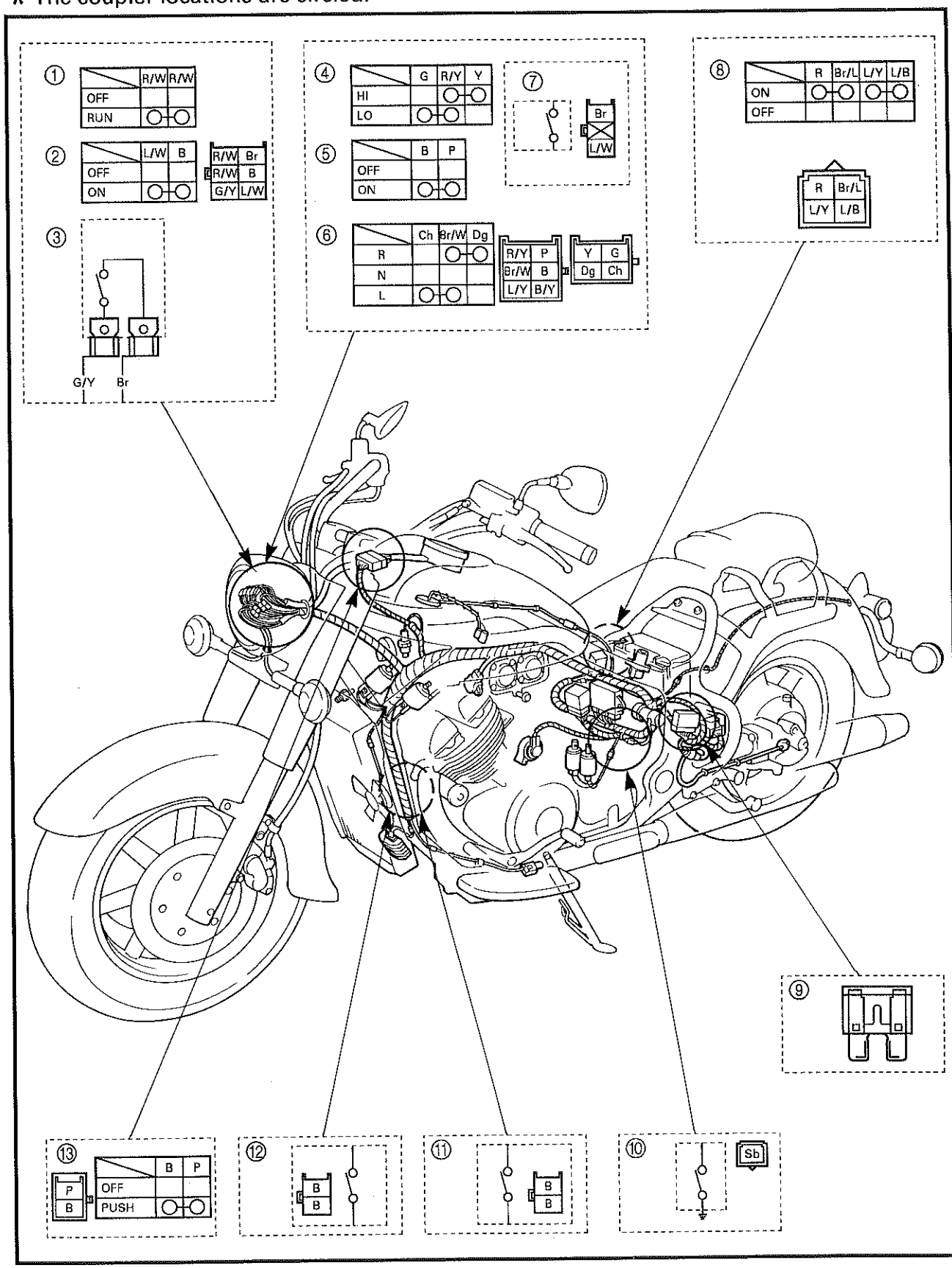
The terminal connections for switches (main switch, handlebar switch, engine stop switch, light switch, etc.) are shown in a chart similar to the one on the left.
This chart shows the switch positions in the column and the switch lead colors in the top row.
For each switch position, "○——○" indicates the terminals with continuity.

The example chart shows that:

① There is continuity between the black and black/white leads when the switch is set to "OFF".
② There is continuity between the red and brown leads when the switch is set to "ON".

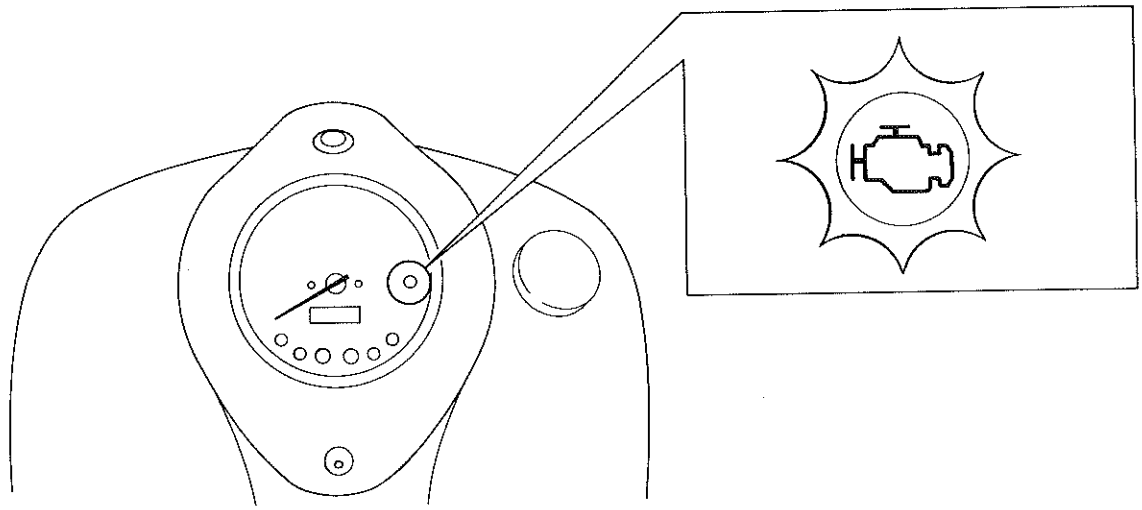
SWITCH CONTINUITY INSPECTION

Refer to "SWITCH INSPECTION" and check for continuity between the lead terminals.
Poor connection, no continuity → Correct or replace
* The coupler locations are circled.



① Engine switch
② Start switch
③ Front brake switch
④ Dimmer switch
⑤ Horn switch
⑥ Turn switch
⑦ Clutch switch
⑧ Main switch
⑨ Fuse
⑩ Neutral switch
⑪ Sidestand switch
⑫ Rear brake switch
⑬ Trip button

SELF-DIAGNOSIS

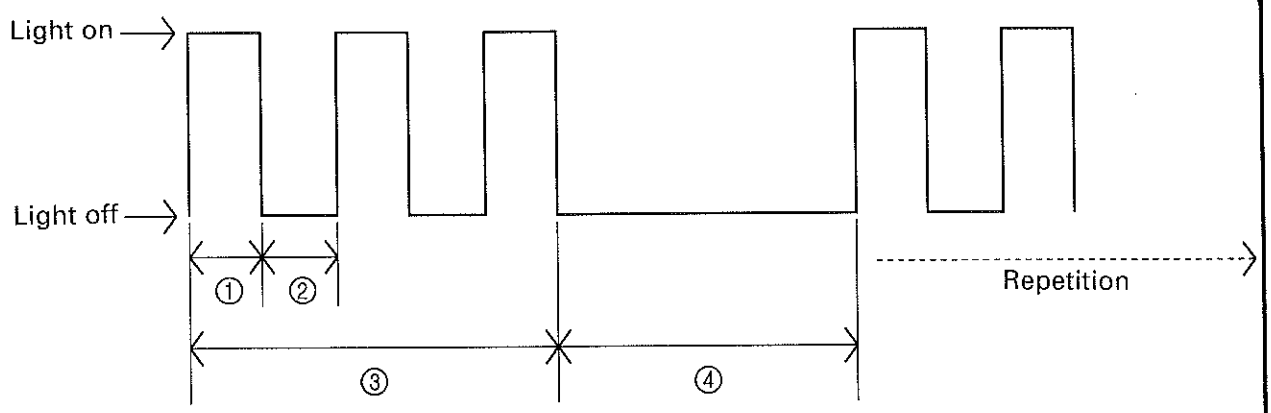


Item	Condition	Response	Display condition code	
			When engine is stationary	When engine is running
TPS (throttle position sensor)	Disconnected Short-circuit Locked	• Enables the motorcycle to run so that the ignition timing is fixed when the throttle is fully open. • Displays the condition code on the engine indicator light.	Blinks in patterns of 3.	Light on
Fuel light system	Disconnected	• Displays the condition code on the engine indicator light.	Blinks in patterns of 8.	Light on
Vehicle speed sensor	Abnormal pulse Disconnected Short-circuit	• Limiter operation (approximately 5,000 rpm) Refer to the "Operation of the Speed Limiter" in "NEW FEATURES". • Displays the condition code on the engine indicator light.	Blinks in patterns of 4.	Light on

Blink pattern of the engine indicator light

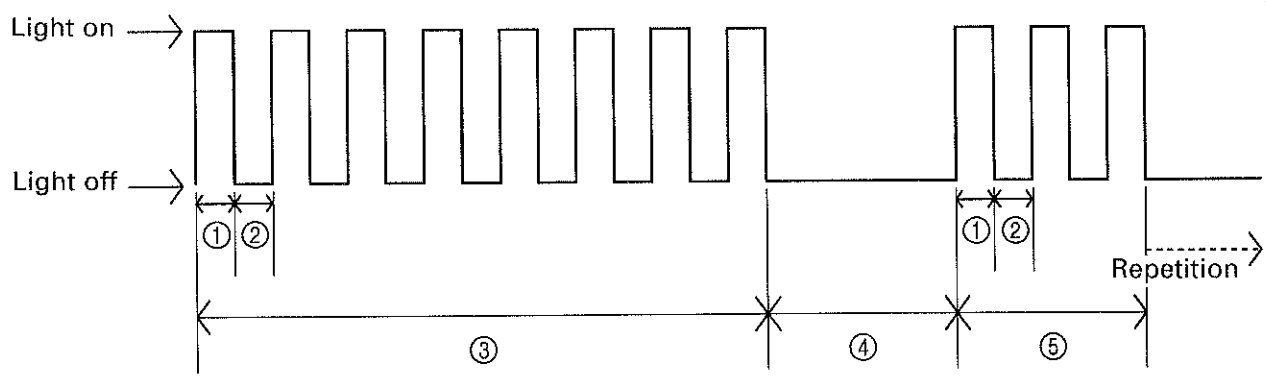
Ex:Only one faulty system...TPS

① Light on (seconds)..... 0.5 seconds
② Light off (seconds)..... 0.5 seconds
③ Number of blinks..... Fault code
④ Light off (seconds)..... 3 seconds



Ex:There are two faulty systems...TPS and fuel light system

① Light on (seconds).....0.5 seconds
② Light off (seconds).....0.5 seconds
③ Number of blinks.....Fuel light system fault code
④ Light off (seconds).....3 seconds
⑤ Number of blinks.....TPS fault code



TROUBLESHOOTING

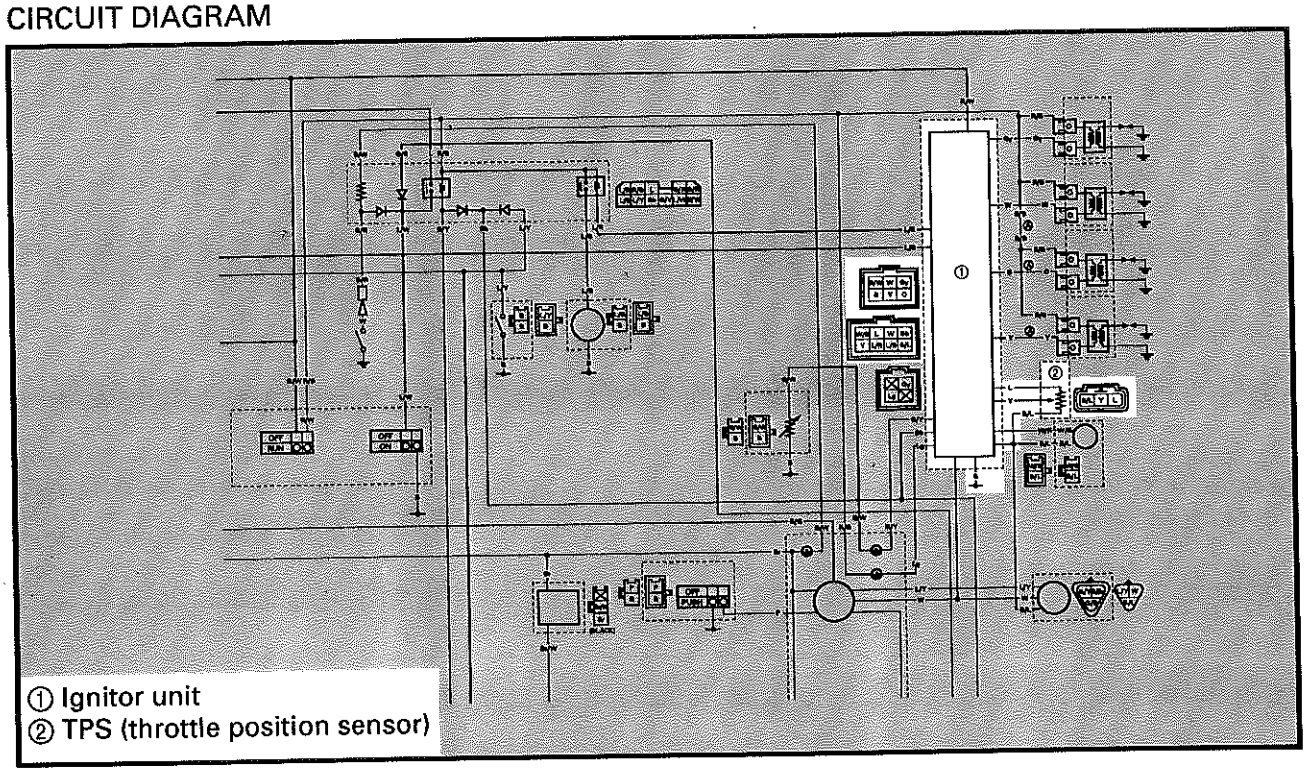
The engine indicator light starts to blink when displaying the self-diagnosis sequence.

NOTE:
Use the following special tool for trouble-shooting.

Pocket tester:
YU-03112, 90890-03112

1.TPS (throttle position sensor)

CIRCUIT DIAGRAM



① Ignitor unit
② TPS (throttle position sensor)

1.Wire harness

- Check the wire harness for continuity. Refer to "CIRCUIT DIAGRAM".

NO CONTINUITY → Repair or replace the wire harness.

CONTINUITY ↓

2.TPS (throttle position sensor)

- Check the TPS (throttle position sensor) for continuity.
- Refer to "TPS (THROTTLE POSITION SENSOR) INSPECTION" in CHAPTER 6.

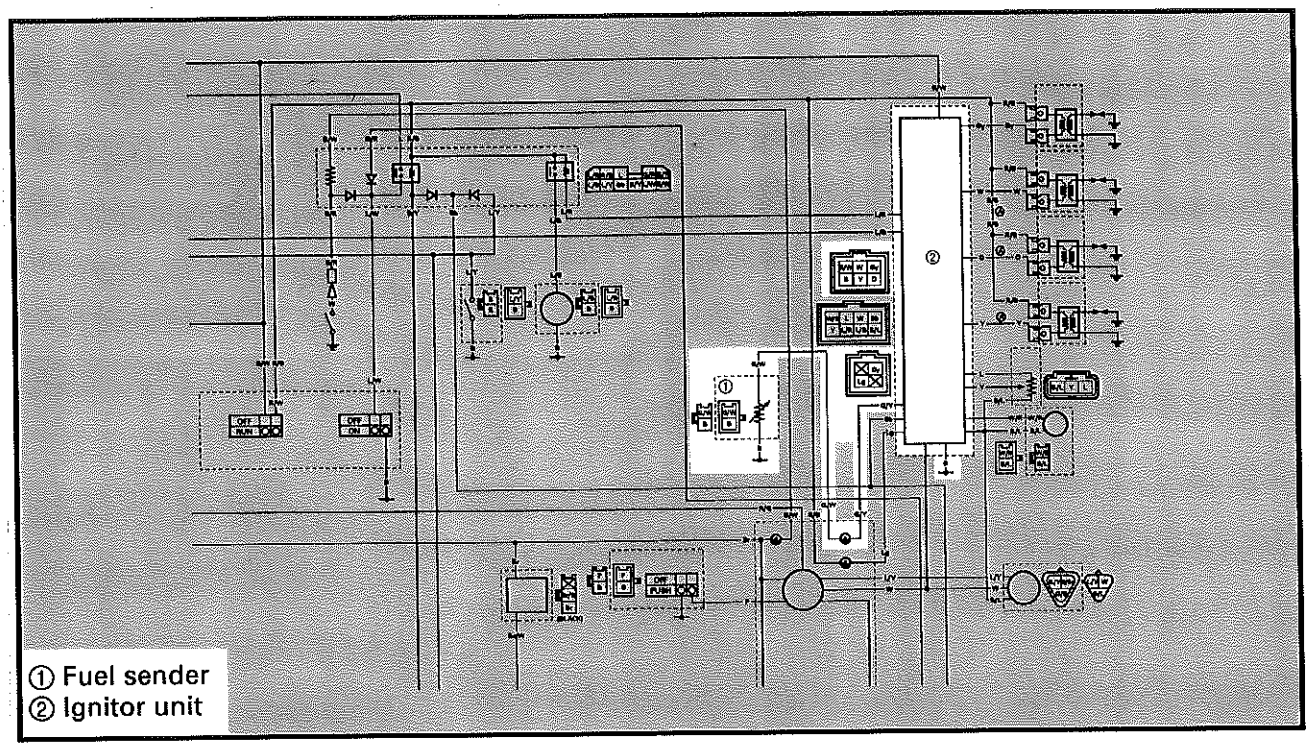
BAD CONDITION → Replace the TPS (throttle position sensor).

GOOD CONDITION ↓

Replace the ignitor unit.

2.Fuel level indicator light

CIRCUIT DIAGRAM



1.Fuel level indicator light

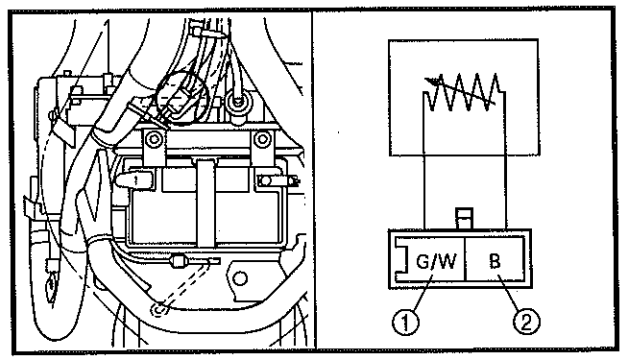
- Check the bulb and bulb socket for continuity.

NO CONTINUITY → Replace the bulb and/or socket.

CONTINUITY ⇩

2.Fuel sender

- Disconnect the fuel sender coupler from the wire harness.
- Connect the pocket tester (Ω × 100) to the fuel sender coupler terminals.



Tester (+) terminal →
Green/White terminal ①
Tester (–) terminal → Black terminal ②

OUT OF SPECIFICATION → Replace the fuel sender.

BOTH MEET SPECIFICATION ⇩

*

*

3.Wire harness
• Check the wire harness for continuity. Refer to "CIRCUIT DIAGRAM".

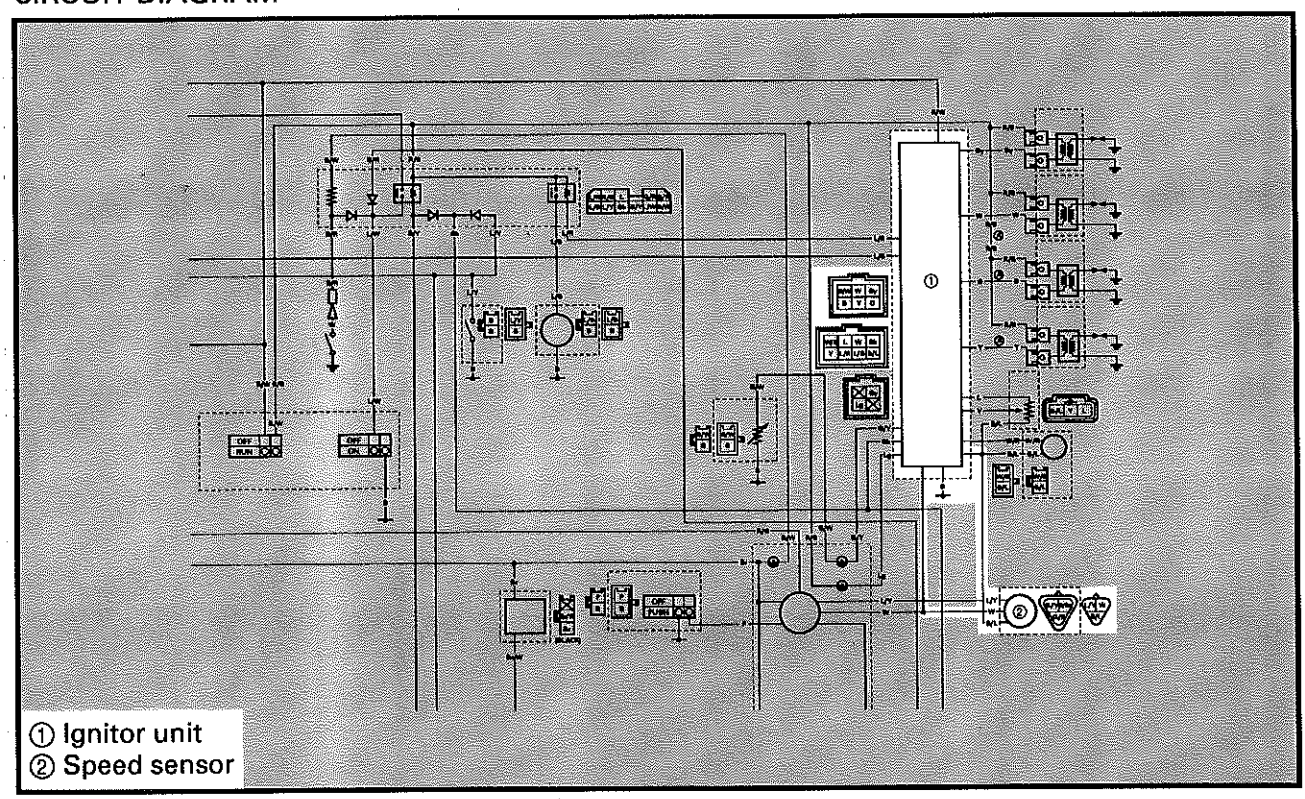
NO CONTINUITY → Repair or replace the wire harness.

CONTINUITY

Replace the ignitor unit.

3.Speed sensor

CIRCUIT DIAGRAM



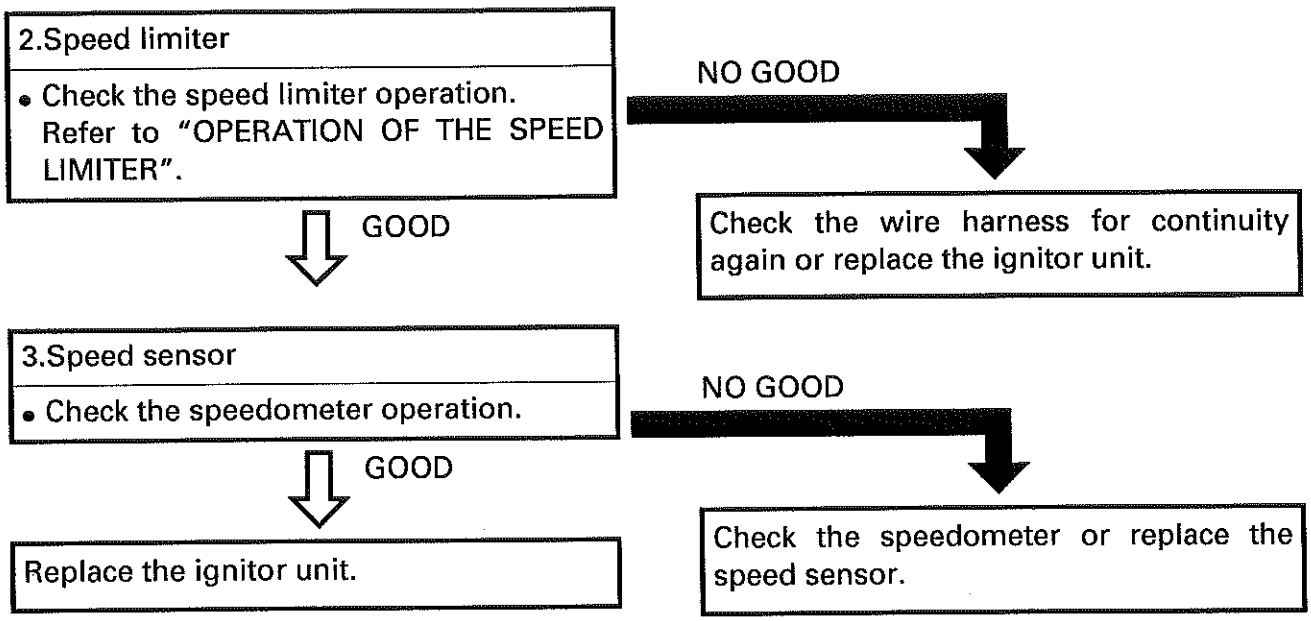
① Ignitor unit
② Speed sensor

1.Wire harness
• Check the wire harness for continuity. Refer to "CIRCUIT DIAGRAM".

NO CONTINUITY → Repair or replace the wire harness.

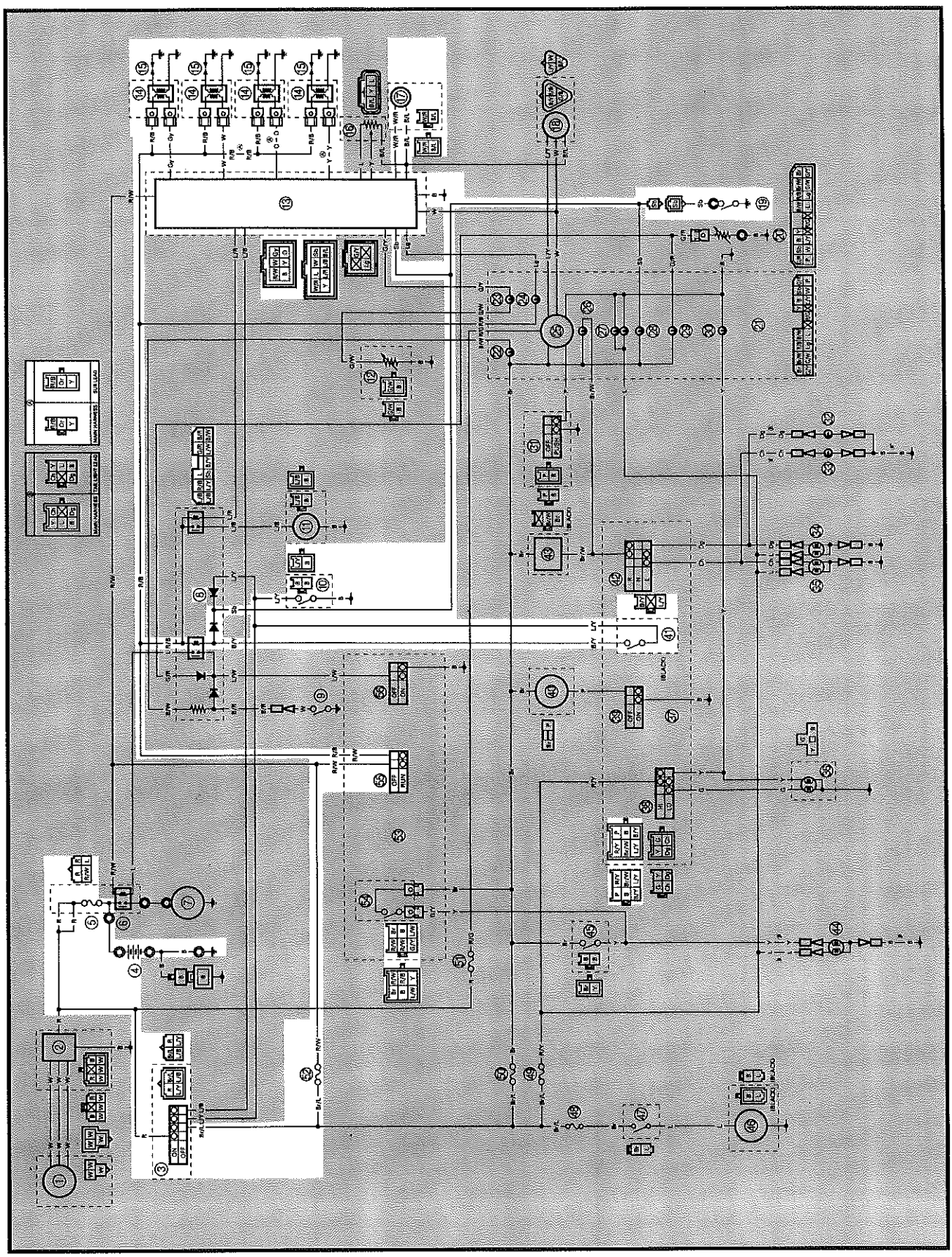
CONTINUITY

Replace the speed sensor.

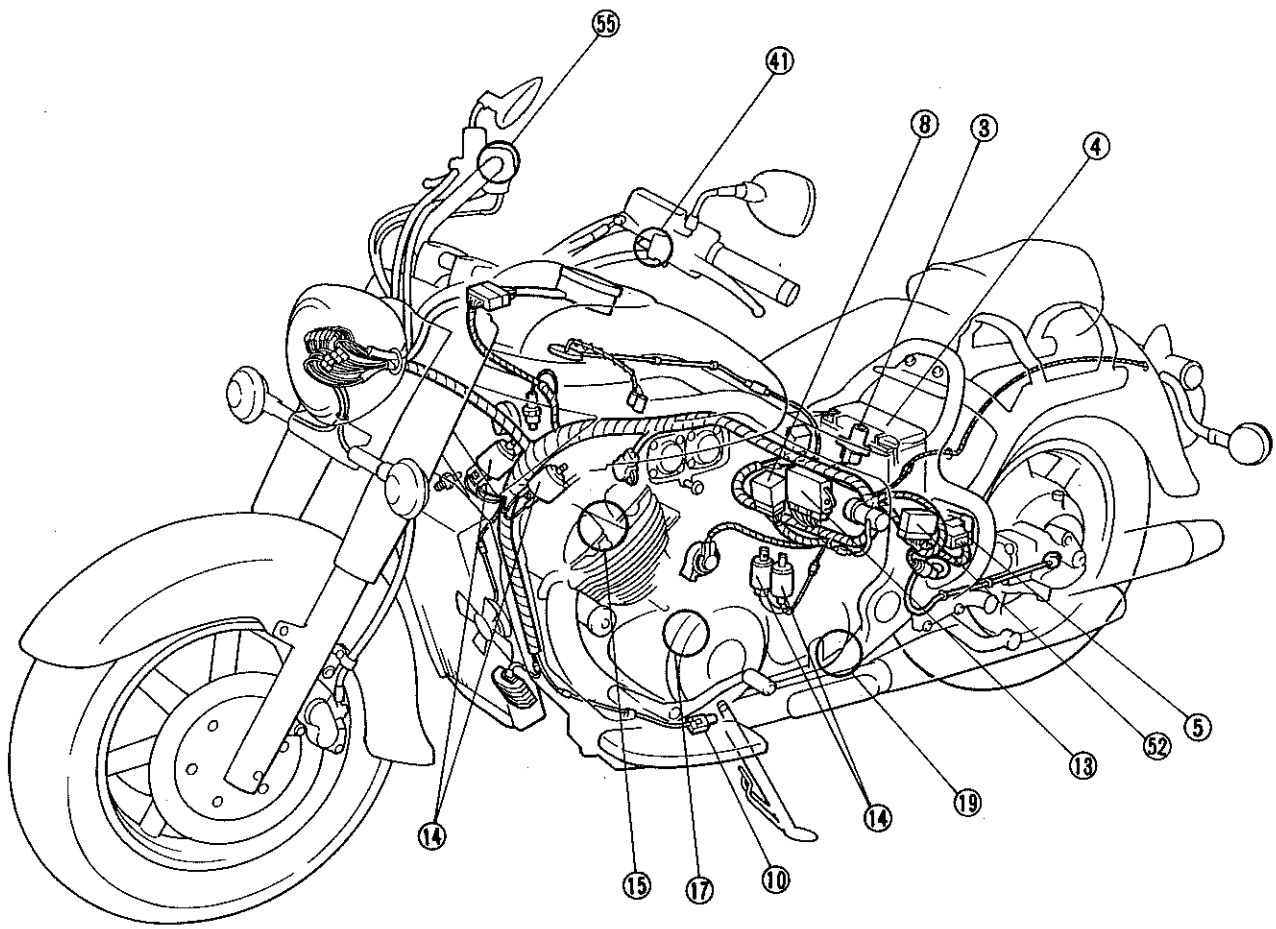

2.Speed limiter
• Check the speed limiter operation. Refer to "OPERATION OF THE SPEED LIMITER".
NO GOOD
GOOD
Check the wire harness for continuity again or replace the ignitor unit.
3.Speed sensor
• Check the speedometer operation.
NO GOOD
GOOD
Check the speedometer or replace the speed sensor.
Replace the ignitor unit.

IGNITION SYSTEM

CIRCUIT DIAGRAM



③ Main switch
④ Battery
⑤ Fuses (main)
⑧ Starting circuit cut-off relay
⑩ Sidestand switch
⑬ Ignitor unit
⑭ Ignition coil
⑮ Spark plug
⑰ Pickup coil
⑲ Neutral switch
㊶ Clutch switch
㊷ Fuse (ignition)
㊺ Engine stop switch



TROUBLESHOOTING

IF THE IGNITION SYSTEM SHOULD BECOME INOPERATIVE (NO SPARK OR INTERMITTENT SPARK)

Procedure

Check:

1. Fuse (main and ignition)
2. Battery
3. Spark plug
4. Ignition spark gap
5. Spark plug cap resistance
6. Ignition coil resistance
7. Main switch
8. Engine stop switch
9. Neutral switch
10. Sidestand switch
11. Clutch switch
12. Pickup coil resistance
13. Wiring connection (entire ignition system)

NOTE:

- Remove the following parts before troubleshooting.

1) Seat
2) Side covers (left and right)
3) Rear inner cover
4) Fuel tank
5) Air filter case
6) Headlight unit

- Use the following special tool(s) for troubleshooting.

Dynamic spark tester:
YM-34487
Ignition checker:
90890 - 06754
Pocket tester:
YU-03112, 90890 - 03112

1. Fuse (main and ignition)

- Remove the fuses.
- Connect the pocket tester (Ω × 1) to the fuses.
- Check the fuses for continuity.

NO CONTINUITY → Replace the fuse(s).

CONTINUITY ↓

2. Battery

- Check the battery condition. Refer to "BATTERY INSPECTION" in CHAPTER 3.

Open-circuit voltage:
12.8 V or more at 20 °C (68 °F)

INCORRECT →
- Clean the battery terminals.
- Recharge or replace the battery.

CORRECT ↓

*

*

3.Spark plug

- Check the spark plug condition.
- Check the spark plug type.
- Check the spark plug gap.
  Refer to "SPARK PLUG INSPECTION" in CHAPTER 3.

Standard spark plug:
DPR7EA-9/X22EPR-U9
NGK/NIPPONDENSO

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

INCORRECT

CORRECT

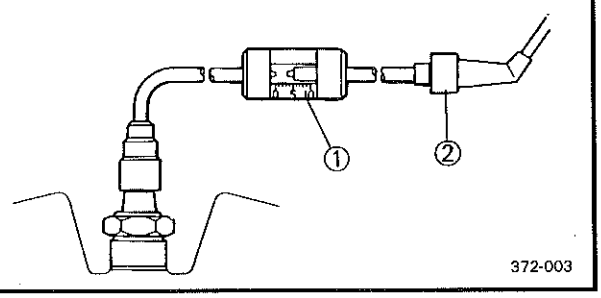
Repair or replace the spark plug.

4.Ignition spark gap

- Disconnect the spark plug cap from the spark plug.
- Connect the dynamic spark tester ① as shown.

② Spark plug cap

- Turn the main switch to "ON".



- Check the ignition spark gap.
- Start the engine, and increase the spark gap until a misfire occurs.

Minimum spark gap:
6.0 mm (0.24 in)

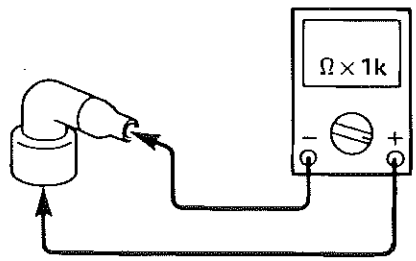
MEETS SPECIFICATION

The ignition system is good.

OUT OF SPECIFICATION OR NO SPARK

5.Spark plug cap resistance

- Remove the spark plug cap.
- Connect the pocket tester (Ω × 1k) to the spark plug cap.



- Check the spark plug cap for the specified resistance.

Spark plug cap resistance:
10 kΩ at 20 °C (68 °F)

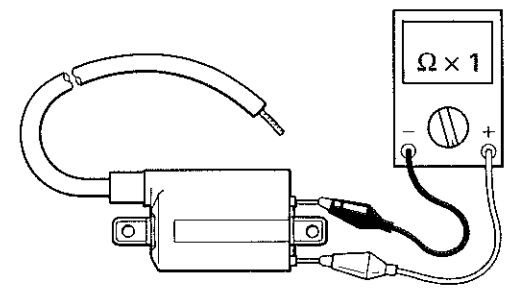
OUT OF SPECIFICATION → Replace the spark plug cap.

MEETS SPECIFICATION

6.Ignition coil resistance

- Disconnect the ignition coil leads from the wire harness.
- Connect the pocket tester (Ω × 1) to the ignition coil.

Tester (+) lead → Orange (Gray/Yellow/White) terminal
Tester (–) lead → Red/Black terminal

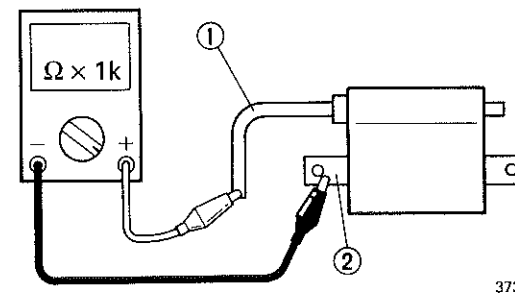


- Check the primary coil for the specified resistance.

Primary coil resistance:
3.57 ~ 4.83 Ω at 20 °C (68 °F)

- Connect the pocket tester (Ω × 1k) to the ignition coil.

Tester (+) lead → Spark plug lead ①
Tester (–) lead → Ignition coil base ②



- Check the secondary coil for the specificated resistance.

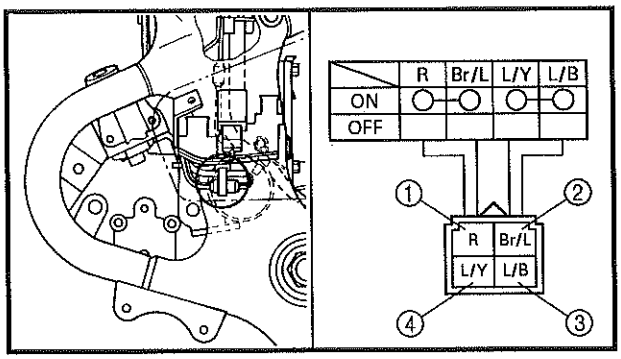
Secondary coil resistance:
10.71 ~ 14.49 kΩ at 20 °C (68 °F)

OUT OF SPECIFICATION → Replace the ignition coil.

BOTH MEET SPECIFICATION

7.Main switch

- Disconnect the main switch coupler from the wire harness.
- Check the switch component for continuity between "Red ① and Brown/Blue ②"and "Blue/Black ③ and Blue/Yellow ④".



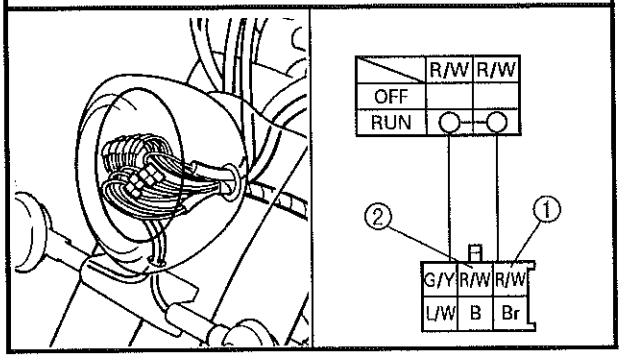
INCORRECT

Replace the main switch.

CORRECT

8.Engine stop switch

- Disconnect the handlebar switch (right) coupler from the wire harness.
- Check the switch component for continuity between "Red/White ① and Red/White ② ".



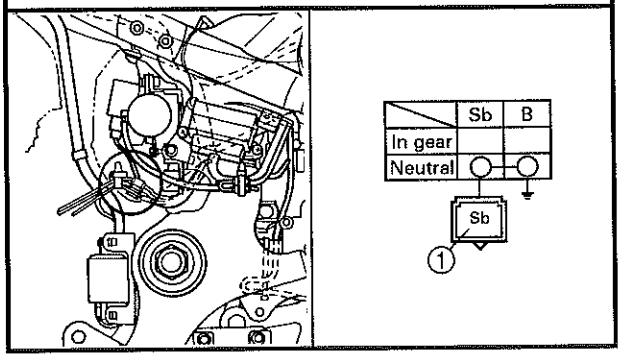
INCORRECT

Replace the handlebar switch (right).

CORRECT

9.Neutral switch

- Disconnect the neutral switch coupler from the wire harness.
- Check the switch component for continuity between "Sky blue ①" and ground.



INCORRECT

Replace the neutral switch.

CORRECT

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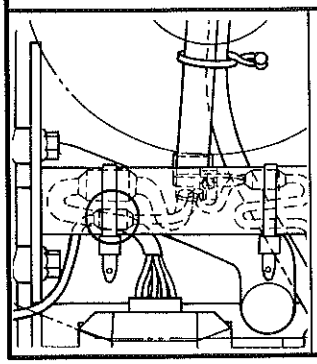
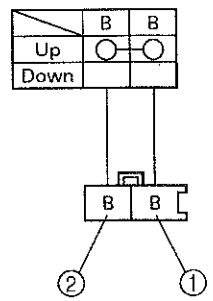
10.Sidestand switch

- Disconnect the sidestand switch coupler from the wire harness.
- Check the switch component for continuity between "Black ① and Black ②".





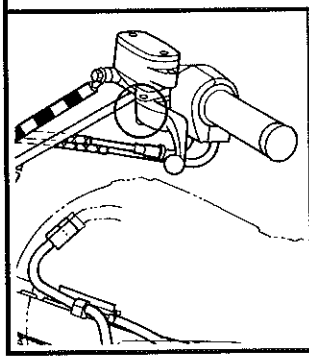
INCORRECT

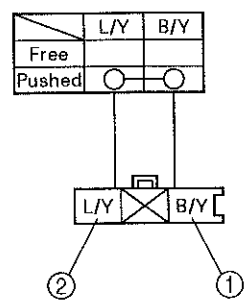
Replace the sidestand switch.

CORRECT

11.Clutch switch

- Disconnect the clutch switch coupler from the wire harness.
- Check the clutch switch component for continuity between "Black/Yellow ① and Blue/Yellow ②".





INCORRECT

Replace the clutch switch.

CORRECT

*

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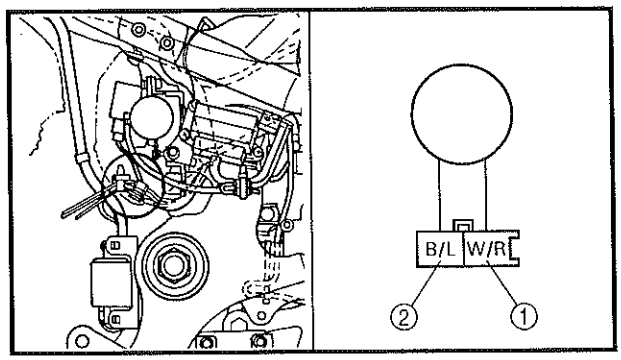
12.Pickup coil resistance

- Disconnect the pickup coil coupler from the wire harness.
- Connect the pocket tester (Ω × 100) to the pickup coil terminal.

Tester (+) lead → White/Red terminal ①
Tester (–) lead →
Black/Blue terminal ②



- Check the pickup coil for the specified resistance.

Pickup coil resistance:
189 ~ 231 Ω at 20 °C (68 °F)
(White/Red — Black/Blue)

OUT OF SPECIFICATION

Replace the pickup coil.

MEETS SPECIFICATION

13.Wiring connection

- Check the connections on the entire ignition system.
  Refer to "CIRCUIT DIAGRAM".

POOR CONNECTION

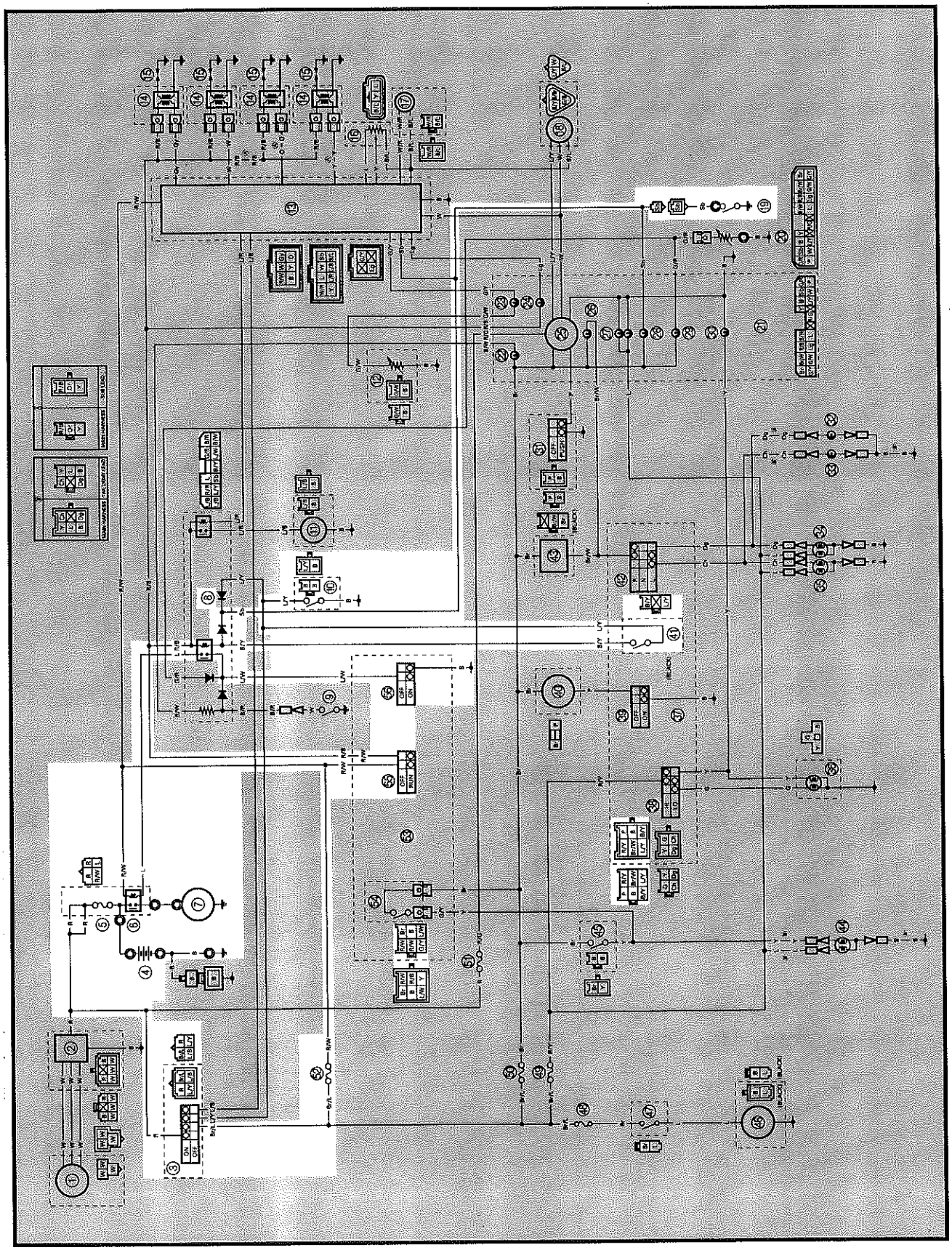
Properly connect the ignition system.

CORRECT

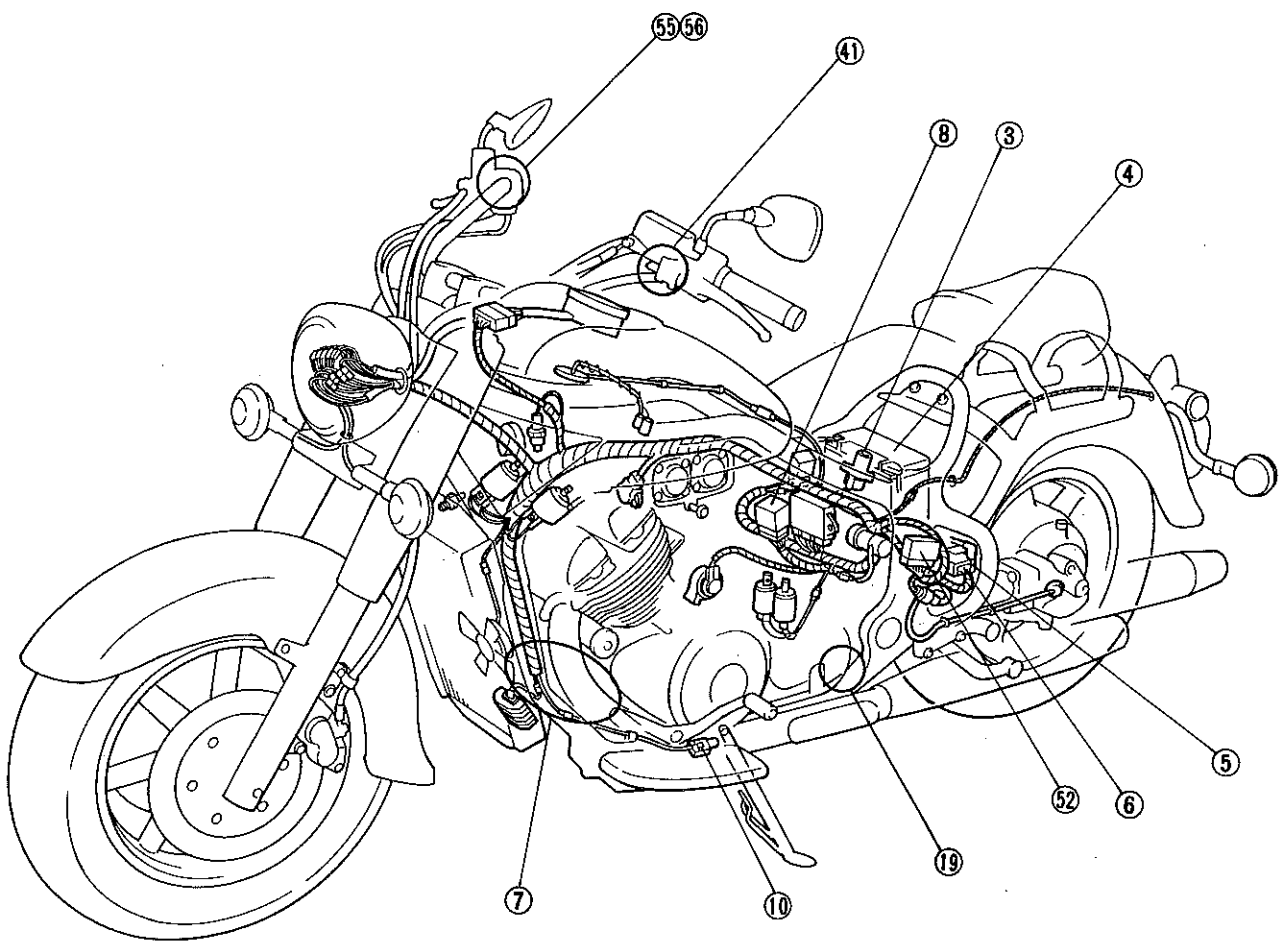
Replace the ignitor unit.

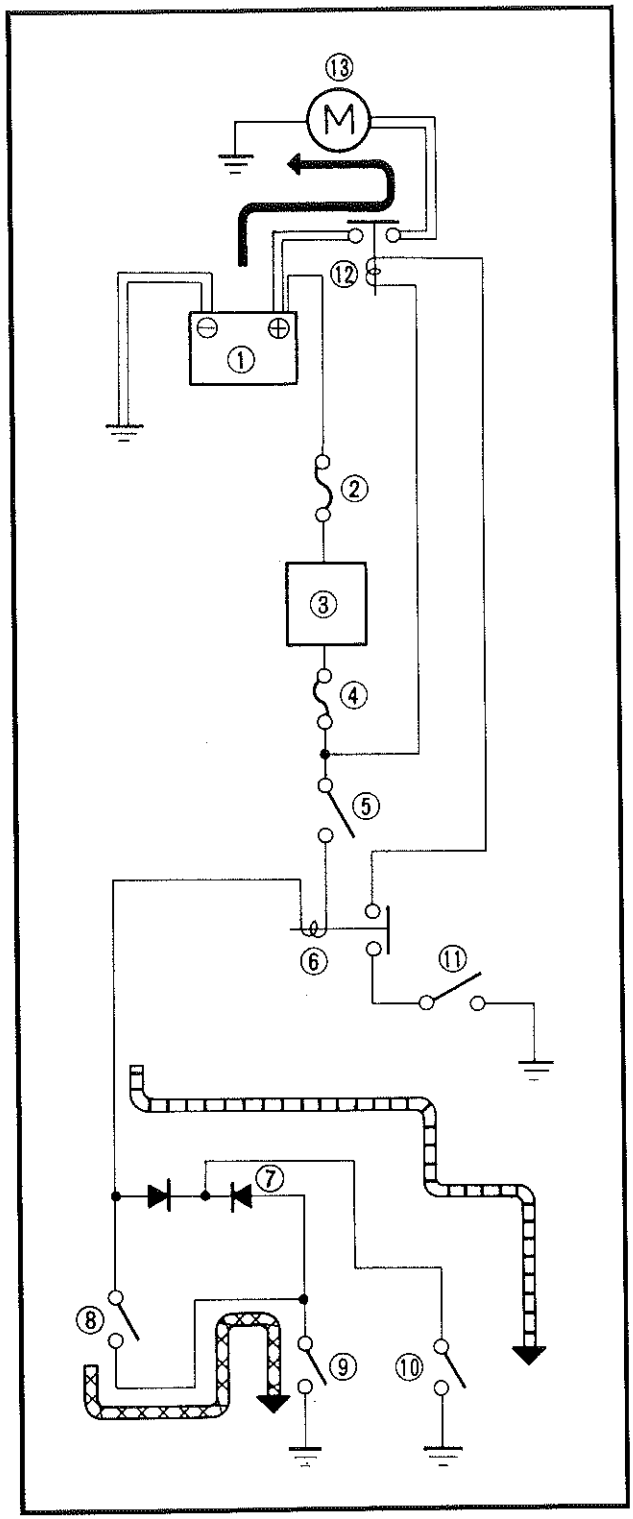
ELECTRIC STARTING SYSTEM

CIRCUIT DIAGRAM



③ Main switch
④ Battery
⑤ Fuse (main)
⑥ Starter relay
⑦ Starter motor
⑧ Starting circuit cut-off relay
⑩ Sidestand switch
⑲ Neutral switch
㊶ Clutch switch
㊷ Fuse (ignition)
㊺ Engine stop switch
㊻ Start switch





STARTING CIRCUIT OPERATION

The starting circuit on this model consists of the starter motor, starter relay, and the starting circuit cut-off relay. If the engine stop switch and the main switch are both closed, the starter motor can operate only if:

The transmission is in neutral (the neutral switch is closed).

or if

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 cut-off relay prevents the starter from operating when neither of these conditions have been met. In this instance, the starting circuit cut-off relay is open so current cannot reach the starter motor.

When at least one of the above conditions have been met however, the starting circuit cut-off relay is closed, and the engine can be started by pressing the start switch.

← WHEN THE TRANSMISSION IS IN NEUTRAL

← WHEN THE SIDESTAND IS UP AND THE CLUTCH LEVER IS PULLED IN

① Battery
② Fuse (main)
③ Main switch
④ Fuse (ignition)
⑤ Engine stop switch
⑥ Starting circuit cut-off relay
⑦ Diode
⑧ Clutch switch
⑨ Sidestand switch
⑩ Neutral switch
⑪ Start switch
⑫ Starter relay
⑬ Starter motor

TROUBLESHOOTING

STARTER MOTOR DOES NOT OPERATE.

Procedure

Check:

1.Fuse (main and ignition)
2.Battery
3.Starter motor
4.Starting circuit cut off-relay
5.Starter relay
6.Main switch
7.Engine stop switch
8.Neutral switch
9.Sidestand switch
10.Clutch switch
11.Start switch
12.Wiring connection (entire starting system)

NOTE:

- Remove the following parts before troubleshooting.

1)Seat
2)Side covers (left and right)
3)Headlight unit

- Use the following special tool(s) for troubleshooting.

Pocket tester:
YU-03112, 90890-03112

1.Fuse (main and ignition)

- Remove the fuses.
- Connect the pocket tester (Ω × 1) to the fuses.
- Check the fuses for continuity.

NO CONTINUITY → Replace the fuse(s).

CONTINUITY ↓

2.Battery

- Check the battery condition. Refer to "BATTERY INSPECTION" in CHAPTER 3.

Open-circuit voltage:
12.8 V or more at 20 °C (68 °F)

INCORRECT →

- Clean the battery terminals.
- Recharge or replace the battery.

CORRECT ↓

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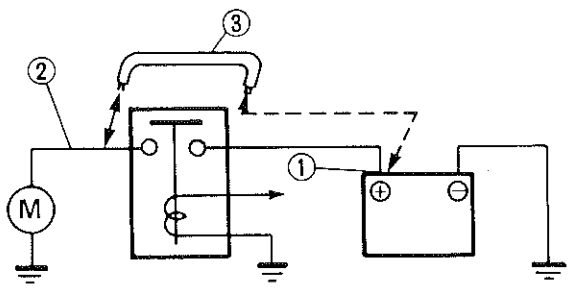
3.Starter motor

- Connect the battery positive terminal ① and starter motor cable ② using a jumper lead ③ *.
- Check the operation of the starter motor.



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⚠ WARNING

- **A wire that is used as a jumper lead must have the equivalent capacity or more as that of the battery lead, otherwise the jumper lead may burn.**
- **This check is likely to produce sparks, so be sure that no flammable gas or fluid is in the vicinity.**

DOES NOT MOVE

Repair or replace the starter motor.

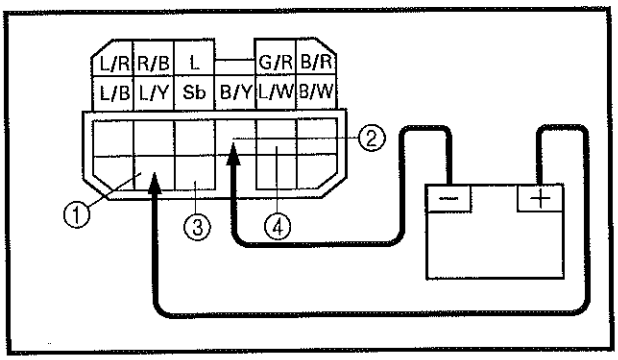
MOVES

4.Starting circuit cut-off relay

- Disconnect the starting circuit cut-off relay coupler from the wire harness.
- Connect the pocket tester (Ω × 1) and battery (12 V) to the starting circuit cut-off relay coupler terminals.

Battery (+) terminal →
Red/Black terminal ①
Battery (–) terminal →
Black/Yellow terminal ②

Tester (+) terminal → Blue terminal ③
Tester (–) terminal →
Blue/White terminal ④



- Check the starting circuit cut-off relay for continuity.

NO CONTINUITY

Replace the starting circuit cut-off relay.

CONTINUITY

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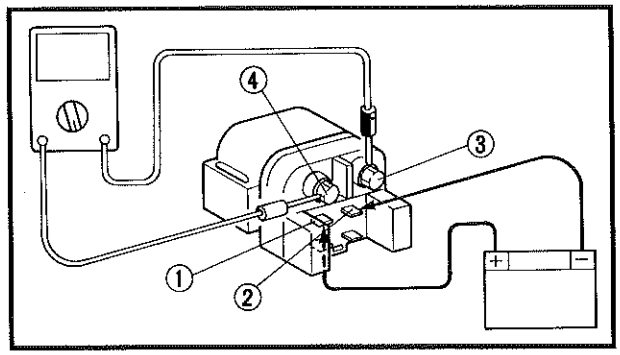
5.Starter relay

- Disconnect the relay unit coupler from the wire harness.
- Connect the pocket tester (Ω × 1) and battery (12 V) to the relay unit coupler terminals.



Battery (+) terminal → **Red/White terminal** ①
Battery (–) terminal → **Blue terminal** ②

Tester (+) lead → **Red terminal** ③
Tester (–) lead → **Black terminal** ④

- Check the starter relay for continuity.

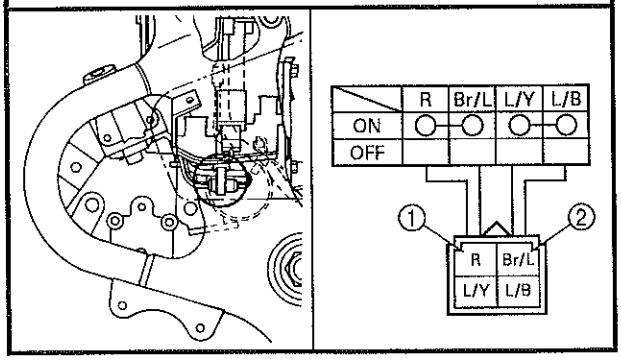
NO CONTINUITY

Replace the starter relay.

CONTINUITY

6.Main switch

- Disconnect the main switch coupler from the wire harness.
- Check the switch component for continuity between "Red ① and Brown/Blue ②".



INCORRECT

Replace the main switch.

CORRECT

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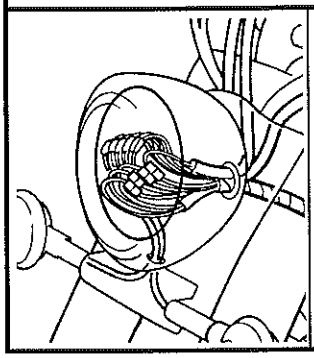
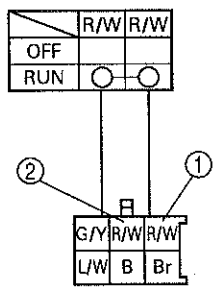
7.Engine stop switch

- Disconnect the handlebar switch (right) coupler from the wire harness.
- Check the switch component for continuity between "Red/White ① and Red/White ②".





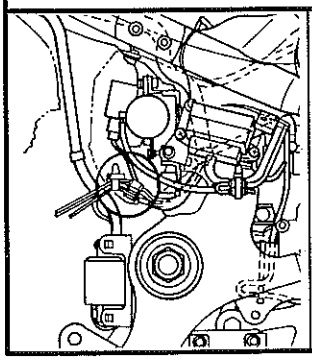
INCORRECT

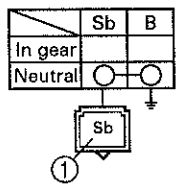
Replace the handlebar switch (right).

CORRECT

8.Neutral switch

- Disconnect the neutral switch coupler from the wire harness.
- Check the switch component for continuity between "Sky blue ①" and ground.





INCORRECT

Replace the neutral switch.

CORRECT

*

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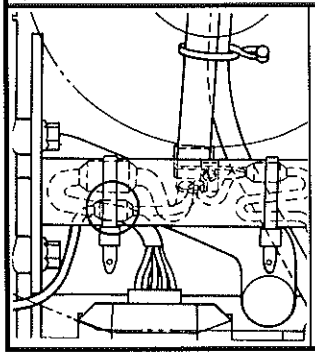
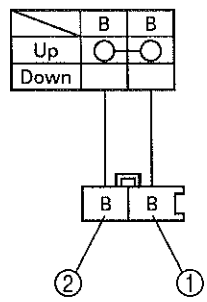
9.Sidestand switch

- Disconnect the sidestand switch coupler from the wire harness.
- Check the switch component for continuity between "Black ① and Black ②".





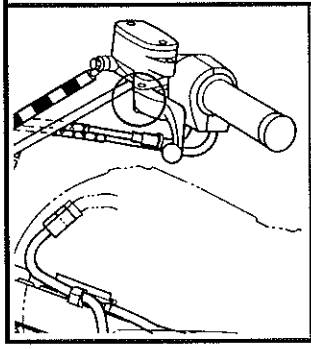
INCORRECT

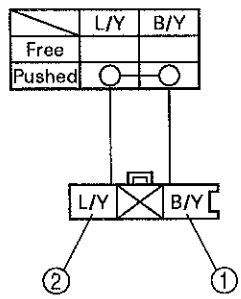
Replace the sidestand switch.

CORRECT

10.Clutch switch

- Disconnect the clutch switch coupler from the wire harness.
- Check the clutch switch component for continuity between "Black/Yellow ① and Blue/Yellow ②".





INCORRECT

Replace the clutch switch.

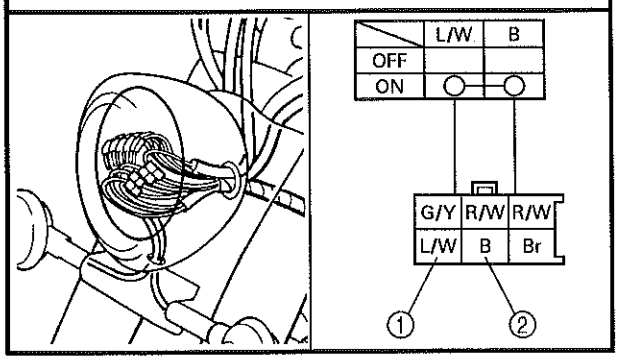
CORRECT

*

*

11.Start switch

- Disconnect the handlebar switch (right) coupler from the wire harness.
- Check the start switch component for continuity between "Blue/White ① and Black ②".



INCORRECT

Replace the handlebar switch (right).

CORRECT

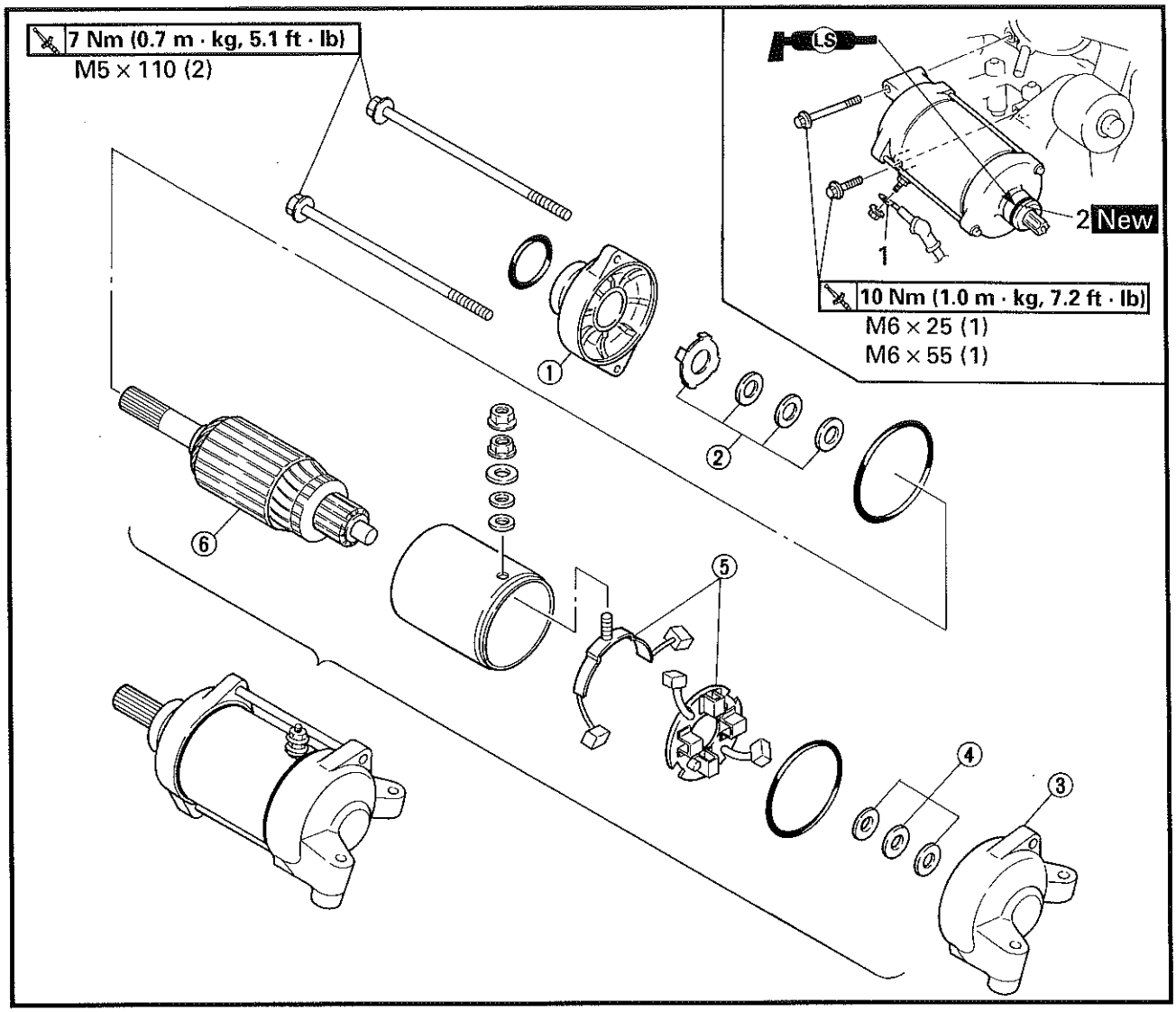
12.Wiring connection

- Check the connections on the entire ignition system.
  Refer to "CIRCUIT DIAGRAM".

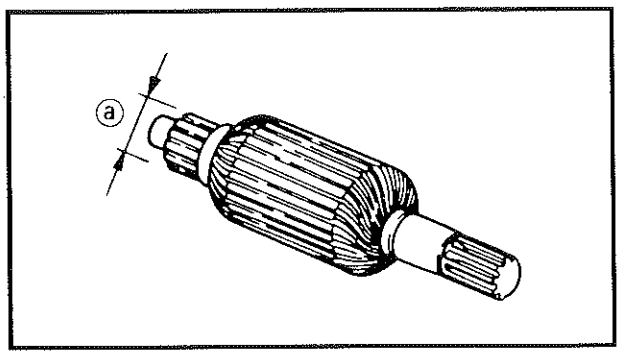
POOR CONNECTION

Properly connect the ignition system.

STARTER MOTOR



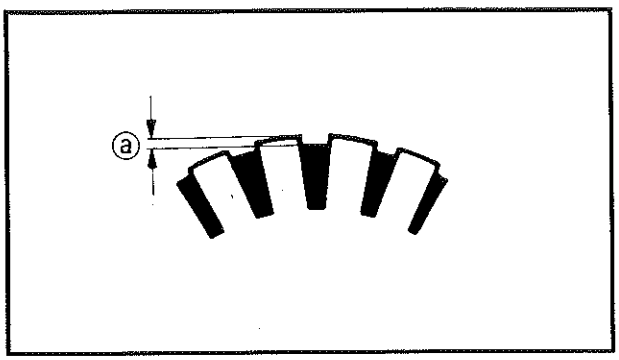
Order	Job name / Part name	Q'ty	Remarks
	Starter motor removal		Remove the parts in the order below.
	Exhaust pipe assembly		Refer to "ENGINE REMOVAL" in CHAPTER 4.
1	Starter motor lead	1	
2	Starter motor / O-ring	1/1	
	Starter motor disassembly		Disassemble the parts in the order below.
①	Front bracket	1	
②	Washer kit	1	
③	Rear bracket	2	Refer to "Assembly".
④	Washer kit	1	
⑤	Brush seat/Brush #1	1/1	**NOTE:** Be sure to remove the installation nut on brush #1 first.
⑥	Armature coil	1	
			For assembly, reverse the disassembly procedure.



INSPECTION AND REPAIR

1.Inspect:
- Commutator
  Dirty → Clean it with #600 grit sandpaper.

2.Measure:
- Commutator diameter ⓐ
  Out of specification → Replace the starter motor.

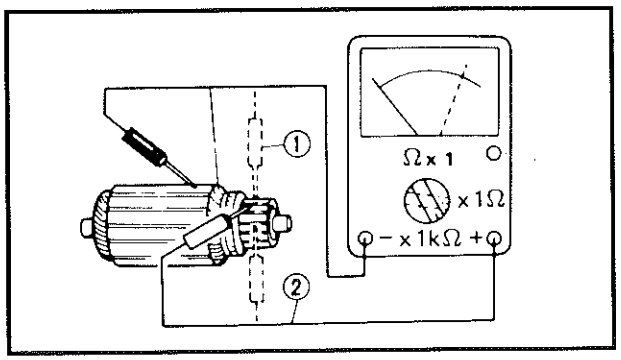


Commutator wear limit:
27 mm (1.06 in)

3.Measure:
- Mica undercut ⓐ
  Out of specification → To scrape the mica to the proper measurement use a hack-saw blade which has been grounded to fit the commutator.

Mica undercut:
0.7 mm (0.03 in)

NOTE:
The mica insulation of the commutator must be undercut to ensure proper operation of the commutator.



4.Inspect:
- Armature coil (insulation/continuity)
  Defects → Replace the starter motor.

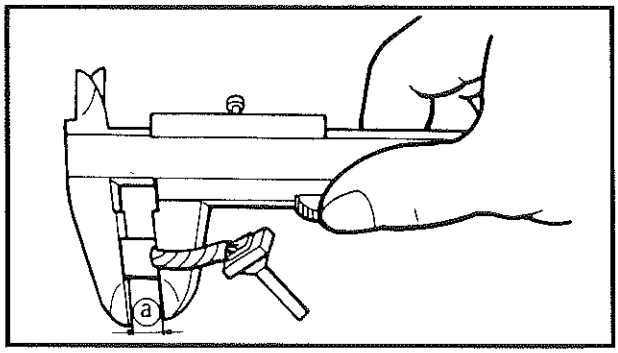
****

Inspecting steps:
- Connect the pocket tester to perform the continuity check ① and insulation check ②.
- Measure the armature resistance.

Armature coil resistance:
Continuity check ①:
0.015 ~ 0.025 Ω at 20 °C (68 °F)
Insulation check ②:
More than 1 MΩ at 20 °C (68 °F)

- If the resistance is incorrect, replace the starter motor.

****

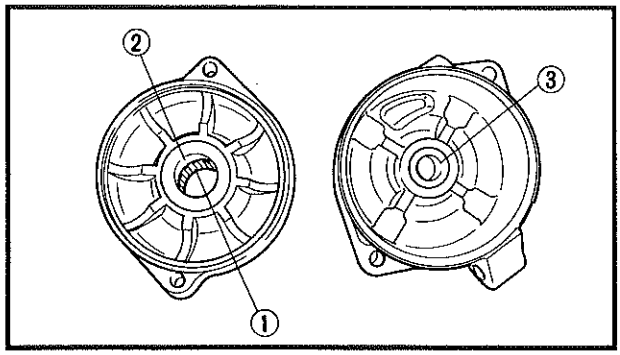


5.Measure:
- Brush length ⓐ
  Out of specification → Replace.

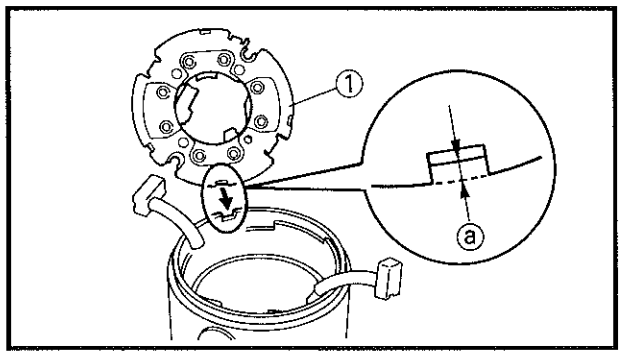
Brush length limit:
5 mm (0.20 in)

6.Measure:
- Brush spring force
  Fatigue/out of specification → Replace as a set.

Brush spring force:
570 ~ 920 g (20.1 ~ 32.5 oz)



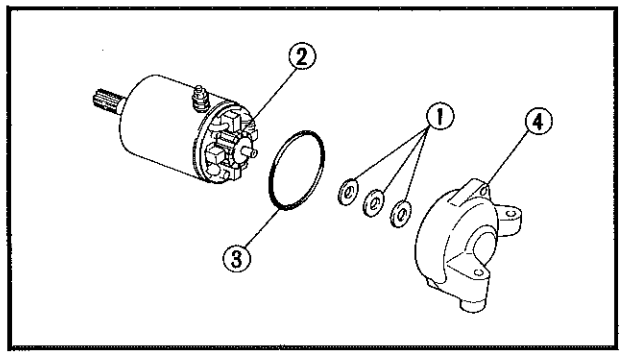
7.Inspect:
- Bearing ①
  Roughness → Replace.
- Oil seal ②
- O-rings
- Bushing ③
  Wear/damage → Replace.



ASSEMBLY

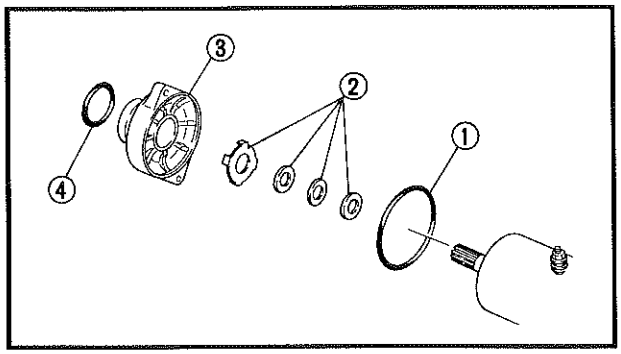
1.Install:
- Brush seat ①

NOTE:
Align the projection ① on the brush seat with the slot ② on the housing.

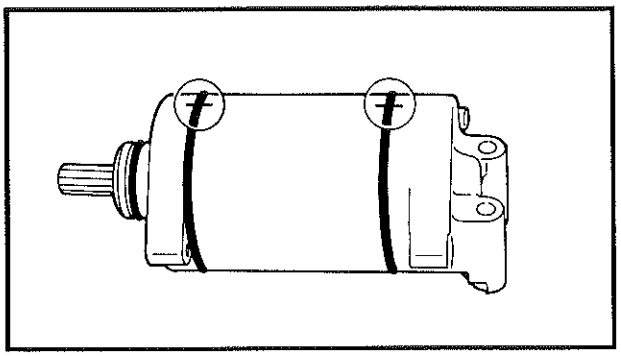


2.Install:
- Washers ①
- Armature coil ②
- O-ring ③
- Rear bracket ④

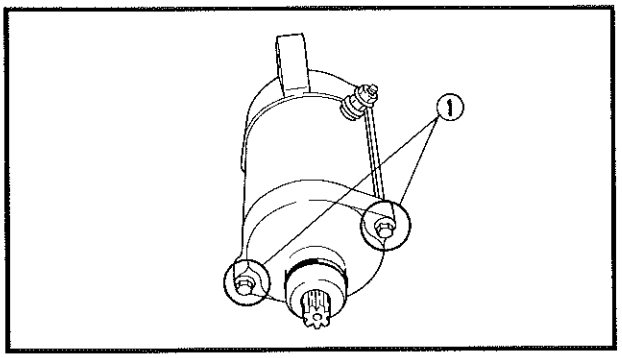
NOTE:
To prevent damaging the brushes during installation push down on the brush springs.



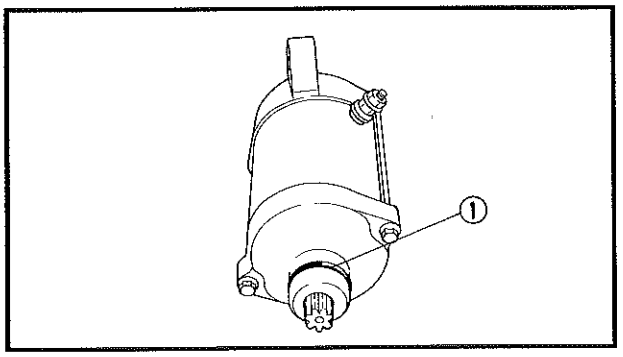
3.Install:
- O-ring ① New
- Washers ②
- Front bracket ③
- O-ring ④ New



NOTE:
Align the match marks ⓐ on the yoke with the match marks ⓑ on the brackets.



4.Install:
- Bolts ① 7Nm (0.7 m · kg, 5.1 ft · lb)

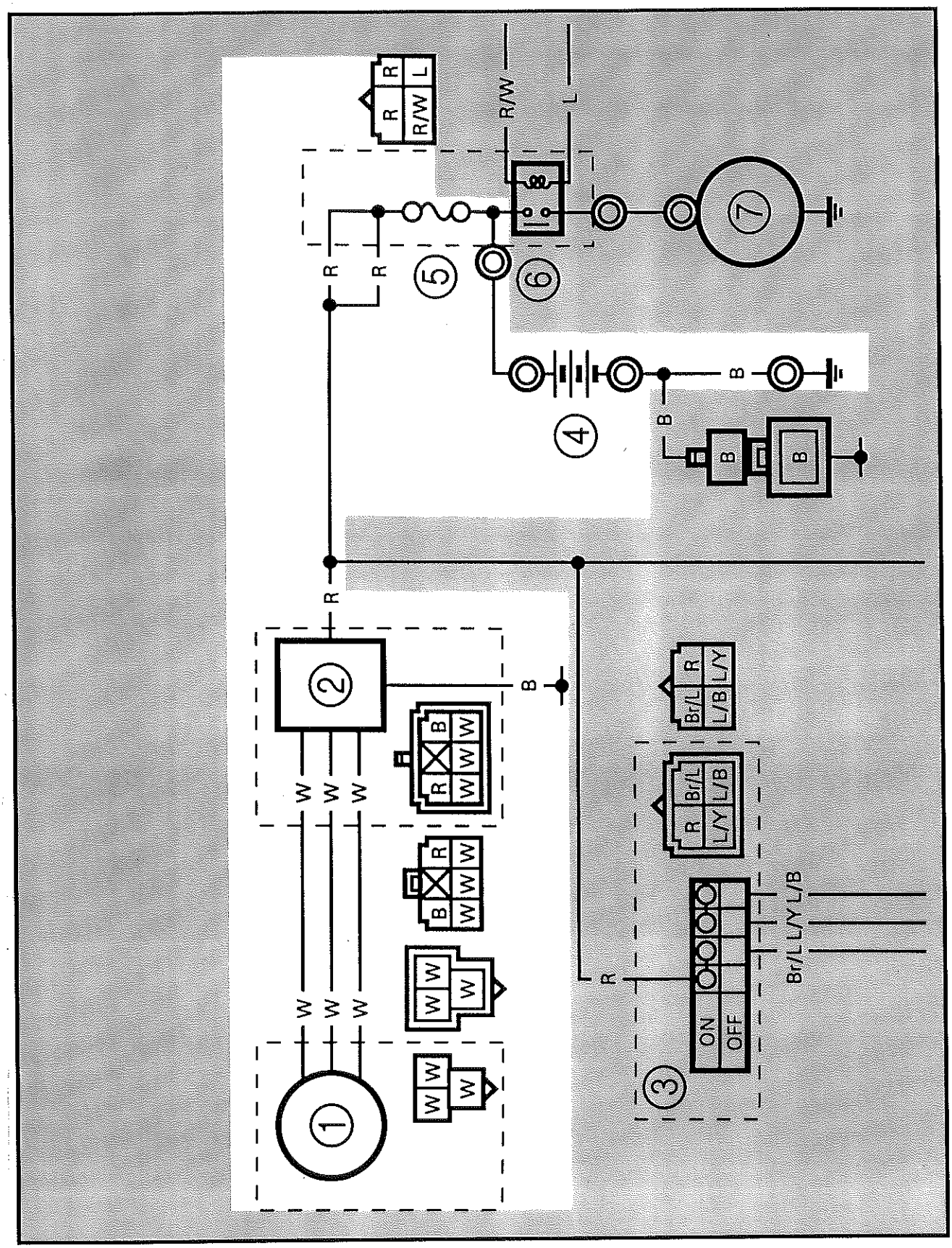


INSTALLATION

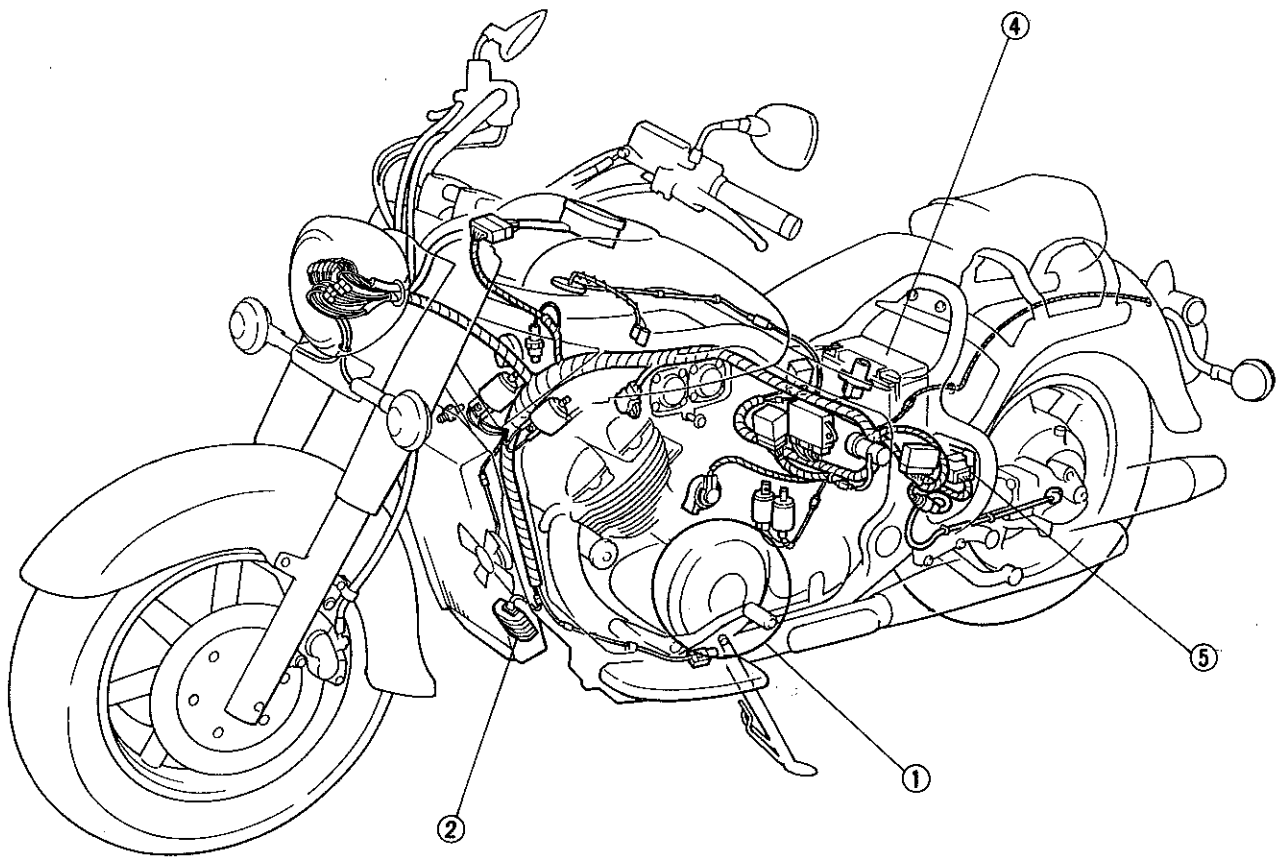
1.Install:
- Starter motor 10Nm (1.0 m · kg, 7.2 ft · lb)
  Refer to "AC MAGNETO AND STARTER CLUTCH" in CHAPTER 4.

CHARGING SYSTEM

CIRCUIT DIAGRAM



① A.C. magneto
② Rectifier/regulator
④ Battery
⑤ Fuse (main)



TROUBLESHOOTING

THE BATTERY IS NOT CHARGED.

Procedure

Check:

1.Fuse (main)
2.Battery
3.Charging voltage
4.Stator coil resistance
5.Wiring connection
(entire charging system)

NOTE:

- Remove the following parts before troubleshooting.

1)Seat
2)Side cover (left)

- Use the following special tool(s) for troubleshooting.

Inductive tachometer:
YU-08036-A, 90890-03113
Pocket tester:
YU-03112, 90890-03112

1.Fuse (main)

- Remove the fuse.
- Connect the pocket tester (Ω × 1) to the fuse.
- Check the fuse for continuity.

NO CONTINUITY → Replace the fuse.

CONTINUITY ↓

2.Battery

- Check the battery condition. Refer to "BATTERY INSPECTION" in CHAPTER 3.

Open circuit voltage:
12.8 V or more at 20 °C (68 °F)

INCORRECT →

- Clean the battery terminals.
- Recharge or replace the battery.

CORRECT ↓

*

*

3.Charging voltage

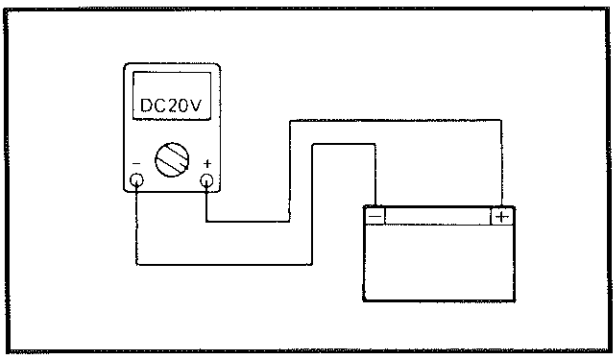
- Connect the inductive tachometer to the spark plug lead.
- Connect the pocket tester (DC 20 V) to the battery.

Tester (+) lead → Battery (+) terminal
Tester (–) lead → Battery (–) terminal

- Start the engine and accelerate to about, 5,000 r/min.
- Check the charging voltage.

Charging voltage:
14 V at 5,000 r/min

NOTE:
Use a fully charged battery.



MEETS SPECIFICATION

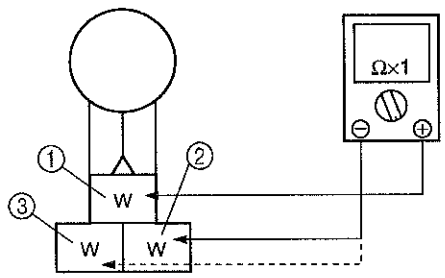
The charging circuit is good.

OUT OF SPECIFICATION

4.Stator coil resistance

- Disconnect the stator coil coupler from the wire harness.
- Connect the pocket tester (Ω × 1) to the stator coils.
- Measure the stator coil resistance.

Stator coil resistance:
1.69 ~ 2.07 Ω at 20 °C (68 °F)



Tester (+) lead → White terminal ①
Tester (–) lead → White terminal ②

Tester (+) lead → White terminal ①
Tester (–) lead → White terminal ③

OUT OF SPECIFICATION

Replace the stator assembly.

BOTH MEET SPECIFICATION

*

*

5.Wiring connection

- Check the connections on the entire ignition system.
  Refer to "CIRCUIT DIAGRAM".

POOR CONNECTION

Properly connect the ignition system.

CORRECT

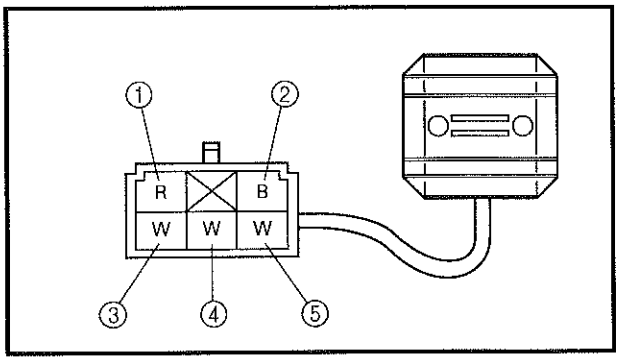
6.Rectifier/regulator (Rectifier circuit)

- Remove the rectifier/regulator from the frame.
- Connect the pocket tester (kΩ × 1) to the rectifier/regulator coupler terminals.
- Check the resistor for the specified resistance.

kΩ

⊖ \ ⊕	①	②	③	④	⑤
①		ON (1 ~ 10)	ON (1 ~ 10)	ON (1 ~ 10)	ON (1 ~ 10)
②	∞		∞	∞	∞
③	∞	ON (1 ~ 10)		∞	∞
④	∞	ON (1 ~ 10)	∞		∞
⑤	∞	ON (1 ~ 10)	∞	∞	

NOTE:
When you switch the "–" and "+" leads of the analog pocket tester the readings in the above chart will be reversed.



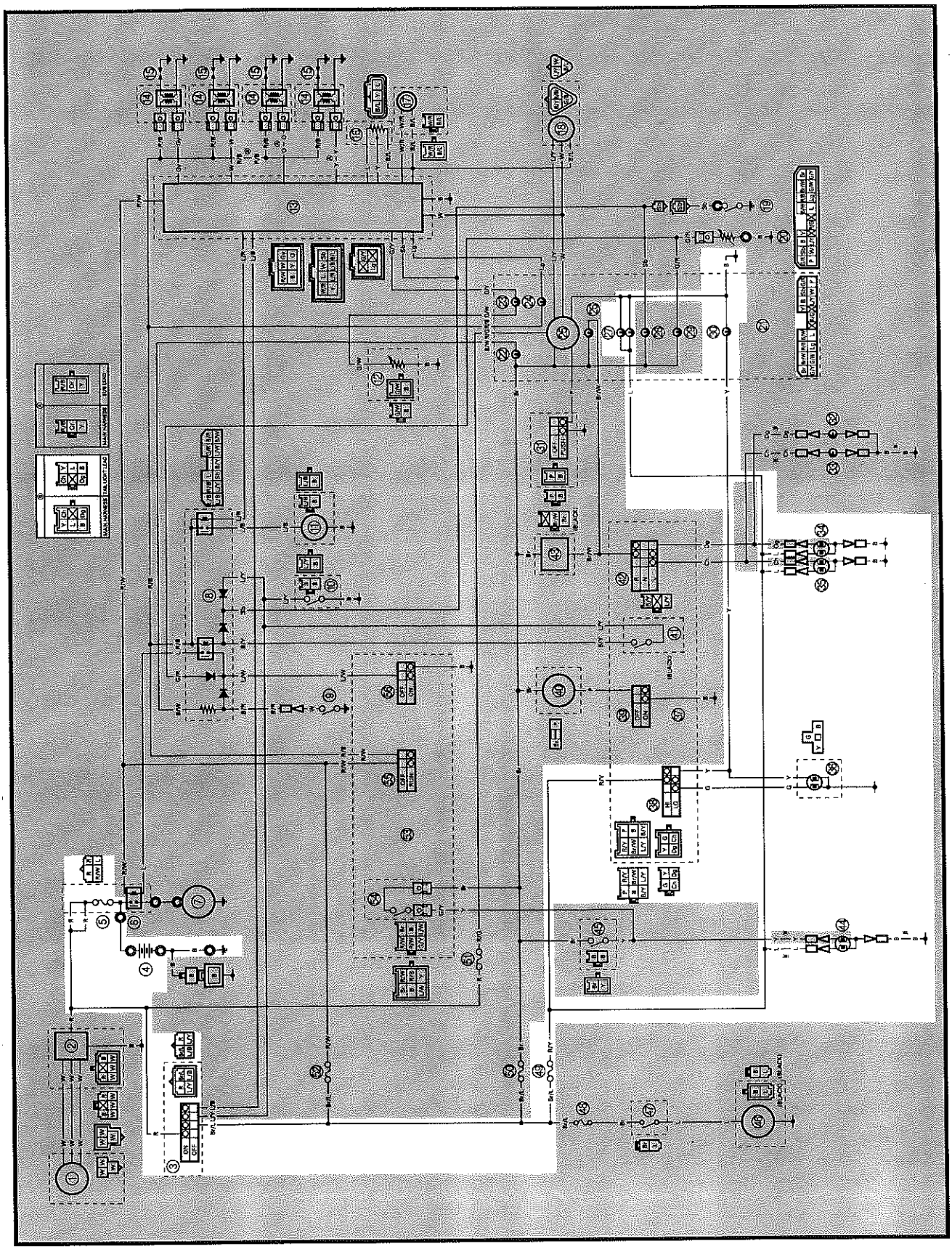
OUT OF SPECIFICATION

Replace the rectifier/regulator.

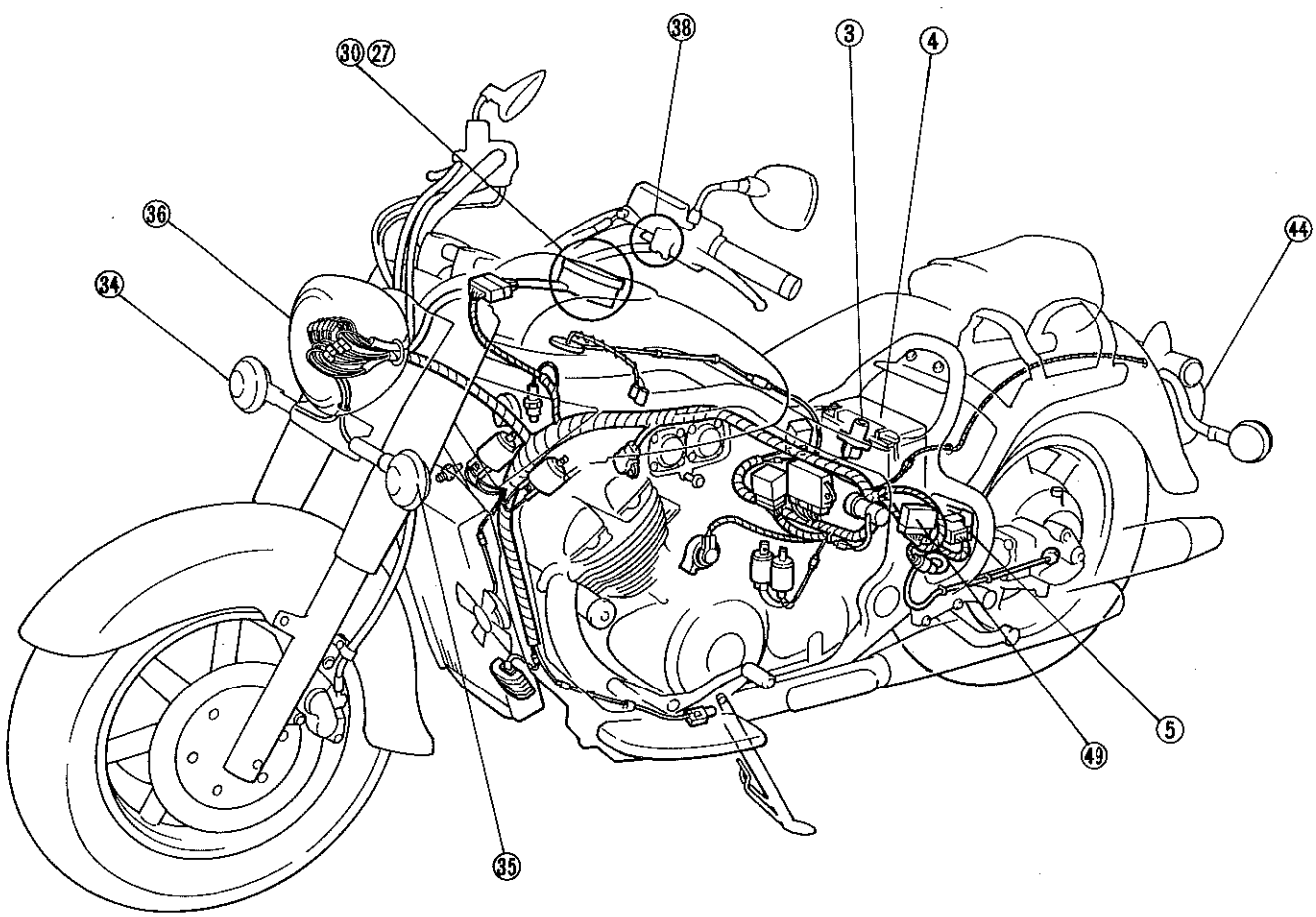
NOTE:
This check is only for the rectifier circuit. If the regulator circuit is faulty, replace the rectifier/regulator.

LIGHTING SYSTEM

CIRCUIT DIAGRAM



③ Main switch
④ Battery
⑤ Fuse (main)
㉗ Meter light
㉚ High beam indicator light
㉞ Front turn signal/position light (right)
㉟ Front turn signal/position light (left)
㊱ Headlight
㊳ Dimmer switch
㊹ Tail/brake light
㊾ Fuse (head)



TROUBLESHOOTING

THE HEADLIGHT HIGH BEAM INDICATOR LIGHT, TAILLIGHT, AND/OR METER LIGHT DO NOT COME ON.

Procedure

Check:

1. Fuse (main and head)
2. Battery
3. Main switch
4. Dimmer switch
5. Wiring connection (entire lighting system)

NOTE:

- Remove the following parts before troubleshooting.
  1) Seat
  2) Side covers (left and right)
  3) Headlight unit
- Use the following special tool(s) for troubleshooting.

Pocket tester:
YU-03112, 90890-03112

1. Fuse (main and head)

- Remove the fuses.
- Connect the pocket tester (Ω × 1) to the fuses.
- Check the fuses for continuity.

NO CONTINUITY → Replace the fuse(s).

CONTINUITY ↓

2. Battery

- Check the battery condition. Refer to "BATTERY INSPECTION" in CHAPTER 3.

Open-circuit voltage:
12.8 V or more at 20 °C (68 °F)

INCORRECT →
- Clean the battery terminals.
- Recharge or replace the battery.

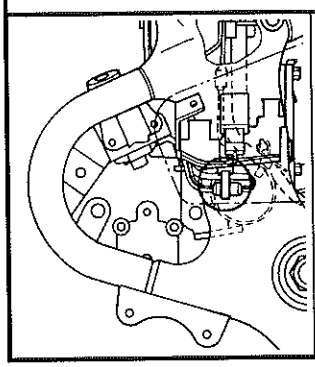
CORRECT ↓

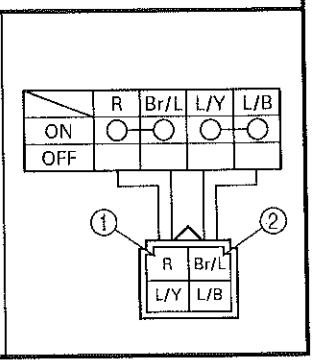
*

*

3.Main switch

- Disconnect the main switch coupler from the wire harness.
- Check the switch component for continuity between "Red ① and Brown/Blue ②".





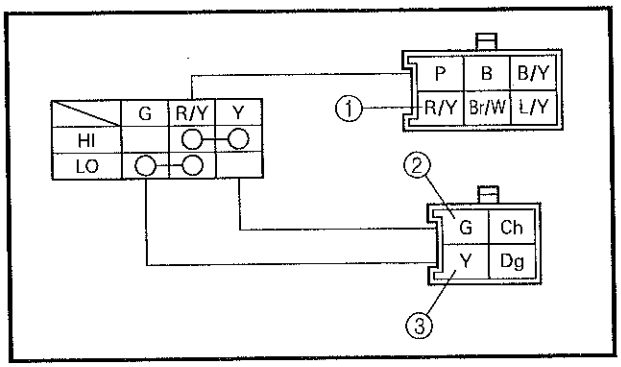
INCORRECT

Replace the main switch.

CORRECT

4.Dimmer switch

- Disconnect the handlebar switch (left) couplers from the wire harness.
- Turn the dimmer switch to "≡D".
- Check the switch component for continuity between "Red/Yellow ① and Green ②".
- Set the position of the dimmer switch to "≡D".
- Check the switch component for continuity between "Red/Yellow ① and Yellow ③".



INCORRECT

The dimmer switch is faulty, replace the handlebar switch (left).

CORRECT

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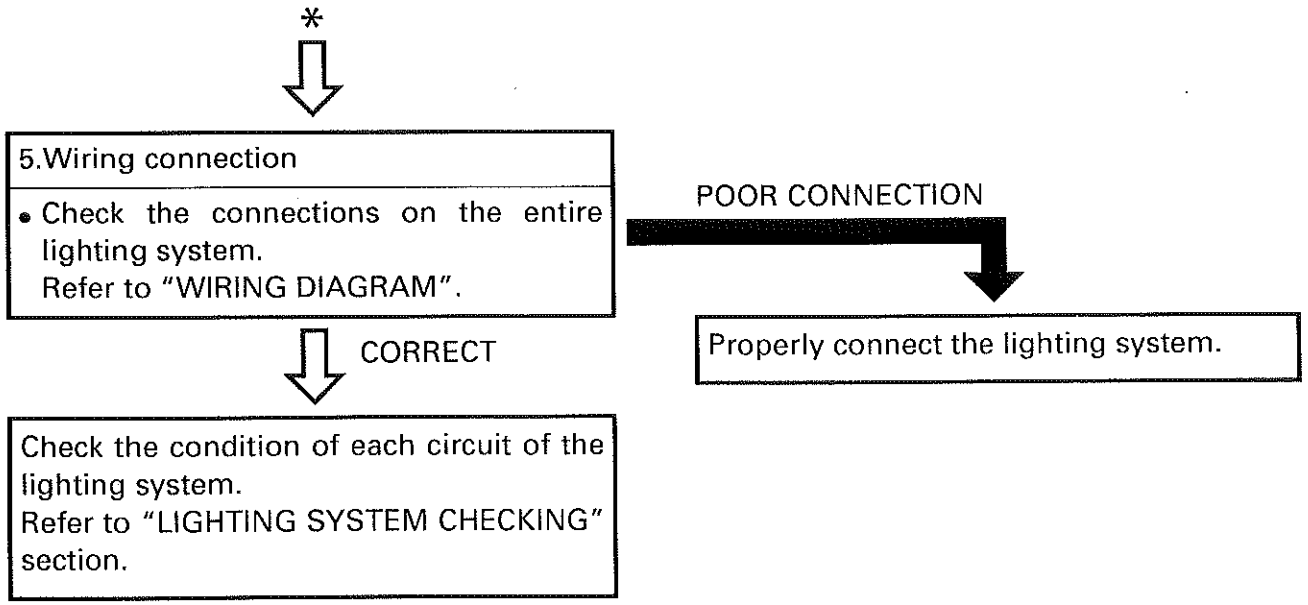

*
5.Wiring connection
• Check the connections on the entire lighting system.
Refer to "WIRING DIAGRAM".
POOR CONNECTION
Properly connect the lighting system.
CORRECT
Check the condition of each circuit of the lighting system.
Refer to "LIGHTING SYSTEM CHECKING" section.

LIGHTING SYSTEM CHECK

1.The headlight and high beam indicator light does not come on.

1.Bulb and bulb socket

- Check the bulb and bulb socket for continuity.

NO CONTINUITY → Replace the bulb and/or bulb socket.

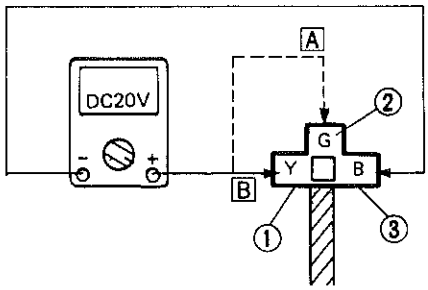
CONTINUITY ↓

2.Voltage

- Connect the pocket tester (DC 20 V) to the headlight and high beam indicator light coupler.

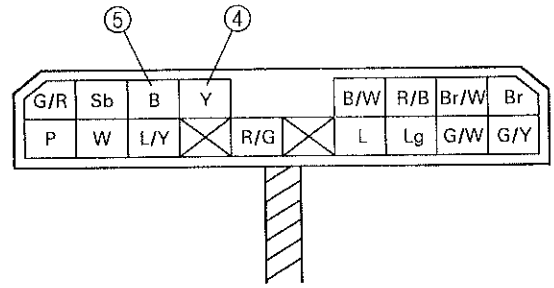
A When the dimmer switch is at "≡D".
B When the dimmer switch is at "≡D".

Headlight connector



Headlight:
Tester (+) lead → Yellow ① or Green ② terminal.
Tester (–) lead → Black ③ terminal.
High beam indicator light:
Tester (+) lead → Yellow ④ terminal.
Tester (–) lead → Black ⑤ terminal.

B Meter connector



- Turn the main switch to "ON".
- Turn the dimmer switch to "≡D" or "≡D".
- Check for voltage (12 V) on the "Green" and "Yellow" lead at the bulb socket connectors.

OUT OF SPECIFICATION → The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.

MEETS SPECIFICATION ↓

This circuit is good.

2.Meter light does not come on.

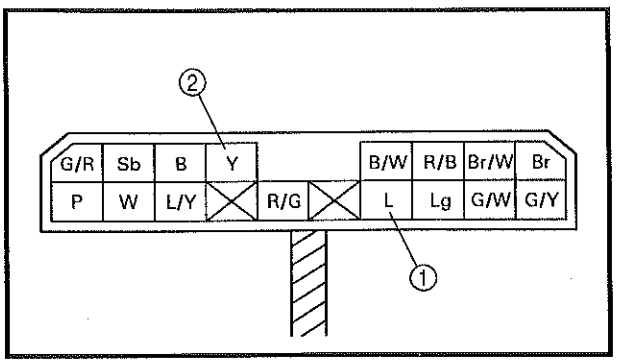
1.Bulb and bulb socket
- Check the bulb and bulb socket for continuity.

NO CONTINUITY → Replace the bulb and/or bulb socket.

CONTINUITY ↓

2.Voltage
- Connect the pocket tester (20 V) to the bulb socket coupler.

Tester (+) lead → Blue terminal ①
Tester (–) lead → Black terminal ②



- Turn the main switch to "ON".
- Check for voltage (12 V) on the "Blue" lead at the bulb socket connector.

OUT OF SPECIFICATION → The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.

MEETS SPECIFICATION ↓

This circuit is good.

3.Taillight does not come on.

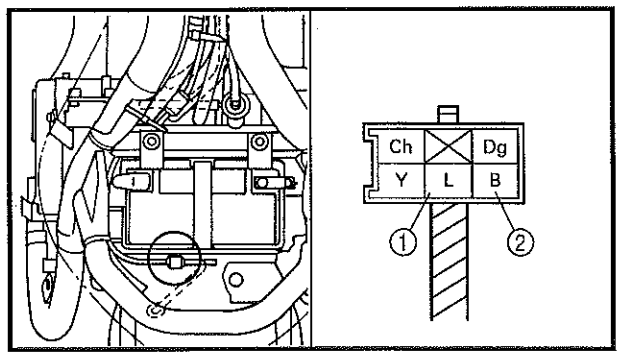
1.Bulb and bulb socket
- Check the bulb and bulb socket for continuity.

NO CONTINUITY → Replace the bulb and/or bulb socket.

CONTINUITY ↓

2.Voltage
- Connect the pocket tester (DC 20 V) to the bulb socket connector.

Tester (+) lead → Blue terminal ①
Tester (–) lead → Black terminal ②



- Turn the main switch to "ON".
- Check for voltage (12 V) on the "Blue" lead at the bulb socket connector.

OUT OF SPECIFICATION

The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.

MEETS SPECIFICATION

This circuit is good.

4.Front position light does not come on.

1.Bulb and bulb socket

- Check the bulb and bulb socket for continuity.

NO CONTINUITY

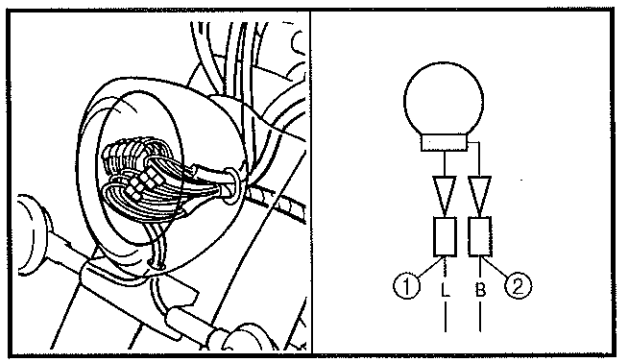
The bulb and/or socket are faulty, replace.

CONTINUITY

2.Voltage

- Connect the pocket tester (DC 20 V) to the bulb socket connector.

Tester (+) lead → Blue lead ①
Tester (–) lead → Black lead ②



- Turn the main switch to "ON".
- Check for voltage (12 V) on the "Blue" lead at the bulb socket connector.

OUT OF SPECIFICATION

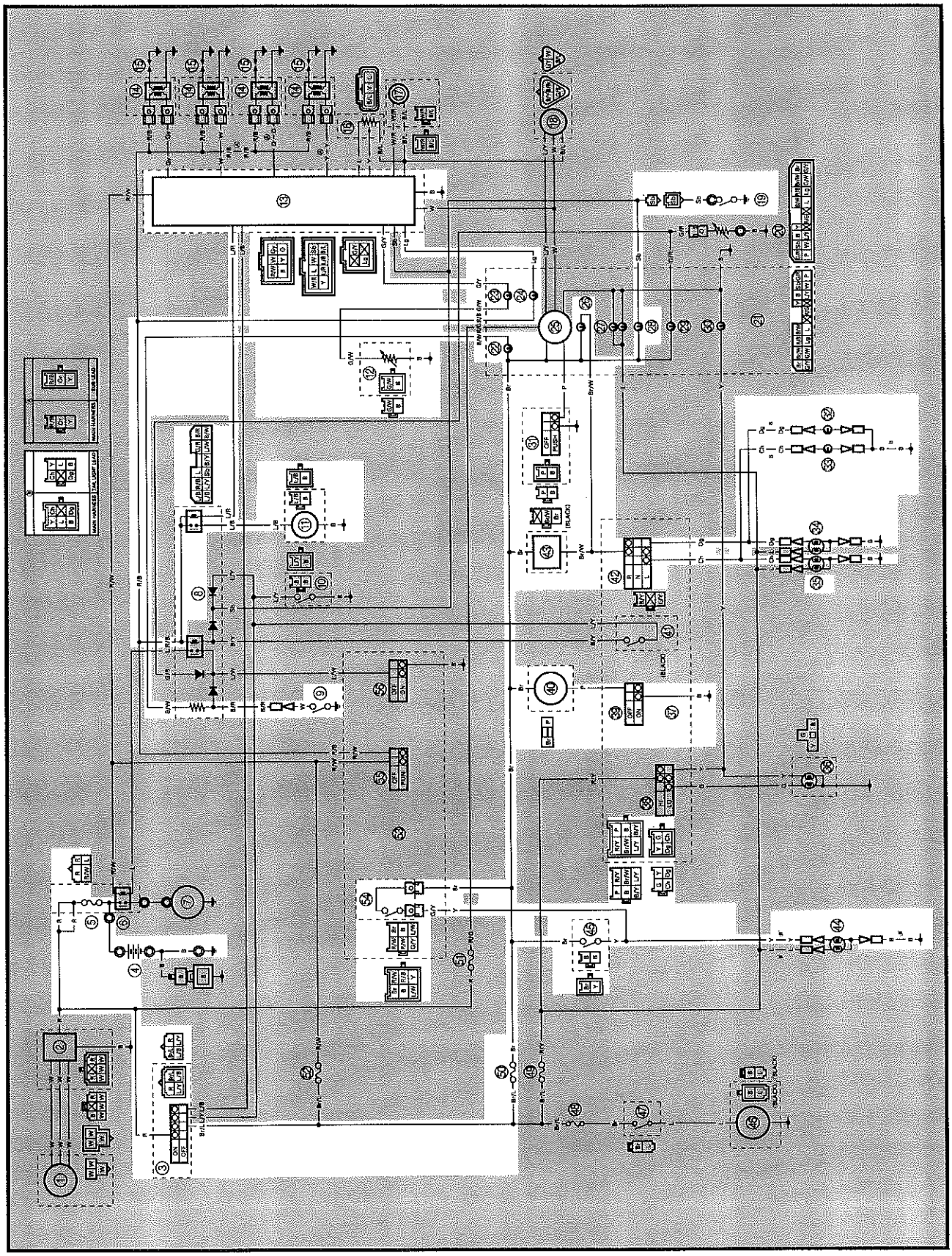
The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.

MEETS SPECIFICATION

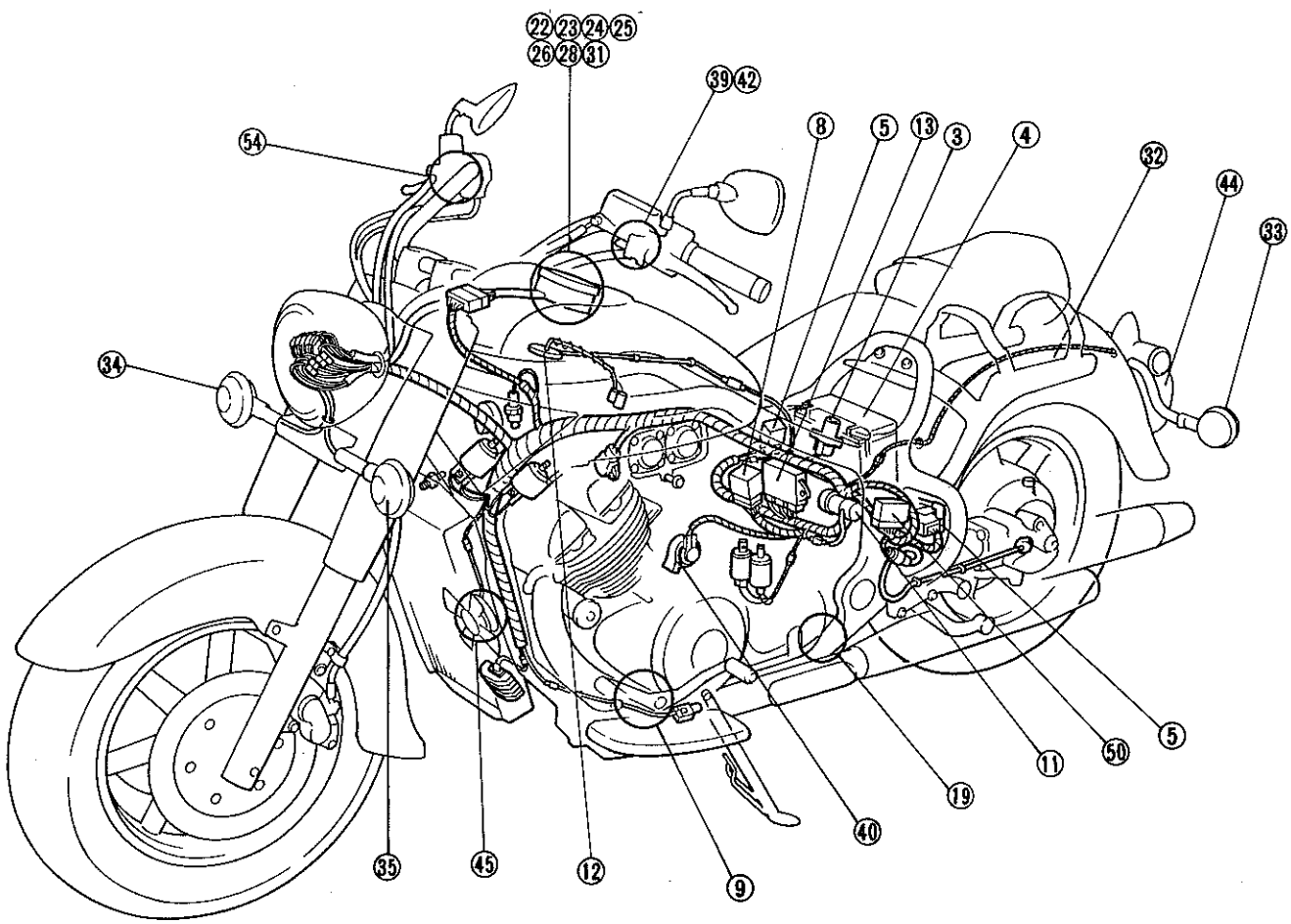
This circuit is good.

SIGNAL SYSTEM

CIRCUIT DIAGRAM



③ Main switch
④ Battery
⑤ Fuse (main)
⑧ Starting circuit cut-off relay
⑨ Oil level switch
⑪ Fuel pump
⑫ Fuel sender
⑬ Ignitor unit
⑲ Neutral switch
㉒ Oil level indicator light
㉓ Fuel level indicator light
㉔ Engine indicator light
㉕ Speedometer
㉖ Turn indicator light
㉘ Neutral indicator light
㉛ Trip button
㉜ Rear turn signal (right)
㉝ Rear turn signal (left)
㉞ Front turn signal/position light (right)
㉟ Front turn signal/position light (left)
㊴ Horn switch
㊵ Horn
㊷ Turn signal switch
㊸ Flasher relay
㊹ Tail brake light
㊺ Rear brake switch
㊿ Fuse (signal)
㊿④ Front brake switch

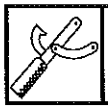


TROUBLESHOOTING

• TURN SIGNAL, BRAKE LIGHT AND/OR INDICATOR LIGHT DO NOT COME ON.
• THE HORN DOES NOT SOUND.

Procedure
Check:
1.Fuse (main and signal)
2.Battery
3.Main switch
4.Wiring connection
(entire signal system)

NOTE:
- Remove the following parts before troubleshooting.
1)Seat
2)Side covers (left and right)
3)Fuel tank
4)Air filter case
- Use the following special tool(s) for troubleshooting.



Pocket tester:
YU-03112, 90890-03112

1.Fuse (main and signal)
- Remove the fuses.
- Connect the pocket tester (Ω × 1) to the fuses.
- Check the fuses for continuity.

NO CONTINUITY → Replace the fuse(s).

CONTINUITY ↓

2.Battery
- Check the battery condition. Refer to "BATTERY INSPECTION" in CHAPTER 3.

Open circuit voltage:
12.8 V or more at 20 °C (68 °F)

INCORRECT →
- Clean the battery terminals.
- Recharge or replace the battery.

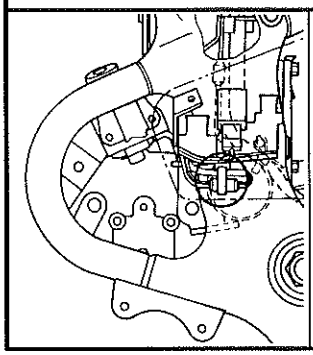
CORRECT ↓

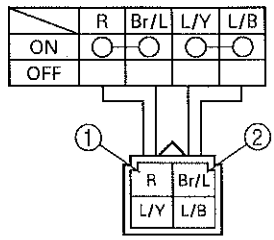
*

*

3.Main switch

- Disconnect the main switch coupler from the wire harness.
- Check the switch component for continuity between "Red ① and Brown/Blue ②".





INCORRECT

Replace the main switch.

CORRECT

4.Wiring connection

- Check the connections on the entire signal system.
  Refer to "WIRING DIAGRAM".

POOR CONNECTION

Properly connect the signal system.

CORRECT

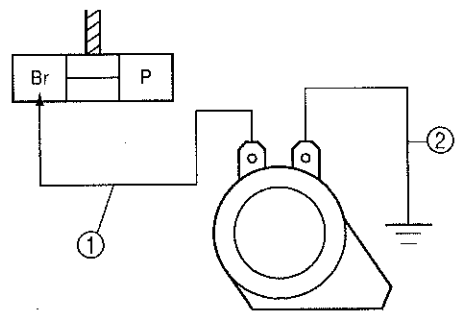
Check the condition of each circuit of the signal system. Refer to "SIGNAL SYSTEM CHECK".

SIGNAL SYSTEM CHECK

1.Horn does not sound.

1.Horn

- Disconnect the horn coupler at the horn terminal.
- Connect a jumper lead ① to the "Brown" terminal in the horn coupler and the horn terminal.
- Connect a jumper lead ② to the horn terminal and ground the jumper lead.
- Turn the main switch to "ON".



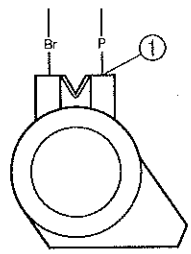
HORN SOUNDS → Horn is good.

HORN DOES NOT SOUND ↓

2.Voltage

- Connect the pocket tester (DC 20 V) to the horn at the "Pink" terminal.

Tester (+) lead → Pink lead ①
Tester (–) lead → Frame ground



- Turn the main switch to "ON".
- Check for voltage (12 V) on the "Pink" lead at the horn terminal.

OUT OF SPECIFICATION → Replace the horn.

MEETS SPECIFICATION ↓

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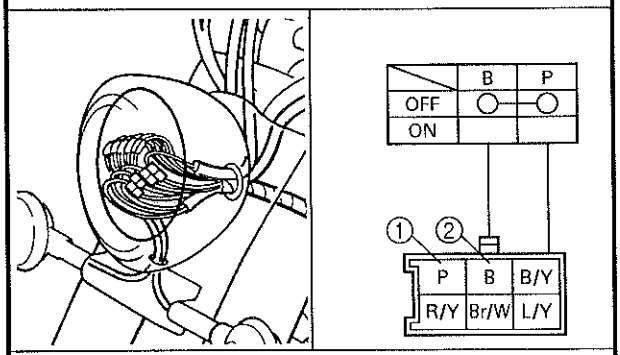
*

3.Horn switch



- Disconnect the handlebar switch (left) coupler from the wire harness.
- Check the switch component for continuity between "Pink ① and Black ②".

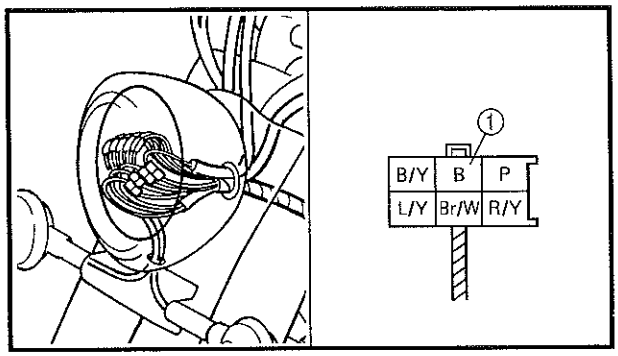
INCORRECT → Replace the handlebar switch (left).

CORRECT

4.Voltage

- Connect the pocket tester (DC 20V) to the horn switch coupler.

Tester (+) lead → Black lead ①
Tester (–) lead → Frame ground



- Turn the main switch to "ON".
- Push the horn switch.
- Check for voltage (12 V) on the "Black" lead at the horn terminal.

OUT OF SPECIFICATION → Replace the wire harness.

MEET SPECIFICATION

Adjust or replace the horn.

2.Brake light does not come on.

1.Bulb and bulb socket

- Check the bulb and bulb socket for continuity.

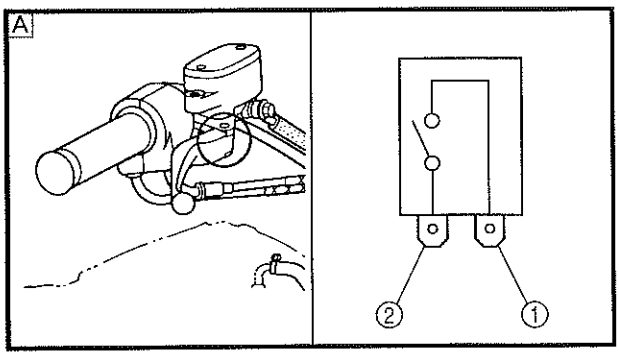
NO CONTINUITY

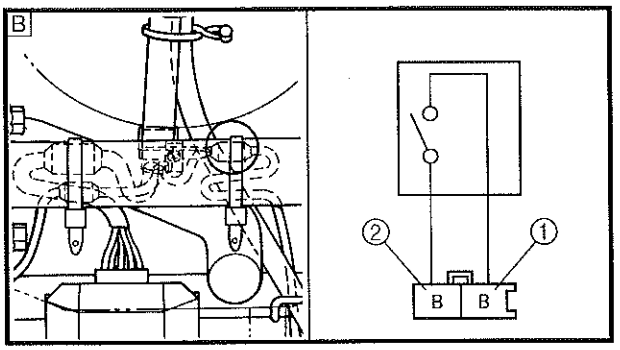
Replace the bulb and/or bulb socket.

CONTINUITY

2.Brake switch

- Disconnect the front brake switch leads from the front brake switch terminal and the rear brake switch coupler from the wire harness.
- Check the switch components for continuity between "Brown ① and Green/Yellow ②", or between "Brown ③ and Yellow ④".





A Front brake switch
B Rear brake switch

INCORRECT

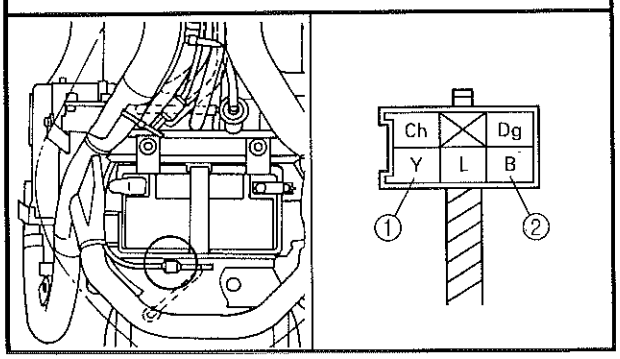
Replace the brake switch.

CORRECT

3.Voltage

- Connect the pocket tester (DC 20 V) to the bulb socket connector.

Tester (+) lead → Yellow terminal ①
Tester (–) lead → Black terminal ②



- Turn the main switch to "ON".
- The brake lever is pulled in or the brake pedal is pressed down.
- Check for voltage (12 V) on the "Yellow" lead at the bulb socket connector.

OUT OF SPECIFICATION

The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.

MEETS SPECIFICATION

This circuit is good.

3.Turn signal and/or turn indicator light does not blink.

1.Bulb and bulb socket

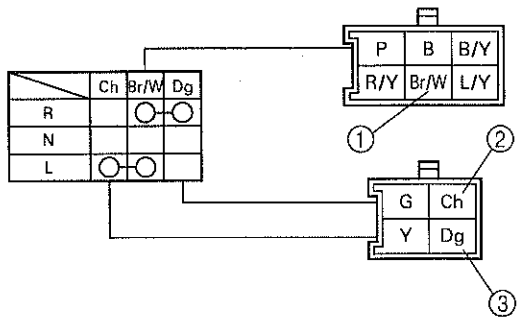
- Check the bulb and bulb socket for continuity.

NO CONTINUITY

Replace the bulb and/or bulb socket.

CONTINUITY

2.Turn signal switch



- Disconnect the handlebar switch (left) couplers from the wire harness.
- Check the switch component for continuity between "Brown/White ① and Chocolate ②", and "Brown/White ① and Dark green ③".

INCORRECT

Replace the handlebar switch (left).

CORRECT

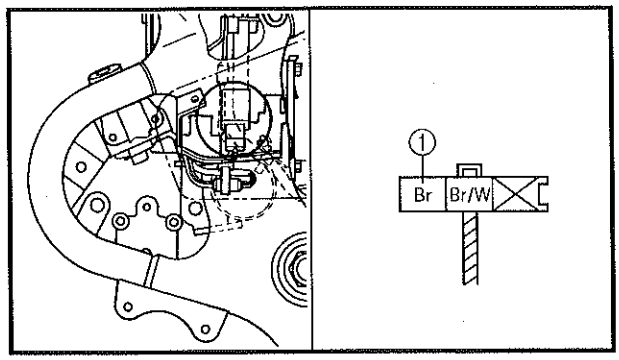
*

*

3.Voltage

- Connect the pocket tester (DC 20 V) to the flasher relay coupler.

Tester (+) lead → Brown terminal ①
Tester (–) lead → Frame ground



- Turn the main switch to "ON".
- Check for voltage (12 V) on the "Brown" lead at the flasher relay terminal.

OUT OF SPECIFICATION

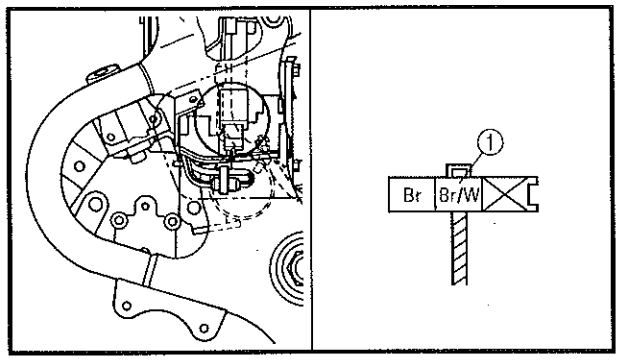
The wiring circuit from the main switch to the flasher relay connector is faulty, repair it.

MEETS SPECIFICATION

4.Voltage

- Connect the pocket tester (DC 20 V) to the flasher relay coupler.

Tester (+) lead →
Brown/White terminal ①
Tester (–) lead → Frame ground



- Turn the main switch to "ON".
- Check for voltage (12 V) on the "Brown/White" lead at the flasher relay terminal.

OUT OF SPECIFICATION

Replace the flasher relay.

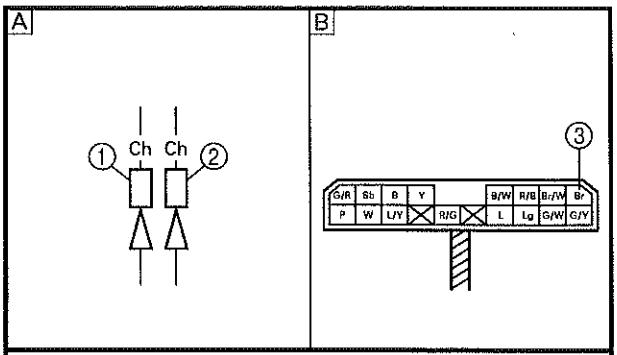
MEETS SPECIFICATION

*

*

5.Voltage

- Connect the pocket tester (DC 20 V) to the bulb socket connector.



A Flasher light
B Turn indicator light

At flasher light (left):
Tester (+) lead → Chocolate lead ①
Tester (–) lead → Frame ground

At flasher light (right):
Tester (+) lead → Dark green lead ②
Tester (–) lead → Frame ground

At turn indicator light:
Tester (+) lead → Brown terminal ③
Tester (–) lead → Frame ground

- Turn the main switch to "ON".
- Move the turn signal switch to " ⇨ " or " ⇦ ".
- Check for voltage (12 V) on the "Chocolate" lead or "Dark green" lead at the bulb socket connector.

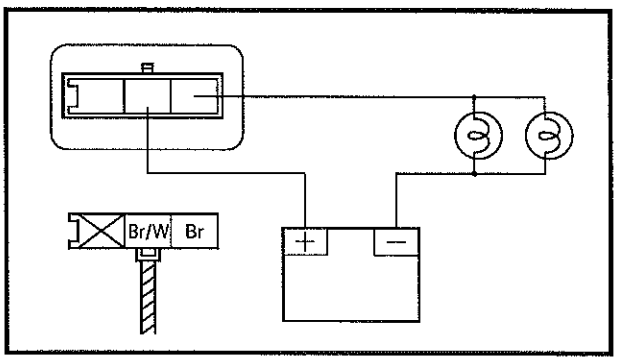
OUT OF SPECIFICATION

The wiring circuit from the turn signal switch to the bulb socket connector is faulty, repair it.

MEETS SPECIFICATION

6.Flasher relay

- Disconnect the flasher relay.
- Connect the battery (12 V) and one or two bulbs to the flasher relay coupler as shown.



Number of turn signal bulbs	(W)	Number of blinks per minute
1*	21	140
2	42	75 ~ 95

* One bulb is lit.

BAD CONDITION

Replace the flasher relay.

GOOD CONDITION

This circuit is good.

4.Neutral indicator light does not come on.

1.Bulb and bulb socket

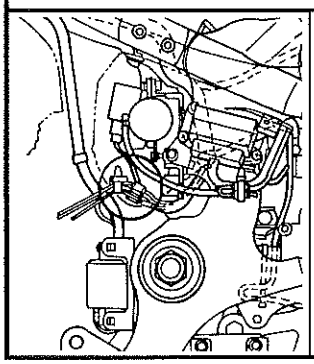
- Check the bulb and bulb socket for continuity.

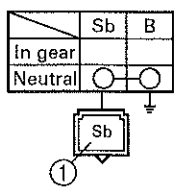
NO CONTINUITY → Replace the bulb and/or bulb socket.

CONTINUITY ↓

2.Neutral switch

- Disconnect the neutral switch coupler from the wire harness.
- Check the switch component for continuity between "Sky blue ①" and Ground.





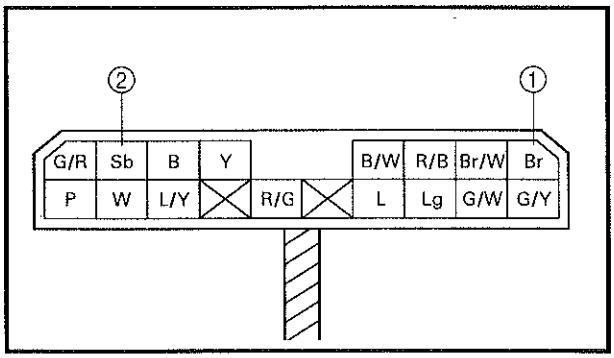
NO CONTINUITY → Replace the neutral switch.

CONTINUITY ↓

3.Voltage

- Connect the pocket tester (DC 20 V) to the bulb socket coupler.

Tester (+) lead → Brown terminal ①
Tester (–) lead → Sky blue terminal ②



- Turn the main switch to "ON".
- Check for voltage (12 V).

OUT OF SPECIFICATION → The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.

MEETS SPECIFICATION ↓

This circuit is good.

5.The oil level indicator light does not come on when the engine oil level is low.

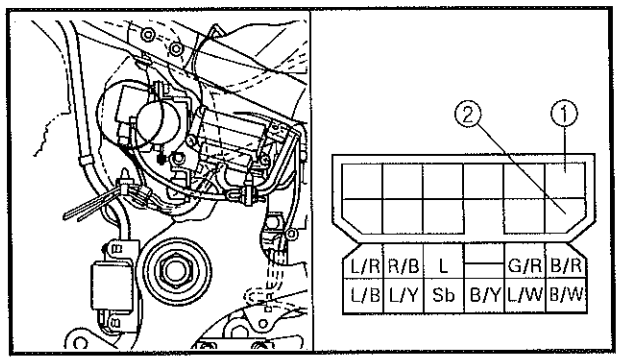
1.Bulb and bulb socket
- Check the bulb and bulb socket for continuity.

NO CONTINUITY

Replace the bulb and/or bulb socket.

2.Starting circuit cut-off relay
- Disconnect the starting circuit cut-off relay coupler from the wire harness.
- Connect the pocket tester (Ω × 1) to the starting circuit cut-off relay coupler terminals.
- Check the resistor for the specified resistance.

Tester (+) terminal →
Black/White terminal ①
Tester (–) terminal → Black/Red ②



OUT OF SPECIFICATION

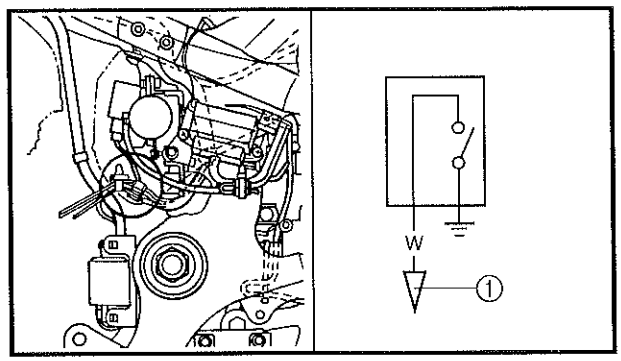
6.4 ~ 9.6 Ω at 20 °C (68 °F)

Replace the starting circuit cut-off relay.

MEETS SPECIFICATION

3.Oil level switch
- Drain the engine oil and remove the oil level switch from the oil pan.
- Connect the pocket tester (Ω × 1) to the oil level switch.

Tester (+) lead →
White lead ①
Tester (–) lead → Frame ground



- Check the oil level switch for continuity.

BAD CONDITION

Replace the oil level switch.

GOOD CONDITION

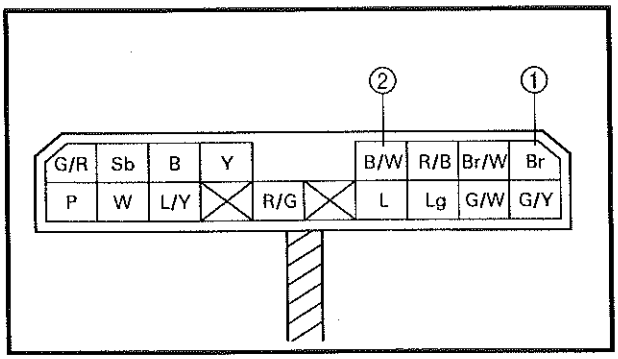
*

*

4.Voltage

- Connect the pocket tester (DC 20 V) to the bulb socket connector.

Tester (+) lead → Brown lead ①
Tester (–) lead → Black/White lead ②



- Turn the main switch to "ON".
- Check for voltage (12 V).

OUT OF SPECIFICATION

The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.

MEETS SPECIFICATION

This circuit is good.

6.The fuel level indicator light does not come on when the fuel level is low.

1.Bulb and bulb socket

- Check the bulb and bulb socket for continuity.

NO CONTINUITY

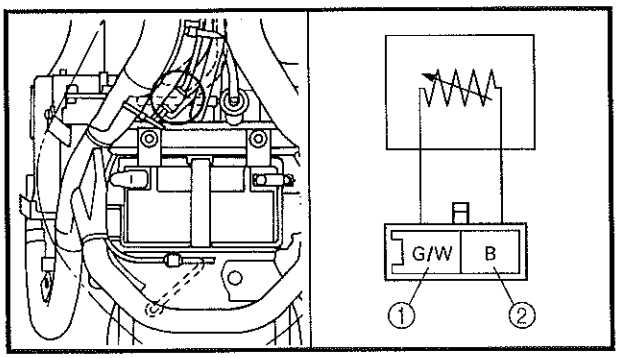
Replace the bulb and/or bulb socket.

CONTINUITY

2.Fuel sender

- Drain the fuel and remove the fuel sender from the fuel tank.
- Connect the pocket tester (Ω × 100) to the fuel sender.

Tester (+) lead →
Green/White terminal ①
Tester (–) lead → Black terminal ②



- Check the fuel sender for the specified resistance.

Fuel sender resistance
(Ω × 100)
600 ~ 1,200 Ω at 25 °C

OUT OF SPECIFICATION

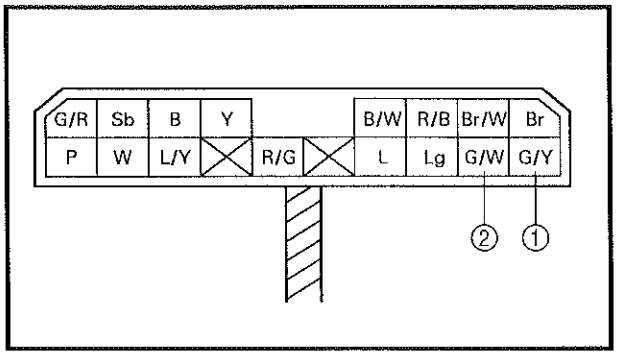
Replace the fuel sender.

BOTH MEET SPECIFICATION

3.Voltage

- Connect the pocket tester (DC 20 V) to the bulb socket connector.

Tester (+) lead → Green/Yellow lead ①
Tester (–) lead → Green/White lead ②



- Turn the main switch to "ON".
- Check for voltage (12 V).

OUT OF SPECIFICATION

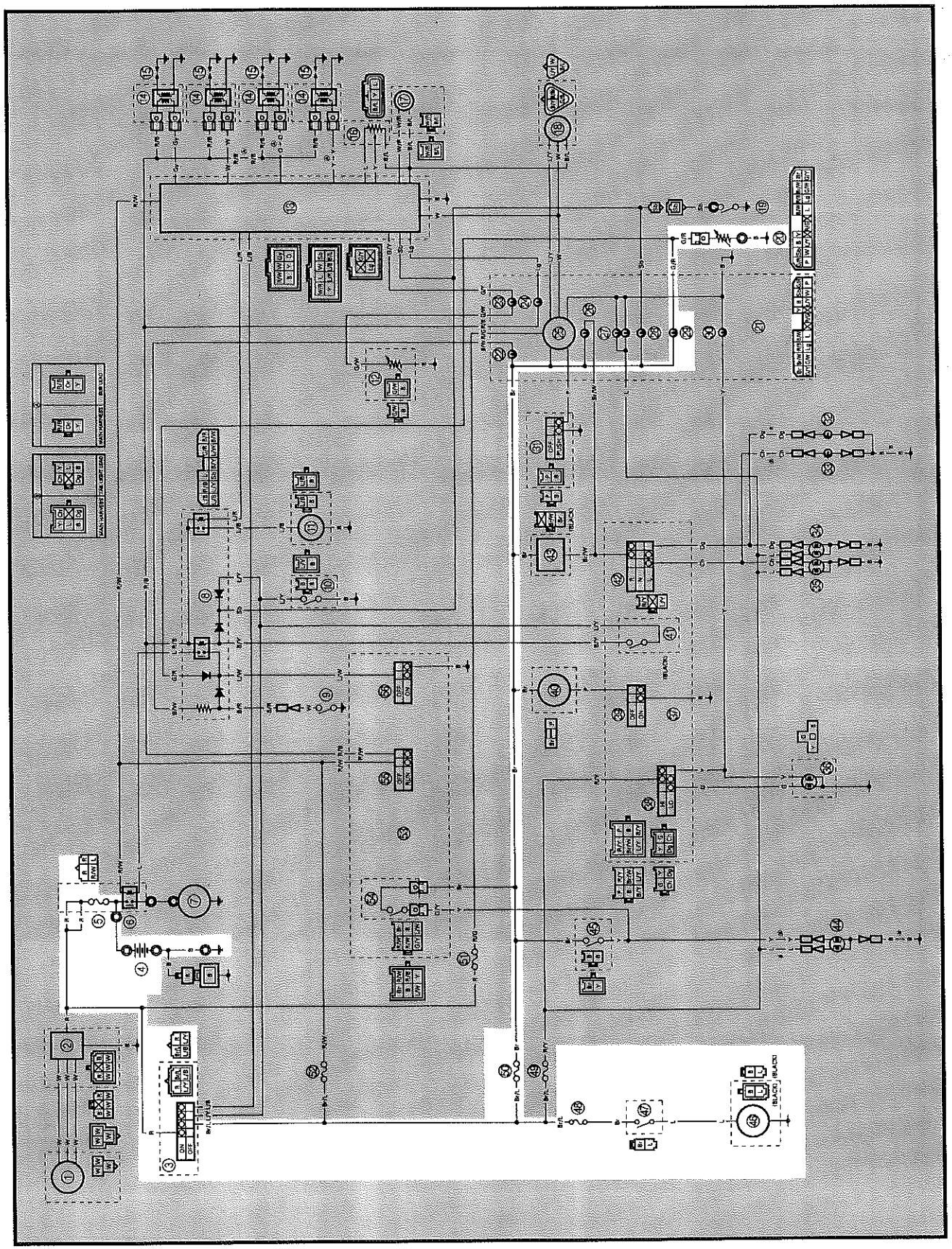
The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.

MEETS SPECIFICATION

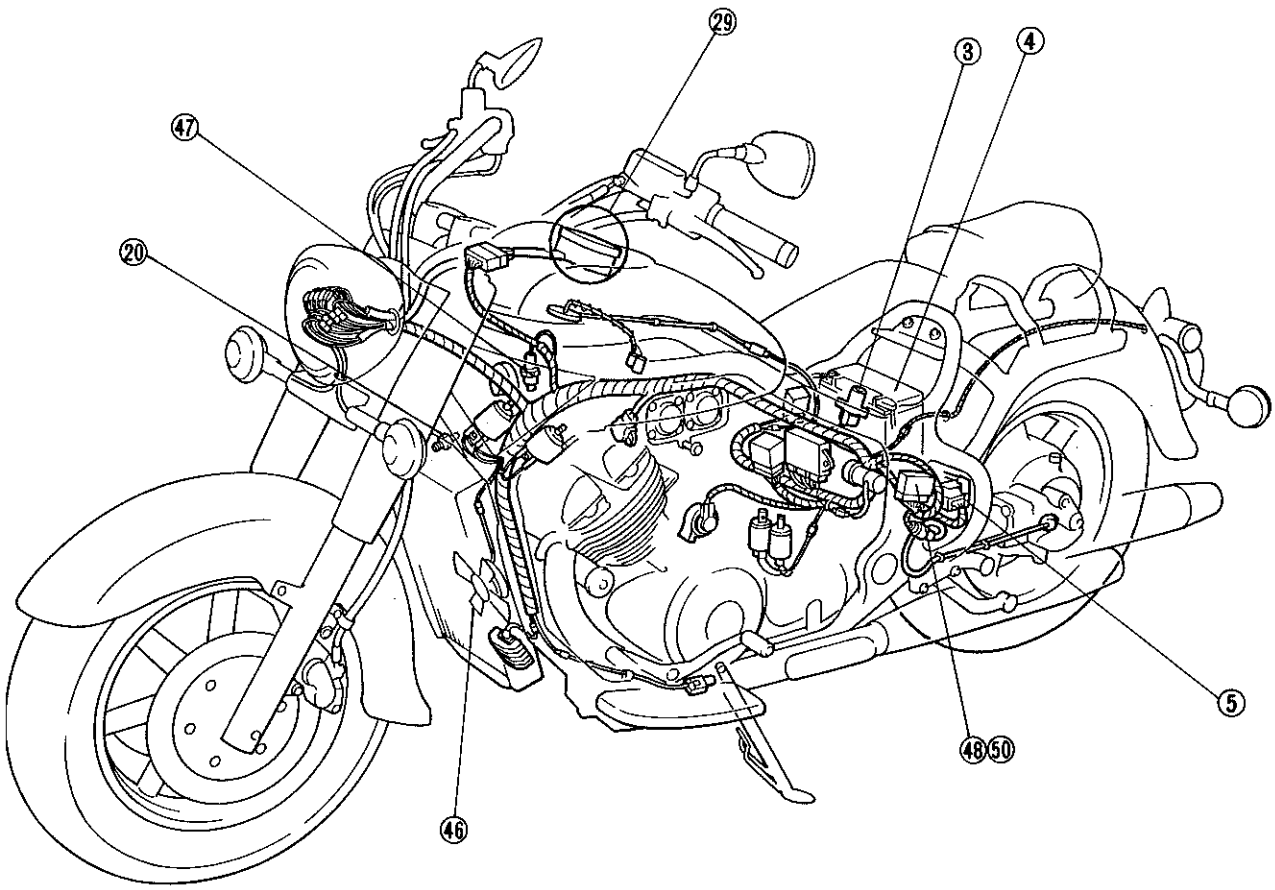
This circuit is good.

COOLING SYSTEM

CIRCUIT DIAGRAM



③ Main switch
④ Battery
⑤ Fuse (main)
⑳ Thermo unit
㉙ Engine overheat indicator light
㊻ Fan motor
㊼ Thermo switch
㊽ Fuse (fan)
㊿ Fuse (signal)



TROUBLESHOOTING

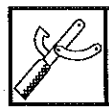
THE FAN MOTOR DOES NOT MOVE.
THE ENGINE OVERHEAT INDICATOR LIGHT DOES NOT COME ON WHEN THE ENGINE IS WARM.

Procedure
Check:
1.Fuse (main, signal and fan)
2.Battery
3.Main switch
4.Fan motor (Test 1)
5.Fan motor (Test 2)
6.Thermo switch
7.Wiring connection
(entire fuel system)

NOTE:
- Remove the following parts before troubleshooting.

1)Seat
2)Side covers (left and right)
3)Fuel tank
4)Air filter case

- Use the following special tool for troubleshooting.



Pocket tester:
YU-03112, 90890-03112

1.Fuse (main, signal and fan)

- Remove the fuses.
- Connect the pocket tester (Ω × 1) to the fuses.
- Check the fuses for continuity.
  Refer to "FUSE INSPECTION" in CHAPTER 3.

NO CONTINUITY → The fuse is faulty, replace it.

CONTINUITY ↓

2.Battery

- Check the battery condition.
  Refer to "BATTERY INSPECTION" in CHAPTER 3.

Open circuit voltage:
12.8 V or more at 20 °C (68 °F)

INCORRECT →
- Clean the battery terminals.
- Recharge or replace the battery.

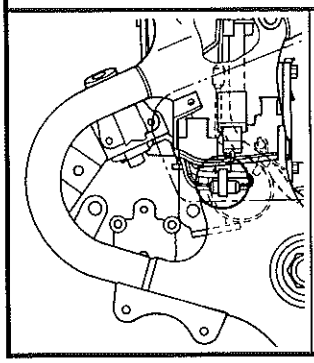
CORRECT ↓

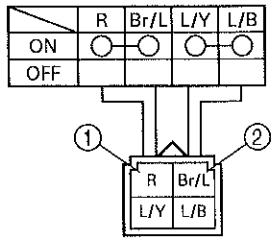
*

*

3.Main switch

- Disconnect the main switch coupler from the wire harness.
- Check the switch component for continuity between "Red ① and Brown/Blue ②".





INCORRECT

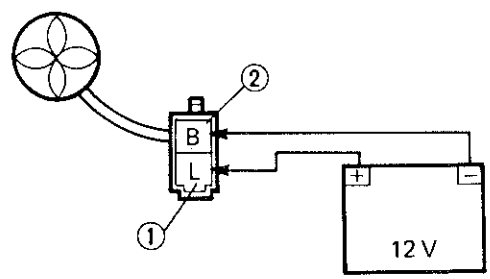
The main switch is faulty, replace it.

CORRECT

4.Fan motor (test 1)

- Disconnect the fan motor coupler.
- Connect the battery (12 V) as shown.

Battery (+) lead → Blue terminal ①
Battery (–) lead → Black terminal ②



- Check the operation of the fan motor.

DOES NOT MOVES

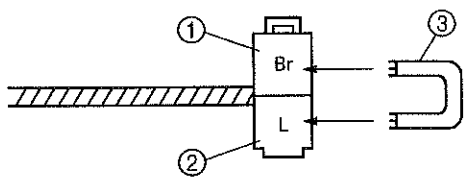
The fan motor is faulty, replace it.

MOVES

*

5.Fan motor (test 2)

- Disconnect the starting circuit cut-off relay coupler from the wire harness.
- Connect the pocket tester (Ω × 1) and battery (12 V) to the starting circuit cut-off relay coupler terminals.



DOES NOT MOVE

The wiring circuit from the main switch to the fan motor leads is faulty, repair it.

MOVES

6.Thermo switch

- Remove the thermo switch from the thermostat housing.
- Connect the pocket tester (Ω × 1) to the thermo switch ①.
- Immerse the thermo switch in water ②.
- Check the thermo switch for continuity. While heating the water use the thermometer ③ to record the temperatures.

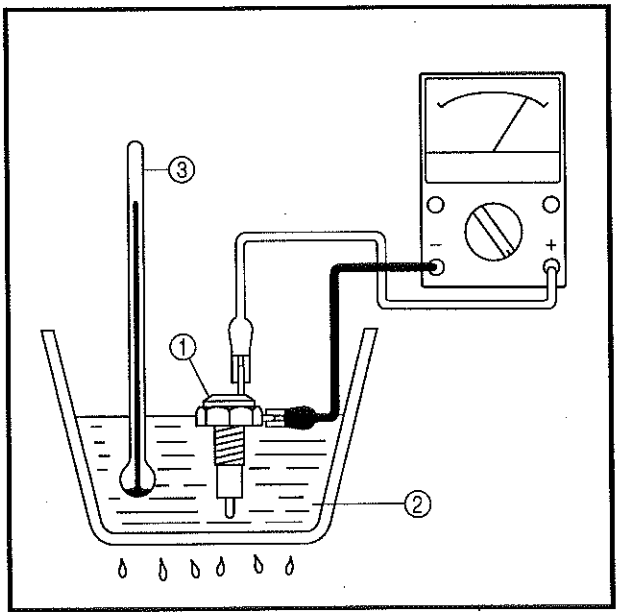
Test step	Water temperature / Thermo switch	Good condition
1	0 ~ 98 °C (32 ~ 208.4°F)	×
2	More than 105 ± 3°C (221.0 ± 5.4°F)	○
3*	105 to 98°C (221.0 to 208.4°F)	○
4*	Less than 98°C (208.4°F)	×

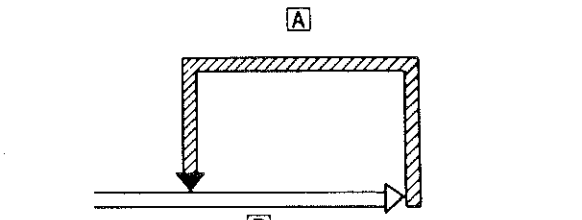
Test 1 & 2; Heat-up tests
Test 3* & 4*; Cool-down tests
○ : Continuity **× : No continuity**

⚠ WARNING

Handle the thermo switch with special care.
Never subject it to a strong shock or allow it to be dropped. Should it be dropped, it must be replaced.

Thermo switch:
8 Nm (0.8 m • kg, 5.8 ft • lb)
Three bond sealock® #10





A THERMO SWITCH "ON", FAN "ON"
B COOLANT TEMPERATURE
BAD CONDITION

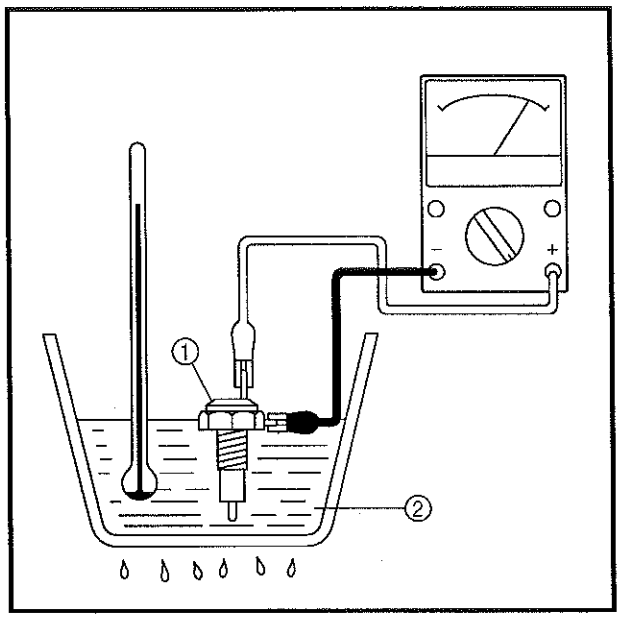
Replace the thermo switch.

GOOD CONDITION

7.Thermo unit

- Remove the thermo unit from the radiator.
- Connect the pocket tester (W × 10) to the thermo unit ①.
- Immerse the thermo unit in the water ②.
- Measure the resistance.

Thermo unit resistance:
80°C (176°F): 47 ~ 53 Ω
100°C (212°F): 26 ~ 30 Ω



⚠ WARNING

Handle the thermo switch with special care.
Never subject it to a strong shock or allow it to be dropped. Should it be dropped, it must be replaced.

Thermo unit:
23 Nm (2.3 m • kg, 17 ft • lb)
Three bond sealock® #10

BAD CONDITION

Replace the thermo unit.

GOOD CONDITION

8.Wiring connection

- Check the connections on the entire cooling system. Refer to "CIRCUIT DIAGRAM".

POOR CONNECTION

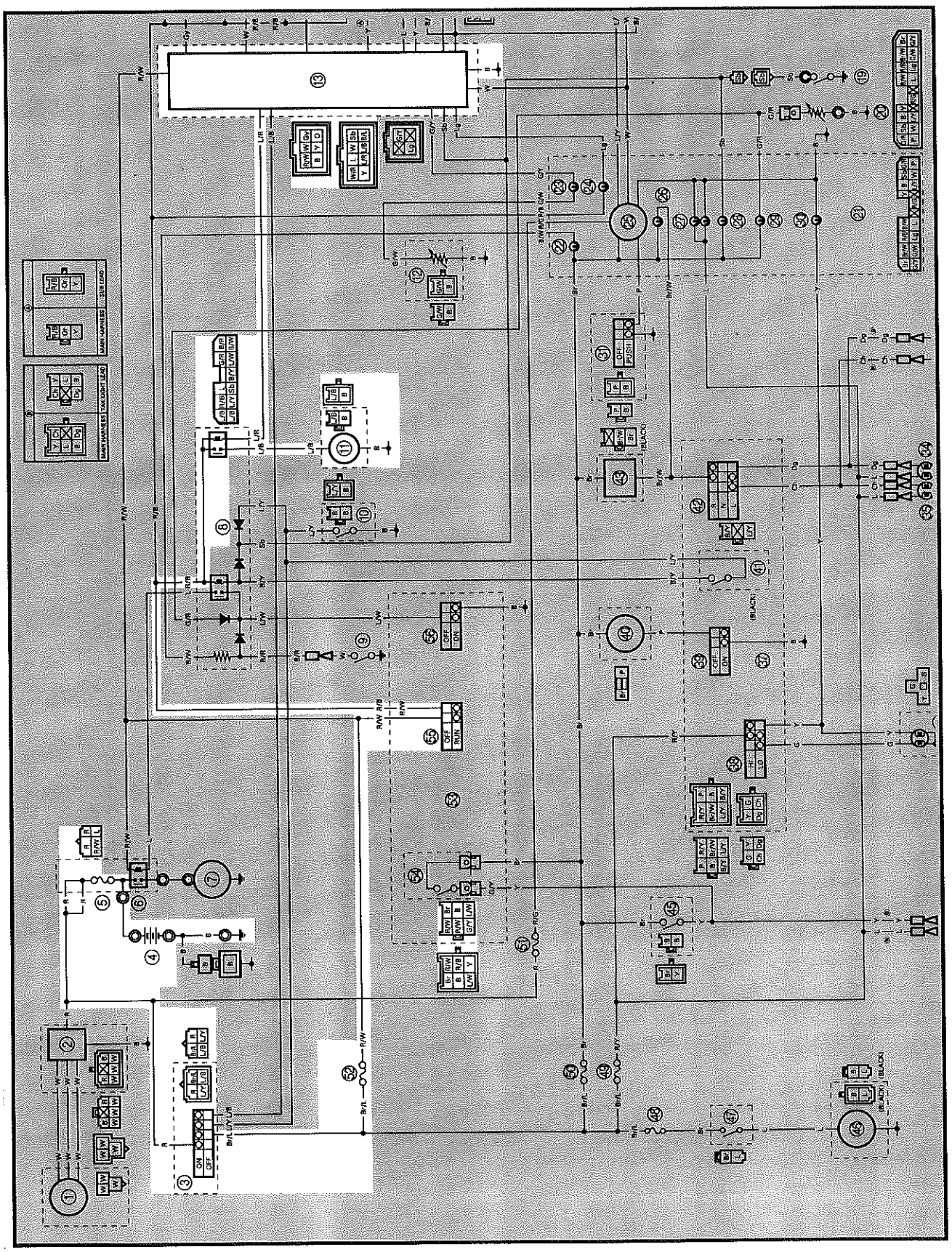
Properly connect the cooling system.

CORRECT

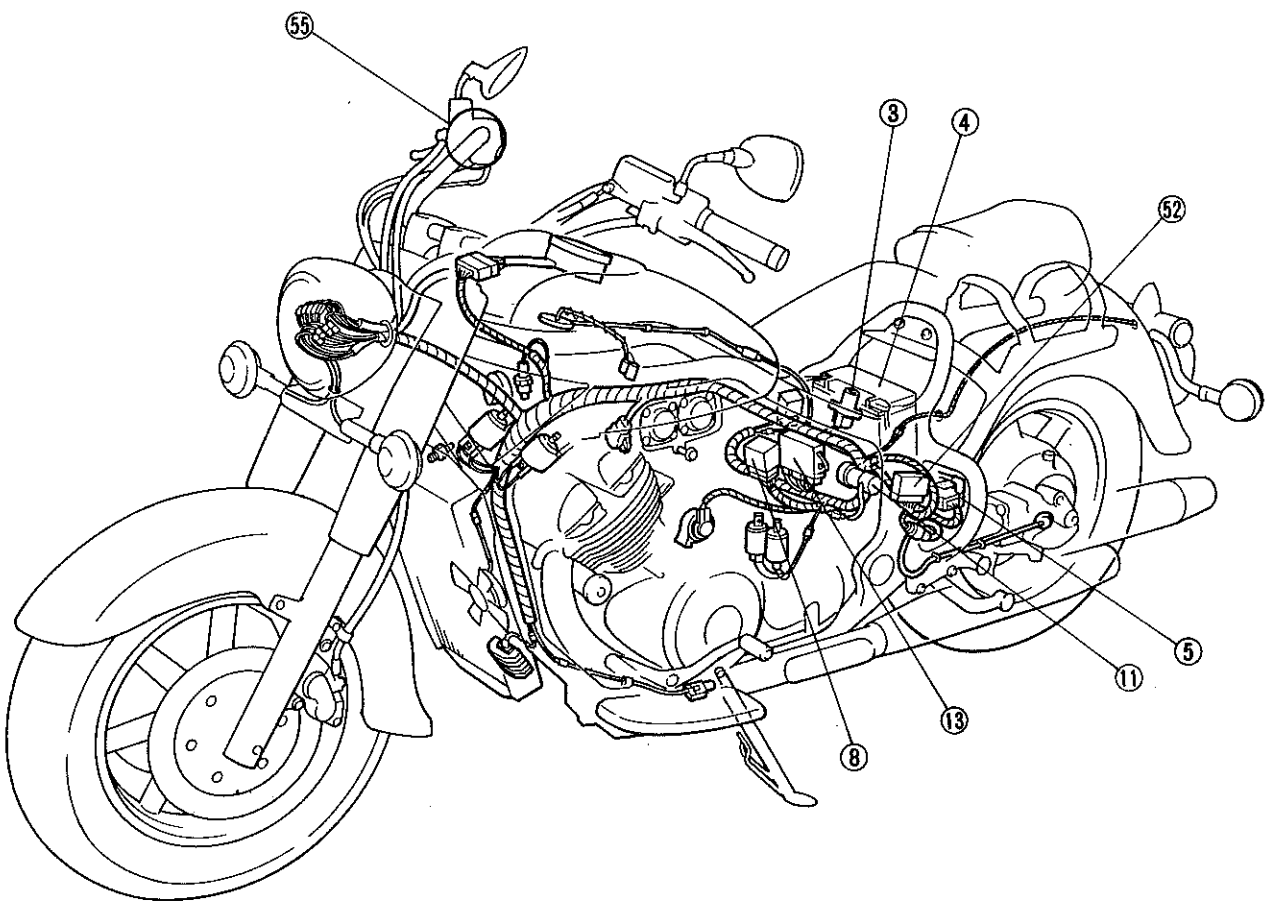
This circuit is good.

FUEL PUMP SYSTEM

CIRCUIT DIAGRAM



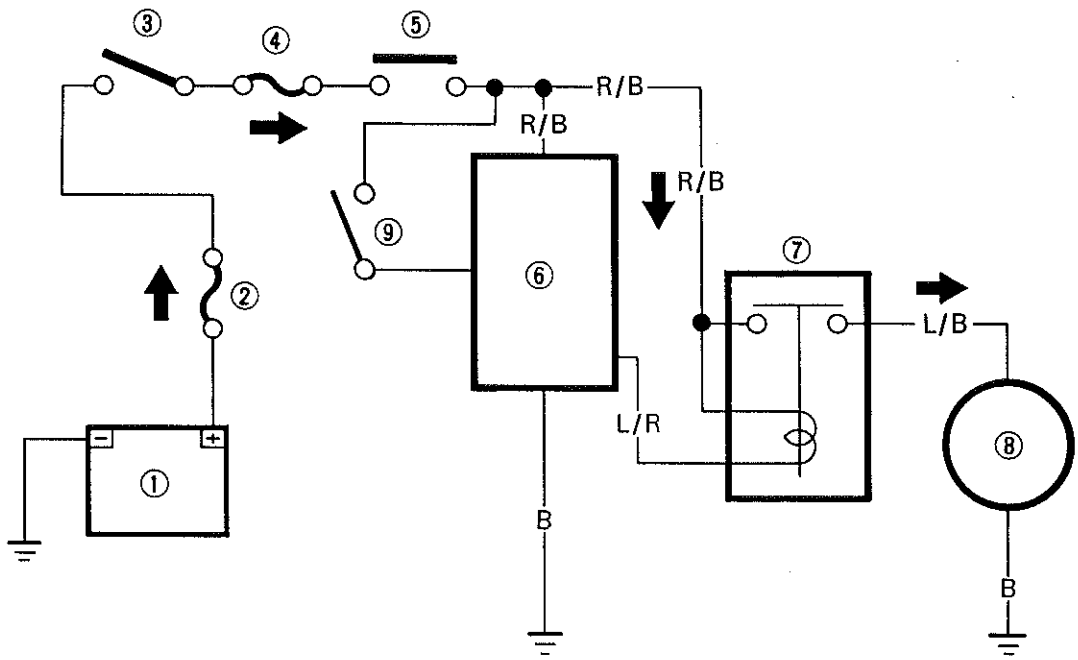
③ Main switch
④ Battery
⑤ Fuse (main)
⑧ Starting circuit cut-off relay
⑪ Fuel pump
⑬ Ignitor unit
㊷ Fuse (ignition)
㊺ Engine stop switch



FUEL PUMP CIRCUIT OPERATION

The fuel pump circuit consists of the fuel pump relay, fuel pump, engine stop switch and ignitor unit.
The ignitor unit includes the control unit for the fuel pump.

① Battery
② Fuse (main)
③ Main switch
④ Fuse (ignition)
⑤ Engine stop switch
⑥ Ignitor unit
⑦ Fuel pump relay
⑧ Fuel pump



TROUBLESHOOTING

THE FUEL PUMP FAILS TO OPERATE.

Procedure

Check;

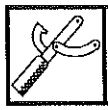
1. Fuses (main and ignition)
2. Battery
3. Main switch
4. Engine stop switch
5. Starting circuit cut-off relay (fuel pump relay)
6. Fuel pump
7. Wiring connection (entire fuel system)

NOTE:

- Remove the following parts before troubleshooting.

1) Seat
2) Side cover (left)
3) Fuel tank
4) Air filter case

- Use the following special tool(s) for troubleshooting.



Pocket tester:
YU-03112, 90890-03112

1. Fuses (main and ignition)

- Remove the fuses.
- Connect the pocket tester (Ω × 1) to the fuses.
- Check the fuses for continuity.

NO CONTINUITY → Replace the fuse(s).

CONTINUITY ↓

2. Battery

- Check the battery condition. Refer to "BATTERY INSPECTION" in CHAPTER 3.

Open circuit voltage:
12.8 V or more at 20 °C (68 °F)

INCORRECT →

- Clean the battery terminals.
- Recharge or replace the battery.

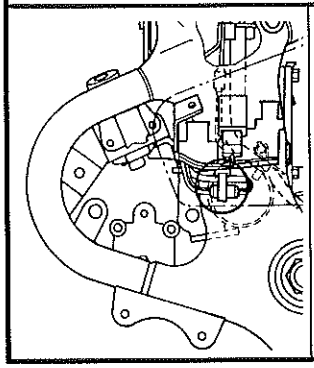
CORRECT ↓

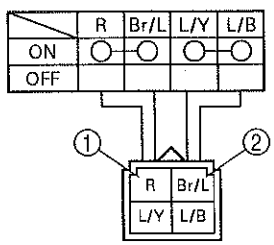
*

*

3.Main switch

- Disconnect the main switch coupler from the wire harness.
- Check the switch component for continuity between "Red ① and Brown/Blue ②".





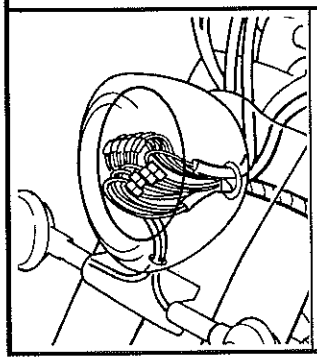
INCORRECT

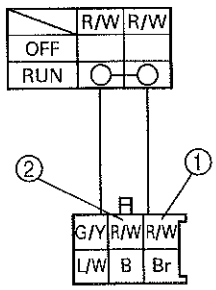
Replace the main switch.

CORRECT

4.Engine stop switch

- Disconnect the handlebar switch (right) coupler from the wire harness.
- Check the switch component for continuity between "Red/White ①" and Red/White ②".





INCORRECT

Replace the handlebar switch (right).

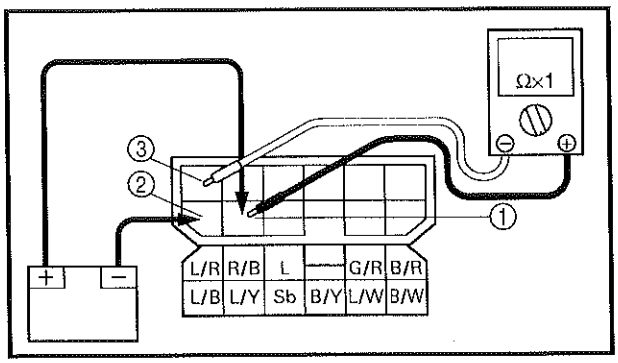
CORRECT

5.Starting circuit cut-off relay (fuel pump relay)

- Disconnect the starting circuit cut-off relay coupler from the wire harness.
- Connect the pocket tester (Ω × 1) and battery (12 V) to the starting circuit cut-off relay coupler terminals.

Battery (+) terminal →
Red/Black terminal ①
Battery (–) terminal →
Blue/Red terminal ②

Tester (+) lead → Red/Black terminal ①
Tester (–) lead → Blue/Black terminal ③



- Check the starting circuit cut-off relay for continuity.

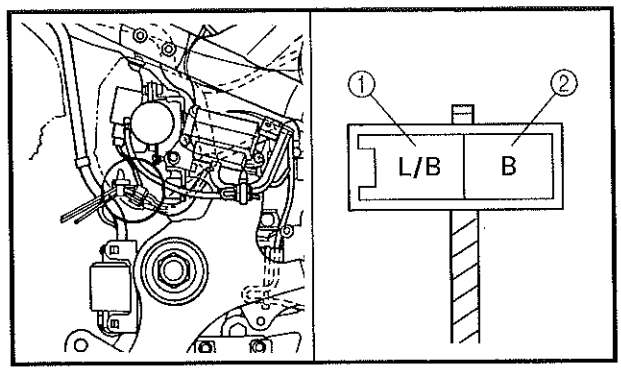
NO CONTINUITY → Replace the starting circuit cut-off relay.

CONTINUITY ↓

6.Fuel pump resistance

- Disconnect the fuel pump coupler from the wire harness.
- Connect the pocket tester (Ω × 1) to the fuel pump coupler terminals.

Tester (+) lead → Blue/Black terminal ①
Tester (–) lead → Black terminal ②



- Check the fuel pump for the specified resistance.

Fuel pump resistance:
4 ~ 30 Ω at 20 °C (68 °F)

OUT OF SPECIFICATION → Replace the fuel pump.

MEET SPECIFICATION ↓

7.Wiring connection

- Check the connections on the entire starting system.
  Refer to "CIRCUIT DIAGRAM".

POOR CONNECTION → Properly connect the starting system.

CORRECT ↓

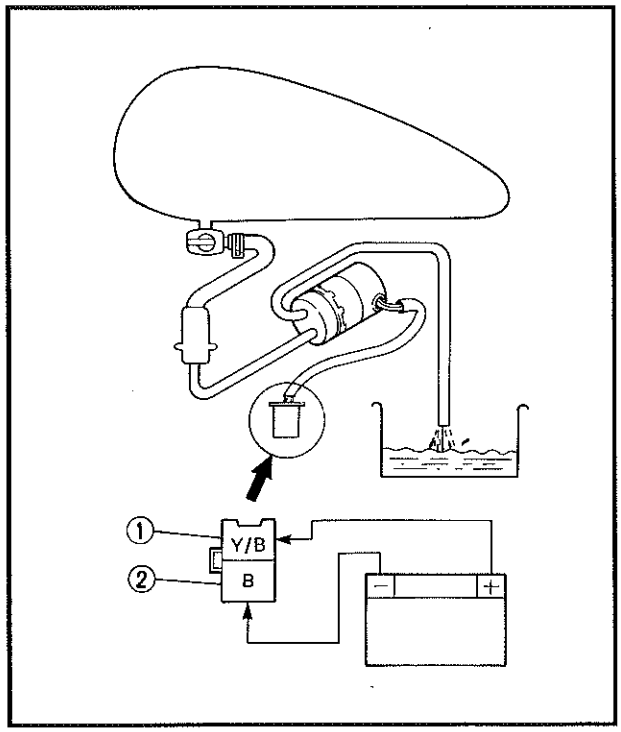
Replace the ignitor unit.

FUEL PUMP TEST

⚠ WARNING

Gasoline is extremely flammable and under certain circumstances there can be a danger of an explosion or combustion. Be extremely careful, and note the following points:

- **Stop the engine before refuelling.**
- **Do not smoke, and keep away from open flames, sparks, or any other kind of fire when performing this test.**
- **Take care not to spill gasoline. If you do accidentally spill some, wipe it up immediately with dry rags.**
- **If gasoline touches the engine when the engine is still hot, there is a danger of combustion. Make sure the engine is completely cool before performing the following test.**



1.Check:
- Fuel pump operation

****

Checking steps:
- Fill up the fuel tank.
- Place an open container under the end of the fuel hose.
- Turn the fuel petcock to "ON".
- Connect the battery (12 V) to the fuel pump coupler terminals.

Battery (+) lead → Blue/Black terminal ①
Battery (–) lead → Black terminal ②

- If fuel flows out from the fuel hose, the fuel pump is good. If not, replace the fuel pump assembly.

****

CONTENTS
TROUBLESHOOTING

EB900000

TROUBLESHOOTING

NOTE:
The following guide for troubleshooting does not cover all the possible causes of problems. It should be helpful, however, as a guide to troubleshooting. Refer to the relative procedure in this manual for inspection, adjustment and replacement of parts.

STARTING FAILURE/HARD STARTING

FUEL SYSTEM

Fuel tank
- Empty
- Clogged fuel filter
- Clogged fuel strainer
- Clogged fuel tank drain hose
- Clogged roll-over valve
- Clogged roll-over valve breather hose
- Deteriorated or contaminated fuel

Fuel petcock
- Clogged fuel hose

Carburetor
- Deteriorated or contaminated fuel
- Clogged pilot jet
- Clogged pilot air passage
- Sucked-in air
- Deformed float
- Worn needle valve
- Improperly sealed valve seat
- Improperly adjusted fuel level
- Improperly set pilot jet
- Clogged starter jet
- Faulty starter plunger
- Improperly adjusted starter cable

Air filter
- Clogged air filter element

Fuel pump
- Faulty fuel pump
- Faulty fuel pump relay

ELECTRICAL SYSTEM

Spark plug
- Improper plug gap
- Worn electrodes
- Wire between terminals severed
- Improper heat range
- Faulty spark plug cap

Ignition coil
- Broken or shorted primary/secondary
- Faulty spark plug lead
- Broken body

Full-transistor system
- Faulty ignitor unit
- Faulty pickup coil

Switch 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

Starter motor
- Faulty starter motor
- Faulty starter relay
- Faulty circuit cut-off relay
- Faulty starter clutch

COMPRESSION SYSTEM

Cylinder and cylinder head
- Loose spark plug
- Loose cylinder head or cylinder
- Faulty cylinder head gasket
- Worn, damaged or seized cylinder
- Improperly sealed valve
- Improper valve-to-valve seat contact
- Improper valve timing
- Faulty valve spring

Piston and piston ring
- Improperly installed piston ring
- Worn, fatigued or broken piston ring
- Seized piston ring
- Seized or damaged piston

Crankcase and crankshaft
- Improperly seated crankcase
- Seized crankshaft

EB901000

POOR IDLE SPEED PERFORMANCE

POOR IDLE SPEED PERFORMANCE

Carburetor
- Improperly returned starter plunger
- Loose pilot jet
- Clogged pilot air jet
- Improperly synchronized carburetors
- Improperly adjusted idle speed (throttle stop screw)
- Improper throttle cable free play
- Flooded carburetor

Electrical system
- Faulty battery
- Faulty spark plug
- Faulty ignitor unit
- Faulty pickup coil
- Faulty ignition coil

Valve train
- Improperly adjusted valve clearance

Air filter
- Clogged air filter element

EB902000

POOR MEDIUM-AND HIGH-SPEED PERFORMANCE

POOR MEDIUM-AND HIGH-SPEED PERFORMANCE

Refer to "STARTING FAILURE/HARD STARTING". (Fuel system, electrical system, compression system and valve train)

Carburetor
- Faulty diaphragm
- Improperly adjusted fuel level
- Clogged or loose main jet

Air filter
- Clogged air filter element

Fuel pump
- Faulty fuel pump

EB903000
FAULTY GEAR SHIFTING

HARD SHIFTING
Refer to "CLUTCH DRAGGING".

SHIFT PEDAL DOES NOT MOVE
Shift shaft
- Improperly adjusted shift pedal link
- Bent shift shaft

Shift cam, shift fork
- Groove jammed with impurities
- Seized shift fork
- Bent shift fork guide bar

Transmission
- Seized transmission gear
- Jammed impurities
- Incorrectly assembled transmission

JUMPS-OUT-OF GEAR
Shift shaft
- Improperly adjusted shift lever position
- Improperly returned stopper lever

Shift fork
- Worn shift fork

Shift cam
- Improper thrust play
- Worn shift cam groove

Transmission
- Worn gear dog

EB904000
CLUTCH SLIPPING/DRAGGING

CLUTCH SLIPPING
Clutch
- Improperly adjusted clutch cable
- Loose clutch spring
- Fatigued clutch spring
- Worn friction plate/clutch plate
- Incorrectly assembled clutch

Engine oil
- Improper oil level
- Improper viscosity (low)
- Deterioration

CLUTCH DRAGGING
Clutch
- Warped pressure plate
- Unevenly tensioned clutch springs
- Bent push rod
- Broken clutch boss
- Burnt primary driven gear bushing
- Bent clutch plate
- Swollen friction plate
- Match marks not aligned

Engine oil
- Improper oil level
- Improper viscosity (high)
- Deterioration

EB905000
OVERHEATING

OVERHEATING

Ignition system
- Improper spark plug gap
- Improper spark plug heat range
- Faulty ignitor unit

Fuel system
- Improper carburetor main jet setting
- Improper fuel level
- Clogged air filter element

Compression system
- Heavy carbon build-up

Engine oil
- Improper oil level
- Improper oil viscosity
- Inferior oil quality

Brake
- Brake drag

EB906000
FAULTY BRAKE

POOR BRAKING EFFECT

Disc brake
- Worn brake pad
- Worn disc
- Air in brake fluid
- Leaking brake fluid
- Faulty cylinder kit cup
- Faulty caliper kit seal
- Loose union bolt
- Broken brake hose
- Oily or greasy disc/brake pad
- Improper brake fluid level

EB907000
FRONT FORK OIL LEAKAGE AND FRONT FORK MALFUNCTION

MALFUNCTION
- Bent, deformed or damaged inner tube
- Bent or deformed outer tube
- Damaged fork spring
- Worn or damaged slide metal
- Bent or damaged damper rod
- Improper oil viscosity
- Improper oil level

OIL LEAKAGE
- Bent, damaged or rusty inner tube
- Damaged or cracked outer tube
- Damaged oil seal lip
- Improperly installed oil seal
- Improper oil level (too high)
- Loose damper rod holding bolt
- Broken cap bolt O-ring
- Loose drain bolt
- Damaged drain bolt gasket

EB908000
UNSTABLE HANDLING

UNSTABLE HANDLING

Handlebar
- Improperly installed or bent

Steering
- Improperly installed handlebar crown
- Bent steering stem
- Improperly installed steering shaft (improperly tightened ring nut)
- Damaged ball bearing or bearing race

Swingarm
- Worn bearing or bushing
- Bent or damaged

Rear shock absorber
- Faulty spring
- Oil and gas leakage

Tire
- Uneven tire pressures on both sides
- Incorrect tire pressure
- Uneven tire wear

Front fork
- Uneven oil levels on both sides
- Uneven spring tension (uneven damping force adjuster position)
- Broken spring
- Twisted front fork

Wheel
- Incorrect wheel balance
- Deformed cast wheel
- Damaged bearing
- Bent or loose wheel axle
- Excessive wheel runout

Frame
- Bent
- Damaged steering head tube
- Improperly installed bearing race

EB909000
FAULTY LIGHTING AND SIGNAL SYSTEMS

HEADLIGHT DOES NOT LIGHT
- Improper bulb
- Too many electric accessories
- Hard charging (broken stator coil wire, faulty rectifier/regulator)
- Incorrect connection
- Improperly grounded
- Poor contacts (main or light switch)
- Bulb life expired

FLASHER DOES NOT LIGHT
- Improperly grounded
- Discharged battery
- Faulty turn switch
- Faulty flasher relay
- Faulty wire harness
- Loosely connected coupler
- Burnt-out bulb
- Faulty fuse

FLASHER BLINKS SLOWLY
- Faulty flasher relay
- Faulty main and/or turn switch
- Improper bulb

BULB BURNT OUT
- Improper bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded
- Faulty main and/or light switch
- Bulb life expired

FLASHER REMAINS LIT
- Faulty flasher relay
- Burnt-out bulb

FLASHER BLINKS QUICKLY
- Improper bulb
- Faulty flasher relay
- Burnt-out bulb

HORN DOES NOT SOUND
- Faulty battery
- Faulty fuse
- Faulty main and/or horn switch
- Improperly adjusted horn
- Faulty horn
- Broken wire harness

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