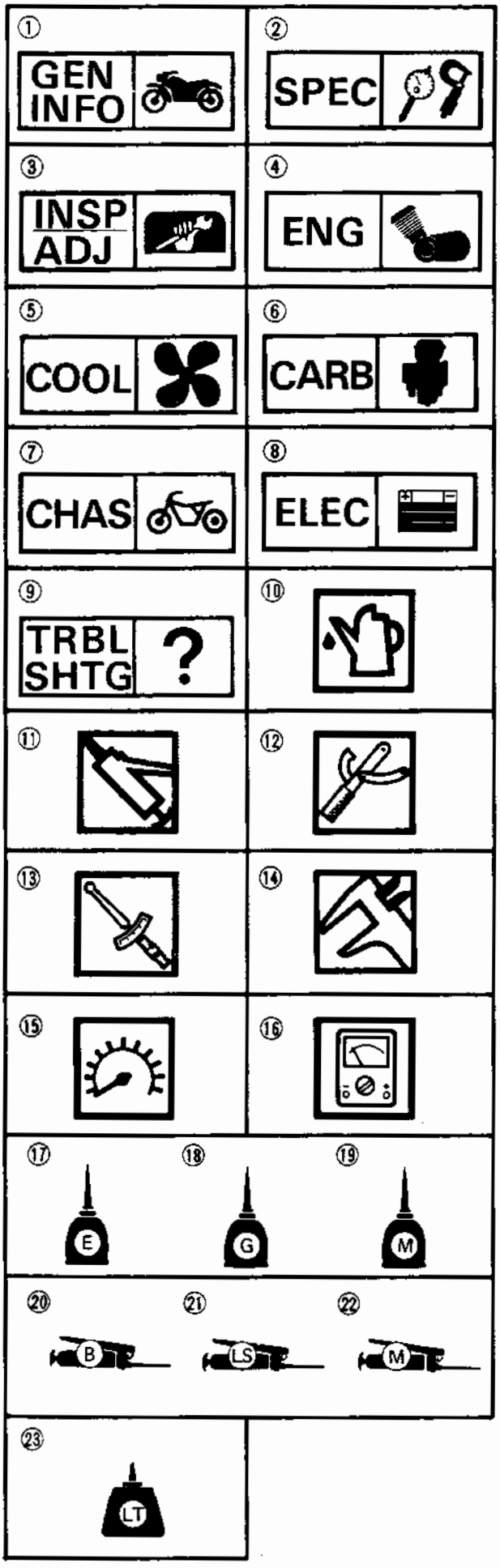
YAMAHA

FZR1000 '89

SERVICE MANUAL

3GM-28197-20



ILLUSTRATED SYMBOLS (Refer to the illustration)

Illustrated symbols ① to ⑨ are designed as thumb tabs to indicate the chapter's number and content.

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

Illustrated symbols ⑩ to ⑯ are used to identify the specifications appearing.

⑩ Filling fluid
⑪ Lubricant
⑫ Special tool
⑬ Tightening
⑭ Wear limit, clearance
⑮ Engine speed
⑯ Ω, V, A

Illustrated symbols ⑰ to ㉓ in the exploded diagram indicate grade of lubricant and location of lubrication point.

⑰ Apply engine oil
⑱ Apply gear oil
⑲ Apply molybdenum disulfide oil
⑳ Apply wheel bearing grease
㉑ Apply lightweight lithium-soap base grease
㉒ Apply molybdenum disulfide grease
㉓ Apply locking agent (LOCTITE®)

NOTICE

This manual was written by the Yamaha Motor Company primarily for use by Yamaha dealers and their qualified mechanics. It is not possible to put an entire mechanic's education into one manual, so it is assumed that persons using this book to perform maintenance and repairs on Yamaha motorcycles have a basic understanding of the mechanical concepts and procedures inherent in motorcycle repair technology. Without such knowledge, attempted repairs or service to this model may render it unfit to use and/or unsafe.
Yamaha Motor Company, Ltd. is continually striving to improve all models manufactured by Yamaha. Modifications and significant changes in specifications or procedures will be forwarded to all Authorized Yamaha dealers and will, where applicable, appear in future editions of this manual.

TECHNICAL PUBLICATIONS
SERVICE DIVISION
MOTORCYCLE GROUP
YAMAHA MOTOR CO., LTD.

HOW TO USE THIS MANUAL

PARTICULARLY IMPORTANT INFORMATION

This material is distinguished by the following notation.

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

⚠CAUTION: **A CAUTION** indicates special procedures that must be followed to avoid damage to the motorcycle.

⚠ WARNING: **A WARNING** indicates special procedures that must be followed to avoid injury to a motorcycle operator or person inspecting or repairing the motorcycle.

MANUAL FORMAT

All of the procedures in this manual are organized in a sequential, step-by-step format. The information has been compiled to provide the mechanic with an easy to read, handy reference that contains comprehensive explanations of all disassembly, repair, assembly, and inspection operations.
In this revised format, the condition of a faulty component will precede an arrow symbol and the course of action required will follow the symbol, e.g.,

- Bearings
  Pitting/Damage → Replace.

EXPLODED DIAGRAM

Each chapter provides exploded diagrams before each disassembly section for ease in identifying correct disassembly and assembly procedures.

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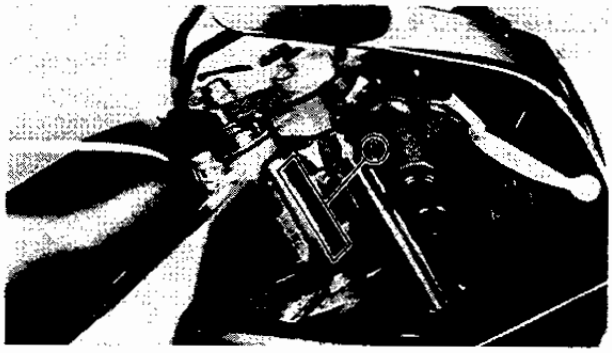
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GENERAL INFORMATION



MOTORCYCLE IDENTIFICATION

FRAME SERIAL NUMBER (Except for AUS)

The frame serial number ① is stamped into the right side of the steering head.

Starting Serial Number:	
FZR1000 . . .	.3GM-000101
FZR1000 . . .	.3GM-007101 (E)
FZR1000 . . .	.3LE-000101 (D, S, A)
FZR1000 . . .	.3LF-000101 (F)
FZR1000 . . .	.3LG-000101 (GB)
FZR1000 . . .	.3LH-000101 (CH)
FZR1000 . . .	.3LJ-000101 (NZ)

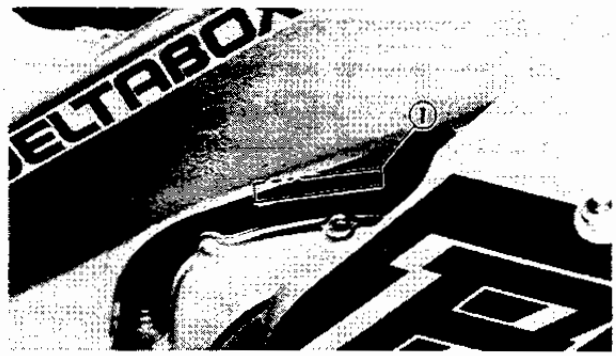
VEHICLE IDENTIFICATION NUMBER (For AUS)

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

Starting Serial Number:
JYA3LJT0 * KA000101

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.



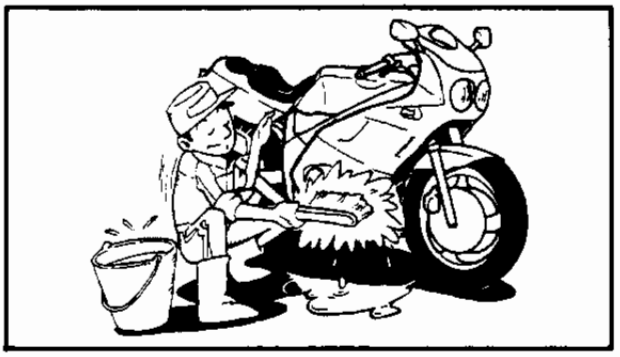
ENGINE SERIAL NUMBER

The engine serial number ① is stamped into the right side of the engine.

Starting Serial Number:	
FZR1000 . . .	.3GM-000101
FZR1000 . . .	.3GM-007101 (E)
FZR1000 . . .	.3LE-000101 (D, S, A)
FZR1000 . . .	.3LF-000101 (F)
FZR1000 . . .	.3LG-000101 (GB)
FZR1000 . . .	.3LH-000101 (CH)
FZR1000 . . .	.3LJ-000101 (AUS, NZ)

NOTE:

- The first three digits of these numbers are for model identifications; the remaining digits are the unit production number.
- Designs and specifications are subject to change without notice.



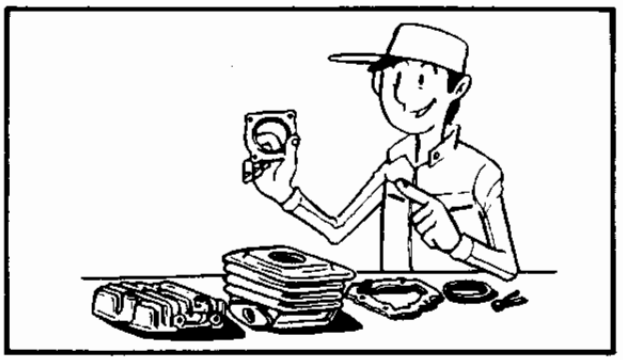
IMPORTANT INFORMATION

PREPARATION FOR REMOVAL

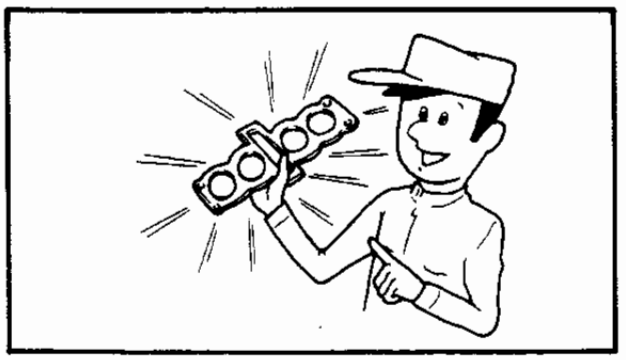
1. Remove all dirt, mud, dust, and foreign material before removal and disassembly.



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



4. During the machines disassembly, clean all parts and place them in trays in the order of disassembly. This will speed up assembly time and help assure that all parts are correctly reinstalled.
5. Keep away from fire.

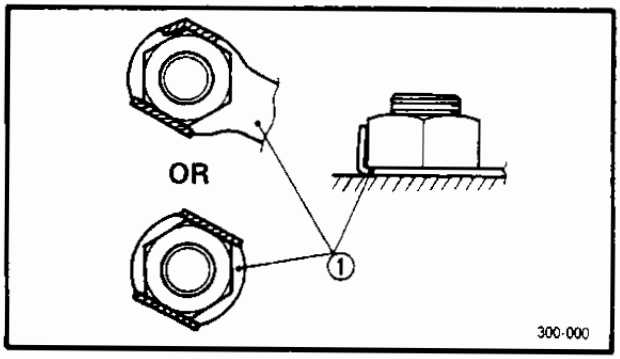


ALL REPLACEMENT PARTS

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

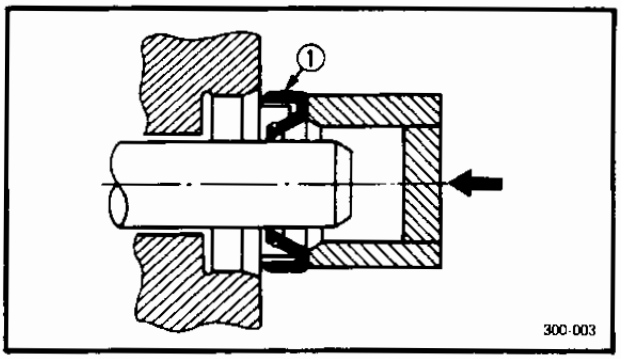
GASKETS, OIL SEALS, AND O-RINGS

1. All gaskets, seals, and O-rings should be replaced when an engine is overhauled. 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.



LOCK WASHERS/PLATES AND COTTER PINS

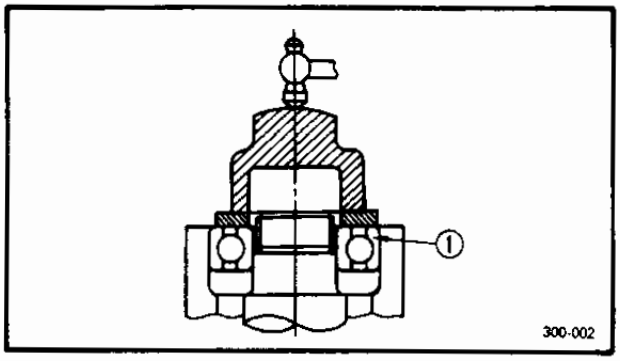
1. All lock washers/plates ① and cotter pins must be replaced when they are removed. Lock tab(s) should be bent along the bolt or nut flat(s) after the bolt or nut has been properly tightened.



BEARINGS AND OIL SEALS

1. Install the bearing(s) and oil seal(s) with their manufacturer's marks or numbers facing outward. (In other words, the stamped letters must be on the side exposed to view.) When installing oil seal(s), apply a light coating of light-weight lithium base grease to the seal lip(s). Oil the bearings liberally when installing.

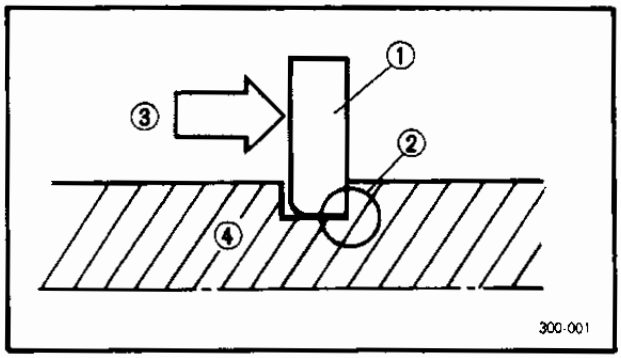
① Oil seal



⚠ CAUTION:

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

① Bearing



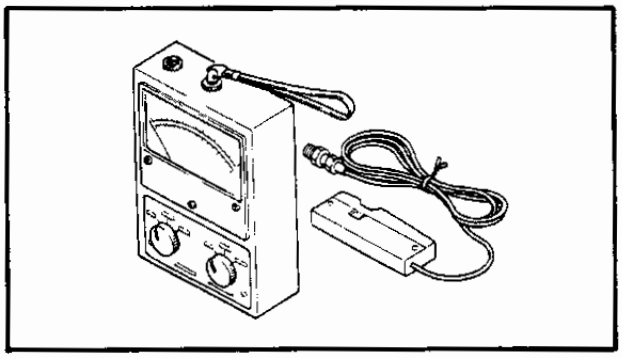
CIRCLIPS

1. All circlips should be inspected 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 to the thrust ③ it receives. See the sectional view.

④ Shaft

SPECIAL TOOLS

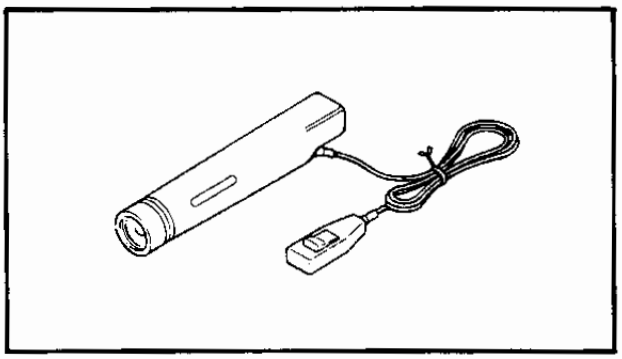
The proper special tools are necessary for complete and accurate tune-up and assembly. Using the correct special tool will help prevent damage caused by the use of improper tools or improvised techniques.



FOR TUNE UP

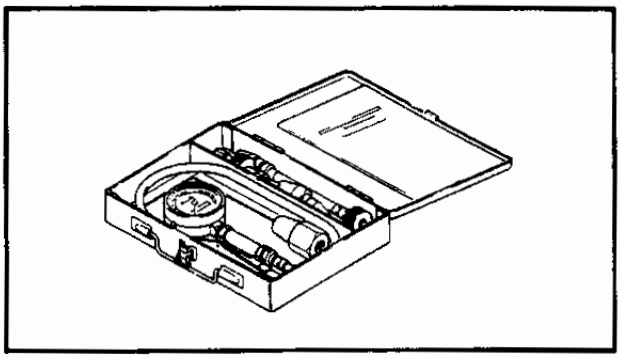
1. Inductive Tachometer
   P/N YU-08036
   P/N 90890-03113

This tool is needed for detecting engine rpm.



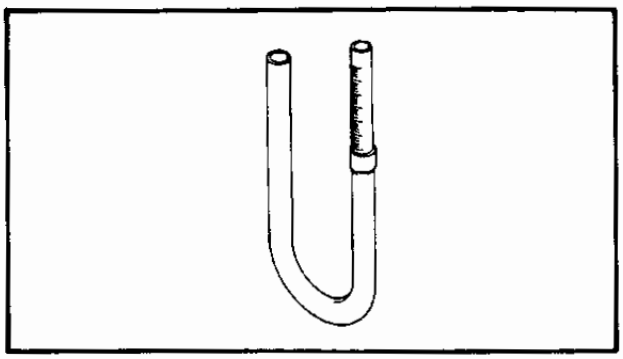
2. Inductive Timing Light
   P/N YM-33277
   P/N 90890-03109

This tool is necessary for checking ignition timing.



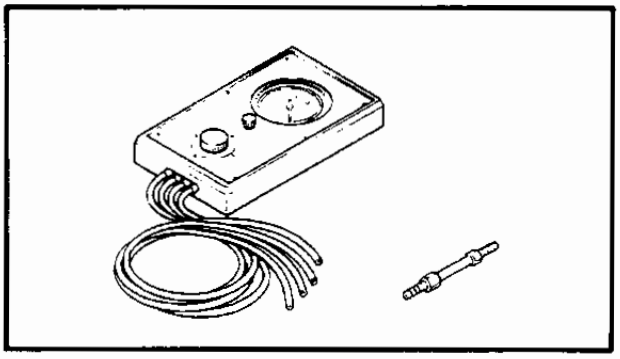
3. Compression Gauge
   P/N YU-33223
   P/N 90890-03081

This gauge is used to measure the engine compression.



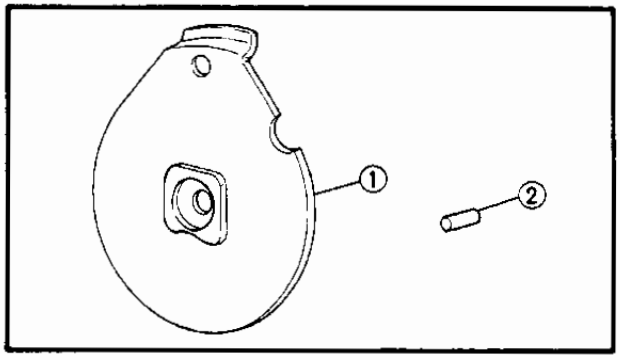
4. Fuel Level Gauge
   P/N YM-01312
   P/N 90890-01312

Thie gauge is used to measure the fuel level in the float chamber.



5. Vacuum Gauge
   P/N YU-08030-A
   P/N 90890-03094
   Adapter
   P/N YM-03060
   P/N 90890-03060

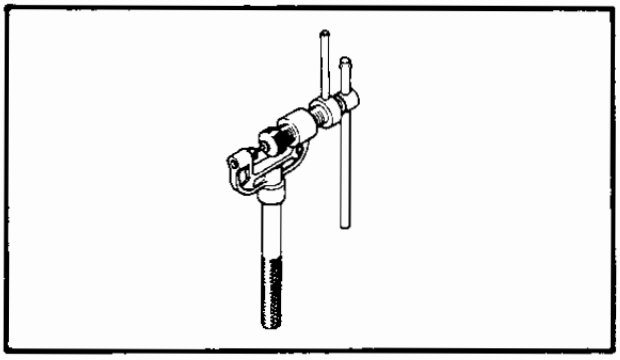
This gauge is needed for carburetor synchronization.



6. Timing Rotor ①
   P/N 33M-81673-10
   Dowel Pin ②
   P/N 93604-08071

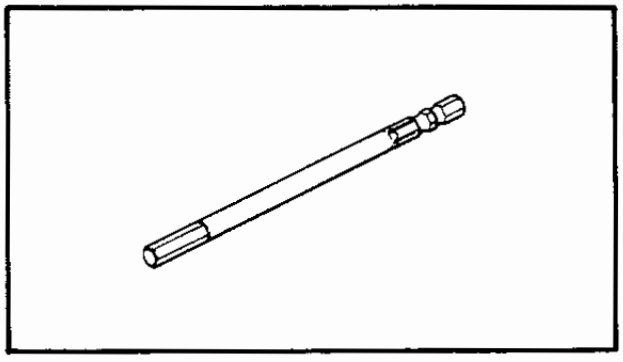
These tools are used to adjusting the valve clearance.

FOR ENGINE SERVICE



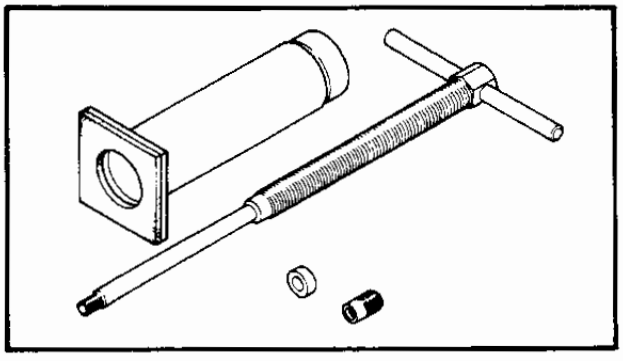
1. Cam Chain Cutter
   P/N YM-01112
   P/N 90890-01112

This tool is used when cutting the cam chain.



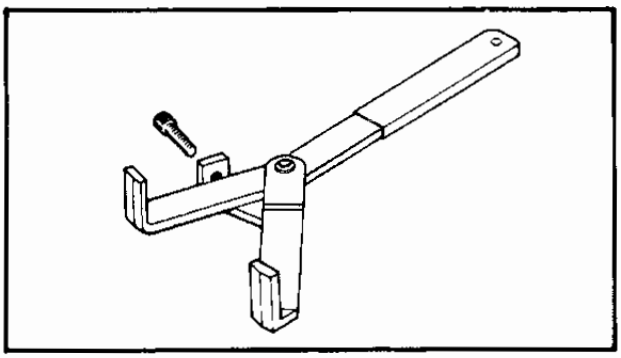
2. Hexagon Wrench (6 mm)
   P/N YM-3448
   P/N 90890-01395

This tool is used to loosen or tighten the cylinder head securing nut.



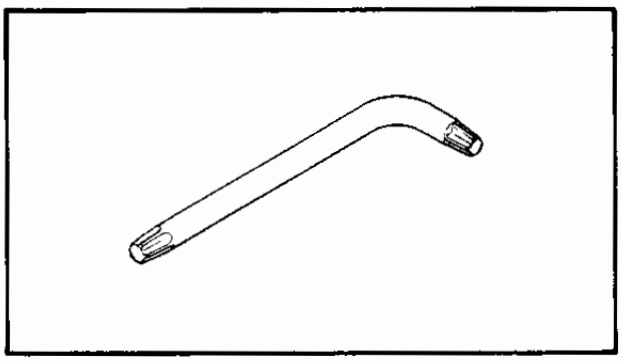
3. Piston Pin Puller
   P/N YU-01304
   P/N 90890-01304

This tool is used to remove the piston pin.



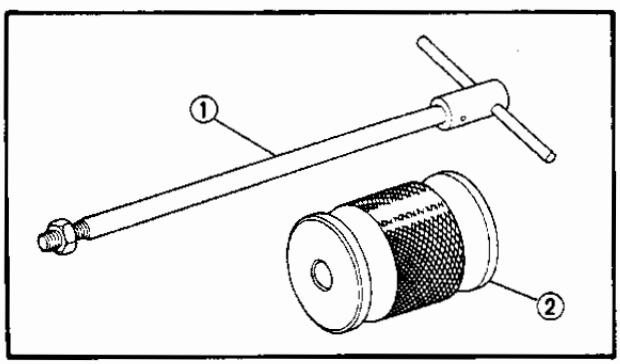
4. Universal Clutch Holder
   P/N YM-91042
   P/N 90890-04086

This tool is used to hold the clutch when removing or installing the clutch boss locknut.



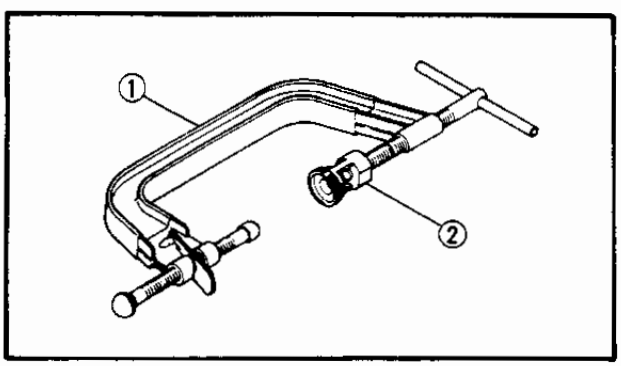
5. Torx wrench (T30)
   P/N YU-05245
   P/N 90890-05245

This tool is used to loosen or tighten the main axle bearing retainer bolt.



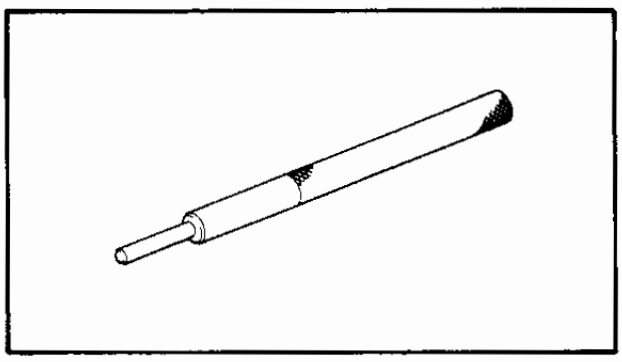
6. Armature Shock Puller ①
   P/N YU-01047-3
   P/N 90890-01290
   Weight ②
   P/N YU-01047-2
   P/N 90890-01291

These tools are used to remove the generator armature.



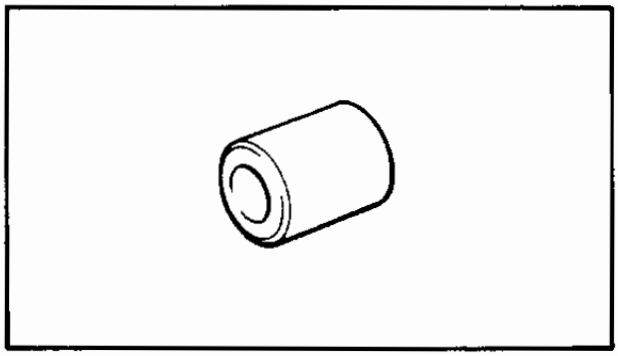
7. Valve Spring Compressor ①
   P/N YM-04019
   P/N 90890-04019
   Attachment ②
   (For Exhust valve)
   P/N YM-04108
   P/N 90890-04108
   (For Intake valve)
   P/N YM-04114
   P/N 90890-04114

These tools are needed to remove and install the valve assemblies.



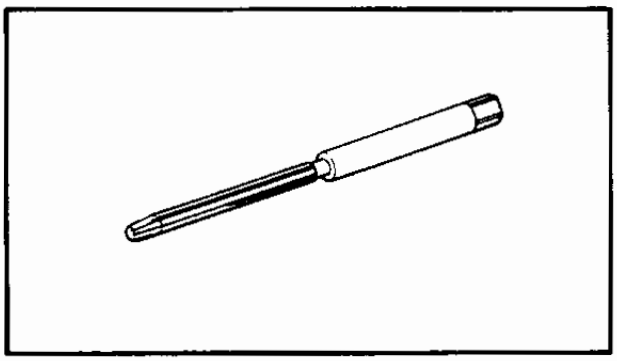
8. Valve Guide Remover (4.5 mm)
   P/N YM-04116
   P/N 90890-04116

This tool is used to remove the valve guides.



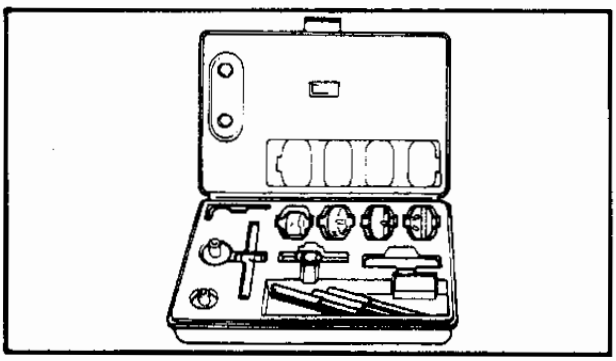
9. Valve Guide Installer
   P/N YM-04117
   P/N 90890-04117

This tool is needed to install the valve guides properly.



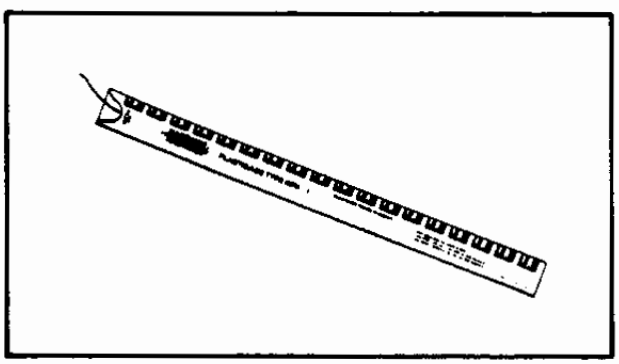
10. Valve Guide Reamer (4.5 mm)
    P/N YM-04118
    P/N 90890-04118

This tool is used to rebore the new valve guide.



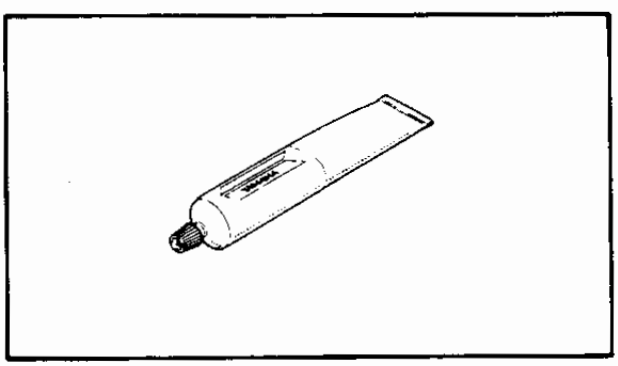
11. Valve Seat Cutter
    P/N YM-91043

This tool is used to adjust the valve clearance.



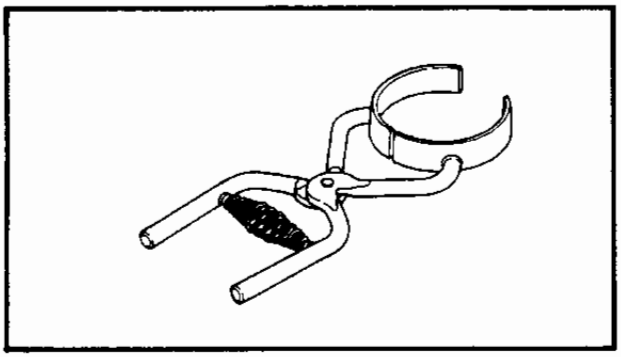
12. Plastigage® Set "Green"
    P/N YU-33210

This gauge is needed to measure the clearance for the connecting rod bearing and the crank shaft bearing.



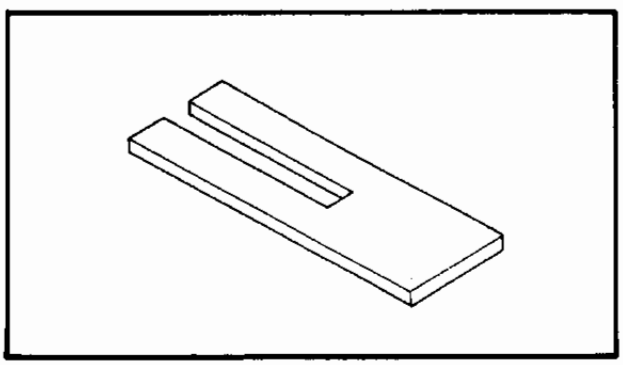
13. Quick Gasket®
    P/N ACC-11001-05-01
    YAMAHA Bond No. 1215
    P/N 90890-85505

This sealant (Bond) is used for crankcase mating surfaces, etc.



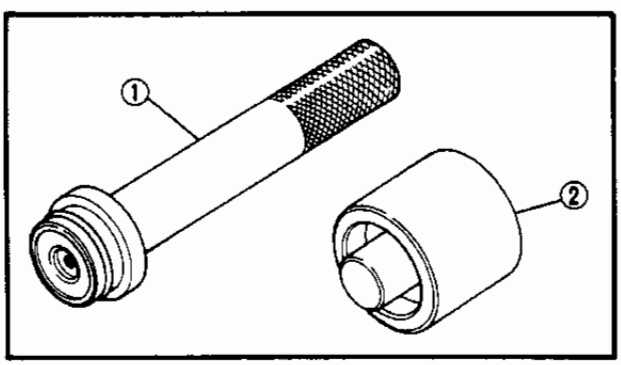
14. Piston Ring Compressor
    P/N YM-04008
    P/N 90890-04008

This tool is used to compress piston rings when installing the cylinder.



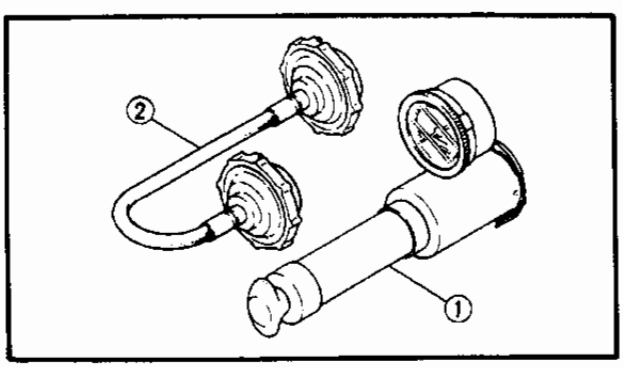
15. Piston Base
    P/N YM-01067
    P/N 90890-01067

Use **4** of these to hold the piston during cylinder installation.



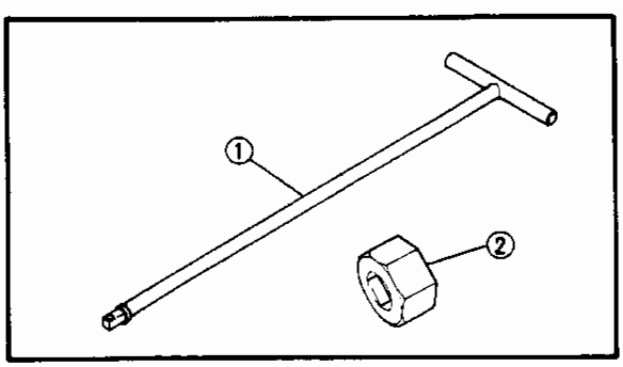
16. Water pump seal installer ①
    P/N YU-04051-1
    P/N 90890-04058
    Adapter ②
    P/N YM-33221
    P/N 90890-04078

These tools are used to installing the seal of the water pump housing.



17. Radiator Cap Tester ①
    P/N YU-24460-01
    P/N 90890-01325
    Adaptor ②
    P/N YU-33984
    P/N 90890-01352

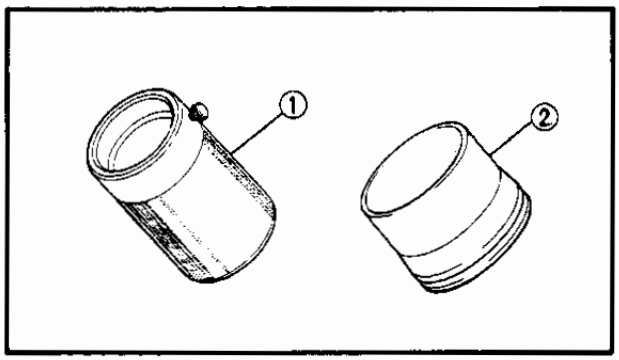
This tester is needed for checking the cooling system.



FOR CHASSIS SERVICE

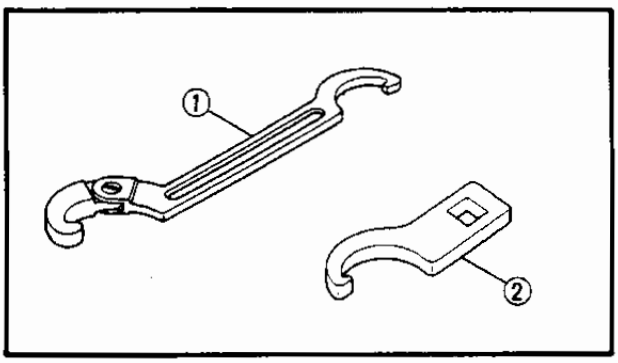
1. T-Handle ①
    P/N YM-01326
    P/N 90890-01326
    Fork Damper Rod Holder (30 mm) ②
    P/N YM-01327
    P/N 90890-01327

This tool is used to loosen and tighten the front fork damper rod holding bolt.



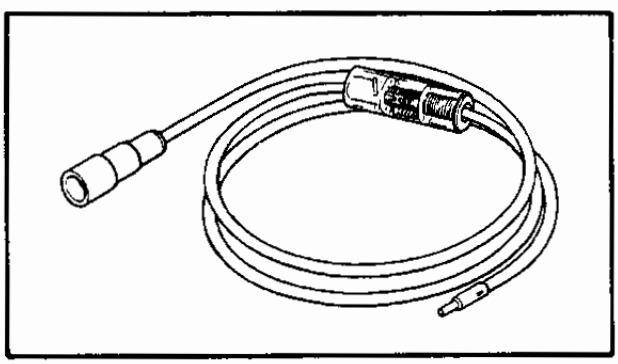
2. Front Fork Seal Driver (weight) ①
   P/N YM-33963
   P/N 90890-01367
   Adapter (43 mm) ②
   P/N YM-08020
   P/N 90890-01374

These tools are used when installing the fork seat.



3. Ring Nut Wrench
   P/N YU-01268 – ①
   P/N 90890-01268
   P/N YU-33975 – ②
   P/N 90890-01403

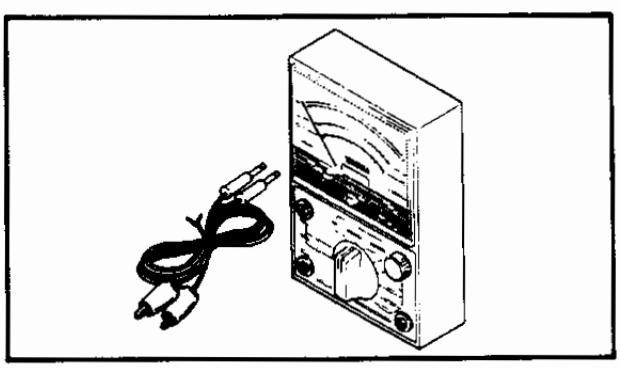
This tool is used to loosen and tighten the steering ring nut.



FOR ELECTRICAL COMPONENTS

1. Dynamic Spark Tester
   P/N YM-34487
   P/N 90890-03144

This instrument is necessary for checking the ignition system components.

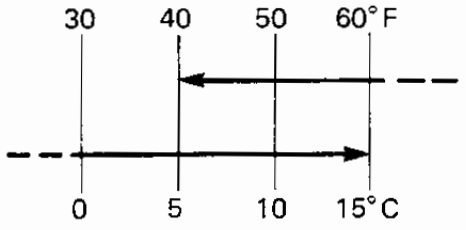


2. Pocket Tester
   P/N YU-03112
   P/N 90890-03112

This instrument is invaluable for checking the electrical system.

SPECIFICATIONS

GENERAL SPECIFICATIONS

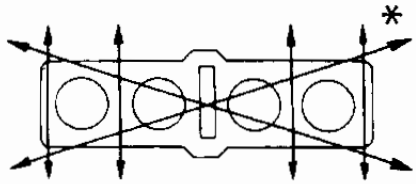
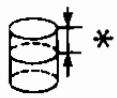
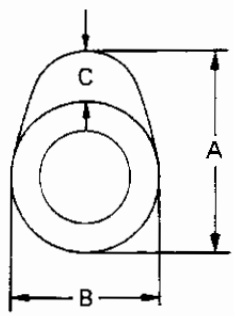
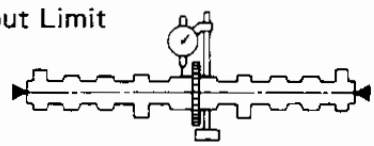
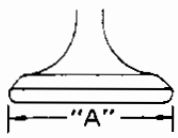
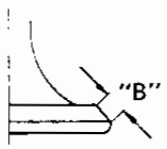
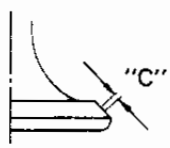
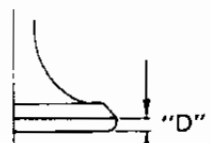
Model	FZR1000
Model Code Number:	3GM1 3GM2 (E) 3LE1 (D, S, A) 3LF1 (F) 3LG1 (GB) 3LH1 (CH) 3LJ1 (AUS, NZ)
Frame Starting Number:	3GM-000101 3GM-007101 (E) 3LE-000101 (D, S, A) 3LF-000101 (F) 3LG-000101 (GB) 3LH-000101 (CH) 3LJ-000101 (NZ)
Vehicle Identification Number:	JYA3LJT0 * KA000101 (AUS)
Engine Starting Number:	3GM-000101 3GM-007101 (E) 3LE-000101 (D, S, A) 3LF-000101 (F) 3LG-000101 (GB) 3LH-000101 (CH) 3LJ-000101 (AUS, NZ)
Dimensions: Overall Length Overall Width Overall Height Seat Height Wheelbase Minimum Ground Clearance	 2,200 mm (86.8 in) 730 mm (28.7 in) 1,160 mm (45.7 in) 765 mm (30.1 in) 1,460 mm (57.5 in) 135 mm (5.3 in)
Basic Weight: With Oil and Full Fuel Tank	 235 kg (518 lb)
Minimum Turning Radius:	3,600 mm (142 in)
Engine: Engine Type Cylinder Arrangement Displacement Bore x Stroke Compression Ratio Compression Pressure < Minimum ~ Maximum > Starting System	 Liquid cooled 4-stroke, gasoline, DOHC 4-cylinder parallel 1,002 cm^3 (61.1 cu.in) 75.5 x 56.0 mm (2.9724 x 2.2047 in) 12 : 1 1,400 kPa (14 kg/cm^2, 199 psi) < 1,360 ~ 1,480 kPa (13.6 ~ 14.8 kg/cm^2, 194 ~ 210 psi) > Electric starter
Lubrication System:	Wet sump
Engine Oil Type or Grade:  	 Yamalube 4-cycle oil or SAE 20W40 type SE motor oil (If temperature does not go below 5°C/40°F) SAE 10W30 type SE motor oil (If temperature does not go above 15°C/60°F)

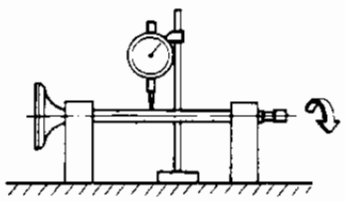
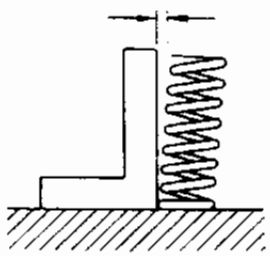
Model	FZR1000	
Engine Oil Capacity:		
Engine Oil:		
Periodic Oil Change:	2.7 L (2.4 Imp qt, 2.9 US qt)	
With Oil Filter Replacement	3.0 L (2.6 Imp qt, 3.1 US qt)	
Total Amount	3.5 L (3.1 Imp qt, 3.7 US qt)	
Coolant Total Amount: (Including All Routes)	2.1 L (1.9 Imp qt, 2.2 US qt)	
Air Filter:	Dry type element	
Fuel:		
Type	Regular gasoline Unleaded Fuel Only (AUS)	
Tank capacity	19.0 L (4.2 Imp gal, 5.0 US gal)	
Reserve Amount	3.5 L (0.77 Imp gal, 0.92 US gal)	
Carburetor:		
Type x Quantity	BDST38 x 4	
Manufacturer	MIKUNI	
Spark Plug:		
Type (Manufacture)	DR8ES-L (NGK), X24ESR-U (N.D.)	
Gap	0.6 ~ 0.7 mm (0.024 ~ 0.028 in)	
Clutch Type:	Wet, multiple-disc	
Transmission:		
Primary Reduction System	Spur gear	
Primary Reduction Ratio	68/41 (1.659)	
Secondary Reduction System	Chain drive	
Secondary Reduction Ratio	47/17 (2.765)	
Transmission Type	Constant-mesh, 5-speed	
Operation	Left foot operation	
Gear Ratio 1st	36/14 (2.571)	
2nd	32/18 (1.778)	
3rd	29/21 (1.381)	
4th	27/23 (1.174)	
5th	28/27 (1.037)	
Chassis:		
Frame Type	Diamond	
Caster Angle	26.75°	
Trail	110 mm (4.33 in)	
Tire:	Front	Rear
Type	Tubeless	Tubeless
Size	130/60 VR17-V280 130/60 ZR17	170/60 VR17-V280 170/60 ZR17
Manufacture (Type)	Bridgestone (CY15) Dunlop (K510F) Pirelli (MP7S) Michelin (A59X)	Bridgestone (CY16) Dunlop (K510) Pirelli (MP7S) Michelin (M59X)

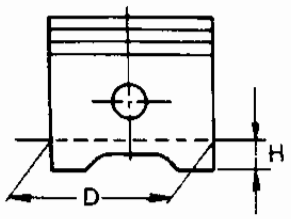
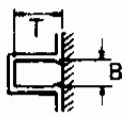
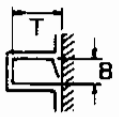
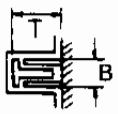
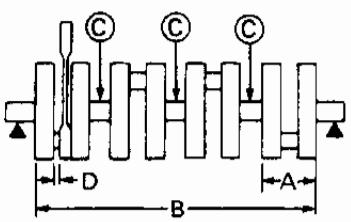
Model		FZR1000	
Maximum Load:		174 kg (384 lb) 205 kg (452 lb) (D, F)	
Tire Pressure (Cold tire):		Front	Rear
Up to 90 kg (198 lb) load*		250 kPa (2.5 kg/cm², 36 psi)	250 kPa (2.5 kg/cm², 36 psi)
90 kg (198 lb) ~ Maximum load*		250 kPa (2.5 kg/cm², 36 psi)	290 kPa (2.9 kg/cm², 42 psi)
High speed riding		250 kPa (2.5 kg/cm², 36 psi)	290 kPa (2.9 kg/cm², 42 psi)
*Load is total weight of 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		120 mm (4.72 in)	
Rear Wheel Travel		130 mm (5.12 in)	
Electrical:			
Ignition System		T.C.I. (Digital ignition)	
Generator System		AC generator	
Battery Type or Model		YB14L	
Battery Capacity		12V 14AH	
Headlight type:		Quartz bulb (D, B, S, F, CH, AUS, NZ) Bulb (A, DK, GR, I, NL, SF, E, N)	
Bulb Wattage x Quantity:			
Headlight		12V, 35W/35W x 2 (I, AUS, NZ) 12V, 55W x 1, 60W/55W x 1 (B, D, F, S) 12V, 45W/40W x 2 (A, DK, E, GR, N, NL, SF) 12V, 60W/55W x 1 (CH)	
Marker Light		12V, 5W x 1	
Tail/Brake Light		12V, 5W/21W x 2	
Flasher Light		12V, 21W x 4	
License Light		12V, 5W x 2	
Meter Light		12V, 3.4W x 4	
Indicator Light:			
Wattage x Quantity	"NEUTRAL"	12V, 3.4W x 1	
	"HIGH BEAM"	12V, 3.4W x 1	
	"TURN"	12V, 3.4W x 1	
	"OIL LEVEL"	12V, 3.4W x 1	

MAINTENANCE SPECIFICATIONS

ENGINE

Model	FZR1000
Cylinder Head:	
Warp Limit*	0.03 mm (0.0012 in) *Lines indicate straightedge measurement
	
Cylinder:	
Bore Size/Measureing Point*	75.500 ~ 75.505 mm (2.9724 ~ 2.9726 in)/ 40 mm (1.57 in)
	
Taper Limit	0.05 mm (0.002 in)
Out of Round Limit	0.05 mm (0.002 in)
Camshaft:	
Drive Method	Chain drive (Center)
Cam Cap Inside Dia. (I1, I4, E1, E4)	24.470 ~ 24.491 mm (0.9634 ~ 0.9642 in)
(I2, I3, E2, E3)	24.500 ~ 24.521 mm (0.9646 ~ 0.9654 in)
Camshaft Outside Dia.	24.437 ~ 24.450 mm (0.9621 ~ 0.9626 in)
Shaft-to-Cap Clearance (I1, I4, E1, E4)	0.020 ~ 0.054 mm (0.0008 ~ 0.0021 in)
(I2, I3, E2, E3)	0.050 ~ 0.084 mm (0.0020 ~ 0.0033 in)
Cam Dimensions: Intake "A"	32.55 ~ 32.65 mm (1.2815 ~ 1.2854 in)
< Limit >	32.45 mm (1.278 in)
"B"	24.95 ~ 25.05 mm (0.9823 ~ 0.9862 in)
< Limit >	24.85 mm (0.978 in)
"C"	7.50 ~ 7.70 mm (0.2953 ~ 0.3031 in)
< Limit >	7.30 mm (0.287 in)
 Exhaust "A"	32.95 ~ 33.05 mm (1.2972 ~ 1.3012 in)
< Limit >	32.85 mm (1.293 in)
"B"	24.95 ~ 25.05 mm (0.9823 ~ 0.9862 in)
< Limit >	24.85 mm (0.978 in)
"C"	7.75 ~ 7.95 mm (0.3051 ~ 0.3130 in)
< Limit >	7.55 mm (0.297 in)
Camshaft Runout Limit	0.03 mm (0.0012 in)
	
Cam Chain:	
Cam Chain Type/No. of Links	DID219FS (BUSH CHAIN)/108 Links
Cam Chain Adjustment Method	Automatic
Valve, Valve Seat, Valve Guide:	
Valve Clearance (Cold):	
IN.	0.11 ~ 0.20 mm (0.004 ~ 0.008 in)
EX.	0.21 ~ 0.30 mm (0.008 ~ 0.012 in)
Valve Dimensions:	
 Head Dia.	
 Face Width	
 Seat Width	
 Margin Thickness	

Model		FZR1000
"A" Head Dia.	IN.	23.4 ~ 23.6 mm (0.9213 ~ 0.9291 in)
	EX.	24.9 ~ 25.1 mm (0.9803 ~ 0.9882 in)
"B" Face Width	IN.	1.63 ~ 2.90 mm (0.0642 ~ 0.1142 in)
	EX.	1.63 ~ 2.90 mm (0.0642 ~ 0.1142 in)
"C" Seat Limit Width	IN.	0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in)
	EX.	0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in)
"D" Margin Thickness Limit	IN.	0.45 ~ 0.95 mm (0.0177 ~ 0.0374 in)
	EX.	0.75 ~ 1.25 mm (0.0295 ~ 0.0492 in)
Stem Outside Diameter	IN.	4.475 ~ 4.490 mm (0.1762 ~ 0.1768 in)
	EX.	4.460 ~ 4.475 mm (0.1756 ~ 0.1762 in)
< Limit >	IN.	4.445 mm (0.175 in)
	EX.	4.43 mm (0.174 in)
Guide Inside Diameter	IN.	4.500 ~ 4.512 mm (0.1772 ~ 0.1776 in)
	EX.	4.500 ~ 4.512 mm (0.1772 ~ 0.1776 in)
< Limit >	IN.	4.55 mm (0.179 in)
	EX.	4.55 mm (0.179 in)
Stem-to-Guide Clearance	IN.	0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in)
	EX.	0.025 ~ 0.052 mm (0.0010 ~ 0.0020 in)
< Limit >	IN.	0.08 mm (0.0031 in)
	EX.	0.1 mm (0.0039 in)
Stem Runout Limit		0.01 mm (0.0004 in)
		
Valve Seat Width	IN.	0.9 ~ 1.1 mm (0.035 ~ 0.043 in)
	EX.	0.9 ~ 1.1 mm (0.035 ~ 0.043 in)
< Limit >	IN.	1.8 mm (0.071 in)
	EX.	1.8 mm (0.071 in)
Valve Spring:		
Free Length	IN.	40.73 mm (1.604 in)
	EX.	44.01 mm (1.733 in)
Installed Length (Valve Closed)	IN.	35.0 mm (1.378 in)
	EX.	35.0 mm (1.378 in)
Compressed Pressure	IN.	12.2 ~ 13.2 kg (26.9 ~ 29.1 lb) at 35 mm (1.378 in)
(Valve closed)	EX.	21 ~ 23 kg (46.3 ~ 50.7 lb) at 35 mm (1.378 in)
Tilt Limit	IN.	2.5°/1.7 mm (0.067 in)
	EX.	2.5°/1.7 mm (0.067 in)
		
Direction of Winding (Top view)	IN.	Clockwise
	EX.	Clockwise 

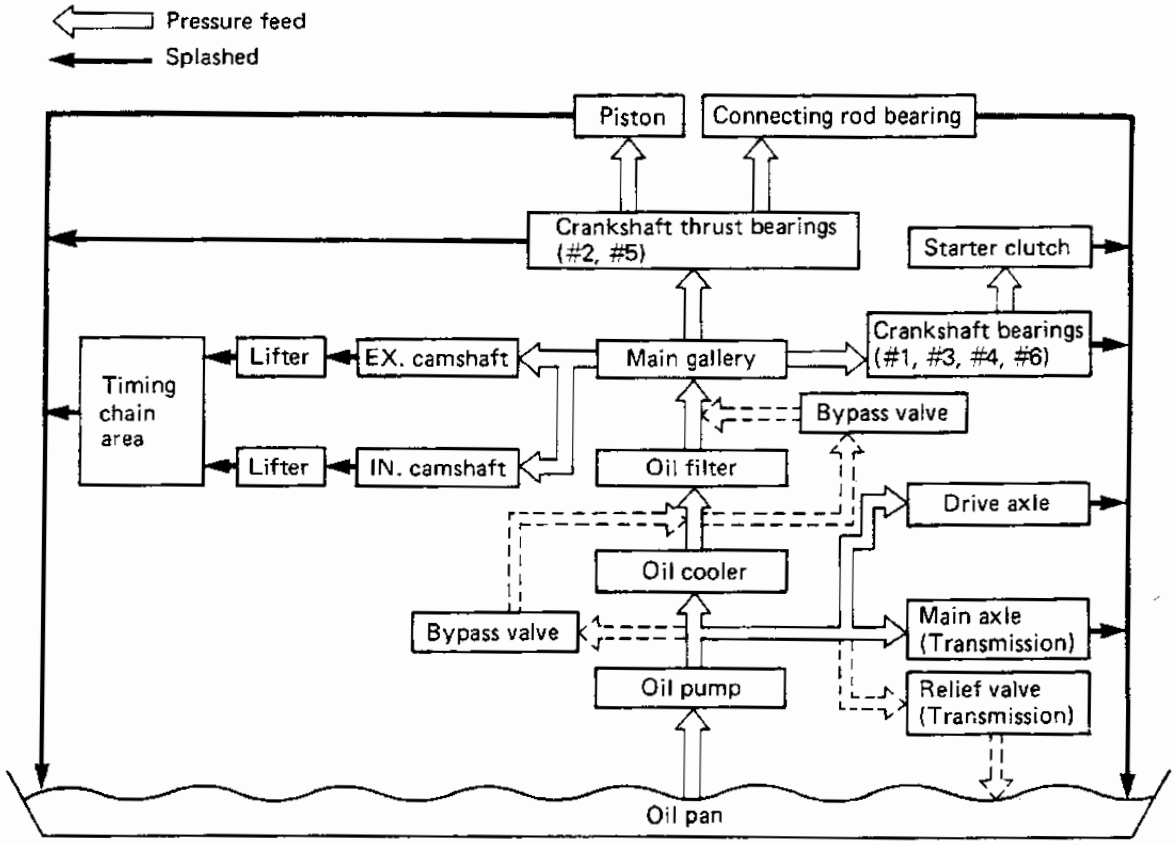
Model	FZR1000
Piston:	
Piston Size "D"	75.425 ~ 75.440 mm (2.700 ~ 2.970 in)
Measuring Point "H" 	3 mm (0.12 in) (From bottom line of piston skirt)
Piston-to-Cylinder Clearance	0.06 ~ 0.08 mm (0.0024 ~ 0.0031 in)
Oversize: 2nd	76.0 mm (3.00 in)
Piston Ring:	
Sectional Sketch — Top Ring 	Barrel B = 0.8 mm (0.0315 in) T = 2.8 mm (0.1102 in)
2nd Ring 	Taper B = 0.8 mm (0.0315 in) T = 2.8 mm (0.1102 in)
Oil Ring 	Expander B = 1.5 mm (0.0591 in) T = 2.5 mm (0.0984 in)
End Gap (Installed): Top Ring	0.3 ~ 0.5 mm (0.0118 ~ 0.0197 in)
< Limit >	0.7 mm (0.0276 in)
2nd Ring	0.3 ~ 0.5 mm (0.0118 ~ 0.0197 in)
< Limit >	0.7 mm (0.0276 in)
Oil Ring	0.2 ~ 0.8 mm (0.0079 ~ 0.0315 in)
Side Clearance: Top Ring	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in)
< Limit >	0.15 mm (0.0059 in)
2nd Ring	0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in)
< Limit >	0.15 mm (0.0059 in)
Oil Ring	—
Connecting Rod:	
Crank Pin Oil Clearance	0.032 ~ 0.056 mm (0.0013 ~ 0.0022 in)
Bearing Size No. Color Code	1. Blue 2. Black 3. Brown 4. Green
Crankshaft: 	
Crank Width "A"	55.7 ~ 59.5 mm (2.19 ~ 2.34 in)
Assembly Width "B"	339.8 ~ 340.2 mm (13.38 ~ 13.39 in)
Runout Limit "C"	0.03 mm (0.0012 in)
Big End Side Clearance "D"	0.160 ~ 0.262 mm (0.006 ~ 0.010 in)

Model		FZR1000	
Main Journal Oil Clearance		0.020 ~ 0.044 mm (0.0008 ~ 0.0017 in)	
Bearing Size No. Color Code		1. Blue 2. Black 3. Brown 4. Green 5. Yellow	
Thrust Bearing Position		#4 Journal	
Clutch:			
Friction Plate Thickness x Quantity		2.9 ~ 3.1 mm (0.114 ~ 0.122 in) x 9	
Location x Quantity/Identification		Outer x 1/Single semi-circular slot Center x 1/Blue painted mark Others x 7/Red painted mark	
< Wear Limit >		2.8 mm (0.110 in)	
Clutch Plate Thickness x Quantity		1.9 ~ 2.1 mm (0.075 ~ 0.083 in) x 8	
< Warp Limit >		0.1 mm (0.0039 in)	
Clutch Spring Free Length x Quantity		50.0 mm (1.97 in) x 6	
Clutch Spring Minimum Length		54.0 mm (2.126 in)	
Clutch Release Method		Hydrauric inner push	
Transmission:			
Main Axle Deflection Limit		0.08 mm (0.0031 in)	
Drive Axle Deflection Limit		0.08 mm (0.0031 in)	
Shifter:			
Shifter Type		Guide bar	
Guide Bar Bending Limit		0.1 mm (0.0039 in)	
Carburetor:			
Type/Manufacture x Quantity		BDST38/MIKUNI x 4	
		3GM1, 3GM2, 3LG1	3LE1, 3LF1, 3LH1
I.D. Mark		3GM00	3LE00, 3LF00, 3LH00
Main Jet	(M.J.)		
(#1, 4 Cylinder)		#125	#127.5
(#2, 3 Cylinder)		#122.5	#125
Main Air Jet	(M.A.J.)	#85	#85
Jet Needle-Clip Position	(J.N.)	5CEW8-3.5	5CEW8-3.5
Needle Jet	(N.J.)	Y-0	Y-0
Pilot Jet	(P.J.)	#40	#40
Pilot Outlet Size	(P.O.)	0.85	0.85
Pilot Air Jet	(P.A.J.)	#115	#115
Pilot Screw	(P.S.)	2-1/2 turns out	2-1/2 turns out
Valve Seat Size	(V.S.)	1.7	1.7
Starter Jet	($G.S_1$)	#60	#60
	($G.S_2$)	0.6	0.6
Bypath Size	($B.P_1$)	0.8	0.8
Throttle Valve Size	(Th.V.)	#125	#125
Fuel Level	(F.L.)	10.5 ~ 11.5 mm (0.41 ~ 0.45 in) Above from the float chamber line	

Model	FZR1000
Lubrication System:	
Oil Filter Type	Paper
Oil Pump Type	Trochoid pump
Tip Clearance	0.09 ~ 0.15 mm (0.0035 ~ 0.0060 in)
< Limit >	< 0.2 mm (0.008 in) >
Side Clearance	0.03 ~ 0.08 mm (0.0012 ~ 0.0031 in)
< Limit >	< 0.15 mm (0.006 in) >
Bypass Valve Setting Pressure	180 ~ 220 kPa (1.8 ~ 2.2 kg/cm², 25.6 ~ 31.3 psi)
Relief Valve Operating Pressure	390 ~ 470 kPa (3.9 ~ 4.7 kg/cm², 55.5 ~ 66.8 psi)
Cooling System:	
Radiator Core Size Width	360 mm (14.2 in)
Height	217.8 mm (8.57 in)
Thickness	32 mm (1.26 in)
Radiator Cap Opening Pressure	95 ~ 125 kPa (0.95 ~ 1.25 kg/cm², 13.5 ~ 17.8 psi)
Reservoir Tank Capacity	0.4 L (0.35 Imp qt, 0.42 US qt)
< From Low to Full Level >	0.15 L (0.13 Imp qt, 0.16 US qt)
Water Pump	
Type	Single-suction centrifugal pump
Reduction Ratio	68/41 x 41/43 (1.581)

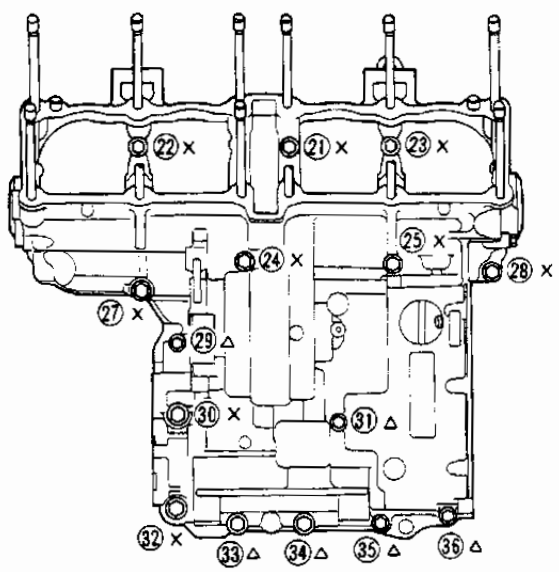
Model	FZR1000

Lubrication Chart:

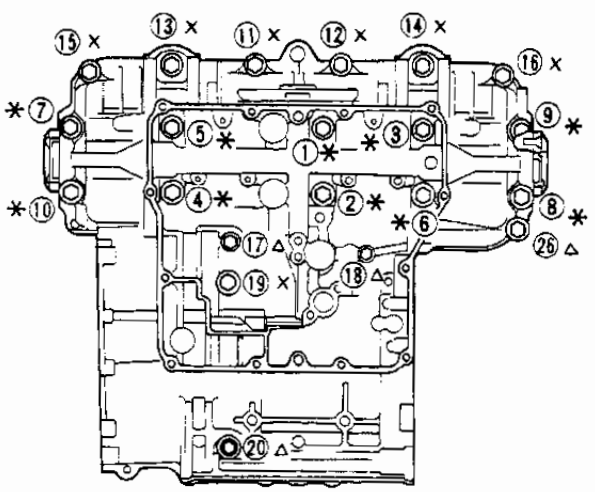


Crankcase Tightening Sequence:

Crankcase (Upper)



Crankcase (Lower)



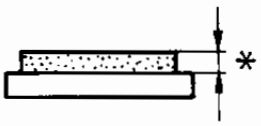
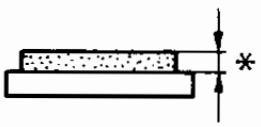
* : 9 mm Bolt: 32 Nm (3.2 m·kg, 23 ft·lb)
x : 8 mm Bolt: 24 Nm (2.4 m·kg, 17 ft·lb)
△ : 6 mm Bolt: 12 Nm (1.2 m·kg, 8.7 ft·lb)

Tightening Torque

Part to be tightened	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m·kg	ft·lb	
Camshaft Cap	Bolt	M6	40	10	1.0	7.2	M
Cylinder Head (exhaust pipe)	Stud bolt	M8	8	15	1.5	11	E
Cylinder Head	Nut	M10	8	41	4.1	30	E
Cylinder Head	Cap nut	M10	4	41	4.1	30	E
Spark Plug	—	M12	4	17.5	1.75	12.5	
Cylinder Head Cover	Bolt	M6	8	10	1.0	7.2	
Connecting Rod	Nut	M8	8	36	3.6	25	M
Timing Chain Sprocket	Flange bolt	M7	4	24	2.4	17	
Timing Chain Tensioner	Bolt	M6	2	10	1.0	7.2	
Timing Chain Tensioner End	Cap bolt	M11	1	20	2.0	14	
Chain Guide (intake side)	Bolt	M6	2	10	1.0	7.2	
Oil Pump Housing	Screw	M6	1	10	1.0	7.2	
Oil Pump Mount	Bolt	M6	3	10	1.0	7.2	
Oil Filter Case	—	M20	1	15	1.5	11	
Oil Pan	Bolt	M6	12	10	1.0	7.2	
Drain Plug	—	M14	1	43	4.3	31	
Oil Pipe 1	Bolt	M6	3	7	0.7	5.1	
Oil Baffle Plate (lower)	Flange bolt	M6	4	10	1.0	7.2	
Oil Baffle Plate (upper)	Flange bolt	M6	10	10	1.0	7.2	
Oil Cooler House	Union bolt	M12	2	32	3.2	23	
Oil Level Switch	Bolt	M6	2	10	1.0	7.2	
Exhaust Pipe	Nut	M8	8	20	2.0	14	
Exhaust Pipe and Muffler	Flange bolt	M8	1	20	2.0	14	
Muffler and Muffler Stay	Flange bolt	M8	1	20	2.0	14	
Muffler Bracket	Flange bolt	M8	1	20	2.0	14	
Exhaust Pipe Blind Plug (CO test)	Bolt	M6	4	10	1.0	7.2	
Crankcase	Stud bolt	M10	12	10	1.0	7.2	E
Main Axle Bearing Stopper	Torx	M6	3	10	1.0	7.2	E
Crankshaft End Cover	Screw	M6	6	7	0.7	5.1	
Crankcase Cover (right)	Bolt	M6	11	10	1.0	7.2	
Crankcase	Flange bolt	M6	7	12	1.2	8.7	E
Crankcase	Flange bolt	M8	17	24	2.4	17	E
Crankcase	Flange bolt	M9	11	32	3.2	23	E
Starter Clutch	Bolt	M8	3	25	2.5	18	
HY-VO Chain Guide	Bolt	M6	2	10	1.0	7.2	
Clutch Boss	Nut	M20	1	70	7.0	50	Use lock washer
Clutch Spring	Bolt	M6	6	8	0.8	5.8	
Drive Sprocket	Nut	M18	1	70	7.0	50	Use lock washer
Shift Cam Stopper Lever	Bolt	M6	1	10	1.0	7.2	
Shift Cam Stopper	Bolt	M6	1	10	1.0	7.2	
Guide Bar Stopper (shift fork)	Bolt	M6	1	10	1.0	7.2	
Neutral Switch	Screw	M6	2	4	0.4	2.9	

CHASSIS

Model		FZR1000
Steering System:		
Steering Bearing Type		Taper Roller Bearing
Front Suspension:		
Front Fork Travel		120 mm (4.72 in)
Front Spring Free Length		321.3 mm (12.6 in)
< Limit >		528 mm (20.79 in)
Spring Rate:	K1	16 N/mm (1.6 kg/mm, 89.6 lb/in)
Stroke	K1	0.0 ~ 120 mm (0.0 ~ 4.72 in)
Optional Spring		No
Oil Capacity		535 cm³ (18.9 Imp oz, 18.1 US oz)
Oil Level (Fully Compression)		116 mm (4.57 in) Bellow the top of inner fork tube without fork spring
Oil Grade		Yamaha Fork Oil 10W or equivalent
Adjustment		←Soft—STD——Hard→ Adjusting groove: 1 2 3 4
Rear Suspension:		
Shock Absorber Travel		70 mm (2.76 in)
Spring Free Length		218 mm (8.58 in)
Fitting Length		200 mm (7.87 in)
Spring Rate	K1	70 N/mm (7.0 kg/mm, 392 lb/in)
Stroke	K1	0.0 ~ 7.0 mm (0.0 ~ 2.76 in)
Optional Spring		No
Enclosed Gas/Air Pressure (STD)		120 kPa (1.2 kg/cm², 17.1 psi)
< Minimum ~ Maximum >		
Adjustment 	Minimum Standard Maximum	37.5 mm (1.48 in) 40.5 mm (1.59 in) 47.5 mm (1.87 in)
Damping Adjustment		←Softer-STD — Stiffer→ Adjusting position: 9 7←turn out 0 (from fully turned-in position)
Swingarm:		
Free Play Limit	End Side	1.0 mm (0.04 in) 1.0 mm (0.04 in)
Front Wheel:		
Type		Cast Wheel
Rim Size		MT3.50 x 17
Rim Material		Aluminum
Rim Runout Limit	Radial Lateral	1 mm (0.04 in) 0.5 mm (0.02 in)
Rear Wheel:		
Type		Cast wheel
Rim Size		MT5.50 x 17
Rim Material		Aluminum
Rim Runout Limit	Radial Lateral	1 mm (0.04 in) 0.5 mm (0.02 in)

Model	FZR1000
Drive Chain:	
Type/Manufacturer	532ZLV/D.I.D
No. of Links	110
Chain Free Play	15 ~ 20 mm (0.6 ~ 0.8 in)
Front Disc Brake:	
Type	Dual (4-pot caliper)
Disc Outside Diameter x Thickness	320 x 4 mm (12.60 x 0.16 in)
Pad Thickness Inner	5.5 mm (0.22 in)
< Limit >*	0.5 mm (0.02 in)
Pad Thickness Outer	5.5 mm (0.22 in)
< Limit >*	0.5 mm (0.02 in)
	
Master Cylinder Inside Diameter	15.87 mm (0.62 in)
Caliper Cylinder Inside Diameter	32.10 mm (1.26 in)
Brake Fluid Type	DOT #4
Rear Disc Brake:	
Type	Single (4-pot caliper)
Disc Outside Diameter x Thickness	267 x 5 mm (10.51 x 0.20 in)
Pad Thickness Inner	5.5 mm (0.22 in)
< Limit >*	0.5 mm (0.02 in)
Pad Thickness Outer	5.5 mm (0.22 in)
< Limit >*	0.5 mm (0.02 in)
	
Master Cylinder Inside Diameter	14.0 mm (0.55 in)
Caliper Cylinder Inside Diameter	42.85 mm (1.69 in)
Brake Fluid Type	DOT #4 or #3
Clutch:	
Master Cylinder Inside Diameter	15.87 mm (0.63 in)
Release Cylinder Inside Diameter	38.1 mm (1.50 in)
Brake Fluid Type	DOT #4 or #3
Brake Lever and Brake Pedal:	
Brake Lever Free Play	2 ~ 5 mm (0.08 ~ 0.20 in)
Brake Pedal Position	60 mm (2.4 in) Bellow the top of the footrest.

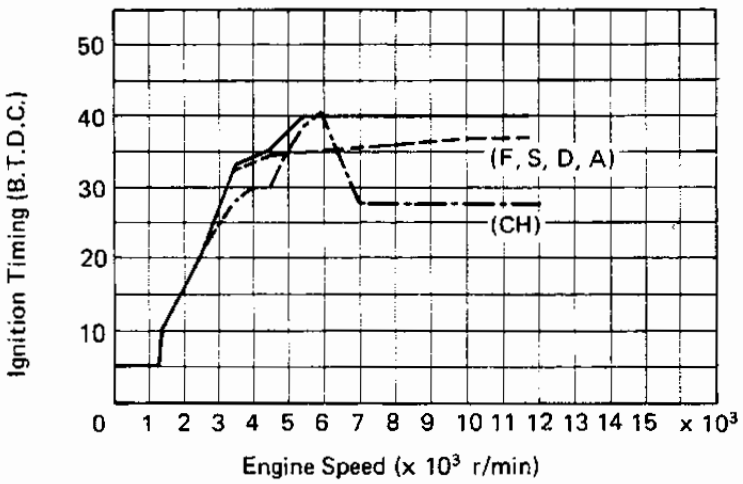
Tightening Torque

Part to be tightened	Thread size	Tightening torque			Remarks
		Nm	m · kg	ft · lb	
Front Axle	M14	75	7.5	54	
Front Axle Pinch	M8	20	2.0	14	
Front Fender	M6	9	0.9	6.5	◀
Under Bracket and Inner Tube	M8	23	2.3	17	
Handle Crown and Inner Tube	M8	20	2.0	14	
Handle Crown and Steering Stem	M22	110	11.0	80	
Lower Ring Nut (steering shaft)	M22	—	—	—	Refer to "NOTE"
Brake Caliper (front/rear)	M10	35	3.5	25	
Brake Disc and Wheel	M10	20	2.0	14	◀
Master Cylinder and Holder (front brake)	M6	9	0.9	6.5	
Master Cylinder Cap (front brake)	M5	2	0.2	1.4	
Bleed Screw (brake caliper/clutch release cylinder)	M8	6	0.6	4.3	
Brake Hose	M10	25	2.5	18	
Handlebar and Handle Boss	M8	28	2.8	20	
Handlebar Boss and Handle Crown	M8	20	2.0	14	
Grip End (handlebar)	M6	7	0.7	5.1	
Engine Mounting:					
Pinch Bolt (cylinder head side)	M8	22	2.2	16	
Pinch Bolt (cylinder side)	M8	22	2.2	16	
Pinch Bolt (rear)	M8	15	1.5	11	
Mounting Bolt (cylinder head)	M10	60	6.0	43	
Mounting Bolt (cylinder)	M10	33	3.3	24	
Mounting Bolt (rear — upper)	M10	60	6.0	43	
Mounting Bolt (rear — lower)	M10	55	5.5	40	
Footrest Bracket and Frame (front)	M8	28	2.8	20	
Footrest and Footrest Bracket (front)	M10	55	5.5	40	
Pivot Axle and Locknut	M18	130	13.0	94	
Relay Arm and Frame	M10	45	4.5	32	
Arm and Swingarm	M12	70	7.0	50	
Arm and Relay Arm	M12	70	7.0	50	
Rear Shock Absorber and Frame	M10	42	4.2	30	
Rear Shock Absorber and Relay Arm	M10	40	4.0	28	
Footrest Bracket and Frame (rear)	M8	28	2.8	20	
Master Cylinder and Frame (rear)	M8	20	2.0	14	
Rear Frame and Frame	M10	55	5.5	40	◀
Tension Bar (front and rear)	M8	28	2.8	20	
Brake Disc and Clutch Hub	M8	20	2.0	14	
Sprocket and Hub	M10	60	6.0	43	
Rear Axle and Nut	M18	150	15.0	110	
Side Stand Bracket and Frame	M8	28	2.8	20	◀
Side Stand Pivot Bolt	M10	48	4.8	35	
Side Stand Pivot Nut	M10	38	3.8	27	

NOTE:

1. Tighten the lower ring nut 52 Nm (5.2 m · kg, 37 ft · lb) by using the torque wrench.
2. Loosen the lower ring nut completely and retighten it 3 Nm (0.3 m · kg, 2.2 ft · lb).
3. Install the upper ring nut, and then align the slots of both ring nut.

ELECTRICAL

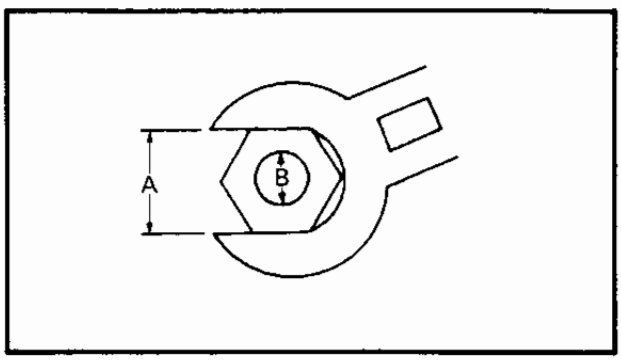
Model	FZR1000
Voltage	12V
Ignition System:	
Ignition Timing (B.T.D.C.)	5° at 1,350 r/min
Advanced Timing (B.T.D.C.)	40° at 5,500 r/min 35° at 4,500 r/min (F, S, D, A) 41° at 6,000 r/min (CH)
Advancer Type	Electrical
	
T.C.I.:	
Pickup Coil Resistance	135 ~ 165Ω at 20°C (68°F)
(Color)	(Gray – Brack)
T.C.I. Unit/Manufacturer	TID14-72/HITACHI TID14-81/HITACHI (F, S, D, A) TID14-89/HITACHI (CH)
Ignition Coil:	
Model/Manufacturer	CM12-37/HITACHI
Minimum Spark Gap	6 mm (0.24 in) or more at 500 r/min
Primary Winding Resistance	1.8 ~ 2.2Ω at 20°C (68°F)
Secondary Winding Resistance	9.6 ~ 14.4 kΩ at 20°C (68°F)
Spark Plug Cap:	
Type	Resin type
Resistance	10 kΩ
Charging System:	
Type	A.C. Generator
A.C. Generator:	
Model/Manufacturer	B3G/NIPPONDENSO
Nominal Output	12V, 28A at 5,000 r/min
Field Coil Resistance	3.8 ~ 4.2Ω at 20°C (68°F) (Brown – Green)
Starter Coil Resistance	0.16 ~ 0.18Ω at 20°C (68°F) (White – White)
Brush – Overall Length	13.7 mm (0.54 in)
< Limit >	4.7 mm (0.19 in)
– Spring Force	230 ~ 330 gr (8.1 ~ 11.6 oz)
Voltage Regulator:	
Type	Field control
No load Regulated Voltage	14.2 ~ 14.8V
Battery:	
Capacity	12V, 14AH
Specific Gravity	1.280

Model	FZR1000
Electrical Starter System:	
Type	Constant mesh type
Starter Motor:	
Model/Manufacturer	SM-13/MITSUBA
Output	0.7 kw
Armature Coil Resistance	0.012Ω ± 10% at 20°C (68°F)
Brush — Overall Length	12 mm (0.47 in)
< Limit >	5 mm (0.20 in)
— Spring Force	680 ~ 920 g (24.0 ~ 32.4 oz)
Commutator Dia.	28 mm (1.10 in)
Wear Limit	27 mm (1.06 in)
Mica Undercut	0.8 mm (0.03 in)
Starter Switch:	
Model/Manufacturer	A104-128/HITACHI
Amperage Rating	100A
Coil Resistance	4.0 ~ 4.7Ω at 20°C (68°F)
Horn:	
Type/Quantity	Plane Type/1 pcs.
Model/Manufacturer	YF-12/NIKKO
Maximum Amperage	2.5A
Flasher Relay (Relay Assembly):	
Type	Semi transistor type
Model/Manufacturer	FB257H/NIPPON DENSO
Self Cancelling Device	Yes (Except for D)
Flasher Frequency	75 ~ 95 cycle/min
Wattage	21W x 2 pcs + 3.4W
Oil Level Switch:	
Model/Manufacturer	3GM/NIPPON DENSO
Fuel Pump Relay:	
Model/Manufacturer	3EN-00/OMRON
Thermostat Switch:	
Model/Manufacturer	2EL/NIPPON THERMOSTAT
Thermo Unit:	
Model/Manufacturer	11H/NIPPON SEIKI
Circuit Breaker:	
Type	Fuse
Amperage for Individual Circuit x Quantity:	
MAIN	30A x 1
HEADLIGHT	20A x 1
SIGNAL	10A x 1
IGNITION	10A x 1
RESERVE	10A x 1, 20A x 1, 30A x 1

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 included in the applicable sections of this book. To avoid warpage, tighten multi-fastener assemblies in a crisscross fashion, in progressive stages, until full torque is reached. Unless otherwise specified, torque specifications call for clean, dry threads. Components should be at room temperature.

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



A: Distance across flats
B: Outside thread diameter

DEFINITION OF UNITS

Unit	Read	Definition	Measure
mm cm	millimeter centimeter	10^{-3} meter 10^{-2} meter	Length Length
kg	kilogram	10^{3} gram	Weight
N	Newton	1 kg x m/sec^2	Force
Nm m·kg	Newton meter Meter kilogram	N x m m x kg	Torque Torque
Pa N/mm	Pascal Newton per millimeter	N/m^2 N/mm	Pressure Spring rate
L cm^3	Liter Cubic centimeter		Volume or Capacity
r/min	Rotation per minute		Engine Speed

LUBRICATION POINT AND GRADE OF LUBRICANT

ENGINE

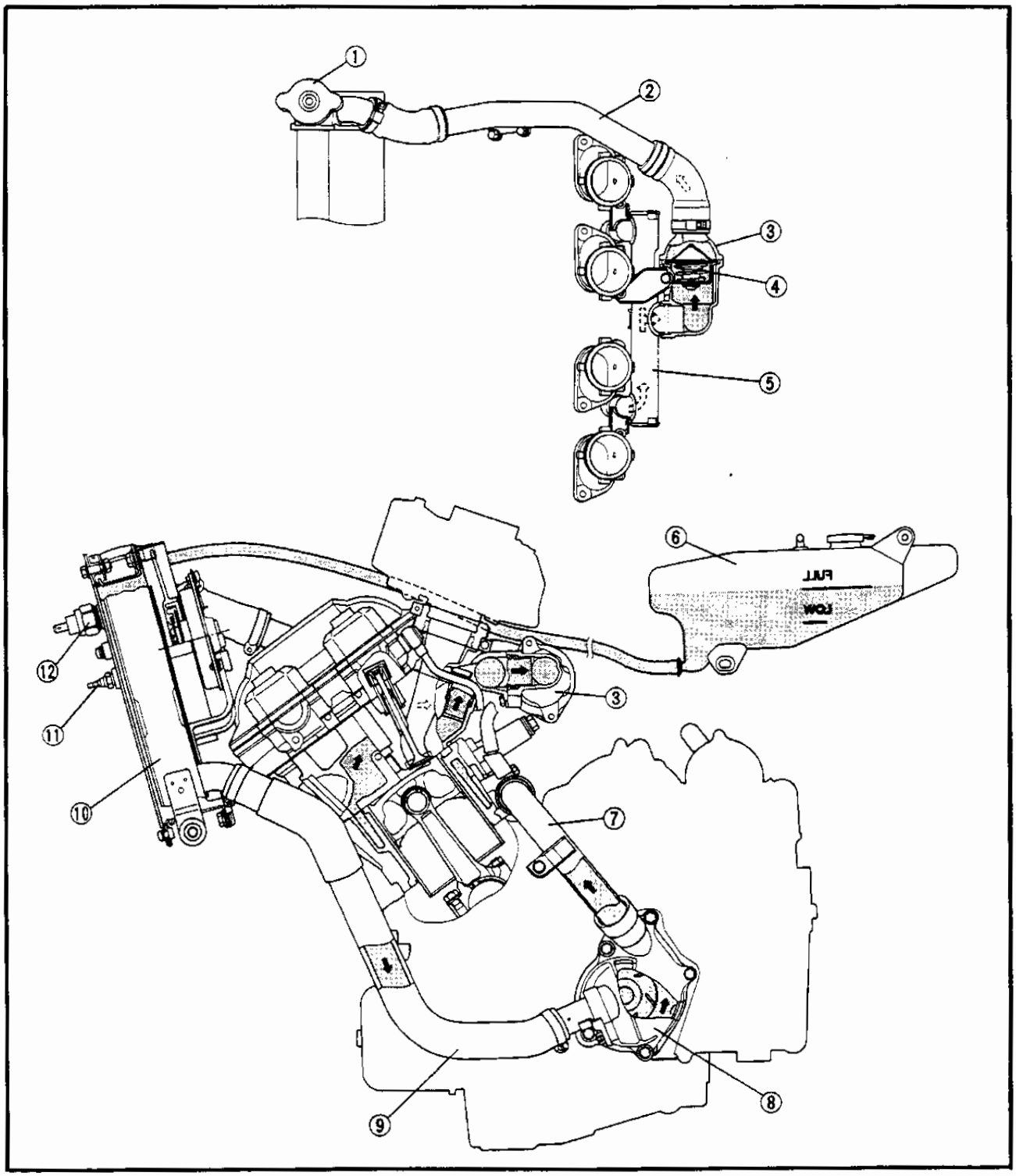
Lubrication Point	Symbol	Grade of Lubricant
Oil seal lip	LS	Lithium-soap base
O-Ring	LS	Lithium-soap base
Bearing	E	Engine oil
Piston surface	E	Engine oil
Piston pin	E	Engine oil
Crankshaft pin	E	Engine oil
Crankshaft journal	E	Engine oil
Connecting rod bolt/Nut	M	Molybdeum disulfide oil
Camshaft cam lobe/Journal	M	Molybdeum disulfide oil
Valve stem (IN, EX)	M	Molybdeum disulfide oil
Valve stem end (IN, EX)	M	Molybdeum disulfide oil
Water pump impeller shaft	E	Engine oil
Oil pump rotor (Inner/Outer), housing	E	Engine oil
Oil strainer assembly	E	Engine oil
Outer starter clutch surface	E	Engine oil
Idle gear surface/Bearing	E	Engine oil
Starter clutch ball	E	Engine oil
Primary driven gear	E	Engine oil
Transmission gear (Wheel/Pinion)	M	Molybdeum disulfide oil
Axle (Main/Drive)	M	Molybdeum disulfide oil
Shift cam	M	Molybdeum disulfide oil
Shift fork/Guide bar	E	Engine oil
Shift shaft assembly	E	Engine oil

CHASSIS

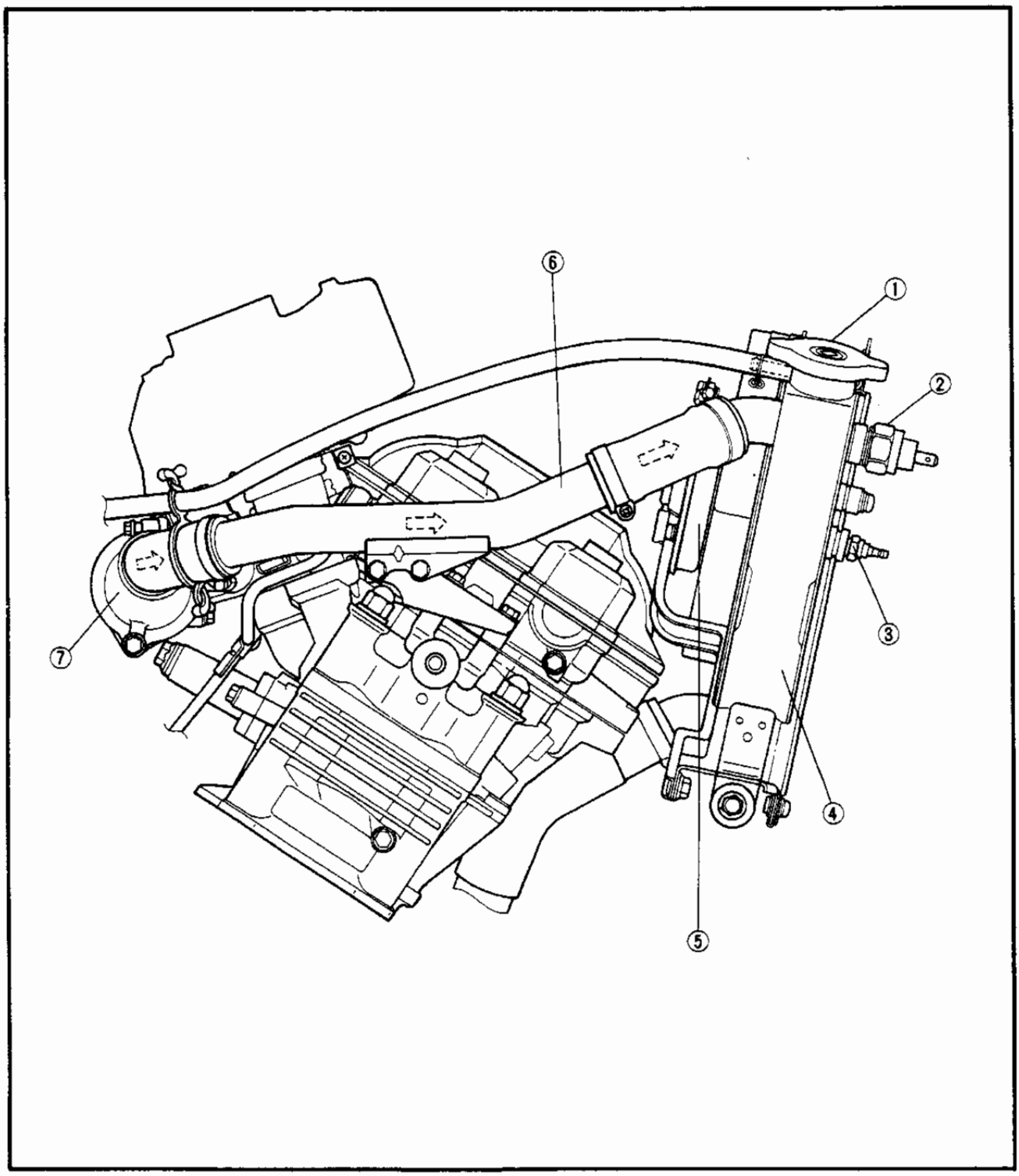
Lubrication Point	Symbol	Grade of Lubricant
Steering bearing (Upper/Lower)	M	Molybdenum disulfide grease
Wheel bearing/Axle	B	Wheel bearing grease
Front wheel oil seal (Right/Left)	B	Wheel bearing grease
Rear wheel oil seal	B	Wheel bearing grease
Clutch hub oil seal	B	Wheel bearing grease
Clutch hub fitting area	B	Wheel bearing grease
Rear brake pedal shaft	B	Wheel bearing grease
Change pedal	B	Wheel bearing grease
Side stand sliding surface	B	Wheel bearing grease
Tube guide (Throttle grip) inner surface	B	Wheel bearing grease
Brake lever bolt, sliding surface	B	Wheel bearing grease
Clutch lever bolt, sliding surface	B	Wheel bearing grease
Rear shock absorber (Upper/Lower)	M	Molybdenum disulfide grease
Swingarm pivot bearing	LS	Lithium-soap base grease
Pivot shaft	LS	Lithium-soap base grease
Arm 1, 2 bearing	LS	Lithium-soap base grease
Thrust cover (Inner)	LS	Lithium-soap base grease
Rellay arm bearing (Inner)	LS	Lithium-soap base grease
Rear footrest ball	B	Wheel bearing grease
Rear footrest pin	B	Wheel bearing grease

COOLANT DIAGRAM

① Radiator cap
② Inlet pipe (radiator)
③ Thermostatic valve housing
④ Thermostatic valve
⑤ Water jacket joint (outlet)
⑥ Reservoir tank (coolant)
⑦ Outlet pipe (water pump)
⑧ Water pump
⑨ Inlet pipe (water pump)
⑩ Radiator
⑪ Thermo unit
⑫ Thermo switch



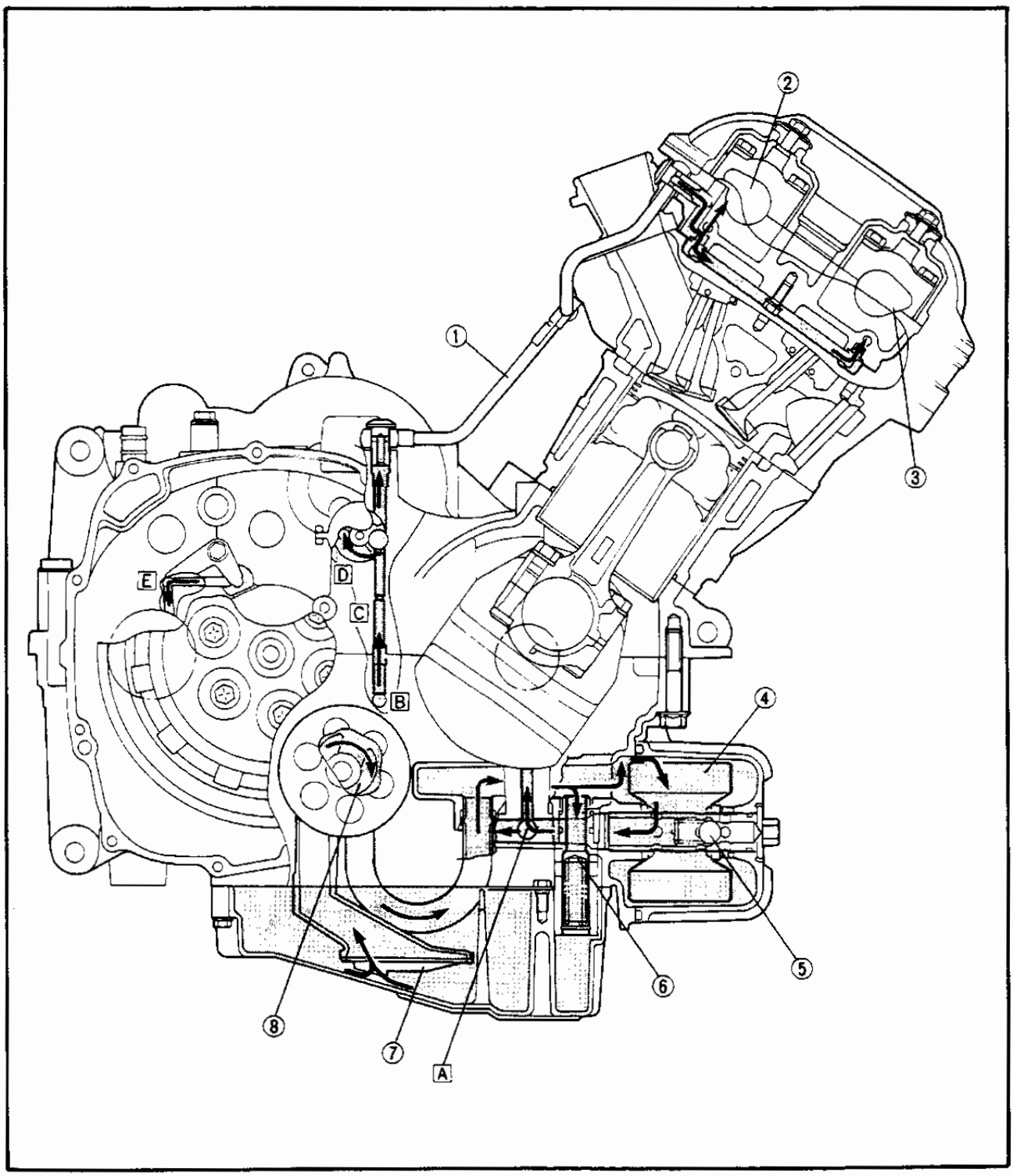
① Radiator cap
② Thermo switch
③ Thermo unit
④ Radiator
⑤ Fan motor
⑥ Inlet pipe (radiator)
⑦ Thermostatic valve housing



LUBRICATION DIAGRAMS

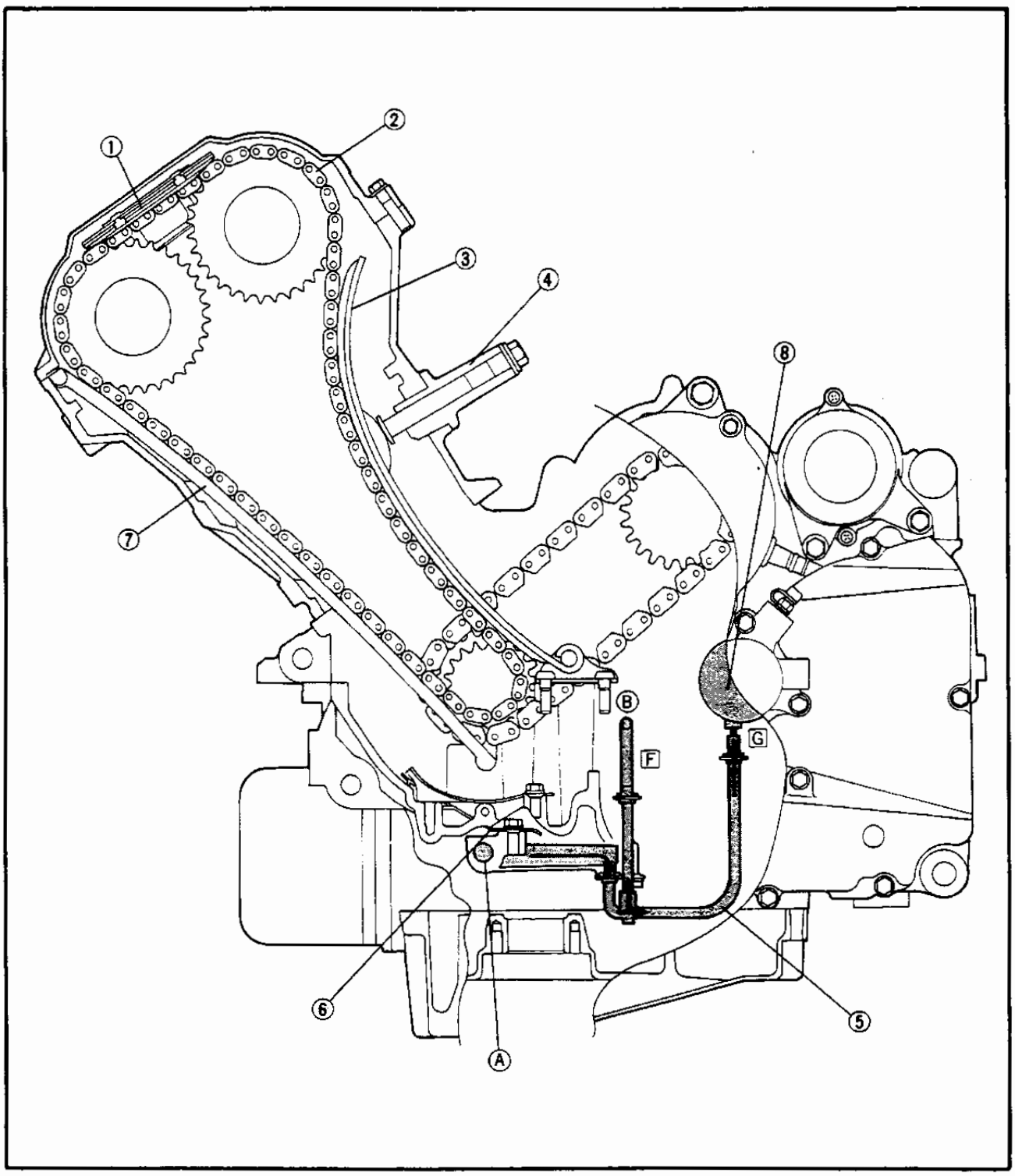
① Oil delivery pipe 2
② Camshaft (intake)
③ Camshaft (exhaust)
④ Oil filter
⑤ Bypass valve
⑥ Relief valve
⑦ Oil strainer
⑧ Oil pump

[A] To Ⓐ (see p 2-22)
[B] To Ⓑ (see p 2-22)
[C] To Ⓒ (see p 2-24)
[D] To Ⓓ (see p 2-24)
[E] To Ⓔ (see p 2-23)

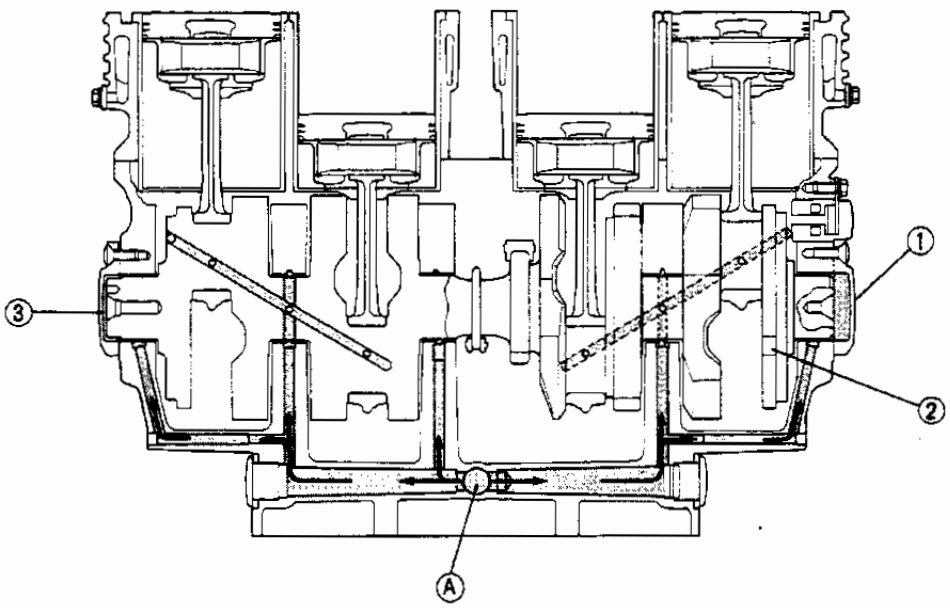


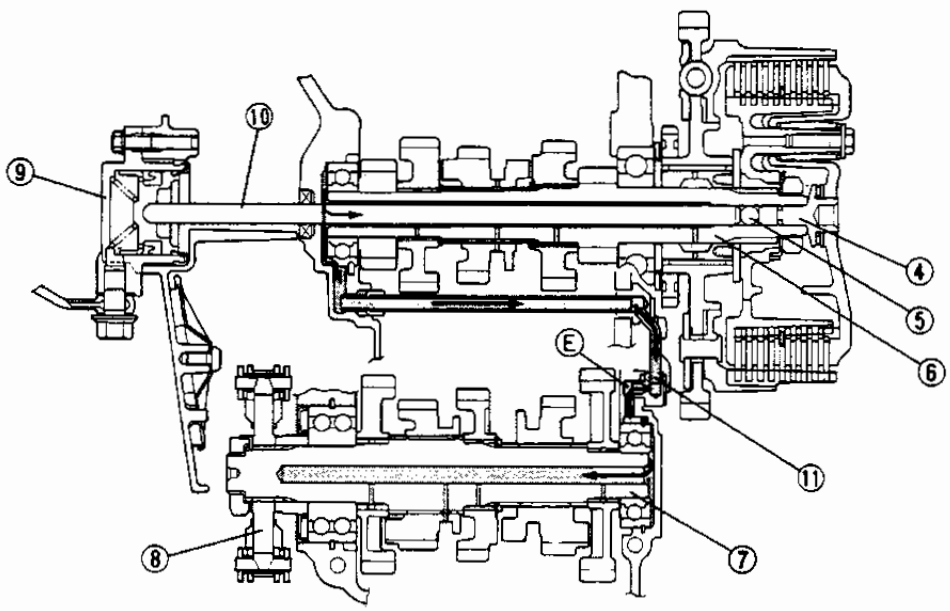
① Timing chain guide (upper)
② Timing chain
③ Timing chain guide (intake side)
④ Timing chain tensioner
⑤ Oil pipe 1
⑥ Baffle plate
⑦ Timing chain guide (exhaust side)
⑧ Main axle

F To Ⓕ (see p 2-24)
G To Ⓖ (see p 2-24)

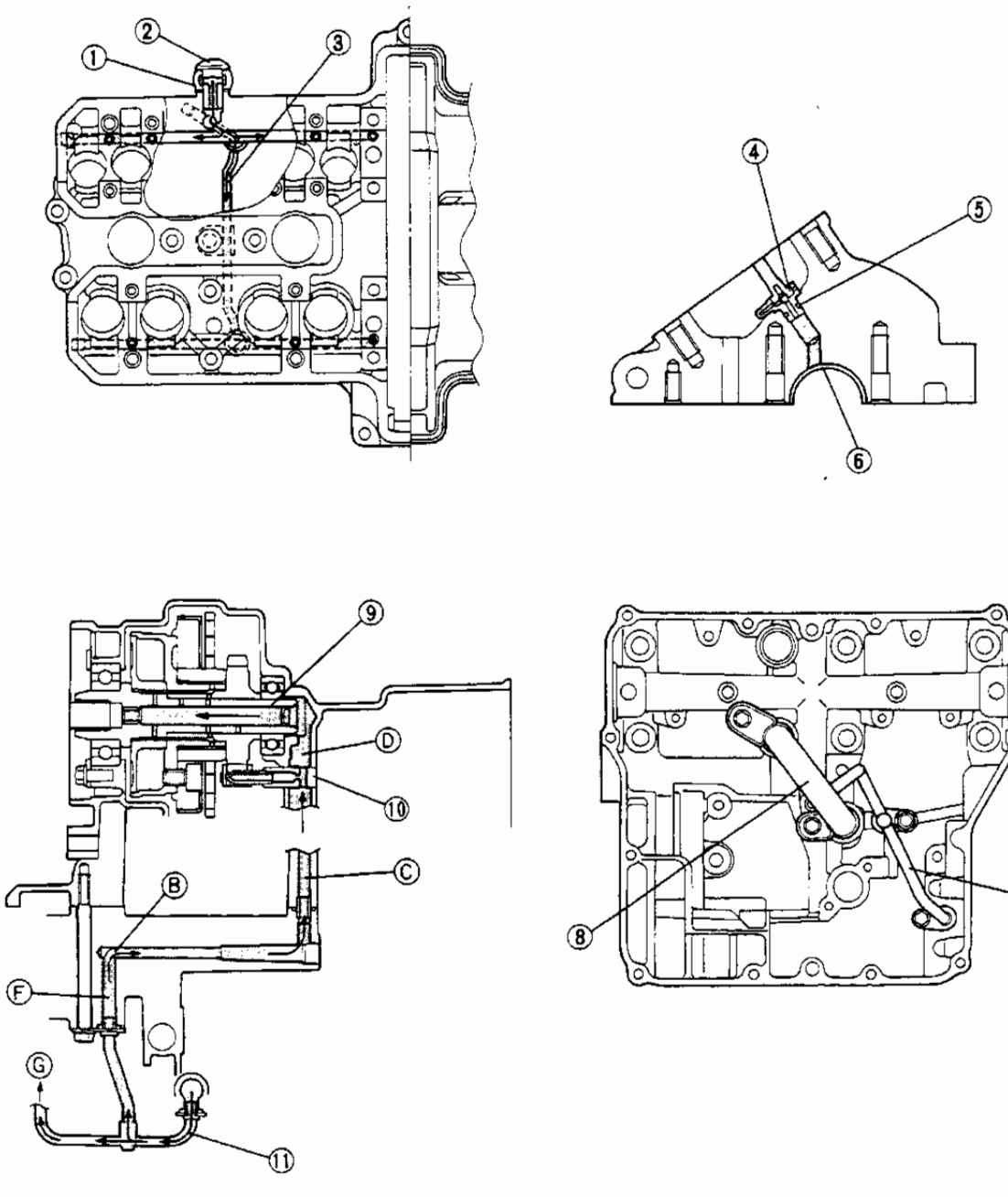


① Crankshaft end cover (right)
② Crankshaft
③ Crankshaft end cover (left)
④ Push rod #1
⑤ Ball
⑥ Main axle
⑦ Drive axle
⑧ Drive sprocket
⑨ Clutch release cylinder
⑩ Push rod #2
⑪ Oil delivery pipe 5

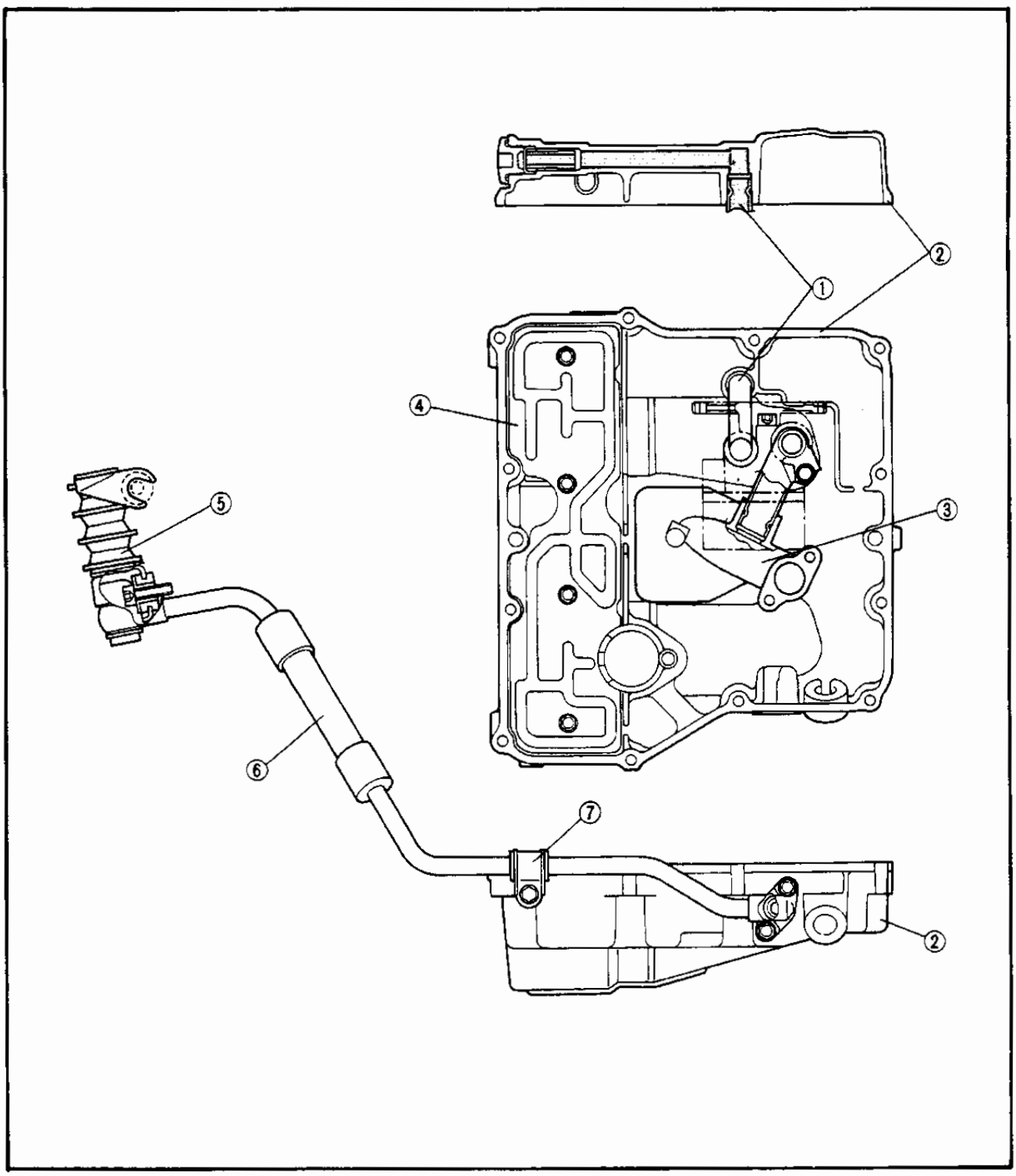




① Oil delivery pipe 2
② Union bolt
③ Oil delivery pipe 3
④ Oil jet nozzle
⑤ O-ring
⑥ Plain bearing (crankshaft)
⑦ Oil delivery pipe 1
⑧ Oil pipe 2
⑨ AC generator shaft
⑩ Oil spray nozzle
⑪ Oil delivery pipe 1

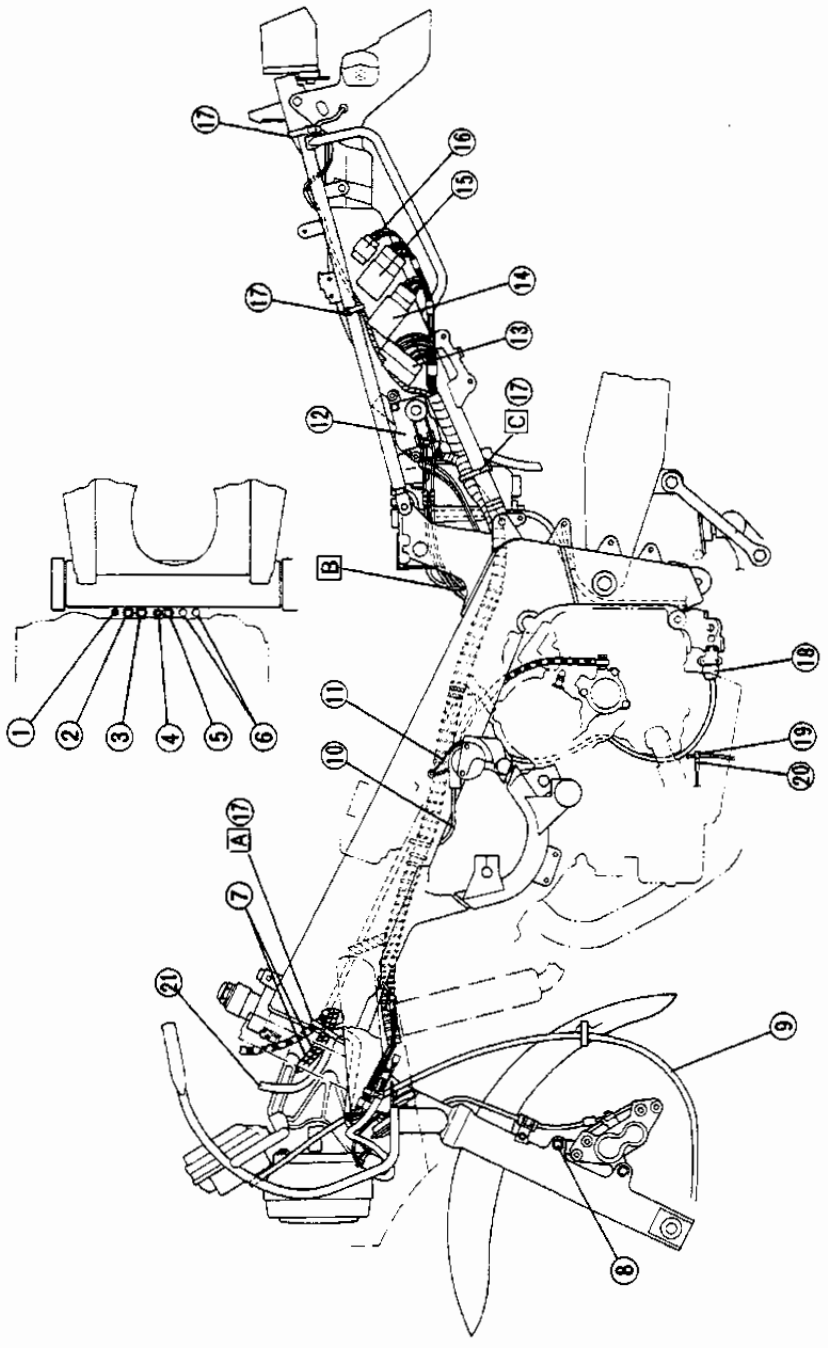


①Oil pipe 2
②Oil pan
③Oil strainer
④Baffle plate
⑤Oil cooler
⑥Pipe (oil cooler)
⑦Clamp

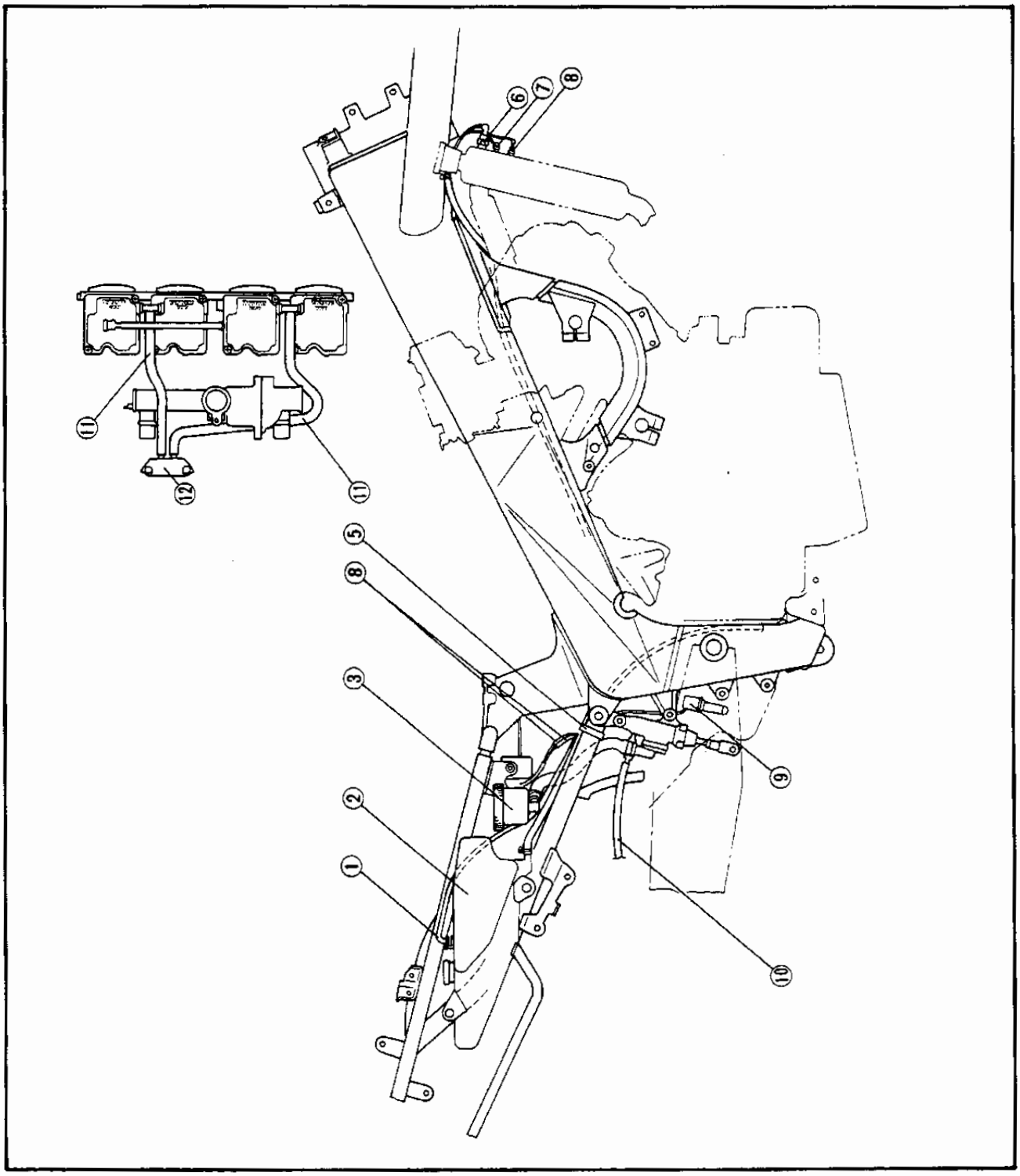


CABLE ROUTING

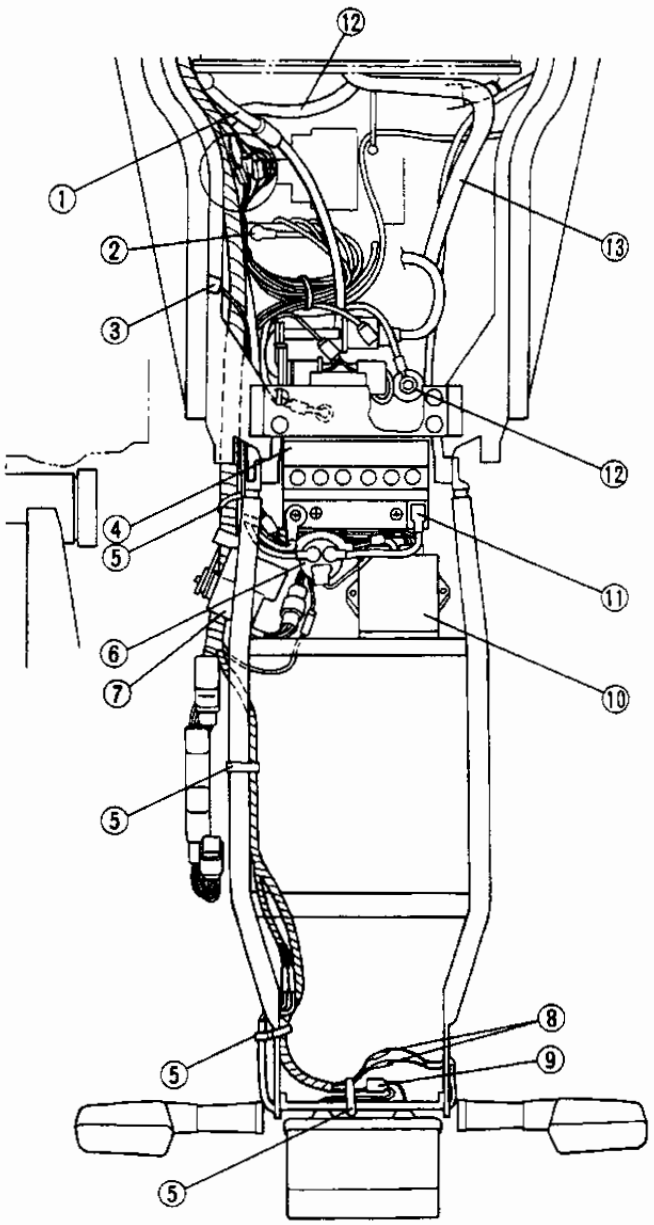
① Ventilation hose (coolant reservoir tank)
② Ventilation hose (air filter case)
③ Breather hose (fuel tank)
④ Breather hose (battery)
⑤ Canister hose
⑥ EXUP cables
⑦ Throttle cables
⑧ Brake hose
⑨ Speedometer cable
⑩ Starter cable
⑪ Starter lever assembly
⑫ EXUP servo motor
⑬ Fuse box
⑭ Flasher relay
⑮ Relay unit
⑯ Fuse (main)
⑰ Band
⑱ Sidestand switch
⑲ Oil level switch lead
⑳ Clamp
㉑ Handlebar switch lead (left)
[A] Clamp the clutch hose and throttle cables
[B] Route the EXUP cables
[C] Clamp the wireharness, starter motor lead and battery negative lead



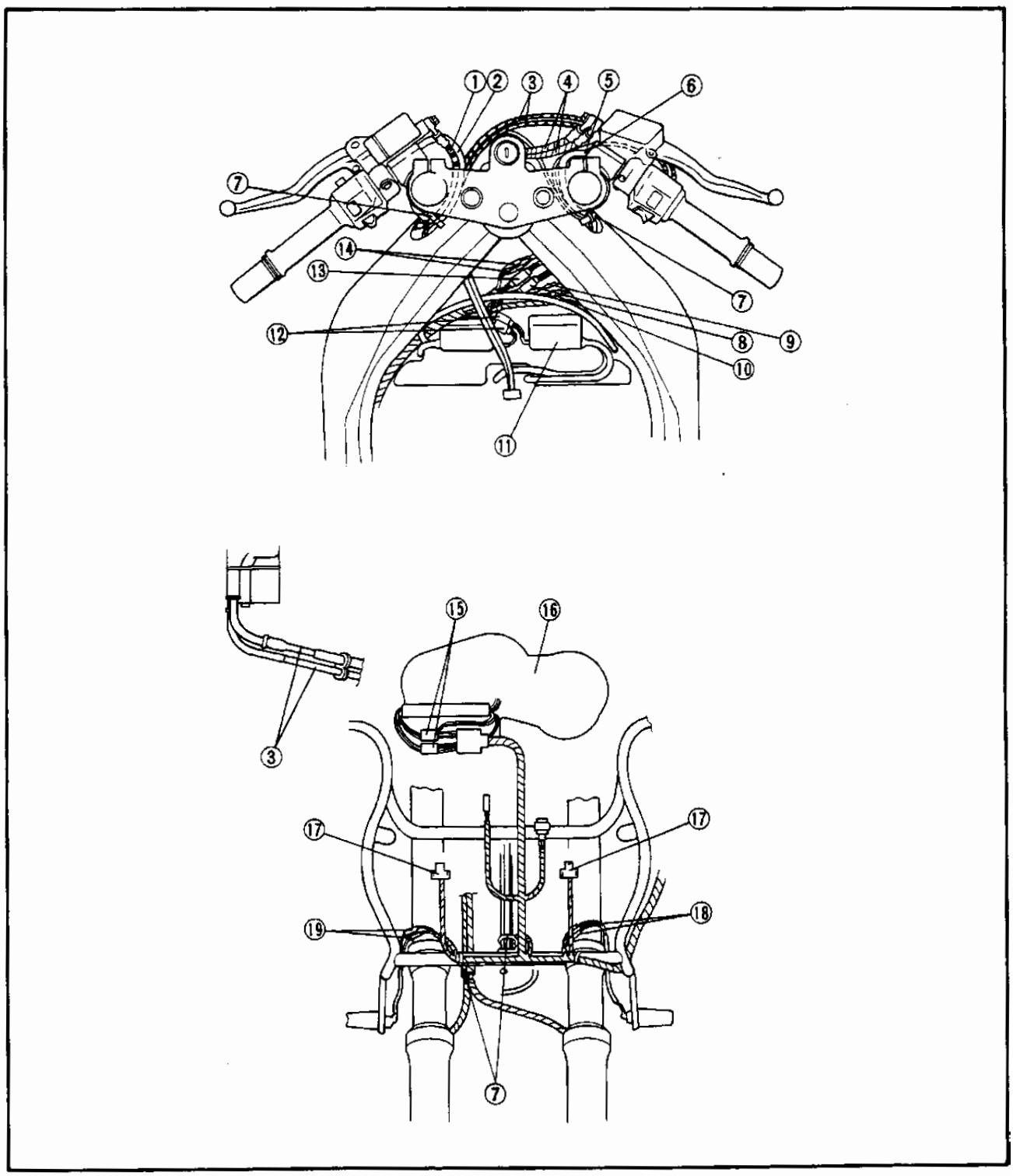
① Ventilation hose (coolant reservoir tank)
② Reservoir tank (coolant)
③ Reservoir tank (rear brake)
④ Rear brake switch leads
⑤ Band
⑥ Thermo switch
⑦ Ground lead
⑧ Thermo unit
⑨ Rear brake switch
⑩ Rear brake hose
⑪ Overflow hose (carburetor)
⑫ Hose guide



① Ventilation hose (air filter case)
② Starter motor lead
③ Fuel sender
④ Battery
⑤ Band
⑥ Starter relay
⑦ EXUP servo motor
⑧ Rear flasher light leads
⑨ Tail/brake light coupler
⑩ Digital ignitor unit
⑪ Battery positive lead
⑫ Sub tank (rear shock absorber)
⑬ Ventilation hose (crankcase)



① Clutch hose
② Handlebar switch leads (left)
③ Throttle cables
④ Front brake hoses
⑤ Front brake switch lead
⑥ Handlebar switch leads (right)
⑦ Band
⑧ Handlebar switch coupler (right)
⑨ Handlebar switch lead (left)
⑩ Fan motor coupler
⑪ Ignition coil
⑫ Ignition coil couplers
⑬ Main switch coupler
⑭ Front brake switch lead
⑮ Motor leads
⑯ Motor assembly
⑰ Headlight coupler
⑱ Front flasher light leads (left)
⑲ Front flasher light leads (right)
[A] Clamp the main switch lead, handlebar switch leads and front brake switch leads.
[B] Clamp the clutch switch lead and handlebar switch leads.



PERIODIC INSPECTION AND ADJUSTMENT

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 new vehicles that are being prepared for sale. All service technicians should be familiar with this entire chapter.

PERIODIC MAINTENANCE/LUBRICATION

Unit: km (miles)

ITEM	REMARKS	BREAK-IN 1,000 (600)	EVERY 6,000 (4,000) or 6 months	EVERY 12,000 (8,000) or 12 months
Valve(s)*	Check valve clearance. Adjust if necessary.	EVERY 42,000 (28,000)		
Spark plug(s)	Check condition. Clean or replace if necessary.	○	○	○
Air filter*	Clean. Replace if necessary.		○	○
Carburetor*	Check idle speed/synchronization/starter operation. Adjust if necessary.	○	○	○
Fuel line*	Check fuel hose and vacuum hose for cracks or damage. Replace if necessary.		○	○
Fuel filter*	Check condition. Replace every 30,000 (20,000).			○
Engine oil	Replace (Warm engine before draining).	○	○	○
Engine oil filter*	Replace.	○		○
Brake*	Check operation/fluid leakage/See NOTE. Correct if necessary.		○	○
Clutch*	Check operation/fluid leakage/See NOTE. Correct if necessary.		○	○
Swingarm pivot*	Check swingarm assembly for looseness. Correct if necessary. Moderately repack every 24,000 (16,000) or 24 months.***			○
Rear suspension link pivots*	Check operation. Apply grease lightly every 24,000 (16,000) or 24 months.***			○
Wheels*	Check balance/damage/runout. Repair if necessary.		○	○
Wheel bearings*	Check bearings assembly for looseness/ damage. Replace if damaged.		○	○
Steering bearing*	Check bearings assembly for looseness. Correct if necessary. Moderately repack every 24,000 (16,000) or 24 months.**	○		○
Front forks*	Check operation/oil leakage. Repair if necessary.		○	○
Rear shock absorber*	Check operation/oil leakage. Repair if necessary.		○	○
Cooling system	Check coolant leakage. Repair if necessary. Replace coolant every 24,000 (16,000) or 24 months.		○	○
Drive chain	Check chain slack/alignment. Adjust if necessary. Clean and lube.	EVERY 500 (300)		



Unit: km (miles)

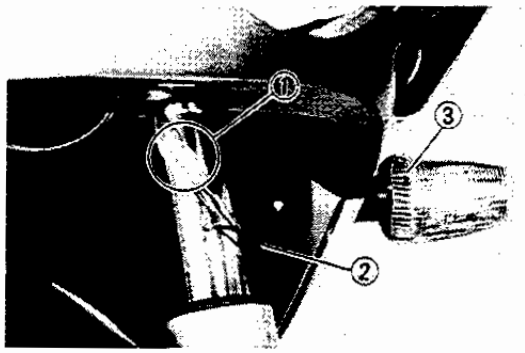
Item	Remarks	Break-in 1,000 (600)	EVERY 6,000 (4,000) or 6 months	EVERY 12,000 (8,000) or 12 months
Fittings/Fasteners*	Check all chassis fittings and fasterners. Correct if necessary.	○	○	○
Sidestand*	Check operation. Repair if necessary.	○	○	○
Sidestand switch*	Check operation. Clean or replace if necessary.	○	○	○
Battery*	Check specific gravity. Check breather pipe for proper operation. Correct if necessary.		○	○
AC Generator*	Replace generator brushes every 100,000 (62,000).			

*: It is recommended that these items be serviced by a Yamaha dealer.
**: Medium weight wheel bearing grease.
***: Molybdenum disulfide grease.

NOTE:

Brake fluid replacement:

1. When disassembling the master cylinder or caliper cylinder (clutch release cylinder), replace the brake fluid. Normally check the brake fluid level and add the fluid as required.
2. On the inner parts of the master cylinder and caliper cylinder (clutch release cylinder), replace the oil seals every two years.
3. Replace the brake (clutch) hoses every four years, or if cracked or damaged.

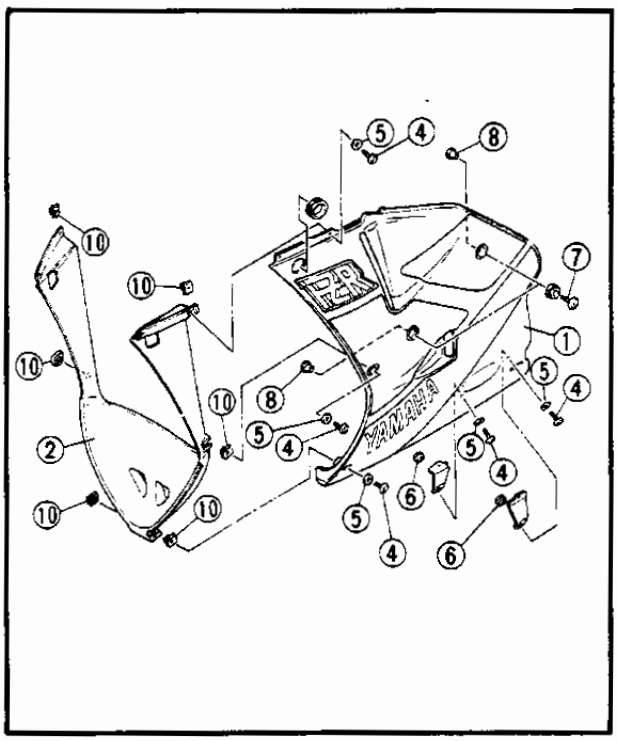


COWLINGS

REMOVAL

Side and upper cowling

1. Disconnect:
   - Flasher light leads ①
2. Pull back the rubber cover ②.
3. Remove:
   - Flasher lights (left and right) ③

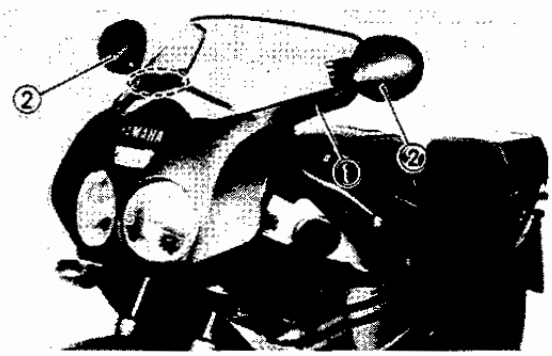


4. Remove:
   - Side cowlings (left ① and right ②)
   - Front cover ③

NOTE:

When removing the front cover, the spring nuts ⑩ may fall off. Be careful not to lose these parts.

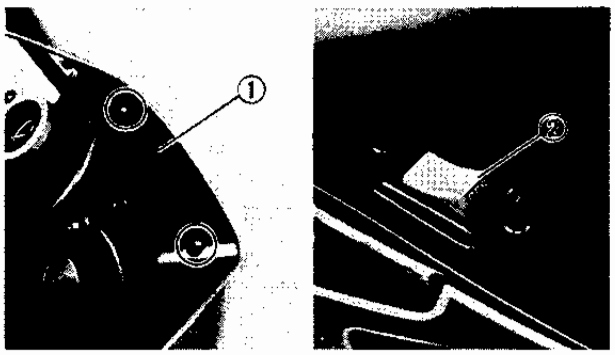
④ Bolt
⑤ Plastic washer
⑥ Nut
⑦ Bolt (large)
⑧ Collar
⑨ Grommet
⑩ Spring nut



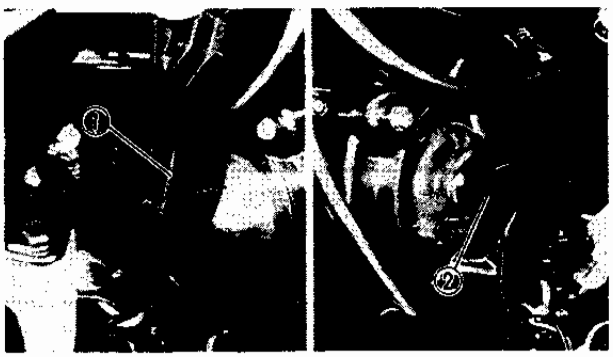
5. Pull back the rubber cover ①.
6. Remove:
   - Rear view mirrors (left and right) ②



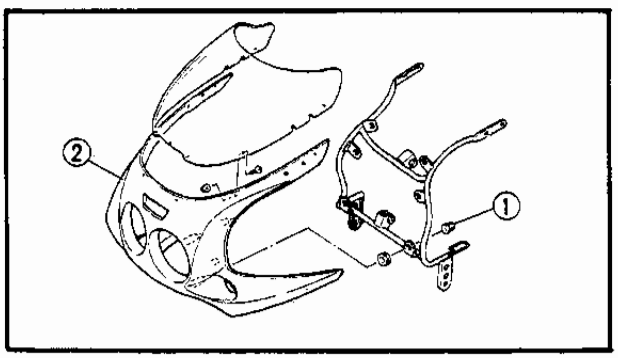
7. Remove:
   - Air intake ducts (left and right) ①



8. Remove:
   - Inner covers (left and right) ①
9. Disconnect:
   - "RES" (fuel reserve) switch ② coupler (on left side cover)



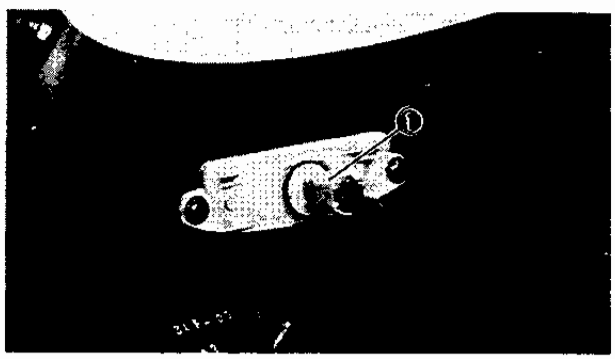
10. Remove:
    - Headlight covers ①
11. Disconnect:
    - Headlight couplers ②



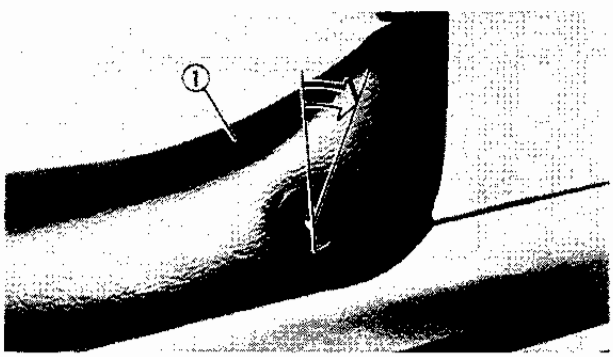
12. Remove:
    - Nuts ①
    - Upper cowling ②

⚠CAUTION:

Remove the headlight together with the upper cowling to prevent the headlight from falling out.



13. Disconnect:
    - Front position light coupler ①

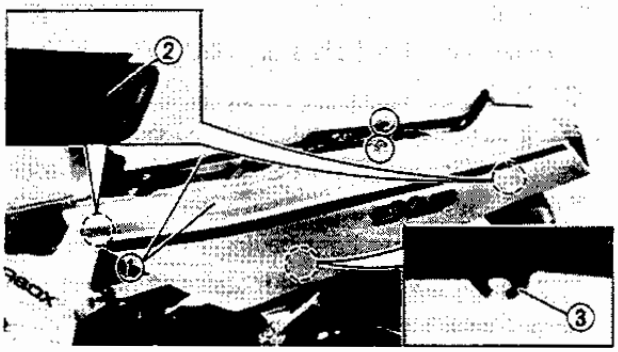


Side and tail cover

1. Remove:
   - Seat ①

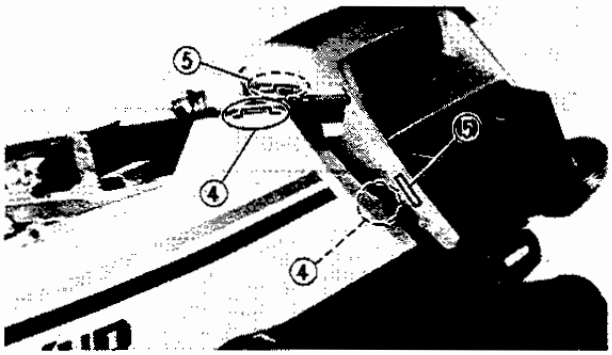
NOTE:

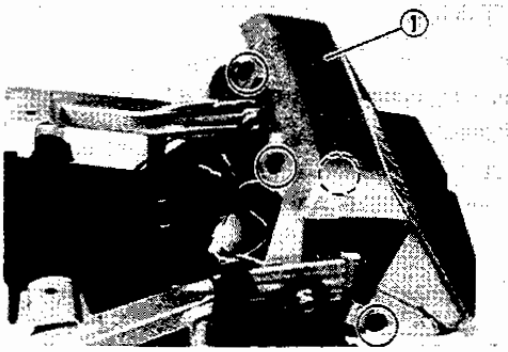
Insert the key into the lock and turn it clockwise to release the seat lock.



2. Remove:
   • Side covers (left and right) ①

NOTE:
When removing the side covers, unhook the projections ② and snap ③ on the side cover from the grommets on the frame and then, unhook the hooks ④ on the side cover end from the slots ⑤ on the tail cover.





3. Remove:
   • Tail cover ①



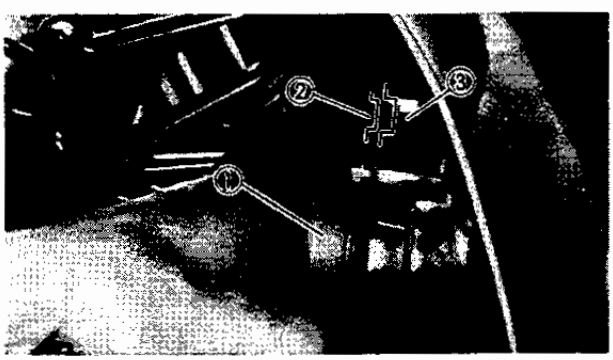
INSTALLATION

Reverse the "REMOVAL" procedure.
Note the following points.

Seat and tail cover

1. Install:
   • Seat

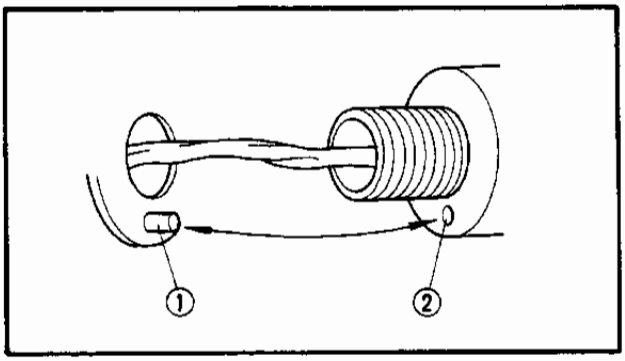
NOTE:
Insert the lobs on the seat front into the receptacle on the frame, then push down the seat end.



Side and upper cowling

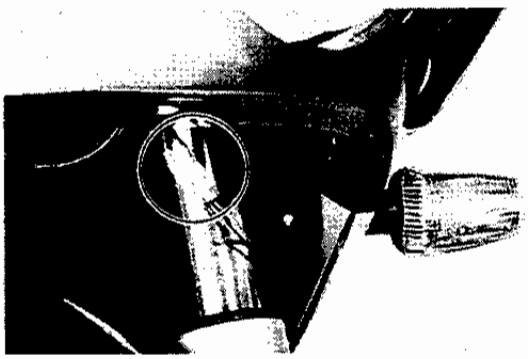
1. Install:
   • Headlight covers (left and right) ①

NOTE:
Make sure that the projection ② on the cover is meshed with slot ③ on the headlight case.



2. Install:
   • Flasher lights (left and right)

NOTE:
- Make sure that the projection ① on the flasher light stay is meshed with hole ② on the flasher light.
- Install the flasher light having a chocolate color lead on the left side and install the flasher light having a dark green color lead on the right side.



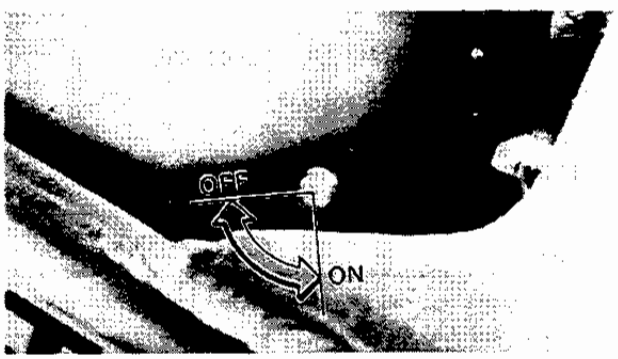
3. Connect:
   • Flasher light leads

NOTE:
Lead of identical colors should be connected.

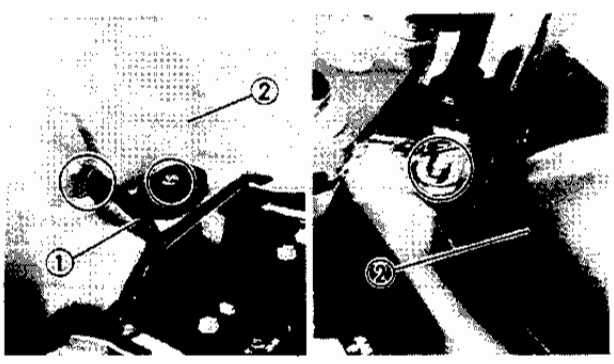
FUEL TANK

REMOVAL

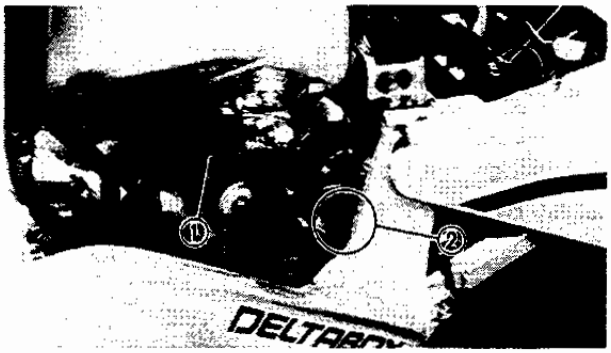
1. Place the motorcycle on a level place.
2. Remove:
   • Seat
   Refer to "SIDE AND TAIL COVERS '.

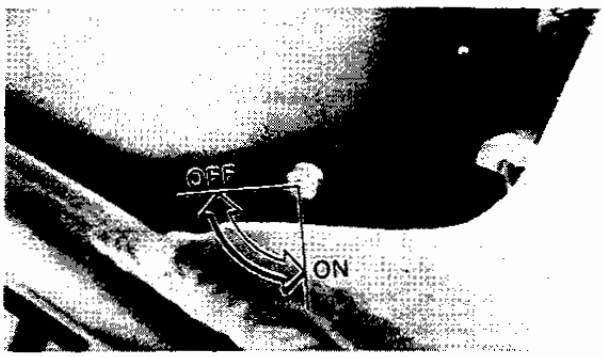


3. Turn the fuel cock to "OFF" position.



4. Disconnect:
   • Breather hose (fuel tank) ①
5. Remove:
   • Fuel tank ②





6. Disconnect:
   - Fuel hose ①
   - Fuel sender coupler ②

WARNING:

Gasoline is highly flammable.
Avoid spilling fuel on the hot engine.

NOTE:

Place a rug on the engine to absorb a spilt fuel.

INSTALLATION

Reverse the "REMOVAL" procedure.
Note the following points.

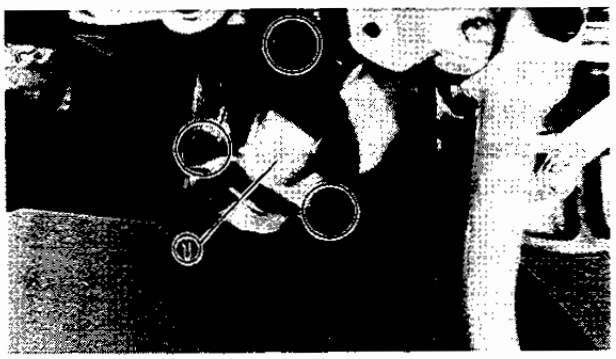
1. Turn the fuel cock to "ON" position.

ENGINE

EXUP CABLE ADJUSTMENT

1. Remove:
   - Seat
   - Side cowling (left)

   Refer to the "COWLINGS" section.



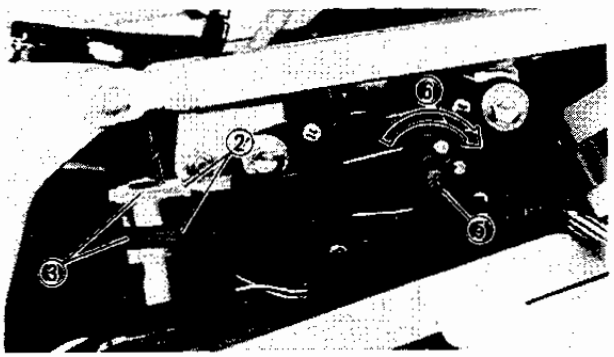
2. Remove:
   - Valve cover ①
3. Turn on the main switch.

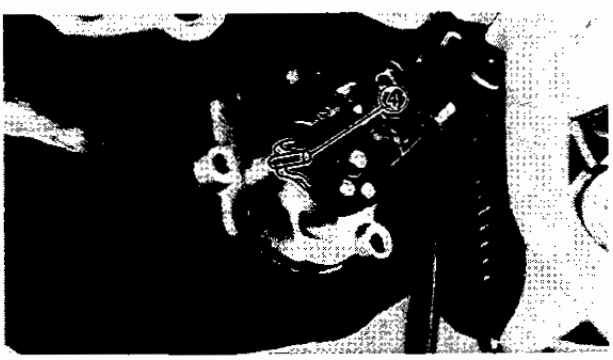
4. Adjust:
   - EXUP cables

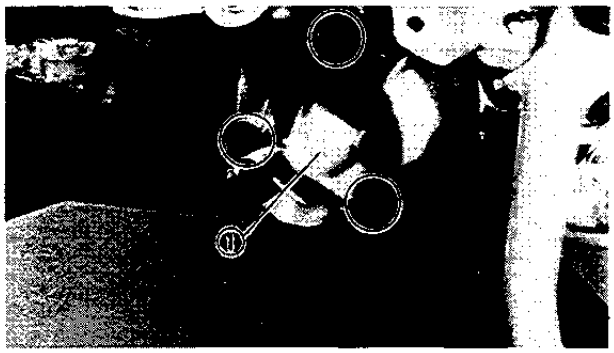
Adjustment steps:
- Loosen both locknuts ② and turn in both adjusters ③.
- Insert a [φ4 mm (φ0.16 in)] pin ④ through the alignment slot in the pulley and into the hole.
- Turn both adjusters counterclockwise by hand until any free play present in the cables has been eliminated.
- Turn both adjusters 1/2 turn clockwise.
- Tighten the locknuts.

Locknuts:
8 Nm (0.8 m · kg, 5.8 ft · lb)

- Remove the pin.
- Turn off the main switch, then turn the EXUP pulley (servo motor) ⑤ back in the direction indicated by the arrow ⑥ until it stops.
- Turn on the main switch once, and check that the alignment is set properly. If not, repeat the steps described above.







5. Install:
   - Valve cover ①

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

6. Install:
   - Side cowling (left)
   - Seat

   Refer to the "COWLINGS" section.

VALVE CLEARANCE ADJUSTMENT

WARNING:

The engine must be cool before servicing the valve clearance.

NOTE:

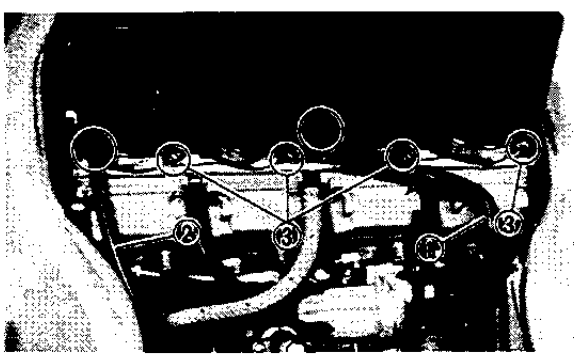
Measure and adjust valve clearance when piston is at TDC on compression stroke.

Removal

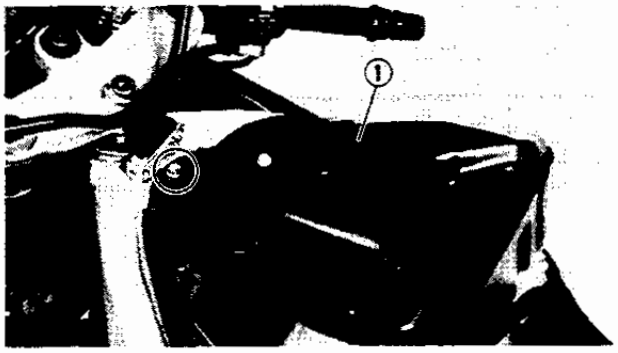
1. Remove:
   - Side cowlings (left and right)
   - Front cover

     Refer to the "COWLINGS" section.
   - Fuel tank

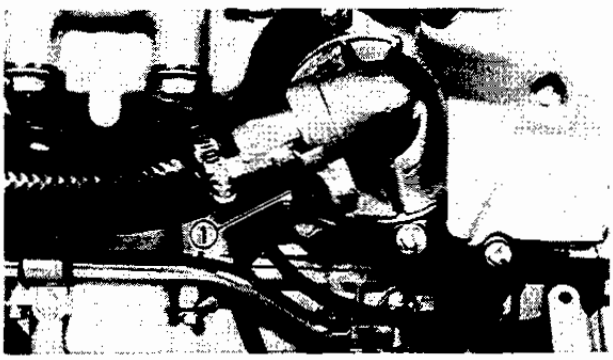
     Refer to the "FUEL TANK" section.



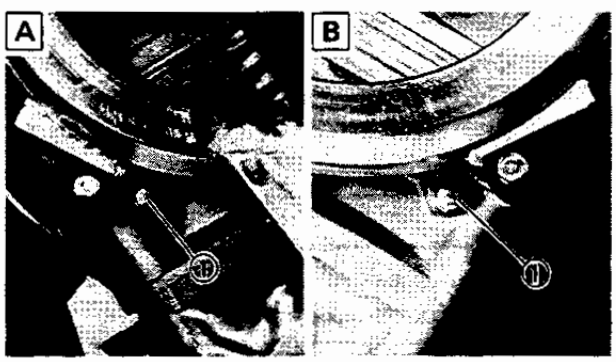
2. Disconnect:
   - Ventilation hose (crankcase) ①
   - Ventilation hose (air filter case) ②
3. Loosen:
   - Clamp screw (air filter case – carburetor) ③



4. Remove:
   • Air filter case ①

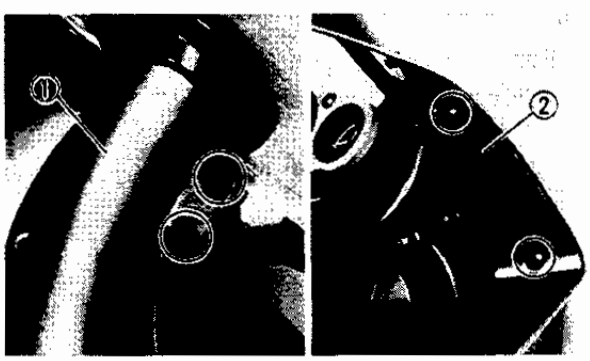


5. Remove:
   • Drain bolt (water pump) ①

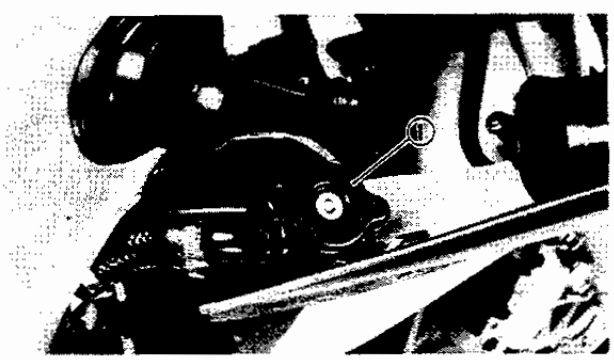


6. Remove:
   • Drain bolts (Cylinder) ①

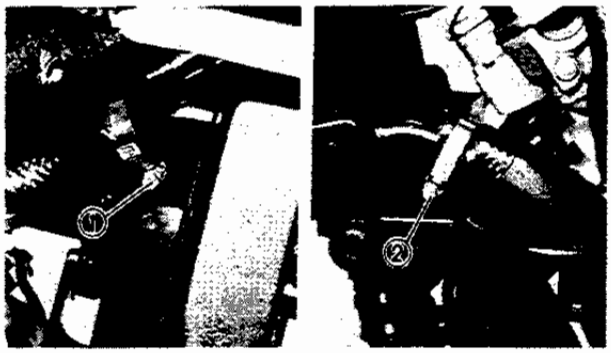
A Left
B Right



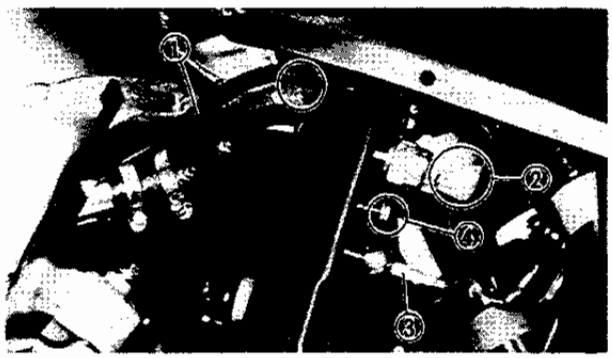
7. Remove:
   • Air intake duct (right) ①
   • Inner cover (right) ②



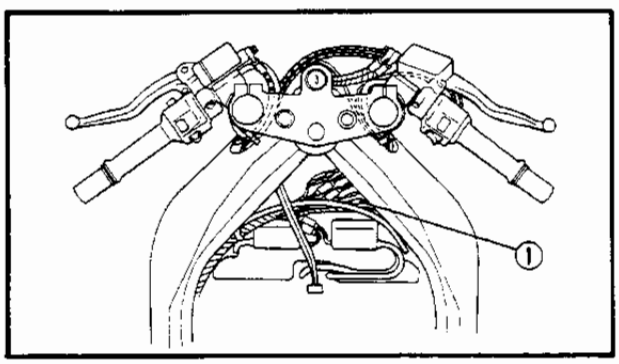
8. Remove:
   • Radiator cap ①
9. Drain:
   • Coolant



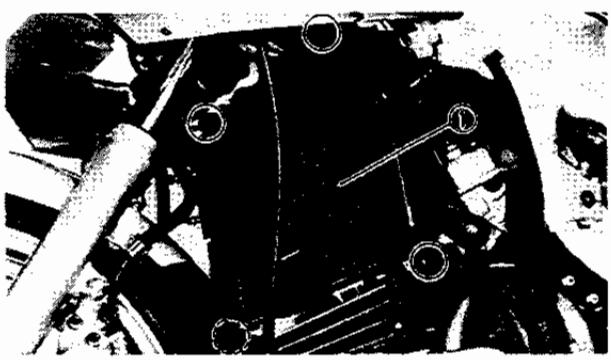
10. Loosen:
    - Hose band (radiator – inlet hose) ①
    - Hose band (radiator – outlet hose) ②



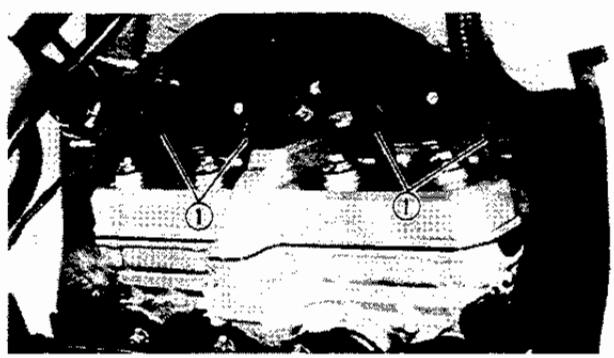
11. Disconnect:
    - Breather hose (radiator) ①
    - Thermo switch leads ②
    - Thermo unit lead ③
    - Ground lead ④



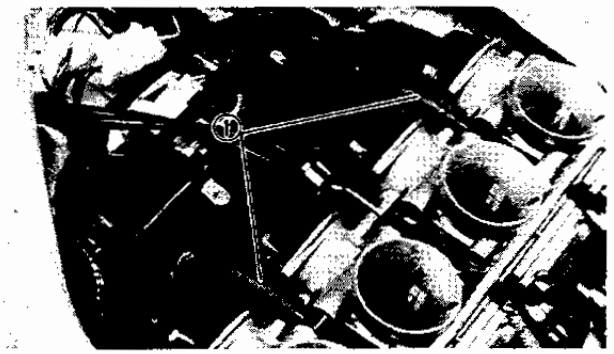
12. Disconnect:
    - Fan motor coupler ①



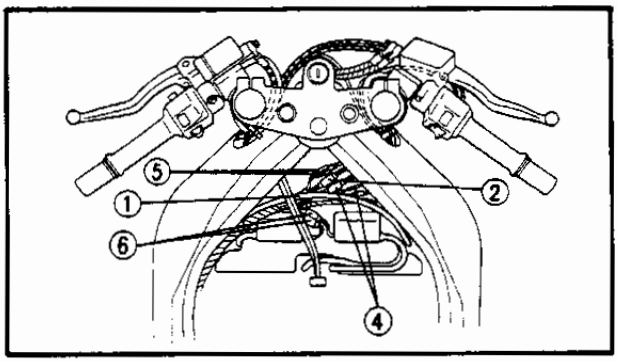
13. Remove:
    - Radiator assembly ①



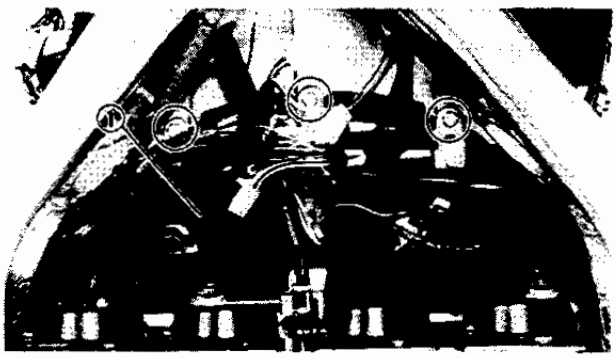
14. Disconnect:
    - Spark plug caps ①
      (from spark plugs)



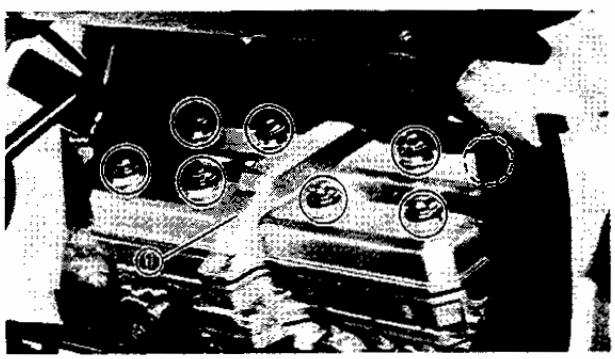
15. Disconnect:
    - Air vent hoses (carburetor) ①



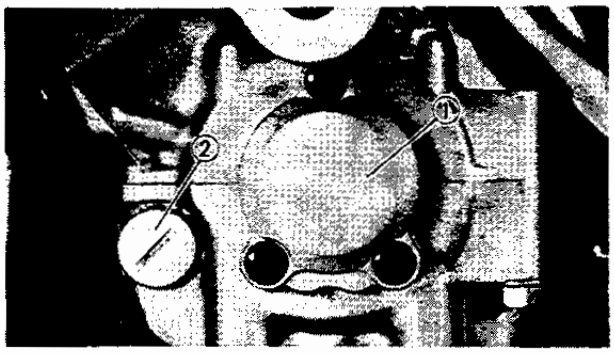
16. Remove:
    - Band ①
17. Disconnect:
    - Main switch coupler ②
    - Handlebar switch coupler ③/lead ④
    - Front brake switch leads ⑤
    - Ignition coil couplers ⑥



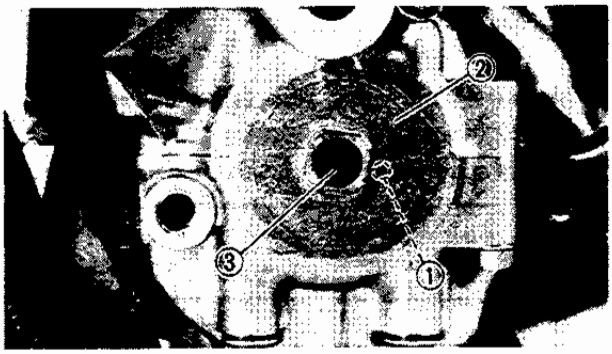
18. Remove:
    - Air baffle plate ①
      (with ignition coils)



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



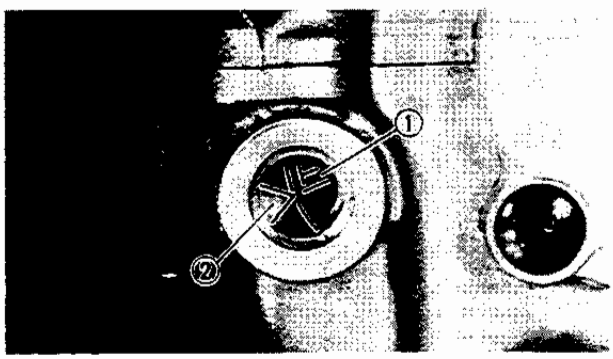
20. Remove:
    - Crankshaft end cover (left) ①
      (with o-ring)
    - Timing plug ②
      (with o-ring)

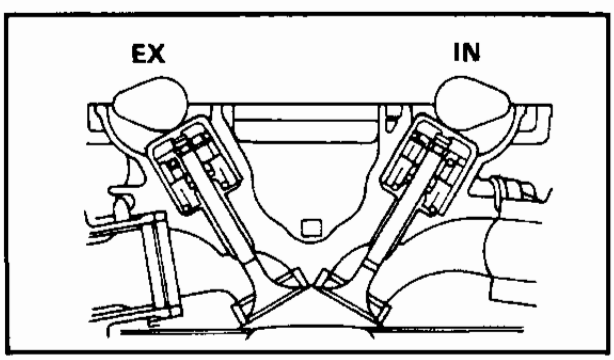


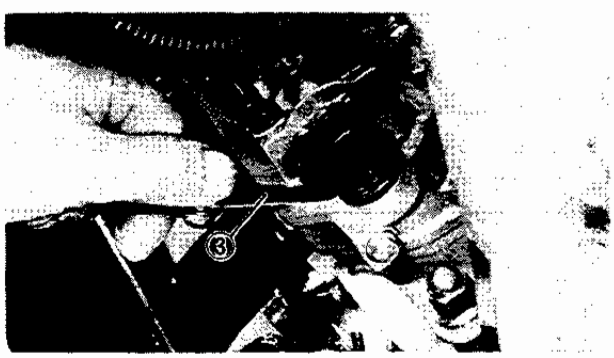
21. Attach:
    - Dowel pin ①
    - Timing rotor ②
    - Bolt (8 mm) ③

Dowel Pin:
93604-08071
Timing Rotor:
33M-81673-10

22. Tighten:
    - Bolt ③







Adjustment

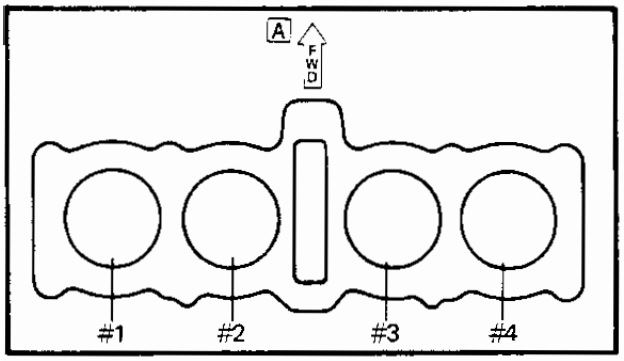
1. Measure:
    - Valve clearance

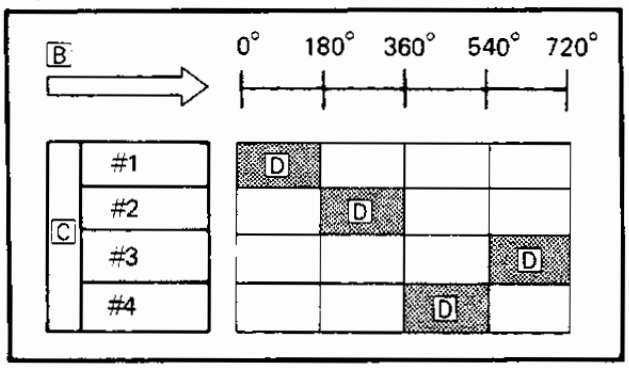
Measurement steps:
- Turn the crankshaft counterclockwise.
- Align the "T" mark ① on the crankshaft web with the stationary pointer ② when #1 piston is at TDC on compression stroke.

NOTE:
Compression TDC can be found when the cam lobes are apart from each other, as shown.

- Measure the valve clearance using a thickness gauge ③.
  Out of specification → Adjust valve clearance.

Intake Valve (Cold):
0.11 ~ 0.20 mm (0.004 ~ 0.008 in)
Exhaust Valve (Cold):
0.21 ~ 0.30 mm (0.008 ~ 0.012 in)





- Record the measured amount if the clearance is incorrect.
- Measure the valve clearance in sequence, for #2, 4 and #3 cylinders.
  Out of specification → Adjust valve clearance.

Firing Sequence:
#1 → #2 → #4 → #3

A Front

NOTE:

Turn the crankshaft each degrees counterclockwise from #1 Cylinder TDC.

B Crankshaft counterclockwise turning angle
C Cylinder number
D Combustion

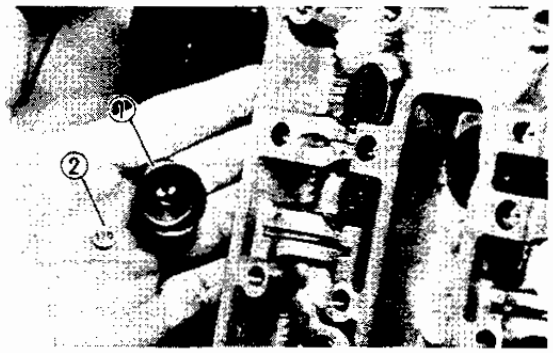
#2 Cylinder	**180 degrees**
#4 Cylinder	**360 degrees**
#3 Cylinder	**540 degrees**

Adjusting Pad Replacement

1. Remove:
   - Timing chain tensioner
   - Chain guide (upper)
   - Chain guide (exhaust side)
   - Camshaft caps (exhaust and intake)
   - Timing chain
   - Camshaft (intake and exhaust)

NOTE:

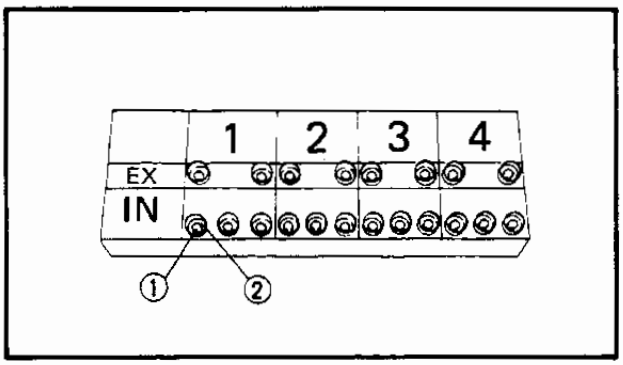
- Refer to the "ENGINE DISASSEMBLY – CAMSHAFT AND CYLINDER HEAD" section in the CHAPTER 4.
- When removing the timing chain or camshafts, fasten the wire to the timing chain to prevent it from falling into the crankcase.

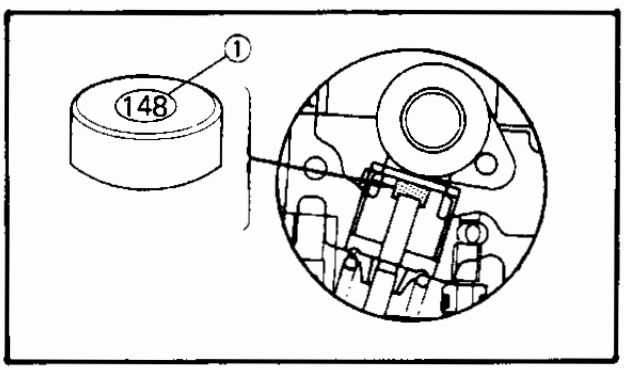


2. Remove:
   - Valve lifter ①
   - Pad ②

   Record the installed pad number.

NOTE:
- Place a rug in the timing chain room to prevent the pad from falling into the crankcase.
- Identify each valve lifter and pad position very carefully so that it can be reinstalled in its original place.





3. Select:
   - Proper pad(s)

Selection steps:
- Select the proper pad from the table:

Pad range		Pad Availability: 25 increments
No. 120 ~ No. 240	1.20 mm (0.047 in) ~ 2.40 mm (0.094 in)	Pads stepped in 0.05 mm (0.002 in) increments

NOTE:
Thickness ① of each pad is marked on the pad top surface.

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

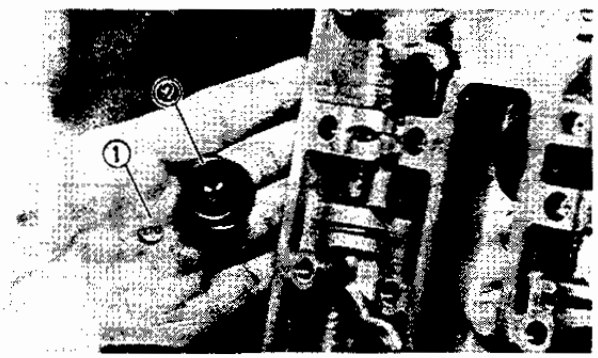
Hundredths digit	Rounded valve
0 or 2	0
5	(NOT ROUNDED OFF)
8	10

EXAMPLE:
Installed pad number = 148 (1.48 mm)
Rounded off digit = 150

NOTE:
Pads can only be selected in 0.05 mm (0.002 in) increments.

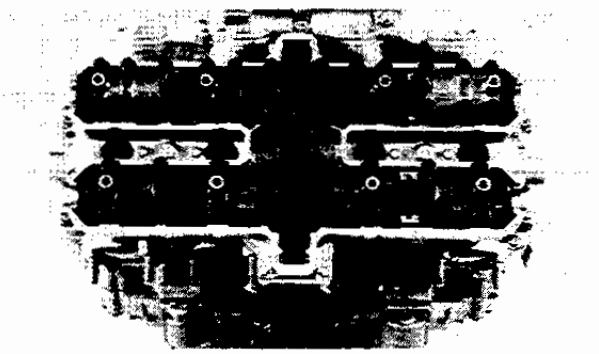
- Locate the "Rounded off Pad Number" on the chart, and then find the measured valve clearance. The point where these coordinates intersect is the new pad number.

NOTE:
Use the new pad number as a guide only as the number must be verified.



4. Install:
   - Pad (new) ①
   - Valve lifter ②

NOTE:
- Apply the molybdenum disulfide grease to the pad.
- Lubricate the valve lifter with a molybdenum disulfide oil.
- Valve lifter must be rotated smoothly by a finger.
- Each valve lifter and pad position very carefully so that its original place.



5. Install:
   - Camshafts (exhaust and intake)
   - Timing chain
   - Camshaft caps

Bolt (camshaft cap):
10 Nm (1.0 m · kg, 7.2 ft · lb)

INTAKE

B MEASURED CLEARANCE	A INSTALLED PAD NUMBER																								
	120	125	130	135	140	145		155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240
0.00 ~ 0.02				120	125	130		140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225
0.03 ~ 0.07			120	125	130	135		145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230
0.08 ~ 0.10		120	125	130	135	140		150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235
0.11 ~ 0.20	C RECOMMENDED CLEARANCE																								
0.21 ~ 0.22	125	130	135	140	145	150		160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	
[illegible]	[illegible]							165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240		
0.28 ~ 0.32	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240			
0.33 ~ 0.37	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240				
0.38 ~ 0.42	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240					
0.43 ~ 0.47	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240						
0.48 ~ 0.52	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240							
0.53 ~ 0.57	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240								
0.58 ~ 0.62	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240									
0.63 ~ 0.67	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240										
0.68 ~ 0.72	175	180	185	190	195	200	205	210	215	220	225	230	235	240											
0.73 ~ 0.77	180	185	190	195	200	205	210	215	220	225	230	235	240												
0.78 ~ 0.82	185	190	195	200	205	210	215	220	225	230	235	240													
0.83 ~ 0.87	190	195	200	205	210	215	220	225	230	235	240														
0.88 ~ 0.92	195	200	205	210	215	220	225	230	235	240															
0.93 ~ 0.97	200	205	210	215	220	225	230	235	240																
0.98 ~ 1.02	205	210	215	220	225	230	235	240																	
1.03 ~ 1.07	210	215	220	225	230	235	240																		
1.08 ~ 1.12	215	220	225	230	235	240																			
1.13 ~ 1.17	220	225	230	235	240																				
1.18 ~ 1.22	225	230	235	240																					
1.23 ~ 1.27	230	235	240																						
1.28 ~ 1.32	235	240																							
1.33 ~ 1.37	240																								

EXAMPLE:

VALVE CLEARANCE (cold):
0.11 ~ 0.20 mm (0.004 ~ 0.008 in)
Installed is 148 (Rounded off number is 150)
Measured clearance is 0.24 mm (0.009 in)
Replace 148 pad with 160 pad

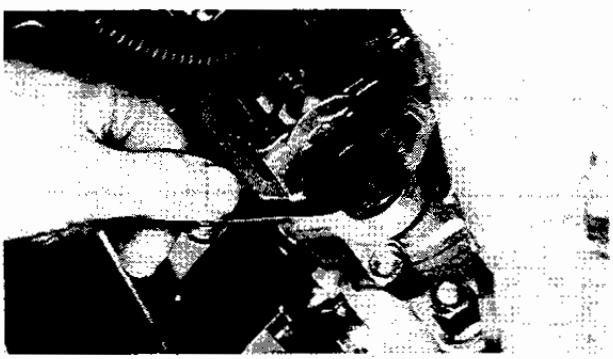
EXHAUST

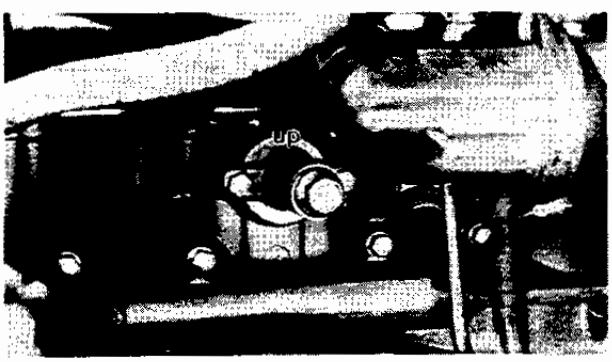
B MEASURED CLEARANCE	A INSTALLED PAD NUMBER																								
	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240
0.00 ~ 0.02						120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215
0.03 ~ 0.07					120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220
0.08 ~ 0.12				120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225
0.13 ~ 0.17			120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230
0.18 ~ 0.20		120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235
0.21 ~ 0.30	C RECOMMENDED CLEARANCE																								
0.31 ~ 0.32	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	
[illegible]	[illegible]												190	195	200	205	210	215	220	225	230	235	240		
0.38 ~ 0.42	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240			
0.43 ~ 0.47	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240				
0.48 ~ 0.52	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240					
0.53 ~ 0.57	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240						
0.58 ~ 0.62	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240							
0.63 ~ 0.67	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240								
0.68 ~ 0.72	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240									
0.73 ~ 0.77	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240										
0.78 ~ 0.82	175	180	185	190	195	200	205	210	215	220	225	230	235	240											
0.83 ~ 0.87	180	185	190	195	200	205	210	215	220	225	230	235	240												
0.88 ~ 0.92	185	190	195	200	205	210	215	220	225	230	235	240													
0.93 ~ 0.97	190	195	200	205	210	215	220	225	230	235	240														
0.98 ~ 1.02	195	200	205	210	215	220	225	230	235	240															
1.03 ~ 1.07	200	205	210	215	220	225	230	235	240																
1.08 ~ 1.12	205	210	215	220	225	230	235	240																	
1.13 ~ 1.17	210	215	220	225	230	235	240																		
1.18 ~ 1.22	215	220	225	230	235	240																			
1.23 ~ 1.27	220	225	230	235	240																				
1.28 ~ 1.32	225	230	235	240																					
1.33 ~ 1.37	230	235	240																						
1.38 ~ 1.42	235	240																							
1.43 ~ 1.47	240																								

EXAMPLE:

VALVE CLEARANCE (cold):
0.21 ~ 0.30 mm (0.008 ~ 0.012 in)
Installed is 175
Measured clearance is 0.35 mm (0.014 in)
Replace 175 pad with 185 pad

NOTE:
- Refer to the "ENGINE ASSEMBLY AND ADJUSTMENT – CYLINDER HEAD AND CAMSHAFT" section in the CHAPTER 4.
- Lubricate the camshaft bearing surfaces, cam lobes and cam journals.
- Install the exhaust camshaft first.
- Align the matching marks.
- Turn the crankshaft counterclockwise several turns for the installed parts to settle into the correct position.





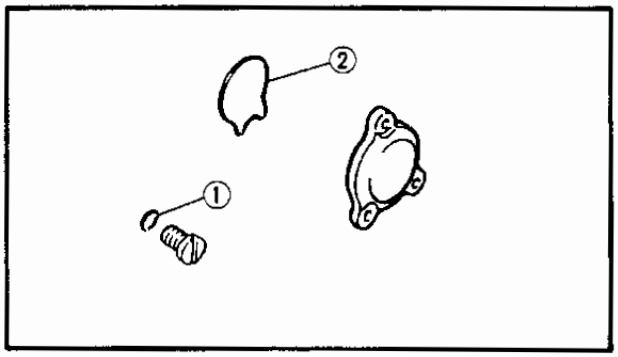
6. Measure:
   - Valve clearance

Valve clearance verification steps:
- Follow the "valve clearance measurement steps".
- If the clearance is incorrect, repeat all Adjusting Pad Replacement steps until the proper clearance is obtained.

7. Install:
   - Chain guide (exhaust side)
   - Chain guide (upper)
   - Timing chain tensioner

Bolt (chain guide – upper):
10 Nm (1.0 m·kg, 7.2 ft·lb)
Bolt (cam chain tensioner):
10 Nm (1.0 m·kg, 7.2 ft·lb)

NOTE:
Install the tensioner body so that the "UP" mark faces upward.



Installation

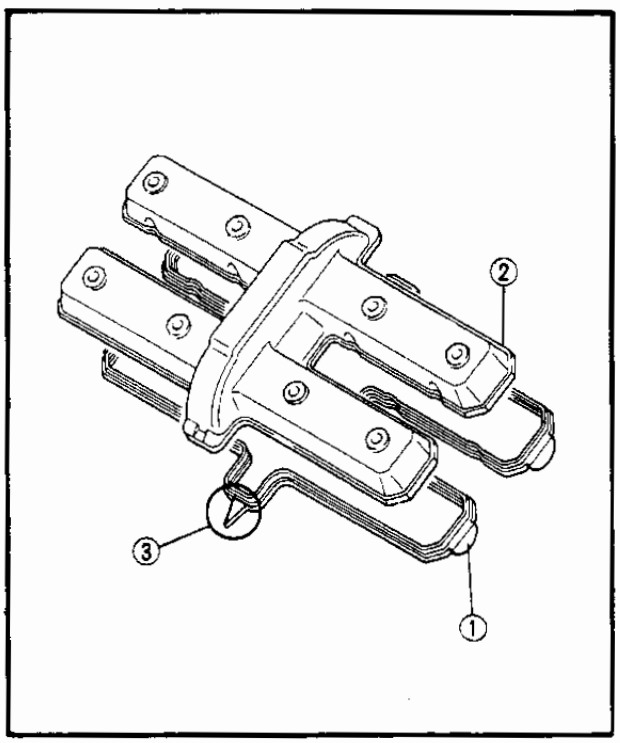
Reverse the "removal" procedure.

Note the following points.

1. Inspect:
   - O-ring (timing plug) ①
   - Gasket (crankshaft end cover) ②

   Wear/Damage → Replace.
2. Tighten:
   - Screws (crankshaft end cover)

	Screw (crankshaft end cover): 7 Nm (0.7 m · kg, 5.1 ft · lb)



3. Inspect:
   - Gasket (cylinder head cover) ①

   Wear/Damage → Replace.
4. Install:
   - Gasket (cylinder head cover)
   - Cylinder head cover ②
   - Spark plugs

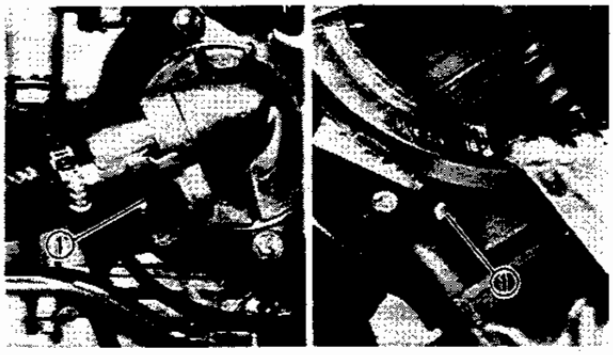
NOTE:

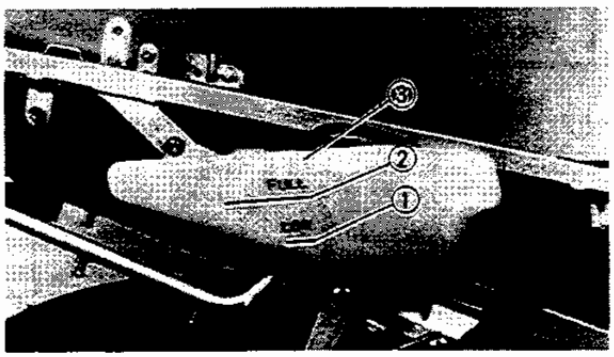
Be sure the cylinder head gasket mark ③ faces front.

	Bolt (cylinder head cover): 10 Nm (1.0 m · kg, 7.2 ft · lb) **Spark plug: 17.5 Nm (1.75 m · kg, 12.5 ft · lb)**

5. Inspect:
   - Gasket (drain bolts — cylinder)
   - Gasket (drain bolts — water pump)

   Damage → Replace.





6. Tighten:
   - Drain bolts ①

	Drain bolt: 10 Nm (1.0 m · kg, 7.2 ft · lb)

7. Fill:
   - Cooling system

   Refer to the "COOLANT REPLACEMENT" section in the CHAPTER 3.

	Recommended coolant: High quality ethylene glycol anti-freeze containing anti-corrosion for aluminum engine inhibitors **Coolant and water mixed ratio:** 50%/50% **Total amount:** 2.1 L (1.9 Imp qt, 2.2 US qt) **Reservoir tank capacity:** 0.4 L (0.35 Imp qt, 0.42 US qt) **From "LOW" to "FULL" level:** 0.15 L (0.13 Imp qt, 0.16 US qt)

① "LOW" level line
② "FULL" level line
③ Coolant reservoir tank

CARBURETOR SYNCHRONIZATION

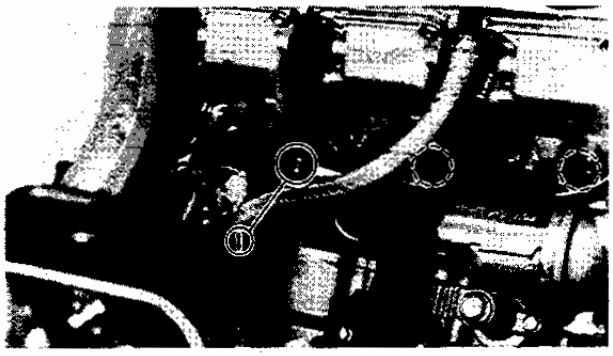
Carburetors must be adjusted to open and close simultaneously.

NOTE:

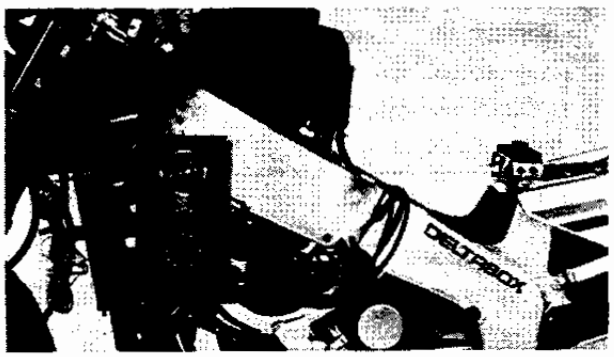
Valve clearance must be set properly before synchronizing the carburetors.

1. Remove:
   - Seat
   - Fuel tank

   Refer to the "FUEL TANK – Removal" section.

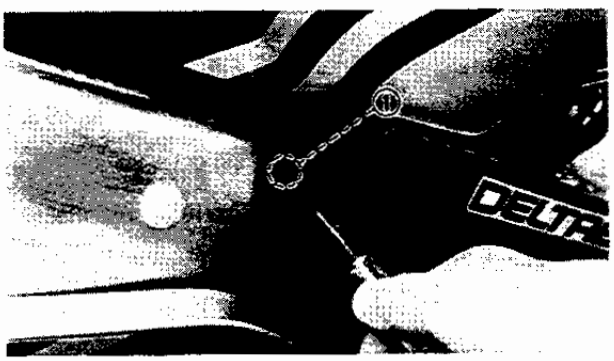


2. Remove:
   - Screws (vacuum plug) ①
     (with gaskets)



3. Install:
   - Adapters
   - Vacuum gauge
   - Sub tank (fuel)

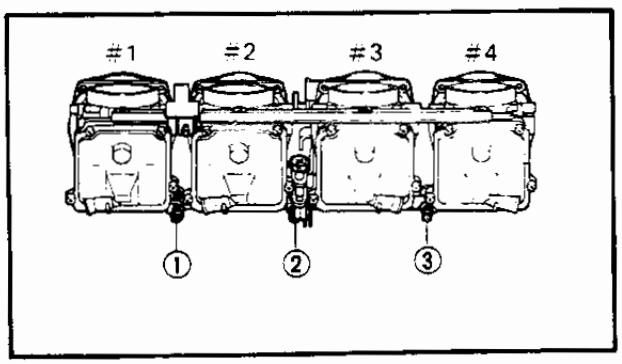
Adapter:
YM-03060
90890-03060
Vacuum gauge:
YU-08030
90890-03094



4. Start the engine and let it warm up.
5. Adjust:
   - Idle speed
     Turn the throttle stop screw ① .

Turn in	**Engine speed is increased.**
Turn out	**Engine speed is decreased.**

Idle speed:
950 ~ 1,050 r/min



6. Adjust:
   - Carburetors synchronization

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



Vacuum pressure at idle speed:
27.26 ~ 26.06 kPa
(205 ~ 195 mmHg, 8.07 ~ 7.67 in Hg)
Vacuum synchronous difference:
1.33 kPa (10 mmHg, 0.4 in Hg)

- Repeat the above steps to synchronize carburetor #4 to carburetor #3 by turning synchronizing screw ③ until both gauges read the same.
- Repeat the same steps to synchronize # 2 carburetor to #3 carburetor by turning synchronizing screw ② until both gauges read the same.

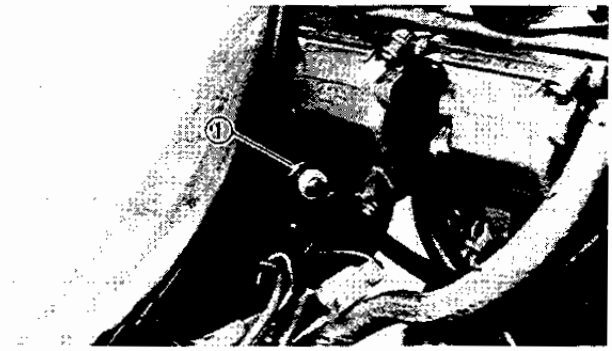
7. Adjust:
   - Idle speed
     Refer to "IDLE SPEED ADJUSTMENT" section.
8. Inspect:
   - Gaskets (vacuum plug)
     Damage → Replace.
9. Install:
   - Fuel tank
   - Seat
     Refer to the "FUEL TANK – Installation" section.

IDLE SPEED ADJUSTMENT

NOTE:
Before adjusting the idle speed, the carburetors synchronization should be adjusted.

1. Start the engine and let it warm up.
2. Check:
   - Idle speed
     Out of specification → Adjust.

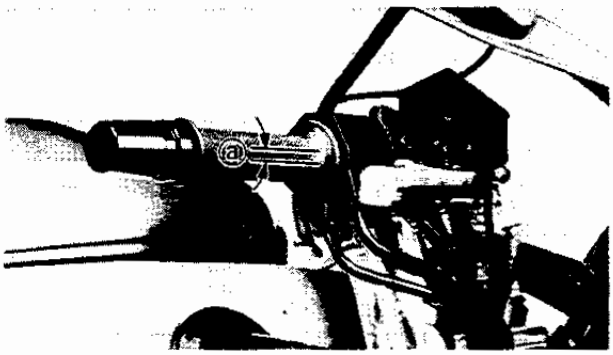
Idle speed:
950 ~ 1,050 r/min



3. Adjust:
   • Engine idle speed

Adjustment steps:
• Turn the throttle stop screw ① in or out until specified idle speed is obtained.

Turn in	**Idle speed becomes higher.**
Turn out	**Idle speed becomes lower.**



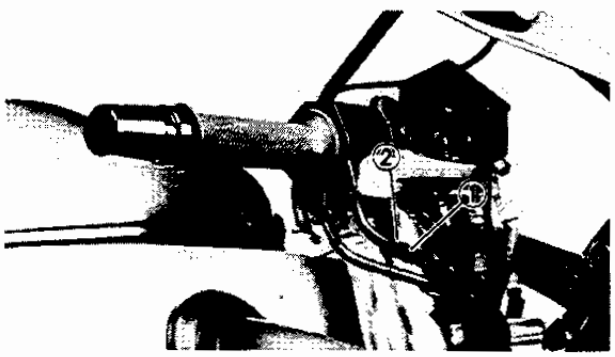
THROTTLE CABLE FREE PLAY ADJUSTMENT

NOTE:
Before adjusting the throttle cable free play, the engine idle speed should be adjusted.

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

Throttle cable free play ⓐ:
2 ~ 5 mm (0.08 ~ 0.20 in)

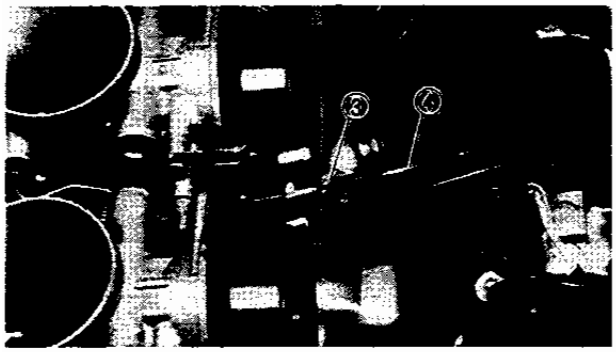
2. Adjust:
   • Throttle cable free play



Adjustment steps:
First step:
- Remove the seat, fuel tank and air filter case.
- Make sure that the adjuster ① and locknut ② on the throttle housing side are fully tightened.
- Loosen the locknut ③ on the carburetor side.
- Turn the adjuster ④ in or out unitl the correct free play is obtained.

Turn in	**Free play is increased.**
Turn out	**Free play is decreased.**

- Tighten the locknut ③.



Second step:
- If the free play is incorrect, adjust the throttle cable free play with the adjuster (Throttle grip side).
- Loosen the locknut ②.
- Turn the adjuster ① in or out until the correct free play is obtained.

Turn in	**Free play is increased.**
Turn out	**Free play is decreased.**

- Tighten the locknut ②.

NOTE:
After adjusting the free play, turn the handlebar to right and left, and make sure that the engine idling does not run faster.

- Install the air filter case, fuel tank and seat.

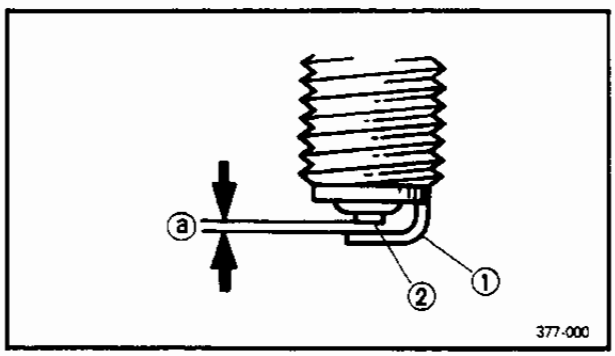
SPARK PLUG INSPECTION

1. Remove:
   - Spark plug

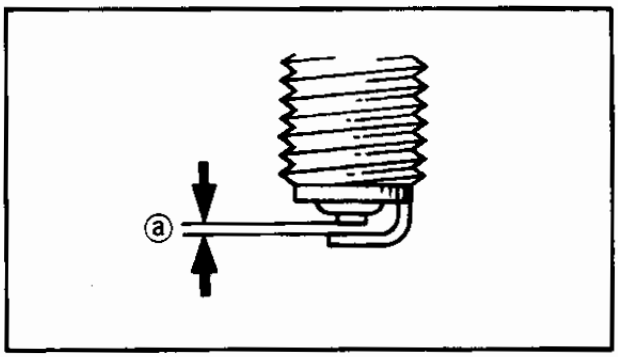
⚠ CAUTION:
Before completely removing plug, use compressed air to clean the setting areas to prevent dirt particles from falling into the engine.

2. Inspect:
   - Spark plug type
     Incorrect → Replace.

Standard spark plug:
DR8ES-L (NGK),
X24ESR-U (NIPPON DENSO)



3. Inspect:
   - Electrode ①
     Wear/Damage → Replace.
   - Insulator color ②
     Normal condition is a medium to light tan color.
     Distinctly different color → Check the engine condition.



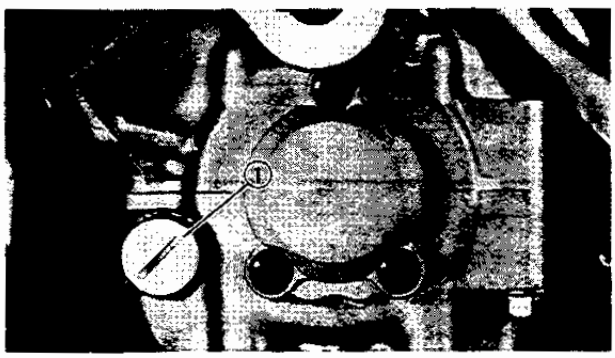
4. Clean:
   - Spark plug
     Clean the spark plug with a spark plug cleaner or wire brush.
5. Measure:
   - Spark plug gap ⓐ
     Out of specification → Regap.
     Use a wire gauge.

Spark plug gap:
0.6 ~ 0.7 mm (0.024 ~ 0.028 in)

6. Tighten:
   - Spark plug

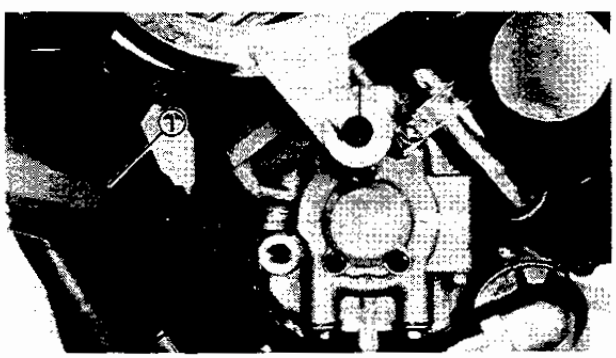
NOTE:
- Before installing a spark plug, clean the gasket surface and plug surface.
- If a torque wrench is not available when you are installing a spark plug, a good estimate of the correct torque is 1/4 to 1/2 turns part finger tight. Have the spark plug torqued to the correct value as soon as possible with a torque wrench.

Spark plug:
17.5 Nm (1.75 m · kg, 13 ft · lb)



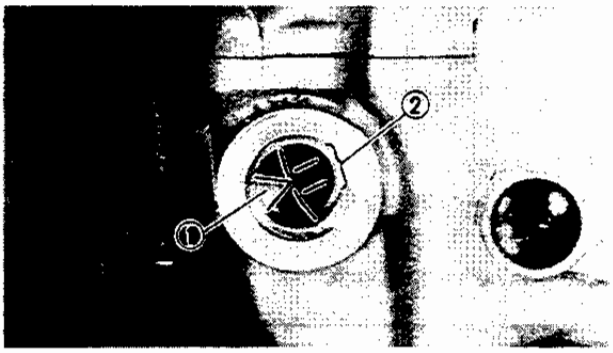
IGNITION TIMING CHECKS

1. Remove:
   - Side cowlings (left and right)
   - Front cover
     Refer to the "COWLINGS" section.
2. Remove:
   - Timing plug ①
     (with o-ring)



3. Attach:
   - Timing light ①
   - Inductive tachometer
     (to #1 spark plug lead)

Timing light:
YU-33223
90890-03109
Inductive tachometer:
YU-08037
90890-03113



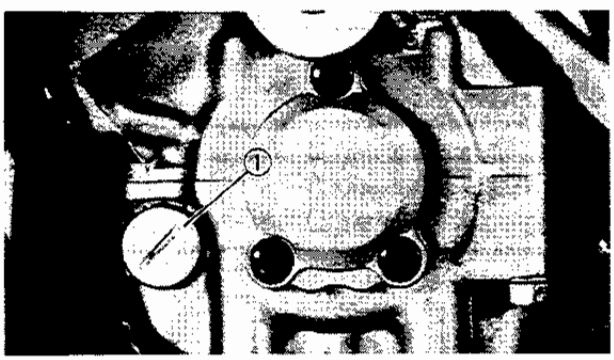
4. Check:
   - Ignition timing

Checking steps:
- Warm up the engine and let it at the specified speed.

Engine speed:
950 ~ 1,050 r/min

- Visually check the stationary pointer ① is within the firing range ② on the crankshaft web.
  Incorrect firing range → Check pickup assembly.

NOTE:
Ignition timing is not adjustable.



5. Install:
   - Timing plug ①
     (with o-ring)
   - Front cover
   - Side cowlings
     Refer to the "COWLINGS" section.

COMPRESSION PRESSURE MEASUREMENT

NOTE:
Insufficient compression pressure will result in performance loss.

1. Remove:
   - Side cowlings (left and right)
   - Front cover
     Refer to the "COWLINGS" section.

2. Measure:
   - Valve clearance
     Out of specification → Adjust.
     Refer to the "VALVE CLEARANCE ADJUSTMENT" section.
3. Warm up the engine.
4. Remove:
   - Spark plugs



4. Measure:
   • Compression pressure

Measurement steps:
- Install the compression gauge ① using an adapter.
- Crank over the engine with the electric starter (be sure the battery is fully charged) with the throttle wide open until the compression reading on the gauge stabilizes.
- Check readings with specified levels (See chart).

Compression gauge:
YU-33223
90890-03081

Compression pressure (at sea level):
Standard:
1,400 kPa (14.0 kg/cm², 199 psi)
Minimum:
1,360 kPa (13.6 kg/cm², 194 psi)
Maximum:
1,480 kPa (14.8 kg/cm², 210 psi)

⚠ WARNING:

When cranking the engine, ground spark plug lead to prevent sparking.

- Repeat the previous steps for the other cylinders.
- If pressure falls bellow the minimum level:

1) Squirt a few drops of oil into the affected cylinder.
2) Measure the compression again.

Compression pressure (with oil introduced into cylinder)

Reading	Diagnosis
Higher than without oil	Worn or damaged pistons
Same as without oil	Defective ring(s), valves, cylinder head gasket or piston is possible.
Above maximum level	Inspect cylinder head, valve surfaces, or piston crown for carbon deposits.

Difference between each cylinder:
Less than 100 kPa (1 kg/cm², 14 psi)

- Remove the compression gauge with a adapter.

3. Install:
   - Spark plug



Spark plug:
17.5 Nm (1.75 m · kg, 12.5 ft · lb)

Refer to the "SPARK PLUG INSPECTION" section.

4. Install:
   - Front cover
   - Side cowlings (left and right)
     Refer to the "COWLINGS" section.

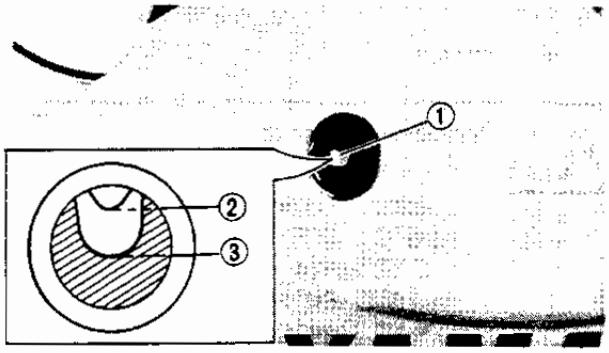
ENGINE OIL LEVEL INSPECTION

1. Inspect:
   - Engine oil level
     Oil level low → Add sufficient oil.

Inspection steps:
- Place the motorcycle on a level place and hold it in an upright position.

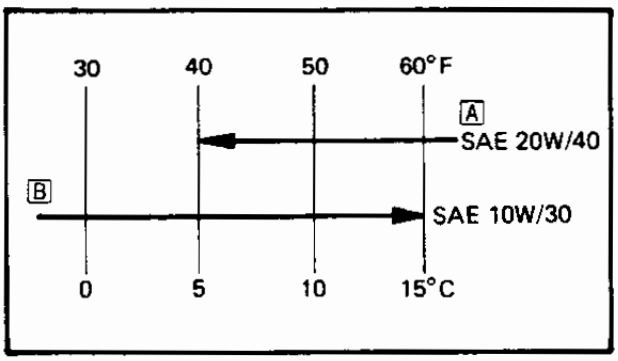
NOTE:
Be sure the motorcycle is positioned straight up when checking the oil level; a slight tilt toward the side can produce false readings.

- Warm up the engine for several minutes, and stop it, then wait at least several minutes for the oil to drain back into the crankcase.



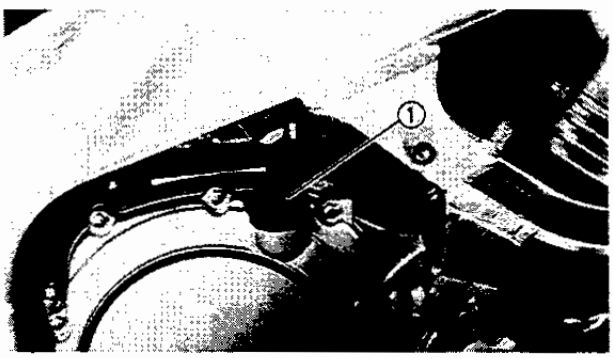
- Visually check the oil level through the level window ① whether or not oil level is between maximum ② and minimum level ③.
- If the level is lower, add the oil up to the proper level.

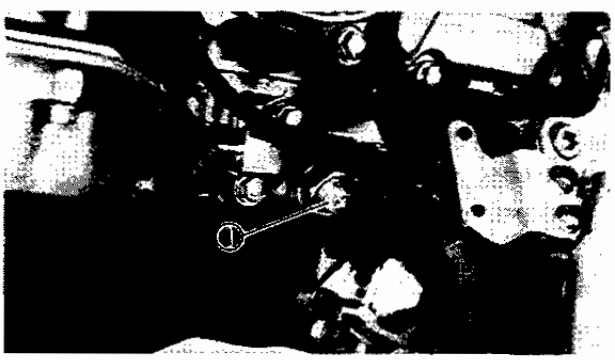
Recommended engine oil:
At 5°C (40°F) or higher [A] :
SAE 20W40 type SE motor oil
At 15°C (60°F) or lower [B] :
SAE 10W30 type SE motor oil



⚠ CAUTION:

- **Do not add any chemical additives. Engine oil also lubricates the clutch and additives could cause clutch slippage.**
- **Be sure no foreign material enters the crankcase.**





ENGINE OIL REPLACEMENT

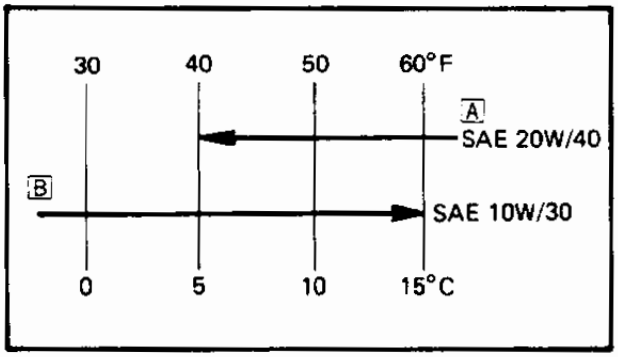
1. Remove:
   - Side cowlings (left and right)
   - Front cover

   Refer to the "COWLINGS" section.
2. Warm up the engine for several minutes.
3. Place a drain pan under the engine.
4. Remove:
   - Oil filler cap ①
5. Remove:
   - Drain plug ①

   Drain the crankcase of its engine oil.
6. Inspect:
   - O-ring (oil filler cap)
   - Gasket (drain plug)

   Wear/Damage → Replace.
7. Tighten:
   - Drain plug

Drain plug:
43 Nm (4.3 m·kg, 31 ft·lb)



8. Fill:
   - Crankcase

Periodic oil change:
2.7 L (2.4 Imp qt, 2.9 US qt)
Recommended engine oil:
At 5°C (40°F) or higher [A] :
SAE 20W40 type SE motor oil
At 15°C (60°F) or lower [B] :
SAE 10W30 type SE motor oil

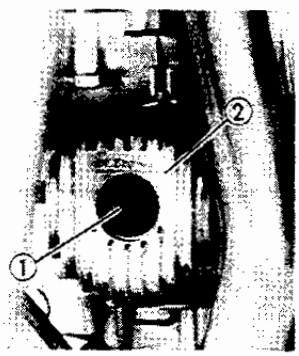
⚠ CAUTION:

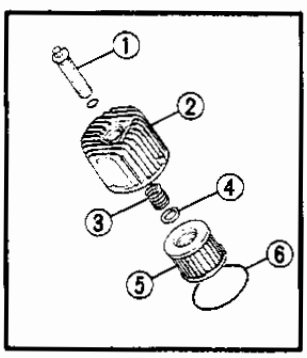
- **Do not add any chemical additives. Engine oil also lubricates the clutch and additives could cause clutch slippage.**
- **Be sure no foreign material enters the crankcase.**

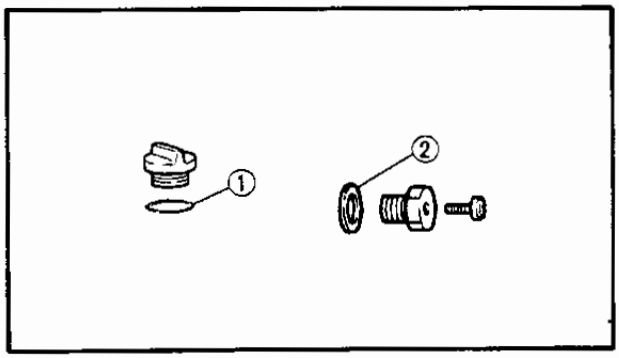
9. Install:
   - Oil filler cap
10. Install:
    - Front cover
    - Side cowlings (left and right)
      Refer to the "COWLINGS" section.

ENGINE OIL FILTER REPLACEMENT

1. Remove:
   - Side cowlings (left and right)
   - Front cover
     Refer to the "COWLING" section.
2. Warm up the engine for several minutes.
3. Place a drain pan under the engine.
4. Remove:
   - Oil filler cap
   - Drain plug
     Drain the crankcase of its engine oil.
5. Remove:
   - Bolt (oil filter) ①
   - Filter cover ②
   - Spring ③
   - Washer ④
   - Oil filter ⑤
   - O-ring ⑥

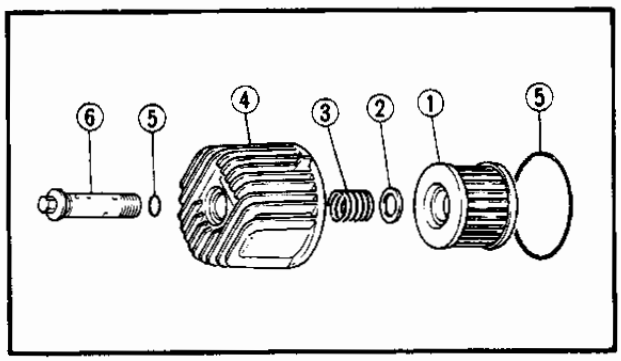






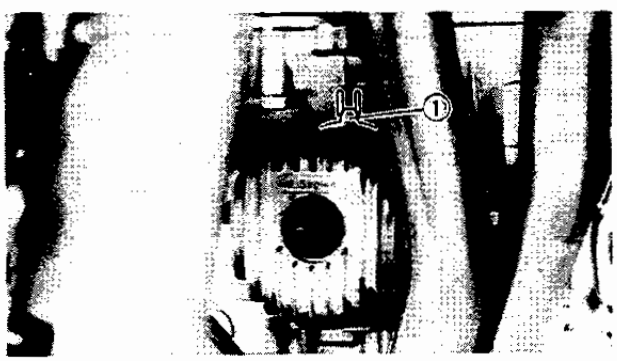
6. Inspect:
   - O-ring (oil filler cap) ①
   - Gasket (drain plug) ②

   Wear/Damage → Replace.



7. Install:
   - Drain plug
   - Oil filter (new) ①
   - Washer ②
   - Spring ③
   - Filter cover ④ (with o-ring ⑤)
   - Bolt (oil filter) ⑥ (with o-ring ⑤)

Drain plug:
43 Nm (4.3 m · kg, 31 ft · lb)
Bolt (oil filter):
15 Nm (1.5 m · kg, 11 ft · lb)

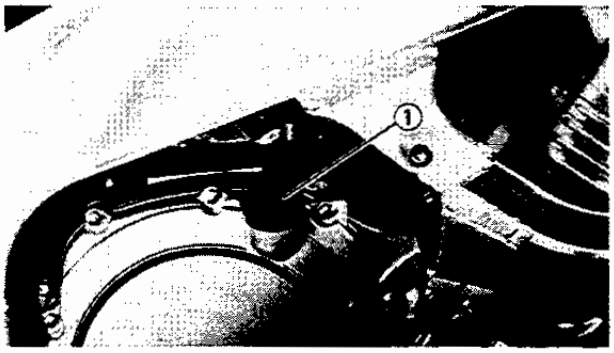


NOTE:
Mesh the oil filter cover projection ① with the crankcase slot.

8. Fill:
   - Crankcase

   Refer to the "ENGINE OIL REPLACEMENT" section for recommended engine oil.

With oil filter replacement:
3.0 L (2.6 Imp qt, 3.1 US qt)



9. Install:
   - Oil filler cap ①
     (with o-ring)
10. Warm up the engine for a few minutes, then stop the engine.



11. Inspect:
    - Oil leaks
    - Oil level
12. Inspect:
    - Oil flow

Inspection steps:
- Slightly loosen the oil gallery bolt ① in the cylinder head.
- Start the engine and keep it idling until oil begins to seep from the oil gallery hole. If no oil comes out after one minute, stop the engine immediately so it will not engine stick.
- Restart the engine after solving the problem(s), and recheck the oil pressure.
- Stop the engine and tighten the oil gallery bolt to specification.

Bolt (oil gallery):
10 Nm (1.0 m · kg, 7.2 ft · lb)

13. Install:
    - Front cover
    - Side cowlings (left and right)
      Refer to the "COWLINGS" section.

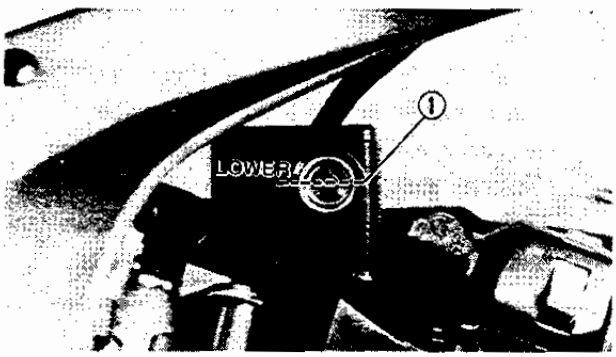
CLUTCH FLUID LEVEL INSPECTION

NOTE:

Position the motorcycle straight up when inspecting the fluid level.

1. Place the motorcycle on a level surface.

NOTE:
Place the motorcycle on its centerstand if the motorcycle is equipped with a centerstand. If not, place a suitable stand under the motorcycle.



2. Inspect:
   - Fluid level
     Fluid level is under "LOWER" level line ①
     → Replenish.

Recommended fluid:
DOT #4
If DOT #4 is not available, #3 can be used.

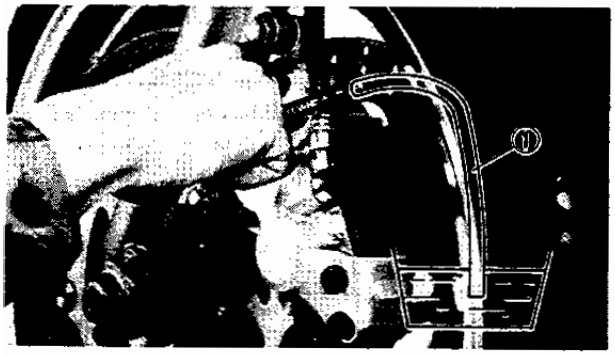
NOTE:
When inspecting the fluid level of the reservoir at the handlebars, make sure that the master cylinder top is horizontal.

⚠ CAUTION:
The 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 performance.**
- **Refill with the same type of fluid: mixing fluids may result in a harmful chemical reaction and lead to poor performance.**
- **Be careful that water does not enter the master cylinder when refilling. Water will significantly lower the boiling point of the fluid and may result in vapor lock.**

AIR BLEEDING (HYDRAULIC CLUTCH SYSTEM)

⚠ WARNING:
Bleed the clutch system if:
- **The system has been disassembled.**
- **A clutch hose has been loosened or removed.**
- **The clutch fluid is very low.**
- **The clutch operation is faulty.**



1. Bleed:
   - Clutch system

Air bleeding steps:
a. Add proper fluid to the reservoir.
b. Install the diaphragm. Be careful not to spill any fluid or allow the reservoir to over flow.
c. Connect the clear plastic hose ① to the bleed screw.
d. Place the other end of the tube into a container.
e. Slowly apply the clutch lever several times.
f. Pull in the lever and hold it in position.
g. Loosen the bleed screw and allow the lever to travel slowly toward its limit.
h. Tighten the bleed screw when the lever has reached its limit, then release the lever.

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

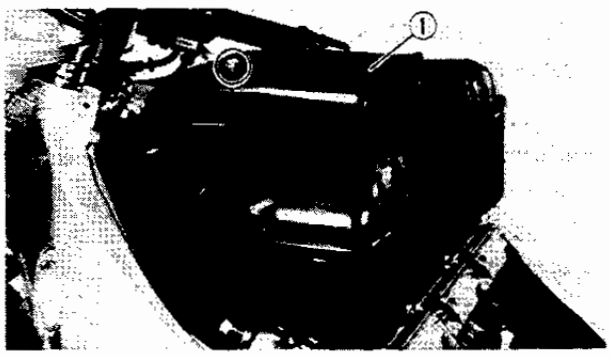
i. Repeat steps (e) to (h) until the air bubbles have been removed from the system.

NOTE:
If bleeding is difficult, it may be necessary to let the clutch fluid system stabilize for a few hours. Repeat the bleeding procedure when the tiny bubbles in the system have disappeared.

j. Add fluid to proper level.
Refer to the "CLUTCH FLUID LEVEL INSPECTION" section.

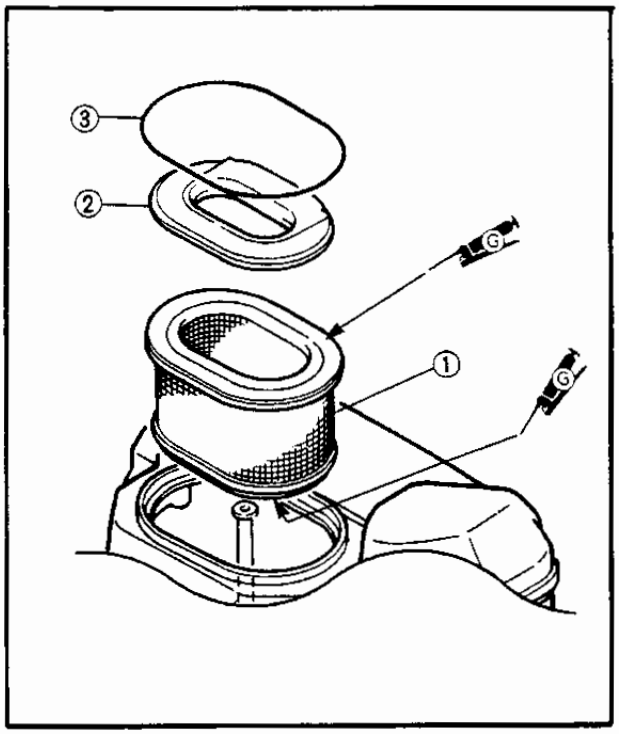
⚠ WARNING:
Check the operation of the clutch after bleeding the clutch system.

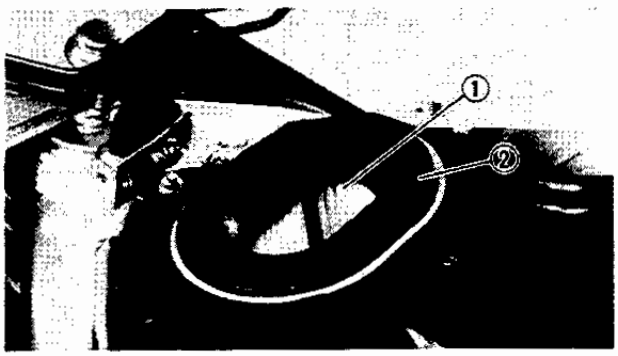
AIR FILTER CLEANING



1. Remove:
   - Seat
   - Fuel tank
     Refer to the "FUEL TANK" section.
   - Air filter case cover ①
   - Sealing rubber
   - Air filter element

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





2. Inspect:
   - Air filter element ①
   - Sealing rubber ②
   - O-ring ③

   Damage → Replace.

3. Clean:
   - Air filter element ①

   Blow out dust in the element from the outer surface using compressed air.
   - Air filter case
   - Case cover

   Using a cloth damped with solvent.
4. Apply:
   - All-purpose grease

   (to air filter element seats ②)
5. Install:
   - Air filter element ①
   - Searing rubber ②
   - Air filter case cover

⚠ CAUTION:

Make sure that the element seat fits into the corresponding filter case and case cover.

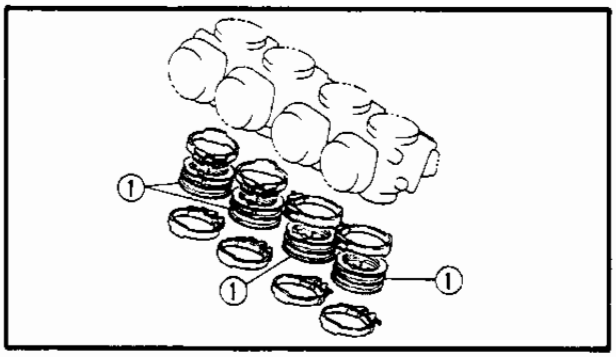
6. Install:
   - Fuel tank
   - Seat

   Repeat to the "FUEL TANK" section.

CARBURETOR JOINT INSPECTION

1. Remove:
   - Seat
   - Fuel tank

   Refer to the "FUEL TANK" section.

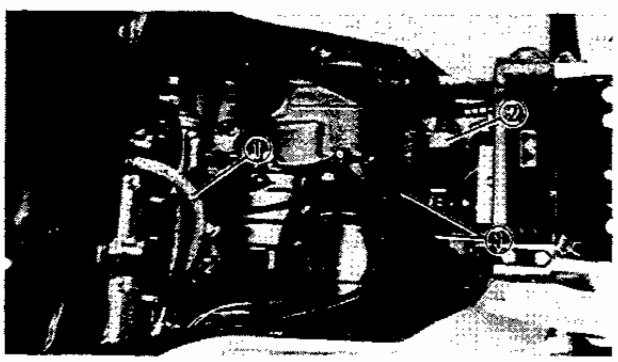


2. Inspect:
   - Carburetor joints ①
     Cracks/Damage → Replace.
     Refer to the "CARBURETION" section in the CHAPTER 6 for replacement.

3. Install:
   - Fuel tank
   - Seat
     Refer to the "FUEL TANK" section.

FUEL LINE INSPECTION

1. Remove:
   - Seat
   - Fuel tank
     Refer to the "FUEL TANK" section.



2. Inspect:
   - Fuel hoses ①
     Cracks/Damage → Replace.
     Loose connection → Connect properly.
   - Fuel filter ②
     Contamination/Damage → Replace.

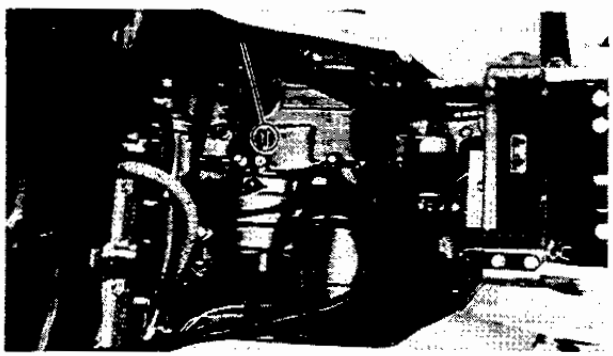
NOTE:
Drain and flush the fuel tank if abrasive damage to any components is evident.

3. Install:
   - Fuel tank
   - Seat
     Refer to the "FUEL TANK" section.

CRANKCASE VENTILATION HOSE INSPECTION

1. Remove:
   - Seat
   - Fuel tank

   Refer to the "FUEL TANK" section.



2. Inspect:
   - Crankcase ventilation hose ①

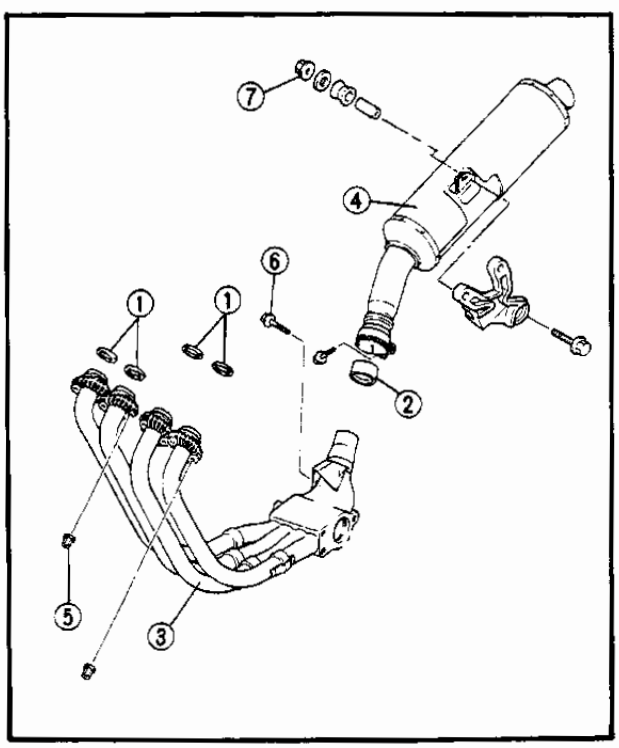
   Cracks/Damage → Replace.
   Loose connection → Connect properly.

⚠ CAUTION:

Make sure that the crankcase ventilation hose is routed correctly.

3. Install:
   - Fuel tank
   - Seat

   Refer to the "FUEL TANK" section.



EXHAUST SYSTEM INSPECTION

1. Inspect:
   - Gasket (exhaust pipe) ①
   - Joint (silencer) ②

   Damage → Replace.
   Exhaust gas leakage → Repair.
   - Exhaust pipe ③
   - Silencer ④

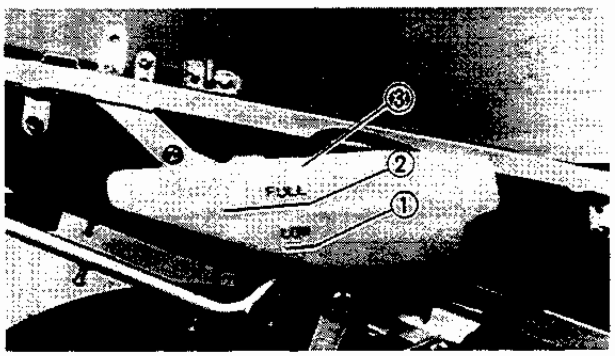
   Cracked/Dent/Damage → Repair or replace.
2. Tighten:
   - Exhaust pipe
   - Muffler

Nut (exhaust pipe) ⑤:
10 Nm (1.0 m·kg, 7.2 ft·lb)
Bolt (muffler stay) ⑥:
25 Nm (2.5 m·kg, 18 ft·lb)
Nut (muffler/rear footrest) ⑦:
42 Nm (4.2 m·kg, 30 ft·lb)

COOLANT LEVEL INSPECTION

1. Remove:
   - Seat
   - Side cover (right)

   Refer to the "COVERS" section.



2. Inspect:
   - Coolant level

   Coolant level is under "LOW" level line ① → Add soft water (tap water).

② "FULL" level
③ Coolant reservoir tank

⚠ WARNING:

Do not remove the radiator cap when the engine is hot.

⚠ CAUTION:

Hard water or salt water is harmful to the engine parts; use boiled or distilled water if you can't get soft water.

3. Add:
   - Soft water (tap water)

   Until the coolant level reaches "FULL" Level line ②.

Reservoir tank capacity:
Total:
0.4 L (0.35 Imp qt, 0.42 US qt)
From "LOW" to "FULL" level:
0.15 L (0.13 Imp qt, 0.16 US qt)

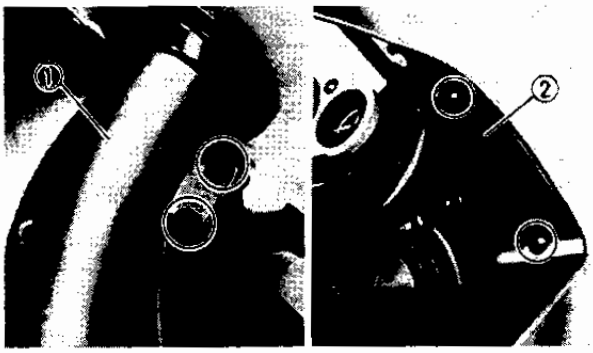
4. Install:
   - Side cover (right)
   - Seat

   Refer to the "COWLING" section.

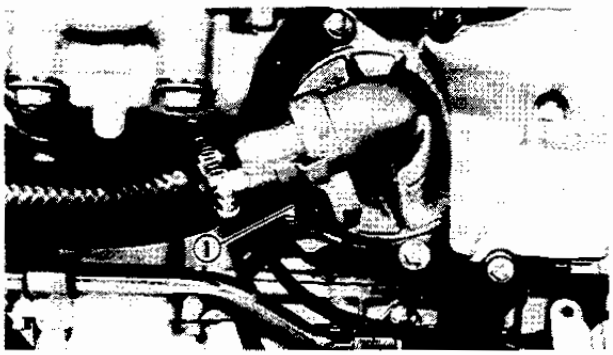
COOLANT REPLACEMENT

⚠ WARNING:

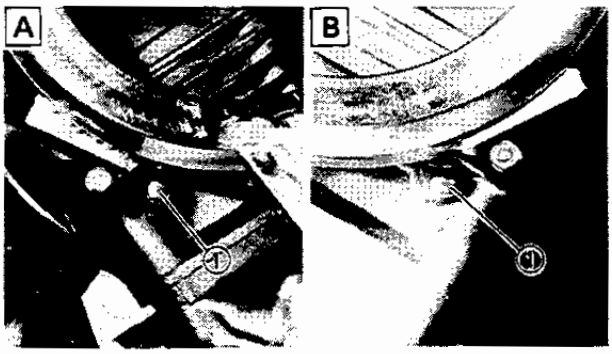
Do not remove the radiator cap when the engine and radiator are hot. Scalding hot fluid and steam may be blown out under pressure, which could cause serious injury. When the engine has cooled, open the radiator cap by the following procedure:
Place a thick rag, like a towel, over the radiator cap, slowly rotate the cap counterclockwise to the detent. This procedure allows any residual pressure to escape. When the hissing sound has stopped, press down on the cap while turning counterclockwise and remove it.



1. Remove:
   - Side cowlings (left and right)
   - Front cover
     Refer to the "COWLINGS" section.
2. Remove:
   - Air intake duct (right) ①
   - Inner cover (right) ②



3. Place an open container under the drain bolts.
4. Remove:
   - Drain bolt (water pump) ①



5. Remove:
   - Drain bolts (cylinder) ①
     Drain the coolant.

NOTE:

Remove the drain bolts first, then remove the radiator cap to prevent the coolant from spilling out.

Ⓐ Left Ⓑ Right

6. Inspect:
   - Gasket (drain bolts – cylinder)
   - Gasket (drain bolt – water pump)

   Damage → Replace.
7. Tighten:
   - Drain bolts

Drain bolt:
10 Nm (1.0 m · kg, 7.2 ft · lb)

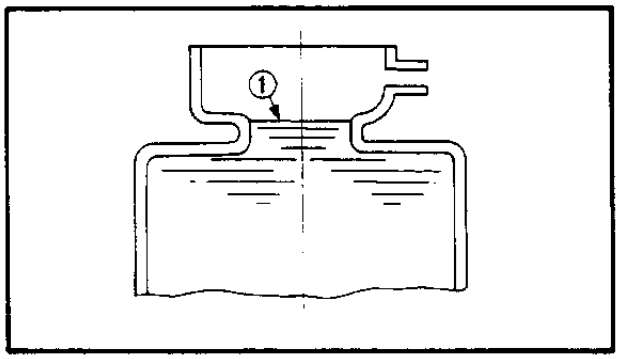
8. Fill:
   - Cooling system

Coolant filling steps:
- Fill the radiator with the coolant to the specified level ①.
- Start the engine.

⚠ CAUTION:

Always check coolant level, and check for coolant leakage before starting engine.

- To maintain the coolant level, add the coolant into the radiator while the engine is running.
- Stop the engine when the coolant level stabilizes.
- Add the coolant again to the specified level.
- Install the radiator cap.
- Fill the reservoir tank with the coolant to the specified level.



Recommended coolant:
High quality ethylene glycol anti-freeze containing anti-corrosion for aluminum engine inhibitors

Coolant and water mixed ratio:
50%/50%

Total amount:
2.1 L (1.9 Imp qt, 2.2 US qt)

Reservoir tank capacity:
0.4 L (0.35 Imp qt, 0.42 US qt)

From "LOW" to "FULL" level:
0.15 L (0.13 Imp qt, 0.16 US qt)

Handling notes of coolant:
The coolant is harmful so it should be handled with special care.

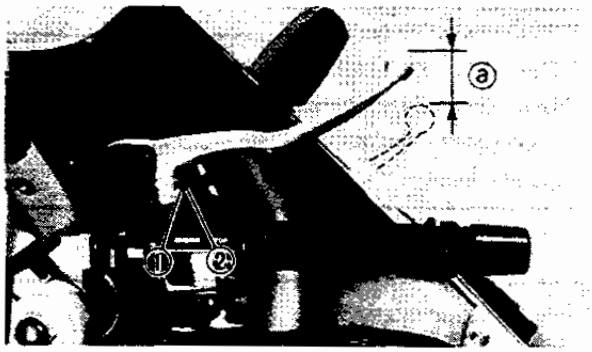
⚠ WARNING:

- **When coolant splashes to your eye.**
  Thoroughly wash your eye with water and see your doctor.
- **When coolant splashes to your clothes.**
  Quickly wash it away with water and then with soap.
- **When coolant is swallowed.**
  Quickly make him vomit and take him to a doctor.

⚠ CAUTION:

- **Hard water or salt water is harmful to the engine parts; use boiled or distilled water if you can't get soft water.**
- **Do not use water containing impurities or oil.**
- **Take care so that coolant does not splash to painted surfaces. If splashes, wash it away with water.**

9. Install:
   - Inner cover (right)
   - Air intake duct (right)
   - Front cover
   - Side cowlings (left and right)
     Refer to the "COWLINGS" section.



CHASSIS

FRONT BRAKE ADJUSTMENT

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

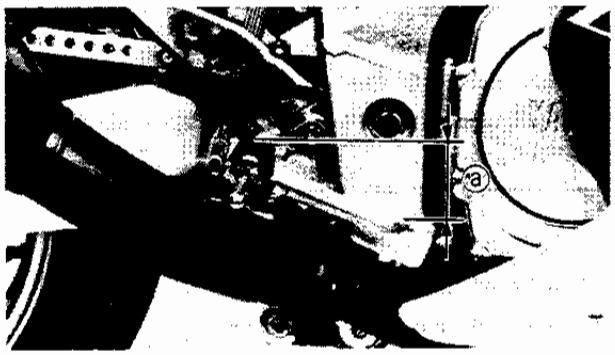
Free play:
2 ~ 5 mm (0.08 ~ 0.20 in)
at lever end.

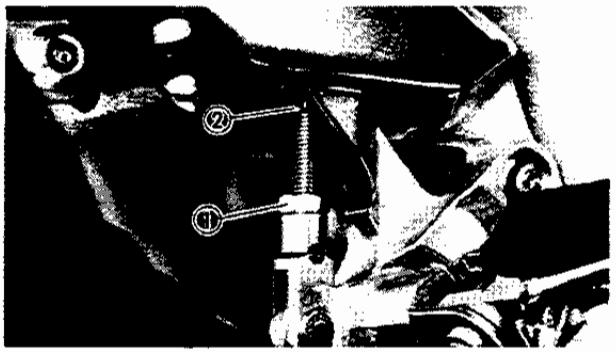
2. Adjust:
   • Brake lever free play

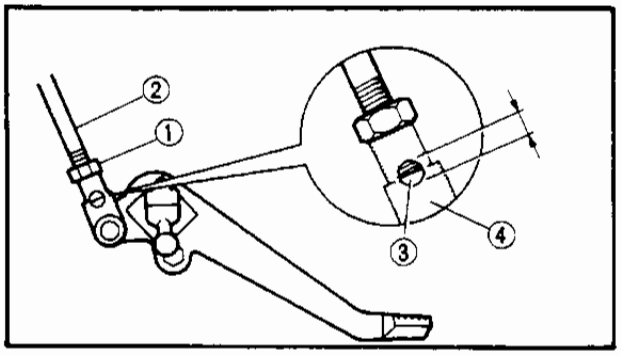
Adjustment steps:	
• Loosen the locknut ①.	
• Turn the adjuster ② in or out until the specified free play is obtained.	
Turn in	**Free play is decreased.**
Turn out	**Free play is increased.**
• Tighten the locknut.	

⚠ CAUTION:

Proper lever free play is essential to avoid excessive brake drag.







REAR BRAKE ADJUSTMENT

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

Brake pedal height:
60 mm (2.36 in)
Below top of footrest.

2. Adjust:
   • Brake pedal height

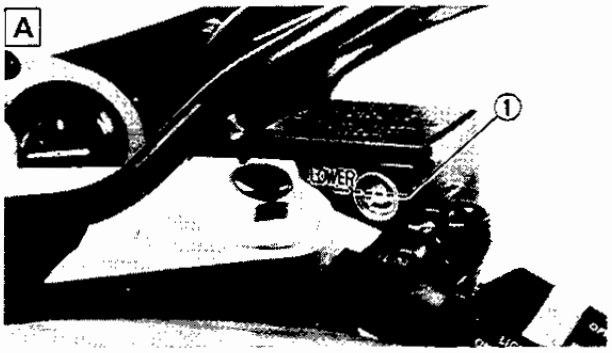
Adjustment steps:	
• Loosen the locknut ①.	
• Turn the adjuster ② in or out until the specified pedal height is obtained.	
Turn in	**Pedal height is increased.**
Turn out	**Pedal height is decreased.**

⚠ WARNING:

After adjusting the brake pedal height, visually check the adjuster end through the hole ③ of the joint holder ④. The adjuster end must appear within this hole.

• Tighten the locknut ①.

Locknut:
26 Nm (2.6 m·kg, 19 ft·lb)





BRAKE FLUID INSPECTION

1. Place the motorcycle on a level surface.
2. Inspect:
   - Brake fluid level
     Fluid level is under "LOWER" level line ① → Replenish.

Recommended Brake Fluid:
DOT #4

A Front brake side
B Rear brake side

NOTE:

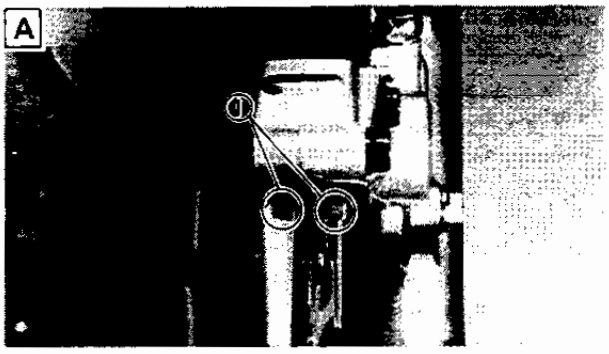
- Position the motorcycle straight up when inspecting the brake fluid level.
- When inspecting the brake fluid level, make sure the top surface of the master cylinder cap or reservoir tank cap is horizontal.
- Before inspecting the rear brake fluid level, remove the side cover (right).
- Refer to the "COWLINGS" section.

⚠ CAUTION:

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

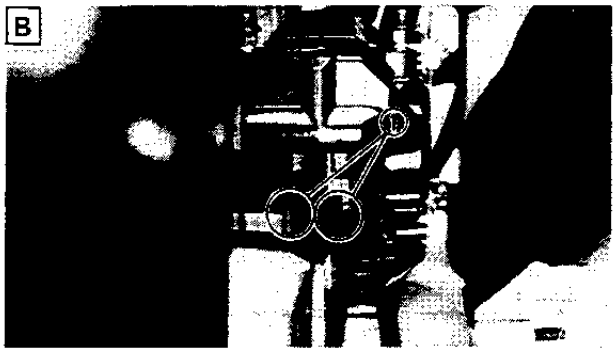
⚠ WARNING:

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



BRAKE PAD INSPECTION

1. Activate the brake lever or brake pedal.
2. Inspect:
   - Brake pad
     Wear indicator ① almost contacts brake disc → Replace brake pad as a set.
     Refer to the "BRAKE PAD REPLACEMENT" section in the CHAPTER 7 for replacement.

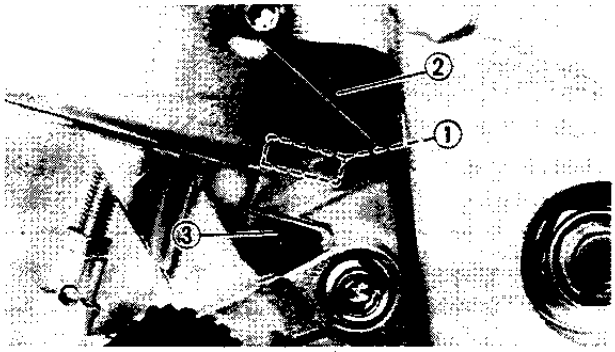


[A] Front brake
[B] Rear brake

BRAKE LIGHT SWITCH ADJUSTMENT

NOTE:

The brake light switch is operated by movement of the brake pedal.
Proper adjustment is achieved when the brake light comes on just before the brake begins to take effect.

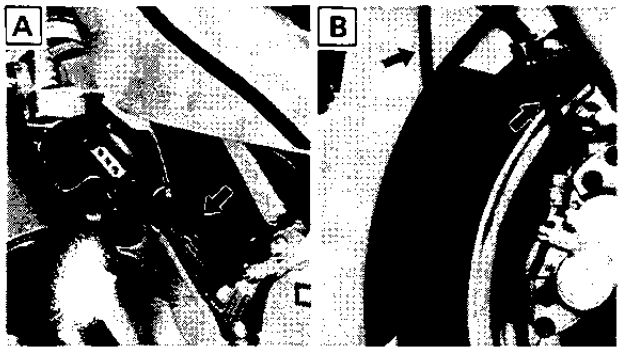


1. Loosen:
   • Locknut ①
2. Adjust:
   • Rear brake light switch
   Hold the switch body ② with your hand so it does not rotate and turn the adjuster ③.

NOTE:

Proper adjustment is achieved when the brake light comes on just before the brake begins to take effect.

3. Tighten:
   • Locknut



BRAKE HOSE INSPECTION

1. Inspect:
   • Brake hoses
   Cracks/Wear/Damage → Replace.

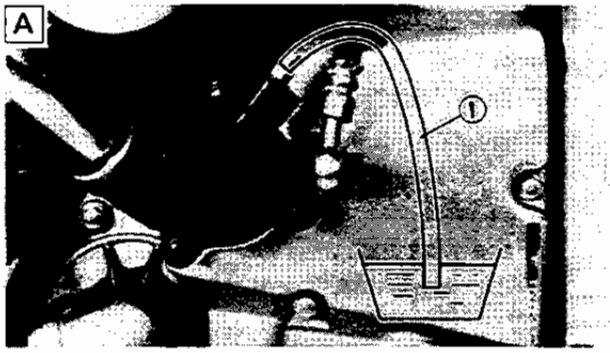
[A] Front brake side
[B] Rear brake side

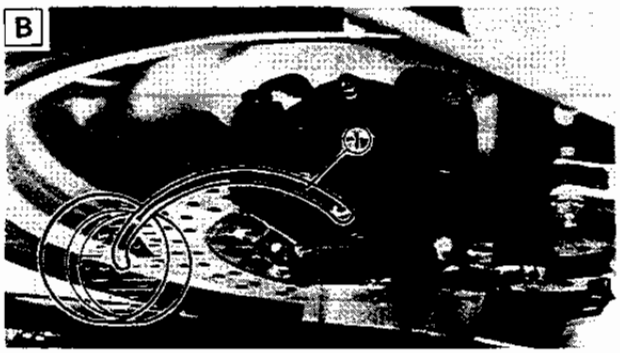
AIR BLEEDING (HYDRAULIC BRAKE SYSTEM)

⚠ WARNING:

Bleed the brake system if:

- **The system has been disassembled.**
- **A brake hose has been loosened or removed.**
- **The brake fluid is very low.**
- **The brake operation is faulty. A loss of braking performance may occur if the brake system is not properly bled.**





1. Bleed:
   - Brake system

Air bleeding steps:

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

[A] Front
[B] Rear

d. Place the other end of the tube 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.

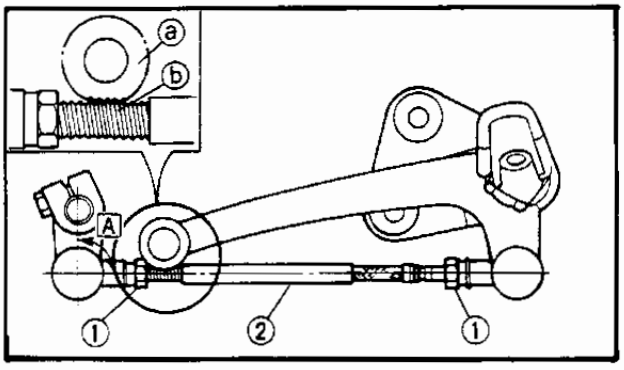
Bleed Screw:
6 Nm (0.6 m · kg, 4.3 ft · lb)

i. Repeat steps(e) to (h) until of the air bubbles have been removed from the system.

NOTE:

If bleeding is difficult, it may be necessary to let the brake fluid system stabilize for a few hours. Repeat the bleeding procedure when the tiny bubbles in the system have disappeared.

j. Add brake fluid to the level line on the reservoir.



CHANGE PEDAL ADJUSTMENT

1. Check:
   - Change pedal position

   When looking at the side view, the bottom ⓐ of the change pedal cover should be even with the top ⓑ of the thread area of the shift rod.

   (Also, angle "A" will be approximately 90°)

   Not even → Adjust.
2. Adjust:
   - Change pedal position

Adjustment steps:
- Loosen both locknuts ①.
- Turn the adjuster rod ② in or out until adjustment is suitable.
- Tighten the both locknuts.

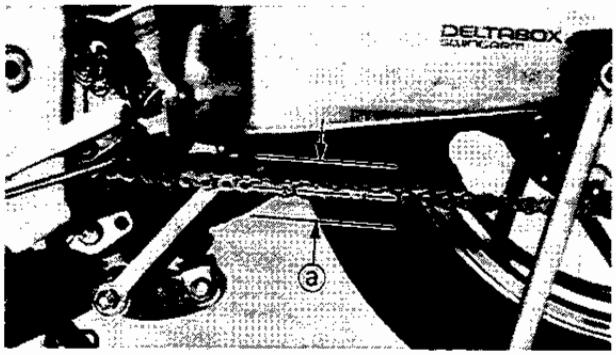
DRIVE CHAIN SLACK ADJUSTMENT

NOTE:

Before checking and/or adjusting the chain slack, rotate the rear wheel through several revolutions. Check the chain slack several times to find the point where the chain is the tightest. Check and/or adjust the chain slack where the rear wheel is in this "tight chain" position.

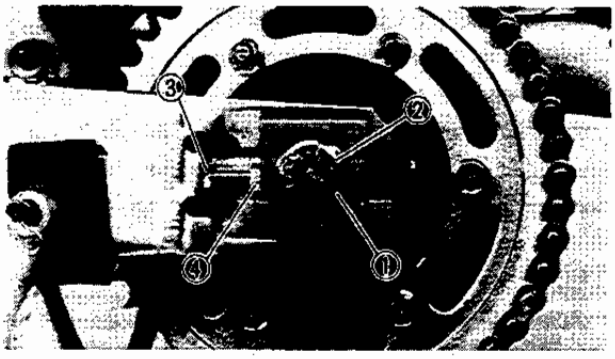
1. Place the motorcycle on a level place, and hold it in an upright position.

NOTE:
The both wheels on the ground without rider on it.



2. Measure:
   - Drive chain slack ⓐ
     Out of specification→Adjust.

Drive Chain Slack:
15 ~ 20 mm (0.6 ~ 0.8 in)



3. Adjust:
   - Drive chain slack

Adjustment steps:

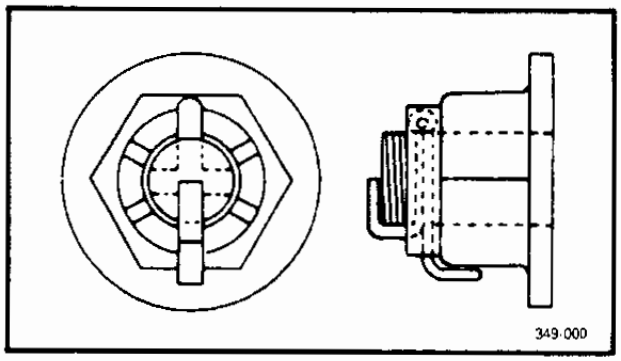
⚠ CAUTION:
Too small chain slack will overload the engine and over vital parts; keep the slack within the specified limits.

- Remove the cotter pin ①.
- Loosen the axle nut ②.
- Loosen both locknuts ③ (adjuster) and turn the adjuster ④ clockwise or counterclockwise until the specified slack is obtained.

Clockwise	**Slack is increased.**
Cownterclockwise	**Slack is decreased.**

NOTE:
Turn each adjuster exactly the same amount to maintain correct axle alignment. (There are marks on each side of swingarm; use them to check for proper alignment.)

- Tighten the locknut.
- Tighten the axle nut to specification, while pushing up or down the chain to be tight.



Axle Nut:
150 Nm (15 m·kg, 108 ft·lb)

• Install the cotter pin.

WARNING:

Always use a new cotter pin on the axle nut.

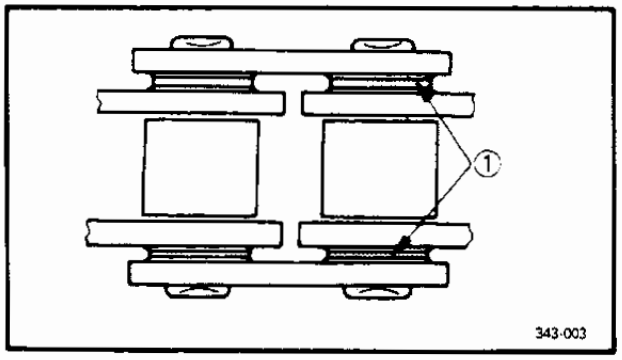
CAUTION:

Do not loosen the axle nut after torque tightening. If the axle nut groove is not aligned with the cotter pin hole, align groove with the hole by tightening up on the axle nut.

DRIVE CHAIN LUBRICATION

The chain consists of many parts which work against each other. If the chain is not maintained properly, it will wear out rapidly, therefore, form the habit of periodically servicing the chain. This service is especially necessary when riding in dusty conditions.

This motorcycle has a drive chain with small rubber O-rings between the chain plates. Steam cleaning, high-pressure washes, and certain solvents can damage these O-rings. Use only kerosene to clean the drive chain. Wipe it dry, and thoroughly lubricate it with SAE 30 ~ 50W motor oil. Do not use any other lubricants on the drive chain. They may contain solvents that could damage the O-rings.



Recommended Lubricant:
SAE 30 ~ 50 Motor Oil

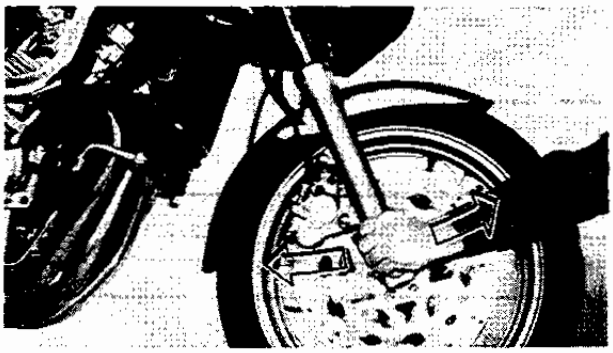
① O-ring

STEERING HEAD INSPECTION

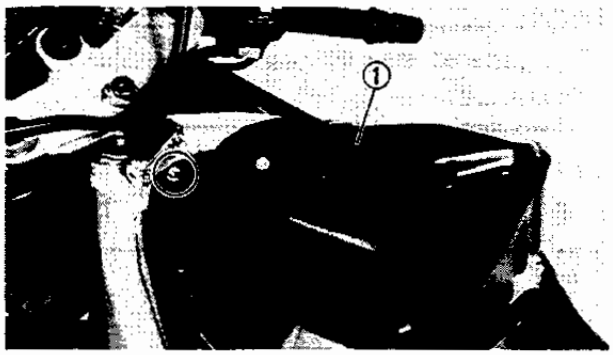
WARNING:

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

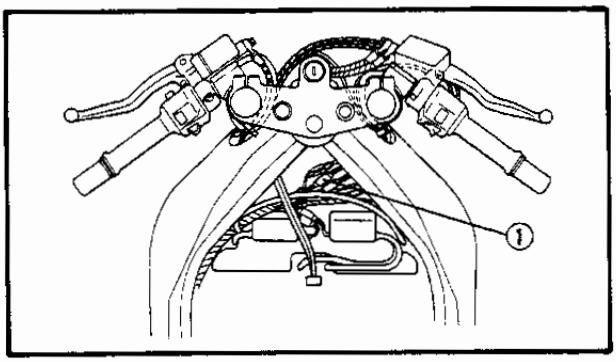
1. Place the motorcycle on a level place.
2. Elevate the front wheel by placing a suitable stand under the engine.



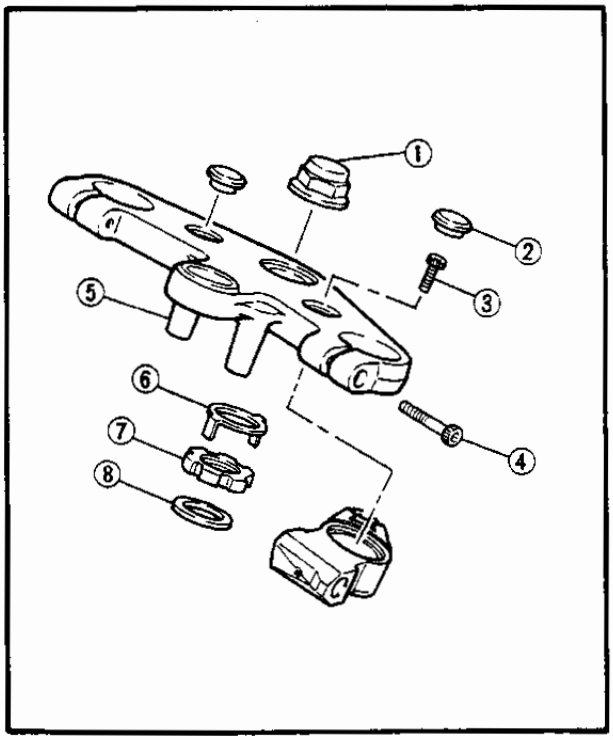
3. Check:
   - Steering assembly bearings
     Grasp the bottom of the front forks and gently rock the fork assembly back and forth.
     Looseness → Adjust the steering head.



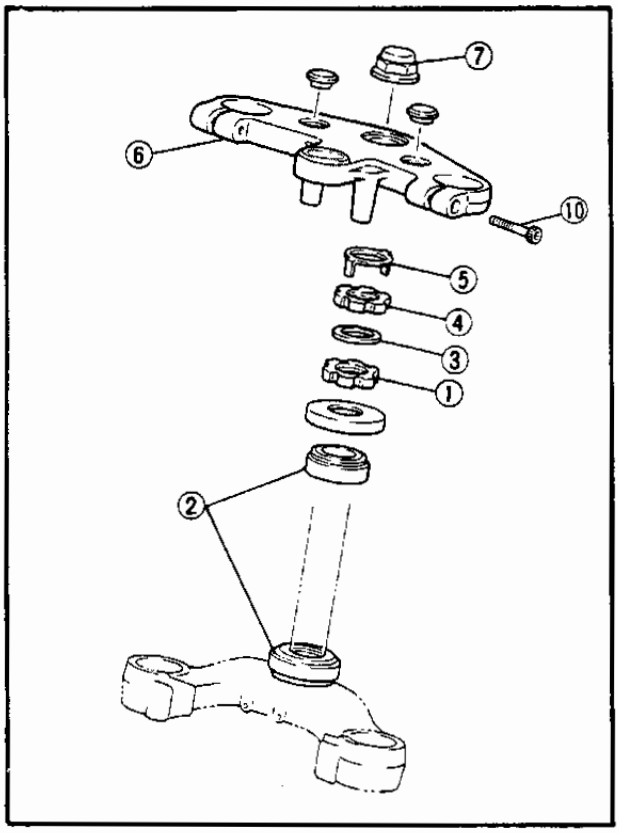
4. Remove:
   - Seat
   - Fuel tank
     Refer to the "FUEL TANK" section.
5. Remove:
   - Air filter case ①
     Refer to the "ENGINE REMOVAL – AIR FILTER CASE" section in the CHAPTER 4.



6. Disconnect:
   - Main switch coupler ①



7. Remove:
   - Nut (steering stem) ①
   - Blind plugs ②
   - Bolts (handlebar boss) ③
8. Loosen:
   - Pinch bolts (upper bracket) ④
9. Remove:
   - Upper bracket ⑤
   - Lock washer ⑥
   - Ring nut (upper) ⑦
   - Washer (rubber) ⑧



10. Tighten:
    - Ring nuts (lower and upper)

Tightening steps:

NOTE:
Set the torque wrench to the ring nut wrench so that they form a right angle.

- Loosen the ring nut (lower) ①

NOTE:
The tapered side of ring nut must be faced downward.

- Tighten the ring nut (lower) using the ring nut wrench.

Ring nut wrench:
YU-33975
90890-01403

Ring nut (lower)
(initial tightening):
52 Nm (5.2 m · kg, 37 ft · lb)

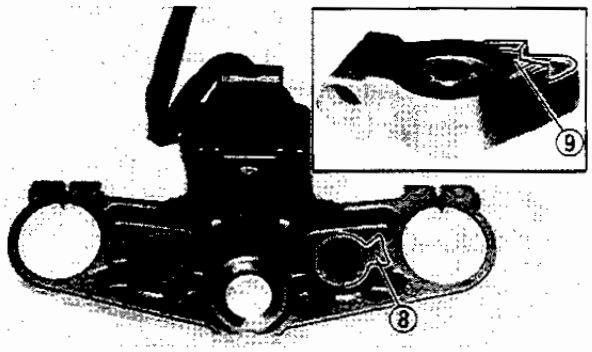
- Loosen the ring nut (lower) completely and retighten it to specification.

⚠ WARNING:
Do not over-tightening.

Ring nut (lower)
(final tightening):
3 Nm (0.3 m · kg, 2.2 ft · lb)

- Check the steering stem by turning it lock to lock. If there is any binding, remove the steering stem assembly and inspect the steering bearing ② .
  Refer to the "STEERING HEAD" section in the CHAPTER 7 for more details.
- Install the washer (rubber) ③ .
- Install the ring nut (upper) ④ .

NOTE:
The tapered side of ring nut must be faced downward.



- Finger tighten the ring nut ④, then align the slots of both ring nuts. If not aligned, hold the ring nut (lower) ① and tighten the other until they are aligned.
- Install the lock washer ⑤.

NOTE:
Make sure the lock washer tab is placed in the slots.

- Install the upper bracket ⑥ and tighten the steering stem nut ⑦ to specification.

NOTE:
Make sure the projection ⑧ on the upper bracket are meshed with slot ⑨ on the handlebar boss.

Nut (steering stem):
110 Nm (11.0 m · kg, 80 ft · lb)

- Tighten the pinch bolts ⑩ to specification.

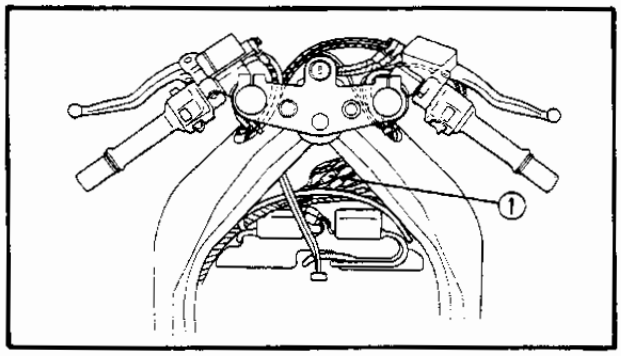
Pinch bolt (upper bracket):
26 Nm (2.6 m · kg, 19 ft · lb)



9. Tighten:
   - Bolts (handlebar boss) ①

Bolt (handlebar boss):
13 Nm (1.3 m · kg, 9.4 ft · lb)

10. Install:
    - Blind plugs ②



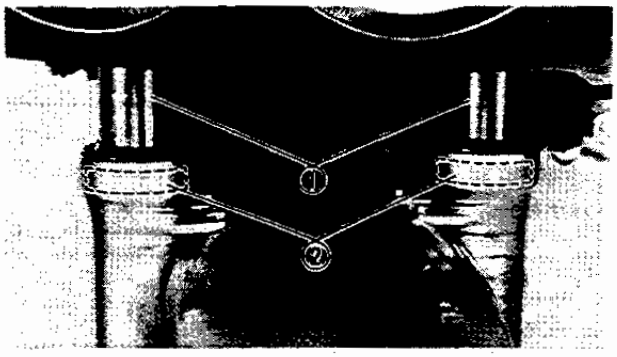
11. Connect:
    - Main switch coupler ①
12. Install:
    - Blind plugs
    - Air filter case
    - Fuel tank
    - Seat

FRONT FORK INSPECTION

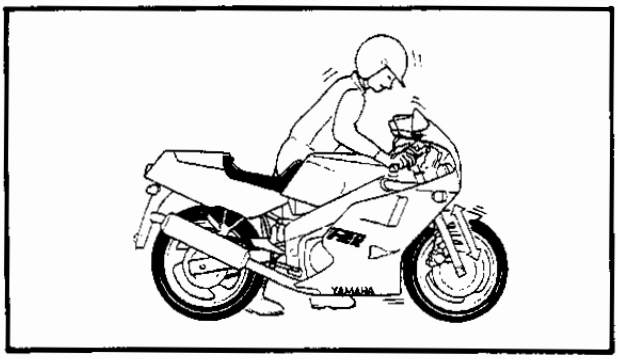
WARNING:

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

1. Place the motorcycle on a level place.



2. Check:
   - Inner tube ①
     Scratch/Damage → Replace.
   - Oil seal ②
     Excessive oil leakage → Replace.
3. Hold the motorcycle on upright position and apply the front brake.

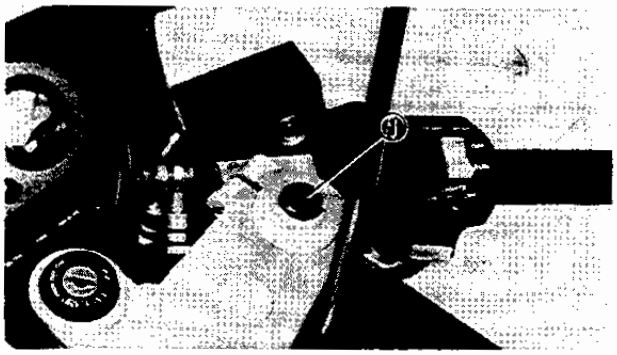


4. Check:
   - Operation
     Pump the front fork up and down for several times.
     Unsmooth operation → Repair.

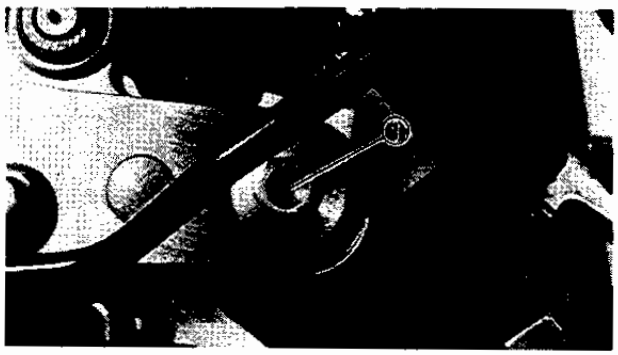
FRONT FORK ADJUSTMENT

WARNING:

- **Always adjust each fork preload to the same setting. Uneven adjustment can cause poor handling and loss of stability.**
- **Securely support the motorcycle so there is no danger of it falling over.**

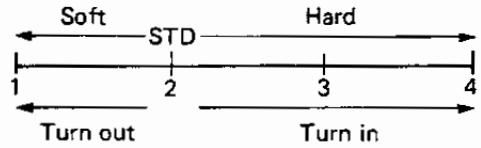


1. Remove:
   - Cap (adjuster) ①



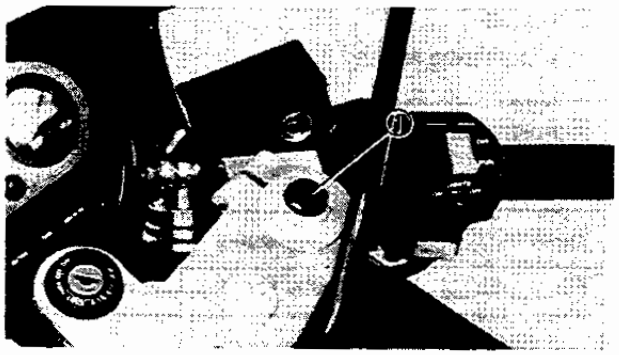
2. Adjust:
   - Spring preload

Adjustment steps: • Turn the adjuster ① in or out.	
Turn in Ⓐ	Preload is increased.
Turn out Ⓑ	Preload is decreased.

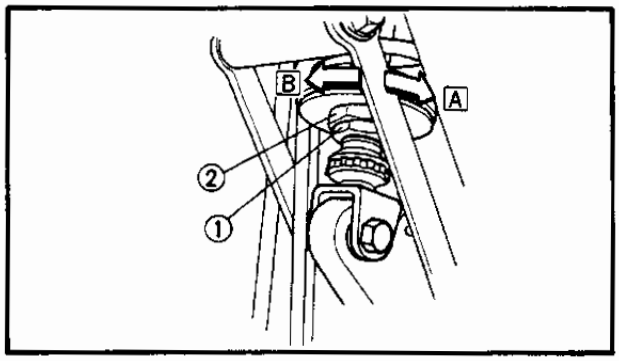


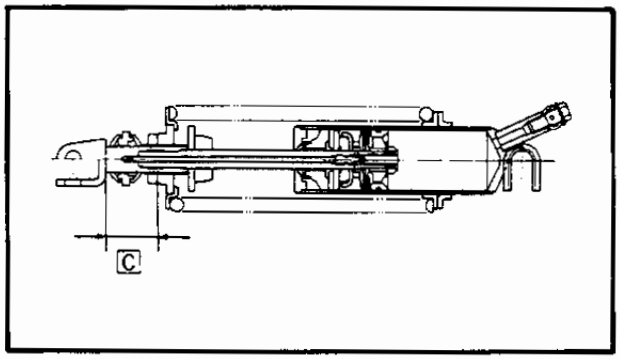
⚠ CAUTION:

Turn the spring preload adjuster from 1 to 4 or 4 to 1 in progressive steps. Never turn the adjuster directly from 1 to 4 or 4 to 1.



3. Install:
   - Cap (adjuster) ①





REAR SHOCK ABSORBER ADJUSTMENT

⚠ WARNING:

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

1. Adjust:
   - Spring preload

Adjustment steps:
- Loosen the locknut ①.
- Turn the adjuster ② in or out.
  Use the wrench (owner's tool kit).

NOTE:

The length of the spring changes 1.0 mm (0.04 in) per turn of the adjuster.

Turn in A	**Preload is increased.**
Turn out B	**Preload is decreased.**

C Measurement length

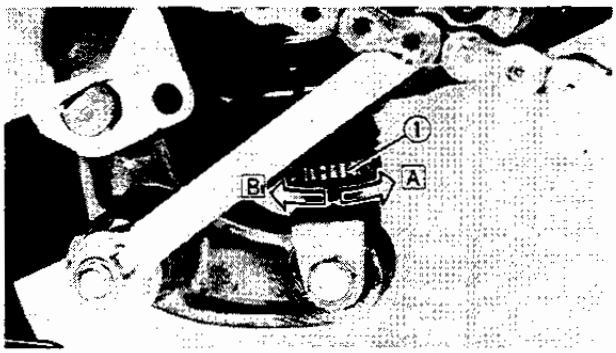
Standard length (installed):
40.5 mm (1.59 in)
Minimum length (installed):
37.5 mm (1.48 in)
Maximum length (installed):
47.5 mm (1.87 in)

⚠ CAUTION:

Never attempt to turn the adjuster beyond the maximum or minimum setting.

- Tighten the locknut.

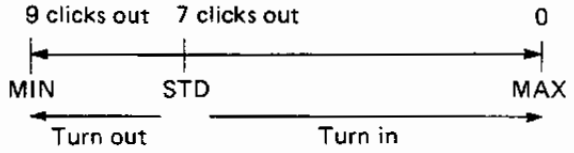
Locknut:
55 Nm (5.5 m·kg, 40 ft·lb)



2. Adjust:
   - Damping force

Adjusting steps:
- Turn the adjuster ① in or out.

Turn in A	**Damping force is increased.**
Turn out B	**Damping force is decreased.**



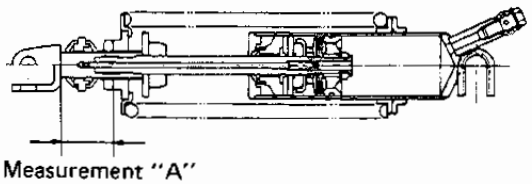
⚠ CAUTION:

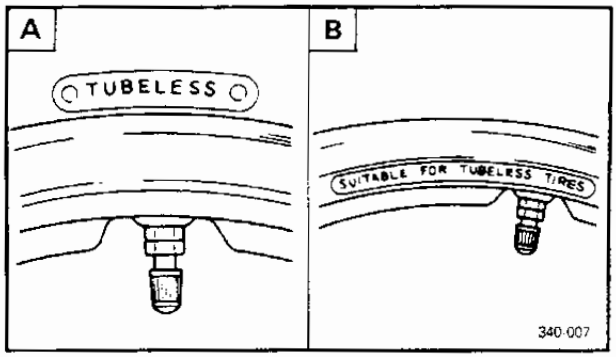
Don't turn out the adjuster more than 9 clicks from the fully tuned-in position.

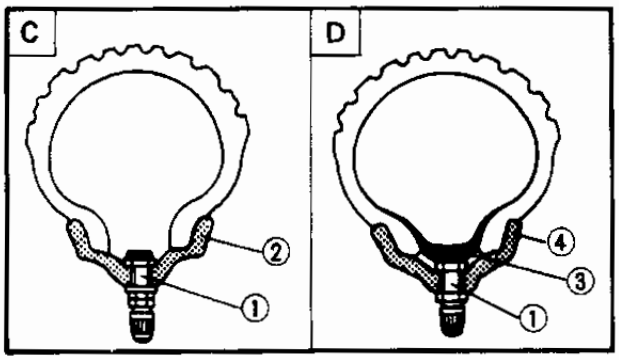
Recommended Combinations of Front Fork and Rear Shock Absorber Settings.

Use this table as a guide for specific riding and motorcycle load conditions.

	Front fork	Rear shock absorber		Loading condition			
	Spring preload adjuster	Spring preload adjuster Measurement "A"	Damping adjuster	Solo rider	With passenger	With accessories equipment	With accessories equipment and passenger
1	1, 2	37.5 ~ 42.5 mm (1.48 ~ 1.67 in)	5 ~ 9 clicks turns out	○			
2	2, 3	40 ~ 45 mm (1.57 ~ 1.77 in)	4 ~ 7 clicks turns out		○	○	
3	3, 4	42.5 ~ 47.5 mm (1.67 ~ 1.87 in)	3 ~ 6 clicks turns out				○





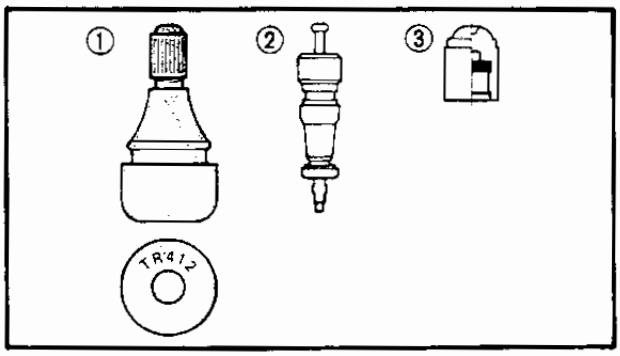


FRONT:

Manufacture	Size	Type
Bridgestone	130/60VR17-V280	CY15
Dunlop	130/60VR17-V280	K510F
Pirelli	130/60ZR17	MP7S
Michelin	130/60ZR17	A59X

REAR:

Manufacture	Size	Type
Bridgestone	170/60VR17-V280	CY16
Dunlop	170/60VR17-V280	K510
Pirelli	170/60ZR17	MP7S
Michelin	170/60ZR17	M59X



TIRE INSPECTION

⚠ WARNING:

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

Wheel	Tire
Tube type	Tube type only
Tubeless type	Tube type or tubeless type

- **Be sure to install the correct tube when using tube type tires.**

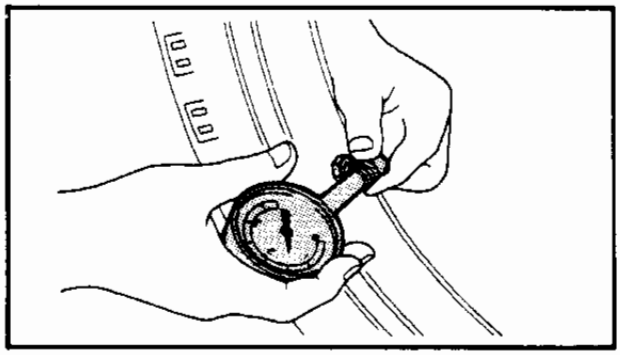
[A] Tire
[B] Wheel
[C] Tubeless tire
[D] Tube type tire
① Air valve
② Aluminum wheel (tubeless type)
③ Tube
④ Aluminum wheel (tube type)

⚠ WARNING:

- **After extensive tests, the tires mentioned have been approved by Yamaha motor Co., Ltd. for this model. No guarantee for handling characteristics can be given if tire combinations other than what is approved are used on this motorcycle.**
  The front and rear tires should be of the same manufacture and design.
- **The use of tire valves and valve cores other than listed could cause tire deflation during extreme high speed riding. Always use genuine parts or their equivalent for replacement.**
- **Be sure to install the valve caps securely, as these are important to prevent air pressure leakage during extreme high speed riding.**

① Tire valve
② Valve core
③ Valve cap with seal

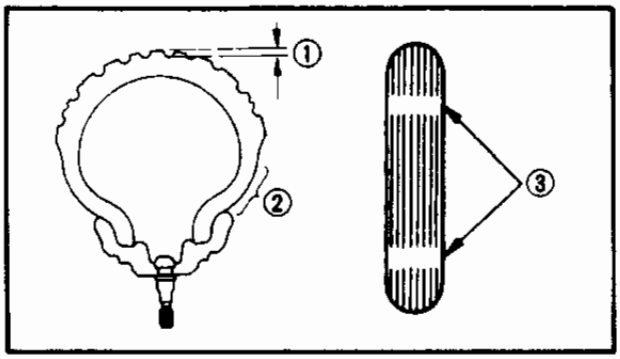
	Type
Tire valve	TR412
Valve core	#9000A (genuine)



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

Basic weight: With oil and full fuel tank	235 kg (518 lb)	
Maximum load*	205 kg (452 lb) For Germany and France 174 kg (384 lb) For the others	
Cold tire pressure	Front	Rear
Up to 90 kg (198 lb) load*	250 kPa (2.5 kg/cm², 36 psi)	250 kPa (2.5 kg/cm², 36 psi)
90 kg (198 lb) ~ Maximum load*	250 kPa (2.5 kg/cm², 36 psi)	290 kPa (2.9 kg/cm², 42 pis)
High speed riding	250 kPa (2.5 kg/cm², 36 psi)	290 kPa (2.9 kg/cm², 42 psi)

*Load is the total weight of 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)

①Tread depth
②Side wall
③Wear indicator

WHEEL INSPECTION

1. Inspect:
   • Aluminum wheels
   Damage/Bends → Replace.

⚠ WARNING:

Never attempt even small repairs to the wheel.

NOTE:

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

CABLE INSPECTION

WARNING:

Damaged cable sheath may cause corrosion and interfere with the cable movement. An unsafe condition may result so replace such cable as soon as possible.

1. Inspect:
   - Cable sheath
   - Cables (Throttle and choke)

   Damage → Replace.

LUBRICATION

Cables

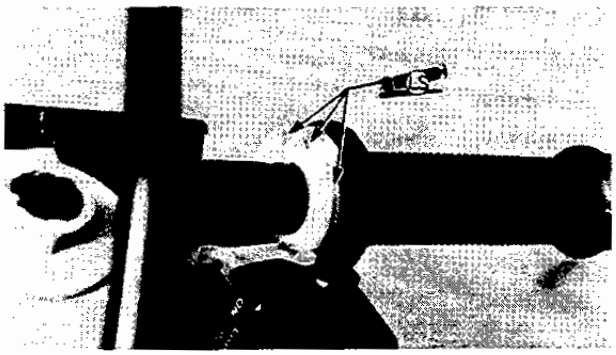
1. Check:
   - Cable operation

   Unsmooth operation → Lubricate.

Recommended lubricant:
SAE 10W30 motor oil

NOTE:

Hold cable end high and apply several drops of lubricant to cable.



2. Apply the grease to the throttle cable end and cable guide groove at inside of throttle housing.

Recommended lubricant:
Lithium soap base grease

Brake and Change Pedals

1. Lubricate the pivoting parts of the each pedal.

Recommended lubricant:
SAE 10W30 Motor Oil

Brake and Clutch Levers

1. Lubricate the pivoting parts of the each lever.

Recommended lubricant:
SAE 10W30 Motor Oil

Sidestand

1. Lubricate the pivoting parts.

Recommended lubricant:
SAE 10W30 motor oil

Rear Suspension

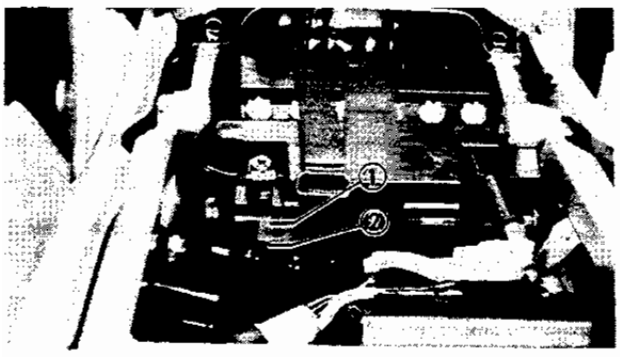
1. Lubricate the pivoting parts.

Recommended lubricant:
Lithium-soap base grease

ELECTRICAL

BATTERY INSPECTION

1. Remove:
   - Seat



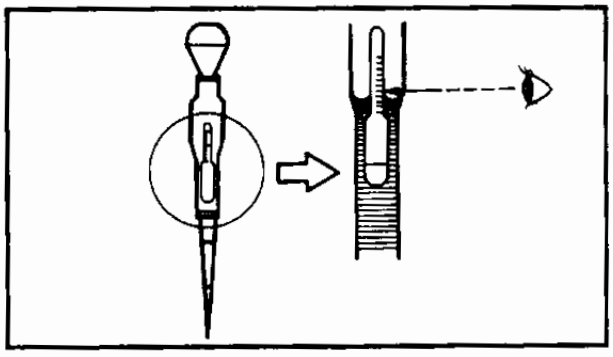
2. Inspect:
   - Fluid level should be between upper ① and lower ② marks.
     Incorrect → Refill.

⚠ CAUTION:

Refill with distilles water only; tap water contains minerals harmful to a battery.

3. Inspect:
   - Battery terminal
     Dirty terminal → Clean with wire brush.
     Poor connection → Correct.

NOTE:
After cleaning the terminals, apply grease lightly to the terminals.



4. Check:
   - Specific gravity:
     Less than 1.280 → Recharge battery.

Charging Current:
1.4 amps/10 hrs
Specific Gravity:
1.280 at 20°C (68°F)

Replace the battery if:
- Battery voltage will not rise to a specific value or bubbles fail to rise even after many hours of charging.
- Sulfation of one or more cells occurs, as indicated by the plates turning white, or an accumulation of material exists in the bottom of the cell.
- Specific gravity readings after a long, slow charge indicate one cell to be lower than the rest.
- Warpage or buckling of plates or insulators is evident.

⚠CAUTION:
Always charge a new battery before using it to ensure maximum performance.



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

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

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

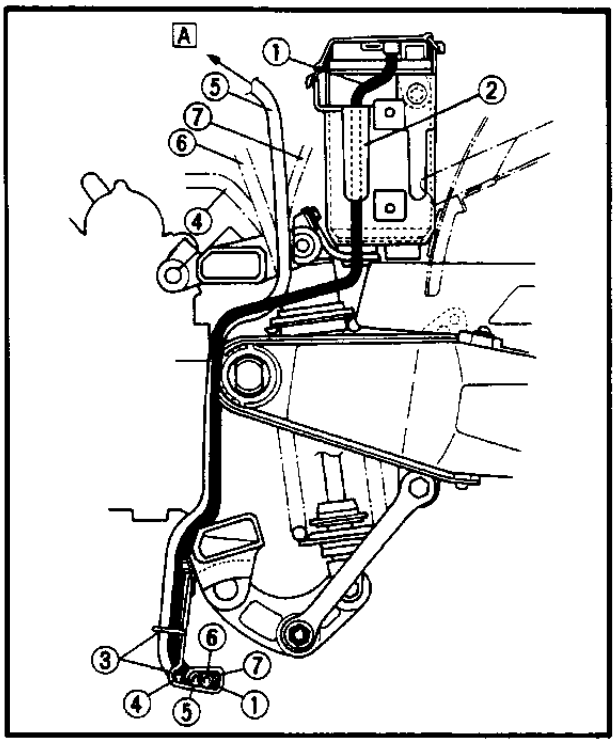
Batteries also generate explosive hydrogen gas, therefore you should always follow these preventive measures:
- **Charge batteries in a well-ventilated area.**
- **Keep batteries away from fire, sparks, or open flames (e.g., welding equipment, lighted cigarettes, etc.)**
- **DO NOT SMOKE when charging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

KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.

5. Inspect:
   - Breather hose (battery) ①
     Obstruction → Remove.
     Damage → Replace.
6. Connect:
   - Breather hose (battery) ①
     Be sure the hose is properly attached and routed.

⚠ CAUTION:

When inspecting the battery, be sure the breather pipe is routed correctly. If the breather pipe touches the frame or exits in such a way as to cause battery electrolyte or gas to exit onto the frame, structural and cosmetic damage to the motorcycle can occur.

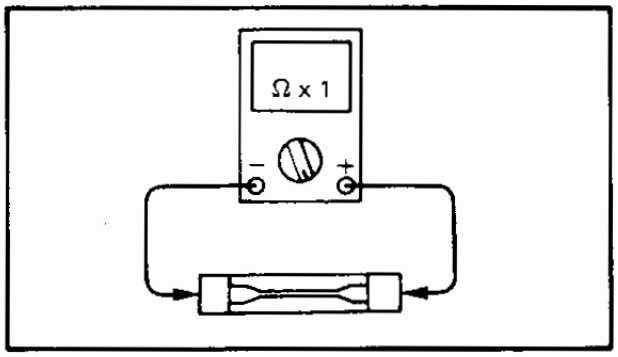


A To fuel tank
② Hose holder
③ Hose guide
④ Overflow hose (carburetor)
⑤ Ventilation hose (fuel tank)
⑥ Ventilation hose (air filter case)
⑦ Breather hose (coolant reservoir tank)

FUSE INSPECTION

1. Remove:
   - Seat
   - Side cover (left)

   Refer to the "COWLINGS" section.



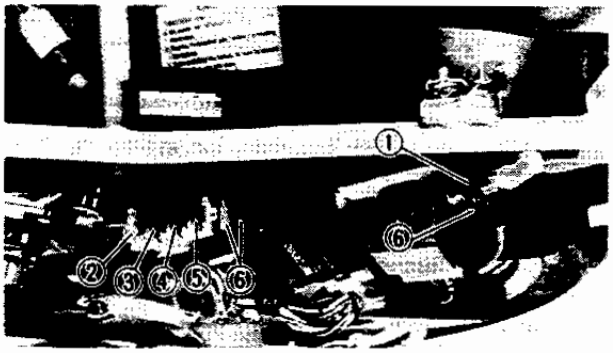
2. Inspect:
   - Fuse

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

NOTE:
Set the "Ω x 1" position.

Pocket tester:
YU-03112
90890-03112

- If the tester is indicated at ∞ . The fuse is blown, replace it.



Description	Amperage	Quantity
① Main	30A	1
② Head	20A	1
③ Signal	10A	1
④ Ignition	10A	1
⑤ Fan	10A	1
⑥ Reserve	30A	1
	20A	1
	10A	1

3. Replace:
   - Blown fuse

Replacement steps:
- Turn off the ignition.
- Install a new fuse of proper amperage.
- Turn on the switches to verify operation of electrical device.
- If fuse blows immediately again, check electrical circuit.

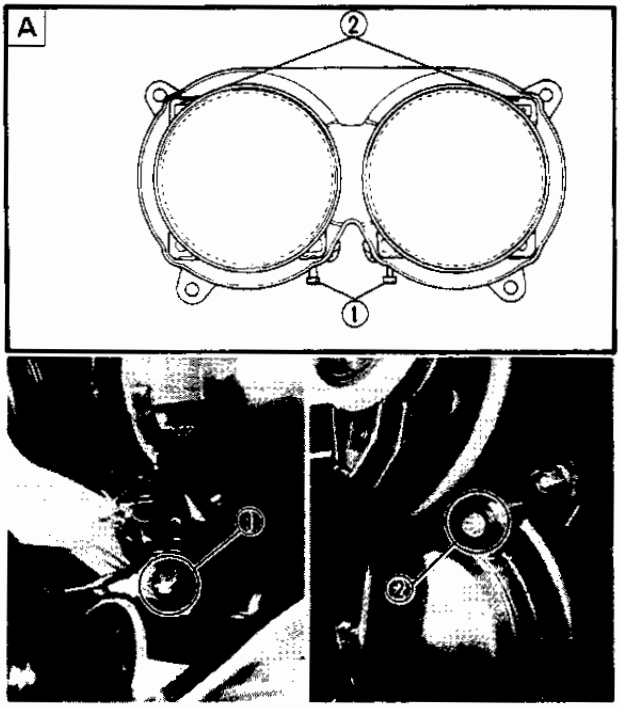
WARNING:

Do not use fuses of higher amperage rating than recommended. Extensive electrical system damage and fire could result from substitution of a fuse of improper amperage.

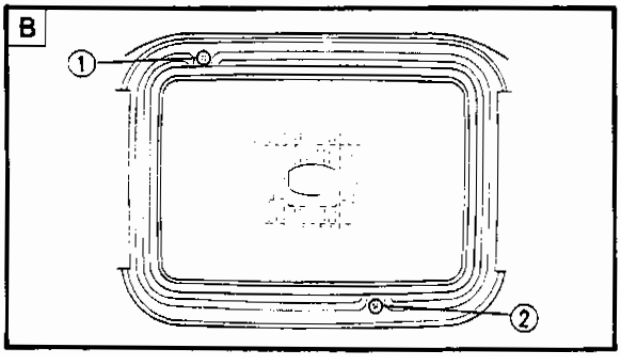
4. Install:
   - Side cover (left)
   - Seat

   Refer to the "COWLINGS" section.

A



B



HEADLIGHT BEAM ADJUSTMENT

NOTE:

This model (Except for CH) is equipped with dual headlight. Adjust the headlight beam for each individual headlight.

1. Adjust:
   - Headlight beam (horizontally)

Horizontal adjustment (for right-hand)	
Right	Turn adjusting screw ① clockwise.
Left	Turn adjusting screw ① counter-clockwise.

Horizontal adjustment (for left-hand)	
Right	Turn adjusting screw ① counter-clockwise.
Left	Turn adjusting screw ① clockwise.

2. Adjust:
   - Headlight beam (vertically)

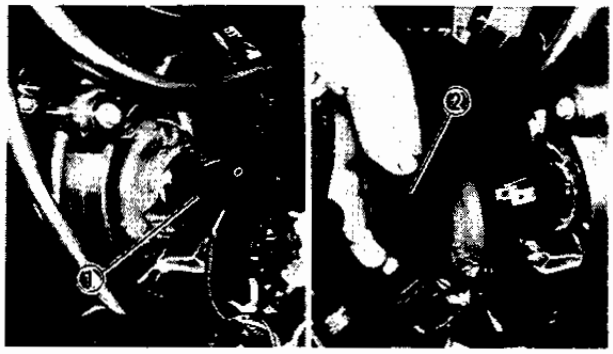
Vertical adjustment	
Higher	Turn the adjusting screw ② clock-wise.
Lower	Turn the adjusting screw ② counterclockwise.

A Except for CH
B For CH

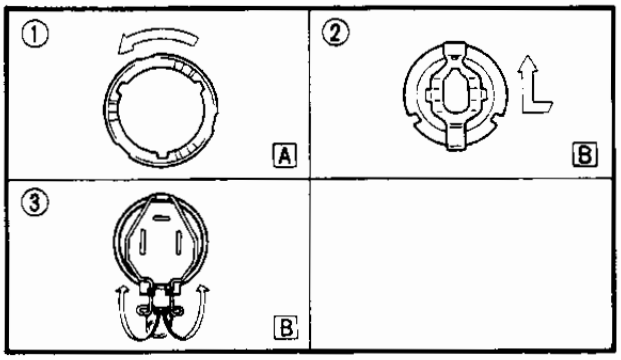


HEADLIGHT BULB REPLACEMENT

1. Remove:
   - Headlight covers ①



2. Disconnect:
   - Headlight coupler(s) ①
3. Remove:
   - Headlight bulb cover(s) ②



4. Remove:
   - Bulb holder

NOTE:

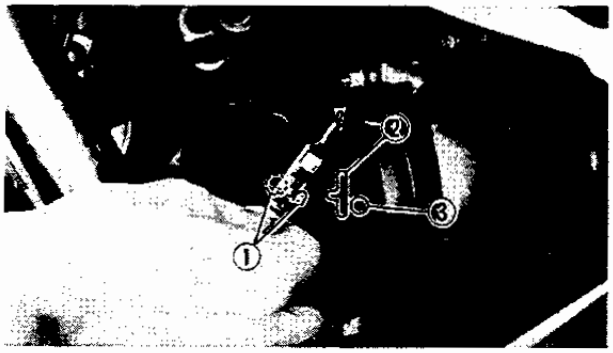
Removal is different according to the model. Remove the bulb holder by refering to illustration as shown.

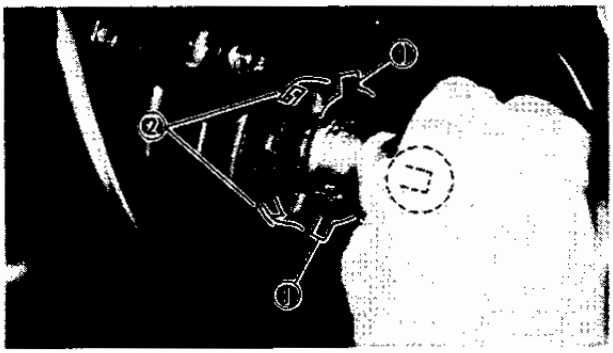
① Left side
② Right side
③ For CH
A Turn
B Unhook

5. Remove:
   - Bulb (defective)

WARNING:

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



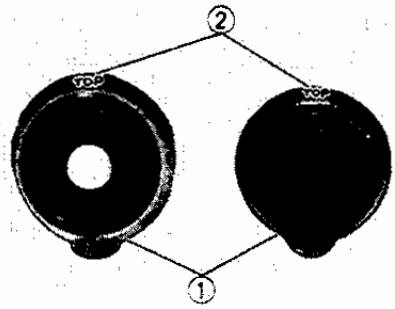


6. Install:
   - Bulb (new)

NOTE:
- Right side:
  Make sure that the projections ① on the bulb are meshed with the slot ② and hole ③ in the bulb case.
  (Except for CH)
- Left side:
  Make sure that the projections ① on the bulb are meshed with the slot ② in the bulb case.
  (Except for CH)

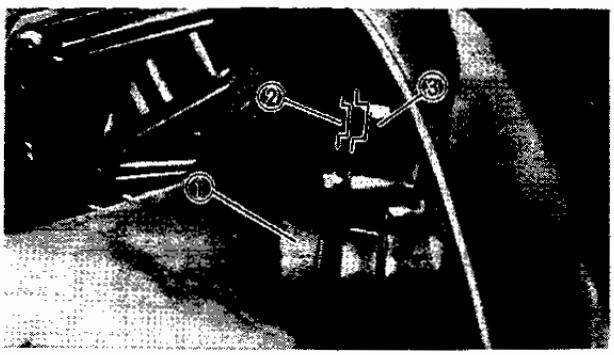
⚠ CAUTION:

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



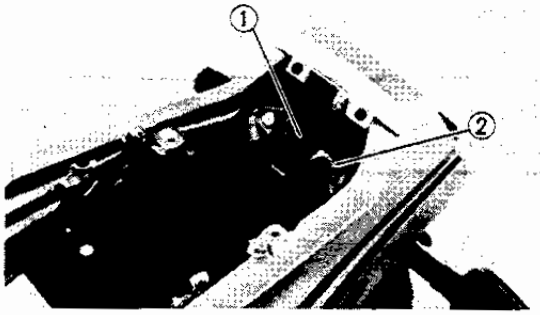
7. Install:
   - Bulb holders
8. Install:
   - Headlight bulb cover ①

NOTE:
Install the bulb covers so that the "TOP" mark faces ② upward.



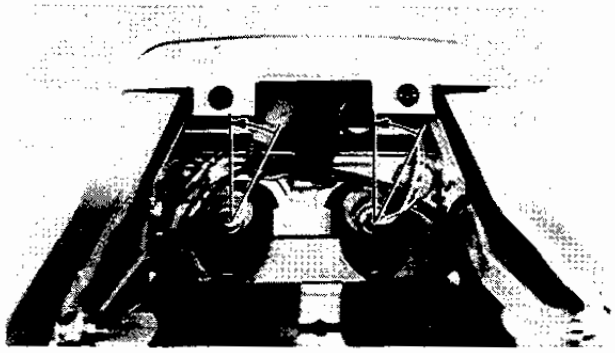
9. Connect:
   - Headlight coupler(s)
10. Install:
    - Headlight cover ①

NOTE:
Make sure that the projections ② on the cover are meshed with slots ③ on the headlight case.



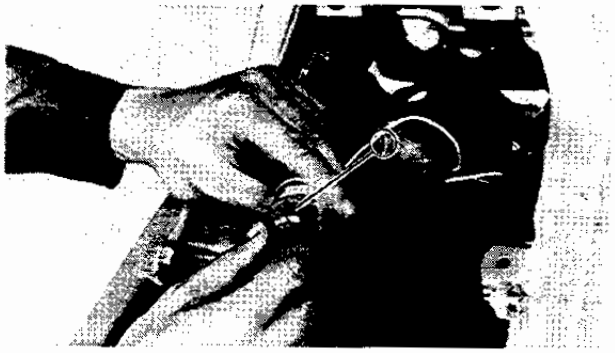
TAIL/BRAKE LIGHT BULB REPLACEMENT

1. Remove:
   - Seat
   - Band ①
   - Tool kit ②



2. Remove:
   - Bulb socket

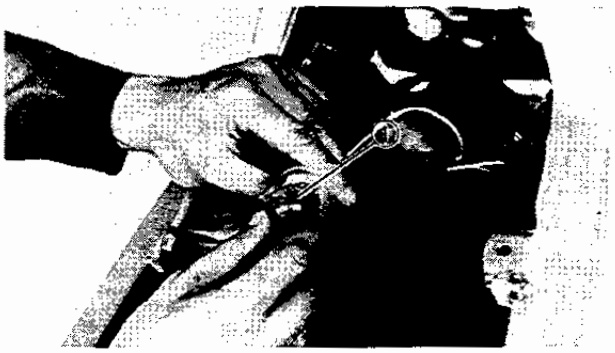
NOTE:
Turn the socket approximately 30° counterclockwise to remove it.



3. Remove:
   - Bulb (defective)

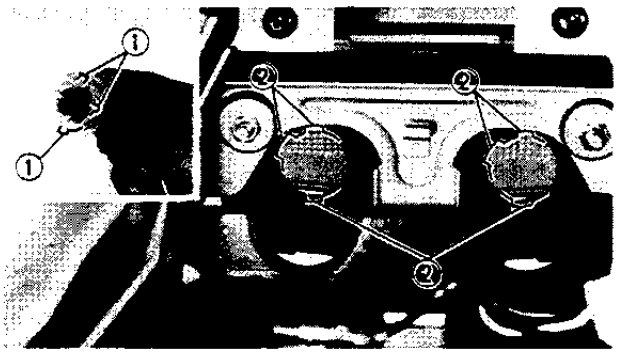
NOTE:
Turn the bulb ① counterclockwise while it is pushed.

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



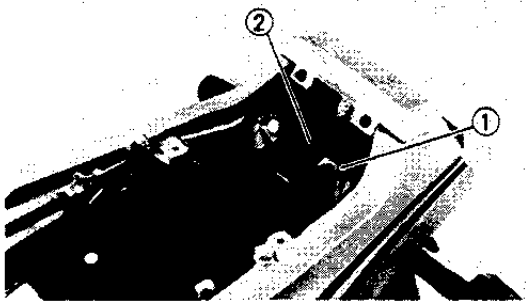
4. Install:
   - Bulb (new)

NOTE:
Turn the bulb ① clockwise while it is pushed.



5. Install:
   - Bulb socket

NOTE:
Make sure that the projections ① on the socket are meshed with slots ② on the headlight case.



6. Install:
   - Tool kit ①
   - Band ②
   - Seat

ENGINE OVERHAUL

ENGINE REMOVAL

NOTE:

It is not necessary to remove the engine in order to remove the following components:

- Cylinder head
- Clutch
- Water pump
- Starter motor
- AC generator

COWLINGS AND FUEL TANK

1. Remove:
   - Side cowlings (left and right)
   - Front cover
   - Seat
   - Side covers (left and right)

   Refer to the "COWLINGS" section in the CHAPTER 3.
   - Fuel tank

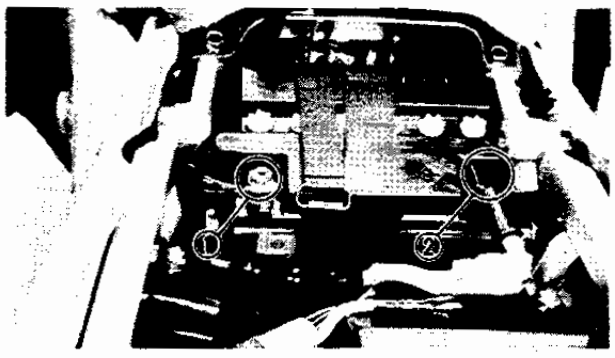
   Refer to the "FUEL TANK" section in the CHAPTER 3.

ENGINE OIL AND COOLANT

1. Drain:
   - Engine oil

   Refer to the "ENGINE OIL REPLACEMENT" section in the CHAPTER 3.
   - Coolant

   Refer to the "COOLANT REPLACEMENT" section in the CHAPTER 3.

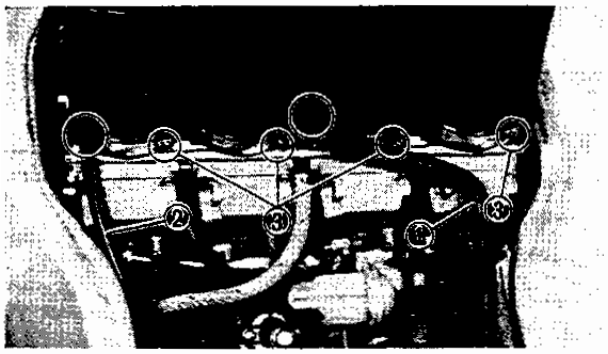


BATTERY LEADS

1. Disconnect:
   - Battery leads

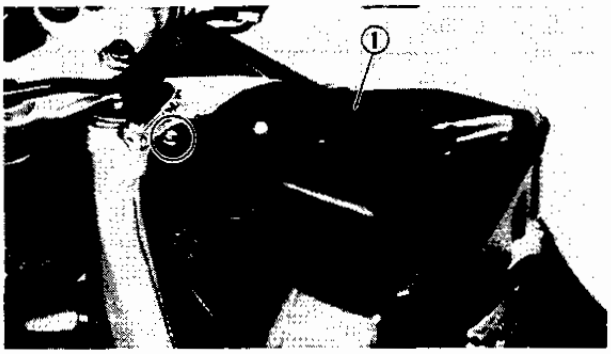
⚠ CAUTION:

Disconnect the negative lead ① first and then disconnect the positive lead ② .

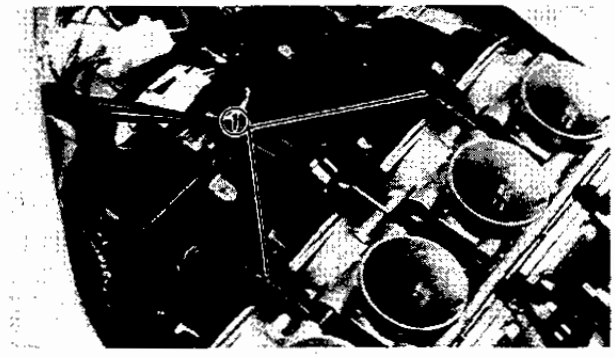


AIR FILTER CASE

1. Disconnect:
   - Ventilation hose (crank case) ①
   - Ventilation hose (air filter case) ②
2. Loosen:
   - Screw (air filter case – carburetor) ③

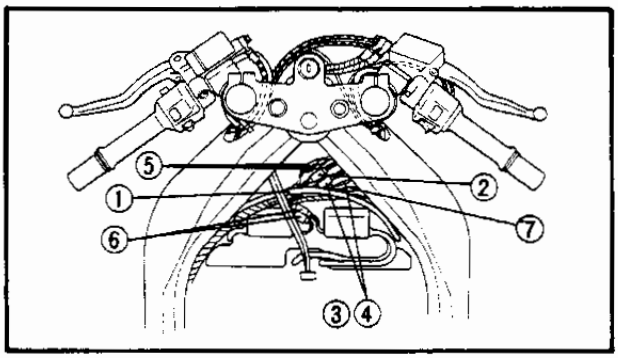


3. Remove:
   - Air filter case ①

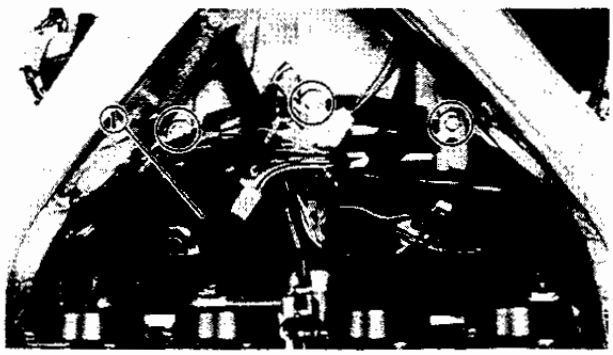


AIR BAFFLE PLATE

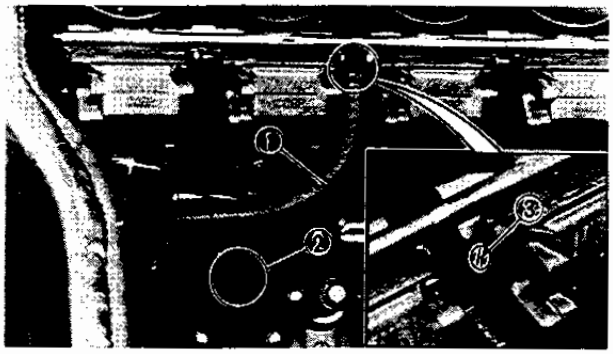
1. Disconnect:
   - Spark plug caps (from spark plugs)
   - Ventilation hoses (carburetor) ①



2. Remove:
   - Band ①
3. Disconnect:
   - Main switch coupler ②
   - Handlebar switch coupler ③ / lead ④
   - Front brake switch leads ⑤
   - Ignition coil couplers ⑥
   - Fan motor coupler ⑦



4. Remove:
   - Air baffle plate ① (with ignition coils)



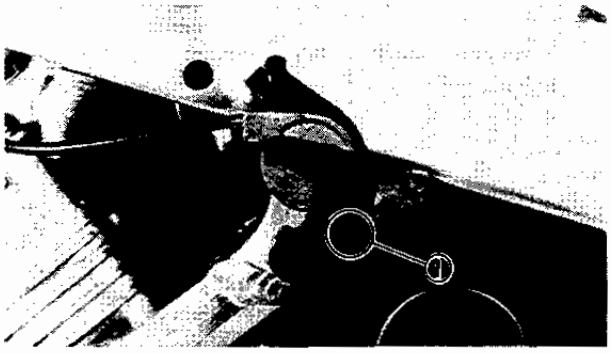
CARBURATOR

1. Loosen:
   - Screws (carburetor joint – lower)
2. Disconnect:
   - Fuel hose ①
   - Overflow hoses (carburetor) ②

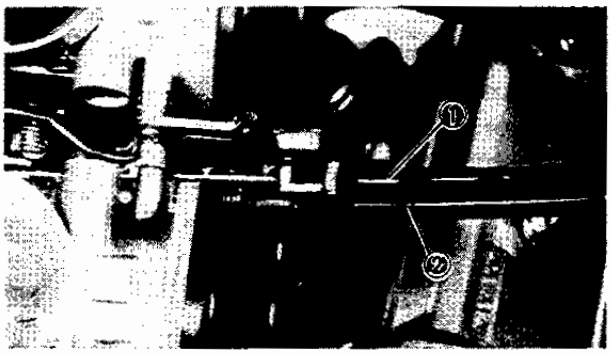
NOTE:

When disconnecting the fuel hose, the fuel strainer ③ may fall off.
Be careful not to lose this part.

3. Remove:
   - Fuel strainer ③



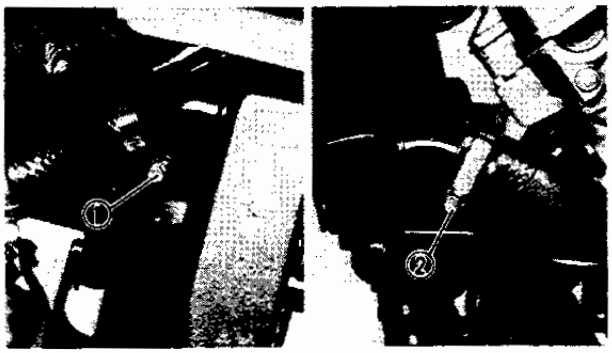
4. Remove:
   - Bolt (starter lever) ①
   - Carburetor assembly (with starter lever assembly)



5. Disconnect:
   - Throttle cable 1 ①
   - Throttle cable 2 ②

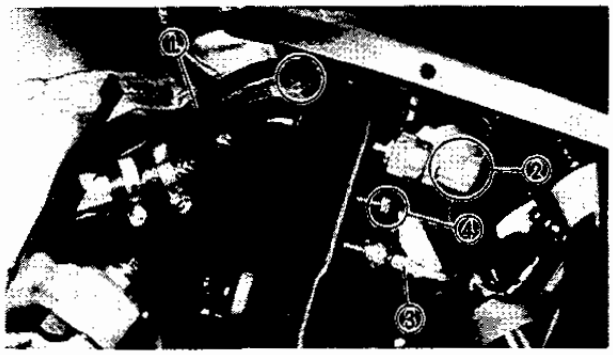
NOTE:

Cover the carburetor with a clean rag to prevent dirt or foreign material into the carburetor.

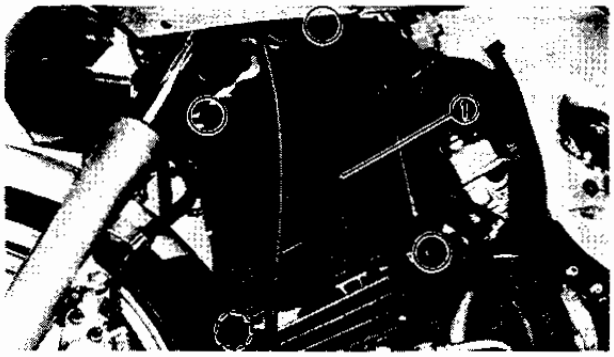


RADIATOR

1. Loosen:
   - Hose band (radiator hose – inlet) ①
   - Hose band (radiator hose – outlet) ②



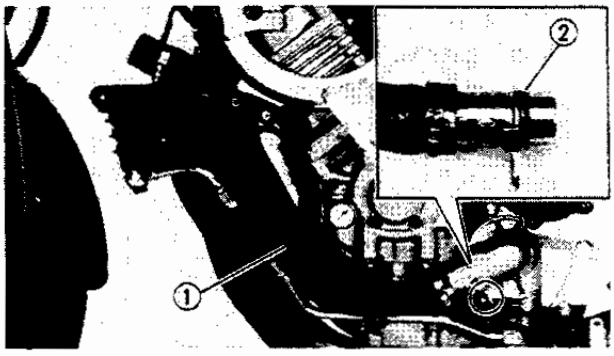
2. Disconnect:
   - Breather hose (radiator) ①
   - Thermo switch leads ②
   - Thermo unit lead ③
   - Ground lead ④



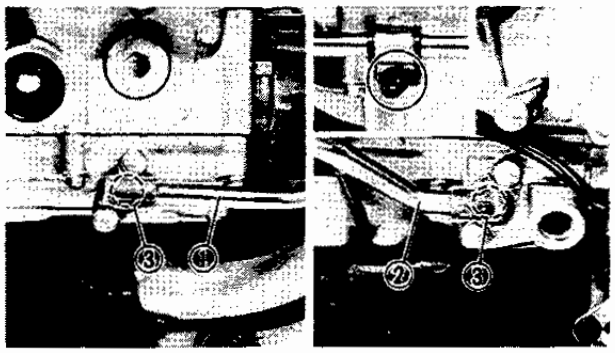
3. Remove:
   - Radiator assembly ①

⚠ CAUTION:

Cover the cylinder head cover and the fender with rugs to prevent a scratching.

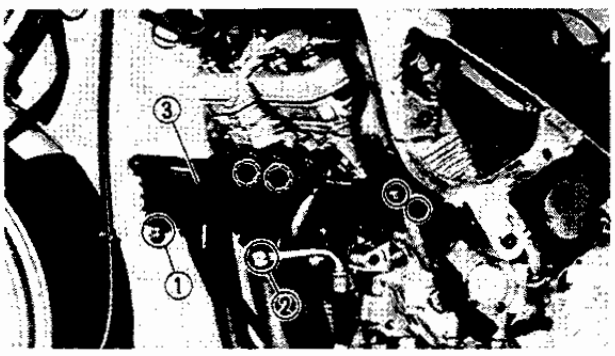


4. Remove:
   - Radiator hose/pipe ①
   - O-ring ②

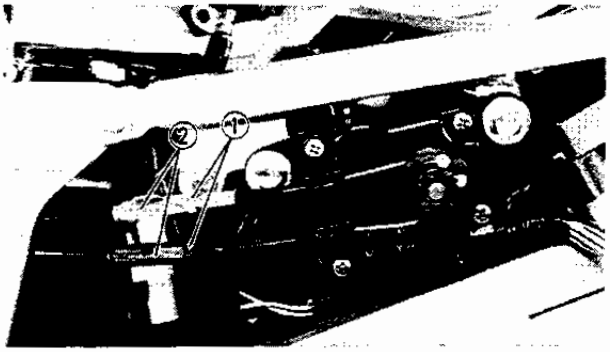


OIL COOLER

1. Disconnect:
   - Pipe (oil cooler – inlet) ①
   - Pipe (oil cooler – outlet) ②
     (with o-rings ③)

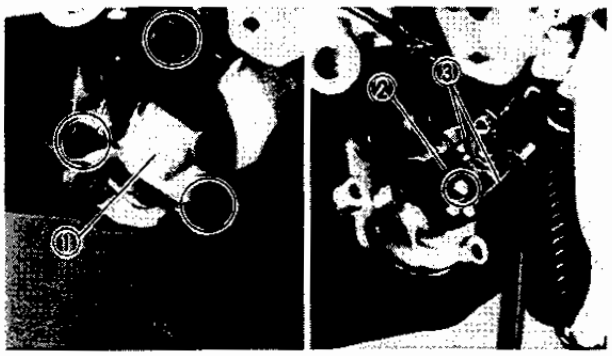


2. Remove:
   - Pipe (oil cooler – inlet) ①
   - Pipe (oil cooler – outlet) ②
   - Copper washers
3. Remove:
   - Oil cooler assembly ③

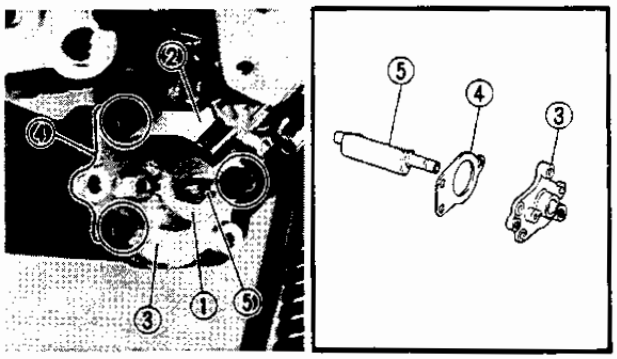


MUFFLER ASSEMBLY

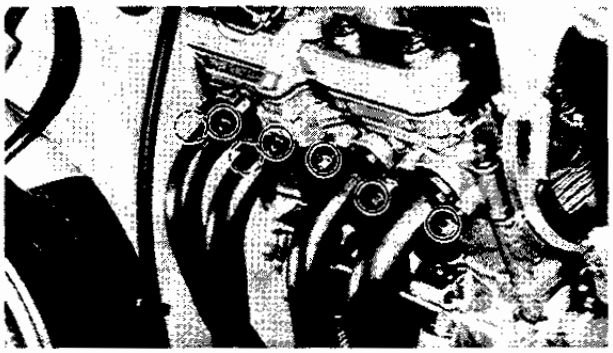
1. Fully loosen the locknuts ① and turn in the adjusters ② completely.



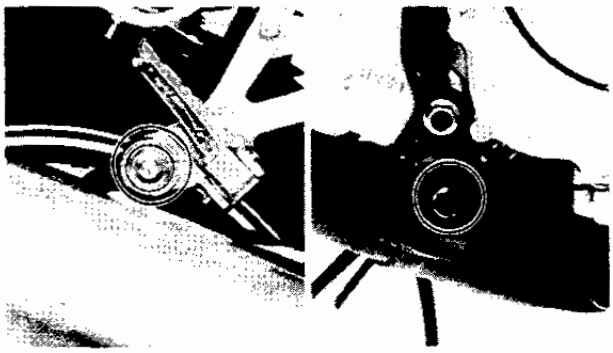
2. Remove:
   - Valve cover ①
   - Pulley ②
3. Disconnect:
   - EXUP cables ③

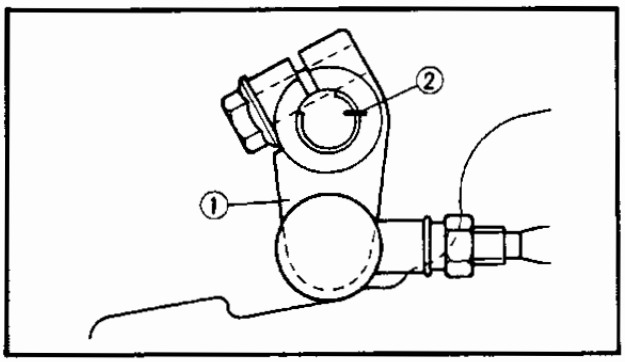


4. Remove:
   - Washer ①
   - Holder (EXUP cable) ②
   - Housing (valve) ③
   - Gasket (steel) ④
   - Valve (EXUP) ⑤



5. Remove:
   - Exhaust pipes
   - Muffler assembly



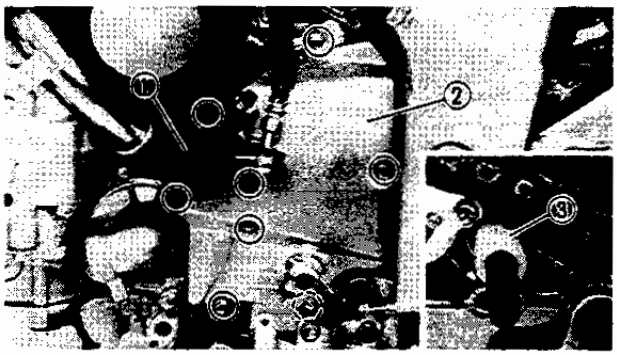


CLUTCH RELEASE CYLINDER AND DRIVE SPROCKET

1. Remove:
   - Shift pedal link ①

NOTE:

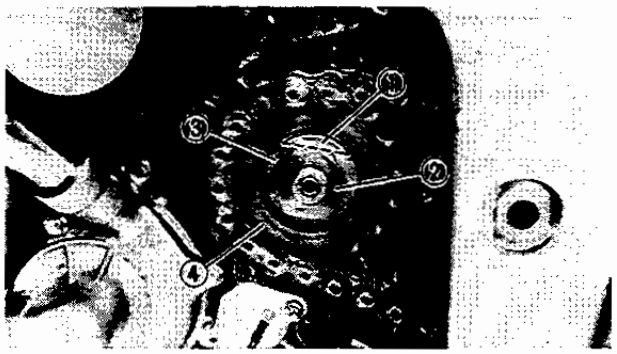
Put marks ② on the shift pedal joint and shift shaft before removing out so that the shift pedal joint can be reinstalled in the original position.



2. Remove:
   - Clutch release cylinder ①
   - Dowel pins
   - Crankcase cover (left) ②
   - Dowel pins
   - Gasket
   - Spacer collar (shift shaft) ③

3. Loosen:
   - Drive chain

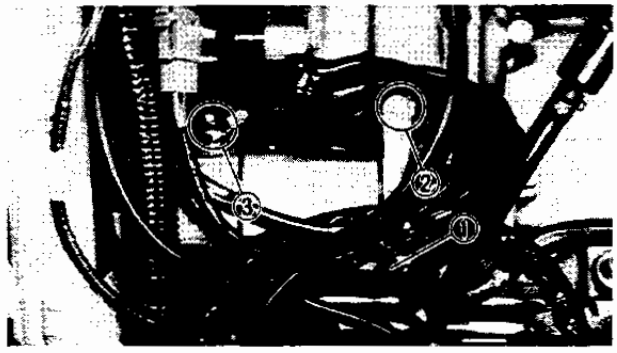
   Refer to the "DRIVE CHAIN SLACK ADJUSTMENT" section in the CHAPTER 3.



4. Straighten:
   - Lock washer tab ①
5. Remove:
   - Nut (drive sprocket) ②
   - Lock washer ③
   - Drive sprocket ④

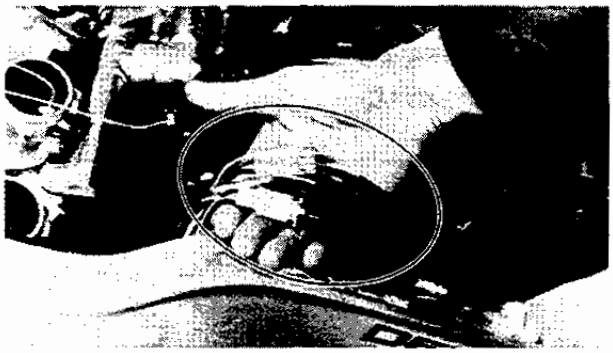
NOTE:

Loosen the nut (drive sprocket), whille applying the rear brake.

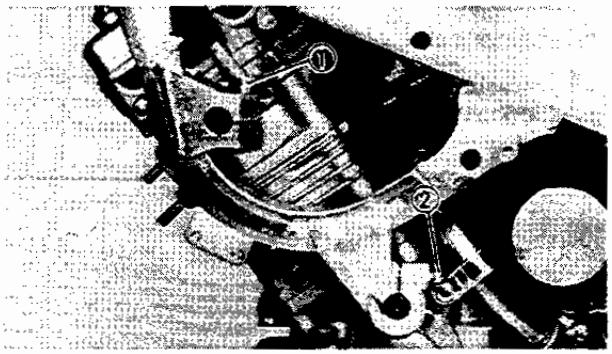


LEADS

1. Remove:
   - Band ①
2. Disconnect:
   - Lead (ground) ②
   - Lead (starter motor) ③

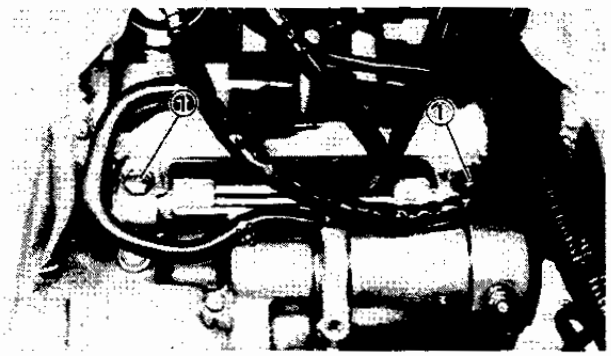


3. Disconnect:
   - Coupler (oil level/neutral switch)
   - Coupler (pick up coil)
   - Coupler (AC generator)
   - Leads (side stand switch)

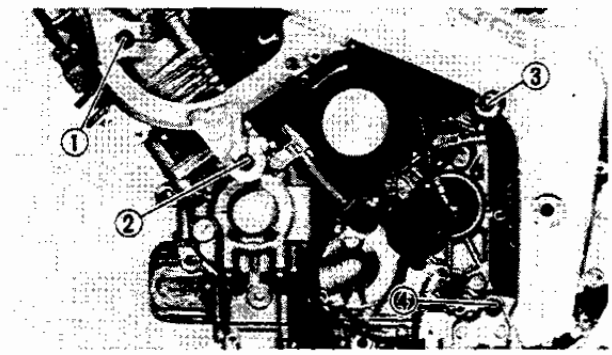


ENGINE REMOVAL

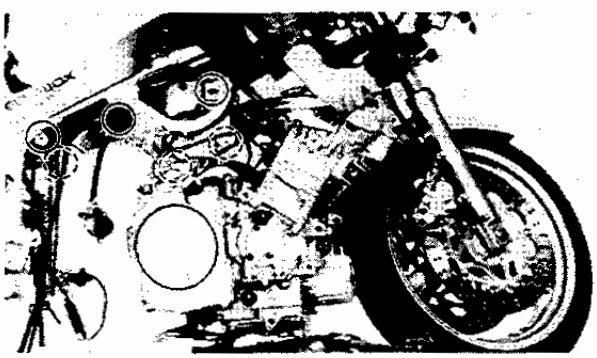
1. Place a suitable stand under the engine.
2. Loosen:
   - Pinch bolt (spacer) ①
   - Pinch bolt (spacer) ②



3. Loosen:
   - Pinch bolts (spacer) ①



4. Remove:
   - Mounting bolt (cylinder head) ①
   - Mounting bolt (cylinder) ②
   - Mounting bolt (rear – upper) ③
   - Mounting bolt (rear – lower) ④



5. Remove:
   - Engine assembly
     (from right side of motorcycle)
   - Mounting collars
     (from mounting boss on frame)

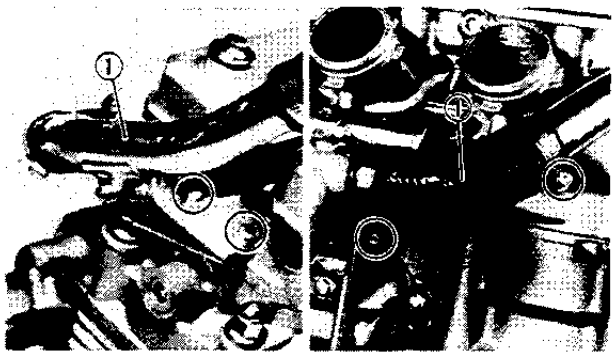
ENGINE DISASSEMBLY

CYLINDER HEAD COVER, CAMSHAFT AND CYLINDER HEAD

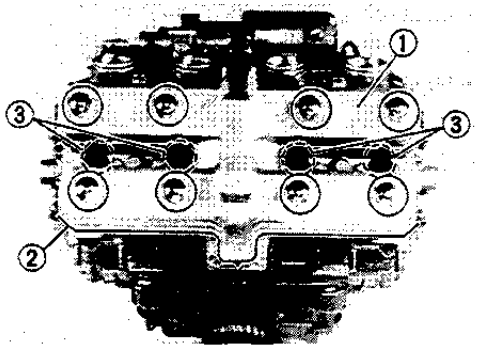
NOTE:

With the engine mounted, the cylinder head cover, camshaft and cylinder head can be maintained by removing the following parts.

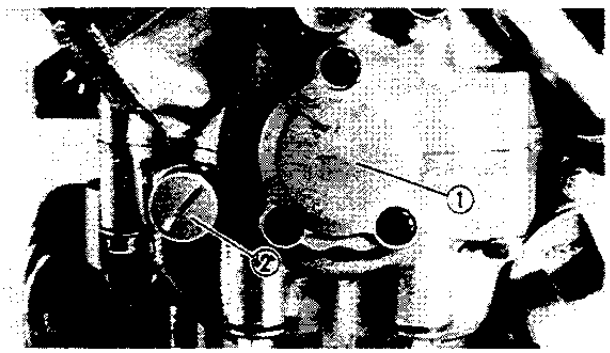
- Side cowlings
- Front cover
- Fuel tank
- Air filter case
- Radiator assembly
- Oil cooler assembly
- Air baffle plate



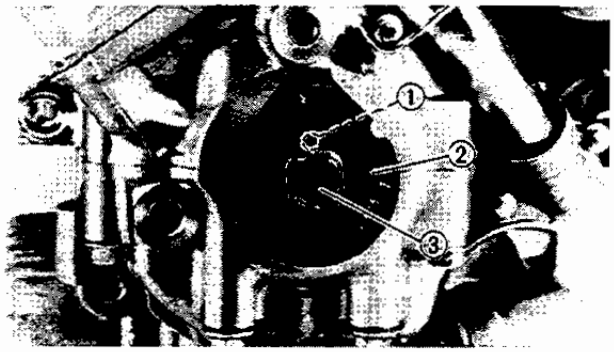
1. Remove:
   - Radiator hose/pipe (inlet) ①



2. Remove:
   - Cylinder head cover ①
   - Gasket (cylinder head cover) ②
   - Spark plugs ③



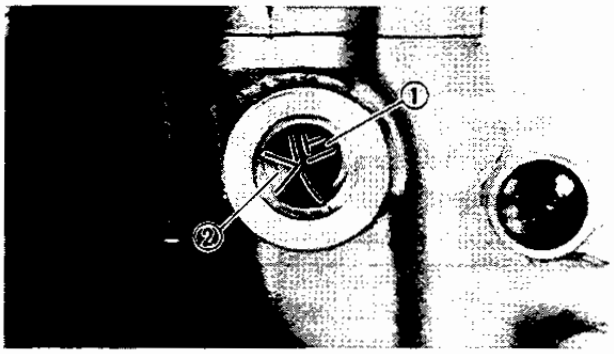
3. Remove:
   - Crankshaft end cover (left) ① (with o-ring)
   - Timing plug ② (with o-ring)



4. Attach:
   - Dowel pin ①
   - Timing rotor ②
   - Bolt (8 mm) ③

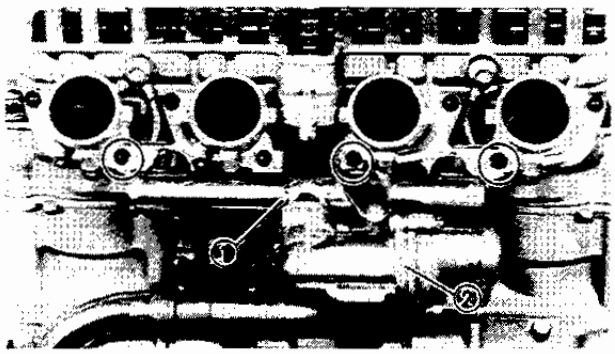
Dowel pin:
93604-08071
Timing rotor:
33M-81673-10

5. Tighten:
   - Bolt (8 mm) ③

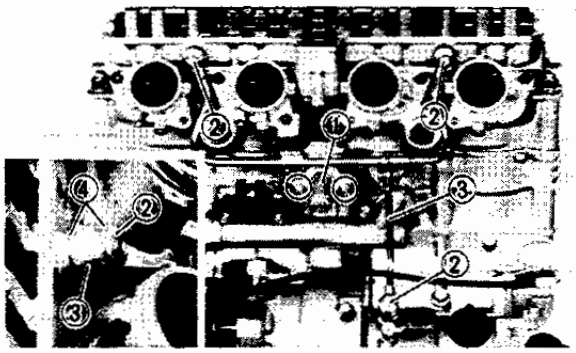


6. Align:
   - "T" mark
     (with stationary pointer)

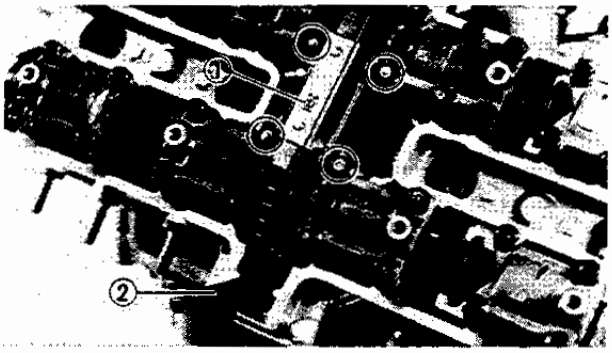
NOTE:
Turn the crankshaft counterclockwise and align the "T" mark ① on the crankshaft web with the stationary pointer ② when #1 piston is at TDC on compression stroke.



7. Remove:
   - Water jacket joint (inlet) ①
     (with thermostatic valve housing ②)



8. Remove:
   - Timing chain tensioner ①
   - Gasket
   - Union bolts ②
   - Oil delivery pipe 2 ③
   - Copper washers ④

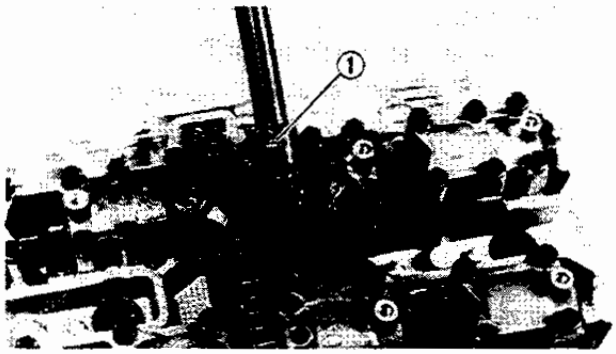


9. Remove:
   - Timing chain guide (upper) ①
   - Timing chain guide (exhaust side) ②

NOTE:
- Select either of the two procedures explained in this manual, as follows:

- **Procedure 1.**
  For engine service except cylinder head disassembly.
  → Disconnect the cam chain.
  The pistons and cylinder can be removed without removing the camshafts.

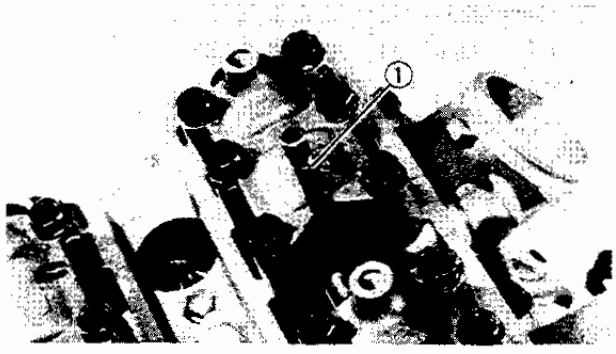
- **Procedure 2.**
  For engine service including cylinder head disassembly.
  → Remove the cam caps and camshafts.
  The camshafts can be removed without disconnecting the cam chain.



Procedure 1.

1. Disconnect:
   - Timing chain
     Use the timing chain cutter ①.

Timing chain cutter:
YM-01112
90890-01112



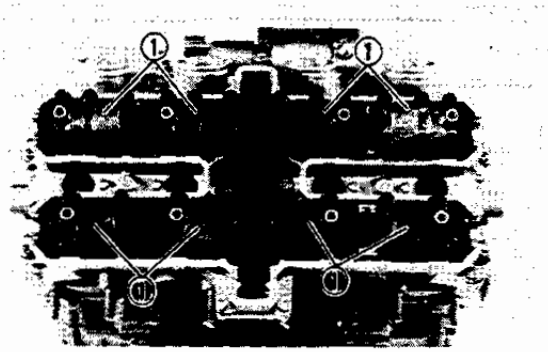
2. Remove:
   - Nuts (cylinder head)
     Use the hexagon wrench (6 mm) ①.

Hexagon wrench:
YM-3448
90890-01395

NOTE:
- Loosen the nuts in their proper loosening sequence.

• Follow numerical order shown in photo. Start by loosening each nut 1/2 turn until all are loose.

3. Remove:
   • Cylinder head
   • Gasket (cylinder head)
   • Dowel pins
4. Refer to "CYLINDER AND PISTON" section.



Procedure 2.

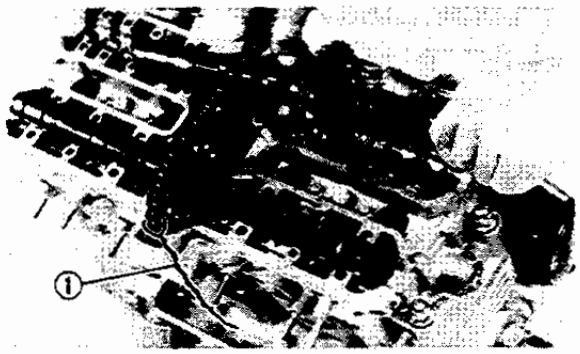
1. Remove:
   • Camshaft caps ①
   • Dowel pins

NOTE:

Remove the camshaft caps in a crisscross pattern from outermost to inner caps.

⚠ CAUTION:

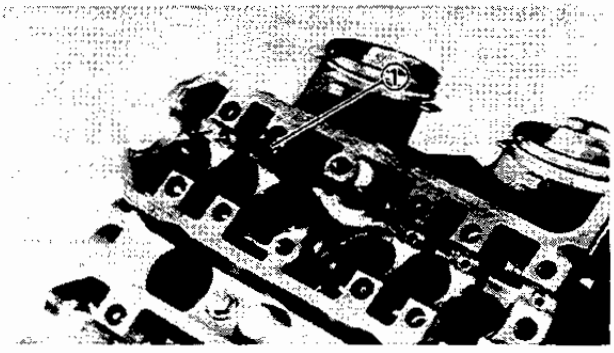
Do not rotate the camshaft because valve damage may occur.



2. Remove:
   • Camshafts

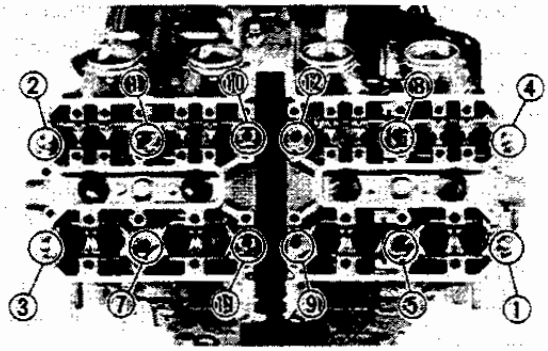
NOTE:

Fasten a safety wire ① to the timing chain to prevent it from falling into the crankcase.



3. Remove:
   • Bolts (cylinder head)
     Use the hexagon wrench (6 mm) ①.

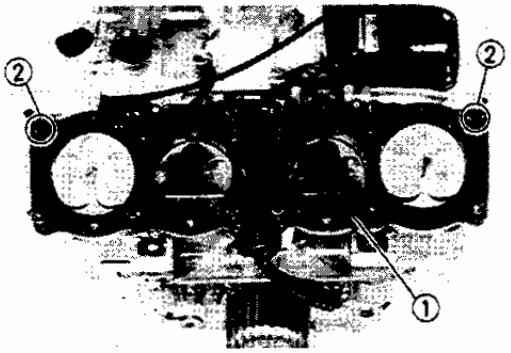
Hexagon wrench:
YM-3448
90890-01395



NOTE:
Loosen the bolts in their proper loosening sequence. Follow numerical order shown in photo. Start by loosening each nut 1/2 turn until all are loose.

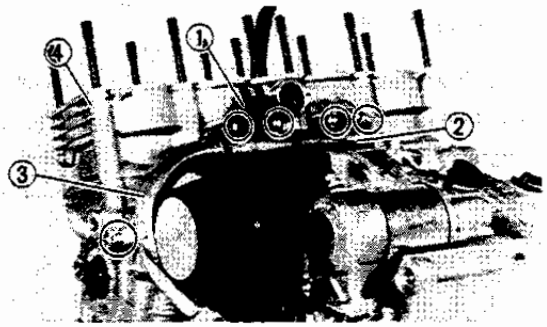
4. Remove:
   - Cylinder head
   - Camshaft case

NOTE:
Remove the cylinder head and camshaft case as a whole to prevent the valve lifters and adjusting pads from falling into the crankcase.

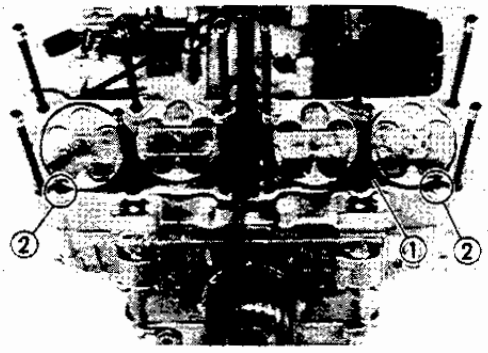


5. Remove:
   - Gasket (cylinder head) ①
   - Dowel pins ②

CYLINDER AND PISTON

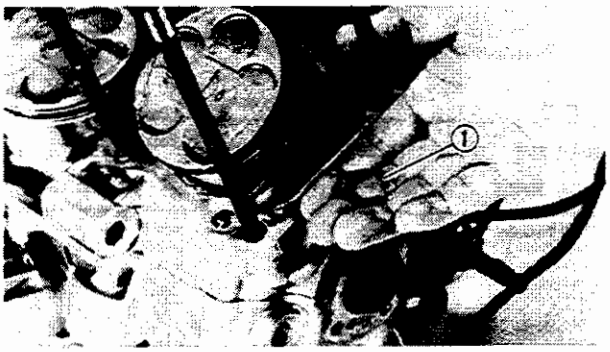


1. Remove:
   - Holder (air vent hose) ①
   - Water jacket joint ② (with o-ring)
   - Coolant feed pipe ③ (with o-ring)
   - Cylinder ④



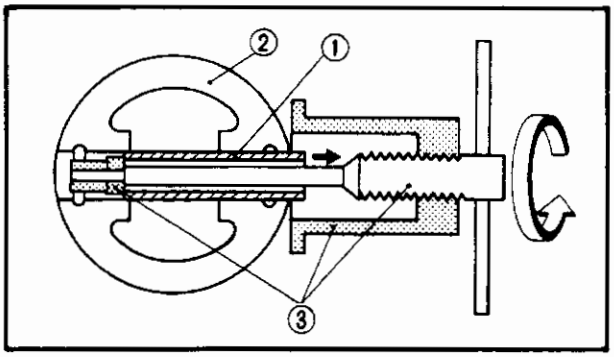
2. Remove:
   - Gasket (cylinder) ①
   - Dowel pins ②

NOTE:
Put identification marks on the each piston head for reference during reinstallation.



3. Remove:
   • Circlips (piston pin) ①

NOTE:
Before removing the piston pin circlip, cover the crankcase with a clean rag to prevent the circlip from falling into the crankcase cavity.



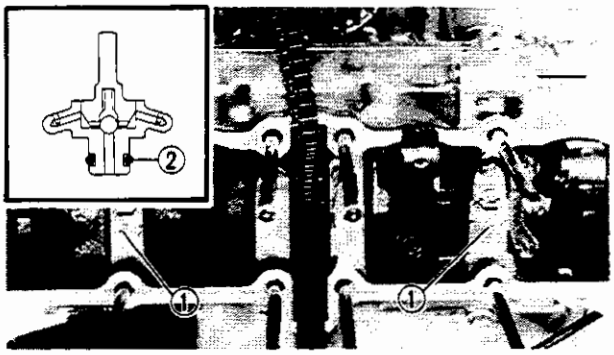
4. Remove:
   • Piston pins ①
   • Pistons ②

NOTE:
Before removing the piston pin, deburr the clip grooved and pin hole area. If the piston pin groove is deburred and piston pin is still difficult to remove, use the piston pin puller.



Piston pin puller ③:
YU-01304
90890-01304

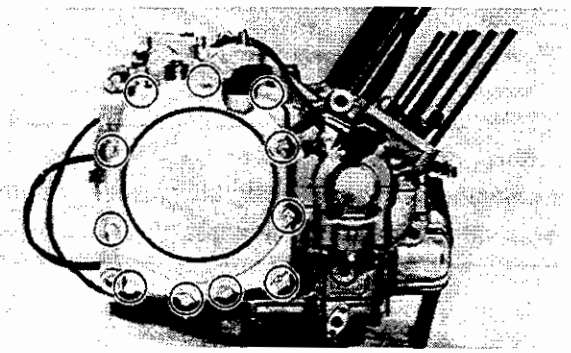
⚠ CAUTION:
Do not use a hammer to drive the piston pin out.



5. Remove:
   • Oil-Jet nozzles ①
   (with o-ring ②)

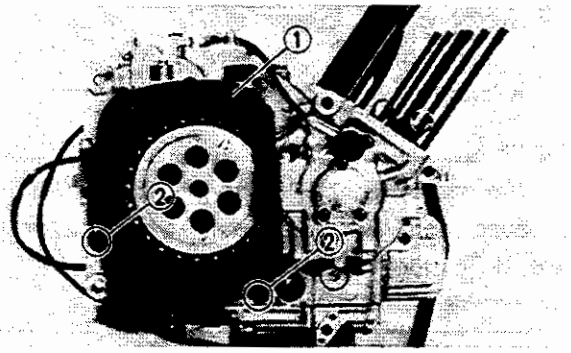
CLUTCH

NOTE:
With the engine mounted, the clutch assembly can be maintained by removing the following parts.
• Side cowling (right)
• Crankcase cover (right)

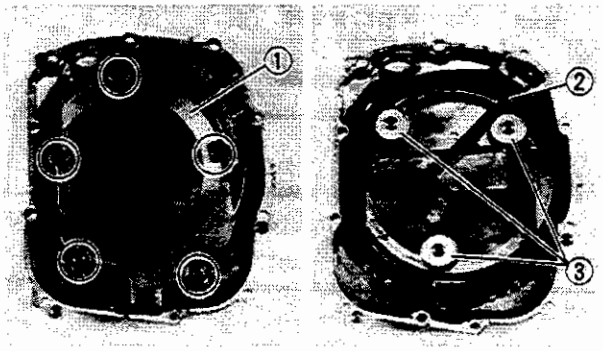


1. Remove:
   - Crankcase cover (right)

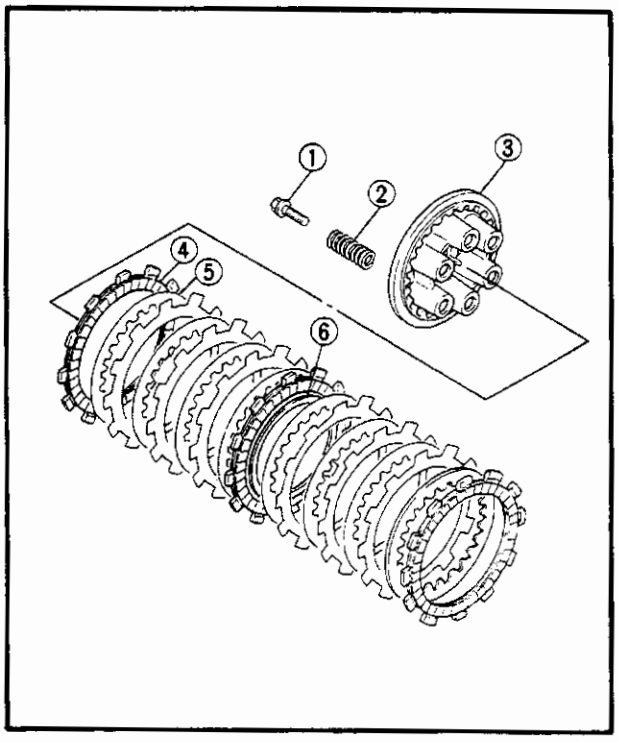
NOTE:
Working in a crisscross pattern, loosen bolts 1/4 turn each. Remove them after all are loosened.



2. Remove:
   - Gasket ①
   - Dowel pins ②

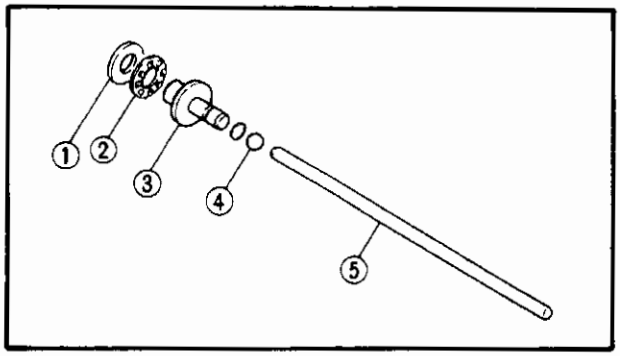


3. Remove:
   - Cover (breather) ①
   - Gasket ②
   - Washer ③
   - Rubber ring
   - Cover

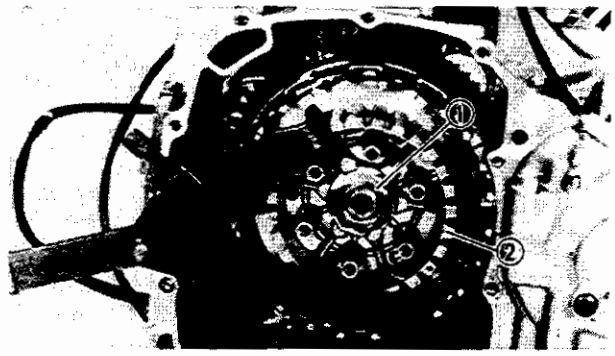


4. Remove:
   - Bolts (pressure plate) ①
   - Clutch springs ②
   - Pressure plate ③
   - Friction plates ④
   - Clutch plates ⑤
   - Cushion spring ⑥

NOTE:
Loosen the bolts in a crisscross pattern.



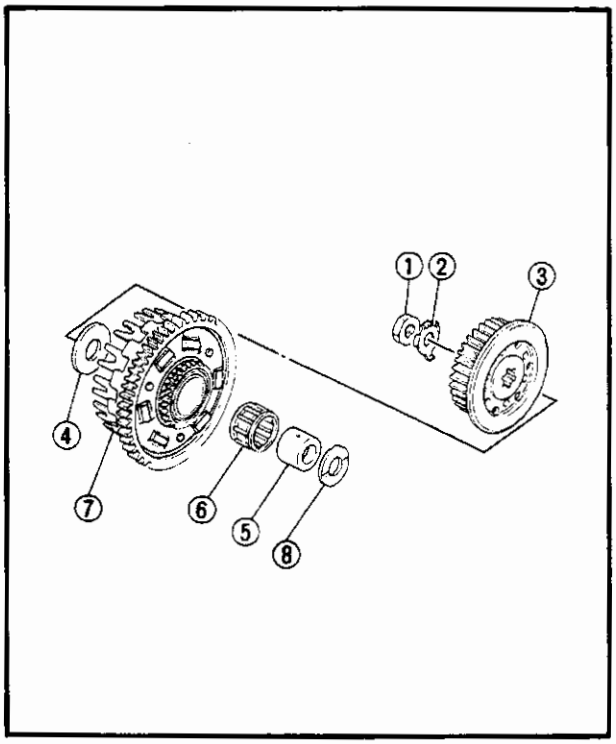
5. Remove:
   - Washer ①
   - Bearing ②
   - Push rod #1 ③
   - Ball ④
   - Push rod #2 ⑤



6. Straighten the lock washer tabs.
7. Loosen:
   - Nut (clutch boss) ①

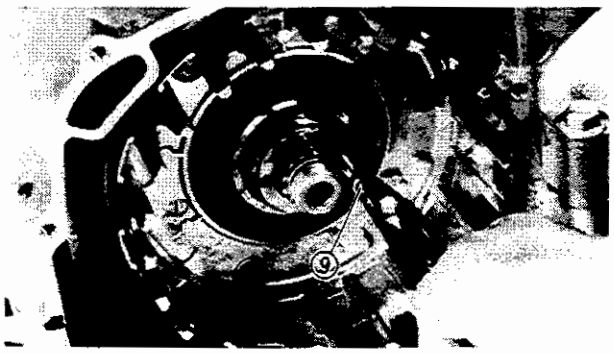
NOTE:
Loosen the nut ① (clutch boss) while holding the clutch boss ② with the universal clutch holder.

Universal clutch holder:
YM-91042
90890-04086



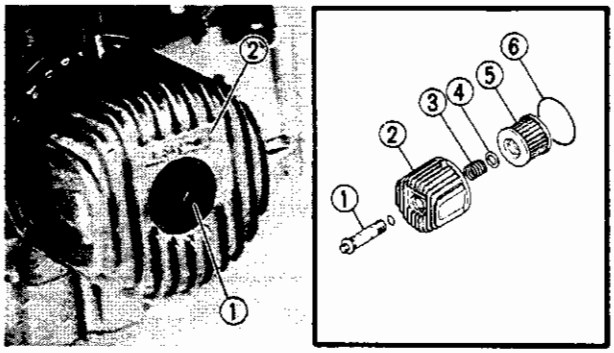
8. Remove:
   - Nut (clutch boss) ①
   - Lock washer ②
   - Clutch boss ③
   - Thrust washer ④
   - Spacer ⑤
   - Bearing ⑥
   - Clutch housing ⑦
   - Thrust washer ⑧

NOTE:
Install the 5 mm (0.2 in) screw ⑨ into the spacer Then remove the spacer by pulling on the screw.

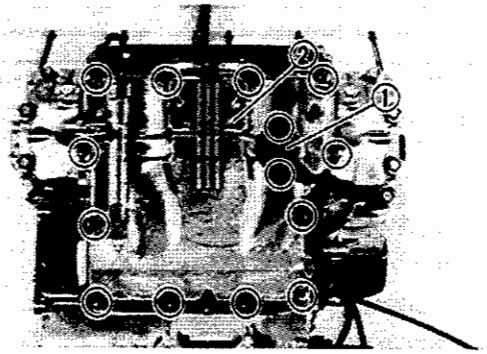


OIL PAN, OIL FILTER AND OIL STRAINER

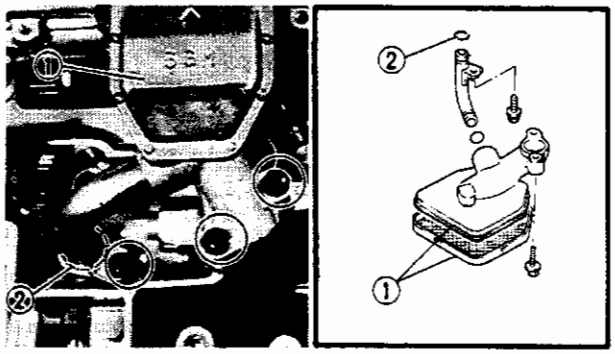
NOTE:
With the engine mounted, the oil pan and oil strainer can be maintained by removing the following parts.
- Side cowlings
- Front cover
- Exhaust pipes



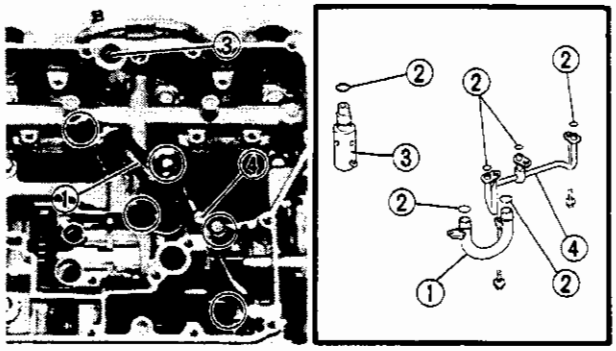
1. Remove:
   - Bolt (oil filter) ①
   - Filter cover ②
   - Spring ③
   - Washer ④
   - Oil filter ⑤
   - O-ring ⑥



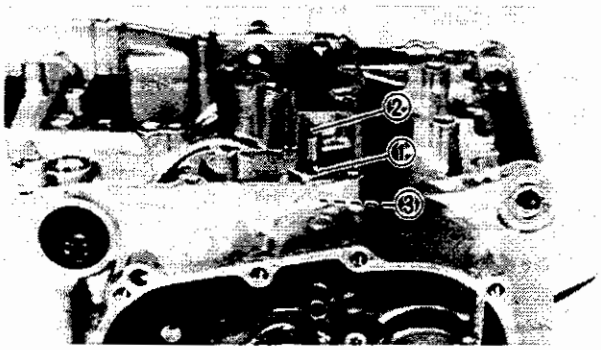
2. Remove:
   - Oil level switch ①
   - Oil pan ②
   - Gasket (oil pan)
   - Neutral switch lead



3. Remove:
   - Oil strainer assembly ①
   - O-ring ②



4. Remove:
   - Oil pipe 2 ①
   - O-rings ②
   - Relief valve ③
   - Oil delivery pipe 1 ④



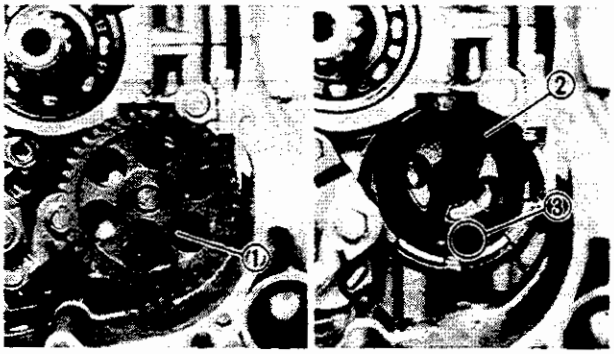
5. Remove:
   - Circlip ①
   - Oil pipe ②
   - Mount rubber ③

OIL PUMP AND SHIFT SHAFT

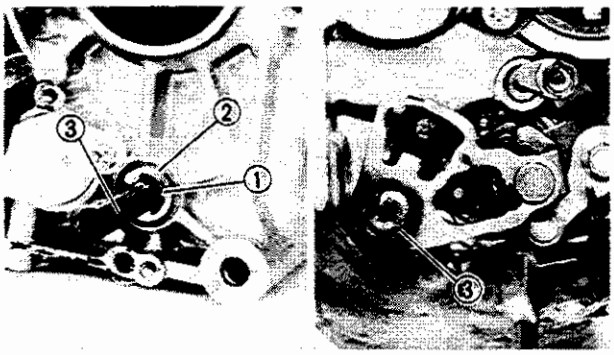
NOTE:

With the engine mounted, the oil pump and shift shaft can be maintained by removing the following parts.

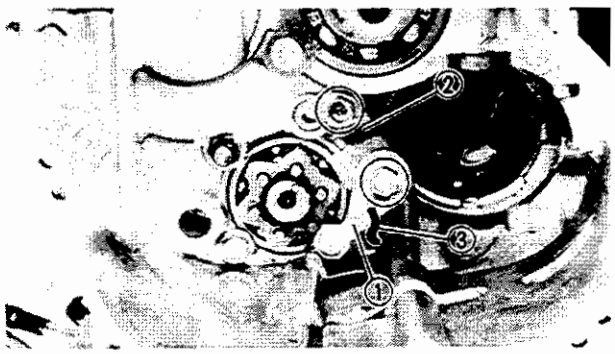
- Side covers
- Front cover
- Crankcase covers (left and right)
- Clutch housing



1. Remove:
   - Oil pump assembly ①
   - Gasket ②
   - Dowel pin ③



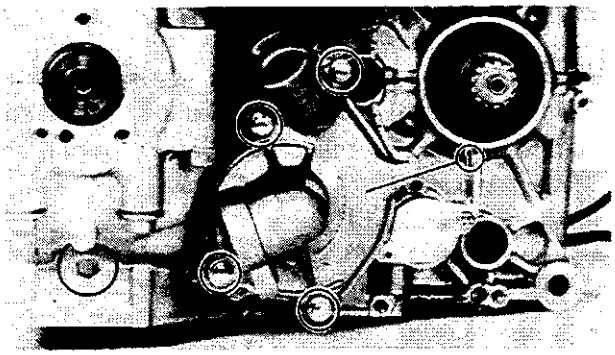
2. Remove:
   - Circlip ①
   - Washer ②
   - Shift shaft assembly ③



3. Remove:
   - Stopper lever ①
   - Stopper plate (shift fork guide bar) ②
   - Spring ③

WATER PUMP

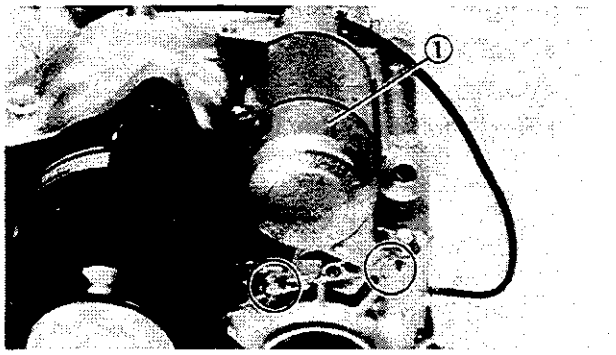
NOTE:
With the engine mounted, the water pump can be maintained by removing the following parts.
- Side covers
- Front cover
- Crankcase cover (left)
- Radiator hose/pipe (outlet)



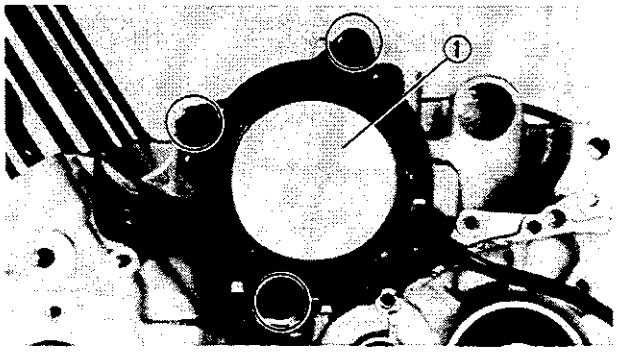
1. Remove:
   - Water pump assembly ①

STARTER MOTOR AND A.C. GENERATOR

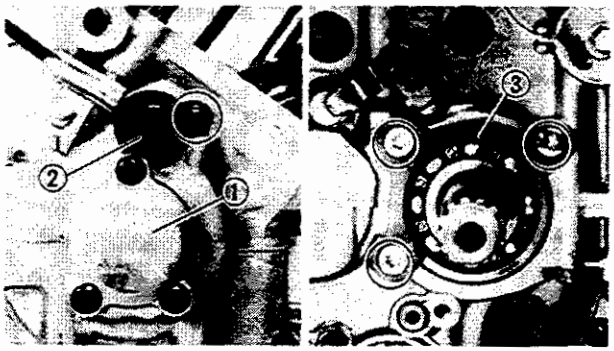
NOTE:
With the engine mounted, the starter motor and A.C. generator can be maintained by removing the following parts.
- Side cowlings (left and right)
- Front cover

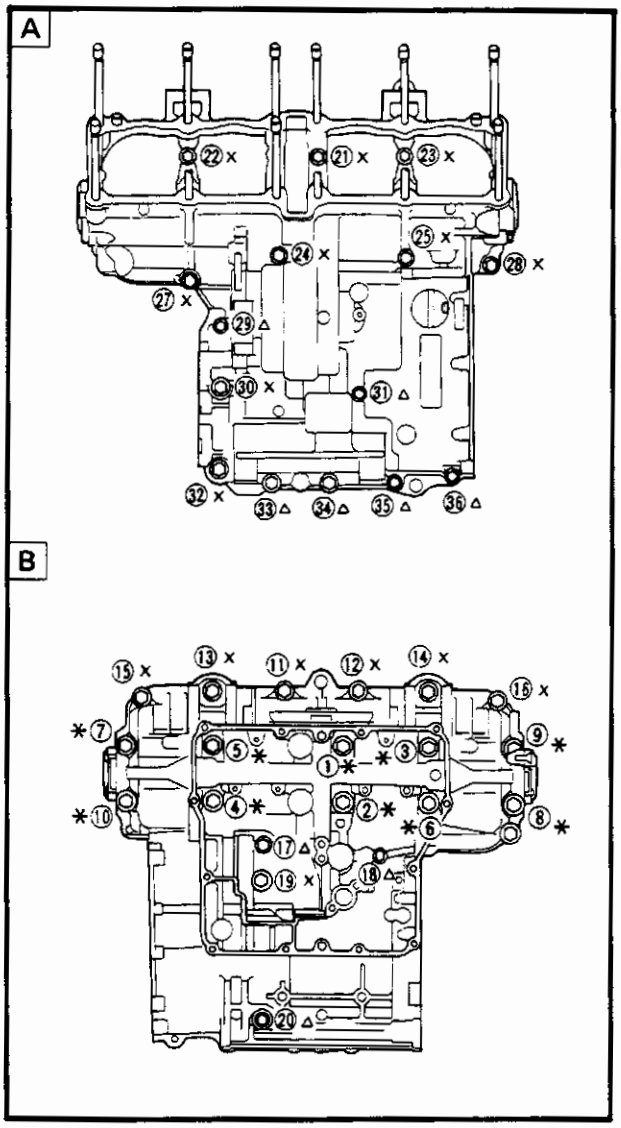


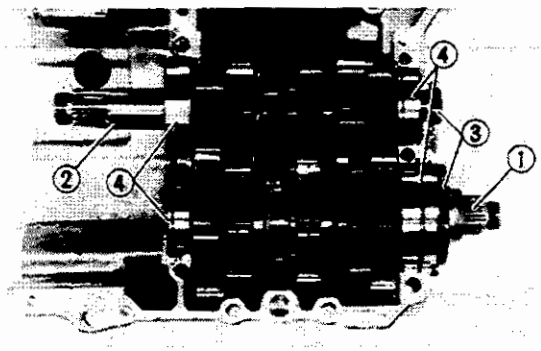
1. Remove:
   - Starter motor ①



2. Remove:
   - AC generator ①







CRANKCASE DISASSEMBLY

1. Remove:
   - Crankshaft end cover (right) ①
   - Pickup coil ②
   - Bearing retainer (main axle) ③

   Use the torx wrench (T30).

	Torx wrench (T30): **YU-29843-6** **90890-05245**

2. Remove:
   - Bolts (crankcase)

NOTE:

- Remove the bolts starting with the highest numbered one.
- The embossed numbers in the crankcase designate the crankcase tightening sequence.

3. Plate the engine upside down.
4. Remove:
   - Crankcase (lower)

⚠ CAUTION:

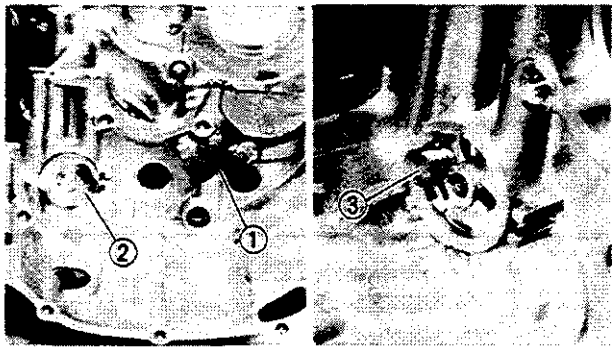
Use a soft hammer to tap on the case half. Tap only on reinforced portions of the case. Do not tap on the gasket mating surface. Work slowly and carefully. Make sure that the case halves separate evenly.

[A] Upper case
[B] Lower case
△ : 6 mm bolts
x : 8 mm bolts
✳ : 9 mm bolts

TRANSMISSION

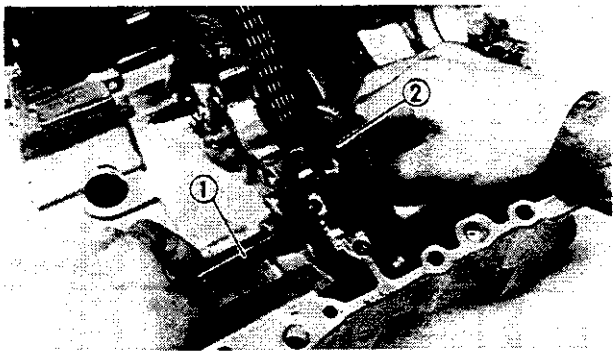
1. Remove:
   - Drive axle assembly ①
   - Main axle assembly ②
   - Oil seal ③

④ Bearing

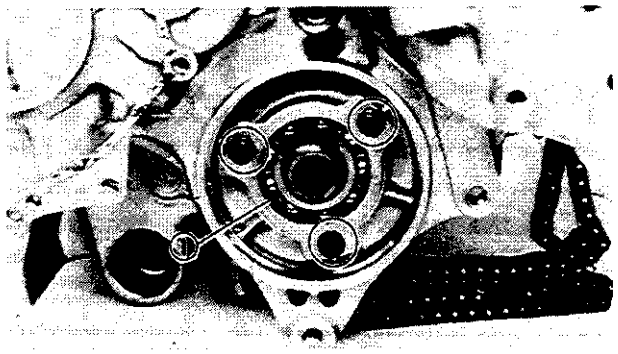


STARTER CLUTCH AND CRANKSHAFT

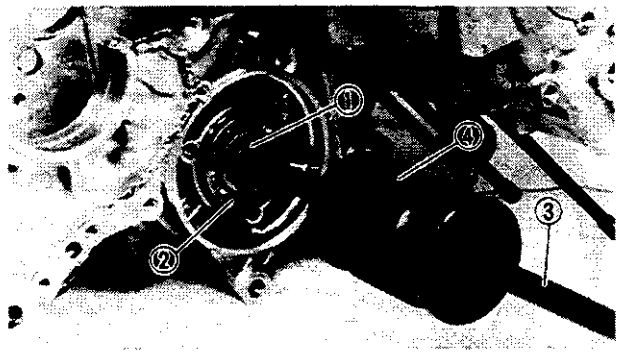
1. Remove:
   - Oil delivery pipe 5 ①
   - O-rings
   - Oil plug plate ②
   - Gasket
   - Oil splay nozzle ③



2. Remove:
   - Shaft ①
   - Starter idle gear ②



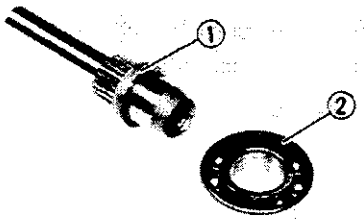
3. Remove:
   - Bearing retainer ①



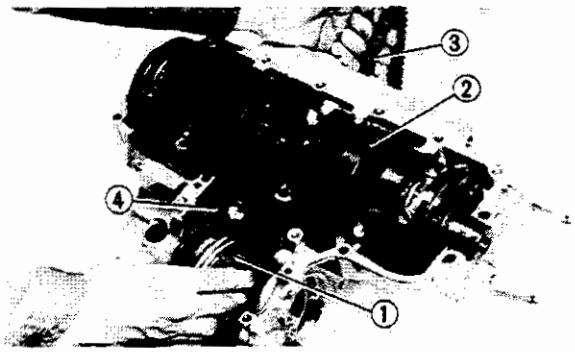
4. Remove:
   - Shaft (AC generator) ①
     (with bearing) ②
     Use the armature shock puller ③ and weight ④.

Armature shock puller:
YU-01047 – 3
90890-01290

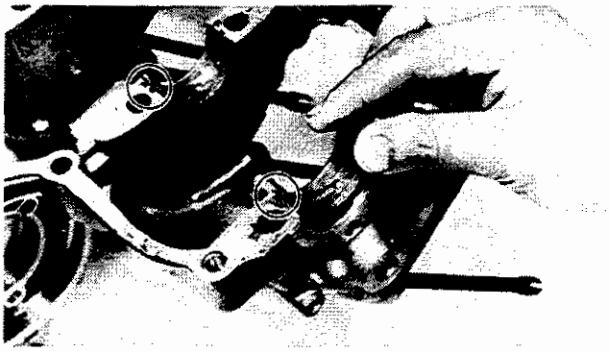
Weight:
YU-01047 – 2
90890-01291



① AC generator shaft
② Bearing

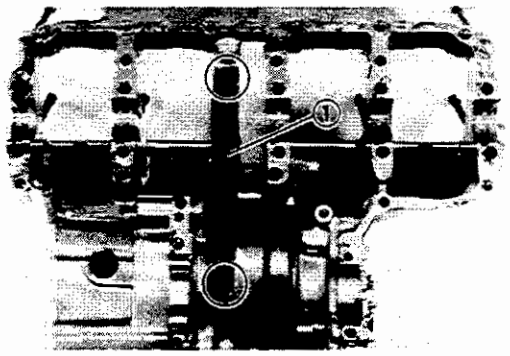


5. Remove:
   - Starter clutch assembly ①
   - Crankshaft assembly ②
   - Timing chain ③
   - HY-VO chain ④

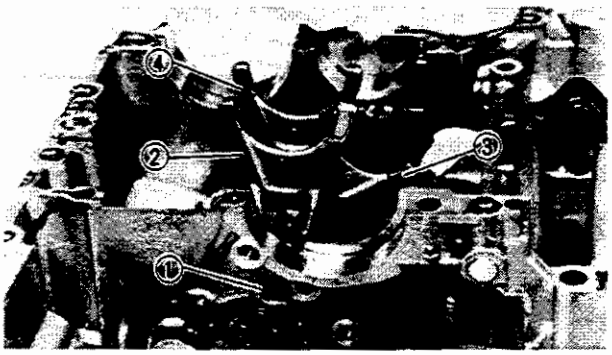


6. Remove:
   - Plane bearings (crankshaft)

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

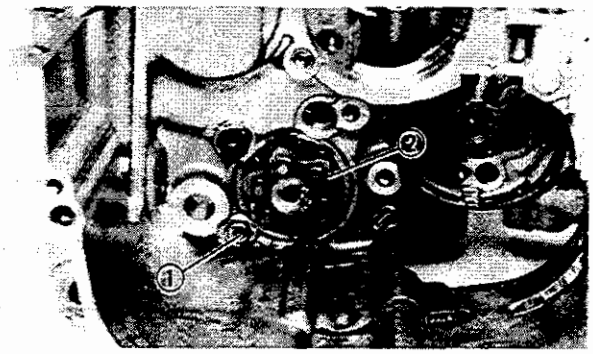


7. Remove:
   - HY-VO chain guide ①

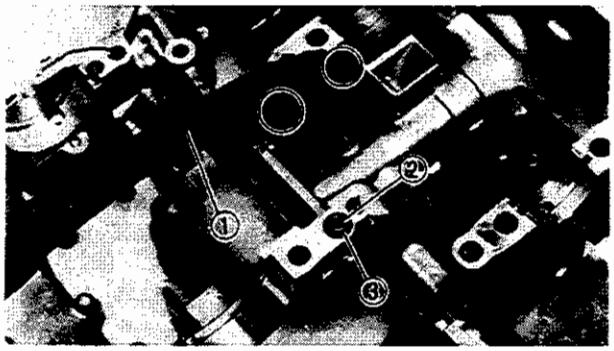


SHIFT FORK AND SHIFT CAM

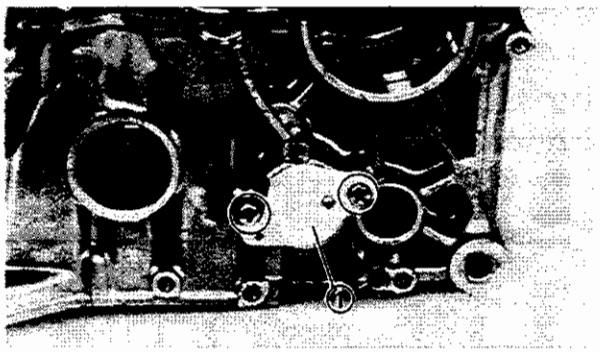
1. Remove:
   - Guide bar (shift fork) ①
   - Shift fork "R" ②
   - Shift fork "C" ③
   - Shift fork "L" ④



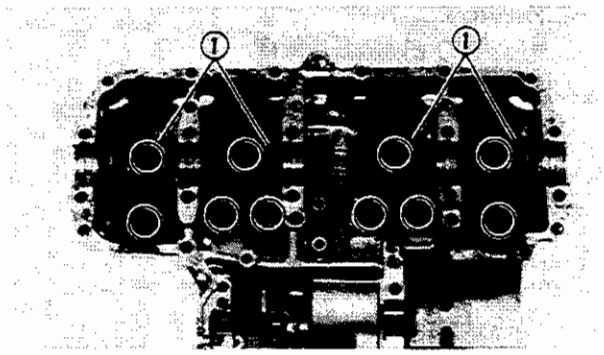
2. Remove:
   - Bolt ①
   - Shift cam assembly ②



3. Remove:
   - Timing chain guide (intake side) ①
   - Dowel pin ②
   - O-ring ③



4. Remove:
   - Neutral switch ①

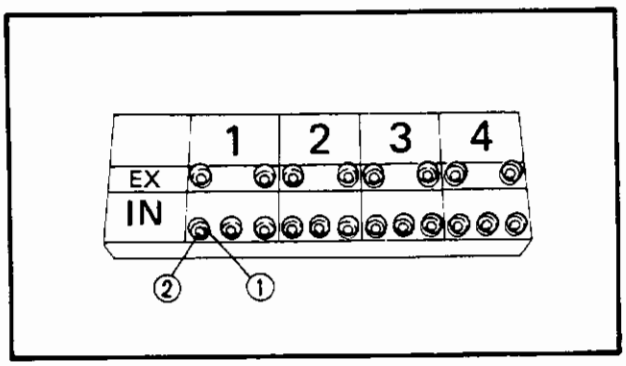


5. Remove:
   - Baffle plates (engine oil) ①

VALVE AND CAMSHAFT CASE

NOTE:

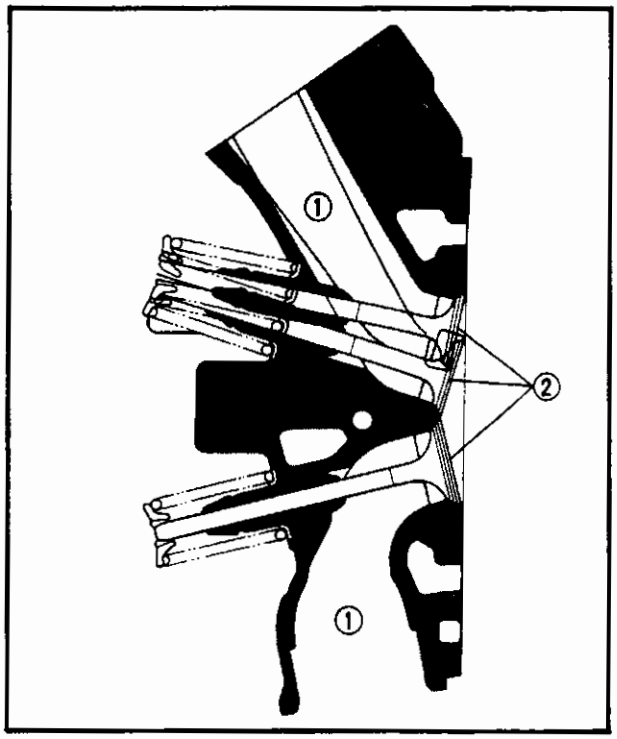
Before removing the internal parts (valve, valve spring, valve seat etc.) of the cylinder head.
The valve sealing should be checked.



1. Remove:
   - Lifters
   - Pads
   - Spark plugs

NOTE:

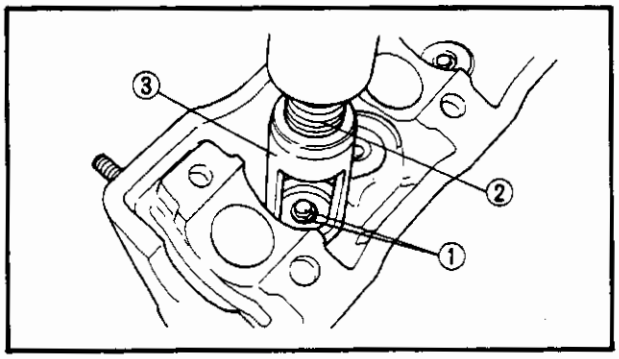
Identify each lifter ① and pad ② position very carefuly so that it can be reinstalled in its original place.



2. Check:
   - Valve sealing

   Leakage at valve seat → Inspect the valve face, valve seat and valve seat width.
   Refer to the "INSPECTION AND REPAIR – VALVE SEAT".

Checking Steps:
- Pour a clean solvent ① into the intake and exhaust ports.
- Check the valve seating.
  There should be no leakage at the valve seat ② .



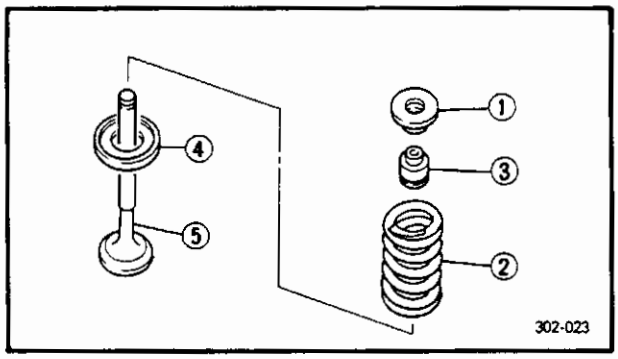
3. Remove:
   - Valve cotters ①

NOTE:
Attach the valve spring compresser ② and attachment ③ between the valve retainer and cylinder head to remove the valve cotters.



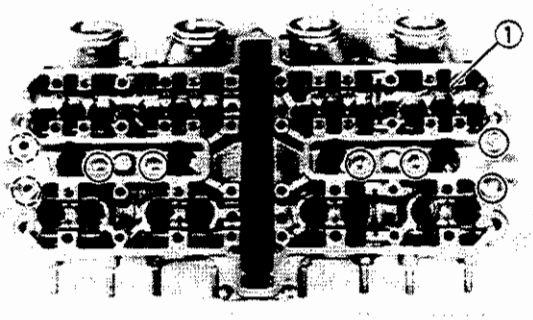
Valve spring compresser:
YM-04019
90890-04019

Attachment:
(For exhaust valve)
YM-04108
90890-04108
(For intake valve)
YM-04114
90890-04114

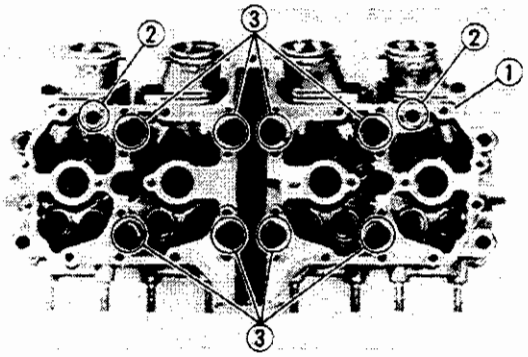


4. Remove:
   - Valve retainers ①
   - Valve spring ②
   - Oil seal ③
   - Spring seat ④
   - Valve ⑤

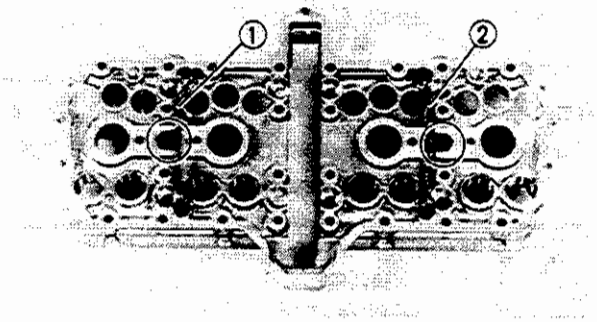
NOTE:
Identify each part position very carefuly so that it can be reinstalled in its original place.



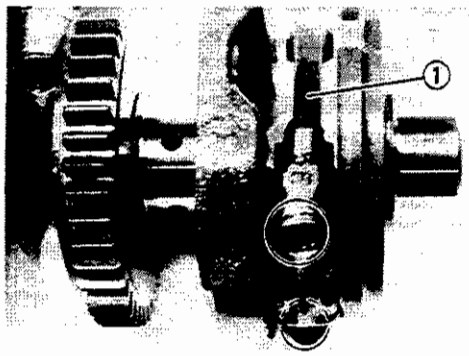
5. Remove:
   - Camshaft case ①



6. Remove:
   - Gasket (camshaft case) ①
   - Dowel pins ②
   - Nuts (cylinder head) ③
   - Washers

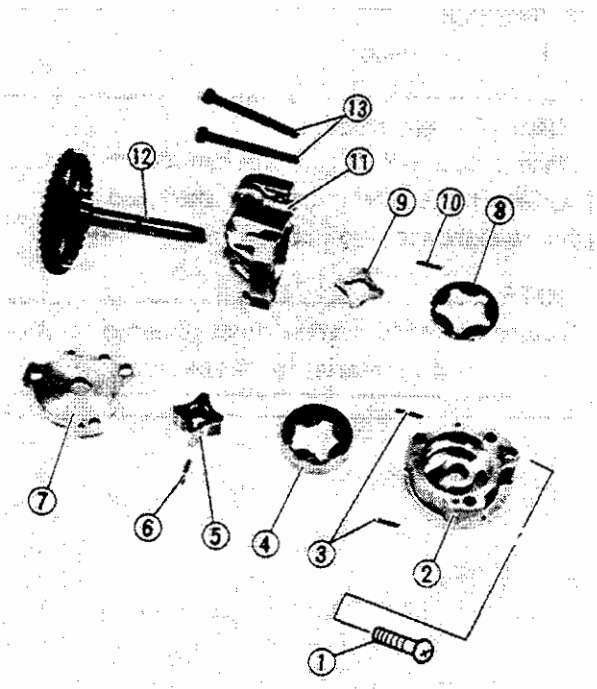


7. Remove:
   - Oil delivery pipe 3 ①
   - Oil delivery pipe 4 ②
   - O-rings



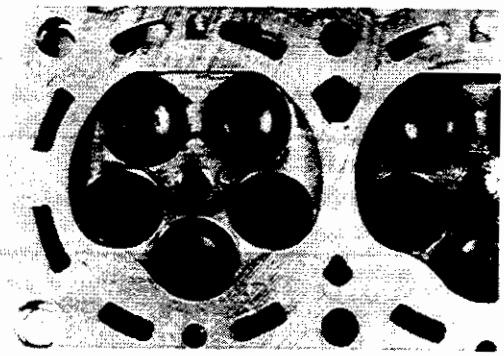
CONNECTING ROD

1. Remove:
   - Connecting rod ①
   - Connecting rod bearing



OIL PUMP

1. Remove:
   - Screw ①
   - Pump housing 1 ②
   - Dowel pins ③
   - Outer rotor 1 ④
   - Inner rotor 1 ⑤
   - Pin 1 ⑥
   - Intermediate plate ⑦
   - Outer rotor 2 ⑧
   - Inner rotor 2 ⑨
   - Pin 2 ⑩
   - Pump housing 2 ⑪
   - Pump shaft ⑫
   - Bolts ⑬



INSPECTION AND REPAIR

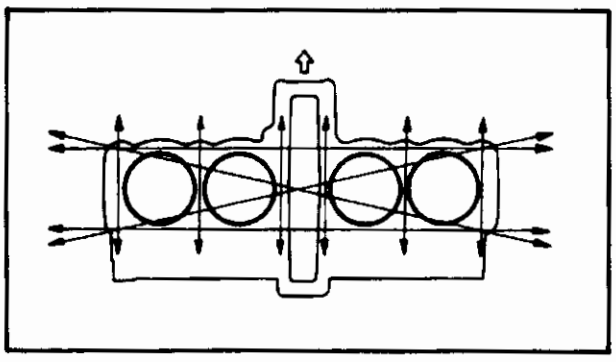
CYLINDER HEAD

1. Eliminate:
   - Carbon deposit
     (from combustion chamber)
     Use rounded scraper.

NOTE:

Do not use a sharp instrument and avoid damaging or scratching:
- Spark plug threads
- Valve seat

2. Inspect:
   - Cylinder head
     Scratches/Damage → Replace.



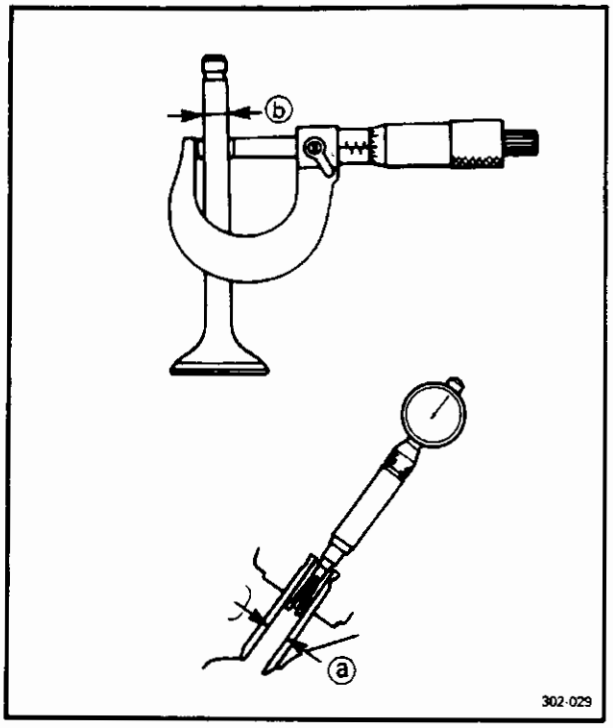
3. Measure:
   - Warpage
     Out of specification → Resurface.

Cylinder head warpage:
Less than 0.03 mm (0.0012 in)

4. Resurface:
   • Cylinder head

Resurfacement steps:
Place a 400 ~ 600 grit wet sandpaper on the surface plate, and resurface the head using a figure-eight sanding pattern.

NOTE:
Rotate the head several times to avoid removing too much material from one side.



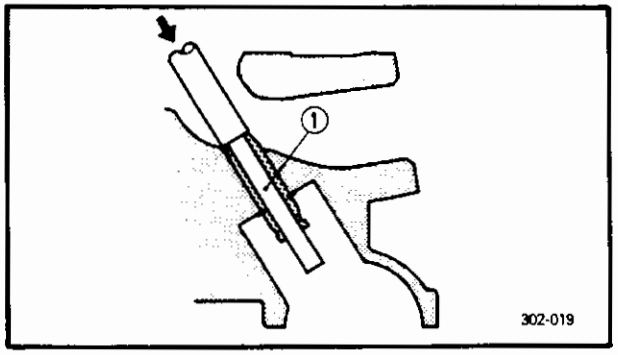
VALVE AND VALVE GUIDE

1. Measure:
   • Stem-to-guide clearance

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

Out of specification → Replace valve guide.

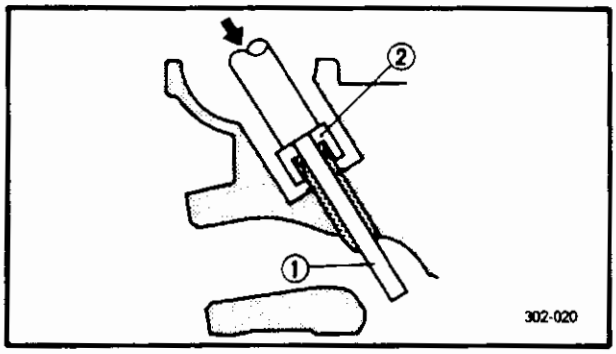
Stem-to-guide clearance:
Intake:
0.010 ~ 0.037 mm
(0.0004 ~ 0.0015 in)
< Limit > : 0.08 mm (0.0031 in)
Exhaust:
0.025 ~ 0.052 mm
(0.0010 ~ 0.0020 in)
< Limit > : 0.10 mm (0.0039 in)

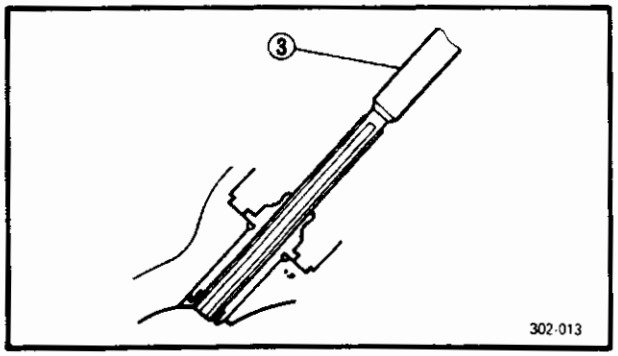


2. Replace:
   • Valve guide

Replacement steps:

NOTE:
Heat the cylinder head in an oven to 100°C (212°F) to ease guide removal and installation and to maintain correct interference fit.



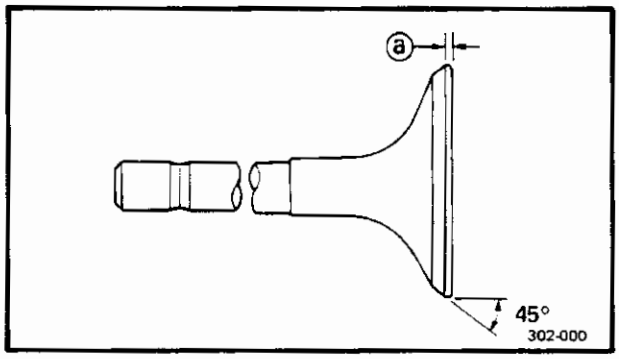


- Remove the valve guide using the valve guide remover ① .
- Install the valve guide (new) using the valve guide installer ② and valve guide remover ① .
- After installing the valve guide, bore the valve guide using the valve guide reamer ③ to obtain proper stem-to-guide clearance.

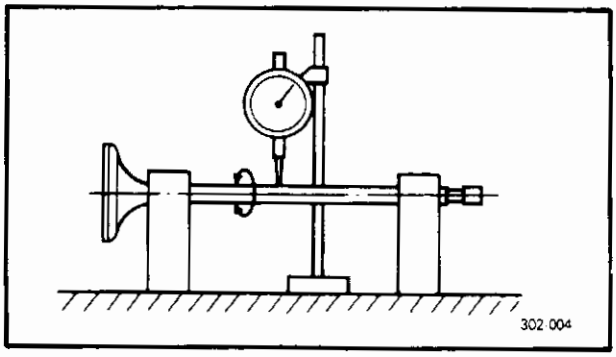
Valve guide remover (4.5 mm):
YM-04116
90890-04116
Valve guide installer (4.5 mm):
YM-04117
90890-04117
Valve guide reamer (4.5 mm):
YM-04118
90890-04118

NOTE:
Reface the valve seat after replacing the valve guide.

3. Eliminate:
   - Carbon deposit (from valve face)
4. Inspect:
   - Valve face
     Pitting/Wear → Grind the face.
   - Valve stem end
     Mushroom shape or diameter larger than rest of stem → Replace.
5. Measure:
   - Margin thickness ⓐ
     Out of specification → Replace.



Margin thickness:
Limit: 0.7 mm (0.0276 in)



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

Runout:
Less than 0.02 mm (0.0008 in)

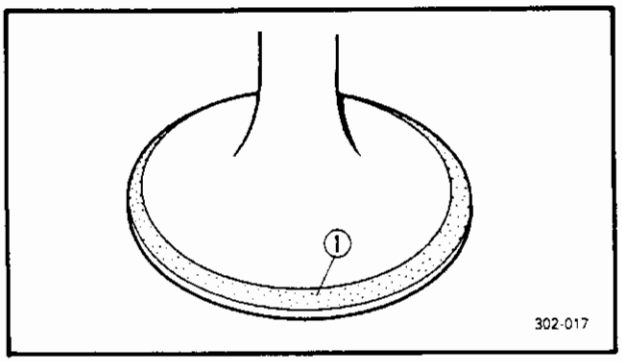
NOTE:
- Always replace the guide if the valve is replaced.
- Always replace the oil seal if the valve is removed.

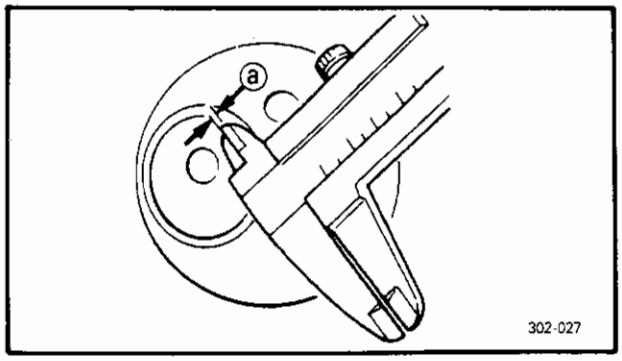
VALVE SEAT

1. Clean:
   - Valve face
   - Valve seat

   Eliminate carbon deposit.
2. Inspect:
   - Valve seat

   Pitting/Wear → Reface valve seat.





3. Measure:
   - Valve seat width ⓐ

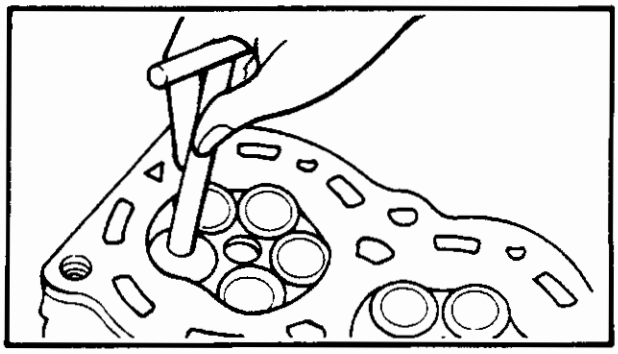
   Out of specification → Reface valve seat.

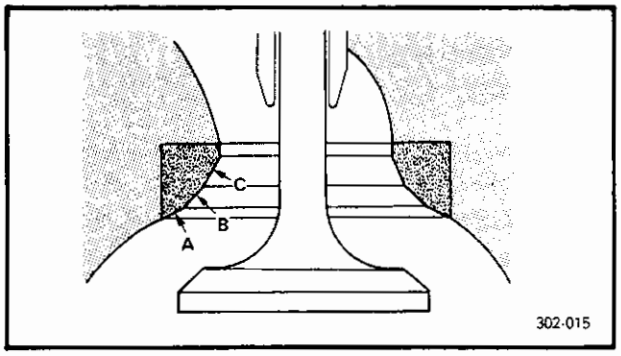
Valve seat width measurement steps:
- Apply the Mechanic's bluing dye (Dykem) ① to the valve face.
- Install the valve into the cylinder head.
- Press the valve through the valve guide and onto the valve seat to make a clear pattern.
- Remove the valve from the cylinder head.
- Measure the valve seat width ⓐ.

  When the valve seat and valve face make contact, bluing will be applied to the valve face.

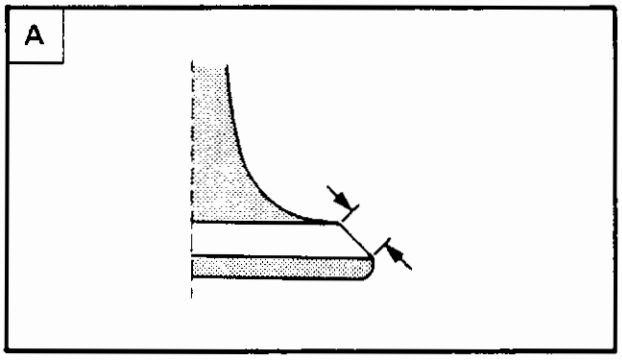
	Valve seat width	Limit
Intake Exhaust	0.9 ~ 1.1 mm (0.035 ~ 0.043 in)	1.6 mm (0.063 in)

- If the valve seat width is too wide, too narrow, or seat has not centered. The valve seat must be refaced.

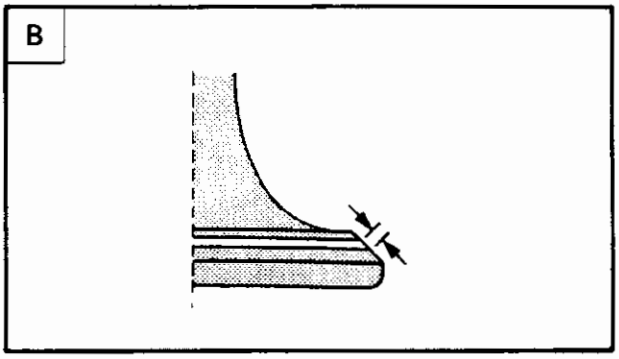




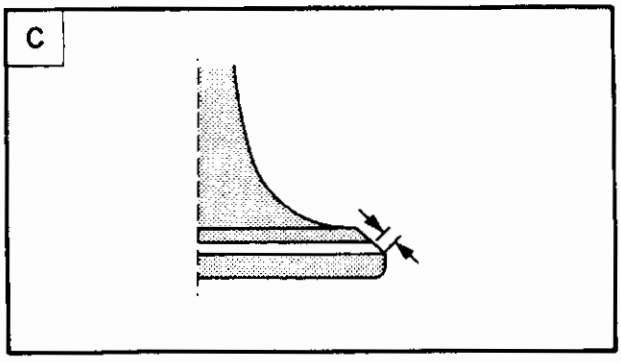
A



B



C



4. Reface:
   - Valve seat

   Use 20°, 45° and 60° Valve Seat Cutter.

⚠ CAUTION:

Remove just enough material to achieve satisfactory seat.
When twisting cutter, keep and even downward pressure to prevent chatter marks.

Cut sections as follows	
Section	**Cutter**
A	20°
B	45°
C	60°

Valve seat refacing steps:

A Valve face indicates that valve seat is centered on valve face but is too wide.

Valve seat cutter set		Desired result
Use lightly	20° cutter	To reduce valve seat width to 1.0 mm (0.04 in)
	60° cutter	

B Valve seat is in the middle of the valve face but too narrow.

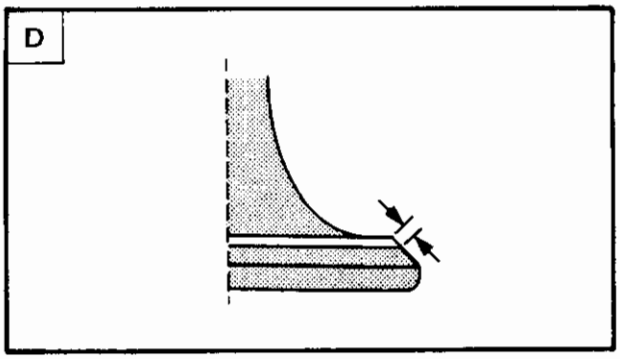
Valve seat cutter set		Desired result
Use	45° cutter	To achieve a uniform valve seat width of 1.0 mm (0.04 in)

C Valve seat is too narrow and right up near valve margin.

Valve seat cutter set		Desired result
Use	20° cutter	To center the seat and to achieve its width of 1.0 mm (0.04 in)
	45° cutter	

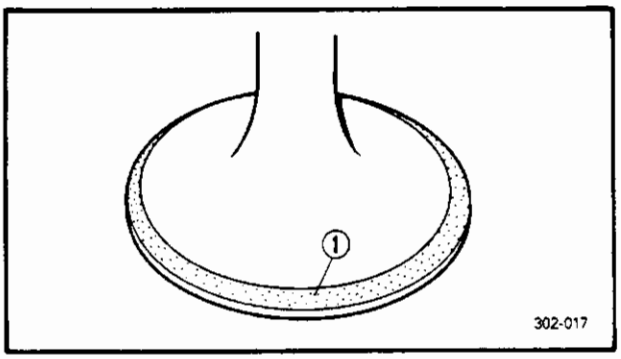
D Valve seat is too narrow and is located down near the bottom edge of the valve face.

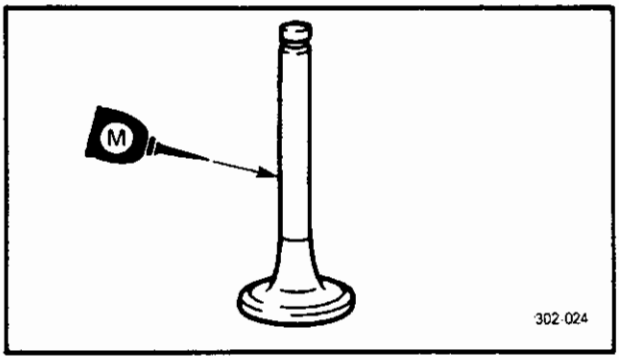
Valve seat cutter set		Desired result
Use	60° cutter, first	To center the seat and increase its width.
	45° cutter	

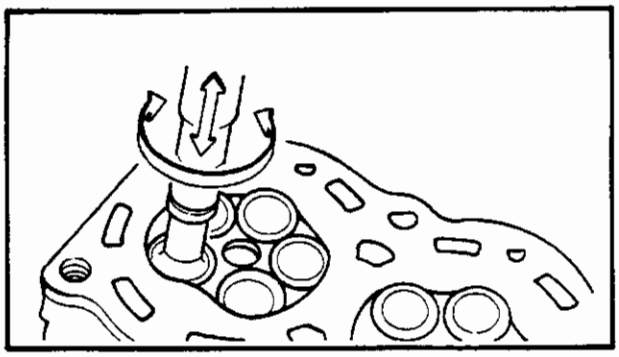


5. Lap:
   - Valve face
   - Valve seat

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







Valve lapping steps:
- Apply a coarse lapping compound ① to the valve face.

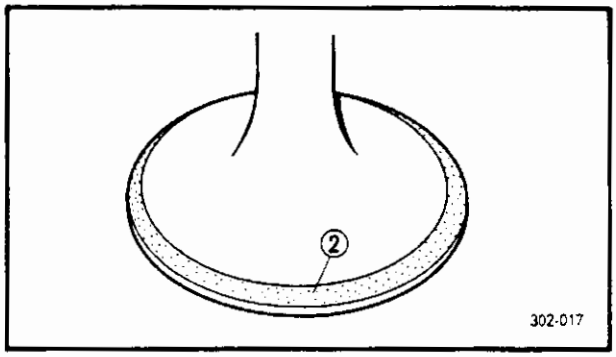
⚠CAUTION:
Be sure no compound enteres the gap between the valve stem and guide.

- Apply a molybdnum 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 compound.

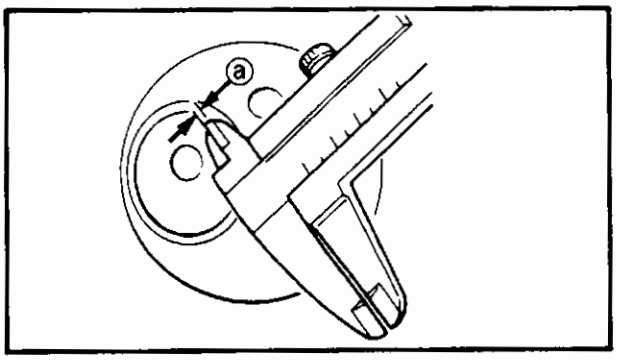
NOTE:
To obtain the best lapping result, lightly tap the valve seat while rotating the valve back and forth between your hand.

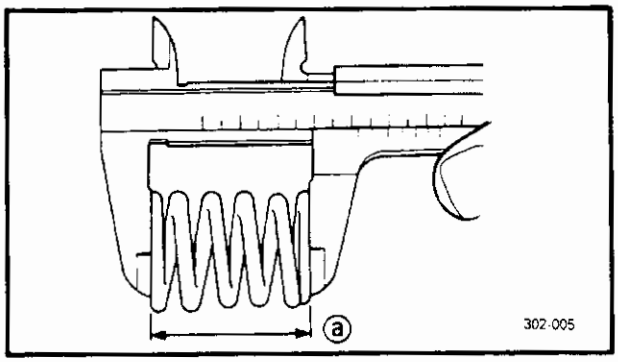
- Apply a fine lapping compound to the valve face and repeat the above steps.

NOTE:
Be sure to clean off all compound from the valve face and valve seat after every lapping operation.



- Apply the Mechanic's bluing dye (dykem) ② 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 lap the valve seat.





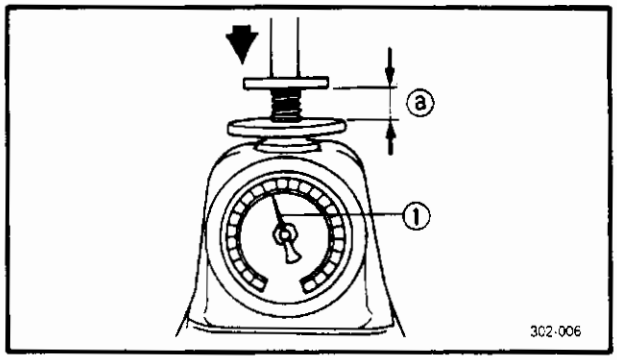
VALVE SPRING

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

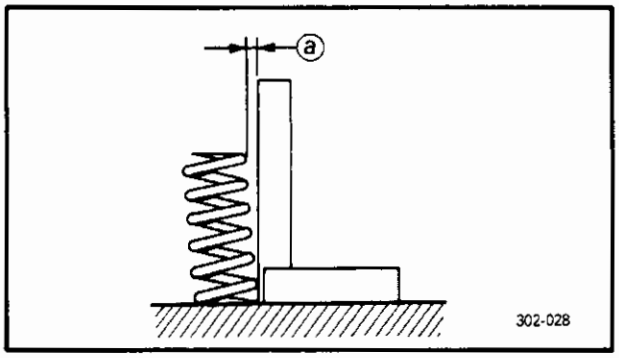
Valve spring free length	
Intake spring	Exhaust spring
39.76 mm (1.565 in)	39.96 mm (1.573 in)

2. Measure:
   - Valve spring installed force ①
     Out of specification → Replace.

ⓐ Installed length

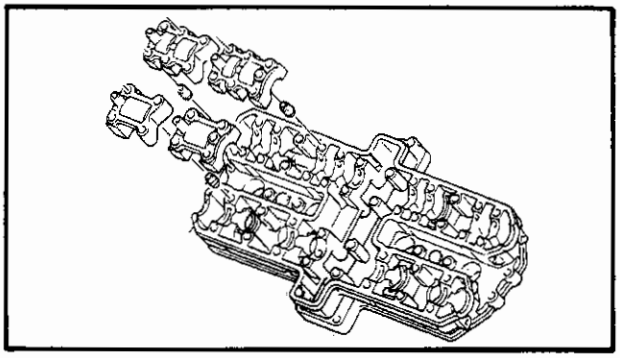


Valve spring installed force			
Intake spring		Exhaust spring	
ⓐ	①	ⓐ	①
35.0 mm (1.378 in)	7.3 ~ 8.7 kg (16.1 ~ 19.2 lb)	35.0 mm (1.378 in)	11.0 ~ 13.0 kg (24.3 ~ 28.7 lb)



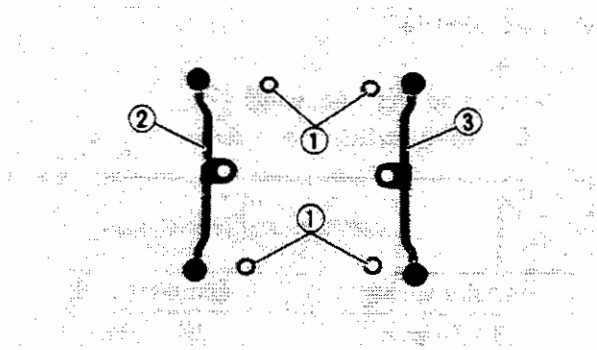
3. Measure:
   • Spring tilt ⓐ
   Out of specification → Replace.

Spring tilt:
Less than 1.8 mm (0.0709 in)

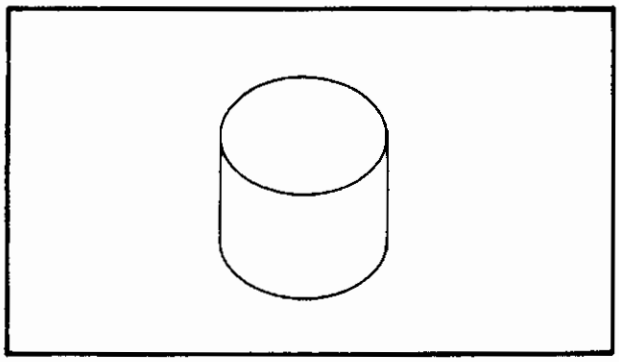


CAMSHAFT CASE

1. Inspect:
   • Camshaft case
   Cracks/Damage → Replace.
   • Camshaft bearing surfaces
   Pitting/Scratches/Damage → Replace the camshaft case and camshaft caps as a set, and inspect the camshaft.

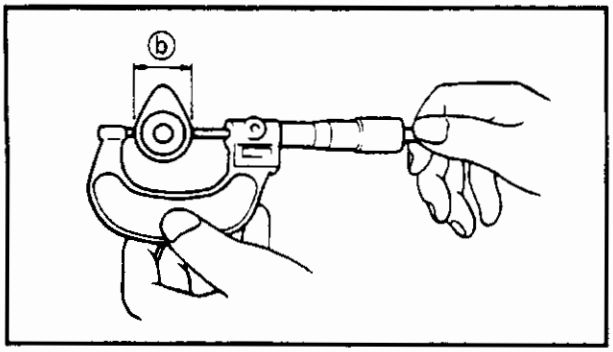


2. Inspect:
   • O-rings ①
   • Oil delivery pipe 3 ②
   • Oil delivery pipe 4 ③
   Damage → Replace.
   Contamination → Wash and blow-out the passage.



VALVE LIFTER

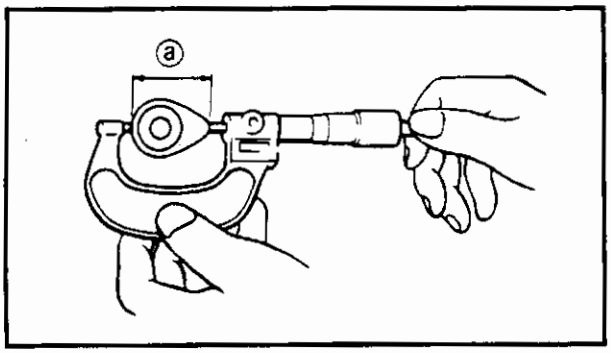
1. Inspect:
   • Valve lifters
   Scratches/Damage → Replace both lifters and camshaft case.



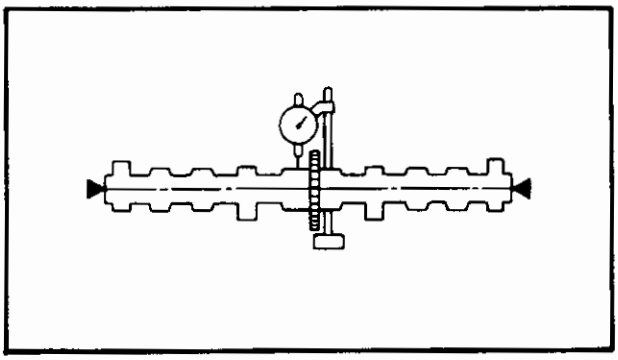
CAMSHAFT, TIMING CHAIN, HY-VO CHAIN, AND CAM SPROCKET

Camshaft

1. Inspect:
   • Cam lobes
   Pitting/Scratches/Blue discoloration → Replace.
2. Measure:
   • Cam lobes
   Use the Micrometer.
   Out of specification → Replace.

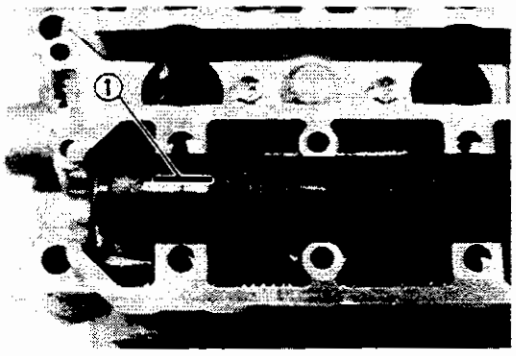


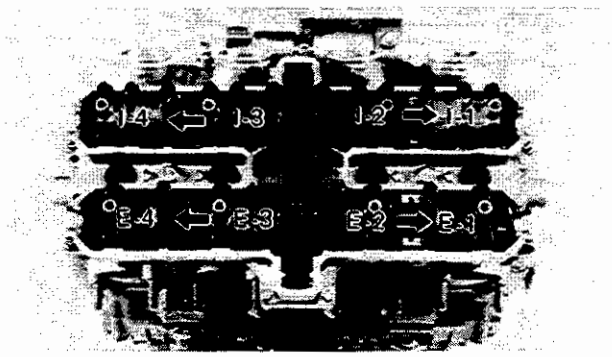
	Cam lobe ⓐ (Limit)	Cam lobe ⓑ (Limit)
Intake	32.45 mm (1.278 in)	24.85 mm (0.978 in)
Exhaust	32.85 mm (1.293 in)	24.85 mm (0.978 in)



3. Measure:
   - Camshaft runout
     Use a dial gauge.
     Out of specification → Replace.

Camshaft runout limit:
0.03 mm (0.0012 in)





Camshaft/Cap Clearance Measurement

1. Install:
   - Intake camshaft
   - Exhaust camshaft
2. Position:
   - Plastigage® ①
     (onto camshaft)

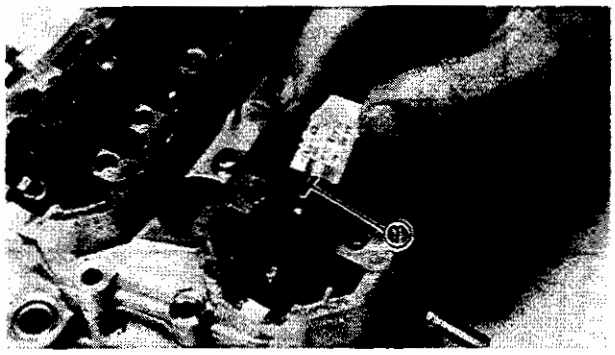
Plastigage®:
YU-33210

3. Install:
   - Dowel pins
   - Camshaft caps
4. Tighten:
   - Camshaft cap bolts

Bolts (camshaft cap):
10 Nm (1.0 m·kg, 7.2 ft·lb)

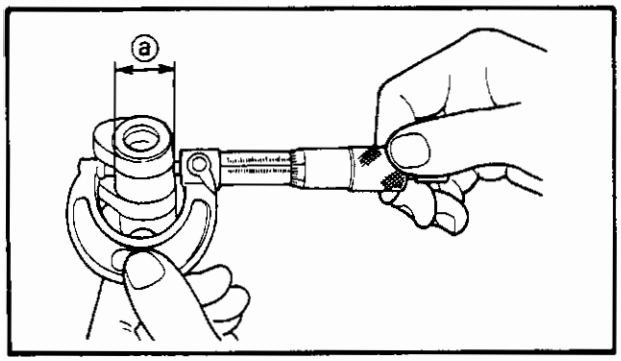
NOTE:
- Tighten the bolts (camshaft caps) in a crisscross pattern from innermost to outer caps.
- Do not turn the camshaft when measuring clearance with the Plastigage®.

5. Remove:
   - Camshaft caps



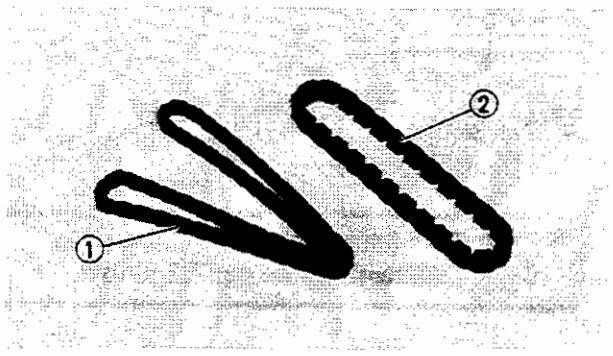
6. Measure:
   • Width of Plastigage® ①
   Out of specification → Follow step 7.

Camshaft-to-cap clearance:
I-1, I-4, E-1, E-4:
0.020 ~ 0.054 mm
(0.0008 ~ 0.0021 in)
I-2, I-3, E-2, E-3:
0.050 ~ 0.084 mm
(0.0020 ~ 0.0033 in)



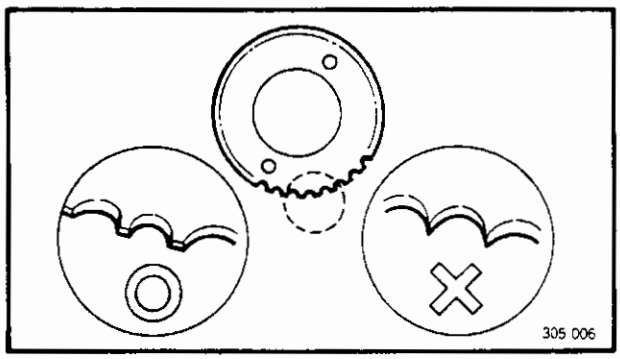
7. Measure:
   • Camshaft outside diameter ⓐ
   Use a micrometer.
   Out of specification → Replace the camshaft.
   Within specification → Replace the camshaft case and camshaft caps as a set.

Camshaft outside diameter:
Standard: 24.437 ~ 24.450 mm
(0.9621 ~ 0.9626 in)
Cam cap inside diameter:
Standard:
I1, I4, E1, E4,:
24.470 ~ 24.491 mm
(0.9634 ~ 0.9642 in)
I2, I3, E2, E3,:
24.500 ~ 24.521 mm
(0.9646 ~ 0.9654 in)



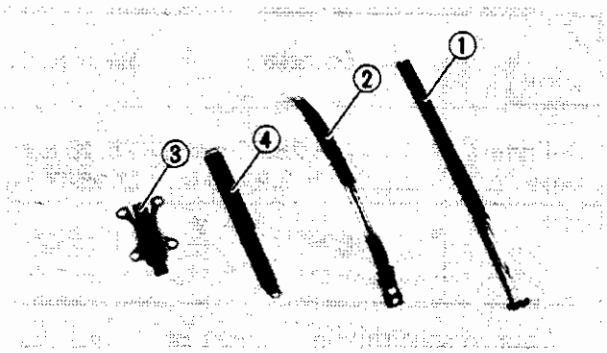
Timing Chain and HI-VO Chain

1. Inspect:
   • Timing chain ①
   • HI-VO chain ②
   Chain stretch/Cracks → Replace.



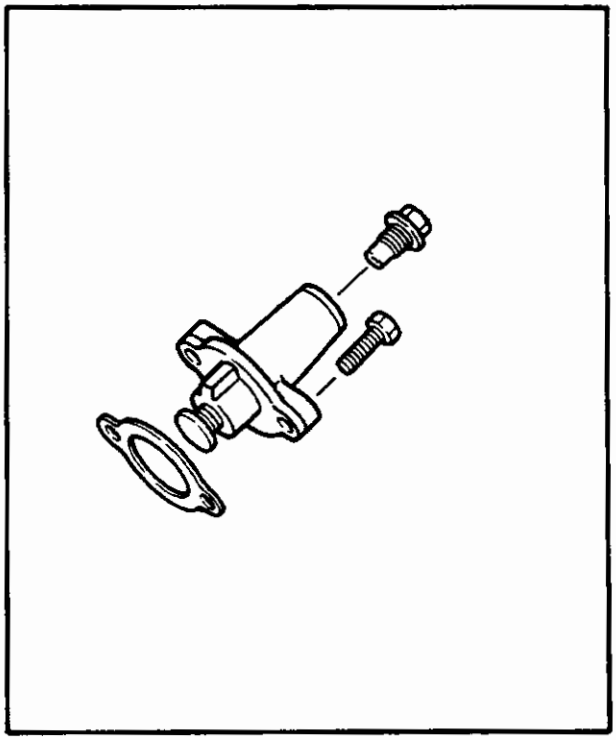
Cam Sprockets

1. Inspect:
   • Cam sprockets
   Wear/Damage → Replace.



Timing Chain and HI-VO Chain Guides

1. Inspect:
   - Timing chain guide (exhaust) ①
   - Timing chain guide (intake) ②
     Wear/Damage → Replace.
   - Timing chain guide (upper) ③
   - HI-VO chain guide ④

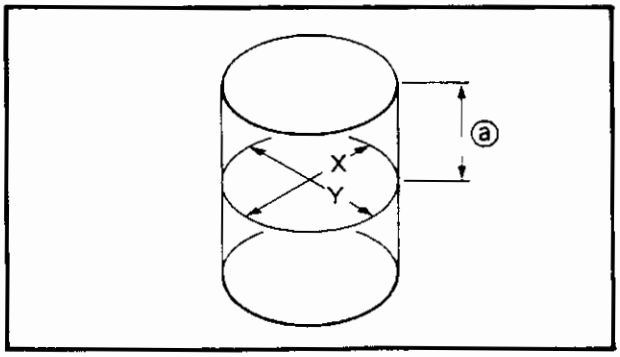


Timing Chain Tensioner

1. Check:
   - One-way cam operation
     Unsmooth operation → Replace.
2. Inspect:
   - All parts
     Damage/Wear → Replace.

CYLINDER AND PISTON

1. Inspect:
   - Cylinder and Piston walls
     Vertical scratches → Rebore or Replace cylinder and piston.
2. Measure:
   - Piston-to-cylinder clearance



Measurement steps:

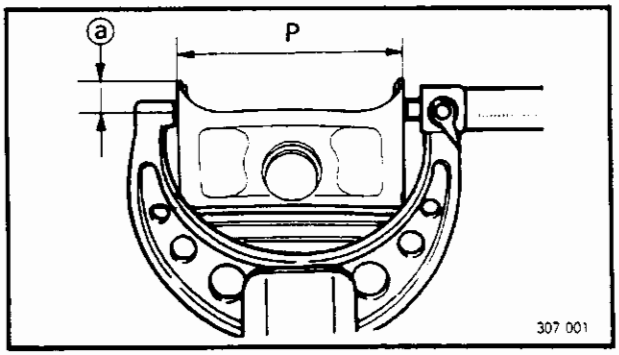
First step:

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

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

NOTE:

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



	Standard	Wear limit
Cylinder bore "C":	75.500 ~ 75.505 mm (2.9724 ~ 2.9726 in)	75.15 mm (2.9587 in)
	$C = \frac{X + Y}{2}$	

- 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.

ⓐ 3 mm (0.12 in) from the piston bottom edge.

	Piston size P
Standard	75.425 ~ 75.440 mm (2.700 ~ 2.970 in)

- If out of specification, replace piston and piston rings as a set.

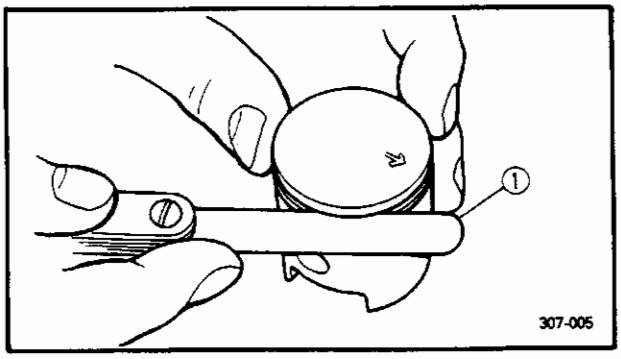
3rd step:

- Calculate the piston-to-cylinder clearance with following formula:

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

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

Piston-to-cylinder clearance:
0.06 ~ 0.08 mm
(0.0024 ~ 0.0031 in)
Limit: 0.15 mm (0.006 in)



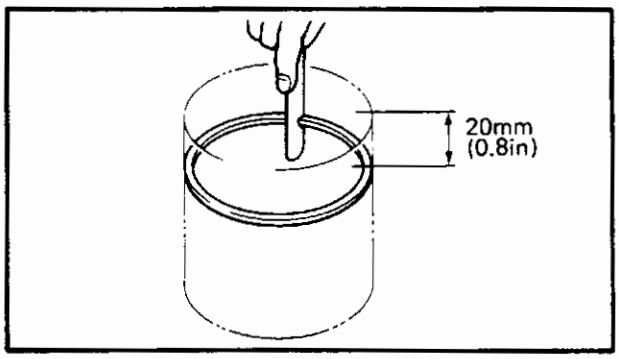
PISTON RING AND PISTON PIN

Piston Ring

1. Measure:
   - Side clearance
     Use a feeler gauge ①.
     Out of specification → Replace the piston and/or rings.

NOTE:
Eliminate the carbon deposits from the piston ring grooves and rings before measuring the side clearance.

	Side clearance:	
	Standard	Limit
Top ring	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in)	0.15 mm (0.0059 in)
2nd ring	0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in)	0.15 mm (0.0059 in)

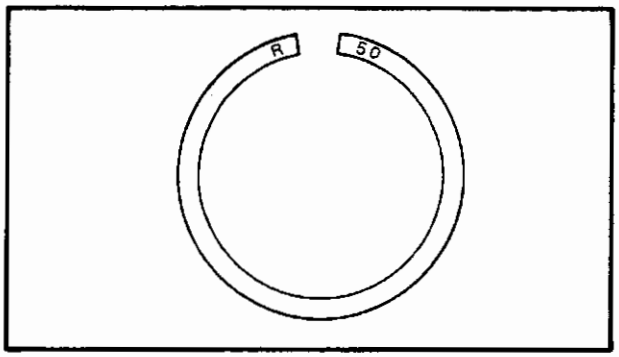


2. Position:
   • Piston ring
     Into cylinder.

NOTE:
Insert the ring into the cylinder, and push it approximately 20 mm (0.8 in) into the cylinder. Push the ring with the piston crown so that the ring will be at a right angle to the cylinder bore.

3. Measure:
   • End gap
     Use a feeler gauge.
     Out of specification → Replace.

	End gap (installed):	
	Standard	Limit
Top ring	0.3 ~ 0.5 mm (0.0118 ~ 0.0197 in)	0.7 mm (0.0276 in)
2nd ring	0.3 ~ 0.5 mm (0.0118 ~ 0.0197 in)	0.7 mm (0.0276 in)
Oil control (rails)	0.2 ~ 0.8 mm (0.0079 ~ 0.0315 in)	–

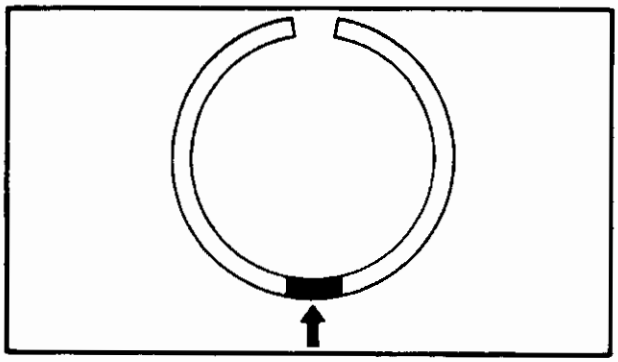


Piston Ring Oversize

- Top and 2nd piston ring

Oversize top and 2nd ring size is stamped on the top of ring.

Oversize 2	**0.50 mm (0.0197 in)**



- Oil control ring

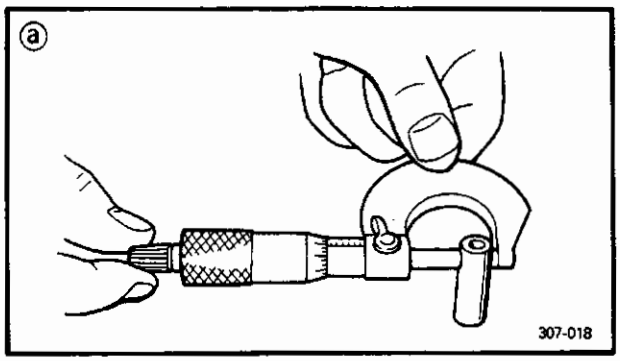
Expander spacer of oil control ring is color-coded to identify sizes.

Size	Color
Oversize 2	Red

Piston Pin

1. Inspect:
   - Piston pin

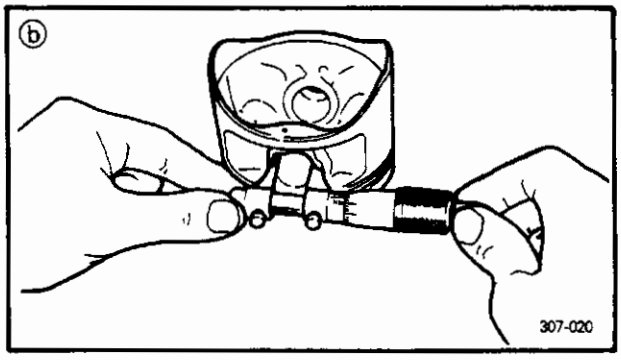
   Blue discoloration/Grooves → Replace then inspect lubrication system.



2. Measure:
   - Outside diameter ⓐ (piston pin)

   Out of specification → Replace.

Outside diameter (piston pin):
17.995 ~ 18.000 mm
(0.7085 ~ 0.7087 in)

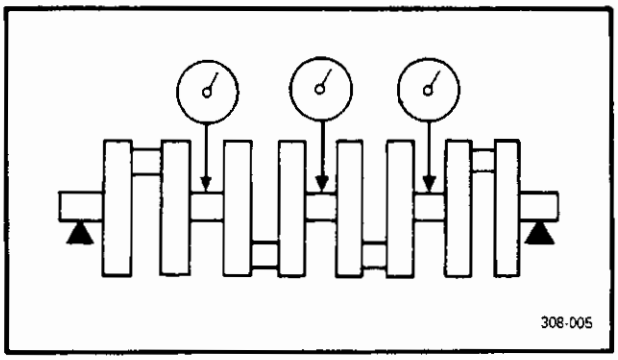


3. Measure:
   - Piston pin-to-piston clearance

   Out of specification → Replace piston.

Piston pin-to-piston clearance =
Bore size (piston pin) ⓑ –
Outside diameter (piston pin) ⓐ

Piston pin-to-piston clearance:
0.004 ~ 0.0020 mm
(0.0002 ~ 0.0008 in)
< Limit: 0.07 mm (0.003 in) >



CRANKSHAFT AND CONNECTING ROD

Crankshaft

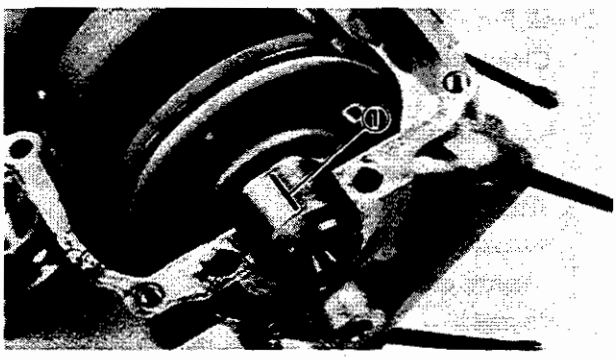
1. Measure:
   - Runout (crankshaft)
     Use the v-blocks and dial gauge.
     Out of specification → Replace.

Runout limit:
0.03 mm (0.0012 in)

2. Inspect:
   - Crankshaft bearing surfaces
     Wear/Scratches → Replace.

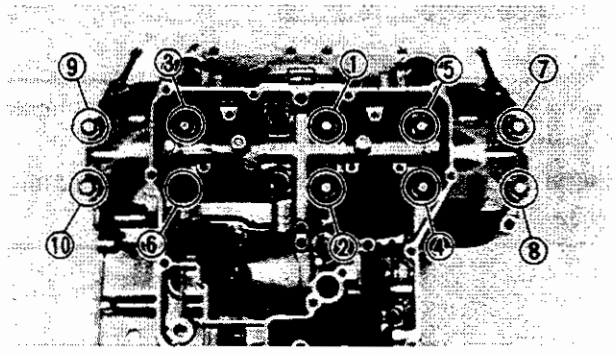
Main Journal Oil Clearance

1. Clean all parts.
2. Position:
   - Crankcase half (upper)
     Place it on a bench in an upside down position.
3. Install:
   - Bearings
     (into upper crankcase)
   - Crankshaft
4. Attach:
   - Plastigage® ①
     (onto crankshaft journal surface)



NOTE:
Do not turn the crankshaft until clearance measurement has been completed.

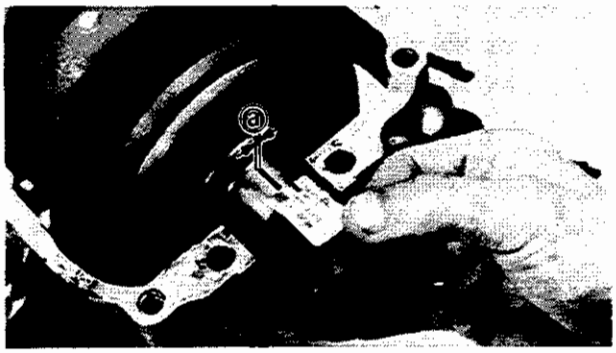
5. Install:
   - Bearings
     (into lower crankcase)
   - Crankcase (lower)
6. Tighten:
   - Bolts



⚠ CAUTION:
Tighten the bolts to specified torque. Tightening sequence is casted on the crankcase.

9 mm (0.35 in) Bolt:
32 Nm (3.2 m·kg, 23 ft·lb)

7. Remove:
   - Bolts
     Reverse assembly procedure.
   - Crankcase (Lower)
     Use care in removing.



8. Measure:
   - Plastigage® width ⓐ
     Out of specification → Replace the bearings; replace the crankshaft if necessary.

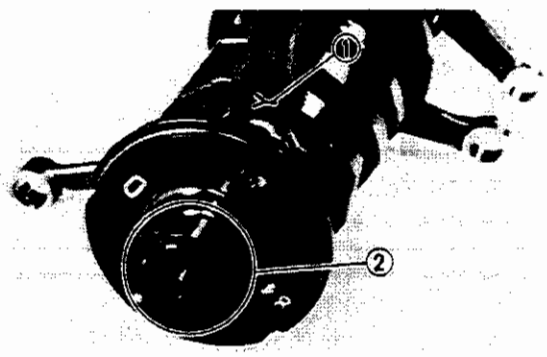
Main journal oil clearance:
0.020 ~ 0.044 mm
(0.0008 ~ 0.0017 in)

Connecting Rod Bearings

1. Inspect:
   - Bearings
     Burns/Flaking/Roughness/Scratches → Replace.

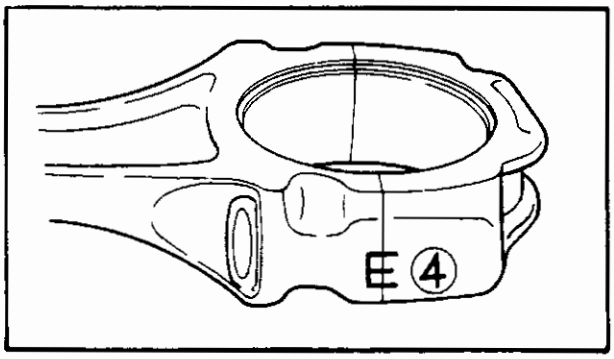
Crank Pin Oil Clearance

1. Clean all parts thoroughly.
2. Install:
   - Connecting rod bearings
     (into connecting rod and cap)
3. Attach:
   - Plastigage®
     (onto crank pin)
4. Install:
   - Connecting rod
   - Connecting rod cap



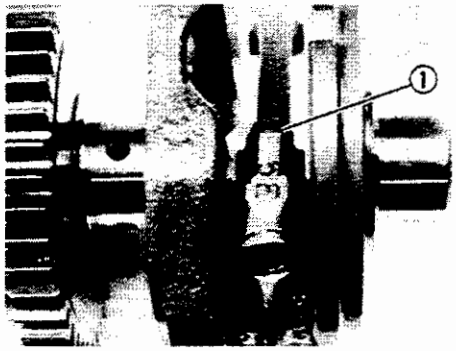
NOTE:

- Be sure the "Y" marks ① on the connecting rods face toward left crankshaft end ② .
- Be sure the letters on both components align to form a perfect character.



5. Lubricate:
   - Bolt threads (Connecting rod)
   - Nut seats (Connecting rod)

Molybdenum Disulfide Grease



6. Tighten:
   - Nuts ① (connecting rod cap)

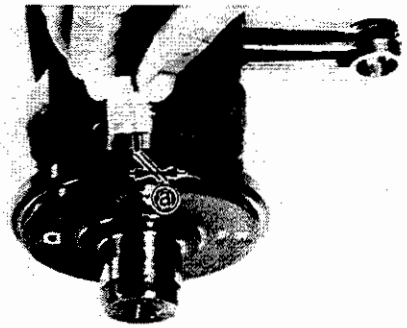
NOTE:

Do not turn the connecting rod until the clearance measurement has been completed.

⚠ CAUTION:

Tighten to full torque specification without pausing. Apply continuous torque between 2.0 and 3.6 m·kg. Once you reach 2.0 m·kg DO NOT STOP TIGHTENING unitl final torque is reached. If tightening is interrupted between 3.0 and 3.6 m·kg, loosen nut to less than 2.0 m·kg, and start again.

Nuts (connecting rod):
36 Nm (3.6 m · kg, 25 ft · lb)

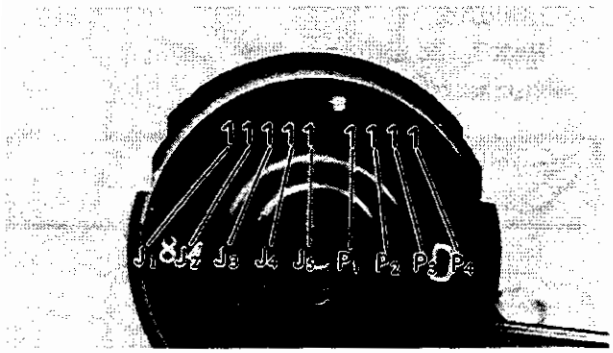


7. Remove:
   - Connecting rod cap

   Use care in removing.
8. Measure:
   - Width of Plastigage® ⓐ

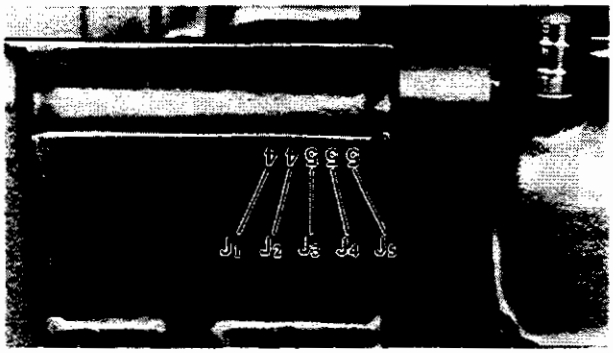
   Out of specification → Replace the bearings and/or replace the crankshaft if necessary.

Crank pin oil clearance:
0.032 ~ 0.056 mm
(0.0013 ~ 0.0022 in)

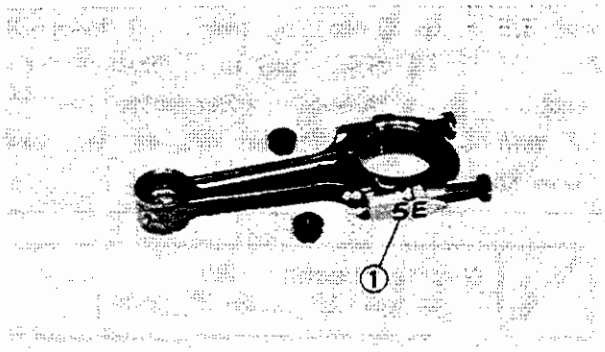


Crankshaft Main Journal and Crank Pin Bearing Selection

- Numbers used to indicate crankshaft journal sizes are stamped on the LH crankweb. The first five (5) are main journal bearing numbers, starting with the left journal. The four (4) crank pin bearing numbers follow in the same sequence.



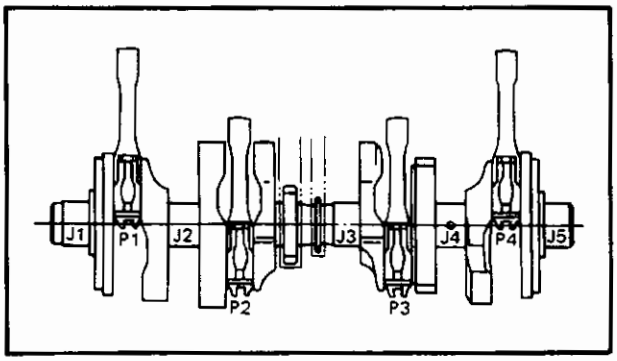
- The upper crankcase half is numbered J1, J2, J3, J4 and J5 on the rear right bosse as shown.



- The numbers are stamped in ink on the connecting rod ①.

BEARING COLOR CODE	
No. 1	Blue
No. 2	Black
No. 3	Brown
No. 4	Green
* No. 5	Yellow

* No. 5 applies only to the main journal bearing selection.



Example 1:
Selection of the main journal bearings:

- If the crankcase J1 and crankshaft J1 sizes are No. 4 and No. 1, respectively, the bearing size No. is:

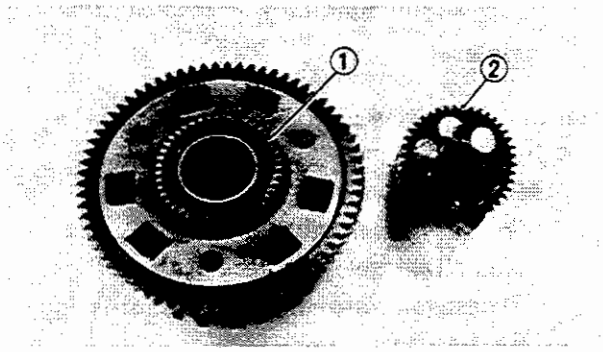
Bearing Size No. =
Crankcase No. – Crankshaft No. =
4 – 1 = 3 (Brown)

BEARING COLOR CODE	
No. 1	Blue
No. 2	Black
No. 3	Brown
No. 4	Green
No. 5	Yellow

Example 2:
Selection of the crank pin bearing:
- If the connecting rod P1 and crankshaft P1 sizes are No. 5 and No. 1, respectively, the bearing size No. is:

Bearing Size No. =
Connecting rod No. – Crankshaft No. =
5 – 1 = 4 (Green)

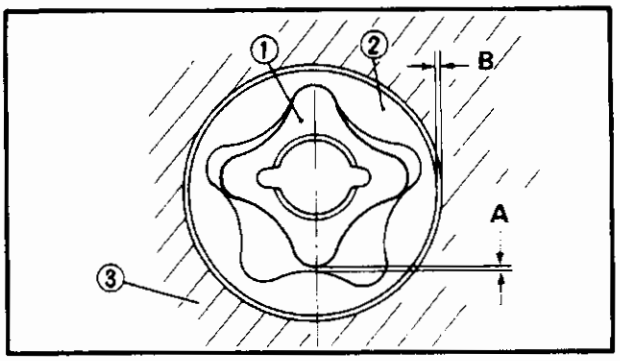
BEARING COLOR CODE	
No. 1	Blue
No. 2	Black
No. 3	Brown
No. 4	Green



OIL PUMP

1. Inspect:
   - Oil pump drive gear ①
   - Oil pump driven gear ②

   Wear/Cracks/Damage → Replace.



2. Measure:
   - Tip clearance "A"

     Between the inner rotor ① and the outer rotor ②
   - Side clearance "B"

     Between the outer rotor ② and the pump housing ③

     Use a filler gauge and straight edge.

     Out of specification → Replace the oil pump assembly.

Tip clearance "A" limit:
0.2 mm (0.008 in)
Side clearance "B" limit:
0.15 mm (0.006 in)

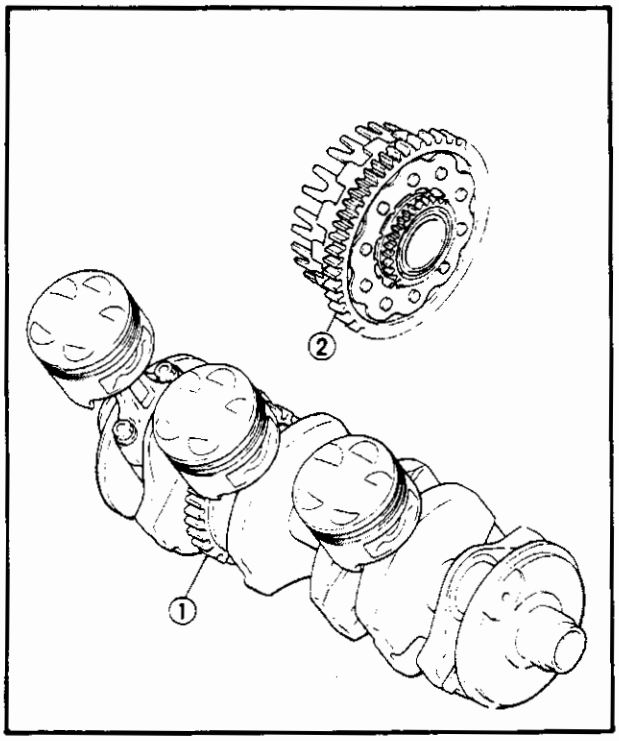
3. Lubricate:
   - Inner rotors
   - Outer rotors
   - Pump shaft

SAE 10W30 Motor Oil

4. Install:
   - Oil pump assembly
     Reverse the "ENGINE DISASSEMBLY – OIL PUMP" section.

NOTE:
Align the pins in the pump shaft with the groove on the inner rotors dualing assembly.

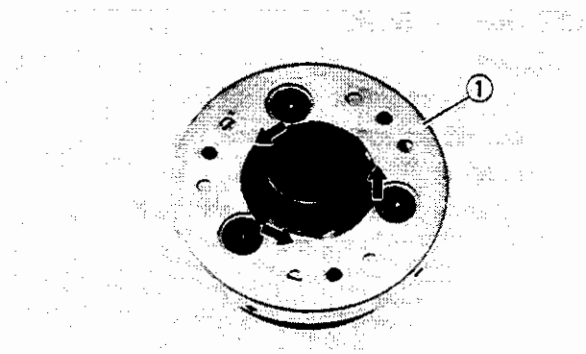
5. Check:
   - Oil pump operation
     Unsmooth operation → Repeat step 2. or replace.



PRIMARY DRIVE

1. Inspect:
   - Primary drive gear (crank shaft) ①
   - Primary driven gear ②
     Wear/Damage → Replace both gears.
     Excessive noises during operation → Replace both gears.

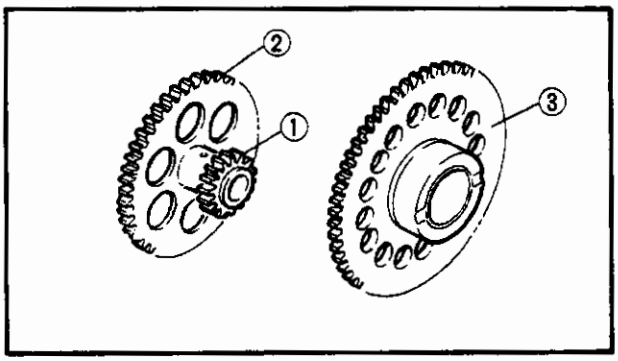
Primary reduction ratio:		
No. of teeth		Ratio
Drive	Driven	
41	68	1.659



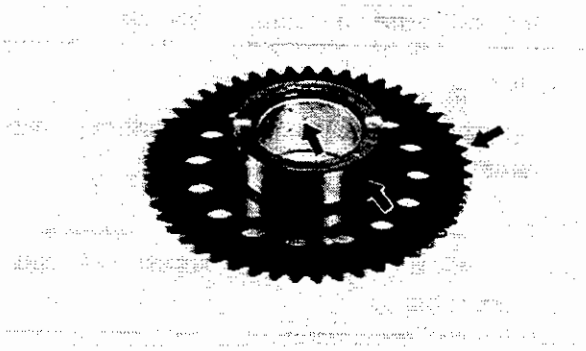
STARTER DRIVES

Starter Clutch

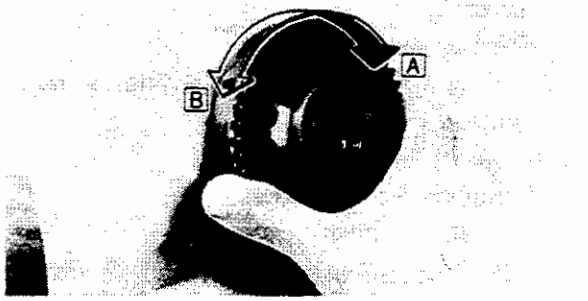
1. Check:
   - Starter clutch ① operation
     Push the roller to arrow direction.
     Unsmooth operation → Replace one-way clutch.



2. Inspect:
   - Starter idle gear teeth ①
   - Starter drive gear teeth ②
   - Starter clutch gear ③
     Burrs/Chips/Roughness/Wear → Replace.



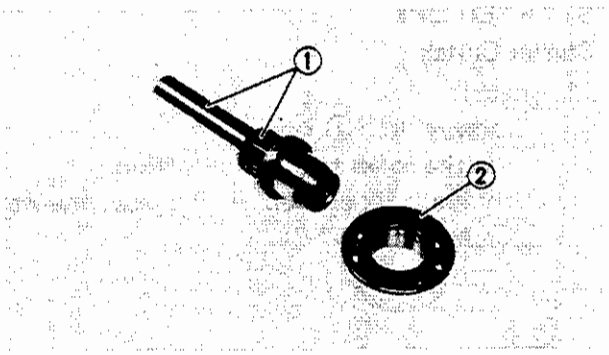
3. Inspect:
   - Starter clutch gear
     (contacting surfaces)
     Pitting/Wear/Damage → Replace.



4. Check:
   - Starter clutch operation

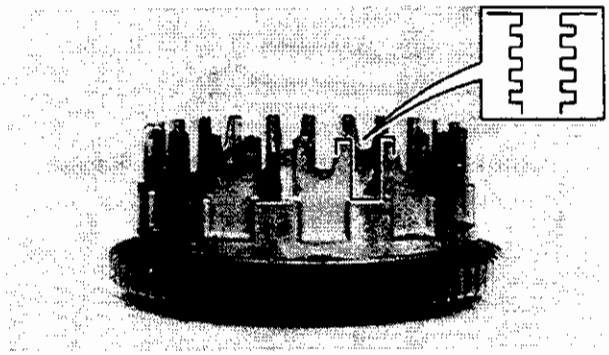
Clutch operation checking steps:

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



AC Generator Shaft

1. Check:
   - Shaft and spline ①
     Wear/Damage → Replace.
   - Bearing ②
     Unsmooth operation → Replace.

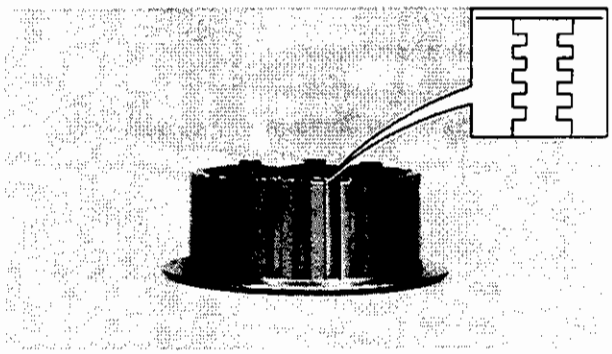


CLUTCH

Clutch Housing

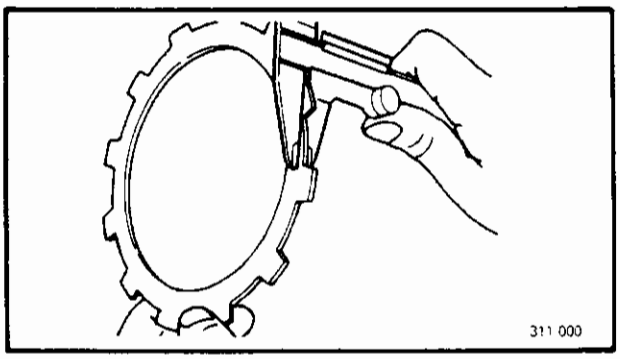
1. Inspect:
   - Dogs
     (on housing)
     Cracks/Wear/Damage → Deburr or replace.
   - Clutch housing bearing
     Chafing/Wear/Damage → Replace.

NOTE:
Wear on the friction plate dogs of the clutch housing will cause an erratic operation.



   - Clutch boss splines
     Scoring/Wear/Damage → Replace clutch boss assembly.

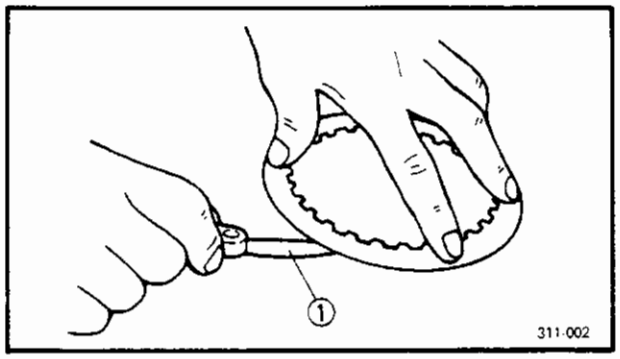
NOTE:
Scoring on the clutch plate splines will cause erratic operation.



Friction Plates

1. Inspect:
   - Friction plate
     Damage/Wear → Replace the friction plates as a set.
2. Measure:
   - Friction plate thickness
     Measure at all four points.
     Out of specification → Replace the friction plates as a set.

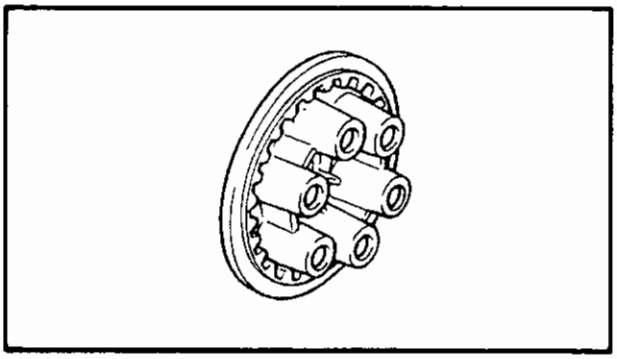
Wear limit:
2.8 mm (0.110 in)



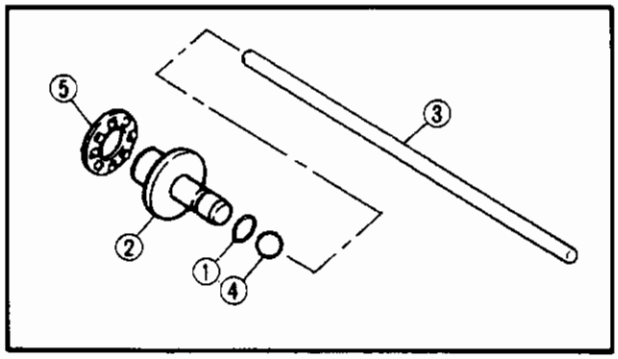
Clutch Plates

1. Measure:
   - Clutch plate warpage
     Use a surface plate and feeler gauge ①
     Out of specification → Replace.

Wear limit:
0.1 mm (0.004 in)

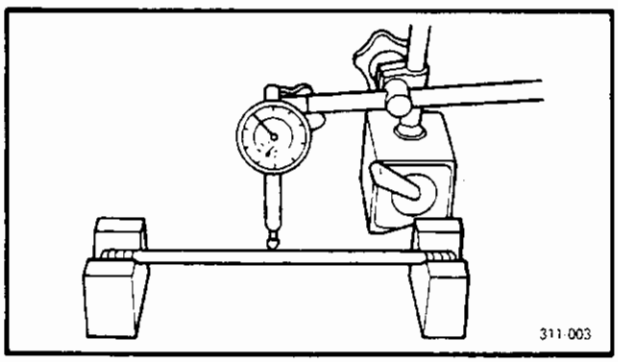


2. Inspect:
   - Pressure plate ①
     Damage → Replace.



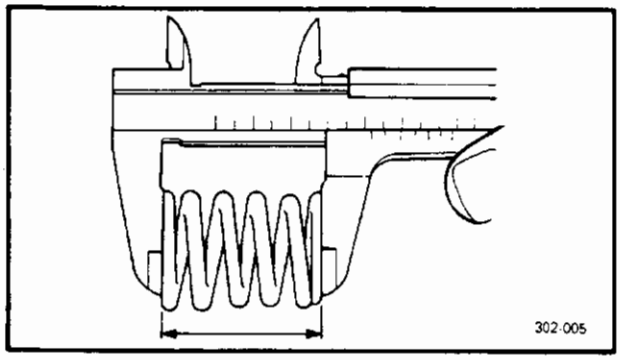
Push Rod

1. Inspect:
   - O-ring ①
   - Push rod #1 ②
   - Push rod #2 ③
   - Ball ④
   - Bearing ⑤
     Wear/Cracks/Damage → Replace.



2. Measure:
   - Push rod #2
     Use a v-blocks and dial gauge.
     Out of specification → Replace.

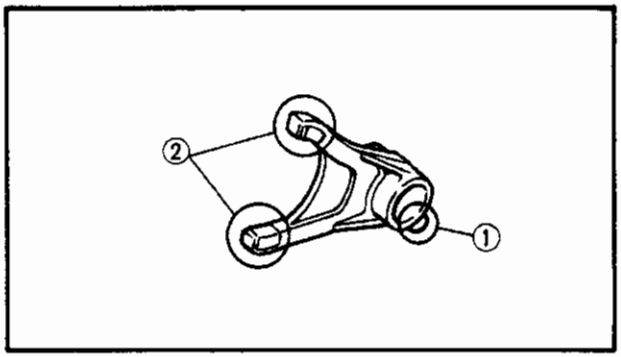
Bending limit:
0.3 mm (0.012 in)



Clutch Spring

1. Measure:
   - Clutch spring free length
     Out of specification → Replace the springs as a set.

Clutch spring minimum free length:
54.0 mm (2.13 in)

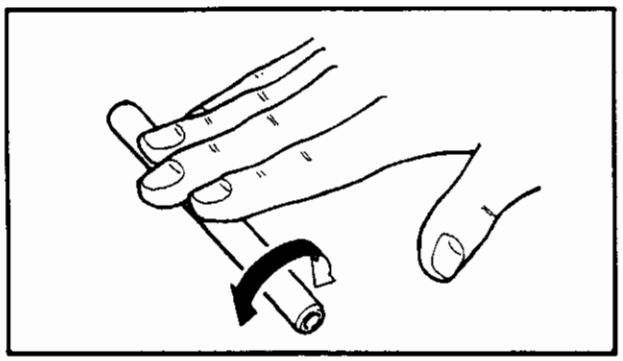


TRANSMISSION

Shift Fork

1. Inspect:
   - Shift fork cam follower ①
   - Shift fork pawl ②

   Wear/Chafing/Bends/Damage → Replace.

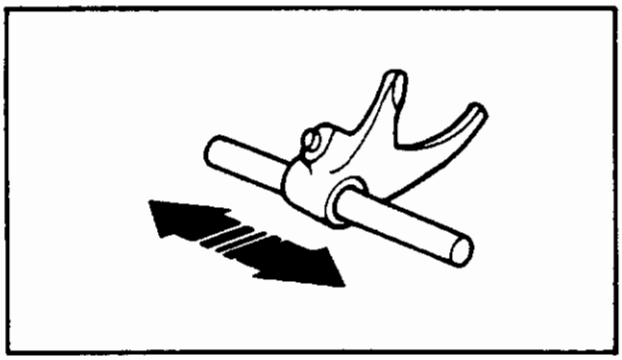


2. Inspect:
   - Guide bar

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

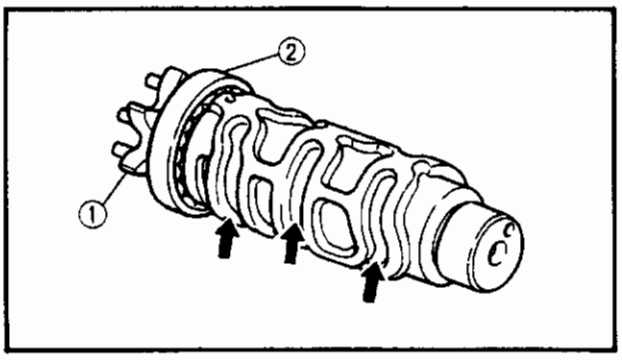
⚠ WARNING:

Do not attempt to straighten a bent guide bar.



3. Check:
   - Shift fork movement

   (on its guide bar)
   Unsmooth operation → Replace the fork and/guide bar.



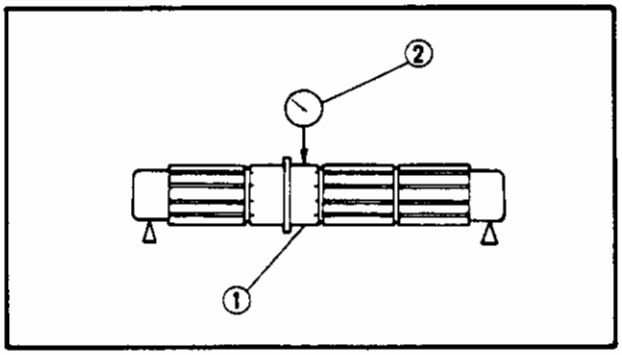
Shift Cam

1. Inspect:
   - Shift cam grooves

     Wear/Damage/Scratches → Replace.
   - Shift cam segment ①

     Damage/Wear → Replace.
   - Shift cam bearing ②

     Pitting/Damage → Replace.

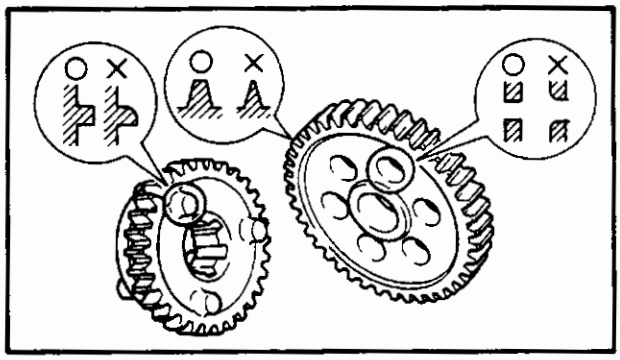


Main and Drive Axles

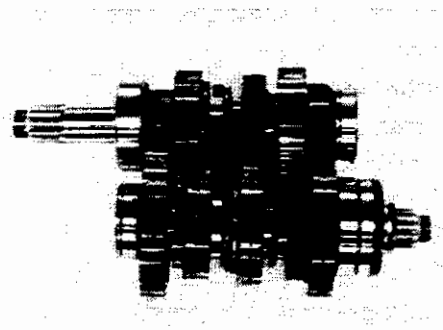
1. Measure:
   - Axle runout (main and rive) ①

     Use a centering device and dial gauge ②.
     Out of specification → Replace.

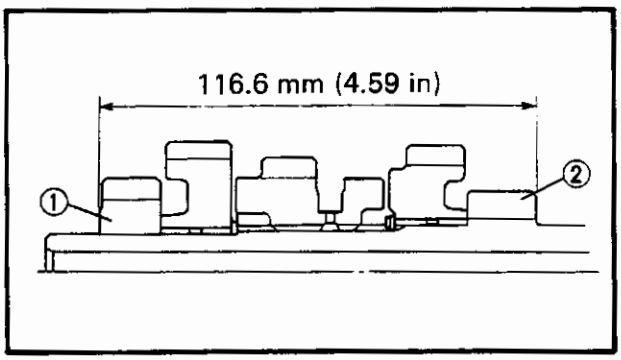
Runout limit: 0.08 mm (0.0031 in)



2. Inspect:
   - Gear teeth
     Blue discoloration/Pitting/Wear → Replace.
   - Mated dogs
     Rounded edges/Cracks/Missing portions → Replace.

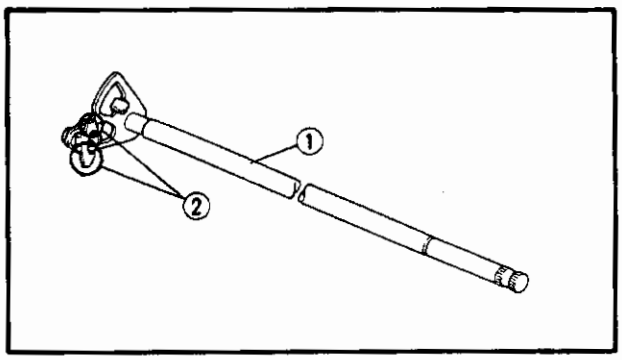


3. Check:
   - Proper gear engagement (each gear)
     (to its counter part)
     Incorrect → Reassemble.
   - Gear movement
     Roughness → Replace.



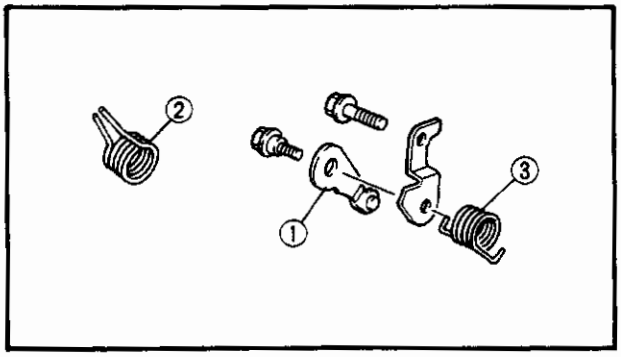
Transmission gear reassembling point:
- Press the 2nd pinion gear ① in the main axle ② as shown.

4. Inspect:
   - Circlips
     Damage/Looseness/Bends → Replace.

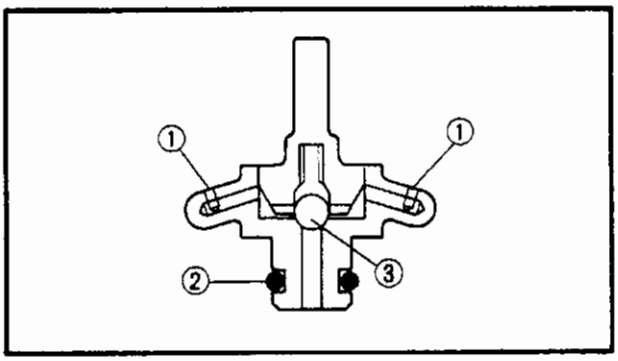


SHIFT SHAFT AND STOPPER LEVER

1. Inspect:
   - Shift shaft ①
   - Shift pawls ②
     Bends/Wear/Damage → Replace.



2. Inspect:
   - Stopper lever ①
     Roller turns roughly → Replace.
     Bends/Damage → Replace.
3. Inspect:
   - Return spring (shift shaft) ②
   - Return spring (shift pawls)
   - Return spring (stopper lever) ③
     Wear/Damage → Replace.

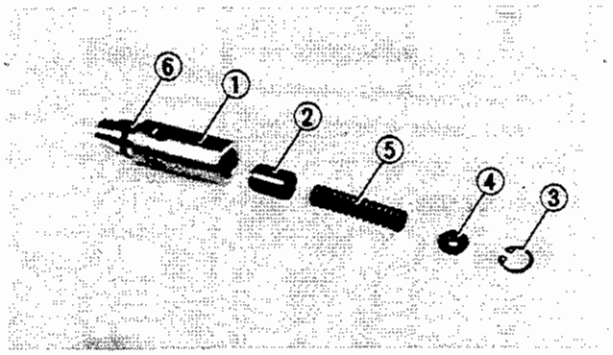


OIL-JET NOZZLE

1. Check:
   - Oil-Jet nozzles ①
   - O-ring ②
   - Check ball ③

   Damage/Wear → Replace.
   - Oil jet passage

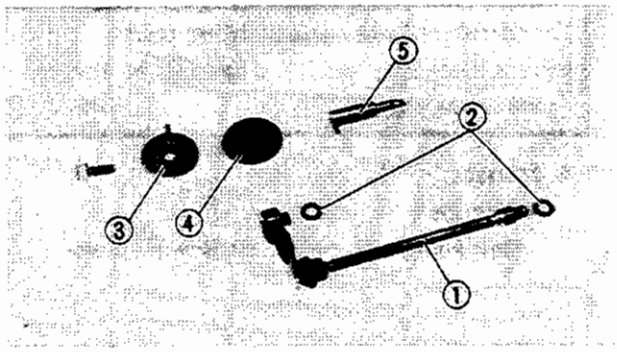
   Clog → Blow out with compressed air.



RELIEF VALVE AND OIL PIPE

1. Check:
   - Relief valve body ①
   - Valve ②
   - Circlip ③
   - Cover ④
   - Spring ⑤
   - O-ring ⑥

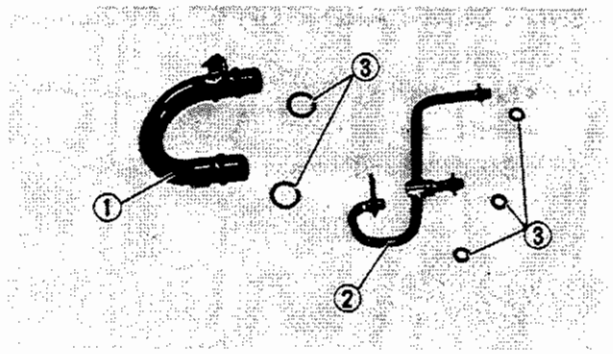
   Damage/Wear → Replace.



2. Check:
   - Oil delivery pipe 5 ①
   - O-rings ②
   - Oil plug plate ③
   - Gasket ④
   - Oil splay nozzle ⑤

   Damage → Replace.

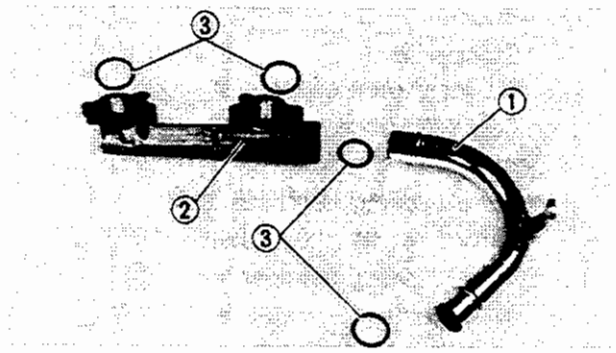
   Contamination → Wash and blow out the passage.



3. Check:
   - Oil pipe 2 ①
   - Oil delivery pipe 1 ②
   - O-ring ③

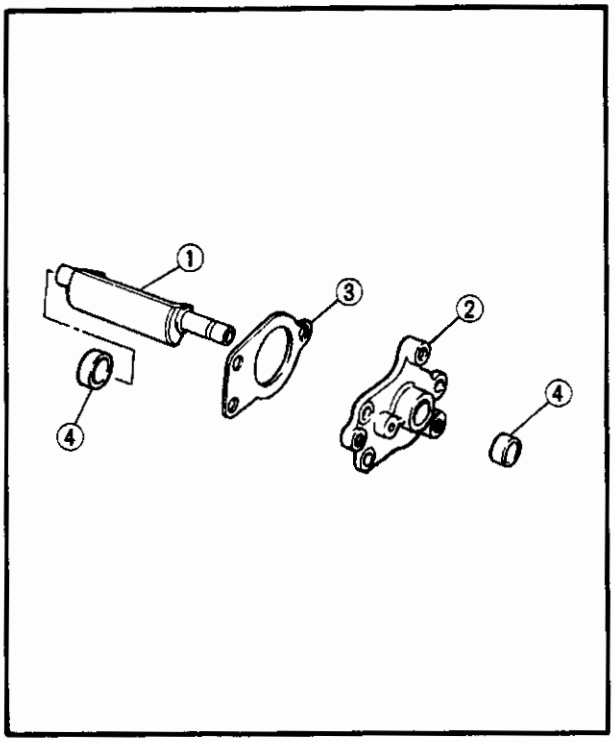
   Damage → Replace.

   Comtamination → Wash and blow out the passage.



4. Check:
   - Coolant pipe ①
   - Water jacket joint ②
   - O-rings ③

   Damage → Replace.



EXUP

1. Inspect:
   - Valve (EXUP) ①
   - Housing (valve) ②
   - Gasket (steel) ③

   Wear/Cracks/Damage → Replace.
   - Bush ④

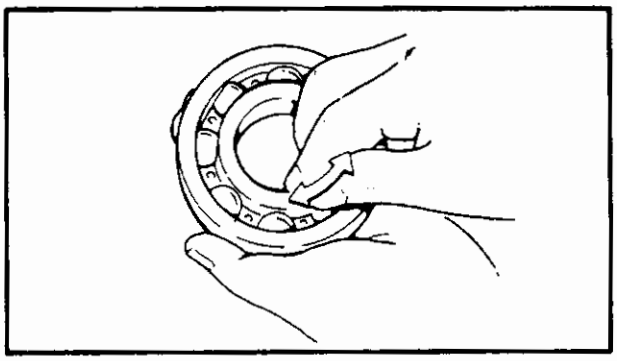
   Wear → Replace.

CRANKCASE

1. Thoroughly wash the case halves in mild solvent.
2. Clean all the gasket mating surfaces and crankcase mating surfaces thoroughly.
3. Inspect:
   - Crankcase

   Cracks/Damage → Replace.
   - Oil delivery passages

   Clog → Blow out with compressed air.



BEARING AND OIL SEAL

1. Inspect:
   - Bearings

   Clean and lubricate, then rotate inner race with finger.

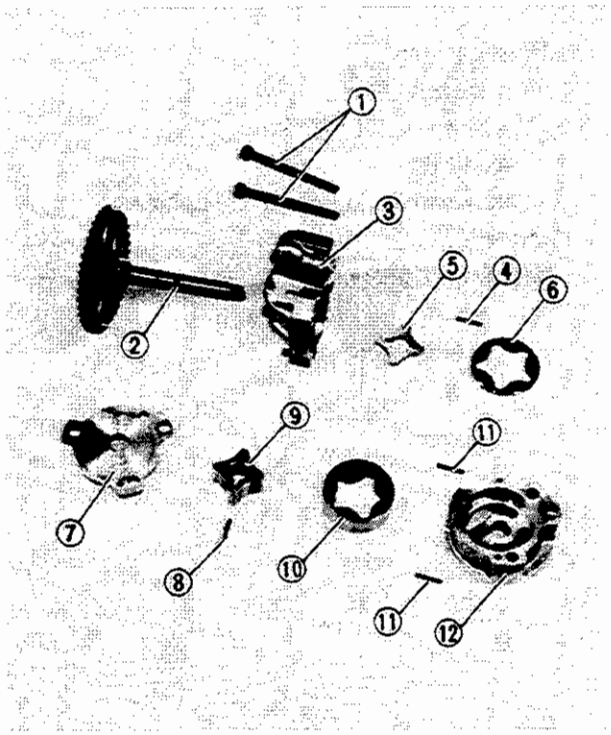
   Roughness → Replace (see Removal).
2. Inspect:
   - Oil seals

   Damage/Wear → Replace (see Removal).

CIRCLIP AND WASHER

1. Inspect:
   - Circlips
   - Washers

   Damage/Looseness/Bends → Replace.



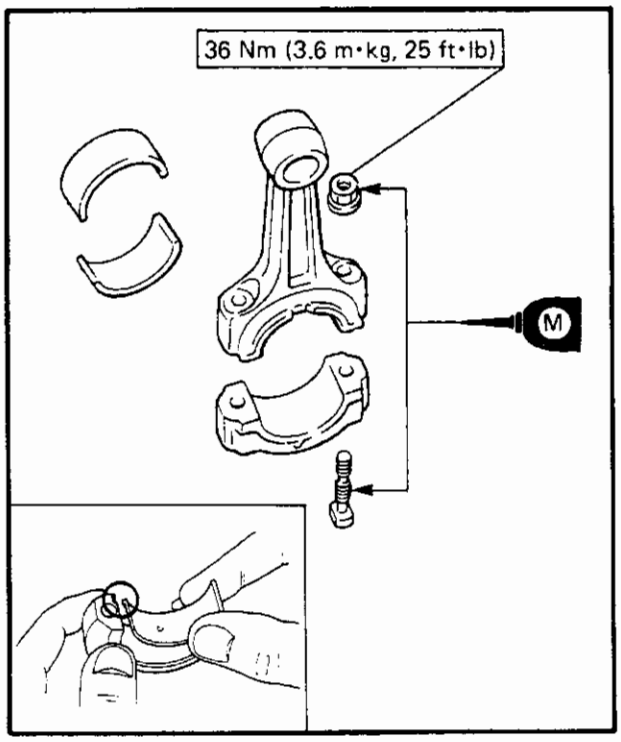
ENGINE ASSEMBLY AND ADJUSTMENT

OIL PUMP

1. Install:
   - Bolts ①
     (to pump housing 2)
   - Pump shaft ②
   - Pump housing 2 ③
   - Pin 2 ④
   - Inner rotor 2 ⑤
   - Outer rotor 2 ⑥
   - Intermediate plate ⑦
   - Pin 1 ⑧
   - Inner rotor ⑨
   - Outer rotor ⑩
   - Dowel pins ⑪
   - Pump housing 1 ⑫
   - Screw

NOTE:

Insert the inner rotors into the outer rotor. Then with the pump shaft dowel pin in the inner rotor slit.



CONECTING ROD

1. Clean:
   - Crankshaft
   - Connecting rods
2. Install:
   - Connecting rod bearings
     (into connecting rod and cap)

NOTE:

- Align the projection of bearing with the groove of cap.
- Identify each bearing position very carefully so that it can be reinstalled in its original place.

3. Lubricate:
   - Connecting rod bolt threads
   - Connecting rod nuts

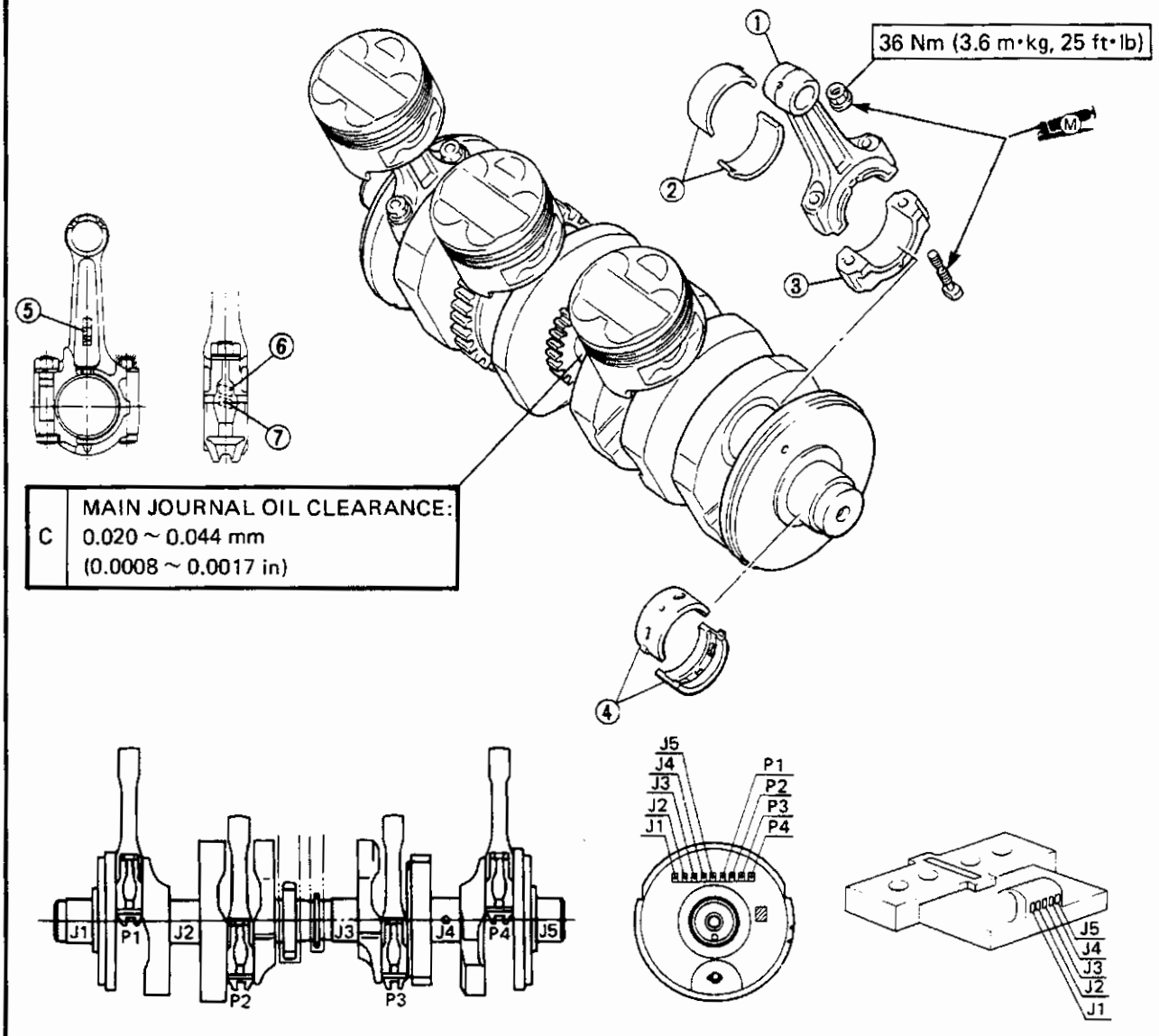
Molybdenum Disulfide Oil

4. Apply engine oil to the crankshaft pins.

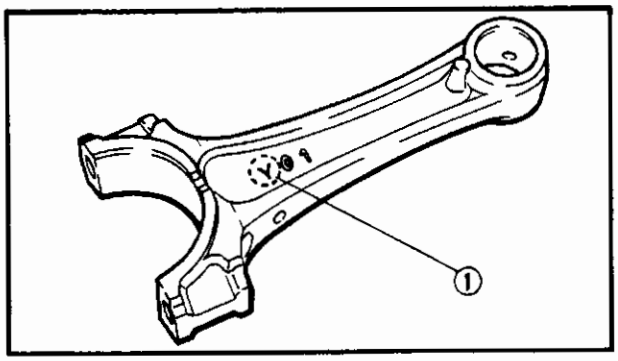
CONNECTING ROD AND CRANKSHAFT

① Connecting rod
② Connecting rod bearing
③ Connecting rod cap
④ Main journal bearing
⑤ "Y" mark
⑥ Matching mark
⑦ Crank pin bearing size

A	CRANKSHAFT RUNOUT LIMIT: 0.03 mm (0.0012 in)
B	CRANK PIN OIL CLEARANCE: 0.032 ~ 0.056 mm (0.0013 ~ 0.0022 in)

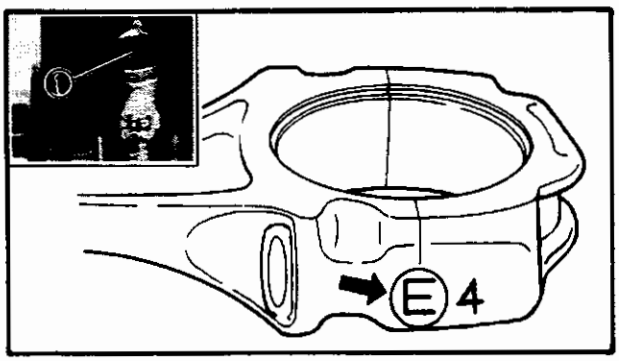


C	MAIN JOURNAL OIL CLEARANCE: 0.020 ~ 0.044 mm (0.0008 ~ 0.0017 in)



5. Install:
   - Connecting rods
   - Connecting rod caps

NOTE:
- The stamped "Y" mark on the connecting rods ① should face towards the left side of the crankcase.
- Be sure that the letter on both components align to from a perfect character.



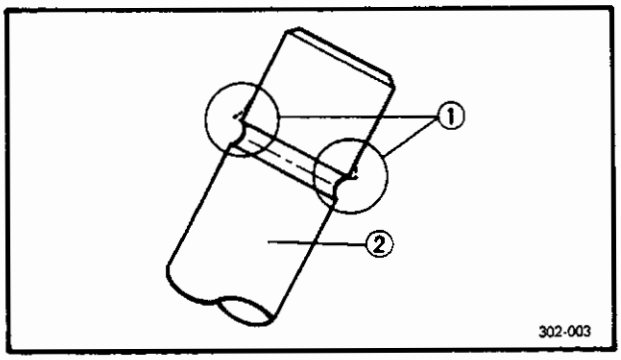
6. Install:
   - Connecting rod bolts

NOTE:
Align the bolt head ① and connecting rod cap.

7. Tighten:
   - Connecting rod nuts

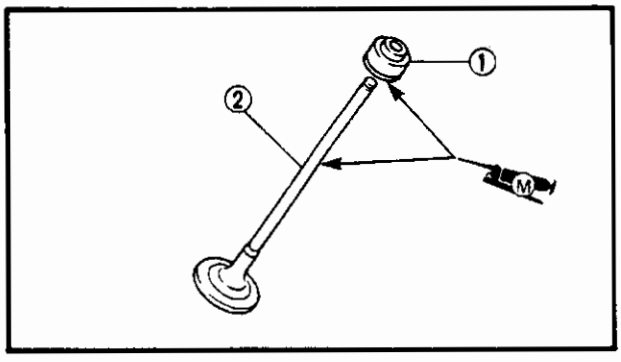
⚠CAUTION:
Tighten to full torque specification without pausing. Apply continuous torque between 2.0 and 3.6 m·kg. Once you reach 2.0 m·kg DO NOT STOP TIGHTENING unitl final torque is reached. If the tightening is interrupted between 2.0 and 3.6 m·kg, loosen the nut to less than 2.0 m·kg and start again.

	Nut (connecting rod): 36 Nm (3.6 m·kg, 25 ft·lb)



VALVE AND CHAMSHAFT CASE

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

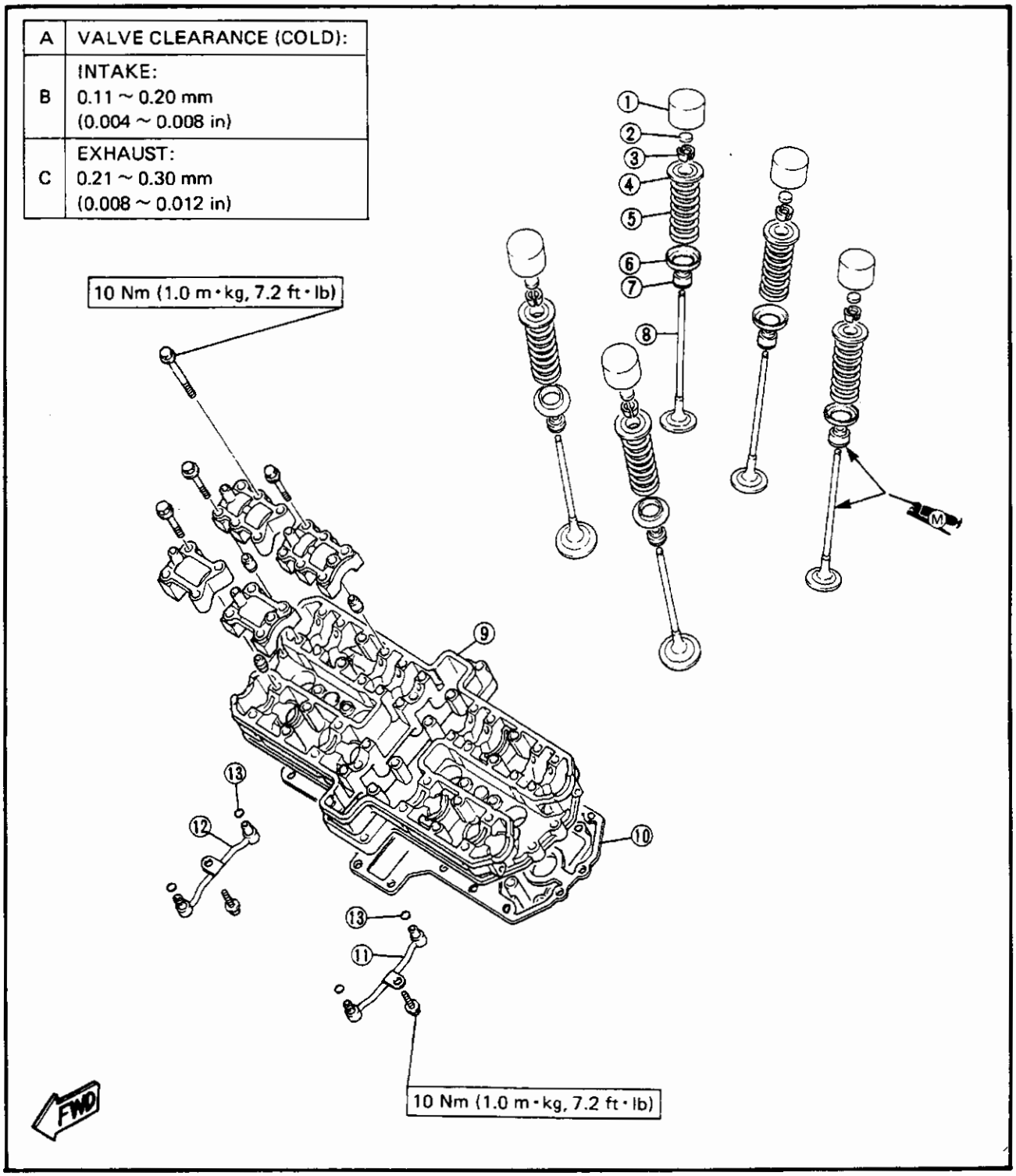


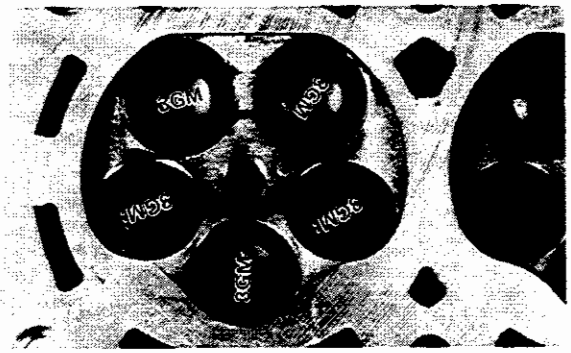
2. Lubricate:
   - Valve stem ①
   - Oil seal ②

	High-quality molybdenum disulfide Motor oil or molybdenum, disulfide grease

VALVE AND CAMSHAFT CASE

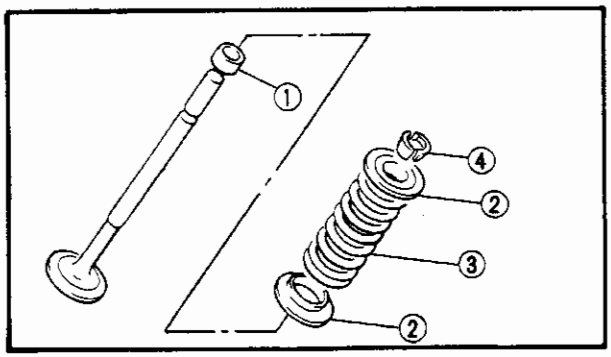
① Valve lifter
② Pad
③ Valve cotter
④ Valve retainer
⑤ Valve spring
⑥ Valve retainer
⑦ Oil seal
⑧ Valve
⑨ Camshaft case
⑩ Gasket (camshaft case)
⑪ Oil delivery pipe 3
⑫ Oil delivery pipe 4
⑬ O-ring





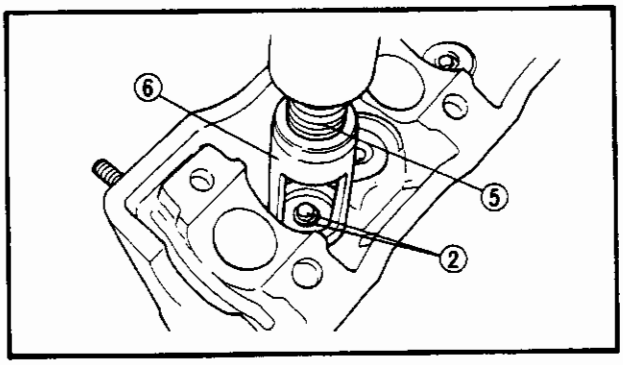
3. Install:
   - Valves
     Intake (right/left) : "3GM:"
     (center) : "3GM·"
     Exhaust : "3GM"

NOTE:
Be sure to reinstall in its original place.



4. Install:
   - Oil seal ①
   - Valve retainers ②
   - Valve spring ③
   - Valve cotters ④

NOTE:
Attach the valve spring compresser ⑤ and attatchment ⑥ between the valve retainers and cylinder head to install the valve cotters.

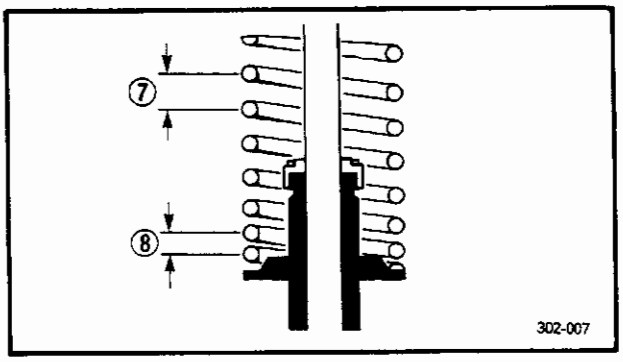




Valve spring compresser:
YM-04019
90890-04019

Attachment:
(For exhaust valve)
YM-04108
90890-04108
(For intake valve)
YM-04114
90890-04114

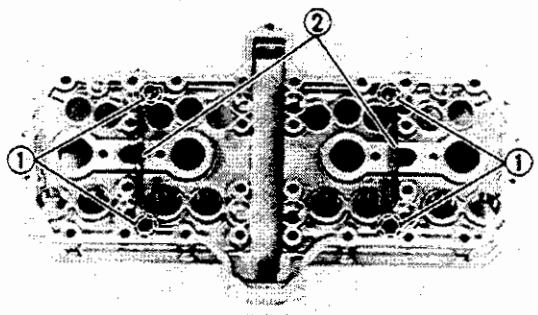
NOTE:
All valve springs must be installed with the larger pitch ⑦ upward as shown.



⑧ Smaller pitch

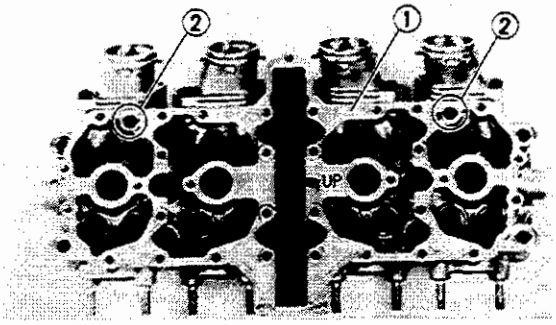
5. Secure the valve cotter onto the valve stem by tapping it lightly with a piece of wood.

NOTE:
Do not hit so much as to damage the valve.



6. Install:
   - O-rings ①
   - Oil delivery pipe 3/4 ②
     (onto camshaft case)

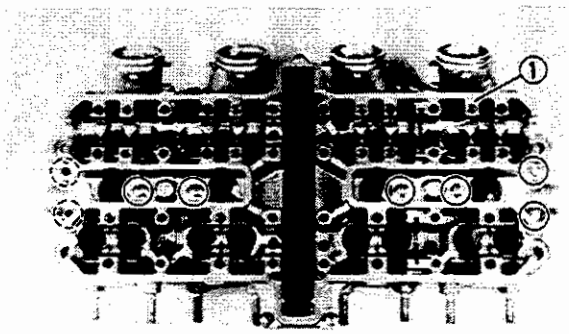
	Bolt (oil delivery pipe 3/4): **10 Nm (1.0 m·kg, 7.2 ft·lb)**



7. Install:
   - Gasket (camshaft case) ①
   - Dowel pins ②

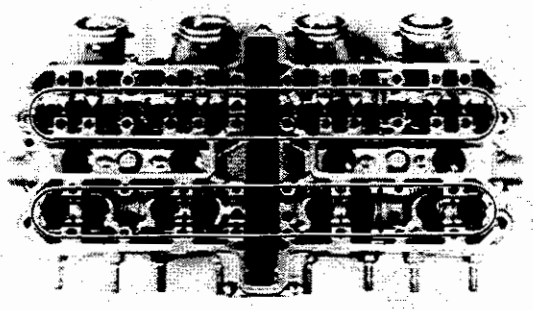
NOTE:
Be sure the "UP" mark faces upward.

⚠ WARNING:
Always use a new gasket (camshaft case).



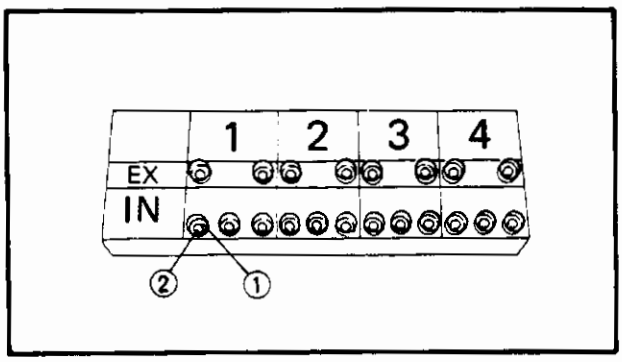
8. Install:
   - Camshaft case ①

	Camshaft case bolts: **10 Nm (1.0 m·kg, 7.2 ft·lb)**



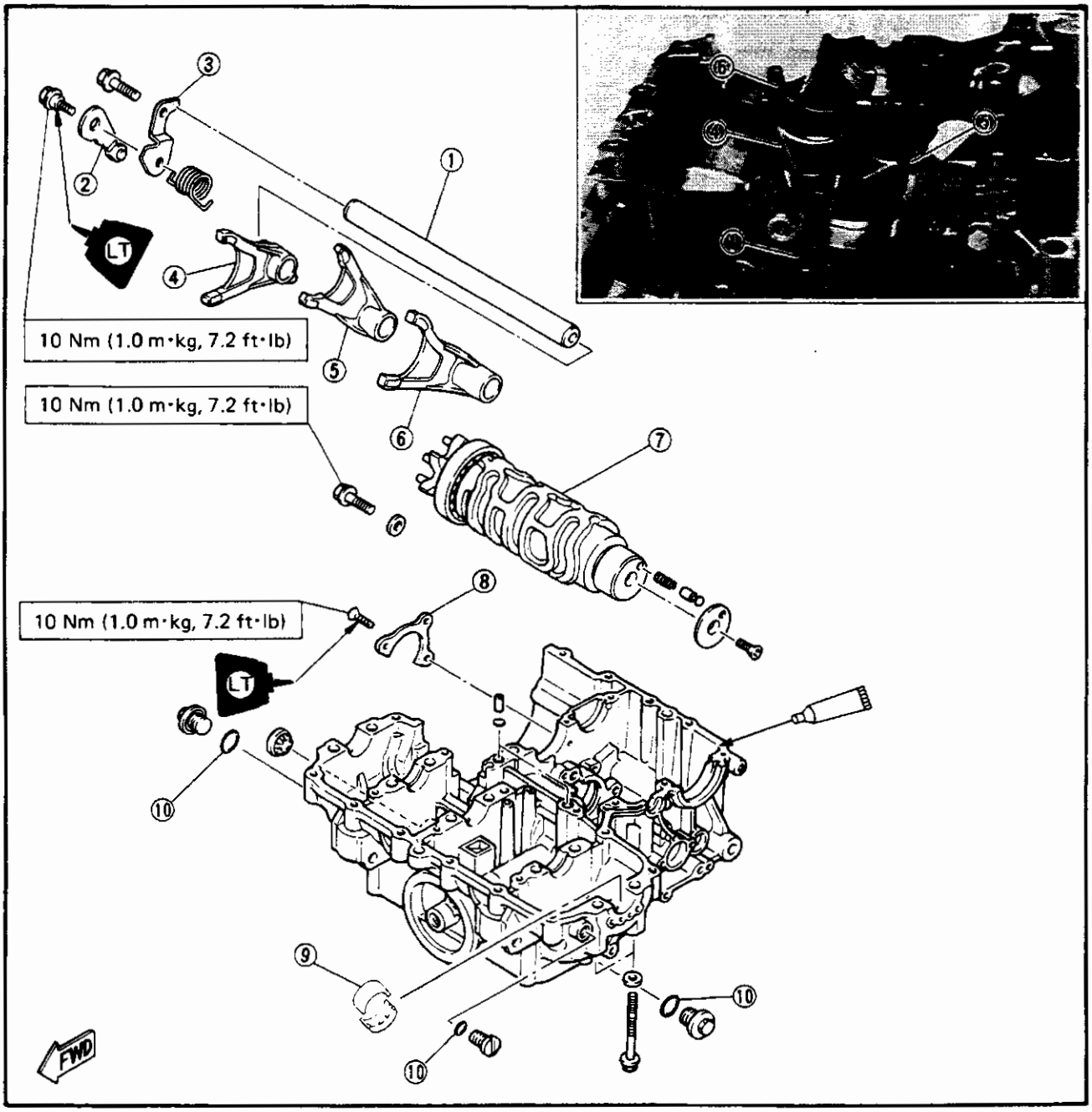
9. Install:
   - Pad ②
   - Valve lifter ①

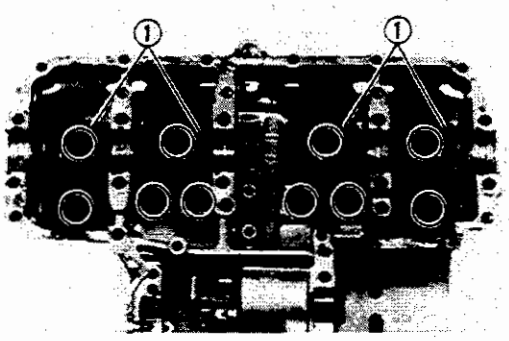
NOTE:
- Apply the molybdenum disulfide grease to the pad.
- Lubricate the valve lifter with a molybdenum disulfide oil.
- Valve lifter must be rotated smoothly by a finger.
- Each valve lifter and pad position very carefully so that its original place.



LOWER CRANKCASE

① Guide bar
② Stopper lever
③ Guide bar stopper
④ Shift fork (R)
⑤ Shift fork (C)
⑥ Shift fork (L)
⑦ Shift cam
⑧ Main axle bearing retainer
⑨ Crankshaft main bearing
⑩ O-ring

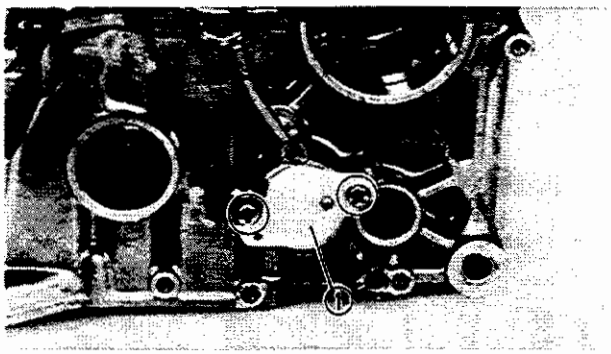




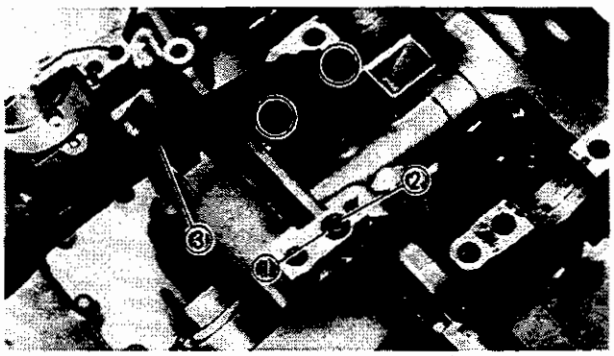
SHIFT FORK AND SHIFT CAM

1. Install:
   - Baffle plates (engine oil) ①

	Bolts (baffle plate): 10 Nm (1.0 m·kg, 7.2 ft·lb)



2. Install:
   - Neutral switch ①

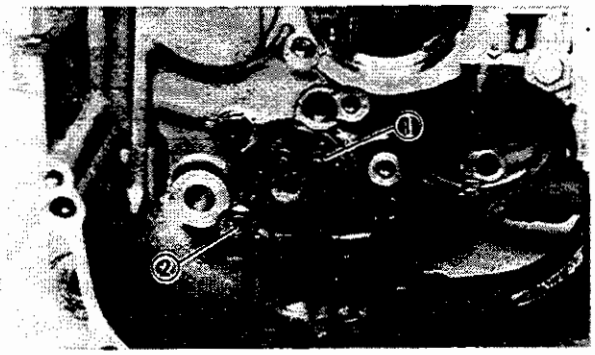


3. Install:
   - O-ring ①
   - Dowel pin ②
   - Timing chain guide (intake side) ③

	Bolt (chain guide): 10 Nm (1.0 m·kg, 7.2 ft·lb)

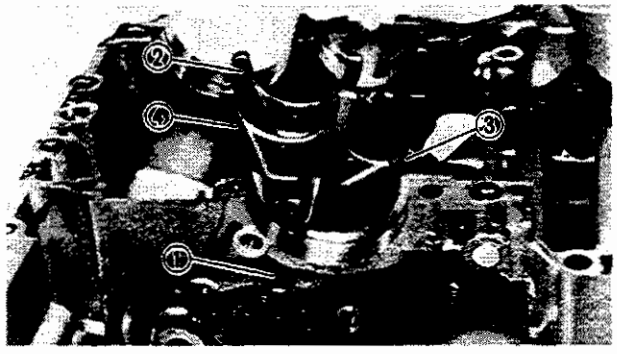
⚠ WARNING:

Always use a new O-ring.



4. Install:
   - Shift cam assembly ①
   - Bolt ②

	Bolt: 10 Nm (1.0 m·kg, 7.2 ft·lb) Apply LOCTITE®



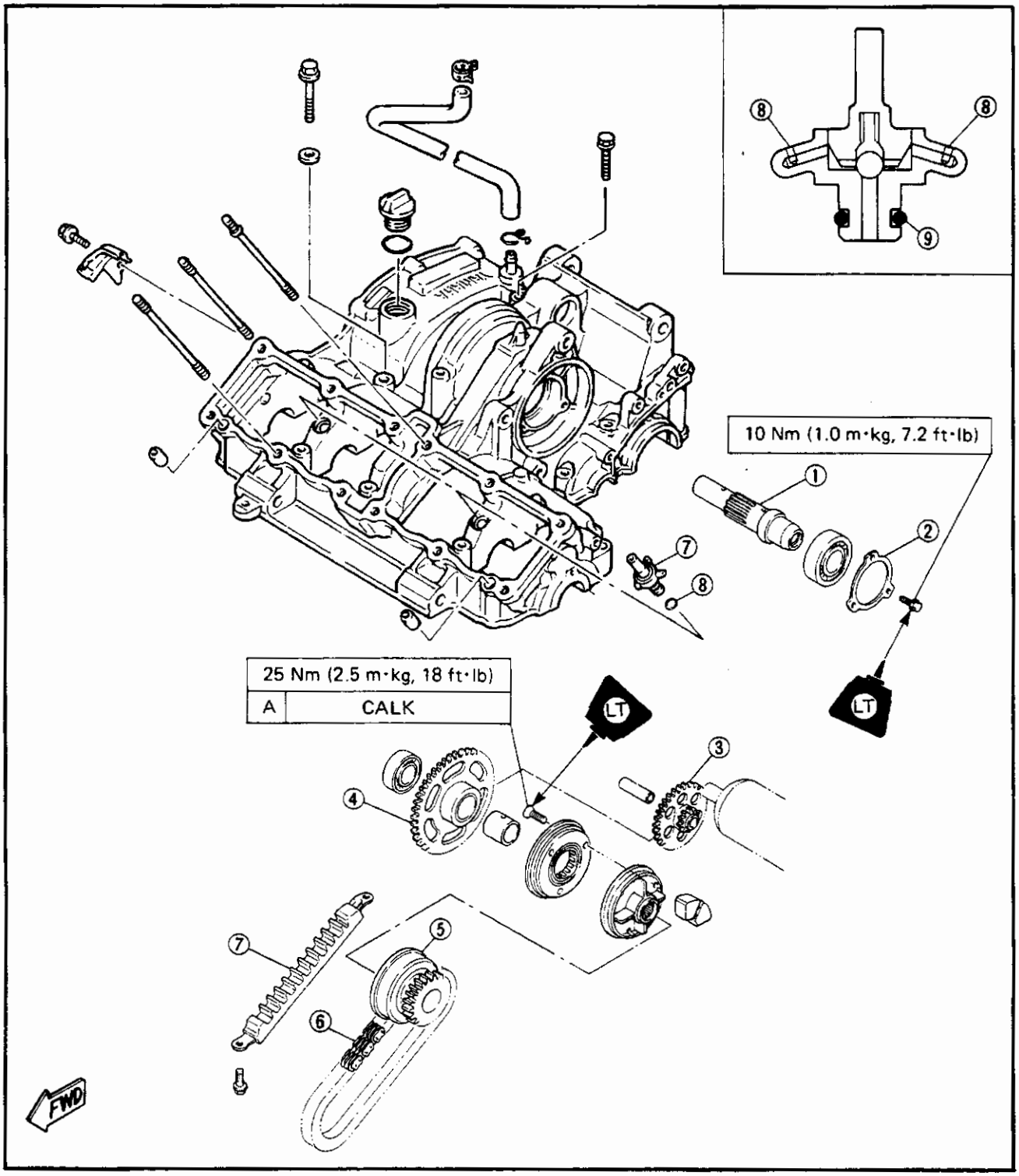
5. Install:
   - Guide bar ①
   - Shift fork "L" ②
   - Shift fork "C" ③
   - Shift fork "R" ④

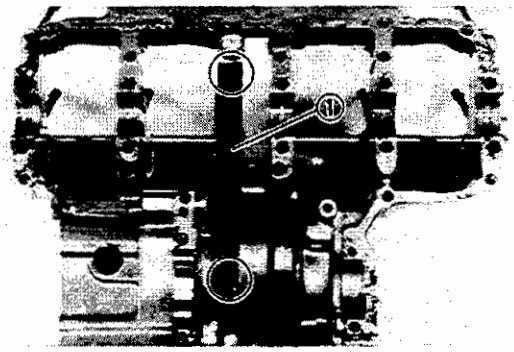
NOTE:

All shift fork letters should face to the right side and be in sequence (R, C, L) begining from the right.

UPPER CRANKCASE

① AC generator shaft
② Bearing retainer
③ Starter idle gear
④ Starter clutch gear
⑤ Starter clutch
⑥ HY-VO chain
⑦ HY-VO chain guide
⑧ Oil-Jet nozzle
⑨ O-ring

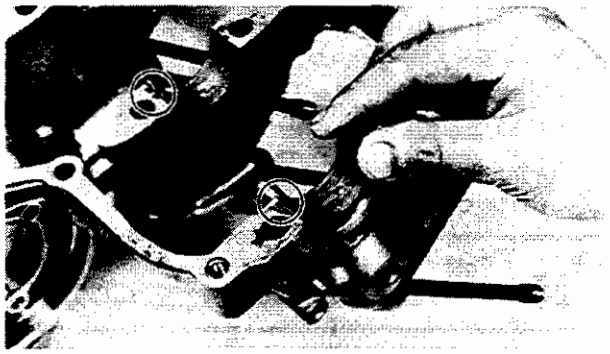




STARTER CLUTCH AND CRANKSHAFT

1. Install:
   - HY-VO chain guide ①

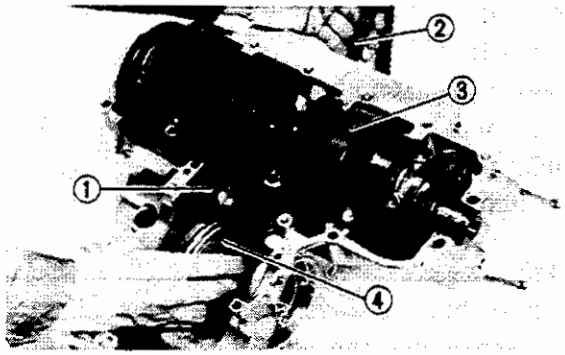
	Bolts (HY-VO chain guide): **10 Nm (1.0 m·kg, 7.2 ft·lb)**



2. Install:
   - Plane bearings (crankshaft)

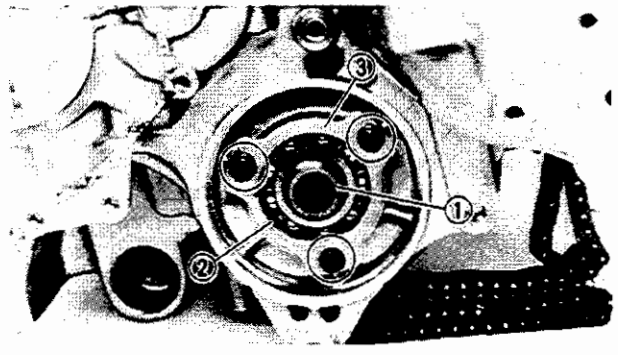
NOTE:
- Align the projection of the bearing with the notch in the case.
- Identify each bearing position so that the bearing should be installed position.

3. Apply engine oil to the plane bearing.



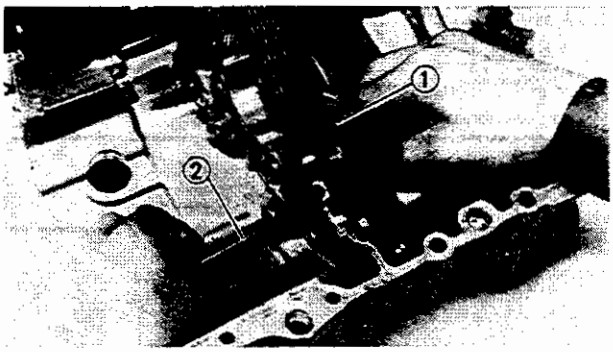
4. Install:
   - HY-VO chain ①
   - Timing chain ②
     (onto crankshaft)
   - Crankshaft assembly ③
   - Starter clutch assembly ④

NOTE:
- The stepped crankshaft end should face to the left.
- Pass the timing chain through the timing chain cavity. Be sure to attach a retaining wire to the timing chain.

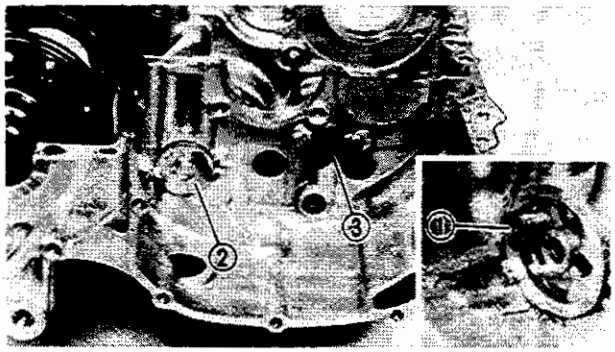


5. Install:
   - AC generator shaft ①
   - Bearing ②
   - Bearing retainer ③
   - Bolts

	Bolt (bearing retainer): **10 Nm (1.0 m·kg, 7.2 ft·lb)** **Apply LOCTITE®**

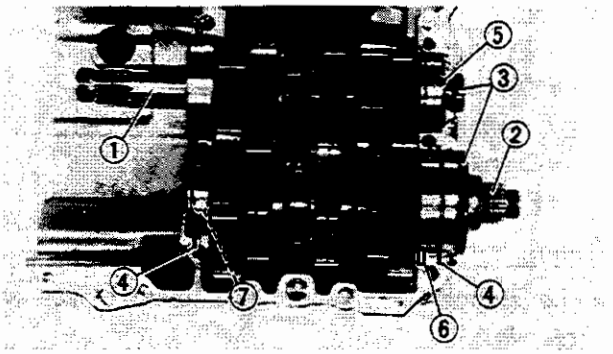


6. Install:
   - Starter idle gear ①
   - Shaft ②



7. Install:
   - Oil splay nozzle ①
   - Gasket
   - Oil plug plate ②
   - Oil delivery pipe 5 ③ (with o-ring)

	Bolt (oil plug plate): 10 Nm (1.0 m · kg, 7.2 ft · lb)



TRANSMISSION

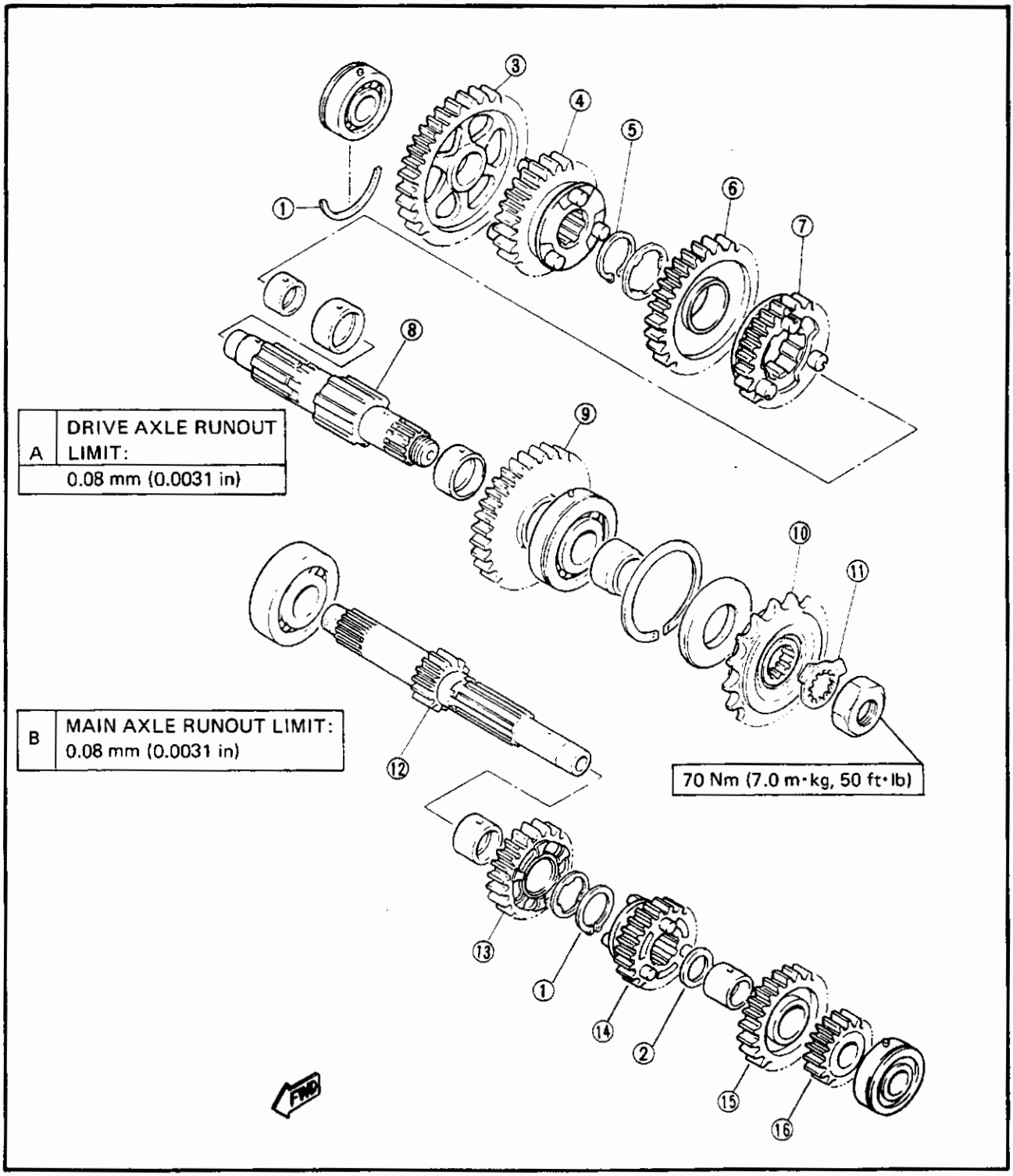
1. Install:
   - Main axle assembly ①
   - Drive axle assembly ②
   - Oil seal ③
   - Circlip ④

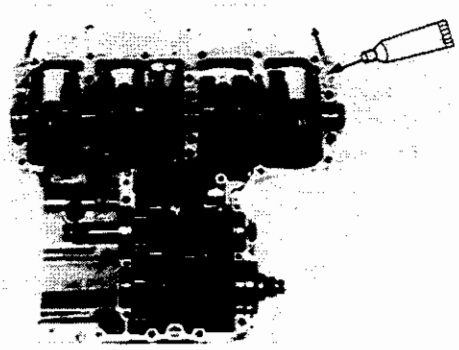
NOTE:

- Be sure that the drive axle bearing circlips ④ are inserted into the upper crankcase positioning grooves.
- Be sure that the main axle bearing pin ⑤ should face to lower case side and the drive axle bearing pin ⑥ should face to rear, and main axle bearing pin ⑦ should face to upper case side.

TRANSMISSION

① Circlip
② Plain washer
③ 1st wheel gear (36T)
④ 4th wheel gear (27T)
⑤ Circlip
⑥ 3rd wheel gear (29T)
⑦ 5th wheel gear (28T)
⑧ Drive axle
⑨ 2nd wheel gear (32T)
⑩ Drive sprocket
⑪ Lock washer
⑫ Main axle
⑬ 4th pinion gear (27T)
⑭ 3rd pinion gear (21T)
⑮ 5th pinion gear (27T)
⑯ 2nd pinion gear (18T)



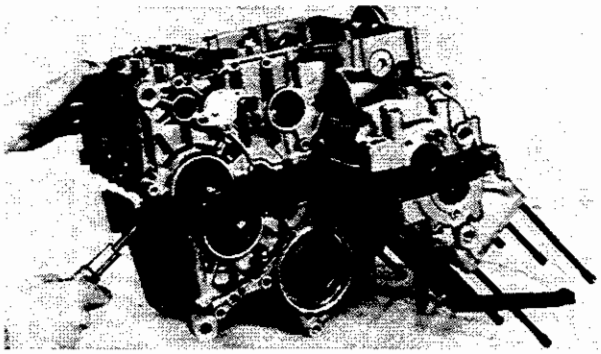


CRANKCASE ASSEMBLY

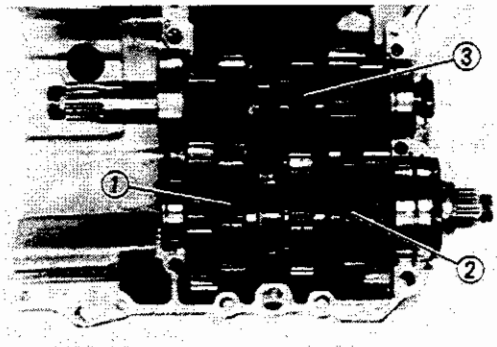
1. Apply:
   - Sealant
     (onto crankcase matching surfaces)

Yamaha bond No. 1215:
90890-85505
Quick gasket®:
ACC-11001-05-01

NOTE:
DO NOT ALLOW any sealant to come in contact with the oil gallery O-ring, or crankshaft bearings. Do not apply sealant to within 2 ~ 3 mm (0.08 ~ 0.12 in) of the bearings.

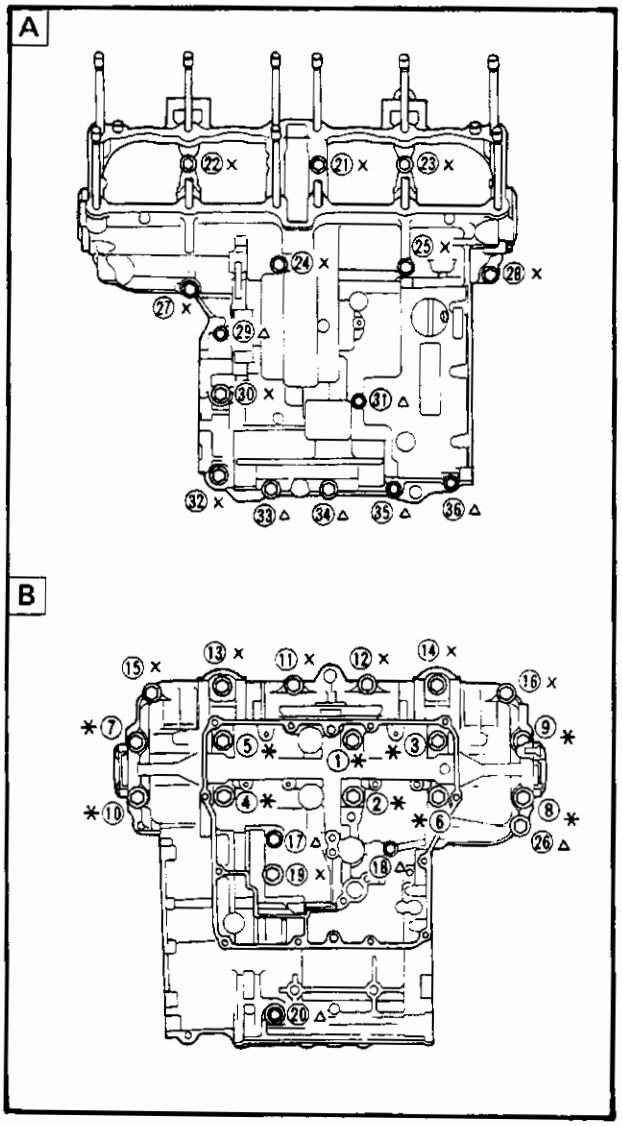


2. Set shift cam and transmission gears in NEUTRAL position.
3. Place the lower crankcase assembly onto the upper crankcase assembly.
4. Install:
   - Lower crankcase.
     Carefully guide the shift forks so that they mesh smoothly with the transmission gears.



NOTE:
- Mesh the shift fork "L" with the 4th wheel gear ① and "R" with the 5th wheel gear ② on the drive axle.
- Mesh the shift fork "C" with the 3rd pinion gear ③ on the main axle.

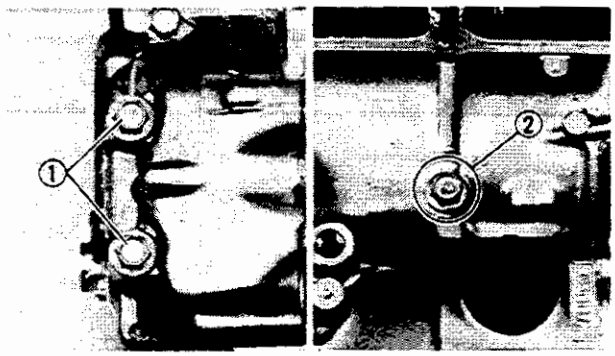
⚠ CAUTION:
Before tightening the crankcase bolts, check the following points:
- **Be sure the gear shifts correctly while hand-turning the shift cam.**



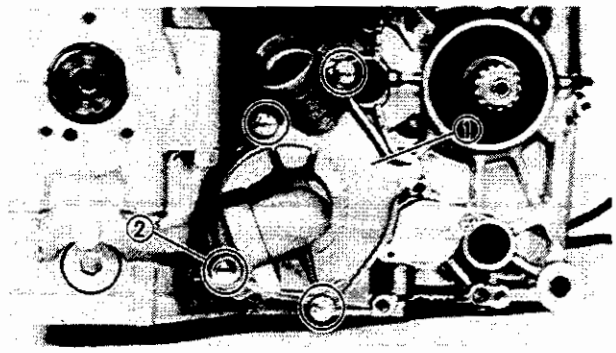
5. Tighten:
   - Lower crankcase bolt [B]
   - Upper crankcase bolt [A]

   (follow the proper tightening sequence.)

△6 mm bolts:
12 Nm (1.2 m·kg, 8.7 ft·lb)
×8 mm bolts:
24 Nm (2.4 m·kg, 17 ft·lb)
✱9 mm bolts:
32 Nm (3.2 m·kg, 23 ft·lb)



NOTE:
- Install the washer ① on bolt No. 7, 8, 9, and 10.
- Install the copper washer ② on bolt No. 25.

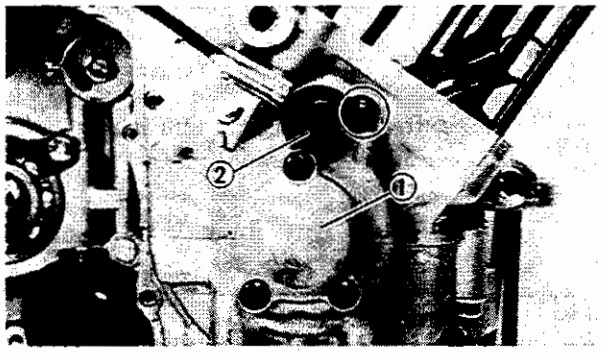


6. Install:
   - Bearing retainer (main axle) ①

   Use the torx wrench (T30).

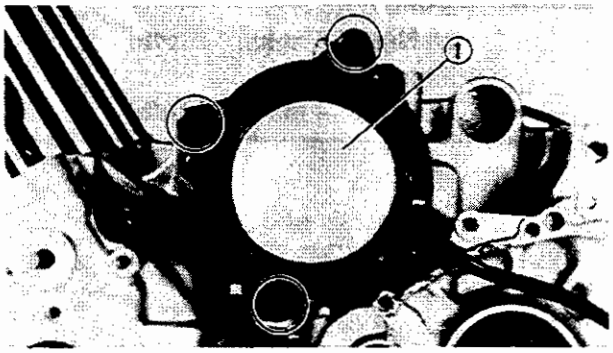
Torx wrench (T30):
YU-29843-6
90890-05245

Screws (bearing retainer):
10 Nm (1.0 m · kg, 7.2 ft · lb)
LOCTITE®



7. Install:
   - O-ring
   - Crankshaft end cover ① (right)
   - Pickup coil ②

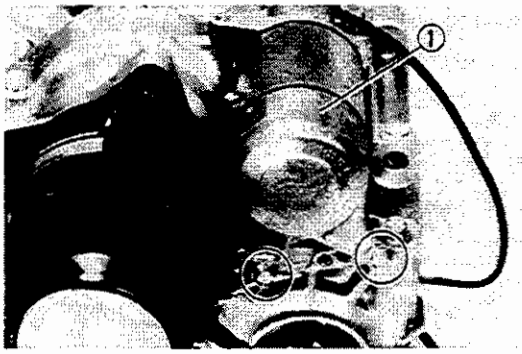
	Screws (crankshaft end cover): 7 Nm (0.7 m · kg, 5.1 ft · lb) **Bolt (pickup coil):** 10 Nm (1.0 m kg, 7.2 ft · lb)



AC GENERATOR AND STARTER MOTOR

1. Check:
   - O-rings (AC generator and starter motor)
     Damage → Replace.
2. Install:
   - AC generator ①

	Bolts (AC generator): 20 Nm (2.0 m · kg, 14 ft · lb)

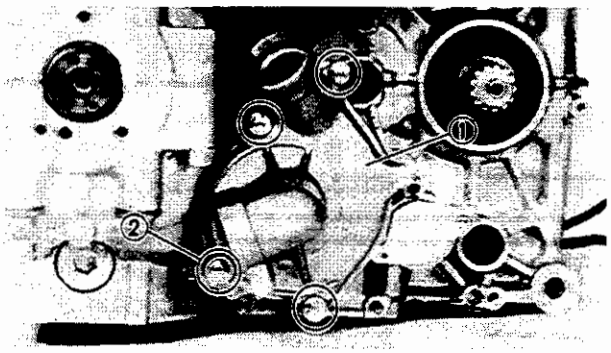


NOTE:
Apply the engine oil to the o-ring of the AC generator.

3. Install:
   - Starter motor ①

	Bolt (starter motor): 10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
Apply the engine oil to the O-ring of the starter motor.



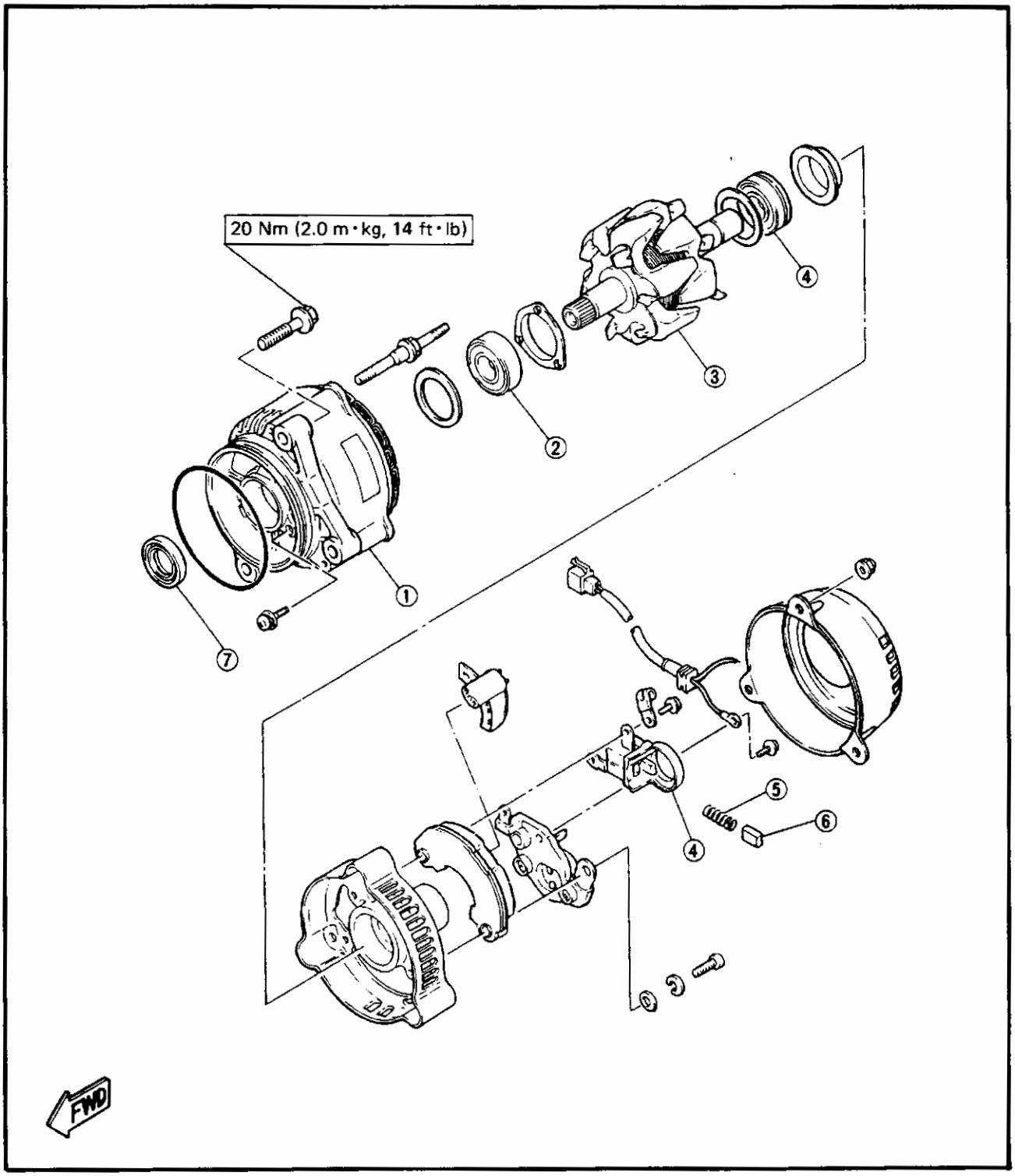
WATER PUMP

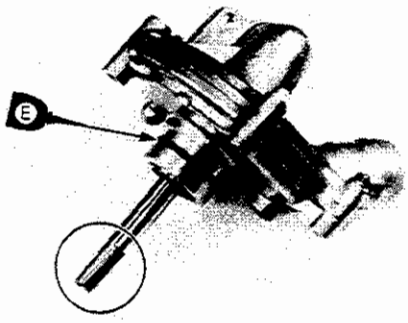
1. Check:
   - O-ring (water pump)
2. Install:
   - Water pump assembly ①

	Bolts (water pump): 10 Nm (1.0 m · kg, 7.2 ft · lb)

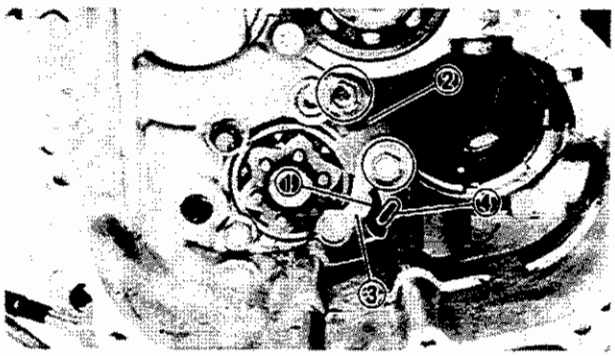
AC GENERATOR

① Stator coil
② Bearing
③ Field coil
④ Brush holder
⑤ Brush spring
⑥ Brush
⑦ Oil seal





NOTE:
- Align the slot of the water pump shaft with the projection of the oil pump drive shaft.
- Before installing the water pump assembly, apply the engine oil to the O-ring.
- Use the cupper washer ② on the coolant drain bolt.

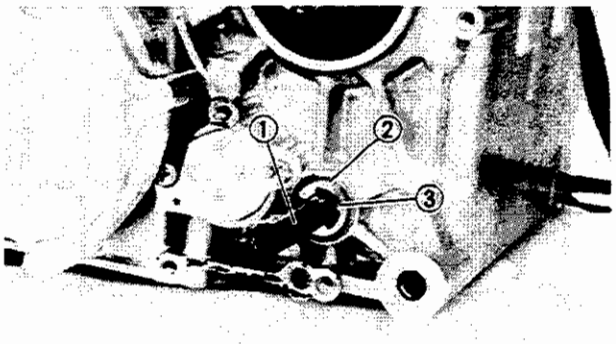


SHIFT SHAFT AND OIL PUMP

1. Install:
   - Spring ①
   - Stopper plate (guide bar) ②
   - Stopper lever ③

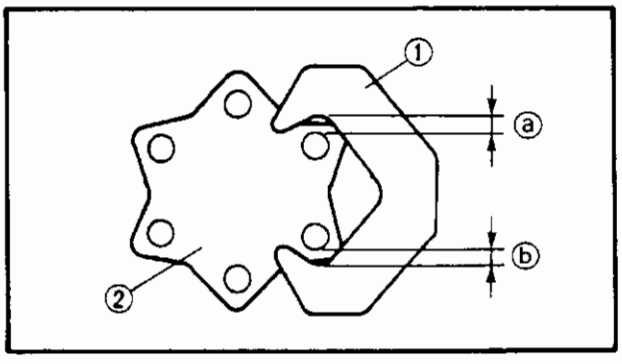
Bolt (stopper plate/stopper lever): 10 Nm (1.0 m·kg, 7.2 ft·lb) Apply LOCTITE®

NOTE:
- Mesh the stopper lever ③ with the shift cam stopper.
- Hook the spring ends on the stopper lever and crankcase boss ④.



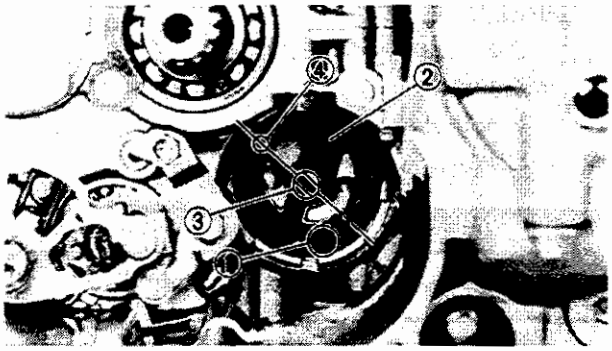
2. Install:
   - Shift shaft ①
   - Washer ②
   - Circlip ③

NOTE:
- Insert the stopper between spring ends.
- Apply the grease to the oil seal lip.



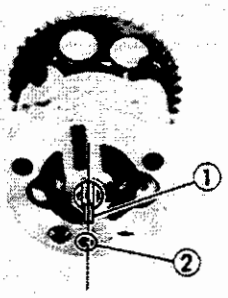
3. Check:
   - Shift pawl ① position
     Gaps ⓐ and ⓑ are not equal → Replace the defective parts or adjust the adjuster.

② Shift cam



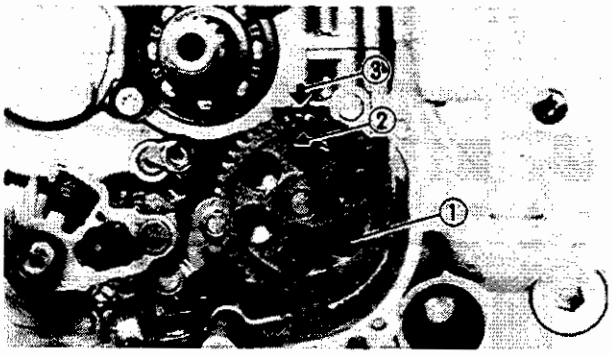
4. Install:
   - Dowel pin ①
   - Gasket ②

NOTE:
Align the water pump impeller shaft slot ③ with the oil pump thread hole ④.



5. Install:
   - Oil pump mounting bolt

NOTE:
Align the oil pump shaft projection ① with the oil pump hole②.

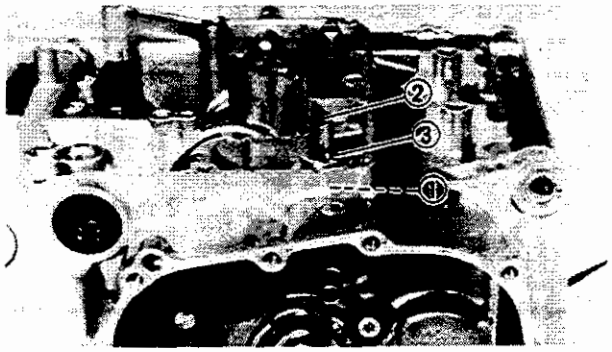


6. Install
   - Oil pump assembly ①

	Oil pump mounting bolts: 10 Nm (1.0 m·kg, 7.2 ft·lb)

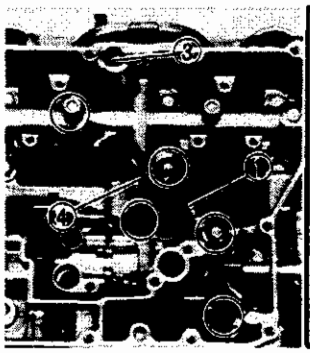
NOTE:
Align the oil pump arrow mark ② with crankcase arrow mark ③.

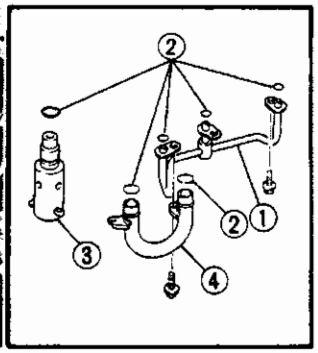
⚠ CAUTION:
- **Be sure that the oil pump turns smoothly in itself after tightening the bolts.**
- **Be sure that the oil pump shaft projection mesh with the water pump impeller shaft slot.**



OIL STRAINER, OIL FILTER AND OIL PAN

1. Install:
   - Mount rubber ①
   - Oil pipe ②
   - Circlip ③



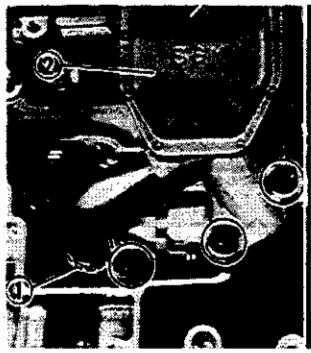


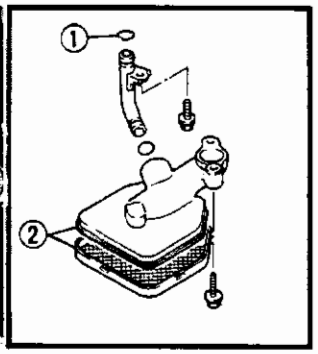
2. Install:
   - Oil delivery pipe 1 ①
   - O-rings ②
   - Relief valve ③
   - Oil pipe 2 ④

WARNING:

Always use new circlip and O-rings.

Bolts (oil pipe 2):
10 Nm (1.0 m · kg, 7.2 ft · lb)



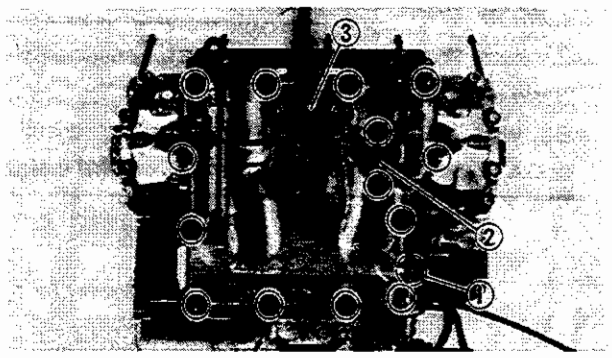


3. Install:
   - O-ring ①
   - Oil strainer assembly ②

WARNING:

Always use a new o-ring.

Bolt (oil strainer):
10 Nm (1.0 m · kg, 7.2 ft · lb)

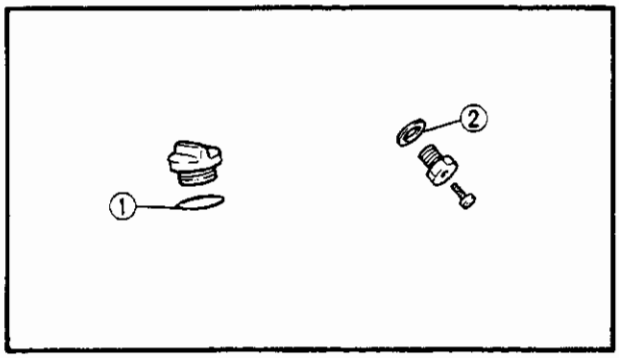


4. Install:
   - Drain plug ①
     (with copper washer)
   - Oil level switch ②
     (with o-ring)
   - Gasket
   - Oil pan ③

WARNING:

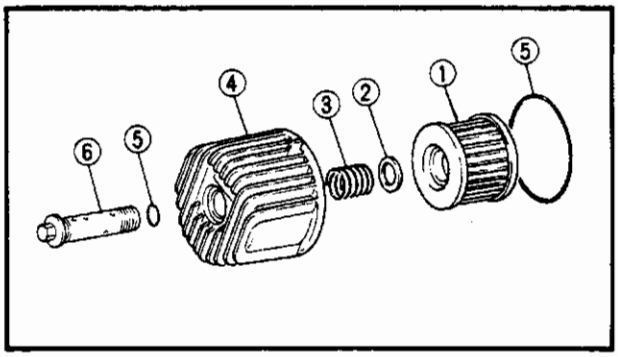
Always use new o-ring and gasket.

Drain plug:
43 Nm (4.3 m · kg, 31 ft · lb)
Bolts (oil level switch):
10 Nm (1.0 m · kg, 7.2 ft · lb)
Oil pan bolts:
10 Nm (1.0 m · kg, 7.2 ft · lb)



5. Inspect:
   - O-ring (oil filler cap) ①
   - Gasket (drain plug) ②

   Wear/Damage → Replace.



6. Install:
   - Oil filter (new) ①
   - Washer ②
   - Spring ③
   - Filter cover ④ (with o-ring ⑤)
   - Bolt (oil filter) ⑥ (with o-ring ⑤)

NOTE:

Be sure that the o-ring is positioned properly.

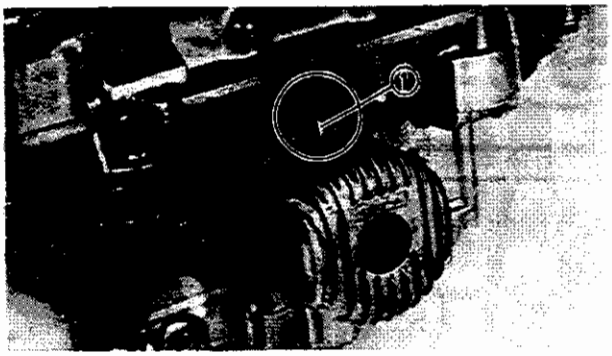
⚠ WARNING:

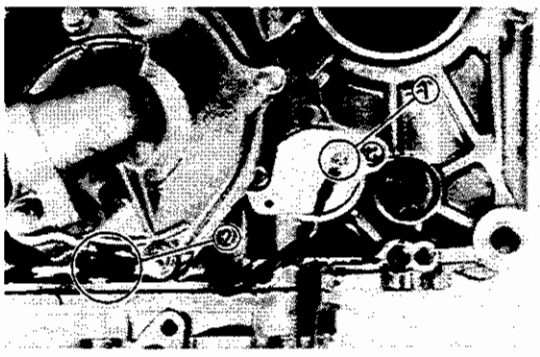
Always use a new o-ring.

Bolt (oil filter): 15 Nm (1.5 m·kg, 11 ft·lb)

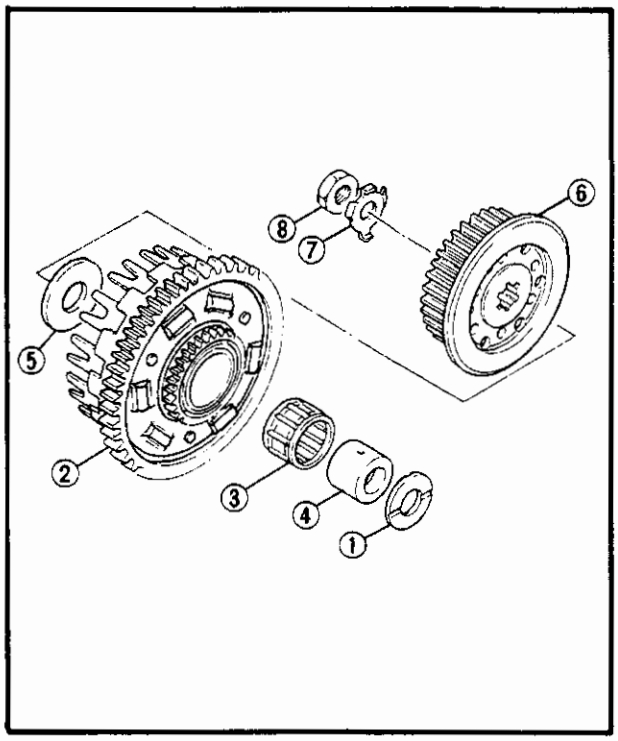
NOTE:

Mesh the oil filter cover projection ① with the crankcase slot.





7. Connect:
   - Neutral switch lead ①
   - Oil level switch lead ②



CLUTCH

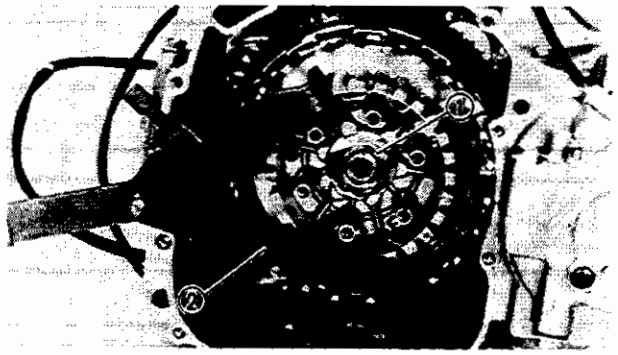
1. Install:
   - Thrust washer ①
   - Clutch housing ②
   - Bearing ③
   - Spacer ④
   - Thrust washer ⑤
   - Clutch boss ⑥
   - Lock washer ⑦
   - Nut (clutch boss) ⑧

NOTE:

Install the bearing ③ and spacer ④ after installation of the clutch housing ② .

⚠ WARNING:

Always use a new lock washer.



2. Tighten:
   - Nut (clutch boss) ①

Nut (clutch boss):
70 Nm (7.0 m · kg, 50 ft · lb)

NOTE:

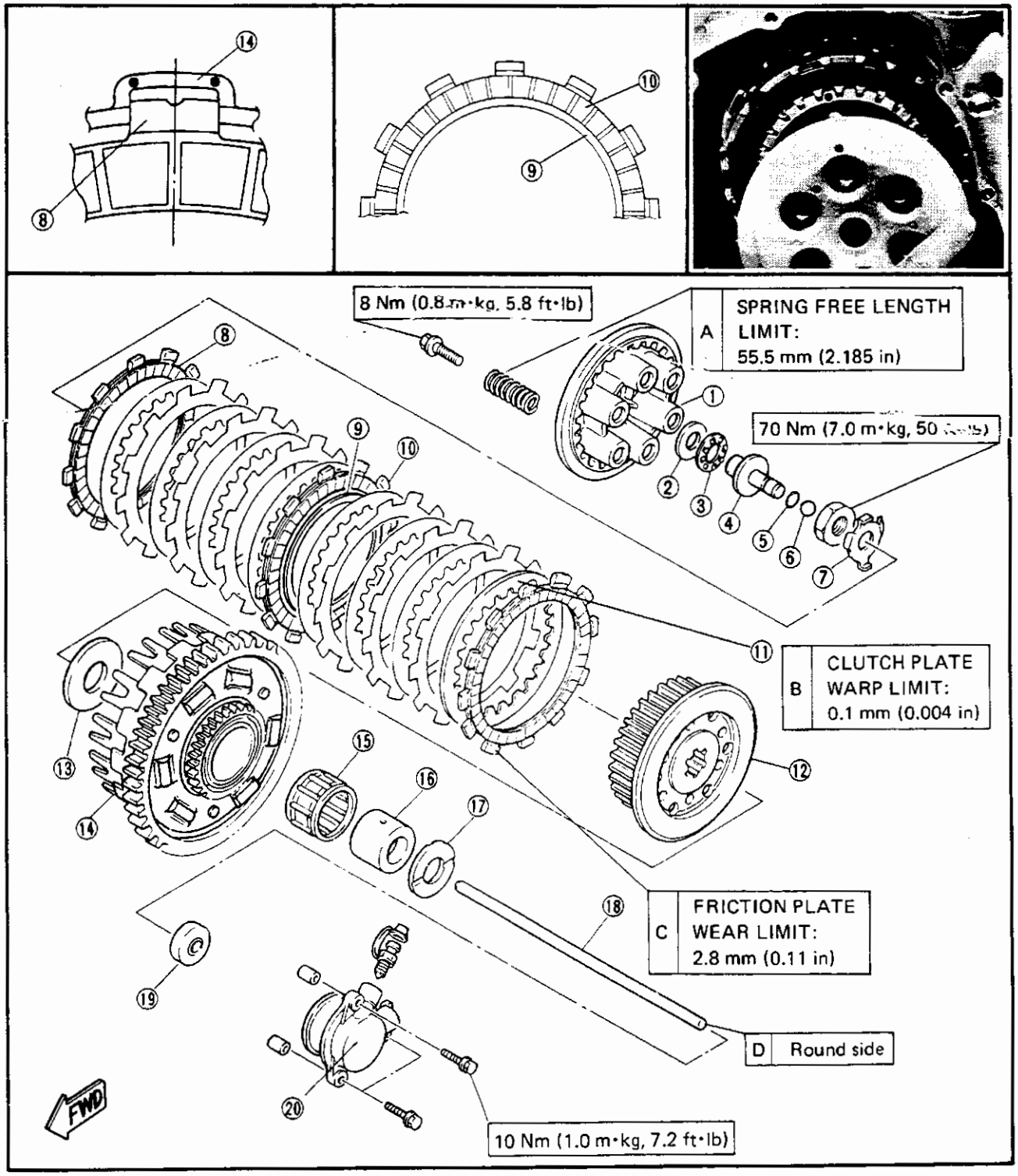
Tighten the nut (clutch boss) ① while holding the clutch boss with the universal clutch holder ②.

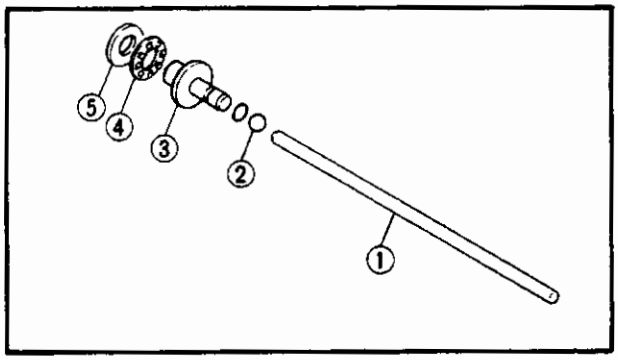
Universal clutch holder:
YM-91042
90890-04086

3. Bend the lock washer tab along the nut flat.

CLUTCH

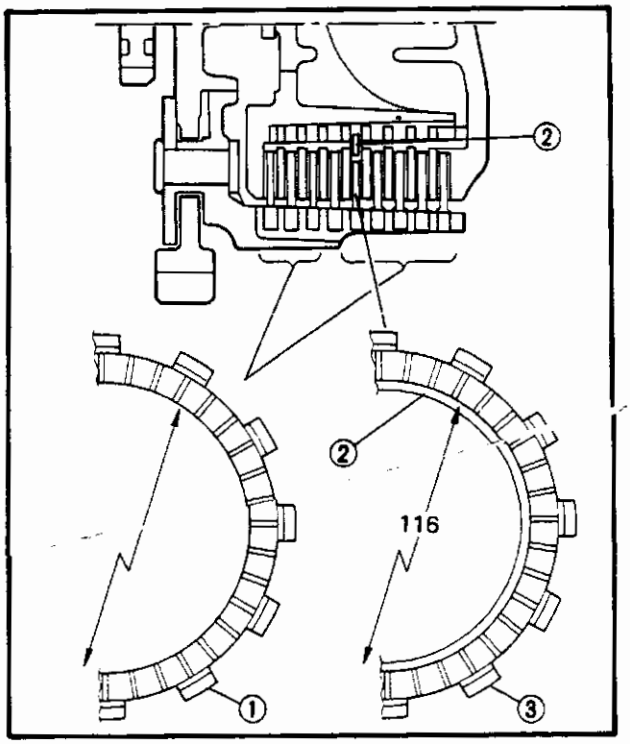
① Pressure plate
② Plate washer
③ Bearing
④ Push rod # 1
⑤ O-ring
⑥ Ball
⑦ Lock washer
⑧ Friction plate (outer)
⑨ Cushion spring
⑩ Friction plate (center)
⑪ Clutch plate
⑫ Clutch boss
⑬ Washer
⑭ Primary driven gear
⑮ Bearing
⑯ Spacer
⑰ Thrust washer
⑱ Push rod #2
⑲ Oil seal
⑳ Clutch release cylinder





4. Install:
   - Push rod #2 ①
   - Ball ②
   - Push rod #1 ③
   - Bearing ④
   - Washer ⑤

NOTE:
Apply the lithium soap base grease to the push rod #2 and ball.



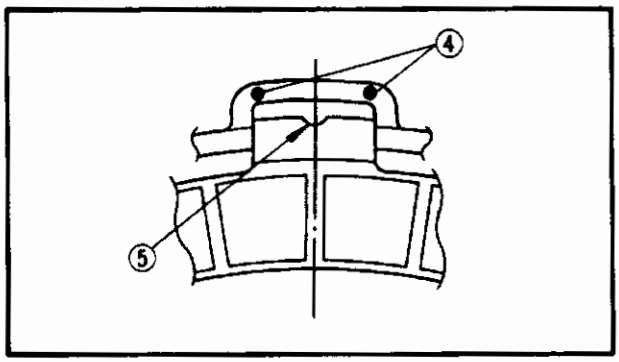
5. Install:
   - Friction plates
   - Clutch plates
   - Cushion spring

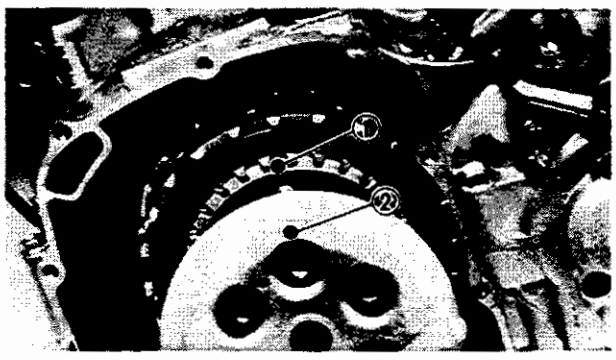
Installation steps:
- Install the four friction plates (with the red painted mark) ① and the four clutch plates mutually.
- Install the cushion spring ② and the one center friction plate (with the blue painted mark) ③ at the center position.

NOTE:
Be sure that the cushion spring ② and the center friction plate ③ must be positioned at the center among nine friction plates.

- Install the three friction plates ① (with the red painted mark) and the three clutch plates mutually.
- Install the one outer friction plate (with the signal semi-circular slot) ④.

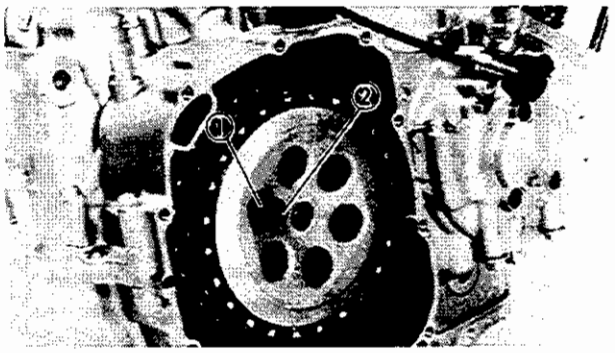
NOTE:
Be sure the that single semi-circular slot ④ on the friction plate is aligned with the clutch housing embossed match marks ⑤.





6. Install:
   - Pressure plate

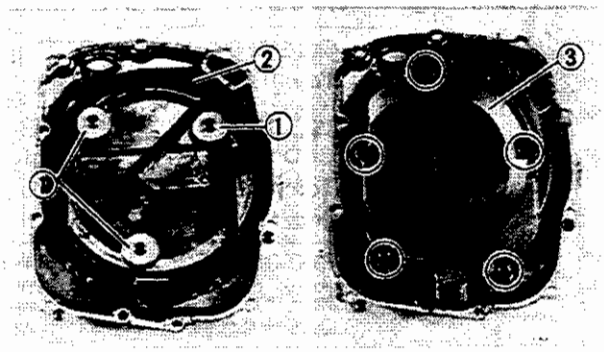
NOTE:
Be sure that the match mark ① on the clutch boss is aligned with the match mark ② on the pressure plate.



7. Install:
   - Clutch springs ①
   - Bolts (clutch spring) ②

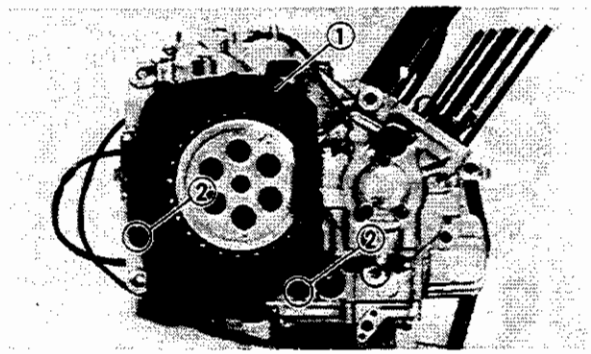
	Bolt (clutch spring): **8 Nm (0.8 m · kg, 5.8 ft · lb)**

NOTE:
Tighten the bolts (clutch spring) in stage, using a crisscross pattern.



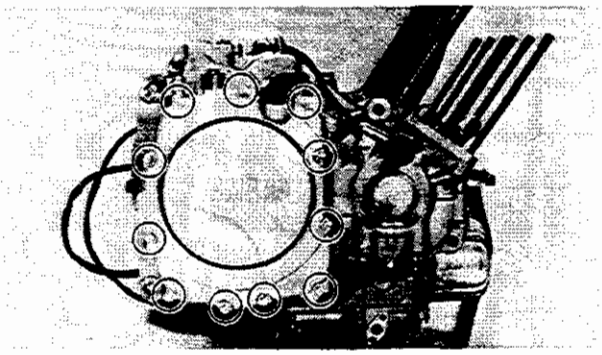
8. Install:
   - Cover
   - Rubber ring
   - Washer ①
   - Gasket ②
   - Cover (breather) ③

⚠ WARNING:
Always use a new gasket.



9. Install:
   - Gasket ①
   - Dowel pins ②

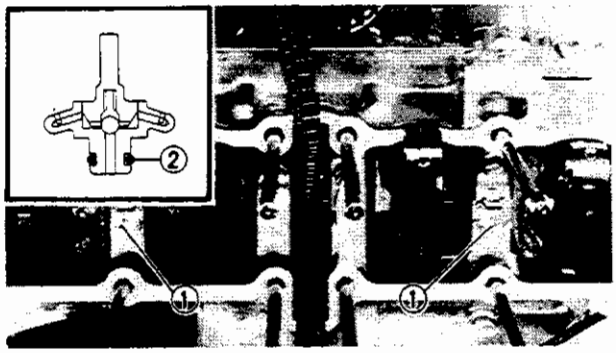
⚠ WARNING:
Always use a new gasket.



10. Install:
    - Crankcase cover (right)

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

NOTE:
Tighten the bolts (crankcase cover) in stage, using a crisscross pattern.



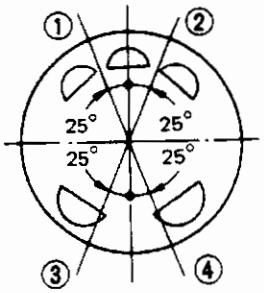
PISTON AND CYLINDER

1. Install:
   - Oil-jet nozzles ①
     (with o-ring ②)

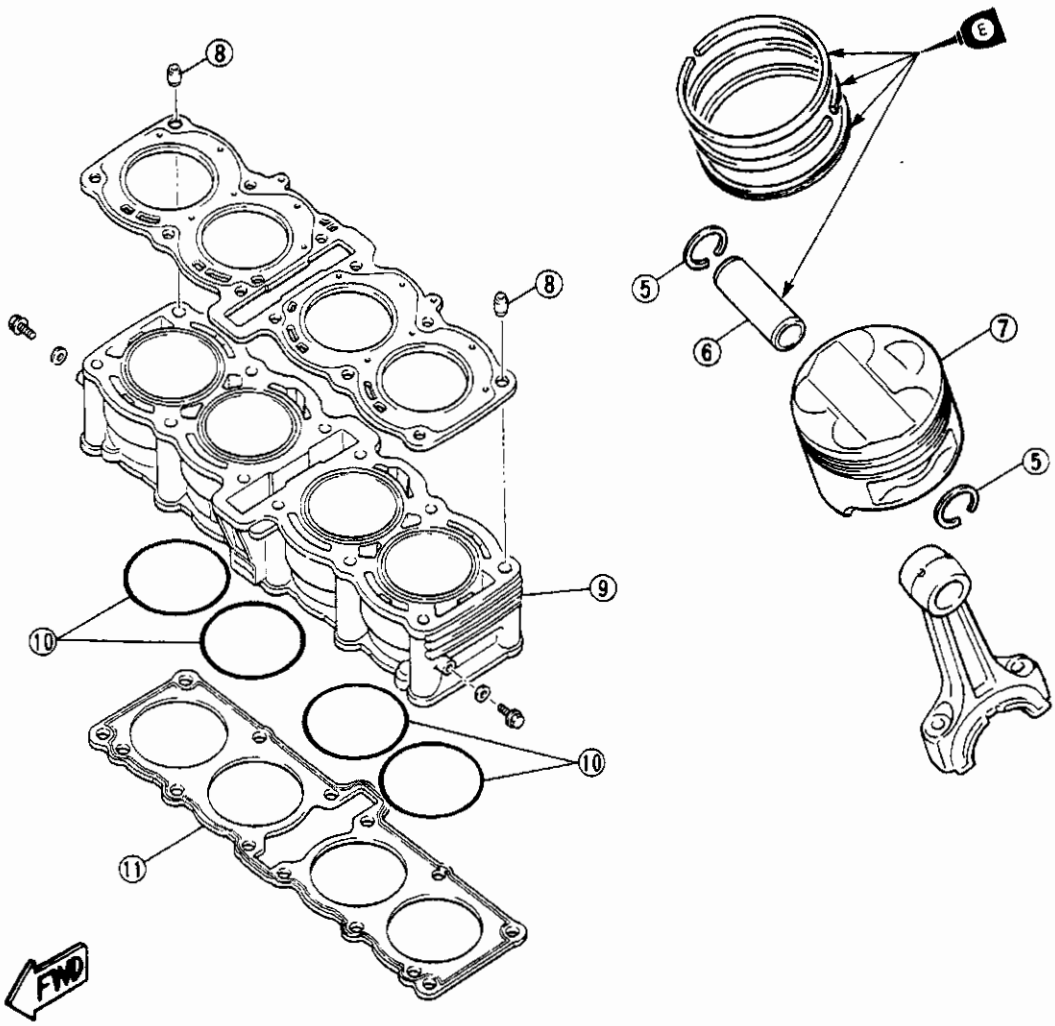
NOTE:
Apply the engine oil to the o-rings.

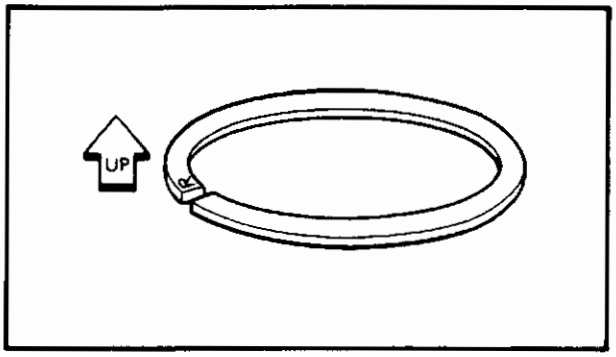
PISTON AND CYLINDER

① Top ring
② Oil ring (Lower)
③ Oil ring (Upper)
④ Second ring
⑤ Circlip
⑥ Piston pin
⑦ Piston
⑧ Dowel pin
⑨ Cylinder
⑩ O-ring
⑪ Gasket



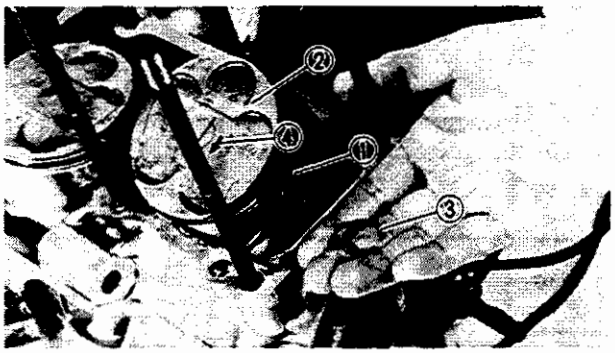
A	SIDE CLEARANCE LIMIT: Top: 0.15 mm (0.0059 in) 2nd: 0.15 mm (0.0059 in)
B	END GAP LIMIT: Top: 0.7 mm (0.0276 in) 2nd: 0.7 mm (0.0276 in)
C	PISTON - TO - CYLINDER CLEARANCE: 0.06 ~ 0.08 mm (0.0024 ~ 0.0032 in)





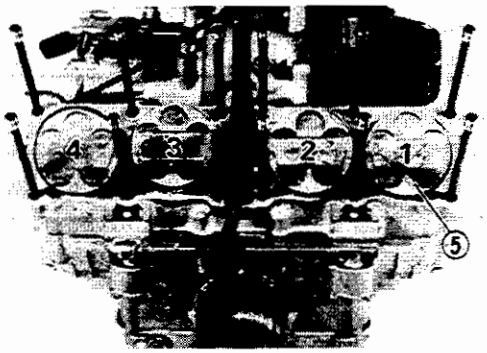
2. Install:
   - Piston rings

NOTE:
Be sure to install rings so that Manufacturer's marks or numbers are located on the top side of the rings. Oil the pistons and rings liberally.

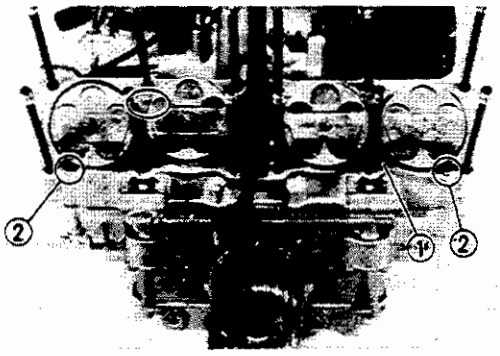


3. Install:
   - Piston pins ①
   - Pistons ②
   - Circlips (piston pin) ③

NOTE:
- Apply the engine oil to the piston pins.
- Be sure that the piston arrow mark ④ face to exhaust side of the engine.
- Before installing the piston pin circlip, cover the crankcase with a clean rag to prevent the circlip from falling into the crankcase cavity.
- Be sure that the marked piston numbers ⑤ should be in sequence (1, 2, 3, 4) begining from the left.



⚠ WARNING:
Always use new circlips (piston pin).



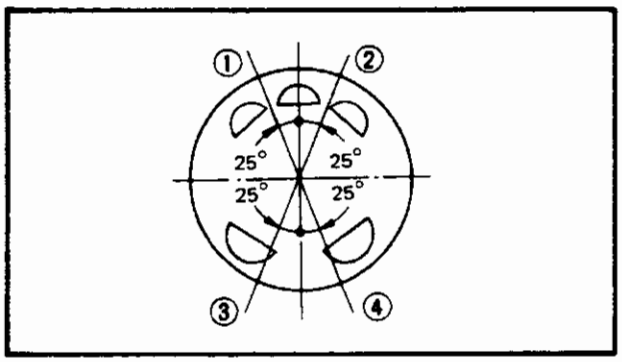
4. Install:
   - Gasket (cylinder) ①
   - Dowel pins ②

NOTE:
The gasket "UP" mark should face upward.

⚠ WARNING:
Always use a new gasket (cylinder).

5. Lubricate:
   - Pistons
   - Piston rings
   - Cylinder

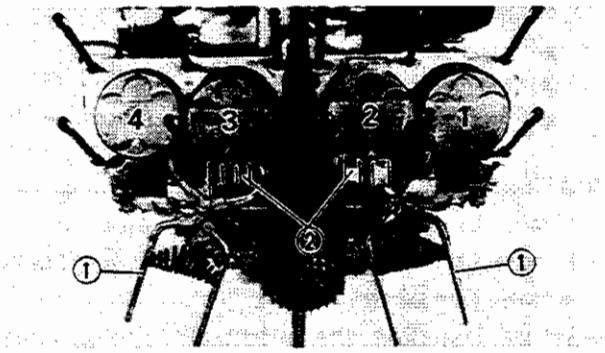
NOTE:
Apply a liberal coating of 4-stroke engine oil.



6. Position:
   - Top ring
   - 2nd ring
   - Oil ring

   Offset the piston ring end gaps as shown.

① Top ring end
② Oil ring end (lower)
③ Oil ring end (upper)
④ 2nd ring end



7. Install:
   - Cylinder

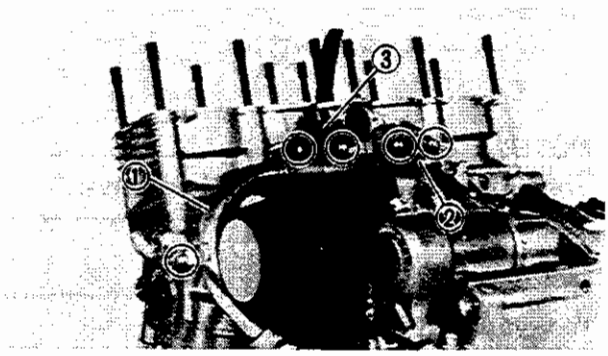
NOTE:

- Use the piston ring compressor ① and piston base ②.

Piston ring compressor:
YM-04008
90890-04008

Piston base:
YM-01067
90890-01067

- Install the #2 and #3 pistons first.
- Pass the cam chain and cam chain guide (exhaust side) through the cam chain cavity.



8. Install:
   - Coolant feed pipe ① (with o-ring)
   - Water jacket joint ② (with o-ring)
   - Holder (air vent hose) ③

Bolt (coolant feed pipe):
10 Nm (1.0 m · kg, 7.2 ft · lb)

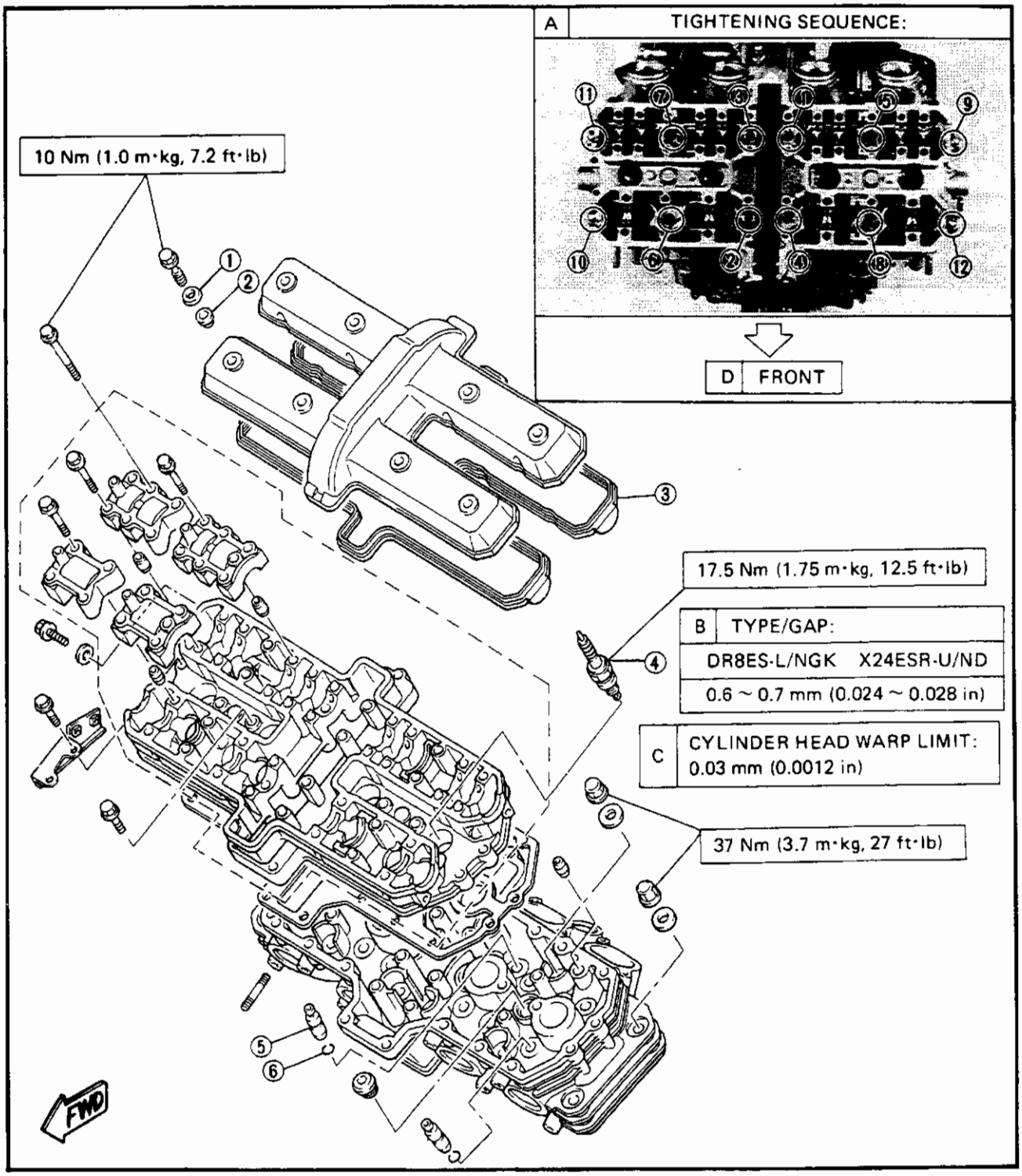
Bolts (water jacket joint):
10 Nm (1.0 m · kg, 7.2 ft · lb)

WARNING:

Always use a new o-ring.

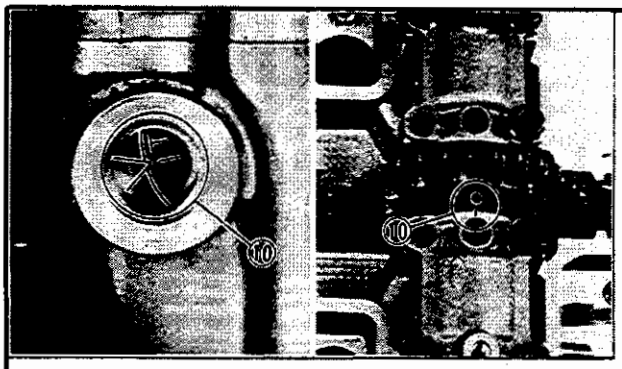
CYLINDER HEAD

① Washer
② Rubber washer
③ Gasket
④ Spark plug
⑤ Valve guide
⑥ Circlip

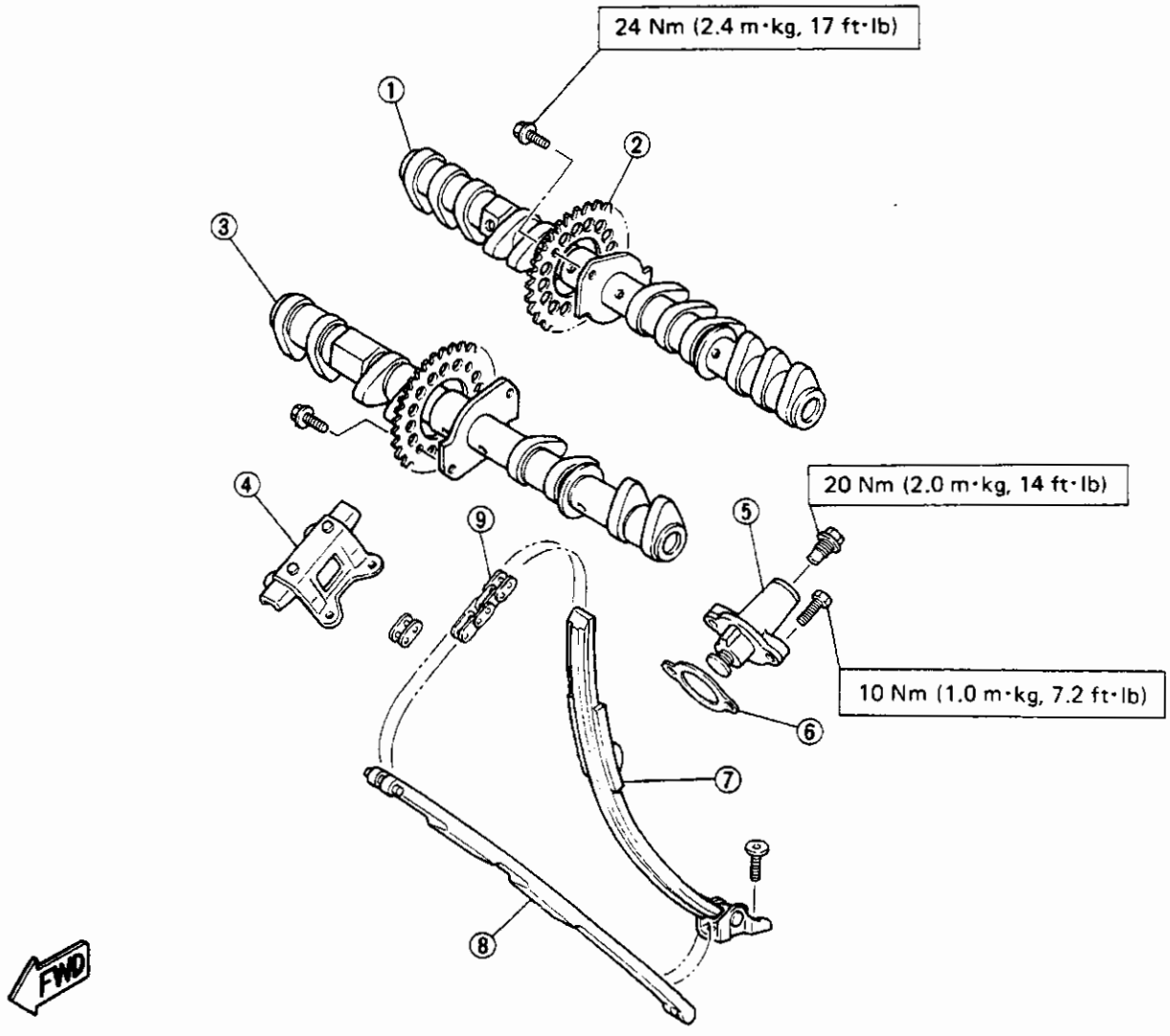


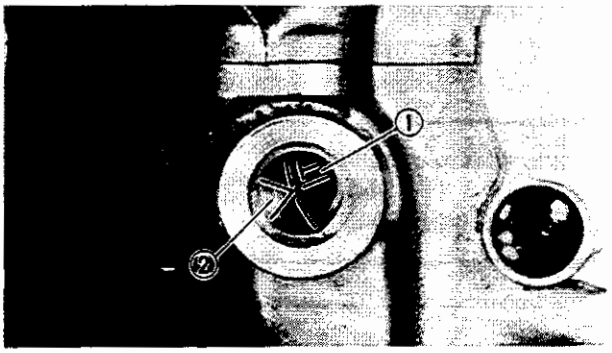
CAMSHAFT

① Camshaft (intake)
② Timing chain sprocket
③ Camshaft (exhaust)
④ Chain guide (upper)
⑤ Timing chain tensioner
⑥ Gasket
⑦ Timing chain guide (intake side)
⑧ Timing chain guide (exhaust side)
⑨ Timing chain
⑩ Match mark



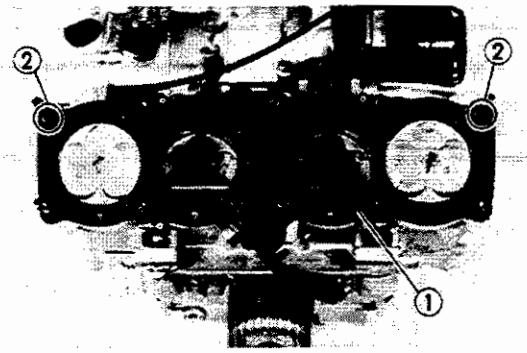
A	VALVE CLEARANCE (COLD):
B	INTAKE: 0.11 ~ 0.20 mm (0.004 ~ 0.008 in)
C	EXHAUST: 0.21 ~ 0.30 mm (0.008 ~ 0.012 in)





9. Align:
   - "T" mark ①
     (with stationary pointer) ②
     Refer to the "ENGINE DISASSEMBLY – CYLINDER HEAD AND CAMSHAFT" section.

NOTE:
When #1 piston is at TDC on compression stroke.



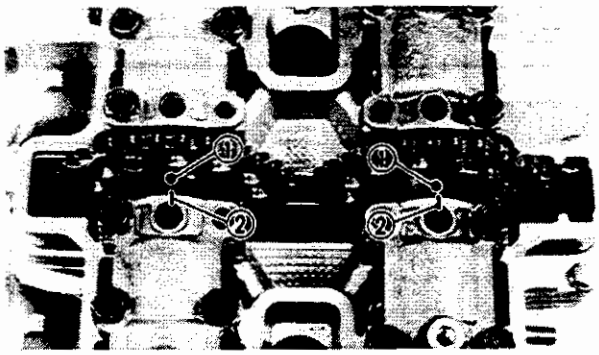
CYLINDER HEAD AND CAMSHAFT

1. Install:
   - Gasket (cylinder head) ① (new)
   - Dowel pins ②

NOTE:
The gasket "UP" mark should face upward.

⚠ WARNING:
Always use a new gasket (cylinder head).

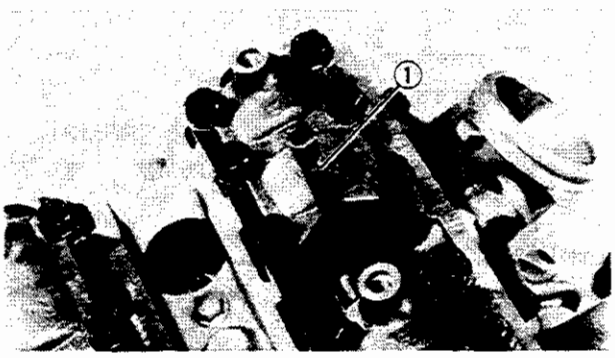
NOTE:
- Select either of the two procedures explained in this manual, as follows:
- Procedure 1.
  The timing chain is disconnected → Connect.
- Procedure 2.
  The camshafts are removed → Install.



Procedure 1

1. Install:
   - Camshafts, camshaft case and cylinder head assembly

NOTE:
- Be sure that the camshaft timing marks ① align with the camshaft cap marks ②.
- Be sure that the "T" mark on the crankshaft web align the stationary pointer when #1 piston is at TDC.

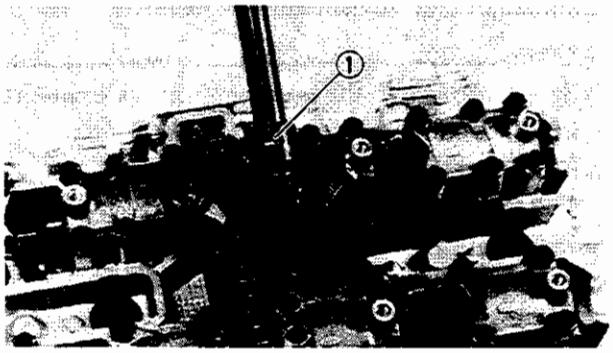


2. Tighten:
   • Nuts (cylinder head)
   Use the hexagon wrench (6 mm) ①.

Hexagon wrench:
YM-3448
90890-01395

NOTE:
Tighten the nuts in their proper tightening sequence and torque nuts in two stages.

Nut (cylinder head):
37 Nm (3.7 m·kg, 27 ft·lb)



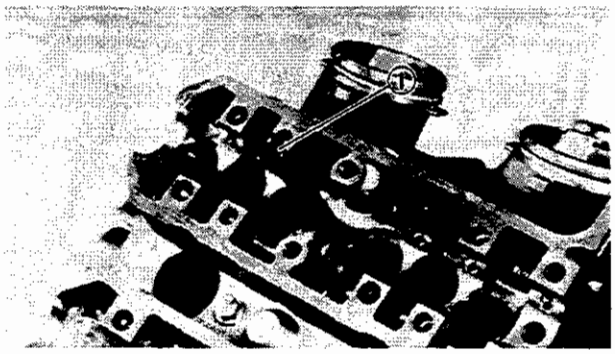
3. Connect:
   • Timing chain
   (with the chain joint)
   Use the timing chain cutter ①.

Timing chain cutter:
YM-01112
90890-01112

NOTE:
Keep the timing chain as tense as possible on the exhaust side.

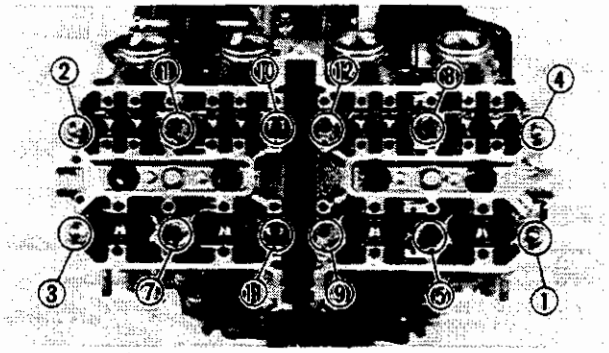
WARNING:
Always use a new chain joint.

4. Go to "CAM CHAIN TENSIONER".



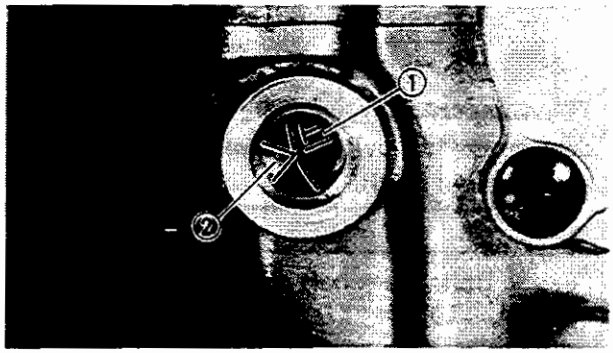
Procedure 2.
1. Install:
   • Camshaft case and cylinder head assembly
2. Tithten:
   • Nuts (cylinder head)
   Use the hexagon wrench (6 mm) ①.

Hexagon wrench:
YM-3448
90890-01395



NOTE:
Tighten the nuts in their proper tightening sequence and torque nuts in two stages.

	Nuts (cylinder head): 37 Nm (3.7 m·kg, 27 ft·lb)



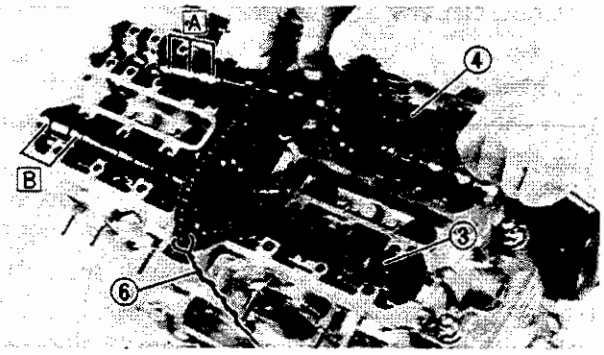
3. Install:
   • Camshafts

Installation steps:
- Turn the crankshaft counterclockwise.
- Align the "T" mark ① on the crankshaft web with the stationary pointer ② when # 1 piston is at TDC.

⚠ CAUTION:
Do not turn the crankshaft during the camshafts installation. Damage or improper valve timing will result.

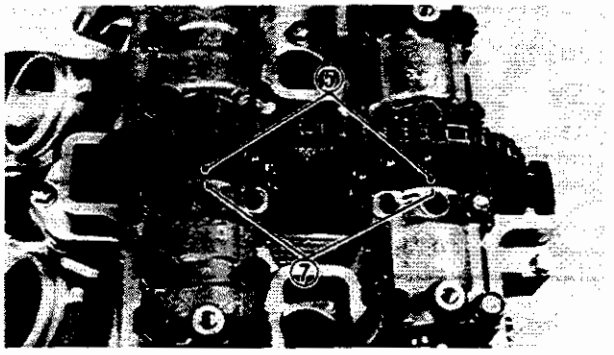
- Lubricate the camshaft bearing surfaces, cam lobes and cam journals.

	Molybdeum Disulfide Oil



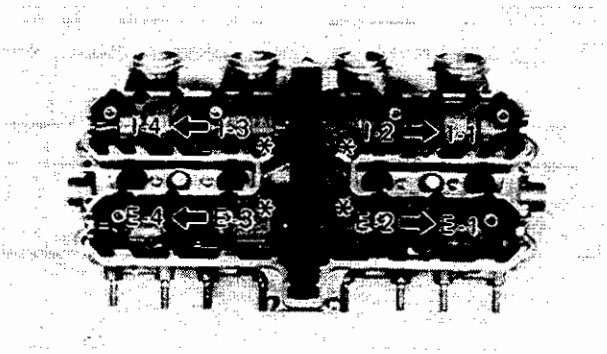
- Install the exhaust camshaft ③ first, then install the intake camshaft ④ .

NOTE:
- "3 – Lobe" [A] is for the intake camshaft.
- "2 – Lobe" [B] is for the exhaust camshaft.
- Be sure the timing marks ⑤ on the camshaft face upward.
- Keep the timing chain as tense as possible on the exhaust side.
- Remove the retaining wire ⑥ .



⚠ CAUTION:
Do not turn the camshaft separately or damage to the piston and valve will result.

- Install the dowel pins.
- Install the camshaft caps.
- Align the camshaft timing marks ⑤ with the camshaft cap marks ⑦ .

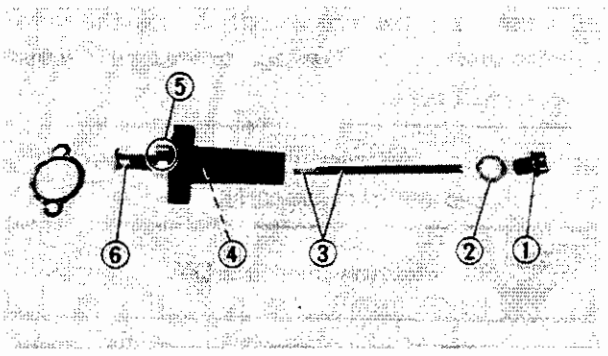


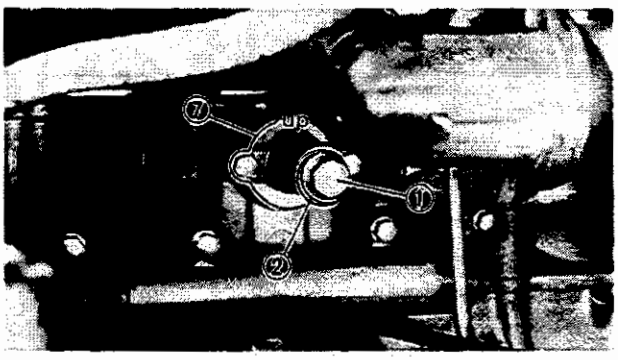
NOTE:
- The numbers are punched on the camshaft caps in increments from right to left.
- Do not install the bolts at * marked place in this stage.
- Tighten the bolts (camshaft caps).

NOTE:
Tighten the camshaft caps in a crisscross pattern from innermost to outer caps.

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

Bolts (camshaft cap):
10 Nm (1.0 m·kg, 7.2 ft·lb)





TIMING CHAIN TENSIONER

1. Install:
   - Timing chain tensioner

Installation steps:
- Remove the tensioner cap bolt ①, washer ②, springs ③ and collar ④.
- Release the timing chain tensioner one-way cam ⑤ and push the tension rod ⑥.
- Install the tensioner with a new gasket ⑦ into the cylinder.

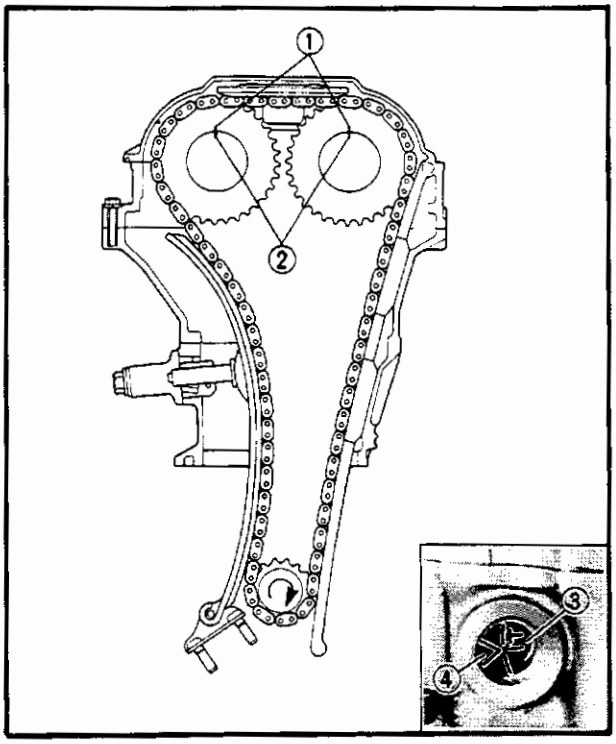
NOTE:
The "UP" mark on the tensioner should face upward.

Bolt (timing chain tensioner):
10 Nm (1.0 m·kg, 7.2 ft·lb)

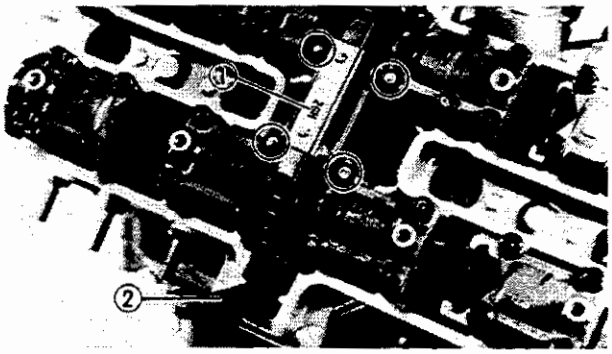
- Install the collar ④, springs ③, washer ② and cap bolt ①.

Cap bolt (timing chain tensioner):
20 Nm (2.0 m·kg, 14 ft·lb)

NOTE:
Install the tensioner body so that the "UP" mark face upward.



2. Turn:
   - Crankshaft
     Counterclockwise for a several turns.
3. Check:
   - Camshaft timing marks ①
     Align with the camshaft cap marks ② .
   - Crankshaft "T" mark ③
     Align with the stationary pointer ④ .
     Out of alignment → Adjust.
     Refer to "CAMSHAFT INSTALLATION STEPS".



4. Install:
   - Timing chain guide (upper) ①
   - Timing chain guide (exhaust side) ②

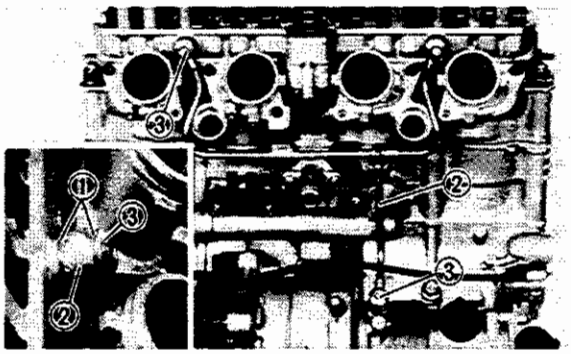
Bolt (chain guide — upper):
10 Nm (1.0 m·kg, 7.2 ft·lb)



5. Measure:
   - Valve clearance
     Out of specification → Adjust.
     Refer to "VALVE CLEARANCE ADJUSTMENT" section in the CHAPTER 3.

Intake valve (cold):
0.11 ~ 0.20 mm
(0.004 ~ 0.008 in)

Exhaust valve (cold):
0.21 ~ 0.30 mm
(0.008 ~ 0.012 in)



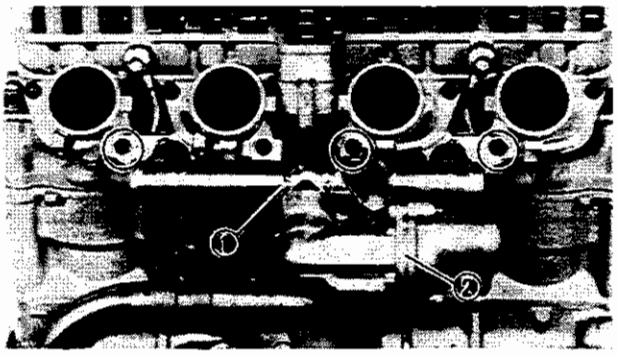
CYLINDER HEAD COVER AND OIL DELIVERY PIPE

1. Install:
   - Copper washers ①
   - Oil delivery pipe 2 ②
   - Union bolts ③

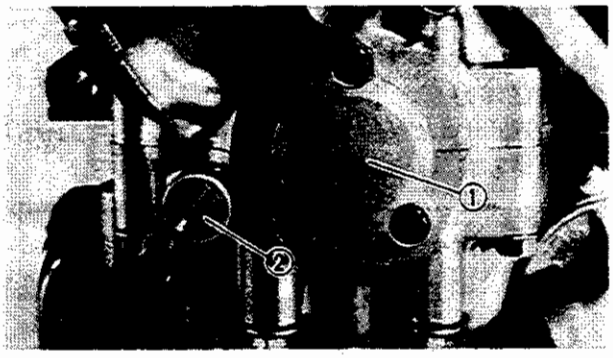
	Union bolt (oil delivery pipe 2): 21 Nm (2.1 m·kg, 15 ft·lb)

⚠ WARNING:

Always use new copper washers.

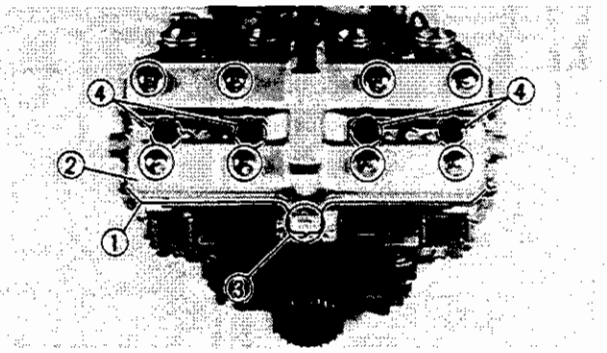


2. Install:
   - Water jacket joint (inlet) ①
     (with thermostatic valve housing ②)



3. Remove:
   - Timing rotor
   - Dowel pin
   - Bolt (8 mm)
4. Install:
   - Crankshaft end cover (left) ①
     (with o-ring)
   - Timing plug ②
     (with o-ring)

	Screws (crankshaft end cover): 7 Nm (0.7 m·kg, 5.1 ft·lb)



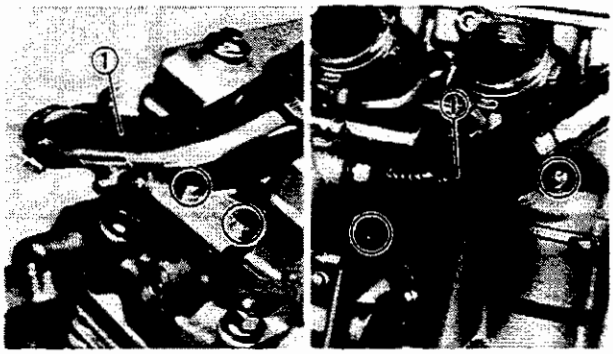
5. Install:
   - Gasket (cylinder head cover) ①
   - Cylinder head cover ②

NOTE:

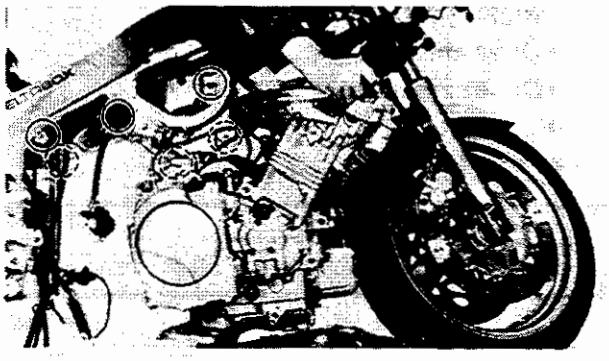
Be sure the cylinder head gasket mark ③ faces front.

6. Install:
   - Rubber washers
   - Washers
   - Bolts (cylinder head cover)
   - Spark plugs ④

Bolt (cylinder head cover):
10 Nm (1.0 m · kg, 7.2 ft · lb)
Spark plug:
17.5 Nm (1.75 m · kg, 12.5 ft · lb)



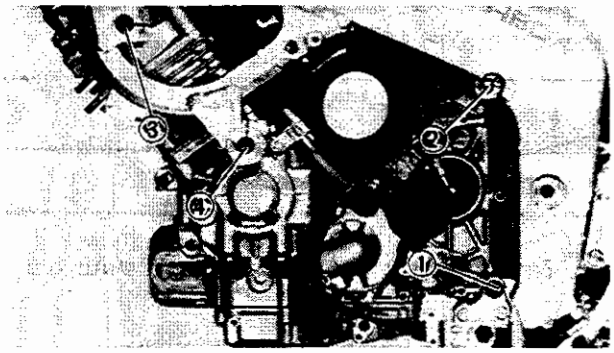
7. Install:
   - Radiator hose/pipe (inlet) ①



REMOUNTING ENGINE

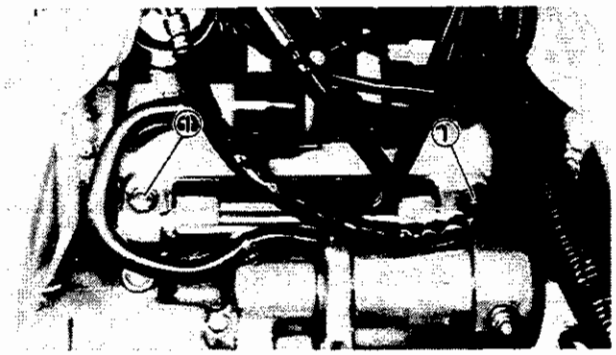
When remounting the engine, reverse the removal procedure. Note the following points.

1. Install:
   - Mounting collars (to mounting boss)
   - Engine assembly (from right side)



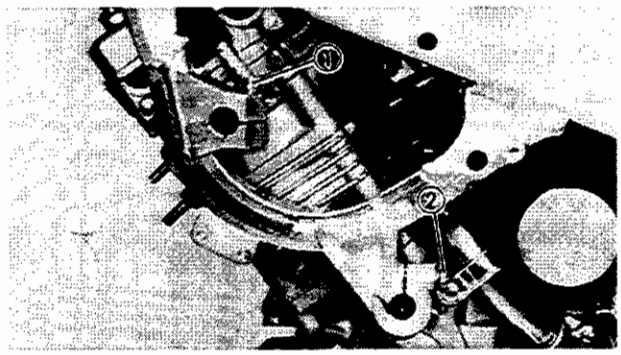
2. Install:
   - Mounting bolt (rear – lower) ①
   - Mounting bolt (rear – upper) ②
   - Mounting bolt (cylinder head) ③
   - Mounting bolt (cylinder) ④

Engine mounting
Bolt (rear – lower) ①
55 Nm (5.5 m · kg, 40 ft · lb)
Bolt (rear – upper) ②
60 Nm (6.0 m · kg, 43 ft · lb)
Bolt (cylinder head) ③
60 Nm (6.0 m · kg, 43 ft · lb)
Bolt (cylinder) ④
33 Nm (3.3 m · kg, 24 ft · lb)



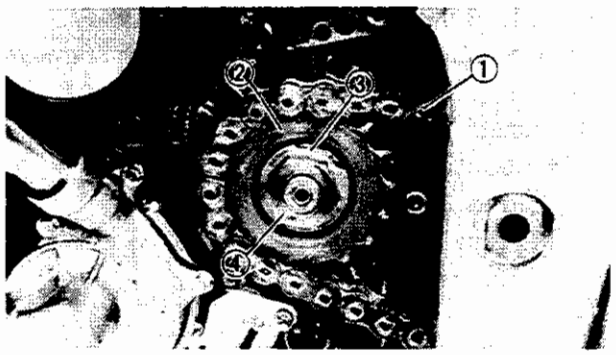
3. Tighten:
   - Pinch bolt (spacer) ①

Pinch bolt (spacer): 15 Nm (1.5 m·kg, 11 ft·lb)



4. Tighten:
   - Pinch bolt (spacer) ①
   - Pinch bolt (spacer) ②

Pinch bolts: 22 Nm (2.2 m·kg, 16 ft·lb)



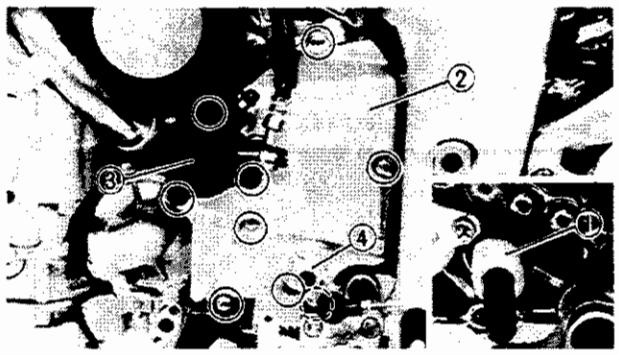
5. Install:
   - Drive chain ①
   - Drive sprocket ②
   - Lock washer ③
   - Nut (drive sprocket) ④

Nut (drive sprocket): 70 Nm (7.0 m·kg, 50 ft·lb)

NOTE:
Tighten the nut (drive sprocket) while applying the rear brake.

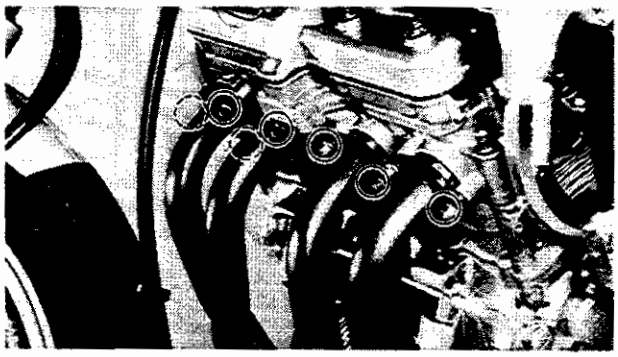
WARNING:
Always use a new lock washer.

6. Bend the lock washer tab along the nut flat.



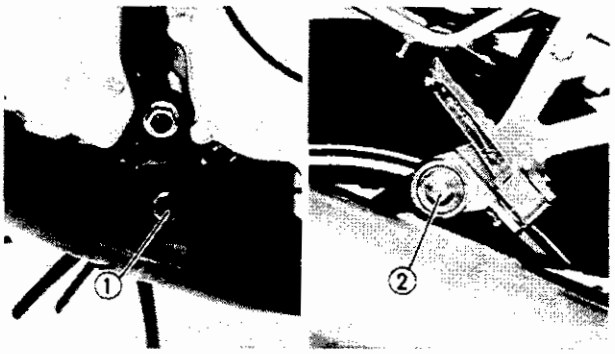
7. Install:
   - Spacer collar (shift shaft) ①
   - Gasket
   - Dowel pins
   - Crankcase cover (left) ②
   - Dowel pins
   - Clutch release cylinder ③
   - Change pedal link ④

Bolt (clutch release cylinder):
10 Nm (1.0 m · kg, 7.2 ft · lb)
Bolt (shift pedal link):
10 Nm (1.0 m · kg, 7,2 ft · lb)



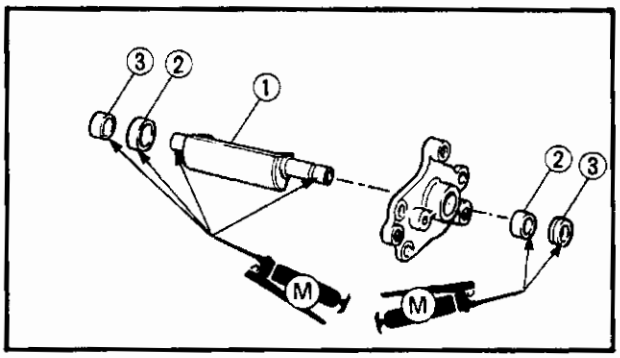
8. Install:
   - Muffler assembly
9. Tighten:
   - Flange nuts (exhaust pipe)

Flange nuts (exhaust pipe):
10 Nm (1.0 m · kg, 7.2 ft · lb)



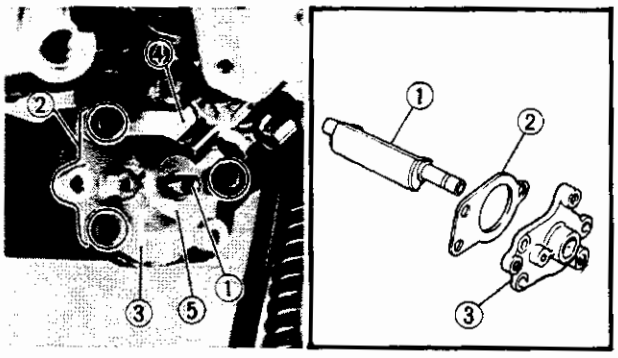
10. Tighten:
    - Bolt (muffler stay) ①
    - Bolt (muffler/rear footrest) ②

Bolt (muffler stay):
25 Nm (2.5 m · kg, 18 ft · lb)
Bolt (muffler/rear footrest):
42 Nm (4.2 m · kg, 30 ft · lb)



11. Lubricate:
    - Valve shaft (EXUP) ①
    - Bush ②
    - Oil seal lip ③

Molybdenum Disulfied Grease

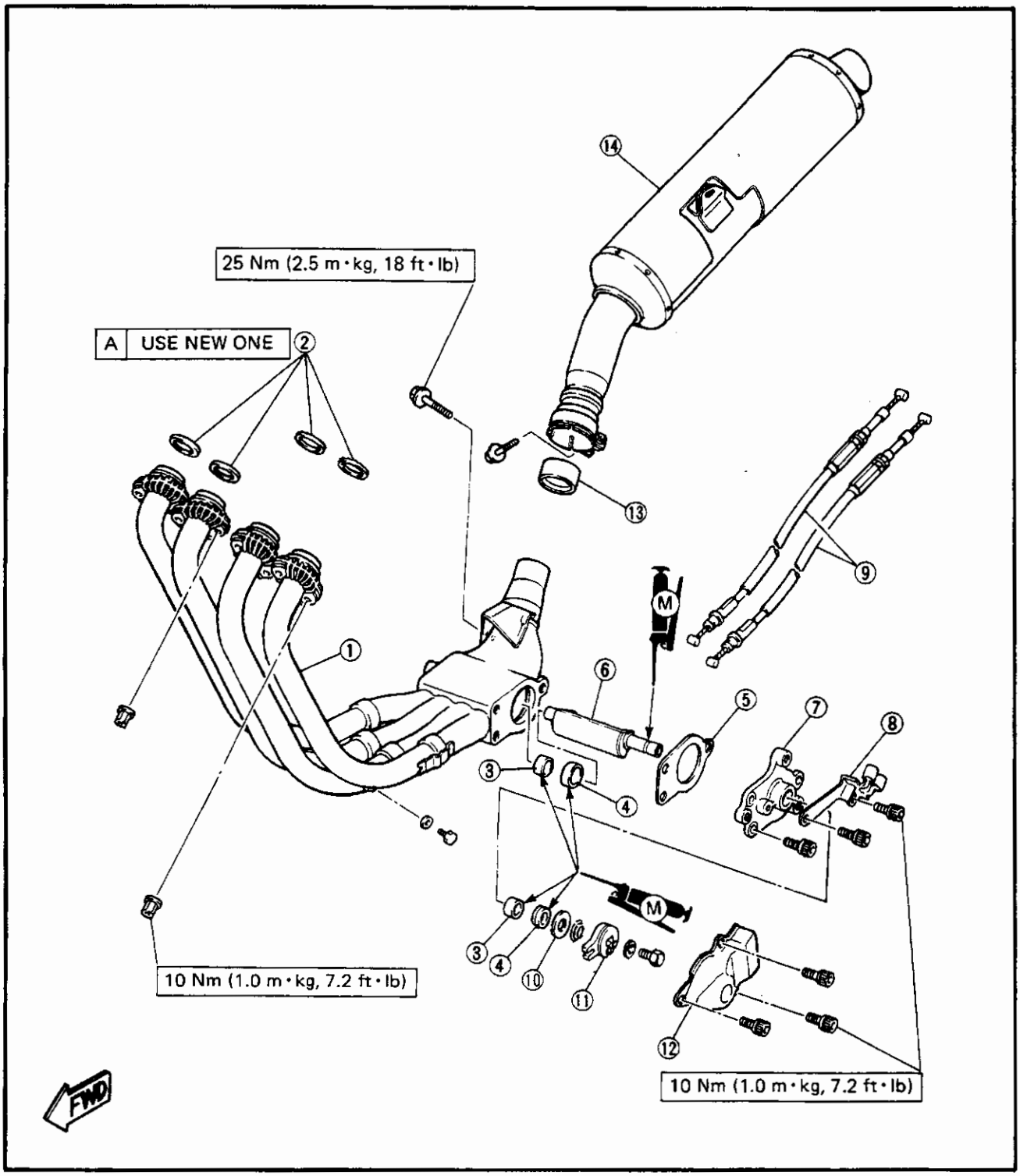


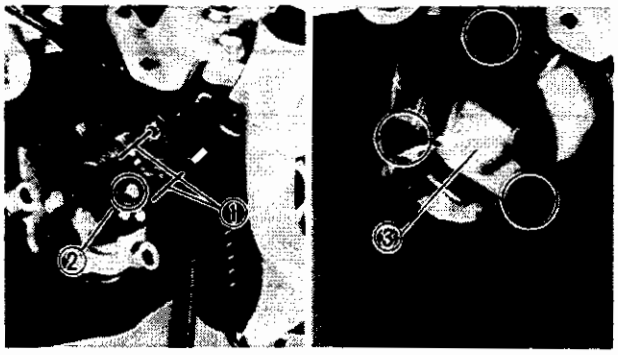
12. Install:
    - Valve (EXUP) ①
    - Gasket (steel) ②
    - Housing (valve) ③
    - Holder (EXUP cable) ④
    - Washer ⑤

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

EXUP

① Exhaust pipe assembly
② Gasket (exhaust pipe)
③ Bush
④ Oil seal
⑤ Gasket
⑥ Valve (EXUP)
⑦ Housing
⑧ Holder (EXUP cable)
⑨ Cables
⑩ Washer
⑪ Pulley
⑫ Valve cover
⑬ Gasket (muffler)
⑭ Muffler assembly

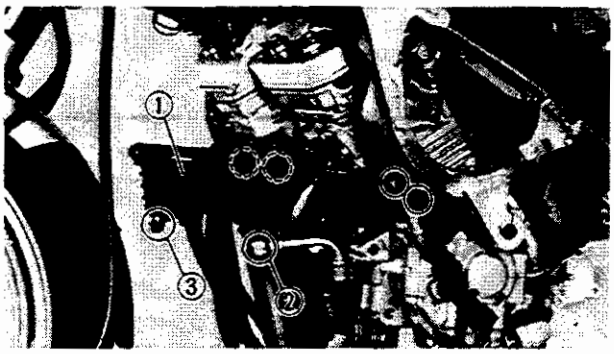




13. Connect:
    - EXUP cables ①
      (to pulley)
14. Install:
    - Pulley ②
    - Valve cover ③

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

15. Adjust:
    - EXUP cable
      Refer to "EXUP CABLE ADJUSTMENT" section in the CHAPTER 3.



16. Install:
    - Oil cooler assembly ①

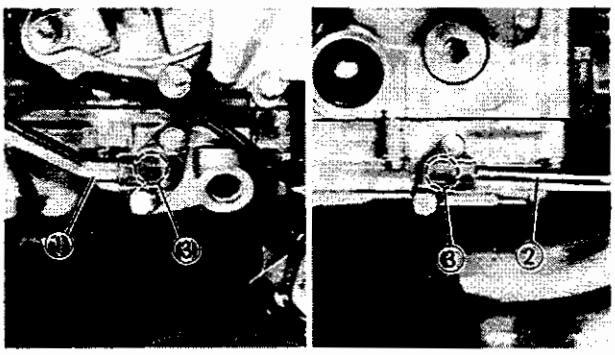
	Stay (oil cooler): **10 Nm (1.0 m · kg, 7.2 ft · lb)**

17. Connect:
    - Pipe (oil cooler – outlet) ②
    - Pipe (oil cooler – inlet) ③
      (with copper washers)

	Union bolt (oil cooler pipe): **25 Nm (2.5 m · kg, 18 ft · lb)**

WARNING:

Always use new copper washer.

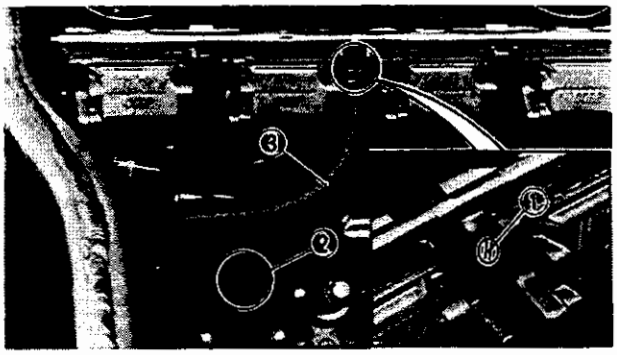


18. Connect:
    - Pipe (oil cooler – outlet) ①
    - Pipe (oil cooler – inlet) ②
      (with o-rings ③)

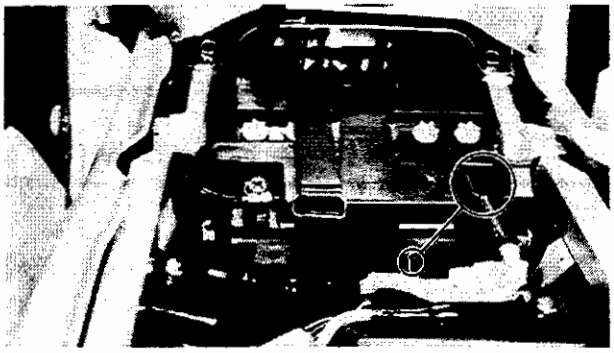
	Pipe (oil cooler): **10 Nm (1.0 m · kg, 7.2 ft · lb)**

⚠ WARNING:

Always use new o-rings.



19. Install:
    - Fuel strainer ①
20. Connect:
    - Overflow hoses (carburetor) ②
    - Fuel hose ③
21. Tighten:
    - Clamp screws (carburetor joint – lower)



22. Connect:
    - Battery leads

NOTE:

Connect the positive lead ① first.

23. Fill:
    - Crankcase

    Refer to the "ENGINE OIL REPLACEMENT" section in the CHAPTER 3.

	Total amount: **3.5 L (3.1 Imp qt, 3.7 US qt)**

24. Fill:
    - Cooling system

    Refer to the "COOLANT LEVEL INSPECTION" section in the CHAPTER 3.

	Total amount: **2.1 L (1.9 Imp qt, 2.2 US qt)**

25. Adjust:
    - Carburetor synchroniz

    Refer to the "CARBURETOR SYNCHRONIZATION" section in the CHAPTER 3.
26. Adjust:
    - Idle speed

    Refer to the "IDLE SPEED ADJUSTMENT" section in the CHAPTER 3.



Idle speed:
950 ~ 1,050 r/min

27. Adjust:
    - Throttle cable free play

    Refer to the "THROTTLE CABLE FREE PLAY ADJUSTMENT" section in the CHAPTER 3.



Throttle cable free play:
2 ~ 5 mm (0.08 ~ 0.20 in)

28. Adjust:
    - Drive chain slack

    Refer to the "DRIVE CHAIN SLACK ADJUSTMENT" section.



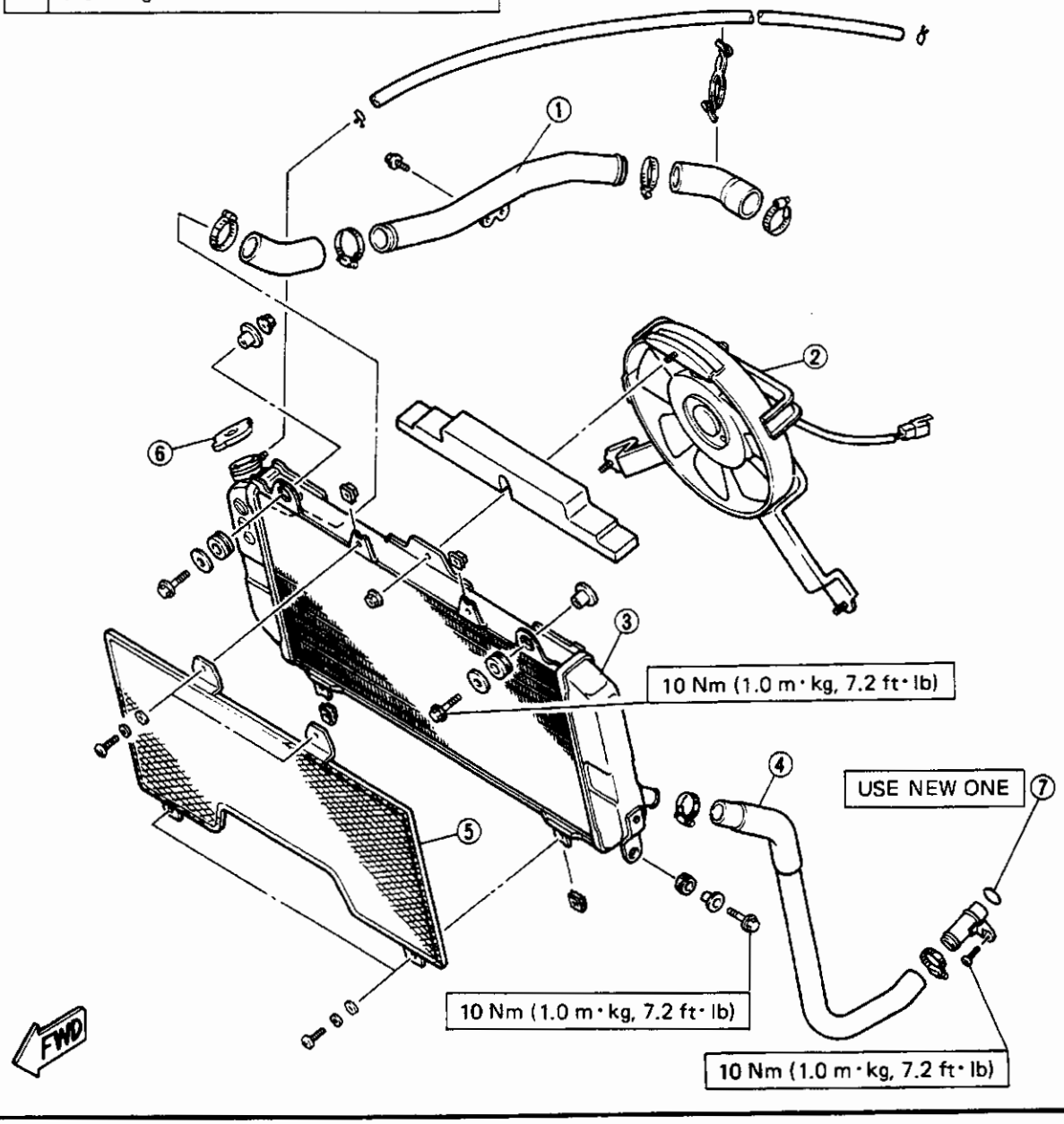
Drive chain slack:
15 ~ 20 mm (0.6 ~ 0.8 in)

COOLING SYSTEM

RADIATOR

① Radiator hose (inlet)
② Fan motor assembly
③ Radiator assembly
④ Radiator hose (outlet)
⑤ Radiator guard
⑥ Radiator cap
⑦ O-ring

A	RADIATOR CAP OPENING PRESSURE: 95 ~ 125 kPa (0.95 ~ 1.25 kg/cm², 13.5 ~ 17.8 psi)
B	COOLANT CAPACITY: 2.1 L (1.9 Imp qt, 2.2 US qt) Including all routes

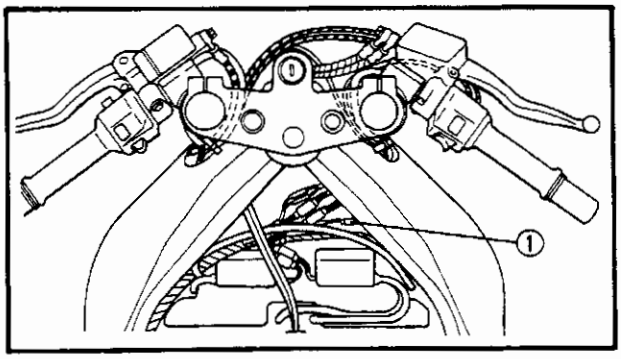


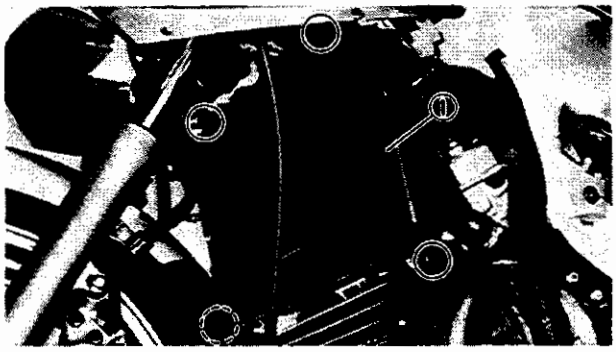
⚠ WARNING:

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 by the following procedure:
Place a thick rag, like a towel, over the radiator cap, slowly rotate the cap counterclockwise to the detent. This procedure allows any residual pressure to escape. When the hissing sound has stopped, press down on the cap while turning counterclockwise and remove it.

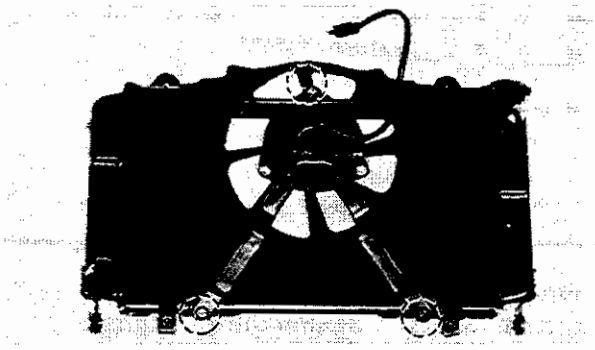
REMOVAL

1. Remove:
   - Side cowling (left and right)
   - Front cowling
     Refer to the "COWLINGS" section in the CHAPTER 3.
   - Seat
   - Fuel tank
     Refer to the "FUEL TANK" section in the CHAPTER 3.
   - Air filter case
     Refer to the "AIR FILTER CASE" section in the CHAPTER 3.
2. Disconnect:
   - Fan motor coupler ①

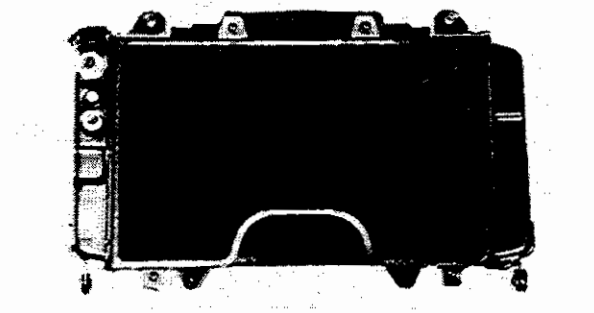




3. Remove:
   - Radiator assembly ①
     Refer to the "ENGINE REMOVAL – RADIATOR" section in the CHAPTER 4.

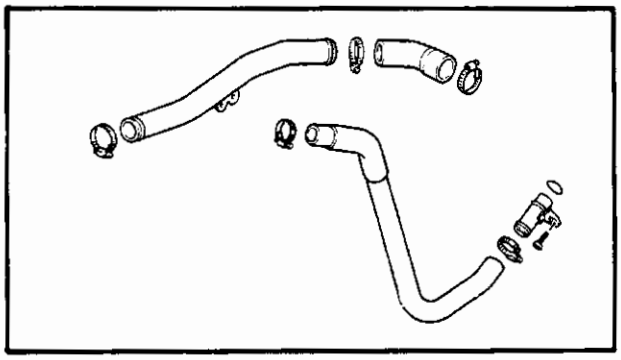


4. Remove:
   - Fan motor assembly

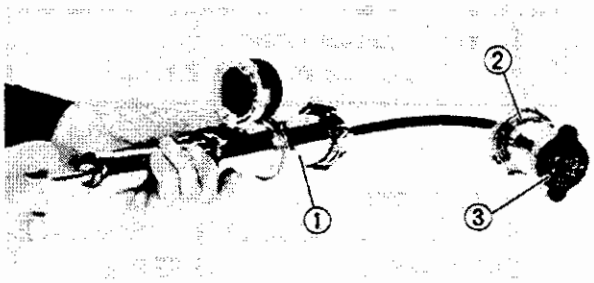


INSPECTION

1. Inspect:
   - Radiator core
     Obstruction → Blow out with compressed air through rear of the radiator.
     Flattened fin → Repair/replace.



2. Inspect:
   - Radiator hoses
   - Radiator pipes
     Cracks/Damage → Replace.



3. Measure:
   - Radiator cap opening pressure
     Radiator cap opens at pressure below the specified pressure → Replace.

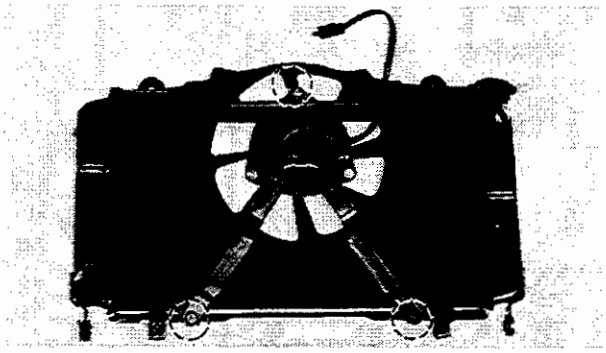
Radiator cap opening pressure:
95 ~ 125 kPa
(0.95 ~ 1.25 kg/cm², 13.5 ~ 17.8 psi)

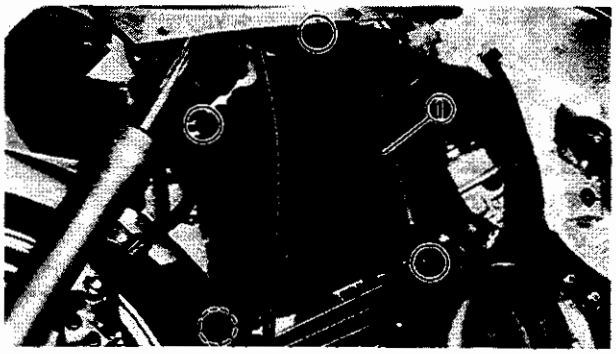
Measurement steps:
- Attach the cooling system tester ① and adapter ② to the radiator cap ③.

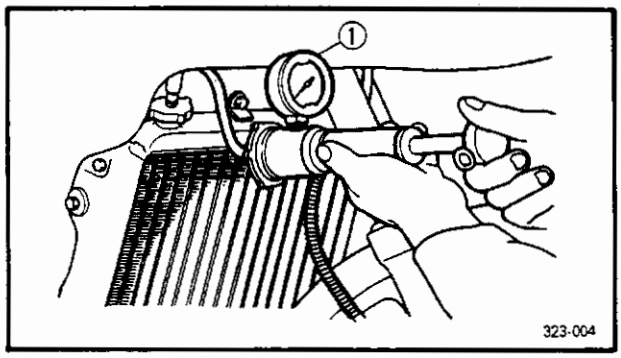
Cooling system tester:
YU-24460-01
90890-01325
Adapter:
YU-33984
90890-01352

- Apply the specified pressure for 10 seconds, and make sure there is no pressure drop.

4. Inspect:
   - Fan motor assembly
     Damage → Replace.
     Does not operate → Check.
     Refer to the "ELECTRICAL – COOLING SYSTEM" section.







INSTALLATION

Reverse the "REMOVAL" procedure.
Note the following points.

1. Install:
   - Fan motor assembly

Screw (fan motor assembly):
10 Nm (1.0 m · kg, 7,2 ft · lb)

2. Install:
   - Radiator assembly ①

Bolts (radiator assembly):
10 Nm (1.0 m · kg, 7.2 ft · lb)

3. Fill:
   - Cooling system
     Refer to the "COOLANT REPLACEMENT" section in the CHAPTER 3.
4. Inspect:
   - Cooling system
     Decrease of pressure (leaks) → Repair as required.

Inspection steps:
- Attach the cooling system tester ① to the radiator.

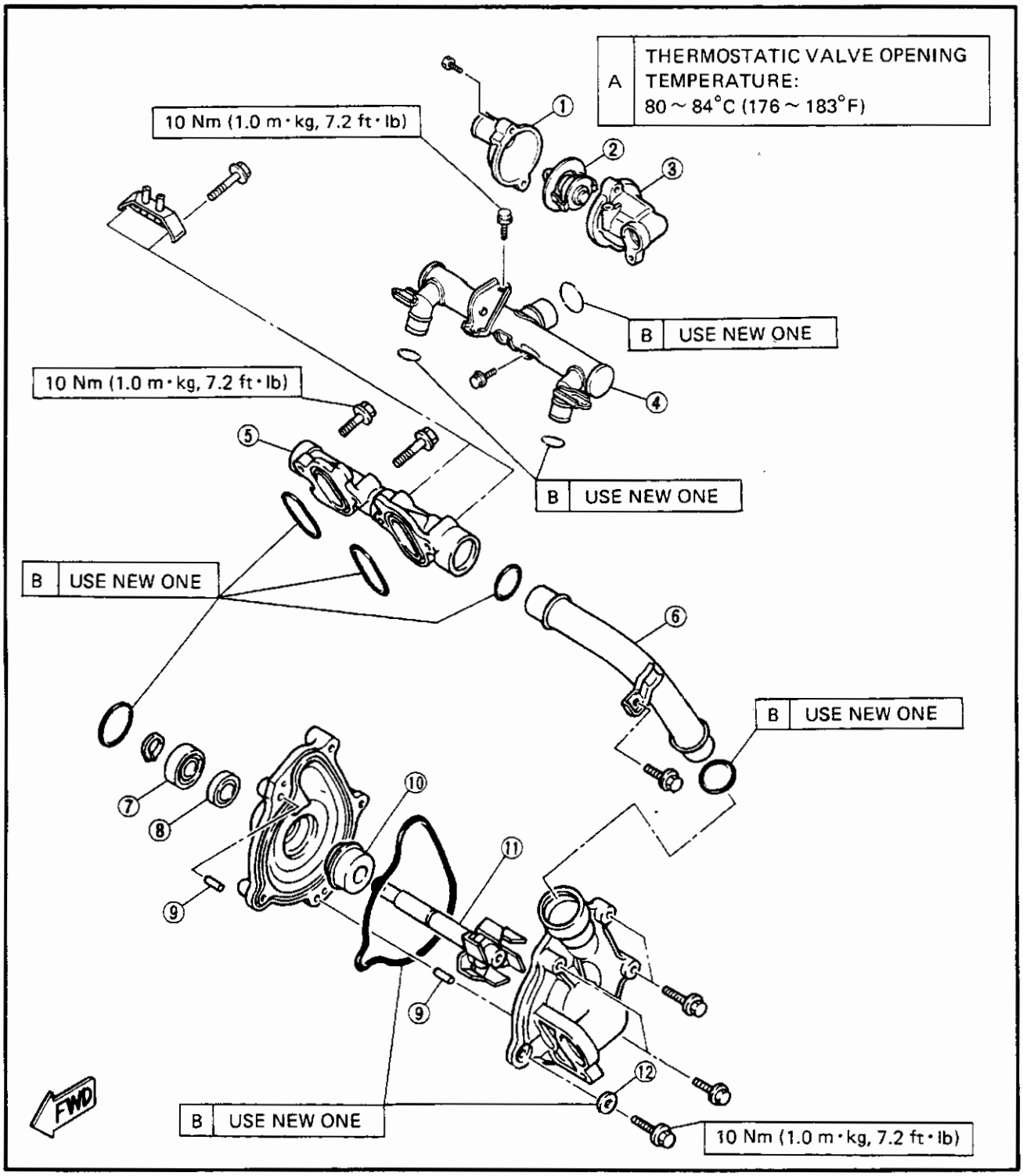


Cooling system tester:
YU-24460-01
90890-01325

- Apply 100 kPa (1.0 kg/cm², 14 psi) pressure.
- Measure the indicated pressure with the gauge.

THERMOSTATIC VALVE/WATER PUMP

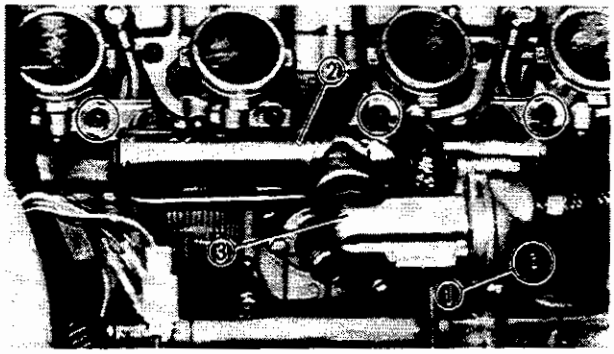
① Thermostatic valve cover
② Thermostatic valve
③ Thermostatic valve housing
④ Water jacket joint (outlet)
⑤ Water jacket joint (inlet)
⑥ Water pump outlet pipe
⑦ Bealing
⑧ Oil seal
⑨ Dowel pin
⑩ Damper rubber
⑪ Impeller shaft
⑫ Cupper washer



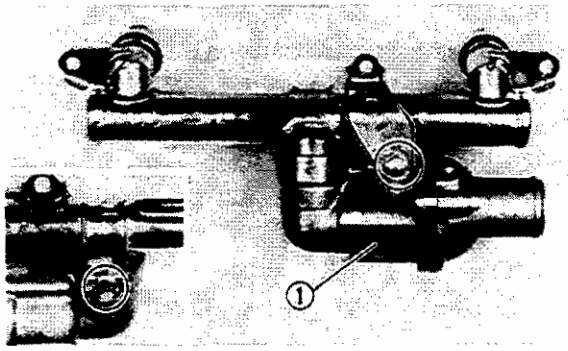
THERMOSTATIC VALVE

REMOVAL

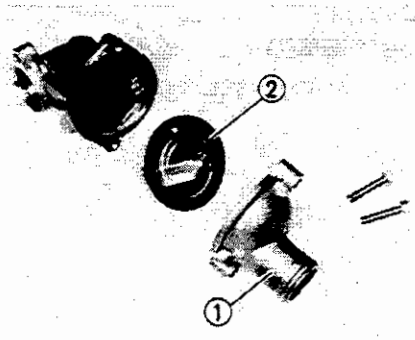
1. Remove:
   - Side cowlings (left and right)
   - Front cowling
     Refer to the "COWLINGS" section in the CHAPTER 3.
   - Seat
   - Fuel tank
     Refer to the "FUEL TANK" section in the CHAPTER 3.
   - Air filter case
     Refer to the "AIR FILTER CASE" in the CHAPTER 3.
   - Carburetor assembly
     Refer to the "CARBURETOR" section in the CHAPTER 3.
2. Drain:
   - Coolant
     Refer to the "COOLANT REPLACEMENT" section in the CHAPTER 3.
3. Loosen:
   - Hose band (radiator hose-inlet) ①
4. Remove:
   - Water jacket joint (outlet) ②
     (with thermostatic valve housing ③)

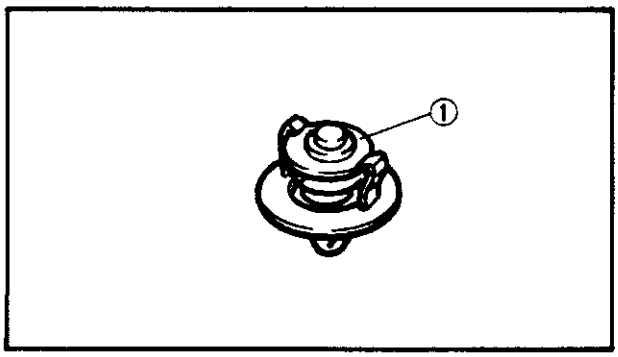


5. Remove:
   - Thermostatic valve housing ①
     (from water jacket joint (outlet))



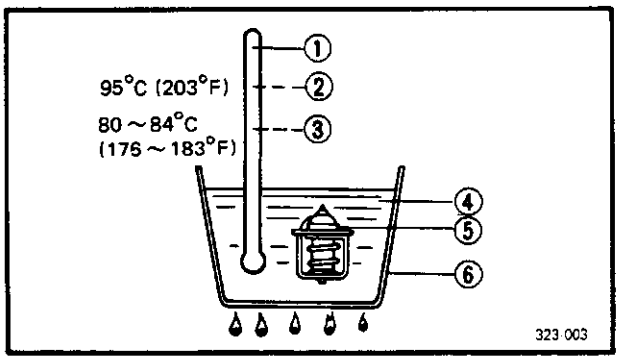
6. Remove:
   - Thermostatic valve cover ①
   - Thermostatic valve ②





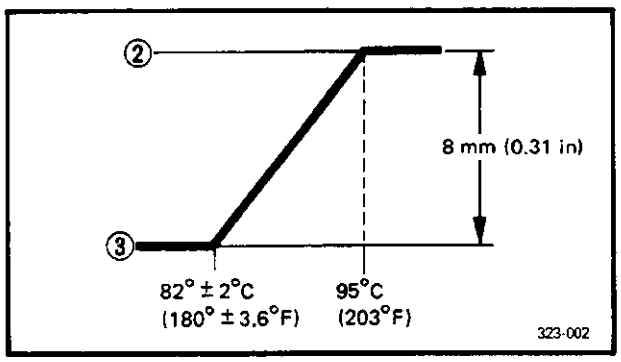
INSPECTION

1. Inspect:
   - Thermostatic valve ①
     Valve does not open at 80 ~ 84°C (176 ~ 183°F) → Replace.

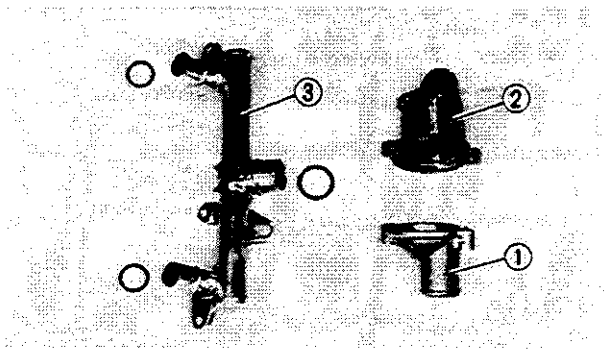


Inspection Steps:
- Suspend thermostatic valve in a vessel.
- Place reliable thermometer in a water.
- Heat water slowly.
- Observe thermometer, while stirring water continually.

① Thermometer
② Full open
③ Opening sequence begins
④ Water
⑤ Thermostatic valve
⑥ Vessel
[A] OPEN
[B] CLOSE



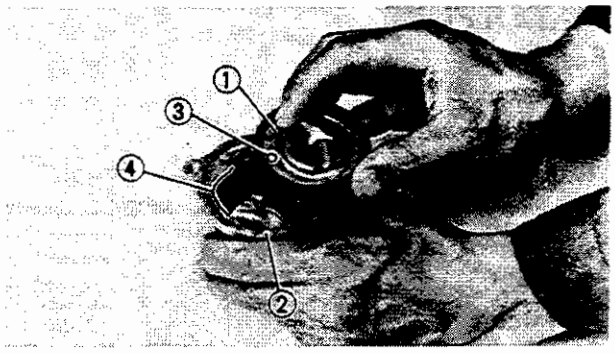
NOTE:
Thermostatic valve is sealed and its setting is specialized work. If its accuracy is in doubt, replace it. A fualty unit could cause serious overheating or overcooling.



2. Inspect:
   - Thermostatic valve cover ①
   - Thermostatic valve housing ②
   - Water jacket joint (outlet) ③
     Cracks/Damage → Replace.

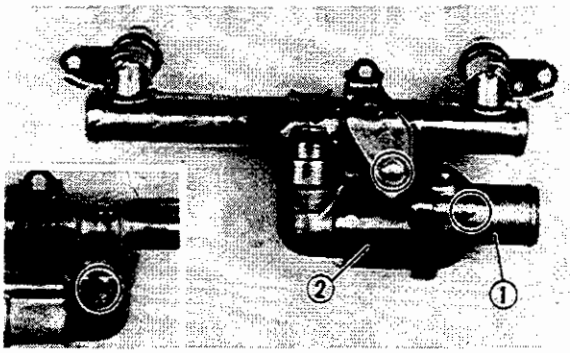
INSTALLATION

Reverse the "REMOVAL" procedure.
Note the following points.



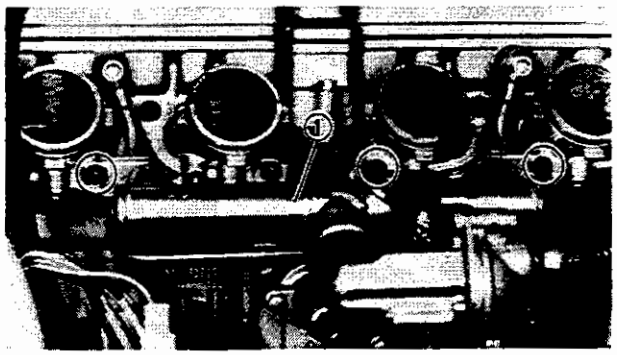
1. Install:
   - Thermostatic valve ①
     (to thermostatic valve housing ②)

NOTE:
The thermostatic valve must be installed with the breather hole ③ facing to the housing slot ④.



2. Install:
   - Thermostatic valve cover ①
   - Thermostatic valve housing ②

Bolt (thermostatic valve cover):
10 Nm (1.0 m · kg, 7.2 ft · lb)
Bolt (thermostatic valve housing):
10 Nm (1.0 m · kg, 7.2 ft · lb)



3. Install:
   - Water jacket joint (outlet) ①

Bolt (water jacket joint):
10 Nm (1.0 m · kg, 7.2 ft · lb)

WARNING:
Always use new o-rings.

4. Fill:
   - Cooling system
     Refer to the "COOLANT REPLACEMENT" section in the CHAPTER 3.
5. Adjust:
   - Throttle cable free play
     Refer to the "THROTTLE CABLE FREE PLAY ADJUSTMENT" section in the CHAPTER 3.

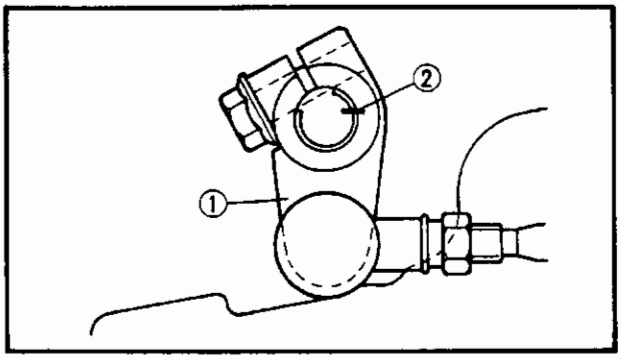
WATER PUMP

REMOVAL

1. Remove:
   - Side cowlings (left and right)
   - Front cowling

   Refer to the "COWLINGS" section in the CHAPTER 3.
2. Drain:
   - Coolant

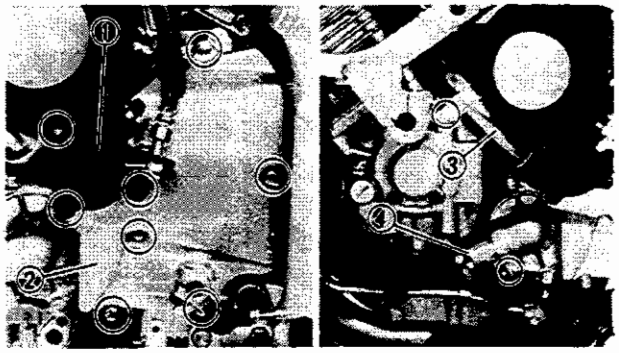
   Refer to the "COOLANT REPLACEMENT" section in the CHAPTER 3.



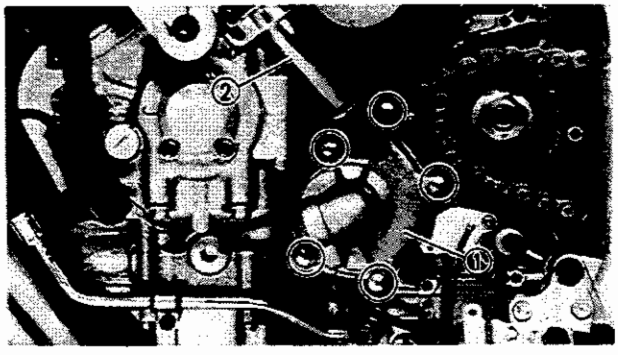
3. Remove:
   - Shift pedal link ①

NOTE:

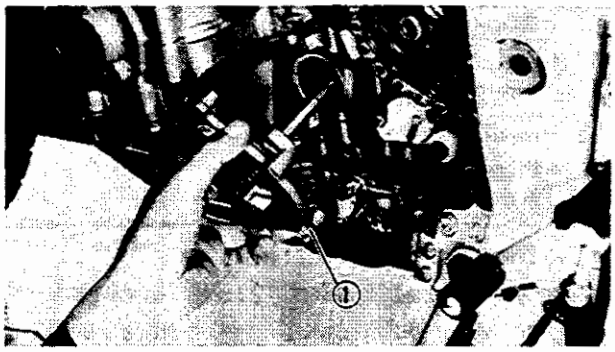
Put marks ② on the shift pedal joint and shift shaft before removing out so that shift pedal joint can be reinstalled in the original position.



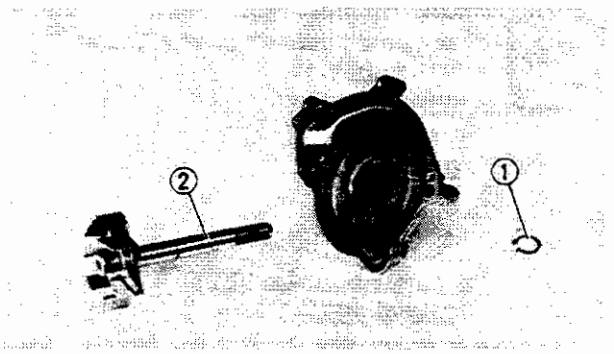
4. Remove:
   - Clutch release cylinder ①
   - Dowel pins
   - Crankcase cover (left) ②
   - Dowel pins
   - Gasket
   - Bolt (outlet pipe – water pump) ③
   - Inlet pipe (water pump) ④



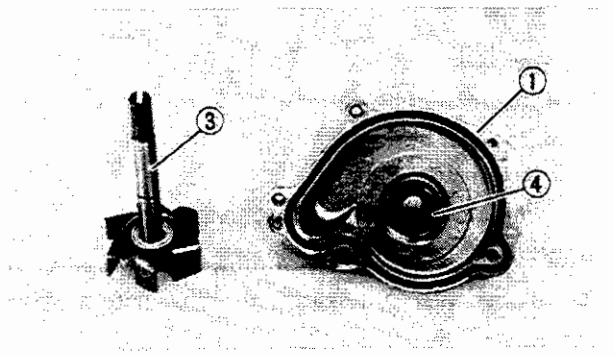
5. Remove:
   - Water pump cover ①
     (with outlet pipe ②)
   - Dowel pins

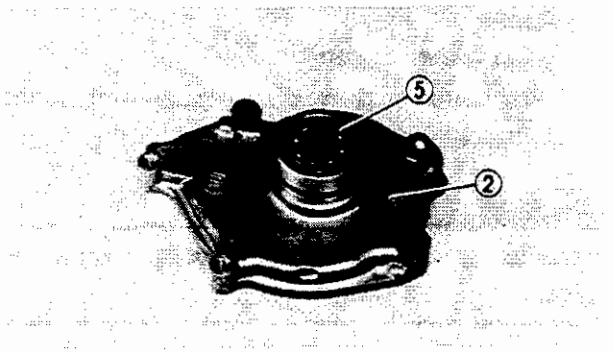


6. Remove:
   - Water pump housing ①



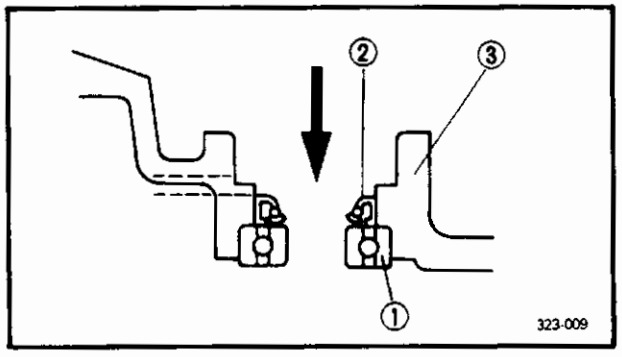
7. Remove:
   - Circlip ①
   - Impeller shaft ②





INSPECTION

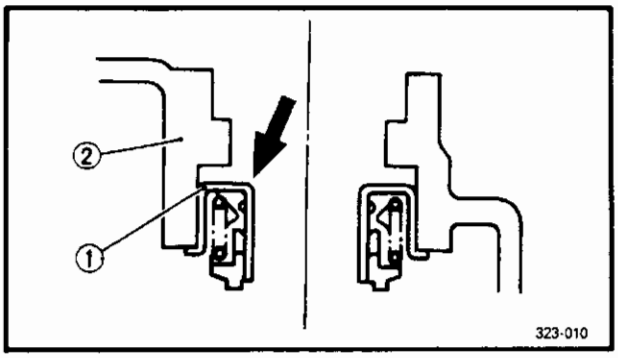
1. Inspect:
   - Water pump cover ①
   - Water pump housing ②
     Cracks/Damage → Replace.
   - Impeller ③
     Cracks/Wear/Damage → Replace.
   - Water pump seals
   - Oil seal ④
     Wear/Damage → Replace.
   - Bearing ⑤
     Roughness → Replace.



Bearing and Seal Replacement

1. Remove:
   - Bearing ①
   - Oil seal ②
     Tap off both components from the water pump seal side.

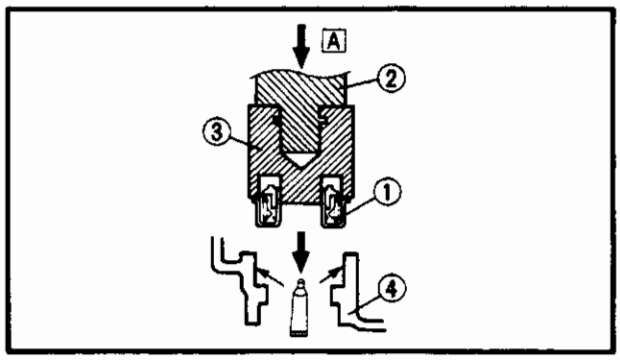
③ Water pump housing



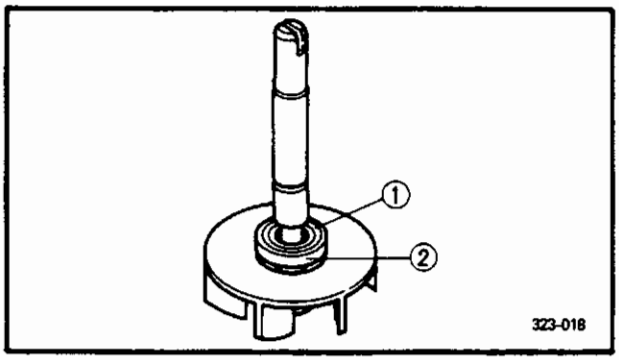
2. Remove:
   - Water pump seal ①
     Tap it off from the water pump housing ②
3. Install:
   - Water pump seal ①

NOTE:
- Use the water pump seal installer.
- Apply Yamaha bond No. 1215 or Quick gasket® to the water pump housing ④ before installing seal.

Water pump seal installer (② and ③):
YU-04051-1
90890-04058
YM-33221
90890-04078
Quick gasket®:
ACC-11001-05-01
Yamaha bond No. 1215
90890-85505

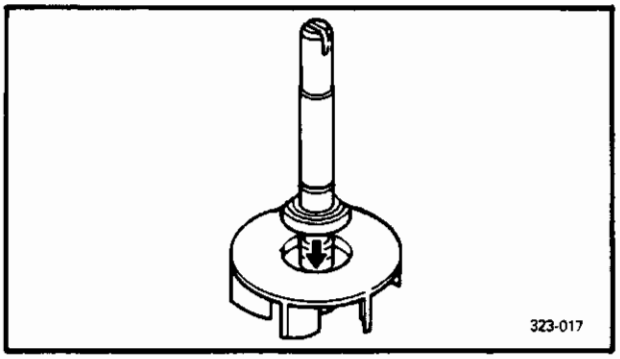


A PRESS



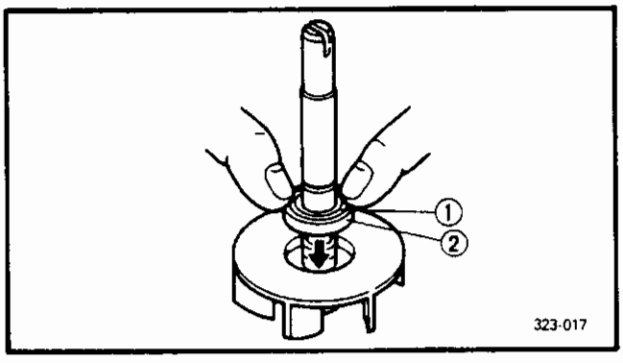
4. Remove:
   - Water pump seal ①
   - Damper rubber ②
     (from impeller)
     Pry out with a small screwdriver.

NOTE:
Be careful not to scratch or bend the impeller shaft.

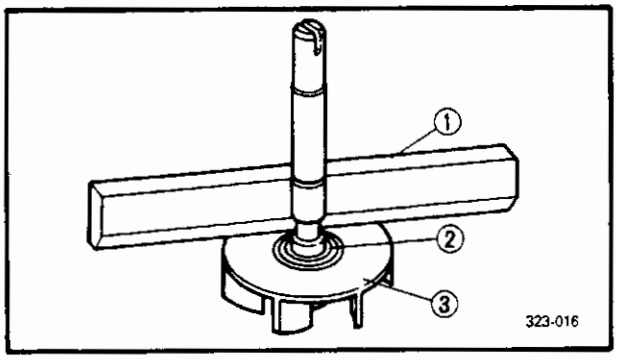


5. Apply:
   - Tap water or coolant
     (to outer surface of dampper rubber and impeller hab.)

⚠ CAUTION:
Never apply oil or grease to water pump seal surfaces.



6. Install:
   - Water pump seal ①/Damper rubber ②
     (to impeller hab)
7. Measure:
   - Tilt
     Out of specification → Repeat the above procedure "4 ~ 6".



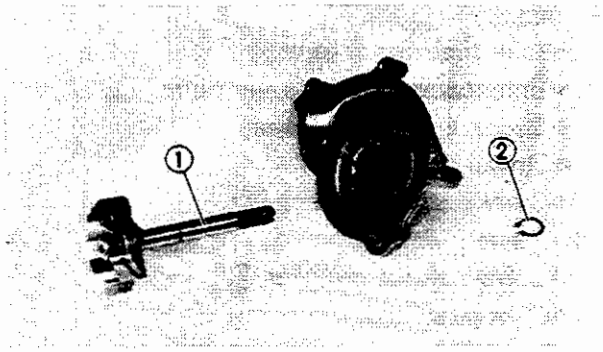
NOTE:
Be sure the water pump seal ② fits squarely.

Tilt limit:
0.15 mm (0.006 in)

① Straight edge
③ Impeller

INSTALLATION

Reverse the "REMOVAL" procedure.
Note the following points.

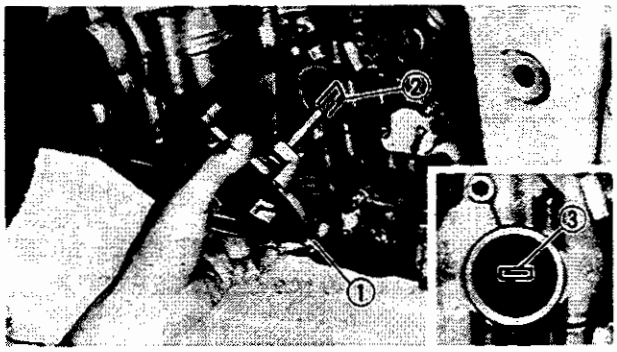


1. Install:
   - Impeller shaft ①
   - Circlip ②

NOTE:
Before installing the impeller shaft, apply the tap water or coolant to the water pump seal and then apply the lithium soap base grease to the bearing and oil seal.

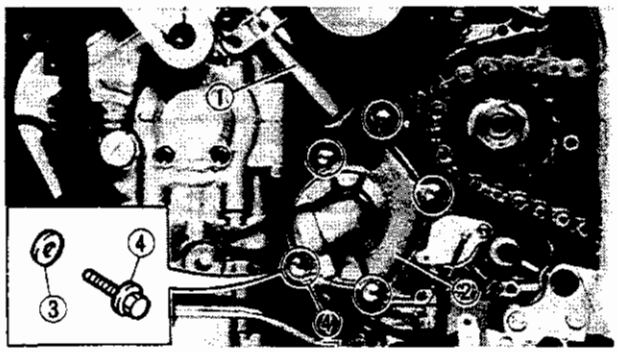
⚠ CAUTION:
Be sure not to scratch the water pump seal while installing.

⚠ WARNING:
Always use new circlip.



2. Install:
   - Water pump housing ①

NOTE:
- Align the slot ② on the impeller shaft with the projection ③ on the oil pump shaft.
- Apply the lithium soap base grease on the o-ring.



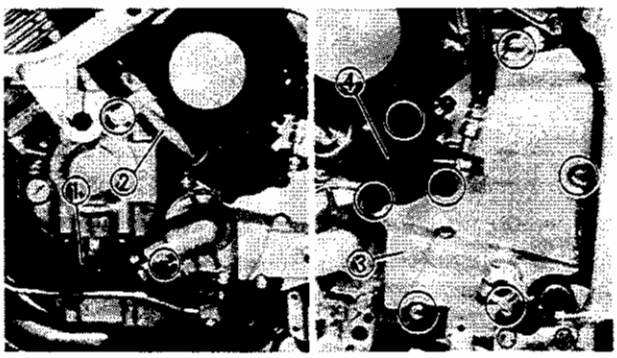
3. Install:
   - Outlet pipe (with o-ring) ①
     (to water pump cover ②)
   - Dowel pins
   - Water pump cover ②

NOTE:
- Before installing the outlet pipe (water pump) ①, apply the grease to the o-rings.
- Set the new cupper washer ③ to the coolant drain bolt ④.

Bolt (water pump cover):
10 Nm (1.0 m · kg, 7.2 ft · lb)

⚠ WARNING:

Alwyas use new o-rings.



4. Install:
   - Inlet pipe (water pump) ①
   - Bolt (outlet pipe – water pump) ②
   - Gasket (crankcase cover)
   - Dowel pins
   - Crankcase cover (left) ③
   - Dowel pins
   - Clutch release cylinder ④
   - Shift pedal link

NOTE:
Before installing the inlet pipe (water pump) ①, apply the grease to the o-ring.

⚠ WARNING:

Always use a new o-ring.

Bolt (outlet pipe – water pump):
10 Nm (1.0 m · kg, 7.2 ft · lb)
Bolt (crankcase cover):
10 Nm (1.0 m · kg, 7.2 ft · lb)
Bolt (shift pedal link):
10 Nm (1.0 m · kg, 7.2 ft · lb)

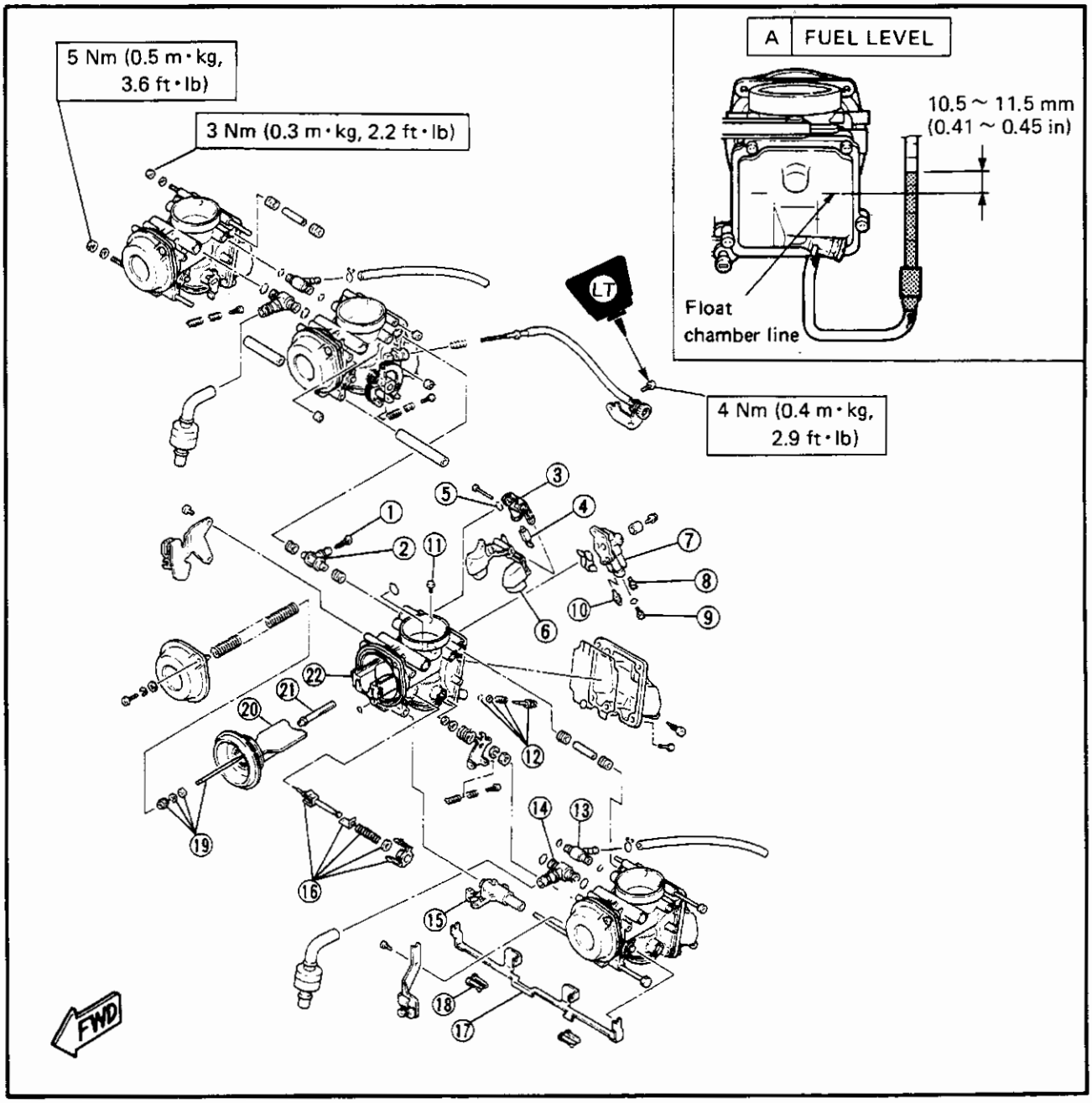
5. Fill:
   - Cooling system
     Refer to the "COOLANT REPLACEMENT" section in the CHAPTER 3.

CARBURETION

CARBURETOR

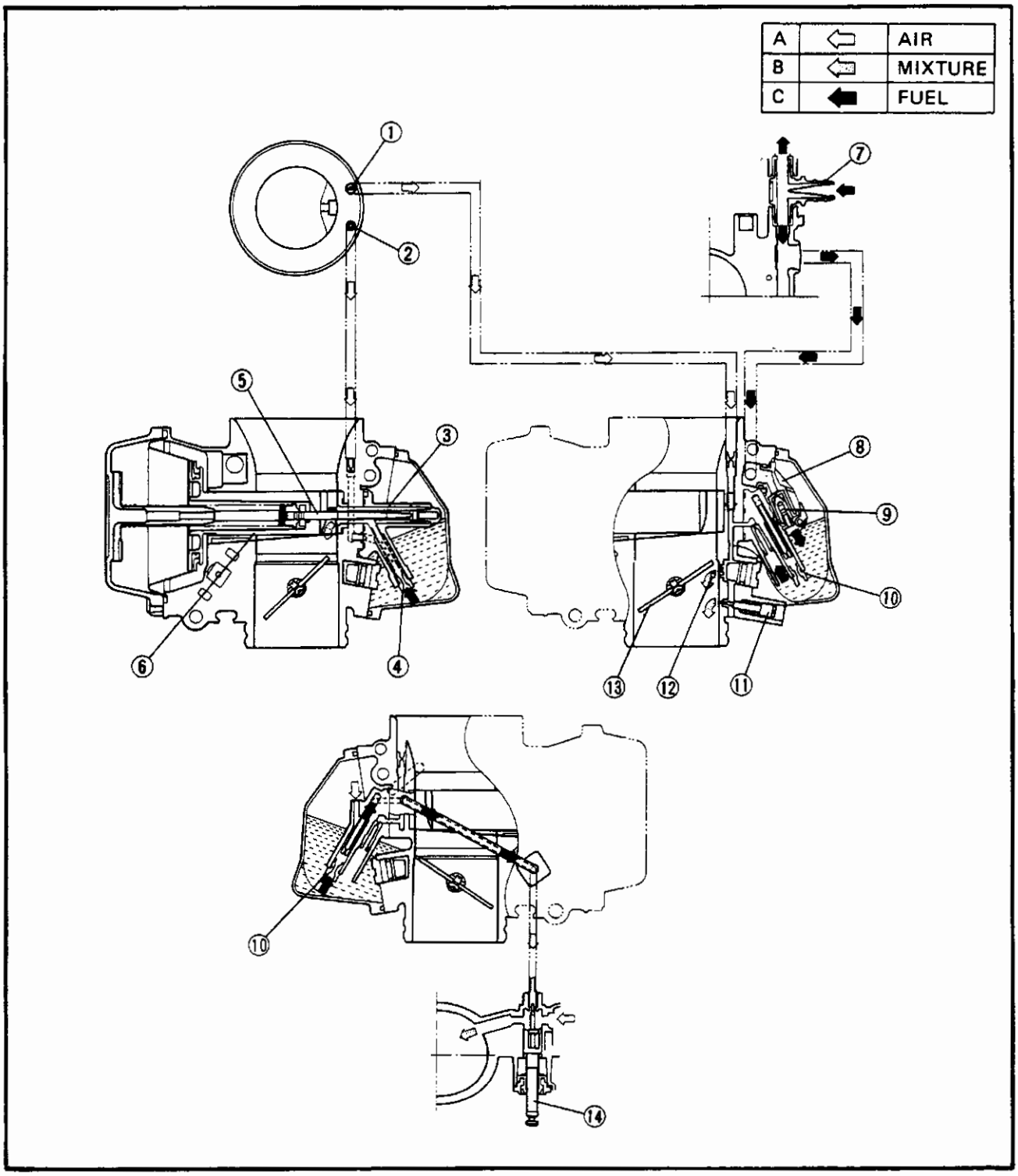
① Fuel strainer
② Joint (fuel feed)
③ Valve seat
④ Needle valve
⑤ O-ring
⑥ Floats
⑦ Jet housing
⑧ Starter jet
⑨ Main jet
⑩ Pilot jet
⑪ Pilot air jet
⑫ Pilot air screw
⑬ Joint (overflow hose)
⑭ Joint (ventilation hose)
⑮ Joint (starter lever)
⑯ Starter plunger
⑰ Starter joint
⑱ Stopper
⑲ Jet needle set
⑳ Throttle valve
㉑ Needle jet
㉒ Throttle valve support

SPECIFICATIONS		
ID Mark	3GM00	3LE00, 3LF00, 3LH00
MAIN JET		
(#1, 4 cylinder)	#125	#127.5
(#2, 3 cylinder)	#122.5	#125
MAIN AIR JET	#85	#85
PILOT JET	#40	#40
PILOT AIR JET	#115	#115
JET NEEDLE	5CEW8-35	5CEW8-35
PILOT SCREW	2-1/2 turns out	2-1/2 turns out
THROTTLE VALVE	#125	#125
ENGINE IDLE SPEED	950 ~ 1,050 r/min	
FUEL LEVEL	10.5 ~ 11.5 mm (0.41 ~ 0.45 in)	



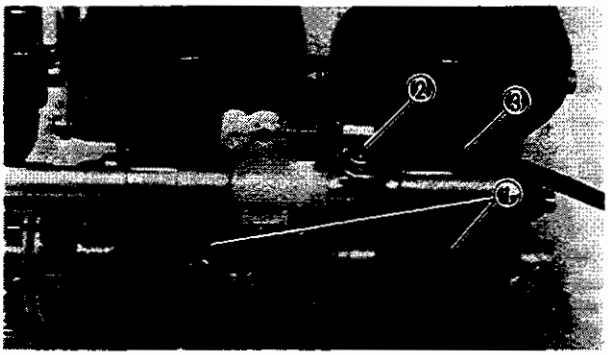
SECTION VIEW

① Pilot air jet
② Main air jet
③ Needle jet
④ Main jet
⑤ Jet needle
⑥ Piston valve
⑦ Joint (fuel feed)
⑧ Valve seat
⑨ Needle valve
⑩ Starter jet
⑪ Pilot screw
⑫ By-pass hole
⑬ Throttle valve
⑭ Starter plunger



REMOVAL

1. Remove:
   - Side cowling (left)
     Refer to the "COWLINGS" section in the CHAPTER 3.
   - Fuel tank
     Refer to the "FUEL TANK" section in the CHAPTER 3.
   - Air filter case
     Refer to the "ENGINE REMOVAL – AIR FILTER CASE" section in the CHAPTER 4.
   - Carburator assembly
     Refer to the "ENGINE REMOVAL – CARBURATOR" section in the CHAPTER 4.



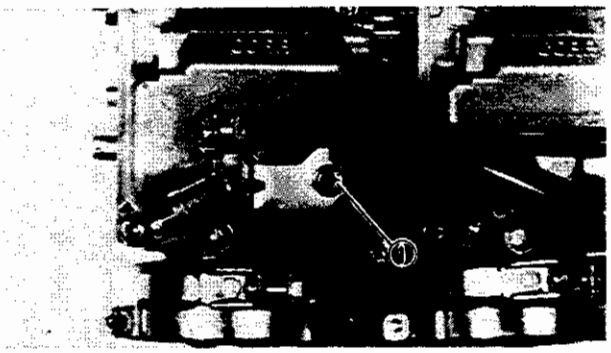
2. Remove:
   - Carburator joints ①
3. Loosen:
   - Clamp screw (starter cable) ②
4. Disconnect:
   - Starter cable ③

DISASSEMBLY

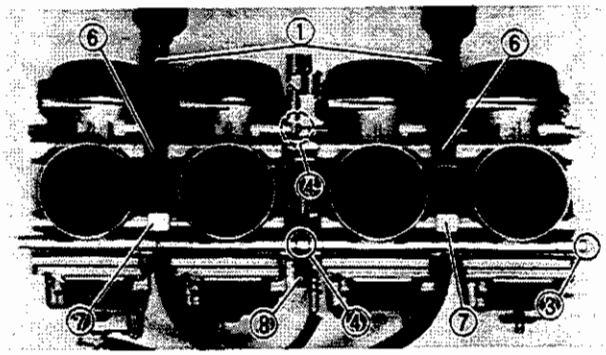
NOTE:

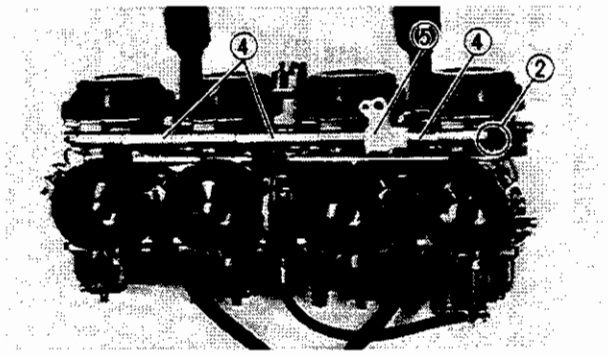
The following parts can be cleaned and inspected without carburetor separation.
(All inner parts except starter plunger can be cleaned and inspected without carburetor separation.)

- Throttle valve
- Piston valve
- All jets
- Float
- Needle valve
- Valve seat
- Main nozzle
- Jet needle

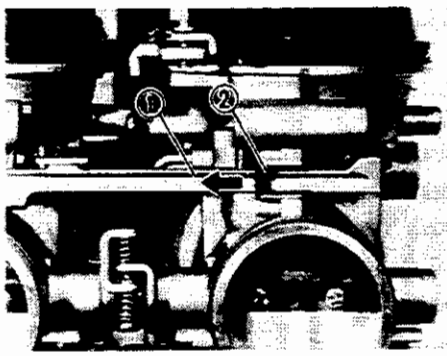


1. Remove:
   - Screw (throttle stop screw bracket) ①



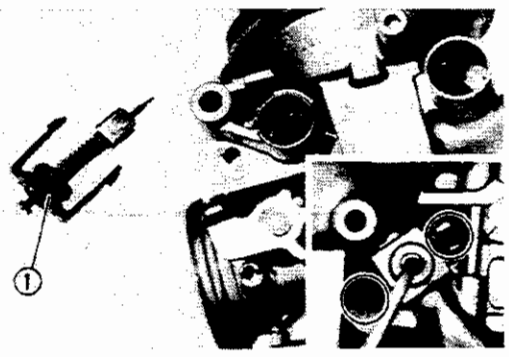


2. Disconnect:
   - Ventilation hoses (carburetor) ①
3. Remove:
   - Connecting bolt (upper) ②
   - Connecting bolt (lower) ③
   - Spacer collars ④
   - Joint (starter lever) ⑤
   - Joints (ventilation hose) ⑥ (with o-rings)
   - Joints (overflow hose) ⑦ (with o-rings)
   - Joint (fuel feed) ⑧ (with gasket rings)
   - Springs



4. Remove:
   - Starter joint ①

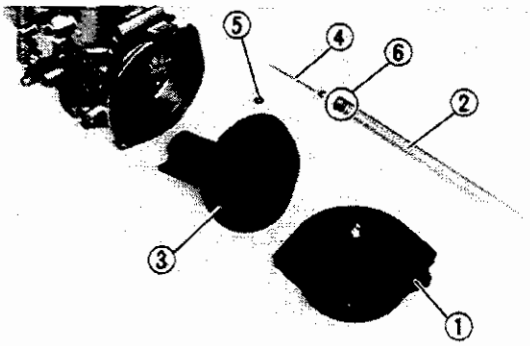
   Slide out the stoppers ② to remove the starter joint ①.



5. Remove:
   - Starter plunger ①

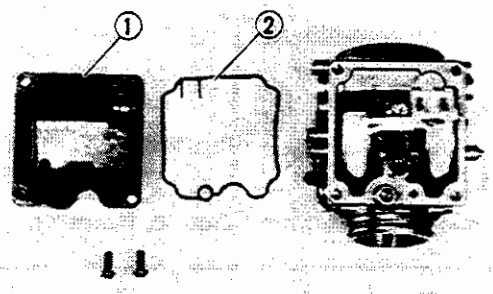
NOTE:

Unhook the hooks from the carburetor body and then pull out the starter plunger.

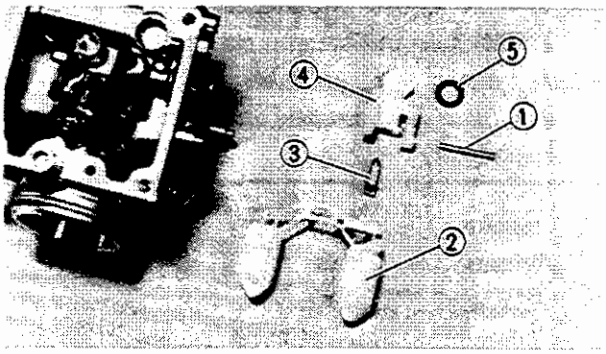


6. Remove:
   - Vacuum chamber cover ①
   - Spring ②
   - Throttle valve ③
   - Jet needle ④
   - O-ring ⑤

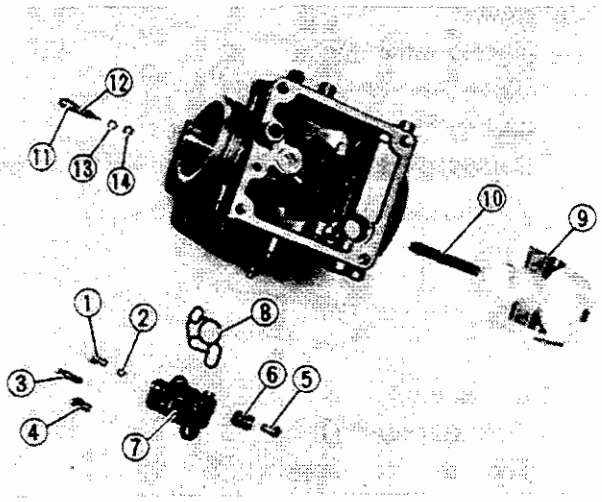
⑥ Jet needle stopper



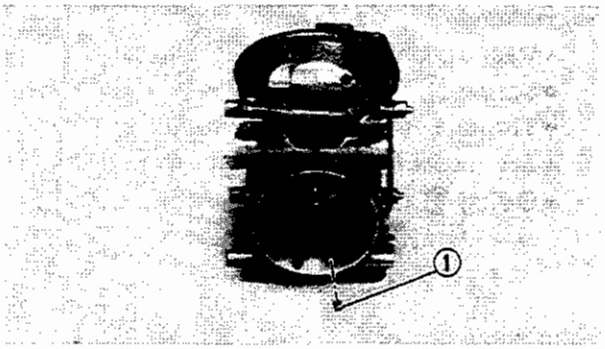
7. Remove:
   - Float chamber cover ①
   - Gasket ②



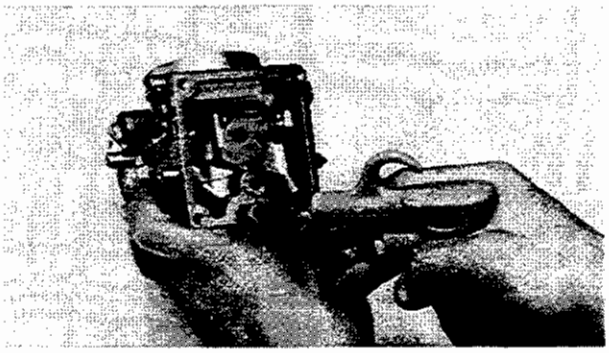
8. Remove:
   - Float pin ①
   - Float ②
   - Needle valve ③
   - Valve seat ④
   - O-ring ⑤



9. Remove:
   - Main jet ①
   - O-ring ②
   - Pilot jet ③
   - Starter jet ④
   - Bolt (needle jet) ⑤
   - Holder (needle jet) ⑥
   - Jet housing ⑦
   - Gasket ⑧
   - Throttle valve support ⑨
   - Needle jet ⑩
   - Pilot air screw ⑪
   - Spring ⑫
   - Washer ⑬
   - O-ring ⑭



10. Remove:
    - Pilot air jet ①



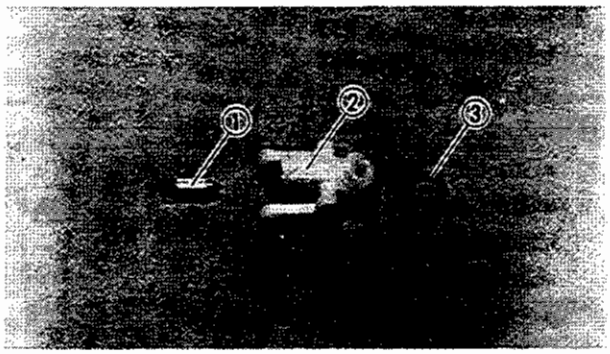
INSPECTION

1. Inspect:
    - Carburetor body
    - Float chamber
    - Jet housing
      Cracks/Damage → Replace.
    - Fuel passage
      Contamination → Clean as indicated.

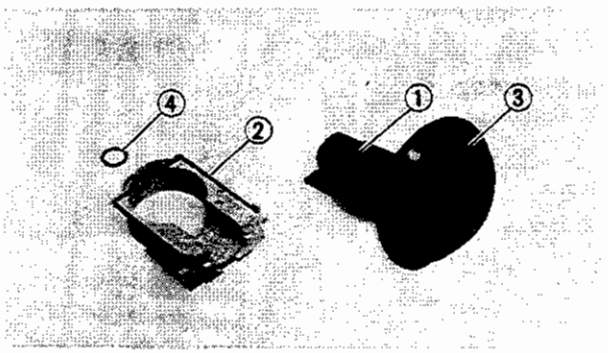


Cleaning steps:
- Wash carburetor in petroleum based solvent. (Do not use any caustic carburetor cleaning solution.)
- Blow out all passages and jets with compressed air.

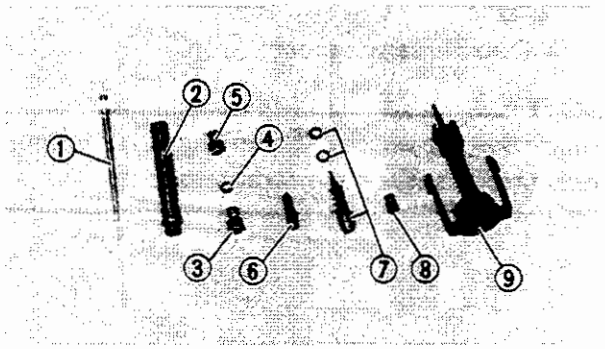
2. Inspect:
    - Floats
      Damage → Replace.



3. Inspect:
    - Needle valve ①
    - Valve seat ②
    - O-ring ③
      Damage/Wear/Contamination → Replace as a set.

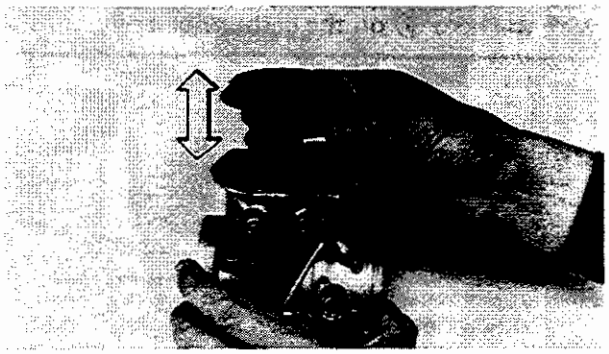


4. Inspect:
    - Throttle valve ①
    - Throttle valve support ②
      Scratches/Wear/Damage → Replace.
    - Rubber diaphragm ③
      Tears → Replace.
    - O-ring ④
      Wear/Damage → Replace.



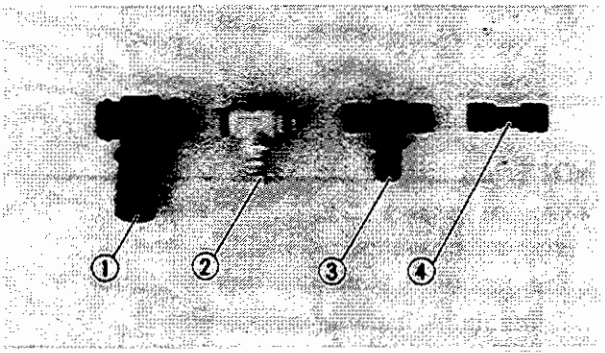
5. Inspect:
   - Jet needle ①
   - Needle jet ②
   - Main jet ③
   - O-ring ④
   - Starter jet ⑤
   - Pilot jet ⑥
   - Pilot air screw set ⑦
   - Pilot air jet ⑧
   - Starter plunger ⑨

   Bends/Wear/Damage → Replace.
   Contamination → Blow out jets with compressed air.



6. Check:
   - Free movement

   Insert the throttle valve into the carburetor body, and check for free movement.
   Stick → Replace.



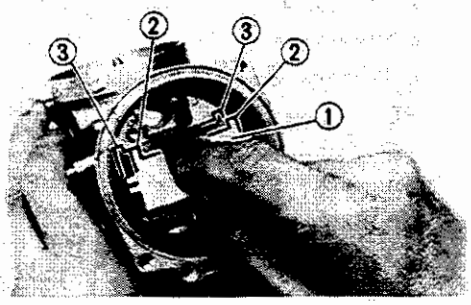
7. Inspect:
   - Joint (ventilation hose) ①
   - Joint (overflow hose) ②
   - Joint (fuel hose) ③
   - Joint (fuel feed) ④

ASSEMBLY

Reverse the "DISASSEMBLY" procedures.
Note the following points.

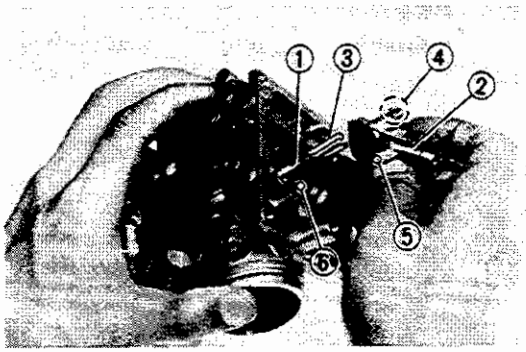
⚠ CAUTION:

- **Before reassembling, wash all parts in clean petroleum based solvent.**
- **Always use a new gasket.**



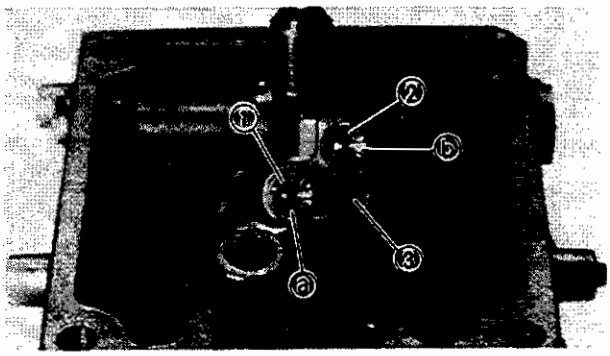
1. Install:
   - Throttle valve support ①

NOTE:
Align the projections ② on the valve support with the slots ③ on the carburetor body.



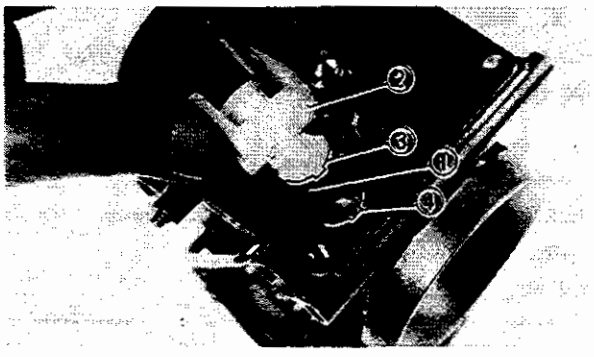
2. Install:
   - Needle jet ①
   - Gasket
   - Jet housing ②
   - Holder (needle jet)
   - Bolt (needle jet)

NOTE:
Align the groove ③ on the needle jet ① with the projection ④ on the jet housing ② and then align the projection ⑤ on the jet housing ② with the hole ⑥ on the carburetor body.



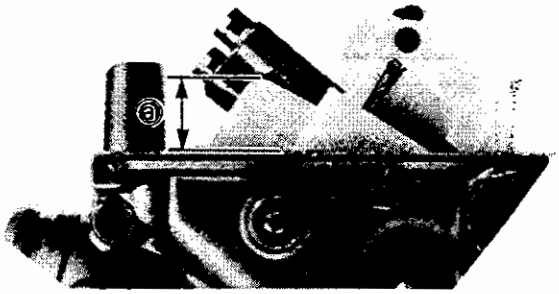
3. Install:
   - Main jet ①
   - Starter jet ②
   - Pilot jet ③

NOTE:
- The jet with a bigger eye is main jet ①. It should be installed on position ⓐ.
- The jet with a smaller eye is starter jet ②. If should be installed on position ⓑ.



4. Install:
   - O-ring ①
   - Valve seat ②
   - Needle valve
   - Float
   - Float pin

NOTE:
Align the projection ③ on the valve seat with the slot ④ on the carburetor body.



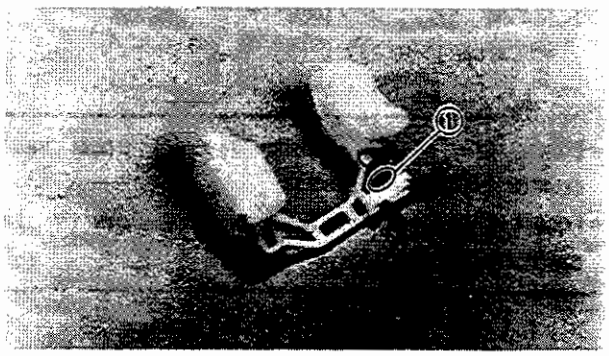
5. Measure:
   - Float height ⓐ
     Out of specification → Adjust.

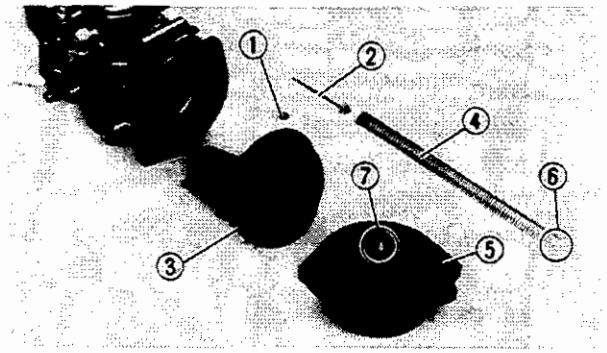
Float height (F.H.):
12 ~ 14 mm (0.47 ~ 0.55 in)

Measurement and adjustment steps:
- Hold the carburetor in an upside down position.
- Measure the distance from the mating surface of the float chamber (gasket removed) to the top of the float.

NOTE:
The float arm should be resting on the needle valve, but not compressing the needle valve.

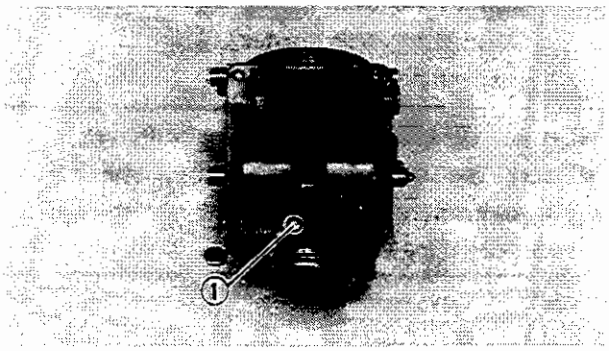
- If the float height is not within specification, inspect the valve seat and needle valve.
- If either is worn, replace them both.
- If both are fine, adjust the float height by bending the float tang ① on the float.
- Recheck the float height.





6. Install:
   - O-ring ①
   - Jet needle ②
   - Throttle valve ③
   - Spring ④
   - Vacuum chamber cover ⑤

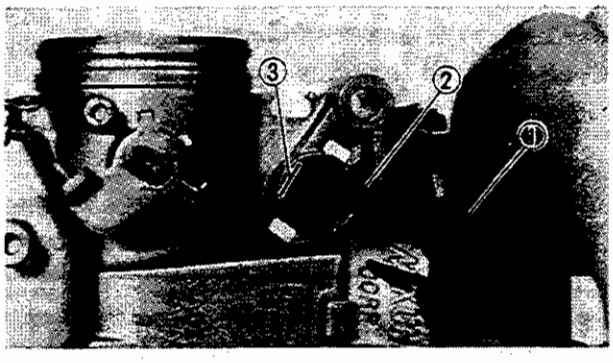
NOTE:
Insert the spring end ⑥ onto the spring guide ⑦ on the vacuum chamber cover.



7. Install:
   - O-ring
   - Washer
   - Spring
   - Pilot air screw ①

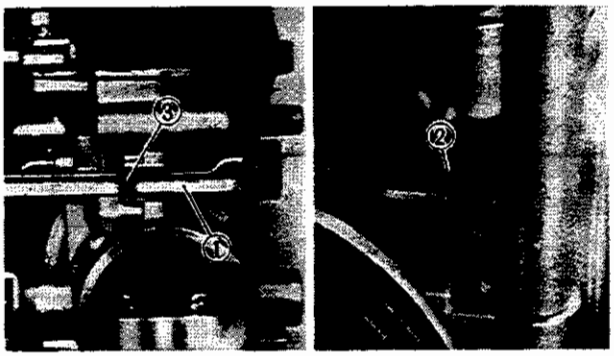
Note the following installation points:
- Screw in the pilot air screw ① until it is lightly seated.
- Back out by the specified number of turns.

Pilot air screw (turns out):
2-1/2



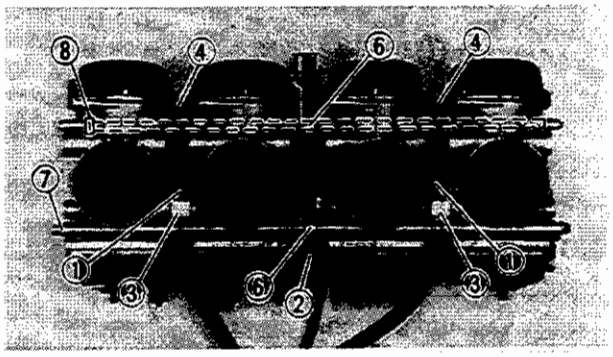
8. Install:
   • Starter plunger ①

NOTE:
Install with the flat surface ② of the starter plunger on that of the carburetor body ③.

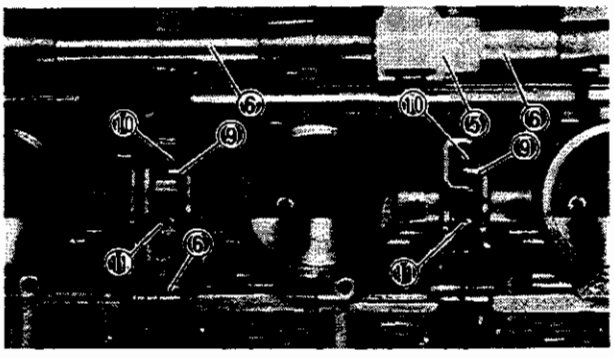


9. Install:
   • Starter joint ①

NOTE:
• Hook the starter joint arm ② onto each starter plunger.
• Insert the stoppers ③ into the slots on the carburetor body.



10. Install:
   • Springs ①
   • Joint (fuel feed) ②
     (with gasket rings)
   • Joints (overflow hose) ③
     (with o-rings)
   • Joints (ventilation hose) ④
     (with o-rings)
   • Joints (starter lever) ⑤
   • Spacer collars ⑥
   • Connecting bolt (lower) ⑦
   • Connecting bolt (upper) ⑧

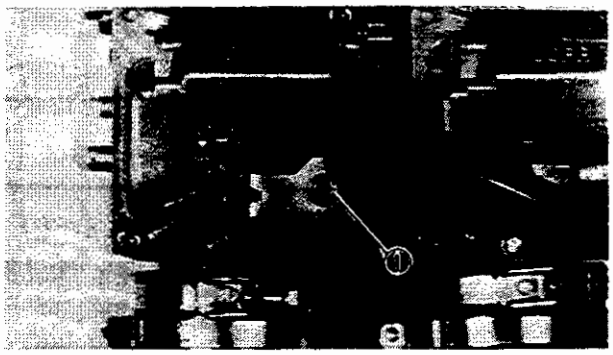


NOTE:
• Do not tighten the connecting bolts yet.
• Insert the throttle arm ⑨ (on the #1, #2, #4 carburetors) between the spring ⑩ and synchronizing screw ⑪ .

11. Tighten:
    - Connecting bolts

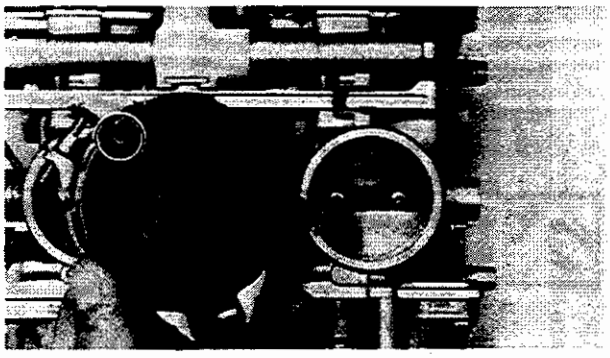
	Connecting bolt (upper): **3 Nm (0.3 m · kg, 2.2 ft · lb)** **Connecting bolt (lower):** **5 Nm (0.5 m · kg, 3.6 ft · lb)**

NOTE:
- Place the carburetor assembly on a surface plate with the intake manifold side down and the tighten the connecting bolts while pushing down the respective carburetors with an even force.
- After tightening, check the throttle lever and starter joint for smooth action.



12. Tighten:
    - Screw (throttle stop screw bracket) ①

	Screw (throttle stop screw bracket): **4 Nm (0.4 m · kg, 2.9 ft · lb)** **Apply LOCTITE®**



INSTALLATION

Reverse the "REMOVAL" procedure.
Note the following points.

1. Install:
    - Carburetor joint

NOTE:
- Install the carburetor joint with the "R" mark onto the #1 and #2 carburetors and the carburetor joint with the "L" mark onto the #3 and #4 carburetors.
- The carburetor joints with the "R" and "L" marks should face the carburetor side.

2. Adjust:
   • Carburetor synchronization
   Refer to the "CARBURETOR SYNCHRONIZATION" section in the CHAPTER 3.

3. Adjust:
   • Idle speed

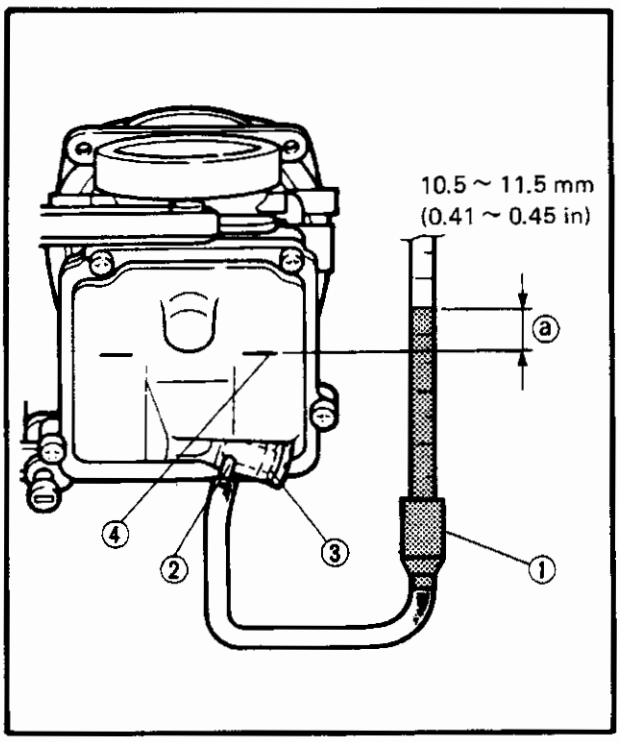
Engine idle speed:
950 ~ 1,050 r/min

Refer to the "IDLE SPEED ADJUSTMENT" section in the CHAPTER 3.

4. Adjust:
   • Throttle cable free play

Throttle cable free play:
2 ~ 5 mm (0.08 ~ 0.20 in)

Refer to the "THROTTLE CABLE FREE PLAY ADJUSTMENT" section in the CHAPTER 3.

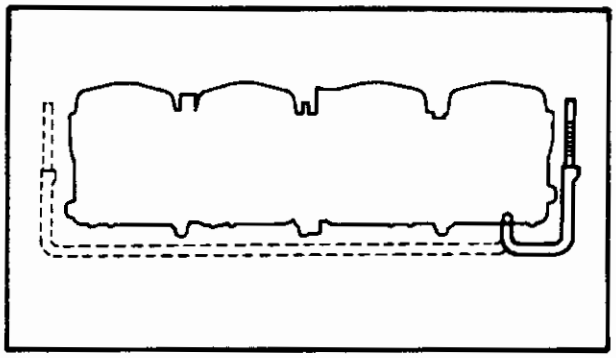


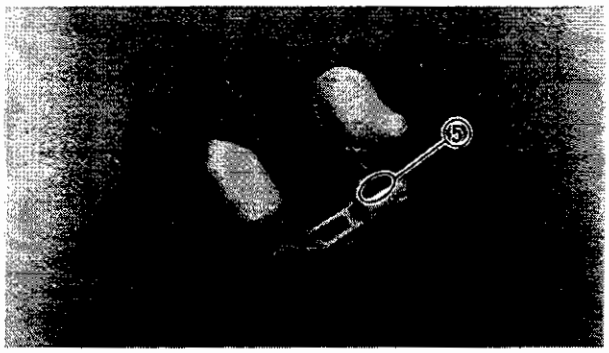
FUEL LEVEL ADJUSTMENT

1. Measure:
   • Fuel level ⓐ
   Out of specification → Adjust.

Fuel level a :
10.5 ~ 11.5 mm
(0.41 ~ 0.45 in)
Above the float chamber line

Fuel level measurement and adjustment steps:
- Place the motorcycle on a level surface.
- Use a garage jack under the engine to ensure that the carburetor is positioned vertically.
- Connect the fuel level gauge ① to the drain pipe ②.





Fuel level gauge:
YM-01312
90890-01312

- Loosen the drain screw ③ and warm up the engine for several minutes.
- Hold the gauge vertically next to the float chamber line ④.
- Measure the fuel level ⓐ with the gauge.

NOTE:
Fuel level readings of both side of carburetor line should be equal.

- If the fuel level is incorrect, adjust the fuel level.
- Remove the carburetor.
- Inspect the valve seat and needle valve.
- If either is worn, replace them both.
- If both are fine, adjust float level by bending the float tang ⑤ slightly.
- Install the carburetor.
- Recheck the fuel level.

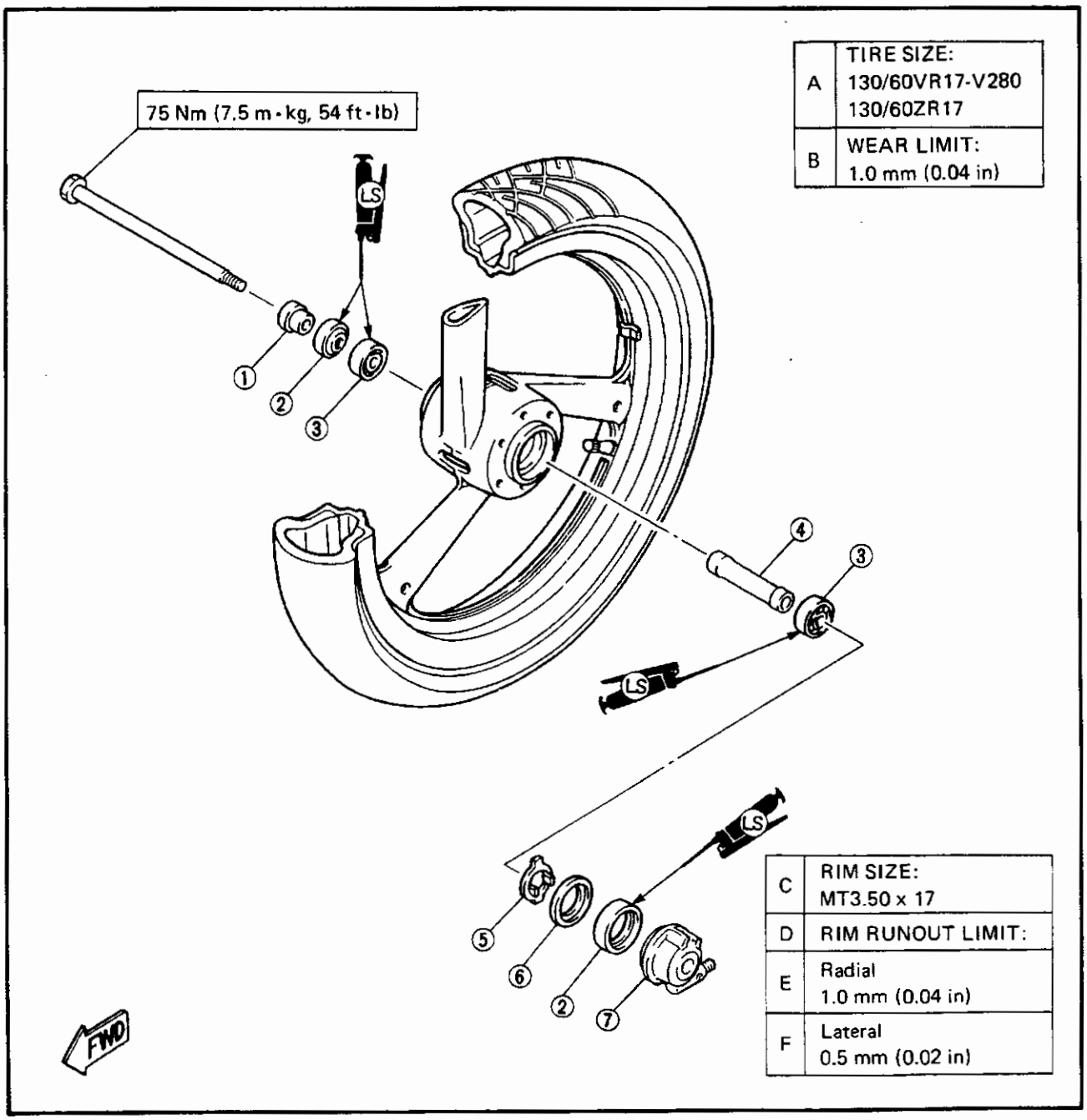
CHASSIS

FRONT WHEEL

① Collar
② Oil seal
③ Bearing
④ Spacer
⑤ Meter clutch
⑥ Clutch retainer
⑦ Speedometer gear unit

TIRE AIR PRESSURE (COLD):		
Cold tire pressure	Front	Rear
Up to 90 kg (198 lb) load*	250 kPa (2.5 kg/cm², 36 psi)	250 kPa (2.5 kg/cm², (36 psi)
90 kg (198 lb) ~ Maximum load*	250 kPa (2.5 kg/cm², 36 psi)	290 kPa (2.9 kg/cm², 42 psi)
High speed riding	250 kPa (2.5 kg/cm², 36 psi)	290 kPa (2.9 kg/cm², 42 psi)

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



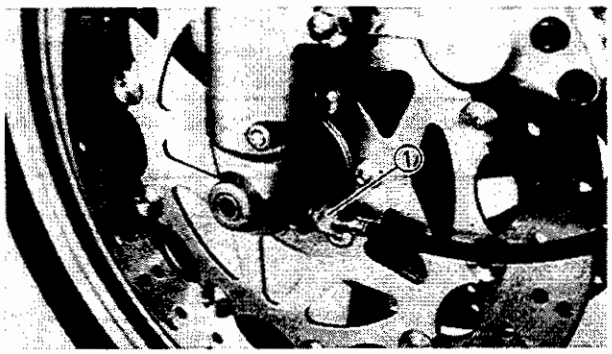
A	TIRE SIZE: 130/60VR17-V280 130/60ZR17
B	WEAR LIMIT: 1.0 mm (0.04 in)

C	RIM SIZE: MT3.50 x 17
D	RIM RUNOUT LIMIT:
E	Radial 1.0 mm (0.04 in)
F	Lateral 0.5 mm (0.02 in)

REMOVAL

1. Remove:
   - Side cowlings (left and right)
   - Front cover

   Refer to the "COWLINGS" section in the CHAPTER 3.

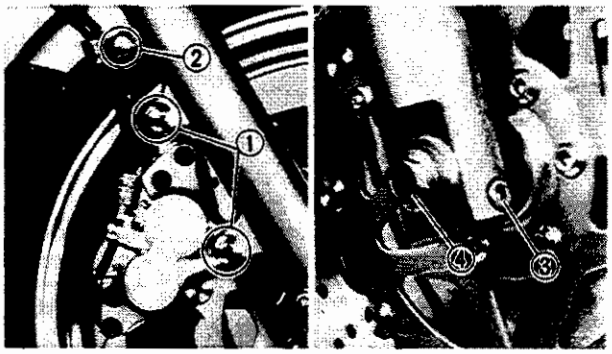


2. Place the motorcycle on a level place.

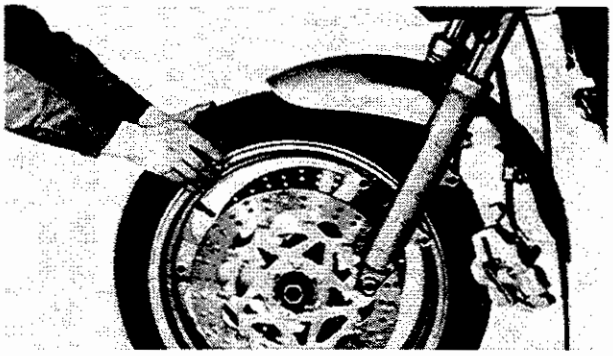
⚠ WARNING:

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

3. Disconnect:
   - Speedometer cable ①



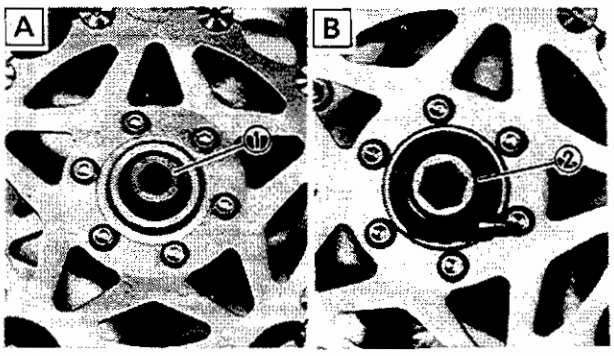
4. Remove:
   - Bolts (brake calipers) ①
   - Clamp (brake hose) ②
5. Loosen:
   - Pinch bolt (front wheel axle) ③
   - Front wheel axle ④
6. Elevate the front wheel by placing a suitable stand under the engine.



7. Remove:
   - Front wheel axle
   - Front wheel

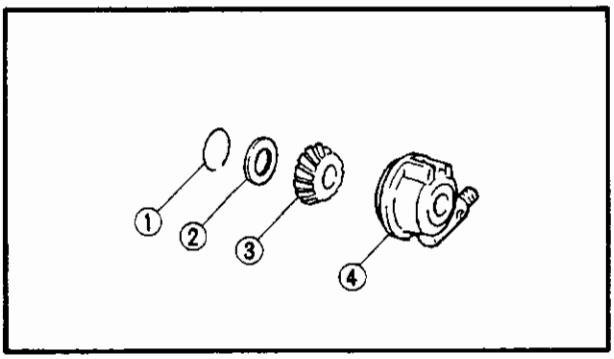
NOTE:

Do not apply the front brake while the wheel is removed.

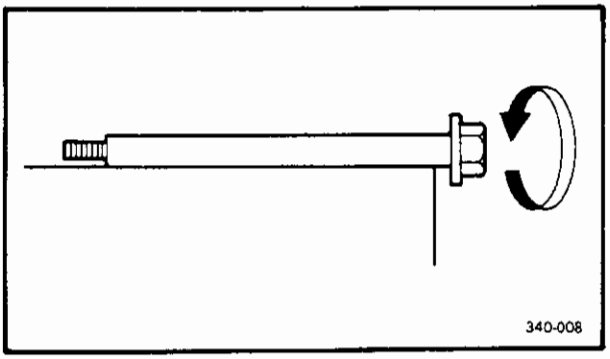


8. Remove:
   - Collar ①
   - Speedometer gear unit ②

A Right side
B Left side



9. Remove:
   - Wire clip ①
   - Washer ②
   - Drive gear ③
     (from gear unit case④)



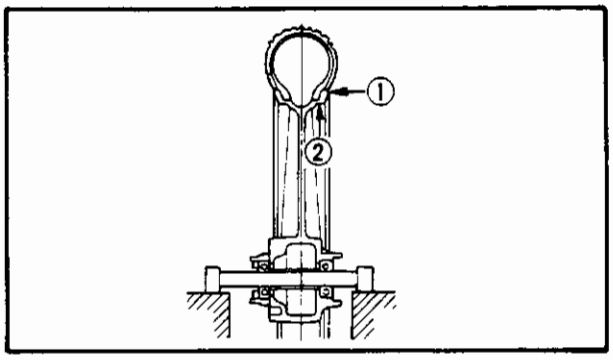
INSPECTION

1. Inspect:
   - Front axle
     Roll the axle on a flat surface.
     Bends → Replace.

⚠ WARNING:

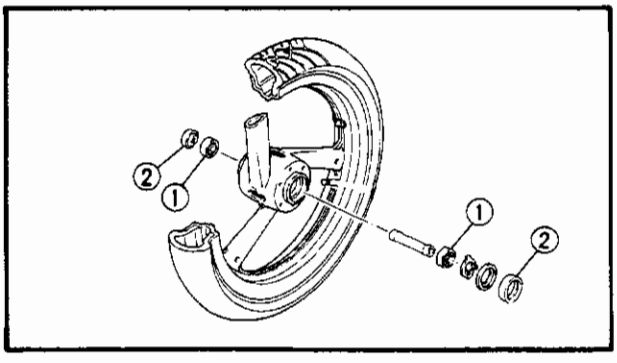
Do not attempt to straighten a bent axle.

2. Inspect:
   - Tire
     Wear/Damage → Replace.
     Refer to the "TIRE INSPECTION" section in the CHAPTER 3.
   - Wheel
     Refer to the "WHEEL INSPECTION" in the CHAPTER 3.

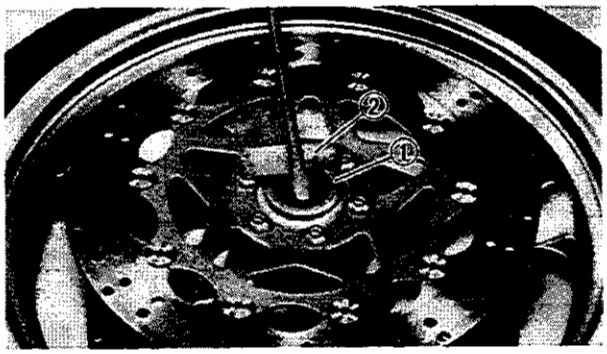


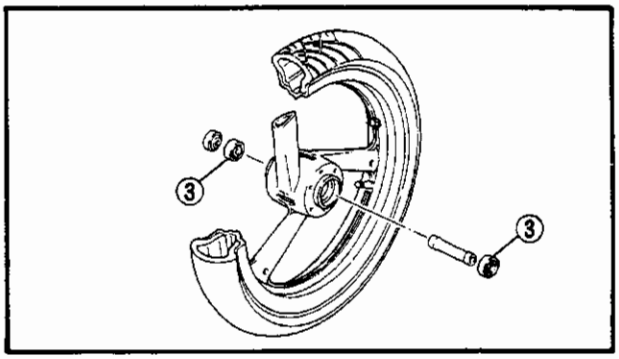
3. Measure:
   - Wheel runout
     Over specified limit → Replace.

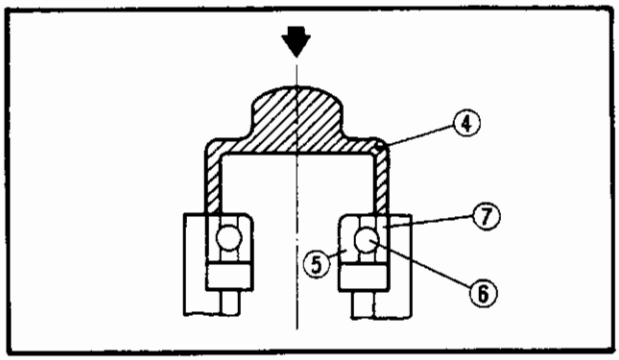
Rim runout limits:
radial ① : 1.0 mm (0.04 in)
lateral ② : 0.5 mm (0.02 in)

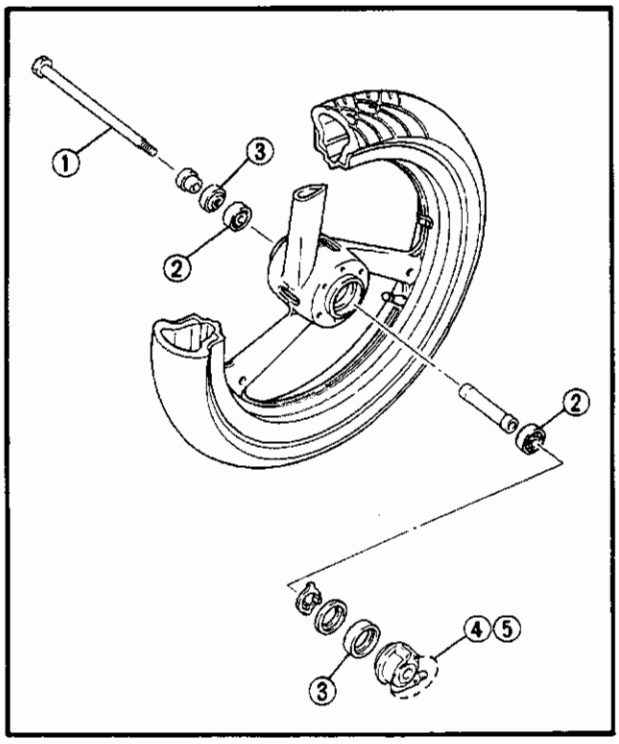


4. Inspect:
   - Wheel bearings ①
     Bearings allow play in the wheel hub or wheel turns roughly → Replace.
   - Oil seals ②
     Wear/Damage → Replace.









Wheel bearing and oil seal replacement steps:

- Clean the outside of the wheel hub.
- Remove the oil seals ① use a flat-head screw driver.

NOTE:

Place a rag ② on the outer edge to prevent damage.

- Remove the bearings ③ using a general bearing puller.
- Install the new bearing and oil seal by reversing the previous steps.

NOTE:

Use a socket ④ that matches the outside diameter of the race of the bearing and oil seal.

⚠ CAUTION:

Do not strike the center race ⑤ or balls ⑥ of the bearing. Contact should be made only with the outer race ⑦ .

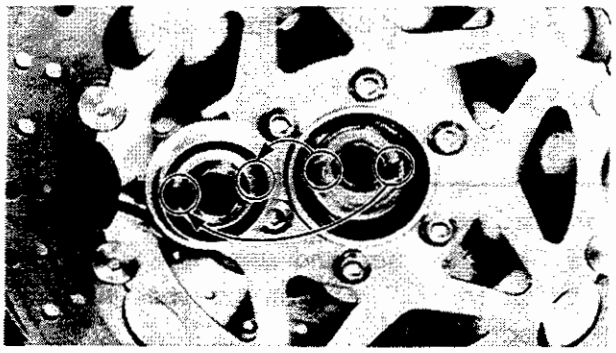
INSTALLATION

Reverse the "Removal" procedure.

Note the following points.

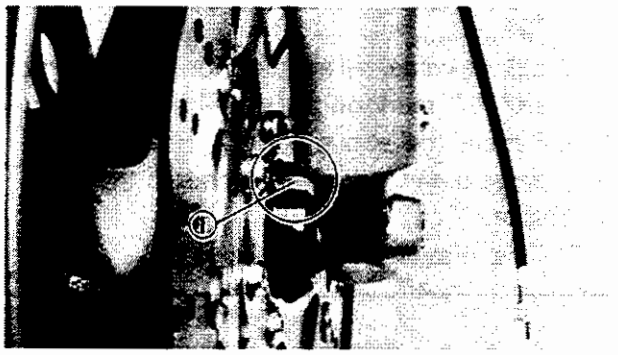
1. Lubricate:
   - Front wheel axle ①
   - Bearings ②
   - Oil seal (lip) ③
   - Drive ④ /Driven gear ⑤ (speedometer)

Lithium soap base grease



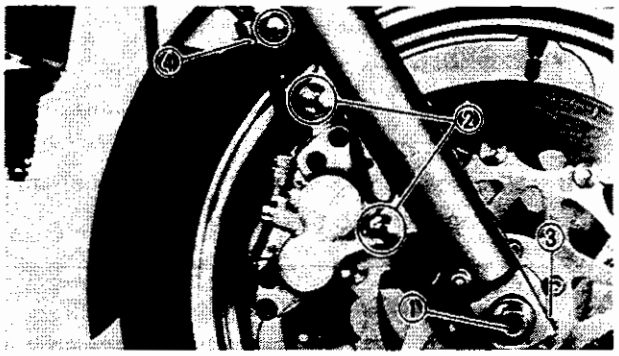
2. Install:
   • Speedometer gear unit

NOTE:
Be sure that the two projections inside the wheel hub mesh with the two slots in the gear unit assembly.



3. Install:
   • Front wheel

NOTE:
Be sure that the projecting portion (torque stopper) ① of the gear unit housing is positioned correctly.



4. Tighten:
   • Front wheel axle ①
   • Bolts (brake calipers) ②
   • Pinch bolt (front wheel axle) ③

Front wheel axle:
75 Nm (7.5 m · kg, 54 ft · lb)
Bolt (brake caliper):
35 Nm (3.5 m · kg, 25 ft · lb)
Pinch bolt (front wheel axle):
20 Nm (2.0 m · kg, 14 ft · lb)

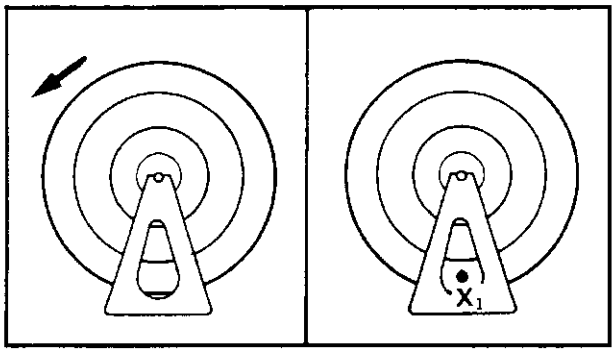
⚠ WARNING:
Make sure that the brake hoses are routed properly.

④ Brake hose clamp

STATIC WHEEL BALANCE ADJUSTMENT

NOTE:
- After replacing the tire and/or rim, wheel balancer should be adjusted.
- Adjust the wheel balance with brake disk installed.

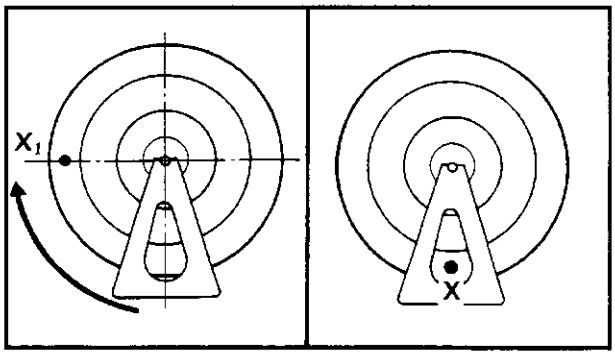
1. Remove:
   • Balancing weight

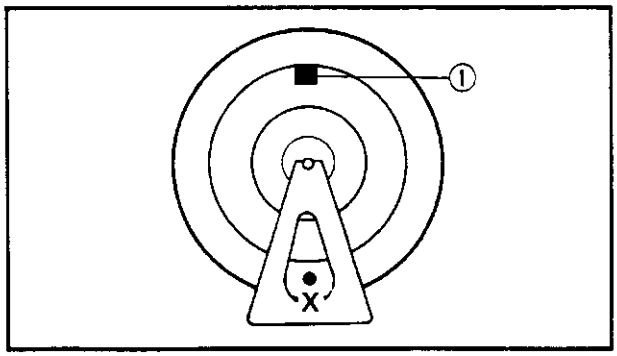


2. Set the wheel on a suitable stand.

3. Find:
   • Heavy spot

Procedure:
a. Spin the wheel and wait for it to rest.
b. Put an "X_1" mark on the wheel bottom spot.
c. Turn the wheel so that the "X_1" mark is 90° up.
d. Let the wheel fall and wait for it to rest. Put an "X_2" mark on the wheel bottom spot.
e. Repeat the above b., c., and d. several times until these marks come to the same spot.
f. This spot is the heavy spot "X".



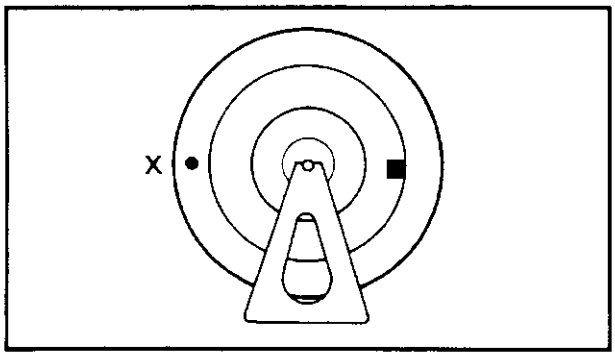


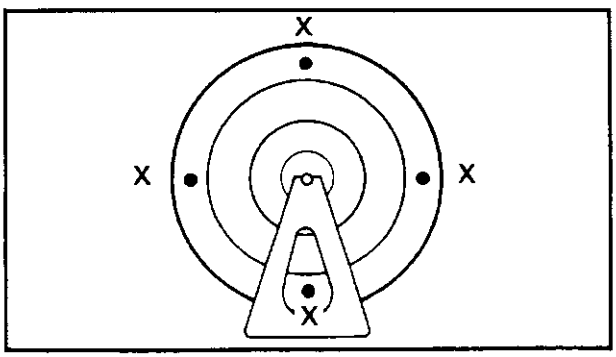
4. Adjust:
   • Wheel balance

Adjusting steps:
• Install a balancing weight ① on 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.



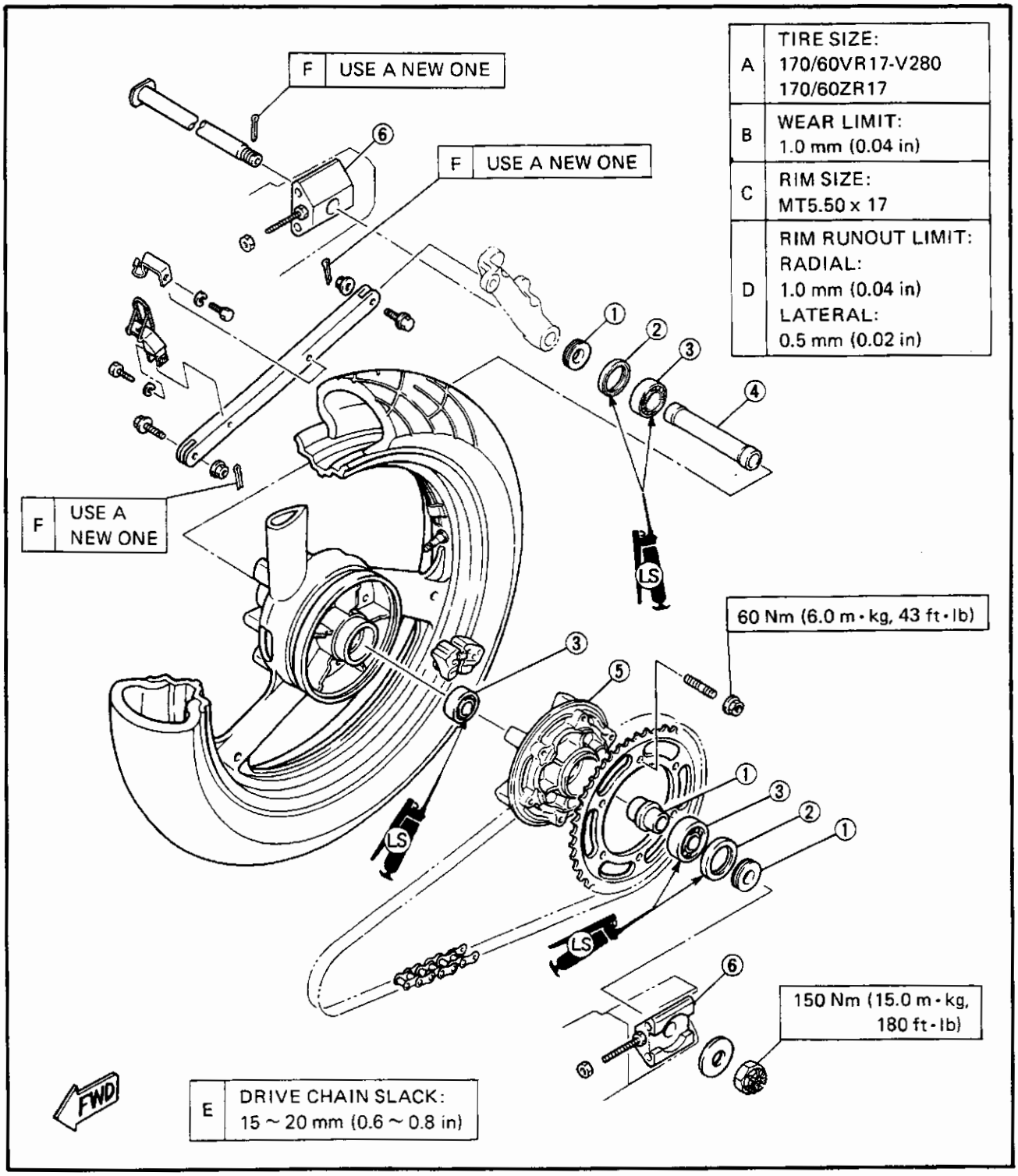


5. Check:
   • Wheel balance

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 wheel balance.

REAR WHEEL

① Collar
② Oil seal
③ Bearing
④ Spacer
⑤ Clutch hub
⑥ Adjuster collar



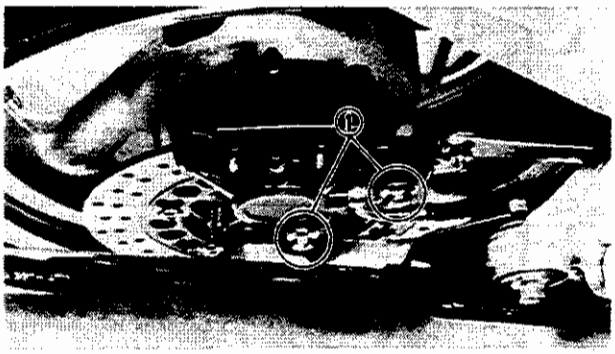
REMOVAL

1. Place the motorcycle on a level place.

⚠ WARNING:

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

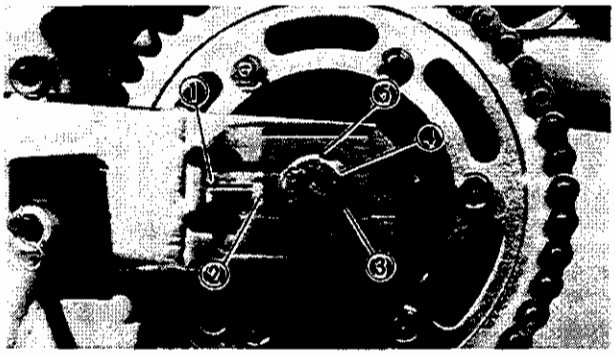
2. Elevate the rear wheel by placing a suitable stand under the swingarm.



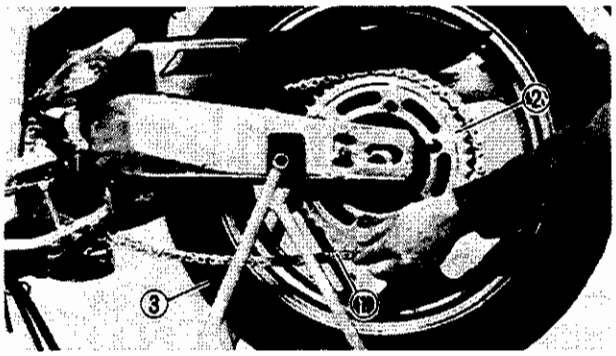
3. Remove:
   - Bolts (brake caliper) ①

NOTE:

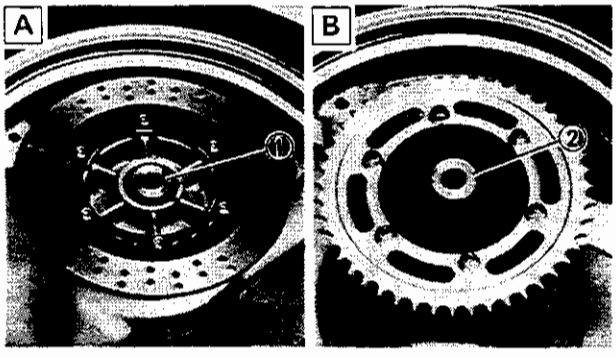
Do not depress the brake pedal while the caliper is removed.



4. Loosen:
   - Locknut ①
   - Adjuster ②
5. Remove:
   - Cotter pin ③
   - Axle nut ④
   - Washer ⑤



6. Push the rear wheel forward and disconnect the drive chain ① from the driven sprocket ② .
7. Remove:
   - Rear wheel axle
   - Adjuster collars (left and right)
   - Rear wheel ③



8. Remove:
   - Collar ①
   - Collar ②

A Right
B Left

INSPECTION

1. Inspect:
   - Tire
   - Rear wheel axle
   - Wheel
   - Wheel bearings
   - Oil seals

   Refer to the "FRONT WHEEL – INSPECTION".
2. Measure:
   - Wheel runout

   Refer to the "FRONT WHEEL – INSPECTION".
3. Check:
   - Wheel balance

   Refer to the "FRONT WHEEL – INSPECTION".

INSTALLATION

Reverse the "Removal" procedure.
Note the following points.

1. Lubricate:
   - Rear wheel axle
   - Bearings
   - Oil seals



Lithium soap base grease

2. Adjust:
   - Drive chain slack



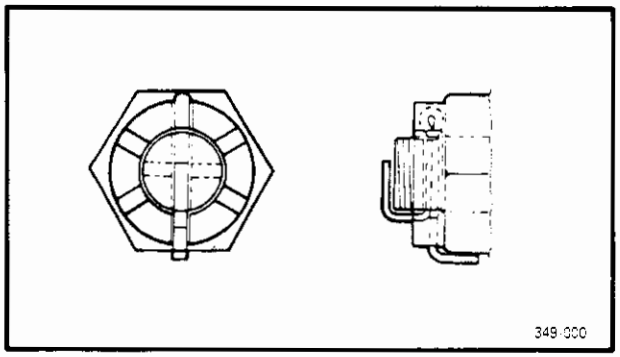
Drive chain slack:
15 ~ 20 mm (0.6 ~ 0.8 in)

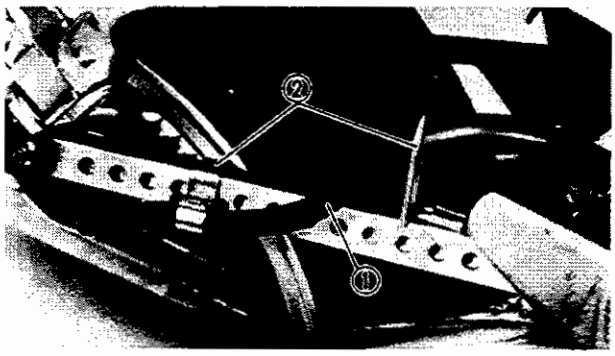
Refer to the "CHAPTER 3. – DRIVE CHAIN ADJUSTMENT".

3. Tighten:
   - Nut (rear wheel axle)
   - Bolts (brake caliper)



Nut (rear wheel axle):
150 Nm (15.0 m · kg, 108 ft · lb)
Bolt (brake caliper):
35 Nm (3.5 m · kg, 25 ft · lb)





NOTE:

Do not loosen the axle nut after torque tightening.

If the axle nut groove is not aligned with the wheel shaft cotter pin hole, align groove to hole by tightening up on the axle nut.

4. Install:
   - Cotter pin

⚠ WARNING:

- **Always use a new cotter pin on the axle nut.**
- **Make sure that the brake hose is routed properly.**

① Brake hose
② Brake hose guide

STATIC WHEEL BALANCE ADJUSTMENT

NOTE:

- After replacing the tire and/or rim, wheel balance should be adjusted.
- Adjust the wheel balance with brake disc and wheel hub installed.

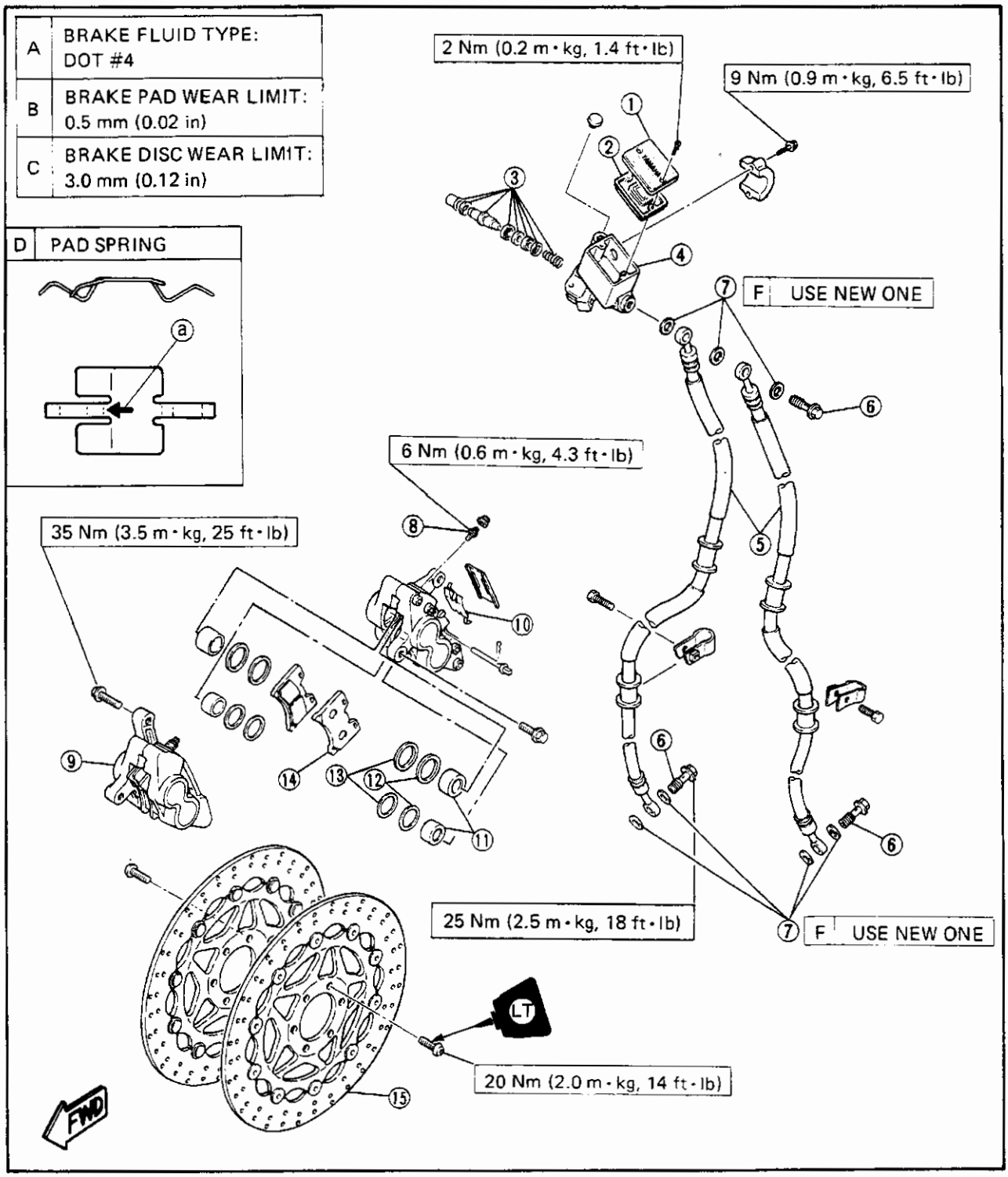
1. Adjust:
   - Wheel balance

   Refer to the "FRONT WHEEL – STATIC WHEEL BALANCE ADJUSTMENT" section.

FRONT AND REAR BRAKE

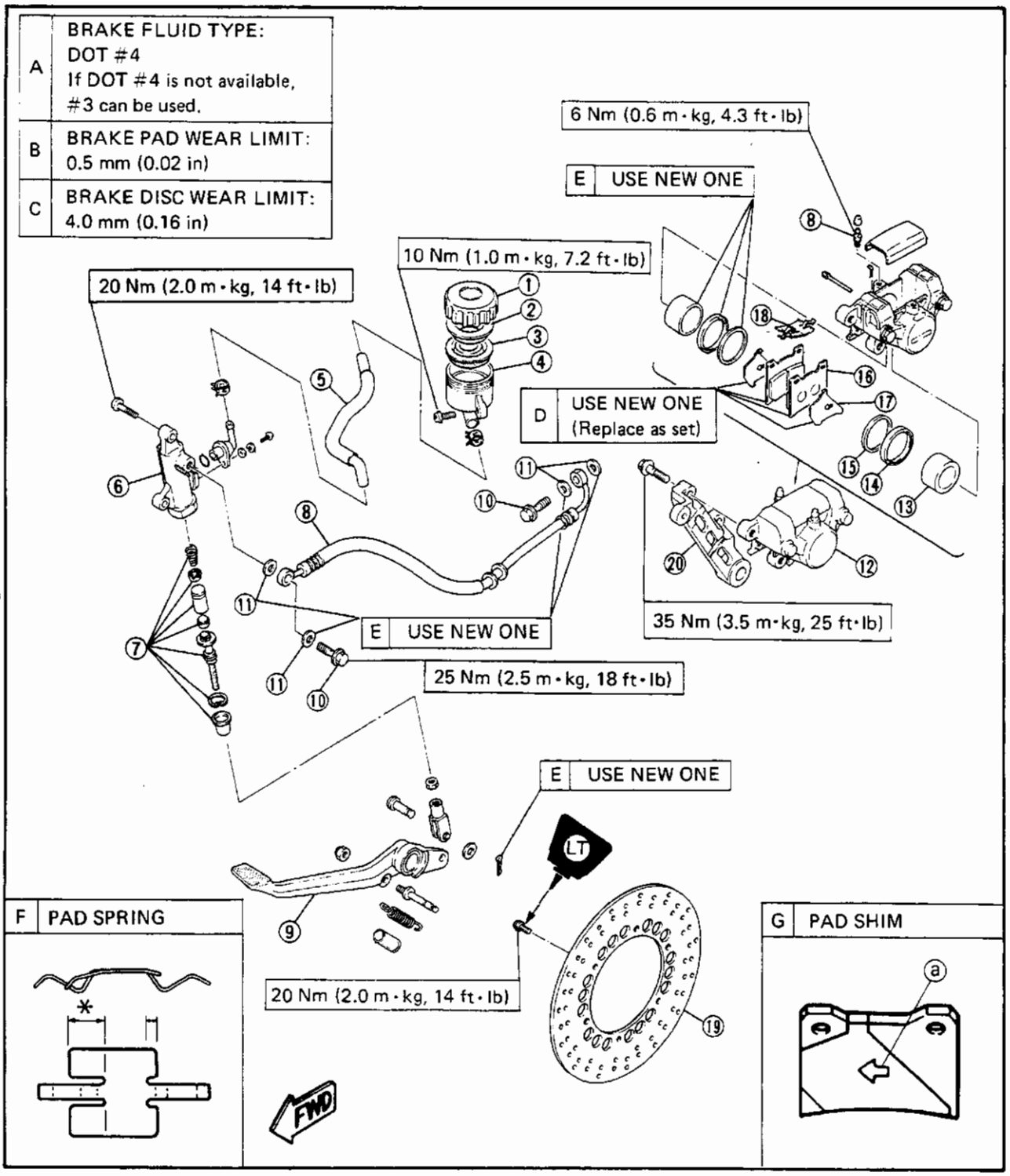
① Master cylinder cap
② Diaphragm
③ Master cylinder kit
④ Master cylinder
⑤ Brake hose
⑥ Union bolt
⑦ Copper washer
⑧ Bleed screw
⑨ Brake caliper
⑩ Pad spring
⑪ Piston
⑫ Piston seal
⑬ Dust seal
⑭ Brake pad
⑮ Brake disc

[D] The arrow mark ⓐ on the pad spring must point the disc rotating direction.



① Reservoir tank cap
② Holder (diaphragm)
③ Diaphragm
④ Reservoir tank
⑤ Reservoir hose
⑥ Master cylinder
⑦ Master cylinder kit
⑧ Brake hose
⑨ Brake pedal
⑩ Union bolt
⑪ Copper washer
⑫ Brake caliper
⑬ Piston
⑭ Piston seal
⑮ Dust seal
⑯ Brake pad
⑰ Shim
⑱ Pad spring
⑲ Brake disc
⑳ Caliper bracket

F The longer tangs (*) of the pad spring must point in the disc rotating direction.
G The allow mark ⓐ on the pad shim must point in the disc rotating direction.



⚠ CAUTION:

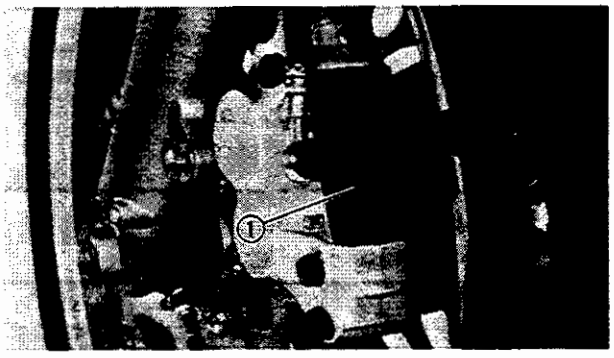
Disc brake components rarely require disassembly. DO NOT:

- **Disassembly components unless absolutely necessary.**
- **Use solvents on internal brake component.**
- **Use contaminated brake fluid for cleaning. Use only clean brake fluid.**
- **Allow brake fluid to come in contact with the eyes otherwise eye injury may occur.**
- **Allow brake fluid to contact painted surfaces or plastic parts otherwise damage may occur.**
- **Disconnect any hydraulic connection otherwise the entire system must be disassembled, drained, cleaned, and then properly filled and bled after reassembly.**

BRAKE PAD REPLACEMENT

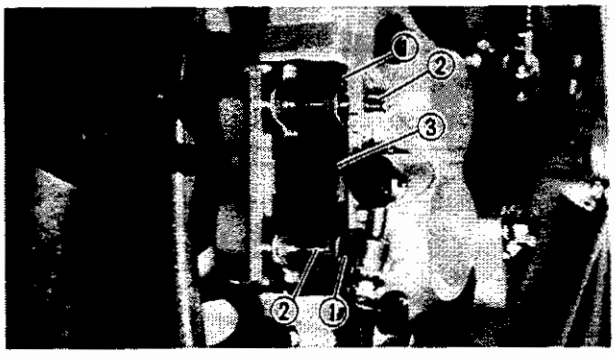
NOTE:

It is not necessary to disassemble the brake caliper and brake hose to replace the brake pads.

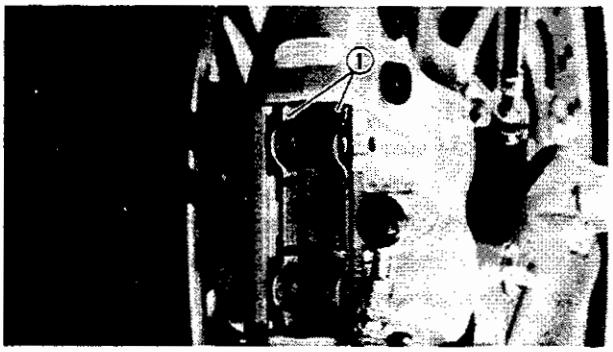


Front Brake

1. Remove:
   - Cover ①



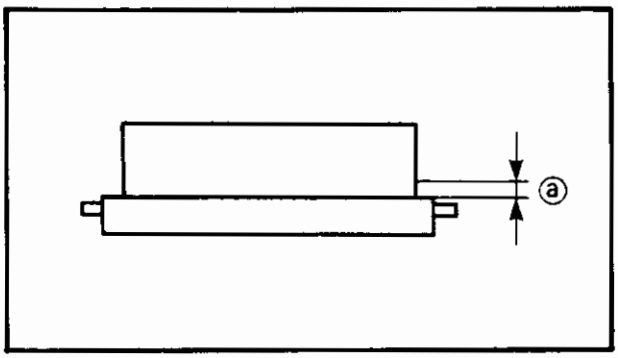
2. Remove:
   - Retaining clips ①
   - Retaining pins ②
   - Pad spring ③



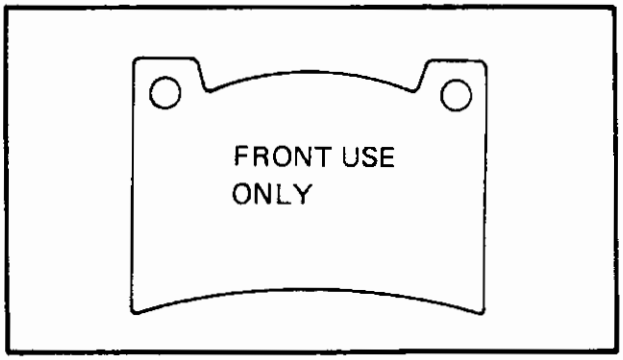
3. Remove:
   • Brake pads ①
   (with shims)

NOTE:
- Replace the pad spring if the pad replacement is required.
- Replace the pads as a set if either is found to be worn to the wear limit.

Wear limit ⓐ:
0.5 mm (0.02 in)

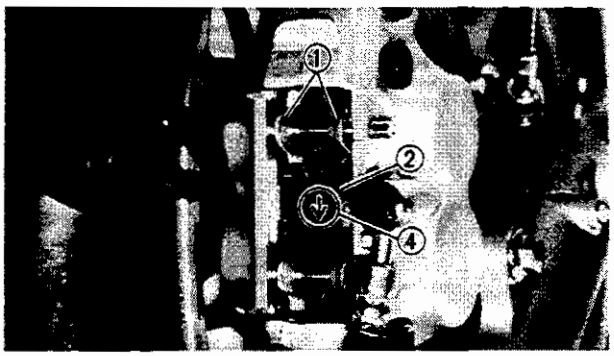


- Replace the pad shim if the pad replacement is required.



4. Install:
   • Brake pads ①
   • Pad springs ②

NOTE:
The brake pads with "FRONT USE ONLY" mark should be used for the front brake only.

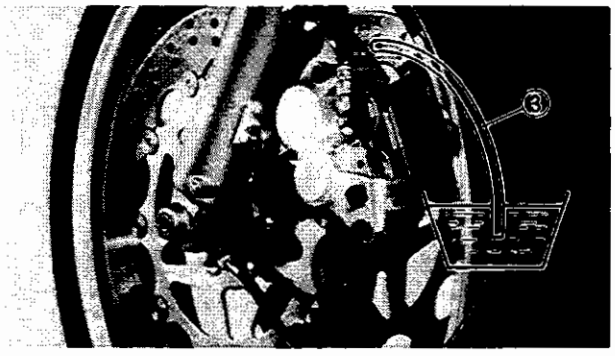


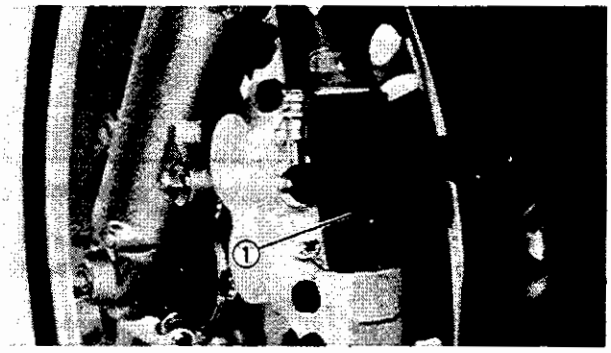
Installation steps:
- Connect a suitable hose ③ tightly to the caliper bleed screw. Then, place the other end of this hose into an open container.
- Loosen the caliper bleed screw and push the piston into the caliper by your finger.
- Tighten the caliper bleed screw.

Caliper bleed screw:
6 Nm (0.6 m · kg, 4.3 ft · lb)

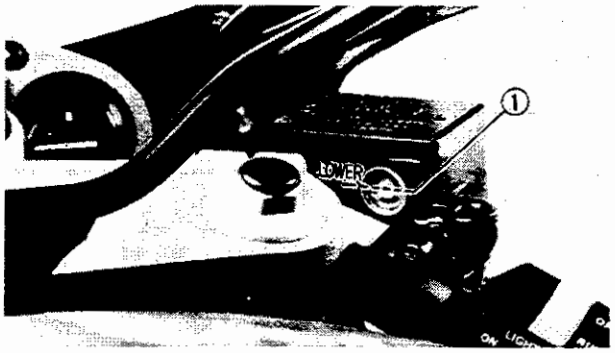
- Install the brake pad (new) and pad spring (new).

NOTE:
The arrow mark ④ on the pad spring must point in the disc rotating direction.





5. Install:
   - Retaining pins
   - Retaining clips
   - Cover ①



6. Inspect:
   - Brake fluid level

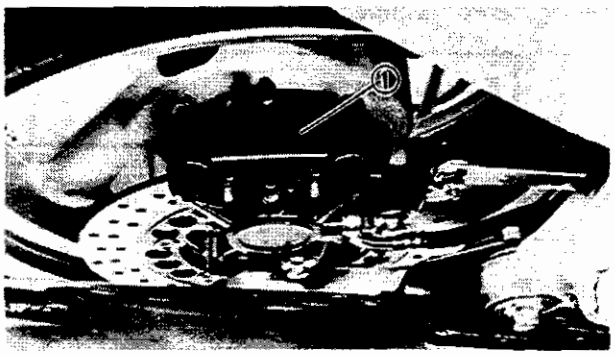
   Refer to the "BRAKE FLUID INSPECTION" section in the CHAPTER 3.

① "LOWER" level line

7. Check:
   - Brake lever operation

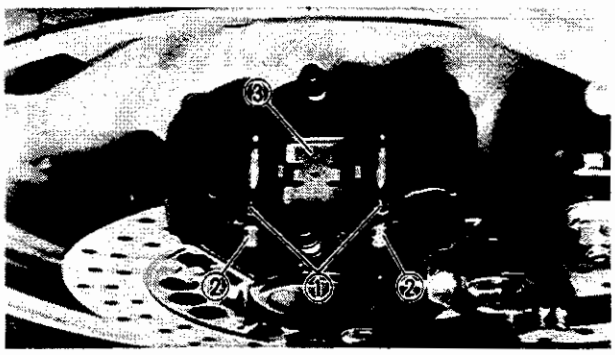
   A softy or spongy filling → Bleed brake system.

   Refer to the "AIR BLEEDING" section in the CHAPTER 3.

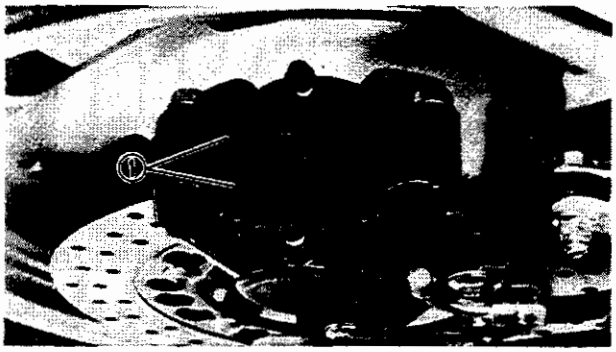


Rear Brake

1. Remove:
   - Cover ①



2. Remove:
   - Retaining clips ①
   - Retaining pins ②
   - Pad spring ③

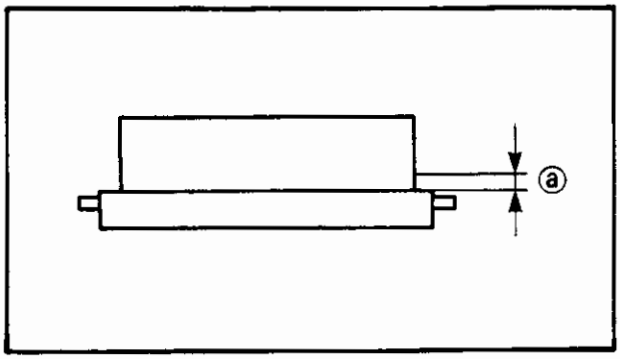


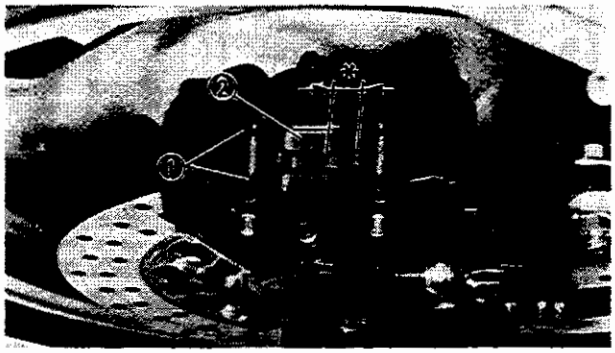
3. Remove:
   - Brake pads ①
     (with shims)

NOTE:
- Replace the pad spring if the pad replacement is required.
- Replace the pads as a set if either is found to be worn to the wear limit.

Wear limit ⓐ:
0.5 mm (0.02 in)

- Replace the pad shim if the pad replacement is required.

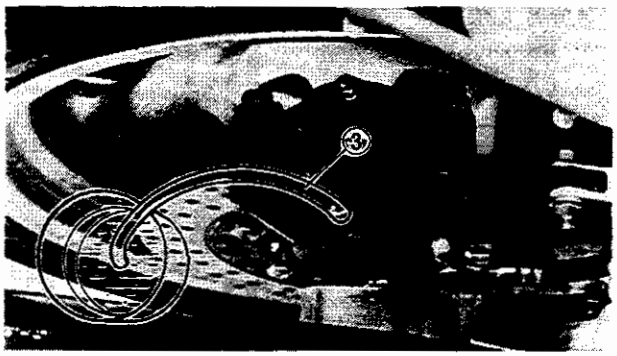




4. Install:
   - Brake pads ①
   - Pad springs ②

Installation steps:
- Connect a suitable hose ③ tightly to the caliper bleed screw. Then, place the other end of this hose into an open container.
- Loosen the caliper bleed screw and push the piston into the caliper by your finger.
- Tighten the caliper bleed screw.

Caliper bleed screw:
6 Nm (0.6 m · kg, 4.3 ftJlb)

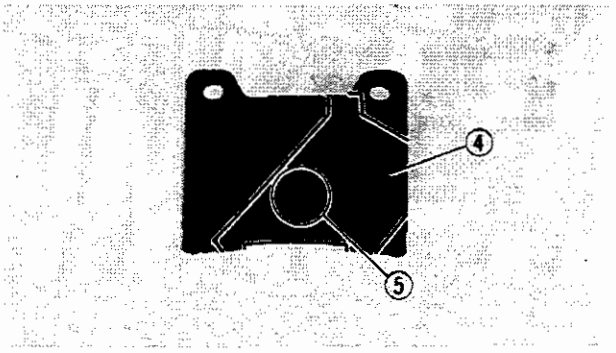


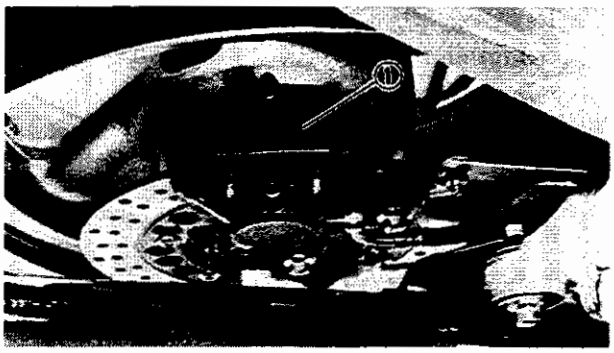
- Install the pad shim (new) ④ to the brake pad (new).

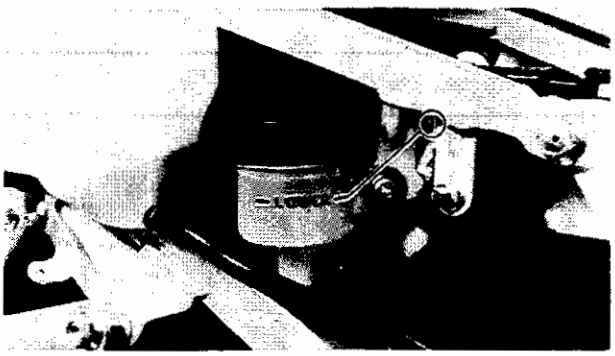
NOTE:
The arrow mark ⑤ on the pad shim must point in the disc rotating direction.

- Install the brake pad (new) and pad spring (new)

NOTE:
The longer tangs (*) of the pad spring must point in the disc rotating direction.







5. Install:
   - Retaining pins
   - Retaining clips
   - Cover ①
6. Remove:
   - Seat
   - Side cover (right)

   Refer to the "COWLINGS" section in the CHAPTER 3.
7. Inspect:
   - Brake fluid level

   Refer to the "BRAKE FLUID INSPECTION" section in the CHAPTER 3.

① "LOWER" level line

8. Check:
   - Brake pedal operation

   A softy or spongy filling → Bleed brake system.

   Refer to the "AIR BLEEDING" section in the CHAPTER 3.
9. Install:
   - Side covers (right)
   - Seat

   Refer to the "COWLINGS" section in the CHAPTER 3.

CALIPER DISASSEMBLY

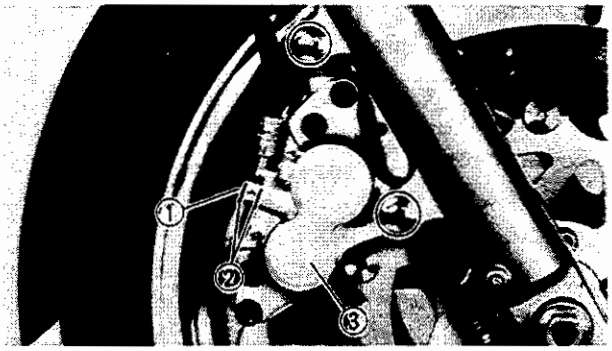
NOTE:

Before disassembling the front brake caliper or rear brake caliper, drain the brake hose, master cylinder, brake caliper and reservoir tank of their brake fluid.

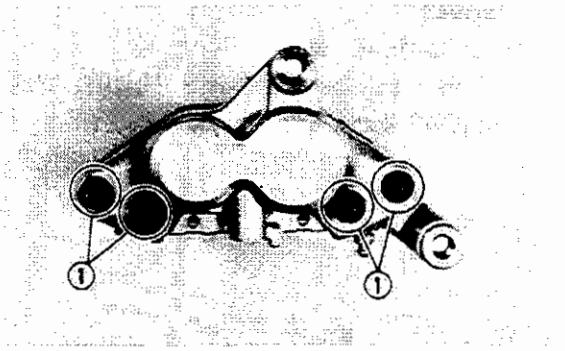
Front Brake

1. Remove:
   - Cover
   - Retaining clips
   - Retaining pins
   - Pad spring
   - Brake pads

   Refer to the "BRAKE PAD REPLACEMENT" section.

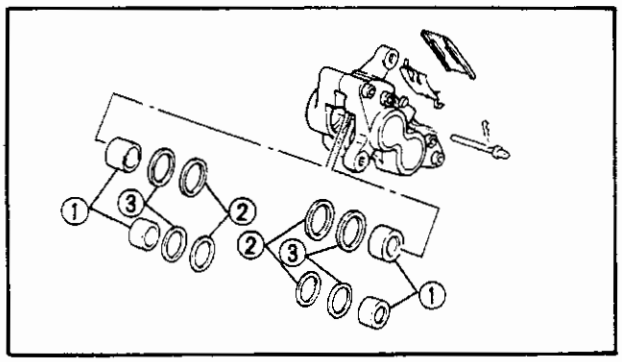


2. Remove:
   - Union bolt ①
   - Copper washers ②
   - Caliper ③

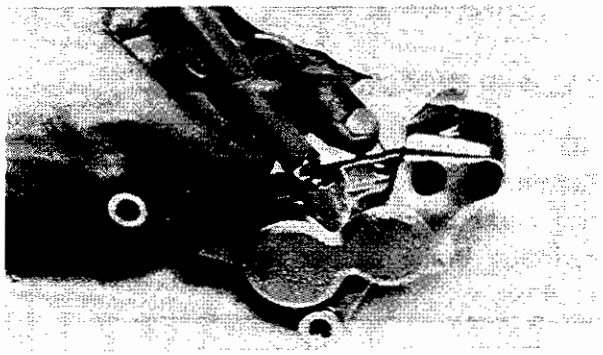


⚠ CAUTION:

Do not loosen the bridge bolts ① .



3. Remove:
   - Pistons ①
   - Dust seals ②
   - Piston seals ③



Remove steps:

- Blow compressed air into the tube joint opening to force out the piston from the caliper body.

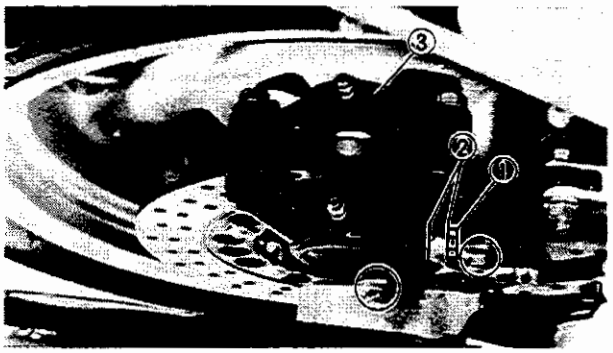
⚠ WARNING:

- **Never try to pry out the piston.**
- **Cover the piston with a rag. Use care so that piston does not cause injury as it is expelled from the cylinder.**

Rear Brake

1. Remove:
   - Cover
   - Retaining clips
   - Retaining pins
   - Pad spring
   - Brake pads (with shims)

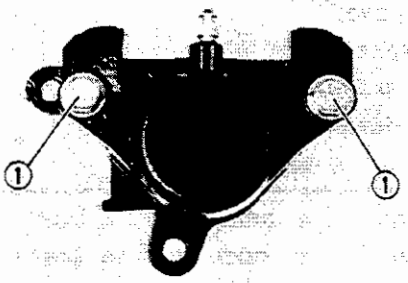
   Refer to the "BRAKE PAD REPLACEMENT" section.

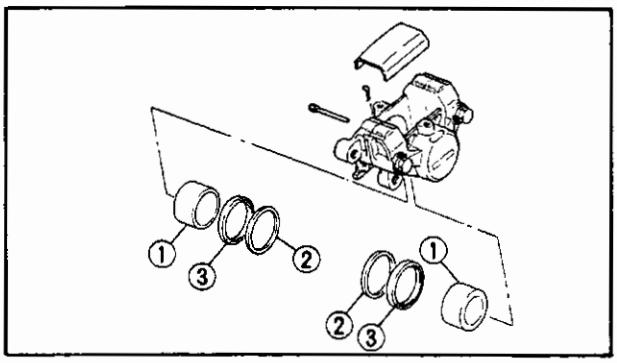


2. Remove:
   - Union bolt ①
   - Copper washers ②
   - Caliper ③

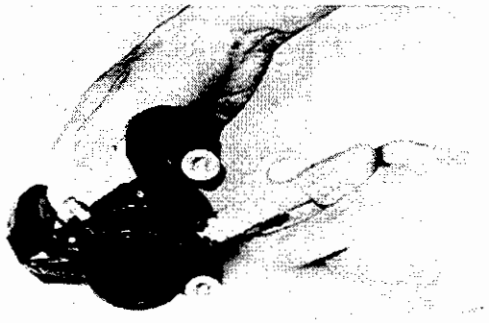
⚠ CAUTION:

Do not loosen the bridge bolts ①.





3. Remove:
   - Pistons ①
   - Dust seals ②
   - Piston seals ③

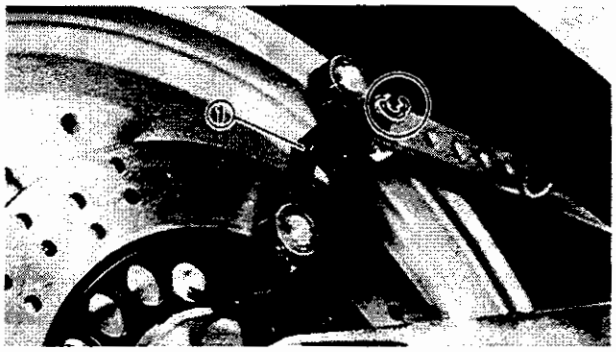


Remove steps:

- Blow compressed air into the tube joint opening to force out the piston from the caliper body.

⚠ WARNING:

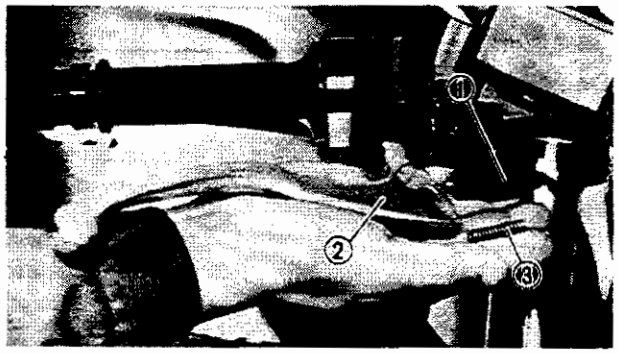
- **Never try to pry out the piston.**
- **Cover the piston with a rag. Use care so that piston does not cause injury as it is expelled from the cylinder.**



4. Remove:
   - Rear wheel
     Refer to the "REAR WHEEL" section.
   - Cotter pin
   - Caliper bracket ①

MASTER CYLINDER DISASSEMBLY

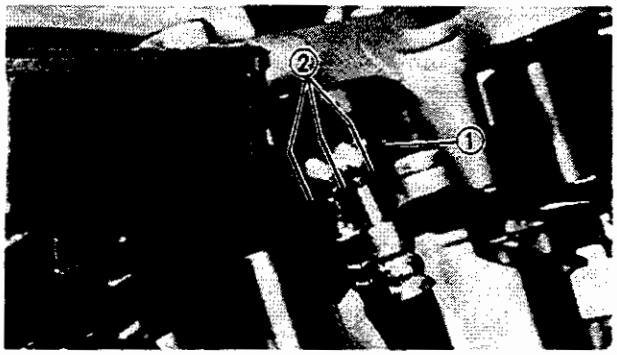
NOTE:
Before disassembling the front or rear brake master cylinders, drain the brake hose, master cylinder, brake caliper and reservoir tank of their brake fluid.



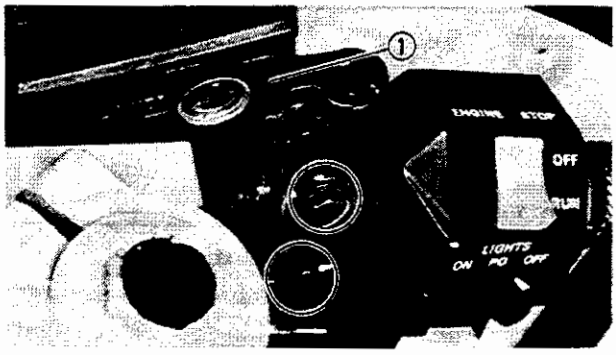
Front Brake

1. Remove:
   - Brake switch ①
   - Brake lever ②
   - Return spring (brake lever) ③

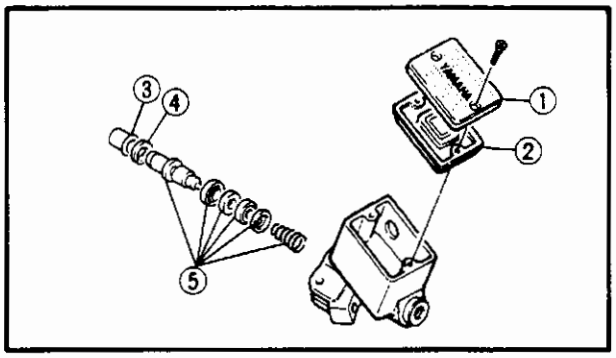
NOTE:
Disconnect the brake switch from the brake lever while the hook of the brake switch is pushed by suitable rod.



2. Remove:
   - Union bolt ①
   - Copper washers ②



3. Remove:
   - Master cylinder ①

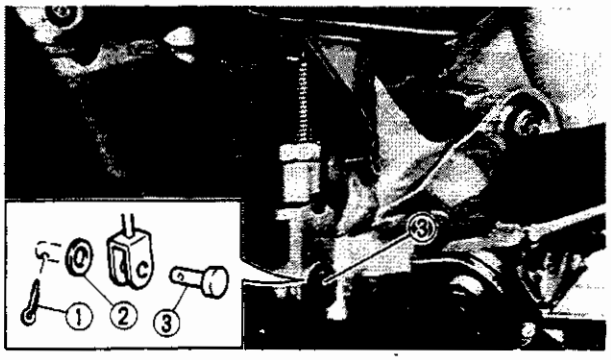


4. Remove:
   - Cap (master cylinder) ①
   - Diaphragm ②
   - Dust boot ③
   - Circlip ④
   - Master cylinder kit ⑤

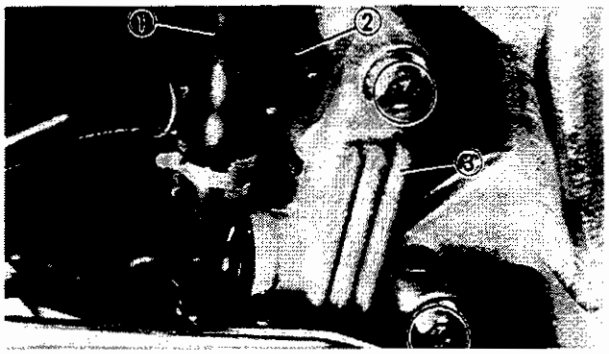
Rear Brake

1. Remove:
   - Seat
   - Side cover (right)

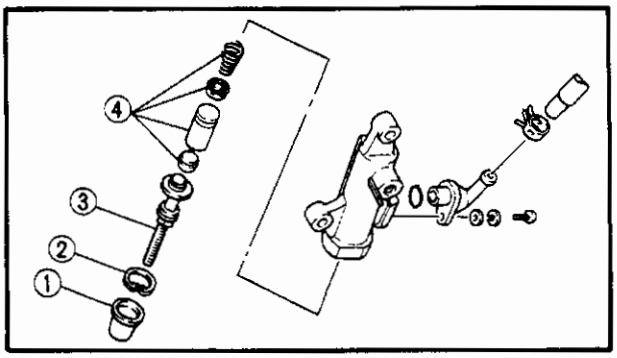
   Refer to the "COWLINGS" section in the CHAPTER 3.



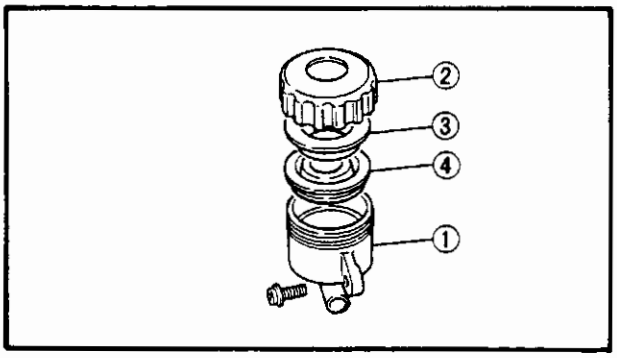
2. Remove:
   - Cotter pin ①
   - Washer ②
   - Clevis pin ③



3. Disconnect:
   - Brake hose (reservoir tank — master cylinder) ①
4. Loosen:
   - Union bolt ②
5. Remove:
   - Master cylinder ③
   - Union bolt ②
   - Copper washers



6. Remove:
   - Dust boot ①
   - Circlip ②
   - Push rod ③
   - Master cylinder kit ④



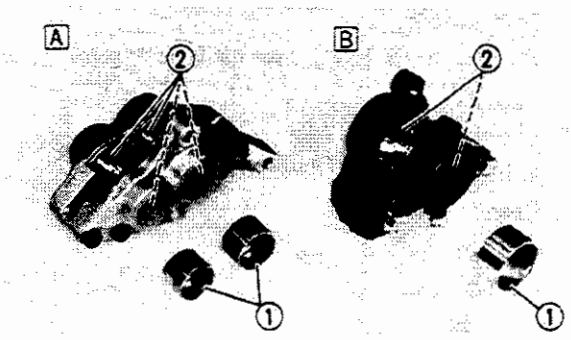
7. Remove:
   - Reservoir tank ①
     (from flame)
   - Cap (reservoir tank) ②
   - Holder (diaphragm) ③
   - Diaphragm ④

INSPECTION AND REPAIR

Recommended brake component replacement schedule:	
Brake pads	As required
Piston seal, dust seal	Every two years
Brake hoses	Every four years
Brake fluid	Replace only when brakes are disassembled.

⚠ WARNING:

All internal parts should be cleaned in new brake fluid only. Do not use solvents will cause seals to swell and distort.

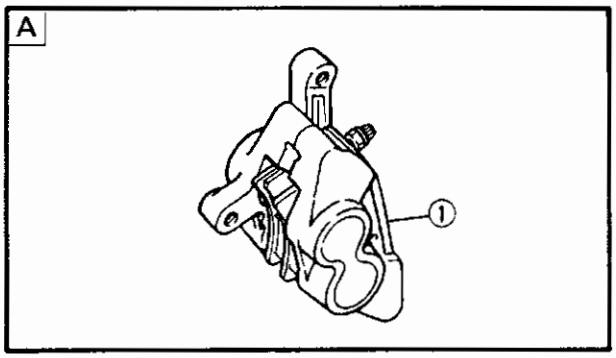


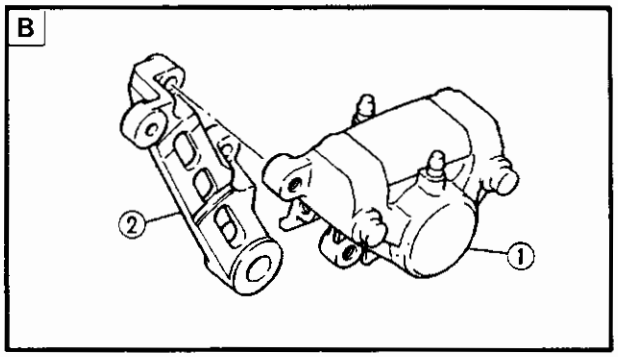
1. Inspect:
   - Caliper piston ①
     Scratches/Rust/Wear → Replace caliper assembly.
   - Caliper cylinder ②
     Wear/Scratches → Replace caliper assembly.

A Front
B Rear

⚠ WARNING:

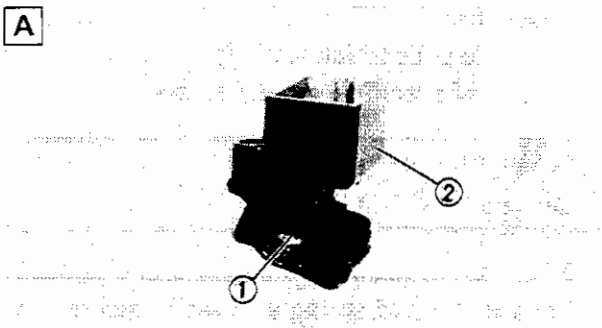
Replace the piston seal and dust seal whenever a caliper is disassembled.



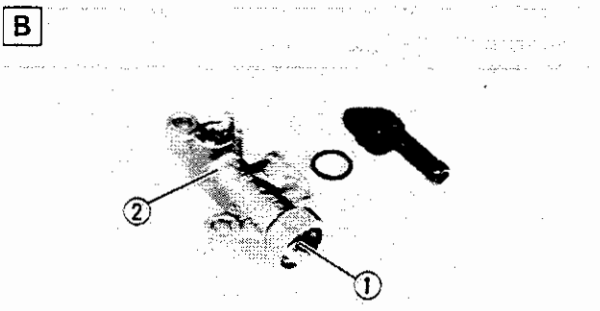


2. Inspect:
   - Caliper body ①
   - Caliper bracket ②
     Cracks/Damage → Replace.
   - Oil delivery passage (caliper body)
     Blow out with compressed air.

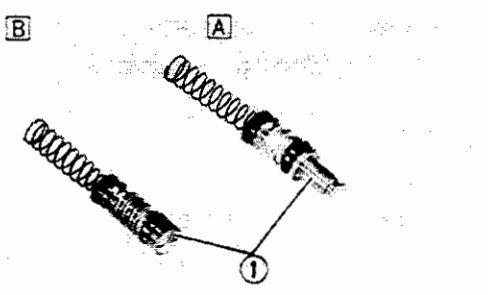
A Front
B Rear



3. Inspect:
   - Master cylinder ①
     Wear/Scratches → Replace the caliper assembly.
   - Master cylinder body ②
     Cracks/Damage → Replace.
   - Oil delivery passage (master cylinder body)
     Blow out with compressed air.

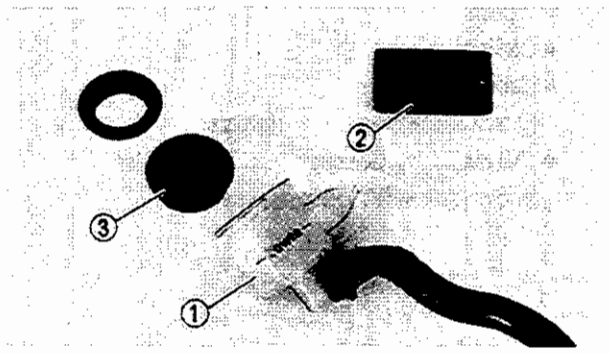


A Front
B Rear

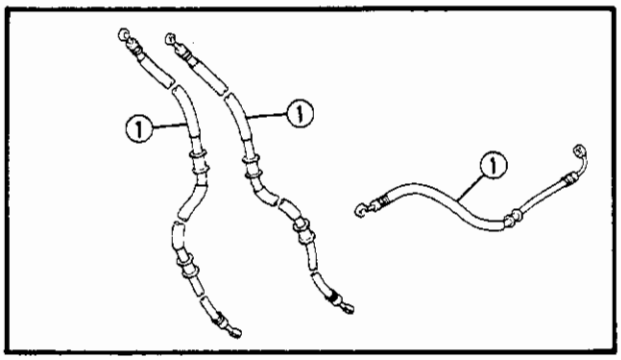


4. Inspect:
   - Master cylinder kit ①
     Scratches/Wear/Damage → Replace as a set.

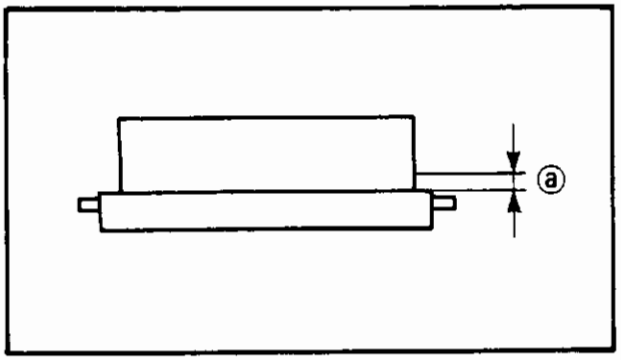
A Front
B Rear



5. Inspect:
   - Reservoir tank ①
     Cracks/Damage → Replace.
   - Diaphragm (front) ②
   - Diaphragm (rear) ③
     Wear/Damage → Replace.



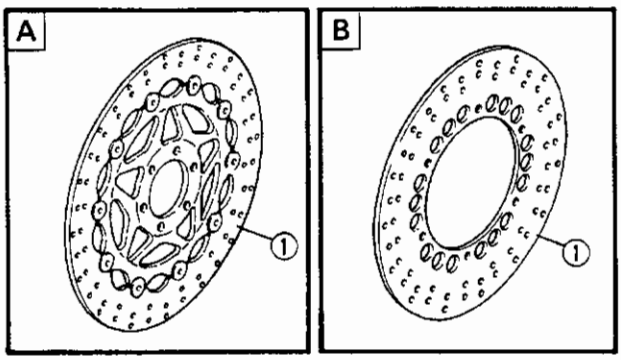
6. Inspect:
   - Brake hoses ①
     Cracks/Wear/Damage → Replace.



7. Measure:
   - Brake pads (thickness) ⓐ
     Out of specification → Replace.

Wear limit:
0.5 mm (0.02 in)

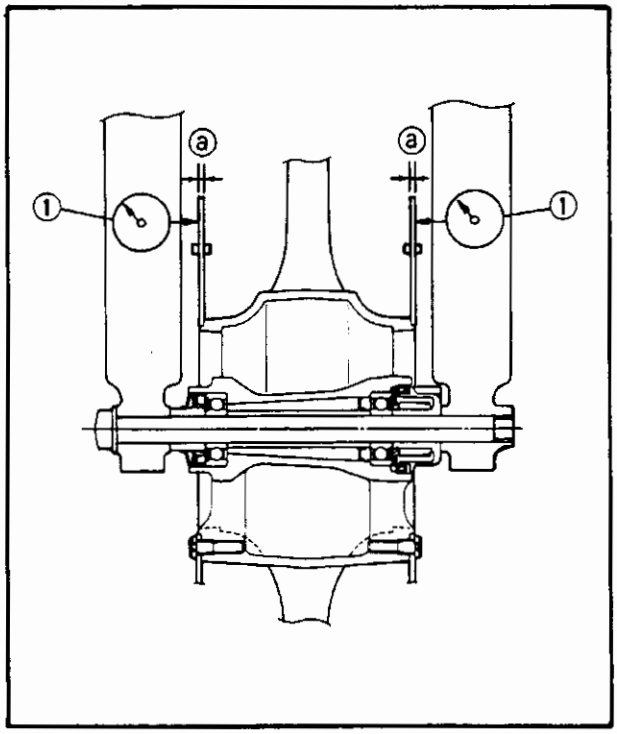
NOTE:
- Replace the pad spring as a set if pad replacement is required.
- Replace the pads as a set if either if found to be worn to the wear limit.



8. Inspect:
   - Brake discs (front and rear) ①
     Galling/Damage → Replace.

[A] Front
[B] Rear

9. Measure:
   - Brake disc deflection
     Out of specification → Inspect wheel runout.
     If wheel runout is in good condition, replace the brake disc(s).



Maximum deflection:
0.15 mm (0.006 in)

- Brake disc thickness ⓐ
  Out of specification → Replace.

Minimum thickness:
front: 3.0 mm (0.12 in)
rear: 4.0 mm (0.16 in)

① Dial gauge

NOTE:

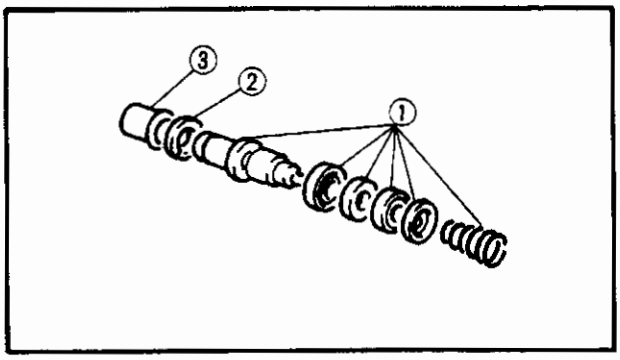
Tighten the bolts (brake disk) in stage using a crisscross pattern.

Bolt (brake disk):
20 Nm (2.0 m·kg, 14 ft·lb)
Use LOCTITE®

ASSEMBLY

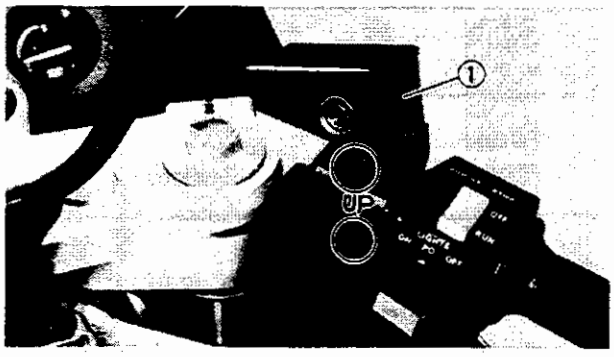
WARNING:

- **All internal parts should be cleaned in new brake fluid only.**
- **Internal parts should be lubricated with brake fluid when installed.**
- **Replace the piston seal and dust seal whenever a caliper is disassembled.**



Front Brake

1. Install:
   - Master cylinder kit ①
   - Circlip ②
   - Dust boot ③

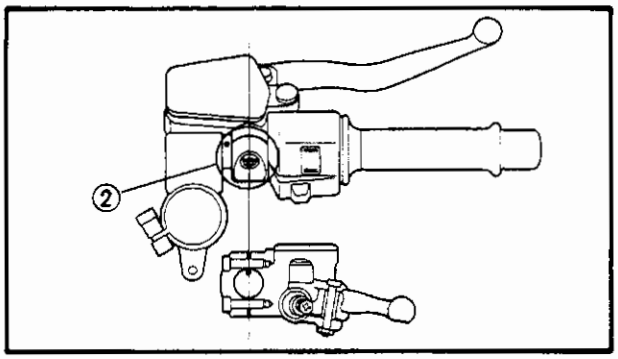


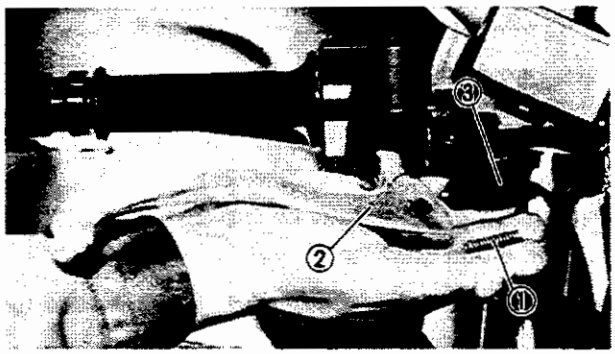
2. Install:
   • Master cylinder ①

⚠ CAUTION:

- **Install the master cylinder holder with the "UP" mark facing upward.**
- **Align the end of the holder with the punch mark ② on the handlebar.**
- **Tighten first the upper bolt, then the lower bolt.**

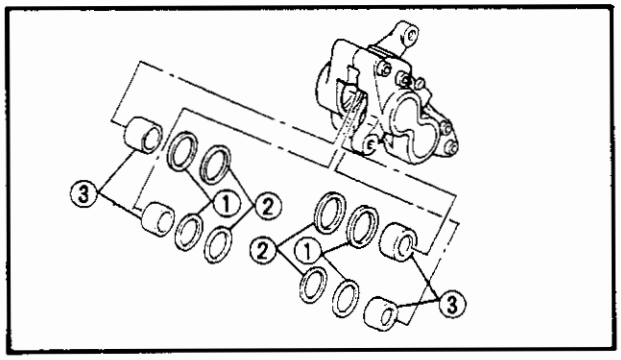
	Bolts (Master cylinder holder): 9 Nm (0.9 m · kg, 6.5 ft · lb)





3. Install:
   • Return spring (brake lever) ①
   • Brake lever ②
   • Brake switch ③

NOTE:
Apply the lithium soap base grease to the brake lever pivot.



4. Install:
   • Piston seal ①
   • Dust seal ②
   • Caliper piston ③

⚠ WARNING:

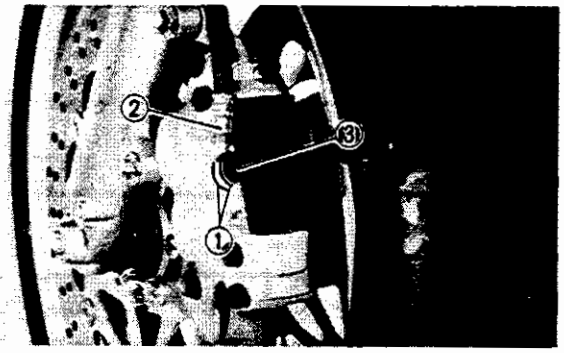
Always use new piston seal and dust seal.

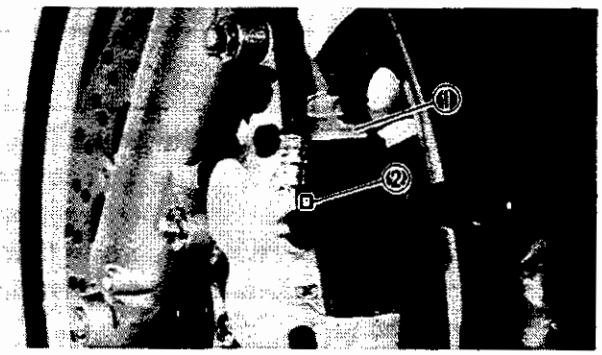
5. Install:
   • Brake caliper

	Bolt (brake caliper): 35 Nm (3.5 m · kg, 25 ft · lb)

   • Brake pads
   • Pad spring
   • Retaining pins
   • Retaining clips
   • Cover

   Refer to "BRAKE PAD REPLACEMENT" section.





6. Install:
   - Copper washers ①
   - Brake hose ②
   - Union bolt ③
     (onto brake caliper)

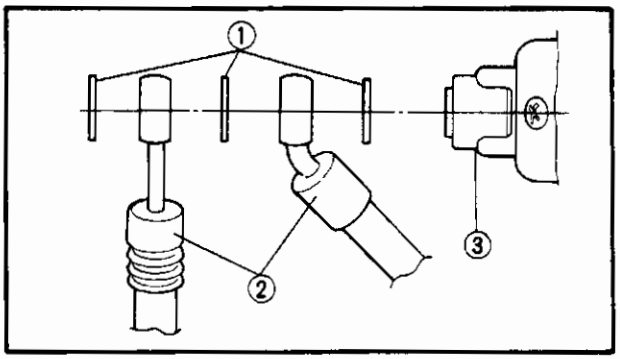
	Union bolt: **25 Nm (2.5 m · kg, 18 ft · lb)**

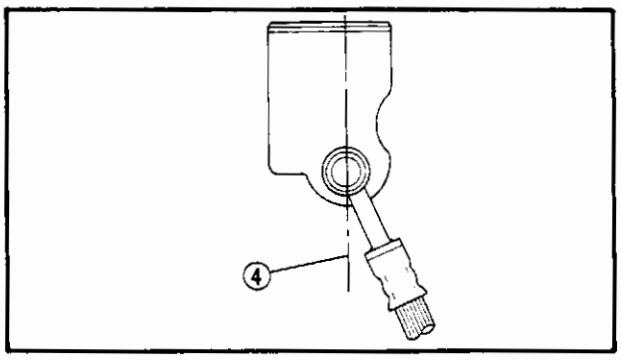
⚠ CAUTION:

When installing the brake hose to the caliper ①, lightly touch the brake pipe with the projection ② on brake caliper.

⚠ WARNING:

- **Proper hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".**
- **Always use new copper washers.**





7. Install:
   - Copper washers ①
   - Brake hoses ②
   - Union bolt
     (onto master cylinder ③)

④ Vertical line

NOTE:

- Install each brake hose as shown.
- Tighten the union bolt while each brake hose is inclined backward.

	Union bolt: **25 Nm (2.5 m · kg, 18 ft · lb)**

8. Make sure that each brake hose does not touch with another parts (throttle cable, wireharness, leads etc.) by turning the handlebar to right and left. If touch, repair.

9. Fill:
   - Master cylinder tank

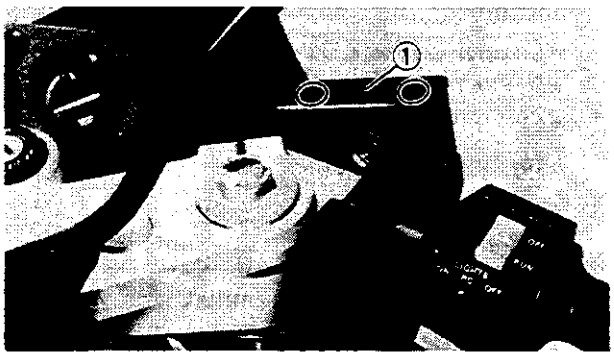
	Recommended brake fluid: DOT #4

⚠ CAUTION:

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

⚠ WARNING:

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

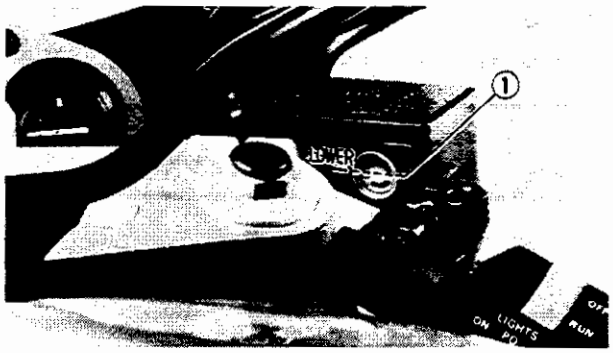


10. Install:
    - Disphragm
    - Cap (master cylinder) ①

	Screw (master cylinder): 2 Nm (0.2 m · kg, 1.4 ft · lb)

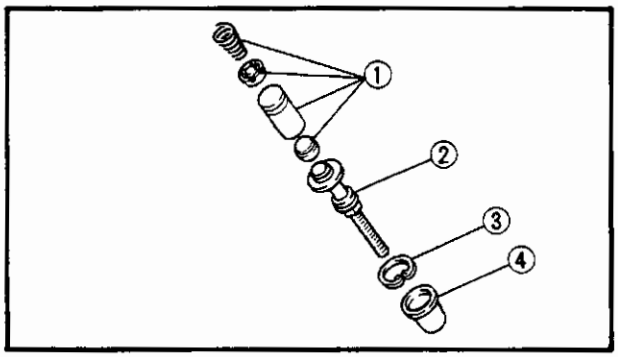
11. Air bleed
    - Brake system

    Refer to "AIR BLEEDING" section in the CHAPTER 3.



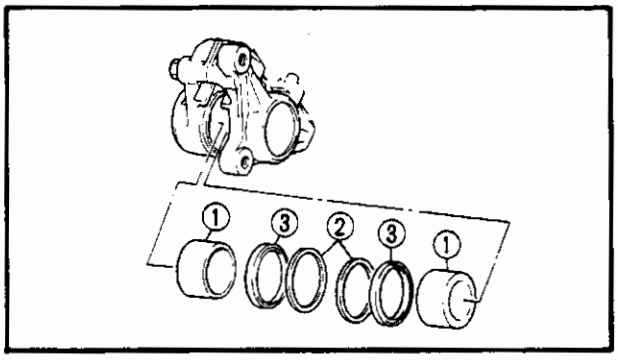
12. Inspect:
- Brake fluid level
  Refer to "BRAKE FLUID INSPECTION" section in the CHAPTER 3.

① "LOWER" level line



Rear Brake

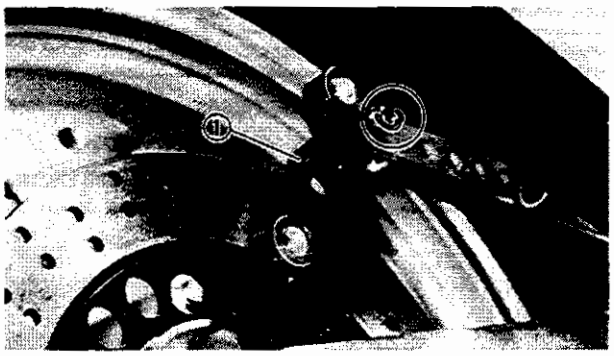
1. Install:
- Master cylinder kit ①
- Push rod ②
- Circlip ③
- Dust boot ④



2. Install:
- Piston seal ①
- Dust seal ②
- Pistons ③

WARNING:

Always use new piston seal and dust seal.



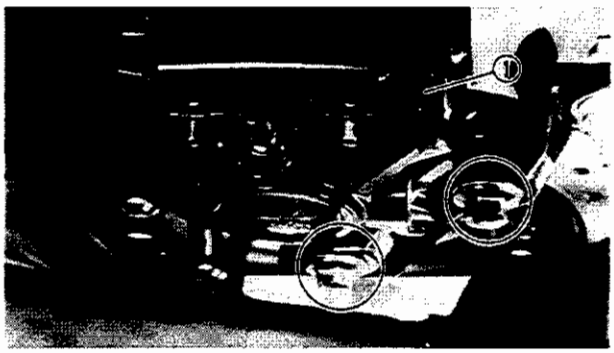
3. Install:
- Caliper bracket ①
- Cotter pin

WARNING:

Always use a new cotter pin.

	Nut (tensionbar – caliper bracket): 28 Nm (2.8 m·kg, 20 ft·lb)

4. Install:
- Rear wheel
  Refer to the "REAR WHEEL" section.

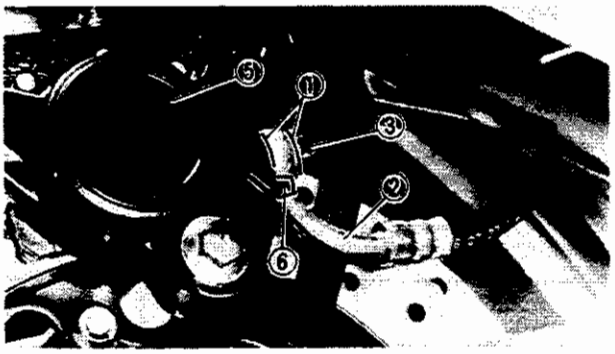


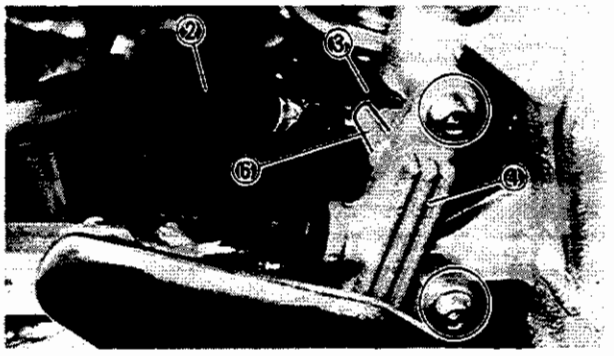
5. Install:
   - Brake caliper (rear) ①

	Brake caliper (rear): **35 Nm (3.5 m · kg, 25 ft · lb)**

   - Brake pads (with shims)
   - Pad spring
   - Retaining bins
   - Retaining clips
   - Cover

   Refer to "BRAKE PAD REPLACEMENT" section.





6. Install:
   - Copper washers ①
   - Brake hose ②
   - Union bolts ③
   - Master cylinder ④

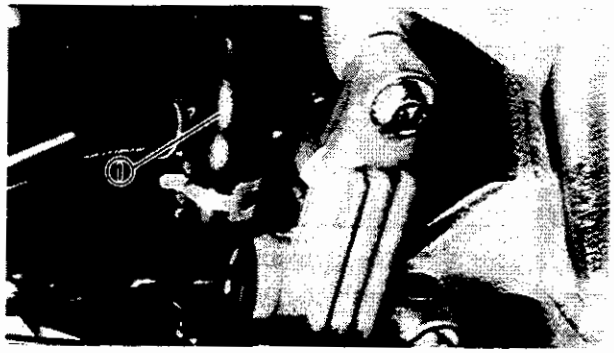
	Bolt (master cylinder): **20 Nm (2.0 m · kg, 14 ft · lb)** **Union bolts:** **25 Nm (2.5 m · kg, 18 ft · lb)**

⚠ CAUTION:

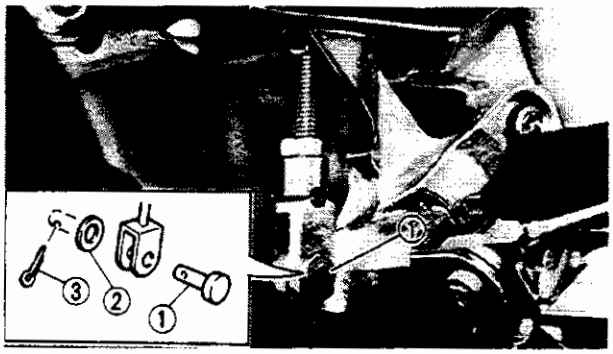
When installing the brake hoses to the caliper ⑤ and master cylinder ④ , lightly touch the brake pipe with the projections ⑥ on them.

⚠ WARNING:

- **Proper hose routing is essential to insure safe motorcycle operation. Refer to the "CABLE ROUTING".**
- **Always use new copper washers.**



7. Connect:
   - Brake hose (reservoir tank – master cylinder) ①



8. Install:
   - Clevis pin ①
   - Washer ②
   - Cotter pin ③

⚠ WARNING:

Always use a new cotter pin.

9. Fill:
   - Reservoir tank

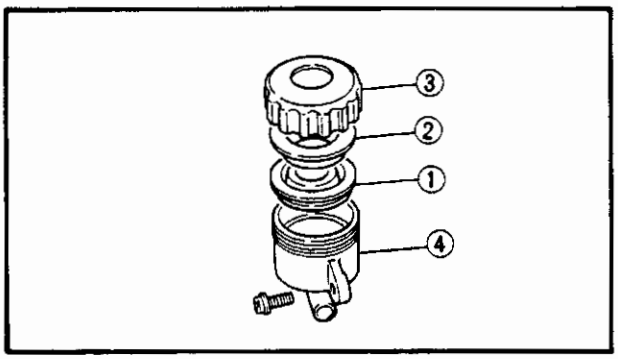
Recommended brake fluid:
DOT #4
If DOT #4 is not available, #3 can be used.

⚠ CAUTION:

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

⚠ WARNING:

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

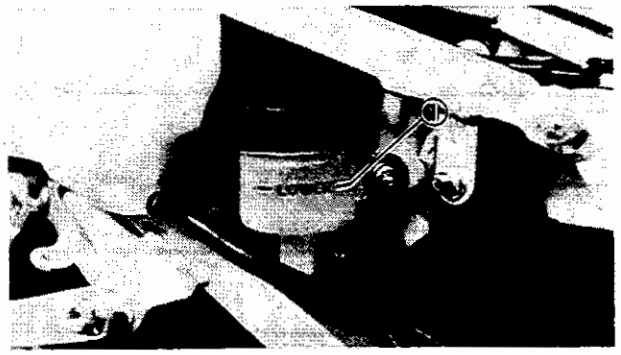


10. Install:
- Diaphragm ①
- Holder (diaphragm) ②
- Cap (reservoir tank) ③
- Reservoir tank ④

NOTE:
Make sure that the projection on the reservoir tank are meshed with the hole on the frame.

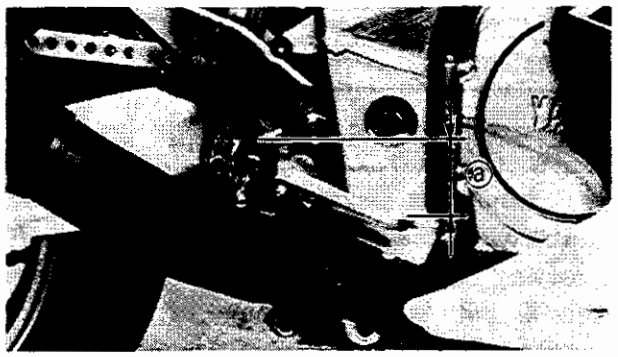
11. Air bleed:
- Brake system
  Refer to "AIR BLEEDING" section in the CHAPTER 3.

12. Install:
- Side cover (right)
- Seat
  Refer to "COVERS" section in the CHAPTER 3.



13. Inspect:
- Brake fluid level
  Refer to the "BRAKE FLUID INSPECTION" section in the CHAPTER 3.

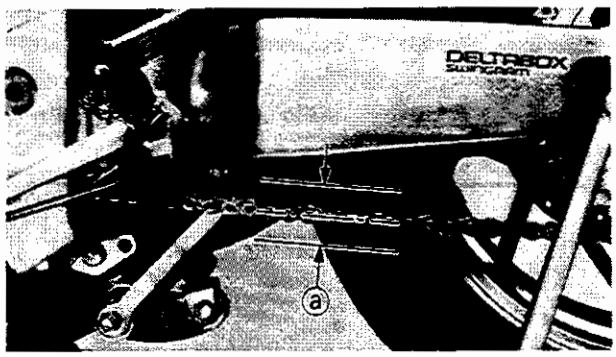
① "LOWER" level line



14. Adjust:
- Rear brake pedal height ⓐ

Pedal height:
60 mm (2.36 in)
Below top of footrest.

Refer to "REAR BRAKE ADJUSTMENT" section in the CHAPTER 3.



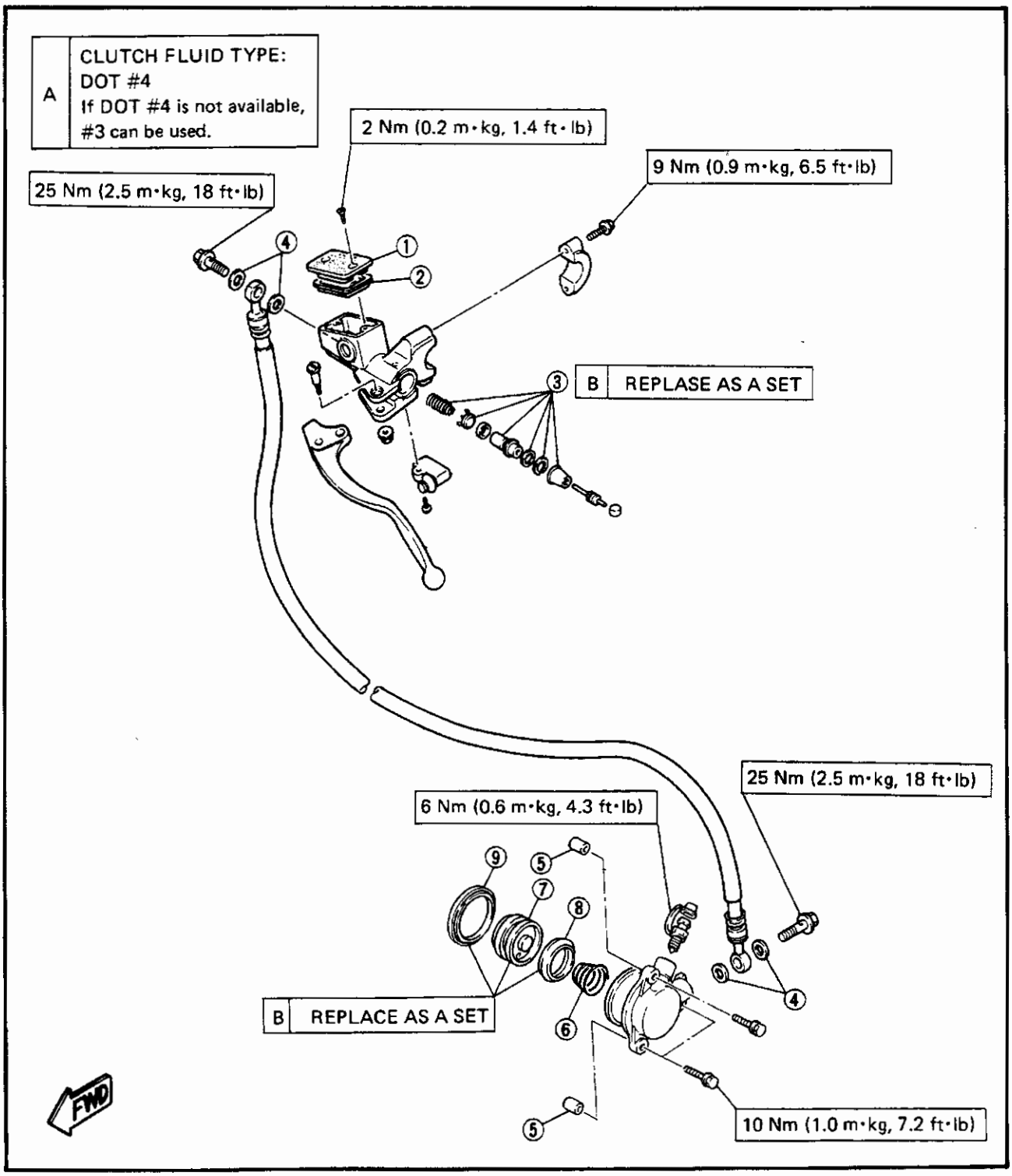
15. Adjust:
- Drive chain slack ⓐ

Drive chain slack:
15 ~ 20 mm (0.6 ~ 0.8 in)

Refer to the "DRIVE CHAIN SLACK ADJUSTMENT" section in the CHAPTER 3.

HYDRAULIC CLUTCH

① Master cylinder cap
② Diaphragm
③ Master cylinder kit
④ Copper washer
⑤ Dowel pin
⑥ Spring
⑦ Piston
⑧ Piston seal
⑨ Dust seal



HYDRAULIC CLUTCH

⚠ CAUTION:

Hydraulic clutch components rarely require disassembly. DO NOT:

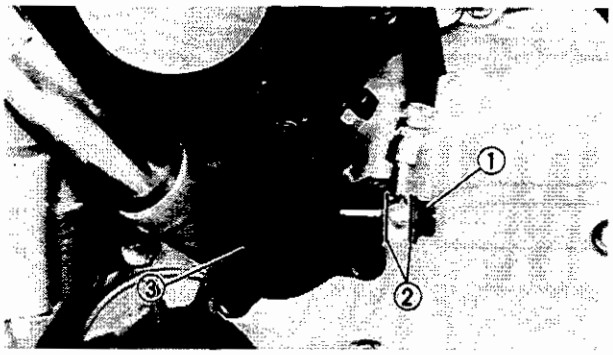
- **Disassembly components unless absolutely necessary.**
- **Use solvents on internal hydraulic clutch component.**
- **Use contaminated clutch fluid or cleaning. Use only clean clutch fluid.**
- **Allow brake fluid to come in contact with the eyes otherwise eye injury may occur.**
- **Allow brake fluid to contact painted surfaces or plastic parts otherwise damage may occur.**
- **Disconnect any hydraulic connection otherwise the entire system must be disassembled, drained, cleaned, and then properly filled and bled after reassembly.**

DISASSEMBLY

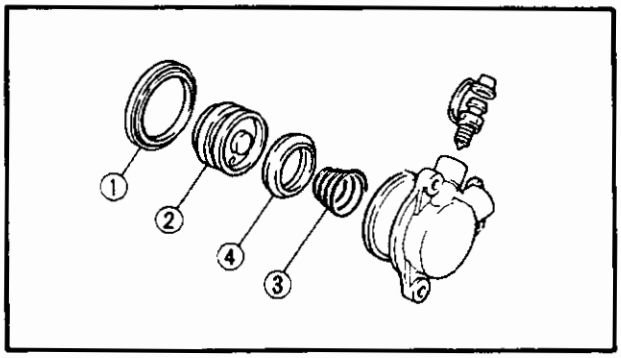
Clutch Release Cylinder

NOTE:

Before disassembling the clutch release cylinder or master cylinder, drain the master cylinder and clutch hose of their fluid.



1. Remove:
   - Union bolt ①
   - Copper washers ②
   - Clutch release cylinder ③
   - Dowel pins



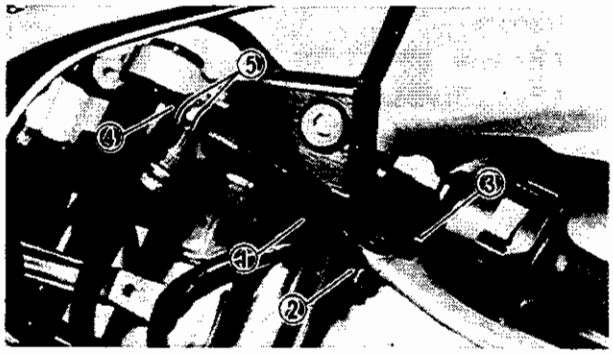
2. Remove:
   - Dust seal ①
   - Piston (release cylinder) ②
   - Spring ③
   - Piston seal ④

NOTE:

Blow compressed air into the hose joint opening to force out the piston from the release cylinder body.

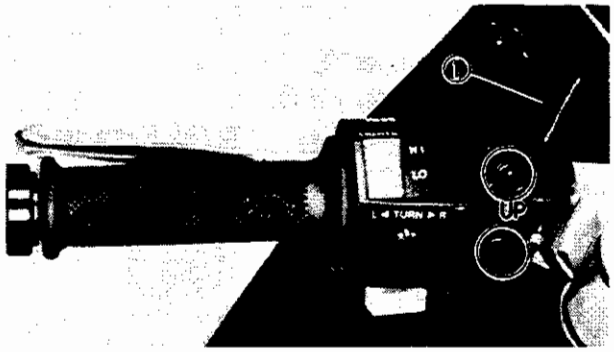
⚠ WARNING:

- **Cover piston with rag and use extreme caution when expelling piston from cylinder.**
- **Never attempt to pry out piston.**

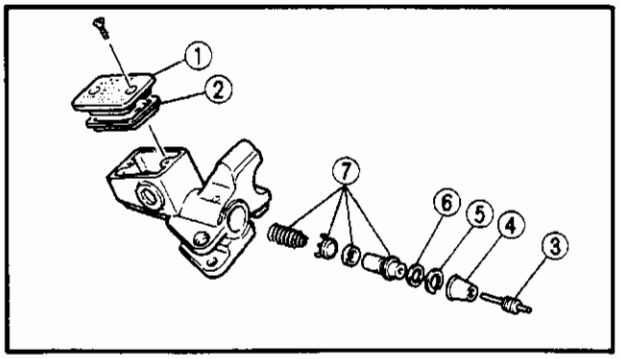


Master cylinder

1. Disconnect:
   - Clutch switch lead ①
2. Remove:
   - Clutch lever ②
   - Holder (push rod) ③
   - Union bolt ④
   - Copper washers ⑤



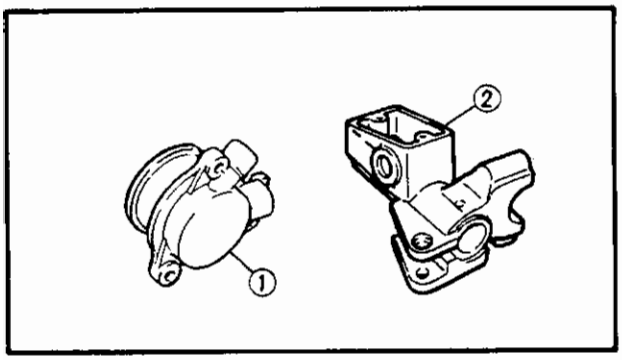
3. Remove:
   - Master cylinder ①



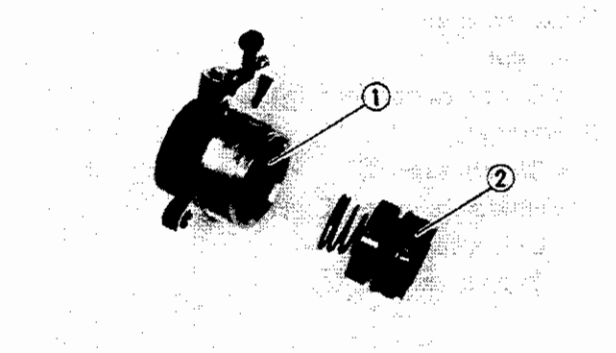
4. Remove:
   - Master cylinder cap ①
   - Diaphragm ②
   - Push rod ③
   - Dust boot ④
   - Circlip ⑤
   - Washer ⑥
   - Master cylinder kit ⑦

INSPECTION AND REPAIR

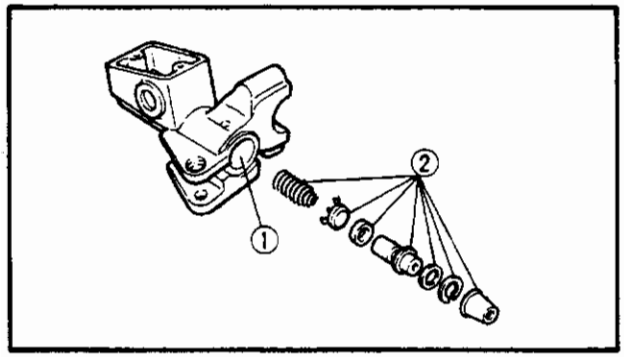
Recommended Clutch Component Replacement Schedule	
Piston seal, dust seal	Every two years
Clutch hoses	Every four years
Clutch fluid (Brake fluid)	Replace only when clutch is disassembled.



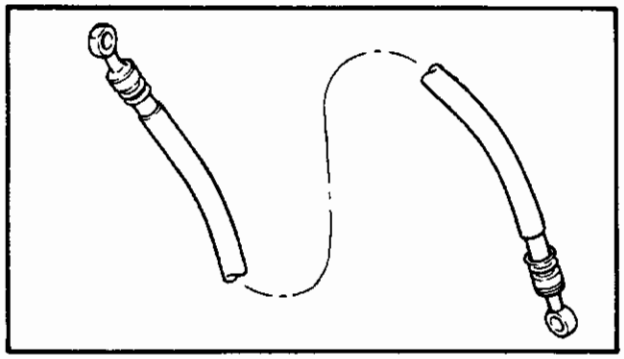
1. Inspect:
   - Release cylinder body ①
   - Master cylinder body ②
     Cracks/Damage → Replace.
   - Oil delivery passage
     Blow out with compressed air.



2. Inspect:
   - Release cylinder ①
   - Piston (release cylinder) ②
     Scratches/Wear/Rust → Replace as a set.



3. Inspect:
   - Master cylinder ①
   - Master cylinder kit ②
     Scratches/Wear/Rust → Replace as a set.

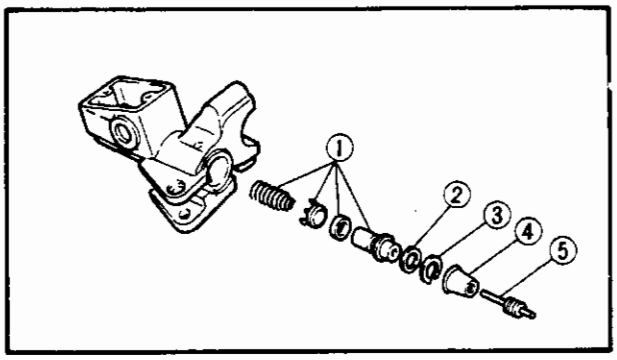


4. Inspect:
   - Clutch hose
     Cracks/Wear/Damage → Replace.

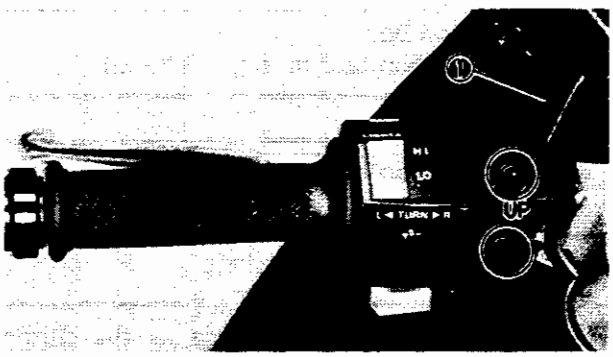
ASSEMBLY

⚠ WARNING:

- **All internal parts should be cleaned in new brake fluid only.**
- **Internal parts should be lubricated with brake fluid when installed.**
- **Replace the piston seal and dust seal whenever the release cylinder is disassembled.**



1. Install:
   - Master cylinder kit ①
   - Washer ②
   - Circlip ③
   - Dust boot ④
   - Push rod ⑤

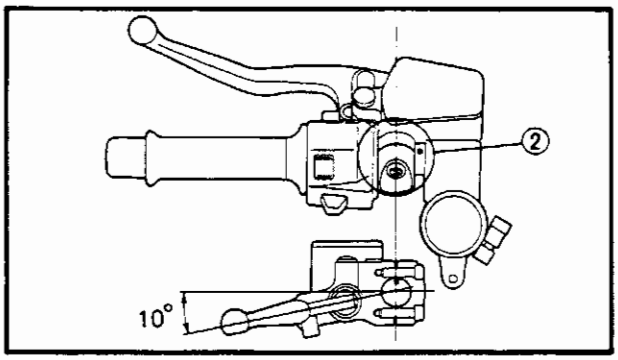


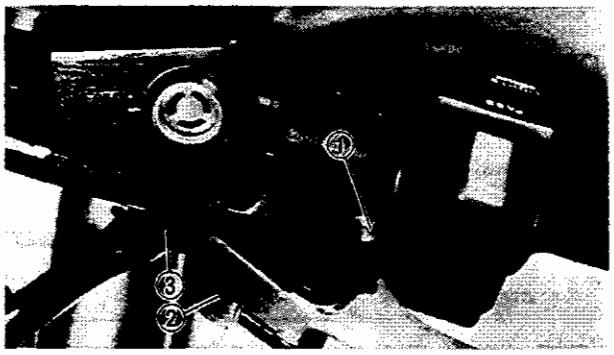
2. Install:
   - Master cylinder ①

⚠ CAUTION:

- **Install the master cylinder holder with the "UP" mark facing upward.**
- **Align the end of the holder with the punch mark ② on the handlebar.**
- **Tighten first the upper bolt, then the lower bolt.**

	Bolts (master cylinder holder): 9 Nm (0.9 m · kg, 6.5 ft · lb)



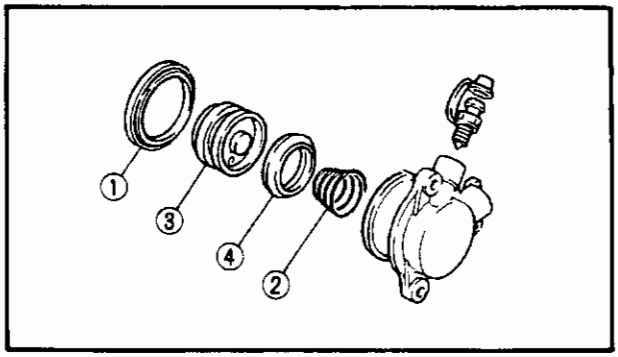


3. Install:
   - Holder (push rod) ①
   - Clutch lever ②

NOTE:

Apply the lithium soap base grease to the clutch lever pivot.

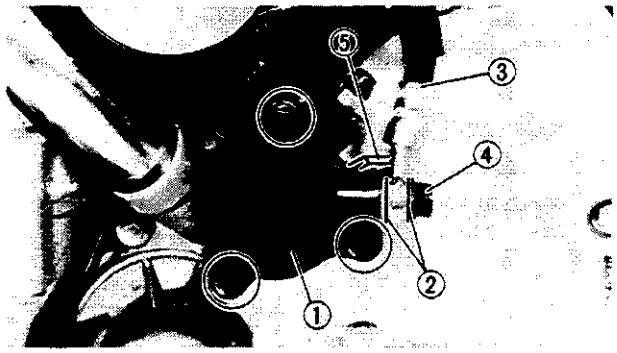
4. Connect:
   - Clutch switch lead ③

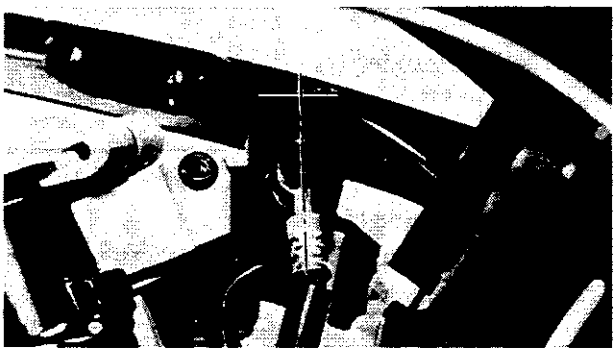


5. Install:
   - Piston seal ①
     (to piston (release cylinder))
   - Spring ②
   - Piston (release cylinder) ③
   - Dust seal ④

⚠ WARNING:

Always use new piston and dust seal.





6. Install:
   - Dowel pins
   - Clutch release cylinder ①

	Bolt (clutch release cylinder): 10 Nm (1.0 m · kg, 7.2 ft · lb)

   - Copper washers ②
   - Brake hose ③
   - Union bolt ④

	Union bolt: 25 Nm (2.5 m · kg, 18 ft · lb)

NOTE:
Tighten the union bolt while holding the clutch hose vertical.

⚠ CAUTION:
When installing the clutch hose to the clutch release cylinder ①, lightly touch the clutch pipe with the projections ⑤ of release cylinder.

⚠ WARNING:
- **Proper hose routing is essential to insure safe motorcycle operation. Refer to the "CABLE ROUTING".**
- **Always use new copper washers.**

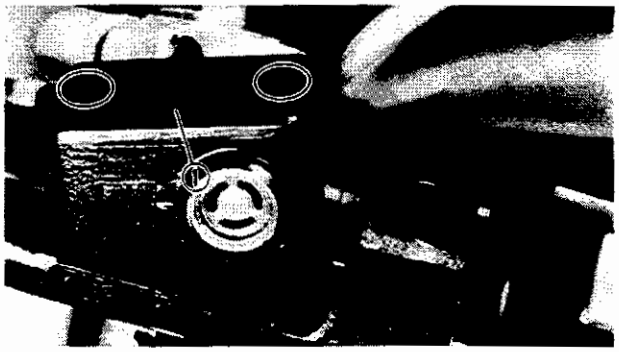
7. Fill:
   - Master cylinder tank

	Recommended fluid: DOT # 4 brake fluid If DOT #4 is not available, #3 can be used.

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

⚠ WARNING:

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

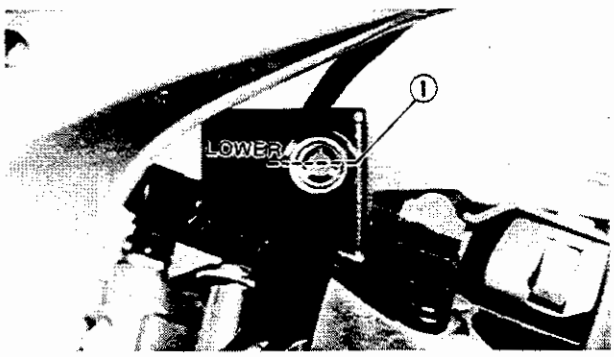


8. Install:
   - Diaphragm
   - Cap (master cylinder) ①

	Screw (master cylinder): 2 Nm (0.2 m · kg, 1.4 ft · lb)

9. Air bleed:
   - Clutch system

   Refer to the "AIR BLEEDING" section in the CHAPTER 3.



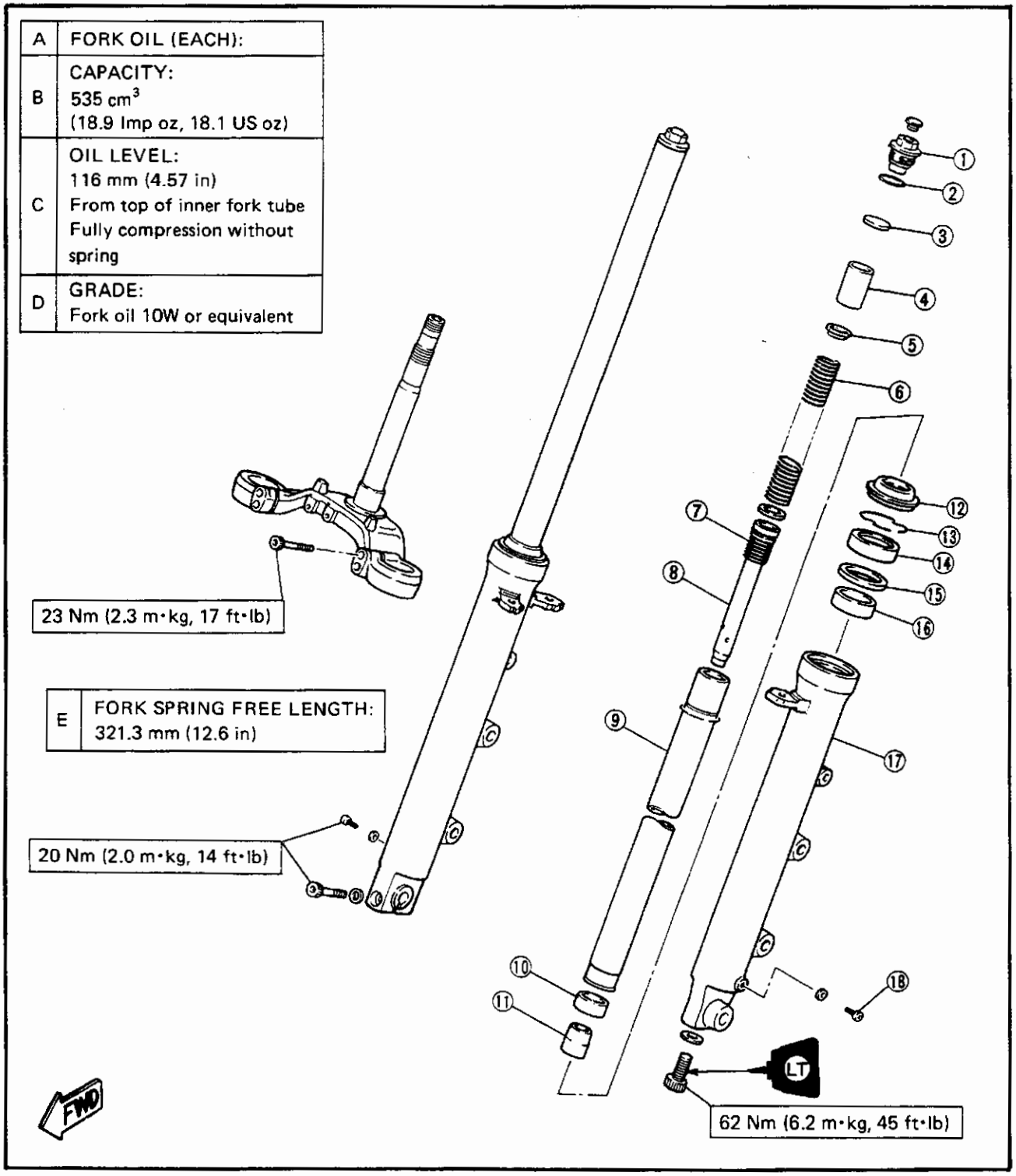
10. Inspect:
    - Fluid level

    Refer to the "CLUTCH FLUID INSPECTION" section in the CHAPTER 3.

① "LOWER" level line

FRONT FORK

① Cap bolt
② O-ring
③ Washer
④ Spacer collar
⑤ Spring seat
⑥ Fork spring
⑦ Rebound spring
⑧ Damper rod
⑨ Inner fork tube
⑩ Slide bushing
⑪ Oil lock piece
⑫ Dust seal
⑬ Retaining clip
⑭ Oil seal
⑮ Seal spacer
⑯ Guide bushing
⑰ Outer fork tube
⑱ Drain screw



REMOVAL

WARNING:

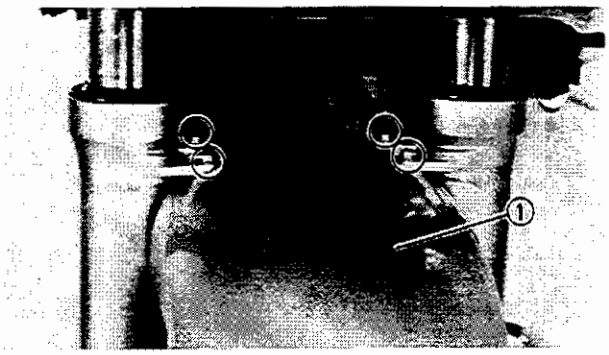
Securely support the motorcycle so there is no danger of it falling over.

1. Remove:
   - Side cowlings (left and right)
   - Front cover

   Refer to the "COWLING" section in the CHAPTER 3.
   - Seat
   - Fuel tank

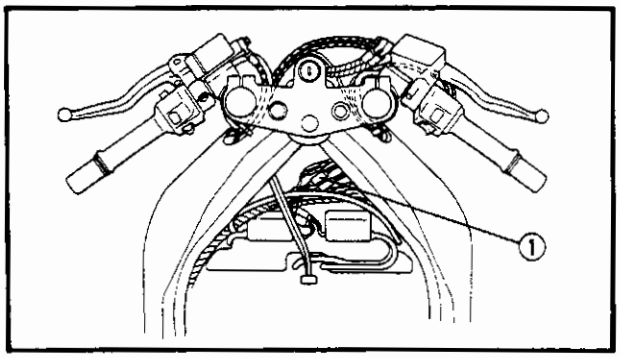
   Refer to the "FUEL TANK" section in the CHAPTER 3.
   - Air filter case

   Refer to the "ENGINE REMOVAL – AIR FILTER CASE" section in the CHAPTER 4.

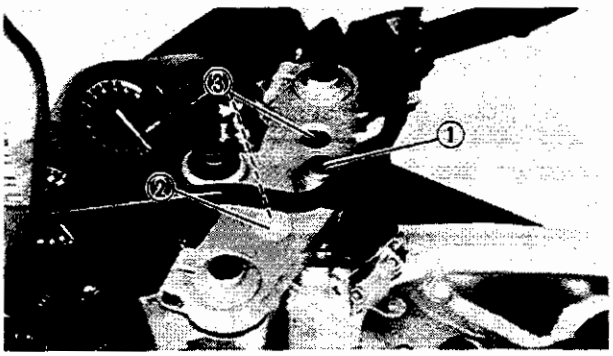


2. Remove:
   - Front wheel

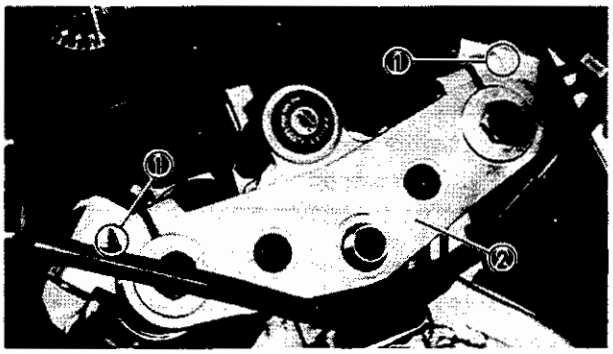
   Refer to the "FRONT WHEEL" section.
3. Remove:
   - Front fender ①



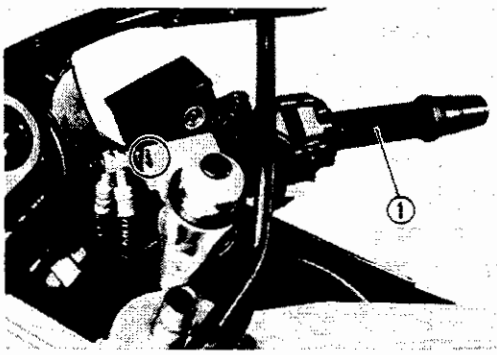
4. Disconnect:
   - Main switch coupler ①



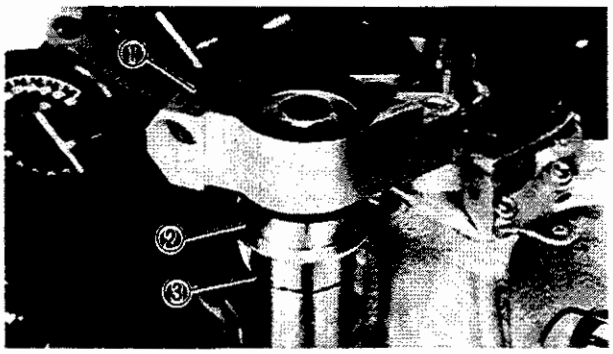
5. Remove:
   - Nut (steering stem) ①
   - Blind plugs ②
   - Bolts (handlebar boss) ③



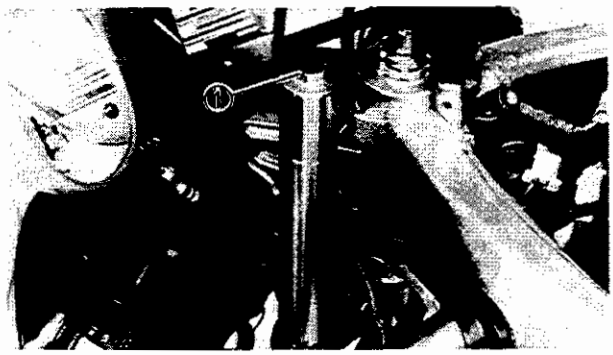
6. Loosen:
   - Pinch bolts (upper brakcet) ①
7. Remove:
   - Upper bracket ②



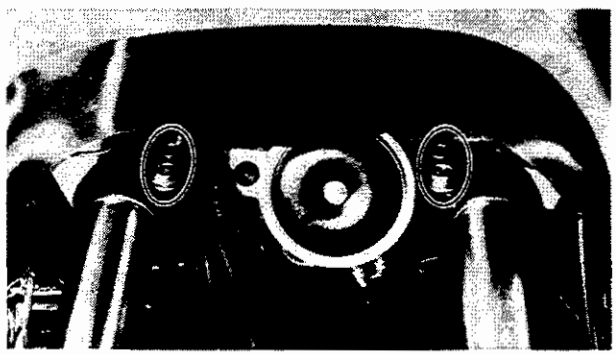
8. Remove:
   - Handlebar assembly (left and right) ①



9. Remove:
   - Handlebar bosses (left and right) ①
   - Washer ②
   - Circlip ③



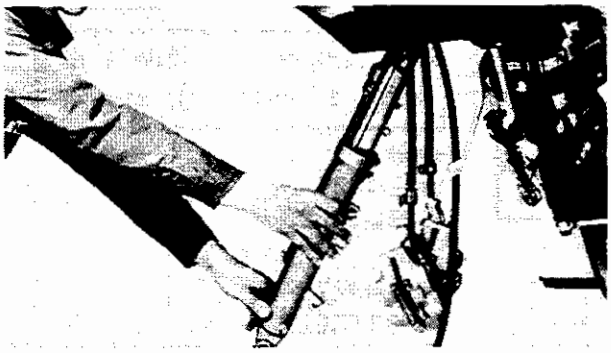
10. Loosen:
    Cap bolt ①



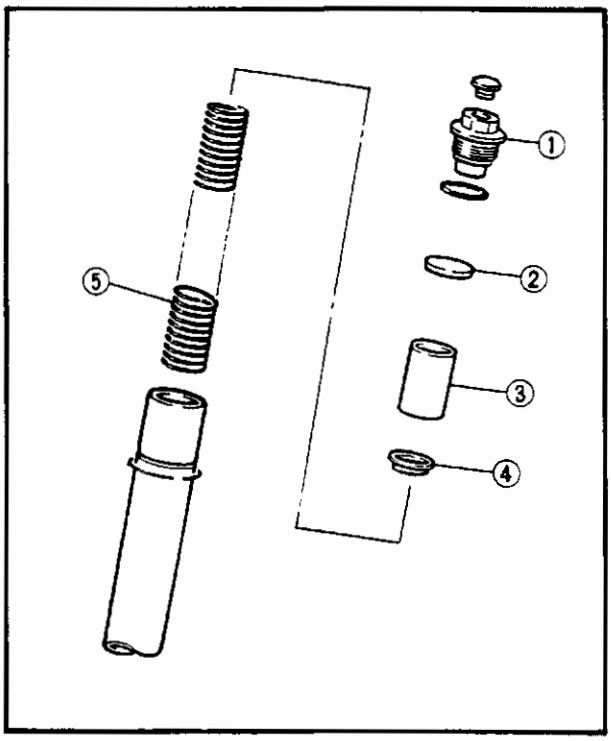
11. Loosen:
    - Pinch bolts (lower bracket)

⚠ CAUTION:

Support the fork before loosening the pinch bolts.



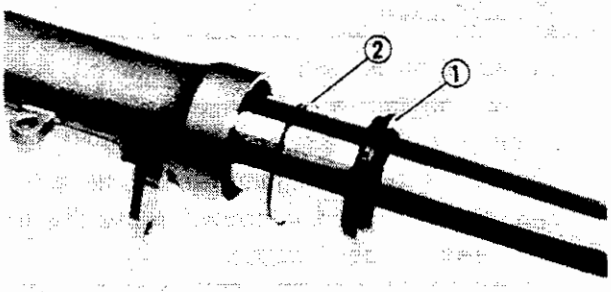
12. Remove:
    - Front fork(s)



DISASSEMBLY

1. Remove:
    - Cap bolt ①
    - Washer ②
    - Spacer collar ③
    - Spring seat ④
    - Fork spring ⑤

⑥ Inner fork tube

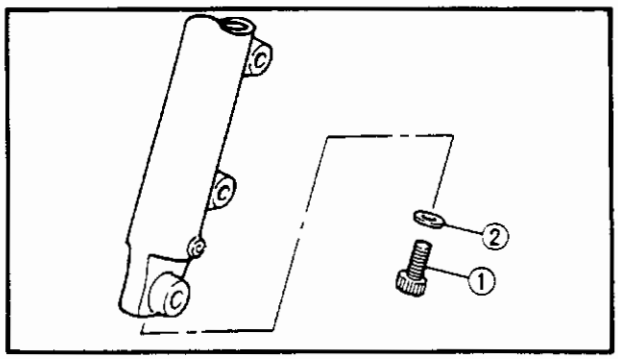


2. Drain:
    - Fork oil
3. Remove:
    - Dust seal ①
    - Retaining clip ②

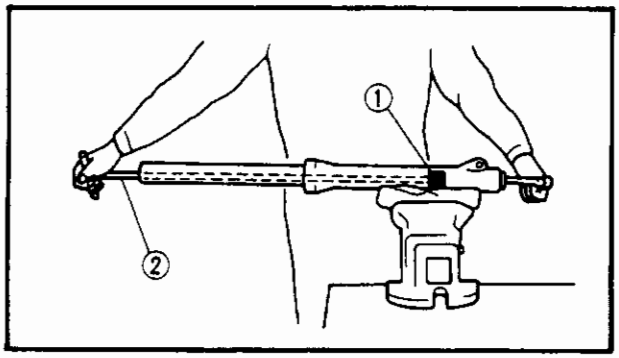
    Use a thin slotted-head screwdriver.

⚠ CAUTION:

Take care not to scratch the inner tube.



4. Remove:
    - Bolt (damper rod) ①
    - Copper washer ②

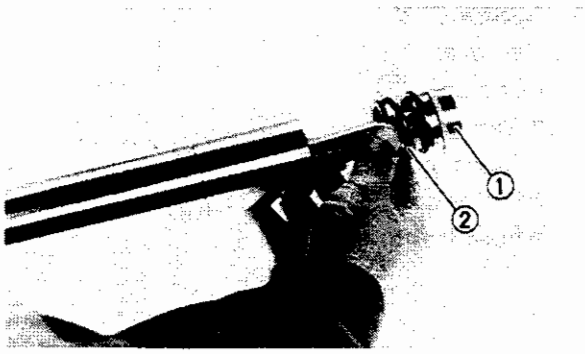


NOTE:
Loosen the bolt (damper rod) while holding the damper rod with the T-handle ① and holder ②.

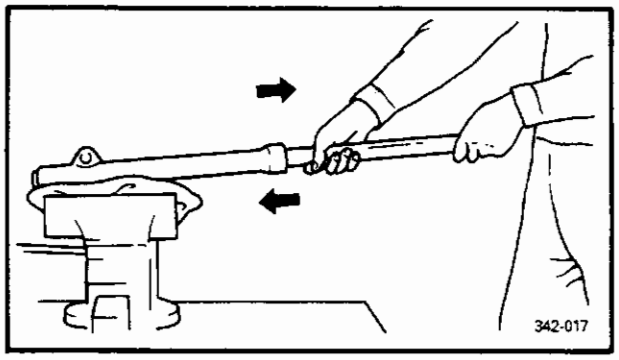


T-Handle:
YM-01326
90890-01326

Holder:
YM-01327
90890-01327



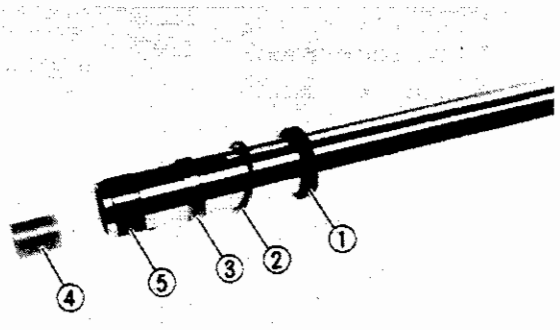
5. Remove:
   - Damper rod ①
   - Rebound spring ②



6. Remove:
   - Inner fork tube

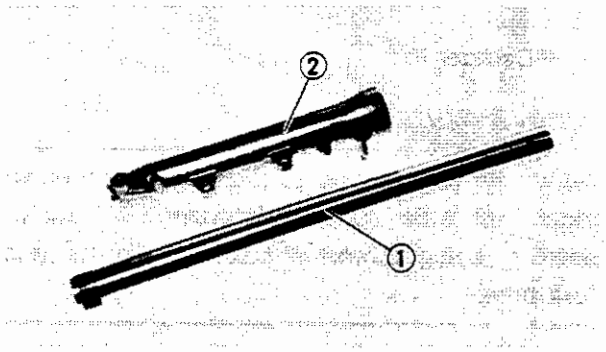
Removal steps
- Hold the fork leg horizontally.
- Clamp the caliper mounting boss of the outer tube securely in a vise with soft jaws.
- Pull out the inner fork tube from the outer tube by forcefully, but carefully, with drawing the inner tube.

⚠ CAUTION:
- **Excessive force will damage the oil seal and/or the bushes. Damaged oil seal and bushing must be replaced.**
- **Avoid bottoming the inner tube in the outer tube during the above procedure, as the oil lock piece will be damaged.**



7. Remove:
   - Oil seal ①
   - Seal spacer ②
   - Guide bush ③
   - Oil lock piece ④

⑤ Slide bush



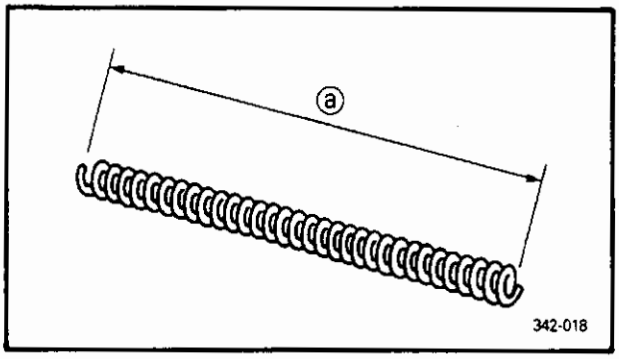
INSPECTION

1. Inspect:
   - Inner fork tube ①
   - Outer fork tube ②

   Scratches/Bends/Damage → Replace.

⚠ WARNING:

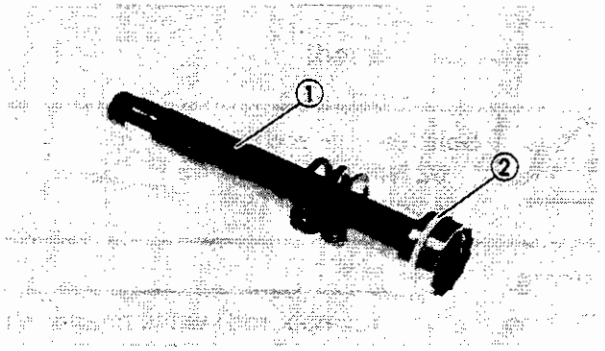
Do not attempt to straighten a bent inner fork tube as this may dangerously weaken the tube.



2. Measure:
   - Fork spring ⓐ

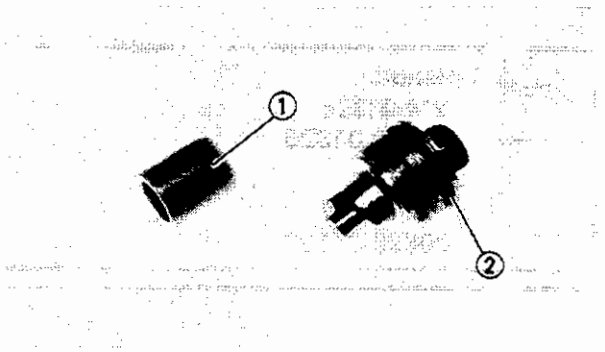
   Over specified limit → Replace.

Fork spring free length (limit):
321.3 mm (12.6 in)



3. Inspect:
   - Damper rod ①
   - Ring ②

   Wear/Damage → Replace.
   Contamination → Blow out all oil passages with compressed air.



4. Inspect:
   - Oil lock piece ①
   - O-ring (cap bolt) ②

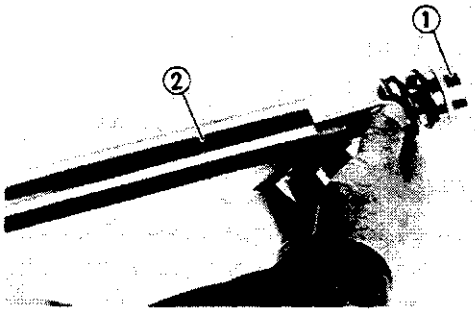
   Wear/Damage → Replace.

ASSEMBLY

Reverse the "DISASSEMBLY" procedure.
Note the following points.

NOTE:

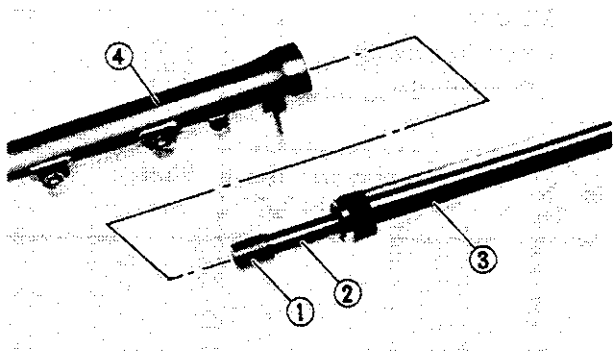
- In front fork reassembly, be sure to use following new parts.
  - * Guide bush
  - * Slide bush
  - * Oil seal
  - * Dust seal
- Make sure that all components are clean before reassembly.



1. Install:
   • Damper rod ①

⚠ CAUTION:

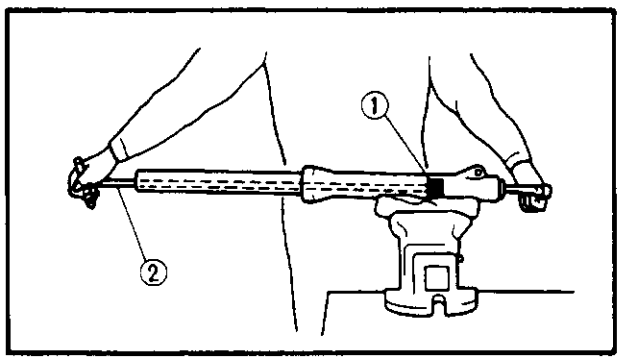
Allow the damper rod to slide slowly down the inner fork tube ② until it protrudes from the bottom, being careful not to damage the inner fork tube.



2. Install:
   • Oil lock piece ①
   (to damper rod ②)
3. Lubricate:
   • Inner fork tube (outer surface) ③

Fork oil 10W or equivalent

④ Outer fork tube



4. Tighten:
   • Bolt (damper rod)

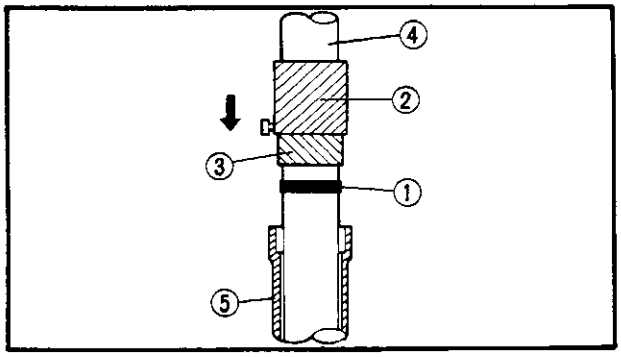
Bolt (damper rod):
62 Nm (6.2 m · kg, 45 ft · lb)
Apply LOCTITE®

NOTE:

Tighten the bolt (damper rod) while holding the damper rod with the T-handle ① and Holder ②.

T-Handle:
YM-01326
90890-01326

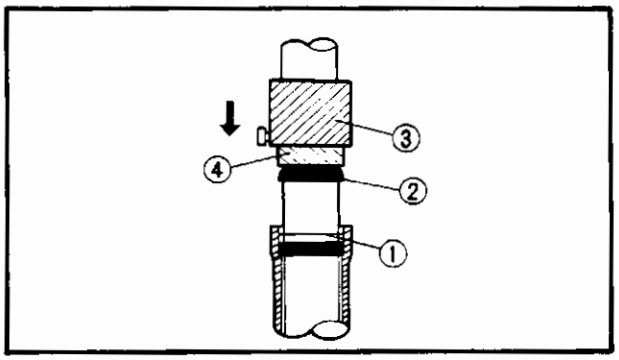
Holder:
YM-01327
90890-01327



5. Install:
   • Guide bush ①
   Use the Fork Seal Driver Weight ② and Adapter ③ .

Fork seal driver weight:
YM-33963
90890-01367
Adapter:
YM-08020
90890-01374

④ Inner fork tube
⑤ Outer fork tube



6. Install:
   - Seal spacer ①
   - Oil seal ②

   Use the Fork Seal Driver Weight ③ and Adapter ④ .

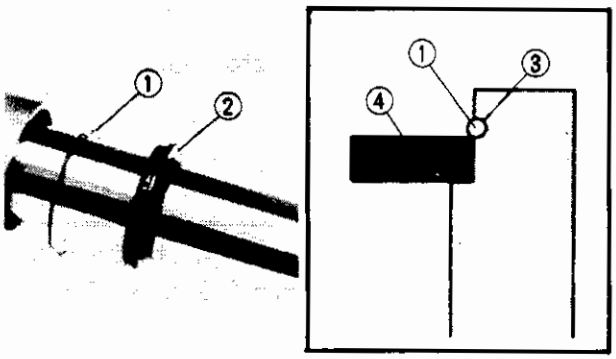
Fork seal driver weight:
YM-33963
90890-01367
Adapter:
YM-08020
90890-01374

⚠ CAUTION:

Be sure that the oil seal numbered side face upward.

NOTE:

Before installing the oil seal, apply the lithium soap base grease onto the oil seal lips.

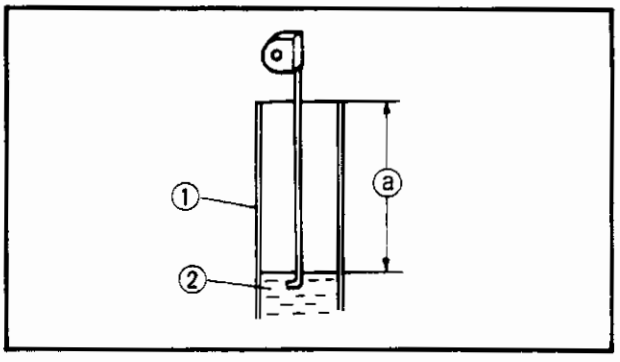


7. Install:
   - Retaining clip ①
   - Dust seal ②

NOTE:

Fit the retaining clip ① correctly in the groove ③ in the outer tube.

④ Oil seal

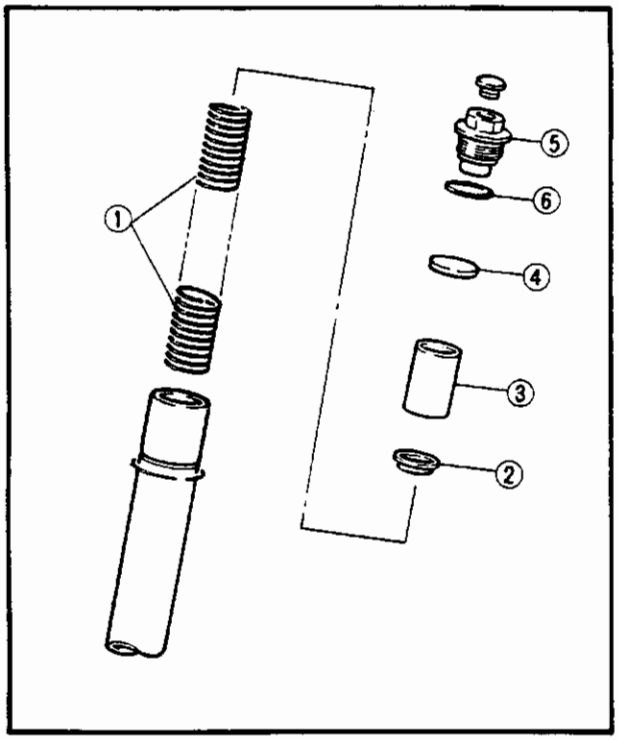


8. Fill:
   - Front fork

Each fork:
535 cm³
(18.9 Imp oz, 18.1 US oz)
Fork Oil 10WT or equivalent
After filling, slowly pump the fork up and down to distribute oil.

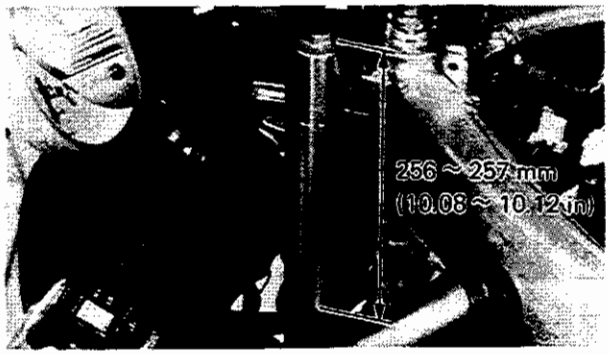
Oil level ⓐ :
116 mm (4.57 in)
From the top of inner fork tube fully compressed without spring.

① Inner fork tube
② Fork oil



9. Install:
   - Fork spring ①
   - Spring seat ②
   - Spacer collar ③
   - Washer ④
   - Cap bolt ⑤

NOTE:
- Before installing the cap bolt, apply the grease to the O-ring ⑥ .
- Temporarily tighten the cap bolt ⑤ .

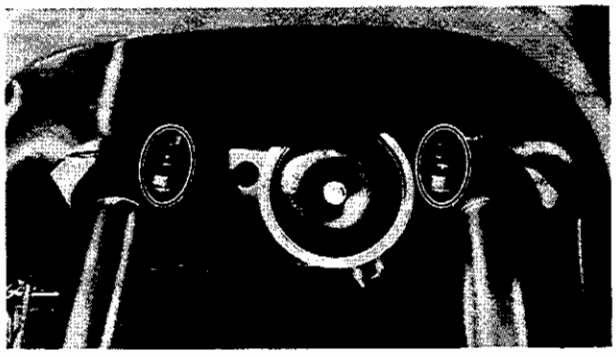


INSTALLATION

Reverse the "REMOVAL" procedure.
Note the following points.

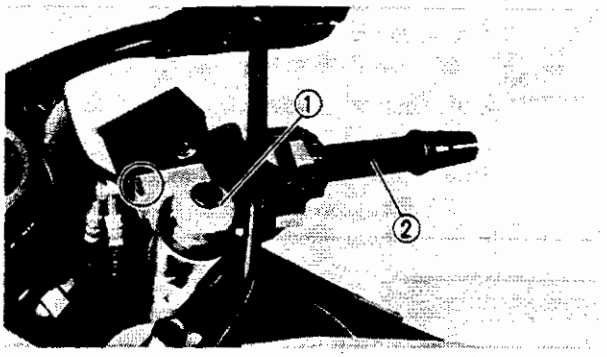
1. Install:
   - Front fork(s)

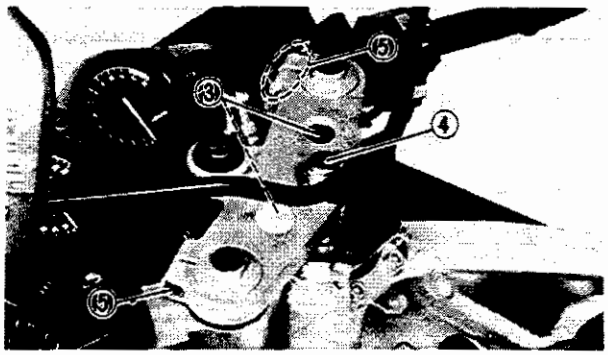
NOTE:
Position the upper end of the inner tube so that it is within 256 ~ 257 mm (10.08 ~ 10.12 in) above the lower bracket.



2. Tighten:
   - Pinch bolt (lower bracket)

Pinch bolt (lower bracket):
23 Nm (2.3 m · kg, 17 ft · lb)



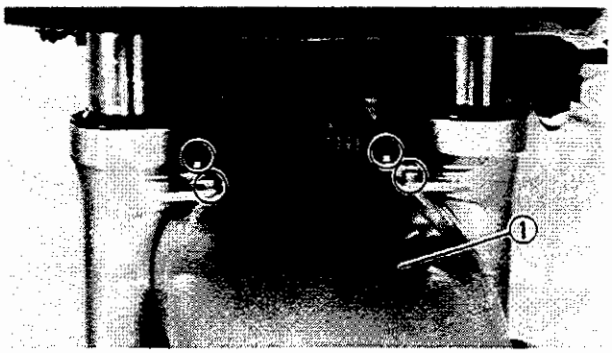


3. Tighten:
   - Cap bolt ①
   - Handlebar assembly ②
   - Bolts (handlebar boss) ③
   - Nut (steering stem) ④
   - Pinch bolts (upper bracket) ⑤

Cap bolt:
23 Nm (2.3 m · kg, 17 ft · lb)
Bolt (handlebar assembly):
28 Nm (2.8 m · kg, 20 ft · lb)
Bolt (handlebar assembly):
20 Nm (2.0 m · kg, 14 ft · lb)
Nut (steering stem):
110 Nm (11.0 m · kg, 80 ft · lb)
Pinch bolt (upper bracket):
26 Nm (2.6 m · kg, 19 ft · lb)

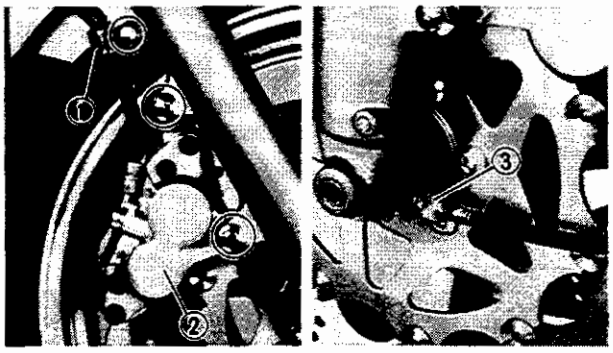
4. Adjust:
   - Spring preload

   Refer to the "FRONT FORK ADJUSTMENT" section in the CHAPTER 3.



5. Install:
   - Front fender ①

Bolt (front fender):
9 Nm (0.9 m · kg, 6.5 ft · lb)



6. Install:
   - Front wheel
   - Clamp (brake hose) ①
   - Brake caliper (left and right) ②
   - Speedometer cable ③

   Refer to the "FRONT WHEEL" section.



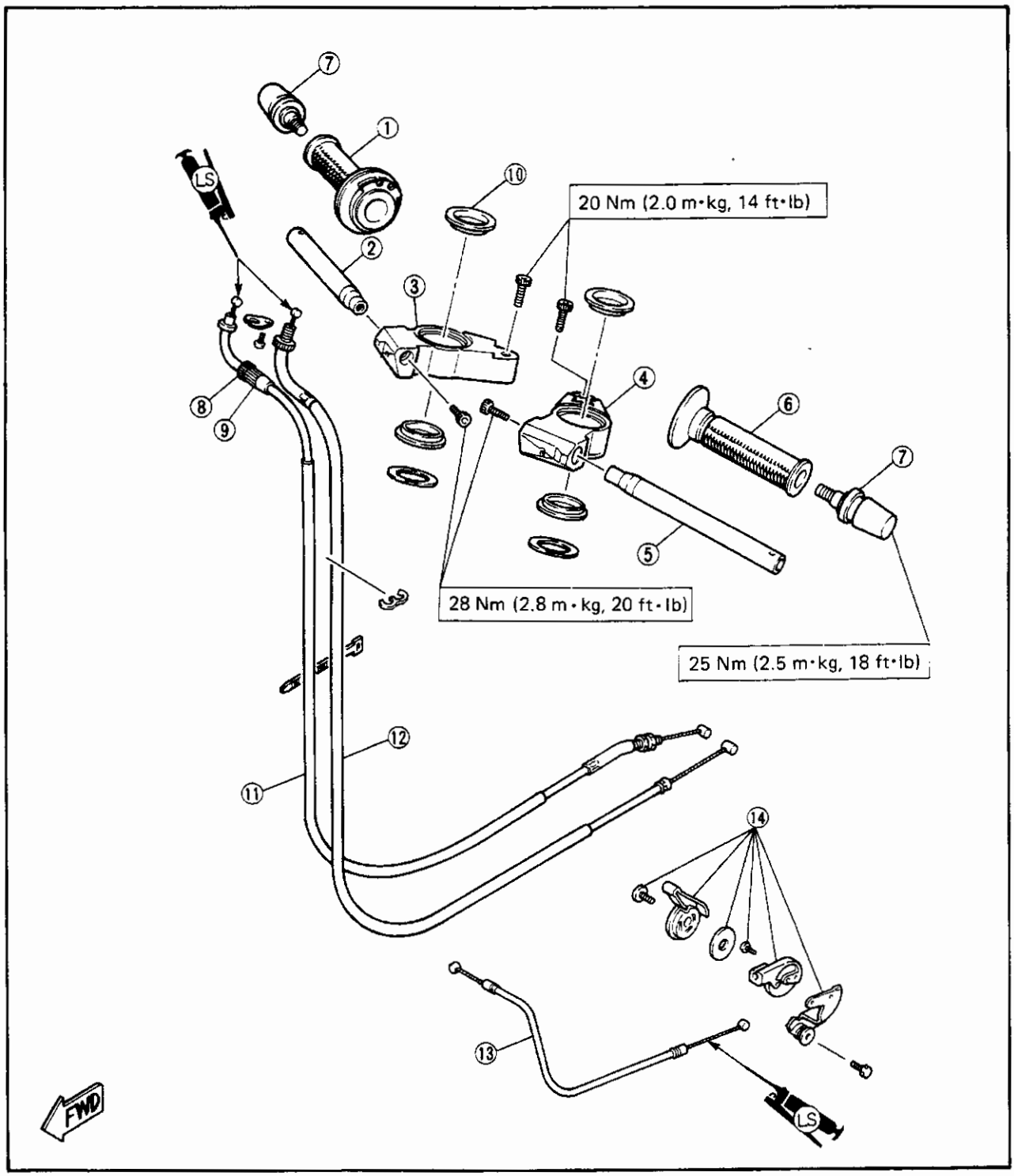
Front axle:
58 Nm (5.8 m · kg, 42 ft · lb)
Bolt (brake caliper):
35 Nm (3.5 m · kg, 25 ft · lb)
Pinch bolt (front wheel axle):
20 Nm (2.0 m · kg, 14 ft · lb)

WARNING:

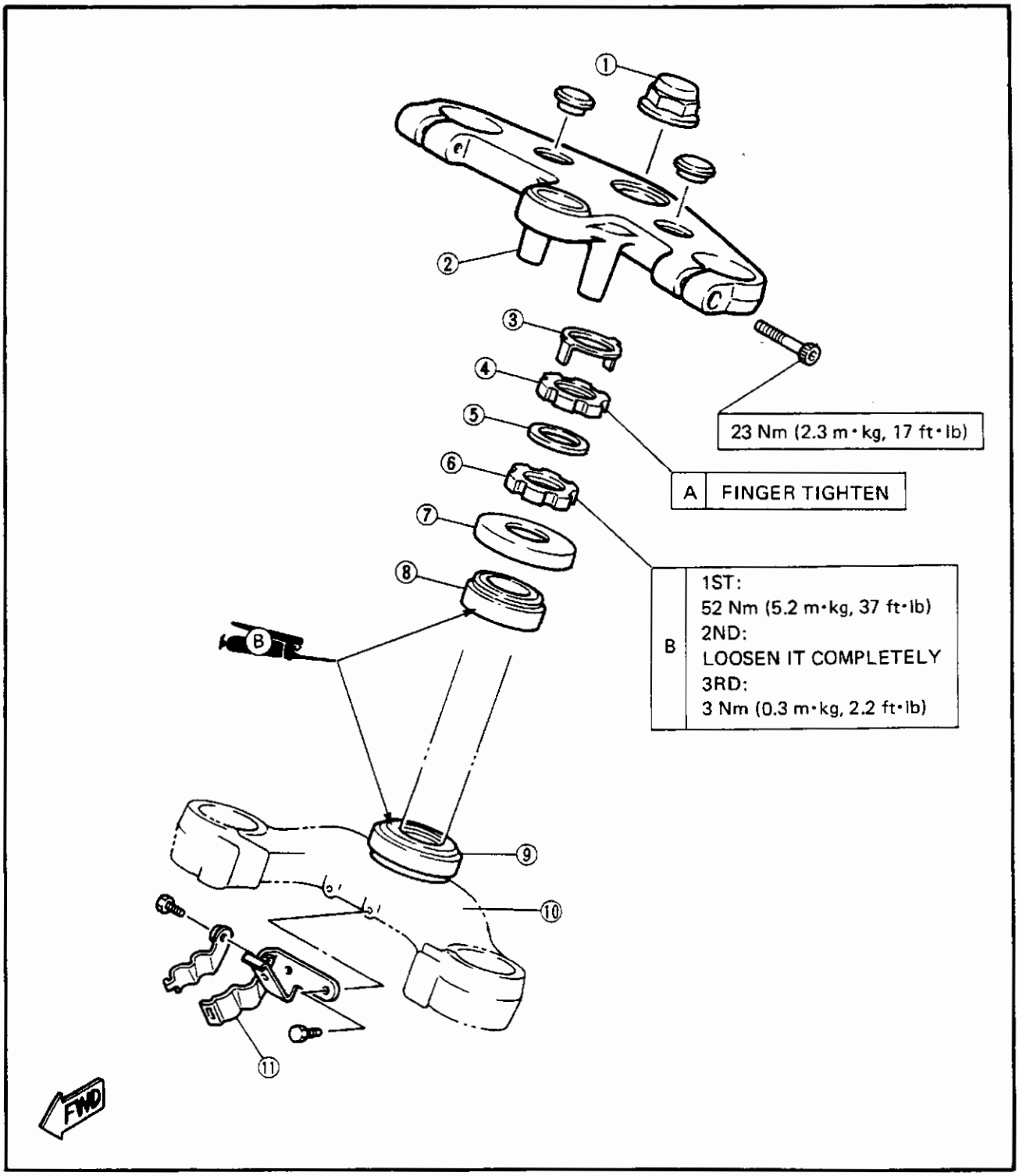
Make sure that the brake hoses are routed properly.

STEERING HEAD AND HANDLEBAR

① Throttle grip
② Handlebar (right)
③ Handlebar boss (right)
④ Handlebar boss (left)
⑤ Handlebar (left)
⑥ Grip rubber
⑦ Handlebar grip end
⑧ Locknut
⑨ Adjuster
⑩ Damper rubber
⑪ Throttle cable 1
⑫ Throttle cable 2
⑬ Starter cable
⑭ Starter lever assembly



① Steering stem nut
② Upper bracket
③ Lock washer
④ Ring nut (upper)
⑤ Washer (rubber)
⑥ Ring nut (lower)
⑦ Bearing cover
⑧ Bearing (upper)
⑨ Bearing (lower)
⑩ Steering stem
⑪ Stay



REMOVAL

WARNING:

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

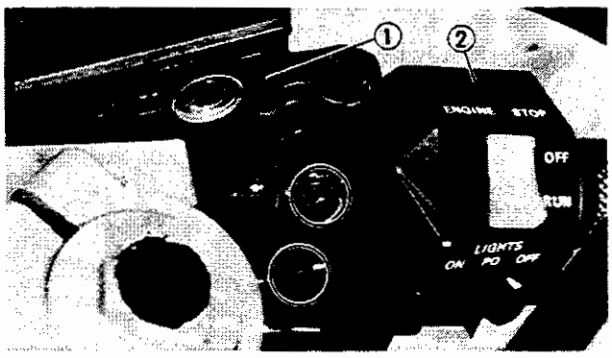
1. Remove:
   - Side cowlings (left and right)
   - Front cover

   Refer to the "COWLING" section in the CHAPTER 3.
   - Seat
   - Fuel tank

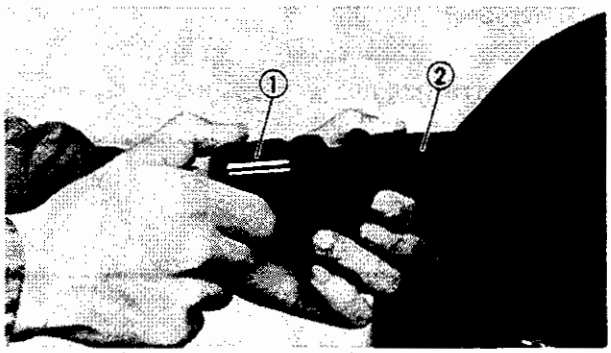
   Refer to the "FUEL TANK" section in the CHAPTER 3.
   - Air filter case

   Refer to the "ENGINE REMOVAL – AIR FILTER CASE" section in the CHAPTER 4.
   - Front wheel

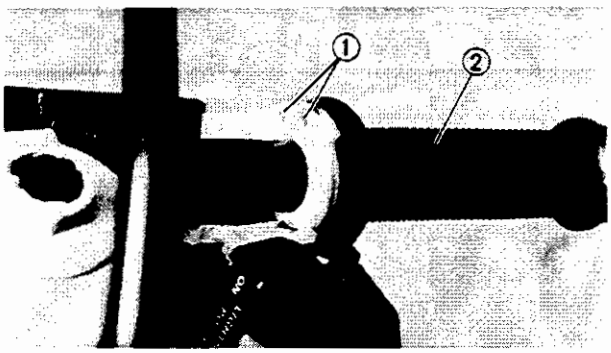
   Refer to the "FRONT WHEEL" section.



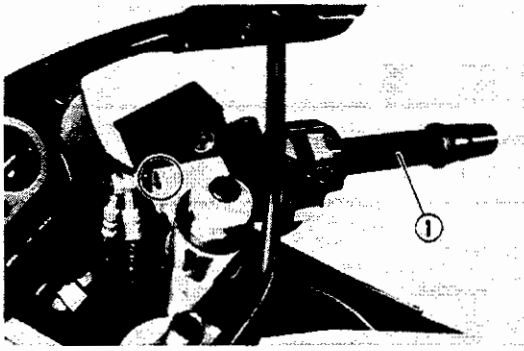
2. Remove:
   - Master cylinders (brake and clutch) ①
   - Handlebar switches (left and right) ②



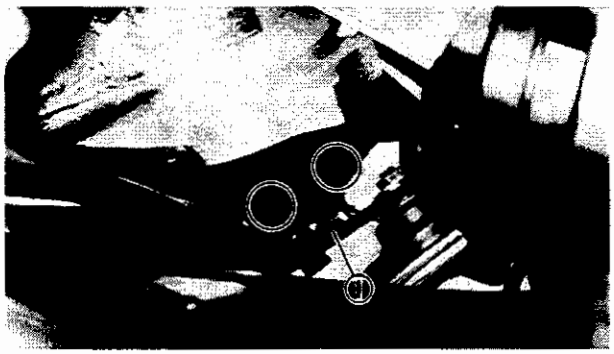
3. Remove:
   - Grip ends (left and right) ①
   - Grip (left) ②



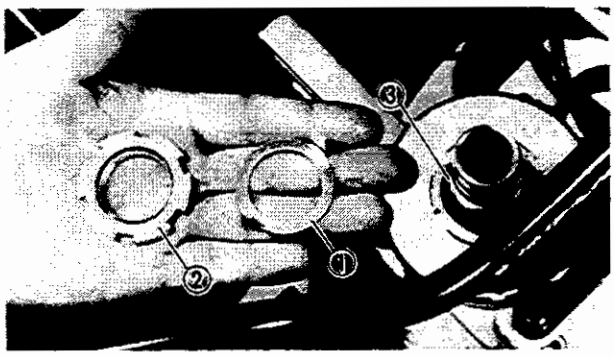
4. Disconnect:
   - Throttle cables ①
5. Remove:
   - Throttle grip ②



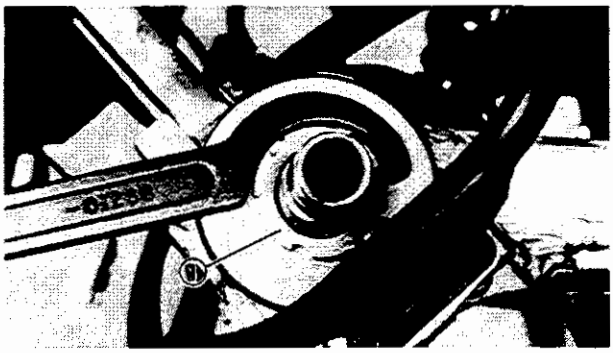
6. Remove:
   - Front fender
   - Upper bracket
   - Front forks
     Refer to the "FRONT FORK – REMOVAL" section.
   - Handlebars (left and right) ①



7. Remove:
   - Stay (hose guide and horn bracket) ①



8. Remove:
   - Lock washer (right nut) ①
   - Ring nut (upper) ②
   - Washer (rubber) ③



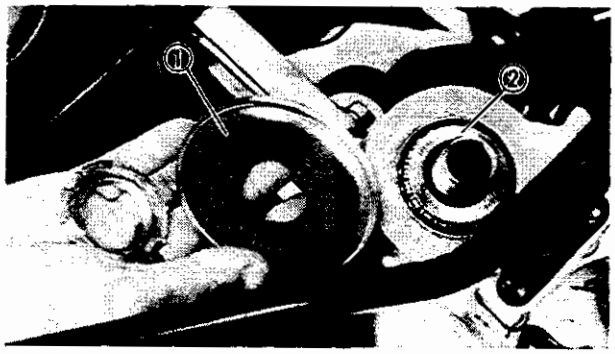
9. Remove:
   - Ring nut (lower) ①
     Use the ring nut wrench.



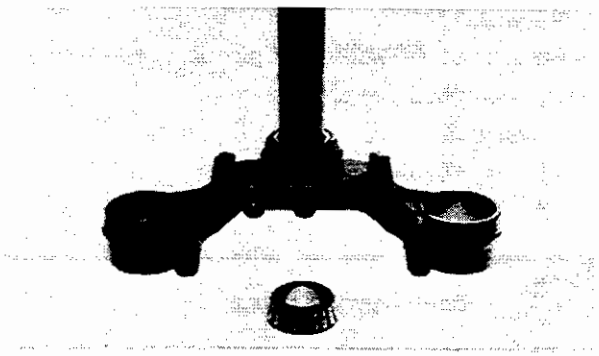
Ring nut wrench:
YU-01268
90890-01268

WARNING:

Support the steering shaft so that it may not fall down.



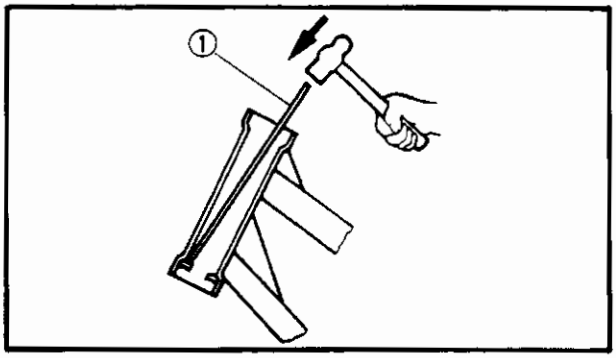
10. Remove:
    - Steering stem
    - Bearing cover ①
    - Bearing (upper) ②
    - Bearing (lower)



INSPECTION

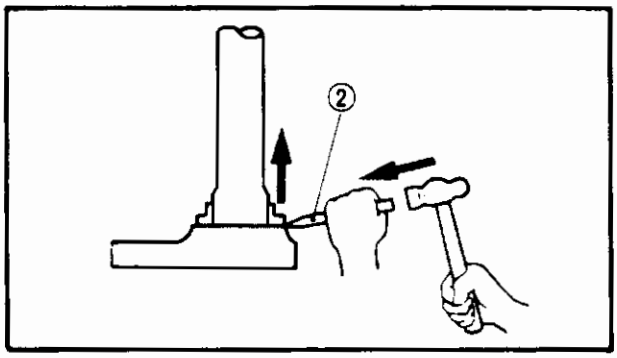
1. Wash the bearing in a solvent.
2. Inspect:
    - Bearings
    - Bearing race

    Pitting/Damage → Replace.



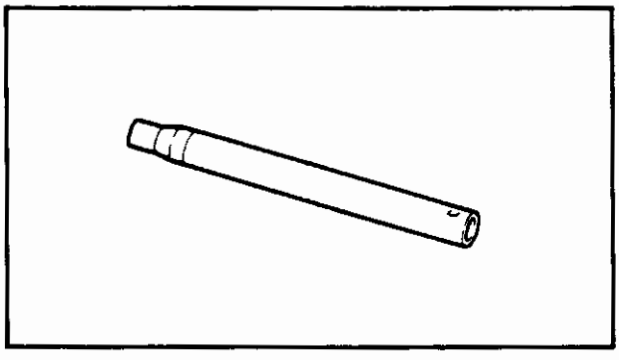
Bearing race remplacement steps:

- Remove the bearing races using a long rod ① and hammer as shown.
- Remove the bearing race on the steering stem using the floor chisel ② and the hammer as shown.
- Install the new dust seal and races.



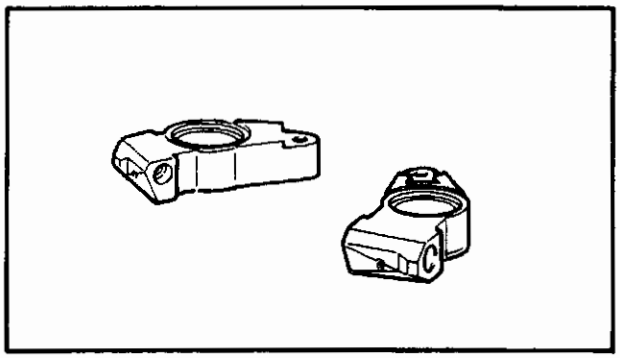
NOTE:

Always replace bearings, races and dust seal as a set.



3. Inspect:
    - Handlebars

    Bents/Damage → Replace.



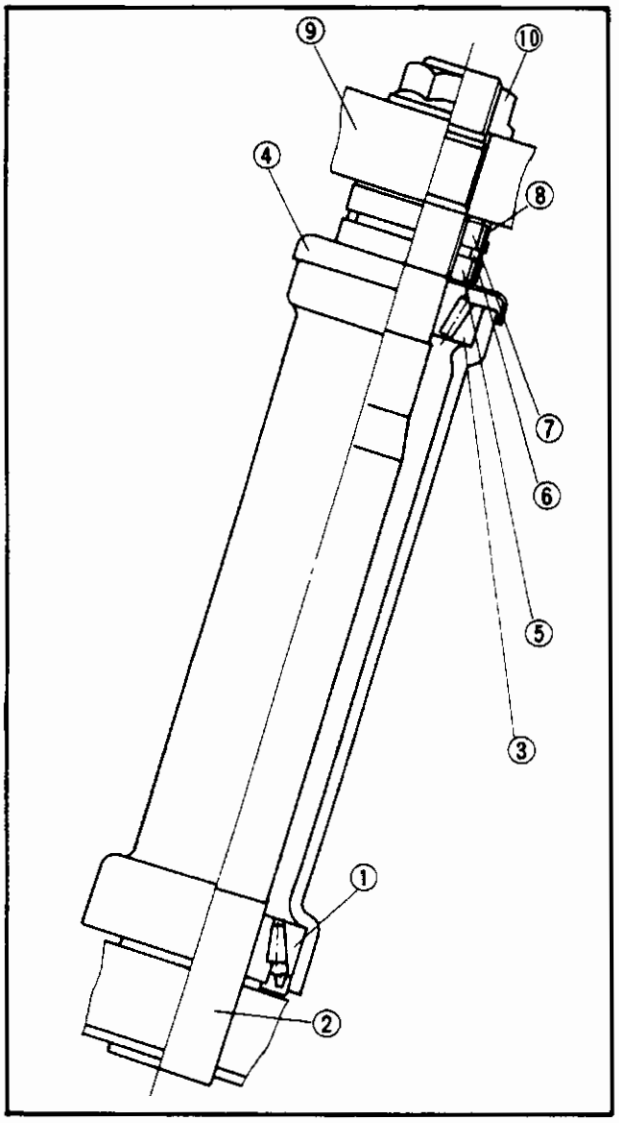
4. Inspect:
   - Handlebar bosses
     Cracks/Damage → Replace.

INSTALLATION

Reverse the "REMOVAL" procedure.
Note the following points.

1. Lubricate:
   - Bearings (upper and lower)
   - Bearing races

Wheel bearing grease



2. Install:
   - Bearing (lower) ⑥
     (onto steering stem)
   - Steering stem ②

⚠CAUTION:

Hold the steering stem until it is secured.

   - Bearing (upper) ③
   - Bearing cover ④
   - Ring nut (lower) ⑤

3. Tighten:
   - Ring nuts (lower and upper)

Tightening steps:

NOTE:

Set the Torque Wrench to the Ring Nut Wrench so that they form a right angle.

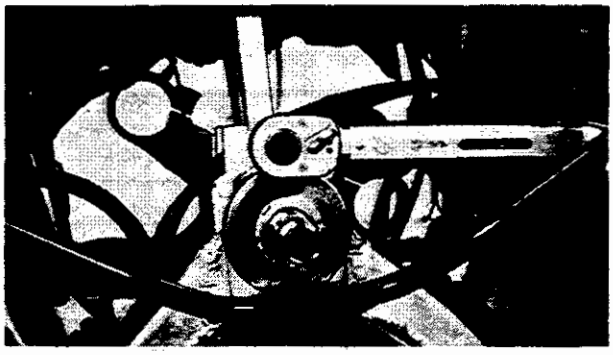
- Install the ring nut (lower) ⑤ .

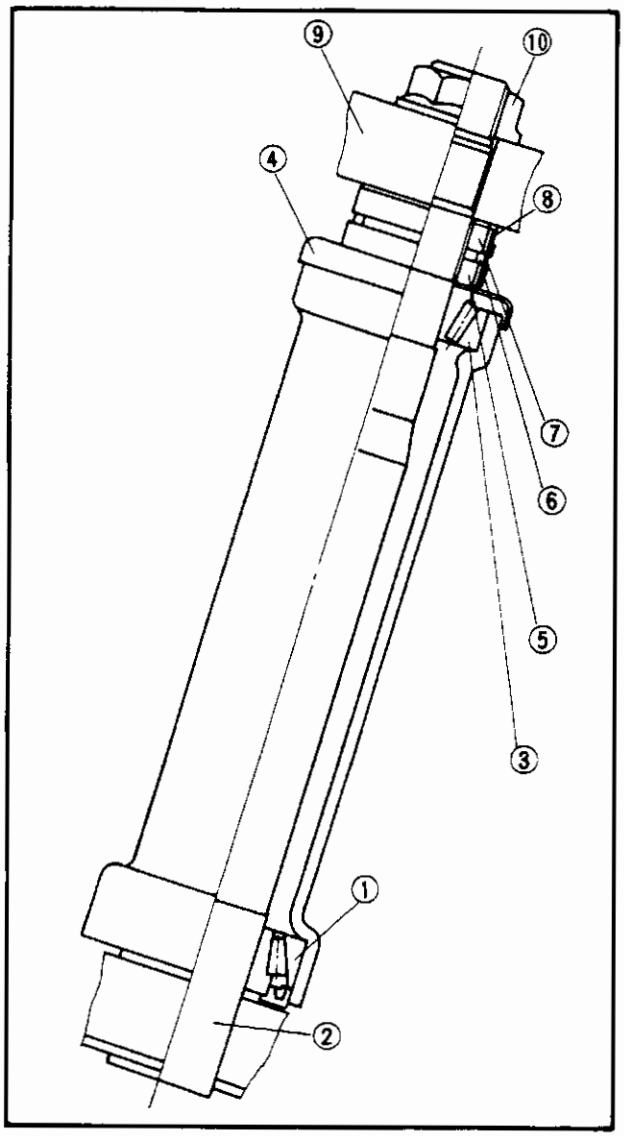
NOTE:

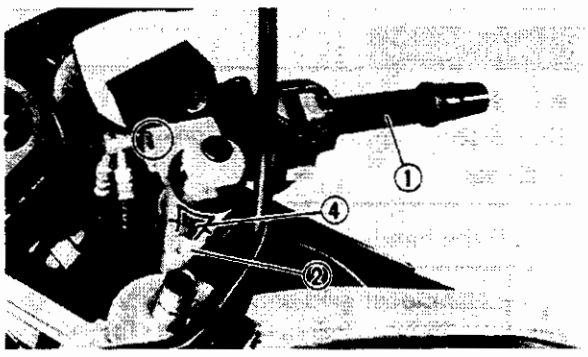
The tapered side of ring nut must face downward.

- Tighten the ring nut ⑤ using the ring nut wrench.

Ring nut wrench:
YU-33975
90890-01403







Ring nut ⑤ (initial tightening):
52 Nm (5.2 m · kg, 37 ft · lb)

- LOOSEN THE RING NUT ⑤ COMPLETELY and retighten it to specification.

⚠ WARNING:

Do not over-tightening.

Ring nut ⑤ (final tightening):
3 Nm (0.3 m · kg, 2.2 ft · lb)

- Check the steering stem by turning it lock to lock. If there is any binding, remove the steering stem assembly and inspect the steering bearings ①, ③.
- Install the washer (rubber) ⑥.
- Install the ring nut (upper) ⑦.

NOTE:

The tapered side of ring nut must face downward.

- FINGER TIGHTEN THE RING NUT ⑦, then align the slots of both ring nuts. If not aligned, hold the lower ring nut ⑤ and tighten the other until they are aligned.
- Install the lock washer ⑧.

NOTE:

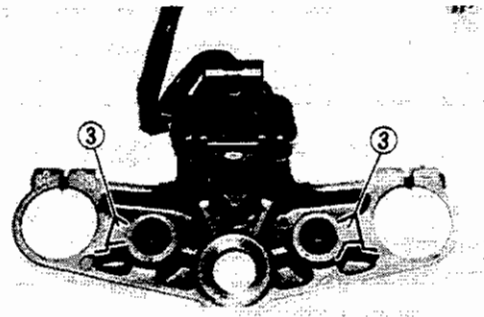
Make sure that the lock washer tab is placed in the slots.

- Install the upper bracket ⑨ and tighten the steering stem nut ⑩ to specification.

Nut (steering stem):
110 Nm (11.0 m · kg, 80 ft · lb)

8. Install:
   - Handlebars (left and right) ①

Bolt (handlebar):
28 Nm (2.8 m · kg, 20 ft · lb)

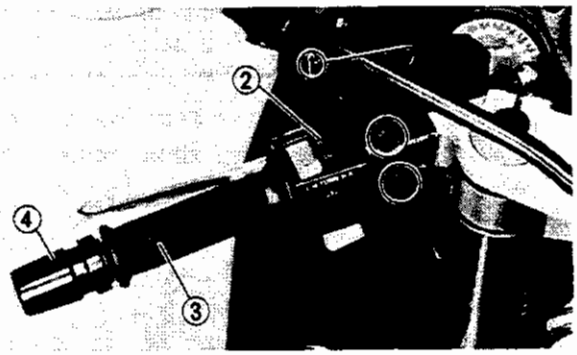


9. Install:
   - Handlebar bosses (left and right) ②

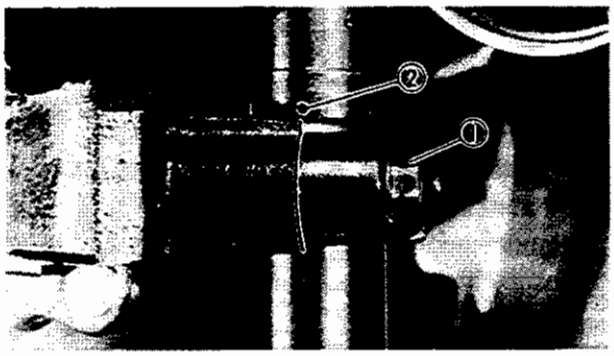
	Bolt (handlebar boss): **20 Nm (2.0 m · kg, 14 ft · lb)**

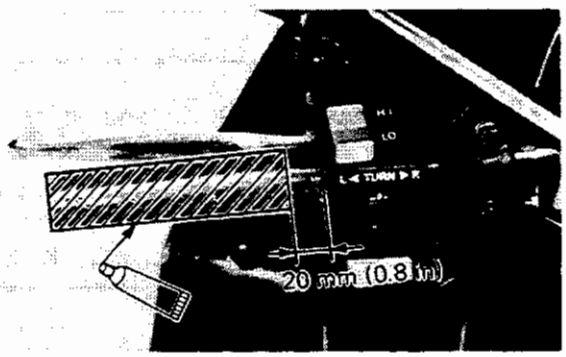
NOTE:

Make sure that the projection ③ on the upper bracket are meshed with slot ④ on the handlebar boss.



10. Install:
    - Master cylinder (clutch) ①
    - Handlebar switch (left) ②
    - Handlebar grip (left) ③
    - Handlebar grip end (left) ④





Handlebar (left) installation steps:

- Install the master cylinder (left) by aligning the slit in the master cylinder holder ① with the punched mark ② on the handlebar.

	Bolt (master cylinder holder): **9 Nm (0.9 m · kg, 6.5 ft · lb)**

⚠ CAUTION:

- **Install the master cylinder holder with the "UP" mark facing upward.**
- **Tighten first the upper bolt, then the lower bolt.**

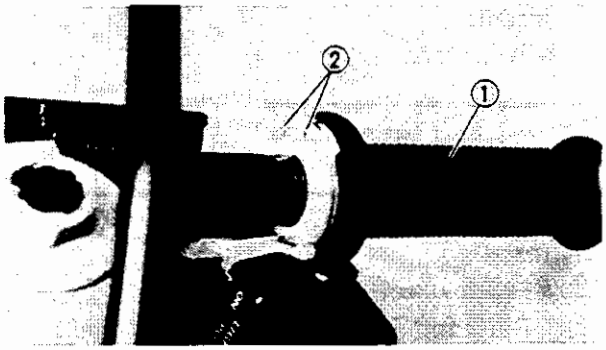
- Install the handlebar switch (left).
- Apply a light coat of rubber adhesive to the 20 mm (0.8 in) space (as shown) at the end of the handlebar.
- Fit the handlebar grip fully over the handlebar end.

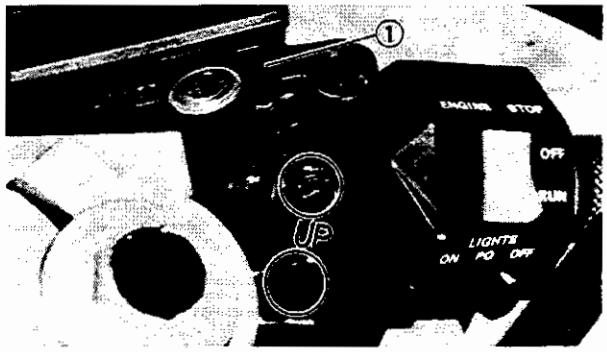
⚠ WARNING:

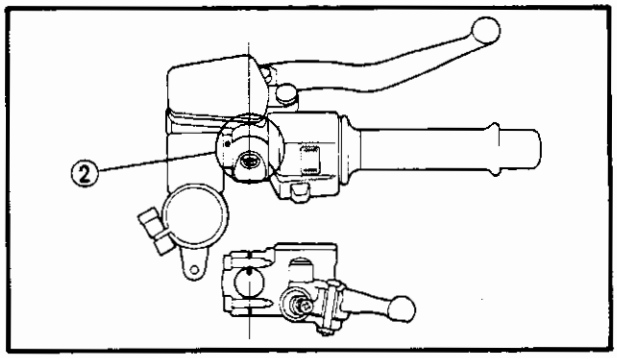
Let the adhesive dry completely. So the grip will be securely in place before moving the handlebar.

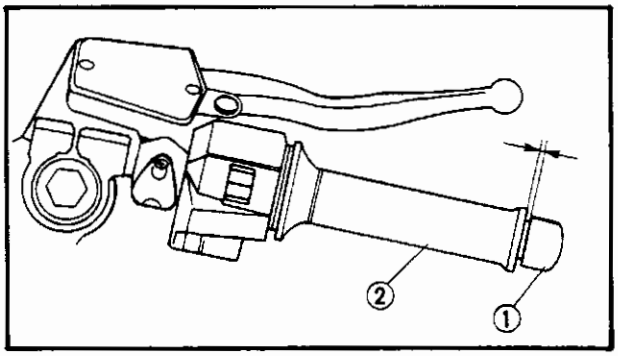
- Install the handlebar grip end (left).

	Handlebar grip end: **25 Nm (2.5 m · kg, 18 ft · lb)**









11. Install:
- Throttle grip ①
- Throttle cable ②
- Handlebar switch (right)

NOTE:

Before installing the throttle grip, apply a light coat of lithium soap base grease onto the surfaces where the handlebar and throttle grip make contact.

12. Install:
- Master cylinder (front brake) ①

⚠ CAUTION:

- **Install the master cylinder holder with the "UP" mark facing upward.**
- **Align the end of the holder with the punch mark ② on the handlebar.**
- **Tighten first the upper bolt, then the lower bolt.**

	Bolts (master cylinder holder): 9 Nm (0.9 m · kg, 6.5 ft · lb)

13. Install:
- Handlebar grip end (right) ①

⚠ WARNING:

Provide a clearance of 1 mm (0.04 in) between the handlebar grip ② and the handlebar grip end ① . Otherwise, the grip may not move.

	Handlebar grip end: 25 Nm (2.5 m · kg, 18 ft · lb)

14. Install:
    - Front fender



Bolt (front fender):
9 Nm (0.9 m · kg, 6.5 ft · lb)

15. Install:
    - Front wheel

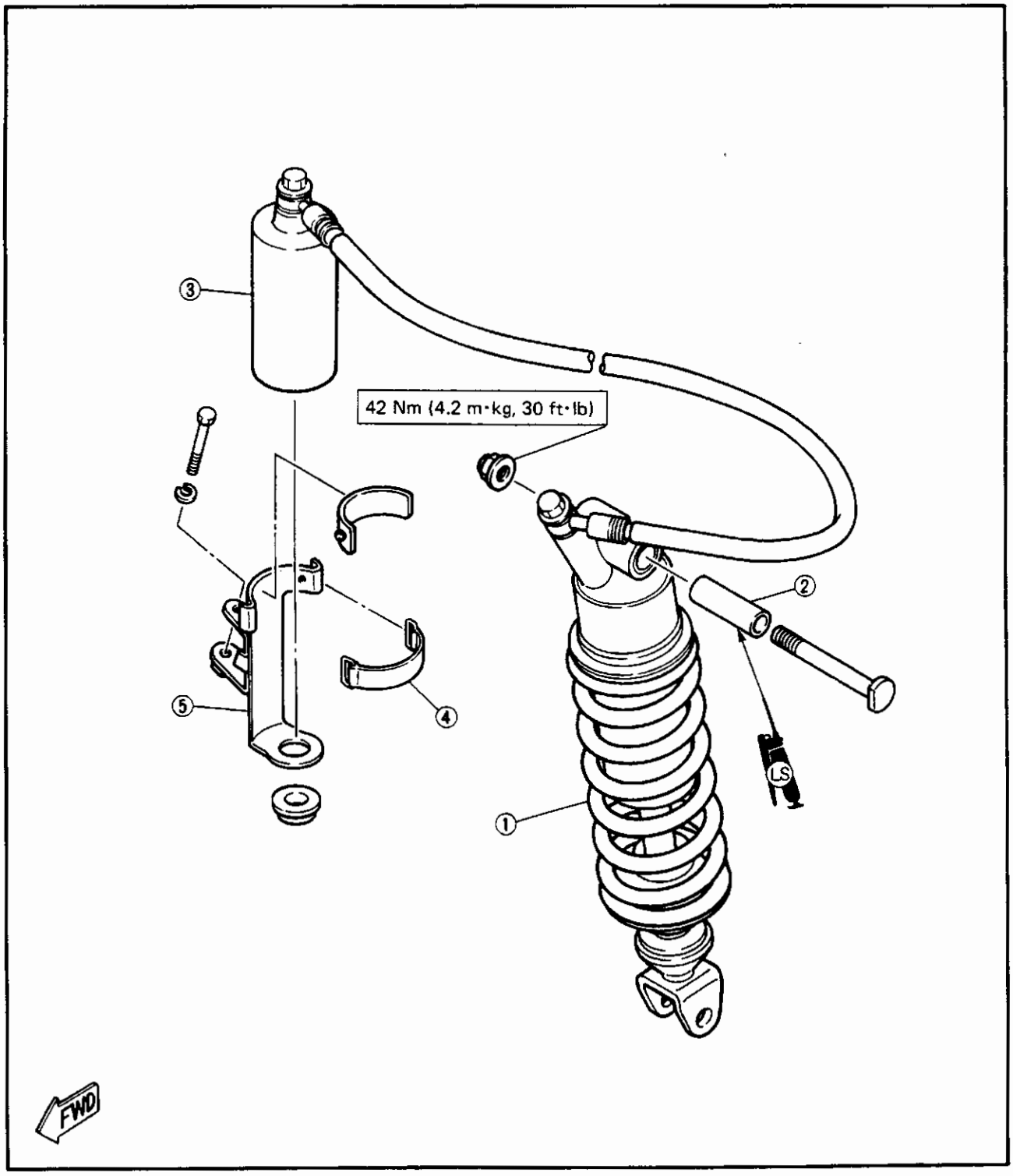
    Refer to "FRONT WHEEL" section.



Front wheel axle:
58 Nm (5.8 m · kg, 42 ft · lb)
Bolt (brake caliper):
35 Nm (3.5 m · kg, 25 ft · lb)
Pinch bolt (front fork):
20 Nm (2:0 m · kg, 14 ft · lb)

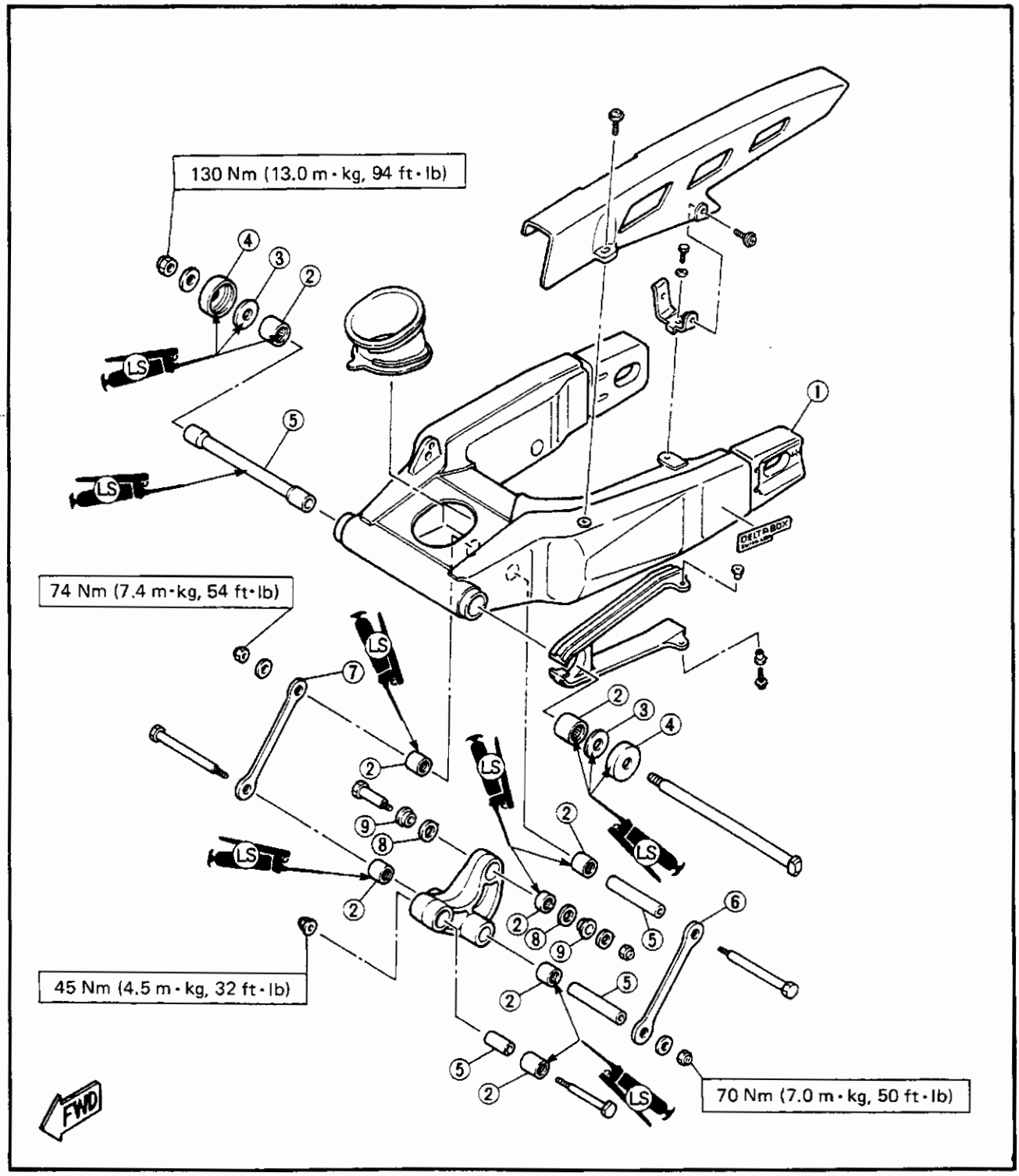
REAR SHOCK ABSORBER AND SWINGARM

① Shock absorber
② Collar
③ Sub tank (shock absorber)
④ Band
⑤ Stay



① Swingarm
② Bearing
③ Thrust washer
④ Thrust cover
⑤ Collar
⑥ Arm 1
⑦ Arm 2
⑧ Oil seal
⑨ Dust cover

NOTE:
Coat the bearings, bushings, thrust covers, oil seals, and collars with a liberal amount of light weight lithium-soap base grease before installing. After installing, thoroughly wipe off excess grease.

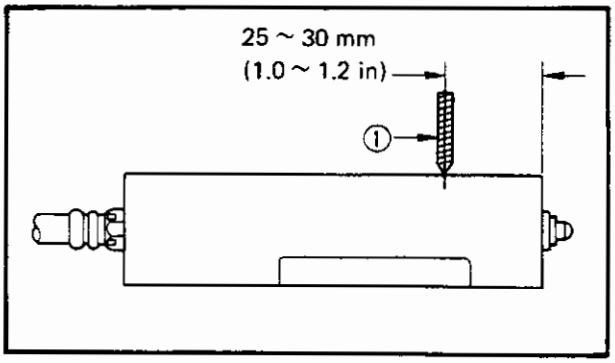


HANDLING NOTES

⚠ WARNING:

This shock absorber contains highly compressed nitrogen gas. Read and understand the following information before handling the shock absorber. The manufacturer cannot be held responsible for property damage or personal injury that may result from improper handling.

1. **Do not tamper or attempt to open the cylinder assembly.**
2. **Do not subject shock absorber to an open flame or other high heat. This may cause the unit to explode due to excessive gas pressure.**
3. **Do not deform or damage the cylinder in any way. Cylinder damage will result in poor damping performance.**



DISPOSAL NOTES

Shock absorber disposal steps:

Gas pressure must be released before disposing the shock absorber. To do so, drill ① a 2 ~ 3 mm (0.08 ~ 0.12 in) hole through the cylinder wall at a point 25 ~ 30 mm (1.0 ~ 1.2 in) under the spring seat.

⚠ CAUTION:

Wear eye protection to prevent eye damage from escaping gas and/or metal chips.

REMOVAL

Rear Shock Absorber

1. Place the motorcycle on a level place.

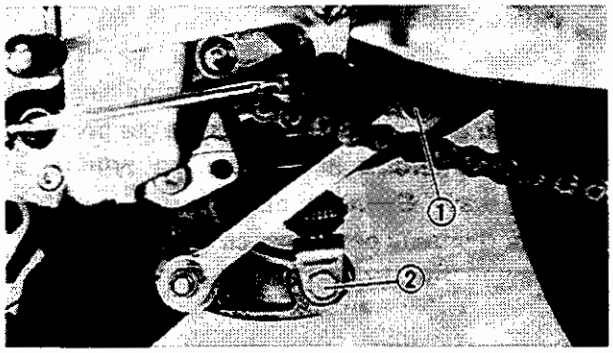
⚠ WARNING:

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

2. Remove:
   - Side cowlings (left and right)
   - Front cover
   - Side covers (left and right)

   Refer to the "COWLINGS" section in the CHAPTER 3.
   - Seat
   - Fuel tank

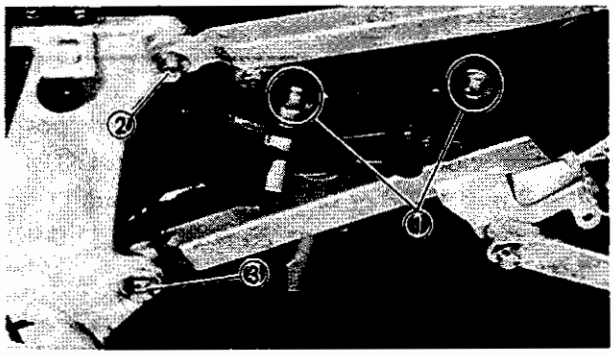
   Refer to the "FUEL TANK" section in the CHAPTER 3.



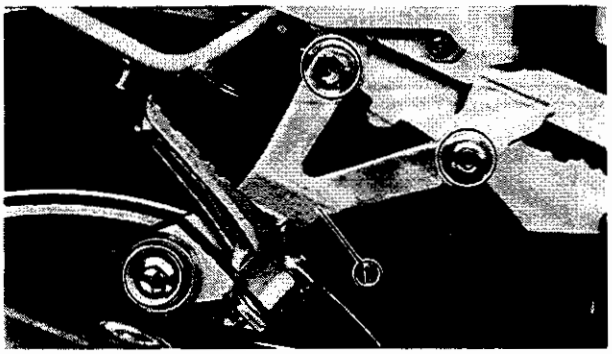
3. Remove:
   - Bolt (compration arm – swingarm) ①
   - Bolt (rear shock absorber – lower) ②

⚠ WARNING:

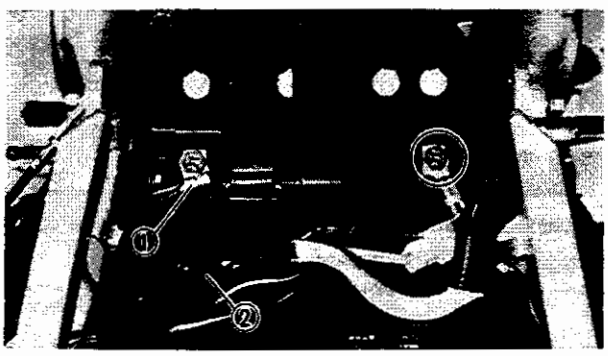
When removing the bolt (compration arm) ①, hold the swingarm so that it does not drop downwards when the bolt removed.



4. Remove:
   - Bolts (EXUP motor) ①
   - Bolts (rear fram – upper) ②
5. Loosen:
   - Bolts (rear fram – lower) ③



6. Remove:
   - Muffler stay ①
7. Push down the rear fram end.

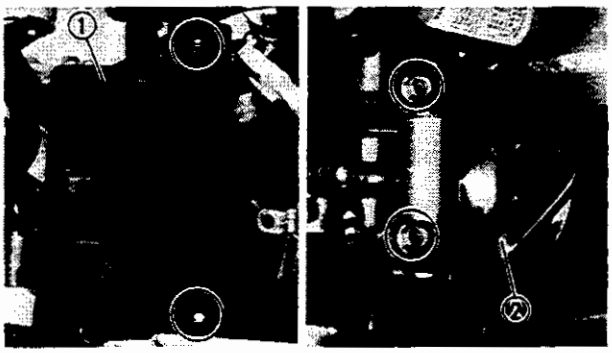


8. Disconnect:
   - Battery leads
   - Starter relay ②

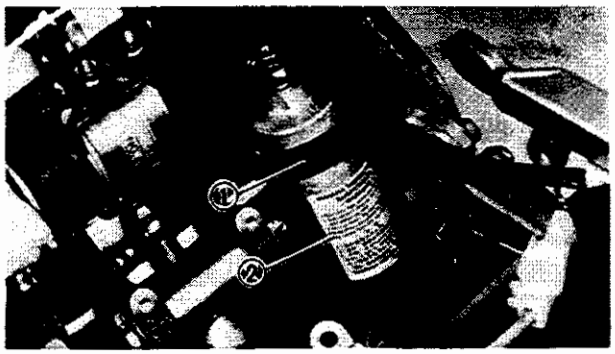
   (from battery case)

⚠ CAUTION:

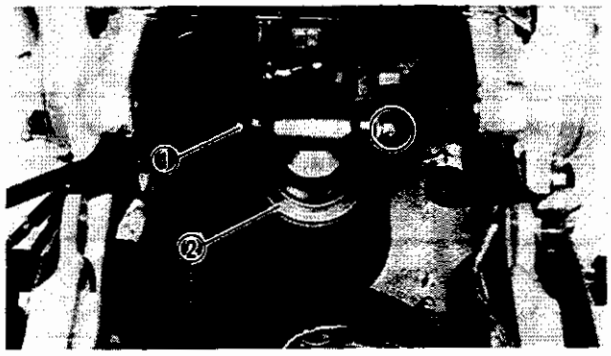
Disconnect the negative lead ① first and then disconnect the positive lead.



9. Remove:
   - Battery case ①
   - Stay (battery case) ②



10. Remove:
    - Band ①
    - Sub tank (shock absorber) ②
      (from sub tank bracket)



11. Remove:
    - Bolt (shock absorber – top) ①
    - Rear shock absorber ②

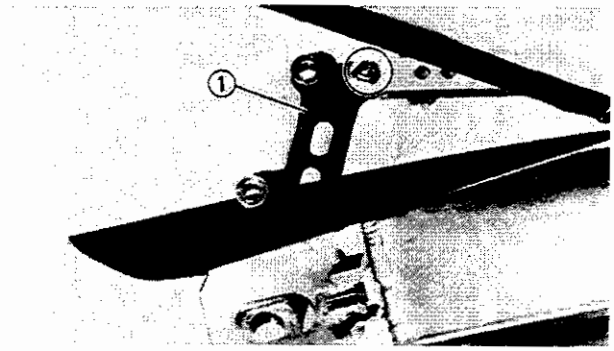
Swingarm

WARNING:

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

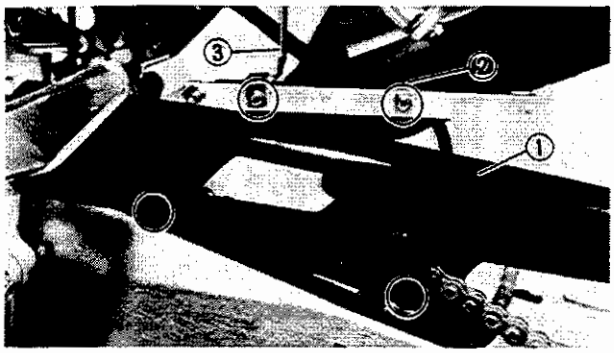
1. Elevate the rear wheel by placing a suitable stand under the engine.

2. Remove:
   - Rear shock absorber
     Refer to the "REAR SHOCK ABSORBER" section.
   - Rear wheel
     Refer to the "REAR WHEEL" section.

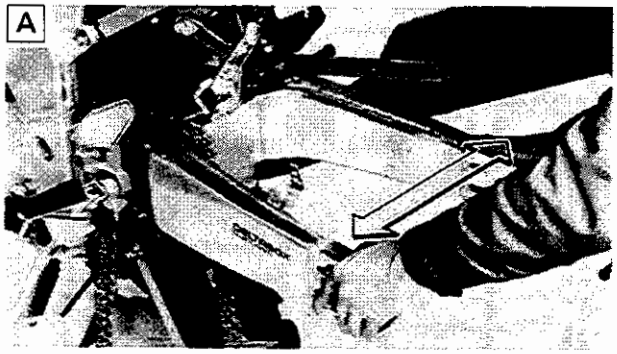


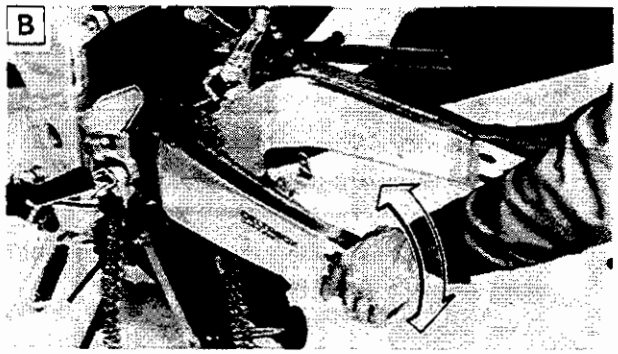
3. Remove:
   - Caliper bracket ①

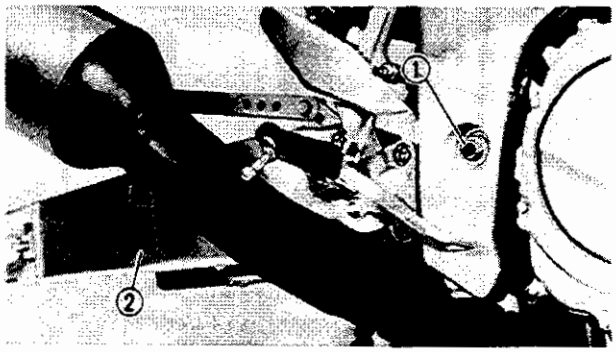
   Refer to "FRONT AND REAR BRAKE – CALIPER DISASSEMBLY" section.



4. Remove:
   - Chain case ①
   - Brake hose holder ②
   - Brake hose guide ③







5. Check
   - Swingarm free play

Inspection steps:
- Check the tightening torque of the pivot shaft (swingarm) securing nut.

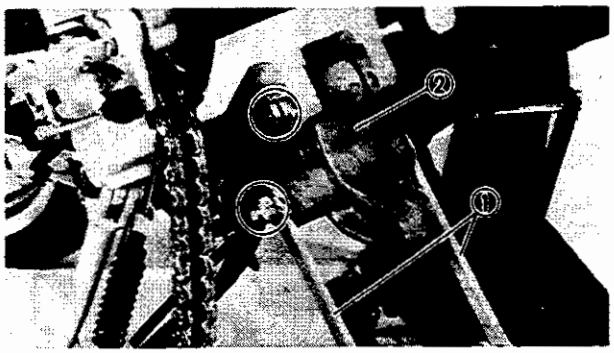
Nut (swingarm-pivot shaft):
130 Nm (13 m · kg, 94 ft · lb)

- Check the swingarm side play [A] by moving it from side to side.
  If side play noticeable, check the inner collar, bearing, washer and thrust cover.

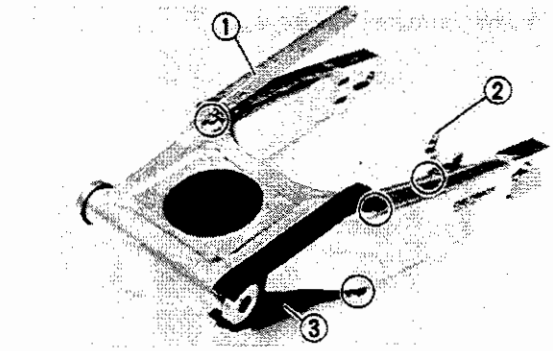
Side play (at end of swingarm):
1.0 mm (0.04 in)

- Check the swingarm vertical movement [B] by moving it up and down.
  If vertical movement is tight, binding or rough, check the inner collar, bearing, washer and thrust cover.

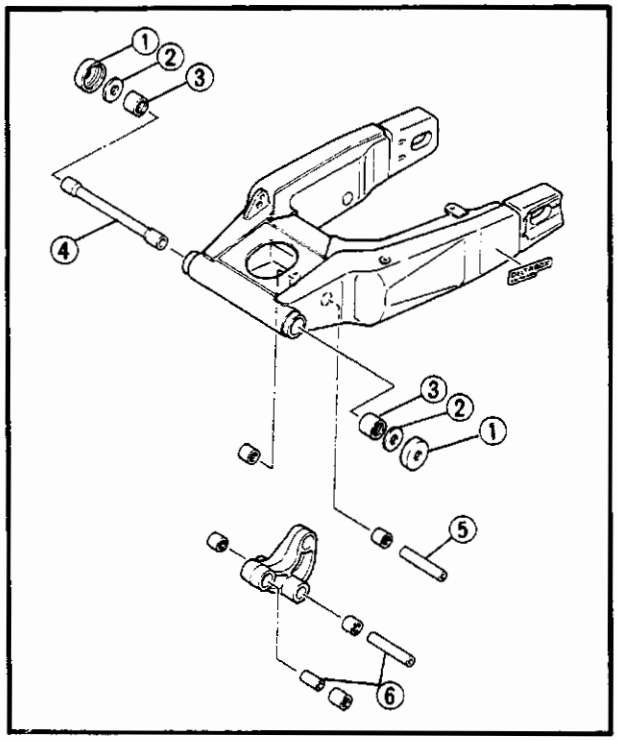
6. Remove:
   - Nut (pivot shaft) ①
   - Washer
   - Pivot shaft
   - Swingarm ②



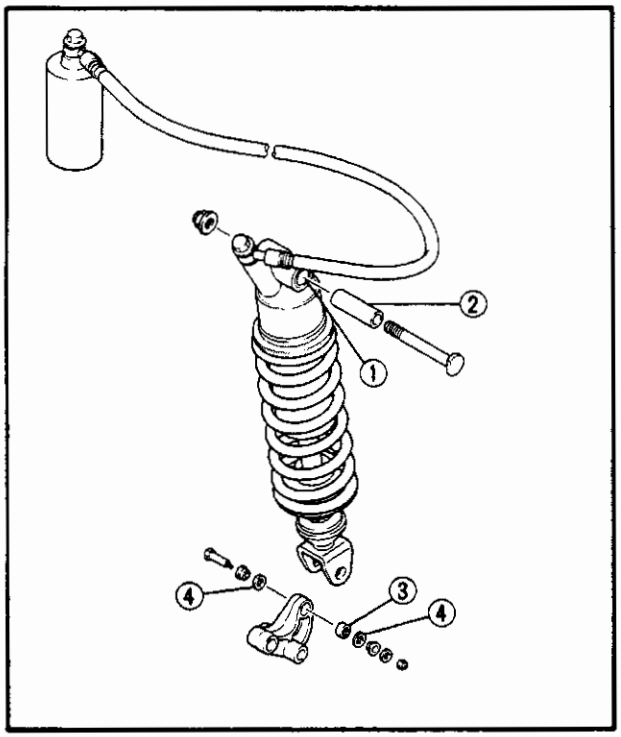
7. Remove:
   - Compression arms (left and right) ①
   - Relay arm ②



8. Remove:
   - Cotter pin
   - Tension bar ①
   - Chain guide ②
   - Chain guide ③



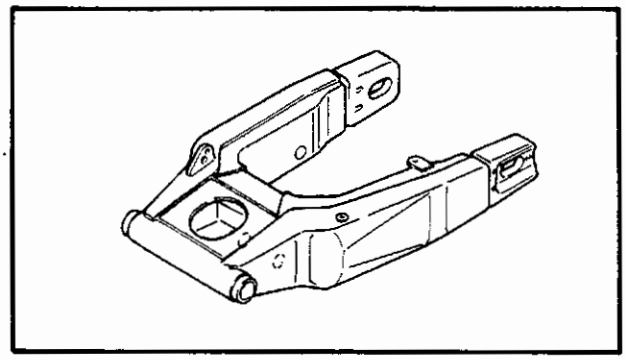
9. Remove:
   - Thrust covers ①
   - Thrust washers ②
   - Bearings ③
   - Inner collar (swingarm) ④
   - Inner collar (compression arm) ⑤
   - Collars (relay arm) ⑥



INSPECTION

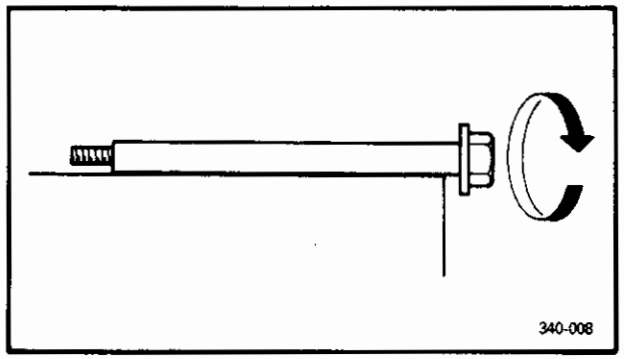
Rear Shock Absorber

1. Inspect:
   - Rear shock absorber
     Oil leaks/Damage → Replace.
2. Inspect:
   - Bushings ①
   - Inner collar ②
   - Bearing ③
   - Oil seals ④
     Wear/Damage → Replace.



Swingarm

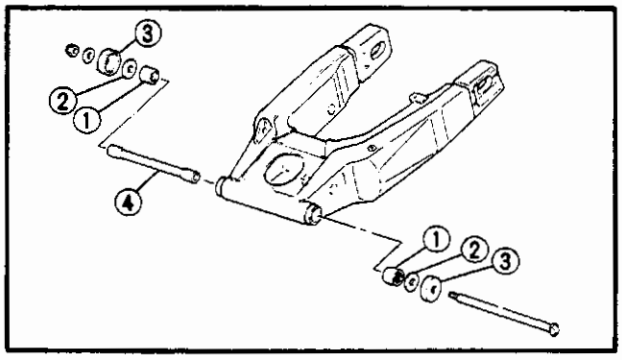
1. Inspect:
   - Swingarm
     Crack/Bents/Damage → Replace.



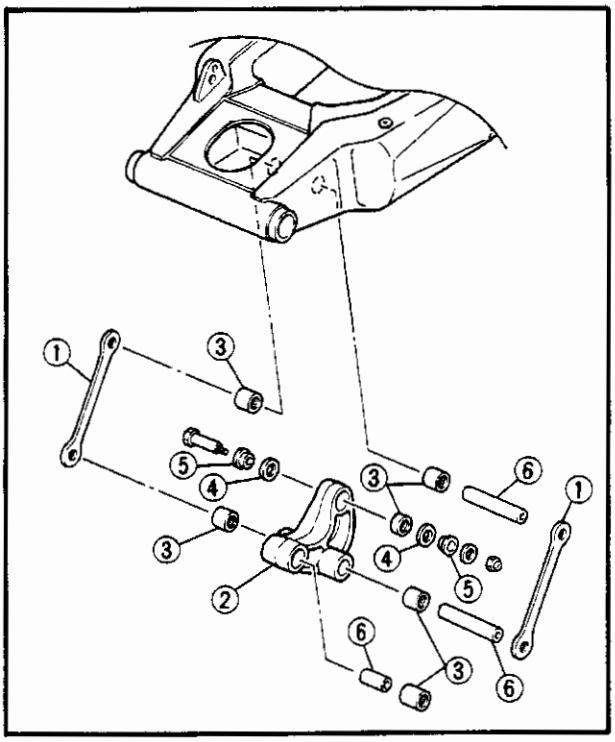
2. Inspect:
   - Pivot shaft ①
     Roll the axle on a flat surface.
     Bents → Replace.

⚠ WARNING:

Do not attempt to straighten a bent axle.



3. Wash the swingarm pivoting parts in a solvent.
4. Inspect:
   - Bearings (race/rollers) ①
     Pitting/Damage → Replace.
   - Thrust washers ②
   - Thrust covers ③
     Wear/Damage → Replace.
   - Inner collar ④
     Wear/Bents/Damage → Replace.



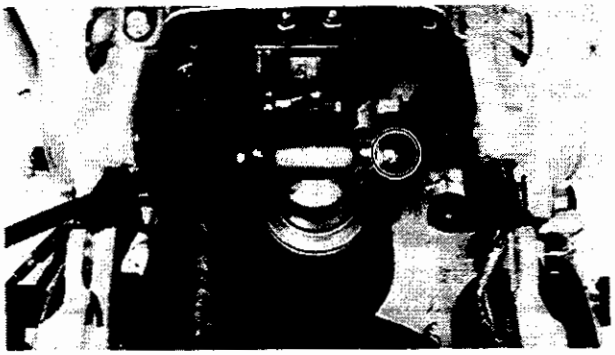
5. Inspect:
   - Compretion arm ①
     Bents/Damage → Replace.
   - Relay arm ②
     Cracks/Damage → Replace.
   - Bearings ③
     Pitting/Damage → Replace.
   - Oil seals ④
   - Dust covers ⑤
   - Inner collars ⑥
     Damage → Replace.

INSTALLATION

Rear Shock Absorber

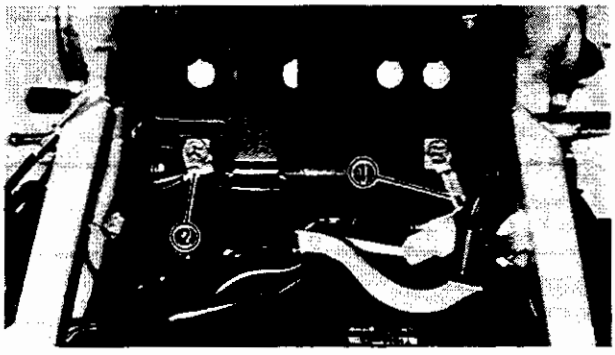
Reverse the "REMOVAL" procedure.
Note the following points.

1. Lubricate:
   - Bearings
   - Oil seals
   - Collars
   - Bushings



	Lithium soap base grease

2. Install:
   - Rear shock absorber

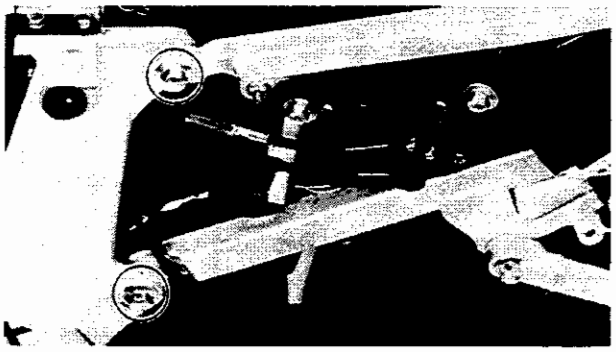


	Nut (shock absorber – top): 42 Nm (4.2 m · kg, 30 ft · lb)

3. Connect:
   - Battery leads

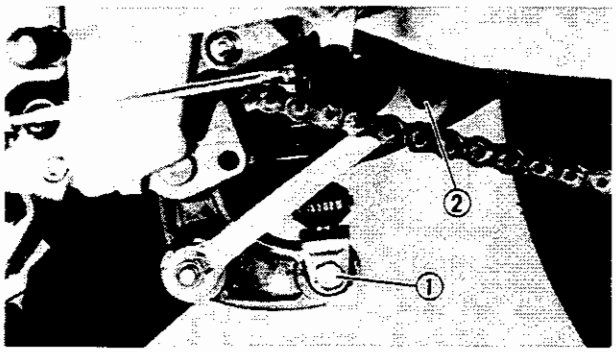
⚠ CAUTION:

Connect the positive lead ① first, and then connect the negative lead ② .



4. Tighten:
   • Bolts (rear frame – lower/upper)

	Bolt (rear frame – lower/upper): 55 Nm (5.5 m·kg, 40 ft·lb)



5. Tighten:
   • Nut (rear shock absorber – lower) ①
   • Nut (compration arm – swingarm) ②

	Nut (rear shock absorber – lower): 42 Nm (4.2 m·kg, 30 ft·lb) **Nut (compration arm – swingarm): 70 Nm (7.0 m·kg, 50 ft·lb)**

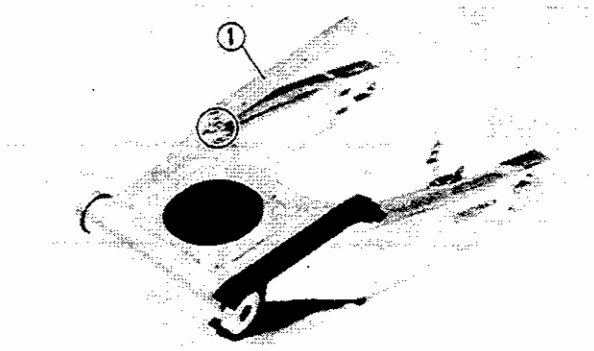
6. Adjust:
   • Rear shock absorber
   Refer to the "REAR SHOCK ABSORBER ADJUSTMENT" section in the CHAPTER 3.

Swingarm

Reverse the "REMOVAL" procedure.
Note the following points.

1. Lubricate:
   • Bearings
   • Inner collars
   • Thrust washers
   • Pivot shaft

	Lithium soap base grease

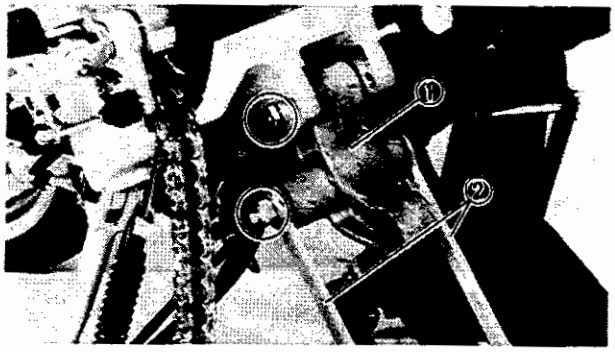


2. Install:
   • Tension bar ①
   (to swingarm)

	Nut (tension bar): 28 Nm (2.8 m·kg, 20 ft·lb)

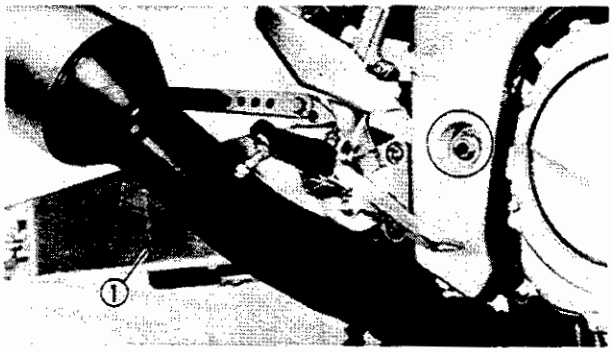
⚠ WARNING:

Always use a new cotter pin.



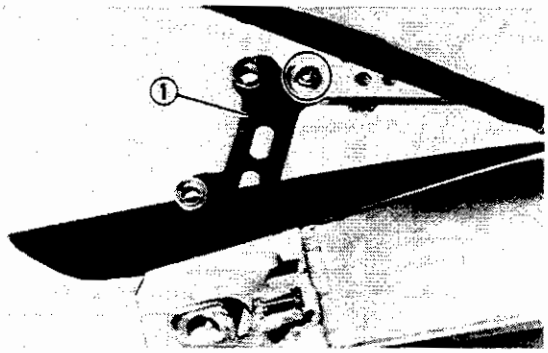
3. Tighten:
   - Nut (relay arm – frame) ①
   - Nut (compration arm – relay arm) ②

	Nut (relay arm – frame): **45 Nm (4.5 m · kg, 32 ft · lb)** **Nut (compration arm – relay arm):** **70 Nm (7.0 m · kg, 50 ft · lb)**



4. Install:
   - Swingarm ①

	Nut (pivot shaft): **130 Nm (13.0 m · kg, 94 ft · lb)**



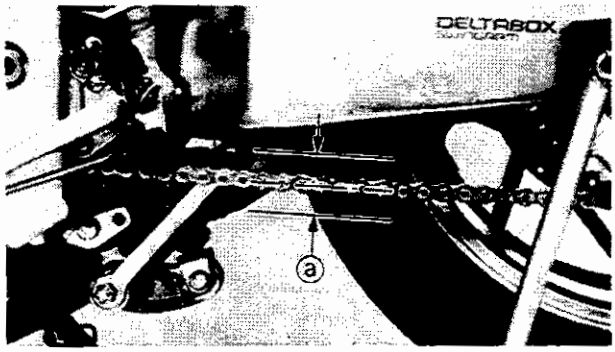
5. Install:
   - Caliper bracket ①
   - Brake caliper (rear)

	Nut (tensionbar – caliper bracket): **28 Nm (2.8 m · kg, 20 ft · lb)** **Brake caliper (rear):** **35 Nm (3.5 m · kg, 25 ft · lb)**

Refer to "FRONT AND REAR BRAKE" section.

6. Install:
   - Rear wheel
     Refer to the "REAR WHEEL" section.
   - Rear shock absorber
     Refer to the "Rear Shock Absorber" section.

	Nut (rear wheel axle): **150 Nm (15.0 m · kg, 108 ft · lb)** **Bolt (brake caliper):** **35 Nm (3.5 m · kg, 25 ft · lb)**



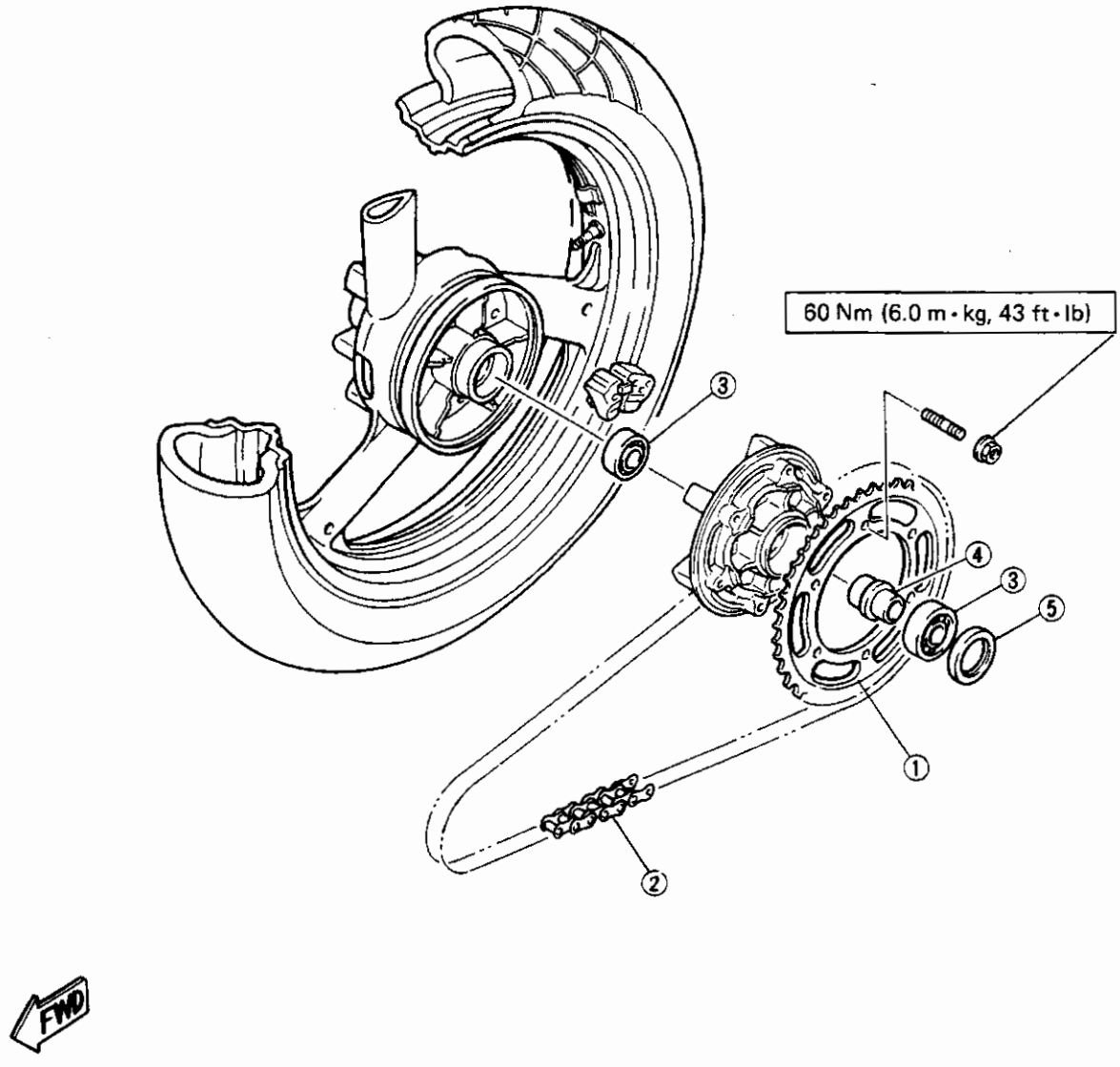
7. Adjust:
   - Drive chain slack ⓐ
     Refer to the "DRIVE CHAIN SLACK ADJUSTMENT" section in the CHAPTER 3.

	Drive chain slack: **15 ~ 20 mm (0.6 ~ 0.8 in)**

DRIVE CHAIN AND SPROCKETS

① Driven sprocket
② Drive chain
③ Bearing
④ Collar
⑤ Oil seal

A	DRIVE CHAIN:
B	TYPE: 532ZLV
C	NO. OF LINKS: 110
D	DRIVE CHAIN SLACK: 15 ~ 20 mm (0.6 ~ 0.8 in)

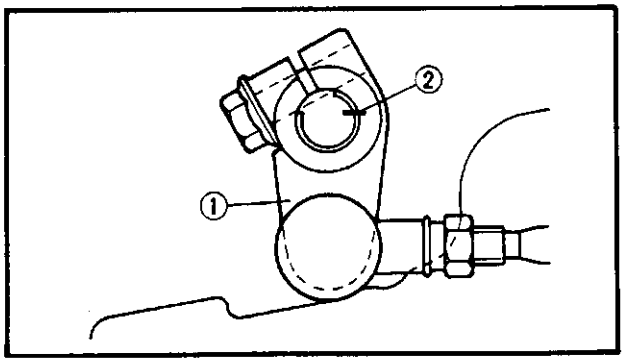


NOTE:
Before removing the drive chain and sprockets, drive chain slack and 10-link length of drive chain should be measured.

REMOVAL

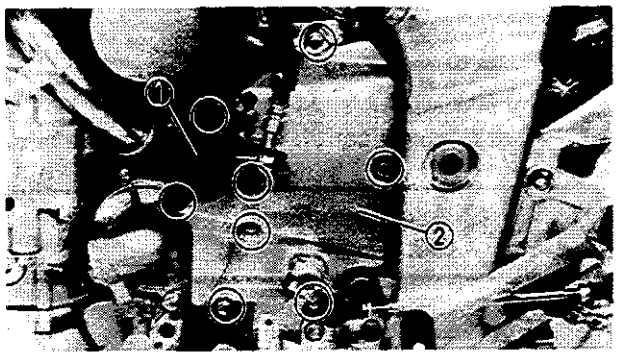
1. Place the motorcycle verticaly on a level place.

⚠ WARNING:
Securely support the motorcycle so there is no danger of it falling over.



2. Remove:
   - Shift pedal link ①

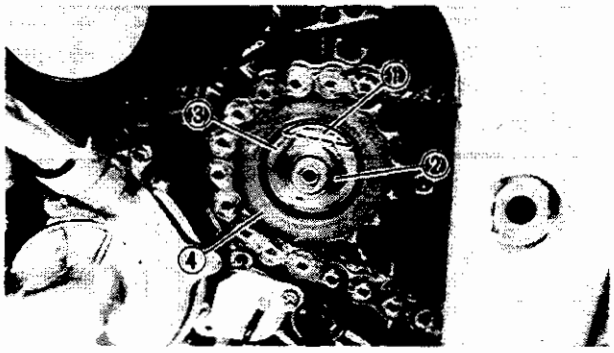
NOTE:
Put marks ② on the shift pedal link and shift shaft before removing out so that shift pedal link can be reinstalled in the original position.



3. Remove:
   - Clutch release cylinder ①
   - Dowel pins
   - Crankcase cover (left) ②
   - Dowel pins
   - Gasket
   - Spacer collar (shift shaft)

4. Loosen:
   - Drive chain

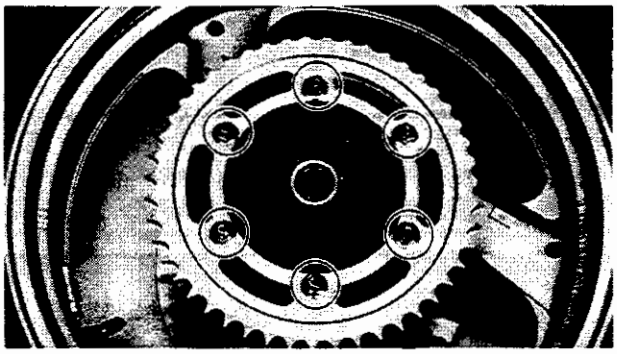
   Refer to the "DRIVE CHAIN SLACK ADJUSTMENT" section in the CHAPTER 3.



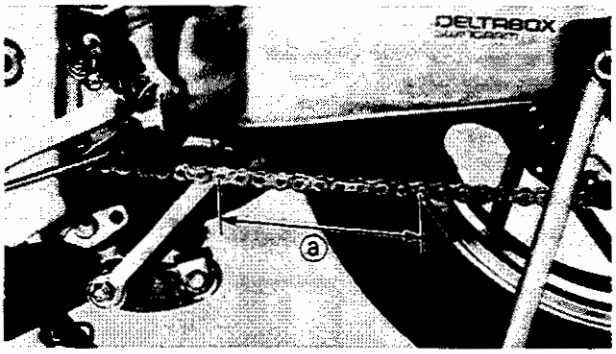
5. Straighten:
   - Lock washer tab ①
6. Remove:
   - Nut (drive sprocket) ②
   - Lock washer ③
   - Drive sprocket ④

NOTE:
Loosen the nut (drive sprocket) while applying the rear brake.

7. Remove:
   - Rear wheel
     Refer to the "REAR WHEEL" section.
   - Swingarm
   - Drive chain
     Refer to the "REAR SHOCK ABSORBER AND SWINGARM" section.



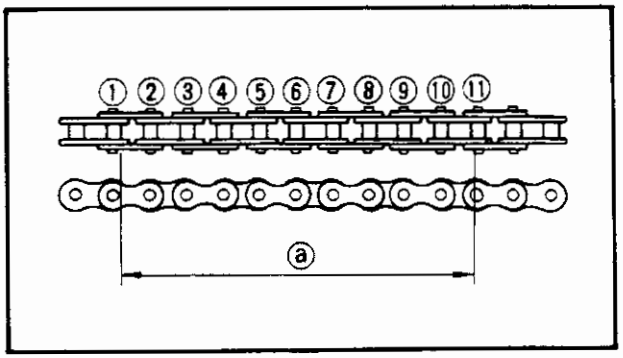
8. Remove:
   - Driven sprocket



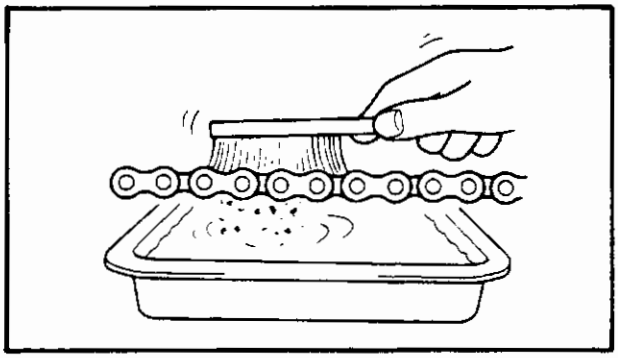
INSPECTION AND CLEANING

1. Measure:
   - 10-link length ⓐ (drive chain)
     Out of specification → Replace drive chain.

10-link length limit:
150.1 mm (5.91 in)

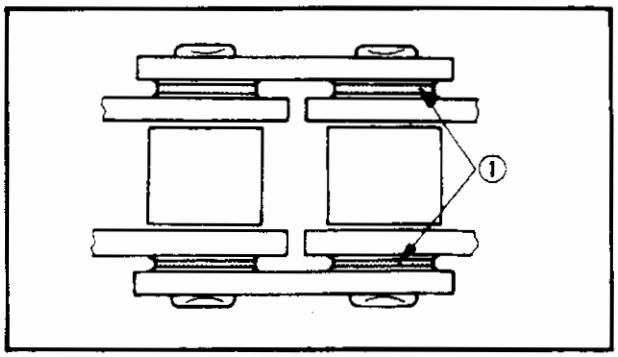


NOTE:
- For measurement make the chain tense by finger.
- 10-link length is a measurement between the insides of the ① and ⑪ rollers as shown.
- Two or three different 10-link lengths should be measured.



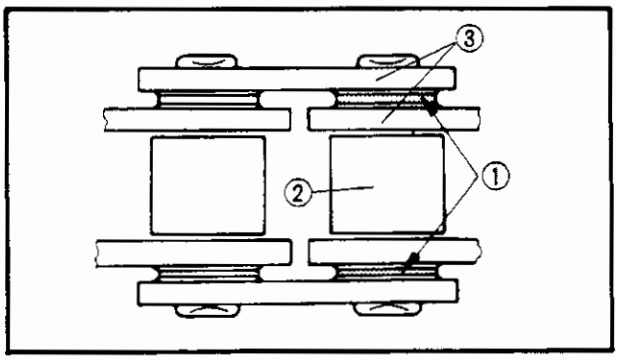
2. Clean:
   - Drive chain

   Place it in kerosene, and brush off as much dirt as possible. Then remove the chain from the kerosene and dry the chain.



⚠ CAUTION:

This motorcycle has a drive chain with small rubber o-rings ① between the chain plates. Steam cleaning, high-pressure washes, and certain solvent can damage these O-rings. Use only kerosene to clean the drive chain.



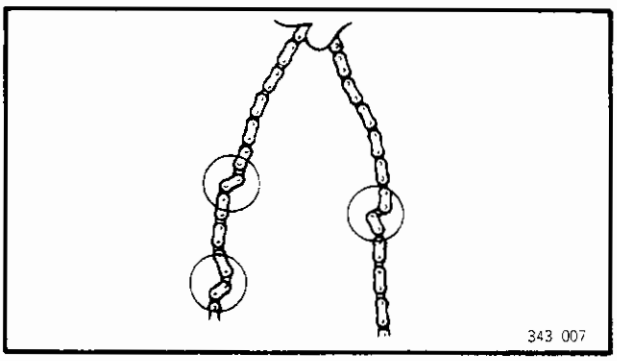
3. Inspect:
   - O-rings ① (Drive chain)

     Damage → Replace drive chain.
   - Rollers ②
   - Side plates ③

     Damage/Wear → Replace drive chain.

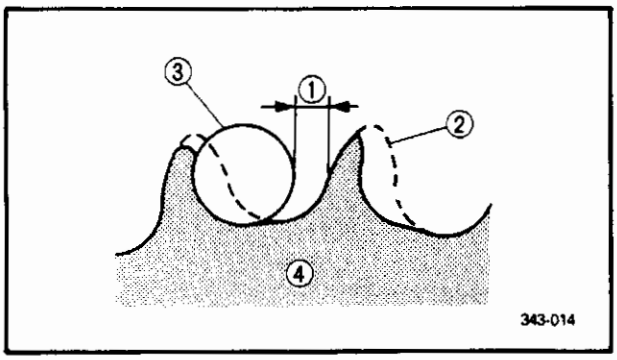
4. Lubricate:
   - Drive chain

Drive chain lubricant:
SAE 30 ~ 50 motor oil



5. Inspect:
   - Drive chain stiffness

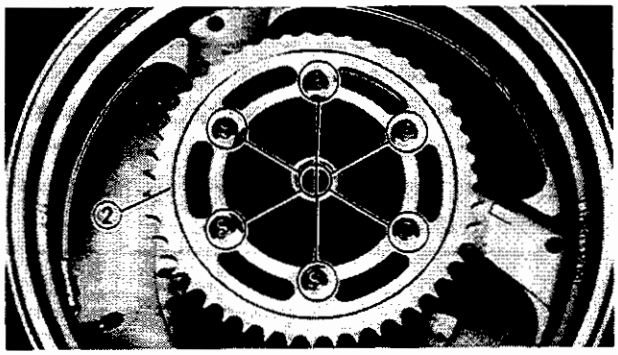
     Stiff → Clean and lubricate or replace.



6. Inspect:
   - Drive sprocket
   - Driven sprocket

   More than 1/4 teeth ① wear → Replace sprocket.
   Bent teeth → Replace sprocket.

② Correct
③ Roller
④ Sprocket



Driven sprocket replacement steps:
- Remove the self-locknuts ① , and driven sprocket ② .
- Clean the hub, especially on the surfaces in contact with the sprocket, using clean cloth.
- Install the new driven sprocket.

NOTE:
Tighten the self-locknuts in stage, using a crisscross pattern.

Self - locknut (driven sprocket): 60 Nm (6.0 m · kg, 43 ft · lb)

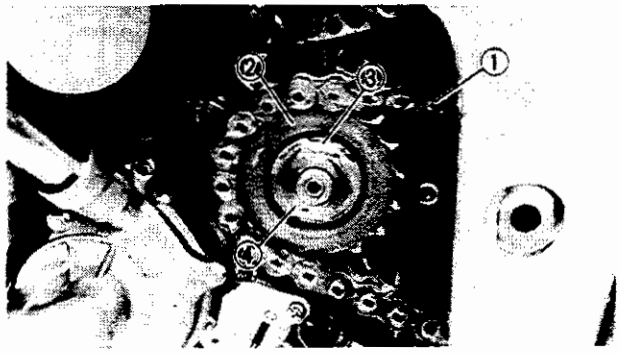
INSTALLATION

Reverse the "REMOVAL" procedure.
Note the following points.

1. Install:
   - Drive chain
   - Swingarm

     Refer to the "REAR SHOCK ABSORBER AND SWINGARM" section.
   - Rear wheel

     Refer to the "REAR WHEEL" section.

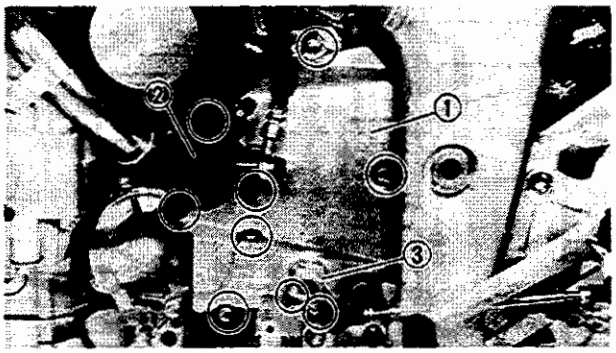


2. Install:
   - Drive chain ①
   - Drive sprocket ②
   - Lock washer ③
   - Nut (drive sprocket) ④

Nut (drive sprocket): 70 Nm (7.0 m · kg, 50 ft · lb)

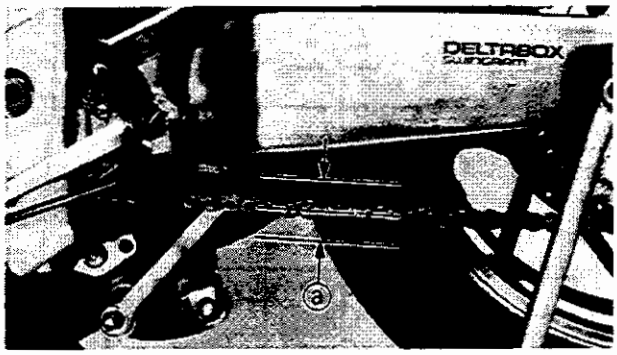
NOTE:
Tighten the nut (drive sprocket) while applying the rear brake.

WARNING:
Always use a new lock washer.



3. Install:
   - Spacer collar (shift shaft)
   - Gasket
   - Dowel pins
   - Crankcase cover (left) ①
   - Dowel pins
   - Clutch release cylinder ②
   - Change pedal link ③

Bolt (crank casecover – left):
10 Nm (1.0 m · kg, 7.2 ft · lb)
Bolt (clutch release cylinder):
10 Nm (1.0 m · kg, 7.2 ft · lb)
Bolt (change pedal link):
10 Nm (1.0 m · kg, 7.2 ft · lb)



4. Adjust:
   - Drive chain slack
     Refer to the "DRIVE CHAIN SLACK ADJUSTMENT" section in the CHAPTER 3.

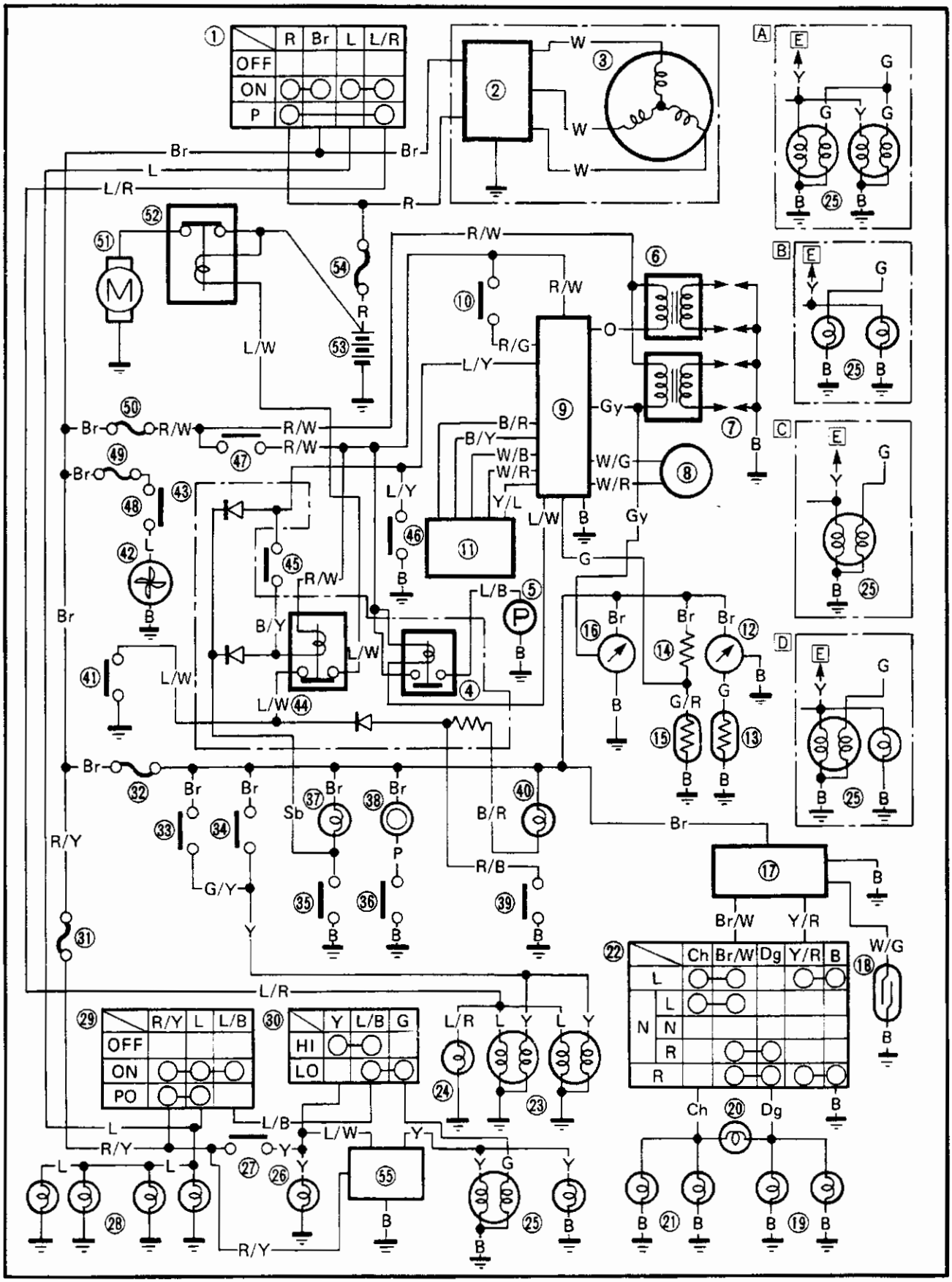
Drive chain slack:
15 ~ 20 mm (0.6 ~ 0.8 in)

CAUTION:
Too small chain slack will overload the engine and other vital parts; keep the slack within the specified limits.

WARNING:
Always use a new cotter pin on the axle nut.

ELECTRICAL

FZR1000 CIRCUIT DIAGRAM





① Main switch
② Rectifier/Regulator
③ AC generator
④ Fuel pump relay
⑤ Fuel pump
⑥ Ignition coil
⑦ Spark plug
⑧ Pick up coil
⑨ Digital ignitor unit
⑩ Reserve switch
⑪ EXUP servo motor
⑫ Engine temperature gauge
⑬ Thermo unit
⑭ Resistor
⑮ Fuel sender
⑯ Tachometer
⑰ Flasher relay
⑱ Reed switch
⑲ Front flasher light
⑳ "TURN" indicator light
㉑ Rearflasher light
㉒ "TURN" switch
㉓ Tail/Brake light
㉔ Auxiliary light
㉕ Headlight
㉖ "HIGH BEAM" indicator light
㉗ "PASS" switch
㉘ Meter light
㉙ "LIGHTS" switch
㉚ "LIGHTS" (dimmer) switch
㉛ Fuse (headlight)
㉜ Fuse (signal)
㉝ Front brake switch
㉞ Rear brake switch
㉟ Neutral switch
㊱ "HORN" switch
㊲ Neutral indicator light
㊳ Horn
㊴ Oil level switch
㊵ "OIL LEVEL" indicator light
㊶ "START" switch
㊷ Fan motor
㊸ Relay unit
㊹ Starting circuit cut-off relay
㊺ Clutch switch
㊻ Sidestand switch
㊼ "ENGINE STOP" switch
㊽ Thermo switch
㊾ Fuse (fan)
㊿ Fuse (ignition)
(51) Starter motor
(52) Starter relay
(53) Battery
(54) Fuse (main)
(55) Headlight relay (for D and F)
[A] for E, N, DK, GR, I and GB
[B] for B and S
[C] for CH
[D] for A, SF and NL
[E] from the "LIGHTS" (dimmer) switch ("Yellow" lead)

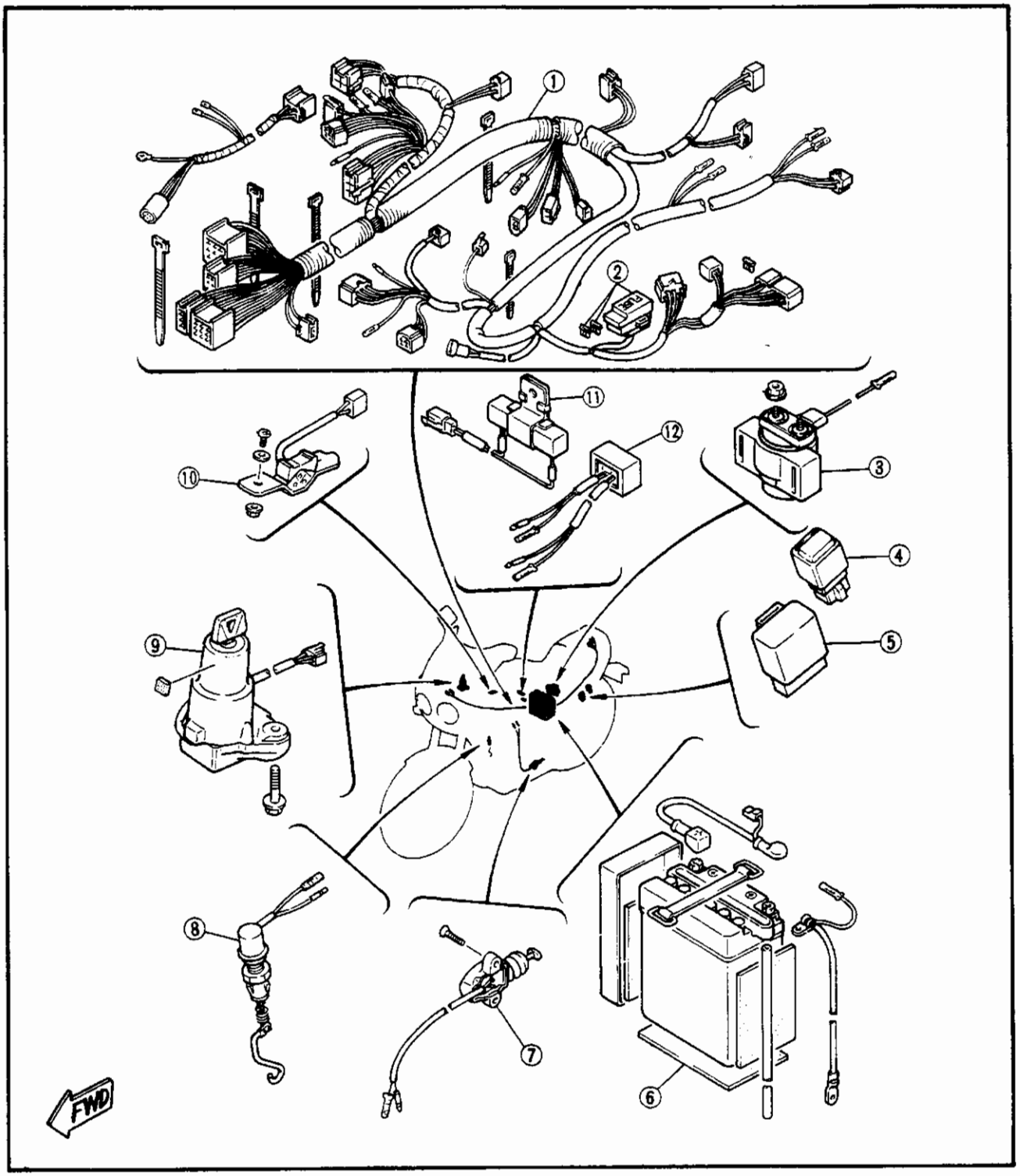
COLOR CODE

B	Black	Dg	Dark green	W/R	White/Red
R	Red	Gy	Gray	W/B	White/Black
O	Orange	Br	Brown	W/G	White/Green
L	Blue	L/B	Blue/Black	Y/L	Yellow/Blue
P	Pink	L/W	Blue/White	Y/R	Yellow/Red
Y	Yellow	L/Y	Blue/Yellow	Br/W	Brown/White
G	Green	L/R	Blue/Red	R/Y	Red/Yellow
W	White	B/Y	Black/Yellow	R/W	Red/White
Ch	Chocolate	B/R	Black/Red	R/G	Red/Green

ELECTRICAL COMPONENTS

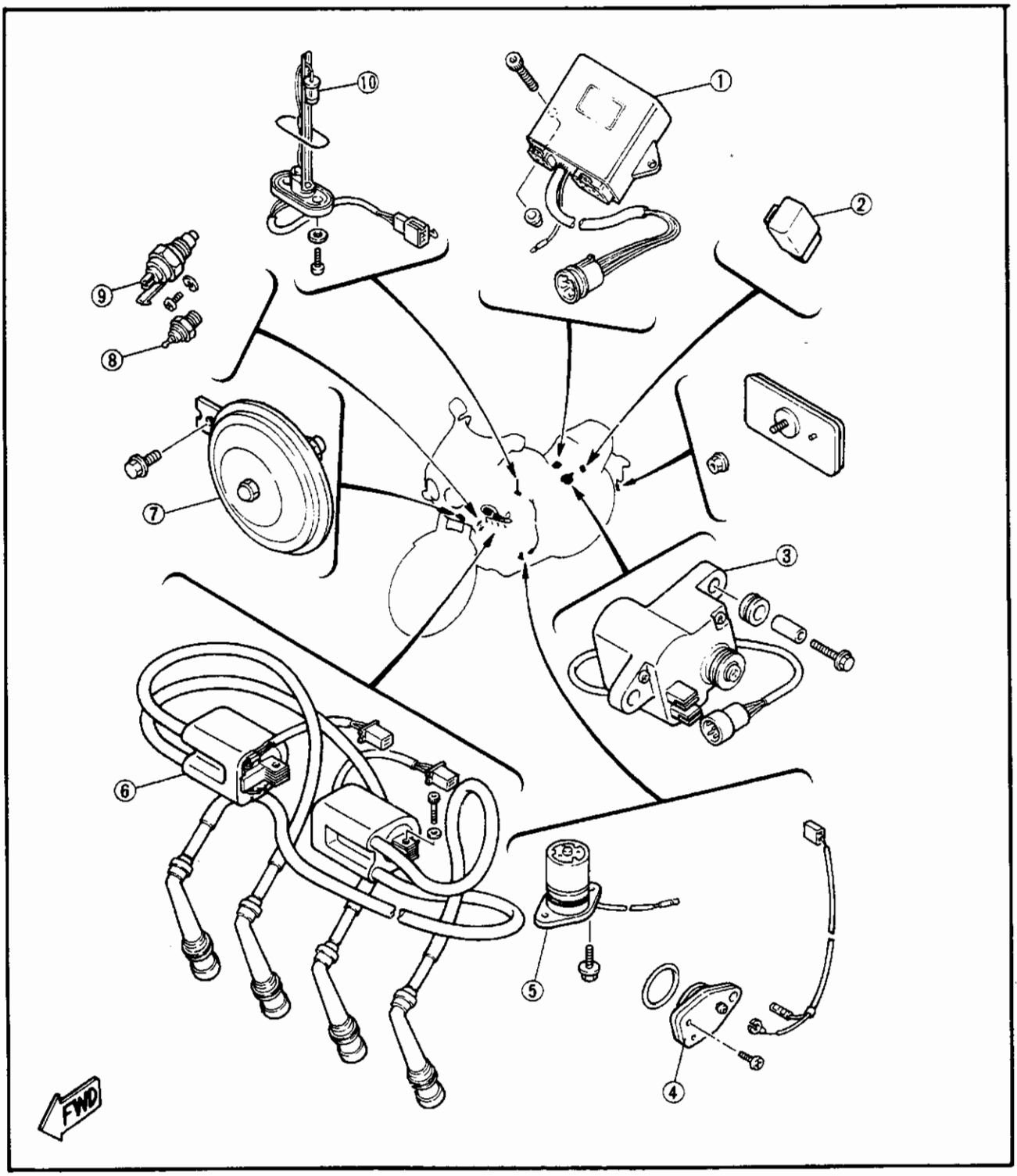
① Wireharness
② Fuse
③ Startor relay
④ Fuse (main)
⑤ Flasher relay
⑥ Battery
⑦ Sidestand switch
⑧ Rear brake switch
⑨ Main switch
⑩ Reserve switch
⑪ Resistor

BATTERY:
CAPACITY: 12V 14AH
SPECIFIC GRAVITY: 1.280



① Digital ignitor unit
② Relay unit
③ Exup servo motor
④ Neutral switch
⑤ Oil level switch
⑥ Ignition coil
⑦ Horn
⑧ Thermo unit
⑨ Thermo switch
⑩ Fuel sender

SPECIFICATIONS	RESISTANCE
IGNITION COIL:	
PRIMARY	1.8 ~ 2.2Ω at 20°C (65°F)
SECONDARY	9.6 ~ 14.4 kΩ at 20°C (68°F)
PICKUP COIL:	135 ~ 165Ω at 20°C (68°F)



CHECKING OF SWITCHES

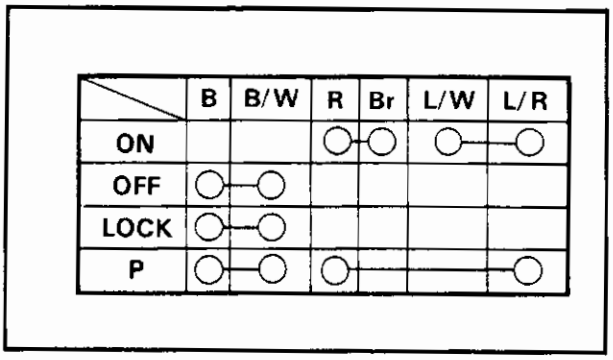
Check the switches for the continuity between the terminals to determine correct connection.

Read the following for switch inspection.

SWITCH CONNECTION AS SHOWN IN MANUAL

The manual contains a connection chart as shown left showing the terminal connections of the switches (e.g., main switch, handlebar switch, brake switch, lighting switch, etc.)

The extreme left column indicates the switch positions and the top line indicates the colors of leads connected with the terminals in the switch component.



"○—○" indicates the terminals between which there is a continuity of electricity; i.e., a closed circuit at the respective switch positions.

In this chart:
"R and Br" and "L/W and L/R" are continuous with the "ON" switch position.

"B and B/W" is continuous with the "OFF" switch position.

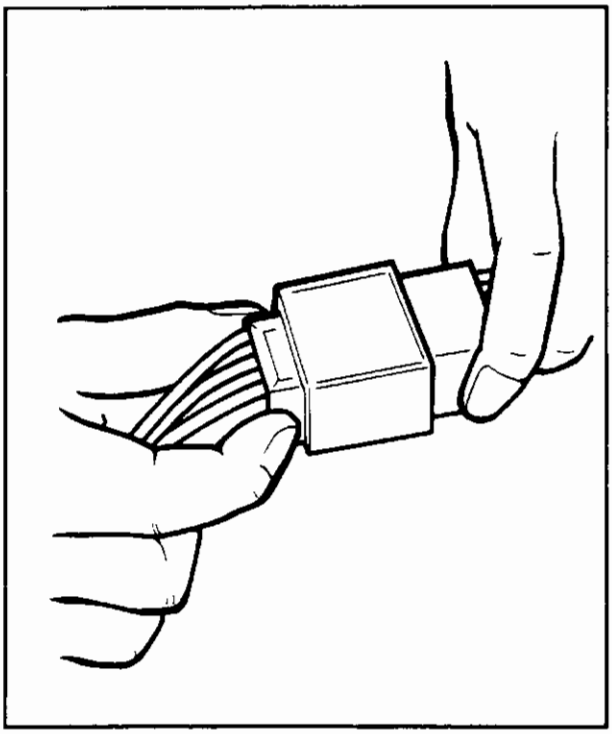
"B and B/W" is continuous with the "LOCK" switch position.

"B and B/W" and "R and L/R" are continuous with the "P" switch position.

CHECKING SWITCH FOR TERMINAL CONNECTION

Before checking the switch, refer to the connection chart as shown above and check for the correct terminal connection (closed circuit) by the color combination.

To explain how to check the switch, the main switch is taken for example in the following.



1. Disconnect the main switch coupler from the wireharness.

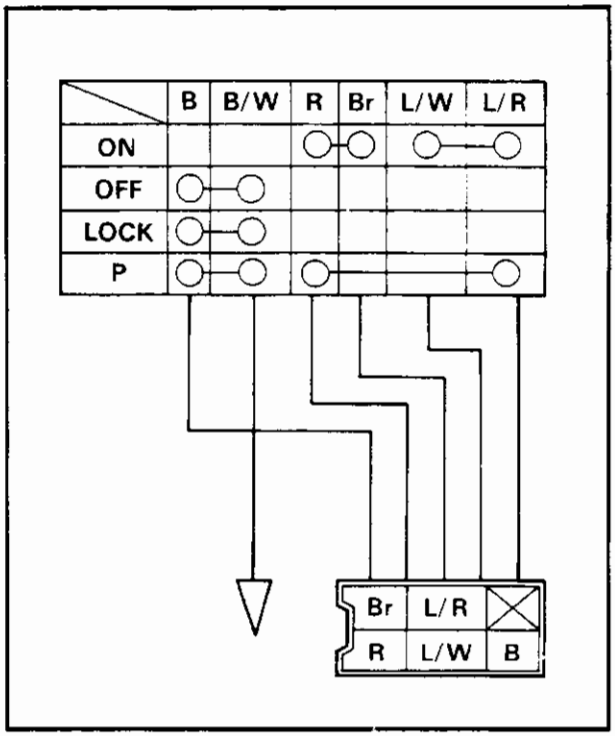
⚠CAUTION:

Never disconnect the main switch coupler by pulling the leads. Otherwise, leads may be pulled off the terminals inside the coupler.

2. Inspect whether any lead is off the terminal inside the coupler. If it is, repair it.

NOTE:

If the coupler is clogged with mud or dust, blow it off by compressed air.



3. Use the connection chart to check the color combination for continuity (a closed circuit). In this example, the continuity is as follows.

   "R and Br" and "L/W and L/R" are continuous with the "ON" switch position.

   "B and B/W" is continuous with the "OFF" switch position.

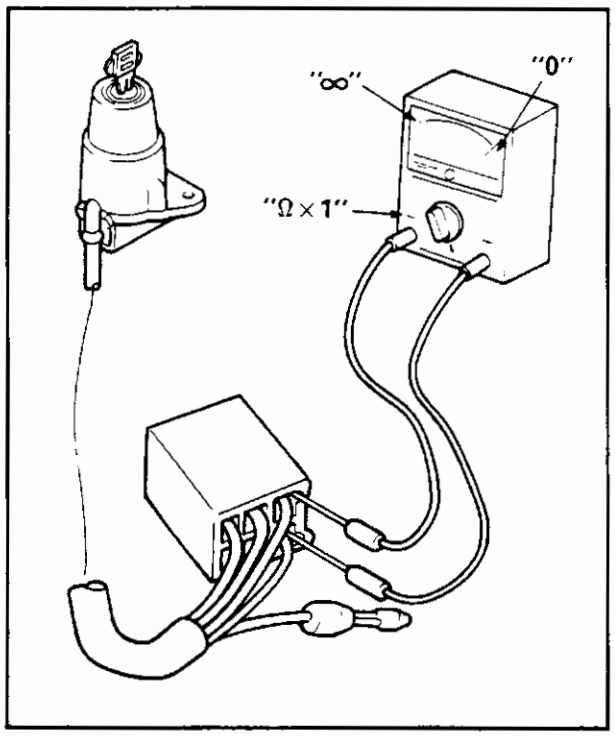
   "B and B/W" is continuous with the "LOCK" switch position.

   "B and B/W" and "R and L/R" are continuous with the "P" switch position.

   Please note that there is no continuity (an open circuit) at all for the color combinations other than the above.

4. Check the switch component for the continuity between "R and Br".

Checking steps:
- Turn the switch key to the "ON", "OFF", "LOCK", and "P" several times.
- Set the pocket tester selector to the "Ω × 1".
- Connect the tester (+) lead to the "R" lead terminal in the coupler and the (−) lead to the "Br" lead terminal.



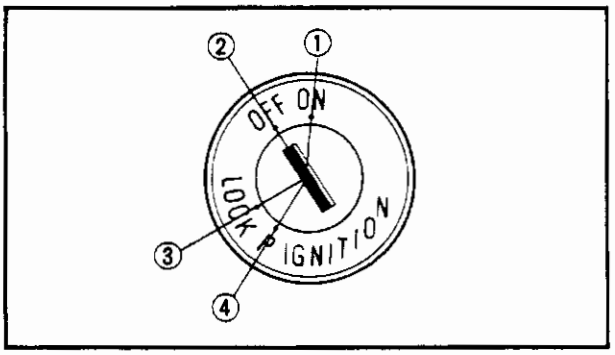
NOTE:

Use thin probes for checking the continuity. Otherwise, the probes may contact other terminals inside the coupler.

- Check the continuity between "R" and "Br" at the respective switch positions of "ON" ①, "OFF" ②, "LOCK" ③, and "P" ④. There must be continuity (the tester indicating "0") at the "ON" switch position, and there must be no continuity (the tester indicating "∞") at "OFF", "LOCK", or "P". There is something wrong between "R" and "Br" if there is no continuity at the "ON" position or if there is some continuity either at the "OFF" or "LOCK" or "P".

NOTE:

Check the switch for continuity several times.



5. Next go on to checking of the continuity between "B and B/W", "L/W and L/R", and "R and L/R" at the respective switch positions, as in the same manner mentioned above.

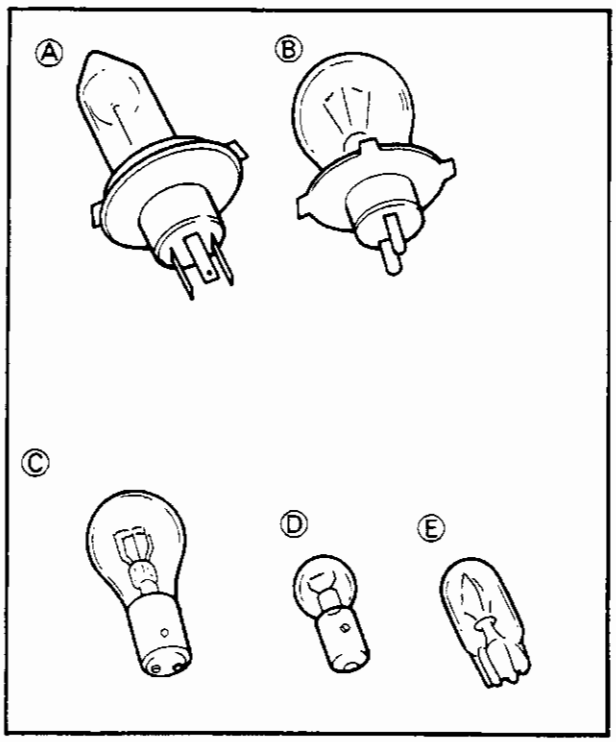
6. If there is something wrong with any one of the combinations, replace the switch component.

CHECKING OF BULBS (FOR HEADLIGHT, TAIL/BRAKE LIGHT, FLASHER LIGHT, METER LIGHT, ETC.)

Check the bulb terminal continuity for the condition of the bulb.

KINDS OF BULBS

The bulbs used in the motorcycle are classified as shown left by the shape of the bulb socket.



Ⓐ and Ⓑ are mainly used for the headlight.

Ⓒ is mainly used for the flasher light and tail/brake light.

Ⓓ and Ⓔ are mainly used for the meter light and other indicator lights.

CHECKING BULB CONDITION

1. Remove the bulb.

NOTE:

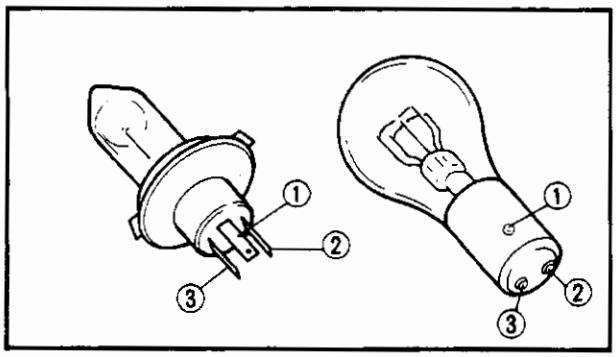
- Bulbs of the Ⓐ and Ⓑ type uses a bulb holder. Remove the bulb holder before removing the bulb itself. Most of the bulb holders for this type can be removed by turning them counterclockwise.
- Most of the bulbs of Ⓒ and Ⓓ type can be removed from the bulb sockets by pushing and turning them counterclockwise.
- Bulbs of the Ⓔ type can be removed from the bulb sockets by simply pulling them out.

⚠ CAUTION:

Be sure to hold the socket firmly when removing the bulb. Never pull the lead. Otherwise, the lead may be pulled off the terminal in the coupler.

⚠ WARNING:

Keep flammable products or your hands away from the headlight bulb while it is on. It will be hot. Do not touch the bulb until it cools down.



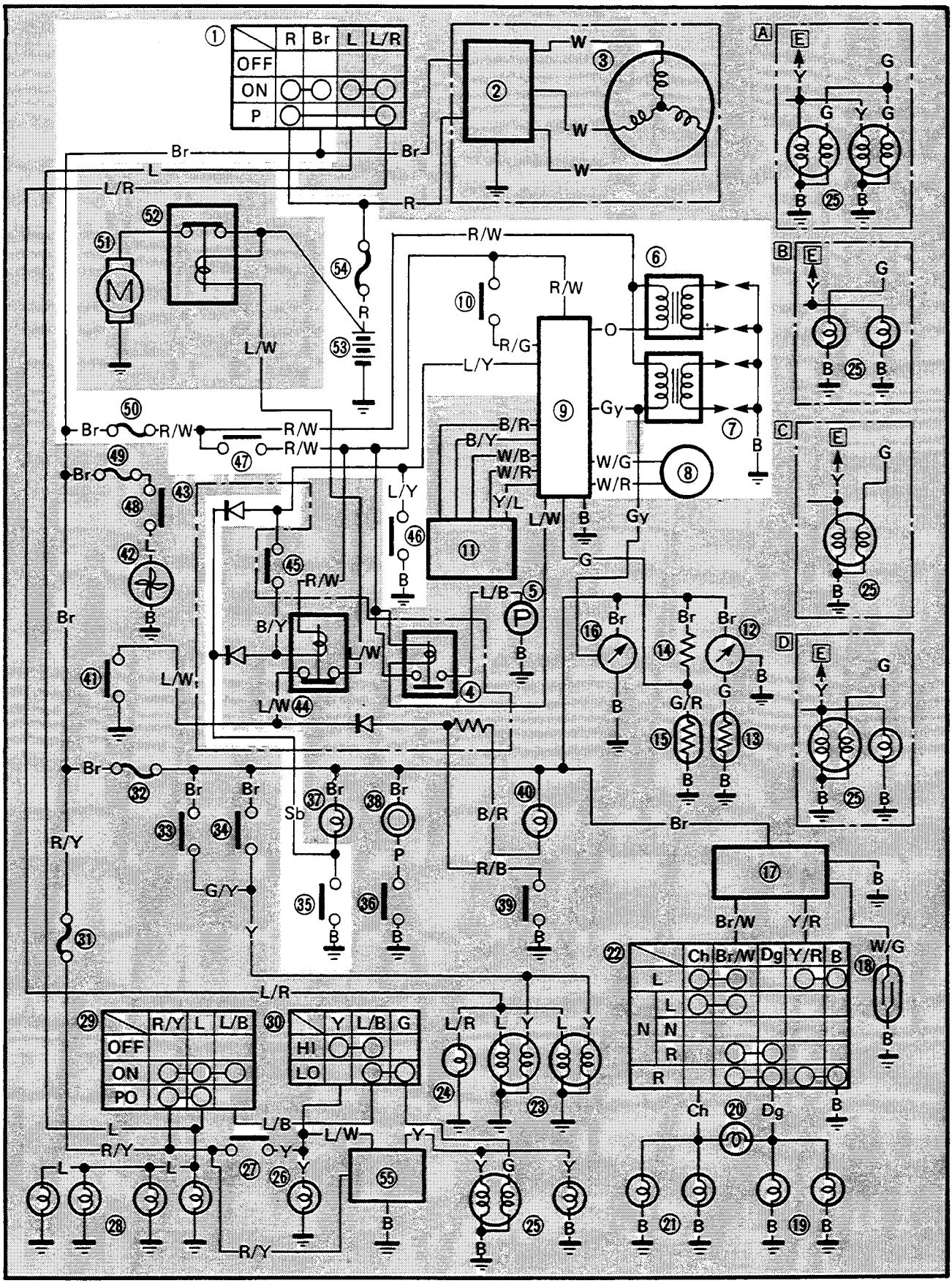
2. Check the bulb terminals for continuity.

Checking steps:
- Set the pocket tester selector to the "Ω × 1".
- Connect the tester leads to the respective bulb terminals. Take for example a 3-terminal bulb as shown left. First check the continuity between the ① and ② terminals by connecting the tester (+) lead to the ① terminal and the tester (−) lead to the ② terminal. Then check the continuity between the ① and ③ terminals by connecting the tester (+) lead still to the ① terminal and the tester (−) lead to the ③ terminal. If the tester shows "∞" in either case, replace the bulb.

3. Check the bulb socket by installing a proven bulb to it. As in the checking of bulbs, connect the pocket tester leads to the respective leads of the socket and check for continuity in the same manner as mentioned above.

IGNITION SYSTEM

CIRCUIT DIAGRAM

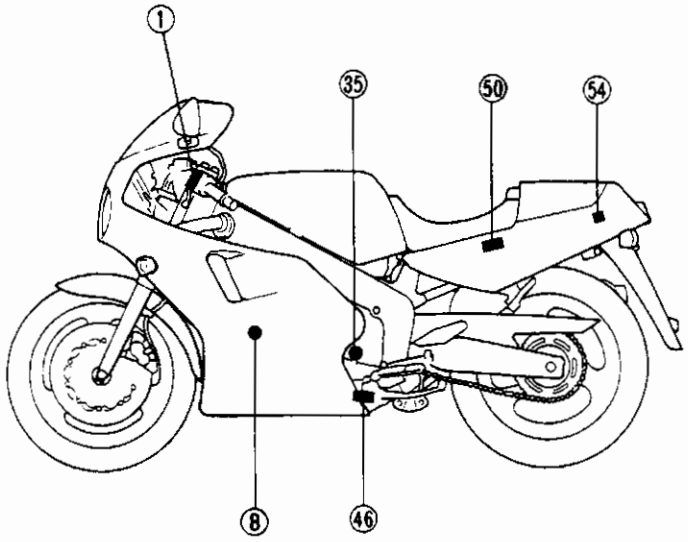


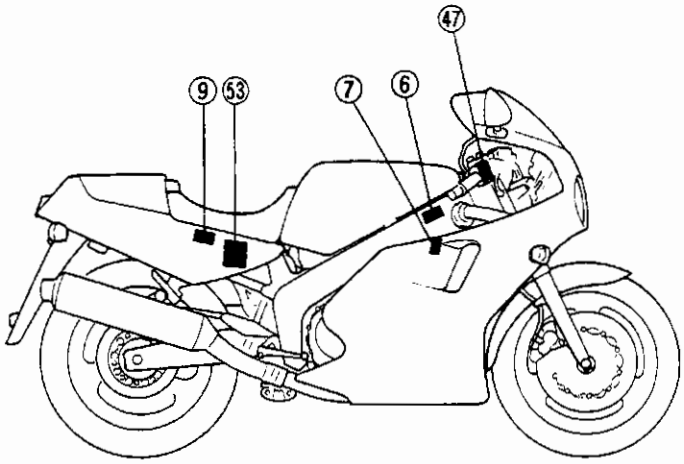
Aforamentioned circuit diagram shows the ignition circuit in the circuit diagram.

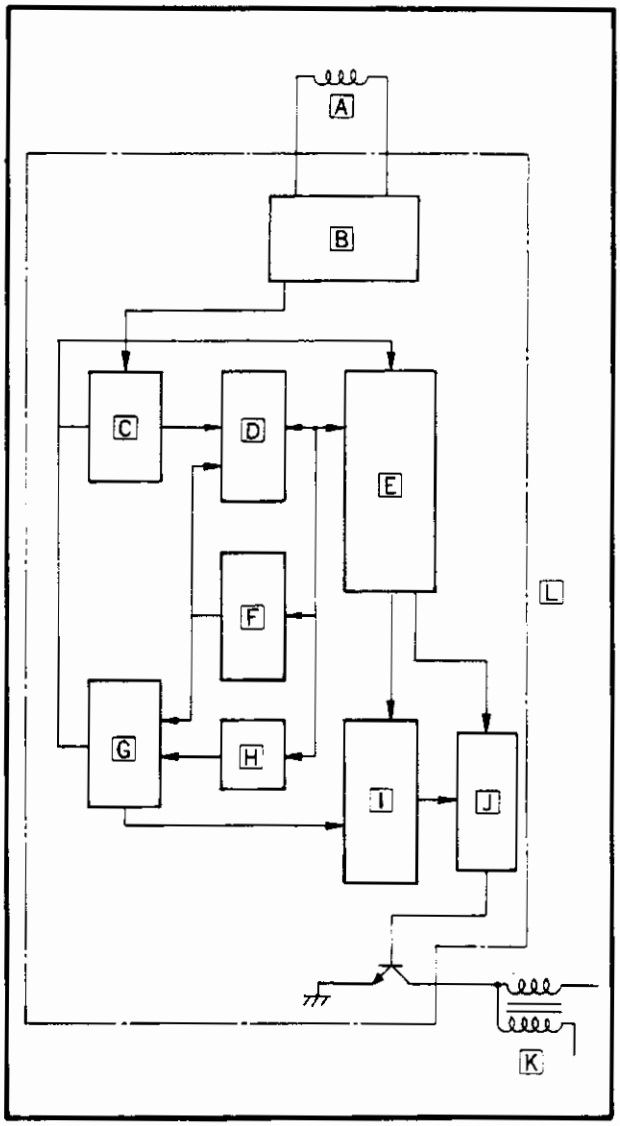
NOTE:

For the color codes, see page 8-2.

① Main switch
⑥ Ignition coil
⑦ Spark plug
⑧ Pick up coil
⑨ Digital ignitor unit
㉟ Neutral switch
㊻ Sidestand switch
㊼ "ENGINE STOP" switch
㊿ Fuse (ignition)
㊸ Battery
㊹ Fuse (main)







DIGITAL IGNITION CONTRL SYSTEM

DESCRIPTION

The electronic ignition that sparks the engine is computer controlled and operated by the digital microprocessor. It has a pre-programed ignition advance curve.

This programed advance curve closely matches the spark timing to the engine's ignition requirements. Only one pickup coil is needed to meet the requirements of the digital ignitor unit.

The digital ignitor also includes the control unit for the electric fuel pump.

A Pickup coil
B Wave-shape shaping circuit
C Edge detection circuit
D Latch circuit
E Microprocessor
F Free-running counter
G Comparison circuit
H Register
I Flip-flop circuit
J Driving circuit
K Ignition coil
L Digital ignitor unit

OPERATION

The following operations are digitally-performed by signal from the pickup coil signal:

1. Determing proper ignition timing.
2. Sensing the engine revolution speed.
3. Determing timing for switching on ignition coil (duty control).
4. Increasing ignition coil primary current for starting the engine.
5. Sensing engine stall.
6. Preventing over-revolution of the engine.

TROUBLESHOOTING

IF 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. Diode (relay unit)
12. Pickup coil resistance
13. Wiring connection (Entire ignition system)

NOTE:

- Remove the following parts before troubleshooting.
  1) Side cowlings
  2) Front cover
  3) Side cover (left)
  4) Seat
  5) Fuel tank
  6) Air filter case
- Use the following special tools in this troubleshooting.



Dynamic spark tester:
YM-34487
90890-03144



Pocket tester:
YU-03112
90890-03112

1. Fuse (main and ignition)

- Remove the fuses.
- Connect the pocket tester (Ω x 1) to the fuses.
- Check the fuses for continuity.

NOCONTINUITY → Replace fuse(s).

CONTINUITY ↓

2. Battery

- Check the battery condition. Refer to the "BATTERY INSPECTION" section in the CHAPTER 3.

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

INCORRECT →

- Refill battery fluid.
- Clean battery terminals.
- Recharge or replace battery.

CORRECT ↓

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3. Spark plug

- Check the spark plug condition.
- Check the spark plug type.
- Check the spark plug gap.

Refer to the "SPARK PLUG INSPECTION" section in the CHAPTER 3.

Standard spark plug:
DR8ES-L (NGK), X24ESR-U (N.D.)

Spark plug gap:
0.6 ~ 0.7 mm (0.024 ~ 0.028 in)

INCORRECT → Repair or replace spark plug.

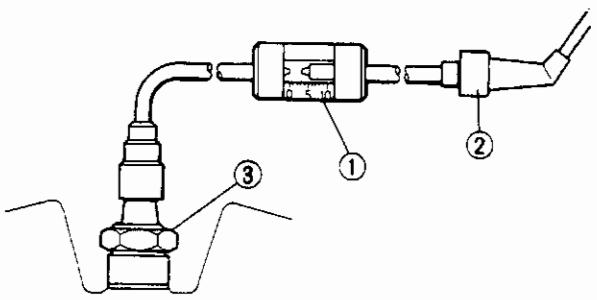
CORRECT ↓

4. Ignition spark gap

- Disconnect the spark plug cap from spark plug.
- Connect the dynamic spark tester ① as shown.

② Spark plug cap
③ Spark plug

- Turn the main switch to "ON".



- Check the ignition spark gap.
- Start engine, and increase spark gap until misfire occurs.

Minimum spark gap:
6.0 mm (0.24 in)

MEETS SPECIFICATION → Ignition system is good.

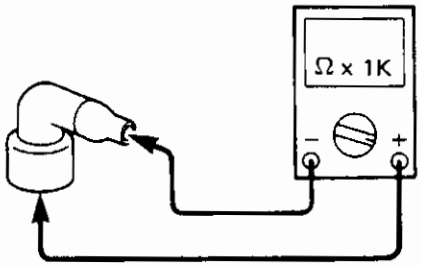
OUT OF SPECIFICATION OR NO SPARK ↓

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5. Spark plug cap resistance

- Remove the spark plug cap.
- Connect the pocket tester (Ω x 1k) to the spark plug cap.



- Check the spark plug cap for specificated resistance.

Spark plug cap resistance:
9 ~ 11 kΩ at 20°C (68°F)

OUT OF SPECIFICATION

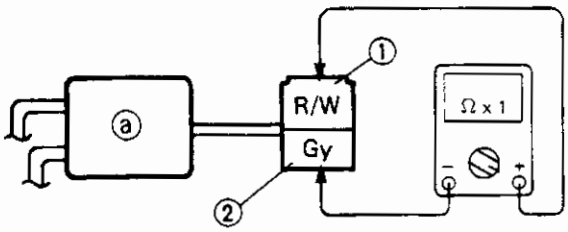
Replace spark plug cap.

MEETS SPECIFICATION

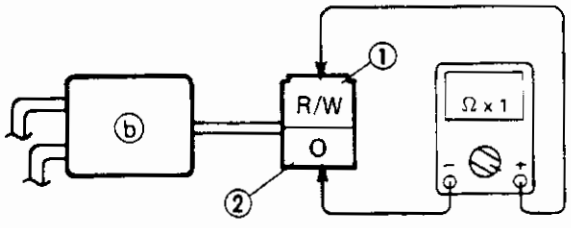
6. Ignition coil resistance

- Disconnect the ignition coil coupler from the wireharness.
- Connect the pocket tester (Ω x 1) to the ignition coil.

Ignition coil (for #2 and #3) ⓐ :
Tester (+) lead → Red/White ① terminal
Tester (–) lead → Gray ② terminal



Ignition coil (for #1 and #4) ⓑ :
Tester (+) lead → Red/White ① terminal
Tester (–) lead → Orange ② terminal

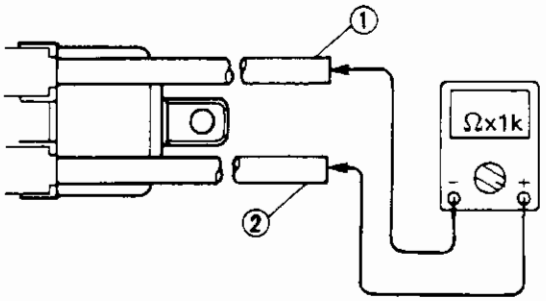


- Check the primary coil for specificated resistance.

Primary coil resistance:
1.8 ~ 2.2Ω at 20°C (68°F)

- Connect the pocket tester (Ω x 1k) to the ignition coil.

Tester (+) lead → Spark plug lead ①
Tester (–) lead → Spark plug lead ②



- Check the secondary coil for specificated resistance.

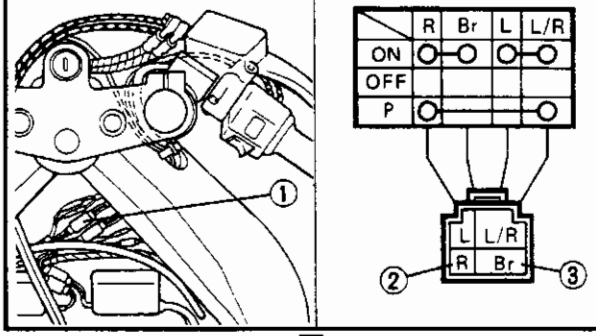
Secondary coil resistance:
9.6 ~ 14.4 kΩ at 20°C (68°F)
(Spark plug lead – Spark plug lead)

OUT OF SPECIFICATION → Replace ignition coil.

BOTH MEET SPECIFICATIONS

7. Main switch

- Disconnect the main switch coupler ① from the wireharness.
- Check the switch component for the continuity between "Red ② and Brown ③ ". Refer to the "CHECKING OF SWITCHES" section.



INCORRECT → Replace main switch.

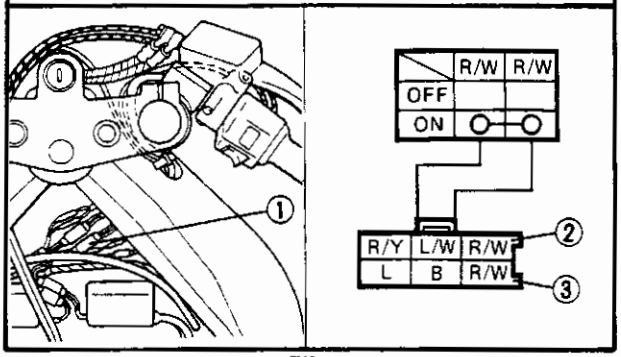
CORRECT

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8. "ENGINE STOP" switch

- Disconnect the handlebar switch (right) coupler from ① the wireharness.
- Check the switch component for the continuity between "Red/White ② and Red/White ③ ". Refer to the "CHECKING OF SWITCHES" section.



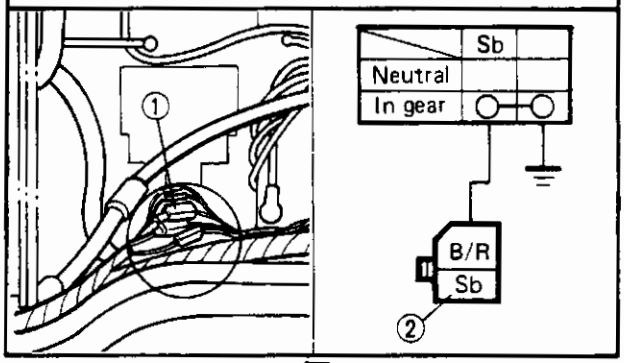
INCORRECT

Replace handlebar switch (right).

CORRECT

9. Neutral switch

- Disconnect the neutral switch coupler ① from the wireharness.
- Check the switch component for the continuity between "Sky blue ② and ground". Refer to the "CHECKING OF SWITCHES" section.



INCORRECT

Replace neutral switch.

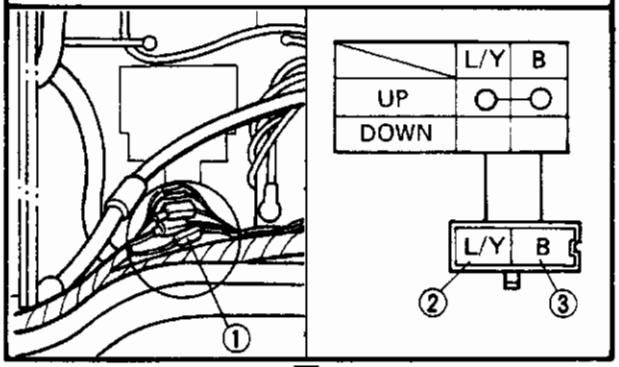
CORRECT

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10. Sidestand switch

- Disconnect the sidestand switch coupler ① from the wireharness.
- Check the switch component for the continuity between "Blue/Yellow ② and Black ③ ". Refer to the "CHECKING OF SWITCHES" section.



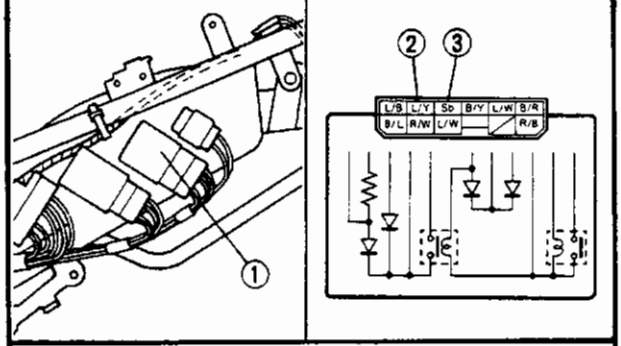
INCORRECT → Replace sidestand switch.

CORRECT

11. Diode (relay unit)

- Disconnect the relay unit ① from the wireharness.
- Connect the pocket tester (Ω x 1) to the relay unit terminal.

Tester (+) lead → Blue/Yellow terminal ①
Tester (-) lead → Skyblue terminal ②



NOCONTINUITY → Replace relay unit.

- Check the relay unit for continuity.

CONTINUITY

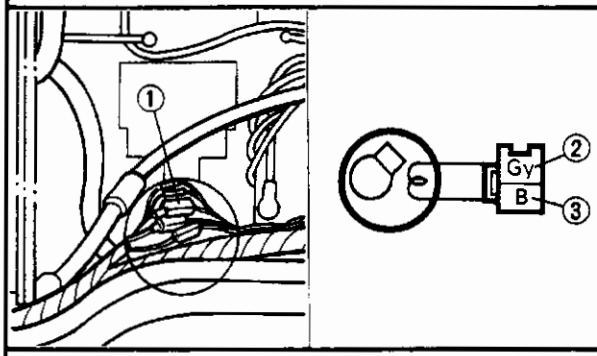
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12. Pickup coil ressitance

- Disconnect the pickup coil ① coupler from the wireharness.
- Connect the pocket tester (Ω x 100) to the pickup coil terminal.

Tester (+) lead → Gray ② terminal
Tester (–) lead → Black ③ terminal



- Check the pickup coil for specificated resistance.

Pickup coil resistance:
135 ~ 165Ω at 20°C (68°F)
(Gray – Black)

OUT OF SPECIFICATION → Replace pickup coil.

MEET SPECIFICATION ↓

13. Wiring connection

Check the entire ignition system for connections.
Refer to the "WIRING DIAGRAM" section.

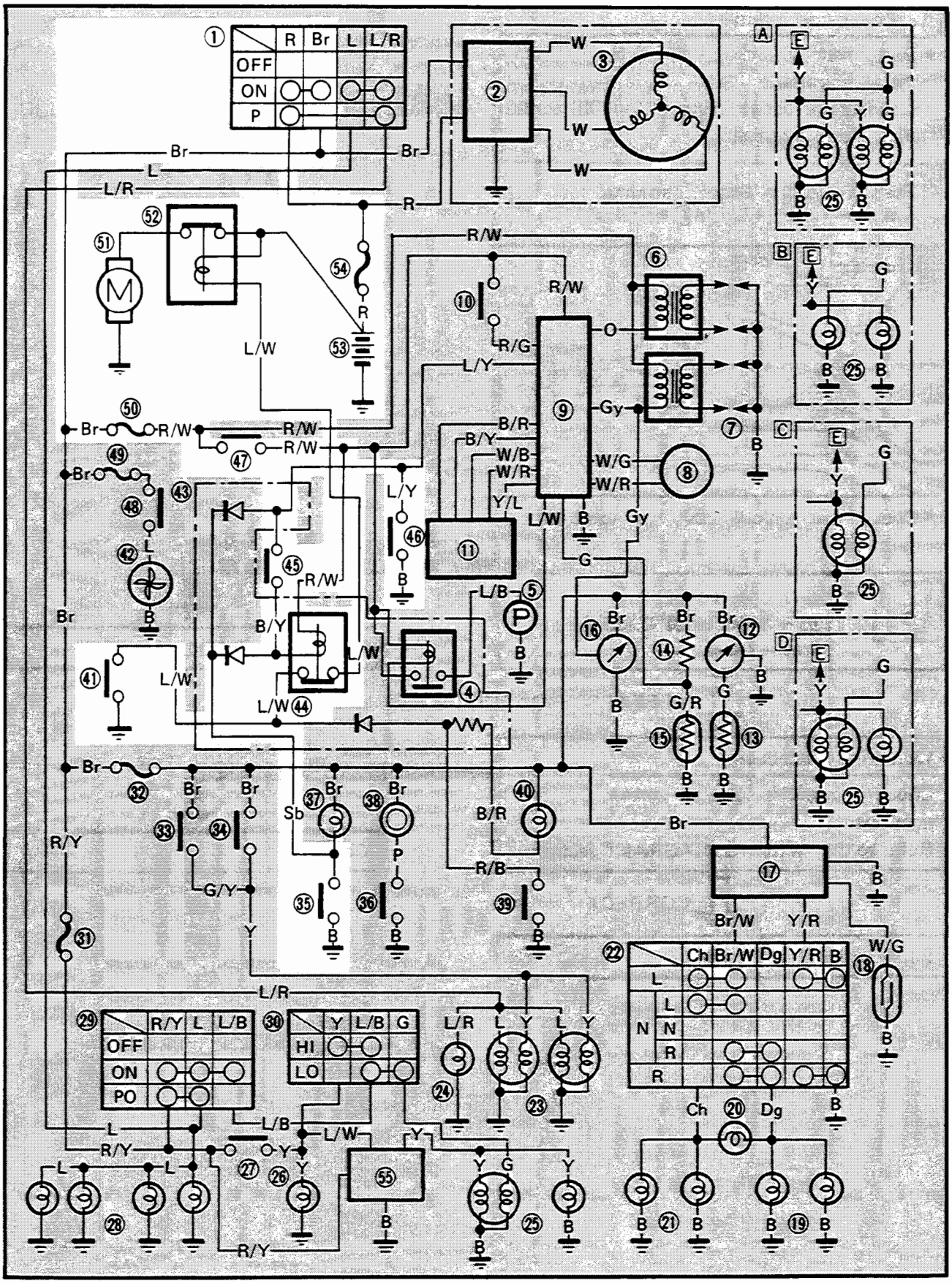
POOR CONNECTION → Correct.

CORRECT ↓

Replace digital ignitor unit.

ELECTRICAL STARTING SYSTEM

CIRCUIT DIAGRAM

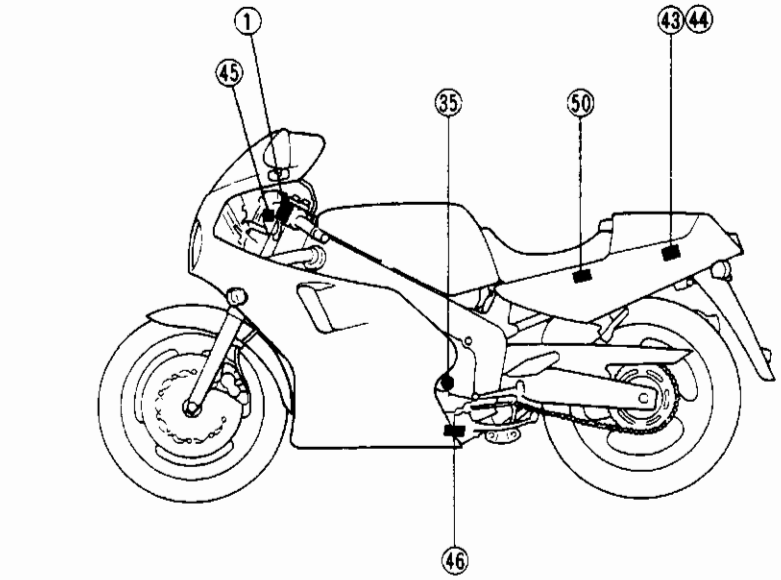


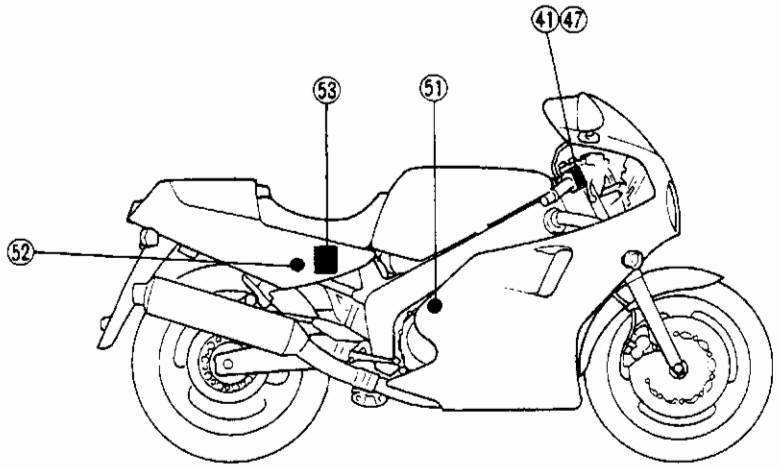
Aformentioned circuit diagram shows electrical starting circuit in circuit diagram.

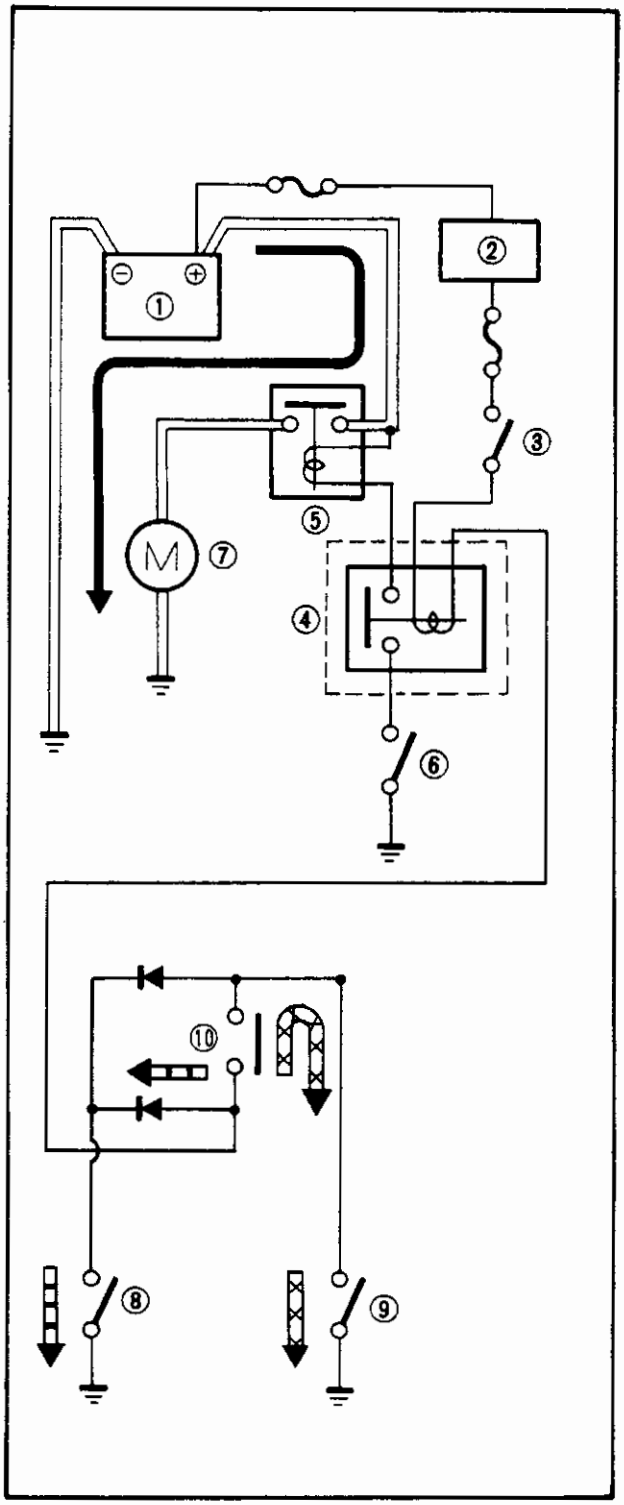
NOTE:

For the color codes, see page 8-2.

① Main switch
㉟ Neutral switch
㊶ "START" switch
㊸ Relay unit
㊹ Starting circuit cut-off relay
㊺ Clutch switch
㊻ Sidestand switch
㊼ "ENGINE STOP" switch
㊿① Starter motor
㊿② Starter relay
㊿③ Battery
㊿④ Fuse (main)







STARTING CIRCUIT OPERATION

The starting circuit on this model consist of the starter motor, starter relay, and the relay unit (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 has been met. In this instance, the starting circuit cut-off relay is open so current cannot reach the starter motor.

When one of both 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 starter switch.

WHEN THE TRANSMISSION IS IN NEUTRAL

WHEN THE SIDESTAND IS UP AND THE CLUTCH LEVER IS PULLED IN

① Battery
② Main switch
③ "ENGINE STOP" switch
④ Starting circuit cut-off relay
⑤ "START" switch
⑥ Starter relay
⑦ Starter motor
⑧ Neutral switch
⑨ Sidestand switch
⑩ Clutch switch

TROUBLESHOOTING

STARTER MOTOR DOES NOT OPERATE.

Procedure

Check;

1. Fuse (main and ignition)
2. Battery
3. Starter motor
4. Starter relay
5. Starting circuit cut-off relay
6. Main switch
7. "ENGINE STOP" switch
8. Neutral switch
9. Sidestand switch
10. Clutch switch
11. "START" switch
12. Wiring connection (Entire electric starting system)

NOTE:

Remove the following parts before troubleshooting.

1) Seat
2) Side cowlings
3) Front cover
4) Side cover (left)
5) Fuel tank
6) Air filter case

- Use the following special tool in this troubleshooting.



Pocket tester:
YU-03112
90890-03112

1. Fuse (main and ignition)

- Remove the fuses.
- Connect the pocket tester (Ω x 1) to the fuses.
- Check the fuses for continuity.

NOCONTINUITY → Replace fuse(s).

CONTINUITY ↓

2. Battery

Check the battery condition.
Refer to the "BATTERY INSPECTION" section in the CHAPTER 3.

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

INCORRECT →

- Refill battery fluid.
- Clean battery terminals.
- Recharge or replace battery.

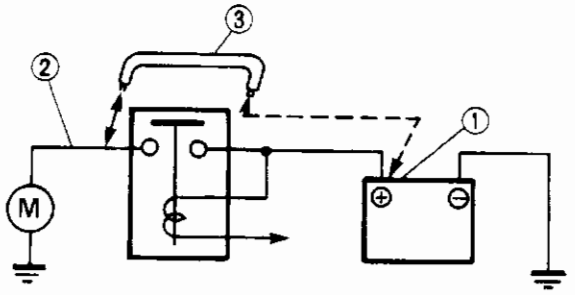
CORRECT ↓

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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 starter motor for operation.

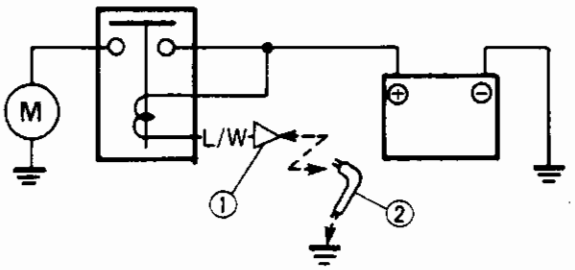
DOES NOT MOVE

Repair or replace starter motor.

MOVES

4. Starter relay

- Disconnect the starter relay lead from the wireharness.
- Ground the starter relay lead (Blue/White) ① to the frame using the jumper lead ② .



- Check the starter motor for operation.

DOES NOT MOVE

Replace starter relay.

MOVES

5. Starting circuit cut-off relay (relay unit)

- Disconnect the relay unit coupler from the wireharness.
- Connect the pocket tester (Ω x 1) and battery (12V) to the relay unit coupler terminals.

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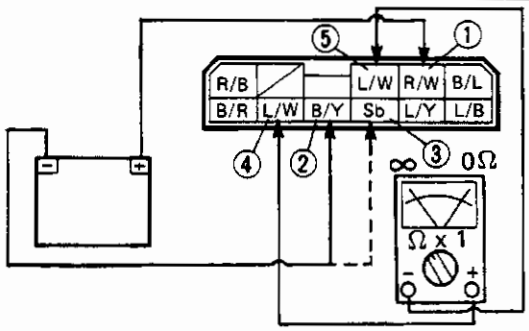
⚠ WARNING:

- **A wire for the jumper lead must have the equivalent capacity as that of the battery lead or more, otherwise it may cause the jumper lead to be burned.**
- **This check is likely to produce sparks, so be sure that no flammable gas or fluid is in the vicinity.**

Step 1.
Battery (+) terminal → Read/White ① terminal.
Battery (-) terminal → Black/Yellow ② terminal.

Step 2.
Battery (+) terminal → Red/White ① terminal.
Battery (-) terminal → Skyblue ③ terminal.

Tester (+) lead → Blue/White ④ terminal
Tester (-) lead → Blue/White ⑤ terminal



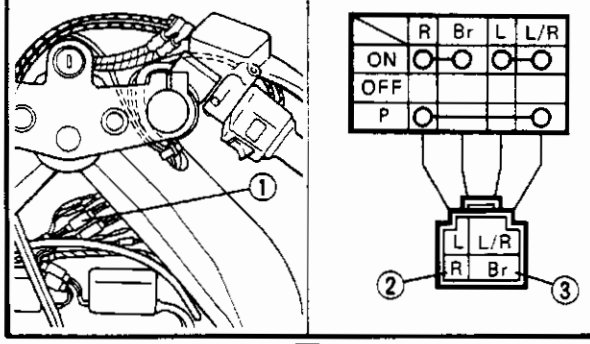
• Check the starting circuit cut-off relay for continuity.

NOCONTINUITY → Replace relay assembly.

CONTINUITY ⇩

6. Main switch

• Disconnect the main switch coupler ① from the wireharness.
• Check the switch component for the continuity between "Red ② and Brown ③ ". Refer to the "CHECKING OF SWITCHES" section.



INCORRECT → Replace main switch.

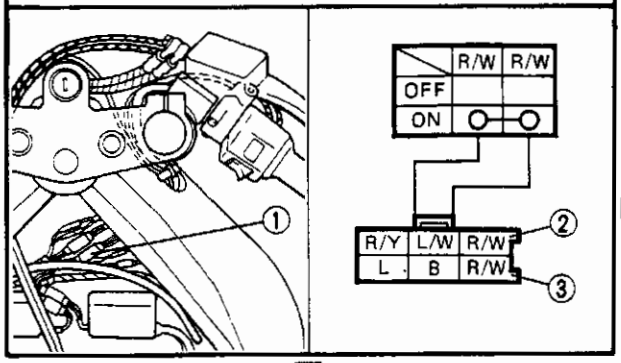
CORRECT ⇩

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7. "ENGINE STOP" switch

- Disconnect the handlebar switch (right) coupler ① from the wireharness.
- Check the switch component for the continuity between "Red/White ② and Red/White ③ ". Refer to the "CHECKING OF SWITCHES" section.



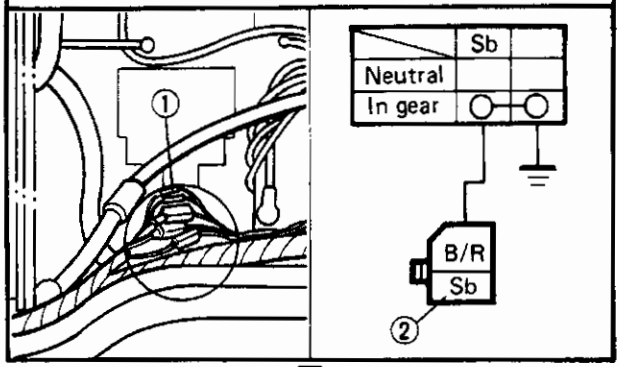
INCORRECT

Replace handlebar switch (right).

CORRECT

8. Neutral switch

- Disconnect the neutral switch lead ① from the wireharness.
- Check the switch component for the continuity between "Sky blue ② and Ground". Refer to the "CHECKING OF SWITCHES" section.



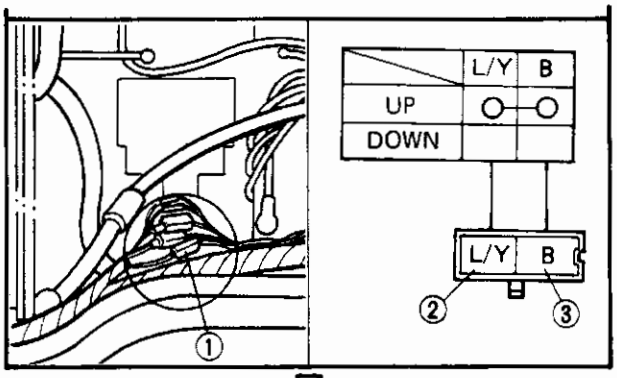
INCORRECT

Replace neutral switch.

CORRECT

9. Sidestand switch

- Disconnect the sidestand switch coupler ① from the wireharness.
- Check the switch component for the continuity between "Blue/Yellow ② and Black ③ ". Refer to the "CHECKING OF SWITCHES" section.



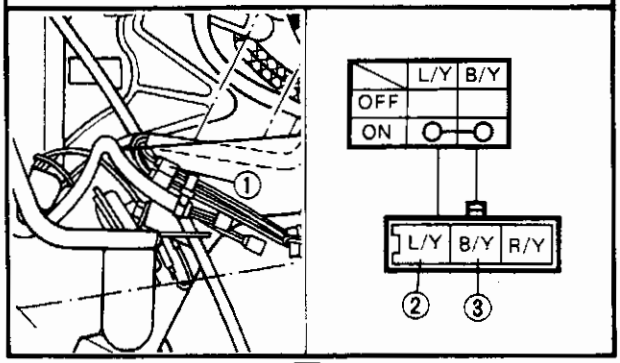
INCORRECT

Replace sidestand switch.

CORRECT

10. Clutch switch

- Disconnect the handlebar switch (left) coupler ① from the wireharness.
- Check the clutch switch component for the continuity between "Blue/Yellow ② and Black/Yellow ③ ". Refer to the "CHECKING OF SWITCHES" section.



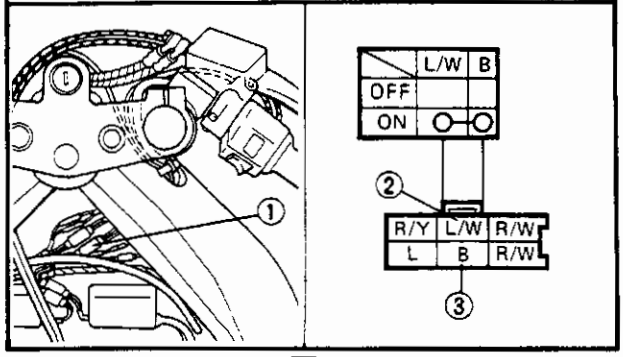
INCORRECT

Replace clutch switch.

CORRECT

11. "START" switch

- Disconnect handlebar switch (right) coupler ① from wireharness.
- Check the "START" switch component for the continuity between "Blue/White ② and Black ③ ". Refer to the "CHECKING OF SWITCHES" section.

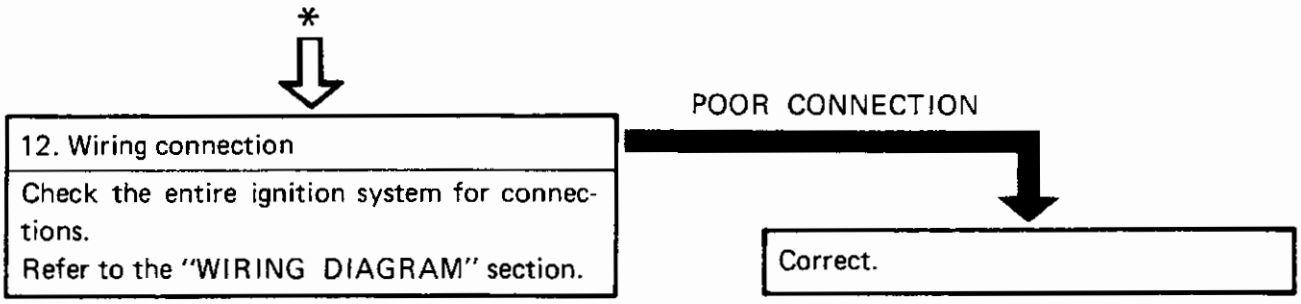


INCORRECT

Replace handlebar switch (right).

CORRECT

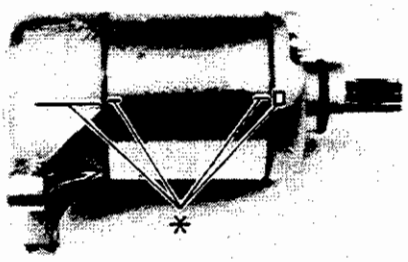
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12. Wiring connection
Check the entire ignition system for connections.
Refer to the "WIRING DIAGRAM" section.
POOR CONNECTION
Correct.

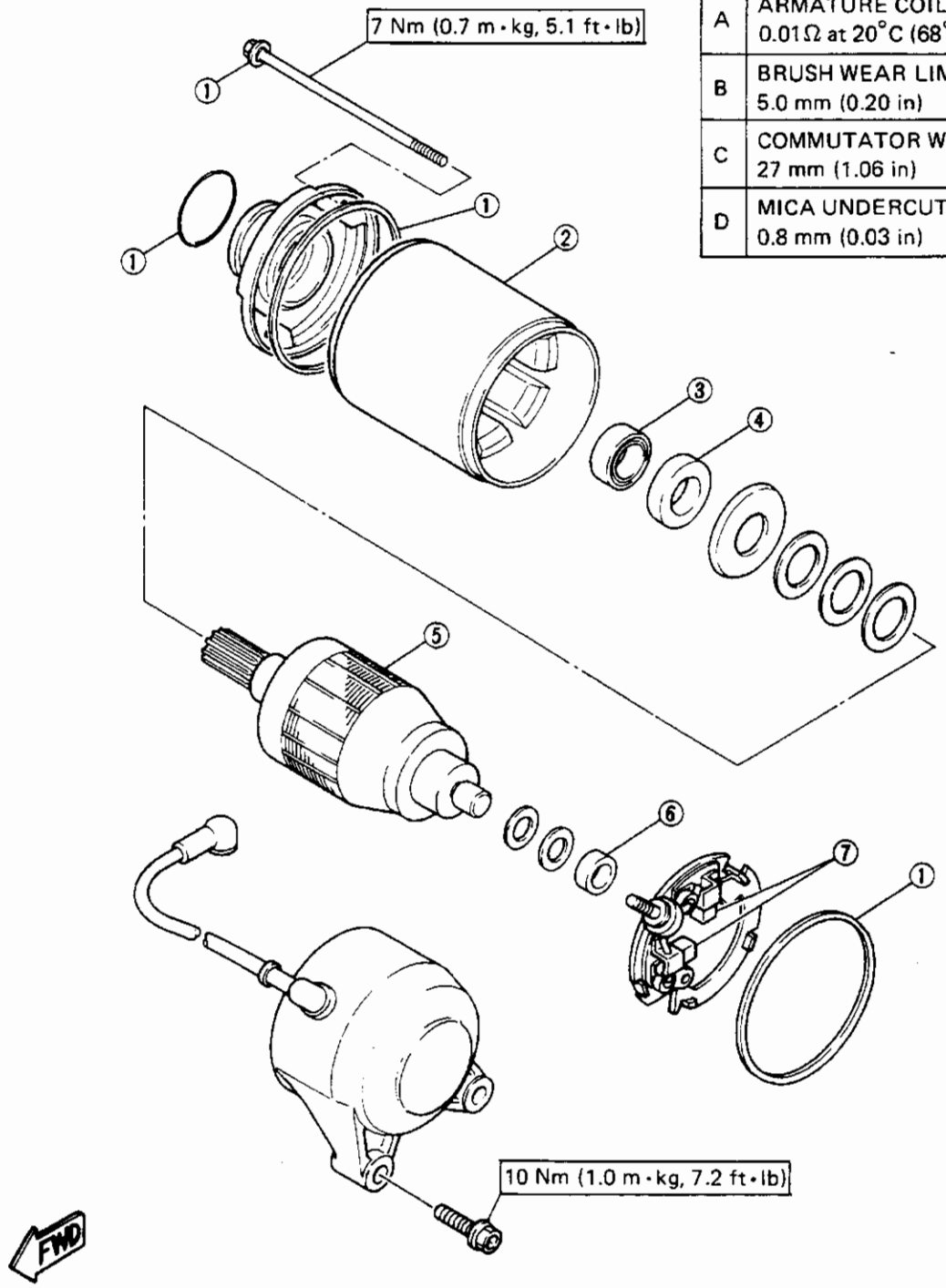
STARTER MOTOR

① O-ring
② Yoke
③ Bearing
④ Oil seal
⑤ Armature
⑥ Bush
⑦ Brush

* MATCH MARKS



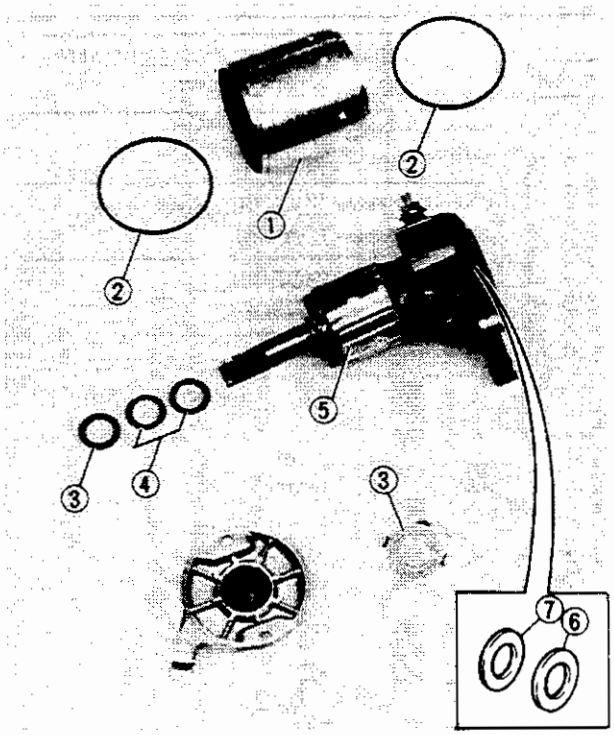
A	ARMATURE COIL RESISTANCE: 0.01Ω at 20°C (68°F)
B	BRUSH WEAR LIMIT: 5.0 mm (0.20 in)
C	COMMUTATOR WEAR LIMIT: 27 mm (1.06 in)
D	MICA UNDERCUT: 0.8 mm (0.03 in)



Removal

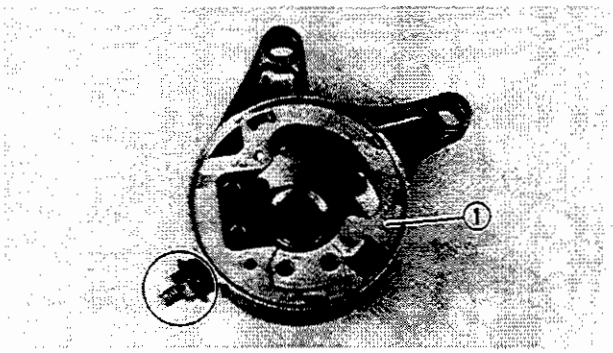
1. Remove:
   - Starter motor

   Refer to the "ENGINE OVERHAUL – ENGINE REMOVAL" section in the CHAPTER 4.

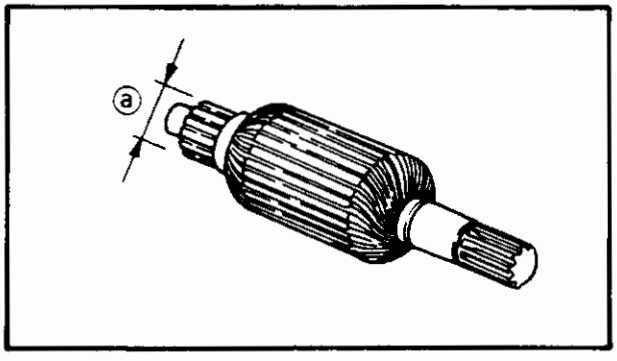


Disassembly

1. Remove:
   - Yoke assembly ①
   - O-rings ②
   - Washers ③
   - Shim(s) ④
   - Armature ⑤
   - Washer ⑥
   - Shims ⑦



2. Remove:
   - Brush set ①



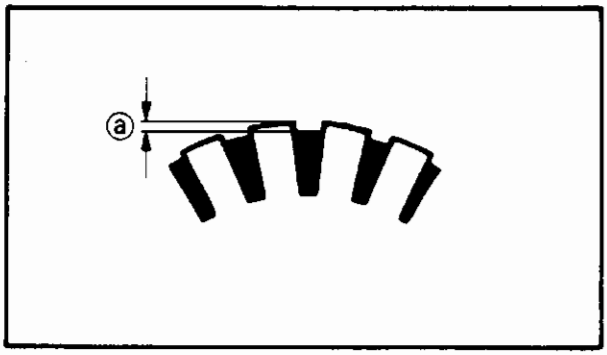
Inspection and Repair

1. Inspect:
   - Commutator

   Dirty → Clean it with #600 grit sandpaper.
2. Measure:
   - Commutator diameter ⓐ

   Out of specification → Replace starter motor.

Commutator wear limit ⓐ :
27 mm (1.06 in)



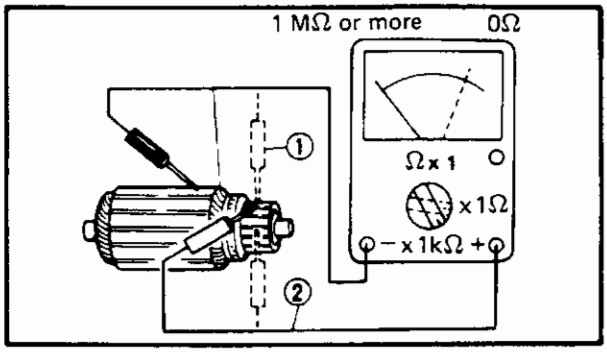
3. Measure:
- Mica undercut ⓐ

  Out of specification → Scrape the mica to proper value use a hacksaw blade can be ground to fit.

Mica undercut ⓐ :
0.8 mm (0.03 in)

NOTE:

The mica insulation of the commutator must be undercut to ensure proper operation of commutator.



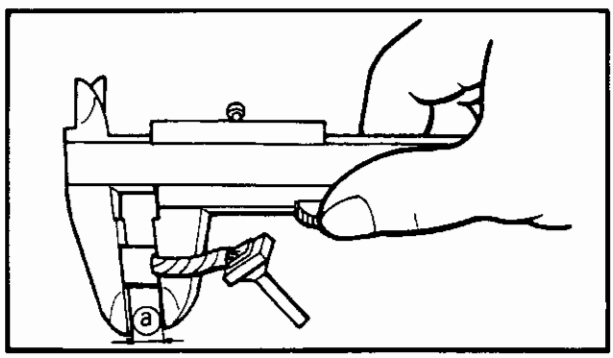
4. Inspect:
- Armature coil (insulation/continuity)

  Defects(s) → Replace starter motor.

Armature coil inspecting steps:
- Connect the pocket tester for continuity check ① and insulation check ② .
- Measure the armautre resistances.

Armature coil resistance:
Continuity check ① :
0Ω at 20°C (68°F)
Insulation check ② :
More than 1MΩ at 20°C (68°F)

- If the resistance is incorrect, replace the starter motor.



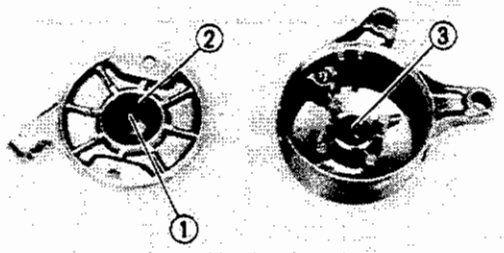
5. Measure:
- Brush length ⓐ

  Out of specification → Replace.

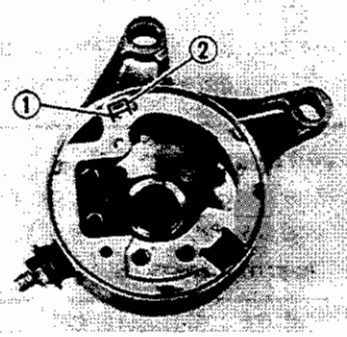
Brush length limit:
5.0 mm (0.20 in)

6. Measure:
   - Brush spring force
     Fatigue/Out of specification → Replace as a set.

Brush spring force:
680 ~ 920 g (24.0 ~ 32.4 oz)



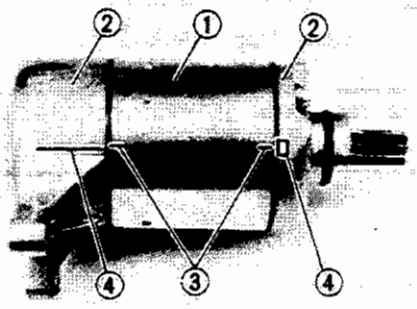
7. Inspect:
   - Bearing ①
   - Oil seal ②
   - O-rings
   - Bushe ③



Assembly
Reverse the "Removal" procedure.
Note the following points.

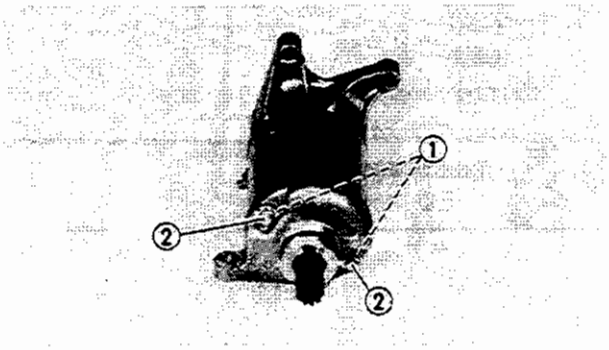
1. Install:
   - Brush seat

NOTE:
Align the projection ① on the brush seat with the slot ② on the housing.



2. Install:
   - Yoke ①
   - Housing cover ②

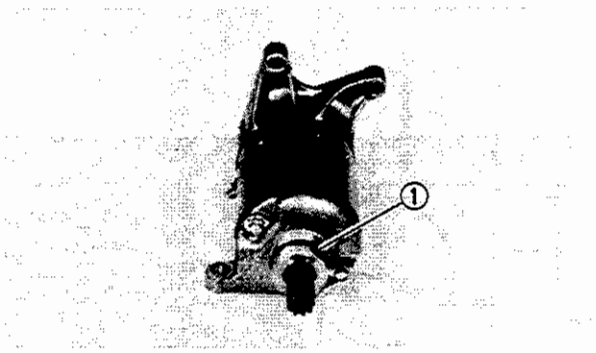
NOTE:
Align the match marks ③ on the yoke with the match marks on the housings ④.



3. Install:
   - O-rings ①
   - Bolts ②

⚠ WARNING:
Always use new O-rings.

Bolt (yoke assembly):
7 Nm (0.7 m · kg, 5.1 ft · lb)



Installation

1. Install:
   - Starter motor

NOTE:

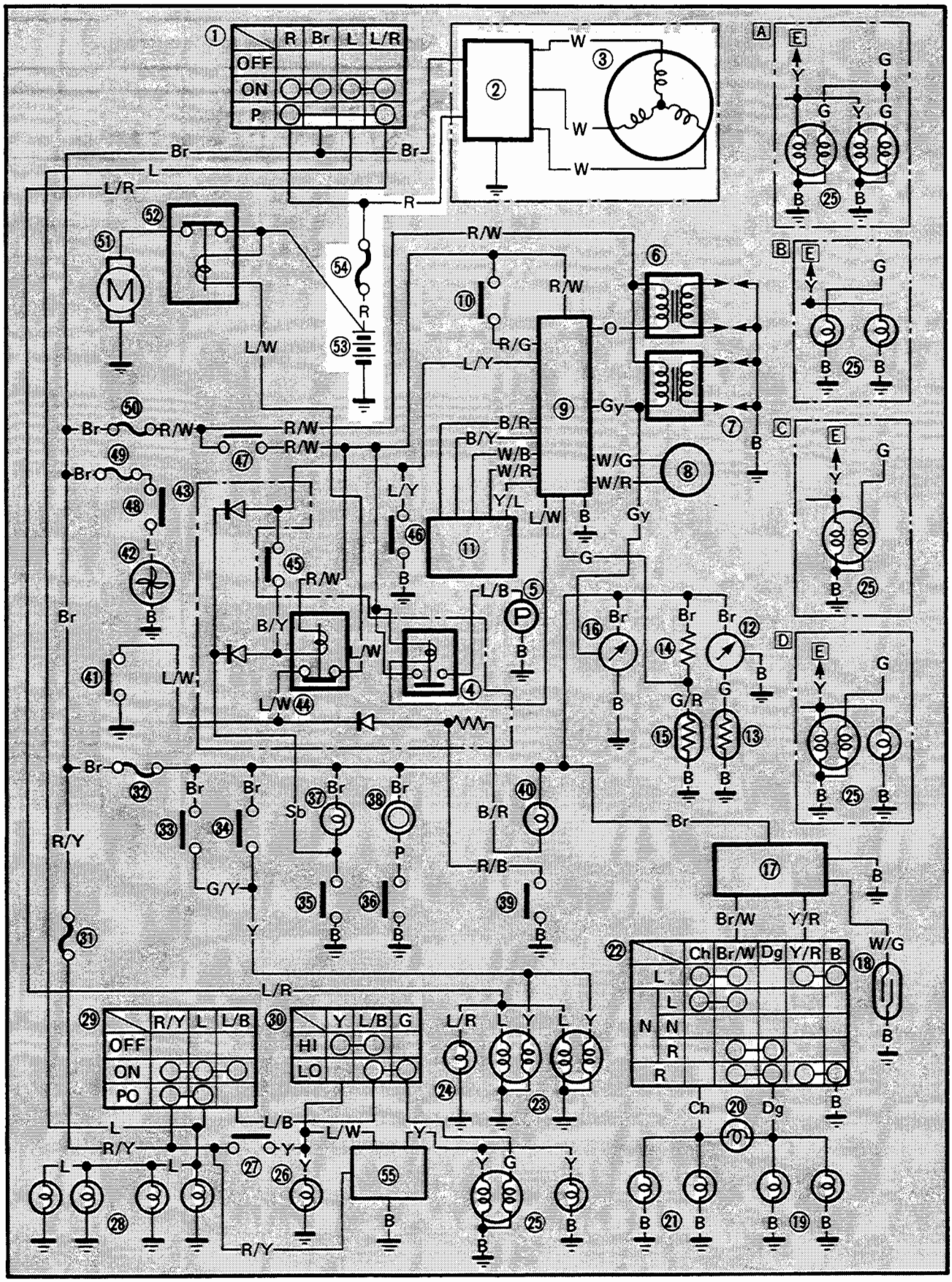
Apply a lightly grease to the o-ring ①.

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

Refer to the "ENGINE OVERHAUL – ENGINE INSTALLATION" section in the CHAPTER 4.

CHARGING SYSTEM

CIRCUIT DIAGRAM

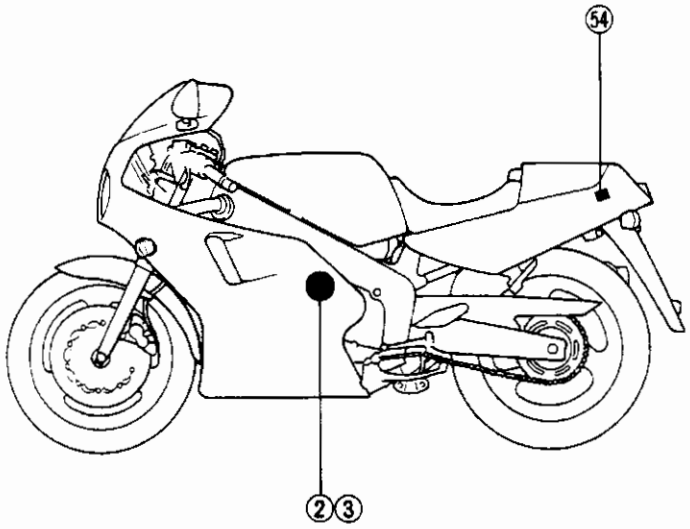


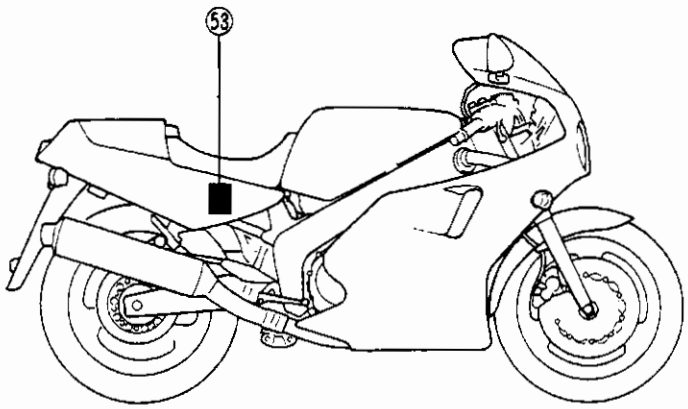
Aforementioned circuit diagram show the charging circuit in the circuit diagram.

NOTE:

For the color codes, see page 8-2.

② Rectifier/Regulator
③ AC generator
㊸ Battery
㊹ Fuse (main)





TROUBLESHOOTING

THE BATTERY IS NOT CHARGED.

Procedure

Check;

1. Fuse (main)
2. Battery
3. Charging voltage
4. Stator coil resistance
5. Brush inspection
6. Field coil (rotor) resistance
7. Wiring connection (Entire charging system)

NOTE:

- Remove the following parts before troubleshooting.
  1) Side cowlings
  2) Front cover
  3) Seat
  4) Fuel tank
- Use the following special tool(s) in this troubleshooting.



Inductive tachometer:
YU-08036
90890-03113



Pocket tester:
YU-03112
90890-03112

1. Fuse (main)

- Remove the fuse.
- Connect the pocket tester (Ω x 1) to the fuse.
- Check the fuse for continuity.

NOCONTINUITY → Replace fuse (main).

CONTINUITY ↓

2. Battery

- Check the battery condition. Refer to the "BATTERY INSPECTION" section in the CHAPTER 3.

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

INCORRECT →

- Refill battery fluid.
- Clean battery terminals.
- Recharge or replace battery.

CORRECT ↓

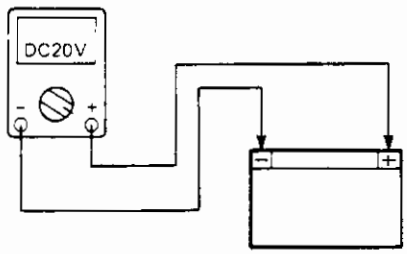
*

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3. Charging voltage

- Connect the inductive tachometer to spark plug lead.
- Connect the pocket tester (DC20V) to the battery.

Tester (+) lead → Battery (+) terminal
Tester (-) lead → Battery (-) terminal



- Start the engine and accelerate to about, 3,000 r/min.
- Check charging voltage.

Charging voltage:
14.3 ~ 15.3V at 3,000 r/min

NOTE:
Use a full charged battery.

MEETS SPECIFICATION → Charging circuit is good.

OUT OF SPECIFICATION

4. Stator coil resistance

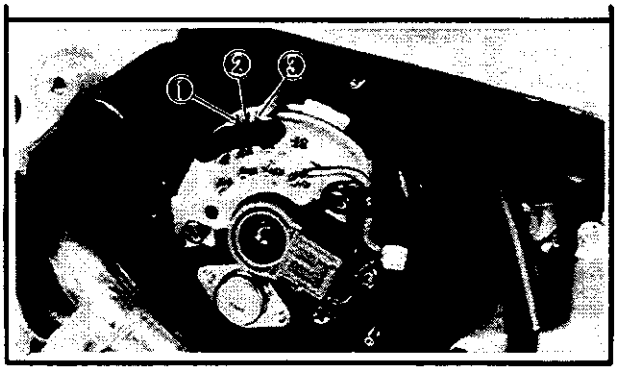
- Remove the generator cover.
- Connect the pocket tester "Ω x 1" to the stator coils.
- Measure the stator coil resistances.

Tester (+) lead → White lead ①
Tester (–) lead → White lead ②

Tester (+) lead → White lead ①
Tester (–) lead → White lead ③

Stator coil resistance:
0.16 ~ 0.18Ω at 20°C (68°F)

OUT OF SPECIFICATION → Replace stator assembly.



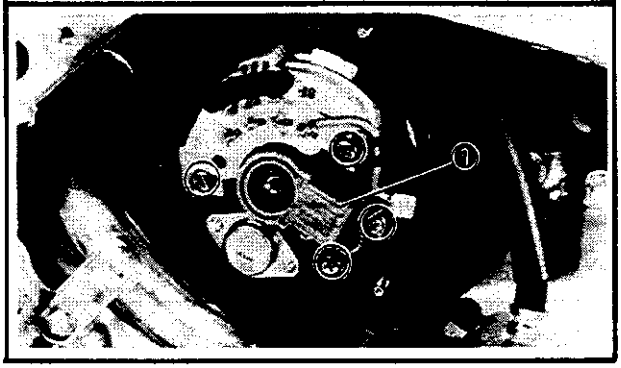
BOTH MEET SPECIFICATIONS

5. Brush inspection

- Remove the brush holder ①.
- Inspect the brush spring.
- Measure the brush length.

Brush length limit:
4.7 mm (0.19 in)

Brush spring force:
230 ~ 330 g (8.1 ~ 11.6 oz)



OUT OF SPECIFICATION

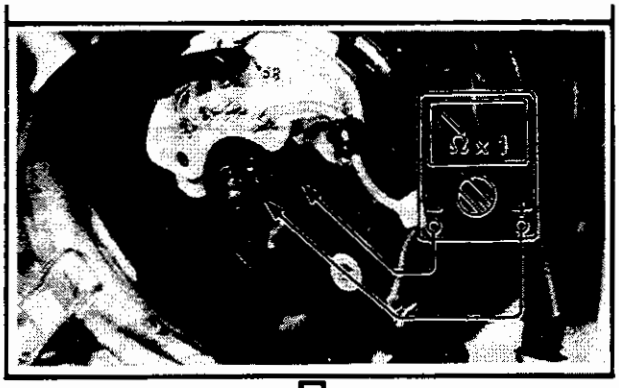
Replace brush and/or spring.

BOTH MEET SPECIFICATIONS

6. Field coil (rotor) resistance

- Connect the pocket tester "Ω x 1" to the rotor.
- Measure the resistance.

Field coil (rotor) resistance:
3.8 ~ 4.2Ω at 20°C (68°F)



OUT OF SPECIFICATION

Replace field coil (Rotor).

MEETS SPECIFICATION

7. Wiring connection

- Check the entire ignition system for connections.
  Refer to the "WIRING DIAGRAM" section.

POOR CONNECTION

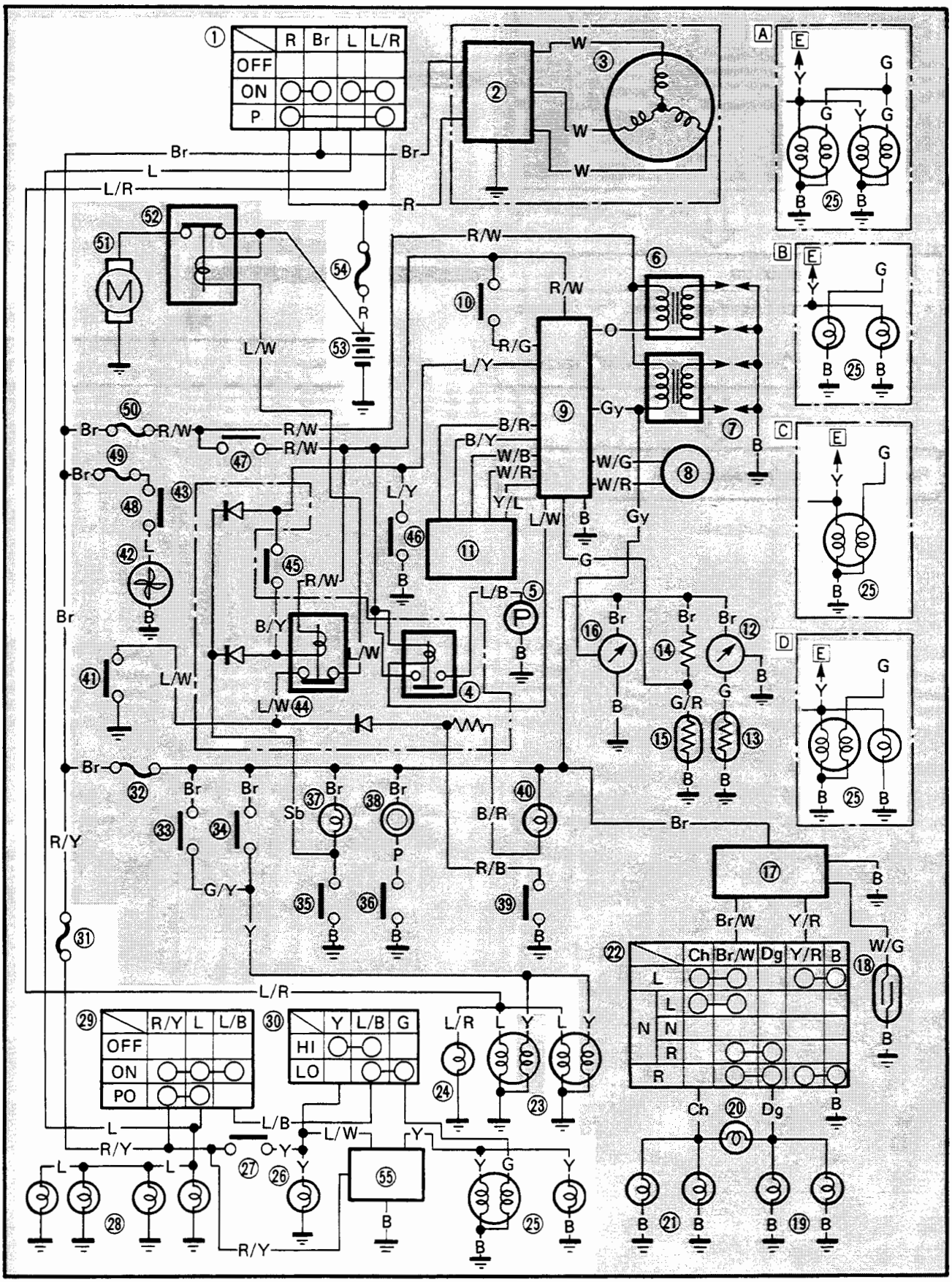
Correct.

OK

Replace rectifier/regulator.

LIGHTING SYSTEM

CIRCUIT DIAGRAM

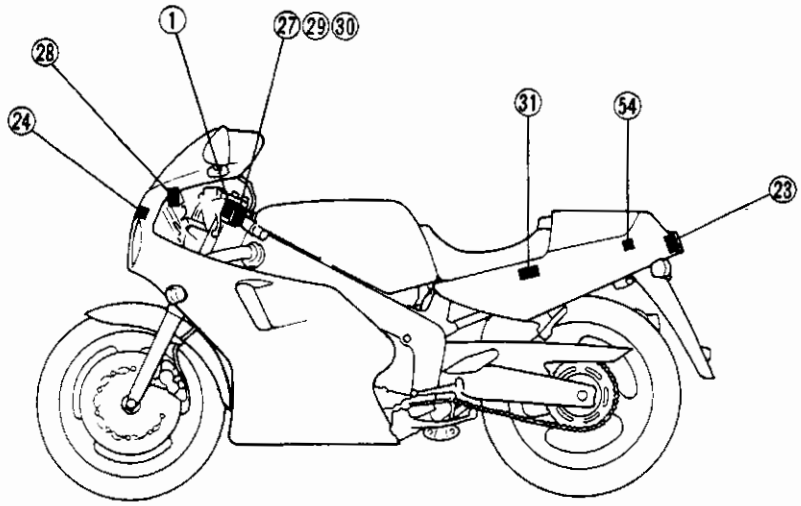


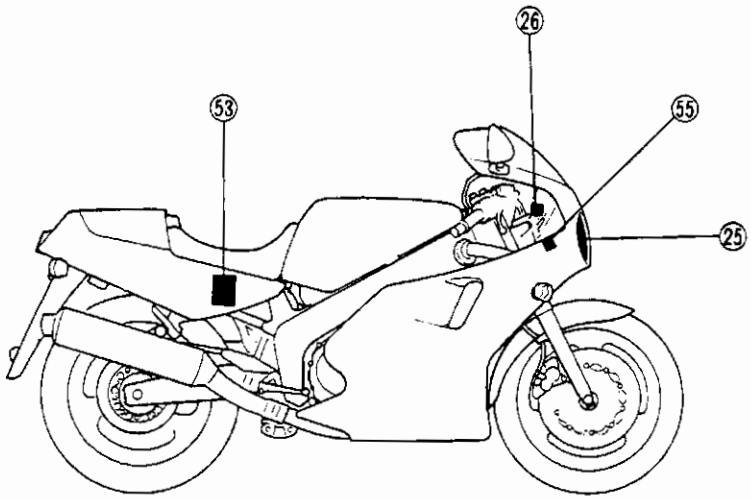
Aforementioned circuit is lighting circuit in circuit diagram.

NOTE:

For color codes, see page 8-2.

① Main switch
㉓ Tail/brake light
㉔ Auxiliary light
㉕ Headlight
㉖ "HIGH BEAM" indicator light
㉗ "PASS" switch
㉘ Meter light
㉙ "LIGHTS" switch
㉚ "LIGHTS" (Dimmer) switch
㉛ Fuse (headlight)
㊸ Battery
㊹ Fuse (main)
㊺ Headlight relay (for D and F)





TROUBLESHOOTING

MEADLIGHT "HIGH BEAM" INDICATOR LIGHT, TAILLIGHT, AUXILIARY LIGHT AND/OR METER LIGHT DO NOT COME ON.

Procedure

Check;

1. Fuse (main and head)
2. Battery
3. Main switch
4. "LIGHTS" switch
5. "LIGHTS" (Dimmer) switch
6. "PASS" switch
7. Wiring connection (Entire lighting system)

NOTE:

- Remove the following parts before troubleshooting.
  1) Side cowlings
  2) Front cowling
  3) Side cover (left)
  4) Seat
  5) Fuel tank
  6) Air filter case
- Use the following special tool(s) in this troubleshooting.



Pocket tester:
YU-03112
90890-03112

1. Fuse (main and head)

- Remove the fuses.
- Connect the pocket tester (Ω x 1) to the fuses.
- Check the fuses for continuity.
  Refer to the "FUSE INSPECTION" in the CHAPTER 3.

NOCONTINUITY → Replace fuse(s).

CONTINUITY ↓

2. Battery

- Check the battery condition.
  Refer to the "BATTERY INSPECTION" section in the CHAPTER 3.

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

INCORRECT →
- Refill battery fluid.
- Clean battery terminals.
- Recharge or replace battery.

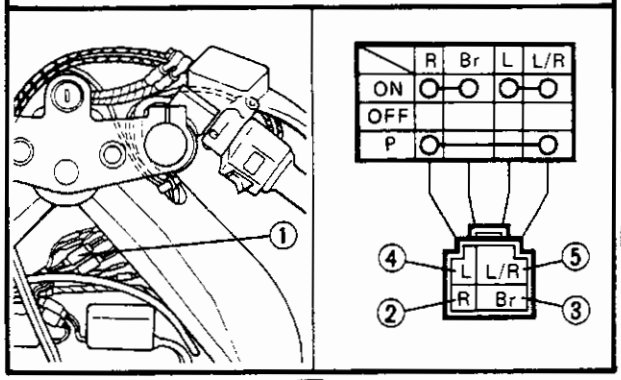
CORRECT ↓

*

*

3. Main switch

- Disconnect the main switch coupler ① from the wireharness.
- Check the switch component for the continuity between "Red ② and Brown ③ ", "Blue ④ and Blue/Red ⑤ " and "Red ② and Blue/Red ⑤ ". Refer to the "CHECKING OF SWITCHES" section.



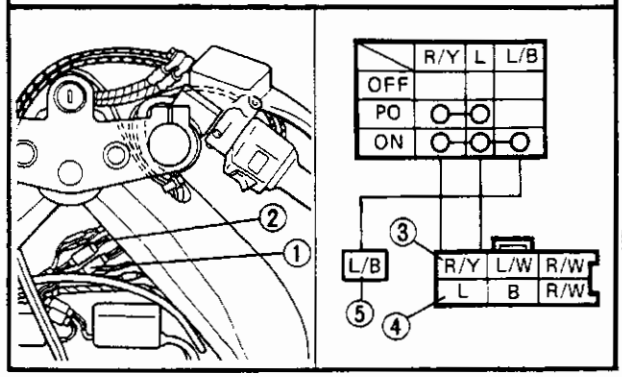
INCORRECT

Replace main switch.

CORRECT

4. "LIGHTS" switch

- Disconnect the handlebar switch (right) couple ① and lead ② from the wireharness.
- Check the switch component for the continuity between "Red/Yellow ③ and Blue ④ " and "Red/Yellow ③ and Blue/Black ⑤ ". Refer to the "CHECKING OF SWITCHES" section.



INCORRECT

Replace handlebar switch (right).

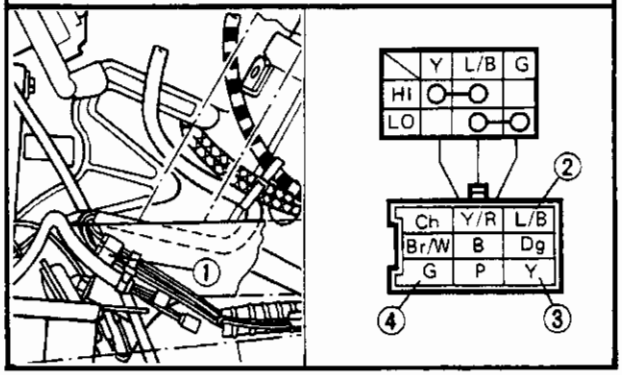
CORRECT

*

*

5. "LIGHTS" (dimmer) switch

- Disconnect the handlebar switch (left) coupler ① from the wireharness.
- Check the switch component for the continuity between "Blue/Black ② and Yellow ③ " and "Blue/Black ② and Green ④ ". Refer to the "CHECKING OF SWITCHES" section.

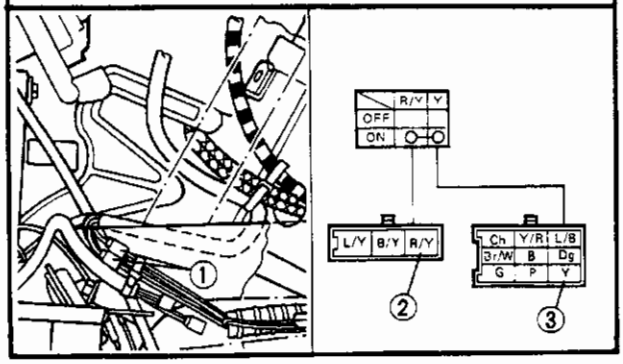


INCORRECT → Replace handlebar switch (left).

CORRECT

6. "PASS" switch

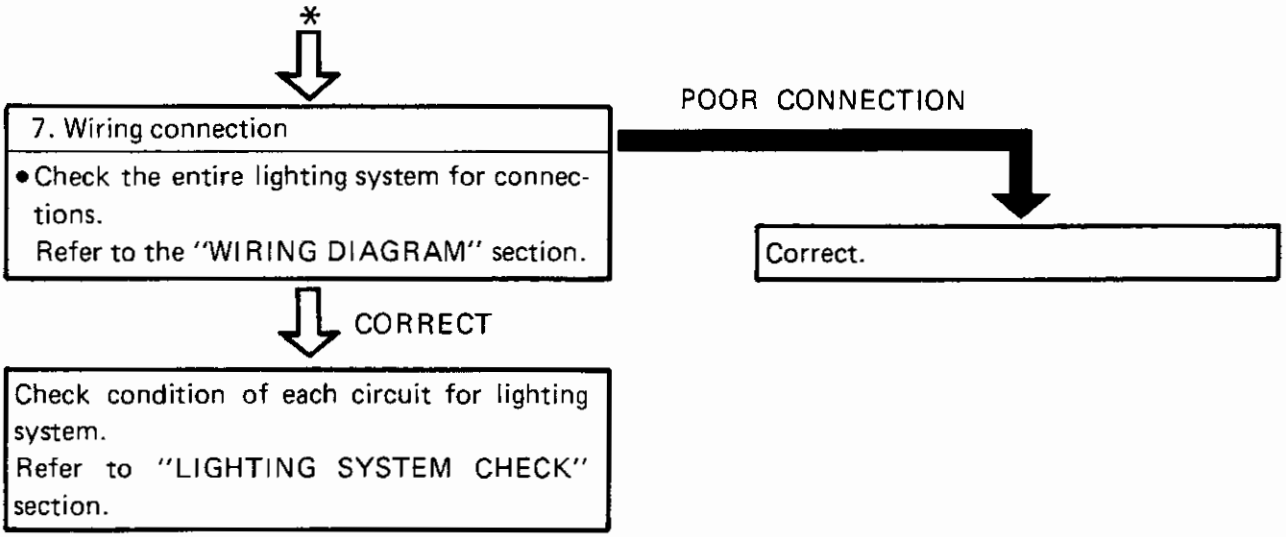
- Disconnect the handlebar switch (left) couplers ① from the wireharness.
- Check the switch component for the continuity between "Red/Yellow ② and Yellow ③ ". Refer to the "CHECKING OF SWITCHES" section.



INCORRECT → Replace handlebar switch (left).

CORRECT

*


*
7. Wiring connection
• Check the entire lighting system for connections.
Refer to the "WIRING DIAGRAM" section.
POOR CONNECTION
Correct.
CORRECT
Check condition of each circuit for lighting system.
Refer to "LIGHTING SYSTEM CHECK" section.

LIGHTING SYSTEM CHECK

1. Headlight and "HIGH BEAM" indicator light do not come on.

1. Bulb and bulb socket

- Check the bulb and bulb socket for continuity.
  Refer to the "CHECKING OF BULBS" section.

NOCONTINUITY → Replace bulb and/or bulb socket.

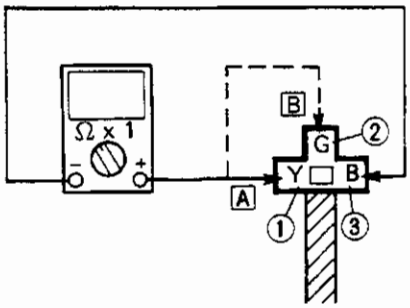
CONTINUITY ↓

2. Voltage

- Connect the pocket tester (DC 20V) to the headlight and "HIGH BEAM" indicator light couplers.

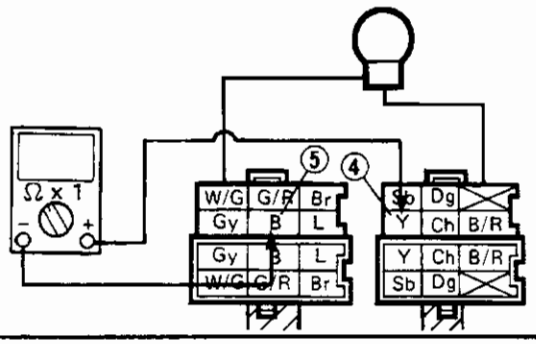
Head light:
Tester (+) lead → Yellow ① or Green ② lead.
Tester (-) lead → Black ③ lead
"HIGH BEAM" indicator light:
Tester (+) lead → Yellow ④ lead
Tester (-) lead → Black ⑤ lead

A



OUT OF SPECIFICATION → Wiring circuit from main switch to bulb socket connector is faulty, repair.

B



A When "LIGHT" (dimmer) switch is "LO" position.
B When "LIGHTS" (dimmer) switch is "HI" position.

- Turn the main switch to "ON".
- Turn the "LIGHTS" switch to "ON".
- Turn the "LIGHTS" (dimmer) switch to "LO" or "HI" position.
  (● Push in the "PASS" switch.)
- Check for voltage (12V) on the "Green" and "Yellow" lead at bulb socket connectors.

⇩ MEETS SPECIFICATION (12V)

Replace headlight relay (for D and F).

2. Meter light does not come on.

1. Bulb and bulb socket

- Check the bulb and bulb socket for continuity.
  Refer to the "CHECKING OF BULBS" section.

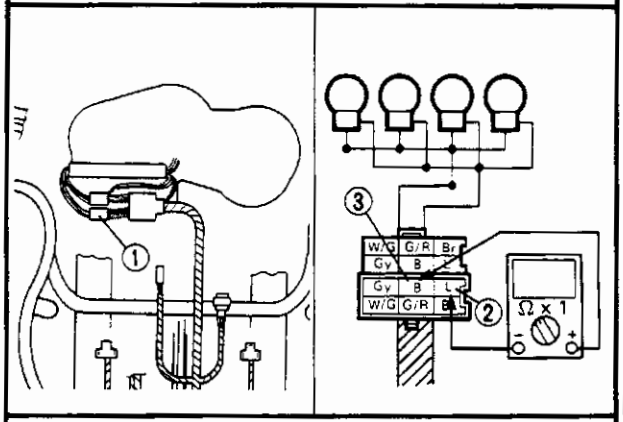
NOCONTINUITY → Replace bulb and/or bulb socket.

⇩ CONTINUITY

2. Voltage

- Connect the pocket tester (DC20V) to the bulb socket coupler ①.

Tester (+) lead → Blue ② terminal
Tester (—) lead → Black ③ terminal



- Turn the main switch to "ON".
- Turn the "LIGHTS" switch to "PO" or "ON".
- Check for voltage (12V) on the "Blue" lead at the bulb socket connector.

OUT OF SPECIFICATION → Wiring circuit from main switch to bulb socket connector is faulty, repair.

⇩ MEETS SPECIFICATION (12V)

This circuit is good.

3. Auxiliary light does not come on.

1. Bulb and bulb socket

- Check the bulb and bulb socket for continuity.
  Refer to the "CHECKING OF BULBS" section.

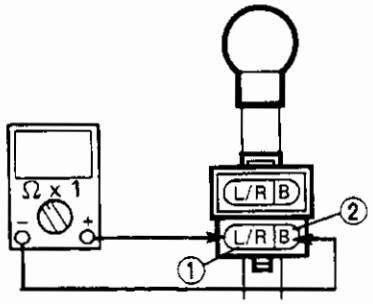
NOCONTINUITY → Bulb and/or bulb socket are faulty, replace.

CONTINUITY ↓

2. Voltage

- Connect the pocket tester (DC20V) to the bulb socket connector.

Tester (+) lead → Blue/Red ① terminal
Tester (—) lead → Black ② terminal



- Turn the main switch to "ON".
- Turn the "LIGHTS" switch to "PO".
- Check for voltage (12V) on the "Blue/Red" lead at the bulb socket connector.

OUT OF SPECIFICATION → Wiring circuit from main switch to bulb socket connector is faulty, repair.

MEETS SPECIFICATION (12V) ↓

This circuit is good.

4. Taillight does not come on.

1. Bulb and bulb socket

- Check the bulb and bulb socket for continuity.
  Refer to the "CHECKING OF BULBS" section.

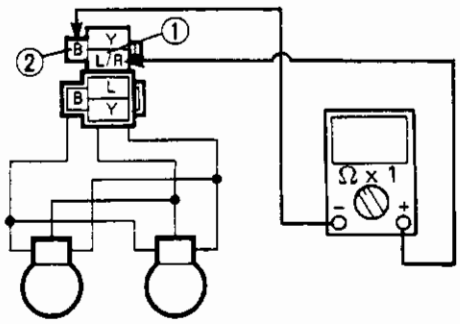
NOCONTINUITY → Replace bulb and/or bulb socket.

CONTINUITY ↓

2. Voltage

- Connect the pocket tester (DC20V) to the bulb socket connector.

Tester (+) lead → Blue/Red ① terminal
Tester (–) lead → Black ② terminal



- Turn the main switch to "ON".
- Turn the "LIGHTS" switch to "ON".
- Check for voltage (12V) on the "Blue" lead at the bulb socket connector.

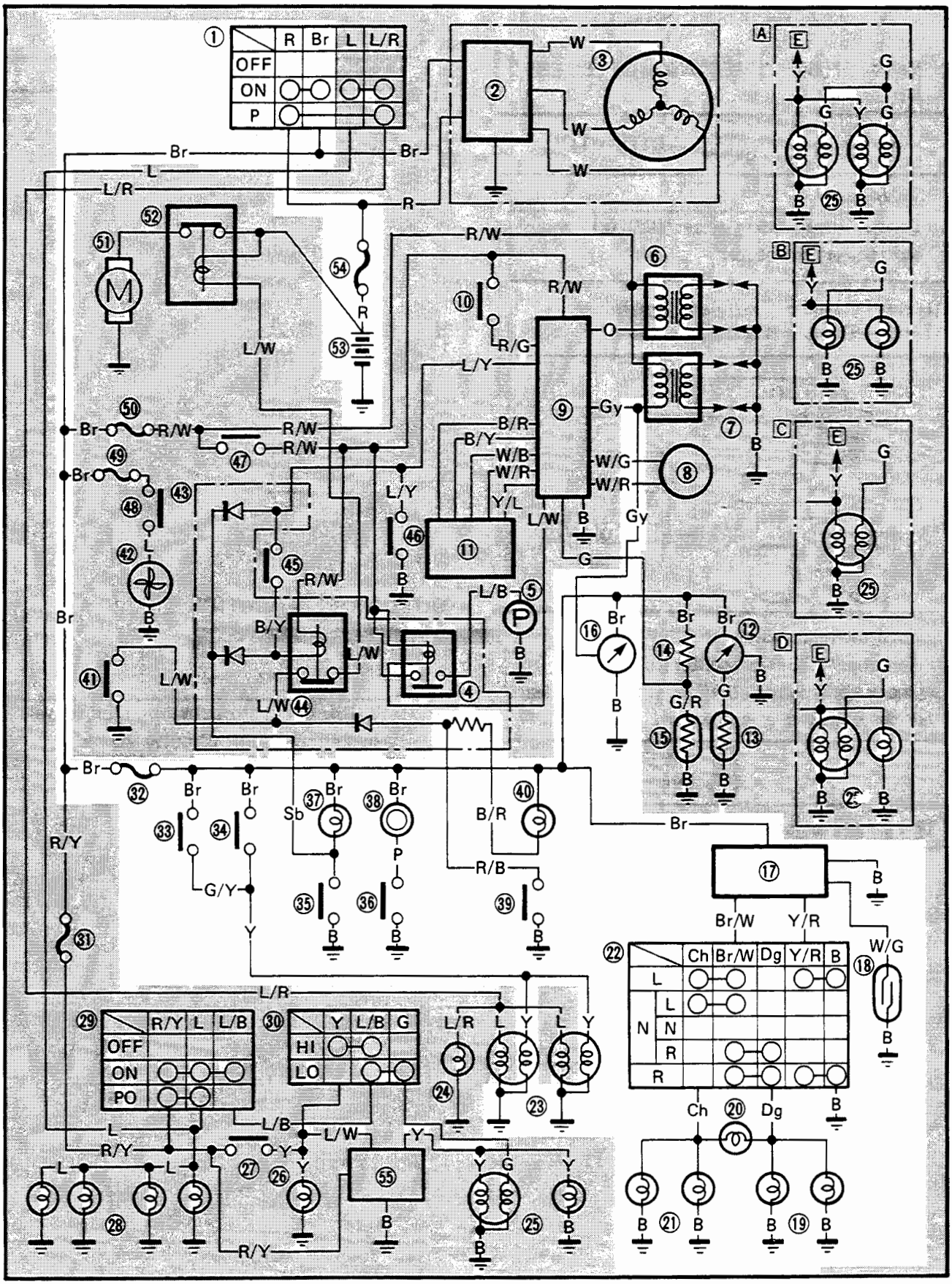
OUT OF SPECIFICATION → Wiring circuit from main switch to bulb socket connector is faulty, repair.

MEETS SPECIFICATION (12V) ↓

This circuit is good.

SIGNAL SYSTEM

CIRCUIT DIAGRAM

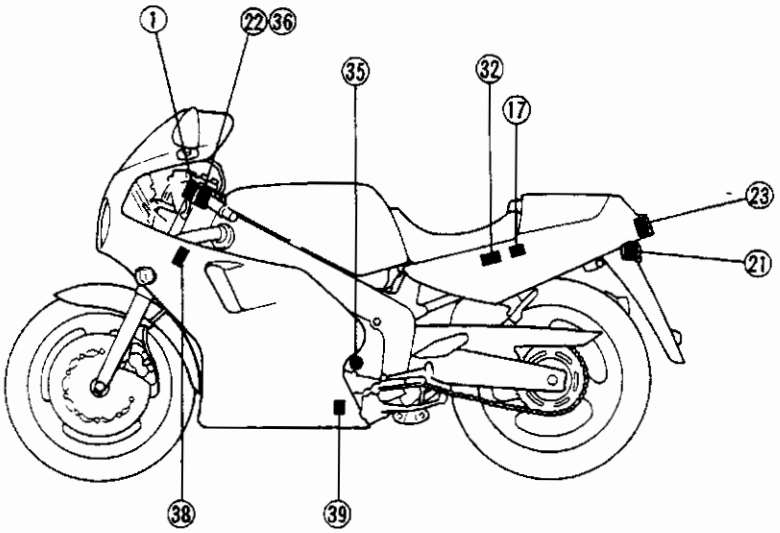


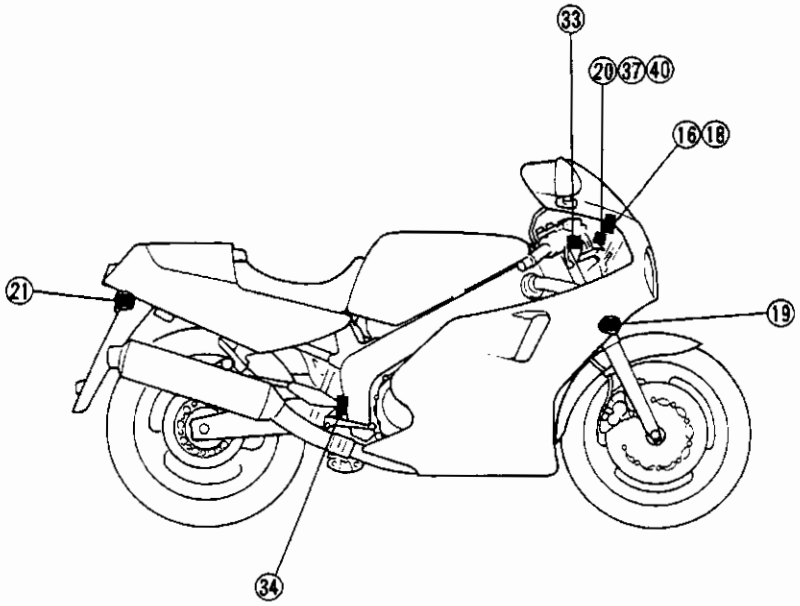
Aforementioned circuit diagram shows the signal circuit in the circuit diagram.

NOTE:

For the color codes, see page 8-2.

① Main switch
⑯ Tachometer
⑰ Flasher relay
⑱ Reed switch
⑲ Front flasher light
⑳ "TURN" indicator light
㉑ Rear flasher light
㉒ "TURN" switch
㉓ Tail/Brake light
㉜ Fuse (signal)
㉝ Front brake switch
㉞ Rear brake switch
㉟ Neutral switch
㊱ "HORN" switch
㊲ Neutral indicator light
㊳ Horn
㊴ Oil level switch
㊵ "OIL LEVEL" switch





TROUBLESHOOTING

- FLASHER LIGHT, BRAKE LIGHT AND/OR INDICATOR LIGHT DO NOT COME ON.
- HORN DOES NOT SOUND.
- TACHOMETER DOES NOT OPERATE.

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) Side cowlings
  2) Front cover
  3) Side cover (left)
  4) Seat
  5) Fuel tank
  6) Air filter case
- Use the following special tool in this troubleshooting.



Pocket tester:
YU-03112
90890-03112

1. Fuse (main and signal)

- Remove the fuses.
- Connect the pocket tester (Ω x 1) to the fuses.
- Check the fuses for continuity.
  Refer to the "FUSE INSPECTION" in the CHAPTER 3.

NOCONTINUITY → Replace fuse(s).

CONTINUITY ↓

2. Battery

- Check the battery condition.
  Refer to the "BATTERY INSPECTION" section in the CHAPTER 3.

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

INCORRECT →
- Refill battery fluid.
- Clean battery terminals.
- Recharge or replace battery.

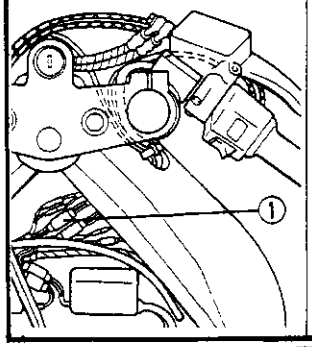
CORRECT ↓

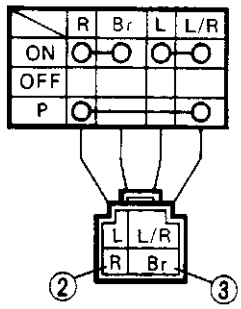
*

*

3. Main switch

- Disconnect the main switch coupler ① from the wireharness.
- Check the switch component for the continuity between "Red ② and Brown ③ ". Refer to the "CHECKING OF SWITCHES" section.





INCORRECT

Replace main switch.

CORRECT

4. Wiring connection

Check the entire signal system for connections. Refer to the "WIRING DIAGRAM" section.

POOR CONNECTION

Correct.

CORRECT

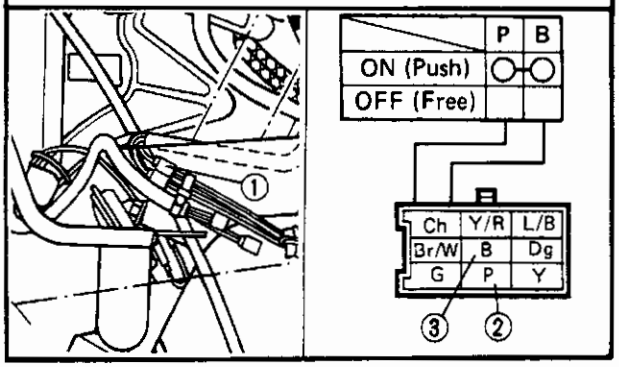
Check condition of each circuit for signal system. Refer to "SIGNAL SYSTEM CHECK" section.

SIGNAL SYSTEM CHECK

1. Horn does not sound.

1. "HORN" switch.

- Disconnect the handlebar switch (left) coupler ① from the wireharness.
- Check the switch component for the continuity between "Pink ② and Black ③ ". Refer to the "CHECKING OF SWITCHES" section.



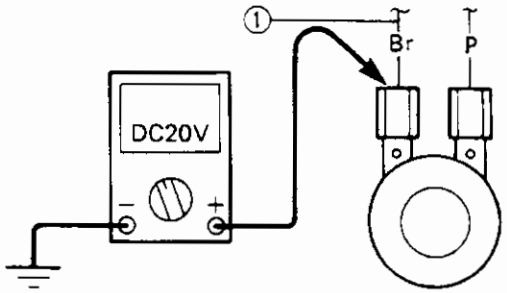
INCORRECT → Replace handlebar switch (left).

CORRECT

2. Voltage

- Connect the pocket tester (DC20V) to the horn lead.

Tester (+) lead → Brown ① lead
Tester (–) lead → Frame ground



OUT OF SPECIFICATION → Wiring circuit from main switch to horn terminal is faulty, repair.

- Turn the main switch to "ON".
- Check for voltage (12V) on the "Brown" lead at the horn terminal.

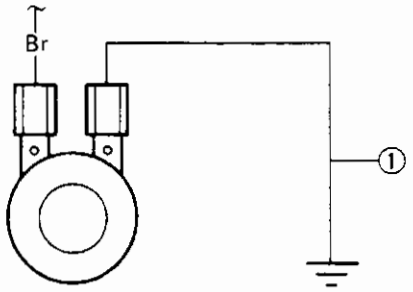
MEETS SPECIFICATION (12V)

*

*

3. Horn

- Disconnect the "Pink" lead at the horn terminal.
- Connect a jumper lead ① to the horn terminal and ground the jumper lead.
- Turn the main switch to "ON".



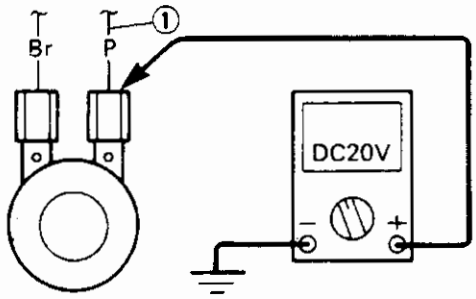
HORN IS SOUNDED → Horn is good.

HORN IS NOT SOUNDED

4. Voltage

- Connect the pocket tester (DC20V) to the horn at the "Pink" terminal.

Tester (+) lead → Pink ① lead
Tester (–) lead → Frame ground



- Turn the main switch to "ON".
- Check for voltage (12V) on the "Pink" lead at the horn terminal.

OUT OF SPECIFICATION → Replace horn.

MEETS SPECIFICATION (12V) → Adjust or replace horn.

2. Brake light does not come on.

1. Bulb and bulb socket

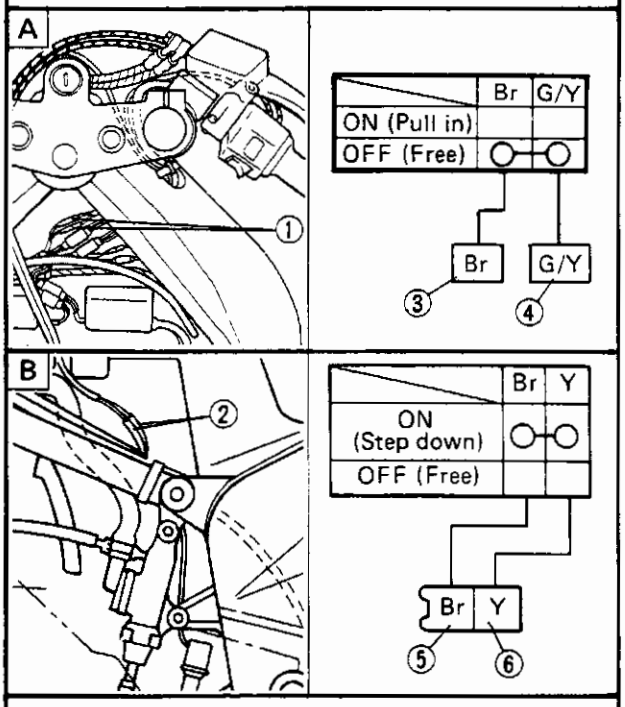
- Check the bulb and bulb socket for continuity.
  Refer to the "CHECKING OF BULBS" section.

NOCONTINUITY → Replace bulb and/or bulb socket.

CONTINUITY ↓

2. Brake switch

- Disconnect the brake switch leads ① and coupler ② from the wireharness.
- Check the switch component for the continuity between "Brown ③ and Green/Yellow ④", or "Brown ⑤ and Yellow ⑥".
  Refer to the "CHECKING OF SWITCHES" section.



A Front brake switch
B Rear brake switch

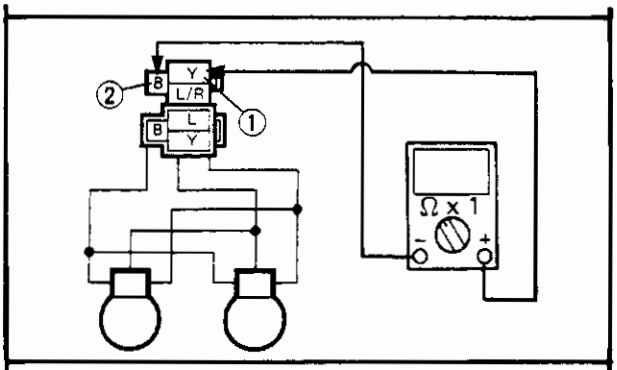
INCORRECT → Replace brake switch.

CORRECT ↓

3. Voltage

- Connect the pocket tester (DC20V) to the bulb socket connector.

Tester (+) lead → Yellow ① lead
Tester (—) lead → Black ② lead



- Turn the main switch to "ON".
- The brake level is pulled in or brake pedal is stepped down.
- Check for voltage (12V) on the "Yellow" lead at the bulb socket connector.

OUT OF SPECIFICATION

Wiring circuit from main switch to bulb socket connector is faulty, repair.

MEETS SPECIFICATION (12V)

This circuit is good.

3. Flasher light and/or "TURN" indicator light do not blink.

1. Bulb and bulb socket

- Check the bulb and bulb socket for continuity.
  Refer to the "CHECKING OF BULBS" section.

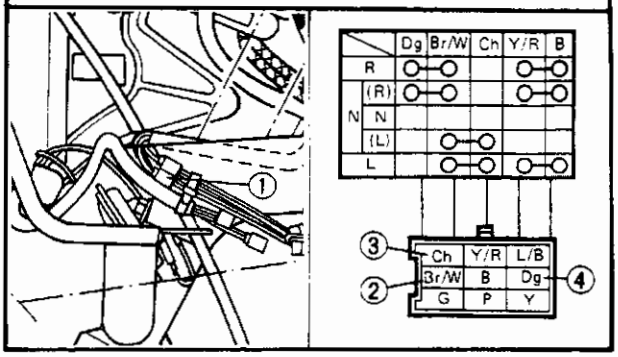
NOCONTINUITY

Replace bulb and/or bulb socket.

CONTINUITY

2. "TURN" switch

- Disconnect the handlebar switch (left) coupler ① from the wireharness.
- Check the switch component for the continuity between "Brown/White ② and Chocolate ③ " and "Brown/White ② and Dark green ④ ". Refer to the "CHECKING OF SWITCHES" section.



INCORRECT

Replace handlebar switch (left).

CORRECT

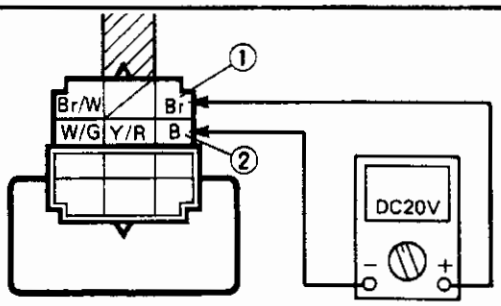
*

*

3. Voltage

- Connect the pocket tester (DC20V) to the flasher relay.

Tester (+) lead → Brown ① terminal
Tester (–) lead → Black ② terminal



- Turn the main switch to "ON".
- Check for voltage (12V) on the "Brown" lead at the flasher relay terminal.

OUT OF SPECIFICATION →

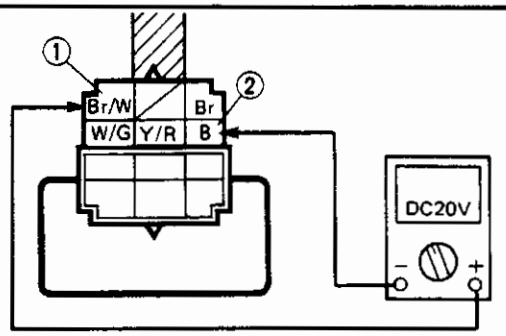
Wiring circuit from main switch to flasher relay connector is faulty, repair.

↓ MEETS SPECIFICATION (12V)

4. Voltage

- Connect the pocket tester (DC20V) to the flasher relay.

Tester (+) lead → Brown/White ① terminal
Tester (–) lead → Black ② terminal



- Turn the main switch to "ON".
- Check for voltage (12V) on the "Brown/White" lead at the flasher relay terminal.

OUT OF SPECIFICATION →

Replace flasher relay.

↓ MEETS SPECIFICATION (12V)

*

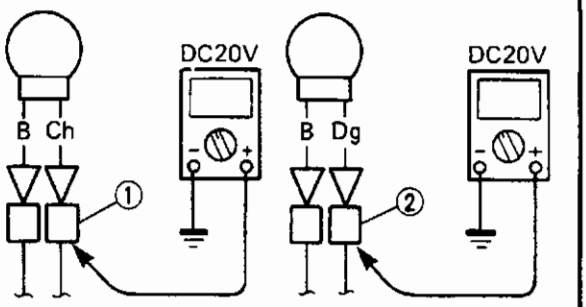
*

5. Voltage

- Connect the pocket tester (DC20V) to the bulb socket connector.

At flasher light (left):
Tester (+) lead → Chocolate ① lead
Tester (–) lead → Frame ground

At flasher light (right):
Tester (+) lead → Dark green ② lead
Tester (–) lead → Frame ground



- Turn the main switch to "ON".
- Turn the "TURN" switch to "L" or "R".
- Check for voltage (12V) on the "Chocolate" lead or "Dark green" lead at the bulb socket connector.

OUT OF SPECIFICATION

Wiring circuit from "TURN" switch to bulb socket connector is faulty, repair.

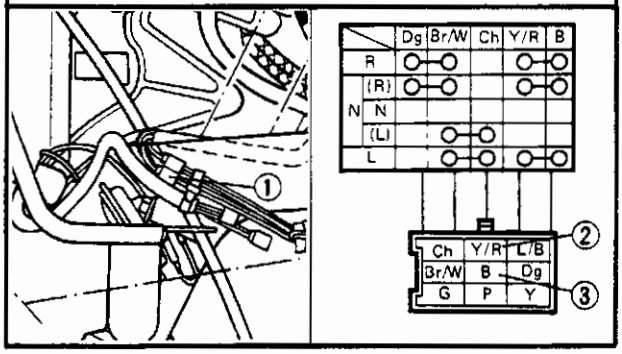
MEETS SPECIFICATION (12V)

This circuit is good.

4. Blinking (Flasher light) is not cancelled automatically.

1. "TURN" switch

- Disconnect the handlebar switch (left) coupler ① from the wireharness.
- Check the switch component for the continuity between "Yellow/Red ② and Black ③".
  Refer to the "CHECKING OF SWITCHES" section.



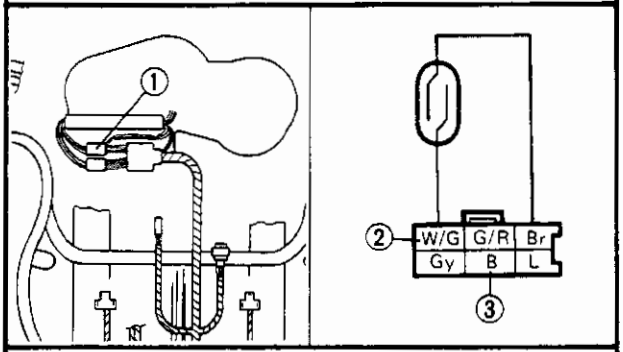
INCORRECT → Replace handlebar switch (left).

CORRECT ↓

2. Reed switch

- Disconnect reed switch coupler ① from the wireharness.
- Connect the pocket tester (Ω x 1) to the reed switch terminal.

Tester (+) lead → White/Green ② terminal
Tester (–) lead → Black ③ terminal



- Check the reed switch for specificated resistance.

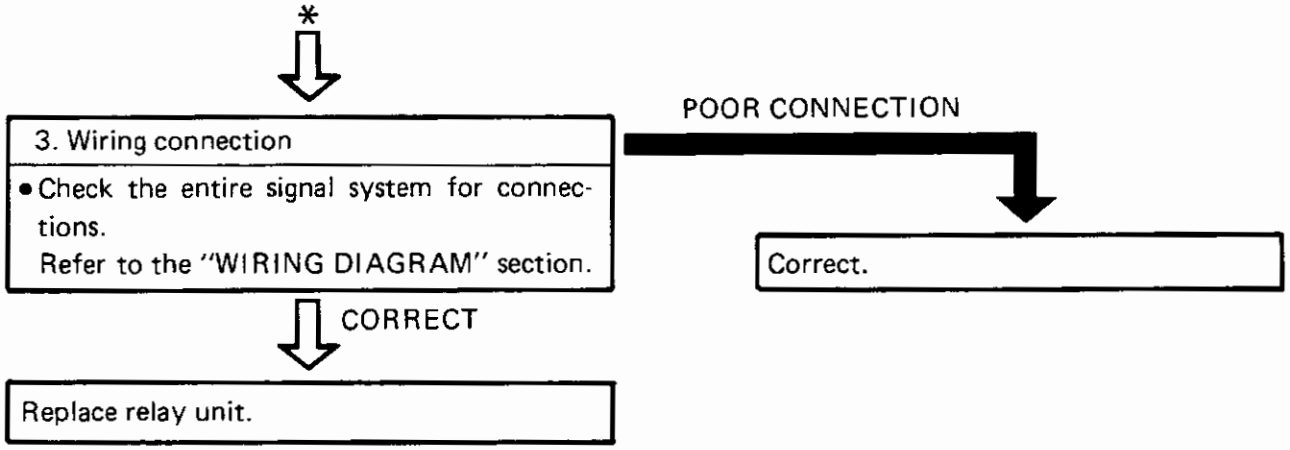
Reed switch resistance:
About 7Ω
(White/Green – Ground)
Then return back 0Ω or ∞Ω when wheel is stopped.

OUT OF SPECIFICATION → Replace speedometer assembly.

NOTE:
When measuring reed switch resistance, lift front wheel and rotate the wheel by hand.

MEETS SPECIFICATION ↓

*


*
3. Wiring connection
• Check the entire signal system for connections.
Refer to the "WIRING DIAGRAM" section.
POOR CONNECTION
Correct.
CORRECT
Replace relay unit.

5. "NEUTRAL" indicator light does not come on.

1. Bulb and bulb socket

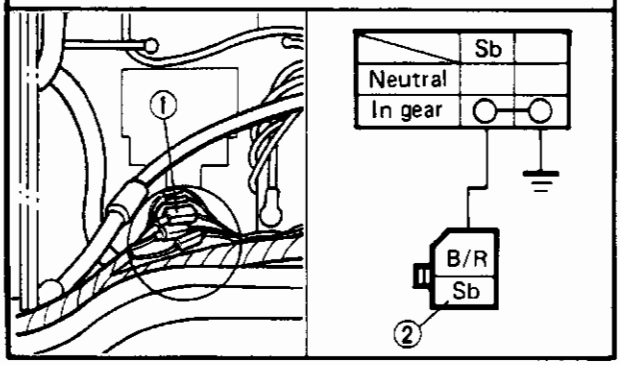
- Check the bulb and bulb socket for continuity.
  Refer to the "CHECKING OF BULBS" section.

NOCONTINUITY → Replace bulb and/or bulb socket.

CONTINUITY ↓

2. Neutral switch

- Disconnect the neutral switch coupler ① from the wireharness.
- Check the switch component for the continuity between "Sky blue ② and Ground".
  Refer to the "CHECKING OF SWITCHES" section.



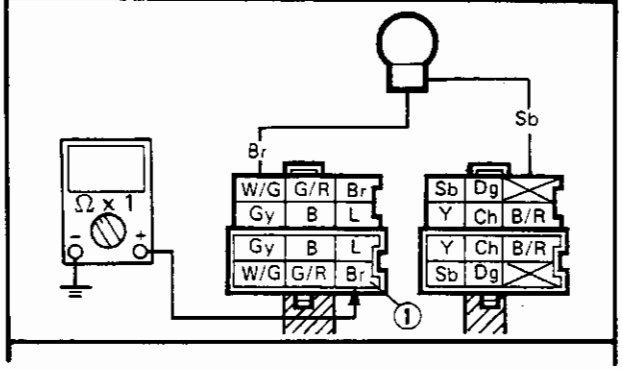
INCORRECT → Replace neutral switch.

CORRECT ↓

3. Voltage

- Connect the pocket tester (DC20V) to the bulb socket connector.

Tester (+) lead → Brown ① terminal
Tester (–) lead → Frame ground



- Turn the main switch to "ON".
- Check for voltage (12V) on the "Brown" lead at bulb socket connector.

OUT OF SPECIFICATION → Wiring circuit from main switch to bulb socket connector is faulty, repair.

MEETS SPECIFICATION (12V) ↓

This circuit is good.

6. "OIL LEVEL" indicator light does not come on, when engine oil level is low.

1. Bulb and bulb socket

- Check the bulb and bulb socket for continuity.
  Refer to the "CHECKING OF BULBS" section.

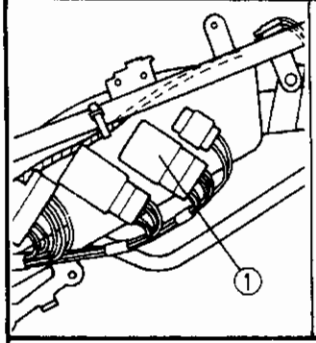
NOCONTINUITY → Replace bulb and/or bulb socket.

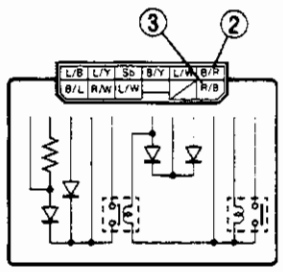
CONTINUITY ↓

2. Resistor

- Remove the relay unit ① from the wire-harness.
- Connect the pocket tester (Ω x 1) to the relay unit terminal.

Tester (+) lead → Black/Red ② terminal
Tester (–) lead → Red/Black ③ terminal





- Check the resistor for continuity.

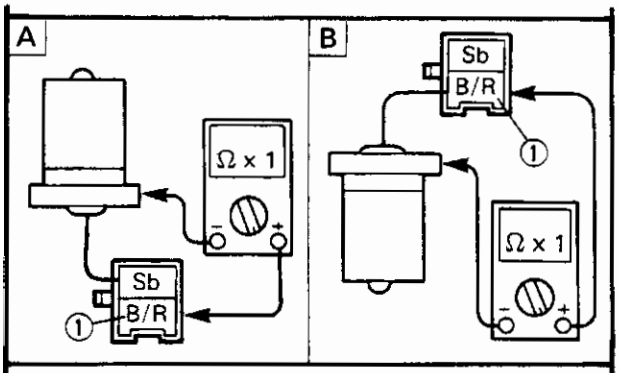
NOCONTINUITY → Replace relay unit.

CONTINUITY ↓

3. Oil level switch

- Drain the engine oil and remove the oil level switch from the oil pan.
- Connect the pocket tester (Ω x 1) to the oil level gauge.

Tester (+) lead → Black/Red ① terminal
Tester (–) lead → Oil level switch body



• Check the oil level switch for continuity.

Switch position		Good condition	Bad condition		
A	Upright position	X	O	X	O
B	Upside down position	O	X	X	O

O : Continuity X : Nocontinuity

BAD CONDITION

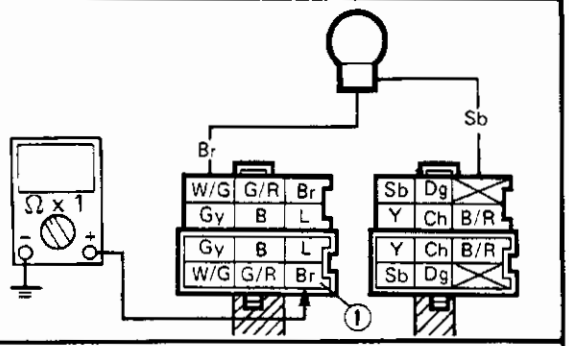
Replace oil level switch.

GOOD CONDITION

4. Voltage

• Connect the pocket tester (DC20V) to the bulb socket connector.

Tester (+) lead → Brown ① lead
Tester (–) lead → Frame ground



• Turn the main switch to "ON".
• Check for voltage (12V) on the "Brown" lead at bulb socket connector.

OUT OF SPECIFICATION

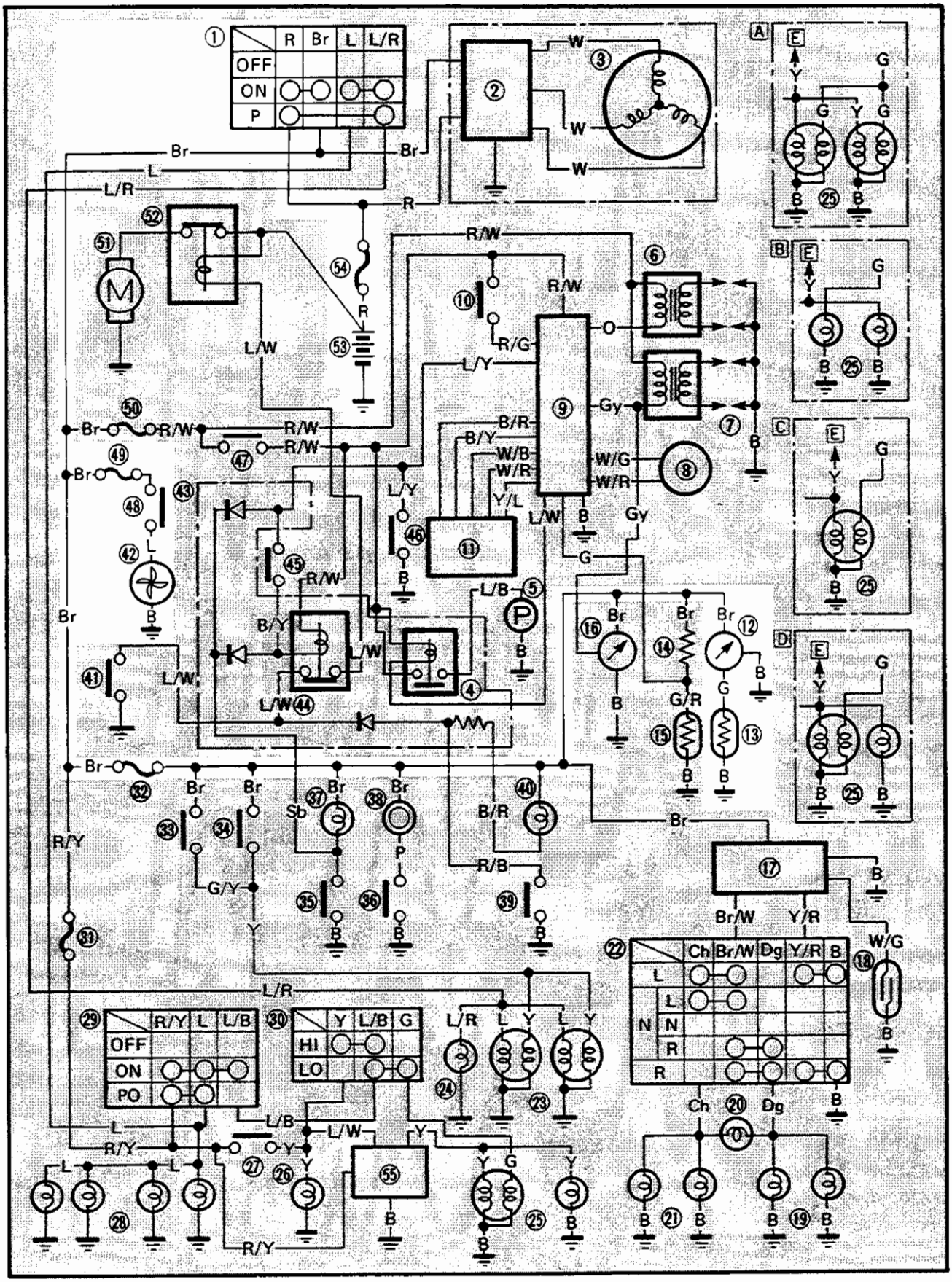
Wiring circuit from main switch to bulb socketed connector is faulty, repair.

MEETS SPECIFICATION (12V)

This circuit is good.

COOLING SYSTEM

CIRCUIT DIAGRAM

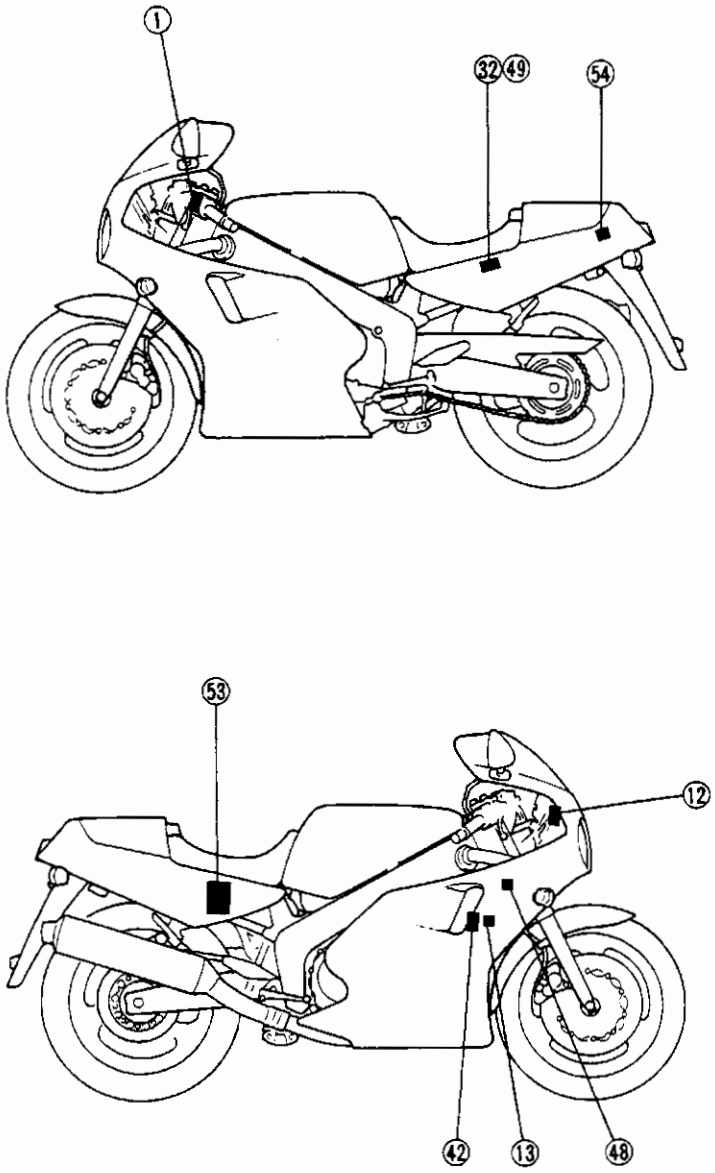


Aforementioned circuit diagram shows the cooling circuit in the circuit diagram.

NOTE:

For the color codes see page 8-2.

① Main switch
⑫ Engine temperature gauge
⑬ Thermo unit
㉜ Fuse (signal)
㊷ Fan motor
㊽ Thermo switch
㊾ Fuse (fan)
㊸ Battery
㊹ Fuse (main)



TROUBLESHOOTING

FAN MOTOR DOES NOT TURN.

Procedure

Check;

1. Fuse (main, signal and fan)
2. Battery
3. Fan motor (Test 1)
4. Fan motor (Test 2)
5. Thermo switch
6. Wiring connection (Entire cooling system)

NOTE:

- Remove the following parts before troubleshooting.
  1) Side cowlings
  2) Front cover
  3) Side cover (left)
  4) Seat
  5) Fuel tank
  6) Air filter case
- Use the following special tool in this troubleshooting.



Pocket tester:
YU-03112
90890-03112

1. Fuse (main, signal and fan)

- Remove the fuses.
- Connect the pocket tester (Ω x 1) to the fuses.
- Check the fuses for continuity.
  Refer to the "FUSE INSPECTION" in the CHAPTER 3.

NOCONTINUITY → Replace fuse(s).

CONTINUITY ↓

2. Battery

- Check the battery condition.
  Refer to the "BATTERY INSPECTION" section in the CHAPTER 3.

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

INCORRECT →
- Refill battery fluid.
- Clean battery terminals.
- Recharge or replace battery.

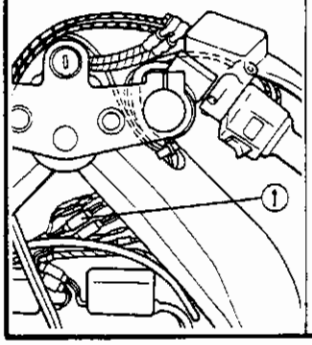
CORRECT ↓

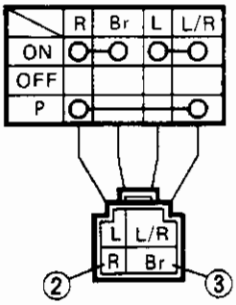
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3. Main switch

- Disconnect the main switch coupler ① from the wireharness.
- Check the switch component for the continuity between "Red ② and Brown ③ ". Refer to the "CHECKING OF SWITCHES" section.





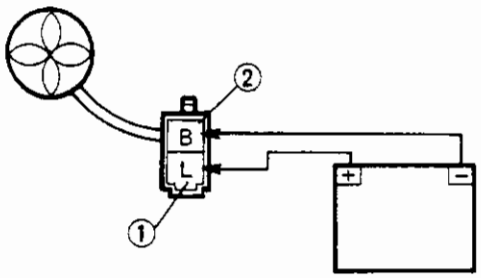
INCORRECT → Replace main switch.

CORRECT

4. Fan motor (test 1)

- Disconnect the fan motor coupler.
- Connect the battery (12V) as shown.

Battery (+) lead → Blue ① terminal
Battery (-) lead → Black ② terminal



- Check the fan motor for operation.

DOES NOT MOVES → Replace fan motor.

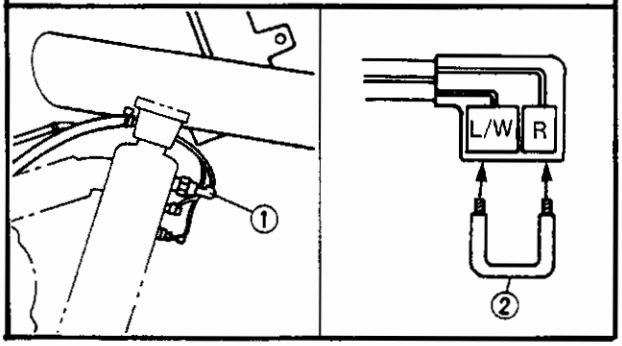
MOVES

*

*

5. Fan motor (test 2)

- Disconnect the thermo switch leads ("Blue/-White" and "Brown") ① .
- Turn the main switch to "ON".
- Connect the leads with the jumper lead ② as shown.



DOES NOT MOVE

Wiring circuit from main switch to fan motor leads is faulty, repair.

MOVES

6. Thermo switch

- Remove the thermo switch from the thermostat housing.
- Connect the pocket tester (Ω x 1) to the thermo switch ① .
- Immerse the thermo switch in the water ② .
- Check the thermo switch for continuity. Note temperatures while heating the water with the temperature gauge ③ .

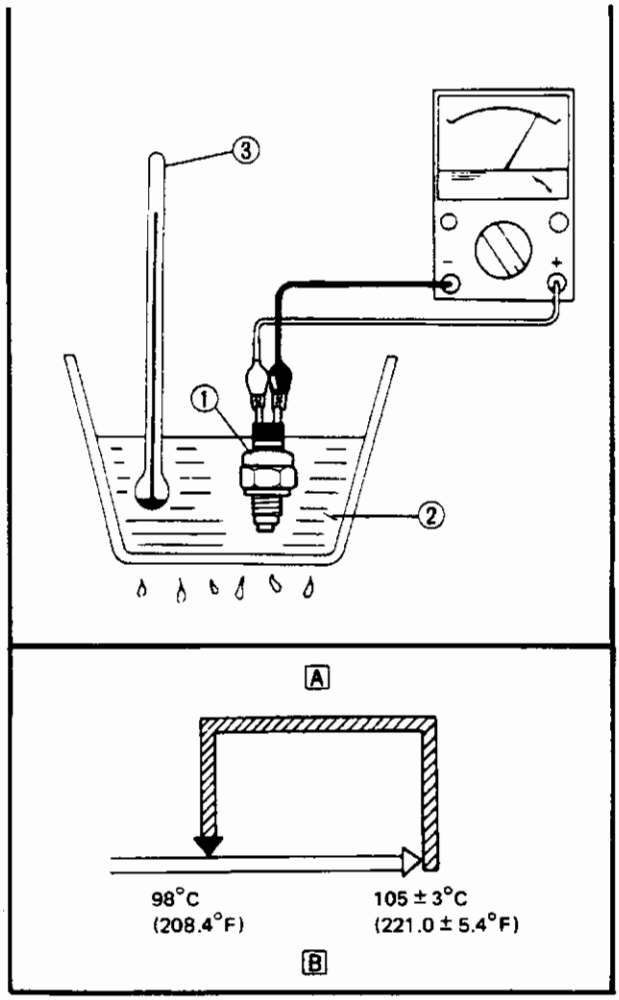
Test step	Water temperature	Good condition
1	0~ 98°C (32 ~ 208.4° F)	X
2	More than 105 ± 3°C (221.0 ± 5.4° F)	○
3*	105 to 98°C (221.0 to 208.4° F)	○
4*	Less than 98°C (208.4° F)	X

Test 1 & 2; Heat-up tests
Test 3* & 4*; Cool-down tests
○ : Continuity X : No continuity

WARNING:

Handle the thermo switch with special care. Never subject it to 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 thermo switch.

WHEN ENGINE IS HOT, TEMPERATURE GAUGE DOES NOT MOVE.

Procedure

Check;

1. Fuse (main and signal)
2. Battery
3. Main switch
4. Thermo unit
5. Voltage
6. Wiring connection
   (Entire cooling system)

NOTE:

- Remove the following parts before troubleshooting.
  1) Side cowlings
  2) Front cover
  3) Side cover (left)
- Use the following special tool(s) in this troubleshooting.



Pocket tester:
YU-03112
90890-03112

1. Fuse (main and signal)
   - Remove the fuses.
   - Connect the pocket tester (Ω x 1) to the fuses.
   - Check the fuses for continuity. Refer to "FUSE INSPECTION" in the CHAPTER 3.

NOCONTINUITY → Replace fuse(s).

CONTINUITY ↓

2. Battery
   - Check the battery condition. Refer to the "BATTERY INSPECTION" section in the CHAPTER 3.

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

INCORRECT → • Refill battery fluid. • Clean battery terminals. • Recharge or replace battery.

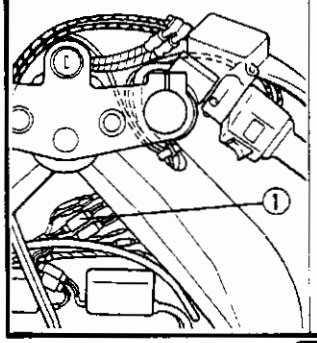
CORRECT ↓

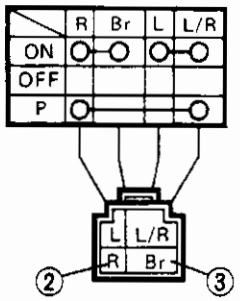
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3. Main switch

- Disconnect the main switch coupler ① from the wireharness.
- Check the switch component for the continuity between "Red ② and Brown ③ ". Refer to the "CHECKING OF SWITCHES" section.





INCORRECT

Replace main switch.

CORRECT

4. Thermo unit

- Drain the coolant and remove the thermo unit.

⚠ WARNING:

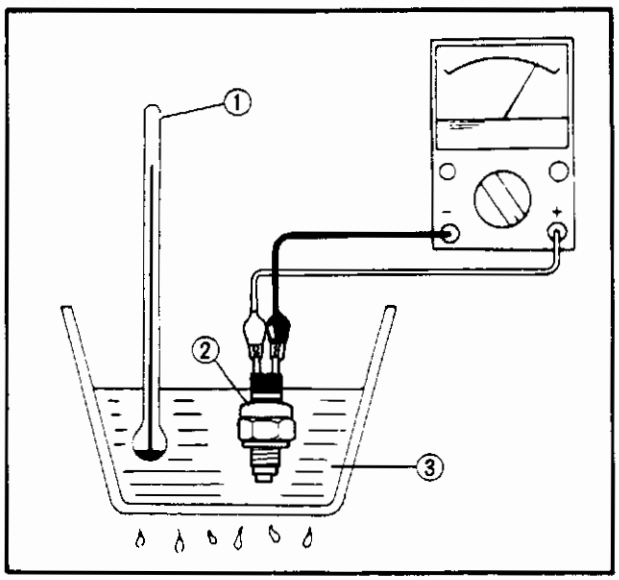
Handle the thermo unit with special care. Never subject it to strong or allow it to be dropped. Should it be dropped, it must be replaced.

- Immerse the thermo unit ② in coolant ③ .
- Measure the resistance at each temperature as tabulated.

① Thermometer

Coolant temperature	Resistance
50°C (122°F)	154Ω
80°C (176°F)	47 ~ 57Ω
100°C (212°F)	26 ~ 29Ω
120°C (248°F)	16Ω

- After measuring the thermo unit, install the unit.



Thermo unit:
15 Nm (1.5 m · kg, 11 ft · lb)
Use water resistant sealant.

⚠ CAUTION:
Avoid overtightening.

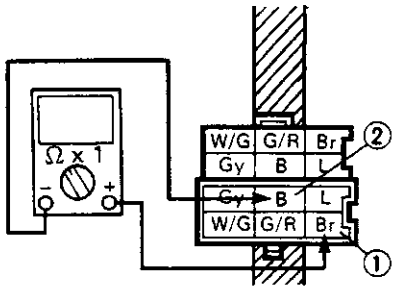
OUT OF SPECIFICATION → Replace thermo unit.

MEET SPECIFICATIONS ↓

5. Voltage

- Connect the pocket tester (DC20V) to the temperature gauge leads.

Tester (+) lead → Brown ① terminal
Tester (–) lead → Black ② terminal



OUT OF SPECIFICATION → Wiring circuit from main switch to temperature gauge connector, repair.

- Turn the main switch to "ON".
- Check for voltage (12V) on the "Brown" lead at the temperature gauge connector.

MEETS SPECIFICATION (12V) ↓

6. Wiring connection

Check the entire cooling system for connections. Refer to the "WIRING DIAGRAM" section.

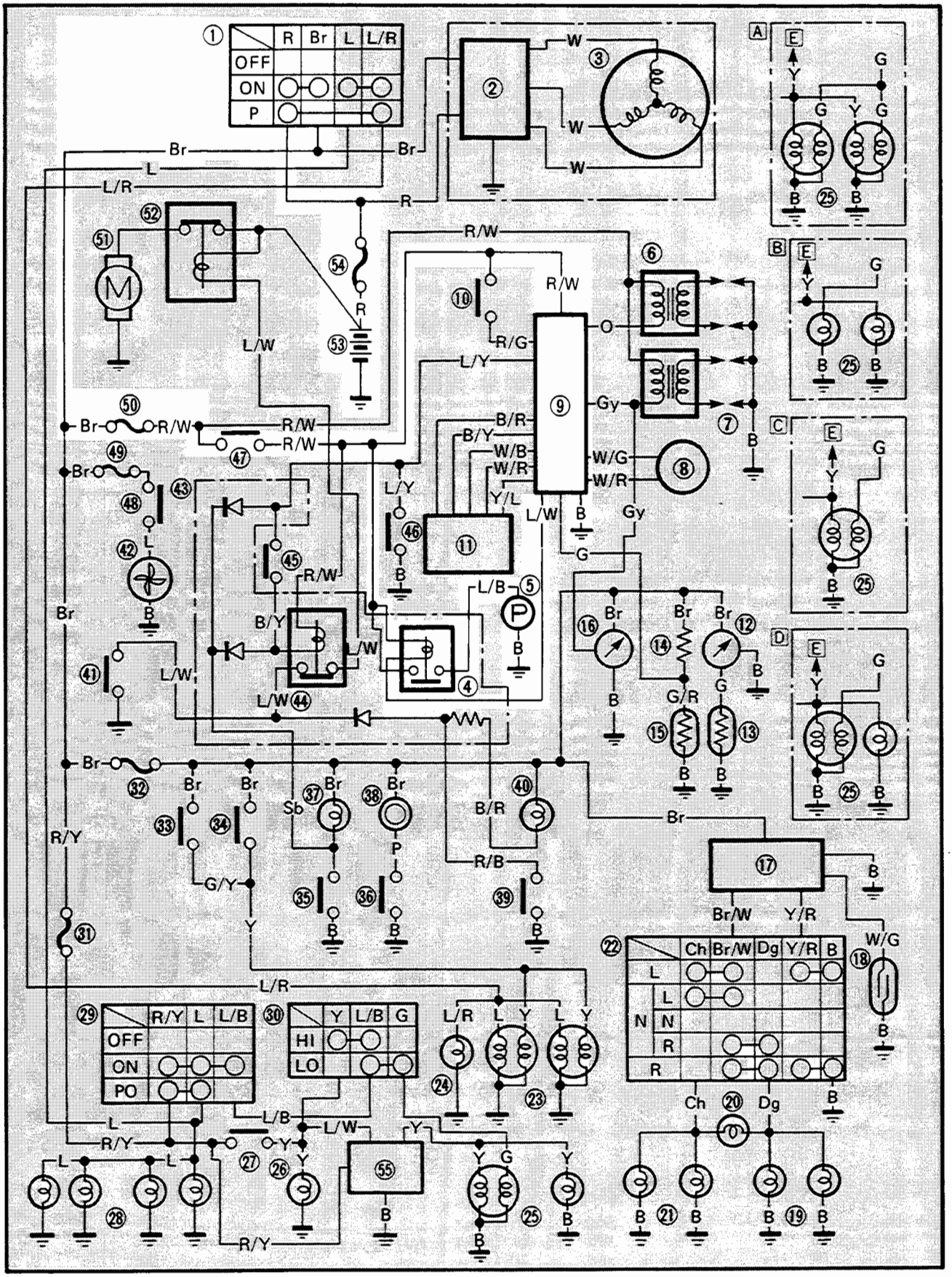
POUR CONNECTION → Correct.

CORRECT ↓

Replace tempmeter gauge.

FUEL PUMP SYSTEM

CIRCUIT DIAGRAM

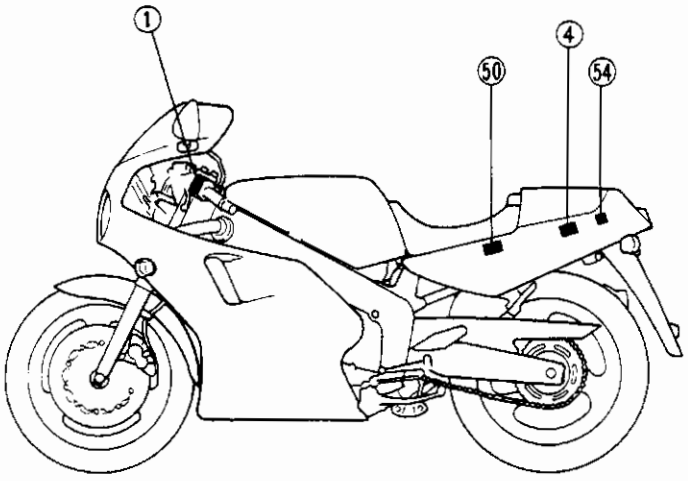


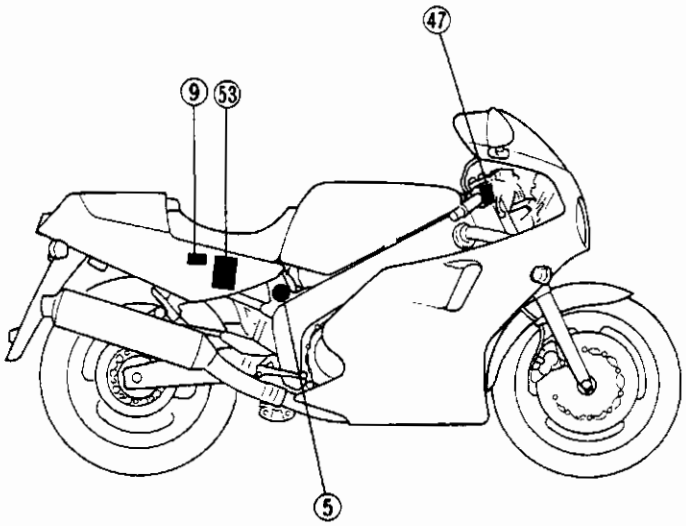
Aforementioned circuit shows fuel pump system circuit in circuit diagram.

NOTE:

For the color codes, see page 8-2.

① Main switch
④ Fuel pump relay
⑤ Fuel pump
⑨ Ignitor unit
㊼ "ENGINE STOP" switch
㊿ Fuse (ignition)
㊸ Battery
㊹ Fuse (main)

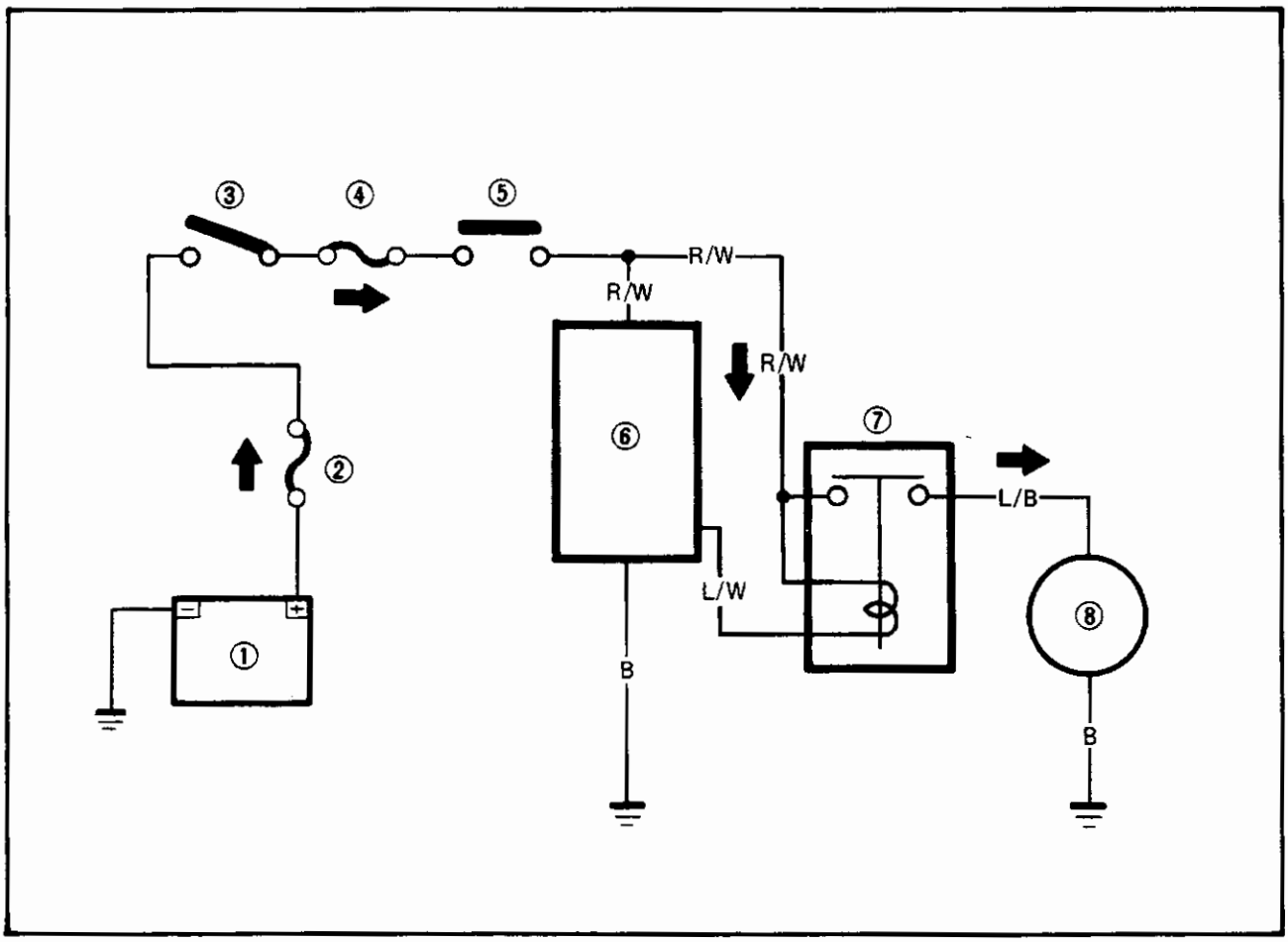




FUEL PUMP CIRCUIT OPERATION

The fuel pump circuit consists of the fuel pump relay, fuel pump, "ENGINE STOP" switch and digital ignition unit.
The digital ignition unit includes the control unit for the fuel pump.
The fuel pump starts and stops as indicated in the chart below.

① Battery
② Fuse (main)
③ Main switch
④ Fuse (ignition)
⑤ "ENGINE STOP" switch
⑥ Digital ignitor unit
⑦ Fuel pump relay
⑧ Fuel pump



FUEL PUMP		
START		STOP
• Main/"ENGINE STOP" switch turned to "ON"	• Engine turned on	• Engine turned off
For about 5 seconds when carburetor fuel level is low	After about 0.1 second	After about 5 seconds

TROUBLESHOOTING

FUEL PUMP FAILS TO OPERATE.

Procedure

1. Fuse (main and ignition)
2. Battery
3. Main switch
4. "ENGINE STOP" switch
5. Fuel pump relay (relay unit)
6. Fuel pump
7. Wiring connection (Entire fuel system)

NOTE:

- Remove the following before troubleshooting.
  1) Seat
  2) Fuel tank
  3) Air filter case
  4) Side cover (left)
- Use the following special tool in this troubleshooting.



Pocket tester:
YU-03112
90890-03112

1. Fuse (main and ignition)

- Remove the fuses.
- Connect the pocket tester (Ω x 1) to the fuses.
- Check the fuses for continuity.
  Refer to the "FUSE INSPECTION" section in the CHAPTER 3.

NOCONTINUITY → Replace the fuse(s).

↓ CONTINUITY

2. Battery

- Check the battery condition.
  Refer to the "BATTERY INSPECTION" section in the CHAPTER 3.

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

INCORRECT →
- Refill battery fluid.
- Clean battery terminals.
- Recharge or replace battery.

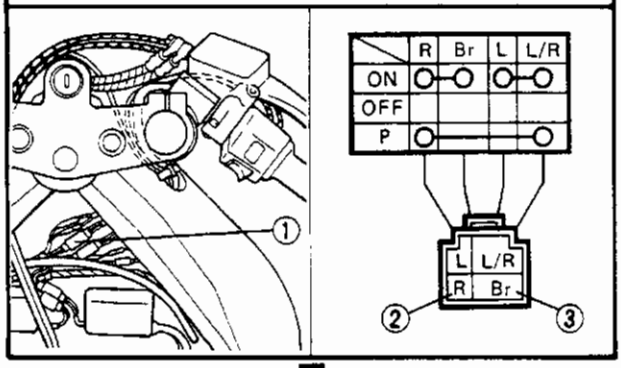
↓ CORRECT

*

*

3. Main switch

- Disconnect the main switch coupler ① and lead from the wireharness.
- Check the switch component for the continuity between "Red ② and Brown ③ " Refer to the "CHECKING OF SWITCHES" section.

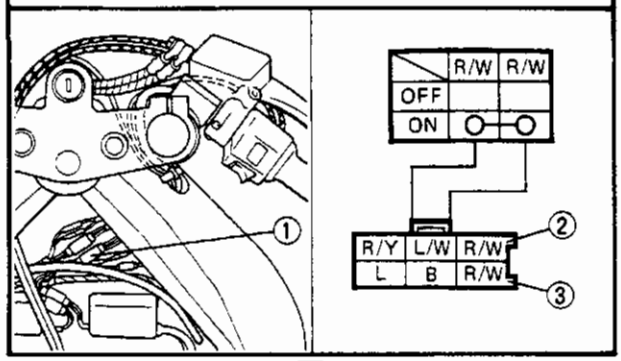


INCORRECT → Replace main switch.

CORRECT

4. "ENGINE STOP" switch

- Disconnect the handlebar switch (right) coupler ① from the wireharness.
- Check the switch component for the continuity between "Red/White ② and Red/White ③ ". Refer to the "CHECKING OF SWITCHES" section.



INCORRECT → Replace handlebar switch (right).

CORRECT

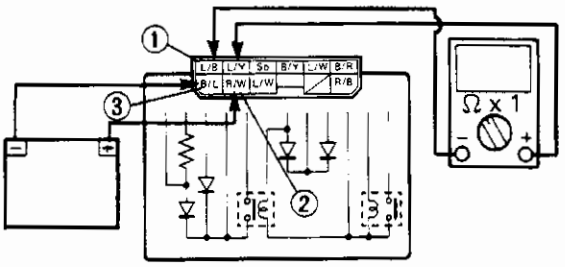
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5. Fuel pump relay (relay unit)

- Disconnect the fuel pump relay unit from the wire harness.
- Connect the pocket tester (Ω x 1) and battery (12V) voltage to the fuel pump relay unit coupler terminals.

Tester (+) lead → Blue/Black ① terminal
Tester (-) lead → Red/White ② terminal
Battery (+) lead → Red/White ② terminal
Battery (-) lead → Black/Blue ③ terminal



- Check the relay for continuity.

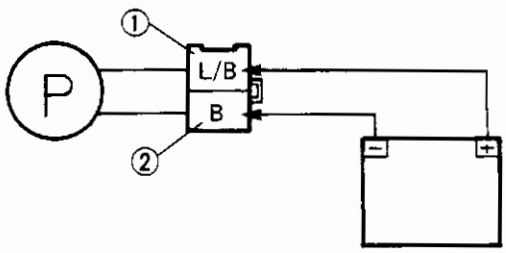
NOCONTINUITY → Replace relay unit.

CONTINUITY ↓

6. Fuel pump

- Disconnect the fuel pump coupler from the wire harness.
- Connect the battery voltage (12V) as shown.

Battery (+) lead → Blue/Black ① terminal
Battery (-) lead → Black ② terminal

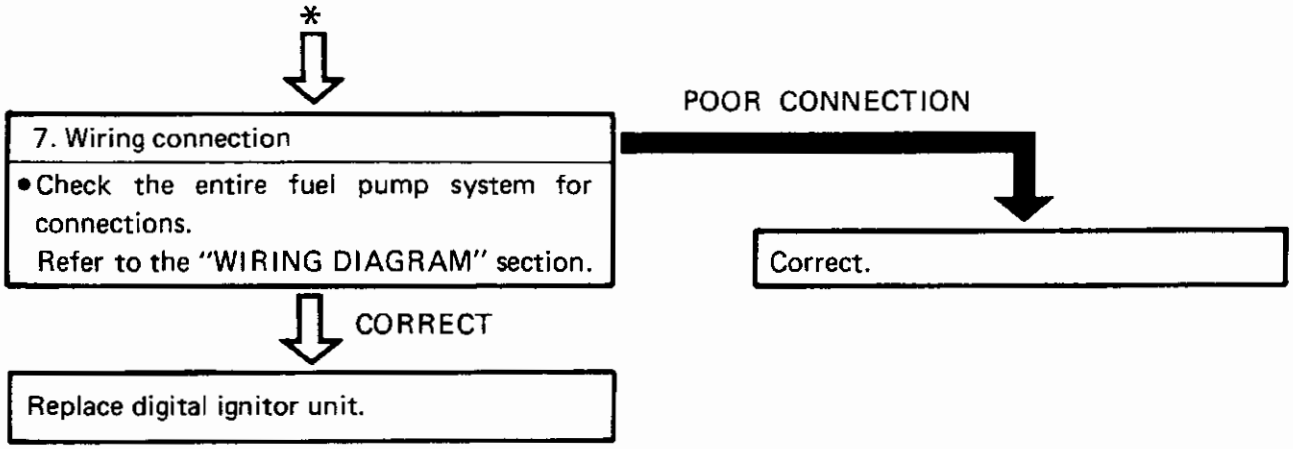


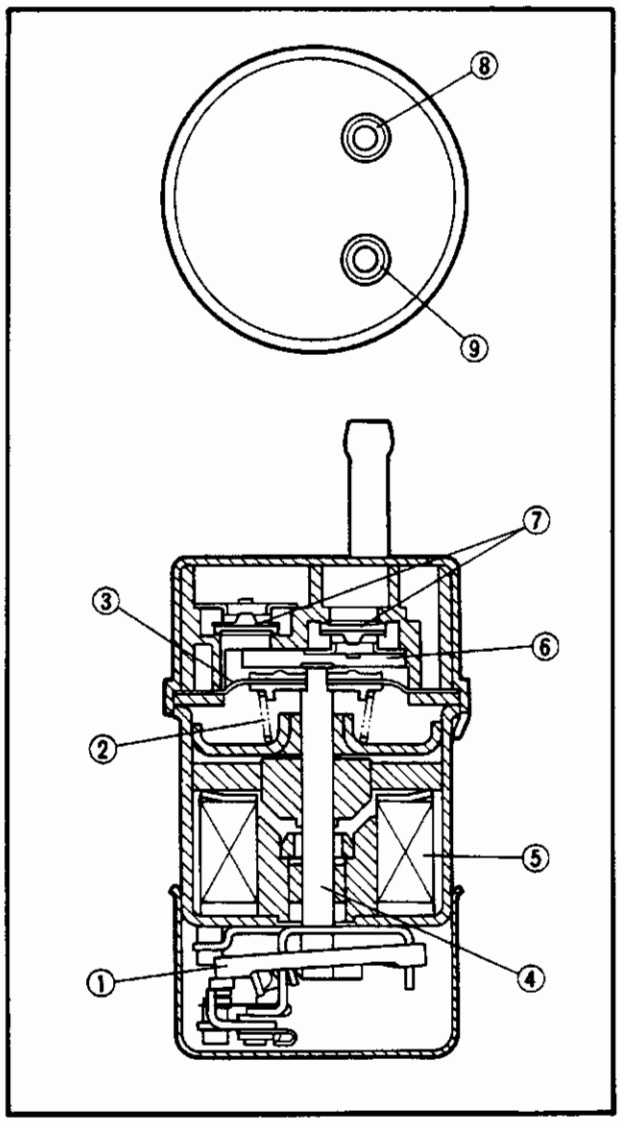
- Check the fuel pump operation.

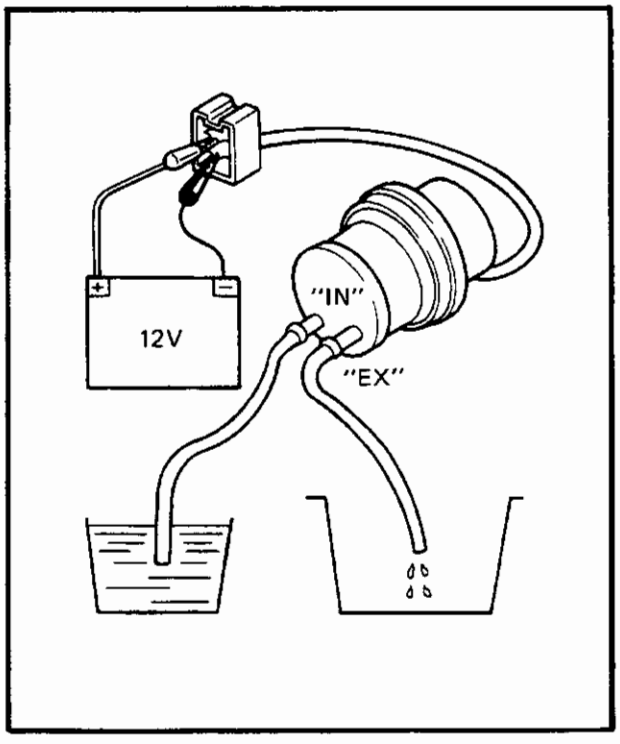
DOES NOT MOVE → Replace fuel pump.

MOVES ↓

*


*
7. Wiring connection
• Check the entire fuel pump system for connections.
Refer to the "WIRING DIAGRAM" section.
POOR CONNECTION
Correct.
CORRECT
Replace digital ignitor unit.





FUEL PUMP TEST

Operation

The diaphragm is pulled in by the plunger allowing fuel to be sucked into the fuel chamber. Fuel is pushed out from the pump until carb float chamber is filled with fuel, and then the cut-off switch cuts off the circuit.
When the spring pushes the diaphragm further to the end, the cut-off switch turns on and the solenoid coil pulls the plunger with the diaphragm forcing fuel into the fuel chamber.

NOTE:
When the main and "ENGINE STOP" switches are ON, the fuel pump relay is activated for five (5) seconds at which time the fuel pump operates.

① Cut-off switch
② Spring
③ Diaphragm
④ Plunger
⑤ Solenoid coil
⑥ Fuel chamber
⑦ Valve
⑧ Outlet
⑨ Inlet

Inspection

1. Inspect:
   - Fuel pump
     Cracks/Damage → Replace.
2. Check:
   - Fuel pump operation

Checking steps:
- Connect suitable hoses to the fuel pump.
- Put the "IN" side hose into the clean solvent.
- Place an open container under the "EX" side hose end.
- Connect the battery to fuel pump terminal.

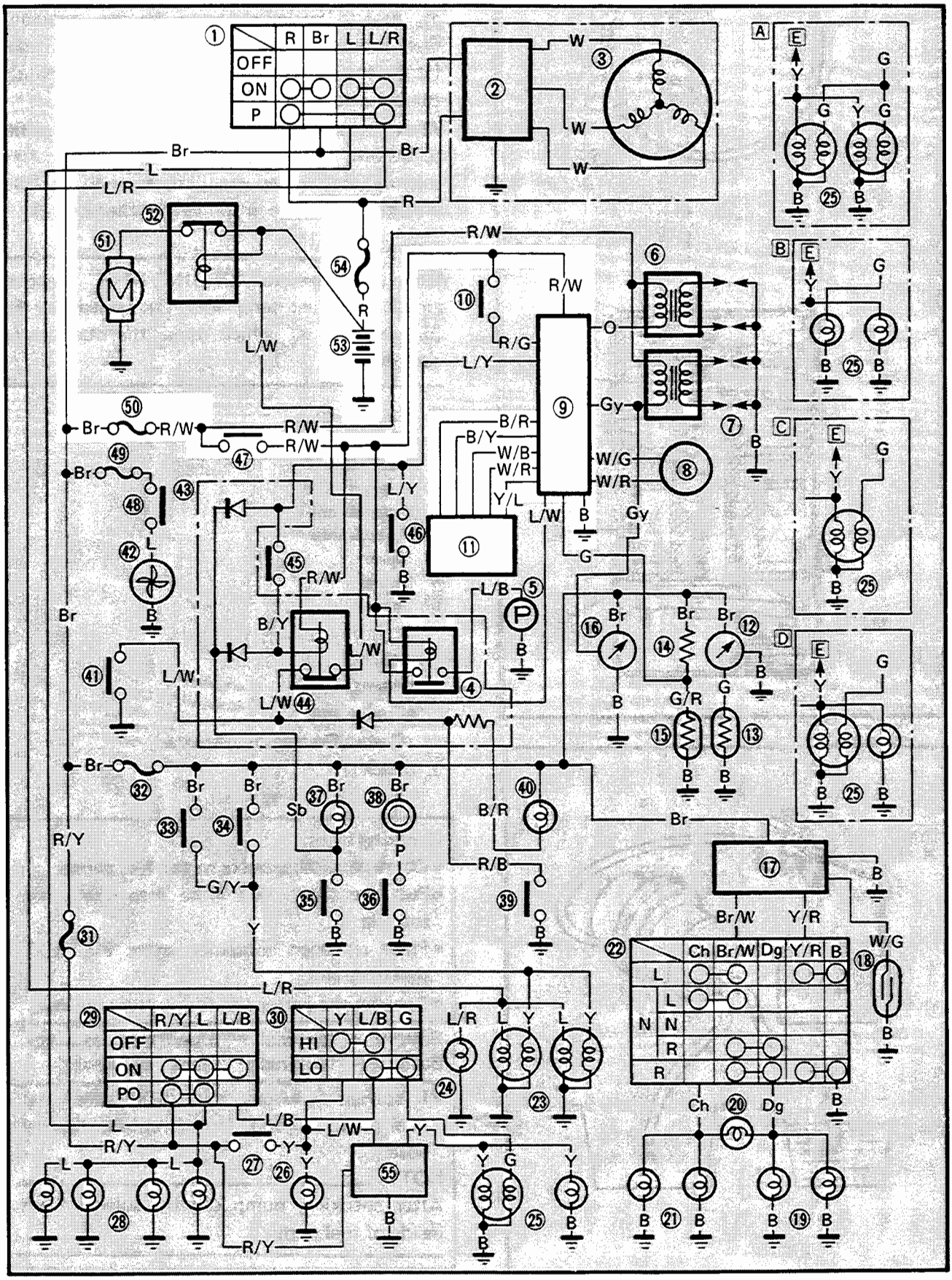
Battery (+) terminal → "Blue/Black" terminal
Battery (–) terminal → "Black" terminal

- If solvent flow out from "EX" side hose, puel pump is good. If not replace the fuel hose.

NOTE:
After checking, pump out the solvent from inside of fuel pump.

EXUP SYSTEM

CIRCUIT DIAGRAM

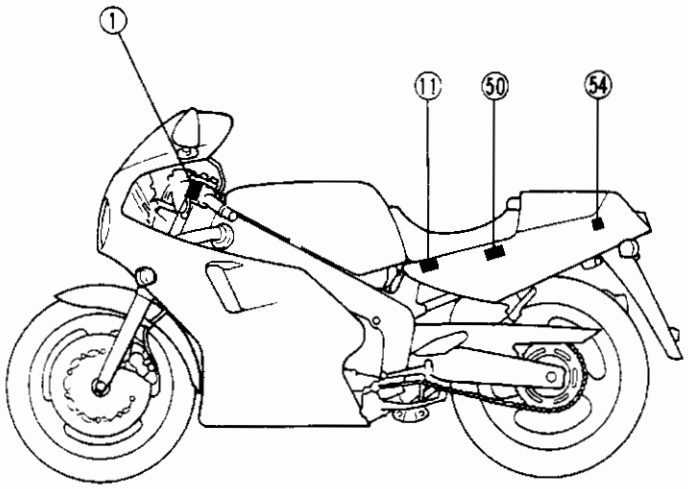


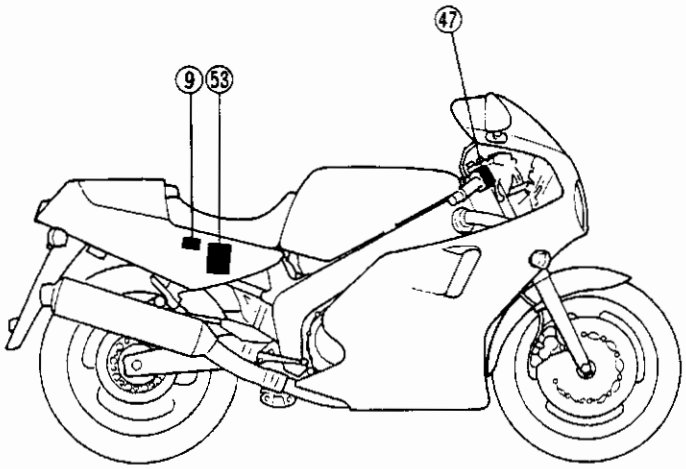
A forementioned circuit diagram shows the EXUP circuit in the circuit diagram.

NOTE:

For the color codes, see page 8-2.

① Main switch
⑨ Digital ignitor unit
⑪ EXUP servo motor
㊼ "ENGINE STOP" switch
㊿ Fuse (ignition)
㊸ Battery
㊹ Fuse (main)





TROUBLESHOOTING

WHEN MAIN SWITCH IS TURNED TO "ON", EXUP SERVOMOTOR DOES NOT OPERATE.

Procedure (1)

Check;

1. EXUP servo motor operation (with EXUP servo motor coupler connected)
2. Voltage
3. EXUP servo motor operation (with EXUP servo motor coupler disconnected)
4. EXUP servo motor resistance (potentionmeter resistance)
5. Wiring connection (entire EXUP system)

Procedure (2)

Check;

1. Fuse (main and ignition)
2. Battery
3. Main switch
4. "ENGINE STOP" switch
5. Wiring connection (entire EXUP system)

NOTE:

- Remove the following parts before troubleshooting.
  1) Seat
  2) Fuel tank
  3) Air filter case
  4) Side cover (left)
- Use the following special tool in this troubleshooting.

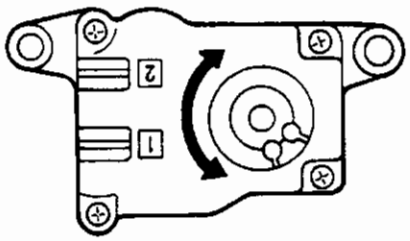


Pocket tester:
YU-03112
90890-03112

Procedure (1)

1. EXUP servo motor operation (with EXUP servo motor coupler connected)

- Disconnect the EXUP cables at EXUP servo motor pully side.
- Start the engine and rev it at to 2,000 r/min.



PULLY TURNS

Check the EXUP cables connection. If connection is correct, inspect the EXUP valve and cables.
Refer to the "ENGINE OVERHAUL" section in the CHAPTER 4.

PULLY DOES NOT TURN

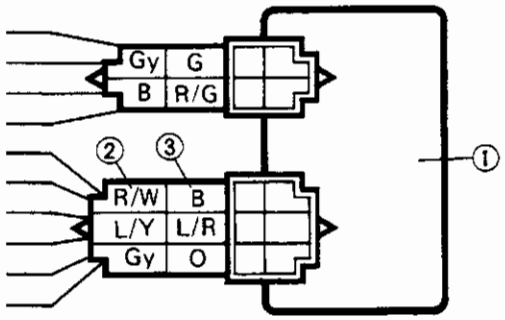
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2. Voltage

- Connect the pocket tester (DC20V) to the digital ignitor unit ① connector.

Tester (+) lead → Red/White ② terminal
Tester (–) lead → Black ③ terminal



- Turn the main switch to "ON" and check for the voltage between "Red/White and Black".

Voltage (Red/White – Black):
10 ~ 14V

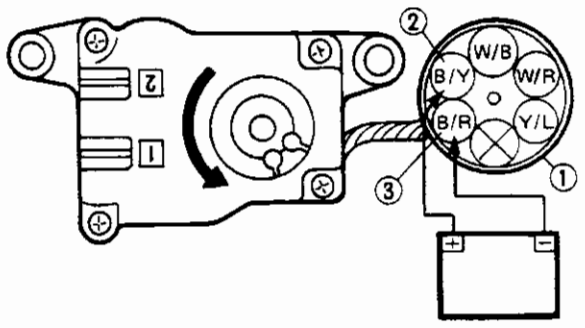
OUT OF SPECIFICATION → Refer to the "procedure (2)".

MEETS SPECIFICATION

3. EXUP servo motor operation (with EXUP servo motor coupler disconnected)

- Disconnect the EXUP cables from the EXUP servo motor pully.
- Disconnect the EXUP servo motor coupler ① from the wireharness.
- Connect the battery leads to the EXUP motor coupler.

Battery positive lead → Black/Yellow ② lead
Battery negative lead → Black/Red ③ lead



PULLY DOES NOT TURN → Replace EXUP servo motor.

- Check the EXUP servo motor for pully operation by allowing it to rotate several times.

⚠ CAUTION:

This test should be performed within a few seconds to prevent further damage.

⇩ PULLY TURNS

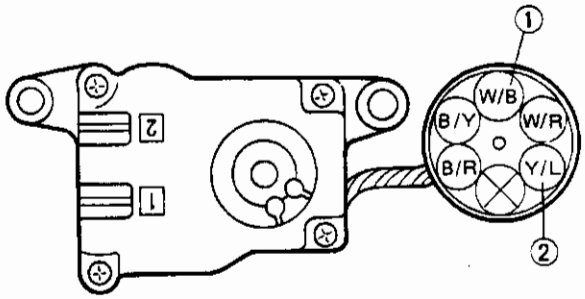
4. EXUP servo motor resistance (potentiometer resistance)

- Disconnect the EXUP servo motor coupler from the wireharness.

Step 1:

- Connect the pocket tester (Ω x 1K) to the EXUP servo motor couplers.

Tester (+) lead → White/Black ① lead
Tester (–) lead → Yellow/Blue ② lead



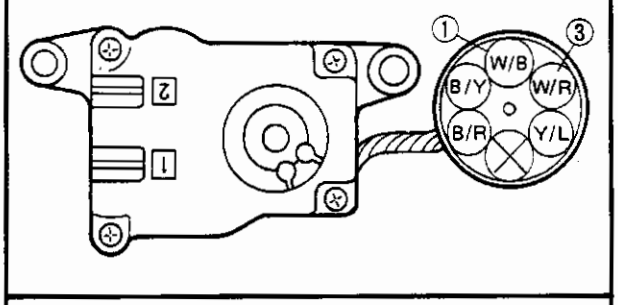
- Measure the EXUP servo motor resistance.

EXUP servo motor resistance:
6.7 ~ 10 kΩ
(White/Black – Yellow/Blue)

Step 2:

- Connect the pocket tester (Ω x 1K) to the EXUP servo motor coupler.

Tester (+) lead → White/Black ① lead
Tester (–) lead → White/Red ③ lead



- Measure the EXUP servo motor resistance while turning the pully slowly.

EXUP servo motor resistance:
0 ~ about 10 kΩ
(White/Black – White/Red)
When pully is turned once.

OUT OF SPECIFICATION

EXUP servo motor is faulty, replace it.

BOTH MEET SPECIFICATIONS

5. Wiring connection

- Check the entire EXUP system for connections.
  Refer to the "WIRING DIAGRAM" section.

POOR CONNECTION

Correct.

CORRECT

Replace digital ignitor unit.

Procedure (2)

1. Fuse (main and ignition)
- Remove the fuse.
- Connect the pocket tester (Ω x 1) to the fuses.
- Check the fuses for continuity.

NOCONTINUITY → Replace fuse(s).

CONTINUITY ↓

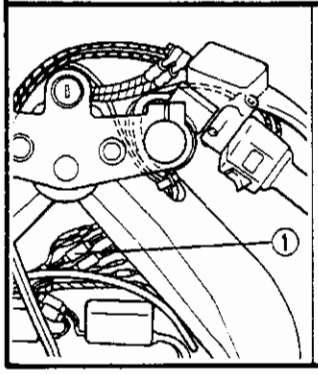
2. Battery
- Check the battery condition. Refer to the "BATTERY INSPECTION" section in the CHAPTER 3.

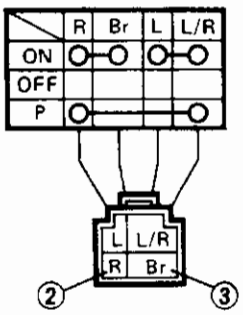
Specific gravity:
1.280 at 20°C (68°F)

INCORRECT →
- Refill battery fluid.
- Clean battery terminals.
- Recharge or replace battery.

CORRECT ↓

3. Main switch
- Disconnect the main switch coupler ① and lead from the wire harness.
- Check the switch component for the continuity between "Red ② and Brown ③ ". Refer to the "CHECKING OF SWITCHES" section.





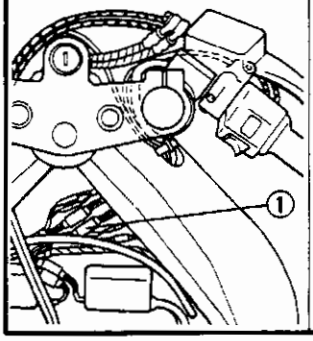
INCORRECT → Replace main switch.

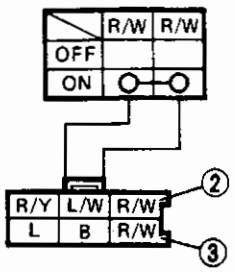
CORRECT ↓

*

4. "ENGINE STOP" switch

- Disconnect the handlebar switch (right) coupler ① from the wireharness.
- Check the switch component for the continuity between "Red/White ② and Red/White ③ ". Refer to the "CHECKING OF SWITCHES" section.





INCORRECT → Replace handlebar switch (right).

CORRECT ↓

5. Wiring connection

- Check the entire EXUP system for connections. Refer to the "WIRING DIAGRAM" section.

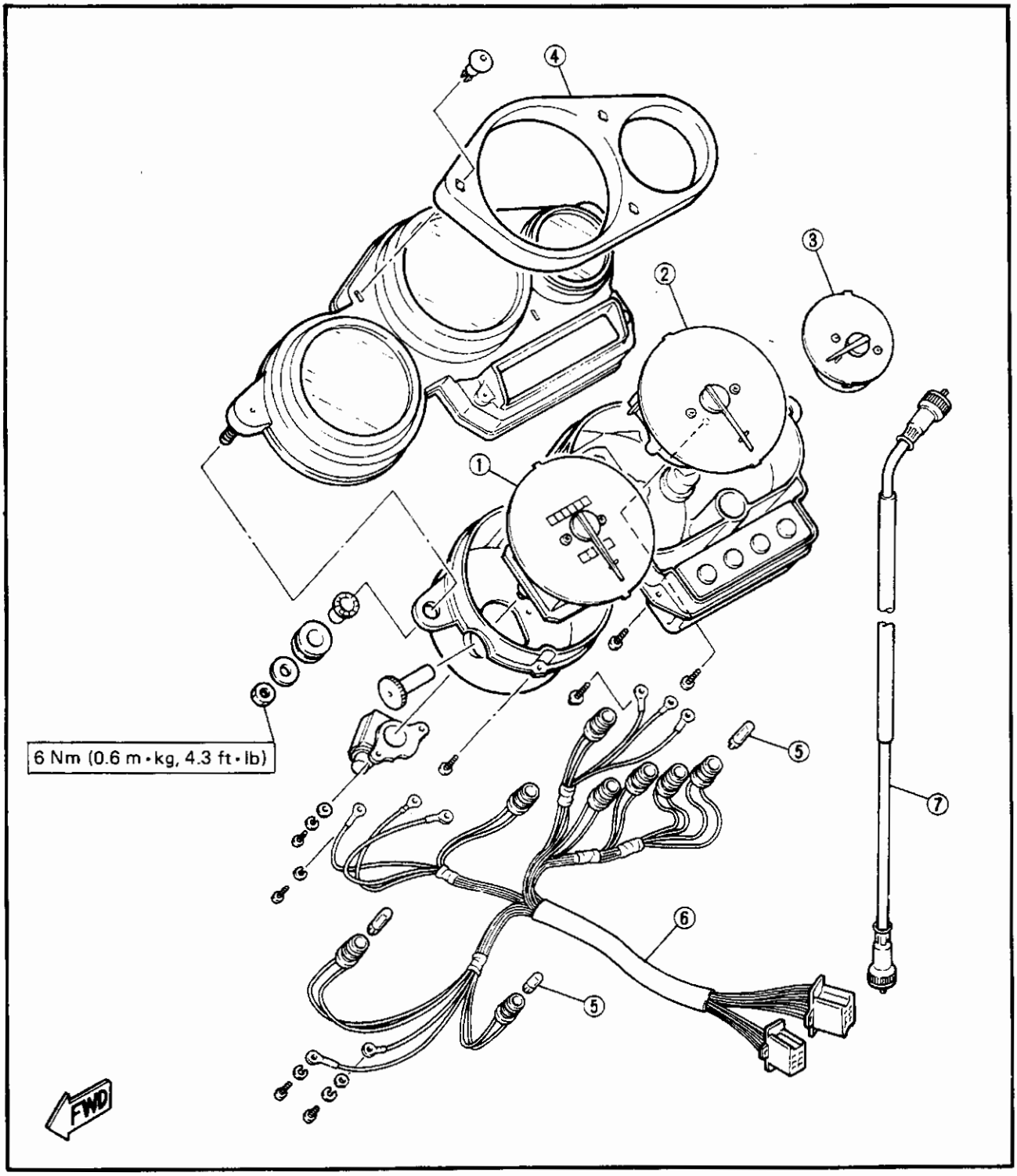
POOR CONNECTION → Correct.

CORRECT ↓

Refer to "procedure (1)".

METER ASSEMBLY

① Speedometer
② Tachometer
③ Engine temperature gauge
④ Damper
⑤ Bulb
⑥ Bulb socket leads
⑦ Speedometer cable

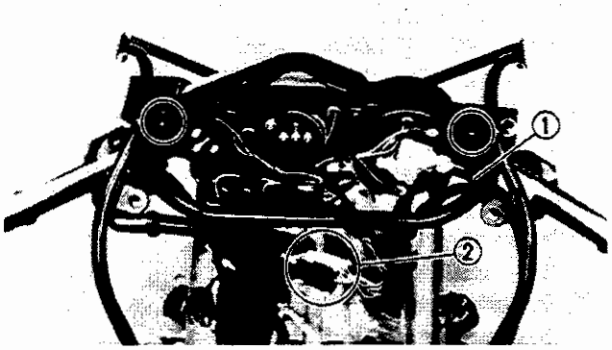


METER ASSEMBLY

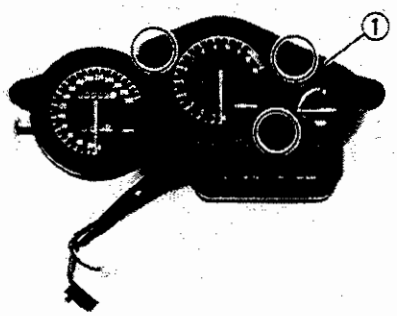
REMOVAL

1. Remove:
   - Side cowlings (left and right)
   - Front cover
   - Upper cowling

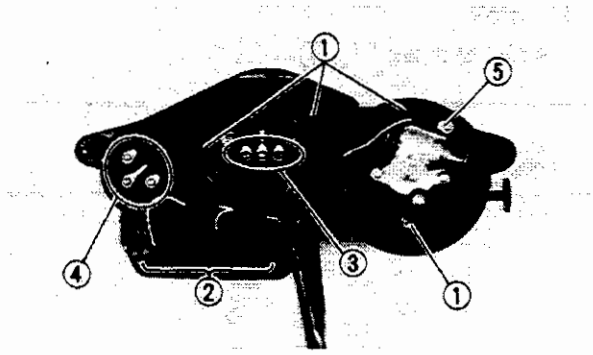
   Refer to the "COWLINGS" section in the CHAPTER 3.



2. Disconnect:
   - Speedometer cable ①
   - Meter leads ②
3. Remove:
   - Speedometer assembly



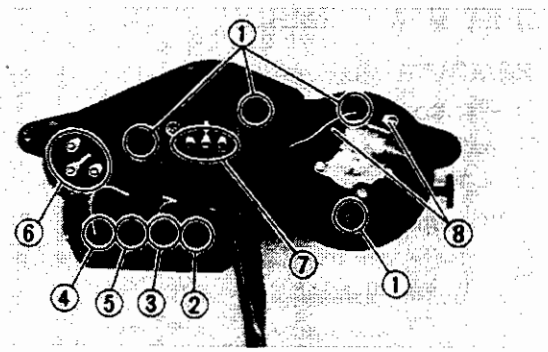
4. Remove:
   - Damper ①



5. Disconnect:
   - Meter lights ①
   - Indicator lights ②
   - Tachometer lead ③
   - Engine temperature gauge lead ④
   - Reed switch lead ⑤

⚠ CAUTION:

Do not remove the indicator bulbs sockets by pulling the leads.



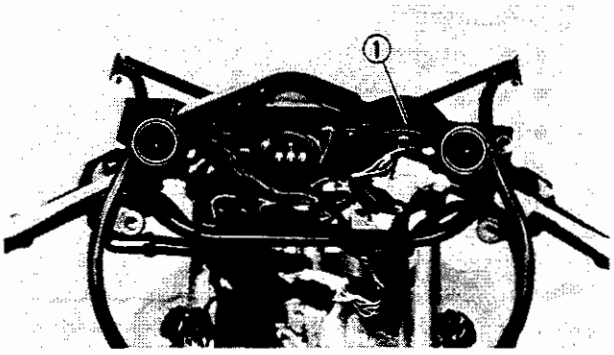
INSTALLATION

Reverse the "REMOVAL" procedure.

Note the following points.

1. Install the meter lights, indicator lights and leads as shown.

① Meter lights leads
(blue and black)
② "OIL LEVEL" indicator light
(brown and black/red)
③ "NEUTRAL" indicator light
(sky blue and brown)
④ "HIGH BEAM" indicator light
(yellow and black)
⑤ "TURN" indicator light
(chocolate and dark green)
⑥ Engine temperature gauge leads
(brown, black and green/red)
⑦ Tachometer leads
(brown, black and gray)
⑧ Reed switch leads
(black and white/green)



3. Install:
   • Meter assembly ①

	Nut (meter assembly): **6 Nm (0.6 m · kg, 4.3 ft · lb)**

TROUBLESHOOTING

NOTE:

The following troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to troubleshooting. Refer to the relative procedure in this manual for inspection, adjustment and replacement of parts.

STARTING FAILURE/HARD STARTING

FUEL SYSTEM	PROBABLE CAUSE
Fuel tank	• Empty • Clogged fuel filter • Clogged fuel strainer • Clogged fuel breather hose • Deteriorated fuel or fuel containing water or foreign material
Fuel cock	• Clogged fuel hose
Carburetor	• Deteriorated fuel, fuel containing water or foreign material • Clogged pilot jet • Clogged pilot air passage • Sucked-in air • Deformed float • Groove-worn needle valve • Improperly sealed valve seat • Improperly adjusted fuel level • Improperly set pilot jet • Clogged starter jet • Starter plunger malfunction • Improperly adjusted starter cable
Air filter element	• Clogged
Fuel pump	• Faulty fuel pump • Faulty fuel pump relay

ELECTRICAL SYSTEM

	PROBABLE CAUSE
Spark plug	• Improper plug gap • Worn electrodes • Wire between terminals broken • Improper heat range • Faulty spark plug cap
Ignition coil	• Broken or shorted primary/secondary • Faulty spark plug lead • Broken body
Full-transistor system	• Faulty igniter unit • Faulty pick-up coil
Switches and wiring	• Faulty main switch • Faulty "ENGINE STOP" switch • Broken or shorted wiring • Faulty neutral switch • Faulty "START" switch • Faulty sidestand switch • Faulty clutch switch
Starter motor	• Faulty starter motor • Faulty starter relay • Faulty circuit cut-off relay (relay unit) • Faulty starter clutch

COMPRESSION SYSTEM

	PROBABLE CAUSE
Cylinder and cylinder head	• Loosen spark plug • Loose cylinder head or cylinder • Broken cylinder head gasket • Worn, damaged or seized cylinder
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 • Damaged crankshaft oil seal lip • Improperly sealed valve • Improperly contacted valve and valve seat • Improper valve timing • Broken valve spring • Seized crankshaft • Seized camshaft

POOR IDLE SPEED PERFORMANCE

POOR IDLE SPEED PERFORMANCE

	PROBABLE CAUSE
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 play • Flooded carburetor
Electrical system	• Faulty battery • Faulty spark plug • Faulty igniter unit • Faulty pickup coil • Faulty ignition coil
Valve train	• Improperly adjusted valve clearance

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)

	PROBABLE CAUSE
Carburetor	• Improper jet needle clip position • Diaphragm malfunction • Improperly adjusted fuel level • Clogged or loose main jet
Air cleaner	• Clogged air filter element
Fuel pump	• Faulty fuel pump

FAULTY GEAR SHIFTING

HARD SHIFTING

Refer to "CLUTCH DRAGGING."

SHIFT PEDAL DOES NOT MOVE

	PROBABLE CAUSE
Shift shaft	• Improperly adjusted shift rod • 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

JUMP-OUT GEAR

	PROBABLE CASE
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

CLUTCH SLIPPING/DRAGGING

CLUTCH SLIPPING

	PROBABLE CAUSE
Clutch	• Loose clutch spring • Fatigued clutch spring • Worn friction plate • Worn clutch plate • Incorrectly assembled clutch
Engine oil	• Low oil level • Improper quality (Low viscosity) • Deterioration

CLUTCH DRAGGING

	PROBABLE CAUSE
Clutch	• Warped pressure plate • Unevenly tensioned clutch springs • Match marks not aligned • Bent push rod • Loose push rod/bent clutch boss nut • Burnt primary driven gear bushing • Bent clutch plate • Swollen friction plate • Faulty cylinder kit cup • Broken clutch boss
Transmission oil	• High oil level • Improper quality (High viscosity) • Deterioration

OVERHEATING OR OVER-COOLING

OVERHEATING

	PROBABLE CAUSE
Ignition system	• Improper spark plug gap • Improper spark plug heat range • Faulty ignitor unit
Fuel system	• Improper carburetor main jet (Improper setting) • Improperly adjusted fuel level • Clogged air filter element
Compression system	• Heavy carbon build-up
Engine oil	• Incorrect oil level • Improper oil viscosity • Inferior oil quality
Brake	• Dragging brake
Cooling system	• Faulty water temperature gauge • Faulty thermo-unit • Incorrect coolant level • Faulty thermostat • Faulty thermo switch • Clogged or damaged radiator • Faulty radiator cap • Seized impeller shaft • Inoperative fan motor

OVER-COOLING

	PROBABLE CAUSE
Cooling system	• Faulty water temperature gauge • Faulty thermo-unit • Faulty thermostat • Faulty thermo switch • Inoperative fan motor

FAULTY BRAKE

POOR BRAKING EFFECT

	PROBABLE CAUSE
Disc brake	• Worn brake pad • Worn brake 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 brake disc • Oily or greasy brake pad • Improper brake fluid level

FRONT FORK OIL LEAKAGE AND FRONT FORK MALFUNCTION

OIL LEAKAGE

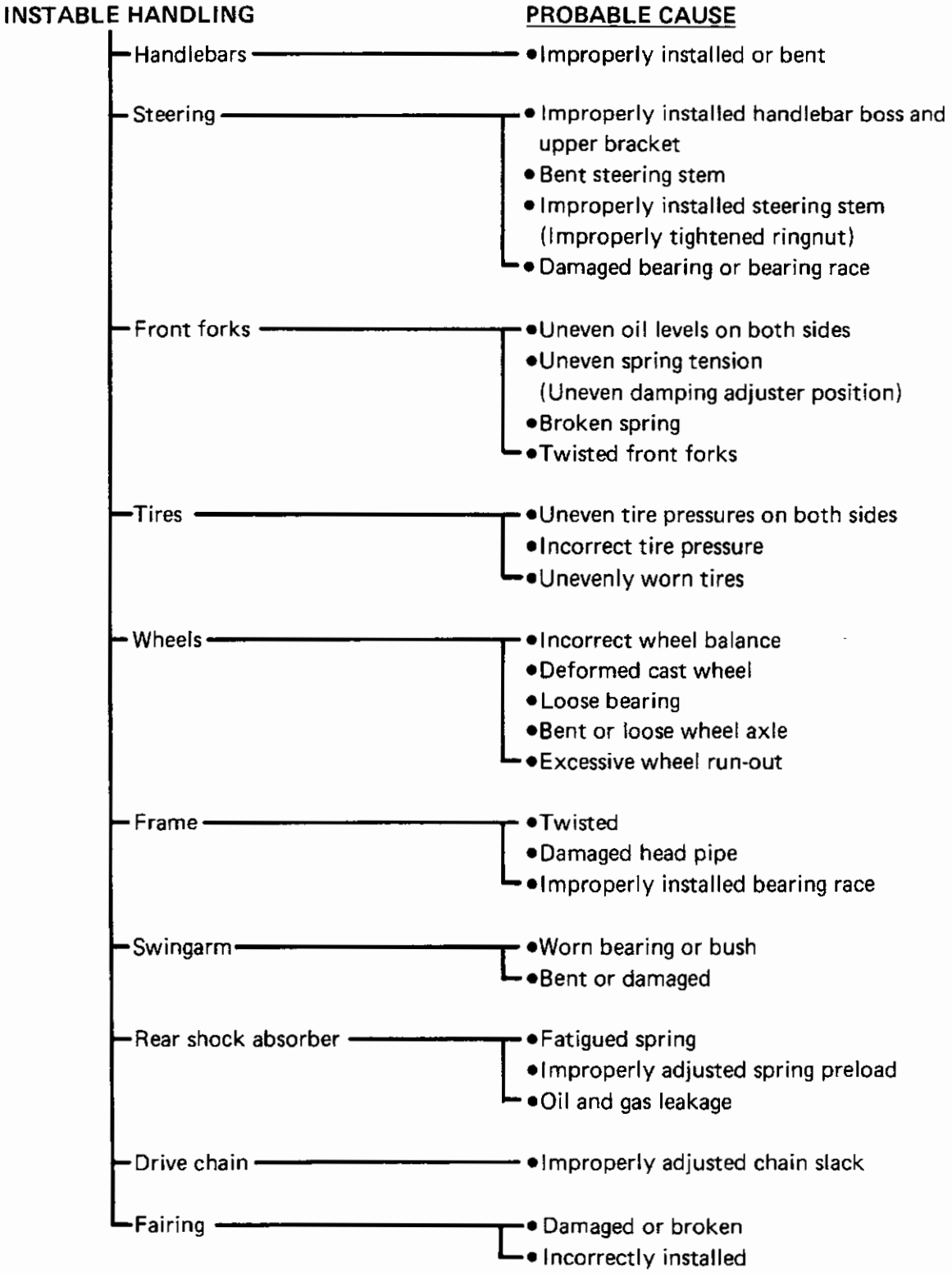
	PROBABLE CAUSE
	• Bent, damaged or rusty inner tube • Damaged or cracked outer tube • Damaged oil seal lip • Improperly installed oil seal • Improper oil level (too much) • Loose damper rod holding bolt • Broken cap bolt O-ring • Loose drain bolt • Damaged drain bolt gasket

MALFUNCTION

	PROBABLE CAUSE
	• 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

INSTABLE HANDLING

INSTABLE HANDLING



FAULTY SIGNAL AND LIGHTING SYSTEM

HEADLIGHT DARK

PROBABLE CAUSE

- Improper bulb
- Too many electric accessories
- Hard charging (Broken stator coil and/or faulty rectifier/regulator)
- Incorrect connection
- Improperly grounded
- Poor contacts (main or "LIGHTS" switch)
- Bulb life expired

BULB BURNT OUT

PROBABLE CAUSE

- Improper bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded
- Faulty main and/or "LIGHTS" switch
- Bulb life expired

FLASHER DOES NOT LIGHT

PROBABLE CAUSE

- Improperly grounded
- Discharged battery
- Faulty "TURN" switch
- Faulty flasher relay
- Broken wireharness
- Loosely connected coupler
- Bulb burnt out

FLASHER KEEPS ON

PROBABLE CAUSE

- Faulty flasher relay
- Insufficient battery capacity (nearly discharged)
- Bulb burnt out

FLASHER WINKS SLOWER

PROBABLE CAUSE

- Faulty flasher relay
- Insufficient battery capacity (nearly discharged)
- Improper bulb
- Faulty main and/or "TURN" switch

FLASHER WINKS QUICKER

PROBABLE CAUSE

- Improper bulb
- Faulty flasher relay

HORN IS INOPERATIVE

PROBABLE CAUSE

- Faulty battery
- Faulty main and/or horn switch
- Improperly adjusted horn
- Faulty horn
- Broken wireharness

FAULTY EXUP

FAULTY EXUP

PROBABLE CAUSE

- Power valve
  - Seized or damaged power valve
  - Carbon build-up
- Control cable
  - Improperly adjusted cable
  - Seized or discontinuous cable
- Electrical parts
  - Insufficient battery capacity (Improperly charged battery)
  - Faulty main switch
  - Faulty EXUP servomotor
  - Faulty ignitor unit
  - Faulty relay unit
  - Broken or shorted wiring

YAMAHA

FZR1000

'89–'90
(W–A)

3GM-SE2

SERVICE INFORMATION

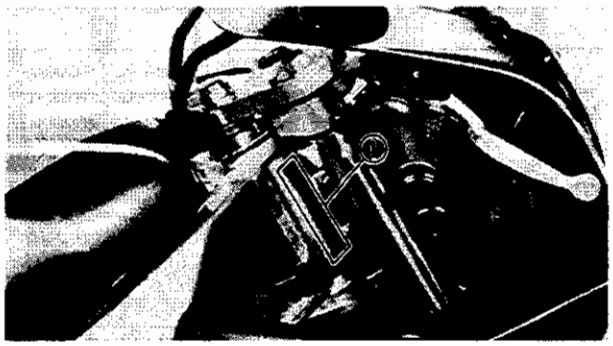
FOREWORD

This Service Information has been prepared to introduce new service and data for the FZR1000 '90 (A). For complete service information procedures it is necessary to use this publication together with the following microfiche service manual.

FZR1000 '89 ~ '90 (W ~ A) SERVICE MANUAL: 3GM-ME2
FZR1000 '89 (W) SERVICE INFORMATION: 3GM-SE1

FZR1000 '90 (A)
SERVICE INFORMATION
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Printed in Japan
3GM-SE2

GENERAL INFORMATION



MOTORCYCLE IDENTIFICATION

FRAME SERIAL NUMBER (Except for E and AUS)

The frame serial number ① is stamped into the right side of the steering head.

Starting Serial Number:
FZR1000 . . . . .3GM-009101
FZR1000 . . . . .3LE- 009101 (D, S, A)
FZR1000 . . . . .3LF- 007101 (F)
FZR1000 . . . . .3LG- 004101 (GB)
FZR1000 . . . . .3LH- 005101 (CH)
FZR1000A . . . .3LJ- 002101 (NZ)

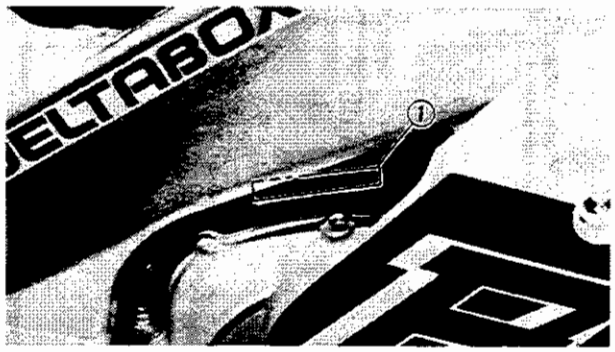
VEHICLE IDENTIFICATION NUMBER (For E and AUS)

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

Starting Serial Number:
JYA3GMS0 * LA016101 (for E)
JYA3LJT0 * LA002101 (for AUS)

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 state.



ENGINE SERIAL NUMBER

The engine serial number ① is stamped into the right side of the engine.

Starting Serial Number:
FZR1000 . . . . .3GM-009101
FZR1000 . . . . .3GM-016101 (E)
FZR1000 . . . . .3LE- 009101 (D, S, A)
FZR1000 . . . . .3LF- 007101 (F)
FZR1000 . . . . .3LG- 004101 (GB)
FZR1000 . . . . .3LH- 005101 (CH)
FZR1000A . . . .3LJ- 002101 (AUS, NZ)

NOTE:

- The first three digits of these numbers are for model identifications; the remaining digits are the unit production number.
- Designs and specifications are subject to change without notice.

SPECIFICATIONS

GENERAL SPECIFICATIONS

Model	FZR1000 (A)
Model Code Number:	3GM3 3GM4 (E) 3LE2 (D, S, A) 3LF2 (F) 3LG2 (GB) 3LH2 (CH) 3LJ2 (AUS, NZ)
Frame Starting Number:	3GM-009101 3LE- 009101 (D, S, A) 3LF- 007101 (F) 3LG- 004101 (GB) 3LH- 005101 (CH) 3LJ- 002101 (NZ)
Vehicle Identification Number:	JYA3GMS0 * LA016101 (E) JYA3LJT0 * LA002101 (AUS)
Engine Starting Number:	3GM-009101 3GM-016101 (E) 3LE- 009101 (D, S, A) 3LF- 007101 (F) 3LG- 004101 (GB) 3LH- 005101 (CH) 3LJ- 002101 (AUS, NZ)

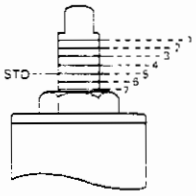
MAINTENANCE SPECIFICATIONS

ENGINE

Model		FZR1000 (A)		
Carburetor: Type/manufacture x Quantity		BDST38/MIKUNI x 4		
		3GM3, 3GM4, 3LG2, 3LJ2	3LE2, 3LF2	3LH2
I.D. Mark		3GM00	3LF00	3LH00
Main Jet	(M.J.)			
(#1, 4 Cylinder)		#125	#127.5	#127.5
(#2, 3 Cylinder)		#122.5	#125	#125
Main Air Jet	(M.A.J.)	#85	#85	#85
Jet Needle-Clip Position	(J.N.)	5CEW8-3	5CEW8-3	5CEW8-3
Needle Jet	(N.J.)	Y-0	Y-0	Y-0
Pilot Jet	(P.J.)	#40	#40	#37.5
Pilot Outlet Size	(P.O.)	0.85	0.85	0.85
Pilot Air Jet	(P.A.J.)	#115	#115	#125
Pilot Screw	(P.S.)	3.0 turns out	3.0 turns out	2.0 turns out
Valve Seat Size	(V.S.)	1.7	1.7	1.7
Starter Jet	($G.S_1$)	#60	#60	#60
	($G.S_2$)	0.6	0.6	0.6
Bypath Size	($B.P_1$)	0.8	0.8	0.8
	($B.P_2$)	0.8	0.8	0.8
	($B.P_3$)	0.8	0.8	0.8
Throttle Valve Size	(Th.V)	#125	#125	#125
Fuel Level	(F.L.)	10.6 ~ 11.6 mm (0.42 ~ 0.46 in) Above from the float chamber line		
Engine Idle Speed		950 ~ 1,050 r/min		

MAINTENANCE SPECIFICATIONS SPEC

CHASSIS

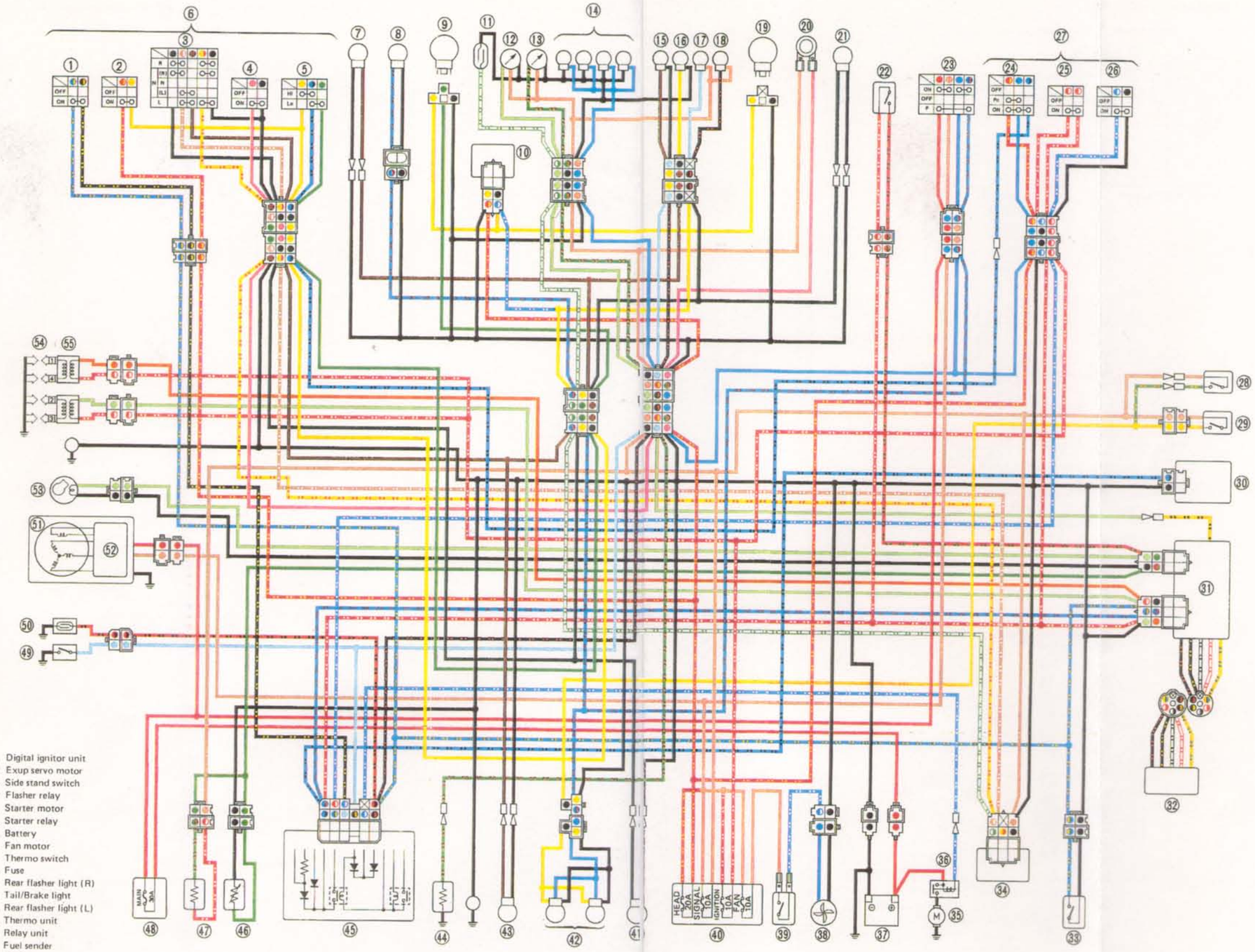
Model		FZR1000 (A)
Front Suspension:		
Front Fork Travel		120 mm (4.72 in)
Front Spring Free Length		321.3 mm (12.6 in)
< Limit >		< 318 mm (12.5 in) >
Spring Rate:	K1	8 N/mm (0.8 kg/mm, 44.8 lb/in)
Stroke	K1	Zero ~ 120 mm (Zero ~ 4.72 in)
Optional Spring		No
Oil Capacity		535 cm³ (18.9 Imp oz, 18.1 US oz)
Oil Level (Fully Compression)		116 mm (4.57 in) Below the top of inner fork tube without fork spring
Oil Grade		Yamaha Fork Oil 10W or equivalent
Adjustment		

	Stiffer				STD	Softer	
Adjusting position	1	2	3	4	5	6	7

YAMAHA MOTOR CO.,LTD.
IWATA, JAPAN

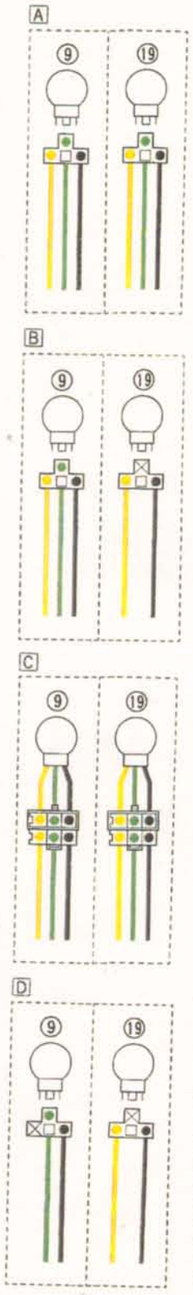
PRINTED IN JAPAN
89 • 9 - 2.0 x 1 CR
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WIRING DIAGRAM FZR1000



1. Clutch switch
2. "PASS" switch
3. "TURN" switch
4. "HORN" switch
5. "LIGHTS" (Dimmer) switch
6. Handlebar switch (L)
7. Front flasher light (L)
8. Auxiliary light
9. Headlight (L)
10. Headlight relay
11. Lead switch
12. Tachometer
13. Engine temperature gauge
14. Meter light
15. "TURN" indicator light
16. "HIGH BEAM" indicator light
17. "NEUTRAL" indicator light
18. "OIL LEVEL" indicator light
19. Headlight (R)
20. Horn
21. Front flasher light (R)
22. Reserve switch
23. Main switch
24. "LIGHTS" switch
25. "ENGINE STOP" switch
26. "START" switch
27. Handlebar switch (R)
28. Front brake switch
29. Rear brake switch
30. Fuel pump
31. Digital ignitor unit
32. Exup servo motor
33. Side stand switch
34. Flasher relay
35. Starter motor
36. Starter relay
37. Battery
38. Fan motor
39. Thermo switch
40. Fuse
41. Rear flasher light (R)
42. Tail/Brake light
43. Rear flasher light (L)
44. Thermo unit
45. Relay unit
46. Fuel sender
47. Resistor
48. Fuse (main)
49. Neutral switch
50. Oil level switch
51. AC generator
52. Rectifier/regulator
53. Pick up coil
54. Spark plug
55. Ignition coil

[A] For GB, E, N, DK, and GR
[B] For SF, NZ and A
[C] For I
[D] For S and D
[E] For CH



Blue Bleu Blau	Dark Green Vert Foncé Dunkelgrün	Red/Yellow Rouge/Jaune Rot/Gelb	Black/Red Noir/Rouge Schwarz/Rot	Yellow Jaune Gelb	Orange Orange Orange	Blue/Red Bleu/Rouge Blau/Rot	Green/Yellow Vert/Jaune Grün/Gelb
Red Rouge Rot	Gray Gris Grau	Red/Black Rouge/Noir Rot/Schwarz	Black/Yellow Noir/Jaune Schwarz/Gelb	Pink Rose Rosa	Yellow/Red Jaune/Rouge Gelb/Rot	Blue/White Bleu/Blanc Blau/Weiß	White/Green Blanc/Vert Weiß/Grün
Green Vert Grün	Brown Brun Braun	Red/White Rouge/Blanc Rot/Weiß	Black/Blue Noir/Bleu Schwarz/Blau	Sky Blue Bleu Ciel Himmelblau	Yellow/Blue Jaune/Bleu Gelb/Blau	Blue/Black Bleu/Noir Blau/Schwarz	White/Black Balnc/Noir Weiß/Schwarz
Black Noir Schwarz	Chocolate Chocolat Schokoladenfarbe	Red/Green Rouge/Vert Rot/Grün	Green/Red Vert/Rouge Grün/Rot	White Blanc Weiß	Brown/White Brun/Blanc Braun/Weiß	Blue/Yellow Bleu/Jaune Blau/Gelb	White/Red Blanc/Rouge Weiß/Rot

YAMAHA

FZR1000 '91(B)

3GM-SE3

SERVICE INFORMATION

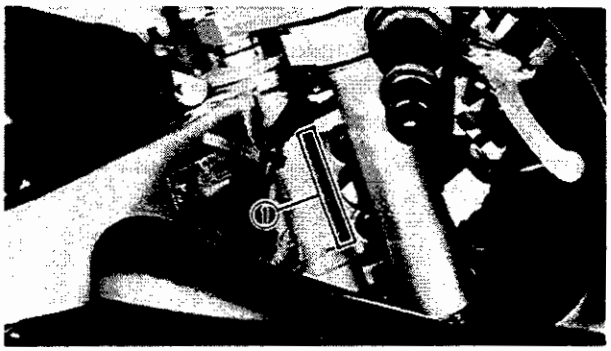
FOREWORD

This Service Information has been prepared to introduce new service and data for the FZR1000 '91 (B). For complete service information procedures it is necessary to use this publication together with the following microfiche service manual.

FZR1000 (B) '91 SERVICE MANUAL: 3GM-ME3
FZR1000 (W) '89 SERVICE INFORMATION: 3GM-SE1
FZR1000 (A) '90 SERVICE INFORMATION: 3GM-SE2

FZR1000 (B) '91
SERVICE INFORMATION
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GENERAL INFORMATION



MOTORCYCLE IDENTIFICATION

FRAME SERIAL NUMBER (Except for E and AUS)

The frame serial number ① is stamped into the right side of the steering head.

Starting Serial Number:
FZR1000 ..... 3GM-018101 (I, B, N, GR, NL)
FZR1000 ..... 3GM-026101 (DK)
FZR1000 ..... 3LE-016101 (D, S, A, SF)
FZR1000 ..... 3LF-015101 (F)
FZR1000 ..... 3LG-009101 (GB)
FZR1000 ..... 3LH-008101 (CH)
FZR1000B ..... 3LJ-004101 (NZ)

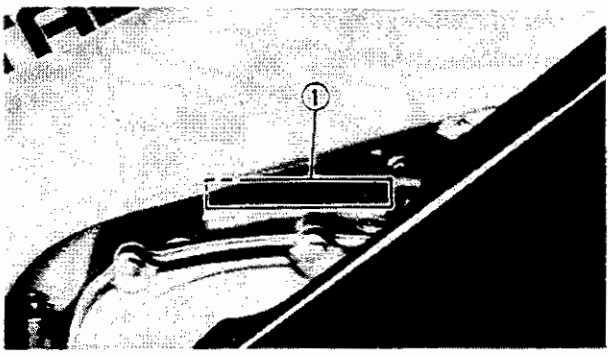
VEHICLE IDENTIFICATION NUMBER (For E and AUS)

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

Starting Serial Number:
JYA3GMS0*MA025101 (for E)
JYA3LJT0*MA004101 (for AUS)

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 state.



ENGINE SERIAL NUMBER

The engine serial number ① is stamped into the right side of the engine.

Starting Serial Number:
FZR1000 ..... 3GM-018101 (I, B, N, GR, NL)
FZR1000 ..... 3GM-025101 (E)
FZR1000 ..... 3GM-026101 (DK)
FZR1000 ..... 3LE-016101 (D, S, A, SF)
FZR1000 ..... 3LF-015101 (F)
FZR1000 ..... 3LG-009101 (GB)
FZR1000 ..... 3LH-008101 (CH)
FZR1000B ..... 3LJ-004101 (AUS, NZ)

NOTE:

- The first three digits of these numbers are for model identifications; the remaining digits are the unit production number.
- Designs and specifications are subject to change without notice.

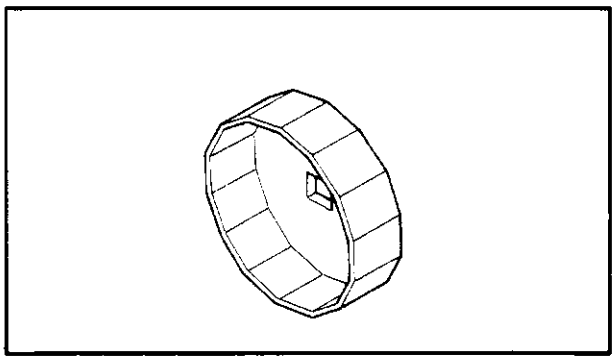
SPECIFICATIONS

GENERAL SPECIFICATIONS

Model	FZR1000 (B)
Model Code Number:	3GM5 (I, B, N, GR, NL) 3GM6 (E) 3GM7 (DK) 3LE3 (D, S, A, SF) 3LF3 (F) 3LG3 (GB) 3LH3 (CH) 3LJ3 (AUS, NZ)
Frame Starting Number:	3GM-018101 (I, B, N, GR, NL) 3GM-026101 (DK) 3LE-016101 (D, S, A, SF) 3LF-015101 (F) 3LG-009101 (GB) 3LH-008101 (CH) 3LJ-004101 (NZ)
Vehicle Identification Number:	JYA3GMS0 * MA025101 (E) JYA3LJT0 * MA004101 (AUS)
Engine Starting Number:	3GM-018101 (I, B, N, GR, NL) 3GM-025101 (E) 3GM-026101 (DK) 3LE-016101 (D, S, A, SF) 3LF-015101 (F) 3LG-009101 (GB) 3LH-008101 (CH) 3LJ-004101 (AUS, NZ)
Dimensions: Overall Length Overall Width Overall Height Seat Height Wheelbase Minimum Ground Clearance	 2,205 mm (86.8 in) 745 mm (29.3 in) 1,170 mm (46.1 in) 775 mm (30.5 in) 1,470 mm (57.9 in) 135 mm (5.3 in)
Minimum Turning Radius:	3,300 mm (130 in)
Coolant Total Amount: (Including All Routes)	 2.8 L (2.5 Imp qt, 3.0 US qt)
Fuel: Type Tank capacity Reserve Amount	 Regular unleaded gasoline Regular gasoline (NZ) Unleaded Fuel Only (AUS) 19.0 L (4.2 Imp gal, 5.0 US gal) 3.4 L (0.75 Imp gal, 0.90 US gal)
Chassis: Frame Type Caster Angle Trail	 Pressed backbone 26.4° 108 mm (4.25 in)

SPECIAL TOOLS

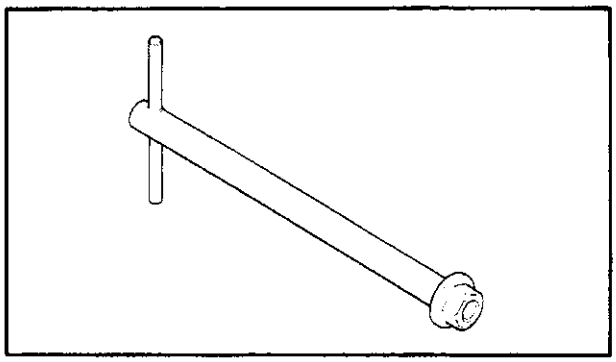
The proper special tools are necessary for complete and accurate tune-up and assembly. Using the correct special tool will help prevent damage caused by the use of improper tools or improvised techniques.



FOR ENGINE SERVICE

1. Oil filter wrench
   P/N 90890-01426

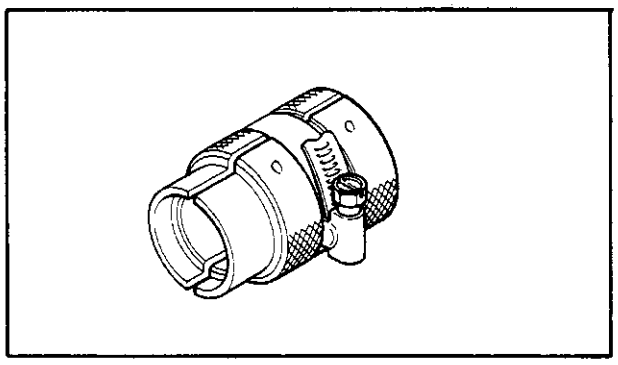
This tool is used to remove and install the oil filter.



FOR CHASSIS SERVICE

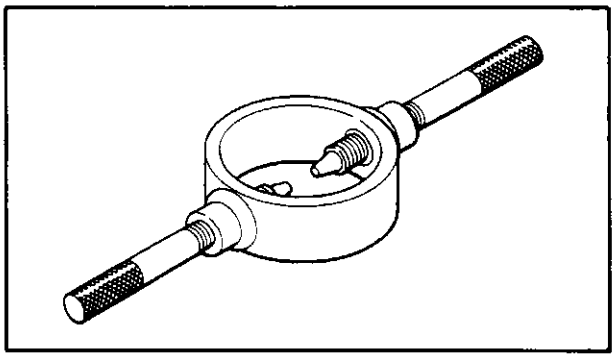
1. Damper rod holder (24 mm)
   P/N 90890-01445

This tool is used to loosen and tighten the front fork damper rod holding bolt.



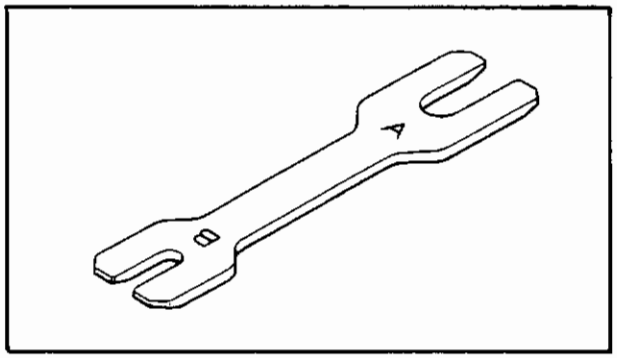
2. Front fork seal driver
   P/N 90890-01424

This tool is used when installing the fork seal.



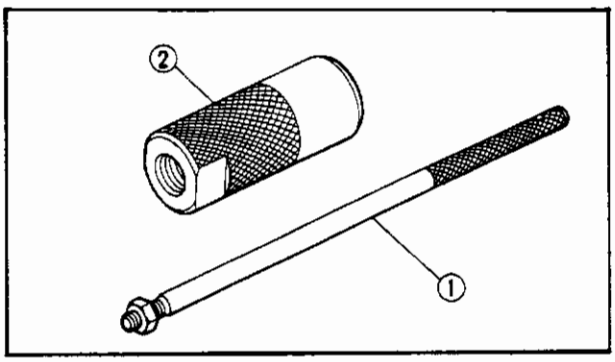
3. Fork spring compressor
   P/N 90890-01441

This tool is needed to disassemble and assemble the front fork.



4. Rod holder
   P/N 90890-01434

This tool is needed to disassemble and assemble the front fork.



5. Rod puller — ①
   P/N 90890-01437
   Rod puller attachment — ②
   P/N 90890-01436

These tools are used to install the front fork.

GENERAL SPECIFICATIONS

SPEC

Model		FZR1000 (B)	
Tire:		Front	Rear
Type		Tubeless	Tubeless
Size		130/60 VR17-V280 130/60 ZR17	170/60 VR17-V280 170/60 ZR17
Manufacture (Type)		Bridgestone (CY17) Dunlop (K510F) Pirelli (MP7S) Michelin (A59X) Metzler (ME33)	Bridgestone (CY20) Dunlop (K510) Pirelli (MP7S) Michelin (M59X) Metzler (ME55A)
Electrical:			
Ignition System		T.C.I. (Digital ignition)	
Generator System		AC generator	
Battery Type or Model		YTX14-BS	
Battery Capacity		12V 12AH	
Bulb Wattage x Quantity:			
Headlight		12V, 55W x 2 (I, B, N, GR, NL, E, D, S, SF, A, CH) 12V, 60W/55W x 1 (DK, F, GB, AUS, NZ)	
Marker Light		12V, 5W x 1 (I, B, GR, NL, E, D, S, SF, A, CH) 12V, 4W x 1 (DK, F, GB, AUS, NZ)	
Tail/Brake Light		12V, 5W/21W x 2	
Flasher Light		12V, 21W x 4	
Meter Light		12V, 1.7W x 4	
Indicator Light:			
Wattage x Quantity	"NEUTRAL"	12V, 3.4W x 1	
	"HIGH BEAM"	12V, 3.4W x 1	
	"TURN"	12V, 3.4W x 1	
	"OIL LEVEL"	12V, 3.4W x 1	

MAINTENANCE SPECIFICATIONS

ENGINE

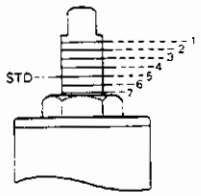
Tightening Torque

Part to be tightened	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m·kg	ft·lb	
Camshaft Cap	Bolt	M6	40	10	1.0	7.2	
Cylinder Head (exhaust pipe)	Stud bolt	M8	8	15	1.5	11	
Cylinder Head	Nut	M10	8	41	4.1	30	
Cylinder Head	Cap nut	M10	4	41	4.1	30	
Spark Plug	–	M12	4	17.5	1.75	12.5	
Cylinder Head Cover	Bolt	M6	8	10	1.0	7.2	
Connecting Rod	Nut	M8	8	36	3.6	25	
Timing Chain Sprocket	Flange bolt	M7	4	24	2.4	17	
Timing Chain Tensioner	Bolt	M6	2	10	1.0	7.2	
Timing Chain Tensioner End	Cap bolt	M11	1	20	2.0	14	
Chain Guide (intake side)	Bolt	M6	2	10	1.0	7.2	
Oil Pump Housing	Screw	M6	1	10	1.0	7.2	
Oil Pump Mount	Bolt	M6	3	10	1.0	7.2	
Oil filter	–	M20	–	17	1.7	12	
Oil cooler	–	M20	–	63	6.3	45	
Oil Pan	Bolt	M6	12	10	1.0	7.2	
Drain Plug	–	M14	1	43	4.3	31	
Oil Pipe 1	Bolt	M6	3	7	0.7	5.1	
Oil Baffle Plate (lower)	Flange bolt	M6	4	10	1.0	7.2	
Oil Baffle Plate (upper)	Flange bolt	M6	10	10	1.0	7.2	
Oil Cooler House	Union bolt	M12	2	32	3.2	23	
Oil Level Switch	Bolt	M6	2	10	1.0	7.2	
Exhaust Pipe	Nut	M8	8	20	2.0	14	
Exhaust Pipe and Muffler	Flange bolt	M8	1	20	2.0	14	
Muffler and Muffler Stay	Flange bolt	M8	1	20	2.0	14	
Muffler Bracket	Flange bolt	M8	1	20	2.0	14	
Exhaust Pipe Blind Plug (CO test)	Bolt	M6	4	10	1.0	7.2	
Crankcase	Stud bolt	M10	12	10	1.0	7.2	
Main Axle Bearing Stopper	Torx	M6	3	10	1.0	7.2	
Crankshaft End Cover	Screw	M6	6	7	0.7	5.1	
Crankcase Cover (right)	Bolt	M6	11	10	1.0	7.2	
Crankcase	Flange bolt	M6	7	12	1.2	8.7	
Crankcase	Flange bolt	M8	17	24	2.4	17	
Crankcase	Flange bolt	M9	11	32	3.2	23	
Starter Clutch	Bolt	M8	3	25	2.5	18	
HY-VO Chain Guide	Bolt	M6	2	10	1.0	7.2	
Clutch Boss	Nut	M20	1	70	7.0	50	Use lock washer
Clutch Spring	Bolt	M6	6	8	0.8	5.8	
Drive Sprocket	Nut	M18	1	70	7.0	50	Use lock washer
Shift Cam Stopper Lever	Bolt	M6	1	10	1.0	7.2	
Shift Cam Stopper	Bolt	M6	1	10	1.0	7.2	
Guide Bar Stopper (shift fork)	Bolt	M6	1	10	1.0	7.2	
Neutral Switch	Screw	M6	2	4	0.4	2.9	

MAINTENANCE SPECIFICATIONS

SPEC

CHASSIS

Model		FZR1000 (B)
Front Suspension:		
Front Fork Travel		120 mm (4.72 in)
Front Spring Free Length		331.5 mm (13.1 in)
<Limit>		<328 mm (12.9 in)>
Spring Rate:	K1	8 N/mm (0.8 kg/mm, 44.8 lb/in)
Stroke	K1	Zero ~ 120 mm (Zero ~ 4.72 in)
Optional Spring		No
Oil Capacity		462 cm³ (16.3 Imp oz, 15.6 US oz)
Oil Level (Fully Compression)		124 mm (4.88 in) Below the top of inner fork tube without fork spring
Oil Grade		Yamaha Fork Oil 5W or equivalent
Adjustment		

	Stiffer				STD	Softer	
Adjusting position	1	2	3	4	5	6	7

MAINTENANCE SPECIFICATIONS SPEC

Tightening Torque

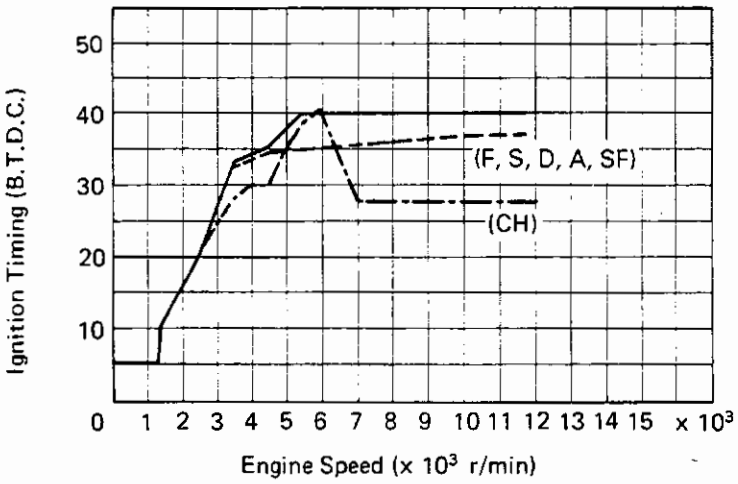
Part to be tightened	Thread size	Tightening torque			Remarks
		Nm	m·kg	ft·lb	
Front Axle	M16	48	4.8	35	
Front Axle Pinch	M8	20	2.0	14	
Front Fender	M6	6	0.6	4.3	
Under Bracket and outer tube	M8	23	2.3	17	
Handle Crown and outer tube	M8	26	2.6	19	
Handle Crown and Steering Stem	M22	110	11.0	80	
Lower Ring Nut (steering shaft)	M22	–	–	–	Refer to "NOTE"
Brake Caliper (front/rear)	M10	35	3.5	25	
Brake Disc and Wheel	M8	20	2.0	14	◁
Master Cylinder and Holder (front brake)	M6	10	1.0	7.2	
Master Cylinder Cap (front brake)	M5	2	0.2	1.4	
Bleed Screw (brake caliper/clutch release cylinder)	M8	6	0.6	4.3	
Brake (clutch) Hose	M10	25	2.5	18	
Handlebar and Handle Boss	M8	28	2.8	20	
Handlebar Boss and Handle Crown	M8	19	1.9	13	
Grip End (handlebar)	M16	30	3.0	22	
Engine Mounting:					
Pinch Bolt (cylinder head side)	M8	22	2.2	16	
Pinch Bolt (cylinder side)	M8	22	2.2	16	
Pinch Bolt (rear)	M8	15	1.5	11	
Mounting Bolt (cylinder head)	M10	40	4.0	29	
Mounting Bolt (cylinder)	M10	40	4.0	29	
Mounting Bolt (rear – upper)	M10	55	5.5	40	
Mounting Bolt (rear – lower)	M10	55	5.5	40	
Footrest Bracket and Frame (front)	M8	28	2.8	20	
Footrest and Footrest Bracket (front)	M10	55	5.5	40	
Pivot Axle and Locknut	M18	130	13.0	94	
Relay Arm and Frame	M10	48	4.8	35	
Arm and Swingarm	M12	74	7.4	53	
Arm and Relay Arm	M12	74	7.4	53	
Rear Shock Absorber and Frame	M10	40	4.0	29	
Rear Shock Absorber and Relay Arm	M10	40	4.0	28	
Footrest Bracket and Frame (rear)	M8	28	2.8	20	
Master Cylinder and Frame (rear)	M8	23	2.3	17	
Rear Frame and Frame	M10	55	5.5	40	◁
Compression Bar (front and rear)	M8	30	3.0	22	
Brake Disc and Clutch Hub	M8	20	2.0	14	
Sprocket and Hub	M10	60	6.0	43	
Rear Axle and Nut	M 18	150	15.0	110	
Side Stand Bracket and Frame	M8	28	2.8	20	
Side Stand Pivot Bolt	M10	46	4.6	33	
Side Stand Pivot Nut	M10	39	3.9	28	
Fuel cock and fuel tank	M6	7	0.7	5.1	
Fuel sender and fuel tank	M6	7	0.7	5.1	

NOTE:

1. Tighten the lower ring nut 52 Nm (5.2 m • kg, 37 ft • lb) by using the torque wrench.
2. Loosen the lower ring nut completely and retighten it 3 Nm (0.3 m • kg, 2.2 ft • lb).
3. Install the upper ring nut, and then align the slots of both ring nut.

MAINTENANCE SPECIFICATIONS SPEC

ELECTRICAL

Model	FZR1000 (B)
Voltage:	12V
Ignition System:	
Ignition Timing (B.T.D.C.)	5° at 1,350 r/min
Advanced Timing (B.T.D.C.)	40° at 5,500 r/min 35° at 4,500 r/min (F, S, D, A, SF) 41° at 6,000 r/min (CH)
Advancer Type	Electrical
	
T.C.I.:	
Pickup Coil Resistance (Color)	135 ~ 165Ω at 20°C (68°F) (Gray-Black)
T.C.I. Unit/Manufacturer	BB7225/HITACHI BB7226/HITACHI (F, S, D, A, SF) BB7231/HITACHI (CH)
Battery:	
Capacity	12V, 12AH
Specific Gravity	1.320
Electrical Starter System:	
Type	Constant mesh type
Starter Motor:	
Model/Manufacturer	SM-13/MITSUBA
Output	0.65 kw
Armature Coil Resistance	0.012Ω ± 10% at 20°C (68°F)
Brush – Overall Length	12.5 mm (0.49 in)
<Limit>	4 mm (0.16 in)
– Spring Force	680 ~ 920 g (24.0 ~ 32.4 oz)
Commutator Dia.	28 mm (1.10 in)
Wear Limit	27 mm (1.06 in)
Mica Undercut	0.7 mm (0.03 in)
Starter Switch:	
Model/Manufacturer	A104-128/HITACHI
Amperage Rating	100A
Coil Resistance	4.0 ~ 4.7Ω at 20°C (68°F)

ELECTRICAL

Model	FZR1000 (B)
Flasher Relay (Relay Assembly):	
Type	Semi transistor type
Model/Manufacturer	G8A-101-03/OMRON or FA249MD/NIPPONDENSO
Self Cancelling Device	No
Flasher Frequency	75 ~ 95 cycle/min
Wattage	21W x 2 pcs + 3.4W
Circuit Breaker:	
Type	Fuse
Amperage for Individual Circuit x Quantity:	
MAIN	30A x 1
HEADLIGHT	20A x 1
SIGNAL	10A x 1
IGNITION	10A x 1
FAN	10A x 1
RESERVE	10A x 1. 20A x 1. 30A x 1

LUBRICATION POINT AND GRADE OF LUBRICANT

ENGINE

Lubrication Point	Symbol	Grade of Lubricant
Oil seal lip	LS	Lithium-soap base
O-Ring	LS	Lithium-soap base
Bearing	E	Engine oil
Piston surface	E	Engine oil
Piston pin	E	Engine oil
Crankshaft pin	E	Engine oil
Crankshaft journal	E	Engine oil
Connecting rod bolt/Nut	M	Molybdeum disulfide oil
Camshaft cam lode/Journal	M	Molybdeum disulfide oil
Valve stem (IN, EX)	M	Molybdeum disulfide oil
Valve stem end (IN, EX)	M	Molybdeum disulfide oil
Water pump impeller shaft	E	Engine oil
Oil pump rotor (Inner/Outer), housing	E	Engine oil
Oil strainer assembly	E	Engine oil
Outer starter clutch surface	E	Engine oil
Idle gear surface/Bearing	E	Engine oil
Starter clutch ball	E	Engine oil
Primary driven gear	E	Engine oil
Transmission gear (Wheel/Pinion)	M	Molybdeum disulfide oil
Axle (Main/Drive)	M	Molybdeum disulfide oil
Shift cam	M	Molybdeum disulfide oil
Shift fork/Guide bar	E	Engine oil
Shift shaft assembly	E	Engine oil

LUBRICATION POINT AND GRADE OF LUBRICANT

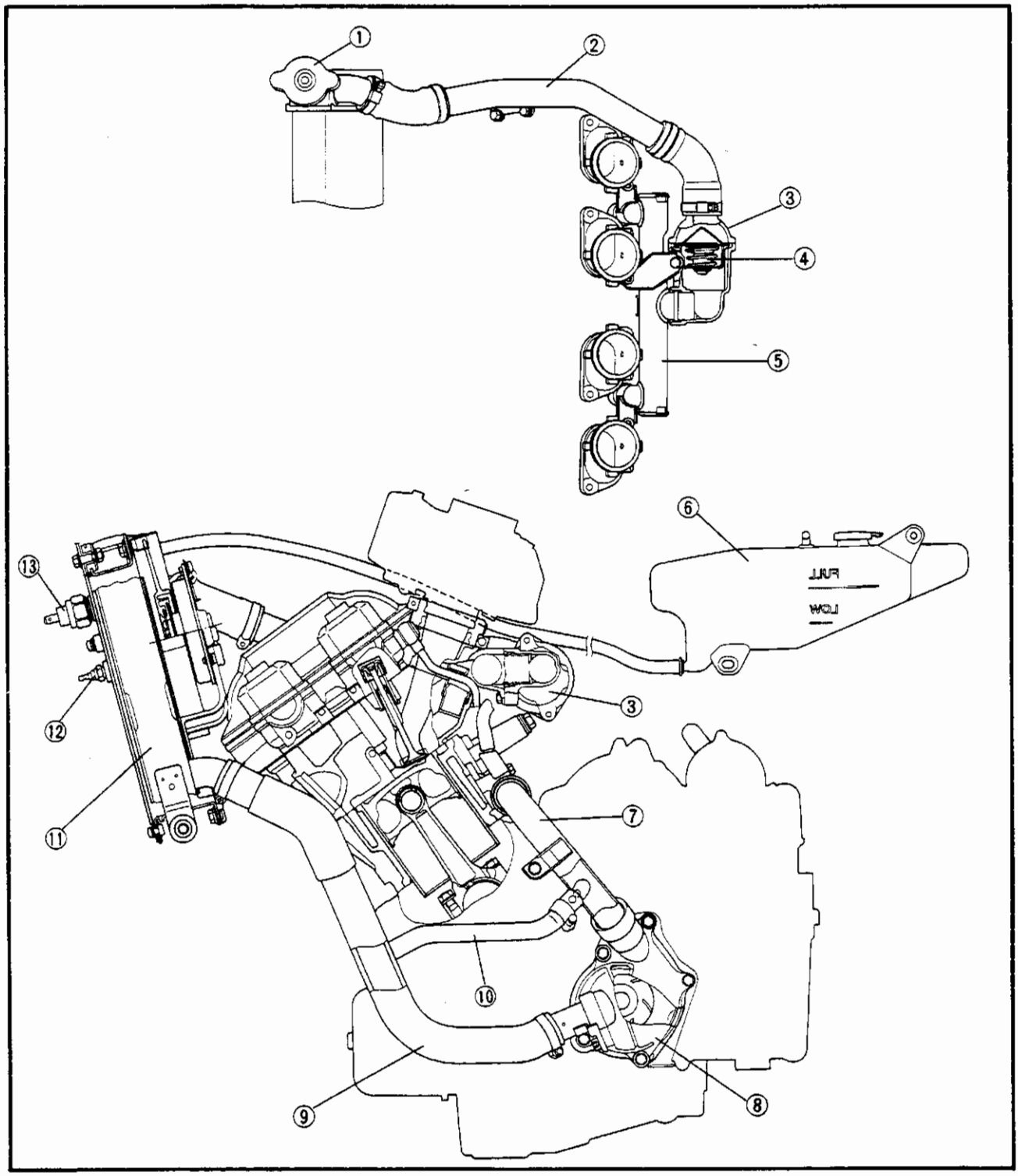
SPEC

CHASSIS

Lubrication Point	Symbol	Grade of Lubricant
Steering bearing (Upper/Lower)	LS	Lithium-soap base grease
Wheel bearing/Axle	LS	Lithium-soap base grease
Front wheel oil seal (Right/Left)	LS	Lithium-soap base grease
Rear wheel oil seal	LS	Lithium-soap base grease
Clutch hub oil seal	LS	Lithium-soap base grease
Clutch hub fitting area	LS	Lithium-soap base grease
Rear brake pedal shaft	LS	Lithium-soap base grease
Change pedal	LS	Lithium-soap base grease
Side stand sliding surface	LS	Lithium-soap base grease
Tube guide (Throttle grip) inner surface	LS	Lithium-soap base grease
Brake lever bolt, sliding surface	LS	Lithium-soap base grease
Clutch lever bolt, sliding surface	LS	Lithium-soap base grease
Rear shock absorber (Upper/Lower)	M	Molybdenum disulfide grease
Swingarm pivot bearing	M	Molybdenum disulfide grease
Pivot shaft	M	Molybdenum disulfide grease
Arm 1, 2 bearing	M	Molybdenum disulfide grease
Thrust cover (Inner)	M	Molybdenum disulfide grease
Rellay arm bearing (Inner)	M	Molybdenum disulfide grease
Rear footrest ball	LS	Lithium-soap base grease
Rear footrest pin	LS	Lithium-soap base grease

COOLANT DIAGRAM

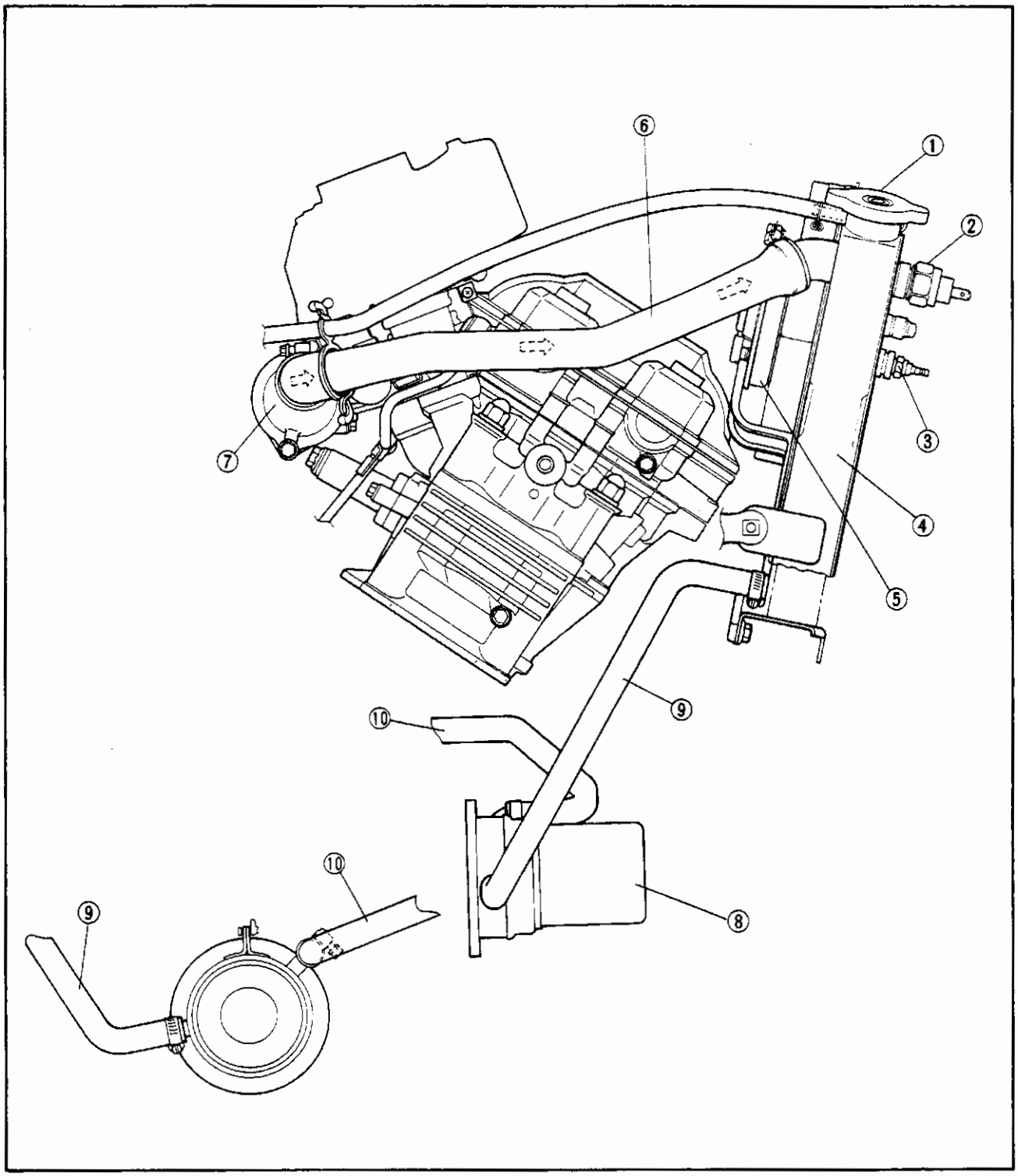
① Radiator cap
② Inlet pipe (radiator)
③ Thermostatic valve housing
④ Thermostatic valve
⑤ Water jacket joint (outlet)
⑥ Reservoir tank (coolant)
⑦ Outlet pipe (water pump)
⑧ Water pump
⑨ Inlet pipe (water pump)
⑩ Outlet pipe (oil cooler)
⑪ Radiator
⑫ Thermo unit
⑬ Thermo switch



COOLANT DIAGRAM

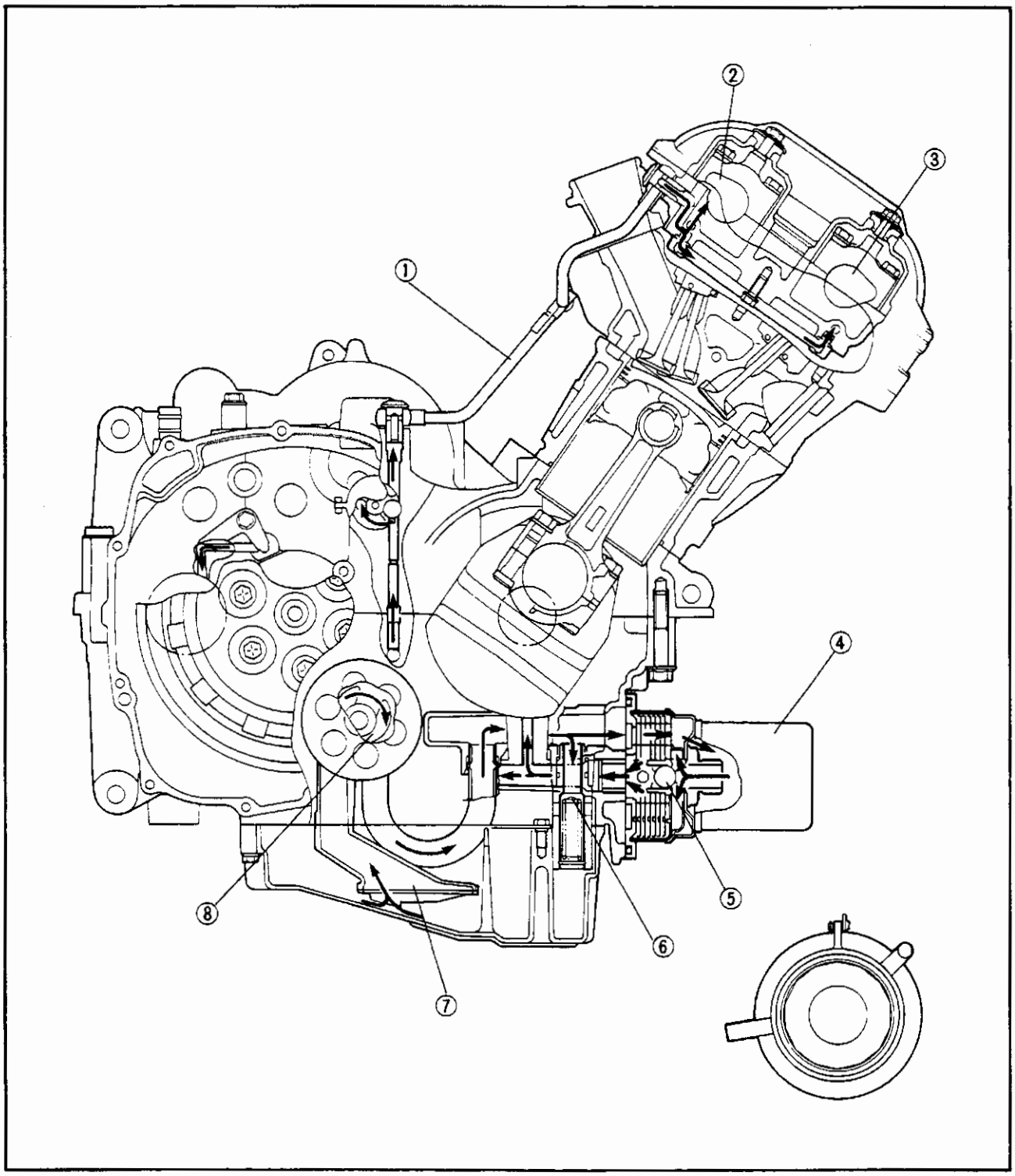
SPEC

① Radiator cap
② Thermo switch
③ Thermo unit
④ Radiator
⑤ Fan motor
⑥ Inlet pipe (radiator)
⑦ Thermostatic valve housing
⑧ Oil filter
⑨ Inlet pipe (Oil cooler)
⑩ Outlet pipe (Oil cooler)



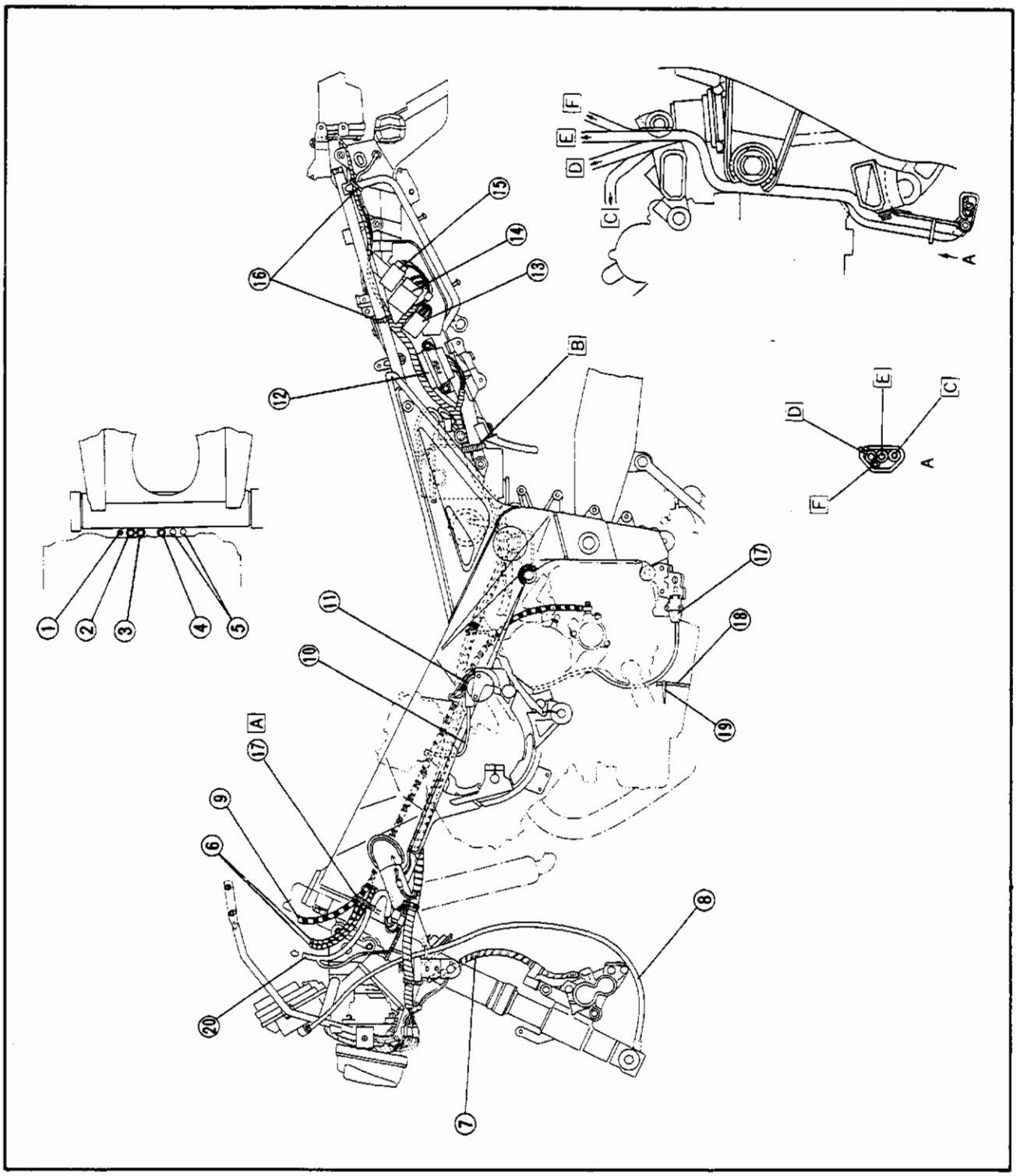
LUBRICATION DIAGRAMS

① Oil delivery pipe 2
② Camshaft (intake)
③ Camshaft (exhaust)
④ Oil filter
⑤ Bypass valve
⑥ Relief valve
⑦ Oil strainer
⑧ Oil pump



CABLE ROUTING

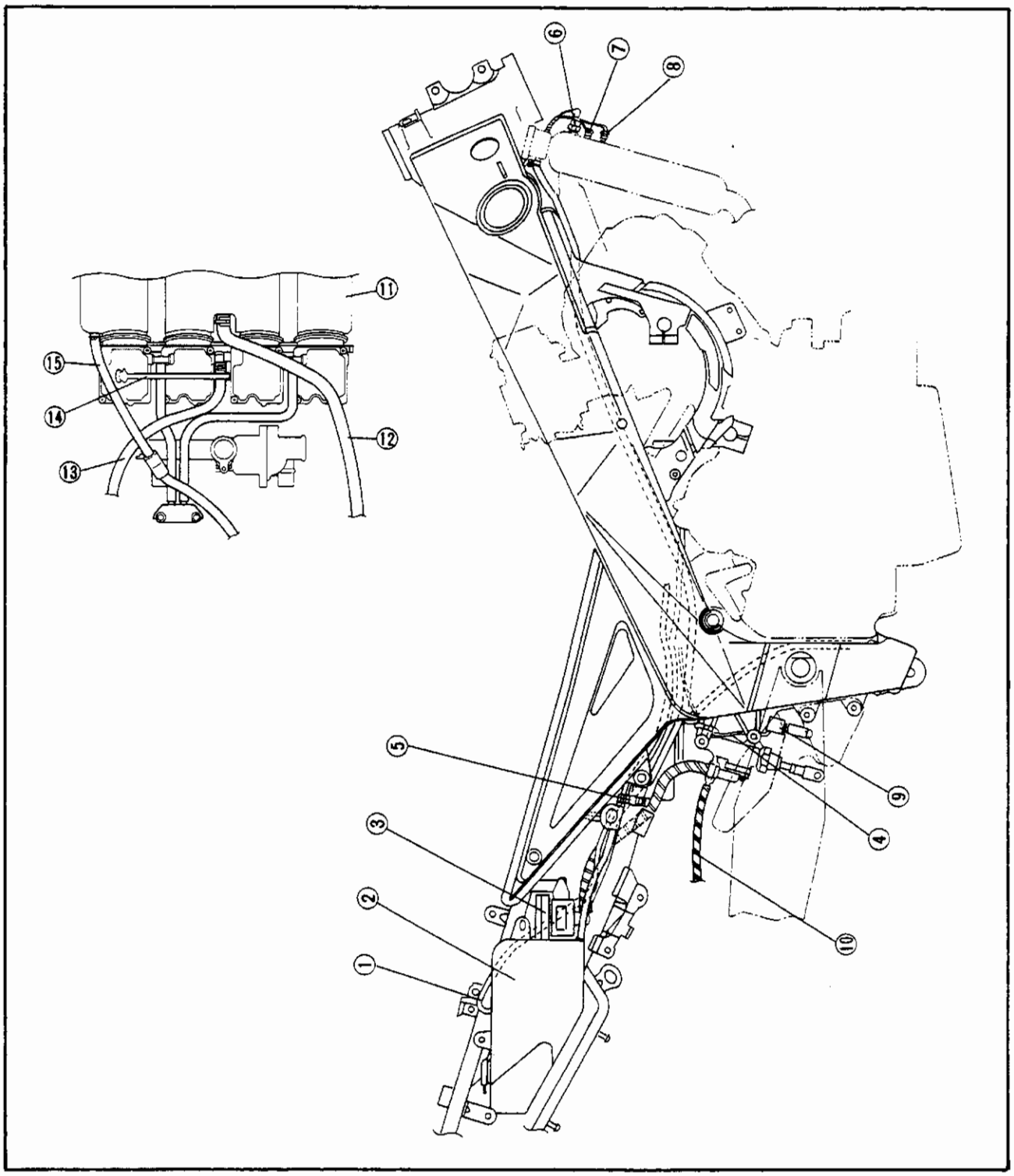
① Ventilation hose (coolant reservoir tank)
② Ventilation hose (air filter case)
③ Breather hose (fuel tank)
④ Canister hose
⑤ EXUP cables
⑥ Throttle cables
⑦ Brake hose
⑧ Speedometer cable
⑨ Clutch hose
⑩ Starter cable
⑪ Starter lever assembly
⑫ Fuse box
⑬ Flasher relay
⑭ Relay unit
⑮ Oil level switch relay
⑯ Band
⑰ Sidestand switch
⑱ Oil level switch lead
⑲ Clamp
⑳ Handlebar switch lead (left)
[A] Clamp the clutch hose and throttle cables and handlebar switch lead (left).
[B] Clamp the wireharness and starter motor lead.
[C] To canister roll over valve
[D] To air cleaner
[E] To fuel tank
[F] To reserver tank



CABLE ROUTING

SPEC

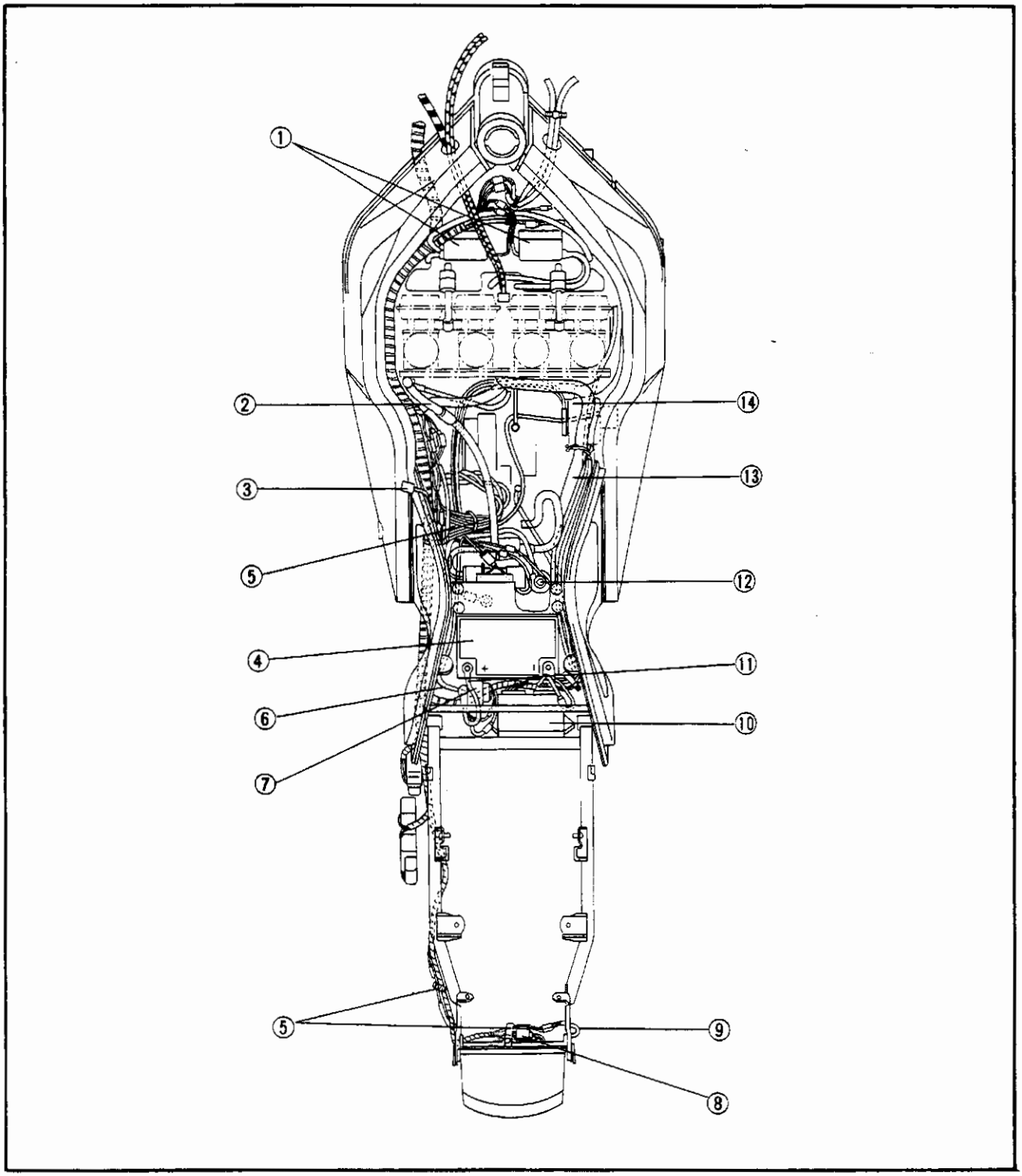
① Ventilation hose (coolant reservoir tank)
② Reservoir tank (coolant)
③ Reservoir tank (rear brake)
④ Rear brake switch leads
⑤ Band
⑥ Thermo switch
⑦ Ground lead
⑧ Thermo unit
⑨ Rear brake switch
⑩ Rear brake hose
⑪ Air filter box
⑫ Ventilation hose (crankcase)
⑬ Fuel hose
⑭ Throttle stop screw
⑮ Air filter drain hose



CABLE ROUTING

SPEC

① Ignition coil
② Ventilation hose (air filter case)
③ Fuel sender
④ Battery
⑤ Band
⑥ Starter motor lead
⑦ Starter relay
⑧ Tail/brake light coupler
⑨ Rear flasher light leads
⑩ Digital ignitor unit
⑪ Battery positive lead
⑫ Sub tank (rear shock absorber)
⑬ Ventilation hose (crankcase)
⑭ EXUP servo motor

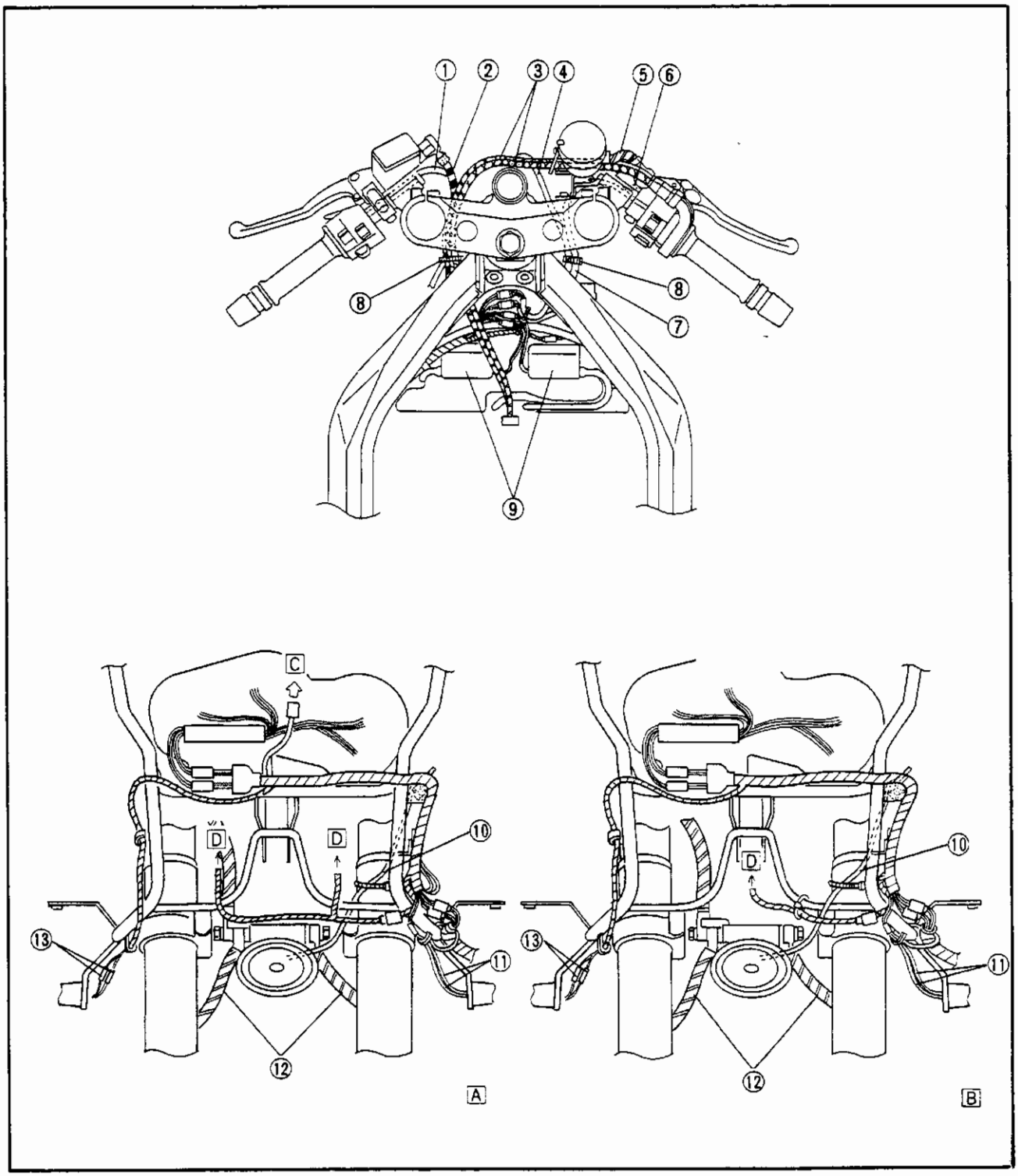


CABLE ROUTING

SPEC

① Handlebar switch leads (left)
② Clutch hose
③ Throttle cables
④ Main switch lead
⑤ Front brake hoses
⑥ Front brake switch lead
⑦ Handlebar switch leads (right)
⑧ Band
⑨ Ignition coil
⑩ Horn lead
⑪ Front flasher light leads (left)
⑫ Front brake hose
⑬ Front flasher light leads (right)

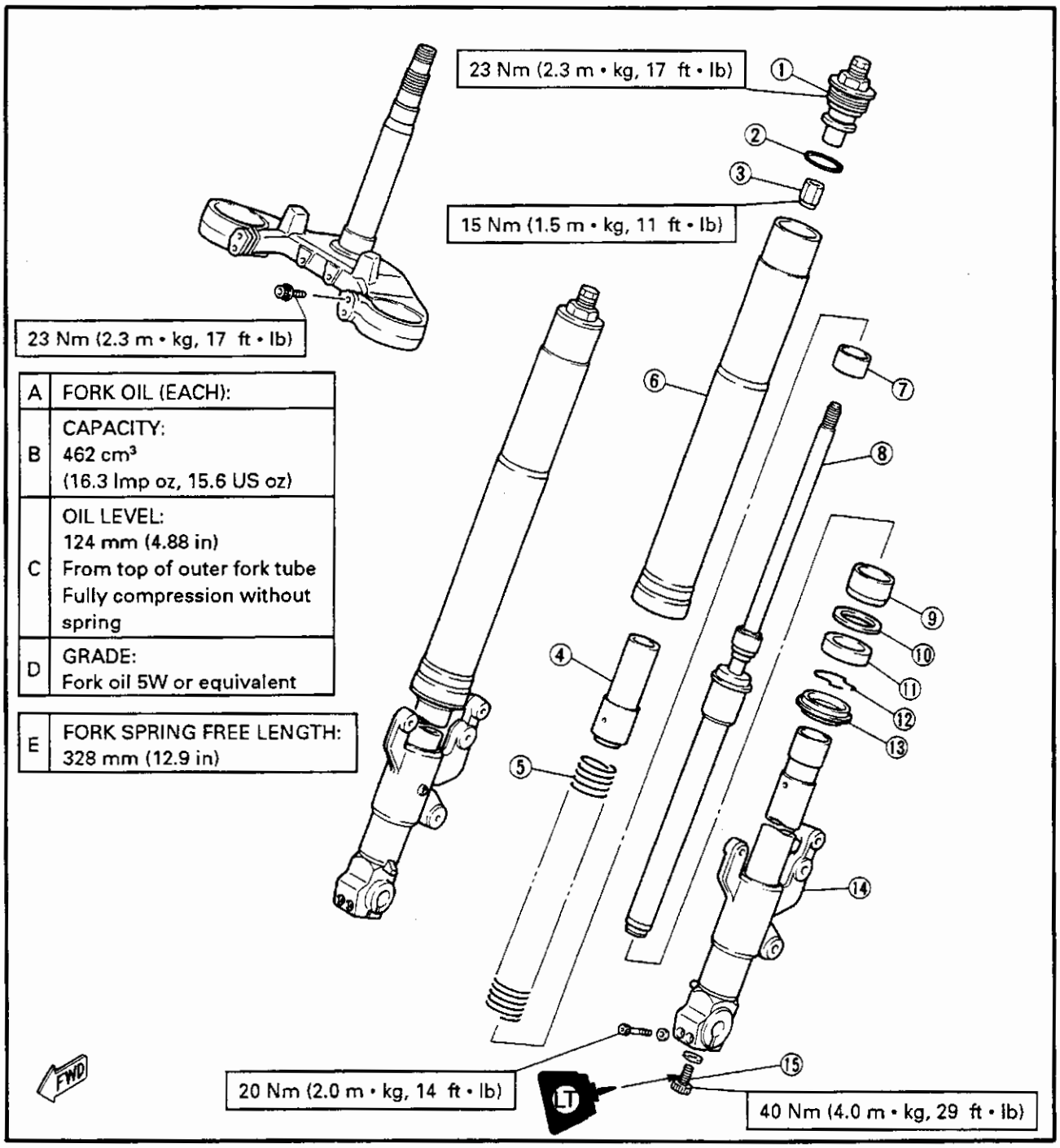
A For B, N, GR, NL, E, D, S, SF, A, CH
B For DK, F, GB, AUS, NZ
C To auxiliary light
D To headlight



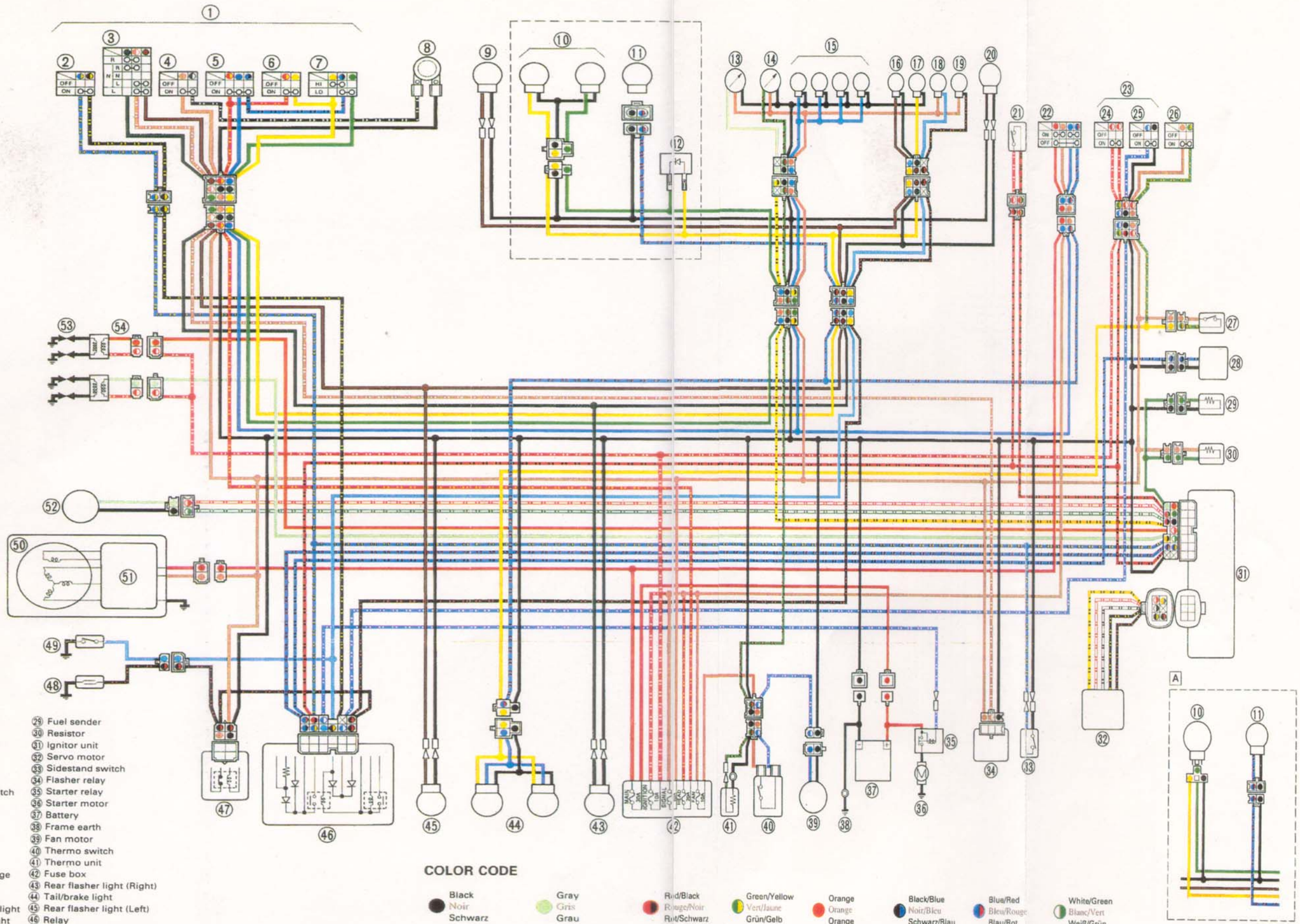
EXPLODED DIAGRAM

FRONT FORK

① Cap bolt complete
② O-ring
③ Locknut
④ Spacer collar
⑤ Fork spring
⑥ Outer fork tube
⑦ Piston metal
⑧ Damper rod assembly
⑨ Slide metal
⑩ Plain washer
⑪ Oil seal
⑫ Stopper ring
⑬ Dust seal
⑭ Inner fork tube
⑮ Damper rod bolt



WIRING DIAGRAM FZR1000 (B)



① Handlebar switch (Left)
② Clutch switch
③ "TURN" signal switch
④ "HORN" switch
⑤ "LIGHTS" switch
⑥ "PASS" switch
⑦ "LIGHTS" (Dimmer) switch
⑧ Horn
⑨ Front flasher light (Left)
⑩ Headlight
⑪ Auxiliary light
⑫ Diode
⑬ Tachometer
⑭ Engine temperature gauge
⑮ Meter light
⑯ "TURN" indicator light
⑰ "HIGH BEAM" indicator light
⑱ "NEUTRAL" indicator light
⑲ "OIL LEVEL" indicator light
⑳ Front flasher light (Right)
㉑ "FUEL" (Reserve) switch
㉒ Main switch
㉓ Handlebar switch (Right)
㉔ "ENGINE STOP" switch
㉕ "START" switch
㉖ Front brake switch
㉗ Rear brake switch
㉘ Fuel pump
㉙ Fuel sender
㉚ Resistor
㉛ Ignitor unit
㉜ Servo motor
㉝ Sidestand switch
㉞ Flasher relay
㉟ Starter relay
㊱ Starter motor
㊲ Battery
㊳ Frame earth
㊴ Fan motor
㊵ Thermo switch
㊶ Thermo unit
㊷ Fuse box
㊸ Rear flasher light (Right)
㊹ Tail/brake light
㊺ Rear flasher light (Left)
㊻ Relay
㊼ Relay (Oil level gauge)
㊽ Oil level gauge
㊾ Neutral switch
㊿ A.C. generator
(51) Rectifier/regulator
(52) Pick up coil
(53) Spark plug
(54) Ignition coil

A For F, DK, GB, AUS, NZ

COLOR CODE

Black Noir Schwarz	Gray Gris Grau	Red/Black Rouge/Noir Rot/Schwarz	Green/Yellow Vert/Jaune Grün/Gelb	Orange Orange Orange	Black/Blue Noir/Bleu Schwarz/Blau	Blue/Red Bleu/Rouge Blau/Rot	White/Green Blanc/Vert Weiß/Grün
Red Rouge Rot	Sky blue Bleu Ciel Himmelblau	Red/Green Rouge/Vert Rot/Grün	Yellow/Black Jaune/Noir Gelb/Schwarz	Yellow Jaune Gelb	Black/Yellow Noir/Jaune Schwarz/Gelb	Blue/Yellow Bleu/Jaune Blau/Gelb	White/Red Blanc/Rouge Weiß/Rot
Blue Bleu Blau	Dark green Vert Foncé Dunkelgrün	Red/White Rouge/Blanc Rot/Weiß	Yellow/Red Jaune/Rouge Gelb/Rot	Brown Brun Braun	Black/White Noir/Blanc Schwarz/Weiß	Blue/White Bleu/Blanc Blau/Weiß	White/Black Blanc/Noir Weiß/Schwarz
Green Vert Grün	Black/Red Noir/Rouge Schwarz/Rot	Blue/Black Bleu/Noir Blau/Schwarz	Brown/White Brun/Blanc Braun/Weiß	Chocolate Chocolat Schokoladenfarbe	Red/Yellow Rouge/Jaune Rot/Gelb	Green/Red Vert/Rouge Grün/Rot	

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