Yamaha XTZ 750
Super Ténéré



Zweizylinder-Viertakt, Reihe, 749 ccm, 51 kW (69 PS) bei 7.500 /min, *25/37 kW (34/50 PS), 235 kg, Sitzhöhe 87 cm, 173 km/h

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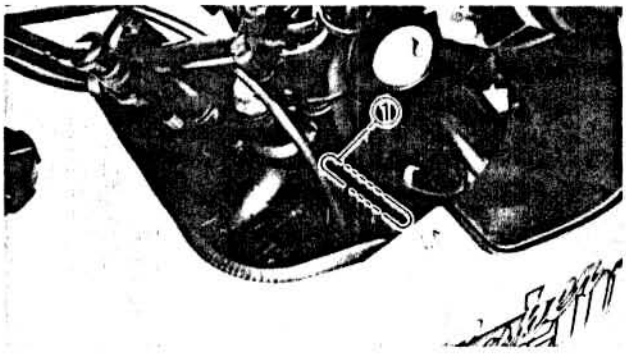
CHAPTER 1.
GENERAL INFORMATION

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GENERAL INFORMATION

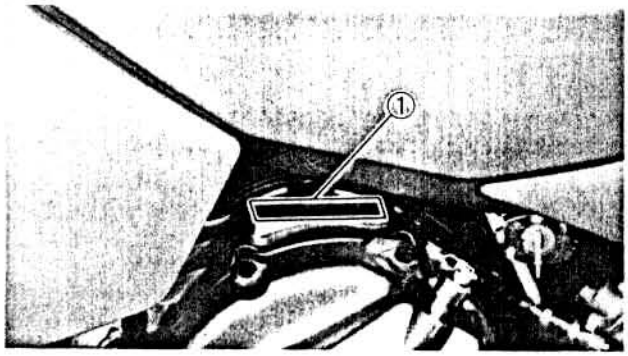


MOTORCYCLE IDENTIFICATION

FRAME SERIAL NUMBER

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

Starting serial number:
3LD-000101
3SC-000101 (E)
3TD-000101 (CH)



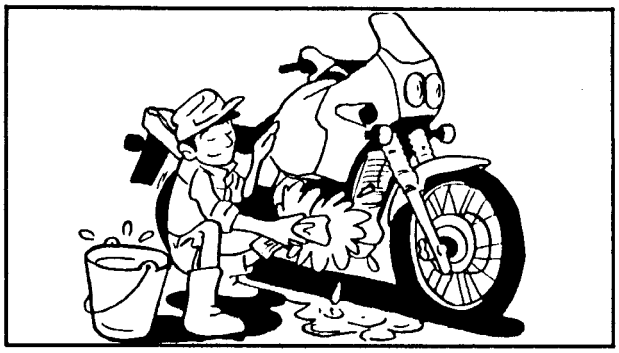
ENGINE SERIAL NUMBER

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

Starting serial number:
3LD-000101
3SC-000101 (E)
3TD-000101 (CH)

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.

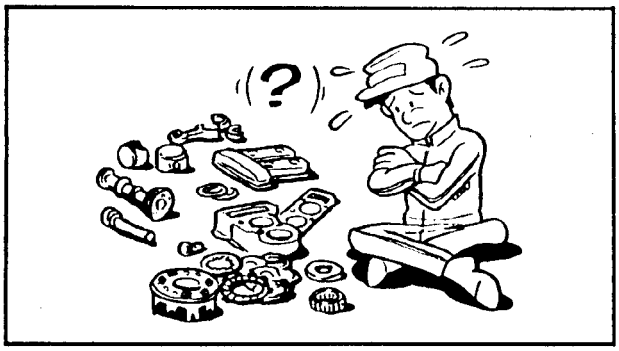


IMPORTANT INFORMATION

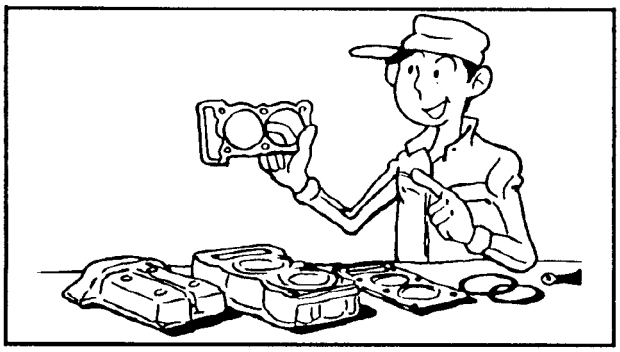
PREPARATION FOR REMOVAL

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

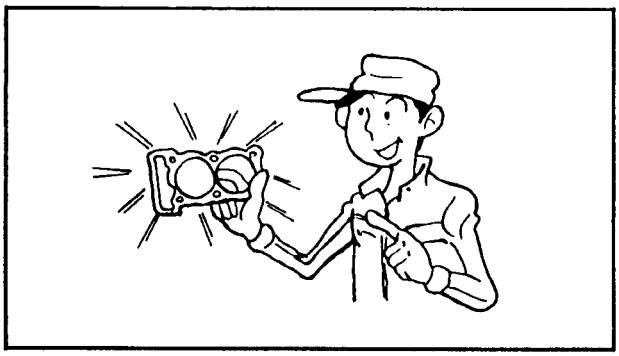
2. Use proper tools and cleaning equipment. Refer to "SPECIAL TOOL".



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 machine 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.



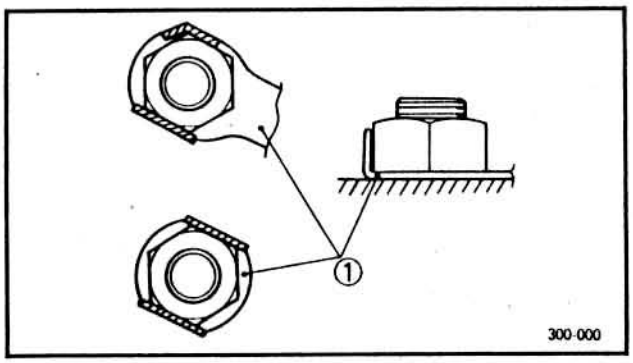
ALL REPLACEMENT PARTS

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

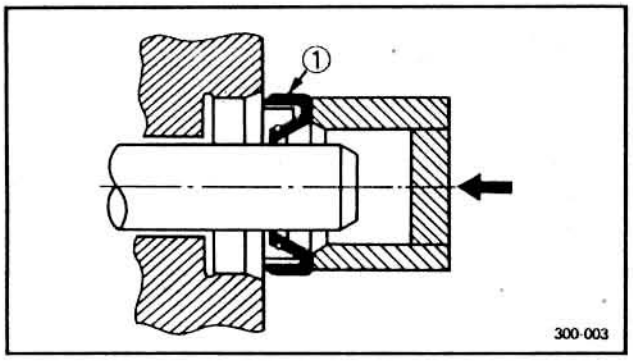
1. All gaskets, seals, and O-rings should be replaced when an engine is overhauled. All gasket surfaces, oil seal lips, and O-rings must be cleaned.

2. Properly oil all mating parts and bearings during reassembly. Apply grease to the oil seal lips.



LOCK WASHERS/PLATES AND COTTER PINS

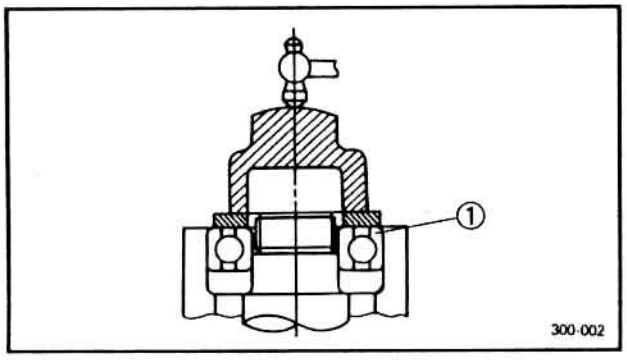
1. All lock washers/plates ① and cotter pins must be replaced when they are removed. Lock tab(s) should be bent along the bolt or nut flat(s) after the bolt or nut has been properly tightened.



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.

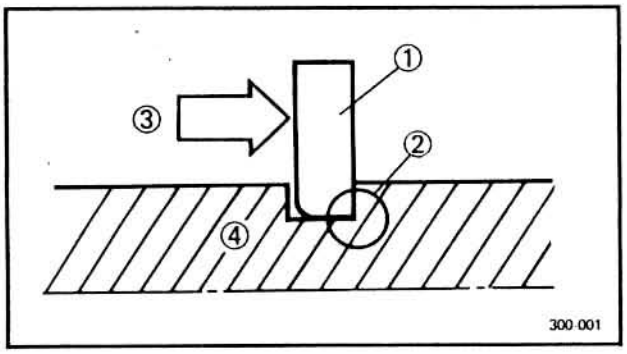
① Oil seal



⚠CAUTION:

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

① Bearing



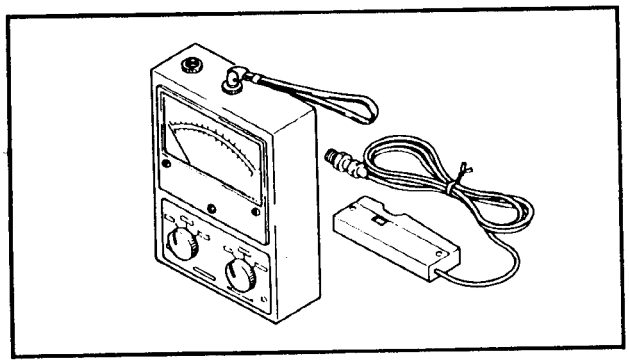
CIRCLIPS

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

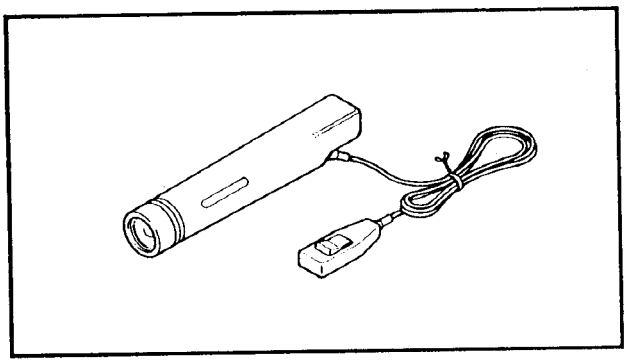
The proper special tools are necessary for complete and accurate tune-up and assembly. Using the correct special tool will help prevent damage caused by the use of improper tools or improvised techniques.



FOR TUNE UP

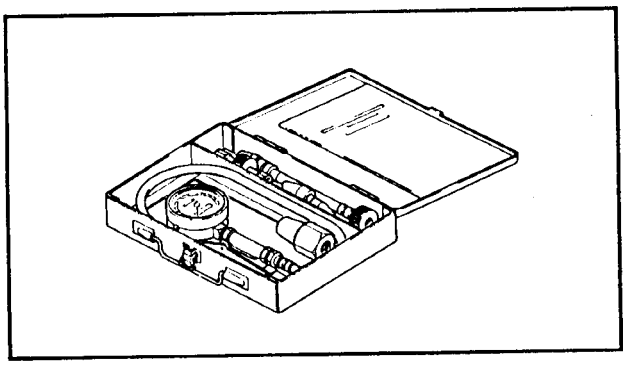
1. Inductive tachometer
   P/N 90890-03113

This tool is needed for detecting engine rpm.



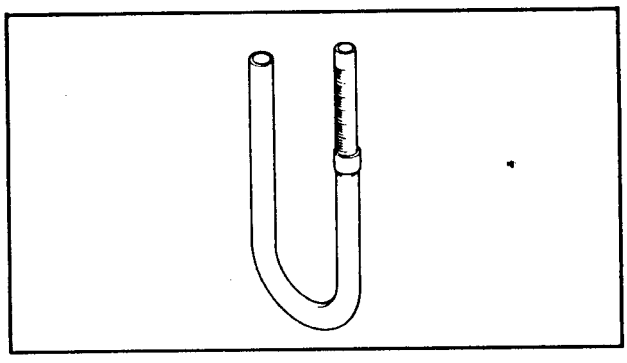
2. Inductive timing light
   P/N 90890-03109

This tool is necessary for checking ignition timing.



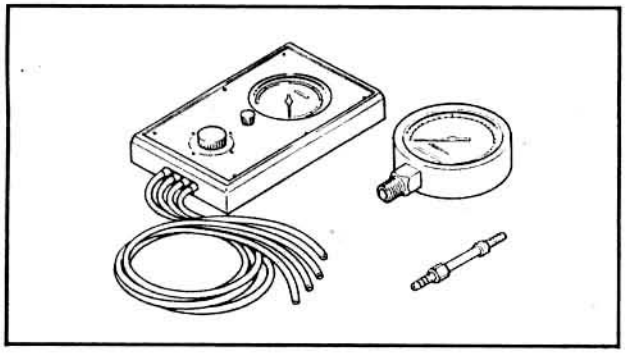
3. Compression gauge
   P/N 90890-03081

This gauge is used to measure the engine compression.



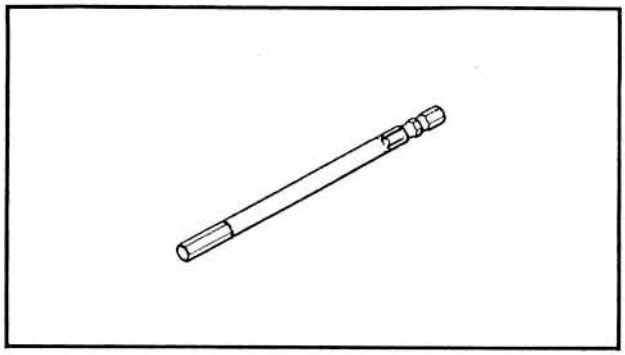
4. Fuel level gauge
   P/N 90890-01312

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



5. Vacuum gauge
   P/N 90890-03094

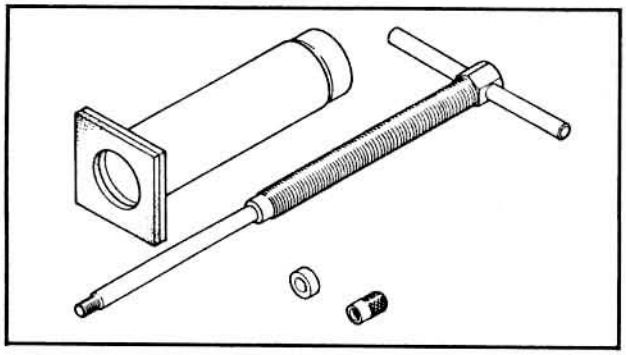
This gauge is needed for carburetor synchronization.



FOR ENGINE SERVICE

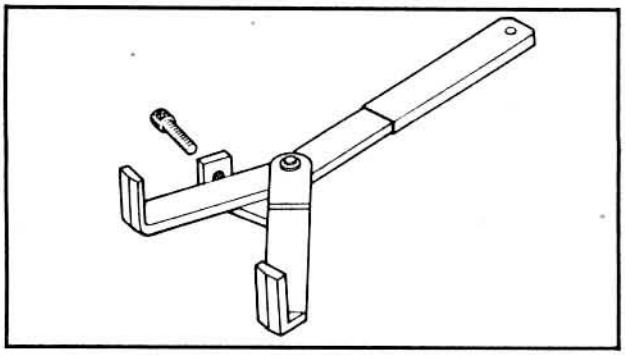
1. Hexagon wrench (6 mm)
   P/N 90890-01395

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



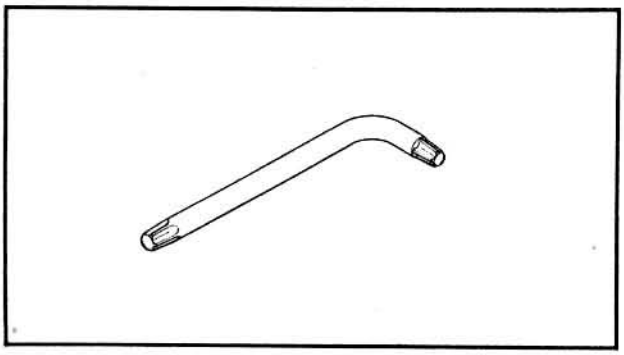
2. Piston pin puller
   P/N 90890-01304

This tool is used to remove the piston pin.



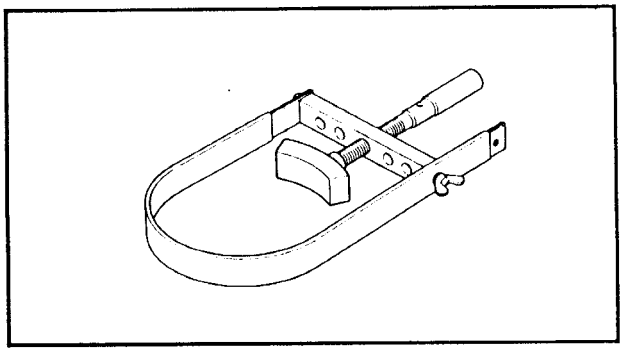
3. Universal clutch holder
   P/N 90890-04086

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



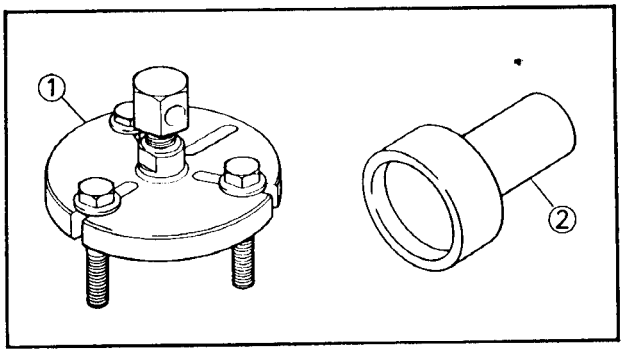
4. Torx wrench (T30)
   P/N 90890-05245

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



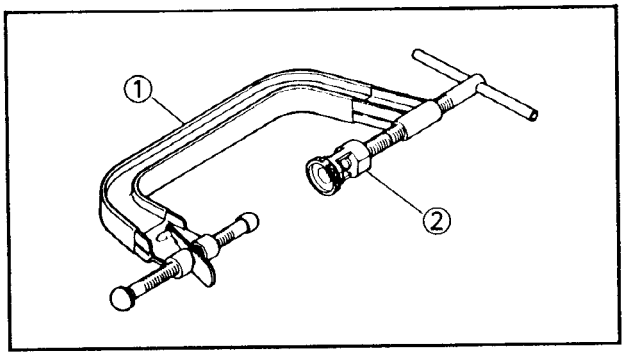
5. Rotor holder
   P/N 90890-01701

This tool is used to hold the rotor.



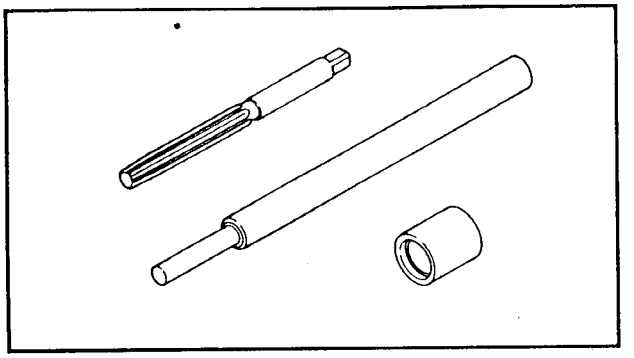
6. Rotor puller
   P/N 90890-01362 ..... ①
   Adapter
   P/N 90890-01382 ..... ②

These tools are used to remove the rotor.



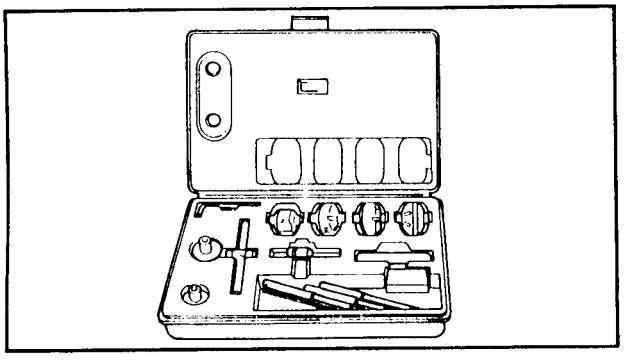
7. Valve spring compressor
   P/N 90890-04019 ..... ①
   Attachment
   P/N 90890-04114 ..... ②

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



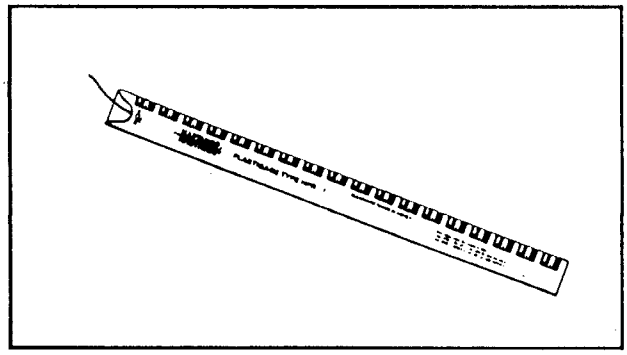
8. Valve guide remover and installer set (5.5 mm)
   P/N 90890-04016

These tools are used to remove, install and re-bore the valve guide.



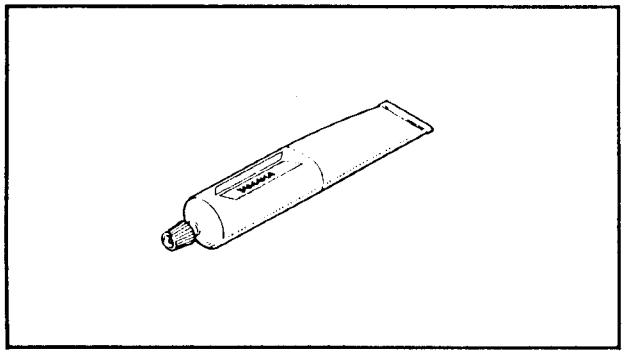
9. Valve seat cutter
   P/N YM-91043

This tool is used to adjust the valve clearance.



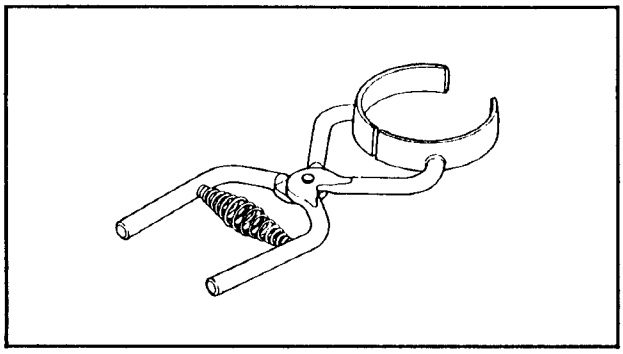
10. Plastigage® set "Green"
    P/N YU-33210

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



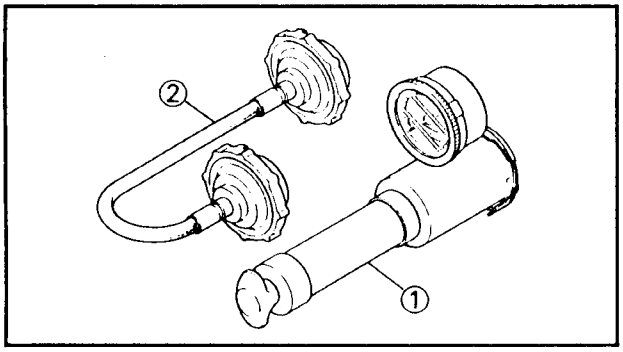
11. YAMAHA bond No. 1215
    P/N 90890-85505

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



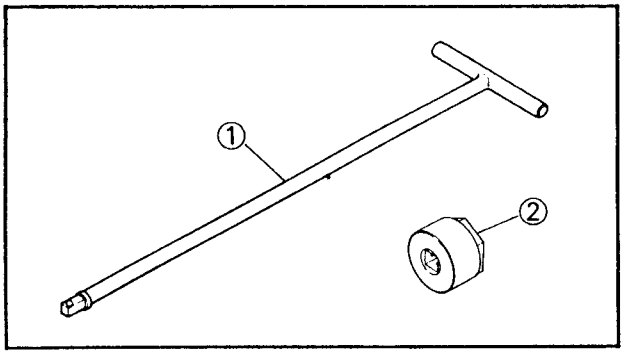
12. Piston ring compressor
    P/N 90890-04121

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



13. Radiator cap tester
    P/N 90890-01325 ..... ①
    Adapter
    P/N 90890-01352 ..... ②

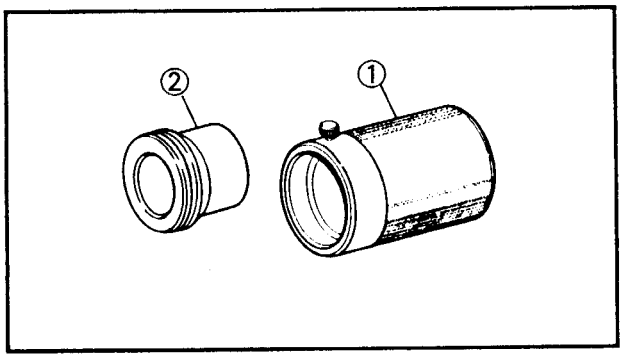
This tester is used for checking the cooling system.



FOR CHASSIS SERVICE

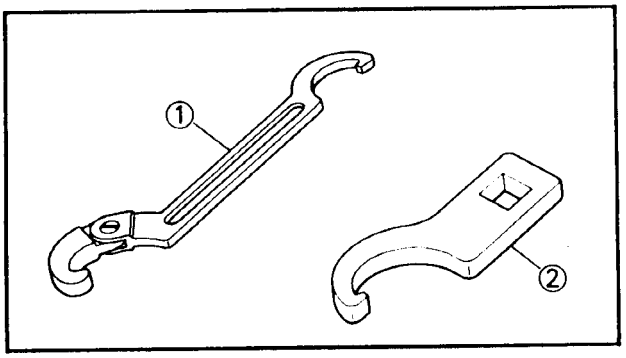
1. T-handle
    P/N 90890-01326 ..... ①
    Fork damper rod holder (30 mm)
    P/N 90890-01327 ..... ②

These tools are used to loosen and tighten the front fork damper rod holding bolt.



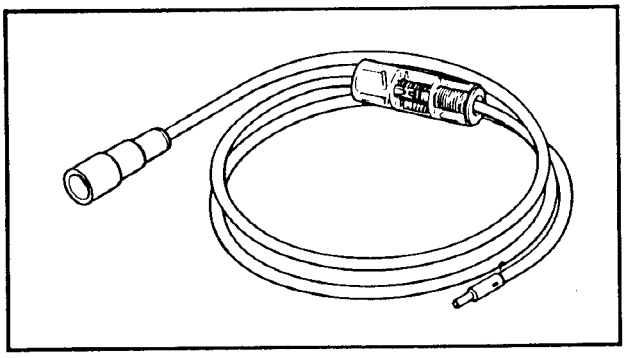
2. Front fork seal driver (weight)
   P/N 90890-01367 ..... ①
   Adapter (43 mm)
   P/N 90890-01374 ..... ②

These tools are used when installing the fork oil seal.



3. Ring nut wrench
   P/N 90890-01268 ..... ①
   P/N 90890-01403 ..... ②

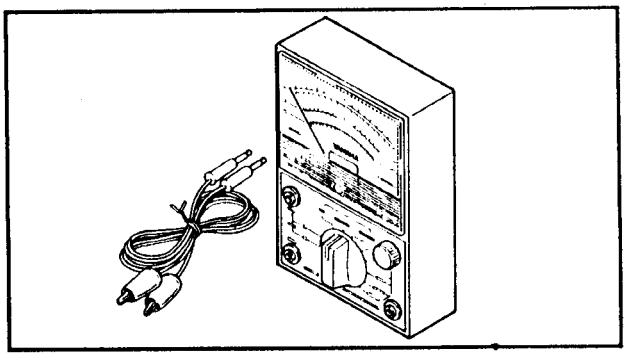
This tool is used to loosen and tighten the steering ring nut.



FOR ELECTRICAL COMPONENTS

1. Dynamic spark tester
   P/N 90890-03144

This instrument is necessary for checking the ignition system components.



2. Pocket tester
   P/N 90890-03112

This instrument is invaluable for checking the electrical system.

CHAPTER 2.
SPECIFICATIONS

GENERAL SPECIFICATIONS 2-1

MAINTENANCE SPECIFICATIONS 2-5
ENGINE 2-5
CHASSIS 2-13
ELECTRICAL 2-17

GENERAL TORQUE SPECIFICATIONS 2-20

DEFINITION OF UNITS 2-20

LUBRICATION POINT AND GRADE OF LUBRICANT 2-21

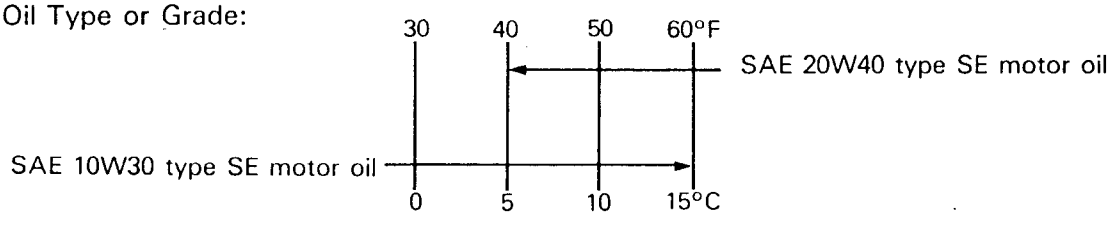
LUBRICATION DIAGRAM 2-23

COOLANT DIAGRAM 2-28

CABLE ROUTING 2-29

SPECIFICATIONS

GENERAL SPECIFICATIONS

Model	XTZ750
Model Code Number:	3LD 3SC (E) 3TD (CH)
Frame Starting Number:	3LD-000101 3SC-000101 (E) 3TD-000101 (CH)
Engine Starting Number:	3LD-000101 3SC-000101 (E) 3TD-000101 (CH)
Dimensions:	
Overall Length	2,285 mm (90.0 in) (B)(F)(GB)(NL)(E)(I) 2,355 mm (92.7 in) (D)(S)(DK)(SF)(N)(CH)
Overall Width	815 mm (32.1 in)
Overall Height	1,355 mm (53.3 in)
Seat Height	865 mm (34.1 in)
Wheelbase	1,505 mm (59.3 in)
Minimum Ground Clearance	240 mm (9.5 in)
Basic Weight:	
With Oil and Full Fuel Tank	226 kg (498 lb)
Minimum Turning Radius:	2,400 mm (94.5 in)
Engine:	
Engine Type	Liquid cooled 4-stroke, DOHC
Cylinder Arrangement	Forward inclined parallel 2-cylinder
Displacement	749 cm^3
Bore × Stroke	87 × 63 mm (3.43 × 2.48 in)
Compression Ratio	9.5 : 1
Compression Pressure	950 kPa (9.5 kg/cm^2, 135 psi)
Starting System	Electric starter
Lubrication System:	Dry sump
Engine Oil Type or Grade:	

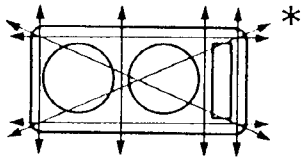
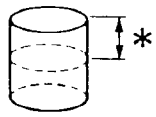
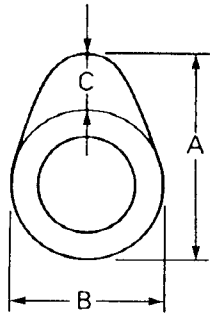
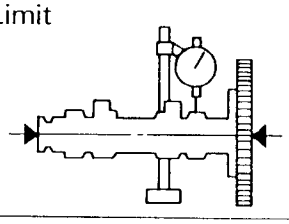
Model	XTZ750	
Engine Oil Capacity:		
Periodic Oil Change:	4.0 L (3.5 Imp qt, 4.2 US qt)	
With Oil Filter Replacement	4.1 L (3.6 Imp qt, 4.3 US qt)	
Total Amount	4.4 L (3.9 Imp qt, 4.7 US qt)	
Coolant Total Amount: (Including All Routes)	1.7 L (1.5 Imp qt, 1.8 US qt)	
Air Filter:	Dry type element	
Fuel:		
Type	Regular gasoline	
Tank Capacity	26 L (5.7 Imp qt, 6.9 US gal)	
Reserve Amount	5 L (1.1 Imp qt, 1.3 US gal)	
Carburetor:		
Type × Quantity	BDST 38 × 2	
Manufacturer	MIKUNI	
Spark Plug:		
Type	DPR8EA-9/X24EPRU-9	
Manufacturer	NGK/NIPPON DENSO	
Gap	0.8 ~ 0.9 mm (0.031 ~ 0.035 in)	
Clutch Type:	Wet, multiple-disc	
Transmission:		
Primary Reduction System	Spur gear	
Primary Reduction Ratio	67/39 (1.718)	
Secondary Reduction System	Chain Drive	
Secondary Reduction Ratio	46/16 (2.875)	
Transmission Type	Constant mesh 5-speed	
Operation	Left foot operation	
Gear Ratio 1st	37/13 (2.846)	
2nd	37/20 (1.850)	
3rd	30/21 (1.429)	
4th	27/23 (1.174)	
5th	28/27 (1.037)	
Chassis:		
Frame Type	Double cradle	
Caster Angle	26.5°	
Trail	101 mm (3.98 in)	
Tire:	Front	Rear
Type	With tube	With tube
Size	90/90-21 54H	140/80-17 69H
Manufacturer (Type)	BRIDGESTONE (TW47)	BRIDGESTONE (TW48)

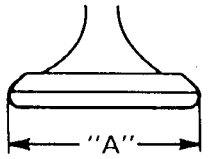
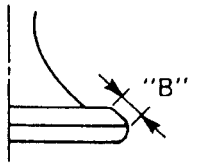
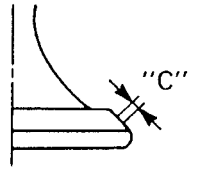
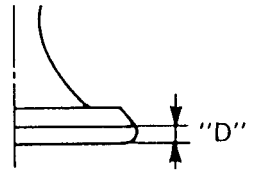
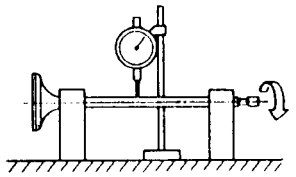
Model	XTZ750	
Tire Pressure (Cold Tire):		
Maximum load*	184 kg (406 lb)	
Cold tire pressure	Front	Rear
Up to 90 kg (198 lb) load*	225 kPa (2.25 kg/cm^2, 33 psi)	225 kPa (2.25 kg/cm^2, 33 psi)
90 kg (198 lb) ~ Maximum load*	225 kPa (2.25 kg/cm^2, 33 psi)	250 kPa (2.5 kg/cm^2, 36 psi)
High speed riding	225 kPa (2.25 kg/cm^2, 33 psi)	250 kPa (2.5 kg/cm^2, 36 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 suspention)	
Shock Absorber:		
Front Shock Absorber	Coil-Air spring/Oil damper	
Rear Shock Absorber	Coil-Gas spring/Oil damper	
Wheel Travel:		
Front Wheel Travel	235 mm (9.25 in)	
Rear Wheel Travel	215 mm (8.46 in)	
Electrical:		
Ignition System	T.C.I. (Digital)	
Generator System	A.C. magneto generator	
Battery Type or Model	YB14L-A	
Battery Capacity	12V, 14AH	
Headlight Type:	Quartz bulb (Halogen)	
Bulb Wattage × Quantity:		
Headlight	12V 55W + 12V 60/55W (D, F, B, S) 12V 45/40W × 2 (SF, NL, E, DK, N) 12V 35/35W × 2 (I, GB)	
Auxiliary Light	12V 4W × 1 (D, F, B, S, SF, NL) 12V 4W × 2 (E, DK, N) 12V 3W × 2 (I) 12V 3.4W × 2 (GB)	
Tail/Brake Light	12V 5W/21W × 1	
Flasher Light	12V 21W × 4	

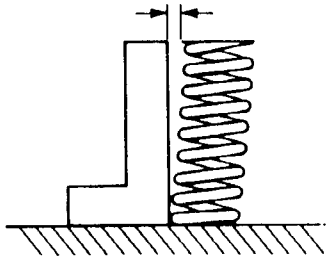
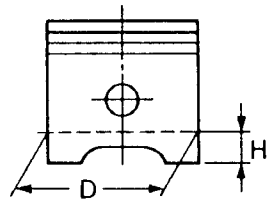
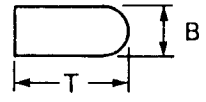
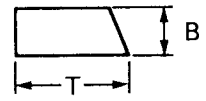
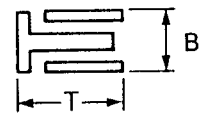
Model		XTZ750
Indicator Light:		
Wattage × Quantity	"METER LIGHT"	12V 3.4W × 2
	"NEUTRAL"	12V 3.4W × 1
	"HIGH BEAM"	12V 3.4W × 1
	"TURN"	12V 3.4W × 2

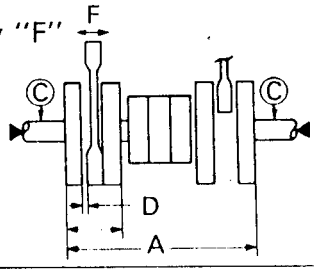
MAINTENANCE SPECIFICATIONS

ENGINE

Model	XTZ750
Cylinder Head: Warp Limit* 	0.03 mm (0.0012 in) * Lines indicate straightedge measurement.
Cylinder: Bore Size/Measureing Point*  <Wear Limit>	87.000 ~ 87.005 mm (3.4252 ~ 3.4254 in) 40 mm (1.6 in) 87.1 mm (3.429 in)
Camshaft: Drive Method Camshaft Outside Diameter Shaft-to-cap Clearance Cam Dimensions: Intake "A" <Limit> "B" <Limit> "C" Exhaust "A" <Limit> "B" <Limit> "C"  Camshaft Runout Limit 	Chain drive (Right) 24.967 ~ 24.980 mm (0.9830 ~ 0.9835 in) 0.020 ~ 0.054 mm (0.0008 ~ 0.0021 in) 35.7 ~ 35.8 mm (1.4055 ~ 1.4094 in) 35.6 mm (1.4 in) 27.95 ~ 28.05 mm (1.1004 ~ 1.1043 in) 27.85 mm (1.1 in) 7.65 ~ 7.85 mm (0.3012 ~ 0.3091 in) 35.95 ~ 36.05 mm (1.4154 ~ 1.4193 in) 35.85 mm (1.41 in) 27.95 ~ 28.05 mm (1.1004 ~ 1.1043 in) 27.85 mm (1.1 in) 7.9 ~ 8.1 mm (0.3110 ~ 0.3189 in) 0.03 mm (0.0012 in)
Timing Chain: Chain Type/No. of Links Chain Adjustment Method	82 RH 2015/138 Links Automatic

Model		XTZ750
Valve, Valve Seat, Valve Guide:		
Valve Clearance (Cold):		
	IN.	0.15 ~ 0.20 mm (0.006 ~ 0.008 in)
	EX.	0.25 ~ 0.30 mm (0.010 ~ 0.012 in)
Valve Dimensions:		
 Head Dia.	 Face Width	 Seat Width
		 Margin Thickness
"A" Head Dia.	IN.	25.9 ~ 26.1 mm (1.020 ~ 1.028 in)
	EX.	27.9 ~ 28.1 mm (1.098 ~ 1.106 in)
"B" Face Width	IN.	2.06 ~ 2.46 mm (0.081 ~ 0.097 in)
	EX.	2.06 ~ 2.46 mm (0.081 ~ 0.097 in)
"C" Seat Limit Width	IN.	0.9 ~ 1.1 mm (0.035 ~ 0.043 in)
	EX.	0.9 ~ 1.1 mm (0.035 ~ 0.043 in)
"D" Margin Thickness Limit	IN.	0.8 ~ 1.2 mm (0.032 ~ 0.047 in)
	EX.	0.8 ~ 1.2 mm (0.032 ~ 0.047 in)
Stem Outside Diameter	IN.	5.475 ~ 5.490 mm (0.2156 ~ 0.2161 in)
	EX.	5.460 ~ 5.475 mm (0.2150 ~ 0.2156 in)
<Limit>	IN.	5.45 mm (0.214 in)
	EX.	5.43 mm (0.214 in)
Guide Inside Diameter	IN.	5.50 ~ 5.51 mm (0.216 ~ 0.217 in)
	EX.	5.50 ~ 5.51 mm (0.216 ~ 0.217 in)
<Limit>	IN.	5.55 mm (0.219 in)
	EX.	5.55 mm (0.219 in)
Stem-to-Guide Clearance	IN.	0.01 ~ 0.04 mm (0.0004 ~ 0.0015 in)
	EX.	0.03 ~ 0.05 mm (0.001 ~ 0.002 in)
<Limit>	IN.	0.08 mm (0.003 in)
	EX.	0.1 mm (0.004 in)
Stem Runout Limit		0.01 mm (0.004 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)

Model		XTZ750
Valve Spring:		
Free Length	IN.	37.29 mm (1.47 in)
	EX.	37.29 mm (1.47 in)
Set Length (Valve Closed)	IN.	30.39 mm (1.2 in)
	EX.	30.39 mm (1.2 in)
Compressed Pressure	IN.	10.00 ~ 11.60 kg (22.05 ~ 22.57 lb) at 30.39 mm
(Valve Closed)	EX.	10.00 ~ 11.60 kg (22.05 ~ 22.57 lb) at 30.39 mm
Tilt Limit	IN.	2.5°/1.7 mm (2.5°/0.067 in)
	EX.	2.5°/1.7 mm (2.5°/0.067 in)
		
Direction of Winding (Top View)	IN.	Clockwise
	EX.	Clockwise
Piston:		
Piston Size "D"		86.920 ~ 86.935 mm (3.422 ~ 3.423 in)
Measuring Point "H"		4.7 mm (0.185 in)
		
Piston Off-set		1 mm (0.04 in)
Piston Off-set Direction		INSIDE
Piston-to-Cylinder Clearance		0.065 ~ 0.085 mm (0.0026 ~ 0.0033 in)
<Limit>		<0.15 mm (0.0059 in)>
Piston Ring:		
Top Ring:		
Type		Barrel
		
Dimensions (B × T)		1.0 × 3.3 mm (0.039 × 0.130 in)
End Gap (Installed)		0.3 ~ 0.5 mm (0.012 ~ 0.020 in)
Side Clearance (Installed)		0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in)
2nd Ring:		
Type		Taper
		
Dimensions (B × T)		1.0 × 3.3 mm (0.039 × 0.130 in)
End Gap (Installed)		0.3 ~ 0.5 mm (0.012 ~ 0.020 in)
Side Clearance		0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in)
Oil Ring:		
		
Dimensions (B × T)		2.0 × 2.8 mm (0.079 × 0.110 in)
End Gap (Installed)		0.2 ~ 0.7 mm (0.008 ~ 0.028 in)

Model	XTZ750
Connecting Rod:	
Oil Clearance	0.026 ~ 0.050 mm (0.001 ~ 0.002 in)
Bearing Color Code	1. Blue 2. Black 3. Brown 4. Green
Crankshaft:	
Crank Width "A"	64.75 ~ 65.25 mm (2.549 ~ 2.569 in)
Runout Limit "C"	0.02 mm (0.0008 in)
Big End Side Clearance "D"	0.16 ~ 0.27 mm (0.006 ~ 0.011 in)
Small End Free Play "F" 	0.8 ~ 1.0 mm (0.0315 ~ 0.0394 in)
Oil Clearance	0.020 ~ 0.038 mm (0.0007 ~ 0.0015 in)
Bearing Color Code	1. Blue 2. Black 3. Brown, 4. Green 5. Yellow 6. Pink 7. Red
Balancer:	
Drive Method	Spur gear
Clutch:	
Friction Plate:	
Thickness	2.9 ~ 3.1 mm (0.114 ~ 0.122 in)
Quantity	8 pcs.
Wear Limit	2.8 mm (0.11 in)
Clutch Plate:	
Thickness	2.2 ~ 2.4 mm (0.087 ~ 0.094 in)
Quantity	1 pc.
Warp Limit	0.1 mm (0.004 in)
Clutch Plate:	
Thickness	1.9 ~ 2.1 mm (0.075 ~ 0.083 in)
Quantity	7 pcs.
Warp Limit	0.1 mm (0.004 in)
Clutch Spring:	
Free Length	51.8 mm (2.04 in)
Quantity	6 pcs.
Minimum Free Length	50 mm (1.97 in)
Clutch Release Method	Outer pull, rack & pinion pull
Transmission:	
Main Axle Runout Limit	0.08 mm (0.003 in)
Drive Axle Runout Limit	0.08 mm (0.003 in)
Shifter:	
Type	Guide bar

Model		XTZ750
Carburetor:		
I.D. Mark		3LD 00, 3TD 00 (CH)
Main Jet	(M.J.)	#142.5, #140 (CH)
Main Air Jet	(M.A.J.)	#60
Jet Needle	(J.N.)	5C19-3, 5C20-3 (CH)
Needle Jet	(N.J.)	Y-4 (611)
Throttle Valve Size	(Th.V)	#130
Pilot Jet	(P.J.)	#42.5, #35 (CH)
Pilot Air Jet	(P.A.J.)	#60
Bypass 1	(B.P.1)	ϕ0.8
2	(B.P.2)	ϕ0.8
3	(B.P.3)	ϕ0.8
Pilot Screw	(P.S.)	2 turns out
Valve Seat	(V.S.)	ϕ1.7
Starter Jet 1	(G.S.1)	#70
2	(G.S.2)	ϕ0.8
Pilot Outlet	(P.O.)	ϕ0.85, ϕ0.9 (CH)
Fuel Level		5.1 ~ 6.1 mm (0.2 ~ 0.24 in) Above from the float chamber line
Engine Idling Speed		1,100 ~ 1,200 r/min
Vacuum Pressure at Idling Speed		31.9 ~ 34.6 kPa (240 ~ 260 mmHg, 8.1 ~ 8.8 inHg)
Lubrication System:		
Oil Filter Type		Paper type
Oil Pump Type		Trochoid pump type
Tip Clearance		0 ~ 0.12 mm (0 ~ 0.005 in)
Side Clearance		0.03 ~ 0.08 mm (0.001 ~ 0.003 in)
Bypass Valve Setting Pressure		40 ~ 80 kPa (0.4 ~ 0.8 kg/cm^2, 5.69 ~ 11.38 psi)
Relief Valve Operating Pressure		350 ~ 450 kPa (3.5 ~ 4.5 kg/cm^2, 49.77 ~ 63.99 psi)
Cooling System:		
Radiator Core Size	Width	380 mm (15 in)
	Height	147.8 mm (5.82 in)
	Thickness	32 mm (1.26 in)
Radiator Cap Opening Pressure		95 ~ 125 kPa (0.95 ~ 1.25 kg/cm^2, 13.51 ~ 17.77 psi)
Reservoir Tank Capacity		0.45 L (0.40 Imp qt, 0.47 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		44/44 × 38/27 (1.407)
Thermostat		
Opening Temperature		80 ~ 84°C (176 ~ 183°F)

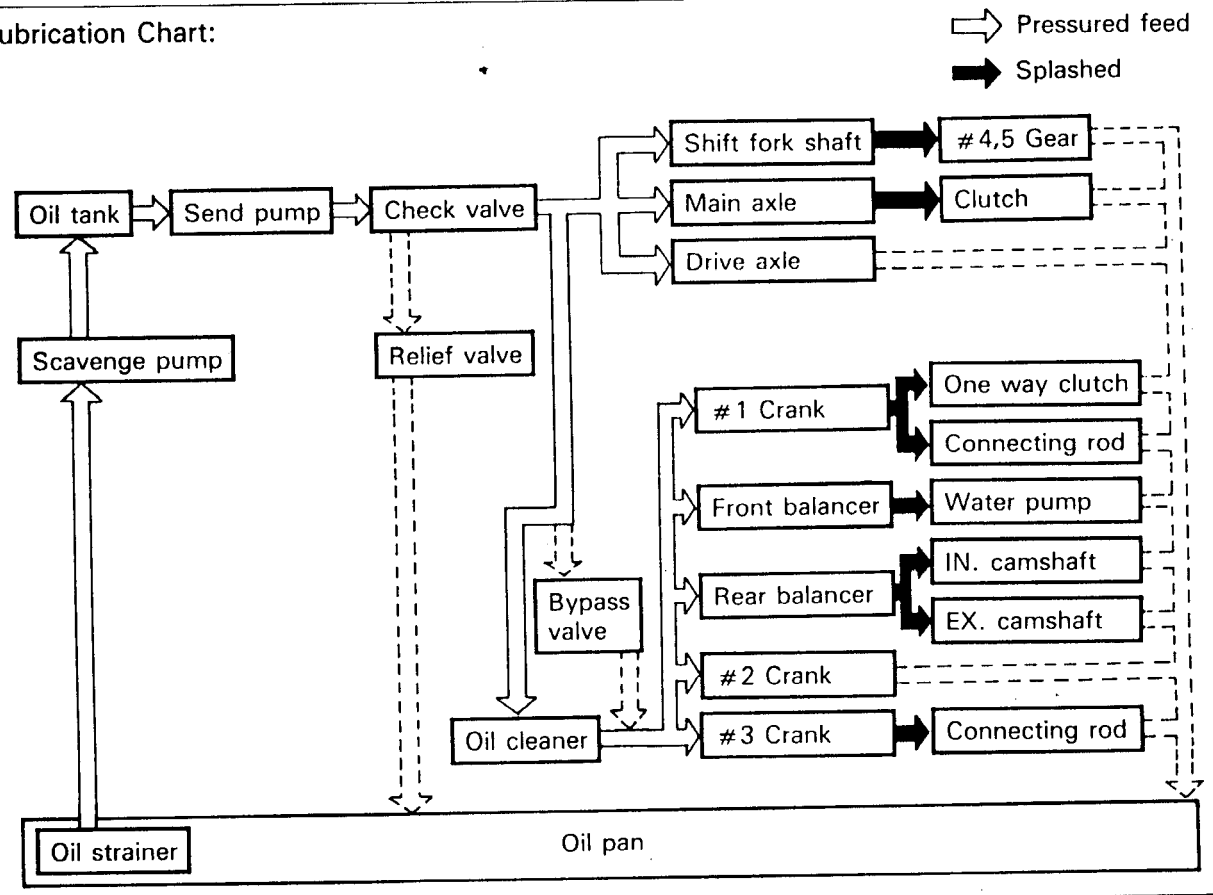
TIGHTENING TORQUE

Part to be tightened	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m•kg	ft•lb	
Cylinder head (exhaust pipe)	Stud bolt	M 8	4	15	1.5	11	E
Cylinder head (camshaft cap)	Flange bolt	M 6	16	10	1.0	7.2	
Cylinder head	Nut	M10	6	40	4.0	29	E
Cylinder head cover	Bolt	M 6	4	10	1.0	7.2	
Cylinder body drain bolt	Flange bolt	M 6	1	10	1.0	7.2	
Spark plug	—	M12	2	17.5	1.75	12.5	
Connecting rod	Nut	M 9	4	48	4.8	35	
Flywheel magneto	Flange bolt	M12	1	130	13	94	
Timing chain sprocket	Flange bolt	M 7	4	24	2.4	17	
Timing chain tensioner	Bolt	M 6	1	10	1.0	7.2	
Thermostat	Flange bolt	M16	1	13	1.3	9.4	L
Hose clamp (thermostat-radiator)	Panhead screw	M 5	2	2	0.2	1.4	
(cylinder-thermostat)	Panhead screw	M 5	2	2	0.2	1.4	
(radiator-water pump)	Panhead screw	M 5	2	2	0.2	1.4	
Radiator protector	Panhead screw	M 5	4	5	0.5	3.6	
Radiator	Flange bolt	M 6	2	7	0.7	5.1	
Delivery hose (crankcase-cylinder)	Bolt	M10	2	21	2.1	15	
Oil pump assembly	Panhead screw	M 6	6	6	0.6	4.3	
Oil buffle plate	Flange bolt	M 6	2	10	1.0	7.2	
Drain plug (oil pan)	—	M14	1	35	3.5	25	
Oil strainer	Panhead screw	M 6	4	7	0.7	5	Stake L
Relief valve stay	Flange bolt	M 6	1	10	1.0	7.2	L
Drain bolt (oil strainer case)	Flange bolt	M10	1	30	3.0	22	
Carburetor joint	Bolt	M 6	4	10	1.0	7.2	
Air cleaner	Flange bolt	M 6	1	7	0.7	5.1	
Muffler protector	Screw	M 6	8	4	0.4	2.9	
Exhaust pipe (CO test)	Bolt	M 6	2	10	1.0	7.2	
Exhaust pipe	Nut	M 8	4	20	2.0	14	
Exhaust pipe protector	Screw	M 6	3	4	0.4	2.9	
Exhaust pipe and muffler	Bolt	M 8	2	20	2.0	14	
Muffler	Bolt	M 8	2	24	2.4	17	
Crankcase	Flange bolt	M10	6	40	4.0	29	M
Crankcase	Flange bolt	M 6	10	12	1.2	8.7	E
Crankcase	Flange bolt	M 8	11	24	2.4	17	E
Balancer shaft	Screw	M 6	2	12	1.2	8.7	
Holder	Flange bolt	M 6	4	10	1.0	7.2	
Chain cover	Flange bolt	M 6	2	5	0.5	3.6	
Crankcase cover (left-rear)	Flange bolt	M 6	5	5	0.5	3.6	

Part to be tightened	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m•kg	ft•lb	
Crankcase cover (left-front)	Panhead screw	M 5	2	4	0.4	2.9	Stake (S)
Starter clutch	Bolt	M 6	3	10	1.0	7.2	
Clutch spring	Screw	M 6	6	8	0.8	5.8	
Clutch boss	Nut	M20	1	7	0.7	5.1	Use lock washer
Main axle bearing stopper	Screw	M 6	3	12	1.2	8.7	
Drive sprocket	Nut	M18	1	70	7.0	51	Use lock washer
Drive axle cover plate	Bolt	M 6	5	7	7.0	5.1	
Shift cam	Screw	M 5	1	4	0.4	2.9	
Shift cam stopper lever	Bolt	M 6	1	12	1.2	8.7	
Shift fork guide	Flange bolt	M 6	2	12	1.2	8.7	
Shift arm	Flange bolt	M 6	1	12	1.2	8.7	
Shift rod	Nut	M 6	2	8	0.8	5.8	
Stopper lever	Bolt	M 8	1	22	2.2	16	(G)
Crankcase	Screw	M 6	1	12	1.2	8.7	
Stator	Screw	M 6	3	7	0.7	5.1	(G)
Stator assembly sensor	Screw	M 5	2	4	0.4	2.9	(G)
Ignition coil	Screw	M 6	2	10	1.0	7.2	
Neutral switch	Screw	M 6	2	4	0.4	2.9	
Starter motor	Flange bolt	M 6	2	10	1.0	7.2	
Thermo switch	—	M 6	1	28	2.8	20	
Thermo switch housing	—	PT 1/8	1	15	1.5	11	
Other engine part	Flange bolt	M 6	—	10	1.0	7.2	
	Screw	M 6	—	7	0.7	5	
	Flange bolt	M 8	—	20	2.0	14	

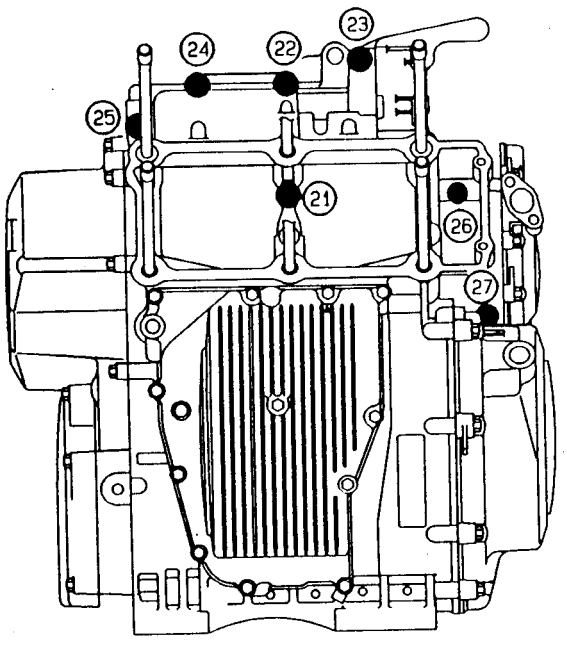
Model	XTZ750

Lubrication Chart:

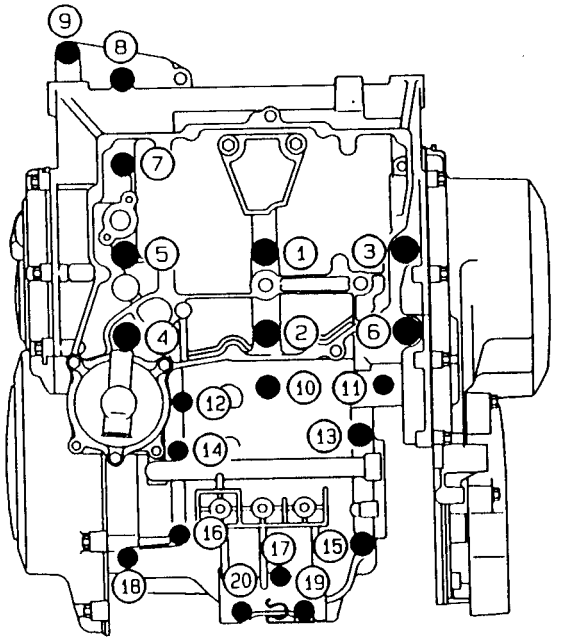


Crankcase Tightening Sequence:

Crankcase (Upper)

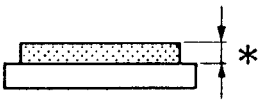
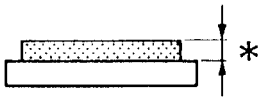


Crankcase (Lower)



CHASSIS

Model		XTZ750
Steering System:		
Steering Bearing Type		Taper Roller Bearing
Front Suspension:		
Front Fork Travel		235 mm (9.25 in)
Front Spring Free Length		544.5 mm (21.4 in)
<Limit>		<517 mm (20.4 in)>
Spring Rate:	K1	4.5 N/mm (0.45 kg/mm, 25.2 lb/in)
Stroke	K1	0.0 ~ 235 mm (0.0 ~ 9.25 in)
Optional Spring		No
Oil Capacity		669 cm^3 (23.5 Imp oz, 22.6 US oz)
Oil Level		130 mm (5.12 in) From top of inner tube fully compressed without spring.
Oil Grade		Fork oil 10W or equivalent
Enclosed Air Pressure:		
Standard		100 kPa (1 kg/cm^2, 14.2 psi)
Rear Suspension:		
Shock Absorber Travel		82 mm (3.23 in)
Spring Free Length		240 mm (9.45 in)
Fitting Length		457 mm (18 in)
Spring Rate	K1	140 N/mm (14.0 kg/mm, 784 lb/in)
Stroke	K1	0.0 ~ 82.0 mm (0.0 ~ 3.2 in)
Optional Spring		No
Enclosed Gas Pressure:		
Standard		2,000 kPa (20 kg/cm^2, 284 psi)
Swingarm:		
Free Play Limit		1.0 mm (0.039 in) at swingarm end Move swingarm end side to side
Side Clearance		0.3 mm (0.012 in) at swingarm pivot
Front Wheel:		
Type		Spoke wheel
Rim Size		1.85 × 21
Rim Material		Aluminum
Rim Runout Limit	Radial	1.0 mm (0.039 in)
	Lateral	0.5 mm (0.020 in)
Rear Wheel:		
Type		Spoke wheel
Rim Size		MT3.00 × 17
Rim Material		Aluminum
Rim Runout Limit	Radial	1.0 mm (0.039 in)
	Lateral	0.5 mm (0.020 in)
Drive Chain:		
Type/Manufacturer		520VL2/DAIDO
No. of Links		112
Chain Free Play		25 ~ 35 mm (0.98 ~ 1.38 in)

Model	XTZ750
Front Disc Brake:	
Type	Dual
Disc Outside Diameter × Thickness	245 × 4 mm (9.65 × 0.16 in)
Pad Thickness Inner	5.2 mm (0.21 in)
<Limit> *	<1.5 mm (0.06 in)>
Pad Thickness Outer	5.2 mm (0.21 in)
<Limit> *	<1.5 mm (0.06 in)>
	
Master Cylinder Inside Diameter	14 mm (0.55 in)
Caliper Cylinder Inside Diameter	27 mm (1.06 in)
Brake Fluid Type	DOT #4 If DOT #4 is not available, DOT #3 can be used
Rear Disc Brake:	
Type	Single
Disc Outside Diameter × Thickness	245 × 5 mm (9.65 × 0.20 in)
Pad Thickness Inner	5.2 mm (0.21 in)
<Limit> *	<1.5 mm (0.06 in)>
Pad Thickness Outer	5.2 mm (0.21 in)
<Limit> *	<1.5 mm (0.06 in)>
	
Master Cylinder Inside Diameter	14 mm (0.55 in)
Caliper Cylinder Inside Diameter	2, mm (1.06 in)
Brake Fluid Type	DOT #4
Brake Lever and Brake Pedal:	
Brake Lever Free Play	2 ~ 5 mm (0.08 ~ 0.20 in) At brake lever end.
Brake Pedal Position	5 ~ 25 mm (0.20 ~ 0.98 in) Below top of footrest.

TIGHTENING TORQUE

Part to be tightened	Thread size	Tightening torque			Remarks
		Nm	m•kg	ft•lb	
Handle crown and inner tube	M 8	23	2.3	17	
Handle crown and steering shaft	M14	80	8.0	58	
Handlebar holder (upper) and handlebar holder (under)	M 8	20	2.0	14	
Steering shaft and ring nut	M25	5.5	0.55	4	See Note
Cowling stay and frame	M 8	15	1.5	11	
Cowling stay and cowling (front)	M 6	7	0.7	5.1	
Cowling stay and ignitor unit	M 6	7	0.7	5.1	
Frame and rectifier/regulator	M 6	7	0.7	5.1	
Cowling stay and conduction unit	M 6	7	0.7	5.1	
Cowling stay and horn	M 6	7	0.7	5.1	
Cowling (front) and side cowling (left and right)	M 5	5	0.5	3.6	
Side cowling (left and right) and fuel tank	M 5	5	0.5	3.6	
Under bracket and joint	M 6	7	0.7	5.1	
Front master cylinder and master cylinder cap	M 4	1.5	0.15	1	
Speedometer and cowling stay	M 6	7	0.7	5.1	
Handle crown and main switch	M 6	7	0.7	5.1	
Handlebar holder (under) and nut	M10	27	2.7	19	
Engine mounting and frame	M10	58	5.8	42	
Frame and down tube (front)	M 8	23	2.3	17	
Frame and down tube (rear-left)	M10	32	3.2	23	
Frame and down tube (rear-right)	M 8	23	2.3	17	
Engine protector and frame	M 6	7	0.7	5.1	
Pivot shaft and frame	M16	90	9.0	65	
Swingarm and relay arm	M14	50	5.0	36	
Relay arm and connecting rod	M14	50	5.0	36	
Connecting rod and rear arm	M14	50	5.0	36	
Rear shock absorber and frame	M10	35	3.5	25	
Rear shock absorber and relay arm	M10	35	3.5	25	
Chain tensioner	M 8	23	2.3	17	
Chain case and swingarm	M 6	4	0.4	2.9	
Chain protector and swingarm	M 6	7	0.7	5.1	
Chain guide and swingarm	M 6	7	0.7	5.1	
Fuel tank bracket and fuel tank	M 6	7	0.7	5.1	
Fuel tank bracket and frame	M 8	15	1.5	11	
Fuel tank and frame	M 6	7	0.7	5.1	
Fuel pump and frame	M 6	7	0.7	5.1	
Ignition coil and frame	M 6	7	0.7	5.1	
Rear carrier (front) and frame	M 8	20	2.0	14	
Rear carrier (rear) and frame	M 6	10	1.0	7.2	
Rear side cover and rear carrier	M 5	4	0.4	2.9	
Rear carrier and flasher bracket	M 6	7	0.7	5.1	
Helmet holder and flasher bracket	M 6	7	0.7	5.1	
Seat and frame	M 6	7	0.7	5.1	
Fuel cock and fuel tank	M 6	5	0.5	3.6	
Frame and battery box	M 6	7	0.7	5.1	

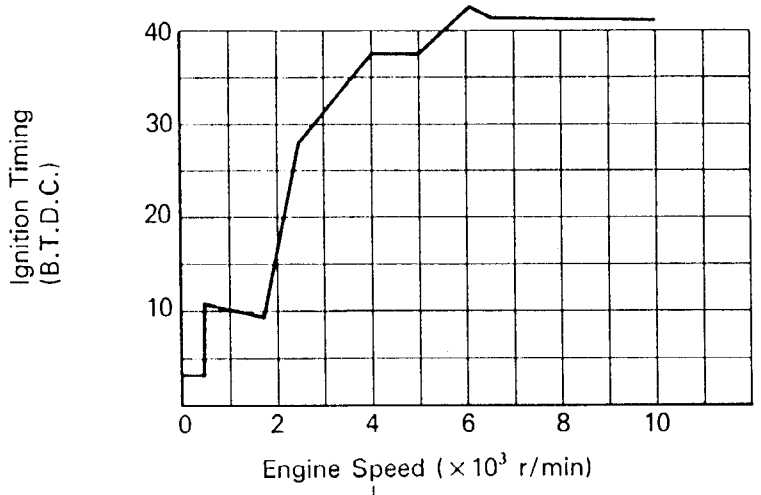
Part to be tightened	Thread size	Tightening torque			Remarks
		Nm	m•kg	ft•lb	
Mud guard and frame	M 6	7	0.7	5.1	
Oil tank and frame	M 6	7	0.7	5.1	
Side cover and frame	M 6	4	0.4	2.9	
Recovery tank and frame	M 6	6	0.6	4.3	
License bracket and frame	M 8	8	0.8	5.8	
License bracket and tail/brake light	M 6	7	0.7	5.1	
Rear reflector and stay	M 5	4	0.4	2.9	
License bracket number plate stay	M 6	4	0.4	2.9	
Front wheel axle and nut	M14	100	10.0	72	
Rear wheel axle and nut	M16	90	9.0	6.5	
Brake caliper (front) and front fork	M10	35	3.5	25	
Brake caliper (rear) and bracket	M10	35	3.5	25	
Sidestand and frame	M10	40	4.0	29	
Footrest bracket and frame	M10	45	4.5	32	
Footrest (for passenger) and frame	M 8	20	2.0	14	
Master cylinder (rear brake) and frame	M 8	20	2.0	14	
Reservoir tank (rear brake) and frame	M 6	4	0.4	2.9	
Sidestand switch and frame	M 5	4	0.4	2.9	
Brake hose (union bolt)	M10	25	2.5	18	
Brake hose and brake hose holder	M10	18	1.8	13	

NOTE:

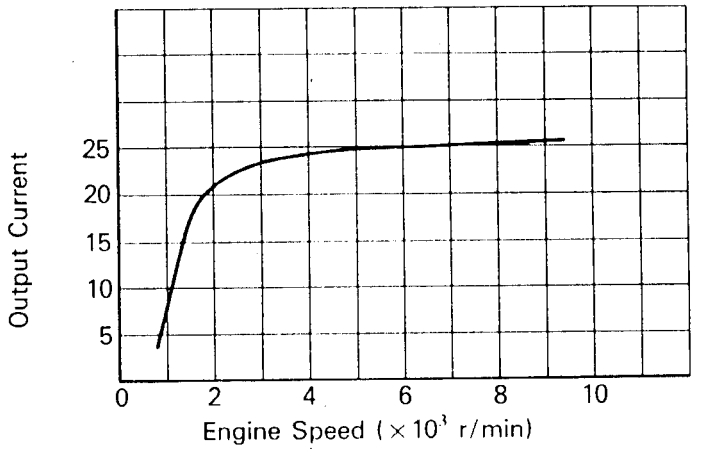
1. First, tighten the ring nut approximately 38 Nm (3.8 m•kg, 27 ft•lb) by using the torque wrench, then loosen the ring nut one turn.
2. Retighten the ring nut to specification.

ELECTRICAL

Model	XTZ750
Voltage	12V
Ignition System:	
Ignition Timing (B.T.D.C.)	10° at 1,150 r/min
Advanced Timing (B.T.D.C.)	43° at 6,000 r/min
Advancer Type	Electrical type



T.C.I.:	
Pickup Coil Resistance	184 ~ 276Ω at 20°C (68°F)
(Color)	(Blue/Yellow – Green/White)
T.C.I. Unit/Manufacturer	TNDF06/NIPPON DENSO
Ignition Coil:	
Model/Manufacturer	JO246/NIPPON DENSO
Minimum Spark Gap	6 mm (0.24 in)
Primary Winding Resistance	2.38 ~ 3.22Ω at 20°C (68°F)
Secondary Winding Resistance	12 ~ 18 kΩ at 20°C (68°F)
Spark Plug Cap:	
Type	Resin type
Resistance	10 kΩ at 20°C (68°F)
Charging System:	
Type	A.C. magneto generator

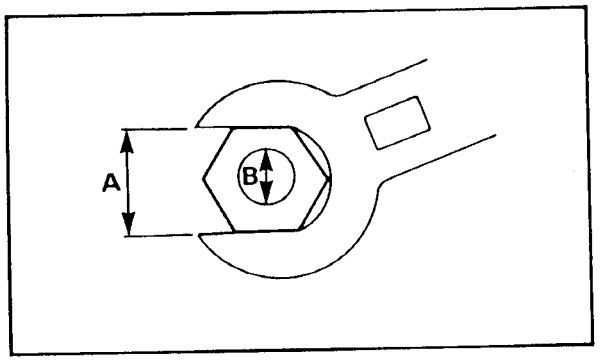
Model	XTZ750
A.C. Generator:	
Model/Manufacturer	TLNZ29/NIPPON DENSO
Nominal Output	14V 25A at 5,000 r/min
	
Stator Coil Resistance	0.20 ~ 0.30Ω at 20°C (68°F) (White—White)
Rectifier/Regulator:	
Model/Manufacturer	SH569/SINDENGEN
Type	Semi conductor—Short circuit type
Voltage Regulator	
No load Regulated Voltage	14.3 ~ 15.3V
Rectifier	
Capacity	25A
Withstand Voltage	240V
Battery:	
Specific Gravity	1.280
Electrical Starter System:	
Type	Constant mesh type
Starter Motor:	
Model/Manufacturer	SM-13/MITSUBA
Output	0.8 kW
Brush—Overall Length	12.5 mm (0.49 in)
<Limit>	<5 mm (0.20 in)>
Commutator Dia.	28.0 mm (1.10 in)
Wear Limit	27.0 mm (1.06 in)
Mica Undercut	0.7 mm (0.028 in)
Starter Relay:	
Model/Manufacturer	MS5D-191/HITACHI
Amperage Rating	100A
Horn:	
Type/Quantity	Plane type/1 pc.
Model/Manufacturer	YF-12/NIKKO
Maximum Amperage	2.5A

Model	XTZ750
Flasher Relay (Relay Assembly):	
Type	Condenser type
Model/Manufacturer	FZ249SD/NIPPON DENSO
Self Cancelling Device	No
Flasher Frequency	60 ~ 120 cyl/min
Wattage	21W × 4 + 3.4W
Starting Circuit Cut-Off Relay:	
Model/Manufacturer	G8MS/OMRON
Coil Winding Resistance	90 ~ 110Ω
Diode	Yes
Headlight Relay (F):	
Model/Manufacturer	ACA1211-9/MATUSHITA
Coil Winding Resistance	72 ~ 88Ω
Diode	No
Electric Fan:	
Model/Manufacturer	NAAF48/NIPPON DENSO
Thermostat Switch:	
Model/Manufacturer	VF105A/N. THERMOSTAT
Function Temperature	102 ~ 108°C (215.6 ~ 226.4°F): ON 98°C (208.4°F): OFF
Thermo Unit:	
Model/Manufacturer	11H/NIPPON SEIKI
Coil Winding Resistance	153.9Ω at 50°C (122°F) 47.5 ~ 52.8Ω at 80°C (176°F) 26.2 ~ 29.3Ω at 100°C (212°F) 16.1Ω at 120°C (248°F)
Circuit Breaker:	
Type	Fuse
Amperage for Individual Circuit × Quantity:	
MAIN	30A/1 pc.
RESERVE	30A/1 pc.

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	6.1
22 mm	16 mm	130	13.0	94



A: Distance across flats
B: Outside thread diameter

DEFINITION OF UNITS

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

LUBRICATION POINT AND GRADE OF LUBRICANT

ENGINE

Lubrication Point	Lubricant Type
Oil seal lips	(LS)
O-ring	(LS)
Bearing	(E)
Piston surface	(E)
Piston pin	(E)
Connecting rod bolt	(M)
Crankshaft journal	(E)
Balancer (Bearing/shaft)	(E)
Camshaft cam lobe/journal	(M)
Valve stem (IN. EX.)	(M)
Valve stem end	(E)
Water pump impeller shaft	(E)
Oil pump rotor (Inner/outer) shaft	(E)
Oil strainer assembly	(E)
Crankcase cover (Push rod)	(M)
Idle gear surface	(E)
Starter clutch ball	(E)
Primary driver gear	(E)
Transmission gear (Wheel/pinion)	(M)
Axle (Main/drive)	(M)
Shift cam	(E)
Shift fork/guide bar	(E)
Shift shaft assembly	(E)
Shift boss (Inner)	(LS)
Matching surface (Cylinder head and cylinder head cover)	Yamaha Bond No. 1215
Crankcase matching surface	Yamaha Bond No. 1215

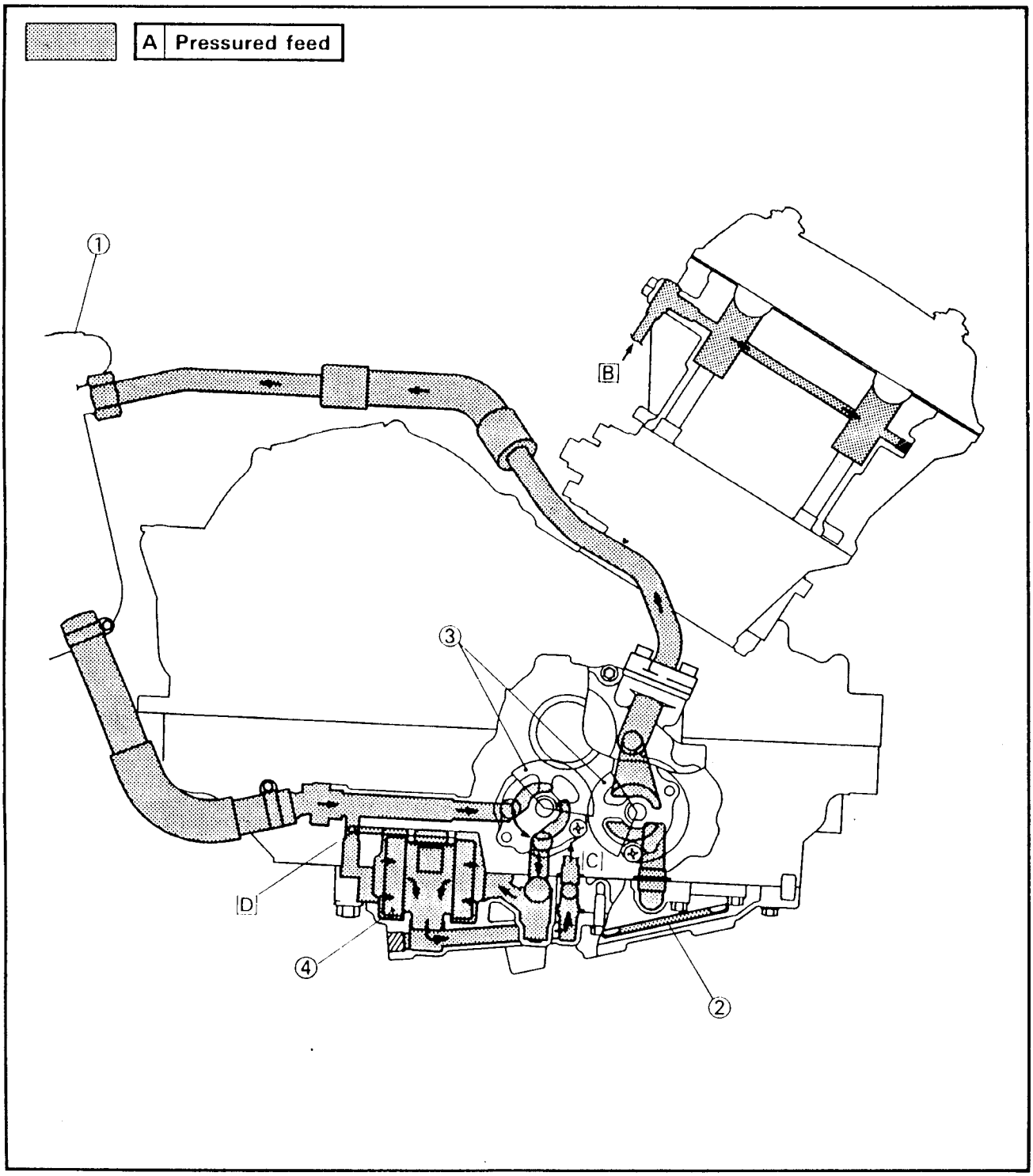
CHASSIS

Lubrication Point	Lubricant Type
Gear unit (Speedometer)	B
Front wheel oil seal lips	LS
Rear wheel oil seal lips	LS
Bush (Swingarm) and thrust cover	LS
Oil seal lips (Swingarm) and bearing	LS
Pivot shaft (Swingarm)	LS
Bearing (Relay arm and rear shock absorber)	B
Bearing (Relay arm and frame)	B
Bearing (Relay arm and connecting rod)	B
Bearing (Connecting rod and swingarm)	B
Brake pedal shaft	LS
Bearing (Steering head)	B
Tube guide (Throttle grip) inner surface	LS
Brake lever, sliding surface	LS
Clutch lever, sliding surface	LS
Clutch cable end	LS
Side stand bolt, sliding surface	LS
Bush (Chain tensioner)	LS
Grease nipple (Swingarm)	LS
Grease nipple (Relay arm)	LS
Grease nipple (Relay arm and connecting rod)	LS
Grease nipple (Connecting rod and swingarm)	LS
Brake pedal and rear master cylinder	LS

LUBRICATION DIAGRAM

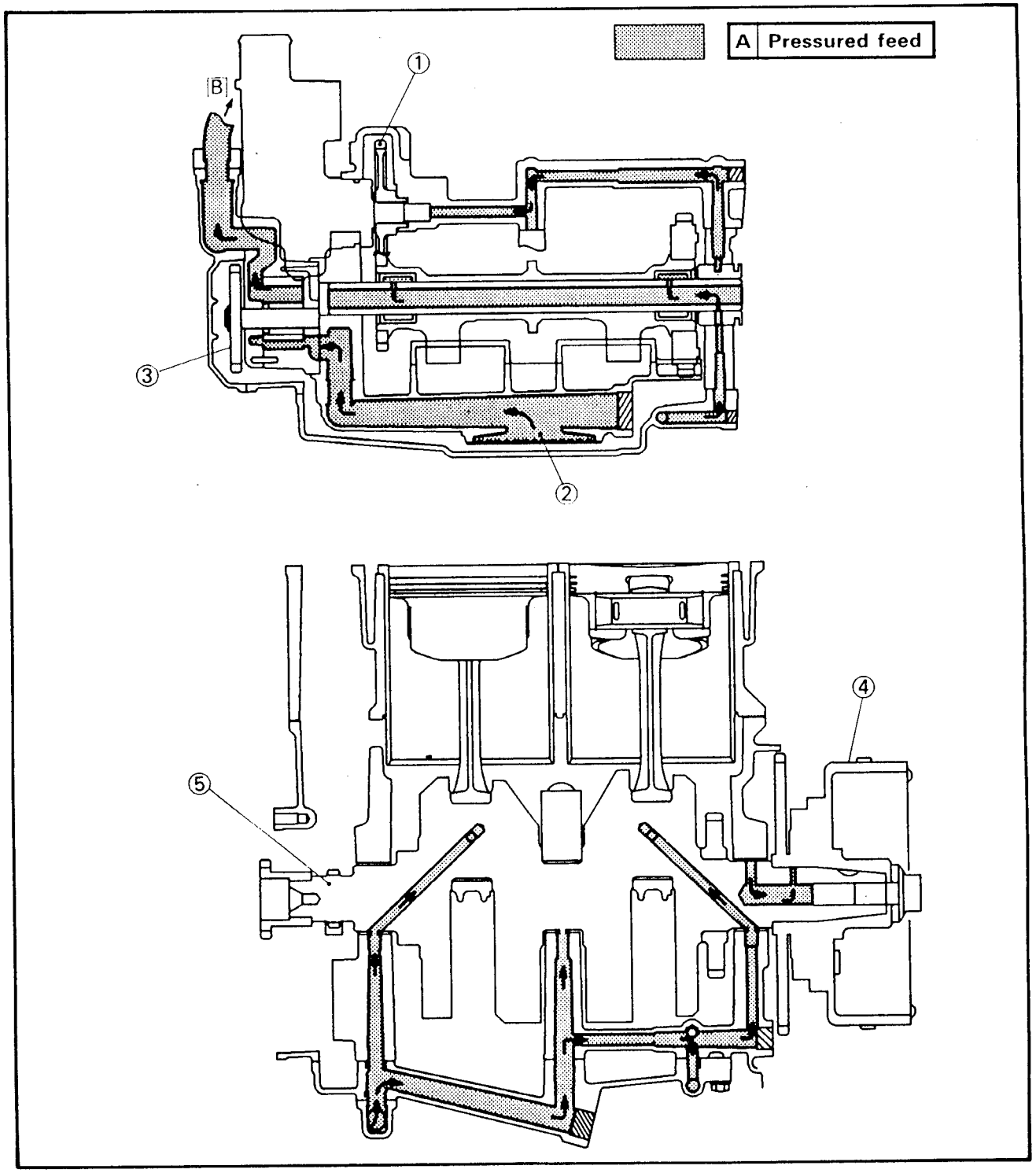
① Oil tank
② Oil strainer
③ Oil pump
④ Oil cleaner

[B] From crankcase
[C] To crankshaft
[D] To transmission



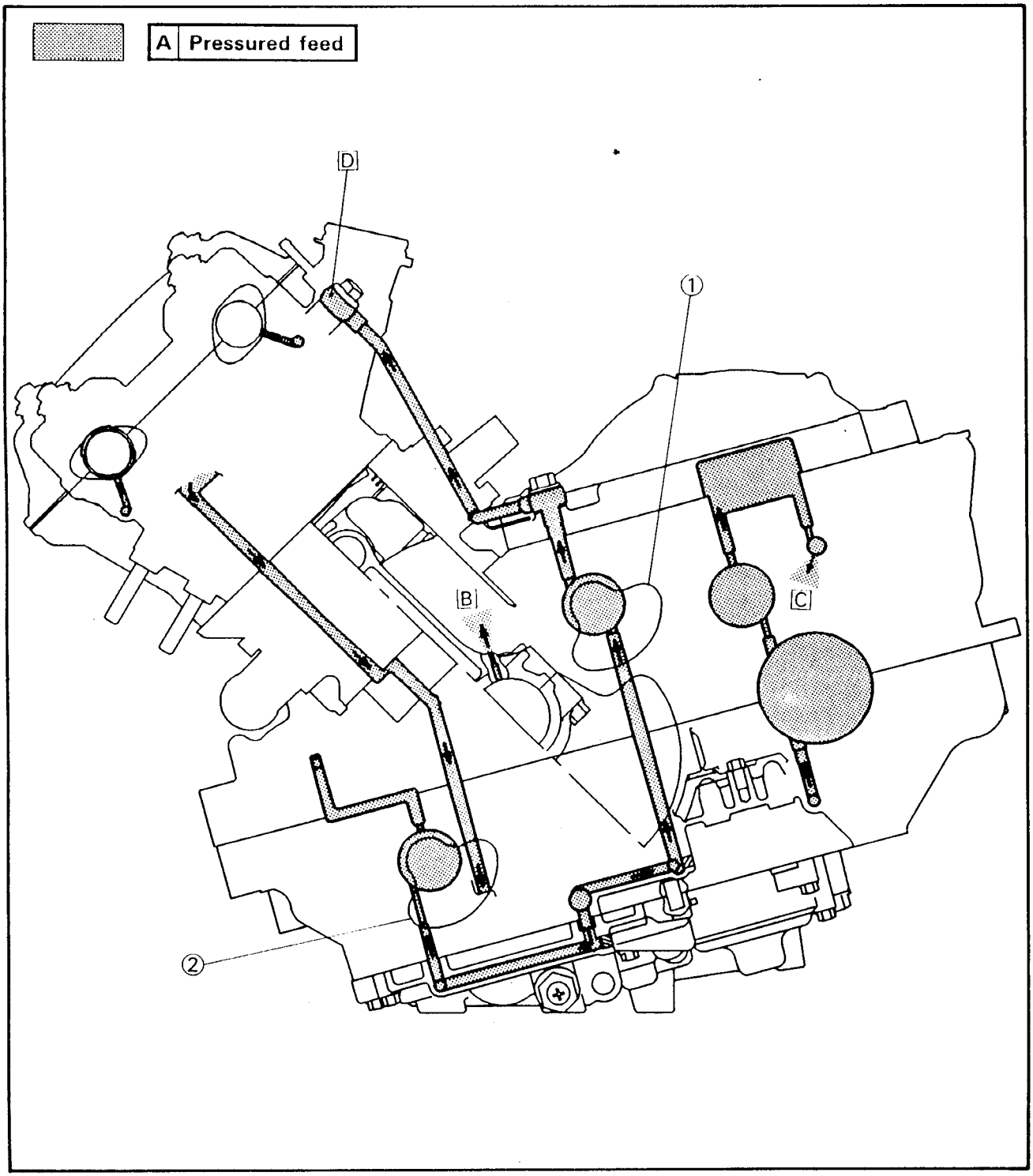
① Balancer
② Oil strainer
③ Oil pump
④ Rotor
⑤ Crankshaft

[B] To oil tank



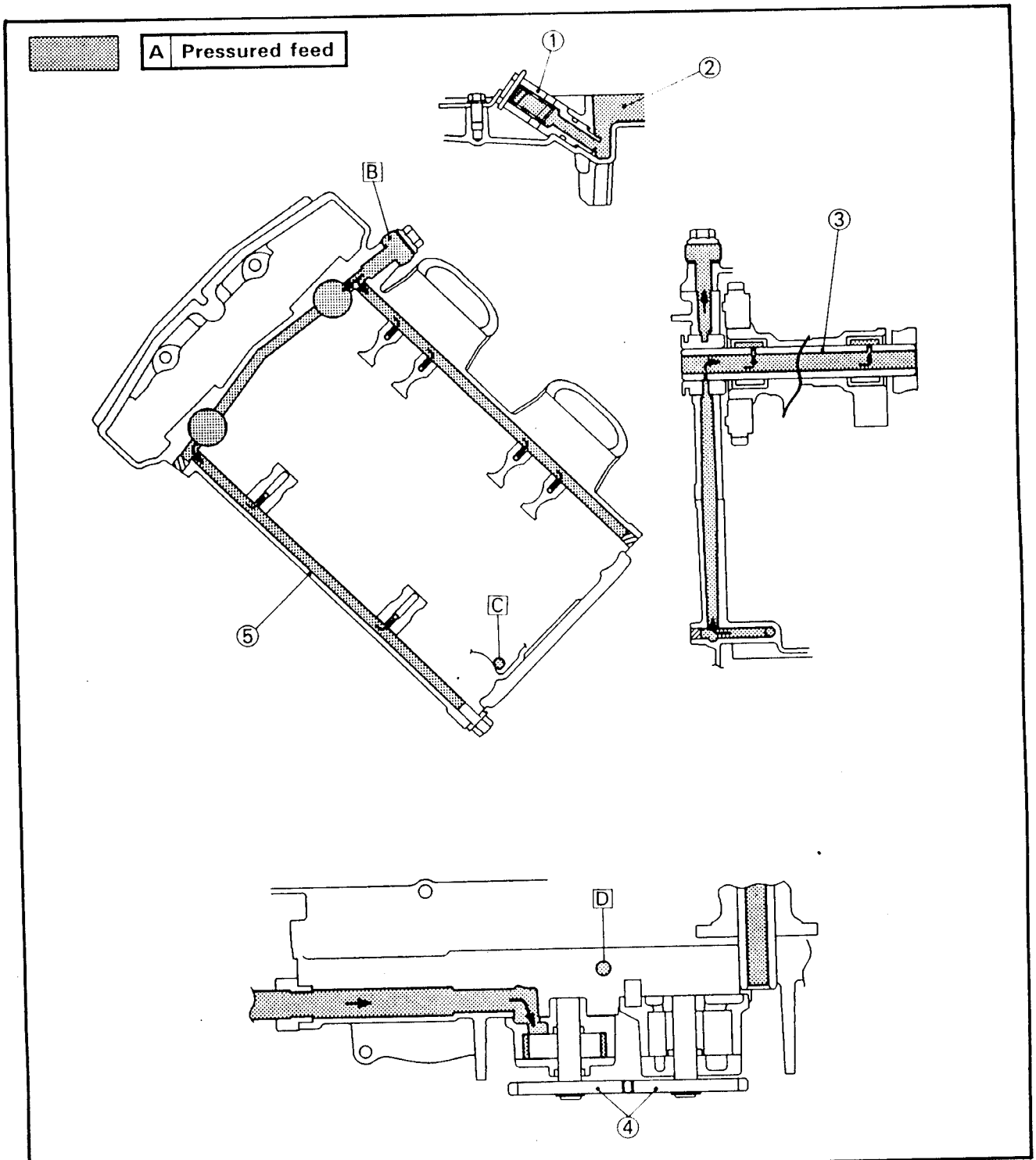
① Rear balancer
② Front balancer

[B] To piston
[C] To shift fork shaft
[D] To cylinder head



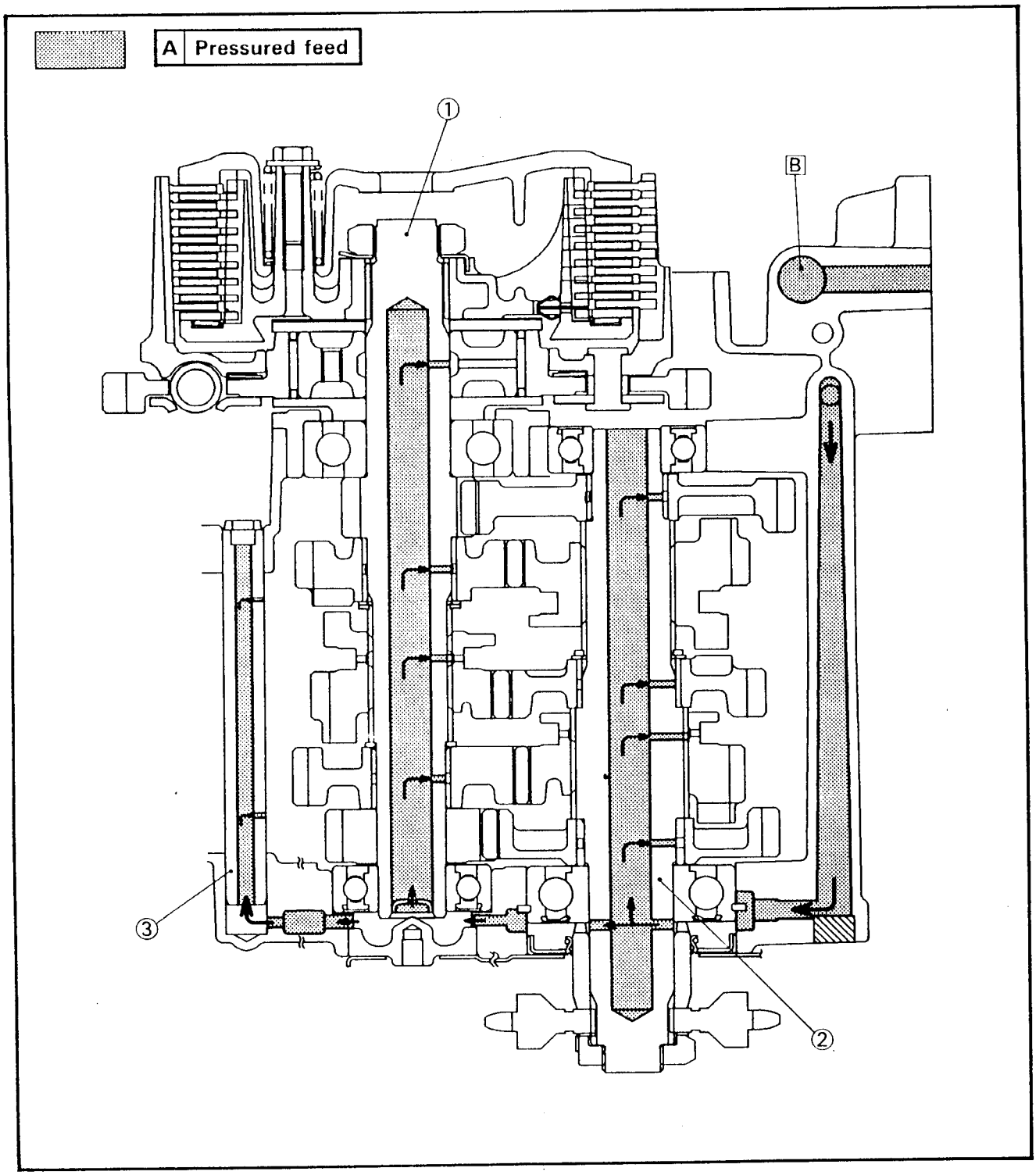
① Relief valve
② Oil pan
③ Balancer shaft
④ Oil pump
⑤ Cylinder head

[B] From crankcase
[C] To crankcase
[D] To crankshaft



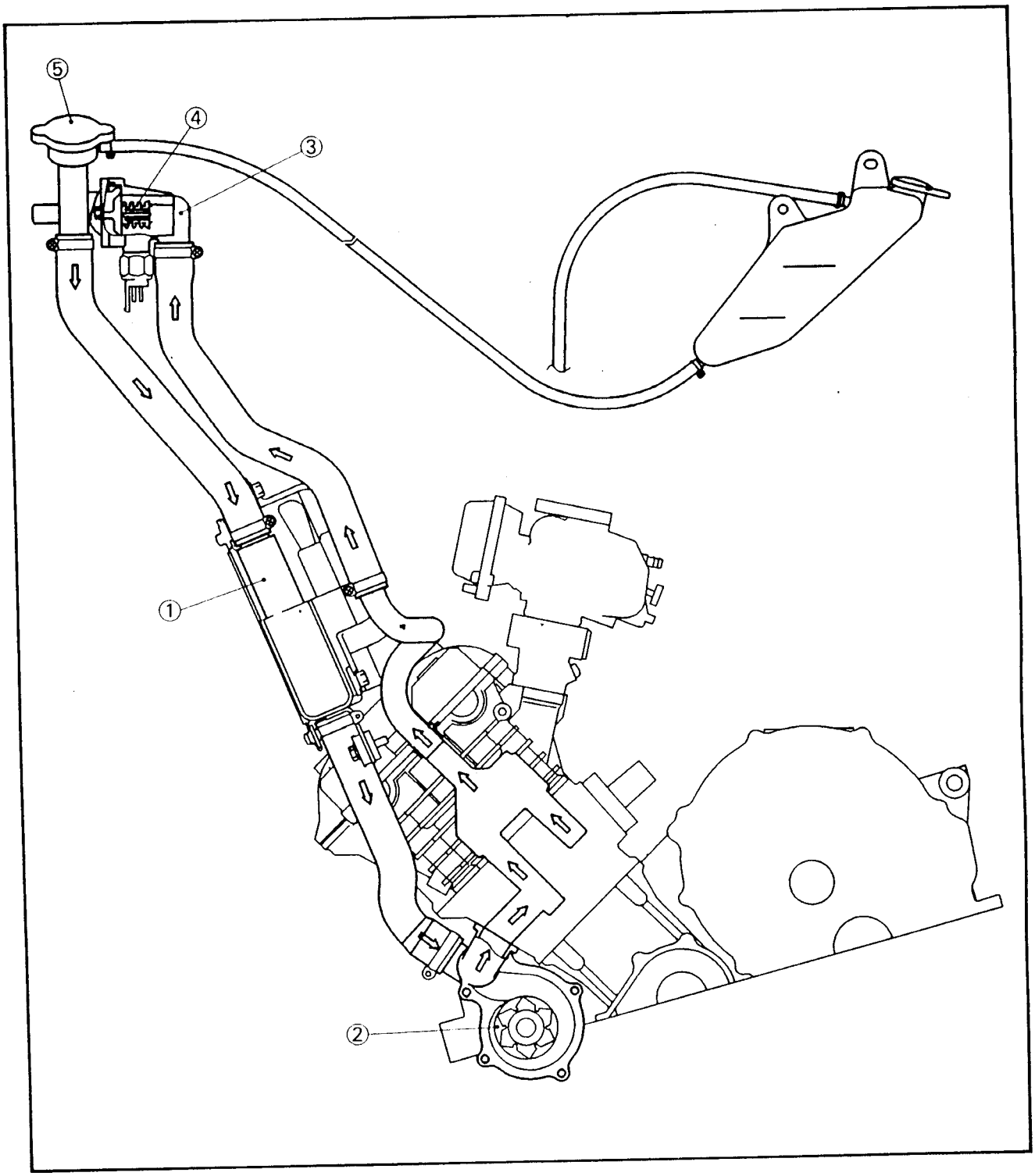
① Main axle
② Drive axle
③ Shift fork shaft

[B] From drain bolt



COOLANT DIAGRAM

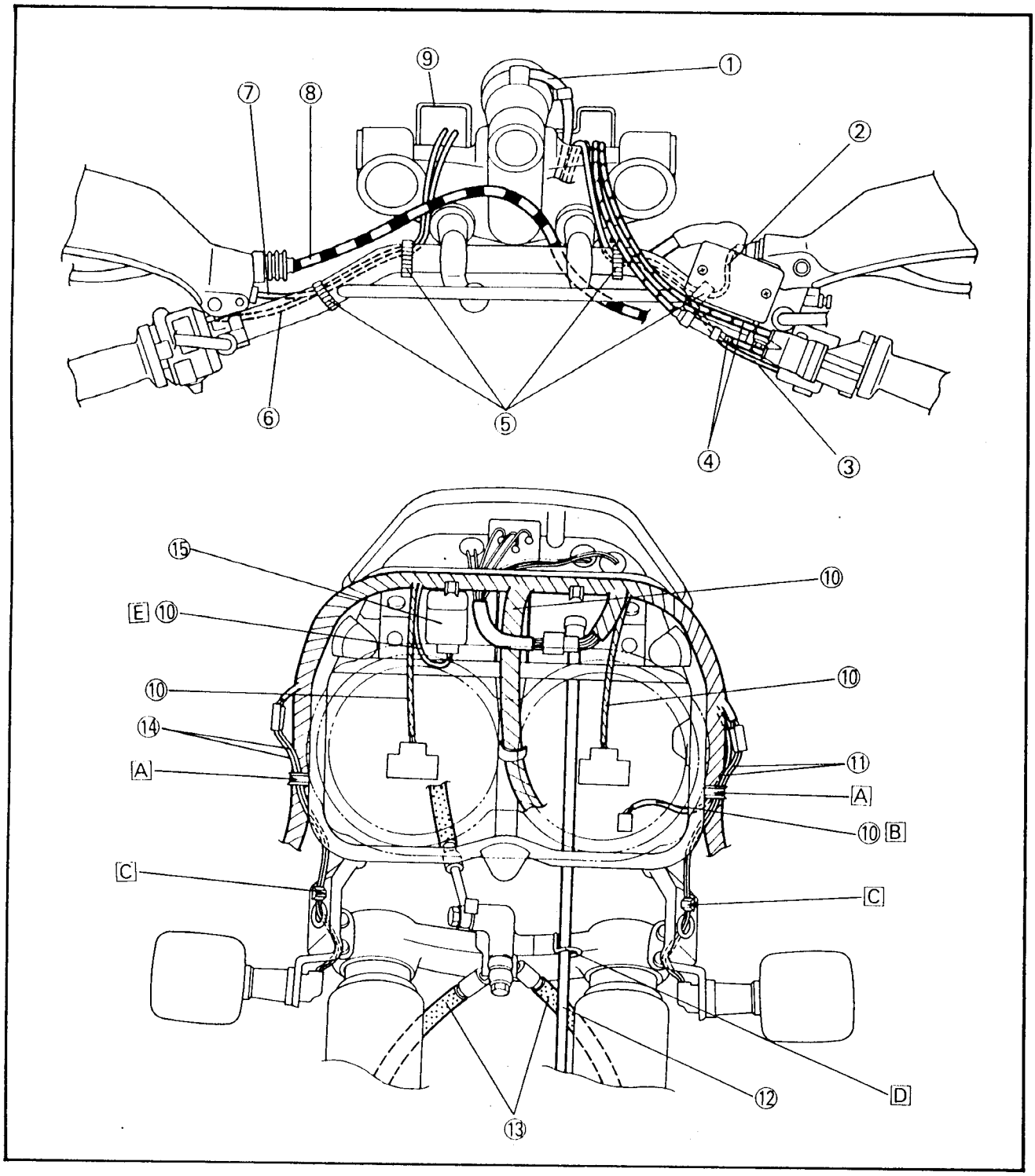
① Radiator
② Water pump
③ Thermostat housing
④ Thermostat
⑤ Radiator cap



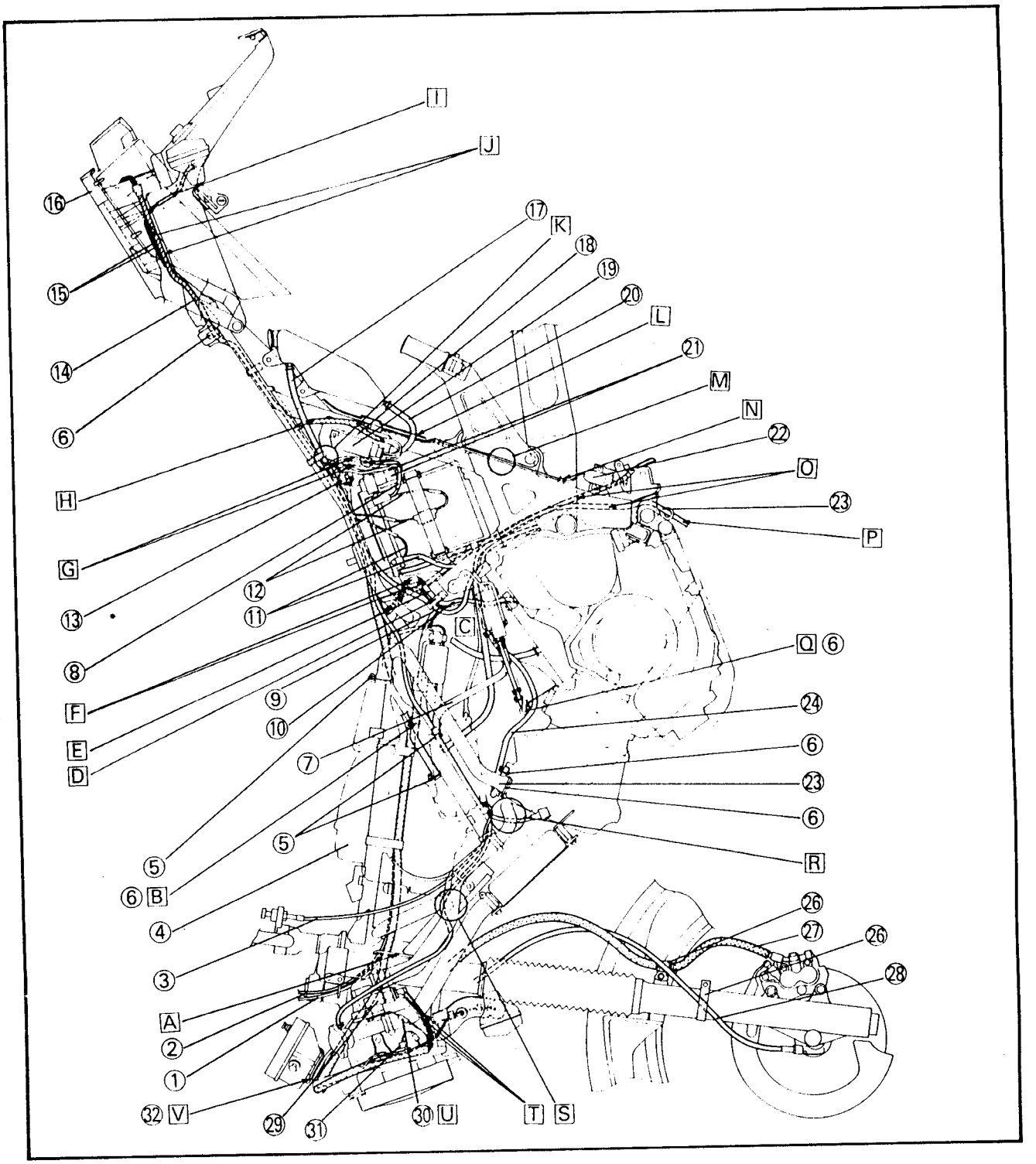
CABLE ROUTING

① Main switch lead
② Front brake switch lead
③ Handlebar switch lead (right)
④ Throttle cable
⑤ Band
⑥ Handlebar switch lead (left)
⑦ Clutch switch lead
⑧ Clutch cable
⑨ Guide
⑩ Headlight lead
⑪ Front flasher light lead (left)
⑫ Speedometer cable
⑬ Brake hose
⑭ Front flasher light lead (right)
⑮ Flasher relay

[A] Clamp the headlight lead and the front flasher light leads.
[B] To the auxiliary light.
[C] After clamping the front flasher light leads, pass them into the hole of the front flasher stay.
[D] Pass the speedometer cable through the guide.
[E] To the flasher relay.

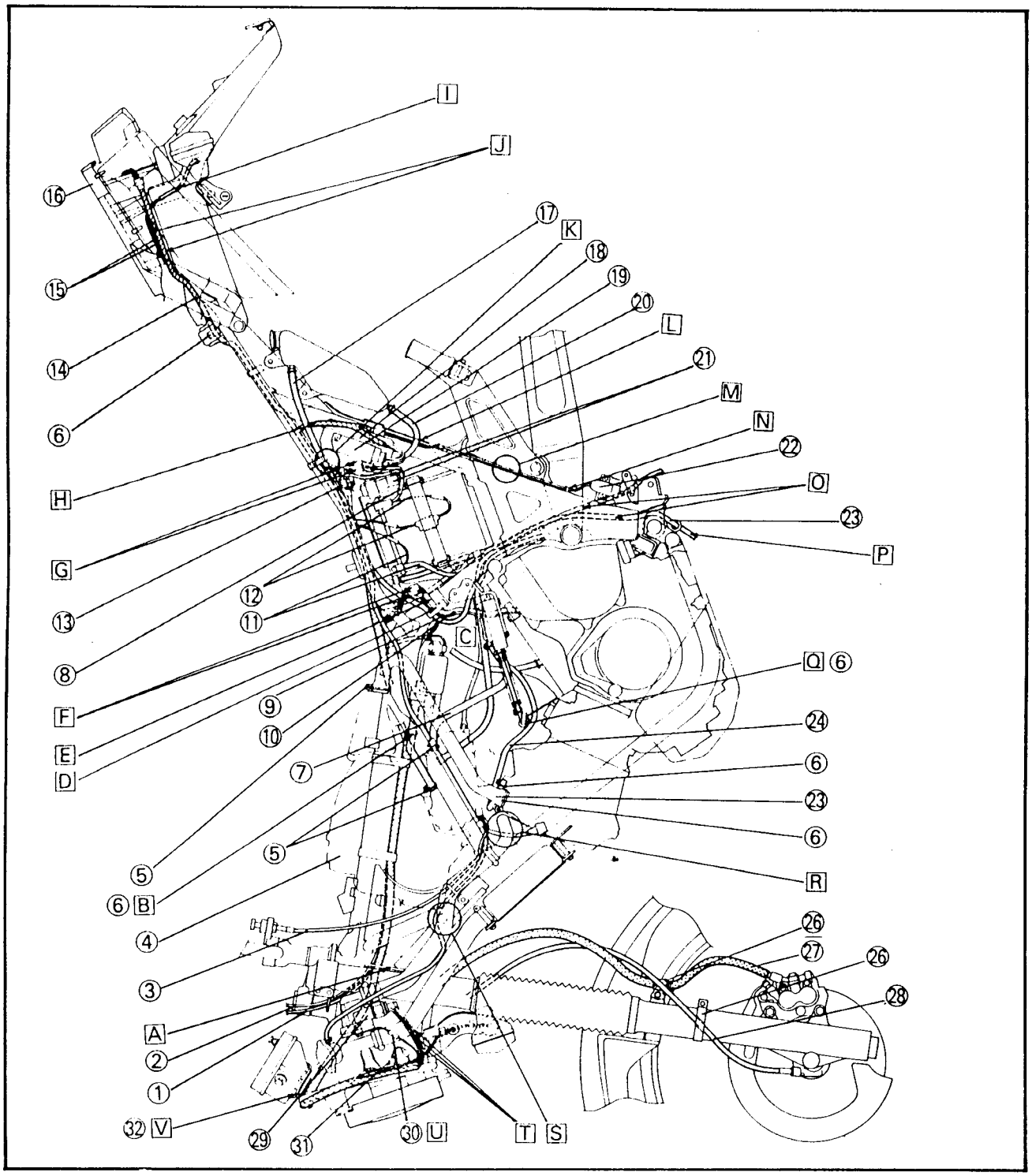


① Handlebar switch lead (left)
② Clutch switch lead
③ Starter cable
④ Air cleaner
⑤ Clip
⑥ Clamp
⑦ Fuel hose
⑧ Starting circuit cut-off relay lead
⑨ Neutral switch lead
⑩ A.C. magneto lead
⑪ Battery negative lead
⑫ Battery positive lead
⑬ Starter relay lead
⑭ Wireharness
⑮ Rear flasher light lead
⑯ Rear carrier
⑰ Air ventilation hose
⑱ Regulator plate
⑲ Rectifier/regulator
⑳ Coolant reservoir tank hose
㉑ Starting circuit cut-off relay
㉒ Sidestand switch
㉓ Breather hose
㉔ Vacuum hose

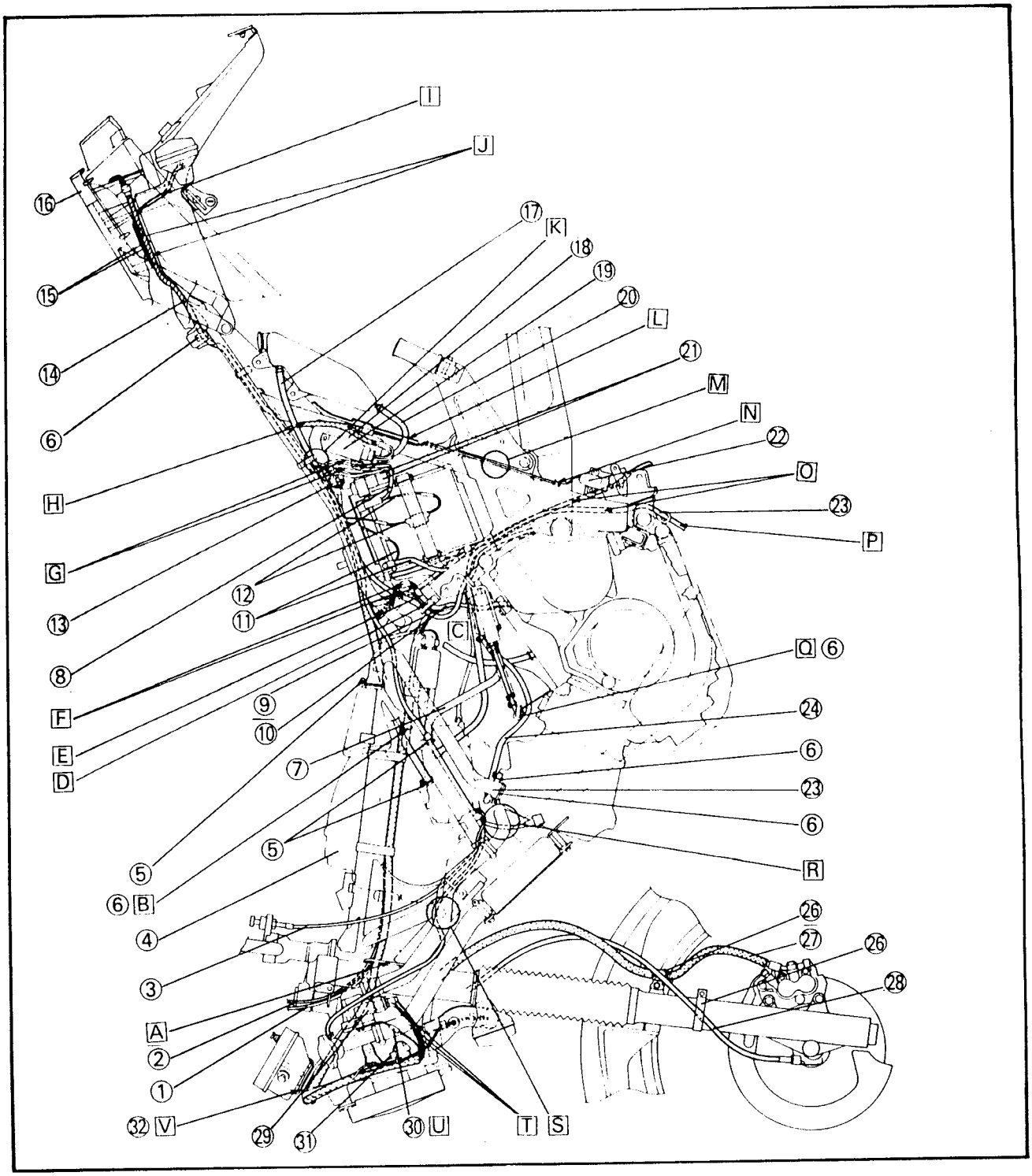


㉕ Spark plug lead
㉖ Holder
㉗ Brake hose
㉘ Speedometer cable
㉙ Thermo unit lead
㉚ Headlight lead
㉛ Auxiliary light
㉜ Meter light lead

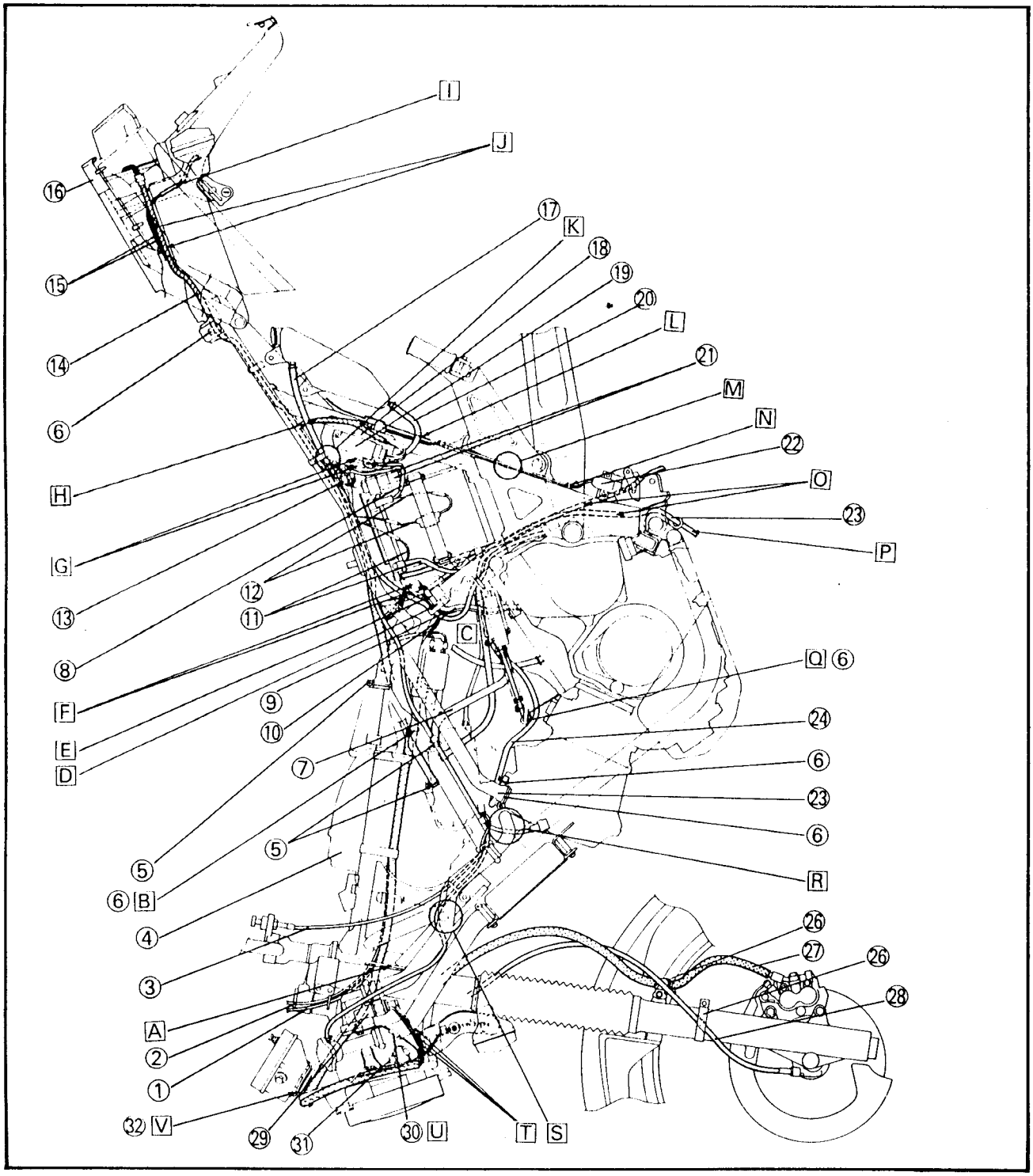
[A] Pass the wireharness through the guide.
[B] Clamp the air ventilation hoses.
[C] To oil tank.
[D] Clamp the starting motor lead, the neutral switch lead and A.C. magneto lead.
[E] Connect the neutral switch lead to the wireharness.
[F] Connect the A.C. magneto lead to the wireharness.
[G] Connect the wireharness to the starter relay.
[H] Pass the wireharness in front of the regulator plate.
[I] Pass the rear flasher light lead, start on the inside of the hole of the license bracket and pass on its outside, and connect it to the wireharness.



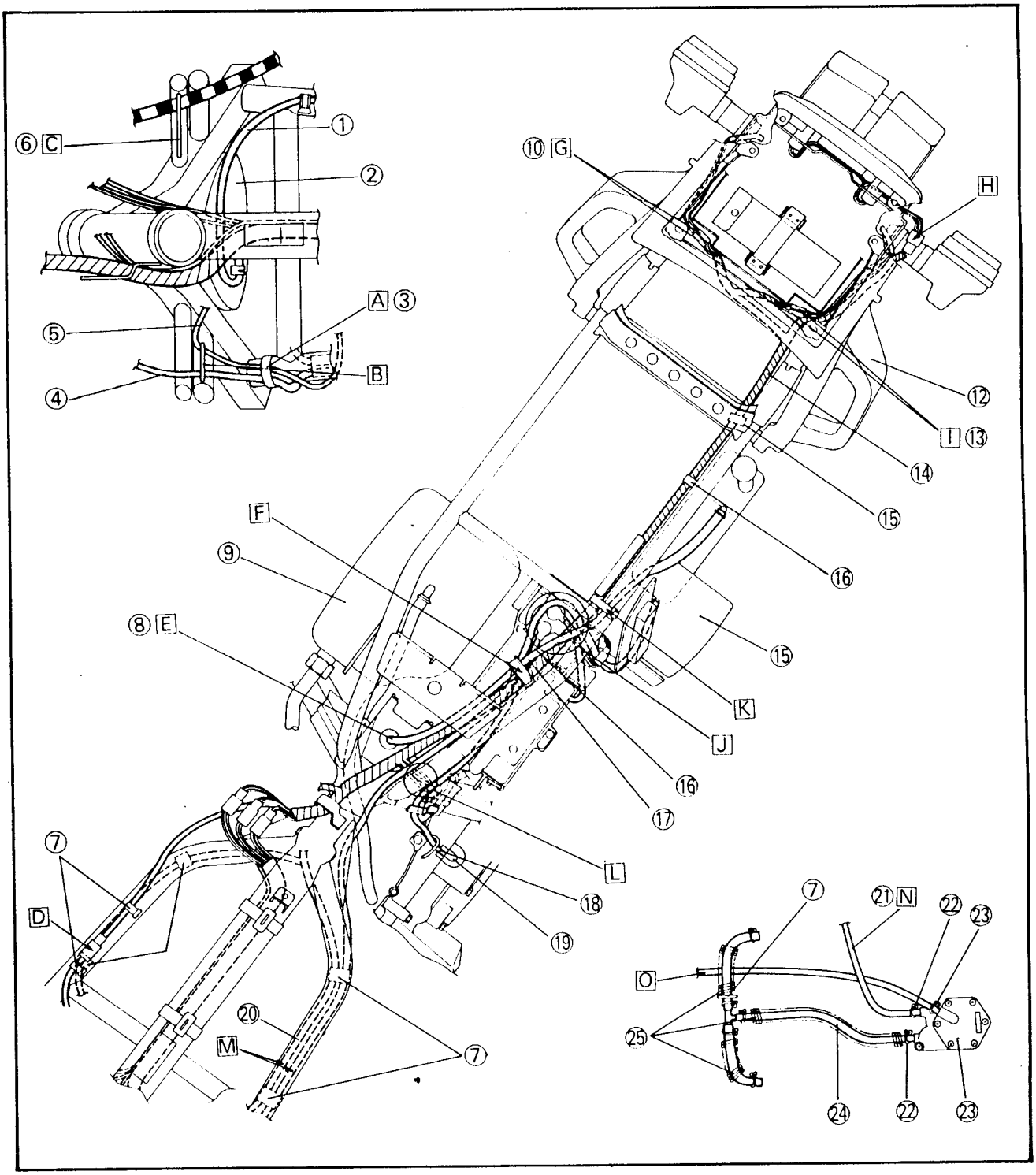
[J] Pass the wireharness and the rear flasher light leads (left and right) outside of the license bracket.
[K] Pass the air ventilation hose inside of the regulator plate and clamp it by band.
[L] Pass the coolant reservoir tank hose through the hole of the battery box.
[M] Do not pinch the sidestand switch lead with the rear footrest.
[N] Clamp the sidestand switch lead.
[O] Pass the breather hoses between the left side of the relay arm and in front of the swingarm.
[P] Pass the breather hose through the hole of the bracket (left side).
[Q] Pass the fuel hose through the clamp.
[R] Pass the spark plug lead over the regulator hose. Be sure both spark plug leads do not contact the cooling fan.



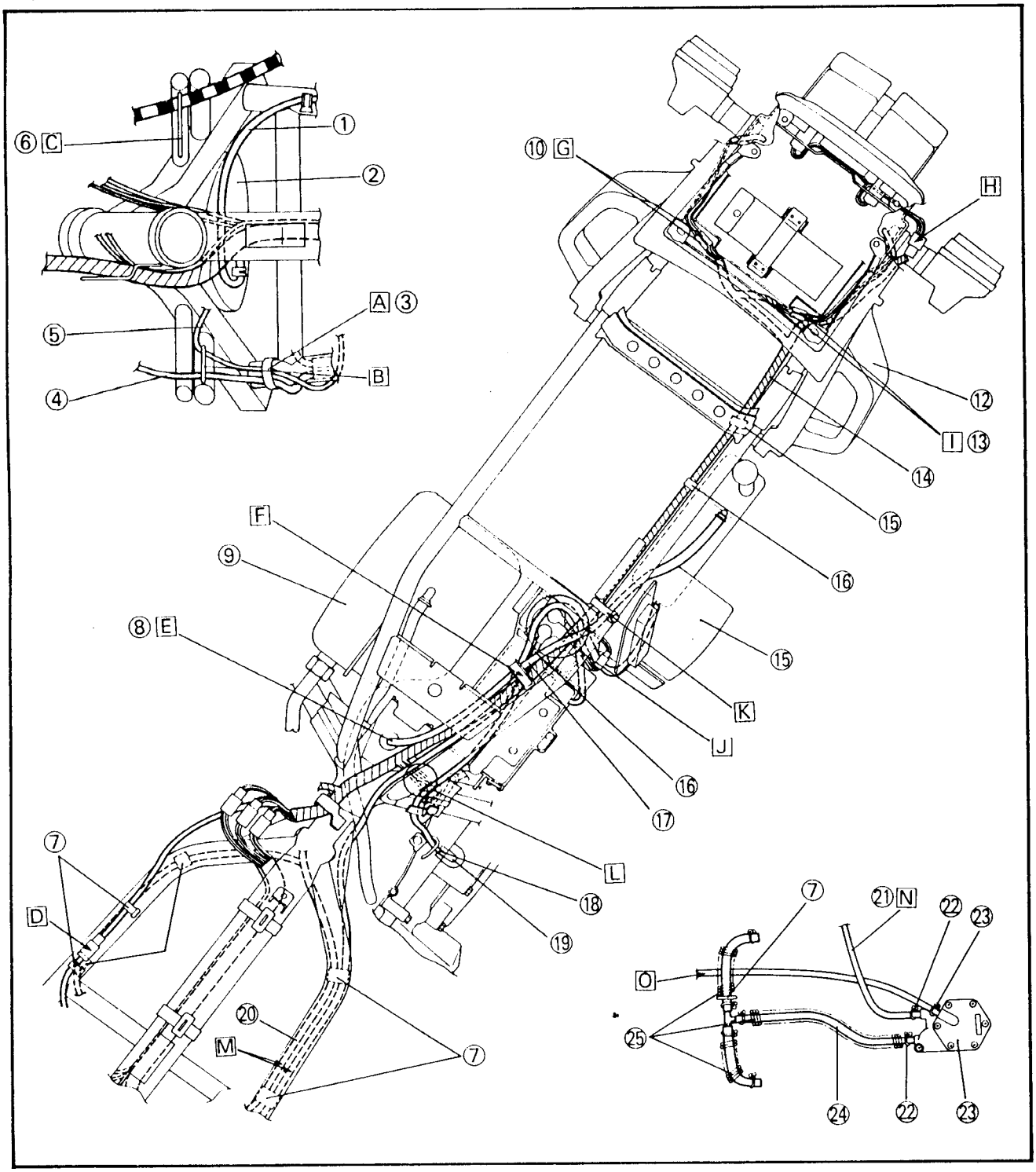
[S] Pass the coolant reservoir hose over the side cowling bracket.
[T] Pass the thermo unit leads outside of the regulator hose and then connect to the thermo unit.
[U] Connect the headlight lead and the thermo unit lead outside of the regulator hose.
[V] Pass the meter light lead outside of the meter.



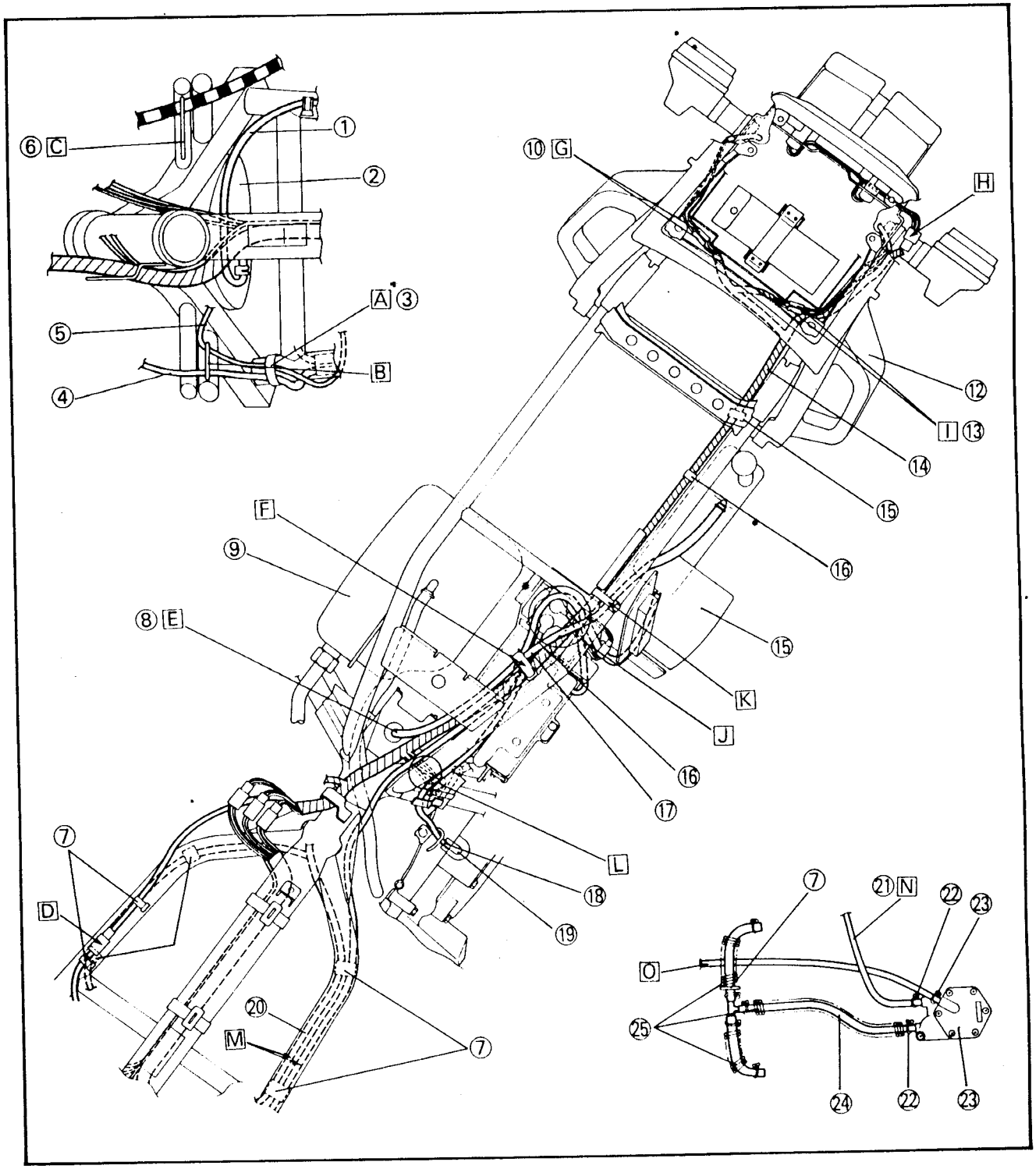
① Fan motor lead
② Cooling fan
③ Band
④ Coolant reservoir tank hose
⑤ Starter cable
⑥ Clutch cable
⑦ Clamp
⑧ Air ventilation hose
⑨ Oil tank
⑩ Rear flasher light lead (right)
⑪ Tail/brake light lead
⑫ Rear carrier
⑬ Rear flasher light lead (left)
⑭ Wireharness
⑮ Battery box
⑯ Starting motor lead
⑰ Air ventilation hose
⑱ Neutral switch lead
⑲ A.C. magneto lead
⑳ Spark plug lead
㉑ Fuel hose (from carburetor)
㉒ Clip
㉓ Fuel pump assembly
㉔ Fuel hose (from fuel tank)
㉕ Spring
㉖ Vacuum hose (from carburetor joint)



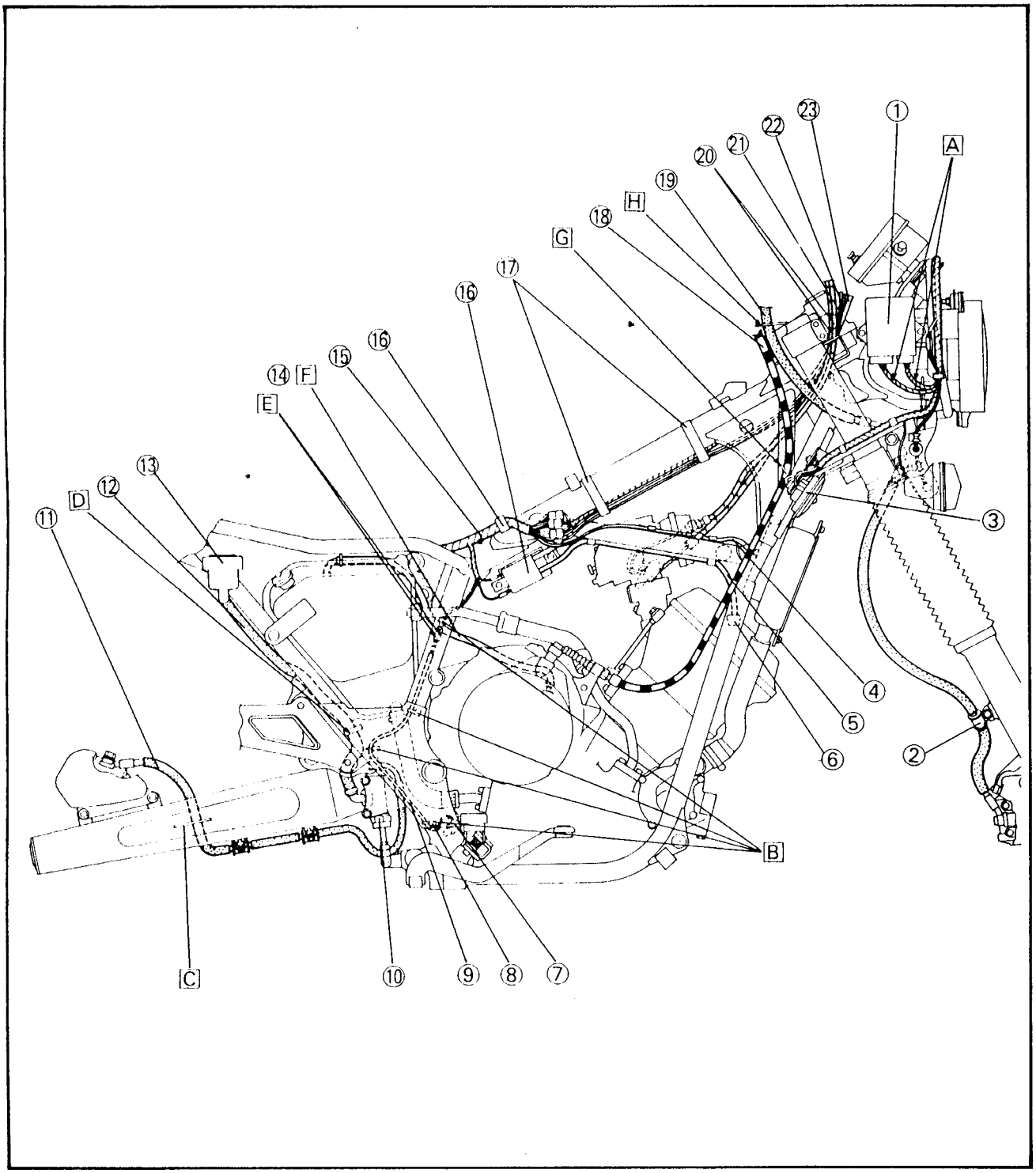
[A] Clamp the starter cable and reservoir tank hose in front of the cross pipe.
[B] Pass the coolant reservoir tank hose and starter cable through the guide.
[C] Pass the clutch cable through the guide.
[D] Clamp the fan motor leads over the frame.
[E] Pass the air ventilation hose through the hole of the bracket.
[F] Clamp the wireharness, air ventilation hose, coolant reservoir tank hose and starter motor lead with the former two on the upper side and the latter two on the lower side.
[G] Connect the rear flasher light lead (right) to the wireharness.
[H] Connect the tail/brake light lead to the wireharness.



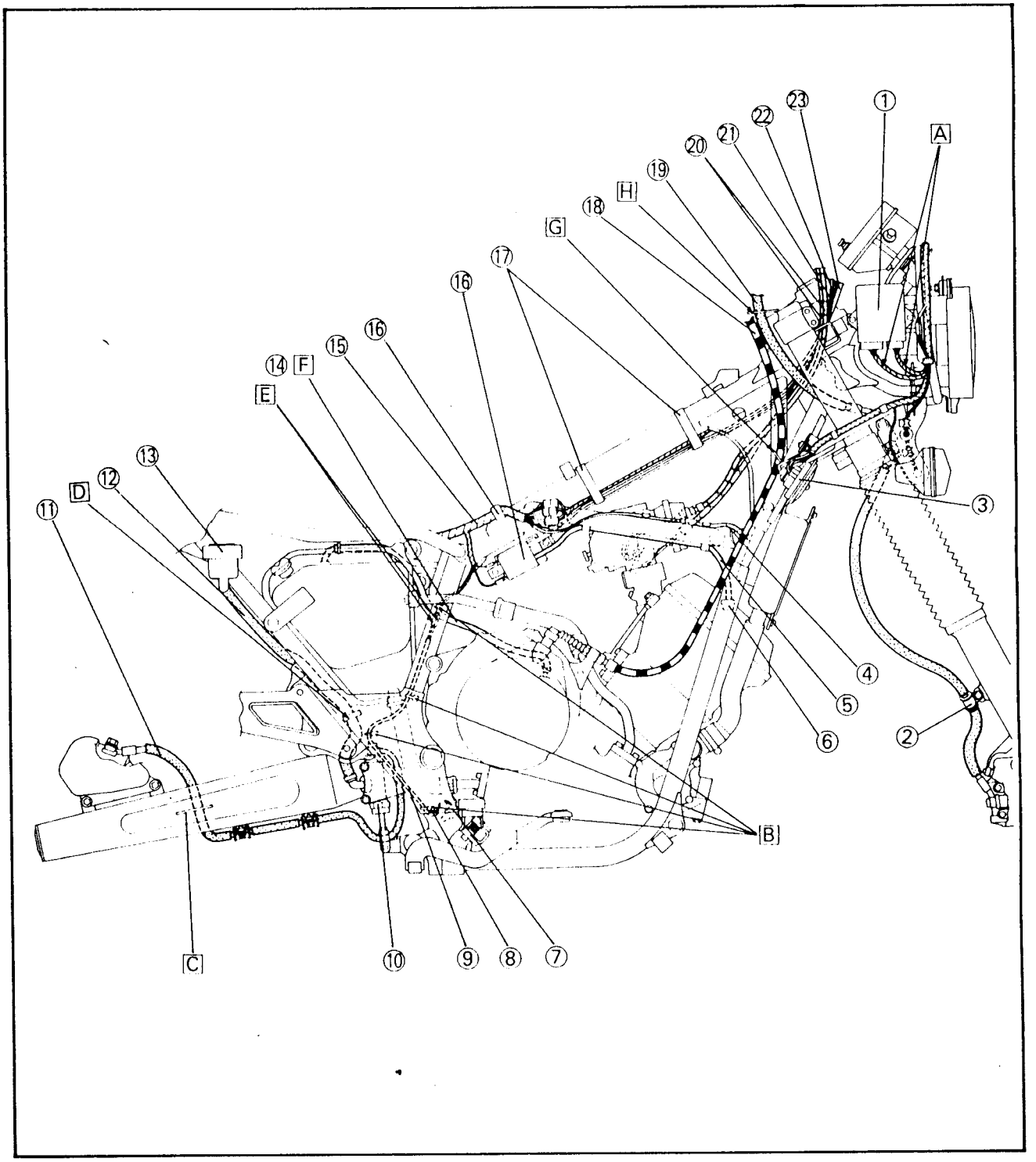
[I] Connect the rear flasher light lead (left) to the wireharness.
[J] Pass the coolant reservoir tank hose right side of the starter relay.
[K] Clamp the wireharness and the air ventilation hose.
[L] Pass the leads under the frame.
[M] Clamp the coolant reservoir tank hose (outside) and the spark plug lead (inside).
[N] Pass the fuel hose over the vacuum hose.
[O] Pass the vacuum hose under the fuel hose.



① Ignitor unit
② Holder
③ Horn
④ Fan motor lead
⑤ Spark plug lead
⑥ Spark plug cap
⑦ Rear brake switch
⑧ Clamp
⑨ Rear brake switch lead
⑩ Master cylinder (rear brake)
⑪ Rear brake hose
⑫ Master cylinder reservoir hose.
⑬ Master cylinder reservoir tank
⑭ Oil tank breather hose
⑮ Wireharness
⑯ Ignition coil
⑰ Band
⑱ Clutch cable
⑲ Brake hose
⑳ Throttle cable
㉑ Front brake switch lead
㉒ Handlebar switch lead (right)
㉓ Main switch lead



[A] Connect the wireharness to ignitor unit.
[B] Clamp the rear brake switch lead.
[C] Pass the rear brake hose through the guide.
[D] Clamp the master cylinder reservoir hose.
[E] Connect the rear brake switch leads to the wireharness under the clamp.
[F] Pass the oil tank breather hose on the inside of the down tube.
[G] Pass the clutch cable through the guide.
[H] Pass the brake hose through the guide.



CHAPTER 3.
PERIODIC INSPECTION AND ADJUSTMENT

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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 INTERVALS

Unit: km (mil)

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/starter operation. Adjust if necessary.	○	○	○
Fuel line*	Check fuel hose for cracks or damage. Replace if necessary.		○	○
Engine oil	Replace (Warm engine before draining)/ See NOTE	○	○	○
Engine oil filter*	Replace.	○	○	○
Brake*	Check operation/fluid leakage/See NOTE. Correct if necessary.		○	○
Clutch	Check operation. Adjust if necessary.		○	○
Swingarm pivot*	Check swingarm assembly for looseness. Correct if necessary. Moderately repack.***	○	○	○
Rear suspension link pivots*	Check operation. Moderately repack.***	○	○	○
Wheels*	Check balance/damage/runout/spoke tightness. Repair if necessary.		○	○
Wheel bearings*	Check bearings assembly for looseness/ damaged. 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)		
Fittings/Fasteners*	Check all chassis fittings and fasteners. Correct if necessary.	○	○	○
Sidestand*	Check operation. Repair if necessary.	○	○	○
Sidestand switch*	Check operation. Clean or replace if necessary.	○	○	○
Battery*	Check specific gravity. Check breather hose for proper operation. Correct if necessary.		○	○

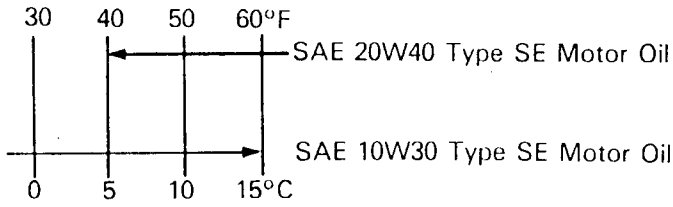


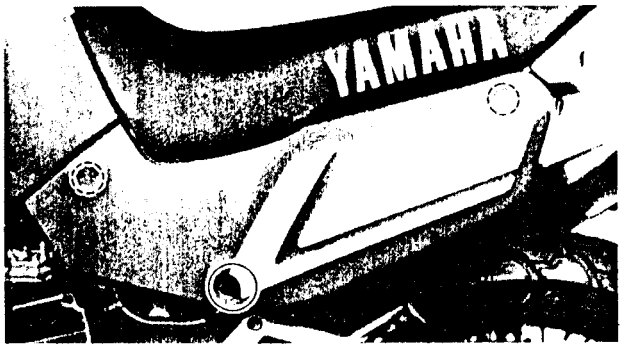
NOTE:

Brake system:

1. When disassembling the master cylinder or caliper cylinder, replace the brake fluid. Normally check the brake fluid level and add the fluid as required.
2. We recommended that, on the inner parts of the master cyliner and caliper cylinder, replace the oil seals every two years.
3. We recommended that replace the brake hoses every four years, or if cracked or damaged.

Engine oil:





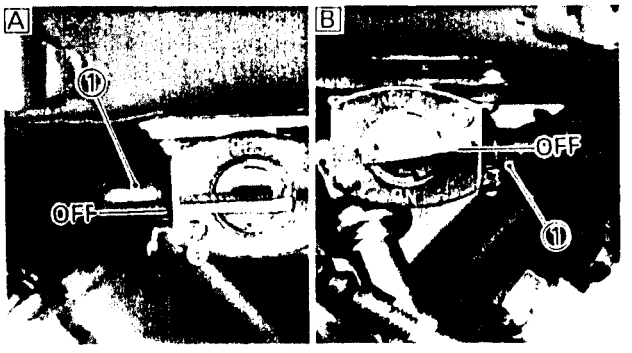
SEAT, FUEL TANK AND COVER

REMOVAL

1. Remove:
   • Side cover (left and right)



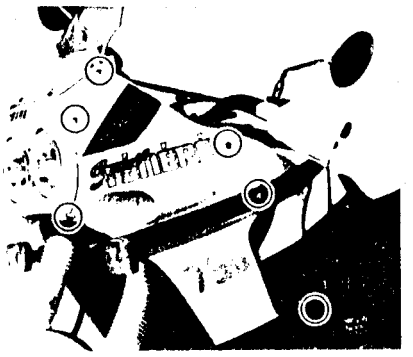
2. Remove:
   • Seat



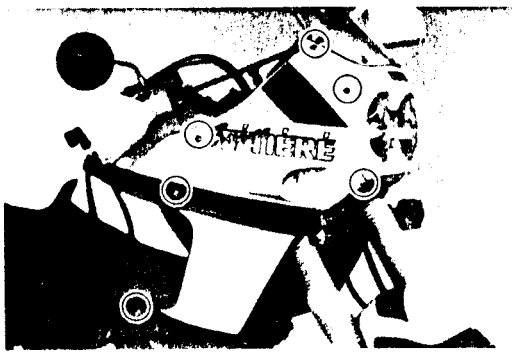
3. Turn the fuel cock levers (left and right) to "OFF".

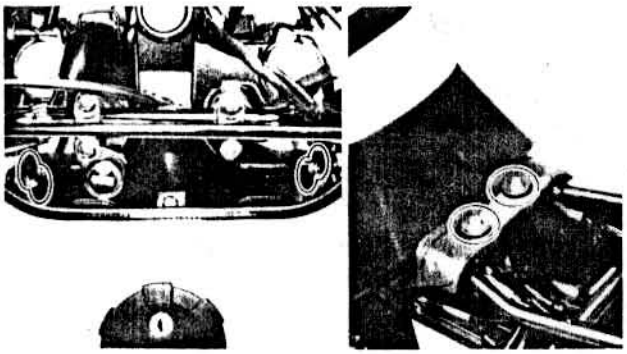
4. Disconnect:
   • Fuel hoses (left and right) ①

A Left
B Right



5. Remove:
   • Side cowling (left and right)





6. Remove:
   - Fuel tank

INSTALLATION

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

1. Install:
   - Side cover
   - Seat
   - Fuel tank

Bolt (side cover):
4 Nm (0.4 m•kg, 2.9 ft•lb)
Bolt (seat):
7 Nm (0.7 m•kg, 5.1 ft•lb)
Bolt (side cowling):
7 Nm (0.7 m•kg, 5.1 ft•lb)
Bolt (fuel tank):
7 Nm (0.7 m•kg, 5.1 ft•lb)

ENGINE

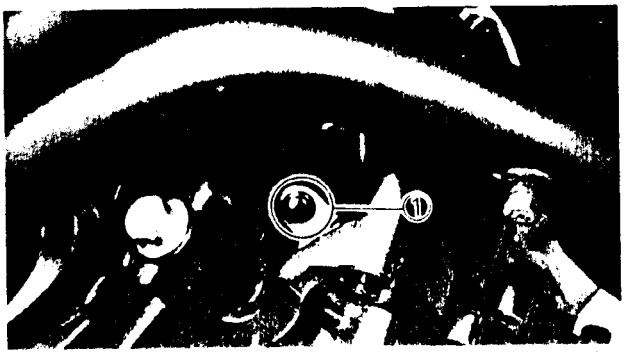
VALVE CLEARANCE ADJUSTMENT

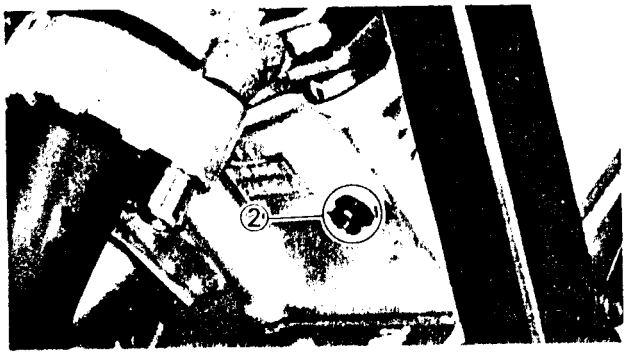
NOTE:

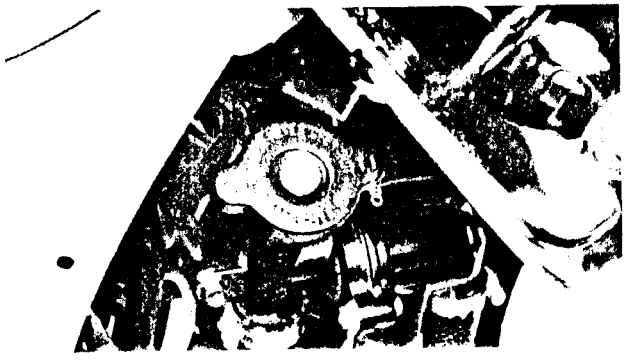
- The valve clearance must be adjusted when the engine is cool to the touch.
- Adjust the valve clearance when the piston is at the Top Dead Center (T.D.C.) on compression stroke.

⚠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.





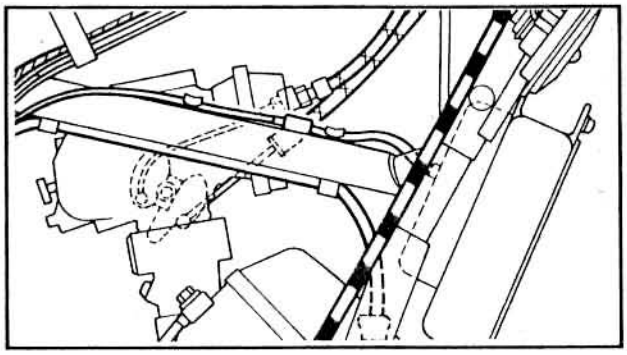


1. Remove:
   - Side cowlings
   - Side covers
   - Seat
   - Fuel tank

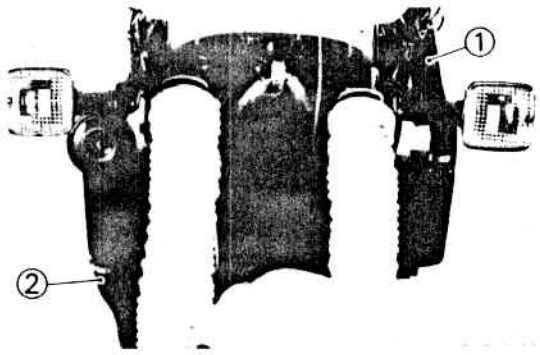
   Refer to the "SEAT, FUEL TANK AND COVER" section.

2. Place a drain pan under the drain bolts.
3. Remove:
   - Drain bolt (Water pump) ①
   - Drain bolts (Cylinder) ②

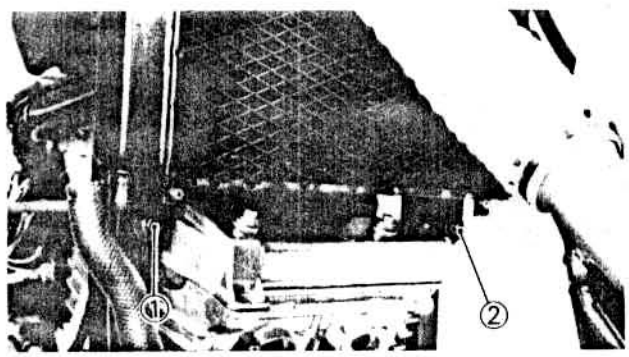
4. Remove:
   - Radiator cap
5. Drain:
   - Coolant



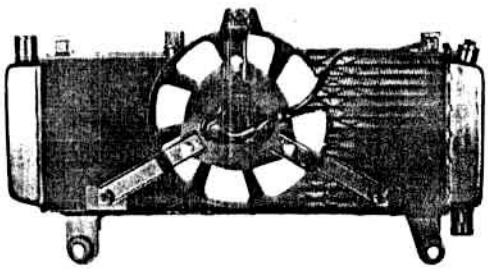
6. Disconnect:
   - Fan motor coupler (black-black)



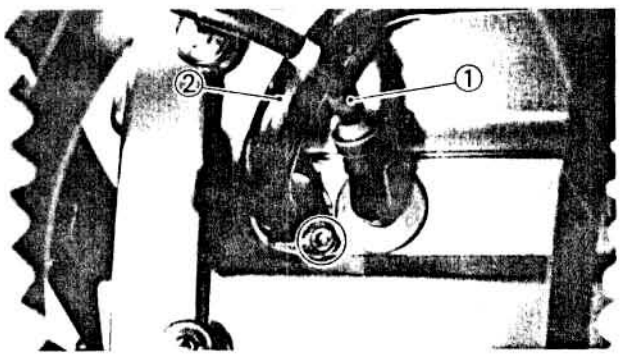
7. Disconnect:
   - Hose (radiator—inlet) ①
   - Hose (radiator—outlet) ②



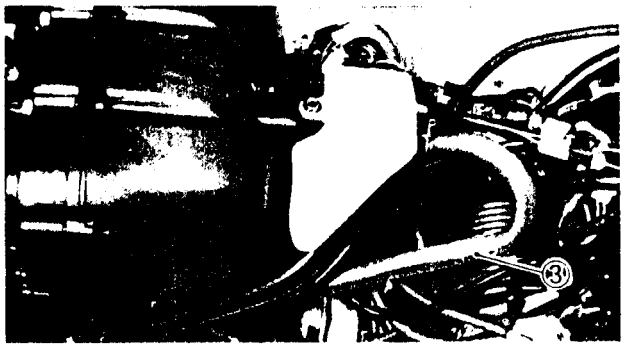
8. Remove:
   - Bolt ① ②

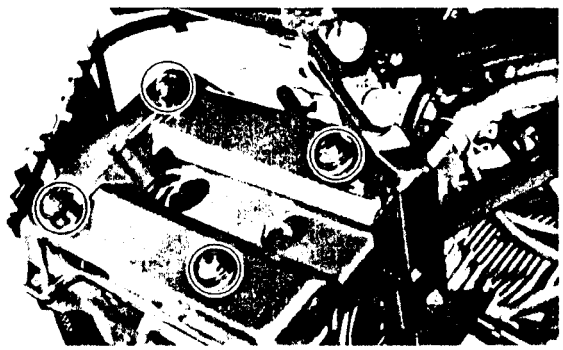


9. Remove:
   - Radiator assembly

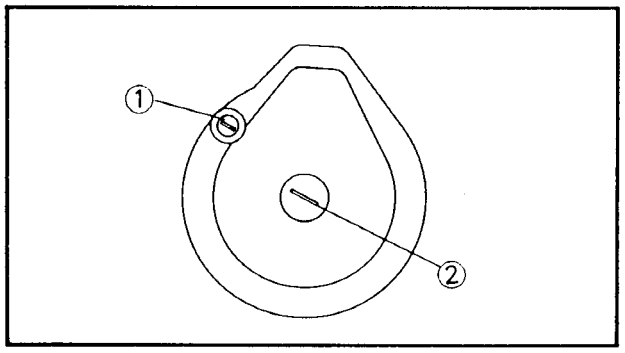


10. Remove:
    - Spark plug leads ①
    - Pipe (cylinder—thermostat) ②
    - Ventilation hose ③

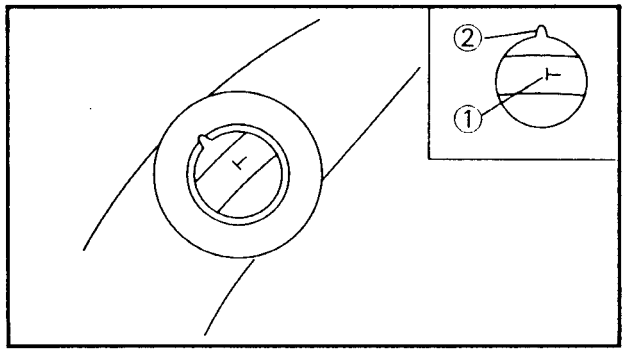


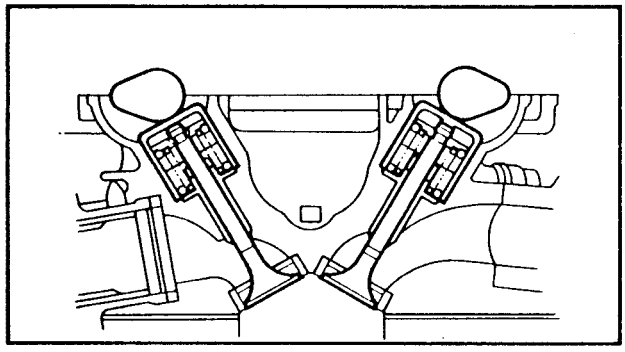


11. Remove:
    - Cylinder head cover



12. Remove:
    - Plug ①
    - Plug ②

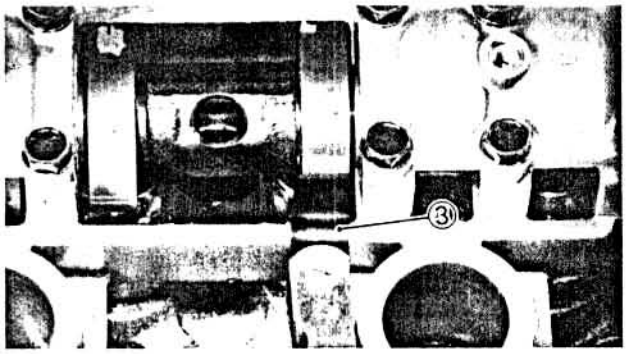


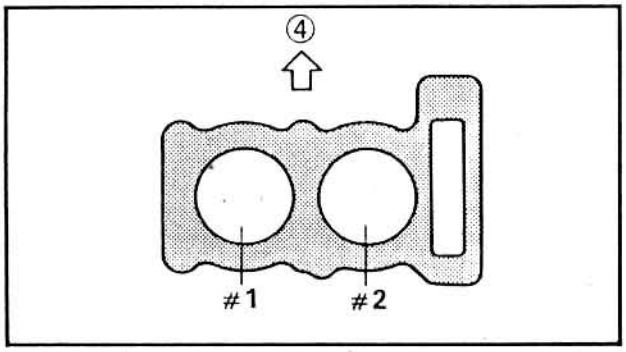


13. Check:
    - Valve clearance
      Out of specification → Adjust.

Valve clearance (cold):
Intake valve:
0.15 ~ 0.20 mm
(0.006 ~ 0.008 in)
Exhaut valve:
0.25 ~ 0.30 mm
(0.010 ~ 0.012 in)

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





NOTE:

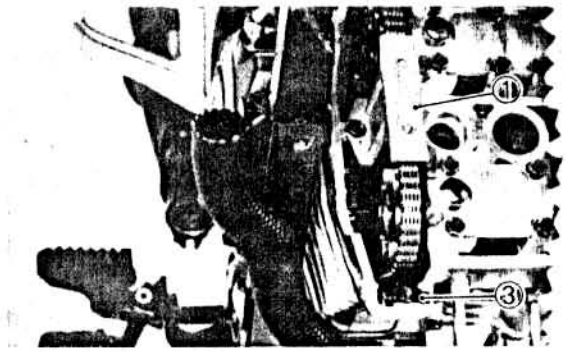
- When measuring the vlave clearance at the #2 cylinder, turn the crankshaft 360 degrees counterclockwise from the #1 cylinder TDC on compression stroke. TDC on compression stroke can be found when the cam lobes are apart from each other, as shown.
- Measure the valve clearance by using Thickness Gauge ③.

NOTE:

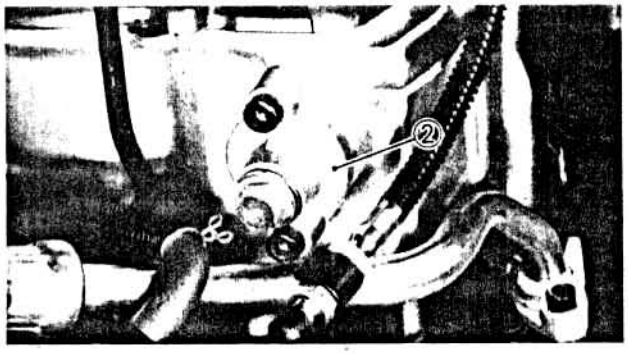
- Record the measured amount if the clearance is incorrect.
- Measure the valve eclearance in sequence.

Measuring sequence:
#1→#2

④ Front

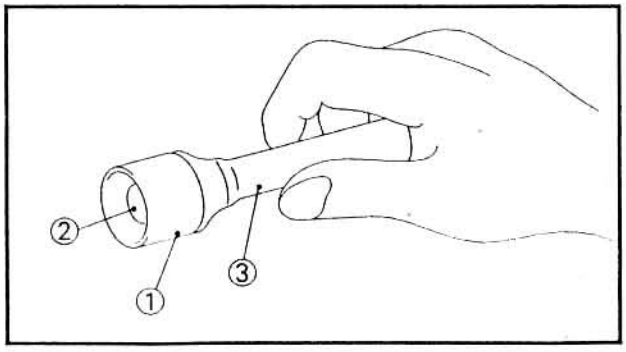


14. Remove:
    - Chain guide (upper) ①
    - Chain guide (exhaust side) ②
    - Timing chain tensioner ③
    - Cam caps
    - Camshafts



NOTE:

Refer to "CHAPTER 4. ENGINE DISASSEMBLY CAMSHAFT AND CYLINDER HEAD — Procedure 2".
Fasten the wire to the cam shain to prevent it from falling into the crankcase.



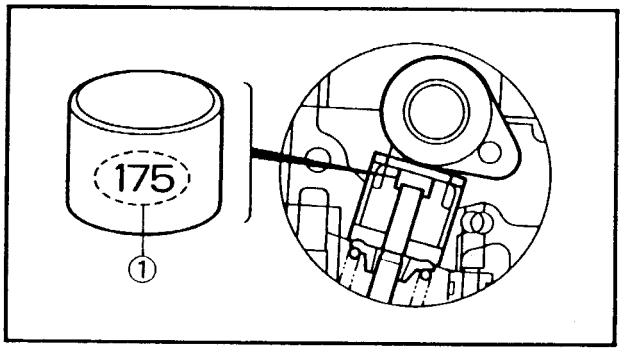
15. Adjust:
    - Valve clearnce

Adjustment steps:

- Remove the valve lifter ① and pad ② by using the valve lapper ③.

NOTE:

- Place a piece of rag in the cam chain room to prevent the pad from falling into the crankcase.
- Remove the rag after adjustment.



- Record the installed pad number.
- 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 side wall.

- 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 = 173 (1.73 mm)

Rounded off digit = 175

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.

VALVE CLEARANCE ADJUSTMENT

INTAKE

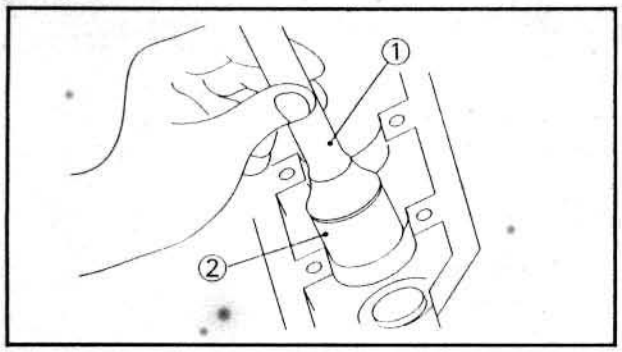
[B] MEASURED CLEARANCE	[A] INSTALLED PAD NUMBER																								
	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240
0.00 ~ 0.04				120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225
0.05 ~ 0.09			120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230
0.10 ~ 0.14		120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235
0.15 ~ 0.20	RECOMMENDED CLEARANCE																								
0.21 ~ 0.25	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	
0.26 ~ 0.30	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240		
0.31 ~ 0.35	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240			
0.36 ~ 0.40	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240				
0.41 ~ 0.45	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240					
0.46 ~ 0.50	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240						
0.51 ~ 0.55	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240							
0.56 ~ 0.60	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240								
0.61 ~ 0.65	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240									
0.66 ~ 0.70	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240										
0.71 ~ 0.75	175	180	185	190	195	200	205	210	215	220	225	230	235	240											
0.76 ~ 0.80	180	185	190	195	200	205	210	215	220	225	230	235	240												
0.81 ~ 0.85	185	190	195	200	205	210	215	220	225	230	235	240													
0.86 ~ 0.90	190	195	200	205	210	215	220	225	230	235	240														
0.91 ~ 0.95	195	200	205	210	215	220	225	230	235	240															
0.96 ~ 1.00	200	205	210	215	220	225	230	235	240																
1.01 ~ 1.05	205	210	215	220	225	230	235	240																	
1.06 ~ 1.10	210	215	220	225	230	235	240																		
1.11 ~ 1.15	215	220	225	230	235	240																			
1.16 ~ 1.20	220	225	230	235	240																				
1.21 ~ 1.25	225	230	235	240																					
1.26 ~ 1.30	230	235	240																						
1.31 ~ 1.35	235	240																							
1.36 ~ 1.40	240																								

VALVE CLEARANCE (cold):
0.15 ~ 0.20 mm (0.006 ~ 0.008 in)
Example: Installed is: 170
Measured clearance is: 0.27 mm (0.011 in)
Replace 170 pad with 180 pad

EXHAUST

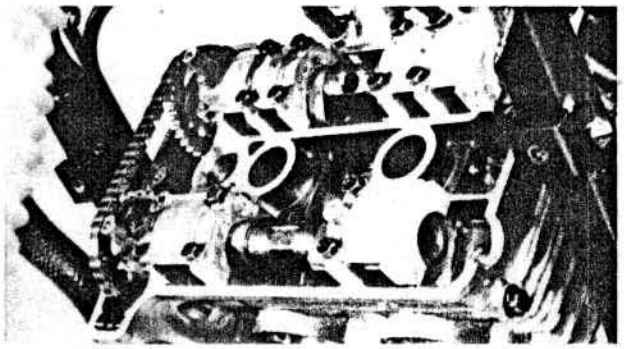
[B] MEASURED CLEARANCE	[A] INSTALLED PAD NUMBER																								
	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240
0.00 ~ 0.04						120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215
0.05 ~ 0.09					120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220
0.10 ~ 0.14				120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225
0.15 ~ 0.19			120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230
0.20 ~ 0.24		120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235
0.25 ~ 0.30	RECOMMENDED CLEARANCE																								
0.31 ~ 0.35	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	
0.36 ~ 0.40	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240		
0.41 ~ 0.45	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240			
0.46 ~ 0.50	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240				
0.51 ~ 0.55	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240					
0.56 ~ 0.60	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240						
0.61 ~ 0.65	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240							
0.66 ~ 0.70	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240								
0.71 ~ 0.75	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240									
0.76 ~ 0.80	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240										
0.81 ~ 0.85	175	180	185	190	195	200	205	210	215	220	225	230	235	240											
0.86 ~ 0.90	180	185	190	195	200	205	210	215	220	225	230	235	240												
0.91 ~ 0.95	185	190	195	200	205	210	215	220	225	230	235	240													
0.96 ~ 1.00	190	195	200	205	210	215	220	225	230	235	240														
1.01 ~ 1.05	195	200	205	210	215	220	225	230	235	240															
1.06 ~ 1.10	200	205	210	215	220	225	230	235	240																
1.11 ~ 1.15	205	210	215	220	225	230	235	240																	
1.16 ~ 1.20	210	215	220	225	230	235	240																		
1.21 ~ 1.25	215	220	225	230	235	240																			
1.26 ~ 1.30	220	225	230	235	240																				
1.31 ~ 1.35	225	230	235	240																					
1.36 ~ 1.40	230	235	240																						
1.41 ~ 1.45	235	240																							
1.46 ~ 1.50	240																								

VALVE CLEARANCE (cold):
0.25 ~ 0.30 mm (0.010 ~ 0.012 in)
Example: Installed is: 175
Measured clearance is: 0.37 mm (0.015 in)
Replace 175 pad with 185 pad



16. Install:
    - Valve lifer ①
    - Pad ② (new)

NOTE:
- Apply molybdenum disulfide grease to the pad.
- Valve lifter must be rotated smoothly by a finger.

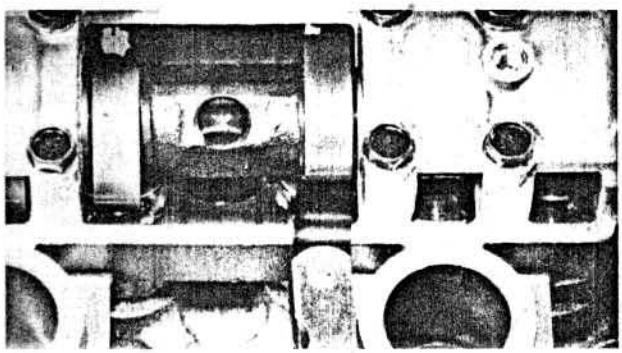


17. Install:
    - Camshafts
    - Timing chain
    - Camshaft caps

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

NOTE:
- Install the exhaust camshaft first.
- Align the matching marks.

NOTE:
- Refer to "CHAPTER 4. ENGINE ASSEMBLY AND ADJUSTMENT — CYLINDER HEAD AND CAMSHAFT" section.
- Apply molybdenum disulfide grease to the cam caps.
- Turn the crankshaft counterclockwise several turns for the installed parts to settle into the correct position.

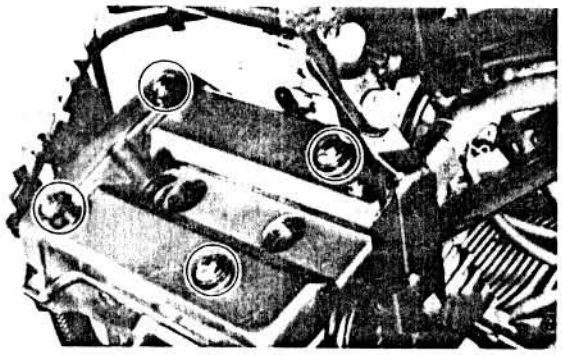


18. Measure:
    - Valve clearance

Valve clearance verification steps:
- Follow the valve clearance measurement stpes.
- If the clearance is incorrect, repeat all adjustment steps unitl the proper clearance is obtained.

19. Install:
    Reverse removal steps.
    - Cylinder head cover
    - Plugs
    - Chain guide (upper)
    - Chain guide (exhaust side)
    - Timing chain tensioner
    - Cam caps
    - Camshaft
    - Pipe (cylinder—thermostat)
    - Ventilation hose
    - Spark plug leads
    - Radiator assembly
    - Cowlings

Bolts (timing chain tensioner):
10 Nm (1.0 m•kg, 7.2 ft•lb)
Bolts (cylinder head cover):
10 Nm (1.0 m•kg, 7.2 ft•lb)
Bolts (radiator):
7 Nm (0.7 m•kg, 5 ft•lb)

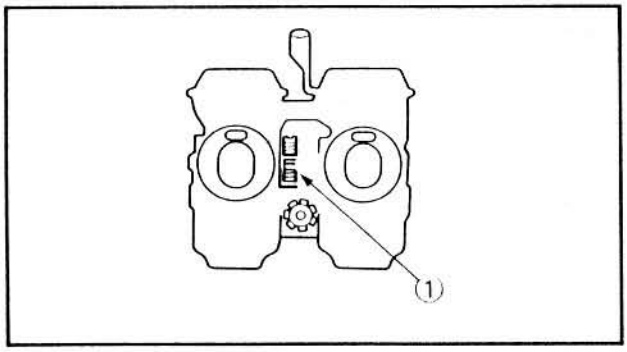


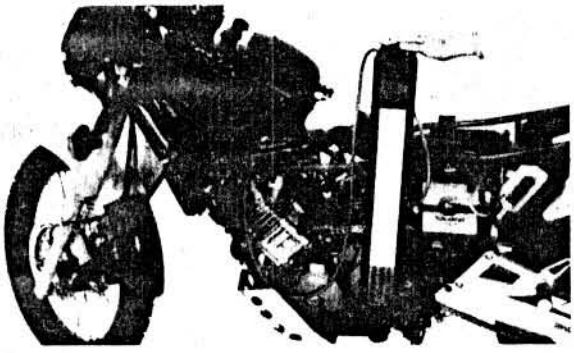
20. Fill:
    - Coolant system

Coolant Amount:
1.7 L (1.5 Imp qt, 1.8 US qt)

5. Start the engine and let it warm up.
6. Check:
   • Engine idling speed:
   Out of specification → Adjust
   Refer to "ENGINE IDLING SPEED ADJUSTMENT" section.

Engine idling speed:
1,100 ~ 1,200 r/min





7. Adjust:
   • Carburetors synchronization

Adjustment steps:
- Synchronize carburetor No. 1 to carburetor No. 2 by turning synchronizing screw ① until both gauges read the same.
- Race the engine for less than a second, two or three times, and check the synchronization again.

Vacuum pressure at idle speed:
30.59 ~ 35.91 kPa
(230 ~ 270 mmHg, 9.04 ~ 10.64 inHg)

NOTE:
The difference between both carburetors should be 1.33 kPa (10 mmHg, 0.4 inHg) or less.

8. Check:
   • Engine idling speed
   Out of specification → Adjust
9. Stop the engine and detach the measuring equipment.

10. Adjust:
    • Throttle cable free play
    Refer to "THROTTLE CABLE FREE PLAY ADJUSTMENT" section.

Free play:
3 ~ 5 mm (0.12 ~ 0.20 in)

11. Install
    - Air filter case
    - Fuel tank
    - Seat
    - Side covers
    - Side cowling

Bolt (air filter case)
7 Nm (0.7 m·kg, 5.1 ft·lb)
Bolts (fuel tank, seat)
7 Nm (0.7 m·kg, 5.1 ft·lb)

TIMING CHAIN ADJUSTMENT

Adjustment free.

IDLE SPEED ADJUSTMENT

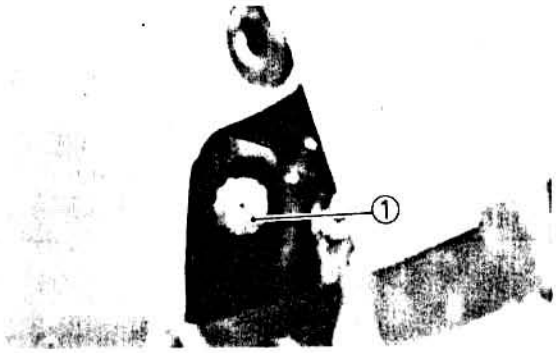
1. Start the engine and let it warm up.
2. Attach:
   - Engine Tachometer
     To spark plug lead.

Engine tachometer:
P/N. 90890-03113

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

Engine idle speed:
1,100 ~ 1,200 r/min

4. Adjust:
   - Engine idle speed



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

Turning in → Idle speed becomes higher.
Turning out → Idle speed becomes lower.

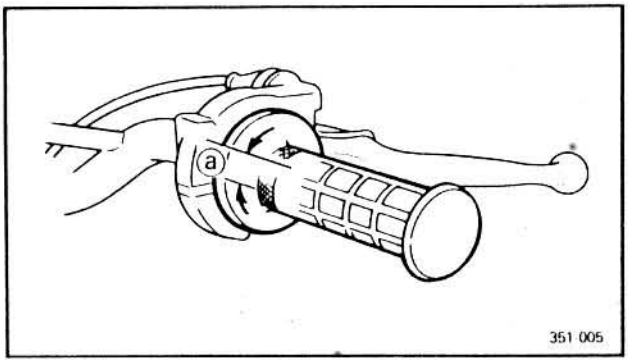
NOTE:

After adjusting the engine idle speed, the throttle cable free play should be adjusted.

THROTTLE CABLE FREE PLAY ADJUSTMENT

NOTE:

Engine idling speed and carburetor synchronization should be adjusted properly before adjusting the throttle cable free play.

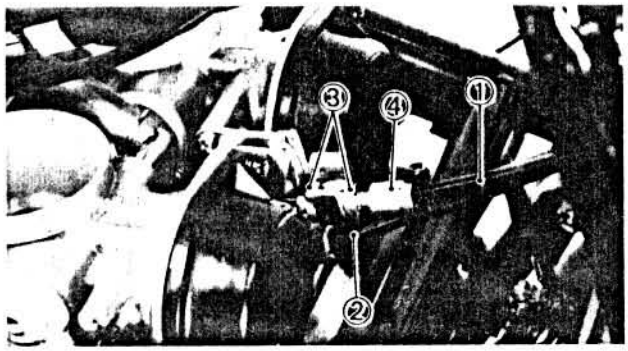


1. Check:
   - Throttle cable free play ⓐ
     Out of specification → Adjust.

Free play:
3 ~ 5 mm (0.12 ~ 0.20 in)

2. Remove:
   - Side cowling
   - Side covers
   - Seat
   - Fuel tank

   Refer to "SEAT, FUEL TANK AND COVER" section.
3. Remove:
   - Bolts (air filter case)



4. Adjust:
   - Throttle cable free play

Adjustment steps:

NOTE:

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

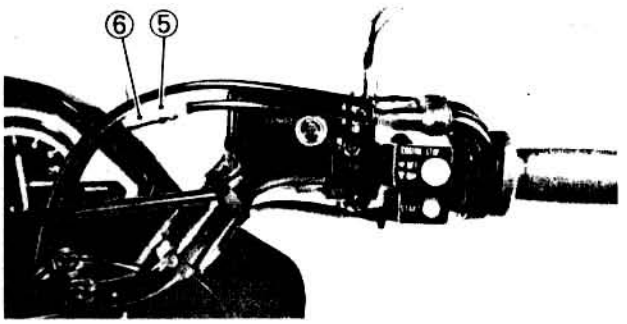
First step:

- Loosen the locknut ③ on the throttle cable #1.
- Turn the adjuster ④ in or out until the specified free play is obtained.

Turning in → Free play is increased.

Turning out → Free play is decreased.

- Tighten the locknuts.



NOTE:

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

Final step:

- Loosen the locknut ⑤.
- Turn the adjuster ⑥ in or out until the specified free play is obtained.

Turning in → Free play is increased.

Turning out → Free play is decreased.

- Tighten the locknut.

⚠WARNING:

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

5. Install:
   - Air filter case
   - Fuel tank
   - Seat
   - Side covers
   - Side cowling

Bolt (air filter case):
7 Nm (0.7 m•kg, 5.1 ft•lb)
Bolts (fuel tank, seat):
7 Nm (0.7 m•kg, 5.1 ft•lb)

SPARK PLUG INSPECTION

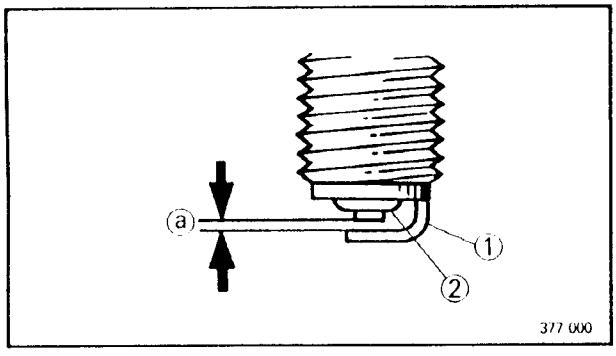
1. Remove:
   - Side cowling
   - Side covers
   - Seat
   - Fuel tank

   Refer to the "SEAT, FUEL TANK AND COVER" section.

2. Remove:
   - Bolts (air filter case)
3. Remove:
   - Spark plug
4. Inspect:
   - Spark plug type

   Incorrect → Replace.

Standard spark plug:
DPR8EA-9 (N.G.K.)
X24EPR-U9 (N.D.)



5. Inspect:
   - Electrode ①

     Wear/Damage → Replace.
   - Insulator ②

     Abnormal color → Replace.

     Normal color is a medium-to-light tan color.
6. Clean the spark plug with a spark plug cleaner or wire brush.
7. Measure:
   - Plug gap ⓐ

     Use a Wire Gauge or Feeler Gauge.

     Out of specification → Regap.

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

8. Tighten:
   - Spark plug(s)

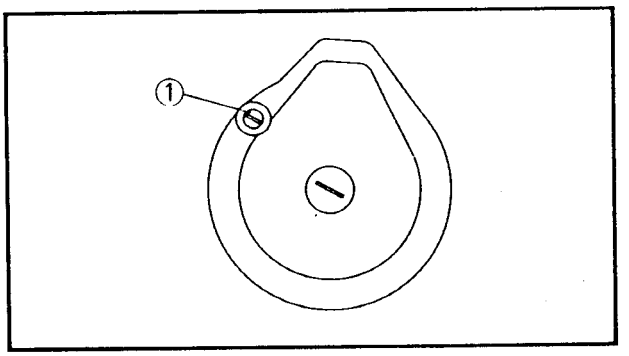
Spark plug:
18 Nm (1.8 m·kg, 13 ft·lb)

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 valve as soon as possible with a torque wrench.

9. Install:
   - Air filter case
   - Fuel tank
   - Seat
   - Side covers
   - Side cowling

Bolt (air filter case):
7 Nm (0.7 m·kg, 5 ft·lb)
Bolts (fuel tank, seat):
7 Nm (0.7 m·kg, 5.1 ft·lb)



IGNITION TIMING CHECK

NOTE:

Carburetor synchronization, engine idling speed and throttle cable free play should be adjusted properly before checking the ignition timing.

1. Remove:
   - Plug (1)

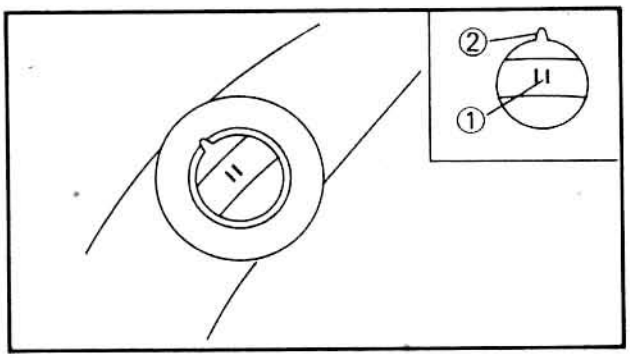
2. Attach:
   - Timing light
   - Inductive tachometer
   (To the spark plug for #1 cylinder)

Timing light:
P/N 90890-03109
Inductive tachometer:
P/N 90890-03113

3. Check:
   - Ignition timing

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

Engine speed:
1,100 ~ 1,200 r/min



- Visually check the stationary pointer ① to verify it is within the required firing range ② indicated on the flywheel.
  Incorrect firing range→Check timing plate and/or pickup assembly (tightness damage).

4. Install:
   - Plug

COMPRESSION PRESSURE MEASUREMENT

NOTE:

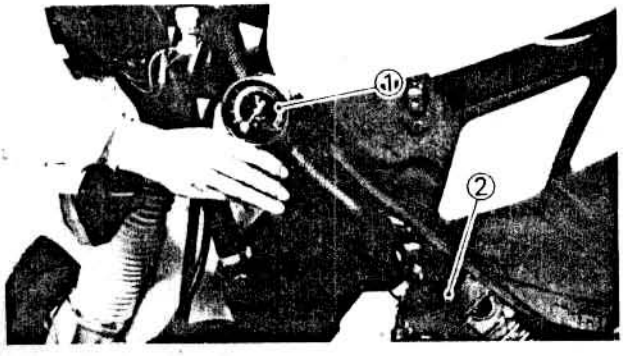
Insufficient compression pressure will result in performance loss.

1. Remove:
   - Side cowling
   - Side covers
   - Seat
   - Fuel tank

   Refter to the "SEAT, FUEL TANK AND COVER" section.

2. Check:
   - Valve clearance

   Out of specification→Adjust.
   Refter to the "VALVE CLEARANCE ADJUSTMENT" section.
3. Start the engine and let it warm up for several minutes.
4. Stop the engine.
5. Remove:
   - Spark plug



6. Attach:
   - Compression gauge ①
   - Adapter ②

	Compression gauge: **P/N. 90890-03081**

7. Measure:
   • Compression pressure
   Above the maximum pressure→
   Inspect cylinder head, valve surface, and piston crown for carbon deposists.

   Below the minimum pressure→
   Squirt a few drops of oil into affected cylinder and measure again.
   • Follow the table below.

Compression pressure (with oil introdued 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.**

Compression Pressure (at Sea Level):
Standard:
950 kPa (9.5 kg/cm², 135 psi)
Minimum:
910 kPa (9.1 kg/cm², 129 psi)
Maximum:
990 kPa (9.9 kg/cm², 141 psi)

Measurement steps:
• 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.

⚠WARNING:

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

8. Repeat the previous steps for the other cylinders.

NOTE:

The difference of compression pressure between the highest and lowest cylinder compression readings should be 100kPa (1 kg/cm², 14 psi) or less.

9. Install:
   - Spark plug
   - Fuel tank
   - Seat
   - Side covers
   - Side cowling

Spark plug:
17.5 Nm (1.75 m•kg, 12.5 ft•lb)
Bolts (fuel tank, seat)
7 Nm (0.7 m•kg, 5.1 ft•lb)

ENGINE OIL LEVEL INSPECTION

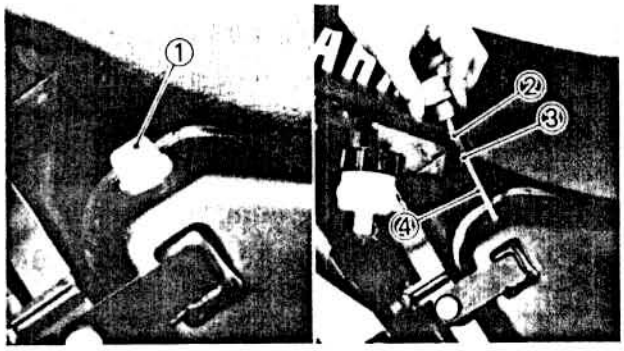
NOTE:

Position the motorcycle straight up when inspecting the oil level.

1. Place the motorcycle on a level surface.

NOTE:

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

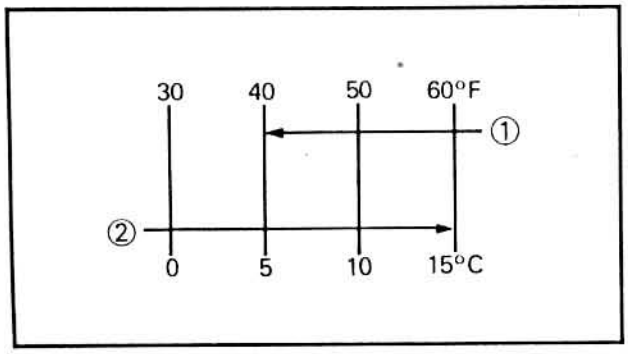


2. Remove:
   - Side cover (right)
   - Oil tank cap ①
3. Inspect:
   - Oil level

   Oil level should be between the maximum ② and minimum ③ marks.
   Oil level is low→Add oil to proper level.

NOTE:

Do not screw the dipstick ④. Insert the dipstick lightly when inspecting the oil level.



Recommended Oil:
At 5°C (40°F) or higher ①:
SAE 20W40 type SE motor oil
At 15°C (60°F) or lower ②:
SAE 10W30 type SE motor oil

⚠CAUTION:

•Do not add any chemical additives. Engine oil also lubricates the clutch and additives could cause clutch slippage.
•Do not allow foregin material to enter the oil tank.

4. Start the engine and let it warn up until the oil temperature rises to approximately 60°C (140°F)

5. Idle the engine more than 10 second while keeping the motorcycle upright. Then stop the engine and inspect the engine oil level once again.

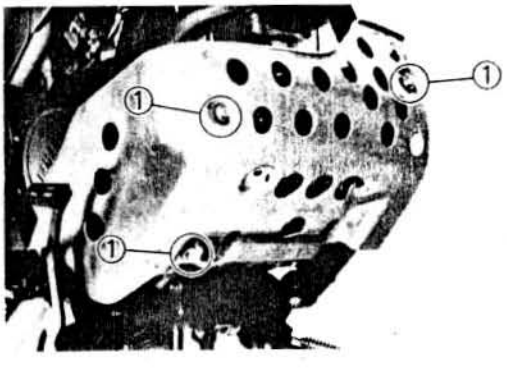
⚠WARNING:

Never attempt to remove the oil tank cap just after high speed operation. The heated oil could spout out, causing danger. Wait until the oil cools down to approximately 60°C (140°F).

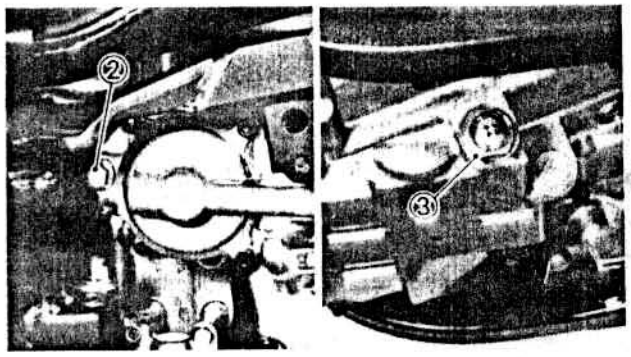
6. Install:
   •Oil tank cap
   •Side cover (right)

ENGINE OIL REPLACEMENT

1. Start the engine and let it warm up for several minutes.
2. Stop the engine and place oil pans under the engine and oil tank.

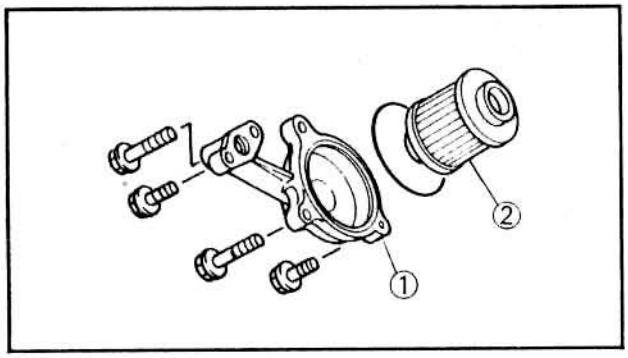


3. Remove
   •Bolts (engine protector) ①



4. Remove:
   - Oil tank cap
   - Drain bolt ② (oil strainer case)
   - Drain plug ③ (oil pan)

   Drain the crankcase and oil tank of their oil.



5. If the oil filter is replaced with oil change, perform the following.
   Oil filter replacement steps:
   - Remove the oil filter cover ① and oil filter element ②.
   - Check the O-ring, if cracked or damaged, replace them with a new one.
   - Install the oil filter element and oil filter cover.

Bolts (oil filter case):
10 Nm (1.0 m•kg, 7.2 ft•lb)

6. Install:
   - Drain bolt (oil strainer case)
   - Drain plug (oil pan)

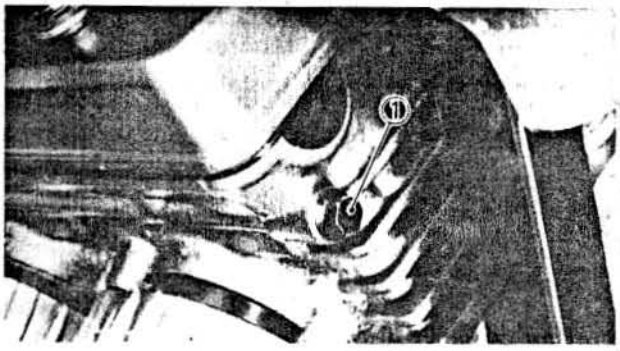
Drain bolt (oil strainer case):
30 Nm (3.0 m•kg, 22 ft•lb)
Drain plug (oil pan):
35 Nm (3.5 m•kg, 25 ft•lb)

NOTE:
Check the gasket (drain bolt and plug). If damaged, replace them with a new one.

7. Fill:
   - Crankcase
   - Oil tank

Oil quantity:
Without oil filter change
4.0 L (3.5 Imp qt, 4.2 US qt)
With oil filter change
4.1 L (3.6 Imp qt, 4.3 US qt)

Refer to the "ENGINE OIL LEVEL INSPECTION" section.



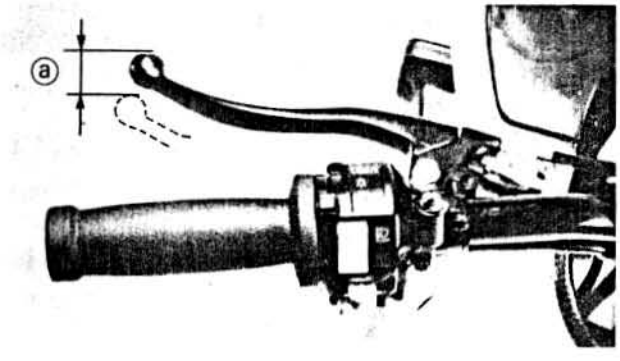
8. Check:
   • Oil pressure

Checking steps:
- Slightly loosen the oil gallery bolt ①.
- Start the engine and keep it idling until oil begins to seep from the oil gallery bolt.
  If no oil comes out after one minute, turn the engine off so it will not seize.
- Restart the engine after solving the problem(s), and recheck the oil pressure.
- After checking, tighten the oil gallery bolt to specification.

Oil gallery bolt:
20 Nm (2.0 m•kg, 14 ft•lb)

9. Install:
   • Oil tank cap
   • Bolts (protector engine)

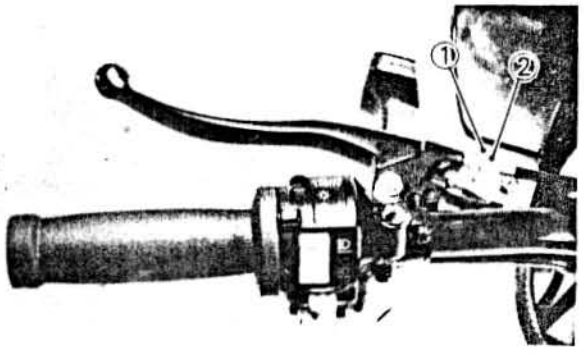
Bolts (protector engine):
7 Nm (0.7 m•kg, 5.1 ft•lb)



CLUTCH ADJUSTMENT

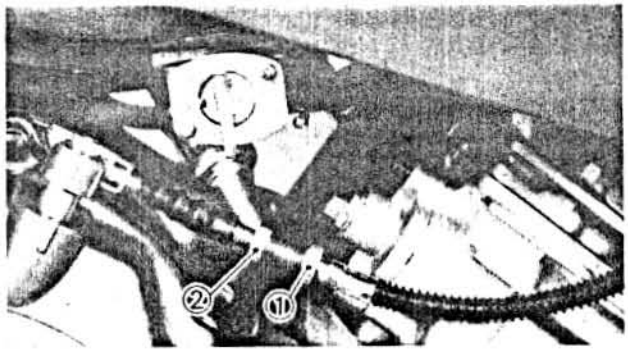
1. Check:
   • Clutch cable free play ⓐ
   Out of specification → Adjust.

Free play:
10 ~ 15 mm (0.4 ~ 0.6 in)
At clutch lever end



2. Adjust:
   • Clutch cable free play

Adjustment steps:
- Loosen the locknuts ①.
- Trun the adjusters ② in or out until the specified free play is obtained.

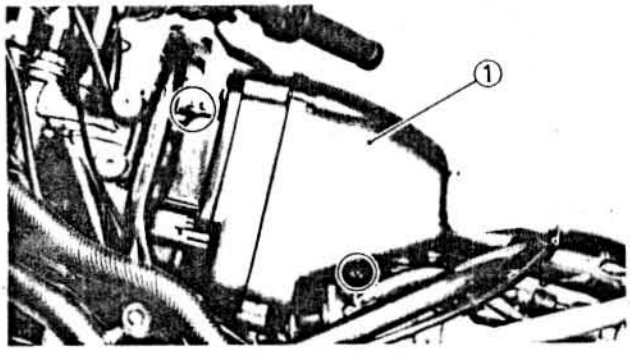


Turning in→Free play is increased.
Turning out→Free play is decreased.
•Tighten the locknuts.

AIR FILTER CLEANING

1. Remove:
   - •Side cowling
   - •Side covers
   - •Seal
   - •Fuel tank

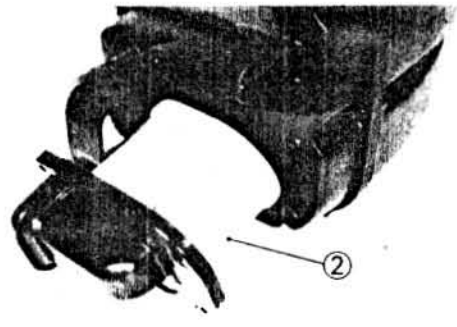
   Refer to "SEAT, FUEL TANK AND COVER" section.



2. Remove:
   - •Bolts (air filter case) ①
   - •Element case ② (left and right)

⚠CAUTION:

Never operate the engine with the air filter element removed. This will allow unfiltered air to enter, causing rapid wear and possible engine damage. Additionally, operation without the filter element will affect carburetor tuning with subsequent poor performance and possible engine overheating.



3. Inspect:
   - •Element case

   Damage→Replace.



4. Clean:
   - •Air filter element

   Blow out dust in the element from the outer surface using compressed air.

5. Install:
   - Air filter element
   - Element case

6. Install:
   - Air filter case
   - Fuel tank
   - Seat
   - Side covers
   - Side cowling

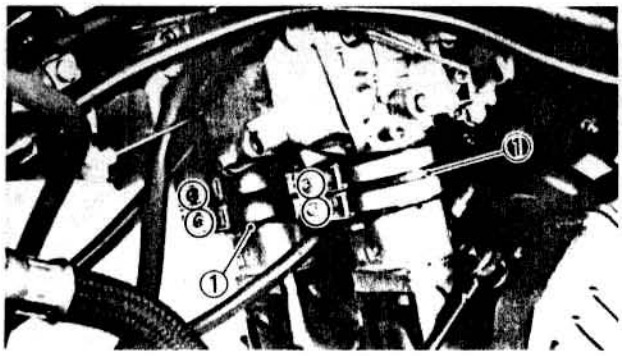
Bolt (air filter case):
7 Nm (0.7 m·kg, 5.1 ft·lb)
Bolts (fuel tank, seat):
7 Nm (0.7 m·kg, 5.1 ft·lb)

CARBURETOR JOINT INSPECTION

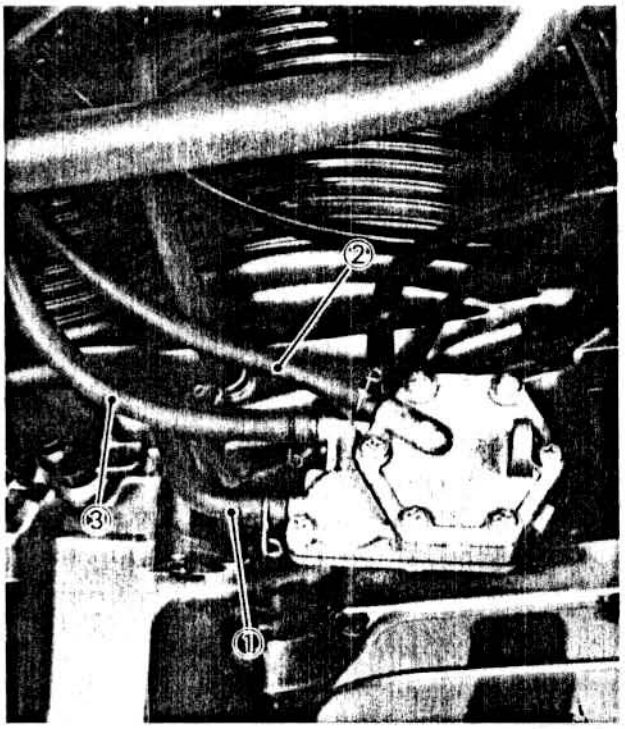
1. Remove:
   - Side cowling
   - Side covers
   - Seat
   - Fuel tank

   Refer to "SEAT, FUEL TANK AND COVER" section.
2. Remove:
   - Bolts (air filter case)
3. Inspect:
   - Carburetor joint ①

   Crack/Damage→Replace.
   Refer to the "CHAPTER 6—CARBURETION" section.
4. Install:
   - Carburetor joint
   - Air filter case
   - Fuel tank
   - Seat
   - Side covers
   - Side cowling



Bolts ① (carburetor joint):
10 Nm (1.0 m·kg, 7.2 ft·lb)
Bolt (air filter case):
7 Nm (0.7 m·kg, 5.1 ft·lb)
Bolts (fuel tank, seat):
7 Nm (0.7 m·kg, 5.1 ft·lb)



FUEL LINE INSPECTION

1. Remove:
   - Side cowling
   - Side covers
   - Seat
   - Fuel tank

   Refer to "SEAT, FUEL TANK AND COVER" section.

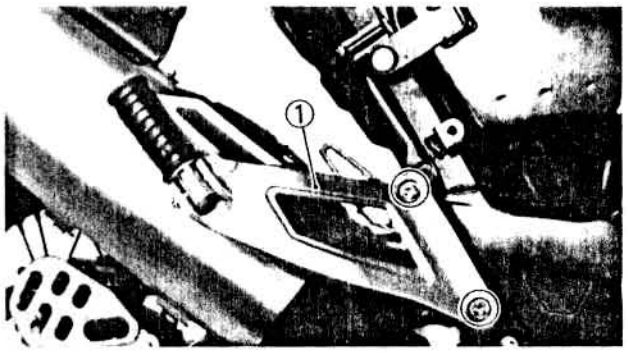
2. Remove:
   - Bolts (air filter case)

3. Inspect:
   - Fuel hose ①
   - Vacuum hose ②
   - Delivery hose ③

   Crack/Damage→Replace.

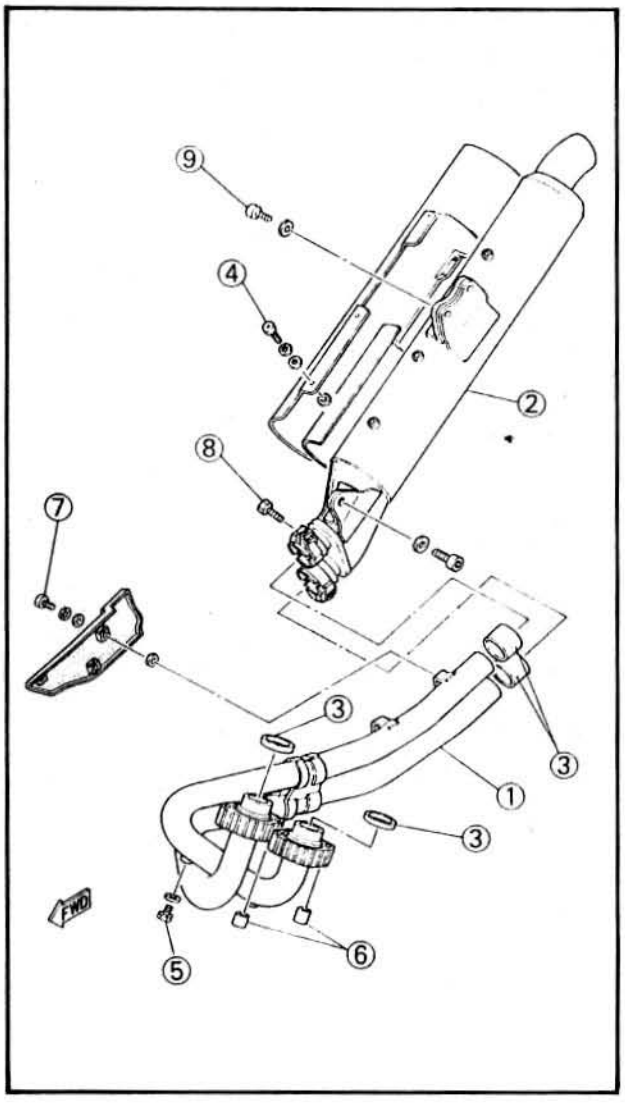
4. Install:
   - Air filter case
   - Fuel tank
   - Seat
   - Side covers
   - Side cowling

Bolt (air filter case):
7 Nm (0.7 m•kg, 5.1 ft•lb)
Bolts (fuel tank, seat):
7 Nm (0.7 m•kg, 5.1 ft•lb)



EXHAUST SYSTEM INSPECTION

1. Remove:
   - Bolts ① (footrest bracket, rear-right)

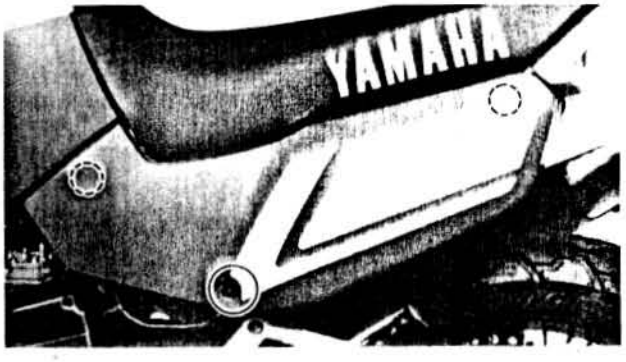


2. Inspect:
   - Exhaust pipe (1)
   - Muffler (2)
     Crack/Damage → Replace.
   - Gasket (3)
     Exhaust gas leaks → Replace.

Screw (4) (muffler protector):
4 Nm (0.4 m•kg, 2.9 ft•lb)
Bolt (5) (exhaust pipe CO test):
10 Nm (1.0 m•kg, 7.2 ft•lb)
Nut (6) (exhaust pipe):
20 Nm (2.0 m•kg, 14 ft•lb)
Screw (7)
(exhaust pipe protector):
4 Nm (0.4 m•kg, 2.9 ft•lb)
Bolt (8)
(exhaust pipe and muffler):
20 Nm (2.0 m•kg, 14 ft•lb)
Bolt (9) (muffler):
24 Nm (2.4 m•kg, 17 ft•lb)

3. Install:
   - Rear footrest bracket (right)

Bolt (rear footrest bracket (right)):
20 Nm (2.0 m•kg, 14 ft•lb)





COOLANT LEVEL INSPECTION

NOTE:

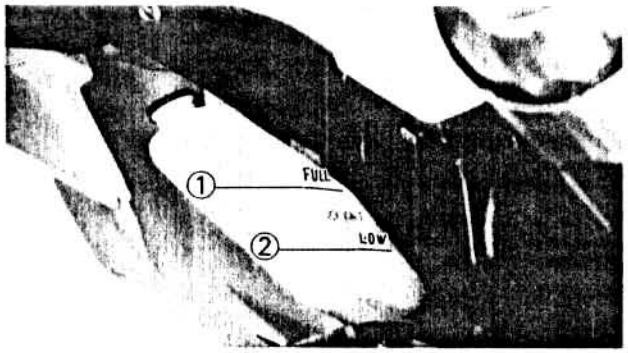
Position the motorcycle straight up when inspecting the coolant level.

1. Place the motorcycle on a level surface.

NOTE:

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

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



3. Inspect:
   • Coolant level
   Coolant level should be between maximum ① and minimum ② marks.
   Coolant level low→Add soft water (top water) to proper level.

⚠CAUTION:

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

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

5. Stop the engine and inspect the coolant level once again.

NOTE:

Wait a few minutes until level setles before inspecting the coolant level.

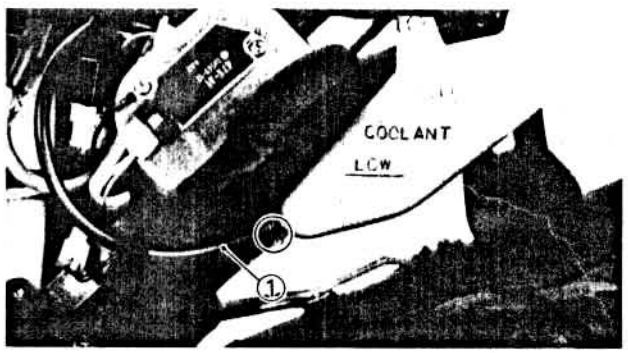
6. Install:
   • Side cover (right)
   • Seat

	Bolts (seat): **7 Nm (0.7 m•kg, 5.1 ft•lb)**

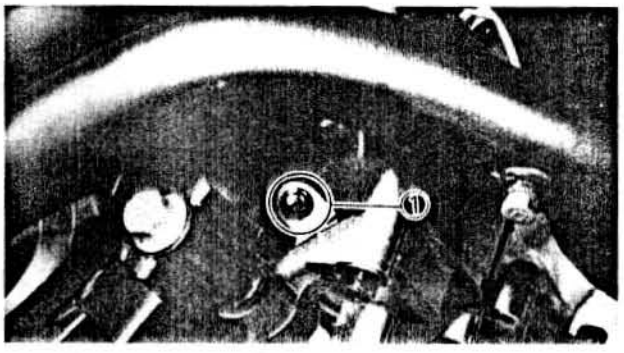
COOLANT REPLACEMENT

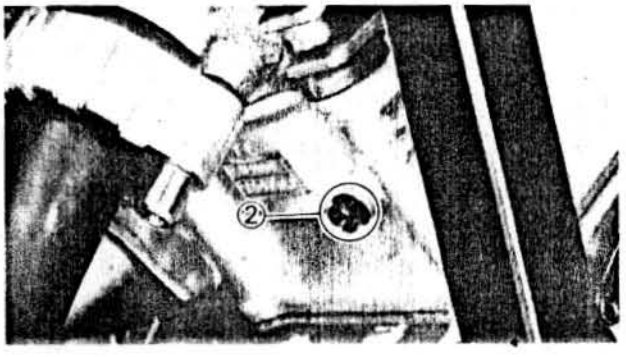
1. Place a drain pan under the drain bolts.

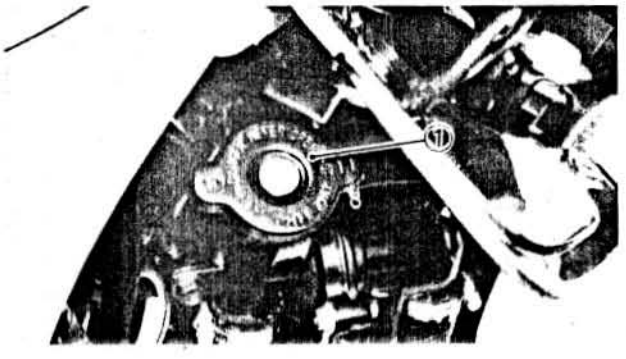
2. Remove:
   • Seat
   • Side cover (right)



3. Disconnect:
   • Hose ① (reservoir tank)
   Drain the reservoir tank of its coolant.







4. Remove:
   - Drain bolt (1) (water pump)
   - Drain bolt (2) (cylinder)
   - Gasket (drain bolt)
   - Radiator cap (3)

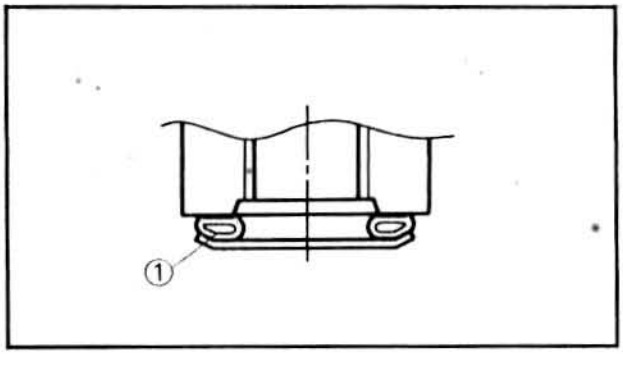
   Drain the radiator and engine of its coolant.

⚠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.

5. Inspect:
   - Gasket (drain bolt)

   Damage→Replace.

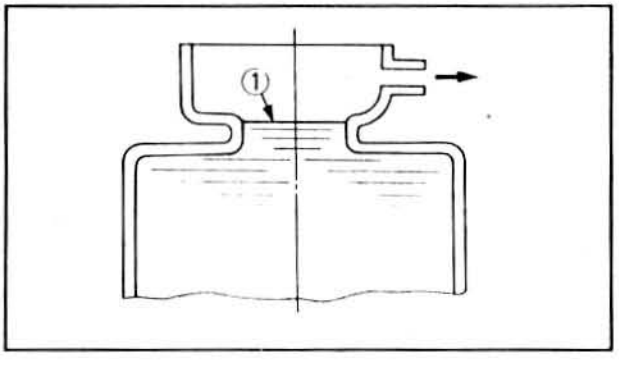


6. Install:
   - Gasket (1) (drain bolt)
   - Drain bolt (cylinder)
   - Drain bolt (water pump)

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

NOTE:

Install the gasket as shown.



7. Fill:
   - Radiator
   - Engine

   (To specified level (1))

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

Coolant and water (soft water)
Mixed ratio:
50% / 50%
Total amount:
1.7 L (1.5 Imq qt, 1.8 US qt)
Reservoir tank capacity:
0.45 L (0.40 Imp qt, 0.48 US qt)

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

⚠WARNING:

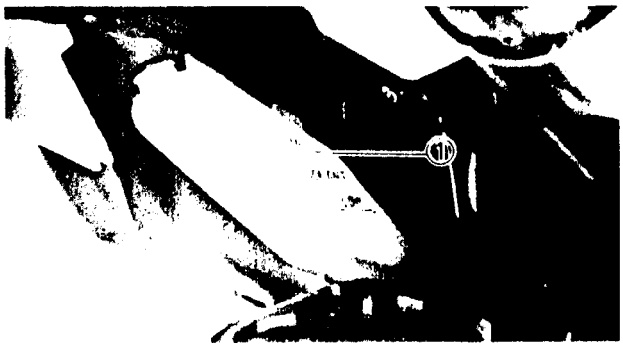
- When coolant splashes in your eye. Thoroughly wash your eye with water and see your doctor.
- When coolant splashes on your clothes. Quickly wash it away with water and then with soap.
- When coolant is swallowed. Quickly make him vomit and take him to a doctor.

⚠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 on painted surfaces. If it splashes, wash it away with water.
- Do not mix more than one type of ethlen glycol anti-freeze containing corrosion inhibitors for aluminum engines.

8. Install:
   - Radiator cap

9. Connect:
   - Hose (reservoir tank)



10. Fill:
    - Reservoir tank
      (to maximum level ①)

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

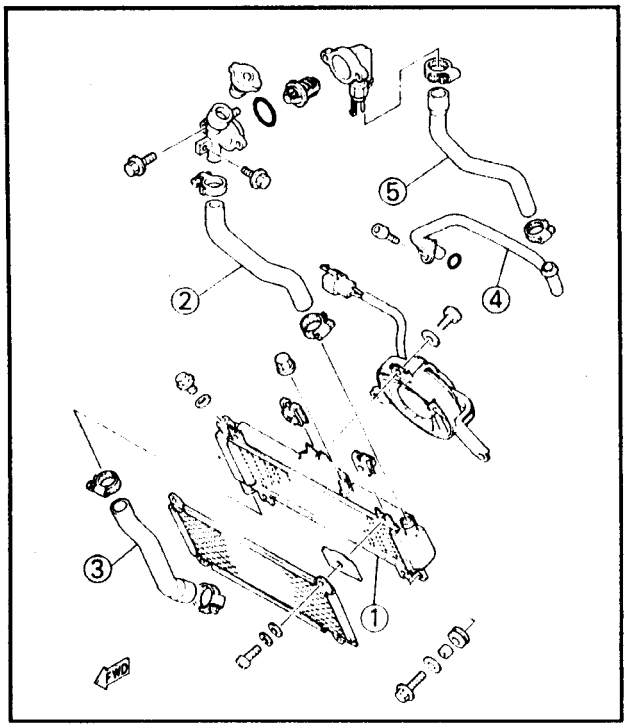
12. Stop the engine and inspect the level. Refer to the "COOLANT LEVEL INSPECTION" section.

NOTE:

Wait a few minutes until level settles before inspecting the coolant level.

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

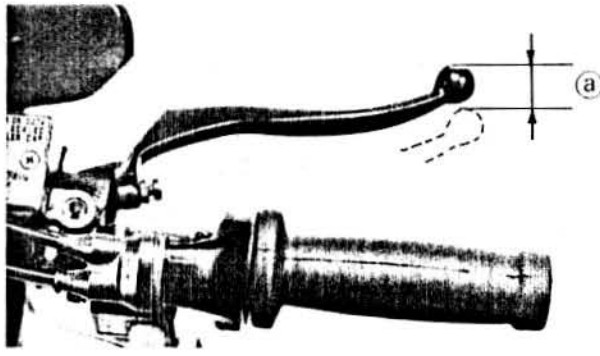
	Bolts (seat): **7 Nm (0.7 m•kg, 5.1 ft•lb)**

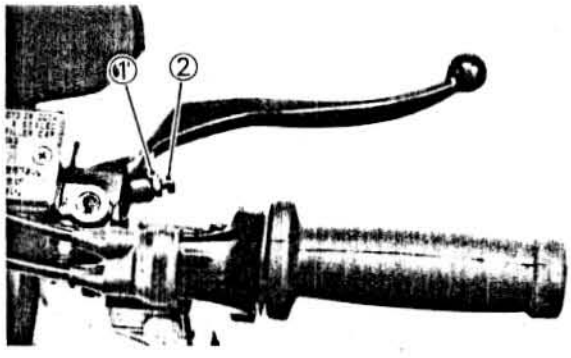


COOLING SYSTEM INSPECTION

1. Inspect:
   - Radiator ①
   - Hose ② (thermostat—radiator)
   - Hose ③ (radiator—cylinder)
   - Pipe ④ (cylinder—thermostat)
   - Hose ⑤ (cylinder—thermostat)

   Crack/Damage→Replace.
   Refer to the "COOLING SYSTEM" 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)

2. Adjust:
   - Brake lever free play

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

Turning in → Free play is increased.

Turning out → Free play is decreased.

- Tighten the locknut.

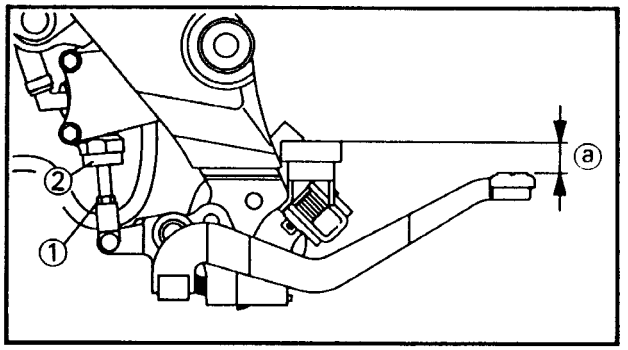
⚠CAUTION:

Make sure that the brake does not drag after adjusting it.

⚠WARNING:

A soft or spongy feeling in the brake lever can indicate the presence of air in the brake system. This air must be removed by bleeding the brake system before the motorcycle is operated.

Air in the system will cause greatly diminished braking capability and can result in loss of control and an accident. Inspect and bleed the system if necessary.



REAR BRAKE ADJUSTMENT

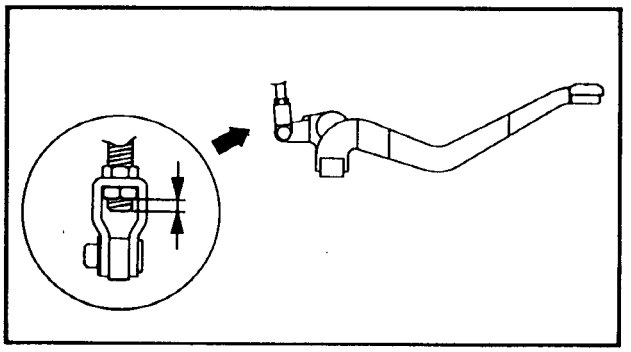
1. Check:
   - Brake pedal height ⓐ
     Out of specification → Adjust.

Brake pedal height:
15 mm (0.6 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.

Turning in → Pedal height is increased.
Turning out → Pedal height is decreased.



⚠WARNING:

After adjusting the brake pedal height, visually check the adjuster end. The adjuster end must appear within 6.25 mm (0.25 in).

- Tighten the locknut.

Locknut:
18 Nm (1.8 m•kg, 13 ft•lb)

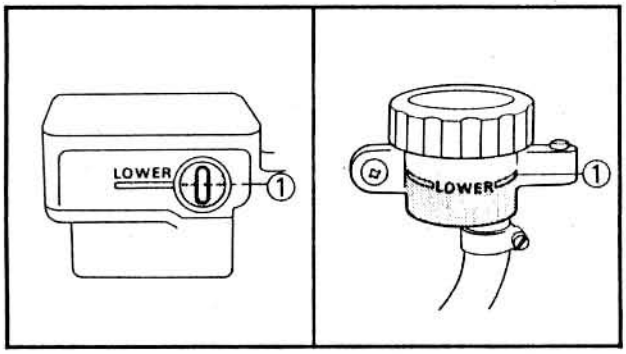
⚠CAUTION:

Make sure that the brake does not drag after adjusting it.

⚠WARNING:

A soft or spongy feeling in the brake pedal can indicate the presence of air in the brake system. This air must be removed by bleeding the brake system before the motorcycle is operated. Air in the system will cause greatly diminished braking capability and can result in loss of control and an accident. Inspect and bleed the system if necessary.

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



BRAKE 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 a centerstand is equipped. If not, place a suitable stand under the motorcycle.

2. Inspect:
   - Fluid level

   Fluid level is under "LOWER" level line ①→Replenish.

Recommended fluid:
Front: DOT No.4 or DOT No. 3
Rear: DOT No. 4

NOTE:

(Front brake fluid only)
If DOT #4 is not available, DOT #3 can be used.

NOTE:

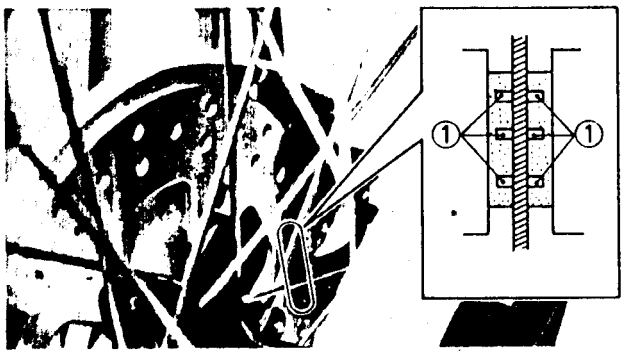
When inspecting the fluid level of the reservoir at the handlebars, make sure the master cylinder top is horizontally level.

⚠CAUTION:

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

⚠WARNING:

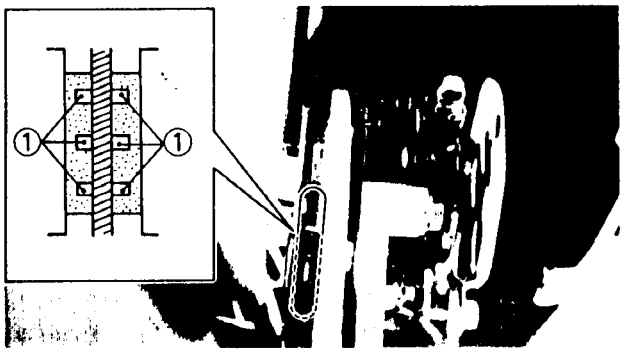
- **Use only the designated quality fluid: otherwise, the rubber seals may deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of fluid; mixing fluids may result in a harmful chemical reaction and lead to poor performance.**
- **Be careful that water does not enter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

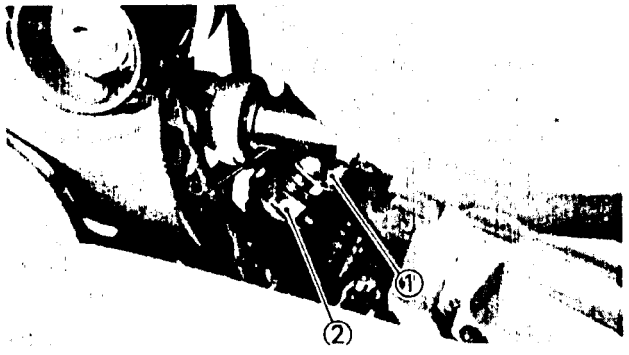


Refer to the "BRAKE PAD REPLACEMENT" section in the CHAPTER 7.

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. Check:
   - Brake light operating timing
     Incorrect → Adjust

2. Adjust:
   - Brake light operating timing

Adjustment steps:
- Hold the main body ① of the switch with your hand so that it does not rotate, and turn the adjuster in or out ② until the operating timing is correct.

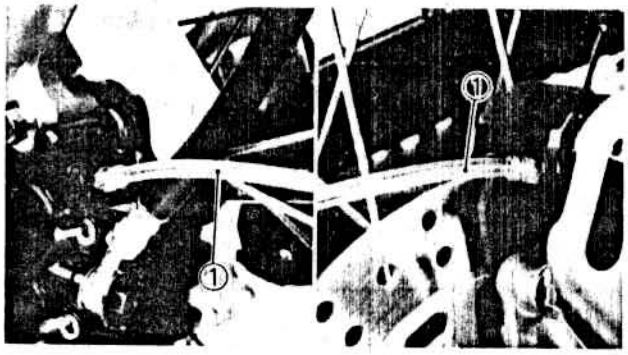
AIR BLEEDING (HYDRAULIC BRAKE SYSTEM)

⚠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.**

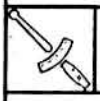
A loss of braking performance may occur if the brake system is not properly bled.

1. Bleed:
   - Brake fluid



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 caliper bleed screw.
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:
5 Nm (0.5 m•kg, 3.6 ft•lb)

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

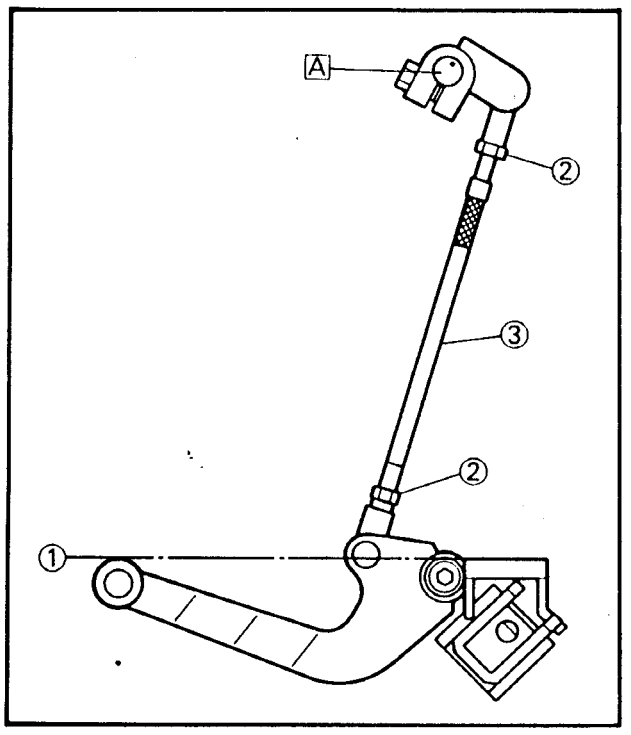
NOTE:

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

j. Add brake fluid to proper level.

⚠WARNING:

Check the operation of the brake after bleeding the brake system.



CHANGE PEDAL ADJUSTMENT

1. Check:
   - Change pedal position
     When looking at the side view the top of the change pedal should be even with the top of the footrest ①. (Also align slot [A] of shift lever with punch mark on the shaft.)

     Not even→Adjust

2. Adjust:
   - Change pedal→position.

Adjustment steps:
- Loosen both locknuts ②
- Turn the adjuster rod ③ in or out until adjustment is suitable.
- Tighten the both locknuts.

DRIVE CHAIN SLACK ADJUSTMENT

NOTE:

Before checking and/or adjusting, rotate the rear wheel several revolutions and check slack at several points to find the tightest point. Check and/or adjust the chain slack with the rear wheel in this "tightest" position.

⚠CAUTION:

Too little of chain slack will overload the engine and other vital parts; keep the slack within the specified limits.

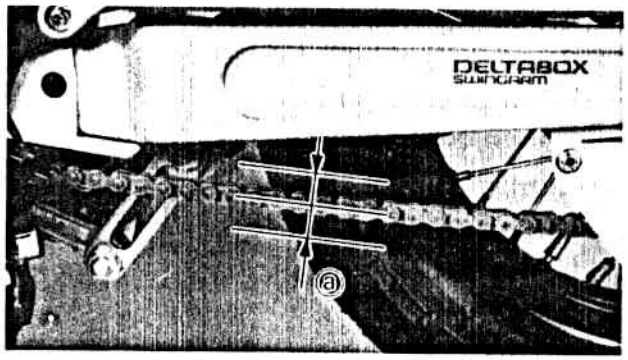
⚠WARNING:

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

1. Place the motorcycle on a level surface.

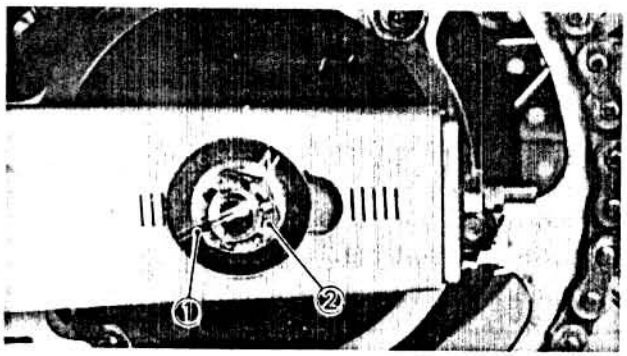
NOTE:

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



2. Check:
   • Drive chain slack ⓐ
   Out of specification → Adjust

	Drive chain slack: **25 ~ 35 mm (1.0 ~ 1.4 in)**



3. Remove:
   • Cotter pin ①

4. Loosen:
   • Axle nut ②

5. Adjust:
   • Drive chain slack

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

Turning in → Slack is increased.

Turning out → Slack is decreased.

NOTE:

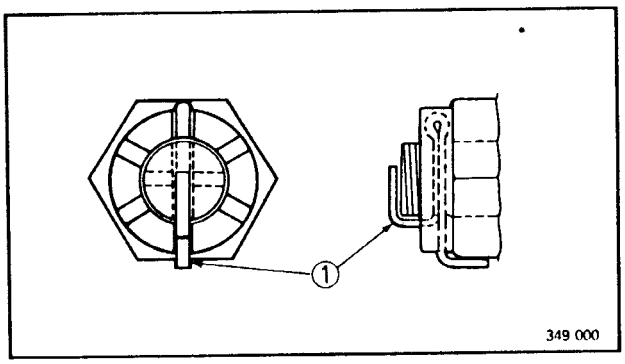
Turn each adjuster exactly the same amount to maintain correct axle alignment. (There are marks on each side of swingarm and on each chain puller; use them to check for proper alignment.)

- Tighten the axle nut to specification, while pushing up or down on the chain to zero slack.

	Axle nut: **90 Nm (9.0 m•kg, 65 ft•lb)**

- Tighten the locknut.

	Locknut: **7 Nm (0.7 m•kg, 5 ft•lb)**



6. Install:
   • Cotter pin ①

⚠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.

⚠WARNING:

Always use a new cotter pin.

DRIVE CHAIN LUBRICATION

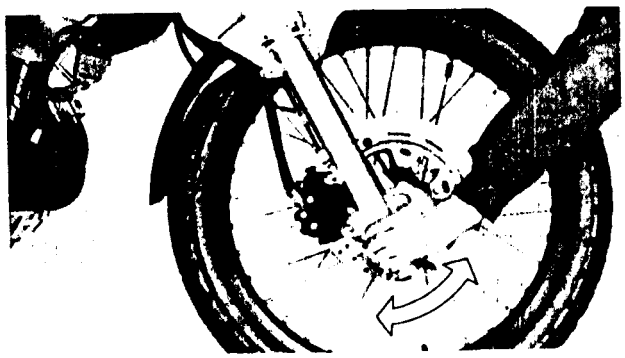
The chain consists of many parts which work against each other. If the chain is not maintained properly, it will wear out rapidly, therefore, form the habit of periodically servicing the chain. This service is especially necessary when riding in dusty conditions.

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.

STEERING HEAD ADJUSTMENT

⚠WARNING:

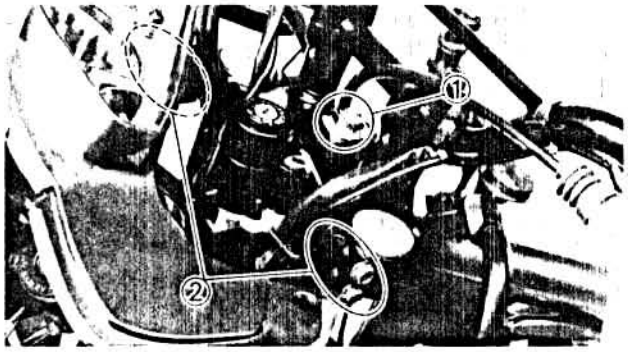
Securely support the motorcycle so there is no danger of it falling over.

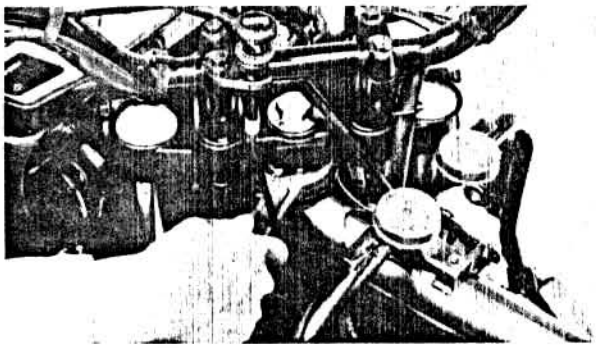


1. Elevate the front wheel by placing a suitable stand under the engine.
2. Check:
   • Steering assembly bearings
   Grasp the bottom of the forks and gently rock the fork assembly back and forth.
   Looseness→Adjust steering head.

3. Remove:
   • Front wheel
   Refer to the "FRONT WHEEL" section in the CHAPTER 7.

4. Adjust:
   • Steering head





Adjustment steps:
- Loosen the bolt ① (steering shaft) and bolt ② (handlebar crown).
- Tighten the ring nut using the Ring nut wrench.

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

Ring nut wrench:
90890-01268

Ring nut (initial tightening):
38 Nm (3.8 m•kg, 27 ft•lb)

- Loosen the ring nut one turn.
- Retighten the ring nut using the Ring nut wrench.

⚠WARNING:
Avoid over-tightening.

Ring nut (final tightening):
6 Nm (0.6 m•kg, 43 ft•lb)

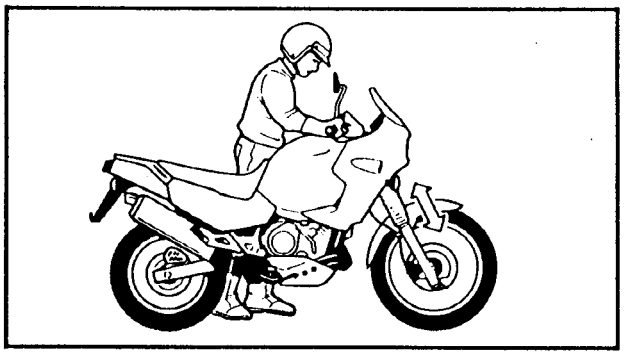
NOTE:
Recheck the steering head by turning the steering from lock to lock, after adjusting steering head.
If steering is binded, loosen the ring nut but not to the extent of free play in bearing.
If steering is loose, repeat the adjustment steps.

- Tighten the bolt (steering shaft) and bolt (handlebar crown).

Bolt (steering shaft):
80 Nm (8.0 m•kg, 58 ft•lb)
Bolt (handlebar crown):
23 Nm (2.3 m•kg, 17 ft•lb)

5. Install:
   • Front wheel
   Refer to the "FRONT WHEEL" section in the CHAPTER 7.





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
   Scratch/Damage → Replace.
   • Oil seal
   Excessive oil leakage → Replace.

3. Hold the motorcycle on upright position and apply the front brake.

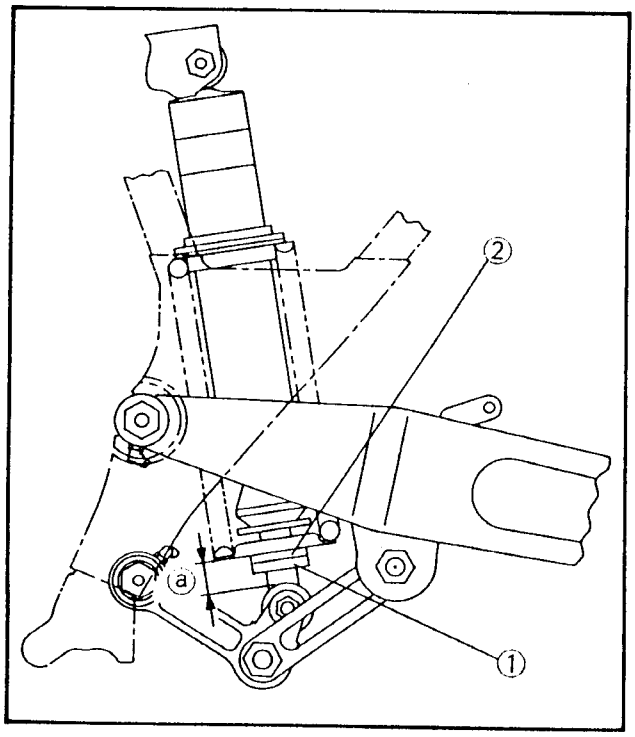
4. Check:
   • Operation
   Pump the front fork up and down for several times.
   Unsmooth operation → Repair.
   Refer to the "FRONT FORK" section in the CHAPTER 7.

REAR SHOCK ABSORBER ADJUSTMENT

⚠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. Adjust:
   • Spring preload

Adjustment steps:
- Loosen the locknut ①.
- Turn the adjuster ② in or out.

Turning in→Spring preload is increased.
Turning out→Spring preload is decreased.

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

Measurement length ⓐ:
Standard:
5.5 mm (0.22 in)
Maximum:
15.5 mm (0.58 in)

⚠CAUTION:

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

- Tighten the locknut.

Locknut:
4.2 Nm (4.2 m•kg, 30 ft•lb)

NOTE:
When adjusting, use the special wrench and extension bar which are included in the owner's tool kit.

TIRE INSPECTION

1. Measure:
   - Tire pressure

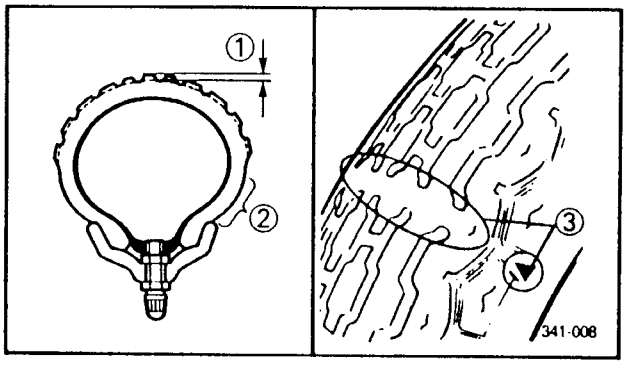
   Out of specification → Adjust.

⚠WARNING:

- Tire inflation pressure should be checked and adjusted when the temperature of the tire equals the ambient air temperature. Tire inflation pressure must be adjusted according to total weight of cargo, rider, passenger, and accessories (fairing, saddlebags, etc. if approved for this model), and vehicle speed.
- Proper loading of your motorcycle is important for the handling, braking, and other performance and safety characteristics of your motorcyle. Do not carry loosely packed items that can shift. Securely pack your heaviest items close to the center of the motorcycle, and destribute the weight evenly from side to side. Properly adjust the suspension for your load, and check the condition and pressure of your tires. NEVER OVERLOAD YOUR MOTORCYCLE. Make sure the total weight of the cargo, rider, passenger, and accessories (fairing, saddlebags, etc. if approved for this model) does not exceed the maximum load of the motorcycle. Operation of an overloaded motorcycle could cause tire damage, an accident, or even injury.

Basic weight: With oil and full fuel tank	226 kg (498 lb)	
Maximum load*	184 kg (406 lb)	
Cold tire pressure	Front	Rear
Up to 90 kg (198 lb) load*	225 kPa (2.25 kg/cm^2, 33 psi)	225 kPa (2.25 kg/cm^2, 33 psi)
90 kg (198 lb) ~ Maximum load*	225 kPa (2.25 kg/cm^2, 33 psi	250 kPa (2.50 kg/cm^2, 36 psi)
High speed riding	225 kPa (2.25 kg/cm^2, 33 psi)	250 kPa (2.50 kg/cm^2, 36 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)

① Tread depth
② Side wall
③ Wear indicator

⚠WARNING:

- **It is dangerous to ride with a wornout tire. When a tire tread begins to show lines, replace the tire immediately.**
- **Patching a punctured tube is not recommended. If it is absolutely necessary to do so, use great care and replace the tube as soon as possible with a good quality replacement.**
- **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.**

Tube type wheel → Tube type tire only
Tubeless type wheel → Tube type or tubeless tire

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

⚠WARNING:

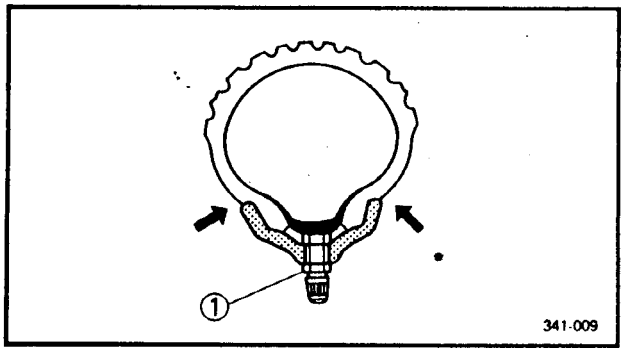
After extensive tests, the tires mentioned below have been approved by Yamaha motor Co., Ltd. for this model. No guarantee for handling characteristics can be given if tire combinations other than what is approved are used on this motorcycle. The front and rear tires should be of the same manufacture and design.

FRONT:

Manufacture	Size	Type
BRIDGESTONE	90/90-21 54H	TW47

REAR:

Manufacture	Size	Type
BRIDGESTONE	140/80-17 69H	TW48



⚠WARNING:

- **After mounting a tire, ride conservatively to allow proper tire to rim seating. Failure to do so may cause an accident resulting in motorcycle damage and possible operator injury.**
- **After a tire repair or replacement, be sure to torque tighten the valve stem locknut ① to specification.**

Valve-stem locknut:
1.5 Nm (0.15 m•kg, 1.1 ft•lb)

WHEEL INSPECTION

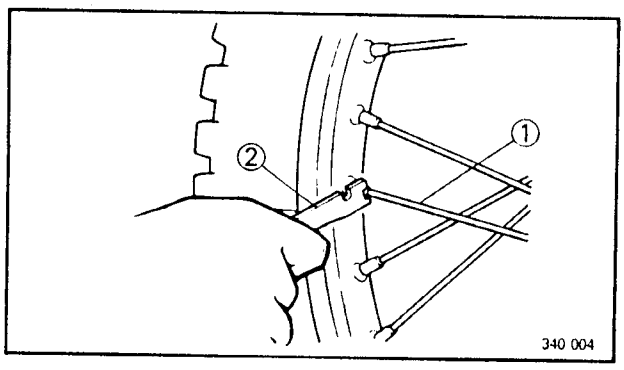
1. Inspect:
   - Wheels
     Damage/Bends→Replace.

NOTE:

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

⚠WARNING:

Never attempt even small repairs to the wheel.



SPOKES INSPECTION AND TIGHTENING

1. Inspect:
   - Spokes ①
     Bend/Damage → Replace.
     Loose spoke → Retighten.
2. Tighten:
   - Spokes

② Spoke wrench

NOTE:

Be sure to retighten these spokes before and after brake-in.

Nipple:
2.8 Nm (0.28 m•kg, 1.57 ft•lb)

CABLE INSPECTION AND LUBRICATION

⚠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
     Damage → Replace.
2. 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.

LEVER AND PEDAL LUBRICATION

Lubricate the lever and pedal at their pivoting points.

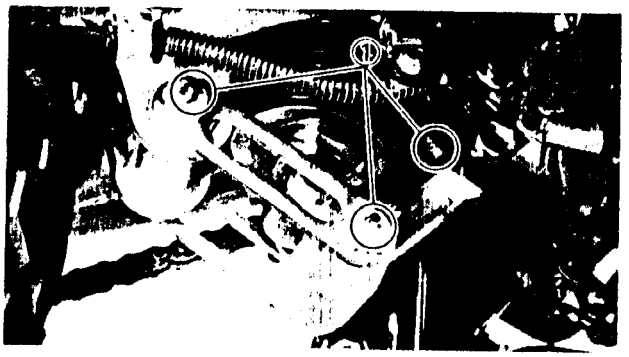
Recommended lubricant:
SAE 10W30 motor oil

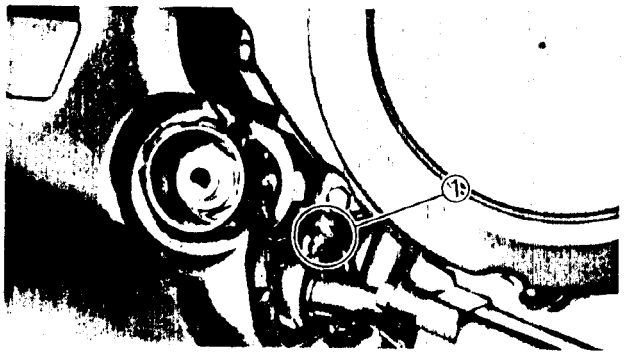
INSP ADJ

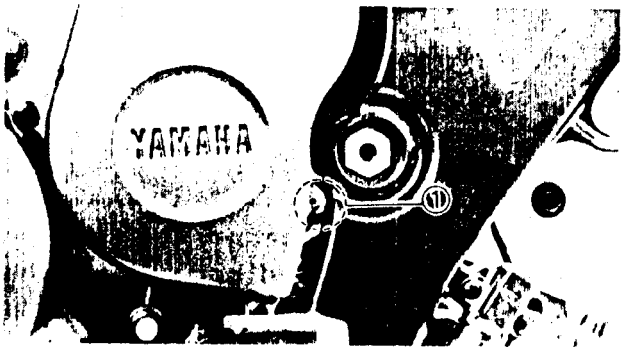
SIDESTAND LUBRICATION

Lubricate the sidestand at pivoting points.

	Recommended lubricant: **SAE 10W30 motor oil**







REAR SUSPENSION LUBRICATION

Lubricate the swingarm and relay arms at their pivoting points.

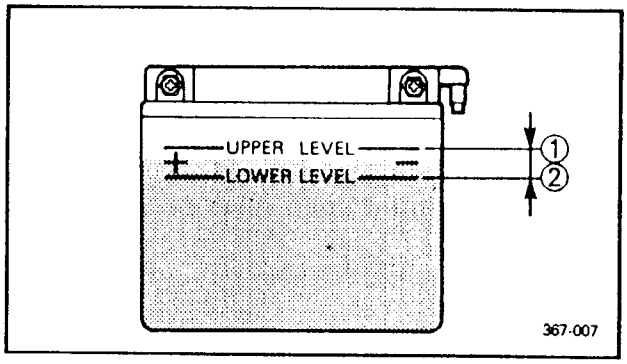
	Recomended lubricant: **Lithium soap base grease**

① Grease nipple

ELECTRICAL

BATTERY INSPECTION

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

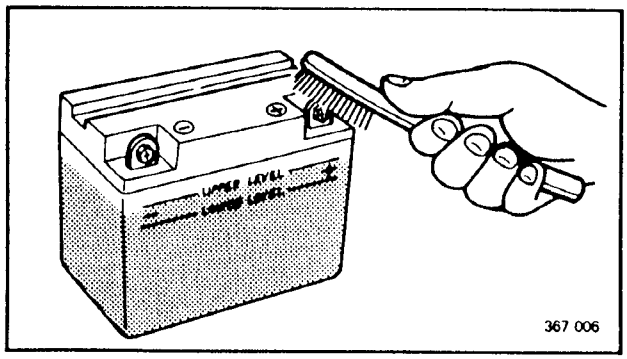


2. Inspect:
   - Fluid level

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

⚠CAUTION:

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



3. Inspect:
   - Battery terminal

   Dirty terminal → Clean with wire brush.
   Poor connection → Correct.

NOTE:

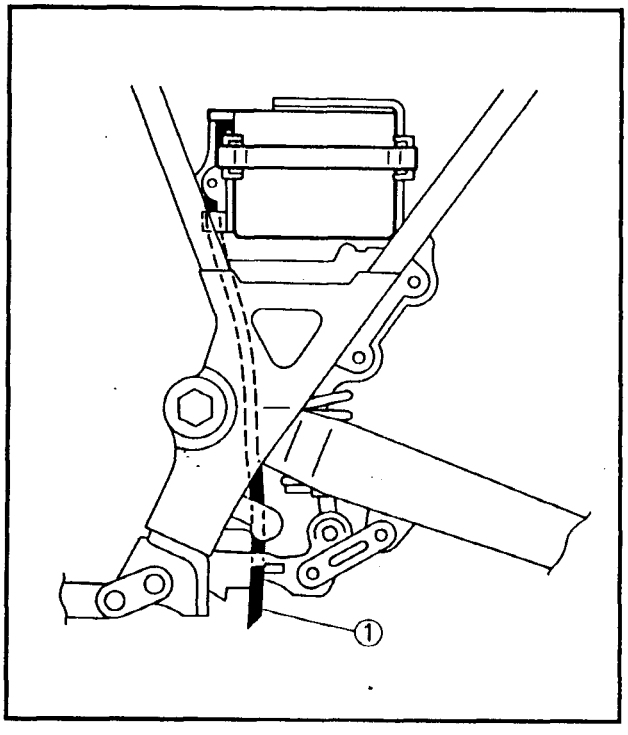
After cleaning the terminals, apply grease lightly to the terminals.

4. Inspect:
   - Breather hose

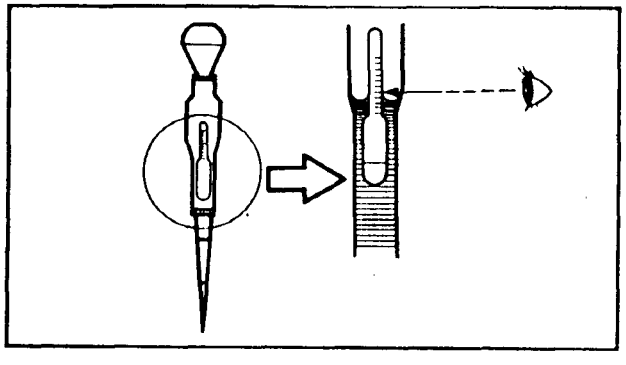
   Obstruction → Remove.
   Damage → Replace.

⚠CAUTION:

When inspecting the battery, be sure the breather hose is routed correctly. If the breather hose 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.



5. Connect:
   • Breather hose ①
   Pass the breather hose between the left side of the relay arm and in front of the swingram.



6. Check:
   • Specific gravity
   Less than 1.280→Recharge battery.

Charging current:
0.4 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 severe 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 agg, 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.

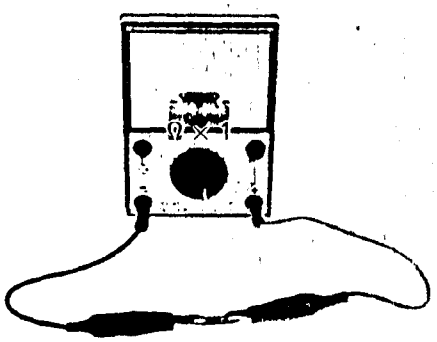
KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.

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

FUSE INSPECTION

⚠CAUTION:

Don't forget to turn off the main switch when checking or replacing the fuse. Otherwise, it may cause accidental shortcircuiting.



1. Inspect:
   • Fuse

Inspection steps:
• Connect the Pocket Tester to the fuse and check it for continuity.

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

Pocket tester:
90890-03112

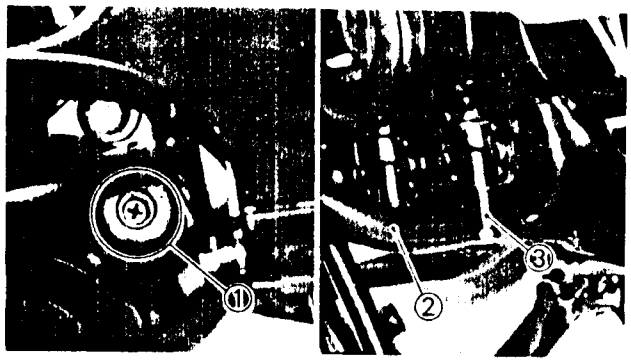
• If the tester is indicated at ∞. The fuse is blown, replace it.

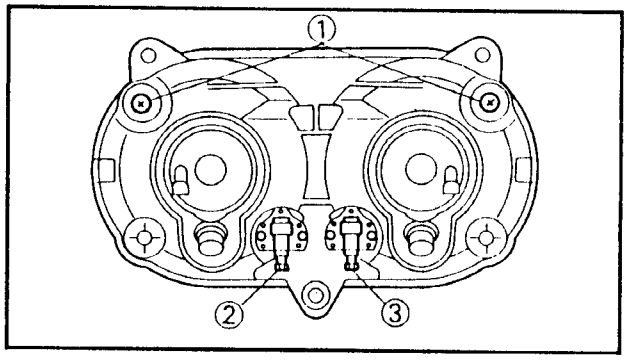
2. Replace:
   • Blown fuse

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

⚠WARNING:

Never use a fuse with a rating other then specified, or other material in place of a fuse. An improper fuse may cause damage to the electrical system and possibly cause a fire, or the lighting and/or ignition may cease to function.





HEADLIGHT BEAM ADJUSTMENT

1. Adjust
   - Headlight beam (vertical)

To raise the beam	Turn the adjuster ① clockwise.
To lower the beam	Turn the adjuster ① counterclockwise.

2. Adjust
   - Headlight beam (horizontal)

(Left)

To right the beam	Turn the adjuster ② clockwise.
To left the beam	Turn the adjuster ② counterclockwise.

(Right)

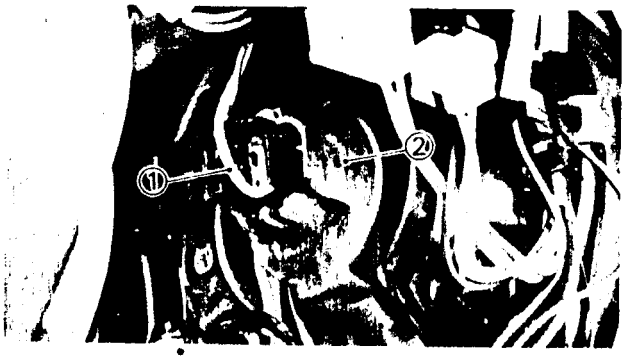
To right the beam	Turn the adjuster ③ counterclockwise.
To left the beam	Turn the adjuster ③ lockwise.

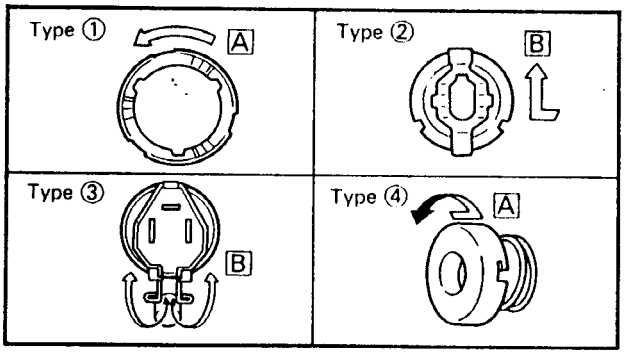
Headlight beam variation

☼ , ☼ : LIGHT "ON"
○ : LIGHT "OFF"

Destination	Lighting		Headlight type	Bulb to be used
Germany Sweden Belgium	HI	☼ ○ A	Quartz bulb	12V 55W ○ 12V 60/55W ○ 12V 4W
	LO	○ ☼ A		
England	HI	A ☼ ☼ A	Quartz bulb	12V 3.4W ○ 12V 35/35W ○ 12V 35/35W ○ 12V 3.4W
	LO	A ☼ ☼ A		
Finland Holland	HI	☼ ☼ A	Bulb	12V 45/40W ○ 12V 45/40W ○ 12V 4W
	LO	○ ☼ A		
Switzerland	HI	A ▭	Quartz bulb	12V 4W ○ 12V 60/55W
	LO	A ▭		
France	HI	☼ ☼ A	Quartz bulb	12V 55W ○ 12V 60/55W ○ 12V 4W
	LO	○ ☼ A		
Italy	HI	A ☼ ☼ A	Bulb	12V 3W ○ 12V 35/35W ○ 12V 35/35W ○ 12V 3W
	LO	A ☼ ☼ A		
Spain Denmark Norway	HI	☼ ☼ A	Bulb	12V 45/40W ○ 12V 45/40W ○ 12V 4W
	LO	☼ ☼ A		

A ... Auxiliary light





HEADLIGHT BULB REPLACEMENT

1. Disconnect:
   - Headlight leads ①
2. Remove:
   - Bulb cover ②
3. Remove:
   - Bulb

   Unhook the bulb.

⚠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.

[A] Turn
[B] Unhook

4. Install:
   - Bulb (new)

   Secure the new bulb with the bulb holder.

⚠CAUTION:

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

5. Install:
   - Bulb cover
6. Connect:
   - Headlight leads

CHAPTER 4.
ENGINE OVERHAUL

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ENGINE OVERHAUL

ENGINE REMOVAL

NOTE:

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

- Cylinder head
- Cylinder
- Piston
- Clutch
- Water pump
- AC generator

SIDE COVERS, SEAT, COWLINGS AND FUEL TANK

1. Remove:
   - Side covers
   - Seat
   - Side cowlings
   - Fuel tank

   Refer to the "SEAT, FUEL TANK AND COVER" section.

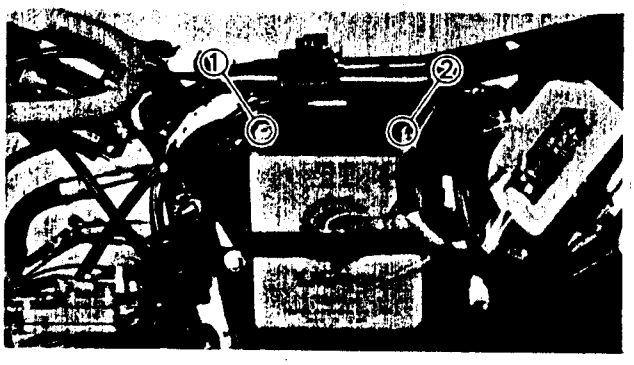
ENGINE OIL AND COOLANT

1. Drain:
   - Crankcase
   - Oil tank

   (of them oil)
   Refer to the "ENGINE OIL REPLACEMENT" section in the CHAPTER 3.

2. Drain:
   - Radiator
   - Recovery tank
   - Crankcase

   (of them coolant)
   Refer to the "COOLANT REPLACEMENT" section in the CHAPTER 3.

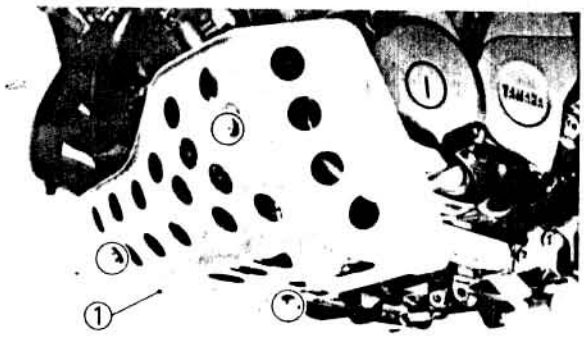


BATTERY LEADS

1. Disconnect:
   - Battery leads

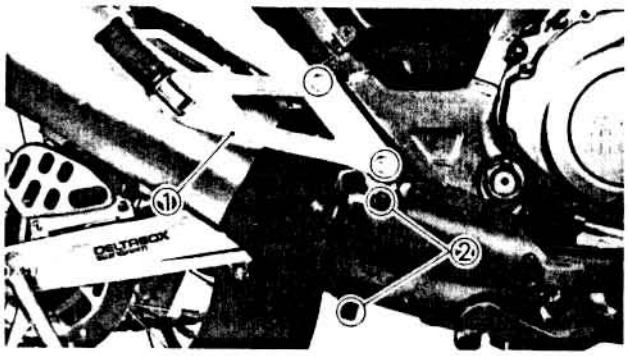
⚠CAUTION:

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



ENGINE GUARD

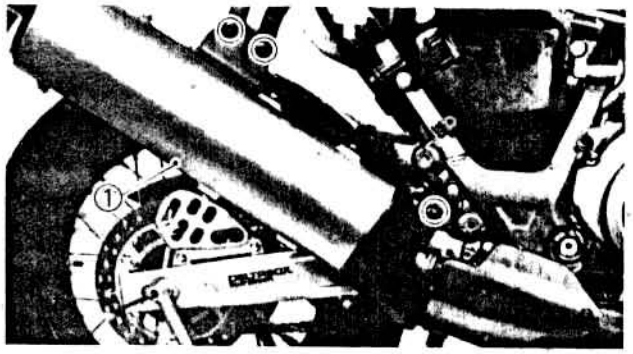
1. Remove:
   - Engine guard ①



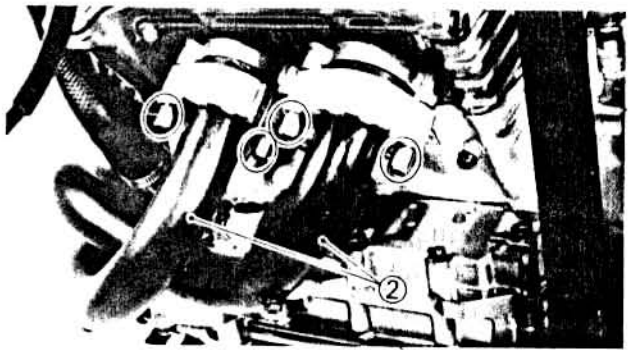
EXHAUST PIPES AND MUFFLER

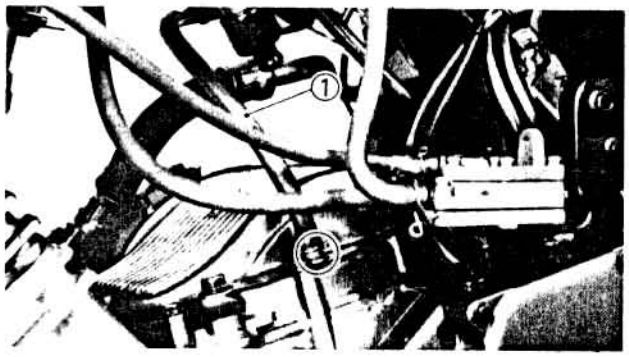
1. Remove:
   - Footrest ①

2. Loosen:
   - Bolt ② (clamp)



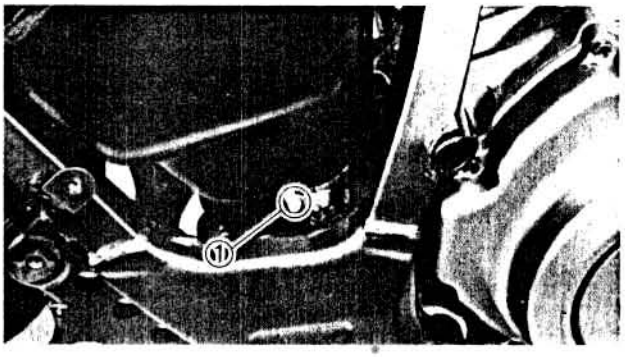
3. Remove:
   - Muffler ①
   - Exhaust pipes ②



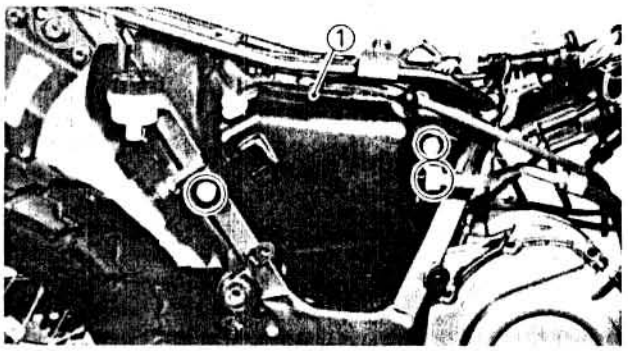


OIL TANK

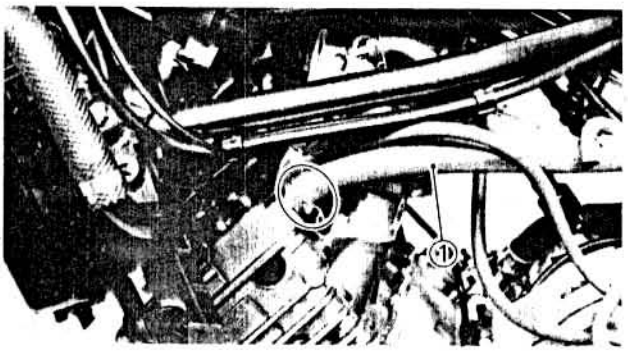
1. Disconnect:
   - Breather hose ①
     (from crankcase)



2. Loosen:
   • Screw ① (hose clamp)

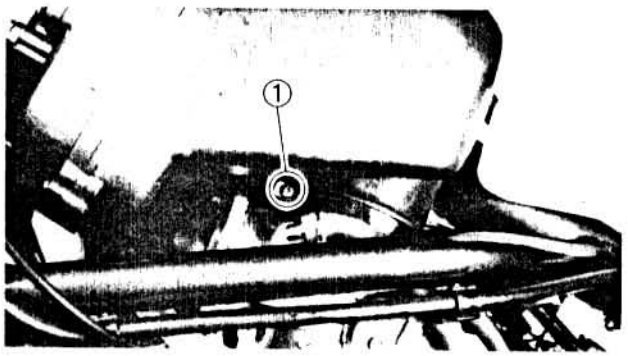


3. Remove:
   • Oil tank ①

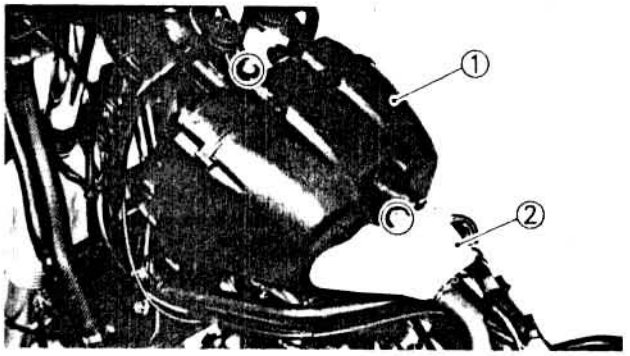


AIR FILTER CASE AND CARBURETOR

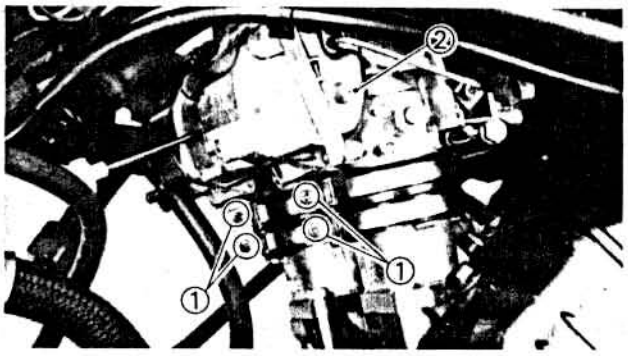
1. Disconnect:
   • Breather hose ①
   (from cylinder head)



2. Loosen:
   • Screws ① (carburetor joints)



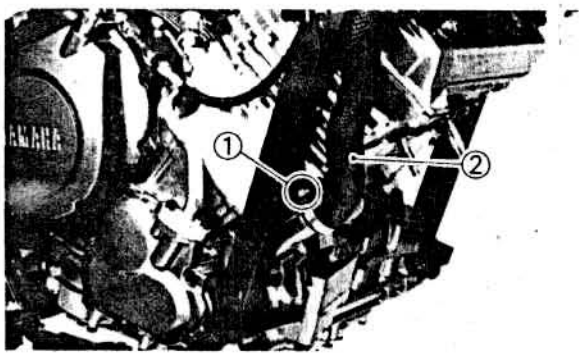
3. Remove:
   • Air filter case ①
   (with oil catcher ② as one unit)



4. Loosen:
   • Screws ① (intake manifold)
5. Disconnect:
   • Carburetors ②
   (from intake manifold)

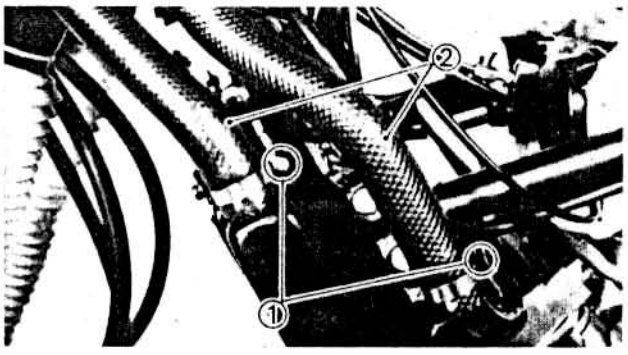
NOTE:

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

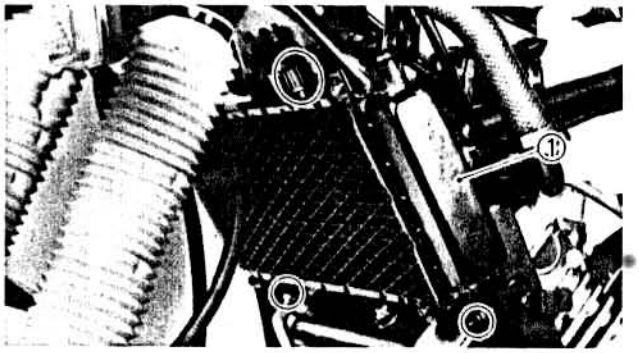


RADIATOR

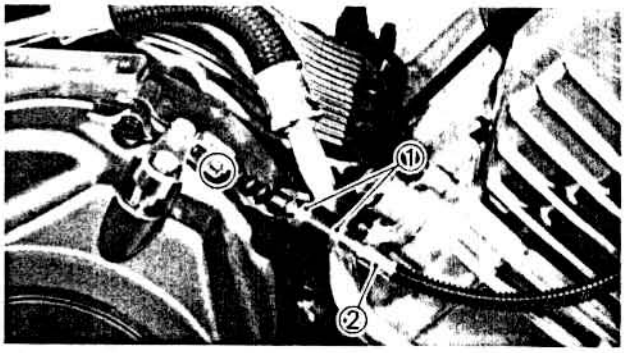
1. Loosen:
   • Screw ① (hose clamp)
2. Disconnect:
   • Radiator hose ②
   (from warter pump)



3. Loosen:
   • Screws ① (hose clamps)
4. Disconnect:
   • Radiator hoses ②

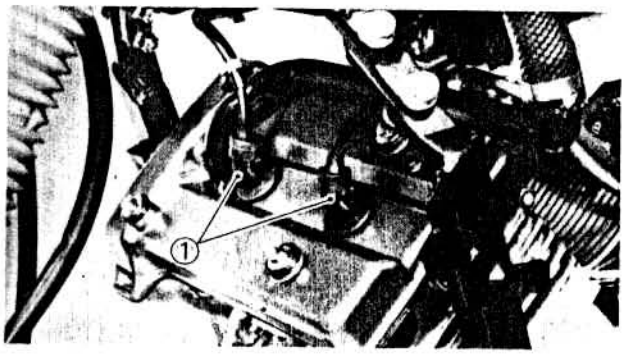


5. Remove:
   • Radiator ①

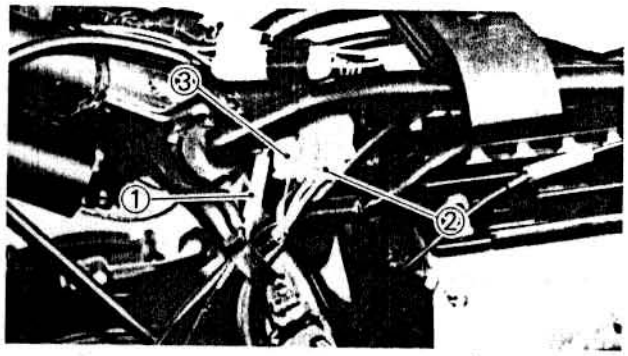


CABLES AND LEADS

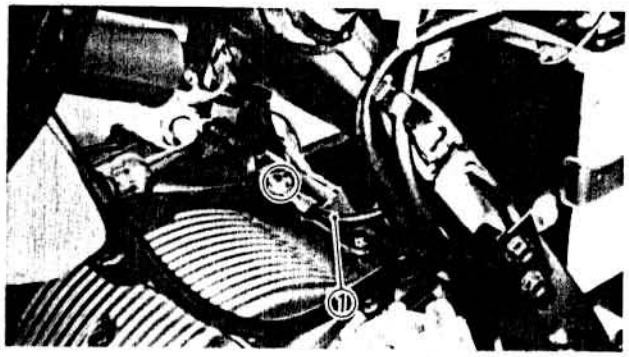
1. Loosen:
   • Nuts ①
2. Disconnect:
   • Clutch cable ②
   (from pull lever)



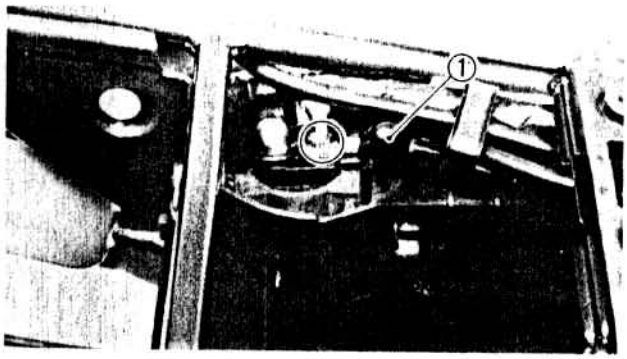
3. Disconnect:
   • Spark plug leads ①
   (from spark plugs)



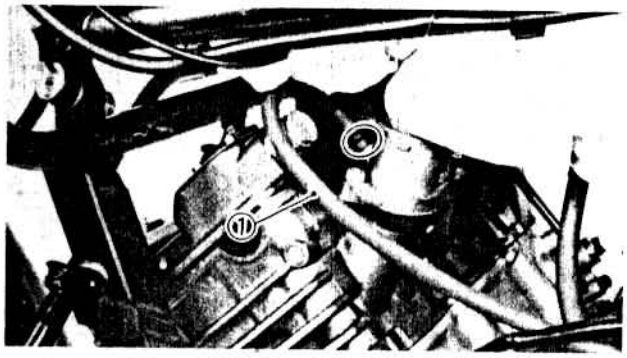
4. Disconnect:
   • Neutral switch lead ①
   • AC magneto leads ②
   • Pickup coil leads ③



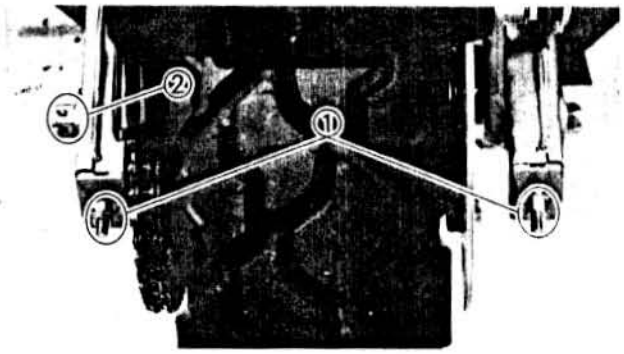
5. Disconnect:
   • Ground lead ①
   (from crankcase cover)



6. Disconnect:
   • Starter motor lead ①
   (from starter relay)

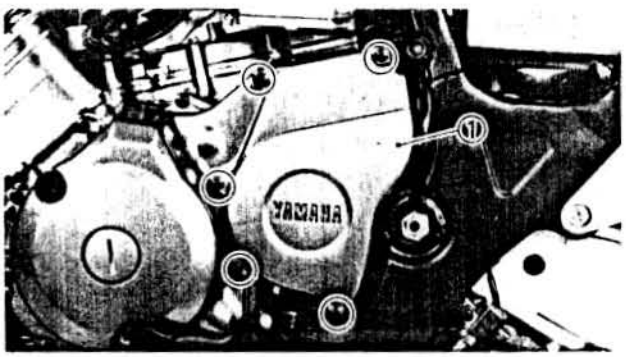


7. Disconnect:
   • Vacuum hose ①
   (from intake manifold)

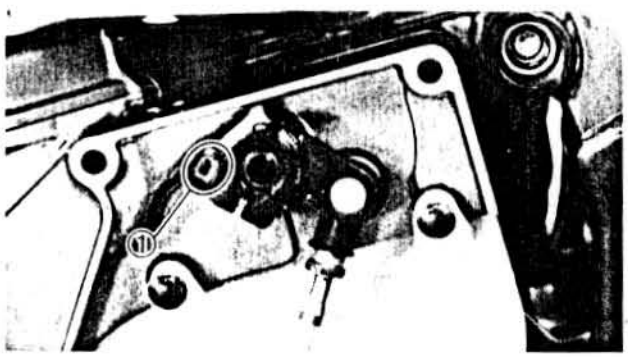


DRIVE CHAIN

1. Loosen:
   - Nuts ① (chain pullers)
   - Axle nut ②

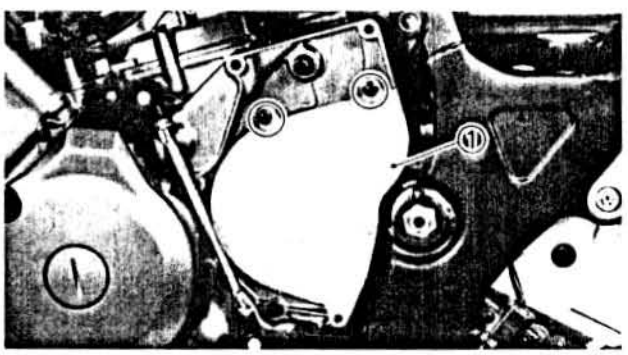


2. Remove:
   - Cover ①

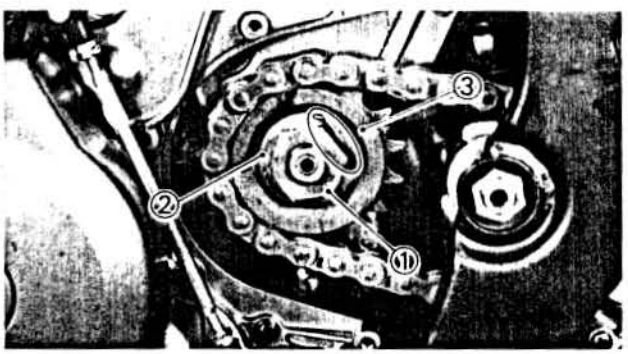


3. Remove:
   - Bolt ① (shift rod)

4. Disconnect:
   - Shift rod (from shift shaft)



5. Remove:
   - Sprocket cover ①



6. Straighten:
   - Lock washer tab

7. Remove:
   - Nut ①
   - Lock washer ②
   - Drive sprocket ③

NOTE:

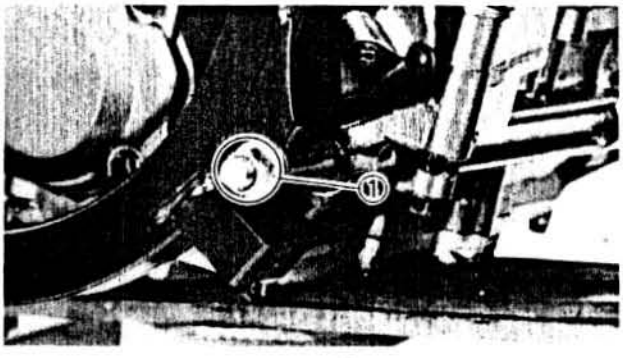
Loosen the nut while applying the rear brake.

ENGINE REMOVAL

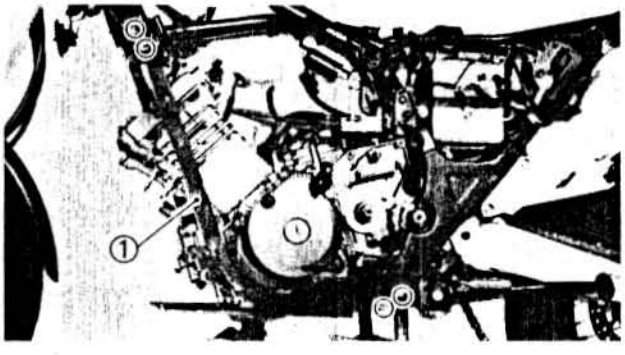
1. Place suitable stands under the frame and engine.

⚠WARNING:

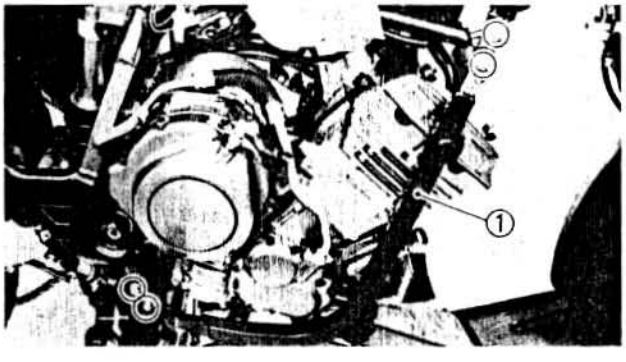
Securely support the motorcycle so there is no danger of it falling over.

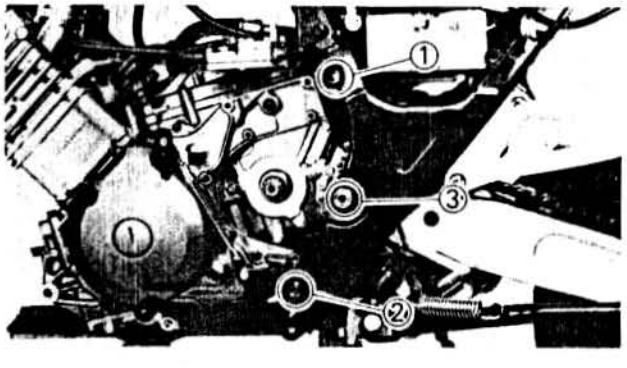


2. Remove:
   - Mounting bolt ① (front—lower)

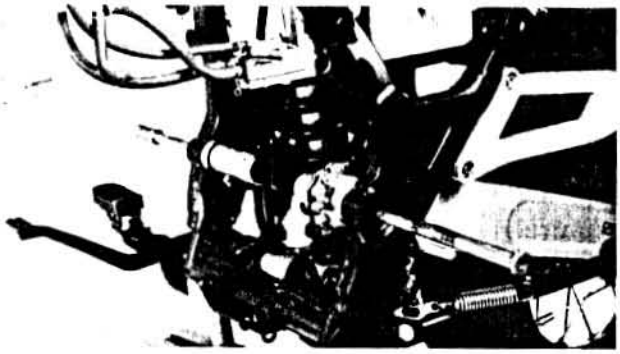


3. Remove:
   - Down tubes ①



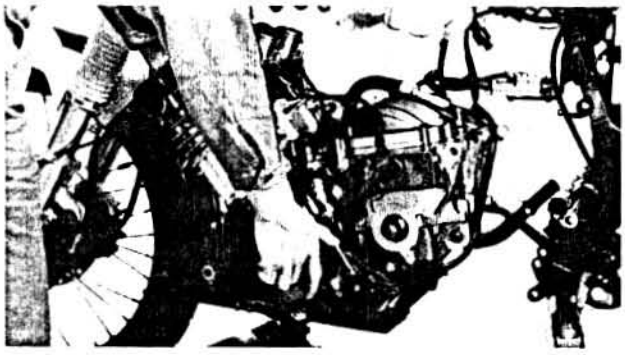


4. Remove:
   - Mounting bolt ① (rear—upper)
   - Mounting bolt ② (rear—lower)
   - Pivot shaft ③

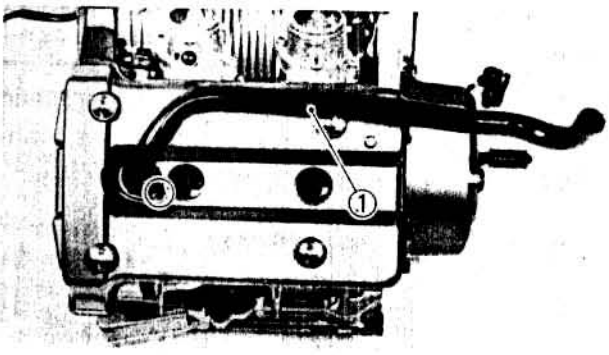


NOTE:

The engine and swingarm are installed using the same pivot shaft. Therefore, take care so that the pivot shaft is pulled, not entirely out, but for enough to set the engine free.



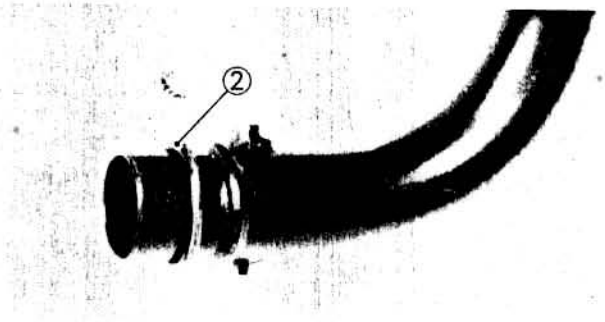
5. Remove:
   - Engine assembly
     (from left side of motorcycle)



ENGINE DISASSEMBLY

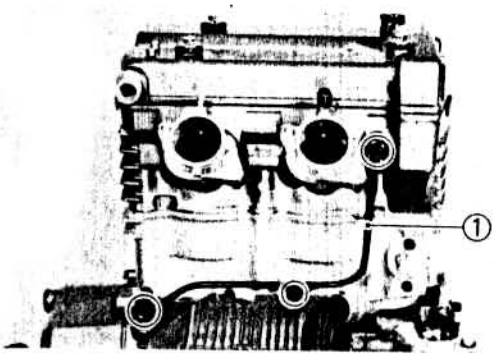
PIPES AND HOSES

1. Remove:
   - Coolant hose ①

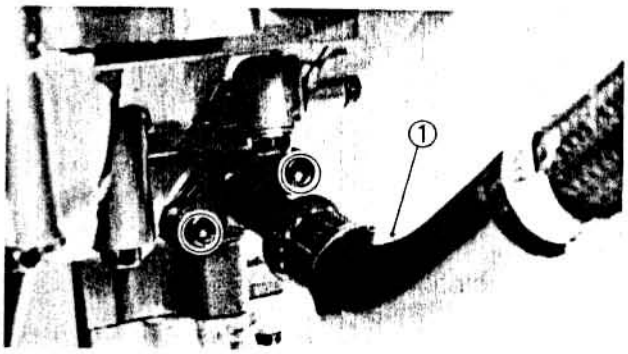


NOTE:

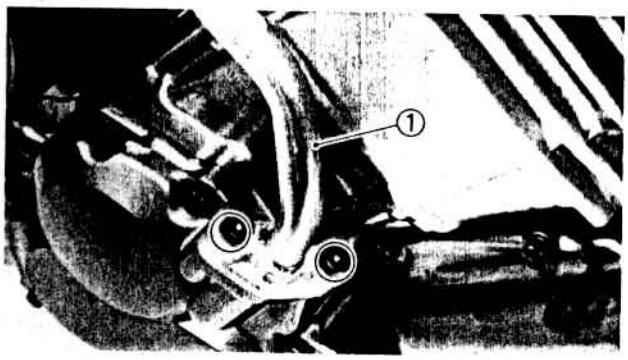
Do not fall the O-ring ② into the cylinder head when removing the coolant hose.



2. Remove:
   - Oil pipe ①



3. Remove:
   - Oil hose ①



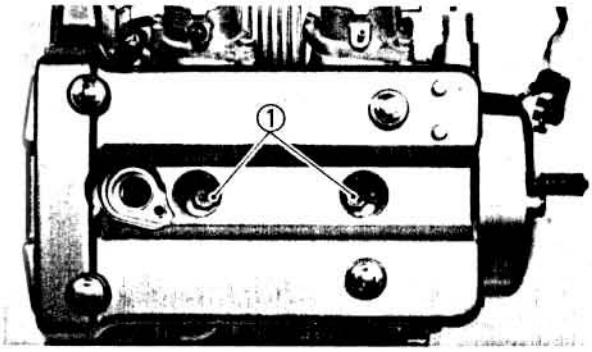
4. Remove:
   - Oil hose ①

CYLINDER HEAD, CYLINDER AND PISTONS

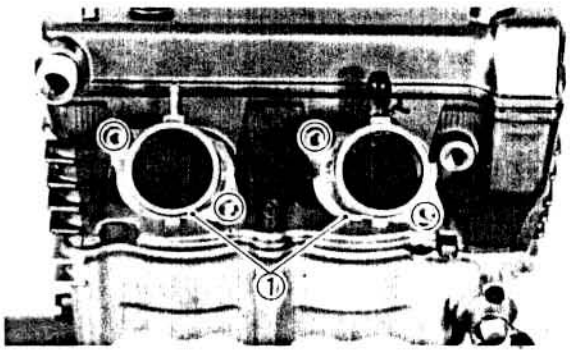
NOTE:

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

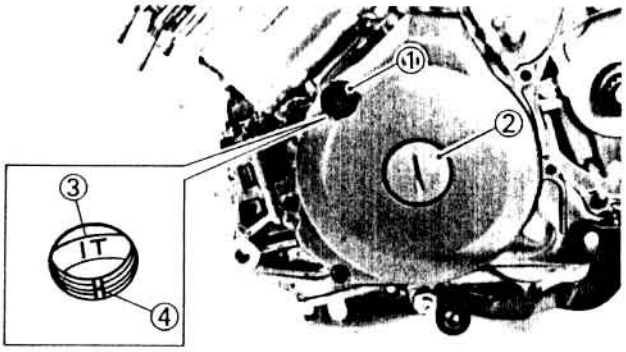
- Side cowlings
- Engine guard
- Fuel tank
- Air filter case
- Radiator
- Carburetor
- Exhaust pipes



1. Remove:
   - Spark plugs (1)

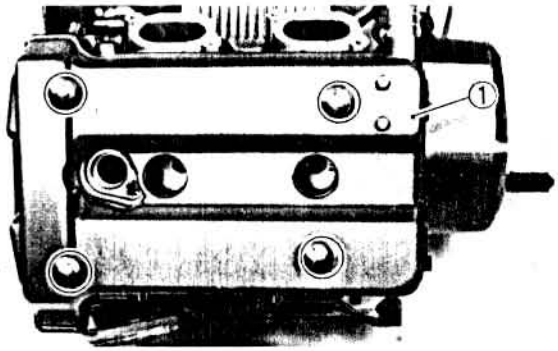


2. Remove:
   - Intake manifolds (1)



3. Remove:
   - Timing plug (1)
   - Plug (center) (2)

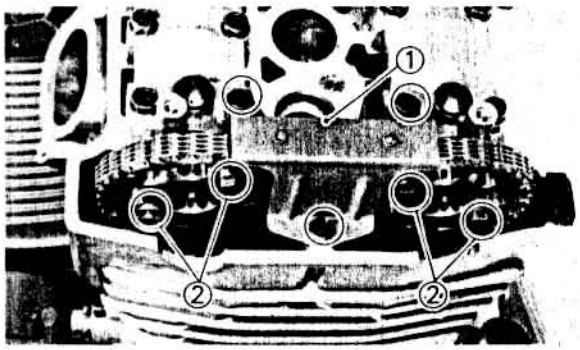
4. Turn:
   - Crankshaft
     (until TDC mark (3) is aligned with stationary pointer (4))



5. Remove:
   - Cylinder head cover (1)

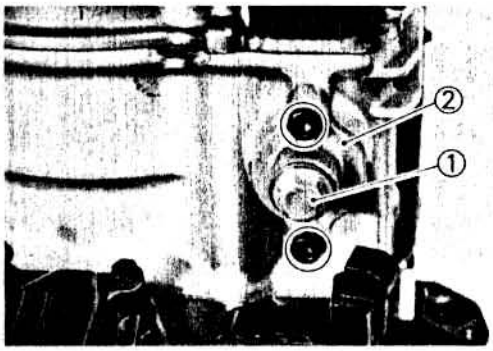
NOTE:

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



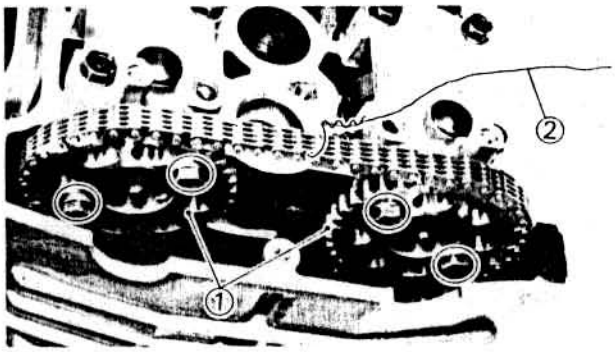
6. Remove:
   • Chain guide ① (upper)

7. Loosen:
   • Bolts ② (cam sprocket)



8. Loosen:
   • Cap bolt ① (chain tensioner)

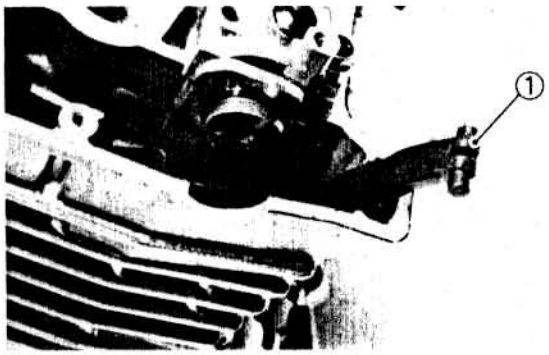
9. Remove:
   • Chain tensioner ②



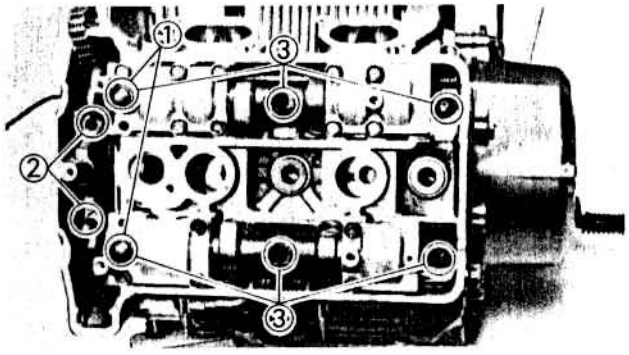
10. Remove:
    • Cam sprockets ①

NOTE:

Fasten a safety wire ② to the timing chain to prevent it from falling into the crankcase.



11. Remove:
    • Chain guide ① (exhaust)



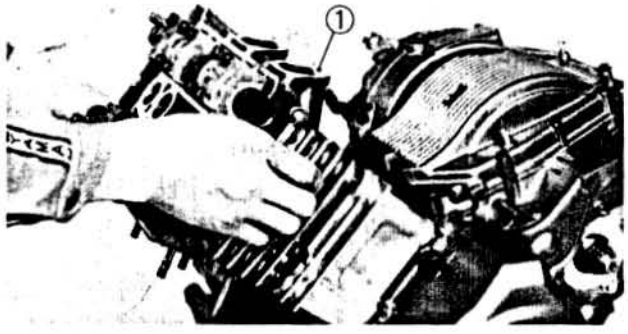
12. Remove:
    • Plugs ①
    • Bolts ②
    • Nuts ③

    Use the hexagon wrench (6 mm).

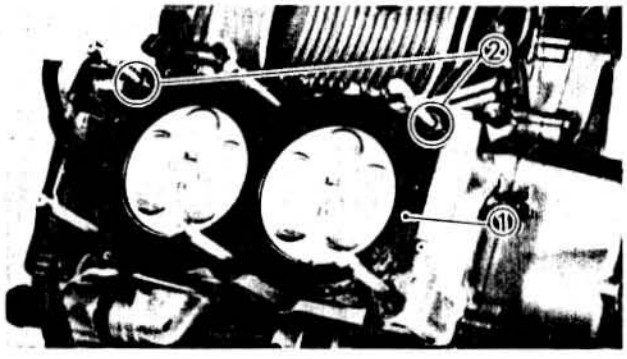
	Hexagon wrench: **90890-01395**

NOTE:

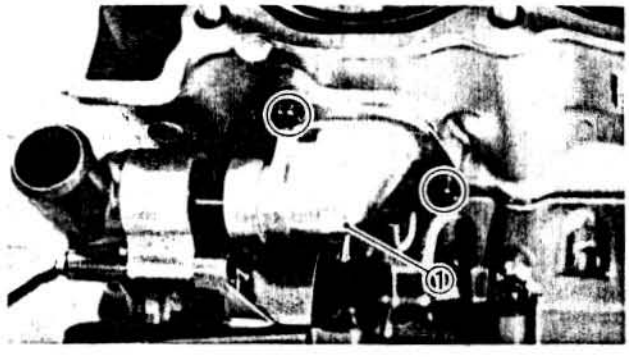
Working in a crisscross pattern, loosen the nuts 1/4 turn each. Remove them after all are loosened.



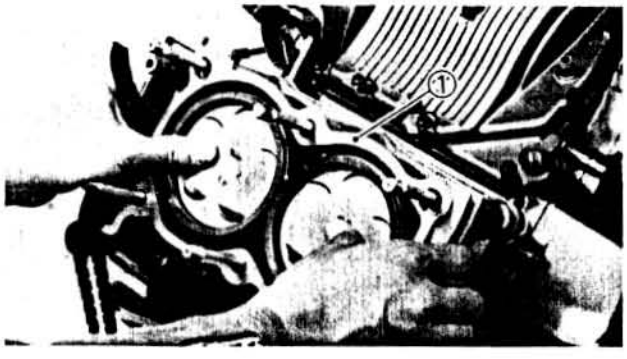
13. Remove:
    • Cylinder head ①



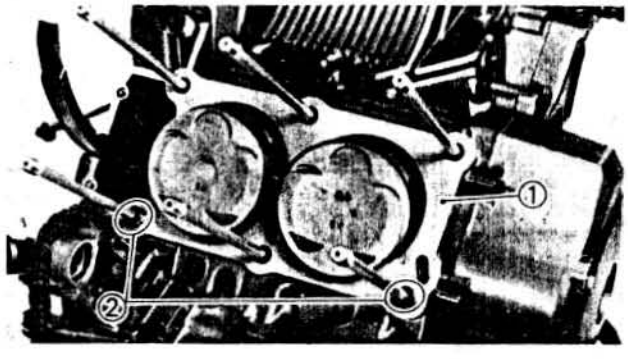
14. Remove:
    • Gasket ① (cylinder head)
    • Dowel pins ②



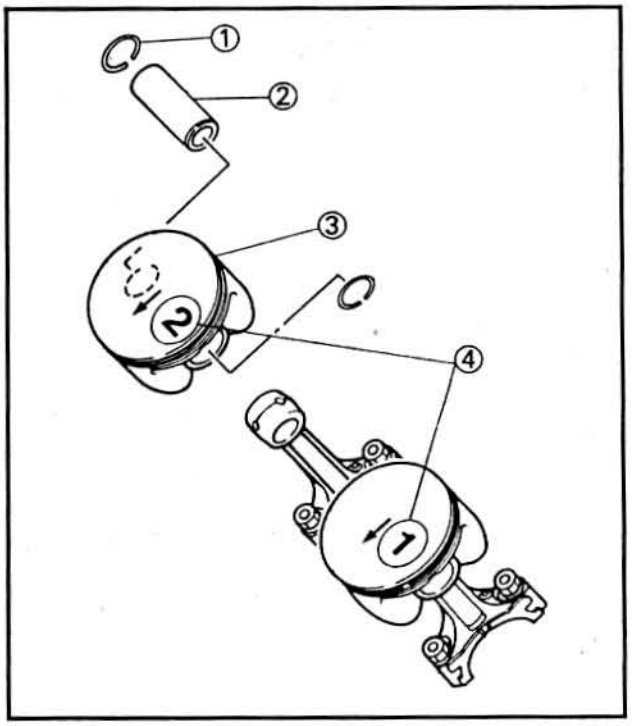
15. Remove:
    • Pipe ①



16. Remove:
    • Cylinder ①



17. Remove:
    • Gasket ① (cylinder)
    • Dowel pins ②



18. Remove:
    - Piston pin circlips ①
    - Piston pins ②
    - Pistons ③

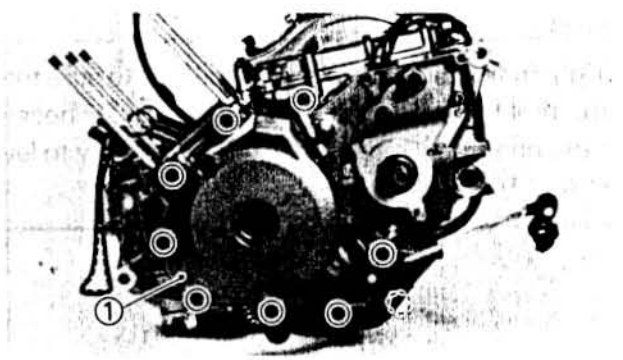
NOTE:

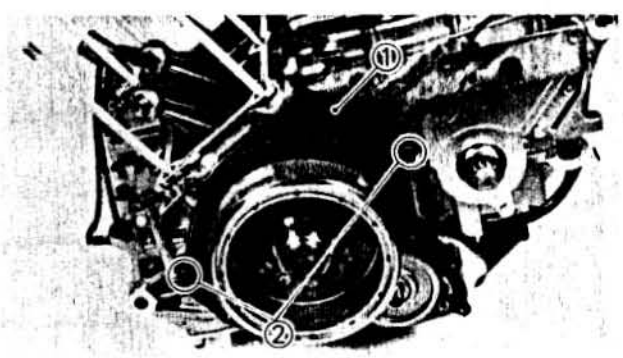
- Before removing the piston pin circlip, cover the crankcase with a clean rag to prevent the circlip from falling into the crankcase cavity.
- Before removing the piston pin, deburr the clip grooved and pin hole area. If the piston pin groove is deburred and piston pin is still difficult to remove, use the piston pin puller.
- Put identification mark ④ on the each piston head for reference during reinstallation.

	Piston pin puller: **90890-01304**

⚠CAUTION:

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





ROTOR AND STARTER DRIVES

NOTE:

With the engine mounted, the AC magneto and starter drives can be maintained by removing the following part.

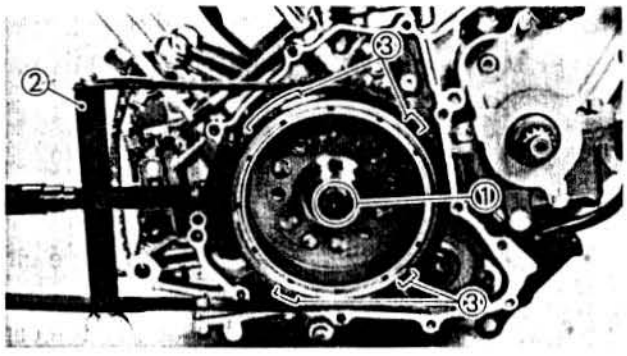
- Engine guard

1. Remove
    - Crankcase cover ① (left)

NOTE:

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

2. Remove:
    - Gasket ① (crankcase cover)
    - Dowel pins ②



3. Remove:
   • Bolt ① (rotor)

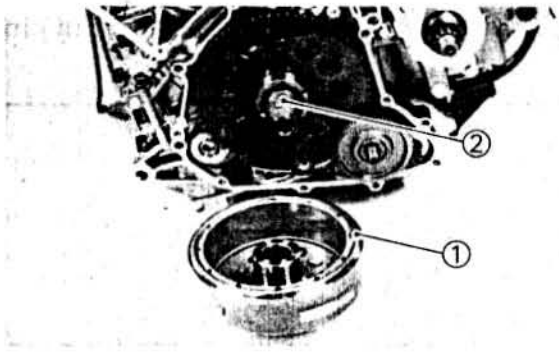
NOTE:

Loosen the bolt (rotor) while holding the rotor with the rotor holder ②.

	Rotor holder: **90890-01701**

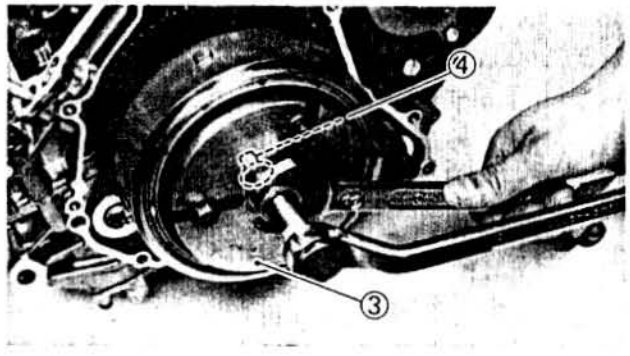
⚠CAUTION:

Do not allow the rotor holder to touch the projections ③ on the rotor.



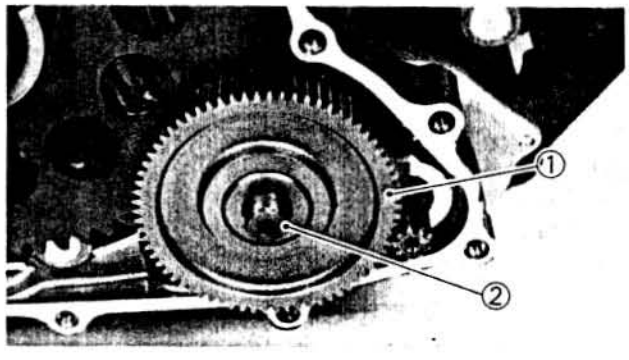
4. Remove:
   • Rotor ①
   • Woodruff key ②
   Use the rotor puller ③ and adapter ④.

	Rotor puller: **90890-01362** **Adapter:** **90890-01382**

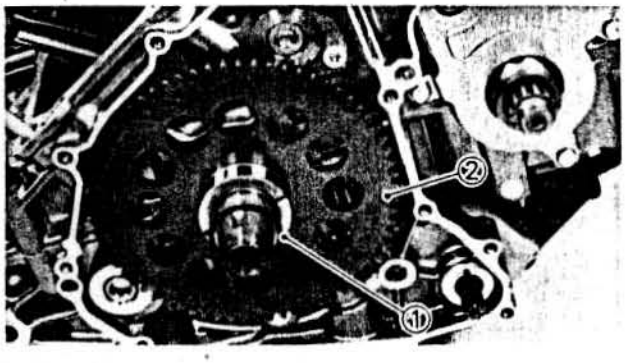


NOTE:

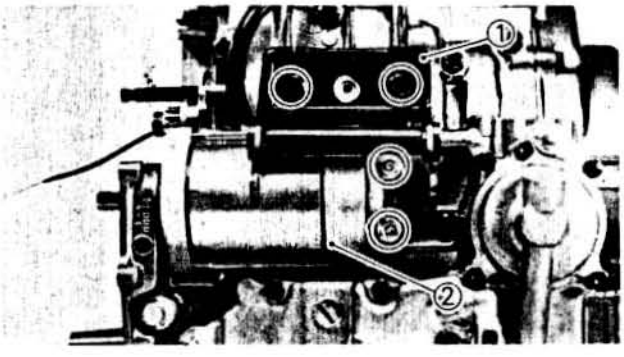
Tighten the tool holding bolts, but make sure that the tool body is parallel with the rotor. If necessary, one screw may be backed out slightly to level tool body.



5. Remove:
   • Starter idle gear ①
   • Shaft ② (starter idle gear)



6. Remove:
   - Washer ①
   - Wheel gear ②

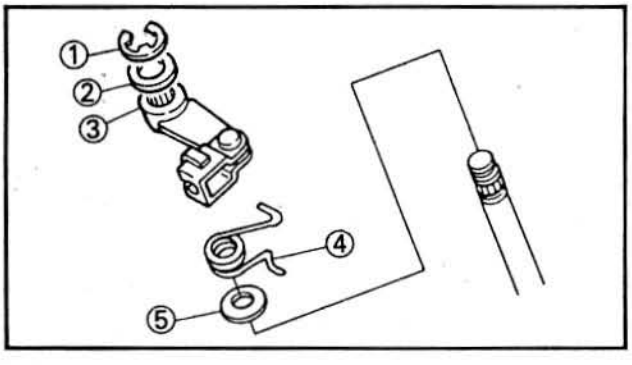


7. Remove:
   - Engine stay ①
   - Starter motor ②

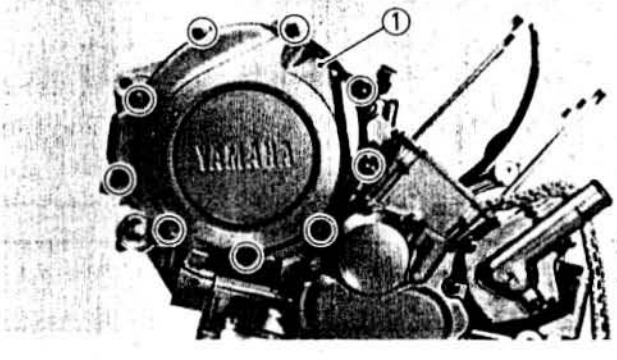
CLUTCH

NOTE:

With the engine mounted, the clutch can be maintained by removing the following parts.
- Clutch cable
- Engine guard
- Exhaust pipes



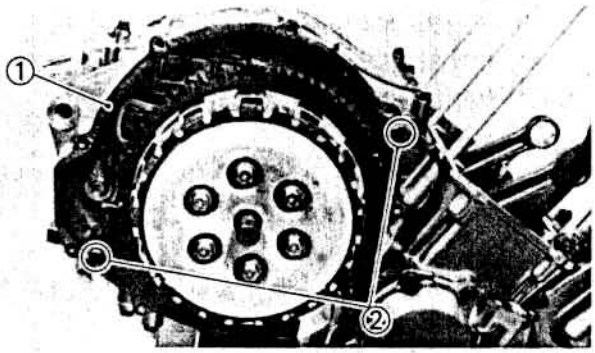
1. Remove:
   - Circlip ①
   - Washer ②
   - Pull lever ③
   - Return spring ④
   - Washer ⑤



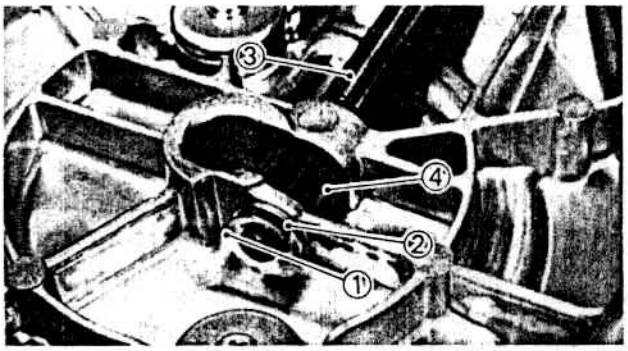
2. Remove:
   - Crankcase cover ① (right)

NOTE:

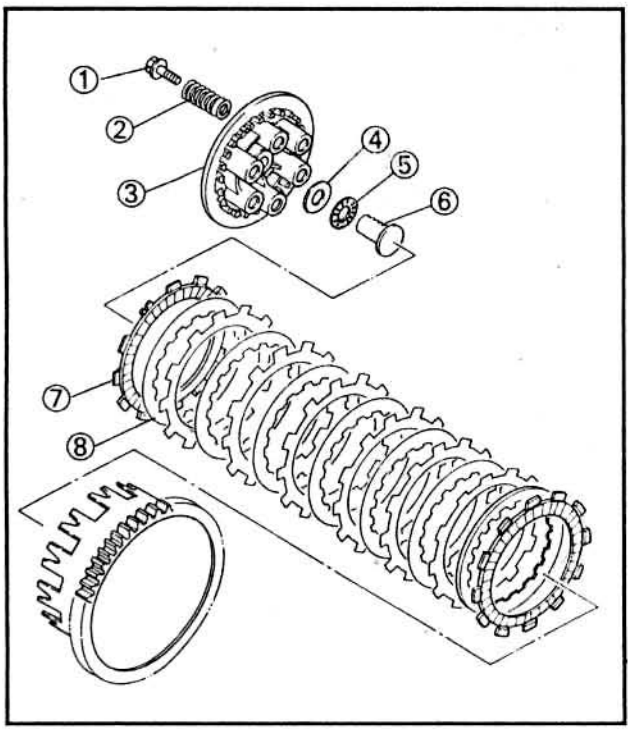
Working in a crisscross pattern, loosen the bolts 1/4 turn each. Remove them after all are loosened.



3. Remove:
   - Gasket ① (crankcase cover)
   - Dowel pins ②



4. Remove:
   - Circlip ①
   - Washer ②
   - Pull lever axle ③
   - Release pinion gear ④ (from crankcase cover)

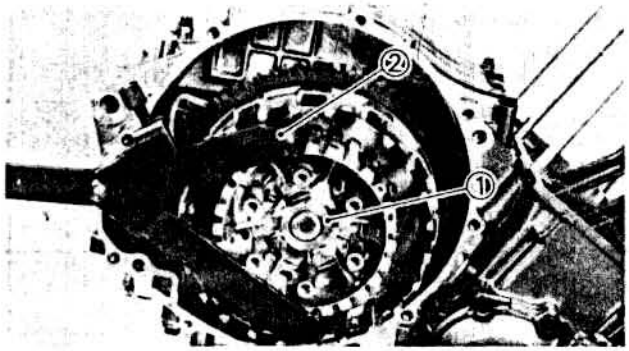


5. Remove:
   - Bolts ①
   - Clutch springs ②
   - Pressure plate ③
   - Washer ④
   - Bearing ⑤
   - Pull rod ⑥
   - Friction plates ⑦
   - Clutch plates ⑧

NOTE:

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

6. Straighten:
   - Lock washer tab

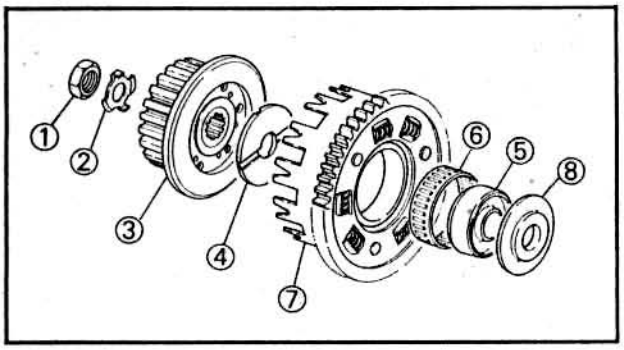


7. Loosen:
   - Nut ① (clutch boss)

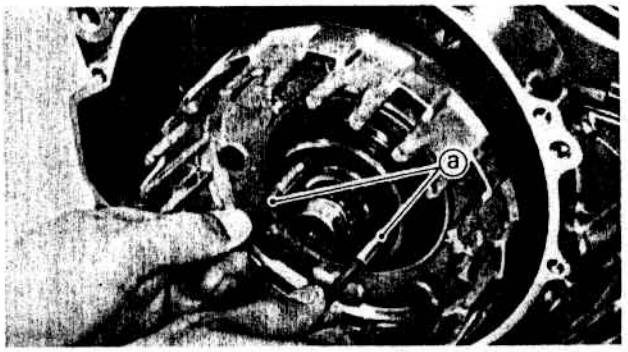
NOTE:

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

	Universal clutch holder: **90890-04086**

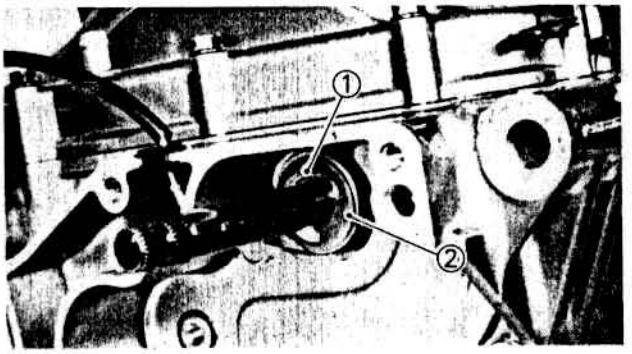


8. Remove:
   - Nut ① (clutch boss)
   - Lock washer ②
   - Clutch boss assembly ③
   - Thrust plate ④
   - Spacer ⑤
   - Bearing ⑥
   - Clutch housing ⑦
   - Thrust plate ⑧

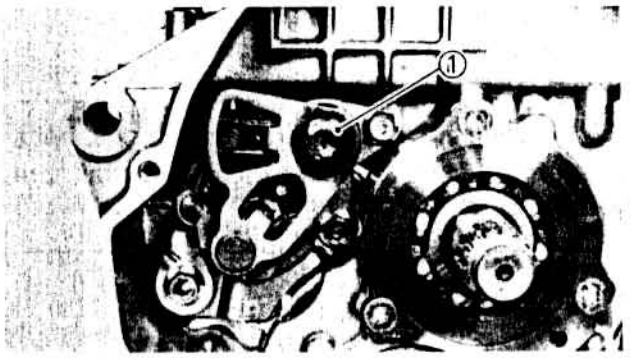


NOTE:

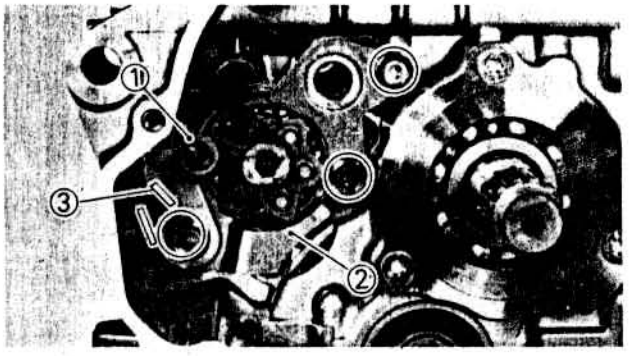
Install suitable screws ⑨ [thread diamater is 6 mm] into the spacer, then remove the spacer by pulling on the screws.



9. Remove:
   - Circlip ①
   - Washer ②



10. Remove:
    - Shift shaft ①



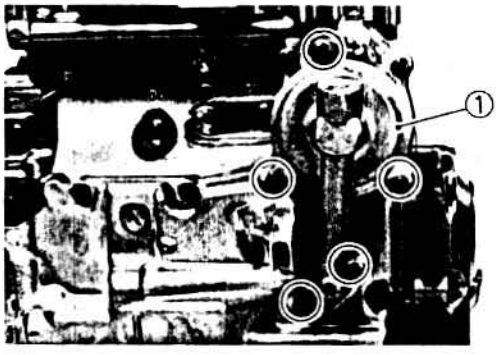
11. Remove:
    - Stopper lever ①
    - Bearing retainer ②
    - Return spring ③

OIL PAN, OIL FILTER AND OIL STRAINER

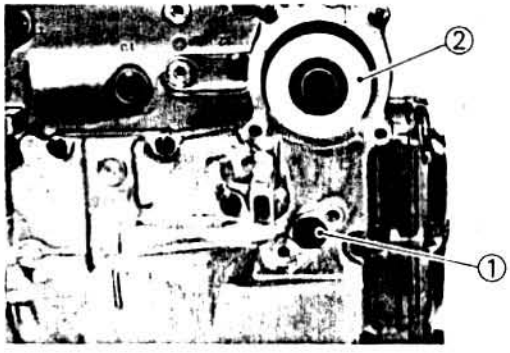
NOTE:

With the engine mounted, the oil pan and oil strainer can be maintained by removing the following part.

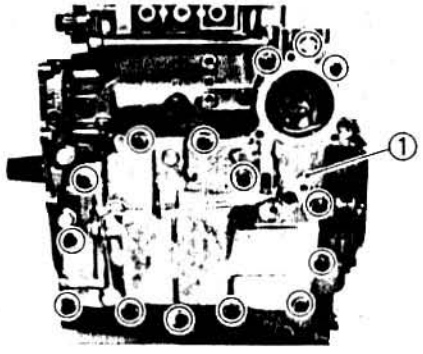
- Engine guard



1. Remove:
   - Oil filter cover ①



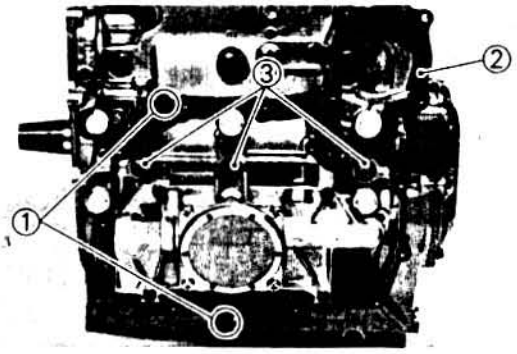
2. Remove:
   - Collar ① (with O-ring)
   - Oil filter ②



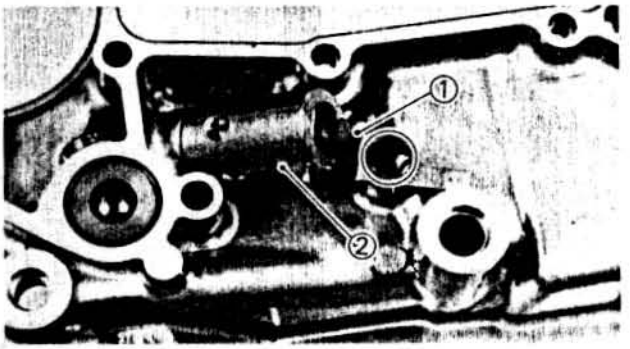
3. Remove:
   - Oil pan ①

NOTE:

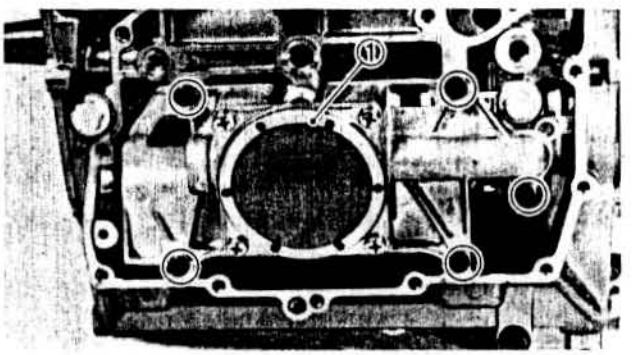
Working in a crisscross pattern, loosen the bolts 1/4 turn each. Remove them after all are loosened.



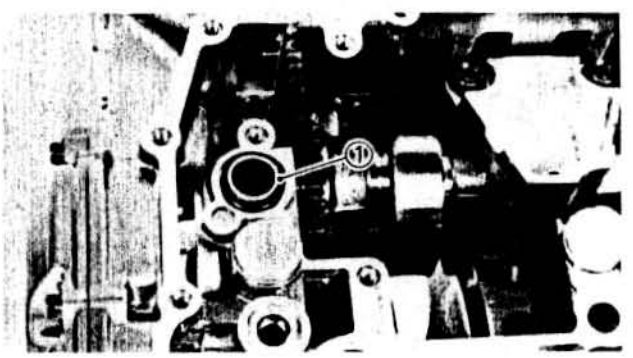
4. Remove:
   - Dowel pins ①
   - Gasket ② (Oil pan)
   - Collars ③ (with O-ring)



5. Remove:
   - Holder ① (relief valve)
   - Relief valve ②
     (from oil pan)



6. Remove:
   - Oil strainer ①

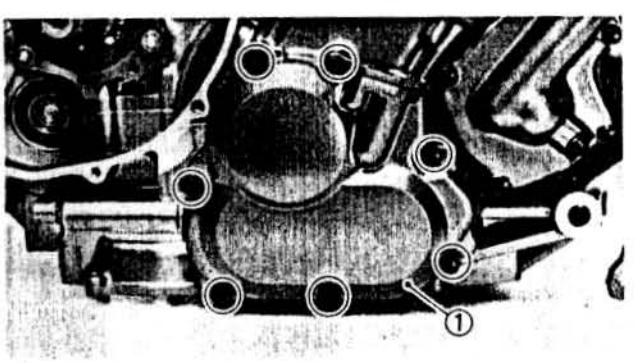


7. Remove:
   - Collar ① (with O-ring)

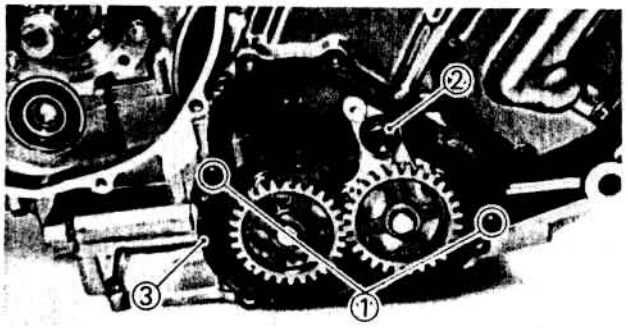
OIL PUMPS AND TIMING CHAIN

NOTE:

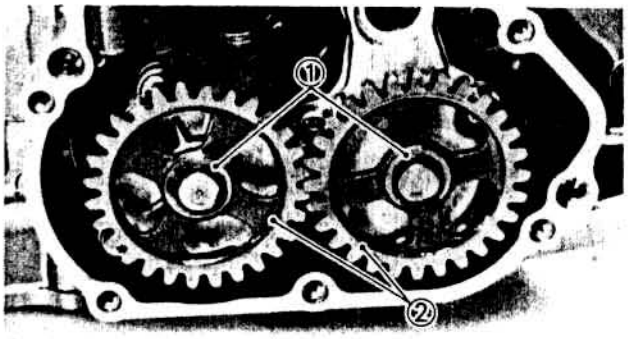
With the engine mounted, the oil pump can be maintained by removing the following parts.
- Engine guard
- Exhaust pipes



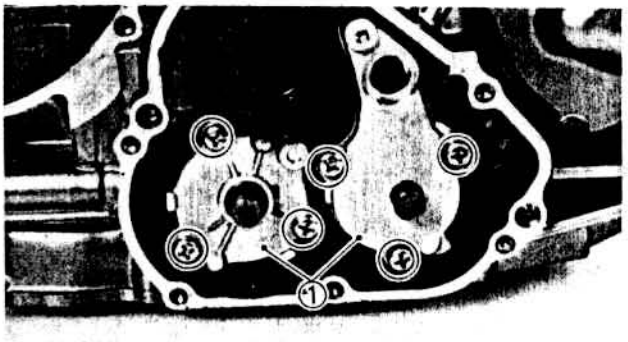
1. Remove:
   - Oil pump cover ①



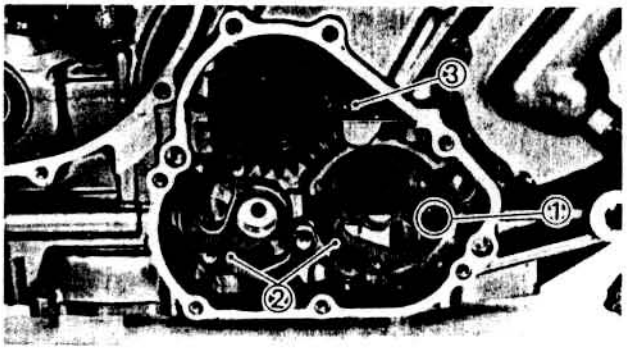
2. Remove:
   - Dowel pins ①
   - Collar ② (with O-ring)
   - Gasket ③ (oil pump cover)



3. Remove:
   - Circlips ①
   - Oil pump gears ②



4. Remove:
   - Oil pumps ①



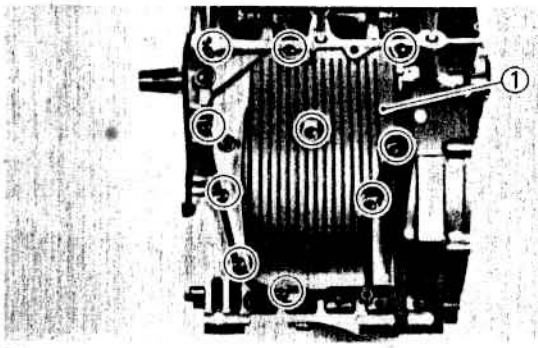
5. Remove:
   - Dowel pin ①
   - Gaskets ② (oil pumps)
   - Timing chain ③

BALANCER WEIGHTS

NOTE:

With the engine mounted, the balancer weights can be maintained by removing the following parts.

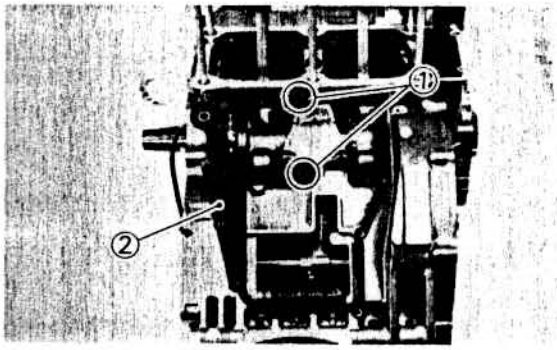
- Engine guard
- Exhaust pipes
- Crankcase cover (left)
- CDI rotor
- Starter drives



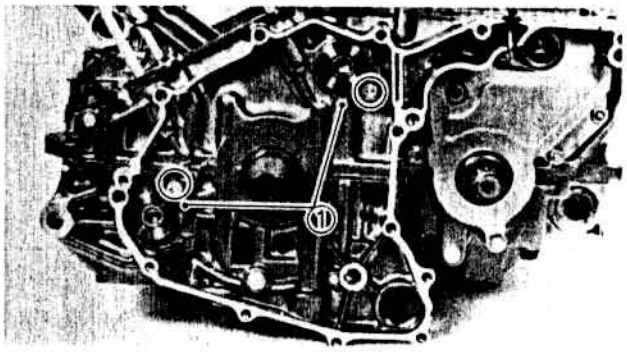
1. Remove:
   - Crankcase cover ① (upper)

NOTE:

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

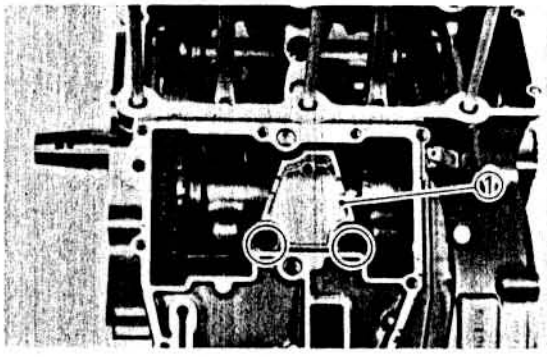


2. Remove:
   - Dowel pins ①
   - Gasket ② (crankcase cover)

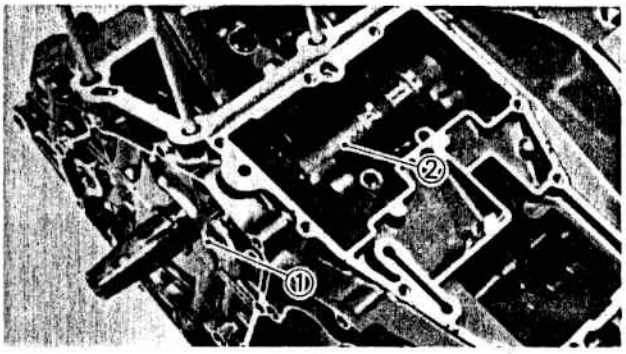


3. Remove:
   - Balancer shaft holders ①
     Use the torx wrench (T30).

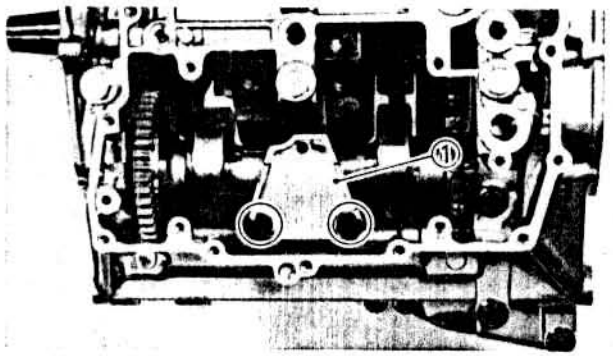
	Torx wrench (T30): **90890-05245**



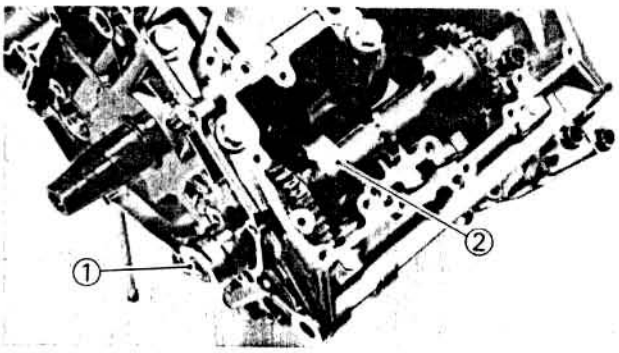
4. Remove:
   - Balancer holder ① (rear)
   - Dowel pins



5. Remove:
   - Balancer shaft ① (rear)
   - Balancer weight ② (rear)



6. Remove:
   - Balancer holder ① (front)
   - Dowel pins

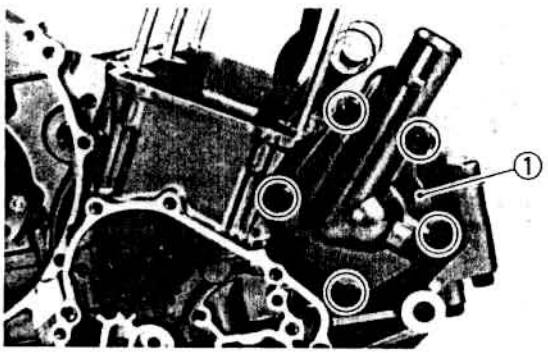


7. Remove:
   - Balancer shaft ① (front)
   - Balancer weight ② (front)

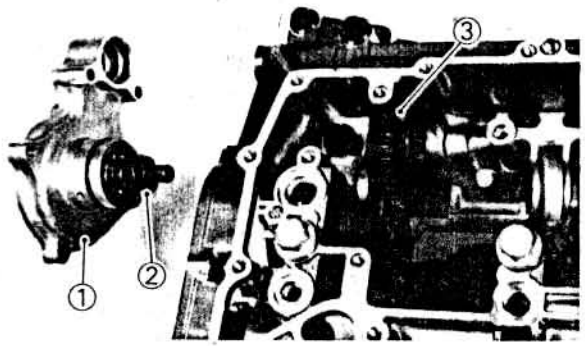
WATER PUMP

NOTE:

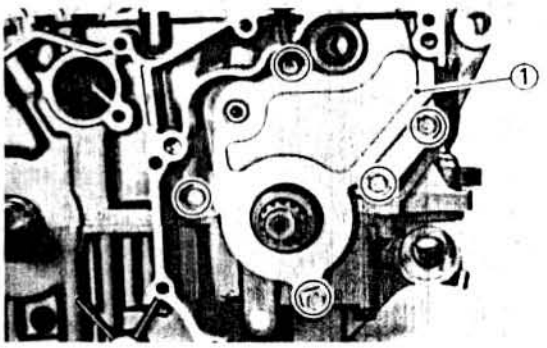
With the engine mounted, the water pump can be maintained by removing the following parts.
- Engine guard
- Exhaust pipes



1. Remove:
   - Water pump cover ①
   - O-ring (water pump cover)

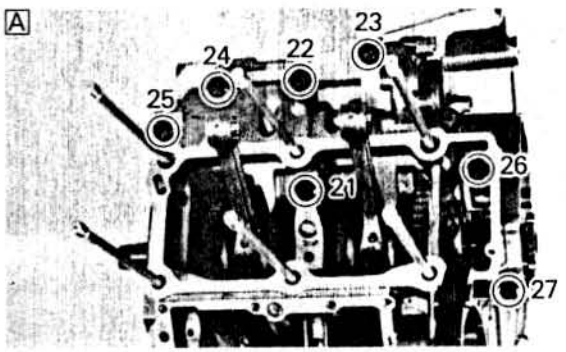


2. Remove:
   - Water pump assembly ①
   - Washer ②
   - Water pump gear ③



CRANKCASE (LOWER)

1. Remove:
   - Plate ①

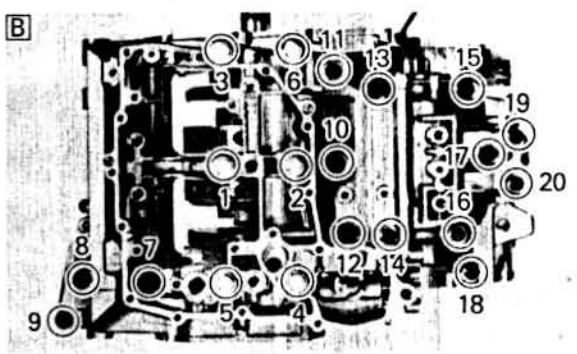


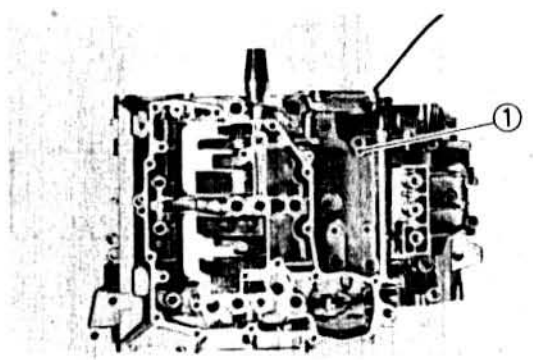
2. Remove:
   - Bolts (crankcase)

Ⓐ Crankcase (upper)
Ⓑ Crankcase (lower)

NOTE:

- Loosen the bolts 1/4 turn each and remove them after all are loosened.
- Loosen the bolts starting with the highest numbered one.
- The embossed numbers in the crankcase (lower) designate the tightening sequence.

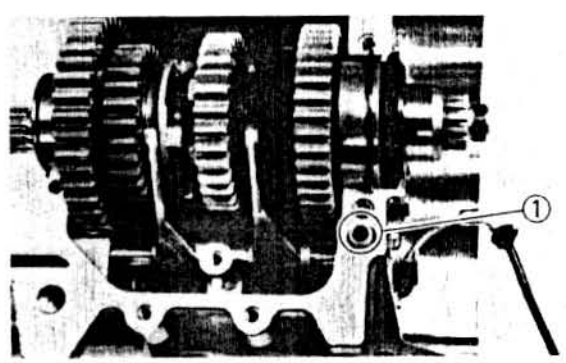




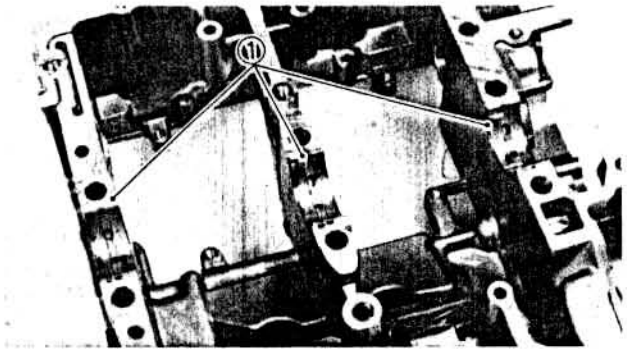
3. Remove:
   - Lower crankcase ①

⚠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.



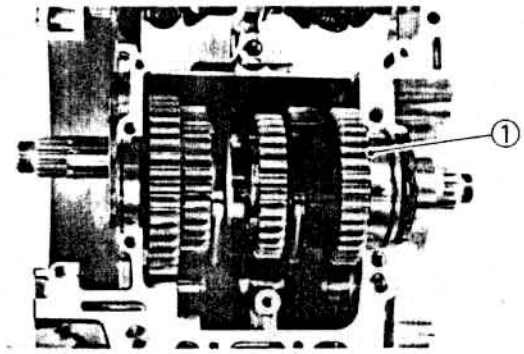
4. Remove:
   - Dowel pin ①



5. Remove:
   - Main journal bearings ①
     (from lower crankcase)

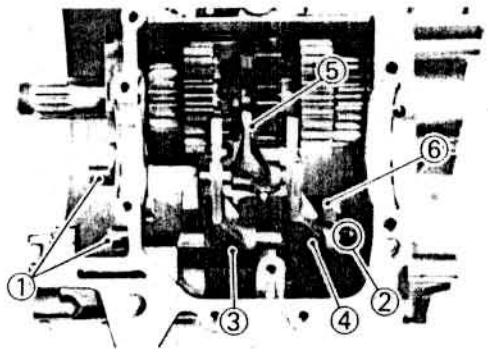
NOTE:

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

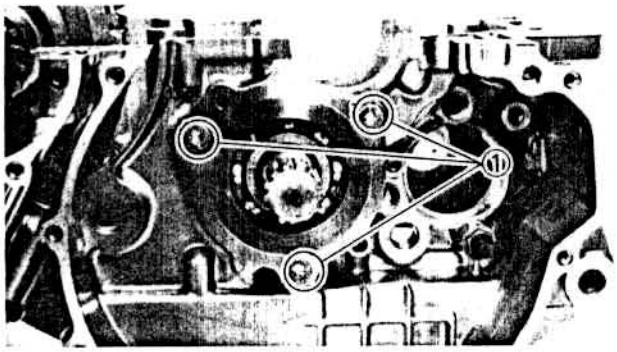


TRANSMISSION AND SHIFTER

1. Remove:
   - Drive axle assembly ①

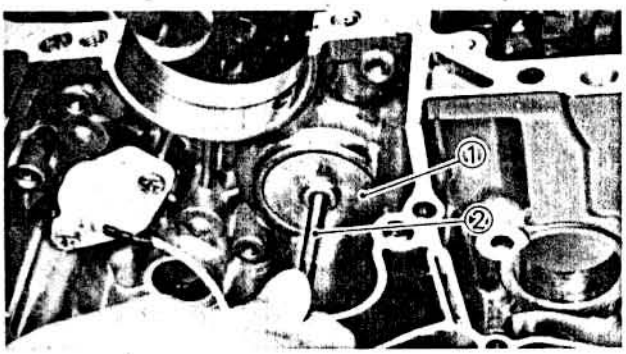


2. Remove:
   - Guide bars ①
   - Spring ②
   - Shift fork "R" ③
   - Shift fork "L" ④
   - Shift fork "C" ⑤
   - Shift cam ⑥



3. Remove:
   - Screws ① (bearing retainer)
     Use the torx wrench (T30).

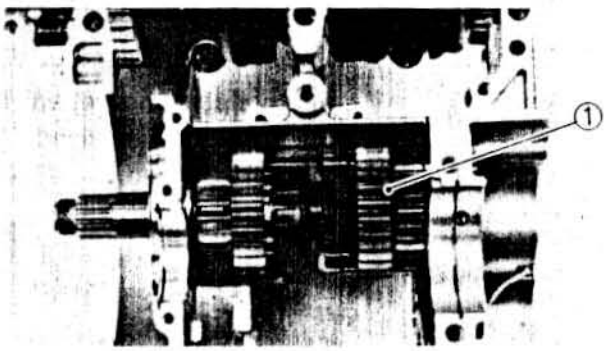
	Torx wrench (T30): **90890-05245**



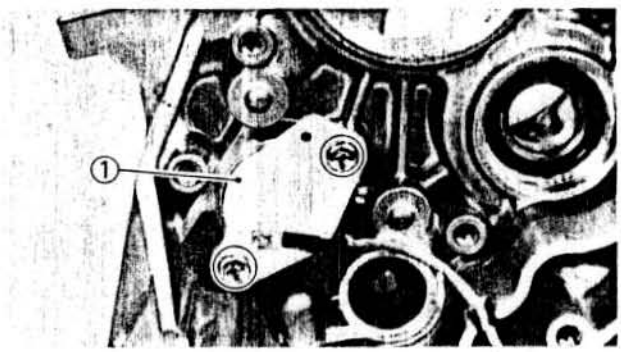
4. Remove:
   - Plug ① (main axle)

NOTE:

Install a suitable screw ② [thread diameter is 6 mm.] into the plug, then remove the plug by pulling on the screw.

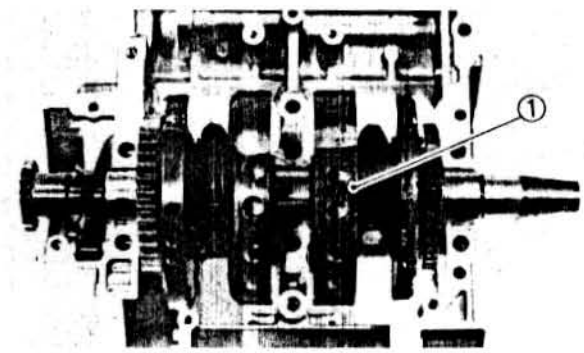


5. Remove:
   • Main axle assembly ①

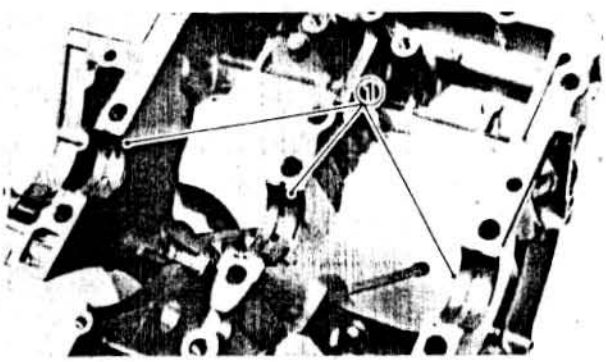


6. Remove:
   • Neutral switch ①

CRANKSHAFT



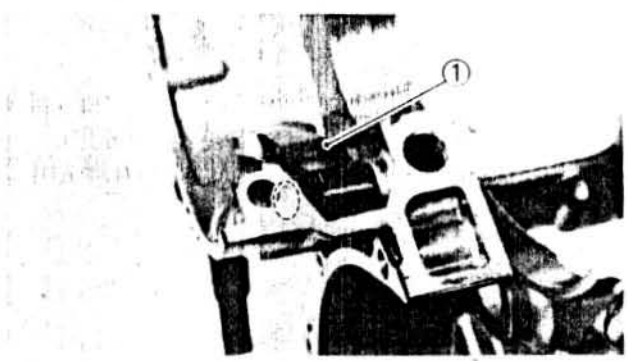
1. Remove:
   • Crankshaft assembly ①



2. Remove:
   • Main journal bearings ①
   (from upper crankcase)

NOTE:

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

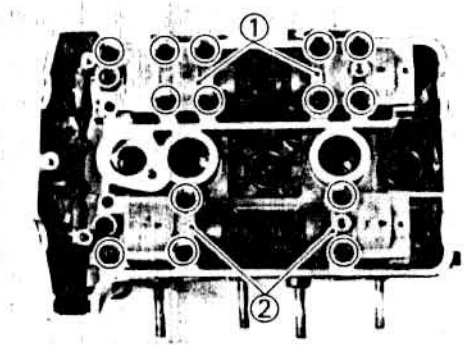


3. Remove:
   • Chain guide ① (intake)

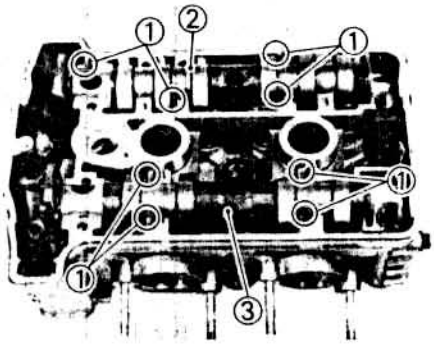
VALVES AND CAMSHAFTS

NOTE:

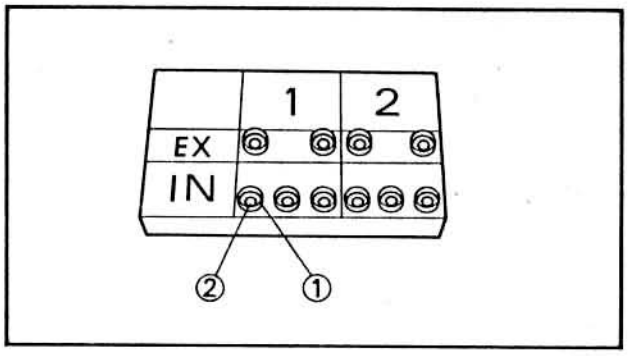
Before removing the internal parts (valve, valve spring, valve seat etc.) of the cylinder head. The valve sealing should be checked.



1. Remove:
   - Cam caps ① (intake camshaft)
   - Cam caps ② (exhaust camshaft)



2. Remove:
   - Dowel pins ①
   - Intake camshaft ②
   - Exhaust camshaft ③



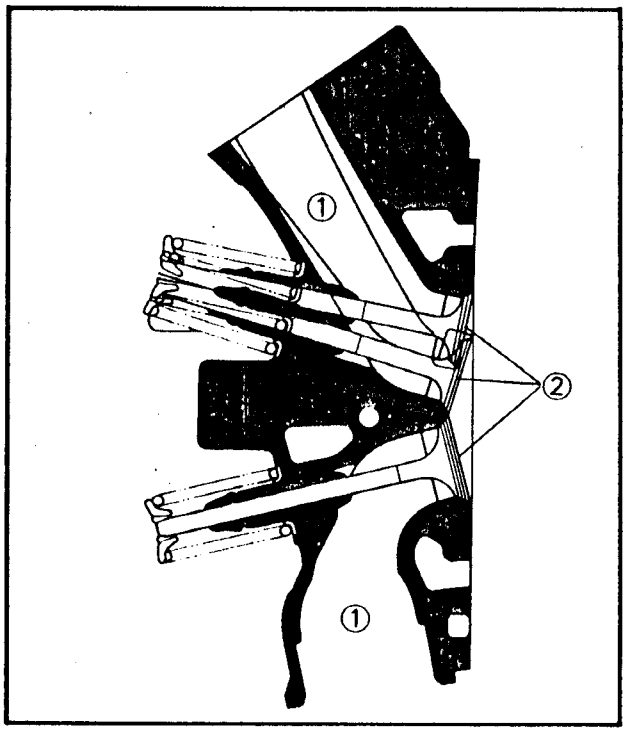
3. Remove:
   - Lifters ①
   - Pads ②

NOTE:

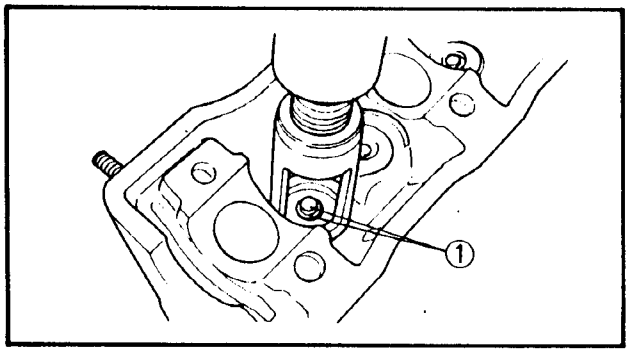
Identify each lifter and pad position very carefuly so that it can be reinstalled in its original place.

4. 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".

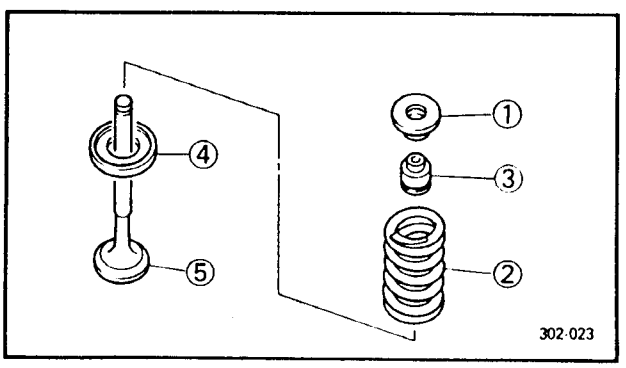


Checking steps:
- Pour a clean solvent ① into the intake and exhaust ports.
- Check the valve sealing.
  There should be no leakage at the valve seat ②.



5. Remove:
   - Valve cotters ①

NOTE:
Remove the valve cotters while compressing the valve spring with the valve spring compresser.

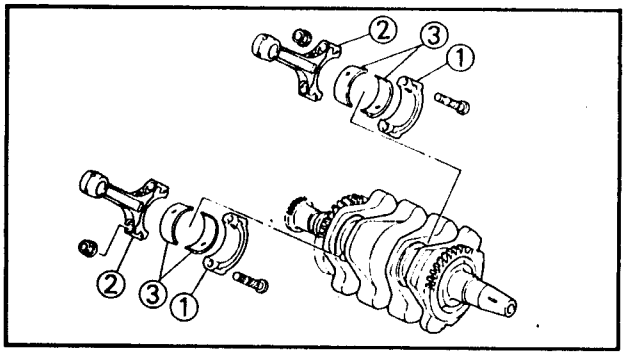




Valve spring compresser:
90890-04019
Attachment:
90890-04114

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

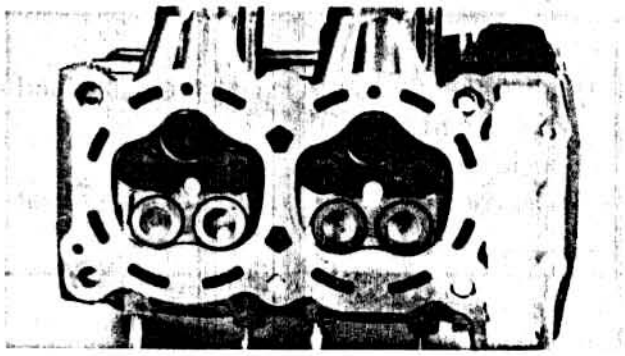
NOTE:
Identify each part position very carefuly so that it can be reinstalled in its original place.



CONNECTING RODS

1. Remove:
   - Connecting rod caps ①
   - Connecting rods ②
   - Crank pin bearings ③

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



INSPECTION AND REPAIR

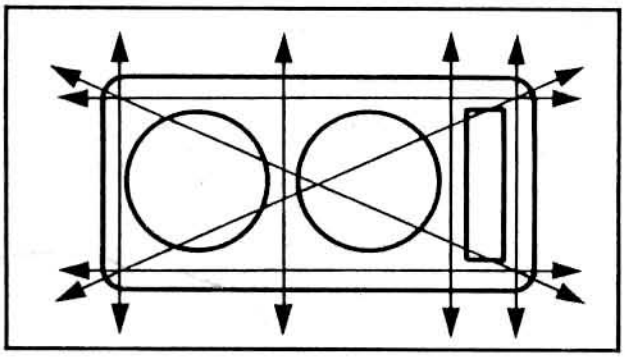
CYLINDER HEAD

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.
   - Water jacket
     Crust of minerals/Rust → Eliminate.



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

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

4. Resurface:
   - Cylinder head

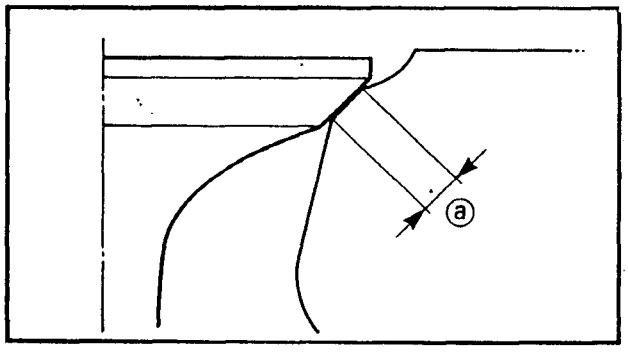
Resurfacement steps:
Place a 400 ~ 600 grit wet sandpaper on the surface plate, and resurface the head using a figure-eight sanding pattern.

NOTE:

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

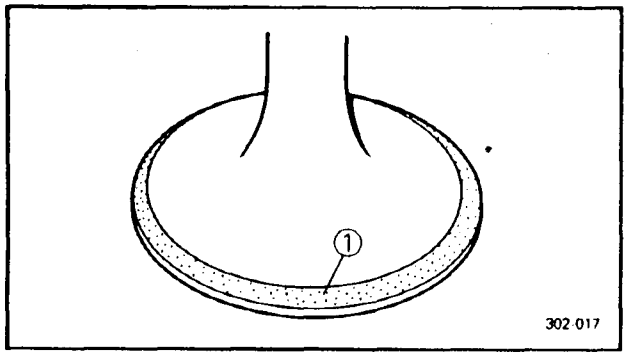
VALVE SEAT

1. Eliminate:
   - Carbon deposit
     (from valve face and valve seat)
2. Inspect:
   - Valve seat
     Pitting/Wear → Reface the valve seat.

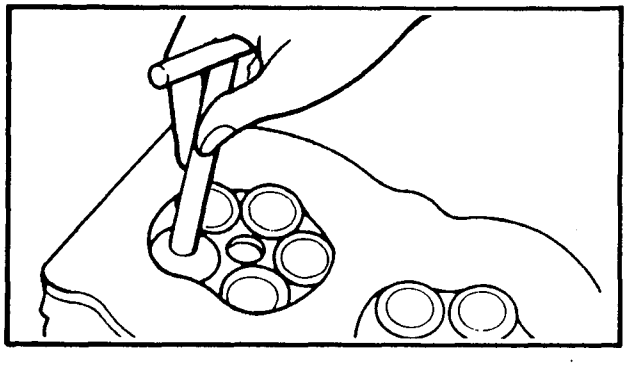


3. Measure:
   - Valve seat width ⓐ
     Out of specification → Reface valve seat.

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



Measurement steps:
- Apply 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.
- Measure the valve seat width. Wherever the valve seat and valve face made contact, bluing will have been removed.
- If the valve seat width is too wide, too harrow, or seat has not centered, the valve seat must be refaced.

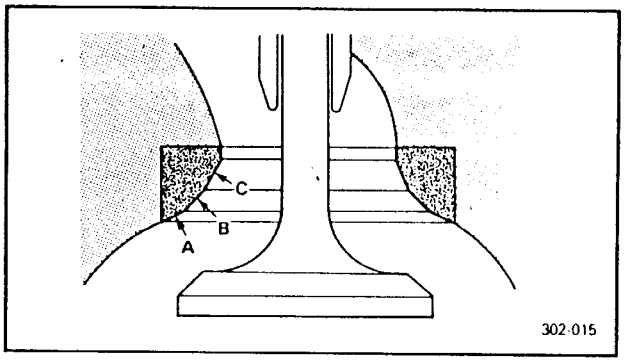


4. Reface:
   - Valve seat
     Use a 30°, 45° and 60° valve seat cutter ①.

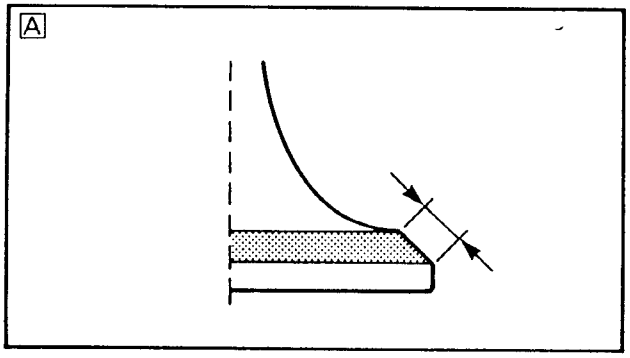
Valve seat cutter:
YM-91043

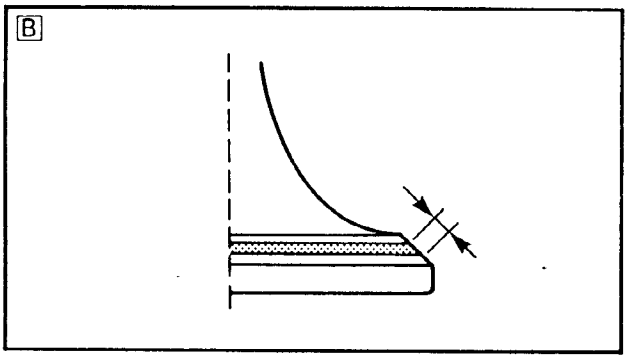
⚠CAUTION:

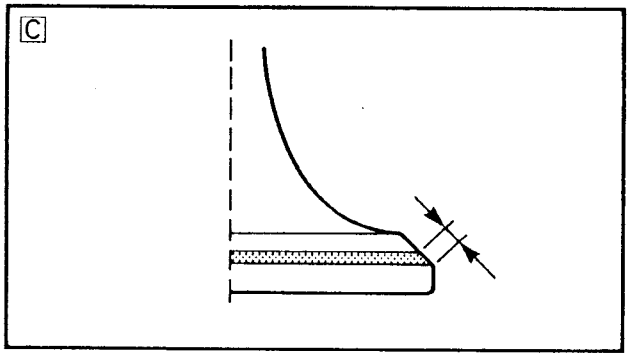
When twisting cutter, keep an even downward pressure (4 ~ 5 kg) to prevent chatter marks.

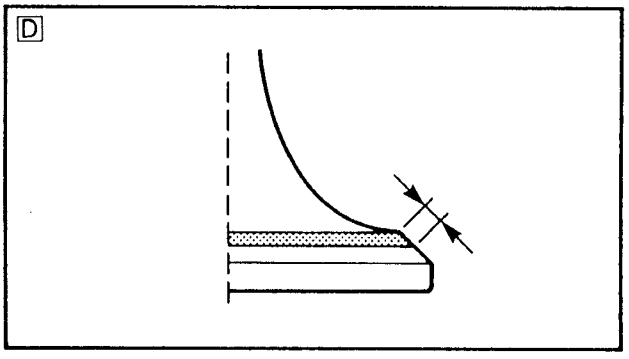


Cut sections as follows	
Section	Cutter
A	30°
B	45°
C	60°









Refacing steps:

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

Valve Seat Cutter Set		Desired Result
Use lightly	30° cutter	To reduce valve seat width to 1.0 mm (0.039 in).
	60° cutter	

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

Valve Seat Cutter Set		Desired Result
Use	45° cutter	To achieve a uniform valve seat width of 1.0 mm (0.039 in).

C Valve seat is too narrow and it is near valve margin.

Valve Seat Cutter Set		Desired Result
Use	30° cutter, first	To center the seat and to achieve its width of 1.0 mm (0.039 in).
	45° cutter	

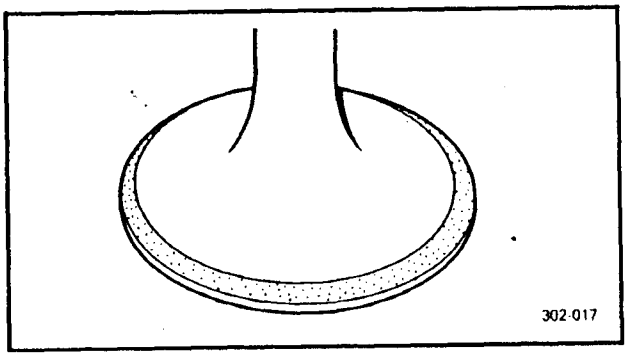
D Valve seat is too narrow and it is located near the bottom edge of the valve face.

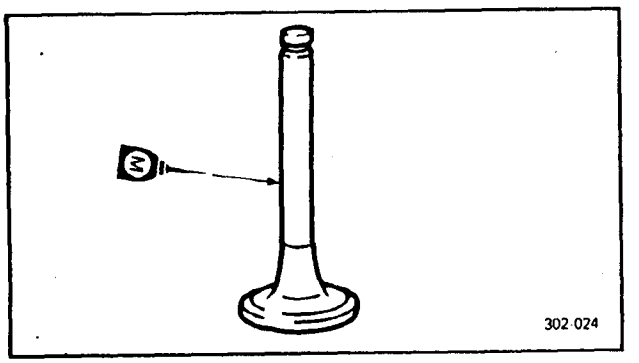
Valve Seat Cutter Set		Desired Result
Use	60° cutter, first	To center the seat and increase its width.
	45° cutter	

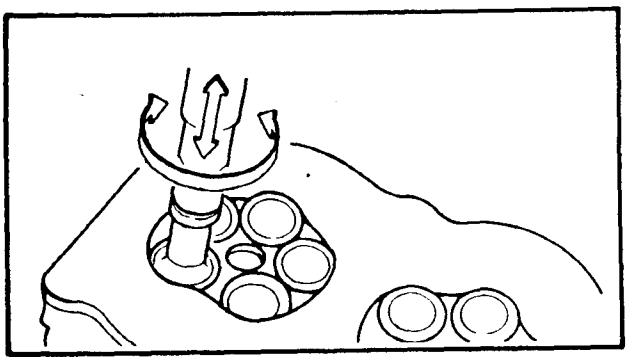
5. Lap:
   - Valve face
   - Valve seat

NOTE:

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







Lapping steps:

- Apply a coarse lapping compound to the valve face.

⚠CAUTION:

Be sure no compound enters the gap between the valve stem and guide.

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

NOTE:

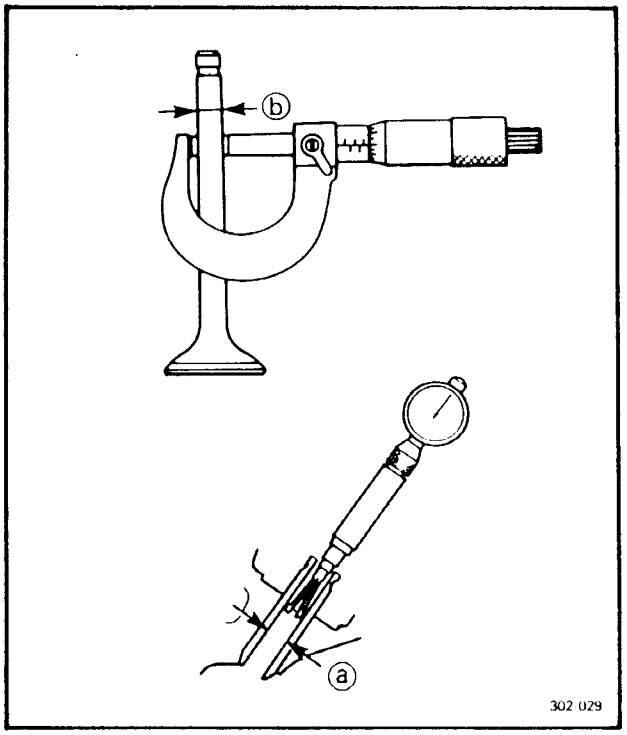
To obtain the best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.

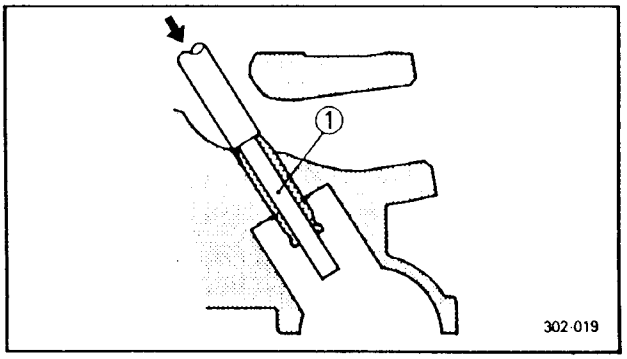
- Apply a fine lapping compound to the valve face and repeat the above steps.

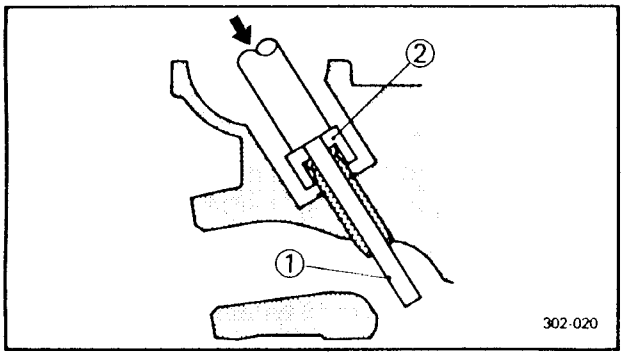
NOTE:

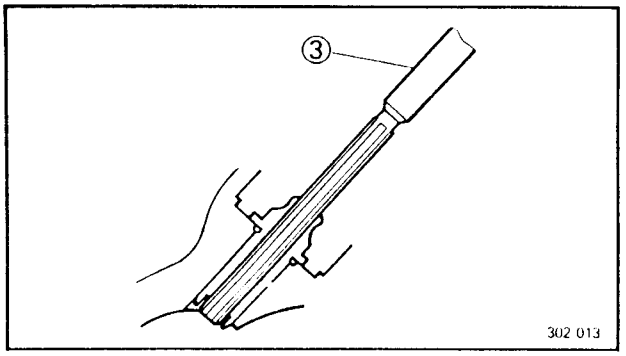
Be sure to clean off all compound from the valve face and valve seat after every lapping operation.

- Apply the Mechanic's bluing dye (Dykem) 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 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:
0.01 ~ 0.04 mm
(0.0004 ~ 0.0015 in)
<Limit> : 0.08 mm (0.0031 in)
Exhaust:
0.03 ~ 0.05 mm
(0.001 ~ 0.002 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.

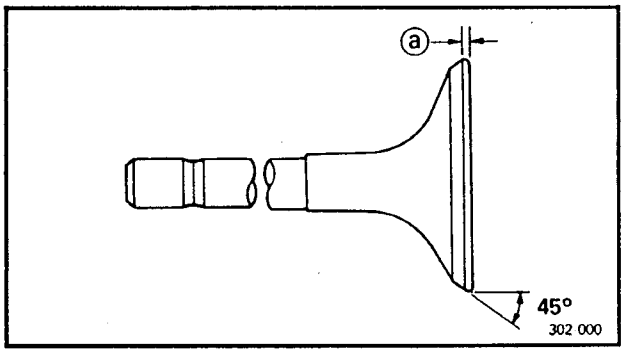
- Remove the valve guide using the valve guide remover ①.
- Install the valve guide (new) using the valve guide installer ② and valve guide remover ①.
- After installing the valve guide, bore the valve guide using the valve guide reamer ③ to obtain proper stem-to-guide clearance.

Valve guide remover and installer set (5.5 mm):
90890-04016

NOTE:

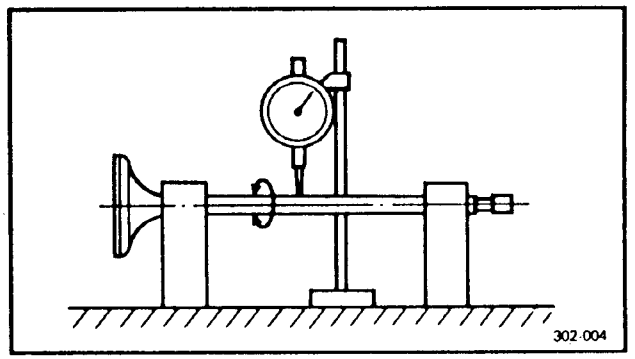
Reface the valve seat after replacing the valve guide.

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.

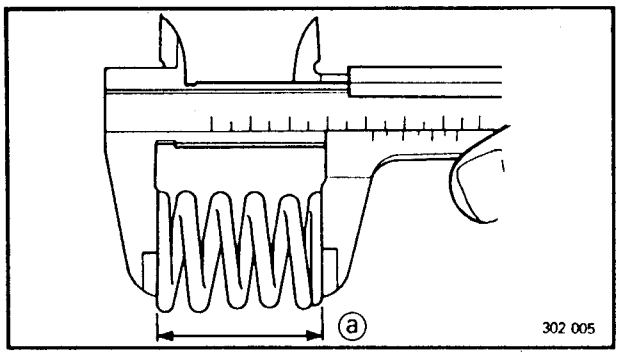
Margin thickness:
Limit: 0.8 mm (0.032 in)



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

Runout:
Less than 0.01 mm (0.0004 in)

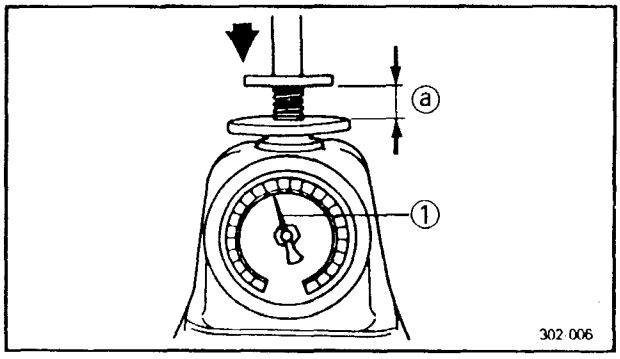
NOTE:
- Always replace the guide if the valve is replaced.
- Always replace the oil seal if the valve is removed.



VALVE SPRING

1. Measure:
   • Free length ⓐ (valve spring)
     Out of specification → Replace.

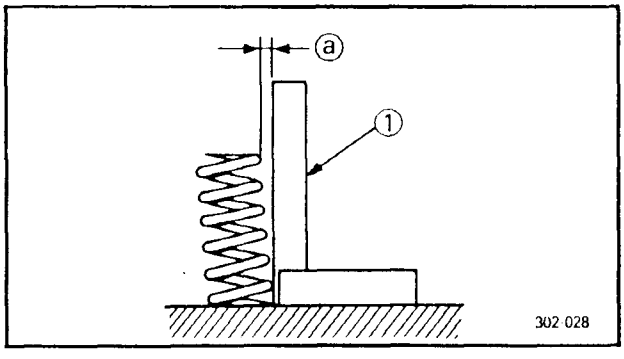
Free length (valve spring):
Intake
37.29 mm (1.47 in)
Exhaust:
37.29 mm (1.47 in)



2. Measure:
   • Compressed force (valve spring) ①
   Out of specification → Replace.

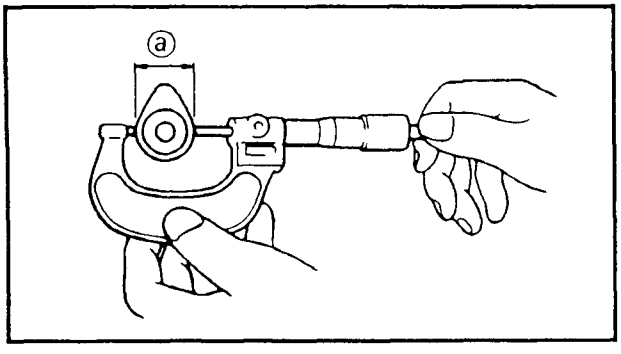
ⓐ Installed length

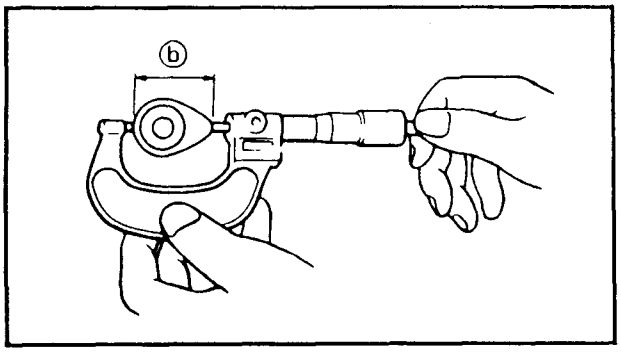
Compressed force:
Intake
10.0 ~ 11.6 kg (22.05 ~ 22.57 lb)
at 30.39 mm (1.2 in)
Exhaust
10.0 ~ 11.6 kg (22.05 ~ 22.57 lb)
at 30.39 mm (1.2 in)



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

Spring tilt:
Less than 1.7 mm (0.067 in)

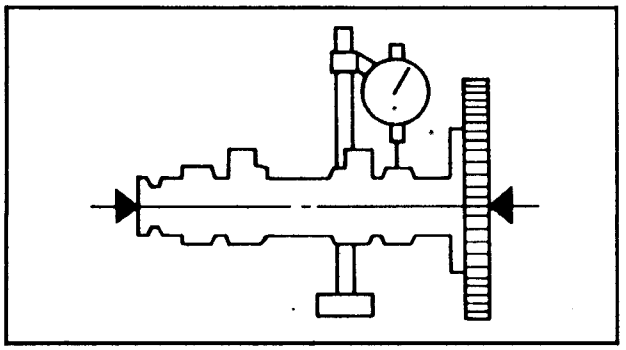




CAMSHAFT

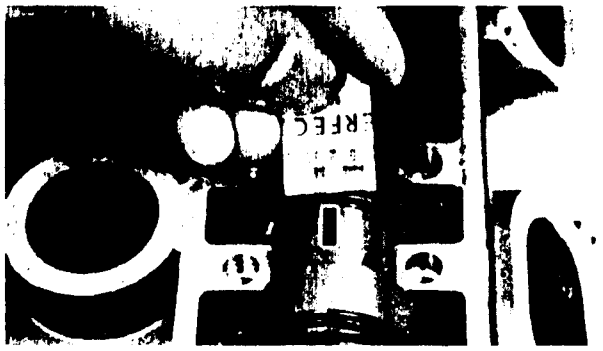
1. Inspect:
   • Cam lobes
   Pitting/Scratches/Blue discoloration → Replace.
2. Measure:
   • Cam lobes length ⓐ and ⓑ.
   Out of specification → Replace.

Cam lobe length:
Intake
ⓐ 35.7 ~ 35.8 mm
(1.405 ~ 1.409 in)
ⓑ 27.95 ~ 28.05 mm
(1.100 ~ 1.104 in)
Exhaust:
ⓐ 35.95 ~ 36.05 mm
(1.415 ~ 1.419 in)
ⓑ 27.95 ~ 28.05 mm
(1.100 ~ 1.104 in)



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

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



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

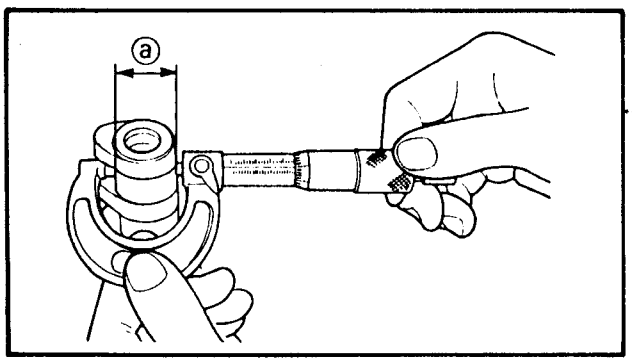
Camshaft-to-cap clearance:
0.020 ~ 0.054 mm
(0.0008 ~ 0.0021 in)

Measuring steps:
- Install the camshaft onto the cylinder head.
- Position a strip of plastigage® onto the camshaft.
- Install the dowel pins and camshaft caps.

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

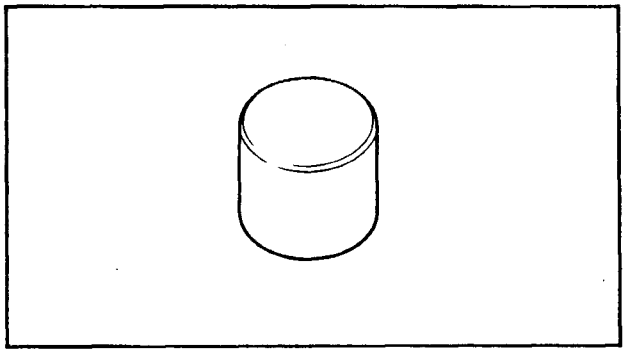
NOTE:
- Tighten the camshaft caps in a crisscross pattern from innermost to outer.
- Do not turn the camshaft when measuring clearance with the Plastigage®.

- Remove the camshaft caps and measure width of the Plastigage®.



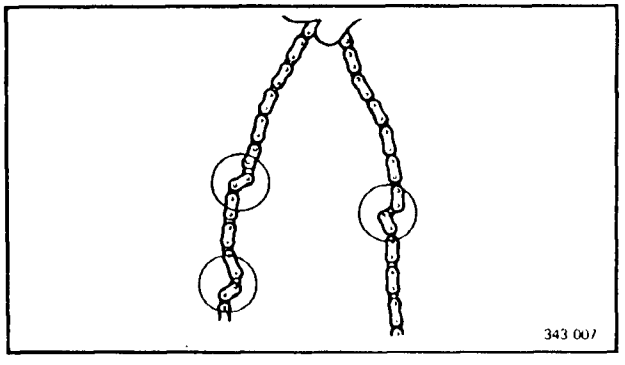
5. Measure:
   • Bearing diameter ⓐ (camshaft)
   Out of specification → Replace camshaft.
   Within specification → Replace cylinder head.

Bearing diameter (camshaft):
24.967 ~ 24.980 (0.9830 ~ 0.9835 in)



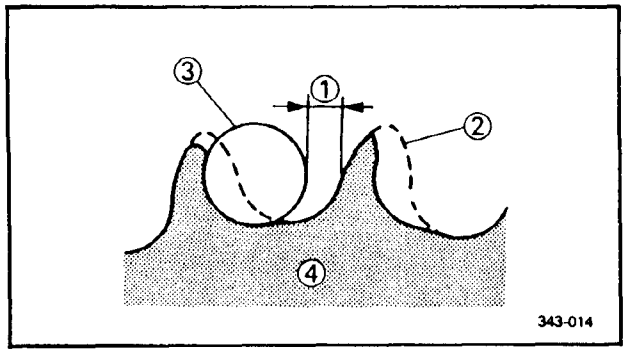
VALVE LIFTER

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



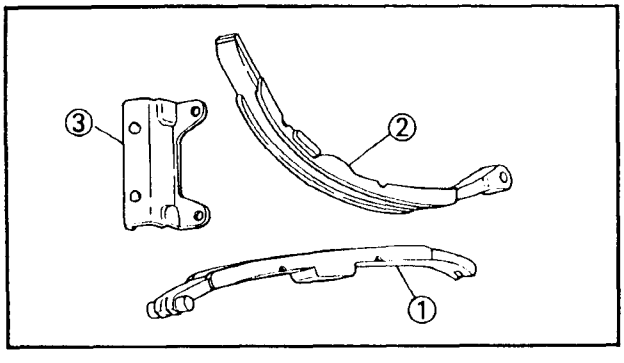
TIMING CHAIN, SPROCKET AND CHAIN GUIDE

1. Inspect:
   - Timing chain
     Stiff/cracks→Replace timing chain and sprocket as a set.

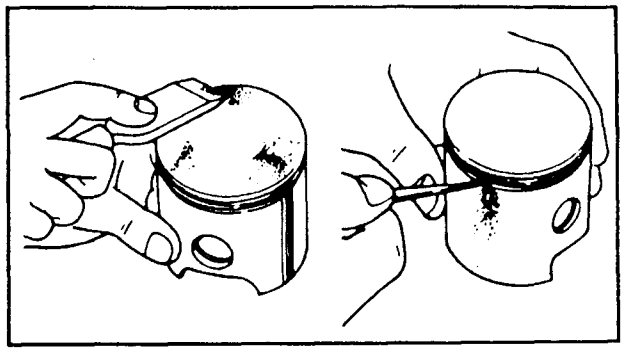


2. Inspect:
   - Cam sprocket
     Wear/Damage→Replace cam sprocket and timing chain as a set.

① 1/4 tooth
② Correct
③ Roller
④ Sprocket



3. Inspect:
   - Chain guide ① (exhaust side)
   - Chain guide ② (intake side)
   - Chain guide ③ (upper)



CYLINDER AND PISTON

1. Eliminate:
   - Carbon deposits
     (from the piston crown and ring grooves.)

2. Inspect:
   - Piston wall
     Wear/Scratches/Damage→Replace.

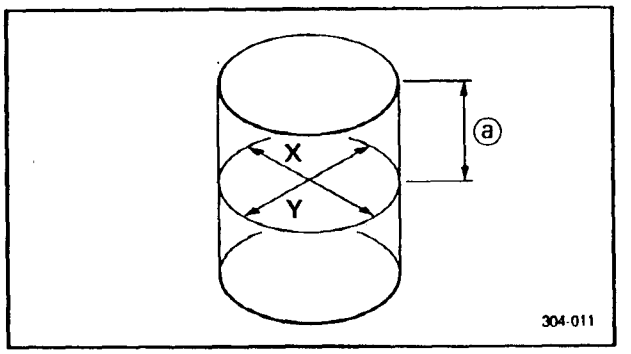


3. Eliminate:
   - Score marks and lacquer deposits
     From the sides of piston.
     Use a 600 ~ 800 grit wet sandpaper.

NOTE:

Sand in a crisscross pattern. Do not sand excessively.

4. Inspect:
   - Cylinder water jacket
     Crust of minerals/Rust → Remove.
   - Cylinder wall
     Wear/Scratches → Rebore or replace.



5. Measure:
   - Piston-to-cylinder clearance

Piston-to-cylinder clearance measurement steps:

First steps

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

ⓐ 40 mm (1.6 in) from the cylinder top

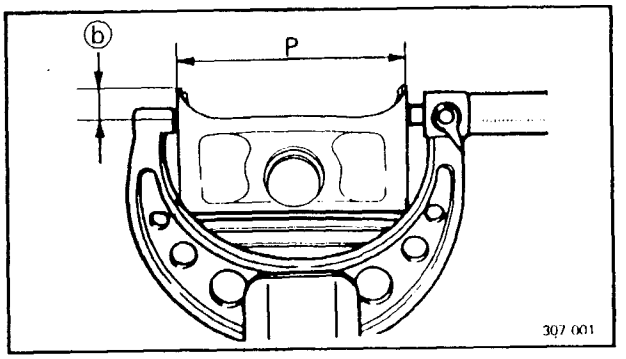
NOTE:

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

Cylinder bore "C":
87.000 ~ 87.005 mm
(3.4252 ~ 3.4254 in)
< Limit: 87.1 mm (3.429 in) >

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

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



2nd steps

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

ⓑ 4.7 mm (0.185 in) from the piston bottom edge

Piston skirt diameter "P":
86.920 ~ 86.935 mm
(3.422 ~ 3.423 in)

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

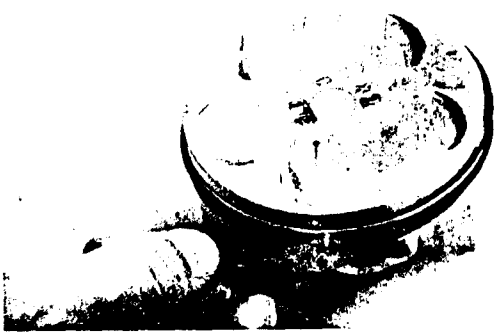
3rd steps

- Find the piston-to-cylinder clearance with following formula.

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

Piston-to-cylinder clearance:
0.065 ~ 0.085 mm
(0.0026 ~ 0.0033 in)
< Limit: 0.15 mm (0.006 in) >

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



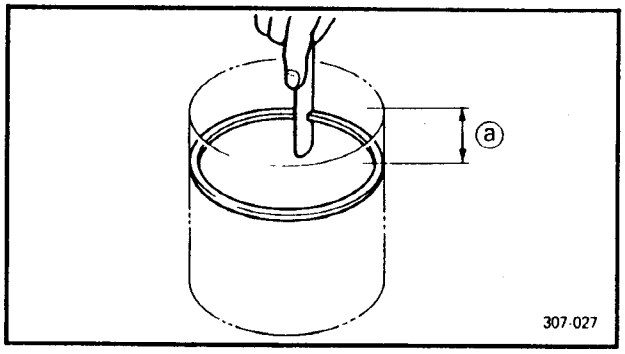
PISTON RING

1. Measure:
   - Side clearance
     Out of specification → Replace piston, and rings as a set.

NOTE:

Clean carbon from piston ring grooves and rings before measuring side clearance.

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



2. Position:
   • Piston ring
   (into the cylinder)

NOTE:
Push the ring with the piston crown so that the ring will be at a right angle to cylinder bore.

ⓐ 20 mm (0.8 in)

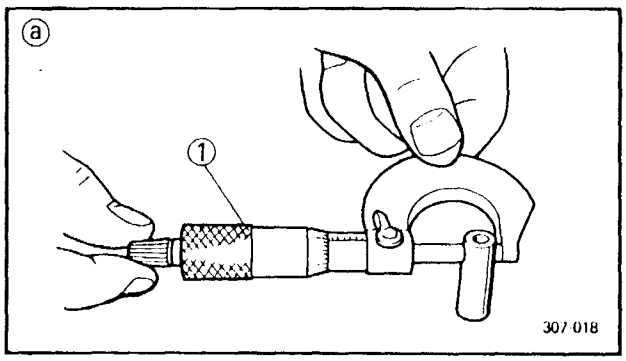
3. Measure:
   • End gap
   Out of specification → Replace.

NOTE:
You cannot measure end gap on expander spacer of oil control ring. If oil control ring rails show excessive gap, replace all three rings.

End gap:
Top ring
0.3 ~ 0.5 mm (0.012 ~ 0.020 in)
2nd ring
0.3 ~ 0.5 mm (0.012 ~ 0.020 in)
Oil ring
0.2 ~ 0.7 mm (0.008 ~ 0.028 in)

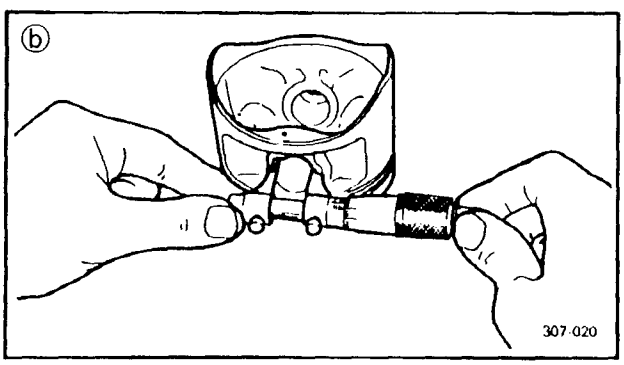
PISTON PIN

1. Inspect:
   • Piston pin
   Blue discoloration/Grooves → Replace then inspect lubrication system.



2. Measure:
   • Outside diameter ⓐ (piston pin)
   Out of specification → Replace.

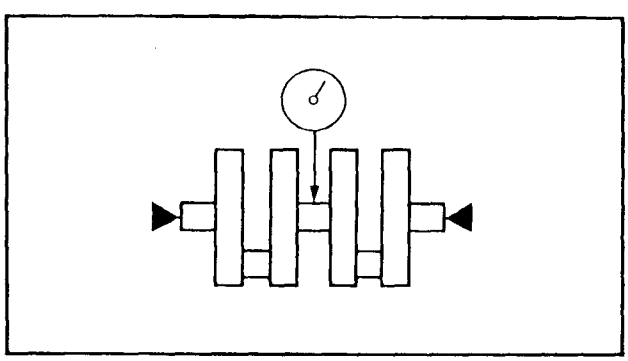
Outside diameter (piston pin):
0.7870 ~ 0.7874 mm
(19.991 ~ 20.000 in)



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:
0.002 ~ 0.022 mm
(0.0001 ~ 0.0008 in)
< Limit: 0.07 mm (0.003 in) >

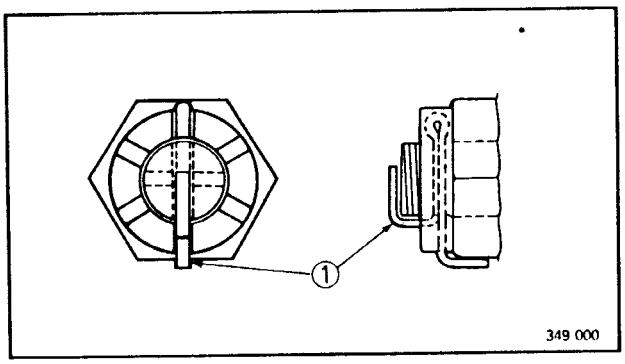


CRANKSHAFT AND CONNECTING ROD

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

Runout:
Less than 0.02 mm (0.0008 in)

2. Inspect:
   • Main journal surfaces
   • Crank pin surfaces
   • Bearing surfaces
   Wear/Scratches → Replace.



6. Install:
   • Cotter pin ①

⚠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.

⚠WARNING:

Always use a new cotter pin.

DRIVE CHAIN LUBRICATION

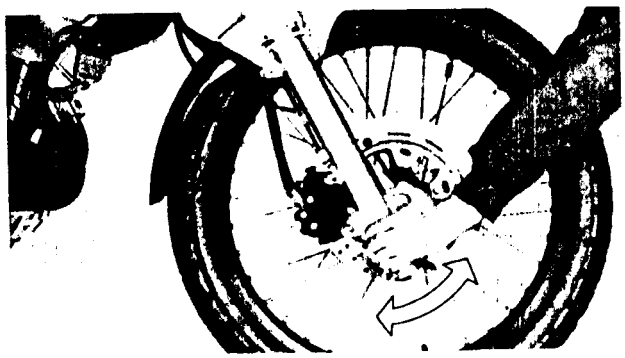
The chain consists of many parts which work against each other. If the chain is not maintained properly, it will wear out rapidly, therefore, form the habit of periodically servicing the chain. This service is especially necessary when riding in dusty conditions.

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.

STEERING HEAD ADJUSTMENT

⚠WARNING:

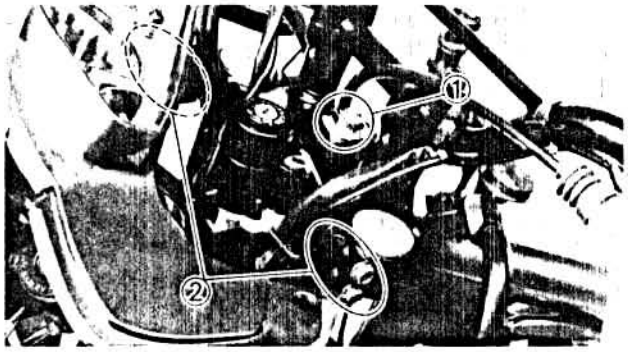
Securely support the motorcycle so there is no danger of it falling over.

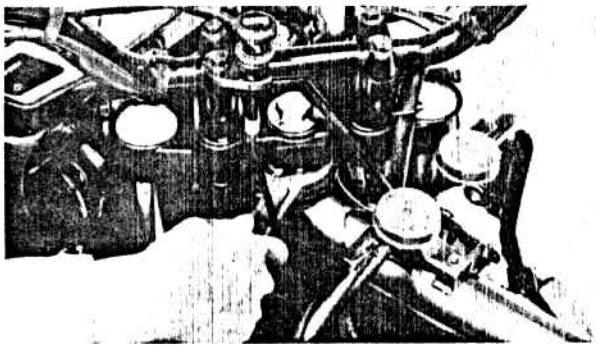


1. Elevate the front wheel by placing a suitable stand under the engine.
2. Check:
   • Steering assembly bearings
   Grasp the bottom of the forks and gently rock the fork assembly back and forth.
   Looseness→Adjust steering head.

3. Remove:
   • Front wheel
   Refer to the "FRONT WHEEL" section in the CHAPTER 7.

4. Adjust:
   • Steering head





Adjustment steps:
- Loosen the bolt ① (steering shaft) and bolt ② (handlebar crown).
- Tighten the ring nut using the Ring nut wrench.

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

Ring nut wrench:
90890-01268

Ring nut (initial tightening):
38 Nm (3.8 m•kg, 27 ft•lb)

- Loosen the ring nut one turn.
- Retighten the ring nut using the Ring nut wrench.

⚠WARNING:
Avoid over-tightening.

Ring nut (final tightening):
6 Nm (0.6 m•kg, 43 ft•lb)

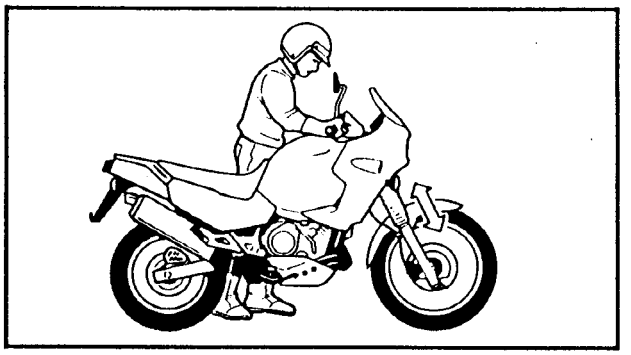
NOTE:
Recheck the steering head by turning the steering from lock to lock, after adjusting steering head.
If steering is binded, loosen the ring nut but not to the extent of free play in bearing.
If steering is loose, repeat the adjustment steps.

- Tighten the bolt (steering shaft) and bolt (handlebar crown).

Bolt (steering shaft):
80 Nm (8.0 m•kg, 58 ft•lb)
Bolt (handlebar crown):
23 Nm (2.3 m•kg, 17 ft•lb)

5. Install:
   • Front wheel
   Refer to the "FRONT WHEEL" section in the CHAPTER 7.





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
   Scratch/Damage → Replace.
   • Oil seal
   Excessive oil leakage → Replace.

3. Hold the motorcycle on upright position and apply the front brake.

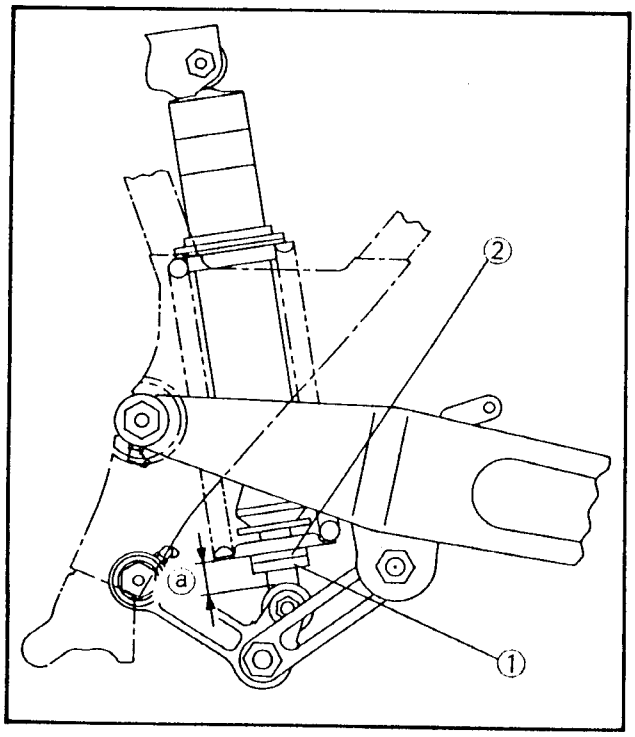
4. Check:
   • Operation
   Pump the front fork up and down for several times.
   Unsmooth operation → Repair.
   Refer to the "FRONT FORK" section in the CHAPTER 7.

REAR SHOCK ABSORBER ADJUSTMENT

⚠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. Adjust:
   • Spring preload

Adjustment steps:
- Loosen the locknut ①.
- Turn the adjuster ② in or out.

Turning in→Spring preload is increased.
Turning out→Spring preload is decreased.

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

Measurement length ⓐ:
Standard:
5.5 mm (0.22 in)
Maximum:
15.5 mm (0.58 in)

⚠CAUTION:

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

- Tighten the locknut.

Locknut:
4.2 Nm (4.2 m•kg, 30 ft•lb)

NOTE:
When adjusting, use the special wrench and extension bar which are included in the owner's tool kit.

TIRE INSPECTION

1. Measure:
   - Tire pressure

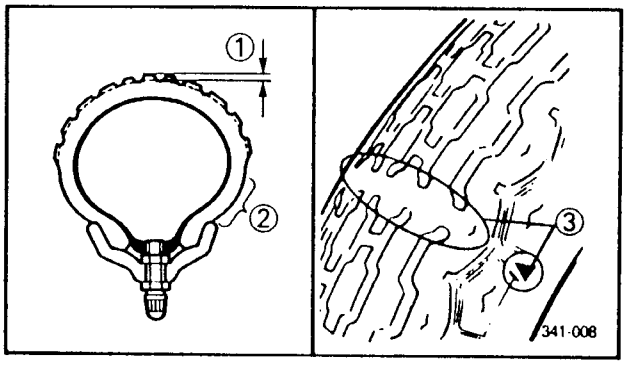
   Out of specification → Adjust.

⚠WARNING:

- Tire inflation pressure should be checked and adjusted when the temperature of the tire equals the ambient air temperature. Tire inflation pressure must be adjusted according to total weight of cargo, rider, passenger, and accessories (fairing, saddlebags, etc. if approved for this model), and vehicle speed.
- Proper loading of your motorcycle is important for the handling, braking, and other performance and safety characteristics of your motorcyle. Do not carry loosely packed items that can shift. Securely pack your heaviest items close to the center of the motorcycle, and destribute the weight evenly from side to side. Properly adjust the suspension for your load, and check the condition and pressure of your tires. NEVER OVERLOAD YOUR MOTORCYCLE. Make sure the total weight of the cargo, rider, passenger, and accessories (fairing, saddlebags, etc. if approved for this model) does not exceed the maximum load of the motorcycle. Operation of an overloaded motorcycle could cause tire damage, an accident, or even injury.

Basic weight: With oil and full fuel tank	226 kg (498 lb)	
Maximum load*	184 kg (406 lb)	
Cold tire pressure	Front	Rear
Up to 90 kg (198 lb) load*	225 kPa (2.25 kg/cm^2, 33 psi)	225 kPa (2.25 kg/cm^2, 33 psi)
90 kg (198 lb) ~ Maximum load*	225 kPa (2.25 kg/cm^2, 33 psi	250 kPa (2.50 kg/cm^2, 36 psi)
High speed riding	225 kPa (2.25 kg/cm^2, 33 psi)	250 kPa (2.50 kg/cm^2, 36 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)

① Tread depth
② Side wall
③ Wear indicator

⚠WARNING:

- **It is dangerous to ride with a wornout tire. When a tire tread begins to show lines, replace the tire immediately.**
- **Patching a punctured tube is not recommended. If it is absolutely necessary to do so, use great care and replace the tube as soon as possible with a good quality replacement.**
- **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.**

Tube type wheel → Tube type tire only
Tubeless type wheel → Tube type or tubeless tire

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

⚠WARNING:

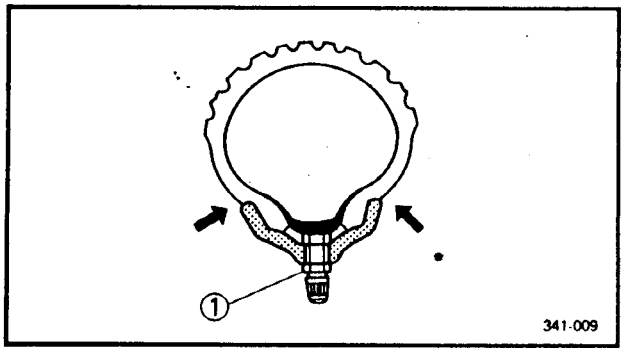
After extensive tests, the tires mentioned below have been approved by Yamaha motor Co., Ltd. for this model. No guarantee for handling characteristics can be given if tire combinations other than what is approved are used on this motorcycle. The front and rear tires should be of the same manufacture and design.

FRONT:

Manufacture	Size	Type
BRIDGESTONE	90/90-21 54H	TW47

REAR:

Manufacture	Size	Type
BRIDGESTONE	140/80-17 69H	TW48



⚠WARNING:

- **After mounting a tire, ride conservatively to allow proper tire to rim seating. Failure to do so may cause an accident resulting in motorcycle damage and possible operator injury.**
- **After a tire repair or replacement, be sure to torque tighten the valve stem locknut ① to specification.**

Valve-stem locknut:
1.5 Nm (0.15 m•kg, 1.1 ft•lb)

WHEEL INSPECTION

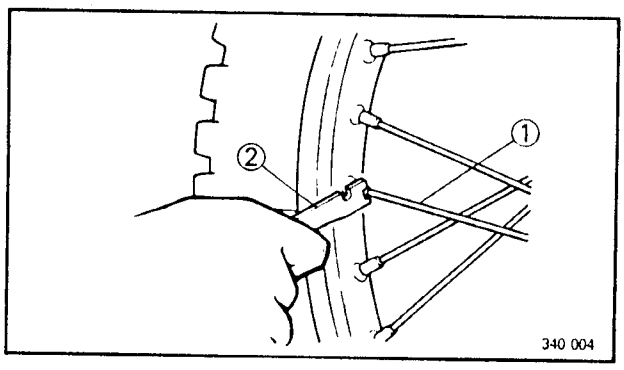
1. Inspect:
   - Wheels
     Damage/Bends→Replace.

NOTE:

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

⚠WARNING:

Never attempt even small repairs to the wheel.



SPOKES INSPECTION AND TIGHTENING

1. Inspect:
   - Spokes ①
     Bend/Damage → Replace.
     Loose spoke → Retighten.
2. Tighten:
   - Spokes

② Spoke wrench

NOTE:

Be sure to retighten these spokes before and after brake-in.

Nipple:
2.8 Nm (0.28 m•kg, 1.57 ft•lb)

CABLE INSPECTION AND LUBRICATION

⚠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
     Damage → Replace.
2. 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.

LEVER AND PEDAL LUBRICATION

Lubricate the lever and pedal at their pivoting points.

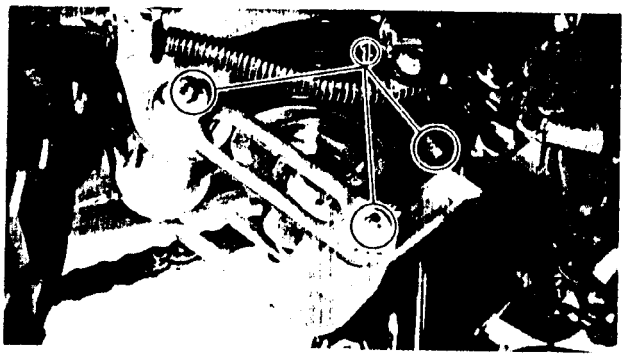
Recommended lubricant:
SAE 10W30 motor oil

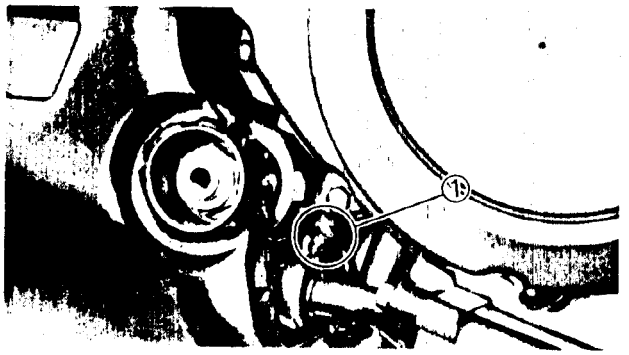
INSP ADJ

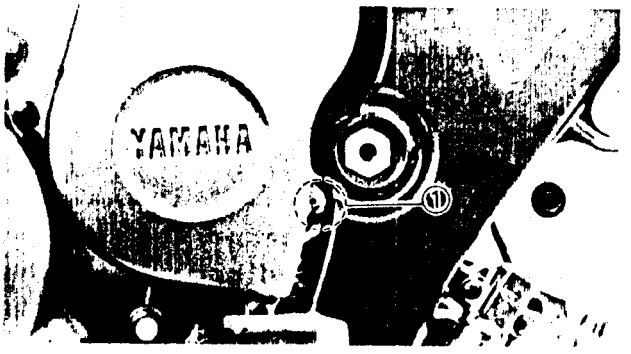
SIDESTAND LUBRICATION

Lubricate the sidestand at pivoting points.

	Recommended lubricant: **SAE 10W30 motor oil**







REAR SUSPENSION LUBRICATION

Lubricate the swingarm and relay arms at their pivoting points.

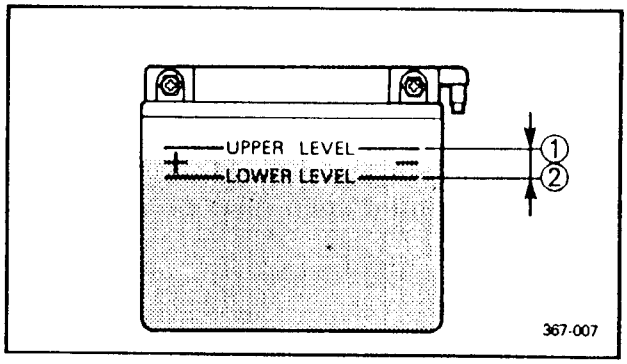
	Recomended lubricant: **Lithium soap base grease**

① Grease nipple

ELECTRICAL

BATTERY INSPECTION

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

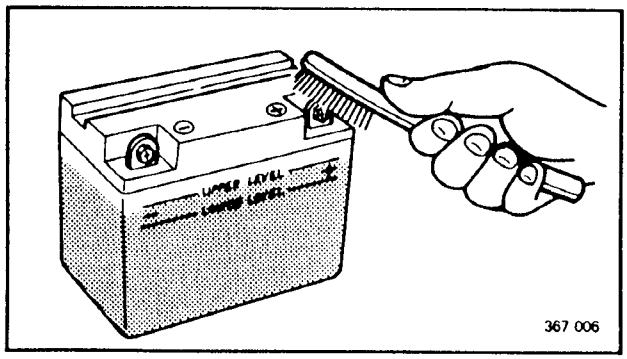


2. Inspect:
   - Fluid level

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

⚠CAUTION:

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



3. Inspect:
   - Battery terminal

   Dirty terminal → Clean with wire brush.
   Poor connection → Correct.

NOTE:

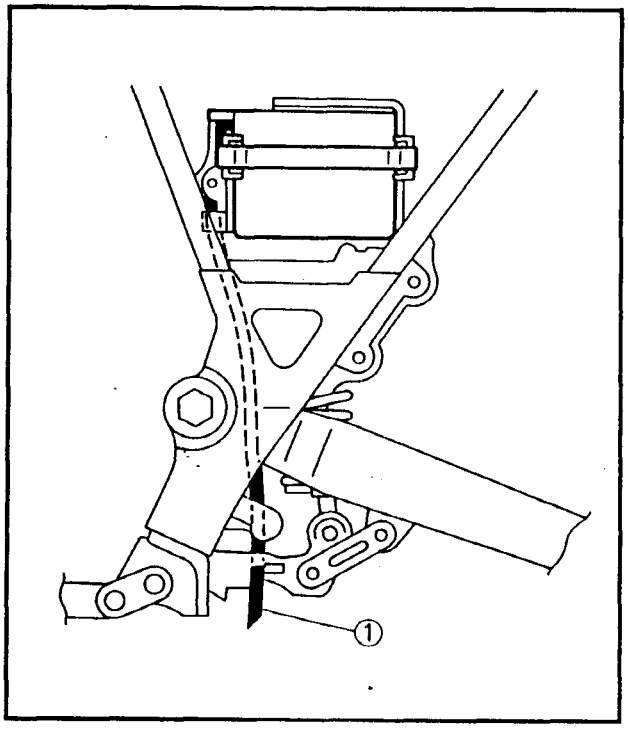
After cleaning the terminals, apply grease lightly to the terminals.

4. Inspect:
   - Breather hose

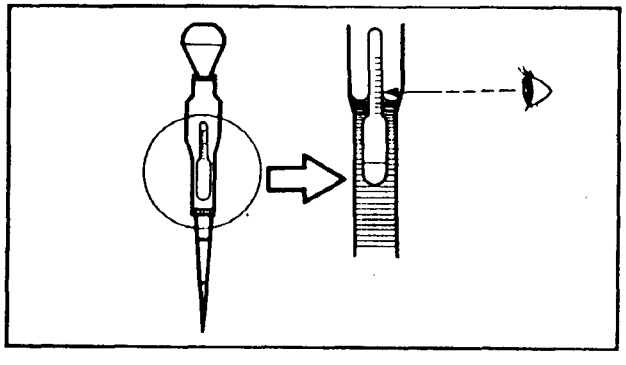
   Obstruction → Remove.
   Damage → Replace.

⚠CAUTION:

When inspecting the battery, be sure the breather hose is routed correctly. If the breather hose 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.



5. Connect:
   • Breather hose ①
   Pass the breather hose between the left side of the relay arm and in front of the swingram.



6. Check:
   • Specific gravity
   Less than 1.280→Recharge battery.

Charging current:
0.4 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 severe 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 agg, 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.

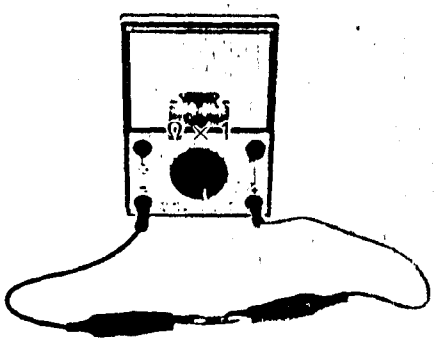
KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.

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

FUSE INSPECTION

⚠CAUTION:

Don't forget to turn off the main switch when checking or replacing the fuse. Otherwise, it may cause accidental shortcircuiting.



1. Inspect:
   • Fuse

Inspection steps:
• Connect the Pocket Tester to the fuse and check it for continuity.

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

Pocket tester:
90890-03112

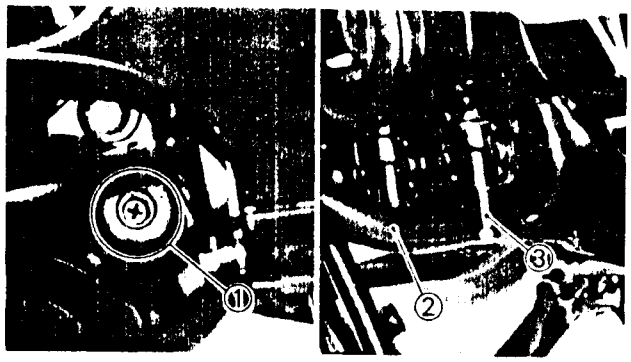
• If the tester is indicated at ∞. The fuse is blown, replace it.

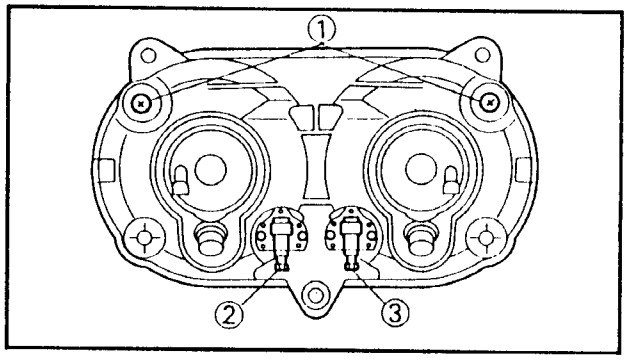
2. Replace:
   • Blown fuse

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

⚠WARNING:

Never use a fuse with a rating other then specified, or other material in place of a fuse. An improper fuse may cause damage to the electrical system and possibly cause a fire, or the lighting and/or ignition may cease to function.





HEADLIGHT BEAM ADJUSTMENT

1. Adjust
   - Headlight beam (vertical)

To raise the beam	Turn the adjuster ① clockwise.
To lower the beam	Turn the adjuster ① counterclockwise.

2. Adjust
   - Headlight beam (horizontal)

(Left)

To right the beam	Turn the adjuster ② clockwise.
To left the beam	Turn the adjuster ② counterclockwise.

(Right)

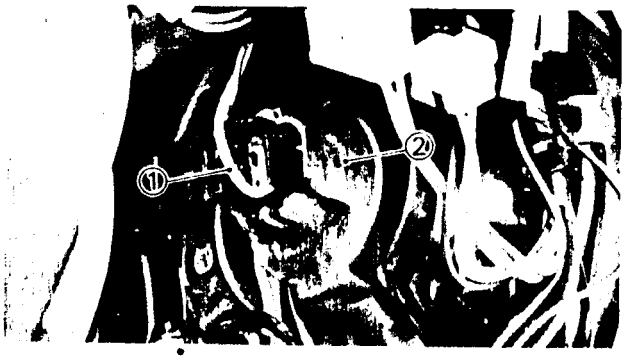
To right the beam	Turn the adjuster ③ counterclockwise.
To left the beam	Turn the adjuster ③ lockwise.

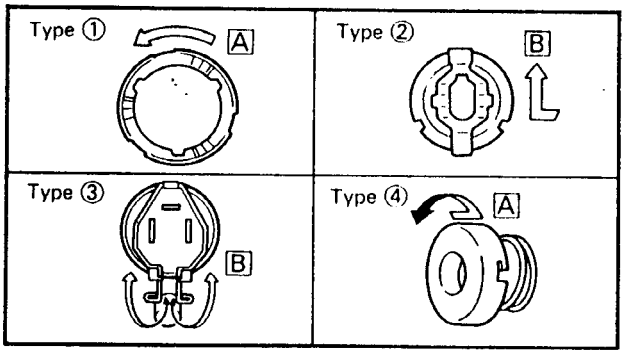
Headlight beam variation

☼ , ☼ : LIGHT "ON"
○ : LIGHT "OFF"

Destination	Lighting		Headlight type	Bulb to be used
Germany Sweden Belgium	HI	☼ ○ A	Quartz bulb	12V 55W ○ 12V 60/55W ○ 12V 4W
	LO	○ ☼ A		
England	HI	A ☼ ☼ A	Quartz bulb	12V 3.4W ○ 12V 35/35W ○ 12V 35/35W ○ 12V 3.4W
	LO	A ☼ ☼ A		
Finland Holland	HI	☼ ☼ A	Bulb	12V 45/40W ○ 12V 45/40W ○ 12V 4W
	LO	○ ☼ A		
Switzerland	HI	A ▭	Quartz bulb	12V 4W ○ 12V 60/55W
	LO	A ▭		
France	HI	☼ ☼ A	Quartz bulb	12V 55W ○ 12V 60/55W ○ 12V 4W
	LO	○ ☼ A		
Italy	HI	A ☼ ☼ A	Bulb	12V 3W ○ 12V 35/35W ○ 12V 35/35W ○ 12V 3W
	LO	A ☼ ☼ A		
Spain Denmark Norway	HI	☼ ☼ A	Bulb	12V 45/40W ○ 12V 45/40W ○ 12V 4W
	LO	☼ ☼ A		

A ... Auxiliary light





HEADLIGHT BULB REPLACEMENT

1. Disconnect:
   - Headlight leads ①
2. Remove:
   - Bulb cover ②
3. Remove:
   - Bulb

   Unhook the bulb.

⚠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.

[A] Turn
[B] Unhook

4. Install:
   - Bulb (new)

   Secure the new bulb with the bulb holder.

⚠CAUTION:

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

5. Install:
   - Bulb cover
6. Connect:
   - Headlight leads

CHAPTER 4.
ENGINE OVERHAUL

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ENGINE OVERHAUL

ENGINE REMOVAL

NOTE:

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

- Cylinder head
- Cylinder
- Piston
- Clutch
- Water pump
- AC generator

SIDE COVERS, SEAT, COWLINGS AND FUEL TANK

1. Remove:
   - Side covers
   - Seat
   - Side cowlings
   - Fuel tank

   Refer to the "SEAT, FUEL TANK AND COVER" section.

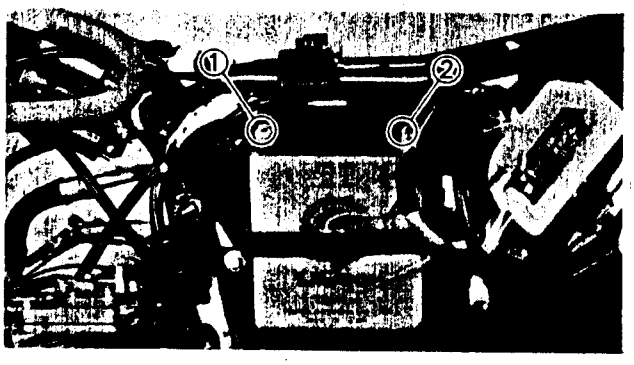
ENGINE OIL AND COOLANT

1. Drain:
   - Crankcase
   - Oil tank

   (of them oil)
   Refer to the "ENGINE OIL REPLACEMENT" section in the CHAPTER 3.

2. Drain:
   - Radiator
   - Recovery tank
   - Crankcase

   (of them coolant)
   Refer to the "COOLANT REPLACEMENT" section in the CHAPTER 3.

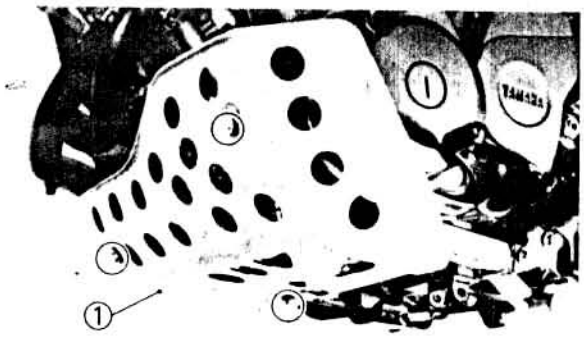


BATTERY LEADS

1. Disconnect:
   - Battery leads

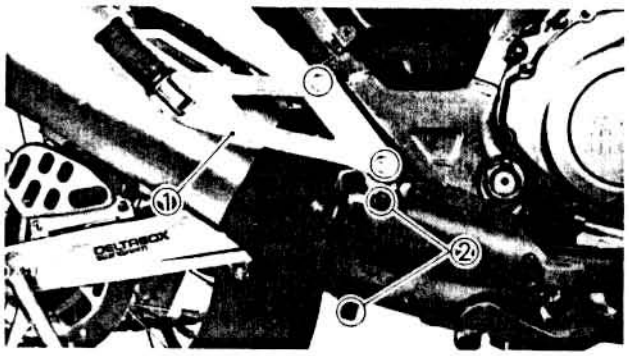
⚠CAUTION:

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



ENGINE GUARD

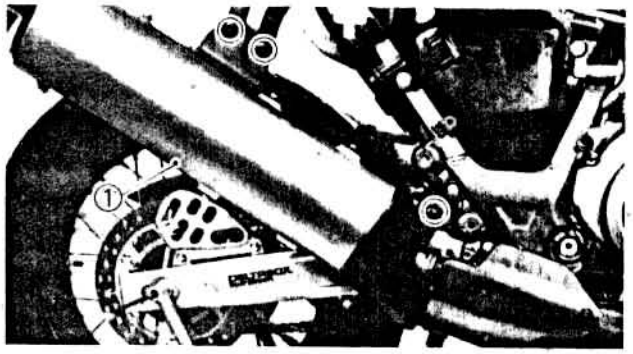
1. Remove:
   - Engine guard ①



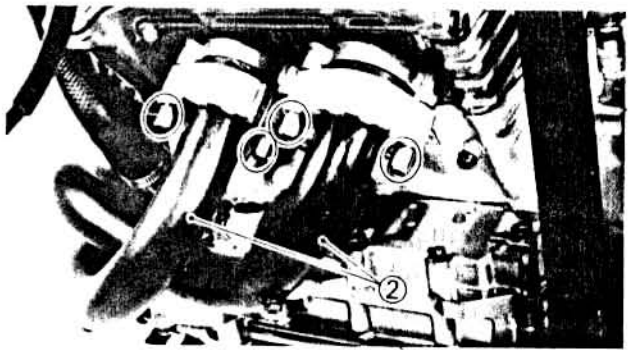
EXHAUST PIPES AND MUFFLER

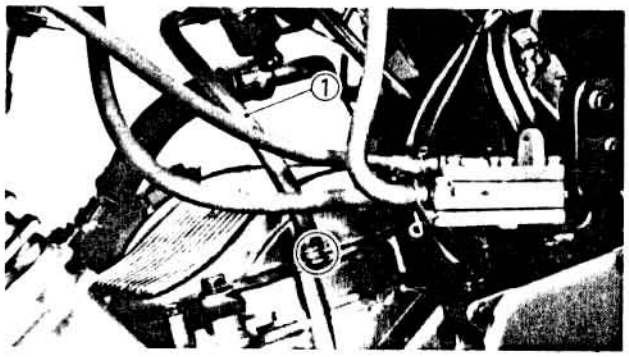
1. Remove:
   - Footrest ①

2. Loosen:
   - Bolt ② (clamp)



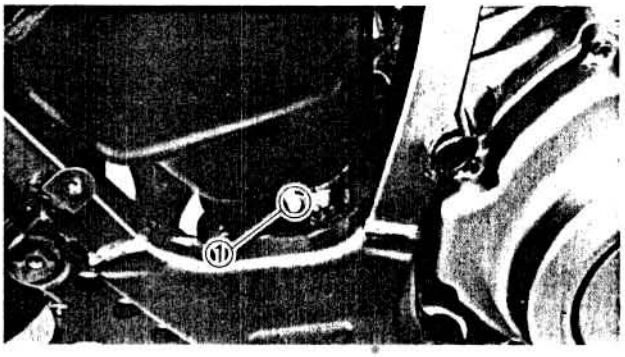
3. Remove:
   - Muffler ①
   - Exhaust pipes ②



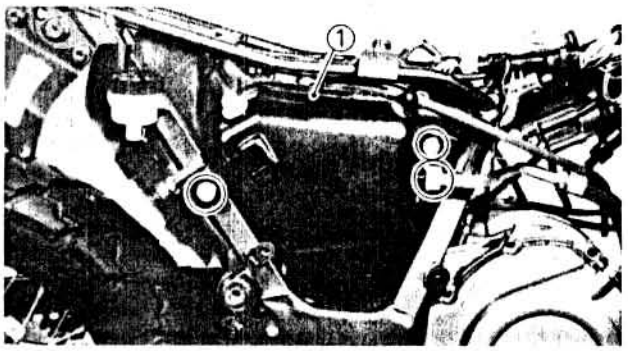


OIL TANK

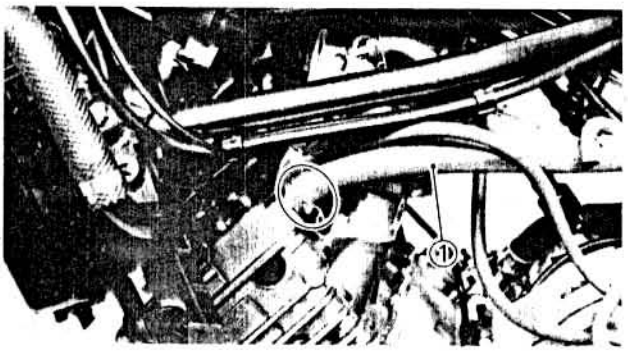
1. Disconnect:
   - Breather hose ①
     (from crankcase)



2. Loosen:
   • Screw ① (hose clamp)

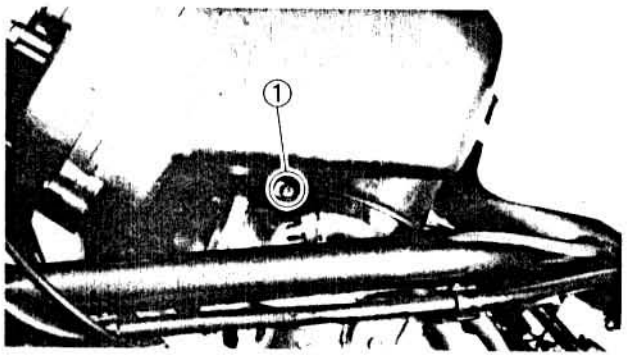


3. Remove:
   • Oil tank ①

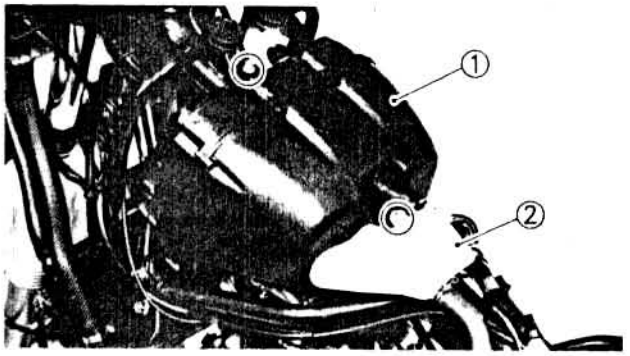


AIR FILTER CASE AND CARBURETOR

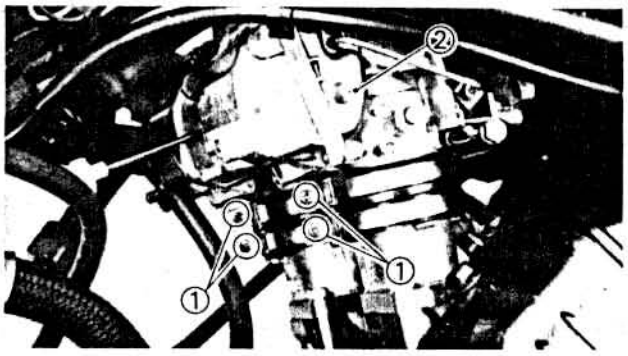
1. Disconnect:
   • Breather hose ①
   (from cylinder head)



2. Loosen:
   • Screws ① (carburetor joints)



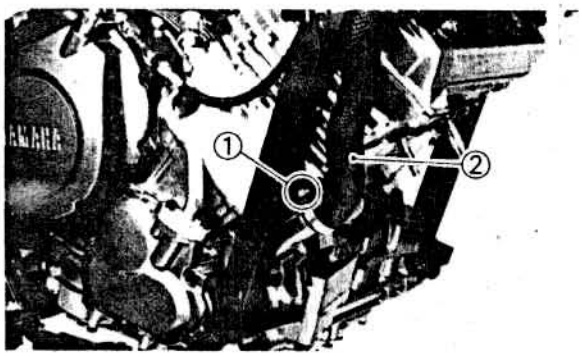
3. Remove:
   • Air filter case ①
   (with oil catcher ② as one unit)



4. Loosen:
   • Screws ① (intake manifold)
5. Disconnect:
   • Carburetors ②
   (from intake manifold)

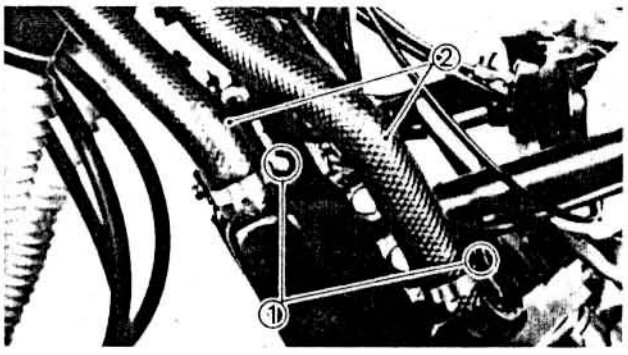
NOTE:

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

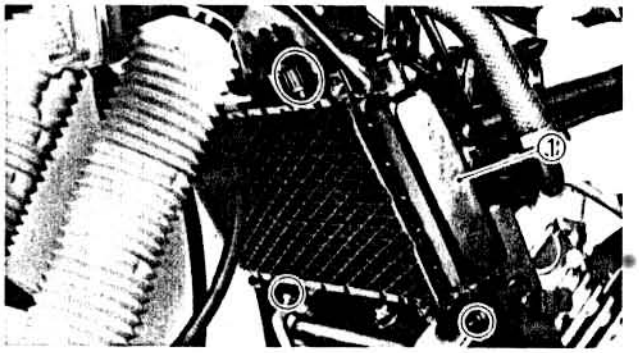


RADIATOR

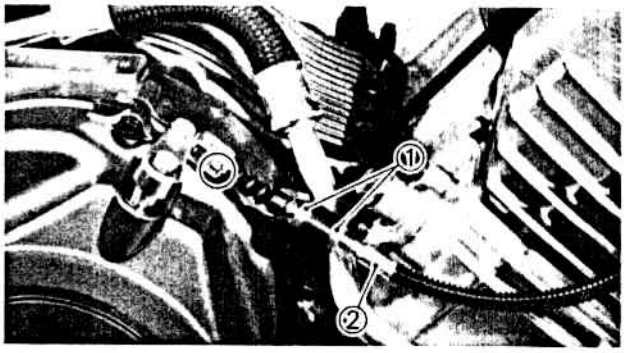
1. Loosen:
   • Screw ① (hose clamp)
2. Disconnect:
   • Radiator hose ②
   (from warter pump)



3. Loosen:
   • Screws ① (hose clamps)
4. Disconnect:
   • Radiator hoses ②

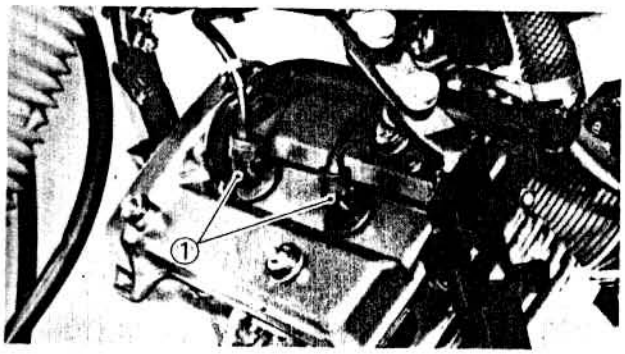


5. Remove:
   • Radiator ①

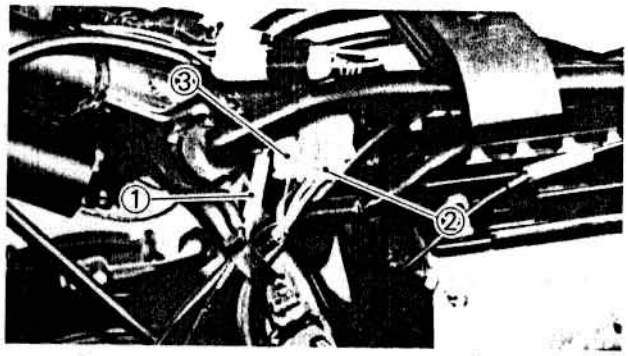


CABLES AND LEADS

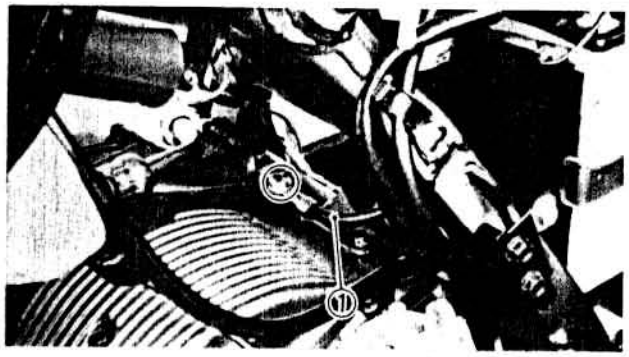
1. Loosen:
   • Nuts ①
2. Disconnect:
   • Clutch cable ②
   (from pull lever)



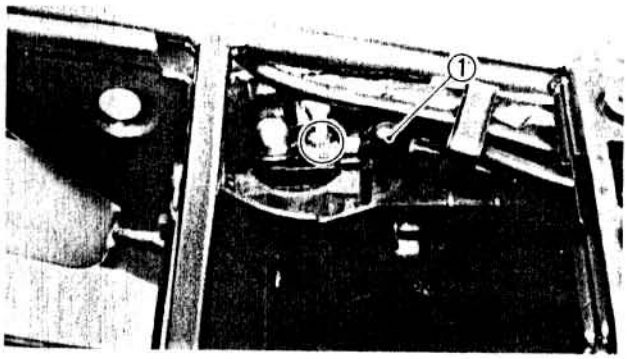
3. Disconnect:
   • Spark plug leads ①
   (from spark plugs)



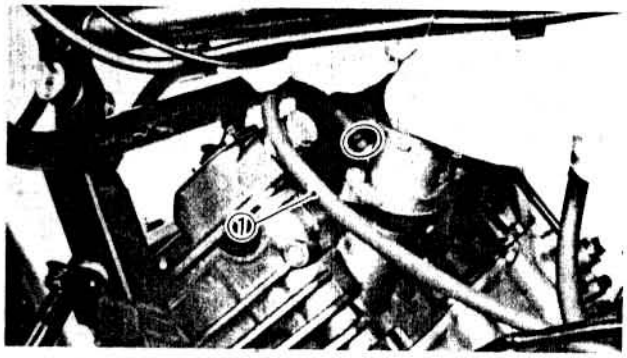
4. Disconnect:
   • Neutral switch lead ①
   • AC magneto leads ②
   • Pickup coil leads ③



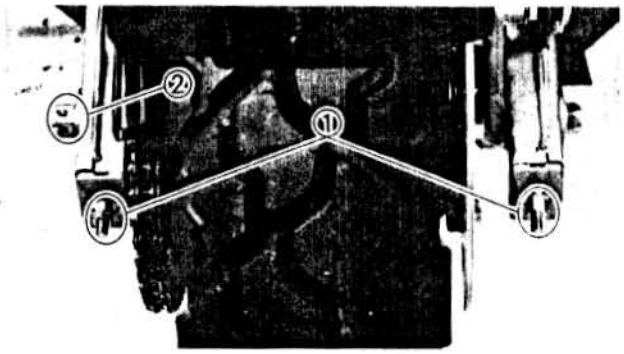
5. Disconnect:
   • Ground lead ①
   (from crankcase cover)



6. Disconnect:
   • Starter motor lead ①
   (from starter relay)

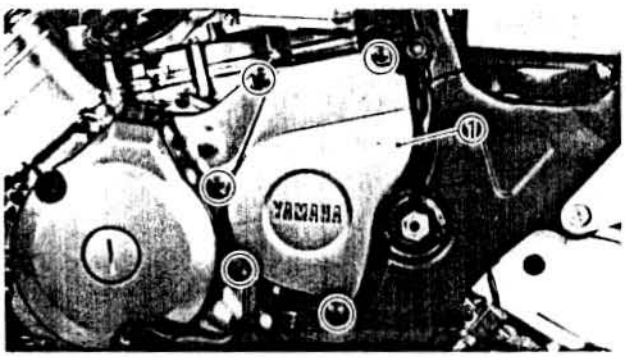


7. Disconnect:
   • Vacuum hose ①
   (from intake manifold)

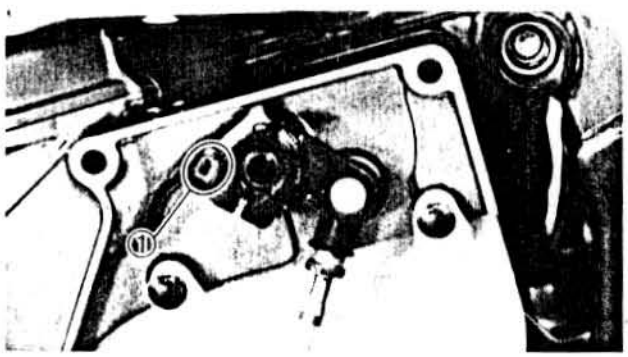


DRIVE CHAIN

1. Loosen:
   - Nuts ① (chain pullers)
   - Axle nut ②

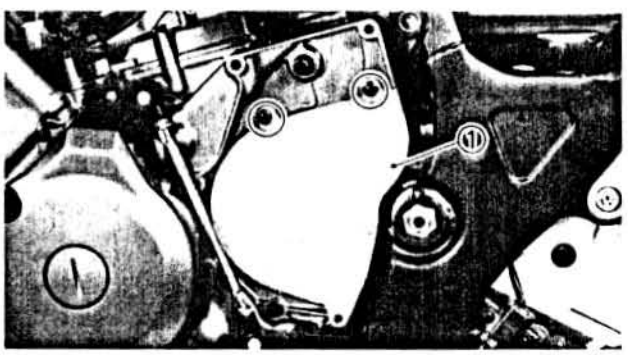


2. Remove:
   - Cover ①

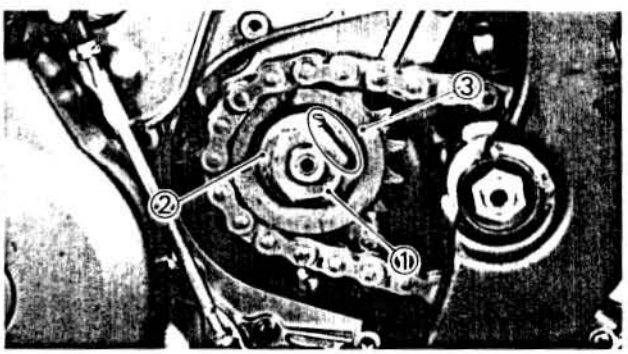


3. Remove:
   - Bolt ① (shift rod)

4. Disconnect:
   - Shift rod (from shift shaft)



5. Remove:
   - Sprocket cover ①



6. Straighten:
   - Lock washer tab

7. Remove:
   - Nut ①
   - Lock washer ②
   - Drive sprocket ③

NOTE:

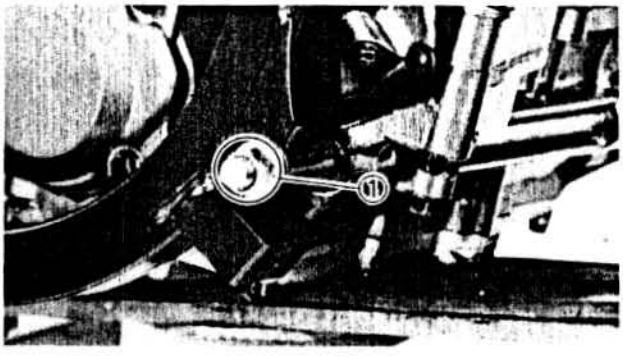
Loosen the nut while applying the rear brake.

ENGINE REMOVAL

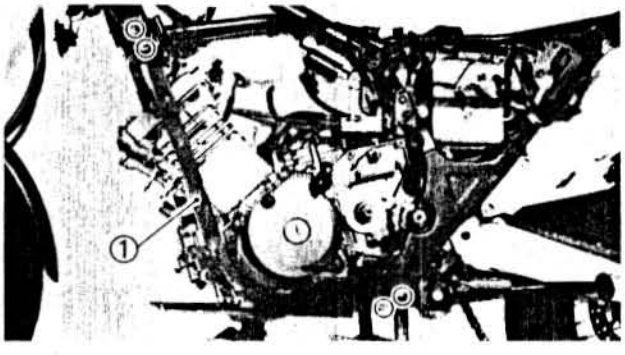
1. Place suitable stands under the frame and engine.

⚠WARNING:

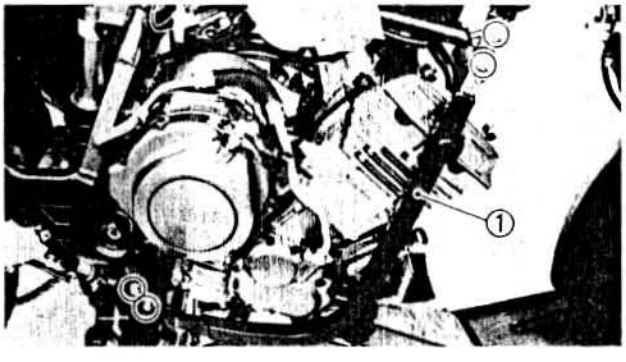
Securely support the motorcycle so there is no danger of it falling over.

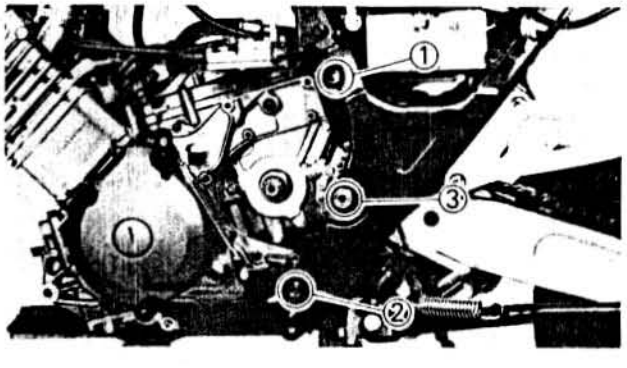


2. Remove:
   - Mounting bolt ① (front—lower)

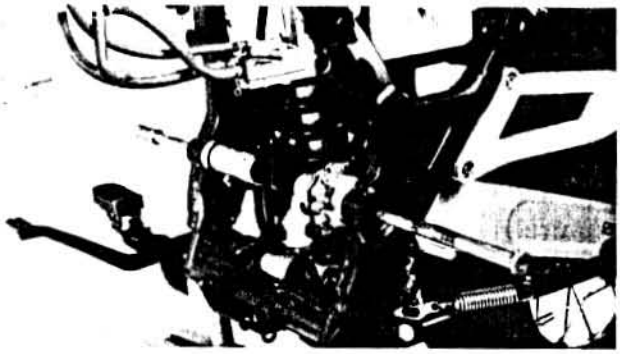


3. Remove:
   - Down tubes ①



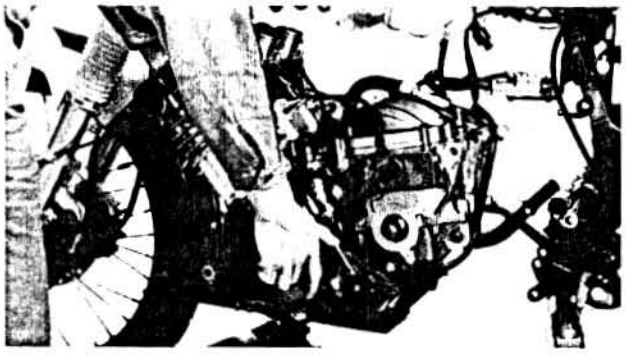


4. Remove:
   - Mounting bolt ① (rear—upper)
   - Mounting bolt ② (rear—lower)
   - Pivot shaft ③

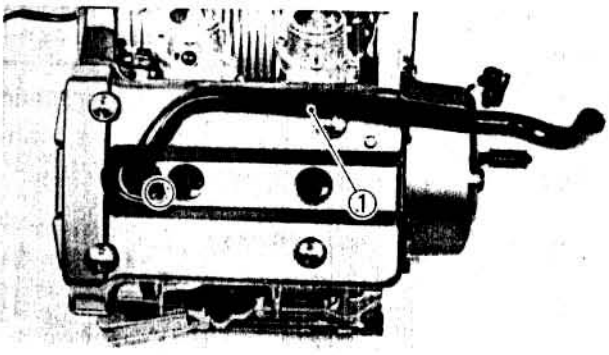


NOTE:

The engine and swingarm are installed using the same pivot shaft. Therefore, take care so that the pivot shaft is pulled, not entirely out, but for enough to set the engine free.



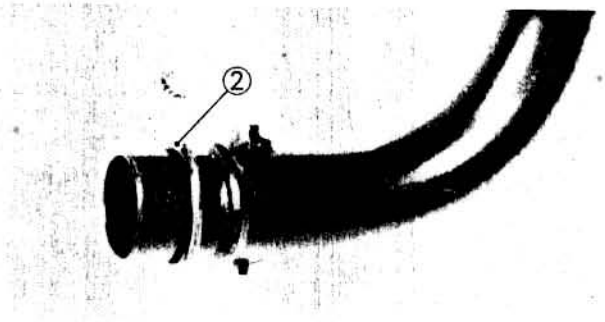
5. Remove:
   - Engine assembly
     (from left side of motorcycle)



ENGINE DISASSEMBLY

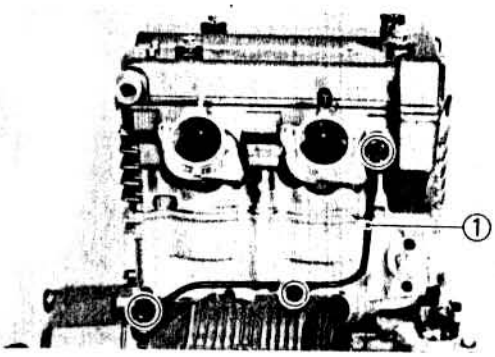
PIPES AND HOSES

1. Remove:
   - Coolant hose ①

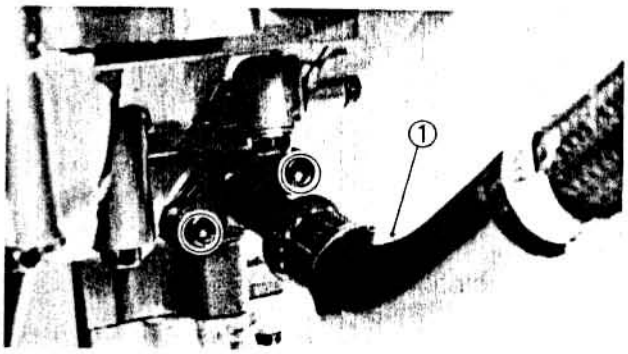


NOTE:

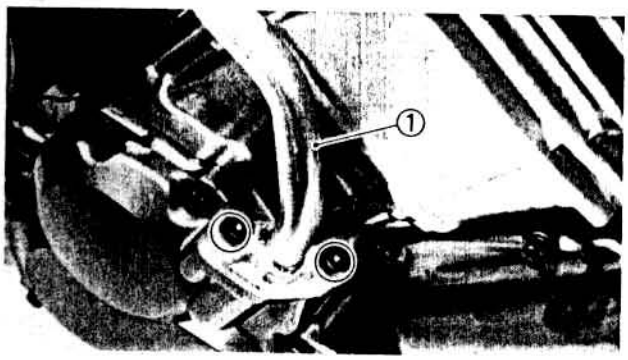
Do not fall the O-ring ② into the cylinder head when removing the coolant hose.



2. Remove:
   - Oil pipe ①



3. Remove:
   - Oil hose ①



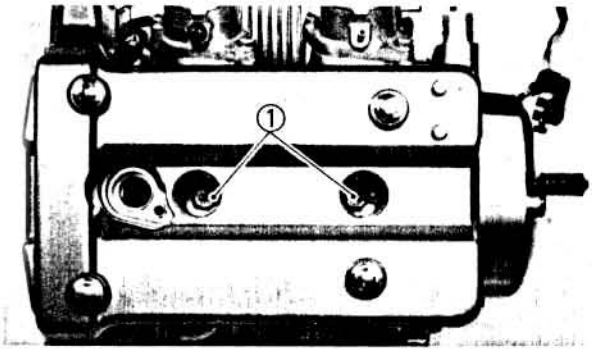
4. Remove:
   - Oil hose ①

CYLINDER HEAD, CYLINDER AND PISTONS

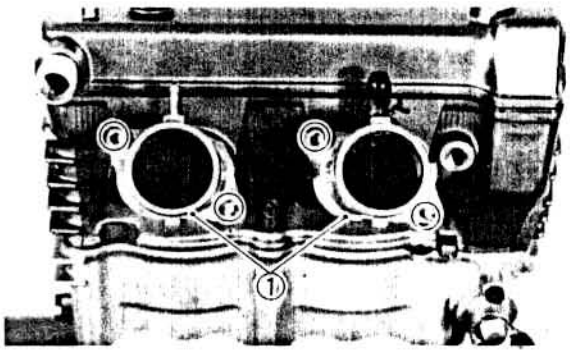
NOTE:

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

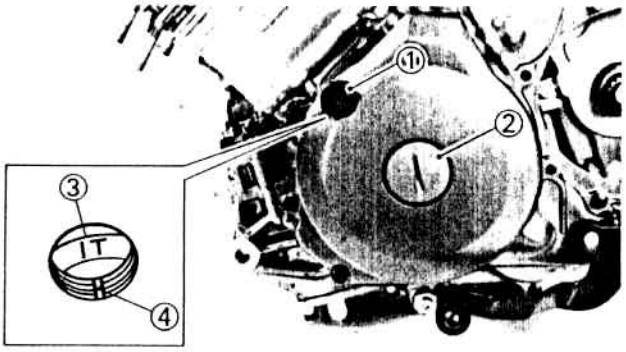
- Side cowlings
- Engine guard
- Fuel tank
- Air filter case
- Radiator
- Carburetor
- Exhaust pipes



1. Remove:
   - Spark plugs (1)

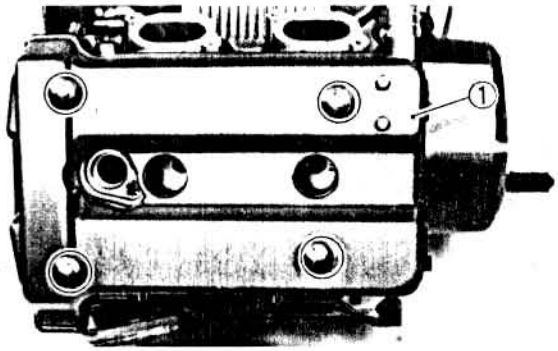


2. Remove:
   - Intake manifolds (1)



3. Remove:
   - Timing plug (1)
   - Plug (center) (2)

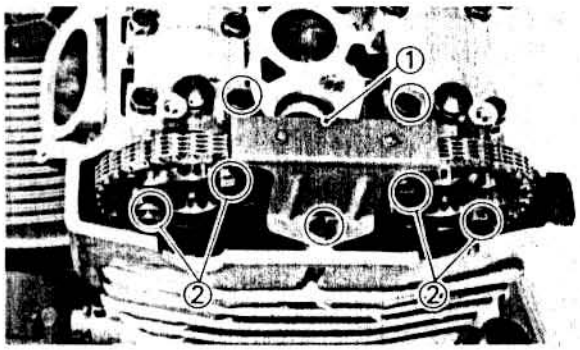
4. Turn:
   - Crankshaft
     (until TDC mark (3) is aligned with stationary pointer (4))



5. Remove:
   - Cylinder head cover (1)

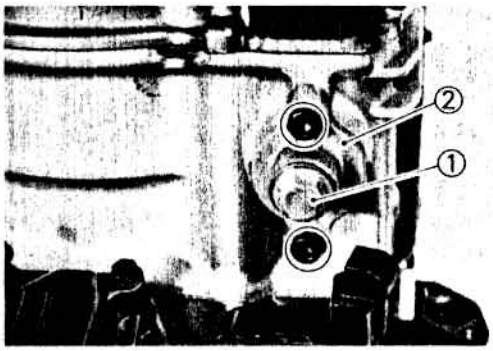
NOTE:

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



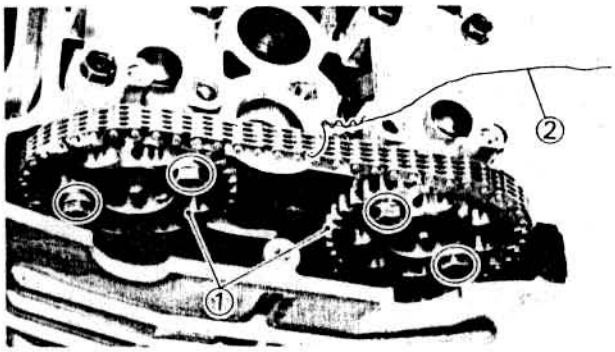
6. Remove:
   • Chain guide ① (upper)

7. Loosen:
   • Bolts ② (cam sprocket)



8. Loosen:
   • Cap bolt ① (chain tensioner)

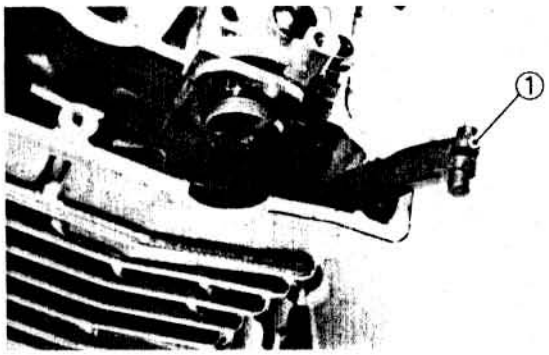
9. Remove:
   • Chain tensioner ②



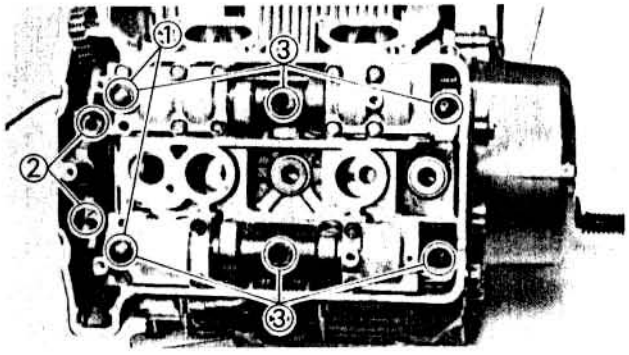
10. Remove:
    • Cam sprockets ①

NOTE:

Fasten a safety wire ② to the timing chain to prevent it from falling into the crankcase.



11. Remove:
    • Chain guide ① (exhaust)



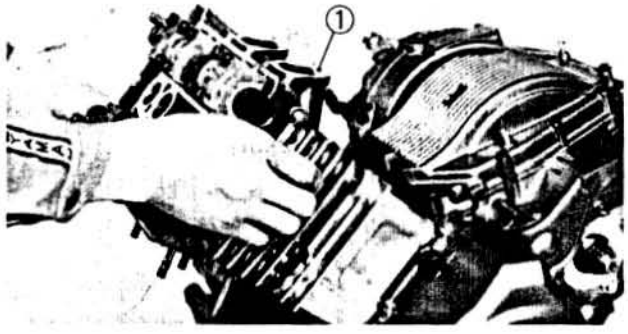
12. Remove:
    • Plugs ①
    • Bolts ②
    • Nuts ③

    Use the hexagon wrench (6 mm).

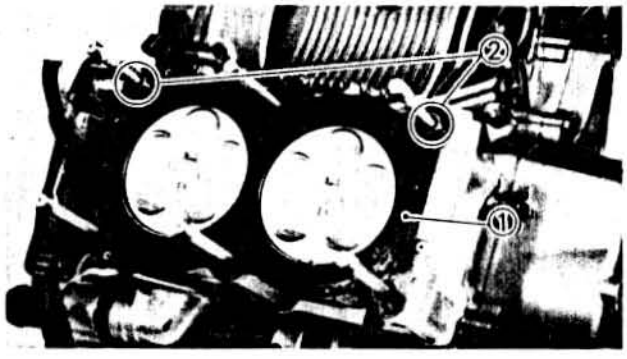
	Hexagon wrench: **90890-01395**

NOTE:

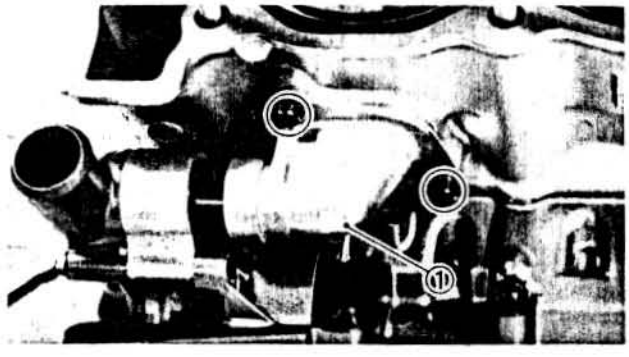
Working in a crisscross pattern, loosen the nuts 1/4 turn each. Remove them after all are loosened.



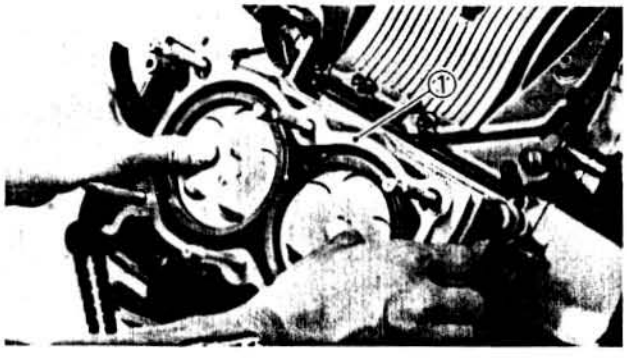
13. Remove:
    • Cylinder head ①



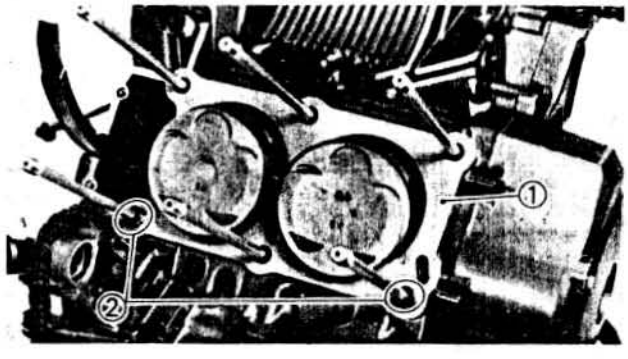
14. Remove:
    • Gasket ① (cylinder head)
    • Dowel pins ②



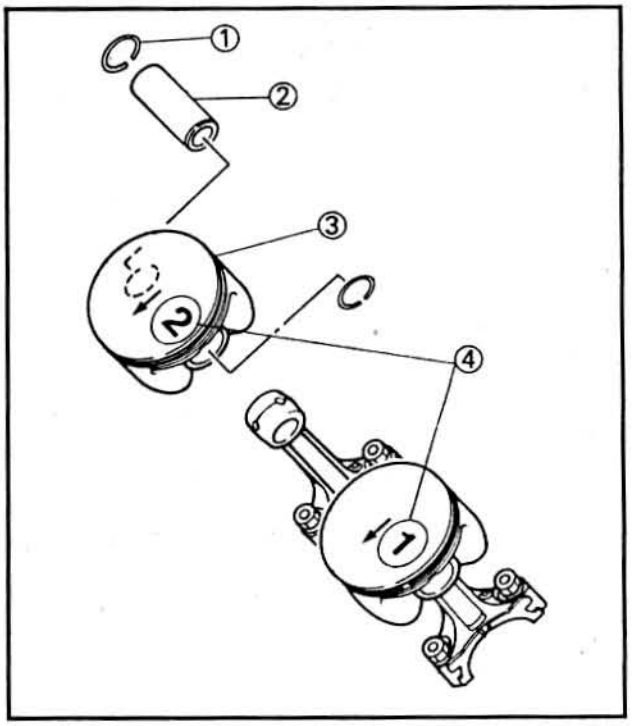
15. Remove:
    • Pipe ①



16. Remove:
    • Cylinder ①



17. Remove:
    • Gasket ① (cylinder)
    • Dowel pins ②



18. Remove:
    - Piston pin circlips ①
    - Piston pins ②
    - Pistons ③

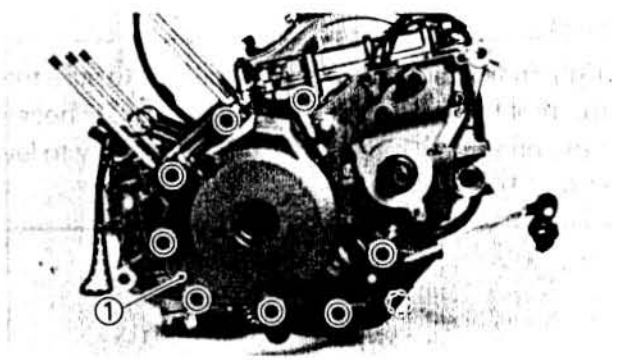
NOTE:

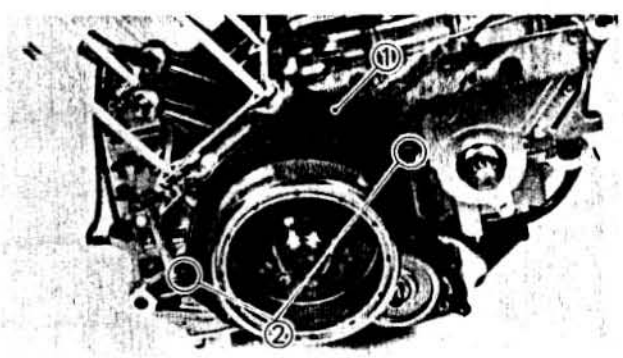
- Before removing the piston pin circlip, cover the crankcase with a clean rag to prevent the circlip from falling into the crankcase cavity.
- Before removing the piston pin, deburr the clip grooved and pin hole area. If the piston pin groove is deburred and piston pin is still difficult to remove, use the piston pin puller.
- Put identification mark ④ on the each piston head for reference during reinstallation.

	Piston pin puller: **90890-01304**

⚠CAUTION:

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





ROTOR AND STARTER DRIVES

NOTE:

With the engine mounted, the AC magneto and starter drives can be maintained by removing the following part.

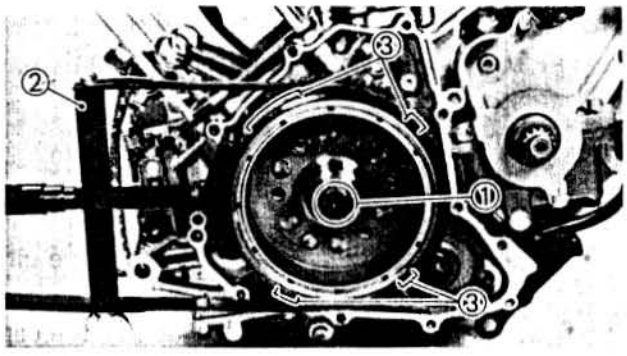
- Engine guard

1. Remove
    - Crankcase cover ① (left)

NOTE:

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

2. Remove:
    - Gasket ① (crankcase cover)
    - Dowel pins ②



3. Remove:
   • Bolt ① (rotor)

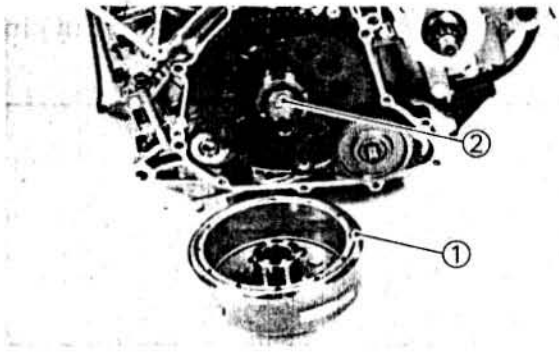
NOTE:

Loosen the bolt (rotor) while holding the rotor with the rotor holder ②.

	Rotor holder: **90890-01701**

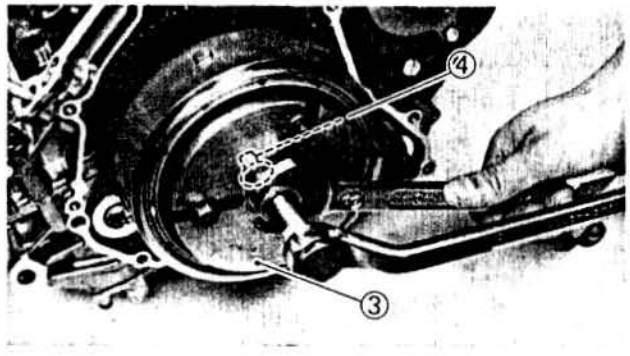
⚠CAUTION:

Do not allow the rotor holder to touch the projections ③ on the rotor.



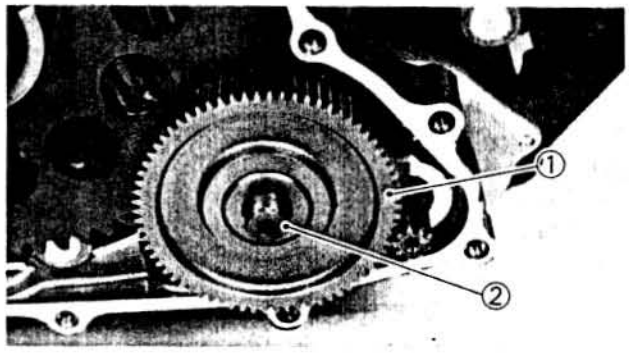
4. Remove:
   • Rotor ①
   • Woodruff key ②
   Use the rotor puller ③ and adapter ④.

	Rotor puller: **90890-01362** **Adapter:** **90890-01382**

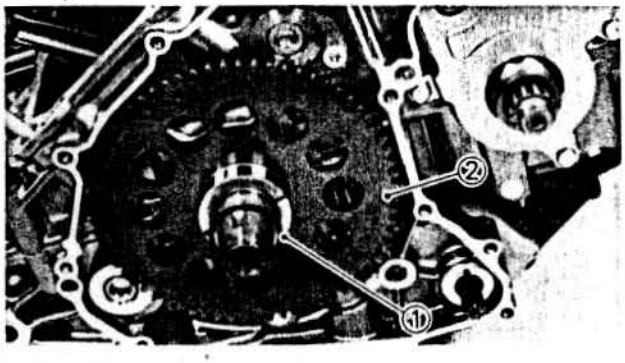


NOTE:

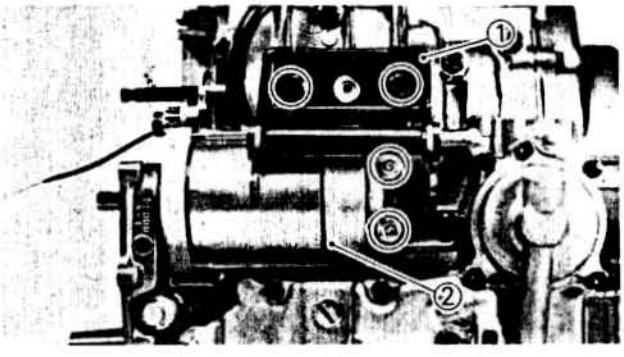
Tighten the tool holding bolts, but make sure that the tool body is parallel with the rotor. If necessary, one screw may be backed out slightly to level tool body.



5. Remove:
   • Starter idle gear ①
   • Shaft ② (starter idle gear)



6. Remove:
   - Washer ①
   - Wheel gear ②

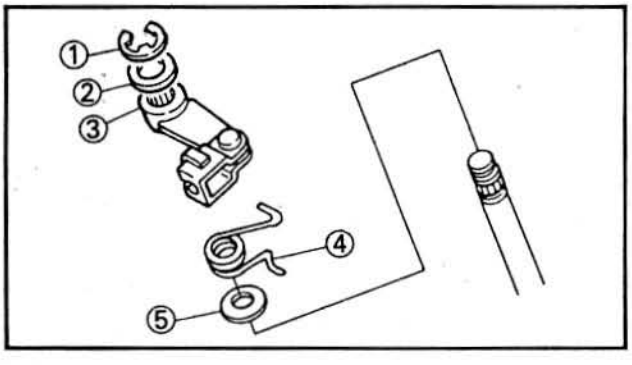


7. Remove:
   - Engine stay ①
   - Starter motor ②

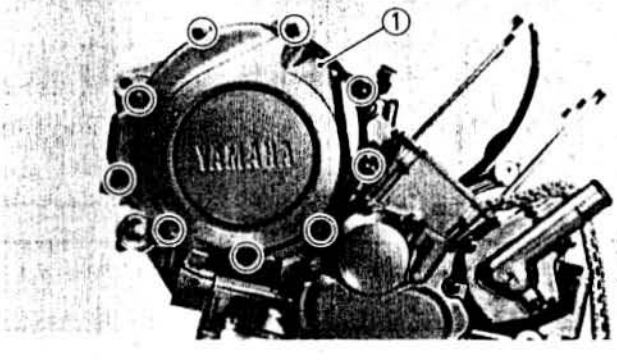
CLUTCH

NOTE:

With the engine mounted, the clutch can be maintained by removing the following parts.
- Clutch cable
- Engine guard
- Exhaust pipes



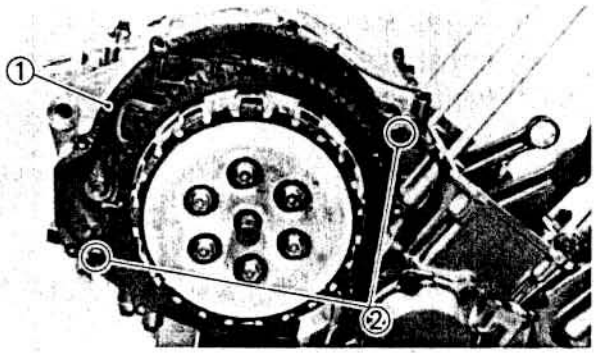
1. Remove:
   - Circlip ①
   - Washer ②
   - Pull lever ③
   - Return spring ④
   - Washer ⑤



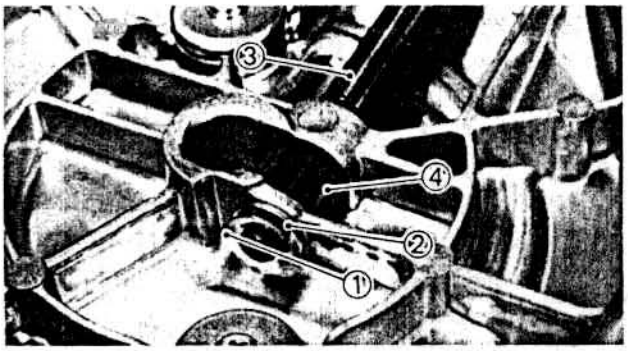
2. Remove:
   - Crankcase cover ① (right)

NOTE:

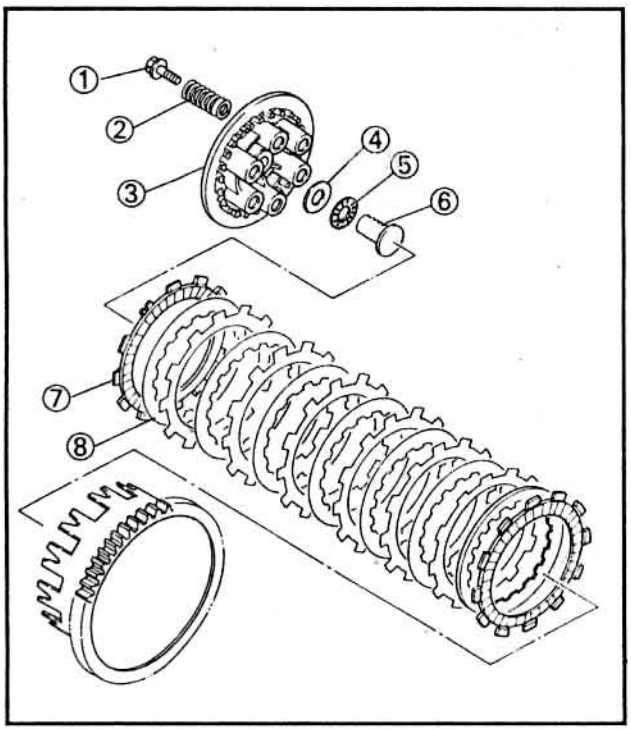
Working in a crisscross pattern, loosen the bolts 1/4 turn each. Remove them after all are loosened.



3. Remove:
   - Gasket ① (crankcase cover)
   - Dowel pins ②



4. Remove:
   - Circlip ①
   - Washer ②
   - Pull lever axle ③
   - Release pinion gear ④ (from crankcase cover)

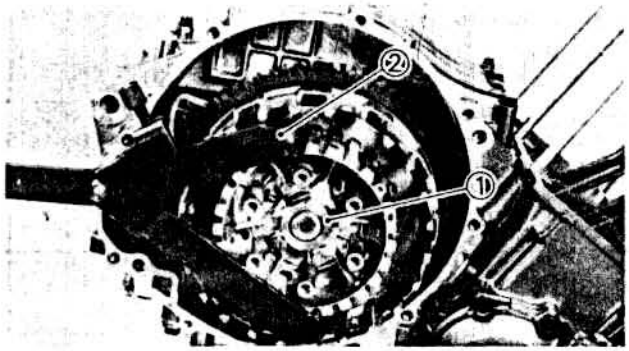


5. Remove:
   - Bolts ①
   - Clutch springs ②
   - Pressure plate ③
   - Washer ④
   - Bearing ⑤
   - Pull rod ⑥
   - Friction plates ⑦
   - Clutch plates ⑧

NOTE:

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

6. Straighten:
   - Lock washer tab

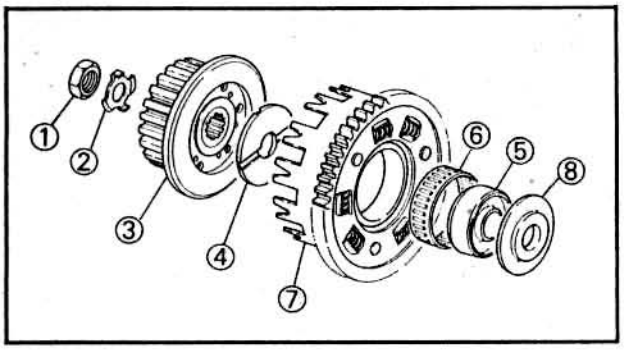


7. Loosen:
   - Nut ① (clutch boss)

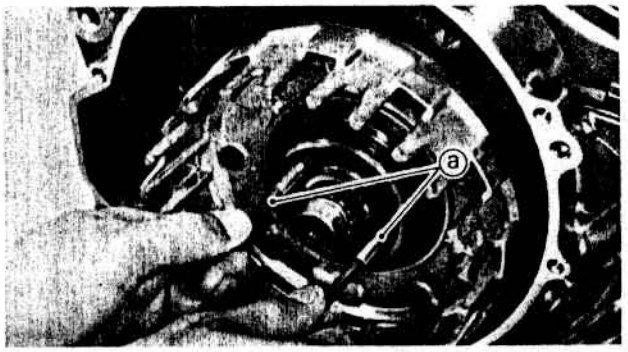
NOTE:

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

	Universal clutch holder: **90890-04086**

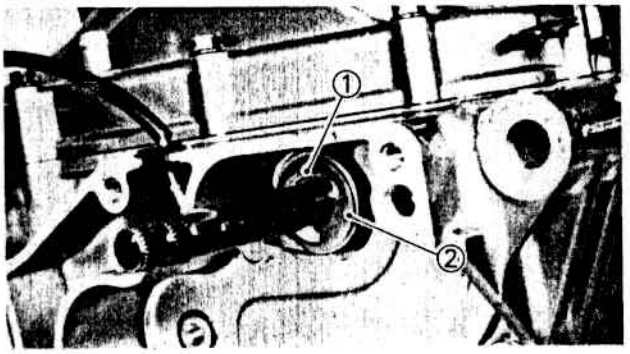


8. Remove:
   - Nut ① (clutch boss)
   - Lock washer ②
   - Clutch boss assembly ③
   - Thrust plate ④
   - Spacer ⑤
   - Bearing ⑥
   - Clutch housing ⑦
   - Thrust plate ⑧

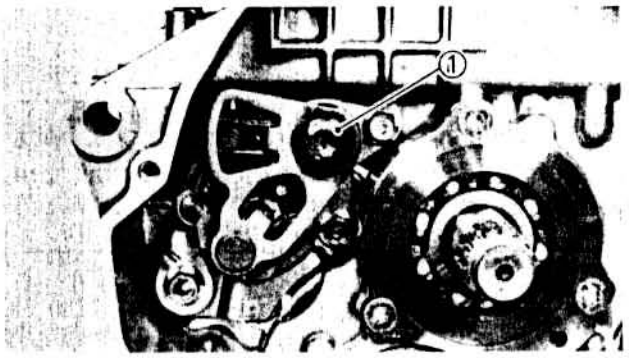


NOTE:

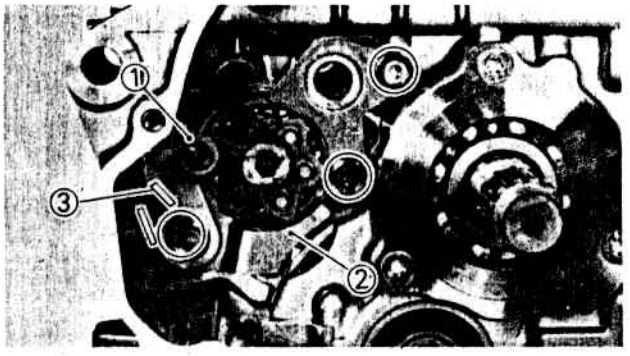
Install suitable screws ⑨ [thread diamater is 6 mm] into the spacer, then remove the spacer by pulling on the screws.



9. Remove:
   - Circlip ①
   - Washer ②



10. Remove:
    - Shift shaft ①



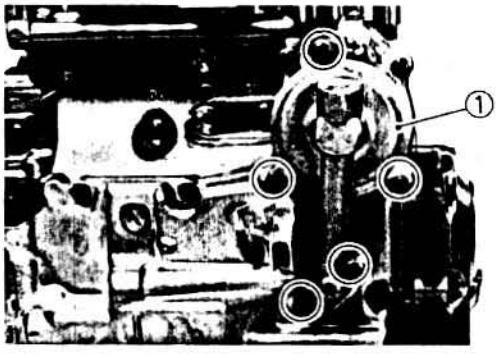
11. Remove:
    - Stopper lever ①
    - Bearing retainer ②
    - Return spring ③

OIL PAN, OIL FILTER AND OIL STRAINER

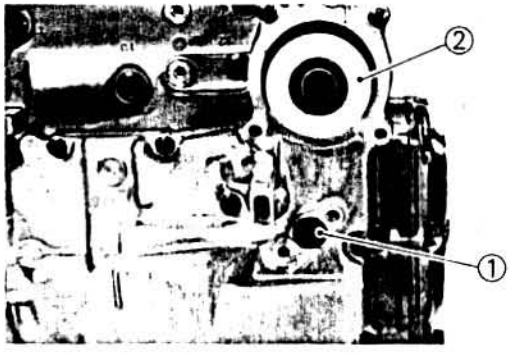
NOTE:

With the engine mounted, the oil pan and oil strainer can be maintained by removing the following part.

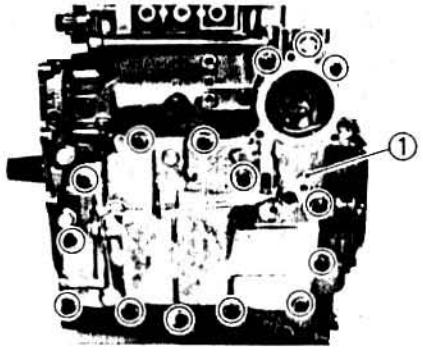
- Engine guard



1. Remove:
   - Oil filter cover ①



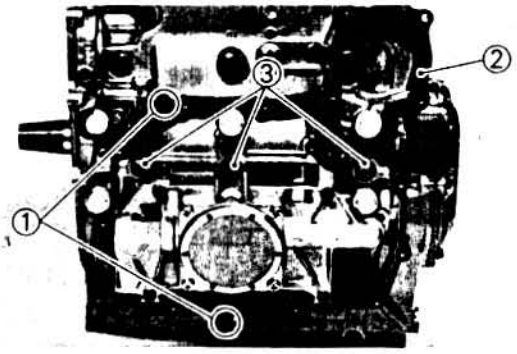
2. Remove:
   - Collar ① (with O-ring)
   - Oil filter ②



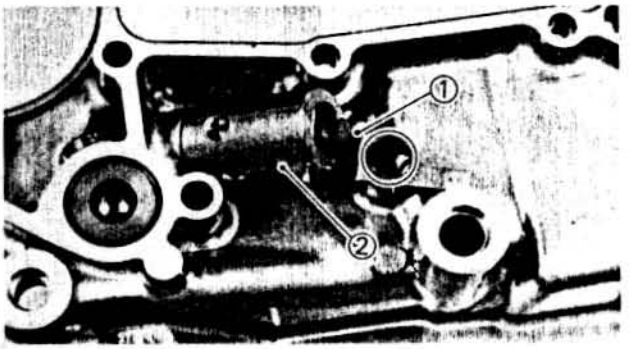
3. Remove:
   - Oil pan ①

NOTE:

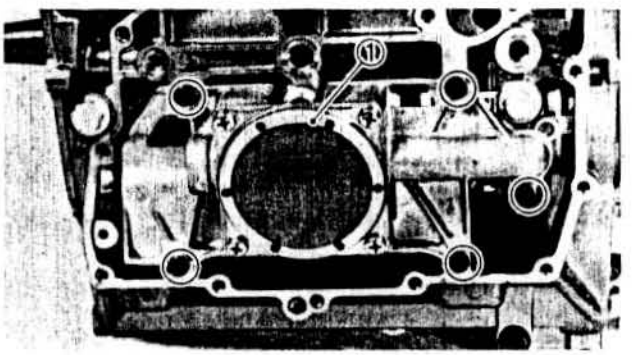
Working in a crisscross pattern, loosen the bolts 1/4 turn each. Remove them after all are loosened.



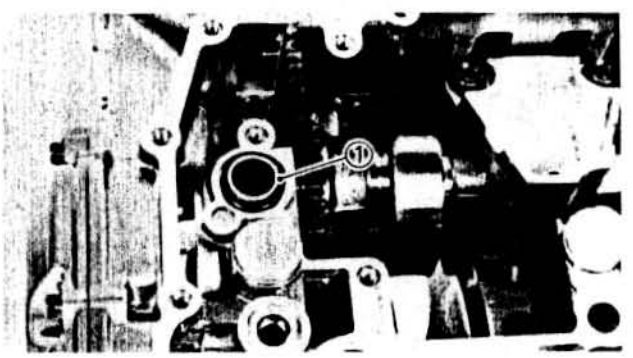
4. Remove:
   - Dowel pins ①
   - Gasket ② (Oil pan)
   - Collars ③ (with O-ring)



5. Remove:
   - Holder ① (relief valve)
   - Relief valve ②
     (from oil pan)



6. Remove:
   - Oil strainer ①

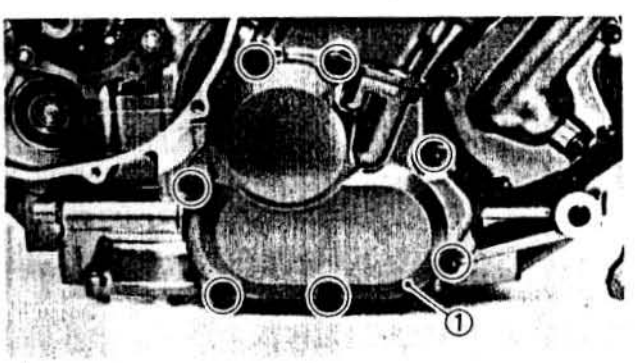


7. Remove:
   - Collar ① (with O-ring)

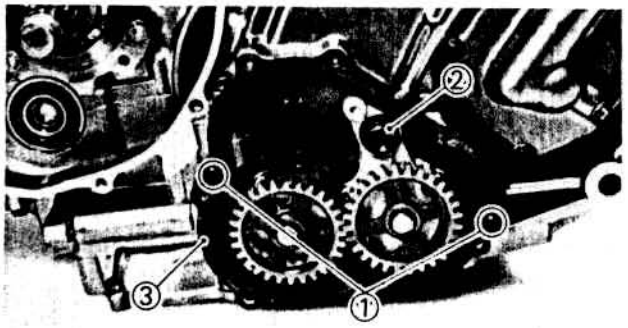
OIL PUMPS AND TIMING CHAIN

NOTE:

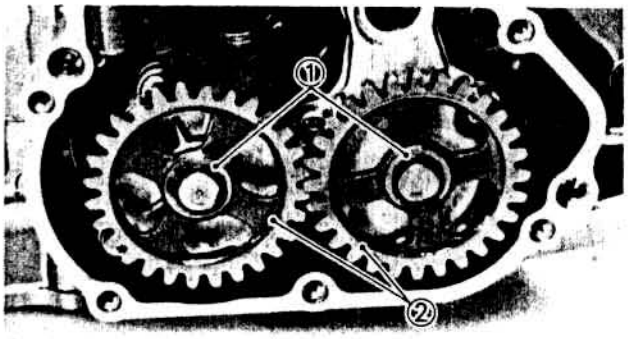
With the engine mounted, the oil pump can be maintained by removing the following parts.
- Engine guard
- Exhaust pipes



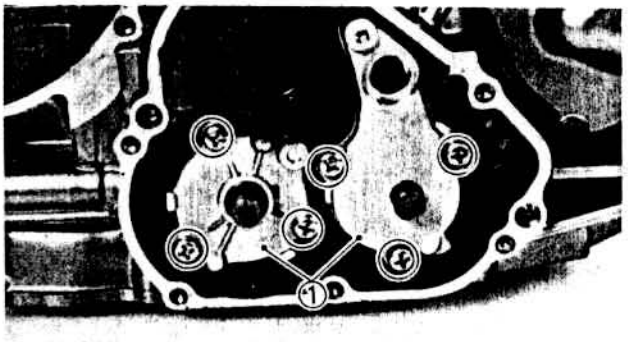
1. Remove:
   - Oil pump cover ①



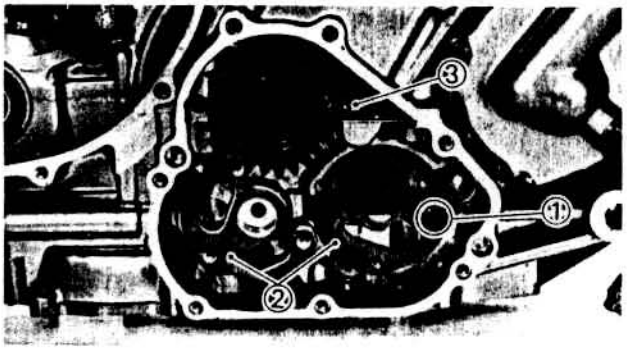
2. Remove:
   - Dowel pins ①
   - Collar ② (with O-ring)
   - Gasket ③ (oil pump cover)



3. Remove:
   - Circlips ①
   - Oil pump gears ②



4. Remove:
   - Oil pumps ①



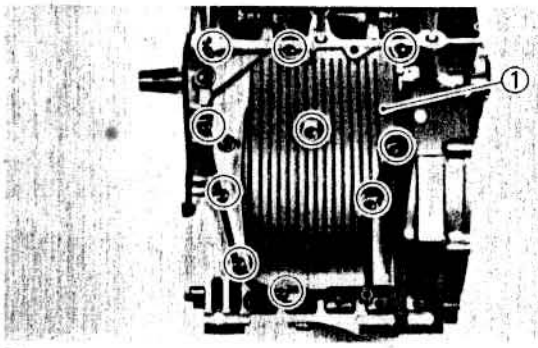
5. Remove:
   - Dowel pin ①
   - Gaskets ② (oil pumps)
   - Timing chain ③

BALANCER WEIGHTS

NOTE:

With the engine mounted, the balancer weights can be maintained by removing the following parts.

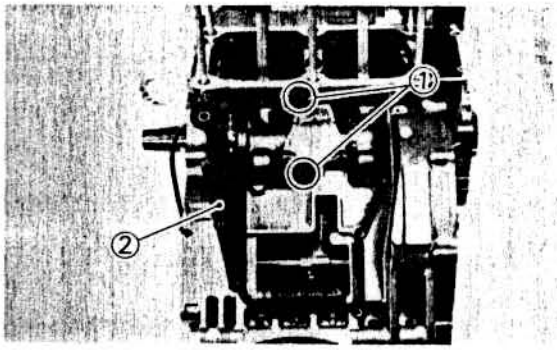
- Engine guard
- Exhaust pipes
- Crankcase cover (left)
- CDI rotor
- Starter drives



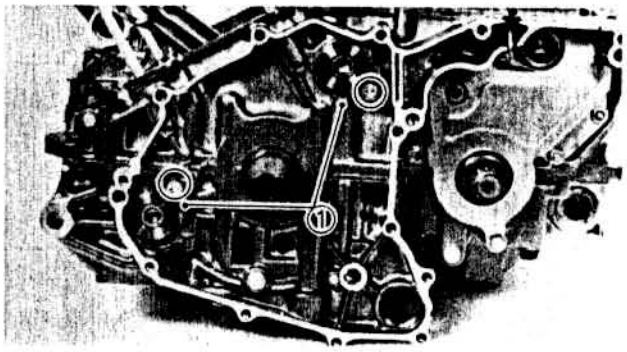
1. Remove:
   - Crankcase cover ① (upper)

NOTE:

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

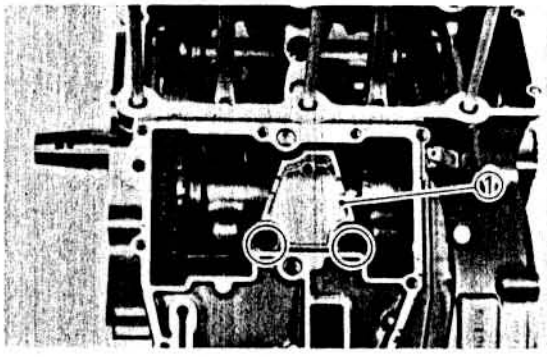


2. Remove:
   - Dowel pins ①
   - Gasket ② (crankcase cover)

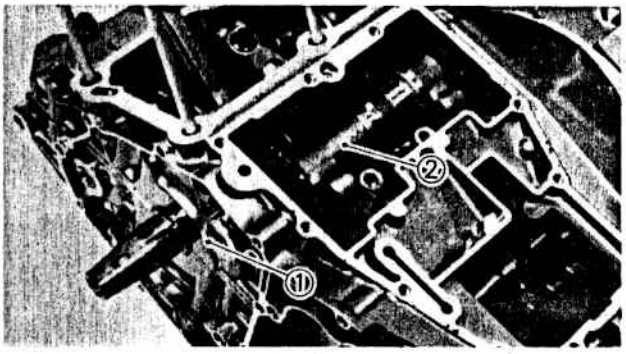


3. Remove:
   - Balancer shaft holders ①
     Use the torx wrench (T30).

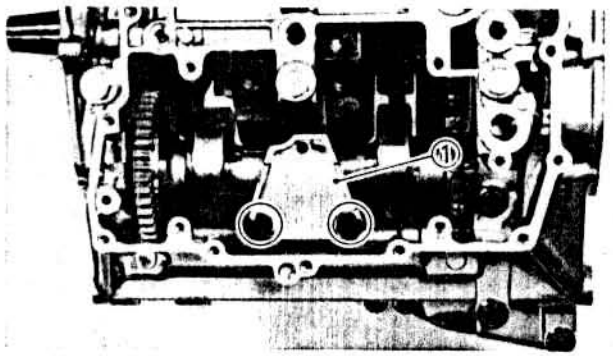
	Torx wrench (T30): **90890-05245**



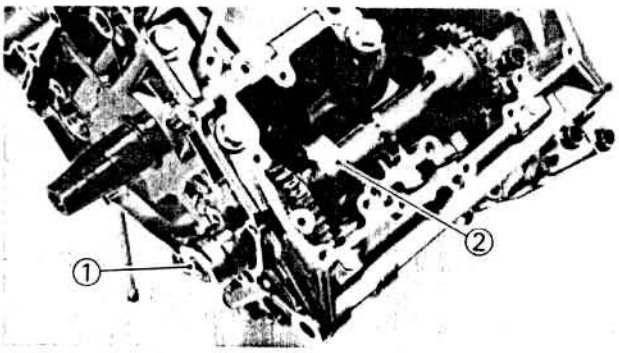
4. Remove:
   - Balancer holder ① (rear)
   - Dowel pins



5. Remove:
   - Balancer shaft ① (rear)
   - Balancer weight ② (rear)



6. Remove:
   - Balancer holder ① (front)
   - Dowel pins

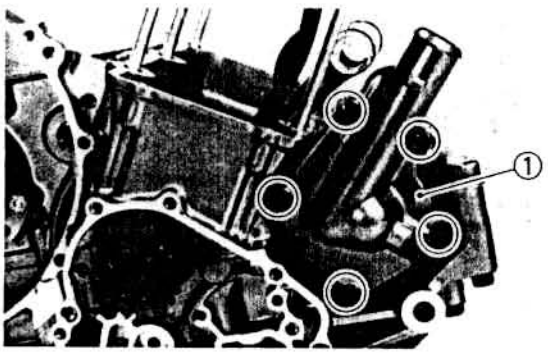


7. Remove:
   - Balancer shaft ① (front)
   - Balancer weight ② (front)

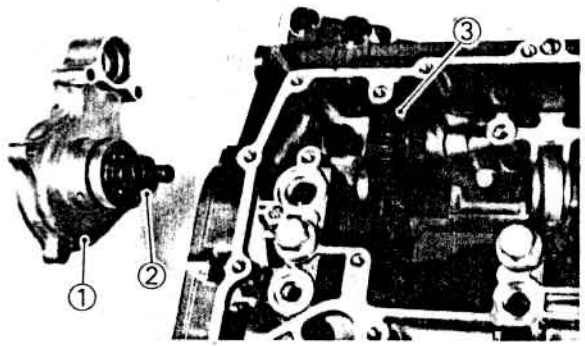
WATER PUMP

NOTE:

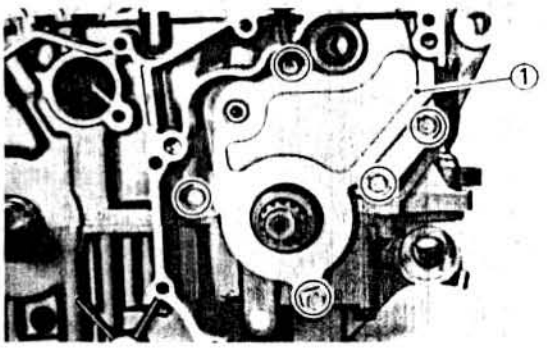
With the engine mounted, the water pump can be maintained by removing the following parts.
- Engine guard
- Exhaust pipes



1. Remove:
   - Water pump cover ①
   - O-ring (water pump cover)

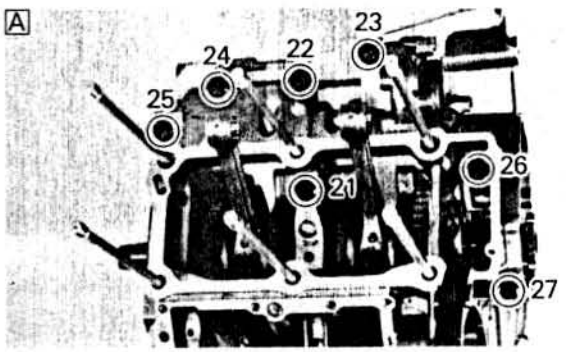


2. Remove:
   - Water pump assembly ①
   - Washer ②
   - Water pump gear ③



CRANKCASE (LOWER)

1. Remove:
   - Plate ①

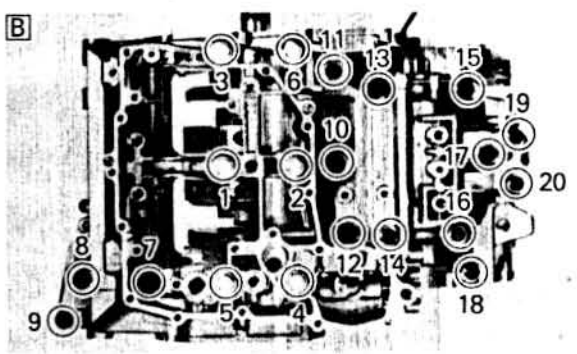


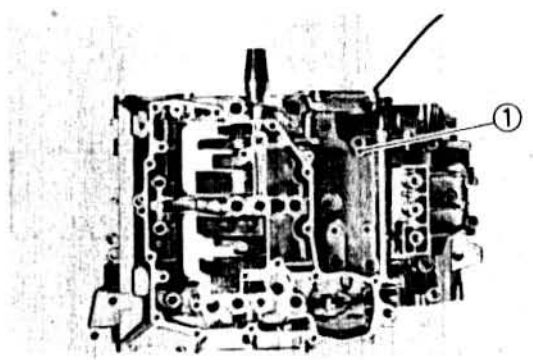
2. Remove:
   - Bolts (crankcase)

Ⓐ Crankcase (upper)
Ⓑ Crankcase (lower)

NOTE:

- Loosen the bolts 1/4 turn each and remove them after all are loosened.
- Loosen the bolts starting with the highest numbered one.
- The embossed numbers in the crankcase (lower) designate the tightening sequence.

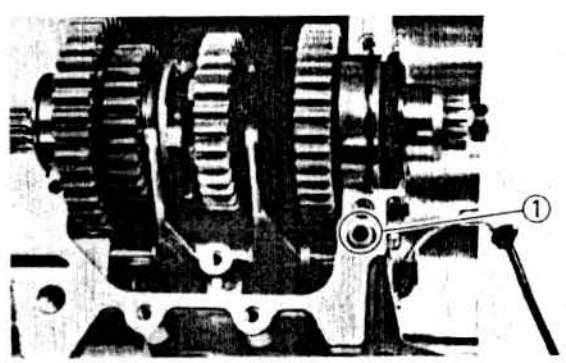




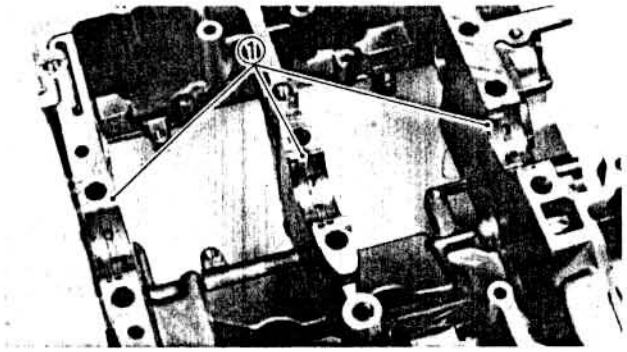
3. Remove:
   - Lower crankcase ①

⚠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.



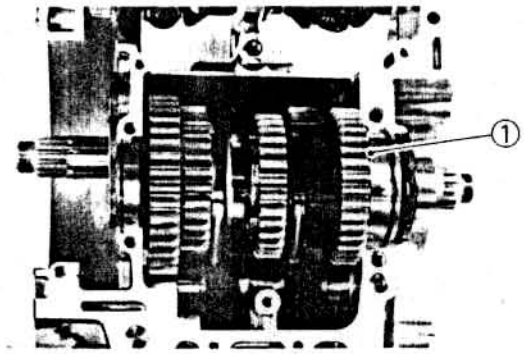
4. Remove:
   - Dowel pin ①



5. Remove:
   - Main journal bearings ①
     (from lower crankcase)

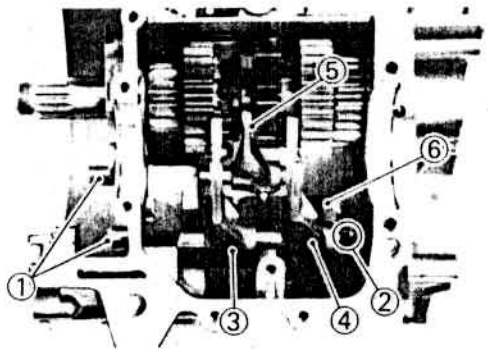
NOTE:

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

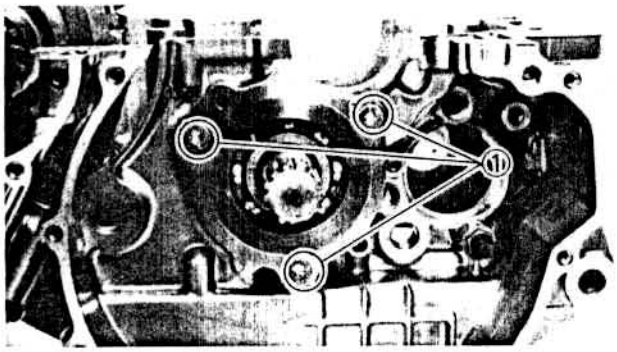


TRANSMISSION AND SHIFTER

1. Remove:
   - Drive axle assembly ①

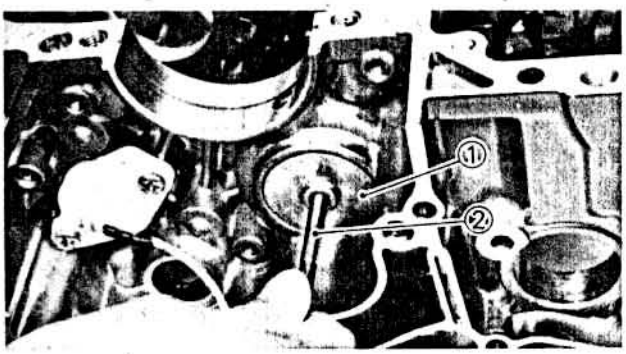


2. Remove:
   - Guide bars ①
   - Spring ②
   - Shift fork "R" ③
   - Shift fork "L" ④
   - Shift fork "C" ⑤
   - Shift cam ⑥



3. Remove:
   - Screws ① (bearing retainer)
     Use the torx wrench (T30).

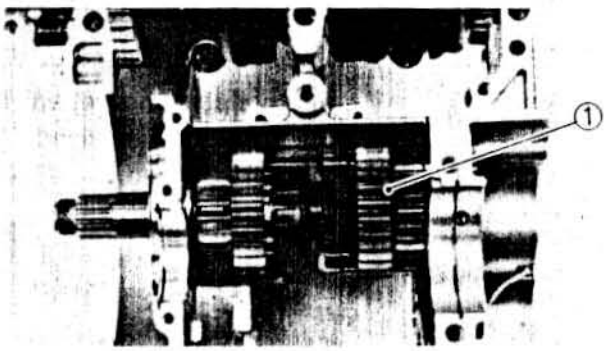
	Torx wrench (T30): **90890-05245**



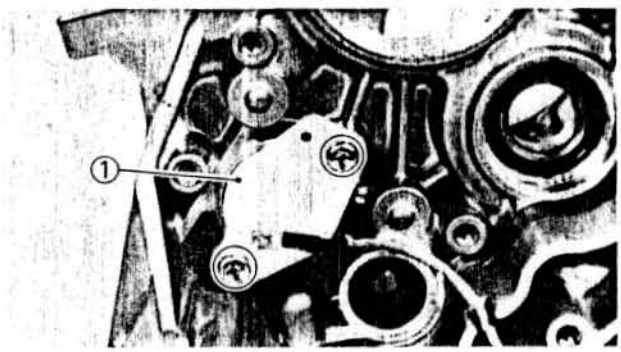
4. Remove:
   - Plug ① (main axle)

NOTE:

Install a suitable screw ② [thread diameter is 6 mm.] into the plug, then remove the plug by pulling on the screw.

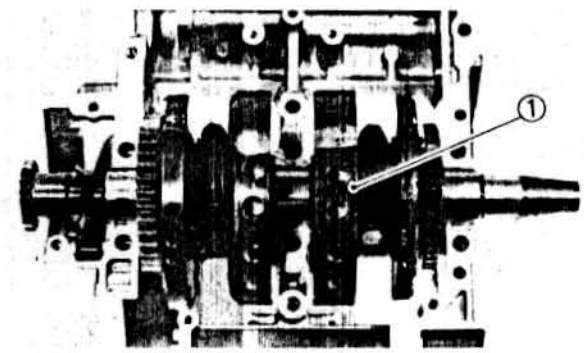


5. Remove:
   • Main axle assembly ①

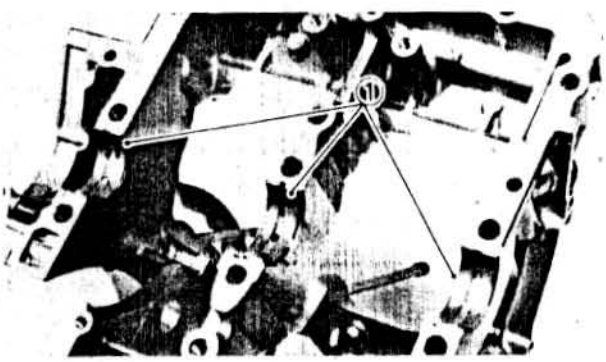


6. Remove:
   • Neutral switch ①

CRANKSHAFT



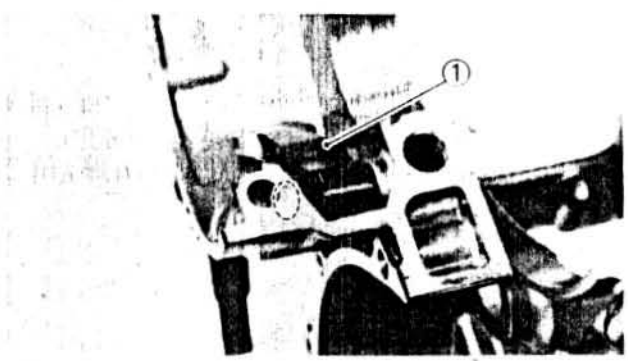
1. Remove:
   • Crankshaft assembly ①



2. Remove:
   • Main journal bearings ①
   (from upper crankcase)

NOTE:

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

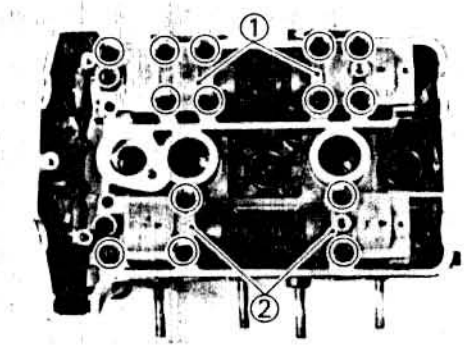


3. Remove:
   • Chain guide ① (intake)

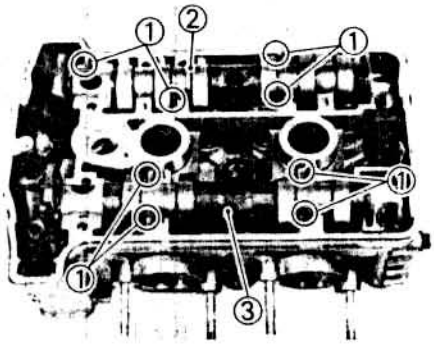
VALVES AND CAMSHAFTS

NOTE:

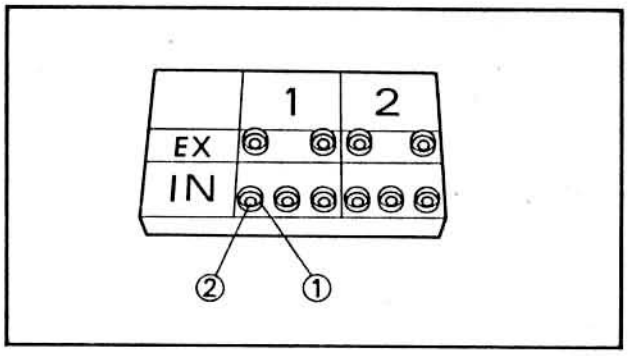
Before removing the internal parts (valve, valve spring, valve seat etc.) of the cylinder head. The valve sealing should be checked.



1. Remove:
   - Cam caps ① (intake camshaft)
   - Cam caps ② (exhaust camshaft)



2. Remove:
   - Dowel pins ①
   - Intake camshaft ②
   - Exhaust camshaft ③



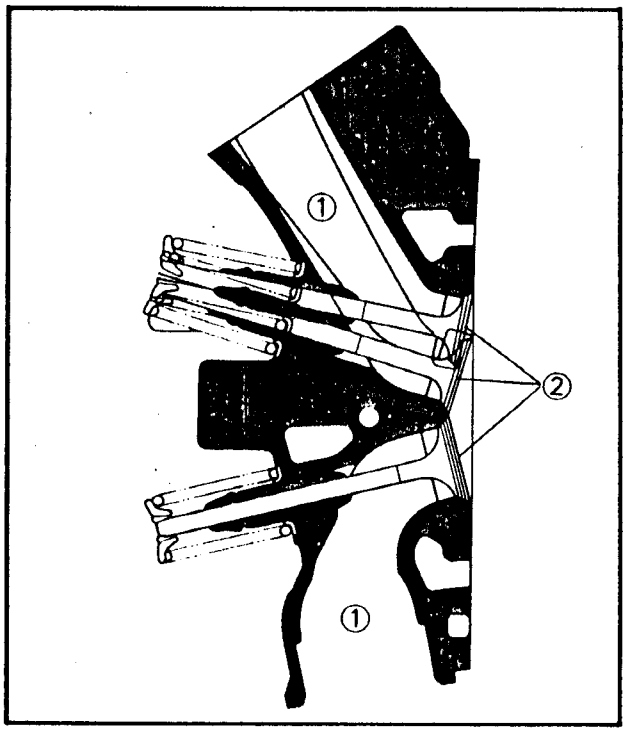
3. Remove:
   - Lifters ①
   - Pads ②

NOTE:

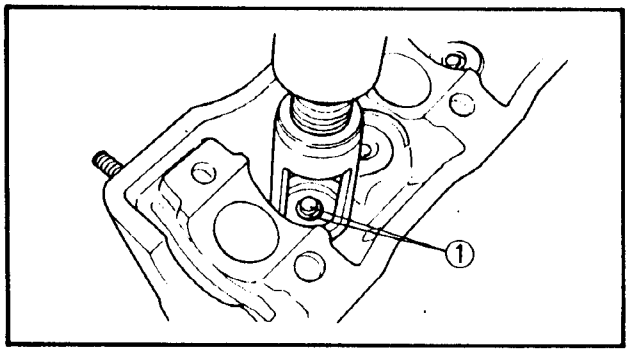
Identify each lifter and pad position very carefuly so that it can be reinstalled in its original place.

4. 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".

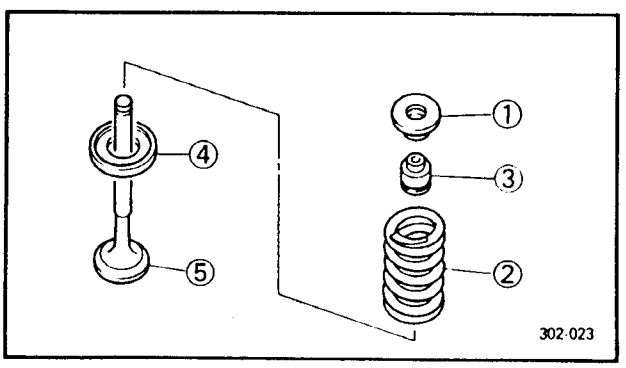


Checking steps:
- Pour a clean solvent ① into the intake and exhaust ports.
- Check the valve sealing.
  There should be no leakage at the valve seat ②.



5. Remove:
   - Valve cotters ①

NOTE:
Remove the valve cotters while compressing the valve spring with the valve spring compresser.

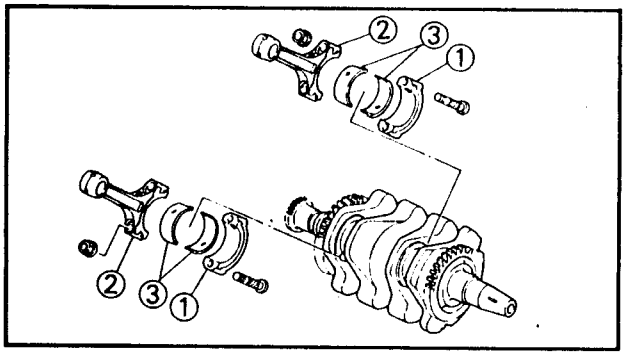




Valve spring compresser:
90890-04019
Attachment:
90890-04114

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

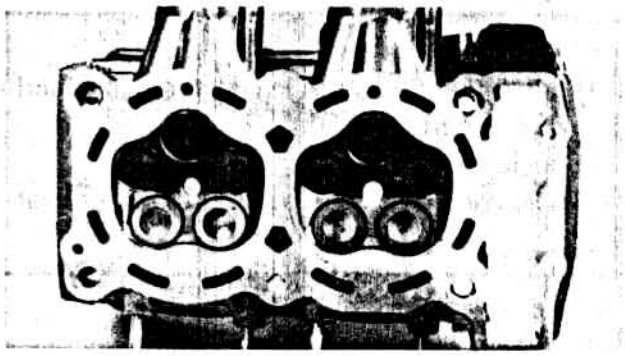
NOTE:
Identify each part position very carefuly so that it can be reinstalled in its original place.



CONNECTING RODS

1. Remove:
   - Connecting rod caps ①
   - Connecting rods ②
   - Crank pin bearings ③

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



INSPECTION AND REPAIR

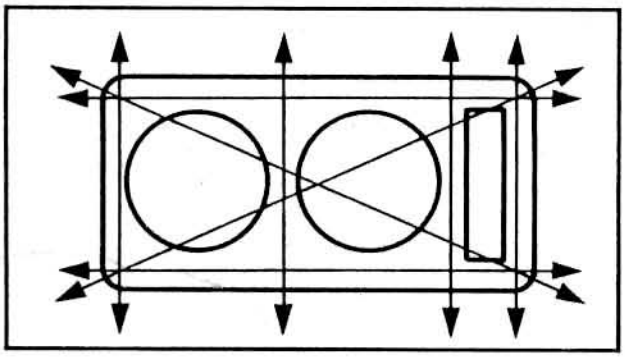
CYLINDER HEAD

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.
   - Water jacket
     Crust of minerals/Rust → Eliminate.



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

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

4. Resurface:
   - Cylinder head

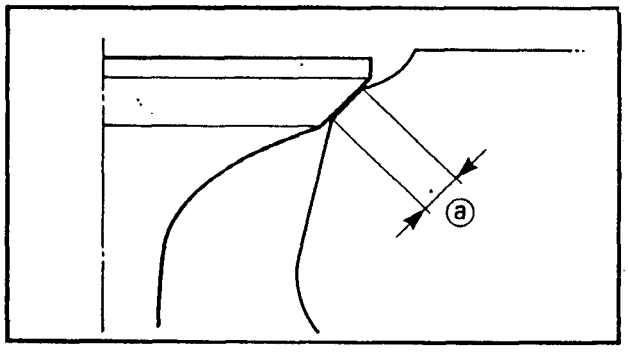
Resurfacement steps:
Place a 400 ~ 600 grit wet sandpaper on the surface plate, and resurface the head using a figure-eight sanding pattern.

NOTE:

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

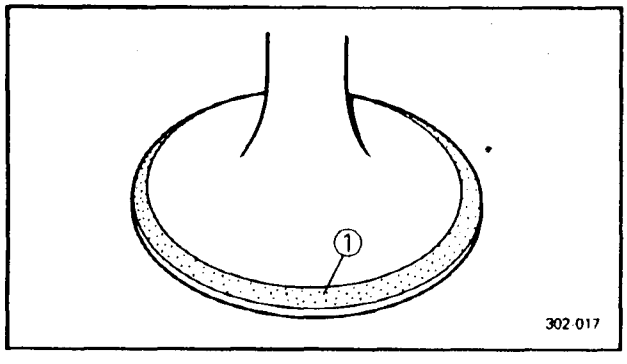
VALVE SEAT

1. Eliminate:
   - Carbon deposit
     (from valve face and valve seat)
2. Inspect:
   - Valve seat
     Pitting/Wear → Reface the valve seat.

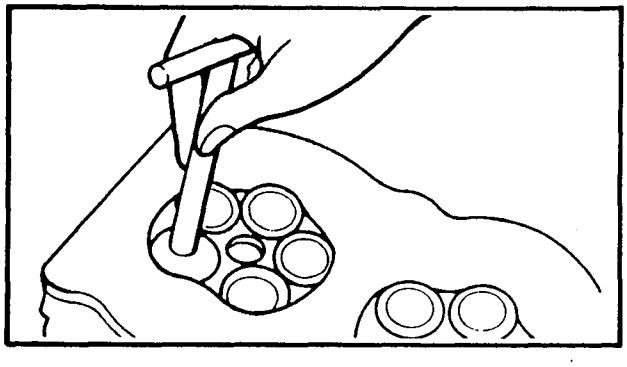


3. Measure:
   - Valve seat width ⓐ
     Out of specification → Reface valve seat.

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



Measurement steps:
- Apply 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.
- Measure the valve seat width. Wherever the valve seat and valve face made contact, bluing will have been removed.
- If the valve seat width is too wide, too harrow, or seat has not centered, the valve seat must be refaced.

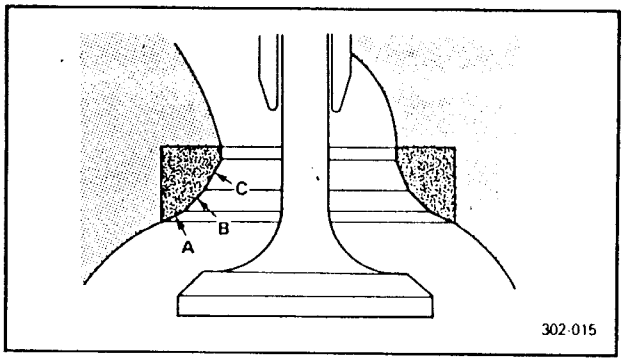


4. Reface:
   - Valve seat
     Use a 30°, 45° and 60° valve seat cutter ①.

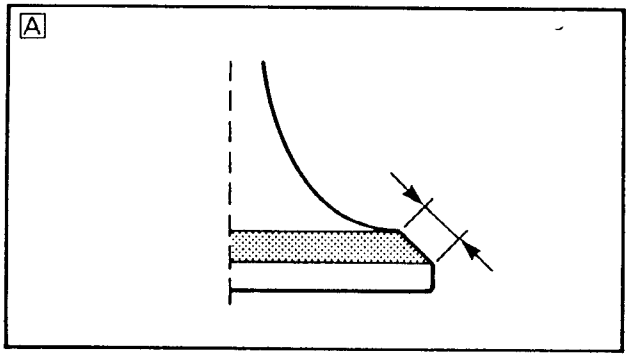
Valve seat cutter:
YM-91043

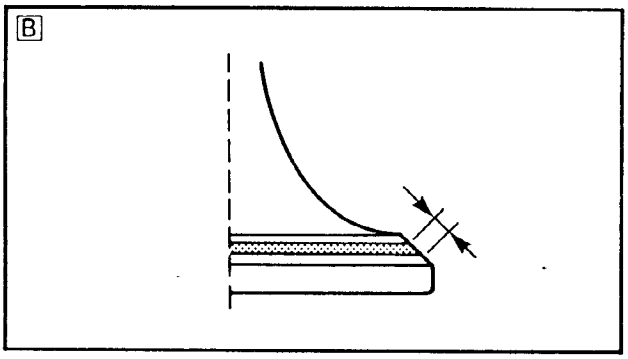
⚠CAUTION:

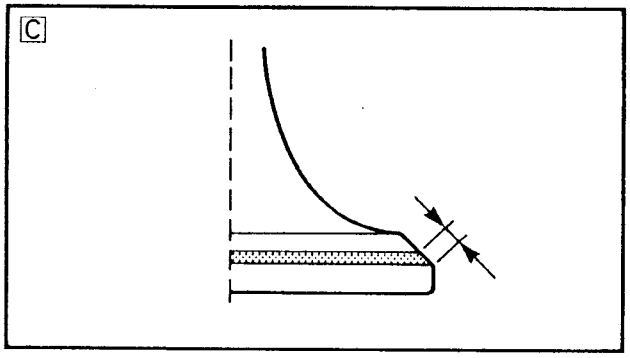
When twisting cutter, keep an even downward pressure (4 ~ 5 kg) to prevent chatter marks.

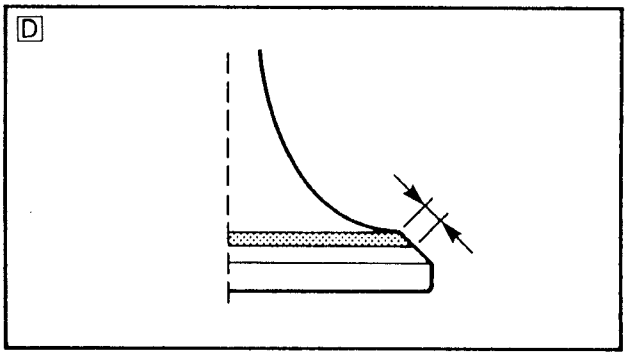


Cut sections as follows	
Section	Cutter
A	30°
B	45°
C	60°









Refacing steps:

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

Valve Seat Cutter Set		Desired Result
Use lightly	30° cutter	To reduce valve seat width to 1.0 mm (0.039 in).
	60° cutter	

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

Valve Seat Cutter Set		Desired Result
Use	45° cutter	To achieve a uniform valve seat width of 1.0 mm (0.039 in).

C Valve seat is too narrow and it is near valve margin.

Valve Seat Cutter Set		Desired Result
Use	30° cutter, first	To center the seat and to achieve its width of 1.0 mm (0.039 in).
	45° cutter	

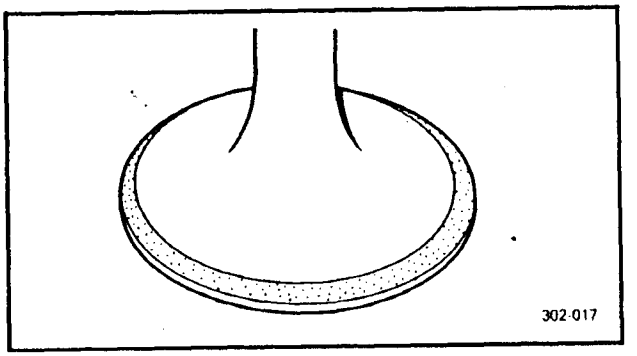
D Valve seat is too narrow and it is located near the bottom edge of the valve face.

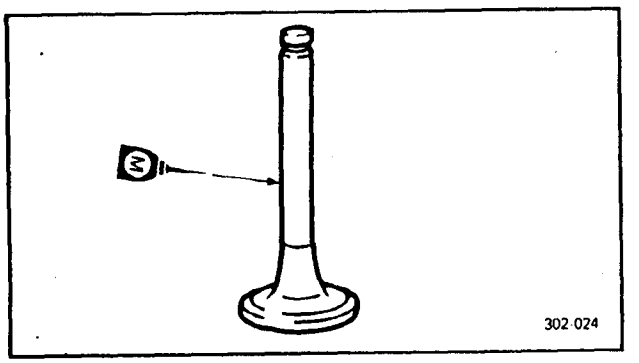
Valve Seat Cutter Set		Desired Result
Use	60° cutter, first	To center the seat and increase its width.
	45° cutter	

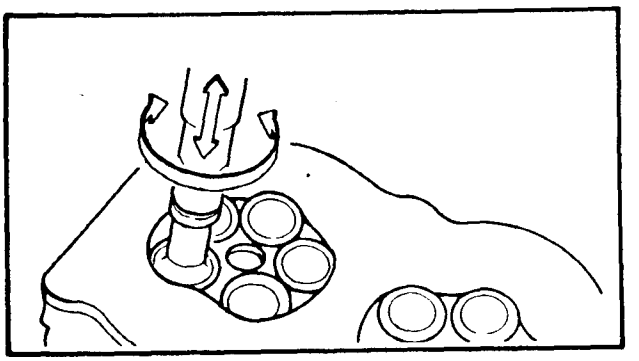
5. Lap:
   - Valve face
   - Valve seat

NOTE:

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







Lapping steps:

- Apply a coarse lapping compound to the valve face.

⚠CAUTION:

Be sure no compound enters the gap between the valve stem and guide.

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

NOTE:

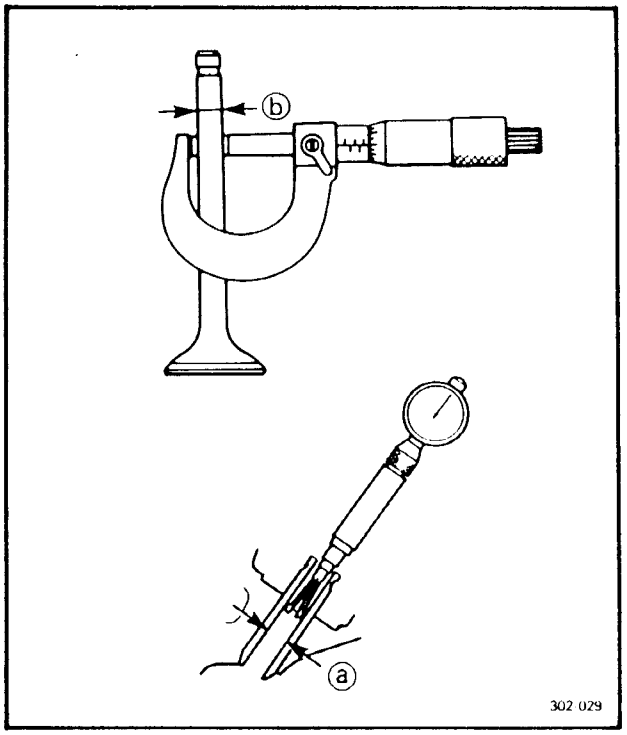
To obtain the best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.

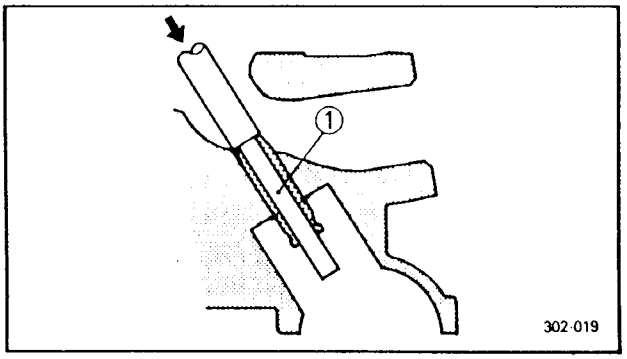
- Apply a fine lapping compound to the valve face and repeat the above steps.

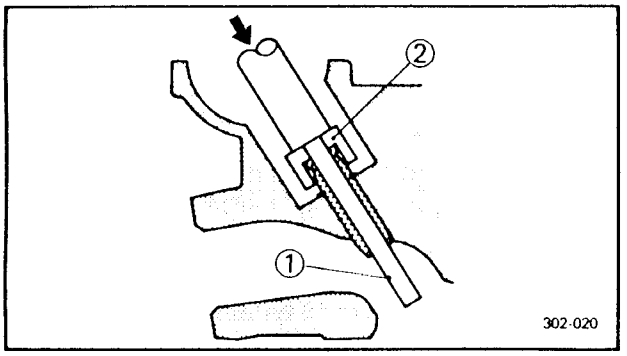
NOTE:

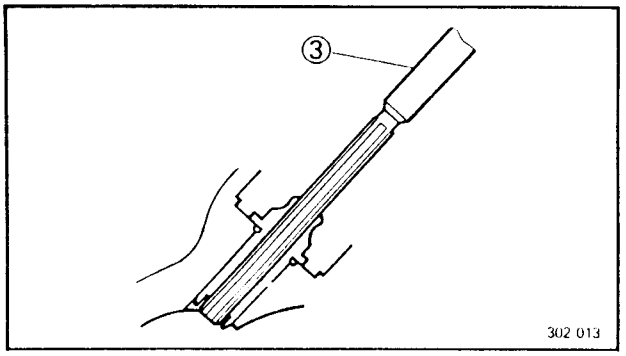
Be sure to clean off all compound from the valve face and valve seat after every lapping operation.

- Apply the Mechanic's bluing dye (Dykem) 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 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:
0.01 ~ 0.04 mm
(0.0004 ~ 0.0015 in)
<Limit> : 0.08 mm (0.0031 in)
Exhaust:
0.03 ~ 0.05 mm
(0.001 ~ 0.002 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.

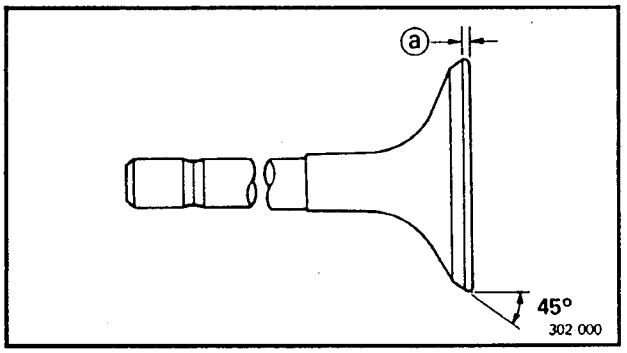
- Remove the valve guide using the valve guide remover ①.
- Install the valve guide (new) using the valve guide installer ② and valve guide remover ①.
- After installing the valve guide, bore the valve guide using the valve guide reamer ③ to obtain proper stem-to-guide clearance.

Valve guide remover and installer set (5.5 mm):
90890-04016

NOTE:

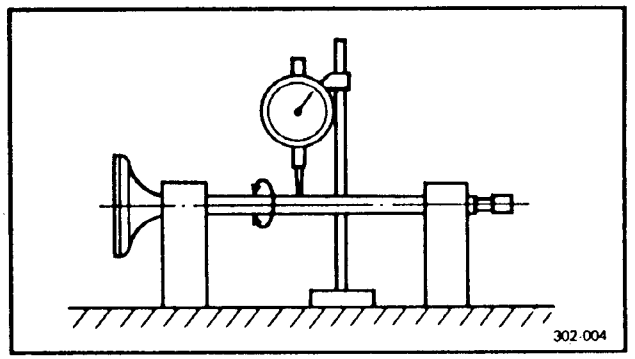
Reface the valve seat after replacing the valve guide.

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.

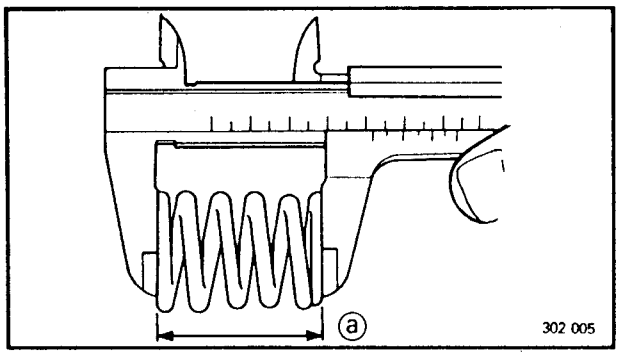
Margin thickness:
Limit: 0.8 mm (0.032 in)



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

Runout:
Less than 0.01 mm (0.0004 in)

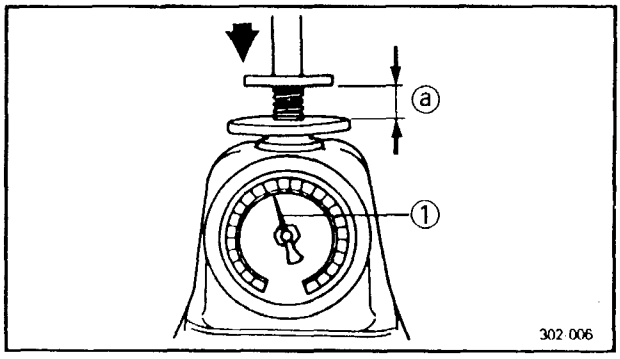
NOTE:
- Always replace the guide if the valve is replaced.
- Always replace the oil seal if the valve is removed.



VALVE SPRING

1. Measure:
   • Free length ⓐ (valve spring)
     Out of specification → Replace.

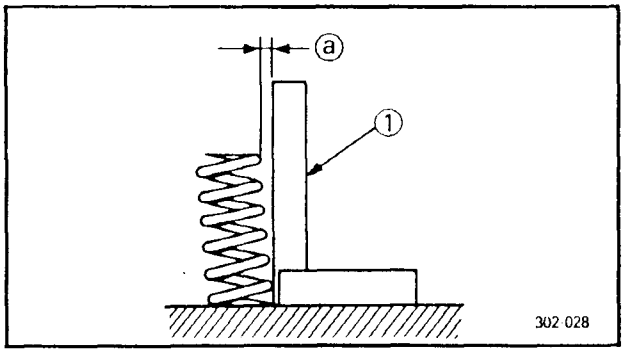
Free length (valve spring):
Intake
37.29 mm (1.47 in)
Exhaust:
37.29 mm (1.47 in)



2. Measure:
   • Compressed force (valve spring) ①
   Out of specification → Replace.

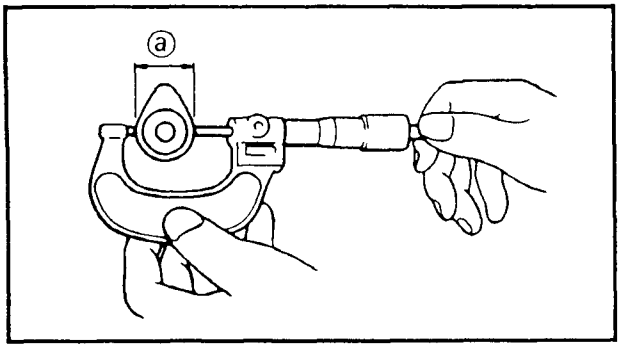
ⓐ Installed length

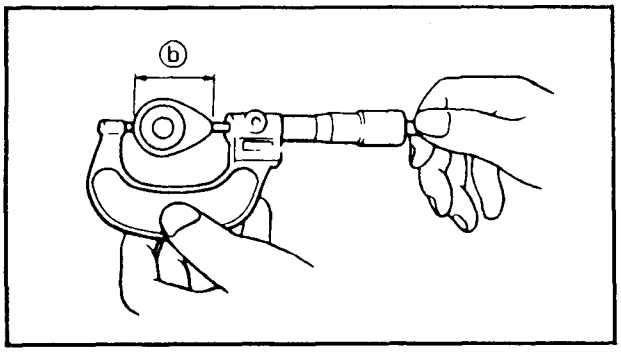
Compressed force:
Intake
10.0 ~ 11.6 kg (22.05 ~ 22.57 lb)
at 30.39 mm (1.2 in)
Exhaust
10.0 ~ 11.6 kg (22.05 ~ 22.57 lb)
at 30.39 mm (1.2 in)



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

Spring tilt:
Less than 1.7 mm (0.067 in)

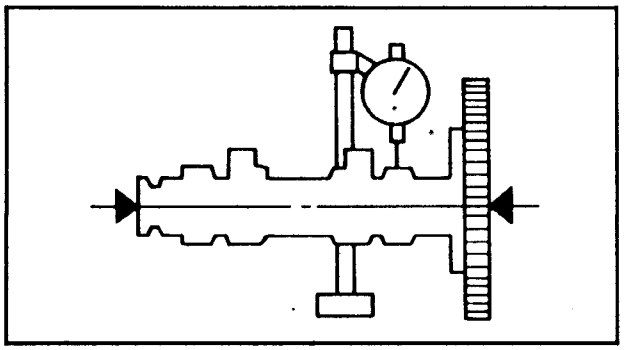




CAMSHAFT

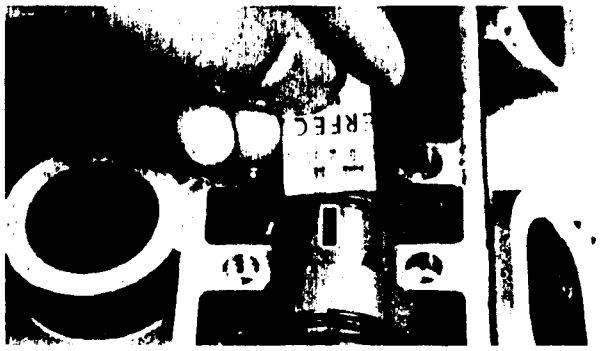
1. Inspect:
   • Cam lobes
   Pitting/Scratches/Blue discoloration → Replace.
2. Measure:
   • Cam lobes length ⓐ and ⓑ.
   Out of specification → Replace.

Cam lobe length:
Intake
ⓐ 35.7 ~ 35.8 mm
(1.405 ~ 1.409 in)
ⓑ 27.95 ~ 28.05 mm
(1.100 ~ 1.104 in)
Exhaust:
ⓐ 35.95 ~ 36.05 mm
(1.415 ~ 1.419 in)
ⓑ 27.95 ~ 28.05 mm
(1.100 ~ 1.104 in)



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

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



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

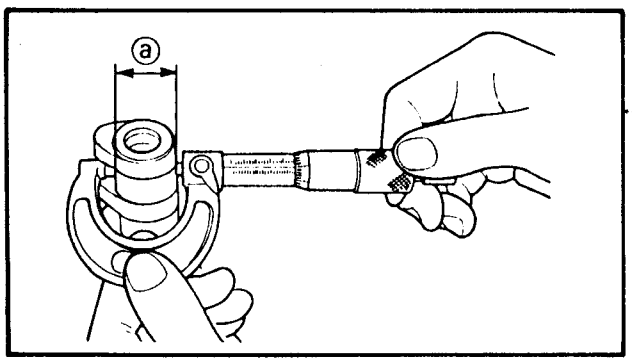
Camshaft-to-cap clearance:
0.020 ~ 0.054 mm
(0.0008 ~ 0.0021 in)

Measuring steps:
- Install the camshaft onto the cylinder head.
- Position a strip of plastigage® onto the camshaft.
- Install the dowel pins and camshaft caps.

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

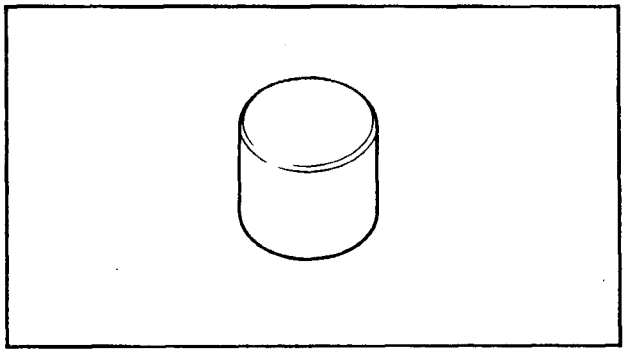
NOTE:
- Tighten the camshaft caps in a crisscross pattern from innermost to outer.
- Do not turn the camshaft when measuring clearance with the Plastigage®.

- Remove the camshaft caps and measure width of the Plastigage®.



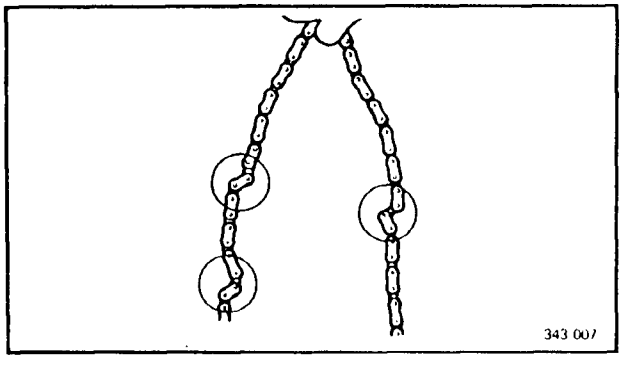
5. Measure:
   • Bearing diameter ⓐ (camshaft)
   Out of specification → Replace camshaft.
   Within specification → Replace cylinder head.

Bearing diameter (camshaft):
24.967 ~ 24.980 (0.9830 ~ 0.9835 in)



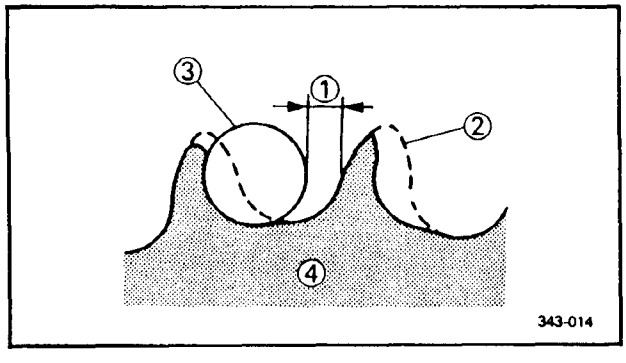
VALVE LIFTER

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



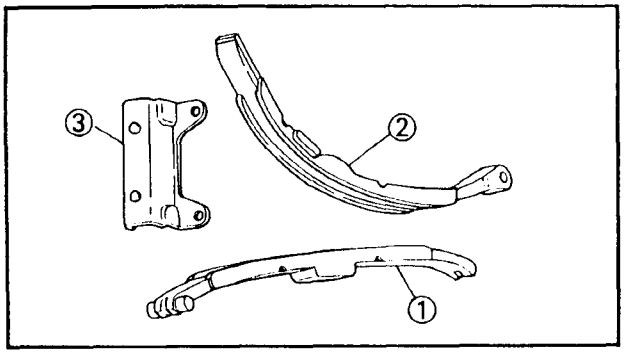
TIMING CHAIN, SPROCKET AND CHAIN GUIDE

1. Inspect:
   - Timing chain
     Stiff/cracks→Replace timing chain and sprocket as a set.

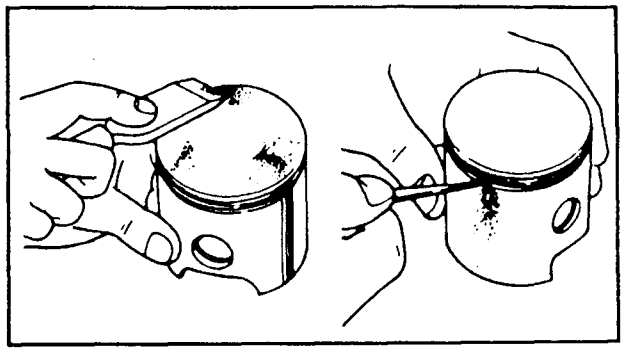


2. Inspect:
   - Cam sprocket
     Wear/Damage→Replace cam sprocket and timing chain as a set.

① 1/4 tooth
② Correct
③ Roller
④ Sprocket



3. Inspect:
   - Chain guide ① (exhaust side)
   - Chain guide ② (intake side)
   - Chain guide ③ (upper)



CYLINDER AND PISTON

1. Eliminate:
   - Carbon deposits
     (from the piston crown and ring grooves.)

2. Inspect:
   - Piston wall
     Wear/Scratches/Damage→Replace.

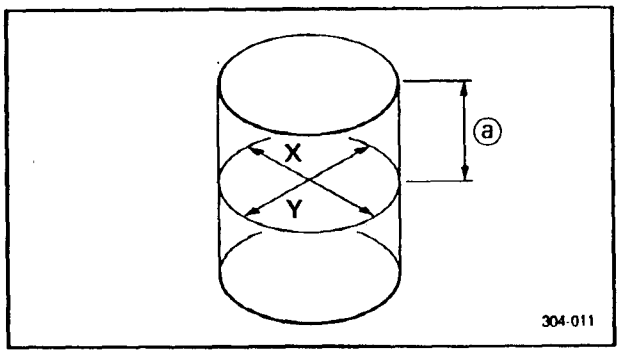


3. Eliminate:
   - Score marks and lacquer deposits
     From the sides of piston.
     Use a 600 ~ 800 grit wet sandpaper.

NOTE:

Sand in a crisscross pattern. Do not sand excessively.

4. Inspect:
   - Cylinder water jacket
     Crust of minerals/Rust → Remove.
   - Cylinder wall
     Wear/Scratches → Rebore or replace.



5. Measure:
   - Piston-to-cylinder clearance

Piston-to-cylinder clearance measurement steps:

First steps

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

ⓐ 40 mm (1.6 in) from the cylinder top

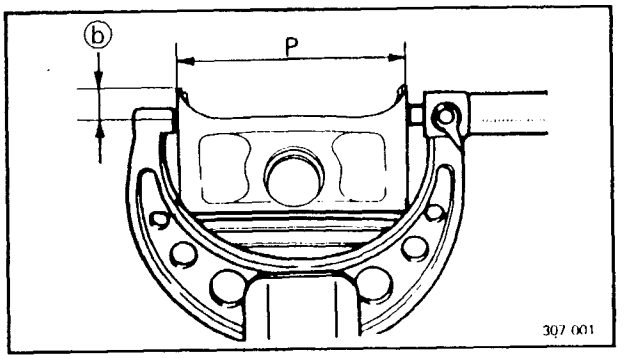
NOTE:

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

Cylinder bore "C":
87.000 ~ 87.005 mm
(3.4252 ~ 3.4254 in)
< Limit: 87.1 mm (3.429 in) >

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

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



2nd steps

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

ⓑ 4.7 mm (0.185 in) from the piston bottom edge

Piston skirt diameter "P":
86.920 ~ 86.935 mm
(3.422 ~ 3.423 in)

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

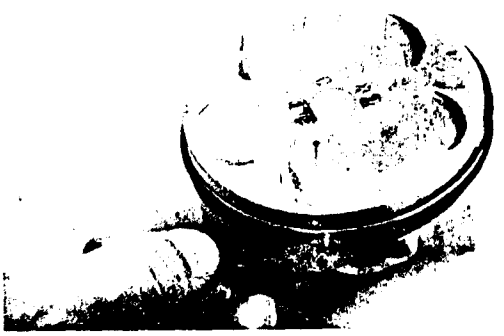
3rd steps

- Find the piston-to-cylinder clearance with following formula.

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

Piston-to-cylinder clearance:
0.065 ~ 0.085 mm
(0.0026 ~ 0.0033 in)
< Limit: 0.15 mm (0.006 in) >

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



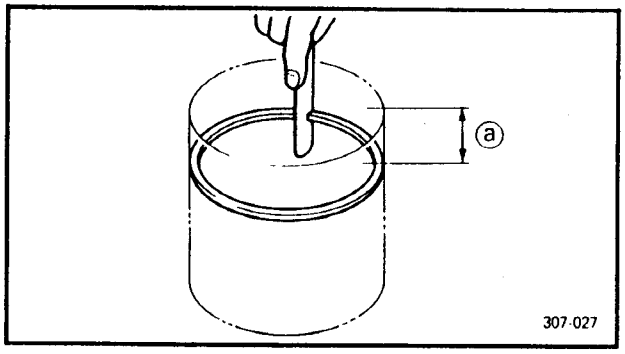
PISTON RING

1. Measure:
   - Side clearance
     Out of specification → Replace piston, and rings as a set.

NOTE:

Clean carbon from piston ring grooves and rings before measuring side clearance.

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



2. Position:
   • Piston ring
   (into the cylinder)

NOTE:
Push the ring with the piston crown so that the ring will be at a right angle to cylinder bore.

ⓐ 20 mm (0.8 in)

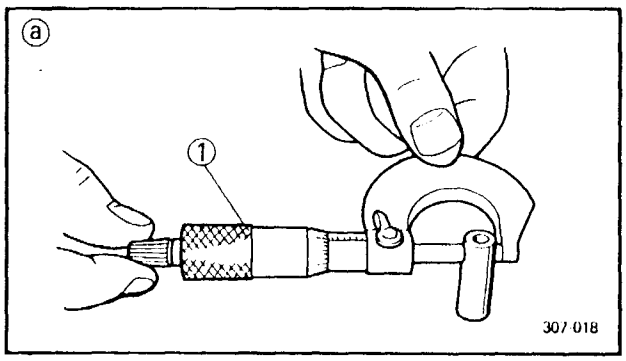
3. Measure:
   • End gap
   Out of specification → Replace.

NOTE:
You cannot measure end gap on expander spacer of oil control ring. If oil control ring rails show excessive gap, replace all three rings.

End gap:
Top ring
0.3 ~ 0.5 mm (0.012 ~ 0.020 in)
2nd ring
0.3 ~ 0.5 mm (0.012 ~ 0.020 in)
Oil ring
0.2 ~ 0.7 mm (0.008 ~ 0.028 in)

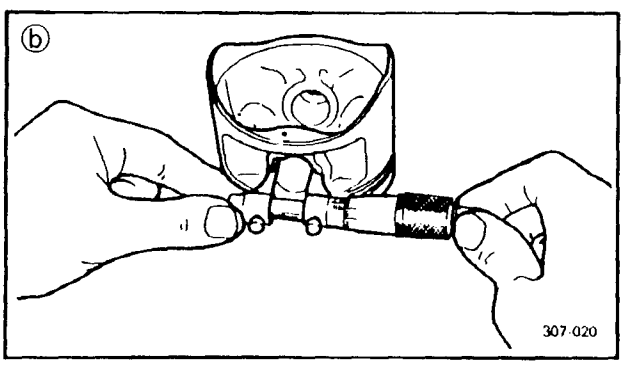
PISTON PIN

1. Inspect:
   • Piston pin
   Blue discoloration/Grooves → Replace then inspect lubrication system.



2. Measure:
   • Outside diameter ⓐ (piston pin)
   Out of specification → Replace.

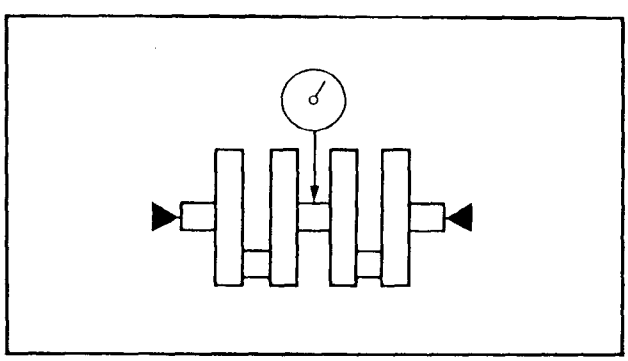
Outside diameter (piston pin):
0.7870 ~ 0.7874 mm
(19.991 ~ 20.000 in)



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:
0.002 ~ 0.022 mm
(0.0001 ~ 0.0008 in)
< Limit: 0.07 mm (0.003 in) >

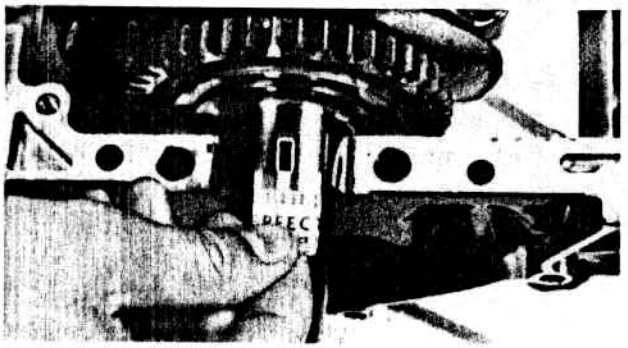


CRANKSHAFT AND CONNECTING ROD

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

Runout:
Less than 0.02 mm (0.0008 in)

2. Inspect:
   • Main journal surfaces
   • Crank pin surfaces
   • Bearing surfaces
   Wear/Scratches → Replace.



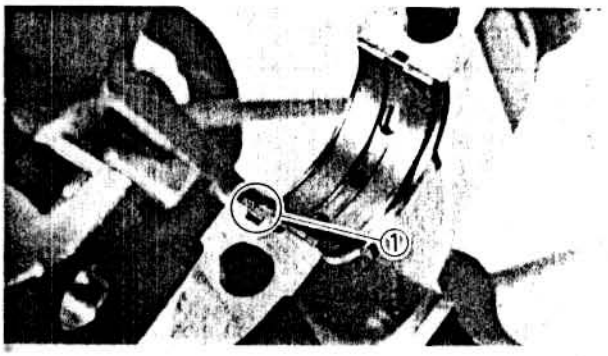
3. Measure:
   • Oil clearance (Main journal)
   Out of specification → Replace bearing.

Oil clearance:
0.020 ~ 0.038 mm
(0.0007 ~ 0.0015 in)

Measuring steps:

⚠CAUTION:

Do not interchange the bearings. They must be installed in their original positions, or the correct oil clearance may not be obtained causing engine damage.



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

NOTE:

Align the projection ① of the bearing with the notch in the crankcase.

- Put a piece of plastigauge® on the each main journal.

NOTE:

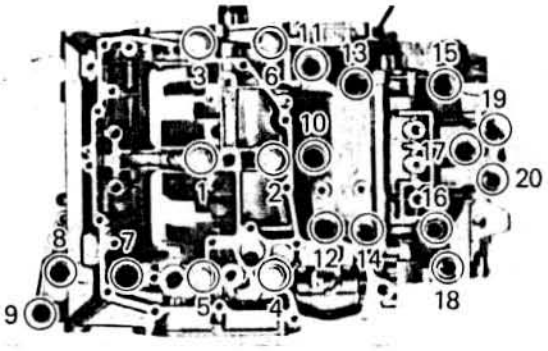
Do not put the plastigauge® over the oil hole in the main journal of the crankshaft.

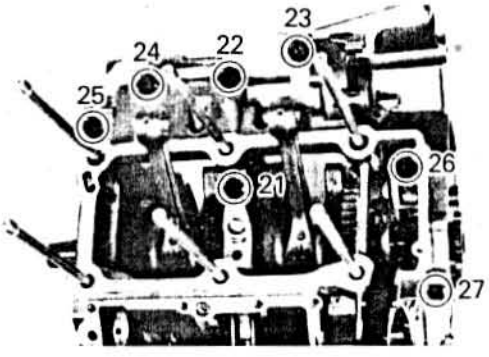
- Install lower half of the bearings into the crankcase (lower) and assembly the crankcase halves.

NOTE:

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

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





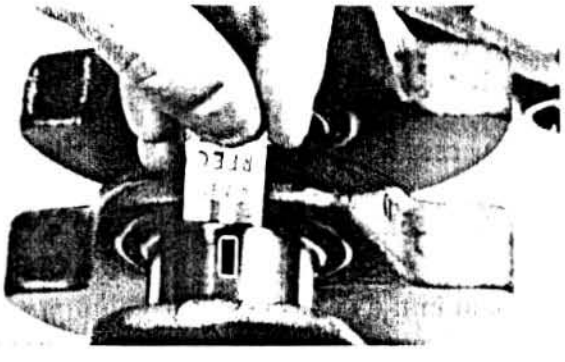
Bolts (crankcase):
M10 (①~⑥):
40 Nm (4.0 m•kg, 29 ft•lb)
M8 (⑦~⑩, ⑬, ⑮ and ㉑~㉕):
24 Nm (2.4 m•kg, 17 ft•lb)
M6 (⑪, ⑫, ⑭, ⑯~⑳, ㉖ and ㉗):
12 Nm (1.2 m•kg, 8.7 ft•lb)

NOTE:

- Lubricate the threads of bolts (M10) with molybdenum disulfied motor oil.
- Lubricate the threads of bolts (M8 and M6) with engine oil.

- Remove the crankcase (lower) and lower half of the bearings.
- Measure the compressed plastigauge width on each main journal.
  If oil clearance is out of specification, select a replacement bearing.

4. Measure:
   - Oil clearance (crank pin)
     Out of specification→Replace bearing.



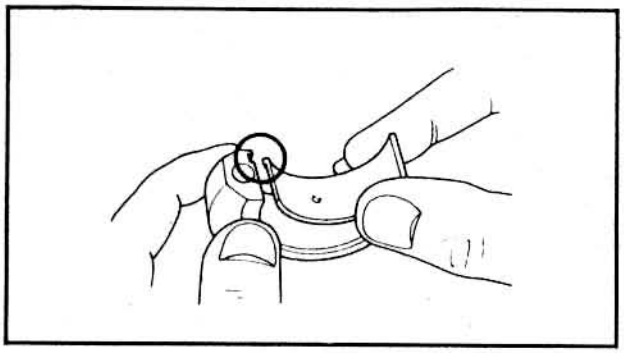
Oil clearance:
0.026 ~ 0.050 mm (0.001 ~ 0.002 in)

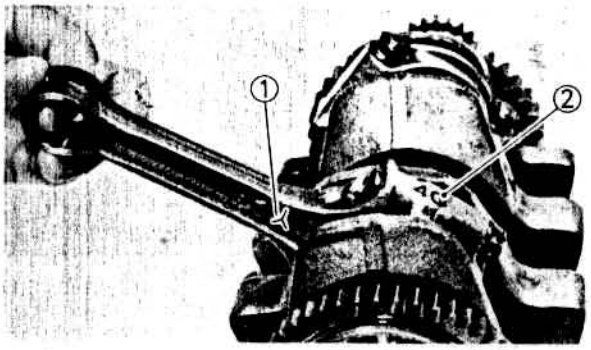
Measuring steps:

⚠CAUTION:

Do not interchange the bearings and connecting rod. They must be installed in their original positions, or the correct oil clearance may not be obtained causing engine damage.

- Clean the bearings, crank pins and bearing portions of the connecting rods.
- Install the upper half of the bearing into the connecting rod and lower half of the bearing into the connecting rod cap.





NOTE:

Align the projection of the bearing with the groove of the cap and connecting rod.

- Put a piece of plastigauge® on the crank pin.
- Assemble the connecting rod halves.

NOTE:

- Do not move the connecting rod or crankshaft until the oil clearance measurement has been completed.
- Lubricate molybdenum disulfide grease to the bolt, threads and nut seats.
- Make sure that the "Y" marks ① on the connecting rods face toward left side of the crankshaft.
- Make sure that the letters ② on both components align to form a perfect character.

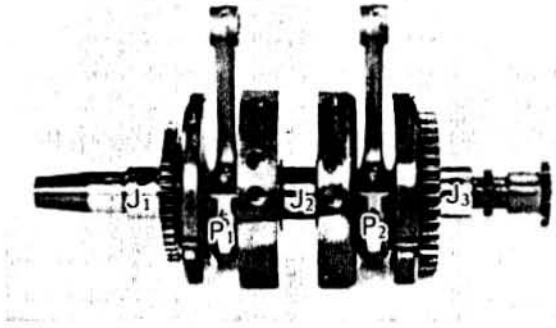
- Tighten the nuts in 2 ~ 3 steps.

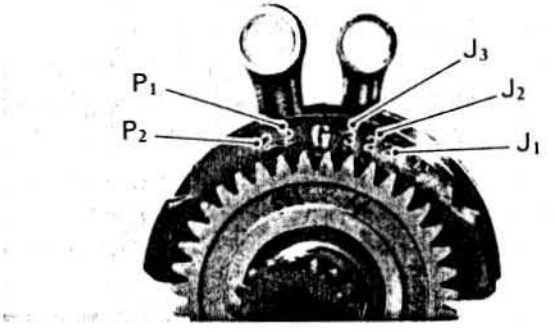
Nut:
48 Nm (4.8 m•kg, 35 ft•lb)

⚠CAUTION:

Tighten to full torque specification without pausing. Apply continuous torque between 4.6 and 4.8 m•kg. Once you reach 4.6 m•kg DO NOT STOP TIGHTENING until final torque is reached. If the tightening is interrupted between 4.6 and 4.8 m•kg, loosen the nut to less than 4.6 m•kg and start again.

- Remove the connecting rods and bearings.
- Measure the compressed plastigauge width on each crank pin.
  If oil clearance is out of specification, select a replacement bearing.







5. Select:
   - Main journal bearing ($J_1 \sim J_3$)
   - Crank pin bearing (P_1 and P_2)

Selection of bearings:
Example 1: Main journal bearing
- If the numerals "4" and "1" are respectively shown on the crankcase J_1 and crankwed J_1, the bearing size of Jr is:

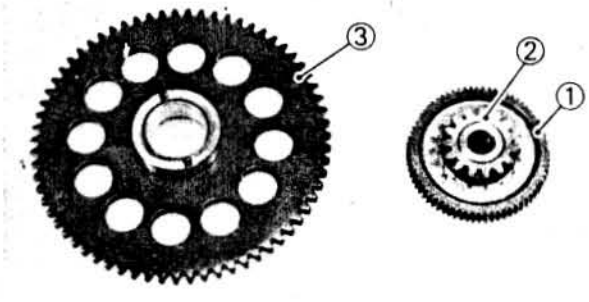
Bearing size of J_1 =
Crankcase J_1 – Crankwed =
4 – 1 = 3 (Brown)

BEARING COLOR CODE	
1	Blue
2	Black
3	Brown
4	Green
5	Yellow
6	Pink
7	Red

Example 2: Crank pin bearing
- If the nemerals "5" and "1" are respectively shown on the connecting rod P_1 and crankwed P_1, the bearing size of P_1 is:

Bearing size of P_1 =
Connecting rod P_1 – Crankwed P_1 =
5 – 1 = 4 (Green)

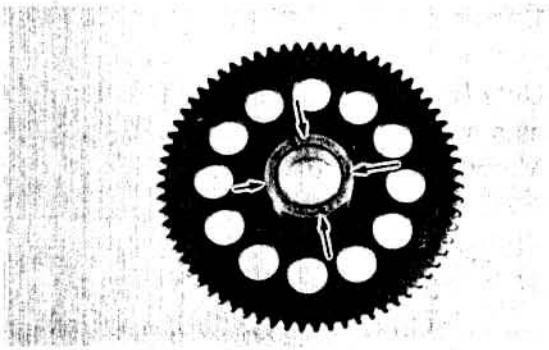
BEARING COLOR CODE	
1	Blue
2	Black
3	Brown
4	Green



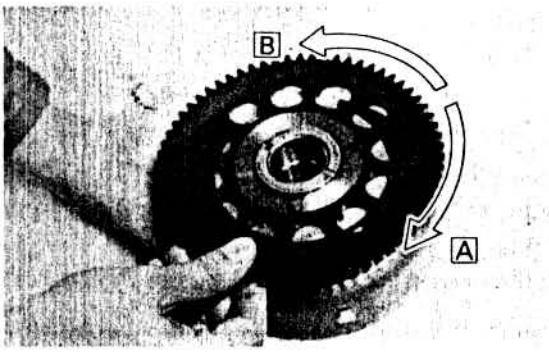
ELECTRIC STARTER DRIVE

1. Inspect:
   - Starter idle gear teeth ①
   - Starter drive gear teeth ②
   - Starter wheel gear teeth ③

   Burrs/Chips/Roughness/Wear → Replace.

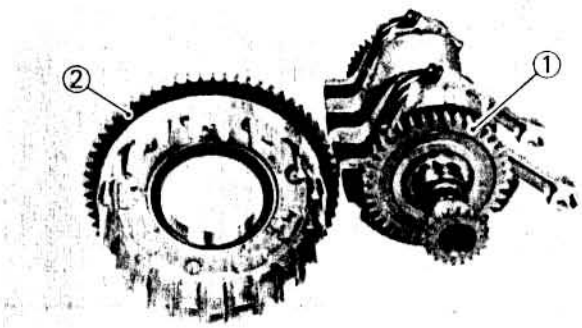


2. Inspect:
   • Starter wheel gear
   (contacting surfaces)
   Pitting/Wear/Damage → Replace.



3. 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.

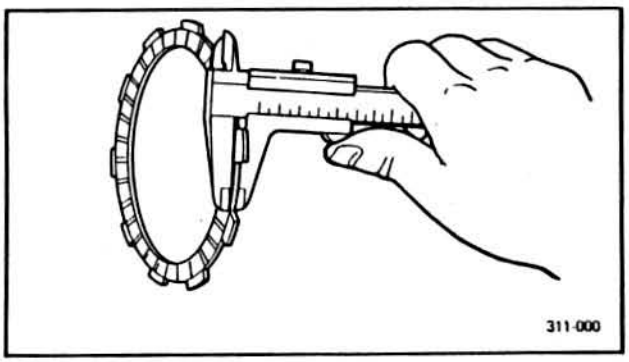


PRIMARY DRIVE

1. Inspect:
   • Primary drive gear teeth ①
   • Primary driven gear teeth ②
   Wear/Damage → Replace both gears.
   Excessive noises during operation → Replace both gears.

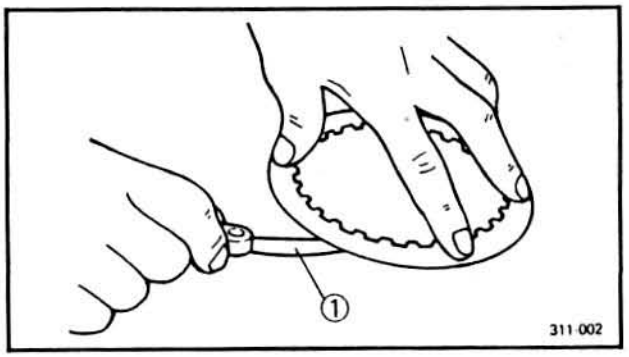
CLUTCH

1. Inspect:
   • Friction plate
   Damage → Replace friction plate as a set.



2. Measure:
   • Friction plate thickness
   Out of specification → Replace friction plate as a set.
   Measure at all four point.

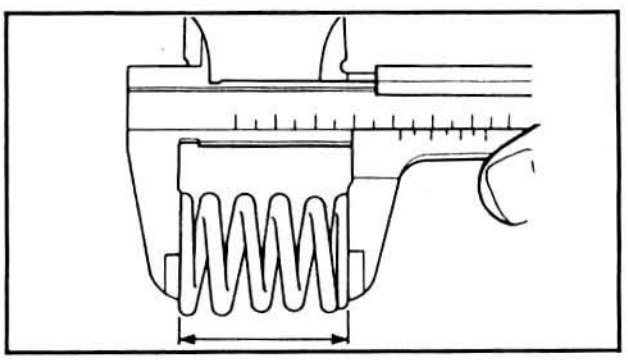
Thickness:
2.9 ~ 3.1 mm (0.114 ~ 0.122 in)
< Limit: 2.8 mm (0.11 in)



3. Inspect:
   • Clutch plate
   Damage → Replace clutch plate as a set.
4. Measure:
   • Clutch plate warpage
   Out of specification → Replace clutch plate as a set.
   Use a surface plate and Feeler Gauge ①.

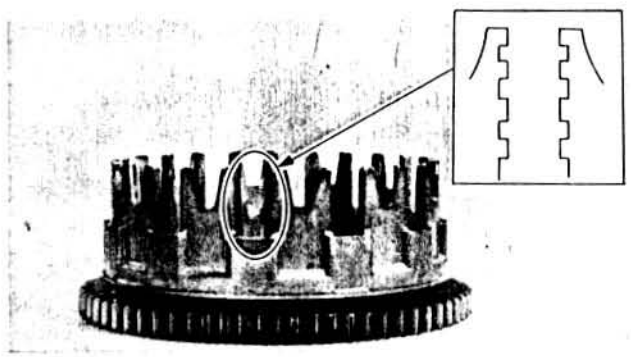
Warpage:
Less than 0.1 mm (0.004 in)

5. Inspect:
   • Clutch spring
   Damage → Replace as a set.



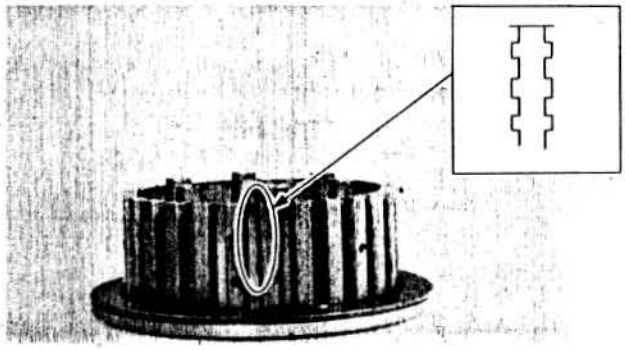
6. Measure:
   • Clutch spring free length
   Out of specification → Replace spring as a set.

Free length (clutch spring):
51.8 mm (2.04 in)
< Limit: 50 mm (1.97 in)



7. Inspect:
   • Dogs on the clutch housing
   Scoring/Wear/Damage → Deburr or replace.
   • Clutch housing bearing
   Wear/Damage → Replace clutch housing.

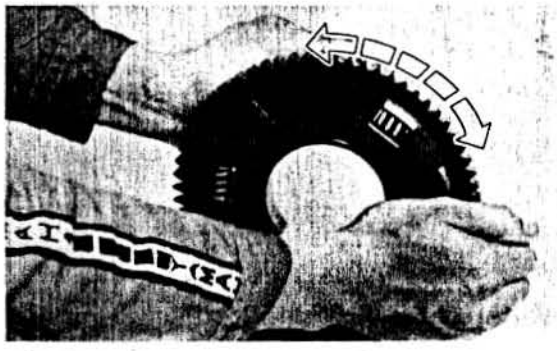
NOTE:
Scoring on the clutch housing dogs will cause eratic operation.



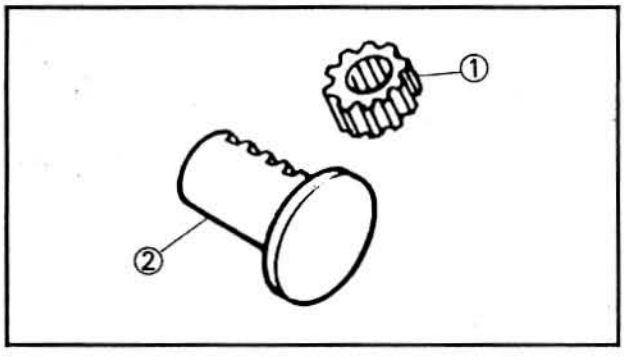
8. Inspect:
   • Clutch boss splines
   Scoring/Wear/Damage → Replace clutch boss.

NOTE:

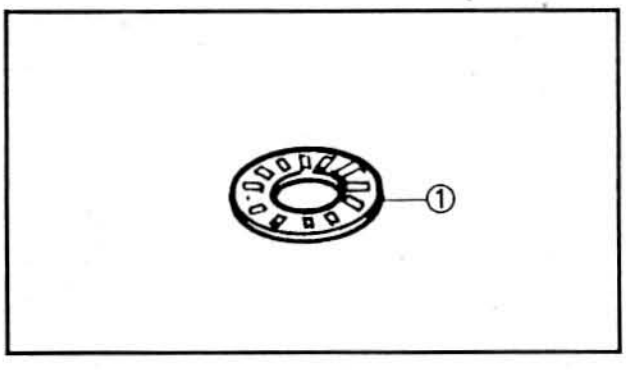
Scoring on the clutch boss splines will cause erratic operation.



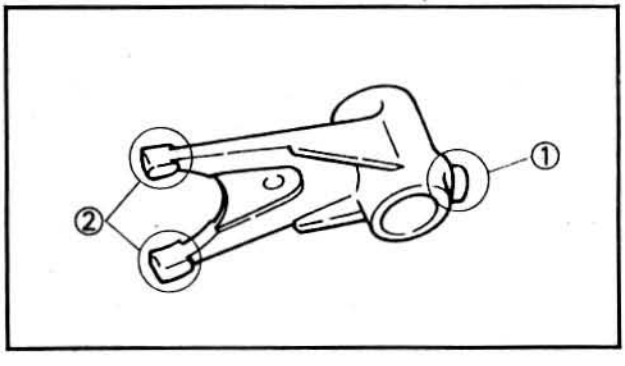
9. Check:
   • Circumferential play
   Free play exists → Replace.



10. Inspect:
   • Gear teeth (release pinion gear) ①
   • Gear teeth (pull rod) ②
   Wear/Damage → Replace as a set.

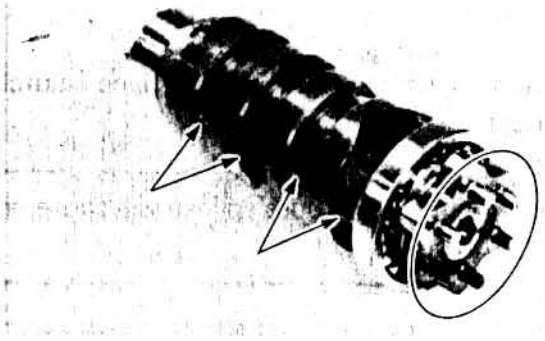


11. Inspect:
   • Bearing ① (Pull rod)
   Wear/Damage → Replace.



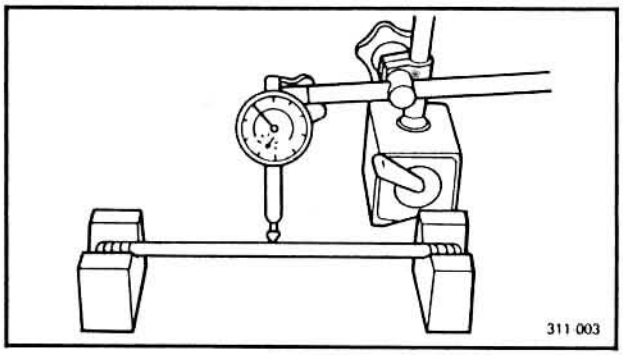
TRANSMISSION AND SHIFTER

1. Inspect:
   • Shift fork cam follower ①
   • Shift fork pawl ②
   Scoring/Bends/Wear → Replace.



2. Inspect:
   - Shift cam groove
   - Shift cam segment

   Wear/Damage → Replace.



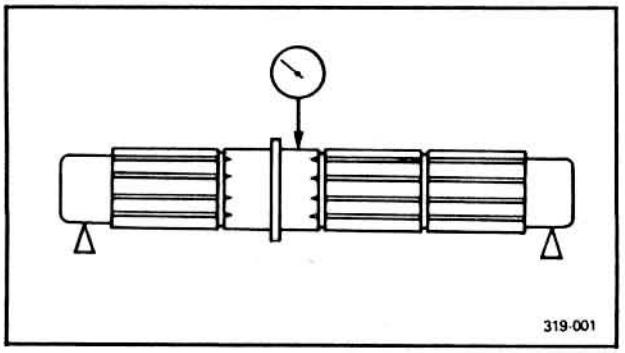
3. Measure:
   - Runout (guide bar)

   Out of specification → Replace.

Runout:
Less than 0.03 mm (0.0012 in)

⚠WARNING:

Do not attempt to straighten as bent guide bar.



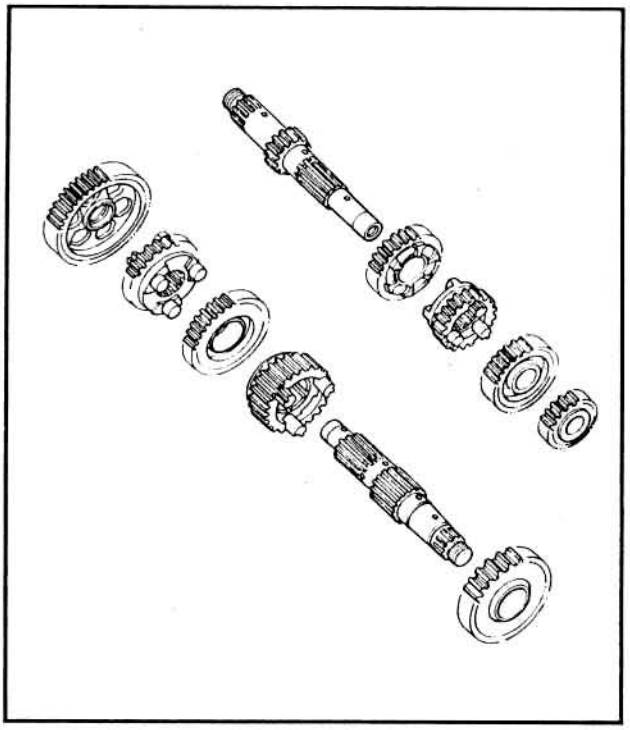
4. Measure:
   - Runout (drive axle and main axle)

   Out of specification → Replace.

Runout:
Less than 0.08 mm (0.003 in)

⚠WARNING:

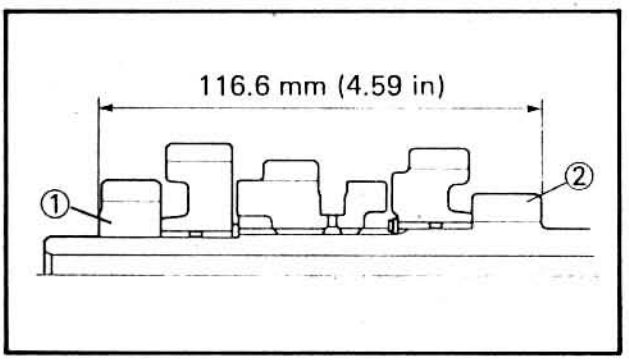
Do not attempt to straighten a bent axle.



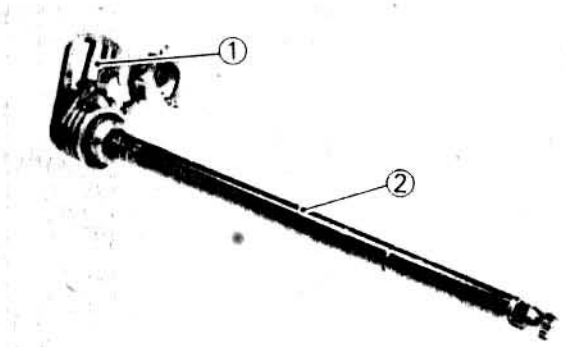
5. Inspect:
   - Gear teeth

   Blue discoloration/Pitting/Wear → Replace.
   - Mated dogs

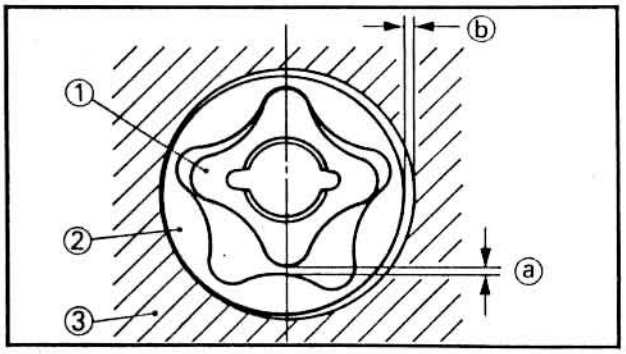
   Rounded edges/Cracks/Missing portions → Replace.

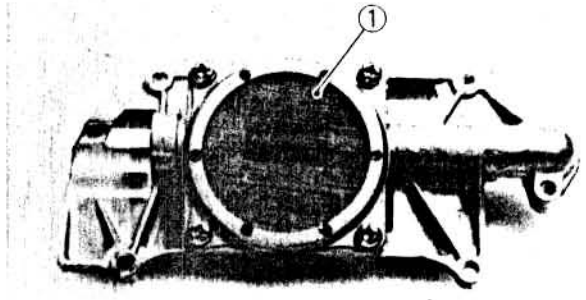


Transmission gear reassembling point:
- Press the 2nd pinion gear ① in the main axle ② as shown.



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





OIL PUMP AND STRAINER

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

Tip clearance:
0.0 ~ 0.12 mm (0.0 ~ 0.005 in)
Side clearance:
0.03 ~ 0.08 mm (0.001 ~ 0.003 in)

2. Inspect:
   - Oil strainer ①
     Damage → Replace

OIL DELIVERY PIPES

1. Inspect:
   - Oil delivery pipes
     Cracks/Damages → Replace.
     Clog → Blow out with compressed air.
   - O-rings
     Damage → 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
     Cranks/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).

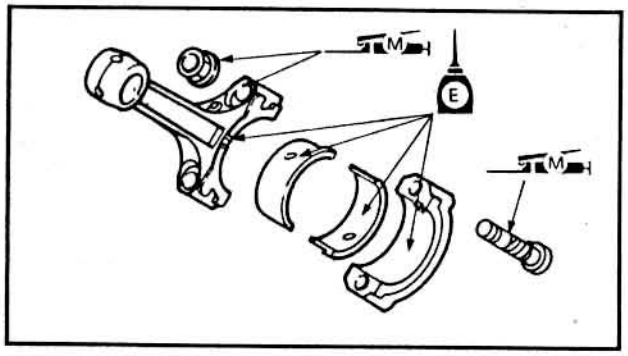
CIRCLIP AND WASHER

1. Inspect:
   - Circlips
   - Washers
     Damage/Looseness/Bends → Replace.

ENGINE ASSEMBLY AND ADJUSTMENT

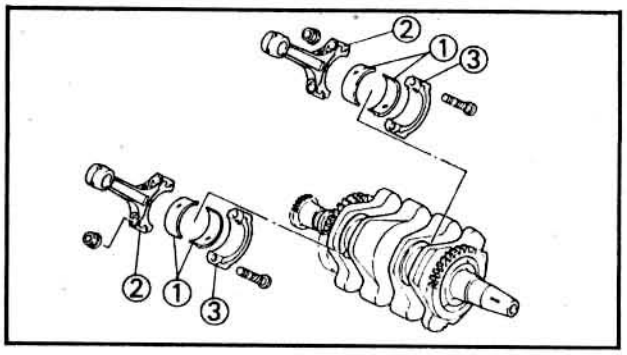
⚠WARNING:

For engine reassembly, replace the following parts with new ones.
- **O-ring**
- **Gasket**
- **Oil seal**
- **Copper washer**
- **Lock washer**
- **Circlip**

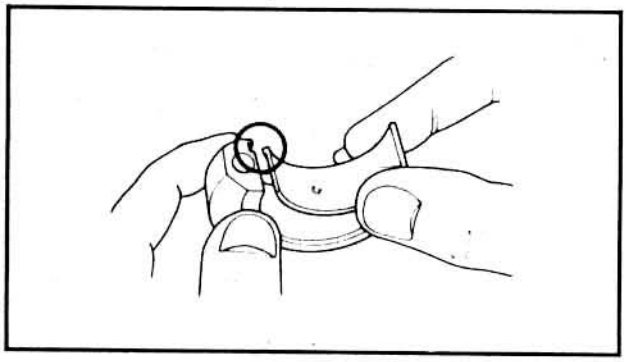


CONNECTING RODS

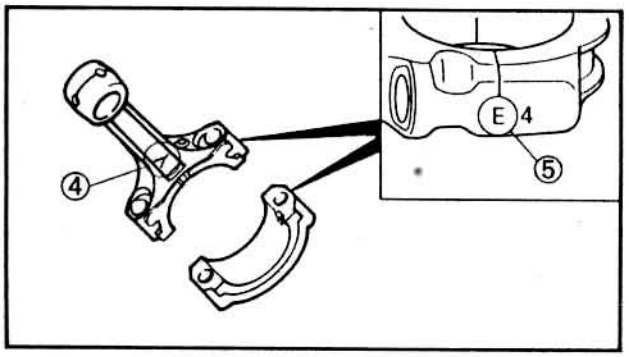
1. Apply:
   - Molybdenum disulfide grease (onto threads of bolts and bottom surfaces of nuts)
   - Engine oil (onto crank pins, crank pin bearings and inner surfaces of connecting rods)

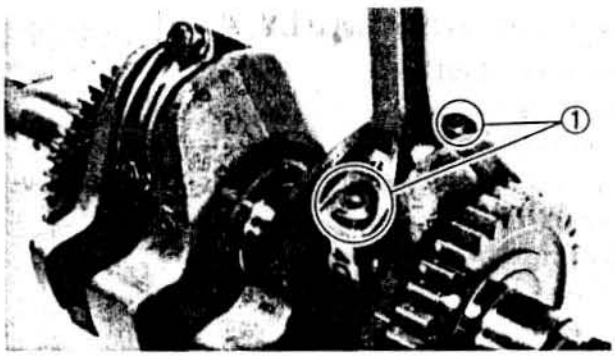


2. Install:
   - Crank pin bearings ①
   - Connecting rods ②
   - Connecting rod caps ③ (onto crank pins)



NOTE:
- Align the projection of bearing with the groove of the cap and connecting rod.
- Identify each bearing position very carefully so that it can be reinstalled in its original place.
- The stamped "Y" mark on the connecting rods ④ should face towards the left side of the crankcase.
- Be sure that the letter ⑤ on both components align to from a perfect character.





3. Align:
   • Bolt head ①
   (with connecting rod cap)

4. Tighten:
   • Nuts (connecting rods)

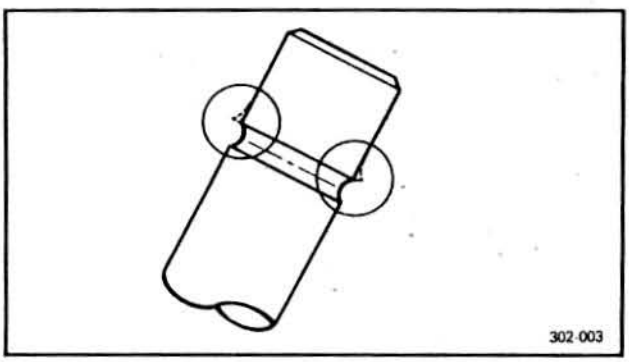
⚠CAUTION:

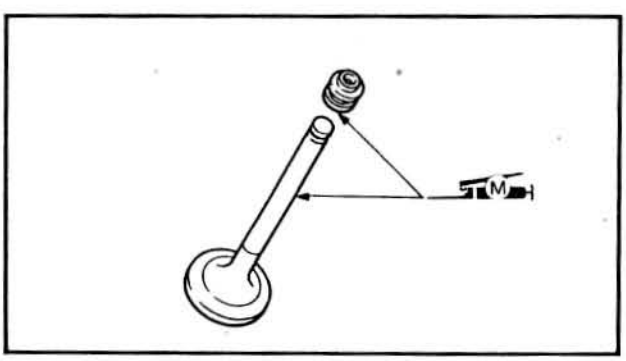
Tighten to full torque specification without pausing. Apply continuous torque between 4.6 and 4.8 m•kg. Once you reach 4.6 m•kg DO NOT STOP TIGHTENING unitl final torque is reached. If the tightening is interrupted between 4.6 and 4.8 m•kg, loosen the nut to less than 4.6 m•kg and start again.

	Nut (connecting rod): **48 Nm (4.8 m•kg, 35 ft•lb)**

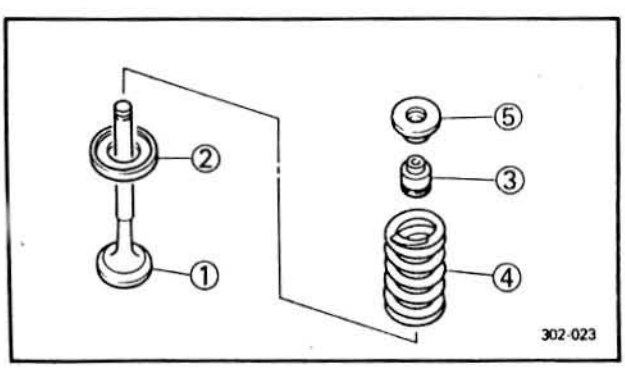
VALVES AND CAMSHAFTS

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

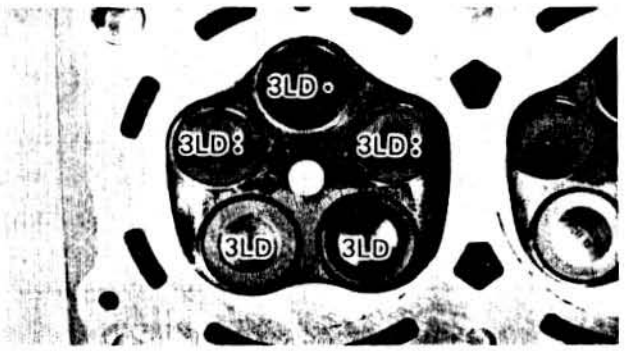




2. Apply:
   • Molybdenum disulfide motor oil
   (onto valve stem and oil seal)



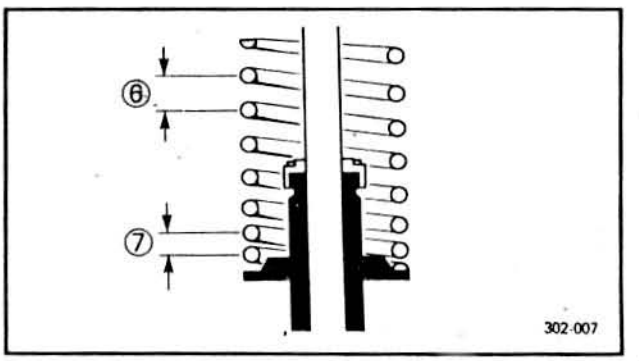
3. Install:
   • Valve ①
   • Spring seat ②
   • Oil seal ③
   • Valve spring ④
   • Valve retainer ⑤
   (into cylinder head)

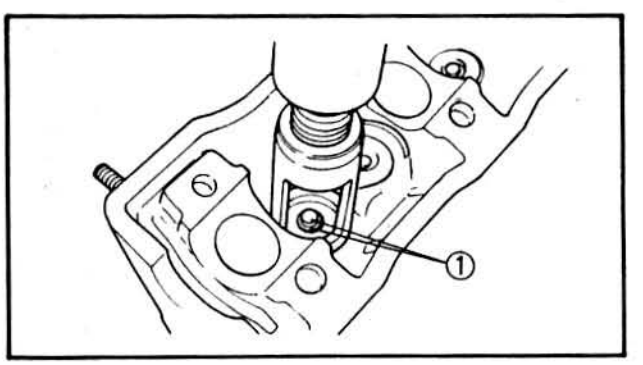


NOTE:

- Make sure that each valve is installed in its original place by reference to its embossed identification mark, as follows:
  Intake (both sides) : 3LD:
  (middle) : 3LD·
  Exhaust : 3LD
- Install the valve spring with larger pitch ⑥ facing upward.

⑦ Smaller pitch





4. Install:
   - Valve cotters ①

NOTE:

Install the valve cotters while compressing the valve spring with the valve spring compresser.



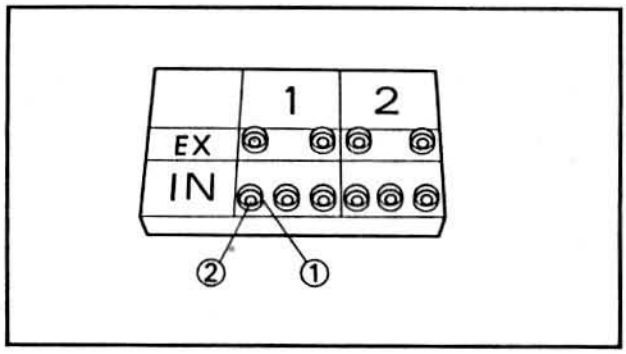
Valve spring compresser:
90890-04019
Attachment:
90890-04114

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.

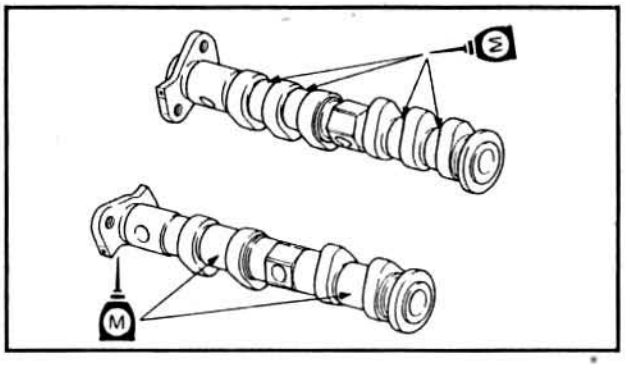
6. Apply:
   - Molybdenum disulfide motor oil
     (onto outer surfaces of valve lifters and pads.)



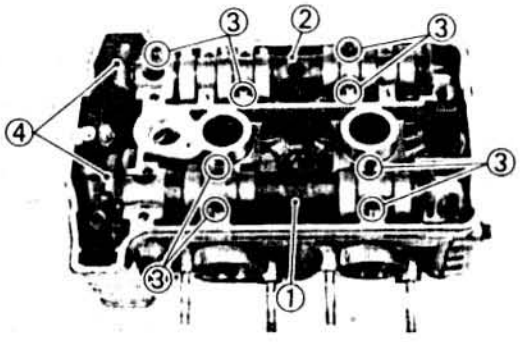
7. Install:
   - Valve lifters ①
   - Pads ②

NOTE:

- Valve lifter must be rotated smoothly by a finger.
- Each valve lifter and pad position very carefully so that its original place.



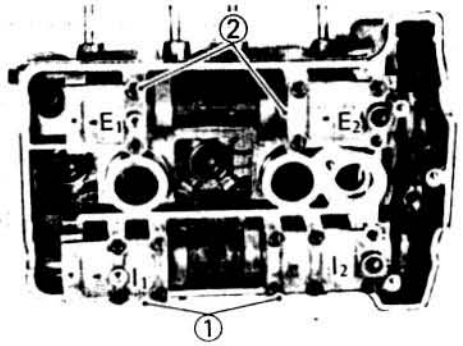
8. Apply:
   - Molybdenum disulfide motor oil (onto journal of camshaft)



9. Install:
   - Exhaust camshaft ①
   - Intake camshaft ②
   - Dowel pins ③

NOTE:

Install the camshaft with the punch mark ④ facing upward.



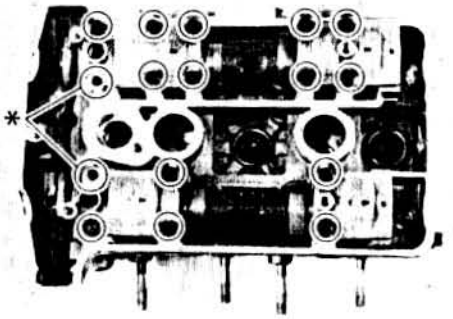
10. Install:
    - Camshaft caps ① (intake camshaft)
    - Camshaft caps ② (exhaust camshaft)

NOTE:

- Make sure that each camshaft cap is installed in its original place by reference to its embossed identification mark, as follows:

Intake	(left)	: I1
	(right)	: I2
Exhaust	(left)	: E1
	(right)	: E2

- Install the camshaft cap with the arrow mark embossed facing right side of the engine.



11. Install:
    • Bolts (camshaft caps)

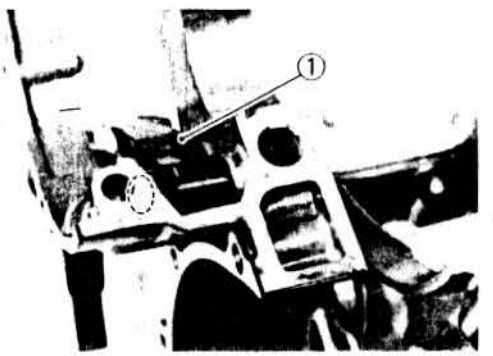
	Bolts (camshaft cap): **10 Nm (1.0 m•kg, 7.2 ft•lb)**

NOTE:

- Do not install the bolts at * marked place in this stage.
- Tighten the bolts (camshaft caps) in a crisscross pattern from innermost.

⚠CAUTION:

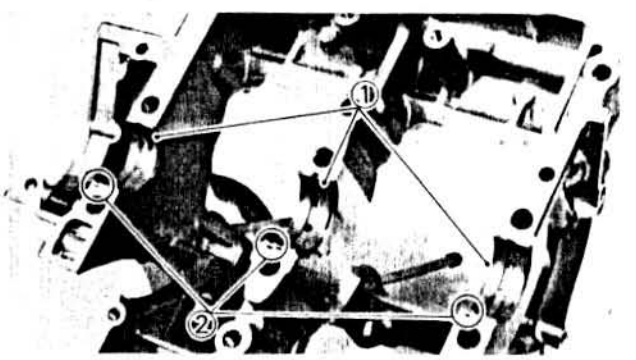
The bolts (camshaft caps) must be tightened evenly or damage to the cylinder head, camshaft caps and cam will result.



CRANKSHAFT

1. Install:
    • Chain guide ① (intake)

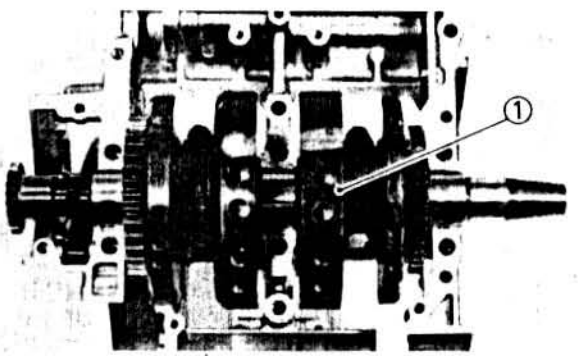
2. Apply:
    • Engine oil
    (onto main journal bearings)



3. Install:
    • Main journal bearings ①
    (onto upper crankcase)

NOTE:

- Align the projection ② of the bearing with the notch in the case.
- Identify each bearing position so that the bearing should be installed in position.

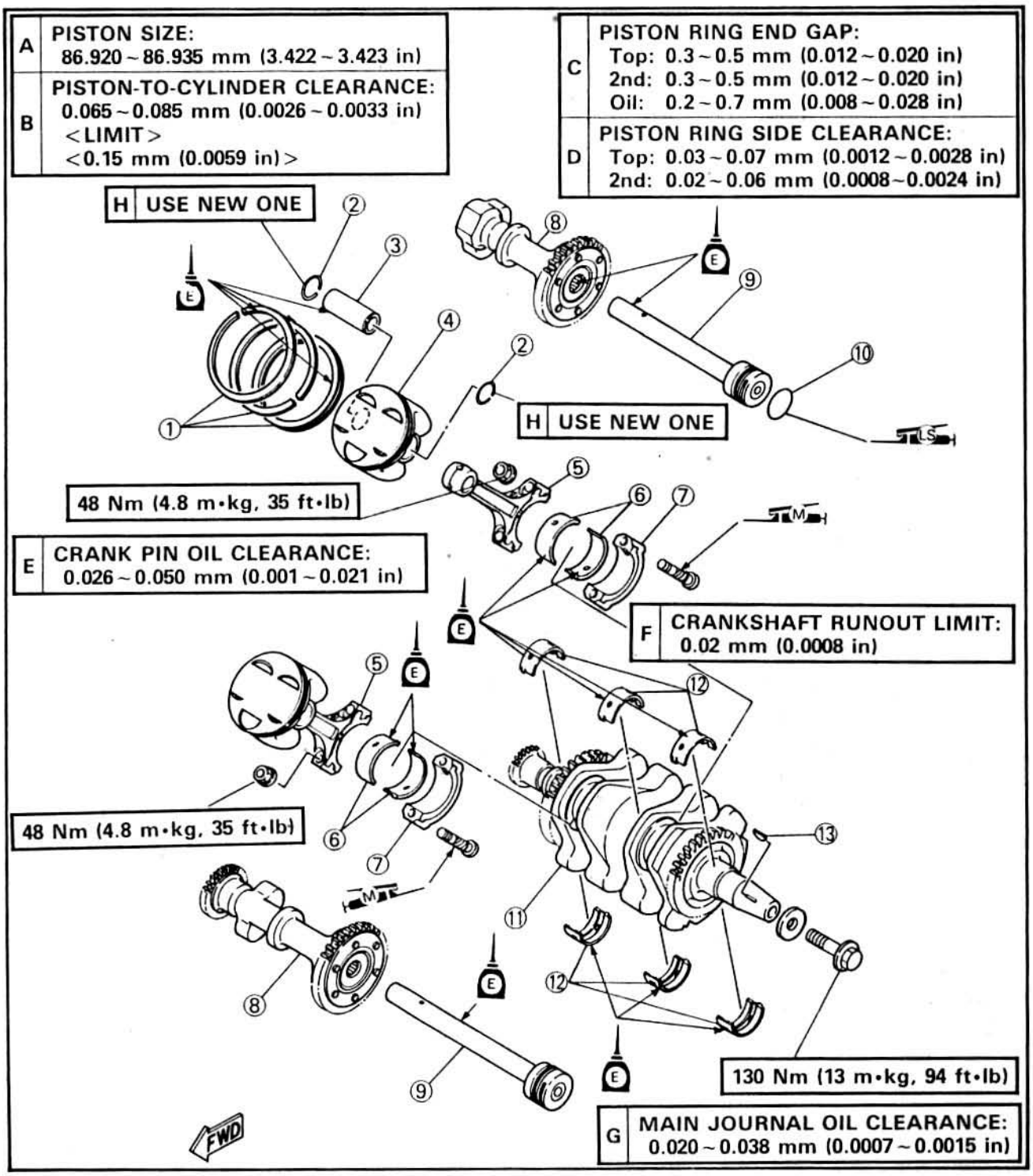


4. Apply:
    • Engine oil
    (onto main journal of crankshaft)

5. Install:
    • Crankshaft assembly ①

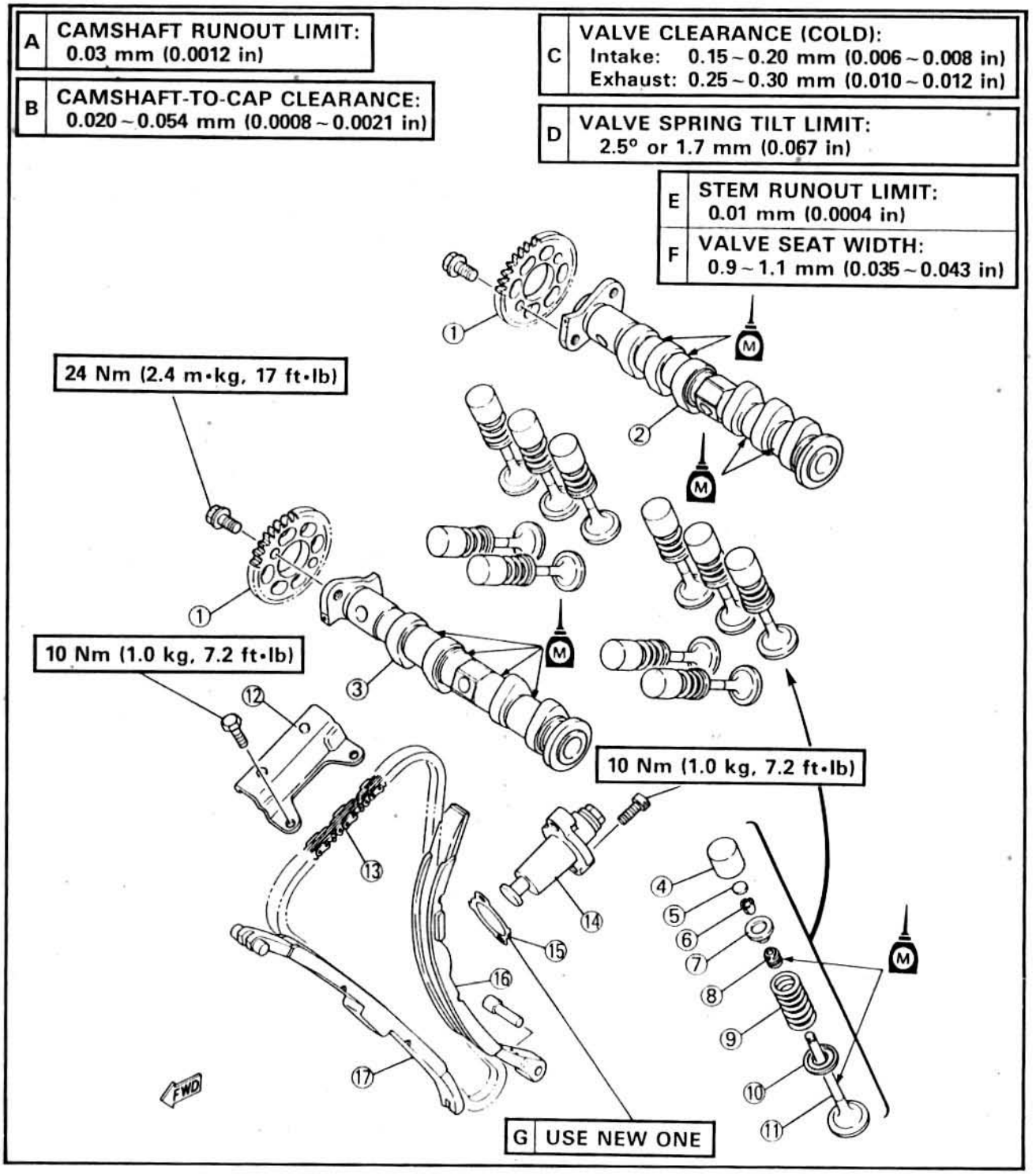
CRANKSHAFT, PISTON AND BALANCER

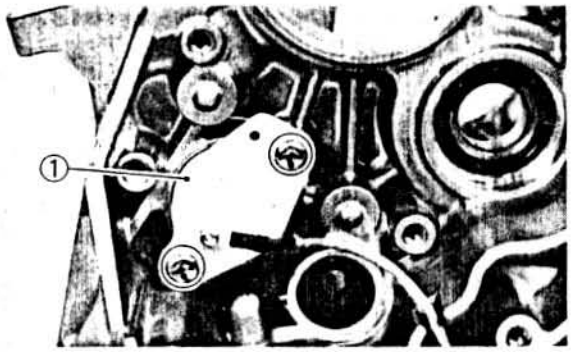
① Piston ring
② Piston pin clip
③ Piston pin
④ Piston
⑤ Connecting rod
⑥ Crank pin bearing
⑦ Connecting rod cap
⑧ Balancer weight
⑨ Balancer shaft
⑩ O-ring
⑪ Crankshaft
⑫ Main journal bearing
⑬ Woodruff key



CAMSHAFT, VALVE AND TIMING CHAIN

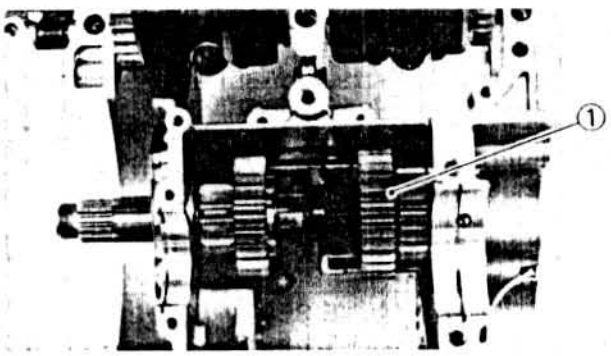
① Cam sprocket
② Camshaft (intake)
③ Camshaft (exhaust)
④ Valve lifter
⑤ Valve pad
⑥ Valve cotter
⑦ Valve retainer
⑧ Oil seal
⑨ Valve spring
⑩ Spring seat
⑪ Valve
⑫ Chain guide
⑬ Timing chain
⑭ Chain tensioner
⑮ Gasket
⑯ Chain guide (intake)
⑰ Chain guide (exhaust)



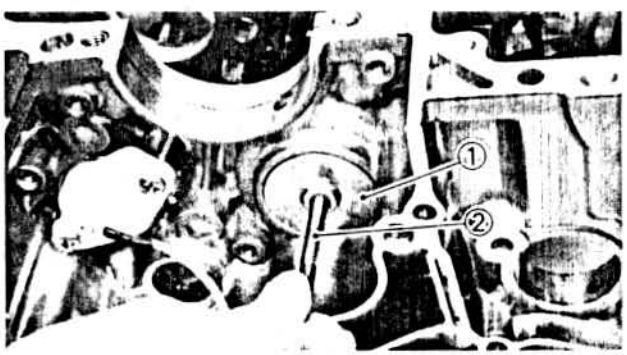


TRANSMISSION AND SHIFTER

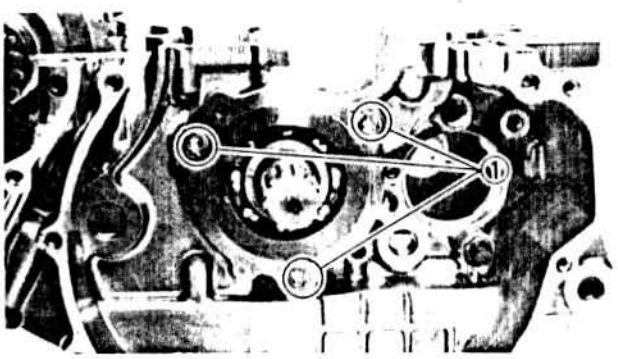
1. Install:
   - Neutral switch ①



2. Install:
   - Main axle assembly ①



3. Install:
   - Plug ① (main axle)

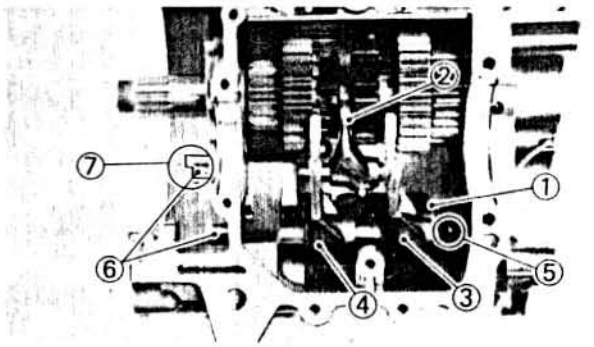


4. Install:
   - Screws ① (bearing retainer)
   Use the torx wrench (T30).

	Torx wrench (T30): **90890-05245**

	Screws (bearing retainer): **12 Nm (1.2 m•kg, 8.7 ft•lb)** **Apply LOCTITE®**

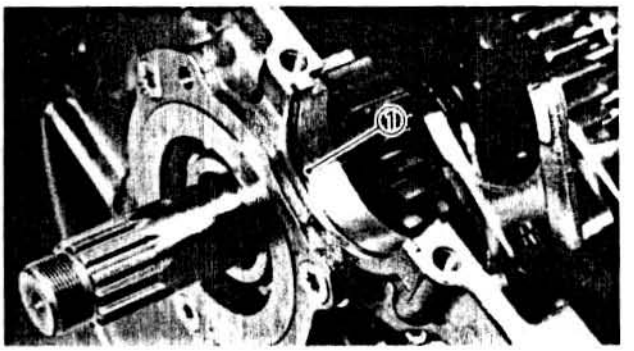
5. Apply:
   - Engine oil
   (onto guide bars)



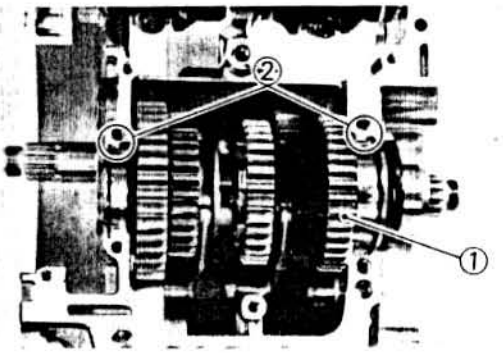
6. Install:
   - Shift cam ①
   - Shift fork "C" ②
   - Shift fork "L" ③
   - Shift fork "R" ④
   - Spring ⑤
   - Guide bars ⑥

NOTE:

- Install the shift forks with the embossed mark on each shift fork facing right side of the engine.
- Install the guide bar with the cut-out end ⑦ facing the right side of the engine.



7. Install:
   - Stopper ring ① (bearing) (onto clutch side)



8. Install:
   - Drive axle assembly ①

NOTE:

- Align the bearing knock pin ② with the pin slot in the crankcase.
- Be sure the stopper ring is fitted to the bearing and the stopper ring have been positioned in the ring groove.



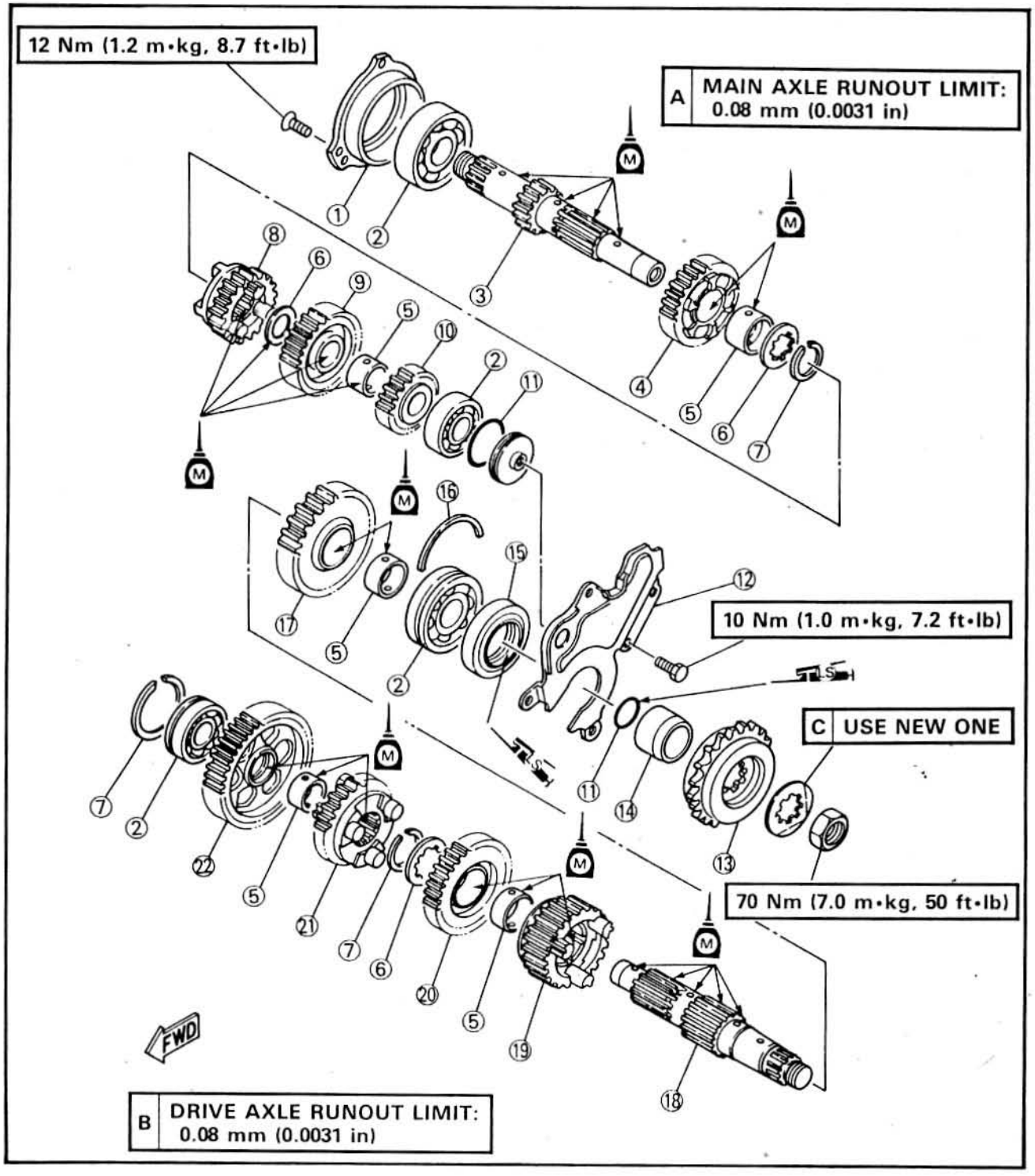
9. Check:
   - Transmission operation unsmooth operation → Repair.

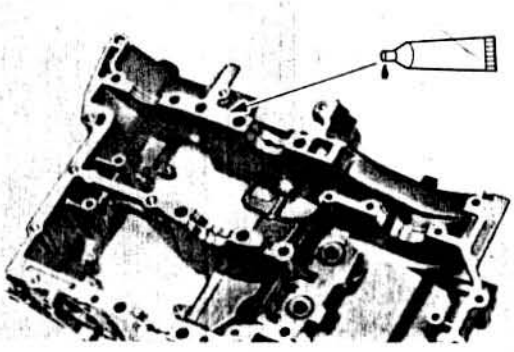
CRANKCASE (LOWER)

1. Apply:
   - Engine oil (onto main journal bearings)

TRANSMISSION

① Bearing housing
② Bearing
③ Main axle
④ 4th pinion gear
⑤ Collar
⑥ Washer
⑦ Circlip
⑧ 3rd pinion gear
⑨ 5th pinion gear
⑩ 2nd pinion gear
⑪ O-ring
⑫ Cover
⑬ Drive sprocket
⑭ Collar
⑮ Oil seal
⑯ Bearing stopper
⑰ 2nd wheel gear
⑱ Drive axle
⑲ 5th wheel gear
⑳ 3rd wheel gear
㉑ 4th wheel gear
㉒ 1st wheel gear



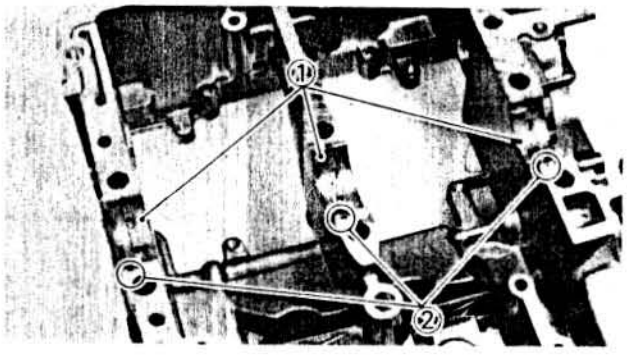


2. Apply:
   - Sealant
     (onto crankcase matching surfaces)

	Yamaha bond No. 1215: 90890-85505

NOTE:

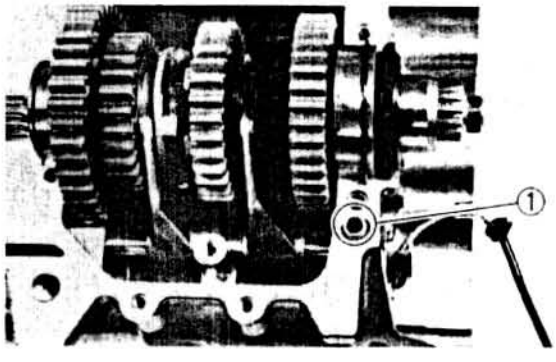
DO NOT ALLOW any sealant to come in conteat with the oil gallery or crankshaft bearings. Do not apply sealant to within 2 ~ 3 mm (0.08 ~ 0.12 in) of the bearings.



3. Install:
   - Main journal bearings (1)
     (onto lower crankcase)

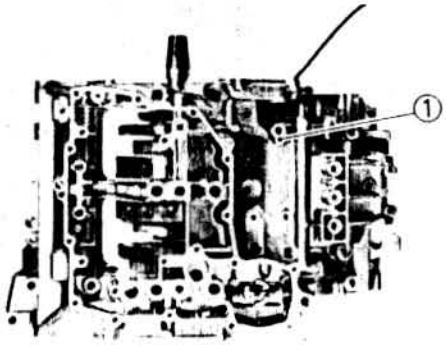
NOTE:

- Align the projection (2) of the bearing with the notch in the case.
- Identify each bearing position so that the bearing should be installed in position.

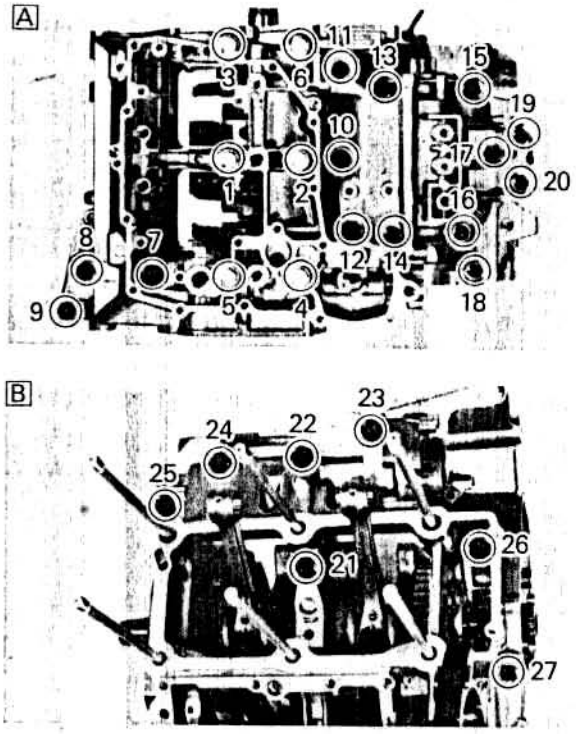


4. Install:
   - Dowel pin (1)

5. Set shift cam and transmission gears in NEUTRAL position.



6. Install:
   - Lower crankcase (1)

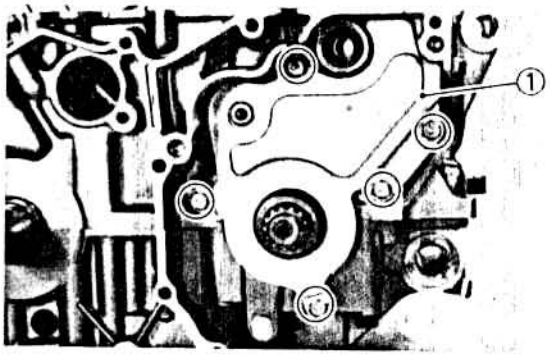


7. Install:
   - Bolts (crankcase)

A Lower crankcase
B Upper crankcase

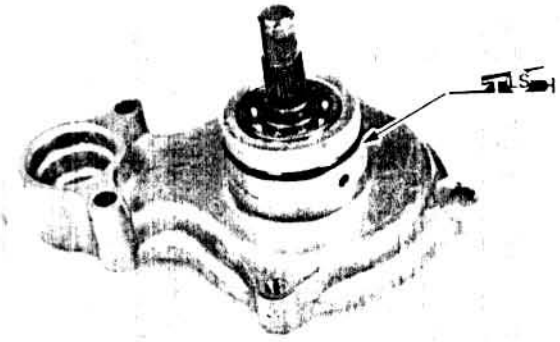
Bolts (crankcase):
M10 (①~⑥):
40 Nm (4.0 m•kg, 29 ft•lb)
M8 (⑦~⑩, ⑬, ⑮ and ㉑~㉕):
24 Nm (2.4 m•kg, 17 ft•lb)
M6 (⑪, ⑫, ⑭, ⑯~⑳, ㉖ and ㉗):
12 Nm (1.2 m•kg, 8.7 ft•lb)

NOTE:
- Lubricate the threads of bolts (M10) with molybdenum disulfied motor oil.
- Lubricate the threads of bolts (M8 and M6) with engine oil.
- Tighten the bolts starting with the lowest numbered one.
- Install the copper washer on the bolts No. 18, No. 25 and No. 27.
- Install the cable holder on the bolt No. 19.



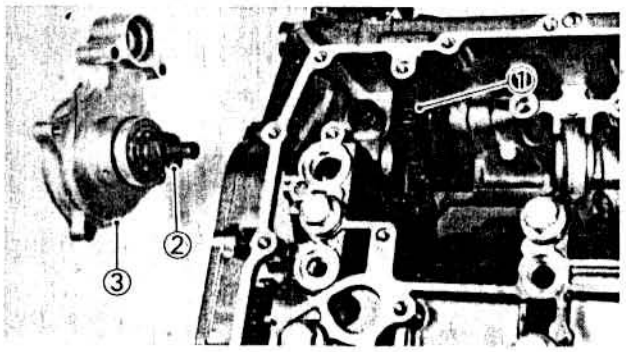
8. Install:
   - Plate ①

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

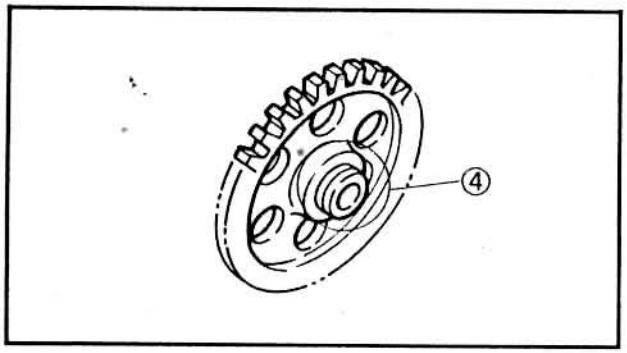


WATER PUMP

1. Apply:
   - Lithium soap base grease
     (onto O-ring on water pump assembly).

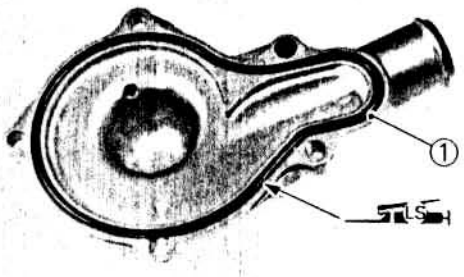


2. Install:
   - Water pump gear ①
   - Washer ②
   - Water pump assembly ③

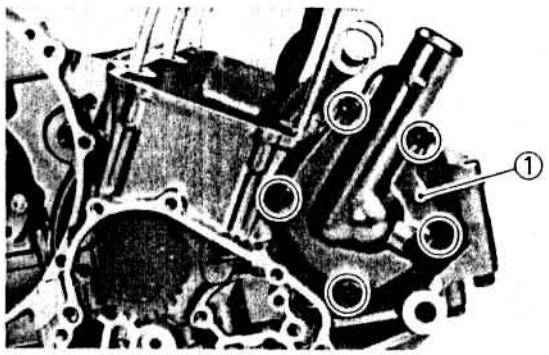


NOTE:

Install the water pump gear with embossed side ④ facing to inside.



3. Apply:
   - Lithium soap base grease (onto O-ring ①)

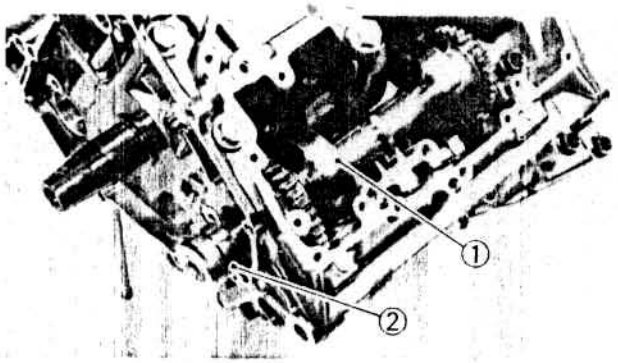


4. Install:
   - O-ring
   - Water pump cover ①

	Bolts (water pump): 10 Nm (1.0 m•kg, 7.2 ft•lb)

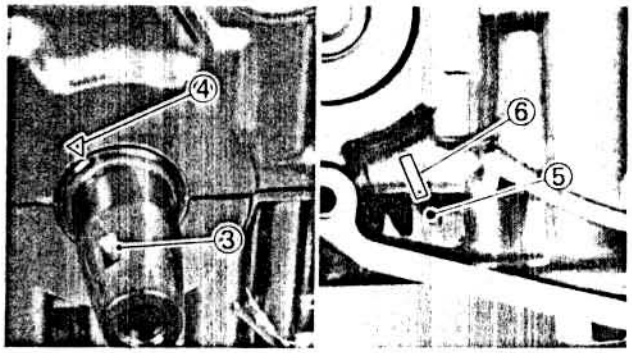
BALANCER WEIGHTS

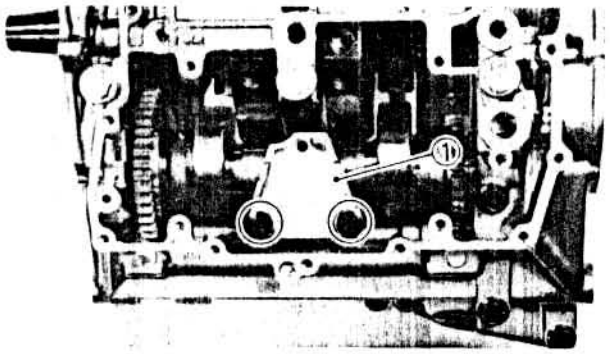
1. Apply:
   - Engine oil (onto balancer shaft)
   - Lithium soap base grease (onto O-ring on balancer shaft)



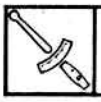
2. Install:
   - Balancer weight ① (front)
   - Balancer shaft ② (front)

Installing steps:
- Turn the crankshaft until the keyway ③ is aligned with the embosed mark ④ on the crankcase.
- While holding the crankshaft, install the balancer weight and align the mark ⑤ on the balancer gear with the embossed mark ⑥ on the crankcase.
- Install the balancer shaft.

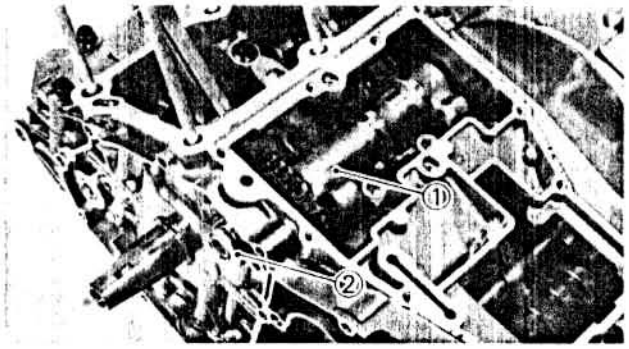




3. Install:
   - Dowel pins
   - Balancer holder ① (front)

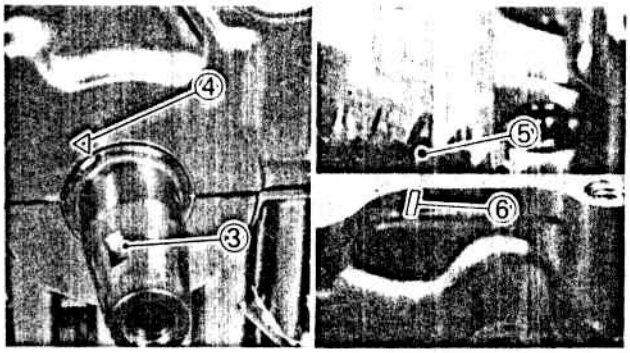


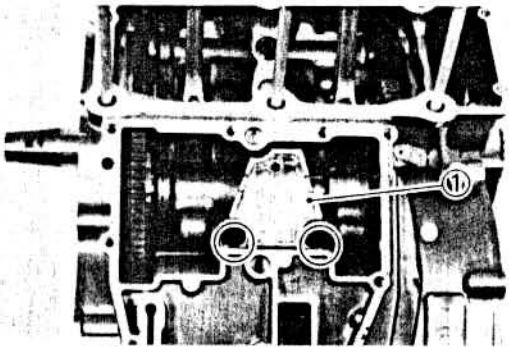
Bolts (balancer holder):
10 Nm (1.0 m•kg, 7.2 ft•lb)



4. Install:
   - Balancer weight ① (rear)
   - Balancer shaft ② (rear)

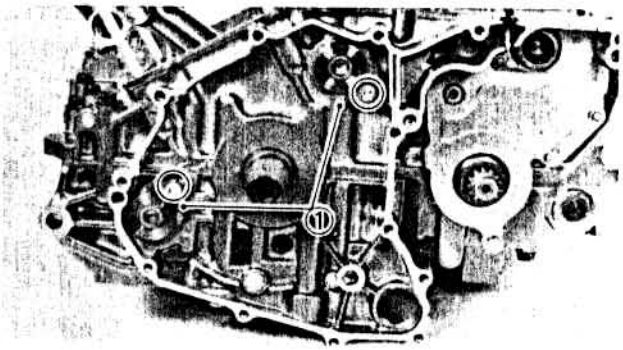
Installing steps:
- Turn the crankshaft until the keyway ③ is aligned with the embosed mark ④ on the crankcase.
- While holding the crankshaft, install the balancer weight and align the mark ⑤ on the balancer gear with the embossed mark ⑥ on the crankcase.
- Install the balancer shaft.





5. Install:
   - Dowel pins
   - Balancer holder ① (front)

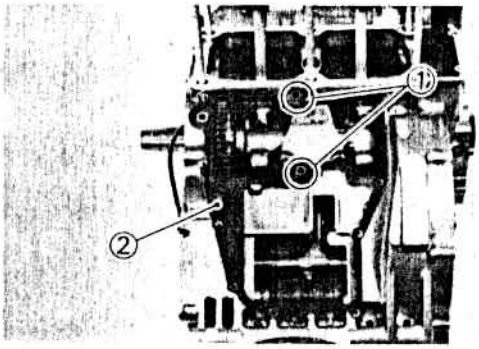
	Bolts (balancer holder): **10 Nm (1.0 m·kg, 7.2 ft·lb)**



6. Install:
   - Balancer shaft holders ①
     Use the torx wrench (T30).

	Torx wrench (T30): **90890-05245**

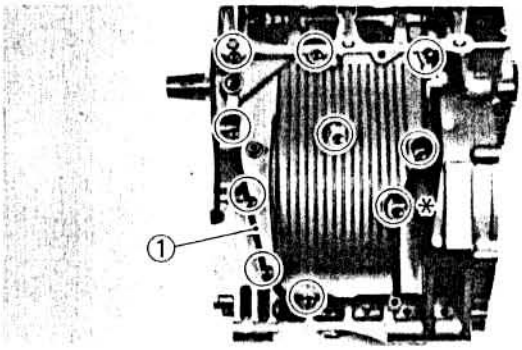
	Screws (balancer shaft holders) **12 Nm (1.2 m·kg, 8.7 ft·lb)** **Apply LOCTITE®**



NOTE:

Install the balancer shaft holder with chamfered side facing outside.

7. Install:
   - Dowel pins ①
   - Gasket ② (crankcase cover)

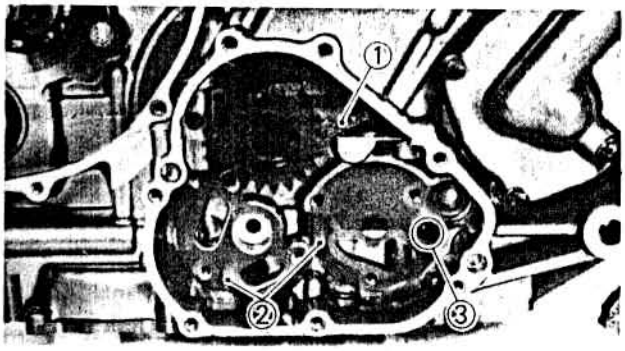


8. Install:
   - Crankcase cover ① (upper)

NOTE:

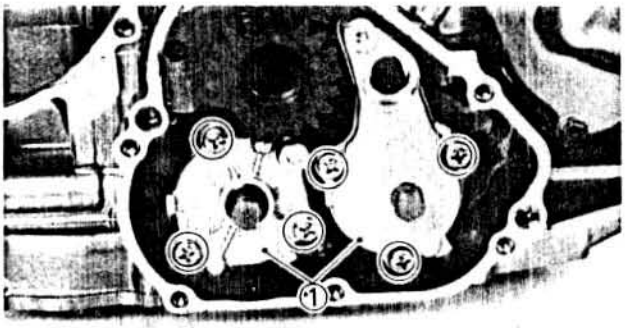
- Install the copper washer on the indicated bolt*.
- Tighten the bolts in a crisscross pattern.

	Bolts (crankcase cover): **10 Nm (1.0 m·kg, 7.2 ft·lb)**



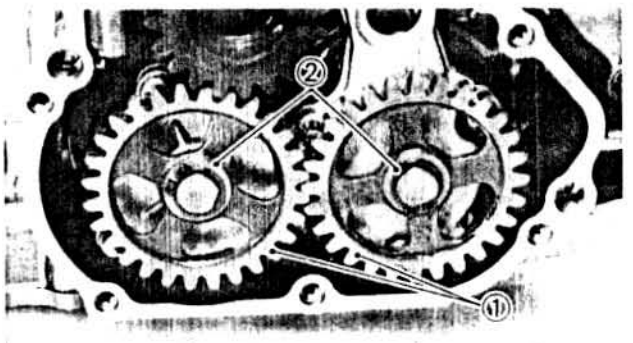
OIL PUMPS AND TIMING CHAIN

1. Install:
   - Timing chain ①
   - Gaskets ② (oil pumps)
   - Dowel pin ③

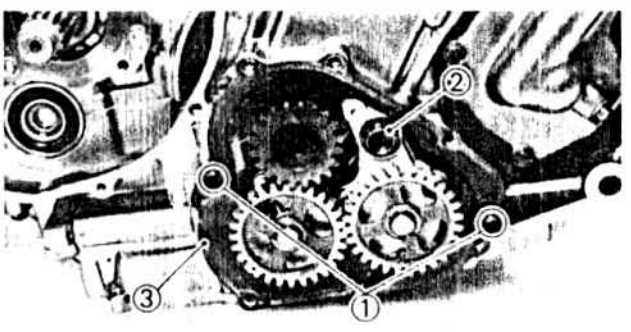


2. Install:
   • Oil pumps ①

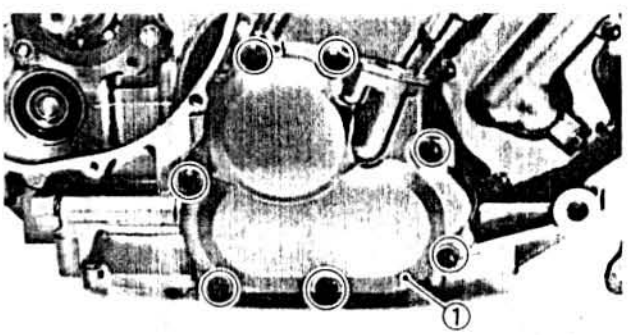
	Screws (oil pumps): **6 Nm (0.6 m•kg, 4.3 ft•lb)**



3. Install:
   • Oil pump gears ①
   • Circlips ②

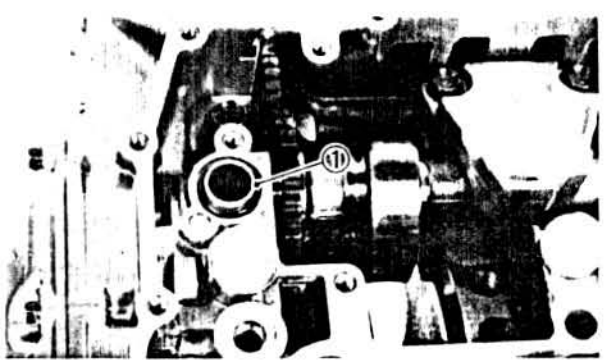


4. Install:
   • Dowel pins ①
   • Collar ② (with O-ring)
   • Gasket ③ (oil pump cover)



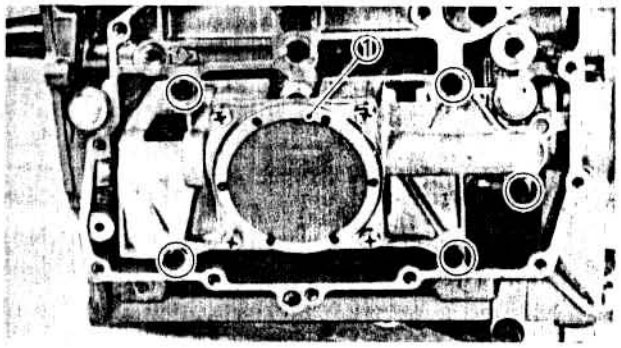
5. Install:
   • Oil pump cover ①

	Bolts (oil pump cover): **10 Nm (1.0 m•kg, 7.2 ft•lb)**



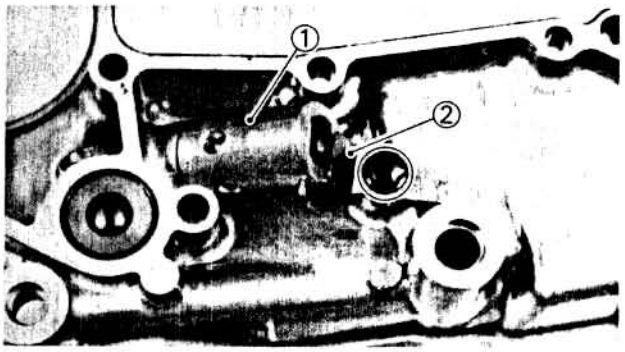
OIL PAN, OIL FILTER AND OIL STRAINER

1. Install:
   • Collar ① (with O-ring)



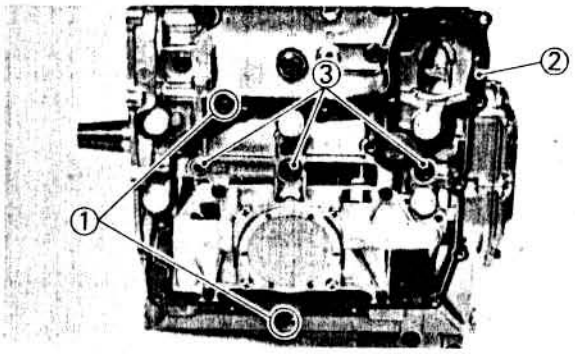
2. Install:
   • Oil strainer ①

	Bolt (oil strainer): **7 Nm (0.7 m•kg, 5.1 ft•lb)** **Apply LOCTITE®**

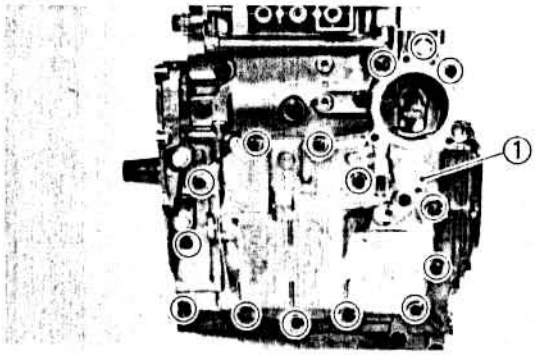


3. Install:
   • Relief valve ①
   • Holder ② (relief valve)
   (into oil pan)

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



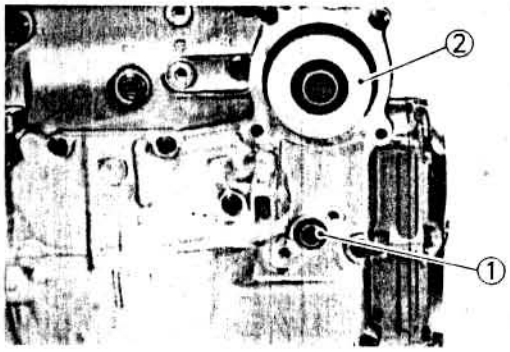
4. Install:
   • Dowel pins ①
   • Gasket ② (oil pan)
   • Collars ③ (with O-ring)



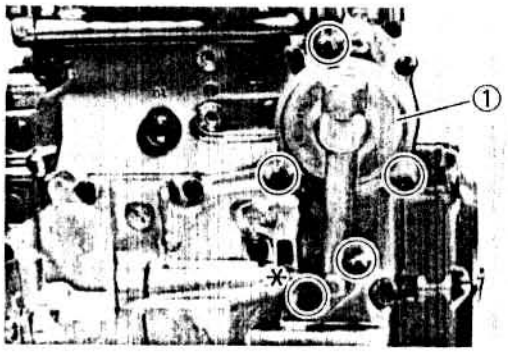
5. Install:
   • Oil pan ①

	Drain bolt: **30 Nm (3.0 m•kg, 22 ft•lb)** **Bolts (oil pan):** **10 Nm (1.0 m•kg, 7.2 ft•lb)**

NOTE:
Tighten the bolts (oil pan) in a crisscross pattern.



6. Install:
   • Collar ① (with O-ring)
   • Oil filter ②

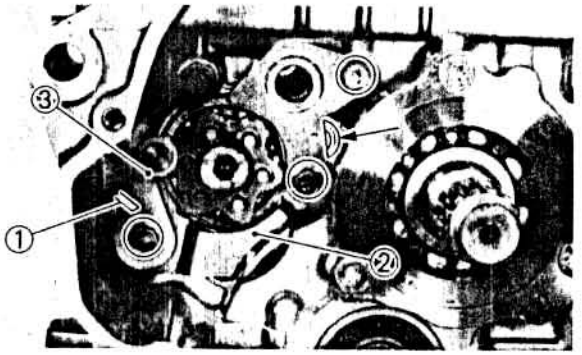


7. Install:
   - Oil filter cover ①

	Bolts (oil filter cover): **10 Nm (1.0 m•kg, 7.2 ft•lb)**

NOTE:

For indicated bolt *, apply Yamaha bond No. 1215 onto the threads of bolt and install the copper washer.



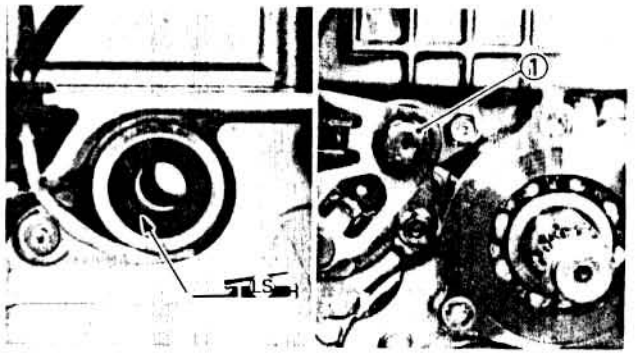
CLUTCH

1. Install:
   - Return spring ①
   - Bearing retainer ②
   - Stopper lever ③

NOTE:

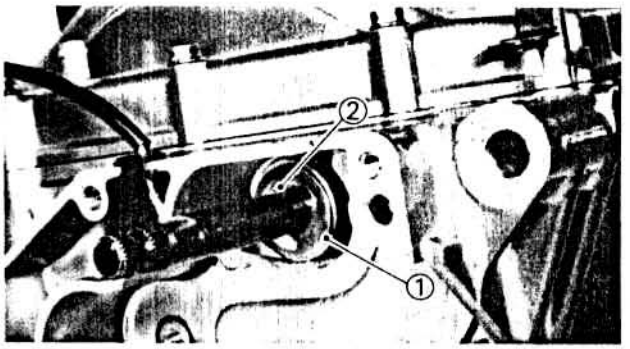
- Hook the spring ends on the stopper lever and crankcase boss.
- Fit the bearing retainer onto the cut surface of guide bar.

	Bolt (stopper lever): **12 Nm (1.2 m•kg, 8.7 ft•lb)** **Bolt (bearing retainer):** **12 Nm (1.2 m•kg, 8.7 ft•lb)** **Apply LOCTITE®**

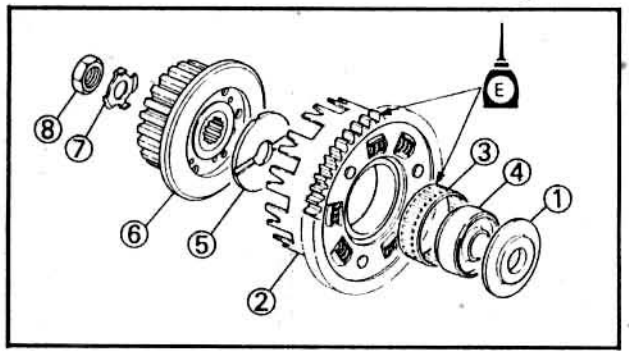


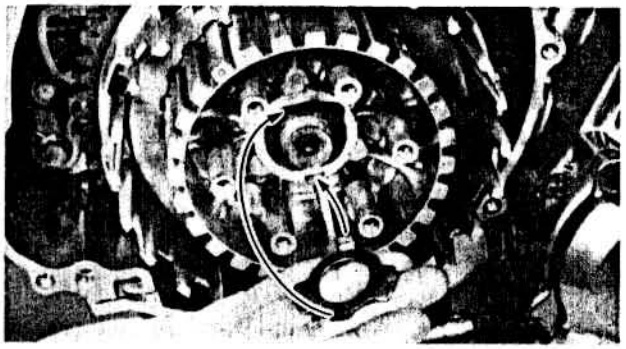
2. Apply:
   - Lithium soap base grease (onto oil seal lips)
   - Engine oil (onto shift shaft)

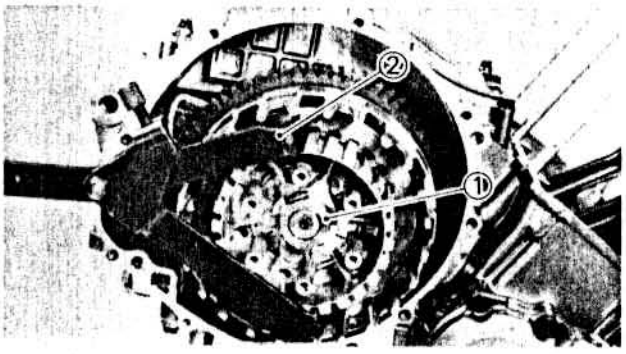
3. Install:
   - Shift shaft ①

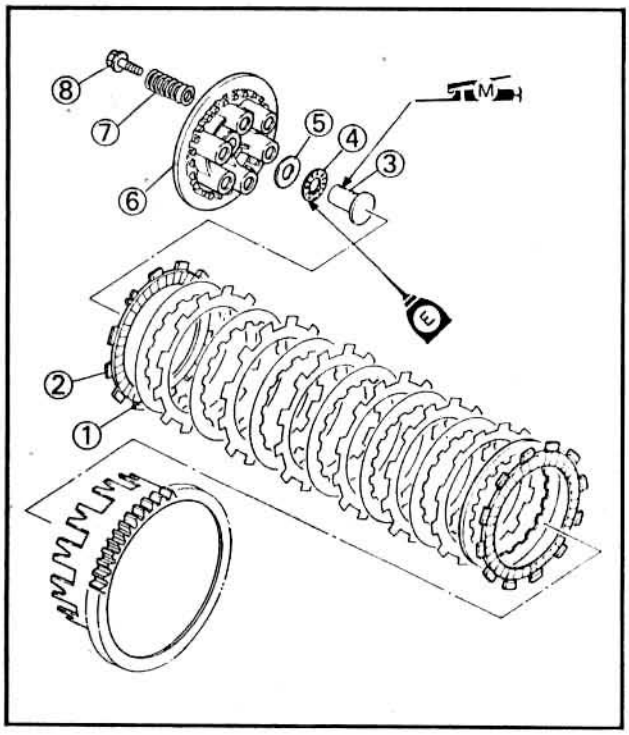


4. Install:
   - Washer ①
   - Circlip ②









5. Apply:
   - Engine oil
     (onto bearing and gear teeth)

6. Install:
   - Thrust plate ① (inner)
   - Clutch housing ②
   - Bearing ③
   - Spacer ④
   - Thrust plate ⑤ (outer)
   - Clutch boss assembly ⑥
   - Lockwasher ⑦
   - Nut ⑧ (clutch boss)

NOTE:
- Install the thrust plate (inner) with embossed side facing to inside.
- Fit the tabs of the lockwasher to the grooves of the clutch boss.

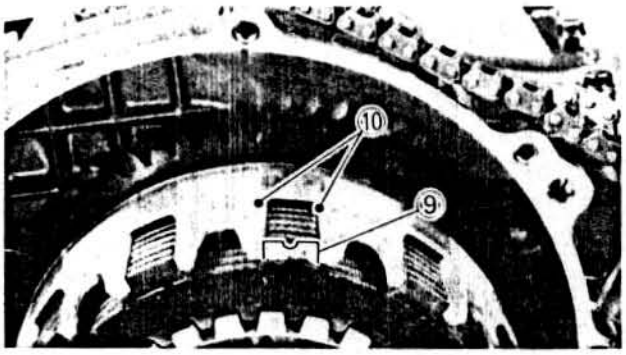
7. Tighten:
   - Nut ① (clutch boss)

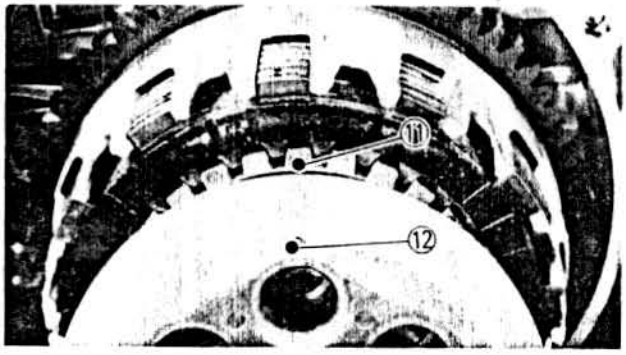
NOTE:
Tighten the nut (clutch boss) while holding the clutch boss with the universal clutch holder ②.

	**Universal clutch holder: 90890-04086**

	**Nut (clutch boss): 70 Nm (7.0 m•kg, 50 ft•lb)**

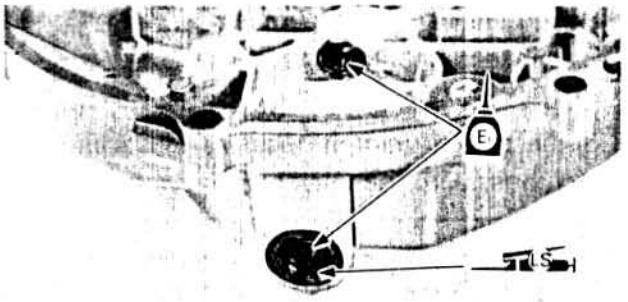
8. Bend:
   - Lock washer tab
     (along nut flat)
9. Apply:
   - Molybdenum disulfide grease
     (onto gear teeth of pull rod)
   - Engine oil
     (onto bearing (pull rod))
10. Install:
    - Clutch plates ①
    - Friction plates ②
    - Pull rod ③
    - Bearing ④ (pull rod)
    - Washer ⑤
    - Pressure plate ⑥
    - Clutch springs ⑦
    - Bolts ⑧



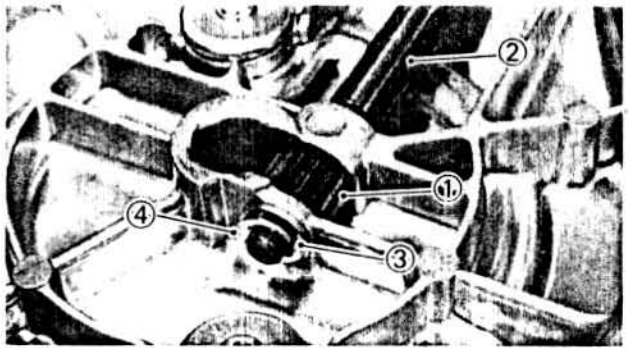


NOTE:
- Install the friction plate with semi-circular slot ⑨ closest to pressure plate and align the semi-circular slot with the embossed marks ⑩ on the clutch housing.
- Make sure that the match mark ⑪ on the clutch boss is aligned with the match mark ⑫ on the pressure plate.
- Tighten the bolts (pressure plate) in a crisscross pattern.

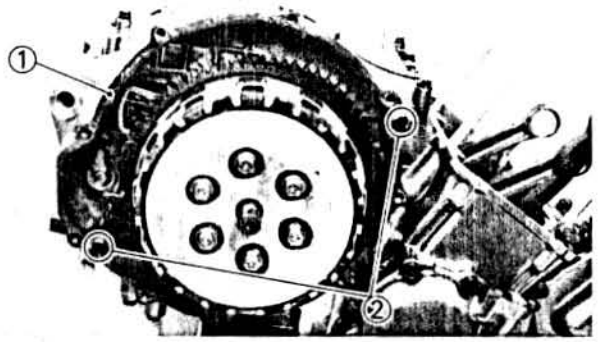
	Bolts (pressure plate): **8 Nm (0.8 m•kg, 5.8 ft•lb)**



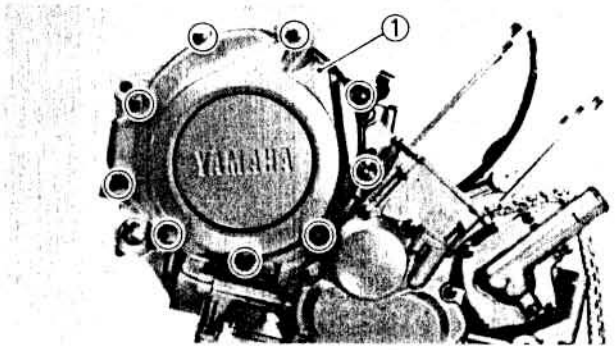
11. Apply:
    - Lithium soap base grease (onto oil seal lips in crankcase cover)
    - Engine oil (onto bearings in crankcase cover)



12. Install:
    - Release pinion gear ①
    - Pull lever axle ②
    - Washer ③
    - Circlip ④ (into crankcase cover)



13. Install:
    - Gasket ① (crankcase cover)
    - Dowel pins ②

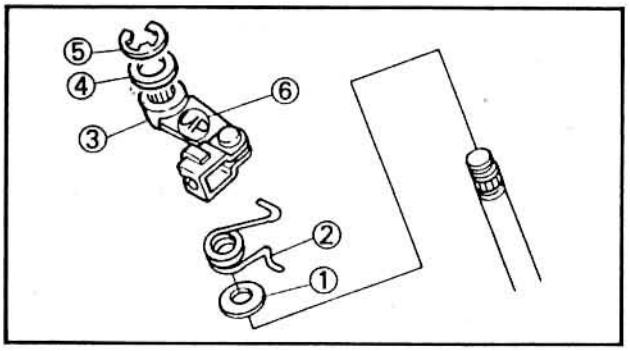


14. Install:
    - Crankcase cover ① (right)

	Bolts (crankcase cover): **10 Nm (1.0 m•kg, 7.2 ft•lb)**

NOTE:

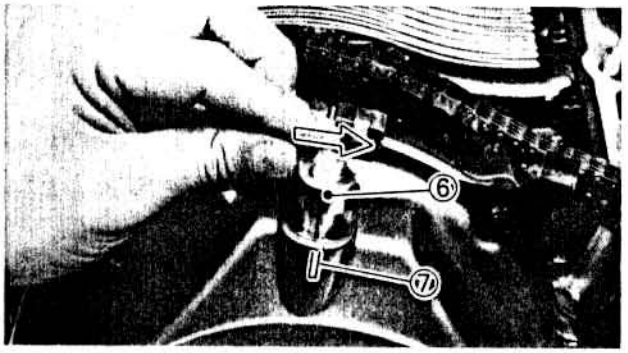
Tighten the bolts (crankcase cover) in a crisscross pattern.

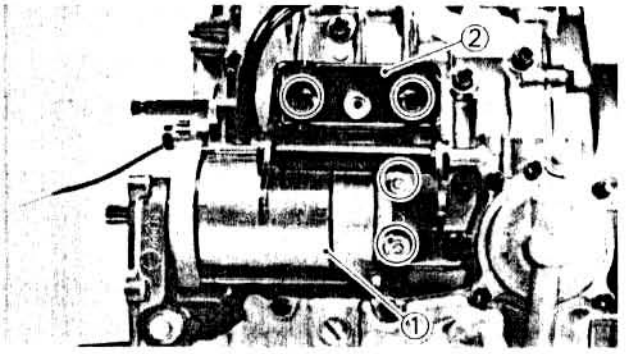


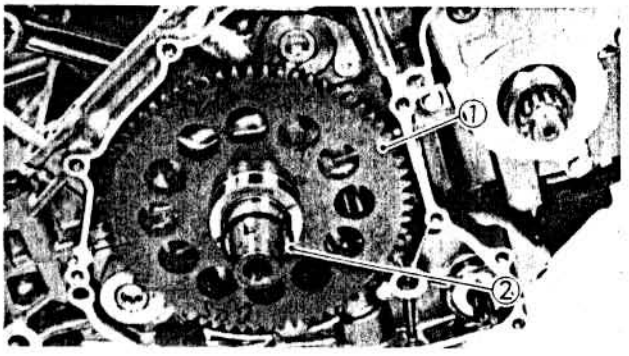
15. Install:
    - Washer ①
    - Return spring ②
    - Pull lever ③
    - Washer ④
    - Circlip ⑤

NOTE:

- Make sure that the mark ⑥ on the pull lever is aligned with the embossed mark ⑦ on the crankcase while pushing the pull lever. If not, change the pull lever position.
- Install the pull lever with the "UP" mark ⑧ facing upward.







ROTOR AND STARTER DRIVES

1. Apply:
    - Lithium soap base grease (onto O-ring on starter motor)

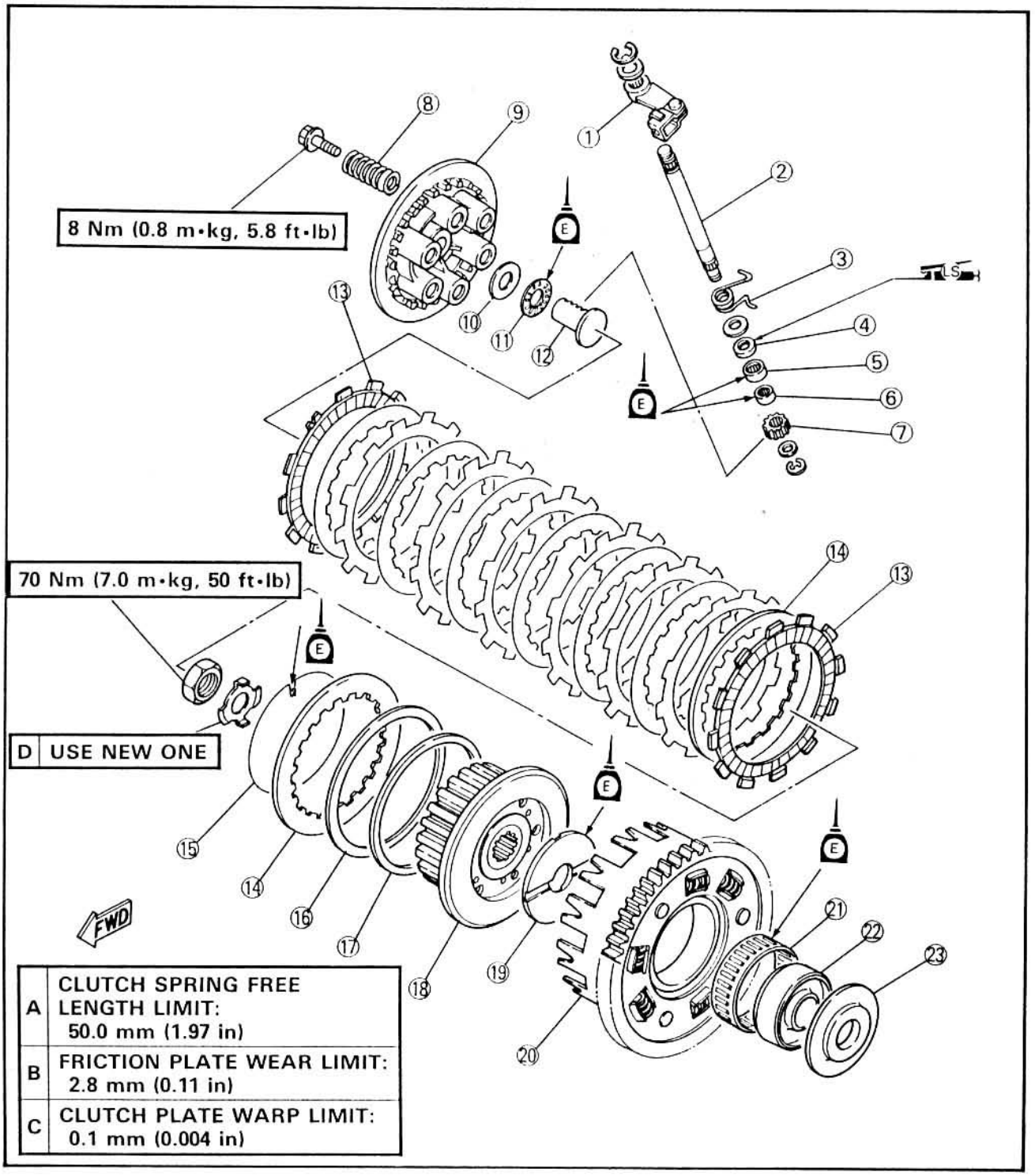
2. Install:
    - Starter motor ①
    - Engine stay ②

	Bolts (starter motor): **10 Nm (1.0 m•kg, 7.2 ft•lb)** **Bolts (engine stay):** **30 Nm (3.0 m•kg, 22 ft•lb)**

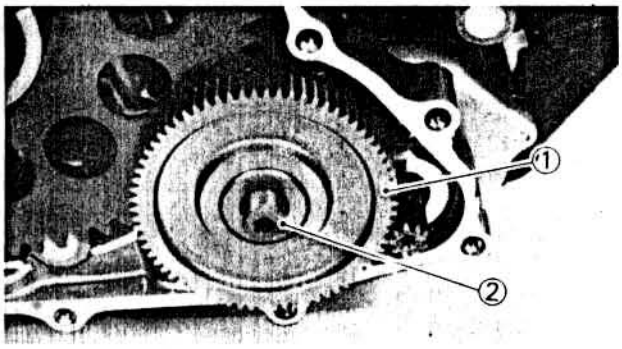
3. Install:
    - Wheel gear ①
    - Washer ②

CLUTCH

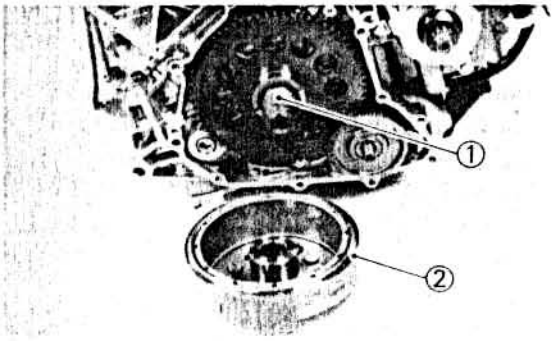
① Pull lever
② Pull rod
③ Return spring
④ Oil seal
⑤ Bearing
⑥ Bearing
⑦ Pinion gear
⑧ Clutch spring
⑨ Pressure plate
⑩ Washer
⑪ Bearing
⑫ Pull rod
⑬ Friction plate
⑭ Clutch plate
⑮ Stopper ring
⑯ Cushion ring
⑰ Cushion ring seat
⑱ Clutch boss
⑲ Thrust washer
⑳ Clutch housing
㉑ Bearing
㉒ Spacer
㉓ Thrust plate



A	CLUTCH SPRING FREE LENGTH LIMIT: 50.0 mm (1.97 in)
B	FRICTION PLATE WEAR LIMIT: 2.8 mm (0.11 in)
C	CLUTCH PLATE WARP LIMIT: 0.1 mm (0.004 in)



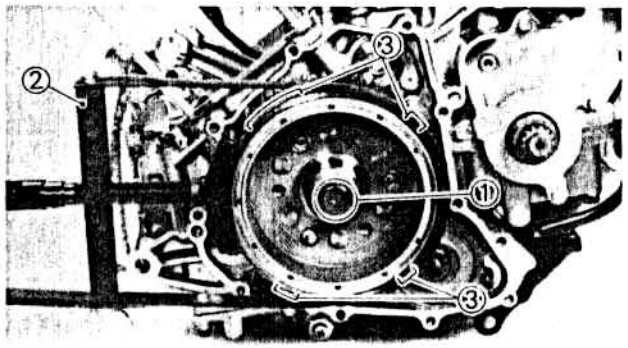
4. Install:
   - Starter idle gear ①
   - Shaft ② (starter idle gear)



5. Install:
   - Woodruff key ①
   - Rotor ②

NOTE:

When installing the magneto rotor, make sure that the woodruff key is properly seated in the key-way of the crankshaft.



6. Install:
   - Bolt ① (rotor)

	Bolt (rotor): **130 Nm (13 m•kg, 94 ft•lb)**

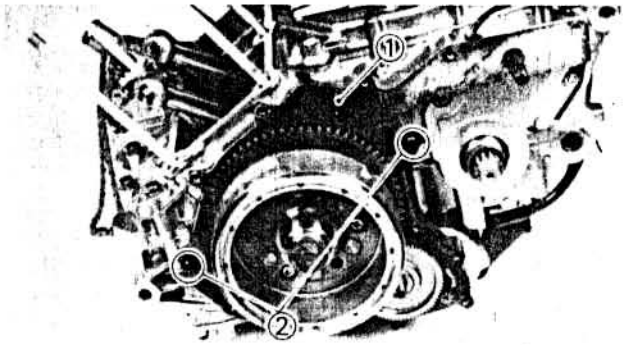
NOTE:

Loosen the bolt (rotor) while holding the rotor with the rotor holder ②.

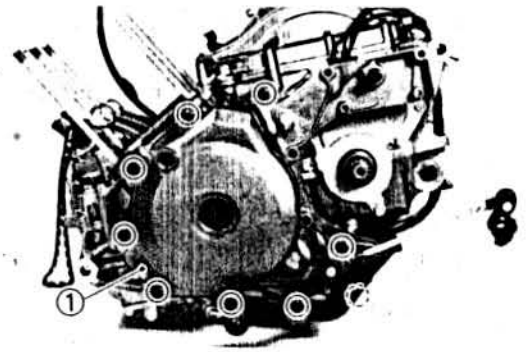
	Rotor holder: **90890-01701**

⚠CAUTION:

Do not allow the rotor holder to touch the projections ③ on the rotor.



7. Install:
   - Gasket ① (crankcase cover)
   - Dowel pins ②



8. Install:
   • Crankcase cover ① (left)

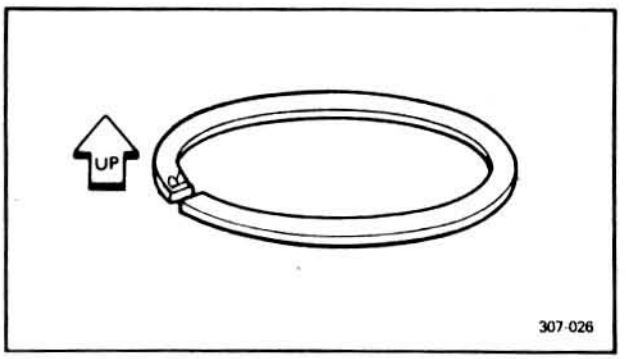
	Bolts (crankcase cover): 10 Nm (1.0 m•kg, 7.2 ft•lb)

NOTE:

Tighten the bolts (crankcase cover) in a crisscross pattern.

CYLINDER HEAD, CYLINDER AND PISTONS

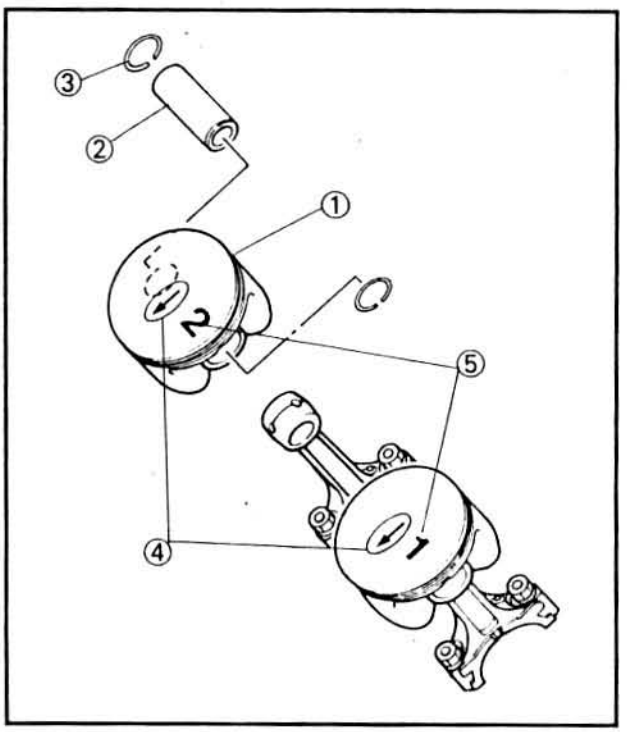
1. Apply:
   • Engine oil
   (onto piston rings and piston pins)



2. Install:
   • Piston rings

NOTE:

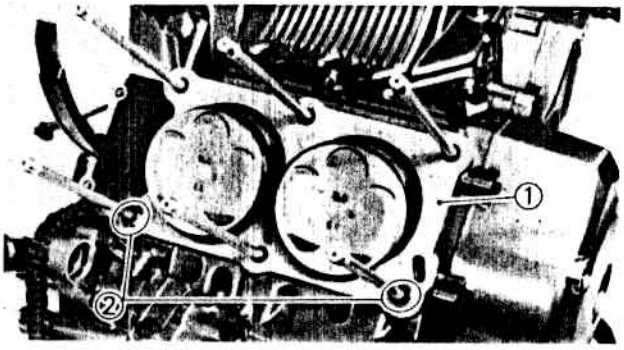
Be sure to install rings so that Manufacturer's marks or numbers are located on the top side of the rings.



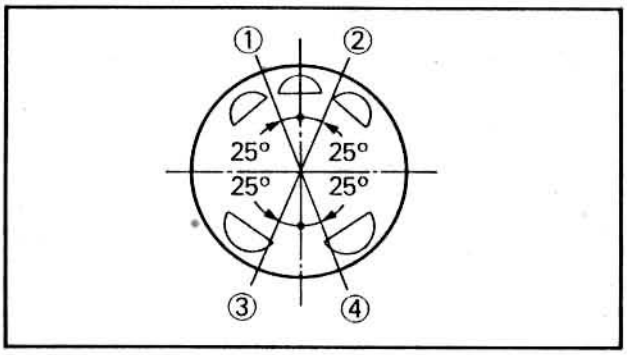
3. Install:
   • Pistons ①
   • Piston pins ②
   • Circlips ③

NOTE:

- The arrow ④ on the piston must point to the front of the engine.
- Make sure that the marked numbers ⑤ on the piston should be in sequence beginning from the left.
- Before installing the circlip, cover the crankcase with a clean towel or rag so you will not accidentally drop the pin clip and material into the crankcase.



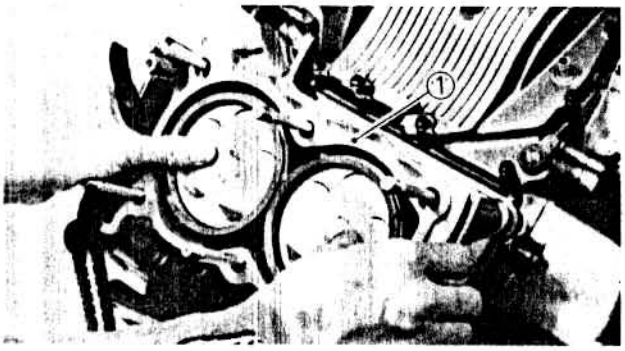
4. Install:
   - Gasket ① (cylinder)
   - Dowel pins ②



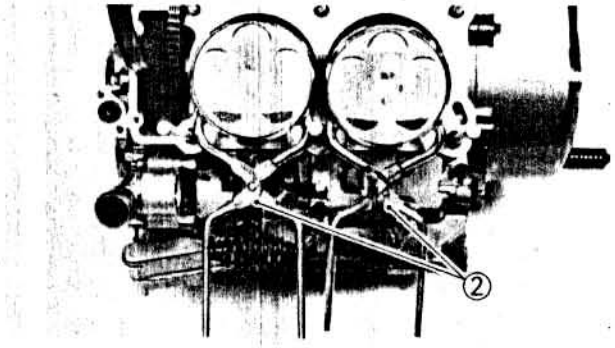
5. Position:
   - Top ring
   - 2nd ring
   - Oil ring

   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



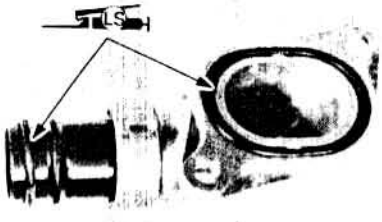
6. Install:
   - Cylinder ①



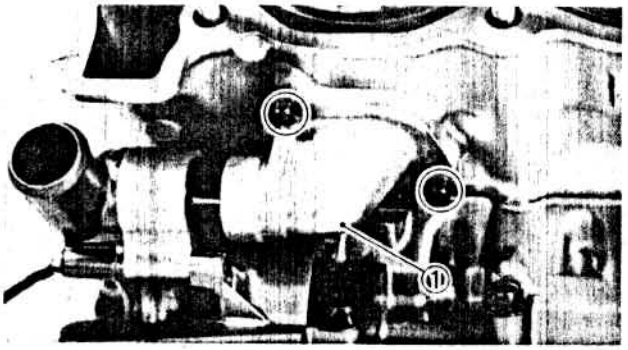
NOTE:

Install the cylinder while compressing the piston rings with the piston ring compressor ②.

	Piston ring compressor: **90890-04121**

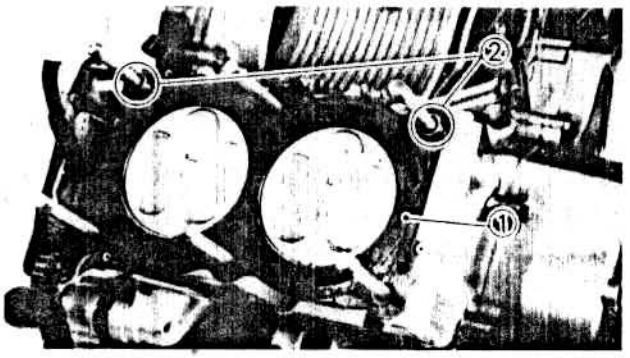


7. Apply:
   - Lithium soap base grease (onto O-rings on pipe)

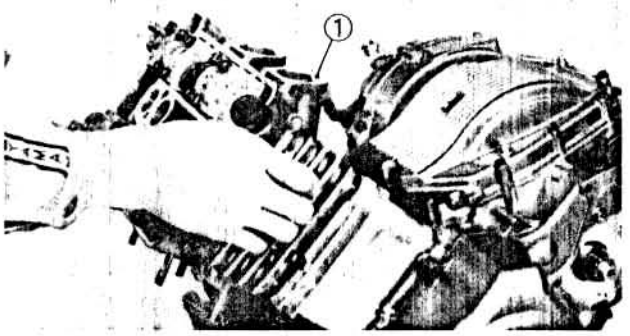


8. Install:
   - Pipe ①

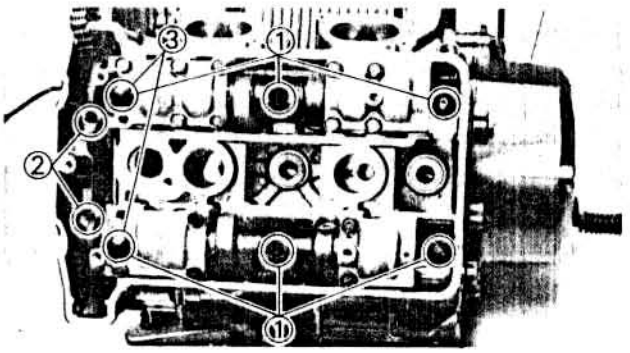
	Bolts (pipe): **10 Nm (1.0 m•kg, 7.2 ft•lb)**



9. Install:
   - Gasket ① (cylinder head)
   - Dowel pins ②



10. Install:
    - Cylinder head ①

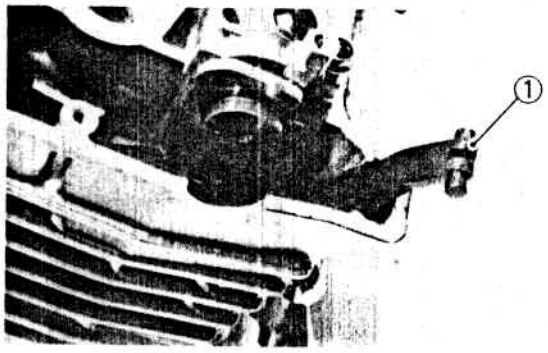


11. Install:
    - Nuts ①
    - Bolts ②
    - Plugs ③

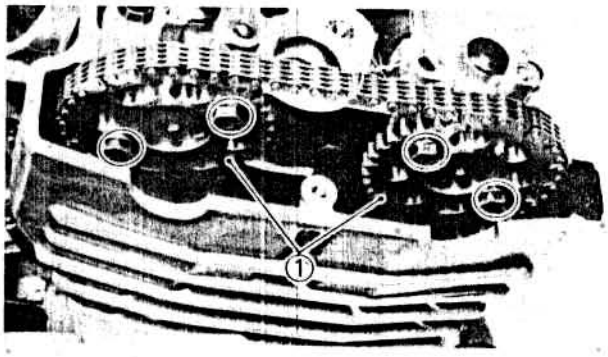
	Nuts: **40 Nm (4.0 m•kg, 29 ft•lb)** **Bolts:** **10 Nm (1.0 m•kg, 7.2 ft•lb)**

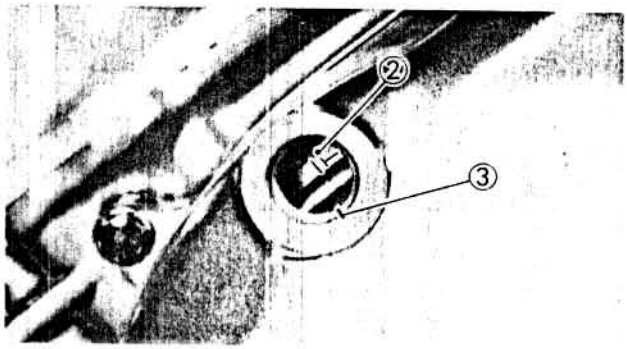
NOTE:

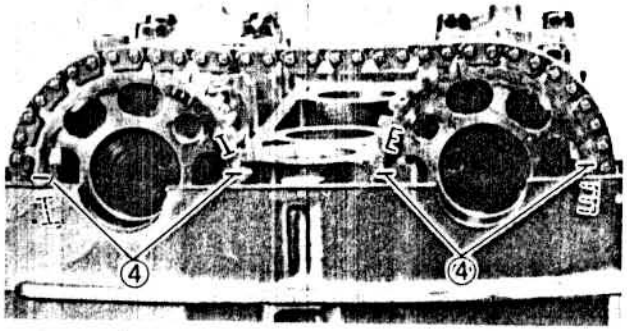
- Apply the engine oil onto the nut threads.
- Tighten the nuts in a crisscross pattern.

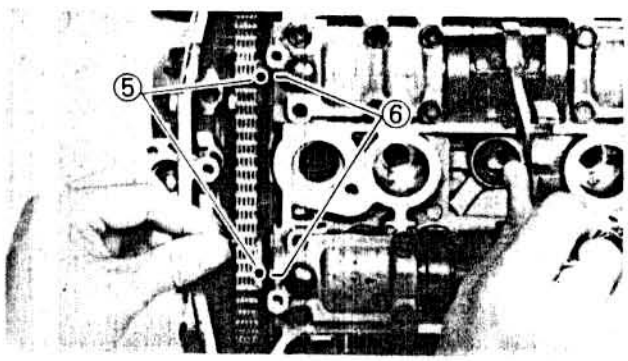


12. Install:
    - Chain guide ① (exhaust)









13. Install:
    - Cam sprockets ①

Installing steps:
- Turn the crankshaft counterclockwise until the TDC mark ② is aligned with the stationary pointer ③.
- Fit the timing chain onto both cam sprockets and install the cam sprockets on the camshafts.

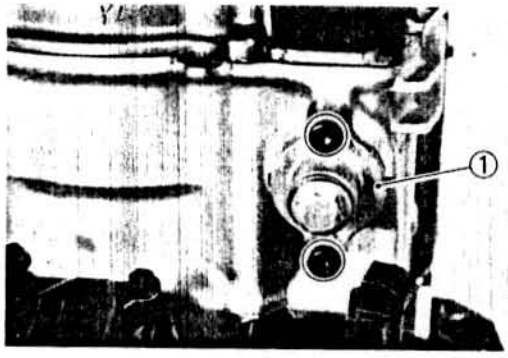
NOTE:

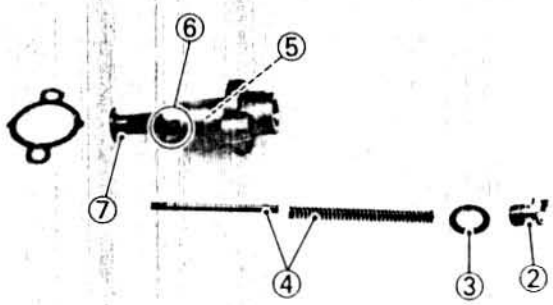
When installing the cam sprockets, start with the exhaust camshaft to keep the timing chain as tense as possible on the exhaust side, and set the respective match marks ④ to be parallel with the case surface on the corresponding sides.
"I": Intake side "E": Exhaust side.

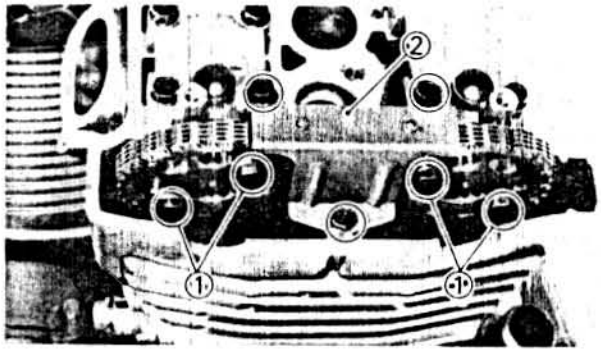
⚠CAUTION:

Do not turn the crankshaft during the camshafts installation. Damage or improper valve timing will result.

- Turn both camshafts opposite to each other until the punch mark ⑤ on the camshaft is aligned with the embossed mark ⑥ on the camshaft cap.
- While holding the camshafts, temporary tighten the bolts.







14. Install:
    - Chain tensioner ①

Installing steps:
- Remove the cap bolt ②, washer ③, springs ④ and collar ⑤.
- Release the ratchet ⑥ and push the tension rod ⑦.

- Install the chain tensioner with the ratchet end facing downward.
- Tighten the bolts.

Bolts (chain tensioner):
10 Nm (1.0 m•kg, 7.2 ft•lb)

- Install the collar ⑤, springs ④, washer ③ and cap bolt ②.

Cap bolt (timing chain tensioner):
20 Nm (2.0 m•kg, 14 ft•lb)

15. Tighten:
    - Bolts ① (cam sprockets)

Bolts (cam sprockets):
24 Nm (2.4 m•kg, 17 ft•lb)

16. Install:
    - Chain guide ② (upper)

Bolts (chain guide):
10 Nm (1.0 m•kg, 7.2 ft•lb)

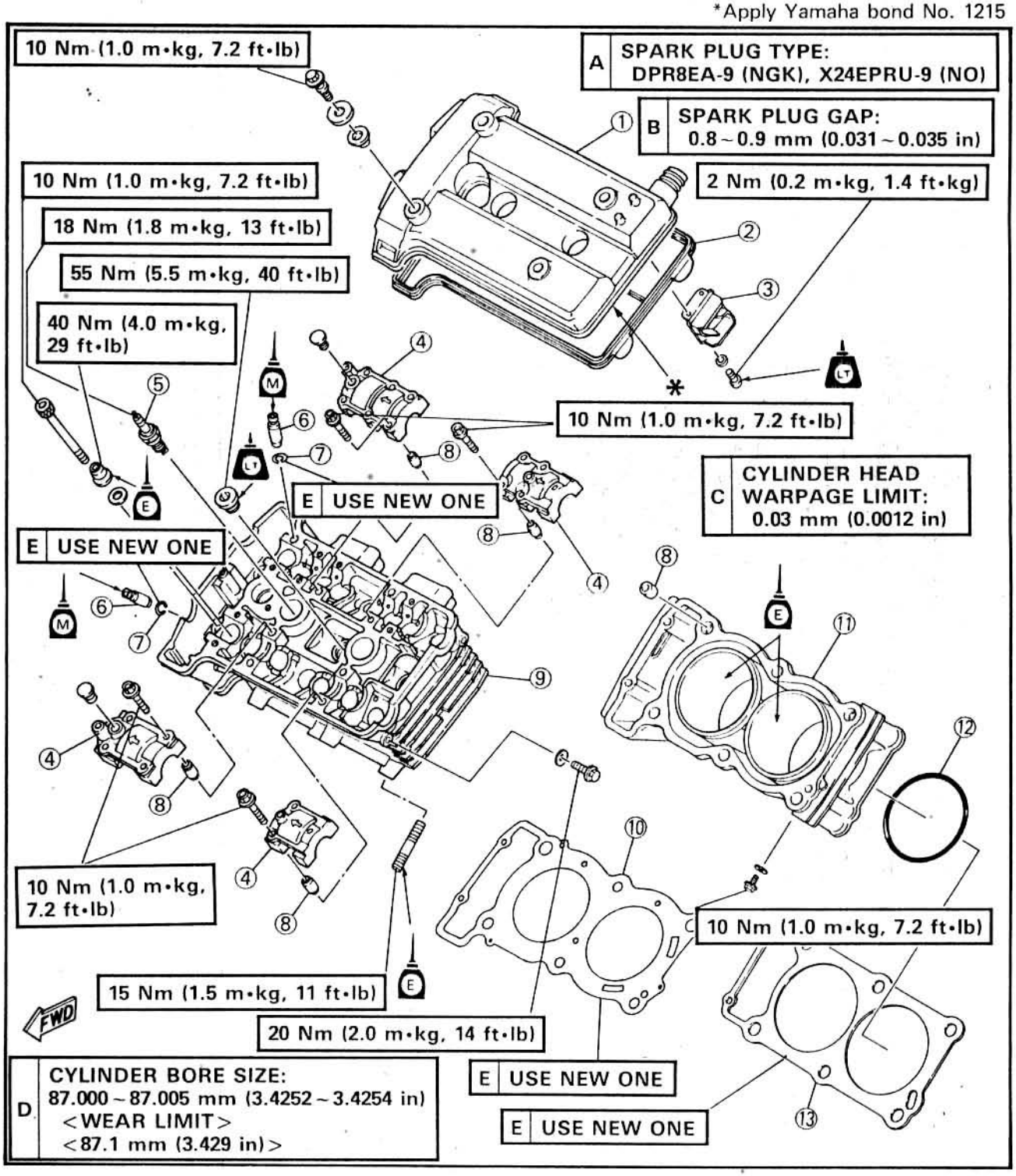
17. Check:
    - Valve timing
      Out of alignment → Adjust.
      Refer to above steps 13 ~ 16.

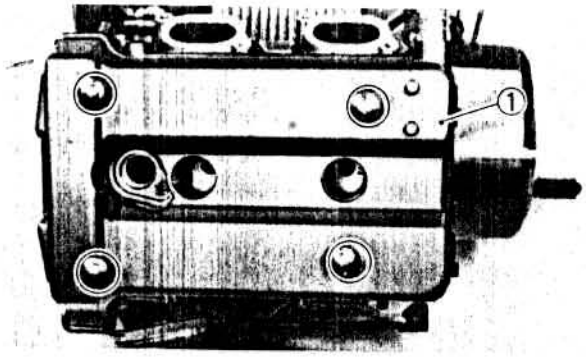
18. Check:
    - Valve clearance
      Out of specification → Adjust.
      Refer to "VALVE CLEARANCE ADJUSTMENT" section in the CHAPTER 3.

Intake valve (cold):
0.15 ~ 0.20 mm
(0.006 ~ 0.008 in)
Exhaust valve (cold):
0.25 ~ 0.30 mm
(0.010 ~ 0.012 in)

CYLINDER HEAD AND CYLINDER

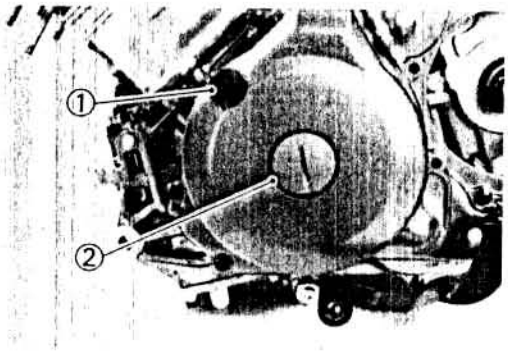
① Cylinder head cover
② Gasket
③ Breather
④ Camshaft cap
⑤ Spark plug
⑥ Valve guide
⑦ Circlip
⑧ Dowel pin
⑨ Cylinder head
⑩ Gasket
⑪ Cylinder
⑫ O-ring
⑬ Gasket



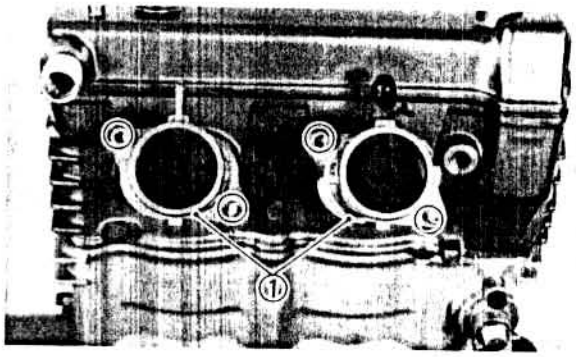


19. Install:
    - Cylinder head cover ①

	Bolts (cylinder head) **10 Nm (1.0 m·kg, 7.2 ft·lb)**

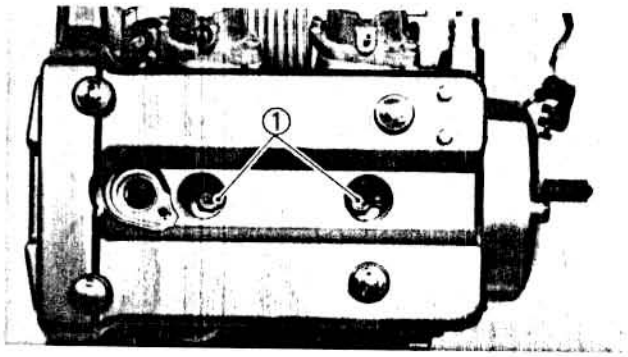


20. Install:
    - Timing plug ①
    - Plug ②



21. Install:
    - Intake manifolds ①

	Bolts (intake manifolds): **10 Nm (1.0 m·kg, 7.2 ft·lb)**

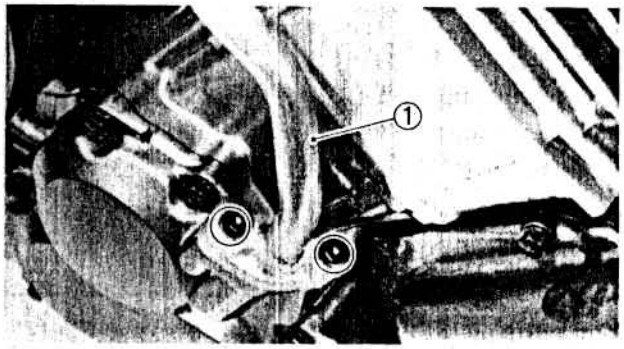


22. Install:
    - Spark plugs ①

	Spark plugs: **18 Nm (1.8 m·kg, 13 ft·lb)**

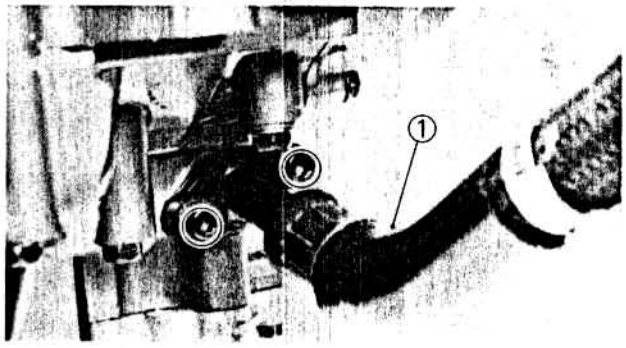
PIPES AND HOSES

1. Apply:
    - Lithium soap base grease
      (onto O-rings on oil pipes)



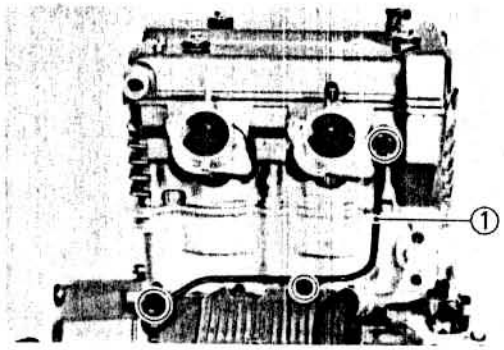
2. Install:
   • Oil hose ①

	Bolts (oil hose): **10 Nm (1.0 m•kg, 7.2 ft•lb)**



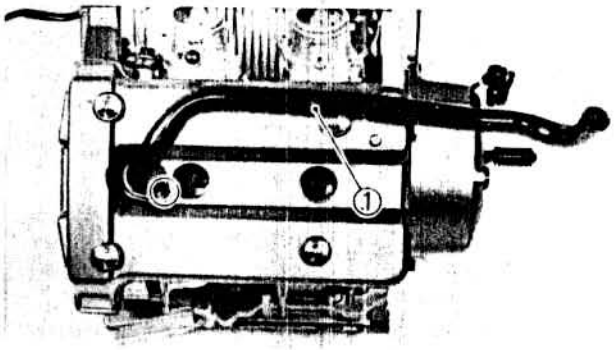
3. Install:
   • Oil hose ①

	Bolts (oil hose): **10 Nm (1.0 m•kg, 7.2 ft•lb)**



4. Install:
   • Oil pipe ①

	Union bolts: **21 Nm (2.1 m•kg, 15 ft•lb)** **Bolt:** **10 Nm (1.0 m•kg, 7.2 ft•lb)**

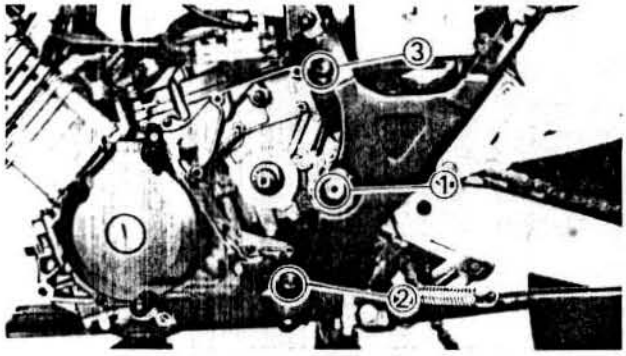


5. Install:
   • Coolant pipe ①

	Bolt (coolant pipe): **10 Nm (1.0 m•kg, 7.2 ft•lb)**

REMOUNTING ENGINE

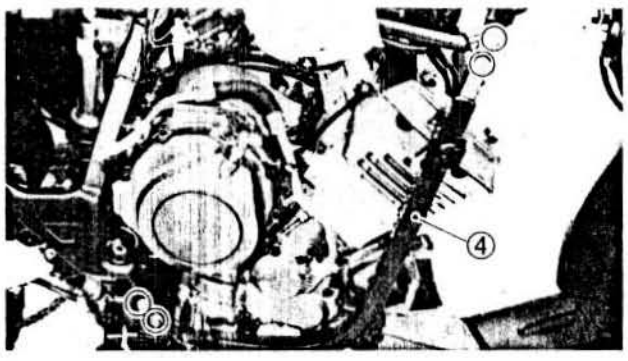
When remounting the engine, reverse the removal procedure. Note the following points.

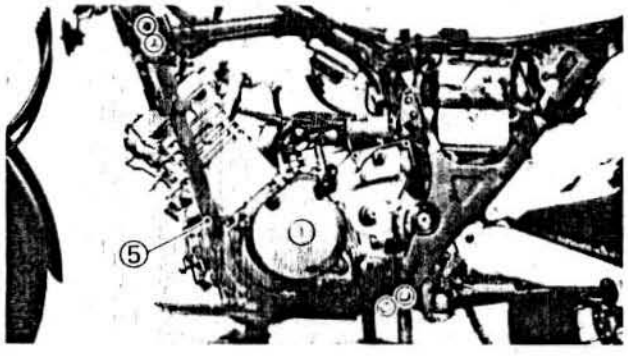


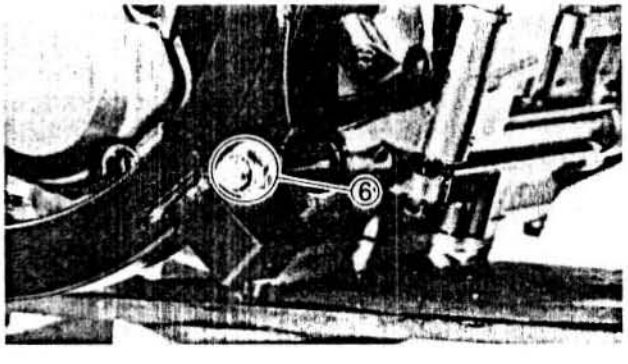
1. Install:
   - Pivot shaft ①
   - Mounting bolt ② (rear—lower)
   - Mounting bolt ③ (rear—upper)
   - Down tube ④ (right)
   - Down tube ⑤ (left)
   - Mounting bolt ⑥ (front—lower)

NOTE:

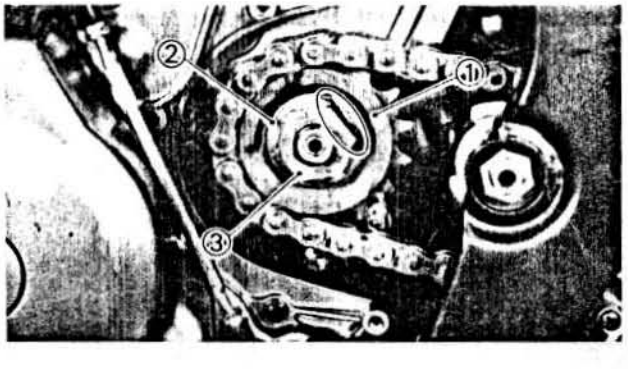
Install the all bolts and nuts first, and then tighten the bolts and nuts to specifications.







	Nut (pivot shaft): **90 Nm (9.0 m•kg, 65 ft•lb)** **Nuts (mounting bolts)** **58 Nm (5.8 m•kg, 42 ft•lb)** **Bolts/Nuts (down tubes):** **32 Nm (3.2 m•kg, 23 ft•lb)**



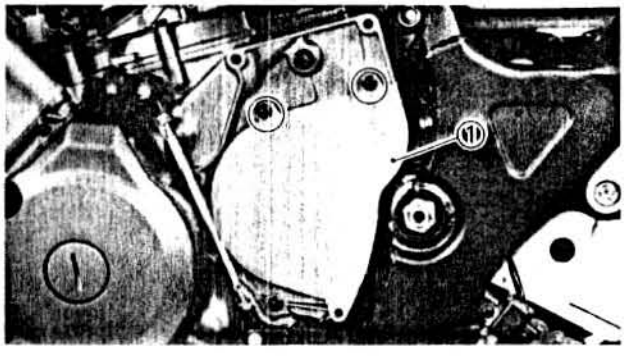
4. Install:
   - Drive sprocket ①
   - Lock washer ②
   - Nut ③

	Nut: **70 Nm (7.0 m•kg, 50 ft•lb)**

5. Bend:
   - Lock washer tab (along nut flat)

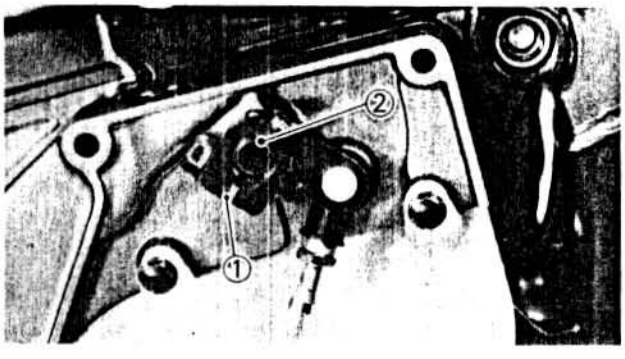
6. Adjust:
   • Drive chain slack
   Refer to the "DRIVE CHAIN SLACK ADJUSTMENT" section in the CHAPTER 3.

	Drive chain slack: **25 ~ 35 mm (1.0 ~ 1.4 in)**



7. Install:
   • Sprocket cover ①

	Bolts (sprocket cover): **5 Nm (0.5 m•kg, 3.6 ft•lb)**

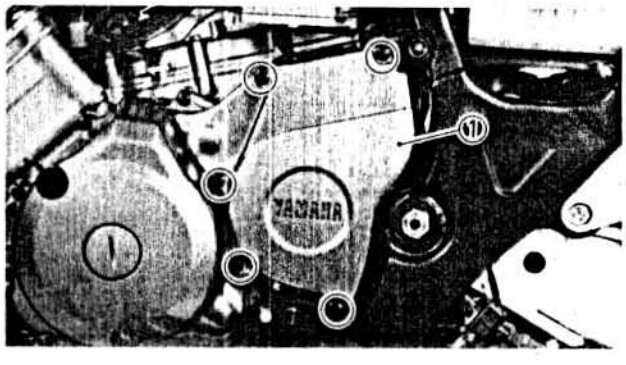


8. Connect:
   • Shift rod
   (to shift shaft)

	Bolt (shift rod): **12 Nm (1.2 m•kg, 8.7 ft•lb)**

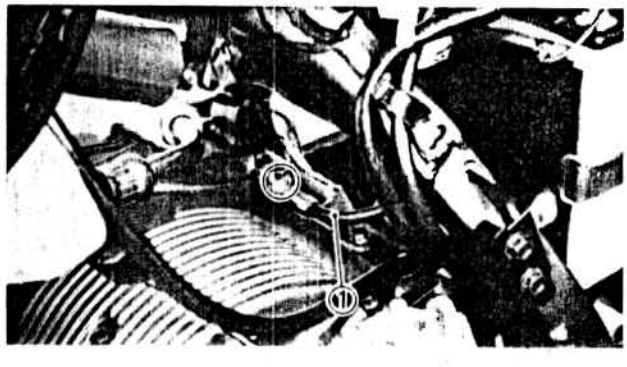
NOTE:

Align the opening ① of the shift rod with the punch mark ② on the shift shaft.



9. Install:
   • Cover ①

	Bolts (cover): **5 Nm (0.5 m•kg, 3.6 ft•lb)**

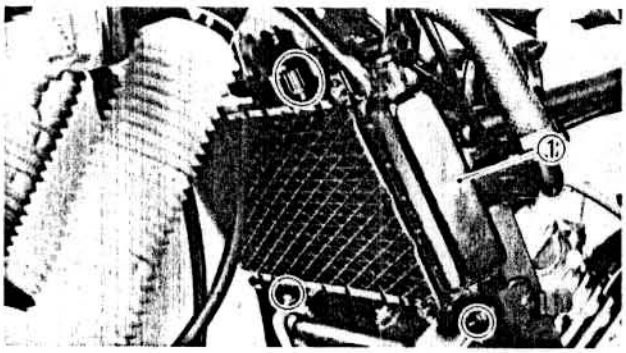


10. Connect:
    • Ground lead ①

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

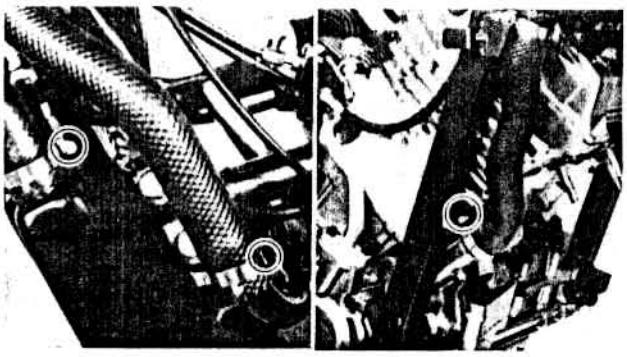
11. Adjust:
    • Clutch cable free play
    Refer to the "CLUTCH ADJUSTMENT" section in the CHAPTER 3.

Free play:
10 ~ 15 mm (0.4 ~ 0.6 in)
at clutch lever end.



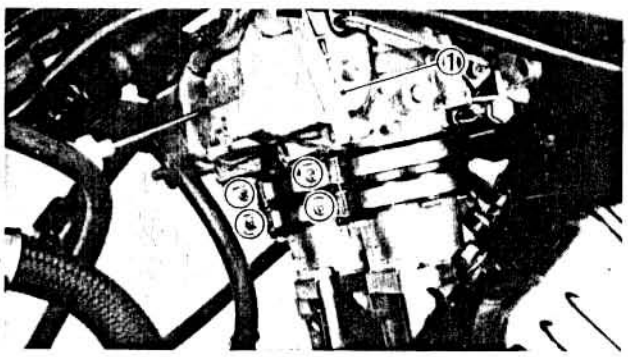
12. Install:
    • Radiator (1)

Bolts (radiator):
7 Nm (0.7 m•kg, 5.1 ft•lb)



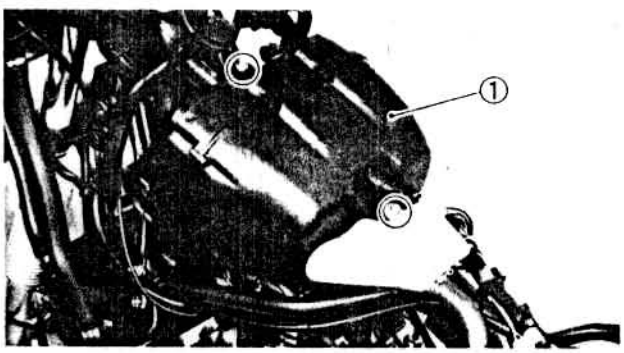
13. Tighten:
    • Screws (hose clamps)

Screws (hose clamps):
2 Nm (0.2 m•kg, 1.4 ft•lb)



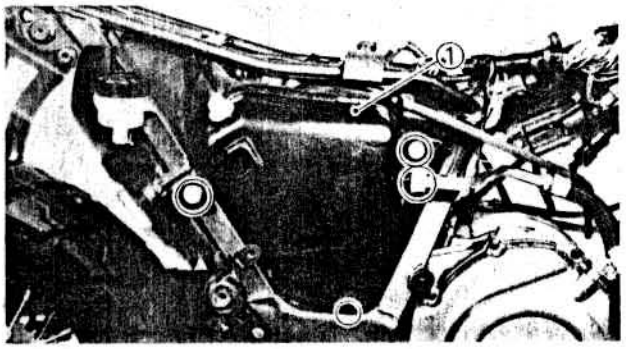
14. Connect:
    • Carburetors (1)

Screws (carburetor joint clamps):
2 Nm (0.2 m•kg, 1.4 ft•lb)



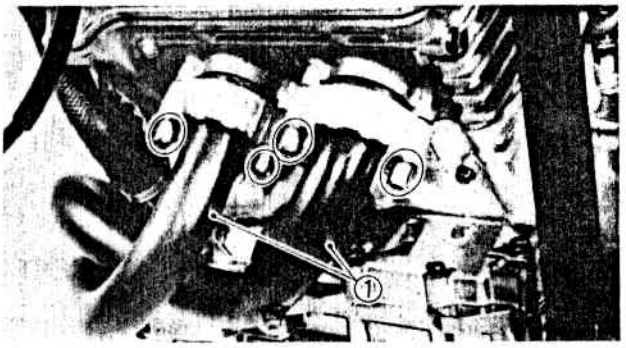
15. Install:
    • Air filter case (1)

Bolt (airfilter case):
7 Nm (0.7 m•kg, 5.1 ft•lb)
Screws (carburetor joint clamps):
2 Nm (0.2 m•kg, 1.4 ft•lb)



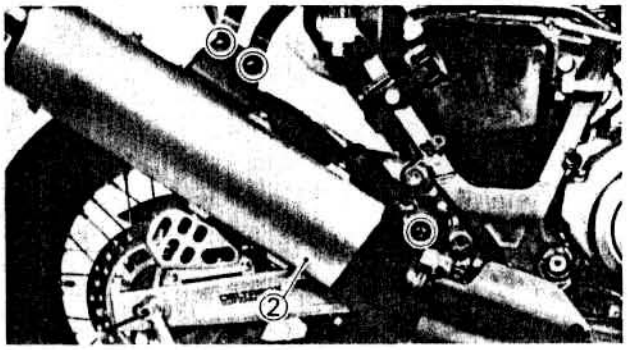
16. Install:
    - Oil tank ①

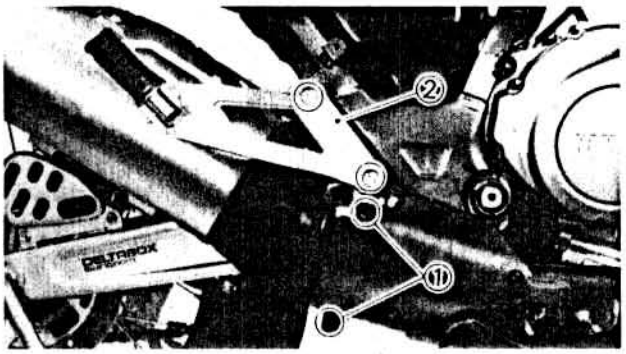
	Bolts (oil tank): **7 Nm (0.7 m•kg, 5.1 ft•lb)** **Screw (hose clamp):** **2 Nm (0.2 m•kg, 1.4 ft•lb)**



17. Install:
    - Exhaust pipes ①
    - Muffler ②

	Nuts (exhaust pipes): **20 Nm (2.0 m•kg, 14 ft•lb)** **Bolts (muffler):** **24 Nm (2.4 m•kg, 17 ft•lb)**



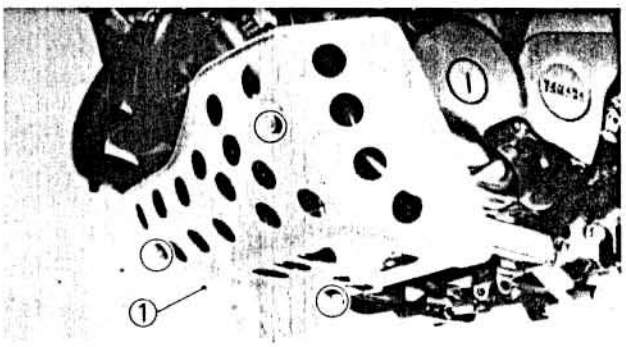


18. Tighten:
    - Bolt ① (clamp)

	Bolt (clamp): **20 Nm (2.0 m•kg, 14 ft•lb)**

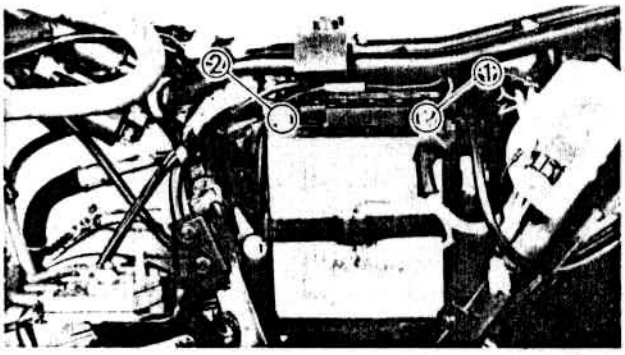
19. Install:
    - Footrest ②

	Bolts (footrest): **20 Nm (2.0 m•kg, 14 ft•lb)**



20. Install:
    - Engine guard ①

	Bolts (engine guard): **7 Nm (0.7 m•kg, 5.1 ft•lb)**



21. Connect:
    - Battery leads

⚠CAUTION:

Connect the positive lead ① first and then connect the negative lead ②.

22. Fill:
    - Radiator
    - Recovery tank

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

    - Oil tank

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

23. Install:
    - Fuel tank
    - Side cowlings
    - Seat
    - Side covers

    Refer to the "SEAT, FUEL TANK AND COVER" section in the CHAPTER 3.

CHAPTER 5.
COOLING SYSTEM

RADIATOR 5-1
REMOVAL 5-1
INSPECTION 5-1
ASSEMBLY 5-2

WATER PUMP 5-4
DISASSEMBLY 5-4
INSPECTION 5-5
ASSEMBLY 5-5

THERMOSTAT 5-6
REMOVAL 5-6
INSPECTION 5-6
ASSEMBLY 5-7

COOLING SYSTEM

RADIATOR

⚠WARNING:

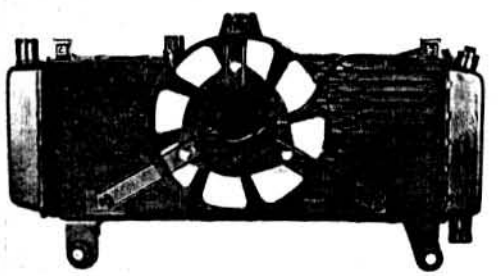
Do not remove the radiator cap when the engine and radiator are hot. Scalding hot fluid and steam may be blown out under pressure, which could cause serious injury. When the engine has cooled, open the radiator cap by the following procedure:
Place a thick rag, like a towel, over the radiator cap, slowly 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.

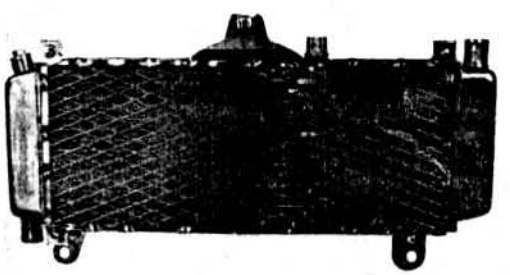
REMOVAL

1. Drain:
   - Coolant

   Refer to "CHAPTER 3. COOLANT REPLACEMENT".
2. Disconnect:
   - Fan motor coupler
3. Remove:
   - Radiator assembly

   Refer to "CHAPTER 3. VALVE CLEARANCE ADJUSTMENT".
4. Remove:
   - Fan motor assembly
   - Radiator grille



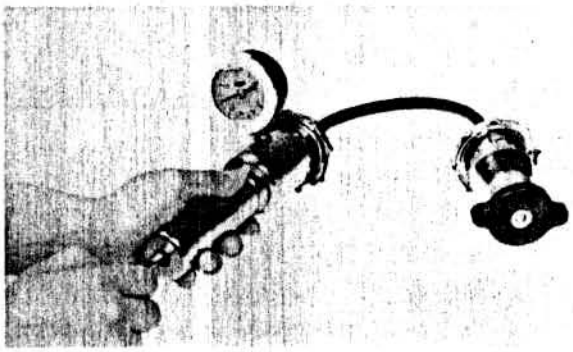


INSPECTION

1. Inspect:
   - Radiator

   Obstruction → Blow out with compressed air through rear of radiator.
   Flattened fins → Repair.
   - Coolant hoses

   Cracks/Damage → Replace.



2. Inspect:
   - Radiator cap
   - Vacuum valve

Inspection steps:
- Measure radiator cap pressure using the radiator cap tester.
- Check vacuum valve for spring tension and seating condition.

Radiator cap tester:
P/N 90890-01325

Valve opens at pressure below specified value or defective → Replace.

Valve opening pressure:
74 ~ 103 KPa
(0.75 ~ 1.05 kg/cm^2,
10.7 ~ 14.9 psi)

ASSEMBLY

1 Install:
   - Radiator assembly

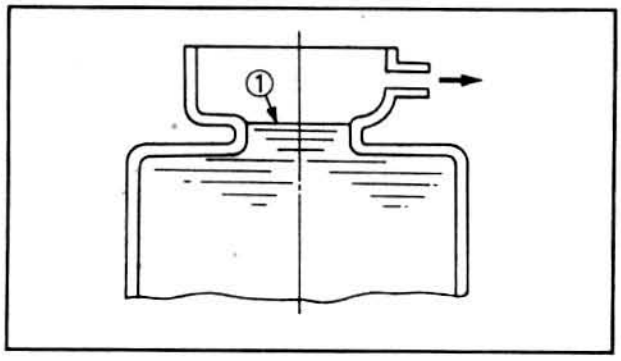
Bolts (radiator):
7 Nm (0.7 m•kg, 5.1 ft•lb)

2. Connect:
   - Fan motor coupler
   - Hose (radiator — inlet)
   - Hose (radiator — outlet)
3. Tighten:
   - Drain bolts

Drain bolts:
10 Nm (1.0 m•kg, 7.2 ft•lb)

NOTE:

Replace with new copper gaskets.



4. Fill:
   • Cooling system

Coolant filling steps:
- Fill the coolant into the radiator until the radiator is full.
- Start the engine (coolant level decreases.)

⚠CAUTION:

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

- Add the coolant while engine is running.
- Stop the engine when coolant level stabilizes.
- Add the coolant again to specified level (1).
- Install the radiator cap.

Recommended coolant:
High quality ethylene glycol anti-freeze containing anti-corrosion for aluminum engine inhibitors
Coolant and water mixed ratio:
50%/50%
Total amount:
1.7 L (1.5 Imp qt, 1.8 US qt)
Reservoir tank capacity:
0.45 L (0.40 Imp qt, 0.48 US qt)
From "LOW" to "FULL" level:
0.15 L (0.13 Imp qt, 0.16 US qt)

⚠CAUTION:

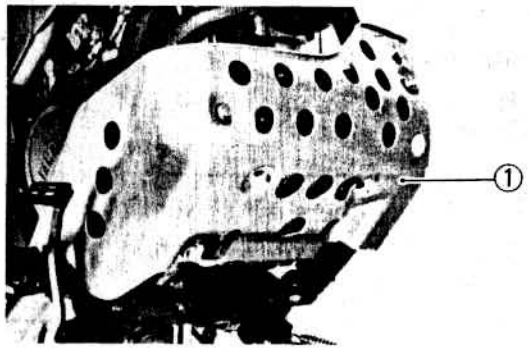
- **Hard water or salt water is harmful to the engine. You may use distilled water if you can't get soft water.**
- **Do not mix more than one type of ethlen glycol anti-freeze containing corrosion for aluminum engine inhabitors.**



5. Inspect:
   • Cooling system

Inspection steps:
- Connect radiator cap tester.
- Apply 1.0 kg/cm^2 (14 lb/in^2) pressure.
- Measure pressure with gauge.
  Decrease of pressure (leaks)→Repair as required.

Radiator cap tester:
P/N 90890-01325

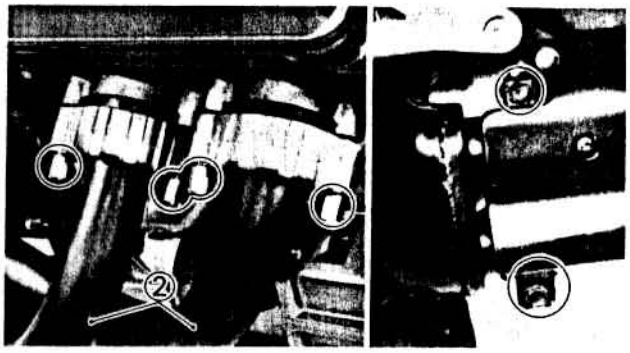


WATER PUMP

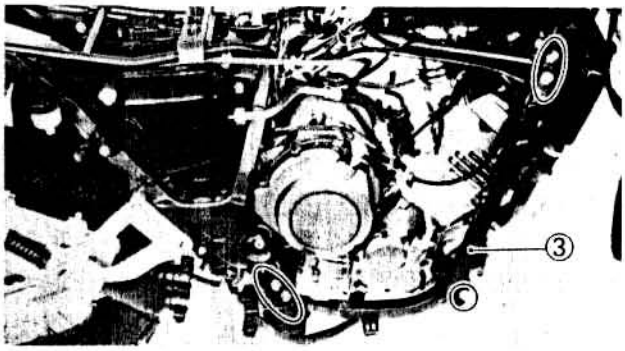
DISASSEMBLY

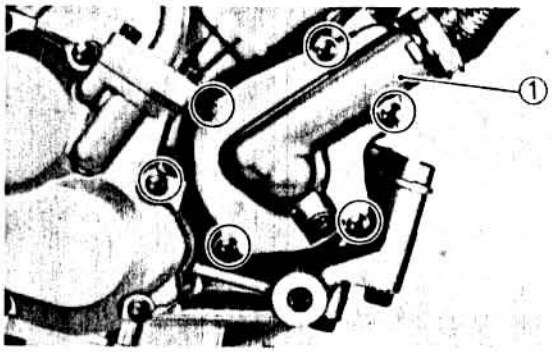
NOTE:

Be sure to drain the coolant before disassembly of the cooling system components.

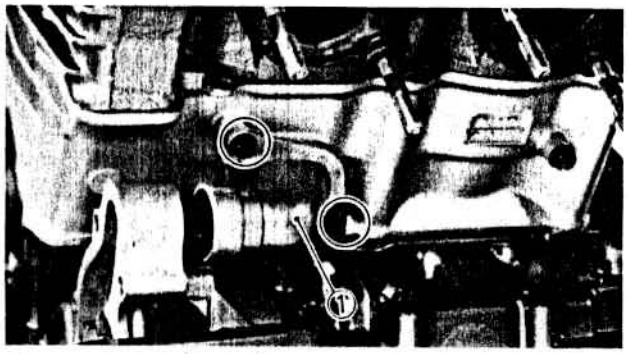


1. Remove:
   - Engine guard ①
   - Exhaust pipe ②
   - Down tube (right) ③

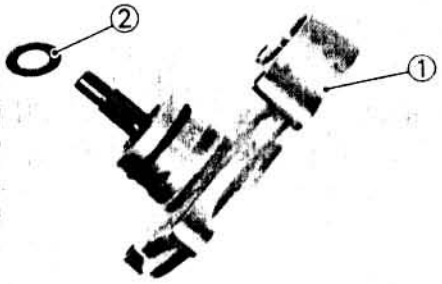




2. Remove:
   - Cover (water pump) ①



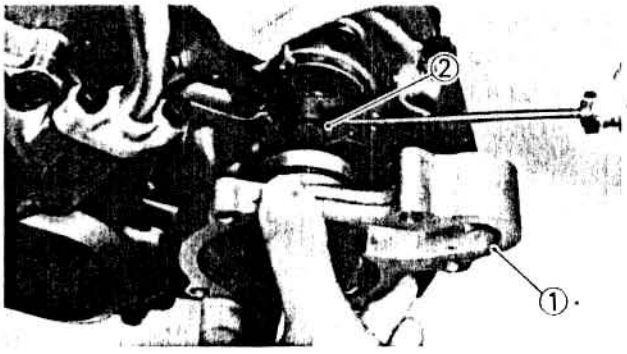
3. Remove:
   - Joint pipe ①



4. Remove:
   - Water pump housing ①
   - O-ring
   - Plain washer ②

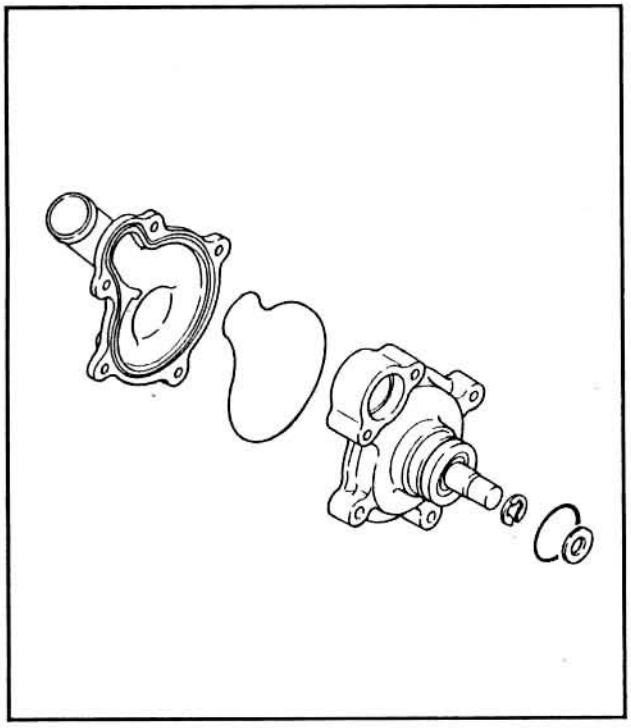
NOTE:

Put the washer on the shaft so that it may not drop into the crankcase, while remoring the water pump housing.



5. Eliminate:
   - Deposits

   From the impeller and water pump housing.



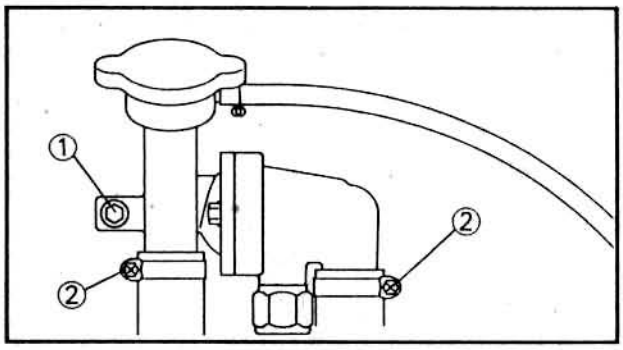
INSPECTION

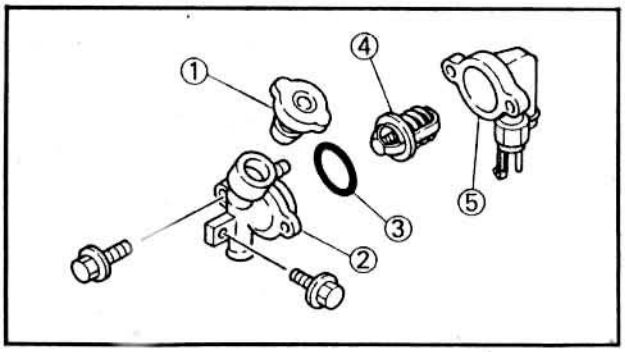
1. Inspect:
   - O-rings
   - Water pump housing
   - Plane washer
   - Joint pipe

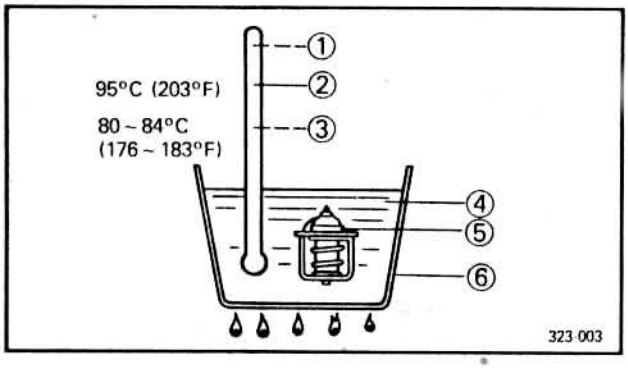
   Cracks/wear/damage→Replace.

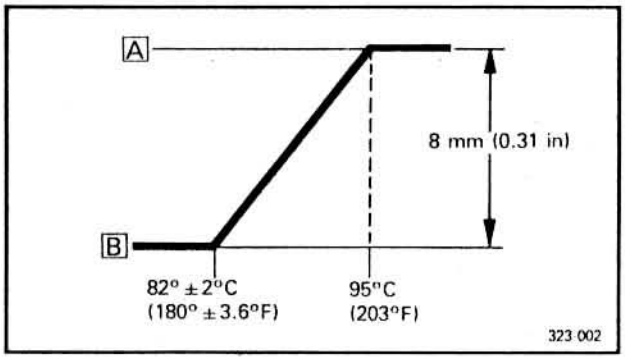
ASSEMBLY

Reverse the "DISASSEMBLY" procedure.









THERMOSTAT

REMOVAL

1. Remove:
   - Bolt (thermostat cover) ①
   - Clamp (radiator hose) ②

2. Remove:
   - Radiator cap ①
   - Thermostat cover ②
   - O-ring ③
   - Thermostat ④
   - Thermostat housing ⑤

INSPECTION

1. Inspect:
   - Thermostat ⑤
     Valve does not open at 80 ~ 84°C (176 ~ 183°F) → Replace.

Inspection steps:
- Suspend thermostat 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 Thermostat
⑥ Vessel
[A] OPEN
[B] CLOSE

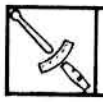
NOTE:

Thermostat is sealed and its setting is specialized work. If its accuracy is in doubt, replace it. A faulty unit could cause serious overheating or overcooling.

2. Inspect:
   - O-ring
     Wear/damage → Replace.

ASSEMBLY

1. Install:
   - Thermostat
   - Thermostat cover



Bolts (thermostat cover):
10 Nm (1.0 m•kg, 7.2 ft•lb)

CHAPTER 6.
CARBURETION

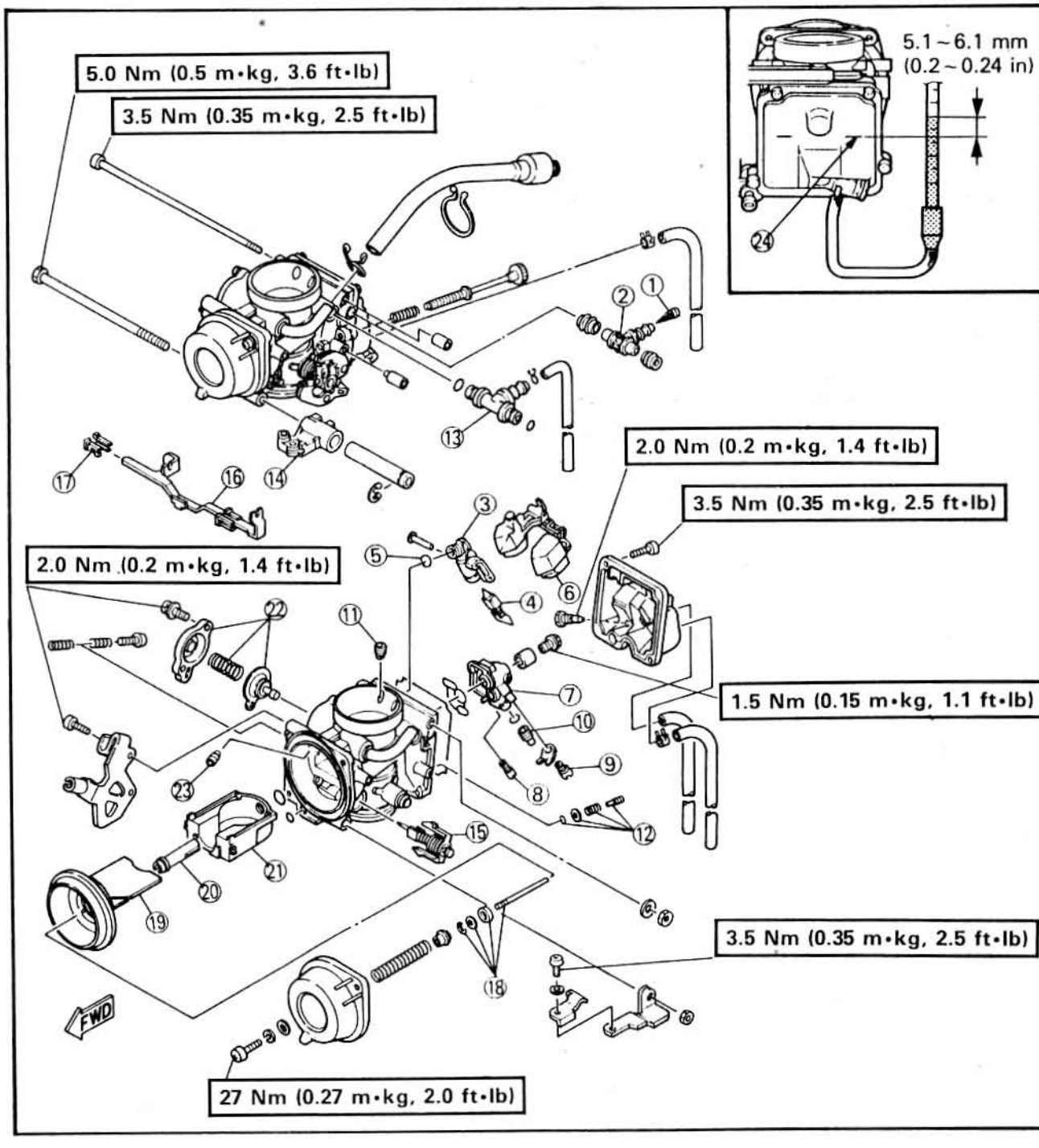
CARBURETOR 6-1
SECTION VIEW 6-2
REMOVAL 6-3
DISASSEMBLY 6-4
INSPECTION 6-6
ASSEMBLY 6-7
INSTALLATION 6-10
FUEL LEVEL ADJUSTMENT 6-11

FUEL PUMP 6-12
PUMP OPERATION INSPECTION 6-12
FUEL PUMP INSPECTION 6-13
REMOVAL 6-13
INSPECTION 6-13
ASSEMBLY 6-13

CARBURETOR

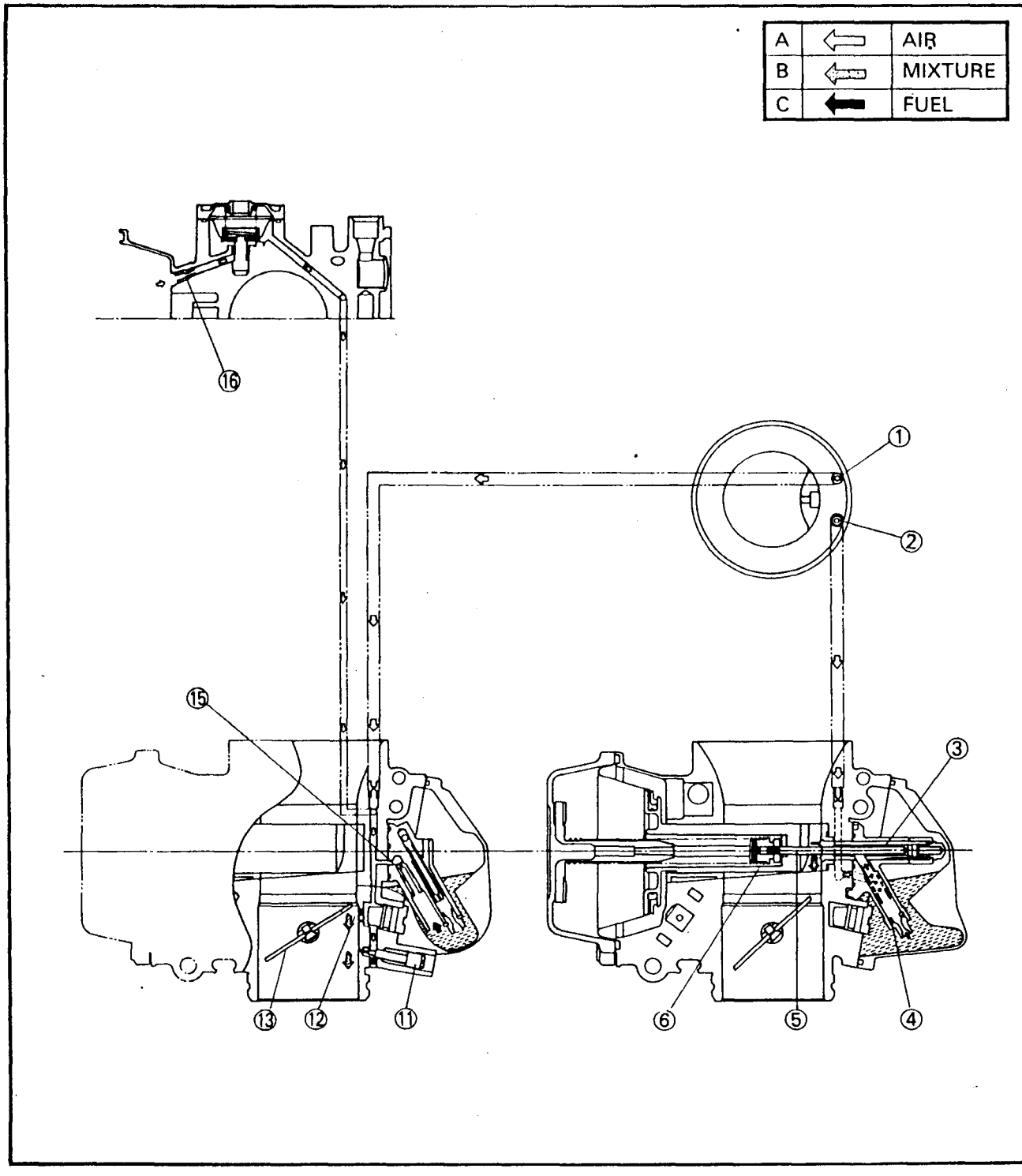
① Fuel strainer
② Joint (delivery hose)
③ Valve seat
④ Needle valve
⑤ O-ring
⑥ Floats
⑦ Jet housing
⑧ Starter jet
⑨ Main jet
⑩ Pilot jet
⑪ Pilot air jet
⑫ Pilot air screw
⑬ Joint (ventilation hose)
⑭ Joint (starter lever)
⑮ Starter plunger
⑯ Starter joint
⑰ Stopper
⑱ Jet needle set
⑲ Throttle valve
⑳ Needle jet
㉑ Throttle valve support
㉒ Coasting enricher
㉓ Pilot air jet 2
㉔ Float chamber line

SPECIFICATIONS		
ID MARK	3LD00	3TD00
MAIN JET	#142.5	#140
MAIN AIR JET	#60	←
PILOT JET	#42.5	#35
PILOT AIR JET 1	#60	←
PILOT AIR JET 2	φ1.4	←
JET NEEDLE	5C19-3	5C20-3
PILOT SCREW	2 Turns out	←
THROTTLE VALVE	#130	←
ENGINE IDLE SPEED	1,100 ~ 1,200 r/min	
FUEL LEVEL [A]	5.1 ~ 6.1 mm (0.2 ~ 0.24 in)	

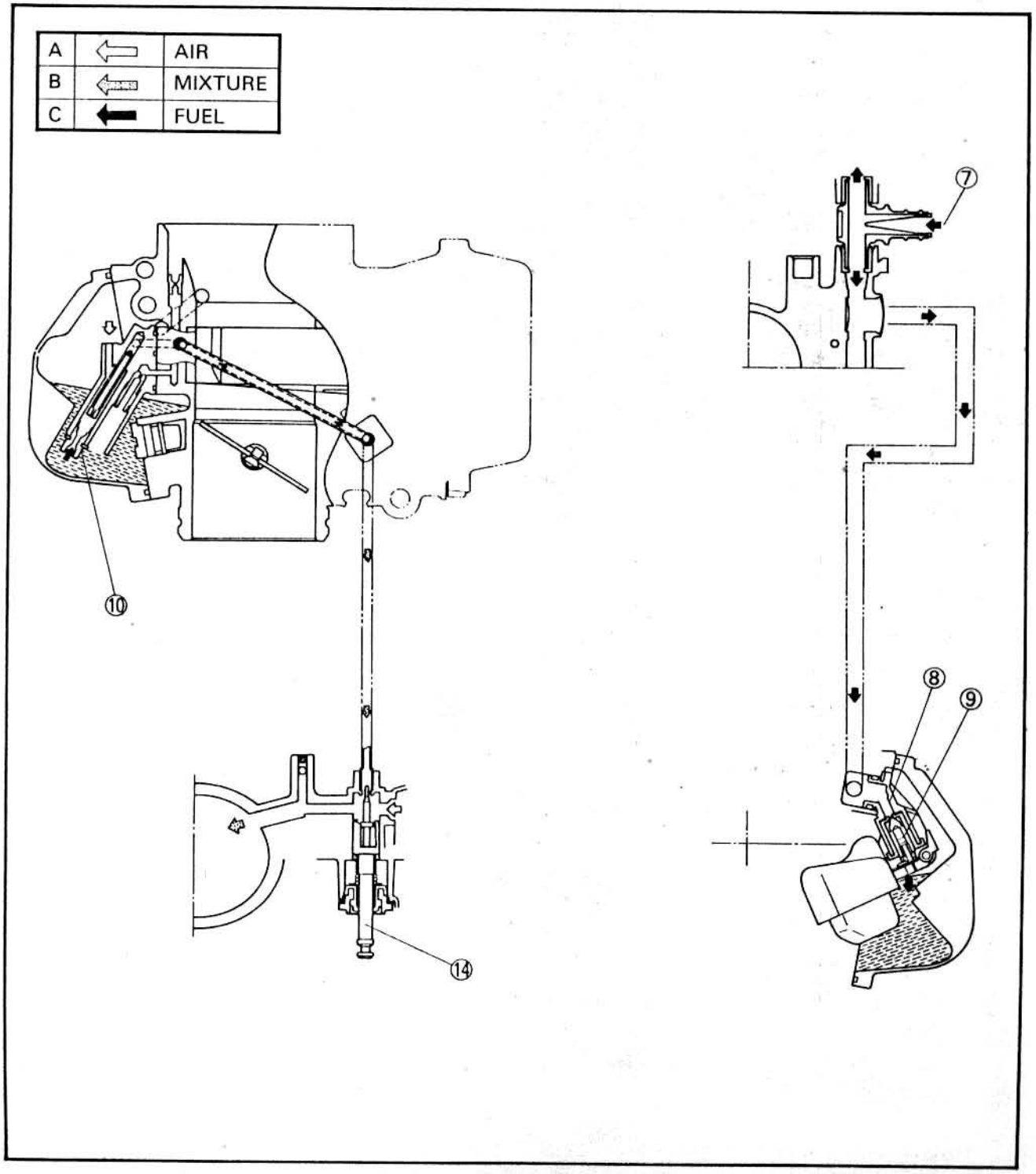


SECTION VIEW

① Pilot air jet 1
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
⑮ Pilot jet
⑯ Pilot air jet 2



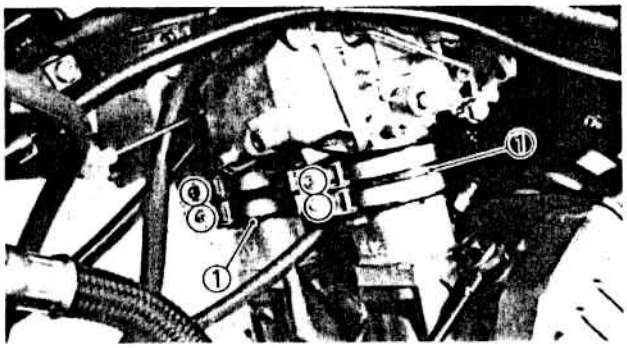
① Pilot air jet 1
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⑨ Needle valve
⑩ Starter jet
⑪ Pilot screw
⑫ By-pass hole
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⑭ Starter plunger
⑮ Pilot jet
⑯ Pilot air jet 2



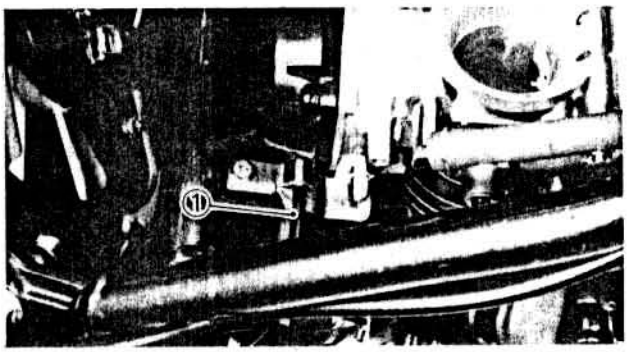
REMOVAL

1. Remove:
   - Side cowlings
   - Side covers
   - Seat
   - Fuel tank

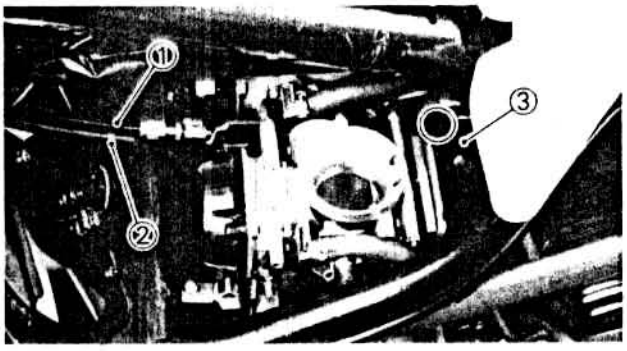
   Refer to "SEAT, FUEL TANK AND COVER" section.
   - Air filter case



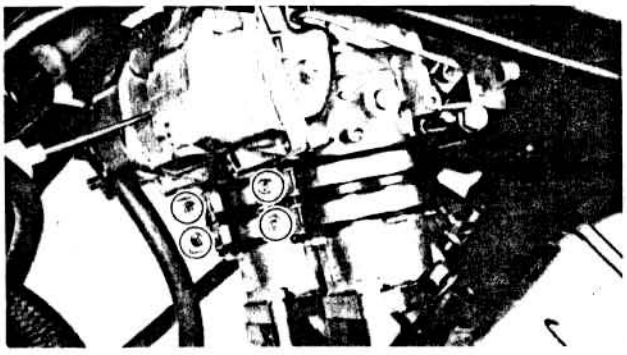
2. Loosen:
   - Screws (carburetor joint clamp — lower) ①



3. Loosen:
   - Screw (starter cable clamp)
4. Disconnect:
   - Starter cable ①



5. Disconnect:
   - Throttle cable 1 ①
   - Throttle cable 2 ②
   - Fuel hose ③

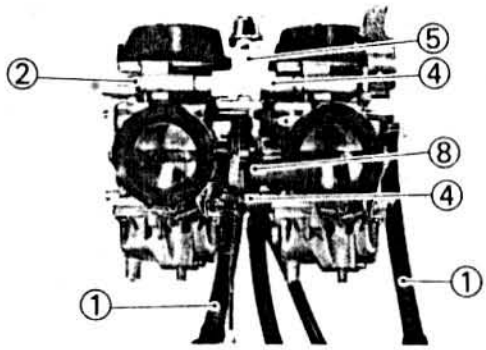


6. Remove:
   - Carburetor assembly and joints

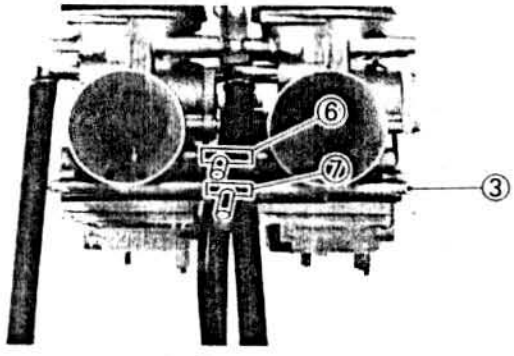
DISASSEMBLY

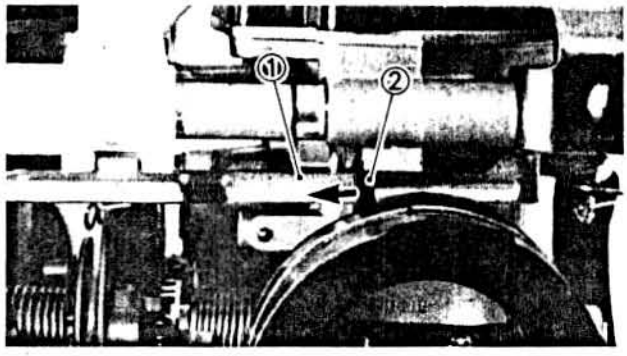
NOTE:

The following parts can be cleaned and inspected without carburetor separation.
- Throttle valve
- Piston valve
- Starter plunger
- Float chamber components



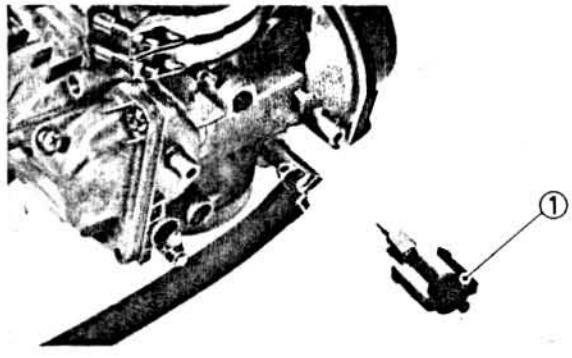
1. Disconnect:
   - Ventilation hoses (carburetor) ①
2. Remove:
   - Connecting bolt (upper) ②
   - Connecting bolt (lower) ③
   - Spacer collars ④
   - Joint (starter lever) ⑤
   - Joint (ventilation hose) ⑥ (with O-rings)
   - Joint (delivery hose) ⑦ (with gasket rings)
   - Spring ⑧





3. Remove:
   - Starter joint ①

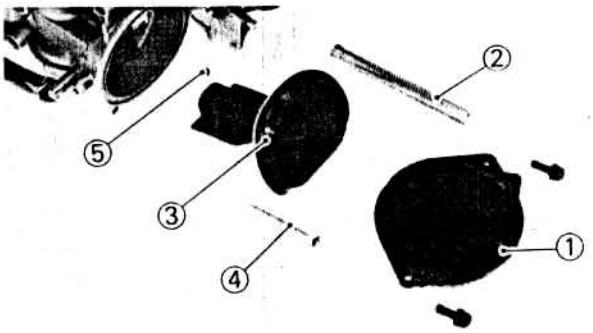
   Slide out the stoppers ② to remove the starter joint ①.



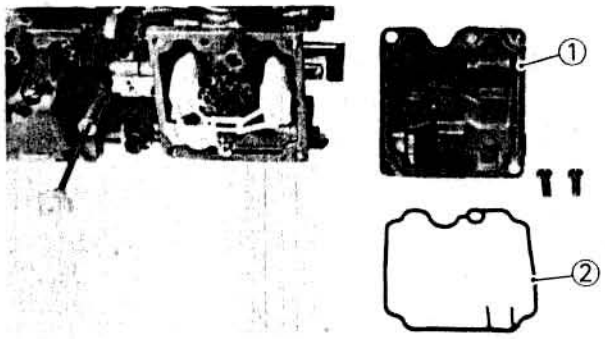
4. Remove:
   - Starter plunger ①

NOTE:

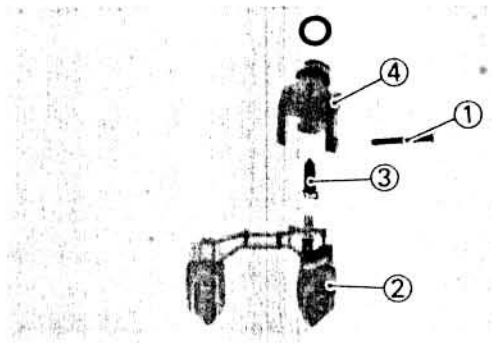
Unhook the hooks from the carburetor body and then pull out the starter plunger.



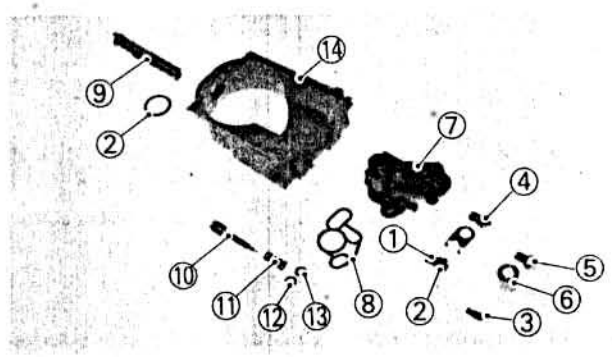
5. Remove:
   - Vacuum chamber cover ①
   - Spring ②
   - Throttle valve ③
   - Jet needle ④
   - O-ring ⑤



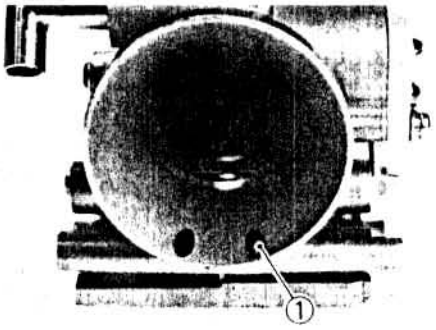
6. Remove:
   - Float chamber cover ①
   - Gasket ②



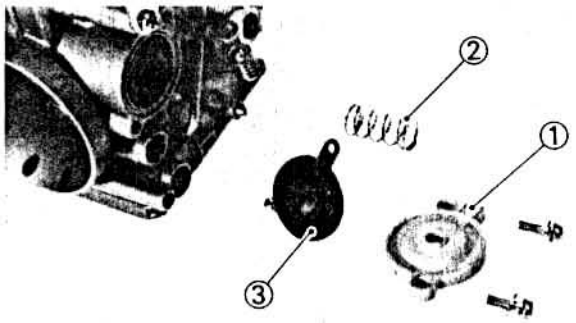
7. Remove:
   - Float pin ①
   - Float ②
   - Needle valve ③
   - Valve seat ④
   - O-ring ⑤



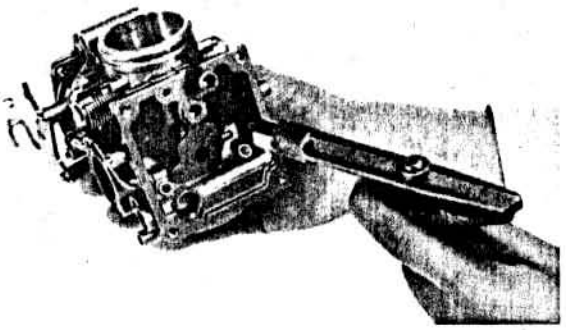
8. Remove:
   - Main jet ①
   - O-ring ②
   - Pilot jet ③
   - Starter jet ④
   - Bolt (needle jet) ⑤
   - Holder (needle jet) ⑥
   - Jet housing ⑦
   - Gasket ⑧
   - Needle jet ⑨
   - Pilot air screw ⑩
   - Spring ⑪
   - Washer ⑫
   - O-ring ⑬
   - Throttle valve support ⑭



9. Remove:
   - Pilot air jet ①



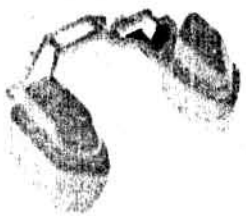
10. Remove:
    - Diaphragm cover ①
    - Spring ②
    - Diaphragm ③



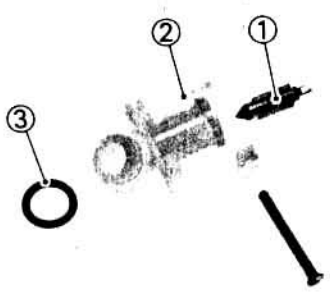
INSPECTION

1. Inspect:
   - Carburetor body
   - Float chamber
   - Jet housing
     Cracks/Damage → Replace.
   - Fuel passage
     Contamination → Clean as indicated.

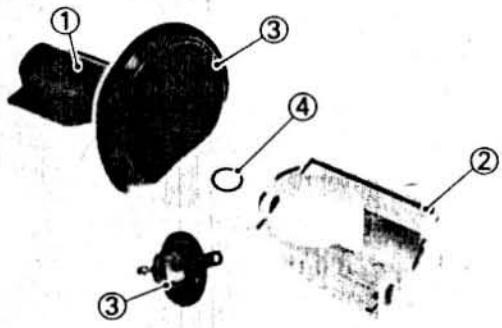
Cleaning steps:
- Wash carburetor in petroleum based solvent. (Do not use any caustic carburetor cleaning solution.)
- Blow out all passages and jets with compressed air.



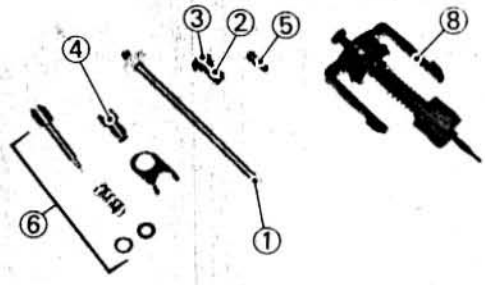
2. Inspect:
   - Floats
     Damage → Replace.



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.

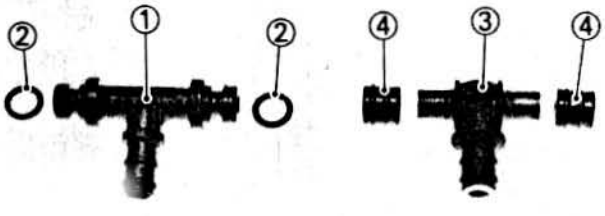




5. Inspect:
   - Jet needle ①
   - Main jet ②
   - O-ring ③
   - Starter jet ④
   - Pilot jet ⑤
   - Pilot air screw set ⑥
   - Pilot air jet ⑦
   - Starter plunger ⑧
     Bends/Wear/Damage→Replace.
     Contamination→Blow out jets with compressed air.



6. Check:
   - Free movement
     Insert the throttle valve into the carburetor body, and check for free movement.
     Stick→Replace.



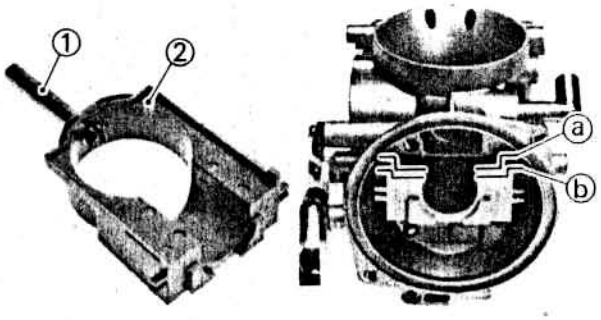
7. Inspect:
   - Joint (ventilation hose) ①
   - O-rings ②
   - Joint (delivery hose) ③
   - Gasket rings ④
     Damage/Wear/Contamination→Replace.

ASSEMBLY

Reverse the "DISASSEMBLY" procedures.
Note the following points.

⚠CAUTION:

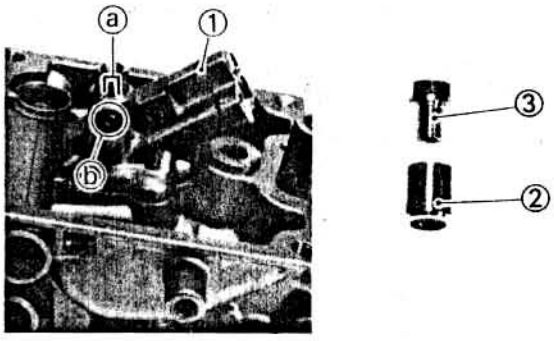
- **Before reassembling, wash all parts in clean petroleum based solvent.**
- **Always use a new gasket.**



1. Install:
   - Needle jet ①
   - Throttle valve support ②

NOTE:

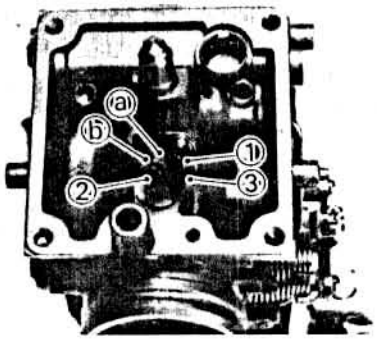
Align the projections ⓐ on the valve support with the slots ⓑ on the carburetor body.



2. Install:
   - Gasket
   - Jet housing ①
   - Holder (needle jet) ②
   - Bolt (needle jet) ③

NOTE:

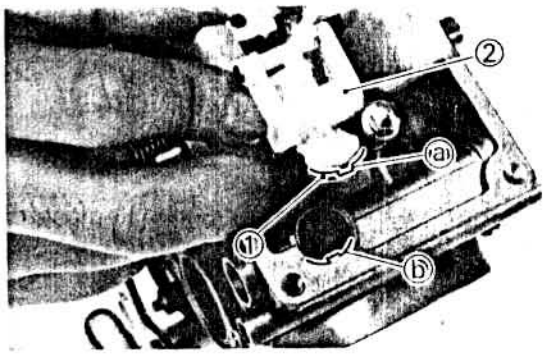
Align the groove ⓐ on the needle jet with the projection ⓑ on the jet housing.



3. Install:
   - Main jet ①
   - Starter jet ②
   - Pilot jet ③

NOTE:

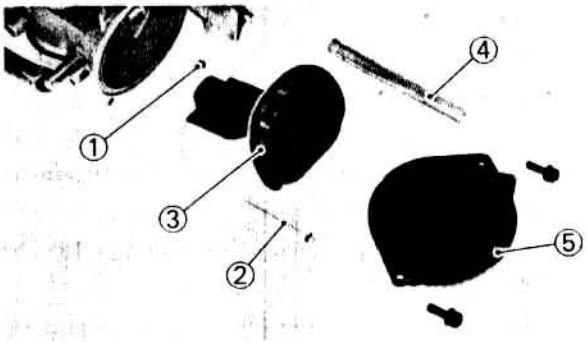
- The jet with a bigger eye is main jet ①. It should be installed on position ⓐ.
- The jet with a smaller eye is starter jet ②. It should be installed on position ⓑ.



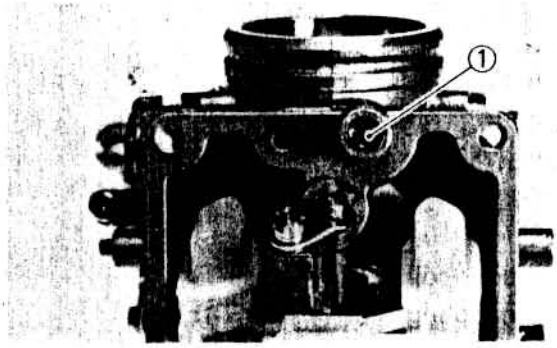
4. Install:
   - O-ring ①
   - Valve seat ②
   - Needle valve
   - Float
   - Float pin

NOTE:

Align the projection ⓐ on the valve seat with the slot ⓑ on the carburetor body.



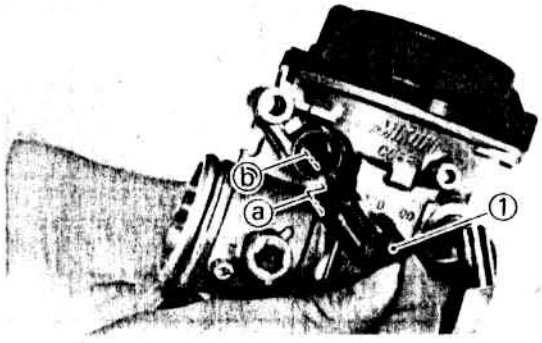
5. Install:
   - O-ring ①
   - Jet needle ②
   - Throttle valve ③
   - Spring ④
   - Vacuum chamber cover ⑤



6. 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.

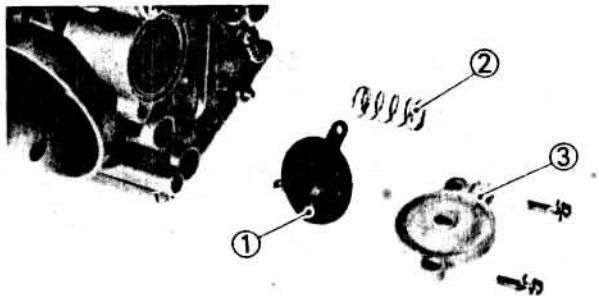
Pilot air screw (turns out): 2



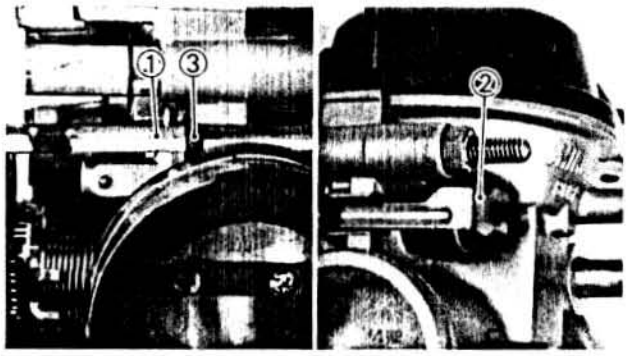
7. Install:
   - Starter plunger ①

NOTE:

Install with the flat surface ⓐ of the starter plunger on that of the carburetor body ⓑ.

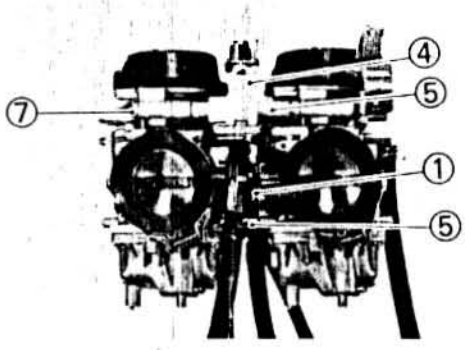


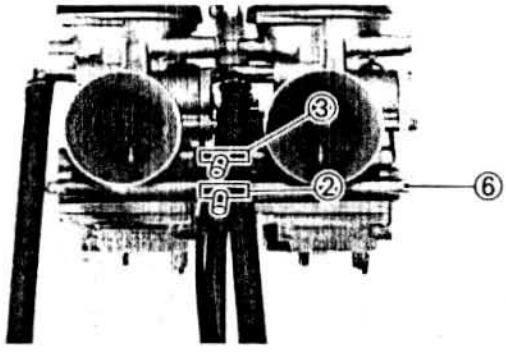
8. Install:
   - Diaphragm ①
   - Spring ②
   - Diaphragm cover ③



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:
    - Spring ①
    - Joint (delivery hose) ② (with gasket rings)
    - Joint (ventilation hose) ③ (with O-rings)
    - Joints (starter lever) ④
    - Spacer collars ⑤
    - Connecting bolt (lower) ⑥
    - Connecting bolt (upper) ⑦

NOTE:
- Do not tighten the connecting bolts yet.
- Insert the throttle arm (on the #1, #2, #4 carburetors) between the spring and synchronizing screw.

11. Tighten:
    - Connecting bolts

Connecting bolt (upper):
35 Nm (0.35 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 then 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.

INSTALLATION

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

1. Adjust:
   • Carburetor synchronization
   Refer to the "CARBURETOR SYNCHRONIZATION" section in the CHAPTER 3.

2. Adjust:
   • Idle speed

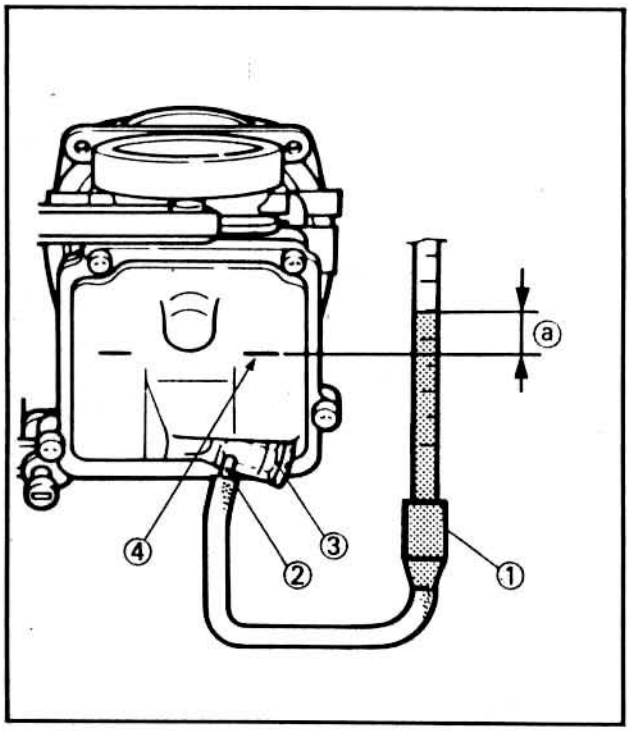
Engine idle speed:
1,100 ~ 1,200 r/min

Refer to the "IDLE SPEED ADJUSTMENT" section in the CHAPTER 3.

3. Adjust:
   • Throttle cable free play

Throttle cable free play:
3 ~ 5 mm (0.12 ~ 0.20 in)

Refer to the "THROTTLE CABLE FREE PLAY ADJUSTMENT" section in the CHAPTER 3.

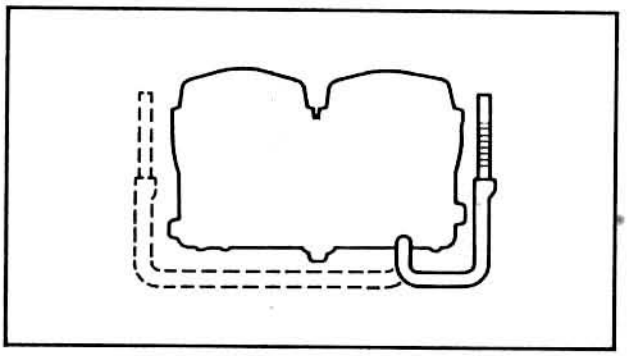


FUEL LEVEL ADJUSTMENT

1. Measure:
   • Fuel level ⓐ
   Out of specification → Adjust.

Fuel level ⓐ:
5.1 ~ 6.1 mm (0.2 ~ 0.24 in)
Above the float chamber line.

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:
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.

FUEL PUMP

PUMP OPERATION INSPECTION

1. Inspect:
   - Fuel pump operation

Operation inspection steps:

- Turn the fuel cocks (Right and left) to "ON".
- Disconnect the fuel hose from the carburetor. (fuel pump — carburetor)
- Place the receptacle under the fuel hose end.
- Turn the main switch to "ON".
- Push the starter switch.
- Check the fuel flows out from the fuel hose end.

  If fuel does not flow out, replace the fuel pump assembly or refer to "FUEL PUMP INSPECTION" section.

FUEL PUMP INSPECTION

Removal

1. Turn the fuel cocks (right and left) to "OFF".
2. Disconnect:
   - Fuel hose
   - Vacuum hose
   - Delivery hose
3. Remove:
   - Fuel pump assembly

Inspection

1. Inspect:
   - Fuel hose
   - Vacuum hose
   - Delivery hose

   Crack/wear/damage → Replace.

ASSEMBLY

Refer to the "FUEL PUMP REMOVAL" section.

1. Inspect:
   - Fuel pump assembly
2. Inspect:
   - Fuel hose
   - Vacuum hose
   - Delivery hose

NOTE:

Be sure to connect the hose correctly, when connecting.

CHAPTER 7.
CHASSIS

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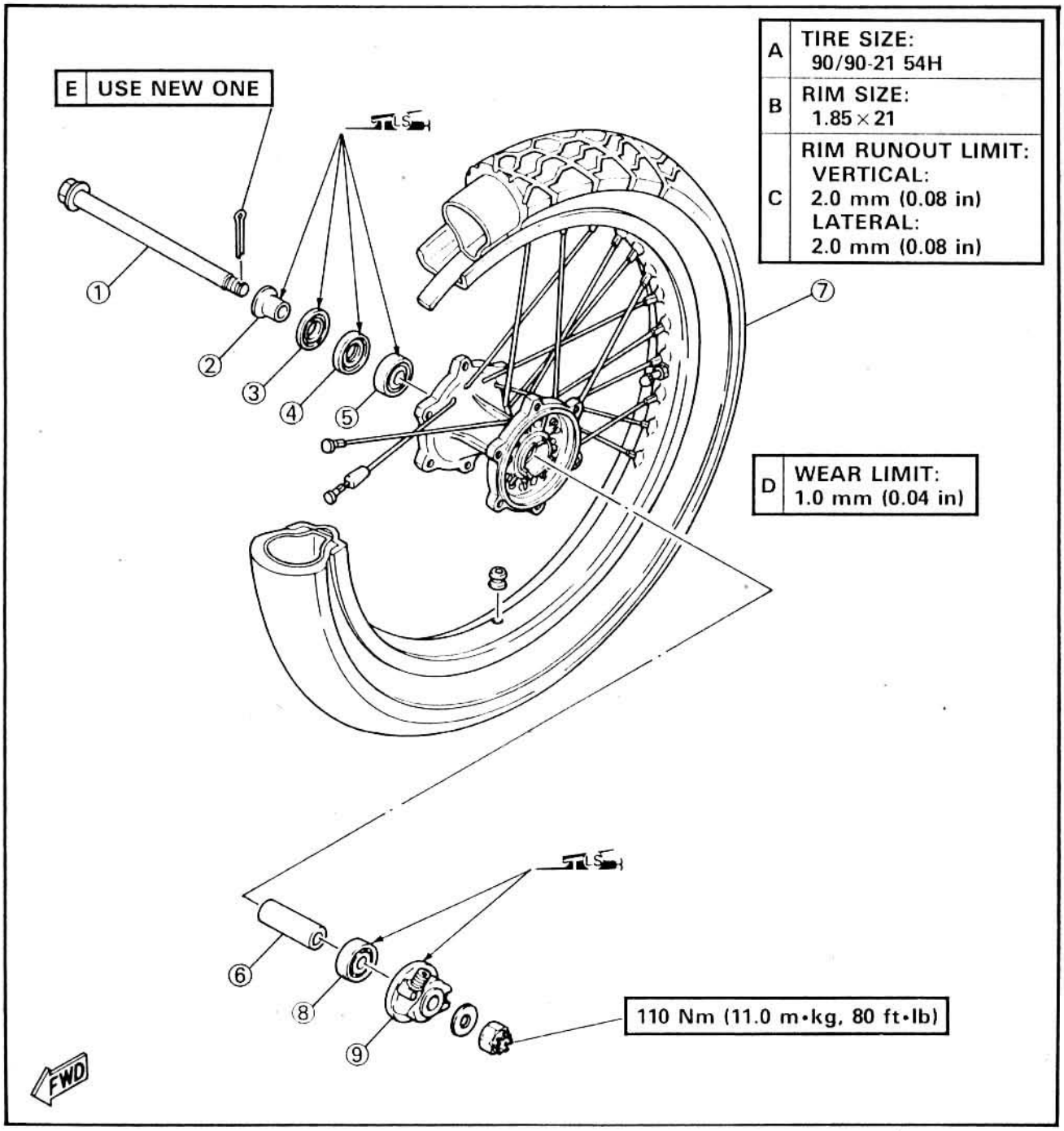
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FRONT WHEEL

① Wheel axle
② Collar
③ Dust cover
④ Oil seal
⑤ Bearing
⑥ Collar
⑦ Front wheel
⑧ Bearing
⑨ Gear unit (speedometer)

TIRE AIR PRESSURE (COLD):		
Cold tire pressure	Front	Rear
Up to 90 kg (198 lb) load*	225 kPa (2.25 kg/cm², 33 psi)	225 kPa (2.25 kg/cm², 33 psi)
90 kg (198 lb) ~ Maximum load*	225 kPa (2.25 kg/cm², 33 psi)	250 kPa (2.50 kg/cm², 36 psi)
High speed riding	225 kPa (2.25 kg/cm², 33 psi)	250 kPa (2.50 kg/cm², 36 psi

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

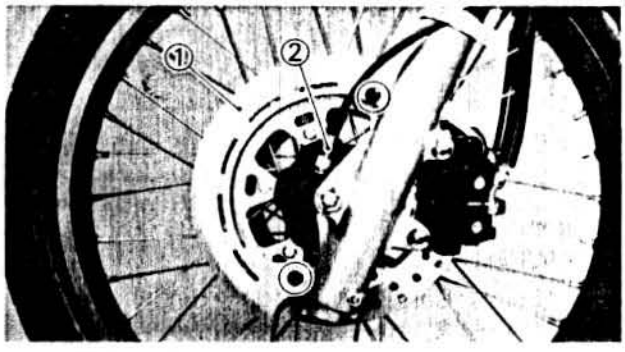


REMOVAL

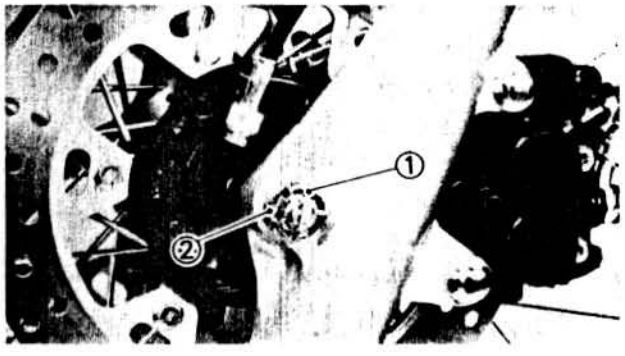
⚠WARNING:

Support the motorcycle securely so there is no danger of it falling over.

1. Elevate the front wheel by placing a suitable stand under the engine.



2. Remove:
   - Disc covers ①
3. Disconnect:
   - Speedometer cable ②

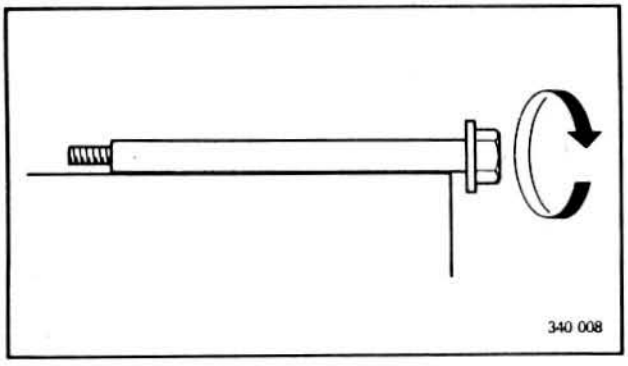


4. Remove:
   - Cotter pin ①
   - Axle nut ②
   - Plain washer

5. Remove:
   - Wheel axle
   - Front wheel
   - Gear unit (speedometer)
   - Collar

NOTE:

Do not depress the brake lever when the wheel is off the motorcycle otherwise the brake pads will be forced shut.



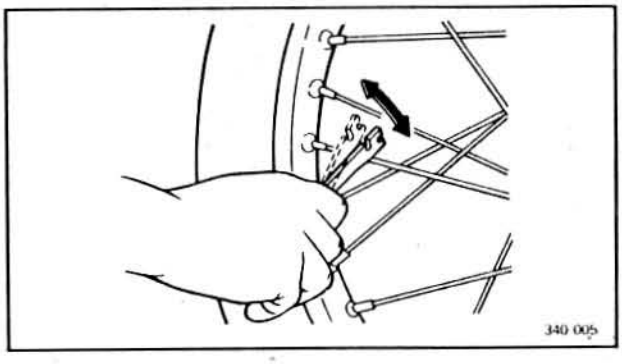
INSPECTION

1. Inspect:
   - Tire
     Wear/Damage → Replace.
     Refer to the "TIRE INSPECTION" section in the CHAPTER 3.
2. Eliminate any corrosion from parts.
3. Inspect:
   - Wheel axle
     Roll the axle on a flat surface.
     Bends → Replace.

⚠WARNING:

Do not attempt to straighten a bent axle.

4. Inspect:
   - Wheel
     Cracks/Bends/Warpage → Replace.



5. Check:
   - Spoke(s)
     Bend/Damage → Replace.
     Loose spoke(s) → Retighten.
     Turn the wheel and tap the spokes with a screwdriver.

NOTE:

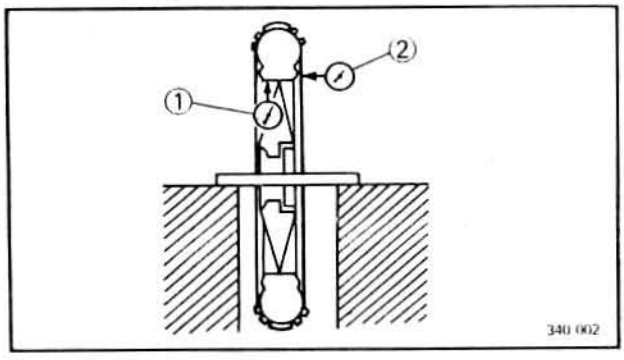
A tight spoke will emit a clear, ringing tone; a loose spoke will sound flat.

6. Tighten:
   - Loose spokes

	Spoke: **2 Nm (0.2 m•kg, 1.4 ft•lb)**

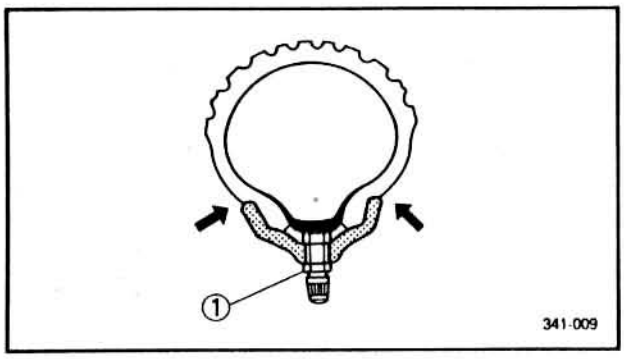
NOTE:

Check the wheel runout after tightening spoke.



7. Measure:
   - Wheel runout
     Out of specification → Check the wheel and bearing play.

	Rim Runout Limits: **Vertical ①: 2.0 mm (0.08 in)** **Lateral ②: 2.0 mm (0.08 in)**

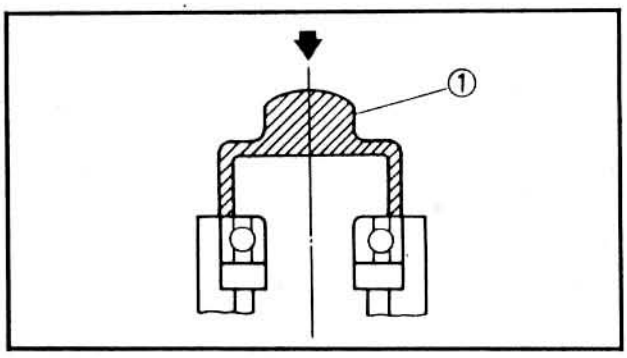


⚠WARNING:

- **After mounting a tire, ride conservatively to allow proper tire to rim seating. Failure to do so may cause an accident resulting in motorcycle damage and possible operator injury.**
- **After a tire repair or replacement, be sure to torque tighten the valve stem locknut ① to specification.**

	Valve Stem Locknut: 1.5 Nm (0.15 m•kg, 1.1 ft•lb)

5. Check:
   - Wheel bearings
     Bearings allow play in the wheel hub or wheel turns roughly→Replace.



Wheel bearing replacement steps:
- Clean the outside of the wheel hub.
- Remove the bearing using a general bearing puller.
- Install the new bearing.

NOTE:

Use a socket ① that matches the outside diameter of the race of the bearing.

⚠CAUTION:

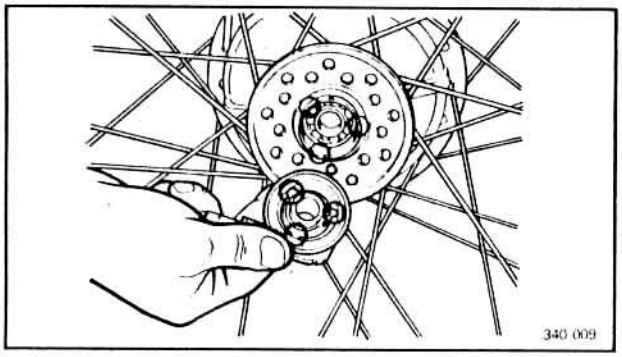
Do not strike the inner race of balls of the bearing. Contact should be made only with the outer race.

INSTALLATION

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

1. Lubricate:
   - Oil seal
   - Gear unit

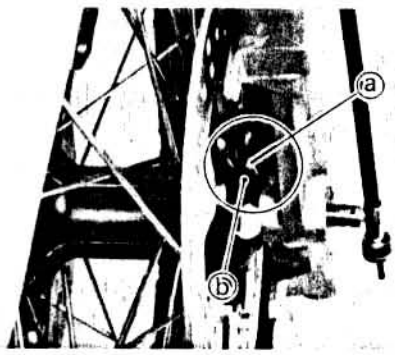
	Lithium soap base grease



2. Install:
   - Gear unit assembly

NOTE:

Make sure the projections inside the gear unit are meshed with the flats in the wheel hub.



3. Install:
   - Front wheel assembly

NOTE:

Be sure the boss (a) on the outer fork tube correctly engages with the locating slot (b) on the gear unit assembly.

4. Tighten:
   - Axle nut

	Axle nut: **110 Nm (11.0 m•kg, 80 ft•lb)**

5. Install:
   - Cotter pin

NOTE:

Bend the ends of the cotter pin.

⚠WARNING:

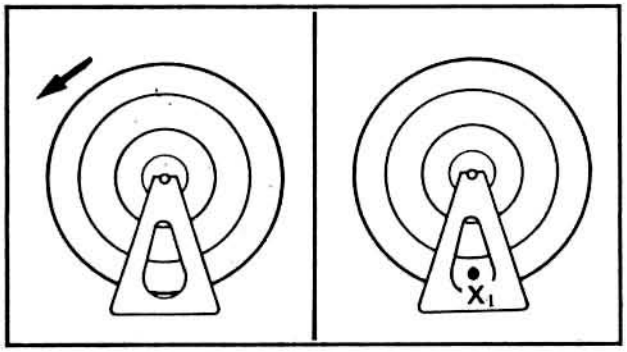
Always use a new cotter pin.

STATIC WHEEL BALANCE ADJUSTMENT

NOTE:

- After replacing the tire and/or rim, wheel balance should be adjusted.
- Adjust the wheel balance with brake disc installed.

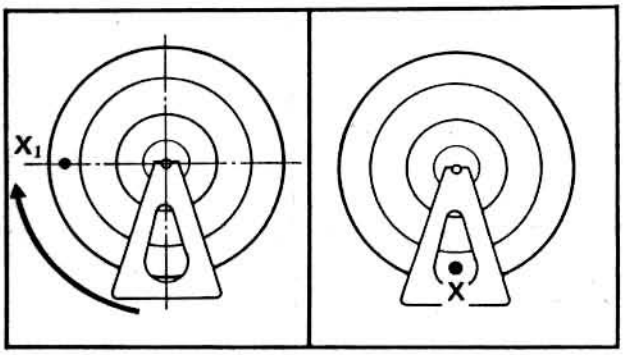
1. Remove:
   - Balancing weight



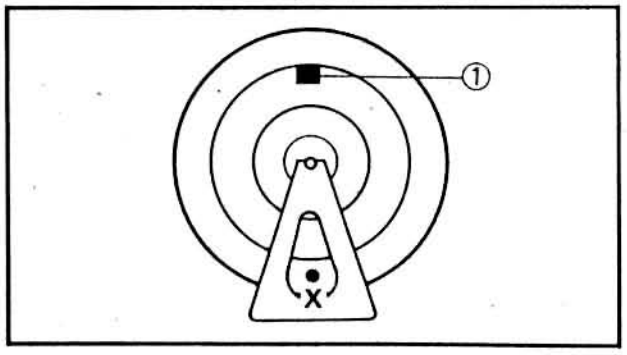
2. Set the wheel on a suitable stand.
3. Find:
   - Heavy spot

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



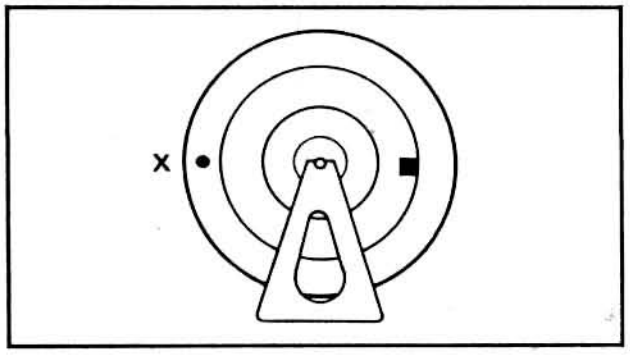
Adjusting steps:

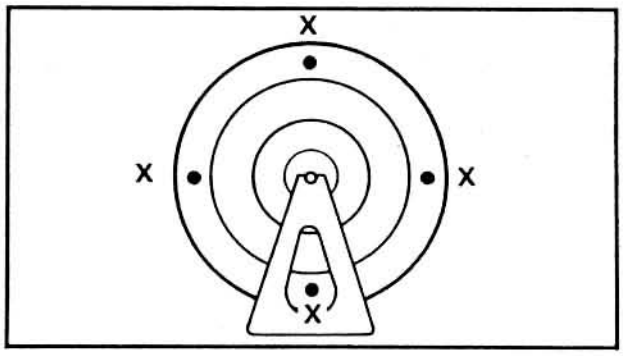
- Install a balancing weight ① on the rim exactly opposite to the heavy spot "X".

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.



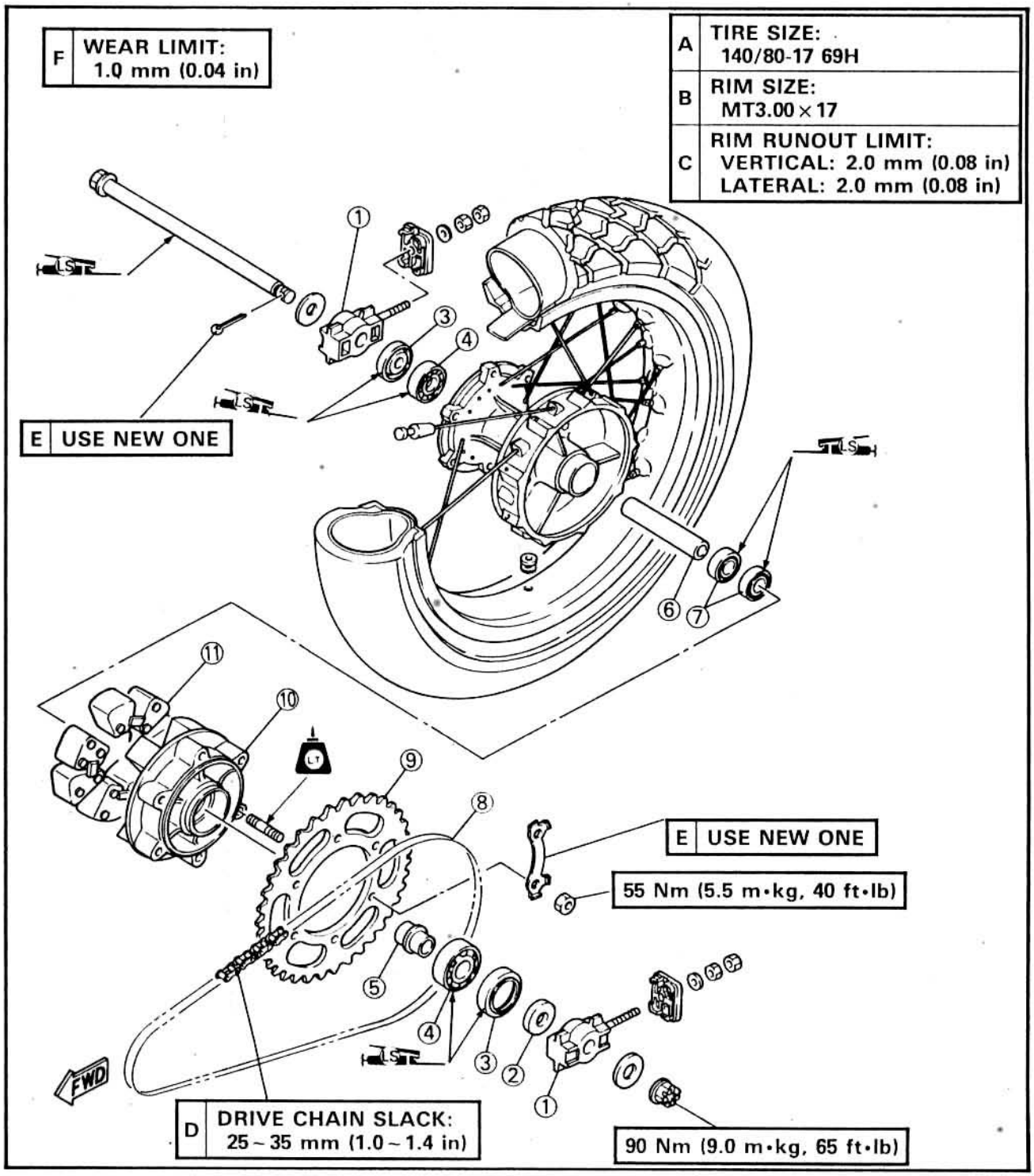


5. Check:
   • Wheel balance

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 Adjuster collar
② Collar
③ Oil seal
④ Bearing
⑤ Collar
⑥ Spacer
⑦ Bearing
⑧ Drive chain
⑨ Driven sprocket
⑩ Clutch hub
⑪ Damper



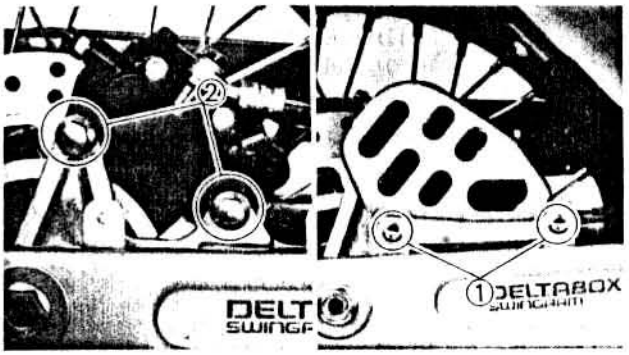
REMOVAL

1. Place the motorcycle on a level place.

⚠WARNING:

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

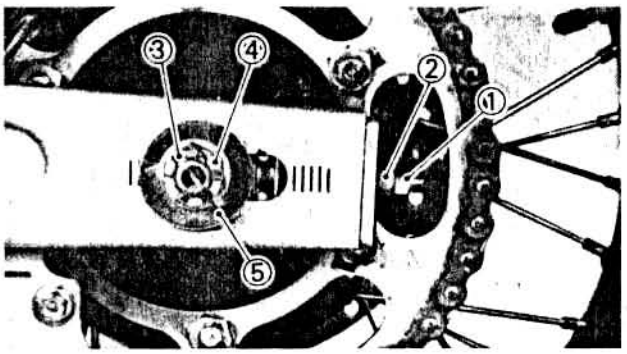
2. Elevate the rear wheel by placing a suitable stand under the swingarm.



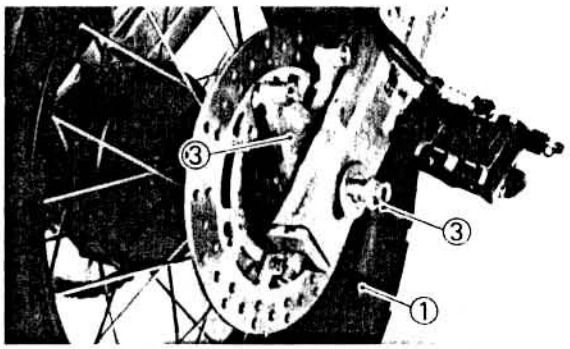
3. Remove:
   - Bolt ① (caliper cover)
   - Bolt ② (brake caliper)

NOTE:

Do not depress the brake pedal when the wheel is off the motorcycle as the brake pads will be forced shut.



4. Loosen:
   - Locknut ①
   - Adjuster ②
5. Remove:
   - Cotter pin ③
   - Axle nut ④
   - Washer ⑤



6. Remove:
   - Rear wheel ①
   - Caliper bracket ②
   - Wheel axle ③

NOTE:

Before removing the rear wheel, push the wheel forward and remove the drive chain.

INSPECTION

1. Inspect:
   - Tire
   - Rear wheel axle
   - Wheel
   - Wheel bearings
   - Oil seals

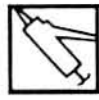
   Refer to the "FRONT WHEEL—INSPECTION".

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:
25 ~ 35 mm (1.0 ~ 1.4 in)

Refer to the "CHAPTER 3. — DRIVE CHAIN ADJUSTMENT".

3. Tighten:
   • Nut (rear wheel axle)
   • Bolts (brake caliper)
   • Bolts (caliper cover)



Nut (rear wheel axle):
90 Nm (9.0 m•kg, 65 ft•lb)
Bolt (brake caliper):
35 Nm (3.5 m•kg, 25 ft•lb)

4. Install:
   • Cotter pin

NOTE:

Bend the ends of the cotter pin.

⚠WARNING:

Always use a new cotter pin.

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.

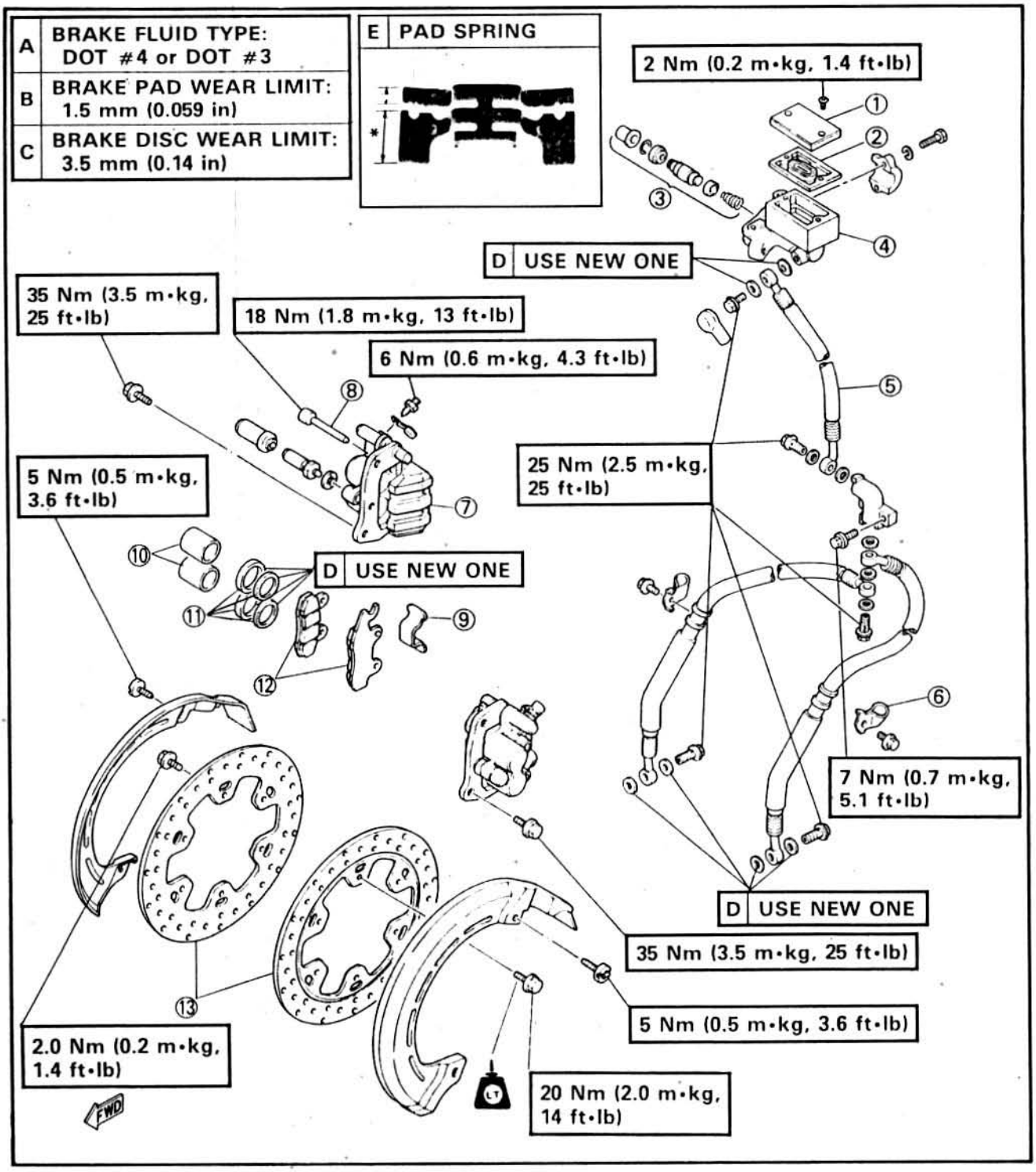
1. Adjust:
   - Wheel balance

   Refer to the "FRONT WHEEL—STATIC WHEEL BALANCE ADJUSTMENT" section.

FRONT AND REAR BRAKE

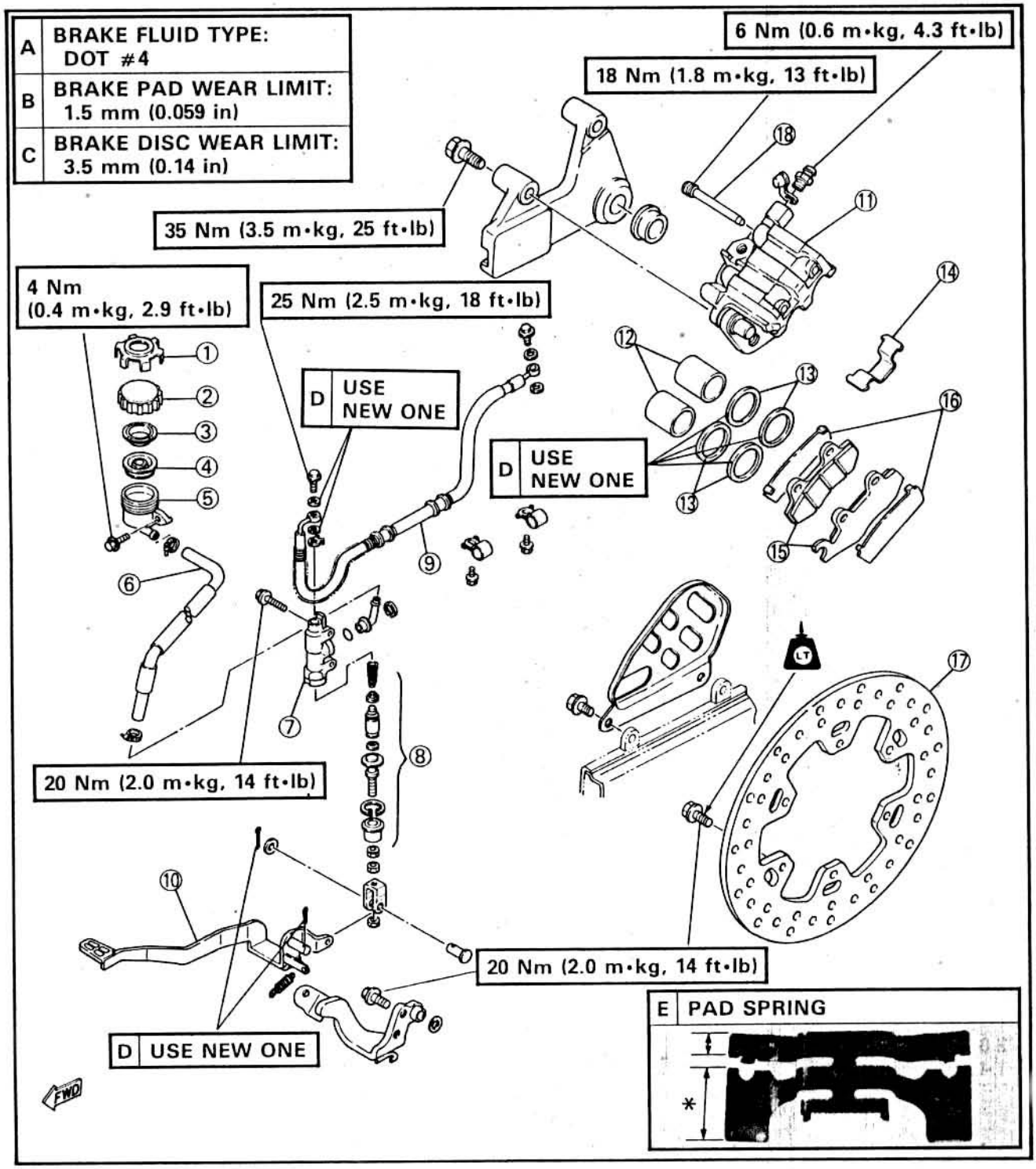
① Master cylinder cap
② Rubber seal
③ Master cylinder kit
④ Master cylinder
⑤ Brake hose
⑥ Brake hose holder
⑦ Brake caliper
⑧ Retaining pin
⑨ Pad spring
⑩ Piston
⑪ Piston seal
⑫ Brake pad
⑬ Brake disc

[E] The longer tangs (*) of the pad spring must point in the outside direction.



① Reservoir tank cover
② Reservoir tank cap
③ Bush
④ Diaphragm
⑤ Reservoir tank
⑥ Reservoir hose
⑦ Master cylinder
⑧ Master cylinder kit
⑨ Brake hose
⑩ Brake pedal
⑪ Brake caliper
⑫ Piston
⑬ Piston seal
⑭ Pad spring
⑮ Brake pad
⑯ Shim
⑰ Brake disc
⑱ Retaining pin

[E] The longer tangs (*) of the pad spring must point in the outside direction.



⚠CAUTION:

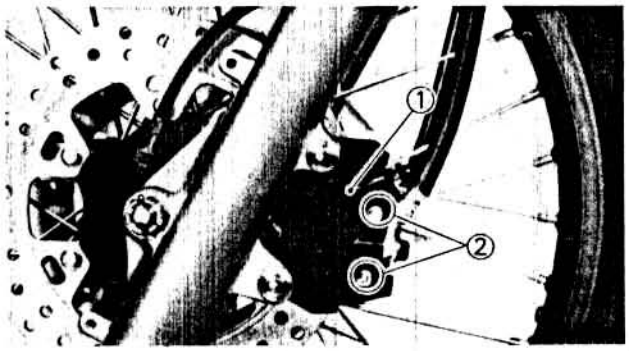
Disc brake components rarely require disassembly. DO NOT:

- **Disassemble 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:

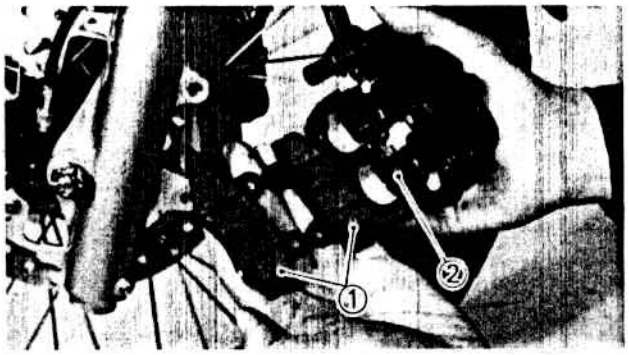
It is not necessary to disassemble the brake caliper and brake hose to replace the brake pads.



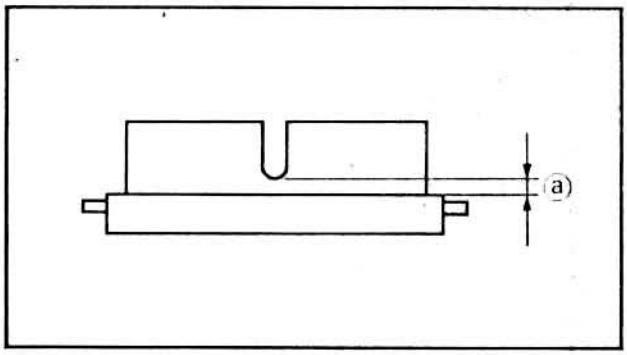
Front Brake

1. Remove:
   - Caliper body ①

2. Remove:
   - Retaining pin ②

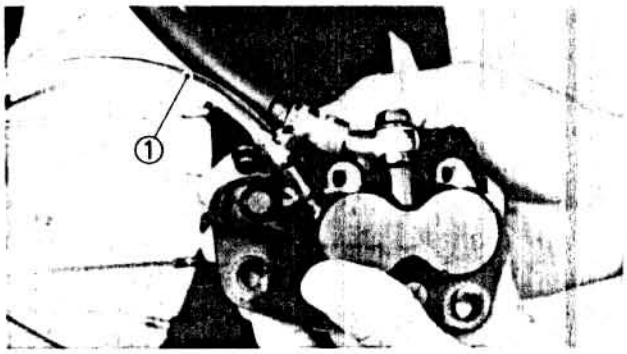


3. Remove:
   - Brake pad ①
   - Pad spring ②



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 ⓐ:
1.5 mm (0.059 in)



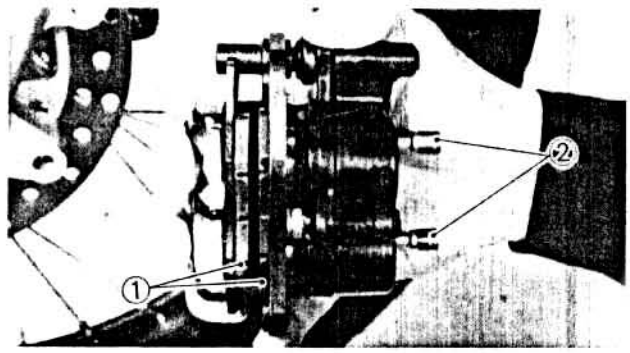
Installation steps:
- Connect a suitable hose ① tightly to the caliper bleed screw. Then, place the other end of this hose into an open container.
- Loosen the caliper bleed screw and push the piston into the caliper by your finger.
- Tighten the caliper bleed screw.

Caliper bleed screw:
6 Nm (0.6 m•kg, 4.3 ft•lb)



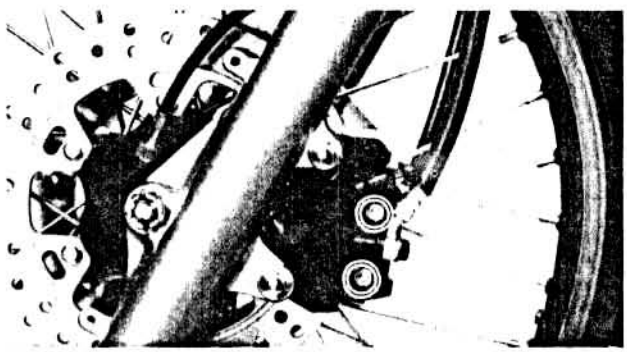
- Install the brake pad (new) and pad spring (new).

NOTE:
The longer tangs (*) of the pad spring must point in the outside direction.



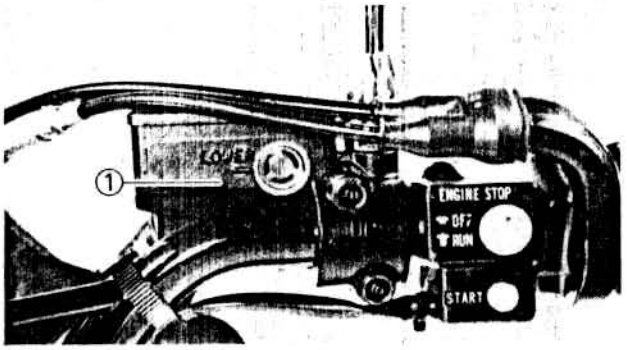
4. Install:
   - Brake pad (new) ①
   - Retaining pin ②

Retaining pin:
18 Nm (1.8 m•kg, 13 ft•lb)



5. Install:
   - Caliper body

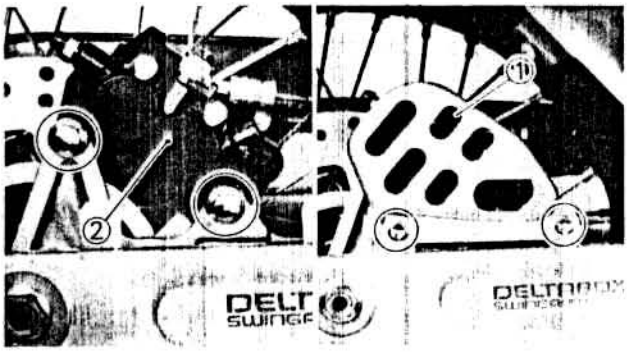
Bolts (caliper body):
35 Nm (3.5 m•kg, 25 ft•lb)



6. Inspect:
   - Brake fluid level
     Refer to the "BRAKE FLUID INSPECTION" section in the CHAPTER 3.

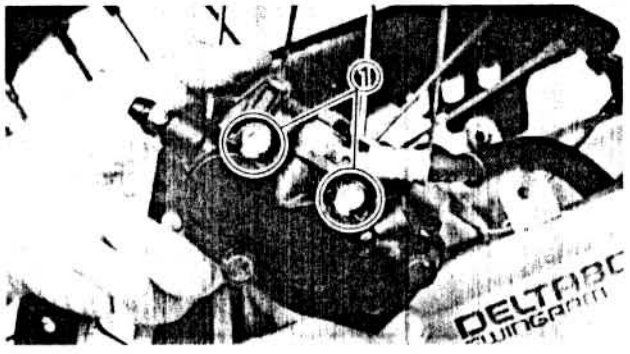
① "LOWER" level line

7. Check:
   - Brake lever operation
     A softy or spongy filling→Bleed brake system.
     Refer to the "AIR BLEEDING" section in the CHAPTER 7.

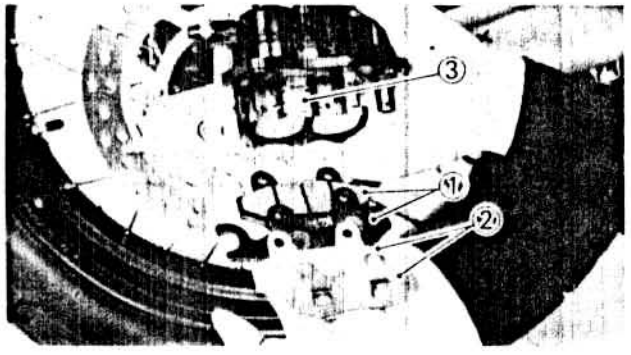


Rear Brake

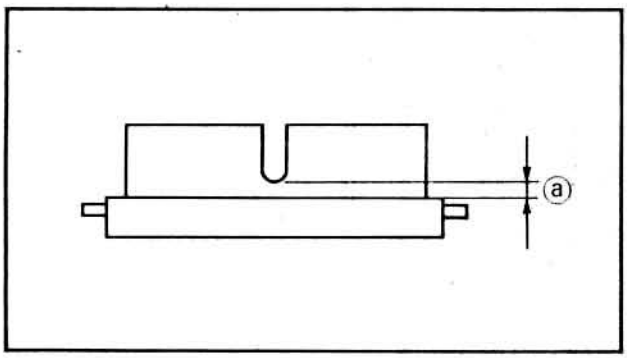
1. Remove:
   - Caliper cover ①
   - Caliper body ②



2. Remove:
   - Retaining pin ①



3. Remove:
   - Brake pad ①
   - Shim ②
   - Pad spring ③

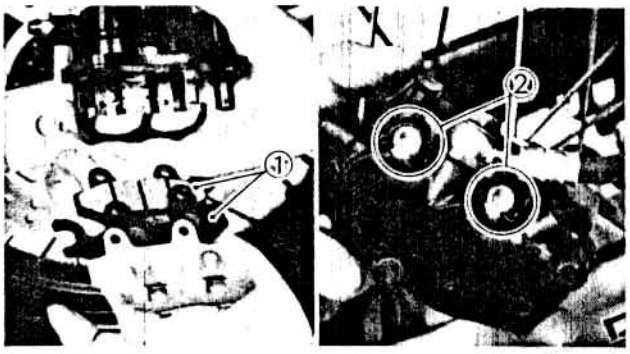


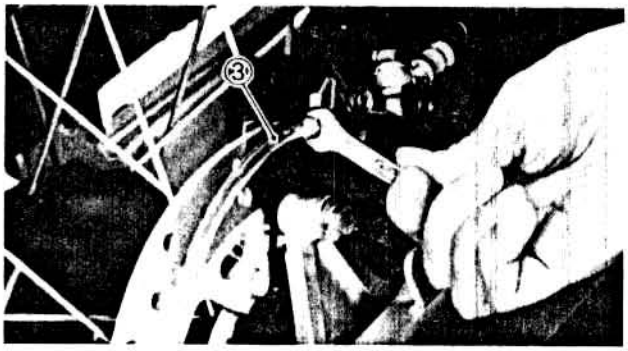
NOTE:

- 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 ⓐ:
1.5 mm (0.059 in)

- Replace the pad shim if the pad replacement is required.







4. Install:
   - Brake pad (new) ①
   - Retaining pin 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.

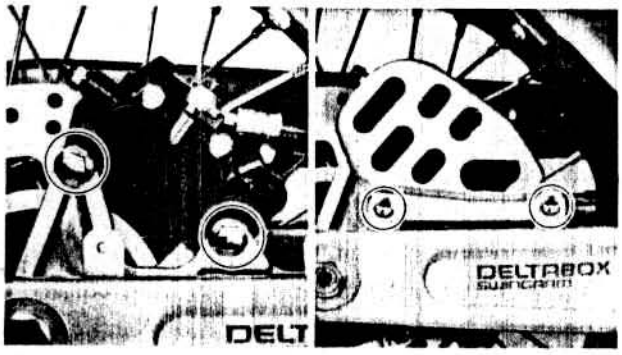
Caliper bleed screw:
6 Nm (0.6 m•kg, 4.3 ft•lb)

- Install the pad shim (new) ④ to the brake pad (new).
- Install the brake pad (new) and pad spring (new).

NOTE:

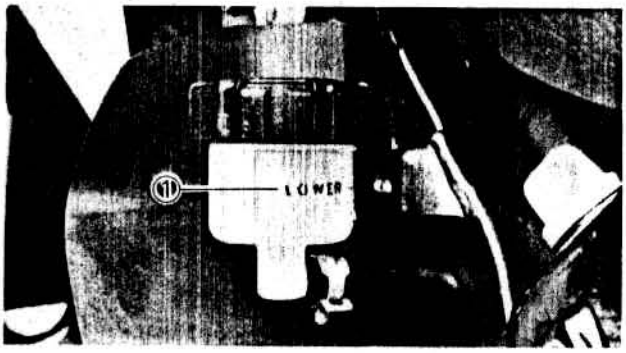
The longer tangs (*) of the pad spring must point in the disc outside direction.

Reteining pin ②:
18 Nm (1.8 m•kg, 13 ft•lb)



5. Install:
   - Caliper body
   - Caliper cover

	Bolts (caliper body): **35 Nm (3.5 m•kg, 25 ft•lb)**



6. Inspect:
   - Brake fluid level

   Refer to the "BRAKE FLUID INSPECTION" section in the CHAPTER 3.

① "LOWER" level line

7. Check:
   - Brake pedal operation

   A softy or spongly filling→Bleed brake system.
   Refer to "AIR BLEEDING" section in CHAPTER 7.

CALIPER DISASSEMBLY

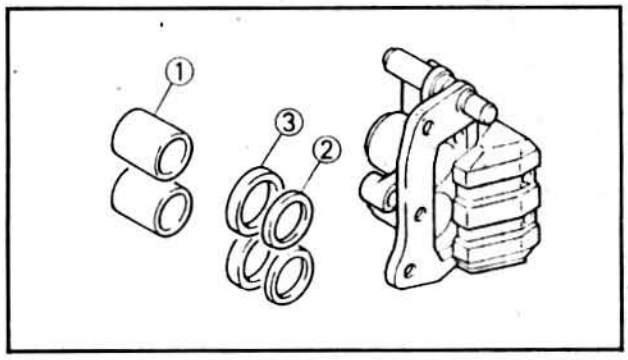
NOTE:

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:
   - Caliper body
   - Brake pad
   - Shim
   - Pad spring

   Refer to the "BRAKE PAD REPLACEMENT" section.



2. Remove:
   - Piston ①
   - Dust seal ②
   - Piston seal ③

Removal steps:
- Blow compressed air into the tube joint opening to force out the piston from the caliper body.

⚠WARNING:

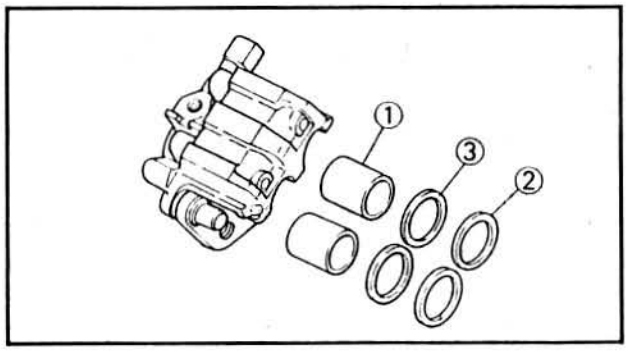
- **Never try to pry out the piston.**
- **Cover the piston with a rag. Use care so that piston does not cause injury as it is expelled from the cylinder.**



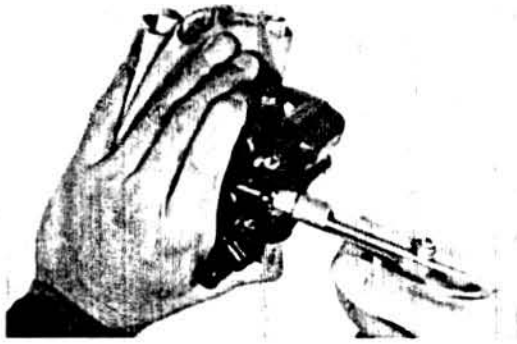
Rear Brake

1. Remove:
   - Caliper body
   - Brake pads

   Refer to the "BRAKE PAD REPLACEMENT" section.



2. Remove:
   - Piston ①
   - Dust seal ②
   - Piston seal ③



Removal steps:
- Blow compressed air into the tube joint opening to force out the piston from the caliper body.

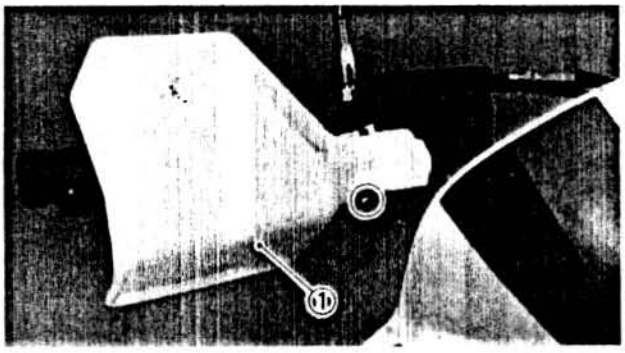
⚠WARNING:

- **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.**

MASTER CYLINDER DISASSEMBLY

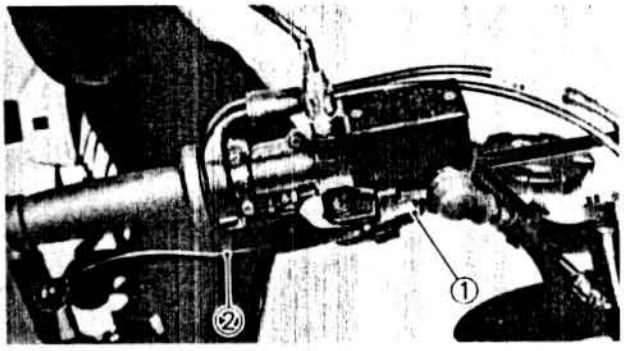
NOTE:

Before disassembling the front or rear brake master cylinders, drain the brake hose, master cylinder, brake caliper and reservoir tank of their brake fluid.

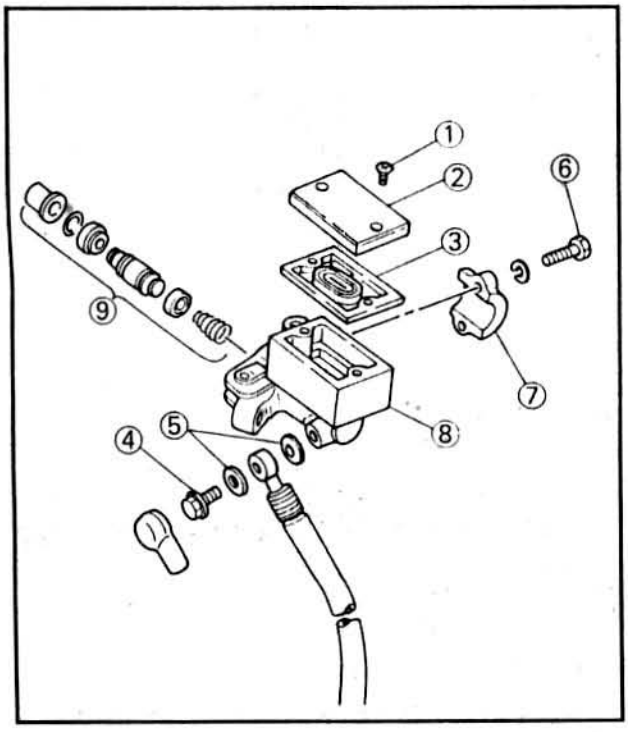


Front Brake

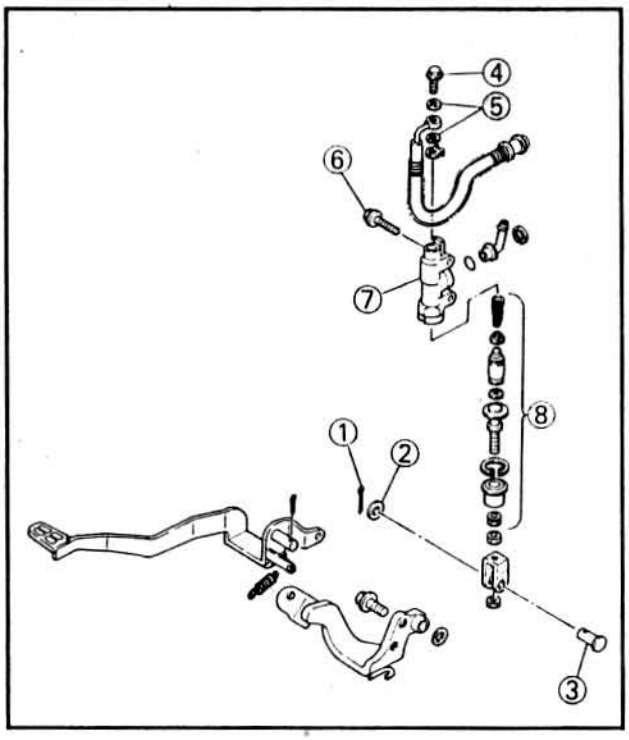
1. Remove:
   - Guard (1)



2. Remove:
   - Brake switch (1)
   - Brake lever (2)



3. Remove:
   - Screw (1) (Master cylinder cap)
   - Master cylinder cap (2)
   - Rubber seal (3)
   - Union bolt (4)
   - Copper washer (5)
   - Bolt (6) (Master cylinder bracket)
   - Master cylinder bracket (7)
   - Master cylinder (8)
   - Master cylinder kit (9)



Rear Brake

1. Remove:
   - Cotter pin ①
   - Plain washer ②
   - Shaft ③
   - Union bolt ④
   - Copper washer ⑤
   - Bolt ⑥ (Master cylinder)
   - Master cylinder ⑦
   - Master cylinder kit ⑧

INSPECTION AND REPAIR

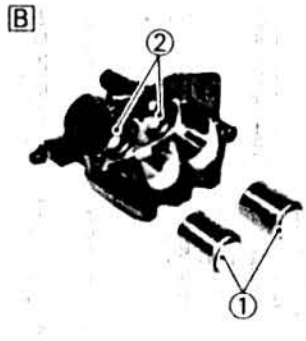
Recommended brake component replacement schedule:	
Brake pads	As required
Piston seal, dust seal	Every two years
Brake hoses	Every four years
Brake fluid	Replace only when brakes are disassembled.

⚠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.

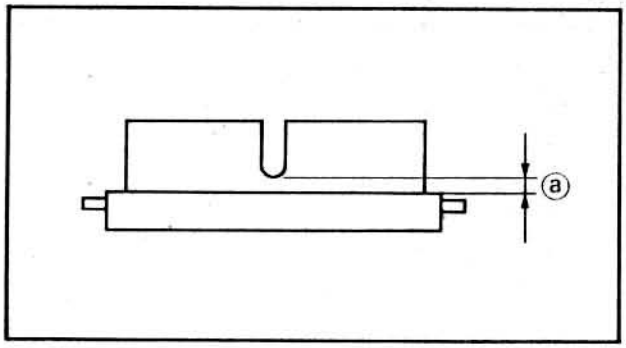




A Front
B Rear

⚠WARNING:

Replace the piston seal and dust seal whenever a caliper is disassembled.

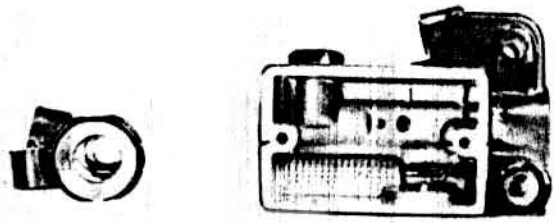


2. Measure:
   • Brake pad thickness ⓐ
   Out of specification → Replace.

Pad wear limit:
1.5 mm (0.059 in)

NOTE:
Replace the pads as a set if either is found to be worn to the wear limit.

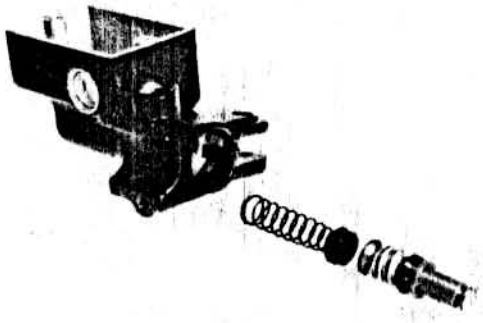
3. Inspect:
   • Brake hose
   Cracks/Damage → Replace.



4. Inspect:
   • Master cylinder body
   Scratches/Wear → Replace.

NOTE:
Clean all passages with new brake fluid.

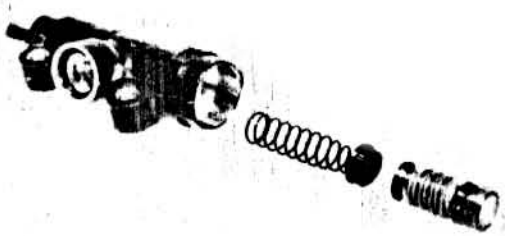
A



5. Inspect:
   • Master cylinder kit
   Scratches/Wear → Replace.

[A] Front brake
[B] Rear brake

B



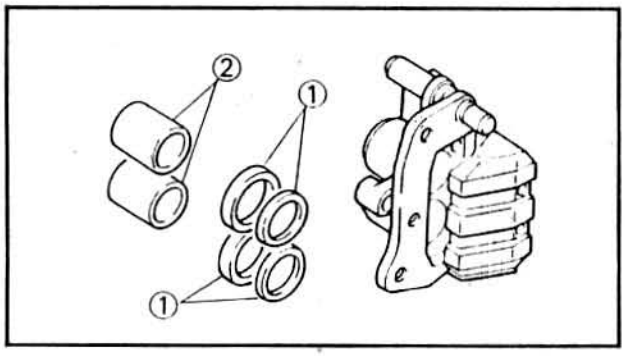
ASSEMBLY

⚠WARNING:

- **All internal parts should be cleaned in new brake fluid only.**
- **Internal parts should be lubricated with brake fluid when installad.**

Brake fluid:
Front brake
DOT #4
If DOT #4 is not available, DOT #3 can be used.
Rear brake
DOT #4

- **Replace the piston seals whenever a caliper is disassembled.**

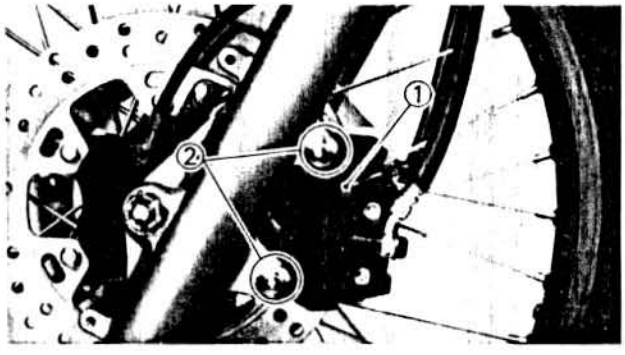


Front Brake

1. Install:
   - Piston seal ①
   - Piston ②

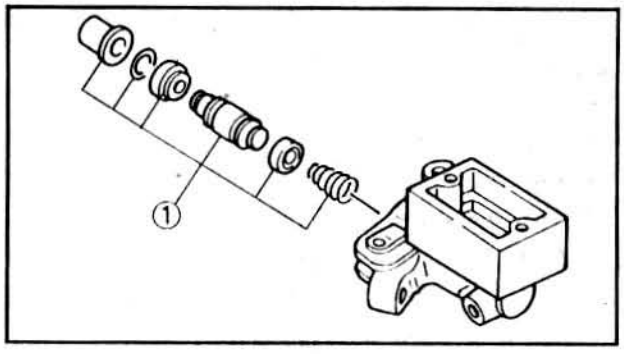
2. Install:
   - Pad spring
   - Brake pad
   - Reteining pin

   Refer to the "BRAKE PAD REPLACEMENT" section.

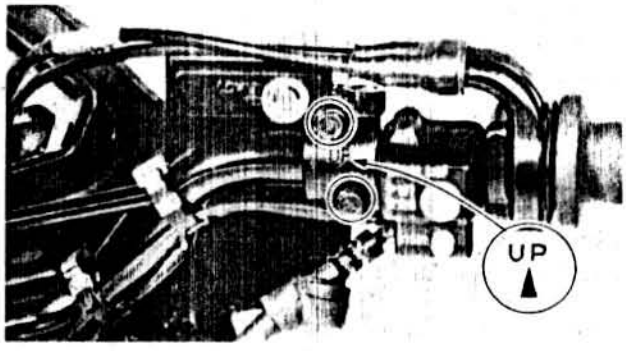


3. Install:
   - Brake caliper ①

Bolt ② (brake caliper):
35 Nm (3.5 m•kg, 25 ft•lb)



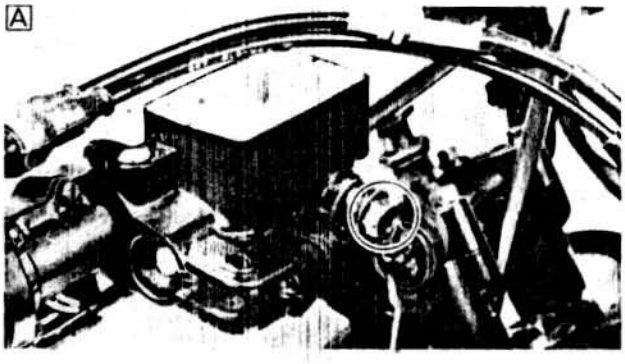
4. Install:
   - Master cylinder kit (1)



5. Install:
   - Master cylinder

NOTE:
- Install the master cylinder bracket with the "UP" mark facing upward.
- Tighten first the upper bolt, then the lower bolt.

	Bolts (master cylinder bracket): 10 Nm (1.0 m·kg, 7.2 ft·lb)

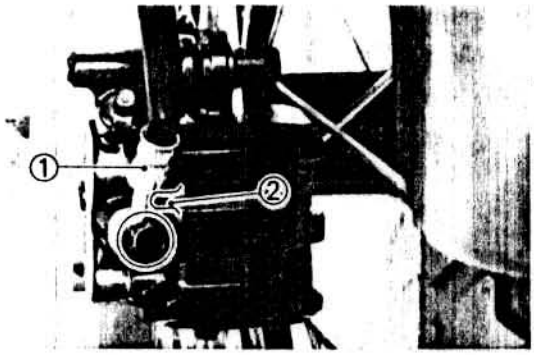


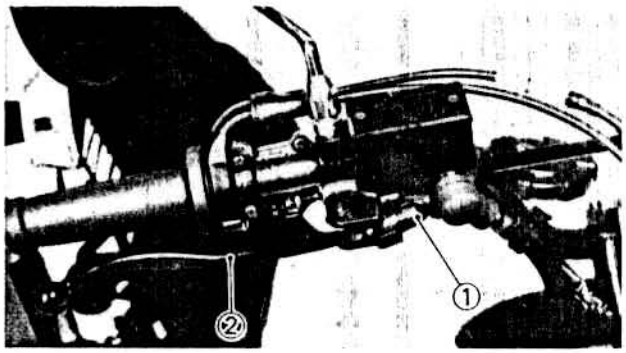
6. Install:
   - Brake hose
   - Copper washers
   - Union bolts

	Union bolts: 27 Nm (2.7 m·kg, 19 ft·lb)

A Master cylinder
B Brake caliper

B





⚠CAUTION:

When installing the brake hose to the caliper, lightly touch the brake pipe ① with the projections ② on the caliper and master cylinder.

⚠WARNING:

Always use new copper washers.

7. Install:
   - Brake switch ①
   - Brake lever ②

NOTE:

Apply lithium soap base grease to pivot shaft of brake lever.

8. Fill:
   - Brake fluid

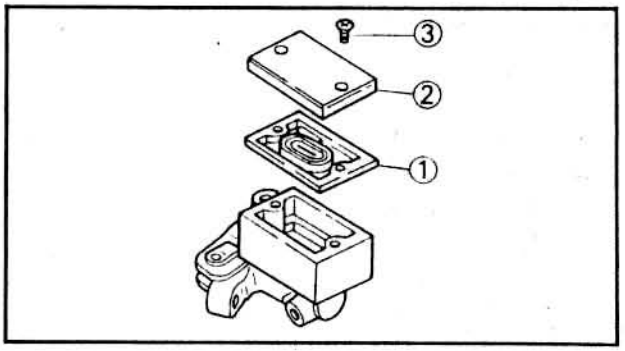
Recommended brake fluid:
DOT #4

⚠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.**

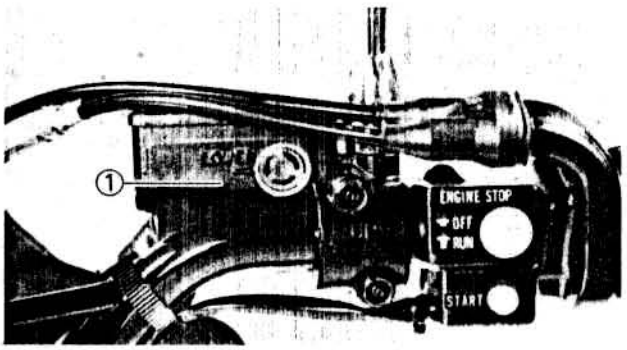


9. Install:
   - •Rubber seal ①
   - •Master cylinder cap ②

	Screws ③ (master cylinder cap): 2 Nm (0.2 m•kg, 1.4 ft•lb)

10. Air bleed:
    - •Brake system

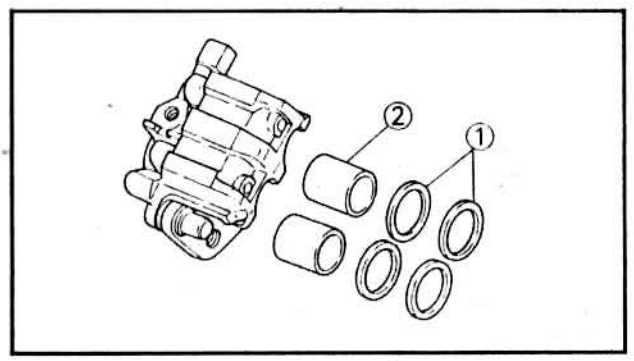
    Refer to the "AIR BLEEDING" section.



11. Inspect:
    - •Brake fluid level

    Fluid level is under "LOWER" level line ①→Replenish.

    Refer to the "BRAKE FLUID INSPECTION" section in the CHAPTER 3.

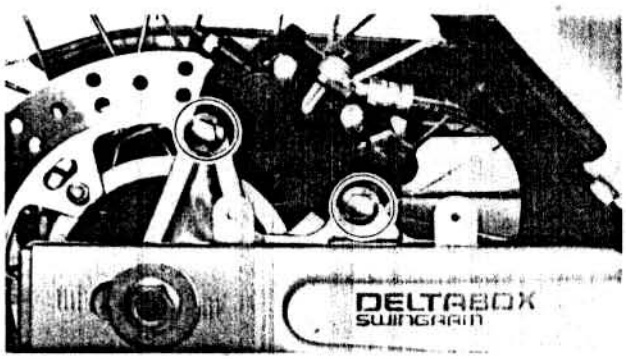


Rear Brake

1. Install:
   - •Piston seal ①
   - •Piston ②

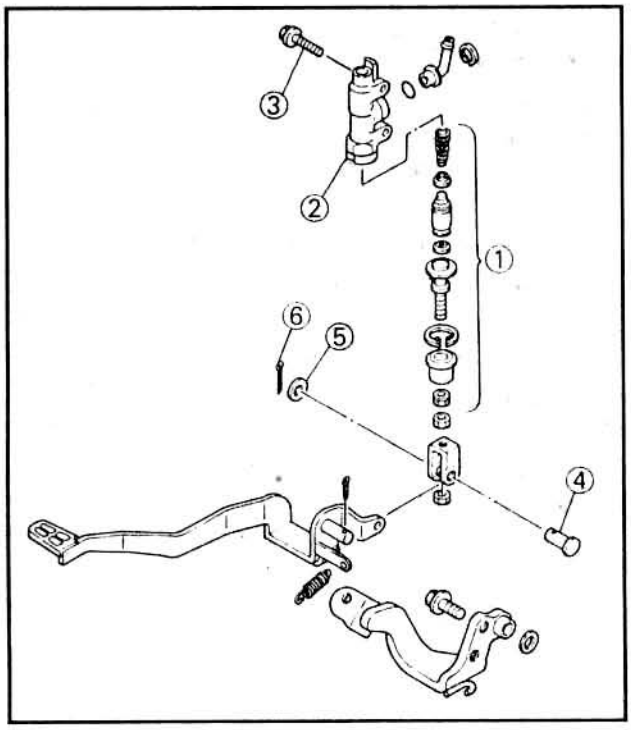
2. Install:
   - •Pad spring
   - •Brake pad
   - •Shim

   Refer to the "BRAKE PAD REPLACEMENT" section.



3. Install:
   - Brake caliper

	Bolts (brake caliper): **35 Nm (3.5 m•kg, 25 ft•lb)**



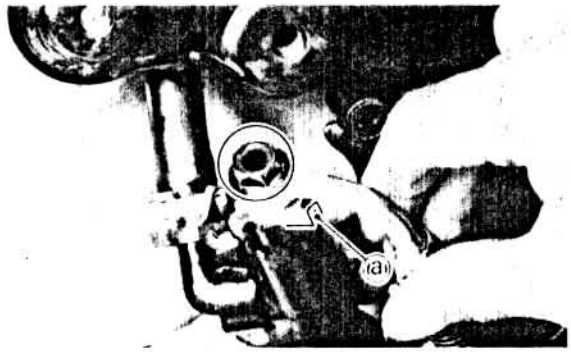
4. Install:
   - Master cylinder kit ①
   - Master cylinder kit ②
   - Bolt ③ (master cylinder)
   - Shaft ④
   - Plain washer ⑤
   - Cotter pin ⑥

	Bolt (master cylinder): **20 Nm (2.0 m•kg, 14 ft•lb)**

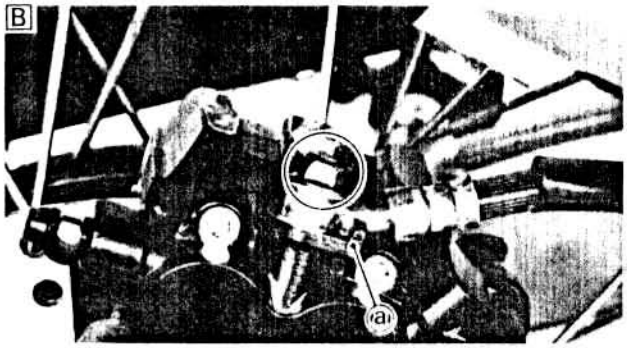
⚠WARNING:

Always use new cotter pin.

A



B



5. Install:
   - Brake hose
   - Copper washer
   - Union bolt

	Union bolt: **27 Nm (2.7 m•kg, 19 ft•lb)**

A Master cylinder
B Brake caliper

⚠CAUTION:

When installing the brake hose, lightly touch the brake pipe ① with the projections ⓐ on the caliper and master cylinder.

⚠WARNING:

Always use new copper washers.

6. Fill:
   • Brake fluid

	Recommended brake fluid: DOT #4

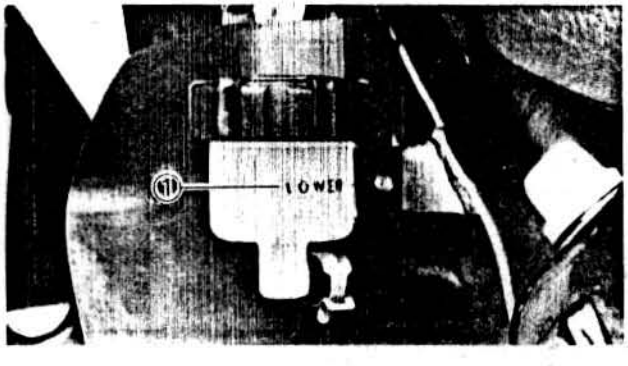
⚠CAUTION:

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

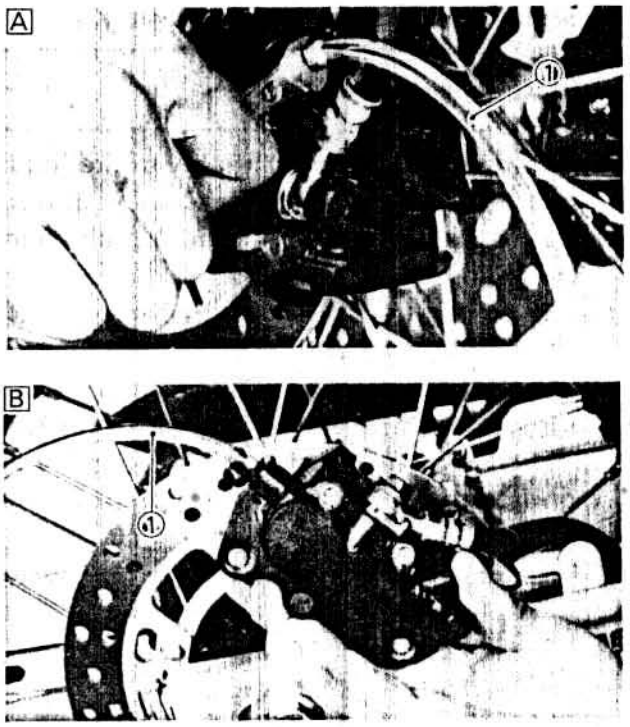
⚠WARNING:

- **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.**

7. Air bleed:
   • Brake system
   Refer to the "AIR BLEEDING" section in the CHAPTER 7.



8. Inspect:
   • Brake fluid level
   Fluid level is under "LOWER" level line ① → Replenish.
   Refer to the "BRAKE FLUID INSPECTION" section in the CHAPTER 3.



AIR BLEEDING

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

1. Bleed:
   - Brake fluid

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 caliper bleed screw.

[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:
5 Nm (0.5 m•kg, 3.6 ft•lb)

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

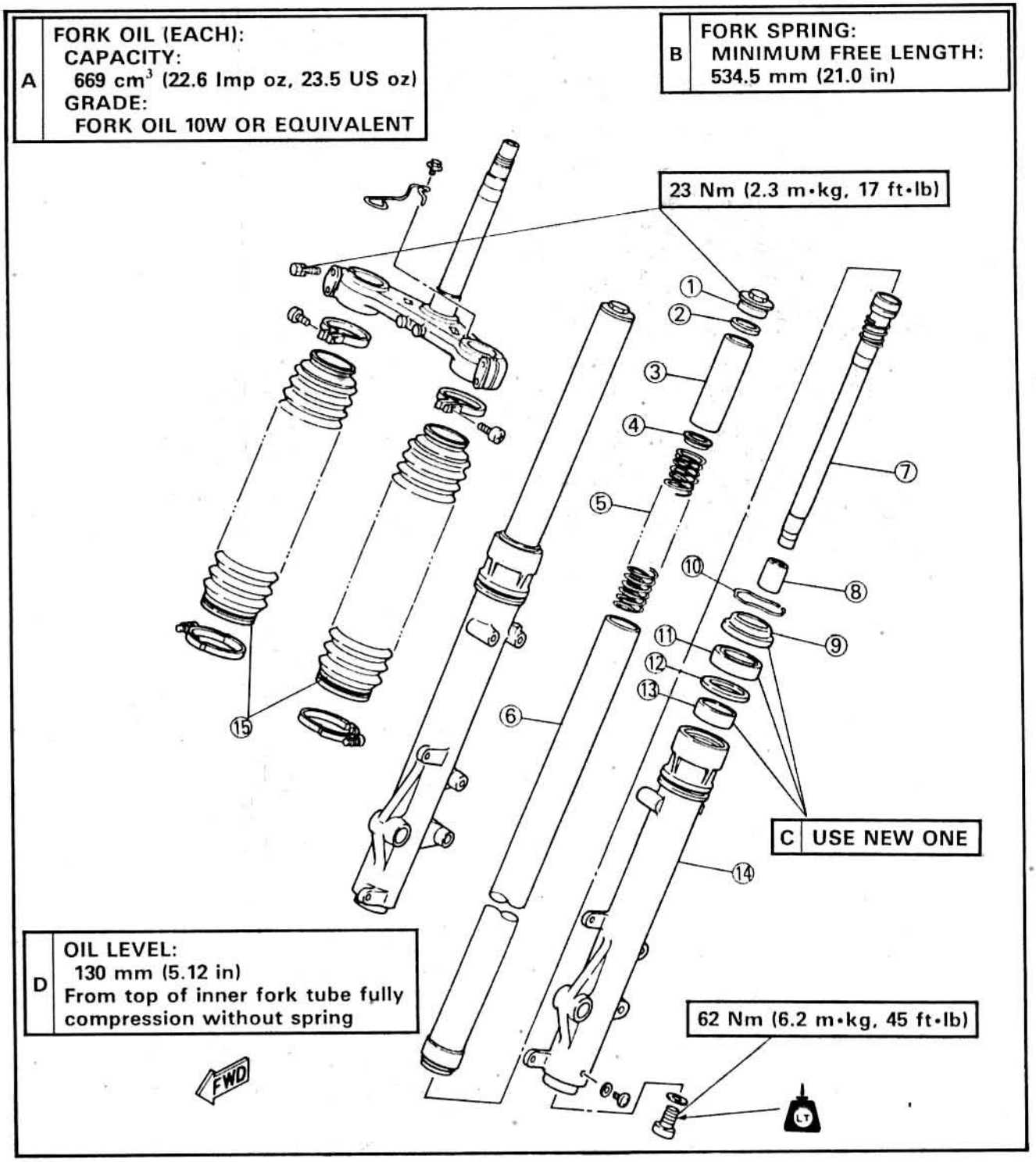
NOTE:

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 disappered.

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

FRONT FORK

① Cap bolt
② O-ring
③ Spacer
④ Spring seat
⑤ Fork spring
⑥ Inner fork tube
⑦ Damper rod
⑧ Oil lock pieces
⑨ Dust seal
⑩ Retaining clip
⑪ Oil seal
⑫ Seal spacer
⑬ Guide bushing
⑭ Outer fork tube
⑮ Fork boot



REMOVAL

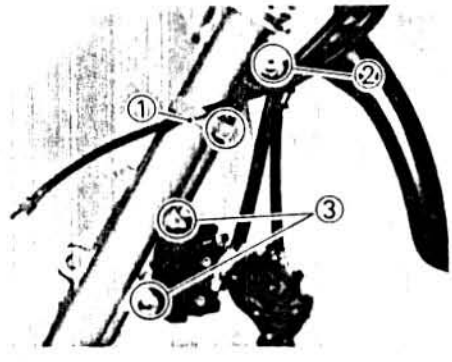
⚠WARNING:

Support the motorcycle securely so there is no danger of it falling over.

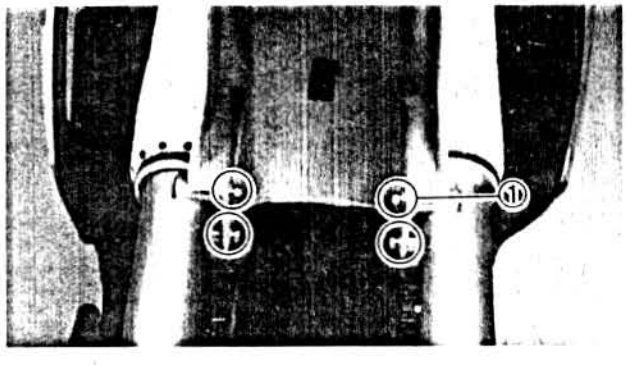
1. Elevate the front wheel by placing a suitable stand under the engine.

2. Remove:
   - Front wheel

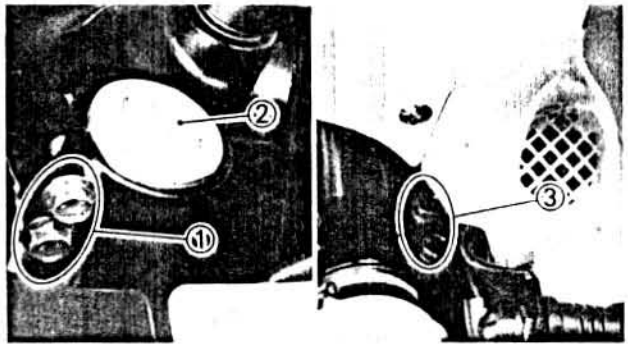
   Refer to the "FRONT WHEEL — REMOVAL" section.



3. Remove:
   - Holder ① (speedometer cable)
   - Holder ② (brake hose)
   - Bolt ③ (brake caliper)



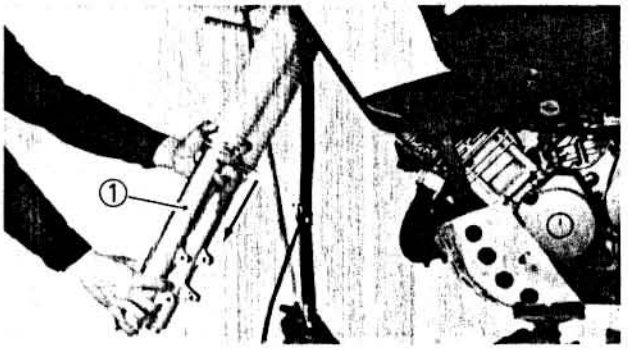
4. Remove:
   - Front fender ①



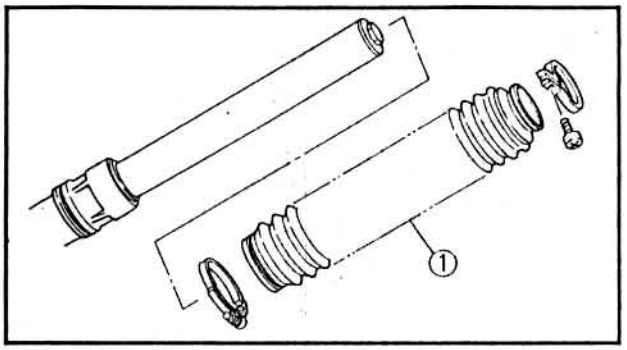
5. Loosen:
   - Pinch bolts ① (handlebar crown)
   - Cap bolts ②
   - Pinch bolts ③ (lower bracket)

⚠WARNING:

Support the fork before loosening the pinch bolt.

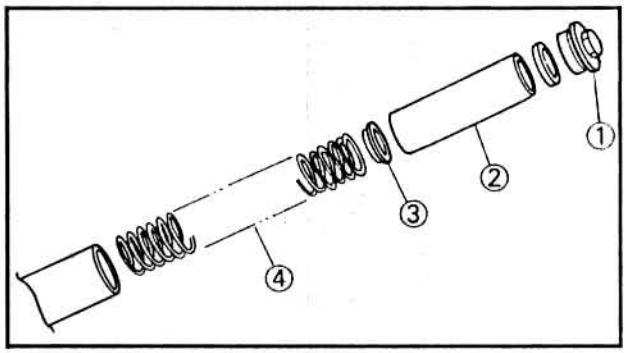


6. Remove:
   • Front fork ①

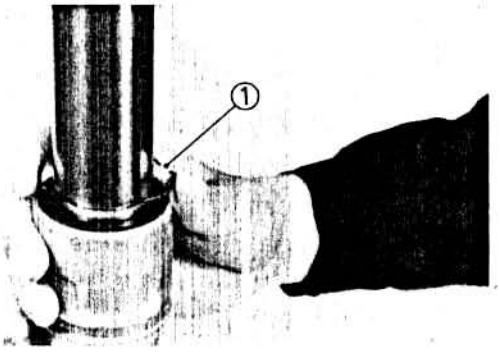


DISASSEMBLY

1. Remove:
   • Fork boot ①



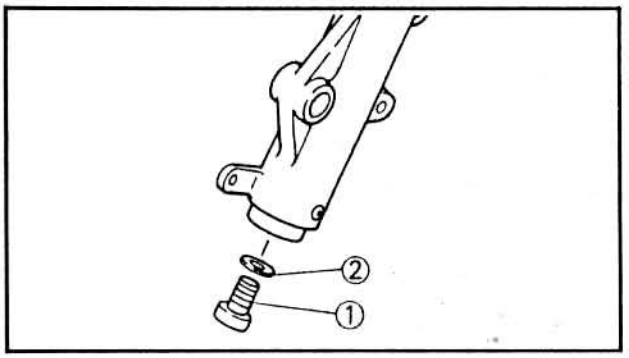
2. Remove:
   • Cap bolt ①
   • Spacer ②
   • Spring seat ③
   • Fork spring ④



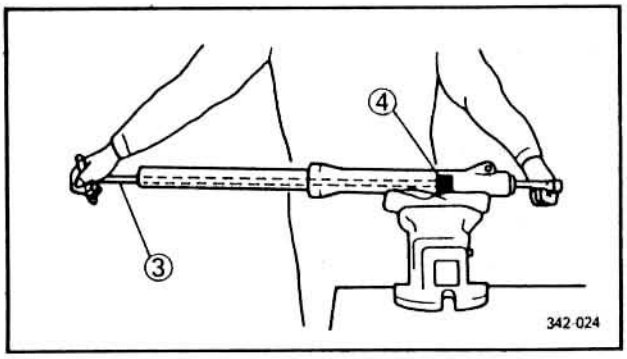
3. Drain:
   • Fork oil
4. Remove:
   • Circlip ①

NOTE:

Use a thin screwdriver, and be careful not to scratch the inner fork tube.



5. Remove:
   • Bolt ① (damper rod)
   • Washer ②

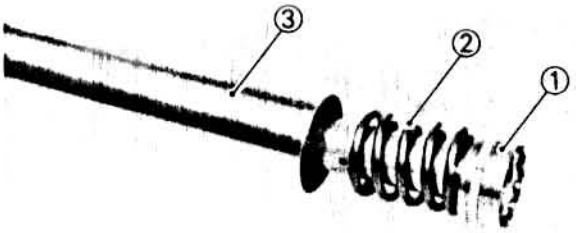


NOTE:

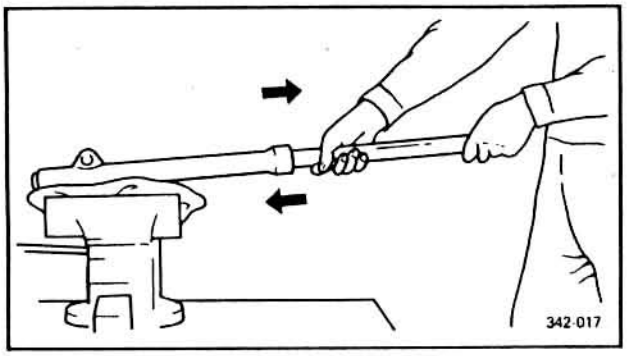
Hold the damper rod to loosen the bolt (damper rod) by the T-handle ③ and holder ④.



T-Handle:
90890-01326
Holder:
90890-01327



6. Remove:
   - Damper rod ①
   - Rebound spring ②
     (Out of inner fork tube ③)

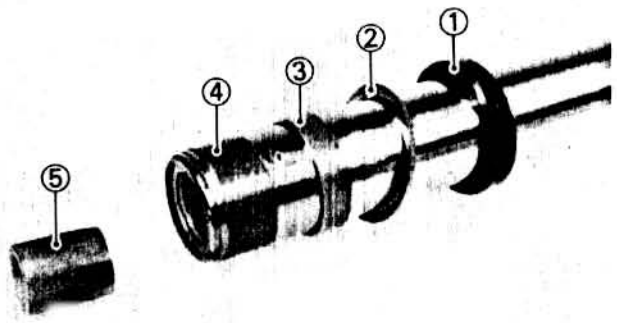


7. Remove:
   - Inner fork tube

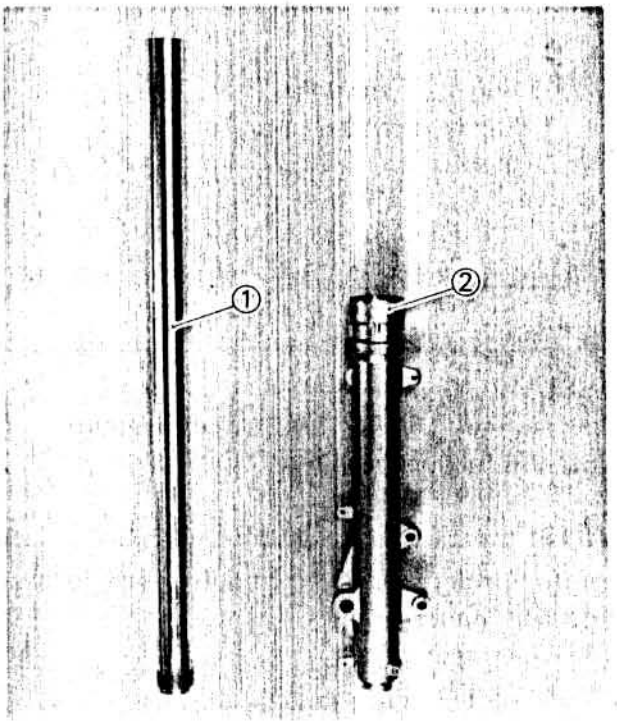
Removal steps:
- Hold the fork leg horizontally.
- Clamp the caliper mounting boss of the outer tube securely in a vise with soft jaws.
- Pull out the inner fork tube from the outer tube by forcefully, but carefully, with drawing the inner tube.

⚠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.**



8. Remove:
   - Oil seal ①
   - Washer ②
   - Guide bush ③
   - Slide metal ④
   - Oil lock piece ⑤



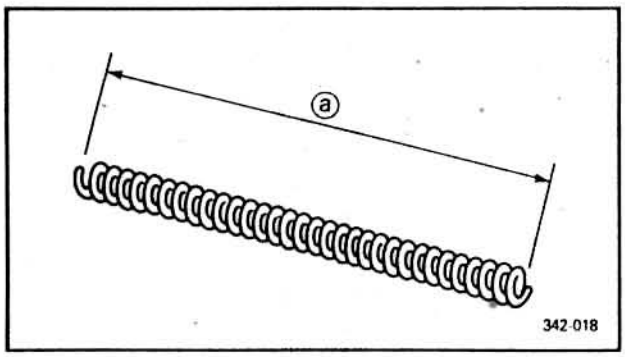
INSPECTION

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 (large) free length ⓐ

   Out of specification → Replace.

Fork spring (large) free length:
544.5 mm (21.4 in)
Minimum free length:
534.5 mm (21.0 in)



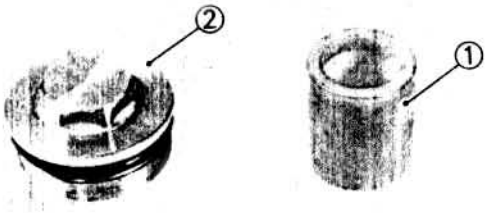
3. Inspect:
   - Damper rod ①

   Wear/Damage → Replace.
   Contamination → Blow out all oil passages with compressed air.
   - Piston ring ②

   Wear/Damage → Replace.



4. Inspect:
   - Rebound spring
     Wear/Damage→Replace.



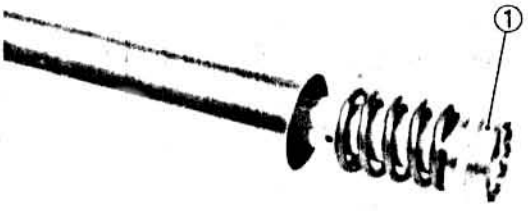
5. Inspect:
   - Oil lock piece ①
   - O-ring ② (cap bolt)
     Damage→Replace.

ASSEMBLY

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

NOTE:

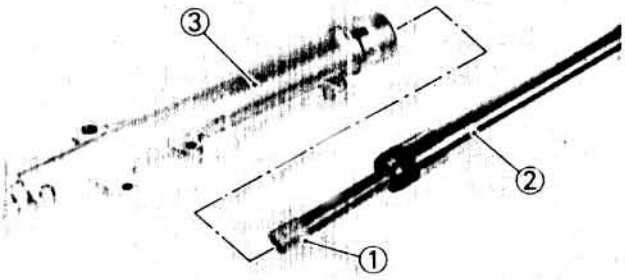
- In front fork reassembly, be sure to use following new parts.
  - * Guide bush
  - * Slide bush
  - * Oil seal
  - * Dust seal
- Make sure all components are clean before reassembly.



1. Install:
   - Damper rod ①

⚠CAUTION:

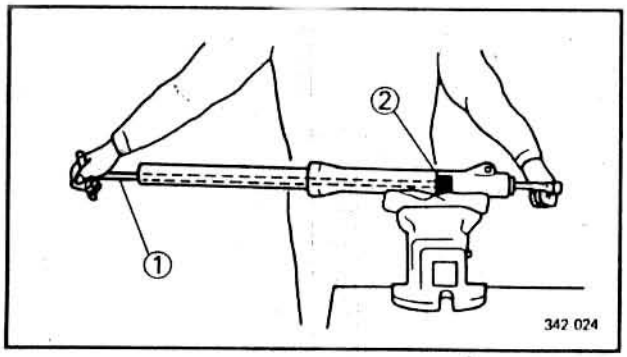
Allow the damper rod to slide slowly down the inner fork tube until it protrudes from the bottom, being careful not to damage the inner fork tube.



2. Install:
   - Oil lock piece ①
3. Lubricate:
   - Inner fork tube ② (outer surface)

	FORK OIL 10W OR EQUIVALENT

③ Outer fork tube

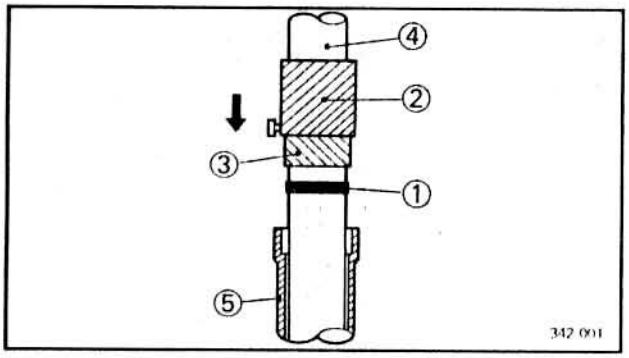


4. Tighten:
   - Bolt (damper rod)

   Use the T-handle ① and holder ② to lock the damper rod.

	T-Handle: **90890-01326** **Holder:** **90890-01327**

	Bolt (damper rod): **62 Nm (6.2 m•kg, 45 ft•lb)** **LOCTITE®.**

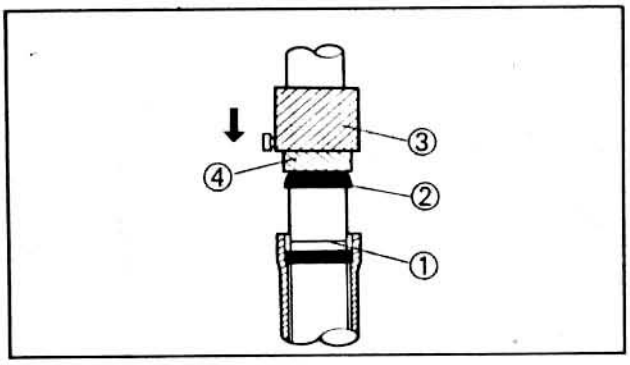


5. Install:
   - Guide bush ①

   Use the fork seal driver weight ② and adapter ③.

	Fork seal driver weight: **90890-01367** **Adapter:** **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.

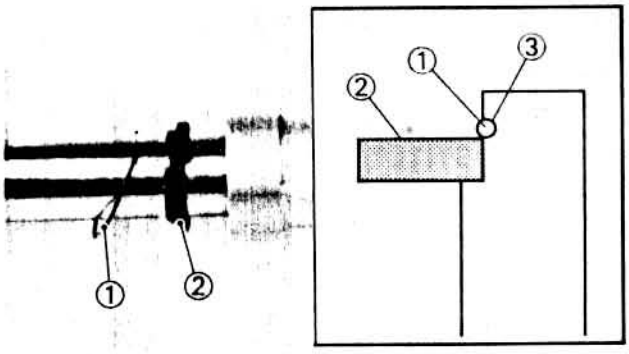
Fork seal driver weight:
90890-01367
Adapter:
90890-01374

⚠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.

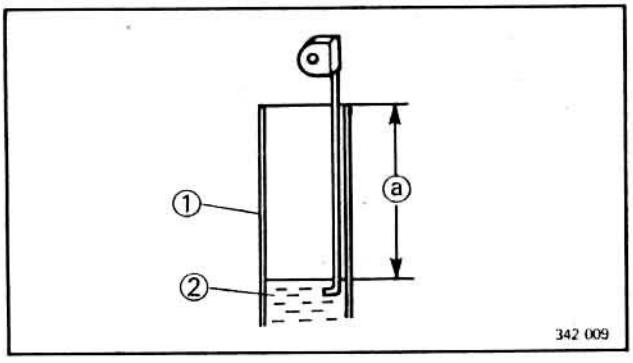


7. Install:
   - Retaining clip ①

NOTE:

Fit the retaining clip ① correctly in the groove ③ in the outer tube.

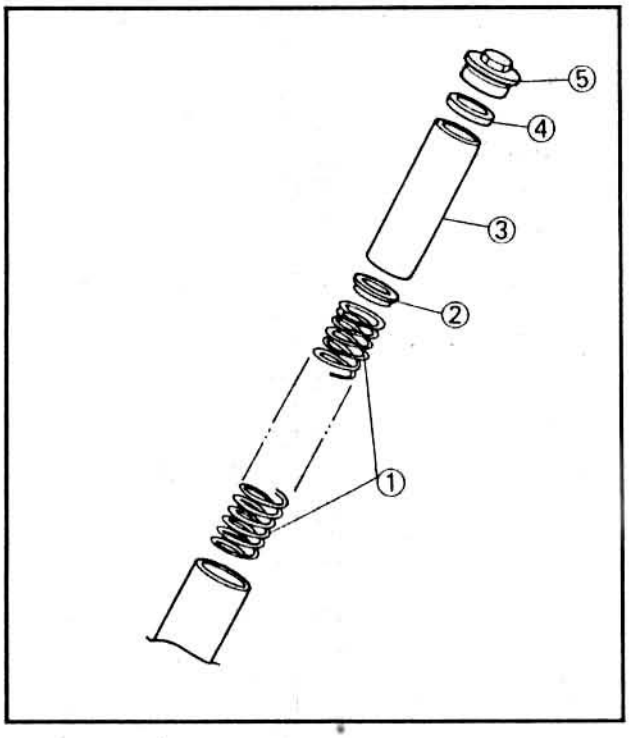
② Dust seal



8. Fill:
   - Front fork

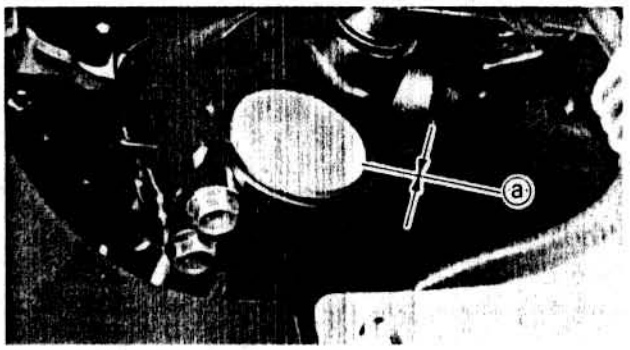
Each fork:
669 cm³ (22.6 Imp oz, 23.5 US oz)
Fork oil 10WT or equivalent
After filling, slowly pump the fork up and down to distribute oil.
Oil level ⓐ:
130 mm (5.12 in)
From the top of inner fork tube fully compressed without spring.

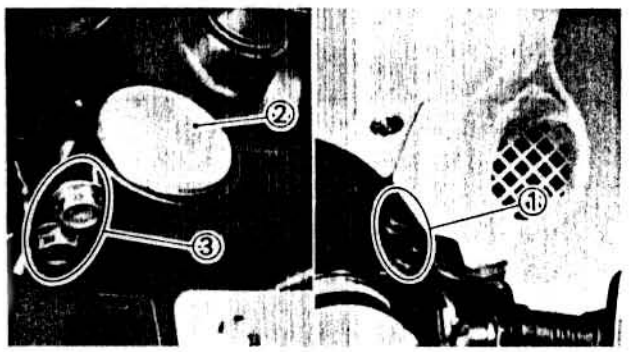
① Inner fork tube
② Fork oil



9. Install:
   - Fork spring ①
   - Spring seat ②
   - Spacer collar ③
   - O-ring ④
   - Cap bolt ⑤

NOTE:
- Before installing the cap bolt, apply the grease to the O-ring ④.
- Temporarily tighten the cap bolt ⑤.





INSTALLATION

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

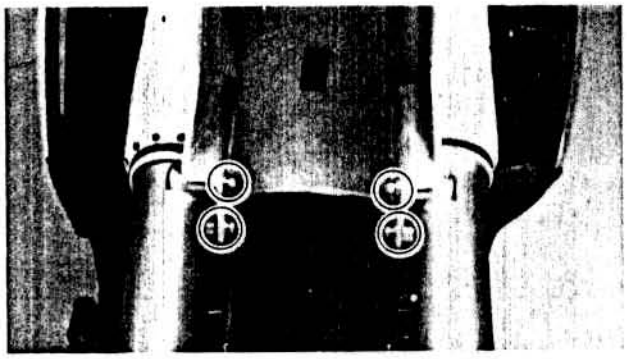
1. Install:
   - Front fork
     Temporary tighten the pinch bolts.

NOTE:
Position the inner fork tube end in such a way that it is flush ⓐ with the top of the handle crown.

2. Tighten:
   - Pinch bolts ① (under bracket)
   - Cap bolt ②
   - Pinch bolts ③ (handle crown)

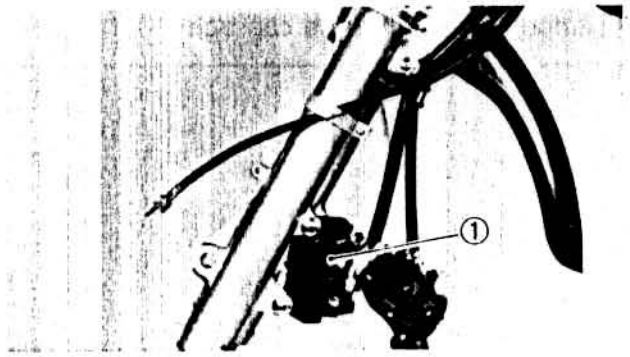


Pinch bolt (under bracket):
23 Nm (2.3 m•kg, 17 ft•lb)
Cap bolt:
23 Nm (2.3 m•kg, 17 ft•lb)
Pinch bolt (handle crown):
23 Nm (2.3 m•kg, 17 ft•lb)



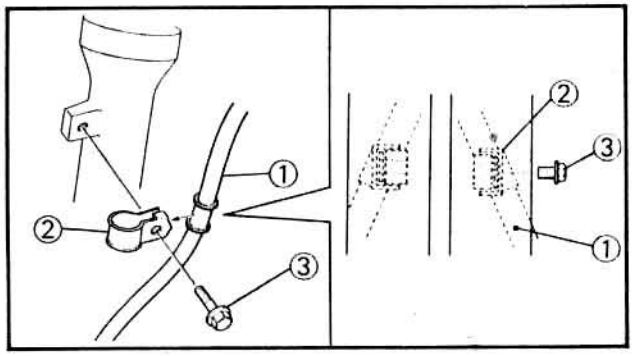
3. Install:
   • Front fender

	Bolt (front fender): **8 Nm (0.8 m•kg, 5.8 ft•lb)**



4. Install:
   • Brake caliper ①

	Bolt (brake caliper): **35 Nm (3.5 m•kg, 25 ft•lb)**



5. Install:
   • Brake hose ①
   • Brake hose holder ②
   • Bolt ③

⚠WARNING:

When fitting the brake hose, start on the outside of the caliper and pass on its inside.

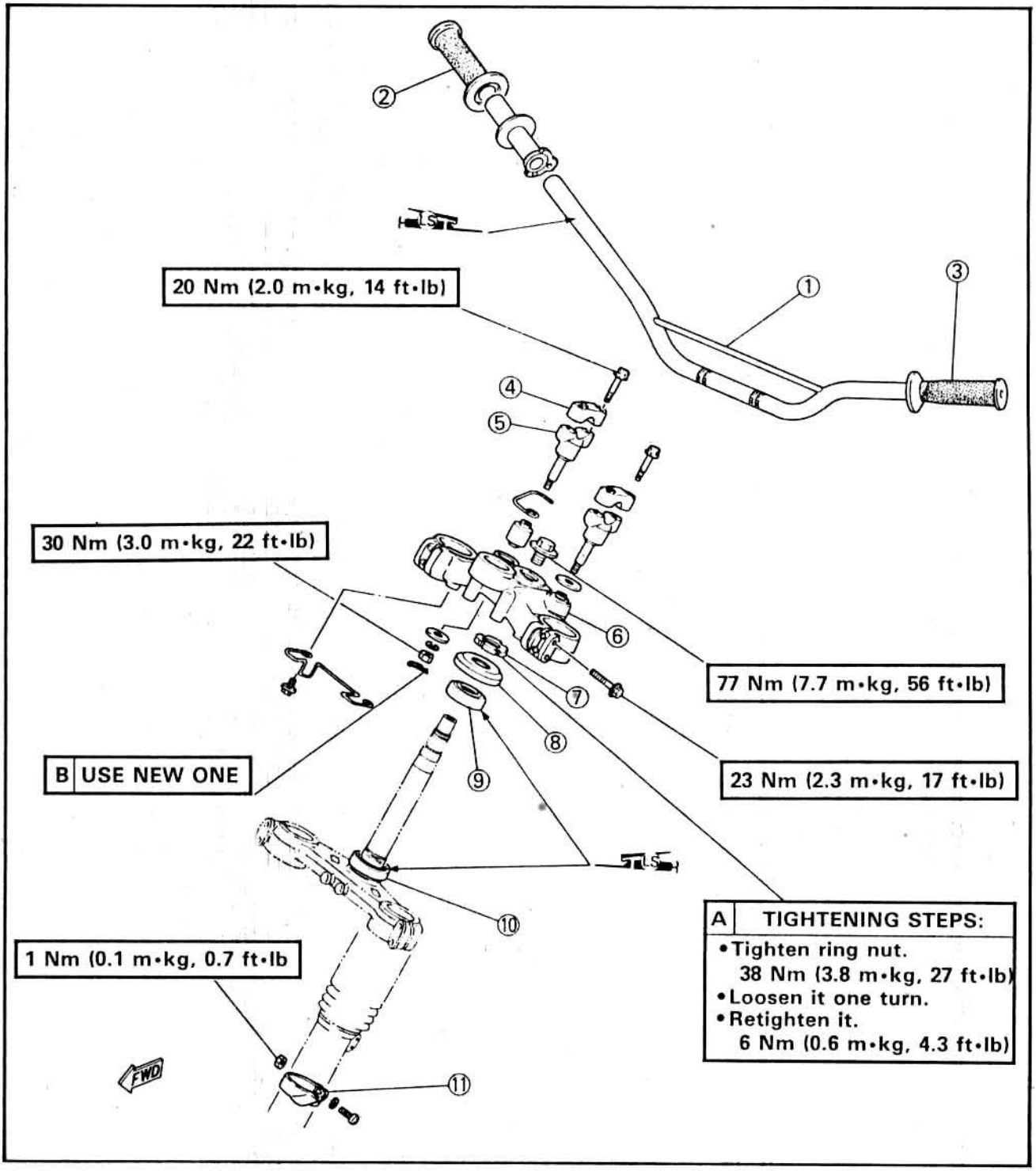
6. Install:
   • Front wheel

	Nut ① (wheel axle): **110 Nm (11.0 m•kg, 80 ft•lb)**

Refer to the "FRONT WHEEL — INSTALLATION" section.

STEERING HEAD AND HANDLEBER

① Handlebar
② Handlebar grip (right)
③ Handlebar grip (left)
④ Handlebar holder (upper)
⑤ Handlebar holder (lower)
⑥ Handle crown
⑦ Ring nut
⑧ Cover
⑨ Bearing (upper)
⑩ Bearing (lower)
⑪ Cable holder (speedometer cable)



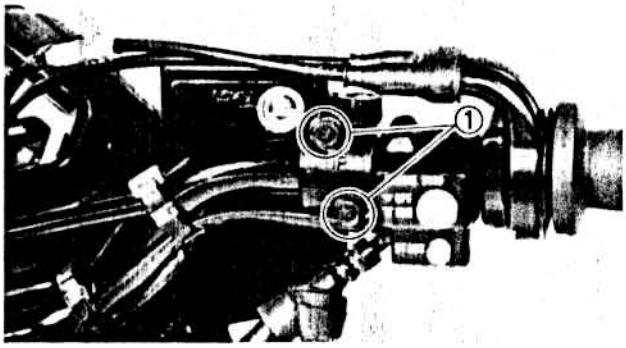
REMOVAL

⚠WARNING:

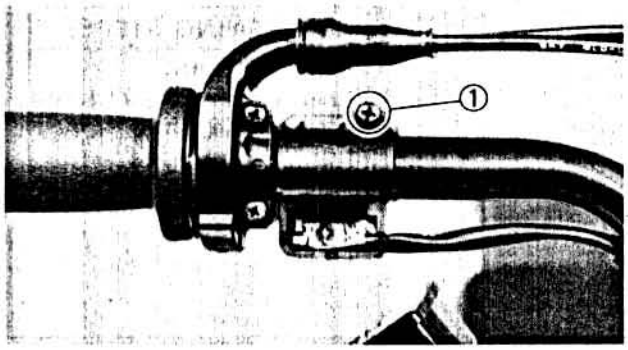
Securely support the motorcycle so there is no danger of it falling over.

1. Elevate the front wheel by placing a suitable stand under the engine.

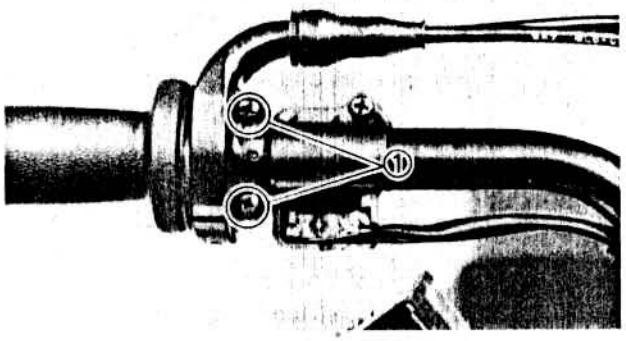
2. Remove:
   - Front wheel
     Refer to the "FRONT WHEEL—REMOVAL" section in the CHAPTER 6.
   - Front fender
   - Side cowling (left and right)
     Refer to the "SEAT, FUEL TANK AND COVER" section in the CHAPTER 3.
   - Front fork
     Refer to the "FRONT FORK—REMOVAL" section in the CHAPTER 6.



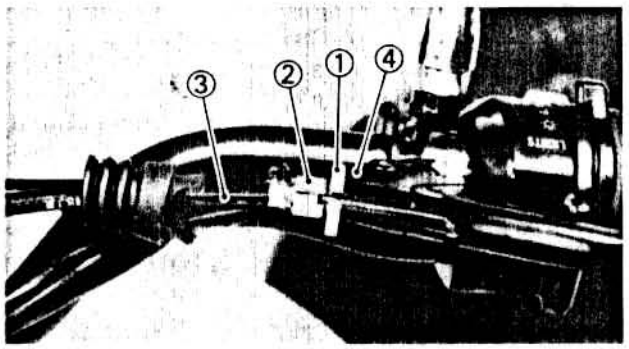
3. Remove:
   - Bolt ① (master cylinder)



4. Remove:
   - Screw ① (handlebar switch-right)

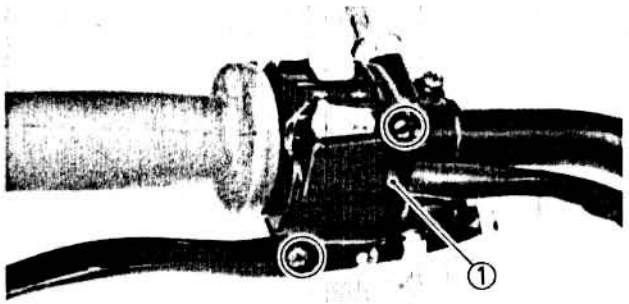


5. Loosen:
   • Screw ① (throttle grip)

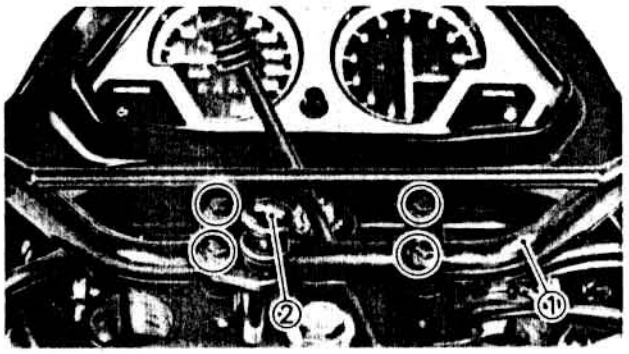


6. Loosen:
   • Locknut ① (clutch cable)
   • Adjuster ② (clutch cable)

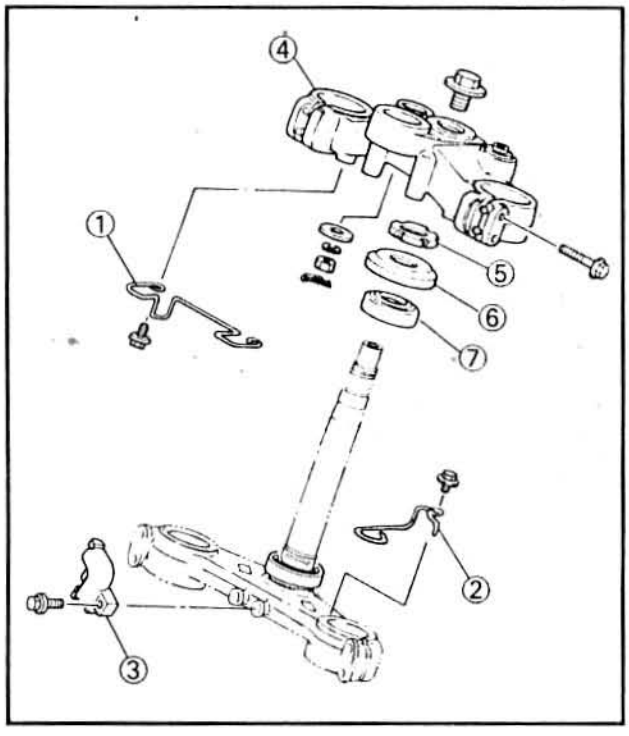
7. Remove:
   • Clutch cable ③
   • Clutch switch ④



8. Remove:
   • Handlebar switch ① (left)



9. Remove:
   • Handlebar ①
   • Starter knob ②



10. Remove:
- Holder ①
- Holder (speed meter cable) ②
- Brake hose ③
- Handlebar crown ④
- Ring nut ⑤
- Bearing cover ⑥
- Bearing (upper) ⑦

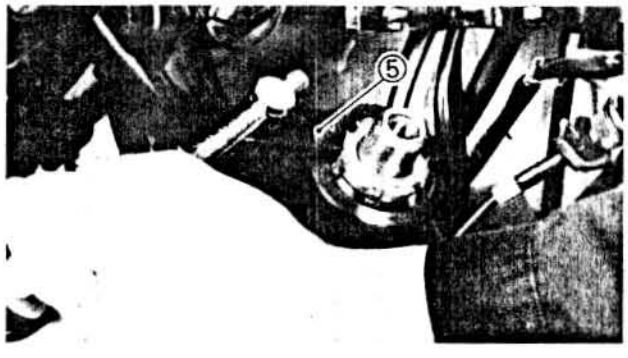
NOTE:

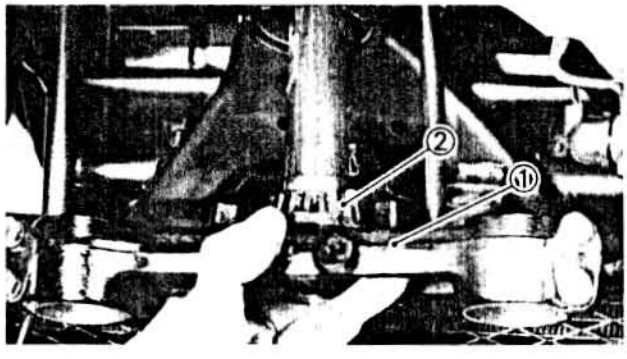
Remove the ring nut by the Ring nut wrench ⑤.

Ring nut wrench:
90890-01268

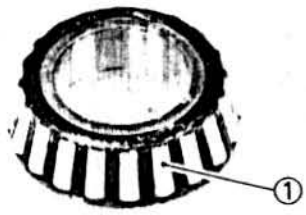
⚠WARNING:

Support the lower bracket so that it may not fall down.



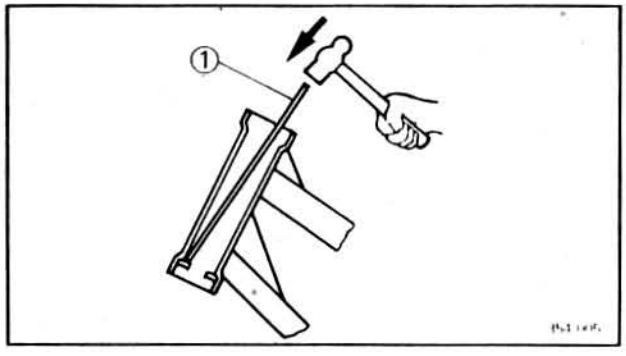


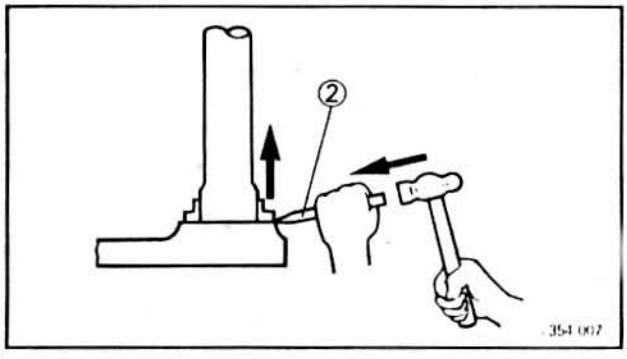
11. Remove:
- Lower bracket ①
- Bearing ② (lower)



INSPECTION

1. Wash the bearings with a solvent.
2. Inspect:
   - Bearing ①
     Pitting/Damage → Replace.





Bearing race replacement 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
     Bends/Cracks/Damage → Replace.



⚠WARNING:

Do not attempt to straighten a bent handlebar as this may dangerously weaken the handlebar.

Handlebar replacement steps:
- Remove the handlebar grip and lever holder.
- Install the lever holder to a new handlebar.
- Apply a light coat of an adhesive for rubber on the left handlebar end.
- Install the handlebar grip.

NOTE:

Wipe off excess adhesive with a clean rag.

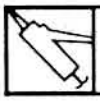
⚠WARNING:

Leave the handlebar intact until the adhesive becomes dry enough to make the grip and handlebar stuck securely.

INSTALLATION

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

1. Lubricate:
   - Bearings (upper and lower)
   - Bearing races



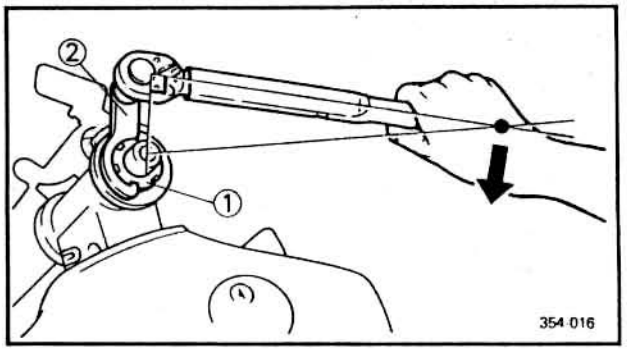
Wheel bearing grease

2. Install:
   - Bearing (lower) (onto steering stem)
   - Steering stem

⚠CAUTION:

Hold the steering stem until it is secured.

   - Bearing (upper)
   - Bearing cover
   - Ring nut



3. Tighten:
   • Ring nut ①

Tightening steps:
• Tighten the ring nut using the ring nut wrench ②.

Ring nut wrench:
90890-01403

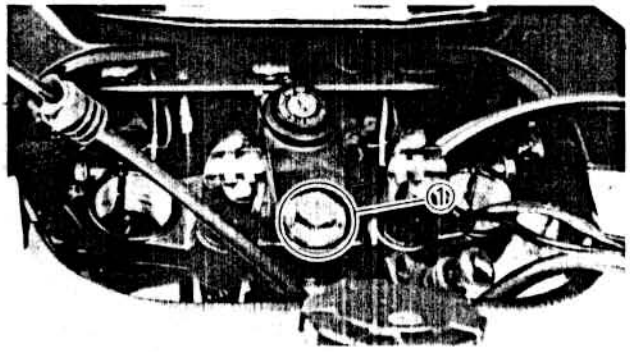
NOTE:
Set the torque wrench to the ring nut wrench so that they form a right angle.

Ring nut (initial tightening):
38 Nm (3.8 m•kg, 27 ft•lb)

• Loosen the ring nut one turn.
• Retighten the ring nut using the ring nut wrench.

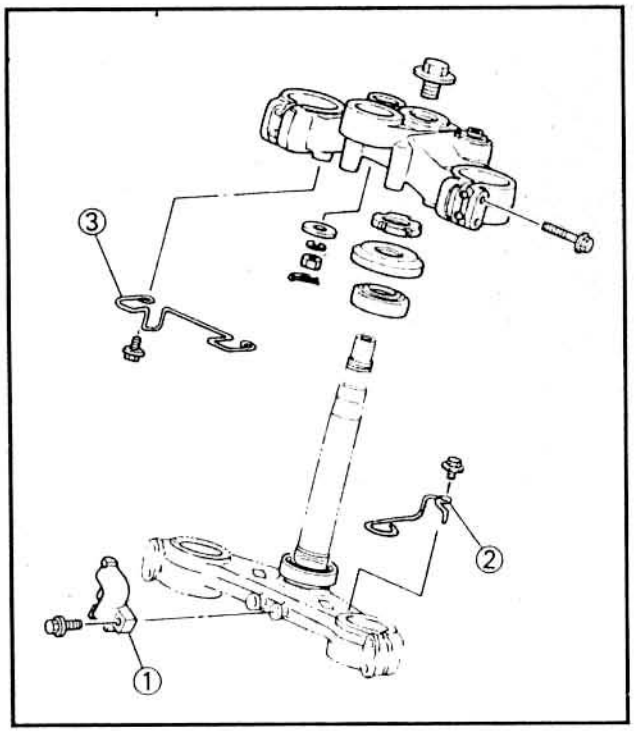
⚠WARNING:
Avoid over-tightening.

Ring nut (final tightening):
6 Nm (0.6 m•kg, 4.3 ft•lb)



4. Install:
   • Handlebar crown

NOTE:
Temporary tighten the steering fitting bolt ①.



5. Install:
   - Brake hose ①
   - Holder (speed meter cable) ②
   - Holder ③

6. Install:
   - Front fork

   Refer to the "FRONT FORK—INSTALLATION" section.

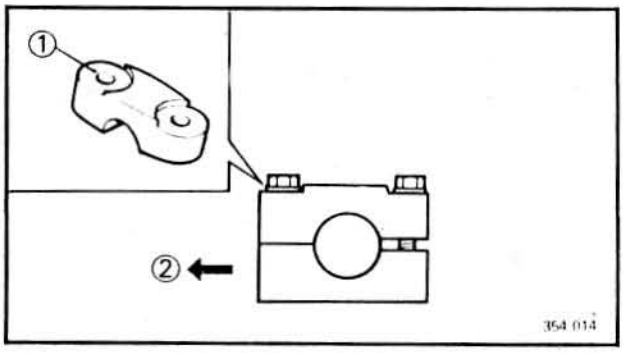
	Pinch bolt (lower bracket): **23 Nm (2.3 m•kg, 17 ft•lb)** **Pinch bolt (handlebar crown):** **23 Nm (2.3 m•kg, 17 ft•lb)**

7. Tighten:
   - Steering fitting bolt

	Steering fitting bolt: **77 Nm (7.7 m•kg, 56 ft•lb)**

8. Install:
   - Handlebars
   - Starter knob

	Bolt (handlebars): **20 Nm (2.0 m•kg, 14 ft•lb)**



NOTE:

The upper handlebar holder should be installed with the punched mark ① forward.

② Forward

⚠CAUTION:

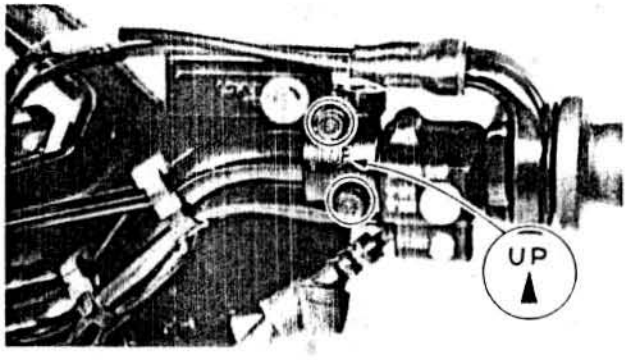
First tighten the bolts on the front side of the handlebar holder, and then tighten the bolts on the rear side.



NOTE:

Before installing the handlebar onto the handlebar crown, apply a light coat of lithium soap base grease onto the handlebar end and install the throttle grip to the handlebar.

9. Install:
   - Throttle grip
   - Handlebar switch (right)



10. Install:
    - Brake master cylinder

NOTE:

- Install the master cylinder bracket with the "UP" mark facing upward.
- Tighten first the upper bolt, then the lower bolt.

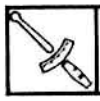
	Bolts (master cylinder bracket): 10 Nm (1.0 m•kg, 7.2 ft•lb)

11. Install:
    • Clutch cable

NOTE:

Apply a light coat of lithium soap base grease onto the clutch cable end.

12. Install:
    • Front wheel
    Refer to "FRONT WHEEL—INSTALLATION" section.



Axle nut:
110 Nm (11.0 m•kg, 80 ft•lb)

13. Adjust:
    • Clutch cable free play

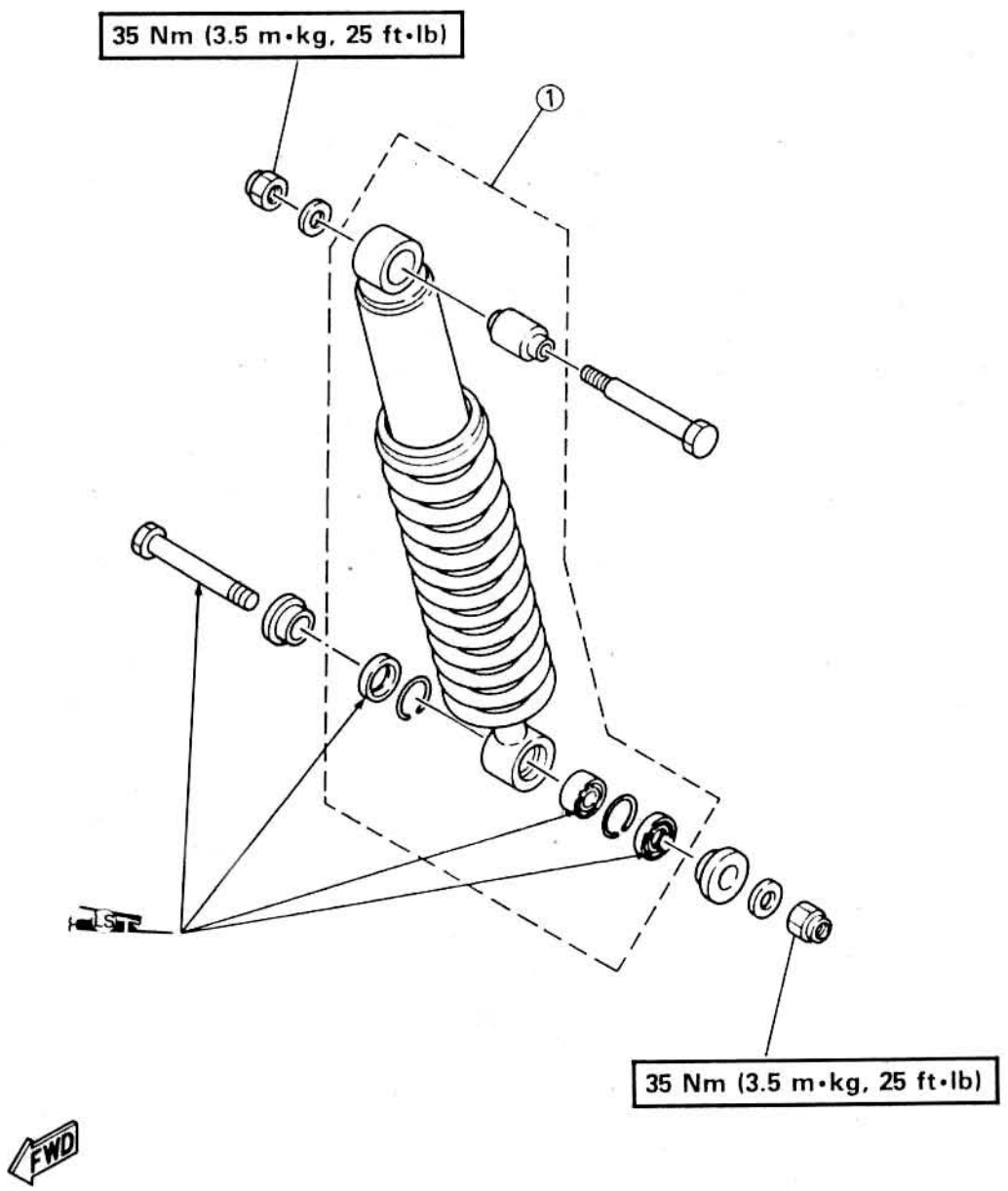


Free play:
10 ~ 15 mm (0.4 ~ 0.6 in)
At lever end

Refer to "CLUTCH ADJUSTMENT" section in CHAPTER 3.

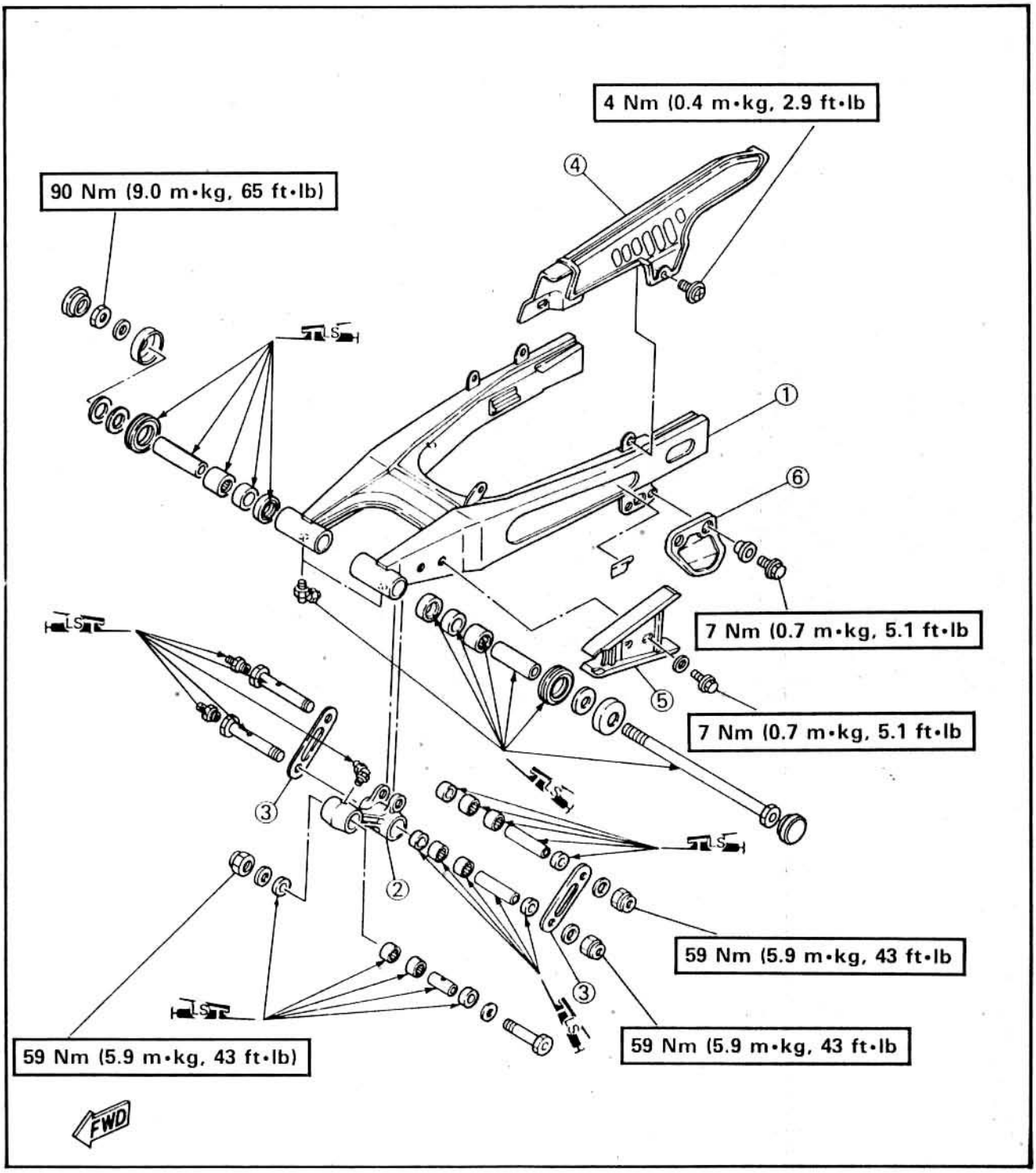
REAR SHOCK ABSORBER AND SWINGRAM

① Rear shock absorber assembly



REAR SHOCK ABSORBER AND SWINGARM

① Swingarm
② Relay arm
③ Connecting arm
④ Chain case
⑤ Chain protector
⑥ Chain guide

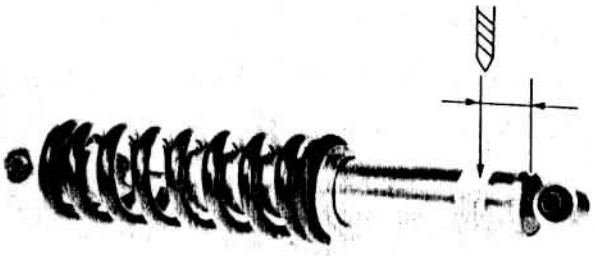


HANDLING NOTES

⚠WARNING:

This shock absorber contains highly pressurized 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.

- **Do not tamper with or attempt to open the cylinder assembly.**
- **Do not subject shock absorber to an open flame or other high heat source. This may cause the unit to explode due to excessive gas pressure.**
- **Do not deform or damage the cylinder in any way. Cylinder damage will result in poor damping performance.**
- **Take care not to scratch the contact surface of the piston rod with the cylinder; or oil could leak out.**
- **When scrapping the shock absorber, Refer to the "NOTES ON DISPOSAL" section.**



NOTES ON DISPOSAL

Shock absorber disposal steps:
Gas pressure must be released before disposing of shock absorber. To do so, drill a 2 ~ 3 mm (0.08 ~ 0.12 in) hole through the cylinder wall at a point 15 ~ 20 mm (0.6 ~ 0.8 in) from the end of the gas chamber.

⚠WARNING:

Wear eye protection to prevent eye damage from escaping gas and/or metal chips.

REMOVAL

Rear Shock Absorber

1. Elerate the rear wheel by placing a suitable stand under the engine.

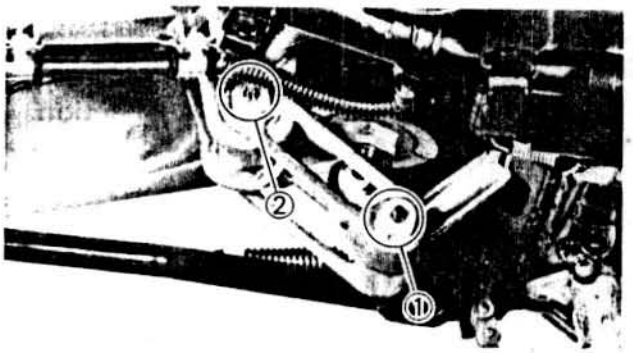
⚠WARNING:

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

2. Remove:
   - Side cowling (left and right)
   - Side cover (left and right)
   - Seat
   - Fuel tank

   Refer to the "SEAT, FUEL TANK AND COVER" section in the CHAPTER 3.
   - Rear wheel

   Refer to the "REAR WHEEL" section.



3. Remove:
   - Bolt ① (connecting arm and relay arm)
   - Bolt ② (connecting arm and rear arm)



4. Remove:
   - Bolt ① (shock absorber—top)
   - Bolt ② (shock absorber—lower)
   - Rear shock absorber ③

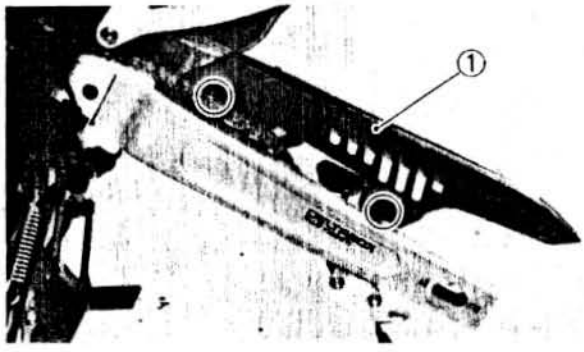
Swingarm

⚠WARNING:

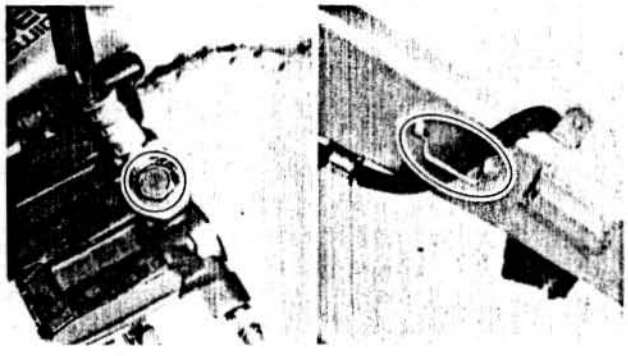
Securely support the motorcycle so there is no danger of it falling over.

1. Elevate the rear wheel by placing a suitable stand under the engine.

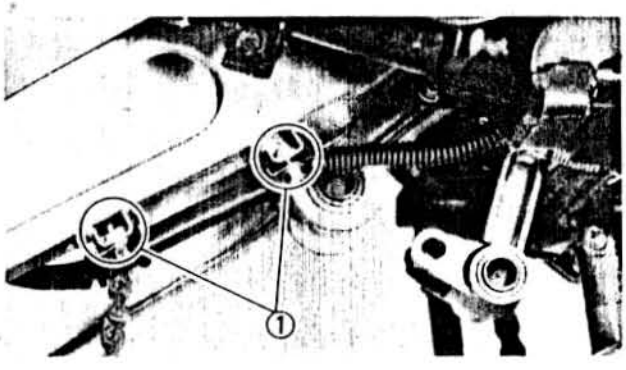
2. Remove:
   • Rear shock absorber
   Refer to the "REAR SHOCK ABSORBER" section.



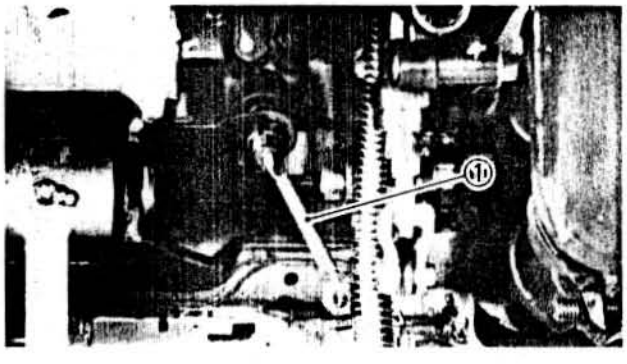
3. Remove:
   • Chain case (1)



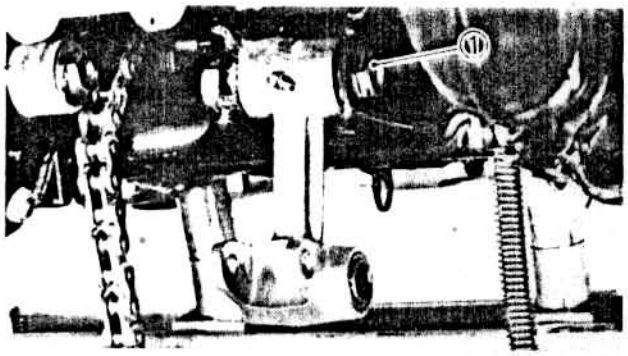
4. Remove:
   • Brake hose
   Refer to the "FRONT AND REAR BRAKE" section.



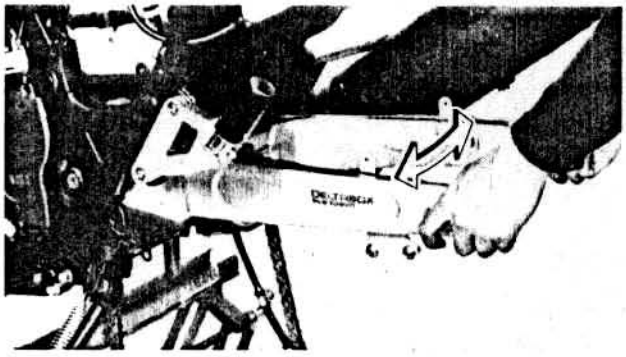
5. Remove:
   • Bolts (1) (hose clamp)



6. Remove:
   • Spring (1) (brake light switch)



7. Remove:
   - Bolt ① (relay arm)



8. Check:
   - Swingarm free play

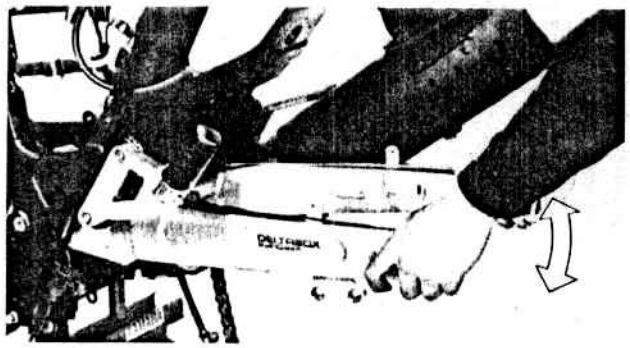
Inspection steps:
- Check the tightening torque of the pivot shaft (swingarm) securing nut.

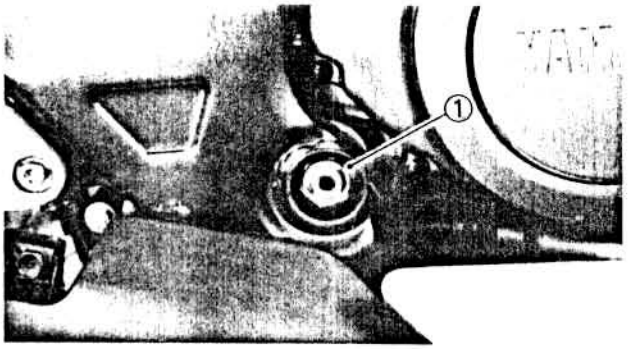
Nut (swingarm-pivot shaft):
90 Nm (9.0 m•kg, 65 ft•lb)

- 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.

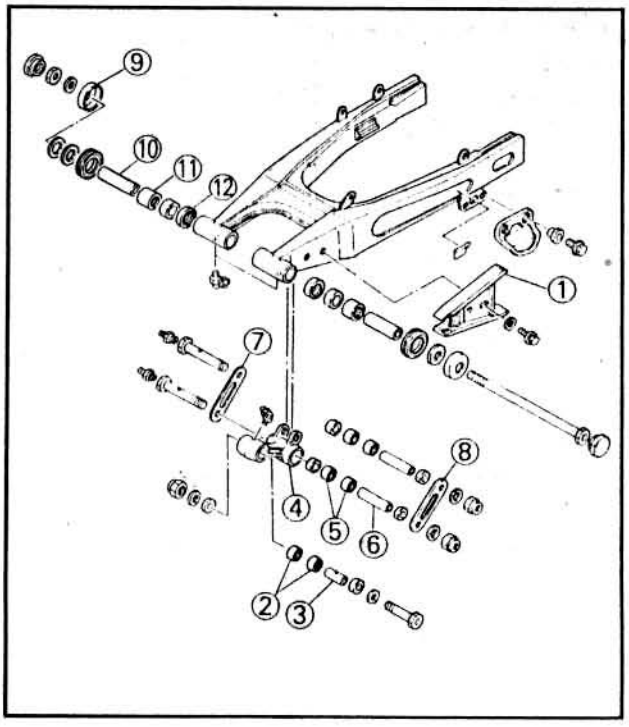
Side play (at end of swingarm):
1.0 mm (0.04 in)

- 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.





9. Remove:
   - Nut (pivot shaft) ①
   - Washer
   - Pivot shaft
   - Swingarm ②

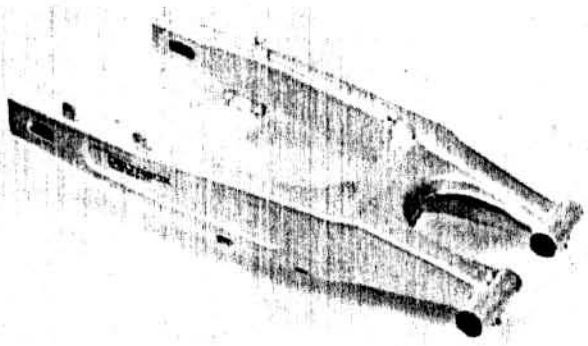


10. Remove:
- Chain protector (1)
- Bearings (2) (Relay arm)
- Collar (3) (Relay arm)
- Relay arm (4)
- Bearings (5) (connecting arm)
- Collars (6) (connecting arm)
- Connecting arm 1 (7)
- Connecting arm 2 (8)
- Thrust covers (9) (swingarm)
- Collars (10) (swingarm)
- Bearings (11) (swingarm)
- Oil seals (12) (swingarm)

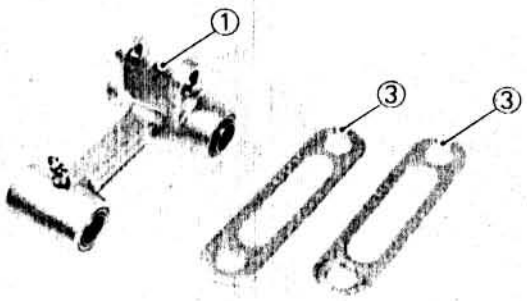
INSPECTION

1. Inspect:
- Shock absorber
  Oil leaks/Damage → Replace.



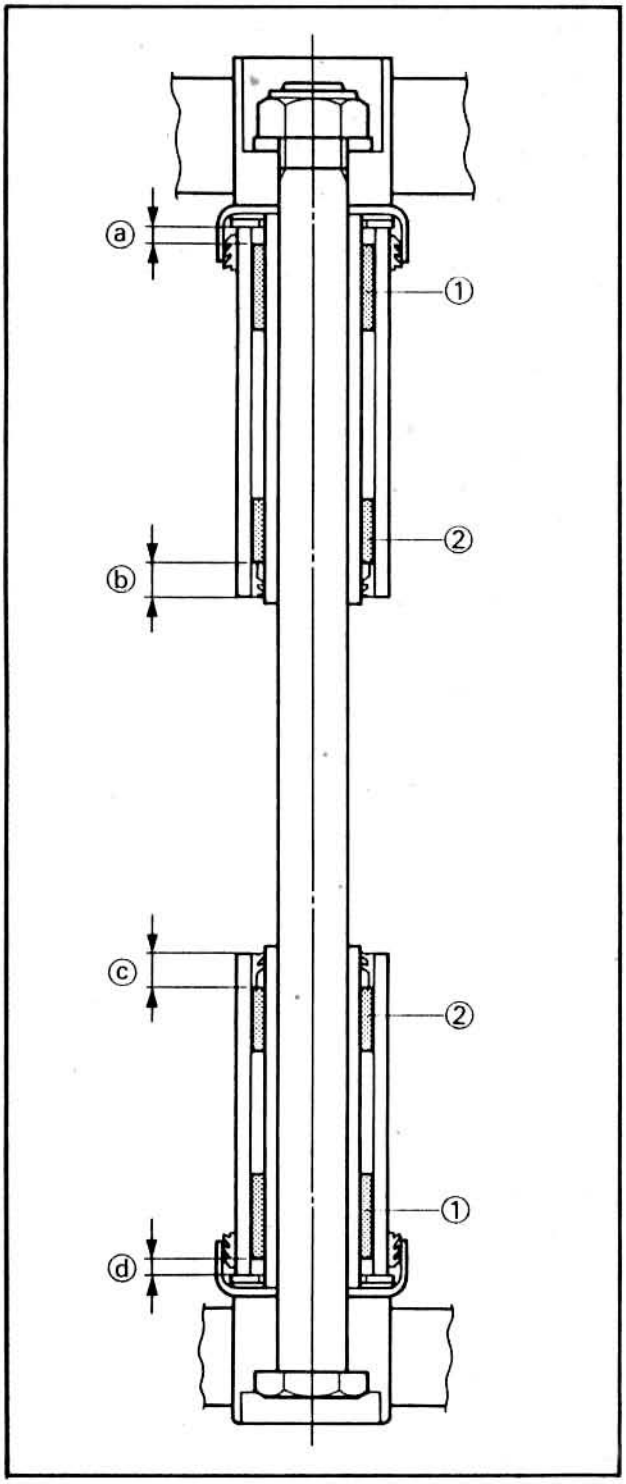


2. Inspect:
- Swingarm
  Bends/Cracks/Damage → Replace.



3. Inspect:
- Relay arm (1)
- Connecting arm 1 (2)
- Connecting arm 2 (3)
  Bends/Cracks/Damage → Replace.

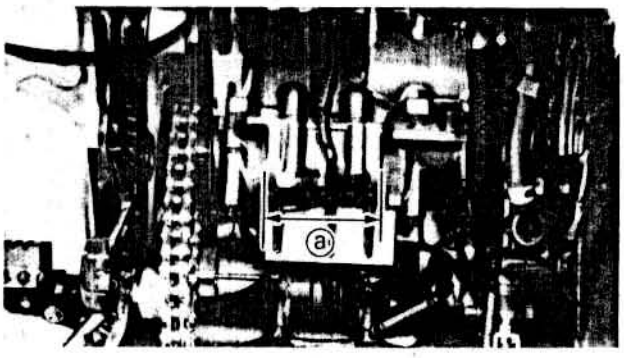
4. Inspect:
   - Oil seal
     Damage → Replace.
   - Thrust cover
     Damage → Replace.
   - Bush
     Scratches/Damage → Replace.
   - Bearing
     Pitting/Damage → Replace.



NOTE:

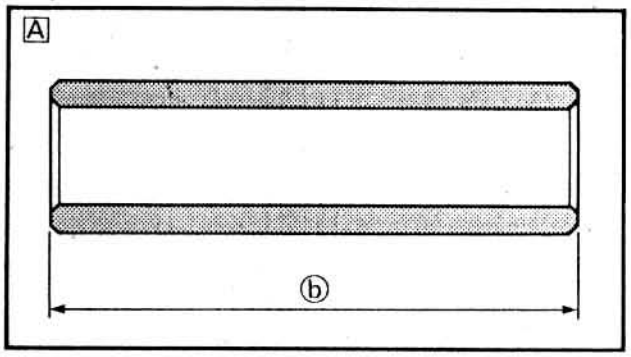
When replacing the bearing and bush of swingarm pivot, install new bearing ① and bush ② as shown.

ⓐ : 4 mm (0.16 in)
ⓑ : 8 mm (0.32 in)
ⓒ : 8 mm (0.32 in)
ⓓ : 4 mm (0.16 in)



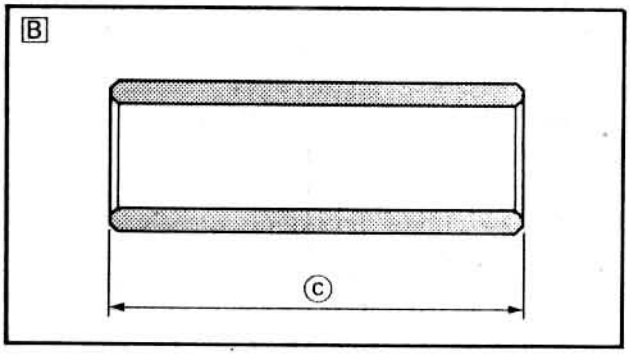
SIDE CLEARANCE ADJUSTMENT

1. Measure:
   • Engine mounting boss width ⓐ



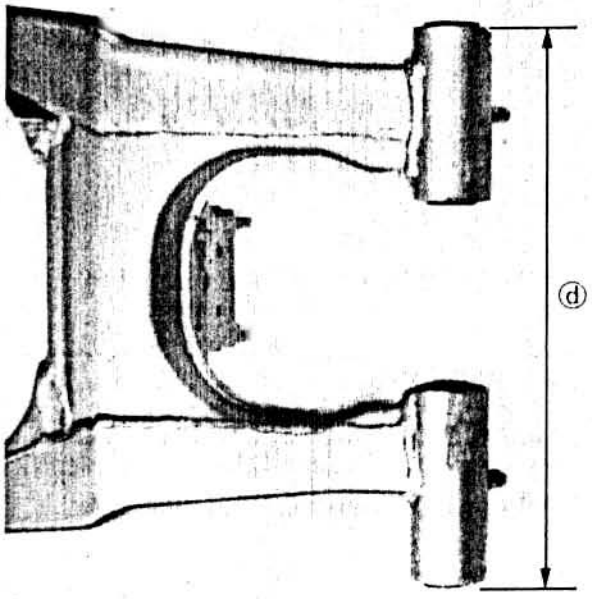
2. Measure:
   • Bush length ⓑ and ⓒ
   Out of specification → Replace.

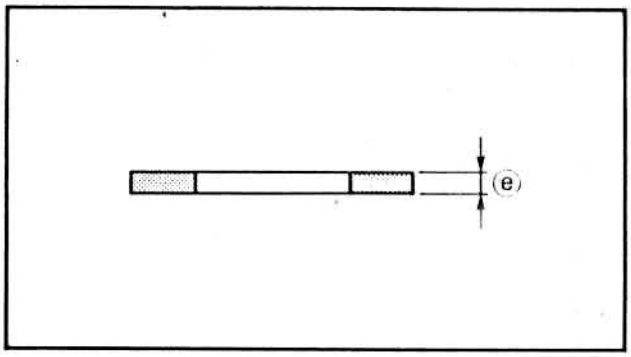
Specified length:
b: 90.95 ~ 91.10 mm (3.581 ~ 3.587 in)
c: 80.95 ~ 81.10 mm (3.187 ~ 3.193 in)



[A] Bush (right-hand)
[B] Bush (left-hand)

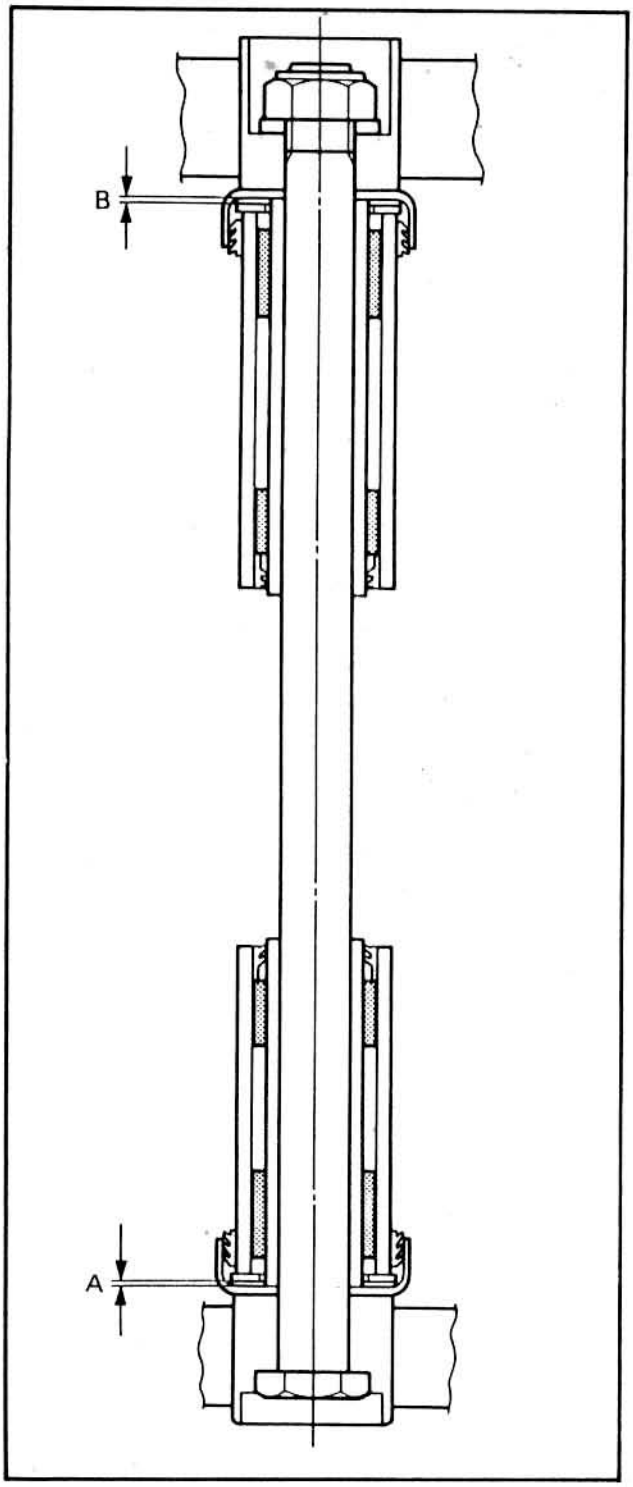
3. Measure:
   • Pivot width ⓓ





4. Measure:
   • Washer thickness ⓔ
   Out of specification → Replace.

Washer thickness:
1.90 ~ 2.00 mm (0.075 ~ 0.079 in)



5. Calculate:
   • Swingarm side clearance
   Out of specification → Adjust side clearance using shim.
   By using formula given below.

Side clearance:
= (ⓐ + ⓑ + ⓒ) − (ⓓ + ⓔ × 2)

Side clearance: A + B
0.4 ~ 0.7 mm (0.016 ~ 0.028 in)

Example:

a. If the engine mounting boss width ⓐ, bush length ⓑ, ⓒ are below.

ⓐ : 79.2 mm (3.12 in)
ⓑ : 90.95 mm (3.58 in)
ⓒ : 80.95 mm (3.19 in)

b. If the pivot width ⓓ and washer thickness ⓔ are below.

ⓓ : 246.5 mm (9.70 in)
ⓔ : 1.90 mm (0.07 in)

Side Clearance
= (79.2 + 90.95 + 80.95) − (246.5 + 1.90 × 2)
= 0.8 mm (0.03 in)

Shim thickness:
0.3 mm (0.012 in)

0.8 mm − 0.7 mm = 0.1 mm

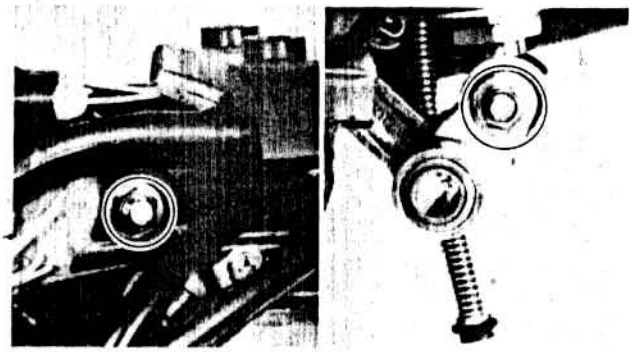
Then, install the one shim.

INSTALLATION

Rear Shock Absorber

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

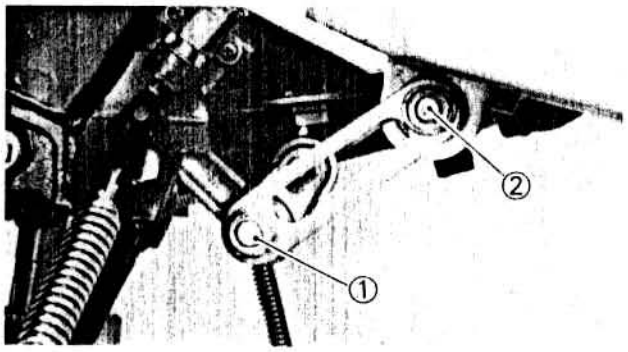
1. Lubricate:
   - Bearings
   - Oil seals
   - Collars
   - Bushings



	Lithium soap base grease

2. Install:
   - Rear shock absorber

	Nut (shock absorber—top): **35 Nm (3.5 m•kg, 25 ft•lb)** **Nut (shock absorber—lower):** **35 Nm (3.5 m•kg, 25 ft•lb)**



3. Tighten:
   - Nut (1) (connecting arm and relay arm)
   - Nut (2) (connecting arm and rear arm)

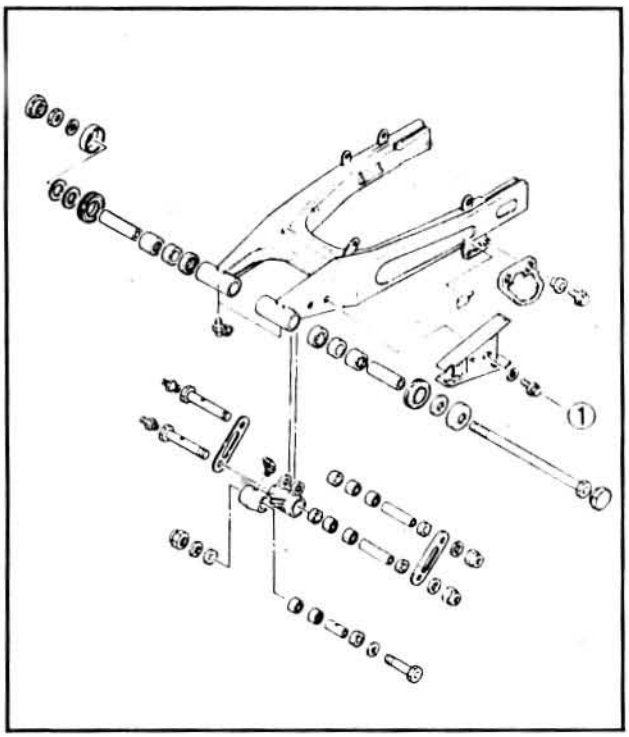
	Nut (connecting arm and relay arm): **59 Nm (5.9 m•kg, 43 ft•lb)** **Nut (connecting arm and rear arm):** **59 Nm (5.9 m•kg, 43 ft•lb)**

Swingarm

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

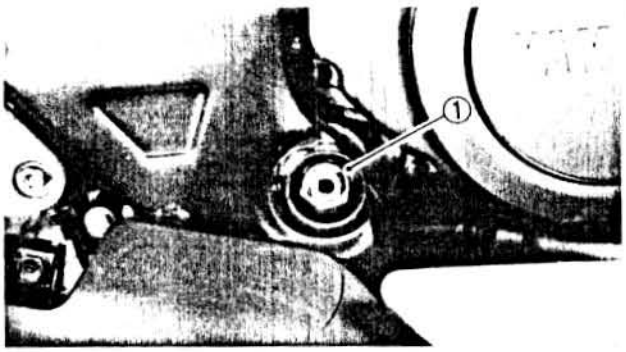
1. Lubricate:
   - Bearings
   - Inner collars
   - Thrust washers
   - Pivot shaft

	Lithium soap base grease



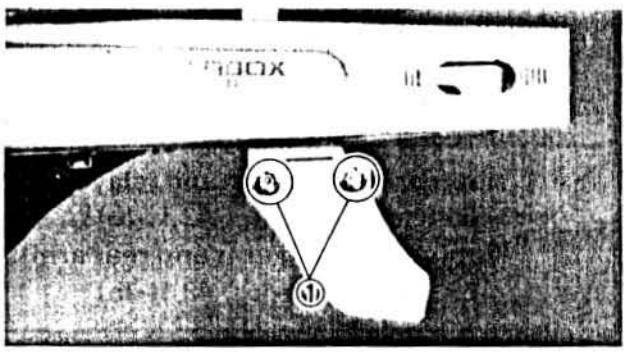
2. Tighten:
   • Bolt (1) (chain protector)

	Bolt (1) (chain protector): 7 Nm (0.7 m•kg, 5.1 ft•lb)



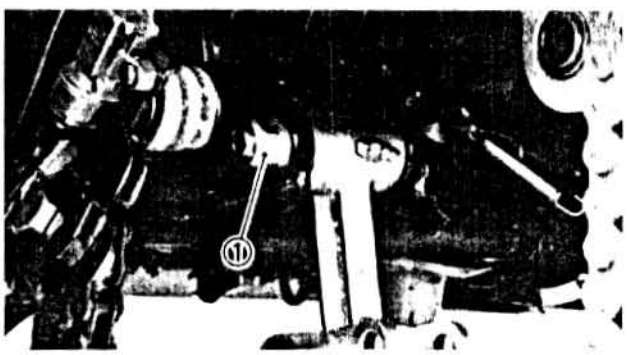
3. Tighten:
   • Nut (1) (pivot shaft)

	Nut (1) (pivot shaft): 90 Nm (9.0 m•kg, 65 ft•lb)



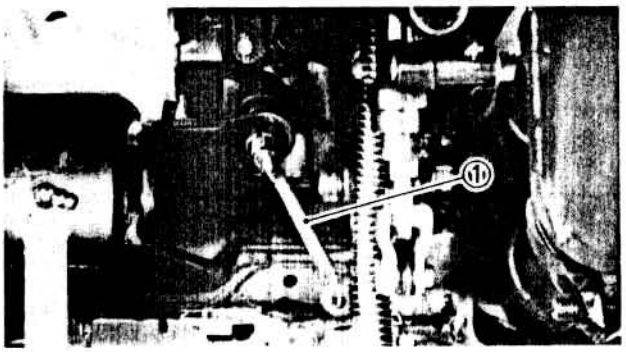
4. Tighten:
   • Bolt (1) (chain guide)

	Bolt (1) (chain guide): 7 Nm (0.7 m•kg, 5.1 ft•lb)

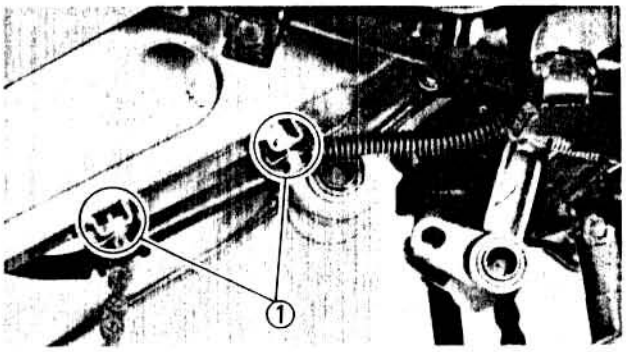


5. Tighten:
   Nut (1) (relay arm)

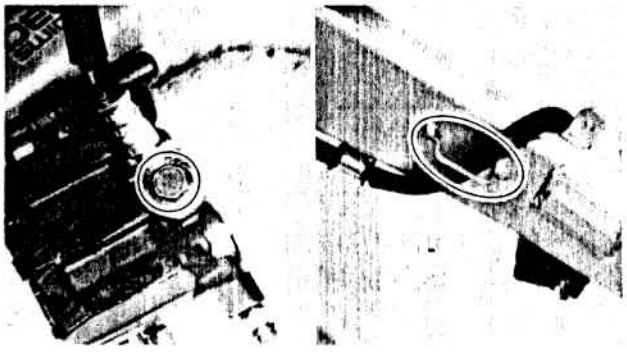
	Nut (1) (relay arm): 59 Nm (5.9 m•kg, 43 ft•lb)



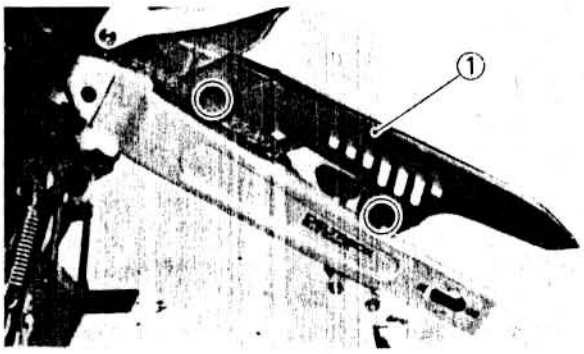
6. Install:
   • Spring ① (brake light switch)



7. Tighten:
   • Bolt ① (hose clamp)



8. Install:
   • Brake hose
   Refer to the "FRONT AND REAR BRAKE" section.



9. Tighten:
   • Screw ① (chain case)

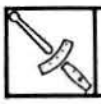
	Screw ① (chain case): 4 Nm (0.4 m•kg, 2.9 ft•lb)

10. Adjust:
    • Drive chain slack

	Prive chain slack: 25 ~ 35 mm (1.0 ~ 1.4 in)

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

11. Install:
    - Rear wheel



Nut (rear wheel axle):
90 Nm (9.0 m•kg, 65 ft•lb)

Refer to the "REAR WHEEL—INSTALLATION" section.

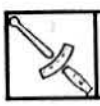
12. Install:
    - Fuel tank



Bolt (fuel tank):
7 Nm (0.7 m•kg, 5.1 ft•lb)

Refer to the "SEAT, FUEL TANK AND COVER" section in the CHAPTER 3.

13. Install:
    - Seat



Bolt (seat):
10 Nm (1.0 m•kg, 7.2 ft•lb)

Refer to the "SEAT, FUEL TANK AND COVER" section in the CHAPTER 3.

14. Install:
    - Side cover (left and right)

    Refer to the "SEAT, FUEL TANK AND COVER" section in the CHAPTER 3.

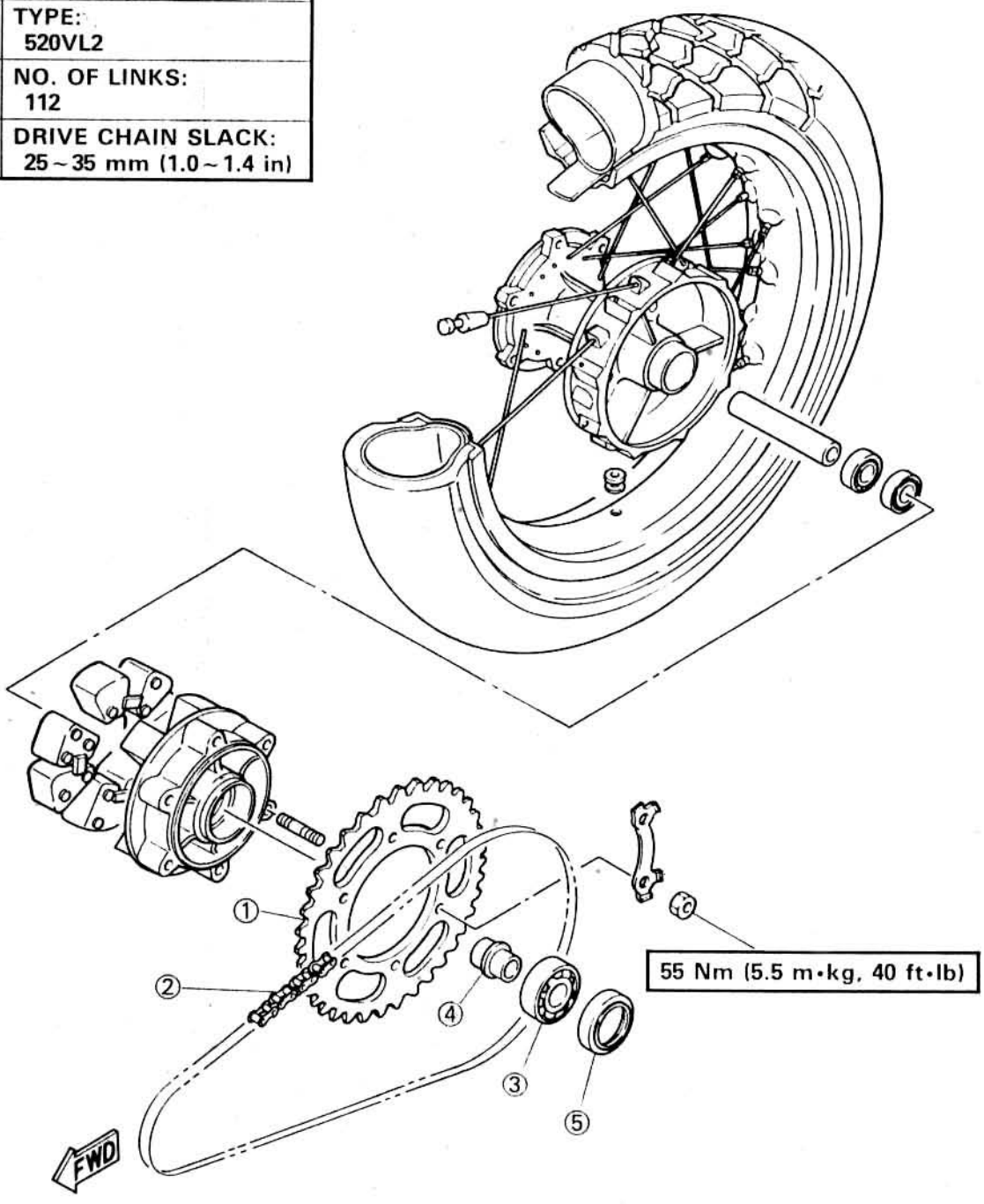
15. Install:
    - Side cowling (left and right)

    Refer to the "SEAT, FUEL TANK AND COVER" section in the CHAPTER 3.

DRIVE CHAIN AND SPROCKETS

① Driven sprocket
② Drive chain
③ Bearing
④ Collar
⑤ Oil seal

A	DRIVE CHAIN
B	TYPE: 520VL2
C	NO. OF LINKS: 112
D	DRIVE CHAIN SLACK: 25 ~ 35 mm (1.0 ~ 1.4 in)



NOTE:

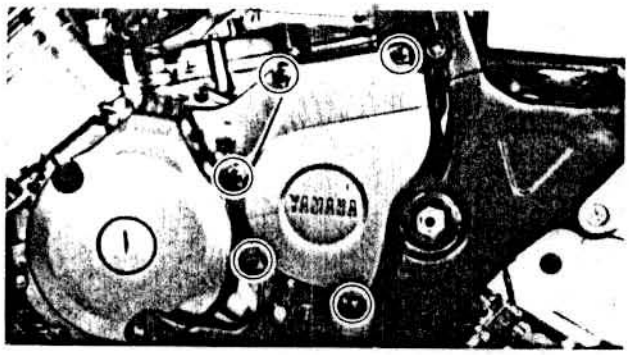
Before removing the drive chain and sprockets, drive chain slack and 10-link length of drive chain should be measured.

REMOVAL

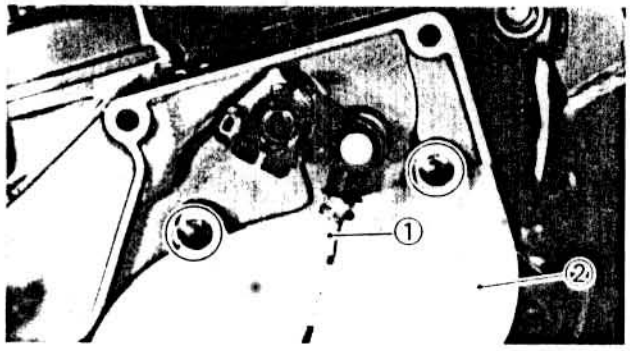
1. Elevate the rear wheel by placing a suitable stand under the engine.

⚠WARNING:

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



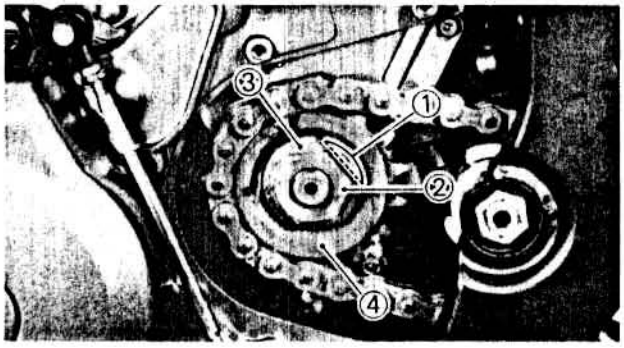
2. Remove:
   - Cover (1) (drive sprocket)



3. Remove:
   - Shift lever (1) (change pedal)
   - Cover (2) (drive sprocket)

4. Loosen:
   - Drive chain

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

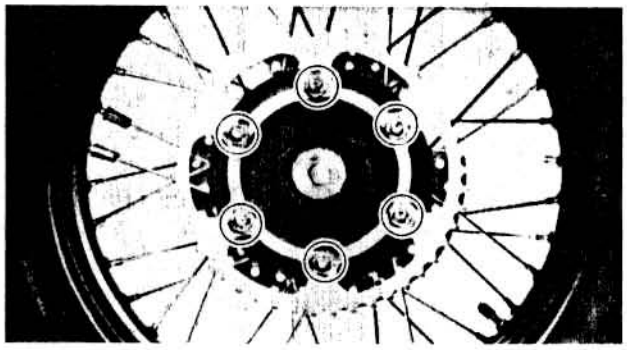


5. Straighten:
   • Lock washer tab ①
6. Remove:
   • Nut (drive sprocket) ②
   • Lock washer ③
   • Drive sprocket ④

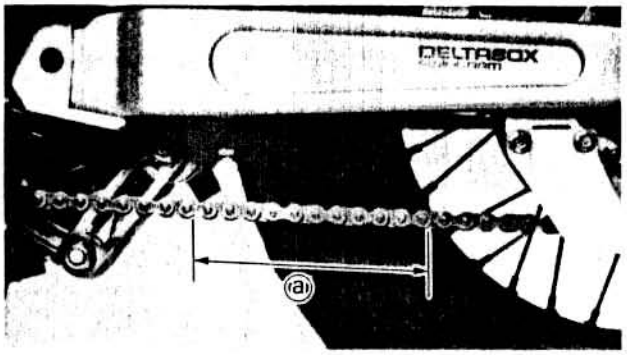
NOTE:

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.



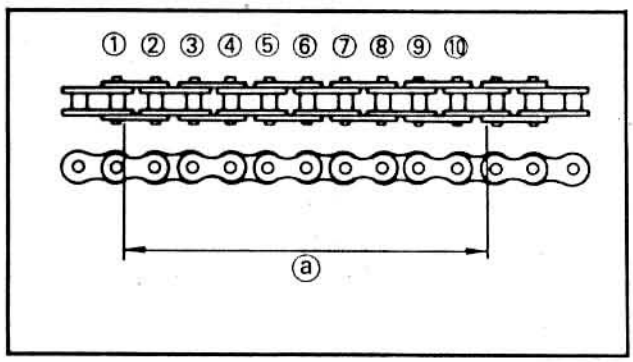
8. Remove:
   • Driven sprocket



INSPECTION

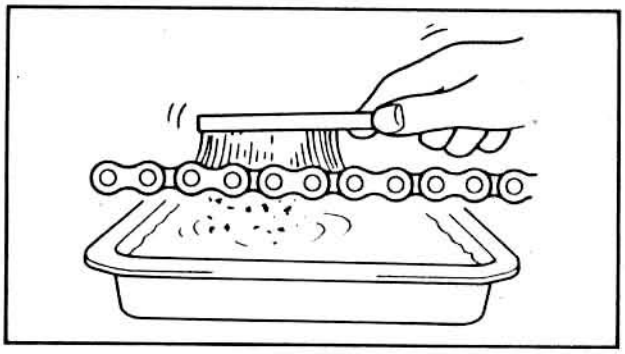
1. Measure:
   • 10-link length ⓐ (drive chain)
     Out of specification → Replace drive chain.

10-link length limit:
150.0 mm (5.91 in)



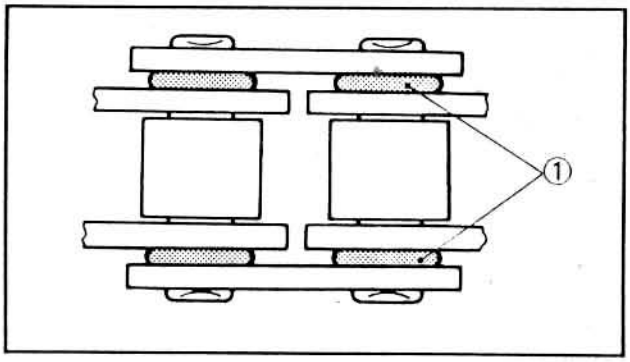
NOTE:

- 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.



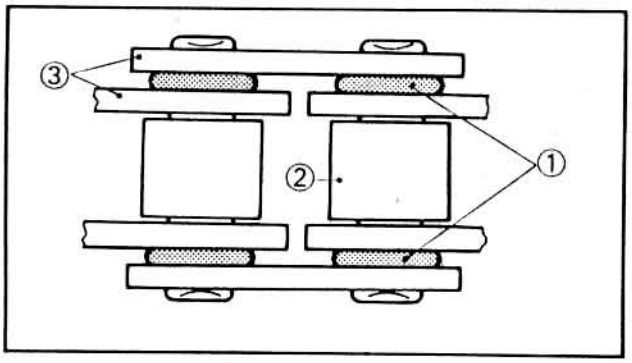
2. Clean:
   - Drive chain

   Place it in kerosene, and brush off as much dirt as possible. Then remove the chain from the kerosene and dry the chain.



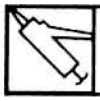
⚠CAUTION:

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.

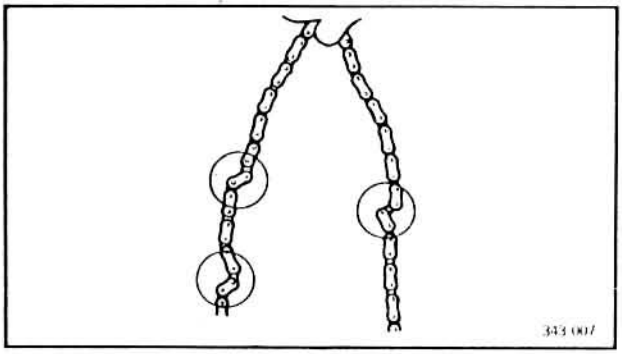


3. Inspect:
   - O-rings ① (drive chain)
     Damage→Replace drive chain.
   - Rollers ②
   - Side plates ③
     Damage/Wear→Replace drive chain.

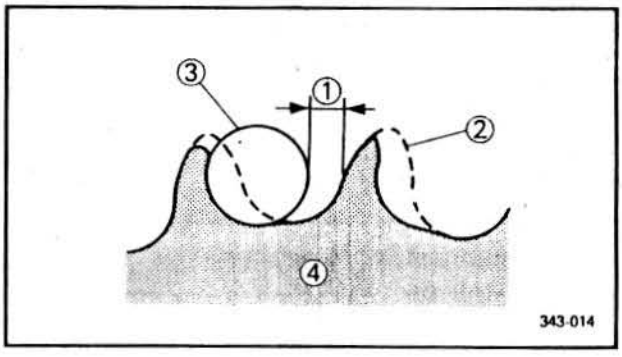
4. Lubricate:
   - Drive chain



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:
- Straighten the lock washer tabs and remove the driven sprocket.
- Install a new driven sprocket and lock washers.

⚠WARNING:

Always use new lock washers.

Nuts (driven sprocket):
55 Nm (5.5 m•kg, 40 ft•lb)

- Bend the lock washer tabs along the nut flats.

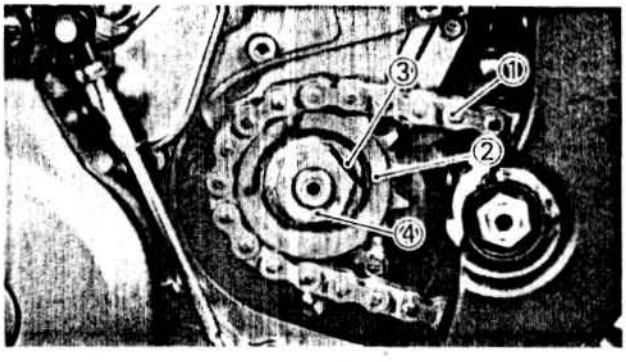
INSTALLATION

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:
   - Rear wheel

   Refer to the "REAR WHEEL—INSTALLATION" section in the CHAPTER 6.

	**Axle nut:** **90 Nm (9.0 m•kg, 65 ft•lb)**

4. Adjust:
   - Drive chain slack

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

	**Drive chain slack:** **25 ~ 35 mm (1.0 ~ 1.4 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.

5. Install:
   - Covers (drive sprocket)
   - Change pedal

	**Bolt (cover):** **7 Nm (0.7 m•kg, 5.1 ft•lb)** **Bolt (change pedal):** **10 Nm (1.0 m•kg, 7.2 ft•lb)**

CHAPTER 8.
ELECTRICAL

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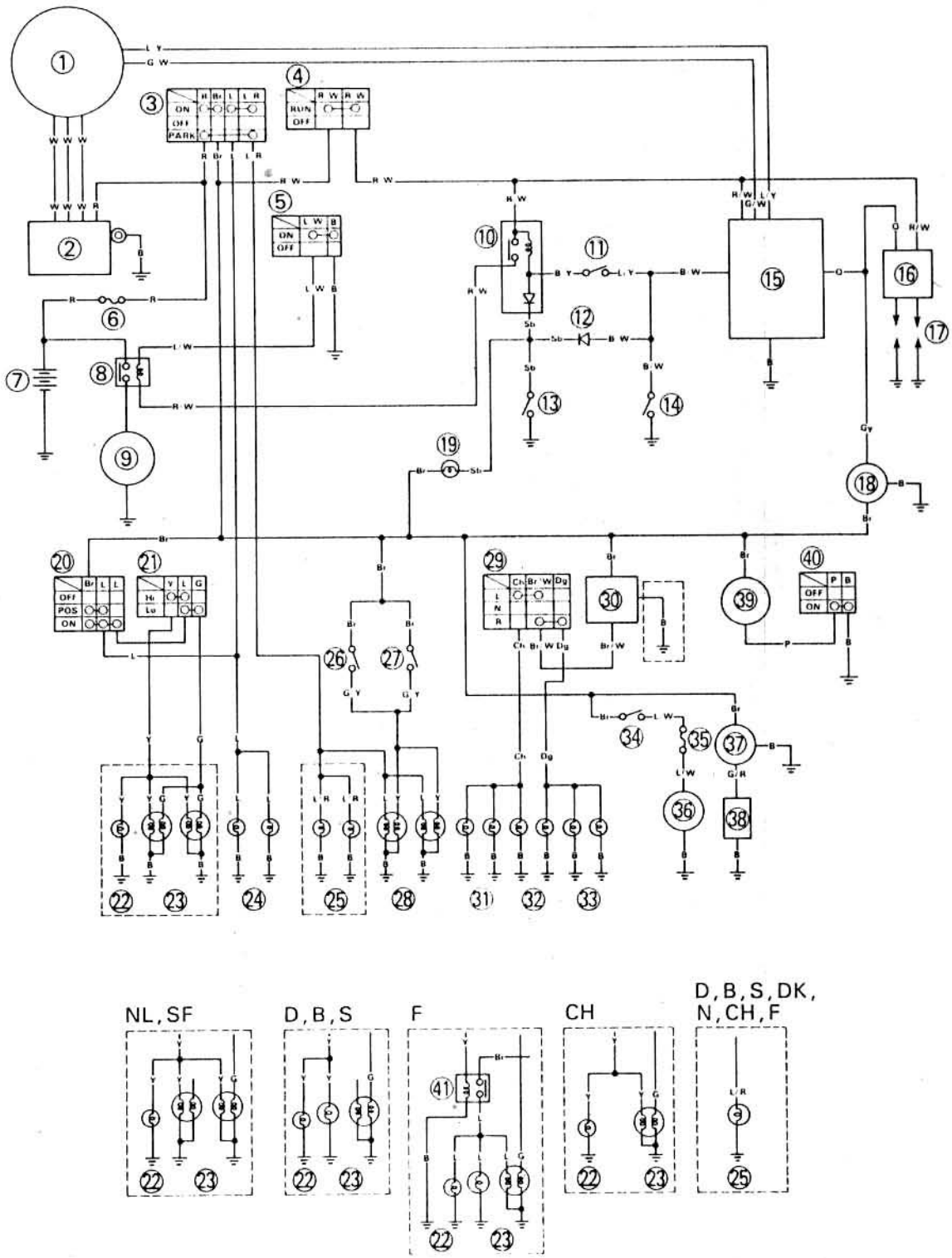
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ELECTRICAL

XTZ750 CIRCUIT DIAGRAM



① A.C. magneto
② Rectifier/Regulator
③ Main switch
④ "ENGINE STOP" switch
⑤ "START" switch
⑥ Fuse (main)
⑦ Battery
⑧ Starter relay
⑨ Starter motor
⑩ Starting circuit cut-off relay
⑪ Clutch switch
⑫ Diode
⑬ Neutral switch
⑭ Sidestand switch
⑮ Ignitor unit
⑯ Ignition coil
⑰ Spark plug
⑱ Tachometer
⑲ "NEUTRAL" indicator light
⑳ "LIGHTS" switch
㉑ "LIGHTS" (dimmer) switch
㉒ "HIGH BEAM" indicator light
㉓ Headlight
㉔ Meter light
㉕ Auxiliary light
㉖ Front brake switch
㉗ Rear brake switch
㉘ Tail/brake light
㉙ "TURN" switch
㉚ Flasher relay
㉛ Flasher light (left)
㉜ "TURN" indicator light
㉝ Flasher light (right)
㉞ Thermo switch
㉟ Fuse (fan motor)
㊱ Fan motor
㊲ Temperature gauge
㊳ Thermo unit
㊴ Horn
㊵ "HORN" switch
㊶ Headlight relay

NOTE:

- "START" switch is closed while the button (switch) is pushed.
- "HORN" switch is closed while the button (switch) is pushed.
- Clutch switch is closed while the clutch lever is pulled.
- Sidestand switch is closed while the sidestand is upped.
- Neutral switch is closed while the transmission is in neutral.
- Brake switch is closed while the brake is applied.

COLOR CODE

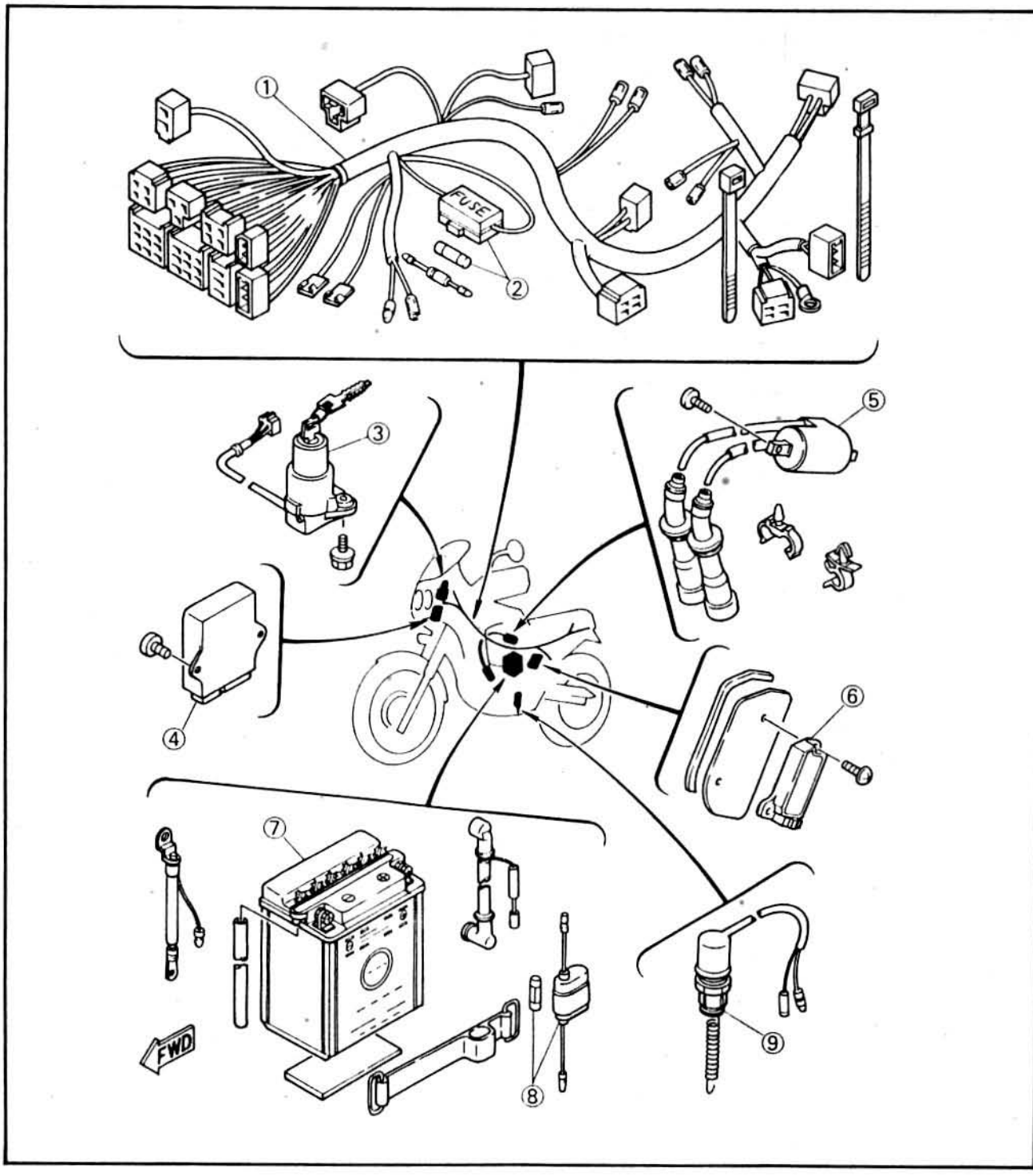
B	Black	Ch	Chocolate	G/Y	Green/Yellow
L	Blue	Gy	Gray	G/R	Green/Red
G	Green	Sb	Sky blue	L/Y	Blue/Yellow
Y	Yellow	Dg	Dark green	L/R	Blue/Red
R	Red	W	White	L/W	Blue/White
P	Pink	B/Y	Black/Yellow	R/W	Red/White
O	Orange	B/W	Black/White	Br/W	Brown/White
Br	Brown	G/W	Green/White		

ELECTRICAL COMPONENTS

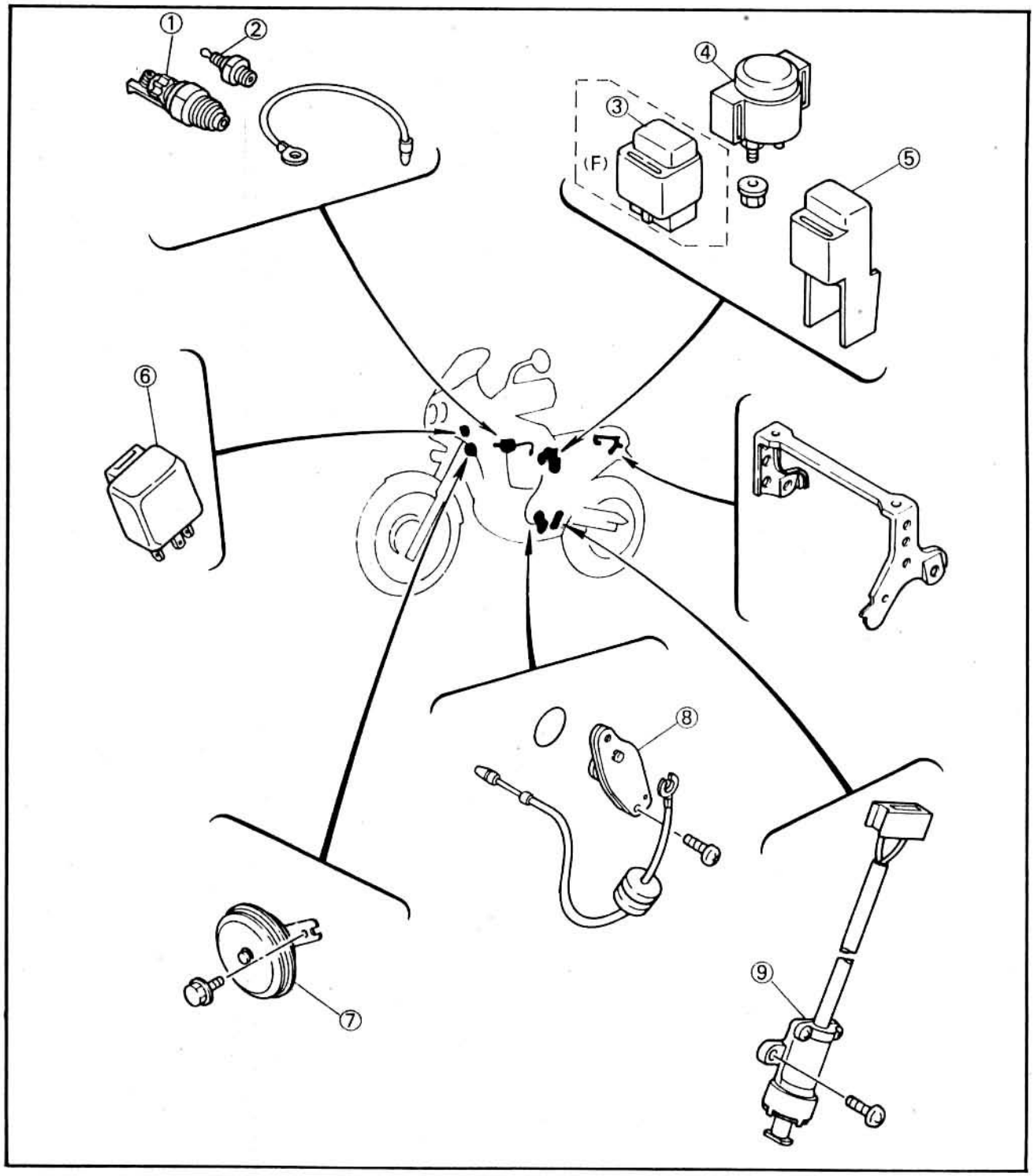
① Wireharness
② Fuse (cooling fan)
③ Main switch
④ Ignitor unit
⑤ Ignition coil
⑥ Rectifier/regulator
⑦ Battery
⑧ Fuse (main)
⑨ Brake switch

BATTERY:
CAPACITY: 12V 14AH
SPECIFIC GRAVITY: 1.280

IGNITION COIL:
PRIMARY COIL RESISTANCE:
2.38 ~ 3.22Ω at 20°C (68°F)
SECONDARY COIL RESISTANCE:
12 ~ 18kΩ at 20°C (68°F)



① Thermo switch
② Thermo unit
③ Headlight relay
④ Starter relay
⑤ Starting circuit cut-off relay
⑥ Flasher relay
⑦ Horn
⑧ Neutral switch
⑨ Sidestand switch



CHECKING OF SWITCHES

Check the switches for the continuity between the terminals to determine correct connection.

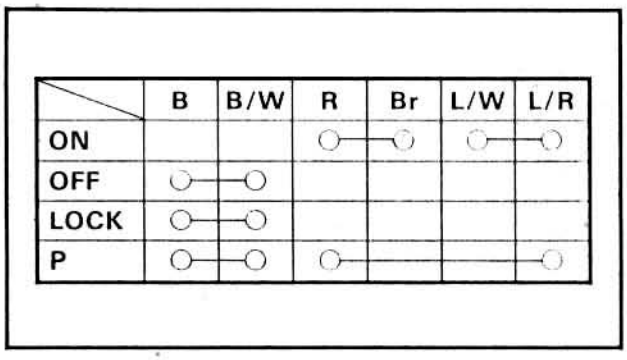
Read the following for switch inspection.

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.



	B	B/W	R	Br	L/W	L/R
ON			○—○		○—○	
OFF	○—○					
LOCK	○—○					
P	○—○		○—	——	——	—○

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.

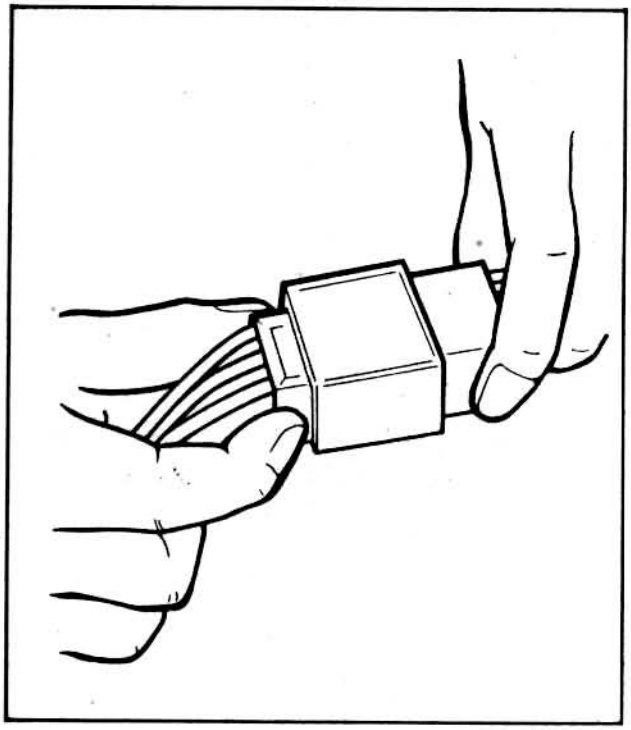
"B and B/W" is continuous with the "LOCK" switch position.

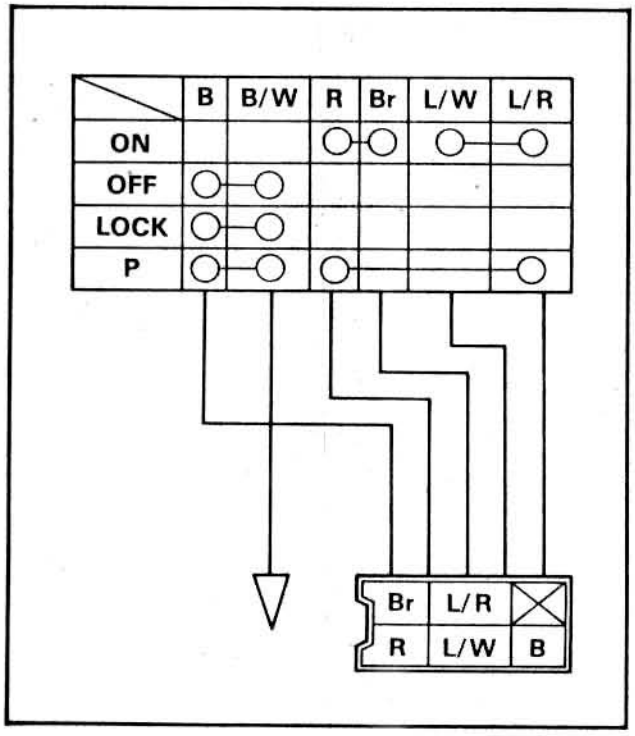
"B and B/W" and "R and L/R" are continuous with the "P" switch position.

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.

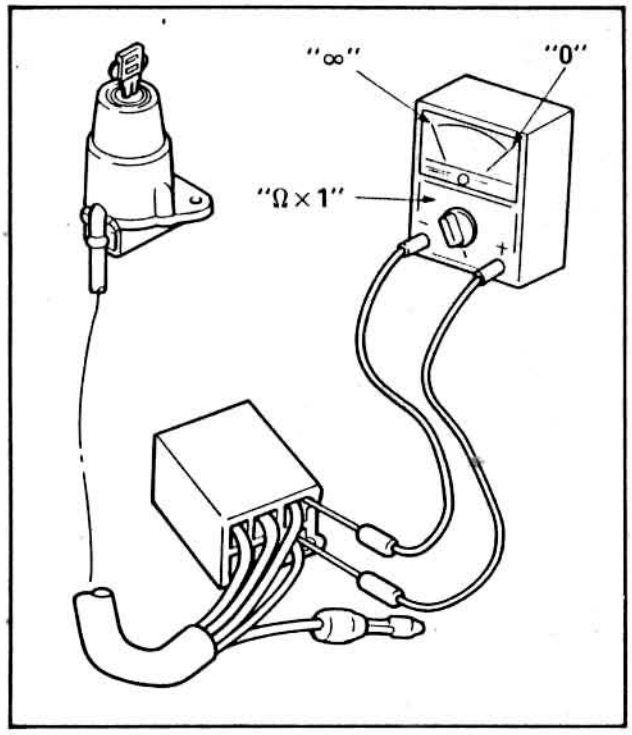
   "B and B/W" is continuous with the "LOCK" switch position.

   "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.



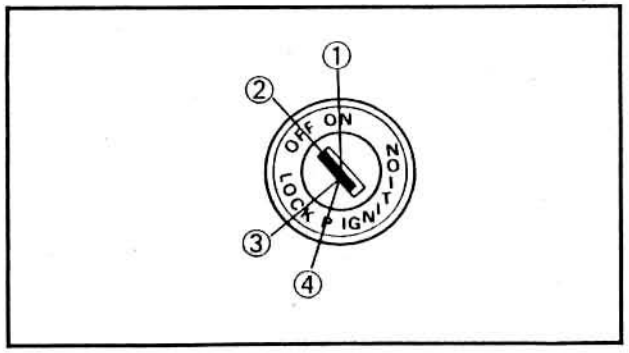
NOTE:

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".

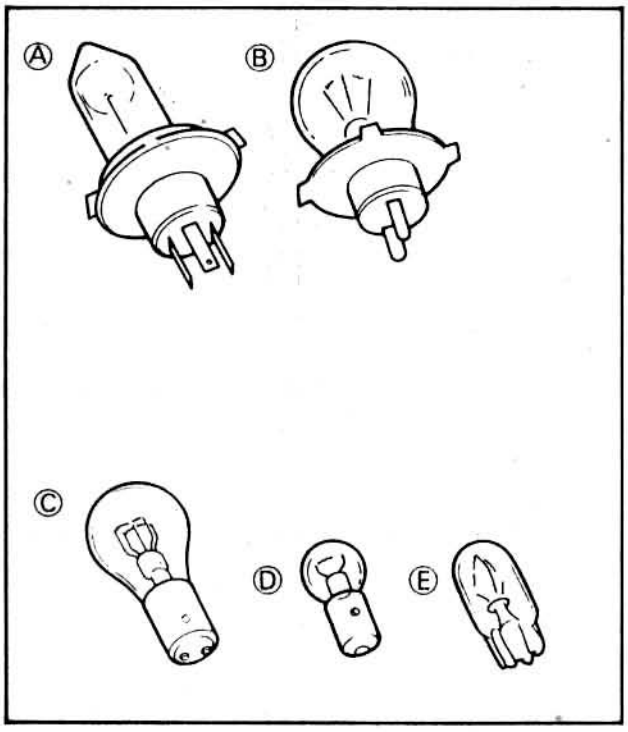
NOTE:

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:

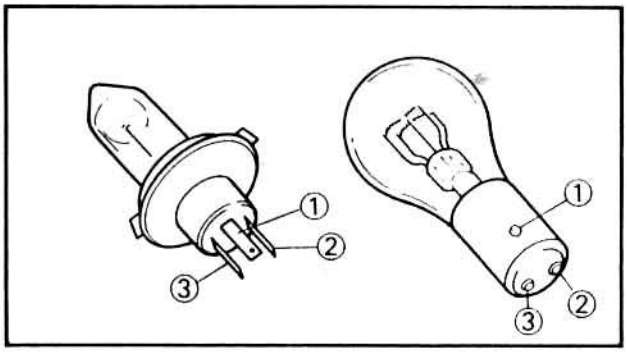
- Bulbs of the Ⓐ and Ⓑ type uses a bulb holder. Remove the bulb holder before removing the bulb itself. Most of the bulb holders for this type can be removed by turning them counterclockwise.
- Most of the bulbs of Ⓒ and Ⓓ type can be removed from the bulb sockets by pushing and turning them counterclockwise.
- 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.

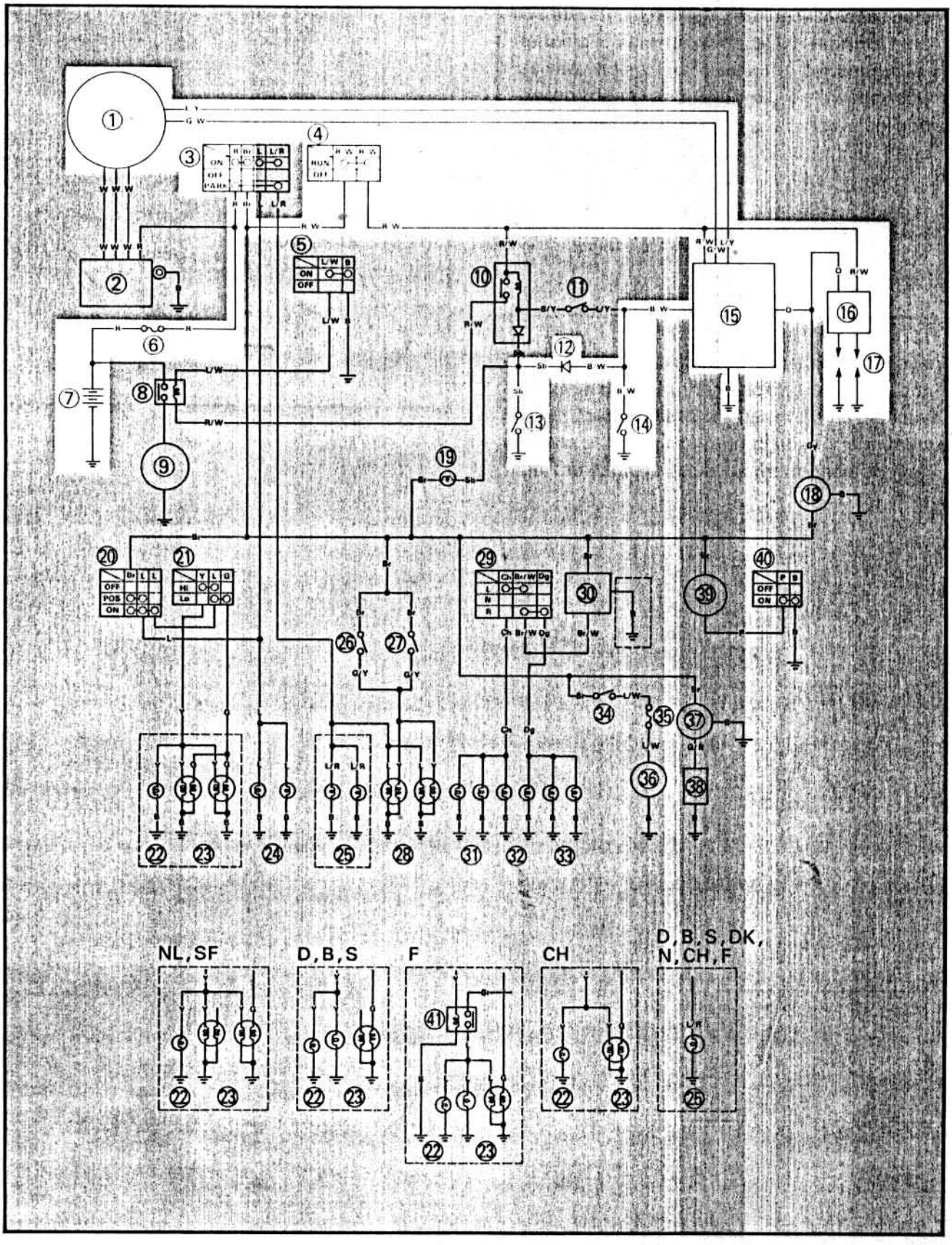
Checking steps:
- Set the pocket tester selector to the "Ω × 1".
- Connect the tester leads to the respective bulb terminals. Take for example a 3-terminal bulb as shown left. First check the continuity between the ① and ② terminals by connecting the tester (+) lead to the ① terminal and the tester (−) 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

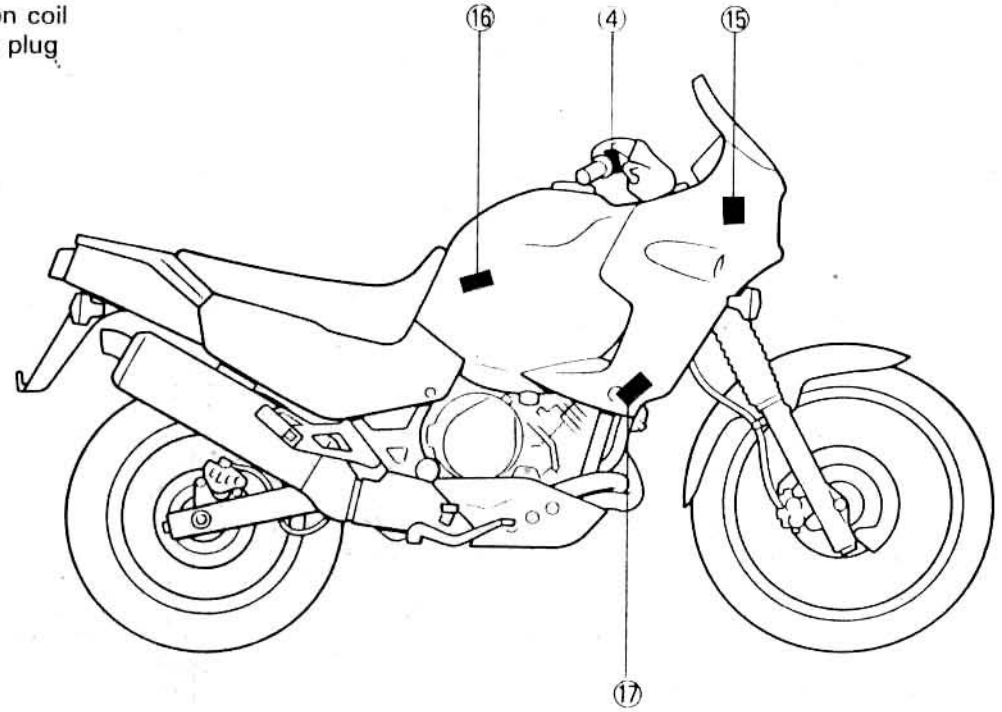
Below circuit diagram shows ignition system.

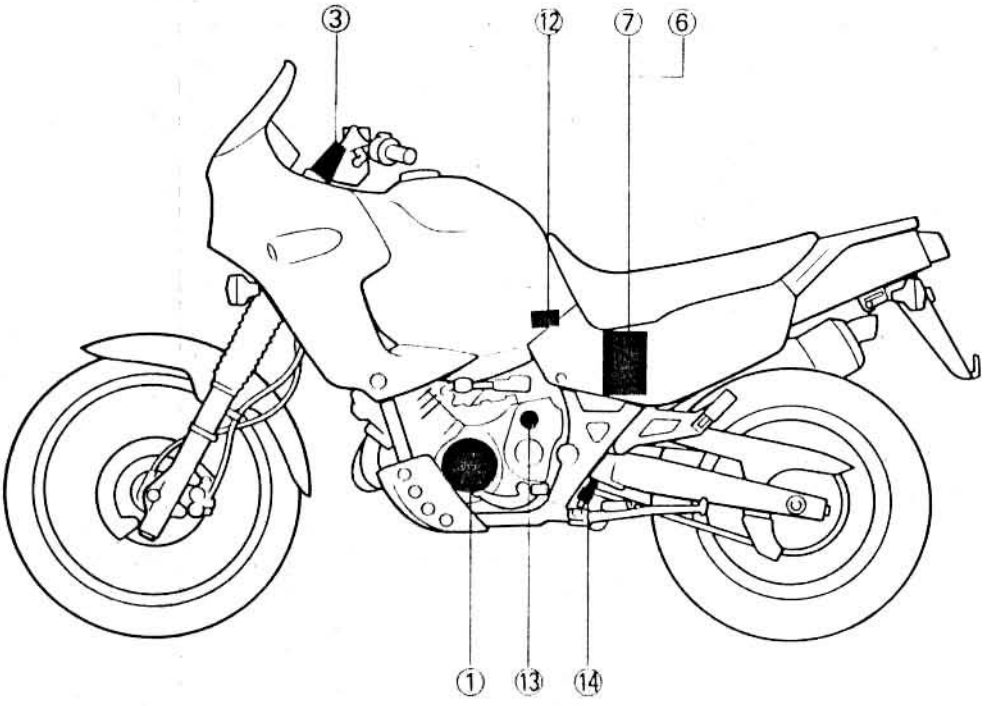


NOTE:

For the color codes, see page 8-2.

① A.C. magneto
③ Main switch
④ "ENGINE STOP" switch
⑥ Fuse (main)
⑦ Battery
⑫ Diode
⑬ Neutral switch
⑭ Sidestand switch
⑮ Ignitor unit
⑯ Ignition coil
⑰ Spark plug





TROUBLESHOOTING

IF IGNITION SYSTEM SHOULD BECOME INOPERATIVE (NO SPARK OR INTERMITTENT SPARK)

Procedure

Check;

1. Fuse (main)
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
12. Pickup coil resistance
13. Wiring connection (Entire ignition system)

NOTE:

- Remove the following parts before troubleshooting.
  1) Seat
  2) Side cowlings
  3) Side cover (left)
  4) Fuel tank
  5) Air filter case
- Use the following special tools in this troubleshooting.



Dynamic spark tester:
90890-03144



Pocket tester:
90890-03112

1. Fuse (main)

- Remove the fuse.
- Connect the pocket tester (Ω × 1) to the fuse.
- Check the fuse for continuity.

NOCONTINUITY → Fuse is faulty, replace it.

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. 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:
DPR8EA-9 (NGK), X24EPRU-9 (N.D.)

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

INCORRECT

Spark plug is faulty, replace it or repair plug gap.

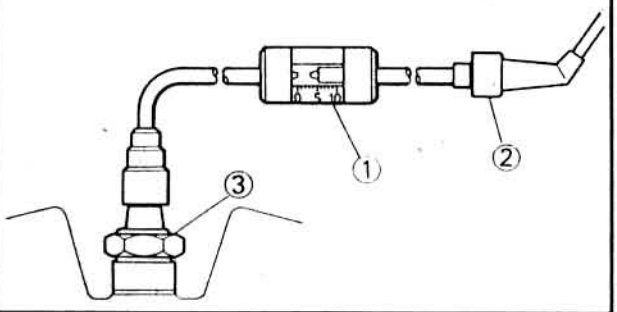
CORRECT

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.

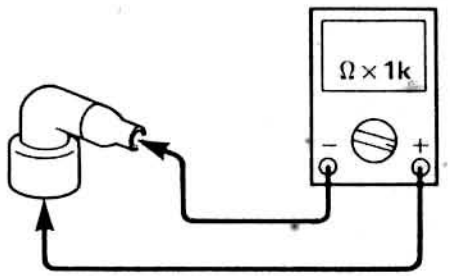
OUT OF SPECIFICATION
OR NO SPARK

*

*

5. Spark plug cap resistance

- Remove the spark plug cap.
- Connect the pocket tester (Ω × 1k) to the spark plug cap.



- Check the spark plug cap for specificated resistance.

Spark plug cap resistance:
9 ~ 11kΩ at 20°C (68°F)

OUT OF SPECIFICATION

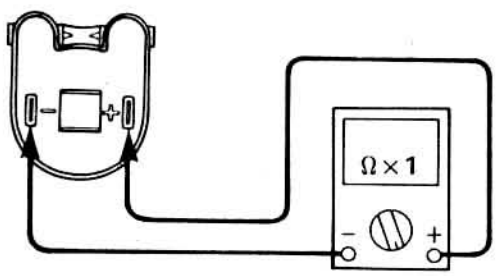
Replace spark plug cap.

MEETS SPECIFICATION

6. Ignition coil resistance

- Disconnect the ignition coil leads from the ignition coil.
- Connect the pocket tester (Ω × 1) to the ignition coil.

Ignition coil:
Tester (+) lead → Terminal
Tester (–) lead → Terminal

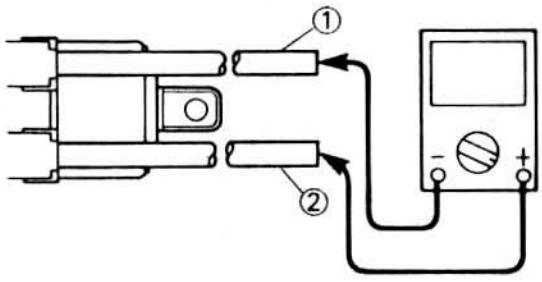


- Check the primary coil for specificated resistance.

Primary coil resistance:
2.38 ~ 3.22Ω at 20°C (68°F)

• Connect the pocket tester (Ω × 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:
12 ~ 18kΩ at 20°C (68°F)
(Spark plug lead — Spark plug lead)

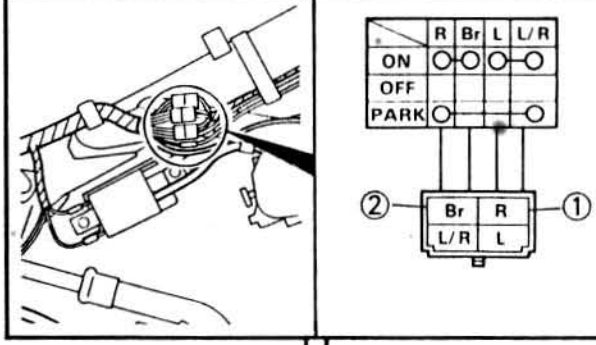
OUT OF SPECIFICATION

Ignition coil is faulty, replace it.

BOTH MEET SPECIFICATIONS

7. Main switch

• Disconnect the main switch coupler from the wireharness.
• Check the switch component for the continuity between "Red ① and Brown ②". Refer to the "CHECKING OF SWITCHES" section.



INCORRECT

Main switch is faulty, replace it.

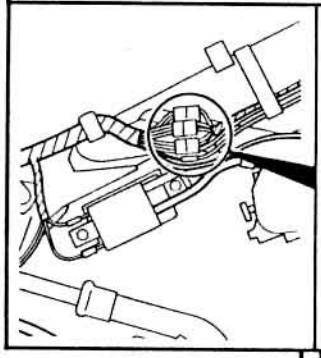
CORRECT

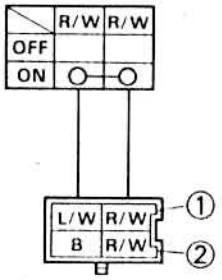
*

*

8. "ENGINE STOP" switch

- Disconnect the handlebar switch (right) coupler from the wireharness.
- Check the switch component for the continuity between "Red/White ① and Red/White ②". Refer to the "CHECKING OF SWITCHES" section.





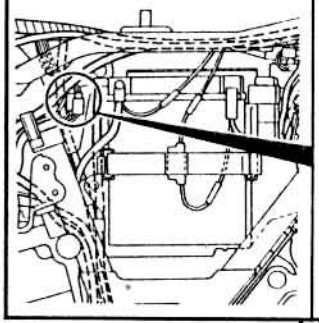
INCORRECT

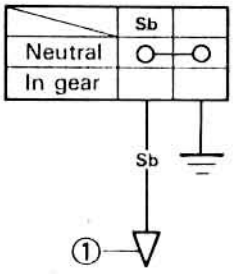
"ENGINE STOP" switch is faulty, replace handlebar switch (right).

CORRECT

9. Neutral switch

- Disconnect the neutral switch lead from the wireharness.
- Check the switch component for the continuity between "Sky blue ① and ground". Refer to the "CHECKING OF SWITCHES" section.





INCORRECT

Neutral switch is faulty, replace it.

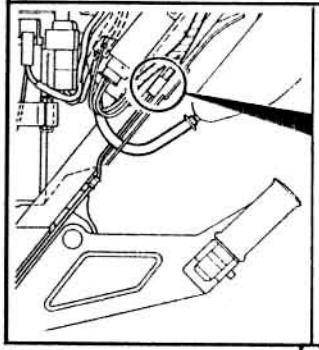
CORRECT

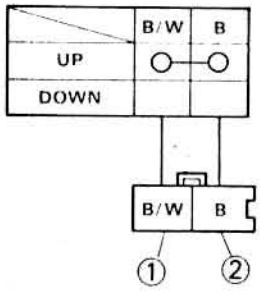
*

*

10. Sidestand switch

- Disconnect the sidestand switch coupler from the wireharness.
- Check the switch component for the continuity between "Black/White (1) and Black (2)". Refer to the "CHECKING OF SWITCHES" section.





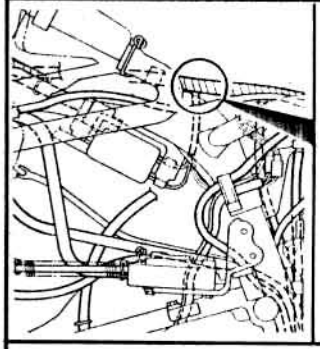
INCORRECT

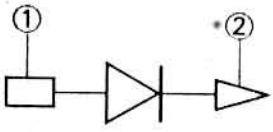
Sidestand switch is faulty, replace it.

CORRECT

11. Diode

- Disconnect the diode leads from the wireharness.
- Connect the pocket tester (Ω × 1) to the diode.





BAD CONDITION

Diode is faulty, replace it.

- Check the diode for continuity.

Pocket tester connecting point		Good	Bad		
(+) lead	(−) lead				
②	①	○		×	×
①	②	×		×	

○: Continuity ×: Nocontinuity

GOOD CONDITION

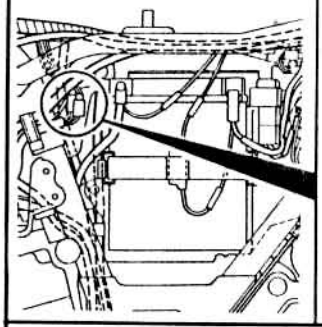
*

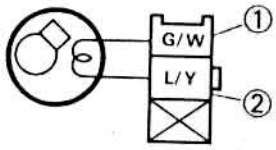
*

12. Pickup coil resistance

- Disconnect the pickup coil coupler from the wireharness.
- Connect the pocket tester (Ω × 100) to the pickup coil terminal.

Tester (+) lead → Green/White lead (1)
Tester (−) lead → Blue/Yellow lead (2)





- Check the pickup coil for specificated resistance.

Pickup coil resistance:
184 ~ 276Ω at 20°C (68°F)
(Green/White — Blue/Yellow)

OUT OF SPECIFICATION → Pickup coil is faulty, replace it.

MEET SPECIFICATION

13. Wiring connection

Check the entire ignition system for connections.
Refer to the "WIRING DIAGRAM" section.

POOR CONNECTION → Correct.

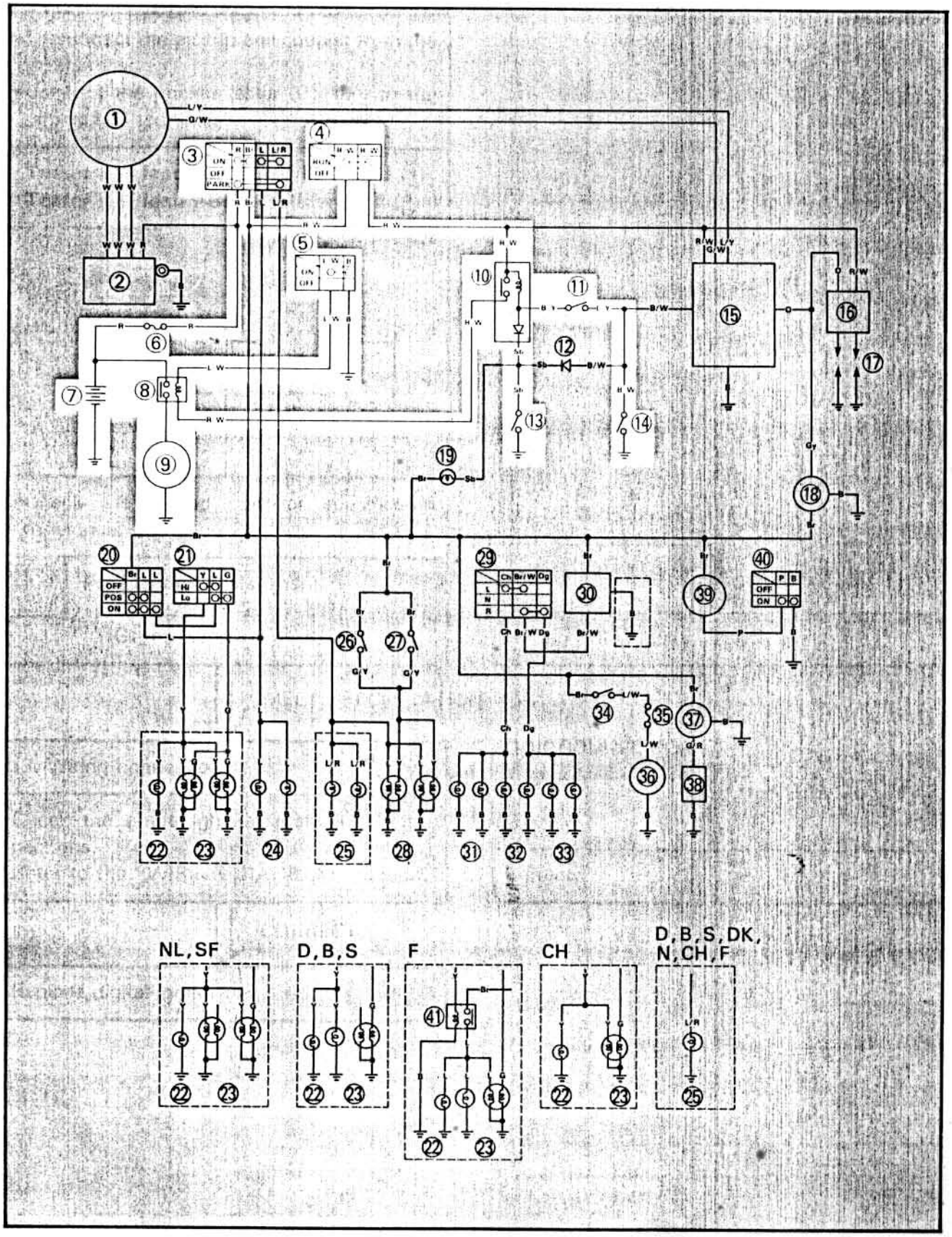
CORRECT

Replace digital ignitor unit.

ELECTRICAL STARTING SYSTEM

CIRCUIT DIAGRAM

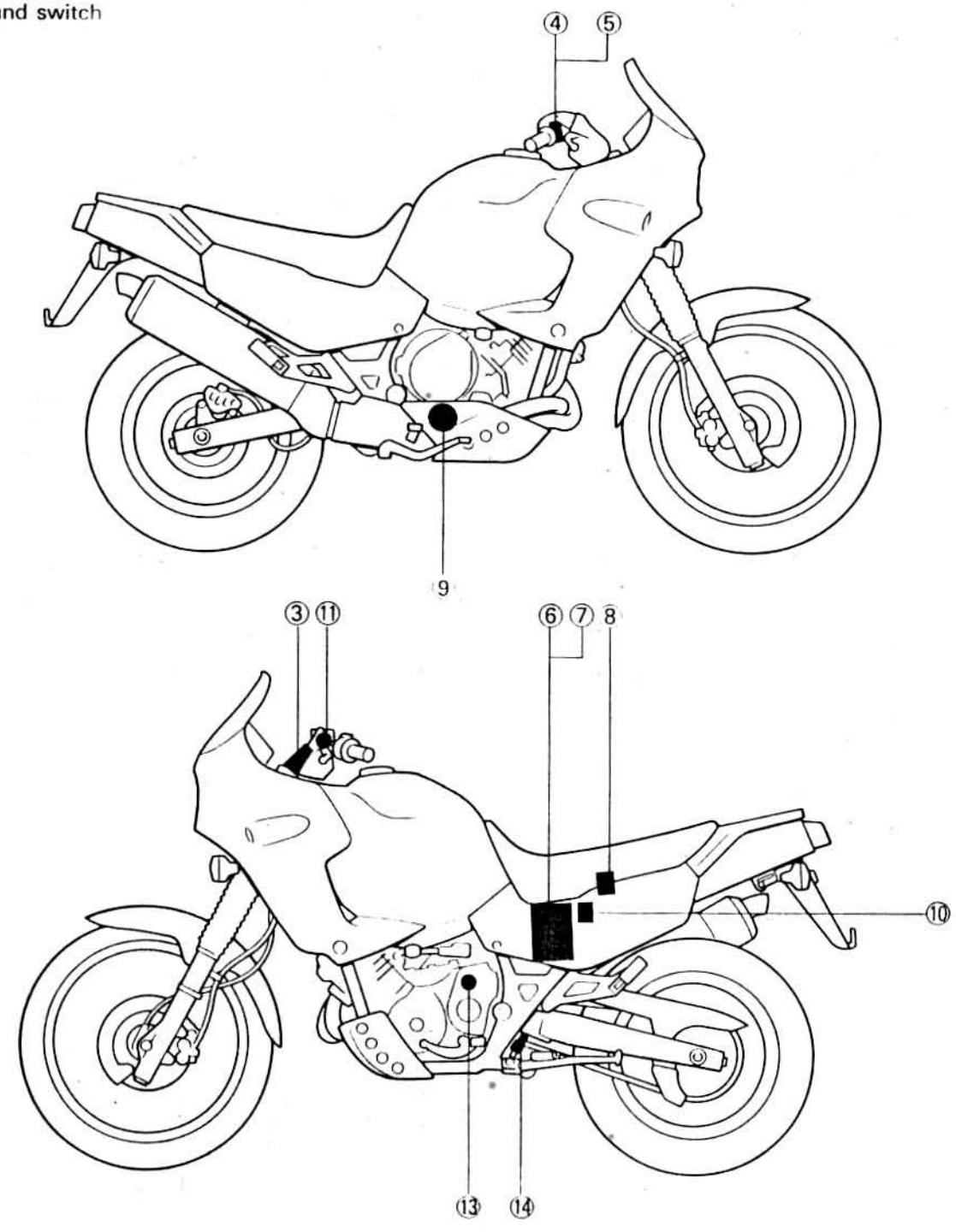
Below circuit diagram shows electrical starting system.

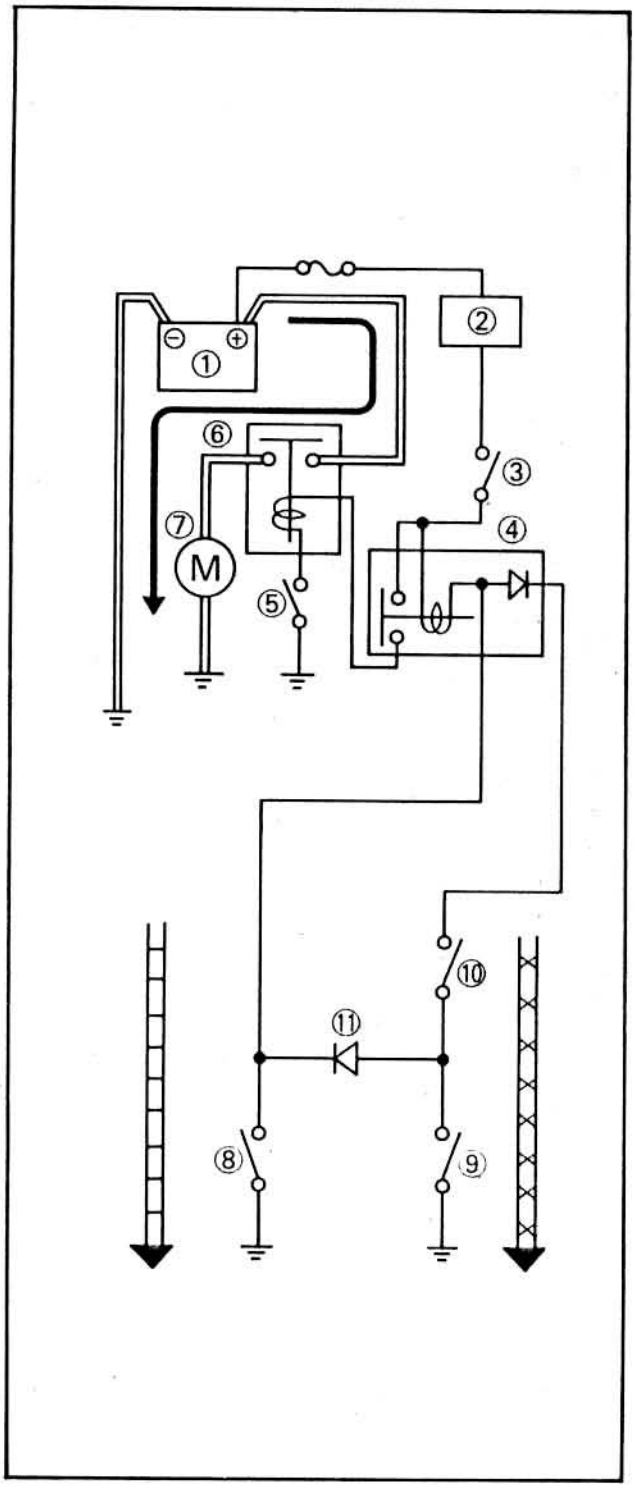


NOTE:

For the color codes, see page 8-2.

③ Main switch
④ "ENGINE STOP" switch
⑤ "START" switch
⑥ Fuse (main)
⑦ Battery
⑧ Starter relay
⑨ Starter motor
⑩ Starting circuit cut-off relay
⑪ Clutch switch
⑬ Neutral switch
⑭ Sidestand switch





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
⑪ Diode

TROUBLESHOOTING

STARTER MOTOR DOES NOT OPERATE.

Procedure

Check;

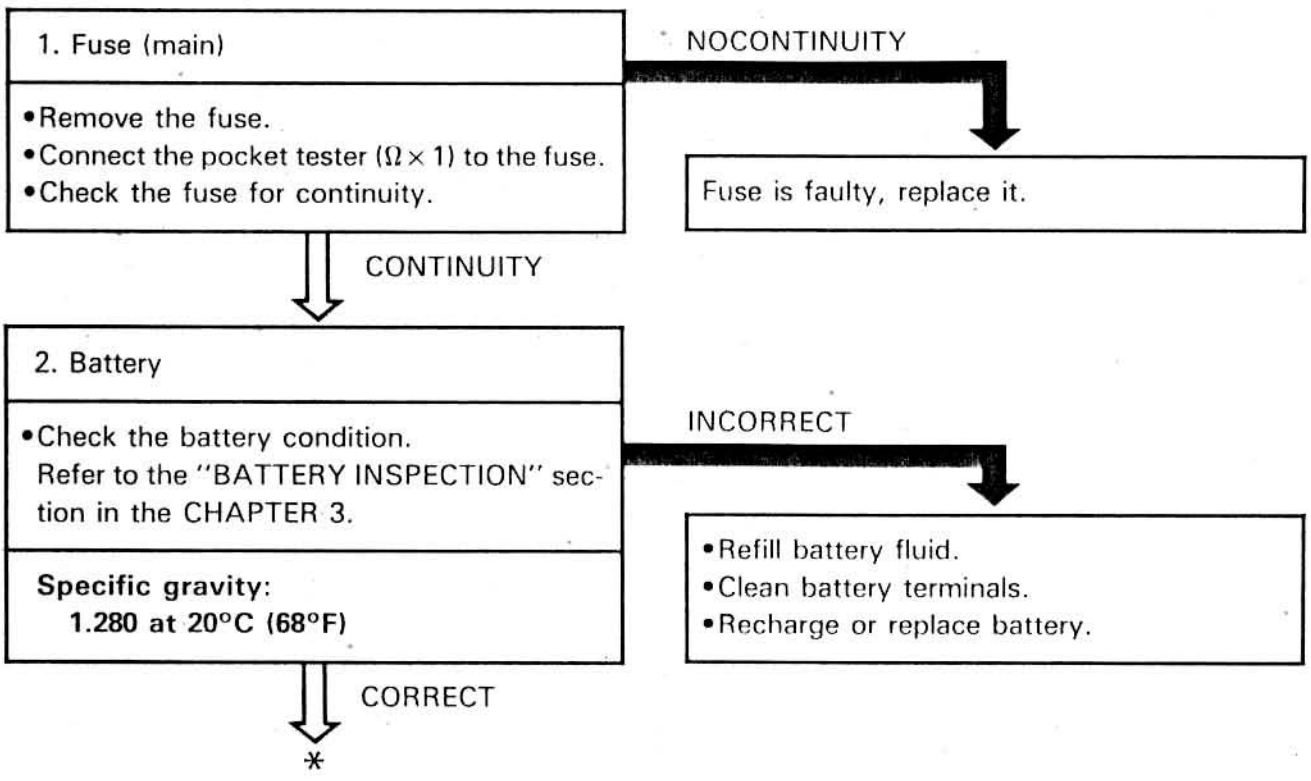
1. Fuse (main)
2. Battery
3. Starter motor
4. Starter relay
5. Starting circuit cut-off relay
6. Main switch
7. "ENGINE STOP" switch
8. Neutral switch
9. Sidestand switch
10. Clutch switch
11. "START" switch
12. Wiring connection
    (Entire electric starting system)

NOTE:

- Remove the following parts before troubleshooting.
  1) Seat
  2) Side cowlings
  3) Side cover (left)
  4) Fuel tank
  5) Air filter case
- Use the following special tool in this troubleshooting.



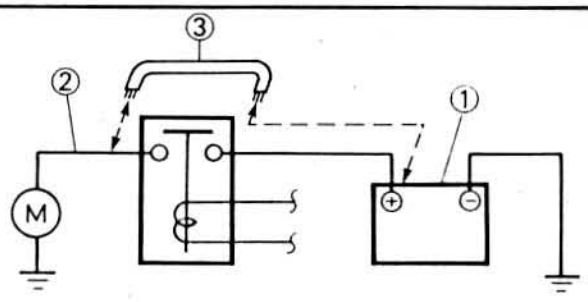
Pocket tester:
90890-03112



*

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.

*

⚠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.**

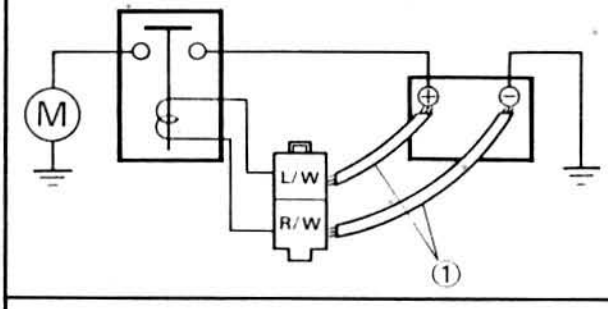
DOES NOT MOVE

Starter motor is faulty, repair or replace it.

MOVES

4. Starter relay

- Disconnect the starter relay coupler from the wireharness.
- Connect the battery to the starter relay leads as shown using the jumper leads (1).



- Check the starter motor for operation.

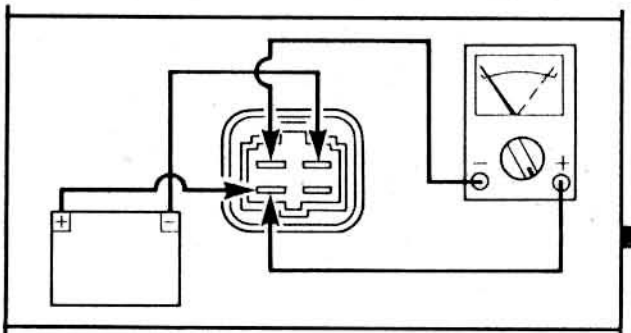
DOES NOT MOVE

Starter relay is faulty, replace it.

MOVES

5. Starting circuit cut-off relay

- Disconnect the starting circuit cut-off relay from the wireharness.
- Connect the pocket tester (Ω × 1) and battery (12V) to the starting circuit cut-off relay.



• Check the starting circuit cut-off relay for continuity.

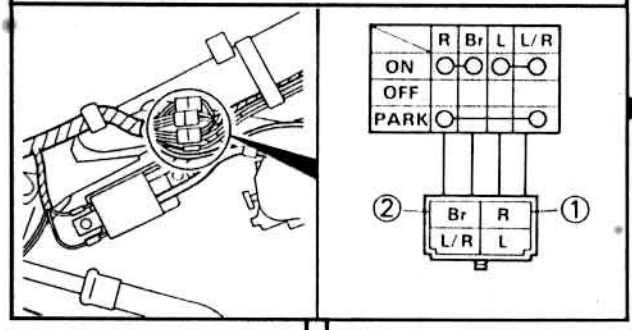
NOCONTINUITY

Starting circuit cut-off relay is faulty, replace it.

CONTINUITY

6. Main switch

• Disconnect the main switch coupler from the wireharness.
• Check the switch component for the continuity between "Red ① and Brown ②". Refer to the "CHECKING OF SWITCHES" section.



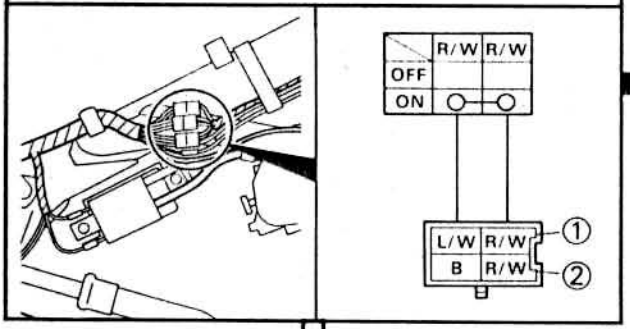
INCORRECT

Main switch is faulty, replace it.

CORRECT

7. "ENGINE STOP" switch

• Disconnect the handlebar switch (right) coupler from the wireharness.
• Check the switch component for the continuity between "Red/White ① and Red/White ②". Refer to the "CHECKING OF SWITCHES" section.



INCORRECT

"ENGINE STOP" switch is faulty, replace handlebar switch (right).

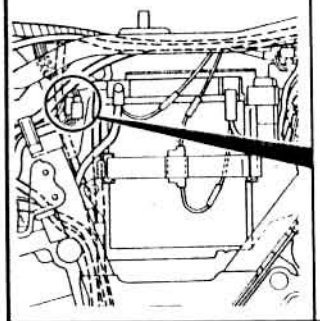
CORRECT

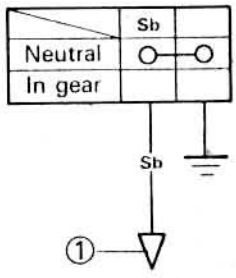
*

*

8. Neutral switch

- Disconnect the neutral switch lead from the wireharness.
- Check the switch component for the continuity between "Sky blue ① and Ground". Refer to the "CHECKING OF SWITCHES" section.





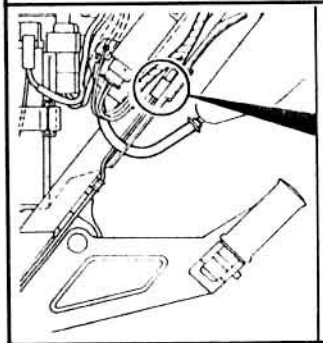
INCORRECT

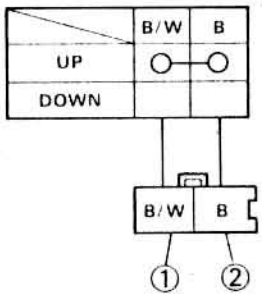
Neutral switch is faulty, replace it.

CORRECT

9. Sidestand switch

- Disconnect the sidestand switch coupler from the wireharness.
- Check the switch component for the continuity between "Black/White ① and Black ②". Refer to the "CHECKING OF SWITCHES" section.





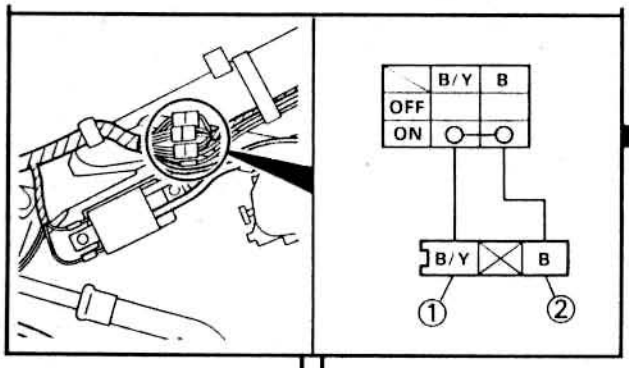
INCORRECT

Sidestand switch is faulty, replace it.

CORRECT

10. Clutch switch

- Disconnect the clutch switch coupler from the wireharness.
- Check the clutch switch component for the continuity between "Black/Yellow ① and Black ②". Refer to the "CHECKING OF SWITCHES" section.



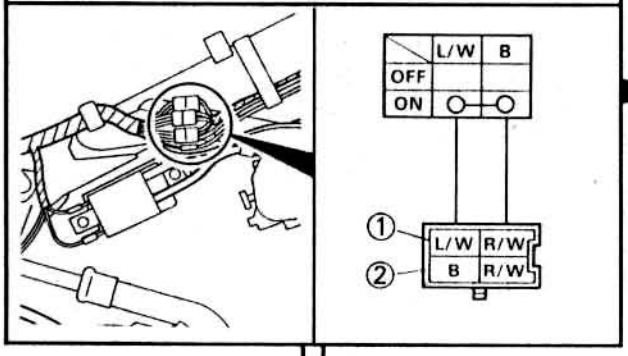
INCORRECT

Clutch switch is faulty, replace it.

CORRECT

11. "START" switch

- Disconnect handlebar switch (right) coupler from wireharness.
- Check the "START" switch component for the continuity between "Blue/White ① and Black ②". Refer to the "CHECKING OF SWITCHES" section.



INCORRECT

"START" switch is faulty, replace handlebar switch (right).

CORRECT

12. Wiring connection

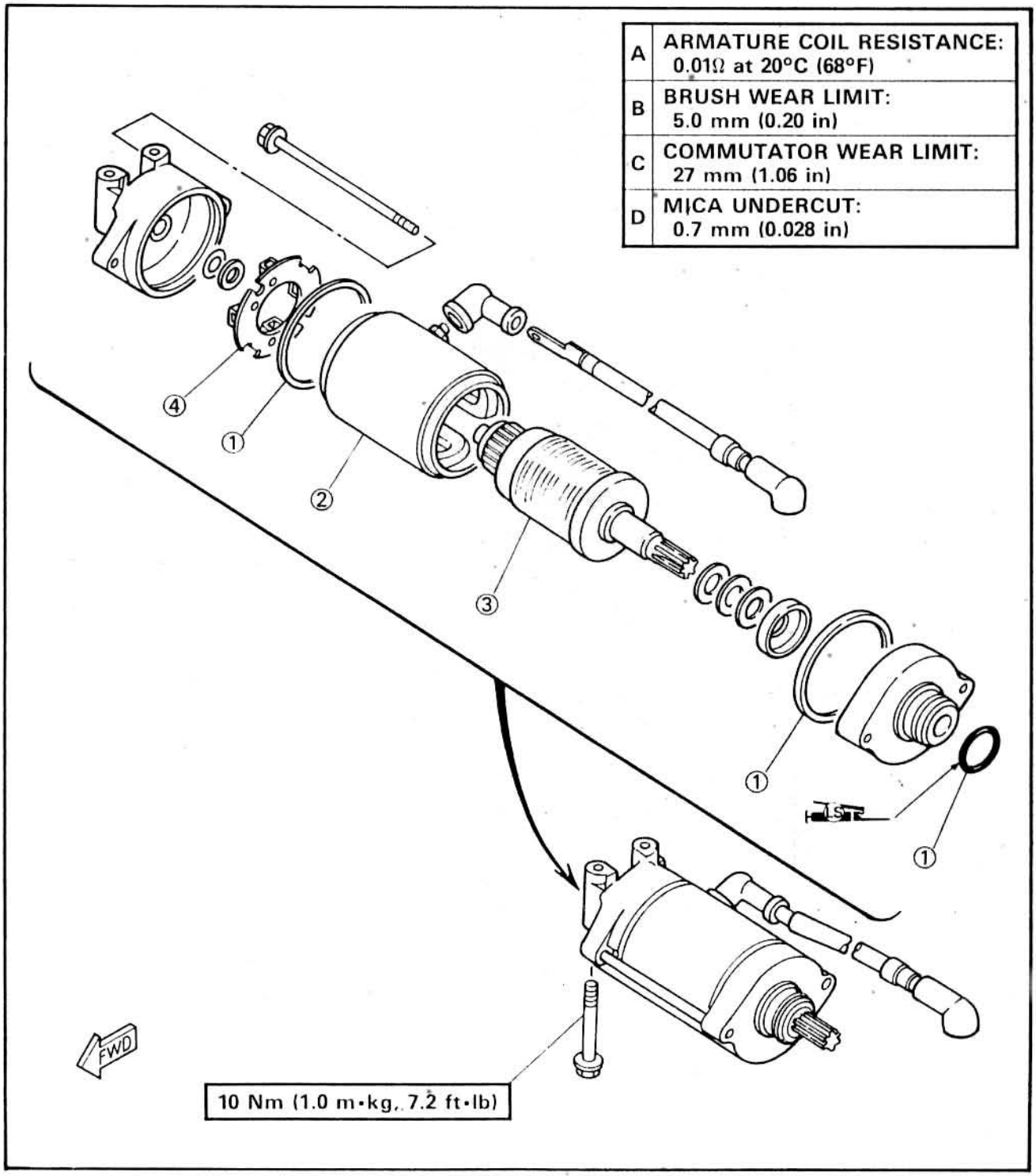
Check the entire ignition system for connections.
Refer to the "WIRING DIAGRAM" section.

POOR CONNECTION

Correct.

STARTER MOTOR

① O-ring
② Yoke
③ Armature
④ Brush



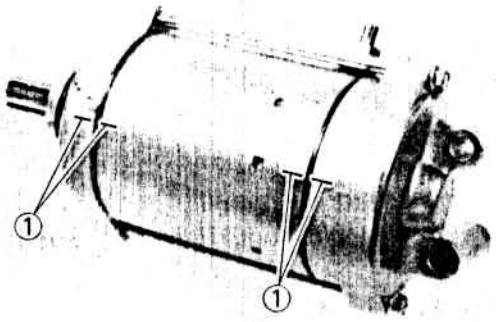
Removal

1. Remove:
   - Starter motor

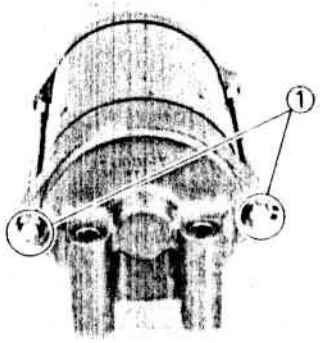
   Refer to the "ENGINE OVERHAUL — ENGINE DISASSEMBLY" section in the CHAPTER 4.

Disassembly

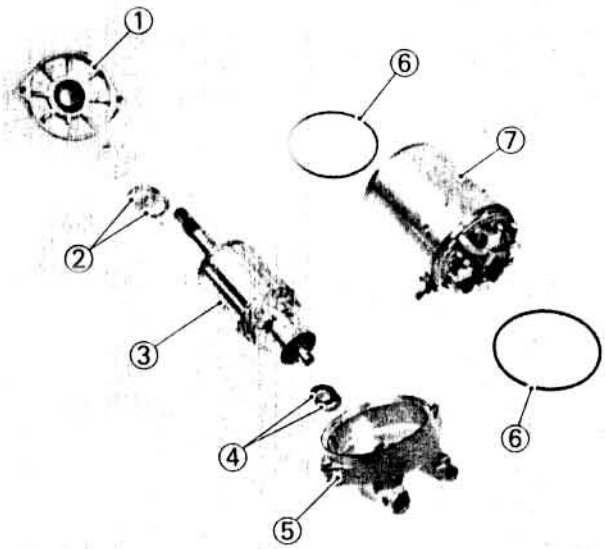
1. Put identifying marks (1) on the brackets for reassembly as shown.

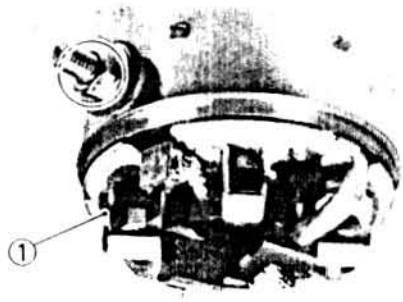


2. Remove:
   - Bolts (1)

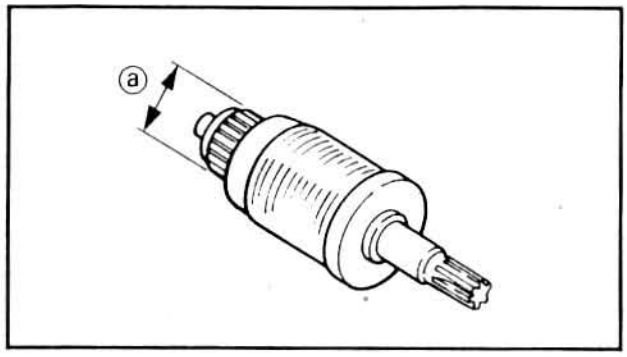


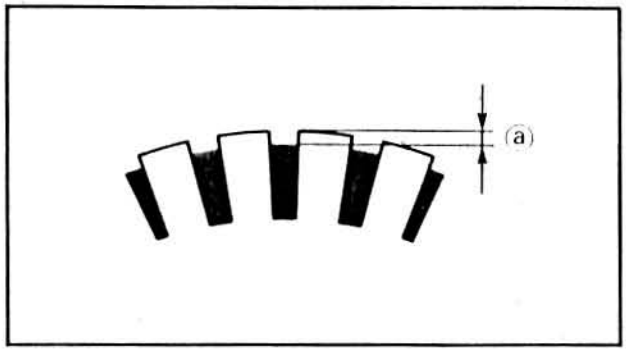
3. Remove:
   - Bracket (1)
   - Washers (2)
   - Armature (3)
   - Shims (4)
   - Bracket (5)
   - O-rings (6)
   - Yoke (7)





4. Remove:
   • Brush ①





Inspection and Repair

1. Inspect:
   • Commutator
   Dirty → Clean it with #600 grit sandpaper.
2. Measure:
   • Commutator diameter ⓐ
   Out of specification → Replace starter motor.

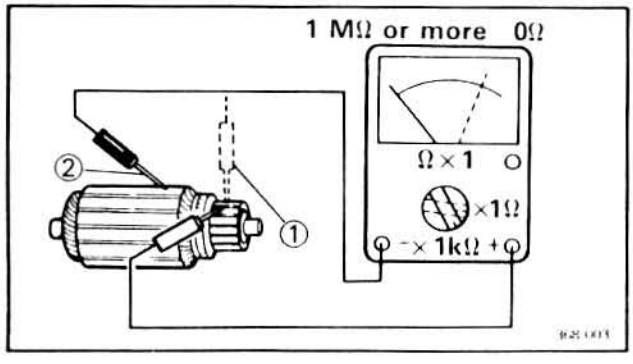
Commutator wear limit:
27 mm (1.06 in)

3. Measure:
   • Mica undercut ⓐ
   Out of specification → Scrape the mica to proper value use a hacksaw blade can be ground to fit.

Mica undercut:
0.7 mm (0.028 in)

NOTE:

The mica insulation of the commutator must be undercut to ensure proper operation of commutator.

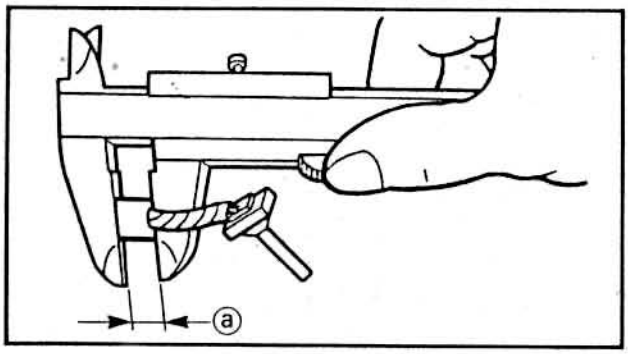


4. Inspect:
   • Armature coil (insulation/continuity)
   Defects(s) → Replace starter motor.

Armature coil inspecting steps:
- Connect the pocket tester for continuity check ① and insulation check ②.
- Measure the armature 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.

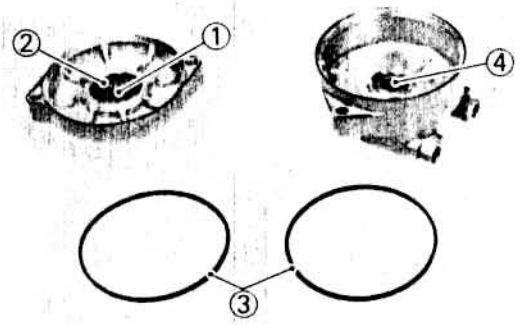


5. Measure:
   - Brush length ⓐ
     Out of specification → Replace.

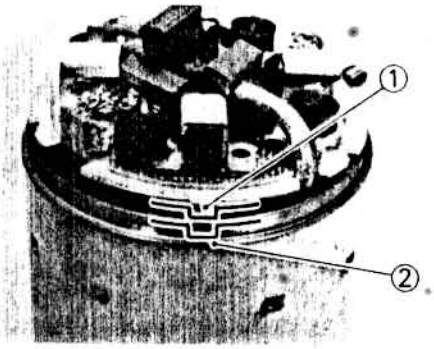
Brush length limit:
5.0 mm (0.20 in)

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 ③
   - Bush ④



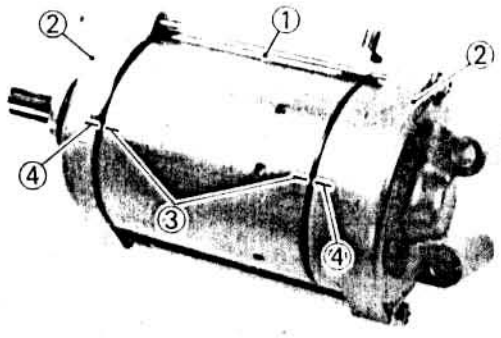
Assembly

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

1. Install:
   - Brush seat

NOTE:

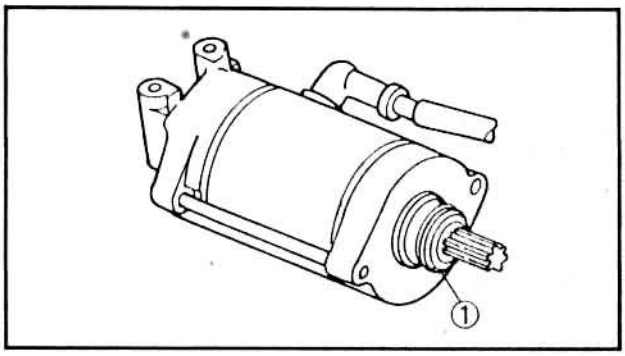
Align the projection ① on the brush seat with the slot ② on the housing.



2. Install:
   - Yoke ①
   - Brackets ②

NOTE:

Align the match marks ③ on the yoke with the match marks on the brackets ④.



Installation

1. Install:
   - Starter motor

NOTE:

Apply a lightly grease to the O-ring ①.

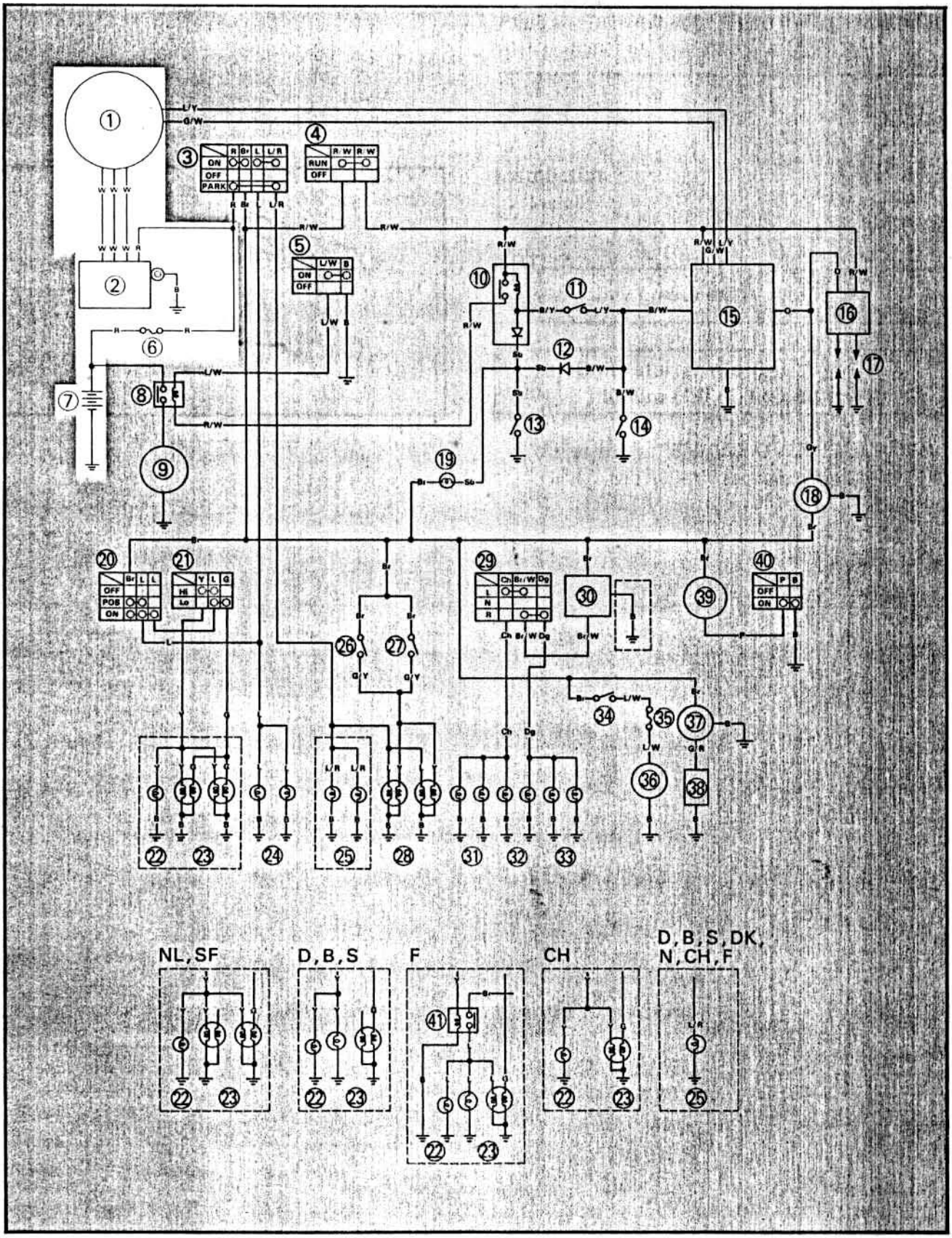
	Bolt (starter motor): 10 Nm (1.0 m•kg, 7.2 ft•lb)

Refer to the "ENGINE OVERHAUL — ENGINE ASSEMBLY" section in the CHAPTER 4.

CHARGING SYSTEM

CIRCUIT DIAGRAM

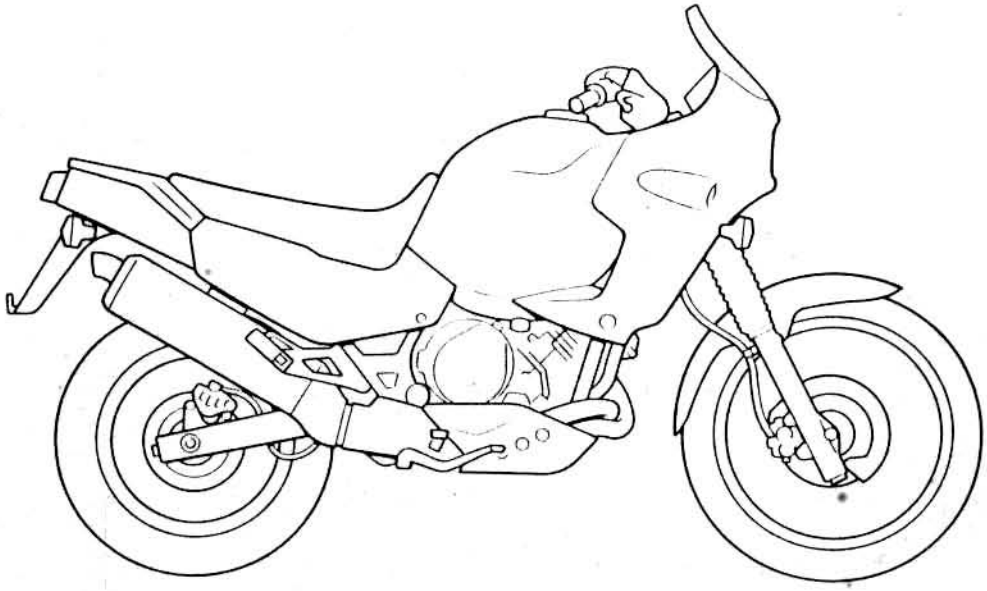
Below circuit diagram shows charging system.

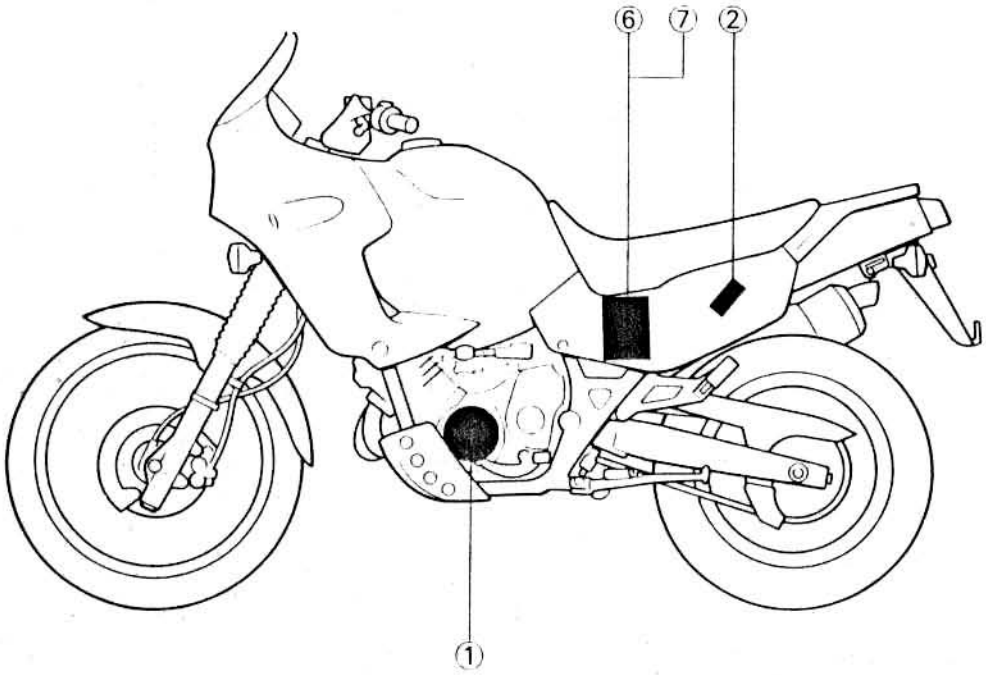


NOTE:

For the color codes, see page 8-2.

① A.C. magneto
② Rectifier/Regulator
⑥ Fuse (main)
⑦ Battery





TROUBLESHOOTING

THE BATTERY IS NOT CHARGED.

Procedure

Check;

1. Fuse (main)
2. Battery
3. Charging voltage
4. Stator coil resistance
5. Wiring connection
   (Entire charging system)

NOTE:

- Remove the following parts before troubleshooting.
  1) Side cowlings
  2) Side cover (left)
  3) Seat
  4) Fuel tank
- Use the following special tool(s) in this troubleshooting.



Inductive tachometer:
90890-03113



Pocket tester:
90890-03112

1. Fuse (main)

- Remove the fuse.
- Connect the pocket tester (Ω × 1) to the fuse.
- Check the fuse for continuity.

NOCONTINUITY → Fuse is faulty, replace it.

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 ↓

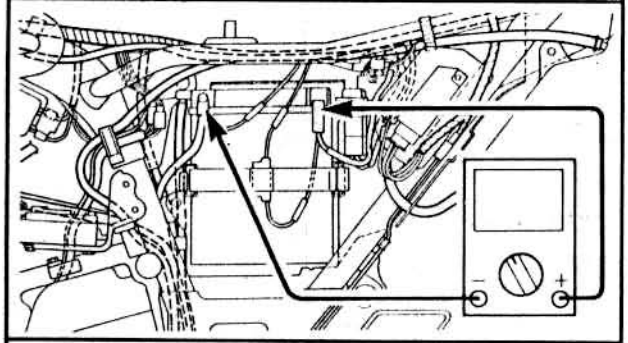
*

*

3. Charging voltage

- Connect the inductive tachometer to the #1 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, 5,000 r/min.
- Check charging voltage.

Charging voltage:
14.3 ~ 15.3V at 5,000 r/min

NOTE:
Use a full charged battery.

MEETS SPECIFICATION → Charging circuit is good.

OUT OF SPECIFICATION

4. Stator coil resistance

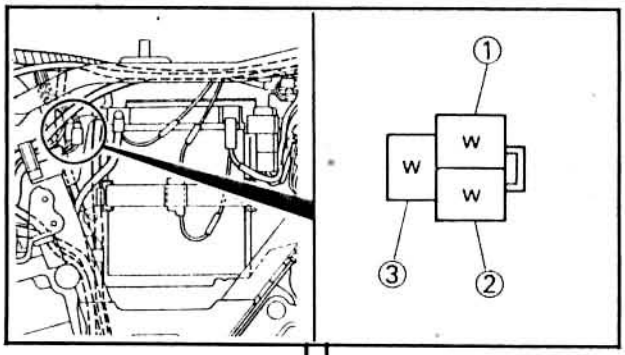
- Disconnect the stator coil coupler from the wireharness.
- Connect the pocket tester "Ω × 1" to the stator coils.
- Measure the stator coil resistances.

Tester (+) lead→White lead (1)
Tester (−) lead→White lead (2)

Tester (+) lead→White lead (1)
Tester (−) lead→White lead (3)

OUT OF SPECIFICATION → Stator coil is faulty, replace it.

Stator coil resistance:
0.2 ~ 0.3Ω at 20°C (68°F)



BOTH MEET SPECIFICATIONS

5. Wiring connection

Check the entire ignition system for connections.
Refer to the "WIRING DIAGRAM" section.

POOR CONNECTION

Correct.

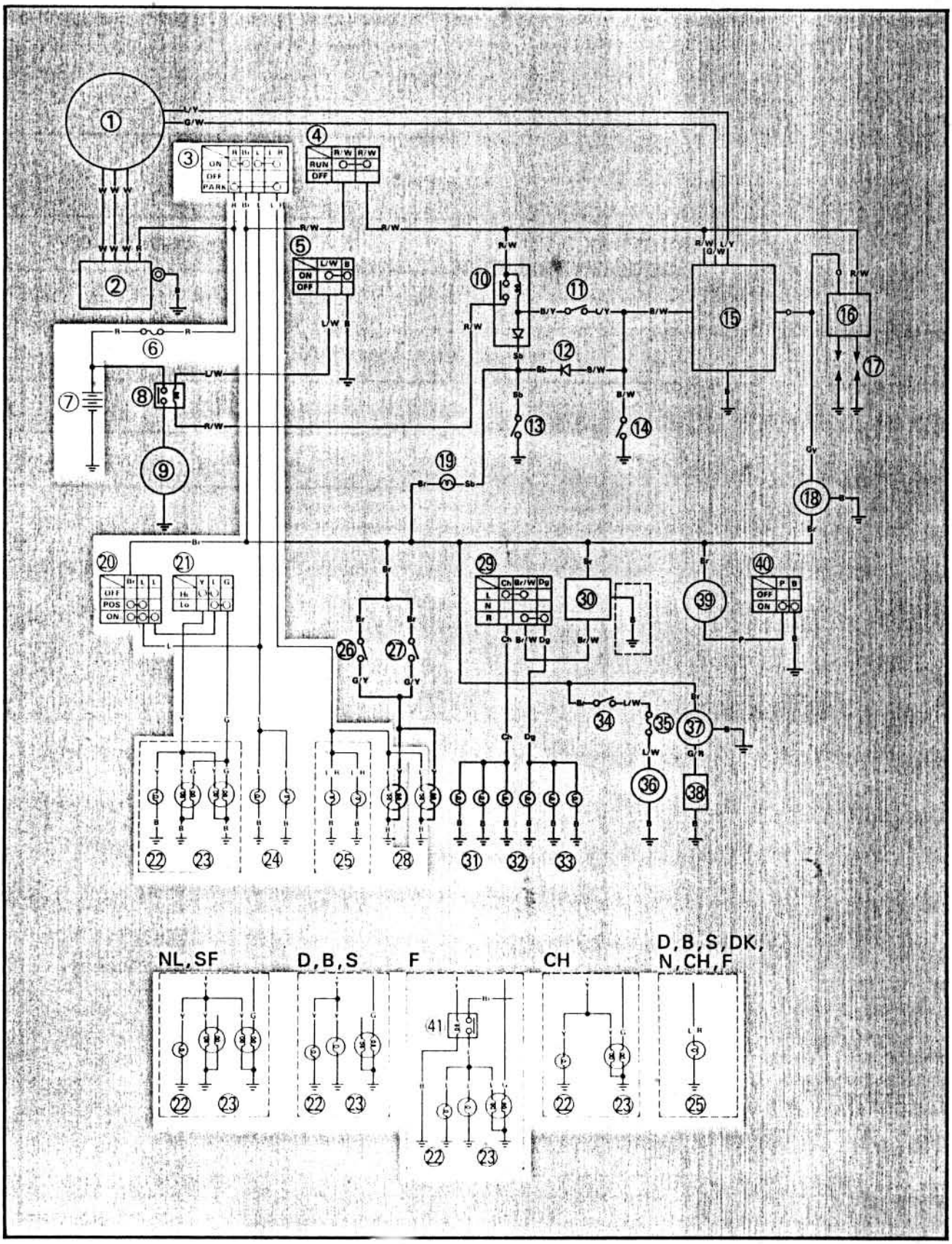
OK

Replace rectifier/regulator.

LIGHTING SYSTEM

CIRCUIT DIAGRAM

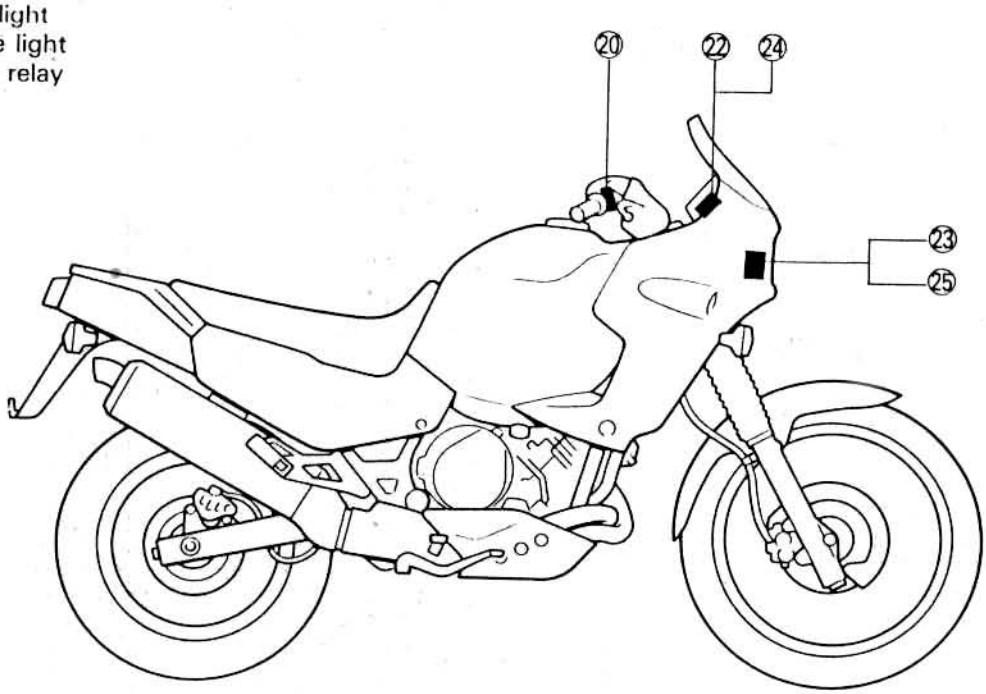
Below circuit diagram shows lighting system.

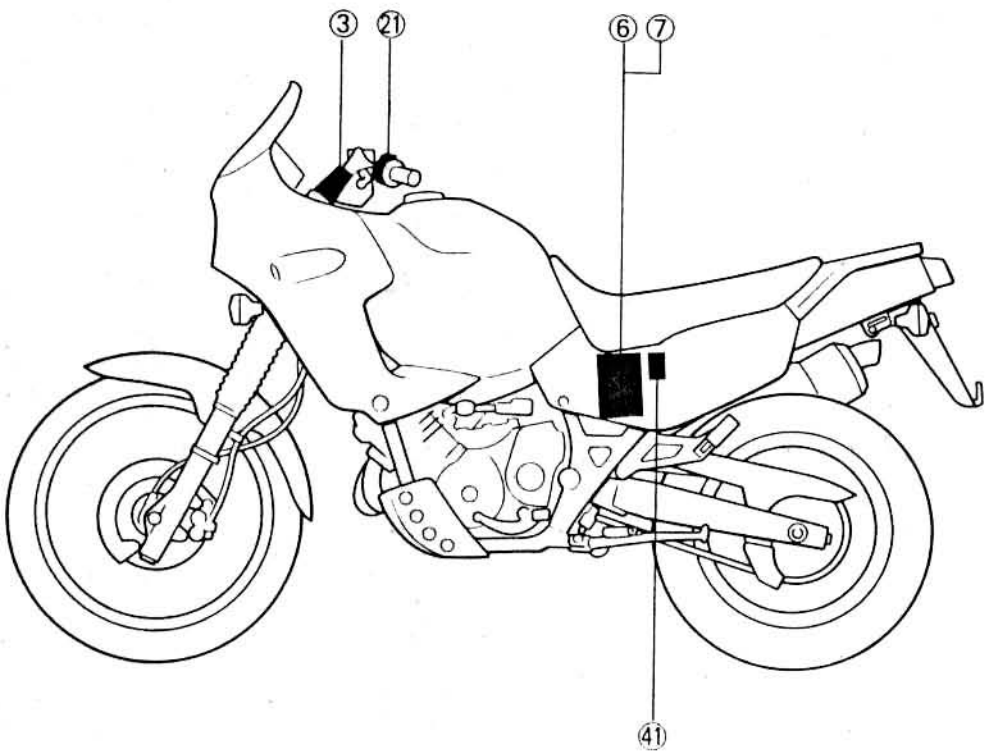


NOTE:

For color codes, see page 8-2.

③ Main switch
⑥ Fuse (main)
⑦ Battery
⑳ "LIGHTS" switch
㉑ "LIGHTS" (dimmer) switch
㉒ "HIGH BEAM" indicator light
㉓ Headlight
㉔ Meter light
㉕ Auxiliary light
㉘ Tail/brake light
㊶ Headlight relay





TROUBLESHOOTING

HEADLIGHT "HIGH BEAM" INDICATOR LIGHT, TAILLIGHT, AUXILIARY LIGHT AND/ OR METER LIGHT DO NOT COME ON.

Procedure

Check;

1. Bulb
2. Fuse (main)
3. Battery
4. Main switch
5. "LIGHTS" switch
6. "LIGHTS" (Dimmer) switch
7. Headlight relay (For F)
8. Wiring connection (Entire lighting system)

NOTE:

- Remove the following parts before troubleshooting.
  1) Side cowlings
  2) Side cover (left)
  3) Seat
  4) Fuel tank
  5) Air filter case
- Use the following special tool(s) in this troubleshooting.



Pocket tester:
90890-03112

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. Fuse (main)

- Remove the fuse.
- Connect the pocket tester (Ω × 1) to the fuse.
- Check the fuse for continuity. Refer to the "FUSE INSPECTION" in the CHAPTER 3.

NOCONTINUITY → Fuse is faulty, replace it.

CONTINUITY ↓

*

*

3. Battery

- Check the battery condition.
  Refer to the "BATTERY INSPECTION" section in the CHAPTER 3.

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

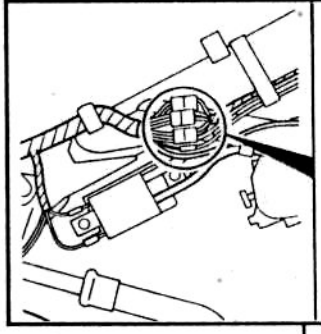
INCORRECT

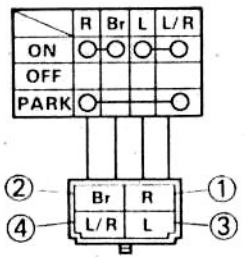
- Refill battery fluid.
- Clean battery terminals.
- Recharge or replace battery.

CORRECT

4. Main switch

- Disconnect the main switch coupler from the wireharness.
- Check the switch component for the continuity between "Red ① and Brown ②", "Blue ③ and Blue/Red ④" and "Red ①" and Blue/Red ④". Refer to the "CHECKING OF SWITCHES" section.





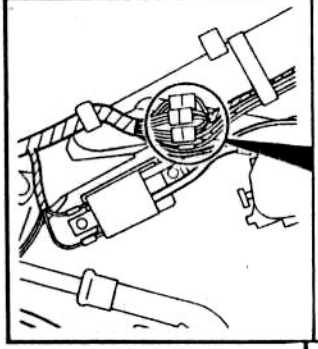
INCORRECT

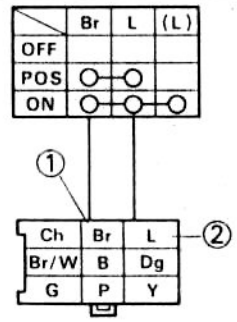
Main switch is faulty, replace it.

CORRECT

5. "LIGHTS" switch

- Disconnect the handlebar switch (left) coupler from the wireharness.
- Check the switch component for the continuity between "Brown ① and Blue ②". Refer to the "CHECKING OF SWITCHES" section.





INCORRECT

"LIGHTS" switch is faulty, replace handlebar switch (left).

CORRECT

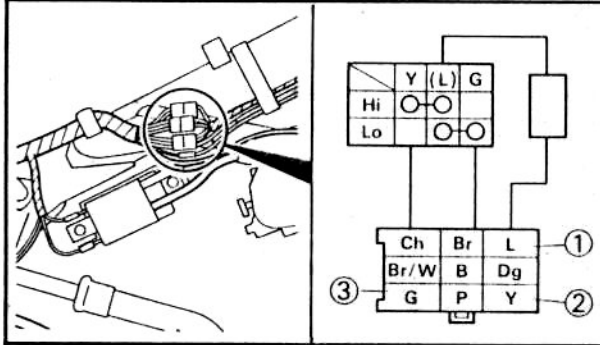
*

*

6. "LIGHTS" (dimmer) switch

- Disconnect the handlebar switch (left) coupler from the wireharness.
- Turn the "LIGHTS" switch to "ON" position.
- Check the switch component for the continuity between "Blue ① and Yellow ②" and "Blue ① and Green ③". Refer to the "CHECKING OF SWITCHES" section.

④ "LIGHTS" switch

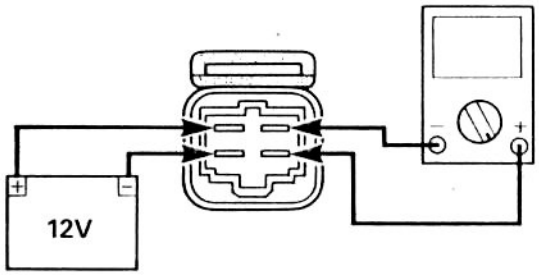


INCORRECT → "LIGHTS" (dimmer) switch is faulty, replace handlebar switch (left).

CORRECT

7. Headlight relay (For F)

- Remove the headlight relay.
- Connect the pocket tester (Ω × 1) and battery (12V) to the headlight relay.
- Check the headlight relay for continuity.



NOCONTINUITY → Headlight relay is faulty, replace it.

CONTINUITY

8. Wiring connection

Check the entire lighting system for connections.
Refer to the "WIRING DIAGRAM" section.

POOR CONNECTION → Correct.

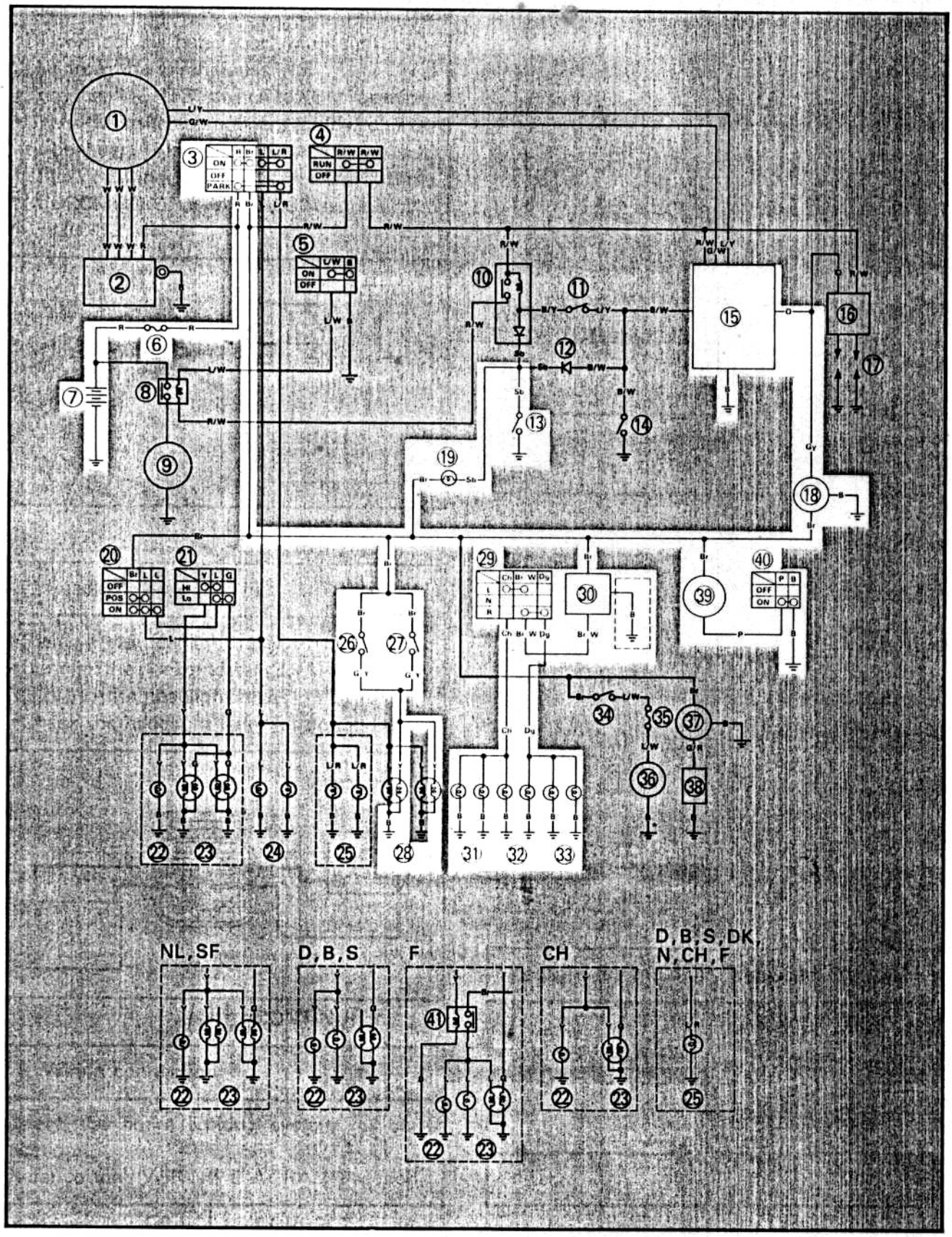
CORRECT

This circuit is good.

SIGNAL SYSTEM

CIRCUIT DIAGRAM

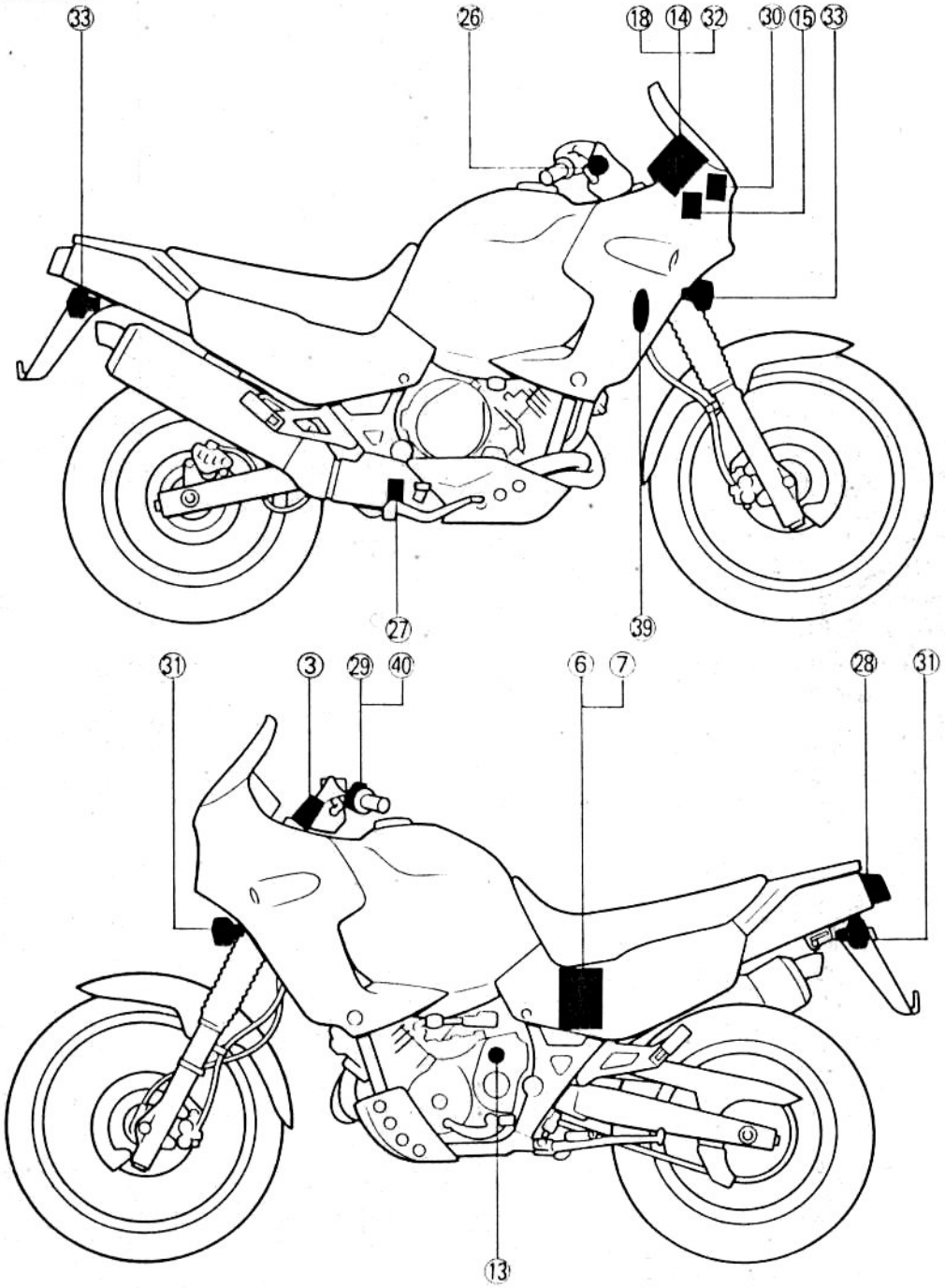
Below circuit diagram shows signal system.



NOTE:

For the color codes, see page 8-2.

③ Main switch
⑥ Fuse
⑦ Battery
⑬ Neutral switch
⑮ Ignitor unit
⑱ Tachometer
⑲ "NEUTRAL" indicator light
㉖ Front brake switch
㉗ Rear brake switch
㉘ Tail/brake light
㉙ "TURN" switch
㉚ Flasher relay
㉛ Flasher light (left)
㉜ "TURN" indicator light
㉝ Flasher light (right)
㊴ Horn
㊵ "HORN" 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)
2. Battery
3. Main switch
4. Wiring connection
   (Entire signal system)

NOTE:

- Remove the following parts before troubleshooting.
  1) Side cowlings
  2) Side cover (left)
  3) Seat
  4) Fuel tank
  5) Air filter case
- Use the following special tool in this troubleshooting.



Pocket tester:
90890-03112

1. Fuse (main)

- Remove the fuses.
- Connect the pocket tester (Ω × 1) to the fuses.
- Check the fuses for continuity.
  Refer to the "FUSE INSPECTION" in the CHAPTER 3.

NOCONTINUITY → Fuse is faulty, replace it.

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 ↓

*

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)
2. Battery
3. Main switch
4. Wiring connection
   (Entire signal system)

NOTE:

- Remove the following parts before troubleshooting.
  1) Side cowlings
  2) Side cover (left)
  3) Seat
  4) Fuel tank
  5) Air filter case
- Use the following special tool in this troubleshooting.



Pocket tester:
90890-03112

1. Fuse (main)

- Remove the fuses.
- Connect the pocket tester (Ω × 1) to the fuses.
- Check the fuses for continuity.
  Refer to the "FUSE INSPECTION" in the CHAPTER 3.

NOCONTINUITY → Fuse is faulty, replace it.

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.

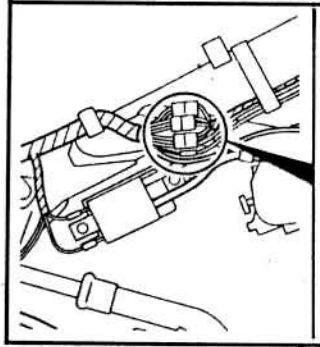
CORRECT ↓

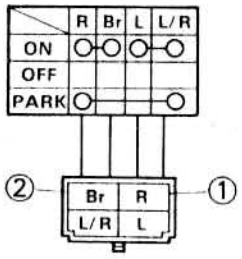
*

*

3. Main switch

- Disconnect the main switch coupler from the wireharness.
- Check the switch component for the continuity between "Red ① and Brown ②". Refer to the "CHECKING OF SWITCHES" section.





INCORRECT

Main switch is faulty, replace it.

CORRECT

4. Wiring connection

Check the entire signal system for connections. Refer to the "WIRING DIAGRAM" section.

POOR CONNECTION

Correct.

CORRECT

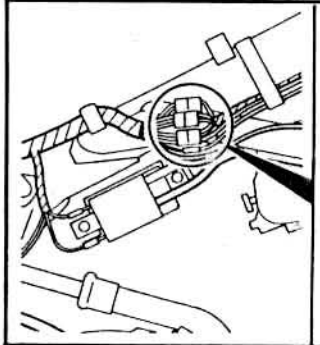
Check condition of each circuit for signal system. Refer to "SIGNAL SYSTEM CHECK" section.

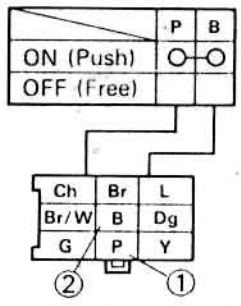
SIGNAL SYSTEM CHECK

1. Horn does not sound.

1. "HORN" switch.

- Disconnect the handlebar switch (left) coupler from the wireharness.
- Check the switch component for the continuity between "Pink (1) and Black (2)". Refer to the "CHECKING OF SWITCHES" section.





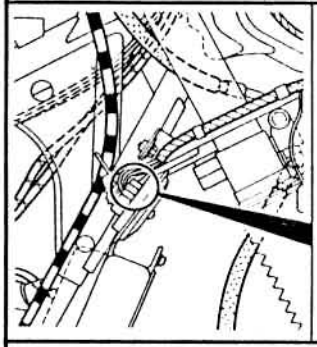
INCORRECT → "HORN" switch is faulty, replace handlebar switch (left).

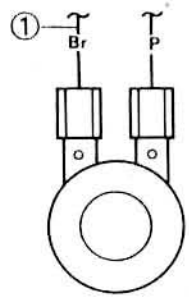
CORRECT

2. Voltage

- Connect the pocket tester (DC20V) to the horn lead.

Tester (+) lead → Brown lead (1)
Tester (−) lead → Frame ground





- Turn the main switch to "ON".
- Check for voltage (12V) on the "Brown" lead at the horn terminal.

OUT OF SPECIFICATION → Wiring circuit from main switch to horn terminal is faulty, repair.

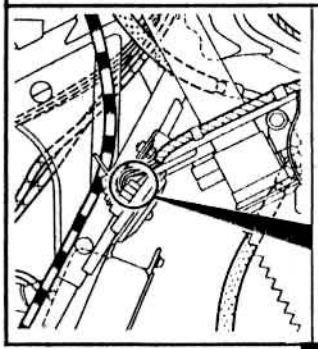
MEETS SPECIFICATION (12V)

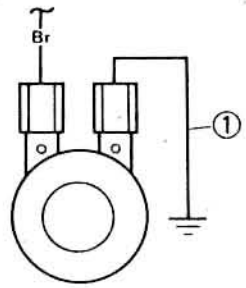
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3. Horn

- Disconnect the "Pink" lead from the horn terminal.
- Connect a jumper lead ① to the horn terminal and ground the jumper lead.
- Turn the main switch to "ON".





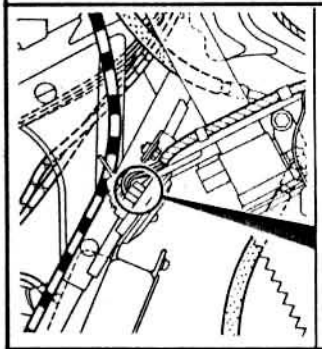
HORN IS SOUNDED → Horn is good.

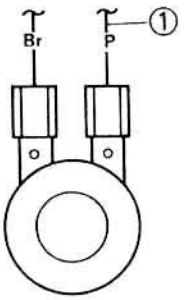
HORN IS NOT SOUNDED

4. Voltage

- Connect the pocket tester (DC20V) to the horn at the "Pink" terminal.

Tester (+) lead → Pink lead ①
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 → Horn is faulty, replace it.

MEETS SPECIFICATION (12V) → Adjust 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.

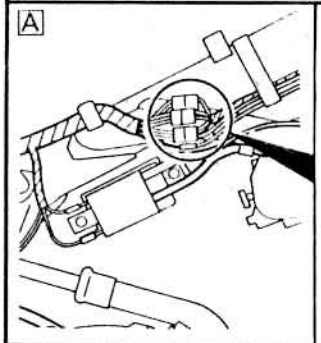
NOCONTINUITY → Replace bulb and/or bulb socket.

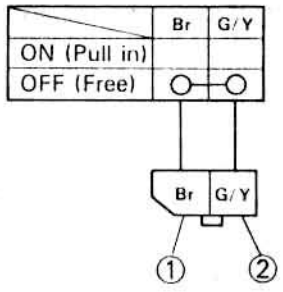
CONTINUITY ↓

2. Brake switch

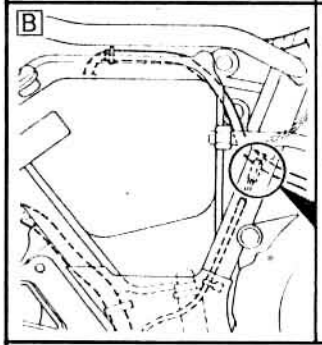
- Disconnect the brake switch leads from the wireharness.
- Check the switch component for the continuity between "Brown ① and Green/Yellow ②". Refer to the "CHECKING OF SWITCHES" section.

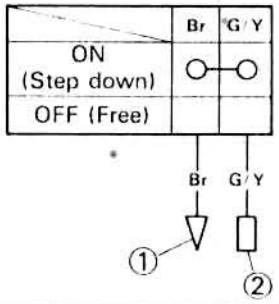
A





B





A Front brake switch
B Rear brake switch

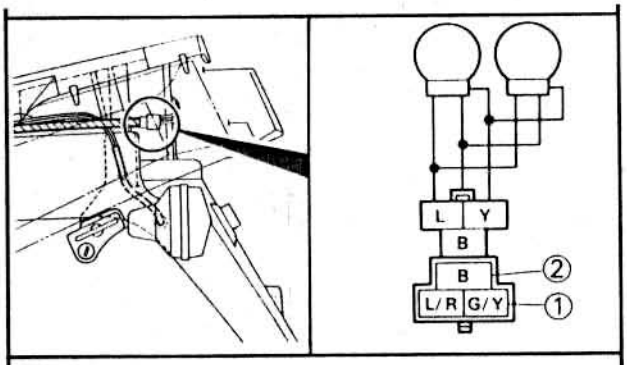
INCORRECT → Brake switch is faulty, replace it.

CORRECT ↓

3. Voltage

- Connect the pocket tester (DC20V) to the bulb socket connector.

Tester (+) lead→Green/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 "Green/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.

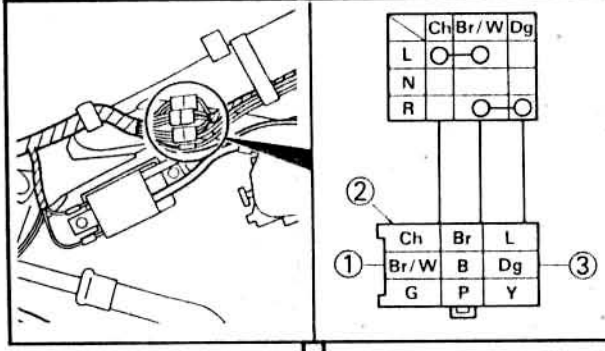
NOCONTINUITY

Replace bulb and/or bulb socket.

CONTINUITY

2. "TURN" switch

- Disconnect the handlebar switch (left) coupler from the wireharness.
- Check the switch component for the continuity between "Brown/White ① and Chocolate ②" and "Brown/White ① and Dark green ③". Refer to the "CHECKING OF SWITCHES" section.



INCORRECT

"TURN" switch is faulty, replace handlebar switch (left).

CORRECT

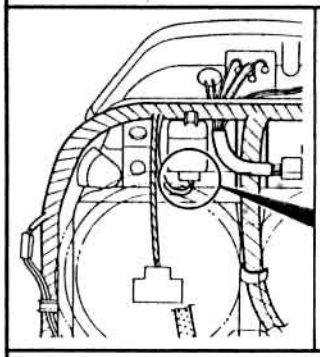
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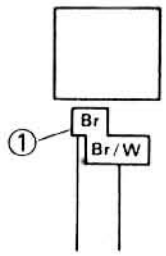
*

3. Voltage

- Connect the pocket tester (DC20V) to the flasher relay.

Tester (+) lead → Brown lead (1)
Tester (−) lead → Frame ground





- Turn the main switch to "ON".
- Check for voltage (12V) on the "Brown" lead at the flasher relay terminal.

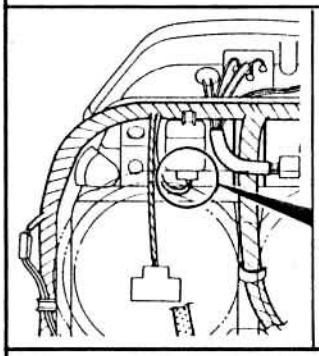
OUT OF SPECIFICATION → Wiring circuit from main switch to flasher relay connector is faulty, repair.

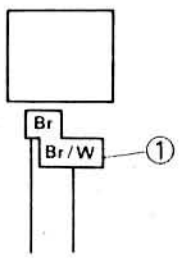
MEETS SPECIFICATION (12V)

4. Voltage

- Connect the pocket tester (DC20V) to the flasher relay.

Tester (+) lead → Brown/White lead (1)
Tester (−) lead → Frame ground





- Turn the main switch to "ON".
- Check for voltage (12V) on the "Brown/White" lead at the flasher relay terminal.

OUT OF SPECIFICATION → Flasher relay is faulty, replace it.

MEETS SPECIFICATION (12V)

*

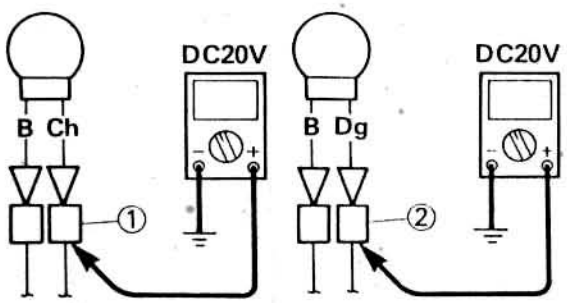
*

5. Voltage

- Connect the pocket tester (DC20V) to the bulb socket connector.

At flasher light (left):
Tester (+) lead → Chocolate lead (1)
Tester (−) lead → Frame ground

At flasher light (right):
Tester (+) lead → Dark green lead (1)
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. "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.

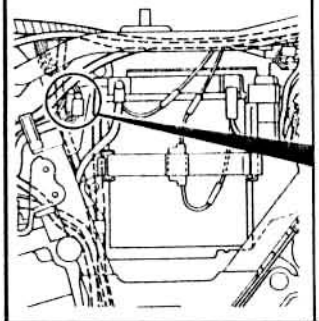
CONTINUITY

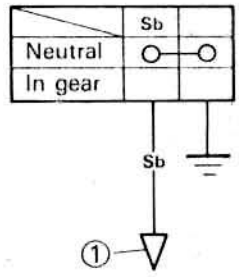
*

*

2. Neutral switch

- Disconnect the neutral switch lead from the wireharness.
- Check the switch component for the continuity between "Sky blue ① and Ground". Refer to the "CHECKING OF SWITCHES" section.





INCORRECT

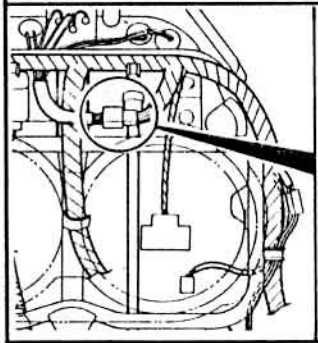
Neutral switch is faulty, replace it.

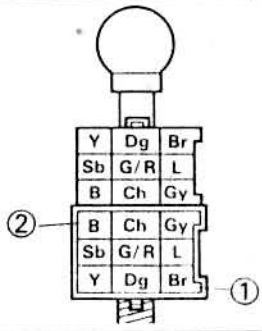
CORRECT

3. Voltage

- Connect the pocket tester (DC20V) to the bulb socket connector.

Tester (+) lead→Brown lead ①
Tester (−) lead→Black lead ②





- 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.

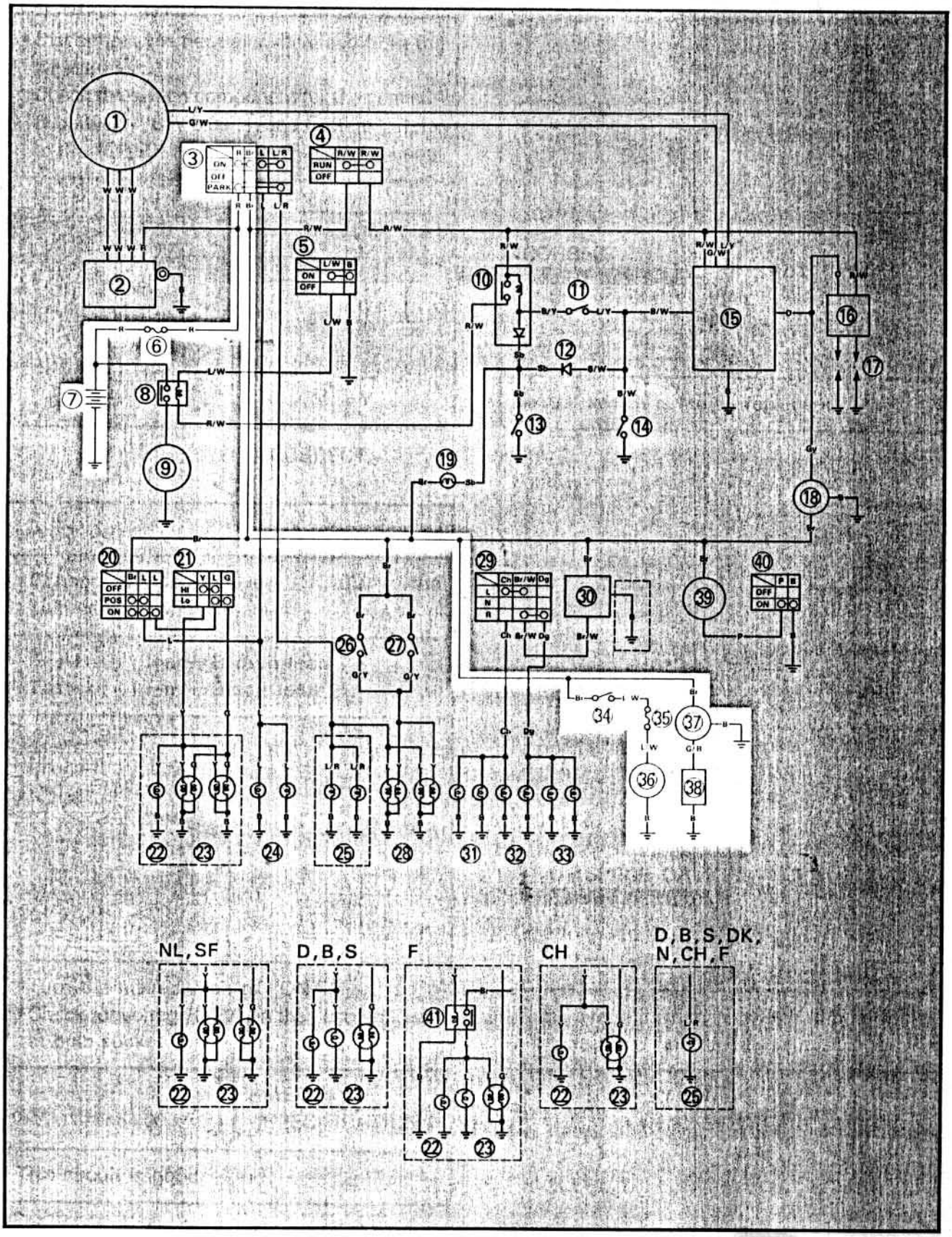
MEETS SPECIFICATION (12V)

This circuit is good.

COOLING SYSTEM

CIRCUIT DIAGRAM

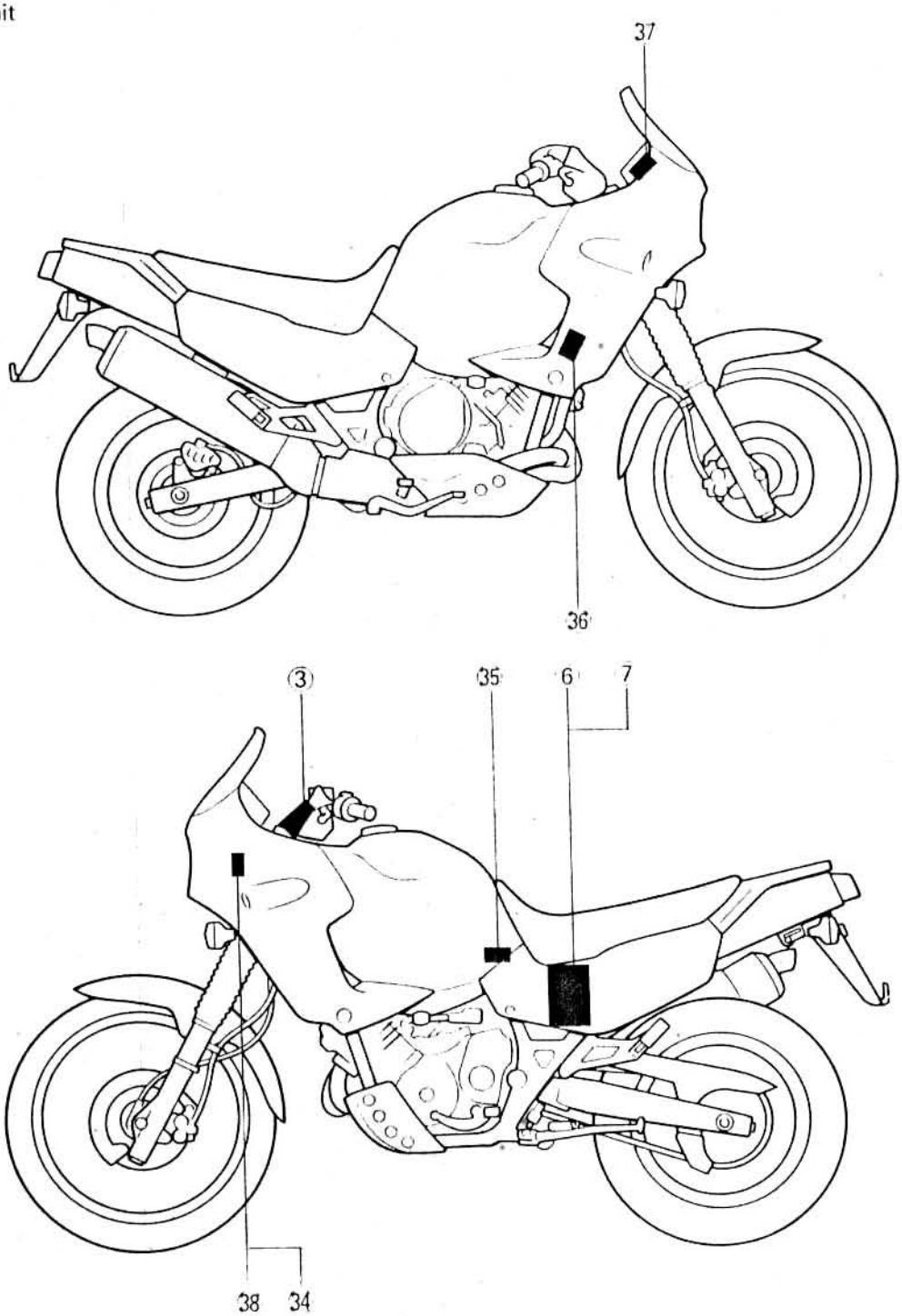
Below circuit diagram shows cooling system.



NOTE:

For the color codes, see page 8 2.

③ Main switch
⑥ Fuse (main)
⑦ Battery
㉞ Thermo switch
㉟ Fuse (fan motor)
㊱ Fan motor
㊲ Temperature gauge
㊳ Thermo unit



TROUBLESHOOTING

FAN MOTOR DOES NOT MOVE.

Procedure

Check;

1. Fuse (main and fan)
2. Battery
3. Main switch
4. Fan motor (Test 1)
5. Fan motor (Test 2)
6. Thermo switch
7. Wiring connection (Entire cooling system)

NOTE:

- Remove the following parts before troubleshooting.
  1) Side cowlings
  2) Side cover (left)
  3) Seat
  4) Fuel tank
  5) Air filter case
- Use the following special tool in this troubleshooting.



Pocket tester:
90890-03112

1. Fuse (main and fan)

- Remove the fuses.
- Connect the pocket tester (Ω × 1) to the fuses.
- Check the fuses for continuity.
  Refer to the "FUSE INSPECTION" in the CHAPTER 3.

NOCONTINUITY → Fuse is faulty, replace it.

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.

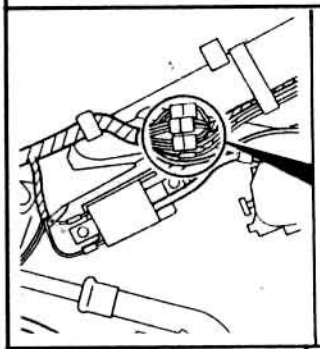
CORRECT ↓

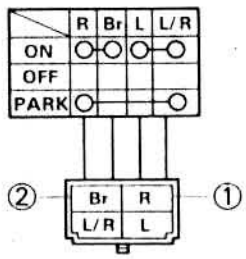
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3. Main switch

- Disconnect the main switch coupler from the wireharness.
- Check the switch component for the continuity between "Red ① and Brown ②". Refer to the "CHECKING OF SWITCHES" section.





INCORRECT

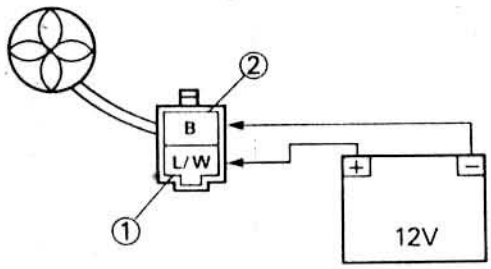
Main switch is faulty, replace it.

CORRECT

4. Fan motor (test 1)

- Disconnect the fan motor coupler.
- Connect the battery (12V) as shown.

Battery (+) lead→Blue/White lead ①
Battery (−) lead→Black lead ②



- Check the fan motor for operation.

DOES NOT MOVES

Fan motor is faulty, replace it.

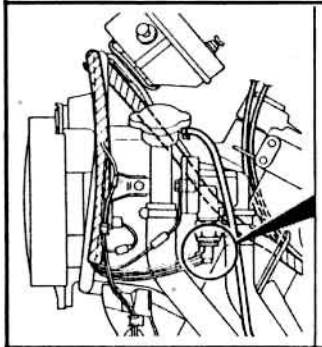
MOVES

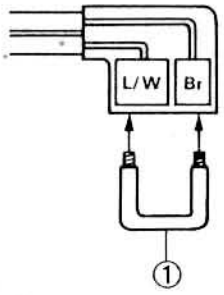
*

*

5. Fan motor (test 2)

- Disconnect the thermo switch leads ("Blue/White" and "Brown").
- Turn the main switch to "ON".
- Connect the leads with a jumper lead (1) 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 × 1) to the thermo switch (1).
- Immerse the thermo switch in the coolant (2).
- Check the thermo switch for continuity. Note temperatures while heating the coolant with the temperature gauge (3).

Test step	Coolant temperature	Good condition
1	Less than 105 ± 3°C (221.0 ± 5.4°F)	×
2	More than 105 ± 3°C (221.0 ± 5.4°F)	○
3*	105 to 98°C (221.0 to 208.4°F)	○
4*	Less than 98°C (208.4°F)	×

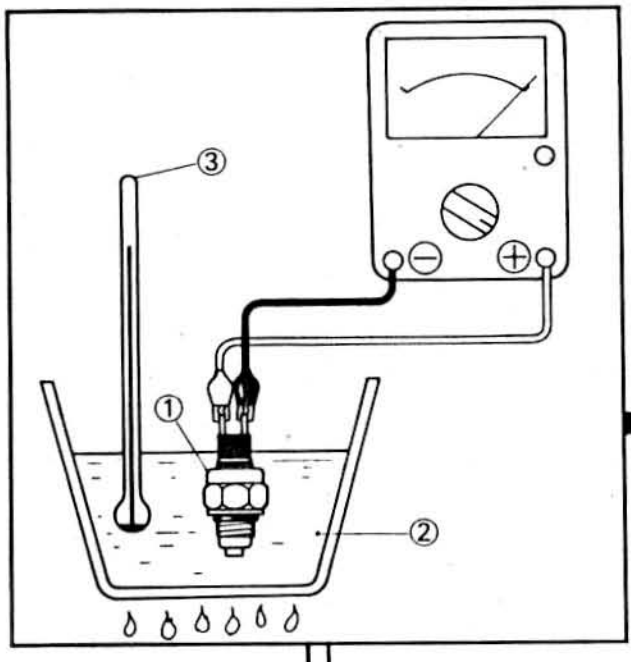
Test 1 & 2; Heat-up tests
Test 3* & 4*; Cool-down tests
○ : Continuity × : Nocontinuity

⚠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:
28 Nm (2.8 m•kg, 20 ft•lb)
Water resistant sealant



BAD CONDITION

Thermo switch is faulty, replace it.

GOOD CONDITION

7. Wiring connection

Check the entire cooling system for connections. Refer to the "WIRING DIAGRAM" section.

POUR CONNECTION

Correct.

CORRECT

This circuit is good.

WHEN ENGINE IS HOT, TEMPERATURE GAUGE DOES NOT MOVE.

Procedure

Check;

1. Fuse (main)
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) Side cover (left)
  3) Seat
  4) Fuel tank
  5) Air clearner case
- Use the following special tool(s) in this troubleshooting.



Pocket tester:
90890-03112

1. Fuse (main)

- Remove the fuse.
- Connect the pocket tester (Ω × 1) to the fuse.
- Check the fuse for continuity. Refer to "FUSE INSPECTION" in the CHAPTER 3.

NOCONTINUITY → Fuse is faulty, replace it.

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.

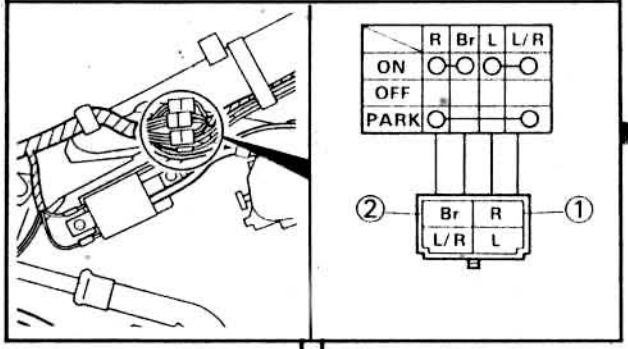
CORRECT ↓

*

*

3. Main switch

- Disconnect the main switch coupler from the wireharness.
- Check the switch component for the continuity between "Red ① and Brown ②". Refer to the "CHECKING OF SWITCHES" section.



INCORRECT

Replace main switch.

CORRECT

4. Thermo unit

- Remove the thermo unit.

⚠WARNING:

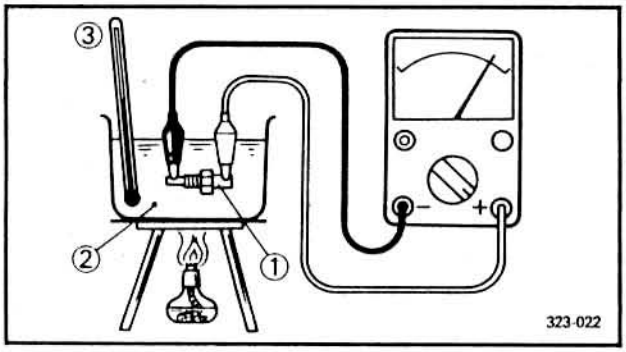
Handle the thermo unit with special care. Never subject it to strong or allow it to be dropped. Should it be dropped, it must be replaced.

- Immerse the thermo unit ① in coolant ②.
- Measure the resistance at each temperature as tabulated.

③ Thermometer

Coolant temperature	Resistance
50°C (122°F)	154Ω
80°C (176°F)	47 ~ 53Ω
100°C (212°F)	26 ~ 29Ω
120°C (248°F)	16Ω

- After measuring the thermo unit, install the unit.



Thermo unit:
13 Nm (1.3 m•kg, 9.4 ft•lb)
Water resistant sealant

⚠CAUTION:

Avoid overtightening.

OUT OF SPECIFICATION

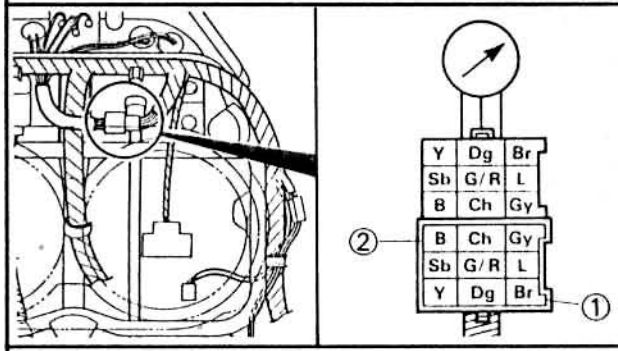
Thermo unit is faulty, replace it.

MEET SPECIFICATIONS

5. Voltage

- Connect the pocket tester (DC20V) to the temperature gauge leads.

Tester (+) lead→Brown lead (1)
Tester (−) lead→Black lead (2)



- Turn the main switch to "ON".
- Check for voltage (12V) on the "Brown" lead at the temperature gauge connector.

OUT OF SPECIFICATION

Wiring circuit from main switch to temperature gauge connector, repair.

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.

CHAPTER 9.
TROUBLESHOOTING

STARTING FAILURE/HEAD STARTING 9-1

POOR IDEL SPEED PERFORMANCE 9-3

POOR MEDIUM AND HIGH SPEED PERFORMANCE 9-3

FAULTY GEAR SHIFTING 9-4

CLUTCH SLIPPING/DRAGGING 9-4

OVERHEATING OR OVER-COOLING 9-5

FAULTY BRAKE 9-6

FRONT FORK OIL LEAKAGE AND FRONT FORK MALFUNCTION 9-6

INSTABLE HANDLING 9-7

FAULTY SIGNAL AND LIGHTING SYSTEMS 9-8

XTZ750 WIRING DIAGRAM 9-10

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 • Clogged vacuum hose

STARTING FAILURE/HARD STARTING

TRBL SHTG ?

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 ignitor 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 • Faulty starter clutch

COMPRESSION SYSTEM

	PROBABLE CAUSE
Cylinder and cylinder head	• Loose 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 sealed 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 ignitor 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 CAUSE
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

OVERHEATING OR OVER-COOLING

CLUTCH DRAGGING

	PROBABLE CAUSE
Clutch	• Warped pressure plate • Unevenly tensioned clutch springs • Match marks not aligned • Loose 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

- Disc brake

PROBABLE CAUSE

- 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

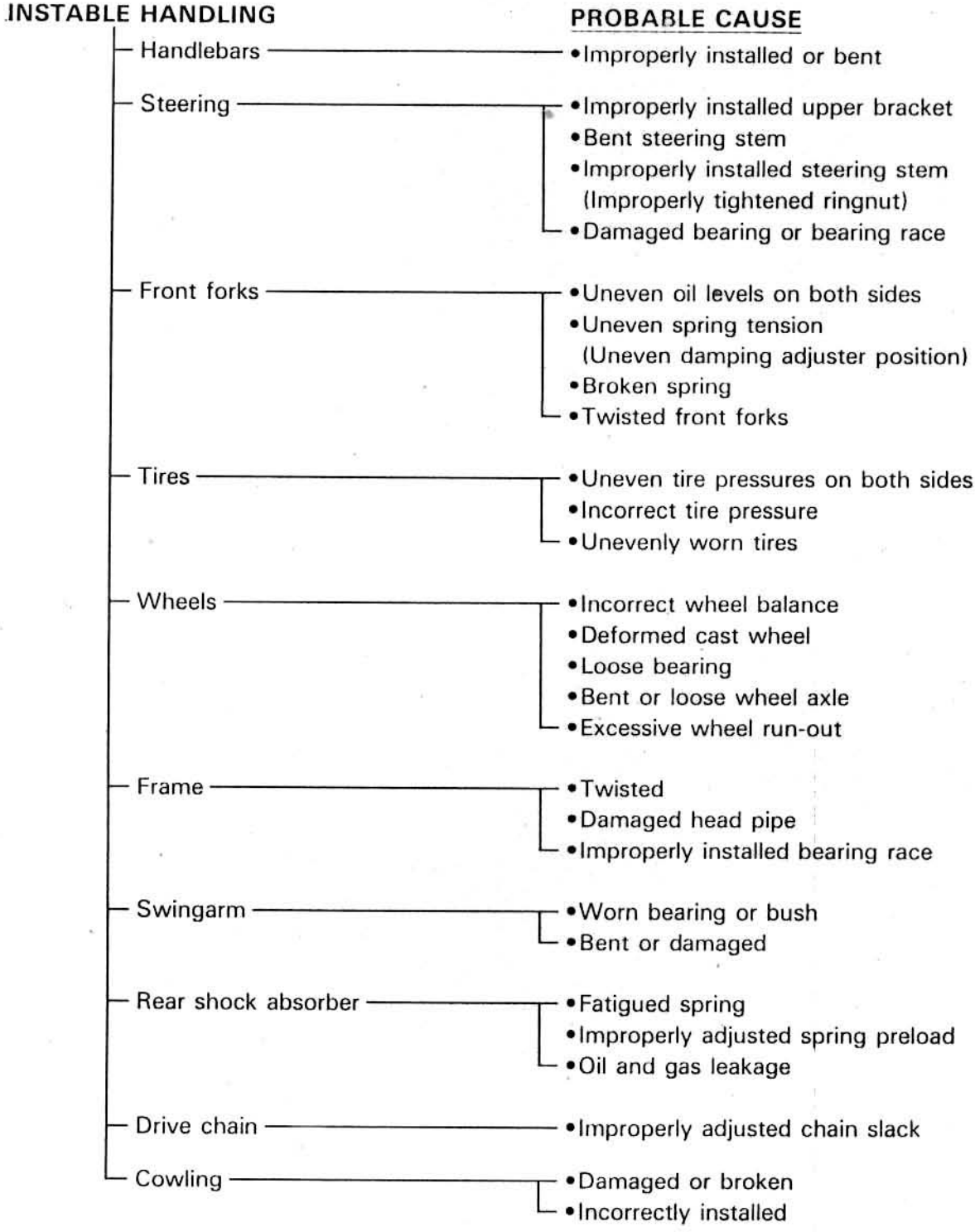
MALFUNCTION

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

FAULTY SIGNAL AND LIGHTING SYSTEM

TRBL SHTG ?

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

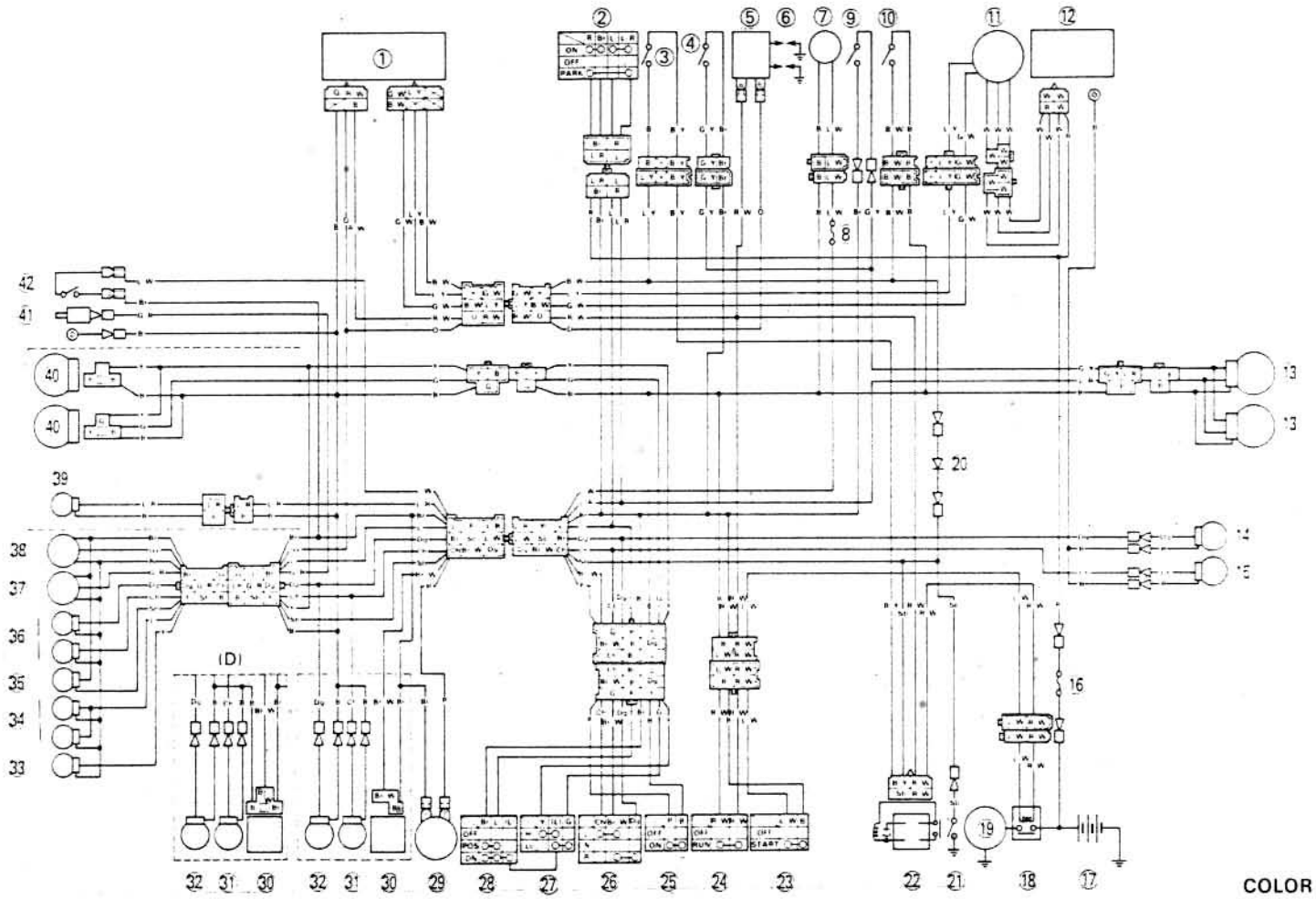
- Improper bulb
- Faulty flasher relay

HORN IS INOPERATIVE

PROBABLE CAUSE

- Faulty battery
- Faulty main and/or horn switch
- Improperly adjusted horn
- Faulty horn
- Broken wireharness

XTZ750 WIRING DIAGRAM



① Ignitor unit
② Main switch
③ Clutch switch
④ Front brake switch
⑤ Ignition coil
⑥ Spark plug
⑦ Fan motor
⑧ Fuse (Fan motor)
⑨ Rear brake switch
⑩ Sidestand switch
⑪ A.C. magneto
⑫ Rectifier/regulator
⑬ Tail/brake light
⑭ Rear flasher light (Right)
⑮ Rear flasher light (Left)
⑯ Main fuse
⑰ Battery
⑱ Starter relay
⑲ Starter motor
⑳ Diode
㉑ Neutral switch
㉒ Starting circuit cut-off relay
㉓ "START" switch
㉔ "ENGINE STOP" switch
㉕ "HORN" switch
㉖ "TURN" switch
㉗ "LIGHTS" (Dimmer) switch
㉘ "LIGHTS" switch
㉙ Horn
㉚ Flasher relay
㉛ Front flasher light (Left)
㉜ Front flasher light (Right)
㉝ "HIGH BEAM" indicator light
㉞ Meter light
㉟ "NEUTRAL" indicator light
㊱ "TURN" indicator light
㊲ Temperature gauge
㊳ Tachometer
㊴ Auxiliary light
㊵ Headlight
㊶ Thermo unit
㊷ Thermo switch

COLOR CODE

B	Black	W	White
R	Red	B/Y	Black/Yellow
L	Blue	R/W	Red/White
G	Green	G/W	Green/White
O	Orange	L/R	Blue/Red
Y	Yellow	L/Y	Blue/Yellow
P	Pink	L/W	Blue/White
Br	Brown	G/R	Green/Red
Ch	Chocolate	G/Y	Green/Yellow
Gy	Gray	Br/W	Brown/White
Sb	Sky blue	B/W	Black/White
Dg	Dark green		