YAMAHA

SERVICE MANUAL

FZR600R '95 4JH-AE4

FZR600R '94 4JH-AE3

FZR600R '94 ~ '95
SERVICE MANUAL
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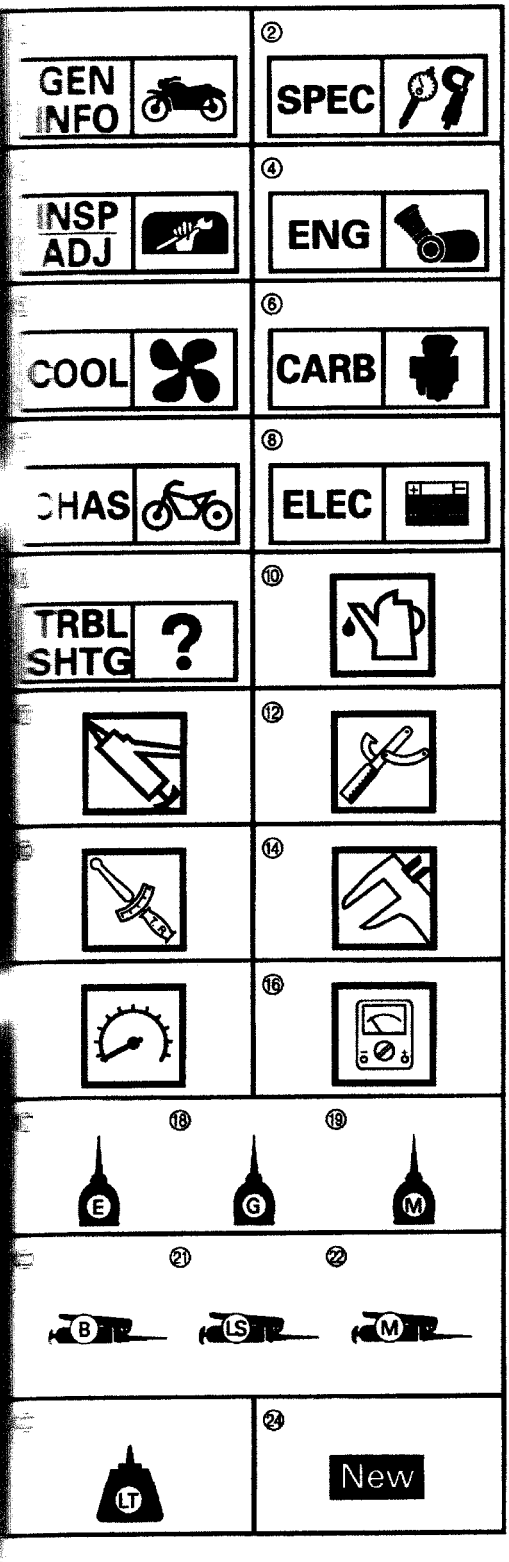
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FZR600R WIRING DIAGRAM



ILLUSTRATED SYMBOLS
(Refer to the illustration)

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

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

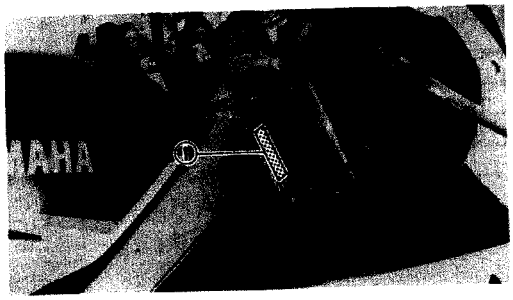
Illustrated symbols ⑩ to ⑯ are used to identify the specifications appearing in the text.

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

Illustrated symbols ⑰ to ㉔ in the exploded diagram indicate grade of lubricant and location of lubrication point.

⑰ Apply engine oil
⑱ Apply gear oil
⑲ Apply molybdenum disulfide oil
⑳ Apply wheel bearing grease
㉑ Apply lightweight lithium-soap base grease
㉒ Apply molybdenum disulfide grease
㉓ Apply locking agent (LOCTITE®)
㉔ Use new one

1



GENERAL INFORMATION

MOTORCYCLE IDENTIFICATION

VEHICLE IDENTIFICATION NUMBER (For E)

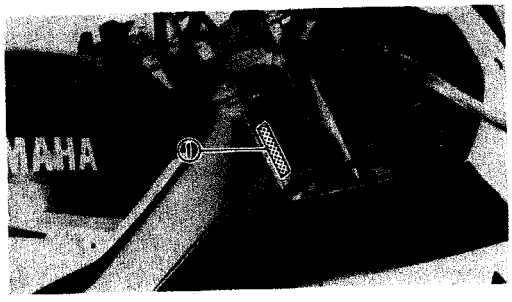
The vehicle identification number ① is stamped into the right side of the steering head.

Starting serial number:
JYA4JHS0∗RA016101 (for E)

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

FRAME SERIAL NUMBER (Except for E)

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

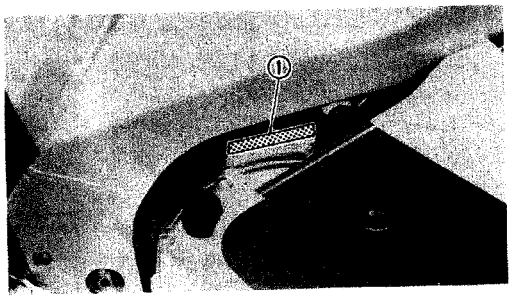


Starting serial number:
4JH-000101 (for D, B, DK, SF, GB, N, NL, F, GR, I and PRT)
4JH-021101 (for D)
4MH-000101 (for D)
4MN-000101 (for CH, A and S)

NOTE:
The first three digits of these numbers are for model identifications; the remaining digits are the unit production number.

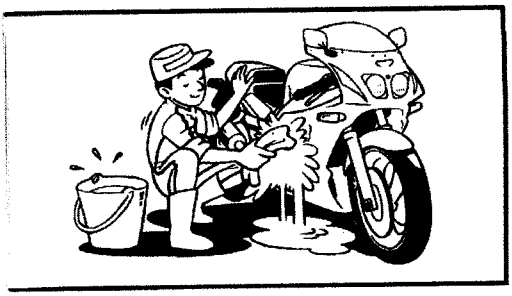
ENGINE SERIAL NUMBER

The engine serial number ① is stamped into crankcase.



Starting serial number:
4JH-016101 (for E)
4JH-000101 (for D, B, DK, SF, GB, N, NL, F, GR, I and PRT)
4JH-021101 (for D)
4MH-000101 (for D)
4MN-000101 (for CH, A and S)

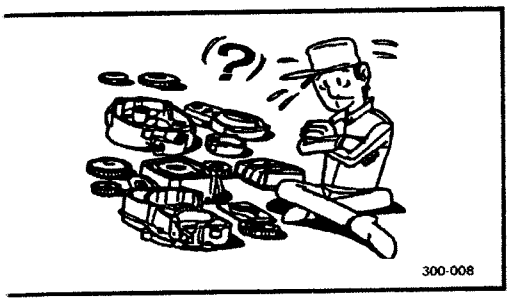
NOTE:
- The first three digits of these numbers are for model identification; the remaining digits are the unit production number.
- Designs and specifications are subject to change without notice.



IMPORTANT INFORMATAION

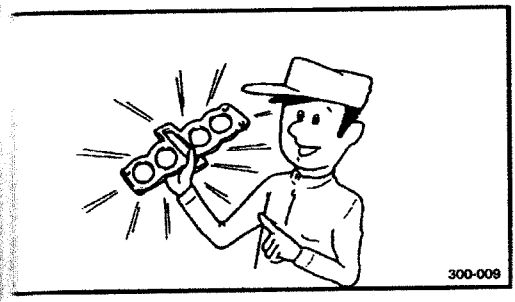
PREPARATION FOR REMOVAL.

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.

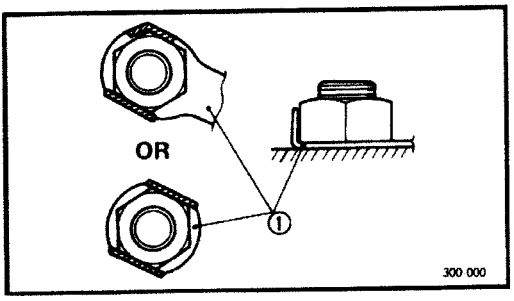


ALL REPLACEMENT PARTS

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.

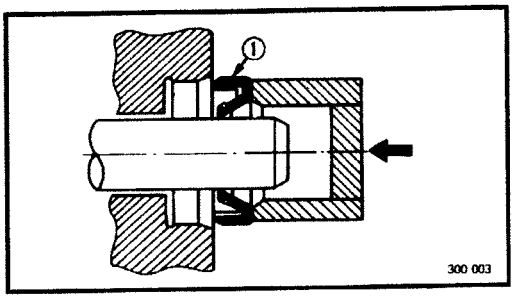
GASKETS, OIL SEALS, AND O-RINGS

1. All gaskets, seals and O-rings should be replaced when an engine is overhauled. All gaskets surfaces, oil seal lips and O-rings must be cleaned.
2. Properly oil all mating parts and bearing during reassembly. Apply grease to the oil seal lips.



LOCK WASHERS/PLATES AND COTTER PINS

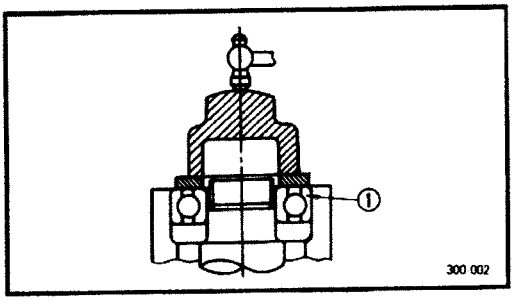
1. All lock washers/plates ① and cotter pins must be replaced when they are removed. Lock tab(s) should be bent along the bolt or nut flat(s) after the bolt or nut has been properly tightened.



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 lightweight lithium base grease to the seal lip(s). Oil the bearings liberally when installing.

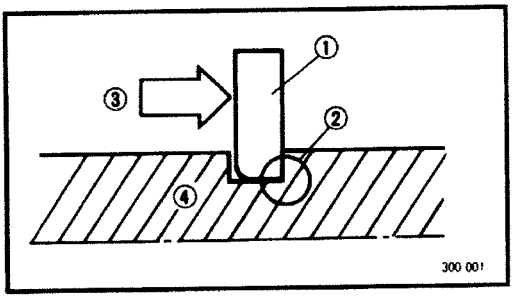
① Oil seal



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 circlips 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. The shape and part number used for the special tool differ by country, so two types are provided.

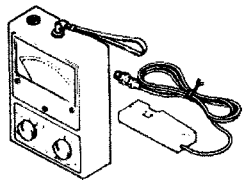
Refer to the list provided to avoid errors when placing an order.

P/N. YM- □□□□□, YU-□□□□□
YS- □□□□□, YK-□□□□□
ACC-□□□□□ } For US, CDN

P/N. 90890- □□□□□ } Except for US, CDN

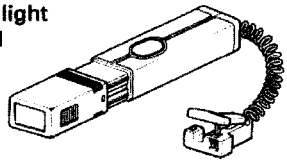
FOR TUNE UP

1
Inductive tachometer
P/N. 90890-03113



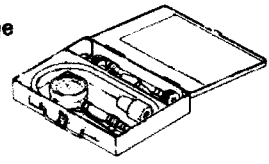
This tool is needed for detecting engine rpm.

2
Inductive timing light
P/N. 90890-03141



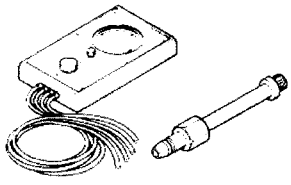
This tool is necessary for checking ignition timing.

3
Compression gauge
P/N. 90890-03081
Adapter
P/N. 90890-04082



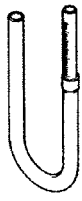
This gauge is used to measure the engine compression.

4
Vacuum gauge
P/N. 90890-03094



This gauge is needed for carburetor synchronization.

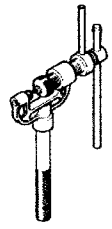
5
Fuel level gauge
P/N. 90890-01312



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

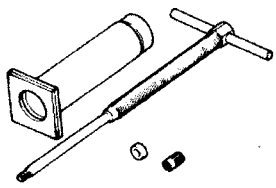
FOR ENGINE SERVICE

1
Cam chain cutter
P/N. 90890-01112



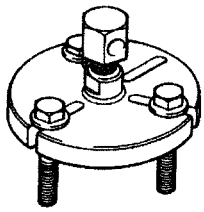
This tool is used when cutting the cam chain.

2
Piston pin puller
P/N. 90890-01304



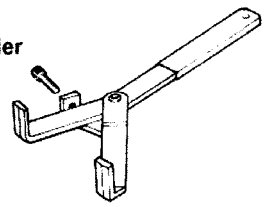
This tool is used to remove the piston pin.

3
Flywheel puller set
P/N. 90890-01362



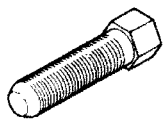
This tool is used to remove the starter clutch.

4
Universal clutch holder
P/N. 90890-04086



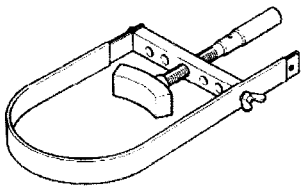
This tool is used to hold the clutch when removing or installing the clutch boss locknut.

5
Rotor puller
P/N. 90890-01080



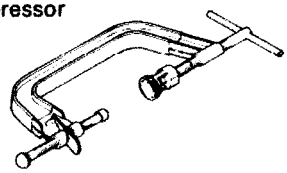
This tool is used to remove the rotor.

6
Sheave holder
P/N. 90890-01701



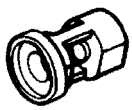
This tool is used to loosen and tighten the A.C. magneto.

7-A
Valve spring compressor
P/N. 90890-04019



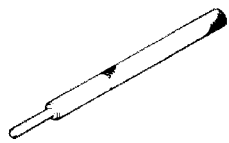
These tools are needed to remove and install the valve assemblies.

7-B
Attachment
P/N. 90890-04108



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

8
Valve guide remover (4.0 mm)
P/N. 90890-04111



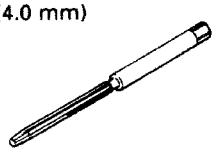
This tool is used to remove the valve guides.

9
Valve guide installer
P/N. 90890-04112



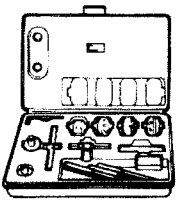
This tool is needed to install the valve guides properly.

10
Valve guide reamer (4.0 mm)
P/N. 90890-04113



This tool is used to rebore the new valve guide.

11
Valve seat cutter
P/N. YM-91043-C



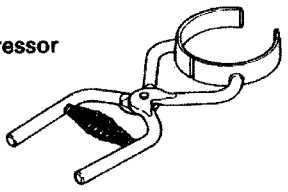
This tool is used to adjust the valve clearance.

12
YAMAHA Bond No. 1215
P/N. 90890-85505



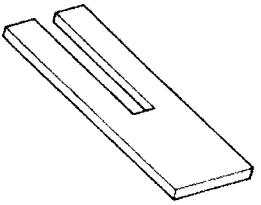
This sealant (Bond) is used for crankcase mating surfaces, etc.

13
Piston ring compressor
P/N. 90890-04044



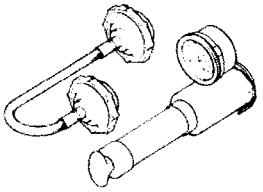
This tool is used to compress piston rings when installing the cylinder.

14
Piston base
P/N. 90890-01067



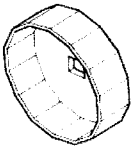
Use four pieces of these to hold the pistons during cylinder installation.

15
Radiator cap tester
P/N. 90890-01325
Adaptor
P/N. 90890-01352



This tester is needed for checking the cooling system.

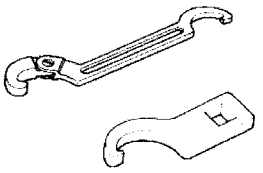
16
Oil filter wrench
P/N. 90890-01426



This tool is used to remove and install the oil filter.

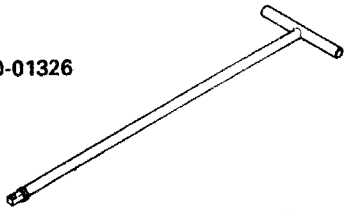
FOR CHASSIS SERVICE

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



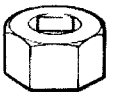
This tool is used to loosen and tighten the steering ring nut.

2-A
T-handle
P/N. 90890-01326



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

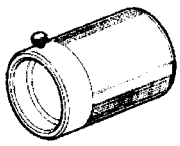
2-B
Front fork cylinder complete holder (27 mm)
P/N. 90890-01388



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

3-A

Fork seal driver weight
P/N. 90890-01367



These tools are used when installing the fork seal.

3-B

Fork seal driver attachment (ø41)
P/N. 90890-01381

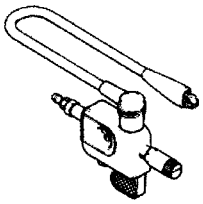


These tools are used when installing the fork seal.

FOR ELECTRICAL COMPONENTS

1

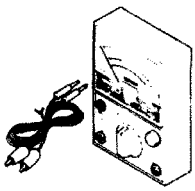
Ignition checker
P/N. 90890-06754



This instrument is necessary for checking the ignition system components.

2

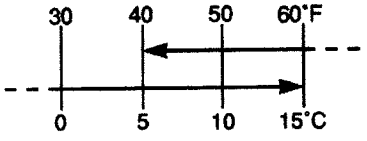
Pocket tester
P/N. 90890-03112



This instrument is invaluable for checking the electrical system.

SPECIFICATIONS

GENERAL SPECIFICATIONS

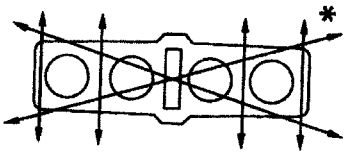
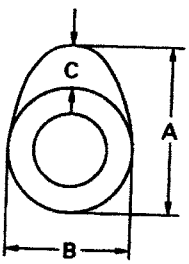
Model	FZR600R
Model code:	4JH1
Engine starting number:	4JH-000101
Frame starting number:	4JH-000101
Dimensions:	
Overall length	2,145 mm (84.4 in)
Overall width	725 mm (28.5 in)
Overall height	1,180 mm (46.5 in)
Seat height	795 mm (31.3 in)
Wheelbase	1,415 mm (55.7 in)
Minimum ground clearance	135 mm (5.31 in)
Minimum turning radius	3,200 mm (126.0 in)
Basic weight:	
With oil and full fuel tank	206 kg (454 lb)
Engine:	
Engine type	Liquid-cooled 4-stroke, DOHC
Cylinder arrangement	Forward-inclined parallel 4-cylinder
Displacement	599 cm^3
Bore × stroke	62.0 × 49.6 mm (2.44 × 1.95 in)
Compression ratio	12:1
Compression pressure (STD)	1,550 kPa (15.5 kg/cm^2, 220 psi) at 400 r/min
Starting system	Electric starter
Lubrication system:	Wet sump
Oil type or grade:	
Engine oil	 SAE20W40 type SE motor oil SAE10W30 type SE motor oil
Oil capacity:	
Engine oil	
Periodic oil change	2.6 L (2.3 Imp qt, 2.7 US qt)
With oil filter replacement	2.9 L (2.6 Imp qt, 3.1 US qt)
Total amount	3.5 L (3.1 Imp qt, 3.7 US qt)
Oil cooler capacity (including all routes)	0.3 L (0.3 Imp qt, 0.3 US qt)
Radiator capacity (including all routes):	1.8 L (1.58 Imp qt, 1.90 US qt)
Air filter:	Dry type element
Fuel:	
Type	Regular unleaded gasoline
Fuel tank capacity	19 L (4.18 Imp gal, 5.02 US gal)
Fuel reserve amount	3.5 L (0.77 Imp gal, 0.92 US gal)

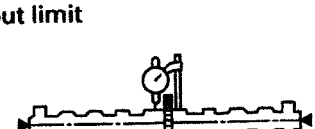
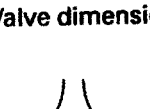
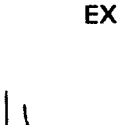
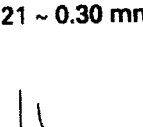
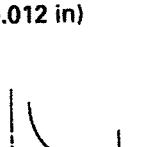
Model		FZR600R
Carburetor:		
Type / quantity		CVKD34/4
Manufacturer		KEIHIN
Spark plug:		
Type		CR9E/U27ESR-N
Manufacturer		NGK/NIPPONDENSO
Spark plug gap		0.7 ~ 0.8 mm (0.028 ~ 0.031 in)
Clutch type:		Wet, multiple-disc
Transmission:		
Primary reduction system		Spur gear
Primary reduction ratio		82/48(1.708)
Secondary reduction system		Chain drive
Secondary reduction ratio		47/15(3.133)
Transmission type		Constant mesh 6-speed
Operation		Left foot operation
Gear ratio	1st	37/13(2.846)
	2nd	37/19(1.947)
	3rd	34/22(1.545)
	4th	28/21(1.333)
	5th	25/21(1.190)
	6th	29/27(1.074)
Chassis:		
Frame type		Diamond
Caster angle		25°
Trail		97 mm (3.82 in)
Tire:		
Type		Tubeless
Size	front	120/60ZR17
	rear	160/60ZR17
Manufacturer	front	BRIDGESTONE/DUNLOP/MICHELIN/METZELER
	rear	BRIDGESTONE/DUNLOP/MICHELIN/METZELER
Type	front	BT50F/D202F/A89X/MEZ1 FRONT
	rear	BT50R/D202/M89X/MEZ1
Tire pressure (cold tire):		
Maximum load-except motorcycle		174 kg (384 lb)
Loading condition A *		0 ~ 90 kg (0 ~ 198 lb)
	front	225 kPa (2.25 kg/cm², 32 psi)
	rear	250 kPa (2.5 kg/cm², 36 psi)
Loading condition B *		90 ~ 174 kg (198 ~ 384 lb)
	front	250 kPa (2.5 kg/cm², 36 psi)
	rear	290 kPa (2.9 kg/cm², 41 psi)
High-speed riding		
	front	250 kPa (2.5 kg/cm², 36 psi)
	rear	290 kPa (2.9 kg/cm², 41 psi)

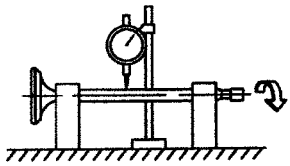
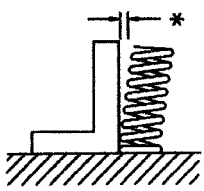
Model		FZR600R
Brake:		
Front brake	type	Dual disc brake
	operation	Right hand operation
Rear brake	type	Single disc brake
	operation	Right foot operation
Suspension:		
Front suspension		Telescopic fork
Rear suspension		Swingarm (link suspension)
Shock absorber:		
Front shock absorber		Coil spring / Oil damper
Rear shock absorber		Coil-gas spring / Oil damper
Wheel travel:		
Front wheel travel		130 mm (5.1 in)
Rear wheel travel		120 mm (4.7 in)
Electrical:		
Ignition system		T.C.I. (Digital)
Generator system		A.C. magneto generator
Battery type		YTX-12BS
Battery capacity		12 V 10 AH
Headlight type:		Quartz bulb (Halogen)
Bulb wattage × quantity:		
Headlight		12 V 60 W / 55 W × 2
Auxiliary light		12 V 5 W × 1
Tail / brake light		12 V 5 W / 21 W × 2
Flasher light		12 V 21 W × 4
Meter light		12 V 1.7 W × 4
Indicator light		
NEUTRAL		12 V 3.4 W × 1
TURN		12 V 3.4 W × 1
OIL LEVEL		12 V 3.4 W × 1
HIGH BEAM		12 V 3.4 W × 1
FUEL		12 V 3.4 W × 1

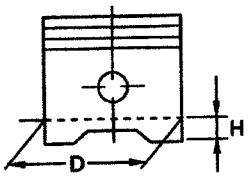
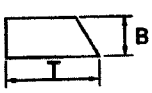
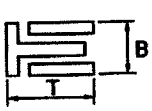
MAINTENANCE SPECIFICATIONS

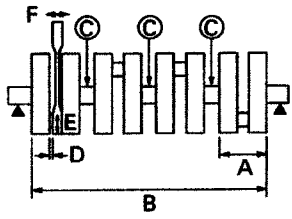
ENGINE

Model		FZR600R
Cylinder head:		
Warp limit		0.05 mm (0.0020 in)
		
Cylinder:		
Bore size		62.00 ~ 62.01 mm (2.4409 ~ 2.4413 in)
Taper limit		0.09 mm (0.004 in)
Out of round limit		0.07 mm (0.0028 in)
Camshaft:		
Drive method		Chain drive (Center)
Cam cap inside diameter		23.000 ~ 23.021 mm (0.9055 ~ 0.9063 in)
Camshaft outside diameter		22.967 ~ 22.980 mm (0.9042 ~ 0.9047 in)
Shaft-to-cap clearance		0.020 ~ 0.054 mm (0.0008 ~ 0.0021 in)
<Limit>		<0.08 mm (0.0031 in)>
Cam dimensions		
		
Intake	"A"	32.75 ~ 32.85 mm (1.289 ~ 1.293 in)
	<limit>	<32.7mm (1.287 in)>
	"B"	24.998 ~ 25.098 mm (0.984 ~ 0.988 in)
	<limit>	<24.95 mm (0.982 in)>
	"C"	7.652 ~ 7.852 mm (0.301 ~ 0.309 in)
	<limit>	<7.5 mm (0.295 in)>
Exhaust	"A"	32.55 ~ 32.65 mm (1.281 ~ 1.285 in)
	<limit>	<32.5 mm (1.280 in)>
	"B"	24.998 ~ 25.098 mm (0.984 ~ 0.988 in)
	<limit>	<24.95 mm (0.982 in)>
	"C"	7.452 ~ 7.652 mm (0.293 ~ 0.301 in)

Model		FZR600R
Camshaft runout limit	<limit>	<7.3 mm (0.287 in)> 0.06 mm (0.0024 in)
		
Cam chain:		
Cam chain type / No. of links		DID215F/118
Cam chain adjustment method		Automatic
Valve, valve seat, valve guide:		
Valve clearance (cold)	IN	0.11 ~ 0.20 mm (0.004 ~ 0.008 in)
	EX	0.21 ~ 0.30 mm (0.008 ~ 0.012 in)
Valve dimensions:		
 Head Dia		
 Face Width		
 Seat Width		
 Margin Thickness		
"A" head diameter	IN	23.9 ~ 24.1 mm (0.941 ~ 0.949 in)
	EX	20.9 ~ 21.1 mm (0.823 ~ 0.831 in)
"B" face width	IN	1.56 ~ 2.40 mm (0.061 ~ 0.094 in)
	EX	1.56 ~ 2.40 mm (0.061 ~ 0.094 in)
"C" seat width	IN	0.9 ~ 1.1 mm (0.035 ~ 0.043 in)
	EX	0.9 ~ 1.1 mm (0.035 ~ 0.043 in)
<Limit>	IN	<1.6 mm (0.06 in)>
	EX	<1.6 mm (0.06 in)>
"D" margin thickness	IN	0.6 ~ 0.8 mm (0.024 ~ 0.031 in)
	EX	0.6 ~ 0.8 mm (0.024 ~ 0.031 in)
<Limit>	IN	<0.5 mm (0.020 in)>
	EX	<0.5 mm (0.020 in)>
Stem outside diameter	IN	3.975 ~ 3.990 mm (0.1565 ~ 0.1571 in)
	EX	3.960 ~ 3.975 mm (0.1559 ~ 0.1565 in)
<Limit>	IN	<3.95 mm (0.156 in)>
	EX	<3.935 mm (0.155 in)>
Guide inside diameter	IN	4.000 ~ 4.012 mm (0.1575 ~ 0.1580 in)
	EX	4.000 ~ 4.012 mm (0.1575 ~ 0.1580 in)
<Limit>	IN	<4.042 mm (0.159 in)>
	EX	<4.042 mm (0.159 in)>
Stem-to-guide clearance	IN	0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in)
	EX	0.025 ~ 0.052 mm (0.0010 ~ 0.0020 in)
<Limit>	IN	<0.08 mm (0.003 in)>
	EX	<0.1 mm (0.004 in)>

Model		FZR600R
Stem runout limit		0.04 mm (0.0016 in)
		
Valve seat width	IN	0.9 ~ 1.1 mm (0.0354 ~ 0.0433in)
	EX	0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in)
<Limit>	IN	<1.6 mm (0.06 in)>
	EX	<1.6 mm (0.06 in)>
Valve spring:		
Inner spring		
Free length	IN	39.17 mm (1.54 in)
	EX	39.17 mm (1.54 in)
<Limit>	IN	<37.5 mm (1.48 in)>
	EX	<37.5 mm (1.48 in)>
Set length (valve closed)	IN	34.5 mm (1.4 in)
	EX	34.5 mm (1.4 in)
Compressed pressure (installed)	IN	11.0 ~ 13.2 kg (24.25 ~ 29.10 lb)
	EX	11.0 ~ 13.2 kg (24.25 ~ 29.10 lb)
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)		Clockwise
	IN	
	EX	Clockwise
		
Piston:		
Piston to cylinder clearance		0.025 ~ 0.050 mm (0.0010 ~ 0.0020 in)
<Limit>		<0.07 mm (0.0028 in)>

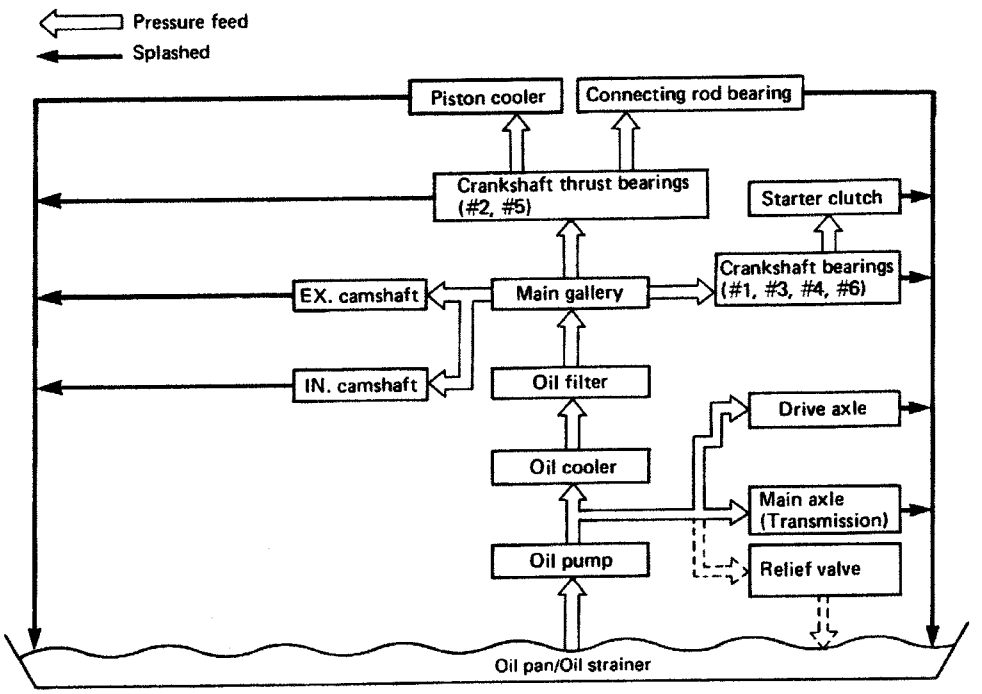
Model	FZR600R
Piston size "D" 	61.960 ~ 61.975 mm (2.439 ~ 2.440 in)
Measuring point "H"	5 mm (0.197 in)
Piston off-set	0.5 mm (0.02 in)
Piston off-set direction	IN side
Piston pin bore inside diameter	17.002 ~ 17.013 mm (0.6694 ~ 0.6698 in)
Piston pin outside diameter	16.991 ~ 17.000 mm (0.6689 ~ 0.6693 in)
Piston rings:	
Top ring: 	
Type	Barrel
Dimensions (B × T)	0.8 × 2.2 mm (0.031 × 0.087 in)
End gap (installed)	0.15 ~ 0.30 mm (0.006 ~ 0.012 in)
<Limit>	<0.6 mm (0.024 in)>
Side clearance (installed)	0.020 ~ 0.075 mm (0.001 ~ 0.003 in)
<Limit>	<0.1 mm (0.004 in)>
2nd ring: 	
Type	Taper
Dimensions (B × T)	0.8 × 2.3 mm (0.031 × 0.091 in)
End gap (installed)	0.25 ~ 0.40 mm (0.010 ~ 0.016 in)
<Limit>	<0.7 mm (0.028 in)>
Side clearance	0.020 ~ 0.055 mm (0.001 ~ 0.002 in)
<Limit>	<0.1 mm (0.004 in)>
Oil ring: 	
Dimensions (B × T)	1.5 × 2.3 mm (0.059 × 0.091 in)
End gap (installed)	0.10 ~ 0.35 mm (0.004 ~ 0.014 in)
Connecting rod:	
Oil clearance	0.043 ~ 0.066 mm (0.002 ~ 0.003 in)
<Limit>	<0.08 mm (0.003 in)>
Color code (corresponding size)	① Blue ② Black ③ Brown ④ Green

Model	FZR600R
Crankshaft:	
	
Crank width "A"	48.4 mm (1.906 in)
Assembly width "B"	296.8 ~ 298.0 mm (11.685 ~ 11.732 in)
Runout limit "C"	0.03 mm (0.0012 in)
Big end side clearance "D"	0.160 ~ 0.262 mm (0.006 ~ 0.010 in)
<Limit>	<0.5 mm (0.020 in)>
Big end radial clearance "E"	0.043 ~ 0.066 mm (0.0017 ~ 0.0026 in)
<Limit>	<0.08 mm (0.003 in)>
Small end free play "F"	0.32 ~ 0.50 mm (0.0126 ~ 0.0197 in)
<Limit>	<0.8 mm (0.0315 in)>
Journal oil clearance	0.005 ~ 0.035 mm (0.0002 ~ 0.0014 in)
<Limit>	<0.08 mm (0.0031 in)>
Color code (corresponding size)	① Blue ② Black ③ Brown ④ Green ⑤ Yellow ⑥Pink
Clutch:	
Friction plate thickness	2.92 ~ 3.08 mm (0.115 ~ 0.121 in)
Quantity	9
Friction plate wear limit	2.8 mm (0.11 in)
Clutch plate thickness	1.90 ~ 2.10 mm (0.075 ~ 0.083 in)
Quantity	8
Warp limit	0.1 mm (0.004 in)
Clutch spring free length	40.4 mm (1.59 in)
Quantity	6
Minimum length	39.3 mm (1.55 in)
Clutch housing thrust clearance	0.05 ~ 0.13 mm (0.002 ~ 0.005 in)
<Limit>	<0.2 mm (0.008 in)>
Clutch housing radial clearance	0.005 ~ 0.041 mm (0.0002 ~ 0.0016 in)
Clutch release method	Inner push, screw push
Push rod bending limit	0.3 mm (0.012 in)
Transmission:	
Main axle deflection limit	0.02 mm (0.001 in)
Drive axle deflection limit	0.02 mm (0.001 in)
Shifter:	
Shifter type	Cam drum
Guide bar bending limit	0.05 mm (0.002 in)
Carburetor:	
I. D. mark	4JH 00
Main jet (M.J)	#118

Model		FZR600R
Main air jet	(M.A.J)	#80
Jet needle	(J.N)	N1YA
Needle jet	(N.J)	2.6
Pilot air jet	(P.A.J.1)	#100
Pilot outlet	(P.O)	0.9
Pilot jet	(P.J)	#35
Bypass 1	(B.P.1)	0.8
Bypass 2	(B.P.2)	0.8
Bypass 3	(B.P.3)	0.8
Bypass 4	(B.P.4)	0.8
Pilot screw	(P.S)	1-3/4 turns out
Valve seat size	(V.S)	1.2
Starter jet	(G.S.1)	#45
Starter jet	(G.S.2)	0.6
Throttle valve size	(Th.V)	#110
Fuel level	(F.L)	11.5 ~ 12.5 mm (0.45 ~ 0.49 in)
Engine idle speed		1,250 ~ 1,350 r/min
Intake vacuum		29.6 kPa (225 mmHg, 8.858 inHg)
Fuel pump:		
Type		Electrical type
Model / manufacturer		4FM/NIPPONDENSO
Consumption amperage	<max>	1 A
Output pressure		20 kPa (0.2 kg/cm², 3 psi)
Lubrication system:		
Oil filter type		Paper type
Oil pump type		Trochoid type
Tip clearance		0.03 ~ 0.09 mm (0.001 ~ 0.004 in)
<Limit>		<0.15 mm (0.006 in)>
Side clearance		0.03 ~ 0.08 mm (0.001 ~ 0.003 in)
<Limit>		<0.15 mm (0.006 in)>
Bypass valve setting pressure		80 ~ 120 kPa (0.8 ~ 1.2 kg/cm², 11.38 ~ 17.07 psi)
Relief valve operating pressure		450 ~ 550 kPa (4.5 ~ 5.5 kg/cm², 64.00 ~ 78.23 psi)
Oil pressure (hot)		80 kPa (0.8 kg/cm², 11.38 psi) at 1,300 r/min
Pressure check location		MAIN GALLERY
Cooling system:		
Radiator core size		
Width		320 mm (12.6 in)
Height		218 mm (8.58 in)
Thickness		24 mm (0.94 in)
Radiator cap opening pressure		110 ~ 140 kPa (1.1 ~ 1.4 kg/cm², 15.65 ~ 19.91 psi)
Reservoir tank capacity		0.55 L (0.48 Imp qt, 0.58 US qt)
<From low to full level>		<0.25 L (0.22 Imp qt, 0.26 US qt)>
Water pump		
Type		Single suction centrifugal pump
Reduction ratio		82/48X48/49(1.673)

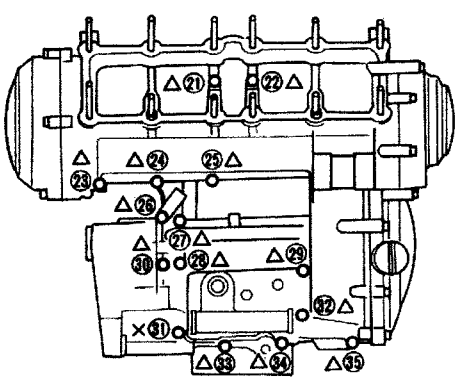
Model	FZR600R

Lubrication chart:

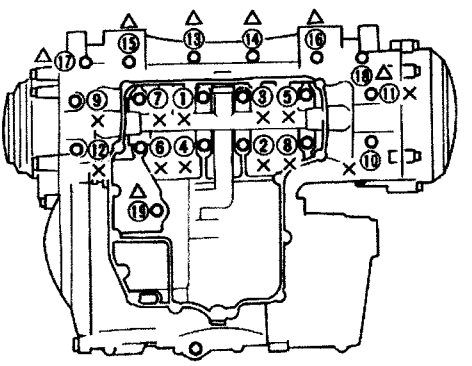


Crankcase tightening sequence:

Crankcase (Upper)



Crankcase (Lower)



×: M8: 24 Nm (2.4 m • kg, 17 ft • lb)
△: M6: 12 Nm (1.2 m • kg, 8.7 ft • lb)

Tightening torques

Part to be tightened	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m·kg	ft·lb	
Camshaft cap	Bolt	M6	24	10	1.0	7.2	
Cylinder head (exhaust pipe)	Stud bolt	M6	8	10	1.0	7.2	E
Cylinder head	Nut	M9	12	35	3.5	25	E
Spark plug	–	M10	4	12.5	1.25	9.0	
Cylinder head cover	Bolt	M6	8	10	1.0	7.2	
Connecting rod	Nut	M7	8	See NOTE			M
Timing chain sprocket	Bolt	M7	4	24	2.4	17	
Timing chain tensioner	Bolt	M6	2	10	1.0	7.2	
Timing chain tensioner end	Cap bolt	M11	1	20	2.0	14	
Chain guide (intake side)	Bolt	M6	2	10	1.0	7.2	LT
Oil filter	–	M20	1	17	1.7	12	E
Oil cooler	–	M20	1	63	6.3	45	E
Oil pan	Bolt	M6	14	10	1.0	7.2	
Drain bolt	–	M14	1	43	4.3	31	
Oil delivery pipe	Bolt	M6	1	10	1.0	7.2	
	Union bolt	M10	2	20	2.0	14	
Oil pump cover	Screw	M6	1	7	0.7	5.1	
Oil pump assembly	Bolt	M6	3	10	1.0	7.2	LT
Oil strainer housing	Bolt	M6	2	10	1.0	7.2	LT
Water pipe 1	Bolt	M6	2	10	1.0	7.2	
Water pipe 2	Bolt	M6	2	10	1.0	7.2	
Thermostatic valve cover	Bolt	M6	2	10	1.0	7.2	
Conduction	Bolt	M6	2	7	0.7	5.1	
Radiator	Bolt	M6	3	7	0.7	5.1	
Joint	Bolt	M6	4	10	1.0	7.2	
Water pump	Bolt	M6	2	10	1.0	7.2	
Water pump cover	Bolt	M6	2	10	1.0	7.2	
Carburetor joint	Bolt	M6	8	10	1.0	7.2	
Air filter case cover	Screw	M5	2	5	0.5	3.6	
Exhaust pipe	Nut	M6	8	10	1.0	7.2	
Muffler and stay	Flange bolt	M8	1	20	2.0	14	
Exhaust pipe blind plug (CO test)	Bolt	M6	4	10	1.0	7.2	
Exhaust pipe and stay	Bolt	M8	1	20	2.0	14	
Exhaust pipe and muffler	Bolt	M8	1	20	2.0	14	
Crankcase	Stud bolt	M8	12	12.5	1.25	9.0	E
Crankcase	Bolt	M8	12	24	2.4	17	M
Crankcase	Bolt	M6	21	12	1.2	8.7	E
Crankcase	Bolt	M8	1	24	2.4	17	E
Oil baffle plate	Screw	M6	2	7	0.7	5.1	LT
Oil baffle plate	Screw	M6	4	7	0.7	5.1	LT

Part to be tightened	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m·kg	ft·lb	
Bearing retainer	Bolt	M6	2	10	1.0	7.2	T
AC magneto cover	Bolt	M6	5	10	1.0	7.2	
Crankcase cover (left)	Bolt	M6	5	10	1.0	7.2	
	Screw	M5	4	4	0.4	2.9	T
Starter clutch cover	Bolt	M6	7	10	1.0	7.2	
Crankcase plug	–	M16	2	8	0.8	5.8	E
Crankcase cover (right)	Bolt	M6	10	10	1.0	7.2	
	Screw	M5	4	4	0.4	2.9	T
Lead holder	Screw	M6	1	7	0.7	5.1	
Starter clutch	Bolt	M10	1	80	8.0	58	
Starter wheel	Bolt	M8	3	30	3.0	22	T
Clutch spring	Screw	M6	6	8	0.8	5.8	
Clutch boss	Nut	M18	1	70	7.0	50	Use lock washer
Push lever	Screw	M5	2	4.5	0.45	3.3	T
Push rod adjuster	Nut	M8	1	16	1.6	12	
Drive sprocket	Nut	M18	1	70	7.0	50	Use lock washer
Stopper plate	Bolt	M6	1	10	1.0	7.2	T
Spring stopper	Screw	M8	1	22	2.2	16	T
Shift arm	Bolt	M6	1	10	1.0	7.2	
Shift cam stopper lever	Bolt	M6	1	10	1.0	7.2	T
Shift pedal adjuster	Nut	M8	2	10	1.0	7.2	(1 of 2 has LH thread)
Guide bar stopper	Bolt	M6	1	10	1.0	7.2	T
Side plate	Screw	M5	1	4	0.4	2.9	T
AC magneto rotor	Bolt	M10	1	85	8.5	62	
Stator coil	Bolt	M6	3	10	1.0	7.2	T
Pickup coil	Screw	M5	2	5	0.5	3.6	
Starter motor	Bolt	M6	2	10	1.0	7.2	
Neutral switch	Screw	M6	2	4	0.4	2.9	
Oil level switch	Bolt	M6	2	7	0.7	5.1	
Thermo switch	–	M16	1	23	2.3	17	
Thermo unit	–	–	1	15	1.5	11	

NOTE:
After tightening to 15 Nm (1.5 m • kg, 11 ft • lb), tighten another 90°.

CHASSIS

Model		FZR600R
Steering system:		
Steering bearing type		Taper roller bearing
Front suspension:		
Front fork travel		130 mm (5.12 in)
Fork spring free length		377 mm (14.8 in)
<Limit>		<372 mm (14.6 in)>
Collar length		150 mm (5.9 in)
Spring rate	(K1)	8.0 N/mm (0.8 kg/mm, 44.8 lb/in)
Stroke	(K1)	0 ~ 130 mm (0.00 ~ 5.12 in)
Optional spring		No
Oil capacity		503 cm^3 (17.7 Imp oz, 17.0 US oz)
Oil level		133 mm (5.24 in)
Oil grade		Fork oil 10 WT or equivalent
Rear suspension:		
Shock absorber travel		64 mm (2.52 in)
Spring free length		238 mm (9.37 in)
Fitting length		220 mm (8.66 in)
Spring rate	(K1)	85.0 N/mm (8.5 kg/mm, 476.0 lb/in)
Stroke	(K1)	0 ~ 64 mm (0.00 ~ 2.52 in)
Optional spring		No
Enclosed gas / air pressure (STD)		1,200 kPa (12 kg/cm^2, 171 psi)
Swingarm:		
Free play limit	end	1 mm (0.04 in)
	side	1 mm (0.04 in)
Front wheel:		
Type		Cast wheel
Rim size		17 X MT3.50
Rim material		Aluminum
Rim runout limit	radial	1 mm (0.04 in)
	lateral	0.5 mm (0.02 in)
Rear wheel:		
Type		Cast wheel
Rim size		17 X MT5.00
Rim material		Aluminum
Rim runout limit	radial	1 mm (0.04 in)
	lateral	0.5 mm (0.02 in)
Drive chain:		
Type / manufacturer		50VA7/DAIDO
No. of links		108
Chain free play		20 ~ 30 mm (0.8 ~ 1.2 in)
Front disc brake:		
Type		Dual

Model		FZR600R
Disc outside diameter × thickness		298 × 4 mm (11.7 × 0.16 in)
Pad thickness	inner	5 mm (0.20 in)
<Limit>		<0.5 mm (0.02 in)>
Pad thickness	outer	5 mm (0.20 in)
<Limit>		<0.5 mm (0.02 in)>
		
Master cylinder inside diameter		15.87 mm (0.62 in)
Caliper cylinder inside diameter		33.96 mm (1.34 in)
Caliper cylinder inside diameter		30.23 mm (1.19 in)
Brake fluid type		DOT #4
Rear disc brake:		
Type		Single
Disc outside diameter × thickness		245 × 5 mm (9.6 × 0.20 in)
Pad thickness	inner	5.5 mm (0.22 in)
<Limit>		<0.5 mm (0.02 in)>
Pad thickness	outer	5.5 mm (0.22 in)
<Limit>		<0.5 mm (0.02 in)>
		
Master cylinder inside diameter		14 mm (0.55 in)
Caliper cylinder inside diameter		42.85 mm (1.69 in)
Brake fluid type		DOT #4
Brake lever & brake pedal:		
Brake pedal position		42 mm (1.7 in)
Clutch lever free play (at pivot)		2 ~ 3 mm (0.08 ~ 0.12 in)

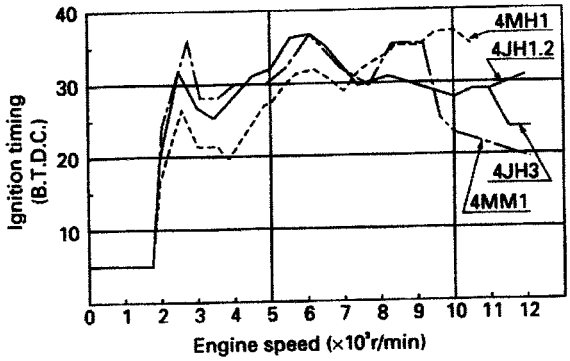
Tightening torques

Part to be tightened	Thread size	Tightening torque			Remarks
		Nm	m·kg	ft·lb	
Upper bracket and inner tube	M8	30	3.0	22	
Upper bracket and steering shaft	M22	110	11.0	80	
Handle boss and inner tube	M6	13	1.3	9.4	
Handle boss and upper bracket	M6	13	1.3	9.4	
Ring nut (steering shaft)	M25	3	0.3	2.2	See NOTE
Inner tube and lower bracket	M10	38	3.8	27	
Union bolt (brake hose)	M10	26	2.6	19	
Master cylinder (front brake)	M6	10	1.0	7.2	
Handle boss and handlebar	M8	28	2.8	20	
Engine mounting:					
Mounting bolt (front)	M10	40	4.0	29	
Mounting bolt (rear upper)	M10	48	4.8	35	
Mounting bolt (rear lower)	M10	48	4.8	35	
Pinch bolt (front left)	M10	64	6.4	46	
Exhaust pipe bracket	M10	40	4.0	29	
Frame and side cover stay	M8	30	3.0	22	
Swingarm pivot shaft	M16	90	9.0	65	
Relay arm and frame	M10	48	4.8	35	
Relay arm and connecting rod	M10	48	4.8	35	
Connecting rod and swingarm	M10	48	4.8	35	
Rear shock absorber and relay arm	M10	40	4.0	29	
Rear shock absorber and bracket	M10	40	4.0	29	
Fuel pump and fuel tank	M5	3	0.3	2.2	
Fuel pump and fuel cock	M6	7	0.7	5.1	
Footrest bracket and frame	M8	30	3.0	22	
Rear footrest and frame	M8	30	3.0	22	
Rear master cylinder and footrest bracket	M8	23	2.3	17	
Rear brake reservoir tank	M6	5	0.5	3.6	
Union bolt (rear brake hose)	M10	26	2.6	19	
Sidestand bolt and nut	M10	39	3.9	28	
Sidestand bolt and frame	M10	46	4.6	33	
Front wheel axle	M14	59	5.9	43	
Rear wheel axle	M18	117	11.7	85	
Front brake caliper	M10	35	3.5	25	
Rear brake caliper	M10	35	3.5	25	
Brake disc and wheel	M8	20	2.0	14	
Driven sprocket and clutch hub	M10	60	6.0	43	
Tension bar	M8	30	3.0	22	
Caliper breed screw	M8	6	0.6	4.3	
Pinch bolt (front axle)	M10	40	4.0	29	

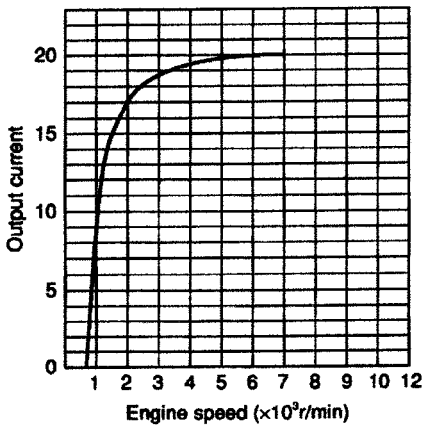
NOTE:
1. First, tighten the ring nut approximately 52 Nm (5.2 m • kg, 38 ft • lb) by using the torque wrench, then loosen the ring nut completely.
2. Retighten the ring nut to specification.

ELECTRICAL

Model	FZR600R
Voltage:	12 V
Ignition system:	
Ignition timing (B.T.D.C.)	5° at 1,300 r/min
Advancer type	Electrical type



T.C.I.:	
Pickup coil resistance / color	189 ~ 231 Ω at 20°C (68°F) / Yellow – Blue
T.C.I. unit model / manufacturer	J4T-045/MITSUBISHI
Ignition coil:	
Model / manufacturer	83R/YAMAHA
Minimum spark gap	6 mm (0.24 in)
Primary winding resistance	2.2 ~ 2.6 Ω at 20°C (68°F)
Secondary winding resistance	10.7 ~ 13.1 kΩ at 20°C (68°F)
Spark plug cap:	
Type	Resin type
Resistance	10 kΩ
Charging system:	
Type	A.C. magneto generator
Model / manufacturer	F4T-353/MITSUBISHI
Nominal output	12 V 21 A at 5,000 r/min

Model	FZR600R
	
Stator coil resistance / color	0.45 ~ 0.55 Ω at 20°C (68°F) / White – White
Voltage regulator:	
Type	Semi-conductor, short-circuit type
Model / manufacturer	SH650A/SHINDENGEN
Rectifier:	
Model / manufacturer	SH650A/SHINDENGEN
Capacity	25 A
Withstand voltage	240 V
Battery:	
Specific gravity	1.320
Electric starter system:	
Type	Constant mesh type
Starter motor:	
Model / manufacturer	SM-13/MITSUBA
Output	0.7 kW
Brush overall length	12.5 mm (0.49 in)
<Limit>	<4 mm (0.16 in)>
Commutator diameter	28 mm (1.10 in)
<Wear limit>	<27 mm (1.06 in)>
Mica undercut	0.7 mm (0.03 in)
Starter switch:	
Model / manufacturer	MS5F/JIDECO
Amperage rating	100 A
Coil winding resistance	4.0 ~ 4.8 Ω at 20°C (68°F)
Horn:	
Type	Plane type
Quantity	1
Model / manufacturer	YF-12/NIKKO
Maximum amperage	2.5 A
Flasher relay:	
Type	Full transistor type

Model	FZR600R
Model / manufacturer	FE246BH/NIPPONDENSO
Self cancelling device	No
Flasher frequency	60 ~ 120 cycle/min
Wattage	21 W × 2 + 3.4 W
Starting circuit cut off relay:	
Model / manufacturer	G8R-30Y-B/OMRON
Coil winding resistance	203 ~ 248 Ω at 20°C (68°F)
Fuel pump relay:	
Model / manufacturer	G8R-30Y-B/OMRON
Coil winding resistance	203 ~ 248 Ω at 20°C (68°F)
Thermostatic switch:	
Model / manufacturer	2EL/NIHON THERMOSTAT
Thermo unit:	
Model / manufacturer	11H/NIPPON SEIKI
Circuit breaker:	
Type	Fuse
Amperage for individual circuit	
MAIN	30 A × 1
HEAD	20 A × 1
SIGNAL	15 A × 1
IGNITION	7.5 A × 1
FAN	7.5 A × 1
Reserve	30 A × 1
Reserve	20 A × 1
Reserve	7.5 A × 1

FZR600R EXCLUSIVE SPECIFICATION

The following specifications are exclusive for the below listed countries.

For specifications other than below, please refer to the General and maintenance specifications.

For England

Bulb wattage x quantity:	
Headlight	12V 35/35W x 2

For Spain

Model code:	4JH2
Engine starting number:	4JH-016101
Vehicle identification number:	JYA4JHS0*RA016101
Dimensions:	
Overall length	2,060 mm (81.1 in)

For Italy

Dimensions:	
Overall length	2,060 mm (81.1 in)
Bulb wattage x quantity:	
Headlight	12V 35/35W x 2

For Greece, France, Portugal

Dimensions:	
Overall length	2,060 mm (81.1 in)

For Germany

Model code:		4MH1, 4JH3
Engine starting number:		4MH-000101, 4JH-021101
Frame starting number:		4MH-000101, 4JH-021101
Tire pressure (cold tire):		
Maximum load - except motorcycle		209 kg (461 lb)
Carburetor: (4MH1)		
I.D. mark		4MH1 00
Main jet	(M.J)	#110
Jet needle	(J.N)	N1YB
Pilot screw	(P.S)	1-7/8 turns out
T.C.I.:		
T.C.I. unit model/manufacturer		J4T-047 / MITSUBISHI (4MH1) J4T-046 / MITSUBISHI (4JH3)

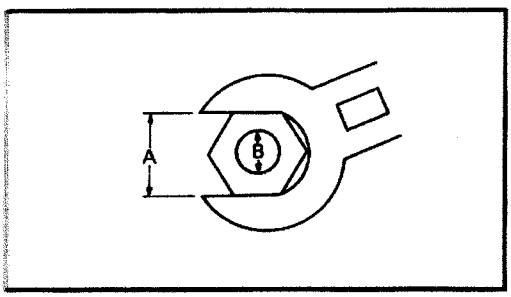
For Switzerland, Austria, Sweden

Model code:		4MM1
Engine starting number:		4MM-000101
Frame starting number:		4MM-000101
Basic weight:		
With oil and full fuel tank		208 kg (459 lb)
Tire pressure (cold tire):		
Maximum load-except motorcycle		172kg (379 lb)
Carburetor:		
I.D. mark		4MM 00
Main air jet	(M.A.J)	#80
Jet needle	(J.N)	N1YC
Pilot air jet	(P.A.J.1)	#105
Pilot screw	(P.S)	1-3/5 turns out
Valve seat size	(V.S)	1.2
Starter jet 1	(G.S.1)	#52
Engine idle speed		1,150 ~ 1,250 r/min
T.C.I.:		
T.C.I. unit model / manufacturer		J4T-048/MITSUBISHI

GENERAL TORQUE SPECIFICATIONS

This chart specifies torque for standard fasteners with standard I.S.O. pitch threads. Torque specifications for special components or assemblies are included in the applicable sections of this book. To avoid warpage, tighten multi-fastener assemblies in a crisscross fashion, in progressive stages, until full torque is reached. Unless otherwise specified, torque specifications call for clean, dry threads. Components should be at room temperature.

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



A. Distance across flats
B. Outside thread diameter

LUBRICATION POINT AND GRADE OF LUBRICANT

ENGINE

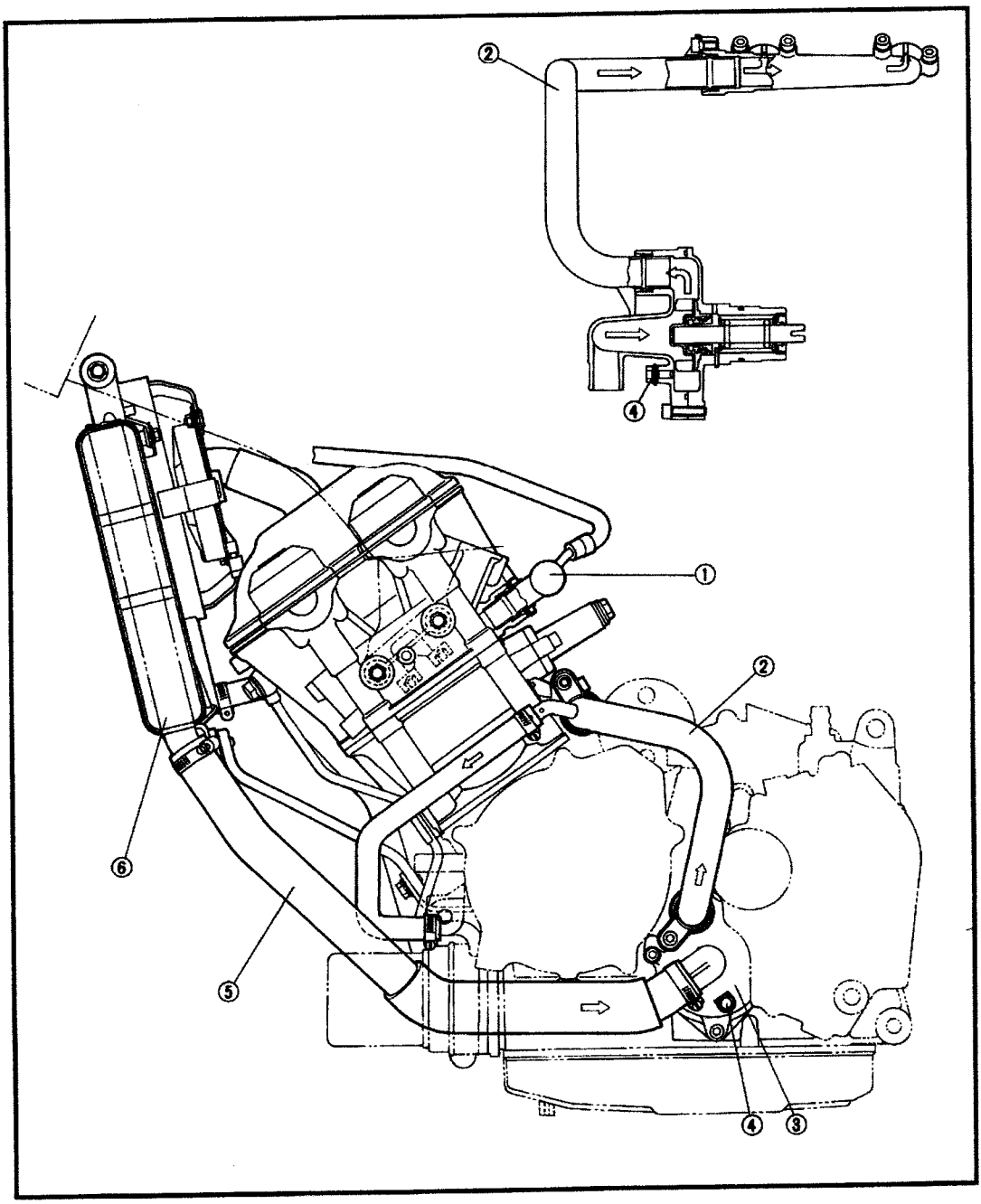
Lubrication Point	Symbol
Oil seal lips	LS
O-ring	LS
Bearing	E
Piston surface	E
Piston pin	E
Connecting rod bearings	E
Crankshaft journal	E
Connecting rod bolt/nut	M
Camshaft cam lobe	M
Valve stem (IN, EX)	M
Valve stem end (IN, EX)	E
Cylinder head bolt/nut	E
Valve lifter	E
Camshaft cap bolt	E
Water pump impeller shaft	LS
Oil pump rotor (inner/outer), housing	E
Oil strainer assembly	LS
Idle gear inner surfaces	E
Transmission gear(wheel/pinion)	M
Axle (main/drive)	M
Push rod (bearing/washer) and ball	LS
Shift cam	E
Shift fork/guide bar	E
Shift shaft assembly	E
Shift pedal	LS
Push lever assembly	LS
Starter idle gear shaft	M

CHASSIS

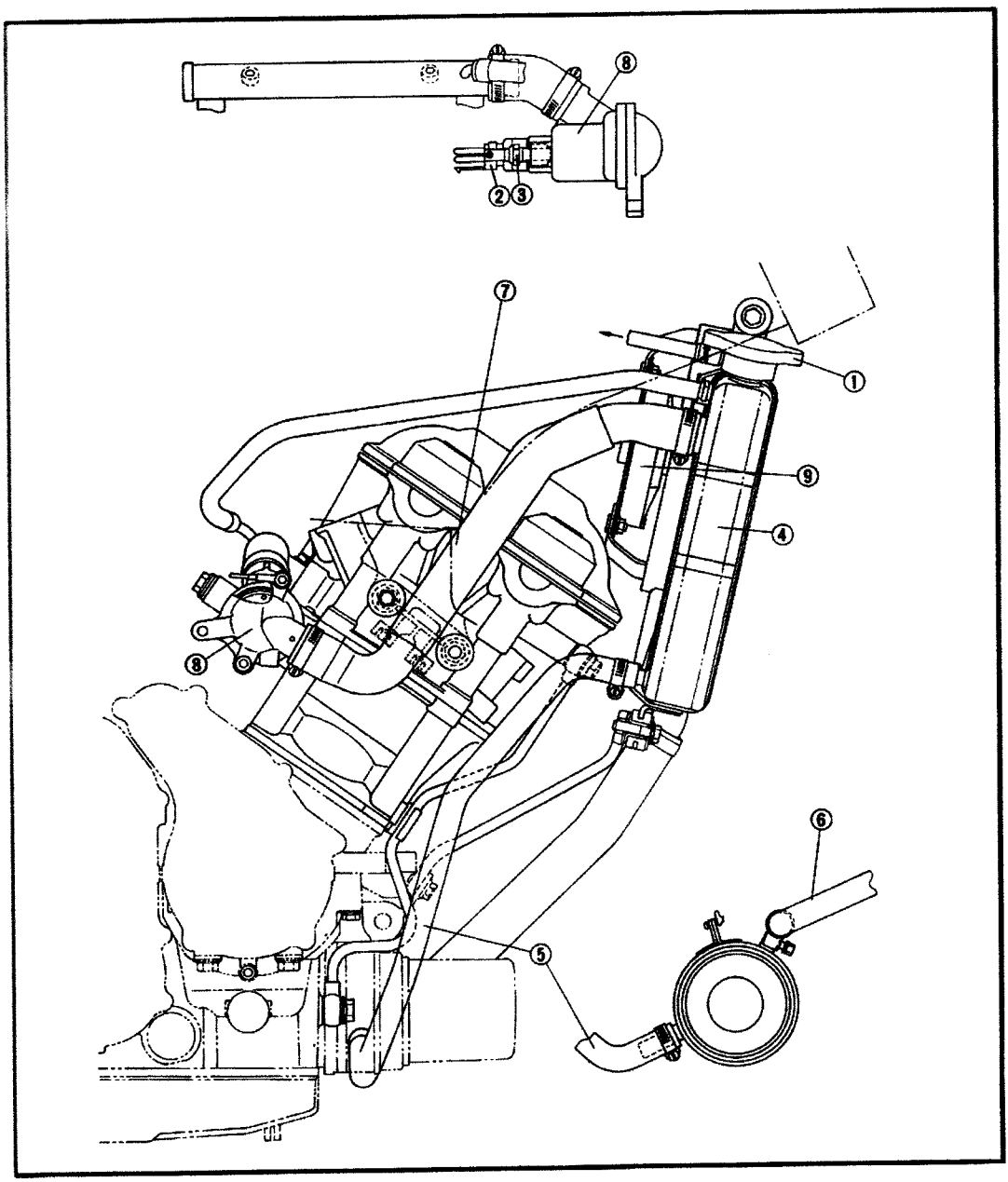
Lubrication Point	Symbol
Steering bearing and bearing race (upper/lower)	LS
Front wheel oil seal (right/left)	LS
Rear wheel oil seal	LS
Clutch hub oil seal	LS
Clutch hub fitting area	LS
Rear brake pedal shaft	LS
Change pedal	LS
Side stand sliding surface	LS
Tube guide (throttle grip) inner surface	LS
Brake lever bolt, sliding surface	LS
Clutch lever bolt, sliding surface	LS
Rear shock absorber (upper/lower)	M
Swingarm pivot collar	M
Pivot shaft	M
Connecting rod bearing (on the swingarm)	M
Thrust cover (inner)	M
Relay arm bearing (inner)	M
Relay arm oil seal	M
Rear footrest pivot	LS

COOLANT DIAGRAMS

① Water jacket joint (outlet)
② Outlet pipe (water pump)
③ Water pump
④ Drain bolt (water pump)
⑤ Inlet pipe (water pump)
⑥ Radiator

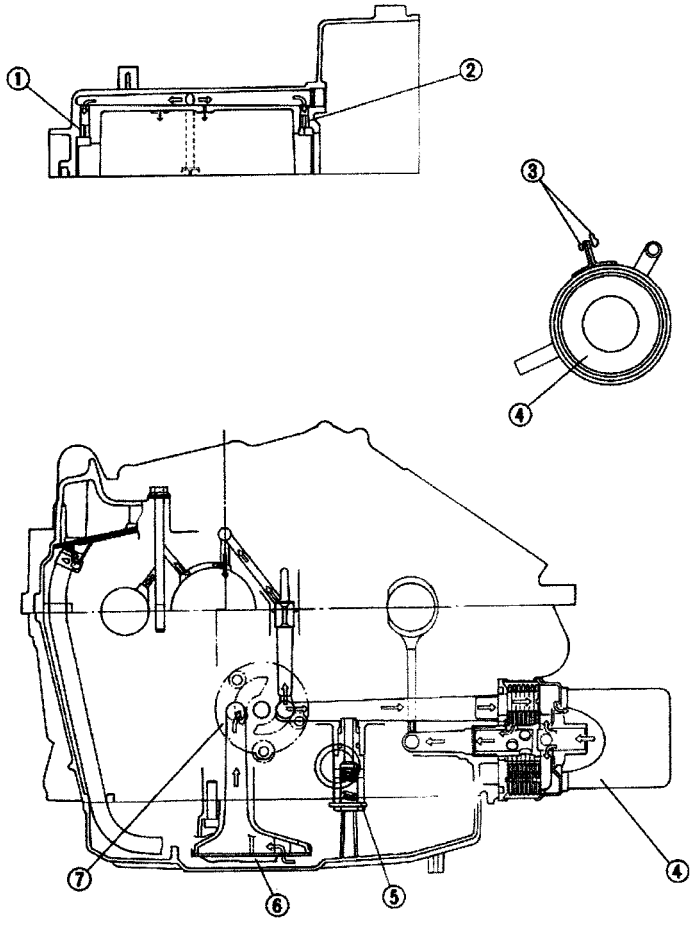


① Radiator cap
② Thermo switch
③ Thermo unit
④ Radiator
⑤ Outlet hose (oil cooler)
⑥ Inlet hose (oil cooler)
⑦ Inlet hose (radiator)
⑧ Thermostatic valve housing
⑨ Fan motor

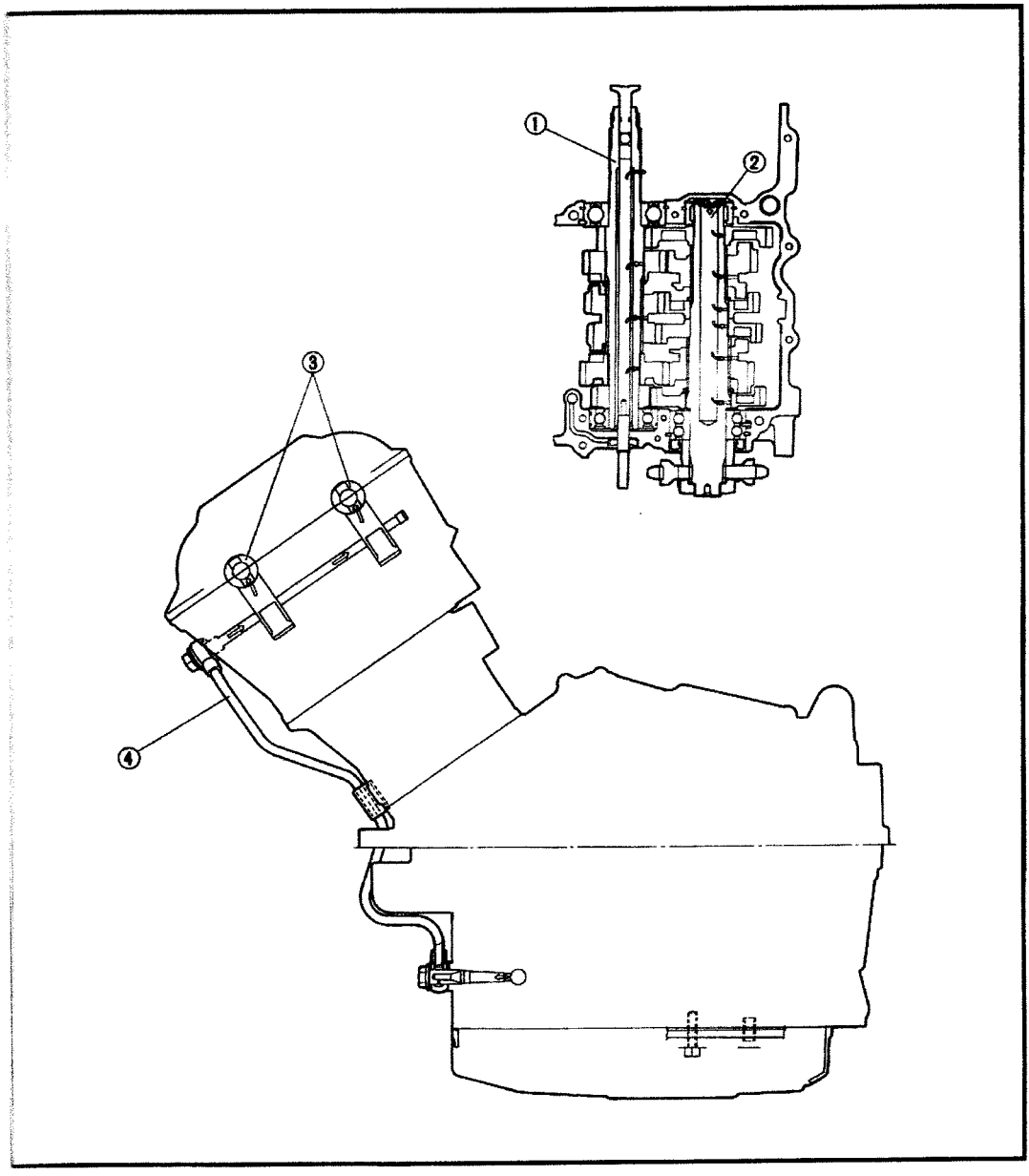


LUBRICATION DIAGRAMS

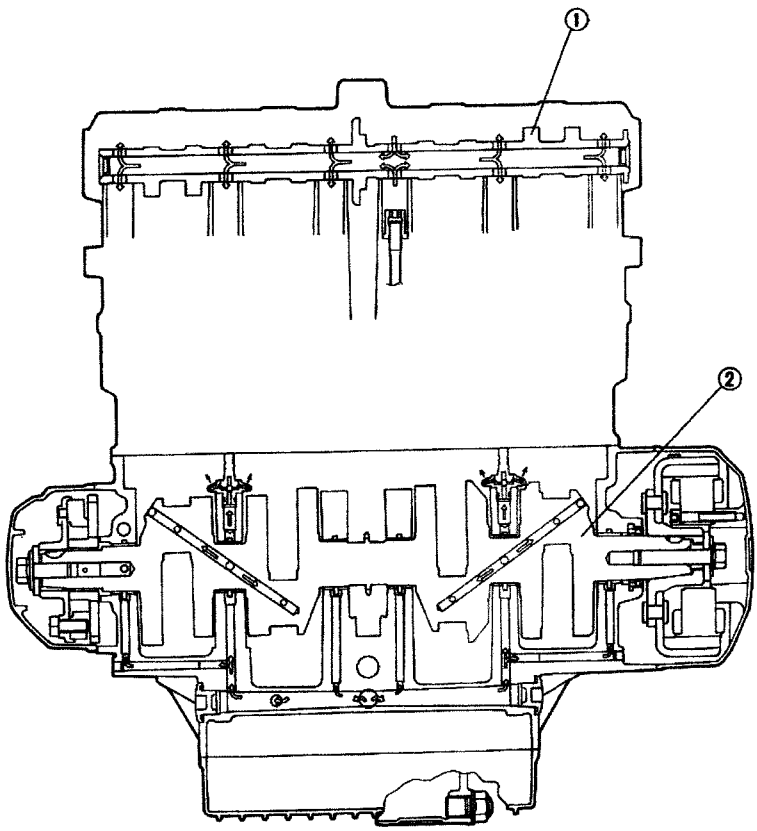
① Oil nozzle (main axle)
② Oil nozzle (drive axle)
③ Projection
④ Oil filter
⑤ Relief valve
⑥ Oil strainer
⑦ Oil pump



1. Main axle
2. Drive axle
3. Camshaft
4. Oil delivery pipe



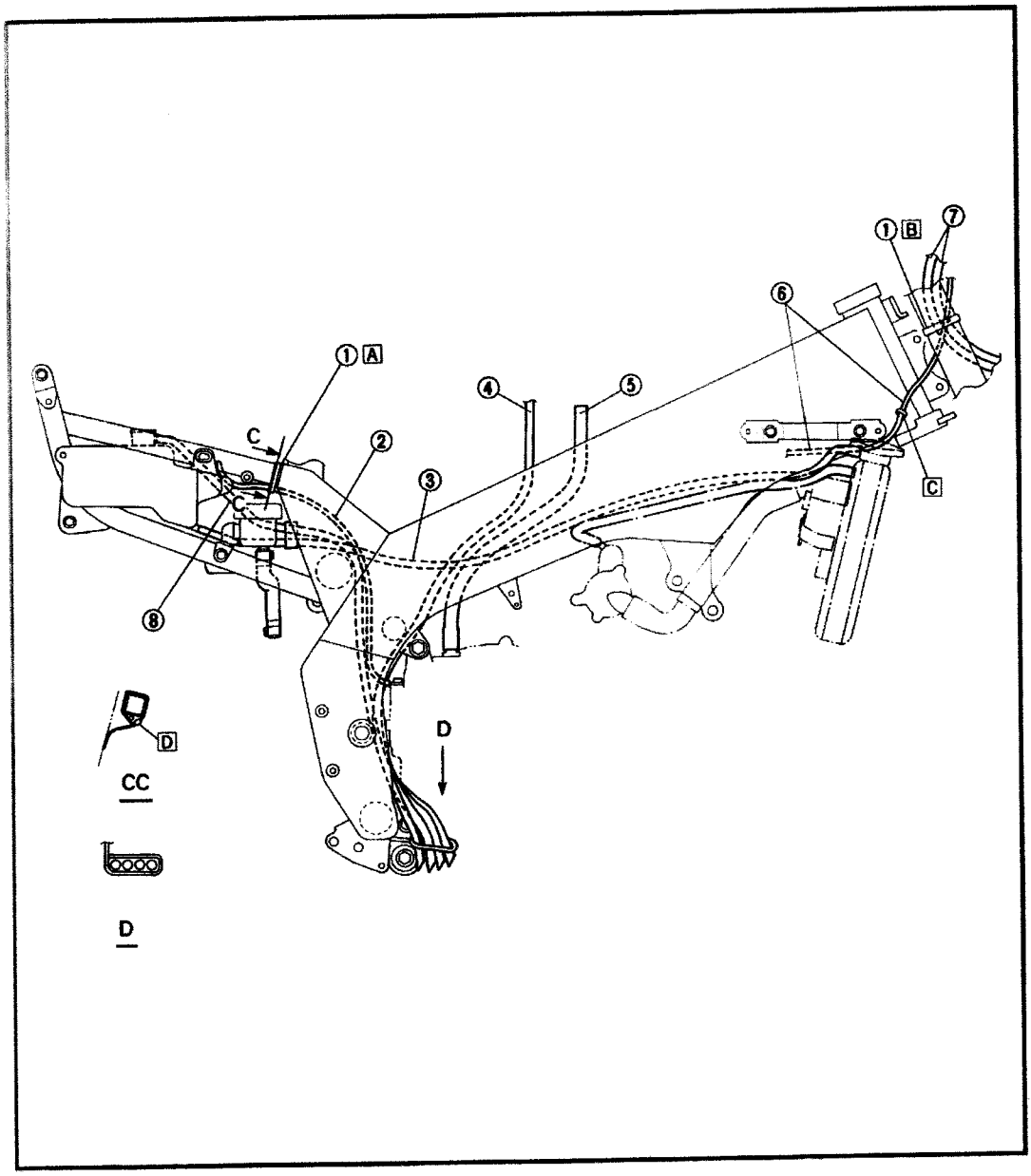
① Camshaft
② Crankshaft



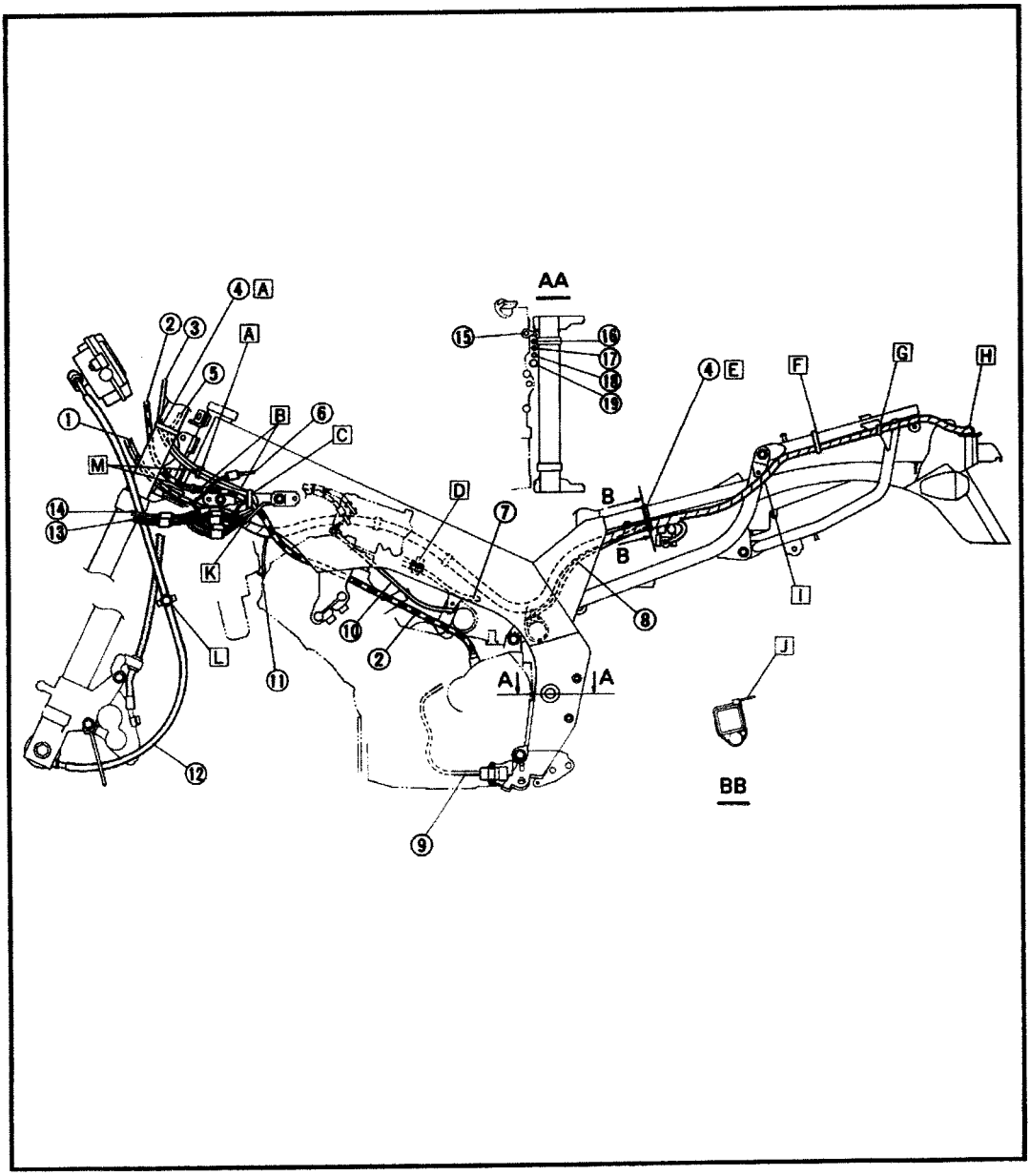
CABLE ROUTING

1. Clamp
2. Ground lead
3. Reservoir tank hose
4. Fuel tank breather hose
5. Crankcase breather hose
6. Handlebar switch lead (right)
7. Front brake hose
8. Reservoir tank breather hose

[A] Clamp the ground lead more than 30 mm in front of the side cover installation screw.
[B] Clamp the handlebar switch lead (right) and front brake hoses.
[C] Insert the clamp to the frame.
[D] Place the ends of the clamp on the side with the wire along the bottom of the frame.

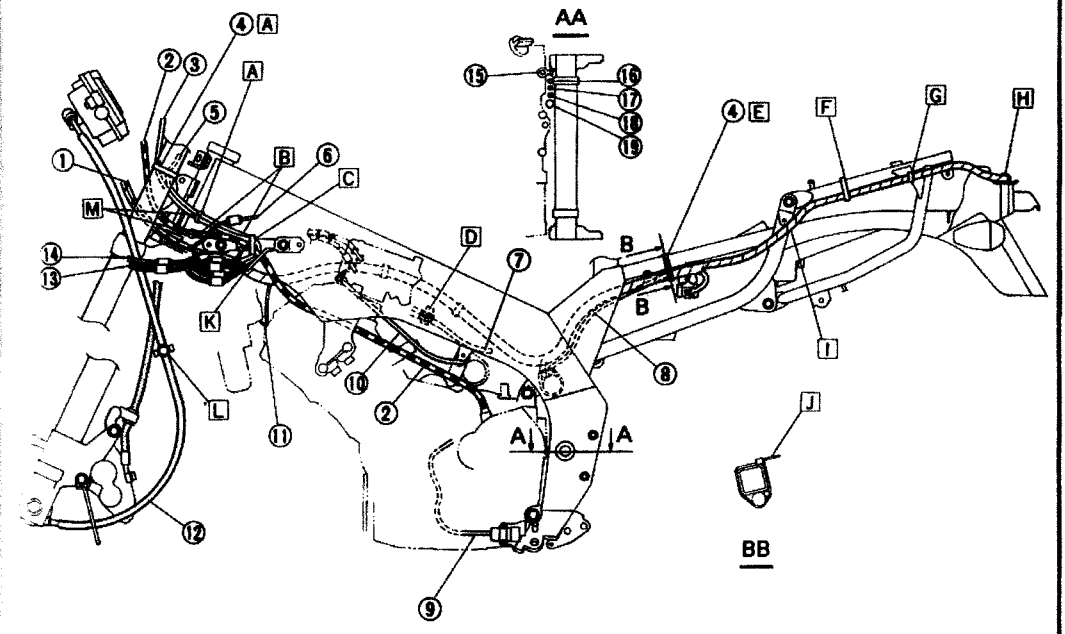


① Throttle cable
② Clutch cable
③ Handlebar switch lead (left)
④ Clamp
⑤ Main switch lead
⑥ Fuel reserve switch lead
⑦ Vacuum hose (#4)
⑧ Starter motor lead
⑨ Sidestand switch lead
⑩ Starter cable
⑪ Fan motor lead
⑫ Speedometer cable
⑬ Headlight lead
⑭ Meter light lead
⑮ Ground lead
⑯ Reservoir tank breather hose
⑰ Roll over hose
⑱ Fuel tank breather hose
⑲ Air filter case breather hose

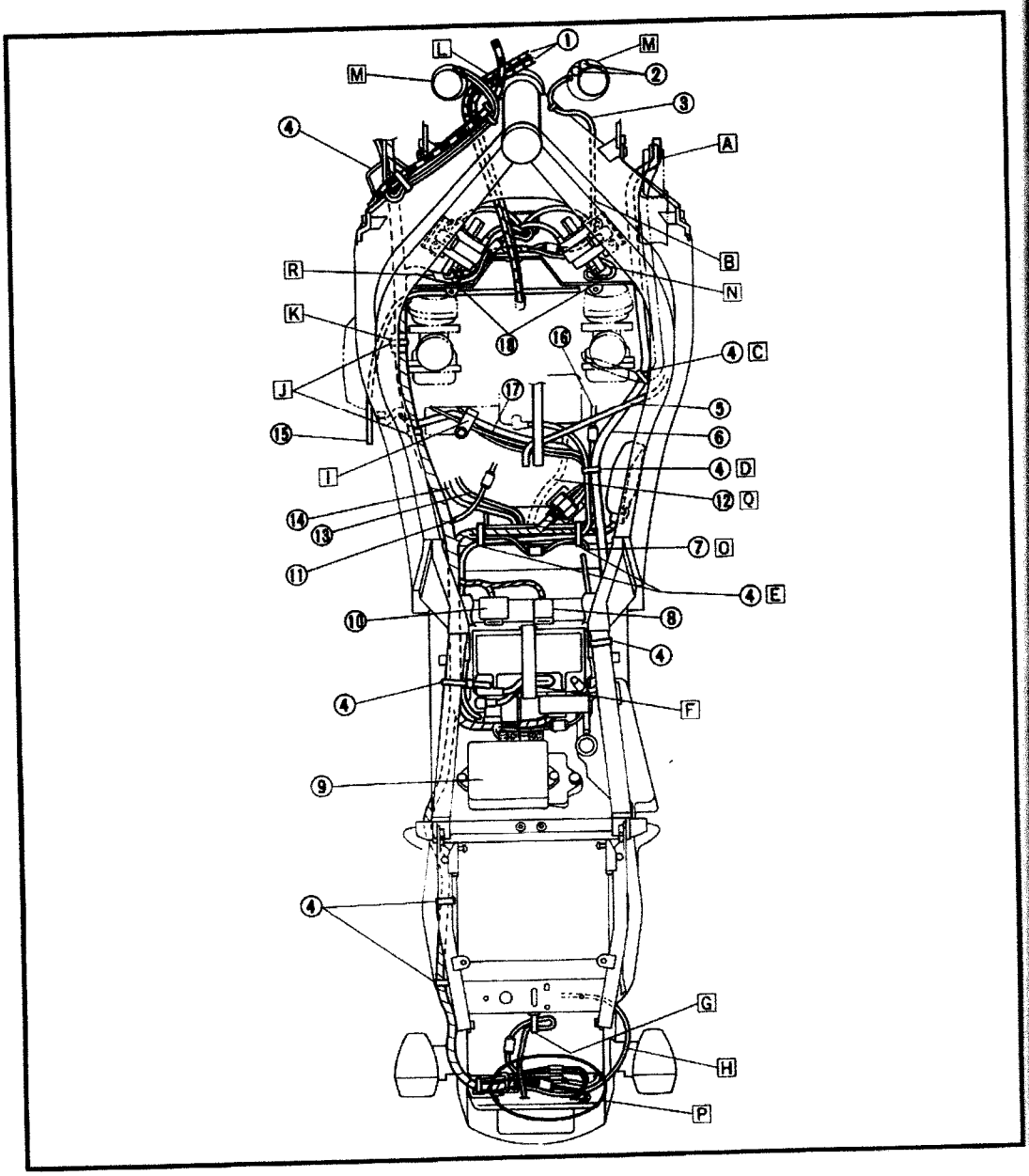


- Clamp the main switch lead and handlebar switch lead (left).
- Pass the clutch cable along the outside of the bracket and the main switch lead along the inside of the bracket.
- Clamp the main switch lead, handlebar switch lead (left) and clutch cable to the bracket.
- Clamp the vacuum hose plug onto the inside of the frame and plug hoses #1 ~ #3.
- Clamp the main harness and starter motor lead behind the side cover installation screw.
- Place the end of the clamp downward.

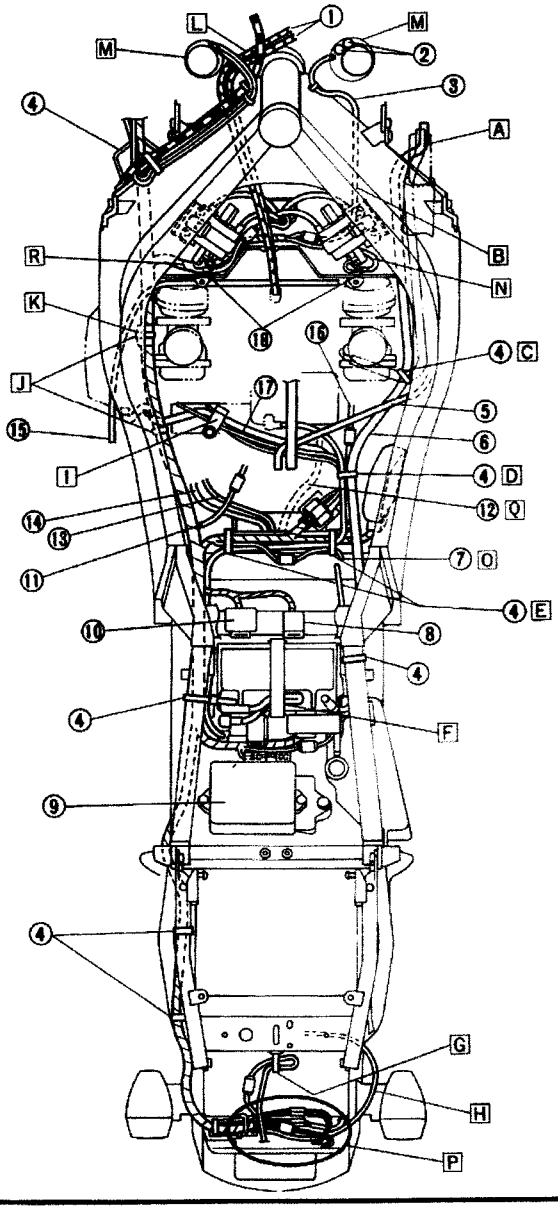
[G] Insert the clamp into the hole in the rear flame.
[H] Insert the clamp into the seat lock stay.
[I] Pass the main harness to the inside of the rear fender from the outside of the frame.
[J] Place the ends of the clamp on the battery box with the wire along the bottom of the frame.
[K] Pass the main harness, main switch lead, handlebar switch lead (left) and clutch cable through the guide.
[L] Install the clamp to the center cowling.
[M] Insert the clamp to the frame.



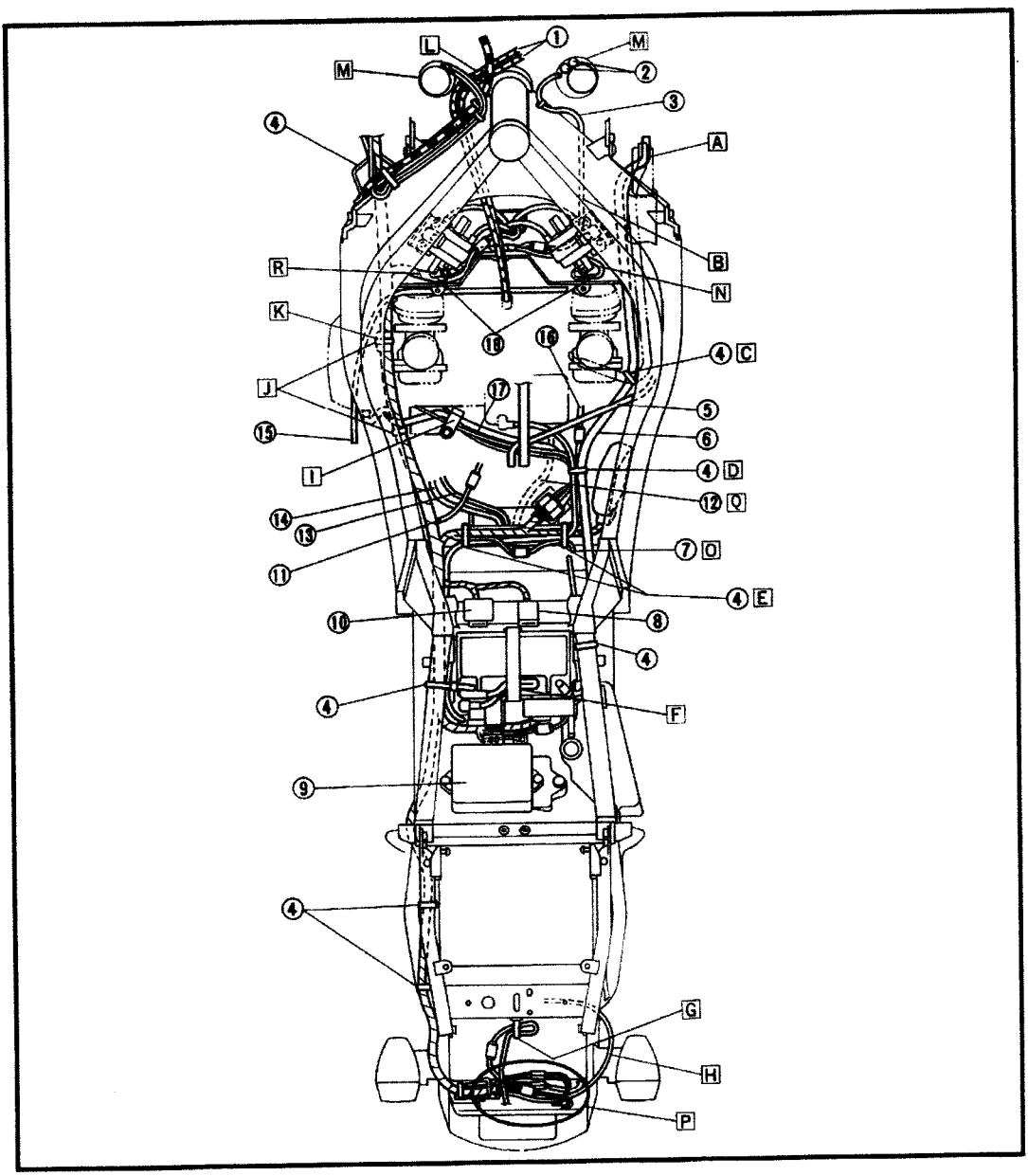
① Throttle cable
② Front brake hose
③ Handlebar switch lead (right)
④ Clamp
⑤ Vacuum hose (#4)
⑥ Reservoir tank hose
⑦ Rear brake switch lead
⑧ Flasher relay
⑨ Ignitor
⑩ Starting circuit cut-off relay
⑪ Fuel pump lead
⑫ Roll over hose (for D)
⑬ Fuel tank breather hose
⑭ Air filter case breather hose
⑮ Starter cable
⑯ Thermo unit lead
⑰ Sidestand switch lead
⑱ Ignition coil lead



Ⓔ Pass the reservoir tank hose through the innermost part of the frame.
Ⓔ Pass the handlebar switch lead (right) between the radiator cover and frame and place it outside only after it is connected.
Ⓔ Clamp the reservoir tank hose and air breather hose.
Ⓔ Clamp the reservoir tank hose and all leads.
Ⓔ Clamp the main harness, rear brake switch lead and starter motor lead to the cross tube.
[F] Hold down the positive lead with the battery band.
[G] Insert the clamp to the fender stay.
[H] Insert the seat lock cable from the rear fender from the outside.
[I] Clamp the sidestand switch lead, AC generator lead and neutral switch lead.



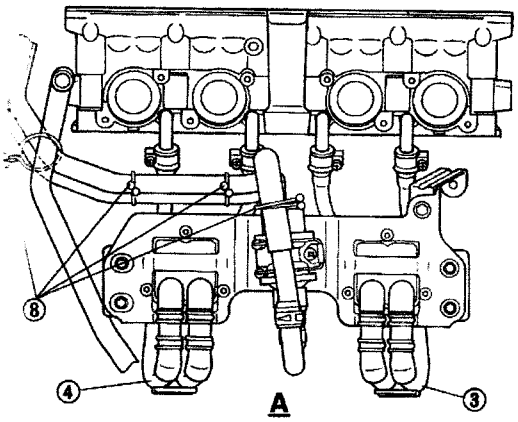
[J] Insert the clamp to the inside of the frame.
[K] Clamp the main harness at the white tape position.
[L] Pass the throttle cable below the lead and clutch cable and above the cowling stay.
[M] Cut the spare band.
[N] The ignition coil lead passes below and outside the ignition coil.
[O] The rear brake switch lead passes in front of the negative lead.
[P] Insert the flasher lead and license lead between the rear fender and seat lock.
[Q] The roll over hose passes to the right and below the vacuum hose and fuel hose (for D).
[R] The wireharness passes below the ignition coil lead.



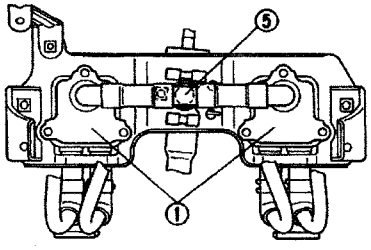
For Swizerland,Austria,Sweden

1. Reed valve
2. Air cut valve assembly
3. Pipe 2
4. Pipe 3
5. Pipe 4
6. Hose
7. Pipe 5
8. Clamp

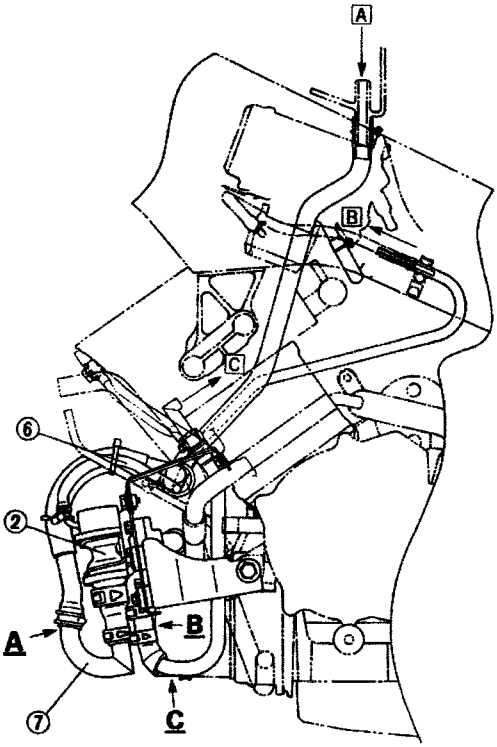
A. From air cleaner
B. To carburetor joint
C. To exhaust port

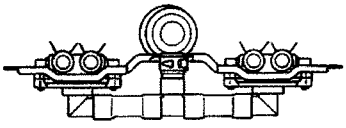


A



B





C

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 (mi)

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 (26,000)		
Spark plug(s)	Check condition. Clean or replace if necessary.	○	○	○
Air filter	Clean. Replace if necessary.		○	○
Carburetor*	Check idle speed/synchronization/starter operation. Adjust if necessary.	○	○	○
Fuel line*	Check fuel hose for cracks or damage. Replace if necessary.		○	○
Fuel filter*	Check condition. Replace if necessary.			○
Engine oil	Replace (warm engine before draining).	○	○	○
Engine oil filter*	Replace.	○		○
Brake*	Check operation/fluid leakage (see NOTE). Correct if necessary.		○	○
Clutch	Check operation. Adjust if necessary.		○	○
Rear arm pivot*	Check rear arm assembly for looseness. Correct if necessary. Moderately repack every 24,000 (16,000) or 24 months.***			○
Rear suspension link pivots*	Check operation. Apply grease lightly every 24,000 (16,000) or 24 months. ***			○
Wheels*	Check balance/damage/runout. Repair if necessary.		○	○
Wheel bearings*	Check bearing assembly for looseness/damage. Replace if damaged.		○	○
Steering bearings*	Check bearing 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.	○	○	○

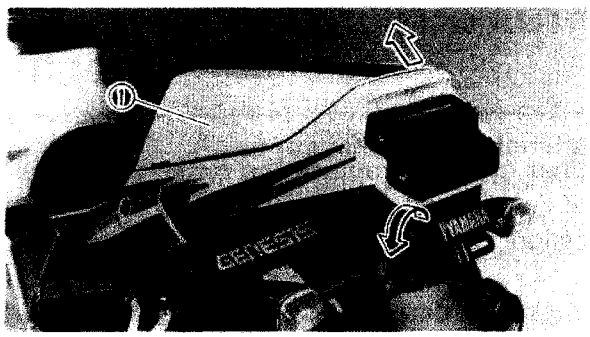


*: It is recommended that these items be serviced by a Yamaha dealer.
**: Medium weight wheel bearing grease.
***: Molybdenum disulfide grease.

NOTE:

Brake fluid replacement:

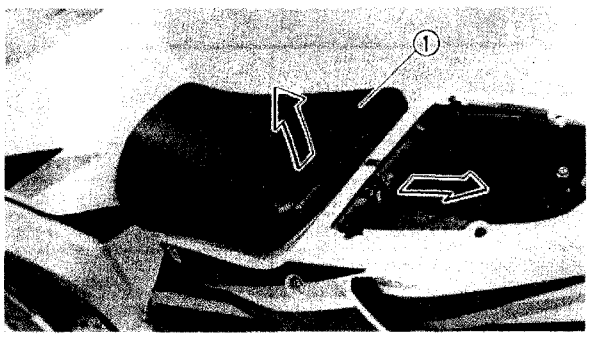
1. When disassembling the master cylinder or caliper cylinder, replace the brake fluid. Normally check the brake fluid level and add the fluid as required.
2. On the inner parts of the master cylinder and caliper cylinder, replace the oil seals every two years.
3. Replace the brake hoses every four years,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



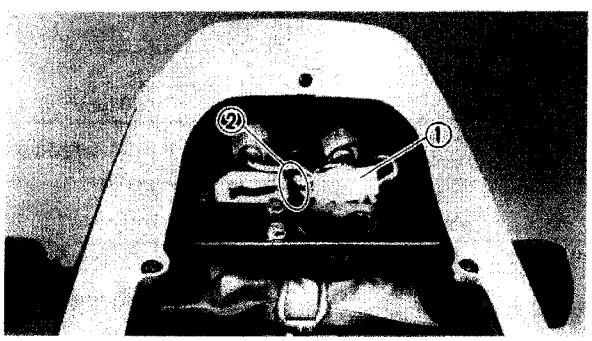
SEAT

REMOVAL

1.Remove:
- Passenger seat ①
  (with cover)

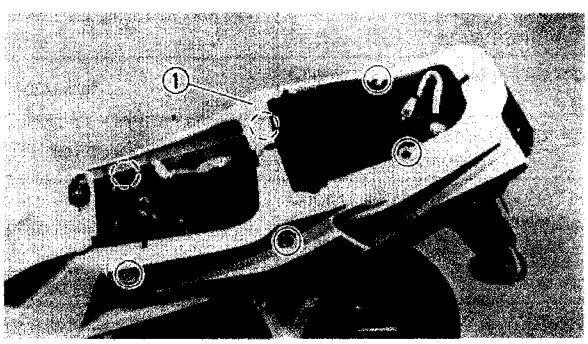


2.Remove:
- Rider seat ①



3.Disconnect:
- Tail/brake light coupler ①

4.Remove:
- Band ②



5.Remove:
- Side cover assembly ①



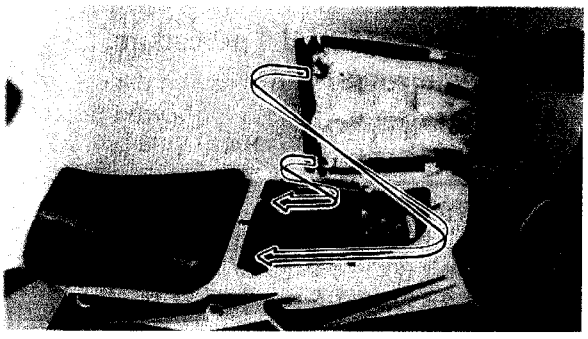
INSTALLATION

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

1.Install:
- Rider seat

NOTE:

Insert the lobes on the front of the seat into the bracket on the frame, then push down the seat end.



2.Install:
- Passenger seat (with cover)

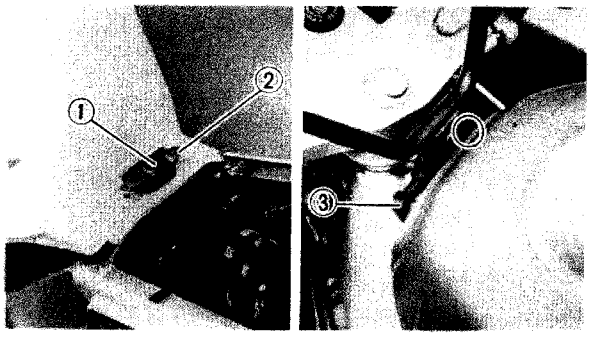
NOTE:
Insert the hooks on the front of the seat into the peg on the frame, then push down the seat end.

FUEL TANK

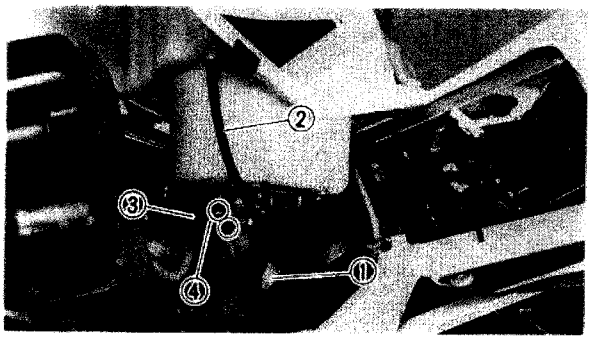
REMOVAL

1.Remove:
- Seat

Refer to the "SEAT" section.



2.Remove:
- Bolt ①
- Plate ②
- Damper rubber
- Bolt ③



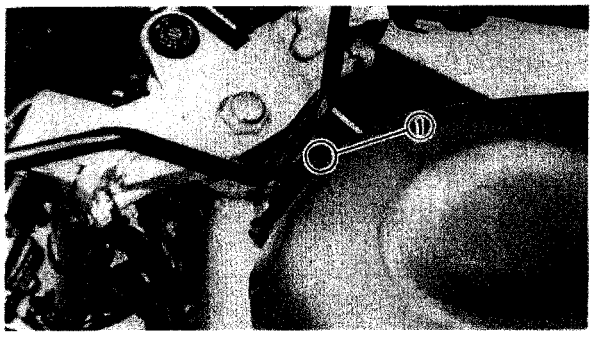
3.Disconnect:
- Fuel pump coupler ①
- Drain hose ② (fuel tank)
- Fuel hose ③
- Vacuum hose ④

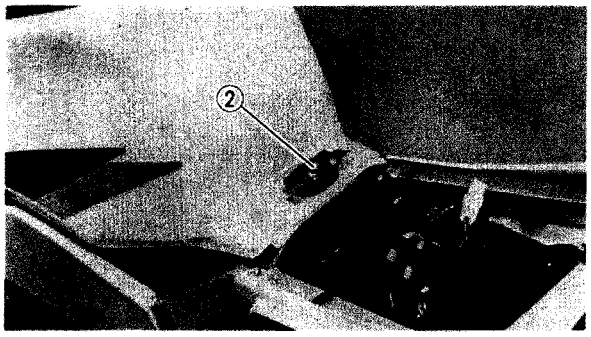
⚠ WARNING

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

NOTE:
Place a rag under the fuel hose to avoid spilling fuel.

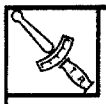
4.Remove:
- Fuel tank





INSTALLATION

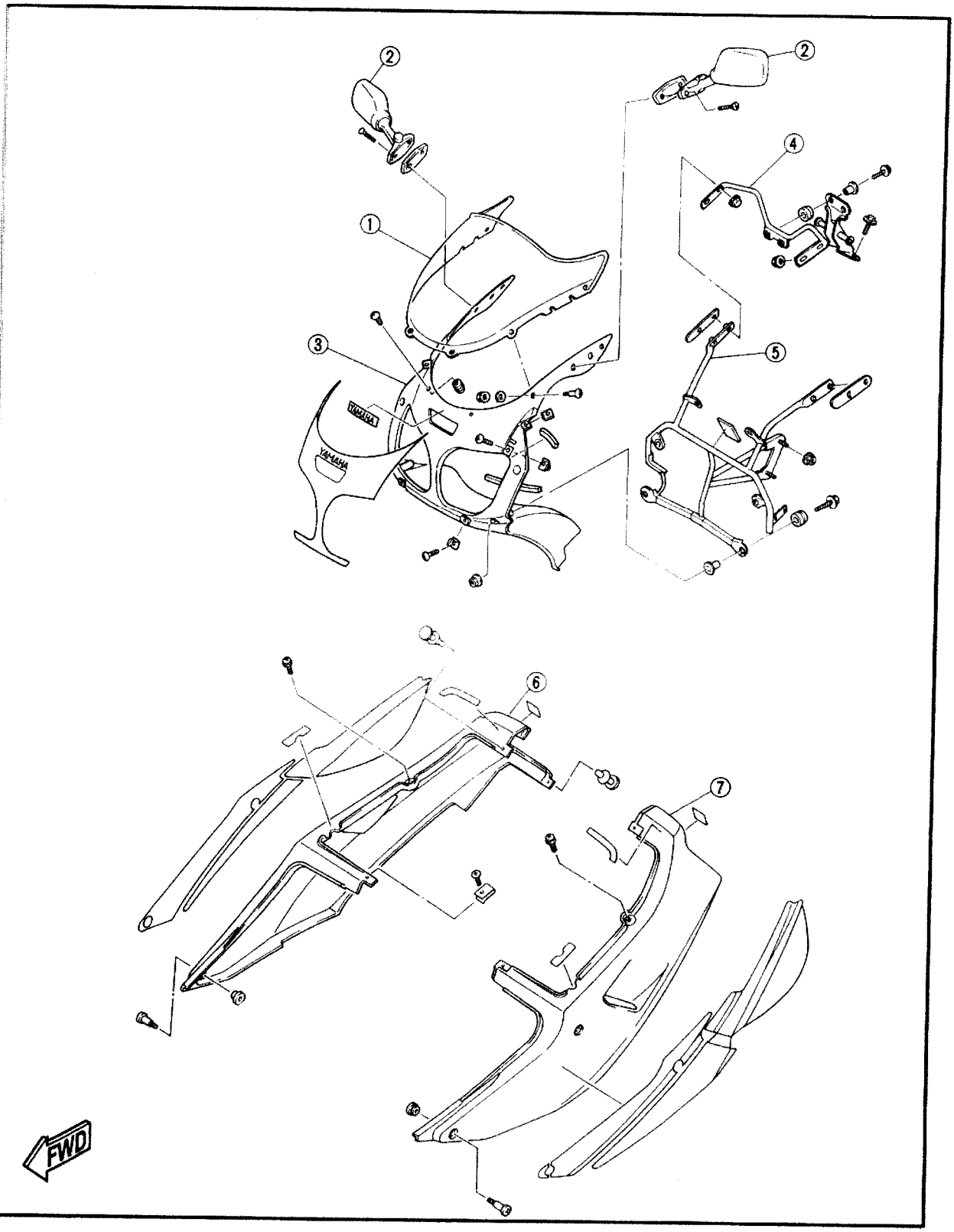
Reverse the "REMOVAL" procedure.
Note the following points.
1.Install:
- Fuel tank



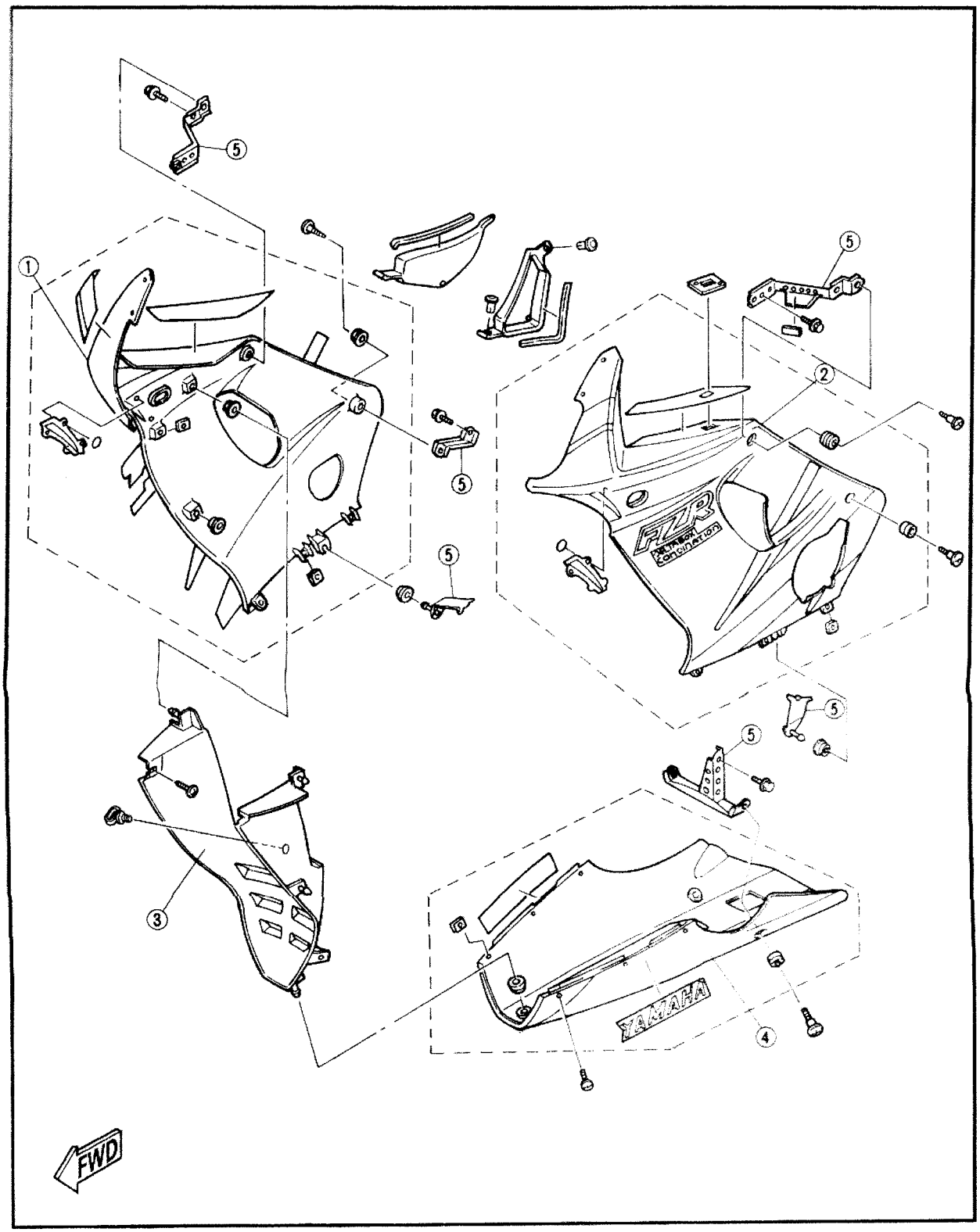
Nut ①:
7 Nm (0.7 m • kg, 5.1 ft • lb)
Bolt ②:
16 Nm (1.6 m • kg, 11 ft • lb)

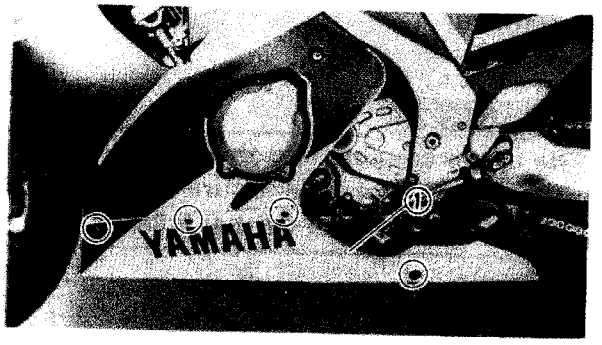
COWLINGS

1. Wind shield
2. Rear view mirror
3. Upper cowling
4. Cowling stay (upper)
5. Cowling stay (lower)
6. Side cover (right)
7. Side cover (left)



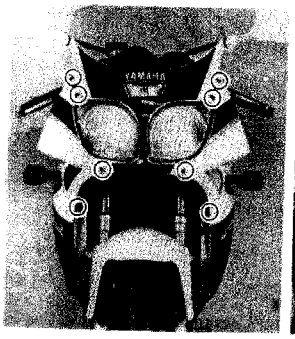
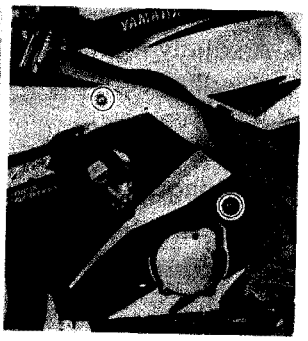
① Center cowling (right)
② Center cowling (left)
③ Center cowling (front)
④ Lower cowling
⑤ Cowling stay



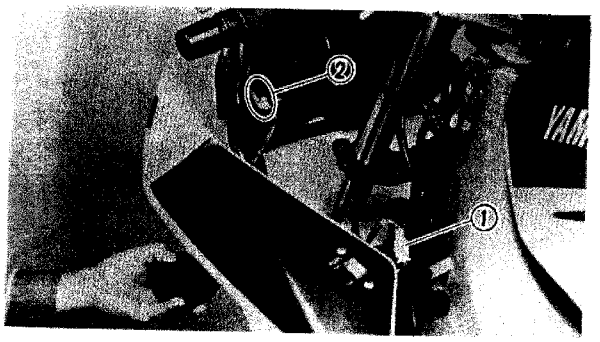


REMOVAL

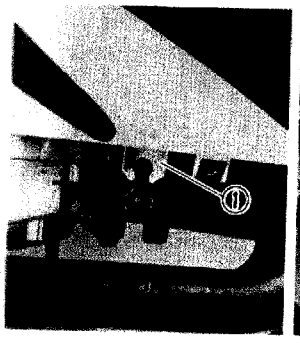
1.Remove:
- Screws
- Lower cowling ①

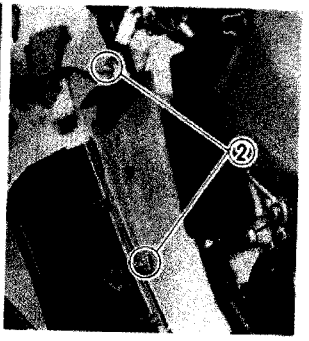



2.Remove:
- Screws

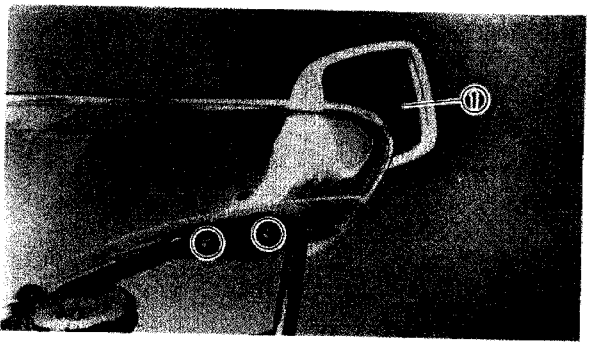


3.Disconnect:
- Speedometer cable (from front wheel)
- Fuel reserve switch coupler ①
- Front flasher light leads ②
- Center cowlings (left and right)
- Center cowling (front)

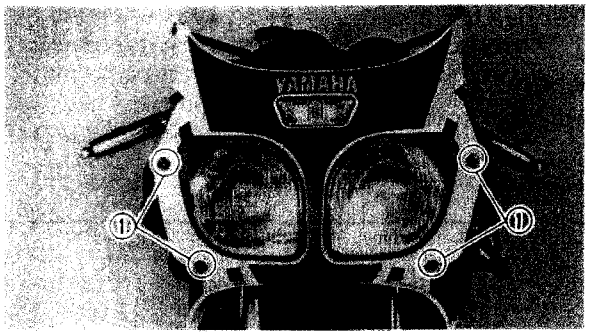




NOTE:
Remove the center cowling grommets ① and ② when removing the center cowling.

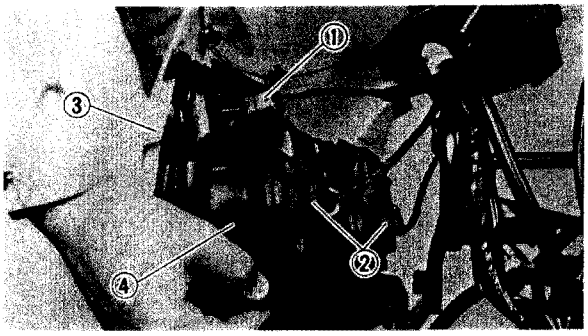


4.Remove:
- Rear view mirrors ① (left and right)



5.Remove:
- Nuts ①

CAUTION:
The upper cowling and the head light unit are separate parts. Make sure that you hold both of them so that neither falls.



6.Disconnect:
- Auxilialy light coupler ①
- Headlight couplers ②

7.Remove:
- Upper cowling ③
- Headlight unit ④

INSTALLATION

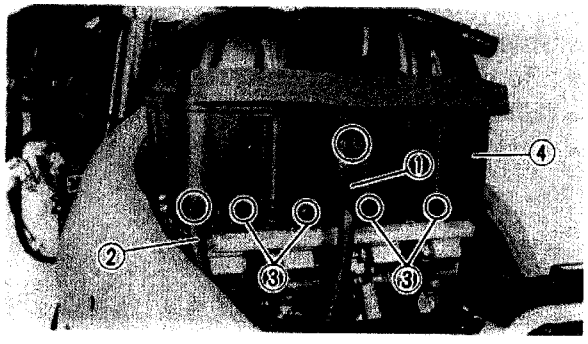
Reverse the "REMOVAL" procedure.

ENGINE

VALVE CLEARANCE ADJUSTMENT

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

1.Remove:
- Seat
  Refer to the "SEAT" section.
- Fuel tank
  Refer to the "FUEL TANK" section.
- Lower cowling
- Center cowling
  Refer to the "COWLINGS" section.

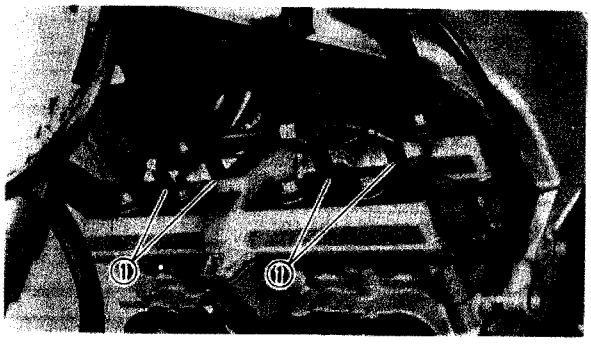


2.Disconnect:
- Breather hose ① (crankcase)
- Breather hose ② (air filter case)

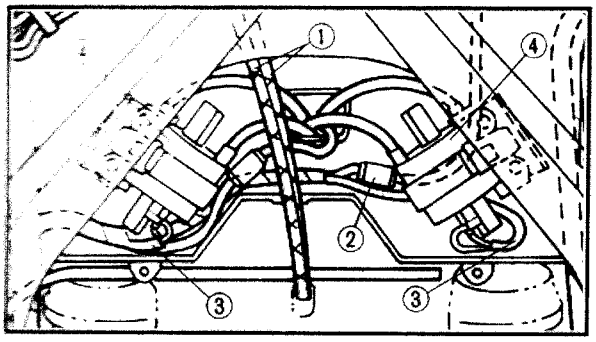
3.Loosen:
- Screw ③

4.Remove:
- Air filter case ④

5.Remove:
- Radiator assembly
  Refer to the "RADIATOR" section in CHAPTER 5.

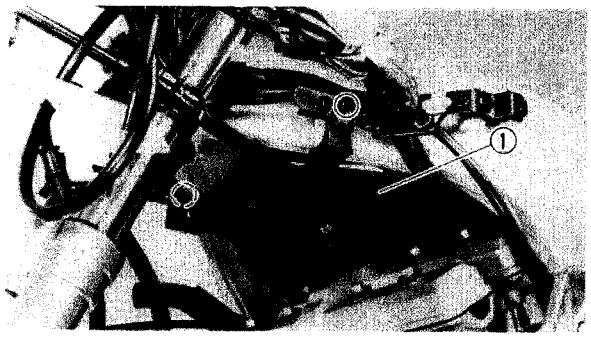


6.Disconnect:
- Spark plug caps ①

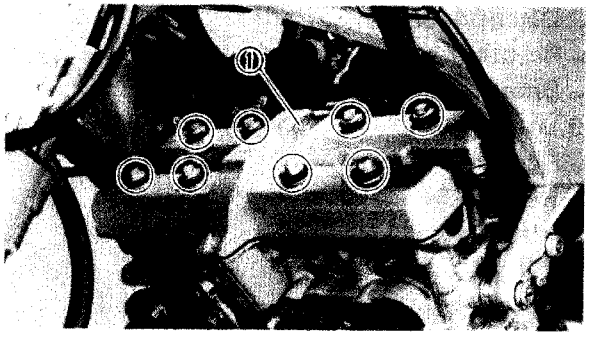


7.Disconnect:
- Throttle cables ①
- Handlebar switch coupler ② (right)
- Ignition coil leads ③

8.Remove:
- Rubber cover
- Ignition coil ④

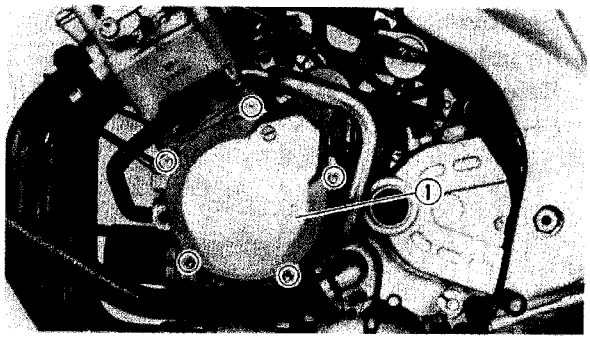


9.Remove:
- Ignition coil plate ①



10.Loosen:
- Spark plugs

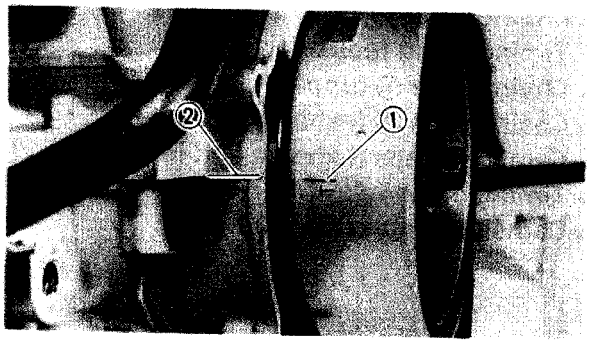
11.Remove:
- Cylinder head cover ①
- Gasket (cylinder head cover)



12.Remove:
- A.C. magneto cover ①

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

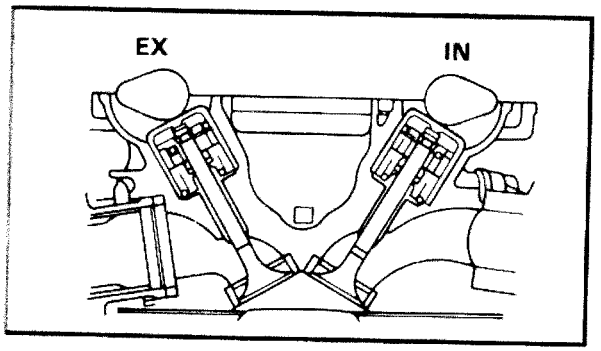
Valve clearance (cold):
Intake valve:
0.11 ~ 0.20 mm (0.004 ~ 0.008 in)
Exhaust valve:
0.21 ~ 0.30 mm (0.008 ~ 0.012 in)



****

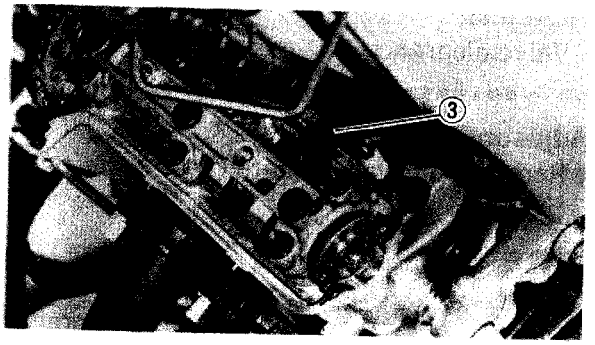
Checking steps:

- Turn the crankshaft counterclockwise.
- Align the "T" mark ① on the magneto with the crankcase end ② when #1 piston is at TDC on compression stroke.



NOTE:

TDC on compression stroke can be found when the cam lobes are opposite each other as shown.

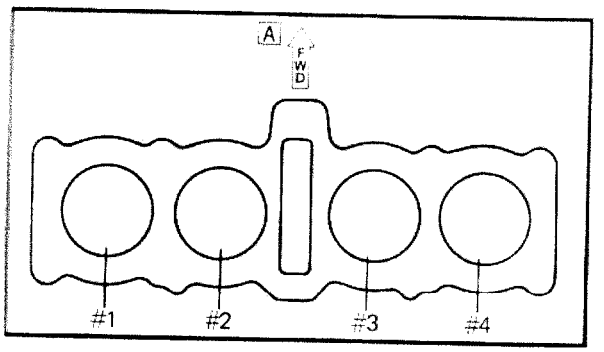


- Measure the valve clearance using a feeler gauge ③.

NOTE:

- Record the measured reading if the clearance is incorrect.
- Measure the valve clearance in the following sequence.

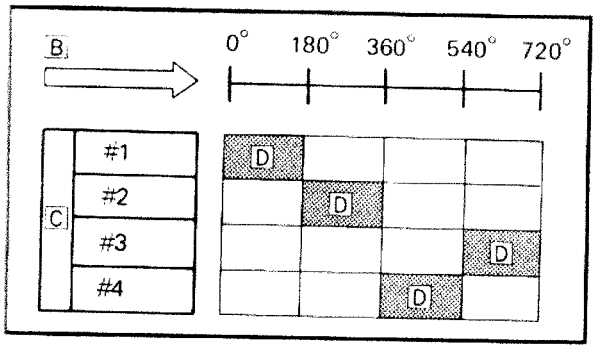
Measuring sequence:
#1 → #2 → #4 → #3



A Front

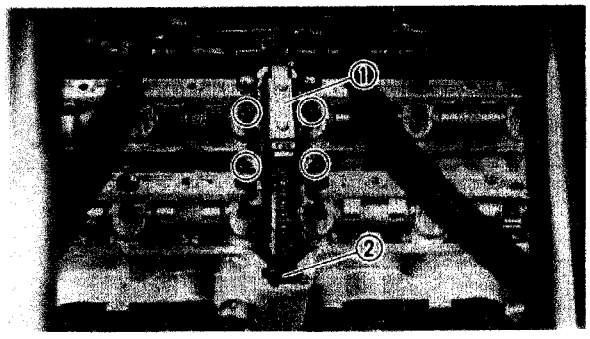
- Turn the crankshaft by the number of degrees indicated below counterclockwise from #1 cylinder TDC.

B Crankshaft counterclockwise turning angle
C Cylinder number
D Combustion



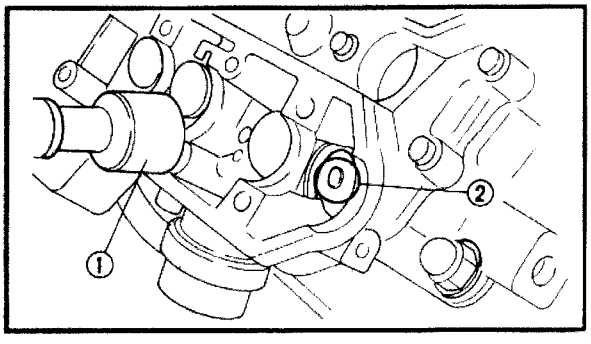
#2 Cylinder	180 degrees
#4 Cylinder	360 degrees
#3 Cylinder	540 degrees

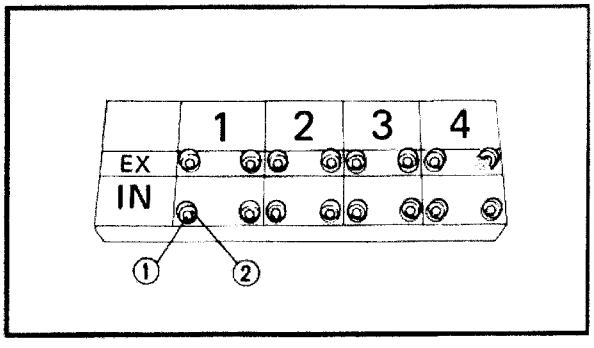
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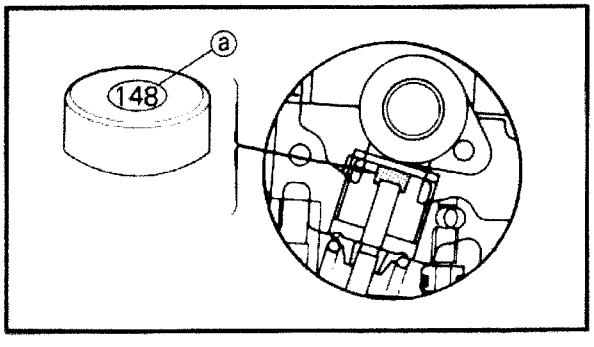


14.Remove:
- Timing chain tensioner
- Chain guide ① (upper)
- Chain guide ② (exhaust side)
- Camshaft caps (exhaust and intake)
- Timing chain
- Camshaft (intake and exhaust)

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







15.Adjust:
- Valve clearance

****

Adjustment steps:

●Remove the valve lifters ① and the pads ②.

NOTE:
- Place a rag in the timing chain space to prevent pads from falling into the crankcase.
- Identify each valve lifter ① and pad ② position very carefully so that they can be reinstalled in their original place.

●Select the proper pad using the pad selecting table:

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

NOTE:
The thickness ⓐ of each pad is indicated in hundreths of millimeters on the pad upper surface.

● Round off the last digit of the installed pad number to the nearest increment.

Last digit of pad number	Rounded value
0 or 2	0
5	(NOT ROUNDED OFF)
8	10

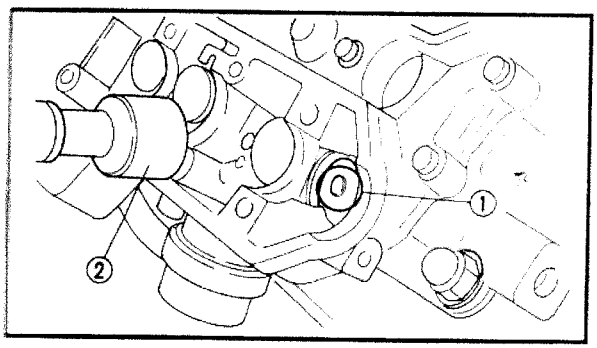
EXAMPLE:
Installed pad number = 148 (1.48 mm)
Rounded off value = 150

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

● Locate the rounded-off value and the measured valve clearance in the chart "PAD SELECTION TABLE". The field where these two coordinates intersect shows the new pad number to use.

NOTE:
Use the new pad number only as a guide when verifying the valve clearance adjustment.

● Install the new pads ① and the valve lifters ②.



NOTE:
- Apply molybdenum disulfide grease to the pad.
- Lubricate the valve lifter with molybdenum disulfide oil.
- Valve lifter must turn smoothly when rotated with a finger.
- Be careful to reinstall valve lifters and old pads in their original place.

● Install the camshafts (exhaust and intake), the timing chain and the camshaft caps.

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

INTAKE

B MEASURED CREARANCE	A INSTALLED PAD NUMBER																								
	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240
0.00 ~ 0.02				120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225
0.03 ~ 0.07			120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230
0.08 ~ 0.10		120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235
0.11 ~ 0.20	C RECOMMENDED CLEARANCE																								
0.21 ~ 0.22	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	
0.23 ~ 0.27	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240		
0.28 ~ 0.32	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240			
0.33 ~ 0.37	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240				
0.38 ~ 0.42	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240					
0.43 ~ 0.47	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240						
0.48 ~ 0.52	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240							
0.53 ~ 0.57	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240								
0.58 ~ 0.62	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240									
0.63 ~ 0.67	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240										
0.68 ~ 0.72	175	180	185	190	195	200	205	210	215	220	225	230	235	240											
0.73 ~ 0.77	180	185	190	195	200	205	210	215	220	225	230	235	240												
0.78 ~ 0.82	185	190	195	200	205	210	215	220	225	230	235	240													
0.83 ~ 0.87	190	195	200	205	210	215	220	225	230	235	240														
0.88 ~ 0.92	195	200	205	210	215	220	225	230	235	240															
0.93 ~ 0.97	200	205	210	215	220	225	230	235	240																
0.98 ~ 1.02	205	210	215	220	225	230	235	240																	
1.03 ~ 1.07	210	215	220	225	230	235	240																		
1.08 ~ 1.12	215	220	225	230	235	240																			
1.13 ~ 1.17	220	225	230	235	240																				
1.18 ~ 1.22	225	230	235	240																					
1.23 ~ 1.27	230	235	240																						
1.28 ~ 1.32	235	240																							
1.33 ~ 1.37	240																								

EXAMPLE:

VALVE CLEARANCE (cold):

0.11 ~ 0.20 mm (0.004 ~ 0.008 in)

Installed is 148 (Rounded off number is 150)

Measured clearance is 0.24 mm (0.009 in)

Replace 148 pad with 160 pad

EXHAUST

B MEASURED CREARANCE	A INSTALLED PAD NUMBER																								
	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240
0.00 ~ 0.02						120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215
0.03 ~ 0.07					120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220
0.08 ~ 0.12				120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225
0.13 ~ 0.17			120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230
0.18 ~ 0.20		120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235
0.21 ~ 0.30	C RECOMMENDED CLEARANCE																								
0.31 ~ 0.32	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	
0.33 ~ 0.37	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240		
0.38 ~ 0.42	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240			
0.43 ~ 0.47	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240				
0.48 ~ 0.52	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240					
0.53 ~ 0.57	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240						
0.58 ~ 0.62	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240							
0.63 ~ 0.67	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240								
0.68 ~ 0.72	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240									
0.73 ~ 0.77	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240										
0.78 ~ 0.82	175	180	185	190	195	200	205	210	215	220	225	230	235	240											
0.83 ~ 0.87	180	185	190	195	200	205	210	215	220	225	230	235	240												
0.88 ~ 0.92	185	190	195	200	205	210	215	220	225	230	235	240													
0.93 ~ 0.97	190	195	200	205	210	215	220	225	230	235	240														
0.98 ~ 1.02	195	200	205	210	215	220	225	230	235	240															
1.03 ~ 1.07	200	205	210	215	220	225	230	235	240																
1.08 ~ 1.12	205	210	215	220	225	230	235	240																	
1.13 ~ 1.17	210	215	220	225	230	235	240																		
1.18 ~ 1.22	215	220	225	230	235	240																			
1.23 ~ 1.27	220	225	230	235	240																				
1.28 ~ 1.32	225	230	235	240																					
1.33 ~ 1.37	230	235	240																						
1.38 ~ 1.42	235	240																							
1.43 ~ 1.47	240																								

EXAMPLE:

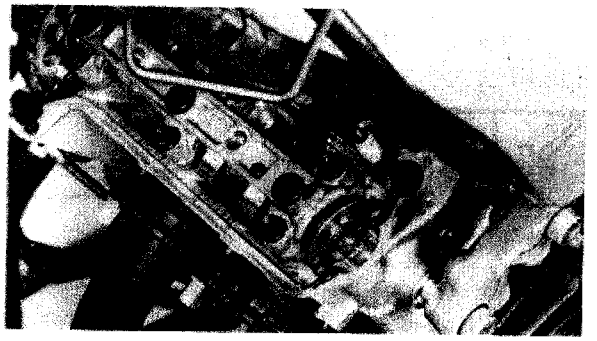
VALVE CLEARANCE (cold):

0.21 ~ 0.30 mm (0.008 ~ 0.012 in)

Installed is 175

Measured clearance is 0.35 mm (0.014 in)

Replace 175 pad with 185 pad



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

- Recheck the valve clearance.
- If the clearance is still incorrect, repeat all the clearance adjustment steps until the specified clearance is obtained.

****

16.Install:
- All removed parts

NOTE:
Install all removed parts in reversed order of their removal. Note the following points.

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

Refer to the "ENGINE ASSEMBLY AND ADJUSTMENT" section in CHAPTER 4.

18.Install:
- A.C. magneto cover

	Bolt (A.C. magneto cover): 10 Nm (1.0 m • kg, 7.2 ft • lb)

19.Install:
- Cylinder head cover
- Spark plugs

Bolt (cylinder head cover):
10 Nm (1.0 m • kg, 7.2 ft • lb)
Spark plug:
12.5 Nm (1.25 m • kg, 9.0 ft • lb)

20.Install:
- Ignition coil plate
- Ignition coil

Bolt (ignition coil):
10 Nm (1.0 m • kg, 7.2 ft • lb)

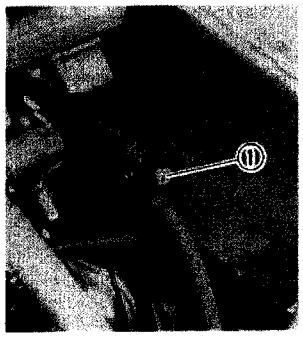
CARBURETOR SYNCHRONIZATION

NOTE:
Valve clearance and idling speed should be adjusted properly before synchronizing the carburetors.

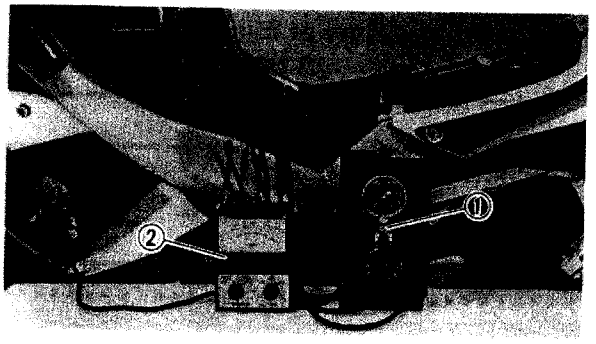
1.Place the motorcycle on a level surface.

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

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

3.Remove:
- Plugs ① (vacuum hose)



4.Attach:
- Adapters
- Vacuum gauge ①
- Inductive tachometer ②
  (to #1 spark plug lead)

Vacuum gauge:
90890-03094
Inductive tachometer:
90890-03113

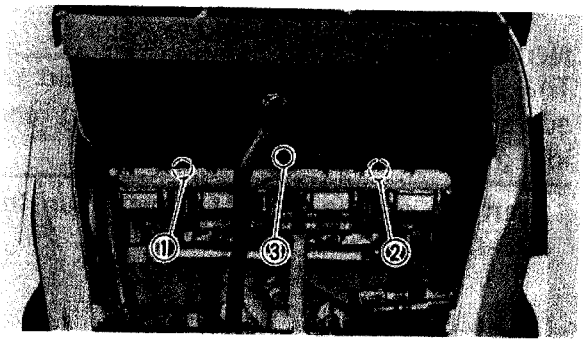
5.Start the engine and let it warm up for several minutes.
6.Check:
- Engine idling speed
  Out of specification → Adjust.
  Refer to the "ENGINE IDLING SPEED ADJUSTMENT" section.

Engine idling speed:
1,150 ~ 1,250 r/min
For (CH)(A)(S)
1,250 ~ 1,350 r/min
Except for (CH)(A)(S)

7.Adjust:
- Carburetor synchronization

****

Adjustment steps:
- Synchronize carburetor #1 to carburetor #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.
- Repeat the above steps to synchronize carburetor #4 to carburetor #3 by turning synchronizing screw ② until both gauges read the same.
- Repeat the same steps to synchronize carburetor #2 to carburetor #3 by turning synchronizing screw ③ until both gauges read the same.



Vacuum pressure at idle speed:
29.6 kPa (225 mm Hg, 8.858 in Hg)

NOTE:
The difference between both carburetors should be 1.33 kPa (10 mm Hg, 0.4 in Hg) 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 the "THROTTLE CABLE FREE PLAY ADJUSTMENT" section.



Free play:
3 ~ 7 mm (0.12 ~ 0.28 in)

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

IDLING SPEED ADJUSTMENT

NOTE:
The carburetor synchronization should be adjusted properly before adjusting the idling speed.

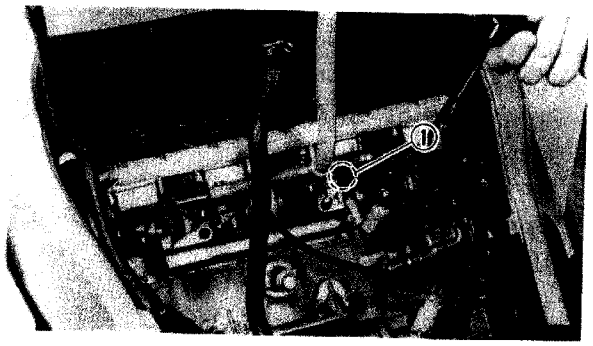
1. Start the engine and let it warm up for several minutes.

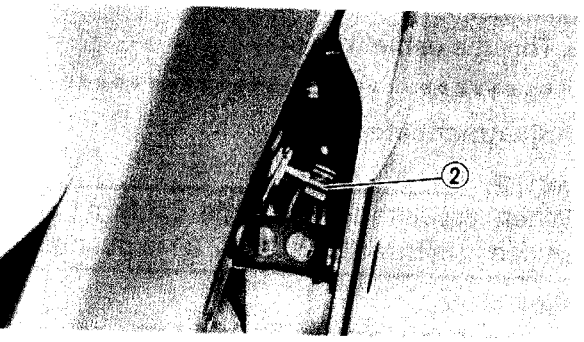
2.Attach:
- Inductive tachometer
  (to the #1 spark plug lead).

	Inductive tachometer: 90890-03113

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

	Engine idling speed: **1,150 ~ 1,250 r/min** **For (CH)(A)(S)** **1,250 ~ 1,350 r/min** **Except for (CH)(A)(S)**





4.Adjust:
- Engine idling speed

****

Adjustment steps:
- Turn the pilot screw ① until it is lightly seated.
- Turn out the pilot screw for the specified number of turns.

Pilot screw:	**1-3/4 turns out (For 4JH)** **1-7/8 turns out (For 4MH)** **1-3/5 turns out (For 4MM)**

- Turn the throttle stop screw ② in or out until specified idling speed is obtained.

Turning in → Idling speed increased.
Turning out → Idling speed decreased.

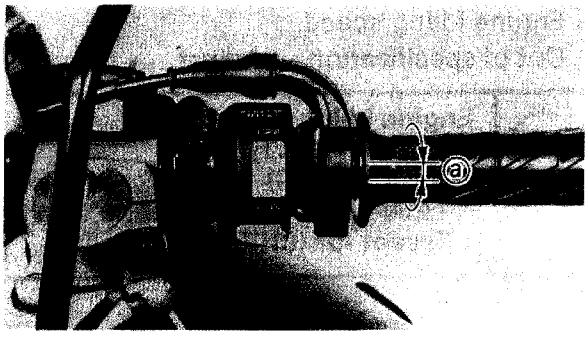
****

5.Adjust:
- Throttle cable free play
  Refer to the "THROTTLE CABLE FREE PLAY ADJUSTMENT" section.

	Free play: **3 ~ 7 mm (0.12 ~ 0.28 in)**

THROTTLE CABLE ADJUSTMENT

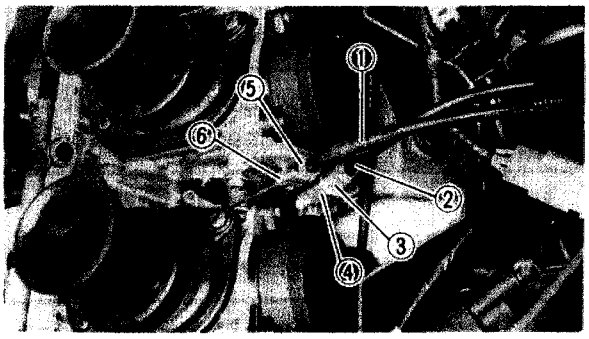
NOTE:
Engine idling speed and carburetor synchronization should be adjusted properly before adjusting the throttle cable free play.



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

Free play:
3 ~ 7 mm (0.12 ~ 0.28 in)
At throttle grip flange

2.Remove:
- Seat
- Fuel tank
  Refer to the "SEAT" and "FUEL TANK" section.
- Air filter case
  Refer to the "VALVE CLEARANCE ADJUSTMENT" section.



3.Adjust:
- Throttle cable free play

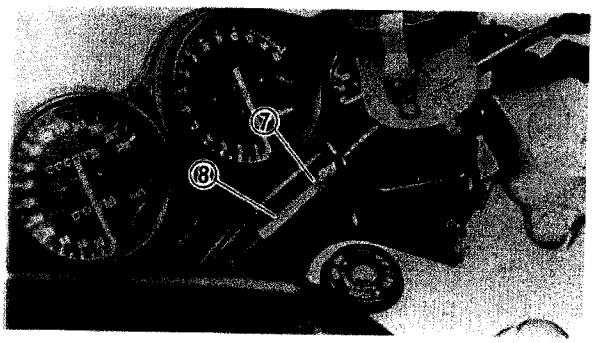
****

Adjustment steps:

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

First step:
- Loosen the locknut ③ on throttle cable #2.
- Turn the adjuster ④ in or out until all slack is removed from throttle cable #2.

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



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

● Tighten the locknuts.

NOTE:
If the free play can not be adjusted here, adjust it at the throttle grip side of the cable.

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

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

● Tighten the locknut.

⚠ WARNING
After adjusting, turn the handlebar to the right and left, making sure that the engine idling speed does not change.

****

4. Install:
- Air filter case
- Fuel tank
- Seat

Refer to the "FUEL TANK" and "SEAT" section.

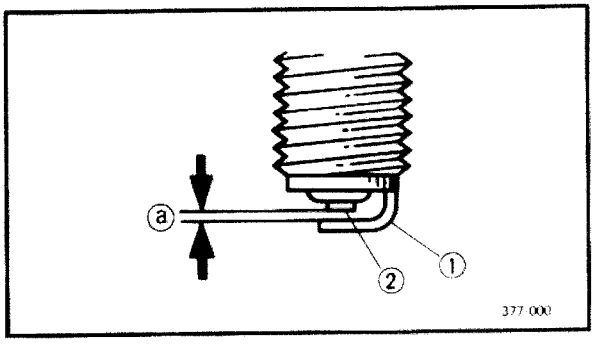
SPARK PLUG INSPECTION

1. Remove:
- Spark plug caps
- Spark plugs

CAUTION:
Before completely removing the spark plug, use compressed air to clean the cylinder head cover areas to prevent dirt from falling into the engine.

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

Standard spark plug:
CR9E (NGK)
U27ESR-N (NIPPONDENSO)



3.Inspect:
- Electrode ①
  Wear/Damage → Replace.
- Insulator ②
  Abnormal color → Replace.
  Normal color is a medium-to-light tan color.

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

5.Measure:
- Spark plug gap ⓐ
  Use a wire gauge.
  Out of specification → Re-gap.

Spark plug gap:
0.7 ~ 0.8 mm (0.028 ~ 0.031 in)

6.Install:
- Spark plug

Spark plug:
12.5 Nm (1.25 m • kg, 9.0 ft • lb)

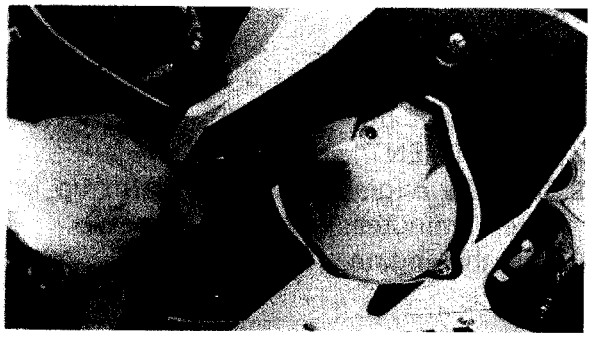
NOTE:
Before installing a spark plug, clean the gasket surface and plug surface.

IGNITION TIMING CHECK

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



1.Remove:
- Timing plug ①



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

Timing light:
90890-03141
Inductive tachometer:
90890-03113

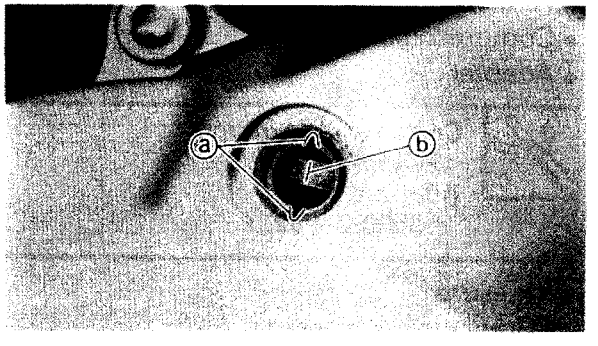
3.Check:
- Ignition timing

****

Checking steps:

- Start the engine and let it warm up. Let the engine run at the specified speed.

Engine speed:
1,150 ~ 1,250 r/min
For (CH)(A)(S)
1,250 ~ 1,350 r/min
Except for (CH)(A)(S)



- Visually check the stationary pointer ⓐ is within the firing range ⓑ on the A.C. magneto.
  Incorrect firing range → Check rotor and pickup assembly.

****



NOTE:
The ignition timing is not adjustable.

4.Install:
- Timing plug ①

COMPRESSION PRESSURE MEASUREMENT

NOTE:
Insufficient compression pressure will result in performance loss.

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

4. Remove:
- Spark plug caps
- Spark plugs

CAUTION:
Before completely removing the spark plug, use compressed air to clean the cylinder head cover areas to prevent dirt from falling into the engine.



5. Attach:
- Compression gauge ①
- Adapter

Compression gauge:
90890-03081
Adapter:
90890-04082

6. Measure:
- Compression pressure

Above the maximum pressure:
Inspect the cylinder head, valve surfaces, and piston crown for carbon deposits.
Below the minimum pressure:
Squirt a few drops of oil into the affected cylinder and measure again.
- Refer to the table below.

Compression pressure (With oil applied into cylinder)	
Reading	**Diagnosis**
Higher than without oil	**Worn or damaged pistons/piston rings → Repair**
Same as without oil	**Defective ring(s), valves, cylinder head gasket or piston is possible → Repair**

Compression pressure (at sea level):
Standard:
1,550 kPa (15.5 kg/cm², 220 psi)
Minimum:
1,300 kPa (13.0 kg/cm², 185 psi)
Maximum:
1,650 kPa (16.5 kg/cm², 235 psi)

****

Measurement steps:

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

⚠ WARNING

Before cranking the engine, ground all spark plug leads to prevent sparking.

- Repeat the previous steps for the other cylinders.

NOTE:

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

****

7. Install:
- Spark plugs
- Spark plug caps



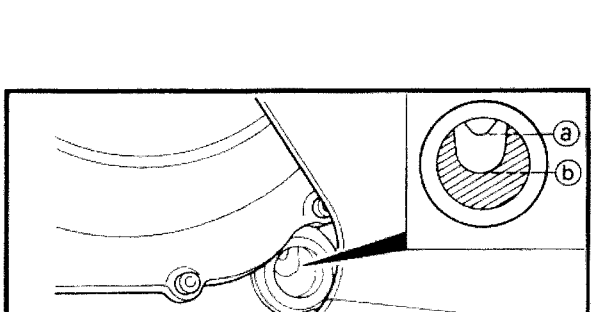
Spark plug:
12.5 Nm (1.25 m • kg, 9.0 ft • lb)

ENGINE OIL LEVEL INSPECTION

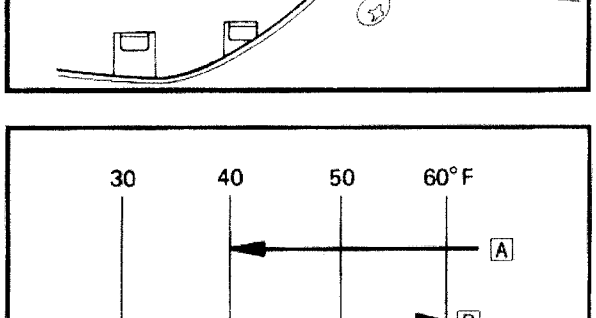
NOTE:
Position the motorcycle straight up when inspecting the oil level.

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. Inspect:
- Oil level
  Oil level should be between maximum ⓐ and minimum ⓑ marks.
  Oil level low → Add oil to proper level.



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

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

CAUTION:
- **Do not add any chemical additives. Engine oil also lubricates the clutch and additives could cause clutch slippage.**
- **Do not allow foreign material to enter the crankcase.**

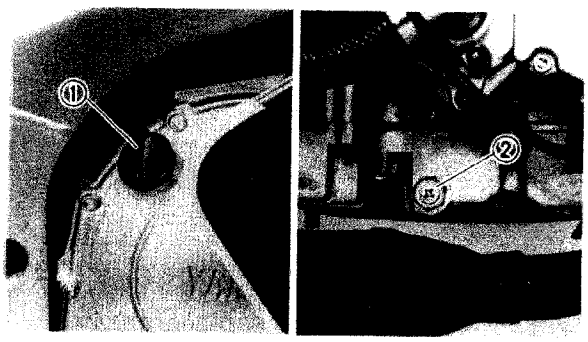
3.Start the engine and let it warm up for several minutes.
4.Stop the engine and inspect the oil level once again.

NOTE:
Wait a few minutes until the oil settles before inspecting the oil level.

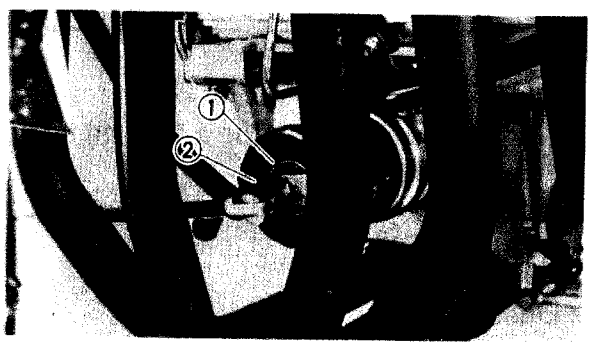
ENGINE OIL REPLACEMENT

1.Remove:
- Lower cowling
- Center cowlings
  Refer to the "COWLINGS" section.

2.Start the engine and let it warm up for several minutes.
3.Stop the engine and place an oil pan under the drain bolt.



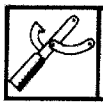
4.Remove:
- Oil filler plug ①
- Drain bolt ② (with gasket)
  Drain the crankcase of its oil.



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

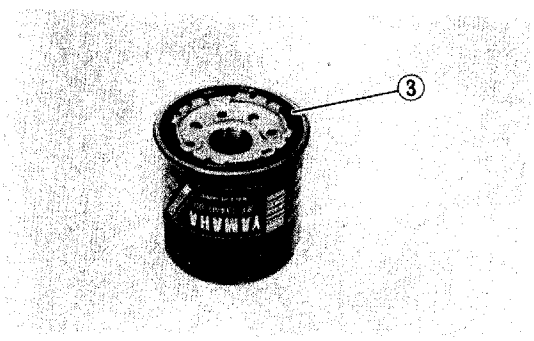
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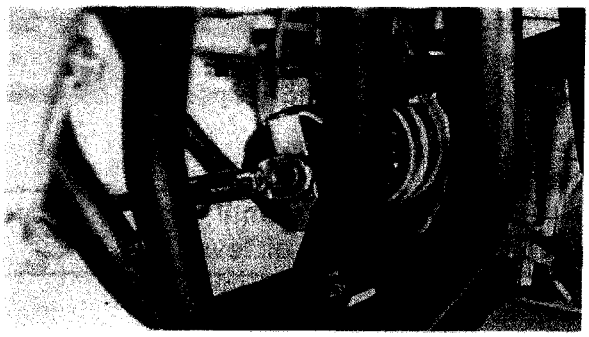
Replacement steps:
- Remove the oil filter ① using the oil filter wrench ②.

	**Oil filter wrench:** **90890-01426**

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

NOTE:
Make sure the O-ring ③ is positioned correctly.





● Tighten the oil filter using the oil filter wrench.

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

****

6. Install:
• Drain bolt

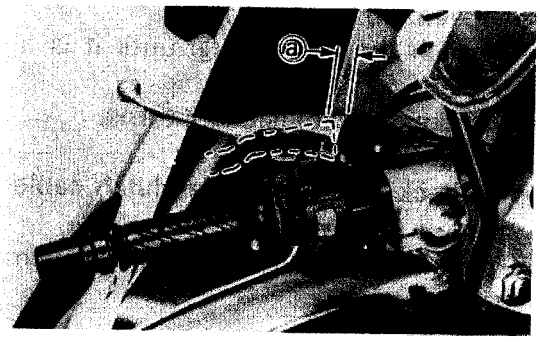
Drain bolt:
43 Nm (4.3 m • kg, 31 ft • lb)

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

7. Fill:
• Crankcase
Refer to the "ENGINE OIL LEVEL INSPECTION" section.

Oil quantity:
Total amount:
3.5 L (3.1 Imp qt, 3.7 US qt)
Periodic oil change:
2.6 L (2.3 Imp qt, 2.7 US qt)
With oil filter replacement:
2.9 L (2.6 Imp qt, 3.1 US qt)

8. Install:
• Oil filler plug
9. Warm up the engine for a few minutes, then stop the engine.
10. Inspect:
• Engine (for oil leaks)
• Oil level
11. Install:
• Center cowlings
• Lower cowling
Refer to the "COWLINGS" section.



CLUTCH ADJUSTMENT

Cable free play adjustment

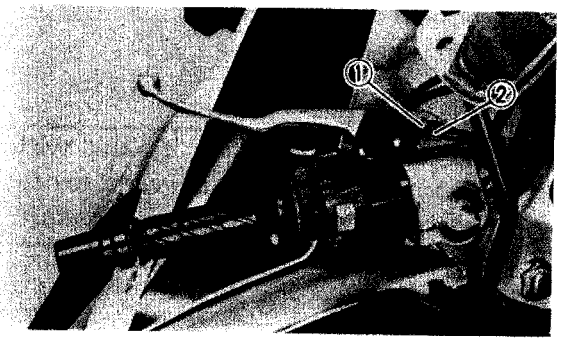
1.Check:

- Clutch cable free play ⓐ
  Out of specification → Adjust.

Free play:
2 ~ 3 mm (0.08 ~ 0.12 in)
At clutch lever pivot

2.Adjust:

- Clutch cable free play



****

Adjustment steps:

- Loosen the locknut(s) ①.
- Turn the adjuster(s) ② in or out until the specified free play is obtained.

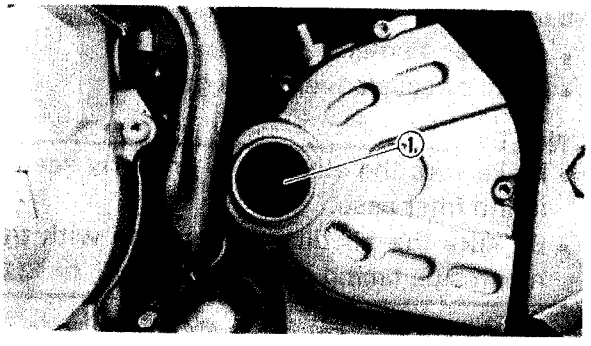
Turning → Free play is increased.
Turning out → Free play is decreased.

- Tighten the locknut(s).

NOTE:

If specified cable free play cannot be obtained by above steps, follow mechanism adjustment to achieve specified free play.

****



Mechanism adjustment

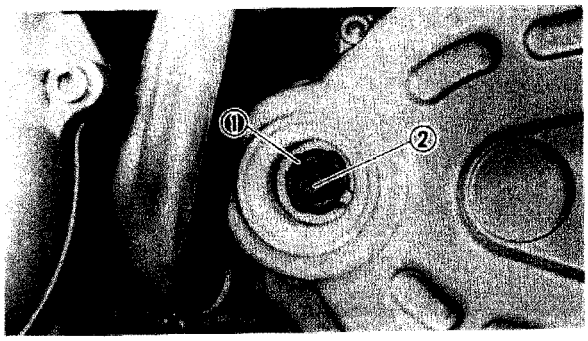
1.Adjust:

- Clutch cable free play

****

Adjustment steps:

- Remove the lower cowling and center cowling (left).
- Remove the cover ①.

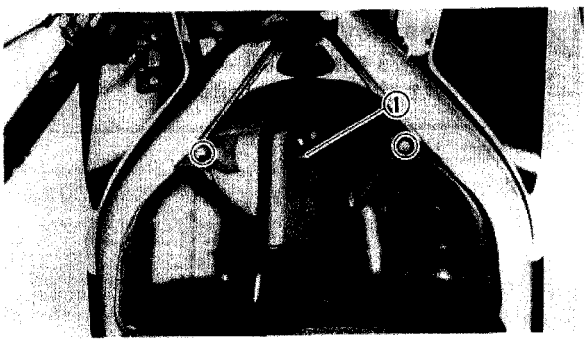


- Loosen the locknut ①.
- Turn in the adjuster ② until it is lightly seated.
- Turn out the adjuster 1/4 turns.
- Tighten the locknut.
- Recheck and adjust the clutch cable free play.
  Refer to the "Cable free play adjustment" section.

****

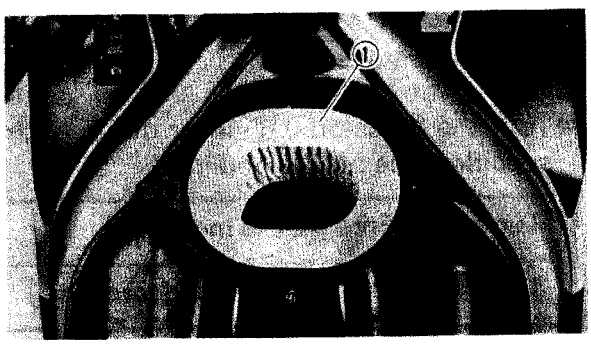
AIR FILTER CLEANING

1.Remove:
- Seat
- Fuel tank
  Refer to the "SEAT" and "FUEL TANK" sections.
- Air filter case cover ①



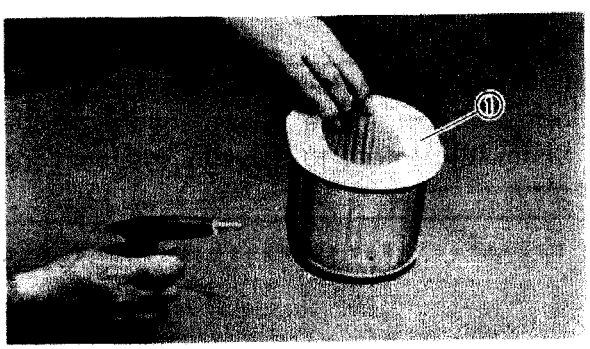
2.Remove:
- Air filter element ①

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



3.Inspect:
- Air filter element
  Damage → Replace.

4.Clean:
- Air filter element ①
  Blow off dust from the outer surface of the element with compressed air.



5.Install:
- Air filter element
- Air filter case cover (with gasket)

NOTE:
- Make sure the element is properly seated in the filter case.
- Be sure the air filter is installed with the mesh side facing backward.

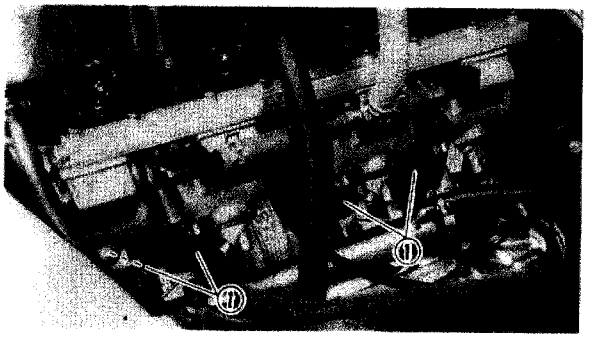
6.Install:
- Fuel tank
- Seat

Refer to the "FUEL TANK" and "SEAT" sections.

CARBURETOR JOINT INSPECTION

1.Remove:
- Seat
- Fuel tank

Refer to the "SEAT" and "FUEL TANK" sections.



2.Inspect:
- Carburetor joints ①

Cracks/Damage → Replace.
Refer to the "CARBURETION" section in CHAPTER 6.

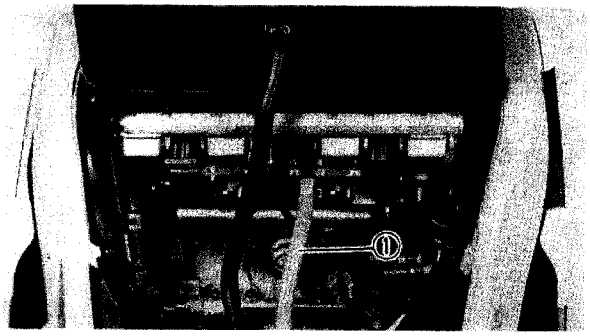
3.Install:
- Fuel tank
- Seat

Refer to the "FUEL TANK" and "SEAT" sections.

FUEL LINE INSPECTION

1.Remove:
- Seat
- Fuel tank

Refer to the "SEAT" and "FUEL TANK" sections.



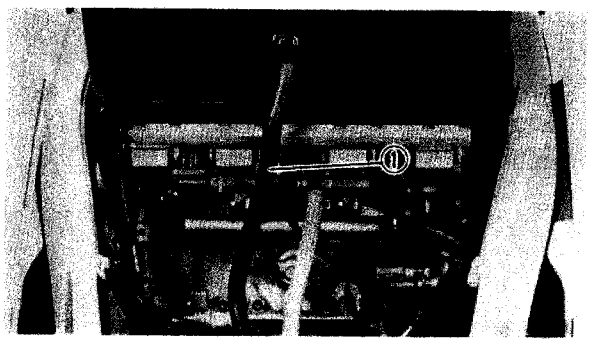
2.Inspect:
- Fuel hoses ①
  Cracks/Damage → Replace.
  Loose connection → Connect properly.

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

3.Install:
- Fuel tank
- Seat
  Refer to the "FUEL TANK" and "SEAT" sections.

CRANKCASE BREATHER HOSE INSPECTION

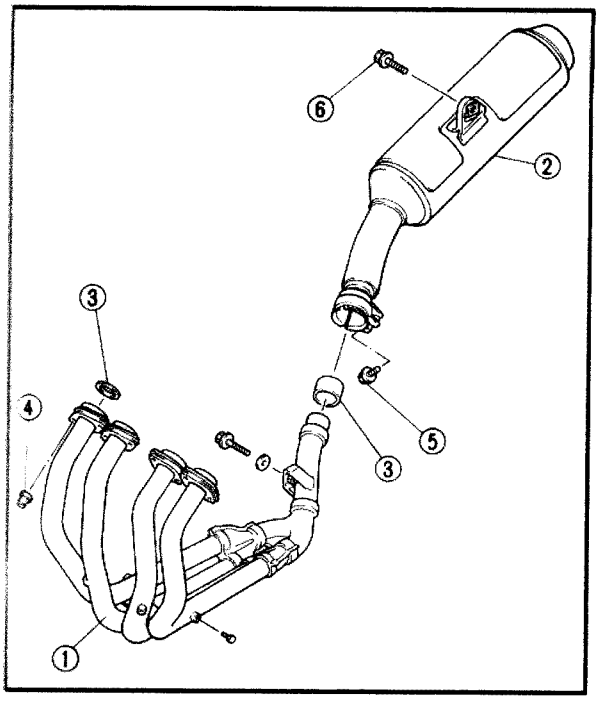
1.Remove:
- Seat
- Fuel tank
  Refer to the "SEAT" and "FUEL TANK" sections.



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

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

3.Install:
- Fuel tank
- Seat
  Refer to the "FUEL TANK" and "SEAT" sections.



EXHAUST SYSTEM INSPECTION

1.Remove:
- Lower cowling
- Center cowlings

Refer to the "COWLINGS" section.

2.Inspect:
- Exhaust pipes ①
- Muffler ②

Cracks/Damage → Replace.
- Gaskets ③

Exhaust gas leaks → Replace.

3.Inspect:
- Tightening torque

Nut ④ (exhaust pipe):
10 Nm (1.0 m • kg, 7.2 ft • lb)
Bolt ⑤
(exhaust pipe and muffler):
20 Nm (2.0 m • kg, 14 ft • lb)
Bolt ⑥ (muffler and stay):
20 Nm (2.0 m • kg, 14 ft • lb)

4.Install:
- Center cowlings
- Lower cowling

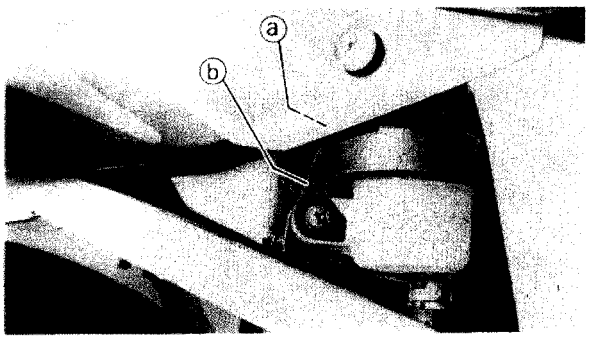
Refer to the "COWLINGS" section.

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.

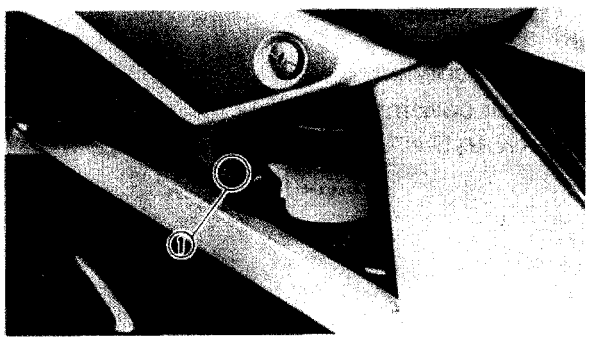


2.Inspect:
- Coolant level
  Coolant level should be between maximum ⓐ and minimum ⓑ marks.
  Coolant level low → Add soft water (tap water) to proper level.

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

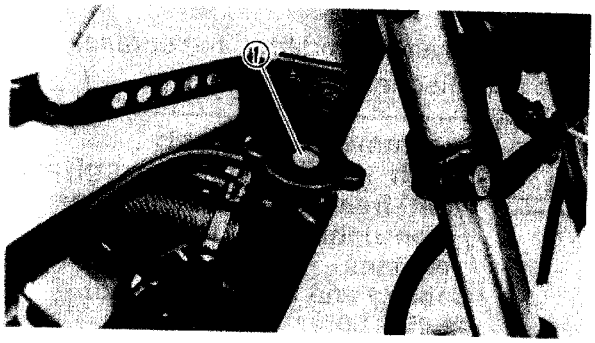
3.Start the engine and let it warm up for several minutes.
4.Stop the engine and inspect the coolant level once again.

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



COOLANT REPLACEMENT
1.Disconnect:
- Hose ① (reservoir tank)
  Drain the reservoir tank of its coolant.

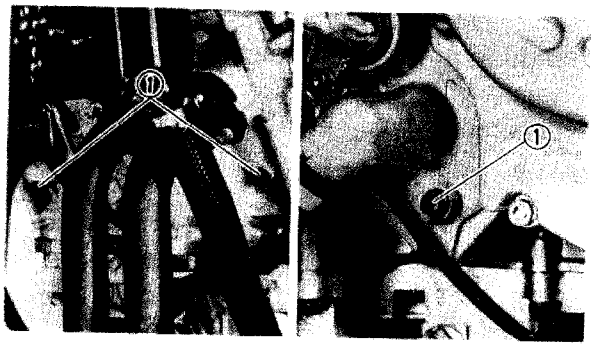
2.Remove:
- Seat
- Lower cowling
- Center cowlings
  Refer to the "SEAT" and "COWLINGS" sections.



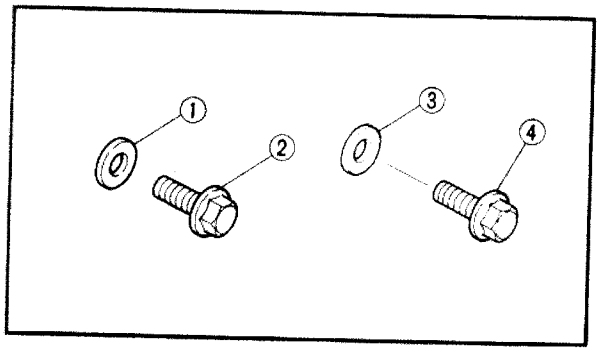
3.Remove:
- Radiator cap ①

⚠ WARNING

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



4.Remove:
- Drain bolt ① (with gasket)
  Drain the radiator and engine of its coolant.

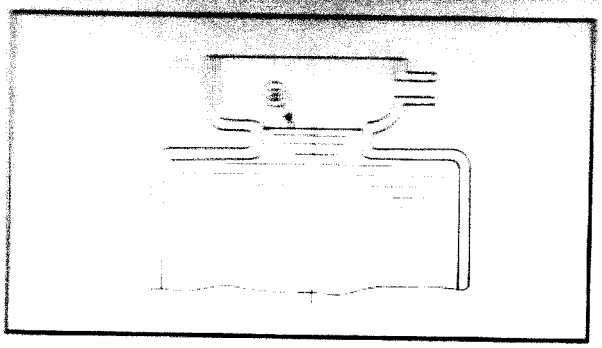


5.Inspect:
- Gaskets ① (cylinder drain bolt ②)
- Gasket ③ (water pump drain bolt ④)
  Damage → Replace.

6.Install:
- Drain bolts

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

7.Connect:
- Coolant reservoir tank hose



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

Recommended coolant:
High quality ethylene glycol anti-freeze containing corrosion inhibitors for aluminum engines
Coolant and water mix ratio:
50% - 50%
Radiator capacity (including all routes):
1.8 L (1.58 Imp qt, 1.90 US qt)
Reservoir tank capacity:
0.55 L (0.48 Imp qt, 0.58 US qt)
From lower to upper level:
0.25 L (0.22 Imp qt, 0.26 US qt)

****

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

⚠ WARNING

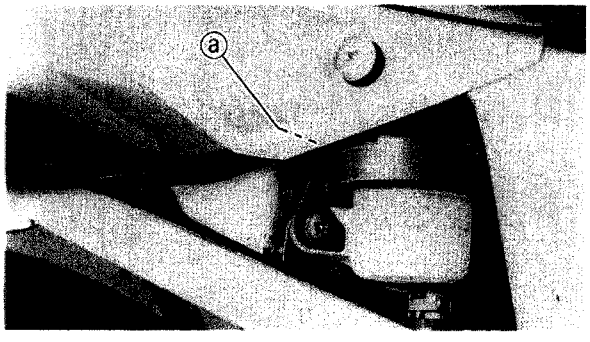
- **If coolant splashes in your eyes:**
  Thoroughly wash your eyes with water and see a doctor.
- **If coolant splashes on your clothes.**
  Quickly wash it away with water and then with soap.
- **If coolant is swallowed.**
  Quickly make the patient vomit and take him to a doctor.

****

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 that no coolant splashes onto painted surfaces. If it does, wash it away with water immediately.**
- **Do not mix different types of ethylene glycol antifreeze containing corrosion inhibitors for aluminium engines.**

9. Install:
- Radiator cap



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

11. Install:
- Reservoir tank cap

12. Start the engine and let it warm up for several minutes.
13. Stop the engine and inspect the level.
    Refer to the "COOLANT LEVEL INSPECTION" section.

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

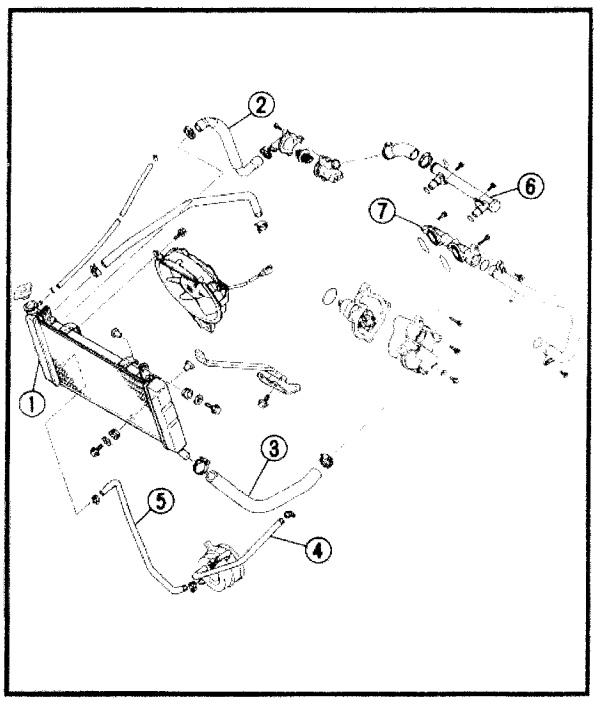
14. Install:
- Center cowlings
- Lower cowling
- Seat

  Refer to the "COWLINGS" and "SEAT" sections.

COOLING SYSTEM INSPECTION

1.Remove:
- Seat
- Fuel tank
- Lower cowling
- Center cowlings

Refer to the "SEAT", "FUEL TANK" and "COWLINGS" sections.

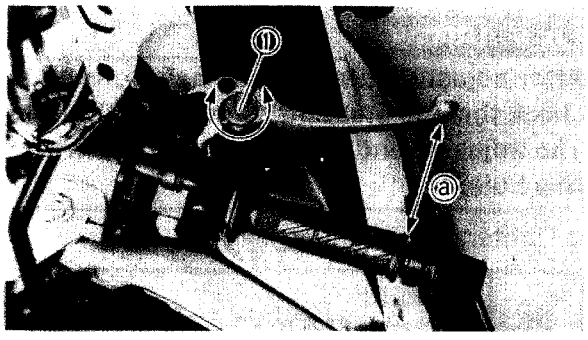


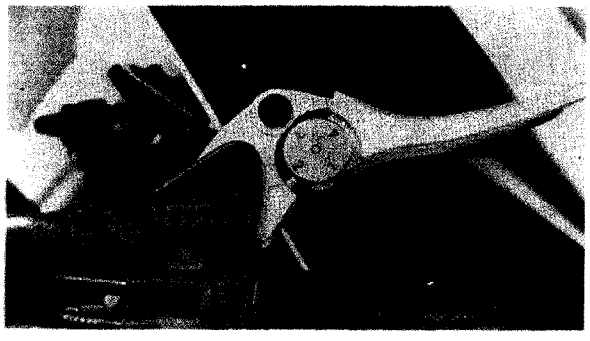
2.Inspect:
- Radiator ①
- Radiator hose ② (inlet)
- Radiator hose ③ (outlet)
- Inlet hose ④ (oil cooler)
- Outlet hose ⑤ (oil cooler)
- Water jacket joint ⑥ (outlet)
- Water jacket joint ⑦ (inlet)

Cracks/Damage → Replace.
Refer to the "COOLING SYSTEM" section in CHAPTER 5.

3.Install:
- Center cowlings
- Lower cowling
- Fuel tank
- Seat

Refer to the "COWLINGS", "FUEL TANK" and "SEAT" sections.





CHASSIS

FRONT BRAKE ADJUSTMENT

1. Adjust:
- Brake lever position
  (distance ⓐ from handle grip to front brake lever)

****

Adjustment steps:

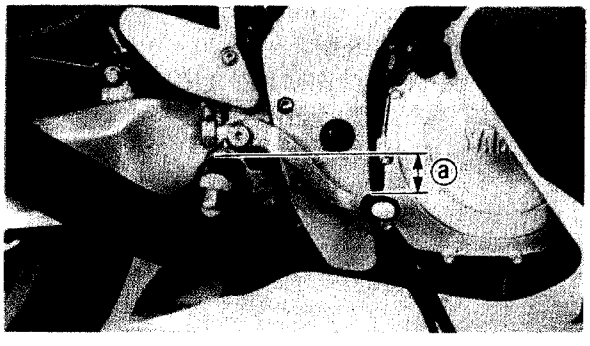
- Turn the adjuster ① while pushing the front brake lever forward until the desired lever position is obtained.

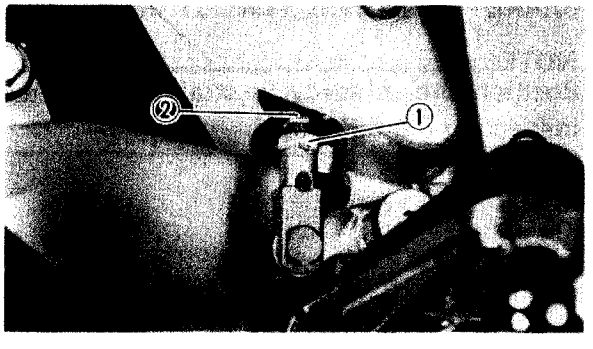
Adjuster position #1	**Distance ⓐ is the largest**
Adjuster position #4	**Distance ⓐ is the smallest**

⚠ WARNING

After adjusting the front brake lever position (distance), make sure the pin on the brake lever holder is firmly inserted in the hole in the adjuster.

****





REAR BRAKE ADJUSTMENT

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

Brake pedal height:
42 mm (1.7 in)
Below top of footrest.

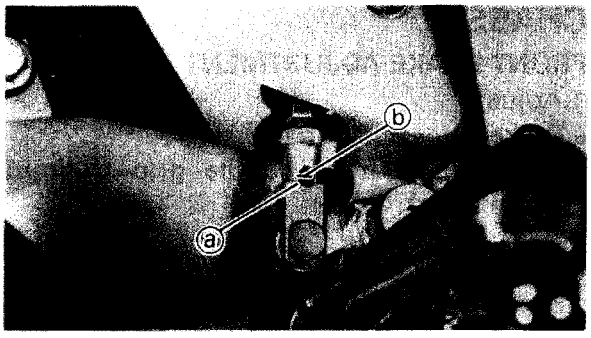
2. Adjust:
- Brake pedal height

****

Adjustment steps:

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

Turning in	**Height decreased.**
Turning out	**Height increased.**



⚠ WARNING

After adjusting brake pedal height, visually check the adjuster end through the hole ⓐ. The adjuster end ⓑ must be visible within this hole.

● Tighten the locknut ①.

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

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.

****

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

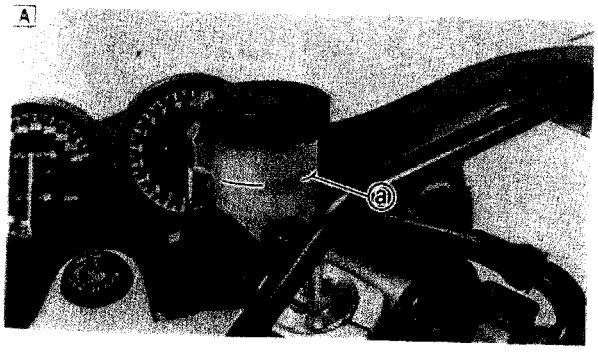
BRAKE FLUID LEVEL INSPECTION

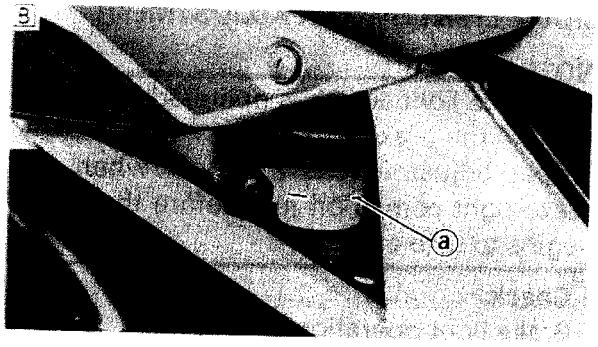
NOTE:

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 ⓐ
  → Fill to proper level.

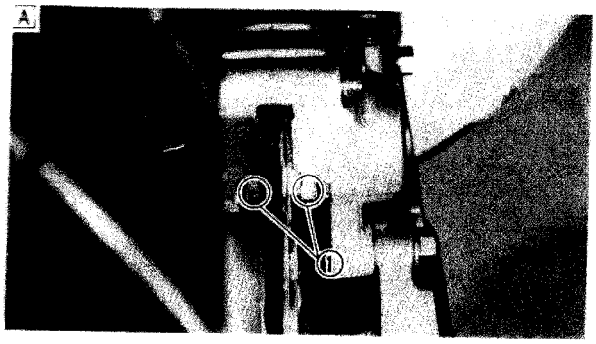
Recommended fluid:
DOT #4

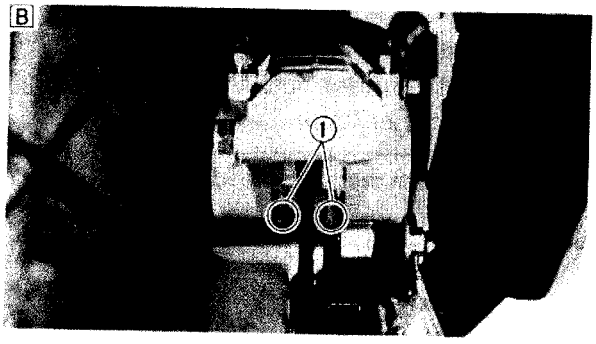
A Front brake
B Rear brake

NOTE:
When inspecting the fluid level in the reservoir on the handlebar, make sure the master cylinder top is horizontal.

CAUTION:
Brake fluid may corrode 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 leading to poor brake performance.**
- **Be careful that water does no enter the master cylinder when refilling. Water will significantly lower the boiling point of the fluid and could cause vapor lock.**





A Front
B Rear

BRAKE PAD INSPECTION

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

Wear indicator ① almost contacting the brake disc → Replace brake pad as a set. Refer to the "BRAKE PAD REPLACEMENT" section in CHAPTER 7.

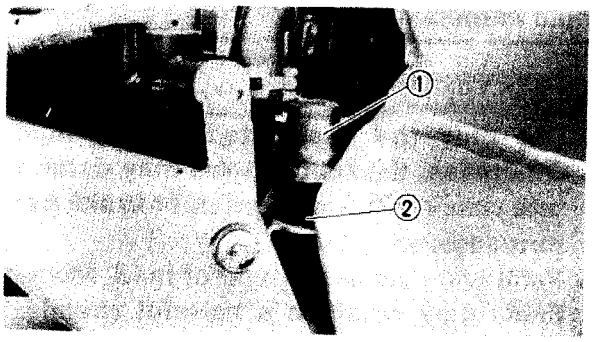
BRAKE LIGHT SWITCH ADJUSTMENT

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 operation

Incorrect → Adjust.

2. Adjust:
- Brake light operating timing



****

Adjustment steps:

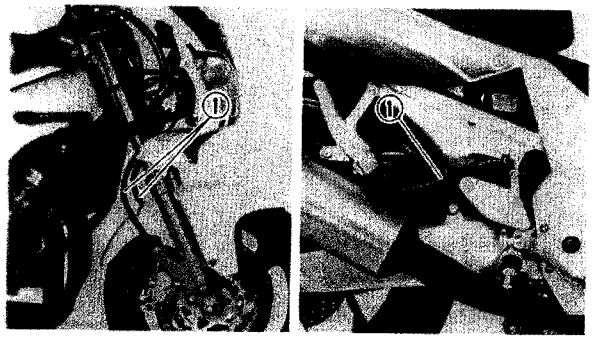
- Hold the main body ① of the switch with your hand so that it does not rotate, and turn the adjuster ② in or out until the operating timing is correct.

Turning in	**Brake light on later.**
Turning out	**Brake light on sooner.**

****

BRAKE HOSE INSPECTION

1. Remove:
- Lower cowling
- Center cowlings
  Refer to the "COWLINGS" section.



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

3. Check:
- Brake hose clamp
  Loosen → Tighten.

4. Hold the motorcycle on upright position and apply the front or rear brake.

5. Check:
- Brake hoses
  Activate the brake lever or pedal several times.
  Fluid leakage → Replace the hose.
  Refer to the "FRONT AND REAR BRAKE" section in CHAPTER 7.

6. Install:
- Center cowlings
- Lower cowling
  Refer to the "COWLINGS" section.

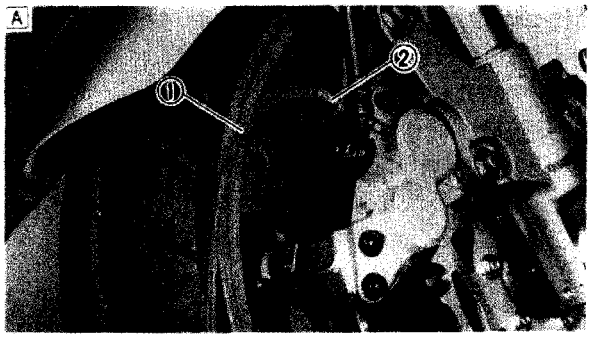
AIR BLEEDING (HYDRAULIC BRAKE SYSTEM)

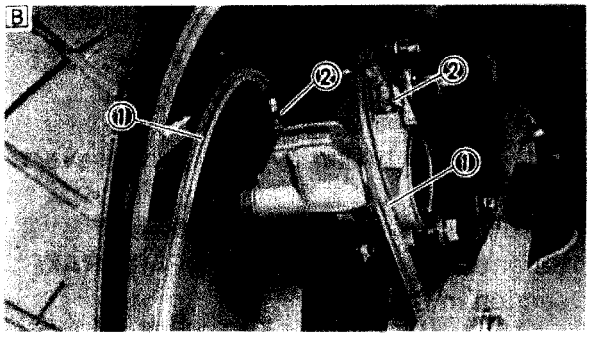
⚠ WARNING

Bleed the brake system if:
- **The system has been disassembled.**
- **A brake hose has been loosened or removed.**

- The brake fluid has been very low.
- The brake operation has been faulty.

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





1. Bleed:
- Brake system

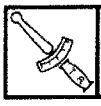
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Air bleeding steps:

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 a clear plastic hose ① tightly to the caliper bleed screw ②.

[A] Front [B] Rear

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

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

NOTE:

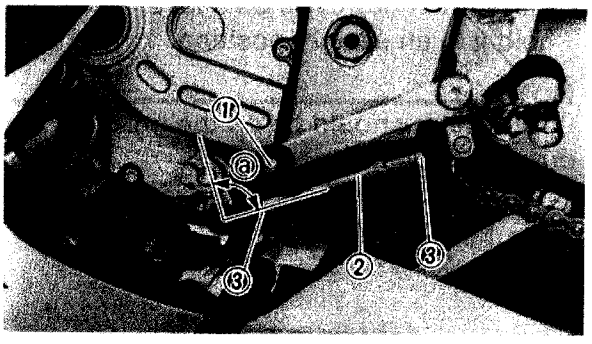
If bleeding is difficult, it may be necessary to let the brake fluid settle for a few hours. Repeat the bleeding procedure when the tiny bubbles in the system have disappeared.

k.Add brake fluid to proper level.
Refer to the "BRAKE FLUID INSPECTION section".

⚠ WARNING

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

****



CHANGE PEDAL ADJUSTMENT

1.Check:

- Change pedal position
  Check that the end ① of the change pedal is above the change pedal rod. (Angle ⓐ should be approximately 90°.)
  If not above → Adjust.

2.Adjust:

- Change pedal position

****

Adjustment steps:

- Loosen both locknuts ③.
- Turn the change pedal rod ② in or out to set the correct pedal height.

Turning in	**Pedal raised.**
Turning out	**Pedal lowered.**

- Tighten both locknuts.

****

DRIVE CHAIN SLACK ADJUSTMENT

NOTE:

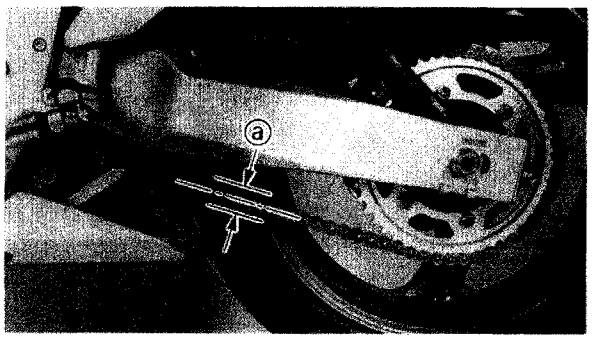
Before checking and/or adjusting, rotate the rear wheel several revolutions and check slack at several points to find the tightest point. Check and/or adjust the chain slack with the rear wheel is in this "tightest" position.

CAUTION:
Too little 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.

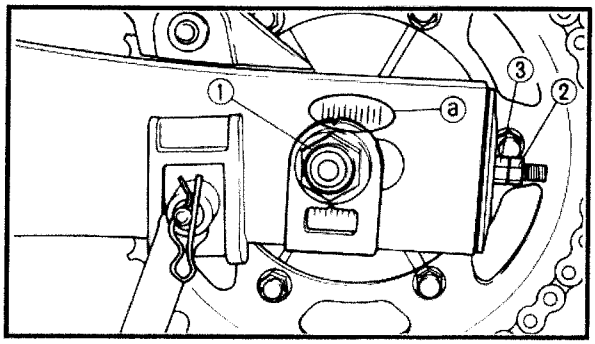
1.Place the motorcycle on a level place, and hold it in an upright position.

NOTE:
Both wheels should be on the ground without a rider on the motorcycle.



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

Drive chain slack:
20 ~ 30 mm (0.8 ~ 1.2 in)



3.Loosen:
- Axle nut ①

4.Adjust:
- Drive chain slack

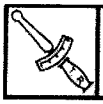
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Adjustment steps:
- Loosen both locknuts ②.
- Turn the adjuster ③ in or out until the specified slack is obtained.

Turn in	**Slack decreases.**
Turn out	**Slack increases.**

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

- Tighten the axle nut to specification, while pushing the chain tight.



Axle nut:
117 Nm (11.7 m • kg, 85 ft • lb)

- Tighten the locknuts.

****

DRIVE CHAIN LUBRICATION

The chain consists of many parts that work with 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 dry, and thoroughly lubricate it with SAE 30 ~ 50W motor oil. Do not use any other lubricants on the drive chain. They may contain solvents that could damage the O-rings.



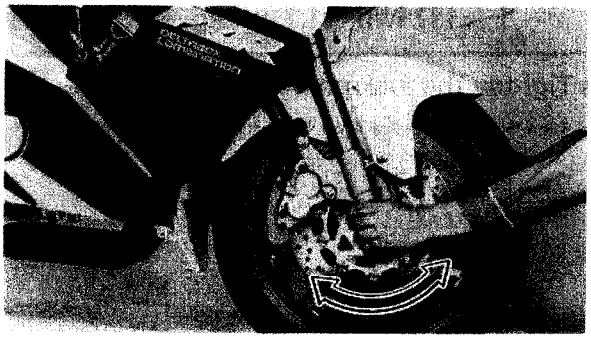
Recommended lubricant:
SAE 30 ~ 50W motor oil or chain lubricant suitable for O-ring chains.

STEERING HEAD INSPECTION

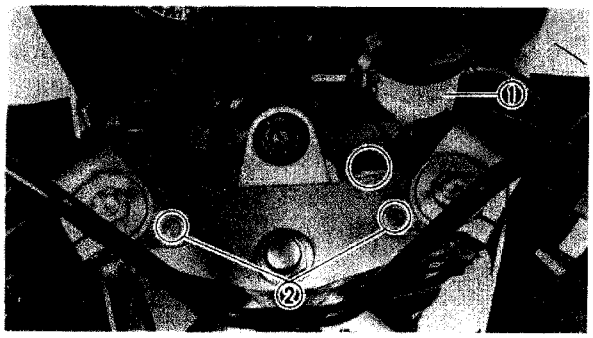
⚠ WARNING

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

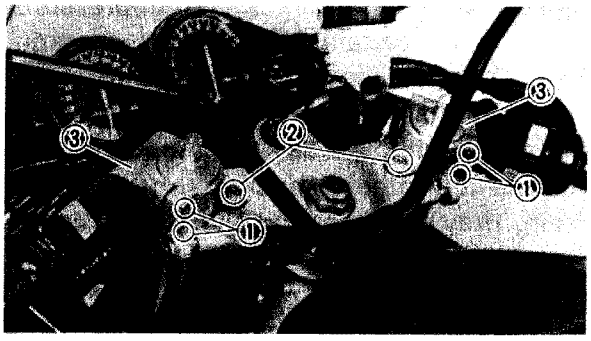
1. Place the motorcycle on a level place.
2. Remove:
   - Lower cowling
     Refer to the "COWLINGS" section.
3. Elevate the front wheel by placing a suitable stand under the engine.
4. Check:
   - Steering assembly bearings
     Grasp the bottom of the front forks and gently rock the fork assembly back and forth.
     Looseness → Adjust the steering head.



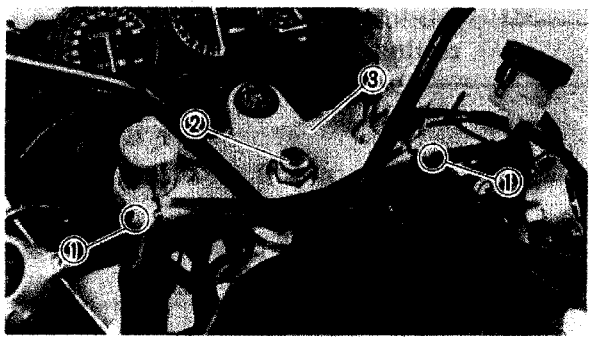
5. Remove:
   - Reservoir tank ① (brake)
   - Blind plugs ②

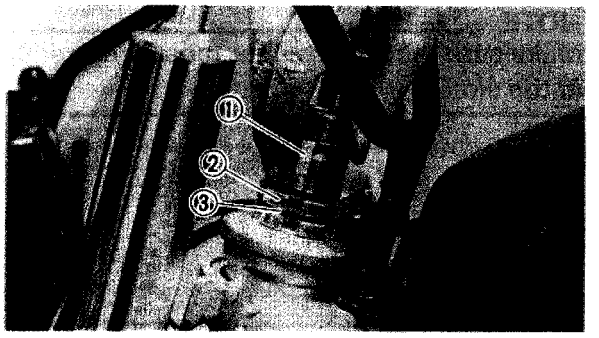


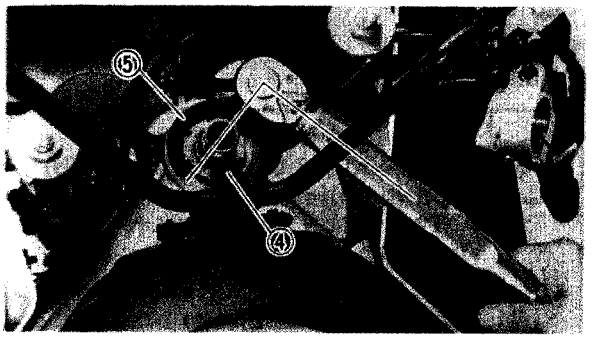
6. Loosen:
   - Pinch bolts ① (handlebar boss)
7. Remove:
   - Bolts ② (handlebar)
   - Handlebars ③



8. Loosen:
   - Pinch bolts ① (upper bracket)
9. Remove:
   - Nut ② (upper bracket)
   - Upper bracket ③





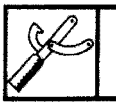
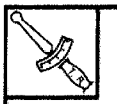


10.Adjust:
- Steering head

****

Adjustment steps:
- Remove the special washer ①, ring nut ② (upper) and rubber washer ③.
- Loosen the ring nut ④ (lower).
- Tighten the ring nut (lower) using the ring nut wrench ⑤.

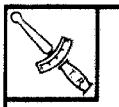
NOTE:
Set the torque wrench to the ring nut wrench so that they form a right angle.

	**Ring nut wrench:** **90890-01403**
	**Ring nut (lower):** **(initial tightening):** **52 Nm (5.2 m • kg, 38 ft • lb)**

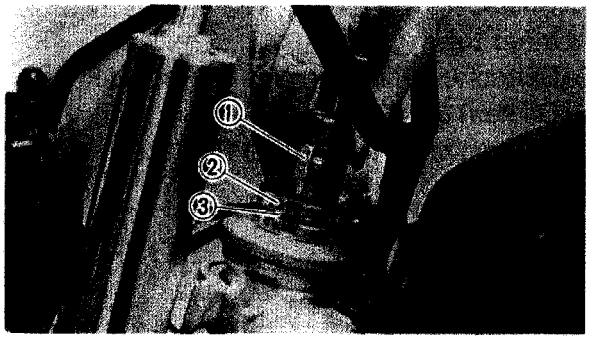
- Loosen the ring nut ④ (lower) completely, then retighten it to specification.

⚠ WARNING

Do not overtighten.

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

- Check the steering head by turning it lock to lock. If it binds, remove the steering stem assembly and inspect the steering bearings.
  Refer to the "STEERING HEAD AND HANDLEBAR" section in CHAPTER 7.



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

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

****

11.Install:
- Upper bracket
- Handlebars

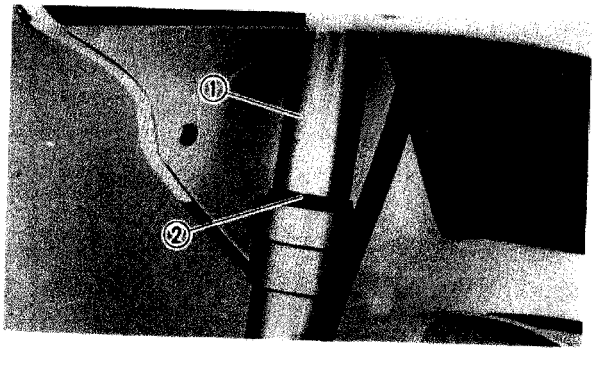
Nut (upper bracket):
110 Nm (11.0 m • kg, 80 ft • lb)
Bolt (handlebar):
13 Nm (1.3 m • kg, 9.4 ft • lb)
Pinch bolt (upper bracket):
30 Nm (3.0 m • kg, 22 ft • lb)
Pinch bolt (handlebar bracket):
13 Nm (1.3 m • kg, 9.4 ft • lb)

12.Install:
- Reservoir tank (brake)
- Lower cowling
  Refer to the "COWLINGS" section.

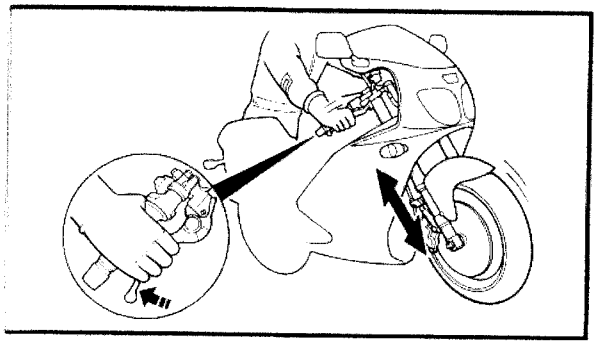
FRONT FORK INSPECTION

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

1.Place the motorcycle on a level place.



2.Check:
- Inner tube ①
  Scratches/Bent/Damage → Replace.
- Oil seal ②
  Excessive oil leakage → Replace.

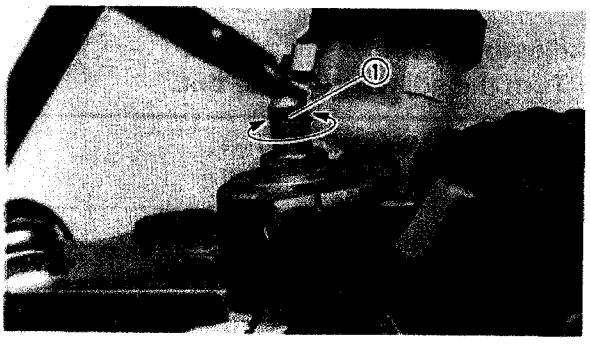


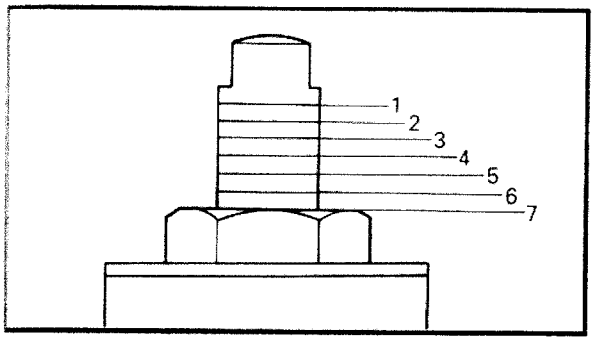
3. Hold the motorcycle in an upright position and apply the front brake.
4. Check:
- Operation
  Pump the front fork up and down for several times.
  Unsmooth operation → Repair.
  Refer to the "FRONT FORK" section in CHAPTER 7.

FRONT FORK ADJUSTMENT

⚠ WARNING

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





Spring preload

1. Adjust:
- Spring preload
  Turn the adjuster ① in or out.

Turn in → Spring preload is harder.
Turn out → Spring preload is softer.

Adjuster position:
Standard: 4
Minimum: 7
Maximum: 1

CAUTION:

- **Grooves are provided to show the adjusting level.**
- **Always keep the adjustment level equal on both forks.**
- **Never turn the adjuster beyond the maximum or minimum setting.**

REAR SHOCK ABSORBER ADJUSTMENT

⚠ WARNING

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

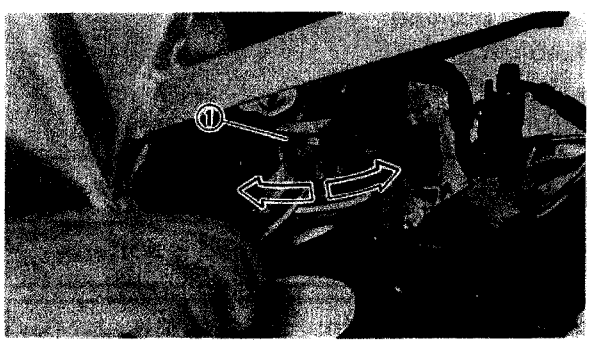
Spring preload

1.Adjust:

- Spring preload

NOTE:

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



****

Adjustment steps:

- Turn the adjuster ① in or out.

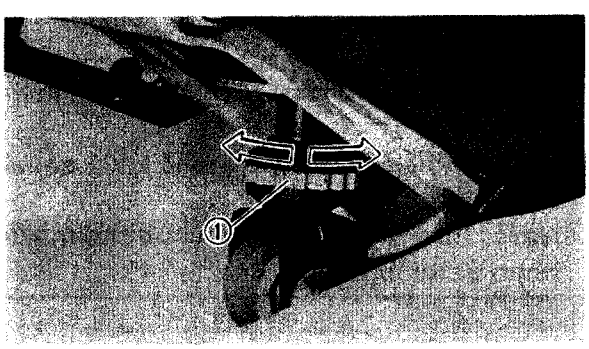
Turning lower number → Spring preload is softer.
Turning higher number → Spring preload is harder.

Adjuster position: **Standard: 3** **Minimum: 1** **Maximum: 7**

CAUTION:

Never turn the adjuster beyond the maximum or minimum setting.

****



Rebound damping

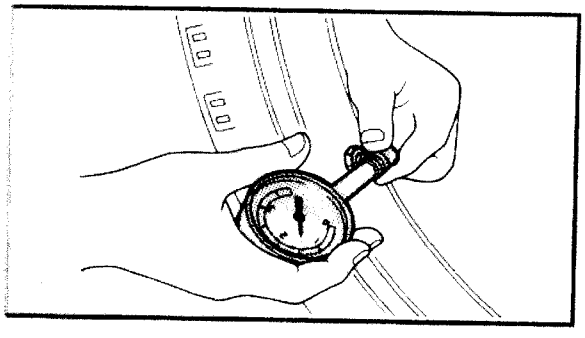
1.Adjust:

- Rebound damping
  Turn the adjuster ① in or out.

Turning in → Rebound damping is harder.
Turning out → Rebound damping is softer.

Adjuster position:
Standard: 10 clicks out
Minimum: 20 clicks out
Maximum: 0 clicks out

CAUTION:
Never turn the adjuster beyond the maximum or minimum setting.



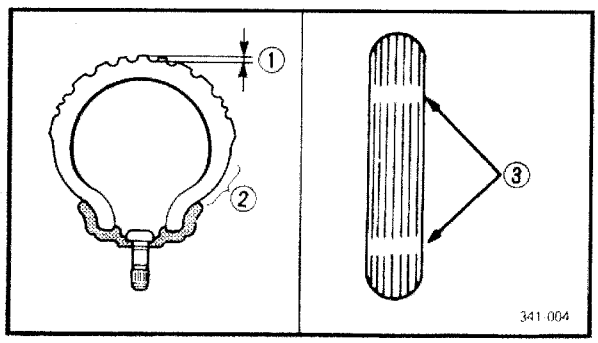
TIRE INSPECTION
1.Measure:
• Tire pressure
Out of specification → Adjust.

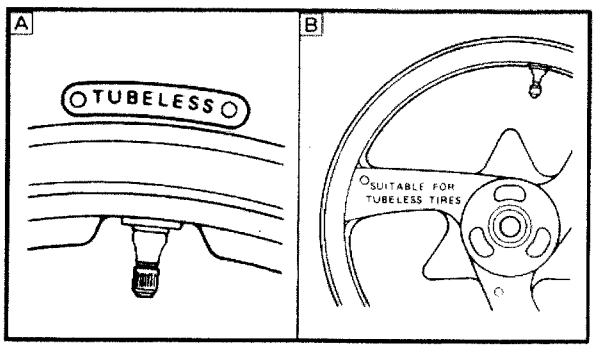
⚠ WARNING
- **Tire inflation pressure should be checked and adjusted when the temperature of the tire equals the ambient air temperature. Tire inflation pressure must be adjusted according to total weight of cargo, rider, passenger, and accessories (fairing, saddlebags, etc. if approved for this model), and vehicle speed.**
- **Proper loading of your motorcycle is important for the handling, braking, and other performance and safety characteristics of your motorcycle. Do not carry loosely packed items that can shift.Securely pack your heaviest items close to the center of the motorcycle, and distribute 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	**206 kg (454 lb) For (I)(E)(F)(D)(B)(SF) (NL)(DK)(N)(GB) 208kg (459lb) For (CH)(A)(S)**	
Maximum load*:	**172 kg (379 lb) For (CH)(A)(S) 174 kg (384 lb) For (I) (E) (F) 209 kg (461 lb) For (D) (B) (SF) (NL) (DK) (N) (GB)**	
Cold tire pressure:	**Front**	**Rear**
Up to 90 kg (198 lbs) load*	**225 kPa (2.25 kgf/cm², 33 psi)**	**250 kPa (2.5 kgf/cm², 36 psi)**
90 Kg (198 lbs) ~ Maximum load*	**250 kPa (2.5 kgf/cm², 36 psi)**	**290 kPa (2.9 kgf/cm², 42 psi)**
High speed riding	**250 kPa (2.5 kgf/cm², 36 psi)**	**290 kPa (2.9 kgf/cm², 42 psi)**

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





2.Inspect:
- Tire surfaces
  Wear/Damage → Replace.

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

① Tread depth
② Side wall
③ Wear indicator

⚠ WARNING

- **It is dangerous to ride with a worn-out tire. When a tire tread begins to show lines, replace the tire immediately.**
- **Do not use tubeless tires on a wheel designed for tube type tires only. Tire failure and personal injury may result from sudden deflation.**

[A] Tire [B] Wheel

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

- 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 a tire combinations other than the approved is used on this motorcycle. The front and rear tires should always be of the same manufacture and design.

FRONT:

Manufacture	Size	Type
MICHELIN	120/60 ZR17	A89X
BRIDGESTONE	120/60 ZR17	BT50F
DUNLOP	120/60 ZR17	D202F
METZELER	120/60 ZR17	MEZ1 FRONT

REAR:

Manufacture	Size	Type
MICHELIN	160/60 ZR17	M89X
BRIDGESTONE	160/60 ZR17	BT50R
DUNLOP	160/60 ZR17	D202
METZELER	160/60 ZR17	MEZ1

⚠ WARNING

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

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 to make any repairs to the wheel.

CABLE INSPECTION AND LUBRICATION

⚠ WARNING
Damaged cable sheaths may cause corrosion and interfere with the cable movement. Replace damaged cables 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 up and pour a few drops of lubricant into the cable sheath.

LEVER AND PEDAL LUBRICATION

Lubricate levers and pedals at their pivoting points.



Recommended lubricant:
SAE 10W30 motor oil

SIDESTAND LUBRICATION

Lubricate the sidestand at pivoting points.



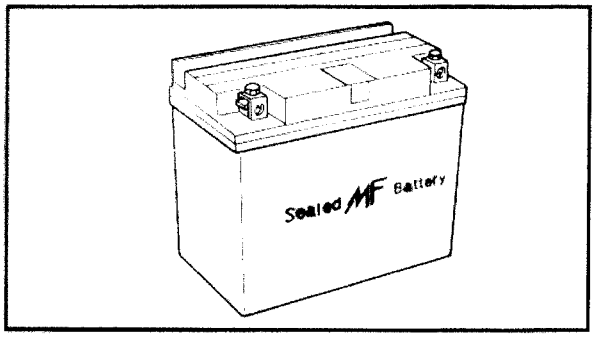
Recommended lubricant:
SAE 10W30 motor oil

REAR SUSPENSION LUBRICATION

Lubricate the rear suspension at pivoting points.



Recommended lubricant:
Molybdenum disulfide grease



ELECTRICAL

BATTERY INSPECTION

NOTE:

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

CAUTION:

CHARGING METHOD

- **This is a sealed type battery. Never remove the sealing caps. If the sealing caps have been removed, the balancing will not be maintained, and battery performance will deteriorate.**
- **Never add water, as this will affect the chemical reaction in the battery and cause loss of performance.**
- **Charging time, charging current and charging voltage for the MF battery are different from general type batteries. The MF battery should be charged as explained in "CHARGING METHOD". If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.**
- **Never use an electrolyte other than specified. The specific gravity of the MF battery electrolyte is 1.32 at 20°C (68°F), whereas the specific gravity of a general type battery electrolyte is 1.28. If electrolyte with a specific gravity lower than 1.32 is used, the concentration of sulfuric acid will decrease, resulting in poor battery performance. If an electrolyte with a specific gravity higher than 1.32 is used, the battery plates will corrode and battery life will be shortened.**

⚠ WARNING

Battery electrolyte is dangerous; it contains sulfuric acid which is poisonous and highly caustic.

Always follow these preventive measures:

- **Avoid bodily contact with electrolyte as it can cause severe burns or permanent eye injury.**
- **Wear protective eye gear when handling or working near batteries.**

Antidote (EXTERNAL):

- **SKIN - Flush with water.**
- **EYES - Flush with water for 15 minutes and get immediate medical attention.**

Antidote (INTERNAL):

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

Batteries generate explosive hydrogen gas. Always follow the following preventive measures:

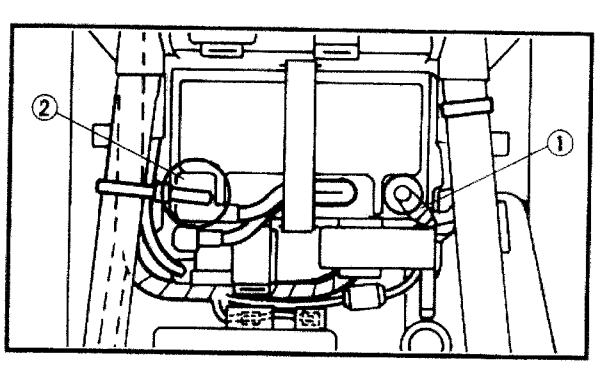
- **Charge batteries in a well-ventilated area.**
- **Keep batteries away from fire, sparks, or open flames (e.g., welding equipment, lighted cigarettes, etc.)**
- **DO NOT SMOKE when charging or handling batteries.**

KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.

1.Remove:

- Seat

Refer to the "SEAT" section.



2.Disconnect:

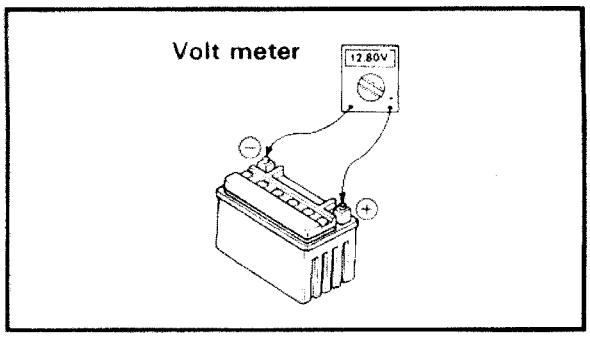
- Battery leads

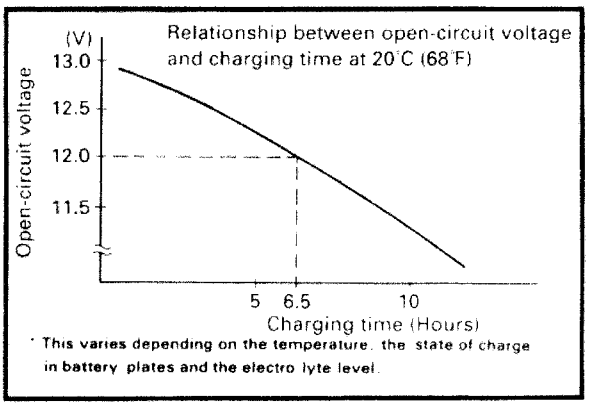
CAUTION:

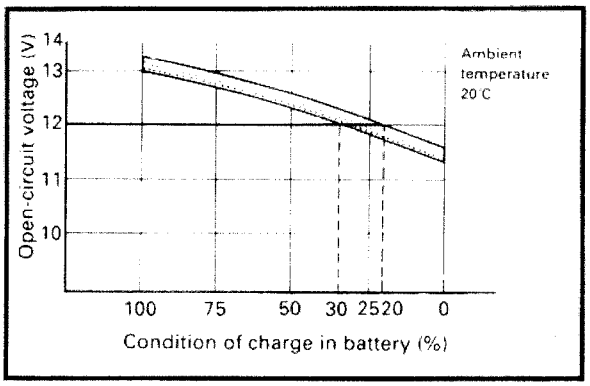
Disconnect the negative lead ① first, then the positive lead ②.

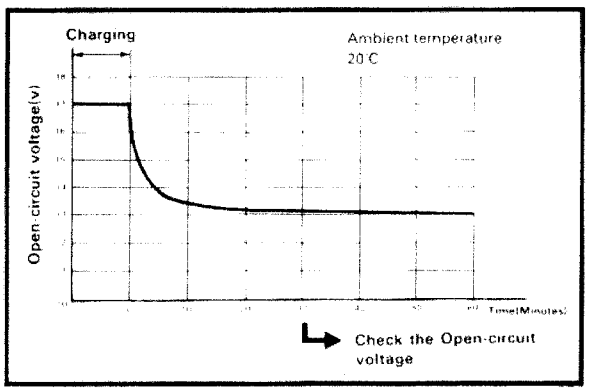
3.Remove:

- Battery









4.Check:
- Battery condition

****

Battery condition checking steps:

- Connect a digital voltmeter to the battery terminals.

Tester (+) lead	Battery (+) terminal
Tester (–) lead	Battery (–) terminal

NOTE:

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

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

- Check the condition of the battery using the charts.

Example:

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

5.Charging method of MF batteries

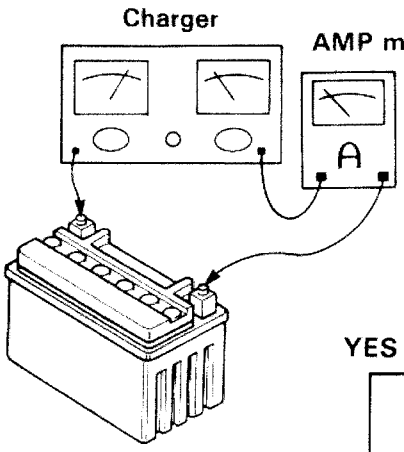
CAUTION:

- **If it is impossible to set the standard charging current, be careful not to overcharge.**
- **When charging the battery, be sure to remove it from the motorcycle. (If charging has to be done with the battery mounted on the motorcycle for some reason, be sure to disconnect the wire at the negative terminal.)**
- **Never remove the sealing caps of an MF battery.**
- **Take care that the charging clips are in a full contact with the terminal and that they are not shorted. (A corroded clip of the charger may cause the battery to generate heat at the contact area. A weak clip spring may cause sparks.)**

- Before removing the clips from the battery terminals, be sure to turn off the power switch of the charger.
- The open-circuit voltage variation of the MF battery after charging is shown below. As shown in the figure, the open-circuit voltage stabilizes about 30 minutes after charging has been completed. Therefore, to check the condition of the battery after charging, wait 30 minutes before measuring the open-circuit voltage.

****

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



Measure the open-circuit voltage prior to charging.

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

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

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

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

YES

NO

By turning the charging voltage adjust dial, set the charging voltage at 20 - 25 v.

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

YES

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

NO

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

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

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

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

Charging method using a constant-voltage type charger

Measure the open-circuit voltage prior to charging.

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

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

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

YES

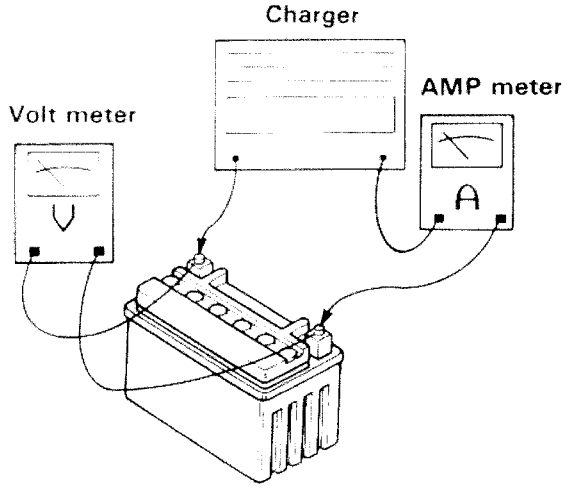
Charge the battery until the battery's charging voltage is 15 volts.

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

Check the open-circuit voltage after having left the battery for 30 minutes after charging.
12.8 v or more---Charging is complete.
12.7 v or less---Recharging is necessary.
Under 12 v---Replace the battery.

NO

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

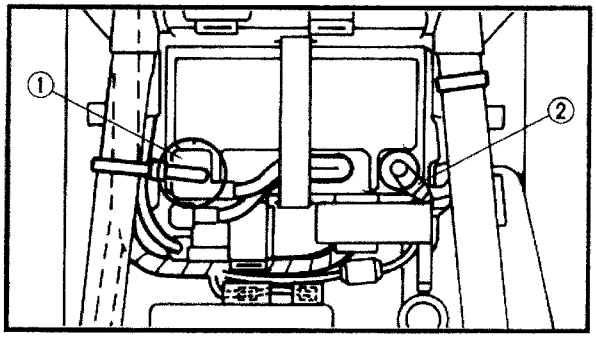


Charging method using a constant current type charger

This type of battery charger cannot charge the MF battery.

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

NOTE:
After cleaning the terminals, grease them lightly.



7.Install:
- Battery

8.Connect:
- Battery leads

CAUTION:
Connect the positive lead ① first, then the negative lead ②.

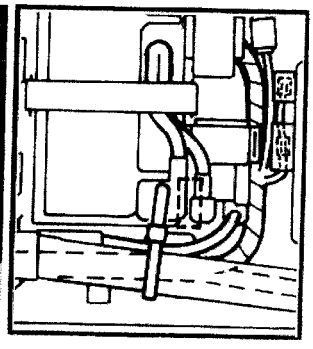
9.Install:
- Seat
  Refer to the "SEAT" section.

FUSE INSPECTION

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

1.Remove:
- Seat
  Refer to the "SEAT" section.





2.Inspect:
- Fuses

****

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

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

	Pocket tester: 90890-03112

- If the tester indicates ∞, replace the fuse.

****

3.Replace:
- Blown fuse

****

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

****

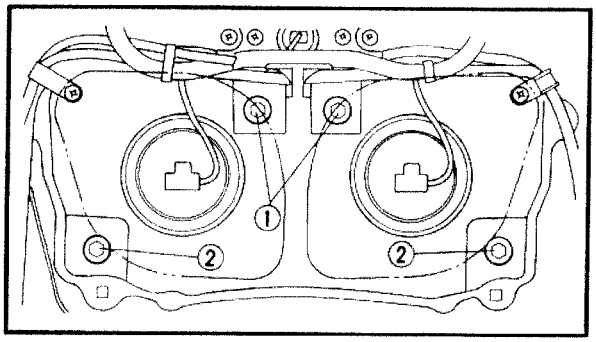
Description	Amperage	Quantity
Main	30A	1
Head	20A	1
Signal	15A	1
Ignition	7.5A	1
Fan	7.5A	1

⚠ WARNING

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

4.Install:
- Side cover
- Seat

Refer to the "SEAT" section.



HEADLIGHT BEAM ADJUSTMENT

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

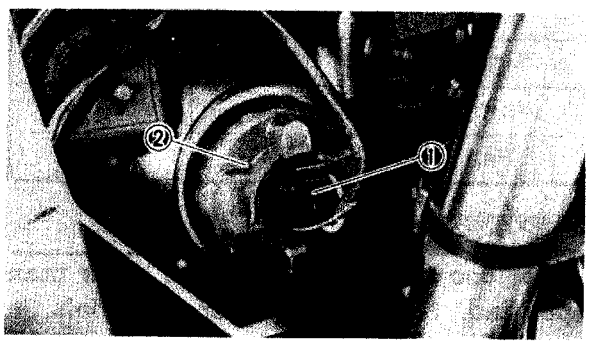
Turning in → Headlight beam higher.
Turning out → Headlight beam lower.

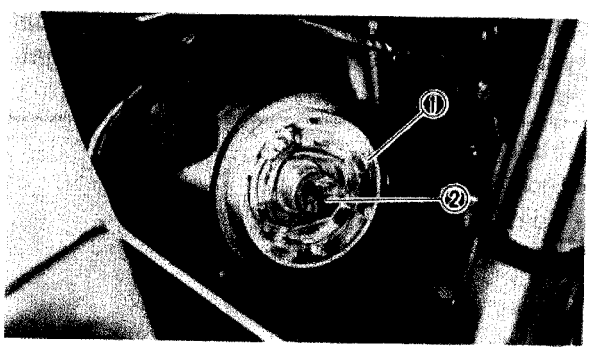
2.Adjust:
- Headlight beam (horizontally)
  Turn the adjuster ② in or out.
  Left-hand light

Turning in → Headlight beam to the left.
Turning out → Headlight beam to the right.

Right-hand light

Turning in → Headlight beam to the right.
Turning out → Headlight beam to the left.





HEADLIGHT BULB REPLACEMENT

1.Disconnect:
- Headlight lead ①

2.Remove:
- Cover ②

3.Unhook:
- Bulb holder ①

4.Remove:
- Bulb ②

⚠ WARNING

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

5.Install:
- Bulb (new)

  Secure the new bulb with the bulb holder.

CAUTION:

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

6.Hook:
- Bulb holder

7.Install:
- Cover

8.Connect:
- Headlight lead

ENGINE OVERHAUL

ENGINE REMOVAL

⚠ WARNING

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

NOTE:

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

- Cylinder head
- Cylinder
- Piston
- Clutch
- Water pump
- Oil cooler
- Starter motor
- AC magneto
- Oil pan

4

FUEL TANK AND COWLINGS

1.Remove:

- Seat
- Fuel tank
- Lower cowling
- Center cowlings

Refer to the "SEAT", "FUEL TANK" and "COWLINGS" sections in CHAPTER 3.

ENGINE OIL AND COOLANT

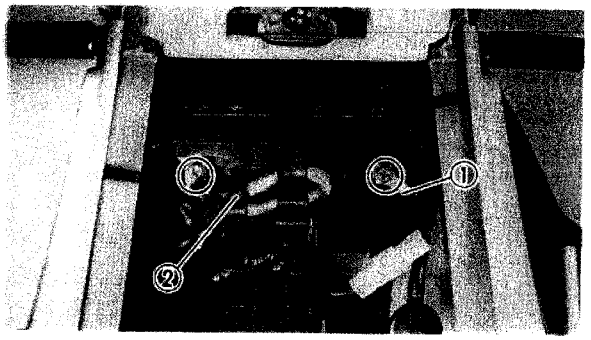
1.Drain:

- Engine oil

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

- Coolant

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

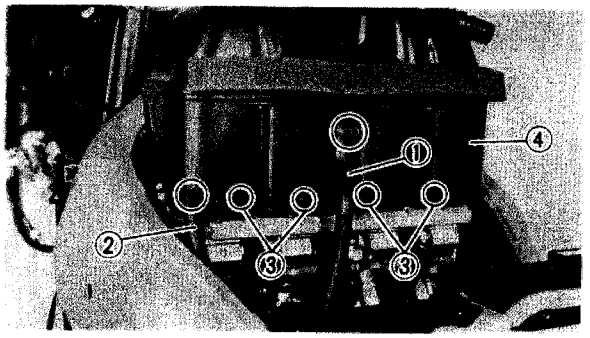


BATTERY LEADS

1.Disconnect:
- Battery leads

CAUTION:

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



AIR FILTER CASE

1.Disconnect:
- Breather hose ① (crankcase)
- Drain hose ② (air filter case)

2.Loosen:
- Screws ③

3.Remove:
- Air filter case ④

CARBURETOR

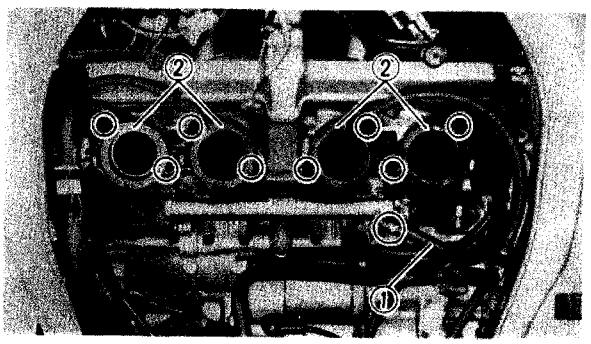
1.Remove:
- Carburetor

  Refer to the "CARBURETOR – REMOVAL" section in CHAPTER 6.

RADIATOR

1.Remove:
- Radiator

  Refer to the "RADIATOR – REMOVAL" section in CHAPTER 5.



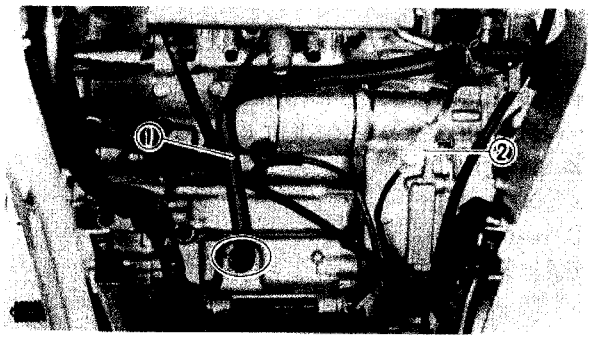
HOSES AND LEADS

1.Disconnect:
- Breather hose ① (thermostatic valve)

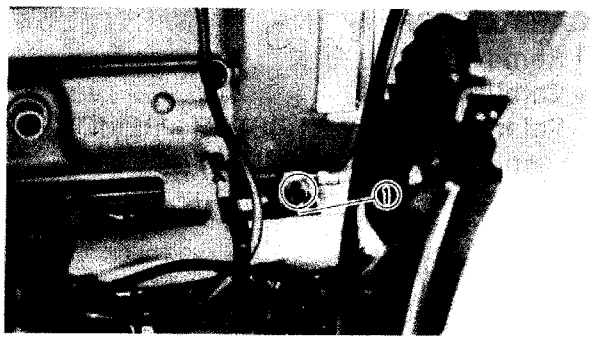
2.Remove:
- Carburetor joints ②



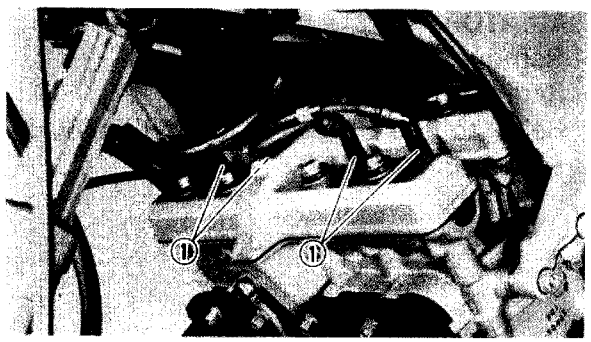
3.Disconnect:
- AC magneto coupler
- Pickup coil coupler
- Oil level switch coupler
- Sidestand switch coupler



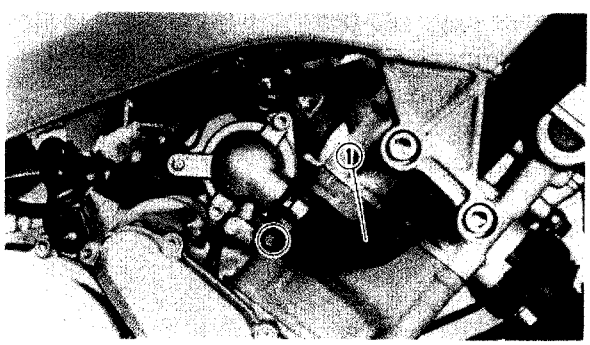
4.Disconnect:
- Breather hose ① (crankcase)
- Thermo switch coupler ②



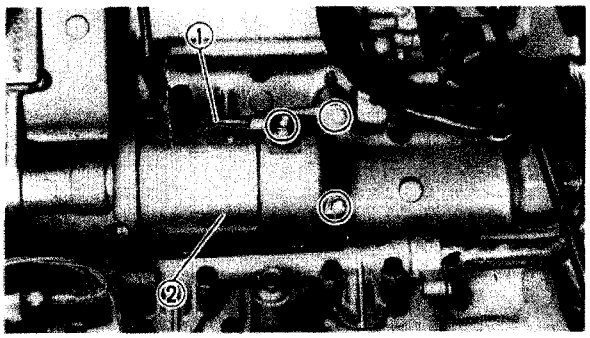
5.Disconnect:
- Ground lead ①



6.Disconnect:
- Spark plug caps ①



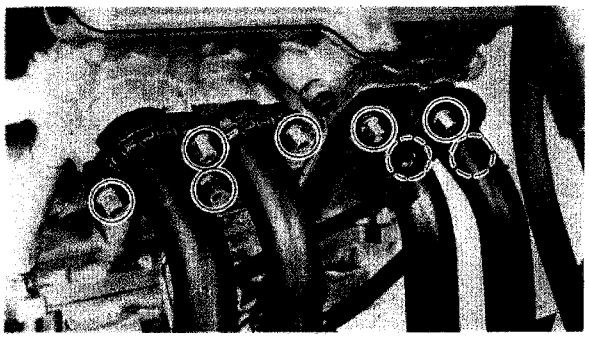
7.Remove:
- Radiator hose ① (inlet)



STARTER MOTOR

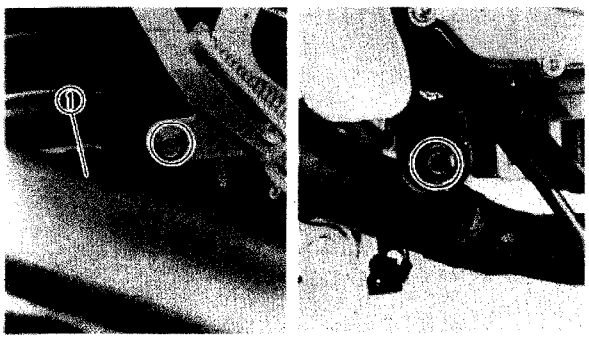
1.Disconnect:
- Starter motor lead ①

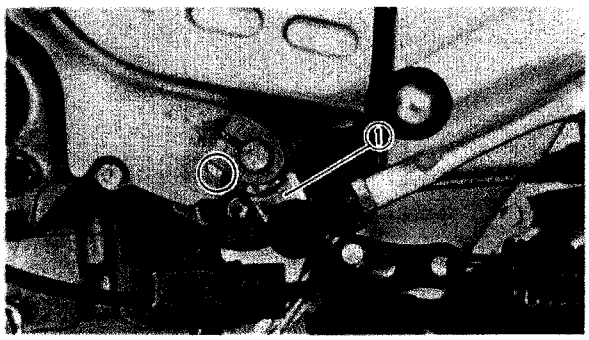
2.Remove:
- Starter motor ②



MUFFLER ASSEMBLY

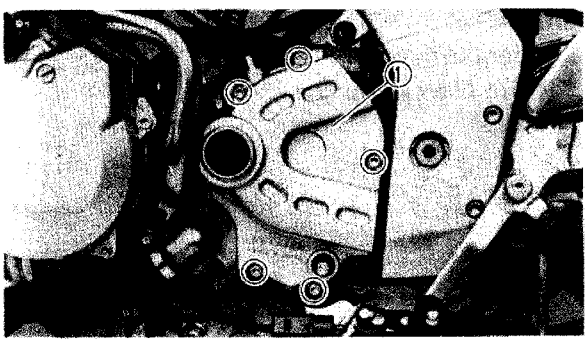
1.Remove:
- Nuts (exhaust pipe)
- Muffler assembly ①
- Gaskets (exhaust pipe)



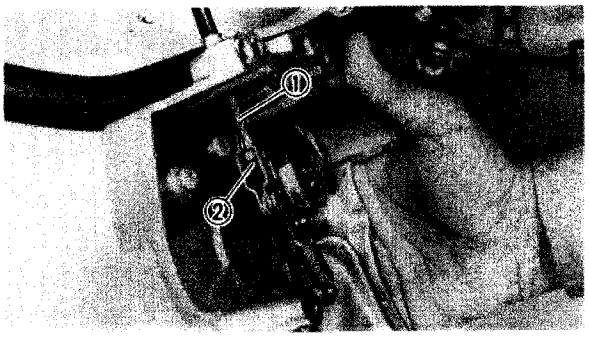


DRIVE SPROCKET

1.Remove:
- Shift pedal link ①



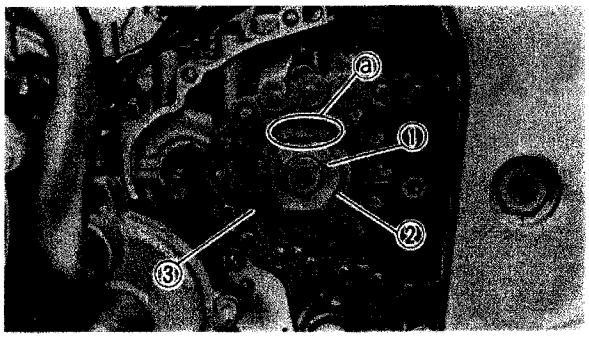
2.Remove:
- Crankcase cover ① (left)
- Dowel pins
- Gasket



3.Disconnect:
- Clutch cable ①

NOTE:
Straighten the tab ② on the clutch cable holder and remove the cable.

4.Loosen:
- Drive chain
  Refer to the "DRIVE CHAIN SLACK ADJUSTMENT" section in CHAPTER 3.



5.Straighten:
- Lockwasher tab ⓐ

6.Remove:
- Nut ① (drive sprocket)
- Lock washer ②
- Drive sprocket ③

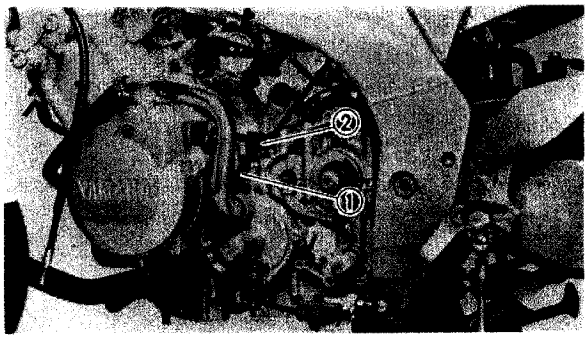
NOTE:
Loosen the nut (drive sprocket) while applying the rear brake.

ENGINE REMOVAL

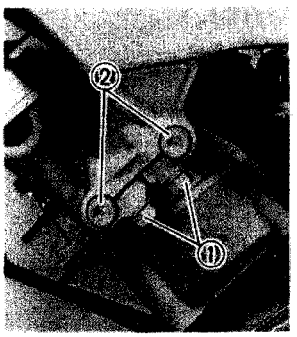
1.Place suitable stand under the frame and engine.

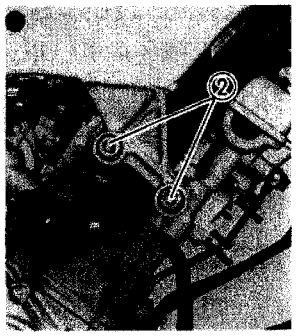
⚠ WARNING

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



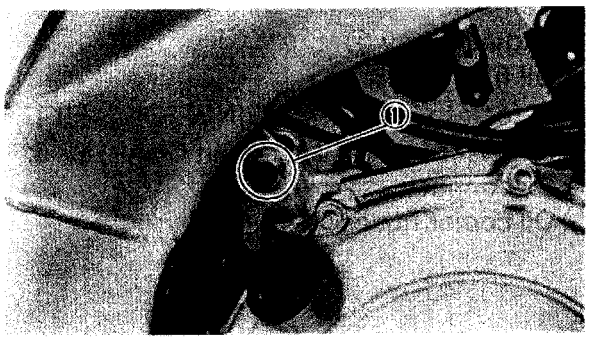
2.Unhook:
- Sidestand switch lead ①
  (from the clamp ②)



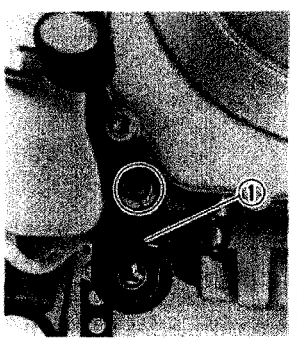


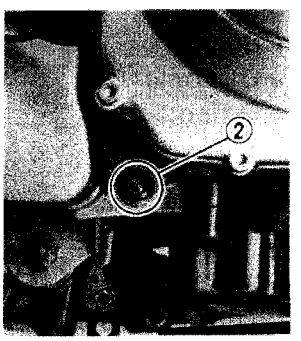
3.Loosen:
- Pinch bolts ①

4.Remove:
- Mounting bolts ② (front)

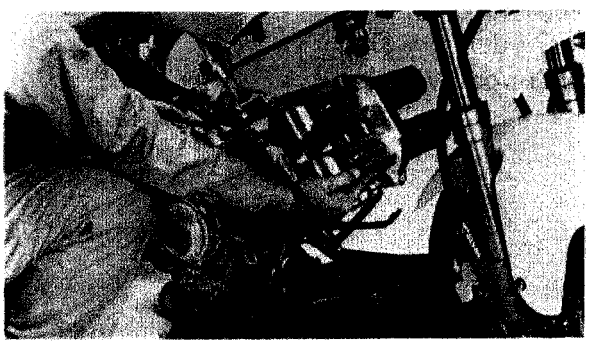


5.Remove:
- Mounting bolt ① (rear-upper)





6.Remove:
- Muffler stay ①
- Mounting bolt ② (rear-lower)



7.Remove:
- Engine assembly
  (from the right side of the motorcycle)

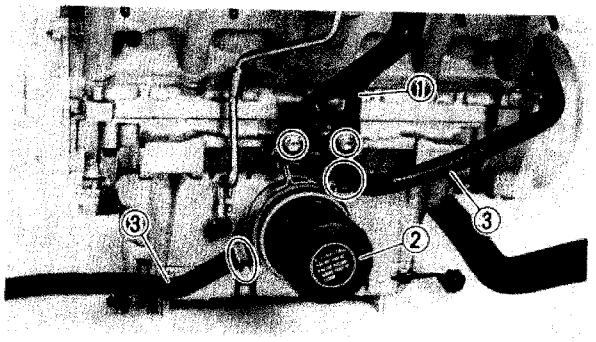
CAUTION:

Cover the front fender with a rug to prevent a scratching.

ENGINE DISASSEMBLY

OIL FILTER AND OIL COOLER

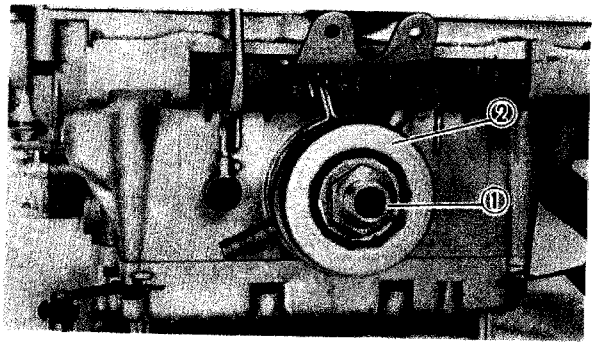
NOTE:
With the engine mounted, the oil filter and oil cooler can be maintained by removing the following part.
- Lower cowling



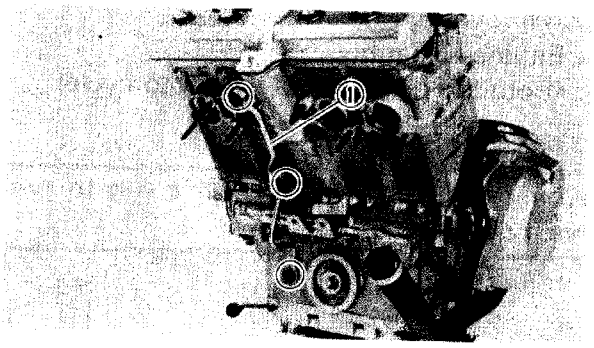
1.Remove:
- Radiator stay ①
- Oil filter ②

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

2.Disconnect:
- Oil cooler hoses ③



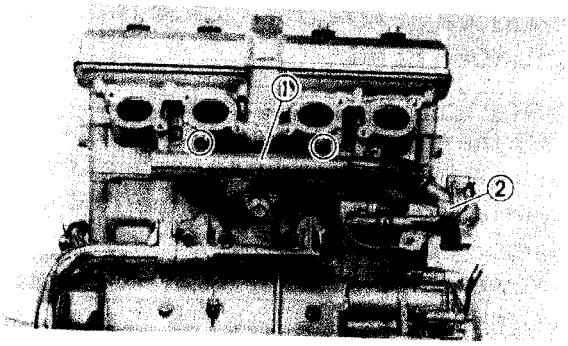
3.Remove:
- Bolt ①
- Oil cooler ②
- O-ring



4.Remove:
- Oil delivery pipe ①
- Copper washers

WATER JACKET JOINT

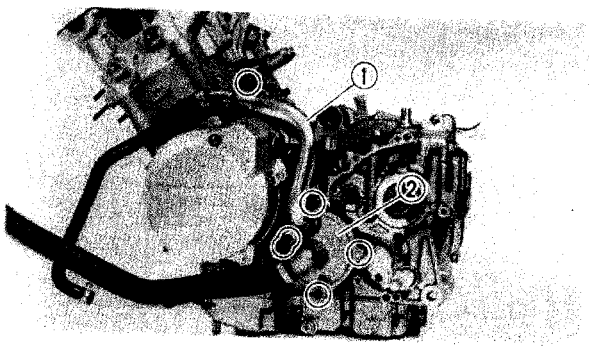
NOTE:
With the engine mounted, the intake manifold can be maintained by removing the following parts.
- Fuel tank
- Air filter case



1.Remove:
- Water jacket joint ① (outlet) (with thermostatic housing ②)
- O-rings

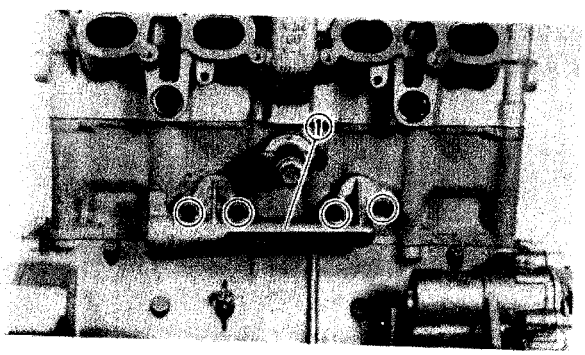
WATER PUMP

NOTE:
With the engine mounted, the water pump can be maintained by removing the following parts.
- Lower cowling
- Center cowling (left)



1.Remove:
- Pipe ①
- Water pump cover ②
- Impeller

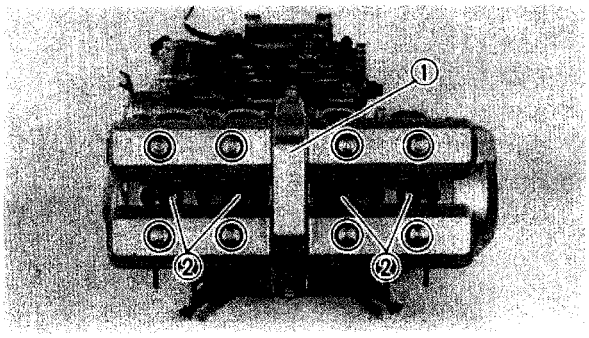
  Refer to the "WATER PUMP – REMOVAL" section in CHAPTER 5.



2.Remove:
- Water jacket joint ① (inlet)

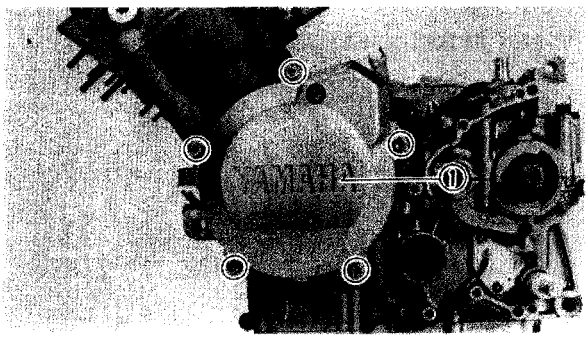
CYLINDER HEAD COVER, CAMSHAFT AND CYLINDER HEAD

NOTE:
With the engine mounted, the cylinder head cover, camshafts, and cylinder head can be maintained by removing the following parts.
- Lower cowling
- Center cowlings
- Fuel tank
- Air filter case
- Radiator assembly

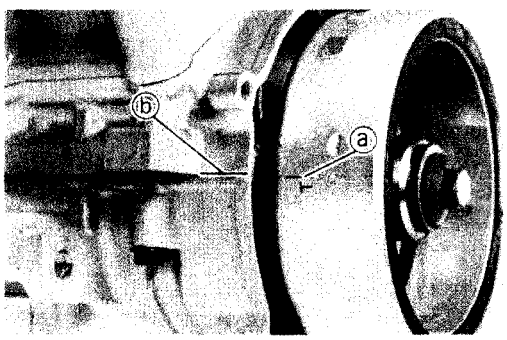


1.Remove:
- Cylinder head cover ①
- Gasket (cylinder head cover)
- Spark plugs ②

NOTE:
Loosen the bolts in a crisscross pattern 1/4 turn each. Remove them after all are loosened.

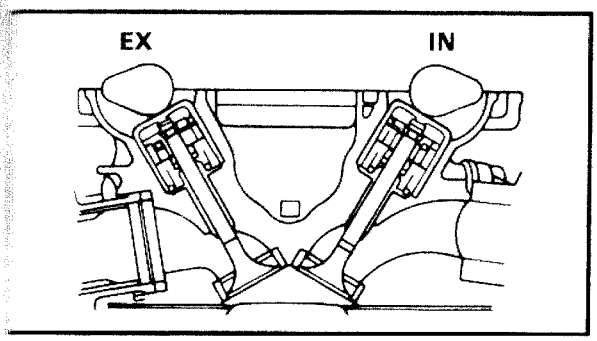


2.Remove:
- A.C. magneto cover ①

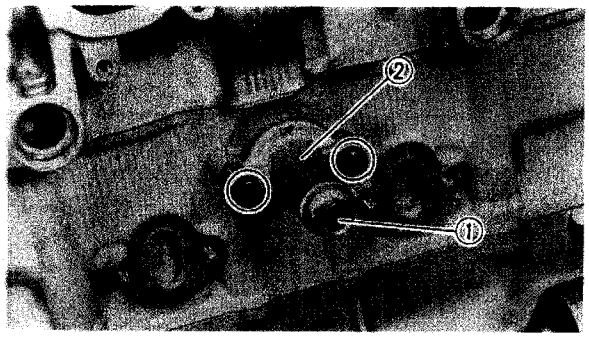


3.Align:
- "T" mark
  (with stationary pointer)

NOTE:
- Turn the crankshaft counterclockwise and align the "T" mark ⓐ with the crankcase end ⓑ when #1 piston is at TDC on compression stroke.

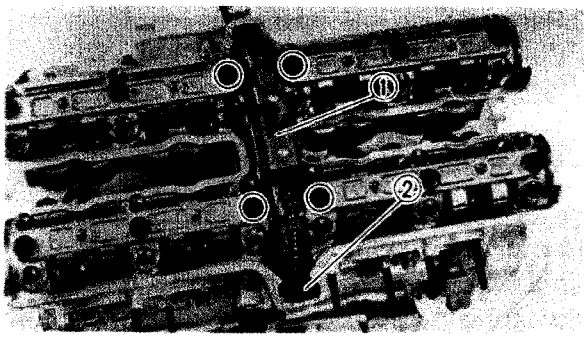


- The #1 piston is in compression stroke TDC when the cam lobes are turned away from each other, as shown.



4.Loosen:
- Cap bolt ① (tensioner)

5.Remove:
- Timing chain tensioner ②
- Gasket



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

NOTE:

Select one of the following procedures explained hereafter:

Procedure 1.

For engine service without cylinder head disassembly.

→ Disconnect the timing chain.

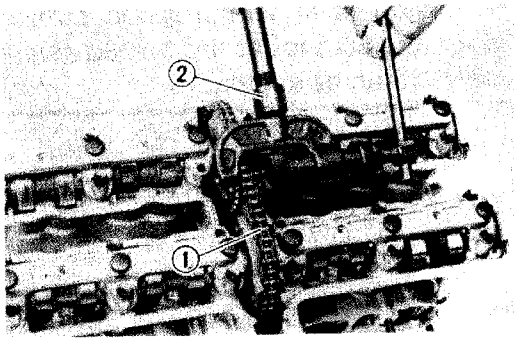
The pistons and cylinders can be removed without removing the camshafts.

Procedure 2.

For engine service including cylinder head disassembly.

→ Remove the camshaft caps and camshafts.

The camshafts can be removed without disconnecting the timing chain.



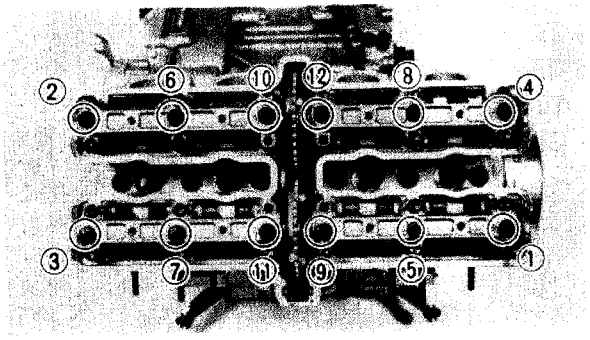
Procedure 1.

1.Disconnect:

- Timing chain ①

  Use the timing chain cutter ②.

	Cam chain cutter: 90890-01112

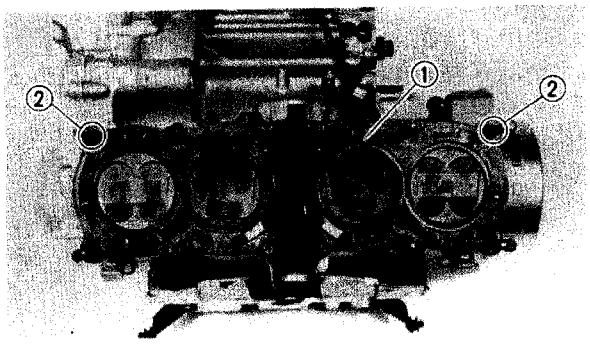


2.Remove:

- Nuts (cylinder head)

NOTE:

- Loosen the nuts in the proper sequence.
- Follow the numerical order shown in the photo. Start with loosening each nut 1/2 turn until all are loose.



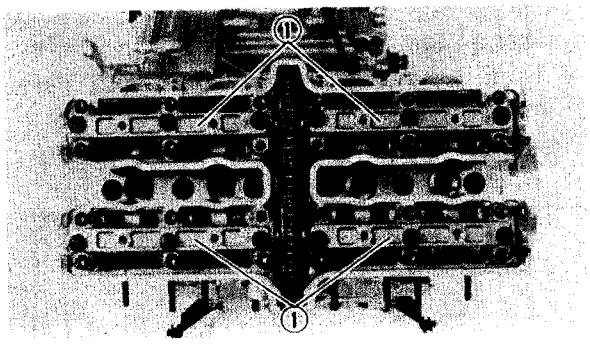
3.Remove:

- Cylinder head (with camshaft)
- Gasket ① (cylinder head)
- Dowel pins ②

NOTE:

Remove the cylinder head (with camshaft) as a whole to prevent the valve lifters and adjusting pads from falling into the crankcase.

4.Next step, see "CYLINDER AND PISTON".



Procedure 2.

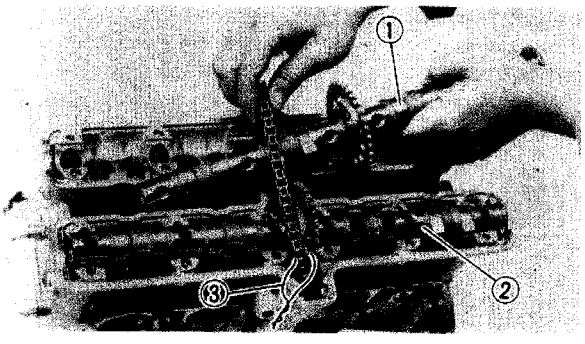
1.Remove:

- Camshaft caps ①
- Dowel pins

NOTE:

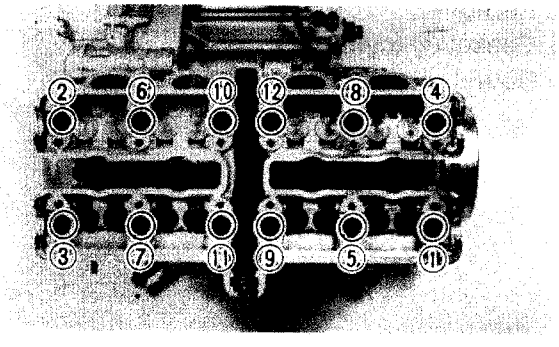
Remove the camshaft cap bolts in a crisscross pattern from the outside to inside.

CAUTION:
The bolts (camshaft caps) must be removed evenly to prevent damage to the cylinder head, camshaft or camshaft caps.



2.Remove:
- Camshaft (intake ① and exhaust ②)

NOTE:
Attach a wire ③ to the timing chain to prevent it from falling into the crankcase.

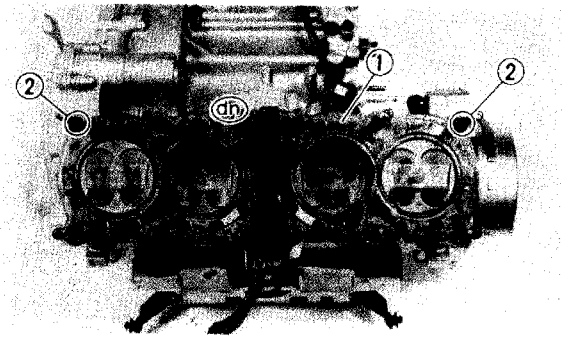


3.Remove:
- Nuts (cylinder head)

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

4.Remove:
- Cylinder head

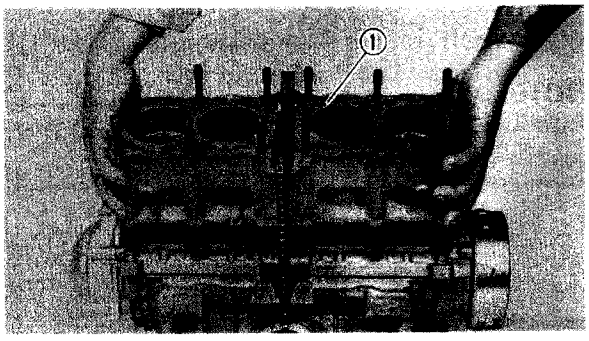
NOTE:
Remove the cylinder head as a whole to prevent the valve lifters and adjusting pads from falling into the crankcase.



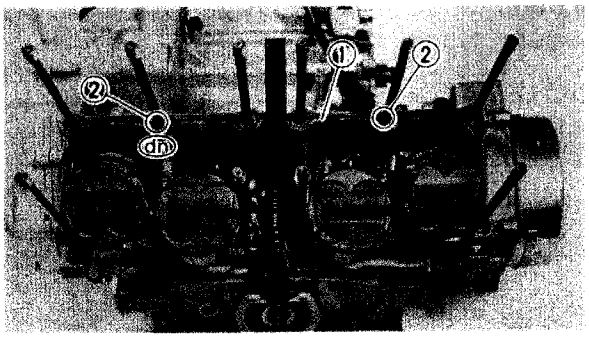
5.Remove:
- Gasket ① (cylinder head)
- Dowel pins ②

CYLINDER AND PISTON

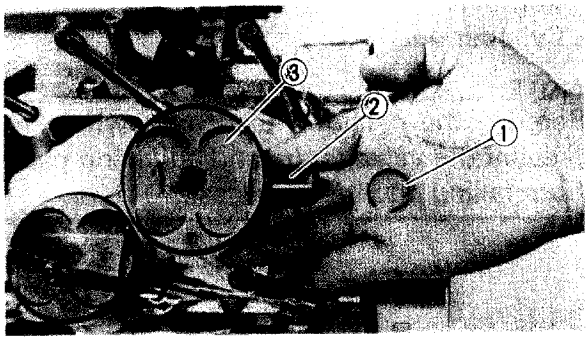
NOTE:
With the engine mounted, the cylinder and piston can be maintained by removing the following parts.
- Lower cowling
- Center cowlings
- Fuel tank
- Air filter case
- Radiator assembly
- Cylinder head assembly



1.Remove:
- Cylinder ①

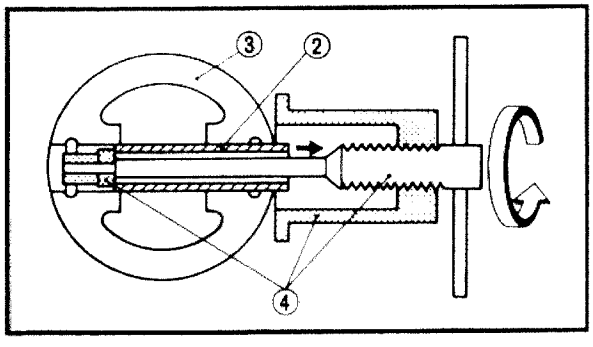


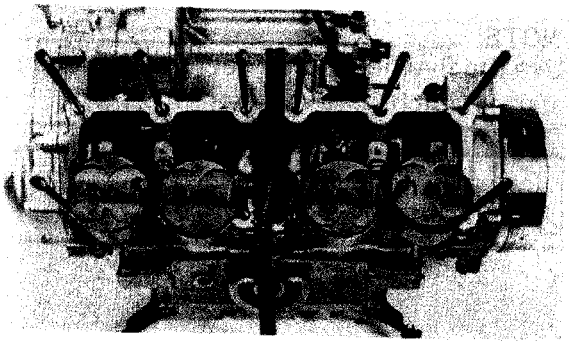
2.Remove:
- Gasket ① (cylinder)
- Dowel pins ②



3.Remove:
- Circlips ① (piston pin)
- Piston pins ②
- Pistons ③

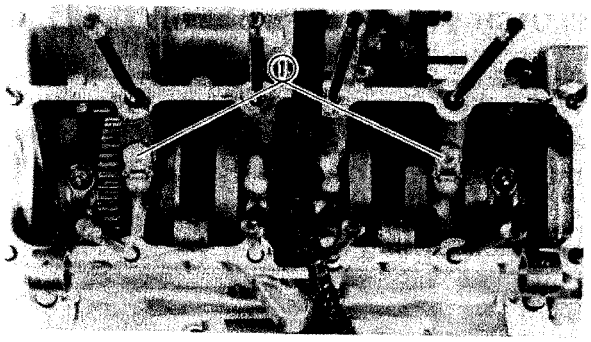
NOTE:
- Before removing the piston pin circlip, cover the crankcase with a clean rag to prevent the circlip from falling into the crankcase cavity.
- Put identification marks on the each piston head for reference during reinstallation.
- Before removing the piston pin, deburr the clip groove and pin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





Piston pin puller:
90890-01304

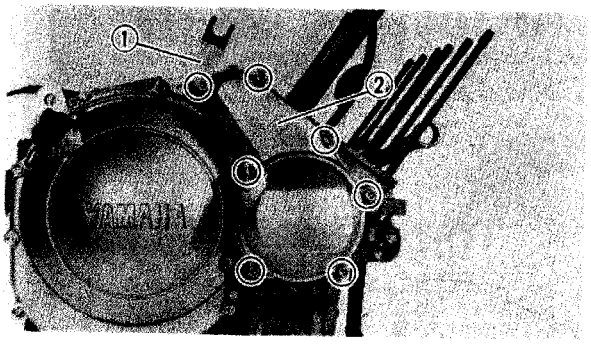
CAUTION:
Do not use a hammer to drive the piston pin out.



4.Remove:
- Oil-Jet nozzles ①
  (with O-ring)

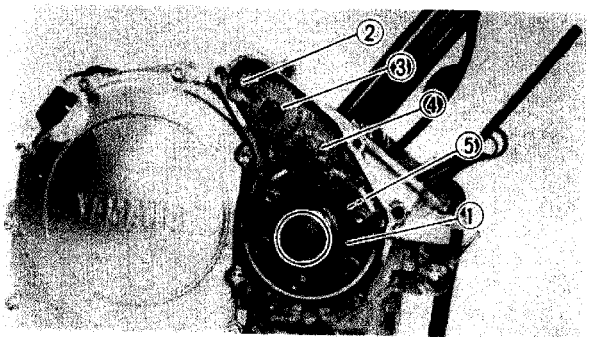
STARTER CLUTCH

NOTE:
With the engine mounted, the clutch can be maintained by removing the following parts.
- Lower cowling
- Side cowlings

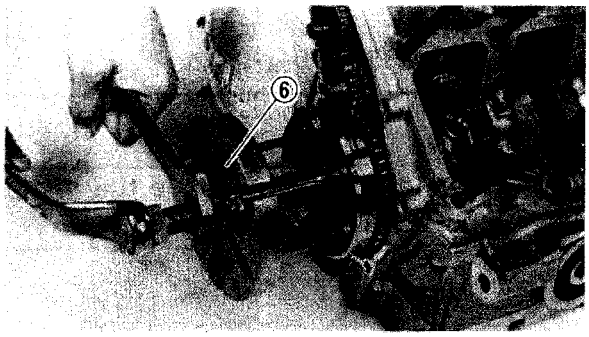


1.Remove:
- Stay ① (throttle stop screw)
- Starter clutch cover ②
- Dowel pins
- Gasket

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



2.Remove:
- Starter clutch ①
- Starter drive gear ②
- Starter idle gear ③ (primary)
- Starter idle gear ④ (secondary)
- Woodruff key
- Starter wheel gear ⑤

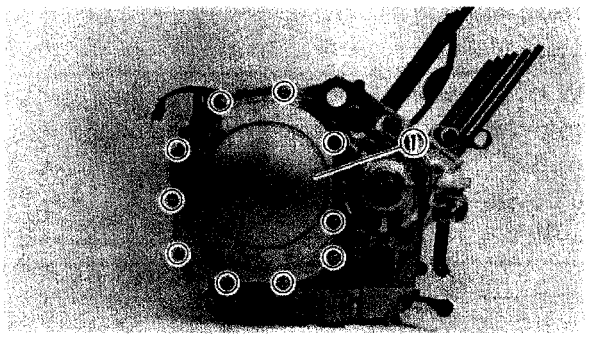


NOTE:
Use the flywheel puller set ⑥ to remove the starter clutch.

	Flywheel puller set: **90890-01362**

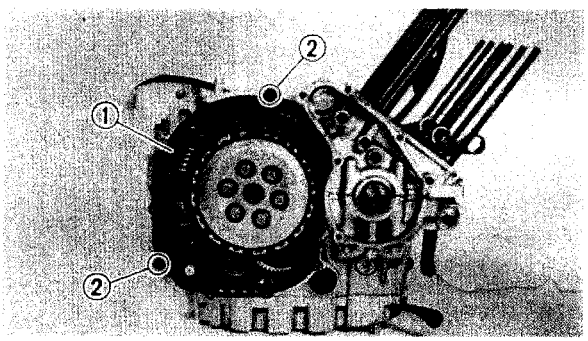
CLUTCH

NOTE:
With the engine mounted, the clutch assembly can be maintained by removing the following parts.
- Lower cowling
- Center cowling (right)

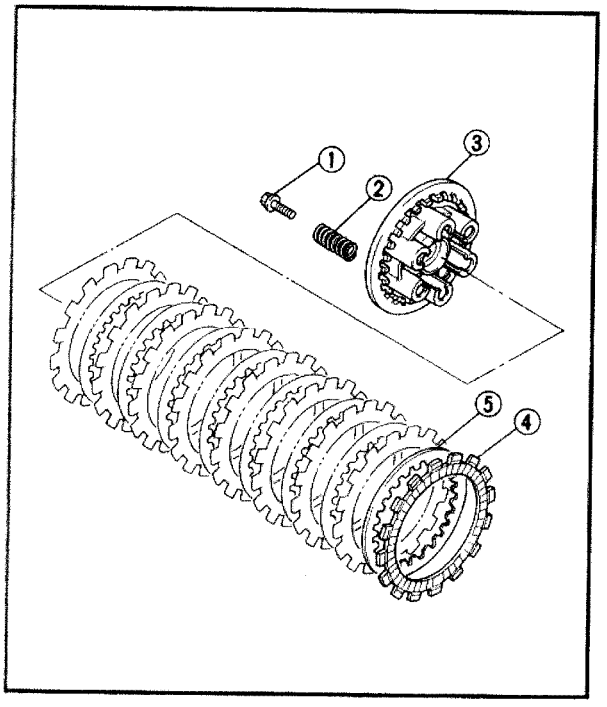


1.Remove:
- Crankcase cover ① (right)

NOTE:
Loosen the bolts in a crisscross pattern.

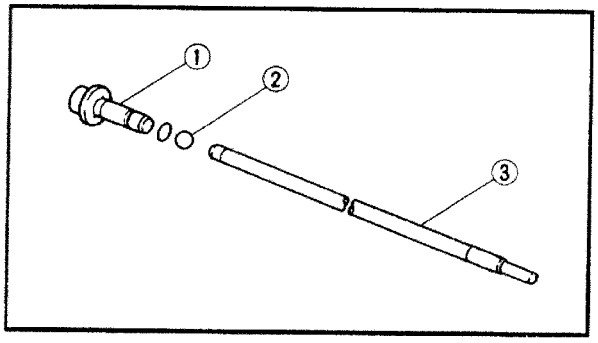


2.Remove:
- Gasket ①
- Dowel pins ②

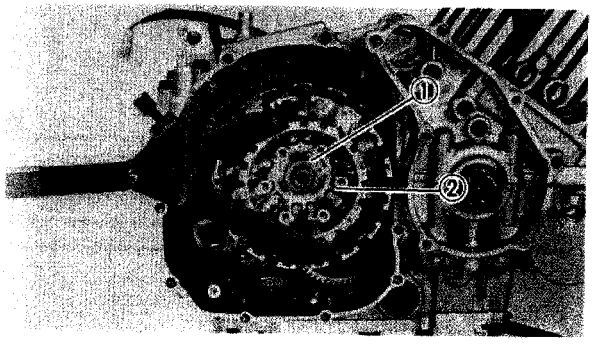


3.Remove:
- Bolts ① (pressure plate)
- Clutch springs ②
- Pressure plate ③
- Friction plates ④
- Clutch plates ⑤

NOTE:
Loosen the bolts (pressure plate) in a criss-cross pattern.



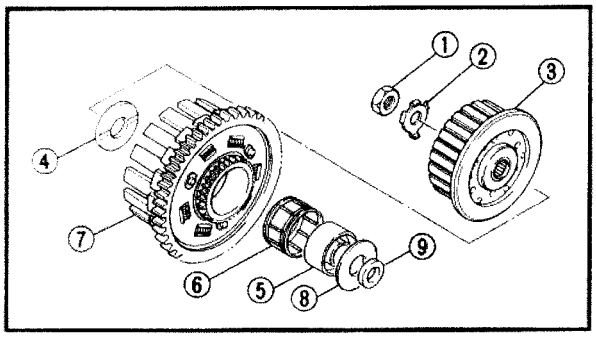
4.Remove:
- Push rod #1 ① (with O-ring)
- Ball ②
- Push rod #2 ③



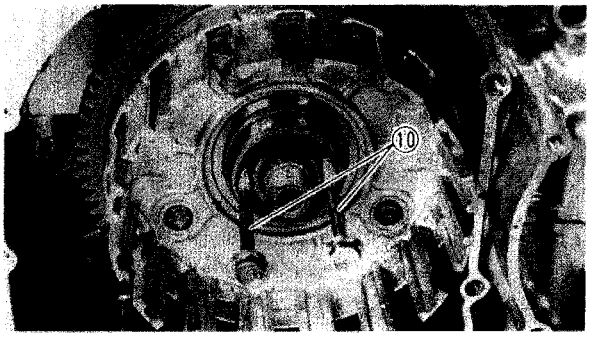
5.Straighten the lock washer tabs.
6.Loosen:
- Nut ① (clutch boss)

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

	Universal clutch holder: 90890-04086



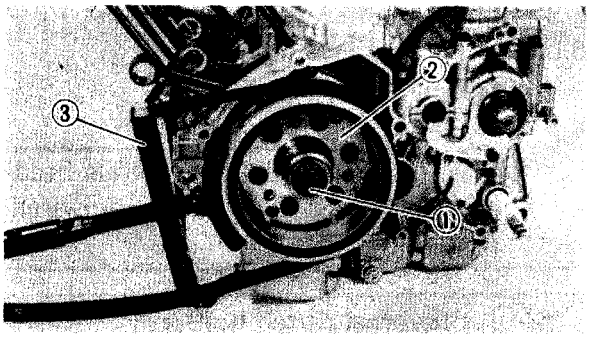
7.Remove:
- Nut ① (clutch boss)
- Lock washer ②
- Clutch boss ③
- Thrust washer ④
- Spacer ⑤
- Bearing ⑥
- Clutch housing ⑦
- Thrust washer ⑧
- Collar ⑨



NOTE:
Install a 5 mm (0.2 in) screw ⑩ onto the spacer. Then remove the spacer by pulling on the screw.

A.C. MAGNETO

NOTE:
With the engine mounted, the starter motor, can be maintained by removing the following parts.
- Lower cowling
- Center cowling (left)
- A.C. magneto cover

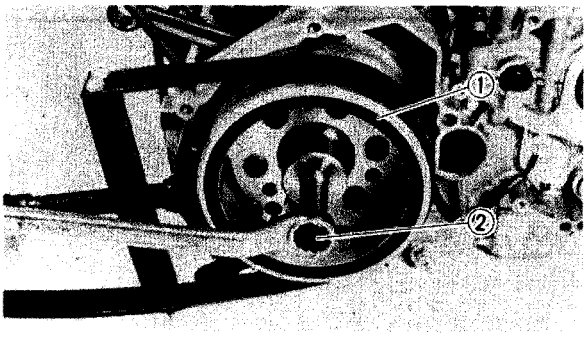


1.Remove:
- Bolt ① (magneto)
- Washer

NOTE:
Loosen the bolt ① (magneto) while holding the magneto ② with the sheave holder ③.

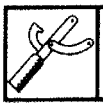


Sheave holder:
90890-01701

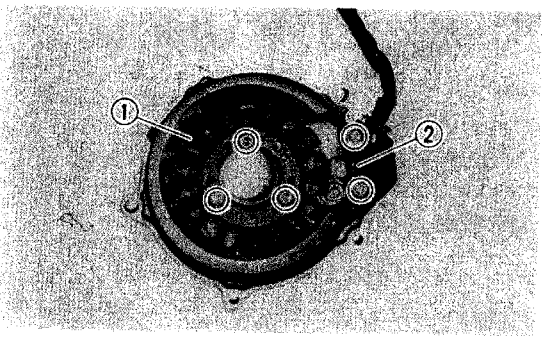


2.Remove:
- Magneto ①
- Woodruff key

NOTE:
Remove the magneto ① using the rotor puller ②.



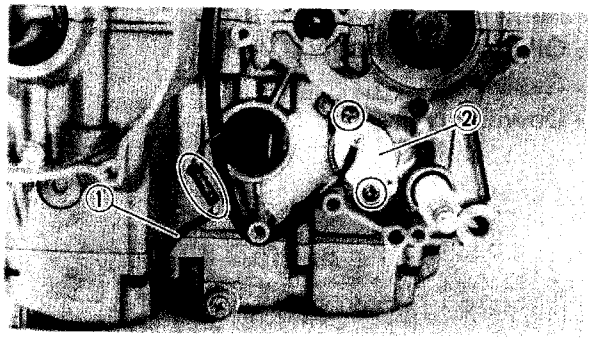
Rotor puller:
90890-01080



3.Remove:
- Stator coil assembly ①
- Pickup coil ②

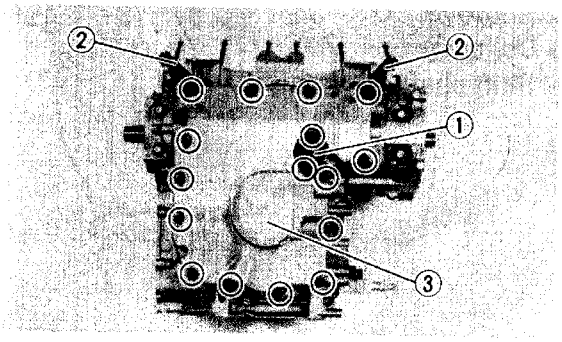
OIL PAN AND OIL STRAINER

NOTE:
With the engine mounted, the oil pan and oil strainer can be maintained by removing the following parts.
- Lower cowling
- Exhaust pipe



1.Disconnect:
- Oil level switch lead ①

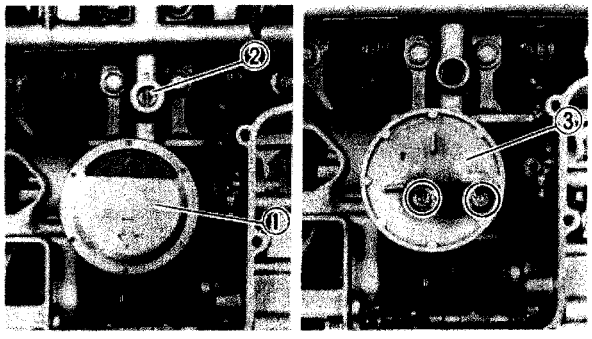
2.Remove:
- Neutral switch ②



3.Remove:
- Oil level switch ①
- Stays ② (center cowling)
- Oil pan ③

NOTE:
Loosen the bolts in a crisscross pattern 1/4 turn each. Remove them after all are loosened.

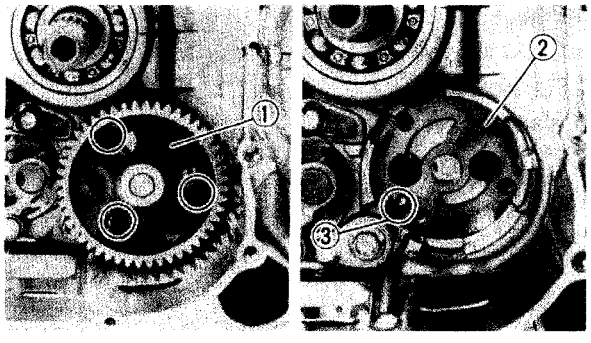
- Gasket (oil pan)
- Dowel pins



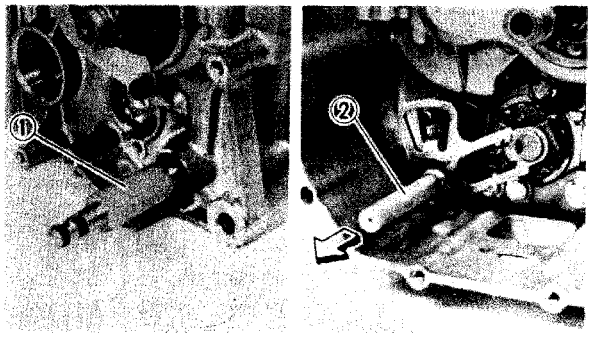
4.Remove:
- Oil strainer cover ①
- Relief valve ②
- Oil strainer housing ③

OIL PUMP AND SHIFT SHAFT

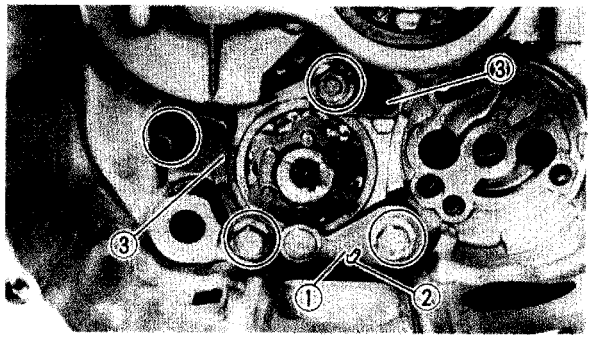
NOTE:
With the engine mounted, the oil pump and shift shaft can be maintained when the following parts are removed:
- Center cowlings
- Crankcase cover (left and right)
- Clutch housing



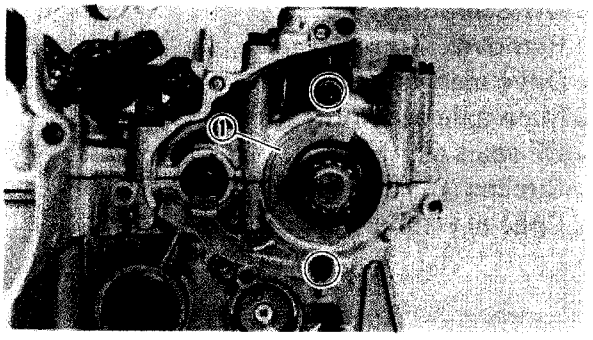
1.Remove:
- Oil pump assembly ①
- Gasket ②
- Dowel pin ③



2.Remove:
- Collar ①
- Shift shaft assembly ②

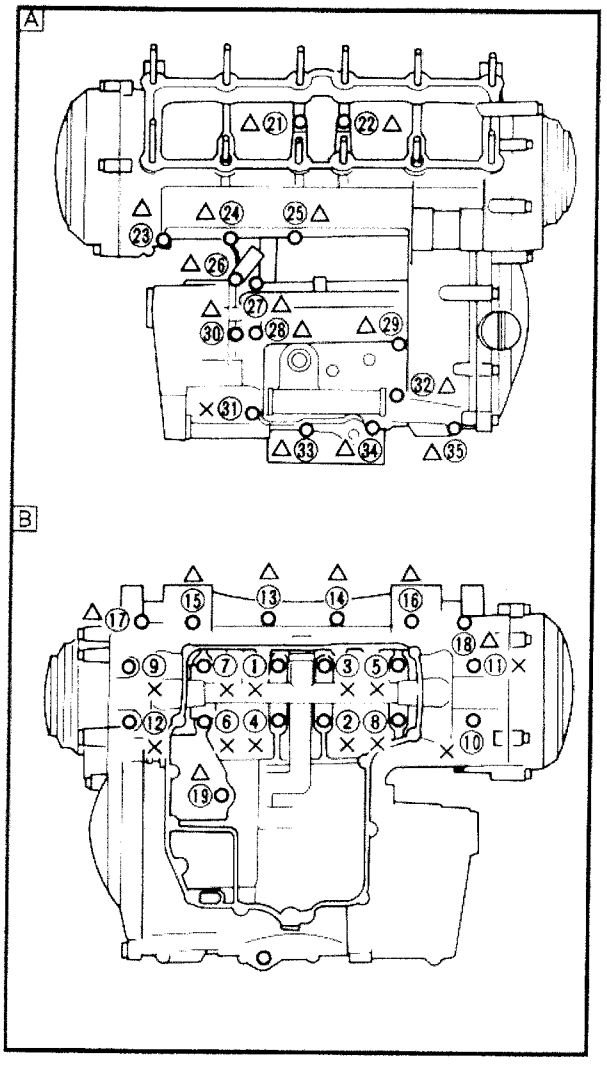


3.Remove:
- Stopper lever ①
- Return spring ②
- Stopper plate ③
  (shift fork guide bar and bearing)



CRANKCASE DISASSEMBLY

1.Remove:
- Oil seal stopper ①



2.Remove:
- Bolts (crankcase)

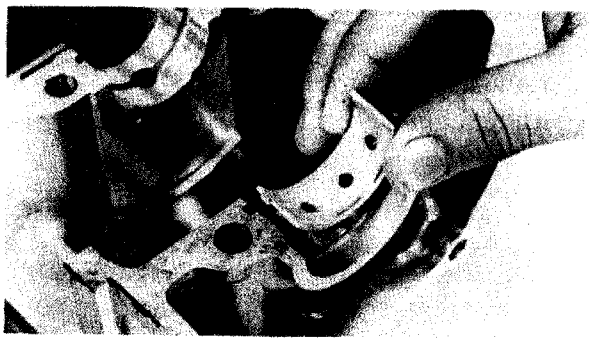
NOTE:
- Loosen the bolts 1/4 turn each and remove them after all are loosened.
- Remove the bolts starting with the highest numbered one.
- The embossed numbers in the crankcase designate the crankcase tightening sequence.

3.Place the engine upside down.

4.Remove:
- Crankcase (lower)

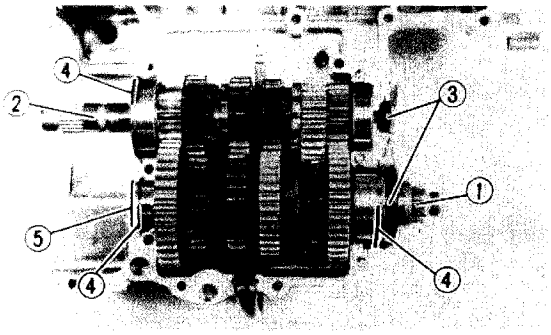
CAUTION:
Use a soft hammer to tap on the case half. Tap only on reinforced portions of the case. Do not tap on the gasket mating surface. Work slowly and carefully. Make sure that the case halves separate evenly.

A Upper case
B Lower case
△:M6 bolts
×:M8 bolts



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

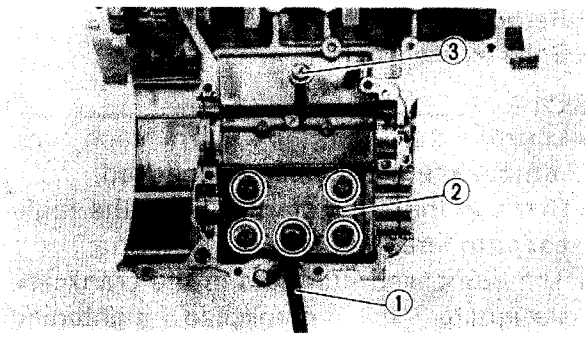
NOTE:
Identify each plain bearing position very carefully so that it can be reinstalled in its original place.



TRANSMISSION

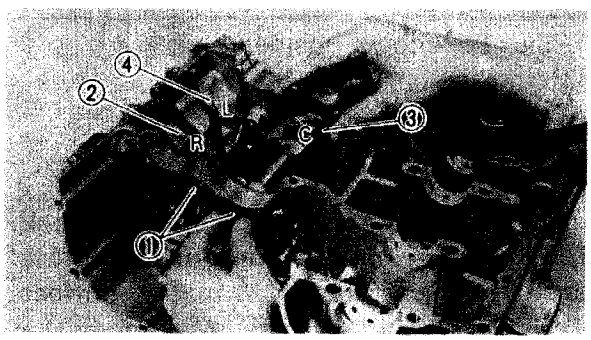
1.Remove:

- Drive axle assembly ①
- Main axle assembly ②
- Oil seals ③
- Circlips ④
- Special washer ⑤



2.Remove:

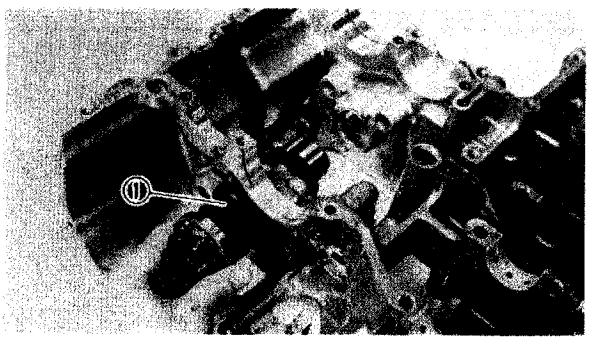
- Breather hose ①
- Oil baffle plate ②
- Oil valve ③



SHIFT FORK AND SHIFT CAM

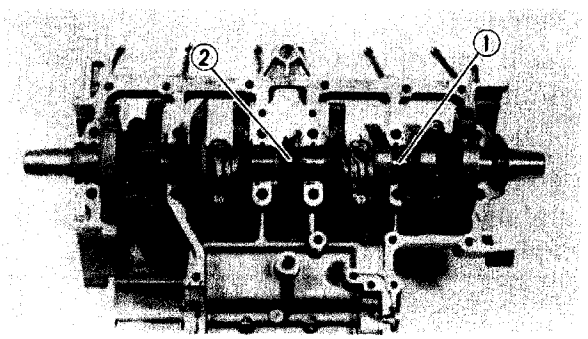
1.Remove:

- Guide bars ① (shift fork)
- Shift fork "R" ②
- Shift fork "C" ③
- Shift fork "L" ④



2.Remove:

- Shift cam assembly ①



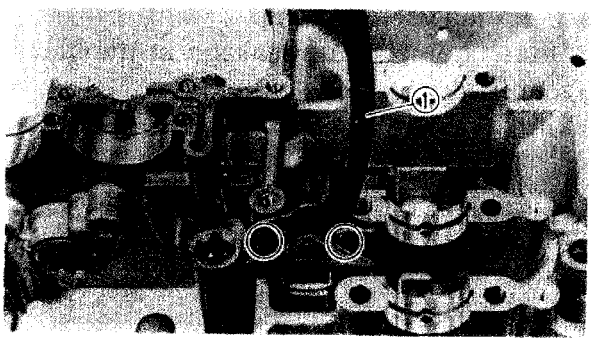
CRANKSHAFT

1.Remove:

- Crankshaft assembly ①
- Timing chain ②

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

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

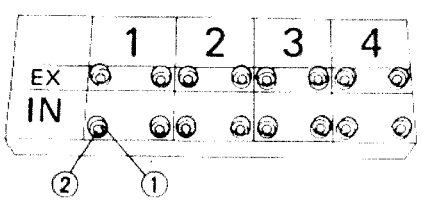


3.Remove:
- Timing chain guide ① (intake side)

VALVE

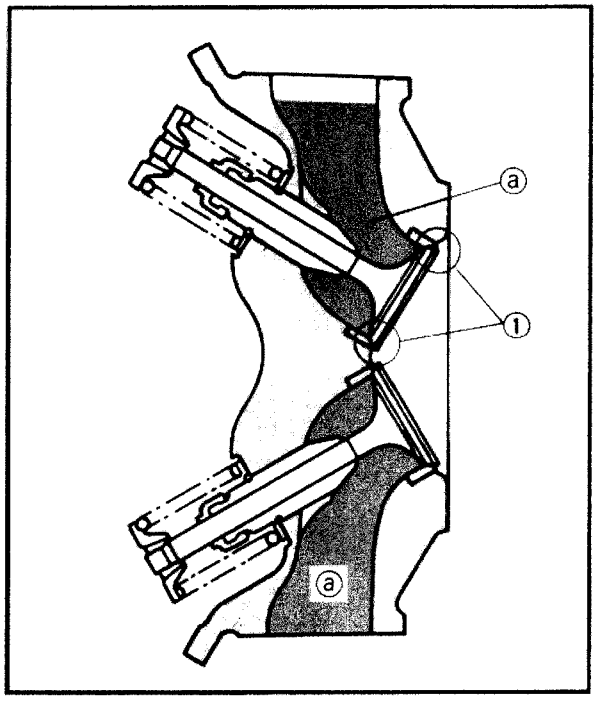
NOTE:
With the engine mounted, the valve and camshaft can be maintained by removing the following parts.
- Fuel tank
- Center cowlings
- Air filter case
- Carburetor
- Radiator
- Cylinder head

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



1.Remove:
- Lifters ①
- Pads ②

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

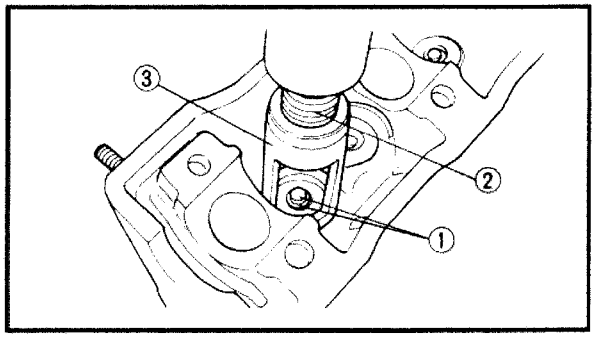


2.Check:
- Valve sealing
  Leakage at valve seat → Inspect the valve face, valve seat and the valve seat width. Refer to "INSPECTION AND REPAIR – VALVE SEAT".

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

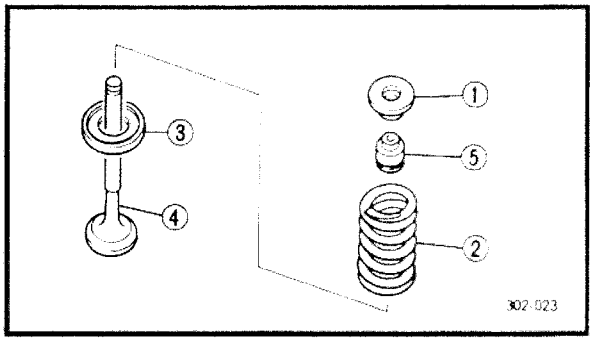
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3.Remove:
- Valve cotters ①

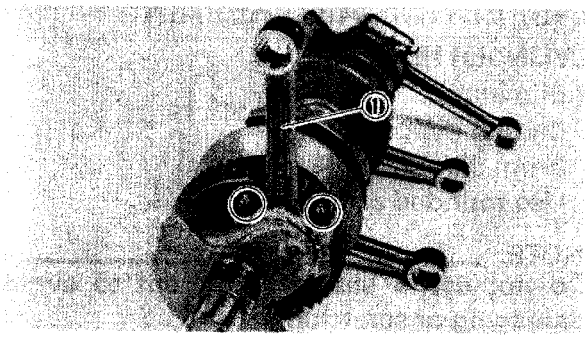
NOTE:
Attach the valve spring compressor ② and attachment ③ between the valve spring retainer and cylinder head to remove the valve cotters.

Valve spring compressor:
90890-04019
Attachment:
90890-04108



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

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



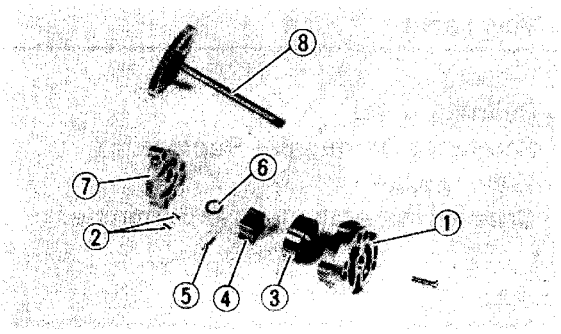
CONNECTING ROD

1.Remove:

- Connecting rod ①
- Bearings (connecting rod)

NOTE:

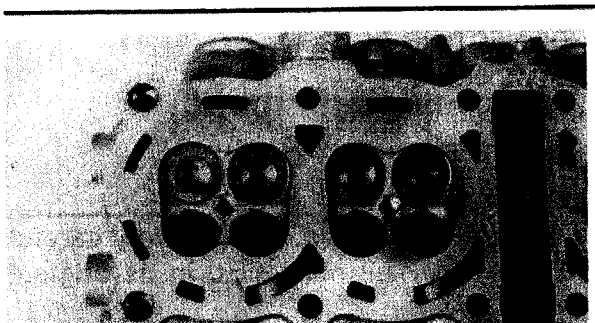
Identify each bearing position very careful so that it can be reinstalled in its original place.



OIL PUMP

1.Remove:

- Screw
- Pump housing ①
- Dowel pins ②
- Outer rotor ③
- Inner rotor ④
- Pin ⑤
- Washer ⑥
- Pump cover ⑦
- Pump shaft ⑧



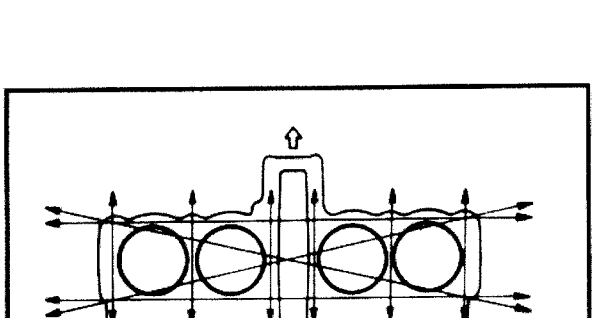
INSPECTION AND REPAIR

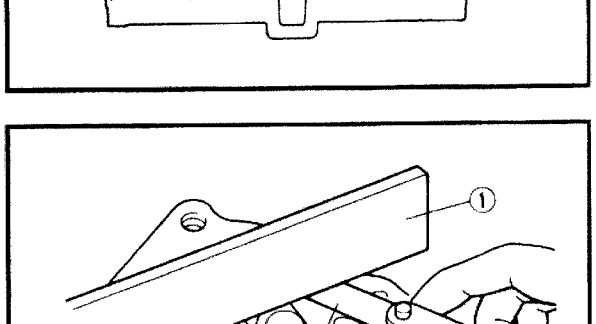
CYLINDER HEAD

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

NOTE:
Do not use a sharp instrument to 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:
- Cylinder head warpage
  Out of specification → Resurface.

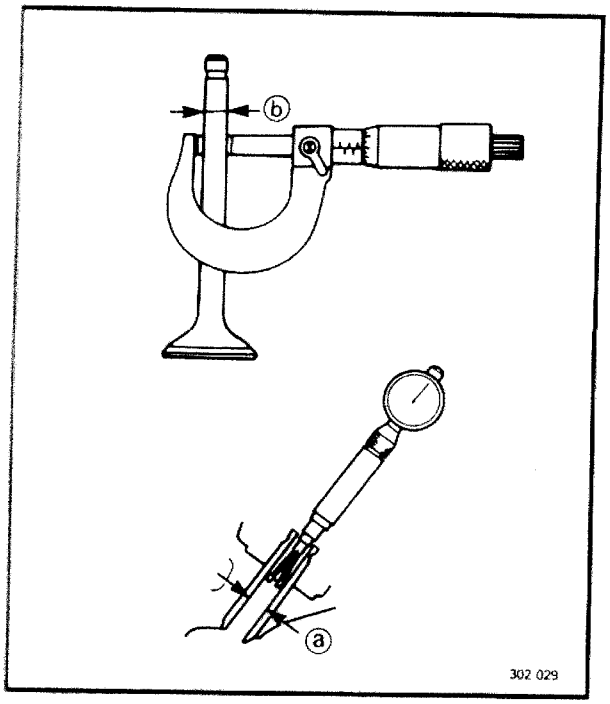
Cylinder head warpage:
Less than 0.05 mm (0.0020 in)

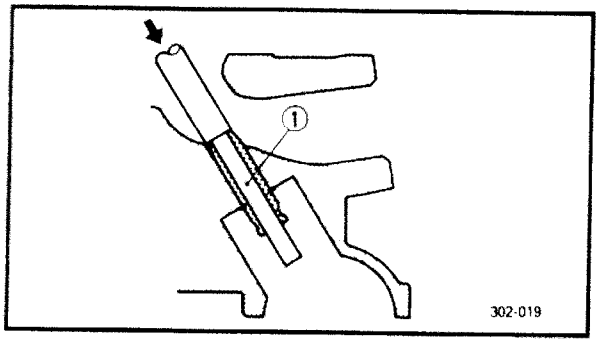
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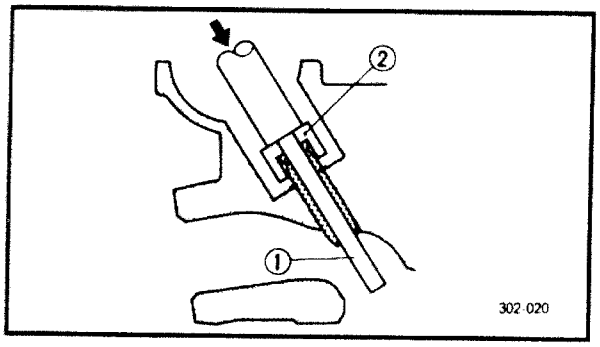
Warpage measurement and resurfacement steps:
- Hold a straight edge ① and a thickness gauge ② to the cylinder head.
- Measure the warpage.
- If the warpage is out of specification, resurface the cylinder head.
- Place a 400 ~ 600 grit wet sandpaper on the surface plate, and resurface the head using a figure-eight sanding pattern.

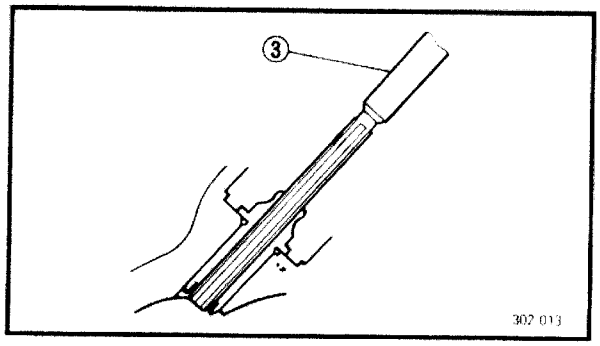
NOTE:
Rotate the head several times to avoid removing too much material from one side.

****









VALVE AND VALVE GUIDE

1.Measure:

- Stem-to-guide clearance

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

Out of specification → Replace valve guide.

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

2.Replace:

- Valve guide

****

Replacement steps:

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

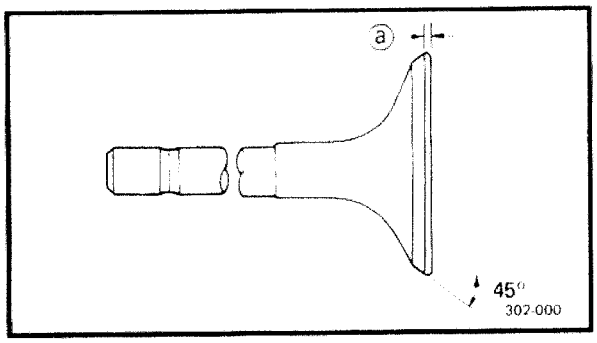
- Remove the valve guide using the valve guide remover ①.
- Install the valve guide (new) using the valve guide installer ② and valve guide remover ①.
- After installing the valve guide, bore the valve guide using the valve guide reamer ③ to obtain proper stem-to-guide clearance.

Valve guide remover (4.0 mm):
90890-04111
Valve guide installer (4.0 mm):
90890-04112
Valve guide reamer (4.0 mm):
90890-04113

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

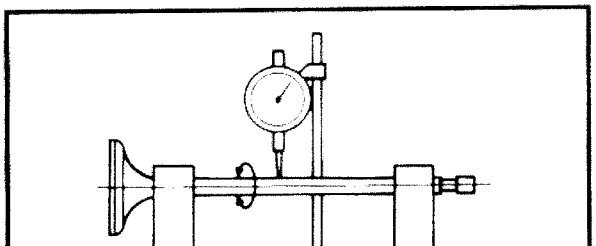
3.Eliminate:
- Carbon deposit
  (from valve face)

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:
0.60 ~ 0.80 mm (0.024 ~ 0.031 in)
<Limit>: 0.5 mm (0.02 in)



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

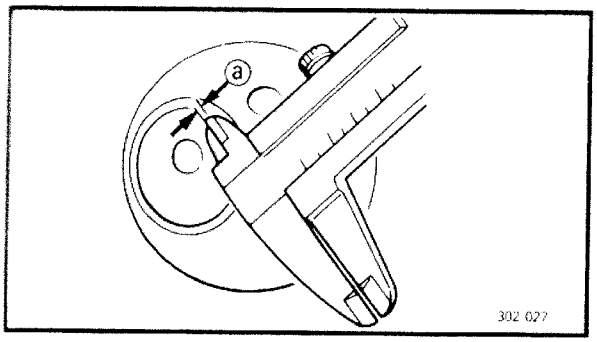
Runout limit:
0.04 mm (0.0016 in)

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

VALVE SEAT

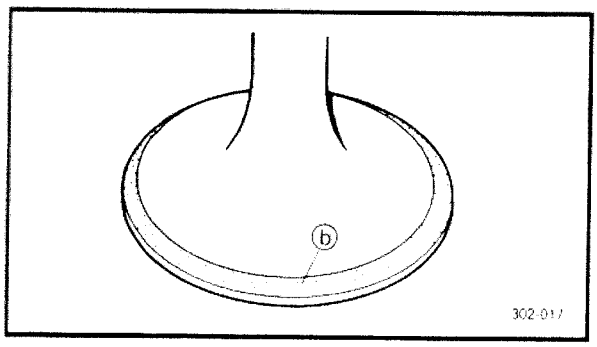
1.Eliminate:
- Carbon deposit
  (from valve face and valve seat)

2.Inspect:
- Valve seat
  Pitting/Wear → Reface valve seat.



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

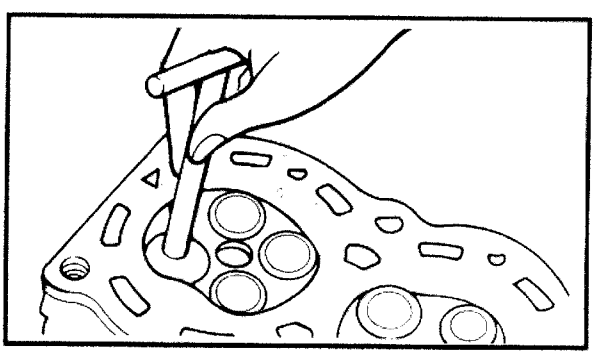
Valve seat width:
Intake:
0.9 ~ 1.1 mm (0.035 ~ 0.043 in)
Exhaust:
0.9 ~ 1.1 mm (0.035 ~ 0.043 in)



****

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

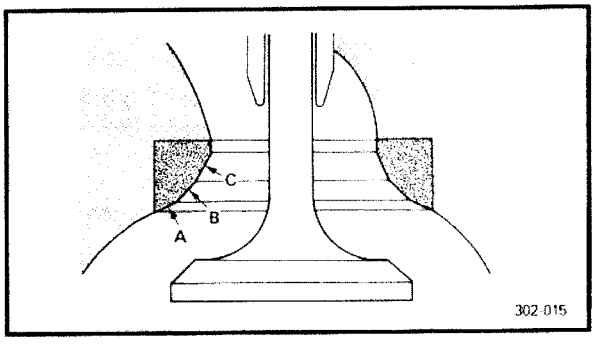
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4.Reface:
- Valve seat
  Use 20°, 45° and 60° valve seat cutter.

Valve seat cutter:
YM-91043-C

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

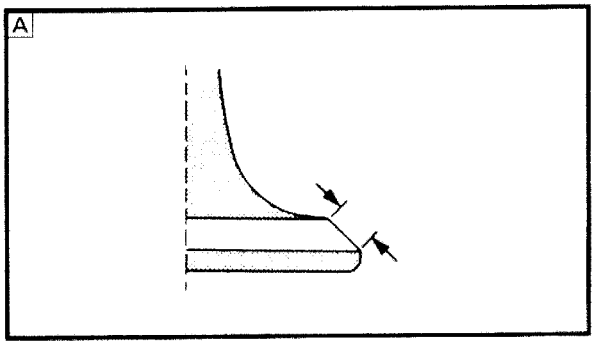


Cut sections as follows:	
Section	**Cutter**
A	20°
B	45°
C	60°

****

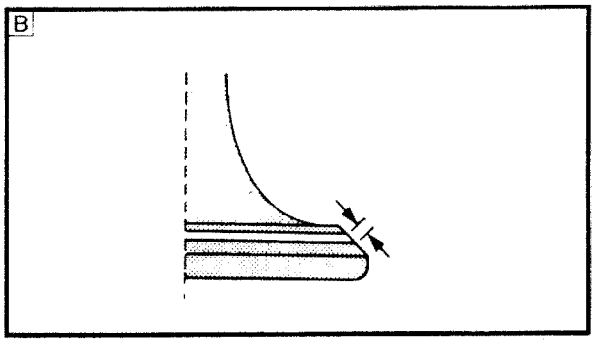
Refacing steps:

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



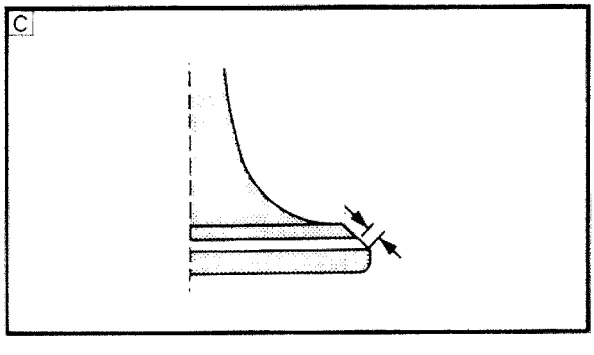
Valve seat cutter set		Desired result
Use lightly	First: 20° cutter Second: 60° cutter	To reduce valve seat width to 1.0 mm (0.039 in)

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

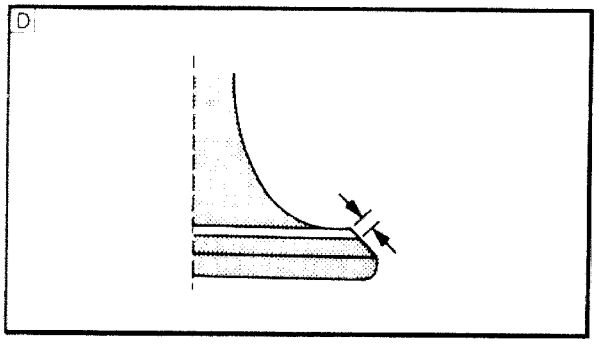


Valve seat cutter set		Desired result
Use	45° cutter	To achieve a uniform valve seat width of 1.0 mm (0.039 in)

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



Valve seat cutter set		Desired result
Use	First: 20° cutter Second: 45° cutter	To center the seat and to achieve its width of 1.0 mm (0.039 in)



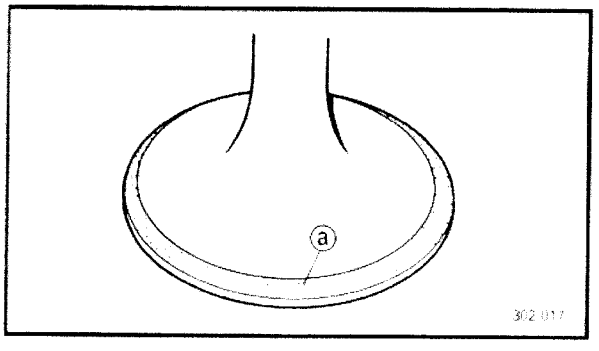
D Valve seat is too narrow and it is located near the bottom edge of the valve face.

Valve seat cutter set		Desired result
Use	First: 60° cutter Second: 45° cutter	To center the seat and achieve its width of 1.0 mm (0.039 in)

****

5.Lap:
- Valve face
- Valve seat

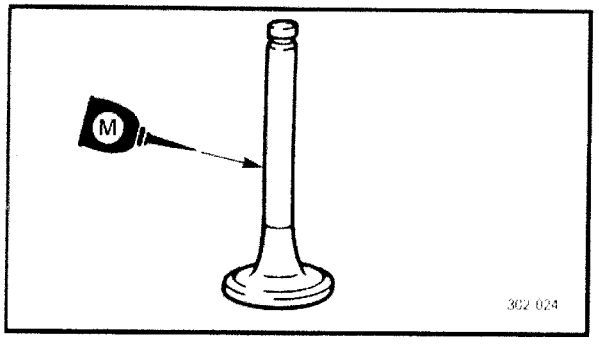
NOTE:
After refacing the valve seat or replacing the valve and valve guide, the valve seat and valve face should be lapped.



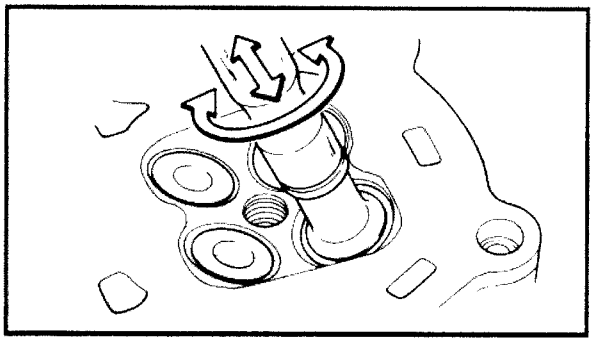
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Lapping steps:
- Apply a coarse lapping compound ⓐ to the valve face.

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

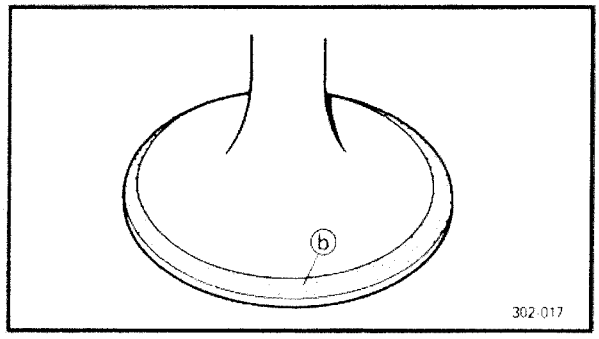


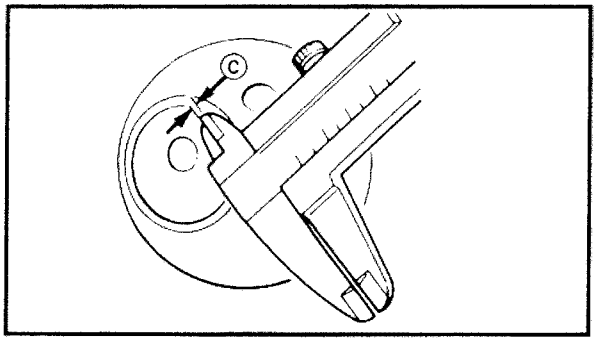
- Apply molybdenum disulfide oil to the valve stem.
- Install the valve into the cylinder head.
- Turn the valve until the valve face and valve seat are evenly polished, then clean off all compound.

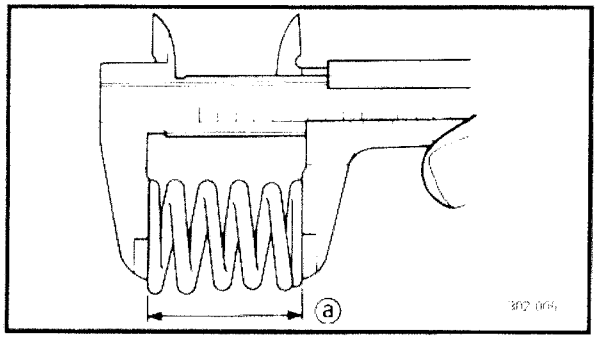


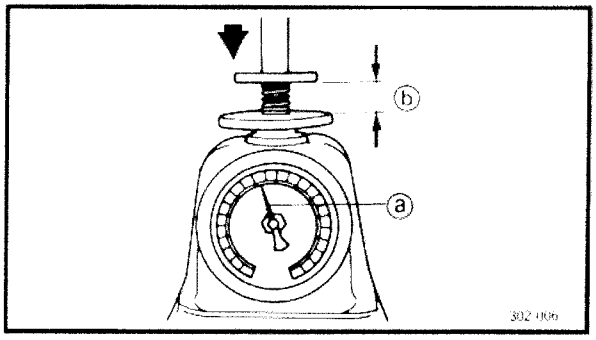
NOTE:
To obtain the best lapping result, lightly tap the valve seat while rotating the valve back and forth between your hand.

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









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

- Apply the Mechanic's bluing dye (Dykem) ⓑ 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.

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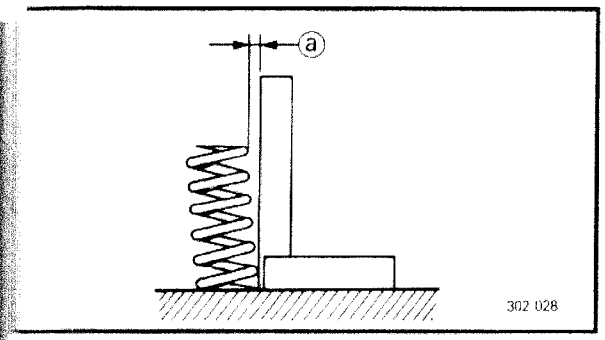
VALVE SPRING

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

Free length (valve spring):
Intake spring:
39.17 mm (1.54 in)
Exhaust spring:
39.17 mm (1.54 in)

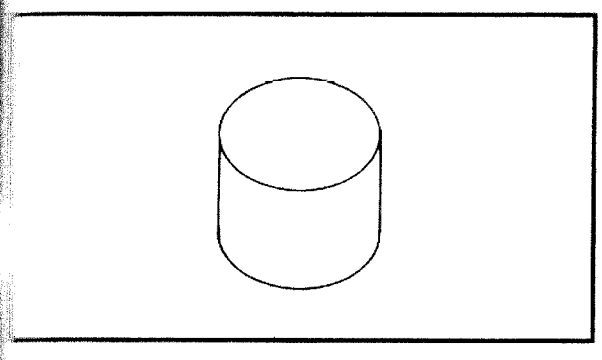
2.Measure:
- Compressed force ⓐ (valve spring)
  Out of specification → Replace.
  ⓑ Installed length

Compressed force:
Intake spring:
11.0 ~ 13.2 kg (24.25 ~ 29.10 lb)
at 34.5 mm (1.4 in)
Exhaust spring:
11.0 ~ 13.2 kg (24.25 ~ 29.10 lb)
at 34.5 mm (1.4 in)

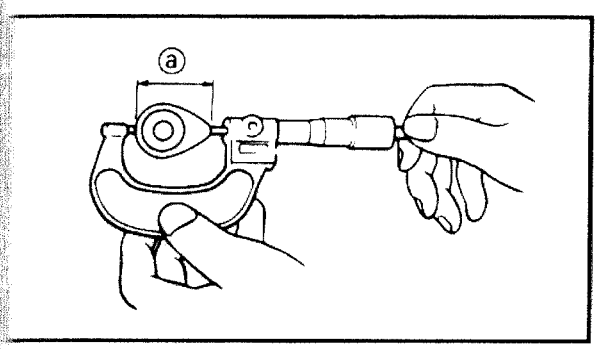


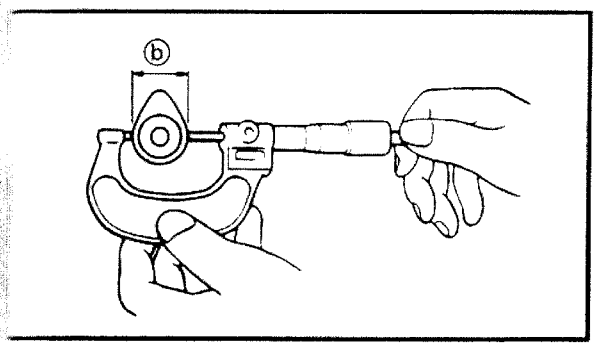
3.Measure:
- Spring tilt ⓐ
  Out of specification → Replace.

Spring tilt limit:
Intake:
1.7 mm (0.067 in)
Exhaust:
1.7 mm (0.067 in)



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

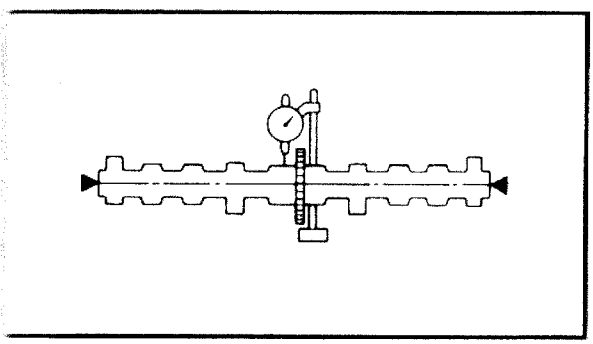




CAMSHAFT
1.Inspect:
- Cam lobes
  Pitting/Scratches/Blue discoloration → Replace.

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

Cam lobes length limit:
Intake:
ⓐ 32.7 mm (1.287 in)
ⓑ 24.95 mm (0.982 in)
Exhaust:
ⓐ 32.5 mm (1.280 in)
ⓑ 24.95 mm (0.982 in)

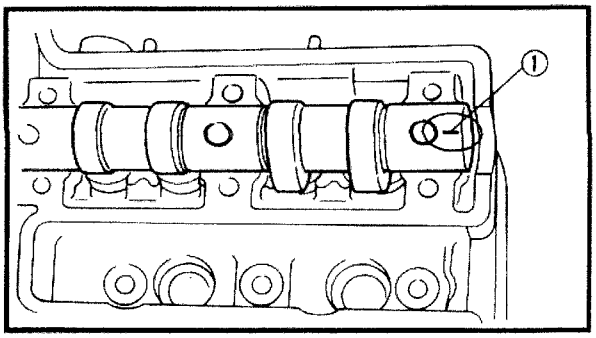


3.Measure:
- Runout (camshaft)
  Out of specification → Replace.

Runout (camshaft):
Less than 0.06 mm (0.0024 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)

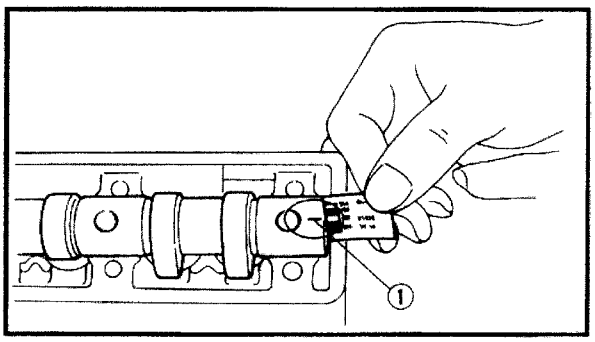


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Measurement steps:
- Install the camshaft onto the cylinder head.
- Position a strip of Plastigauge® ① onto the camshaft.
- Install the dowel pins and camshaft caps.

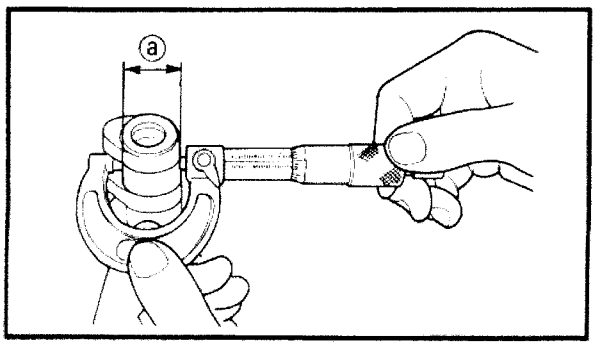
Bolts (camshaft cap)
10 Nm (1.0 m • kg, 7.2 ft • lb)

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



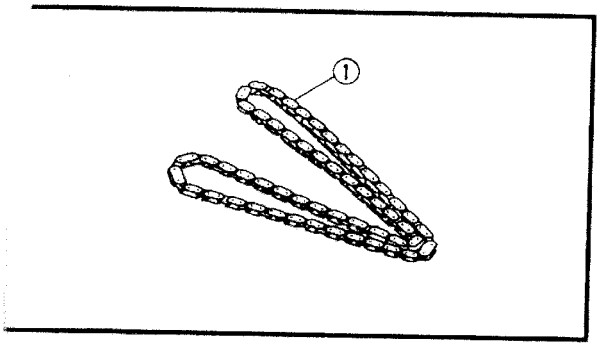
- Remove the camshaft caps and measure the width of the Plastigauge® ①.

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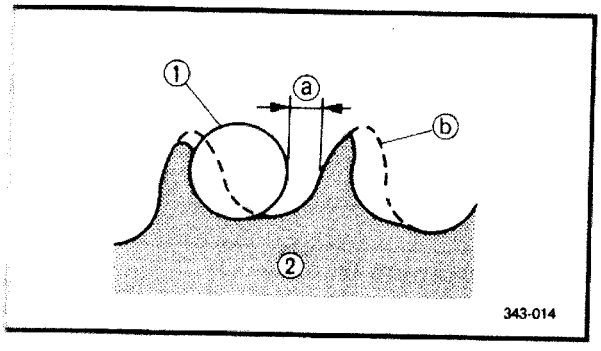
5.Measure:
- Bearing diameter ⓐ (camshaft)
  Out of specification → Replace the camshaft.
  Within specification → Replace camshaft case and camshaft caps as a set.

Bearing diameter (camshaft):
22.967 ~ 22.980 mm
(0.9042 ~ 0.9047 in)



TIMING CHAIN, SPROCKET AND CHAIN GUIDE

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



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

ⓐ 1/4 tooth
ⓑ Correct
① Roller
② Sprocket

3.Inspect:
- Timing chain guide (exhaust)
- Timing chain guide (intake)
- Timing chain guide (upper)
  Wear/Damage → Replace.

TIMING CHAIN TENSIONER

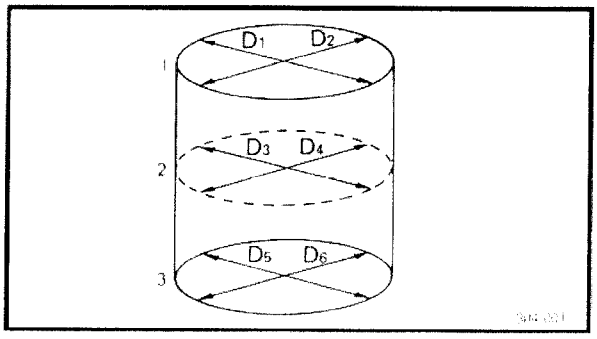
1.Check:
- One-way cam operation
  Unsmooth operation → Replace.

2.Inspect:
- All parts
  Damage/Wear → Replace.

CYLINDER AND PISTON

1.Inspect:
- Cylinder and Piston walls
  Vertical scratches → Replace cylinder and piston.

2.Measure:
- Piston-to-cylinder clearance



****

Measurement steps:

First step:

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

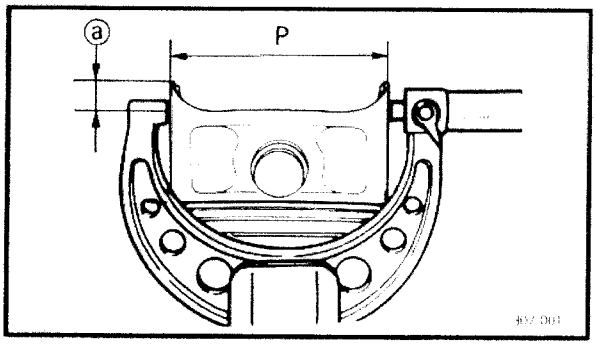
NOTE:

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"	**62.00 ~ 62.01 mm (2.4409 ~ 2.4413 in)**
Taper limit "T"	**0.09 mm (0.004 in)**
Out of round "R"	**0.07 mm (0.0028 in)**

"C" = Maximum D
"T" = (Maximum D_1, or D_2) – (Maximum D_5 or D_6)
"R" = (Maximum D_1, D_3 or D_5) – (Minimum D_2, D_4 or D_6)

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



2nd step:

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

ⓐ 5 mm (0.197 in) from the piston bottom edge.

	Piston size P
Standard	**61.960 ~ 61.975 mm (2.439 ~ 2.440 in)**

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

3rd step:

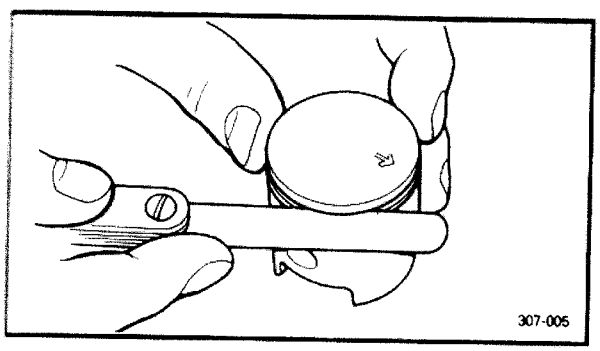
- Calculate the piston-to-cylinder clearance with following formula:

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

Piston-to-cylinder clearance:
0.025 ~ 0.050 mm
(0.0010 ~ 0.0020 in)
<Limit>: 0.07 mm (0.0028 in)

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

****



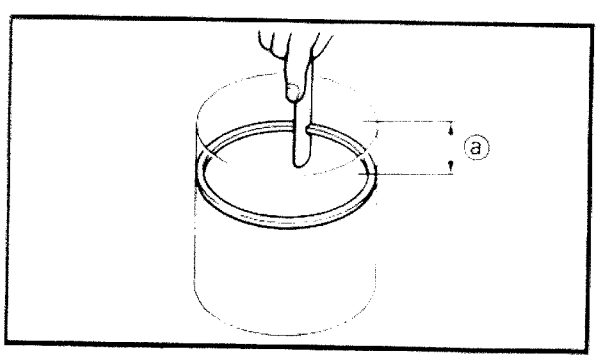
PISTON RING

1.Measure:

- Side clearance
  Out of specification → Replace piston and rings as a set.

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

Side clearance:
Top ring:
0.020 ~ 0.075 mm (0.001 ~ 0.003 in)
<Limit>: 0.1 mm (0.004 in)
2nd ring:
0.020 ~ 0.055 mm (0.001 ~ 0.002 in)
<Limit>: 0.1 mm (0.004 in)



2.Position:

- Piston ring
  (into cylinder)

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

ⓐ 20 mm (0.8 in)

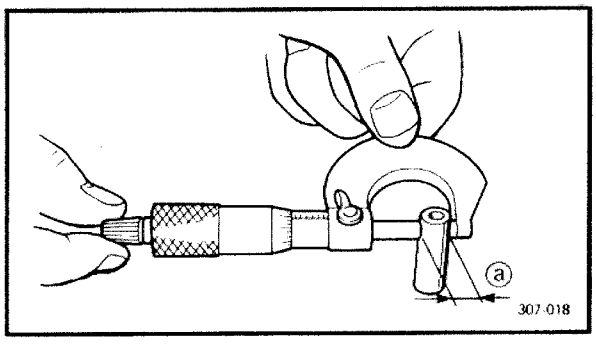
3.Measure:
- End gap
  Out of specification → Replace.

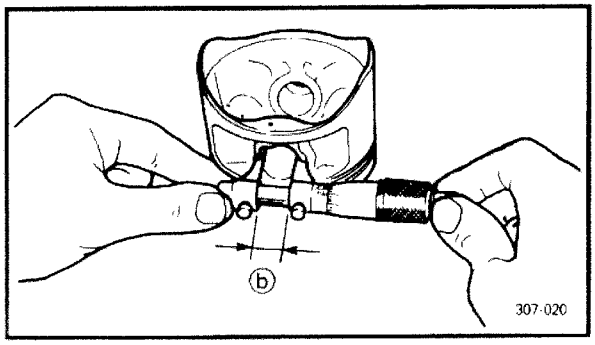
NOTE:
You cannot measure the end gap on the expander spacer of the oil control ring. If the oil control ring rails show excessive gap, replace all three rings.

End gap:
Top ring:
0.15 ~ 0.30 mm (0.006 ~ 0.012 in)
<Limit>: 0.6 mm (0.024 in)
2nd ring:
0.25 ~ 0.40 mm (0.010 ~ 0.016 in)
<Limit>: 0.7 mm (0.028 in)
Oil ring:
0.10 ~ 0.35 mm (0.004 ~ 0.014 in)

PISTON PIN
1.Inspect:
- Piston pin
  Blue discoloration/Grooves → Replace, then inspect lubrication system.

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





****

Measurement steps:
- Measure the piston pin outside diameter ⓐ.
  If out of specification, replace the piston pin.

Outside diameter (piston pin):
16.991 ~ 17.000 mm
(0.6689 ~ 0.6693 in)

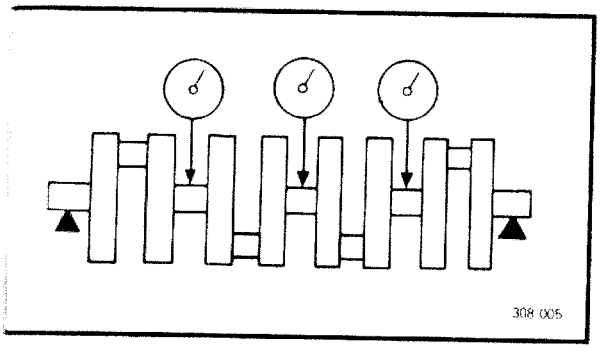
- Measure the piston inside diameter ⓑ.
- Calculate the piston pin-to-piston clearance with following formula:

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

● If out of specification, replace the piston.

Piston pin-to-piston clearance =
0.002 ~ 0.022 mm
(0.00008 ~ 0.00087 in)
<Limit>: 0.07 mm (0.003 in)

****



CRANKSHAFT AND CONNECTING ROD

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

Runout:
Less than 0.03 mm (0.0012 in)

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

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

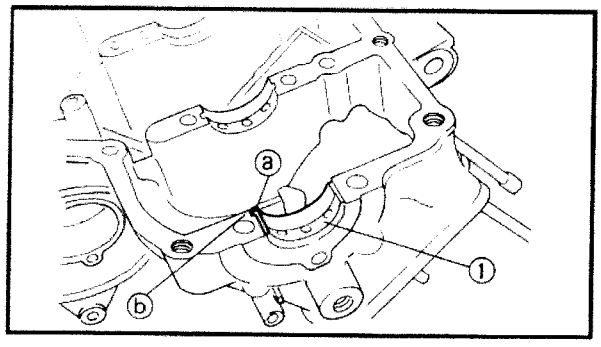
Oil clearance:
0.005 ~ 0.035 mm
(0.0002 ~ 0.0014 in)

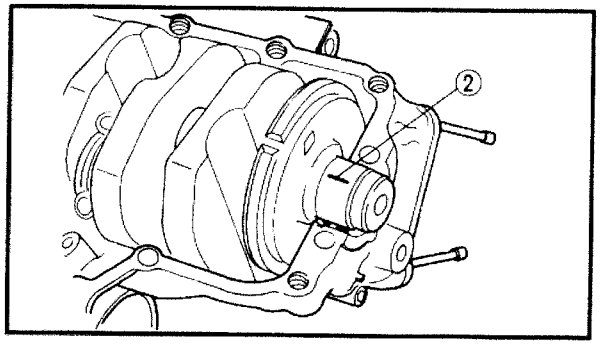
****

Measurement 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, main journals and bearing portions of the crankcase.
- Place the crankcase (upper) on a bench in an upside down position.
- Install the upper half of the bearings ① and the crankshaft into the crankcase (upper).

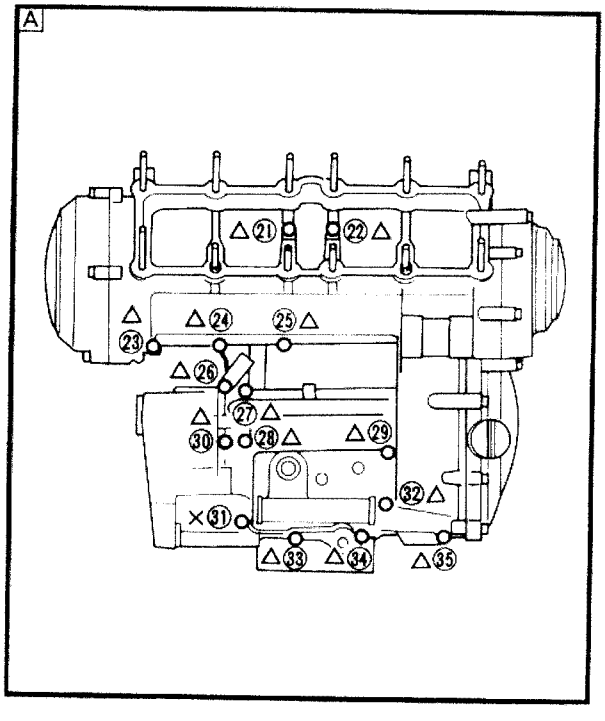
NOTE:
Align the projection ⓐ of the bearing with the notch ⓑ in the crankcase.

- Put a piece of Plastigauge® ② on each main journal.

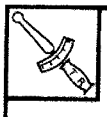
NOTE:
Do not put the Plastigauge® over the oil hole in the main journal of the crankshaft.

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

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

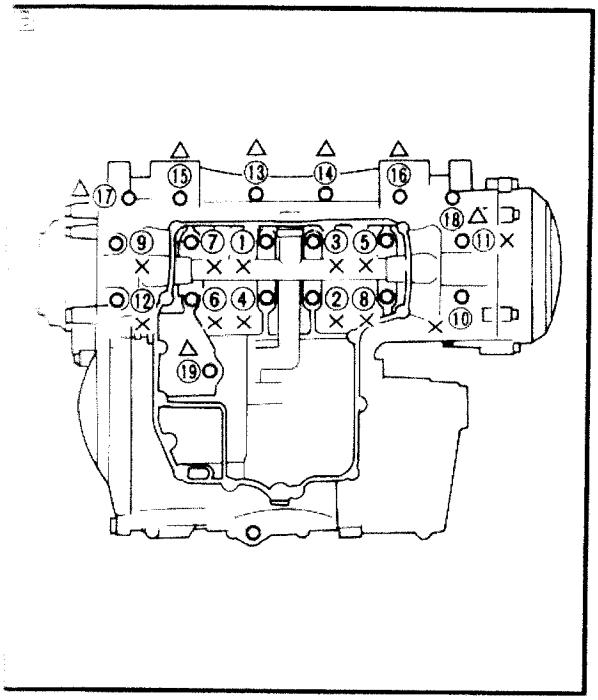


- Tighten the bolt to specification in the tightening sequence cast on the crankcase.



Bolt (crankcase):
× M8 (① ~ ⑫ and ㉛):
24 Nm (2.4 m • kg, 17 ft • lb)
△ M6 (⑬ ~ ㉚ and ㉜ ~ ㉟):
12 Nm (1.2 m • kg, 8.7 ft • lb)

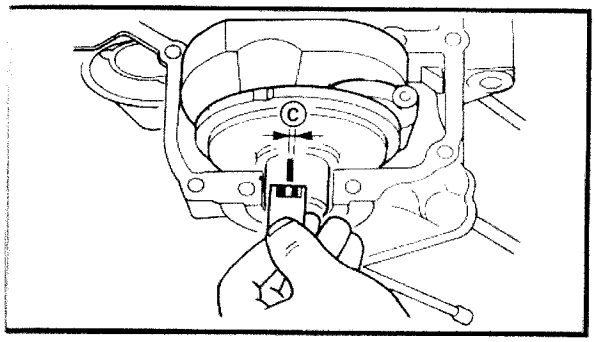
A Upper case



Ⓑ Lower case

NOTE:
- Lubricate the threads of bolts (M8) with molybdenum disulfide motor oil.
- Lubricate the threads of bolts (M6) with engine oil.

● Remove the crankcase (lower) and lower half of the bearing.



● 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.

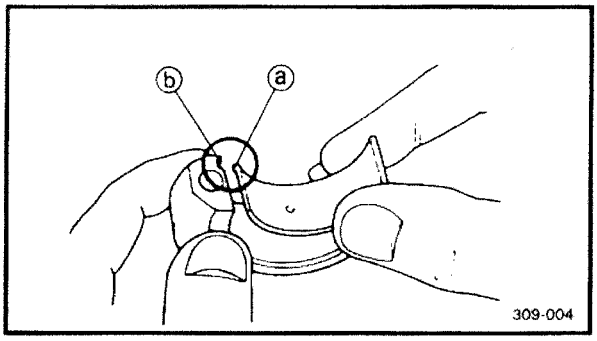
Oil clearance:
0.043 ~ 0.066 mm
(0.0017 ~ 0.0026 in)

****

Measurement steps:

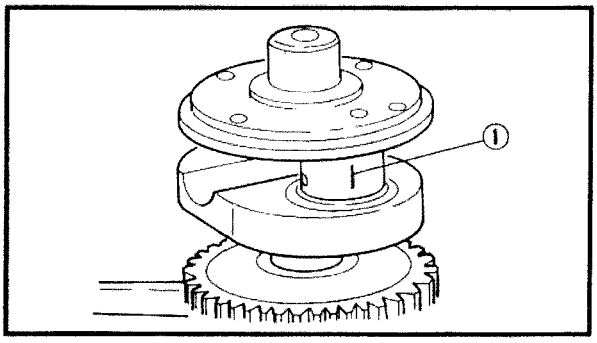
CAUTION:

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.



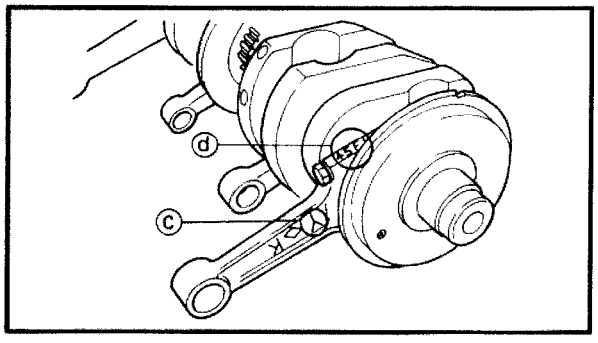
- Clean the bearings, crank pins and bearing portions of the connecting rods.
- Install the upper half of the bearing into the connecting rod and lower half of the bearing into the connecting rod cap.

NOTE:
Align the projection ⓐ of the bearing with the notch ⓑ of the cap and connecting rod.



- Put a piece of Plastigauge® ① on the crank pin.
- Assemble the connecting rod halves.

NOTE:
- Do not move the connecting rod or crankshaft until the oil clearance measurement has been completed.
- Apply molybdenum disulfide grease to the bolts, threads and nut seats.
- Make sure the "Y" marks ⓒ on the connecting rods face the left side of the crankshaft.
- Make sure that the letters ⓓ on both components align to from a perfect character.

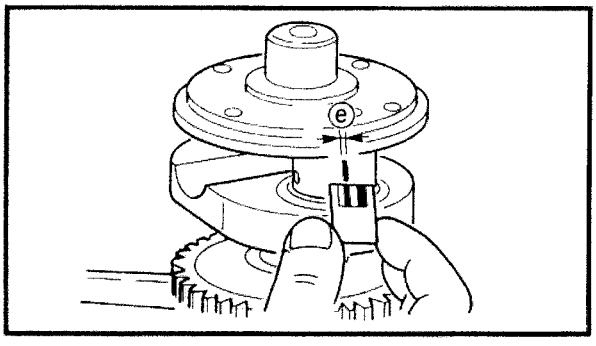


- Tighten the nuts.



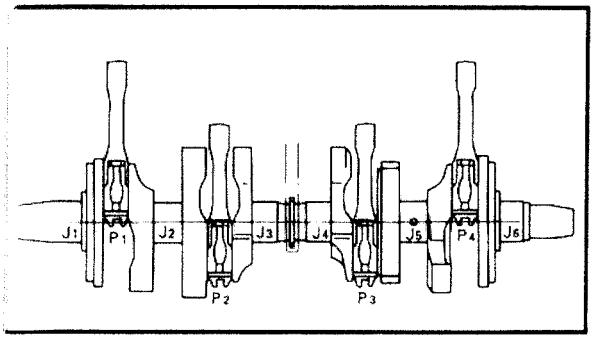
Nut:
15 Nm (1.5 m • kg, 11 ft • lb) +
Tighten the nut another 90°

Refer to the "ENGINE ASSEMBLY AND ADJUSTMENT — CONNECTING ROD" section.

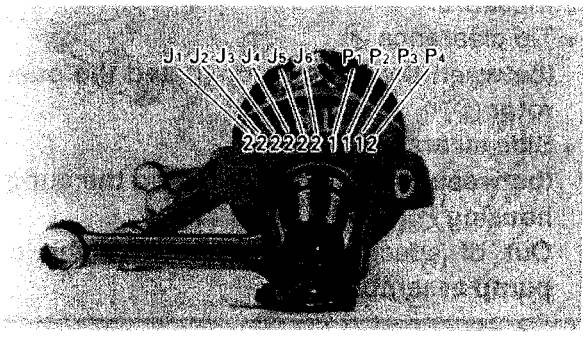


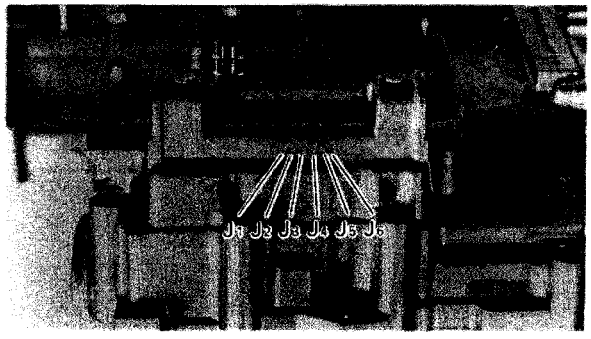
- Remove the connecting rods and bearings.
- Measure the compressed Plastigauge® width ⓔ on each crank pin.
  If oil clearance is out of specification, select a replacement bearing.

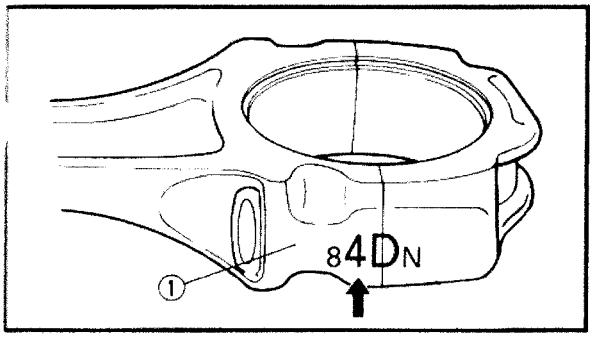
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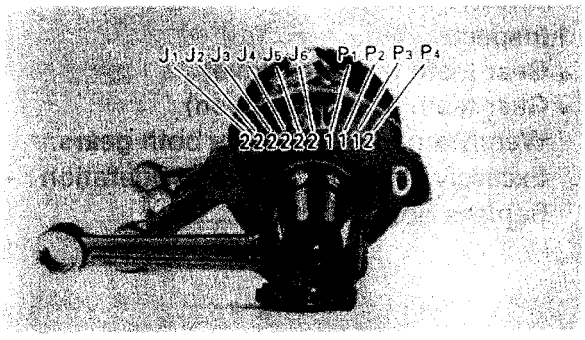


5.Select:
- Main journal bearing ($J_1 \sim J_6$)
- Crank pin bearing ($P_1 \sim P_4$)









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Selection of bearings:

Example 1: Main journal bearing

- If "J_1" on the crankcase is "6" and "2" on the crankweb, then the bearing size for "J_1" is:

Bearing size of J_1:
Crankcase J_1 – Crankweb J_1 + 1 =
6 – 2 + 1 = 5 (Yellow)

BEARING COLOR CODE	
1	Blue
2	Black
3	Brown
4	Green
5	Yellow
6	Pink

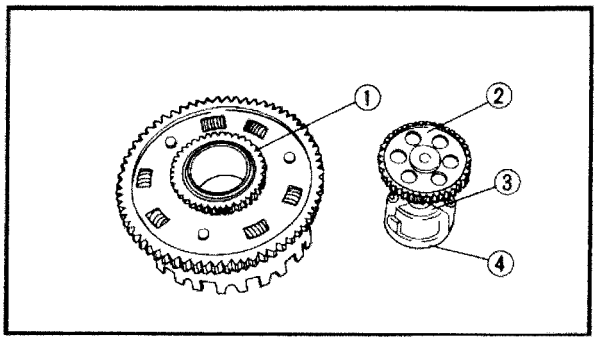
Example 2: Crank pin bearing

- If "P_1" on the connecting rod is "4" and "1" on the crankweb, then the bearing size for "P_1" is:

Bearing size of P_1:
Connecting rod P_1 – Crankweb P_1 =
4 – 1 = 3 (Brown)

BEARING COLOR CODE	
1	Blue
2	Black
3	Brown
4	Green

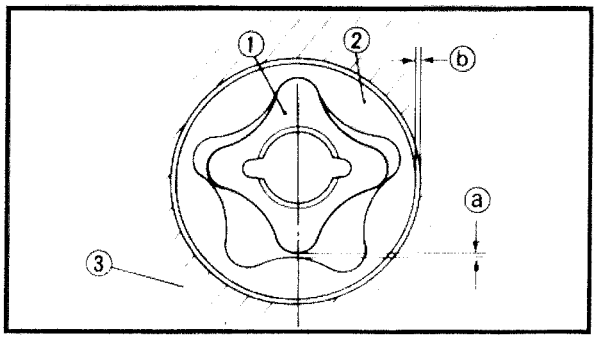
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OIL PUMP

1.Inspect:
- Drive gear (oil pump ①)
- Driven gear (oil pump ②)
- Pump housing ③
- Pump housing cover ④

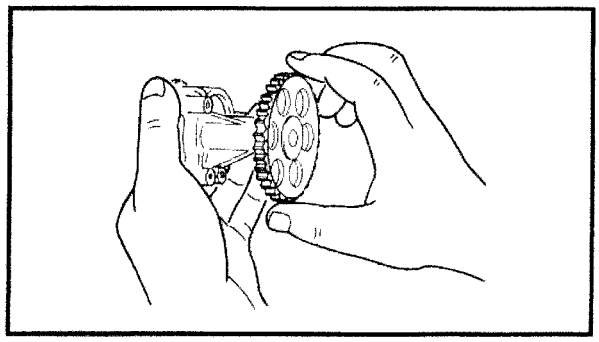
Wear/Cracks/Damage → Replace.



2.Measure:
- Tip clearance ⓐ (between the inner rotor ① and the outer rotor ②)
- Side clearance ⓑ (between the outer rotor ② and the pump housing ③)

Out of specification → Replace the oil pump assembly.

Tip clearance:
0.03 ~ 0.09 mm
(0.001 ~ 0.004 in)
Side clearance:
0.03 ~ 0.08 mm
(0.001 ~ 0.003 in)



3.Check:
- Oil pump operation

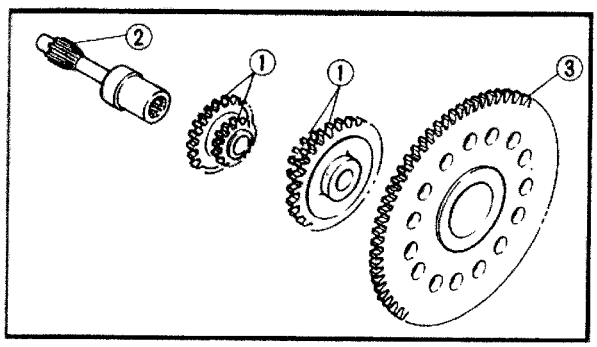
Unsmooth → Repeat steps 1 and 2 or replace defective parts.

PRIMARY DRIVE

1.Inspect:
- Gear teeth (primary drive)
- Gear teeth (primary driven)

Wear/Damage → Replace both gears.
Excessive noises during operation → Replace both gears.

Primary reduction ratio:		
No. of teeth		Ratio
Drive	Driven	
48	82	1.708

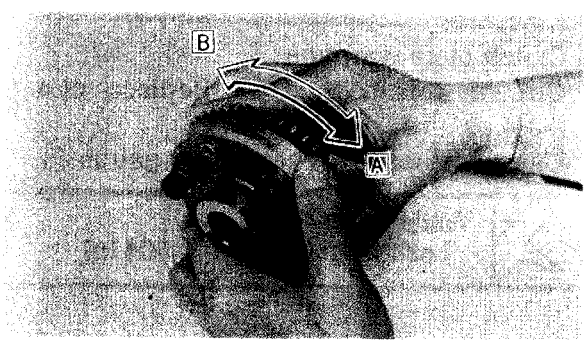


STARTER DRIVES

1.Inspect:

- Gear teeth (starter idle ①)
- Gear teeth (starter drive ②)
- Gear teeth (starter wheel ③)

Burrs/Chips/Roughness/Wear → Replace.



2.Check:

- Starter clutch operation

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Clutch operation checking steps:

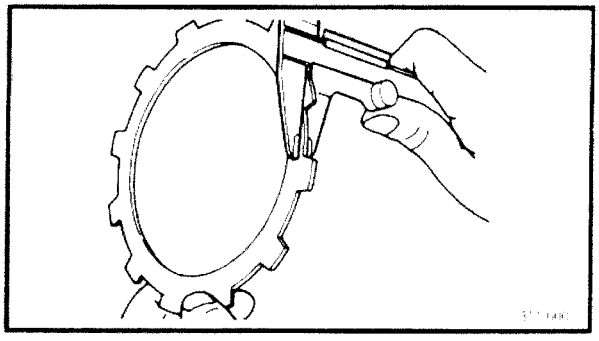
- Install the starter wheel gear to the starter clutch, and hold the starter clutch.
- When turning the starter wheel gear clockwise [A], the starter clutch and the wheel gear should be engaged.
  If not, the starter clutch is faulty. Replace it.
- When turning the starter wheel gear counterclockwise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

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CLUTCH

1.Inspect:

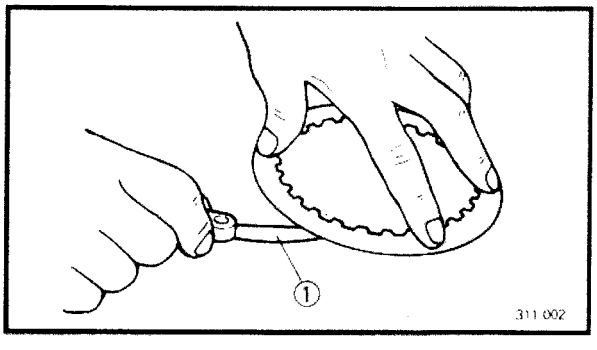
- Friction plate
  Damage/Wear → Replace friction plates as a set.



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

Thickness:
2.92 ~ 3.08 mm (0.115 ~ 0.121 in)
<Limit>: 2.8 mm (0.11 in)

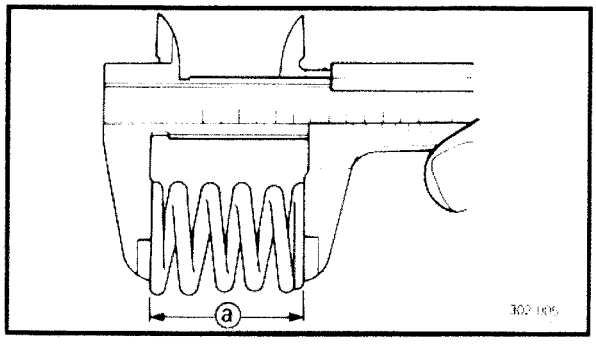
3.Inspect:
- Clutch plate
  Damage → Replace clutch plates as a set.



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

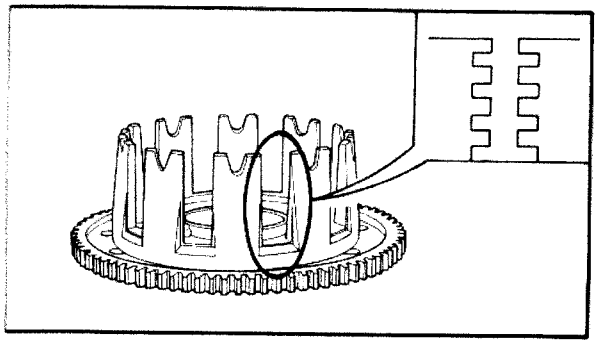
Warp limit:
Less than 0.1 mm (0.004 in)

5.Inspect:
- Clutch spring
  Damage → Replace springs as a set.



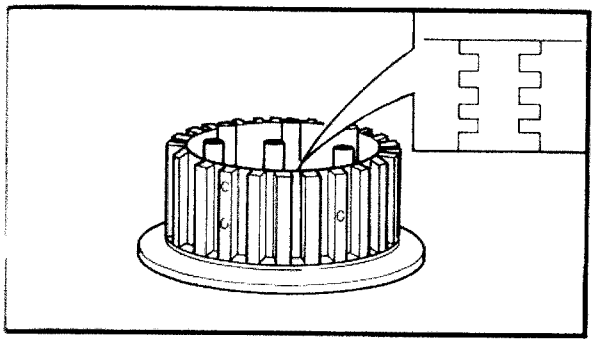
6.Measure:
- Free length ⓐ (clutch spring)
  Out of specification → Replace spring as a set.

Free length (clutch spring):
40.4 mm (1.59 in)
<Limit>: 39.3 mm (1.55 in)



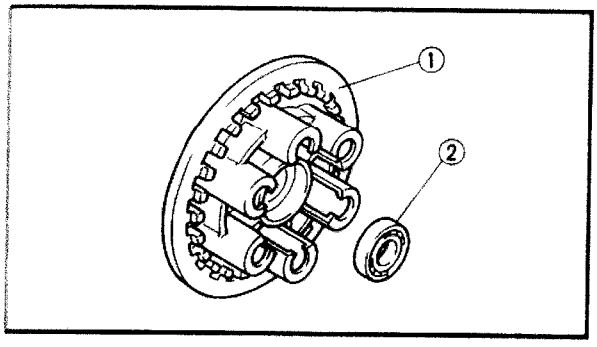
7.Inspect:
- Dogs
  (on the clutch housing)
  Pitting/Wear/Damage → Deburr or replace.
- Clutch housing bearing
  Wear/Damage → Replace clutch housing.

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

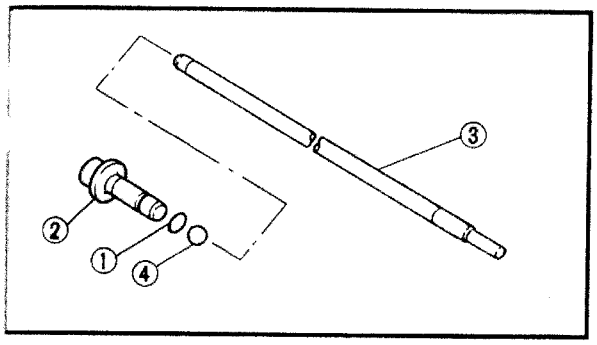


8.Inspect:
- Clutch boss splines
  Pitting/Wear/Damage → Replace clutch boss.

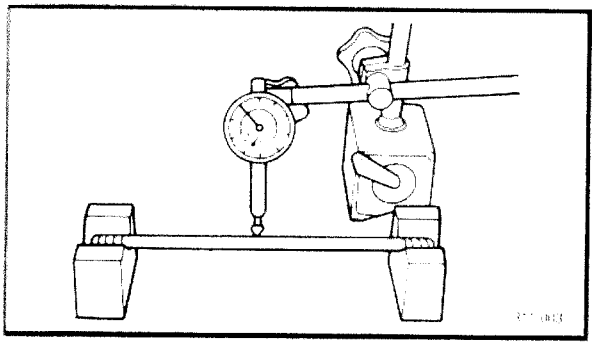
NOTE:
Pitting on the clutch boss splines will cause erratic operation.



9.Inspect:
- Pressure plate ①
  Cracks/Damage → Replace.
- Bearing ②
  Wear/Damage → Replace.

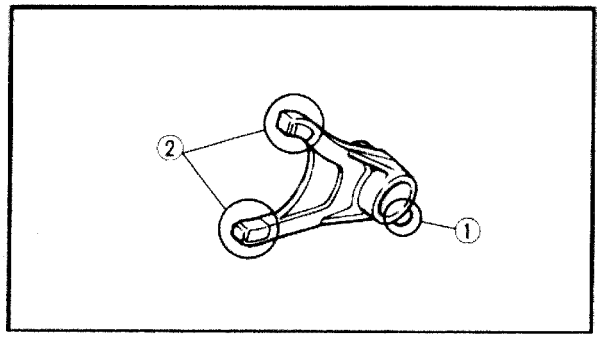


10.Inspect:
- O-ring ①
- Push rod #1 ②
- Push rod #2 ③
- Ball ④
  Wear/Crack/Damage → Replace.



11.Measure:
- Push rod #2
  Out of specification → Replace.

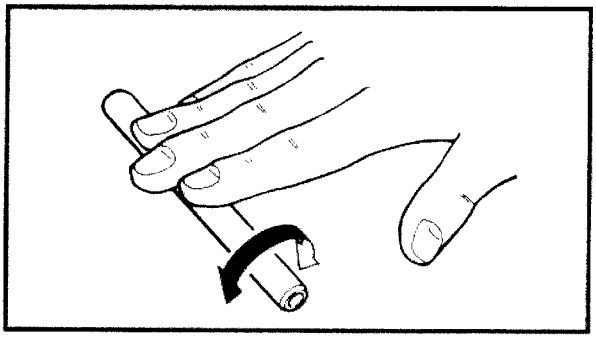
Bending limit:
0.3 mm (0.012 in)



TRANSMISSION AND SHIFTER

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

Scoring/Bends/Wear/Damage → Replace.

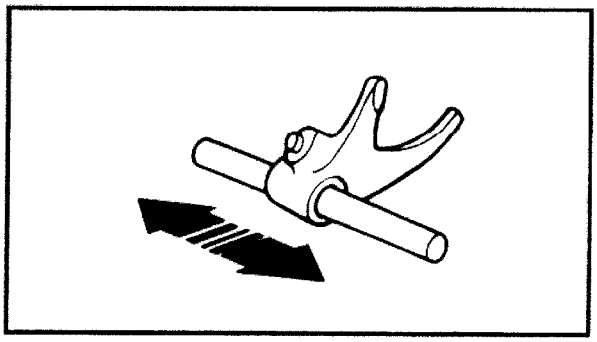


2.Inspect:
- Guide bar

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

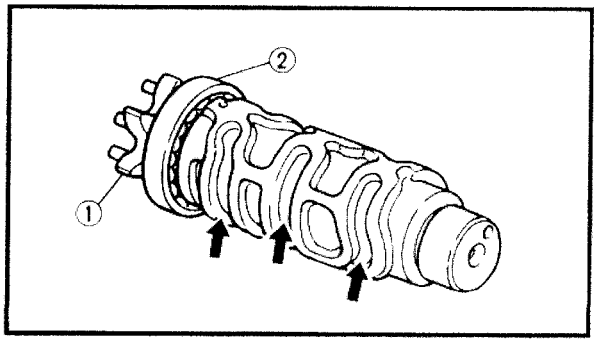
⚠ WARNING

Do not attempt to straighten a bent guide bar.



3.Check:
- Shift fork movement

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

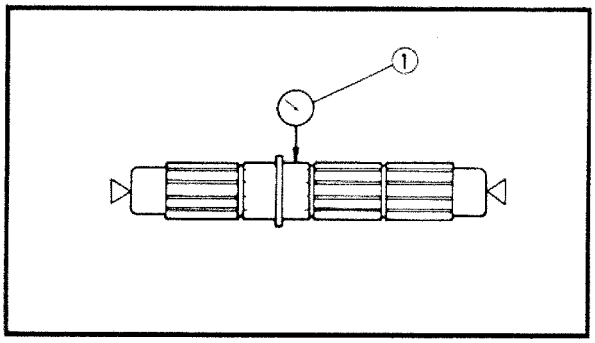


4.Inspect:
- Shift cam grooves

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

Damage/Wear → Replace.
- Shift cam bearing ②

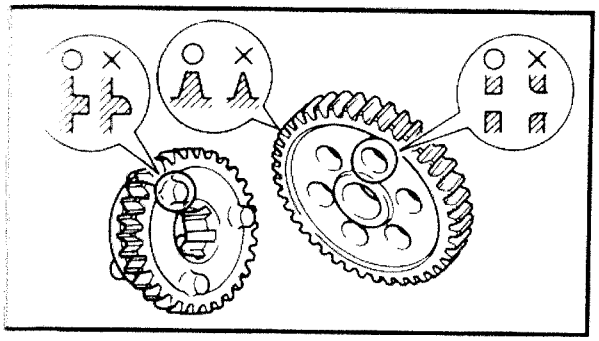
Pitting/Damage → Replace.



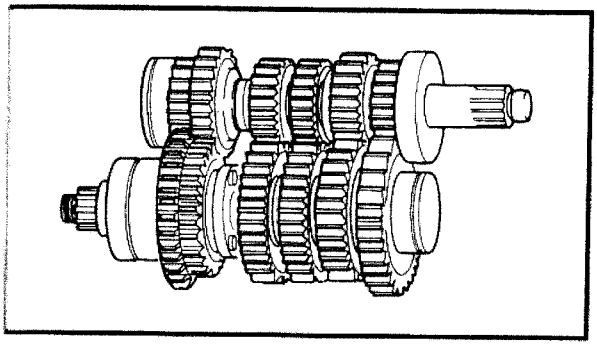
5.Measure:
- Axle runout (main and drive)

Use a centering device and dial gauge ①.
Out of specification → Replace.

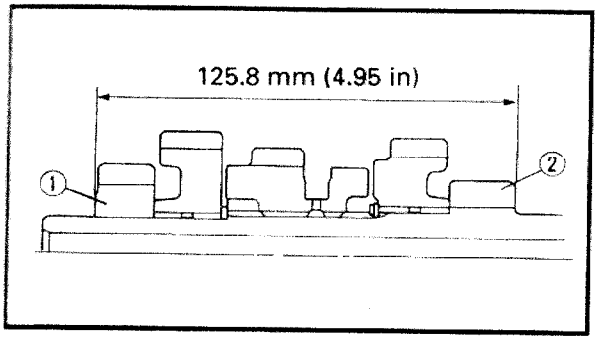
Runout limit:
0.04 mm (0.002 in)



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



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

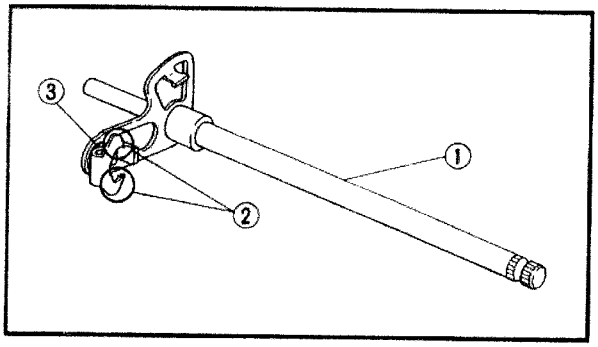


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Transmission gear reassembling point:
Press the 2nd pinion gear ① in the main axle ② as shown.

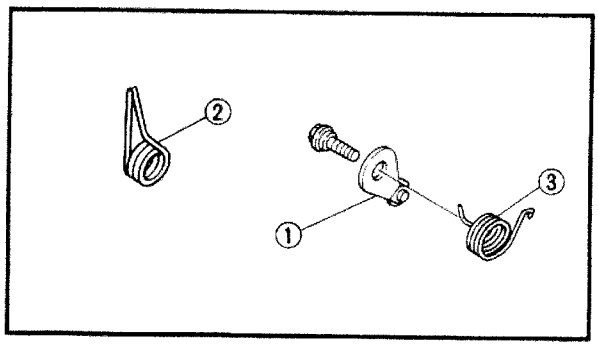
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8.Inspect:
- Circlips
  Damage/Looseness/Bends → Replace.



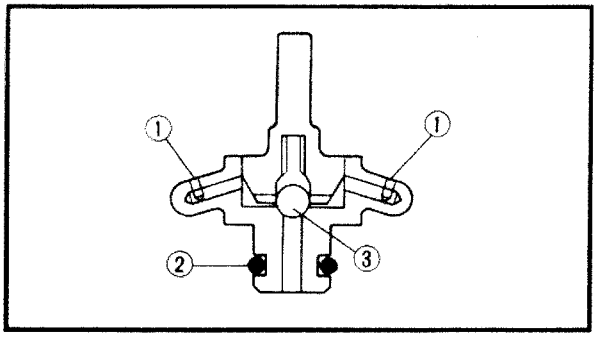
SHIFT SHAFT AND STOPPER LEVER

1.Inspect:
- Shift shaft ①
- Shift pawls ②
- Return spring ③ (shift pawls)
  Bends/Wear/Damage → Replace.



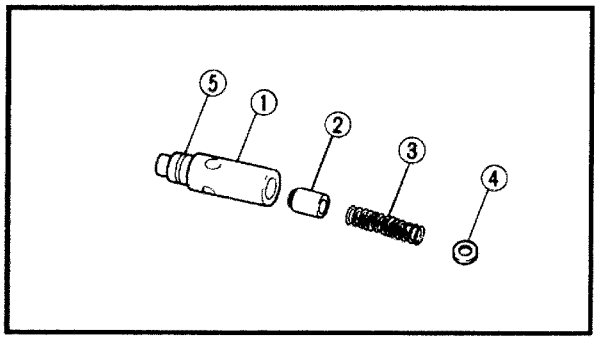
2.Inspect:
- Stopper lever ①
  Roller turns roughly → Replace.
  Bends/Damage → Replace.

3.Inspect:
- Return spring ② (shift shaft)
- Return spring ③ (stopper lever)
  Wear/Damage → Replace.



OIL-JET NOZZLE

1.Check:
- Oil-jet nozzles ①
- O-ring ②
- Check ball ③
  Damage/Wear → Replace.
- Oil jet passage
  Clogged → Blow out with compressed air.

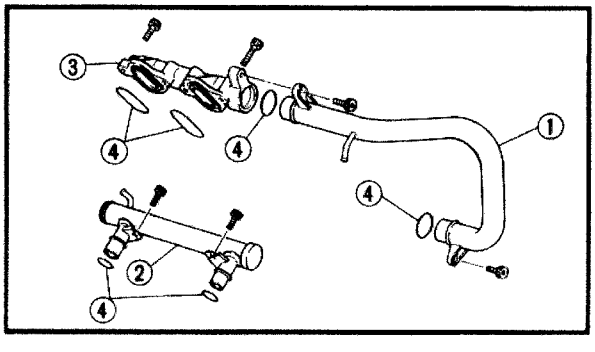


RELIEF VALVE, OIL PIPE AND STRAINER

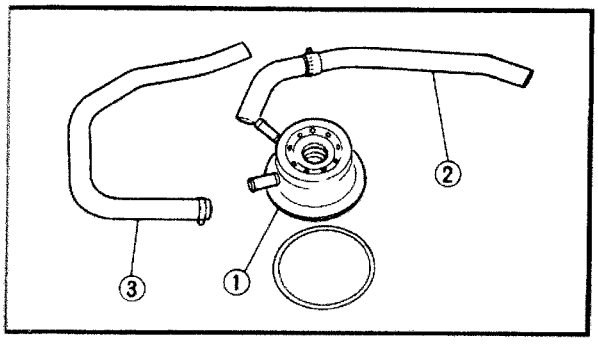
1.Check:
- Relief valve body ①
- Valve ②
- Spring ③
- Spring seat ④
- O-ring ⑤
  Damage/Wear → Replace.

2.Check:
- Oil delivery pipe
  Damage → Replace.
  Contamination → Wash and blow out the passage.

3.Inspect:
- Oil strainer
  Damage → Replace.



4.Check:
- Coolant pipe ①
- Water jacket joint (outlet ② and inlet ③)
- O-rings ④
  Damage → Replace.
  Refer to the "COOLING SYSTEM" section in CHAPTER 5.



OIL COOLER

1.Check:
- Oil cooler ①
- Inlet hose ② (oil cooler)
- Outlet hose ③ (oil cooler)

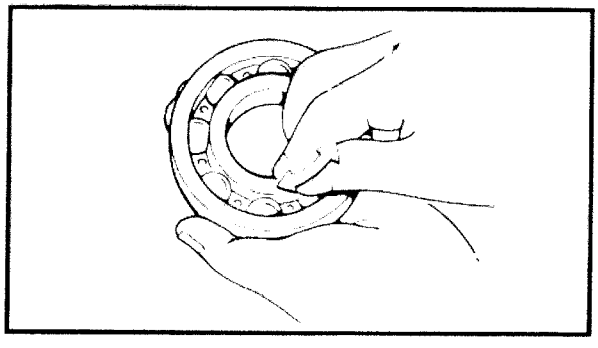
Cracks/Wear/Damage → Replace.

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

Cracks/Damage → Replace.
- Oil delivery passages

Clogged → Blow out with compressed air.



BEARING AND OIL SEAL

1.Inspect:
- Bearings

Clean and lubricate, then rotate inner race with finger.
Roughness → Replace.
2.Inspect:
- Oil seals

Damage/Wear → Replace.

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.

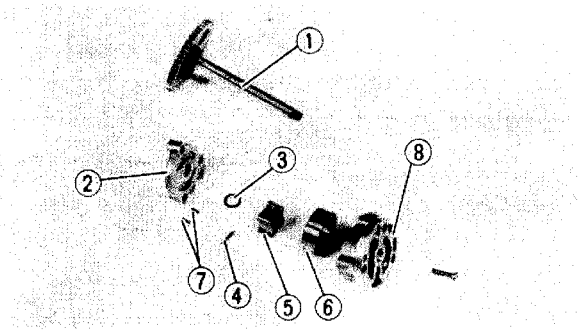
- **O-ring**
- **Gasket**
- **Oil seal**
- **Copper washer**
- **Lock washer**
- **Circlip**

OIL PUMP

1.Lubricate:

- Inner rotor
- Outer rotor
- Pump shaft

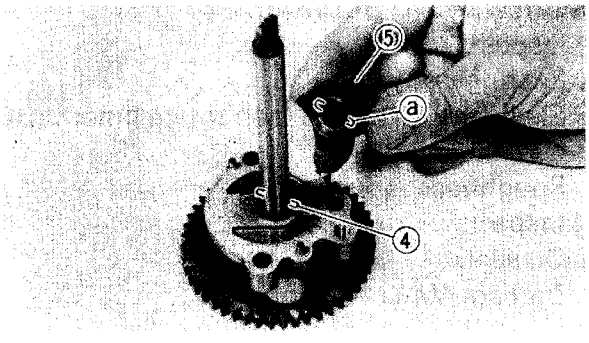
	Recommended lubricant: SAE 10W30 motor oil



2.Install:

- Pump shaft ①
  (to pump cover ②)
- Washer ③
- Pin ④
- Inner rotor ⑤
- Outer rotor ⑥
- Dowel pins ⑦
- Pump housing ⑧
- Screw

	Screw (pump housing): 7 Nm (0.7 m • kg, 5.1 ft • lb)

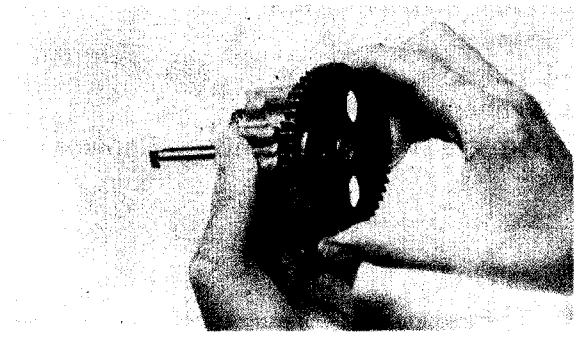


NOTE:

When installing the inner rotor, align the pin ④ in the pump shaft with the groove ⓐ on the inner rotor ⑤.

3.Check:

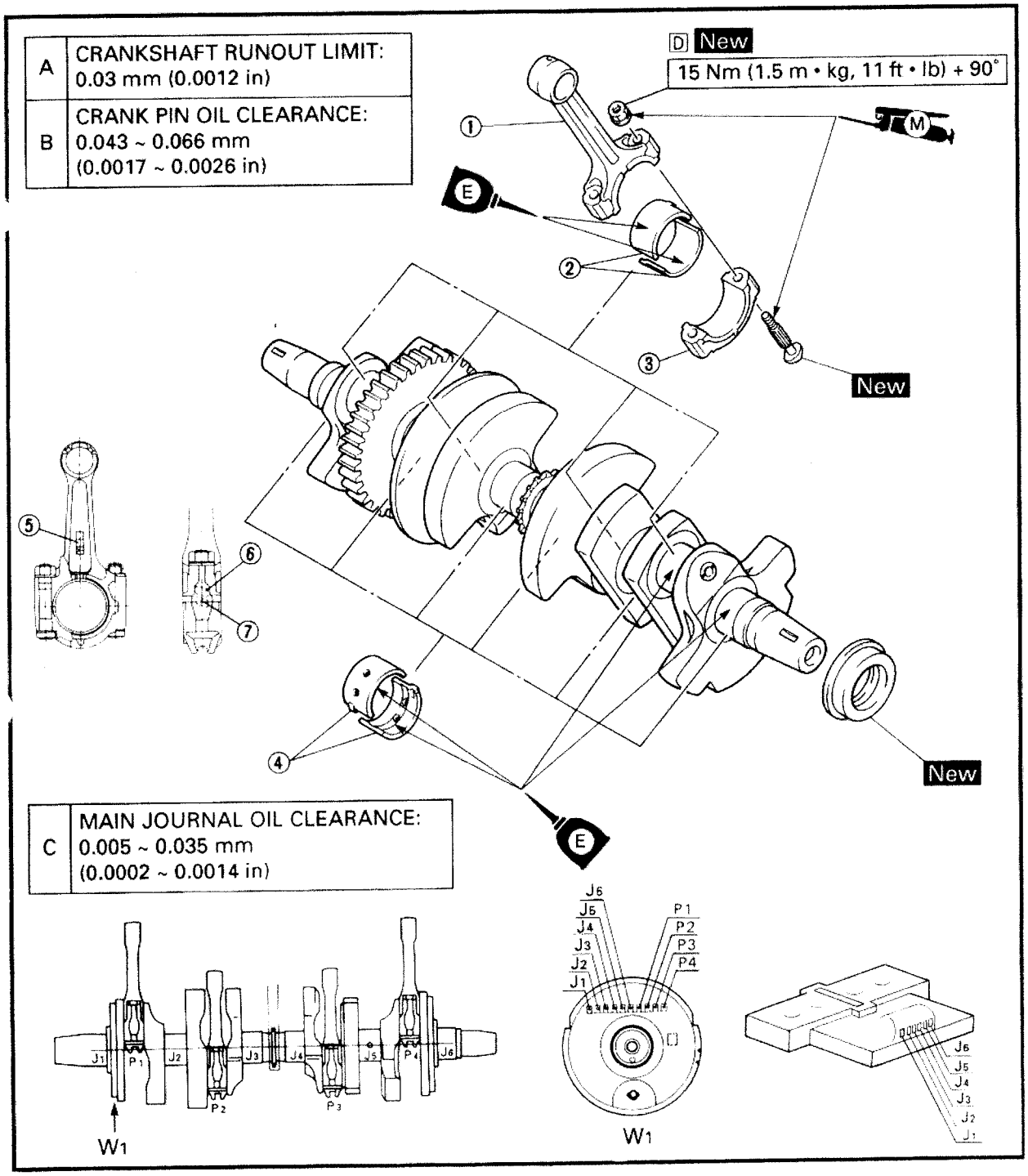
- Oil pump operation
  Refer to the "INSPECTION AND REPAIR - OIL PUMP" section.



CONNECTING ROD AND CRANKSHAFT

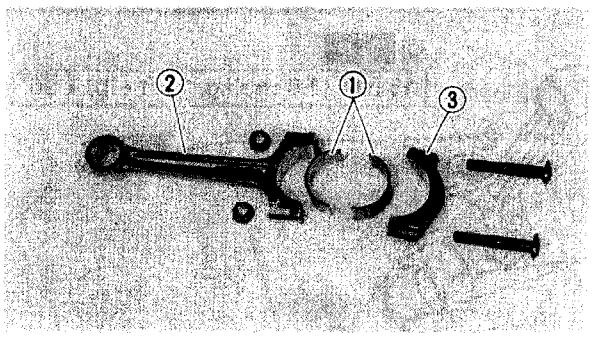
① Connecting rod
② Plane bearing (connecting rod)
③ Connecting rod cap
④ Plain bearing (crankshaft-main journal)
⑤ Projection mark
⑥ Crank pin bearing size
⑦ Connecting rod weight number

[D] After tightening to the specified torque, tighten another 90° (1/4 turn)



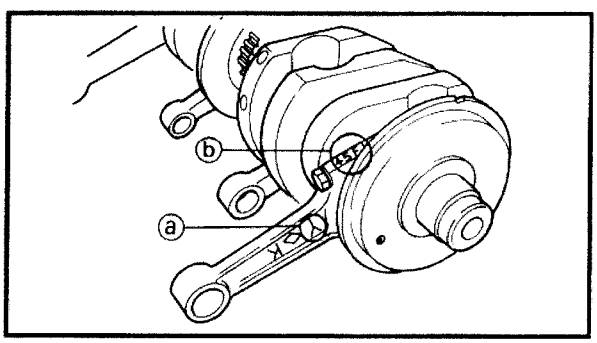
CONNECTING ROD

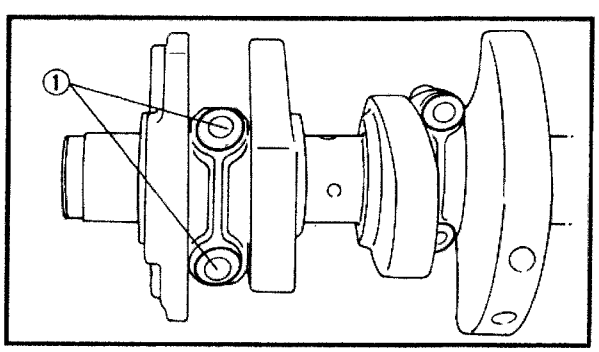
1.Apply:
- Molybdenum disulfide grease (onto threads of bolts and nut seats)
- Engine oil (onto crank pins, crank pin bearings and inner surfaces of connecting rods)



2.Install:
- Bearings ① (crank pin)
- Connecting rods ②
- Connecting rod caps ③ (onto crank pins)

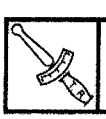
NOTE:
- Align the projection of bearing with the groove of the caps and connecting rod.
- Make sure to reinstalle each connecting rod bearing in its original place.
- The stamped "Y" mark ⓐ on the connecting rods should face towards the left of the crankshaft.
- Be sure that the letter ⓑ on both components align to from a perfect character.





3.Align:
- Bolt head ① (with connecting rod cap)

4.Tighten:
- Nuts (connecting rods)

	**Nut (connecting rod): 15 Nm (1.5 m • kg, 11 ft • lb) + 90°**

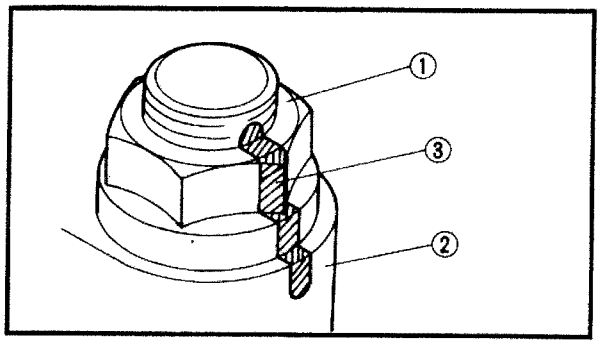
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Tightening steps:

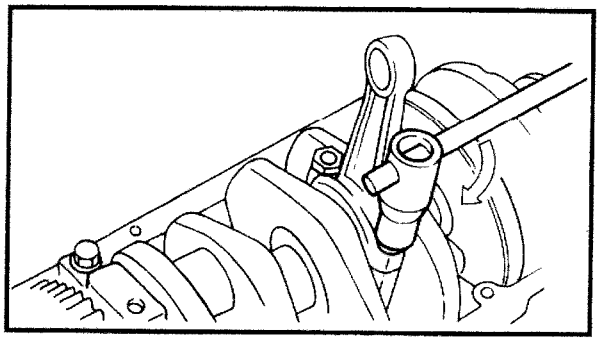
- Replace the connecting rod bolts and nuts with new ones.

CAUTION:

Tighten the connecting rod bolts using the plastic-region tightening angle method. Do not reuse bolts and nuts that have used before. Always install new bolts and nuts.



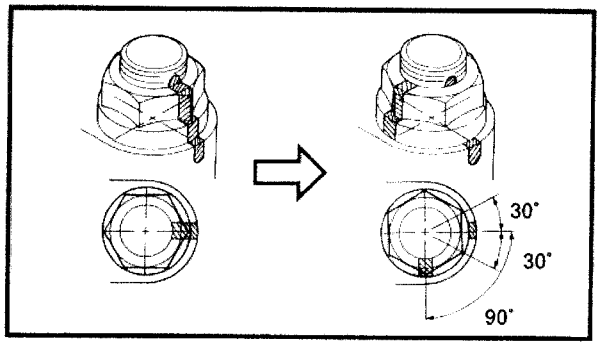
- Clean the connecting rod bolts and nuts.
- Tighten the connecting rod nuts.
- Put a mark ③ on the corner of the connecting rod nut ① and the connecting rod ②.



- Tighten the nut further to the specified angle (90°).

⚠ WARNING

When the nut is tightened more than the specified angle, do not loosen the nut to the specified angle.
Replace the bolt with a new one and perform the procedure again.

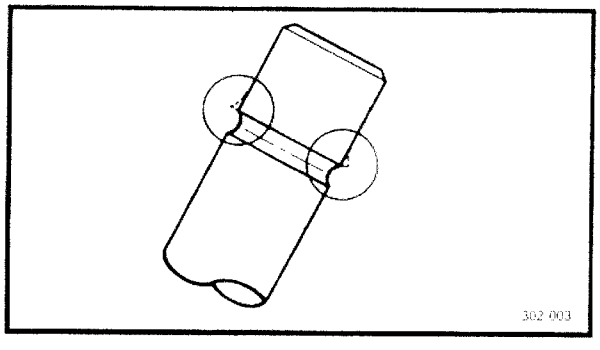


CAUTION:

- **Do not use a torque wrench to tighten the nut to the specified angle.**
- **Tighten the nut further if it is not tightened to the specified angle.**

NOTE:

When using a hexagonal nut, note that the angle from one corner to another is 60°.

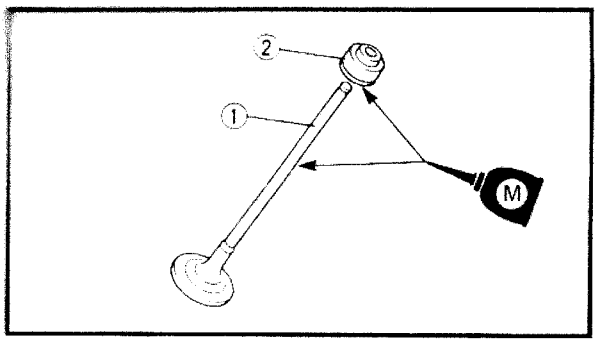


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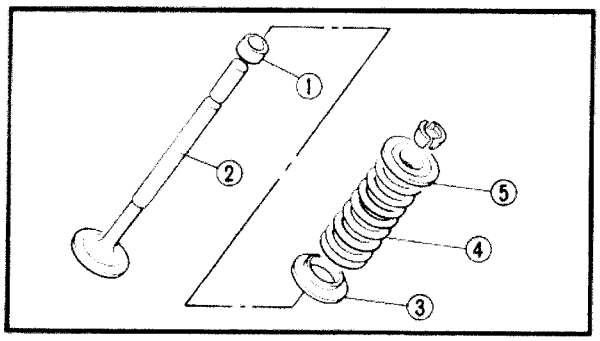
VALVE

1.Deburr:

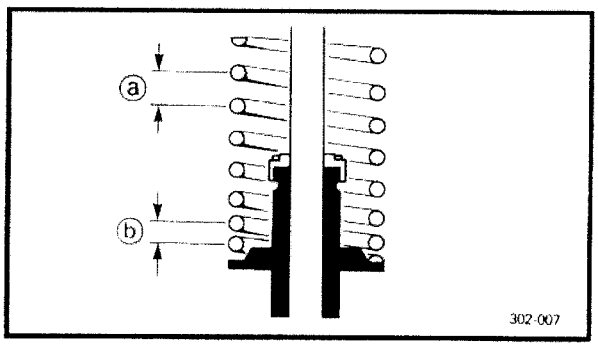
- Valve stem end
  Use an oil stone to smooth the stem end.



2.Apply:
- Molybdenum disulfide oil
  (onto valve stem ① and oil seal ②)

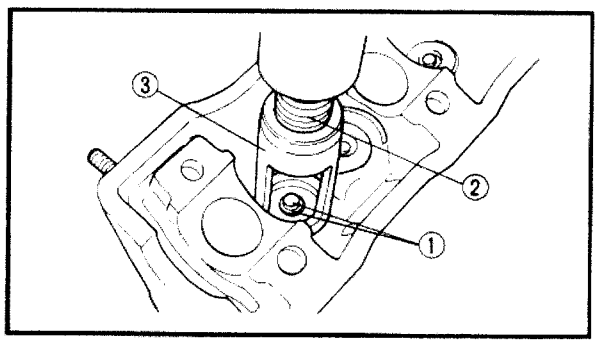


3.Install:
- Oil seal ①
- Valve ②
- Spring seat ③
- Valve spring ④
- Valve retainer ⑤
  (into cylinder head)



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

ⓑ Smaller pitch



4.Install:
- Valve cotters ①

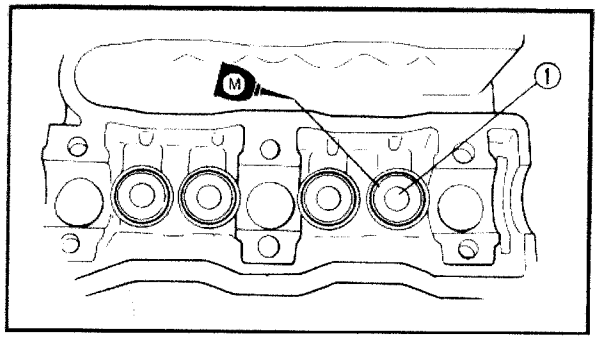
NOTE:
Install the valve cotters while compressing the valve spring with the valve spring compressor.



Valve spring compressor ②:
90890-04019
Attachment ③:
90890-04108

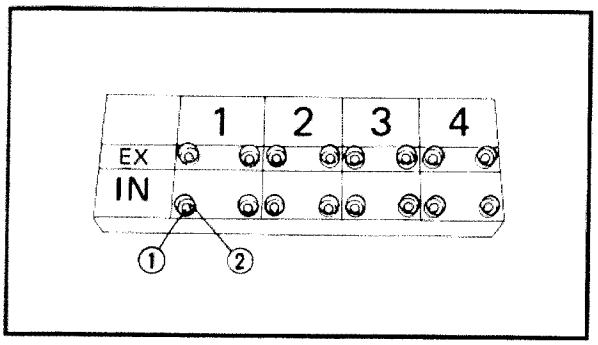
5.Secure the valve cotters ① onto the valve stem by tapping lightly with a piece of wood.

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



6.Install:
- Pads ①
- Valve lifters ②

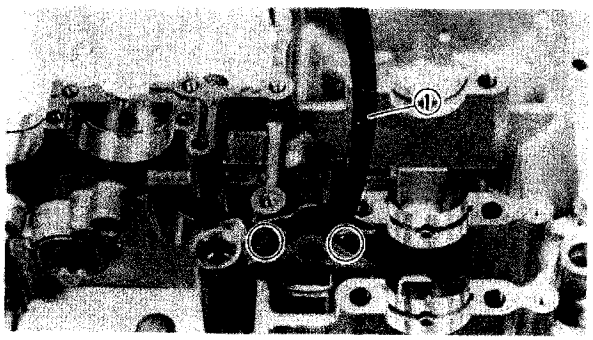
NOTE:
- Apply molybdenums disulfide oil to the valve lifters and pads.
- The valve lifters must move smoothly when rotated with the finger.
- Each valve lifter and pad must be reinstalled in its original position.

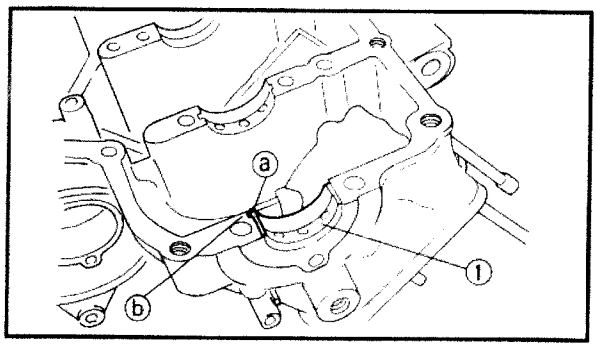


CRANKSHAFT

1.Install:
- Timing chain guide ① (intake side)

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





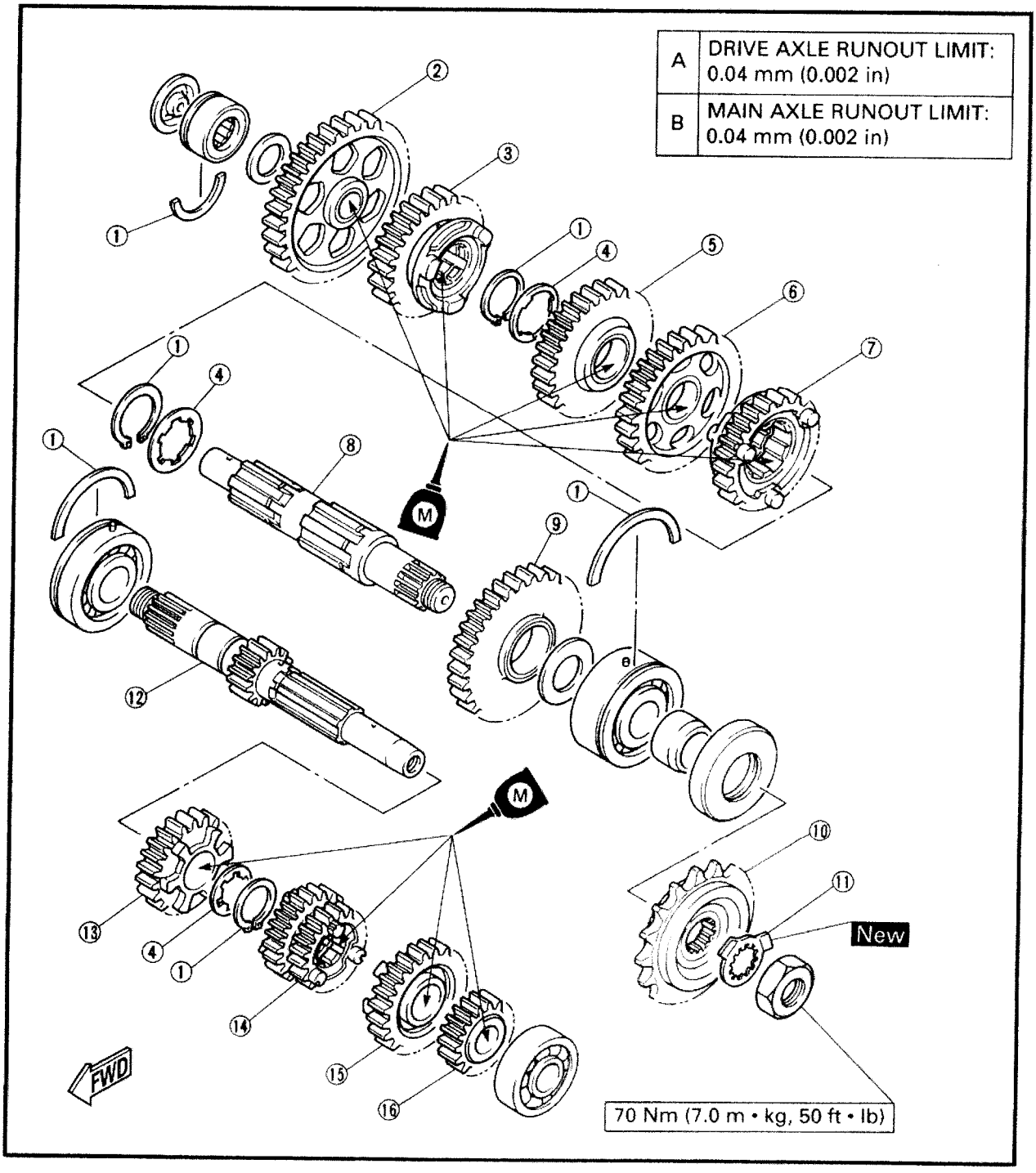
2.Install:
- Main journal bearings ①
  (onto upper crankcase)

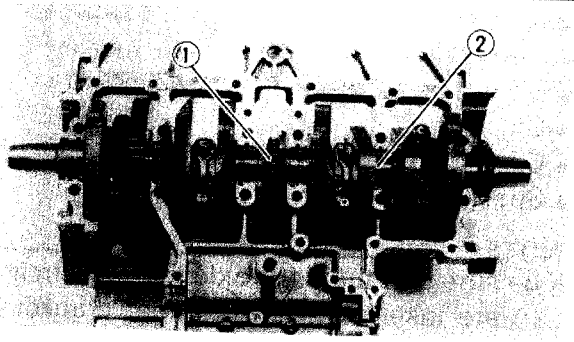
NOTE:
- Align the projection ⓐ of the bearing with the notch ⓑ in the case.
- Be sure to install each bearing (crankshaft) in its original place.

3.Apply engine oil to the bearing (main journal) surfaces.

TRANSMISSION

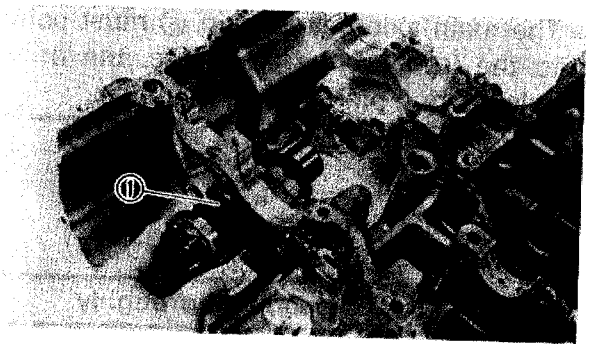
① Circlip
② 1st wheel gear
③ 5th wheel gear
④ Thrust washer
⑤ 4th wheel gear
⑥ 3rd wheel gear
⑦ 6th wheel gear
⑧ Drive axle
⑨ 2nd wheel gear
⑩ Drive sprocket
⑪ Lock washer
⑫ Main axle
⑬ 5th pinion gear
⑭ 3rd pinion gear
⑮ 6th pinion gear
⑯ 2nd pinion gear





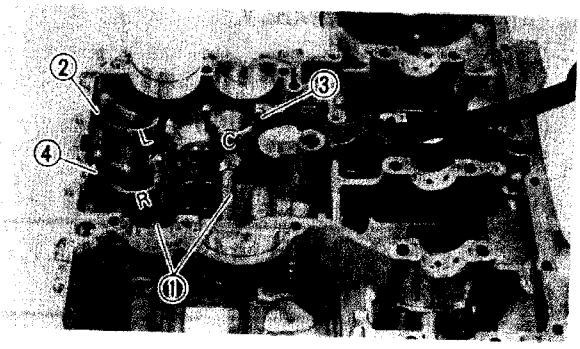
4.Install:
- Timing chain ①
  (onto crankshaft)
- Crankshaft assembly ②

NOTE:
Pass the timing chain thought the timing chain cavity and attach a retaining wire to it.



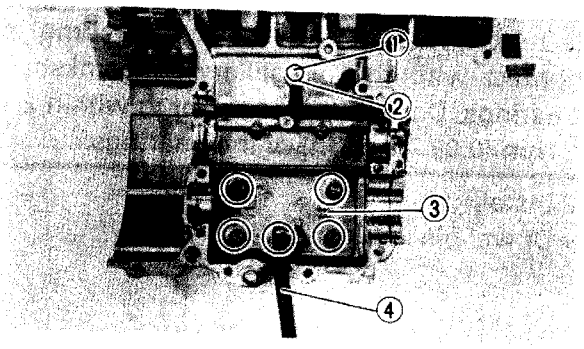
SHIFT FORK AND SHIFT CAM

1.Install:
- Shift cam assembly ①



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

NOTE:
Install the shift forks with the embossed mark to the right and in sequence (R, C, L) beginning from the right.



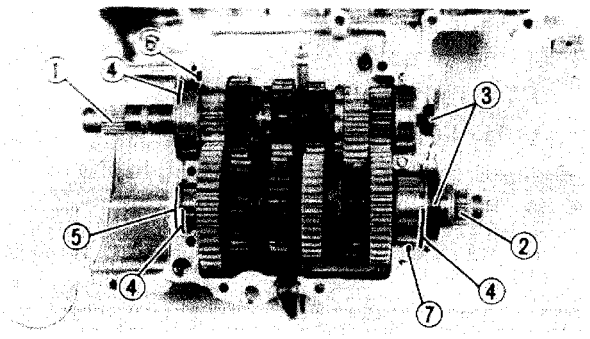
TRANSMISSION

1.Install:
- Oil valve ①
- O-ring ②
- Oil baffle plate ③
- Breather hose ④

	Screws (oil baffle plate): 7 Nm (0.7 m • kg, 5.1 ft • lb)

⚠ WARNING

Always use a new O-ring.



2.Install:
- Main axle assembly ①
- Drive axle assembly ②
- Oil seals ③
- Circlips ④
- Special washer ⑤

NOTE:
- Be sure that the drive axle bearing circlips ④ are inserted into the upper crankcase positioning grooves.
- The main axle bearing pin ⑥ must point to the front of the crankcase, the drive axle bearing pin ⑦ to the rear side.

3.Check:
- Transmission
  Unsmooth rotation → Repair.

NOTE:
Oil each gear and bearing thoroughly.

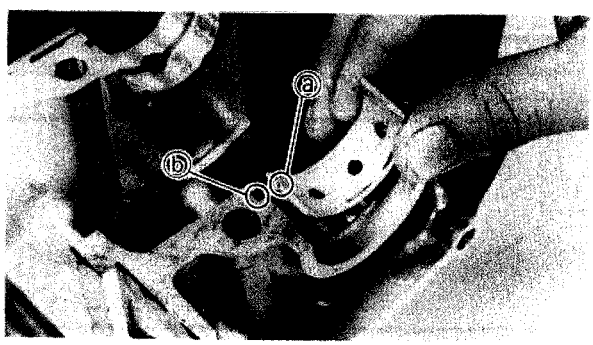
CRANKCASE ASSEMBLY

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

	Yamaha bond No. 1215: 90890-85505

NOTE:
DO NOT ALLOW any sealant to come in contact with the oil gallery or crankshaft bearings. Do not apply sealant to within 2 ~ 3 mm (0.08 ~ 0.12 in) of the bearings.

2.Install:
- Dowel pin



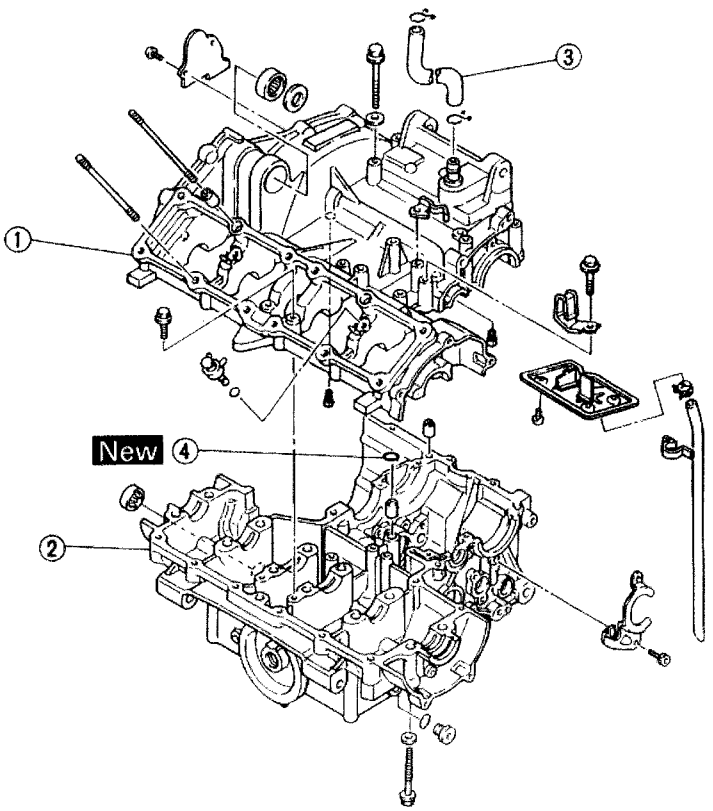
3.Install:
- Main journal bearings
  (onto lower crankcase)

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

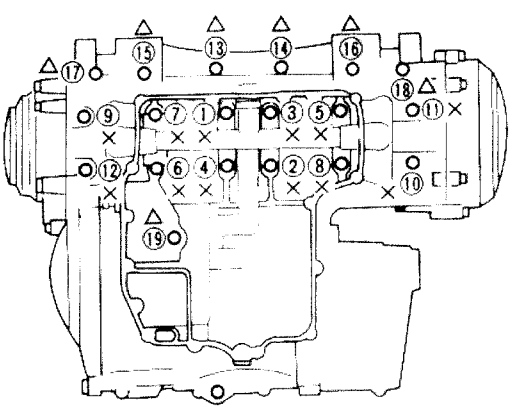
CRANKCASE

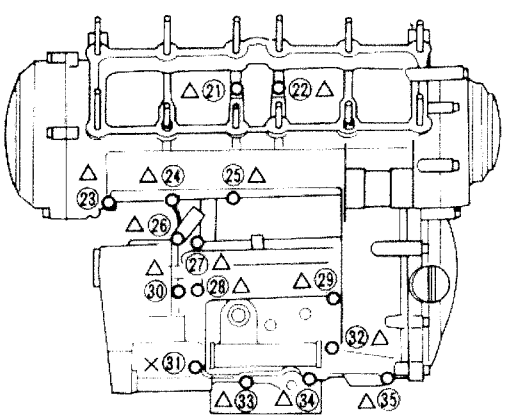
① Crankcase upper
② Crankcase lower
③ Crankcase breather hose
④ O-ring

Ⓐ Crankcase sequence tightening

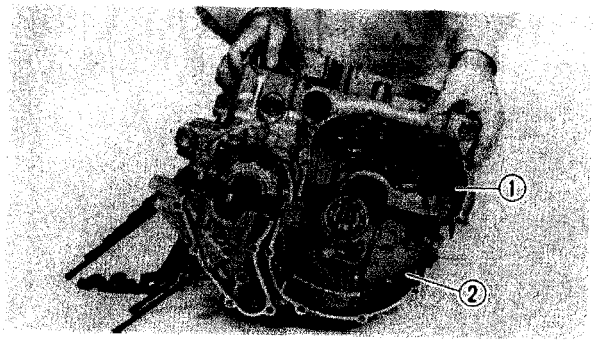


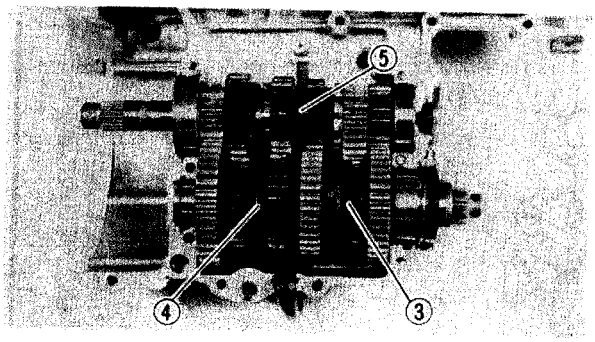
Ⓐ





① ~ ⑫, ㉚	24 Nm (2.4 m • kg, 17 ft • lb)
⑬ ~ ㉙, ㉛ ~ ㉟	12 Nm (1.2 m • kg, 8.7 ft • lb)





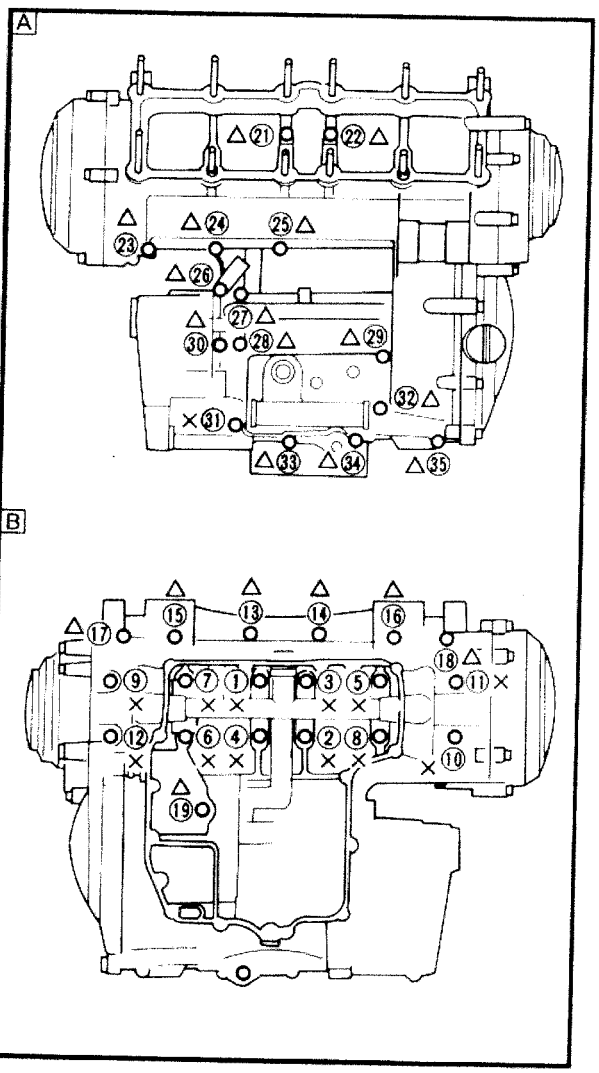
4.Set shift cam and transmission gears in "NEUTRAL" position.

5.Install:

- Lower crankcase ①
  (onto upper crankcase ②)
  Place the lower crankcase assembly onto the upper crankcase assembly.

NOTE:

- Carefully guide the shift forks so that they mesh smoothly with the transmission gears.
- Mesh the shift fork "L" with the 4th wheel gear ③ and "R" with the 5th wheel gear ④ on the drive axle.
- Mesh the shift fork "C" with the 3rd pinion gear ⑤ on the main axle.



CAUTION:

Before tightening the crankcase bolts, check the following points:

- **Be sure the gears shift correctly when the shift cam is turned by hand.**

6.Tighten:

- Upper crankcase bolt
- Lower crankcase bolt
  (follow the proper tightening sequence)

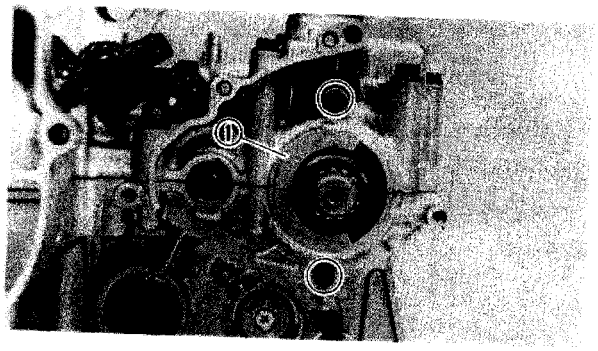


△ M6 bolt:
12 Nm (1.2 m • kg, 8.7 ft • lb)
× M8 bolt:
24 Nm (2.4 m • kg, 17 ft • lb)

A Upper crankcase
B Lower crankcase

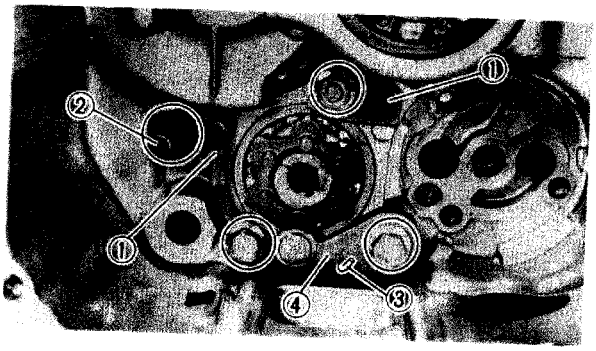
NOTE:

- Lubricate the threads of bolts (No.① ~ ⑫) with molybdenum disulfide oil.
- Lubricate the threads of bolts (No.⑬ ~ ㉟) with engine oil.
- Tighten the bolts in the tightening sequence cast on the crankcase.
- Install a copper washer on bolt No.㉙.



7.Install:
- Oil seal stopper ①

	Bolt (oil seal stopper): **10 Nm (1.0 m • kg, 7.2 ft • lb)** **LOCTITE®**

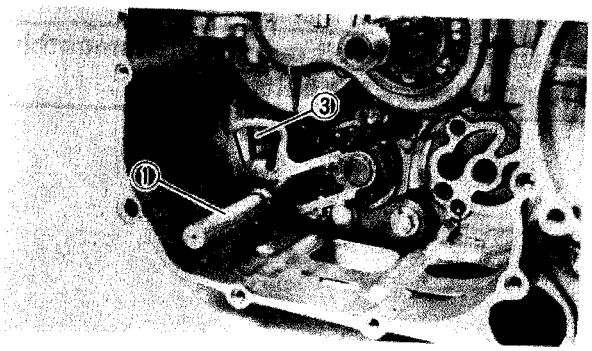


SHIFT SHAFT AND OIL PUMP

1.Install:
- Stopper plate ① (guide bar and bearing)
- Spring stopper ②
- Return spring ③
- Stopper lever ④

	Bolt **(stopper plate/stopper lever):** **10 Nm (1.0 m • kg, 7.2 ft • lb)** **LOCTITE®** **Spring stopper:** **22 Nm (2.2 m • kg, 16 ft • lb)** **LOCTITE®**

NOTE:
- Hook the spring ends on the stopper lever ④ and crankcase boss.
- Mesh the stopper lever ④ with the shift cam stopper.

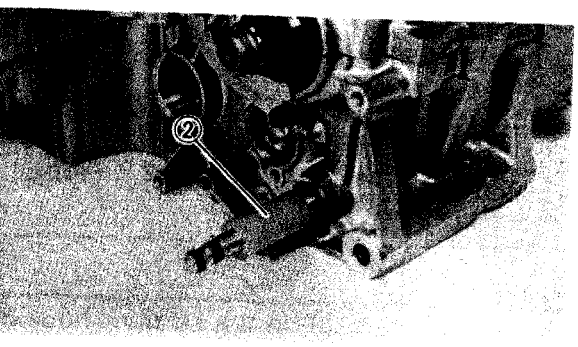


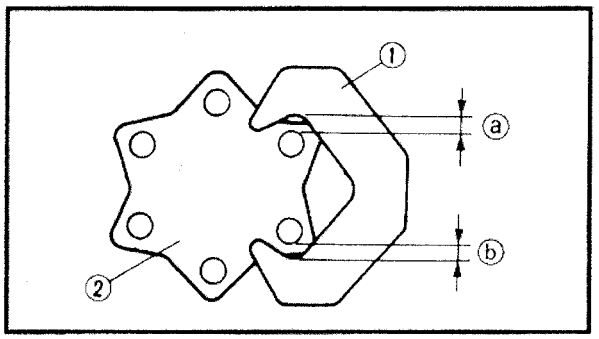
2.Install:
- Shift shaft ①
- Collar ②

NOTE:
- Apply grease to the oil seal lips.
- Hook the spring ends onto the stopper ③.

⚠ WARNING

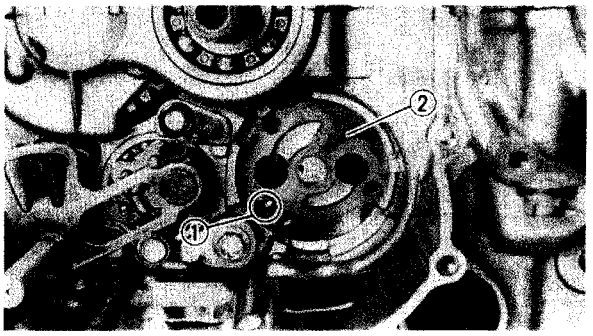
Always use a new circlip.



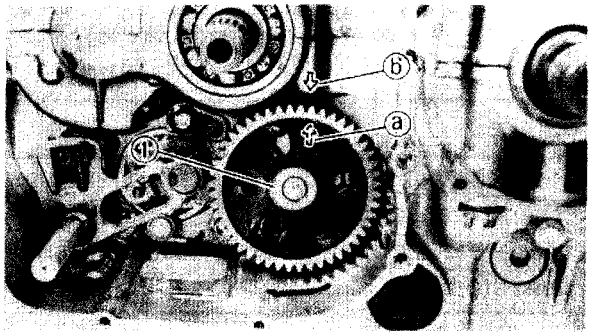


3.Check:
- Shift pawl ① position
  Gaps ⓐ and ⓑ are not equal → Replace defective parts.

② Shift cam



4.Install:
- Dowel pin ①
- Gasket ②

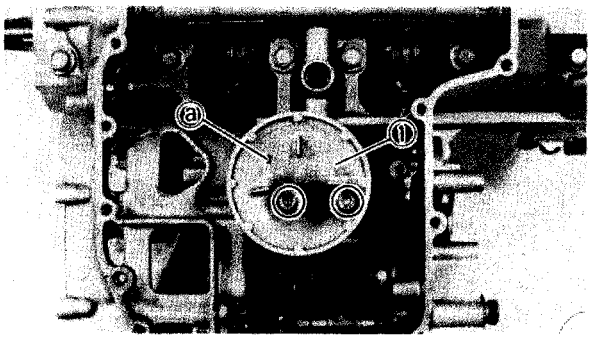


5.Install:
- Oil pump assembly ①

	Bolt (oil pump assembly): **10 Nm (1.0 m • kg, 7.2 ft • lb)**

NOTE:
Align the arrow mark ⓐ on the oil pump with the arrow mark ⓑ on the crankcase.

CAUTION:
Be sure that the oil pump turns smoothly after tightening the bolts.

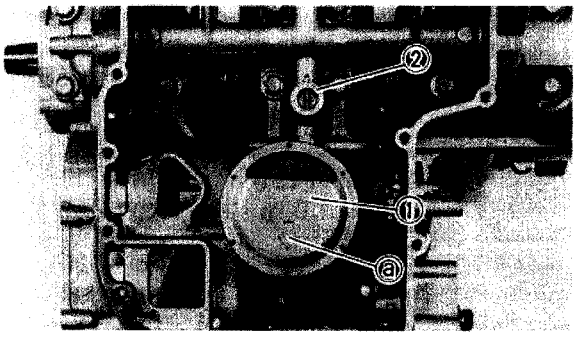


OIL PAN AND OIL STRAINER

1.Install:
- Oil strainer housing ①

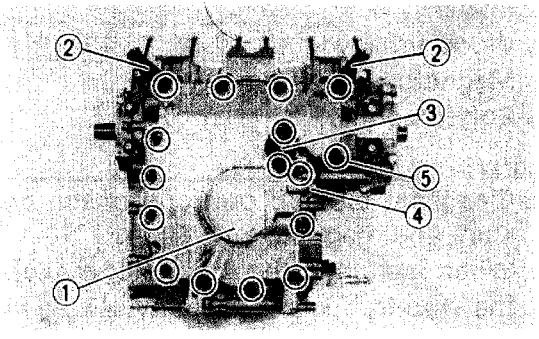
	Bolt (oil strainer): **10 Nm (1.0 m • kg, 7.2 ft • lb)** **LOCTITE ®**

NOTE:
The arrow mark ⓐ on the strainer housing must point to the front of the engine.



2.Install:
- Oil strainer cover ①
- Relief valve ②

NOTE:
The arrow mark ⓐ on the strainer cover must point to the rear of the engine.



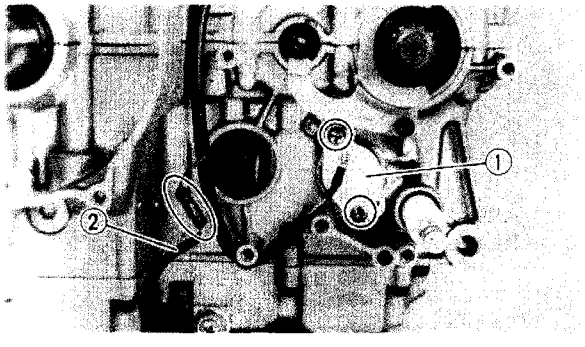
3.Install:
- Dowel pins
- Gasket (oil pan)
- Oil pan ①
- Stays ② (center cowling)
- Oil level switch ③ (with O-ring)
- Drain bolt ④ (with copper washer)

⑤ Clamp (oil level switch lead)

⚠ WARNING
Always use new copper washer and gasket.

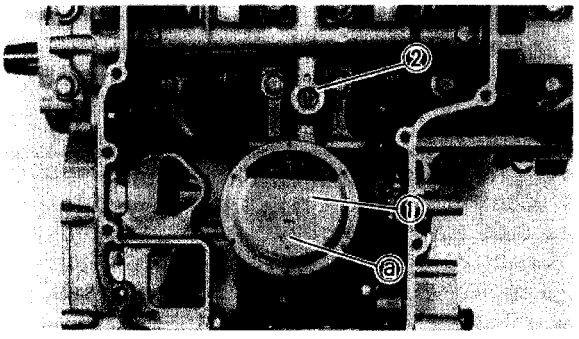
NOTE:
- Tighten the bolts (oil pan) in a crisscross pattern.
- Apply engine oil to the O-ring of the oil level switch.

Bolt (oil pan):
10 Nm (1.0 m • kg, 7.2 ft • lb)
Bolt (oil level switch):
7 Nm (0.7 m • kg, 5.1 ft • lb)
Drain bolt:
43 Nm (4.3 m • kg, 31 ft • lb)



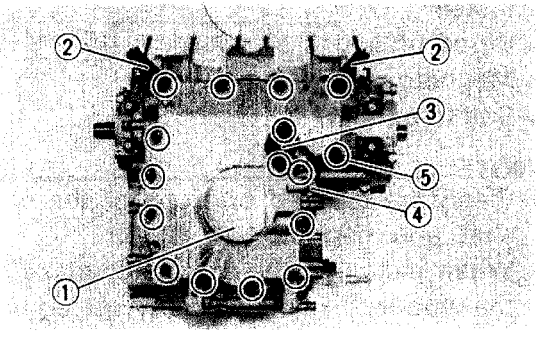
4.Install:
- Neutral switch ①

5.Connect:
- Oil level switch lead ②



2.Install:
- Oil strainer cover ①
- Relief valve ②

NOTE:
The arrow mark ⓐ on the strainer cover must point to the rear of the engine.



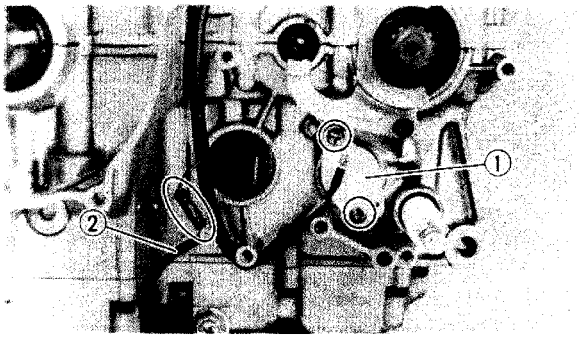
3.Install:
- Dowel pins
- Gasket (oil pan)
- Oil pan ①
- Stays ② (center cowling)
- Oil level switch ③ (with O-ring)
- Drain bolt ④ (with copper washer)

⑤ Clamp (oil level switch lead)

⚠ WARNING
Always use new copper washer and gasket.

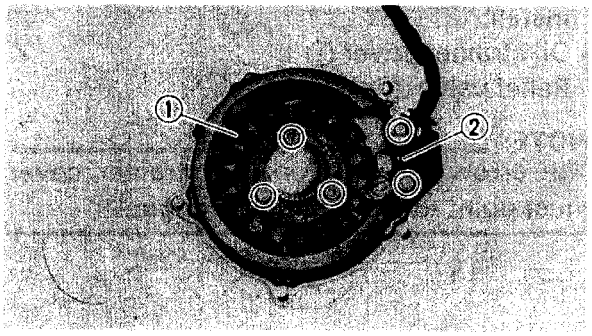
NOTE:
- Tighten the bolts (oil pan) in a crisscross pattern.
- Apply engine oil to the O-ring of the oil level switch.

Bolt (oil pan):
10 Nm (1.0 m • kg, 7.2 ft • lb)
Bolt (oil level switch):
7 Nm (0.7 m • kg, 5.1 ft • lb)
Drain bolt:
43 Nm (4.3 m • kg, 31 ft • lb)



4.Install:
- Neutral switch ①

5.Connect:
- Oil level switch lead ②



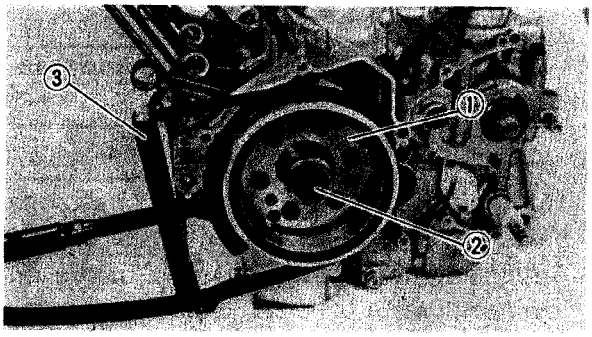
A.C. MAGNETO

1.Install:
- Stator coil assembly ①
- Pickup coil ②

Bolt (stator coil assembly):
10 Nm (1.0 m • kg, 7.2 ft • lb)
LOCTITE®
Screw (pickup coil):
5 Nm (0.5 m • kg, 3.6 ft • lb)

2.Install:
- Woodruff key
- Magneto
- Bolt (magneto)

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



3.Tighten:
- Bolt ① (magneto)

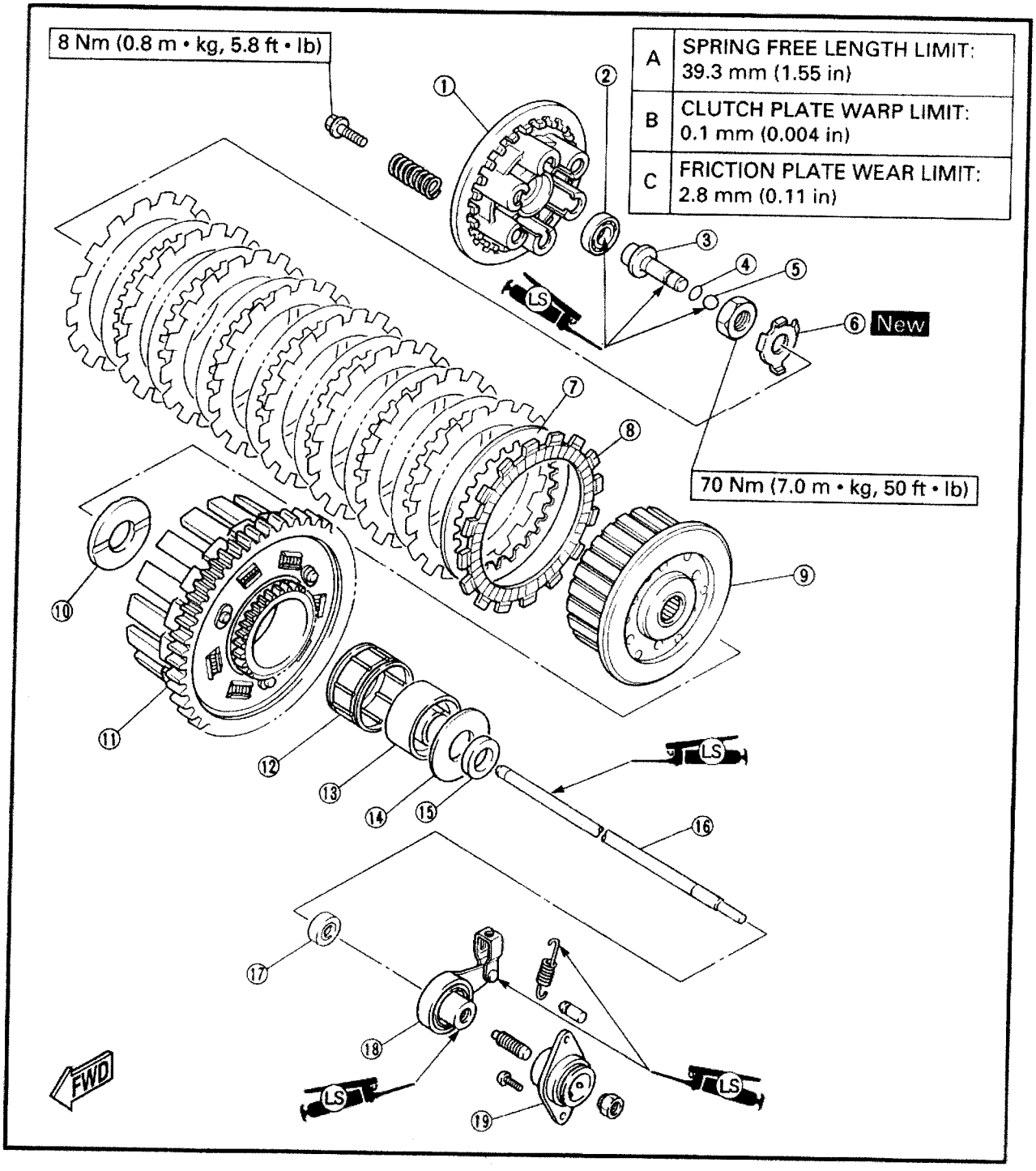
Bolt (magneto):
85 Nm (8.5 m • kg, 62 ft • lb)

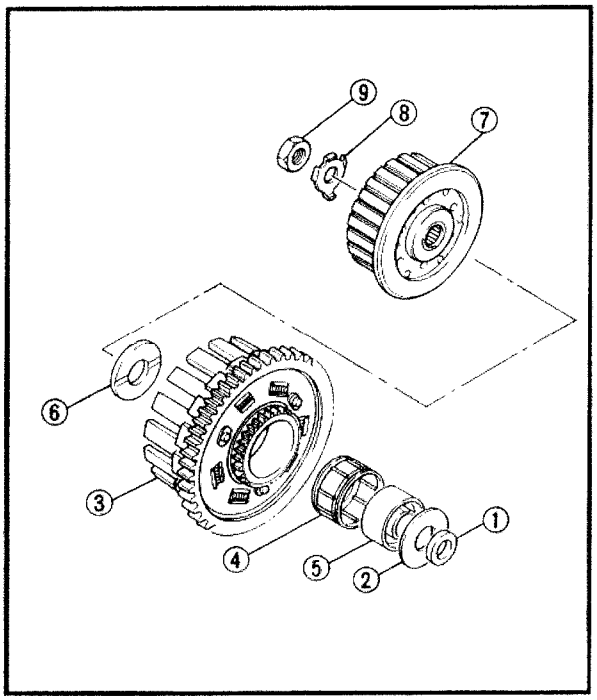
NOTE:
Tighten the bolt ① (magneto) while holding the magneto ② with the sheave holder ③.

Sheave holder:
90890-01701

CLUTCH

① Pressure plate
② Bearing
③ Push rod #1
④ O-ring
⑤ Ball
⑥ Lock washer
⑦ Clutch plate
⑧ Friction plate
⑨ Clutch boss
⑩ Thrust washer
⑪ Clutch housing
⑫ Bearing
⑬ Spacer
⑭ Thrust washer
⑮ Collar
⑯ Push rod #2
⑰ Oil seal
⑱ Push lever assembly
⑲ Ball screw housing



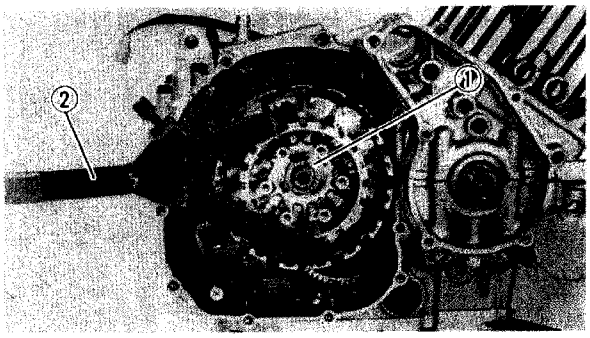


CLUTCH

1.Install:
- Collar ①
- Thrust washer ②
- Clutch housing ③
- Bearing ④
- Spacer ⑤
- Thrust washer ⑥
- Clutch boss ⑦
- Lock washer ⑧
- Nut ⑨ (clutch boss)

NOTE:
Install the spacer ⑤ with the two screw holes towards the clutch boss.

⚠ WARNING
Always use a new lock washer.



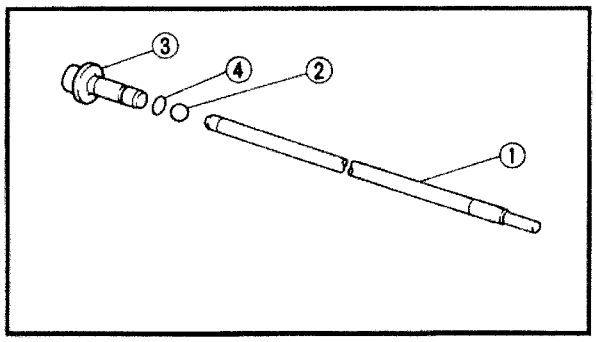
2.Tighten:
- Nut ① (clutch boss)

	Nut (clutch boss): **70 Nm (7.0 m • kg, 50 ft • lb)**

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

	Universal clutch holder: **90890-04086**

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

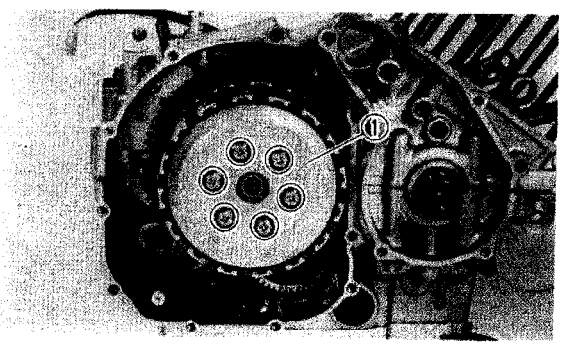


4.Install:
- Push rod #2 ①
- Ball ②
- Push rod #1 ③
  (with O-ring ④)

NOTE:
Apply the lithium soap base grease to the push rod #1, #2 and ball.

5.Install:
- Friction plates
- Clutch plates

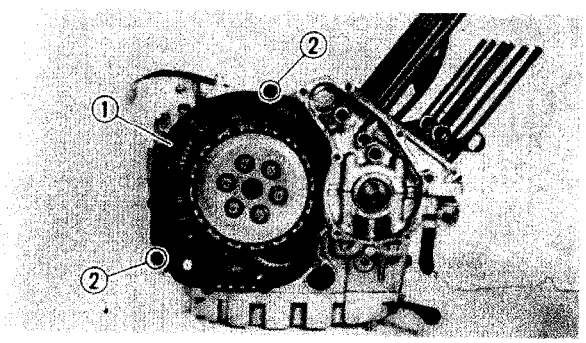
NOTE:
Mount friction and clutch plate alternately.



6.Install:
- Pressure plate ①
- Clutch springs
- Bolts (clutch spring)

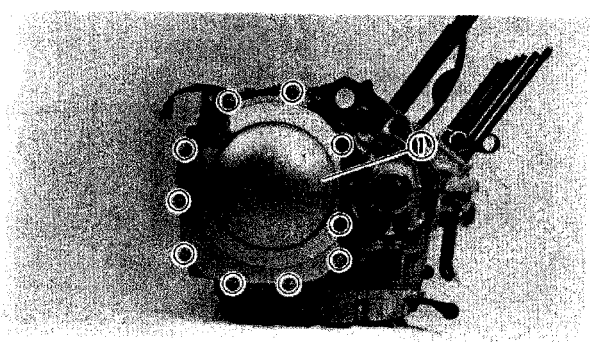
	Bolt (clutch spring): **8 Nm (0.8 m • kg, 5.8 ft • lb)**

NOTE:
Tighten the bolts (clutch spring) in stage, using a crisscross pattern.



7.Install:
- Gasket ①
- Dowel pins ②

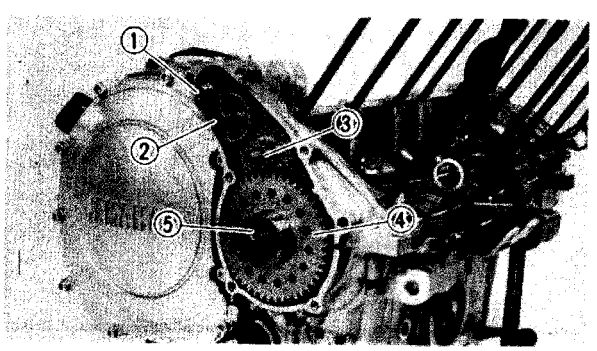
⚠ WARNING
Always use a new gasket.



8.Install:
- Crankcase cover ① (right)

	Bolt (crankcase cover): **10 Nm (1.0 m • kg, 7.2 ft • lb)**

NOTE:
Tighten the bolts (crankcase cover) in stage, using a crisscross pattern.

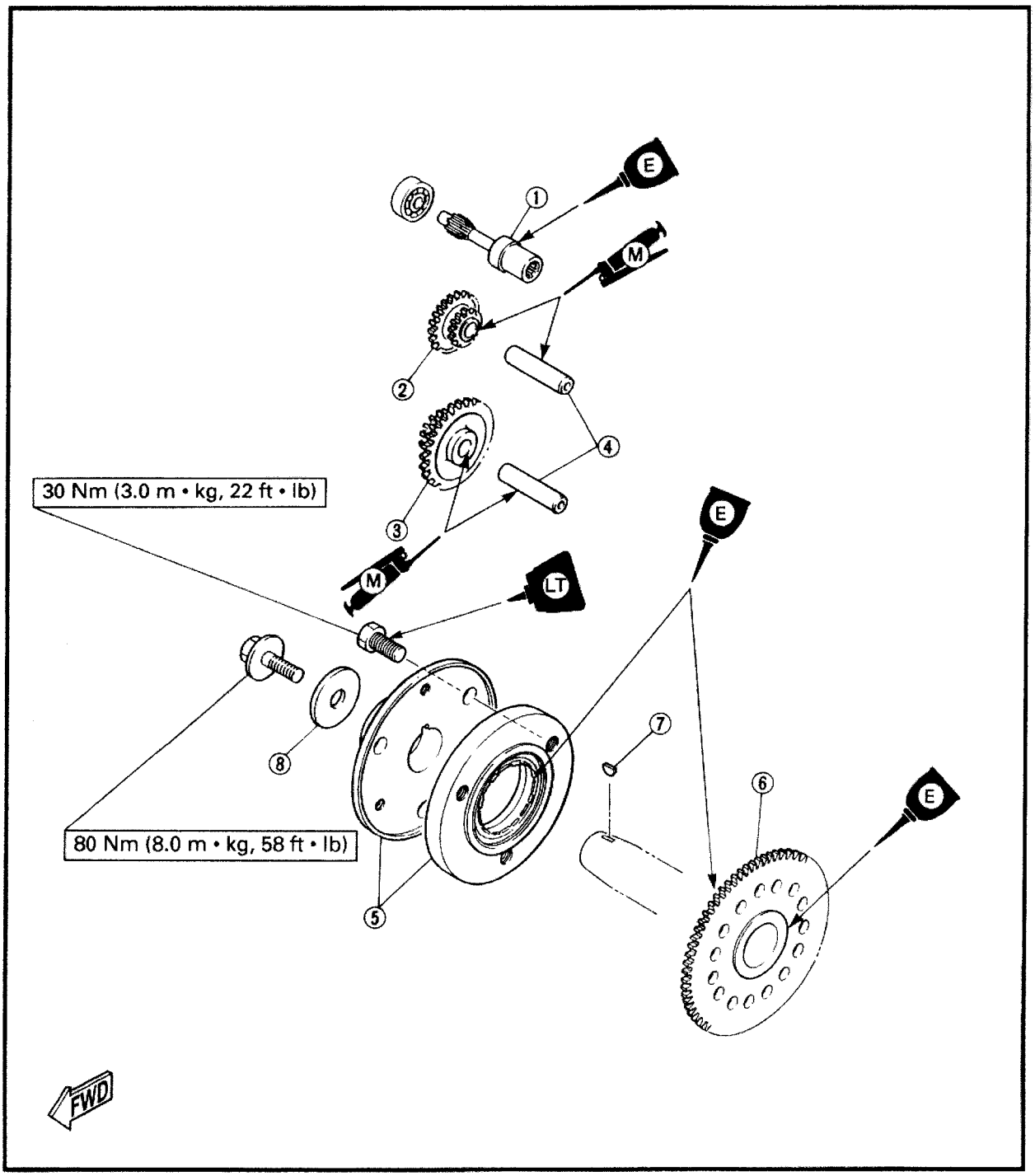


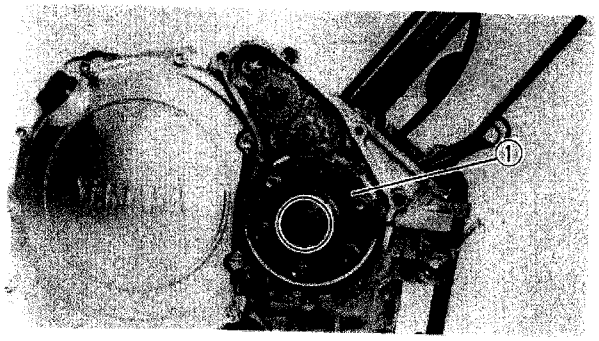
STARTER CLUTCH

1.Install:
- Starter drive gear ①
- Starter idle gear ② (primary)
- Starter idle gear ③ (secondary)
- Starter wheel gear ④
- Woodruff key ⑤

STARTER CLUTCH

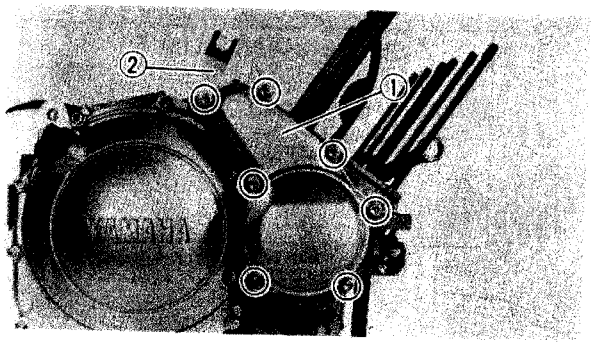
① Starter drive gear
② Idle gear (primary)
③ Idle gear (secondary)
④ Shaft
⑤ Starter clutch assembly
⑥ Starter wheel gear
⑦ Woodruff key
⑧ Washer





2.Install:
- Starter clutch ①

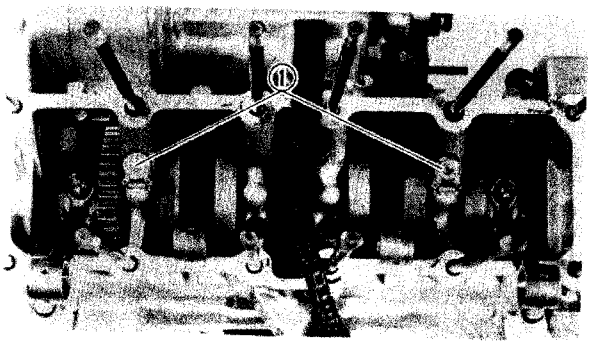
	Bolt (starter clutch): **80 Nm (8.0 m • kg, 58 ft • lb)**



3.Install:
- Dowel pins
- Gasket (starter clutch cover) (new)
- Starter clutch cover ①
- Stay ② (throttle stop screw)

	Bolt (starter clutch cover): **10 Nm (1.0 m • kg, 7.2 ft • lb)**

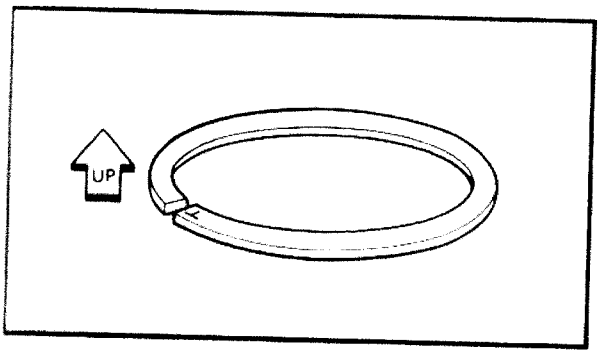
NOTE:
Tighten the bolts (starter clutch cover) in stage, using a crisscross pattern.



PISTON AND CYLINDER

1.Install:
- Oil-jet nozzles ①
  (with O-ring)

NOTE:
Apply engine oil to the O-rings.

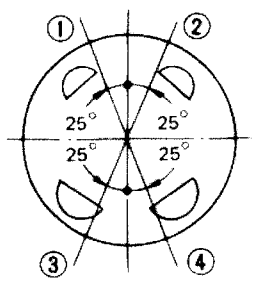


2.Install:
- Piston rings

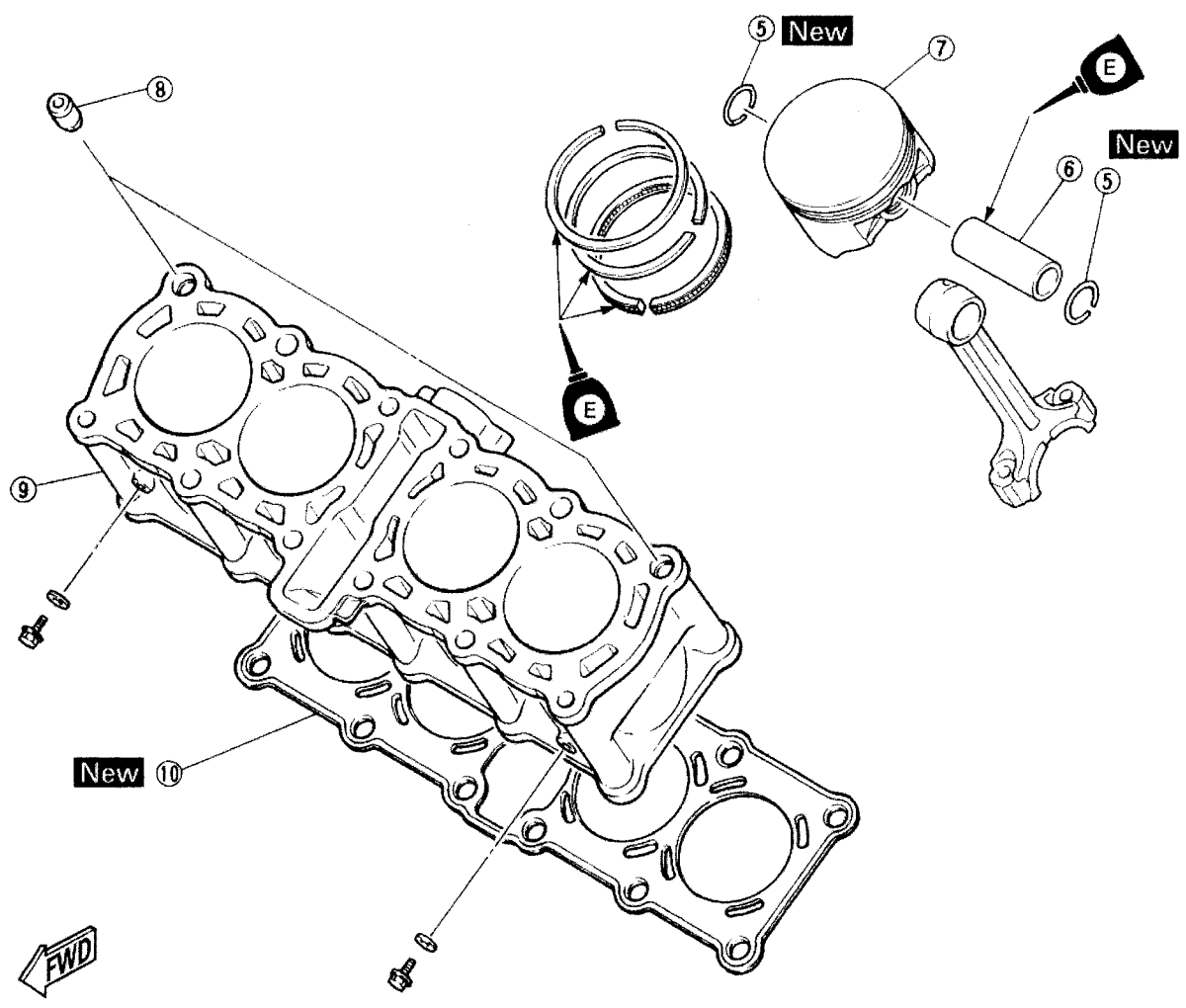
NOTE:
Be sure to install rings so that the manufacturer's marks or numbers are located on the upper side of the rings. Oil the pistons and rings liberally.

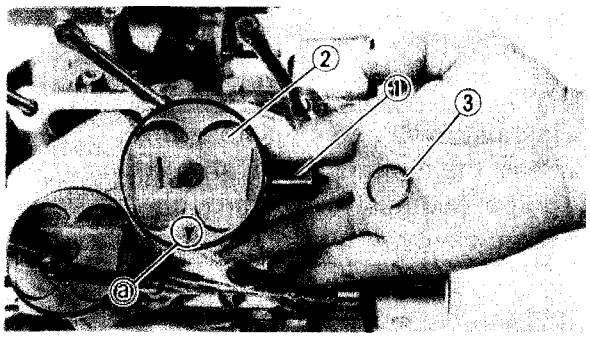
PISTON AND CYLINDER

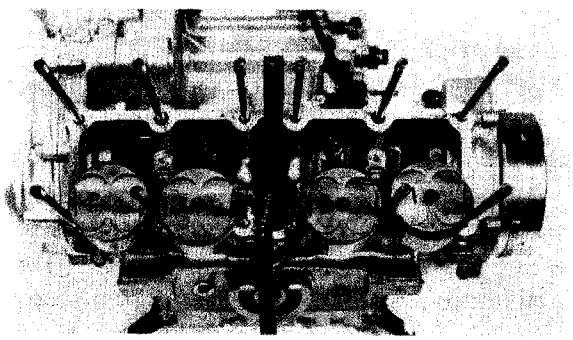
① Top ring
② Oil ring (lower)
③ Oil ring (upper)
④ Second ring
⑤ Circlip
⑥ Piston pin
⑦ Piston
⑧ Dowel pin
⑨ Cylinder
⑩ Gasket

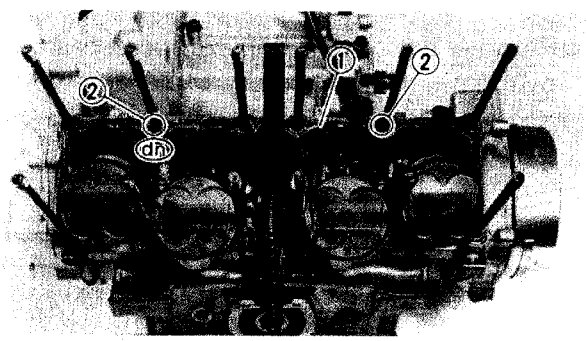


A	SIDE CLEARANCE LIMIT: Top: 0.1 mm (0.004 in) 2nd: 0.1 mm (0.004 in)
B	END GAP LIMIT: Top: 0.6 mm (0.024 in) 2nd: 0.7 mm (0.028 in)
C	PISTON TO CYLINDER CLEARANCE LIMIT: 0.07 mm (0.0028 in)









3.Install:
- Piston pins ①
- Pistons ②
- Circlips ③ (piston pin)

NOTE:
- Apply engine oil to the piston pins.
- Be sure that the arrow mark ⓐ on the piston points to the exhaust side of the engine.
- Before installing the piston pin circlip, cover the crankcase with a clean rag to prevent the circlip from falling into the crankcase.
- Reinstall each piston into the cylinder it came from (numbering order 1 to 4 from the left).

⚠ WARNING

Always use new circlips (piston pin).

4.Install:
- Gasket ① (cylinder)
- Dowel pins ②

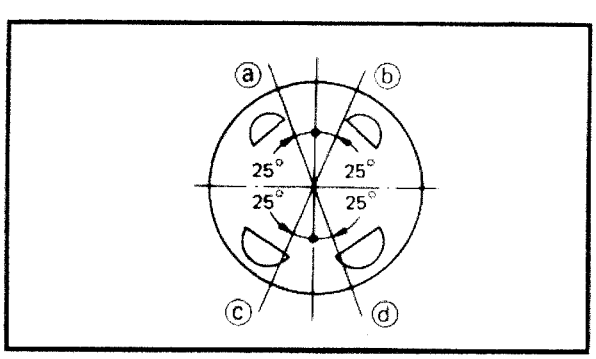
NOTE:
The gasket mark "UP" must be correctly readable from above.

⚠ WARNING

Always use a new gasket (cylinder).

5.Lubricate:
- Pistons
- Piston rings
- Cylinder

NOTE:
Apply a liberal coating of engine oil.

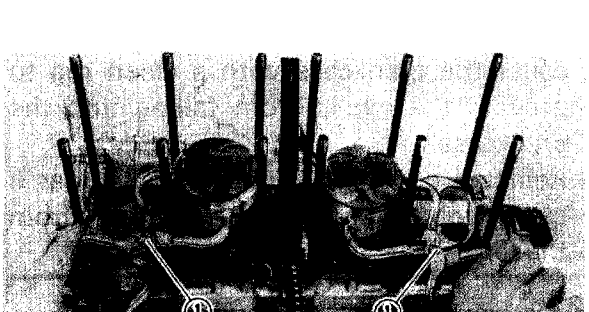


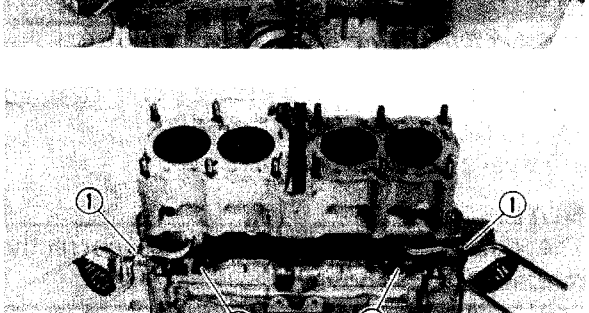
6.Position:
- Top ring
- 2nd ring
- Oil ring

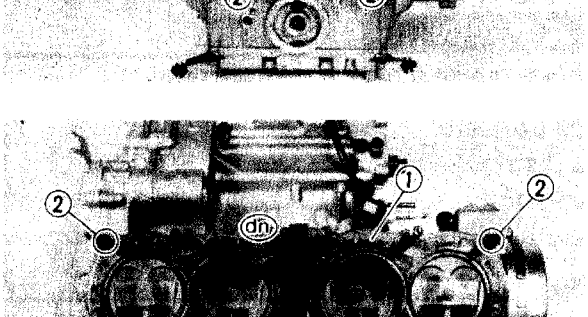
Offset the piston ring end gaps as shown.
ⓐ Top ring end
ⓑ Oil ring end (lower)
ⓒ Oil ring end (upper)
ⓓ 2nd ring end

7.Install:
- Cylinder

NOTE:
- Install the #2 and #3 pistons first.
- Pass the timing chain and timing chain guide (exhaust side) through the timing chain cavity.







****

Installation steps:
- Set the piston ring compressor ① to the #2 and #3 pistons.
- Install the #2 and #3 pistons to the cylinder.
- Remove the piston ring compressors.
- Set the piston ring compressors ① and piston bases ② to the #1 and #4 pistons.
- Install the #1 and #4 pistons to the cylinder.
- Remove the piston ring compressors and piston bases.

Piston ring compressor:
90890-04044
Piston base:
90890-01067

****

CYLINDER HEAD AND CAMSHAFT

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

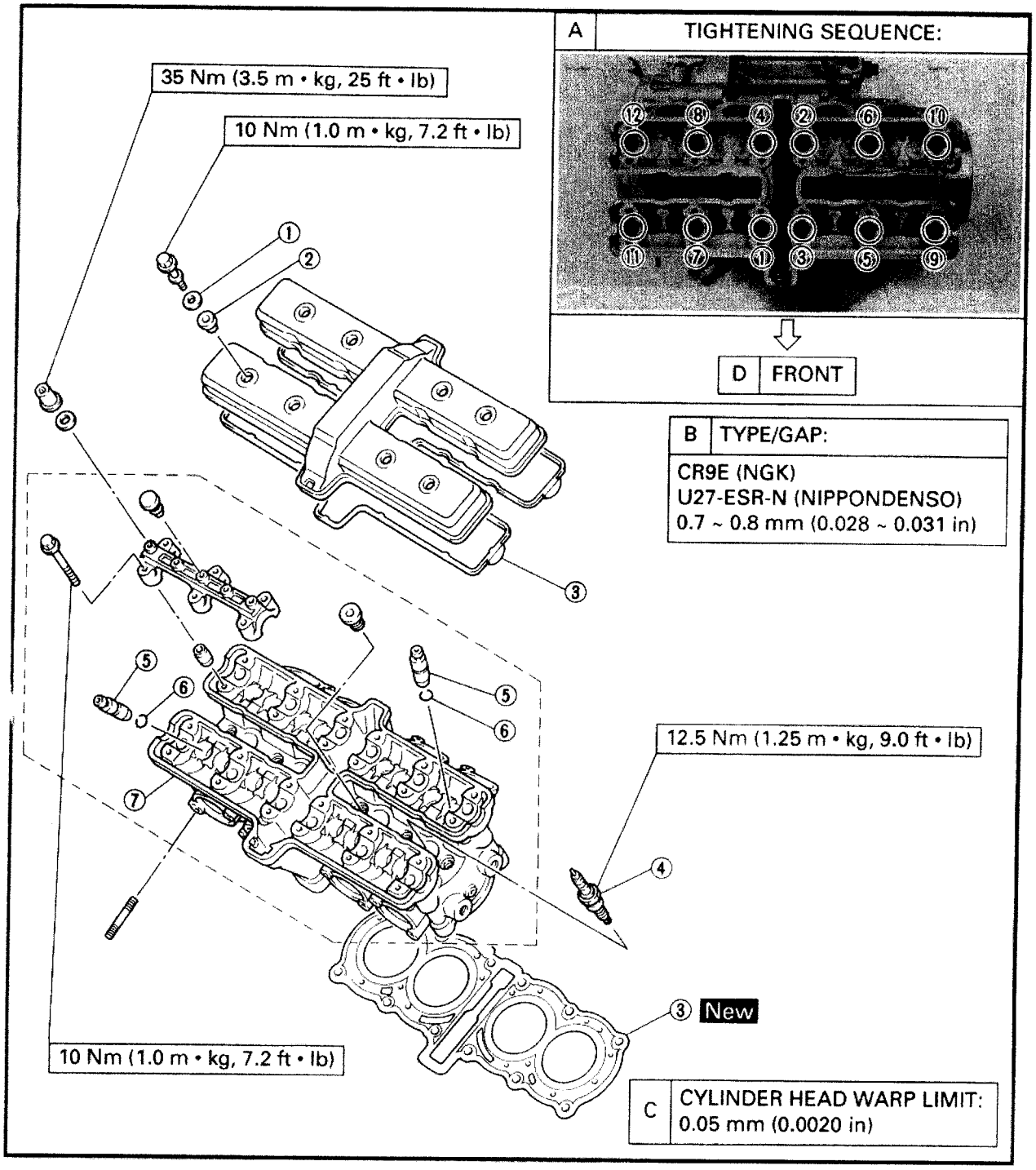
NOTE:
The mark "UP" on the gasket must be readable correctly from above.

⚠ WARNING
Always use a new gasket (cylinder head).

NOTE:
- Select either of the two procedures explained in this manual, as follows:
- Procedure 1:
  The timing chain is disconnected → Connect.
- Procedure 2:
  The camshafts are removed → Install.

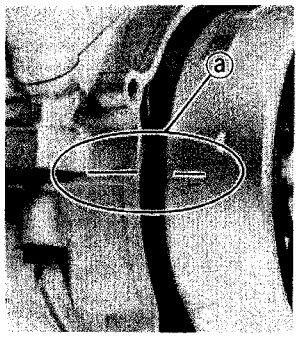
CYLINDER HEAD

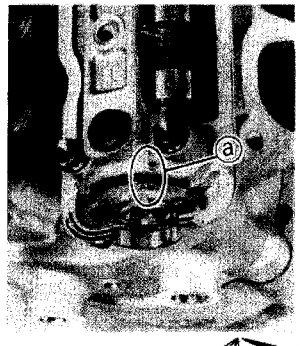
① Washer
② Rubber washer
③ Gasket
④ Spark plug
⑤ Valve guide
⑥ Circlip
⑦ Cylinder head



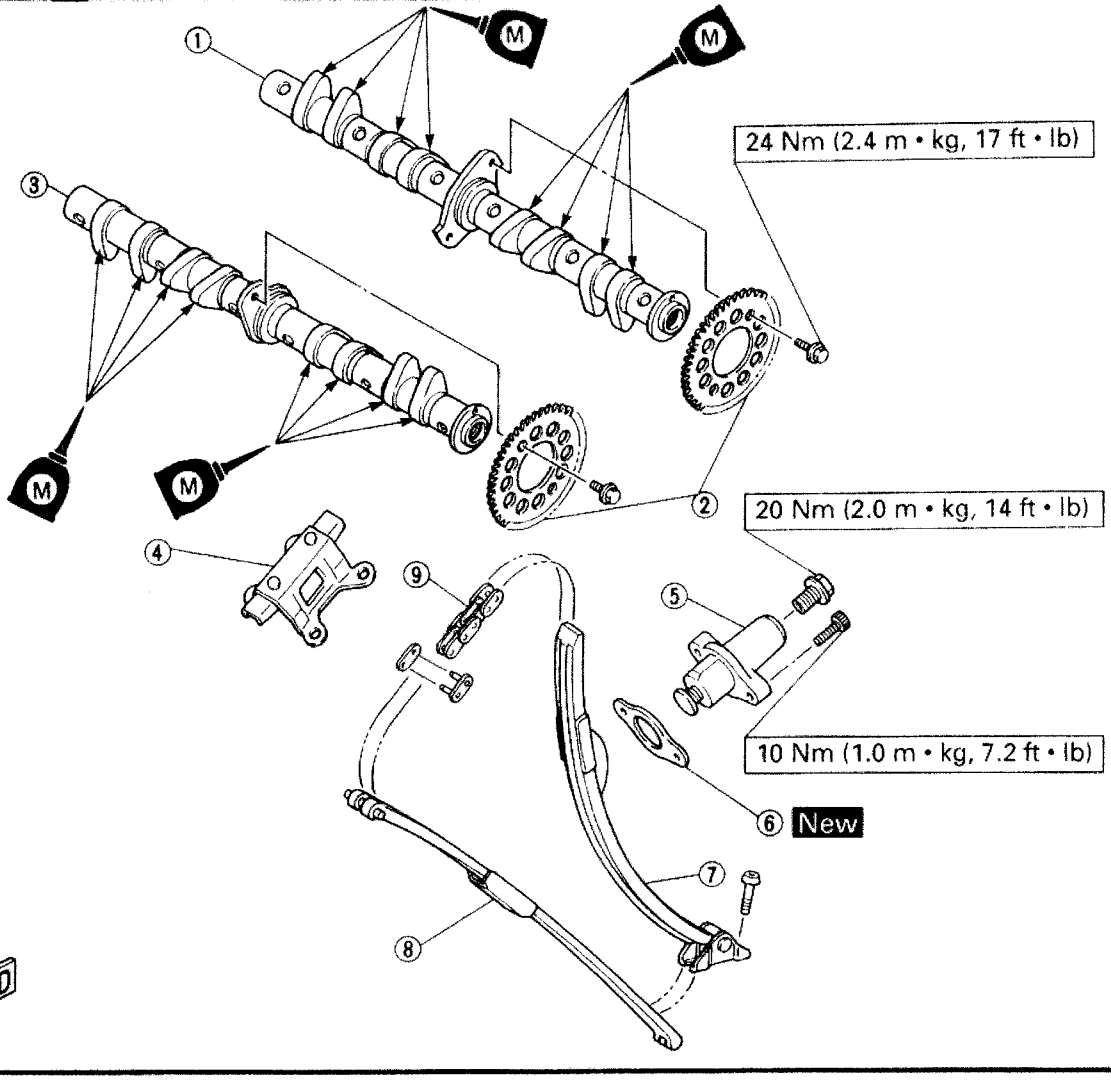
CAMSHAFT

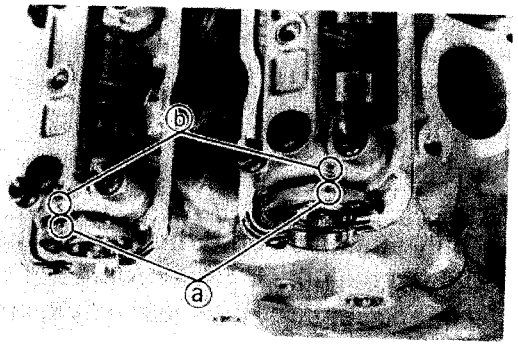
① Camshaft (intake)
② Timing chain sprocket
③ Camshaft (exhaust)
④ Chain guide (upper)
⑤ Timing chain tensioner
⑥ Gasket
⑦ Timing chain guide (intake side)
⑧ Timing chain guide (exhaust side)
⑨ Timing chain
ⓐ Match mark

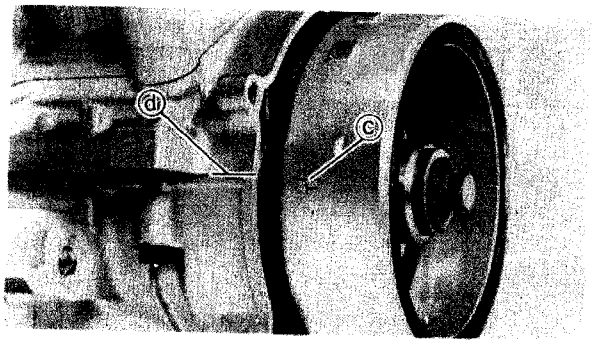




A	VALVE CLEARANCE (COLD):
B	INTAKE: 0.11 ~ 0.20 mm (0.004 ~ 0.008 in)
C	EXHAUST: 0.21 ~ 0.30 mm (0.008 ~ 0.012 in)







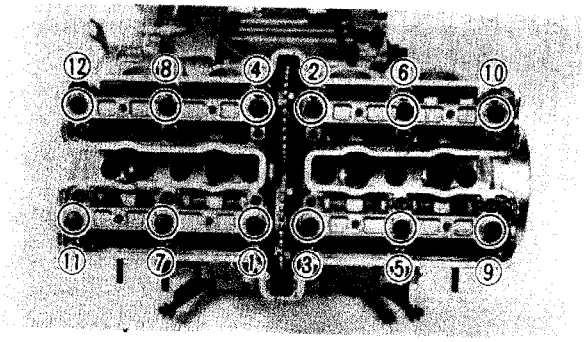
Procedure 1

1.Install:

- Cylinder head assembly (with camshafts)

NOTE:

- Be sure that the camshaft timing marks ⓐ align with the camshaft cap marks ⓑ.
- Be sure that the "T" mark ⓒ on the magneto web is aligned with the crankcase end ⓓ when #1 piston is at TDC.

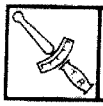


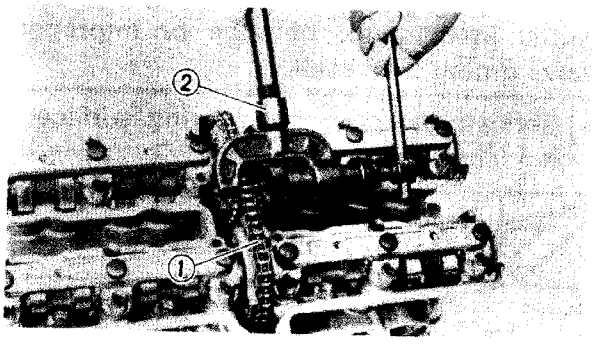
2.Tighten:

- Nuts (cylinder head)

NOTE:

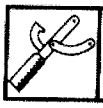
- Apply engine oil onto the nut threads.
- Tighten the nuts in the proper tightening sequence and torque them in two stages.

	**Nut (cylinder head): 35 Nm (3.5 m • kg, 25 ft • lb)**



3.Connect:

- Timing chain ①
  (with the chain joint)
  Use the timing chain cutter ②.

	**Cam chain cutter: 90890-01112**

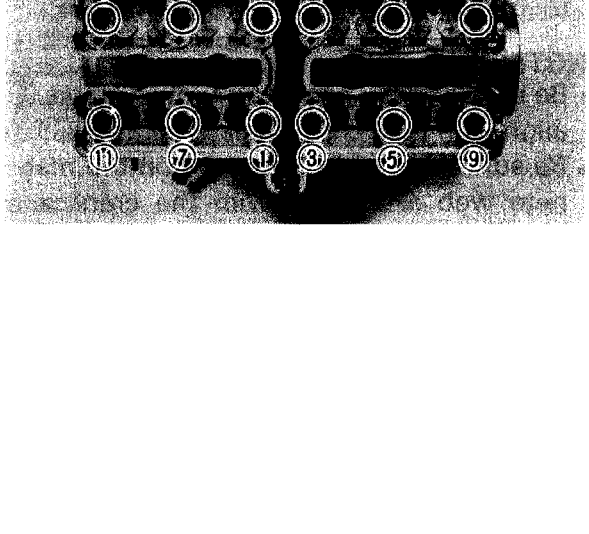
NOTE:

Keep the timing chain as tense as possible on the exhaust side.

⚠ WARNING

Always use a new chain joint.

4.Next installation step, see "TIMING CHAIN TENSIONER".



Procedure 2.

1.Install:

- Cylinder head assembly

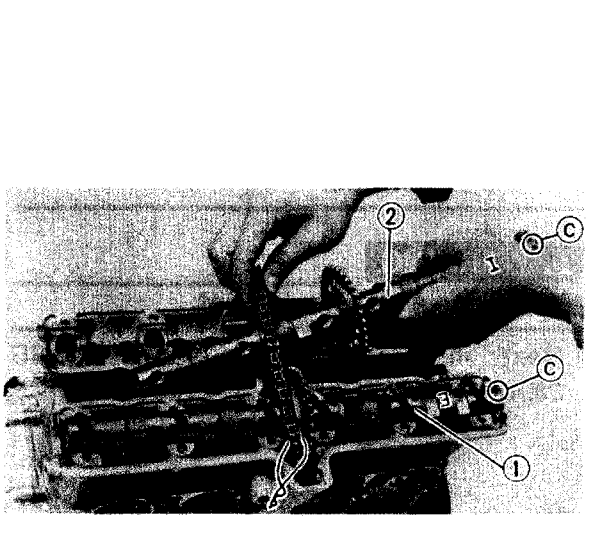
2.Tighten:

- Nuts (cylinder head)

NOTE:

- Apply engine oil onto the nut threads.
- Tighten the nuts in their proper tightening sequence and torque them in two stages.

Nuts (cylinder head):
35 Nm (3.5 m • kg, 25 ft • lb)



3.Install:

- Camshafts (intake and exhaust)

****

Installation steps:

- Turning counterclockwise, align the "T" mark ⓐ on the magneto with the crankcase end ⓑ when #1 piston is at TDC.

CAUTION:

Do not turn the crankshaft during the camshafts installation. Damage or improper valve timing will result.

- Lubricate the camshaft bearing surfaces, cam lobes and cam journals.

Recommended lubricant:
Molybdenum disulfide oil



- Install the exhaust camshaft ① first, then install the intake camshaft ②.

NOTE:

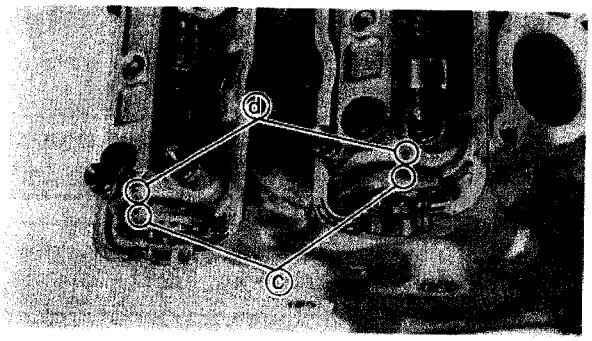
- Be sure to install the camshafts in the right place:
  I mark = intake camshaft
  E mark = exhaust camshaft
- Be sure the timing marks Ⓒ on the camshaft face upward.

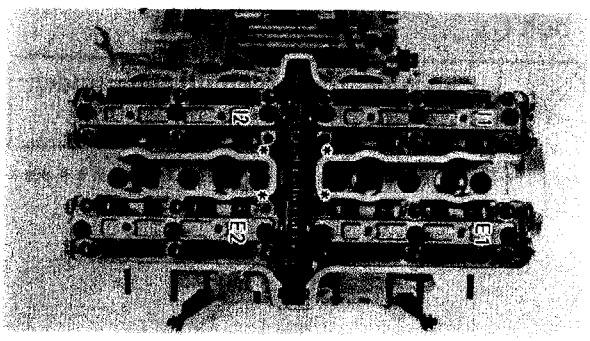
- Keep the timing chain as tense as possible on the exhaust side.
- Remove the retaining wire.

CAUTION:

Do not rotate the camshaft because damage could occur to the piston and valves.

- Install the dowel pins.
- Install the camshaft caps.
- Align the camshaft timing marks ⓒ with the camshaft cap marks ⓓ.





- Tighten the bolts (camshaft caps).

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

NOTE:

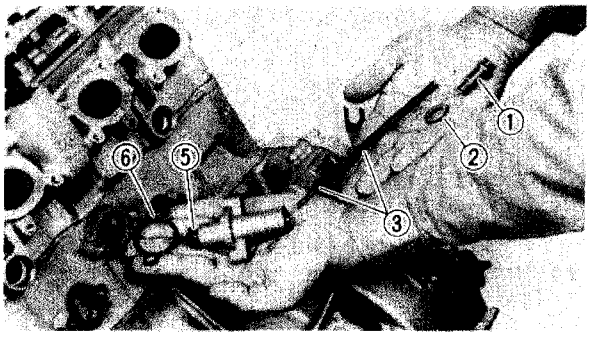
- The camshaft caps are numbered from left to right.
- Apply engine oil onto the bolt (camshaft cap) threads.
- Do not install the bolts at places marked "✻" in this stage.
- Tighten the camshaft caps in a crisscross pattern starting from the center.

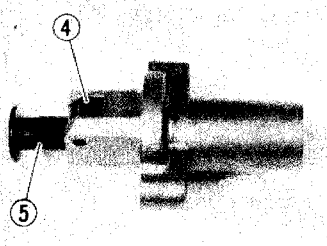
CAUTION:

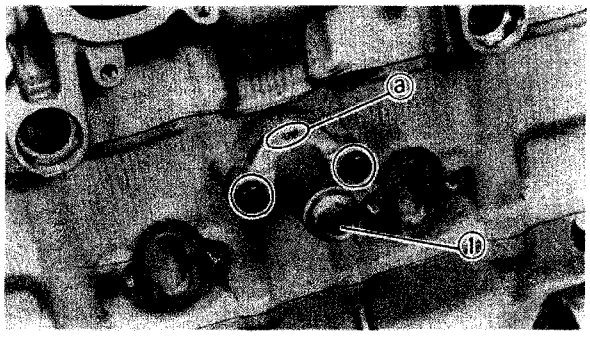
The camshaft caps must be tightened evenly or damage to the cylinder head, camshaft caps and cam will result.

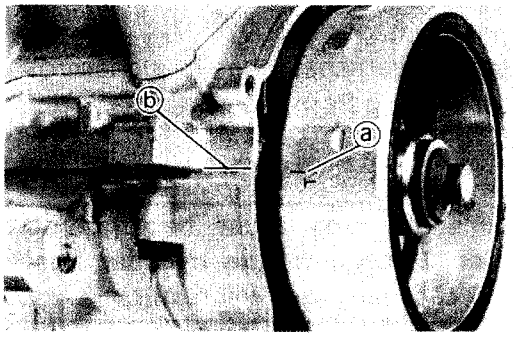
- Install the timing chain guide of the exhaust side.

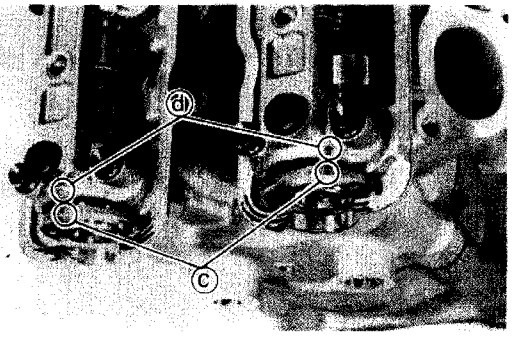
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TIMING CHAIN TENSIONER

1.Install:

- Timing chain tensioner

****

Installation steps:

- Remove the tensioner cap bolt ①, washer ② and springs ③.
- Release the timing chain tensioner one-way cam ④ and push the tensioner rod ⑤ all the way in.
- Install the tensioner with a new gasket ⑥ onto the cylinder.

NOTE:

The "UP" mark ⓐ on the tensioner should face upward.

	Bolt (timing chain tensioner): 10 Nm (1.0 m • kg, 7.2 ft • lb)

- Install the springs ③, washer ② and cap bolt ①.

	Cap bolt (timing chain tensioner): 20 Nm (2.0 m • kg, 14 ft • lb)

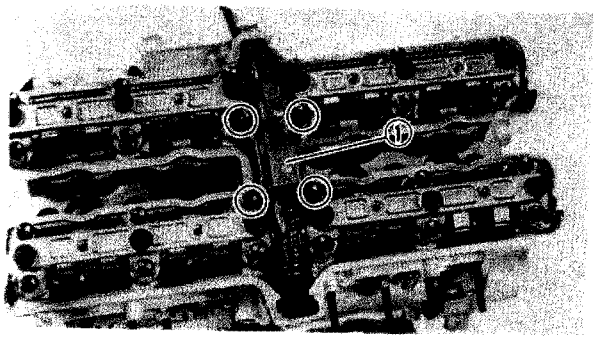
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2.Turn:

- Crankshaft
  Counterclockwise several turns

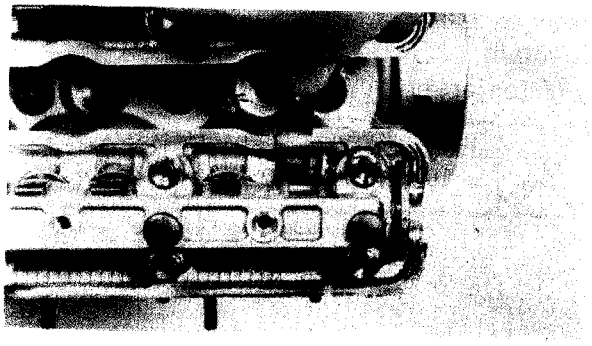
3.Check:

- Magneto "T" mark ⓐ
  Align with the crankcase end ⓑ.
- Camshaft timing marks ⓒ
  Align with the camshaft cap marks ⓓ.
  Out of alignment → Adjust.
  Refer to "Camshaft installation steps".



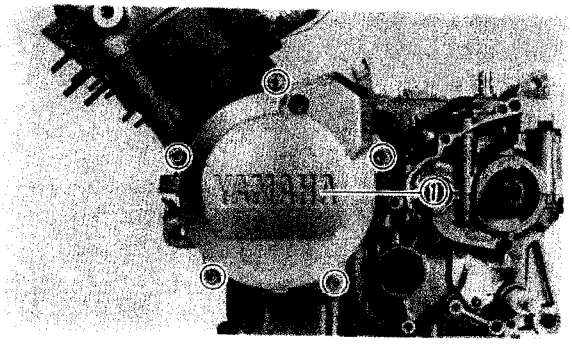
4.Install:
- Timing chain guide ① (upper)

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



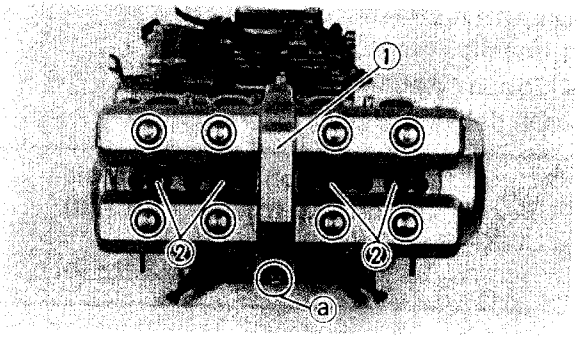
5.Measure:
- Valve clearance
  Out of specification → Adjust.
  Refer to "VALVE CLEARANCE ADJUSTMENT" in CHAPTER 3.

	Intake valve (cold): 0.11 ~ 0.20 mm (0.004 ~ 0.008 in) **Exhaust valve (cold): 0.21 ~ 0.30 mm (0.008 ~ 0.012 in)**



6.Install:
- A.C. magneto cover ①

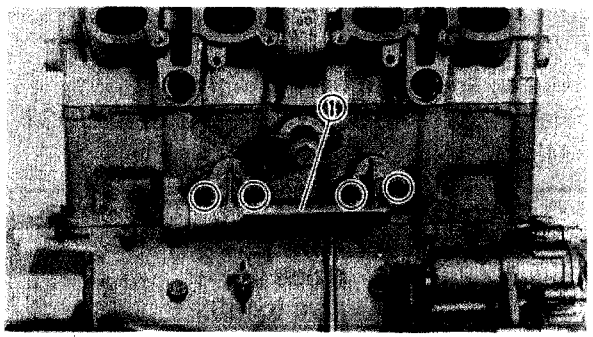
	Bolt (A.C. magneto cover): 10 Nm (1.0 m • kg, 7.2 ft • lb)



7.Install:
- Gasket (cylinder head cover)
- Cylinder head cover ①
- Spark plugs ②

NOTE:
- Be sure the cylinder head gasket mark ⓐ points to the front.
- Tighten the cylinder head cover bolts in a crisscross pattern.

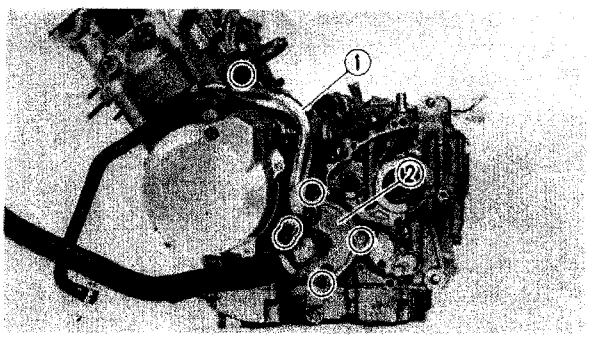
Spark plug:
12.5 Nm (1.25 m • kg, 9.0 ft • lb)
Bolt (cylinder head cover):
10 Nm (1.0 m • kg, 7.2 ft • lb)



WATER PUMP

1.Install:
- Water jacket joint ① (inlet)

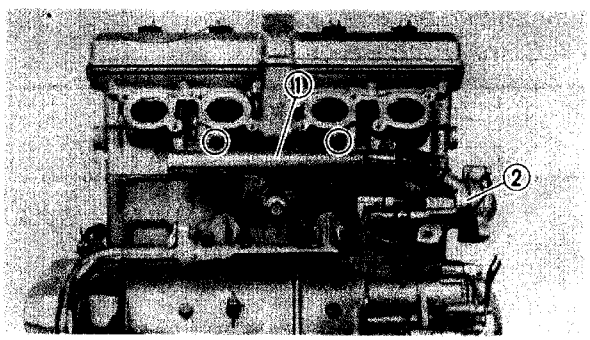
Bolt (water jacket joint):
10 Nm (1.0 m • kg, 7.2 ft • lb)



2.Install:
- Impeller
- Pipe ①
- Water pump cover ②

Bolt (water pump cover):
10 Nm (1.0 m • kg, 7.2 ft • lb)

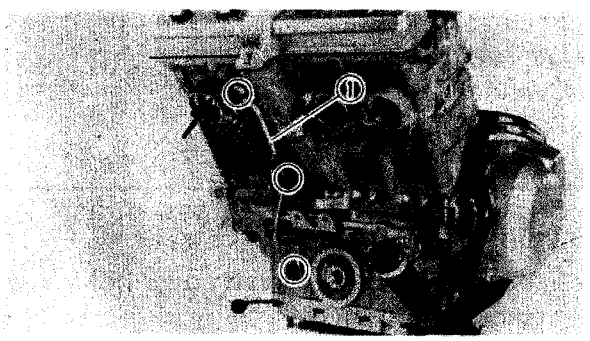
Refer to the "WATER PUMP – INSTALLATION" section in CHAPTER 5.



WATER JACKET JOINT

1.Install:
- O-rings
- Water jacket joint ① (outlet) (with thermostatic housing ②)

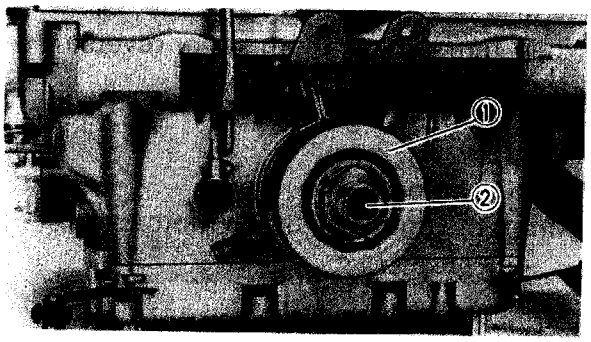
Bolt (water jacket joint):
7 Nm (0.7 m • kg, 5.1 ft • lb)



OIL COOLER AND OIL FILTER

1.Install:
- Copper washers
- Oil delivery pipe ①

Union bolt (oil delivery pipe):
20 Nm (2.0 m • kg, 14 ft • lb)
Bolt (oil delivery pipe):
10 Nm (1.0 m • kg, 7.2 ft • lb)

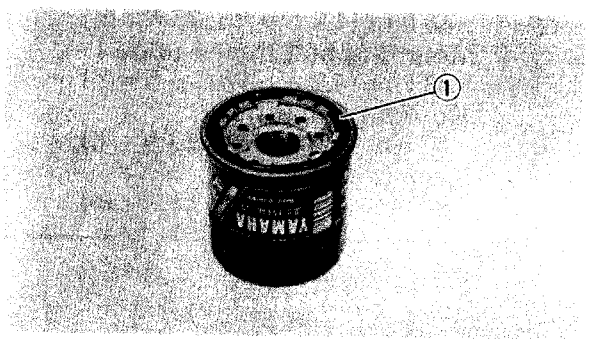


2.Install:
- O-ring
- Oil cooler ①
- Bolt ②

Bolt (oil cooler):
63 Nm (6.3 m • kg, 45 ft • lb)

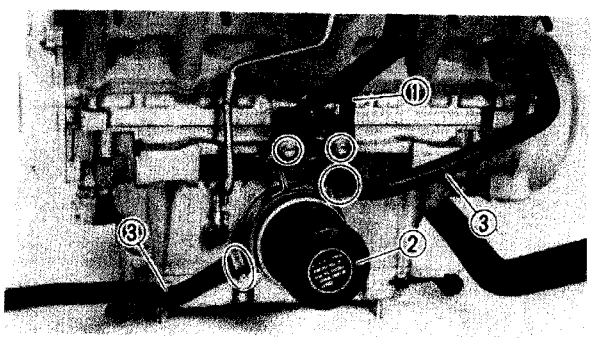
NOTE:
- Apply engine oil to the O-ring of the oil cooler.
- Be sure that the O-ring is positioned properly.

⚠ WARNING
Always use a new O-ring.



3.Apply:
- Engine oil (lightly)
  (to O-ring ① of new oil filter)

NOTE:
Make sure the O-ring ① is positioned properly.

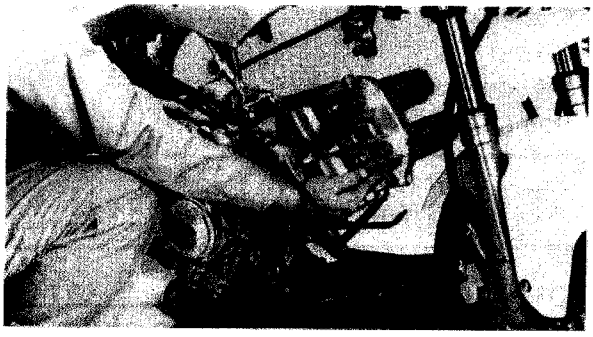


4.Install:
- Radiator stay ①
- Oil filter ② (new)

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

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

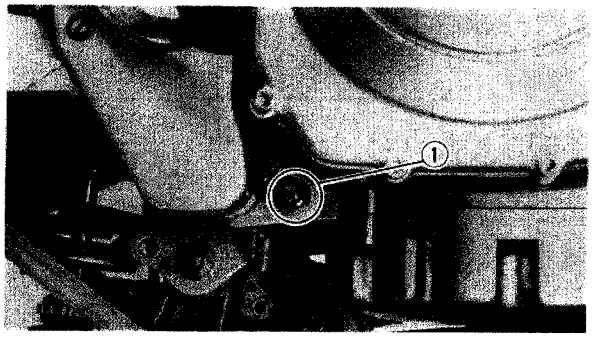
5.Connect:
- Oil cooler hoses ③



ENGINE REMOUNTING

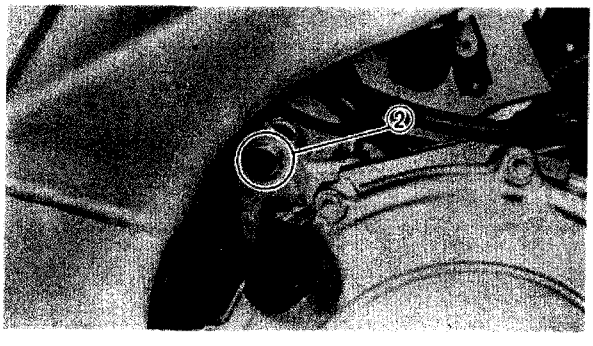
When remounting the engine, reverse the removal procedure.
Note the following points.

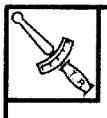
1.Install:
- Engine assembly
  (from the right side of the motorcycle)



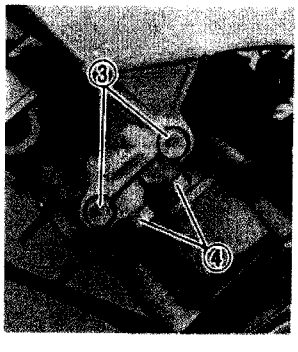
2.Install:
- Mounting bolt ① (rear-lower)
- Mounting bolt ② (rear-upper)
- Mounting bolts ③ (front)
- Pinch bolts ④

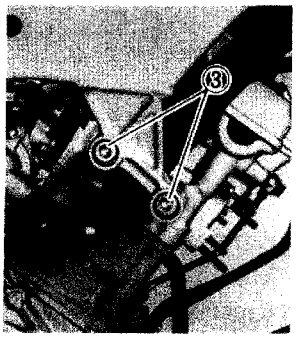
NOTE:
First install all the bolts and nuts, and then tighten them to specification.

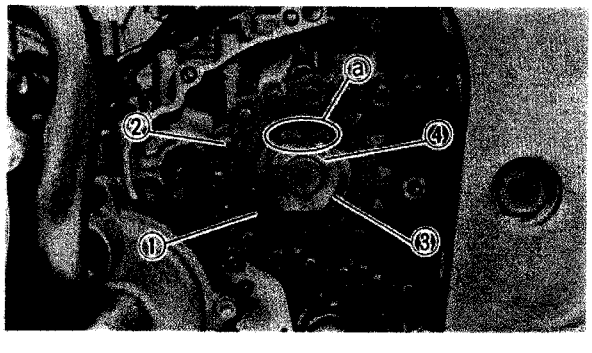




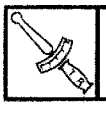
Mounting bolt (rear – lower)
48 Nm (4.8 m • kg, 35 ft • lb)
Mounting bolt (rear – upper)
48 Nm (4.8 m • kg, 35 ft • lb)
Mounting bolt (front):
40 Nm (4.0 m • kg, 29 ft • lb)
Pinch bolt (front):
64 Nm (6.4 m • kg, 46 ft • lb)







3.Install:
- Drive sprocket ①
  (with drive chain ②)
- Lock washer ③
- Nut ④ (drive sprocket)



Nut (drive sprocket):
70 Nm (7.0 m • kg, 50 ft • lb)

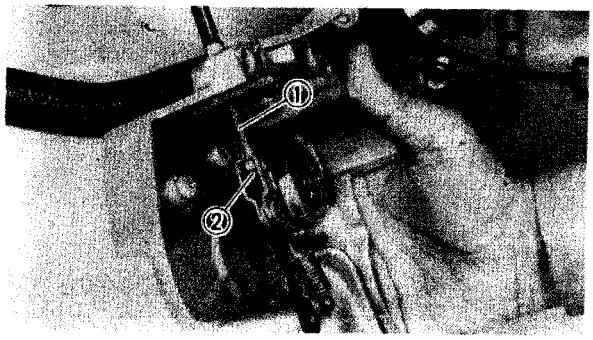
⚠ WARNING

Always use a new lock washer.

NOTE:

Tighten the nut (drive sprocket), while applying the rear brake.

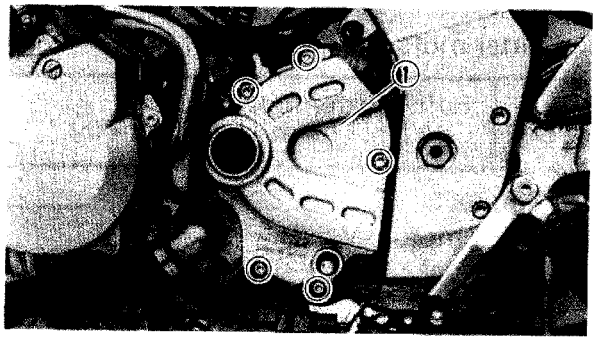
4. Bend the lock washer tab ⓐ along a flat side of the nut.



5. Install:
- Clutch cable ①

NOTE:

Bend tab ② to install the cable.



6. Install:
- Gasket
- Dowel pins
- Crankcase cover ① (left)

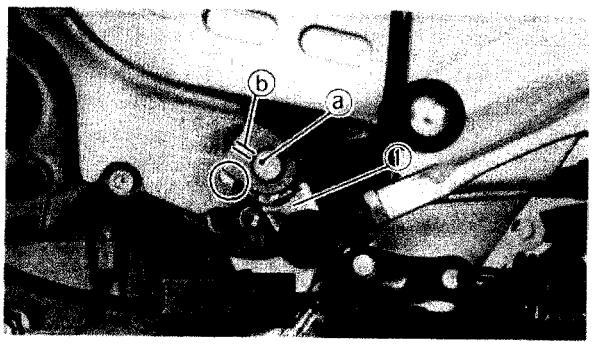
	Bolt (crankcase cover – left): 10 Nm (1.0 m • kg, 7.2 ft • lb)

NOTE:

Tighten the bolts (crankcase cover – left) in stage, using a crisscross pattern.

⚠ WARNING

Always use a new gasket.

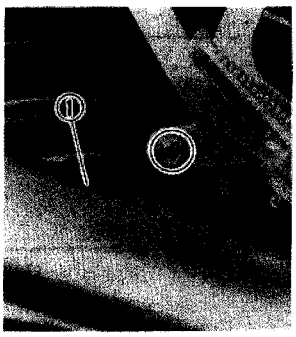
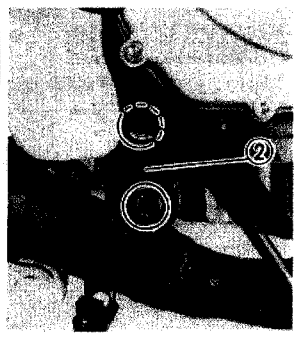


7. Install:
- Shift pedal link ①

	Bolt (shift pedal link): 10 Nm (1.0 m • kg, 7.2 ft • lb)

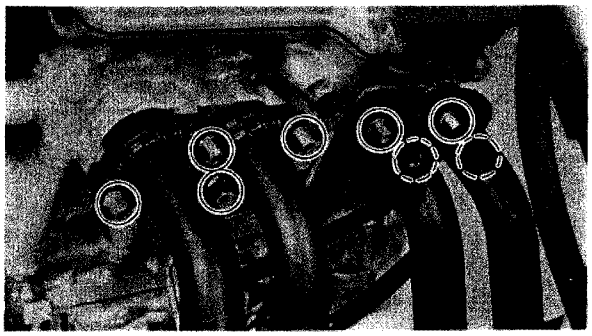
NOTE:

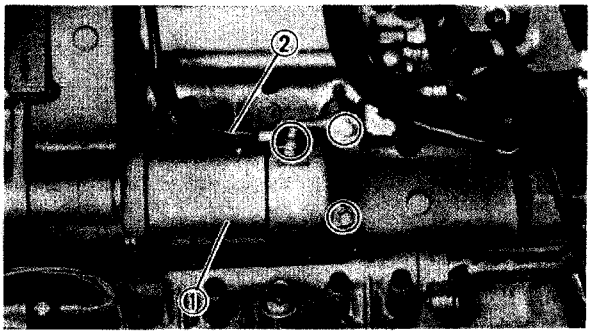
Align the punched mark ⓐ on the shaft with the slot ⓑ on the pedal link.

8.Install:
- Gaskets (exhaust pipe)
- Muffler assembly ①
- Stay ② (exhaust pipe)
- Nuts (exhaust pipe)

Bolt (muffler):
20 Nm (2.0 m • kg, 14 ft • lb)
Bolt (exhaust pipe stay):
20 Nm (2.0 m • kg, 14 ft • lb)
Nut (exhaust pipe):
10 Nm (1.0 m • kg, 7.2 ft • lb)

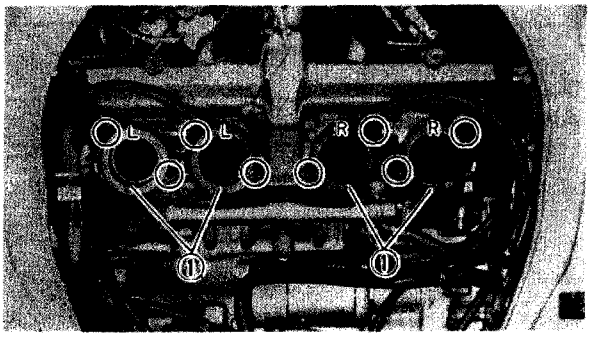




9.Install:
- Starter motor ①

Bolt (starter motor):
10 Nm (1.0 m • kg, 7.2 ft • lb)

10.Connect:
- Starter motor lead ②



11.Connect:
- Carburetor joint ①

NOTE:
Install the carburetor joint with the "L" mark onto the #1 and #2 cylinders and the carburetor joint with the "R" mark onto the #3 and #4 cylinders.

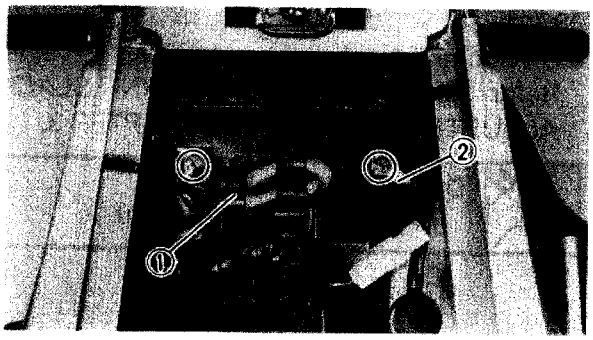
Bolt (carburetor joint):
10 Nm (1.0 m • kg, 7.2 ft • lb)

12.Install:
- Radiator

  Refer to the "RADIATOR – INSTALLATION" section in CHAPTER 5.

13.Install:
- Carburetor

  Refer to the "CARBURETOR – INSTALLATION" section in CHAPTER 6.



14.Connect:
- Battery leads

CAUTION:

Connect the positive lead ① first and then the negative lead ②.

15.Fill:
- Crankcase

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

Total amount:
3.5 L (3.1 Imp qt, 3.7 US qt)

16.Fill:
- Cooling system

  Refer to the "COOLANT LEVEL INSPECTION" section in CHAPTER 3.

Radiator capacity (including all routes):
1.8 L (1.58 Imp qt, 1.90 US qt)

17.Adjust:
- Idle speed

  Refer to the "IDLE SPEED ADJUSTMENT" section in CHAPTER 3.

Idle speed:
1,150 ~ 1,250 r/min
For (CH)(A)(S)
1,250 ~ 1,350 r/min
Except for (CH)(A)(S)

18.Adjust:
- Throttle cable free play
  Refer to the "THROTTLE CABLE FREE PLAY ADJUSTMENT" section in CHAPTER 3.



Throttle cable free play:
3 ~ 7 mm (0.12 ~ 0.28 in)

19.Adjust:
- Drive chain slack
  Refer to the "DRIVE CHAIN SLACK ADJUSTMENT" section in CHAPTER 3.



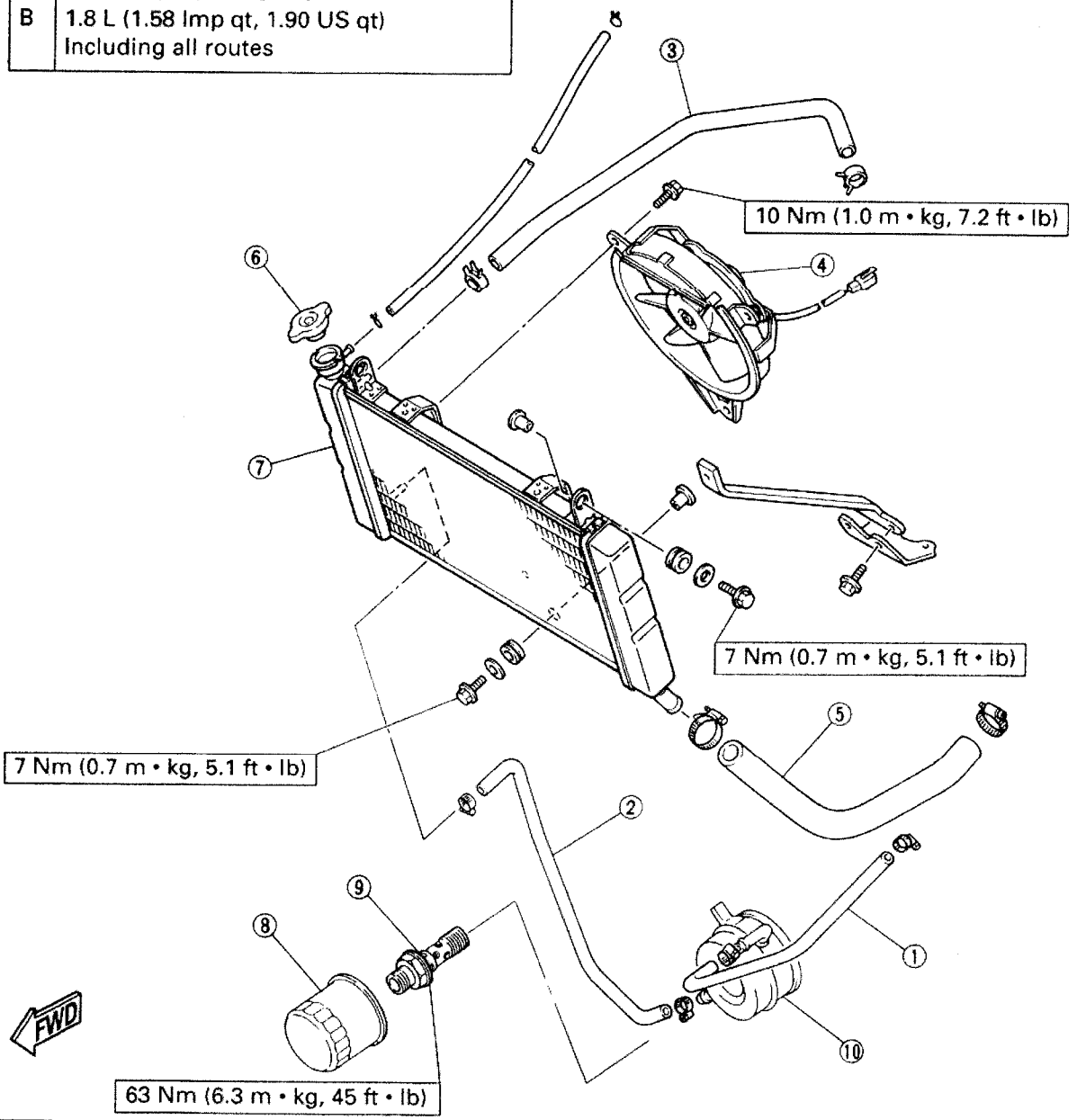
Drive chain slack:
20 ~ 30 mm (0.8 ~ 1.2 in)

COOLING SYSTEM

RADIATOR/OIL COOLER

① Inlet hose (oil cooler)
② Outlet hose (oil cooler)
③ Breather hose (thermostatic valve housing)
④ Fan motor assembly
⑤ Outlet hose (radiator)
⑥ Radiator cap
⑦ Radiator
⑧ Oil filter
⑨ Bolt
⑩ Oil cooler

A	RADIATOR CAP OPENING PRESSURE: 110 ~ 140 kPa (1.1 ~ 1.4 kg/cm², 15.65 ~ 19.91 psi)
B	RADIATOR CAPACITY: 1.8 L (1.58 Imp qt, 1.90 US qt) Including all routes



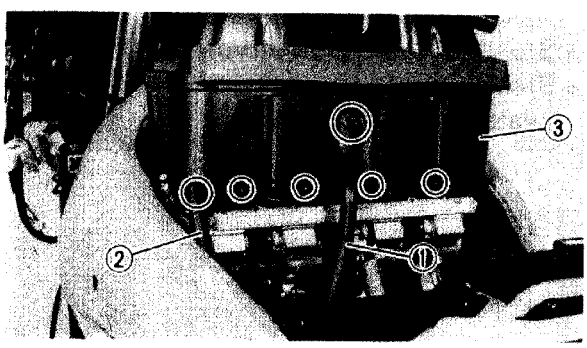
RADIATOR

⚠ 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.

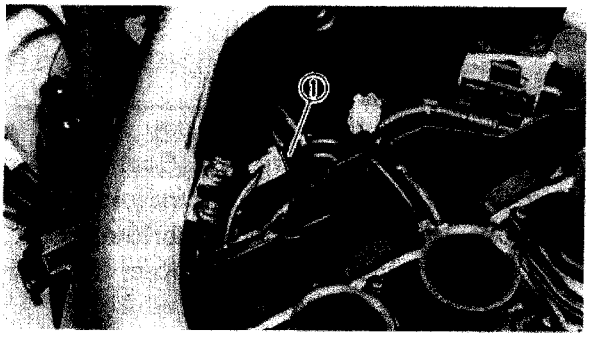
REMOVAL

1.Remove:
- Seat
  Refer to the "SEAT" section in CHAPTER 3.
- Fuel tank
  Refer to the "FUEL TANK" section in CHAPTER 3.
- Lower cowling
- Center cowlings
  Refer to the "COWLINGS" section in CHAPTER 3.



2.Disconnect:
- Breather hose ① (crankcase)
- Breather hose ② (air filter case)

3.Remove:
- Air filter case ③

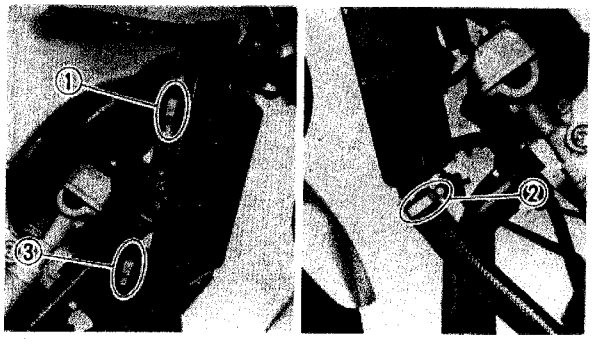


4.Disconnect:
- Cooling fan motor coupler ①

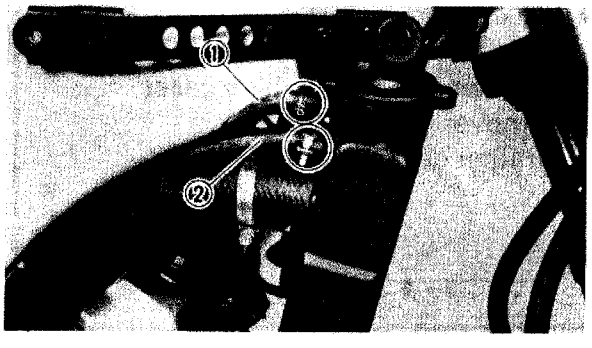
5.Drain:
- Coolant:
  Refer to the "COOLANT REPLACEMENT" section in CHAPTER 3.

NOTE:
Thoroughly flush the cooling system with clean tap water.

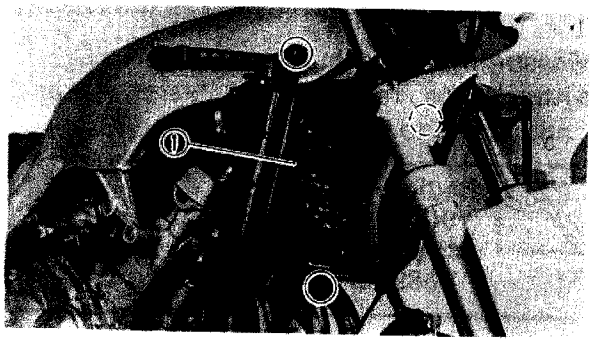
CAUTION:
Take care so that no coolant does not splash to painted surfaces. If splashes, wash it away with water.



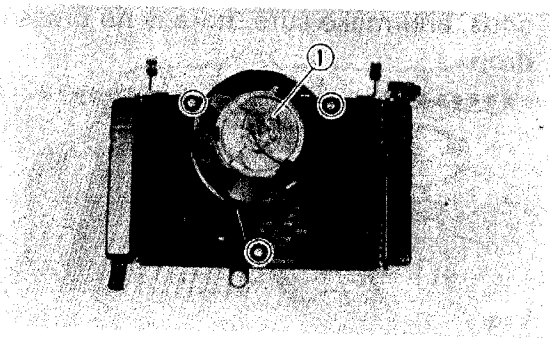
6.Loosen:
- Hose band ① (radiator – inlet hose)
- Hose band ② (radiator – outlet hose)
- Hose band ③ (oil cooler – outlet hose)



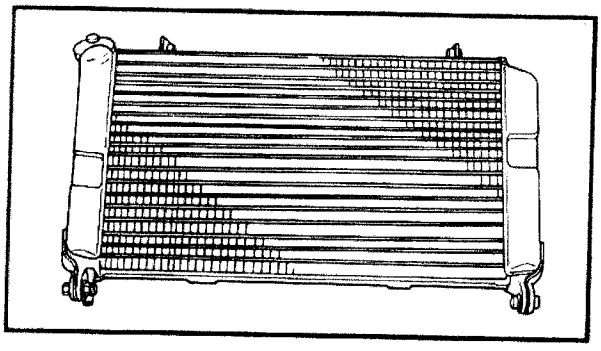
7.Disconnect:
- Breather hose ① (reservoir tank)
- Breather hose ②
  (water jacket joint – outlet)



8.Remove:
- Radiator assembly ①

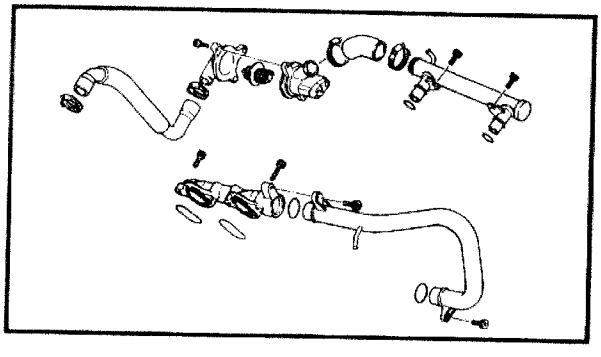


9.Remove:
- Fan motors ①



INSPECTION

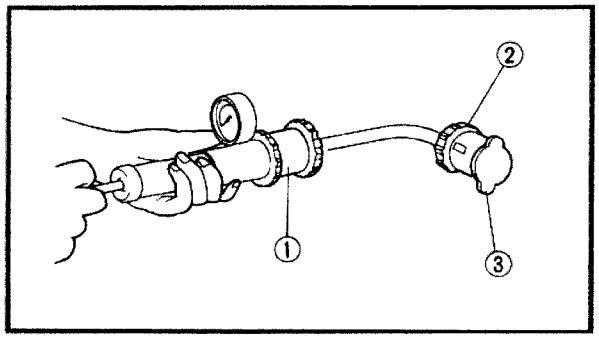
1.Inspect:
- Radiator core
  Obstruction → Blow out with compressed air through rear of the radiator.
  Flattened fin → Repair/Replace.



2.Inspect:
- Radiator hoses
- Radiator pipes
  Cracks/Damage → Replace.

3.Measure:
- Radiator cap opening pressure
  Radiator cap opens at pressure below the specified pressure → Replace.

Radiator cap opening pressure:
110 ~ 140 kPa
(1.1 ~ 1.4 kg/cm², 15.64 ~ 19.91 psi)



****

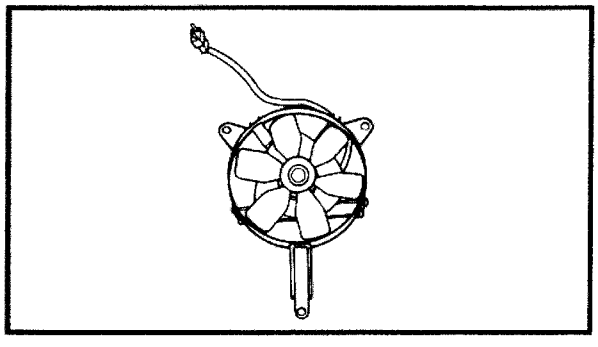
Measurement steps:

- Attach the radiator cap tester ① and adapter ② to the radiator cap ③.

Radiator cap tester:
90890-01325
Adapter:
90890-01352

- Apply the specified pressure for 10 seconds, and make sure there is no pressure drop.

****



4.Inspect:

- Fan motor assembly
  Damage → Replace.
  Does not operate → Check.
  Refer to "COOLING SYSTEM" section in CHAPTER 8.

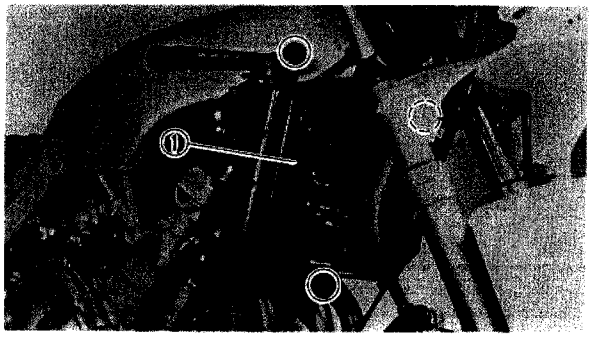
INSTALLATION

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

1.Install:

- Fan motors

Bolt (fan motor):
10 Nm (1.0 m • kg, 7.2 ft • lb)

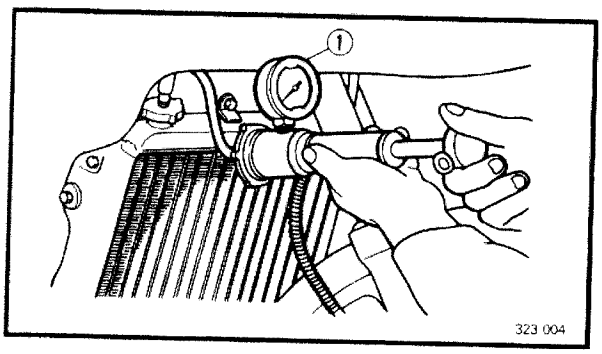


2.Install:

- Radiator assembly ①

Bolt (radiator assembly):
7 Nm (0.7 m • kg, 5.1 ft • lb)

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

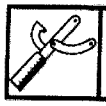


4.Inspect:
- Cooling system
  Decrease of pressure (leaks) → Repair as required.

****

Inspection steps:

- Attach the radiator cap tester ① to the radiator.

	**Radiator cap tester:** **90890-01325**

- Apply 100 kPa (1.0 kg/cm², 14 psi) pressure.
- Measure the indicated pressure with the gauge.

****

OIL COOLER

REMOVAL

1.Remove:
- Lower cowling
- Center cowlings

Refer to the "COWLINGS" section in CHAPTER 3.

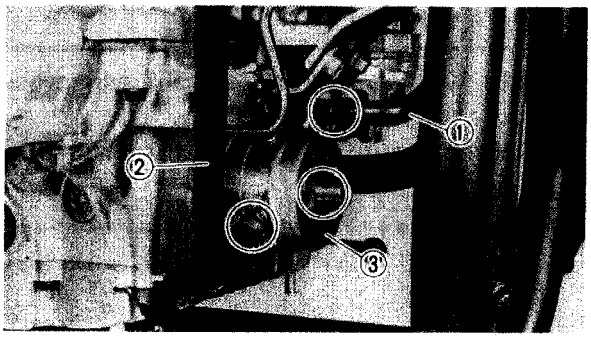
2.Drain:
- Engine oil

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

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

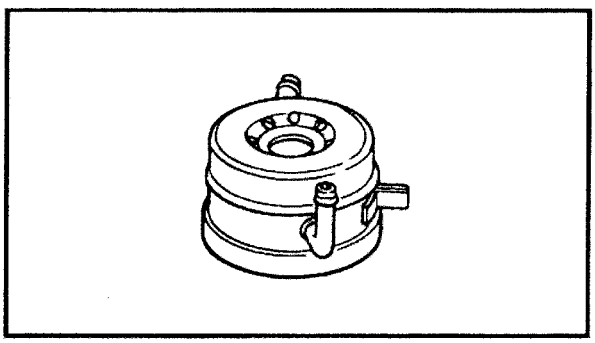
3.Remove:
- Oil filter

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



4.Disconnect:
- Inlet hose ① (oil cooler)
- Outlet hose ② (oil cooler)

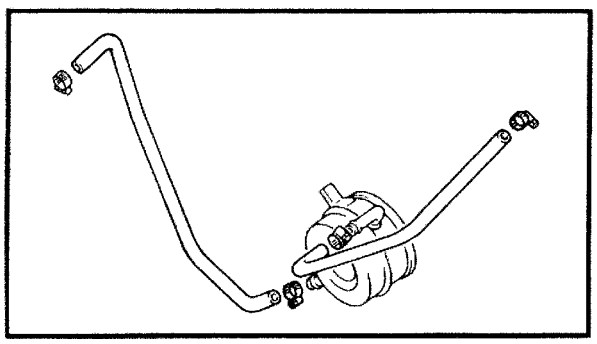
5.Remove:
- Oil cooler ③



INSPECTION

1.Inspect:
- Oil cooler

Cracks/Damage → Replace.



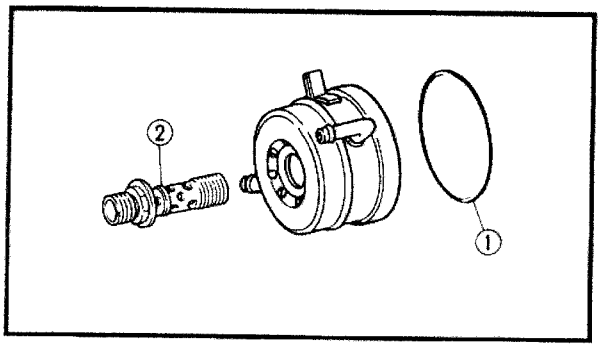
2.Inspect:
- Inlet hose (oil cooler)
- Outlet hose (oil cooler)

Cracks/Wear/Damage → Replace.

INSTALLATION

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

1. Clean the mating surfaces of the oil cooler and the crankcase with a cloth dampened with thinner.



2. Lubricate:
- O-ring ①
- Bolt ②

	Engine oil

⚠ WARNING

Always use a new O-ring on the oil cooler.

3. Install:
- O-ring
- Oil cooler

NOTE:

Make sure the O-ring is positioned properly.

	Bolt (oil cooler): **63 Nm (6.3 m • kg, 45 ft • lb)**

4. Install:
- Oil filter

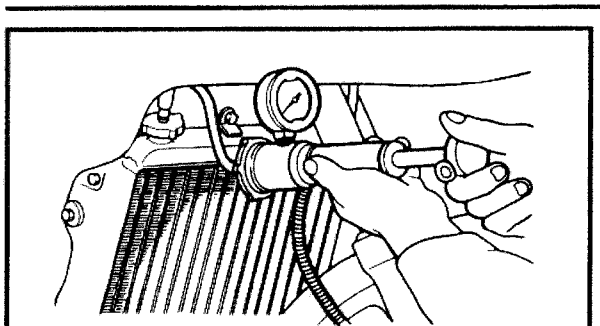
Refer to the "ENGINE OIL FILTER REPLACEMENT" section in CHAPTER 3.

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

5. Fill:
- Cooling system

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

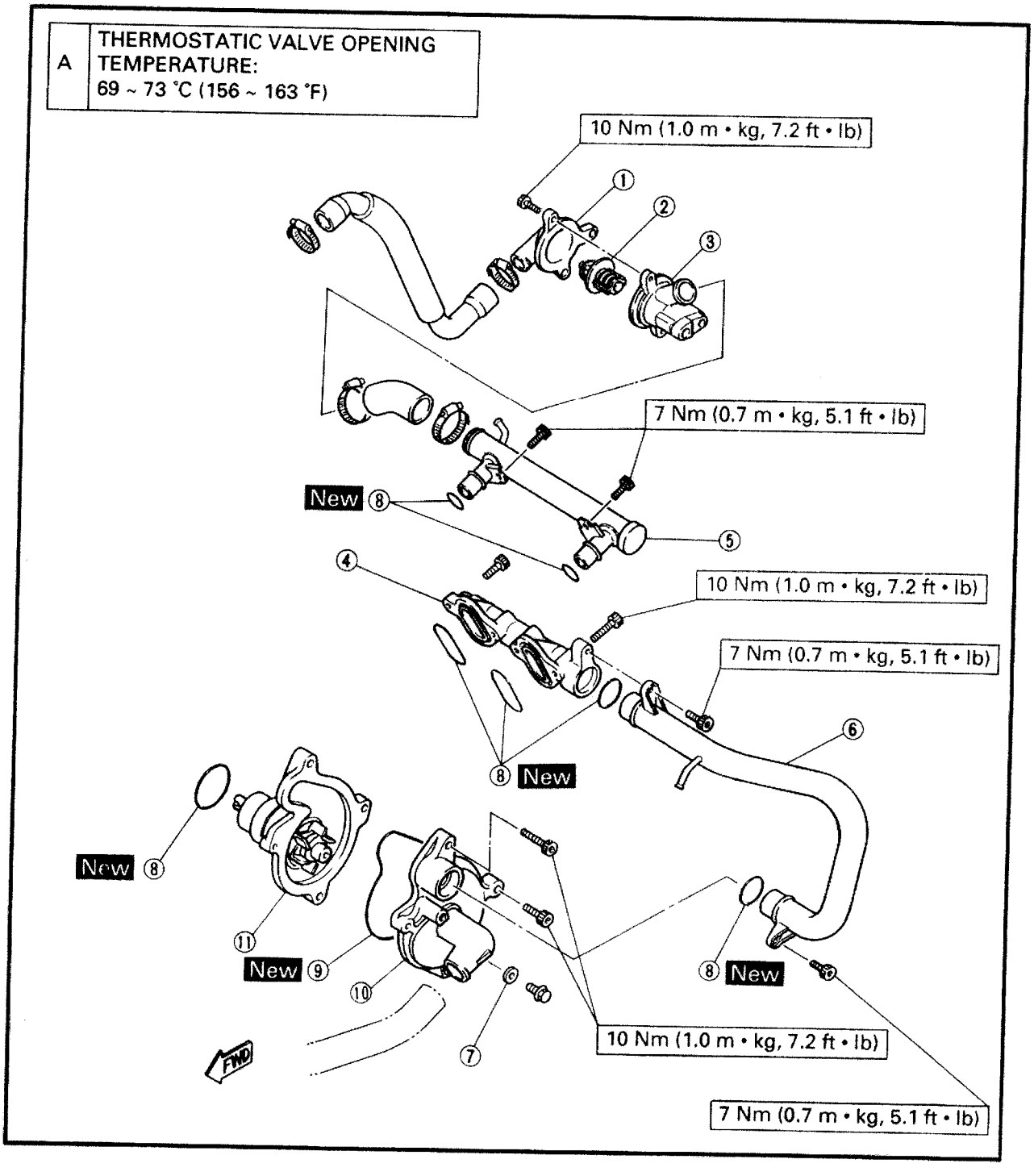
Refer to the "ENGINE OIL REPLACEMENT" section in CHAPTER 3.



6.Inspect:
- Cooling system (oil cooler)
  Decrease of pressure (leaks) → Replace oil cooler as required.
  Refer to the "RADIATOR — INSTALLATION" section.

THERMOSTATIC VALVE/WATER PUMP

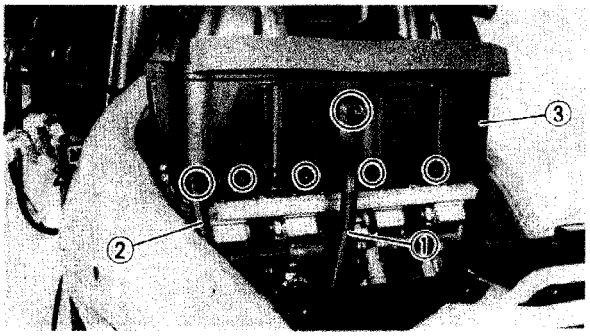
① Thermostatic valve cover
② Thermostatic valve
③ Thermostatic valve housing
④ Water jacket joint (inlet)
⑤ Water jacket joint (outlet)
⑥ Outlet pipe (water pump)
⑦ Copper washer
⑧ O-ring
⑨ Gasket
⑩ Water pump cover
⑪ Water pump housing



THERMOSTATIC VALVE

REMOVAL

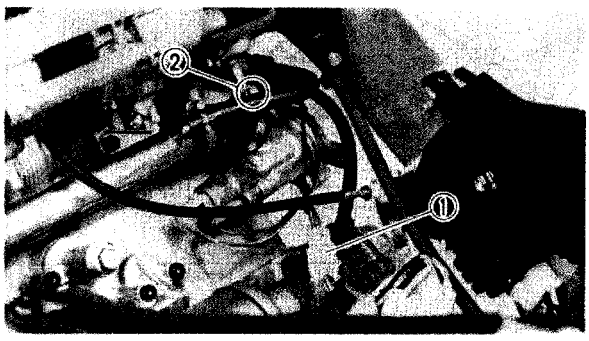
1.Remove:
- Seat
  Refer to the "SEAT" section in CHAPTER 3.
- Fuel tank
  Refer to the "FUEL TANK" section in CHAPTER 3.
- Lower cowling
- Center cowlings
  Refer to the "COWLINGS" section in CHAPTER 3.



2.Disconnect:
- Breather hose ① (crankcase)
- Breather hose ② (air filter case)

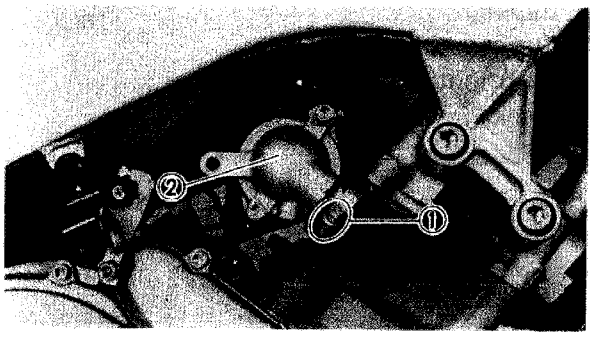
3.Remove:
- Air filter case ③

4.Drain:
- Coolant
  Refer to the "COOLANT REPLACEMENT" section in CHAPTER 3.



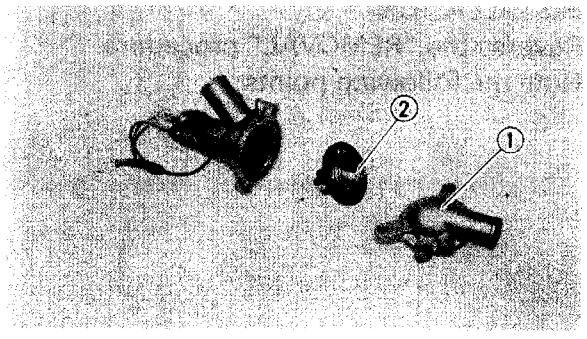
5.Disconnect:
- Thermo switch/thermo unit coupler ①

6.Loosen:
- Hose band ②

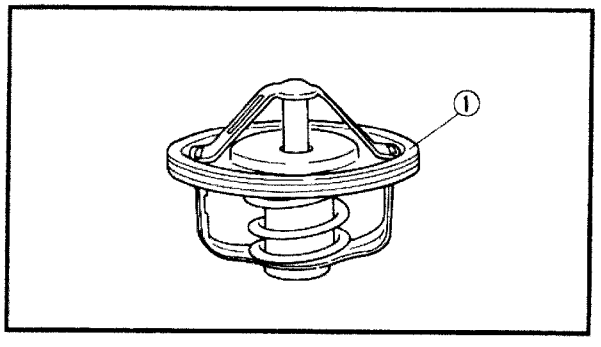


7.Loosen:
- Hose band ①

8.Remove:
- Thermostatic valve housing ②



9.Remove:
- Thermostatic valve cover ①
- Thermostatic valve ②



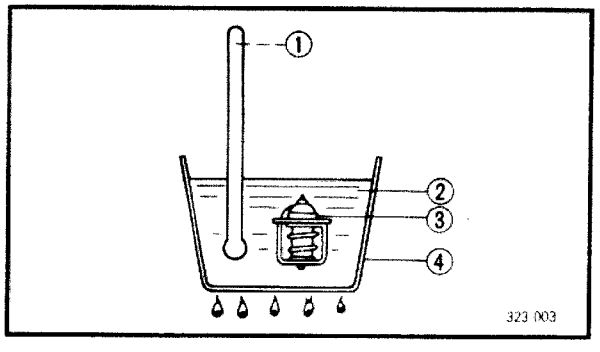
INSPECTION

1.Inspect:
- Thermostatic valve ①
  Valve does not open at 69 ~ 73°C (156 ~ 163°F) → Replace.

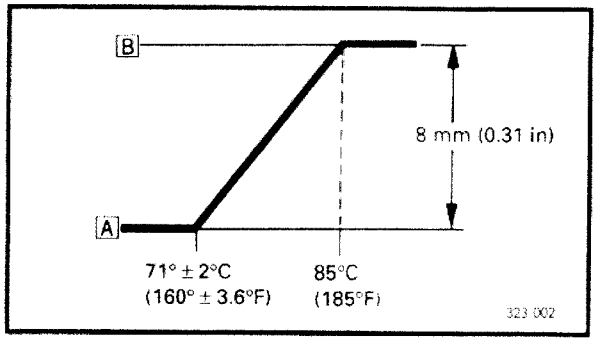
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Inspection steps:
- Suspend thermostatic valve in a vessel.
- Place reliable thermometer in a water.
- Observe thermometer, while stirring water continually.

****

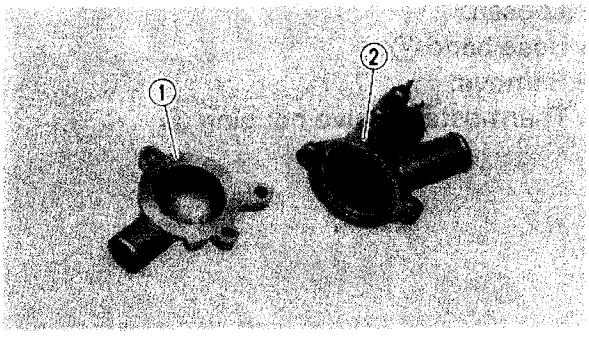


① Thermometer
② Water
③ Thermostatic valve
④ Vessel



[A] CLOSE
[B] OPEN

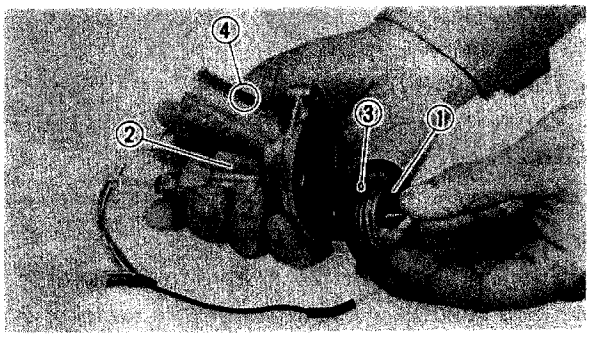
NOTE:
Thermostatic valve is sealed and its setting is specialized work. If its accuracy is in doubt, replace it. A faulty unit could cause serious overheating or over-cooling.



2.Inspect:
- Thermostatic cover ①
- Thermostatic housing ②
  Cracks/Damage → Replace.

INSTALLATION

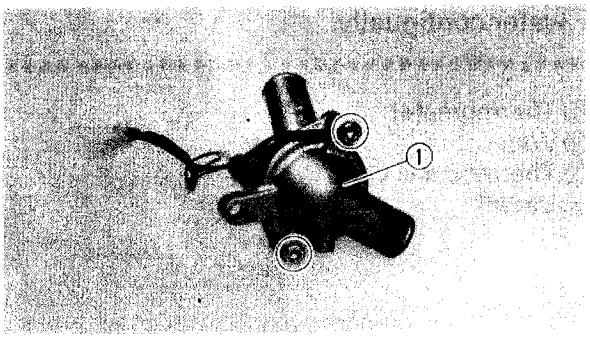
Reverse the "REMOVAL" procedure.
Note the following points.



1.Install:
- Thermostatic valve ①
  (to thermostatic housing ②)

NOTE:

The thermostatic valve must be installed with the breather hole ③ facing to the housing projection ④.



2.Install:
- Thermostatic valve cover ①

	Bolt (thermostatic valve cover): 10 Nm (1.0 m • kg, 7.2 ft • lb)

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

WATER PUMP

REMOVAL

1.Remove:
- Lower cowling
- Center cowling (left)

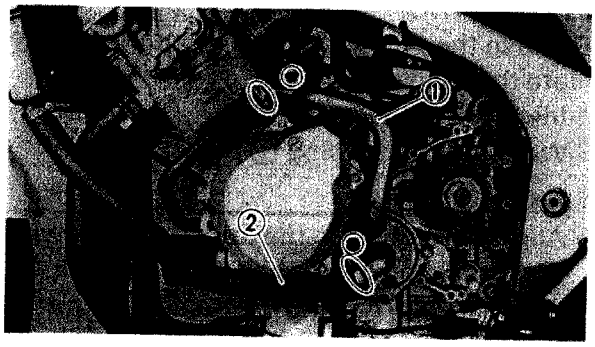
Refer to the "COWLINGS" section in CHAPTER 3.

2.Drain:
- Coolant

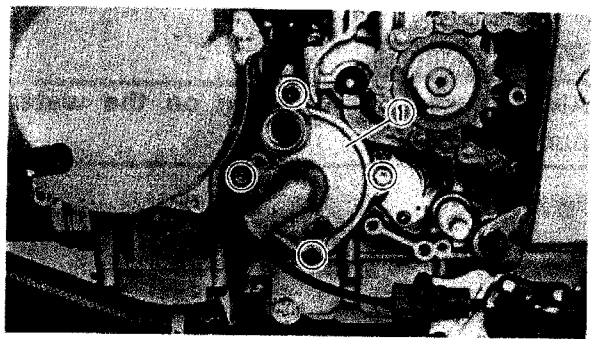
Refer to the "COOLANT REPLACEMENT" section in CHAPTER 3.

3.Remove:
- Shift pedal link
- Crankcase cover (left)

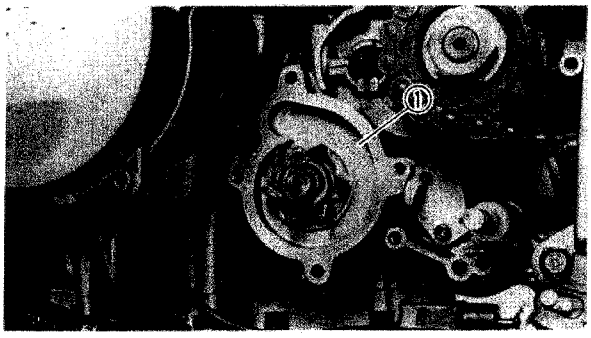
Refer to the "ENGINE REMOVAL" section in CHAPTER 4.



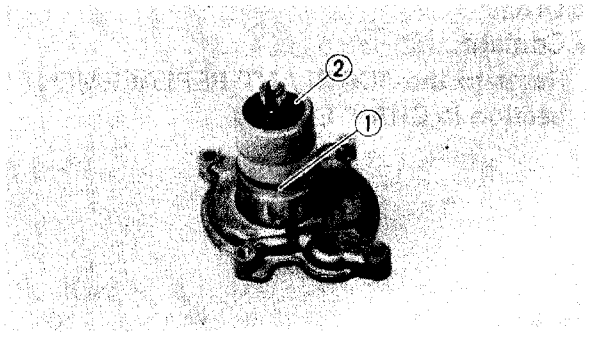
4.Remove:
- Outlet pipe ①
- O-rings
- Inlet hose ②



5.Remove:
- Water pump cover ①
- O-ring

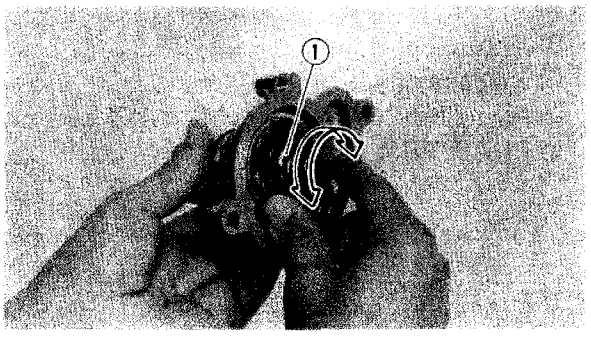


6.Remove:
- Water pump housing ①

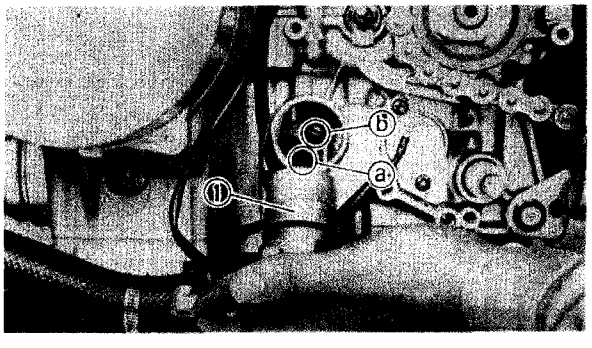


INSPECTION

1.Inspect:
- O-ring ①
  Wear/Damage → Replace.
- Oil seal ②
  Wear/Damage → Replace water pump housing assembly.



2.Inspect:
- Impeller ①
  Cracks/Wear/Damage → Replace water pump housing assembly.
- Bearing
  Roughness → Replace water pump housing assembly.



INSTALLATION

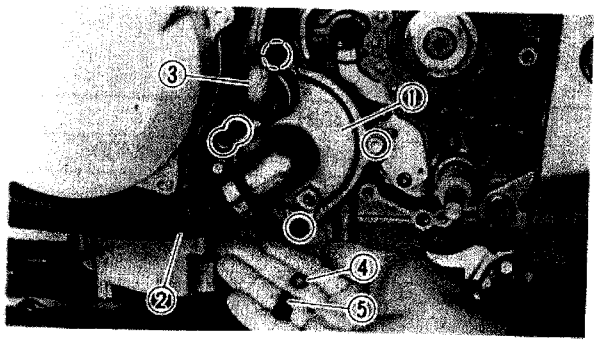
Reverse the "REMOVAL" procedure.
Note the following points.

1.Install:
- Water pump housing ①

NOTE:
- Align the slot ⓐ on the impeller shaft with the projection ⓑ on the oil pump shaft.
- Apply a thin coating of grease to the O-ring.

⚠ WARNING

Always use a new O-ring on the water pump housing.



2.Install:
- O-ring
- Water pump cover ①
- Inlet hose ②
- O-rings
- Outlet pipe ③

NOTE:
- Before installing the outlet pipe ③, apply the grease to the O-rings.
- Set the new copper washer ④ to the coolant drain bolt ⑤.

	Bolt (water pump cover): 10 Nm (1.0 m • kg, 7.2 ft • lb)

⚠ WARNING

Always use new O-rings, and copper washer on the coolant drain bolt.

3.Install:
- Crankcase cover (left)
- Shift pedal link

Refer to the "ENGINE ASSEMBLY AND ADJUSTMENT" section in CHAPTER 4.

4.Fill:
- Cooling system

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

5.Inspect:
- Cooling system

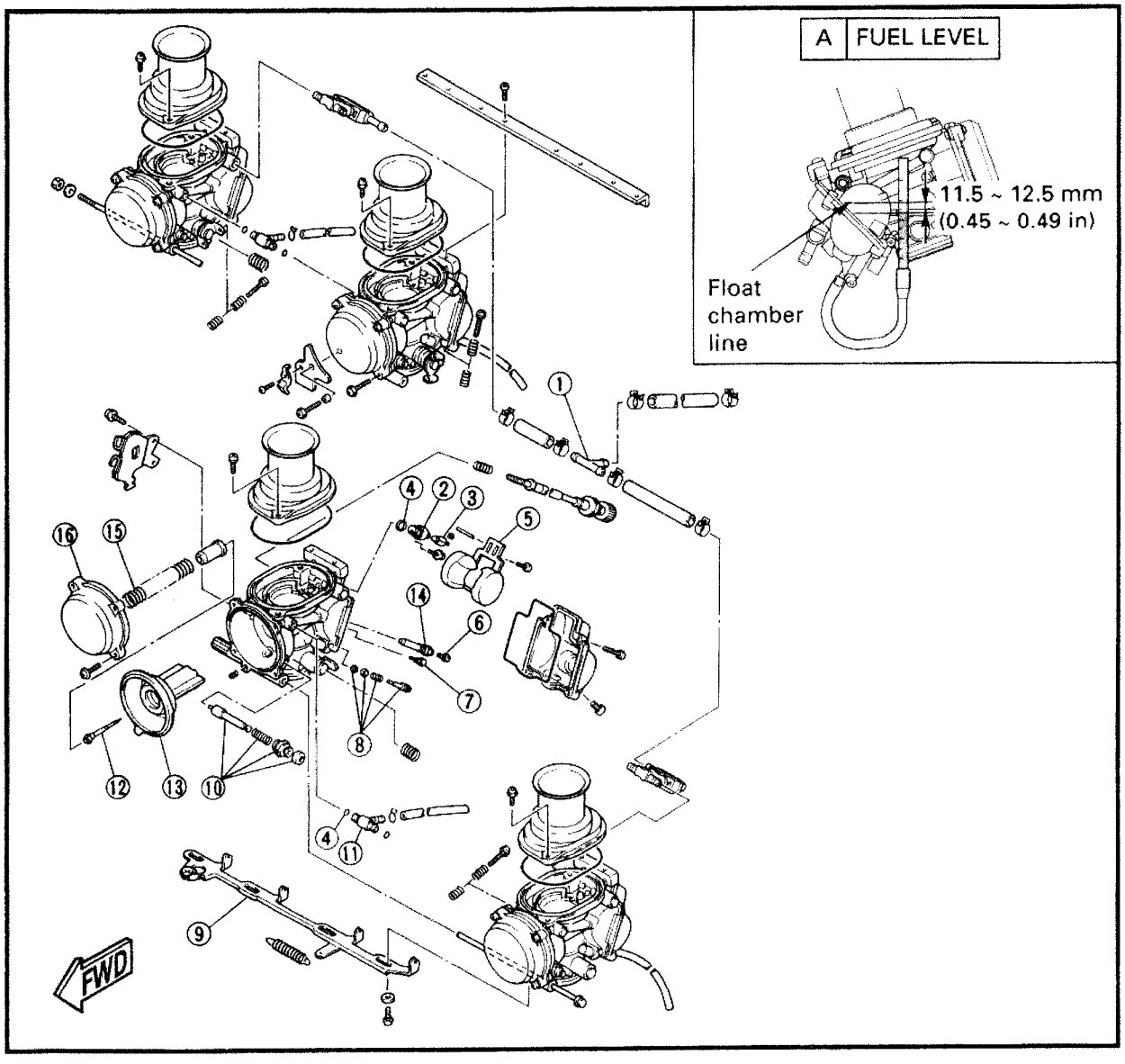
Decrease of pressure (leaks) → Replace oil cooler as required.
Refer to the "RADIATOR — INSTALLATION" section.

CARBURETION

CARBURETOR

① Joint (fuel feed)
② Valve seat
③ Needle valve
④ O-ring
⑤ Floats
⑥ Main jet
⑦ Pilot jet
⑧ Pilot screw set
⑨ Joint (starter lever)
⑩ Starter plunger set
⑪ Joint (airvent hose)
⑫ Jet needle set
⑬ Piston valve
⑭ Needle jet
⑮ Spring
⑯ Vacuum chamber cover

SPECIFICATIONS			
I. D. Mark	4JH00	4MH00	4MM00
MAIN JET	#118	#110	#115
MAIN AIR JET	#80	←	←
PILOT JET	#35	←	←
PILOT AIR JET 1	#100	←	#105
JET NEEDLE	N1YA	N1YB	N1YC
PILOT SCREW	1-3/4 turns out	1-7/8 turns out	1-3/5 turns out
THROTTLE VALVE	#110	←	←
ENGINE IDLE SPEED	1,250 ~ 1,350 r/min		1,150 ~ 1,250 r/min
FUEL LEVEL	11.5 ~ 12.5 mm (0.45 ~ 0.49 in)		



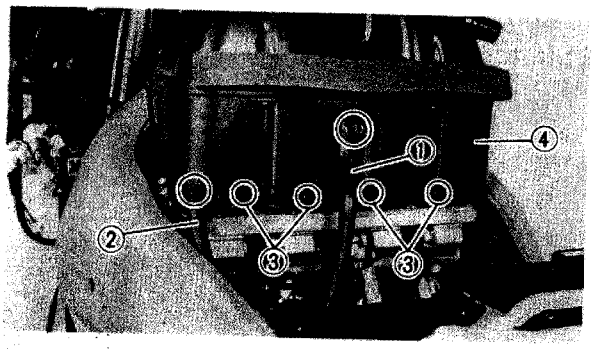
REMOVAL

1.Remove:
- Seat
  Refer to the "SEAT" section in CHAPTER 3.
- Fuel tank
  Refer to the "FUEL TANK" section in CHAPTER 3.
- Center cowling (left)
  Refer to the "COWLINGS" section in CHARTER 3.

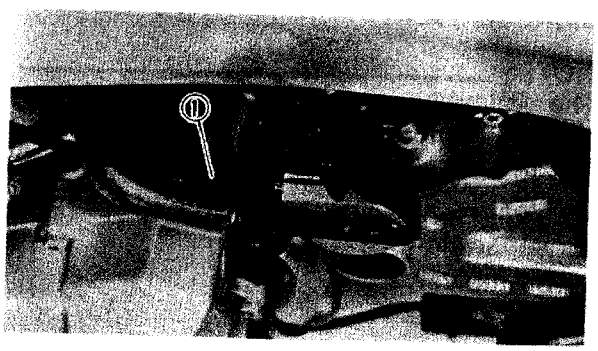
2.Disconnect:
- Breather hose ① (crankcase)
- Breather hose ② (air filter case)

3.Loosen:
- Screws ③

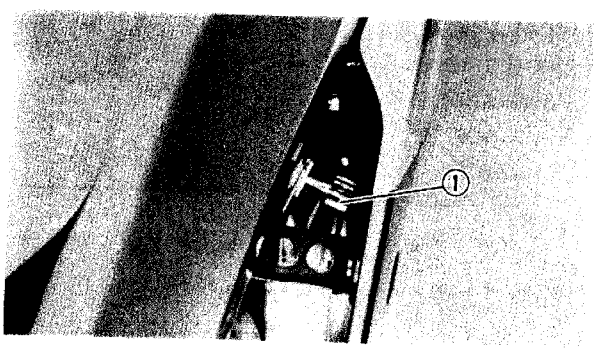
4.Remove:
- Air filter case ④



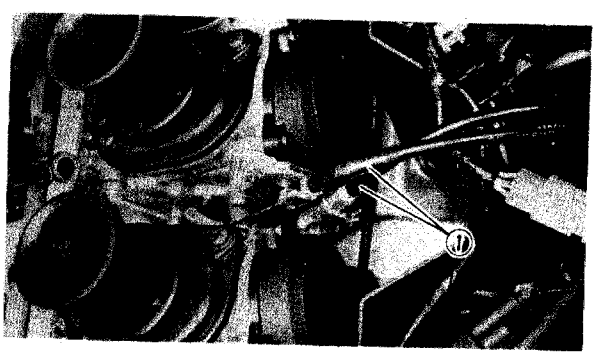
5.Disconnect:
- Starter cable ①

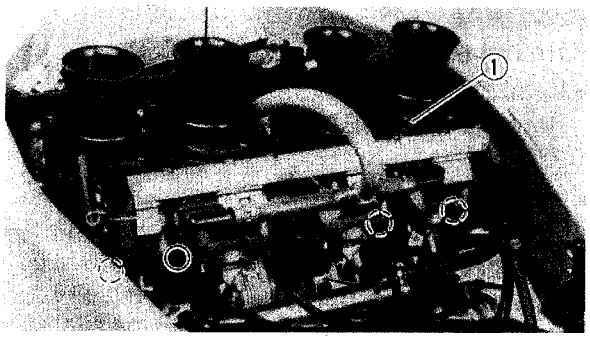


6.Remove:
- Throttle stop screw ①



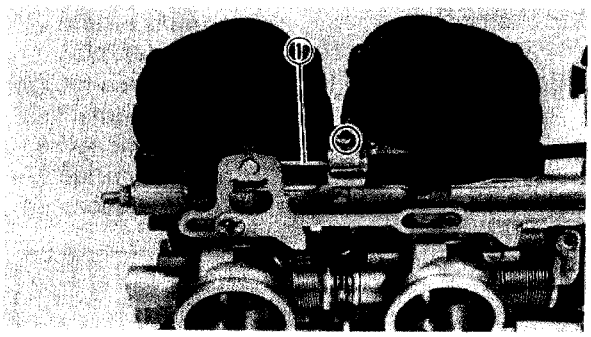
7.Disconnect:
- Throttle cables ①





8.Loosen:
- Carburetor joint screws

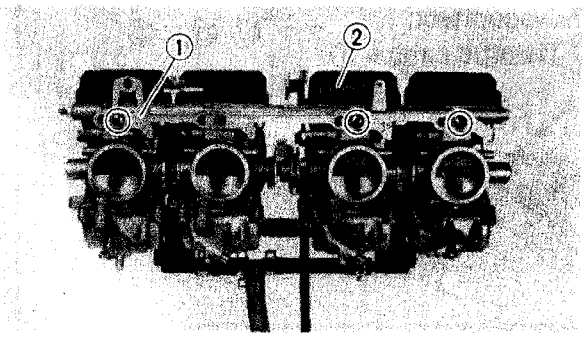
9.Remove:
- Carburetor ①



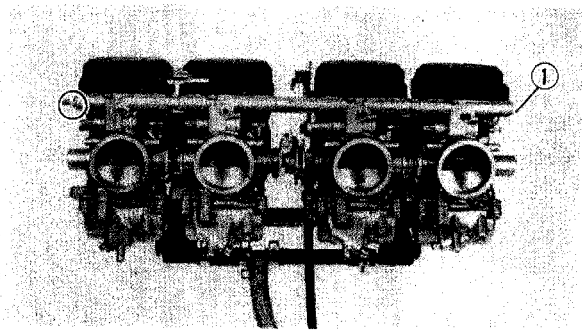
10.Remove:
- Starter cable ①

DISASSEMBLY

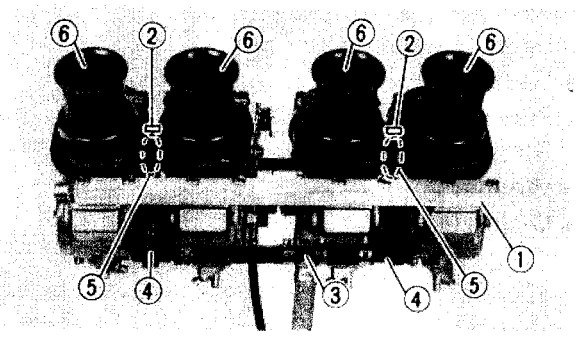
NOTE:
The following parts can be cleaned and inspected without carburetor separation.
(All inner parts except starter plunger can be cleaned and inspected without carburetor separation.)
- Throttle valve
- Piston valve
- All jets
- Float
- Needle valve
- Valve seat
- Main nozzle
- Jet needle



1.Remove:
- Starter joint ①
- Return spring ②

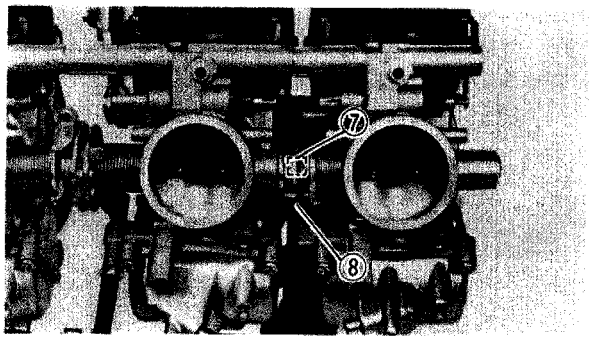


2.Remove:
- Connecting bolt ① (upper)

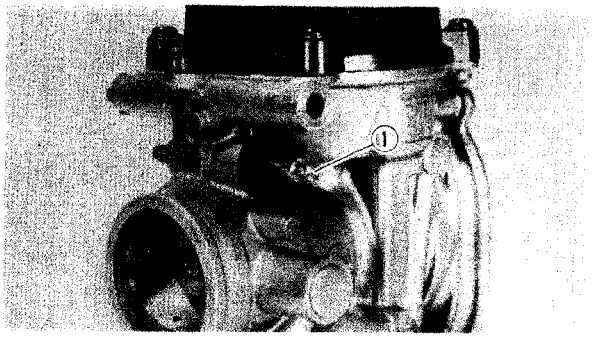


3.Remove:
- Connecting plate ① (lower)
- Joints ② (air vent hose-vacuum chamber) (with O-rings)
- Joint ③ (fuel hose)
- Joints ④ (fuel feed) (with O-ring)
- Springs ⑤ (from between carburetors #1 and #2, and #3 and #4)
- Air funnel ⑥ (with O-ring)

CAUTION:
- **Never disassemble the joint ④ (fuel feed).**
- **Since the parts that were removed are defective, do not reuse them.**

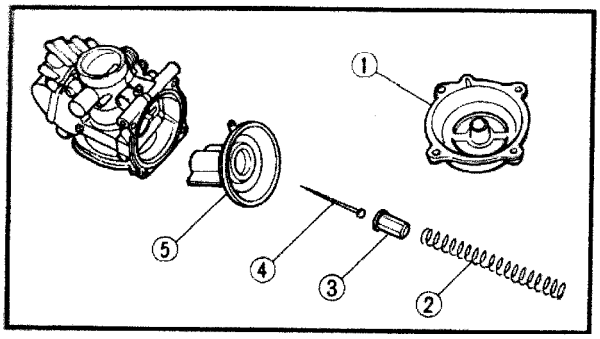


NOTE:
Be careful not to lose the return spring ⑦ under the synchronizing screw ⑧ when disassembling the carburetor.

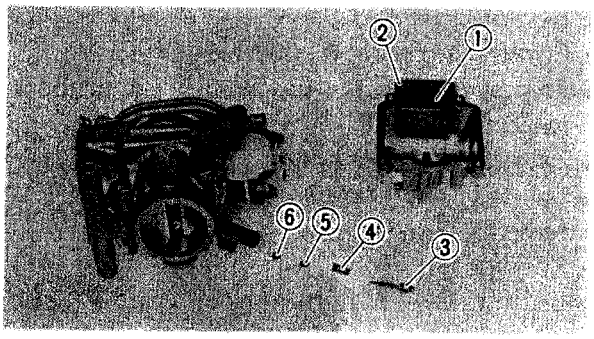


4.Remove:
- Starter plunger ①

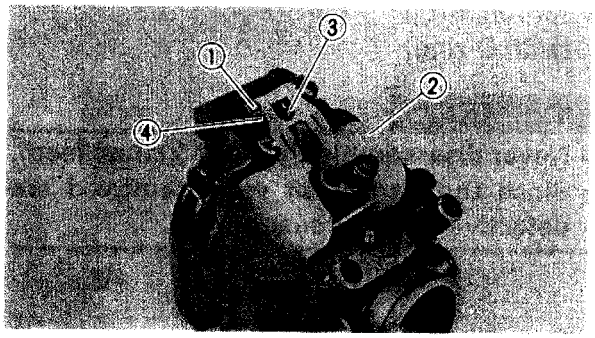
NOTE:
Unhook the hooks from the carburetor body and then pull out the starter plunger.



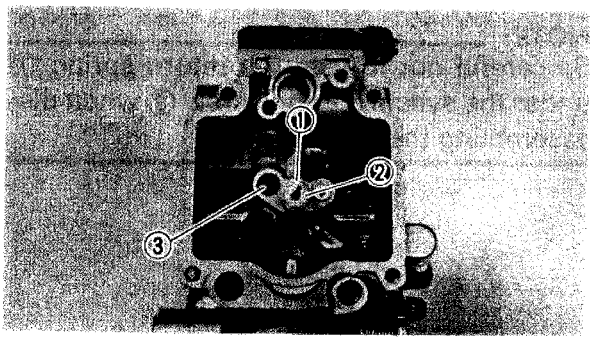
5.Remove:
- Vacuum chamber cover ①
- Spring ②
- Jet needle holder ③
- Jet needle ④
- Piston valve ⑤



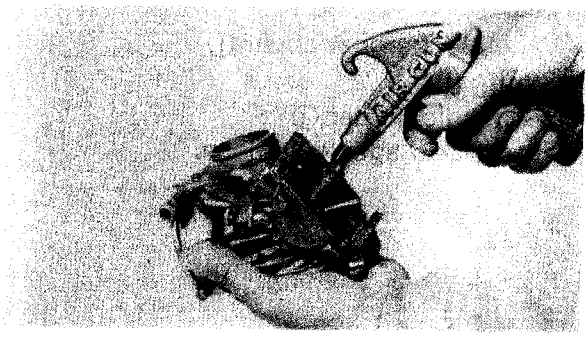
6.Remove:
- Float chamber ①
- Gasket ②
- Pilot screw ③
- Spring ④
- Washer ⑤
- O-ring ⑥



7.Remove:
- Float pin ①
- Float ②
- Needle valve ③
- Valve seat ④
- O-ring



8.Remove:
- Main jet holder ①
- Main jet ②
- Pilot jet ③



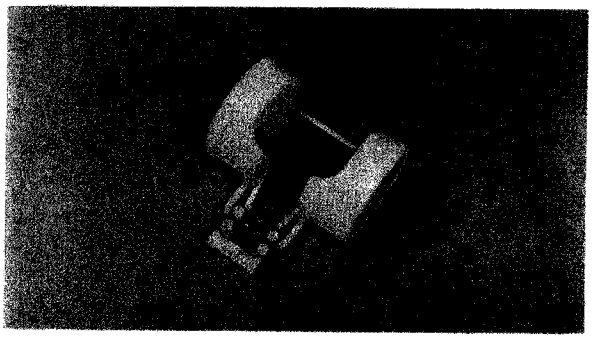
INSPECTION

1.Inspect:
- Carburetor body
- Float chamber
- Jet housing
  Cracks/Damage → Replace.
- Fuel passage
  Contamination → Clean.
- Carburetor float chamber body
  Contamination → Clean.

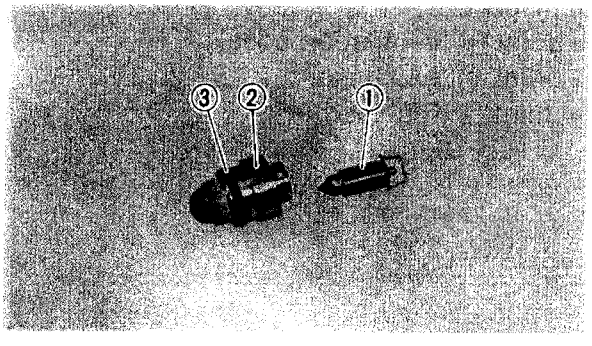
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Cleaning steps:
- Wash carburetor in petroleum based solvent. (Do not use any caustic carburetor cleaning solution.)
- Blow out all passages and jets with compressed air.

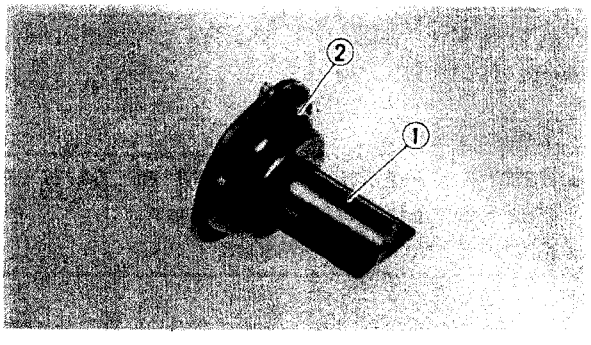
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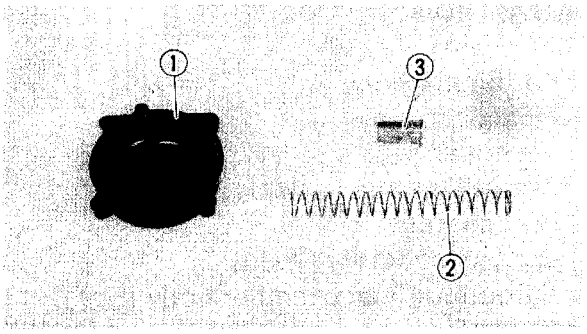
2.Inspect:
- Floats
  Damage → Replace.



3.Inspect:
- Needle valve ①
- Valve seat ②
- O-ring ③
  Damage/Wear/Contamination → Replace as a set.

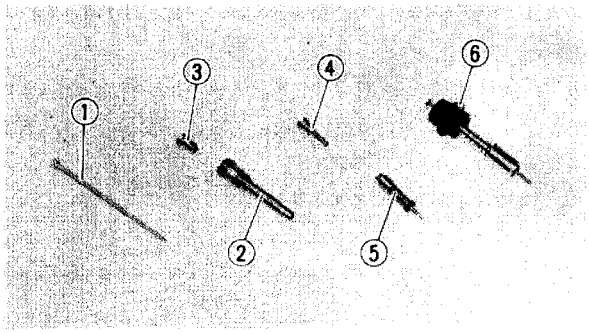


4.Inspect:
- Throttle valve ①
  Scratches/Wear/Damage → Replace.
- Rubber diaphragm ②
  Tears → Replace.



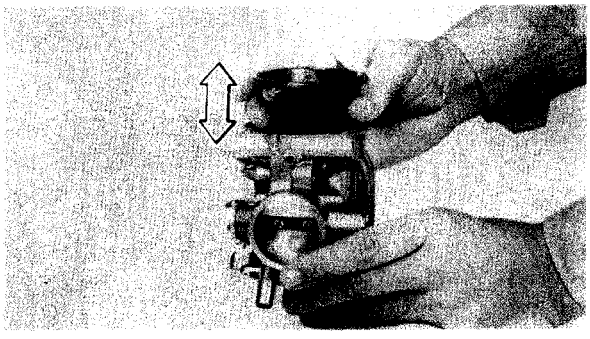
5.Inspect:
- Vacuum chamber cover ①
- Spring ②
- Jet needle holder ③

Cracks/Damage → Replace.



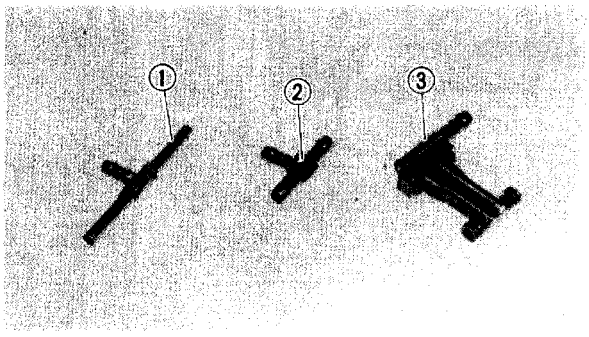
6.Inspect:
- Jet needle ①
- Needle jet ②
- Main jet ③
- Pilot jet ④
- Pilot screw ⑤
- Starter plunger ⑥

Bends/Wear/Damage → Replace.
Contamination → Blow out jets with compressed air.



7.Check:
- Free movement

Insert the throttle valve into the carburetor body, and check for free movement.
Stick → Replace.



8.Inspect:
- Joint ① (ventilation hose)
- Joint ② (fuel hose)
- Joint ③ (fuel feed)

Cracks/Damage → Replace.

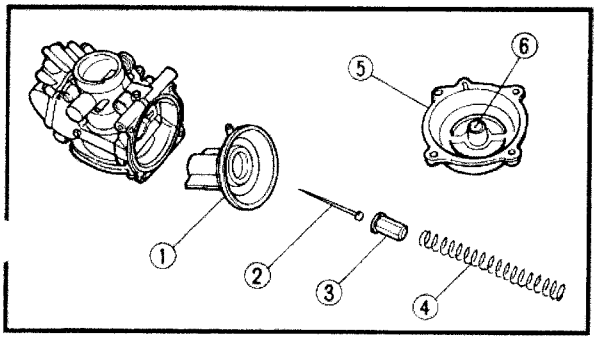
ASSEMBLY

Reverse the "DISASSEMBRY" procedures.
Note the following points.

CAUTION:
- **Before reassembling, wash all parts in clean petroleum based solvent.**
- **Always use a new gasket.**

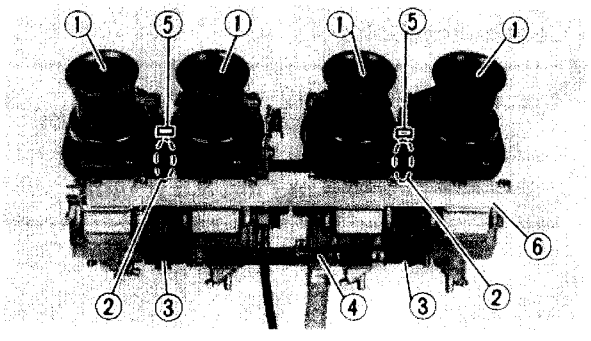
1.Install:
- O-ring
- Washer
- Spring
- Pilot air screw

Pilot screw (turns out):
1-3/4 (For 4JH)
1-7/8 (For 4MH)
1-3/5 (For 4MM)

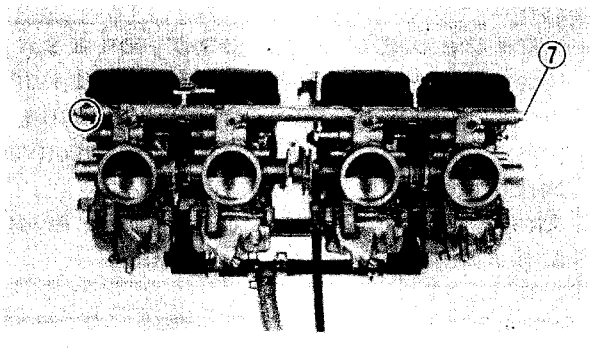


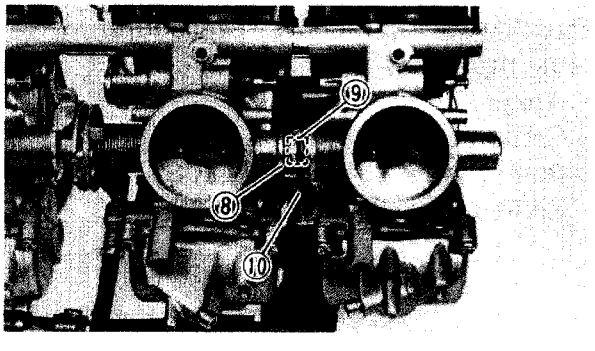
2.Install:
- Throttle valve ①
- Jet needle ②
- Jet needle holder ③
- Spring ④
- Vacuum chamber cover ⑤

NOTE:
- Insert the spring end onto the spring guide ⑥ on the vacuum chamber cover.
- Match the tab on the diaphragm to the recess in the carburetor body.

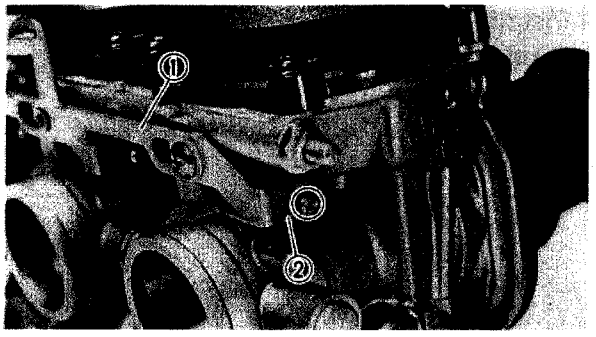


3.Install:
- Air funnel ① (with O-ring)
- Springs ② (between the carburetors #1 and #2, and #3 and #4)
- Joint ③ (fuel feed) (with gasket rings)
- Joint ④ (fuel hose)
- Joints ⑤ (air vent hose-float chamber) (with O-ring)
- Connecting plate ⑥ (lower)
- Connecting bolt ⑦ (upper)



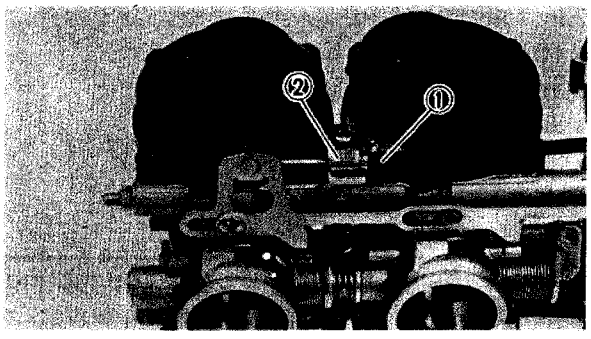


NOTE:
- Do not tighten the connecting bolts yet.
- Insert the throttle arm ⑧ (on the #1, #2, #4 carburetors) between the spring ⑨ and synchronizing screw ⑩.



4.Install:
- Starter joint ①

NOTE:
Hook the starter joint arm ② onto each starter plunger.



5.Install:
- Starter cable ①

NOTE:
Clamp the starter cable with the holder ②.

6.Tighten:
- Connecting bolts

Connecting bolt (upper):
3.5 Nm (0.35 m • kg, 2.5 ft • lb)
Connecting plate (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 carburetor 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 CHAPTER 3.

2.Adjust:
• Idle speed

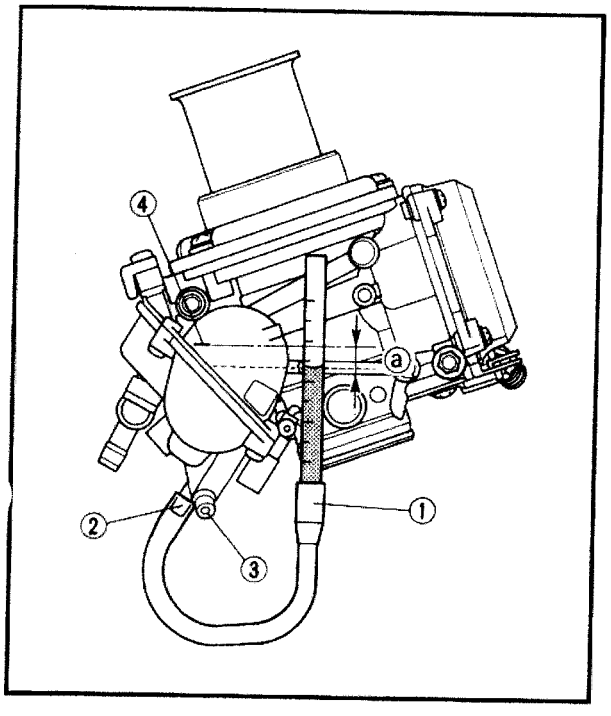
Engine idle speed:
1,150 ~ 1,250 r/min
For (CH)(A)(S)
1,250 ~ 1,350 r/min
Except for (CH)(A)(S)

Refer to the "IDLE SPEED ADJUSTMENT" section in CHAPTER 3.

3.Adjust:
• Throttle cable free play

Throttle cable free play:
3 ~ 7 mm (0.12 ~ 0.28 in)

Refer to the "THROTTLE CABLE FREE PLAY ADJUSTMENT" section in CHAPTER 3.



FUEL LEVEL ADJUSTMENT
1.Measure:
• Fuel level ⓐ
Out of specification → Adjust

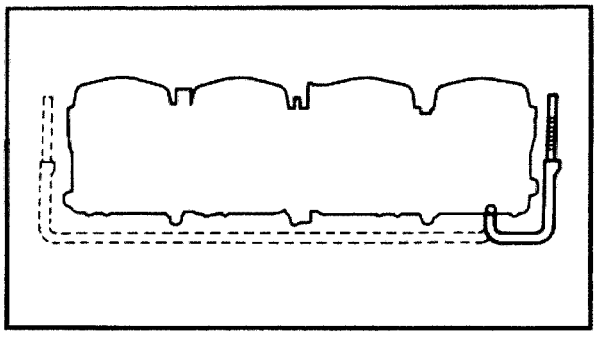
Fuel level:
11.5 ~ 12.5 mm (0.45 ~ 0.49 in)
Below the float chamber line

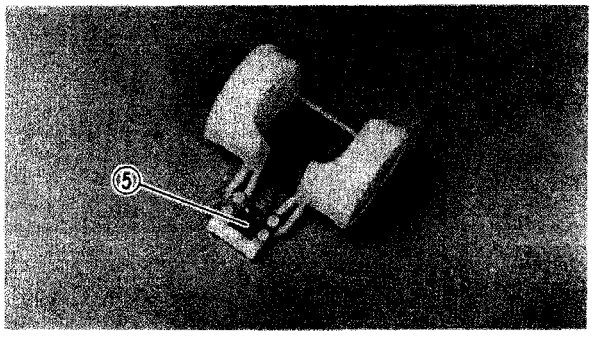
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Fuel level measurement and adjustment steps:
- Place the motorcycle on a level surface.
- Use a garage jack under the engine to ensure that the carburetor is positioned vertically.
- Connect the fuel level gauge ① to the drain pipe ②.

Fuel level gauge:
90890-01312

- Loosen the drain screw ③.
- Hold the gauge vertically next to the float chamber line ④.
- Measure the fuel level ⓐ with the gauge.





NOTE:
Fuel level readings of both side of carburetor line should be equal.

- If the fuel level is incorrect, adjust the fuel level.
- Remove the carburetor.
- Inspect the valve seat and needle valve.
- If either is worn, replace them both.

- If both are fine, adjust float level by bending the float tang ⑤ slightly.
- Install the carburetor.
- Recheck the fuel level.

****

CHASSIS

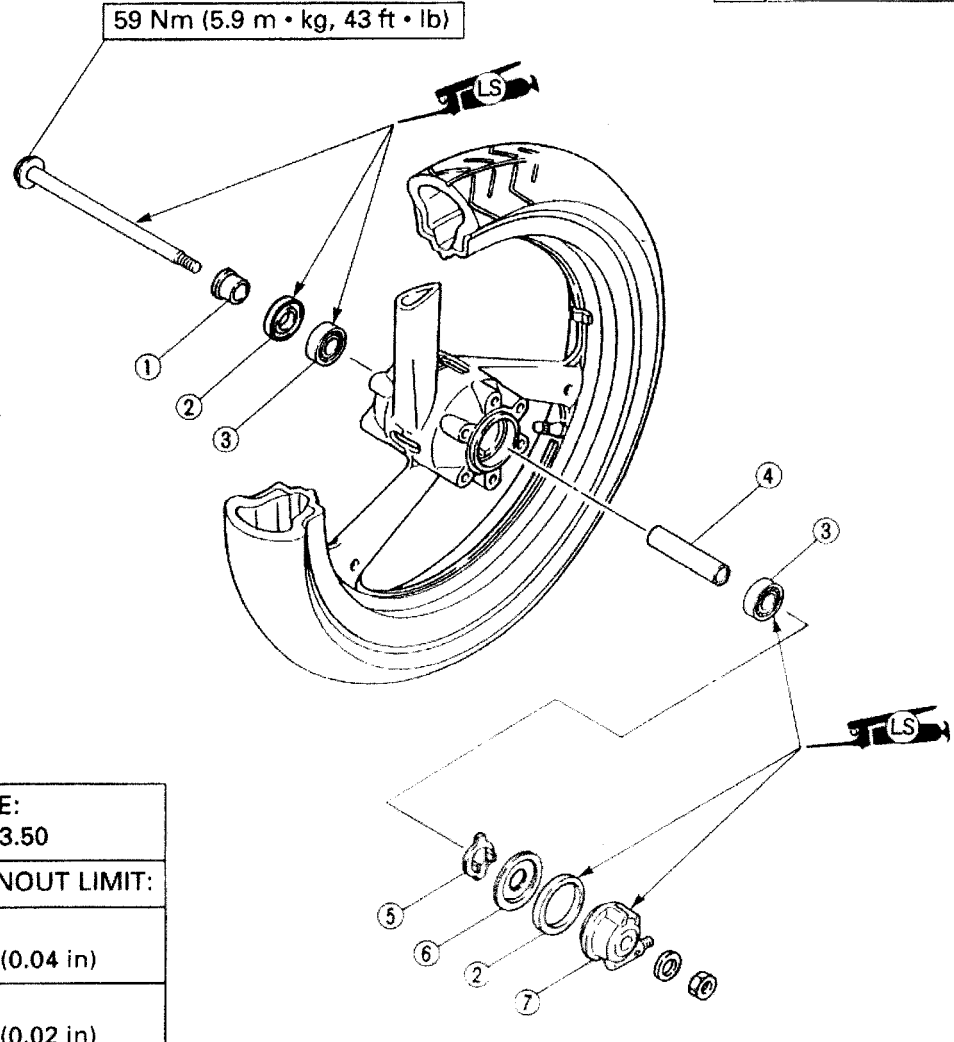
FRONT WHEEL

1. Collar
2. Oil seal
3. Bearing
4. Spacer
5. Meter clutch
6. Clutch retainer
7. Speedometer gear unit

TIRE PRESSURE (COLD)		
Maximum load*	172kg(379 lb) (CH) (A) (S) 174 kg (384 lb) For (I) (E) (F) 209 kg (461 lb) For (D) (B) (SF) (NL) (DK) (N) (GB)	
Cold tire pressure:	Front	Rear
Up to 90 kg (198 lb) load*	225 kPa (2.25 kg/cm², 33 psi)	250 kPa (2.5 kg/cm², 36 psi)
90 kg (198 lb) load ~ Maximum load*	250 kPa (2.5 kg/cm², 36 psi)	290 kPa (2.9 kg/cm², 42 psi)
High speed riding	250 kPa (2.5 kg/cm², 36 psi)	290 kPa (2.9 kg/cm², 42 psi)

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

A	TIRE SIZE: 120/60 ZR17
B	WEAR LIMIT: 1.0 mm (0.04 in)



C	RIM SIZE: 17 × MT3.50
D	RIM RUNOUT LIMIT:
E	Radial 1.0 mm (0.04 in)
F	Lateral 0.5 mm (0.02 in)

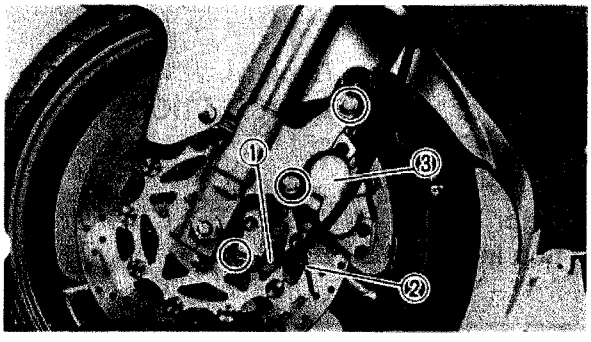
FWD

REMOVAL

⚠ WARNING

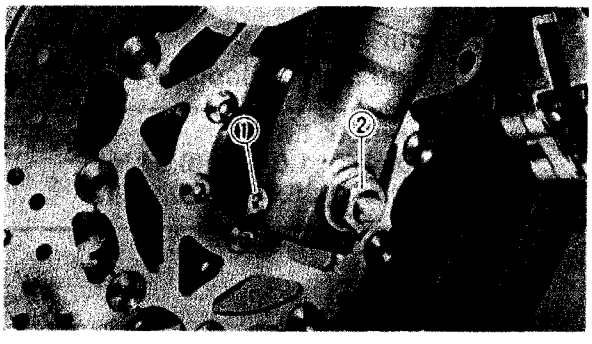
Securely support the motorcycle so there is no danger of it falling over.

1.Place the motorcycle on a level place.
2.Remove:
- Lower cowling
  Refer to the "COWLINGS" section in CHAPTER 3.



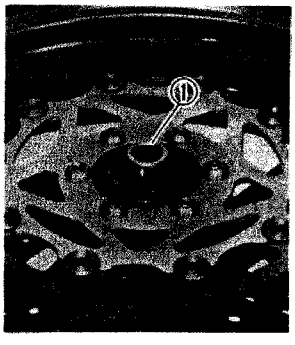
3.Remove:
- Speedometer cable①
- Speedometer cable guide ②
- Brake calipers ③ (left and right)

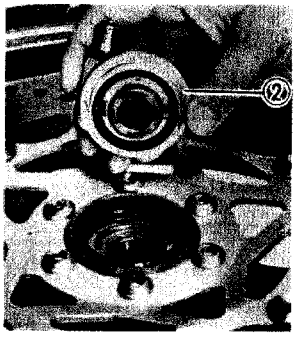
NOTE:
Do not depress the brake lever when the wheel is off the motorcycle otherwise the brake pads will be forced shut.



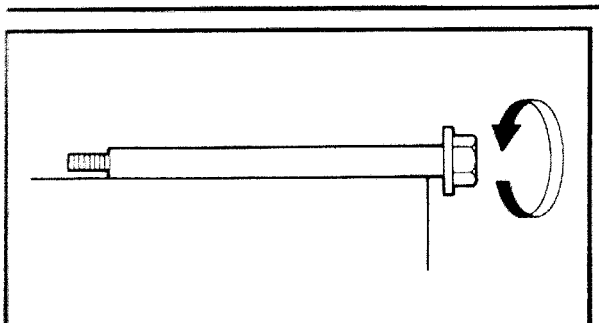
4.Loosen:
- Pinch bolt ① (front axle)
- Front axle nut ②

5.Elevate the front wheel by placing a suitable stand under the engine.
6.Remove:
- Front axle
- Front wheel





7.Remove:
- Collar ① (right)
- Speedometer gear unit ②



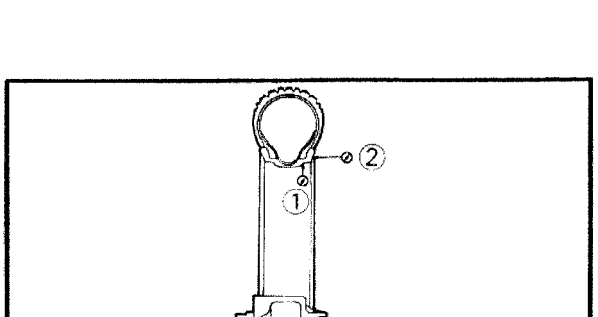
INSPECTION

1.Inspect:
- Front axle
  Roll the axle on a flat surface.
  Bends → Replace.

⚠ WARNING

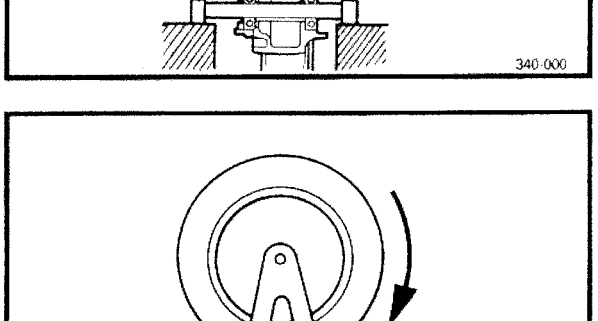
Do not attempt to straighten a bent axle.

2.Inspect:
- Tire
  Wear/Damage → Replace.
  Refer to the "TIRE INSPECTION" section in CHAPTER 3.
- Wheel
  Refer to the "WHEEL INSPECTION" section in CHAPTER 3.

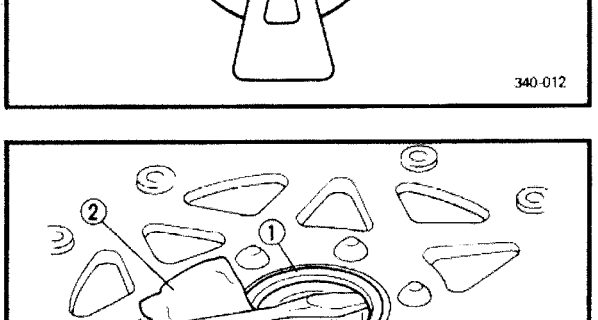


3.Measure:
- Wheel runout
- Over specified limit → Replace.

Rim runout limits:
Radial ①: 1.0 mm (0.04 in)
Lateral ②: 0.5 mm (0.02 in)



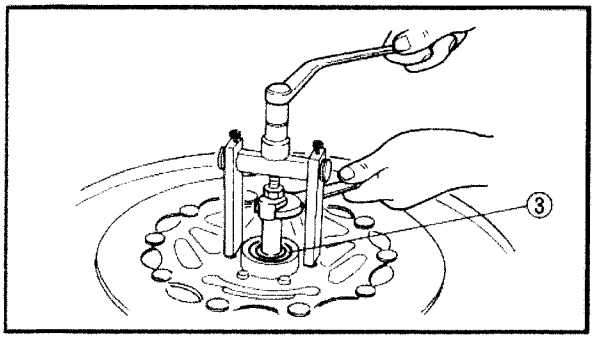
4.Inspect:
- Wheel bearings
  Bearings allow play in the wheel hub or wheel turns roughly → Replace.
- Oil seals
  Wear/Damage → Replace.

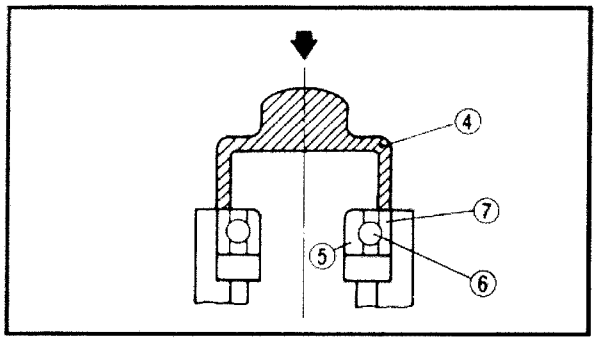


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Wheel bearing and oil seal replacement steps:
- Clean the outside of the wheel hub.
- Remove the oil seals ① use a flat-head screw driver.

NOTE:
Place a rag ② on the outer edge to prevent damage.





- Remove the bearing ③ using a general bearing puller.
- Install the new bearing and oil seal by reversing the previous steps.

NOTE:
Use a socket ④ that matches the outside diameter of the race of the bearing and oil seal.

CAUTION:
Do not strike the center race ⑤ or balls ⑥ of the bearing. Contact should be made only with the outer race ⑦.

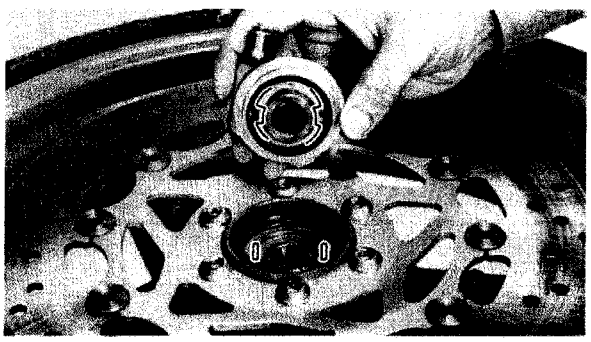
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INSTALLATION

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

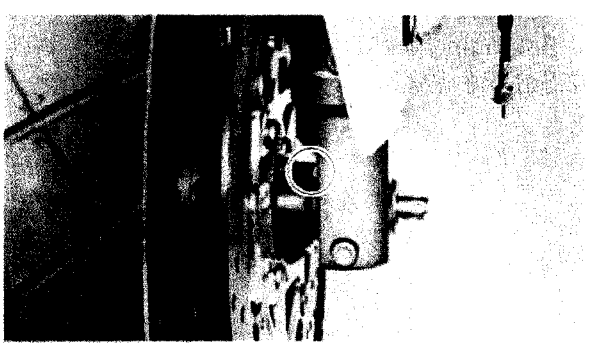
1.Lubricate:
- Front wheel axle
- Bearings
- Oil seal (lips)
- Drive/Driven gear (speedometer)

Recommended lubricant:
Lithium soap base grease



2.Install:
- Speedometer gear unit

NOTE:
Be sure that two projections inside the wheel hub mesh with the two slots in the gear unit assembly.



3.Install:
- Front wheel

NOTE:
Be sure that the projection (torque stopper) of the gear unit housing is positioned correctly.

4.Tighten:
- Front axle
- Bolts (brake caliper)
- Pinch bolt (front axle)



Front axle:
59 Nm (5.9 m • kg, 43 ft • lb)
Bolt (brake caliper):
35 Nm (3.5 m • kg, 25 ft • lb)
Pinch bolt (front axle):
40 Nm (4.0 m • kg, 29 ft • lb)

CAUTION:
Before tightening the pinch bolt, stroke the front fork several times to check for proper fork operation.

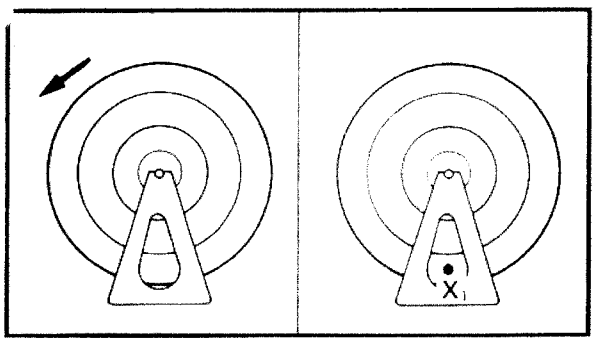
⚠ WARNING
Make sure that the brake hose is routed properly.

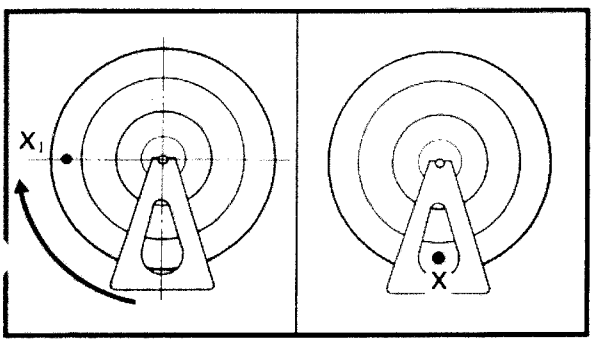
STATIC WHEEL BALANCE ADJUSTMENT

NOTE:
- After replacing the tire and/or rim, wheel balancer should be adjusted.
- Adjust the wheel balance with brake disk installed.

1.Remove:
- Balancing weight

2.Set the wheel on a suitable stand.





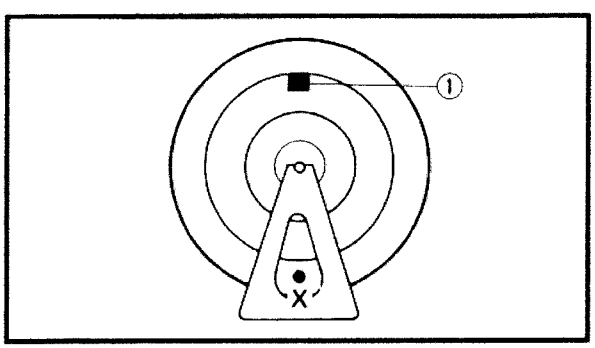
3.Find:
- Heavy spot

****

Procedure:

a.Spin the wheel and wait for it to rest.
b.Put an "X_1" mark on the wheel bottom spot.
c.Turn the wheel so that the "X_1" mark is 90° up.
d.Left 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

****

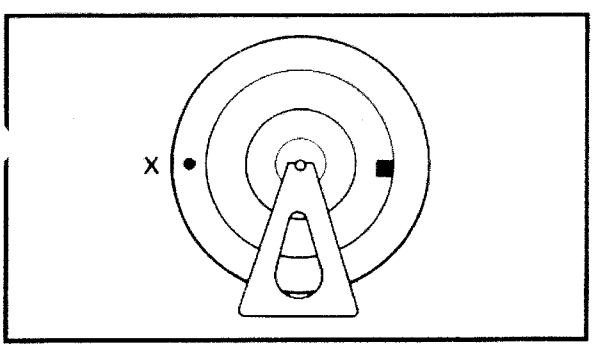
Adjusting steps:

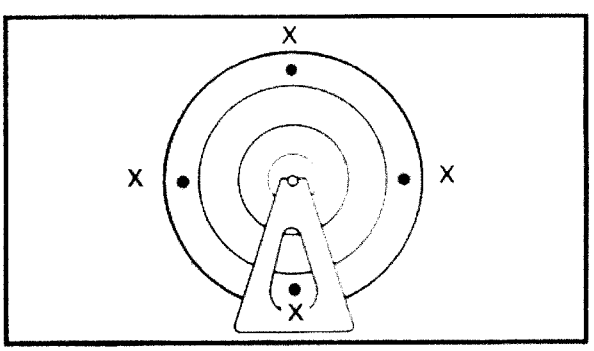
- Install a balancing weight ① on the rim exactly opposite to the heavy spot "X".

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

****

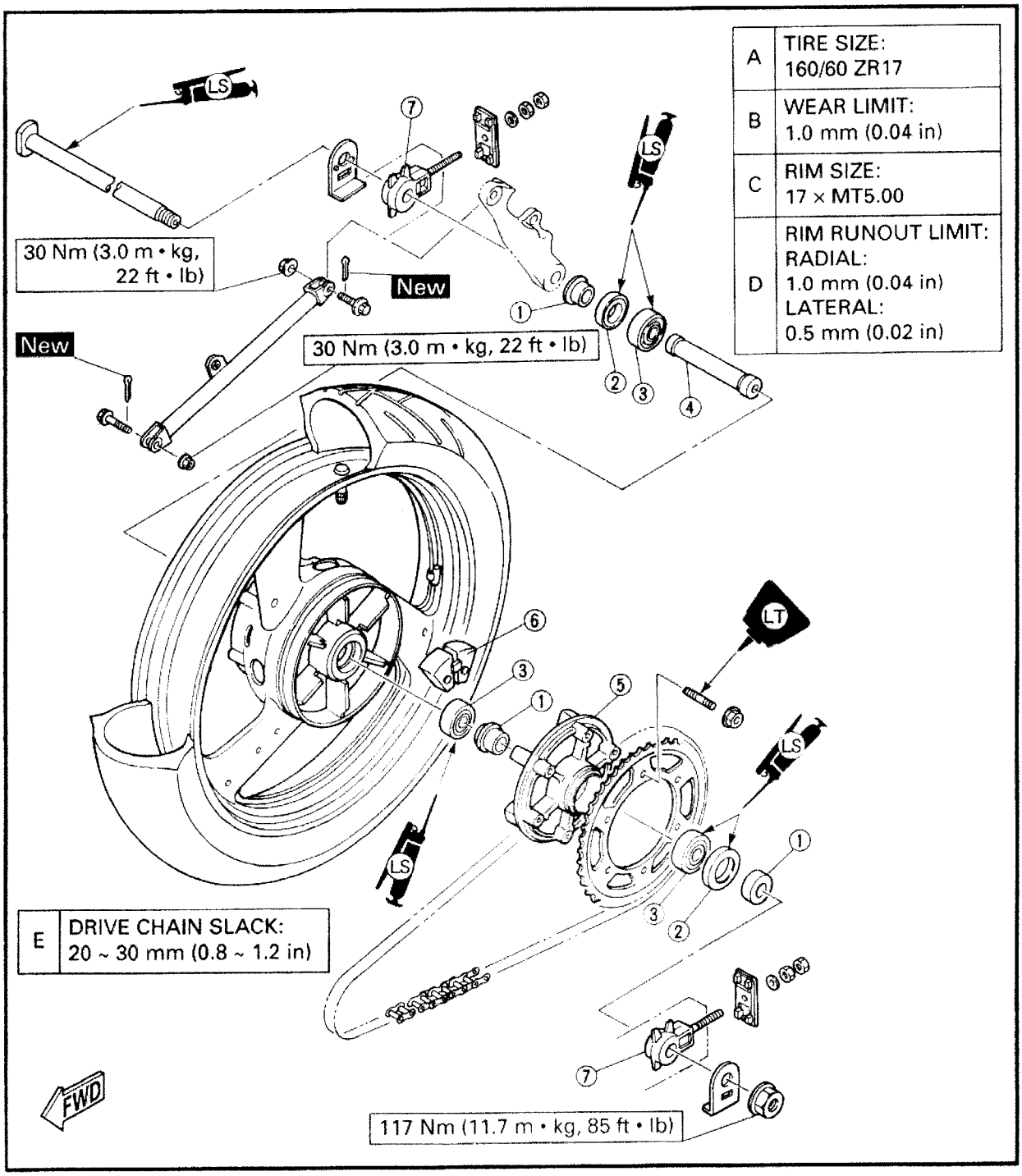
Checking steps:

- Turn the wheel so that is comes to each point as shown.
- Check that the wheel is at rest at each point. If not, readjust the wheel balance.

****

REAR WHEEL

① Collar
② Oil seal
③ Bearing
④ Spacer
⑤ Sprocket hub
⑥ Damper rubber
⑦ Adjuster collar

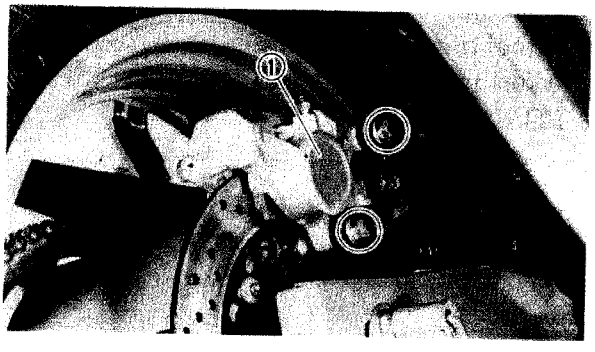


REMOVAL

⚠ WARNING

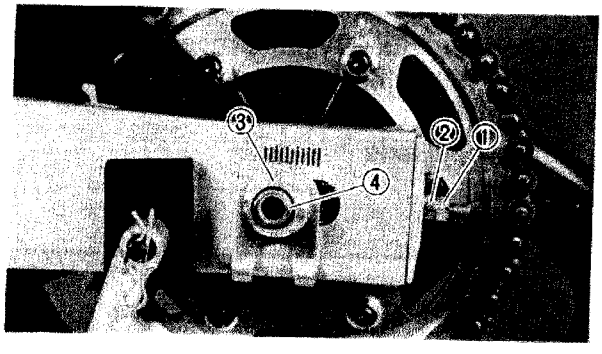
Securely support the motorcycle so there is no danger of it falling over.

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

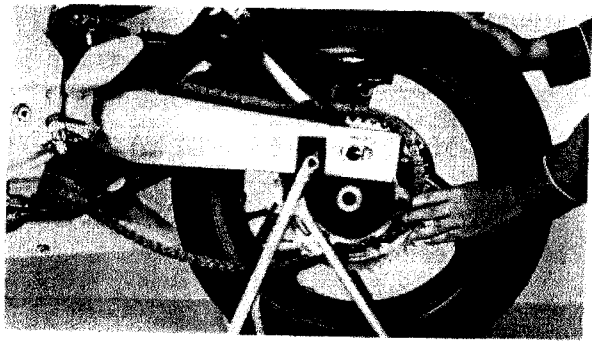


3. Remove:
   - Brake caliper ①

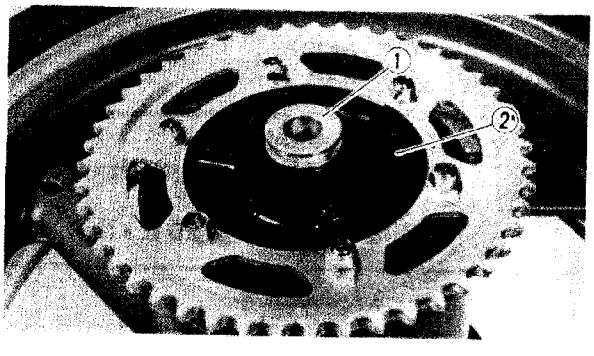
NOTE:
Do not depress the brake pedal while the caliper is removed.



4. Loosen:
   - Locknut ①
   - Adjuster ②
5. Remove:
   - Axle nut ③
   - Rear wheel axle ④
   - Rear wheel



NOTE:
Push the rear wheel forward and disconnect the drive chain from the rear sprocket wheel.



6. Remove:
   - Collar ① (left)
   - Sprocket hub ②
   - Damper rubber
   - Collar (right)

INSPECTION

1.Inspect:
- Rear wheel axle
- Wheel
- Wheel bearing
- Oil seals

Refer to the "FRONT WHEEL INSPECTION" section.

2.Measure:
- Wheel runout

Refer to the "FRONT WHEEL INSPECTION" section.

INSTALLATION

Reverse the "REMOVAL" procedure.
Note the following points.
1.Lubricate:
- Rear wheel axle
- Bearings
- Oil seals



Recommended lubricant:
Lithium soap base grease

2.Adjust:
- Drive chain slack



Drive chain slack:
20 ~ 30 mm (0.8 ~ 1.2 in)

Refer to the "DRIVE CHAIN ADJSUTMENT" section in CHAPTER 3.

3.Tighten:
- Nut (rear wheel axle)
- Bolts (brake caliper)



Nut (rear wheel axle):
117 Nm (11.7 m • kg, 85 ft • lb)
Bolt (brake caliper):
35 Nm (3.5 m • kg, 25 ft • lb)

STATIC WHEEL BALANCE ADJUSTMENT

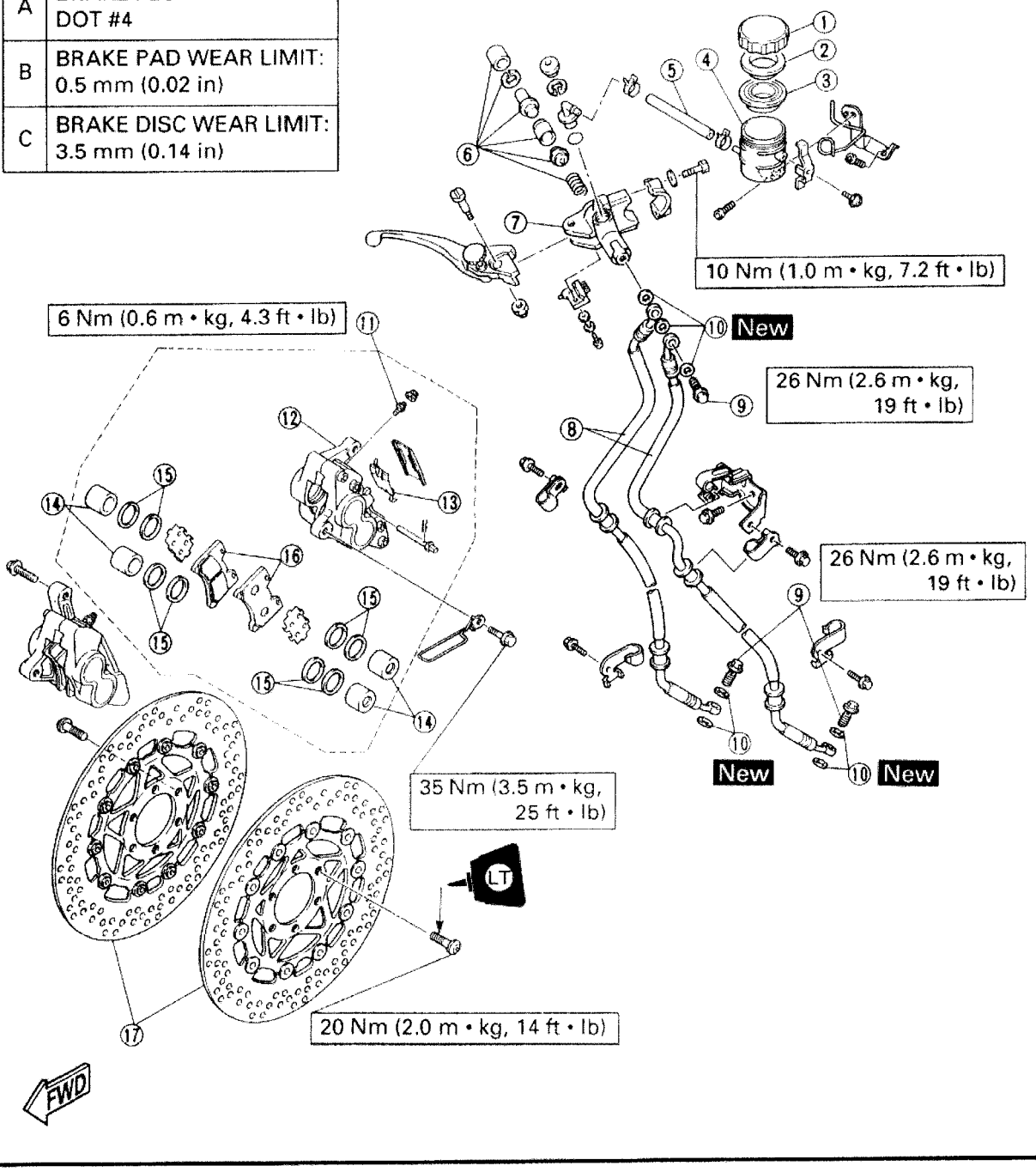
NOTE:
- After replacing the tire and/or rim, wheel balance should be adjusted.
- Adjust the wheel balance with brake disc and hub installed.

1. Adjust:
- Wheel balance
  Refer to the "STATIC WHEEL BALANCE ADJUSTMENT – FRONT WHEEL" section.

FRONT AND REAR BRAKE

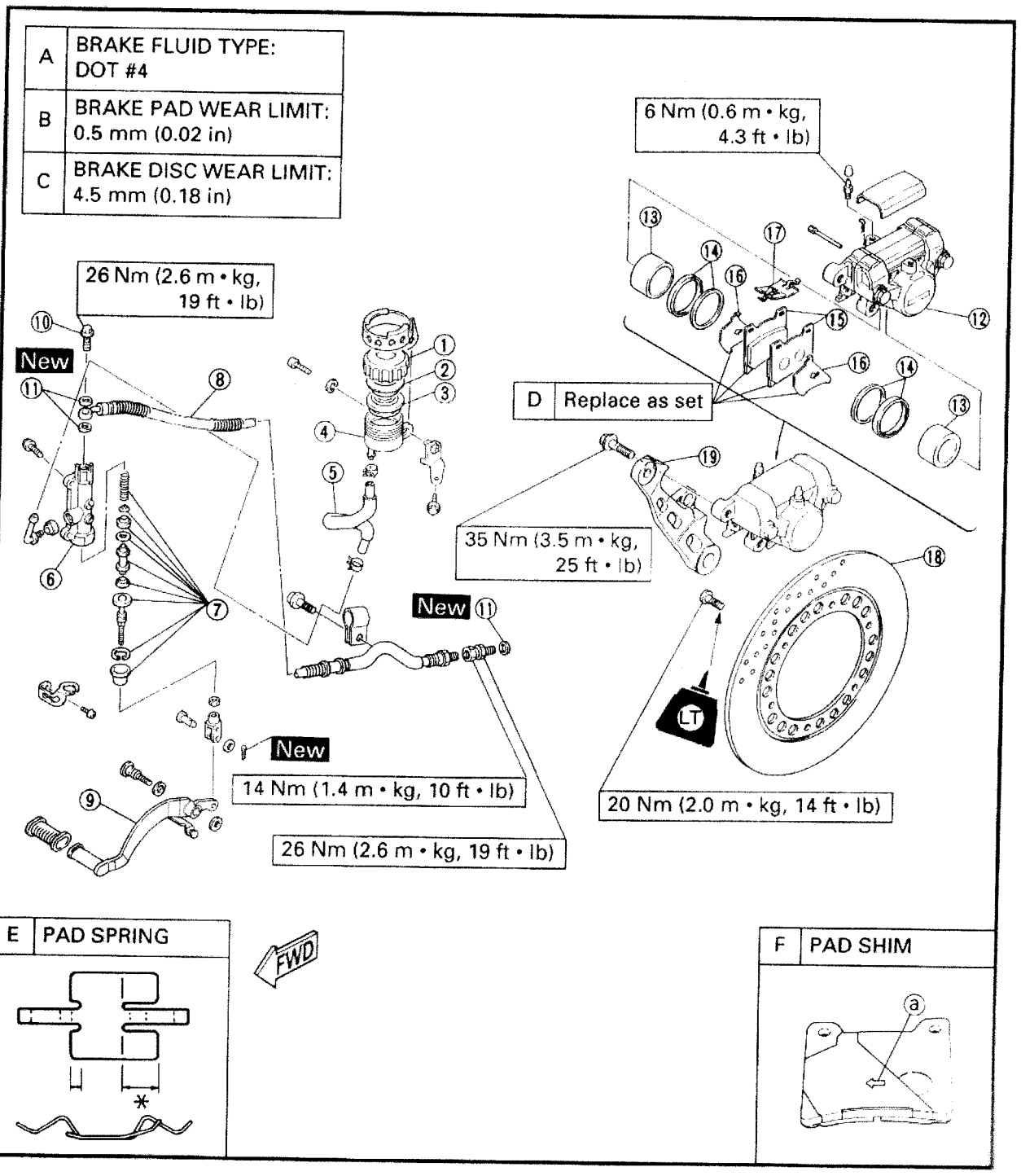
① Reservoir tank cap
② Holder (diaphragm)
③ Diaphragm
④ Reservoir tank
⑤ Reservoir hose
⑥ Master cylinder kit
⑦ Master cylinder
⑧ Brake hose
⑨ Union bolt
⑩ Copper washer
⑪ Bleed screw
⑫ Brake caliper
⑬ Pad spring
⑭ Piston
⑮ Piston seal
⑯ Brake pad
⑰ Brake disc

A	BRAKE FLUID TYPE: DOT #4
B	BRAKE PAD WEAR LIMIT: 0.5 mm (0.02 in)
C	BRAKE DISC WEAR LIMIT: 3.5 mm (0.14 in)



① Reservoir tank cap
② Holder (diaphragm)
③ Diaphragm
④ Reservoir tank
⑤ Reservoir hose
⑥ Master cylinder
⑦ Master cylinder kit
⑧ Brake hose
⑨ Brake pedal
⑩ Union bolt
⑪ Copper washer
⑫ Brake caliper
⑬ Piston
⑭ Piston seal
⑮ Brake pad
⑯ Shim
⑰ Pad spring
⑱ Brake disc
⑲ Caliper bracket

E The longer tangs (✳) of the pad spring must point in the disc rotating direction.
F The arrow mark ⓐ on the pad shim must point in the disc rotating direction.



CAUTION:

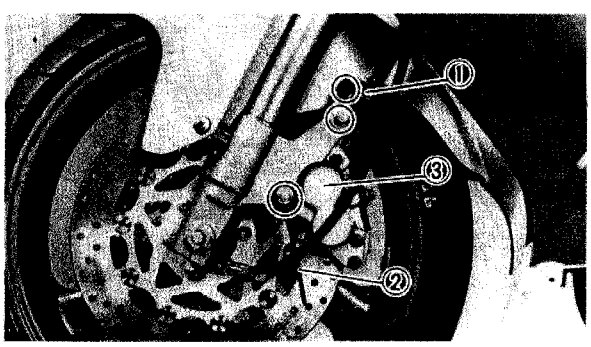
Disc brake components rarely require disassembly. DO NOT:

- **Disassemble components unless absolutely necessary.**
- **Use solvents on internal brake components.**
- **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:

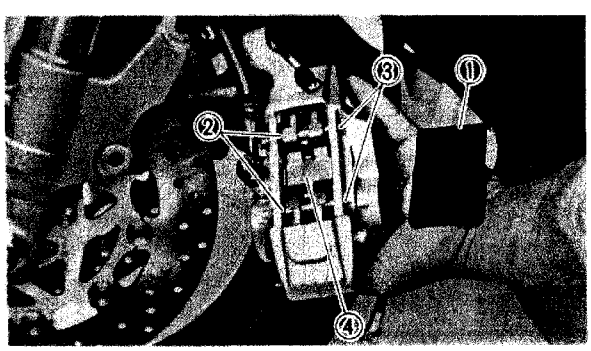
It is not necessary to disassemble the brake caliper and brake hose to replace the brake pads.



Front brake

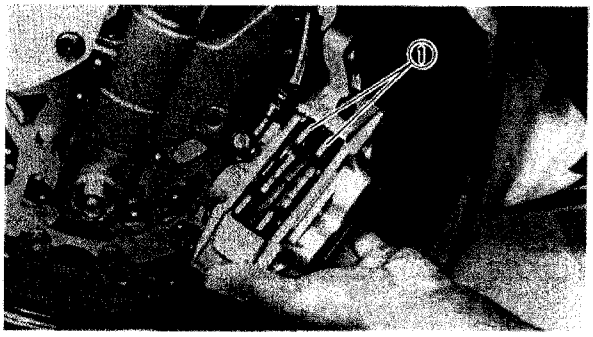
1.Remove:

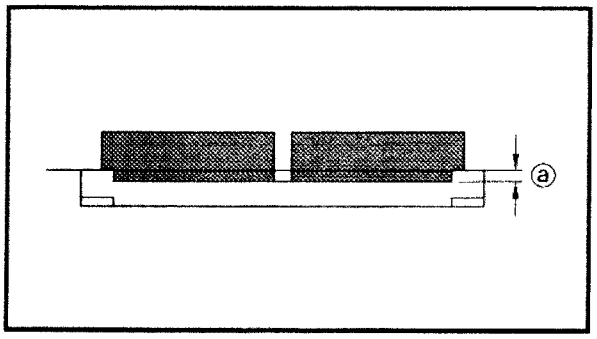
- Brake hose holder ①
- Speedometer cable guide ②
- Brake caliper ③



2.Remove:

- Pad cover ①
- Retaining clips ②
- Retaining pins ③
- Pad spring ④





3.Remove:
- Brake pads ①
  (with pad shims)

NOTE:
- When pad replacement is required, also replace the pad spring and shims.
- Replace the pads as a set if either is found to be worn to the wear limit ⓐ.

Wear limit ⓐ:
0.5 mm (0.02 in)

4.Install:
- Pad shims
  (onto brake pads)
- Brake pads
- Pad spring

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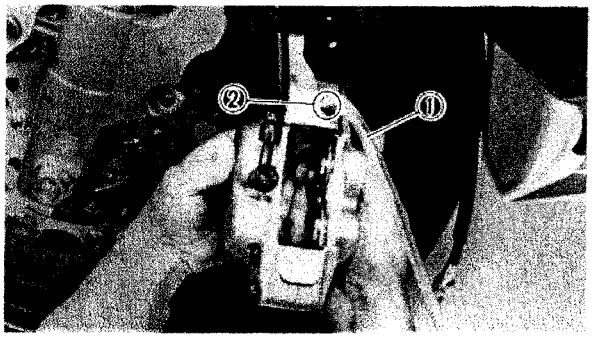
Installation steps:
- Connect a suitable hose ① tightly to the caliper bleed screw ②. Then, place the other end of this hose into an open container.
- Loosen the caliper bleed screw and push the pistons into the caliper with the finger.
- Tighten the caliper bleed screw ②.

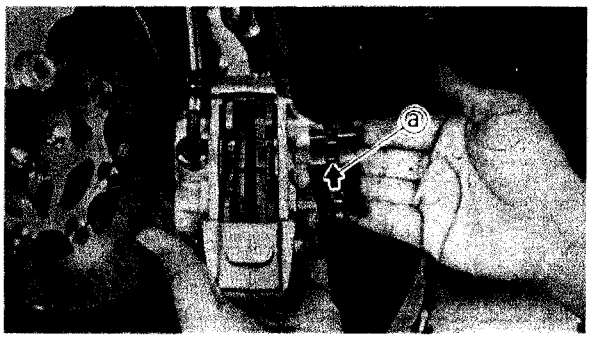
Caliper bleed screw:
6 Nm (0.6 m • kg, 4.3 ft • lb)

- Install the pad shims (new) onto the new brake pads.
- Install the brake pads (new) and pad spring (new).

NOTE:
The arrow mark ⓐ on the pad spring must point in the direction of the disc rotation.

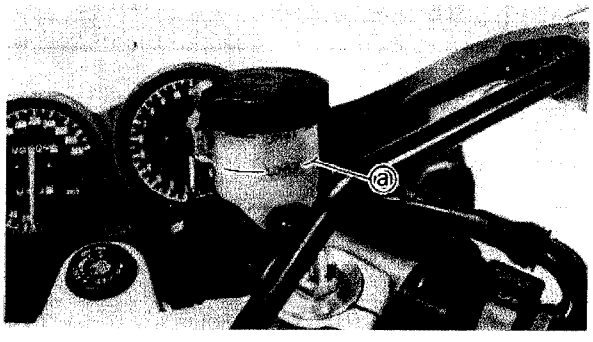
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5.Install:
- Retaining pins
- Retaining clips
- Pad cover
- Brake caliper

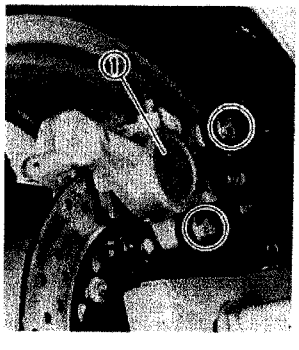
	Bolt (brake caliper): **35 Nm (3.5 m • kg, 25 ft • lb)**

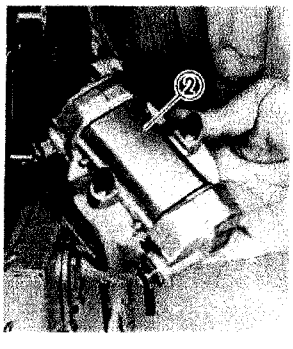


6.Inspect:
- Brake fluid level
  Refer to the "BRAKE FLUID INSPECTION" section in CHAPTER 3.

ⓐ "LOWER" level line

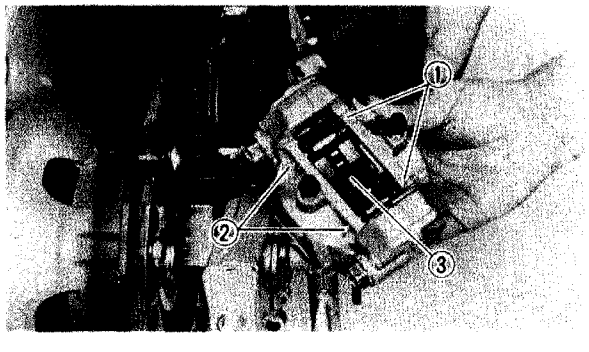
7.Check:
- Brake lever operation
  A soft or spongy feeling → Bleed brake system.
  Refer to the "AIR BLEEDING" section in CHAPTER 3.



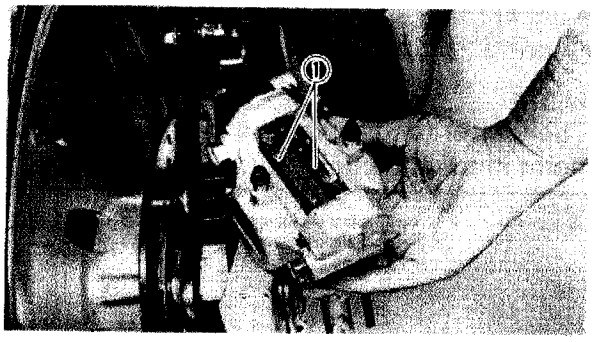


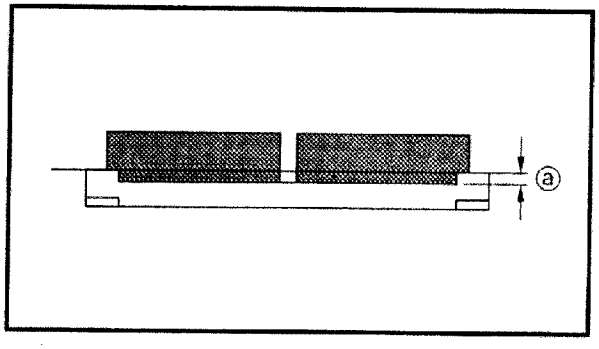
Rear brake

1.Remove:
- Brake caliper ①
- Pad cover ②



2.Remove:
- Retaining clips ①
- Retaining pins ②
- Pad spring ③



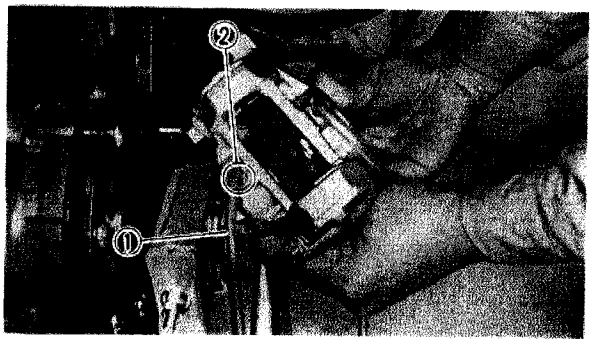


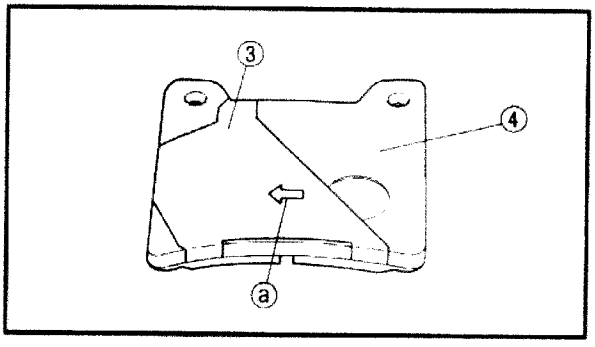
3.Remove:
- Brake pads ①
  (with pad shims)

NOTE:
- When pad replacement is required, also replace the pad spring and shims.
- Replace the pads as a set if either is found to be worn to the wear limit ⓐ.

Wear limit ⓐ:
0.5 mm (0.02 in)

4.Install:
- Pad shims
  (onto brake pads)
- Brake pads
- Pad spring





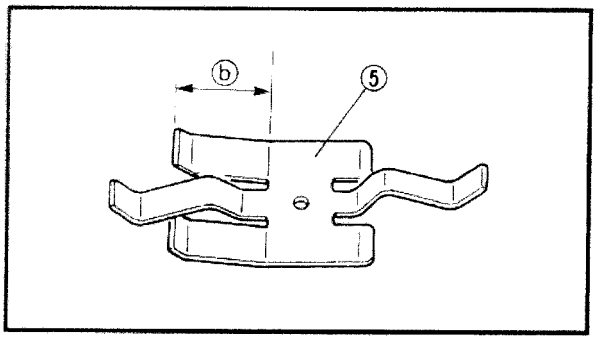
****

Installation steps:
- Connect a suitable hose ① tightly to the caliper bleed screw ②. Then, place the other end of this hose into an open container.
- Loosen the caliper bleed screw and push the pistons into the caliper with the finger.
- Tighten the caliper bleed screw ②.

Caliper bleed screw:
6 Nm (0.6 m • kg, 4.3 ft • lb)

- Install the pad shim ③ (new) on the brake pad ④ (new).

NOTE:
The arrow mark ⓐ on the pad shim must point in the direction of the disc rotation.



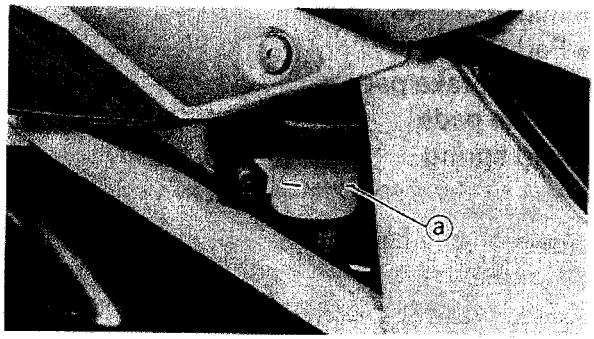
● Install the brake pads (new) and pad spring ⑤ (new).

NOTE:
The longer tangs ⓑ of the pad spring must point in the direction of the disc rotation.

****

5. Install:
- Retaining pins
- Retaining clips
- Pad cover
- Brake caliper

	Bolt (brake caliper): **35 Nm (3.5 m • kg, 25 ft • lb)**



6. Inspect:
- Brake fluid level
  Refer to the "BRAKE FLUID INSPECTION" section in CHAPTER 3.

ⓐ "LOWER" level line

7. Check:
- Brake pedal operation
  A soft or spongy feeling → Bleed brake system.
  Refer to the "AIR BLEEDING" section in CHAPTER 3.

CALIPER DISASSEMBLY

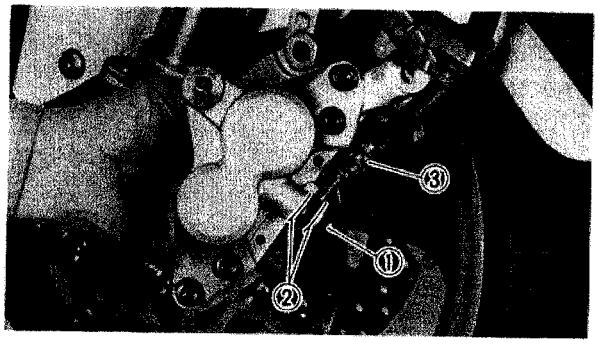
NOTE:
Before disassembling the front brake caliper or rear brake caliper, drain the brake hose, master cylinder, brake caliper and reservoir tank of their brake fluid.

Front brake

1.Loosen:
- Union bolt

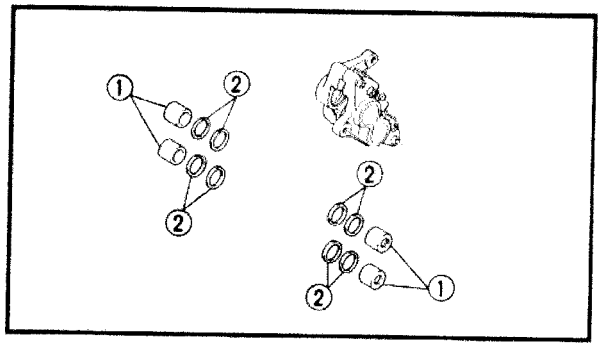
2.Remove:
- Brake caliper
- Pad cover
- Retaining clips
- Retaining pins
- Pad spring
- Brake pads
  (with pad shims)
  Refer to the "BRAKE PAD REPLACEMENT" section.

3.Remove:
- Union bolt ①
- Copper washers ②
- Brake hose ③



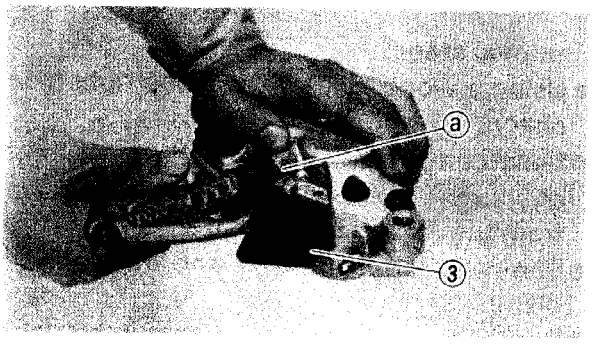
NOTE:
Place the open end of the hose into a container and pump the oil fluid out carefully.

4.Remove:
- Pistons ①
- Piston seals ②

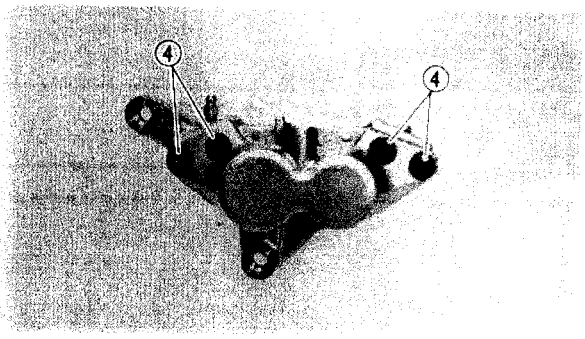


****

Removal steps:
- Using a wood piece ③, lock the right side piston.
- Blow compressed air into the hose joint opening ⓐ to force out the left side piston from the caliper body.
- Remove the piston seals and reinstall the piston.
- Repeat previous step to force out the right side piston from the caliper body.



⚠ WARNING
- **Never try to pry out the piston.**
- **Do not loosen the bolts ④.**



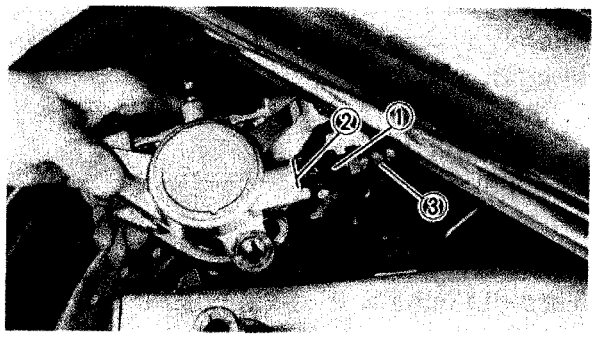
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Rear brake

1.Loosen:
- Union bolt

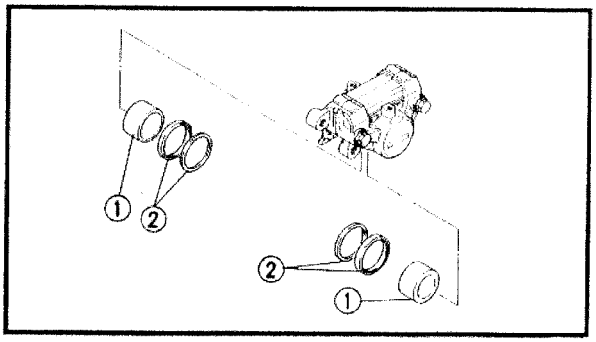
2.Remove:
- Brake caliper
- Pad cover
- Retaining clips
- Retaining pins
- Pad spring
- Brake pads
  (with pad shims)
  Refer to "BRAKE PAD REPLACEMENT" section.

3.Remove:
- Union bolt ①
- Copper washer ②
- Brake hose ③



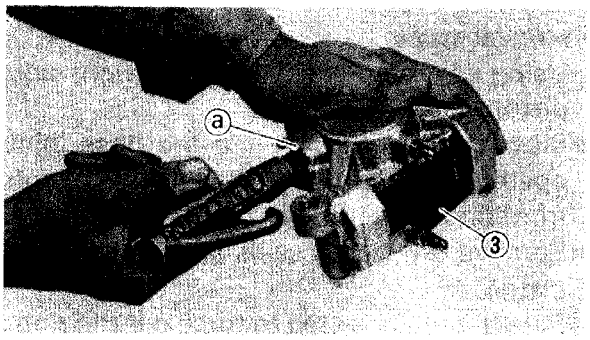
NOTE:
Place the open end of the hose into a container and pump the oil fluid out carefully.

4.Remove:
- Pistons ①
- Piston seals ②

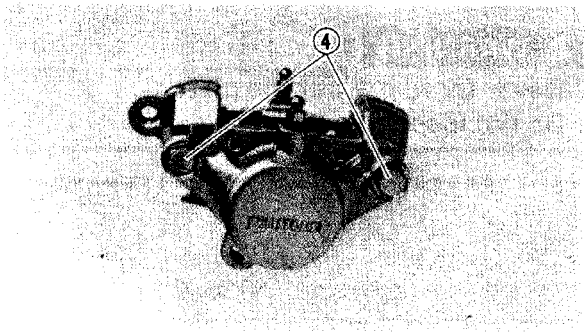


****

Removal steps:
- Using a wood piece ③, lock the right side piston.
- Blow compressed air into the hose joint opening ⓐ to force out the left side piston from the caliper body.
- Remove the piston seals and reinstall the piston.
- Repeat previous step to force out the right side piston from the caliper body.



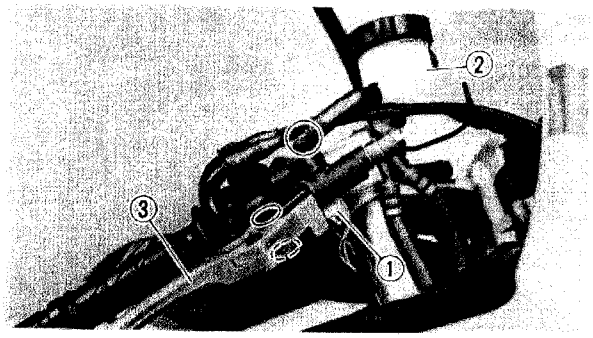
⚠ WARNING
- **Never try to pry out the piston.**
- **Do not loosen the bolts ④.**



****

MASTER CYLINDER DISASSEMBLY

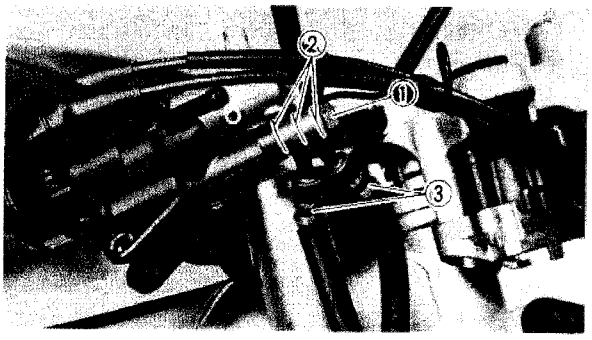
NOTE:
Before disassembling the front or rear brake master cylinders, drain the brake hose, master cylinder, brake caliper and reservoir tank of their brake fluid.



Front brake

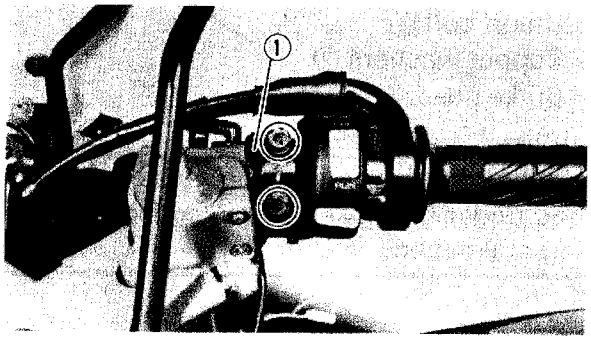
1.Disconnect:
- Brake switch leads ①

2.Remove:
- Reservoir tank ②
- Brake lever ③

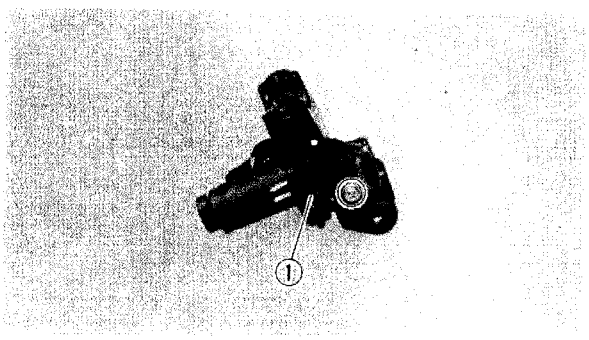


3.Remove:
- Union bolt ①
- Copper washers ②
- Brake hoses ③

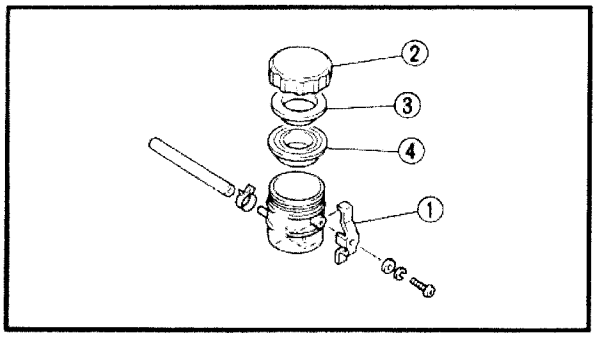
NOTE:
Hold a container under the master cylinder and under the hose end to collect remaining brake fluid.



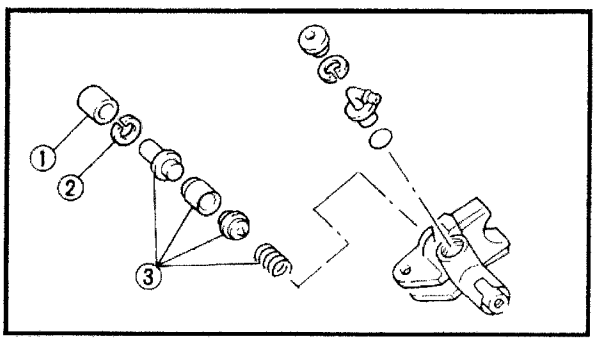
4.Remove:
- Master cylinder ①



5.Remove:
- Brake switch ①

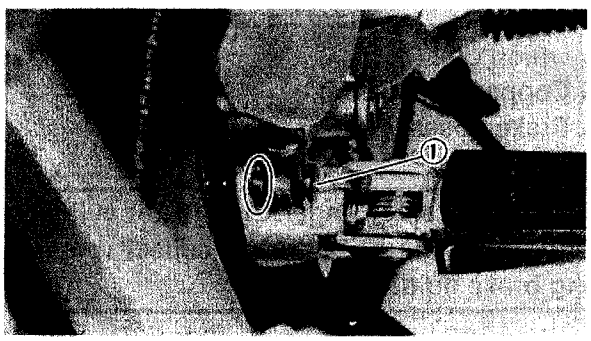


6.Remove:
- Stopper ①
- Cap ② (reservoir tank)
- Holder ③ (diaphragm)
- Diaphragm ④

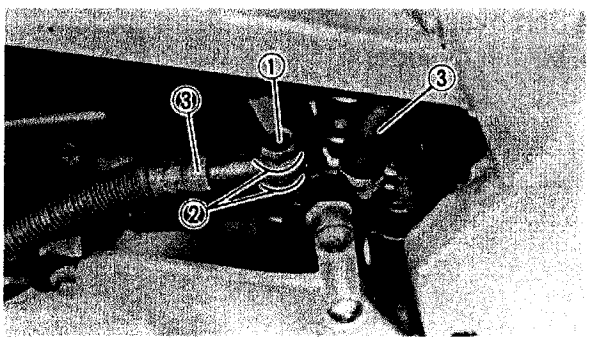


7.Remove:
- Dust boot ①
- Circlip ②
- Master cylinder kit ③

Rear brake

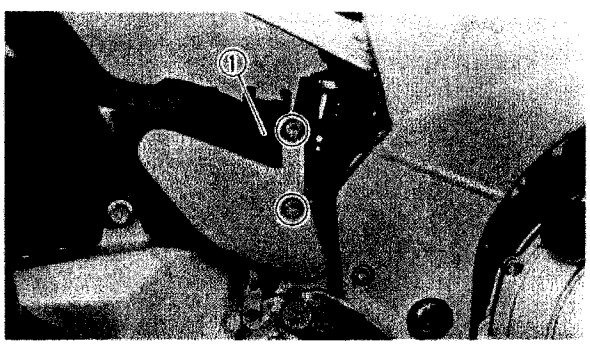


1.Remove:
- Cotter pin
- Washer
- Clevis pin ①

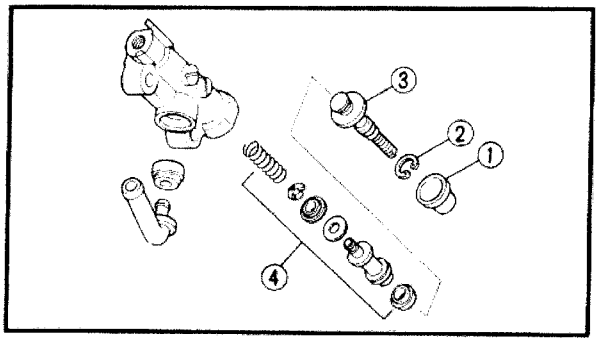


2.Remove:
- Union bolt ①
- Copper washers ②
- Brake hoses ③

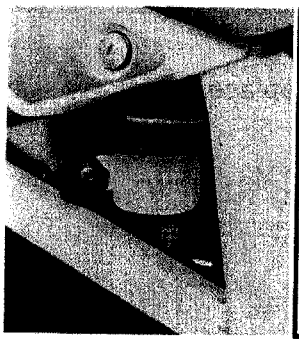
NOTE:
Hold a container under the master cylinder and under the hose ends to collect remaining brake fluid.

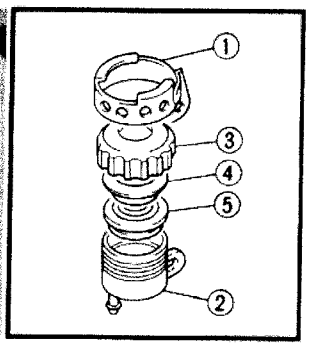


3.Remove:
- Master cylinder ①



4.Remove:
- Dust boot ①
- Circlip ②
- Push rod ③
- Master cylinder kit ④





5.Remove:
- Holder ① (cap)
- Reservoir tank ②
- Cap ③ (reservoir tank)
- Holder ④ (diaphragm)
- Diaphragm ⑤

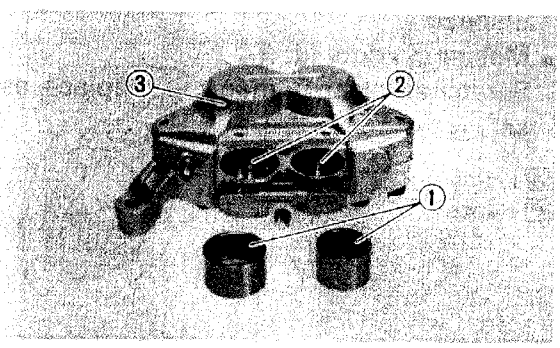
INSPECTION AND REPAIR

Recommended brake component replacement schedule:	
Brake pads	As required
Piston seal, dust seal	Every two years
Brake hoses	Every two years
Brake fluid	Replace only when brakes are disassembled.

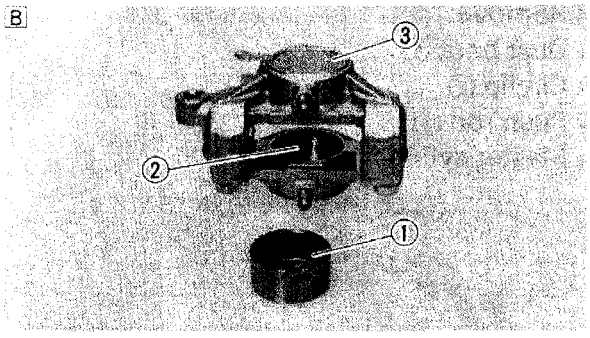
⚠ WARNING

All internal parts should be cleaned in new brake fluid only. Do not use solvents as they will cause seals to swell and distort.

A



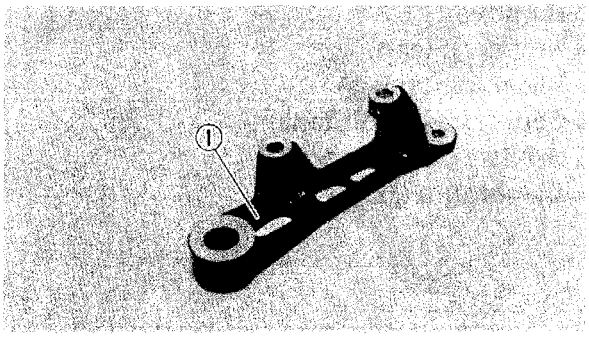
1.Inspect:
- Caliper piston ①
  Scratches/Rust/Wear → Replace caliper assembly.
- Caliper cylinder ②
  Wear/Scratches → Replace caliper assembly.
- Caliper body ③
  Cracks/Damage → Replace.
- Oil delivery passage (caliper body)
  Blow out with compressed air



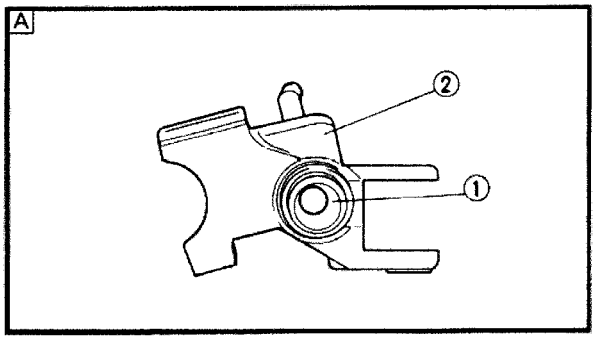
⚠ WARNING

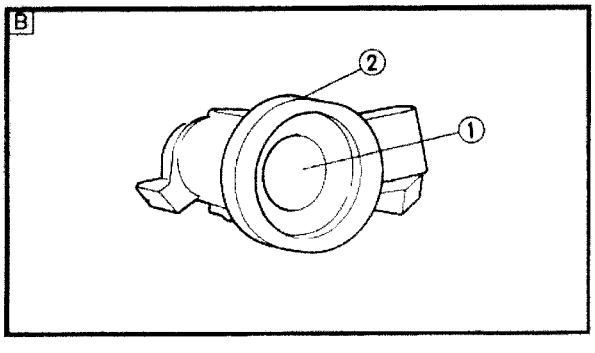
Replace the piston seal and dust seal whenever the caliper is disassembled.

A Front
B Rear



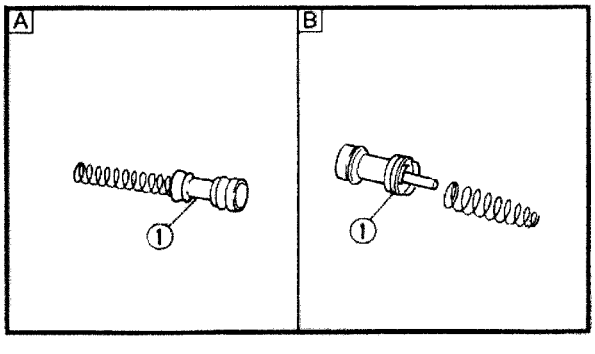
2.Inspect:
- Caliper bracket ①
  Cracks/Damage → Replace.





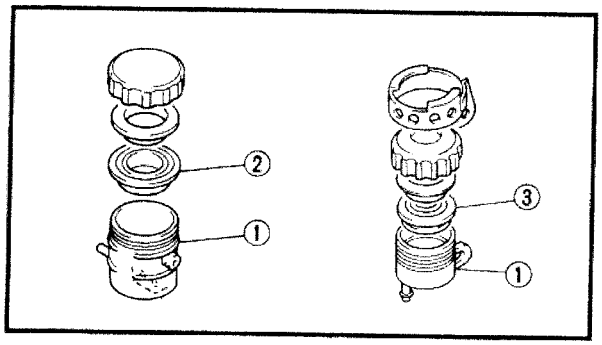
3.Inspect:
- Master cylinder ①
  Wear/Scratches → Replace the master cylinder assembly.
- Master cylinder body ②
  Cracks/Damage → Replace.
- Oil delivery passage (master cylinder body)
  Blow out with compressed air.

A Front
B Rear

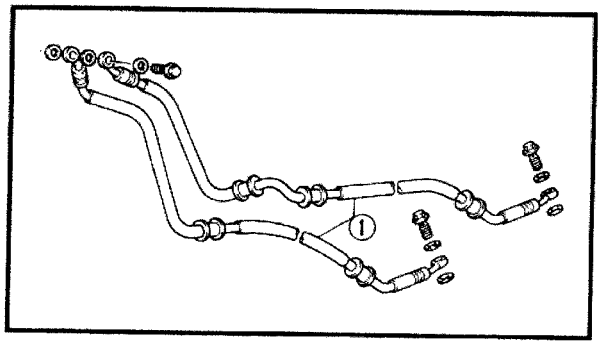


4.Inspect:
- Master cylinder kit ①
  Scratches/Wear/Damage → Replace as a set.

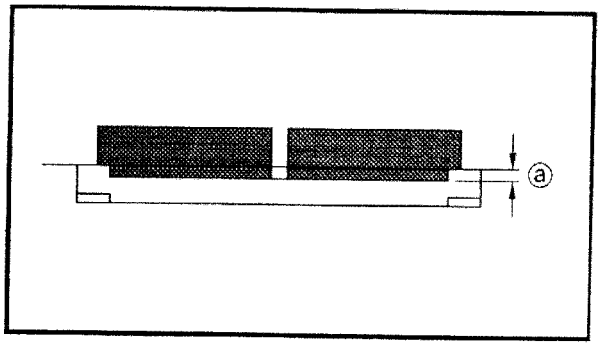
A Front
B Rear



5.Inspect:
- Reservoir tank ①
  Cracks/Damage →Replace.
- Diaphragm ② (front)
- Diaphragm ③ (rear)
  Wear/Damage → Replace.



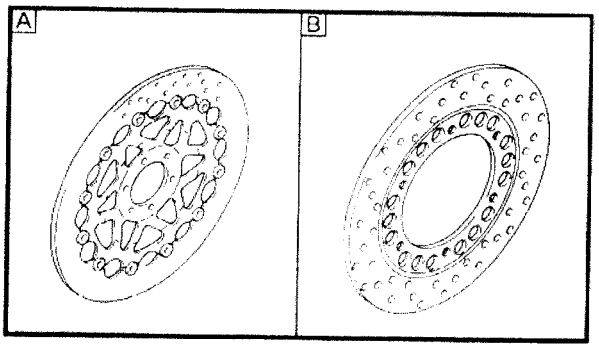
6.Inspect:
- Brake hoses ①
  Cracks/Wear/Damage → Replace.



7.Measure:
- Brake pads (thickness)
  Out of specification → Replace.

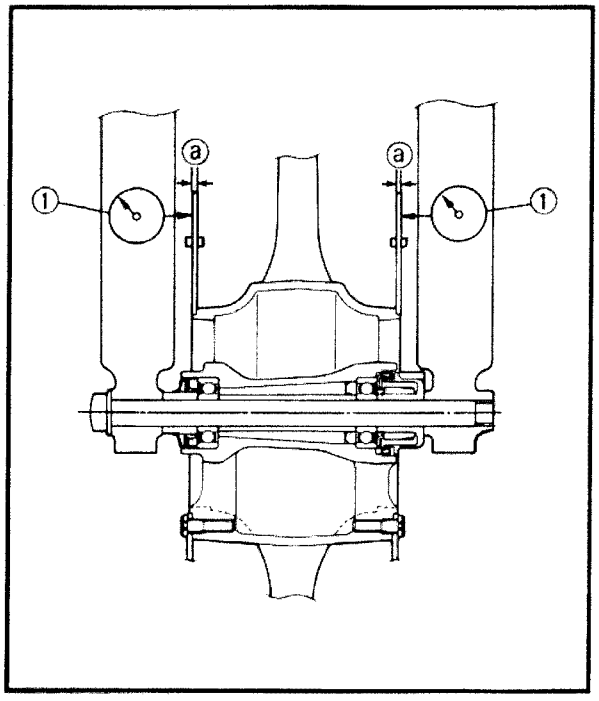
NOTE:
- When pad replacement is required, also replace the pad spring and shims.
- Replace the pads as a set if either is found to be worn to the wear limit ⓐ.

Wear limit ⓐ (front and rear):
0.5 mm (0.02 in)



8.Inspect:
- Brake discs (front and rear)
  Galling/Damage → Replace.

A Front
B Rear



9.Measure:

- Brake disc deflection
  Out of specification → Inspect wheel runout.
  If wheel runout is in good condition, replace the brake disc(s).

Maximum deflection:
Front: 0.3 mm (0.012 in)
Rear: 0.15 mm (0.006 in)

- Brake disc thickness ⓐ
  Out of specification → Replace.

Minimum thickness:
Front: 3.5 mm (0.14 in)
Rear: 4.5 mm (0.18 in)

① Dial gauge

NOTE:
Tighten the bolts (brake disc) in stage using a crisscross pattern.

Bolt (brake disc):
20 Nm (2.0 m • kg, 14 ft • lb)
LOCTITE®

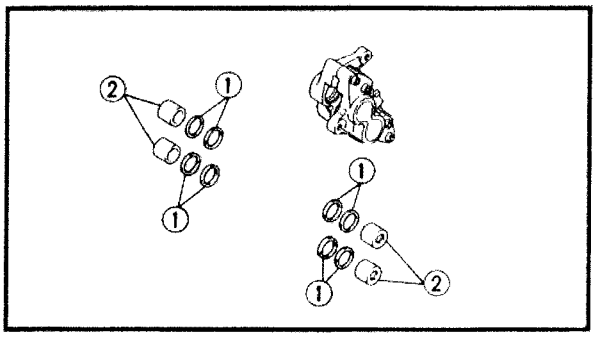
CALIPER ASSEMBLY

⚠ WARNING

- **All internal parts should be cleaned in new brake fluid only.**
- **Internal parts should be lubricated with brake fluid when installed.**

Recommended brake fluid:
DOT #4

- **Replace the piston seals and dust seals whenever a caliper is disassembled.**

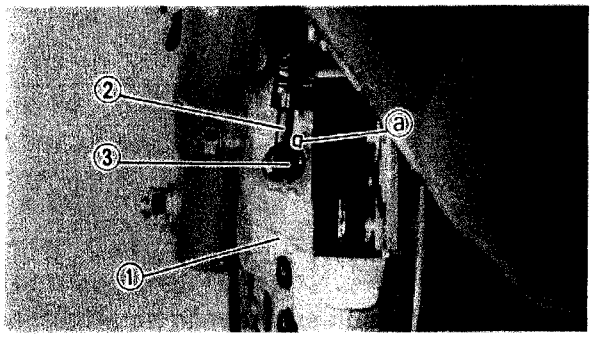


Front brake

1.Install:
- Piston seals ①
- Pistons ②

⚠ WARNING

Always use new piston seals.



2.Install:
- Brake caliper ① (temporarily)
- Copper washers
- Brake hose ②
- Union bolt ③

	Union bolt: **26 Nm (2.6 m • kg, 19 ft • lb)**

CAUTION:

When installing the brake hose on the caliper ①, take care that the pipe touches the projection ⓐ on the brake caliper.

⚠ WARNING

- **Proper hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".**
- **Always use new copper washers.**

3.Remove:
- Brake caliper

4.Install:
- Brake pads (with pad shims)
- Pad spring
- Retaining pins
- Retaining clips
- Pad cover
- Brake caliper

Refer to the "BRAKE PAD REPLACEMENT" section.

	Bolt (brake caliper): **35 Nm (3.5 m • kg, 25 ft • lb)**

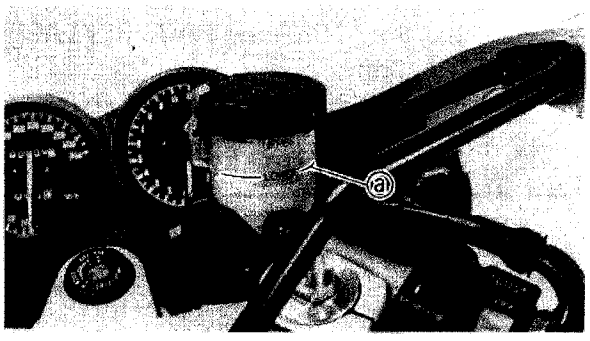
5.Fill:
- Reservoir tank

	Recommended brake fluid: DOT #4

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

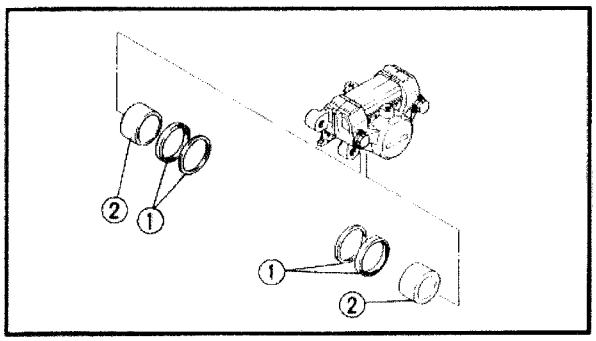
⚠ WARNING
- **Use only the designated quality brake fluid: otherwise, the rubber seals may deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid: mixing fluids may result in a harmful chemical reaction and lead to poor performance.**
- **Be careful that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

6.Air bleed
- Brake system
  Refer to the "AIR BLEEDING" section in CHAPTER 3.



7.Inspect:
- Brake fluid level
  Fluid level is under "LOWER" level line → Replenish.
  Refer to the "BRAKE FLUID INSPECTION" section in CHAPTER 3.

ⓐ "LOWER" level line

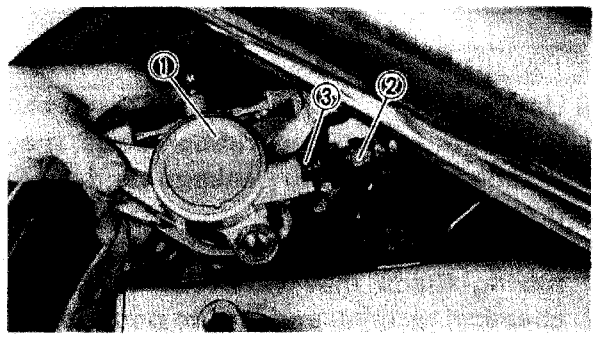


Rear brake

1.Install:
- Piston seals ①
- Pistons ②

⚠ WARNING

Always use new piston seals.



2.Install:
- Brake caliper ① (temporarily)
- Copper washer
- Brake hose ②
- Union bolt ③

	Union bolt: **26 Nm (2.6 m • kg, 19 ft • lb)**

⚠ WARNING

- **Proper hose routing is essential to insure safe motorcycle operation. Refer to the "CABLE ROUTING".**
- **Always use new copper washers.**

3.Remove:
- Brake caliper

4.Install:
- Brake pads
  (with pad shims)
- Pad spring
- Retaining pins
- Retaining clips
- Pad cover
- Brake caliper
  Refer to the "BRAKE PAD REPLACEMENT" section.

	Bolt (brake caliper): **35 Nm (3.5 m • kg, 25 ft • lb)**

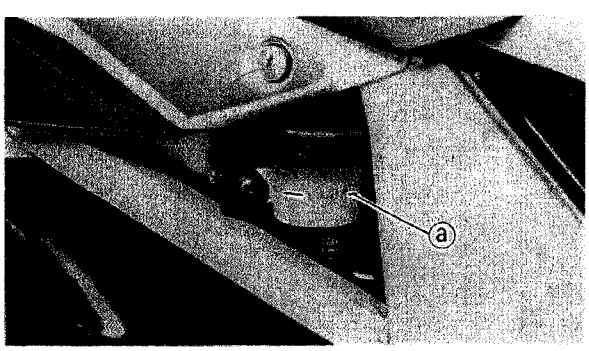
5.Fill:
- Reservoir tank

	Recommended brake fluid: DOT #4

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

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

6.Air bleed:
- Brake system
  Refer to the "AIR BLEEDING" section in CHAPTER 3.



7.Inspect:
- Brake fluid level
  Fluid level is under "LOWER" level line → Replenish.
  Refer to the "BRAKE FLUID INSPECTION" section in CHAPTER 3.

ⓐ "LOWER" level line

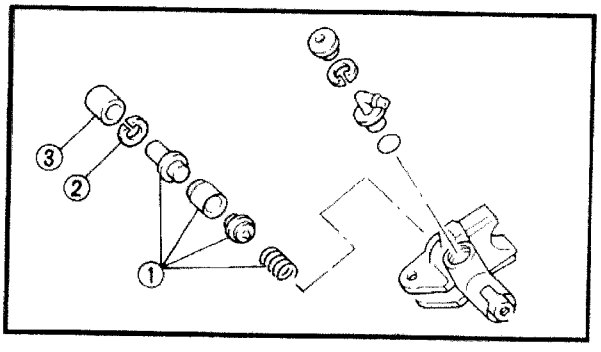
MASTER CYLINDER ASSEMBLY

⚠ WARNING

- **All internal parts should be cleaned in new brake fluid only.**
- **Internal parts should be lubricated with brake fluid when installed.**

Recommended brake fluid:
DOT #4

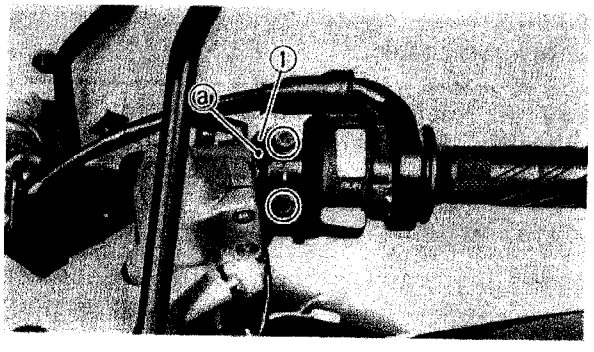
- **Replace the piston seals and dust seals whenever a caliper is disassembled.**



Front brake

1.Install:

- Master cylinder kit ①
- Circlip ②
- Dust boot ③
- Brake switch



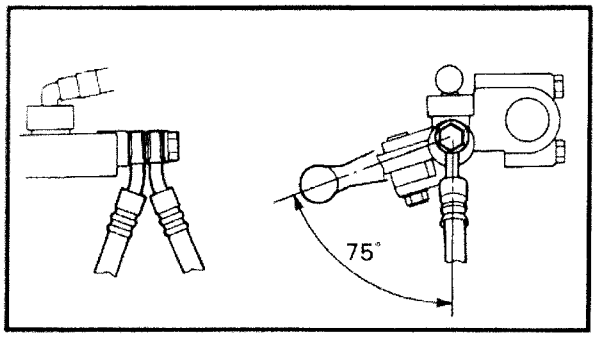
2.Install:

- Master cylinder ①

CAUTION:

- **Install the master cylinder holder with the "UP" mark facing upward.**
- **Align the end of the holder with the punch mark ⓐ on the handlebar.**
- **Tighten first the upper bolt, then the lower bolt.**

Bolt (master cylinder holder):
10 Nm (1.0 m • kg, 7.2 ft • lb)



3.Install:
- Copper washers
- Brake hose
- Union bolt

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

NOTE:
- Tighten the union bolt while holding the brake hose as shown.
- Check that the brake hose does not touch other parts (throttle cable, wire harness, leads, etc.) by turning the handlebar left and right, and correct if necessary.

⚠ WARNING
- **Proper hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".**
- **Always use new copper washers.**

4.Install:
- Brake lever
- Reservoir tank

5.Connect:
- Brake switch leads

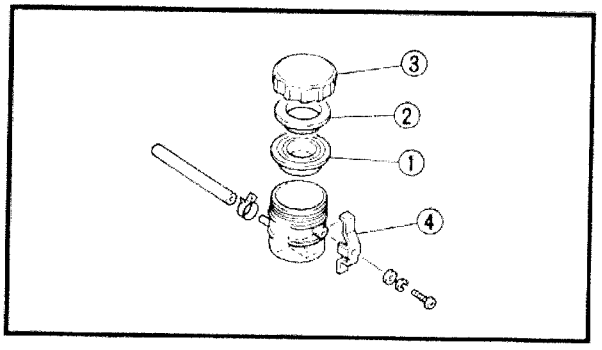
6.Fill:
- Reservoir tank

Recommended brake fluid:
DOT #4

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

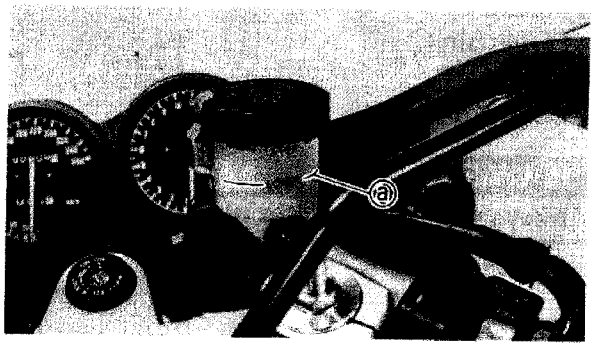
⚠ WARNING
- **Use only the designated quality brake fluid: otherwise, the rubber seals may deteriorate, causing leakage and poor brake performance.**

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



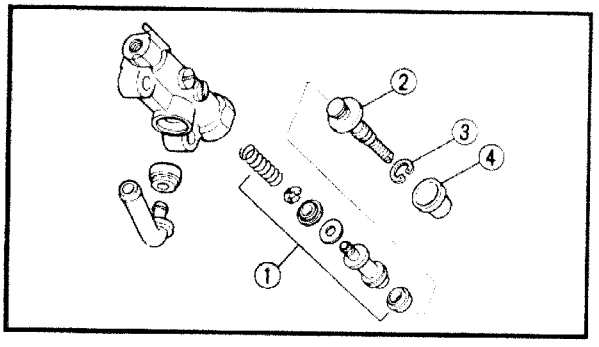
7.Install:
- Diaphragm ①
- Holder ② (diaphragm)
- Cap ③ (master cylinder)
- Stopper ④

8.Air bleed:
- Brake system
  Refer to the "AIR BLEEDING" section in CHAPTER 3.



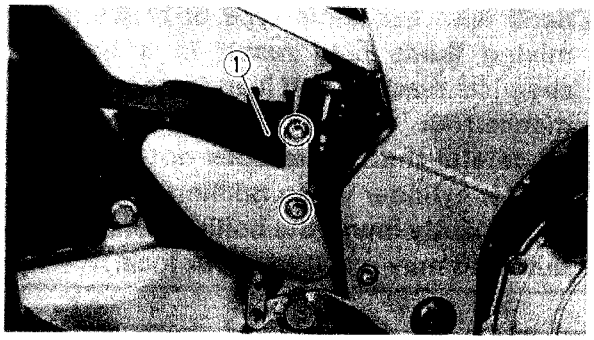
9.Inspect:
- Brake fluid level
  Fluid level is under "LOWER" level line → Replenish.
  Refer to the "BRAKE FLUID INSPECTION" section in CHAPTER 3.

ⓐ "LOWER" level line



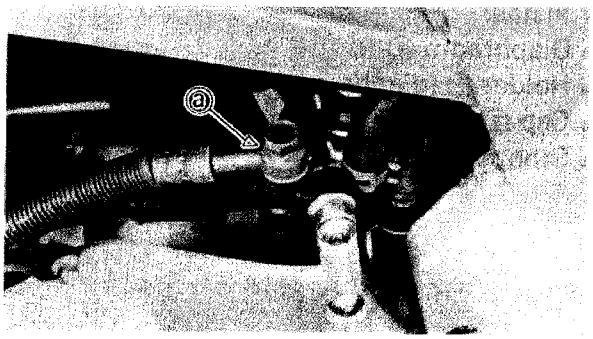
Rear brake

1.Install:
- Reservoir tank
  (onto frame)
- Master cylinder kit ①
- Push rod ②
- Circlip ③
- Dust boot ④



2.Install:
- Master cylinder ①

	Bolt (master cylinder): 23 Nm (2.3 m • kg, 17 ft • lb)



3.Install:
- Copper washers
- Brake hoses
- Union bolt.

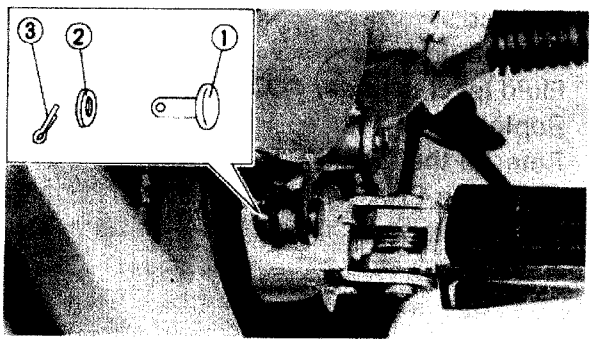
	Union bolt: 26 Nm (2.6 m • kg, 19 ft • lb)

CAUTION:

When installing the brake hose on the master cylinder, take care that the pipe touches the projection ⓐ as shown.

⚠ WARNING

- **Proper hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".**
- **Always use new copper washers.**



4.Install:
- Clevis pin ①
- Washer ②
- Cotter pin ③

⚠ WARNING

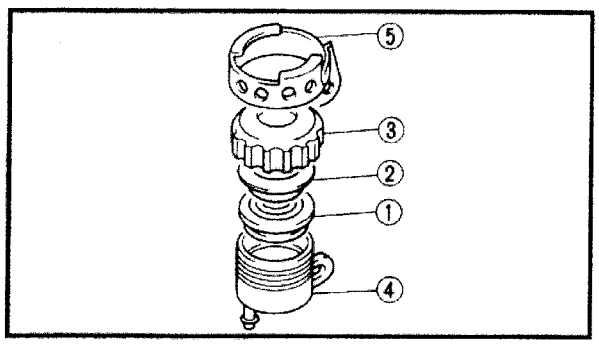
Always use a new cotter pin.

5.Fill:
- Reservoir tank

	Recommended brake fluid: DOT #4

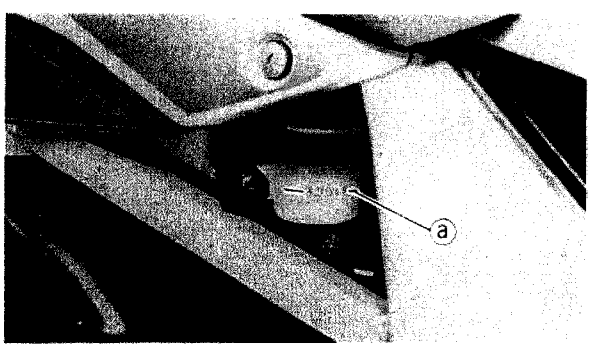
CAUTION:
Brake fluid may erode painted surfaces or plastic parts. Always clean up spilled fluid immediately.

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



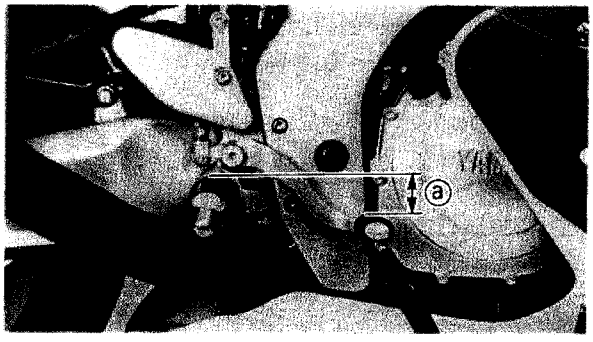
6.Install:
- Diaphragm ①
- Holder ② (diaphragm)
- Cap ③ (reservoir tank)
- Reservoir tank ④
- Holder ⑤ (cap)

7.Air bleed:
- Brake system
  Refer to the "AIR BLEEDING" section in CHAPTER 3.



8.Inspect:
- Brake fluid level
  Fluid level is under "LOWER" level line → Replenish.
  Refer to the "BRAKE FLUID INSPECTION" section in CHAPTER 3.

ⓐ "LOWER" level line



9.Adjust:
- Brake pedal height ⓐ
  Refer to the "REAR BRAKE ADJUSTMENT" section in CHAPTER 3.

Brake pedal height:
42 mm (1.7 in)
Below top of footrest.

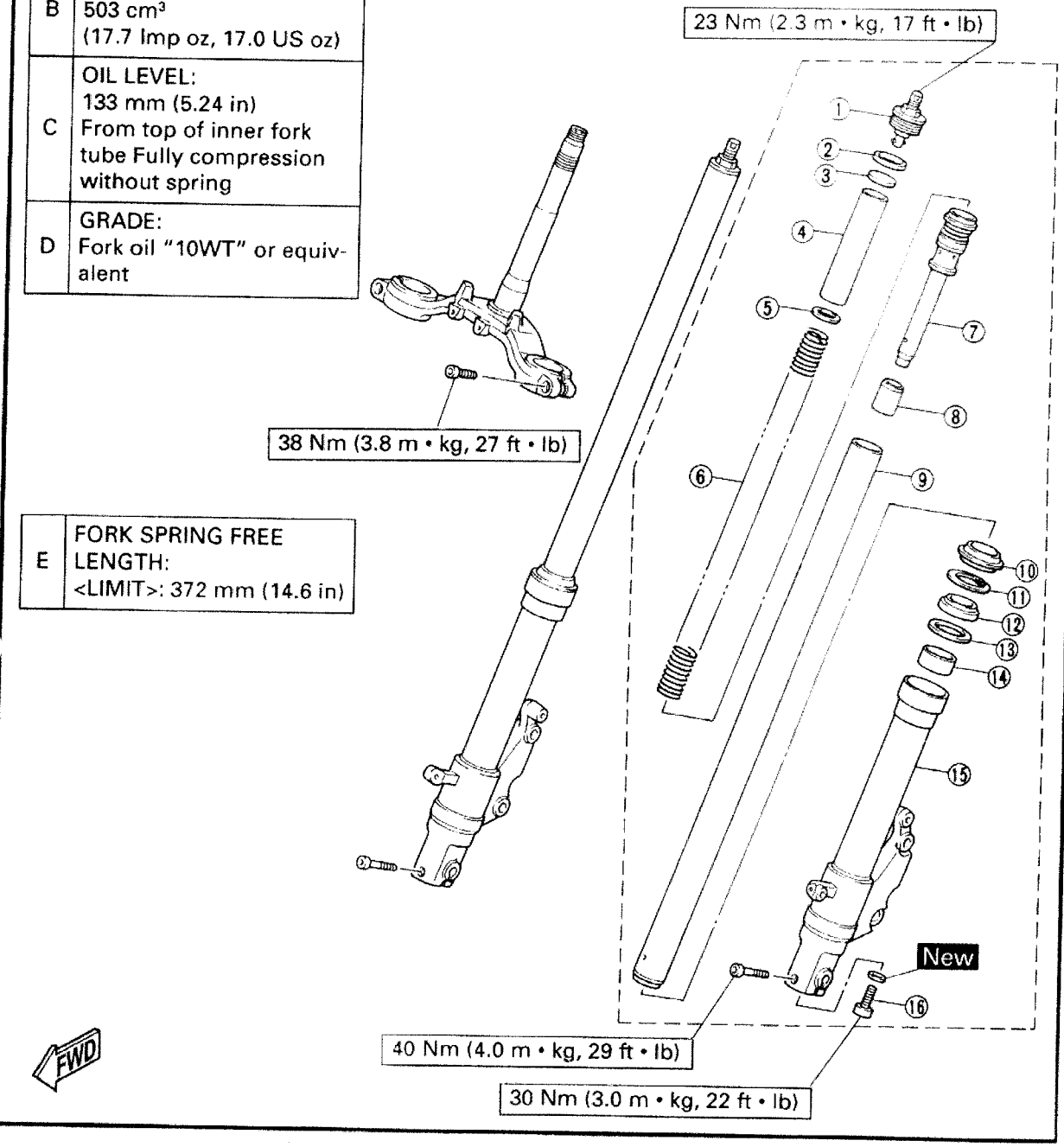
10.Adjust:
- Brake light switch
  Refer to the "BRAKE LIGHT SWITCH ADJUSTMENT" section in CHAPTER 3.

FRONT FORK

① Cap bolt complete
② O-ring
③ Washer
④ Spacer
⑤ Spring seat
⑥ Fork spring
⑦ Damper rod assembly
⑧ Oil lock piece
⑨ Inner fork tube
⑩ Dust seal
⑪ Stopper ring
⑫ Oil seal
⑬ Plain washer
⑭ Slide metal
⑮ Outer fork tube
⑯ Damper rod bolt

A	FORK OIL (EACH):
B	CAPACITY: 503 cm³ (17.7 Imp oz, 17.0 US oz)
C	OIL LEVEL: 133 mm (5.24 in) From top of inner fork tube Fully compression without spring
D	GRADE: Fork oil "10WT" or equivalent

E	FORK SPRING FREE LENGTH: <LIMIT>: 372 mm (14.6 in)



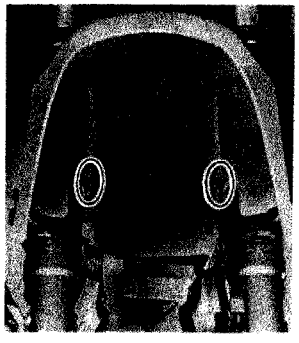
REMOVAL

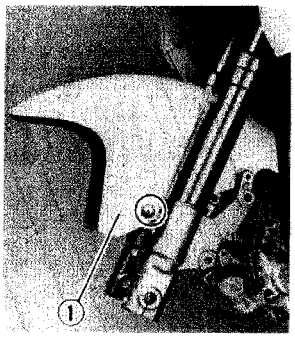
⚠ WARNING

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

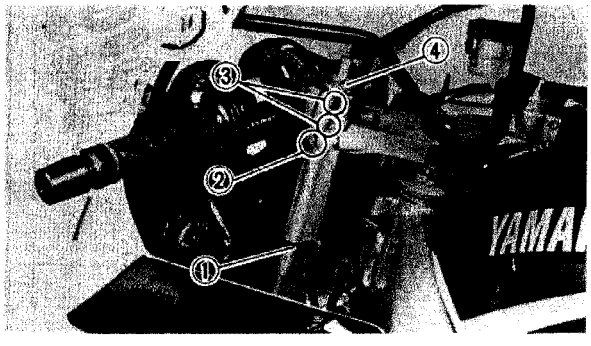
1.Place the motorcycle on a level place.
2.Remove:
- Lower cowling
  Refer to the "COWLINGS" section in CHAPTER 3.

3.Remove:
- Brake calipers (left and right)
- Front wheel
  Refer to the "FRONT WHEEL" section.





4.Remove:
- Front fender ①

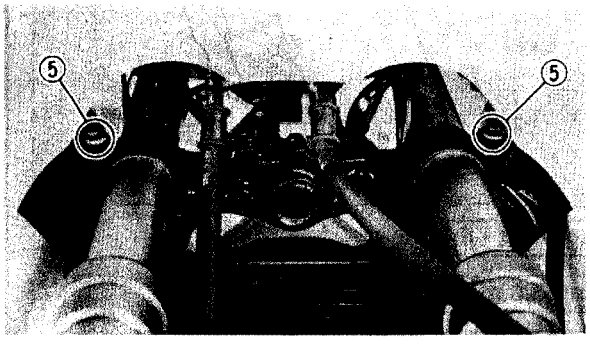


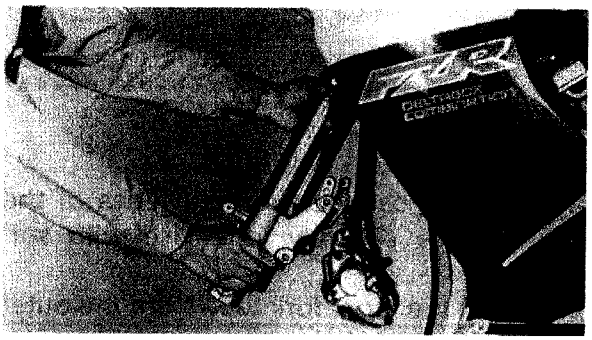
5.Remove:
- Bands ① (handlebar switch lead)

6.Loosen:
- Pinch bolts ② (upper bracket)
- Pinch bolts ③ (handlebar boss)
- Cap bolts ④
- Pinch bolts ⑤ (lower bracket)

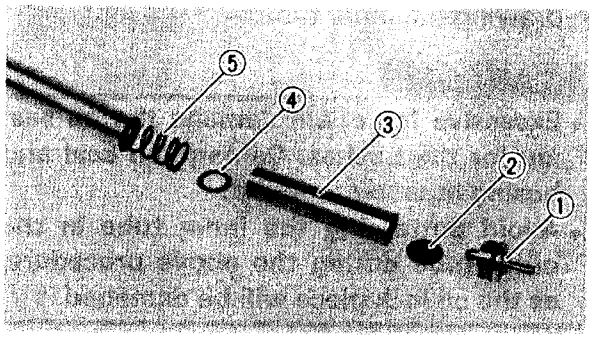
⚠ WARNING

Support the fork before loosening the pinch bolts.





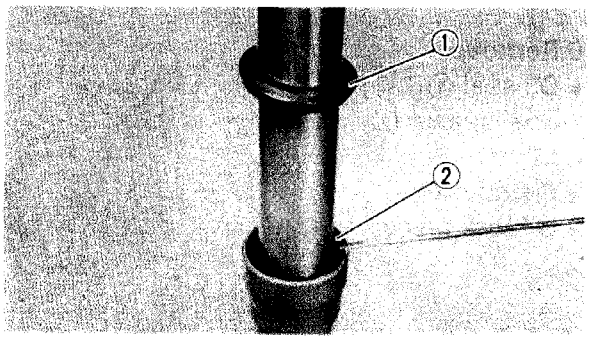
7.Remove:
- Front fork(s)



DISASSEMBLY

1.Remove:
- Cap bolt ①
- Washer ②
- Spacer ③
- Spring seat ④
- Fork spring ⑤

Drain the fork oil.

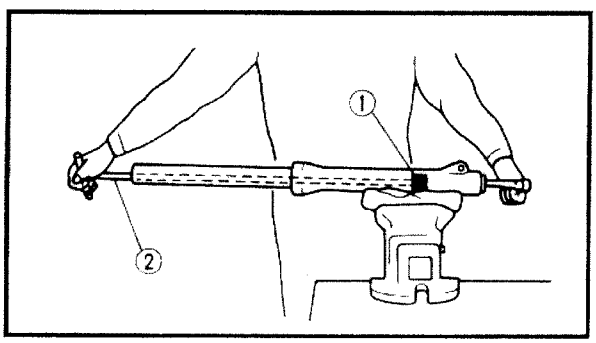


2.Remove:
- Dust seal ①
- Stopper ring ②

Using slotted-head screwdriver.

CAUTION:

Take care not to scratch the inner tube.



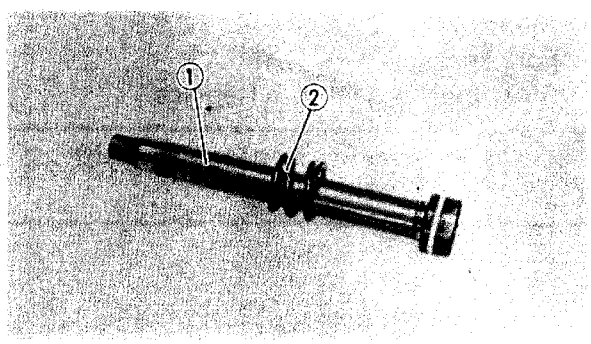
3.Remove:
- Bolt (damper rod)

NOTE:

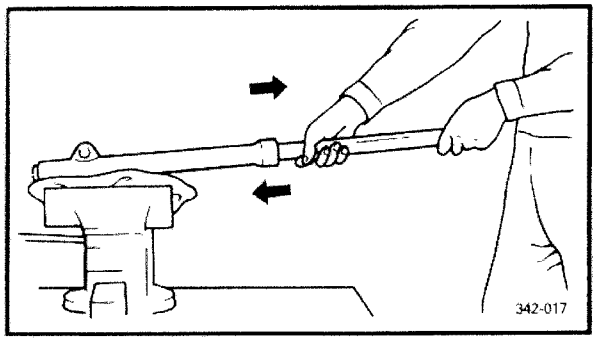
Loosen the bolt (damper rod) while holding the damper rod with the T-handle ② and holder ①.



Damper rod holder:
90890-01388
T-Handle:
90890-01326



4.Remove:
- Damper rod ①
- Rebound spring ②



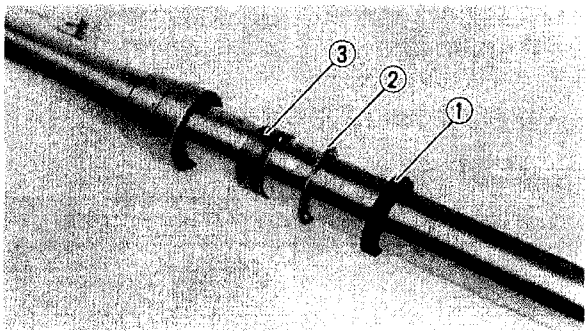
5.Remove:
- Inner fork tube

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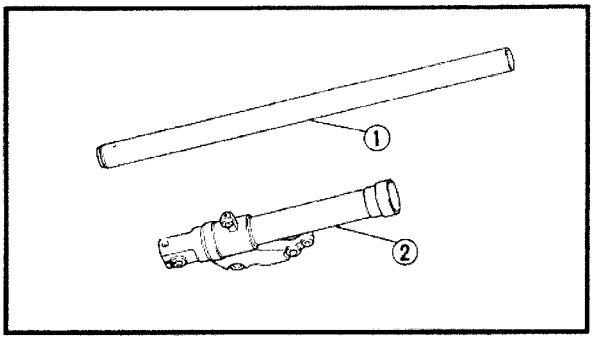
Removal steps:
- Hold the fork leg holizontally.
- Clamp the caliper mounting boss of the outer tube securely in a vise with soft jaws.
- Pull out the inner fork tube from the outer tube by forcefully, but carefully, with drawing the inner tube.

CAUTION:
- **Excessive force will damage the oil seal and/or the bushes. Damage oil seal and busing must be replaced.**
- **Avoid bottoming the inner tube in the outer tube during the above procedure, as the oil lock piece will be damaged.**

****



6.Remove:
- Oil seal ①
- Seal spacer ②
- Slide metal ③
- Piston metal
- Oil lock piece



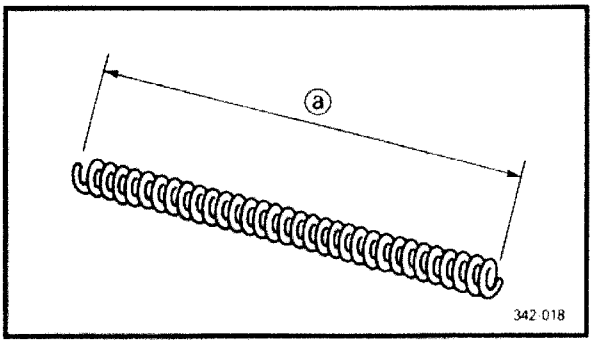
INSPECTION

1.Inspect:
- Inner fork tube ①
- Outer fork tube ②

Scratches/Bends/Damage → Replace.

⚠ WARNING

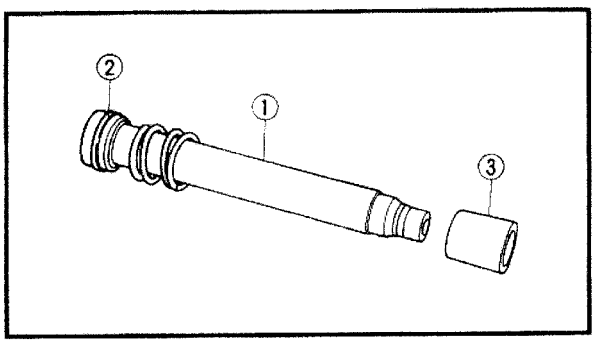
Do not attempt to straighten a bent inner fork tube as this may dangerously weaken the tube.



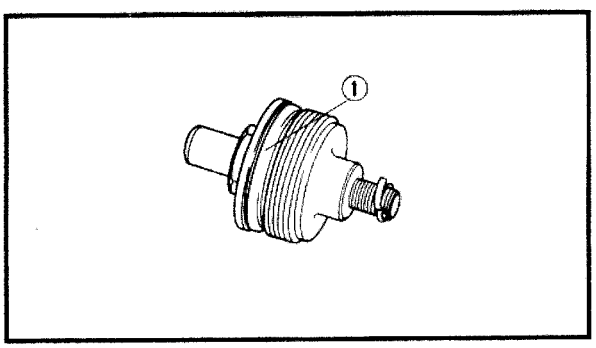
2.Measure:
- Fork spring ⓐ

Over specified limit → Replace.

Fork spring free length (limit): 372 mm (14.6 in)



3.Inspect:
- Damper rod ①
- Ring ②
  Wear/Damage → Replace.
  Contamination → Blow out all oil passages with compressed air.
- Oil lock piece ③
  Damage → Replace.

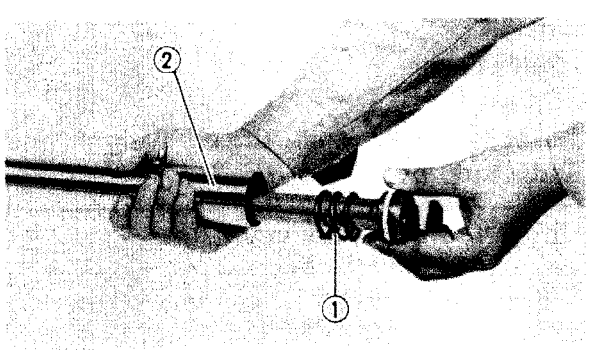


4.Inspect:
- O-ring ① (cap bolt complete)
  Wear/Damage → Replace.

ASSEMBLY

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

NOTE:
- In front fork reassembly, be sure to use following new parts.
  * Piston metal
  * Slide metal
  * Oil seal
  * Dust seal
- Make sure that all components are clean before reassembly.



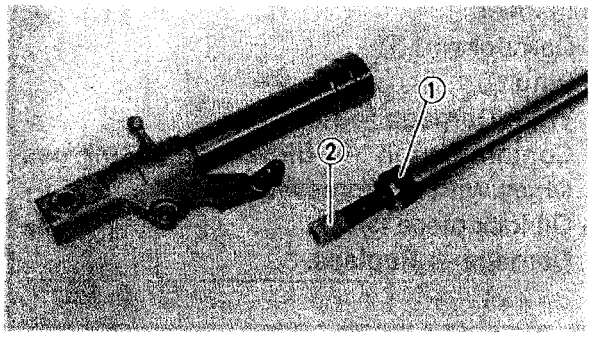
1.Install:
- Damper rod ①

CAUTION:

Allow the damper rod to slide slowly down the inner fork tube ② until it protrudes from the bottom, being careful not to damage the inner fork tube.

NOTE:

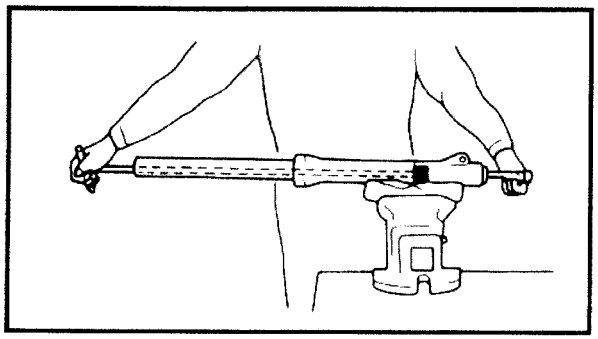
Always use a new copper washer.



2.Lubricate:
- Inner fork tube (outer surface)

Recommended lubricant:
Fork oil 10WT or equivalent

3.Install:
- Piston metal ①
- Oil lock piece ②

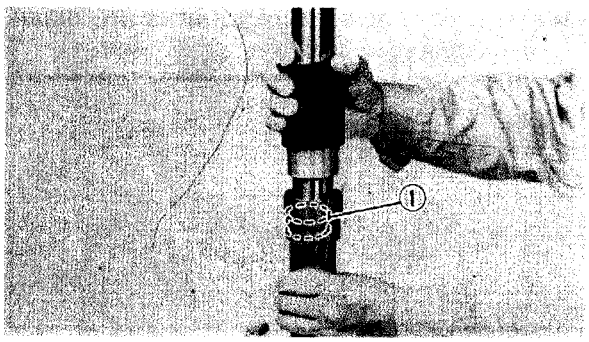


4.Tighten:
- Bolt (damper rod)

Bolt (damper rod):
30 Nm (3.0 m • kg, 22 ft • lb)
LOCTITE®

NOTE:
Tighten the bolt (damper rod) while holding the damper rod with the T-handle and holder.

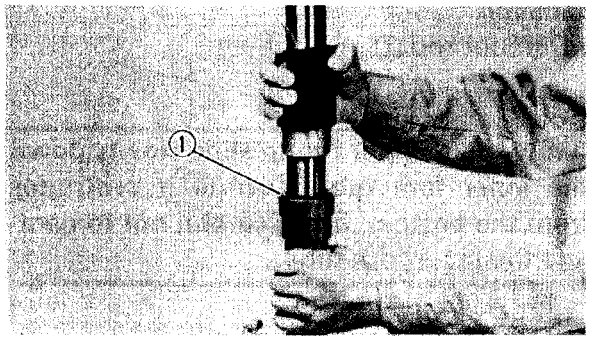
T-handle:
90890-01326
Holder (24 mm):
90890-01388



5.Install:
- Slide metal ①

Use the fork seal driver weight and adapter.

Fork seal driver weight:
90890-01367
Adapter:
90890-01381



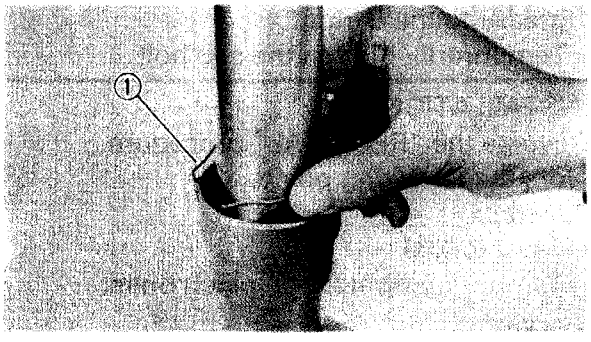
6.Install:
- Seal spacer
- Oil seal ①

Use the fork seal driver weight and adapter.

Fork seal driver weight:
90890-01367
Adapter:
90890-01381

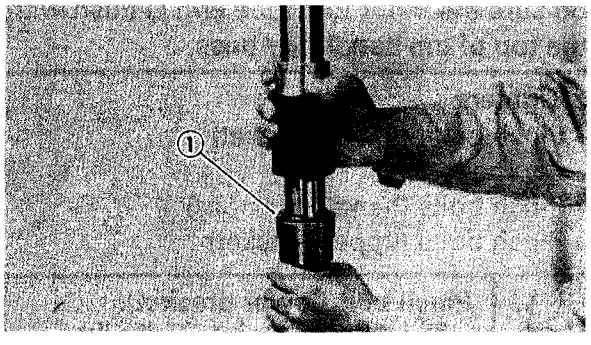
NOTE:
Before installing the oil seal, apply the lithium soap base grease onto the oil seal lips.

CAUTION:
Be sure that the oil seal numbered side face upward.



7.Install:
- Retaining clip ①

NOTE:
Fit retaining clip correctly in the groove in the outer tube.



8.Install:
- Dust seal ①

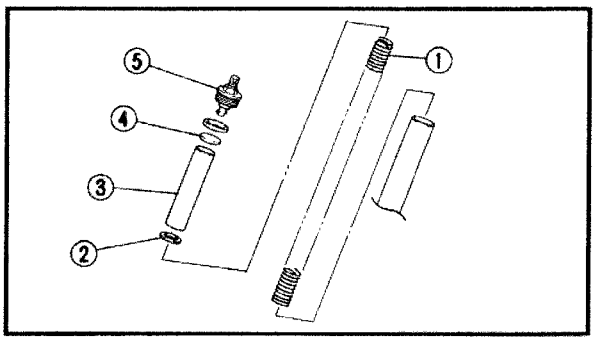
  Use the fork seal driver weight.

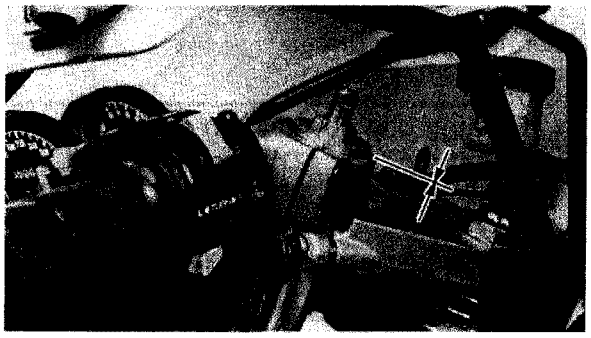
	Fork seal driver weight: 90890-01367

9.Fill:
- Fork oil

	Each fork: 503 cm³ (17.7 Imp oz, 17.0 US oz) Fork oil 10WT or equivalent after filling, slowly pump the fork up and down to distribute oil.
	Oil level: 133 mm (5.24 in) from the top of inner fork tube fully compressed without spring.

NOTE:
Place the fork on upright position.





10.Install:
- Fork spring ①
- Spring seat ②
- Spacer collar ③
- Washer ④
- Cap bolt ⑤

NOTE:
- Fork spring must be installed with the smaller pitch upward.
- Before installing the cap bolt, apply the grease to the O-ring.
- Temporarily tighten the cap bolt.

INSTALLATION

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

1.Install:
- Front fork(s)

  Temporary tighten the pinch bolts.

NOTE:

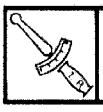
Be sure the inner fork tube end is flush with the top of the handlebar boss.

2.Tighten:
- Pinch bolts (lower bracket)
- Cap bolts
- Pinch bolts (handlebar boss)
- Pinch bolts (upper bracket)



Pinch bolt (lower bracket):
38 Nm (3.8 m • kg, 27 ft • lb)
Cap bolt:
23 Nm (2.3 m • kg, 17 ft • lb)
Pinch bolt (handlebar):
13 Nm (1.3 m • kg, 9.4 ft • lb)
Pinch bolt (upper bracket):
30 Nm (3.0 m • kg, 22 ft • lb)

3.Install:
- Front fender
- Brake hose holder



Bolt (front fender):
6 Nm (0.6 m • kg, 4.3 ft • lb)

4.Install:
- Front wheel
- Brake caliper

Refer to the "FRONT WHEEL" section.



Front axle:
59 Nm (5.9 m • kg, 43 ft • lb)
Bolt (brake caliper):
35 Nm (3.5 m • kg, 25 ft • lb)
Pinch bolt (front axle):
40 Nm (4.0 m • kg, 29 ft • lb)

⚠ WARNING

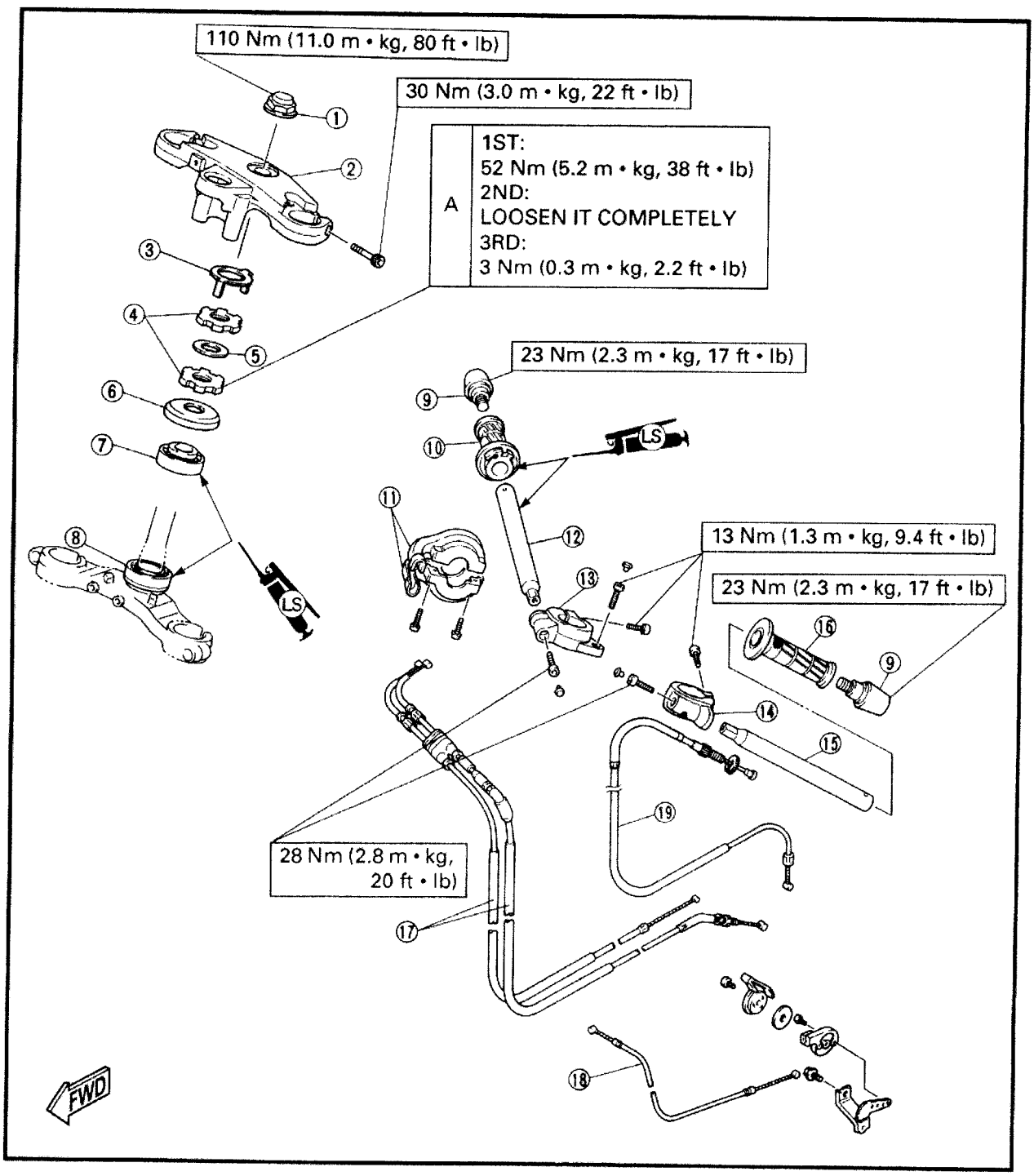
Make sure that the brake hose are routed properly.

5.Adjust:
- Spring preload

Refer to the "FRONT FORK ADJUSTMENT" section in CHAPTER 3.

STEERING HEAD AND HANDLEBAR

1. Steering stem nut
2. Upper bracket
3. Special washer
4. Ring nut
5. Rubber washer
6. Bearing cover
7. Bearing (upper)
8. Bearing (lower)
9. Handlebar grip end
10. Throttle grip
11. Throttle cable housing
12. Handlebar (right)
13. Handlebar boss (right)
14. Handlebar boss (left)
15. Handlebar (left)
16. Grip rubber
17. Throttle cable
18. Starter cable
19. Clutch cable



REMOVAL

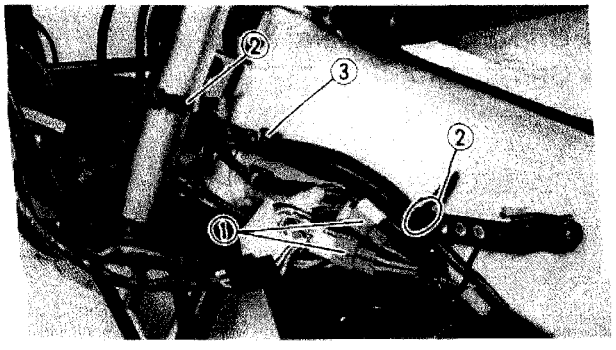
⚠ WARNING

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

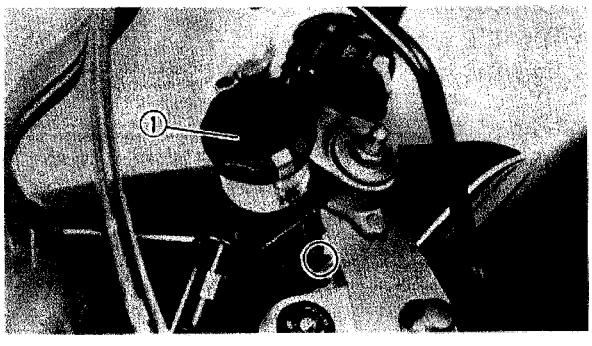
1. Remove:
   - Lower cowling
   - Center cowling (left)

   Refer to the "COWLINGS" section in CHAPTER 3.
2. Disconnect:
   - Main switch couplers ①
3. Remove:
   - Bands ②
   - Cable clamp ③

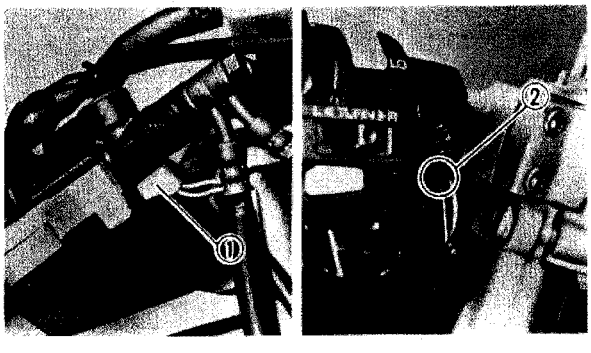
   (main switch and handlebar switch (left))



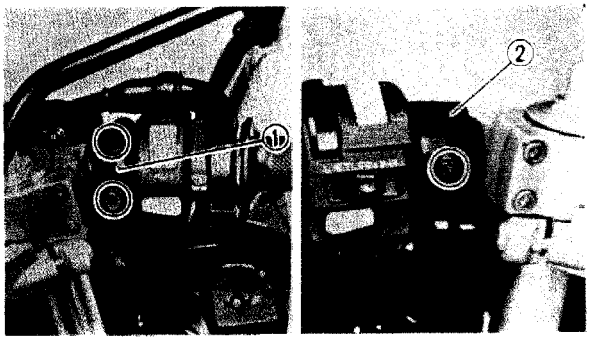
4. Remove:
   - Reservoir tank ①

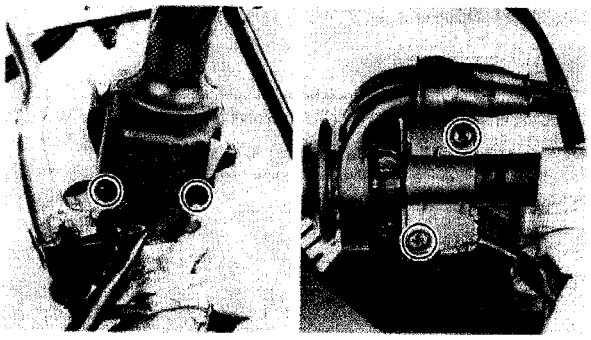


5. Disconnect:
   - Brake light switch leads ①
   - Clutch switch coupler ②

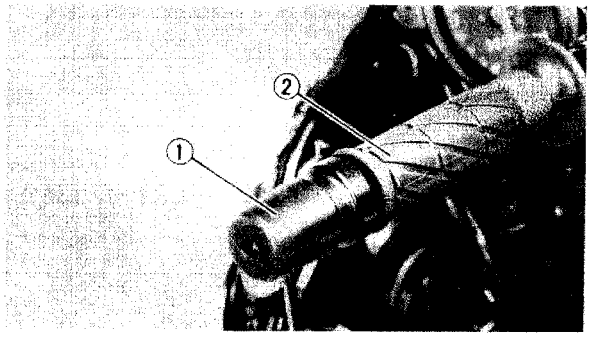


6. Remove:
   - Master cylinder holder ①
   - Bolt ② (clutch lever holder)

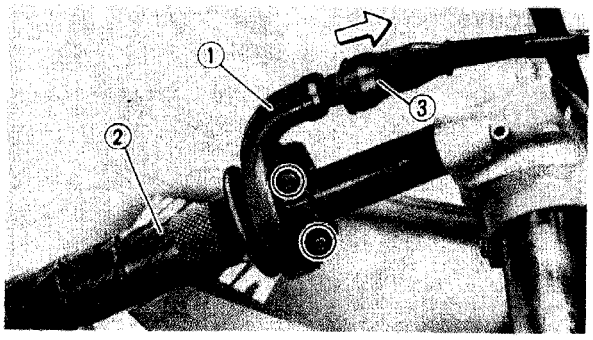




7.Remove:
- Handlebar switches (left and right)

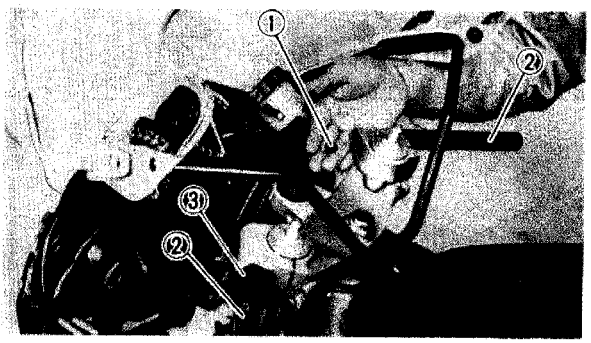


8.Remove:
- Grip ends ① (left and light)
- Grip ② (left)

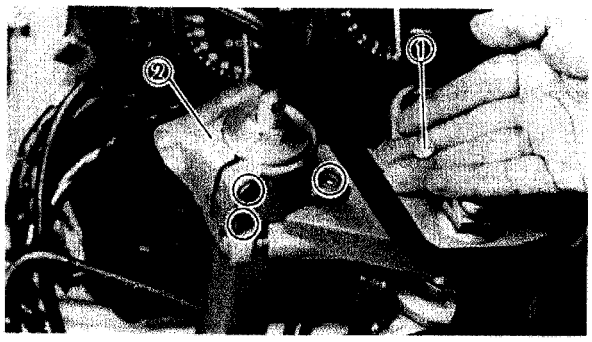


9.Remove:
- Throttle cable housing ①
- Throttle grip ②

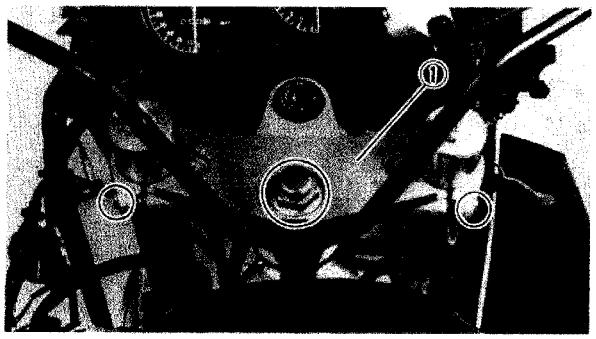
NOTE:
When removing the throttle cable housing, pull back the rubber cover ③.



10.Remove:
- Blind plugs ①
- Handlebars ② (left and right)
- Clutch lever holder ③



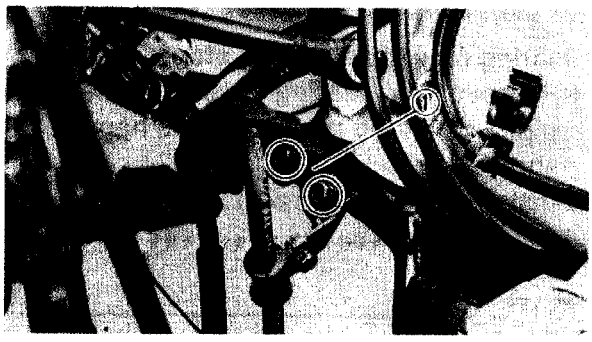
11.Remove:
- Blind plugs ①
- Handlebar bosses ② (left and right)



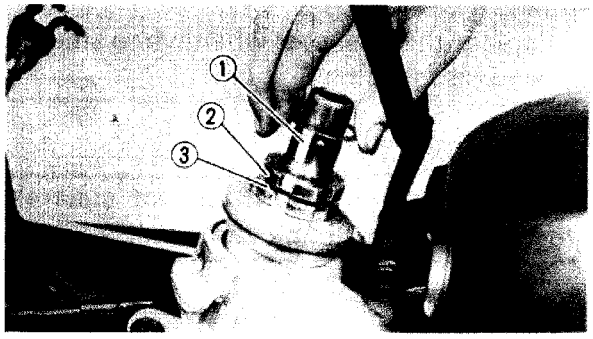
12.Remove:
- Upper bracket ①

13.Remove:
- Front wheel
- Front forks

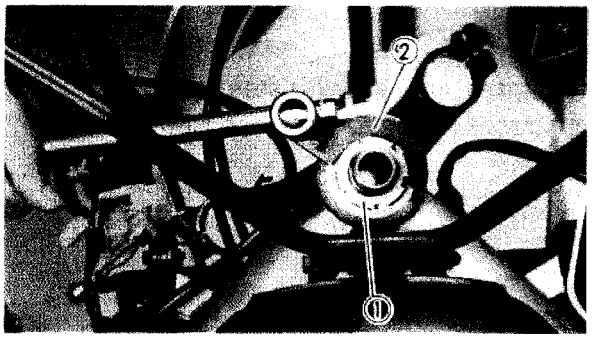
Refer to the "FRONT WHEEL" and "FRONT FORK" section.



14.Remove:
- Brake hose holder ①



15.Remove:
- Special washer ①
- Ring nut ② (upper)
- Rubber washer ③



16.Remove:
- Ring nut ① (lower)

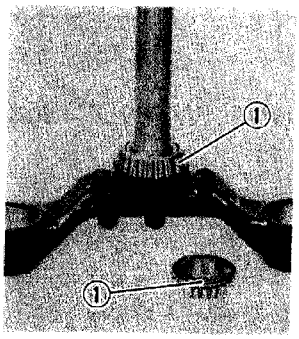
Use the ring nut wrench ②.

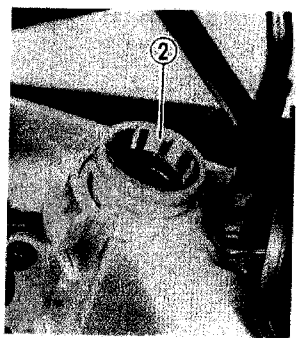
	Ring nut wrench: 90890-01403

⚠ WARNING

Support the steering shaft so that it may not fall down.

17.Remove:
- Bearing cover
- Bearing (upper and lower)
- Dust seal (lower)

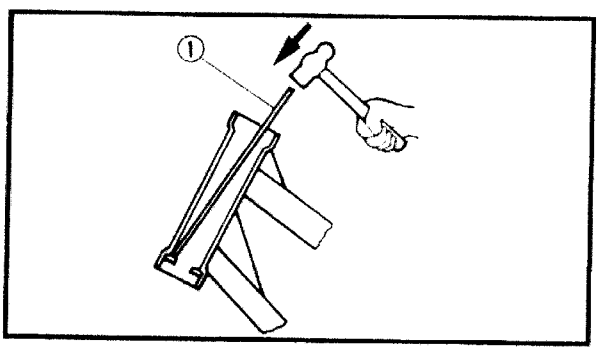




INSPECTION

1.Wash the bearing and bearing races with a solvent.

2.Inspect:
- Bearings ①
- Bearing races ②
  Pitting/Damage → Replace.



****

Bearing race replacement steps:

- Remove the bearing races on the head pipe using long rod ① and the hammer as shown.
- Install the new dust seal and races.

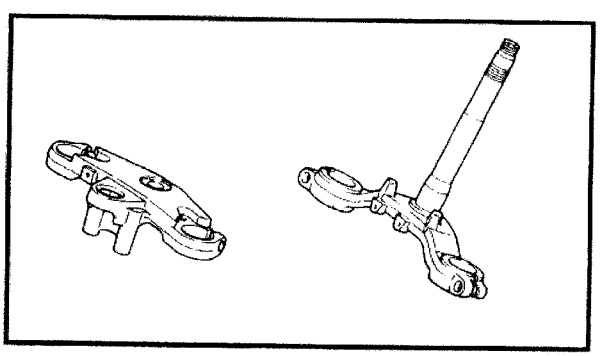
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NOTE:

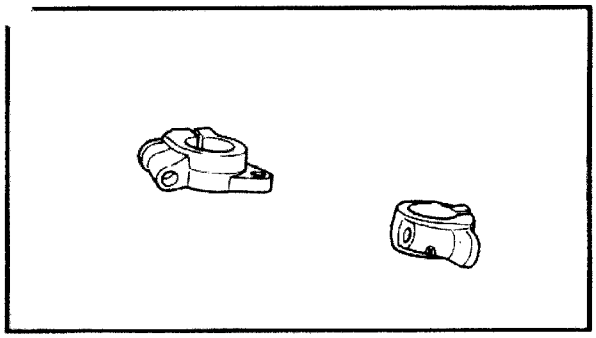
- Always replace bearings and races as a set.
- Replace the dust seal whenever a steering head disassembled.

CAUTION:

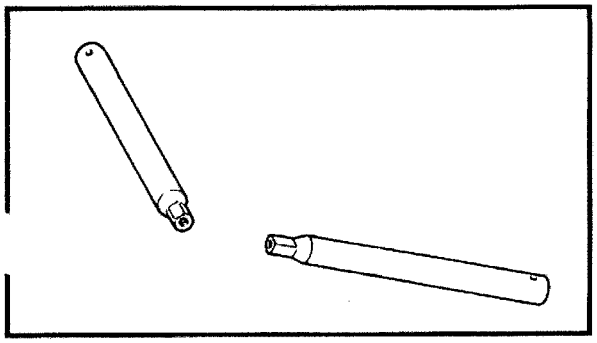
If the bearing race is fitted not squarely, the head pipe could be damaged.



3.Inspect:
- Upper bracket
- Under bracket (with steering stem)
  Cracks/Bends/Damage → Replace.



4.Inspect:
- Handlebar bosses
  Crack/Damage → Replace.



5.Inspect:
- Handlebars
  Bends/Cracks/Damage → Replace.

⚠ WARNING

Do not attempt to straighten a bent handlebar as this may dangerously weaken the handlebar.

****

Left handlebar replacement steps:
- Remove the handlebar grip.
- Apply a light coat of an adhesive for rubber on the 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.

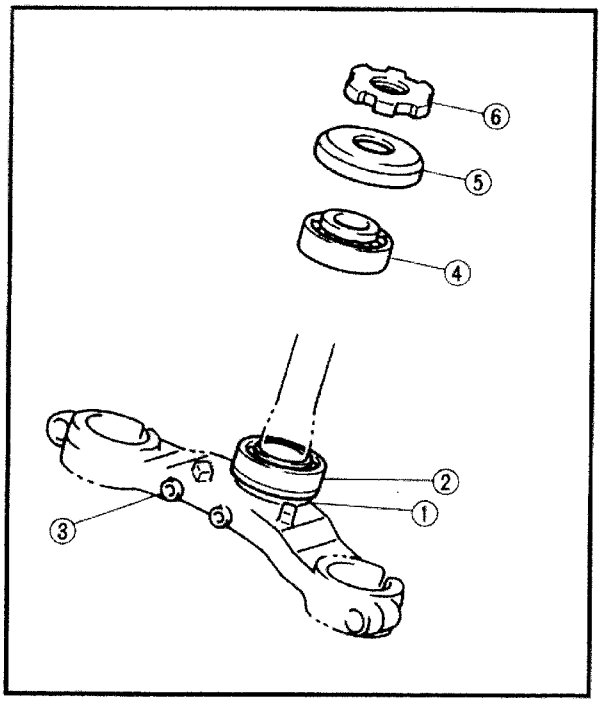
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INSTALLATION

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

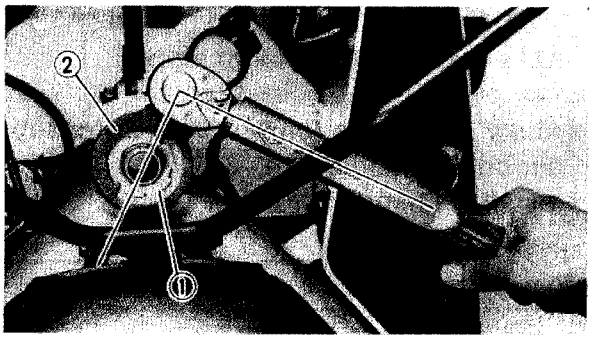
1.Lubricate:
- Bearings (upper and lower)
- Bearing races

Recommended lubricant:
Lithium-soap base grease



2.Install:
- Dust seal ① (lower)
- Bearing ② (lower)
- Steering stem ③
- Bearing ④ (upper)
- Bearing cover ⑤
- Ring nut ⑥ (lower)

CAUTION:
Hold the steering stem until it is secured.

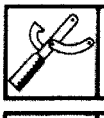
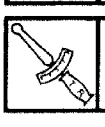


3.Tighten:
- Ring nuts (lower and upper)

****

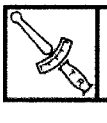
Tightening steps:
- Tighten the ring nut ① (lower) using the ring nut wrench ②.

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

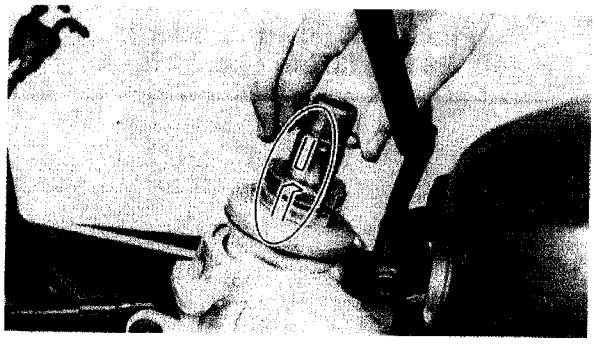
	**Ring nut wrench: 90890-01403**
	**Ring nut (initial tightening): 52 Nm (5.2 m • kg, 37 ft • lb)**

- Turn the steering stem left and right for several times.
- Loosen the ring nut completely and retighten it to specification.

⚠ WARNING
Do not over tightening.

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

- Check the steering stem by turning lock to lock. If there is any binding, remove the steering stem assembly and inspect the steering bearings.
- Install the rubber washer.
- Install the ring nut (upper).
- Finger tighten the ring nut, then align the slots of both ring nuts. If not aligned, hold the lower ring nut and tighten the other until they are aligned.
- Install the lock washer.

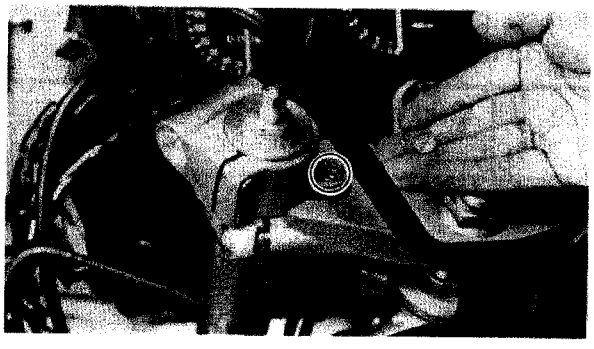


NOTE:
Make sure that the lock washer tab is placed in the slots.

****

4.Install:
- Upper bracket
- Nut (steering stem)

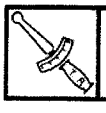
NOTE:
Temporarily tighten the steering stem nut.

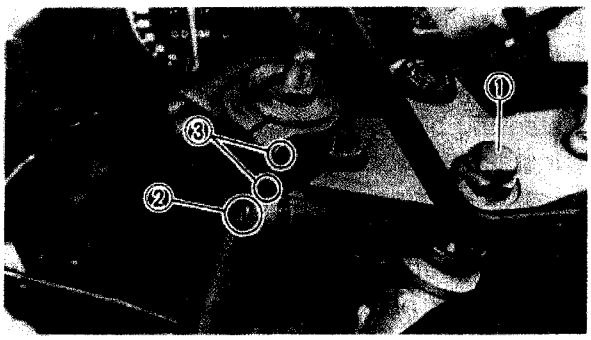


5.Install:
- Front forks
- Handlebar bosses
  Refer to the "FRONT FORK" section.

NOTE:
In this stage, temporarily tighten the pinch bolt.

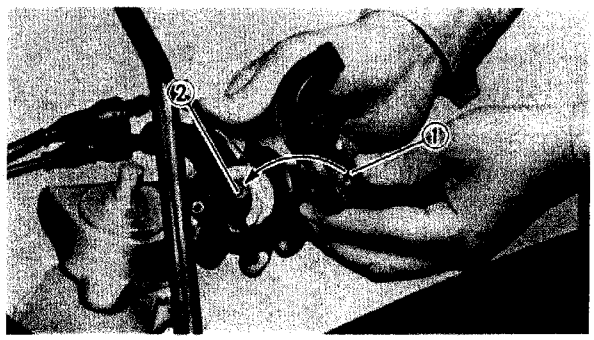
6.Install:
- Handlebar (left)
  (with the clutch lever holder)
- Handlebar (right)

	**Handlebar:** **28 Nm (2.8 m • kg, 20 ft • lb)**



7.Tighten:
- Nut ① (steering stem)
- Pinch bolts ② (upper bracket)
- Pinch bolts ③ (handlebar boss)
- Pinch bolts (lower bracket)

Nut (steering stem):
110 Nm (11.0 m • kg, 80 ft • lb)
Pinch bolt (upper bracket):
30 Nm (3.0 m • kg, 22 ft • lb)
Pinch bolt (handlebar boss):
13 Nm (1.3 m • kg, 9.4 ft • lb)
Pinch bolt (lower bracket):
38 Nm (3.8 m • kg, 27 ft • lb)



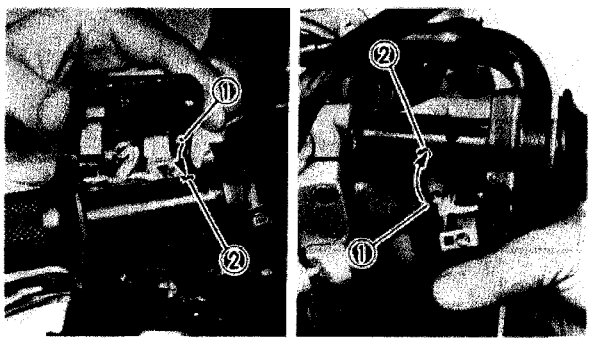
8.Install:
- Throttle grip
- Throttle cable housing

⚠ WARNING

Align the projection ① on the throttle cable housing with the hole ② on the handlebar.

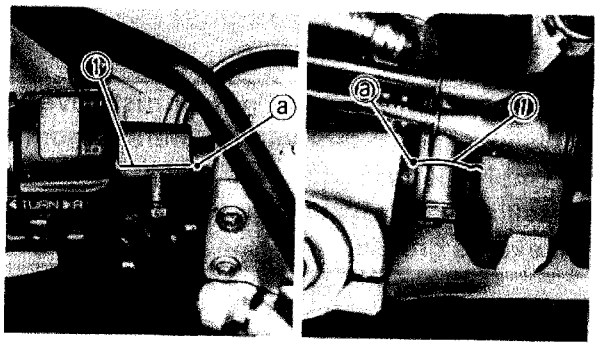
9.Install:
- Grip ends (left and right)

Grip end:
23 Nm (2.3 m • kg, 17 ft • lb)



10.Install:
- Handlebar switch (left and right)

NOTE:
Aligne the projection ① on the handlebar switch with the hole ② on the handlebar.



11.Install:
- Clutch lever holder
- Brake lever holder

NOTE:
Aligne the slit in the lever holders ① with the punched mark ⓐ on the handlebars.

CAUTION:
- **Install the lever holders with the "UP" mark facing upward.**
- **Tighten first the upper bolt, then the lower bolt.**

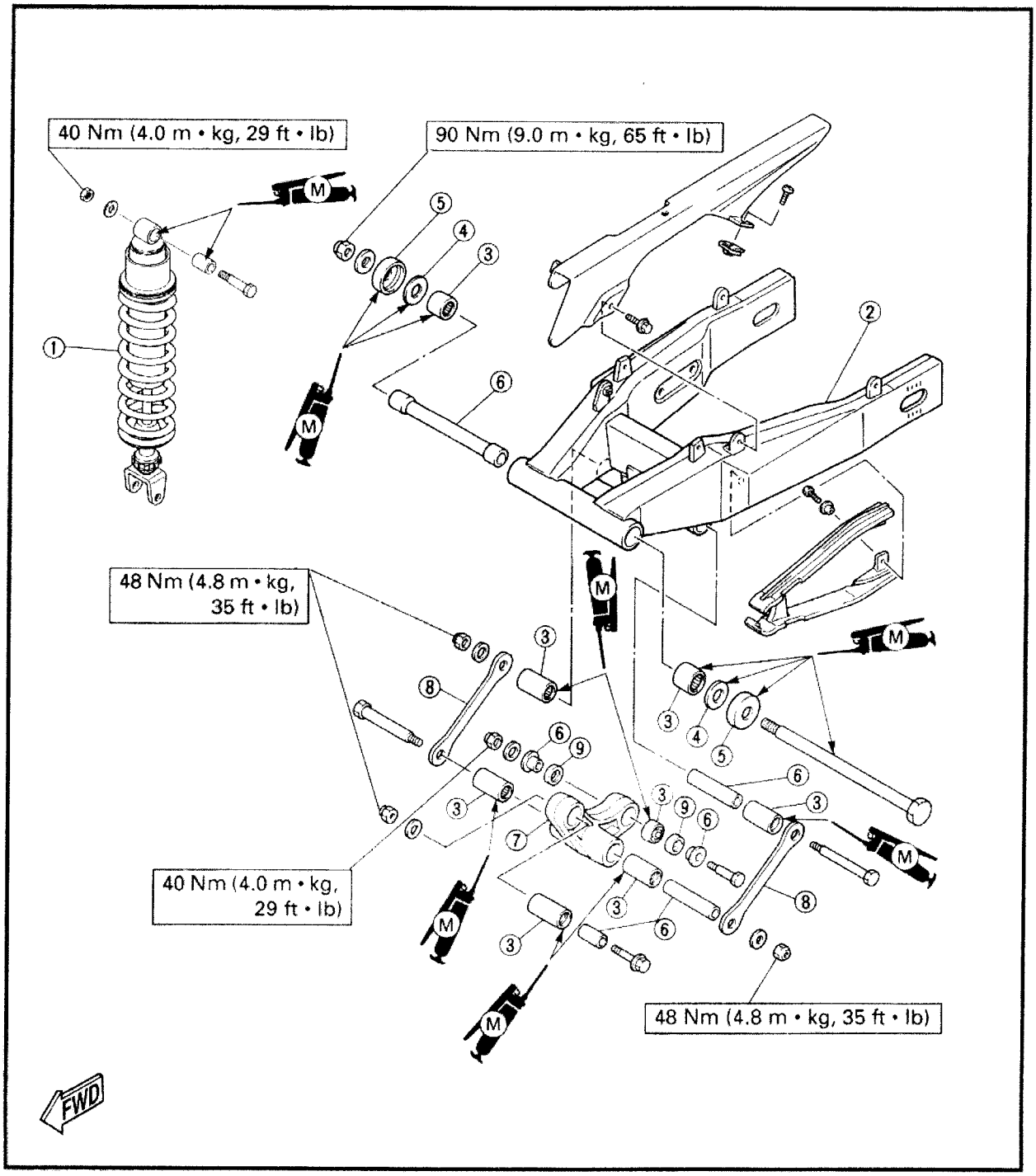


Bolt (lever holder):
10 Nm (1.0 m • kg, 7.2 ft • lb)

REAR SHOCK ABSORBER AND SWINGARM

① Shock absorber
② Swingarm
③ Bearing
④ Thrust washer
⑤ Thrust cover
⑥ Collar
⑦ Relay arm
⑧ Connecting rod
⑨ Oil seal

NOTE:
Coat the bearings, bushings, thrust covers, oil seals, and collars with a liberal amount of molybdenum disulfide grease before installing. After installing, thoroughly wipe off excess grease.

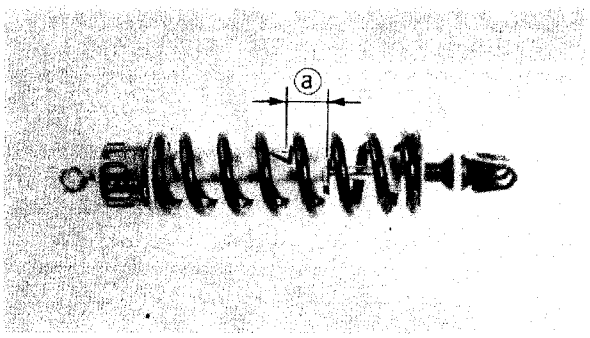


HANDLING NOTES

⚠ WARNING

This shock absorber contains highly compressed nitrogen gas. Read and understand the following information before handling the shock absorber. The manufacturer cannot be held responsible for property damage or personal injury that may result from improper handling.

- **Do not tamper or attempt to open the cylinder assembly.**
- **Do not subject shock absorber to an open flame or other high heat. This may cause the unit to explode due to excessive gas pressure.**
- **Do not deform or damage the cylinder in any way. Cylinder damage will result in poor damping performance.**



NOTES ON DISPOSAL

****

Shock absorber disposal steps:

- Gas pressure must be released before disposing of the 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

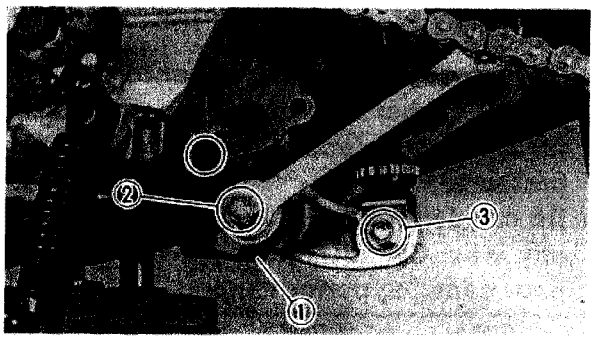
Rear shock absorber

1. Place the motorcycle on the level place.
2. Remove:
   - Lower cowling
     Refer to the "COWLINGS" section in CHAPTER 3.

3.Elevate the rear wheel by placing a suitable stand under the engine.

⚠ WARNING

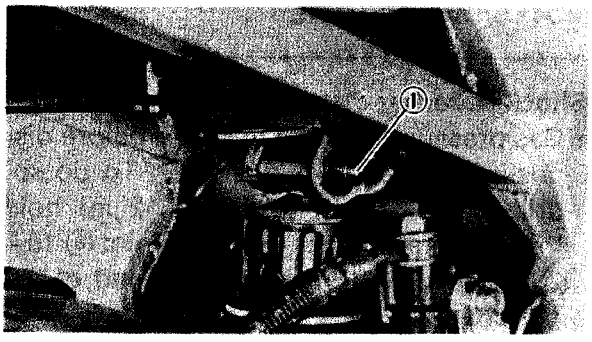
Securely support the motorcycle so there is no danger of it falling over.



4.Remove:
- Stay ① (lower cowling)
- Bolt ② (connecting rod)
- Bolt ③ (shock absorber-lower)

NOTE:

When removing the lower bolt, hold the swingarm so that it does not drip downwards when the lower bolt removed.



5.Remove:
- Bolt ① (shock absorber-upper)
- Rear shock absorber

NOTE:

Pull up the swingarm, then remove the rear shock absorber, through between the swingarm and relay arm.

Swingarm

1.Place the motorcycle on a level place.

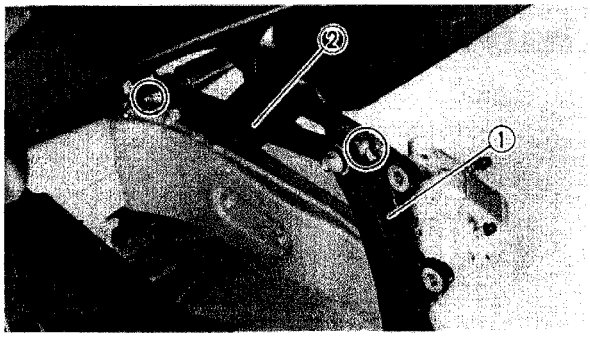
2.Remove:
- Lower cowling
  Refer to the "COWLING" section in CHAPTER 3.

3.Elevate the rear wheel by placing a suitable stand under the engine.

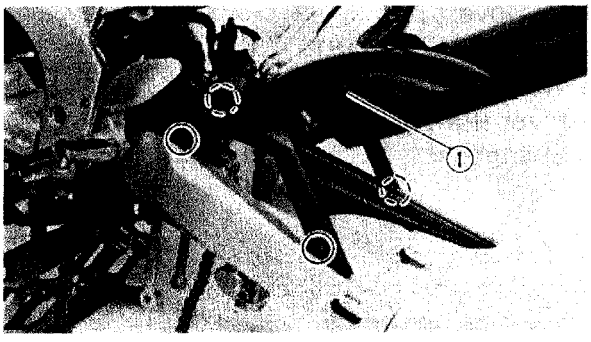
⚠ WARNING

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

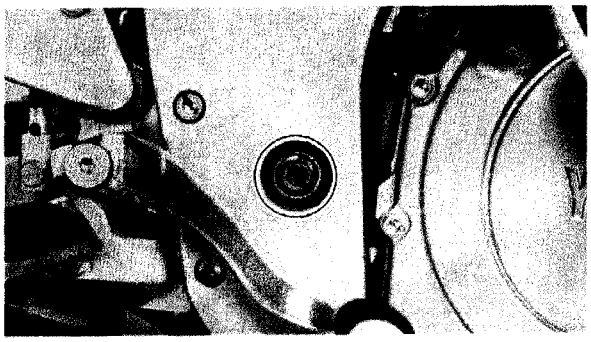
4.Remove:
- Rear shock absorber
  Refer to the "Rear shock absorber" section.
- Rear wheel
  Refer to the "REAR WHEEL" section.



5.Remove:
- Caliper bracket ①
- Tension bar ②



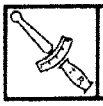
6.Remove:
- Rear fender ①

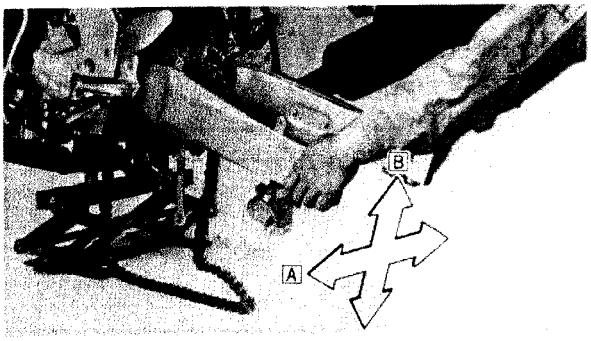


7.Check:
- Swingarm free play

****

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)**

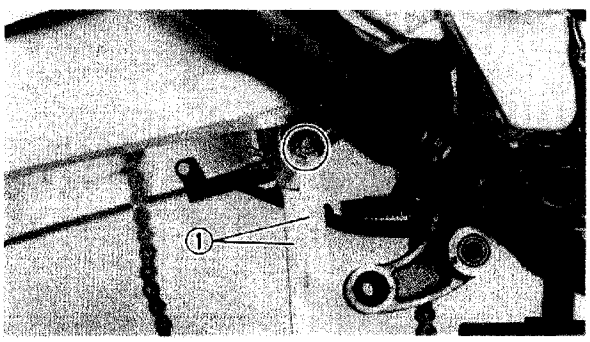


- Check the swingarm side play [A] by moving it from side to side.
  If side play is noticeable, check the inner collar, bearing, washer and thrust cover.

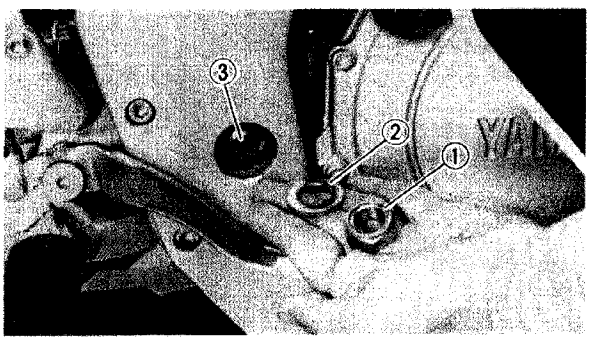
	**Side play (at end of swingarm): 1.0 mm (0.04 in)**

● 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.

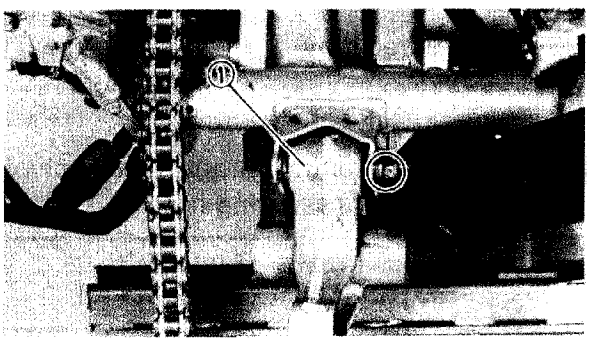
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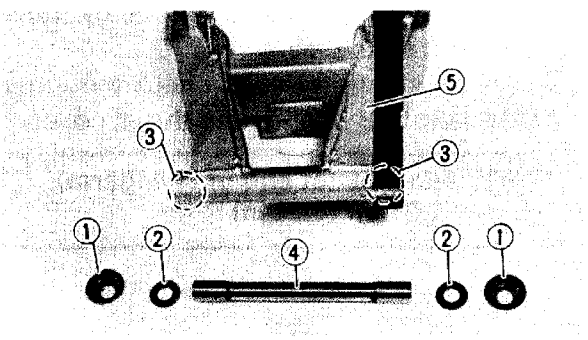
8. Remove:
- Connecting rod ① (left and right)



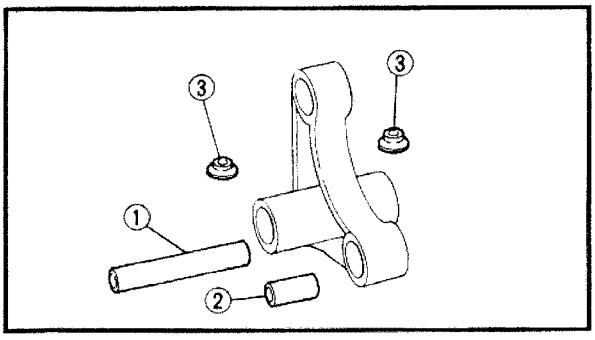
9. Remove:
- Nut ① (pivot shaft)
- Washer ②
- Pivot shaft ③
- Swingarm



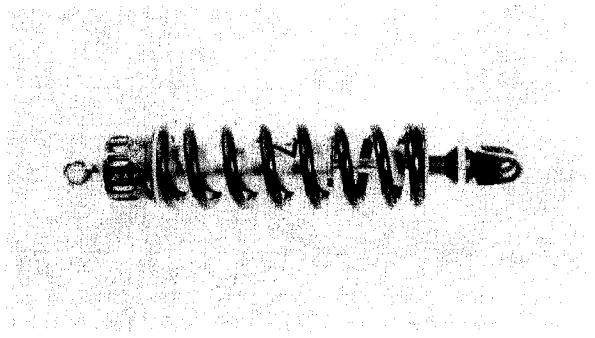
10. Remove:
- Relay arm ①



11. Remove:
- Thrust covers ①
- Thrust washers ②
- Bearings ③
- Collar ④ (swingarm)
- Swingarm ⑤



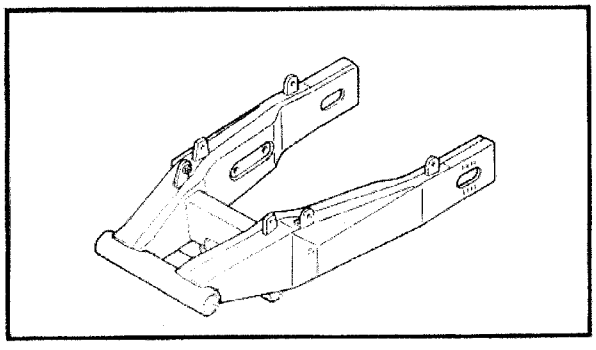
12.Remove:
- Collar ① (compression arm)
- Collar ② (relay arm)
- Collar ③ (shock absorber)



INSPECTION

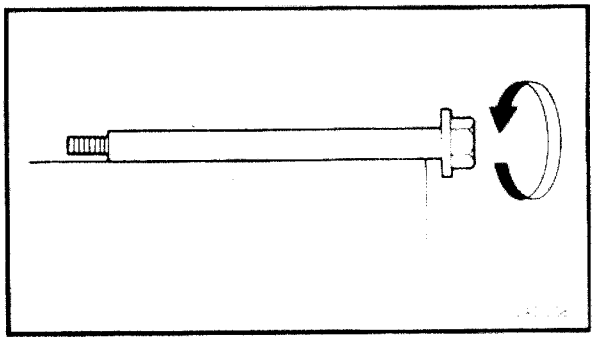
Rear shock absorber

1.Inspect:
- Rear shock absorber rod
  Bents/Damage → Replace the rear shock absorber assembly.
- Rear shock absorber
  Oil leaks/Gas leaks → Replace the rear shock absorber assembly.
- Spring
  Wear/Damage → Replace the rear shock absorber assembly.
- Bushings
- Bolts
  Wear/Bends/Damage → Replace.



Swingarm

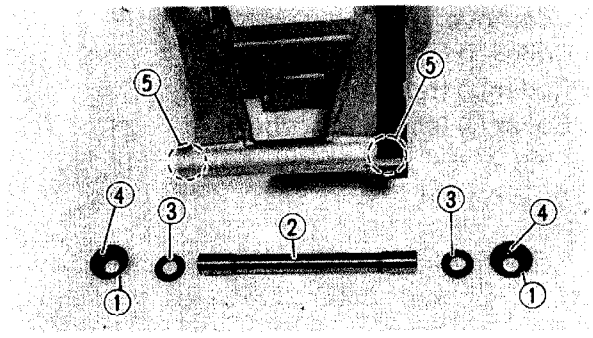
1.Inspect:
- Swingarm
  Crack/Bends/Damage → Replace.



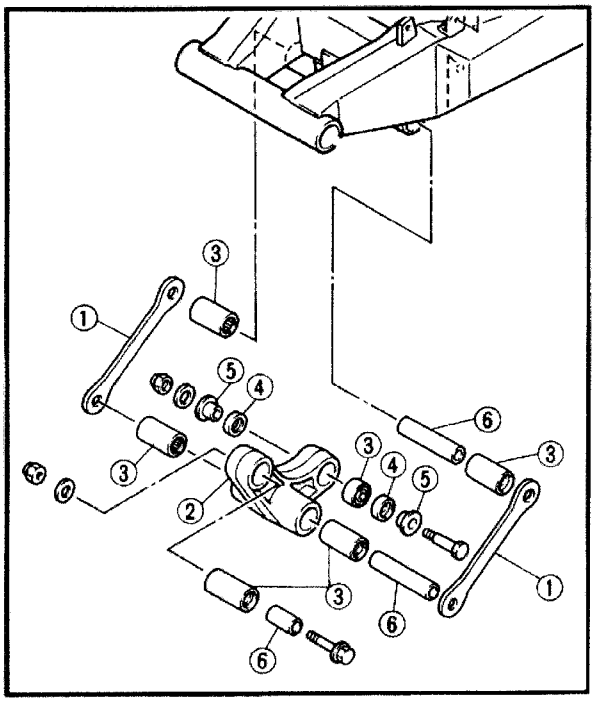
2.Inspect:
- Pivot shaft
  Roll the axle on a flat surface.
  Bends → Replace.

⚠ WARNING

Do not attempt to straighten a bent axle.



3.Wash the swingarm pivoting parts in a solvent.
4.Inspect:
- Thrust cover ①
- Inner collar ②
- Washer ③
- Oil seal ④
  Wear/Damage → Replace.
- Bearing ⑤
  Pitting/Damage → Replace.



5.Inspect:
- Connecting rod ①
- Relay arm ②
  Cracks/Damage → Replace.
- Bearings ③
  Pitting/Damage → Replace.
- Oil seals ④
- Collars ⑤ (shock absorber)
- Collars ⑥
  Damage/Scratches → Replace.

INSTALLATION

Rear shock absorber

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

1.Lubricate:

- Bearings
- Oil seals
- Collars
- Bushes



Recommended lubricant:
Molybdenum disulfide grease

2.Install:

- Collars
- Rear shock absorber



Nut (shock absorber - upper):
40 Nm (4.0 m • kg, 29 ft • lb)
Nut (shock absorber - lower):
40 Nm (4.0 m • kg, 29 ft • lb)
Nut (connecting rod):
48 Nm (4.8 m • kg, 35 ft • lb)

NOTE:
Lift up the swingarm to install rear shock absorber.

Swingarm

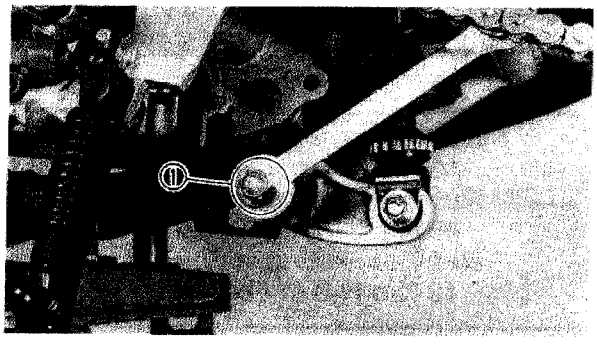
Reverse the "REMOVAL" procedure.
Note the following points.

1.Lubricate:
- Bearings
- Inner collars
- Thrust covers
- Pivot shaft

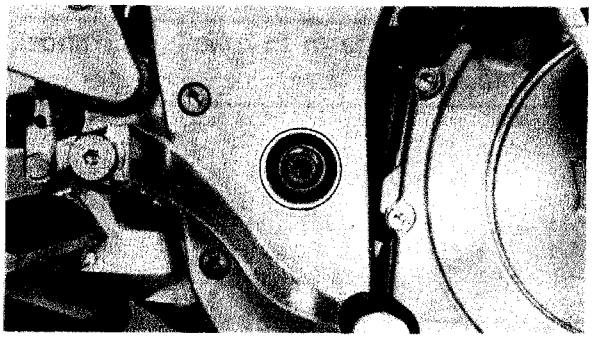
Recommended lubricant:
Molybdenum disulfide grease

2.Install:
- Relay arm
- Connecting rod (left and right)

Nut (relay arm):
48 Nm (4.8 m • kg, 35 ft • lb)
Nut (connecting rod):
48 Nm (4.8 m • kg, 35 ft • lb)



CAUTION:
Insert the bolt ① (connecting rod) from the right.



3.Install:
- Swingarm

Nut (pivot shaft):
90 Nm (9.0 m • kg, 65 ft • lb)

4.Install:
- Drive sprocket
- Crankcase cover (left)

Refer to the "ENGINE INSTALLATION" section in CHAPTER 4.

5.Install:
- Rear fender
- Tension bar
- Caliper bracket



Bolt (rear fender):
7 Nm (0.7 m • kg, 5.1 ft • lb)
Nut (tension bar):
30 Nm (3.0 m • kg, 22 ft • lb)

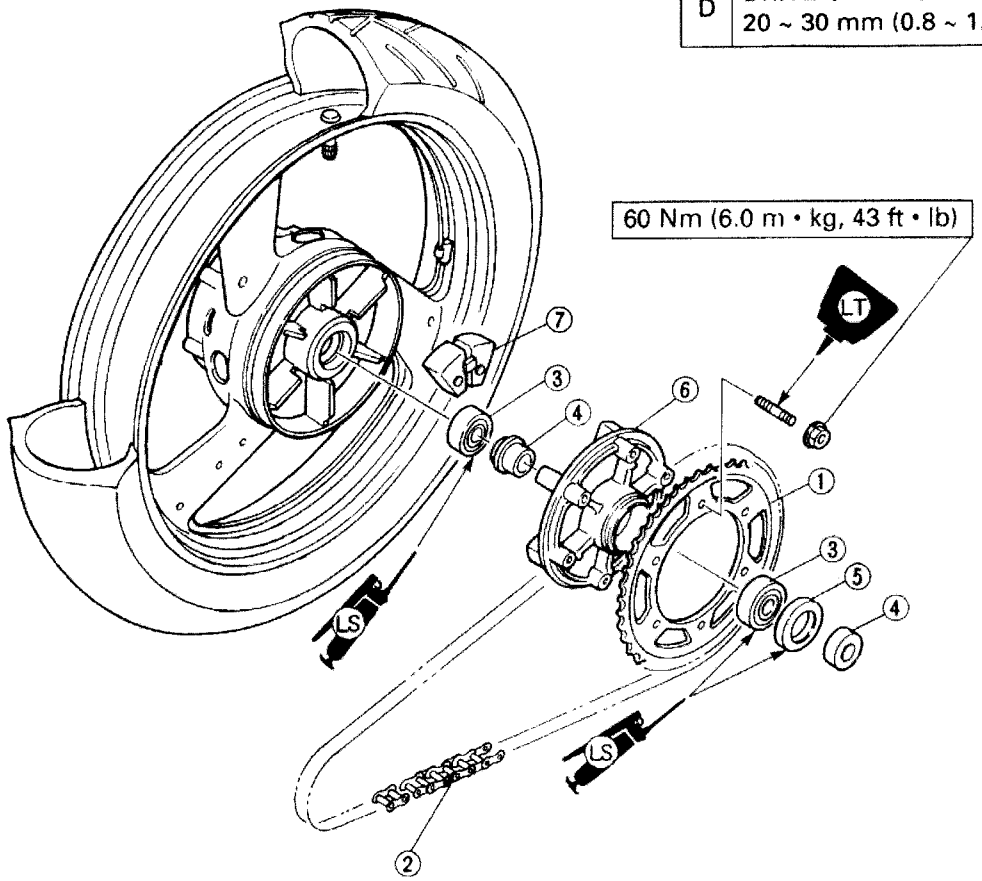
6.Install:
- Rear shock absorber
  Refer to the "Rear shock absorber" section.
- Rear wheel
  Refer to the "REAR WHEEL" section.

7.Adjust:
- Drive chain slack
  Refer to the "DRIVE CHAIN SLACK ADJUSTMENT" section in CHAPTER 3.

DRIVE CHAIN AND SPROCKETS

① Driven sprocket
② Drive chain
③ Bearing
④ Collar
⑤ Oil seal
⑥ Sprocket hub
⑦ Dumper rubber

A	DRIVE CHAIN:
B	TYPE: 50VA7
C	NO. OF LINKS: 108
D	DRIVE CHAIN SLACK: 20 ~ 30 mm (0.8 ~ 1.2 in)



NOTE:
Before removing the drive chain and sprockets, drive chain slack and 10 link length of drive chain should be measured.

REMOVAL

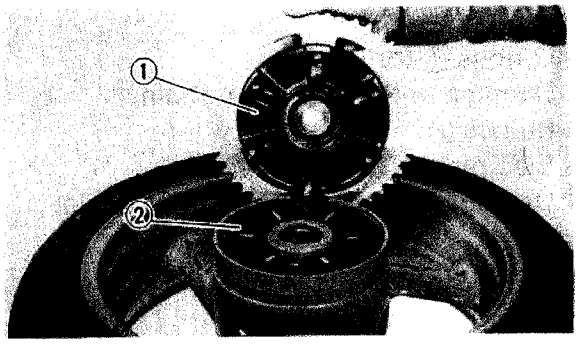
1.Place the motorcycle on a level place.

⚠ WARNING

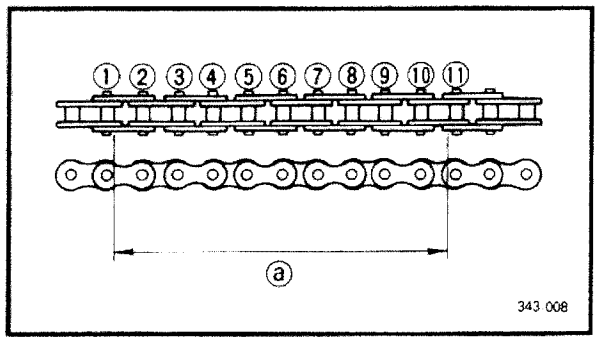
Securely support the motorcycle so there is no danger of it falling over.

2.Remove:
- Shift pedal link
- Crankcase cover (left)
- Drive sprocket
  Refer to the "ENGINE REMOVAL" section in CHAPTER 4.

3.Remove:
- Rear wheel
  Refer to the "REAR WHEEL" section.
- Rear shock absorber
- Swingarm
- Drive chain
  Refer to the "REAR SHOCK ABSORBER AND SWINGARM" section.



4.Remove:
- Collar
- Driven sprocket ①
  (with sprocket hub)
- Dumper rubber ②



INSPECTION

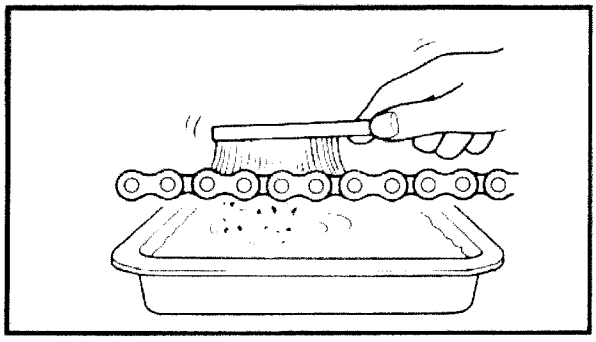
1.Measure:

- 10 link length ⓐ (drive chain)
  Out of specification → Replace drive chain.

10 link length limit:
151 mm (5.94 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 length should be measured.

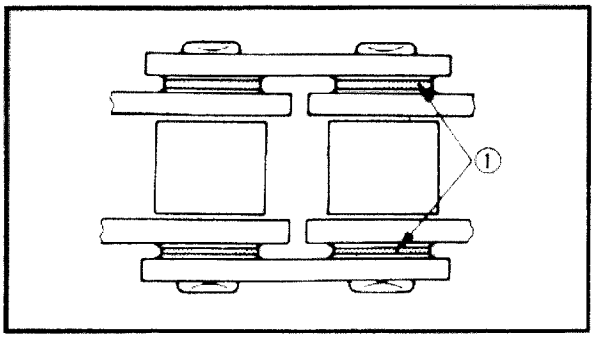


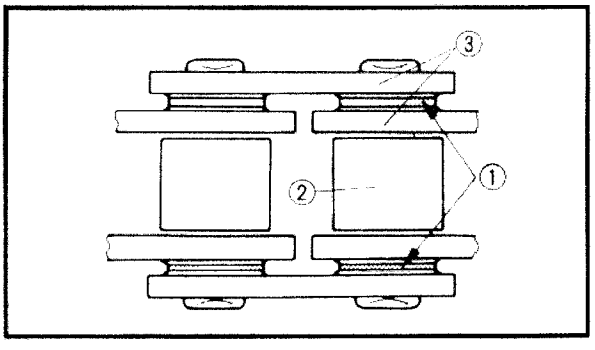
2.Clean:

- 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.



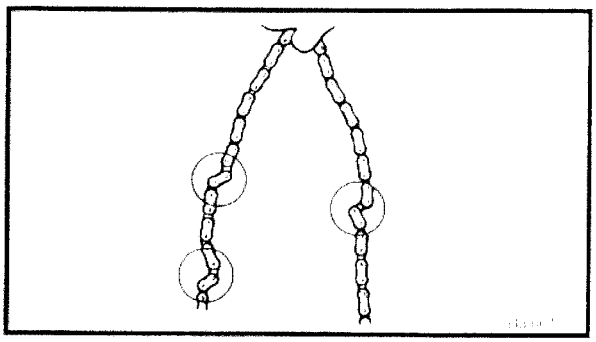


3.Inspect:

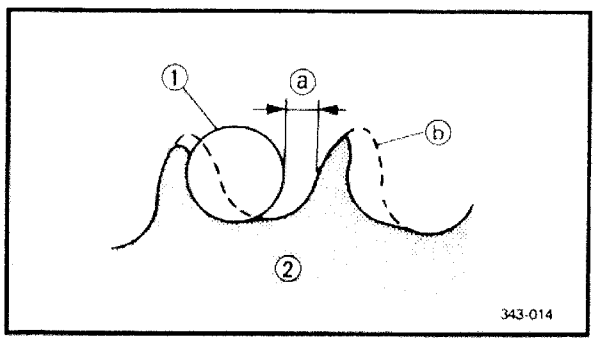
- O-rings ① (drive chain)
  Damage → Replace drive chain.
- Rollers ②
- Side plates ③
  Damage/Wear → Replace drive chain.

4.Lubricate:
- Drive chain

Drive chain lubricant:
SAE 30 ~ 50W motor oil or chain lubricants suitable for "O-ring" chains

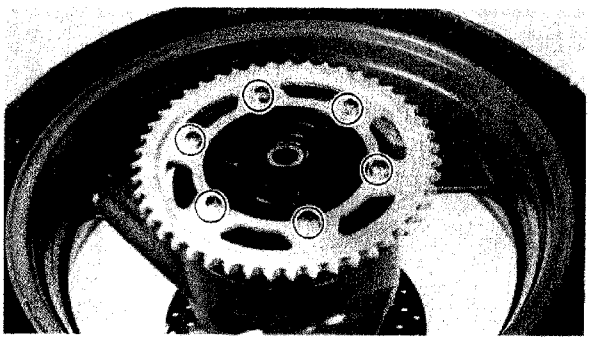


5.Inspect:
- Drive chain stiffness
  Stiff → Clean and lubricate or replace.



6.Inspect:
- Drive sprocket
- Rear sprocket wheel
  More than 1/4 teeth ⓐ wear → Replace sprocket.
  Bent teeth → Replace sprocket.

ⓑ Correct
① Roller
② Sprocket

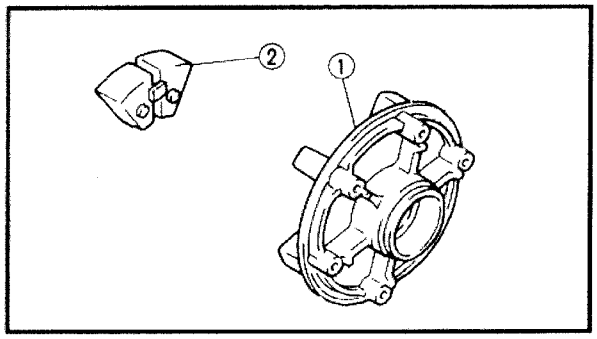


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Driven sprocket replacement steps:
- Remove the self locknut, and driven sprocket.
- Clean the hub, especially on the surfaces in contact with the sprocket, using a clean cloth.
- Install the new driven sprocket.

NOTE:
Tighten the self locknut in stage, using a crisscross pattern.

Self locknut (driven sprocket):
60 Nm (6.0 m • kg, 43 ft • lb)



7.Inspect:
- Sprocket hub ①
  Cracks/Damage → Replace.
- Dumper rubber ②
  Wear/Damage → Replace.

INSTALLATION

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

1.Install:
- Drive chain
- Swingarm
- Rear shock absorber
  Refer to the "REAR SHOCK ABSORBER AND SWINGARM" section.
- Rear wheel
  Refer to "REAR WHEEL" section.

2.Install:
- Drive sprocket
- Crankcase cover
- Shift pedal link
  Refer to the "ENGINE ASSEMBLY AND ADJUSTMENT" section in CHAPTER 4.

3.Adjust:
- Drive chain slack
  Refer to the DRIVE CHAIN SLACK ADJUSTMENT" section in CHAPTER 3.

Drive chain slack:
20 ~ 30 mm (0.8 ~ 1.2 in)

CAUTION:

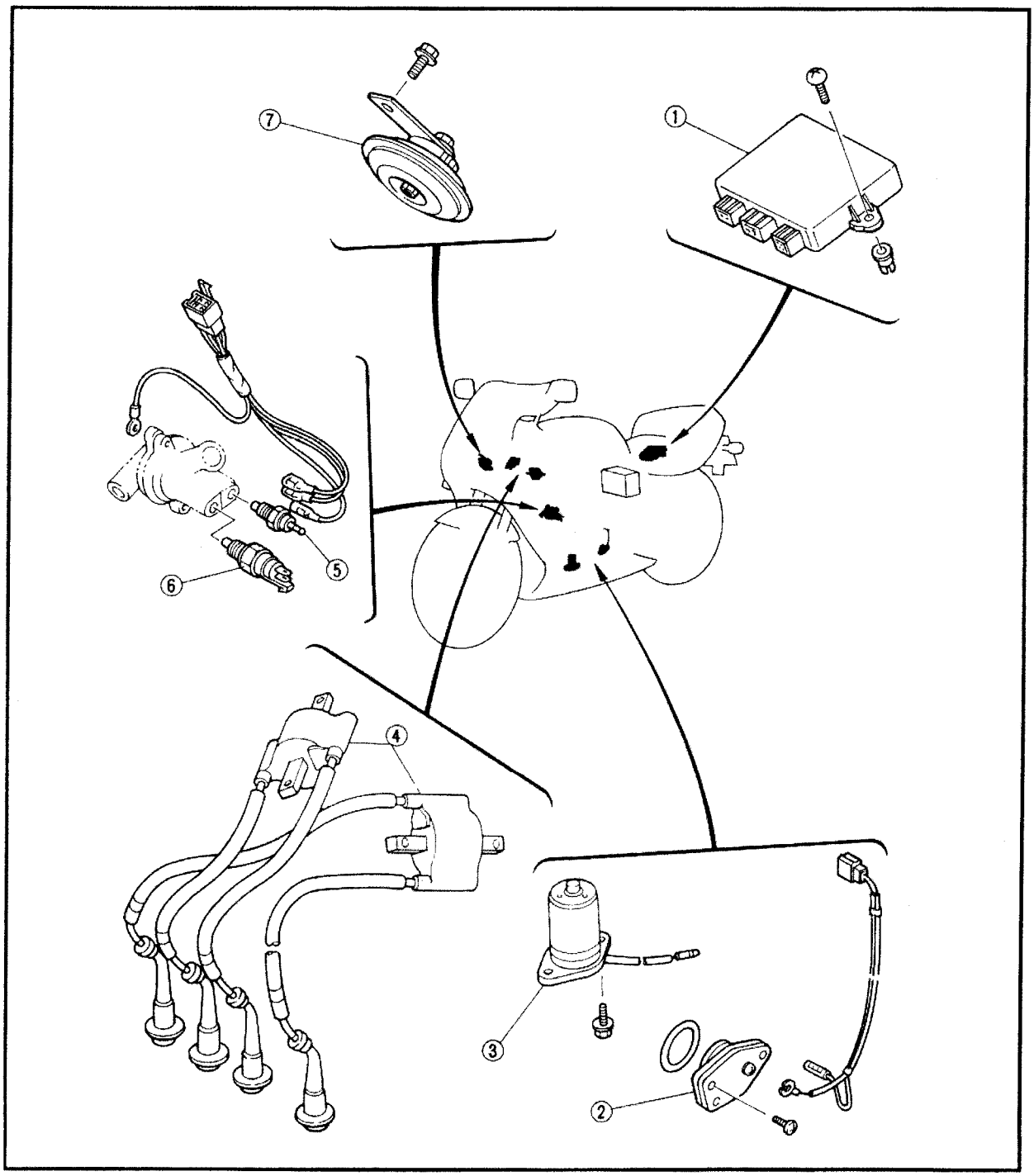
Too small chain slack will overload the engine and other vital parts; keep the slack within the specified limits.

ELECTRICAL

ELECTRICAL COMPONENTS

① Ignitor unit
② Neutral switch
③ Oil level switch
④ Ignition coil
⑤ Thermo unit
⑥ Thermo switch
⑦ Horn

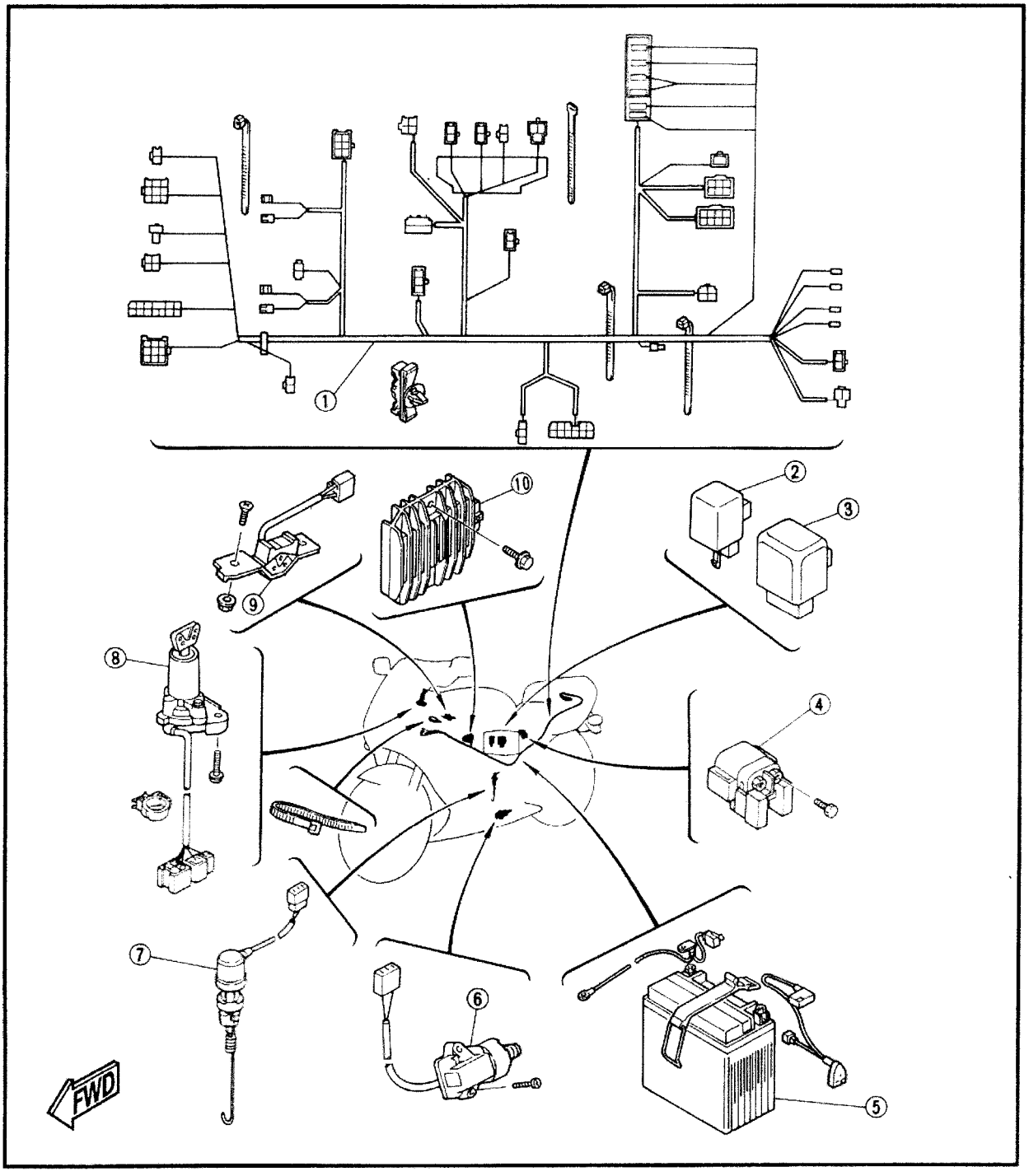
IGNITION COIL:
PRIMARY WINDING RESISTANCE:
2.2 ~ 2.6 Ω at 20°C (68° F)
SECONDARY WINDING RESISTANCE:
10.7 ~ 13.1 kΩ at 20° C (68° F)

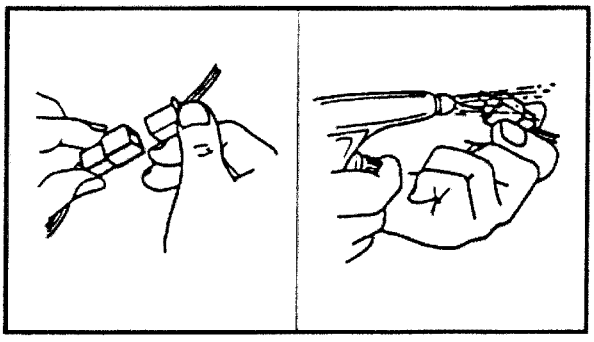


8

① Wireharness
② Flasher relay
③ Starting circuit cut-off relay
④ Starter relay
⑤ Battery
⑥ Sidestand switch
⑦ Brake switch
⑧ Main switch
⑨ Fuel reserve switch
⑩ Rectifier/regulator

BATTERY:
CAPACITY:
12V 10AH
SPECIFIC GRAVITY:
1.320

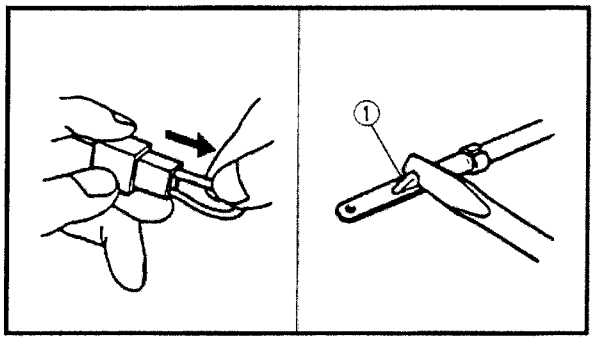




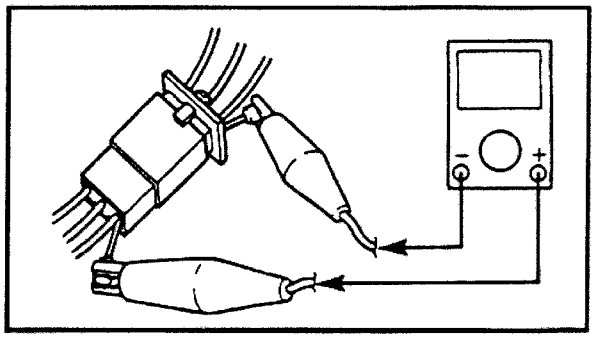
CHECKING OF CONNECTIONS

Dealing with stains, rust, moisture, etc. on the connector.

1. Disconnect:
   - Connector
2. Dry each terminal by an air blower.



3. Connect and disconnect the connector two or three times.
4. Pull the lead to check that it will not come off.
5. If the terminal comes off, bend up the pin ① and reinsert the terminal into connector.

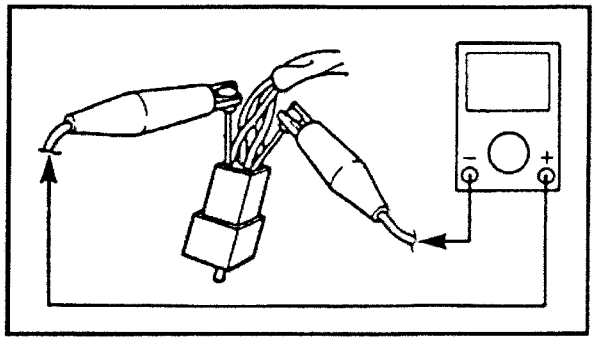


6. Connect:
   - Connector

NOTE:
The two connectors "click" together.

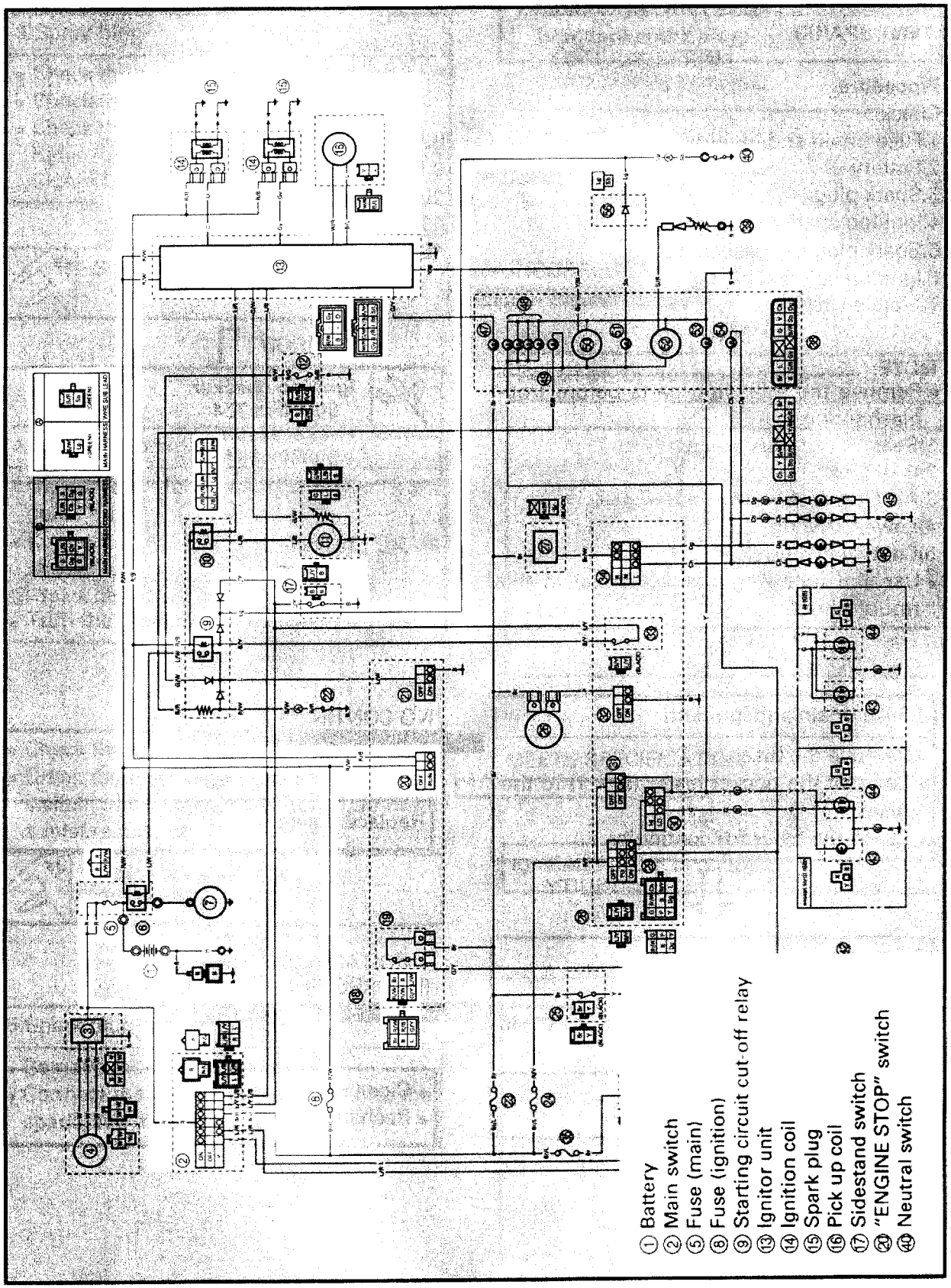
7. Check for continuity by a tester.

NOTE:
- If there is no continuity, clean the terminals.
- Be sure to perform the above steps 1 to 7 when checking the wireharness.
- For a field remedy, use a contact revitalizer available on the market.
- Use the tester on the connector as shown.



IGNITION SYSTEM

CIRCUIT DIAGRAM



TROUBLESHOOTING

IF IGNITION SYSTEM SHOULD BECOME INOPERATIVE (NO SPARK OR INTERMITTENT SPARK)

Procedure

Check;

1. Fuse (main and ignition)
2. Battery
3. Spark plug
4. Ignition spark gap
5. Spark plug cap resistance
6. Ignition coil resistance
7. Main switch
8. "ENGINE STOP" switch
9. Neutral switch
10. Sidestand switch
11. Pick up coil resistance
12. Wiring connection (entire ignition system)

NOTE:

- Remove the following parts before troubleshooting.

1) Seat
2) Fuel tank
3) Air filter case
4) Lower cowling
5) Center cowling (left)

- Use the following special tool(s) in this troubleshooting.



Ignition checker:
90890-06754
Pocket tester:
90890-03112

1. Fuse (main and ignition)
   - Remove the fuses.
   - Connect the pocket tester (Ω × 1) to the fuses.
   - Check the fuses for continuity.

NO CONTINUITY → Replace fuse(s).

CONTINUITY ↓

2. Battery
   - Check the battery condition. Refer to "BATTERY INSPECTION" in CHAPTER 3.

Open circuit voltage:
12.8V or more at 20° C(68° F)

INCORRECT →
- Clean battery terminals.
- Recharge or replace the battery.

CORRECT ↓

*

*

3.Spark plug

- Check the spark plug condition.
- Check the spark plug type.
- Check the spark plug gap.
  Refer to "SPARK PLUG INSPECTION" in CHAPTER 3.

Standard spark plug:
CR9E/U27ESR-N
NGK/NIPPONDENSO

Spark plug gap:
0.7 ~ 0.8 mm (0.028 ~ 0.031 in)

INCORRECT

Repair or replace spark plug.

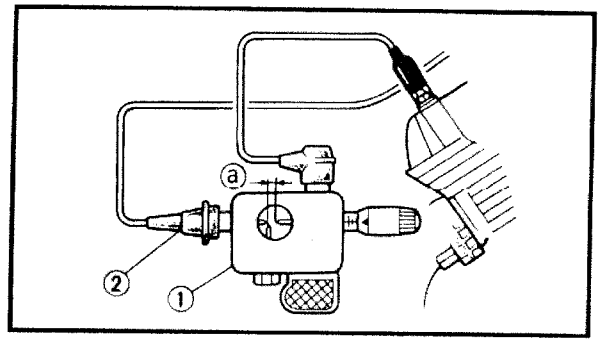
CORRECT

4.Ignition spark gap

- Disconnect the spark plug cap from spark plug.
- Connect the ignition checker ① as shown.

② Spark plug cap

- Turn the main switch to "ON".



- Check the ignition spark gap ⓐ.
- Crank the engine by pushing the starter switch, and increase the spark gap until a misfire occurs.

Minimum spark gap:
6.0 mm (0.24 in)

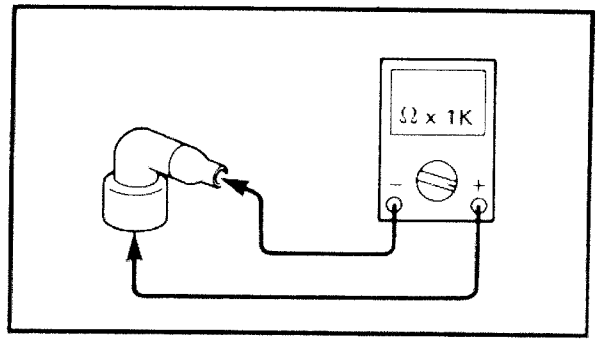
MEETS SPECIFICATION

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:
10 kΩ at 20° C (68° F)

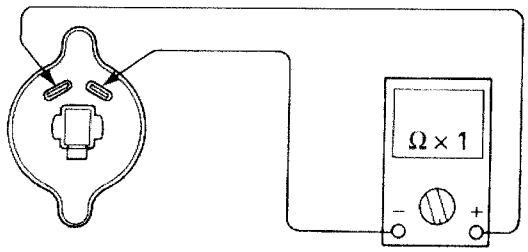
OUT OF SPECIFICATION → Replace spark plug cap.

MEETS SPECIFICATION

6.Ignition coil resistance

- Disconnect the ignition coil connector from the wireharness.
- Connect the pocket tester (Ω × 1) to the ignition coil.

Tester (+) lead → Red/Black terminal
Tester (–) lead → Orange (Gray) terminal

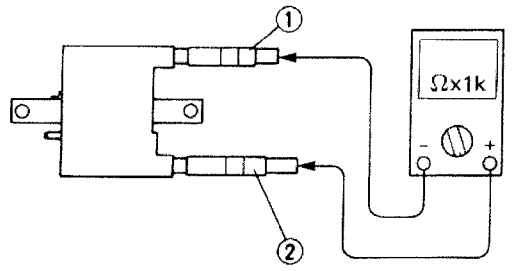


- Check the primary coil for specificated resistance.

Primary coil resistance:
2.2 ~ 2.6 Ω 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.

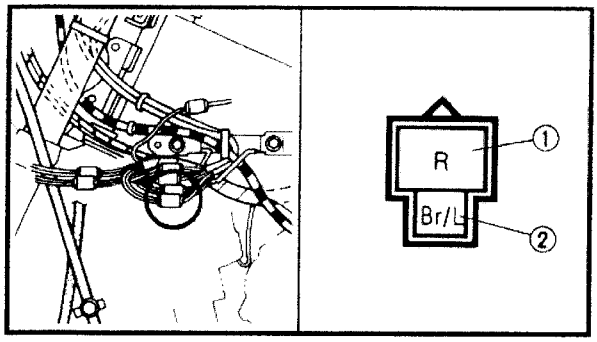
Secondary coil resistance:
10.7 ~ 13.1 kΩ at 20° C (68° F)

OUT OF SPECIFICATION → Replace ignition coil.

BOTH MEET SPECIFICATION

7.Main switch

- Disconnect the main switch coupler from the wireharness.
- Check the switch component for the continuity between "Red ① and Brown/Blue ②".



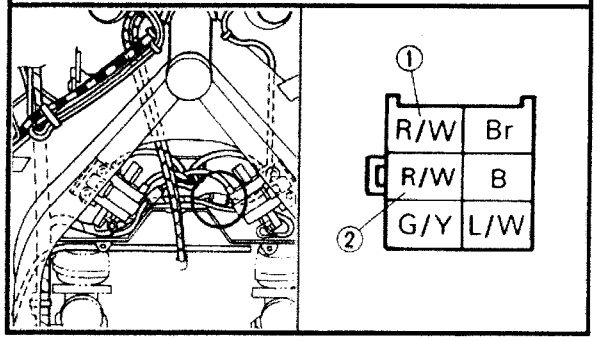
INCORRECT

Replace main switch.

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 ".



INCORRECT

Replace handlebar switch (right).

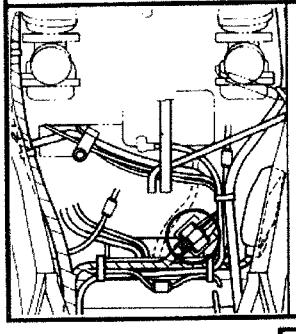
CORRECT

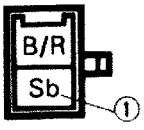
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9.Neutral switch

- Disconnect the neutral switch coupler from the wireharness.
- Check the switch component for the continuity between "Sky blue ①" and Ground.





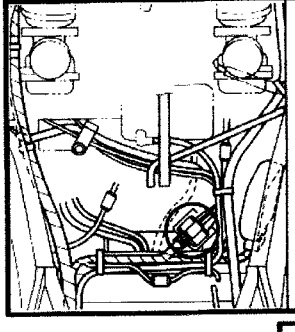
INCORRECT

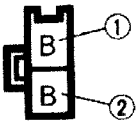
Replace neutral switch.

CORRECT

10.Sidestand switch

- Disconnect the sidestand switch coupler from the wireharness.
- Check the switch component for the continuity between "Black ① and Black ②".





INCORRECT

Replace sidestand switch.

CORRECT

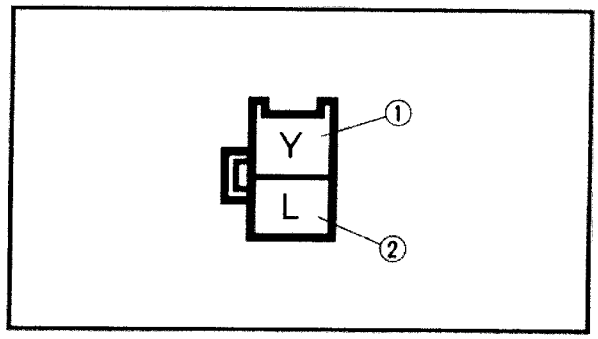
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11.Pickup coil resistance

- Disconnect the pickup coil coupler from the wireharness.
- Connect the pocket tester (Ω × 100) to the pickup coil terminal.

Tester (+) lead → Yellow terminal ①
Tester (–) lead → Blue terminal ②



- Check the pickup coil for specificated resistance.

Pickup coil resistance:
189 ~ 231 Ω at 20° C (68° F)
(Yellow - Blue)

OUT OF SPECIFICATION

Replace pickup coil.

MEETS SPECIFICATION

12.Wiring connection

- Check the entire ignition system for connections.
  Refer to "CIRCUIT DIAGRAM".

POOR CONNECTION

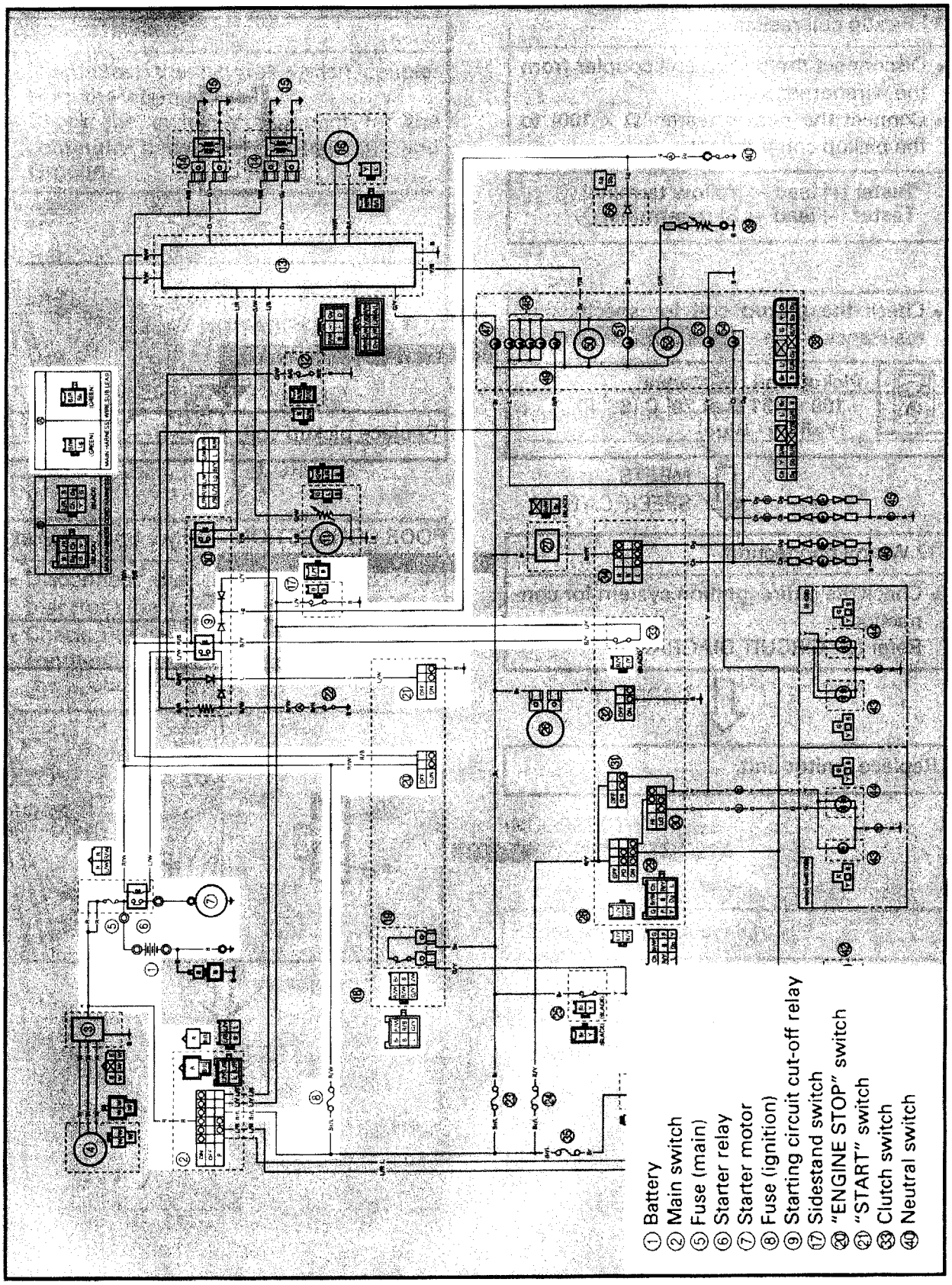
Correct.

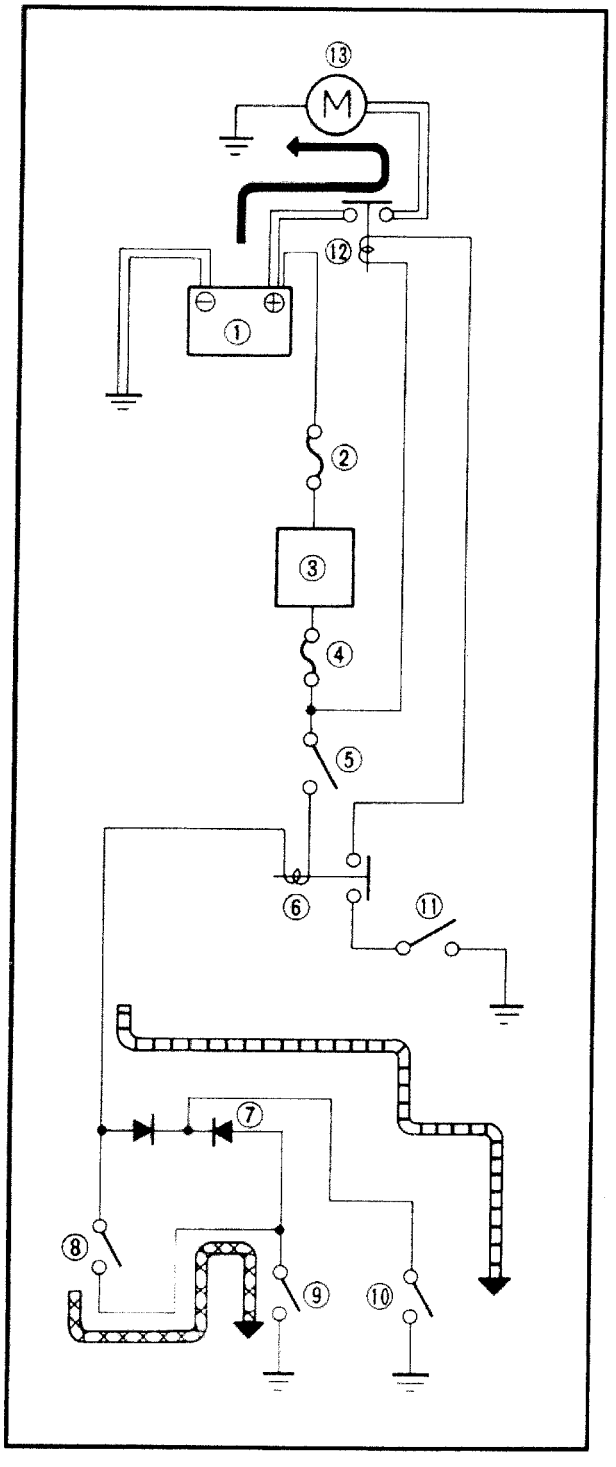
CORRECT

Replace ignitor unit.

ELECTRIC STARTING SYSTEM

CIRCUIT DIAGRAM





STARTING CIRCUIT OPERATION

The starting circuit on this model consist of the starter motor, starter relay, and the starting circuit cut-off relay. If the "ENGINE STOP" switch and the main switch are both closed, the starter motor can operate only if:

The transmission is in neutral (the neutral switch is closed).

or if

The clutch lever is pulled to the handlebar (the clutch switch is closed) and the sidestand is up (the sidestand switch is closed).

The starting circuit cut-off relay prevents the starter from operating when neither of these conditions has bees met. In this instance, the starting circuit cut-off relay is open so current cannot reach the starter motor.

When at least one of the above conditions have been met however, the starting circuit cut-off relay is closed, and the engine can be started by pressing the starter switch.

⟵ WHEN THE TRANSMISSION IS IN NEUTRAL

⟵ WHEN THE SIDESTAND IS UP AND THE CLUTCH LEVER IS PULLED IN

① Battery
② Fuse (main)
③ Main switch
④ Fuse (ignition)
⑤ "ENGINE STOP" switch
⑥ Starting circuit cut-off relay
⑦ Diode
⑧ Clutch switch
⑨ Sidestand switch
⑩ Neutral switch
⑪ "START" switch
⑫ Starter relay
⑬ Starter motor

TROUBLESHOOTING

STARTER MOTOR DOES NOT OPERATE.

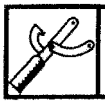
Procedure

Check;

1. Fuse (main and ignition)
2. Battery
3. Starter motor
4. Starting circuit cut off-relay
5. Starter relay
6. Main switch
7. "ENGINE STOP" switch
8. Neutral switch
9. Sidestand switch
10. Clutch switch
11. "START" switch
12. Wiring connection (entire starting system)

NOTE:

- Remove the following parts before troubleshooting.
  1) Seat
  2) Fuel tank
  3) Air filter case
  4) Lower cowling
  5) Center cowling (left)
- Use the following special tool(s) in this troubleshooting.



Pocket tester:
90890-03112

1. Fuse (main and ignition)
   - Remove the fuses.
   - Connect the pocket tester (Ω × 1) to the fuses.
   - Check the fuses for continuity.

NO CONTINUITY → Replace fuse(s).

CONTINUITY ↓

2. Battery
   - Check the battery condition. Refer to "BATTERY INSPECTION" in CHAPTER 3.

Open circuit voltage:
12.8V or more at 20° C (68° F)

INCORRECT →
- Clean battery terminals.
- Recharge or replace the battery.

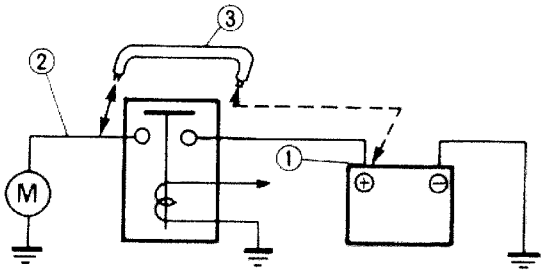
CORRECT ↓

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3.Starter motor

- Connect the battery positive terminal ① and starter motor cable ② using a jumper lead ③ *.
- Check the starter motor for operation.



*

⚠ WARNING

- **A wire for 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

Repair or replace starter motor.

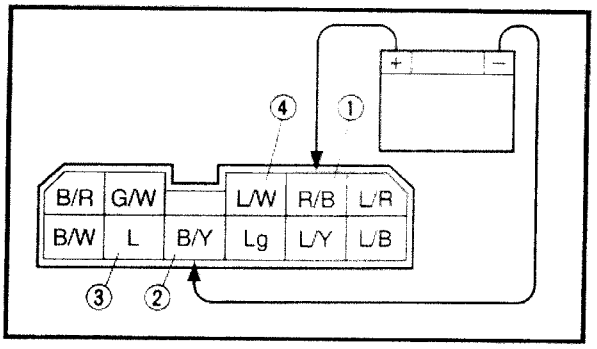
MOVES

4.Starting circuit cut-off relay

- Disconnect the starting circuit cut-off relay coupler from the wireharness.
- Connect the pocket tester (Ω × 1) and battery (12V) to the starting circuit cut-off relay coupler terminals.

Battery (+) terminal →
Red/Black terminal ①
Battery (–) terminal →
Black/Yellow terminal ②

Tester (+) terminal → Blue terminal ③
Tester (–) terminal → Blue/White ④



- Check the starting circuit cut-off relay for continuity.

NO CONTINUITY

Replace starting circuit cut-off relay.

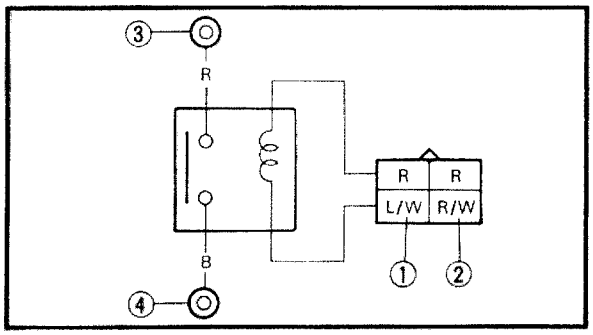
CONTINUITY

*

*

5.Starter relay

- Disconnect the relay unit coupler from the wireharness.
- Connect the pocket tester (Ω × 1) and battery (12V) to the relay unit coupler terminals.



Battery (+) terminal →
Blue/White terminal ①
Battery (–) terminal →
Red/White terminal ②

Tester (+) lead → Red terminal ③
Tester (–) lead → Black terminal ④

- Check the starter relay for continuity.

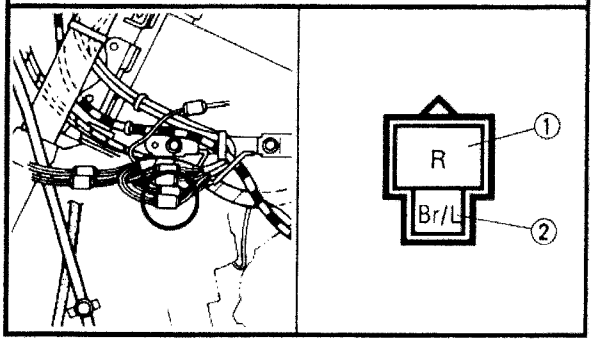
NO CONTINUITY

Replace starter relay.

CONTINUITY

6.Main switch

- Disconnect the main switch coupler from the wireharness.
- Check the switch component for the continuity between "Red ① and Brown/Blue ②".



INCORRECT

Replace main switch.

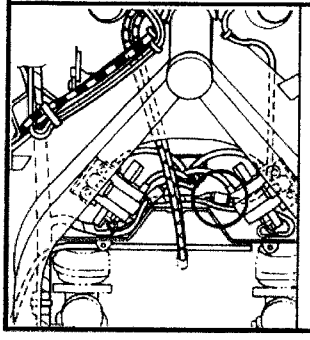
CORRECT

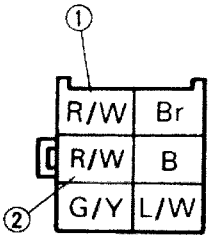
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7."ENGINE STOP" switch

- Disconnect the handlebar switch (right) coupler from the wireharness.
- Check the switch component for the continuity between "Red/White ① and Red/White ②".





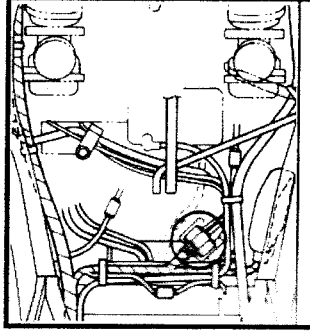
INCORRECT

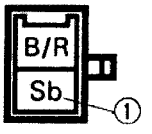
Replace handlebar switch (right).

CORRECT

8.Neutral switch

- Disconnect the neutral switch coupler from the wireharness.
- Check the switch component for the continuity between "Sky blue ①" and Ground.





INCORRECT

Replace neutral switch.

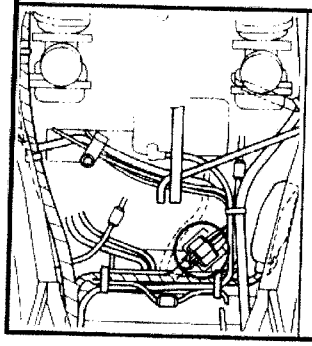
CORRECT

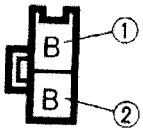
*



9.Sidestand switch

- Disconnect the sidestand switch coupler from the wireharness.
- Check the switch component for the continuity between "Black ① and Black ②".





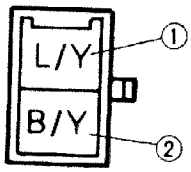
INCORRECT

Replace sidestand switch.

CORRECT

10.Clutch switch

- Disconnect the clutch switch coupler from wireharness.
- Check the clutch switch component for the continuity between "Blue/Yellow ① and Black/Yellow ②".



INCORRECT

Replace clutch switch.

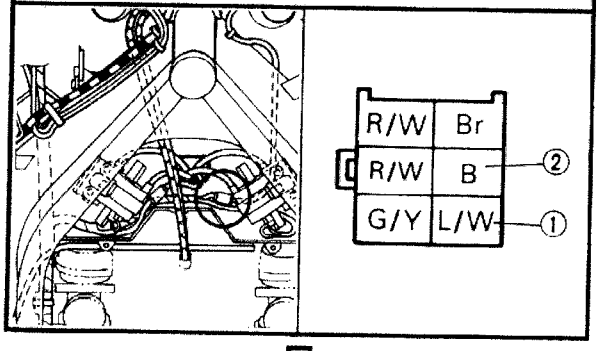
CORRECT



*

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 ".



INCORRECT

Replace handlebar switch (right).

CORRECT

12.Wiring connection

- Check the entire starting system for connections.
  Refer to "CIRCUIT DIAGRAM".

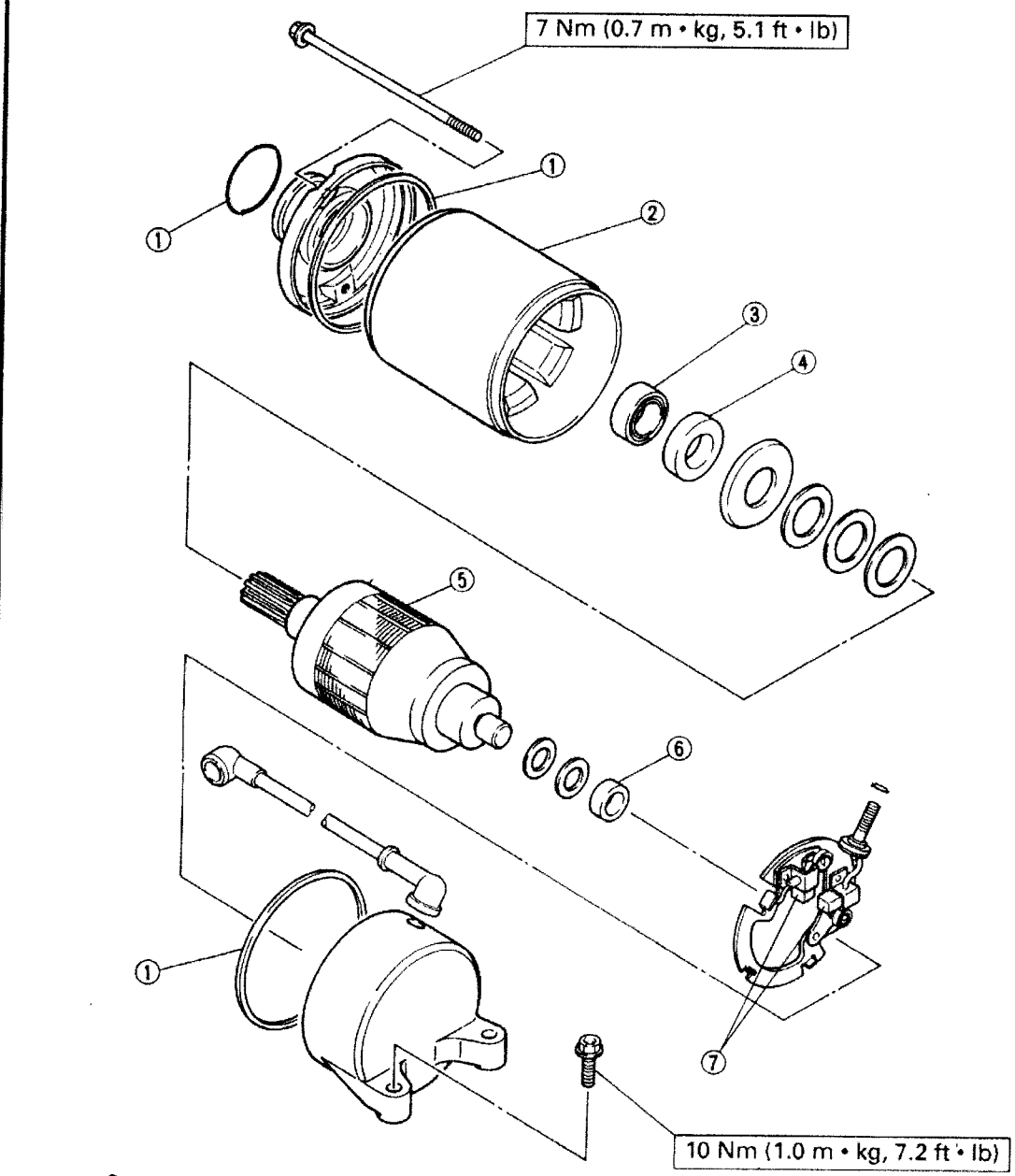
POOR CONNECTION

Correct.

STARTER MOTOR

① O-ring
② Yoke
③ Bearing
④ Oil seal
⑤ Armature
⑥ Bushing
⑦ Brush

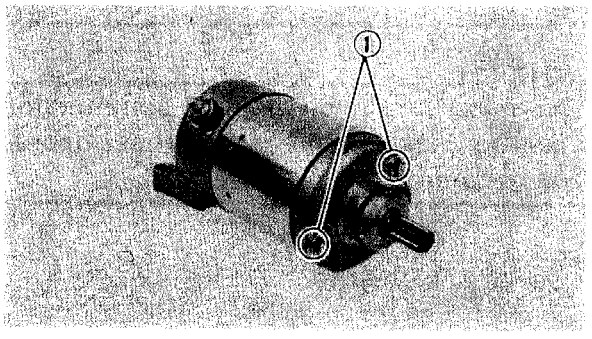
A	ARMATURE COIL RESISTANCE: 0.015 ~ 0.025 Ω at 20° C (68° F)
B	BRUSH WEAR LIMIT: 4 mm (0.16 in)
C	COMMUTATOR WEAR LIMIT: 27 mm (1.06 in)
D	MICA UNDERCUT: 0.7 mm (0.03 in)



Removal

1.Remove:

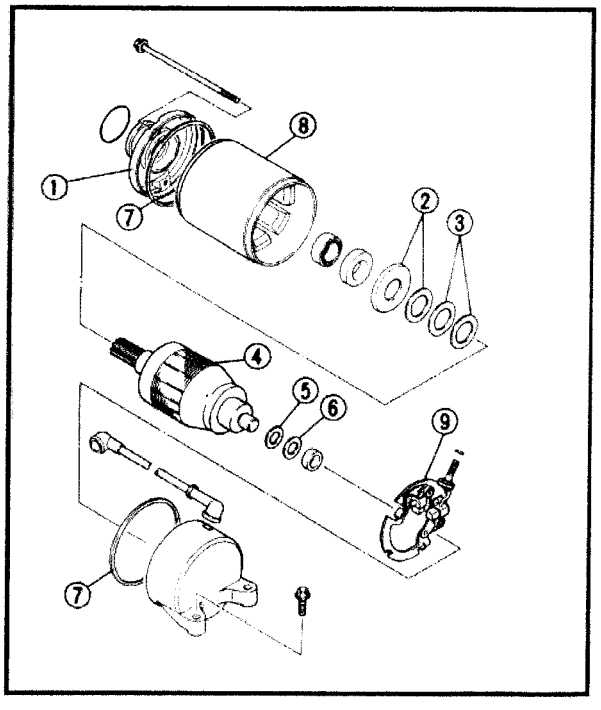
- Starter motor
  Refer to "ENGINE OVERHAUL-ENGINE REMOVAL" section in CHAPTER 4.



Disassembly

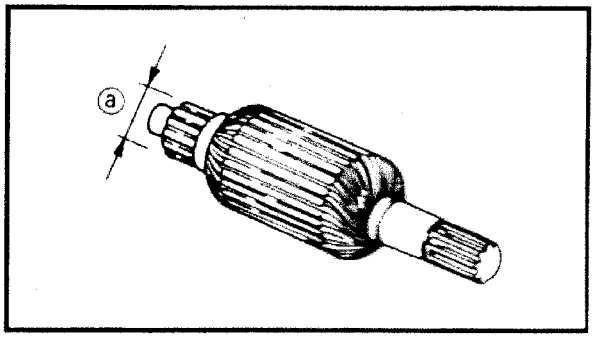
1.Remove:

- Bolts ①
  (with washer and O-ring)



2.Remove:

- Bracket ①
- Washers ②
- Shims ③
- Armature ④
- Washer ⑤
- Shims ⑥
- O-rings ⑦
- Yoke ⑧
- Brushes ⑨



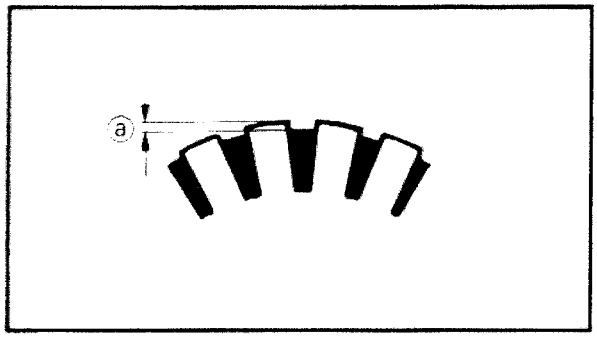
Inspection and repair

1.Inspect:

- Commutator
  Dirty → Clean it with #600 grit sandpaper.

2.Measure:

- Commutator diameter ⓐ
  Out of specification → Replace starter motor.

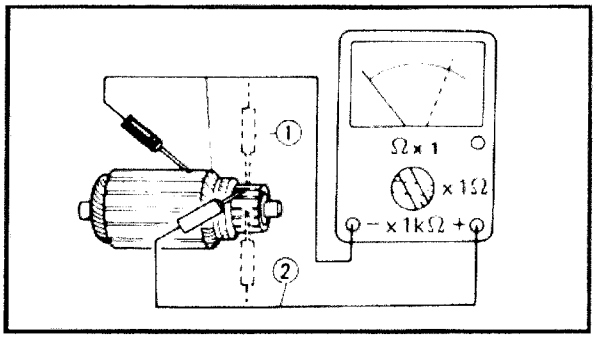


Commutator wear limit:
27 mm (1.06 in)

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 (0.03 in)

NOTE:
The mica insulation of the commutator must be undercut to ensure proper operation of commutator.



4.Inspect:
- Armature coil (insulation/continuity)
  Defects → Replace starter motor.

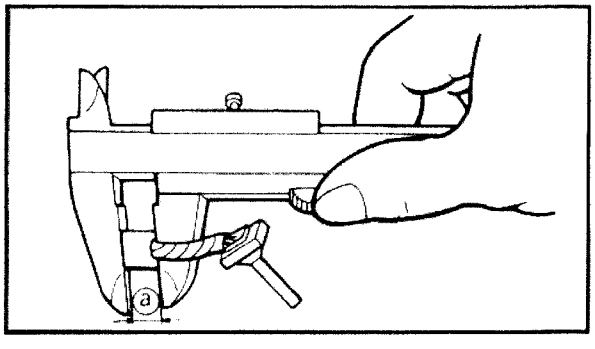
****

Inspecting steps:
- Connect the pocket tester for continuity check ① and insulation check ②.
- Measure the armature resistances.

Armature coil resistance:
Continuity check ①:
0.015 ~ 0.025 Ω at 20° C (68° F)
Insulation check ②:
More than 1 MΩ at 20° C (68° F)

- If the resistance is incorrect, replace the starter motor.

****

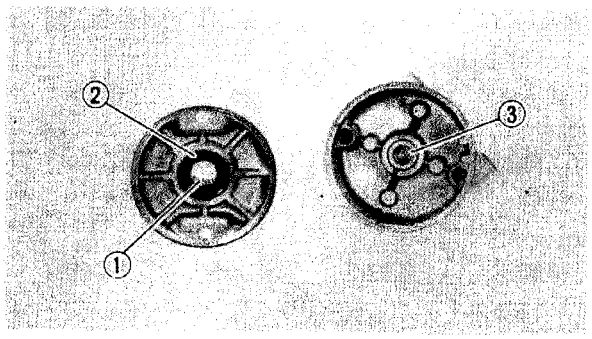


5.Measure:
- Brush length ⓐ
  Out of specification → Replace.

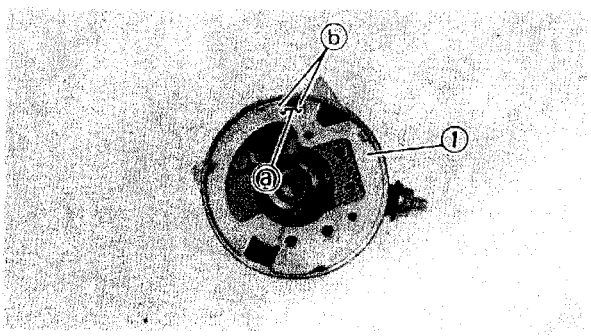
Brush length limit:
4 mm (0.16 in)

6.Measure:
- Brush spring force
  Fatigue/Out of specification → Replace as a set.

	Brush spring force: **570 ~ 920 g (20.1 ~ 32.5 oz)**

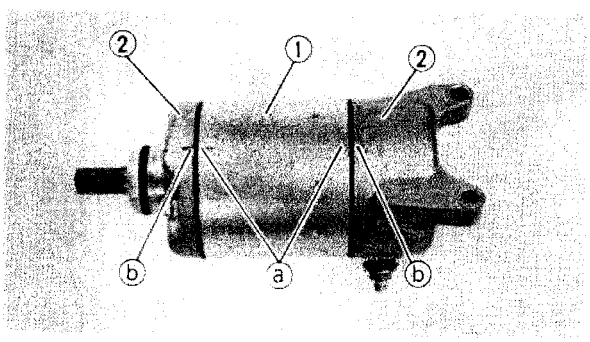


7.Inspect:
- Bearing ①
  Roughness → Replace.
- Oil seal ②
- O-rings
- Bushing ③
  Wear/Damage → Replace.



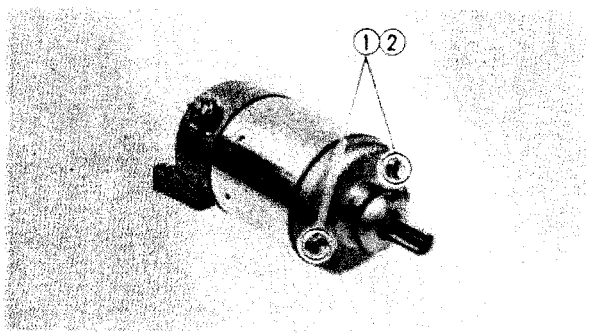
Assembly
Reserve the "Removal" procedure.
Note the following points.
1.Install:
- Brush seat ①

NOTE:
Align the projection ⓐ on the brush seat with the slot ⓑ on the housing.



2.Install:
- Yoke ①
- Brackets ②

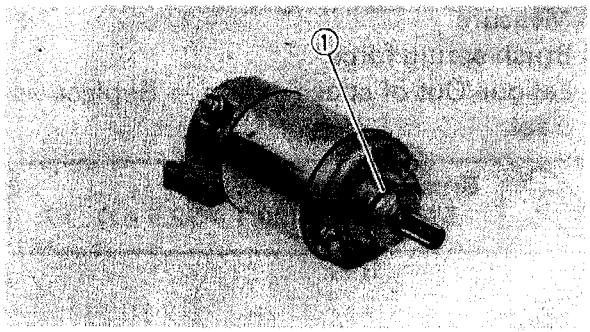
NOTE:
Align the match marks ⓐ on the yoke with the match marks ⓑ on the brackets.



3.Install:
- O-rings ①
- Washer
- Bolts ②

⚠ WARNING
Always use new O-rings.

	Bolt (yoke assembly): **7 Nm (0.7 m • kg, 5.1 ft • lb)**



Installation

1.Install:

- Starter motor

NOTE:

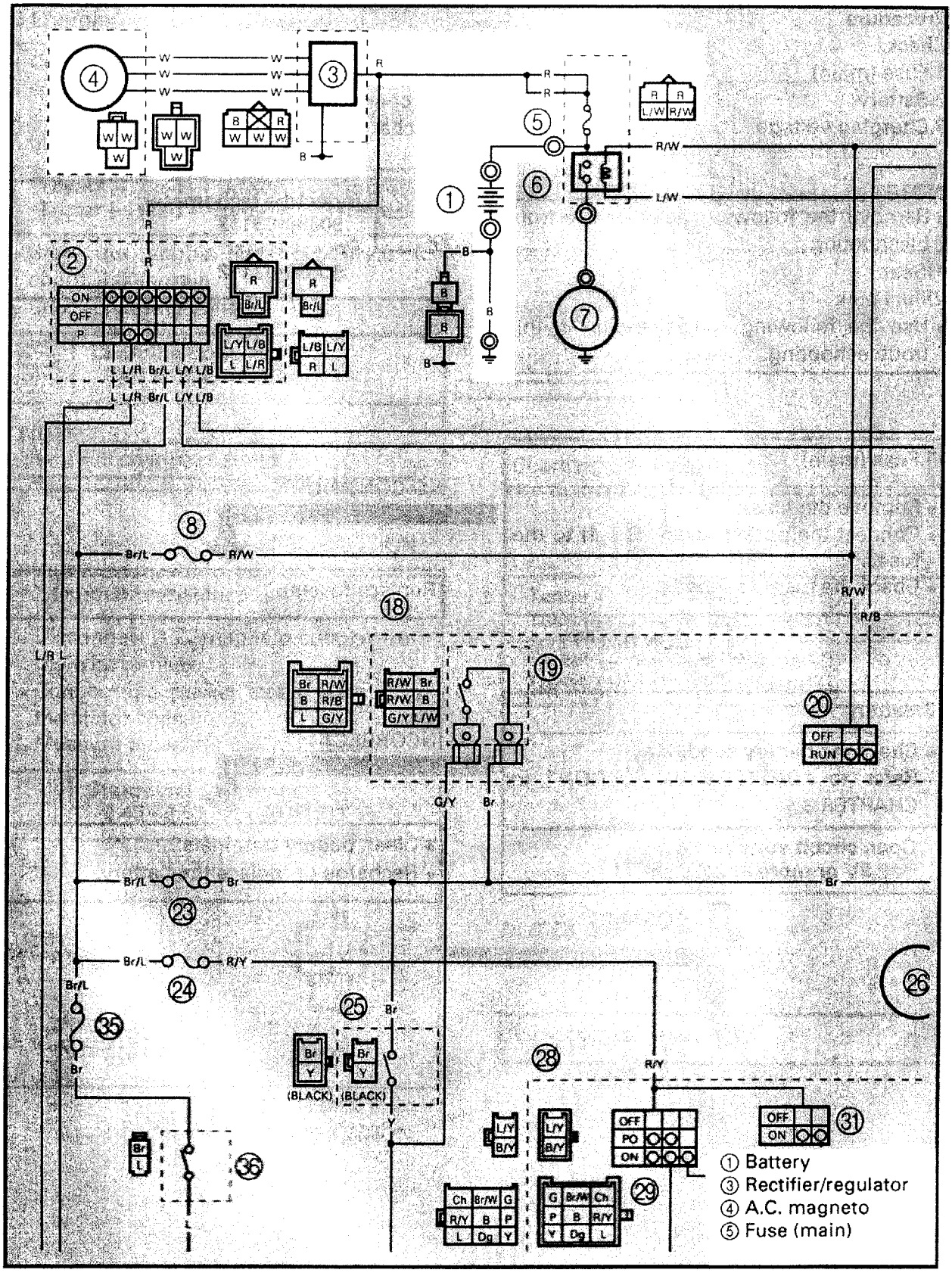
Apply a grease lightly to the O-ring ①.

	Bolt (starter motor): **10 Nm (1.0 m • kg, 7.2 ft • lb)**

Refer to "ENGINE OVERHAUL-ENGINE REMOUNTING" section in CHAPTER 4.

CHARGING SYSTEM

CIRCUIT DIAGRAM



TROUBLESHOOTING

THE BATTERY IS NOT CHARGED.

Procedure

Check;

1. Fuse (main)
2. Battery
3. Charging voltage
4. Stator coil resistance
5. Wiring connection (entire charging system)

NOTE:

- Remove the following parts before troubleshooting.
  1) Seat
  2) Fuel tank
- Use the following special tool(s) in this troubleshooting.



Inductive tachometer:
90890-03113
Pocket tester:
90890-03112

1. Fuse (main)

- Remove the fuses.
- Connect the pocket tester (Ω × 1) to the fuses.
- Check the fuses for continuity.

NO CONTINUITY → Replace fuse(s).

CONTINUITY ↓

2. Battery

- Check the battery condition. Refer to "BATTERY INSPECTION" in CHAPTER 3.

Open circuit voltage:
12.8V or more at 20° C(68° F)

INCORRECT →

- Clean battery terminals.
- Recharge or replace the battery.

CORRECT ↓

*

*

3.Charging voltage

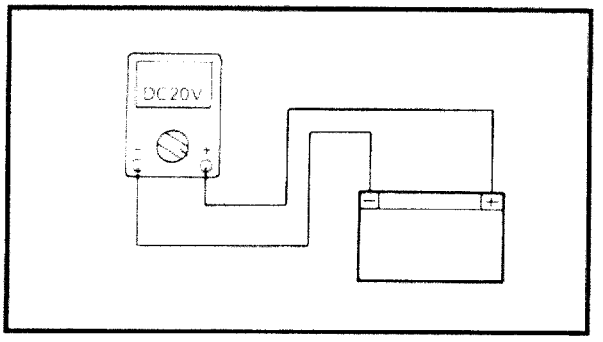
- Connect the inductive tachometer to spark plug lead.
- Connect the pocket tester (DC 20V) to the battery.

Tester (+) lead → Battery (+) terminal
Tester (–) lead → Battery (–) terminal

- Start the engine and accelerate to about, 3,000 r/min.
- Check charging voltage.

Charging voltage:
14V at 3,000 r/min

NOTE:
Use a full charged battery.



MEETS SPECIFICATION

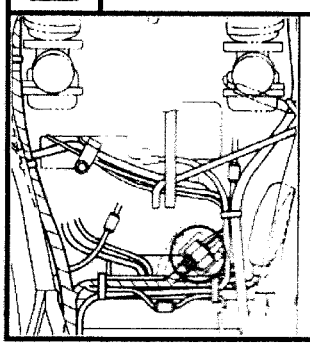
Charging circuit is good.

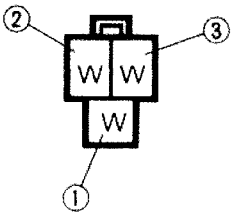
OUT OF SPECIFICATION

4.Stator coil resistance

- Disconnect A.C. magneto coupler from the wireharness.
- Connect the pocket tester "Ω × 1" to the stator coils.
- Measure the stator coil resistance.

Stator coil resistance:
0.45 ~0.55 Ω at 20° C (68° F)





Tester (+) lead → White lead ①
Tester (–) lead → White lead ②

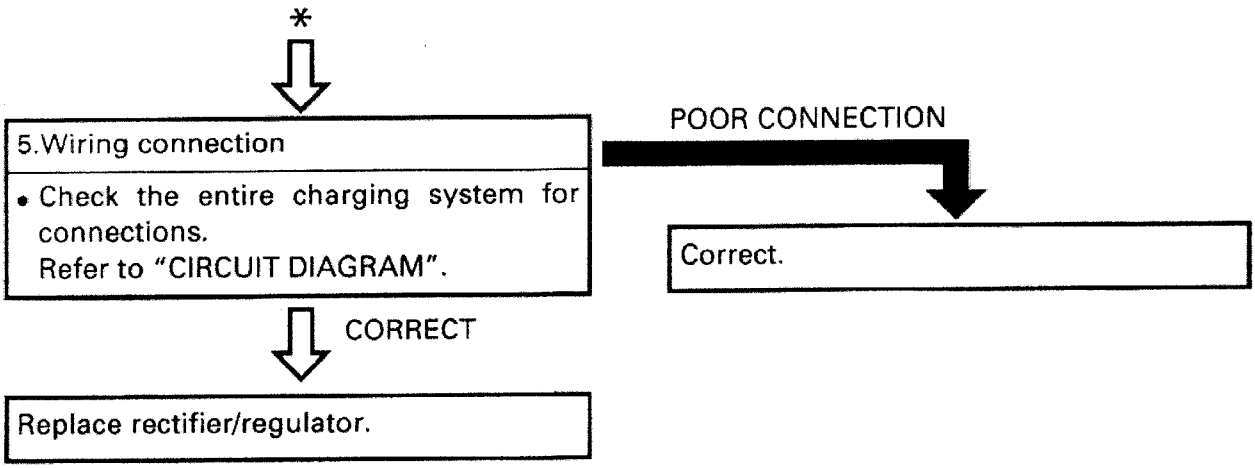
Tester (+) lead → White lead ①
Tester (–) lead → White lead ③

OUT OF SPECIFICATION

Replace stator assembly.

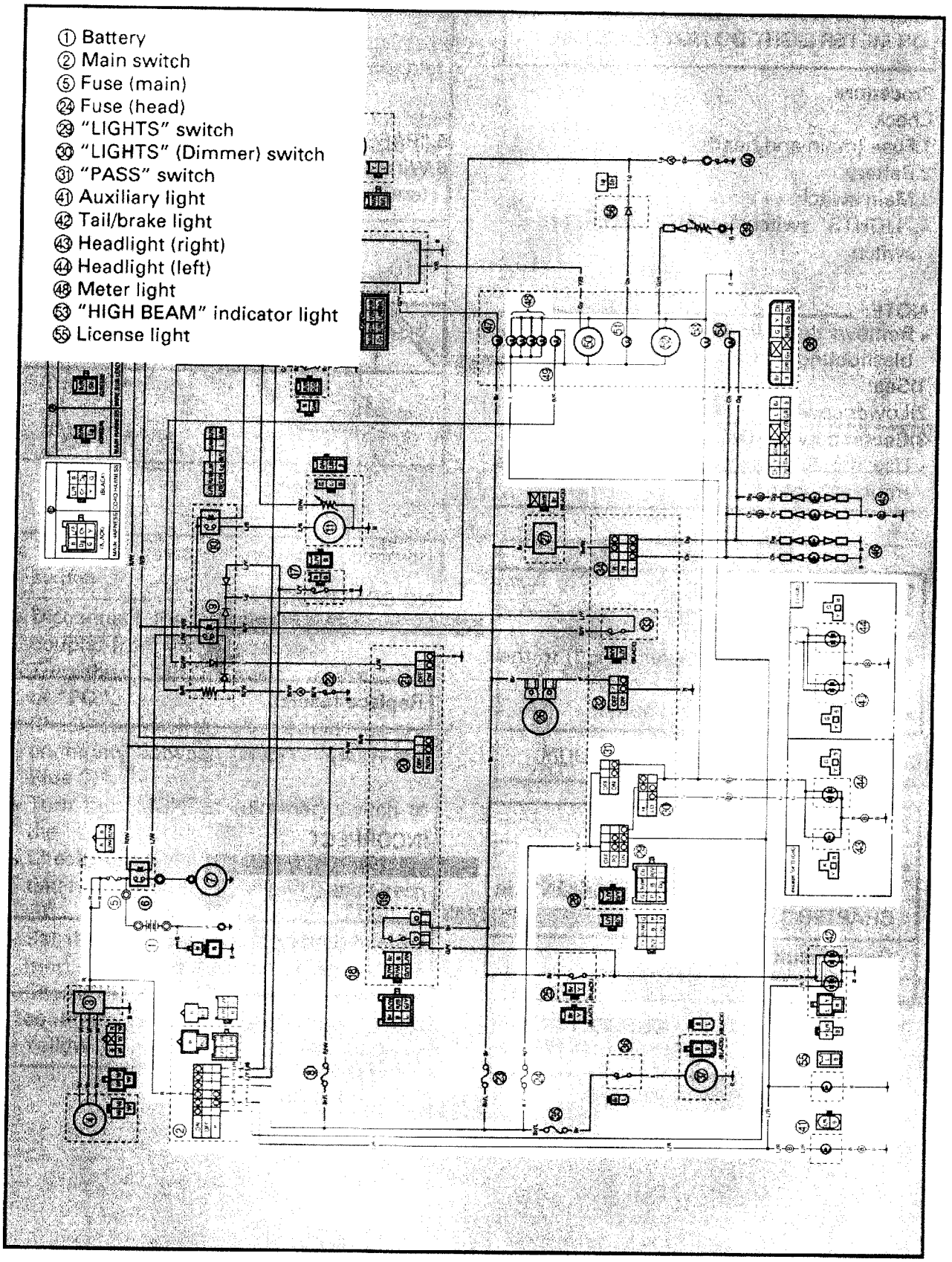
BOTH MEET SPECIFICATION

*


*
5.Wiring connection
• Check the entire charging system for connections.
Refer to "CIRCUIT DIAGRAM".
POOR CONNECTION
Correct.
CORRECT
Replace rectifier/regulator.

LIGHTING SYSTEM

CIRCUIT DIAGRAM



TROUBLESHOOTING

HEADLIGHT "HIGH BEAM" INDICATOR LIGHT, TAILLIGHT, LICENSE LIGHT AND/ OR METER LIGHT DO NOT COME ON.

Procedure

Check;

1. Fuse (main and head)
2. Battery
3. Main switch
4. "LIGHTS" switch/"LIGHTS" (dimmer) switch
5. "PASS" switch
6. Wiring connection (entire lighting system)

NOTE:

- Remove the following parts before troubleshooting.

1) Seat
2) Lower cowling
3) Center cowling (left)

- Use the following special tool(s) in this troubleshooting.



Pocket tester:
90890-03112

1. Fuse (main and head)

- Remove the fuses.
- Connect the pocket tester (Ω × 1) to the fuses.
- Check the fuses for continuity.

NO CONTINUITY → Replace fuse(s).

CONTINUITY ↓

2. Battery

- Check the battery condition. Refer to "BATTERY INSPECTION" in CHAPTER 3.

Open circuit voltage:
12.8V or more at 20° C(68° F)

INCORRECT →

- Clean battery terminals.
- Recharge or replace the battery.

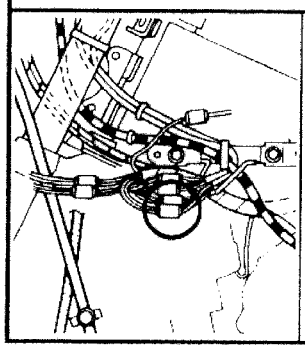
CORRECT ↓

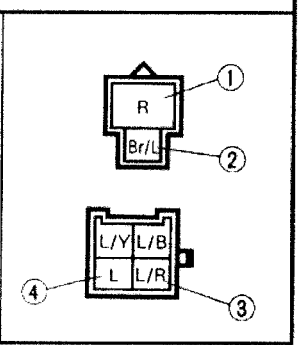
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3.Main switch

- Disconnect the main switch coupler from the wireharness.
- Check the switch component for the continuity between "Red ① and Brown/Blue ②", "Blue/Red ③ and Blue ④", "Red ① and Blue/Red ③".





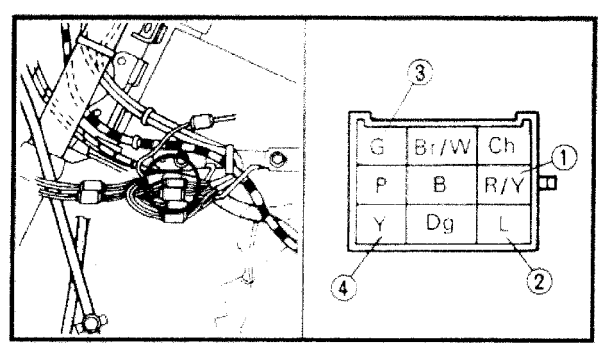
INCORRECT

Replace main switch.

CORRECT

4."LIGHTS" switch/"LIGHTS" (dimmer) switch

- Disconnect the handlebar switch (left) coupler from the wireharness.
- Turn the "LIGHTS" switch to the "ON" or "PO".
- Check the switch component for the continuity between "Red/Yellow ① and Blue ②".
- Turn the "LIGHTS" (dimmer) switch to the "LO".
- Check the switch component for the continuity between "Red/Yellow ① and Green ③".
- Set the position of the "LIGHTS" (dimmer) switch to the "HI".
- Check the switch component for the continuity between "Red/Yellow ① and Yellow ④".



INCORRECT

"LIGHTS" switch/"LIGHTS" (dimmer) switch are faulty, replace handlebar switch (left).

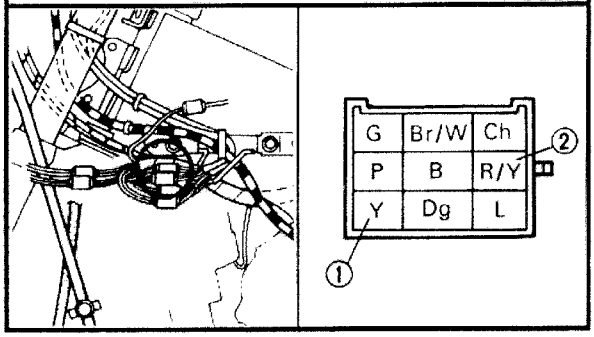
CORRECT

*

*

5."PASS" switch

- Disconnect the handlebar switch (left) coupler from the wireharness.
- Check the switch component for the continuity between "Yellow ① and Red/Yellow ②".



INCORRECT

"PASS" switch is faulty, replace handlebar switch (left).

CORRECT

6.Wiring connection

- Check the entire lighting system for connections.
  Refer to "WIRING DIAGRAM".

POOR CONNECTION

Correct.

CORRECT

Check condition of each circuit for lighting system.
Refer to "LIGHTING SYSTEM CHECK" section.

LIGHTING SYSTEM CHECK

1.Headlight and "HIGH BEAM" indicator light does not come on.

1.Bulb and bulb socket

- Check the bulb and bulb socket for continuity.

NO CONTINUITY → Replace bulb and/or bulb socket.

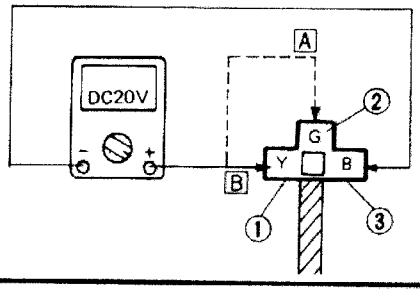
CONTINUITY ↓

2.Voltage

- Connect the pocket tester (DC 20V) to the headlight and "HIGH BEAM" indicator light couplers.

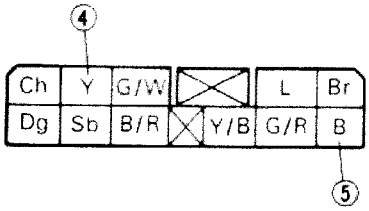
Ⓐ When "LIGHTS" (dimmer) switch is "LO" position.
Ⓑ When "LIGHTS" (dimmer) switch is "HI" position.

Headlight connector



Head light:
Tester (+) lead → Yellow ① or Green ② lead.
Tester (–) lead → Black ③ lead.
"HIGH BEAM" indicator light:
Tester (+) lead → Yellow ④ lead.
Tester (–) lead → Black ⑤ lead.

Ⓑ Meter connector



- Turn the main switch to "ON".
- Turn the "LIGHTS" switch to "ON" position.
- Turn the "LIGHTS" (dimmer) switch to "LO" or "HI" position.
- Check for voltage (12V) on the "Green" and "Yellow" lead at bulb socket connectors.

OUT OF SPECIFICATION → Wiring circuit from main switch to bulb socket connector is faulty, repair.

MEETS SPECIFICATION ↓

This circuit is good.

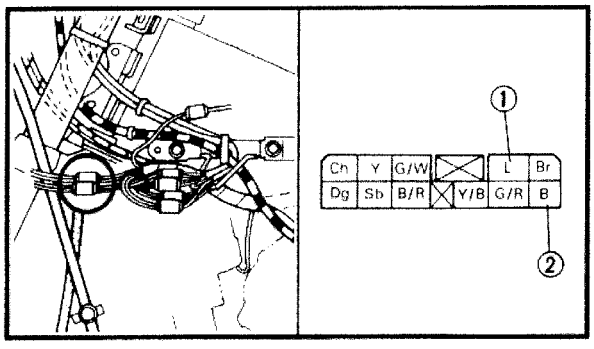
2.Meter light does not come on.

1.Bulb and bulb socket
• Check the bulb and bulb socket for continuity.

NO CONTINUITY → Replace bulb and/or bulb socket.

CONTINUITY ↓

2.Voltage
• Connect the pocket tester (20V) to the bulb socket coupler.
Tester (+) lead → Blue terminal ① **Tester (–) lead → Black terminal ②**



- Turn the main switch to "ON".
- Turn the "LIGHTS" switch to "ON" or "PO" position.
- Check for voltage (12V) on the "Blue" lead at the bulb socket connector.

OUT OF SPECIFICATION → Wiring circuit from main switch to bulb socket connector is faulty, repair.

MEETS SPECIFICATION ↓

This circuit is good.

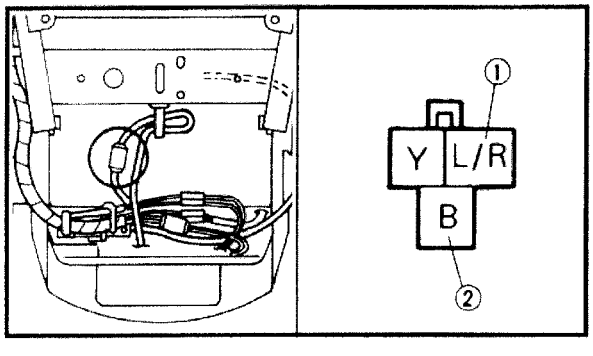
3.Taillight does not come on.

1.Bulb and bulb socket
• Check the bulb and bulb socket for continuity.

NO CONTINUITY → Replace bulb and/or bulb socket.

CONTINUITY ↓

2.Voltage
• Connect the pocket tester (DC 20V) to the bulb socket connector.
Tester (+) lead → Blue/Red terminal ① **Tester (–) lead → Black terminal ②**



- Turn the main switch to "ON".
- Turn the "LIGHTS" switch to "ON" or "PO" position.
- Check for voltage (12V) on the "Blue/Red" lead at the bulb socket connector.

OUT OF SPECIFICATION

Wiring circuit from main switch to bulb socket connector is faulty, repair.

MEETS SPECIFICATION

This circuit is good.

4.Auxiliary light does not come on.

1.Bulb and bulb socket

- Check the bulb and bulb socket for continuity.

NO CONTINUITY

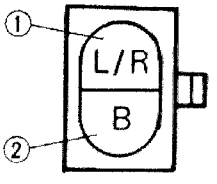
Bulb and/or socket are faulty, replace.

CONTINUITY

2.Voltage

- Connect the pocket tester (DC 20V) to the bulb socket connector.

Tester (+) lead → Blue/Red terminal ①
Tester (–) lead → Black terminal ②



- Turn the main switch to "ON".
- Turn the "LIGHTS" switch to "ON" or "PO" position.
- Check for voltage (12V) on the "Blue/Red" lead at the bulb socket connector.

OUT OF SPECIFICATION

Wiring circuit from main switch to bulb socket connector is faulty, repair.

MEETS SPECIFICATION

This circuit is good.

5.License light does not come on.

1.Bulb and bulb socket

- Check the bulb and bulb socket for continuity.

NO CONTINUITY

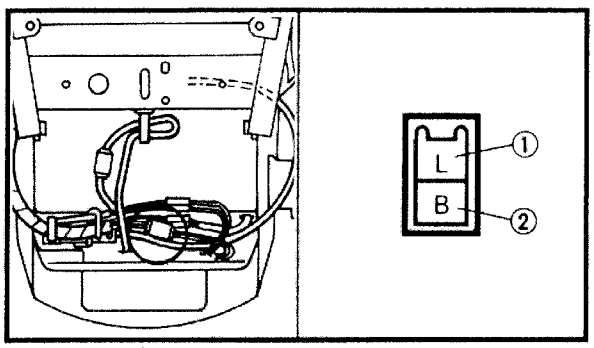
Replace bulb and/or bulb socket.

CONTINUITY

2.Voltage

- Connect the pocket tester (DC 20V) to the bulb socket connector.

Tester (+) lead → Blue terminal ①
Tester (–) lead → Black terminal ②



- Turn the main switch to "ON".
- Turn the "LIGHTS" switch to "ON" or "PO" position.
- Check for voltage (12V) on the "Blue" lead at the bulb socket connector.

OUT OF SPECIFICATION

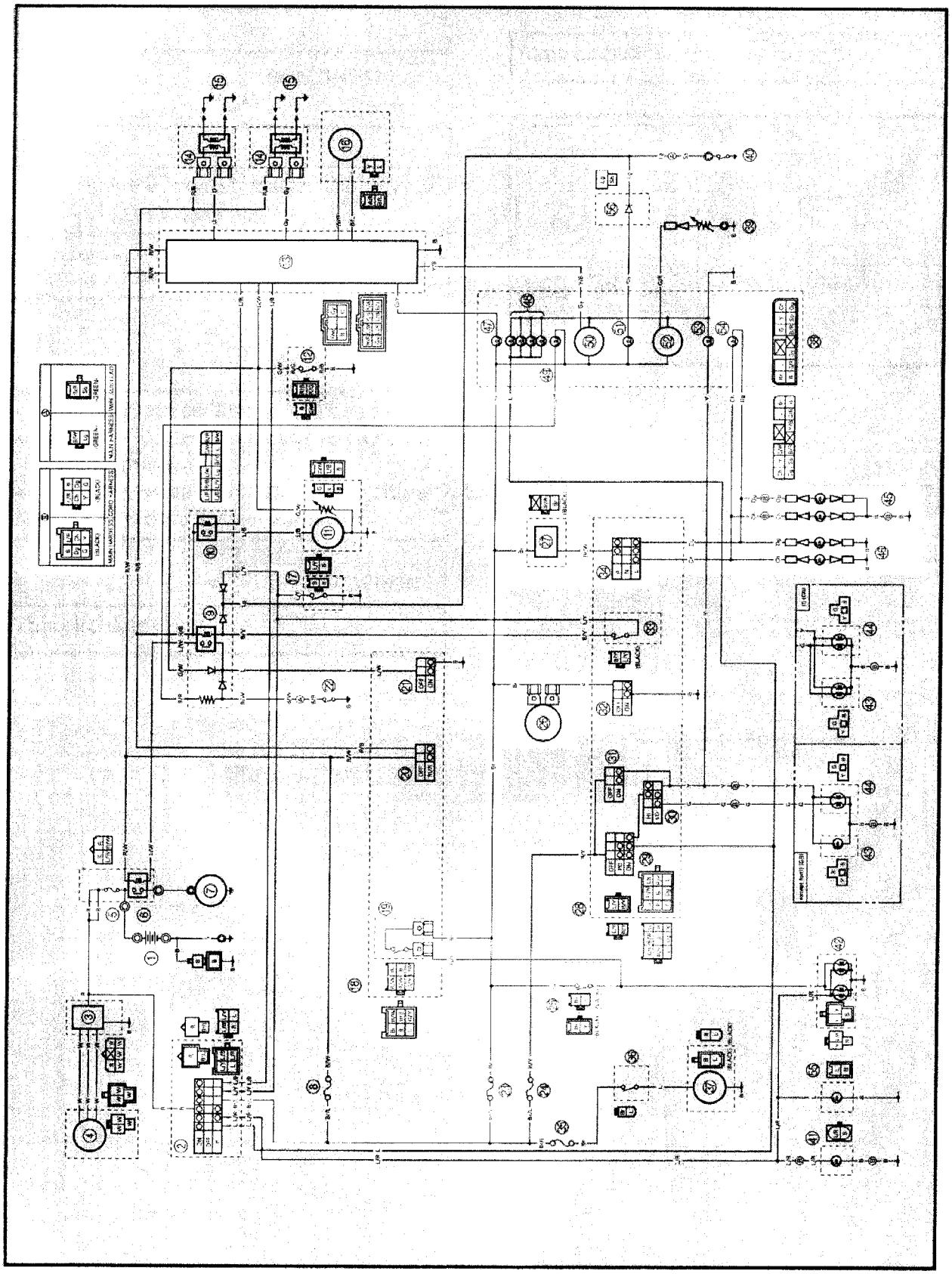
Wiring circuit from main switch to bulb socket connector is faulty, repair.

MEETS SPECIFICATION

This circuit is good.

SIGNAL SYSTEM

CIRCUIT DIAGRAM



① Battery
② Main switch
⑤ Fuse (main)
⑪ Fuel pump
⑬ Ignitor unit
⑲ Front brake switch
㉒ Oil level switch
㉓ Fuse (signal)
㉕ Rear brake switch
㉖ Horn
㉗ Flasher relay
㉜ "HORN" switch
㉞ "TURN" switch
㊵ Neutral switch
㊷ Tail/brake light
㊺ Front flasher light
㊻ Rear flasher light
㊼ "FUEL LEVEL" indicator light
㊾ "OIL LEVEL" indicator light
㊿ "NEUTRAL" indicator light
(54) "TURN" indicator light
(56) Diode

TROUBLESHOOTING

• FLASHER LIGHT, BRAKE LIGHT AND/OR INDICATOR LIGHT DO NOT COME ON.
• HORN DOES NOT SOUND.

Procedure
Check;
1.Fuse (main and signal)
2.Battery
3.Main switch
4.Wiring connection
(entire signal system)

NOTE:
- Remove the following parts before troubleshooting.
1)Seat
2)Lower cowling
3)Center cowling (left)
4)Fuel tank
- Use the following special tool in this troubleshooting.



Pocket tester:
90890-03112

1.Fuse (main and signal)

- Remove the fuses.
- Connect the pocket tester (Ω × 1) to the fuses.
- Check the fuses for continuity.

NO CONTINUITY → Replace fuse(s).

CONTINUITY ↓

2.Battery

- Check the battery condition. Refer to "BATTERY INSPECTION" in CHAPTER 3.

Open circuit voltage:
12.8V or more at 20° C (68° F)

INCORRECT →
- Clean battery terminals.
- Recharge or replace the battery.

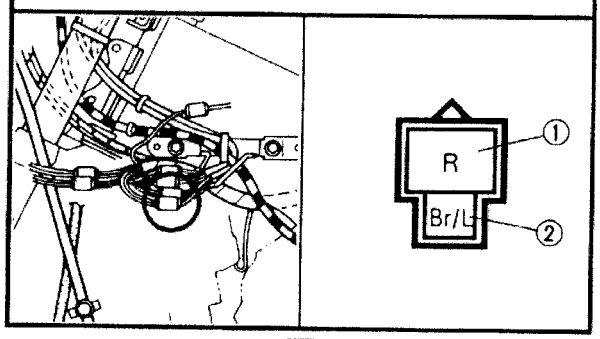
CORRECT ↓

*

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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/Blue ②".



INCORRECT

Replace main switch.

CORRECT

4.Wiring connection

- Check the entire signal system for connections.
  Refer to "WIRING DIAGRAM".

POOR CONNECTION

Correct.

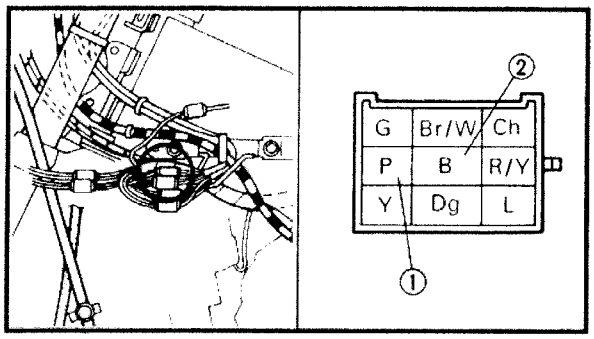
CORRECT

Check condition of each circuit for signal system. Refer to "SIGNAL SYSTEM CHECK".

SIGNAL SYSTEM CHECK

1.Horn does not sound.

1."HORN" switch.



- Disconnect the handlebar switch (left) coupler from wireharness.
- Check the switch component for the continuity between "Pink ① and Black ②".

INCORRECT

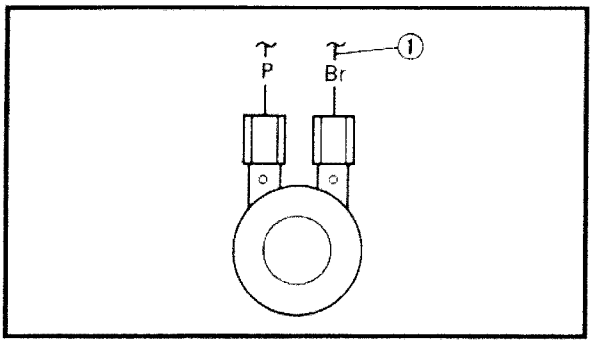
Replace handlebar switch (left).

CORRECT

2.Voltage

- Connect the pocket tester (DC 20V) to the horn lead.

Tester (+) lead→ Brown lead ①
Tester (–) lead → Frame ground



- Turn the main switch to "ON".
- Push the "HORN" switch.
- Check for voltage (12V) on the "Brown" lead at the horn terminal.

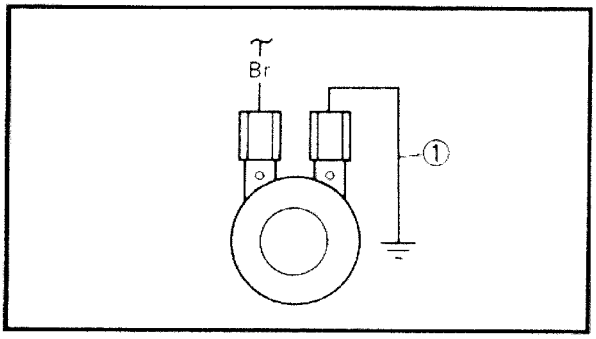
OUT OF SPECIFICATION

Wiring circuit from main switch to horn terminal is faulty, repair.

MEETS SPECIFICATION

3.Horn

- Disconnect the "Pink" lead at the horn terminal.
- Connect a jumper lead ① to the horn terminal and ground the jumper lead.
- Turn the main switch to "ON".



HORN IS SOUNDED

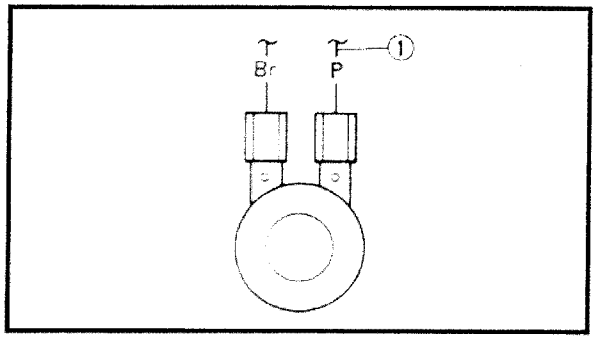
Horn is good.

HORN IS NOT SOUNDED

4.Voltage

- Connect the pocket tester (DC 20V) 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

Replace horn.

MEETS SPECIFICATION

Adjust or replace horn.

2.Brake light does not come on.

1.Bulb and bulb socket

- Check the bulb and bulb socket for continuity.

NO CONTINUITY

Replace bulb and/or bulb socket.

CONTINUITY

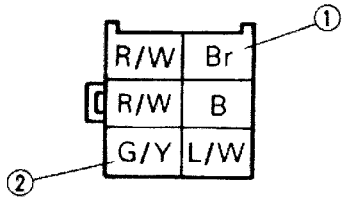
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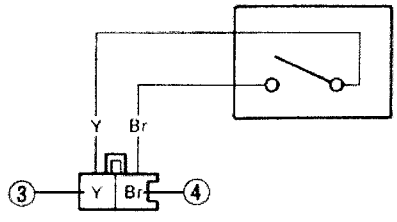
2.Brake switch

- Disconnect the brake switch coupler from the wireharness.
- Check the switch components for the continuity between "Brown ① and Green/Yellow ②", or "Yellow ③ and Brown ④".

A



B



A Front brake switch
B Rear brake switch

INCORRECT

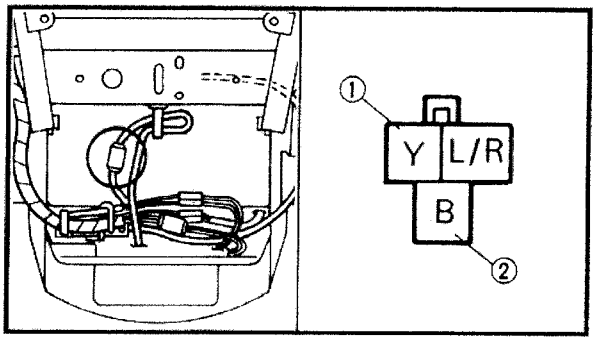
CORRECT

Replace brake switch.

3.Voltage

- Connect the pocket tester (DC 20V) to the bulb socket connector.

Tester (+) lead → Yellow lead ①
Tester (–) lead → Black lead ②



- Turn the switch to "ON".
- The brake lever is pulled in or brake pedal is stepped down.
- Check for voltage (12V) on the "Yellow" lead at the bulb socket connector.

OUT OF SPECIFICATION

Wiring circuit from main switch to bulb socket connector is faulty, repair.

MEETS SPECIFICATION

This circuit is good.

3.Flasher light and/or "TURN" indicator light does not blink.

1.Bulb and bulb socket

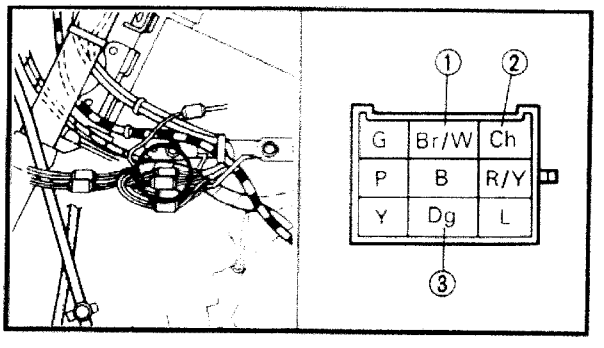
- Check the bulb and bulb socket for continuity.

NO CONTINUITY

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".

INCORRECT

Replace handlebar switch (left).

CORRECT

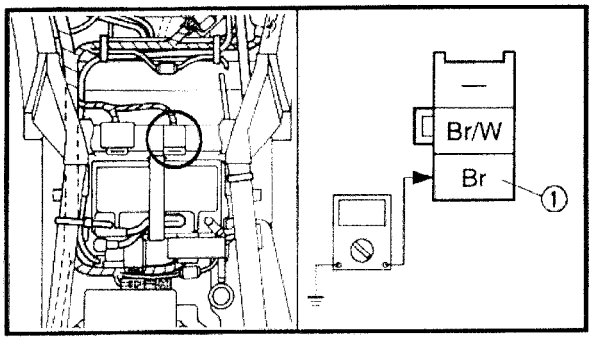
*

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3.Voltage

- Connect the pocket tester (DC 20V) to the flasher relay coupler.

Tester (+) lead → Brown terminal 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

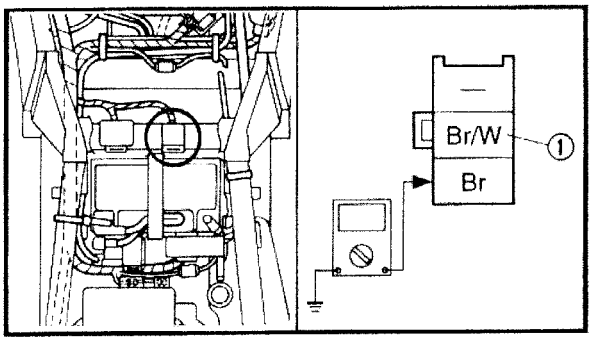
Wiring circuit from main switch to flasher relay connector is faulty, repair.

MEETS SPECIFICATION

4.Voltage

- Connect the pocket tester (DC 20V) to the flasher relay lead.

Tester (+) lead →
Brown/White terminal 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.

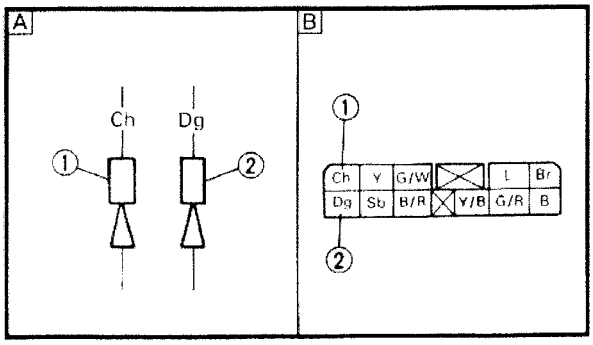
OUT OF SPECIFICATION

Replace flasher relay.

MEETS SPECIFICATION

5.Voltage

- Connect the pocket tester (DC 20V) to the bulb socket connector.



A Flasher light
B "TURN" indicator light

At flasher light (left):
Tester (+) lead → Chocolate lead ①
Tester (–) lead → Frame ground

At flasher light (right):
Tester (+) lead → Dark green lead ②
Tester (–) lead →Frame ground

- 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

This circuit is good.

4."NEUTRAL" indicator light does not come on.

1.Bulb and bulb socket

- Check the bulb and bulb socket for continuity.

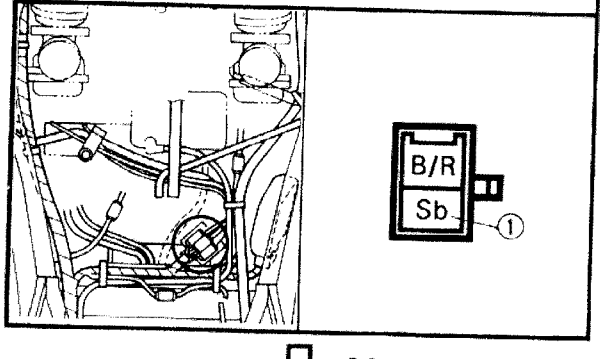
NO CONTINUITY

Replace bulb and/or bulb socket.

CONTINUITY

2.Neutral switch

- Disconnect the neutral switch coupler from the wireharness.
- Check the switch component for the continuity between "Sky blue ①" and Ground.



NO CONTINUITY

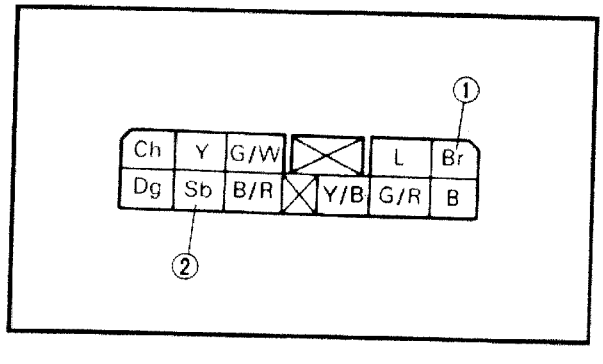
Replace neutral switch.

CONTINUITY

3.Voltage

- Connect the pocket tester (DC 20V) to the bulb socket coupler.

Tester (+) lead — Brown terminal ①
Tester (–) lead — Sky blue terminal ②



- Turn the main switch to "ON".
- Check for voltage (12V).

OUT OF SPECIFICATION

Wiring circuit from main switch to bulb socket connector is faulty, repair.

MEETS SPECIFICATION

This circuit is good.

5."OIL LEVEL" indicator light does not come on, when engine oil level is low.

1.Bulb and bulb socket

- Check the bulb and bulb socket for continuity.

NO CONTINUITY

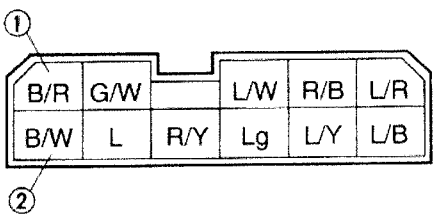
Replace bulb and/or bulb socket.

CONTINUITY

2.Starting circuit cut-off relay

- Disconnect the starting circuit cut-off relay coupler from the wireharness.
- Connect the pocket tester (Ω × 1) to the starting circuit cut-off relay coupler terminals.
- Check the resistor for specification resistance.

Tester (+) terminal →
Black/Red terminal ①
Tester (–) terminal → Black/White ②





6.4~9.6 Ω at 20°C (68°F)

OUT OF SPECIFICATION

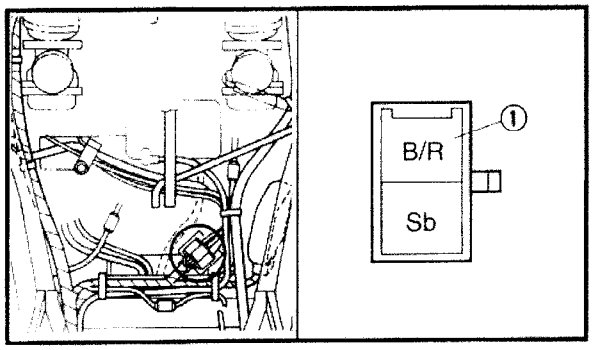
Replace starting circuit cut-off relay.

MEETS SPECIFICATION

3.Oil level switch

- Drain the engine oil and remove the oil level switch from the oil pan.
- Connect the pocket tester (Ω × 1) to the oil level switch.

Tester (+) lead →
Black/Red terminal ①
Tester (–) lead → Frame ground



- Check the oil level switch for continuity.

BAD CONDITION

Replace oil level switch.

GOOD CONDITION

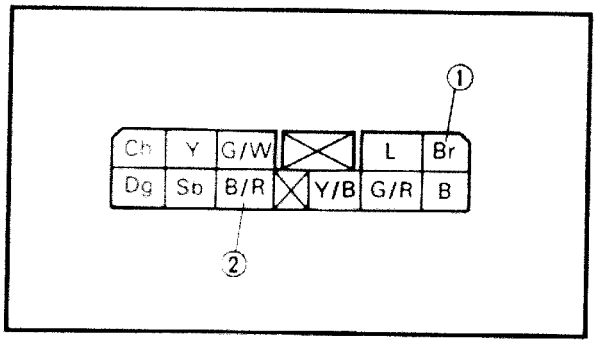
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4.Voltage

- Connect the pocket tester (DC 20V) to the bulb socket connector.

Tester (+) lead → Brown lead ①
Tester (–) lead → Black/Red lead ②



- Turn the main switch to "ON".
- Check for voltage (12V).

OUT OF SPECIFICATION

Wiring circuit from main switch to bulb socket connector is faulty, repair.

MEETS SPECIFICATION

This circuit is good.

6."FUEL" level indicator light does not come on, when fuel level is low.

1.Bulb and bulb socket

- Check the bulb and bulb socket for continuity.

NO CONTINUITY

Replace bulb and/or bulb socket.

CONTINUITY

2.Fuel sender

- Refer to "FUEL SENDER SELF DIAGNOSIS" section.

BAD CONDITION

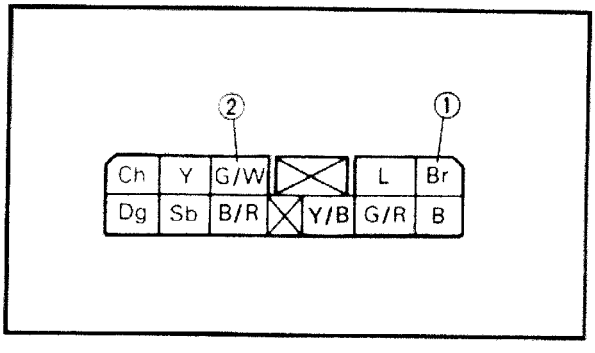
Replace fuel sender.

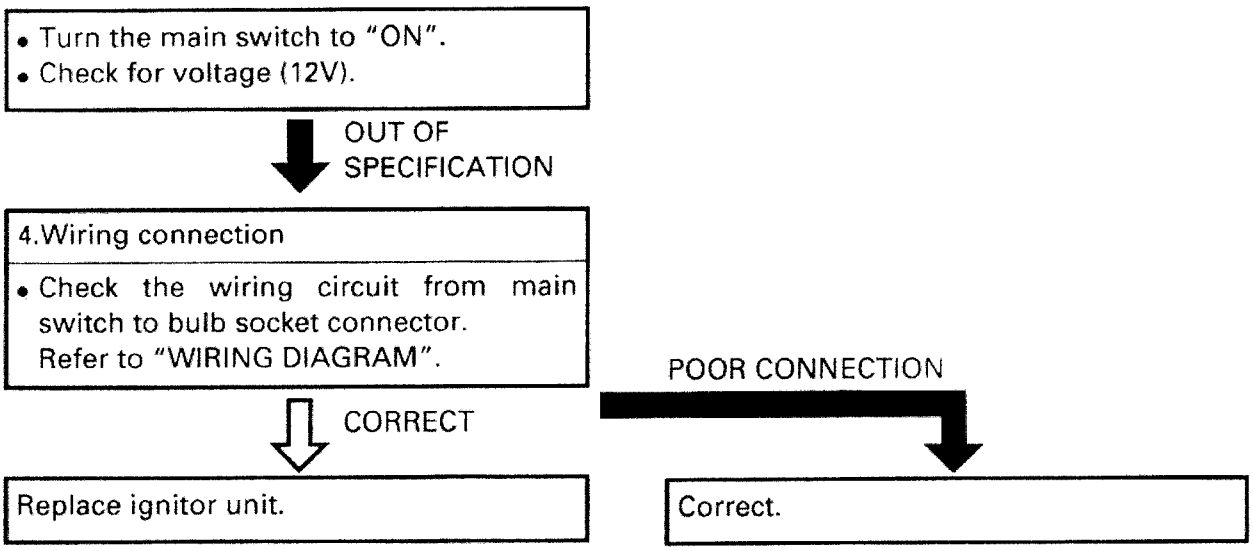
GOOD CONDITION

3.Voltage

- Connect the pocket tester (DC 20V) to the bulb socket connector.

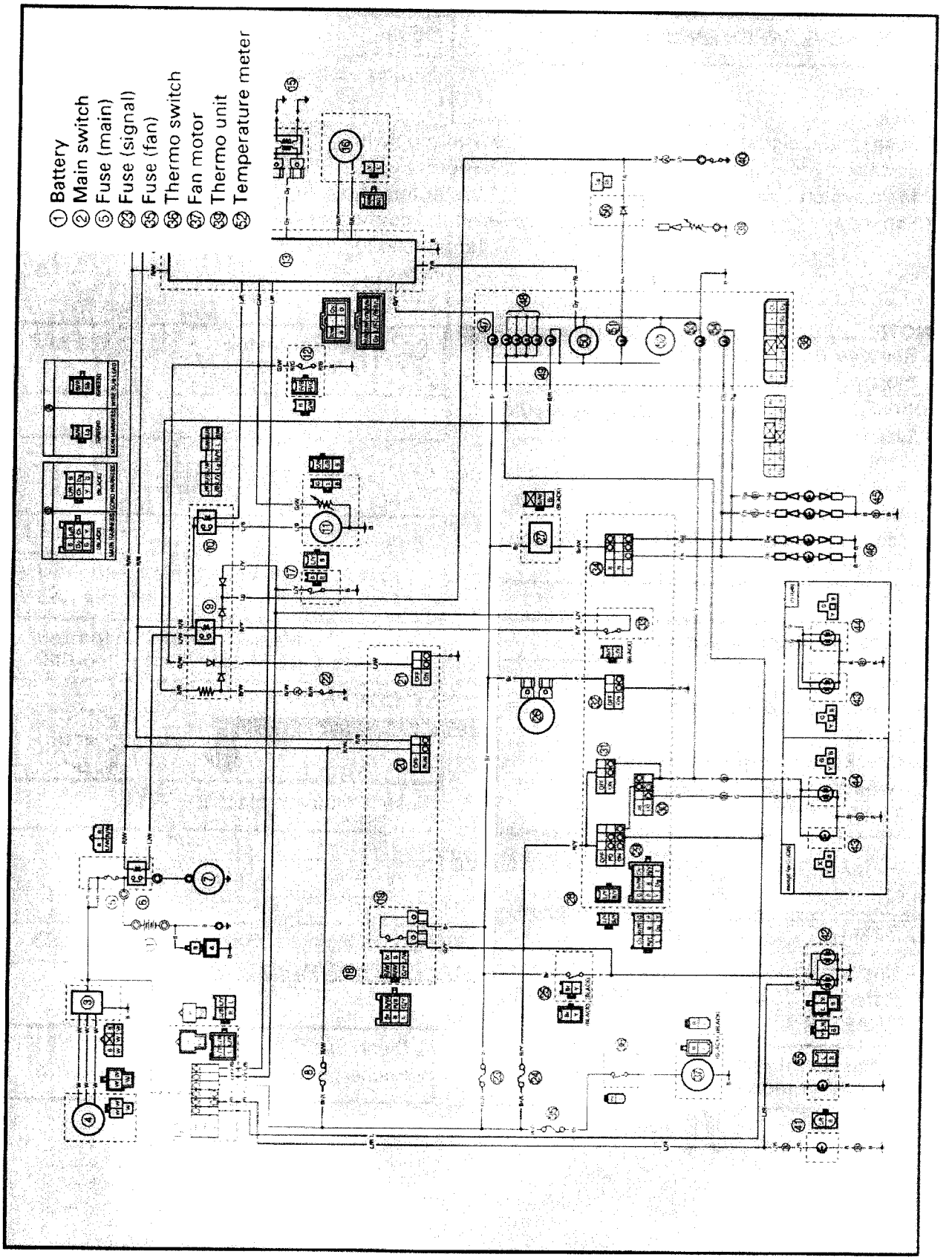
Tester (+) lead → Brown lead ①
Tester (–) lead → Green/White lead ②




• Turn the main switch to "ON".
• Check for voltage (12V).
OUT OF SPECIFICATION
4.Wiring connection
• Check the wiring circuit from main switch to bulb socket connector. Refer to "WIRING DIAGRAM".
POOR CONNECTION
CORRECT
Replace ignitor unit.
Correct.

COOLING SYSTEM

CIRCUIT DIAGRAM



TROUBLESHOOTING

• FAN MOTOR DOES NOT MOVE.
• WATER TEMPERATURE METER DOES NOT MOVE, WHEN ENGINE IS WARM.

Procedure

Check;

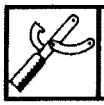
1.Fuse (main, signal and fan)
2.Battery
3.Main switch
4.Fan motor
5.Thermo switch
6.Thermo unit
7.Water temperature
8.Wiring connection (entire cooling system)

NOTE:

- Remove the following parts before troubleshooting.

1)Seat
2)Lower cowling
3)Center cowling (left)
4)Fuel tank
5)Air filter case

- Use the following special tool in this troubleshooting.



Pocket tester: 90890-03112

1.Fuse (main, signal and fan)

- Remove the fuses.
- Connect the pocket tester (Ω × 1) to the fuses.
- Check the fuses for continuity. Refer to "FUSE INSPECTION" in CHAPTER 3.

NO CONTINUITY → Fuse is faulty, replace it.

CONTINUITY ↓

2.Battery

- Check the battery condition. Refer to "BATTERY INSPECTION" in CHAPTER 3.

Open circuit voltage: 12.8V or more at 20° C(68° F)

INCORRECT →

- Clean battery terminals.
- Recharge or replace the battery.

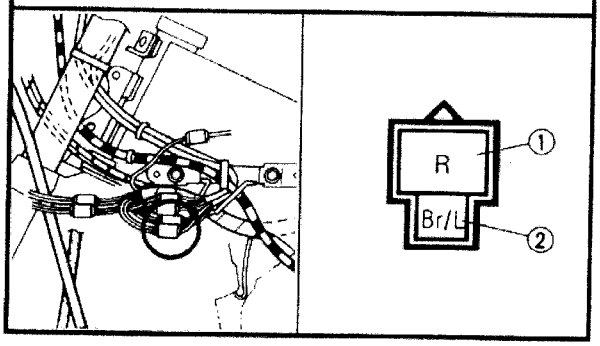
CORRECT ↓

*

*

3.Main switch

- Disconnect the main switch coupler from the wireharness.
- Check the switch component for the continuity between "Red ① and Brown/Blue ②".



INCORRECT

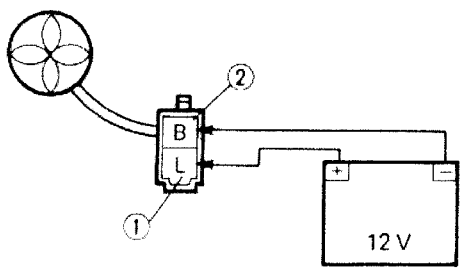
Main switch is faulty, replace it

CORRECT

4.Fan motors

- Disconnect the fan motor couplers.
- Connect the battery (12V) as shown.

Battery (+) lead → Blue lead ①
Battery (–) lead → Black lead ②



- Check the fan motors for operation.

DOES NOT MOVES

Fan motor(s) in faulty, replace it(s).

MOVES

*

*

5.Thermo switch

- Remove the thermo switch from the radiator.
- Connect the pocket tester (Ω × 1) to the thermo switch ①.
- Immerse the thermo switch in the water ②.
- Check the thermo switch for continuity. Note temperatures while heating the water with the temperature gauge ③.

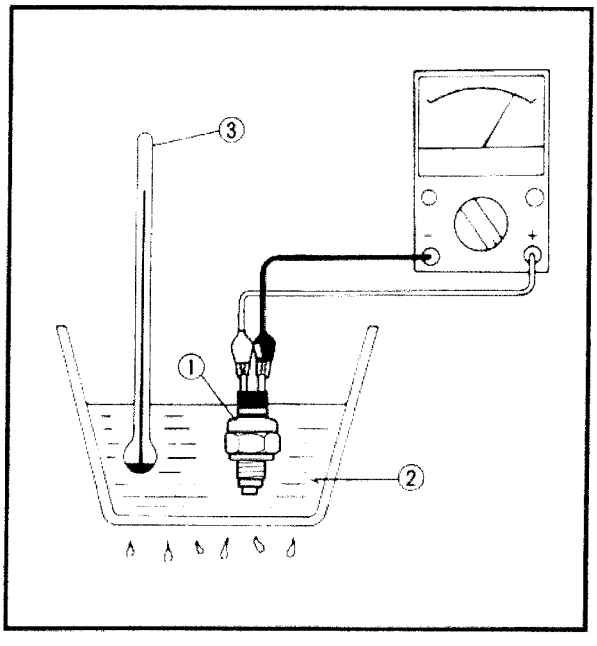
Test step	Water temperature / Thermo switch	Good condition
1	0 ~ 98°C (32 ~ 208.4°F)	×
2	More than 105 ± 3°C (221.0 ± 5.4°F)	○
3*	105 to 98° C (221.0 to 208.4°F)	○
4*	Less than 98°C (208.4°F)	×

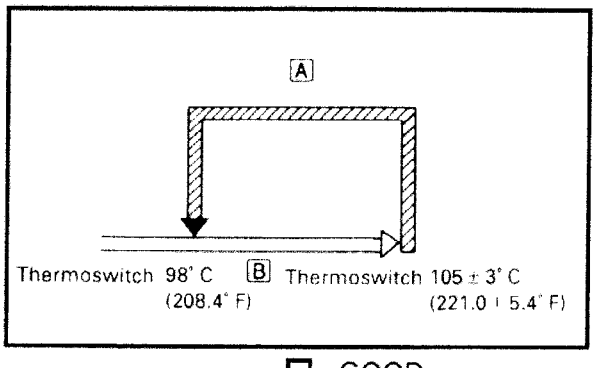
Test 1 & 2; Heat-up tests
Test 3* & 4*; Cool-down tests
○: Continuity ×: No continuity

⚠ WARNING

Handle the thermo switch with special care.
Never subject it to strong shock or allow it to be dropped. Should it be dropped, it must be replaced.

Thermo switch:
23 Nm (2.3 m • kg, 17 ft • lb)
Three bond sealock® #10





A THERMO SWITCH "ON", FAN "ON"
B COOLANT TEMPERATURE

BAD CONDITION

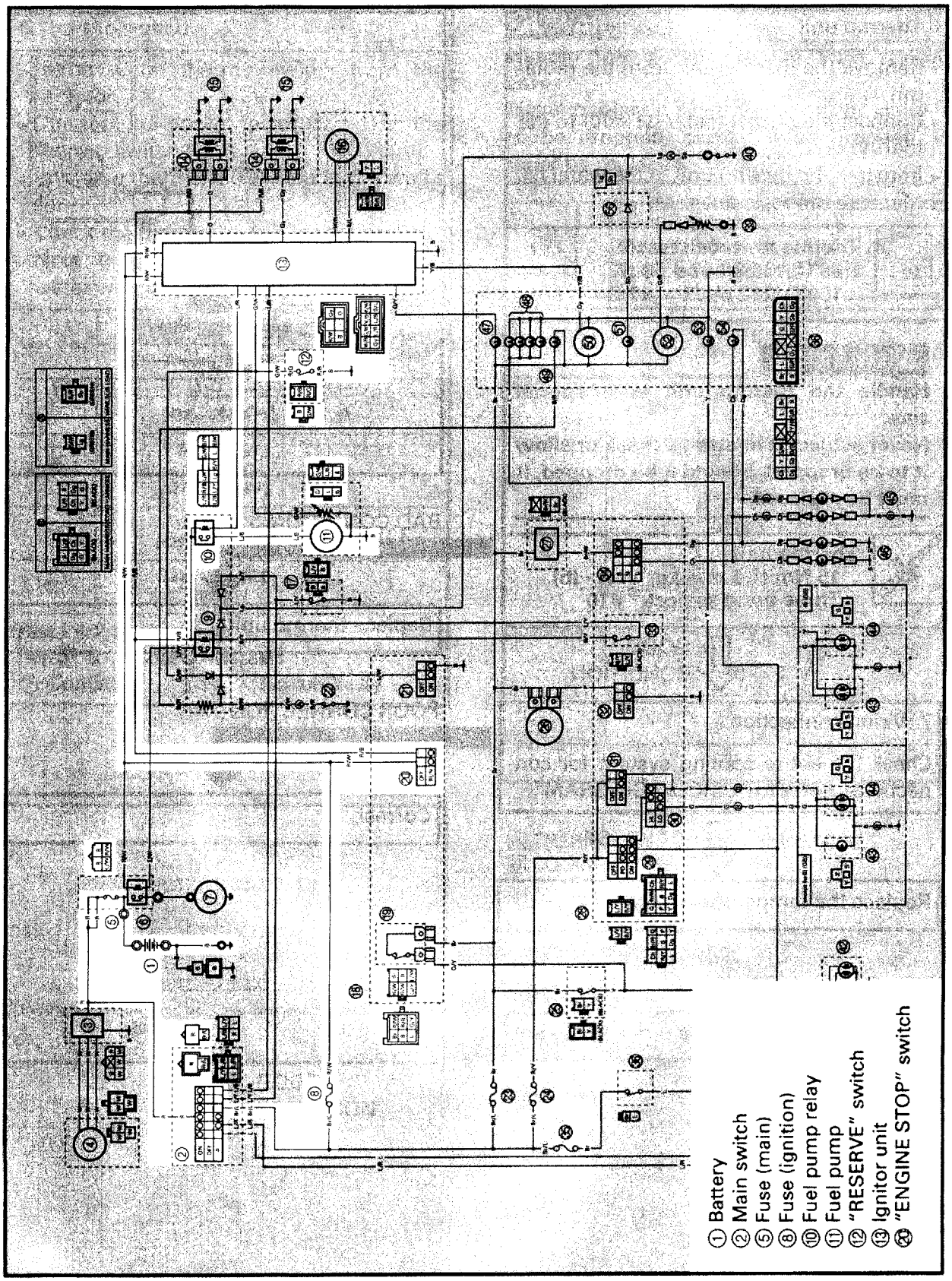
Replace thermo switch.

GOOD CONDITION

*

FUEL PUMP SYSTEM

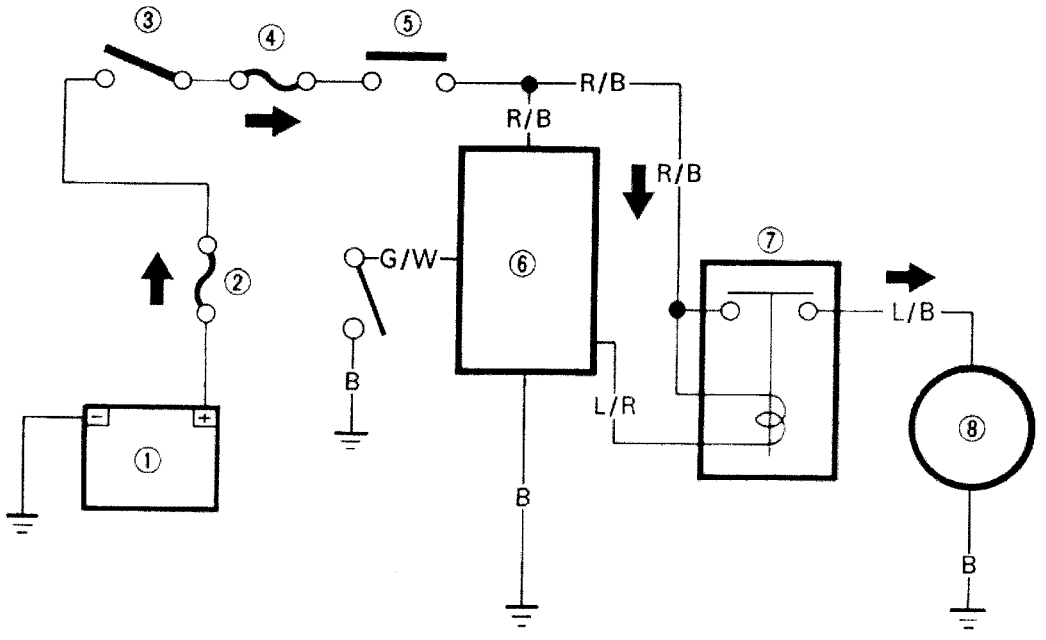
CIRCUIT DIAGRAM



FUEL PUMP CIRCUIT OPERATION

The fuel pump circuit consists of the fuel pump relay, fuel pump, "ENGINE STOP" switch and ignitor unit.
The ignitor unit includes the control unit for the fuel pump.

① Battery
② Fuse (MAIN)
③ Main switch
④ Fuse (IGNITION)
⑤ "ENGINE STOP" switch
⑥ Ignitor unit
⑦ Fuel pump relay
⑧ Fuel pump
⑨ Reserve switch



TROUBLESHOOTING

FUEL PUMP FAILS TO OPERATE.

Procedure

Check;

1.Fuse (main and ignition)
2.Battery
3.Main switch
4."ENGINE STOP" switch
5.Starting circuit cut-off relay (fuel pump relay)
6.Fuel pump
7.Wiring connection (entire fuel system)

NOTE:

- Remove the following parts before troubleshooting.

1)Seat
2)Lower cowling
3)Center cowling (left)
4)Fuel tank
5)Air filter case

- Use the following special tool(s) in this troubleshooting.



Pocket tester:
90890-03112

1.Fuse (main and ignition)

- Remove the fuses.
- Connect the pocket tester (Ω × 1) to the fuses.
- Check the fuses for continuity.

NO CONTINUITY → Replace fuse(s).

CONTINUITY ↓

2.Battery

- Check the battery condition. Refer to "BATTERY INSPECTION" in CHAPTER 3.

Open circuit voltage:
12.8V or more at 20° C (68° F)

INCORRECT →

- Clean battery terminals.
- Recharge or replace the battery.

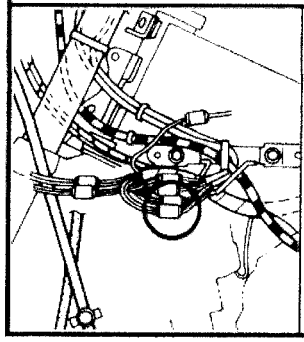
CORRECT ↓

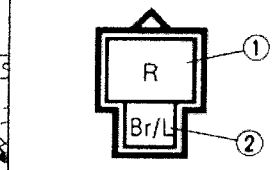
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3.Main switch

- Disconnect the main switch coupler from the wireharness.
- Check the switch component for the continuity between "Red ① and Brown/Blue ②".





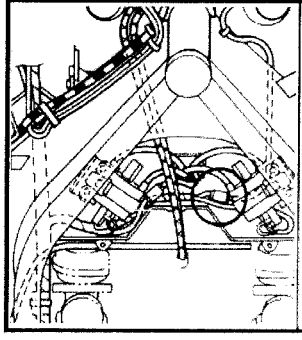
INCORRECT

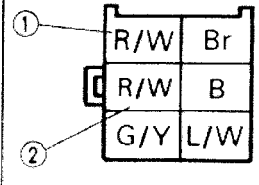
Replace main switch.

CORRECT

4."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".





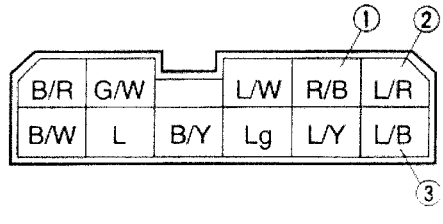
INCORRECT

Replace handlebar switch (right).

CORRECT

5.Starting circuit cut-off relay (fuel pump relay)

- Disconnect the starting circuit cut-off relay coupler from the wireharness.
- Connect the pocket tester (Ω × 1) and battery (12V) to the starting circuit cut-off relay coupler terminals.



Battery (+) terminal →
Red/Black terminal ①
Battery (–) terminal →
Blue/Red terminal ②

Tester (+) lead → Red/Black terminal ①
Tester (–) lead → Blue/Black terminal ③

- Check the starting circuit cut-off relay for continuity.

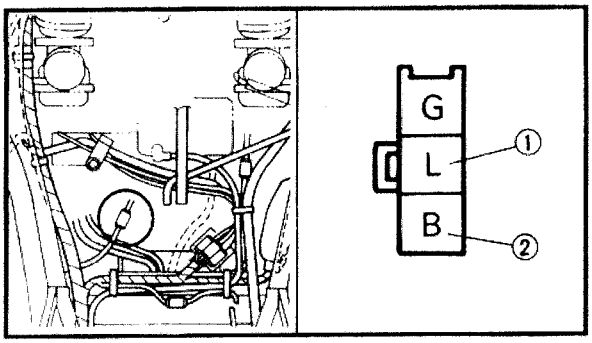
NO CONTINUITY → Replace starting circuit cut-off relay.

CONTINUITY ↓

6.Fuel pump resistance

- Disconnect the fuel pump coupler from the wireharness.
- Connect the pocket tester (Ω × 1) to the fuel pump coupler terminals.

Tester (+) lead → Blue terminal ①
Tester (–) lead → Black terminal ②



- Check the fuel pump for specificated resistance.

Fuel pump resistance:
4 ~ 30 Ω at 20° C (68° F)

OUT OF SPECIFICATION → Replace fuel pump.

MEET SPECIFICATION ↓

7.Wiring connection

- Check the entire fuel pump system for connections.
  Refer to "CIRCUIT DIAGRAM".

POOR CONNECTION → Correct.

CORRECT ↓

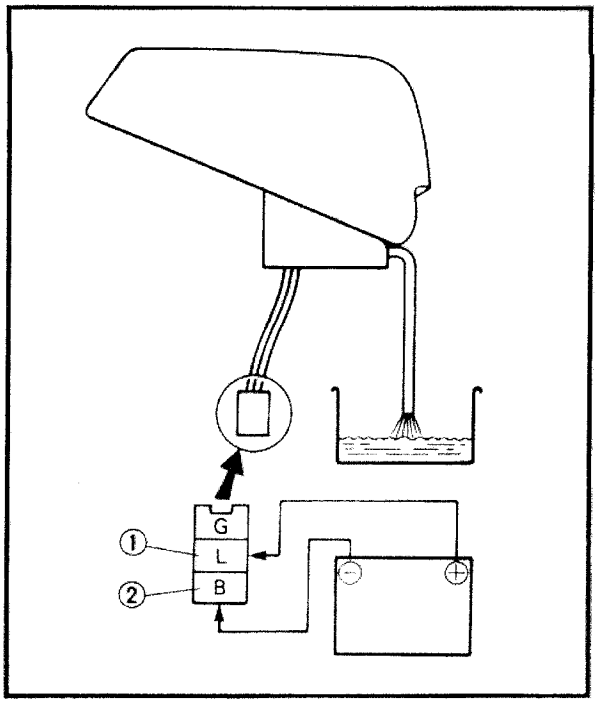
Replace ignitor unit.

FUEL PUMP TEST

⚠ WARNING

Gasoline is extremely flammable and there is danger of explosion or combustion under certain circumstances. Be extremely careful of the following points.

- **Stop the engine before refuelling.**
- **Do not smoke, and keep away from open flames, sparks, or any other kind of fire.**
- **Take care not to spill gasoline. If you do accidentally spill some, wipe it up immediately with dry rags.**
- **If gasoline touches the engine when it has just stopped and is still hot, there is danger of combustion. Make sure the engine is completely cool before performing any operations.**



1. Check:
- Fuel pump operation

****

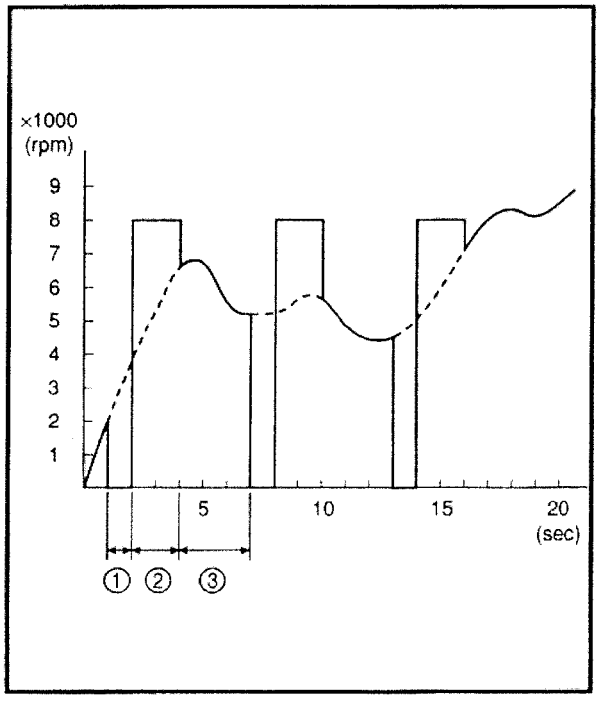
Checking steps:

- Fill up the fuel tank.
- Place an open container under the end of the fuel hose.
- Connect the battery (12V) to the fuel pump coupler terminals.

Battery (+) lead → Blue ① terminal
Battery (–) lead → Black ② terminal

- If solvent flows out from the fuel hose, the fuel pump is good. If not, replace the fuel pump assembly.

****

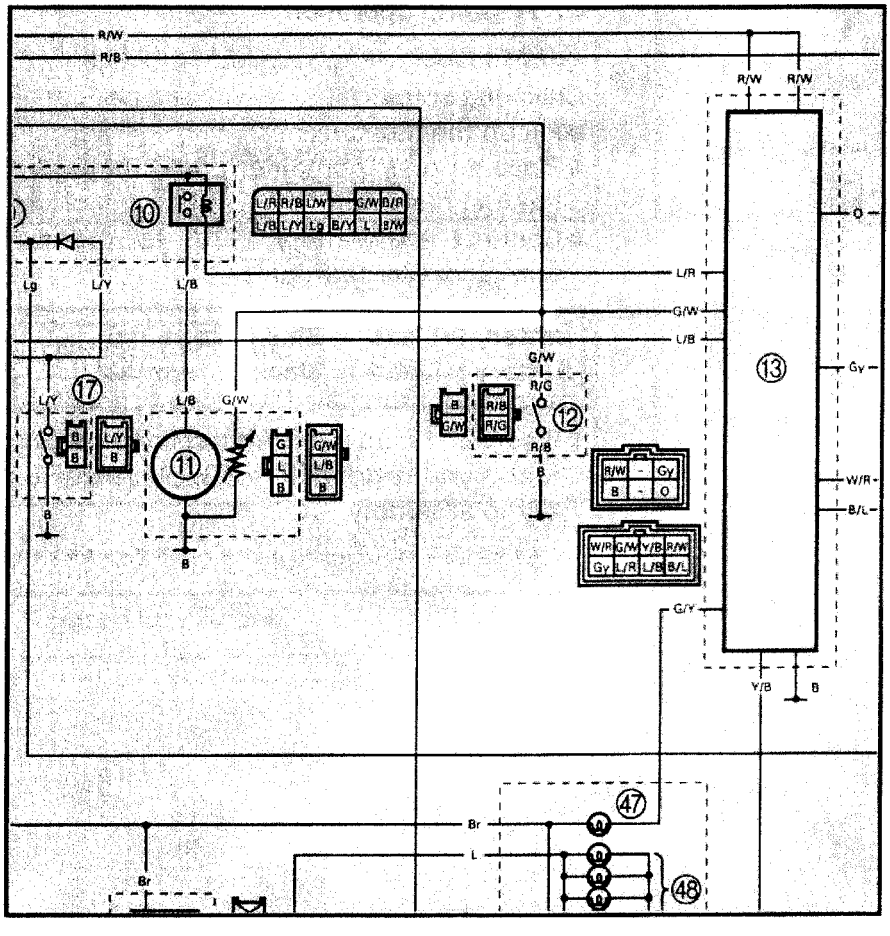


FUEL SENDER SELF DIAGNOSIS

When the needle of the tachometer shows the following pattern while either running or stopped when the main switch is on, the fuel sender circuit is broken. In that case, it would be best to inspect it.

① 0 rpm - 1 second
② 8000 rpm - 2 seconds
③ present engine revolutions - 3 seconds
The above pattern is repeated.

CIRCUIT DIAGRAM



When the wiring is broken as shown in the figure left the tachometer pattern above is shown.

NOTE:
If a short occurs the "Fuel" level indicator remains lits.
(The position of the reserve switch or the presence of fuel is irrelevant.)

TROUBLESHOOTING

IF THE THACHOMETER'S FUEL SELF-DIAGNOSIS OPERATES.

Procedure
Check;
1.Fuel sender
2.Wireharness

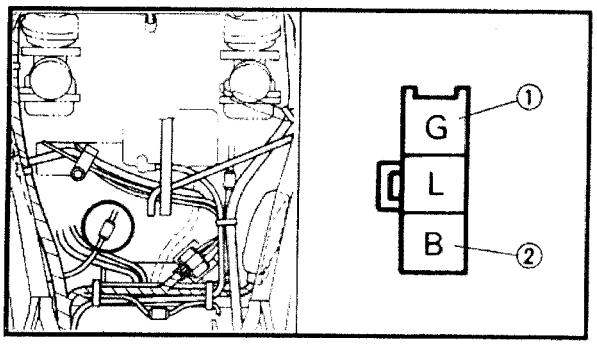
NOTE:
- Remove the following parts before trouble-shooting.

1)Seat
2)Lower cowling
3)Center cowling (left)
4)Fuel tank

1.Fuel sender

- Drain the fuel and remove the fuel sender from the fuel tank.
- Connect the pocket tester (Ω × 1) to the fuel sender.

Tester (+) lead → Green terminal ①
Tester (–) lead → Black terminal ②



- Check the fuel sender for continuity.

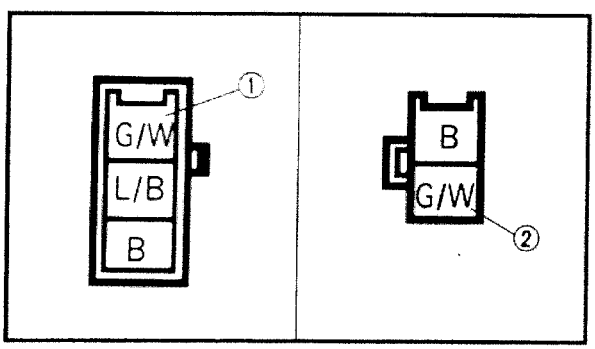
BAD CONDITION → Replace fuel sender.

GOOD CONDITION ↓

2.Wireharness

- Connect the pocket tester (Ω × 1) to the fuel sender coupler (wireharness side) and reserve switch coupler (wireharness side).

Tester (+) lead →
Green/White terminal ①
(fuel sender side)
Tester (–) lead →
Green/White terminal ②
(reserve switch side)



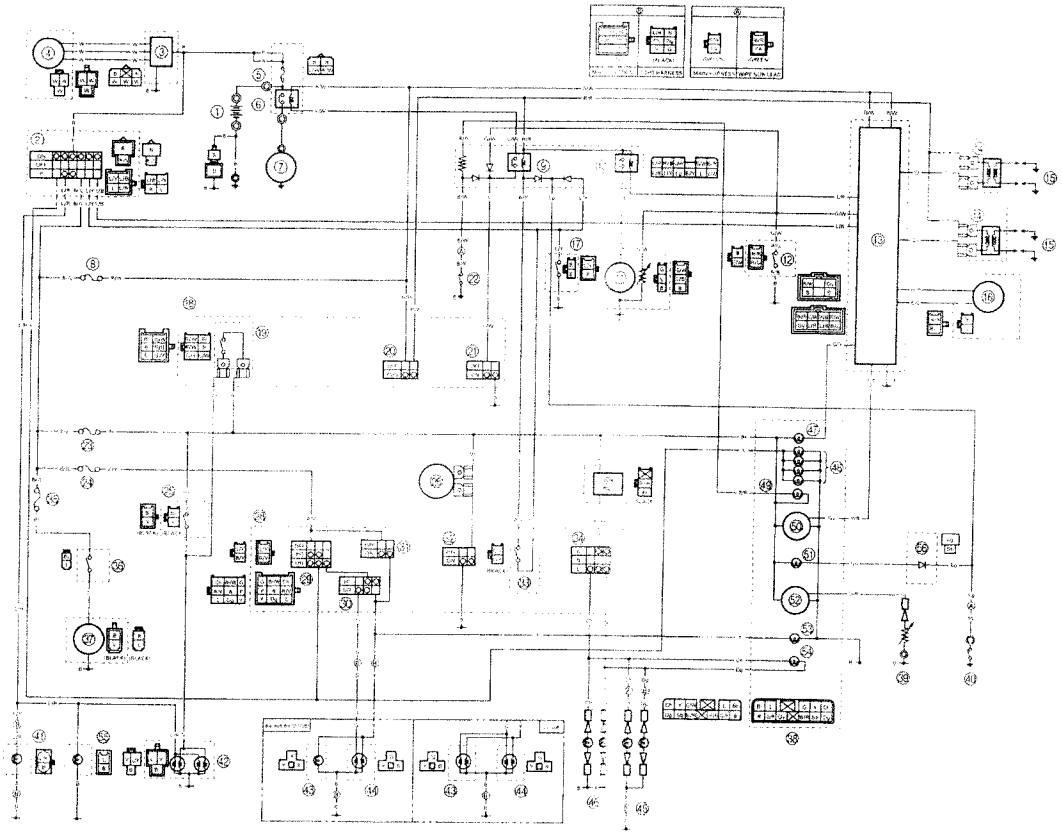
- Check the wireharness for continuity. Refer to the "CIRCUIT DIAGRAM".

NO CONTINUITY → Repair or replace wireharness.

CONTINUITY ↓

This circuit is good.

FZR600R WIRING DIAGRAM

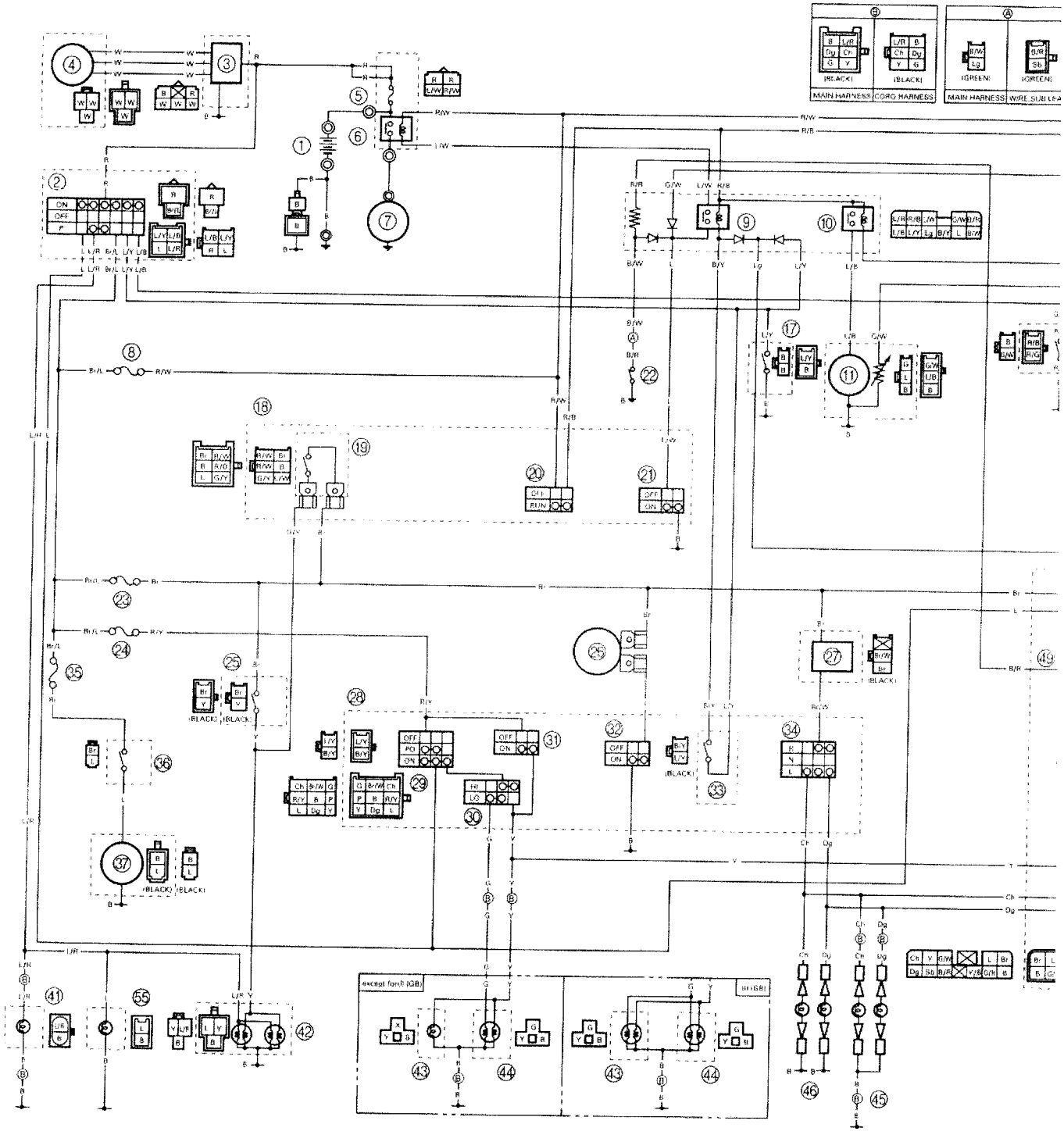


① Battery
② Main switch
③ Rectifier/regulator
④ A.C. magneto
⑤ Fuse (main)
⑥ Starter relay
⑦ Starter motor
⑧ Fuse (ignition)
⑨ Starting circuit cut-off relay
⑩ Fuel pump relay
⑪ Fuel pump
⑫ "RESERVE" switch
⑬ Ignitor unit
⑭ Ignition coil
⑮ Spark plug
⑯ Pick up coil
⑰ Sidestand switch
⑱ Handlebar switch (right)
⑲ Front brake switch
⑳ "ENGINE STOP" switch
㉑ "START" switch
㉒ Oil level switch
㉓ Fuse (signal)
㉔ Fuse (head)
㉕ Rear brake switch
㉖ Horn
㉗ Flasher relay
㉘ Handlebar switch (left)
㉙ "LIGHT" switch
㉚ "LIGHTS" (dimmer) switch
㉛ "PASS" switch
㉜ "HORN" switch
㉝ Clutch switch
㉞ "TURN" switch
㉟ Fuse (fan)
㊱ Thermo switch
㊲ Fan motor
㊳ Meter assembly
㊴ Thermo unit
㊵ Neutral switch
㊶ Auxiliary light
㊷ Tail/brake light
㊸ Head light (right)
㊹ Head light (left)
㊺ Front flasher light
㊻ Rear flasher light
㊼ "FUEL LEVEL" indicator light
㊽ Meter light
㊾ "OIL LEVEL" indicator light
㊿ Tachometer
(51) "NEUTRAL" indicator light
(52) Temperature meter
(53) "HIGH BEAM" indicator light
(54) "TURN" indicator light
(55) License light
(56) Diode

COLOR CODE

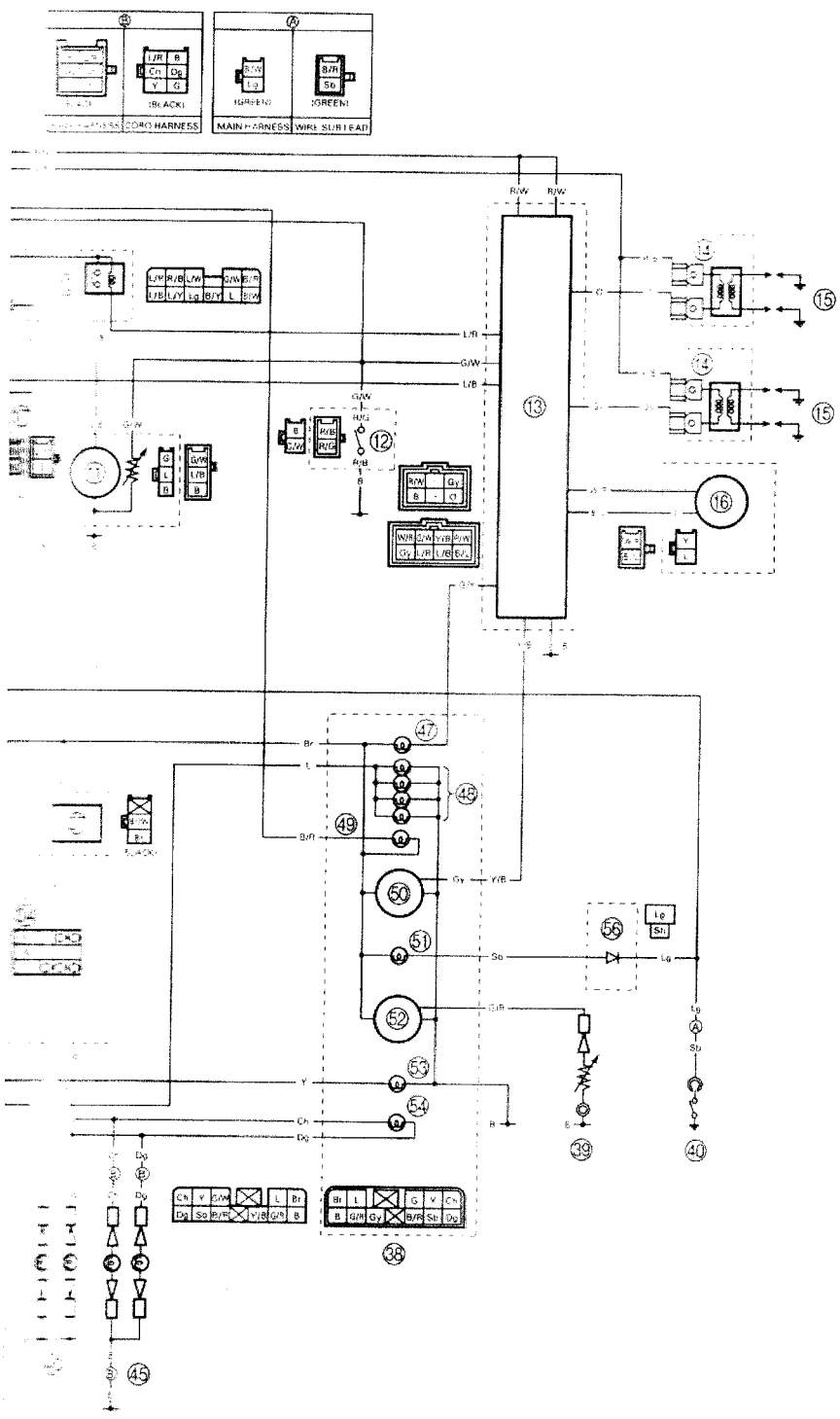
B .....Black	L..... Blue	W ..... White	Br/L ..... Brown/Blue	L/R ..... Blue/Red	R/Y..... Red/Yellow
Br.....Brown	Lg..... Light green	Y..... Yellow	Br/W ..... Brown/White	L/W..... Blue/White	W/B..... White/Black
Ch .....Chocolate	O..... Orange	B/L..... Black/Blue	G/R ..... Green/Red	L/Y ..... Blue/Yellow	W/R..... White/Red
Dg.....Dark green	P..... Pink	B/R ..... Black/Red	G/Y ..... Green/Yellow	R/B..... Red/Black	Y/B..... Yellow/Black
G.....Green	R ..... Red	B/W ..... Black/White	G/W ..... Green/White	R/G ..... Red/Green	
Gy.....Gray	Sb ..... Sky blue	B/Y ..... Black/Yellow	L/B..... Blue/Black	R/W ..... Red/White	

FZR600R WIRING DIAGRAM



COLOR CODE

B ..... Black	L ..... Blue	W ..... White	Br/L ..... Brown/Blue	L/R ..... B
Br ..... Brown	Lg ..... Light green	Y ..... Yellow	Br/W ..... Brown/White	L/W ..... B
Ch ..... Chocolate	O ..... Orange	B/L ..... Black/Blue	G/R ..... Green/Red	L/Y ..... B
Dg ..... Dark green	P ..... Pink	B/R ..... Black/Red	G/Y ..... Green/Yellow	R/B ..... R
G ..... Green	R ..... Red	B/W ..... Black/White	G/W ..... Green/White	R/G ..... R
Gy ..... Gray	Sb ..... Sky blue	B/Y ..... Black/Yellow	L/B ..... Blue/Black	R/W ..... R



① Battery
② Main switch
③ Rectifier/regulator
④ A.C. magneto
⑤ Fuse (main)
⑥ Starter relay
⑦ Starter motor
⑧ Fuse (ignition)
⑨ Starting circuit cut-off relay
⑩ Fuel pump relay
⑪ Fuel pump
⑫ "RESERVE" switch
⑬ Ignitor unit
⑭ Ignition coil
⑮ Spark plug
⑯ Pick up coil
⑰ Sidestand switch
⑱ Handlebar switch (right)
⑲ Front brake switch
⑳ "ENGINE STOP" switch
㉑ "START" switch
㉒ Oil level switch
㉓ Fuse (signal)
㉔ Fuse (head)
㉕ Rear brake switch
㉖ Horn
㉗ Flasher relay
㉘ Handlebar switch (left)
㉙ "LIGHT" switch
㉚ "LIGHTS" (dimmer) switch
㉛ "PASS" switch
㉜ "HORN" switch
㉝ Clutch switch
㉞ "TURN" switch
㉟ Fuse (fan)
㊱ Thermo switch
㊲ Fan motor
㊳ Meter assembly
㊴ Thermo unit
㊵ Neutral switch
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㊸ Head light (right)
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㊼ "FUEL LEVEL" indicator light
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㊾ "OIL LEVEL" indicator light
㊿ Tachometer
(51) "NEUTRAL" indicator light
(52) Temperature meter
(53) "HIGH BEAM" indicator light
(54) "TURN" indicator light
(55) License light
(56) Diode

Brown/Blue	L/R ..... Blue/Red	R/Y ..... Red/Yellow
Brown/White	L/W ..... Blue/White	W/B ..... White/Black
Green/Red	L/Y ..... Blue/Yellow	W/R ..... White/Red
Green/Yellow	R/B ..... Red/Black	Y/B ..... Yellow/Black
Green/White	R/G ..... Red/Green	
Blue/Black	R/W ..... Red/White	

TROUBLESHOOTING

NOTE:
The following troubleshooting does not cover all the possible causes of trouble. If should be helpful, however, as a guide to troubleshooting. Refer to the relative procedure in this manual for inspection, adjustment and replacement of parts.

STARTING FAILURE/HARD STARTING

FUEL SYSTEM

Fuel tank
- Empty
- Clogged fuel filter
- Clogged fuel strainer
- Clogged fuel tank drain hose
- Clogged roll over valve (for D)
- Clogged roll over valve breather hose (for D)
- Deteriorated fuel or fuel containing water or foreign material

Fuel cock
- Clogged fuel hose/vacuum 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 cleaner
- Clogged air filter

Fuel pump
- Faulty fuel pump
- Faulty fuel pump relay

ELECTRICAL SYSTEM

Spark plug
- Improper plug gap
- Worn electrodes
- Wire between terminals broken
- Improper heat range
- Faulty spark plug cap

Ignition coil
- Broken or shorted primary/secondary
- Faulty spark plug lead
- Broken body

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

Cylinder and cylinder head
- Loose spark plug
- Loose cylinder head or cylinder
- Broken cylinder head gasket
- Worn, damaged or seized cylinder
- Improperly sealed valve
- Improperly contacted valve and valve seat
- Improper valve timing
- Broken valve spring

Piston and piston rings
- Improperly installed piston ring
- Worn, fatigued or broken piston ring
- Seized piston ring
- Seized or damaged piston

Crankcase and crankshaft
- Improperly seated crankcase
- Seized crankshaft

POOR IDLE SPEED PERFORMANCE

POOR IDLE SPEED PERFORMANCE

Carburetor
- Improperly returned starter plunger
- Loose pilot jet
- Clogged pilot air jet
- Improperly synchronized carburetors
- Improperly adjusted idle speed (throttle stop screw)
- Improper throttle cable free play
- Flooded carburetor

Electrical system
- Faulty battery
- Faulty spark plug
- Faulty ignitor unit
- Faulty pickup coil
- Faulty ignition coil

Valve train
- Improperly adjusted valve clearance

Air cleaner
- Clogged air filter

POOR MEDIUM AND HIGH SPEED PERFERMANCE

POOR MEDIUM AND HIGH SPEED PERFERMANCE

Refer to "Starting failure/Hard starting." (Fuel system, electrical system, compression system and valve train.)

Carburetor
- 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

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

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

Clutch
- Improperly adjusted clutch cable
- Loose clutch spring
- Fatigued clutch spring
- Worn, friction plate/clutch plate
- Incorrectly assembled clutch

Engine oil
- Low oil level
- Improper quality/(low viscosity)
- Deterioration

CLUTCH DRAGGING

Clutch
- Warped pressure plate
- Unevenly tensioned clutch springs
- Bent push rod
- Broken clutch boss
- Burnt primary driven gear bushing
- Bent clutch plate
- Swollen friction plate

Engine oil
- Improper oil level
- Improper quality/(high viscosity)
- Deterioration

OVERHEATING

OVERHEATING

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

FAULTY BRAKE

POOR BRAKING EFFECT

Disc brake
- Worn brake pads
- Worn disc
- Air in brake fluid
- Leaking brake fluid
- Faulty cylinder kit cup
- Faulty caliper kit seal
- Loose union bolt
- Broken brake hose
- Oily or greasy disc/brake pads
- Improper brake fluid level

FRONT FORK OIL LEAKAGE AND FRONT FORK MALFUNCTION

OIL LEAKAGE
- Bent, damaged or rusty inner tube
- Damaged or cracked outer tube
- Damaged oil seal lip
- Improperly installed oil seal
- Improper oil level (too much)
- Loose damper rod holding bolt
- Broken cap bolt O-ring
- Loose drain bolt
- Damaged drain bolt gasket

MALFUNCTION
- Bent, deformed or damaged inner tube
- Bent or deformed outer tube
- Damaged fork spring
- Worn or damaged slide metal
- Bent or damaged damper rod
- Improper oil visconsity
- Improper oil level

INSTABLE HANDLING

INSTABLE HANDLING

Handlebar
- Improperly installed or bent

Steering
- Improperly installed handlebar crown
- Bent steering stem
- Improperly installed steering shaft (Improperly tightened ring nut)
- Damaged bearings and races

Front forks
- Uneven oil levels on both sides
- Uneven spring tension (uneven damping force adjuster position)
- Broken spring
- Twisted front forks

Swingarm
- Worn bearing or bush
- Bent or damaged

Rear shock absorber
- Fatigued spring
- Oil and gas leakage

Tires
- Uneven tire pressures on both sides
- Incorrect tire pressure
- Unevenly worn tires

Wheels
- Incorrect wheel balance
- Deformed case wheel
- Damaged bearing
- Bent or loose wheel axle
- Excessive wheel run-out

Frame
- Twisted
- Damaged head pipe
- Improperly installed bearing race

FAULTY LIGHTING AND SIGNAL SYSTEM

HEADLIGHT DARK
- Improper bulb
- Too many electric accessories
- Hard charging (broken stator coil wire, faulty rectifier/regulator)
- Incorrect connection
- Improperly grounded
- Poor contacts (main or light switch)
- Bulb life expires

BULB BURNT OUT
- Improper bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded
- Faulty main and/or light switch
- Bulb life expires

FLASHER DOES NOT LIGHT
- Improperly grounded
- Discharged battery
- Faulty turn switch
- Faulty flasher relay
- Broken wireharness
- Loosely connected coupler
- Bulb burnt out
- Faulty fuse

FLASHER WINKS SLOWER
- Faulty flasher relay
- Faulty main and/or turn switch

FLASHER KEEPS ON
- Faulty flasher relay
- Bulb burnt out

FLASHER WINKS QUICKER
- Improper bulb
- Faulty flasher relay
- Bulb burnt out

HORN IS INOPERATIVE
- Faulty battery
- Faulty fuse
- Faulty main and/or horn switch
- Improperly adjusted horn
- Faulty horn
- Broken wireharness