YAMAHA

SZR 660 '95

4SU-ME1

SERVICE MANUAL

Although some of the drawings and photographs used in this manual are taken from other manuals and do not refer directly to the model in question, the procedures described and the details illustrated are nonetheless relevant and suitable to the user's purposes.

WARNING

This manual has been written by Belgarda S.p.A. mainly for use by Yamaha dealers and their skilled mechanics. It is impossible to provide a mechanic with all the information necessary in a single manual. Presumably, though, the people who use this manual for the maintenance and repair of Yamaha motorcycles will already have elementary knowledge of the principles of mechanics and the procedures for motorcycle repair techniques. Without this knowledge, repair or maintenance work on this model could prove inefficient and/or dangerous.
Yamaha makes constant efforts to improve all its models. Important alterations or changes to procedures characteristics will be communicated to all Yamaha dealers and published in future editions of this manual. Especially important information in this manual is highlighted by the graphics shown below.

TECHNICAL PUBLICATIONS
R&D TECHNICAL DIVISION
MOTORCYCLE GROUP
BELGARDA S.p.A.

PARTICULARLY IMPORTANT INFORMATION

The manual includes the following symbols and relative remarks:

⚠ This safety alert symbol means: ATTENTION! BE CAREFUL! YOUR SAFETY IS AT RISK!

⚠ WARNING The WARNING symbol indicates special procedures to be followed to avoid **injury** to the rider or the person inspecting or repairing the cycle.

CAUTION: CAUTION indicates special precautions to be taken to avoid **damage** to the cycle.

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

HOW TO USE THIS MANUAL

LAYOUT

This manual consists of chapters on the principal cycle components (see "Symbol Legend").
(1): This symbol, in the top right-hand corner of each page, identifies the chapter graphically.
(2): This title appears at the top of each page to the left of the chapter symbol.
(3): The final caption in the chapter "Periodic inspection and adjustment".

FORMAT

All the procedures suggested in this manual are arranged in a sequential, step by step order. The information is written in such a way as to provide the mechanic with a handy, easy to read reference containing explanations on all disassembly, repair, assembly and inspection operations.
Particularly important procedure sequences (4) are shown between two rows of asterisks (*) and each procedure is preceded by the symbol " • ".

IMPORTANT SPECIFICATIONS

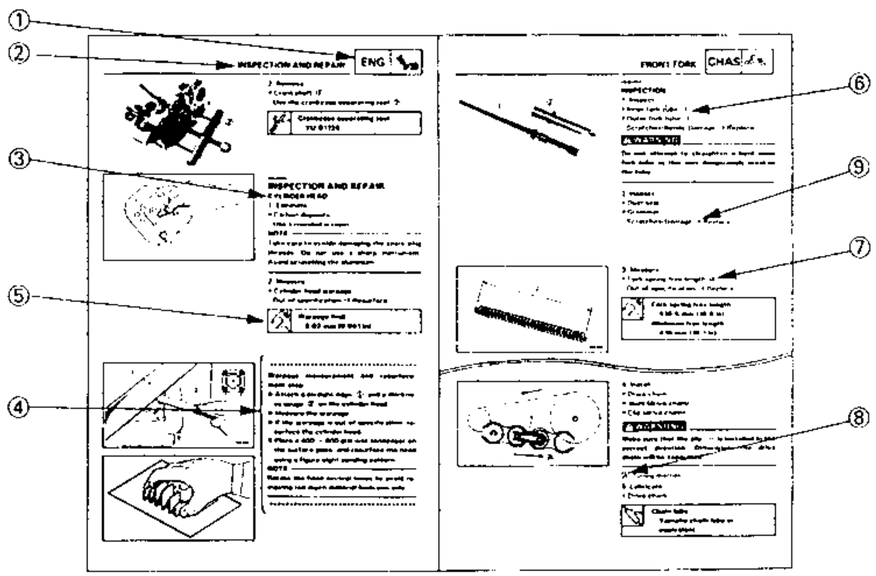
- All data and special tools are contained in insets preceded by the specific symbol (5).
- A number inscribed in round brackets indicates (6) the number of a part, whereas a letter of the alphabet indicates alignment data or marks (7); further indications are signalled by a letter eclosed in an inset (8).
- The condition of a faulty component precedes an arrow followed by the procedure required and the symbol (9).

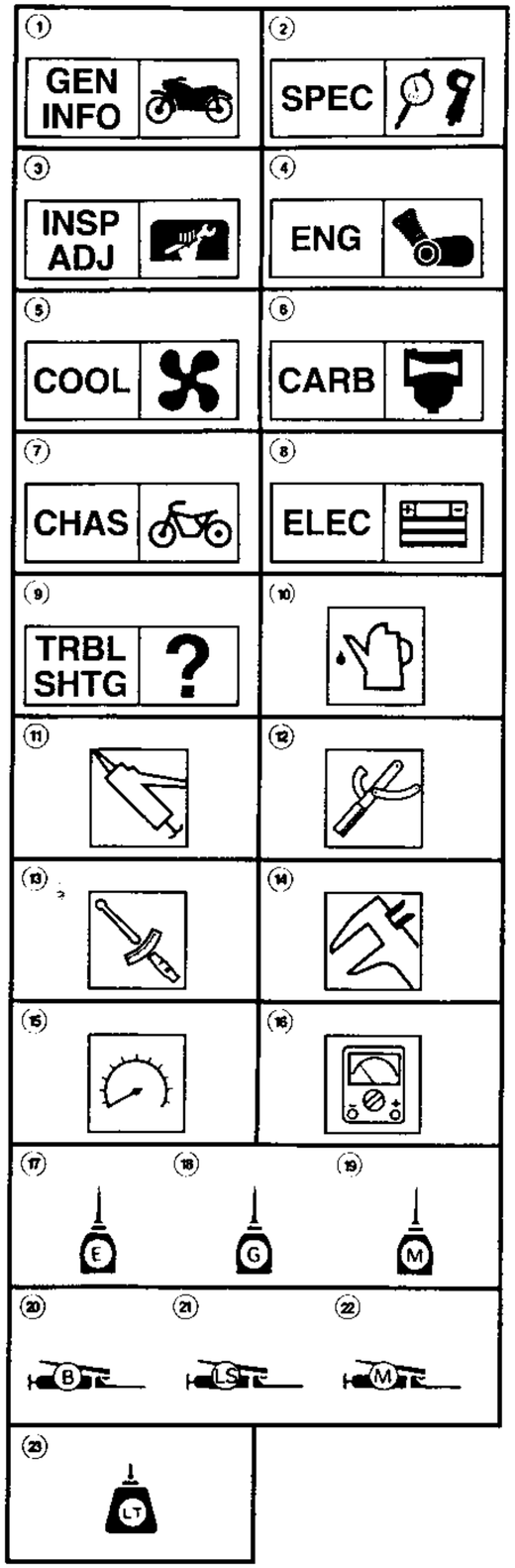
ILLUSTRATED SEQUENCES

The simplest disassembly and reassembly sequences are shown in an exploded drawing of the parts and a table in which the parts themselves are numbered in progressive order of disassembly. Follow the numbers progressively to perform the disassembly sequence. Follow the numbered operations in the reverse order to perform the reassembly sequence. The table also includes notes to facilitate operations.

EXPLODED DIAGRAMS

In some chapters the disassembly section is preceded by exploded diagrams. These are designed to aid identification of components for proper assembly, as well as the assembly procedures themselves.





SYMBOL LEGEND

(Refer to illustrations)

Symbols (1) to (9) are used to indicate chapter number and content.

(1) General information
(2) Technical specifications
(3) Periodic inspection and adjustment
(4) Engine overhaul
(5) Cooling system
(6) Carburetor
(7) Chassis
(8) Electricals
(9) Troubleshooting

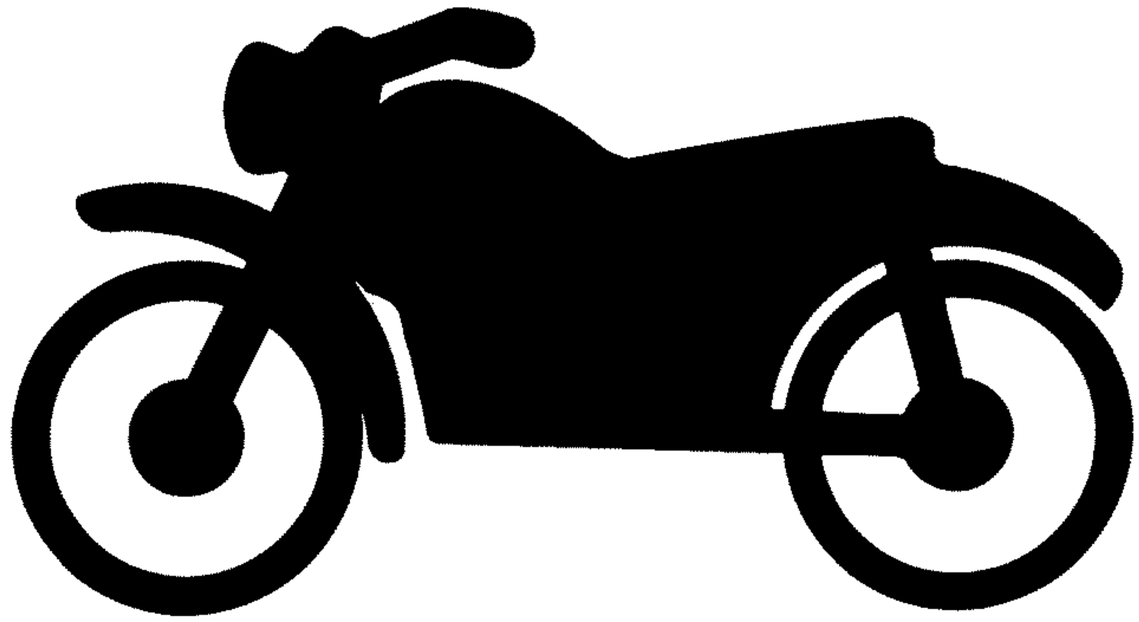
Symbols (10) to (16) serve to specify the following elements:

(10) Fluid
(11) Lubricant
(12) Special tool
(13) Screw tightening
(14) Wear and tear limit, clearance
(15) Engine speed
(16) Resistance (Ω), Voltage (V), Electric Current (A)

Symbols (17) to (23) in the exploded diagram indicate type 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 grease
(22) Apply molybdenum disulfide grease
(23) Apply locking liquid (LOCTITE®)

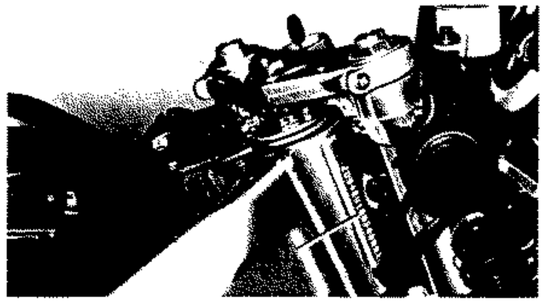
CONTENTS



GEN INFO 1

CHAPTER 1°
GENERAL INFORMATION

IDENTIFICATION OF MOTORCYCLE

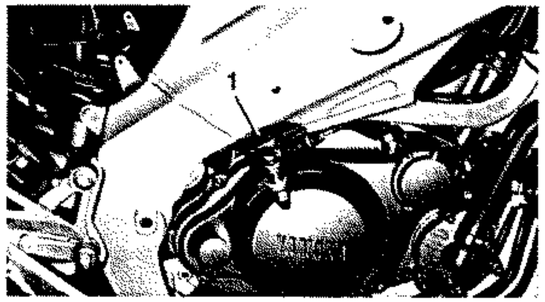


1. Motorcycle identification number

IDENTIFICATION NUMBER

The identification number is stamped on the right of the steering head pipe.

Progressive serial number:
SZR 660
4SU-040101 (D) version
ZD04SU10000000101 (I-GR-P) version
ZD04SU10000020101
[F-B-N-S-DK-NL-(A-CH)] version
ZD04SU10000060101 (E) version



1. Engine serial number

ENGINE SERIAL NUMBER

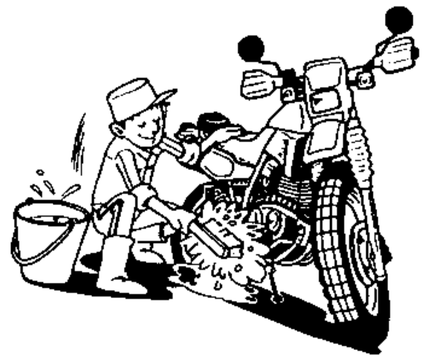
The engine serial number is stamped on the right of the engine.

Progressive engine serial number:
SZR 660
4SU-000101

NOTE:

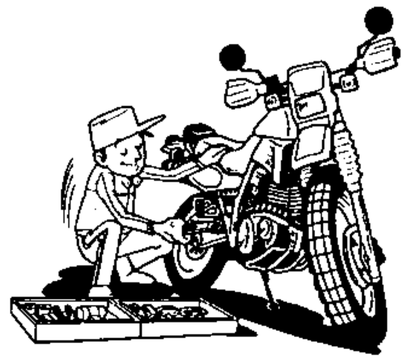
- The first three digits in these numbers identify the model; the other digits form the progressive production number of the unit.
- Diagrams and specifications may be altered without prior warning.

IMPORTANT INFORMATION



PREPARATION FOR DISASSEMBLY AND REASSEMBLY

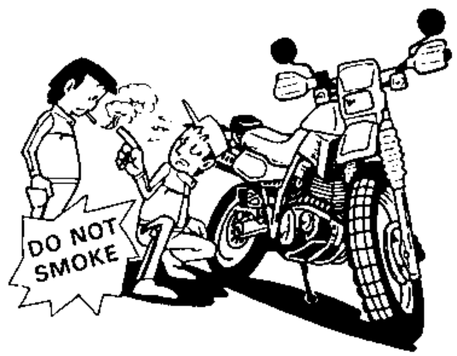
1. Remove all dirt, mud, dust and foreign objects prior to disassembly.



2. Use proper material and tools. Refer to section 'SPECIAL TOOLS'.

3. When disassembling the cycle, keep together mated parts: gears, cylinders, pistons and other parts 'mated' in the course of normal wear and tear. Such parts must be either reused together or completely replaced.

4. During disassembly, clean all parts and place them in trays in order of disassembly. This makes reassembly quicker and helps assure that all parts are assembled properly.



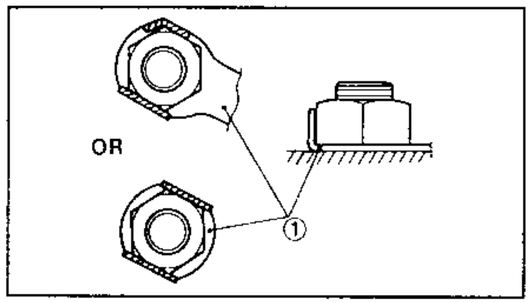
5. Keep away from fire and sources of heat.

SPARE PARTS

1. We recommend original Yamaha parts for all replacements. Use the oil and grease recommended by Yamaha for all assembly and adjustment operations.
   Products of other makes with the same function and appearance might be inferior in quality.

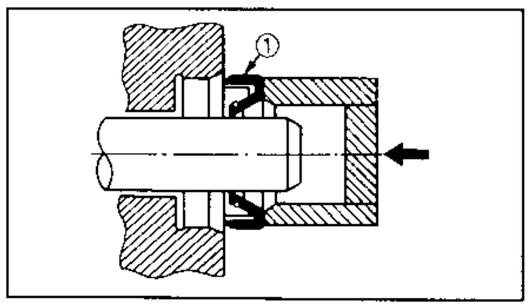
GASKETS, OIL SEALS AND O-RINGS

1. All gaskets, oil seals and O-rings should be replaced during engine overhauls. All gasket surfaces, oil seal lips and O-rings must be cleaned prior to assembly.
2. Properly oil all mating parts and bearings during reassembly. Apply grease to oil seal lips.



LOCK WASHERS, PLATES AND COTTER PINS

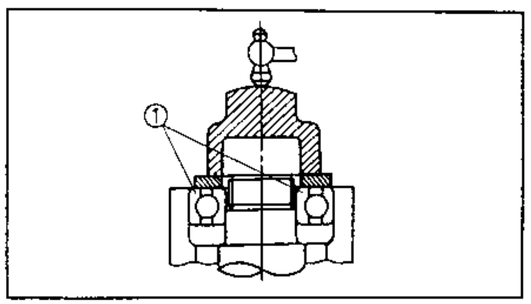
1. All lock washers, plates (1) and cotter pins must be replaced once removed. Lock tabs must be bent along the bolt or nut surfaces after the bolt or nut has been properly tightened.



BEARINGS AND OIL SEALS

1. Fit bearings and oil seals with the manufacturer's mark or number facing outwards (ie, the stamped letters must be visible). When installing oil seals, apply a light coating of lightweight lithium-based grease to the seal lips. Oil the bearings liberally when installing.

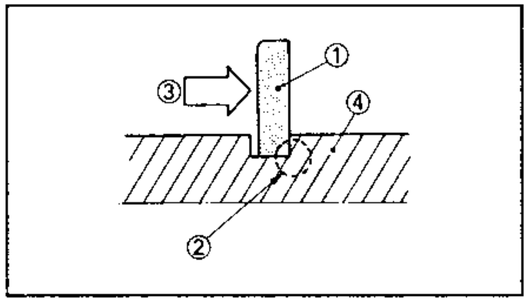
(1) Oil seals



CAUTION:

Do not use compressed air to dry the bearings. This damages their outer surface.

(1) Bearing



CIRCLIPS

1. All circlips should be inspected carefully prior to reassembly. Always replace piston ring clips after one use.
   Replace twisted circlips. When installing a circlip (1), make sure that the sharp-edged corner (2) is positioned opposite the thrust (3) it receives. See the illustration here.

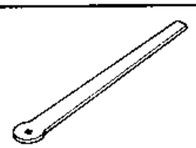
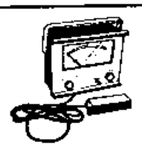
(4) Shaft

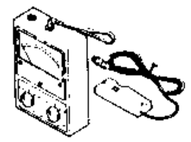
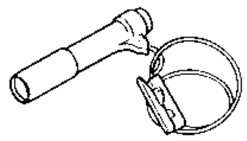
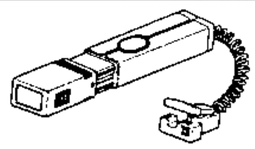
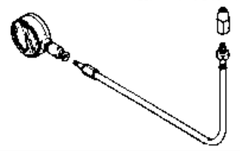
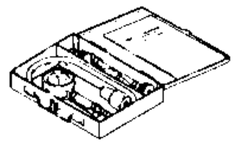
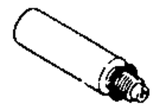
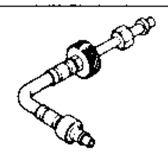
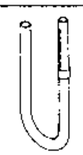
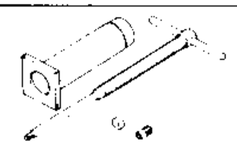
SPECIAL TOOLS

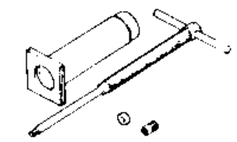
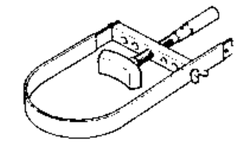
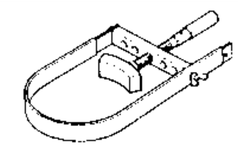
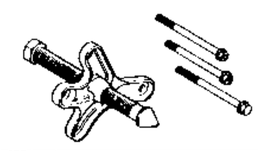
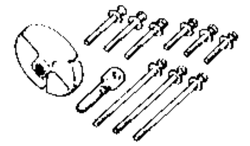
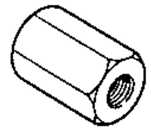
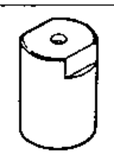
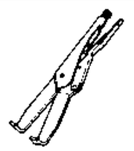
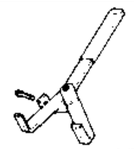
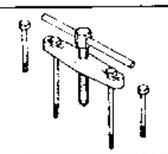
Special tools are required to perform proper disassembly and reassembly operations and for proper tuning up. The use of such tools avoids damage due to the use of unsuitable tools and/or makeshift techniques.
The shape and part number used for the special tool differ by country, so two types are provided. Refer to the list provided to avoid errors when placing an order.

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

Except for USA, CDN
P/N. 90890-□□□□□

Tool number	Tool name	Illustration
YM-08035	VALVE ADJUSTMENT TOOL	
90890-01311	VALVE ADJUSTMENT TOOL	
YU-08036-A	INDUCTIVE ENGINE SPEED INDICATOR	

Tool number	Tool name	Illustration
90890-03113	INDUCTIVE ENGINE SPEED INDICATOR	
YM-33277-A	INDUCTIVE STROBOSCOPIC LAMP	
90890-03141	INDUCTIVE STROBOSCOPIC LAMP	
YU-33223	PRESSURE GAUGE	
90890-03081	PRESSURE GAUGE	
YU-33223-3	ADAPTER FOR PRESSURE GAUGE	
90890-04082	ADAPTER FOR PRESSURE GAUGE	
YM-01312-A	FUEL LEVEL GAUGE	
90890-01312	FUEL LEVEL GAUGE	
YU-01304	PISTON PIN CLIP PULLER	

Tool number	Tool name	Illustration
90890-01304	PISTON PIN CLIP PULLER	
YS-01880	ROTOR HOLDER	
90890-01701	ROTOR HOLDER	
YU-33270	ROTOR SCREW PULLER	
90890-01362	ROTOR SCREW PULLER	
YM-04063-A	ADAPTER FOR ROTOR SCREW PULLER	
90890-04063	ADAPTER FOR ROTOR SCREW PULLER	
YM-91042	ALL-PURPOSE CLUTCH HOLDER	
90890-04086	ALL-PURPOSE CLUTCH HOLDER	
YU-01135-A	CRANKCASE SEPARATING TOOL	

Tool number	Tool name	Illustration
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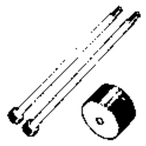
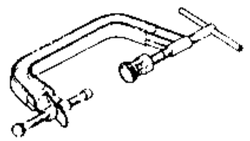
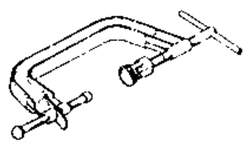
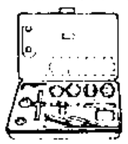
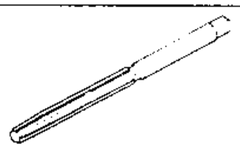
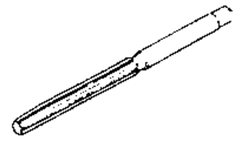
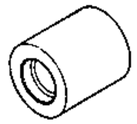
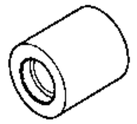
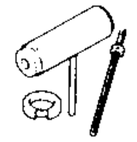
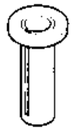
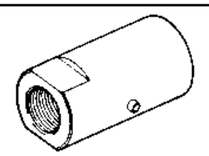
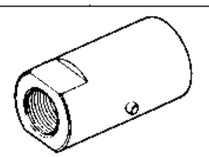
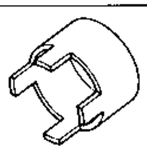
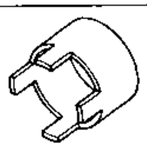
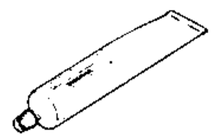
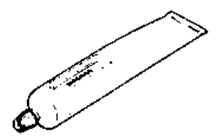
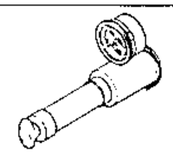
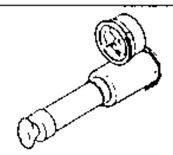
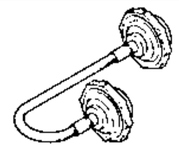
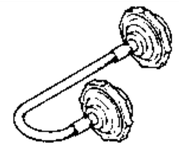
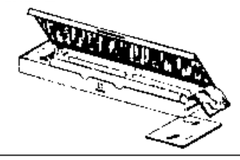
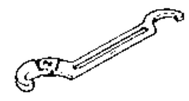
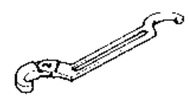
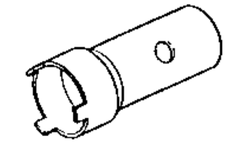
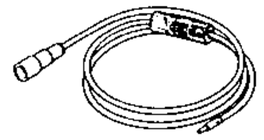
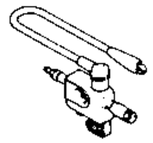
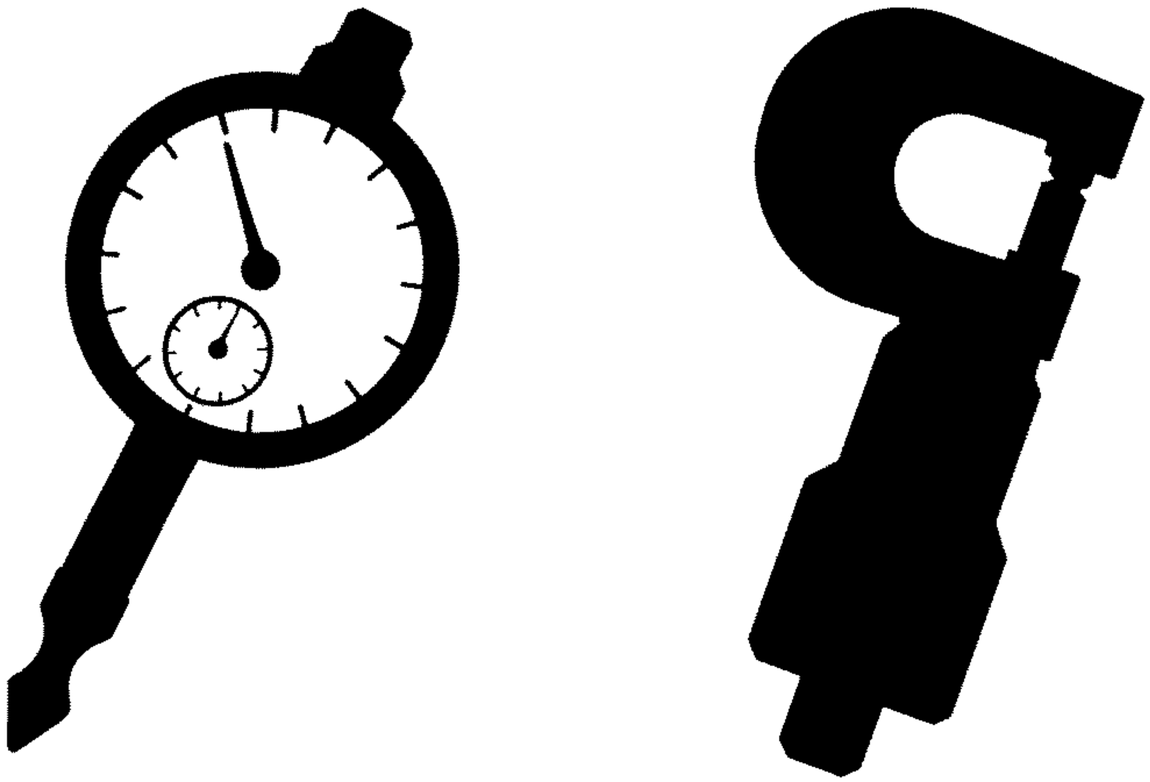
YU-01083-A	SLIDING HAMMER UNIT	
90890-01083	SLIDING HAMMER BOLT	
90890-01084	SLIDING HAMMER WEIGHT	
YM-04019	VALVE SPRING COMPRESSION CLAMP	
90890-04019	VALVE SPRING COMPRESSION CLAMP	
YM-91043	VALVE HOUSING CUTTER	
YM-04064	6 mm (0.24 in) VALVE GUIDE PULLER	
90890-04064	6 mm (0.24 in) VALVE GUIDE PULLER	
YM-04066	6 mm (0.24 in) VALVE GUIDE REAMER	

Tool number	Tool name	Illustration
90890-04066	6 mm (0.24 in) VALVE GUIDE REAMER	
YM-04065-A	6 mm (0.24 in) VALVE GUIDE INSTALLER	
90890-04065	6 mm (0.24 in) VALVE GUIDE INSTALLER	
YU-90050	DRIVING SHAFT INSTALLATION UNIT	
90890-01274	DRIVING SHAFT INSTALLATION HOSE	
90890-01275	DRIVING SHAFT INSTALLATION BOLT	
YM-90069	#10 (M14) ADAPTER (FOR DRIVING SHAFT INSTALLATION)	
90890-04059	#10 (M14) ADAPTER (FOR DRIVING SHAFT INSTALLATION)	
YM-91044	CRANK SPACER	
90890-04081	CRANK SPACER	

Tool number	Tool name	Illustration
90890-01288	SPACER (FOR CRANK)	
ACC-11001-01	SEALANT (QUICK GASKET)® Yamaha Bond No. 1215®	
90890-85505	SEALANT (QUICK GASKET)® Yamaha Bond No. 1215®	
YU-24460-01	RADIATOR CAP TESTER	
90890-01325	RADIATOR CAP TESTER	
YU-33984	ADAPTER (FOR RADIATOR CAP TESTER)	
90890-01352	ADAPTER (FOR RADIATOR CAP TESTER)	
4SU-F8120-W0	FRONT FORK SERVICE KIT ASSY	
YU-01268	RING NUT WRENCH	
90890-01268	RING NUT WRENCH	

Tool number	Tool name	Illustration
90890-01385	RING NUT WRENCH	
YM-34487	DINAMIC SPARK TESTER	
90890-03144	IGNITION CHECKER	
YU-03112	POCKET TESTER	
90890-03112	POCKET TESTER	



SPEC 2

CHAPTER 2°
TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS - GENERAL SPECIFICATIONS

Model code number	4SU1
Initial engine stamp number	4SU-000101
Initial frame stamp number	4SU-040101 (D) version ZD04SU10000000101 (I-GR-P) version ZD04SU10000020101 [F-B-N-S-DK-NL-(A-CH)] version ZD04SU10000060101 (E) version
Dimensions:	
Overall length	2,040 mm
Overall width	740 mm
Overall height	1,140 mm
Seat height	770 mm
Wheel base	1,410 mm
Minimum ground clearance	145 mm
Basic weight	159 kg
Minimum turning radius	3,150 mm (left); 3,200 mm (right)
Engine:	
Engine type	4-stroke, SOHC, liquid cooled, 5-valve
Model	4SU1
Cylinder layout	Single cylinder, inclined forward
Displacement	659 cc
Bore x stroke	100x84 mm
Compression ratio	9.2:1
Starting system	Electric starter
Lubrication:	
Type	Dry sump with separate oil tank
Recommended engine oil	SHELL SUPER 4TX 20W/50
Capacity (engine oil):	
Periodic oil change	2.6 liters
With oil filter replacement	2.7 liters
Total amount	3.0 liters
Cooling system:	
Type	Liquid with forced circulation and electric fan
Water/cooling liquid ratio	50% - 50%
Circuit liquid total quantity	1.4 liters
Expansion tank capacity	0.55 liters
From "LOW" to "FULL"	0.210 liters
Air filter:	
Type	Dry filter element
Fuel (type):	Premium Grade Fuel. If Premium Grade gasoline is not available, then unleaded gasoline with octane grade (R.O.N.) of 91 or higher can be used
Tank capacity:	
Total	14 liters
Reserve amount	2.5 liters
Carburetor:	
Type/Manufacturer	Y26PV-3J/TEIKEI
Spark plug:	
Type/Manufacturer	DPR8EA-9 or DPR9EA-9/NGK
Electrode gap	0.8~0.9 mm
Clutch:	
Type	Wet, multi-disc

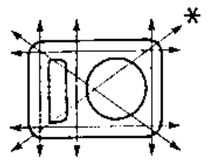
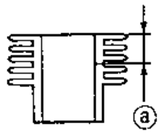
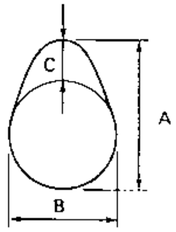
Transmission:		
Type		Constant mesh 5-speed
Primary reduction system		Straight-tooth gears
Primary reduction ratio		71/34 (2.088)
Secondary reduction system		Chain drive
Secondary reduction ratio		39/15 (2.600)
Operation		Left foot operation
Gear ratio:	1st	30/13 (2.308)
	2nd	27/17 (1.588)
	3rd	24/20 (1.200)
	4th	21/22 (0.954)
	5th	19/24 (0.792)
Frame:		
Frame type		Deltabox aluminium frame
Caster angle/Trail		24°/102 mm
Tires:		
Type		Tubeless
Size:		
Front		110/70 ZR17 TX15 (MICHELIN) - 110/70 ZR17 TL (DUNLOP)
Rear		150/60 ZR17 TX25 (MICHELIN) - 150/60 ZR17 TL (DUNLOP)

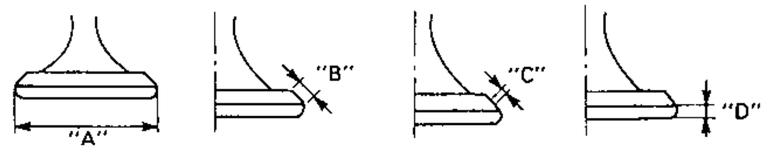
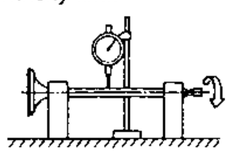
Tire inflation pressure (cold tires) bar-kg/cm² (psi)	Front	Rear
Rider only	2 (28)	2.2 (32)
With passenger	2.2 (32)	2.5 (37)

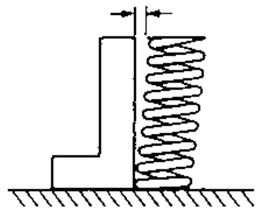
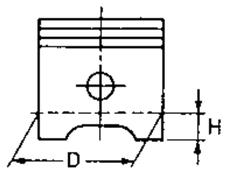
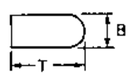
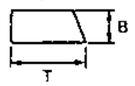
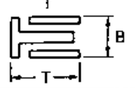
Brakes:	
Front brake type	Single 320 mm disk brake
Operation	Right hand operation
Rear brake type	Single 210 mm disk brake
Operation	Right foot operation
Front suspension:	Adjustable upside-down telescopic fork, dia. 41 mm, Upside Down
Rear suspension:	Aluminium swinging fork with adjustable shock absorber
Wheel travel:	
Front	120 mm
Rear	121.5 mm
Electric system:	
Ignition system	T.C.I. (Digital)
Battery type/Voltage	CTX9 BS YACHT MF/12V 8Ah
Fuses	20A (Main) - 7.5A (Electric fan)
Generator	A.C. 12V
Headlight type	Provided with quartz lamp (halogen)
Bulb specifications:	
Headlights (halogen)	12V-2x55W
Tail/Brake light	12V-21/5W
Turn lights	12V-10W
Front parking light	12V-5W
Numberplate light	12V-5W
Warning lamps: "N" (neutral) - "High beam" "Low fuel" - "Turn lights"	12V-4x1.2W

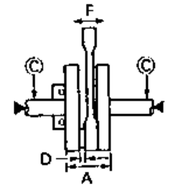
MAINTENANCE SPECIFICATIONS

ENGINE

Part	Standard	Limit
Cylinder head: 	–	0.03 mm *The lines show where you have to site the measuring slide rule
Cylinder: Bore Measurement point (a) 	100.005 ~ 100.07 mm 50 mm	100.1 mm –
Cam shaft: Advance method Cam shaft outer diameter Backlash between cam shaft and cap Cam size: 	Chain advance (left) 22.967 ~ 22.980 mm 0.020 ~ 0.054 mm Suction: "A" 35.69 ~ 35.79 mm "B" 30.06 ~ 30.16 mm "C" 5.74 mm Exhaust: "A" 36.50 ~ 36.60 mm "B" 30.11 ~ 30.21 mm "C" 6.55 mm	 – – 35.54 mm 29.91 mm – 36.35 mm 29.96 mm –
Cam shaft eccentricity limit	–	0.03 mm
Timing chain: Timing chain type Link number Timing chain adjustment method	 75 RN 2015 126 links Automatic	
Rocker/rocker shaft: Rocker outer diameter Rocker shaft inner diameter Rocker-shaft backlash	 12.000 ~ 12.018 mm 11.976 ~ 11.991 mm 0.009 ~ 0.042 mm	 – – –

Part	Standard	Limit
Valves, valve seats, valve guide: Valve clearance (cold): Suction Exhaust	 0.10 ~ 0.15 mm 0.15 ~ 0.20 mm	 – –
Valve sizes: Suction: "A" head diameter "B" face width "C" seat width "D" edge thickness Exhaust: "A" head diameter "B" face width "C" seat width "D" edge thickness	 29.9 ~ 30.1 mm 2.25 mm 0.9 ~ 1.1 mm 0.85 ~ 1.15 mm 31.9 ~ 32.1 mm 2.26 mm 0.9 ~ 1.1 mm 0.85 ~ 1.15 mm	 – – – – – – – –
 Head diameter / Face width / Seat width / Edge thickness		
Rod outer diameter: Suction Exhaust Guide inner diameter: Suction Exhaust Backlash between rod and guide: Suction Exhaust Rod eccentricity limit 	 5.975 ~ 5.990 mm 5.960 ~ 5.975 mm 6.000 mm ~ 6.012 mm 6.000 ~ 6.012 mm 0.010 mm ~ 0.037 mm 0.025 ~ 0.052 mm –	 5.95 mm 5.93 mm 6.05 mm 6.55 mm 0.08 mm 0.1 mm 0.01 mm
Valve seat standard width: Suction and Exhaust	0.9 ~ 1.1 mm	–

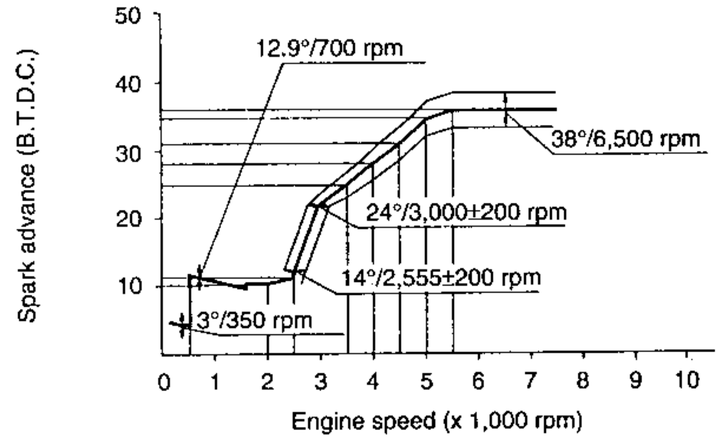
Part	Standard	Limit
Valve springs:		
Free length:		
Suction	32.63 mm	–
Exhaust	36.46 mm	–
Position size (with closed valve):		
Suction	27.50 mm	–
Exhaust	31.00 mm	–
Winding sense (top view):		
Suction and exhaust	Clockwise 	
Slope limit: 		
Suction	–	2.5°/1.4 mm
Exhaust	–	2.5°/1.6 mm
Compression force (with closed valve):		
Suction	10.2 ~ 11.8 kg	–
Exhaust	12.3 ~ 14.1 kg	–
Piston:		
"D" piston size	99.945 ~ 99.985 mm	–
"H" measurement point 	2.5 mm	–
Piston allowance	1.0 mm	–
Piston pin off-centring	Suction side	
Piston-cylinder backlash	0.050 ~ 0.070 mm	0.15 mm
Rings:		
Type:		
Upper ring	Trapezoidal	
Lower ring	Conic	
Sizes (B x T):		
Upper ring 	B = 1.2 mm T = 3.8 mm	– –
Lower ring 	B = 1.2 mm T = 4.0 mm	– –
Scraper ring 	B = 2.5 mm T = 3.4 mm	– –

Part	Standard	Limit
End clearance (with mounted ring):		
Upper ring	0.30 ~ 0.45 mm	–
Lower ring	0.30 ~ 0.45 mm	–
Scraper ring	0.20 ~ 0.70 mm	–
Side backlash (with installed ring):		
Upper ring	0.04 ~ 0.08 mm	–
Lower ring	0.03 ~ 0.07 mm	–
Scraper ring	0.015 ~ 0.042 mm	–
Main shaft: 		
"A" shaft width	74.95 ~ 75.00 mm	–
"C" off-centring limit	–	0.03 mm
"D" backlash	0.35 ~ 0.65 mm	–
"F" small end backlash	0.8 ~ 1.0 mm	–
Balancing weight:		
Advance method	Cylinder gear	
Clutch:		
Friction plate:		
Thickness	2.74 ~ 2.86 mm	2.6 mm
Quantity	6 parts	
Friction plate:		
Thickness	2.94 ~ 3.06 mm	2.8 mm
Quantity	2 parts	
Clutch plate:		
Thickness	1.2 mm	–
Quantity	7 parts	
Distortion limit	–	0.2 mm
Clutch spring:		
Free length	42.8 mm	40.8 mm
Quantity	5 parts	
Clutch release method	Rack and pinion external traction	
Gear box:		
Principal axis off-centring limit	–	0.08 mm
Intermediate shaft off-centring limit	–	0.08 mm
Selector:		
Type	Drum with cam and guide bar	

Part		Standard	Limit
Lubrication system:			
Oil filter:			
Type		Paper	
Oil pump:			
Type		Trochoidal	
Extremity clearance		0.12 mm	–
Lateral clearance		0.03 ~ 0.08 mm	–
Derivation valve adjustment pressure		80 ~ 120 kPa (0.8 ~ 1.2 kg/cm²)	–
Cooling system:			
Radiator	Width	431 mm	–
	Height	133 mm	–
	Thickness	32 mm	–
Valve adjustment pressure		95 ~ 125 kPa (0.95 ~ 1.25 kg/cm²)	–
Expansion tank capacity		0.55 litri	–
From "LOW" to "FULL"		0.210 litri	–
Liquid pump:			
Type		Single suction centrifugal pump	
Reduction ratio		33/34 (0.971)	–
Thermostat:			
Opening temperature		80 ~ 84°C (176 ~ 183°F)	–
Carburetor:			
Identification initials		4SU-00	–
Main jet	(M.J.)		
Primary carburetor		#140	–
Secondary carburetor		#165	–
Main air jet	(M.A.J.)		
Primary carburetor		Ø 1.0	–
Secondary carburetor		Ø 1.0	–
Jet needle	(J.N.)		
Primary carburetor		5D96-3/5	–
Secondary carburetor		5X7C-4/5	–
Nozzle jet	(N.J.)		
Primary carburetor		V-00	–
Secondary carburetor		Ø 2.7	–
Pilot air jet	(P.A.J.)	Ø 0.6	–
Pilot jet	(P.J.)	#50	–
Pilot output	(P.O.)	0.8	–
By pass	(B.P.)	Ø 1.0	–
Pilot screw	(P.S.)	ca. 3 turns open	–
Valve seat	(V.S.)	Ø 2.5	–
Starter jet	(G.S.)	# 76	–
Fuel level	(F.L.)	6.0~8.0 mm under float chamber matching surface	–
Float height	(F.H.)	25.0~27.0 mm	–
Engine idle speed		1,300 ± 50 rpm	–
Suction pressure at engine idle speed		26.6~34.6 kPa (200~260 mmHg)	–

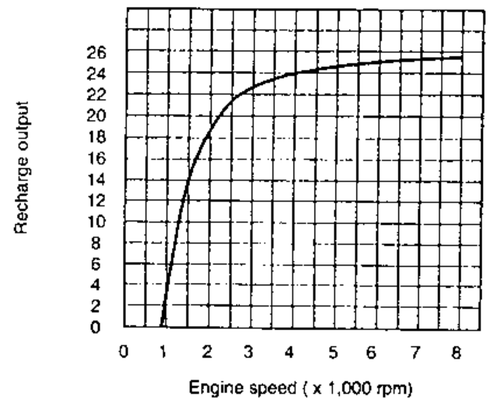
ELECTRIC SYSTEM

Part	Standard	Limit
Voltage:	12V	–
Ignition system:		
Minimum spark advance (B.T.D.C.)	12° at 1,300 rpm	–
Maximum spark advance (B.T.D.C.)	38° at 6,500 rpm	–
Spark advance device	Electric type	



Spark unit:		
Model/Manufacturer	TNDF19/NIPPONDENSO	
Pick-up coil resistance (colour)	184~276 Ω at 20°C (68°F) (Blue/Yellow - Green/White)	–
Ignition coil:		
Model/Manufacturer	JO268/NIPPONDENSO	
Primary coil resistance	3.4~4.6 Ω at 20°C (68°F)	–
Secondary coil resistance	10.4~15.6 kΩ at 20°C (68°F)	–
Spark plug cap:		
Type	Resin	
Spark plug cap resistance	10 kΩ at 20°C (68F)	–
Charge system:		
Type	CA magnet generator	

B-1

Part	Standard	Limit
AC Alternator:		
Model/Manufacturer	TLMZ55/NIPPONDENSO	
Recharge output	14V, 24.5A at 5,000 rpm	–
Armature resistance (winding)	0.20~0.30 Ω at 20°C (68°F)	–
(colour)	(White - White)	
		
Voltage regulator/Rectifier:		
Model/Manufacturer	SH650A/SHINDENGEN	
Voltage regulator:		
Type	Short circuit semiconductor	
Not charged adjusted voltage	14.2~15.2V	–
Rectifier:		
Capacity	25A	
Resistance voltage	240V	
Battery:		
Electrolyte density	1.320	–
Electric starter system:		
Type	Constant mesh gear	
Starter motor:		
Model/Manufacturer	SM-13/MITSUBA	
Capacity	0.8 kW	
Brush length	12.5 mm	5 mm
Commutator diameter	28 mm	27 mm
Mica cut (depth)	0.7 mm	–
Ignition relay:		
Model/Manufacturer	MS5D-191/HITACHI	
Nominal amperage	100A	
Horn:		
Type	Flat	
Model/Manufacturer	220/CEV-PAGANI	
Max. intensity	2.5A	

Part	Standard	Limit
Turn light relay:		
Type	Warm-wire type	
Model/Manufacturer	301877102/CEV-PAGANI	
Automatic stop device	None	
Flashing frequency	60~120 cycles/min	–
Power	10Wx2+2W	
Electric fan:		
Model/Manufacturer	VA27-A37/C-46A 12V/SPAL	
Thermostatic switch:		
Model/Manufacturer	VF105A/N. THERMOSTAT	
Operating temperature	102~108°C (215.6~226.4°C): ON	–
	98°C (208.4°F): OFF	–
Thermo unit:		
Model/Manufacturer	KIAL 41/NIPPONDENSO	
Coil resistance	226 Ω at 50°C (122°F)	–
	26.4 Ω at 115°C	–
Electric circuit switch device:		
Type	Fuse	
Individual amperage	20A (main)	
	7.5A (electric fan)	

B-2

CHASSIS

Part	Standard	Limit
Steering:		
Bearing type	Taper roller bearing	
Front suspension:		
Fork travel	120 mm	
Fork spring: free length	402 mm	–
Spring constant (K)	7.95 N/mm (0.795 kg/mm)	
Optional spring	None	
Oil amount	300 cu.cm	
Oil level	130 mm from upper edge of inner tube (fully compressed, without spring)	
Oil type:	BEL RAY MC 10 SAE5	
Inner tube external diameter	41 mm	
Rear suspension:		
Shock absorber travel	48 mm	
Free spring length	175 mm	–
Spring-loaded length:		
Standard	166 mm	
Minimum	161 mm	
Maximum	170 mm	
Spring constant (K)	125 N/mm (12.5 kg/mm)	
Travel	Zero~65 mm	
Optional spring	None	
Gas pressure	12 kg/sq.cm (170 psi)	
Rear arm:		
Clearance limit	–	1.0 mm at the rear arm end (move rear arm from side to side)
Side clearance	0.4~0.7 mm at the rear arm axle	–
Front wheel:		
Type	Light alloy	
Rim size	3.00x17"	
Wheel material	Aluminium	
Wheel eccentricity limit:		
Vertical	–	0.5 mm
Lateral	–	0.5 mm

Part	Standard	Limit
Rear wheel:		
Type	Light alloy	
Rim size	4.00x17"	
Wheel material	Aluminium	
Wheel eccentricity limit		
Vertical	–	0.5 mm
Lateral	–	0.5 mm
Drive chain:		
Type/Manufacturer	135 ORS-A REGINA CHAIN	
Number of links	110	
Chain slack	25~40 mm	–
Front disk brake:		
Type	Single	
External disk diameter	320 mm	
Disk thickness	4 mm	3.5 mm
Pad thickness	5.0 mm	0.8 mm
Internal master cylinder diameter	13 mm	
Internal caliper cylinder diameter	30/34 mm	
Quantity	2 parts	
Brake fluid type	DOT #4	
Rear disk brake:		
Type	Single	
External disk diameter	210 mm	
Disk thickness	5 mm	4 mm
Pad thickness	4.0 mm	0.8 mm
Internal master cylinder diameter	11 mm	
Internal caliper cylinder diameter	32 mm	
Brake fluid type	DOT #4	
Brake pedal lever:		
Brake lever free play (travel)	2~5 mm at the lever end	–
Brake pedal position	50 mm below the footrest plane	–
Clutch lever and throttle grip:		
Clutch lever free play	10~15 mm at the lever end	–
Throttle cable free play	3.0~5.0 mm at the grip flange	–

TIGHTENING TORQUES

Part to be tightened	Thread size	Q.ty	Tightening torque Nm	Tightening torque mkg	Note
Head					
Flange bolt	M9	4	38	3.8	
Flange bolt	M9	2	38	3.8	
Socket head bolt	M6	1	10	1.0	
Stud bolt (exhaust pipe)	M6	4	7	0.7	
Screw plug	M18	–	55	5.5	
Spark plug	M12	1	18	1.8	
Cylinder head cover					
Socket head bolt	M6	16	10	1.0	
Cylinder head cover					
Socket head bolt	M6	1	10	1.0	
Cylinder head lateral cover	M32	2	12	1.2	
Socket head bolt	M6	4	10	1.0	
Gear unit assembling					
Socket head bolt	M6	1	10	1.0	
Engine speed indicator stop cap					
Flat head screw	M6	1	7	0.7	
Cylinder					
Flange bolt	M10	2	42	4.2	
Flange bolt	M10	2	42	4.2	
Socket head bolt	M6	2	10	1.0	
1 support					
Socket head bolt	M6	1	10	1.0	
Balancer shaft gear					
Hexagonal nut	M16	1	60	6.0	Use a lock washer
Rotor (AC magnet)					
Hexagonal nut	M14	1	150	15.0	
Lock nut (valve clearance adjustment)					
Hexagonal nut	M6	4	14	1.4	
2 retainer guide					
Hexagonal bolt	M6	2	8	0.8	
Timing sprocket					
Flange bolt	M7	2	20	2.0	
Timing chain tensioner					
Hexagonal head bolt	M6	2	10	1.0	
Rocker shaft stop					
Socket head bolt	M6	2	10	1.0	
Cooling liquid pump					
Socket head bolt	M6	3	10	1.0	
1 tube					
Socket head bolt	M6	1	10	1.0	
2 tube					
Flange bolt	M6	1	10	1.0	
Thermostat assembly					
Flange bolt	M6	2	10	1.0	

Part to be tightened	Thread size	Q.ty	Tightening torque Nm	Tightening torque mkg	Note
Filler (coolant)					
Cylindrical socked head bolt	M6	1	10	1.0	
Oil pump					
Socket head bolt	M6	2	10	1.0	
Oil delivery/return hose					
Truncated cone head screw	M6	2	7	0.7	
Draining plug (oil sump)	M14	1	30	3.0	
Oil filter cover					
Socket head bolt	M6	3	10	1.0	
Drainage screw	M5	1	5	0.5	
Radiator					
Flange bolt	M6	4	10	1.0	
Oil pump assembly					
Flange bolt	M6	3	10	1.0	
2 cover					
Truncated cone head screw	M6	1	7	0.7	
Oil suction net filter					
Truncated cone head screw	M6	2	7	0.7	
Drainage hole					
Plug screw	M14	1	30	3.0	
Filter cover					
Socket head bolt	M6	1	10	1.0	
Socket head bolt	M6	2	10	1.0	
Filter cover drainage					
Screw	M5	1	5	0.5	
1 oil tube					
Socket head bolt	M6	4	10	1.0	
Drilled joint	M12	1	35	3.5	
2 oil tube					
Socket head bolt	M6	2	10	1.0	
Drilled joint	M12	1	35	3.5	
Connecting oil hose					
Bolt	M10	2	20	2.0	
Socket head bolt	M6	1	10	1.0	
Carburetor joint					
Socket head bolt	M6	4	10	1.0	
Left carburetor joint					
Clamp	M4	1	2	0.2	
Right carburetor joint					
Clamp	M5	1	5	0.5	
Carburetor joint (left, air filter)					
Clamp	M4	1	2	0.2	
Carburetor joint (right, air filter)					
Clamp	M5	1	5	0.5	

B-4

Part to be tightened	Thread size	Q.ty	Tightening torque Nm	Tightening torque mkg	Note
Air cleaner case					
Self-tapping screw	M9	7	5	0.5	
Air cleaner cover					
Crosshead screw	M5	3	5	0.5	
Exhaust pipe					
Nut	M6	4	10	1.0	
1-2 exhaust pipes					
Socket head bolt	M6	1	10	1.0	
Silent-Block to frame					
Flange nut	M8	1	23	2.3	
Silent-Block to bracket					
Flange nut	M8	1	23	2.3	
1 exhaust pipe to bracket					
Flange screw	M8	1	23	2.3	
Muffler and exhaust pipe					
Socket head bolt	M6	1	10	1.0	
Muffler assembling					
Flange bolt	M10	1	40	4.0	
1 - 2 oil sump					
Socket head bolt	M6	9	10	1.0	
Socket head bolt	M6	4	10	1.0	
Socket head bolt	M6	1	10	1.0	
Holdfast (cable)					
Truncated cone head screw	M6	1	7	0.7	
1 crankcase cover					
Socket head bolt	M6	6	10	1.0	
Socket head bolt	M6	1	10	1.0	
Socket head bolt	M6	1	10	1.0	
Socket head bolt	M6	1	10	1.0	
Plug screw	M8	1	10	1.0	
2 crankcase cover					
Socket head bolt	M6	2	10	1.0	
3 crankcase cover					
Socket head bolt	M6	5	10	1.0	
Socket head bolt	M6	3	10	1.0	
Socket head bolt	M6	2	10	1.0	
Bearing cover plate					
Flat head screw	M6	3	7	0.7	⊣B
Locking plate					
Socket head bolt	M6	2	10	1.0	
Clutch spring					
Screw with washer	M6	5	8	0.8	
Clutch hub					
Nut	M20	1	90	9.0	Use a lock washer
Primary transmission gear					
Nut	M20	1	120	12.0	Use a lock washer
Thrust lever assembly (stop)					
Bolt	M6	1	6.5	0.65	
Thrust lever assembly					
Screw	M8	1	12	1.2	

Part to be tightened	Thread size	Q.ty	Tightening torque Nm	Tightening torque mkg	Note
Guide sprocket					
Nut	M18	1	110	11.0	Use a lock washer
Oil seal cover					
Socket head bolt	M6	2	10	1.0	
Stop lever					
Screw with washer	M6	1	10	1.0	
Gearbox arm					
Bolt	M6	1	10	1,0	
Stator coil					
Truncated cone head screw	M6	3	7	0.7	⊣B
Neutral switch	M10	1	20	2.0	
1 lateral cylinder head cover	M32	2	12	1.2	
Spring tensioner					
Hole	M16	1	20	2.0	
Starter					
Flange bolt	M6	2	10	1.0	
1 cover					
Socket head bolt	M6	1	10	1.0	
Socket head bolt	M6	3	10	1.0	
Starter unidirectional clutch					
Socket head bolt	M8	3	30	3.0	Stop ⊣B
Pick-up coil					
Truncated cone head screw	M5	2	5	0.5	⊣B
Ignition coil					
Socket head bolt	M5	2	5	0,5	
Voltage regulator					
Hexagonal head bolt	M6	2	5	0.5	
Ignition unit					
Hexagonal head screw	M6	2	5	0.5	
Thermo switch					
Truncated cone head screw	M16	1	28	2.8	
Thermo unit					
Truncated cone head screw	PT1/8	1	15	1.5	

Part to be tightened	Thread size	Q.ty	Tightening torque Nm	Tightening torque mkg	Note
Engine assembling:					
Front engine bracket and frame	M10 x 1.25	1	65	6.5	Axle
Front engine bracket and engine	M10 x 1.25	2	65	6.5	Flange bolt and locknut
Upper cylinder head bracket and frame	M10 x 1.25	2	65	6.5	Socket head bolt and locknut
Upper engine bracket and cylinder head	M10 x 1.25	1	65	6.5	Socket head bolt and locknut
Rear/upper engine and frame	M10 x 1.25	1	65	6.5	Socket head bolt and locknut
Rear/lower engine and frame	M10 x 1.25	1	65	6.5	Bolt
Lower/rear engine axle tightening	M6 x 1.0	1	10	1.0	Socket head screw
Driver footrest and frame	M8 x 1.25	4	23	2.3	Special screw

Tightening sequence:

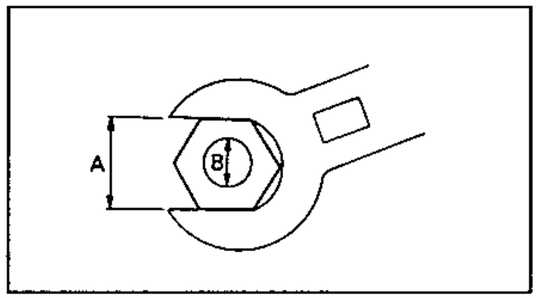
Part to be tightened	Thread size	Q.ty	Tightening torque Nm	Tightening torque mkg	Note
Passenger footrest and frame	M8 x 1.25	4	25	2.5	Hexagonal head screw with flange
Footrest to bracket	M10 x 1.5	2	50	5.0	Socket thin head screw
Side stand:					
Side stand bracket to frame	M10 x 1.25	2	55	5.5	Screw
Stand pivot	M10 x 1.25	1	40	4.0	Pivot
Stand nut	M10 x 1.25	1	35	3.5	Special nut
Rear small frame:					
Upper rear small frame to main frame fastening	M10 x 1.25	2	40	4.0	Hexagonal head screw with flange
Lower rear small frame to main frame fastening	M8 x 1.25	2	23	2.3	Hexagonal head screw with flange
Front small frame:					
Rear small frame to steering head fastening	M8 x 1.25	2	25	2.5	Hexagonal head screw with flange
Rear small frame to main frame fastening	M8 x 1.25	1	23	2.3	Hexagonal head screw with flange
Side panel/fender/rear cowling/fuel tank:					
Rear wheel fender to rear arm	M6 x 1	3	10	1.0	Hexagonal head screw
Front wheel fender to front fork	M6 x 1	4	10	1.0	Socket thin head screw
Front wheel fender to front fork	M6 x 1	2	10	1.0	Socket thin head screw and locknut
Battery case to rear small frame	M6 x 1	5	10	1.0	Hexagonal head screw
Rear cowling to rear small frame	M6 x 1	2	10	1.0	Socket thin head screw
Fuel tank to frame	M6 x 1	1	10	1.0	Large socket thin head screw
Fuel tank to rear small frame	M6 x 1	1	10	1.0	Socket thin head screw
Fuel pump to bracket	M5 x 0.75	2	5	0.5	Flange nut
Bracket to fuel tank	M6 x 1	2	7	0.7	Cylindrical head screw
Front small frame and headlight	M6 x 1	4	7	0.7	Locknut
Front small frame and instrumentation	M5 x 0.75	3	5	0.5	Flange nut
Front small frame and mirrors	M6 x 1	4	10	1.0	Flange cap nut
Side panel to frame bracket	M6 x 1	2	10	1.0	Hexagonal head screw
Bracket to frame	M6 x 1	2	10	1.0	Socket thin head screw
Air connection to front small frame	M6 x 1	2	10	1.0	Socket head screw
Side panel, air connection to bracket	M5 x 0.75	3	5	0.5	Socket thin head screw
Front fork/handle bar:					
Handle crown and fork	M8 x 1.25	2	23	2.3	Socket head screw
Handle crown and handle bar fastening	M6 x 1	2	10	1.0	Socket head screw

Part to be tightened	Thread size	Q.ty	Tightening torque Nm	Tightening torque mkg	Note
Under bracket and fork	M8 x 1.25	4	23	2.3	Socket head screw
Handle bar fastening to fork	M8 x 1.25	4	23	2.3	Socket head screw
Handle crown nut	M22 x 1.0	1	110	11.0	Nut
Counterweight to handle bar fastening	M8 x 1.25	2	25	2.5	Socket head screw
Upper steering ring nut and steering column	M25 x 1.0	2	3	0.3	Ring nut
Rear/front braking circuit:					
Front brake master cylinder and fastening bracket to handle bar	M6 x 1.0	2	10	1.0	Socket head screw
Brake fluid tank (front bracket)	M6 x 1.0	2	10	1.0	Socket head screw
Front brake master cylinder and brake hose	M10 x 1.0	1	15	1.5	Joint
Front brake caliper and brake hose	M10 x 1.0	1	15	1.5	Joint
Front and rear brake fluid bleeder screw	M10 x 1.0	1	6	0.6	Air bleeder
Front brake caliper to front fork	M10 x 1.5	2	50	5.0	Hexagonal head screw with flange
Front wheel axle	M16 x 1.5	1	70	7.0	Axle
Front wheel axle fastening bolt	M8 x 1.25	1	15	1.5	Socket head screw
Front/rear brake disk and hub	M8 x 1.25	6+3	23	2.3	Socket thin head screw
Footrest and rear brake master cylinder	M6 x 1.0	2	13	1.3	Hexagonal head screw
Bracket and rear brake fluid tank	M6 x 1.0	1	4	0.4	Socket head screw
Rear brake caliper and bracket	M8 x 1.25	2	23	2.3	Socket thin head screw
Rear brake caliper and brake hose	M10 x 1.0	1	15	1.5	Joint
Rear brake master cylinder and brake hose	M10 x 1.0	1	15	1.5	Joint
Driven sprocket and hub clutch	M8 x 1.25	6	23	2.3	Hexagonal head screw
Rear wheel axle nut	M14 x 1.5	1	80	8.0	Axle + locknut
Shock absorber/rear arm:					
Rear arm/rear arm axle and main frame	M18 x 1.5	1	110	11	Axle + locknut
Rear arm and connecting rods	M10 x 1.25	1	40	4.0	Bolt + locknut
Relay arm and connecting rods	M10 x 1.25	1	40	4.0	Bolt + locknut
Relay arm and frame	M10 x 1.25	1	40	4.0	Bolt + locknut
Relay arm and shock absorber	M10 x 1.25	1	40	4.0	Bolt + locknut
Shock absorber and frame	M10 x 1.25	1	40	4.0	Bolt + locknut
Chain guard seal and rear arm	M6 x 1.0	1	5	0.5	Hexagonal head screw
Chain case and rear arm	M6 x 1.0	2	9	0.9	Hexagonal head screw

GENERAL SPECIFICATIONS ABOUT TIGHTENING TORQUES

This table indicates the tightening torques for standard attachments with ISO-pitch thread. Torque specifications for special components or units are indicated in the related sections of this manual. In order to avoid any damage, tighten those units with many fastenings by following a progressive cross sequence, until the final tightening torque is obtained. Unless otherwise specified, the tightening torques given are meant for clean and dry threads. All components must be at ambient temperature.

A (Nut)	B (Bolt)	General specification about tightening torques Nm	General specification about tightening torques mkg
10 mm	6 mm	6	0.6
12 mm	8 mm	15	1.5
14 mm	10 mm	30	3.0
17 mm	12 mm	55	5.5
19 mm	14 mm	85	8.5
22 mm	16 mm	130	13.0



A: Distance between flat parts
B: External thread diameter

DEFINITION OF UNITS OF MEASUREMENT

Unit	Meaning	Definition	Measure
mm cm	millimetre centimetre	10^{-3} metres 10^{-2} metres	Length Length
kg	kilogram	10^{3} grams	Weight
N	Newton	1 kg x m/sec^2	Force
Nm mkg	Newton-metre metre per kilo	N x m m x kg	Torque Torque
Pa N/mm	Paskal Newton per mm	N/m^2 N/mm	Pressure Spring constant
L cm^3	Litre Cubic centimetres	—	Volume or capacity
rpm	Revolutions per minute	—	Engine speed

LUBRICATION POINTS AND LUBRICANT TYPE

ENGINE

Lubrication points (part name)	Lubricant type
Oil seal edges (completely)	LS
Bearing retainer	E
Rod pins	E
Rod (big end)	E
Pistons and piston rings	E
Hub (balancer drive sprocket)	E
Piston pins	E
Valve stem and guide	M
Oil seal (valve stem end)	M
Rocker shaft and rocker arm	E
Cam and bearing (camshaft)	E
Rotor and rotor housing (oil pump)	E
Disengagement control rod	LS
Primary driven gear and primary shaft	E
Sliding gear (transmission)	M
Free gear (transmission)	M
Shift forks and fork guide bar	E
Gearshift cam and bearing (gearshift cam)	E
Gearshift shaft	E
Rod housing coupled surfaces	Bonding agent (rapid seal adhesive)® Yamaha bond No. 1215®
Coupled surfaces (cylinder head and cylinder head cover)	Bonding agent (rapid seal adhesive)® Yamaha bond No. 1215®

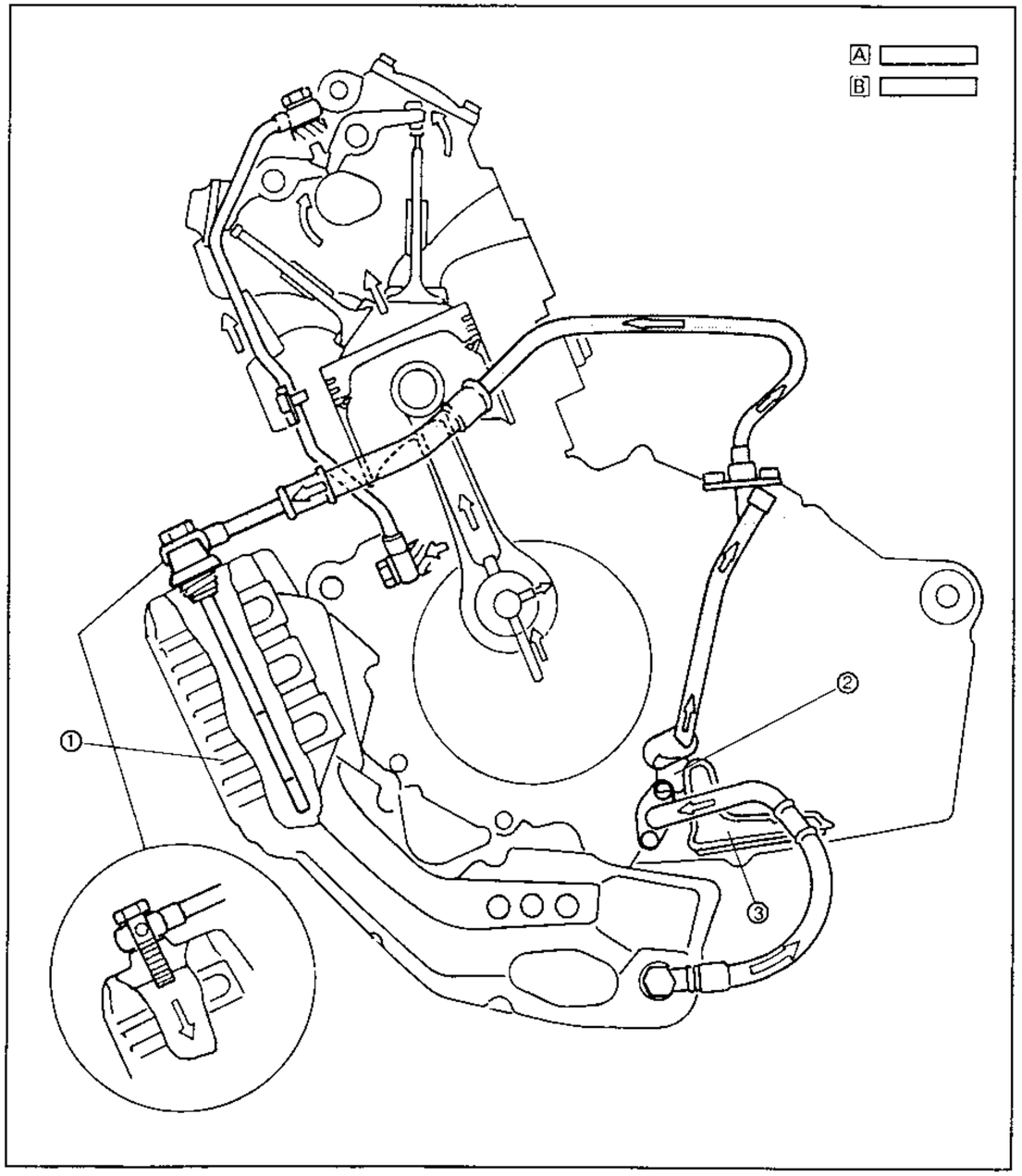
CHASSIS

Lubrication points (part name)	Lubricant type
Gear unit (tachometer)	LS
Oil seal edges (completely)	LS
Wheel axle (front and rear wheels)	LS
Rear wheel hub and clutch	LS
Bearing brasses (rear arm) and relay arm	LS
Pivot rod (rear arm)	LS
Bearing brasses (rear shock absorber)	LS
Bearing brasses (shock arm and link)	LS
Bearing (shock arm and link)	LS
Pivot points (brake pedal and gearshift selector)	LS
Bearings (steeering column)	LS
Throttle grip end	LS
Pivot points (brake lever and clutch lever)	LS
Clutch cable end	LS
Pivot points (side stand)	LS
Bearing brasses (chain tensioner)	LS
Grease nipple (rear arm)	LS
Grease nipple (shock arm)	LS
Grease nipple (shock link)	LS

LUBRICATION LAYOUT

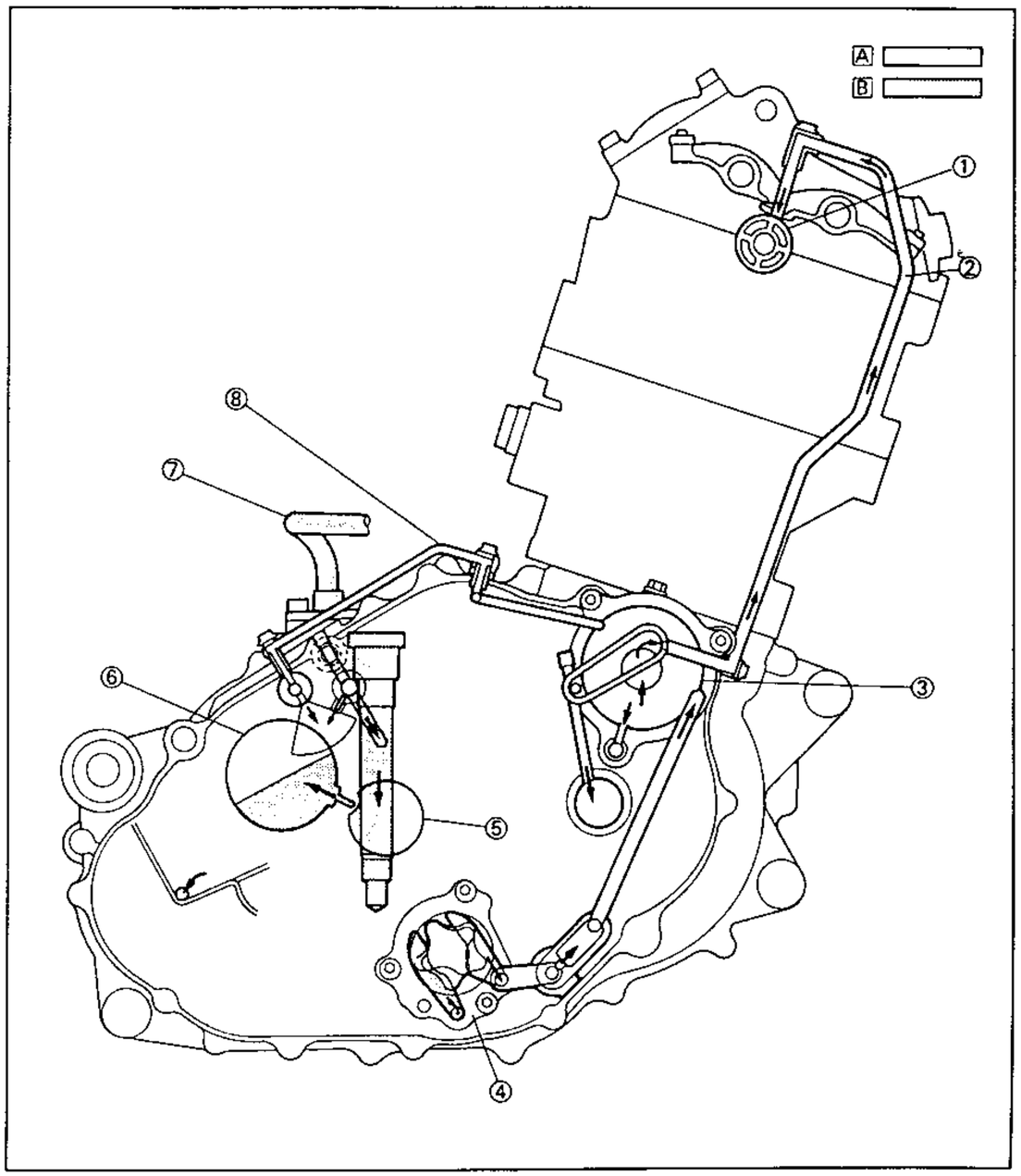
(1) Oil tank
(2) Oil pump
(3) Oil pump strainer (engine)

[A] INTAKE
[B] RETRIEVAL



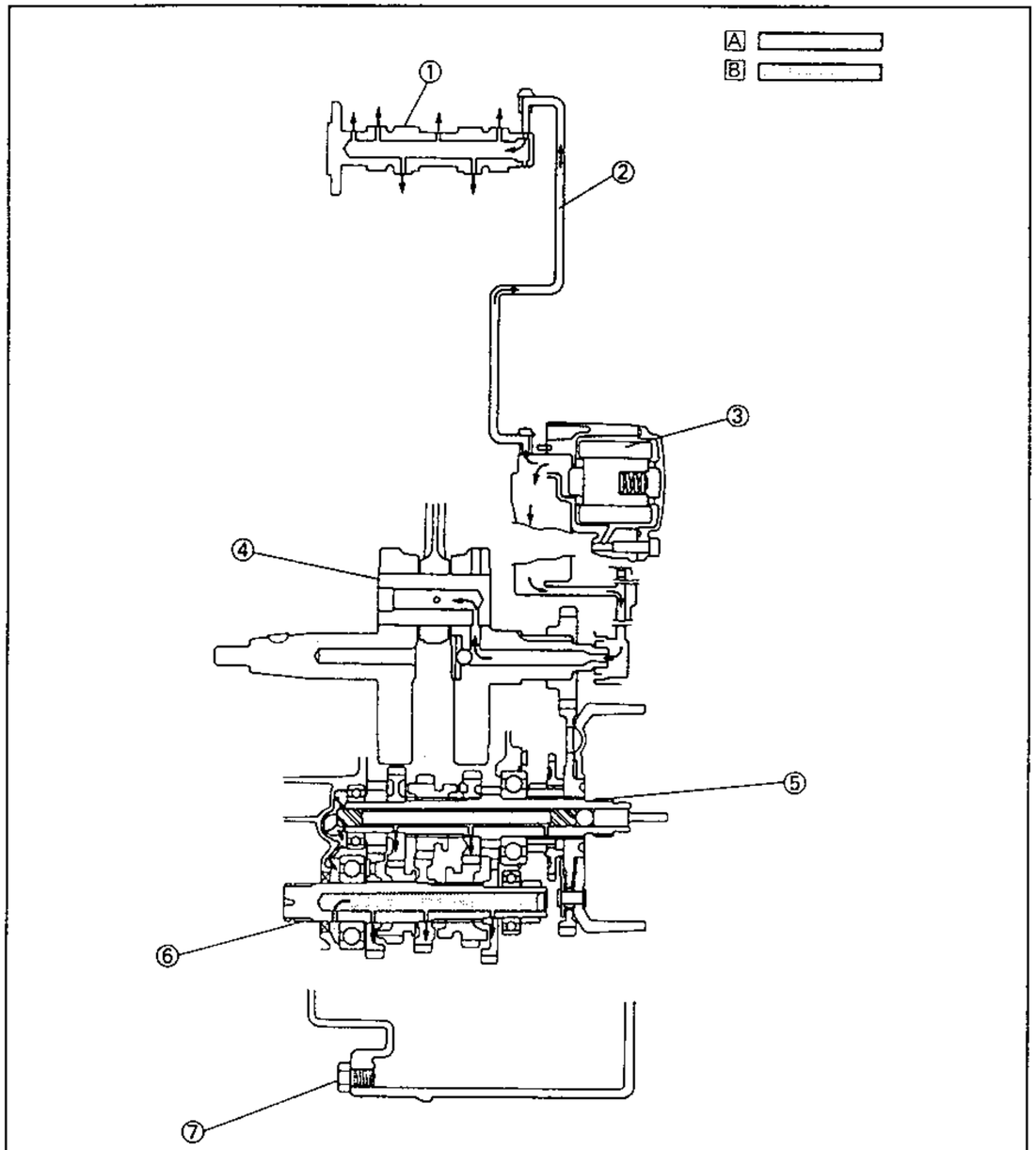
(1) Camshaft
(2) Oil delivery hose
(3) Oil filter
(4) Oil pump
(5) Main driving shaft
(6) Drive shaft
(7) Oil hose
(8) Oil delivery hose

[A] INTAKE
[B] RETRIEVAL



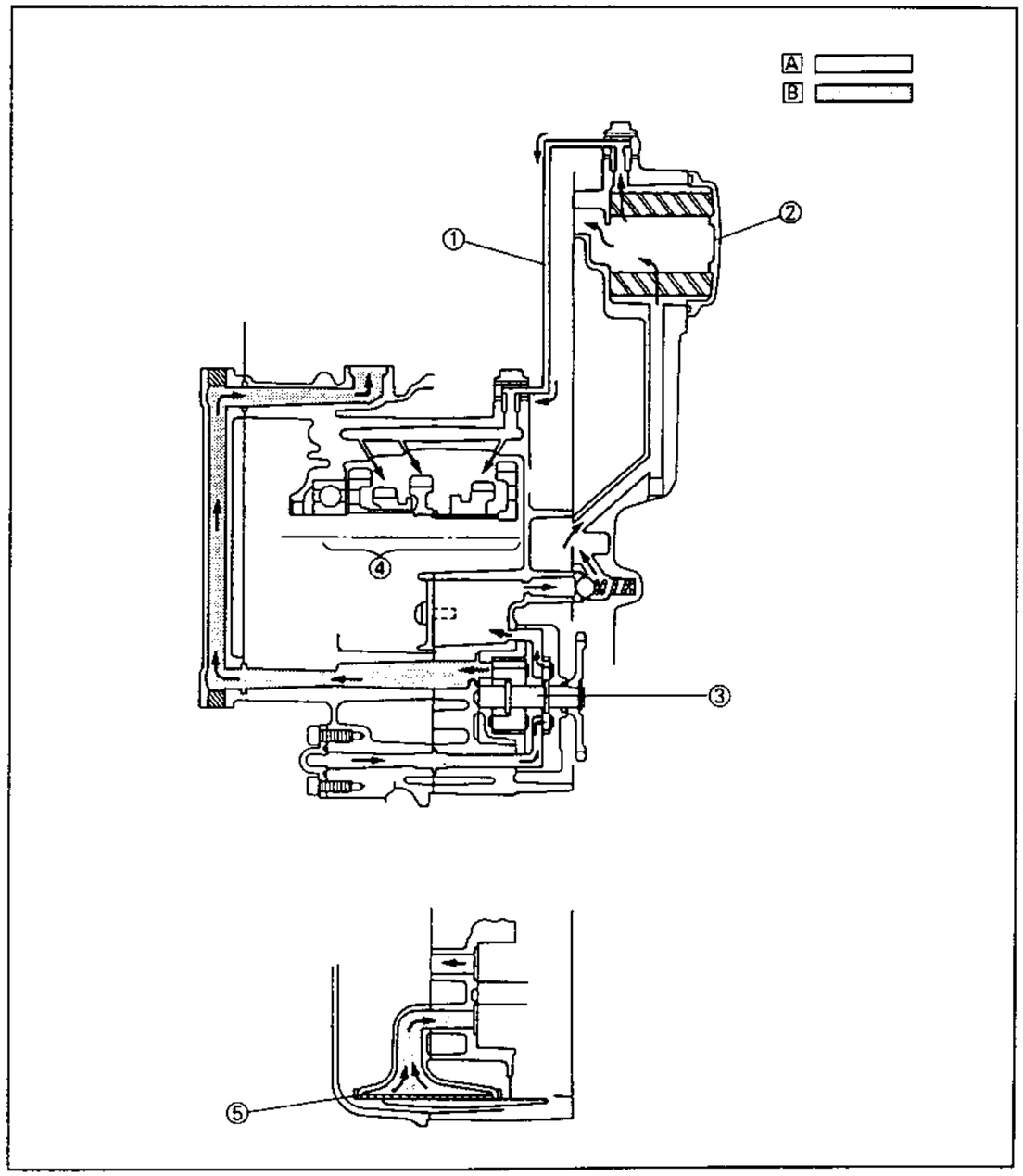
(1) Camshaft
(2) Oil delivery hose
(3) Oil filter
(4) Connecting rod pin
(5) Main driving shaft
(6) Secondary drive shaft
(7) Drain plug

[A] INTAKE
[B] RETRIEVAL



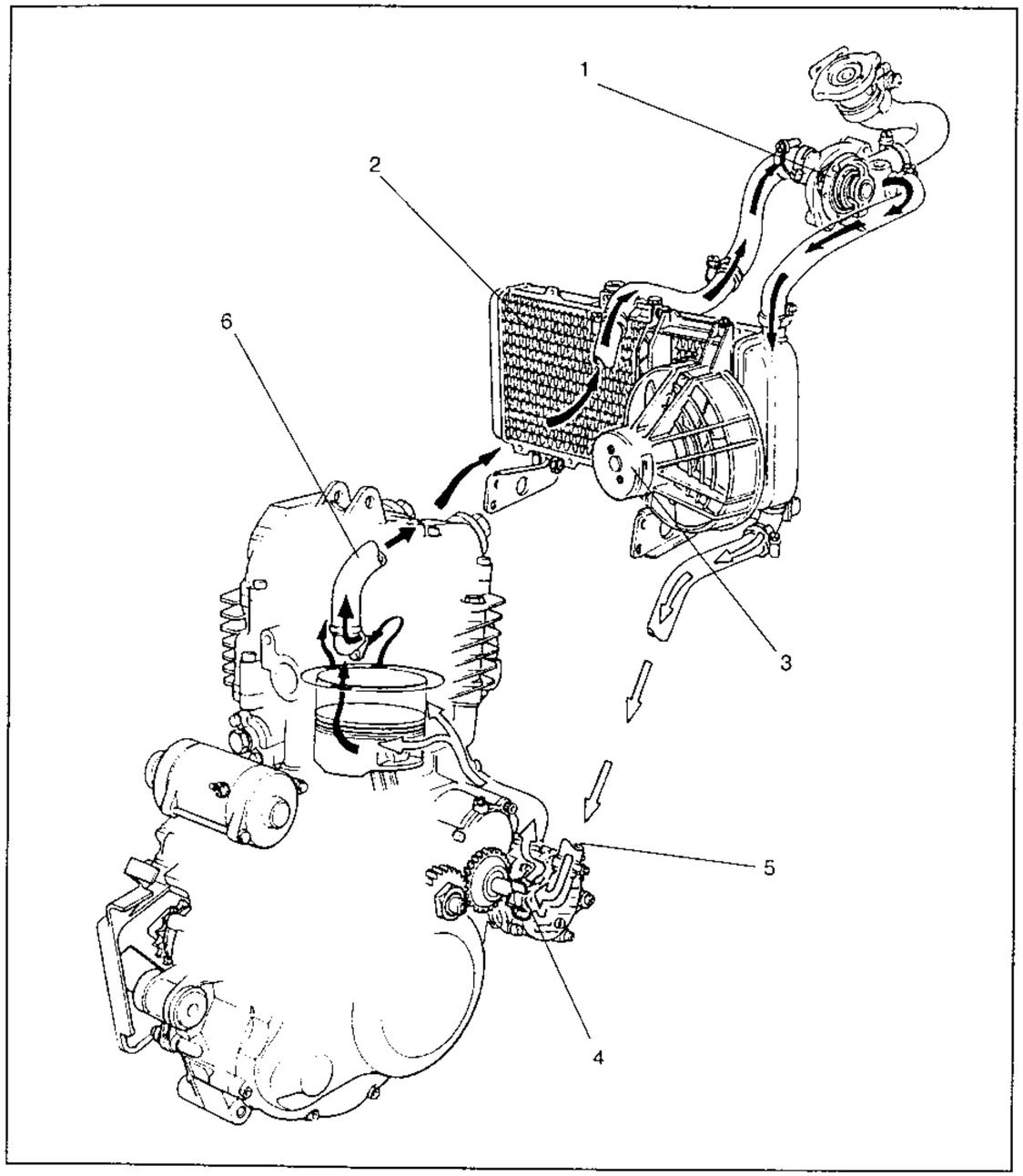
(1) Oil delivery hose
(2) Oil filter
(3) Oil pump
(4) Transmission
(5) Oil pump strainer

[A] INTAKE
[B] RETRIEVAL



COOLING LAYOUT

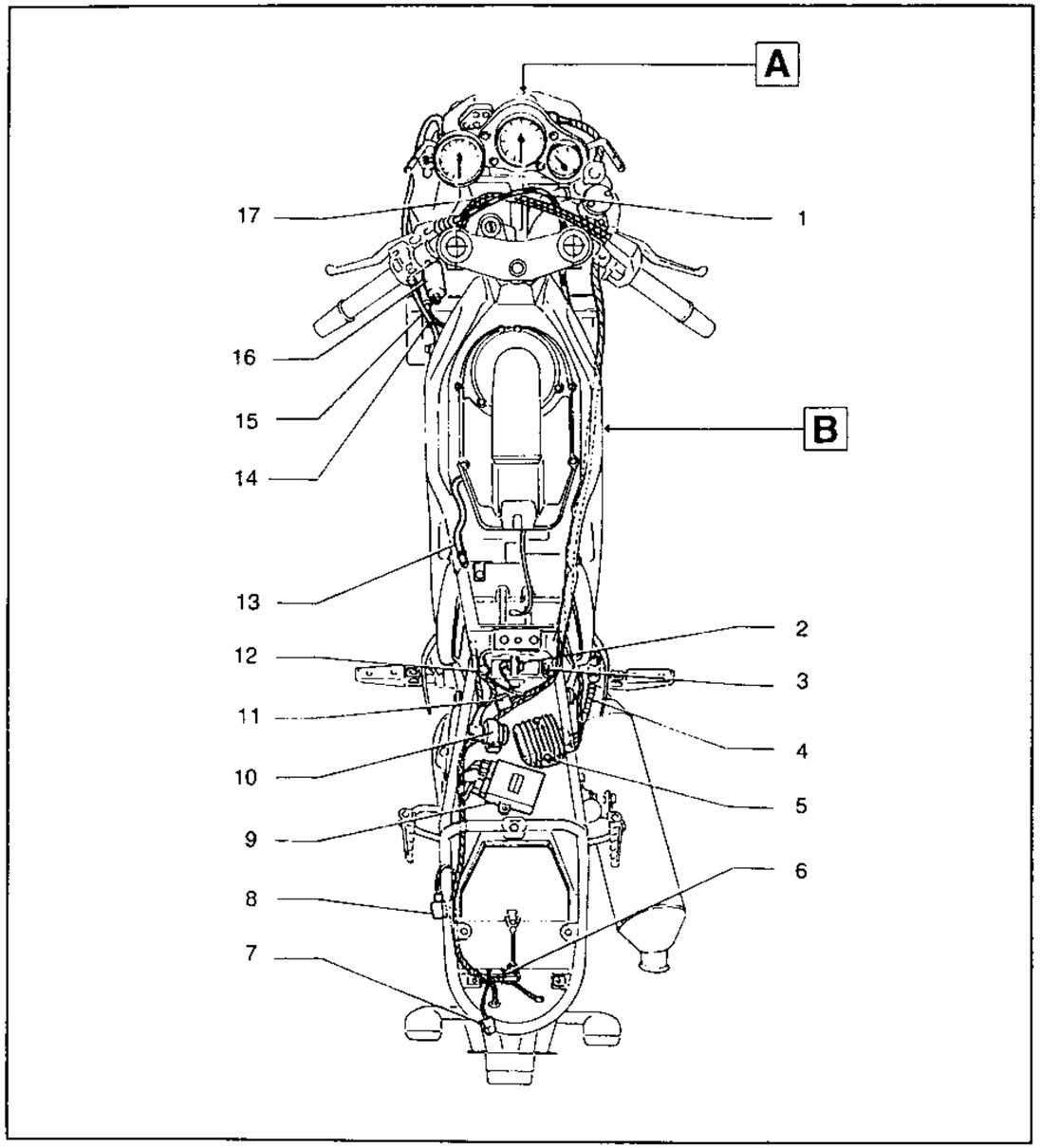
(1) Thermostat
(2) Radiator
(3) Electric fan
(4) Pump
(5) Inlet hose
(6) Outlet hose



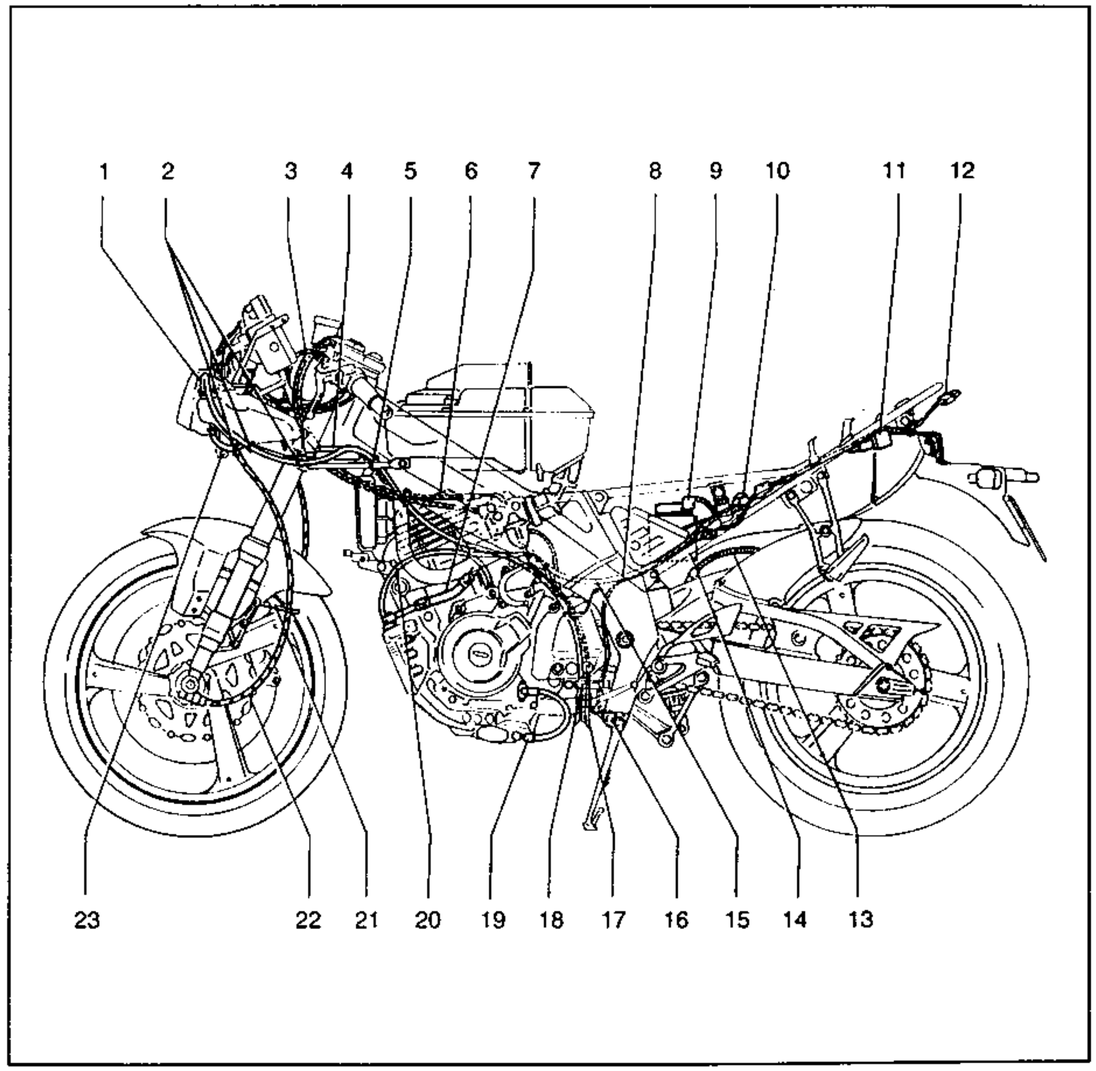
CABLES ROUTING

1. Clutch cable
2. Fuse holder
3. (–) cable
4. Rear brake hose
5. Regulator/ Rectifier
6. Clamp
7. Rear taillight connector
8. Flasher relay
9. C.D.I. unit
10. Starter relay
11. Connector
12. (+) cable
13. Fuel impulse pipe
14. Clamp
15. Recovery tank breather pipe
16. Coil
17. Throttle cables

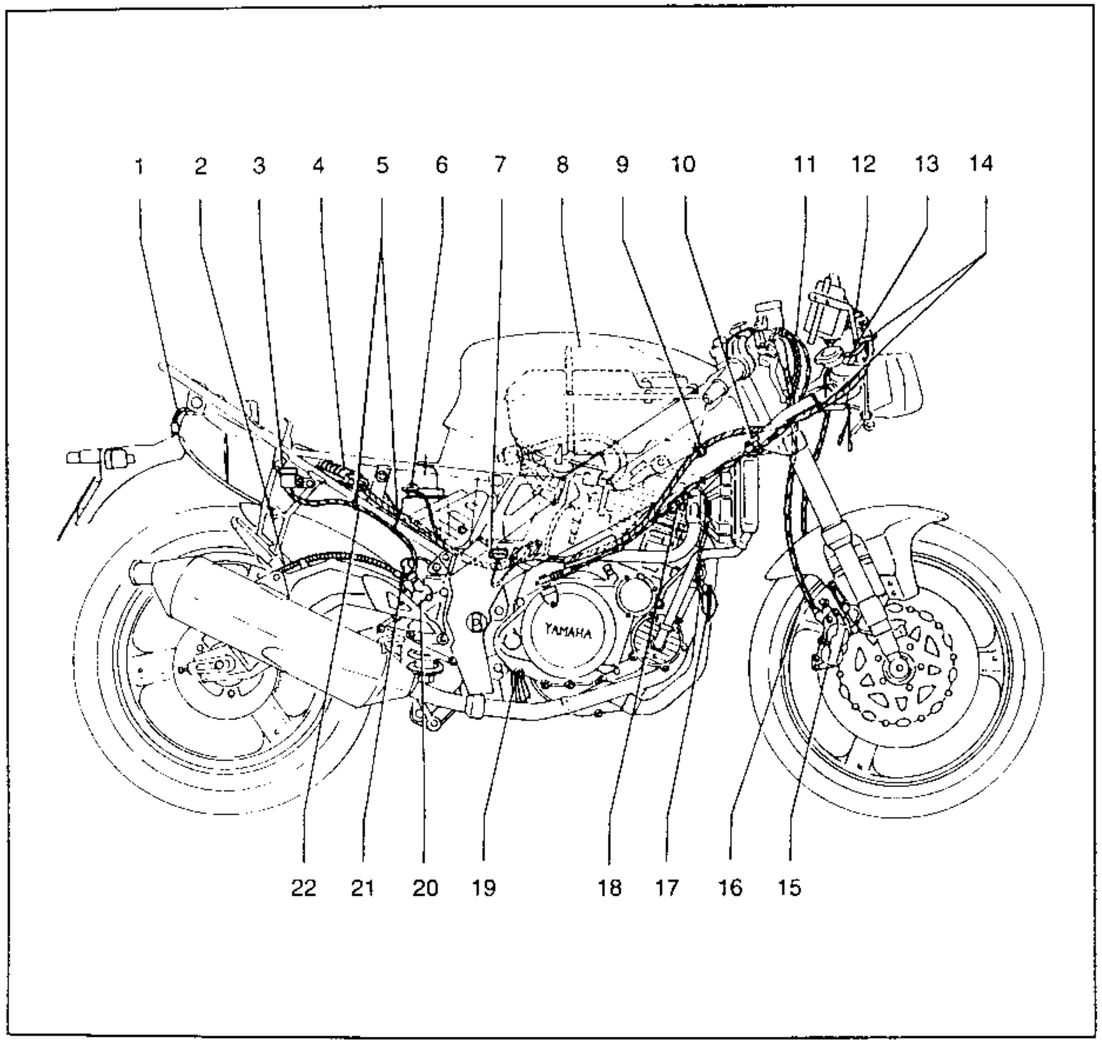
A B Cfr. page 2-32



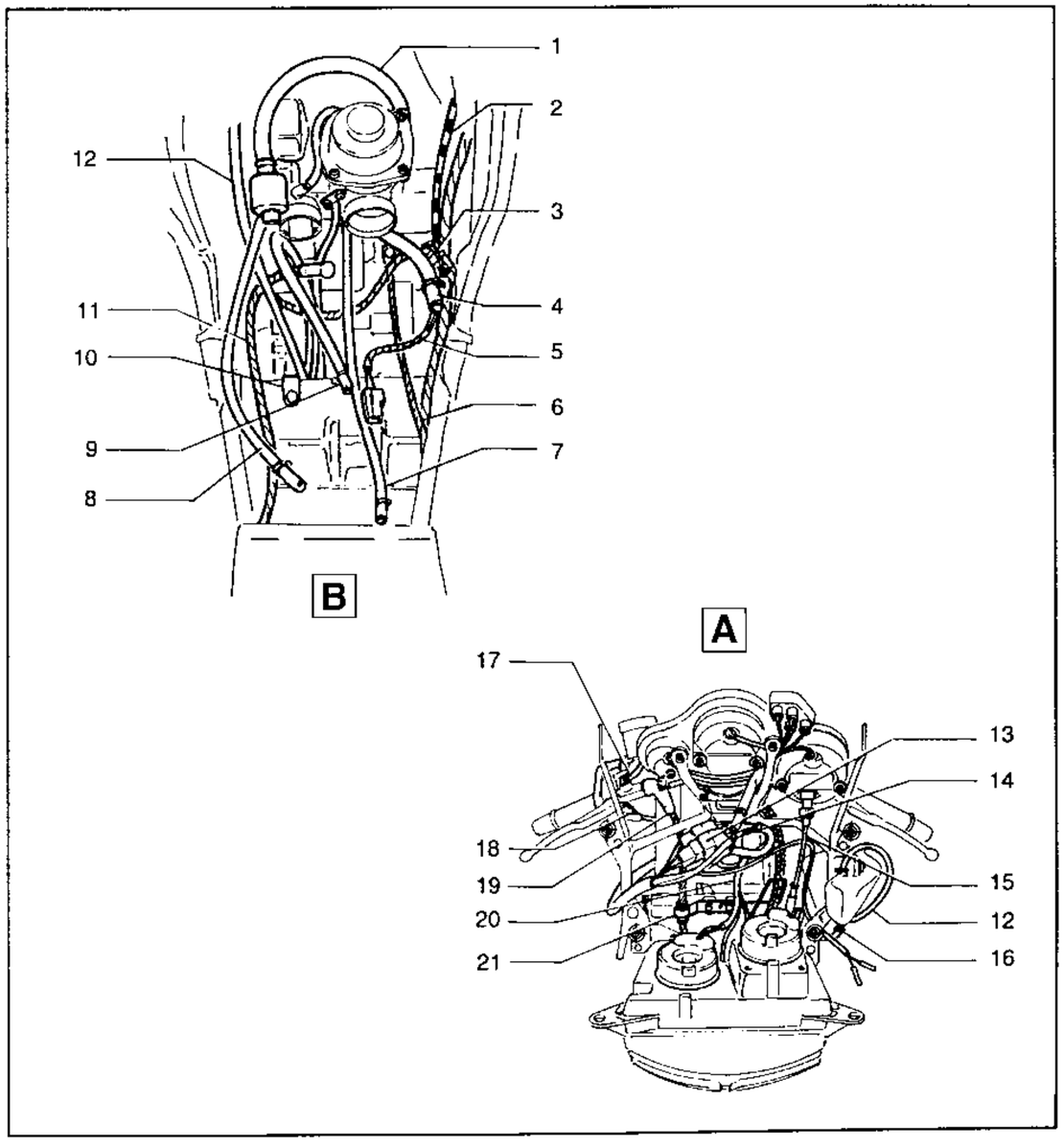
1. Recovery tank breather pipe
2. Clamp
3. Clutch cable
4. Coil
5. Clamp
6. Throttle cables
7. Oil retrieval hose
8. Starter motor cable
9. Battery (+) cable/ Starter relay
10. Starter relay
11. Flasher relay
12. Taillight connector
13. Rear brake hose
14. Battery
15. Cables holder
16. Side stand switch
17. Breather pipes
18. Cables holder
19. Oil delivery hose
20. Engine oil breather pipe (to engine oil tank)
21. Odometer cable sleeve
22. Odometer cable
23. Recovery tank supply hose



1. Number plate and direction indicator cables
2. Rear brake hose
3. Rear brake fluid reserve tank
4. Regulator/Rectifier
5. Clamp
6. (–) cable
7. Low fuel signal connector cable
8. Air cleaner case
9. Cable holder
10. Cable holder
11. Clutch cable
12. Throttle cables
13. Recovery tank supply hose
14. Clamp
15. Front brake caliper
16. Front brake hose
17. Horn
18. Cooling radiator fan connector
19. Breather pipes
20. Rear brake master cylinder
21. Rear stop switch
22. Rear brake supply hose



1. Carburetor suction connection hose
2. Clutch cable
3. Clamp
4. Fuel tap suction connection hose
5. Low fuel signal connector cable
6. Earth cable
7. Battery bleeder pipe
8. Fuel impulse pipe
9. Fuel tank water discharge pipe
10. Cables holder
11. Starter motor cable
12. Recovery tank breather pipe
13. Instrumentation lighting connector cable
14. Clamp
15. Odometer cable
16. Recovery tank supply pipe
17. Front brake fluid supply hose
18. Front stop switch cable
19. Front brake hose
20. Front lamps assembly cable
21. Front brake hose and throttle cables holder



INSP ADJ 3

CHAPTER 3°
PERIODIC INSPECTION AND ADJUSTMENT

INSP ADJ

PERIODIC INSPECTION AND ADJUSTMENT

INTRODUCTION

This chapter lists the procedures necessary to perform the recommended inspections and adjustments. Observance of these preventive maintenance procedures will ensure proper functioning and longer life for the vehicle.
The need for general overhauls will also be considerably reduced.
The information which follows applies to motorbikes already in use and new ones ready for sale. All maintenance personnel should be familiar with the instructions contained in this chapter.

PERIODIC MAINTENANCE/LUBRICATION INTERVALS

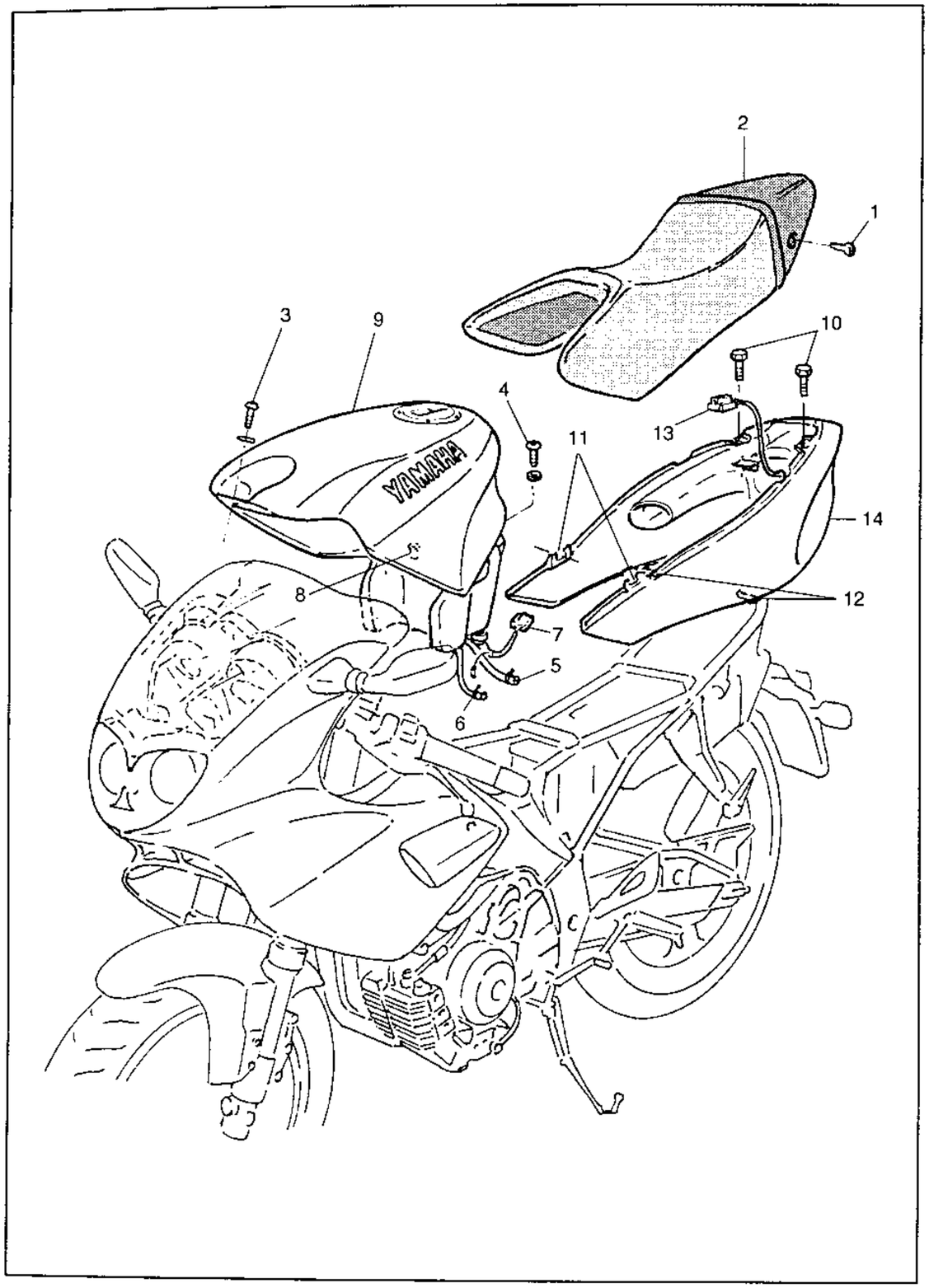
PART	NOTES	AFTER RUNNING 1,000 km (600 mi)	EVERY 6,000 km (4,000 mi) or 6 months	EVERY 12,000 km (8,000 mi) or 12 months
Valves*	Check valve clearance. Adjust if necessary.	O	O	O
Spark plug	Check conditions. Clean or replace if necessary.	O	O	O
Air filter	Clean. Replace if necessary.		O	O
Carburetor*	Check idle speed and starter. Adjust if necessary.	O	O	O
Fuel line*	Check fuel pipes condition. Replace if necessary.		O	O
Engine oil	Replace (heat engine prior to dumping oil).	O	O	O
Engine oil filter*	Replace filter element.	O	O	O
Cooling system	Check coolant leakage. Repair if necessary. Replace coolant every 24,000 kms (16,000 mi) or 24 months		O	O
Brakes*	Check functioning/fluid/leakage. See NOTE. Correct if necessary.		O	O
Clutch	Check functioning. Adjust if necessary.		O	O
Rear arm axle*	Check that the rear arm unit is not loose. Correct if necessary. Grease moderately.***	O	O	O

PART	NOTES	AFTER RUNNING 1,000 km (600 mi)	EVERY 6,000 km (4,000 mi) or 6 months	EVERY 12,000 km (8,000 mi) or 12 months
Rear suspension connection pins**	Check functioning. Grease moderately.***		O	O
Wheels*	Check balancing/damage/run-out. Repair if necessary.		O	O
Wheel bearings*	Check bearing clearance/damage. Replace if necessary.		O	O
Steering bearings*	Check bearing clearance. Correct if necessary. Lubricate moderately every 24,000 km (16,000 mi) or 24 months	O		O
Front fork*	Check functioning/oil leakage. Repair if necessary.		O	O
Rear shock absorber*	Check functioning/oil leakage. Repair if necessary.		O	O
Drive chain	Check chain slack/alignment. Adjust if necessary. Clean and lubricate the chain.	Every 500 km (300 mi)		
Fittings/ fasteners*	Check all frame fittings and fasteners. Tighten if necessary.	O	O	O
Side stand*	Check functioning. Repair if necessary.	O	O	O
Side stand switch*	Check functioning. Clean or replace if necessary.	O	O	O

* Maintenance work on these elements should be performed by a Yamaha dealer.
** Medium-consistency bearing grease.
*** Lithium soap-based grease.

NOTE:
Brake fluid replacement:
1. After disassembling the master and caliper cylinders, replace the brake fluid. Check the level of the fluid regularly and top up if necessary.
2. Replace the gaskets inside the master and caliper cylinders every 2 years.
3. Replace the brake hoses every four years or when they are cracked or damaged.

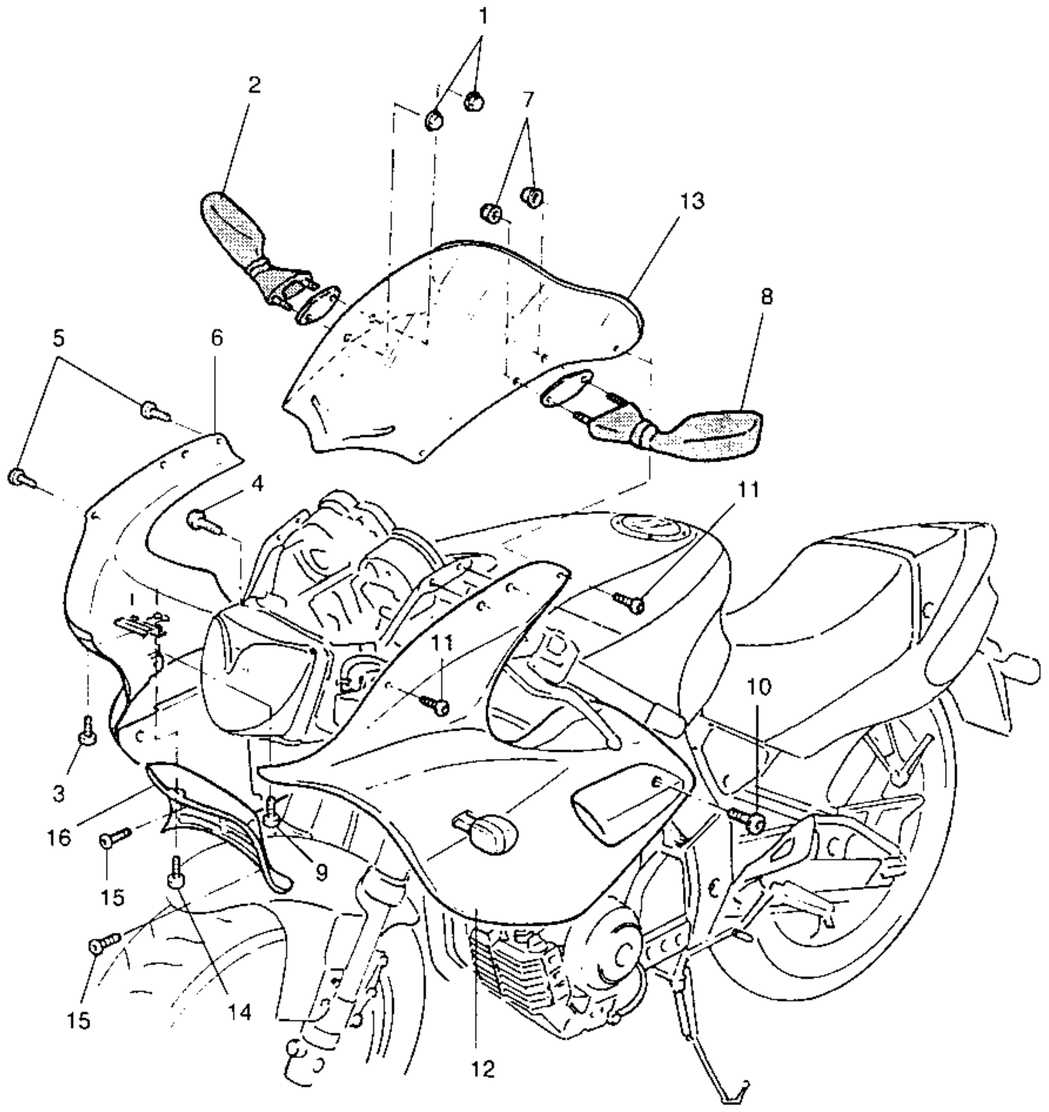
SEAT, FUEL TANK AND REAR COWLING



JOB INSTRUCTION CHART

Order	Job name/Part name	Q.ty	Remarks
	Removal of seat, fuel tank and rear cowling		**Remove the parts in the order. The seat removed, fuel tank and rear cowling may be removed individually.**
1	Key	1	**NOTE:** Turn the key anticlockwise to remove the seat and clockwise to reinstall it.
2	Seat	1	
3	Screw	1	
4	Screw	1	
5	Fuel pipe	1	**NOTE:** Before removing the fuel pipe, close the tap by turning the ring nut screw tightly clockwise.
6	Suction pressure intake pipe	1	
7	Low fuel warning light connector	1	
8	Tap water discharge pipe	1	
9	Fuel tank	1	
10	Screw	2	
11	Pressure fasteners	2	**NOTE:** Press down the rear cowling extremities.
12	Pressure fasteners	2	**NOTE:** Widen the rear cowling body sides carefully.
13	Taillight connector	1	
14	Rear cowling	1	**Reverse the removal procedure for installation.**

COWLING



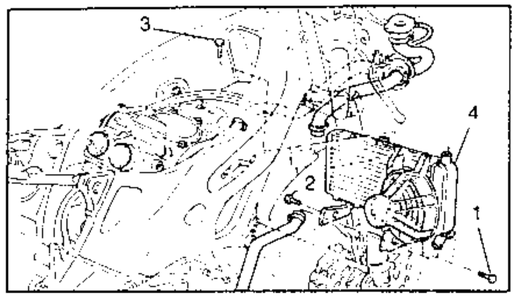
JOB INSTRUCTION CHART

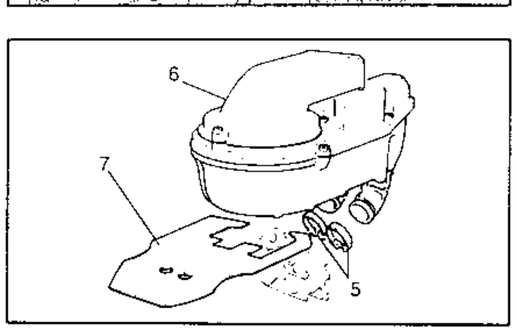
Order	Job name/Part name	Q.ty	Remarks
	Removal of cowling		**Remove the parts in the order shown. The right and left semifairings may be removed separately.**
1	Nut	2	
2	Rear view mirror (R)	1	
3	Screw	1	
4	Screw	1	
5	Screw	2	
6	Side panel (R)	1	
7	Nut	2	
8	Rear view mirror (L)	1	
9	Screw	1	
10	Screw	1	
11	Screw	2	
12	Side panel (L)	1	
13	Window front	1	
14	Screw	1	
15	Screw	2	
16	Air flap	1	
			Reverse the removal procedure for installation.

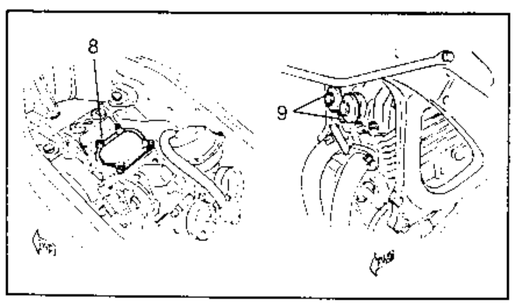
ENGINE

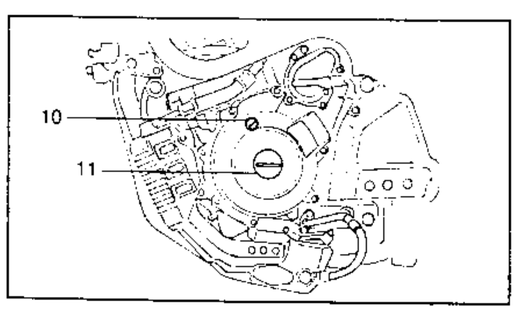
VALVE CLEARANCE ADJUSTMENT

NOTE:
- Valve clearance must be adjusted when the engine is at ambient temperature.
- Adjust valve clearance with the piston under compression at top dead centre.









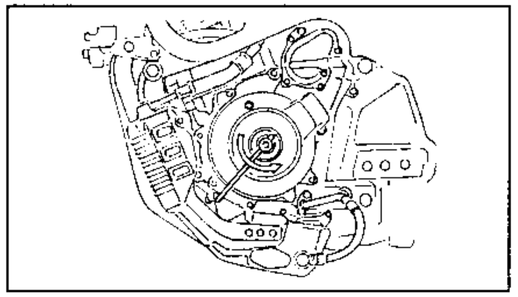
CAUTION:

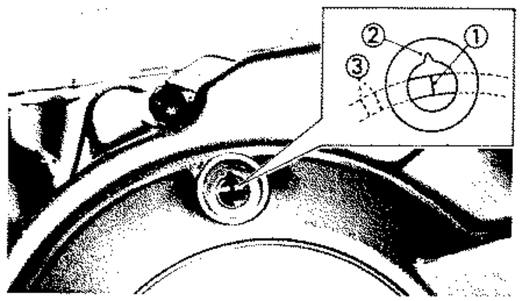
When removing the spark plug and tappet cover, be careful not to drop foreign objects inside the engine.

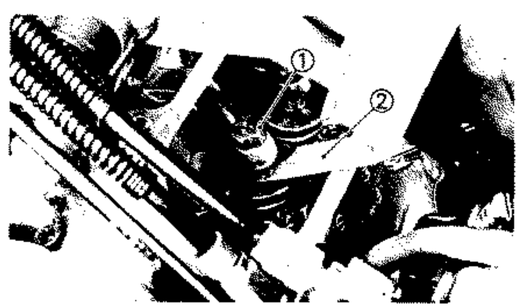
⚠ WARNING

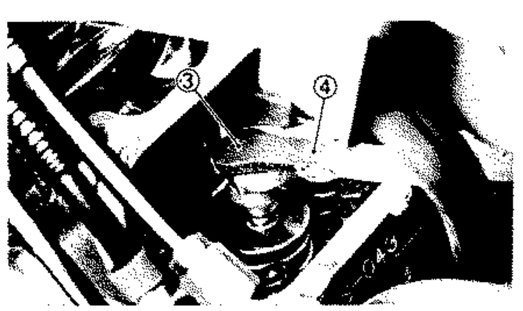
Hold the motorcycle firmly in place to prevent it falling over during the operation.

1. Remove:
   - Seat
   - Fuel tank
   - Cowling
   - See the section "SEAT, FUEL TANK AND REAR COWLING" and "COWLING".
2. Remove:
   - Screws (1) (2) (fastening the radiator)
   - Screw (3)
3. Remove:
   - Radiator (4) (disconnect the electric connector)
4. Loosen:
   - Carburetor manifold clamps (5)
5. Remove:
   - Air cleaner case assembly (6)
   - Air panel (7)
6. Disconnect:
   - Spark plug cap
7. Remove:
   - Spark plug
   - Tappet cover (8) (suction)
   - Tappet covers (9) (exhaust)
8. Remove:
   - Cap (10)
   - Cap (11)









9. Turn:
   - Driving shaft anticlockwise (using a wrench)
10. Align:
    - Reference mark "T" on the flywheel (1) with the fixed reference mark on the crankcase (2)

NOTE:

Check that the piston is under compression at top dead centre.

(3) Ignition timing reference mark

11. Check:
    - Valve clearance using the special gauge (1)

    Out of specification → Adjust.

Valve clearance (cold):
Suction:
0.10~0.15 mm
Exhaust:
0.15~0.20 mm

12. Adjust:
    - Valve clearance

Adjustment:
- Loosen the lock nut (1).
- Fit a thickness gauge (2) between the rocker arm and the valve stem.
- Turn the adjuster (3) clockwise or anticlockwise using the special tool (4) to obtain the required clearance.

Special tool:
P/N. YM-08035
P/N. 90890-01311

- Holding the adjuster firmly in place, lock tighten lock nut.

Lock nut:
14 Nm (1.4 mkg)

- Measure valve clearance.
- If the clearance is incorrect, repeat the previous steps to achieve the required value.

13. Reassemble:
    Reverse the removal procedure.
    - Caps
    - Tappet cover (suction)
    - Tappet covers (exhaust)
    - Spark plug

Tappet cover (exhaust):
12 Nm (1.2 mkg)

Bolt (tappet cover-suction):
10 Nm (1.0 mkg)

Spark plug:
18 Nm (1.8 mkg)

14. Connect:
    - Spark plug cap

15. Reassemble:
    - Air panel
    - Air cleaner case assembly
    - Radiator
    - Thermostat assembly
    - Fuel tank
    - Seat
    - Cowling
    - See the section "SEAT, FUEL TANK AND REAR COWLING" and "COWLING".

Bolt (air cleaner case):
5 Nm (0.5 mkg)

Carburetor manifold clamp (L):
2 Nm (0.2 mkg)

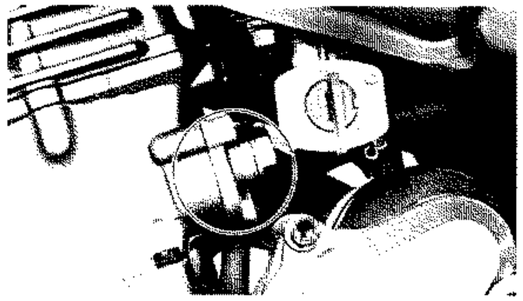
Carburetor manifold clamp (R):
5 Nm (0.5 mkg)

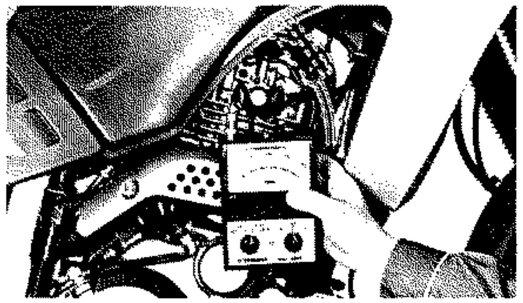
Bolt (radiator):
10 Nm (1.0 mkg)

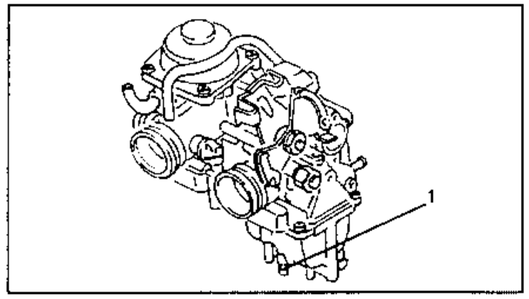
Bolt (thermostat assembly):
10 Nm (1.0 mkg)

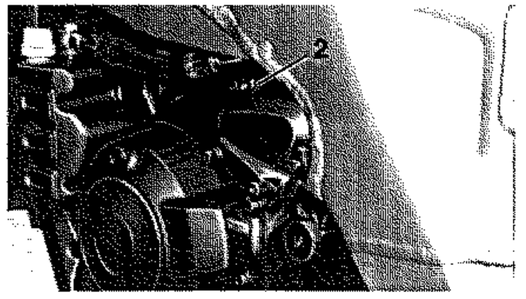
Screws (fuel tank):
10 Nm (1.0 mkg)

Screws (cowling):
10 Nm (1.0 mkg)









DRIVE CHAIN ADJUSTMENT

The drive chain does not need to be adjusted.

IDLE SPEED ADJUSTMENT

1. Start the engine and let it heat.
2. Connect:
    - The inductive engine speed indicator to the spark plug cable.

Inductive engine speed indicator:
P/N. YU-08036-A
P/N. 90890-03113

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

Engine idle speed:
1,250~1,350 rpm

4. Adjust:
    - Engine idle speed

Adjustment:
- Turn the air adjusting screw (1) until it is slightly locked.
- Unscrew the air adjusting screw by 3 turns aprox.

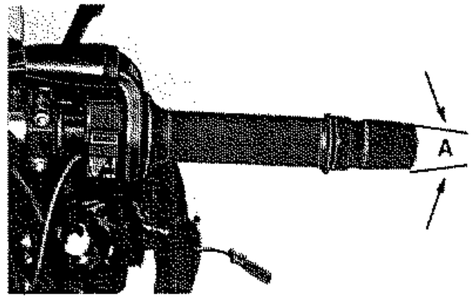
Air adjusting screw:
Unscrew by 3 turns aprox.

- Turn the throttle stop knob (2) either way to obtain the engine idle speed required.

Screwing	**Increases idle speed**
Unscrewing	**Decreases idle speed**

5. Disconnect:
    - Inductive engine speed indicator
6. Adjust:
    - Throttle cable free play
      See the section "THROTTLE CABLE FREE PLAY ADJUSTMENT".

Throttle cable free play:
3 ~ 5 mm



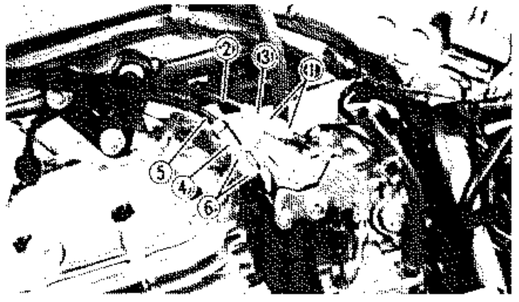
THROTTLE CABLE FREE PLAY ADJUSTMENT

NOTE:
Before adjusting the throttle cable free play, adjust the engine idle speed.

1. Check:
   - Throttle cable free play (A)
   - Out of specification → Adjust.

Throttle cable free play:
3 ~ 5 mm

2. Remove:
   - Seat
   - Fuel tank
   - Air cleaner case
   - Air panel
   - See the section "SEAT, FUEL TANK AND REAR COWLING" and "VALVE CLEARANCE ADJUSTMENT".



3. Adjust:
   - Throttle cable free play

Adjustment:
- Loosen the 1 throttle cable (2) lock nuts (1).
- Turn the adjuster (3) clockwise or anticlockwise to obtain the required free play.
- If after loosening the adjuster by 5 mm, the free play is still not correct, tighten the adjuster (4) on the 2 throttle cable (5) once more.
- Tighten the lock nuts.

(1), (6) Lock nuts

4. Reassemble:
   - Air panel
   - Air cleaner case
   - Fuel tank
   - Seat

Bolt (air cleaner case):
5 Nm (0.5 mkg)
Carburetor manifold clamp (L):
2 Nm (0.2 mkg)
Carburetor manifold clamp (R):
5 Nm (0.5 mkg)
Screws (fuel tank):
10 Nm (1.0 mkg)

SPARK PLUG INSPECTION

1. Remove:
   - Seat
   - Fuel tank
   - Air cleaner case
   - Air panel
   - See the section "SEAT, FUEL TANK AND REAR COWLING" and "VALVE CLEARANCE ADJUSTMENT"

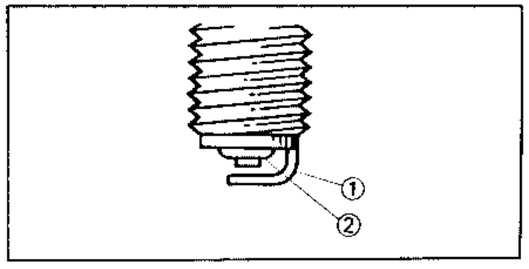
2. Disconnect:
   - Spark plug cap

3. Remove:
   - Spark plug

CAUTION:
When removing the spark plug, be careful not to drop foreign objects or dirt inside the engine.

4. Inspect:
   - Type of spark plug
     Incorrect → Replace.

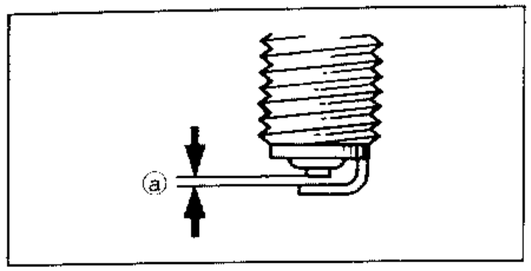
Standard spark plug:
DPR8EA-9 (NGK), DPR9EA-9 (NGK)



5. Inspect:
   - Electrodes (1)
     Wear/Damage → Replace.
   - Insulator (2)
     Abnormal insulator colour → Replace the spark plug.
     Normal insulator (2) colour is light tan.

SPARK PLUG INSPECTION

INSP ADJ



6. Clean:
   - The spark plug with a suitable tool and a steel brush
7. Measure:
   - Spark plug electrode gap (a)
     Use a wire or thickness gauge
     Out of specification → Regap.

Electrode gap:
0.8~0.9 mm

8. Tight:
   - Spark plug

Spark plug:
18 Nm (1.8 mkg)

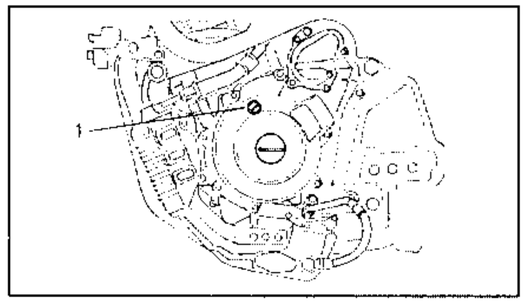
NOTES:
- Before installing the spark plug, clean the surface and thread.
- Tighten the spark plug by hand before torquing to specification.

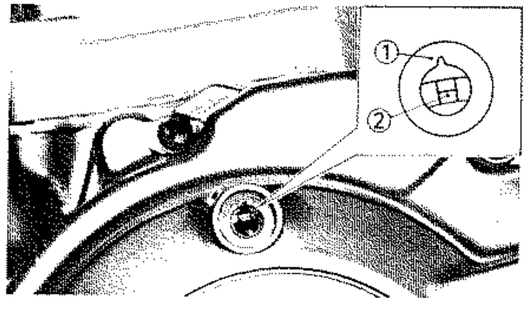
9. Connect:
   - Spark plug cap
10. Install:
    - Air panel
    - Air cleaner case
    - Fuel tank
    - Seat

Bolt (air cleaner case):
5 Nm (0.5 mkg)
Carburetor manifold clamp (L):
2 Nm (0.2 mkg)
Carburetor manifold clamp (R):
5 Nm (0.5 mkg)
Screws (fuel tank):
10 Nm (1.0 mkg)

IGNITION TIMING CHECK

INSP ADJ





IGNITION TIMING CHECK

NOTE:
Before checking the ignition timing adjust the throttle cable free play and the engine idle speed.

1. Start the engine and let it heat.
2. Connect:
   - Inductive rev. counter
   - Stroboscopic lamp to spark plug cable

Inductive engine speed indicator:
P/N. YU-08036-A
P/N. 90890-03113
Stroboscopic lamp:
P/N. YM-33277-A
P/N. 90890-03141

3. Remove:
   - Cap (1)

CAUTION:
In certain conditions, the oil might spray out when the cap is removed. Be careful therefore when removing the cap.

4. Check:
   - Advance ignition

Check:
- Heat engine and let it run to the number of revs required.

Engine speed:
1,300 rpm

- Check that the firm reference (1) is in the field of reference mobile (2) on the flywheel.
  Incorrect ignition timing → Check the ignition coil unit.

NOTE:
Ignition timing cannot be adjusted.

5. Install:
   - Cap
6. Remove:
   - Stroboscopic lamp
   - Inductive engine speed indicator

COMPRESSION INSPECTION

NOTE:
Insufficient compression causes a loss of performance.

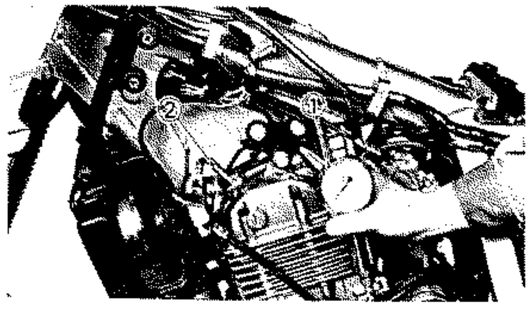
⚠ WARNING

Set the motorcycle firmly in place to prevent it falling during the operation.

1. Remove:
   - Seat
   - Fuel tank
   - Air cleaner case
   - Air panel
   - See the section "SEAT, FUEL TANK AND REAR COWLING" and "VALVE CLEARANCE ADJUSTMENT.
2. Check:
   - Valve clearance
     Out of specification → Adjust.
     See the section "VALVE CLEARANCE ADJUSTMENT".
3. Install:
   - Auxiliary fuel tank
4. Start the engine and let it heat
   - Stop the engine
5. Disconnect:
   - Spark plug cap
6. Remove:
   - Spark plug

CAUTION:
When removing the spark plug, be careful to prevent foreign bodies from dropping inside the engine.

7. Apply:
   - Pressure gauge (1)
   - Adapter (2)



Pressure gauge:
P/N. YU-33223
P/N. 90890-03081

Adapter:
P/N. YU-33223-3
P/N. 90890-04082

8. Check:
   - Pressure under compression

Check:
- Check that the battery is fully charged and rev the engine with the starter. Hold down the accelerator until the reading on the pressure gauge is stable.

⚠ WARNING

While operating the starter, disconnect the spark plug cap to avoid sparks.

- Compare the pressure reading with those in the table.

Pressure under compression (at sealevel):
Standard:
1,100 kPa (11 kg/cm², 156 psi)
Minimum:
900 kPa (9 kg/cm², 128 psi)
Maximum:
1,200 kPa (12 kg/cm², 171 psi)

- If the pressure reading is lower than minimum:

1) Add a few drops of oil to the cylinder through the hole in the spark plug.
2) Measure the compression again.
3) Compare the new reading with the first, then proceed according to the indications in the table.

Pressure under compression (after adding oil to the cylinder)	
Reading	**Diagnosis**
Pressure higher than before.	**Piston worn or damaged.**
Pressure same as before.	**Cylinder head or piston rings, valves, gaskets may be faulty.**
Pressure above maximum value.	**Inspect cylinder head, valve surfaces, piston rim to check for carbon deposits.**

9. Remove:
   - Auxiliary fuel tank
   - Pressure gauge (with adapter)
10. Install:
   - Spark plug
     See the section "SPARK PLUG INSPECTION".

Spark plug
18 Nm (1.8 mkg)

11. Connect:
   - Spark plug cap
12. Reassemble:
   - Air panel
   - Air cleaner case
   - Fuel tank
   - Seat

Bolt (air cleaner case):
5 Nm (0.5 mkg)
Carburetor manifold clamp (L):
2 Nm (0.2 mkg)
Carburetor manifold clamp (R):
5 Nm (0.5 mkg)
Screws (fuel tank):
10 Nm (1.0 mkg)

ENGINE OIL LEVEL CHECK

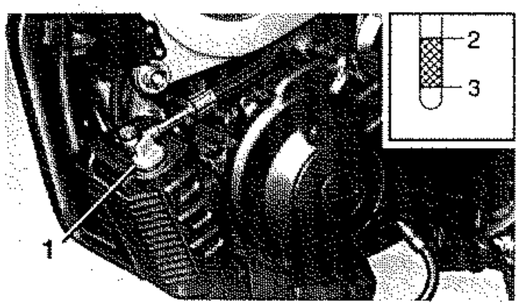
CAUTION:

Do not put additives into the engine oil. The latter also lubricates the clutch and additives might cause it to slide.

⚠ WARNING

Never remove the oil tank cap when the engine is hot. The boiling oil might spill over, causing burns. Wait for the oil to cool to at least 60° or thereabouts.

This model is fitted with a dry crankcase lubrication system. A feed pump delivers oil to the engine; after fully lubricating the latter, the oil is returned to the tank by a scavenge pump. The oil level must therefore be checked in the oil tank.



1. Set the motorcycle level and hold it upright.
2. Unscrew the oil tank cap (1) and clean the cap stem.
3. Insert the cap sucker rod into the tank. Do not unscrew; simply place on the filler.
4. Pull out the rod and check the oil level. The latter must be between the minimum (3) and maximum (2) levels.

NOTE:

To check the oil level, place the cap with the rod on the filler without screwing it.
For an exact check, hold the cycle upright.

If the oil level is below minimum → Add oil up to minimum level.

Recommended engine oil:
SHELL SUPER 4TX 20W/50

5. Reassemble the oil tank cap.

6. Start the engine and heat until the temperature reaches 60°C or thereabouts.

CAUTION:

Never start the engine when the oil tank is empty.

7. Run the engine at idle speed for about 10 seconds, holding the motorcycle firmly upright. Turn off the engine and add oil up to the maximum level.
8. Replace the oil tank cap.

Oil capacity:
Total:
3.0 litres
Periodic oil change:
2.6 litres
With oil filter change:
2.7 litres

ENGINE OIL REPLACEMENT

CAUTION:

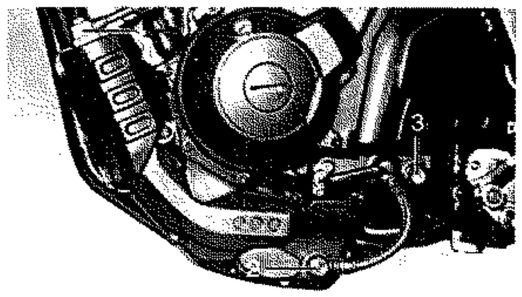
Do not put additives into the engine oil. The latter also lubricates the clutch and additives might cause it to slide.

⚠ WARNING

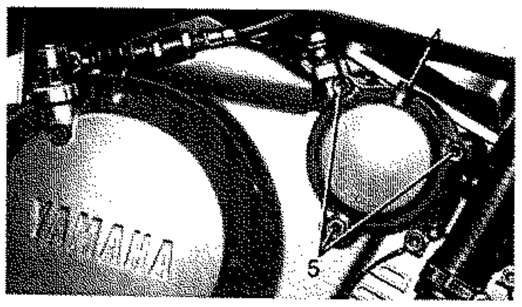
Remove the oil tank tap carefully when the engine is hot: the hot oil can spout out injuring the user.

Engine oil replacement (without replacing oil filter)

1. Start the engine, heat it for a few minutes then switch off.
2. Place a container under the engine and oil tank.



3. Remove:
   - Oil tank cap (1)
   - Oil inlet hose fastening screw (2)
   - Oil sump drainage bolt (3)
   - Oil filter cover bleeder screw (4)
   - Filter cover screw (5)



NOTE:

The oil filter cover is secured by three screws. The lowest one should be removed first, so that the filter will drain.

4. Drain:
   - Engine oil completely
5. Replace:
   - Oil inlet hose gaskets
   - Oil sump drainage bolt gasket (engine)
6. Inspect:
   - All gaskets
     Damaged → Replace.

7. Reassemble:
   - Filter cover screws
   - Oil sump drainage bolt
   - Oil inlet hose fastening screw

Oil sump drainage bolt (engine):
30 Nm (3.0 mkg)
Oil inlet hose fastening screw:
30 Nm (3.0 mkg)
Filter cover screw:
10 Nm (1.0 mkg)

8. Fill:
   - Oil tank
   - Oil filter housing (by bleeder hole)

Recommended engine oil:
SHELL SUPER 4TX 20W/50
Oil capacity:
Periodic change 2.6 litres

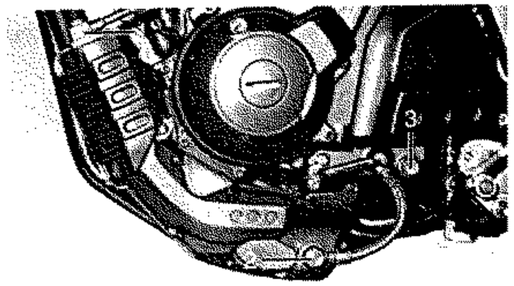
CAUTION:

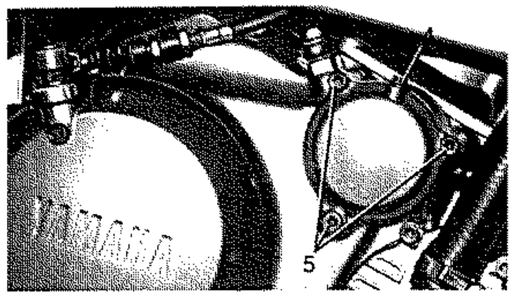
Be careful to prevent foreign bodies dropping into the engine.
Do not put additives into the engine oil. The latter also lubricates the clutch and the additives may make it slide.

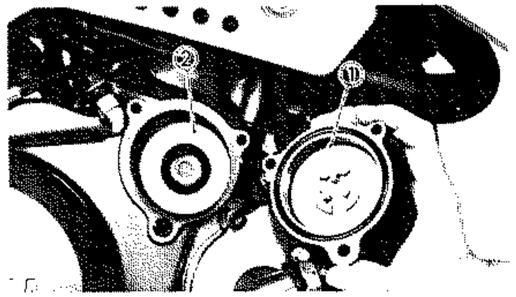
9. Install:
   - Oil filter cover bleeder screw

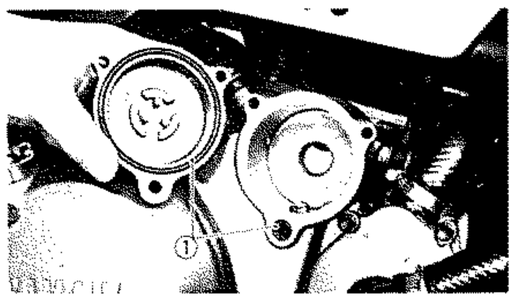
Oil filter cover bleeder screw:
5 Nm (0.5 mkg)

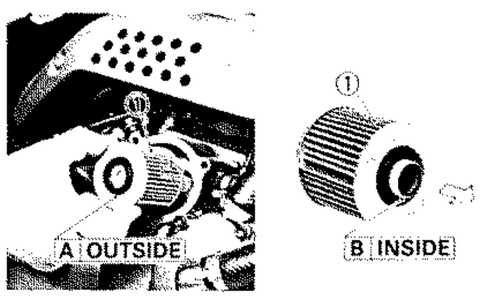
10. Check:
    - Oil level
      See the section "ENGINE OIL LEVEL CHECK".
    - Oil pressure
      See the section "ENGINE OIL PRESSURE CHECK".
    - Oil leakage
11. Install:
    - Oil tank cap











Engine oil replacement (with oil filter replacement)

1. Start the engine, heat it up for a few minutes, then turn it off.
2. Place a container under the engine and oil tank.
3. Remove:
   - Oil tank cap (1)
   - Oil inlet hose fastening screw (2)
   - Oil sump drainage bolt (3)
   - Oil filter cover bleeder screw (4)
   - Filter cover screws (5)

NOTE:
The oil filter cover is fastened with three screws. The lower screw must be removed first to allow the filter to drain.

4. Drain:
   - Engine oil completely
5. Remove:
   - Oil filter cover (1)
   - Oil filter (2)
6. Replace:
   - Oil inlet gaskets
   - Oil sump drainage bolt gasket (engine)
7. Inspect:
   - All gaskets
   - O-ring (1)
     Damaged → Replace.
8. Reassemble:
   - Oil filter (1) (new)

CAUTION:
Install the new oil filter as shown:
[A] OUTER
[B] INNER

   - Oil filter cover screws
   - Oil sump drainage screw
   - Oil inlet hose screw

Oil sump drainage screw (engine):
30 Nm (3.0 mkg)
Oil inlet hose screw:
30 Nm (3.0 mkg)
Oil filter cover screws:
10 Nm (1.0 mkg)

9. Fill:
   - Oil tank
   - Oil filter housing (by bleeder hole)

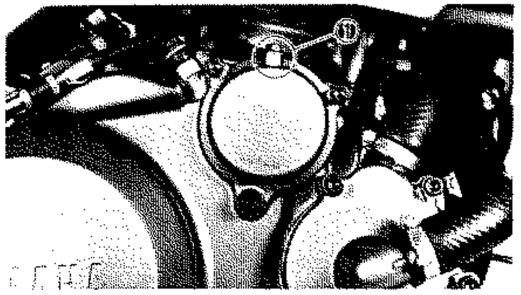
Recommended engine oil:
SHELL SUPER 4TX 20W/50
Oil capacity:
Total:
3.0 litres
Periodic oil change
(with oil filter replacement):
2.7 litres

CAUTION:
Be careful to prevent foreign bodies dropping into the engine crankcase.
Do not add additives to the engine oil. The latter also lubricates the clutch and the additives may make it slide.

10. Install:
    - Oil filter cover bleeder screw

Oil filter cover bleeder screw:
5 Nm (0.5 mkg)

11. Check:
    - Oil level
      See the section "ENGINE OIL LEVEL CHECK".
    - Oil pressure
      See the section "ENGINE OIL PRESSURE CHECK".
    - Oil leakage
12. Install:
    - Oil tank cap



ENGINE OIL PRESSURE CHECK

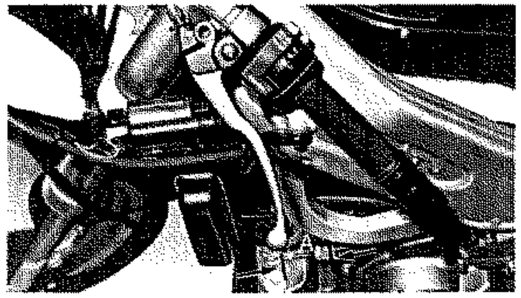
1. Remove:
   - Bleeder screw (1)
2. Start the engine and let it run at idle speed until oil flows out of the bleeder hole.
3. Inspect:
   - Conditions of oil at bleeder hole
     Oil leakage → Oil pressure is correct.
     No leakage → Oil pressure insufficient.

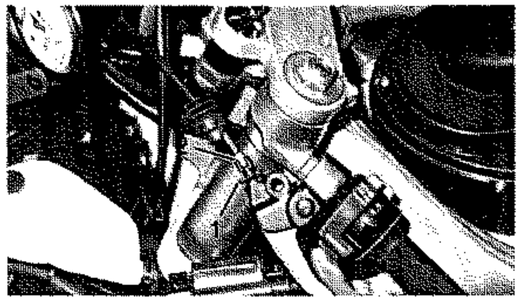
CAUTION:

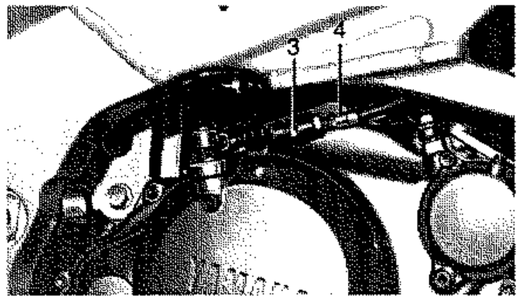
If the oil does not flow out after one minute, stop the engine immediately to prevent seizure.

4. Tighten:
   - Bleeder screw

	Bleeder screw: **5 Nm (0.5 mkg)**







CLUTCH ADJUSTMENT

Cable free play adjustment

1. Check:
   - Clutch free play adjustment (A)
     Out of specification → Adjust.

	Free play (at the lever end): **10 ~ 15 mm**

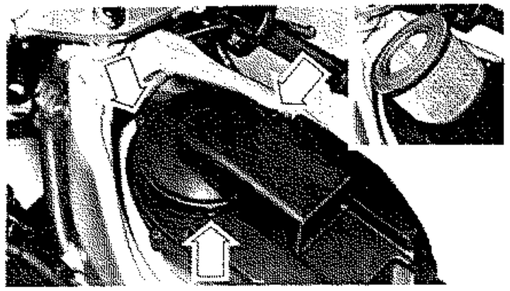
2. Adjust:
   - Clutch cable free play

Adjustment:

- Loosen lock nut (1).
- Turn the adjuster (2) either way to obtain correct free play.
- Tighten lock nut after adjustment.
- If free play is still incorrect, turn the crankcase adjuster following the same procedure described for the handle bar adjuster.
  (3) Lock nut
  (4) Adjuster

NOTE:

After adjustment, recheck lever free play to make sure that it works smoothly and progressively.
If it is impossible to obtain the required adjustment or if the clutch does not work properly, adjust the internal mechanism.



AIR FILTER CLEANING

1. Remove:
   - Seat
   - Fuel tank
   See the section "SEAT, FUEL TANK AND REAR COWLING".
2. Unscrew:
   - Filter case cover screw
3. Remove:
   - Filter case cover
4. Pull out:
   - Filter element (tap to clean)

CAUTION:

The engine must never be started without the air filter element, as this would cause undue wear and tear of the piston and/or cylinder. Use of the engine without the filter element modifies the carburation, causing poor performance and overheating.

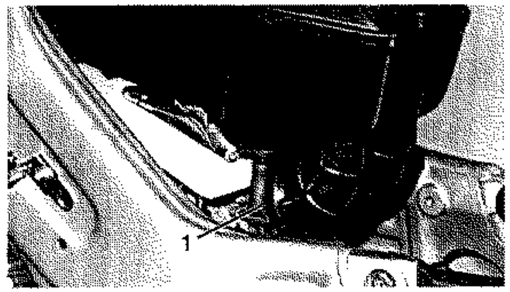
5. Inspect:
   - Filter element
   Damaged → Replace.
6. Clean:
   - Filter element by blowing compressed air from the small metal net side.
7. Install:
   - Filter element (in the filter case)
   - Filter case cover

NOTE:

When installing the filter case cover, be sure that the seal is mounted to prevent air from entering.

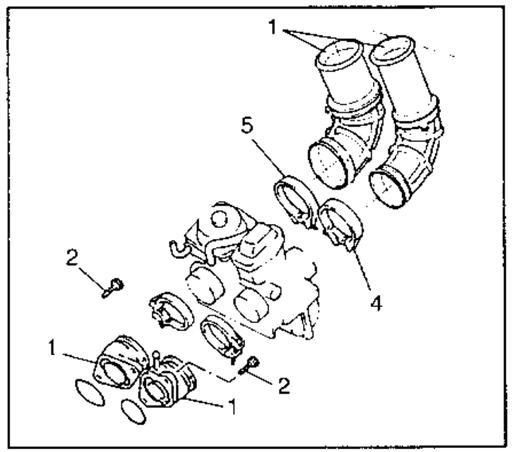
8. Tighten:
   - Filter case cover fastening screws

	Filter case cover fastening screws: 5 Nm (0.5 mkg)



9. Inspect:
   - Transparent sleeve (1) (on the filter case bottom)
   Water and/or dirt → Clean the sleeve and the filter case.
10. Reassemble:
    - Fuel tank
    - Seat
    See the section "SEAT, FUEL TANK AND REAR COWLING".

	Fuel tank screws: 10 Nm (1.0 mkg)



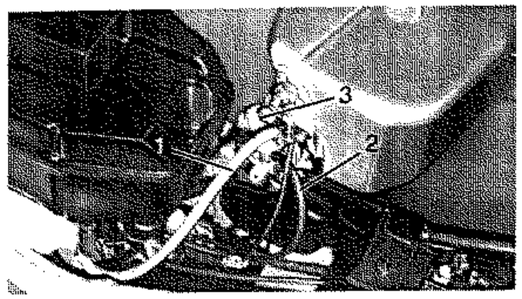
SUCTION HOSE AND MANIFOLD INSPECTION

1. Remove:
   - Seat
   - Fuel tank
   - Air filter case
   See the section "SEAT, FUEL TANK AND REAR COWLING" and "VALVE CLEARANCE ADJUSTMENT"
2. Inspect:
   - Suction hoses and manifolds (1)
   Cracked/Damaged → Replace.

	Screw (2) (carburetor manifold): 10 Nm (1.0 mkg) **Screw (4) (flange L): 2 Nm (0.2 mkg)** **Screw (5) (flange R): 5 Nm (0.5 mkg)**

3. Reassemble:
   - Air filter case
   - Fuel tank
   - Seat

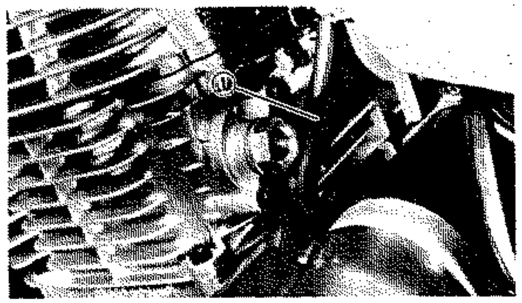
	Bolt (air filter case): 5 Nm (0.5 mkg) **Screws (fuel tank): 10 Nm (1.0 mkg)**



FUEL LINE INSPECTION

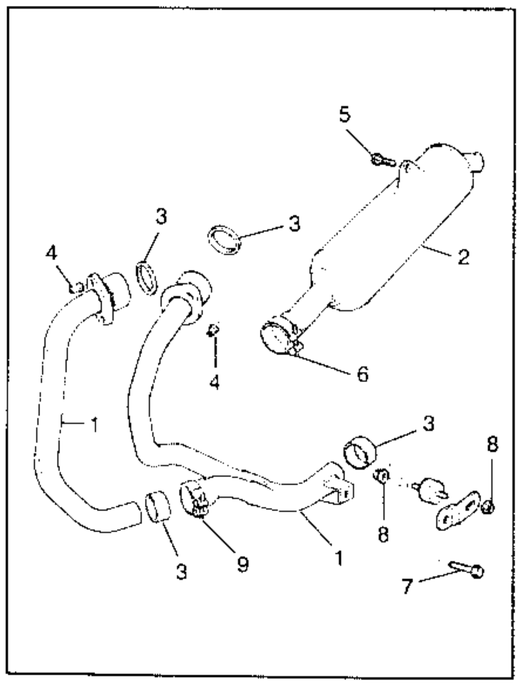
1. Remove:
   - Seat
   - Fuel tank
   See the section "SEAT, FUEL TANK AND REAR COWLING".
2. Inspect:
   - Fuel pipe (1)
   - Suction pipe (2)
   - Pipe from fuel tap (3) to suction assembly
   Cracked/Damaged → Replace.
3. Reassemble:
   - Fuel tank
   - Seat

Fuel tank screws:
10 Nm (1.0 mkg)



CRANKCASE VENTILATION HOSE INSPECTION

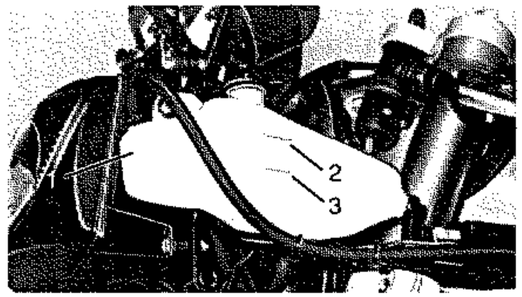
1. Inspect:
   - Crankcase ventilation hose (1)
   Cracked/Damaged → Replace.



EXHAUST SYSTEM INSPECTION

1. Inspect:
   - Exhaust pipe (1)
   - Silencer (2)
   Cracks/Damage → Replace.
   - Gaskets (3)
   Exhaust gas leakage → Replace.
2. Check:
   - Tightening torques

Nut (4) (exhaust pipe):
10 Nm (1.0 mkg)
Screw (5) (silencer):
40 Nm (4.0 mkg)
Bolt (6) (9) (flange):
10 Nm (1.0 mkg)
Screw (7) (exhaust pipe to bracket):
23 Nm (2.3 mkg)
Nuts (8) (Silent-block):
23 Nm (2.3 mkg)



CHECKING THE COOLANT LEVEL

1. Set the motorcycle level and hold it upright.
2. Check:
   - Coolant level on the reservoir tank (1).
   The coolant level must be between "LOW" (3) and "FULL" (2) references.
   Level below the "LOW" mark → Add the coolant to the "FULL" mark.

NOTE:
(3) "LOW" and (2) "FULL" references on the reservoir tank internal side are visible even if the side panels are mounted.

Recommended coolant:
High quality ethylene glycol antifreeze solution containing corrosion inhibitors for aluminium engines.
Coolant and water mixed ratio: 50%-50%
Total amount: 1.4 litres
Reservoir tank capacity: 0.55 litres
From «LOW» to «FULL» level: 0.210 litres

CAUTION:
Hard water or salt water is harmful to the engine. Use boiled or distilled water if soft water is not available.

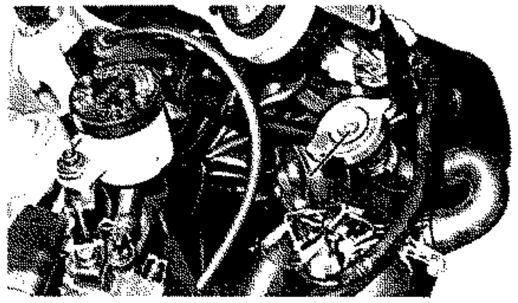
3. Start the engine and let it heat.
4. Turn off the engine and wait for a few minutes.
5. Recheck the level of the coolant.

CHANGING THE COOLANT

⚠ WARNING

Replace the coolant when the engine is cold to avoid the risk of burns.

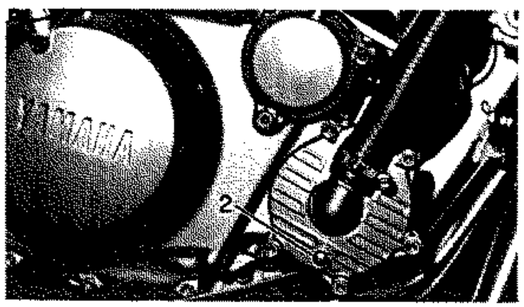
1. Remove:
   - Side panels of the cowling
     See the section "COWLING"



2. Remove:
   - Thermostat cap (1)

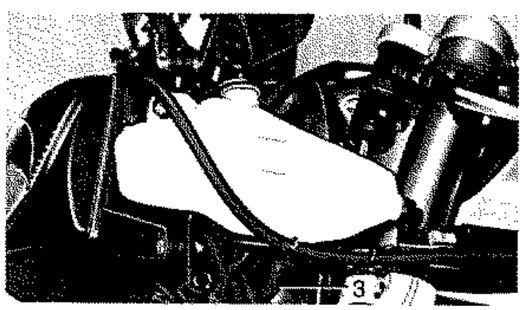
⚠ WARNING

Do not remove the thermostat cap when the engine and/or the radiator are hot. Scalding hot fluid and steam may be blow out under pressure, which could cause serious injury. When the engine has cooled, open the cap by the following procedure: place a thick rag, like a towel, over the 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.



3. Place:
   - Container under the engine

4. Remove:
   - Drain bolt (2) from the water pump case



5. Detach:
   - Pipe (3) from the base of the reservoir tank

6. Drain:
   - Reservoir tank
   - All the cooling circuit
   - Engine

7. Wash:
   - All the cooling circuit
     Use tap water

8. Inspect:
   - Gasket of drain bolt
   Damaged → Replace.

9. Install:
   - Drain bolt and gasket

Drain bolt (water pump): 10 Nm (1.0 mkg)

10. Replace:
    - Supply pipe to the reservoir tank

11. Fill:
    - Cooling circuit (through the filler of thermostat assy)

Recommended coolant:
High quality ethylene glycol antifreeze solution containing corrosion inhibitors for aluminium engines.
Coolant and water mixed ratio: 50%-50%
Total amount: 1.4 litres
Reservoir tank capacity: 0.55 litres
From «LOW» to «FULL» level: 0.210 litres

CAUTION:

Hard water or salt water is harmful to the engine. Use boiled or distilled water if soft water is not available.

12. Install:
    - Thermostat assy cap

13. Run the engine for a few minutes, then remove the thermostat assy cap and fill again the cooling circuit.

14. Install:
    - Thermostat assy cap

15. Fill:
    - Reservoir tank (up to "FULL" level)
16. Start the engine and let it warm up for several minutes.
17. Check:
    - Coolant level
      See the section "CHECKING THE COOLANT LEVEL".
18. Inspect:
    - All the cooling circuit
      Leakage → Repair.
      See the section "COOLING CIRCUIT INSPECTION".
19. Reassemble:
    - Side panels of the cowling
      See the section "COWLING"

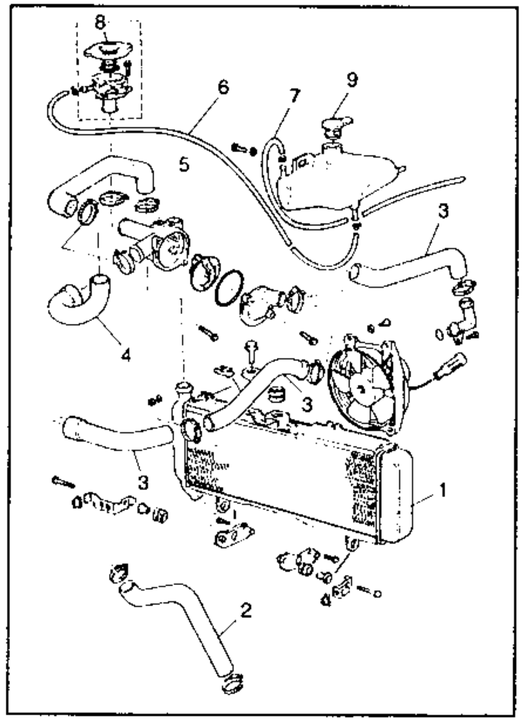
	Screws (side panels of cowling): 10 Nm (1.0 mkg)

Notes on using the coolant:

- The coolant is harmful to the health and must be used with care.

⚠ WARNING

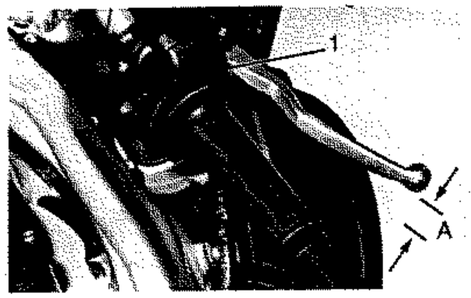
- **If the coolant enters into contact with the eyes, wash them with water and call a doctor.**
- **If you should swallow the coolant, try to be sick and go to a doctor immediately.**
- **If the coolant enters into contact with clothes wash them immediately with water, then with soap.**



COOLING CIRCUIT INSPECTION

1. Inspect:
    - Radiator (1)
    - Hose (2) (water pump-radiator)
    - Hoses (3) (cylinder-thermostat)
    - Hose (4) (thermostat-filler)
    - Hose (5) (radiator-thermostat)
    - Pipe (6) (filler-tank)
    - Pipe (7) (tank overflow)
    - Filler cap (8)
    - Reservoir tank (9)

   Cracks/Damage → Replace.
   See the section "COOLING SYSTEM" in chapter 5.



CHASSIS

FRONT BRAKE ADJUSTMENT

1. Check:
   - Free play at the end of brake lever (A)
   Out of specification → Adjust.

Free play (at the end of lever):
10 ~ 15 mm

2. Adjust:
   - Brake lever free play

Adjustment:
- Extract the adjuster lock spring.
- Turn the adjuster (1) either way to obtain the correct free play.

Screwing	**Free play diminishes**
Unscrewing	**Free play increases**

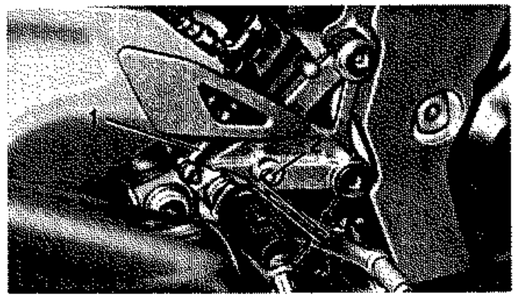
- Reassemble properly the adjuster safety spring.

CAUTION:

Proper lever free play is essential to avoid undue brake pad friction.

⚠ WARNING

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



REAR BRAKE ADJUSTMENT

1. Check:
   - Free play of brake pedal (A)
   Out of specification → Adjust.

Brake pedal free play (A):
0.5 - 1 mm

2. Adjust:
   - Brake pedal free play

Adjustment:
- Loose the eccentric screw (2).
- Turn the eccentric either way to obtain the correct free play.
- Tighten the eccentric screw.
- Recheck brake pedal free play.

NOTE:

Factory configured brake pedal position.

To change pedal position:

1. Loose:
   - Adjuster lock nut (1)
2. Turn:
   - Adjuster pivot (to the right position)
3. Tighten:
   - Adjuster lock nut
4. Adjust:
   - Brake pedal free play

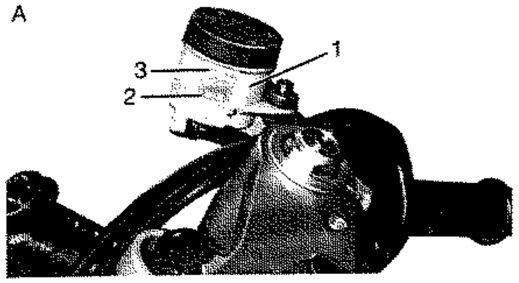
CAUTION:

Proper pedal free play is essential to avoid undue brake pad friction.

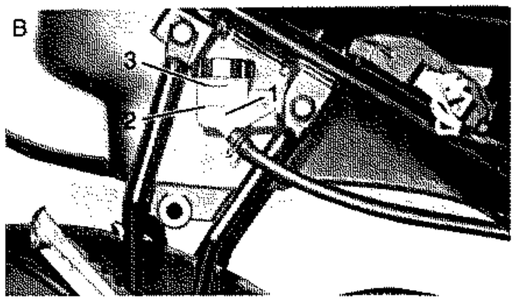
⚠ WARNING

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

A



B



BRAKE FLUID LEVEL CHECK

NOTE:

When checking the level of the fluid make certain that the position of the motorcycle is level and perfectly upright and, turning the handle bar, that the top of the front tank cover is in a horizontal position.

1. Check:
   - Level of brake fluid
     If the level is below the minimum (2) → Top up to the maximum level (3).

Recommended brake fluid:
DOT No. 4

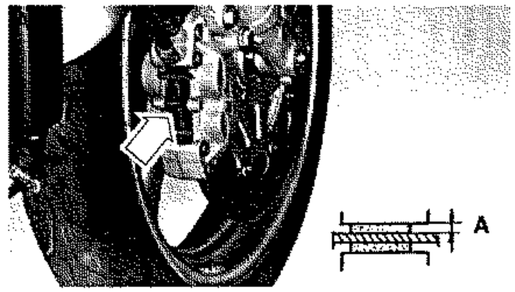
[A] Front brake
[B] Rear brake
(1) Brake fluid tank
(2) Minimum level
(3) Maximum level

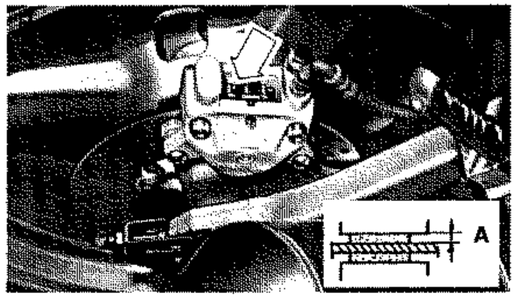
CAUTION:

The brake fluid may corrode painted surfaces and plastic parts. Always clean up spilled fluid immediately.

⚠ WARNING

- **Use only brake fluid in conformity with prescribed standards, otherwise the rubber gaskets risk deteriorating, causing fluid leakage and poor brake performance.**
- **Always use the same brand of fluid. The mixing of fluids could provoke a chemical reaction which would, in turn, result in poor brake performance.**
- **When adding fluid be sure that no water or foreign bodies enter the fluid tank. Water would lower the boiling point, generating vapour bubbles during braking.**





BRAKE PAD WEAR INSPECTION

1. Operate the brake lever or brake pedal.
2. Check:
   - Thickness of frictional material
     Out of specification → Replace.

Wear limit (A):
Front: 0.8 mm
Rear: 0.8 mm

For brake pad replacement, see the section "BRAKE PAD REPLACEMENT" in chapter 7.

[A] Front brake
[B] Rear brake

BRAKE HOSING INSPECTION

1. Inspect:
   - Brake hosing
     Cracks/Damage → Replace.

To replace hosing, see the section "FRONT AND REAR BRAKE" in chapter 7°.

BRAKE CIRCUIT BLEEDING

⚠ WARNING

If the brake lever or brake pedal has a soft or slack feel, this means that there is air in the brake system. It should be bled away before using the cycle. Air in the system seriously affects the effectiveness of braking and may cause loss of control of the motorcycle.
In all cases, bleed the brake system if:

- **The system has been disassembled.**
- **A brake hose has been loosened or removed.**
- **The brake fluid in the tank is at a very low level.**
- **Brake operation is faulty.**

Air bleeding procedures:

a. Top up the level of the fluid in the tank to maximum.
b. Install the diaphragm. Be careful not to spill fluid or let it overflow from the tank.
c. Connect a clear plastic hose to the caliper bleeder screw.
d. Place the other end of the hose in a container.
e. Slowly pull the brake lever or press the brake pedal several times.
f. Pull the brake lever right in or press the pedal right down and hold in position.
g. Loosen the bleeder screw and allow the lever or pedal to travel slowly towards its limit.
h. Tighten the bleeder screw when the lever or pedal limit has been reached, then release the lever or pedal.

	Bleeder screw: 6 Nm (0.6 mkg)

i. Repeat operations (e) to (h) until all the air bubbles have disappeared from the clear plastic hose.

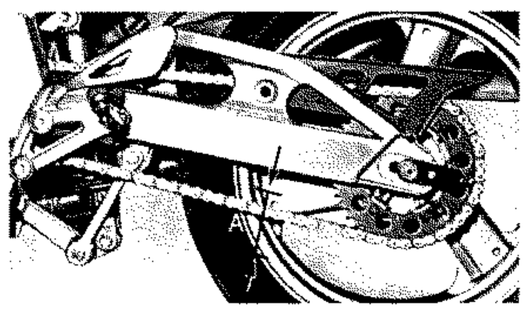
NOTE:
If bleeing proves difficult, it may be necessary to allow the brake fluid system to stabilise for a few hours. Repeat the bleeding procedure when the tiny bubbles in the system have disappeared.

j. Top up fluid to the maximum level.

DRIVE CHAIN TIGHTNESS INSPECTION AND ADJUSTMENT

Inspecting tightness:

NOTE:
Before checking and/or adjusting the chain, rotate the rear wheel through several revolutions and check the tightness several times to find the point on the wheel where chain tightness is highest.
Check and/or adjust chain tightness with rear wheel in this "tight chain" position.



1. Check:
   - Drive chain slack (A)
     Out of specification → Adjust.

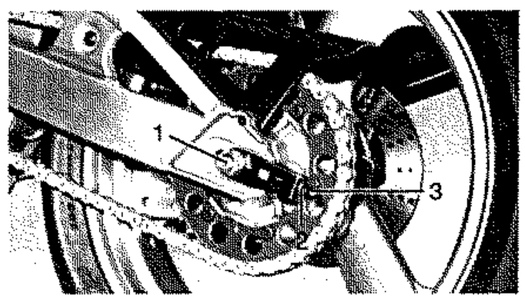
	Drive chain slack (A): 25 – 40 mm

NOTE:
To check chain tightness, the motorcycle must stand in an upright position with its two wheels touching the ground and no one sitting on it. Check tightness in the position shown in the figure.

2. Adjust:
   - Drive chain tightness

Tightness adjustment:

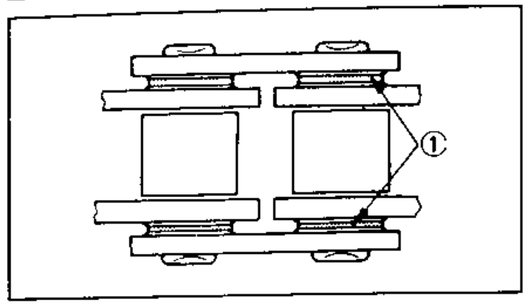
CAUTION:
An unduly tight chain will overload and damage the engine and drive parts. Be careful therefore to keep chain tightness within the limits specified.



- Loosen the rear wheel axle nut (1).
- Loosen the lock nuts (2) on either side of the chain stretchers.
- Turn both chain stretchers (R and L) (3) by the same amount to obtain the required tightness.
- After adjusting, screw the rear wheel axle nut to the specified torque.

	Real wheel axle nut: 80 Nm (8.0 mkg)

NOTE:
Turn the two chain stretchers (3) in exactly the same way to keep the wheel properly centred.

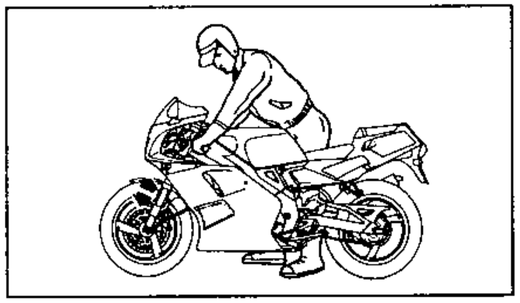


DRIVE CHAIN LUBRICATION

The chain consists of many small parts which operate one over another. If it is not properly maintained, it will wear quickly. It is thus necessary to carry out regular maintenance work on the chain, especially if the motorcycle is often driven over dusty surfaces. The motorcycle is fitted with a chain with small O-rings between the plates. Cleaning with steam, pressurised products and some solvents may damage these rings. Clean the chain with kerosene only. After cleaning, dry the chain with compressed air, then lubricate well with SAE 30W/50 engine oil or a special lubricant for chains with O-rings. Never use other lubricants since they may contain solvents harmful to the O-rings.

Recommended lubricant:
SAE 30W/50 engine oil

(1) O-rings



FRONT FORK INSPECTION AND ADJUSTMENT

⚠ WARNING

When inspecting the front fork, hold the motorcycle firmly to prevent it falling over.

Visual inspection:

1. Check:
   - Inner tubes
     Scratches/Dents/Damage → Replace.
   - Oil seals
     Undue oil leakage → Replace.

Operating inspection:

1. Check:
   - Proper functioning
     With the motorcycle in a level upright position and with your hands on the handle bar, operate the front brake. Then compress and release the front fork several times.
     Irregular/jerky functioning → Repair.

Adjustment:

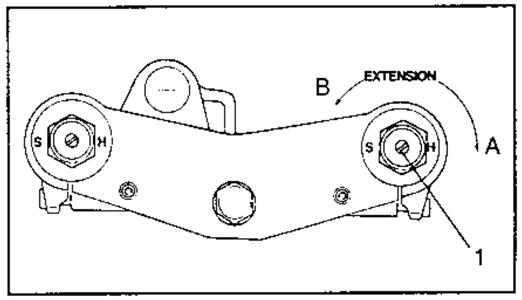
Fork damper adjustable both in extension (right fork adjustment) and compression (left fork adjustment).

CAUTION:

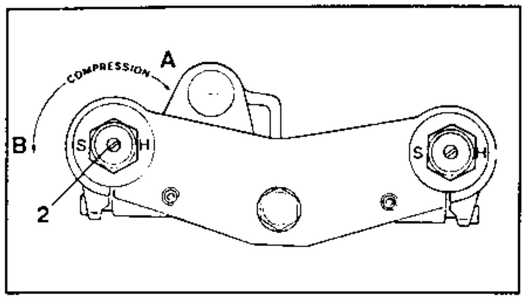
Do not force the adjusting screw beyond the minimum and maximum limits.

Adjustment of extension damping effect

On the cap of right fork is a screw (1) which adjusts damping effect during front fork extension.
Turning the screw clockwise (A) the damping effect increases, anticlockwise (B) it decreases.



ADJUSTMENT FIELD	
Maximum	**Minimum**
Screw completely tightened in clockwise direction (A)	Screw turned 24 clicks in anticlockwise direction (B)
Standard adjustment: 13 clicks from maximum	



Compression damping effect adjustment
On the cap of left stem is a screw (2) which serves to adjust the compression damping effect.
To increase the damping effect, turn the adjuster clockwise (A), to reduce it turn the adjuster anticlockwise (B).

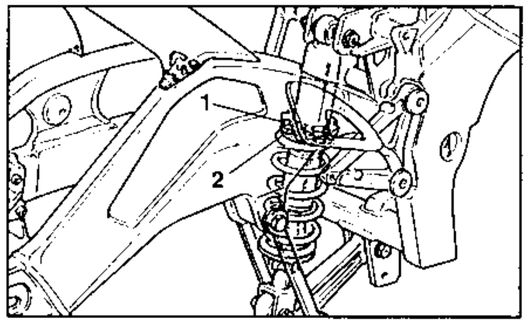
ADJUSTMENT FIELD
Maximum
Fully turned in position
Standard adjustment
13 clicks from maximum
Minimum
24 clicks anticlockwise (B) from maximum

SHOCK ABSORBER INSPECTION AND ADJUSTMENT

⚠ WARNING

This shock absorber contains highly compressed nitrogen gas.
Read these warnings carefully before handling the shock absorber. The manufacturer declines all responsibility for damage or wounds due to improper handling.

- **Do not tamper with or try to open the cylinder. This may cause damage or wounds to the operator.**
- **Do not expose the shock absorber to naked flames or any other heat sources: excess gas pressure might cause it to explode.**
- **Do not deform or damage the cylinder in any way. Damage to the cylinder might jeopardise the damping effect.**



NOTE:
The shock absorber spring preload may be adjusted according to the driver's preferences, to the weights being carried and to road conditions.

⚠ WARNING

Hold the motorcycle firmly in place to prevent it falling over.

Spring preload adjustment
Adjust the spring preload as follows:

- Loosen the lock nut (1).
- To increase the preload, turn the adjuster (2) clockwise. To reduce it, turn anticlockwise.
- The spring preload changes by 1 mm per turn of the adjuster.

NOTE:
For adjustment purposes, use the special wrench provided with the motorcycle.

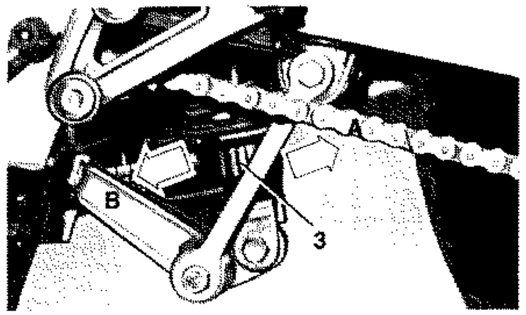
- After adjusting, screw lock nut (2) to the adjuster (1) and tighten to prescribed torque.

	Shock absorber lock nut: 42 Nm (4.2 mkg)

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

Spring length with preload

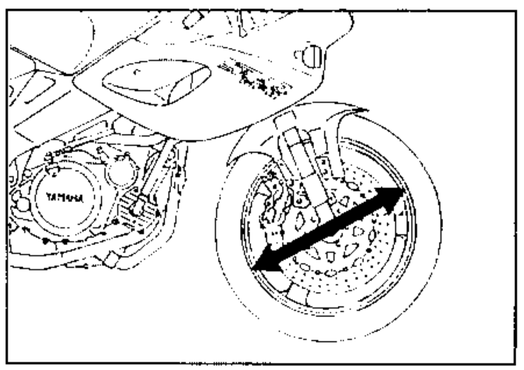
Standard length	166 mm
Minimum length	161 mm
Maximum length	170 mm



Extension damping effect adjustment
To increase the extension damping effect, turn the setting (3) at the base of the shock absorber clockwise (A). To reduce it turn anticlockwise (B).

Adjustment field

Maximum effect: adjuster fully turned in.
Standard adjustment: adjuster turned 10 clicks out from maximum.

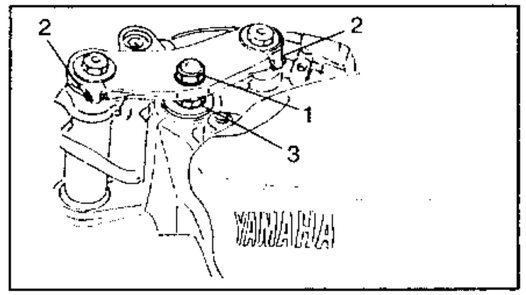


STEERING INSPECTION

⚠ WARNING

Hold the motorcycle firmly in place to prevent it falling over.

1. Raise the front wheel and place a support under the engine.
2. Check:
   - Steering bearings
     Grasp the bottoms of the front fork stems and rock back and forward.
     Free play → Adjust steering bearing.
3. Adjust:
   - Steering bearing



Adjustment:
- Loosen steering column nut (1) and upper fork plate screws (2).
- Tighten ring nut (3) with the special wrench.

Ring nut wrench:
P/N. YU-01268
P/N. 90890-01268

Ring nut (initial tightening):
38 Nm (3.8 mkg)

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

⚠ WARNING

Do not tighten the ring nut excessively.

Ring nut (final tightening):
3 Nm (0.3 mkg)

- Tighten the steering column nut and the front fork plate screws.

Nut (steering column):
110 Nm (11.0 mkg)
Screws (front fork plate):
23 Nm (2.3 mkg)

TYRE INSPECTION

FRONT:

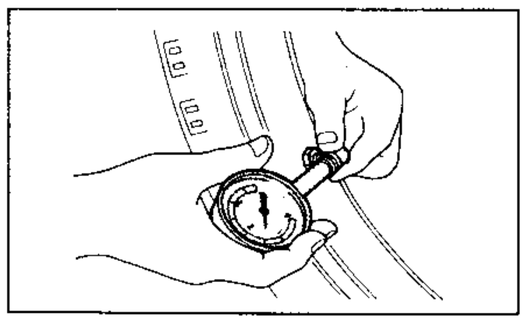
Make	Measurement	Type
MICHELIN	110/70 ZR 17	TX 15
DUNLOP	110/70 ZR 17	TL

REAR:

Make	Measurement	Type
MICHELIN	150/60 ZR 17	TX 25
DUNLOP	150/60 ZR 17	TL

⚠ WARNING

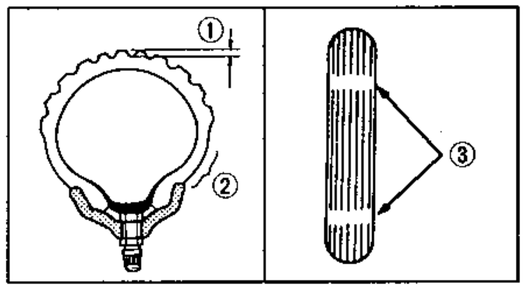
- **Tyre pressure must be checked when the tyres are at ambient temperature. Pressure must be adjusted according to the total weight of luggage, driver, passenger and accessories (fairings, bags, if approved for this model) and speed of the motorcycle.**
- **A list of tyres approved for this model following severe testing by Belgarda S.p.A is provided. There can be no guarantee of safe roadholding if a combination of tyres different from those indicated is used.**
- **Front and rear tyres must have the same design and be of the same make.**
- **The use of valves and valve stems other than those indicated might cause the loss of tyre pressure at high speeds. Use only original or compatible spare parts.**
- **Replace the valve cap securely to prevent losses of tyre pressure at high speed.**



1. Check:
   - Tyre pressure
     Out of specification → Adjust.

INFLATING PRESSURES in bar (psi)		
	Front	**Rear**
With driver only	2 (28)	2.2 (32)
With driver and passenger	2.2 (32)	2.5 (37)

2. Adjust:
   - Air pressure



Adjustment:

- Remove the valve cap.

Use an air pump or compressed air pistol	**Increase air pressure**
Eliminate air by pressing valve tube stem	**Air pressure diminishes**

- Install valve caps securely.

3. Inspect:
   - Tyre surface
     Wear/Damage → Replace.

Minimum track thickness (front and rear): 1.0 mm

(1) Track thickness
(2) Side
(3) Wear indicators

⚠ WARNING

- **The use of worn tyres reduces stability and may cause a loss of control.**
- **The tyres mounted on the cycle are "tubeless": ie, without air chambers. In order to avoid compromising the safety of the cycle, never mount an air chamber, even in the event of repairs to the tyre.**

4. Tighten:
   - Valve stem lock nut

Valve stem lock nut: 1.5 Nm (0.15 mkg)

⚠ WARNING

After assembling the new tyres, drive slowly to allow them to adapt well to the rim and ensure maximum grip.

WHEEL INSPECTION

1. Inspect:
   - Wheels
     Damage/Deformation/Fissures → Replace.

NOTE:
Always balance the wheel after the replacement or reassembly of a tyre.

⚠ WARNING

Never try to repair a wheel in any way. If a wheel is deformed or cracked, it must be replaced.

Bearing inspection

Check the front and rear wheel bearing periodically to make sure that they do not have free play in the hub and that the wheel turns smoothly without sticking. Wheel bearings must always be checked in accordance with the maintenance table.

CABLE INSPECTION AND LUBRICATION

⚠ WARNING

If the cable sheath is damaged, corrosion might ensue or the cable might not run freely. To avoid such drawbacks, replaced damaged cables as quickly as possible.

1. Inspect:
   - Cable sheath
     Damaged → Replace.
2. Check:
   - Cable functioning
     Does not run freely → Lubricate.

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

NOTE:
Hold the cable vertical and apply a few drops of lubricant.

LEVER AND PEDAL LUBRICATION

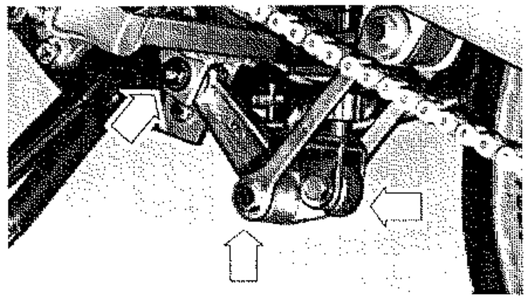
Lubricate all lever and pedal pins.

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

SIDE STAND LUBRICATION

Lubricate the side stand and articulations.

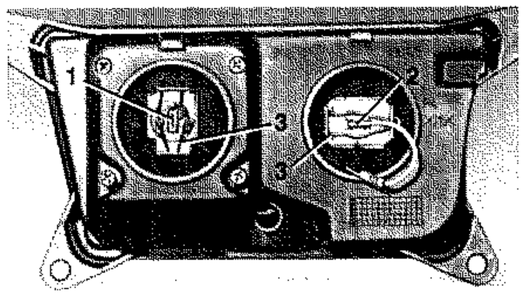
	Recommended lubricant: **SAE 10W30 engine oil**

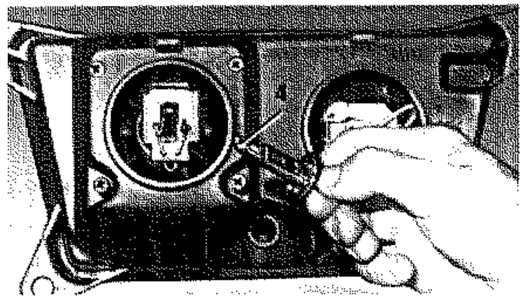


SWING ARM LUBRICATION

Lubricate the swing and connection arm pivots.

	Light lithium-soap grease





ELECTRICALS

HEADLIGHT: LAMP REPLACEMENT AND SETTING

Replacing the headlight bulbs

1. Approach the light from behind the front cowling:
   (1) Low beam bulb
   (2) High beam bulb
2. Remove:
   - Rubber protection
3. Detach:
   - Connectors
   - Fastener small spring edges (3)
4. Extract:
   - Lamp (4)

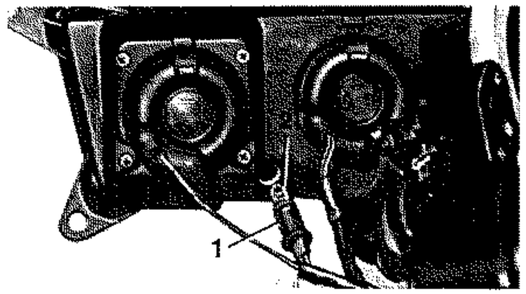
5. Install:
   - New lamp
   - Lamp fastening small spring
   - Lamp connector
   - Rubber protection

⚠ WARNING

Do not touch the lamp when on and keep all inflammable products well away.

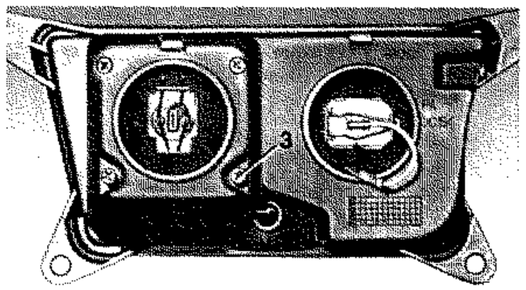
CAUTION:

Do not touch the glass part of the lamp with the fingers and be careful not to soil it. If it is soiled, clean thoroughly with a cloth soaked in alcohol before reassembling.



Front parking light lamp replacement

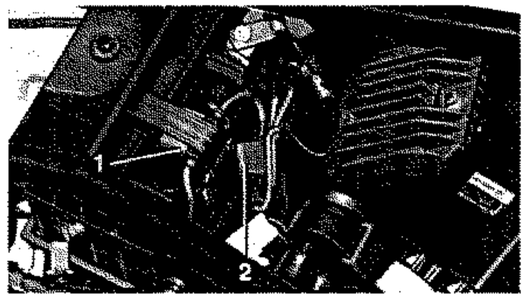
1. Remove:
   - Lamp holder (1) (pressure fitted)
   - Lamp (2) (pressure fitted)
2. Install:
   - New lamp (pressure fitted)
   - Lamp holder (pressure fitted)

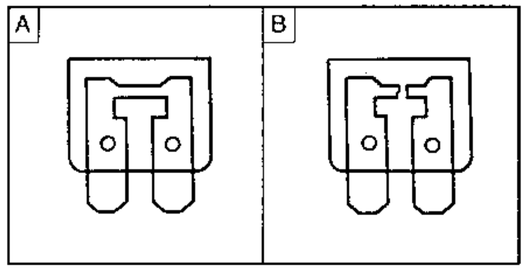


Vertical setting of the headlight beam

1. Approac the setting screw (3) in the rear part of the headlight
2. Screw or unscrew:
   - Adjusting screw (3)

Screw	**Increase the headlight beam**
Unscrew	**Decrease the headlight beam**





FUSE INSPECTION AND REPLACEMENT

1. Remove:
   - Seat
   - Fuse box (1 - main, 2 - fan motor)
   - Fuse (from fuse box)
2. Inspect:
   - Fuse
     (A) Intact fuse
     (B) Broken off fuse
3. Replace:
   - Broken fuse

Replacement:

- Disconnect the main switch (OFF position).
- Replace the fuse with a new one with suitable amperage.

Prescribed fuses:
(1) Main fuse: 20A
(2) Electric fan motor fuse: 7.5A

- Turn on main switch (ON position).
- Operate the various switches, turning on all electric devices to check that they are working.
- If the fuse burns out again, check the circuit in question.

⚠ WARNING

Do not use fuses with an amperage higher than that prescribed. Such fuses might cause damage to the motorcycle and even fire.

4. Install:
   - Fuse box
   - Seat

BATTERY INSPECTION

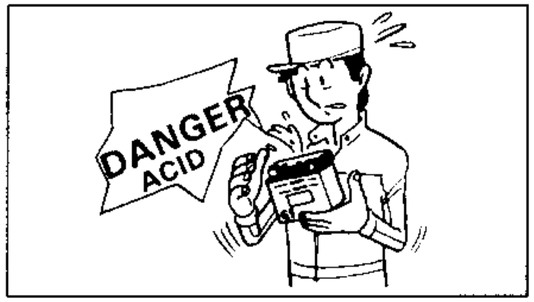
NOTE:

The battery mounted on the motorcycle is of the maintenance-free sealed type (MF). It is thus impossible to measure electrolyte density to check the battery charge. The battery charge is checked by measuring the voltage at the battery terminals.

CAUTION:

Charging method

- The battery is of the sealed (MF) type. Do not remove caps during charging. If the caps are removed, the balance of the battery is not maintained and its performance progressively diminishes.
- Never add water, not even distilled water. Otherwise, the chemical reactions in the battery will not take place normally, making regular functioning impossible.
- The charging time, current and voltage of a MF battery are different from those of a normal battery.
  The MF battery must be charged as described in the section "Charging method". If the battery were overcharged, the level of the electrolyte would drop considerably. Pay careful attention therefore while charging the battery.
- Avoid using electrolyte other than that specified. The specific density of the electrolyte in the battery is 1.32 at 20°C (the specific density of electrolyte for normal batteries is 1.28). If an electrolyte of specific density lower than 1.32 were used, the sulphuric acid would diminish, thus reducing the performance of the battery. If an electrolyte with a specific density of 1.32 or over were used, the battery plates would be corroded and the battery would last less.



⚠ WARNING

The electrolyte in the battery is dangerous: it contains sulphuric acid and is thus poisonous and extremely corrosive.
Always observe the following prevention measures:

- **Avoid physical contact with the electrolyte as it may cause serious burns or permanent damage to the eyes.**
- **Wear eye protections when handling or working with batteries.**

(EXTERNAL) ANTIDOTO:

- **SKIN - Rinse with water.**
- **EYES - Rinse with water for 15 minutes and call a doctor immediately.**

(INTERNAL) ANTIDOTO:

- **Drink copious amounts of water or milk followed by milk of magnesia, scrambled eggs or vegetable oil.**
  Call a doctor immediately.

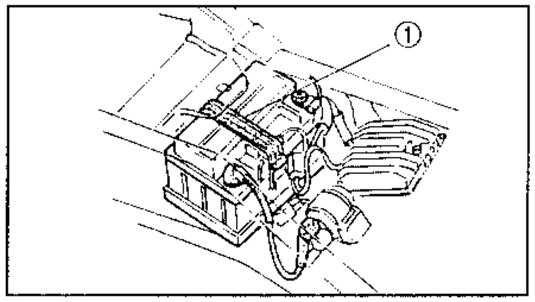
Batteries generate explosive hydrogen gas: observe the following prevention measures:

- **Charge the battery in a well-aired space.**
- **Do not allow fire, sparks or flames (eg welding equipment, lit cigarettes etc) near to the batteries.**
- **DO NOT SMOKE when charging or handling batteries.**

KEEP THE BATTERY AND ELECTROLYTE WELL OUT OF THE REACH OF CHILDREN.

CAUTION:

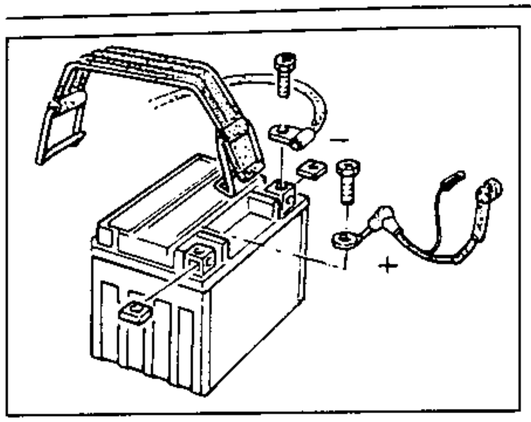
When you are removing battery from chassis, first disconnect (–) pole, then (+) pole. When you are mounting battery onto chassis, first connect (+) pole, then (–) pole.

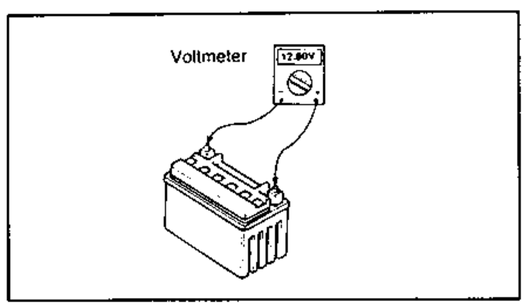


1. Remove:
   - Seat
   - Elastic belt fastening battery (1)

NOTE:

You can install battery easily from front side of its seat, under tank, by removing two clamping screws of tank and lifting it without discoupling fuel hoses.





2. Disconnect:
   - Battery cables

CAUTION:

Disconnect first the negative cable, then the positive cable.

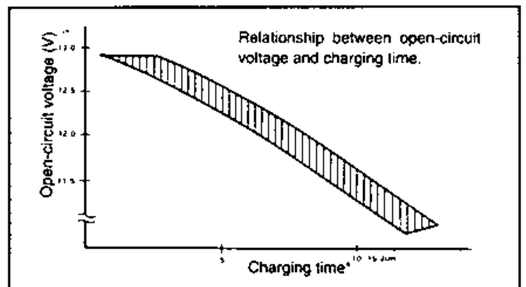
3. Remove:
   - The battery
4. Check:
   - The conditions of the battery

Battery condition check stages:

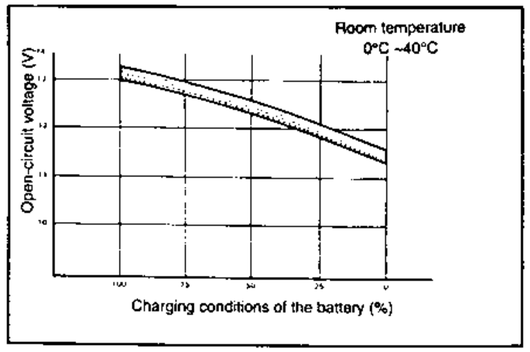
- Connect the pocket tester to the battery terminals.
  Tester (+) wire → Battery terminal (+)
  Tester (–) wire → Battery terminal (–)

NOTE:

The charging time for a partially or totally MF battery may be checked by measuring the open circuit voltage (the voltage measured with the positive terminal disconnected).



* This varies depending on the temperature, the state of charge in battery plates and the electrolyte level.



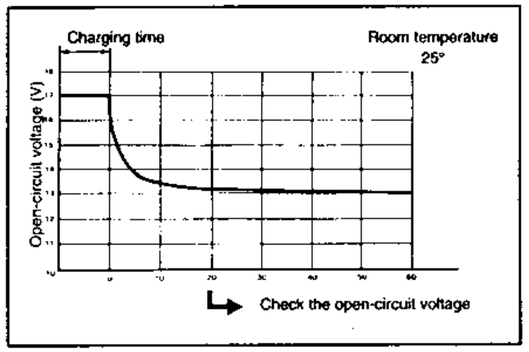
Open-circuit voltage	Charging time
12.8V or more	Charging unnecessary
12.7V - 11.5V	5 - 10 hours
Fewer than 11.5V	15 - 20 hours

- Battery charging time according to charging conditions are shown in the figure.

5. MF battery charging method.

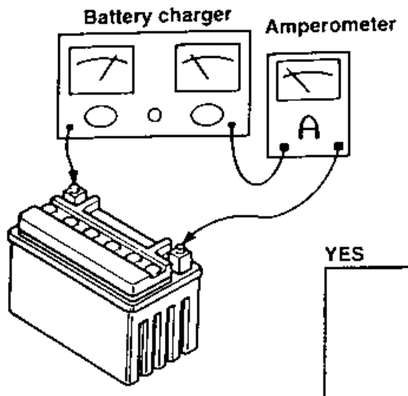
CAUTION:

- **If it is impossible to obtain the envisaged charge current voltage, charge the battery according to the instructions In the section "Charging with a constant voltage battery charger".**



- **When charging the battery, remove it from the motorcycle. If it is necessary to recharge the battery on the motorcycle, be sure to disconnect the negative terminal.**
- **Never remove the battery caps.**
- **Make sure that the battery charger pincers are firmly in contact with the terminals and are not in short circuit. An oxidised pincer may generate heat on the surface of the contact. A pincer with a weak spring may cause sparks.**
- **Before removing the pincers from the battery terminals, turn off the battery charger.**
- **Voltage readings are shown in the diagram. The open circuit voltage stabilises about 30 minutes after the cycle has been completed. Thus, to check the conditions of the battery, measure the open circuit voltage 30 minutes after the charging has been completed.**

Method for charging with a variable voltage battery charger



Measure the open circuit voltage before charging.

Connect the battery charger and amperometer to the battery and start to charge.

Check that the current is higher than the standard charging current indicated on the battery.

YES

NOT

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

Turning the charge voltage regulation control, set the charging voltage to 20 —25V.

Check the amperage for 3-5 minutes to see if the standard charge current is reached.

1A or more

1A or less

If the current is higher than 1A, regulate the voltage to 16 -17V and continue to charge.

NOT

Set the timer to the charging time suitable for the open circuit voltage.

After 5 minutes, regulate the voltage to 16 - 17V and continue to charge.

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

If charging takes more than 5 hours, it is advisable to check the charge current after 5 hours. If there are changes in amperage, regulate the voltage to obtain the standard charge current.

Measure the open circuit battery voltage after leaving the battery unused for over 30 minutes.
12.8V or more - Charging complete.
12.7V or less - Recharging necessary.
Under 12.0V - Replace battery.

NOTE:
The current must be measured 30 minutes after stopping the cycle.

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

Method for charging with a constant voltage battery charger

Measure the open circuit voltage before charging.

Connect the battery charger and amperometer to the battery and start to charge.

Check that the current is higher than the standard charging current indicated on the battery.

YES

NOT

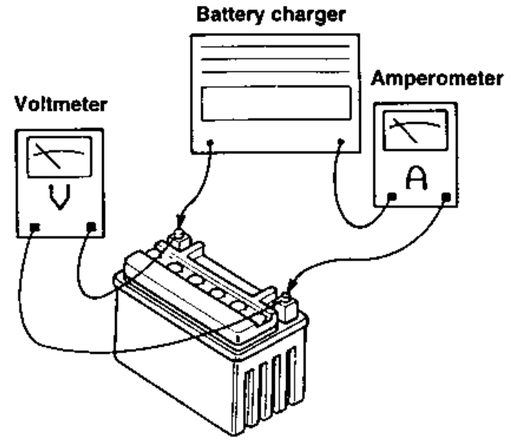
Charge the battery until the charging voltage is 16V or more.

This type of battery charger cannot recharge an MF battery.
A variable voltage or constant current battery charger is recommended.

Measure the open circuit battery voltage after leaving the battery unused for over 30 minutes.
12.8V or more - Charging complete.
12.7V or less - Recharging necessary.
Under 12.0V - Replace battery.

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

NOTE:
The current must be measured 30 minutes after stopping the cycle.



Method for charging with a constant current battery charger (exclusively for MF batteries)

Measure the open circuit voltage before charging.

NOTE:
The current must be measured 30 minutes after stopping the cycle.

↓

Connect the battery charger and amperometer to the battery and start to charge.

↓

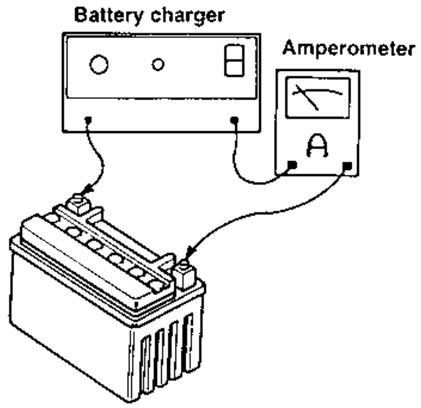
After an hour's charging, check that the nominal charging current of the battery charger is flowing by checking the amperometer.

YES → Since the charging current is constant, the charging time varies according to the capacity of the battery. Set the charging time by following the instructions specified for the battery charger.

↓

Measure the open circuit battery voltage after leaving the battery unused for over 30 minutes.
12.8V or more - Charging complete.
12.7V or less - Recharging necessary.
Under 12.0V - Replace battery.

NOT → If the nominal current fails to flow, replace the battery.



6. Inspect:
   - Battery terminals
     Dirty poles → Clean with steel brush.
     Uncertain connections → Tighten terminals.

NOTE:
After cleaning the poles, grease them slightly.

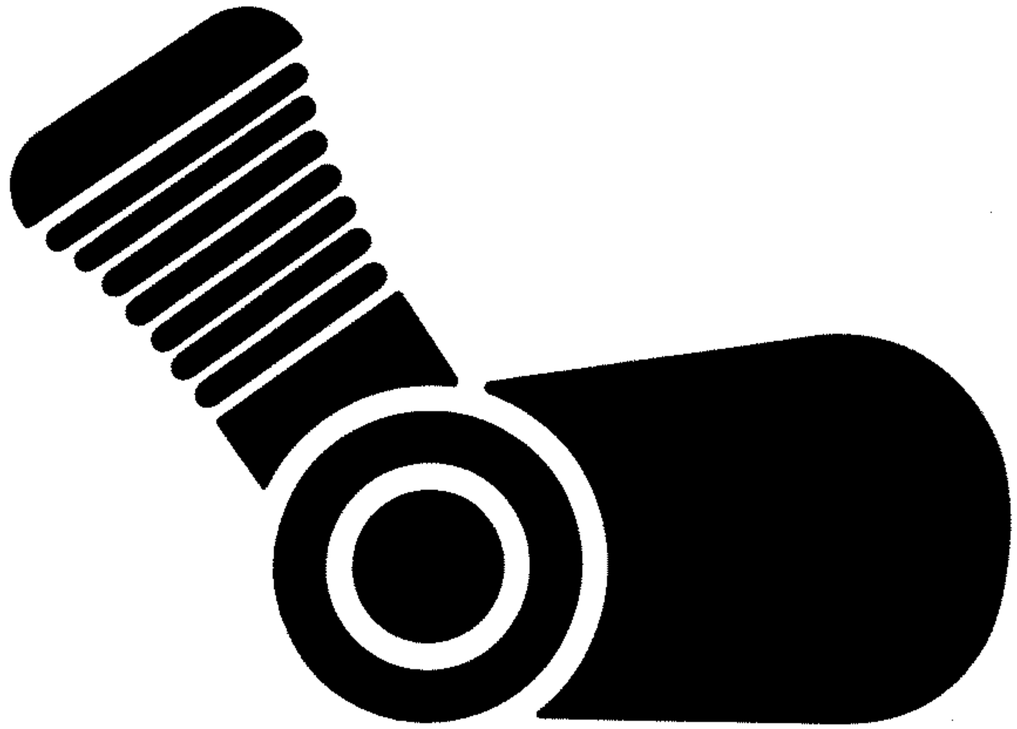
7. Install:
   - Battery

NOTE:
To introduce battery under the seat, put battery in horizontal position and introduce it into chassis from short side. After bringing it near seat, turn it 90° horizontally, set it to vertical position and low it into its seat with poles backward. You can install battery easily from front side of its seat, under tank, by removing two clamping screws of tank and lifting it without discoupling fuel hoses.

8. Connect:
   - Battery cables

CAUTION:
Connect first the positive cable, then the negative cable.

9. Install:
   - Elastic belt fastening battery
   - Seat



ENG 4

CHAPTER 4°

ENGINE OVERHAUL

ENGINE OVERHAUL

ENGINE REMOVAL

NOTE:

It is not necessary to detach the engine from the chassis to remove the following parts:

- Cylinder head
- Cylinder
- Piston/Piston rings
- Clutch
- Water pump
- Oil pump
- Alternator

⚠ WARNING

Support the motorcycle securely to prevent it falling over.

COWLING, SEAT AND FUEL TANK

1. Remove:
   - Side panels (L and R)
   - Seat
   - Fuel tank

   See the section "COWLING" and "SEAT, FUEL TANK AND REAR COWLING" in chapter 3.

ENGINE OIL

1. Drain:
   - Engine oil

   See the section "ENGINE OIL REPLACEMENT" in chapter 3.

COOLING CIRCUIT

1. Drain:
   - Cooling circuit

   See the section "CHANGING THE COOLANT" in chapter 3.

BATTERY CABLES

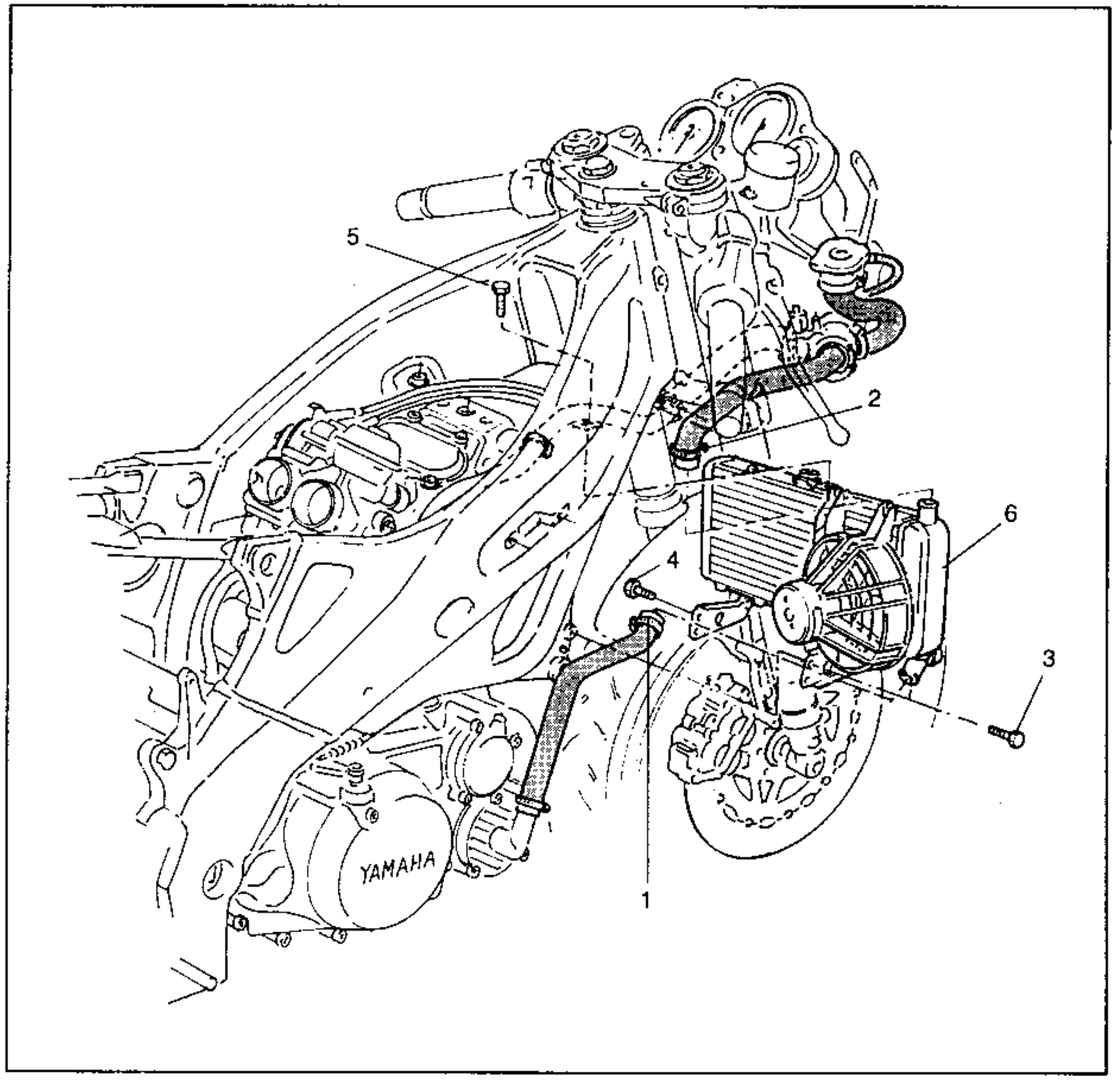
1. Disconnect:
   - Battery cables

CAUTION:

Disconnect first the negative cable (–), then the positive cable (+).

2. Remove:
   - Battery

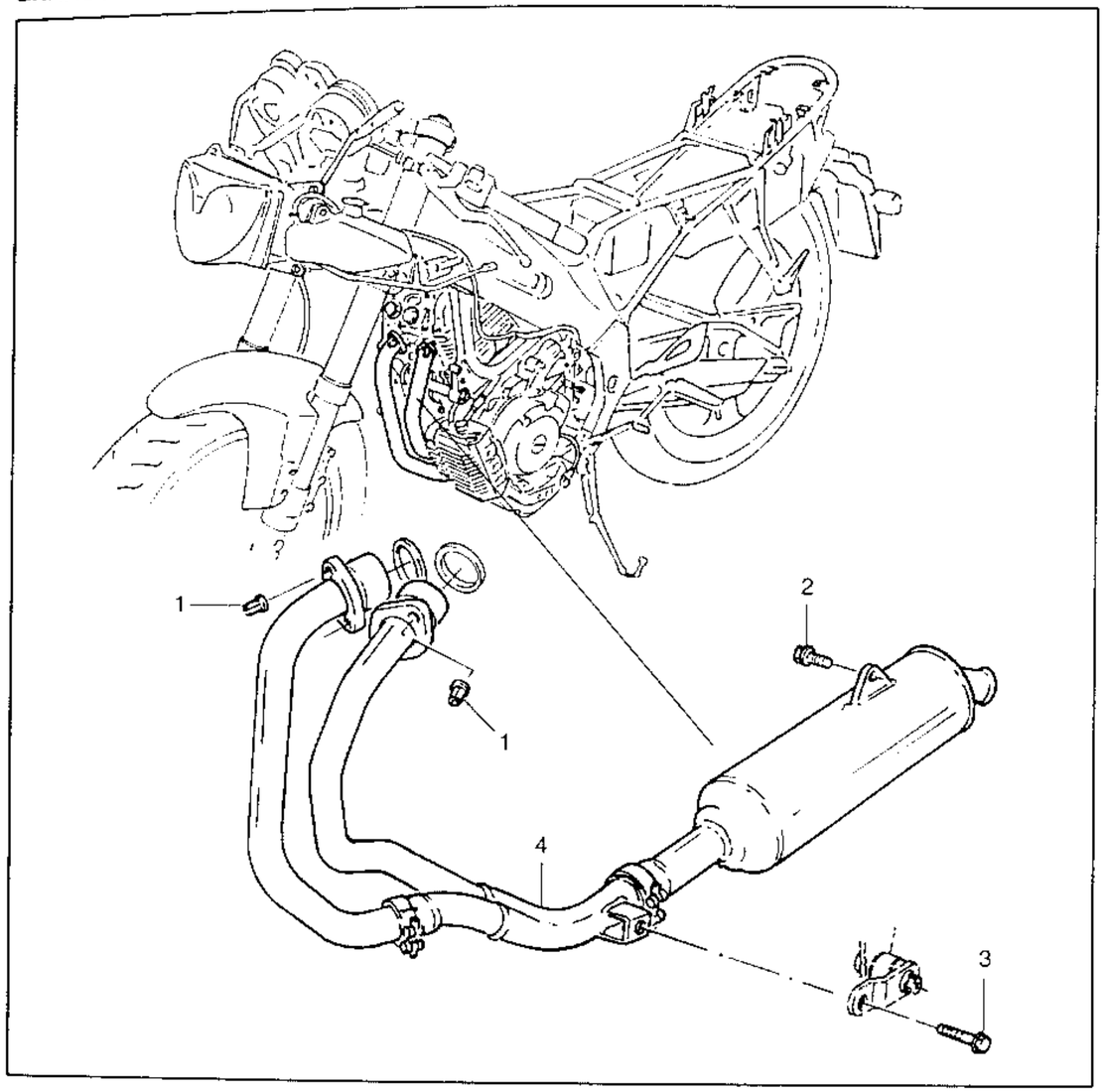
RADIATOR



JOB INSTRUCTION CHART

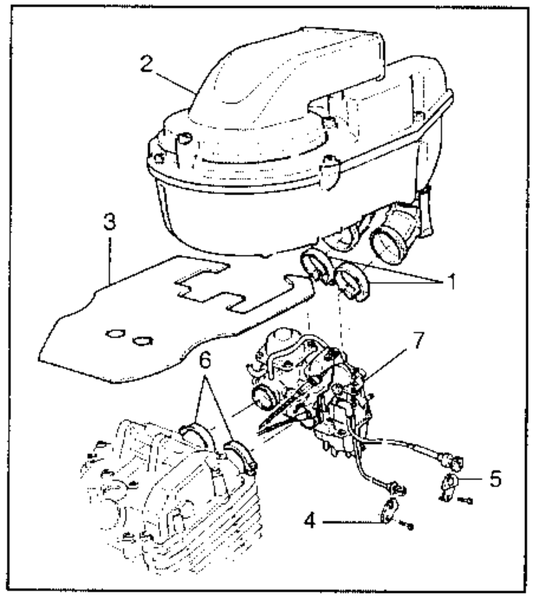
Order	Job name/Part name	Q.ty	Remarks
	Removal of radiator		**Remove the parts in the order.**
1	Clamp	1	
2	Clamp	1	
3	Screw	1	
4	Screw	1	
5	Screw	1	
6	Radiator (disconnect electrical connector)	1	**Reverse the removal procedure for installation.**

EXHAUST PIPE



JOB INSTRUCTION CHART

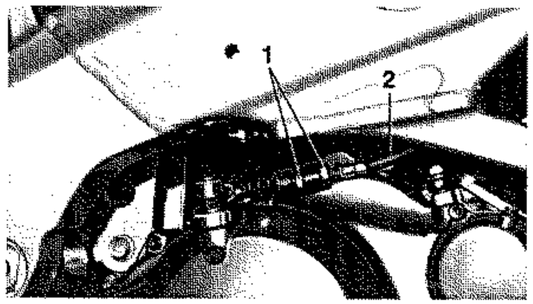
Order	Job name/Part name	Q.ty	Remarks
	Removal of exhaust pipe		**Remove the parts in the order.**
1	Nut	4	
2	Screw	1	
3	Screw	1	
4	Exhaust pipe (assembly)	1	
			Reverse the removal procedure for installation.



AIR FILTER CASE AND CARBURETOR

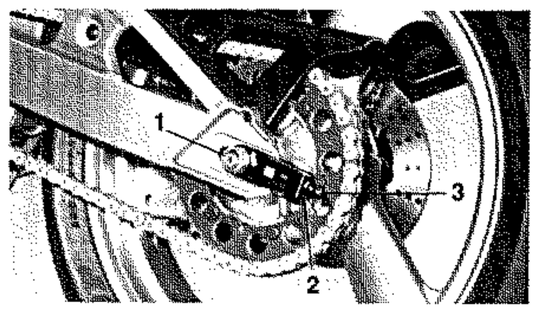
1. Loosen:
   - Carburetor manifold clamps (1)
2. Remove:
   - Air filter case (2)
   - Air panel (3)
3. Disconnect:
   - Engine idle speed control knob bracket (4)
   - Starter control knob bracket (5)
4. Loosen:
   - Carburetor joint clamps (6)
5. Remove:
   - Carburetors (7)

NOTE:
Cover the carburetor with a rag to prevent dirt or foreign bodies entering.



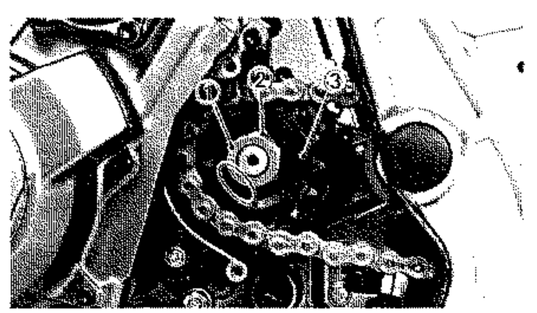
CLUTCH CABLE

1. Loosen:
   - Nut (1)
2. Disconnect:
   - Clutch cable (2)
     (from lever and bracket)



DRIVE CHAIN

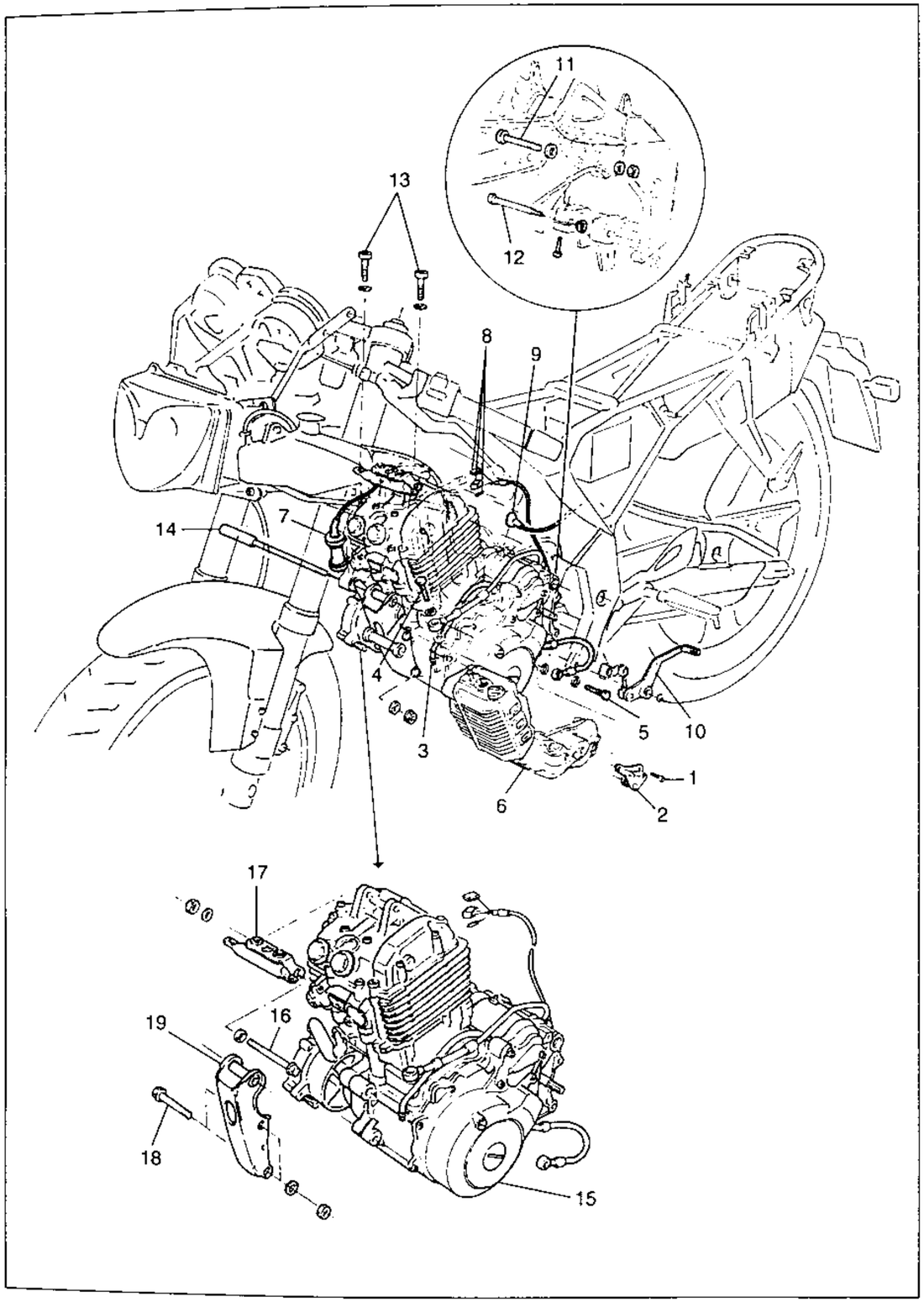
1. Loosen:
   - Rear wheel axle nut (1)
   - Lock nut (2) of the chain stretchers
   - Chain stretcher screws (3)
2. Remove:
   - Sprocket cover
3. Straighten:
   - Lock washer tab



4. Remove:
   - Nut (1)
   - Lock washer (2)
   - Sprocket (3)

NOTE:
Loosen the sprocket nut (1) while applying the rear brake.

ENGINE DETACHMENT

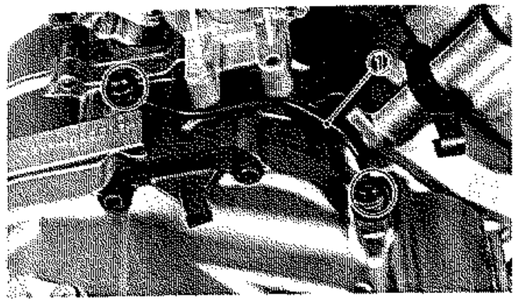


JOB INSTRUCTION CHART

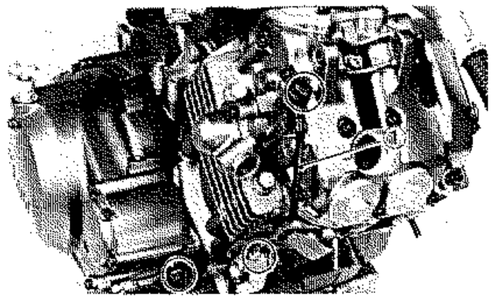
Order	Job name/Part name	Q.ty	Remarks
	Detachment of engine from frame		**Remove the parts in the order.**
1	Screw	2	
2	Bracket	1	
3	Crankcase ventilation hose	1	
4	Screw (oil recovery hose)	1	
5	Screw (oil delivery hose)	1	
6	Oil tank	1	
7	Spark plug cable	1	
8	Wire harness connector	3	
9	Starter plus leadwire	1	
10	Shift pedal	1	
11	Bolt (engine mounting)	1	
12	Screw (engine mounting)	1	
13	Screw (engine upper mounting)	2	
14	Axle (engine front mounting)	1	
15	Engine	1	
16	Bolt (engine upper mounting stay)	1	
17	Engine upper mounting stay	1	
18	Bolt (engine front mounting stay)	2	
19	Engine front mounting stay	1	**Reverse the removal procedure for installation.**

ENGINE DISASSEMBLY

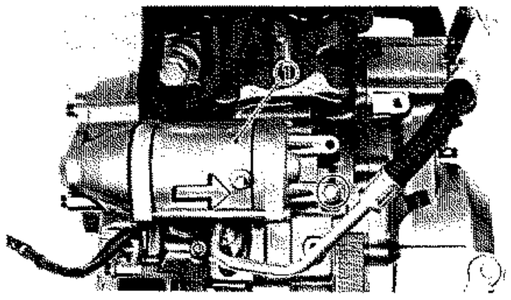
STARTER MOTOR AND HOSES



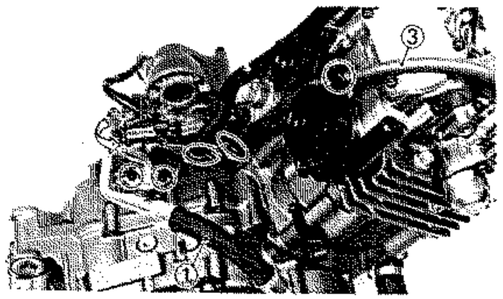
1. Remove:
   - Oil pipe (1)



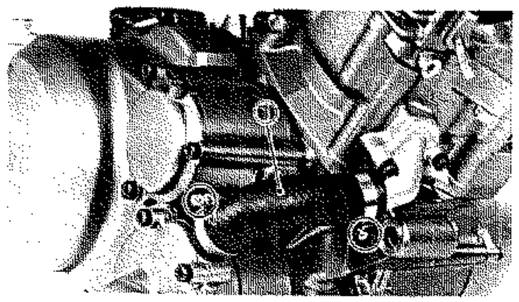
2. Remove:
   - Oil pipe (1)



3. Remove:
   - Starter motor (1)



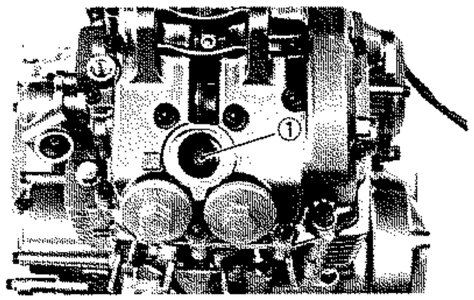
4. Remove:
   - Oil hose (1)
   - Breather hose (3) (crankcase)



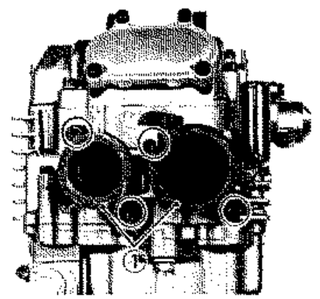
5. Remove:
   - Coolant hose (1)

CYLINDER HEAD, CYLINDER AND PISTON

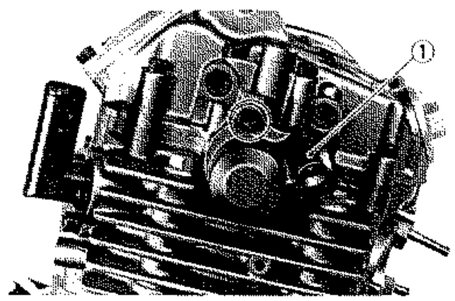
NOTE:
With the engine mounted, the cylinder head cover, camshaft and cylinder head can be maintained by removing the following parts.
- Seat
- Fuel tank
- Cowling
- Radiator
- Exhaust pipe
- Ignition coil
- Air filter case
- Air panel
- Carburetor



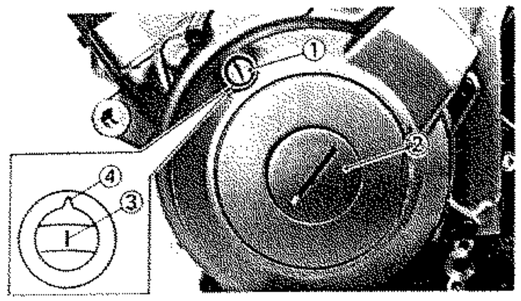
1. Remove:
   - Spark plug (1)



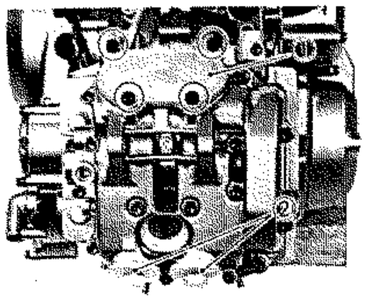
2. Remove:
   - Intake manifolds (1)



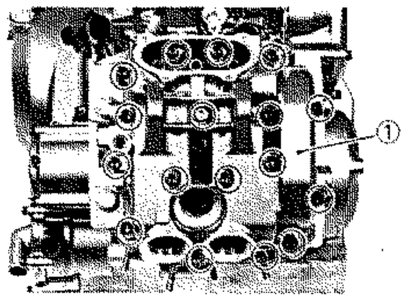
3. Remove:
   - Cap (1)



4. Remove:
   - Timing plug (1)
   - Plug (center) (2)
5. Turn:
   - Crankshaft
     (until TDC mark (3) is aligned with stationary pointer (4)

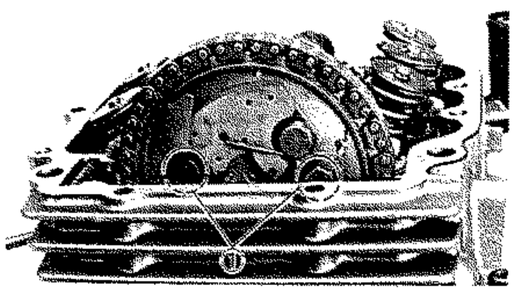


6. Remove:
   - Tappet cover (intake) (1)
   - Tappet cover (exhaust) (2)

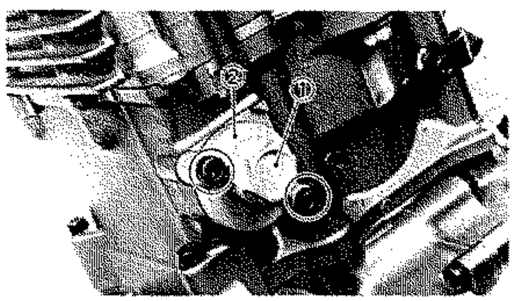


7. Remove:
   - Cylinder head cover (1)

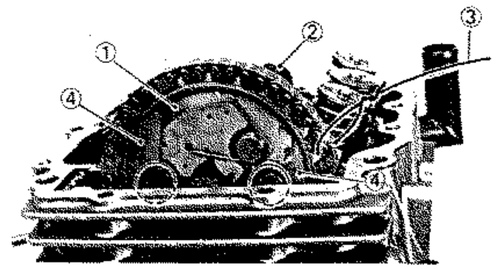
NOTE:
Working in a crisscross pattern, loosen the bolts 1/4 turn each. Remove them after all are loosened.



8. Loosen:
   - Bolts (1) (cam sprocket)

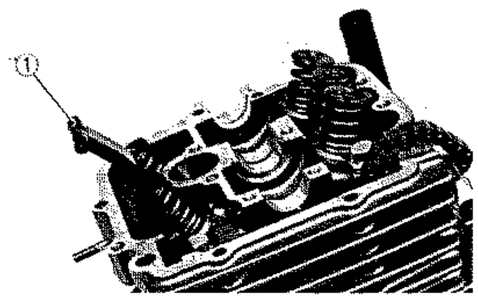


9. Loosen:
   - Cap bolt (1) (chain tensioner)
10. Remove:
    - Chain tensioner (2)

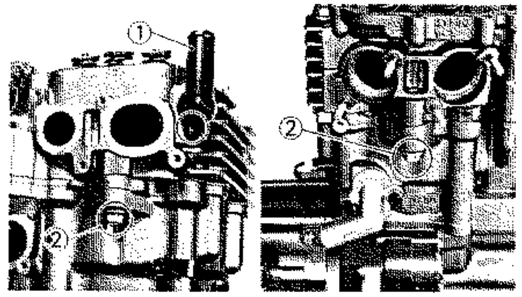


11. Remove:
    - Cam sprocket (1)
    - Camshaft (2)

NOTE:
- Fasten a safety wire (3) to the timing chain to prevent if from falling into the crankcase.
- Do not fall the stopper guide plate (4) into the crankcase when removing the bolts (cam sprocket).

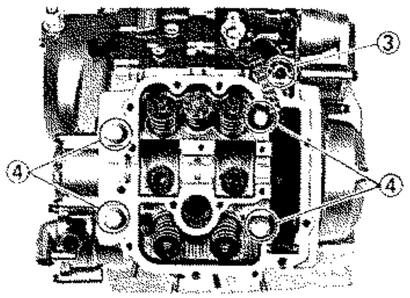


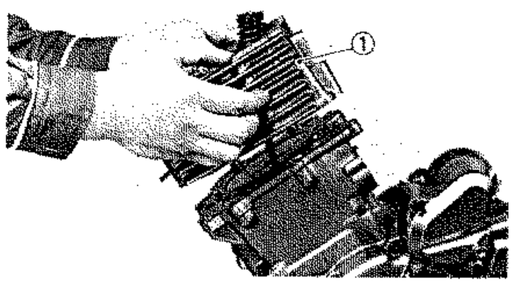
12. Remove:
    - Chain guide (1) (exhaust)



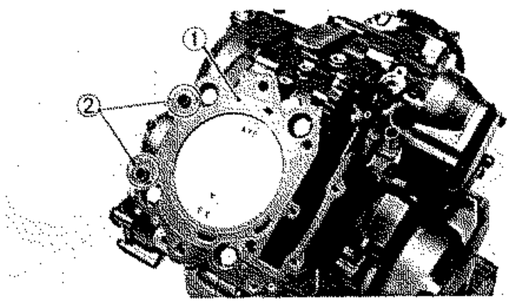
13. Remove:
    - Pipe (1)
    - O-Ring
    - Bolts (2)
    - Bolts (3)
    - Bolts (4)

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

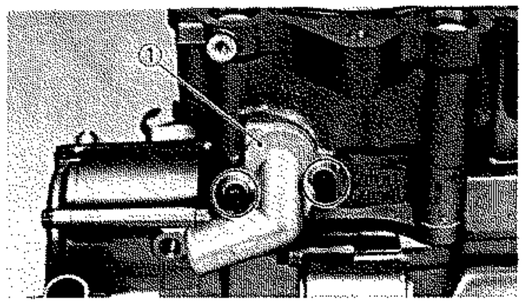




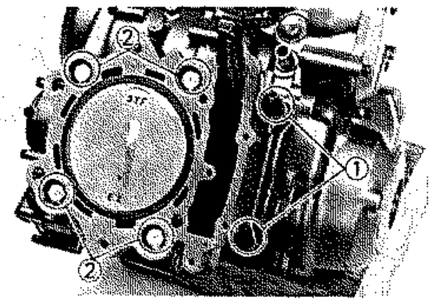
14. Remove:
    - Cylinder head (1)



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

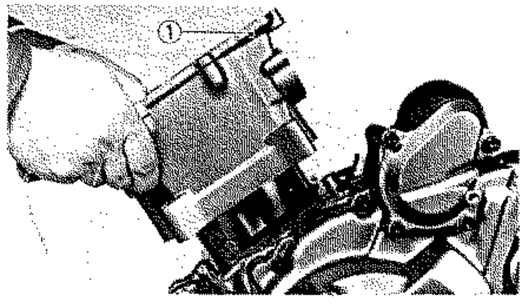


16. Remove:
    - Pipe (1)

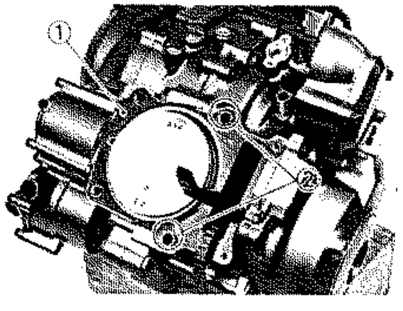


17. Remove:
    - Bolts (1)
    - Bolts (2)

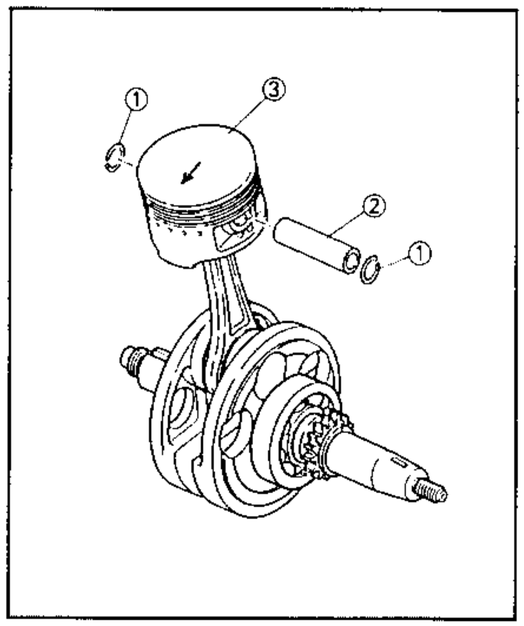
NOTE:
Working in a crisscross pattern, loosen the bolts 1/4 turn each. Remove them after all are loosened.



18. Remove:
    - Cylinder (1)



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



20. Remove:
    - Piston pin circlips (1)
    - Piston pin (2)
    - Piston (3)

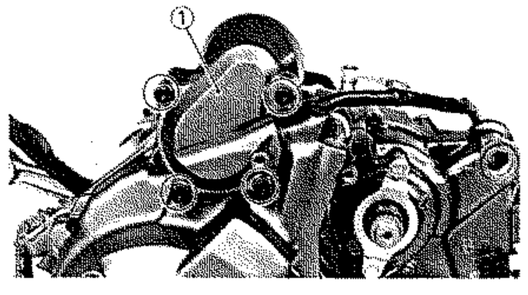
NOTE:
- Before removing the piston pin circlip, cover the crankcase with a clean rag to prevent the circlip from falling into the crankcase cavity.
- Before removing the piston pin, deburr the clip grooved and pin hole area. If the piston pin groove is deburred and piston pin is still difficult to remove, use the piston pin puller.

	Piston pin puller: **P/N YU-01304, 90890-01304**

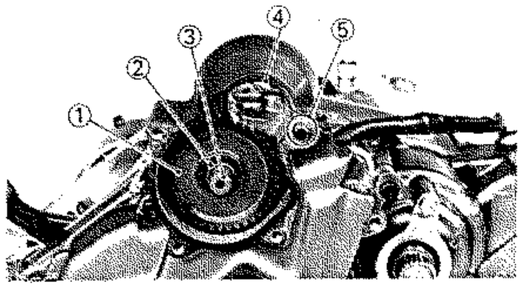
CAUTION:
Do not use a hammer to drive the piston pin out.

ROTOR AND STARTER DRIVERS

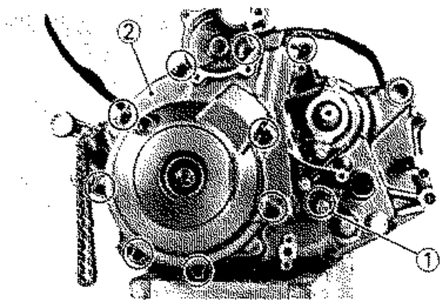
NOTE:
The AC magneto and starter drivers can be maintained with the engine mounted.



1. Remove:
    - Cover (1)

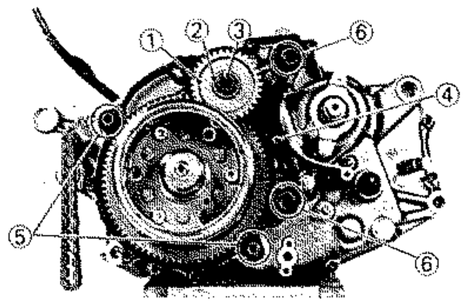


2. Remove:
   - Starter idle gear 1 (1)
   - Needle bearing (2)
   - Shaft (3)
   - Gasket (4)
   - Dowel pin (5)

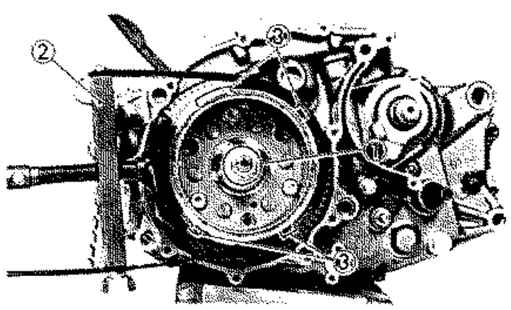


3. Disconnect:
   - Neutral switch lead (1)
4. Remove:
   - Crankcase cover (2) (left)

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



5. Remove:
   - Starter idle gear 2 (1)
   - Needle bearing (2)
   - Shaft (3)
   - Gasket (4) (crankcase cover)
   - Dowel pins (5)
   - O-rings (6)

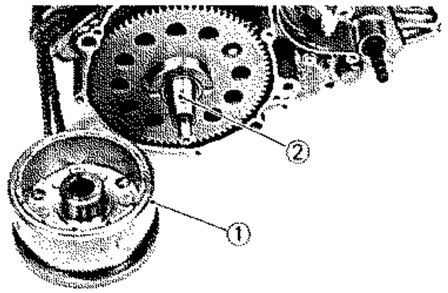


6. Remove:
   - Nut (1) (rotor)

NOTE:
Loosen the nut (rotor) while holding the rotor with the rotor holder (2).

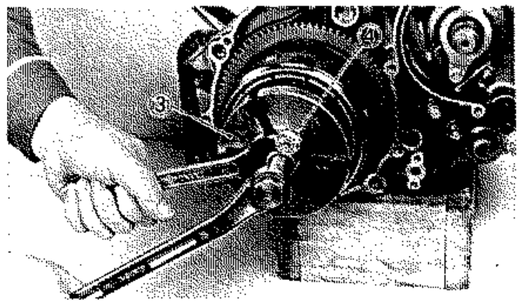
	Rotor holder: **P/N YS-01880, 90890-01701**

CAUTION:
Do not allow the rotor holder to touch the projection (3) on the rotor.

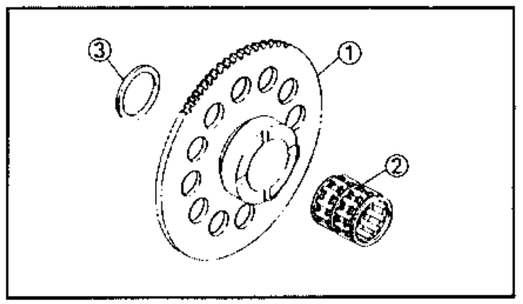


7. Remove:
   - Rotor (1)
   - Woodruff key (2)
   Use the rotor puller (3) and adapter (4).

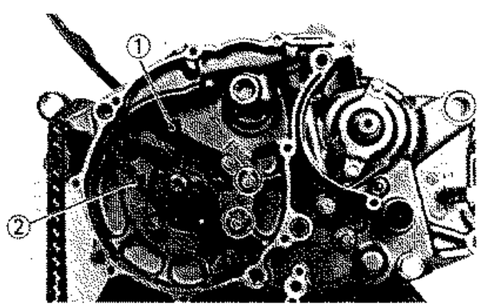
	Rotor puller: **P/N YU-33270, 90890-01362** **Adapter:** **P/N YM-04063-A, 90890-04063**



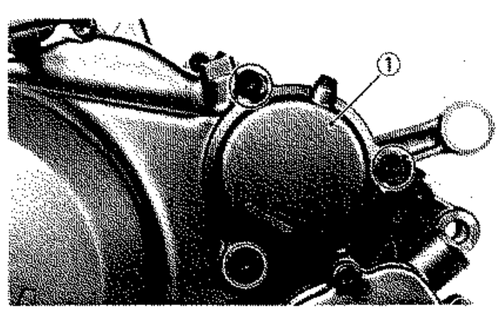
NOTE:
Tighten the tool holding bolts, but make sure that the tool body is parallel with the rotor. If necessary, one screw may be backed out slightly to level tool body.



8. Remove:
   - Wheel gear (1)
   - Needle bearing (2)
   - Washer (3)



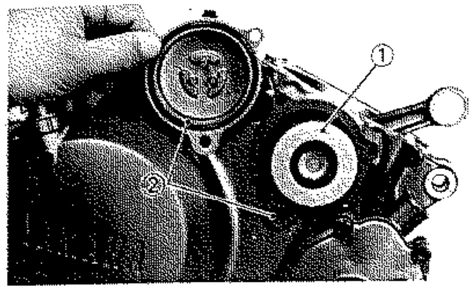
9. Remove:
   - Chain guide (1)
   - Timing chain (2)



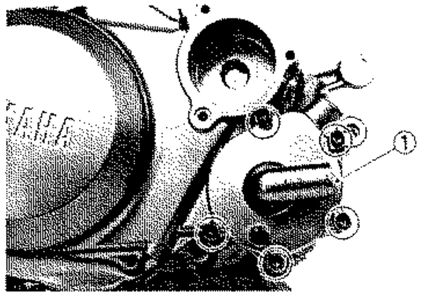
OIL FILTER AND WATER PUMP

NOTE:
The water pump can be maintained with the engine mounted.

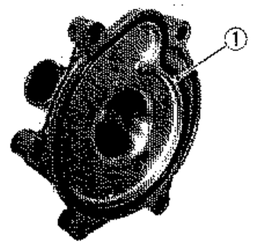
1. Remove:
   - Oil filter cover (1)



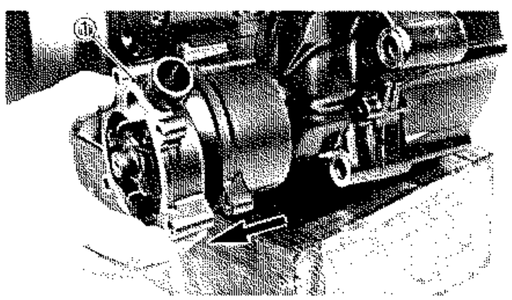
2. Remove:
   - Oil filter (1)
   - O-rings (2)



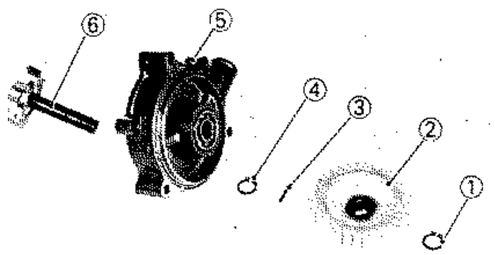
3. Remove:
   - Water pump cover (1)



4. Remove:
   - O-ring (1)



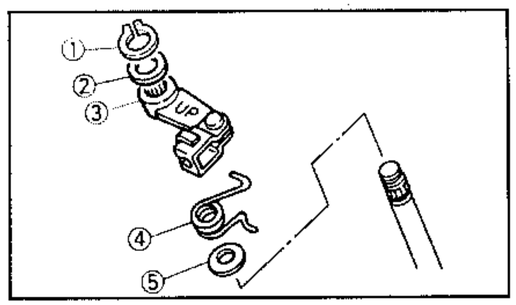
5. Remove:
   - Water pump housing (1)



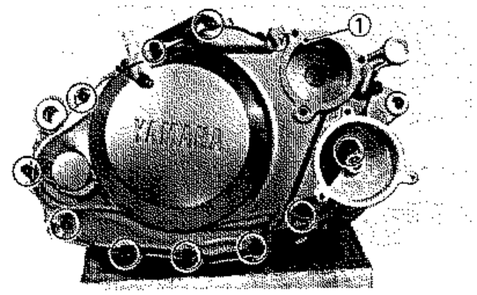
6. Remove:
   - Circlip (1)
   - Water pump gear (2)
   - Pin (3)
   - Circlip (4)
   - Water pump housing (5)
   - Impeller shaft (6)

CLUTCH AND BALANCER GEAR

NOTE:
With the engine mounted, the clutch can be maintained by removing the following parts:
- Side panel (R)
- Clutch cable
- Water pump housing

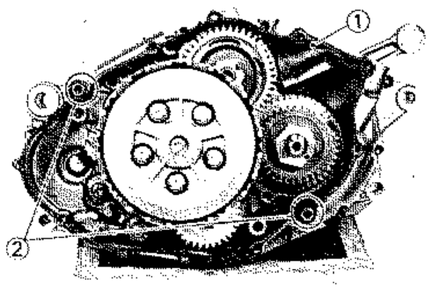


1. Remove:
   - Circlip (1)
   - Washer (2)
   - Pull lever (3)
   - Return spring (4)
   - Washer (5)

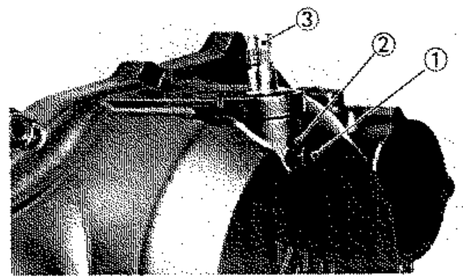


2. Remove:
   - Crankcase cover (1) (right)

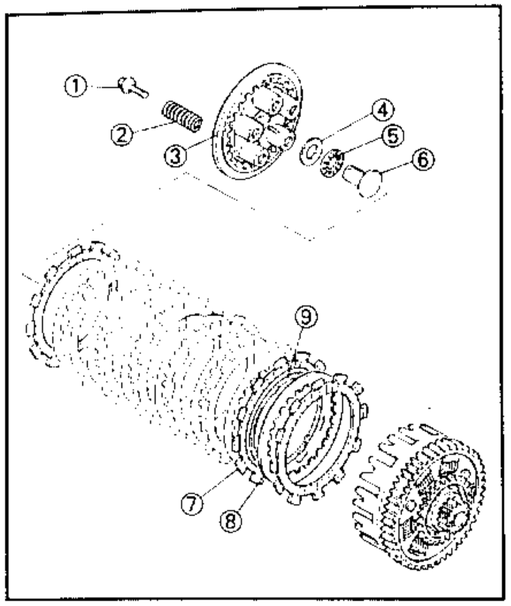
NOTE:
Working in a crisscross pattern, loosen the bolts 1/4 turn each. Remove them after all are loosened.



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

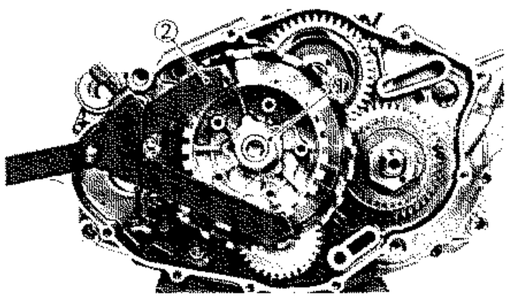


4. Remove:
   - Bolt (1)
   - Washer (2)
   - Pull lever axle (3) (from crankcase cover)



5. Remove:
   - Bolts (1)
   - Clutch springs (2)
   - Pressure plate (3)
   - Washer (4)
   - Bearing (5)
   - Pull rod (6)
   - Friction plate (7)
   - Clutch plate (8)
   - Cushion spring (9)

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

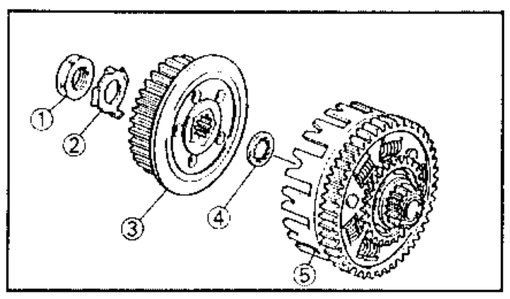


6. Straighten:
   - Lock washer tab

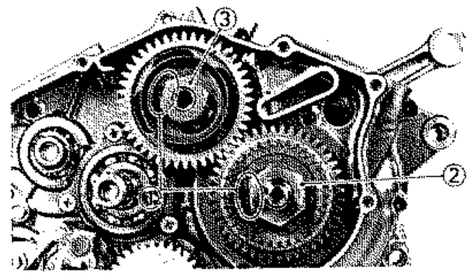
7. Loosen:
   - Nut (1) (clutch boss)

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

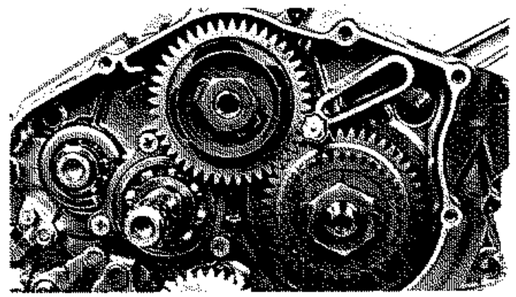
	Universal clutch holder: P/N YM-91042, 90890-04086



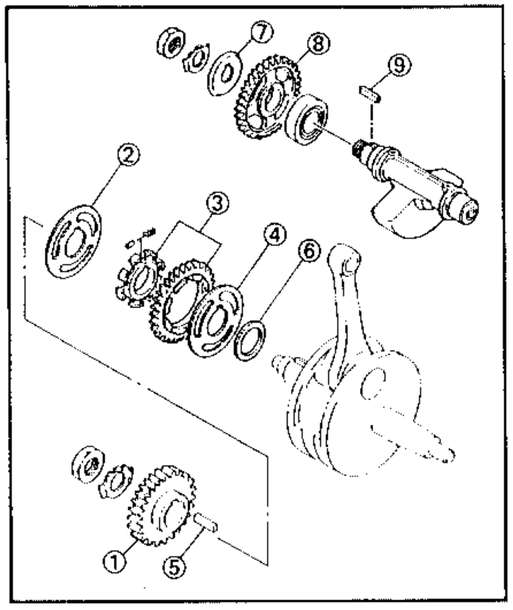
8. Remove:
   - Nut (1) (clutch boss)
   - Lock washer (2)
   - Clutch boss assembly (3)
   - Thrust plate (4)
   - Clutch housing (5)



9. Straighten:
   - Lock washer tabs (1)
10. Loosen:
   - Nut (2) (crankshaft)
   - Nut (3) (balancer shaft)



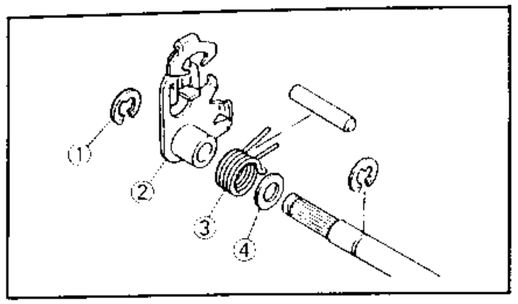
NOTE:
- Place a folded rag or aluminum plate between the teeth of the balancer drive gear and balancer gear.
- Take care not to damage the gear teeth.



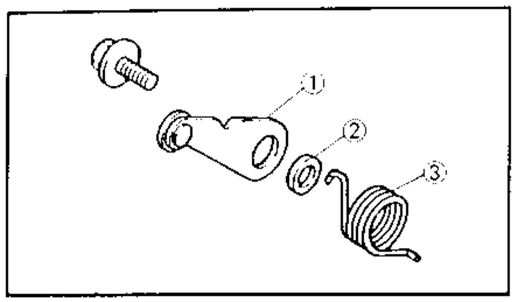
11. Remove:
   - Primary drive gear (1)
   - Plate (2)
   - Balancer drive gear (3)
   - Plate (4)
   - Key (5)
   - Plater washer (6)
   - Plate (7)
   - Balancer gear (8)
   - Key (9)

SHIFT LEVER AND OIL PUMP

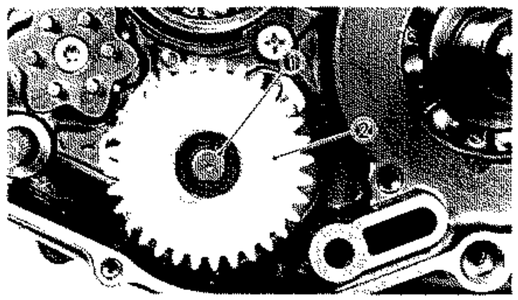
NOTE:
- With the engine mounted, the oil pump can be maintained by removing the following parts:
- Clutch cable
- Water pump housing



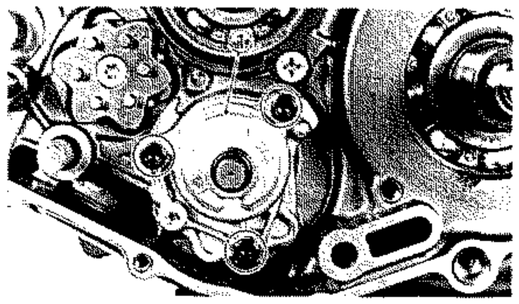
1. Remove:
   - Circlip (1)
   - Shift lever (2)
   - Torsion spring (3)
   - Washer (4)



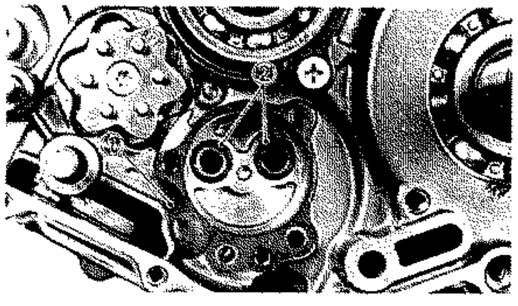
2. Remove:
   - Stopper lever (1)
   - Collar (2)
   - Return spring (3)



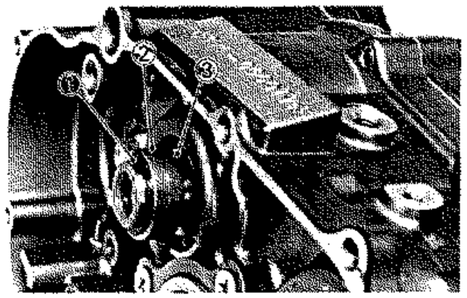
3. Remove:
   - Circlip (1)
   - Oil pump gear (2)



4. Remove:
   - Oil pump assembly (1)

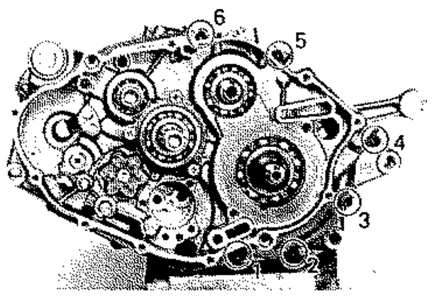


5. Remove:
   - Gasket (1)
   - O-ring (2)

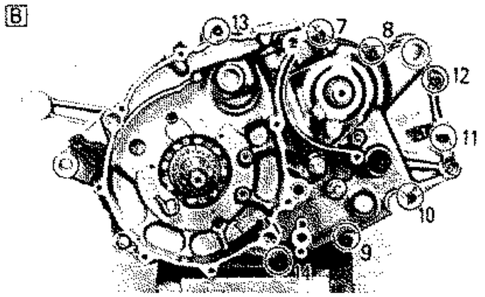


6. Remove:
   - Circlip (1)
   - Collar (2)
   - Circlip (3)

Ⓐ



Ⓑ

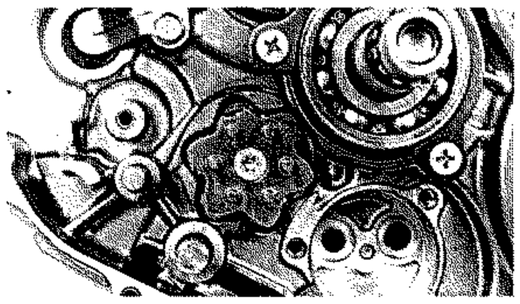


CRANKCASE (RIGHT)

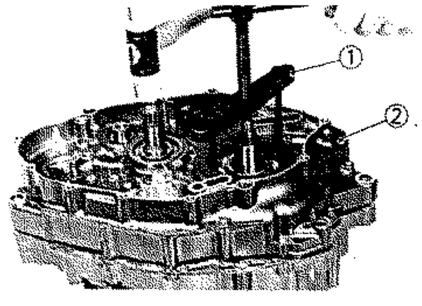
1. Remove:
   - Bolts (crankcase)

Ⓐ Crankcase (right)
Ⓑ Crankcase (left)

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



NOTE:
Turn the shift cam to the position shown in the figure so that it does not contact the crankcase when separating the crankcase.



2. Attach:
   - Crankcase separating tool (1)

	Crankcase separating tool: P/N YU-01135-A, 90890-01135

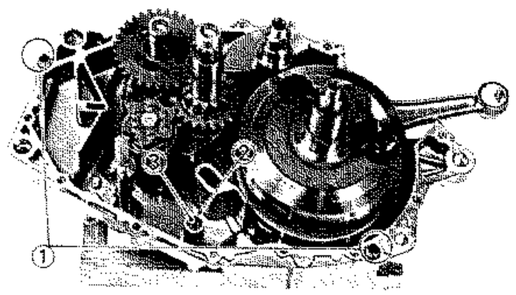
3. Remove:
   - Crankcase (right) (2)

NOTE:

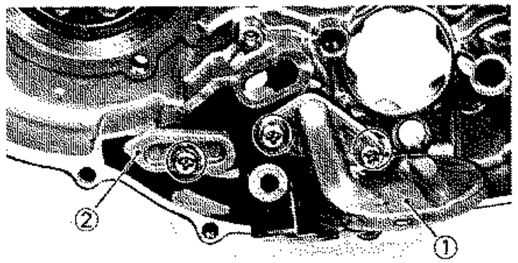
- Fully tighten the tool holding bolts, but make sure the tool body is parallel with the case. If necessary, one screw may be backed out slightly to level tool body.
- As pressure is applied, alternately tap on the front engine mounting boss, transmission shafts, and shift cam.

CAUTION:

Use soft hammer to tap on the case half. Tap only on reinforced portions of case. Do not tap on gasket mating surface. Work slowly and carefully. Make sure the case halves separate evenly. If one end "hans up" take pressure off the push screw, realign, and start over. If the cases do not separate, check for a remaining case screw or fitting. Do not force.

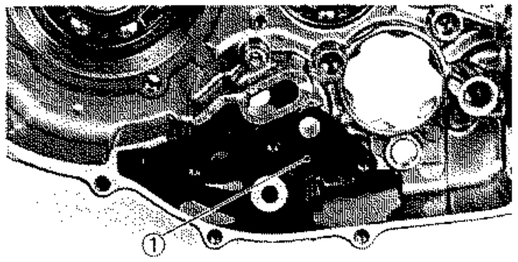


4. Remove:
   - Dowel pins (1)
   - Dowel pin (2)
   - O-ring (3)

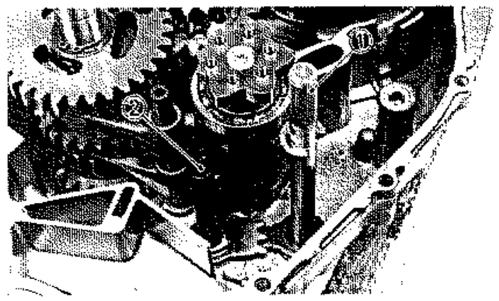


OIL STRAINER

1. Remove:
   - Oil strainer (1)
   - Oil passage cover (2)

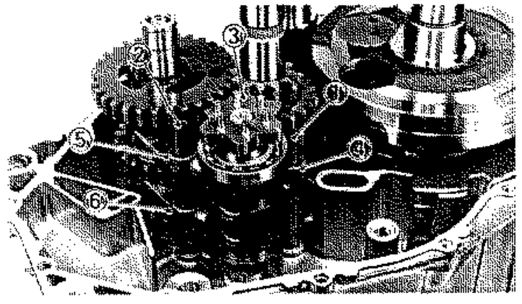


2. Remove:
   - Gasket (1) (oil strainer)

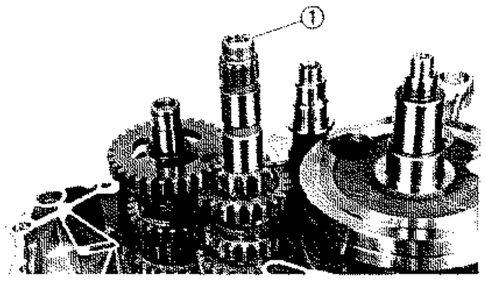


BALANCER, TRANSMISSION AND SHIFTER

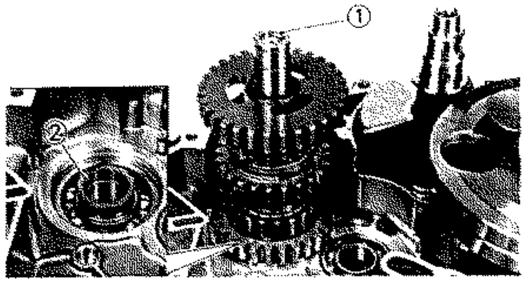
1. Remove:
   - Shift shaft (1)
   - Shift shaft 2 (2)



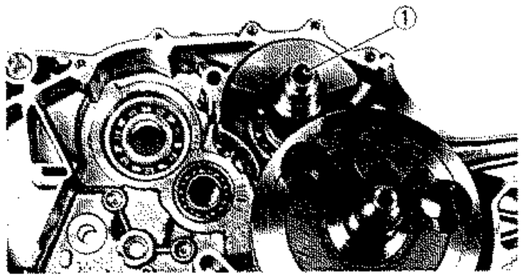
2. Remove:
   - Guide bar (1) (short)
   - Guide bar (2) (long)
   - Shift cam (3)
   - Shift fork 2 "C" (4)
   - Shift fork 3 "R" (5)
   - Shift fork 1 "L" (6)



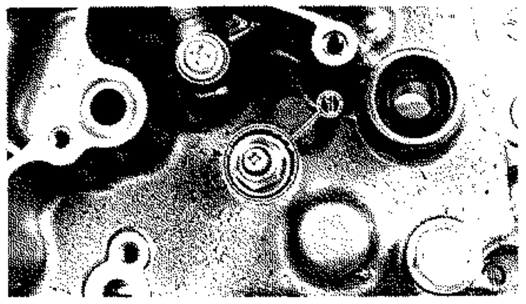
3. Remove:
   - Main axle assembly (1)



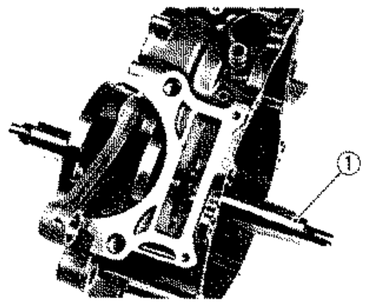
4. Remove:
   - Drive axle assembly (1)
   - Collar (2)

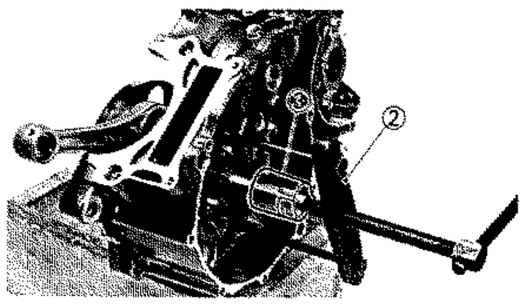


5. Remove:
   - Balancer shaft (1)



6. Remove:
   - Neutral switch (1)





CRANKSHAFT

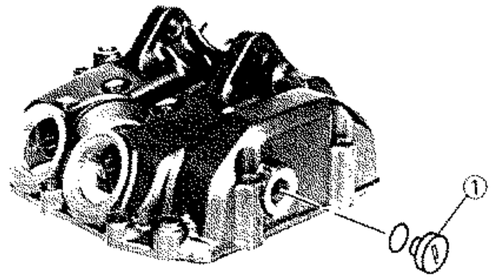
1. Remove:
   - Crankshaft assembly (1)
     Use the crankcase separating tool (2) and adapter (3).

	Crankcase separating tool: **P/N YU-01135-A, 90890-01135** **Adapter:** **P/N YM-04063-A, 90890-04063**

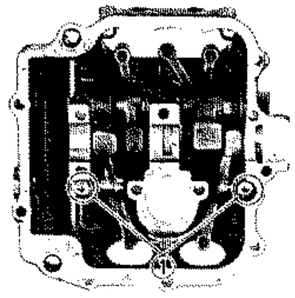
NOTE:
Tighten the tool holding bolts, but make sure that the tool body is vertical with the crankshaft. If necessary, one screw may be backed out slightly to level tool body.

ROCKER ARM

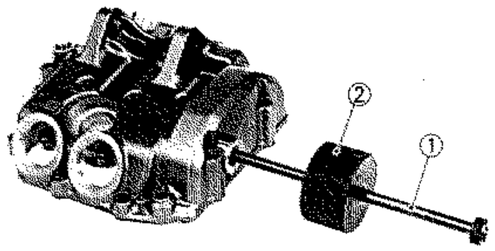
NOTE:
With the engine mounted, the rocker arm can be maintained by removing the following parts:
- Cowling
- Seat
- Fuel tank
- Radiator
- Exhaust pipes
- Cylinder head cover



1. Remove:
   - Plug (1)



2. Remove:
   - Bolts (1) (rocker arm shaft)



3. Remove:
   - Rocker arm shaft
   - Rocker arm

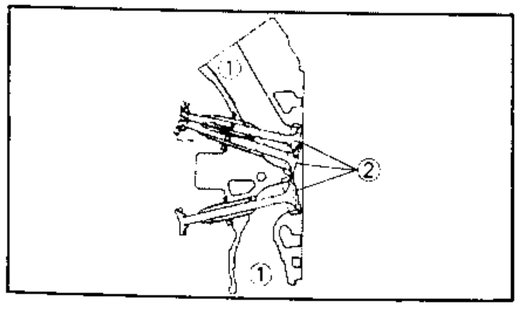
NOTE:
Remove the rocker arm shaft by the slide hammer bolt (1) and weight (2).

Slide hammer set:
P/N YU-01083-A
Slide hammer bolt:
P/N 90890-01083
Weight:
P/N 90890-01084

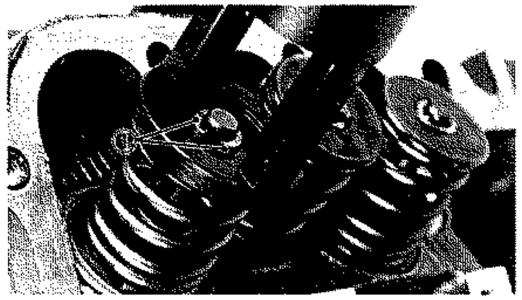
VALVES

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

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



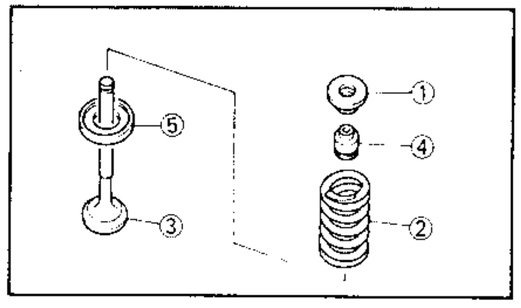
Checking steps:
- Pour a clean solvent (1) into the intake and exhaust ports.
- Check the valve sealing.
  There should be no leakage at the valve seat (2).



2. Remove:
   - Valve cotters (1)

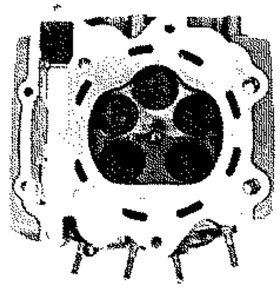
NOTE:
Remove the valve cotters while compressing the valve spring with the valve spring compressor.

Valve spring compressor:
P/N YM-04019, 90890-04019



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

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



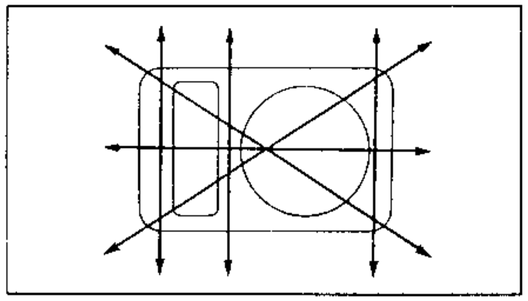
INSPECTION AND REPAIR

CYLINDER HEAD

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

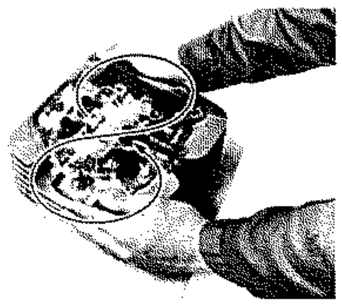
NOTE:
Do not use a pointed tool to avoid damaging or scratching:
- spark plug thread
- valve seats
- combustion chamber

2. Inspect:
   - Cylinder head
     Scratches/Damage → Replace.
   - Water jacket
     Crust of minerals/Rust → Eliminate.



3. Measure:
   - Deformation
     Out of specification → Rework the surface.

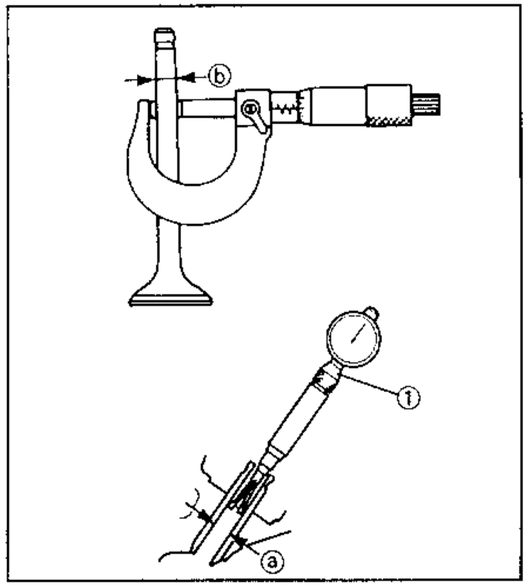
	Cylinder head deformation: **Less than 0.03 mm**

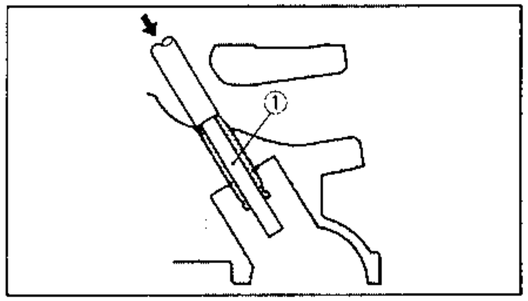


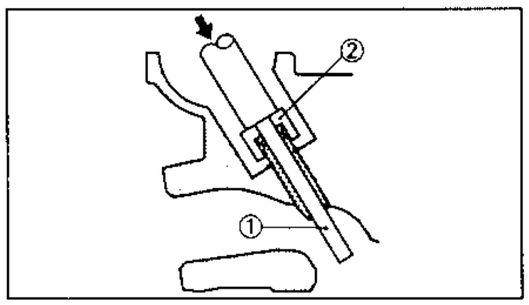
4. Surface:
   - Cylinder head

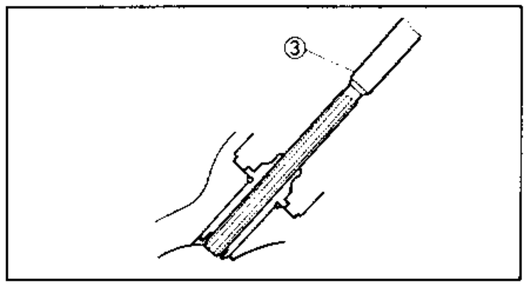
Levelling:
Level the cylinder head with wet 400 ~ 600 emery paper in a figure-8 direction.

NOTE:
To avoid removing too much material on one side only, turn the cylinder head a number of times.









VALVES AND VALVE GUIDES

1. Measure:
   - Clearance between stem and guide

Clearance between stem and guide =
Internal diameter of valve guide (a) –
Diameter of valve stem (b)

Out of specification → Replace valve guide.

	Clearance between stem and guide:
Intake:	**0.010 ~ 0.037** **< Limit >: 0.08 mm**
Exhaust:	**0.025 ~ 0.052** **< Limit >: 0.10 mm**

(1) Bore gauge

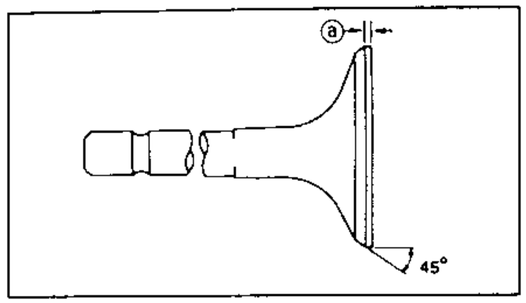
2. Replace:
   - Valve guide

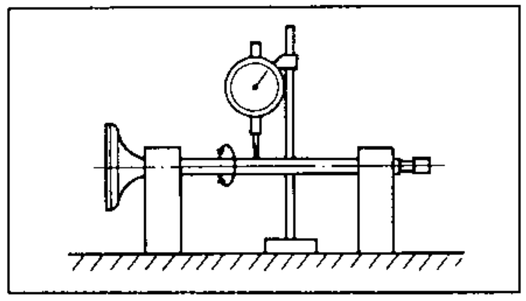
Replacement:

NOTE:
Heat the cylinder head in an oven at 100°C to facilitate the removal and installation of the guides and to maintain correct locking interference.

- Remove the valve guide using the special punch (1).
- Install the new guide using the special installation tool (2).
- After installing the valve guide, bore with special tool (3) to obtain valve-guide free play.

6 mm guide valve puller:
P/N YM-04064-A
P/N 90890-04064
6 mm valve guide installer:
P/N YM-04065
P/N 90890-04065
6 mm valve guide borer:
P/N YM-04066
P/N 90890-04066





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

3. Clean the valve surfaces of the carbon deposits.
4. Inspect:
   - Valve seal surface
     Pitting/Wear → Grind the valve seal surface.
5. Measure:
   - Edge thickness (a)
     Out of specification → Reface.

Edge thickness limit:
0.8 mm

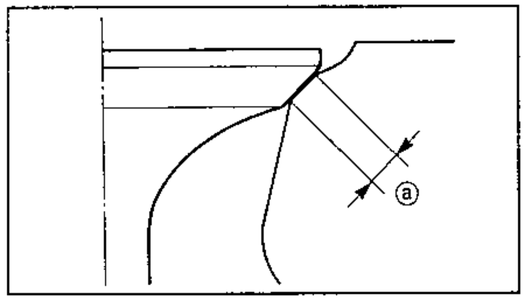
6. Check:
   - Valve stem tip
     Deformed, mushroom-shaped or with a higher diameter than the rest of the stem → Replace valve.
   - Misalignment (valve stem)
     Out of specification → Replace valve.

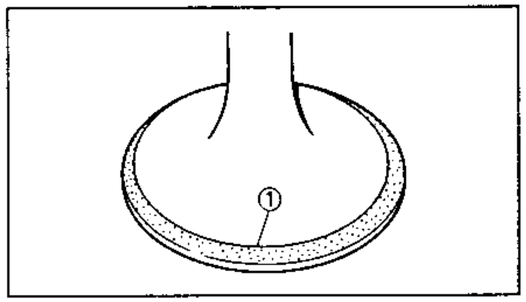
Stem offsettig limit:
0.01 mm

NOTE:
- Changing the valve, replace also the valve guide.
- Pulling the valve out, replace the oil seal.

VALVE HOUSING

1. Clean the valve surface and seat of carbon deposits.
2. Inspect:
   - Valve seat
     Pitting/Wear → Renew valve seat.

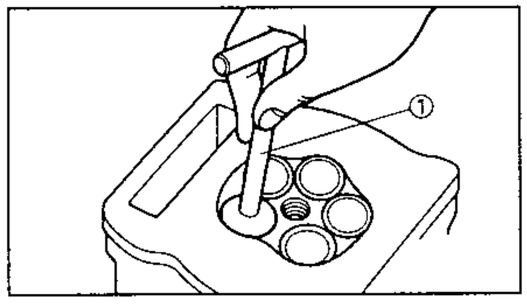




3. Measure:
   - Valve seat width (a)
     Out of specification → Renew valve seat.

Valve seat width:	
Intake:	0.9 ~ 1.1 mm
Exhaust:	0.9 ~ 1.1 mm

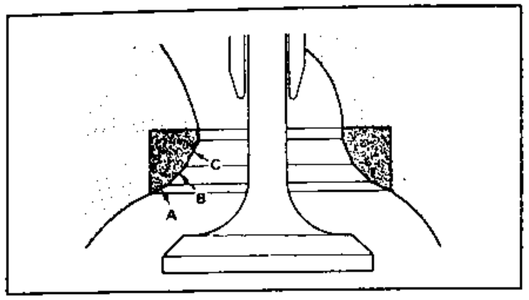
Measurement stages:
- Apply Prussian blue (Dykem) to the valve seat (1).
- Install the valve in the cylinder head.
- Press the valve onto the seat through the guide to leave a clear outline.
- Measure the width of the valve seat. Where there is contatc between valve and seat the Prussian blue is wiped away.
- If the valve seat is too narrow, wide or off-centre, the valve seat must be renewed.



4. Renew:
   - Valve seat
     Use the special tool to renew the valve seat (1) with 30°, 45° and 60° mills.

Valve seat milling unit:
P/N. YM-91043

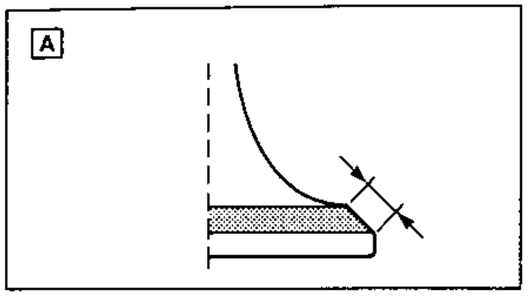
CAUTION:
Turning the milling tool, maintain uniform pressure (about 4-5 kg) to avoid leaving marks on the valve seat.



Mill the valve seat as follows	
Section	Mill
A	30°
B	45°
C	60°

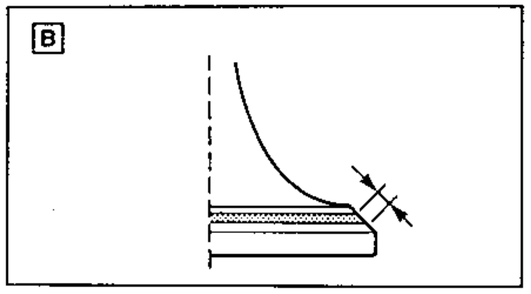
Valve seat faults recorded by analysing the valve seal surface:

[A] If the valve surface resembles that shown in the figure, this means that the valve seat is centred on the surface but is too wide.



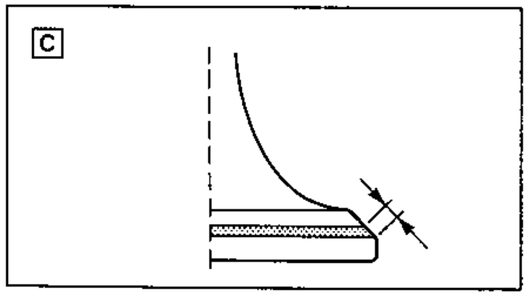
Intervention on the valve seat		Desired effect
Mill type:	30°	Reduce valve seat width to 1.0 mm
	60°	

[B] If the valve surface is like this, it means that the valve seat is centred on the valve surface but is too narrow.



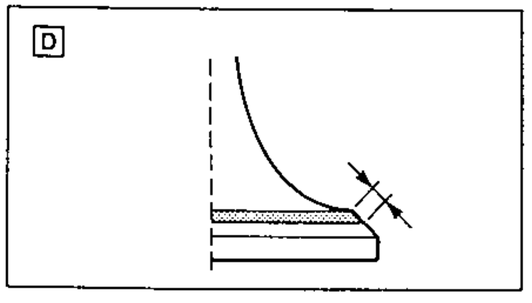
Intervention on the valve seat		Desired effect
Mill type:	45°	Increase valve seat width to 1.0 mm

[C] If the valve surface is like this, it means that the valve seat is too narrow and close to the edge of the valve.



Intervention on the valve seat		Desired effect
Mill type:	30° (before)	Centring of seat and attainment of 1.0 mm width
	45°	

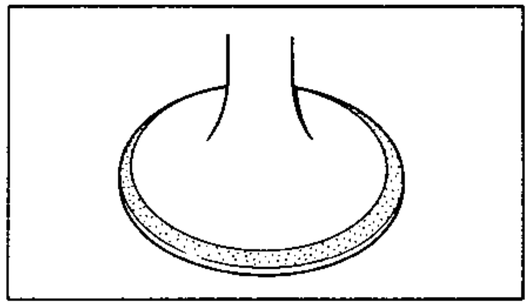
[D] If the valve surface is like this, it means that the valve seat is too narrow and situated low down near the lower edge of the valve surface.



Intervention on the valve seat		Desired effect
Mill type:	60° (before)	Centring of seat and attainment of 1.0 mm width
	45°	

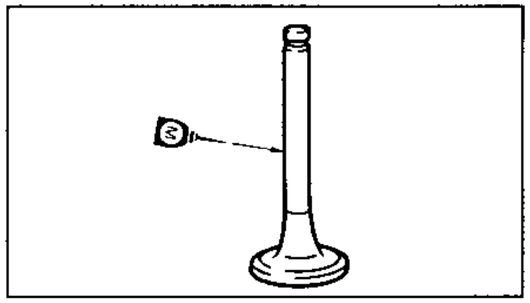
5. Emery:
   - Principal valve surface
   - Valve seat

NOTE:
If the valve seat is renewed or the valve and guide replaced, the valve seat and seal surface must be lapped.

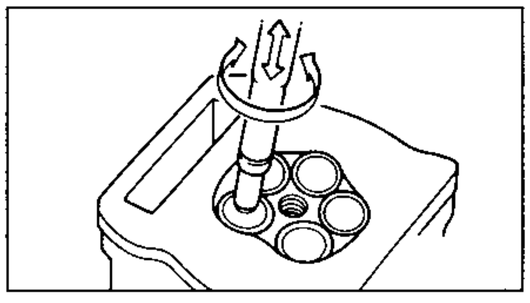


Lapping:
- Apply rough-lapping compound to the valve seal surface.

CAUTION:
Make sure the lapping compound does not run into the space between the guide and valve stem.



- Apply oil to the molybdenum disulfide on the valve stem.
- Install the valve in the cylinder head.



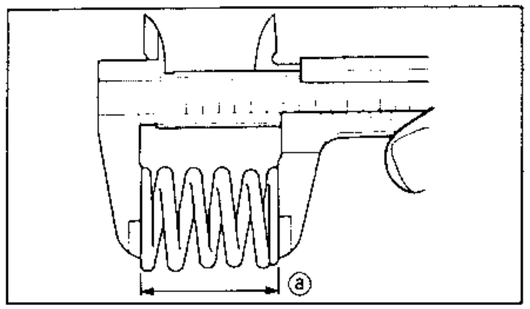
- Turn the valve until face and surface are not evenly polished. Then clean away all the lapping compound.

NOTE:
For best results, during lapping, repeatedly apply (light) pressure to the valve seat, turning the valve backwards and forwards by hand.

- Apply a fine-lapping compound on the valve seal surface and repeat the procedures described above.

NOTE:
Be sure to remove all the lapping compound from the valve surface after every lapping operation.

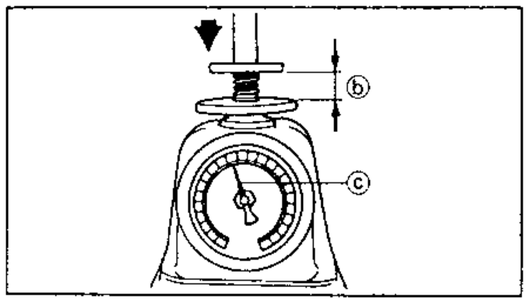
- Apply Prussian blue (Dykem) to the valve seal surface.
- Install the valve in the cylinder head.
- Press the valve onto the seat through the guide to leave a clear outline.
- Measure the valve seat width once more. If the width of the valve is out of specification alter and relap.



VALVE SPRING

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

Free width (a) of valve spring:	
Intake	**Exhaust**
32.63 mm	**36.46 mm**

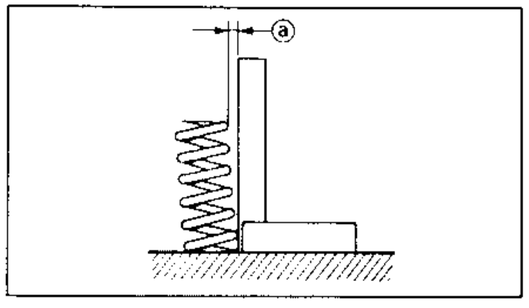


2. Measure:
   - Spring load
     Out of specification → Replace.

(b) Length of loaded spring

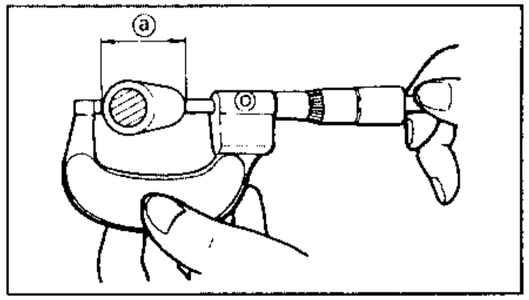
Valve spring load:
Intake:
(c) 10.2 ~ 11.8 kg
(b) 27.50 mm

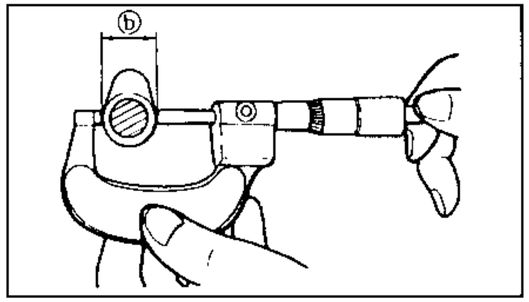
Exhaust:
(c) 12.3 ~ 14.1 kg
(b) 31.00 mm

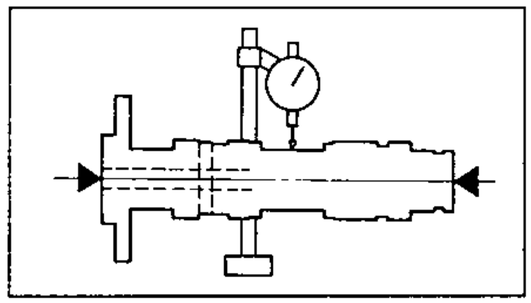


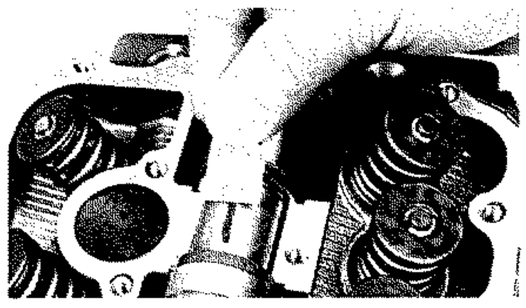
3. Measure:
   - Inclination of spring (a)
     Out of specification → Replace.

Inclination of spring:	
Intake	**Exhaust**
Lower than 1.4 mm	**Lower than 1.6 mm**









CAMSHAFT

1. Inspect:
   - Cam eccentrics
     Pitting/Scratches/Blue colour → Replace camshaft.
2. Measure:
   - Cam eccentrics
     Out of specification → Replace camshaft.

	(a)	(b)
Intake:	**35.69~35.79 mm**	**30.06~30.16 mm**
Exhaust:	**36.50~36.60 mm**	**30.11~30.21 mm**

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

Runout (camshaft):
Less than 0.03 mm

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

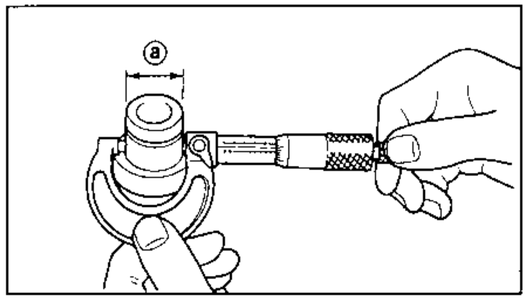
Camshaft-to-cap clearance:
0.020 ~ 0.054 mm

Measurement steps:
- Install the camshaft onto the cylinder head.
- Positione a strip of Plastigauge® onto the camshaft.
- Install the dowel pins and cylinder head cover.

Bolt (cylinder head cover):
10 Nm (1.0 kgm)

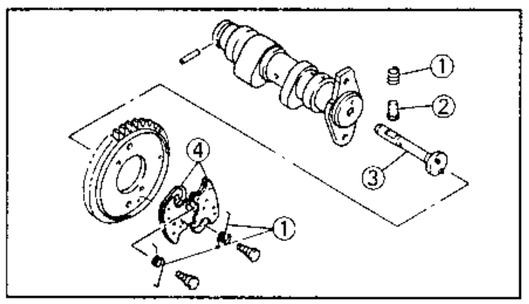
NOTE:
- Tighten the bolts (cylinder head cover) in a criss-cross pattern from innermost to outer.
- Do not turn the camshaft when measuring clearance with the Plastigauge®.

- Remove the cylinder head cover and measure width of the Plastigauge®.



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

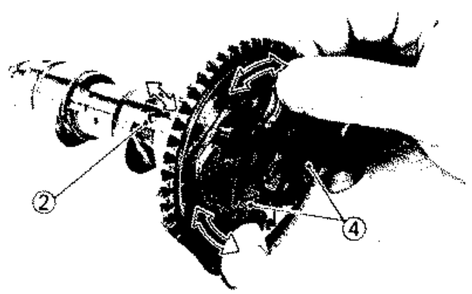
Bearing diameter (camshaft):
22.967 ~ 22.980 mm

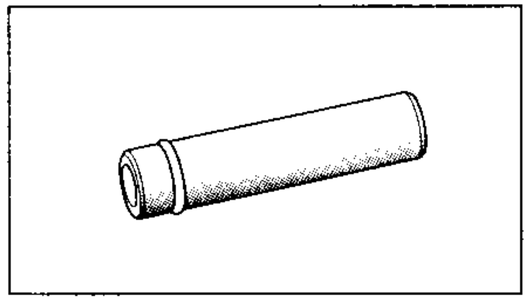


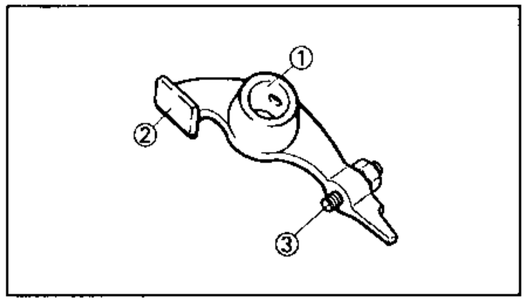
DECOMPRESSION

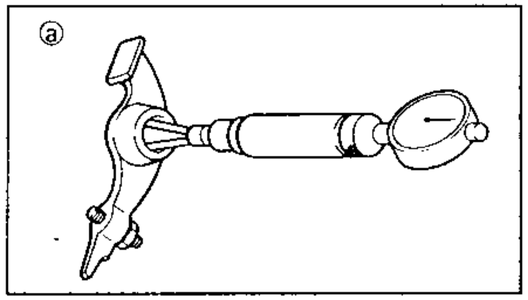
1. Inspect:
   - Spring (1)
     Damage → Replace.
   - Decompression pin (2)
   - Decompression lever (3)
   - Decompression cams (4)
     Damage/Bends/Wear → Replace.

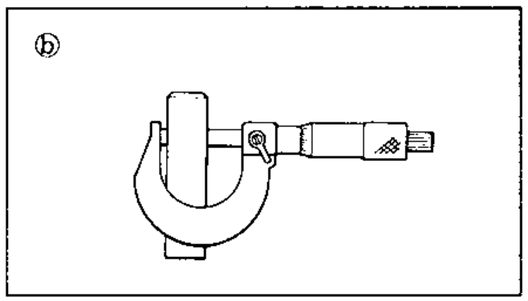
2. Check:
   - Decompression play
     Play exists → Replace.

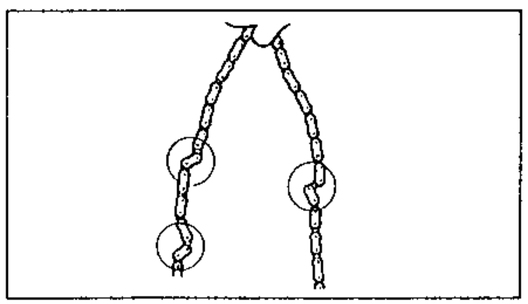












ROCKER ARM AND ROCKER ARM SHAFT

1. Inspect:
   - Rocker arm shaft
     Blue colour/Grooves → Replace shaft and check lubrication system.

2. Inspect:
   - Rocker arm shaft slot (1)
   - Surface in contact with cam eccentric (2)
   - Adjuster surface (3)
     Pitting/Wear/Scratches/Blue colour → Replace and check lubrication system.

3. Measure:
   - Rocker arm-shaft clearance

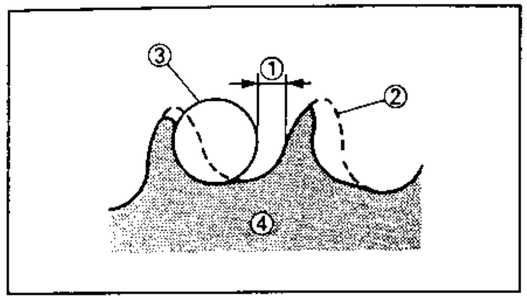
Rocker arm-shaft clearance =
Internal diameter (a) of rocker arm – External diameter (b) of shaft

Out of specification → Replace assembly.

Rocker arm shaft clearance:
0.009 ~ 0.042 mm

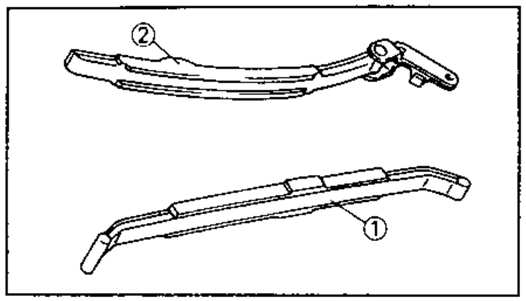
CAMSHAFT CHAIN, SPROCKET AND CHAIN GUIDE

1. Inspect:
   - Chain
     Stiffness/Cracks → Replace timing chain and sprocket.



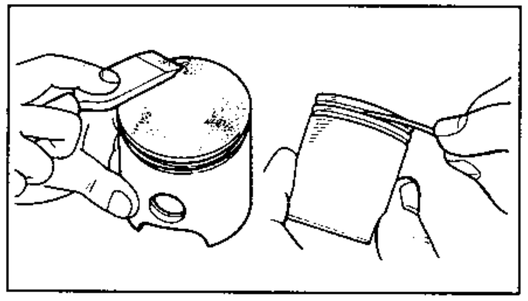
2. Inspect:
   - Sprocket
     Wear/Damage → Replace timing chain and sprocket.

(1) 1/4 tooth (maximum)
(2) New sprocket tooth profile
(3) Roller
(4) Sprocket



CAMSHAFT CHAIN GUIDE

1. Inspect:
   - Lateral chain guide (exhaust) (1)
   - Lateral chain guide (intake) (2)
     Wear/Damage → Replace.

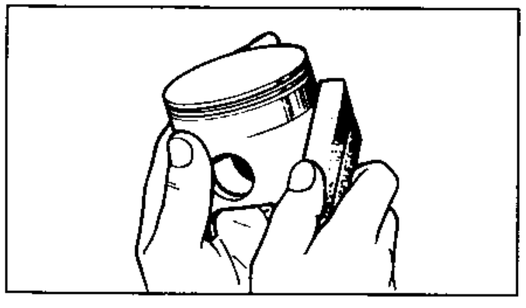


CYLINDER AND PISTON

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

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

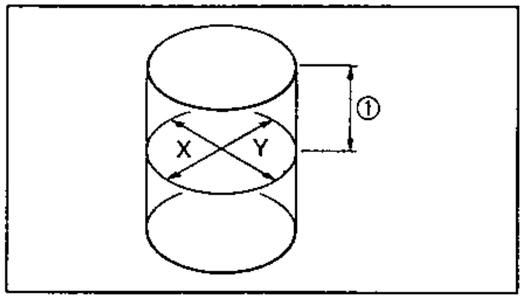
3. Eliminate:
   - Score marks and lacquer deposits
     (from the side of the piston)
     Use a 600 ~ 800 grit wet sandpaper.



NOTE:
Sand in a crisscross pattern. Do not sand excessively.

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

5. Measure:
   - Piston-to-cylinder clearance



Measurement stages:

First stage

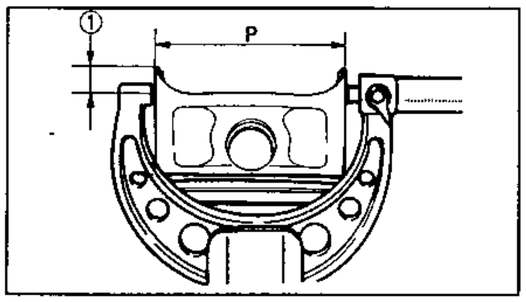
- Measure cylinder bore "C" with a cylinder gauge.

(1) 50 mm from top of cylinder

NOTE:
Measure bore parallel and at right angles to the driving shaft. Then calculate average measurement.

	Standard	Wear limit
Cylinder bore "C"	100.005 ~ 100.045 mm	100.1 mm
$C = \frac{X + Y}{2}$		

- If the measurements are out of tolerance, replace the cylinder liner, piston and circlips all together.



Second stage

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

(1) 2.5 mm from the lower edge of the piston

Piston skirt "P" size:	
Standard	99.945 ~ 99.985 mm

- If the measurements are out of tolerance, replace the piston and circlips all together.

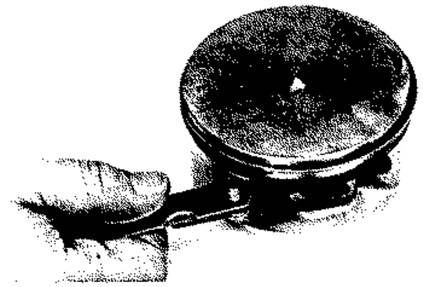
Third stage

- Calculate the piston-cylinder clearance according to the following formula.

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

Piston-cylinder clearance:
0.050 ~ 0.070 mm
Maximum limit:
0.15 mm

- If the measurements are out of tolerance, rebore or replace the cylinder, and replace the piston and piston ring as a set.

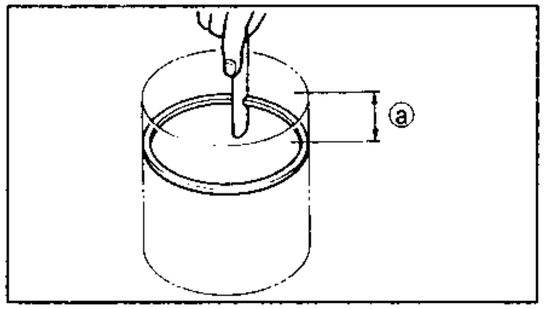


PISTON RINGS

1. Measure:
   - Lateral clearance of rings
     Use a thickness gauge.
     Out of specification → Replace piston and piston ring as a set.

NOTE:
Before measuring lateral clearance, remove carbon deposits from the piston ring seats and from the rings themselves.

Piston ring lateral clearance:	
Upper ring	0.04 ~ 0.08 mm
Lower ring	0.03 ~ 0.07 mm



2. Position:
   - Ring
     (into cylinder)

NOTE:
Fit each ring into the cylinder and push it to about 20 mm from the top edge of the cylinder. Push the ring into the cylinder with the piston so that it is perfectly perpendicular to the cylinder axis.

(a) 20 mm

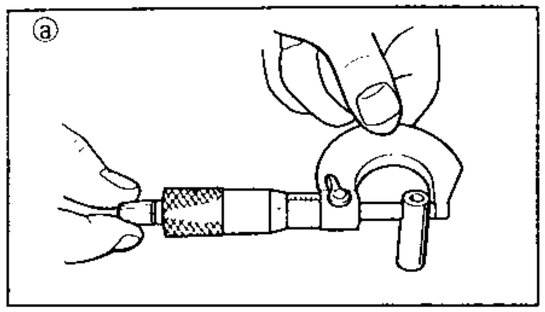
3. Measure:
   - Ring tip port
     Out of specification → Replace.

NOTE:
It is impossible to measure the oil scraper tip port. If the oil scraper port appears too large, replace all three rings as a set.

Piston ring tip port (fitted into cylinder)	
Upper ring	0.30 ~ 0.45 mm
Lower ring	0.30 ~ 0.45 mm
Oil scraper (tracks)	0.20 ~ 0.70 mm

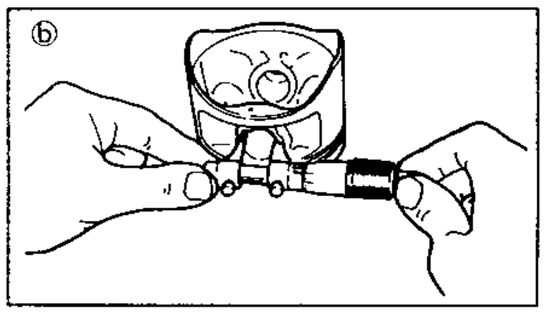
PISTON PIN

1. Check:
   - Piston pin
     Blue colour/Grooves → Replace and check lubrication system.



2. Measure:
   - External diameter (a) of pin
     Out of specification → Replace.

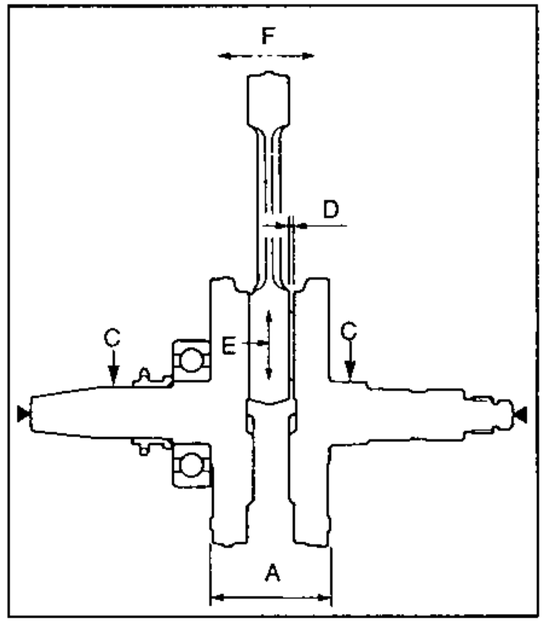
External diameter (pin):
21.991 ~ 22.000 mm



3. Measure:
   - Clearance between piston pin and piston seat
     Out of specification → Replace.
   - Calculate the piston pin–piston clearance according to the following formula:

Clearance between piston pin and piston =
Diameter on piston (b) –
Diameter of pin (a)

Clearance between piston pin and piston:
0.004 ~ 0.024 mm
Maximum clearance:
0.07 mm



CRANKSHAFT

1. Measure:
   - Crank width (A)
     Out of specification → Replace crankshaft.

Crank width:
74.95 ~ 75.00 mm

   - Runout (C)
     Out of specification → Replace crankshaft and/or width bearing.

Runout limit:
0.03 mm

   - Small end free play (D)
     Out of specification → Replace big end bearing, crank pin and/or connecting rod.

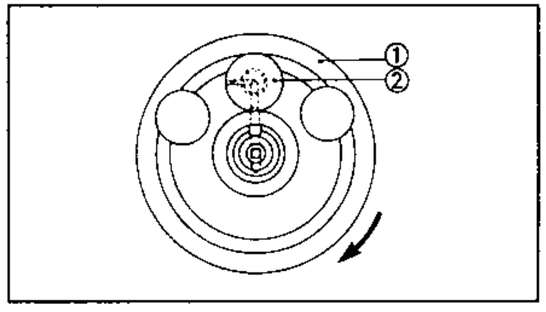
Small end free play:
0.8 mm

   - Big end radial clearance (E)
     Out of specification → Replace connecting rod, big end bearing and/or crank pin.

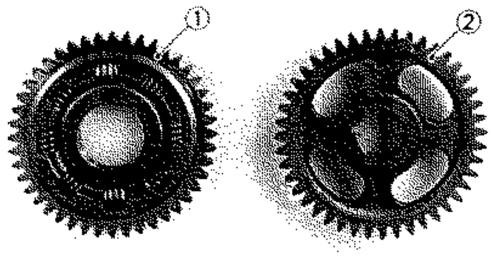
Big end radial clearance:
0.01 ~ 0.025 mm

   - Side clearance (F)
     Out of specification → Replace connecting rod.

Big end side clearance:
0.35 ~ 0.65 mm

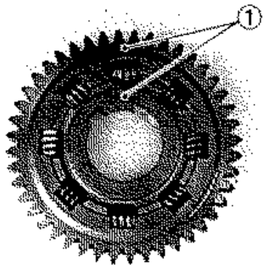


Crankshaft reassembling point:
The crankshaft (1) and the crank pin (2) oil passages must be properly interconnected with a tolerance of less than 1.0 mm.

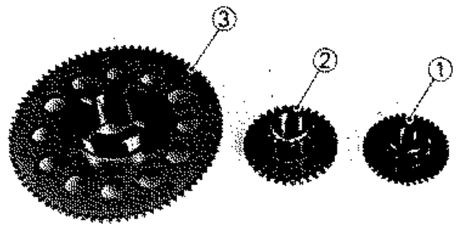


BALANCER DRIVE GEAR AND BALANCER GEAR

1. Inspect:
   - Balancer drive gear teeth (1)
   - Balancer gear teeth (2)
     Wear/Damage → Replace both gears.

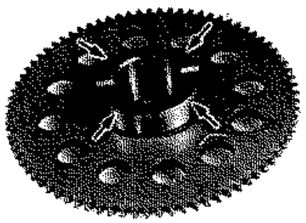


2. Check:
   - Match marks (1)
     If they are not aligned → Align match marks as shown.

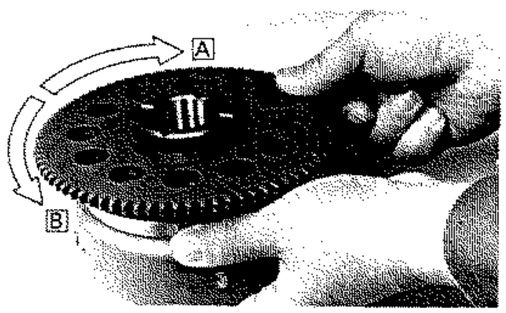


ELECTRIC STARTER DRIVE

1. Inspect:
   - Starter idle gear 1 teeth (1)
   - Starter idle gear 2 teeth (2)
   - Starter wheel gear teeth (3)
     Burrs/Chips/Roughness/Wear → Replace.



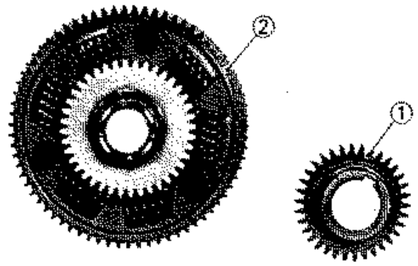
2. Inspect:
   - Starter wheel gear
     (contacting surfaces)
     Pitting/Wear/Damage → Replace.



3. Check:
   - Starter clutch operation

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 counter-clockwise [B], the starter clutch gear should turn freely.
  If not, the starter clutch is faulty. Replace it.

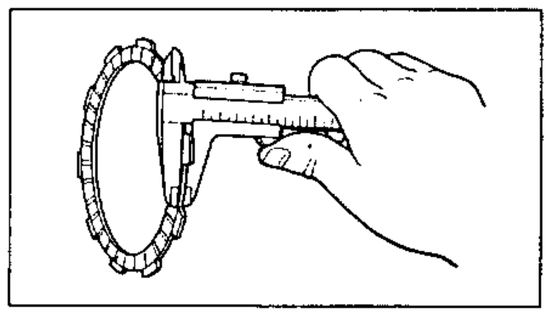


PRIMARY DRIVE

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

CLUTCH

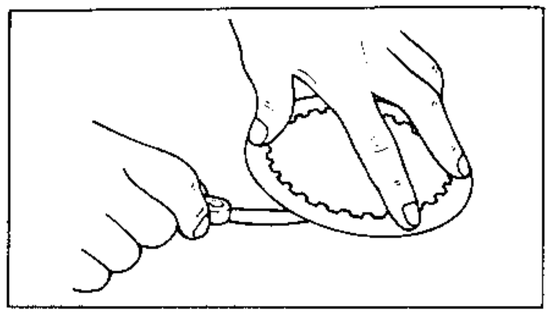
1. Inspect:
   - Friction plates
     Damage → Replace friction plate as a set.



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

	Thickness	Wear limit
Type "A" (2 pcs.)	2.94 ~ 3.06 mm	2.8 mm
Type "B" (6 pcs.)	2.74 ~ 2,86 mm	2.6 mm

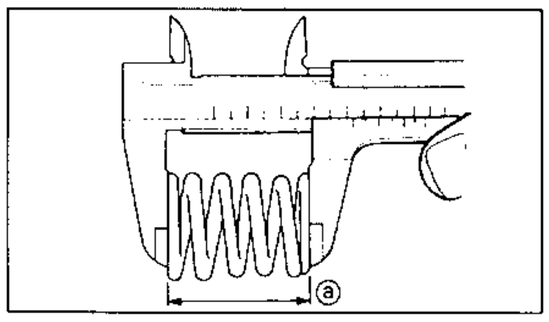
3. Inspect:
   - Clutch plates
     Damage → Replace clutch plates as a set.



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

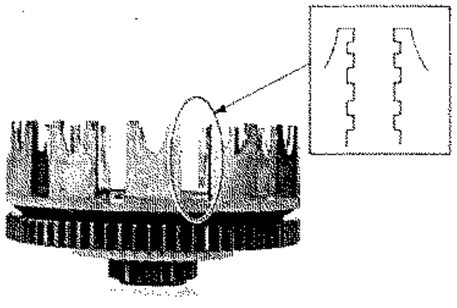
Clutch plate warp limit:
Less than 0.2 mm

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



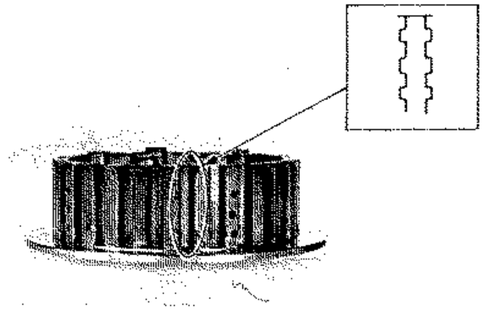
6. Measure:
   - Clutch spring free length (a)
     Out of specification → Replace springs as a set.

Free length (clutch spring):
42.8 mm
< Limit: 40.8 mm >



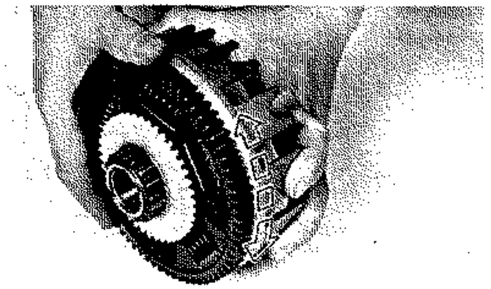
7. Inspect:
   - Dogs on the clutch housing
     Scoring/Wear/Damage (on edges):
     Moderate → Deburr.
     Accentuated → Replace clutch housing.

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

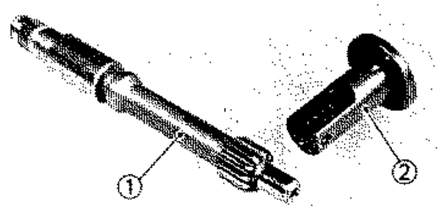


8. Inspect:
   - Clutch boss splines
     Scoring:
     Moderate → Deburr.
     Accentuated → Replace clutch boss.

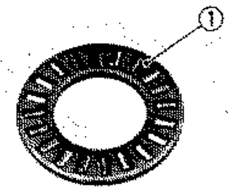
NOTE:
Scoring on the clutch boss splines will cause erratic operation.



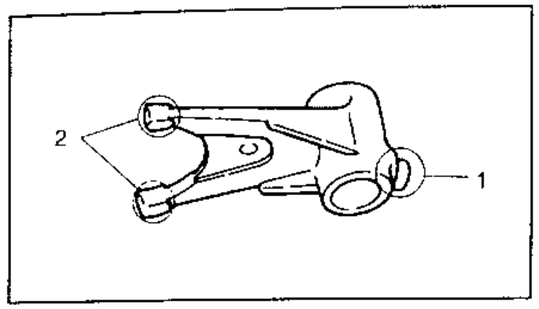
9. Check:
   - Circumferential play
     Free play exists → Replace.



10. Inspect:
    - Gear teeth (1) (pull lever axle)
    - Gear teeth (2) (pull rod)
      Wear/Damage → Replace as a set.

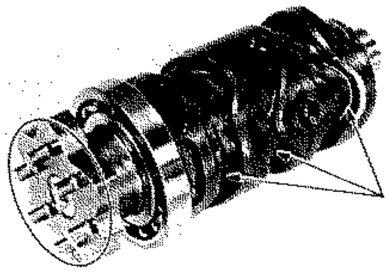


11. Inspect:
    - Bearing (1) (pull rod)
      Wear/Damage → Replace.

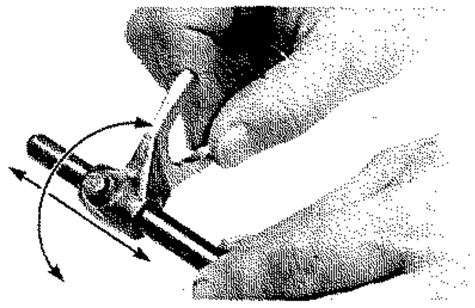


TRANSMISSION AND GEARBOX

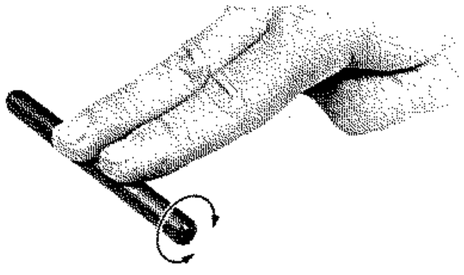
1. Inspect:
   - Gear fork cam pin (1)
   - Gear fork pawl (2)
     Lines/Creases/Wear → Replace.



2. Inspect:
   - Drum groove
   - Gear cam pins
     Wear/Damage → Replace.



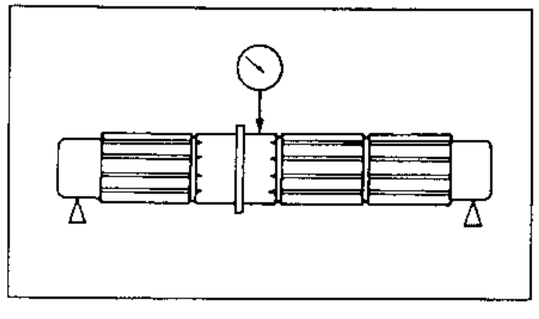
3. Check:
   - Gear fork movement
     Rough functioning → Replace gear forks and/or guide bars.



4. Inspect:
   - Guide bar
     Turn on a flat surface
     Curvature → Replace.

⚠ WARNING

Do not attempt to straighten a deformed guide bar.

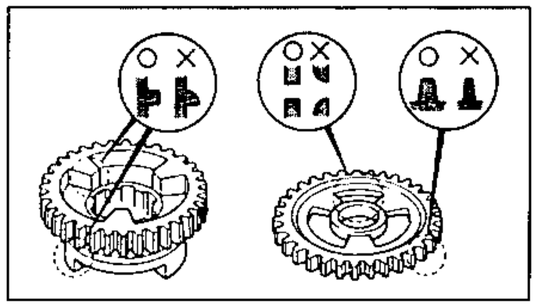


5. Measure:
   - Transmission shaft eccentricity.
     Use the centring tool and micrometer.
     Out of specification → Replace shaft.

Eccentricity limit:
0.08 mm

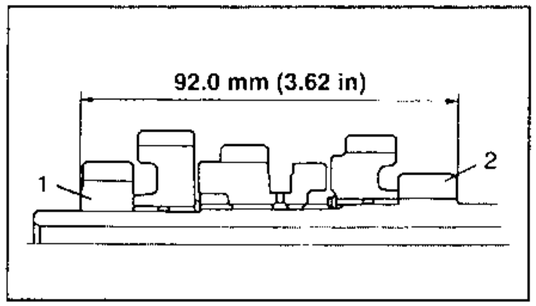
⚠ WARNING

Do not attempt to straighten a deformed shaft.



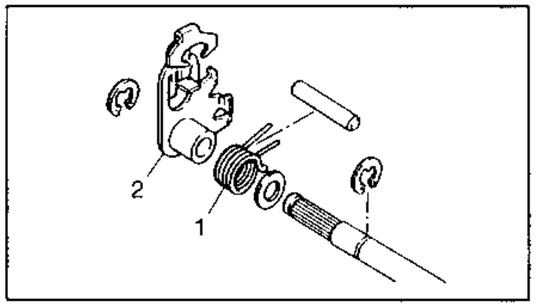
6. Inspect:
   - Gear teeth
     Brown colouring/Pitting/Wear → Replace.
   - Mating clutches
     Rounded edges/Cracks/Missing fragments → Replace.

7. Check:
   - Proper mating of each gear (with corresponding part)
   - Gear movement
     Roughness → Replace.

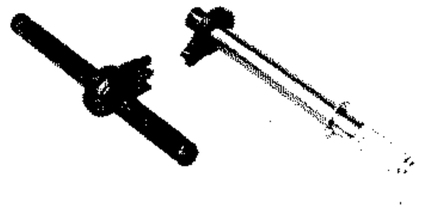


Transmission gear assembly stages:

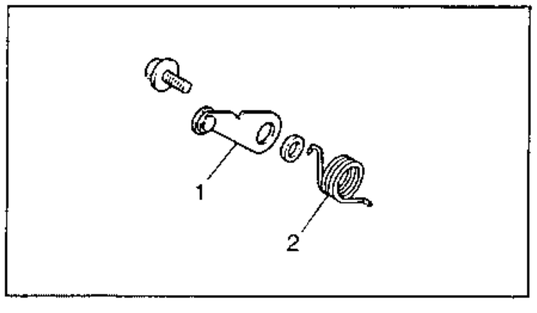
- Fit the 2nd pinion gear (1) to the propeller shaft (2) as shown in the figure.



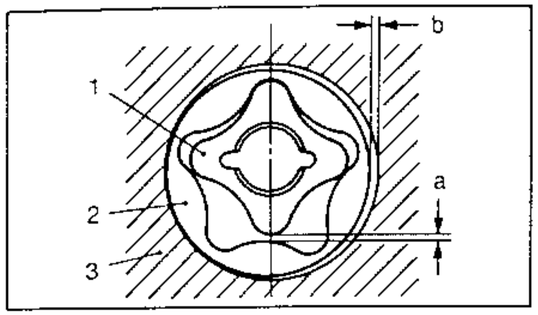
8. Inspect:
   - Spring (1)
     Damage → Replace.
   - Shift lever (2)
     Damage/Bends/Wear → Replace.



9. Inspect
   - Shift shaft:
     Bent/Wear/Damage → Replace.



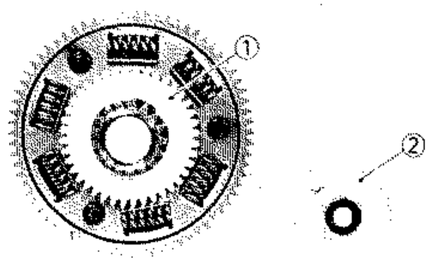
10. Inspect:
    - Stop lever (1)
      The roller rotates jerkily → Replace.
      Bent/Damage → Replace.
    - Return spring (2)
      Damage/Cracks → Replace.



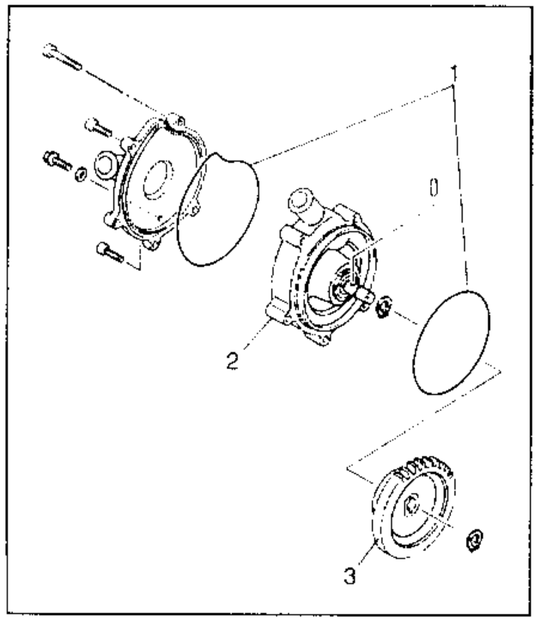
OIL PUMP, WATER PUMP AND STRAINER

1. Measure:
   - Clearance between rotors (a)
     Between the internal rotor (1) and the external rotor (2)
   - Lateral clearance (b)
     Between the external rotor (2) and the pump stator (3)
     Out of specification → Replace oil pump.

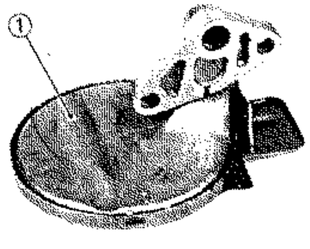
Oil pump clearances:	
Clearance between rotors (a)	0.12 mm
Lateral clearance (b)	0.03 ~ 0.08 mm



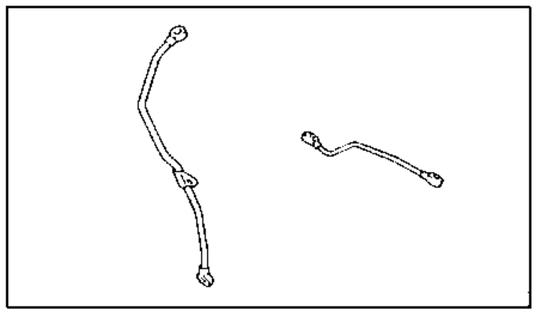
2. Inspect:
   - Oil pump drive gear (1)
   - Oil pump driven gear (2)
     Wear/Cracks/Damage → Replace.



3. Inspect:
   - O-ring (1)
   - Water pump housing (2)
   - Water pump gear (3)
     Cracks/Wear/Damage → Replace.



4. Inspect:
   - Oil strainer (1)
     Damage → Replace.



OIL DELIVERY PIPES

1. Inspect:
   - Oil delivery pipes
     Cracks/Damages → Replace.
     Clog → Blow out with compressed air.

CRANKCASE

1. Thoroughly wash the case halves in mild solvent.
2. Clean all the gasket mating surface and crankcase mating surface thoroughly.
3. Inspect:
   - Crankcase
     Cracks/Damage → Replace.
   - Oil delivery passages
     Clog → Blow out whit compressed air.

BEARING AND OIL SEAL

1. Inspect:
   - Bearing
     Clean and lubricate, then rotate inner race with finger.
     Roughness → Replace.
2. Inspect:
   - Oil seal
     Damage/Wear → Replace.

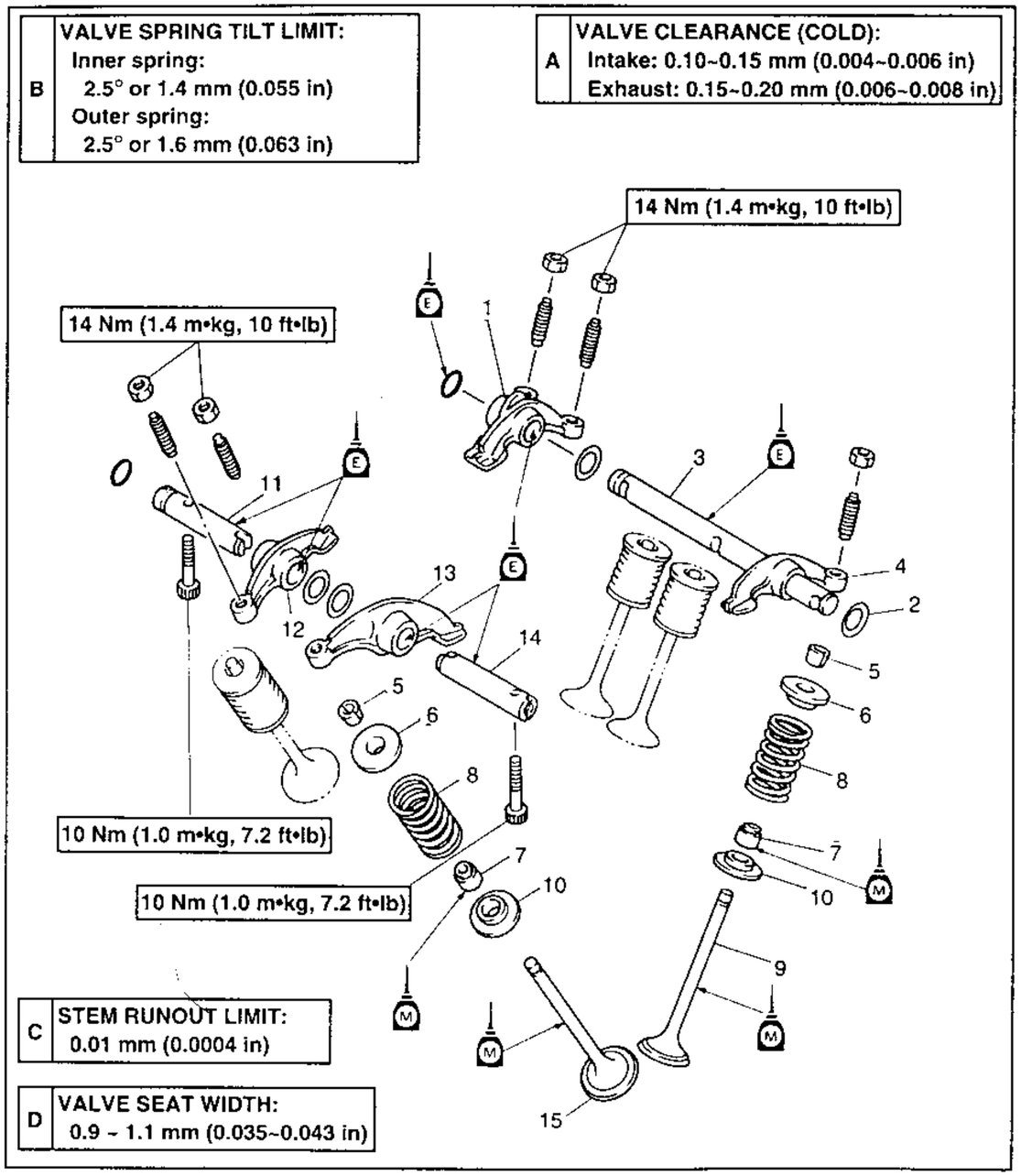
CIRCLIP AND WASHER

1. Inspect:
   - Circlip
   - Washer
     Damage/Free play/Warp → Replace.

ENGINE ASSEMBLY AND SETTING

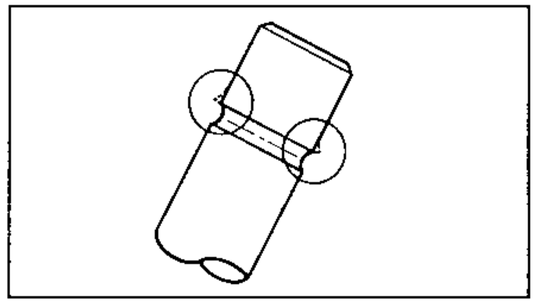
VALVES AND ROCKER ARMS

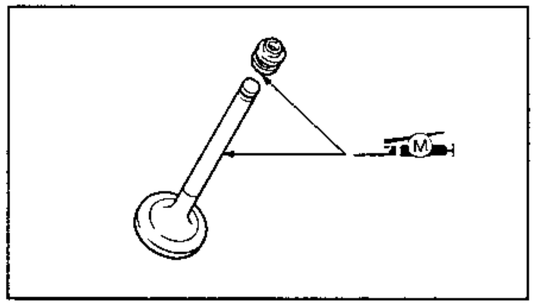
(1) Rocker arm n. 2
(2) Wave washer
(3) Rocker shaft (intake)
(4) Rocker arm n. 1
(5) Valve cotters
(6) Upper valve spring retainer
(7) Oil seal
(8) Valve spring
(9) Valve (intake)
(10) Lower valve spring retainer
(11) Rocker shaft (exhaust)
(12) Rocker arm n. 4
(13) Rocker arm n. 3
(14) Rocker shaft (exhaust)
(15) Valve (exhaust)

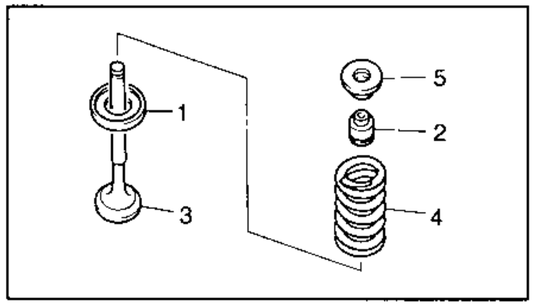


⚠ WARNING

For engine reassembly, replace the following parts whit new one.
- **O-ring**
- **Gasket**
- **Oil seal**
- **Key**
- **Lock washer**
- **Circlip**





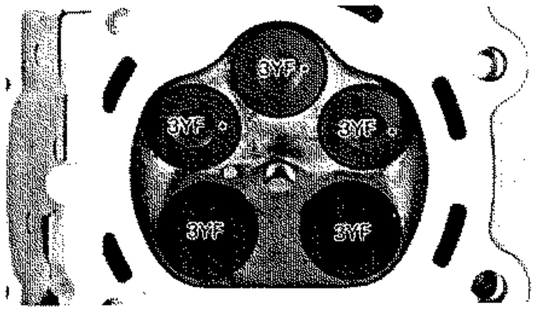


VALVES

1. Burrs:
   - Valve stem head
     Polish the valve stem head with an oil stone.

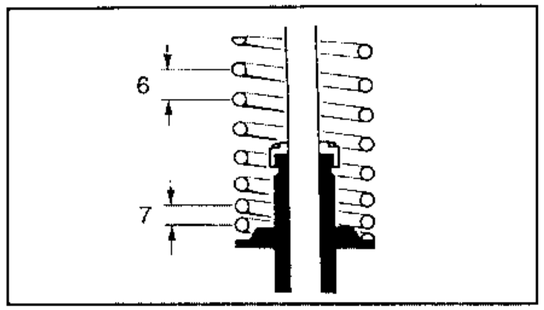
2. Apply:
   - Molybdenum disulfide grease (to the valve stem and oil seal)

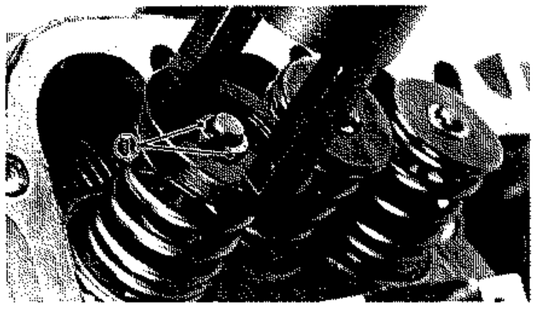
3. Install:
   - Lower valve cap (1)
   - Oil seal (2)
   - Valve (3)
   - Valve spring (4)
   - Upper valve cap (5) (into cylinder head)



NOTE:

- Make sure that the each valve is installed in its original place by reference to it embossed identification mark, as follows:
  Intake: 3YF ●
  Exhaust: 3YF
- Install the valve spring with larger pitch (6) facing upward.
  (7) Smaller pitch.





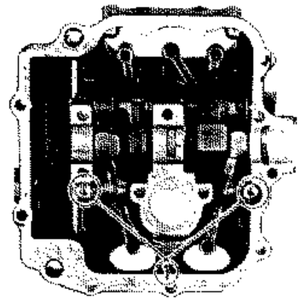
4. Install:
   - Valve cotters (1)

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

	Valve spring compressor: **P/N YM-04019, 90890-04019**

5. Secure the valve cotters on to the valve stem by tapping it lightly with a piece of wood.

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

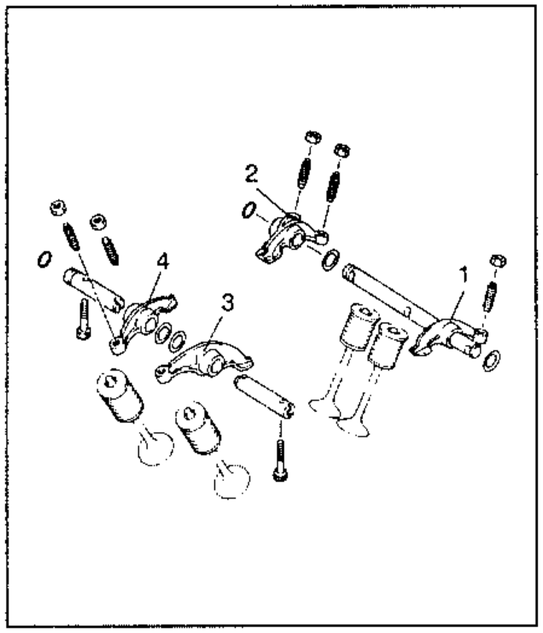


ROCKER ARMS

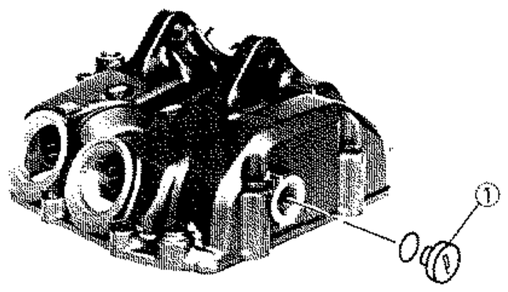
1. Lubricate:
   - Rocker shaft
     (with engine oil)
2. Install:
   - Rocker arm
   - Rocker shaft

	Screws (1) (rocker shaft): **10 Nm (1.0 mkg)**

NOTE:
Each rocker arm is numbered.



(1) # 1
(2) # 2
(3) # 3
(4) # 4

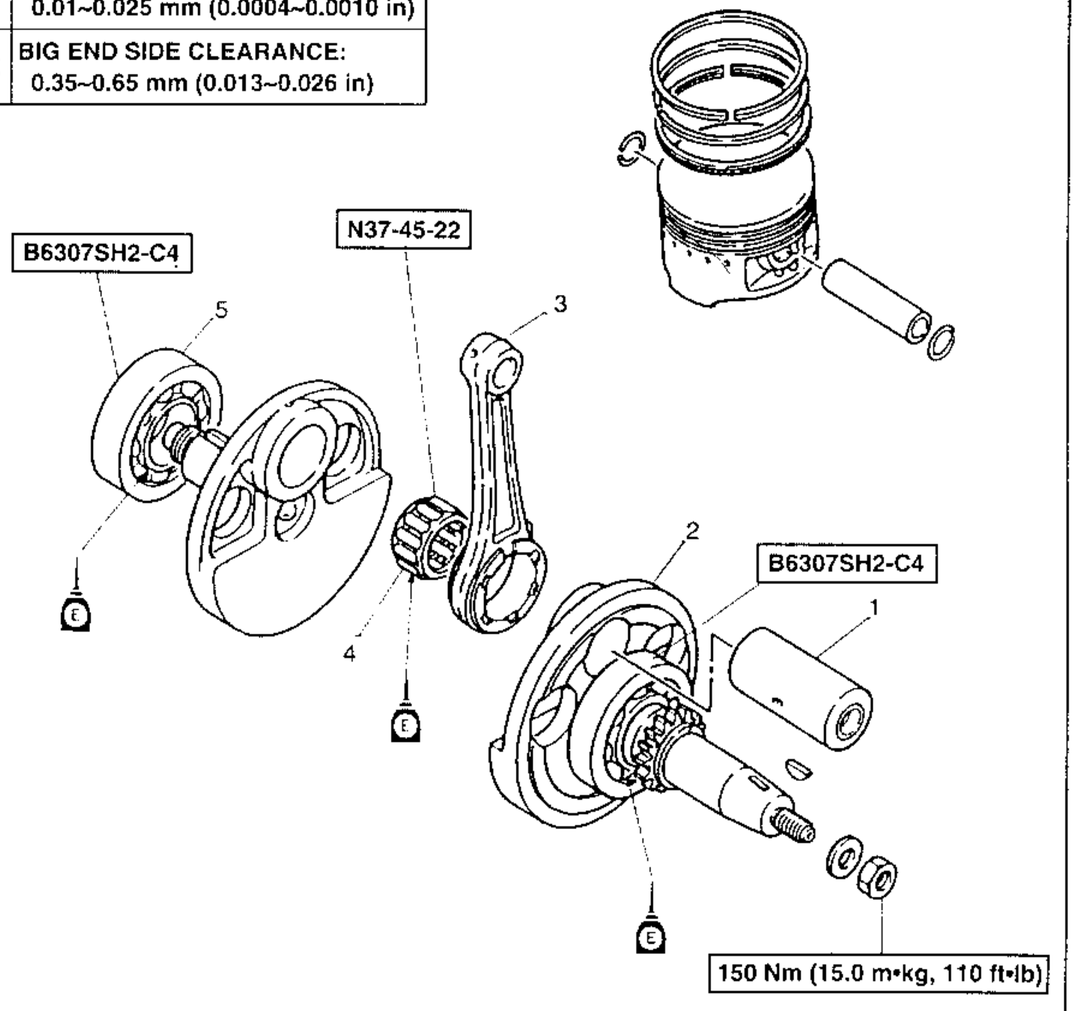


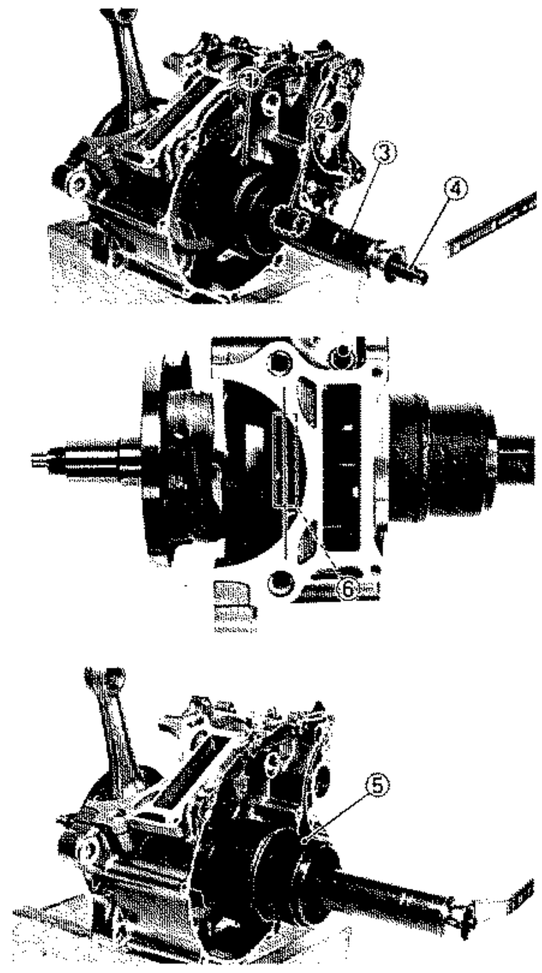
3. Install:
   - Cap (1)

CRANKSHAFT

(1) Connecting rod pin
(2) Crank (left)
(3) Connecting rod
(4) Bearing
(5) Bearing

A	CRANK WIDTH: 74.95~75.00 mm (2.950~2.953 in)
B	RUNOUT LIMIT: 0.03 mm (0.0012 in)
C	SMALL END FREE PLAY: 0.8 mm (0.031 in)
D	BIG END RADIAL CLEARANCE: 0.01~0.025 mm (0.0004~0.0010 in)
E	BIG END SIDE CLEARANCE: 0.35~0.65 mm (0.013~0.026 in)





1. Attach:
   - Crankshaft installing tool

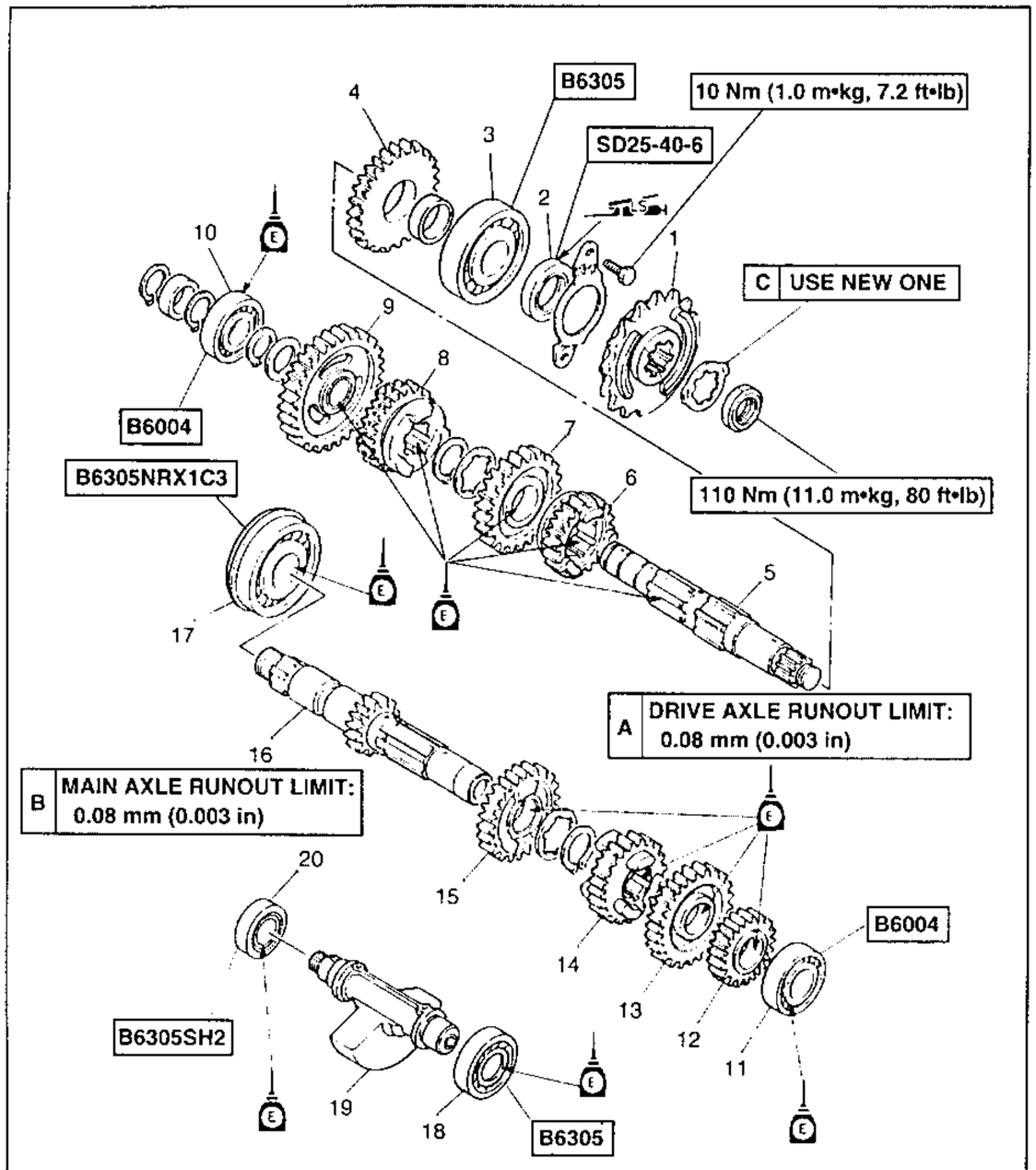
Crankshaft installer set:
P/N. YU-90050
Crank pot spacer (1):
P/N. YM-91044
P/N. 90890-04081
Adapter # 10 (2):
P/N. YM-90069
P/N. 90890-04059
Crankshaft installer pot (3):
P/N. 90890-01274
Crankshaft installer bolt (4):
P/N. 90890-01275
Spacer (5):
P/N. 90890-01288

NOTE:
Hold the connecting rod at top dead center with one hand while turning the nut of the installing tool with the other. Operate the installing tool until half of the crankshaft bearing (6) is inserted into the crankcase as shown. Then, add the spacer (5) as shown and operate the installing tool until the crankshaft bottoms against the bearing.

CAUTION:
To protect the crankshaft against scratches or to facilitate the operation of the installation apply the grease to the oil seal lips, and apply the engine oil to each bearing.

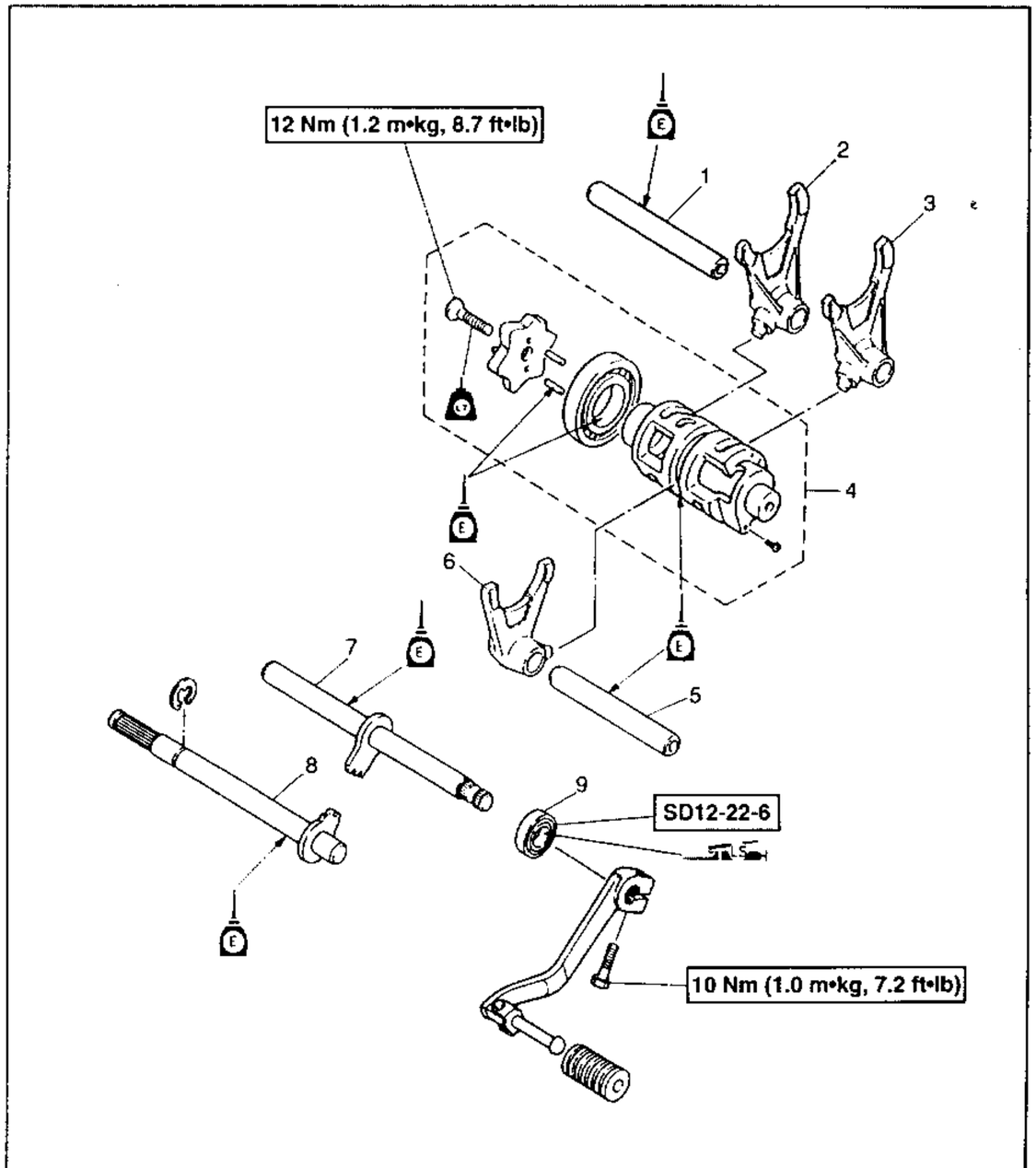
BALANCER SHAFT AND TRANSMISSION

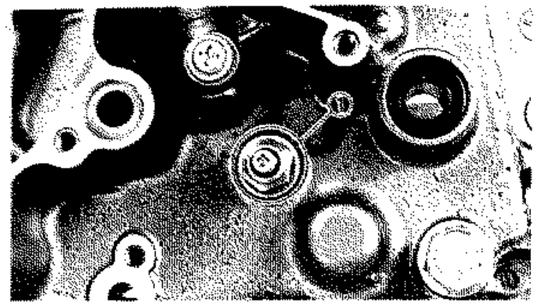
(1) Sprocket
(2) Oil seal
(3) Bearing
(4) Second wheel gear
(5) Secondary shaft
(6) Fifth wheel gear
(7) Third wheel gear
(8) Fourth wheel gear
(9) First wheel gear
(10) Bearing
(11) Bearing
(12) Second sprocket gear
(13) Fifth sprocket gear
(14) Third sprocket gear
(15) Fourth sprocket gear
(16) Main shaft
(17) Bearing
(18) Bearing
(19) Bearing
(20) Bearing



SHIFTER

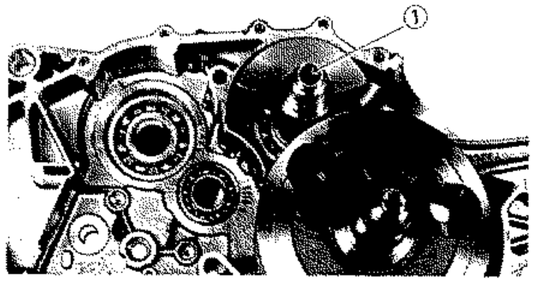
(1) Guide bar (long)
(2) Selector fork #3 "R"
(3) Selector fork #1 "L"
(4) Gear cam
(5) Guide bar (short)
(6) Selector fork #2 "C"
(7) Gear shaft #2
(8) Gear shaft #1
(9) Oil seal



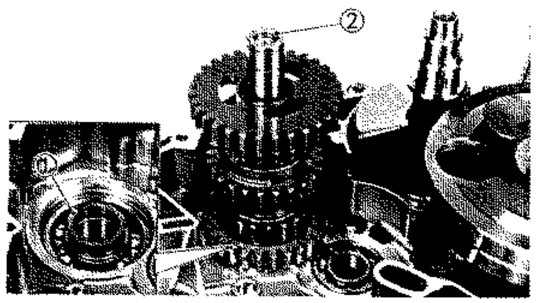


BALANCER, TRANSMISSION AND SHIFTER

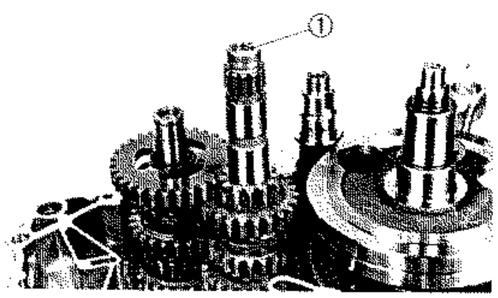
1. Install:
   - Neutral switch (1)



2. Install:
   - Balancer shaft (1)

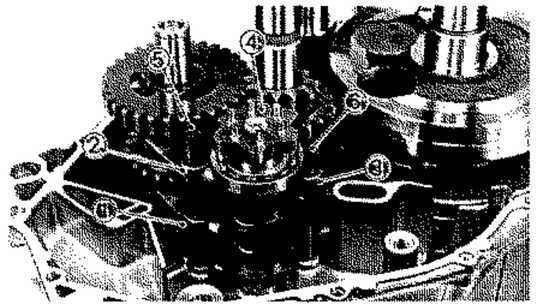


3. Install:
   - Collar (1)
   - Drive axle assembly (2)



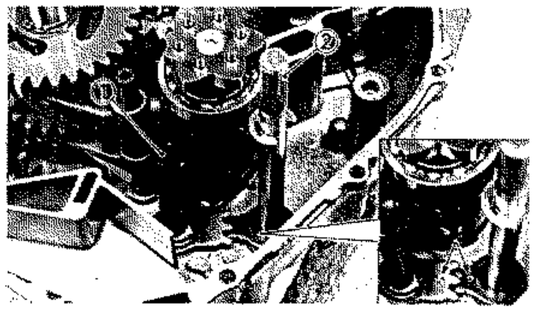
4. Install:
   - Main axle assembly (1)

5. Apply:
   - Engine oil
     (onto guide bars)

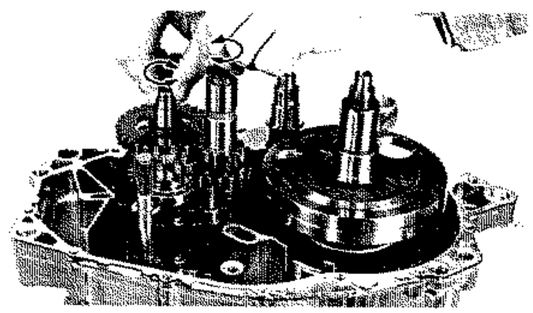


6. Install:
   - Shift fork #1 "L" (1)
   - Shift fork #3 "R" (2)
   - Shift fork #2 "C" (3)
   - Gear cam (4)
   - Guide bar (long) (5)
   - Guide bar (short) (6)

NOTE:
Install the shift forks with the embossed mark on each shift fork facing right side of the engine.



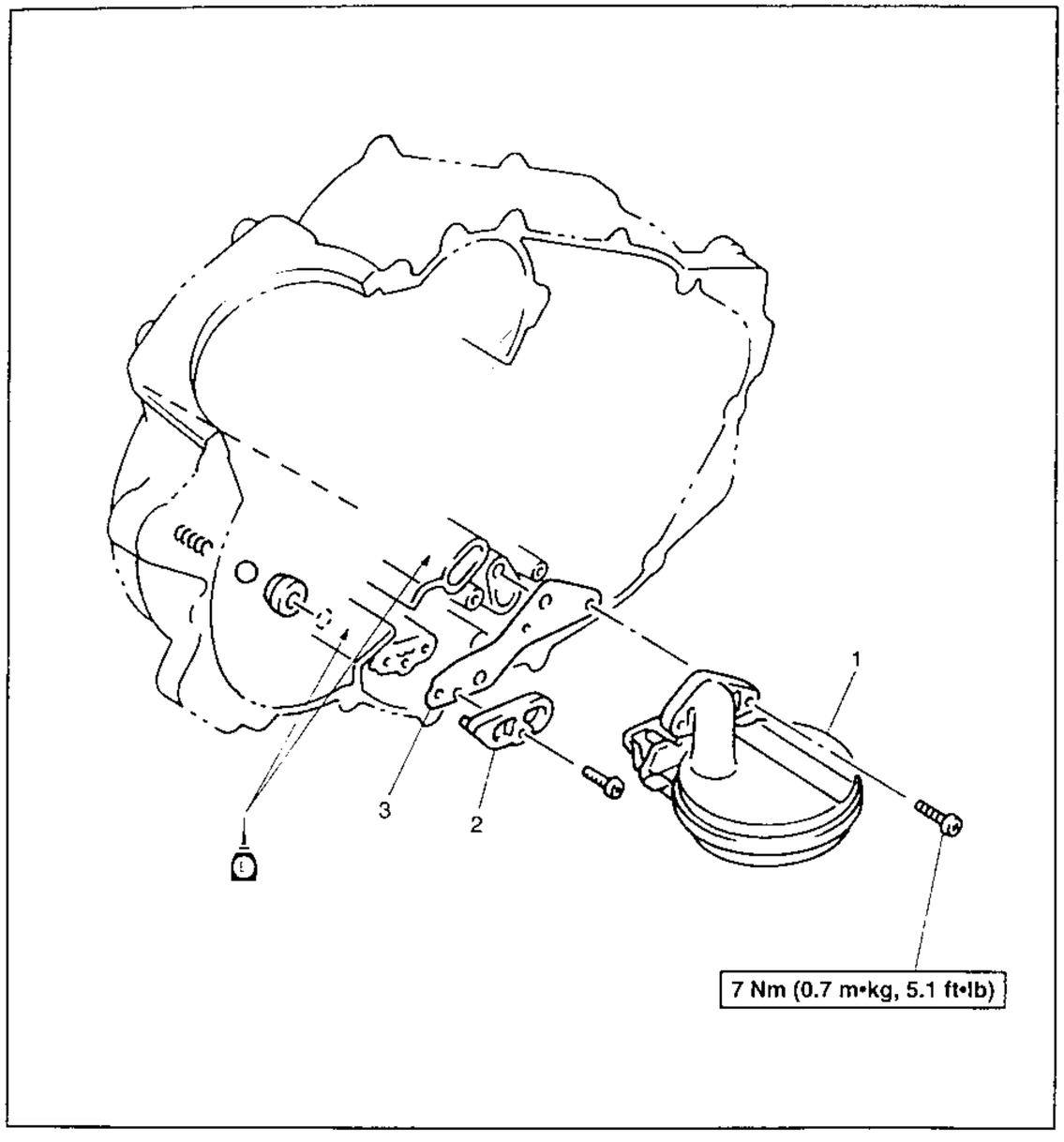
7. Install:
   - Shift shaft #2 (1)
   - Shift shaft #1 (2)



8. Check:
   - Transmission operation
     Unsmooth operation → Repair.

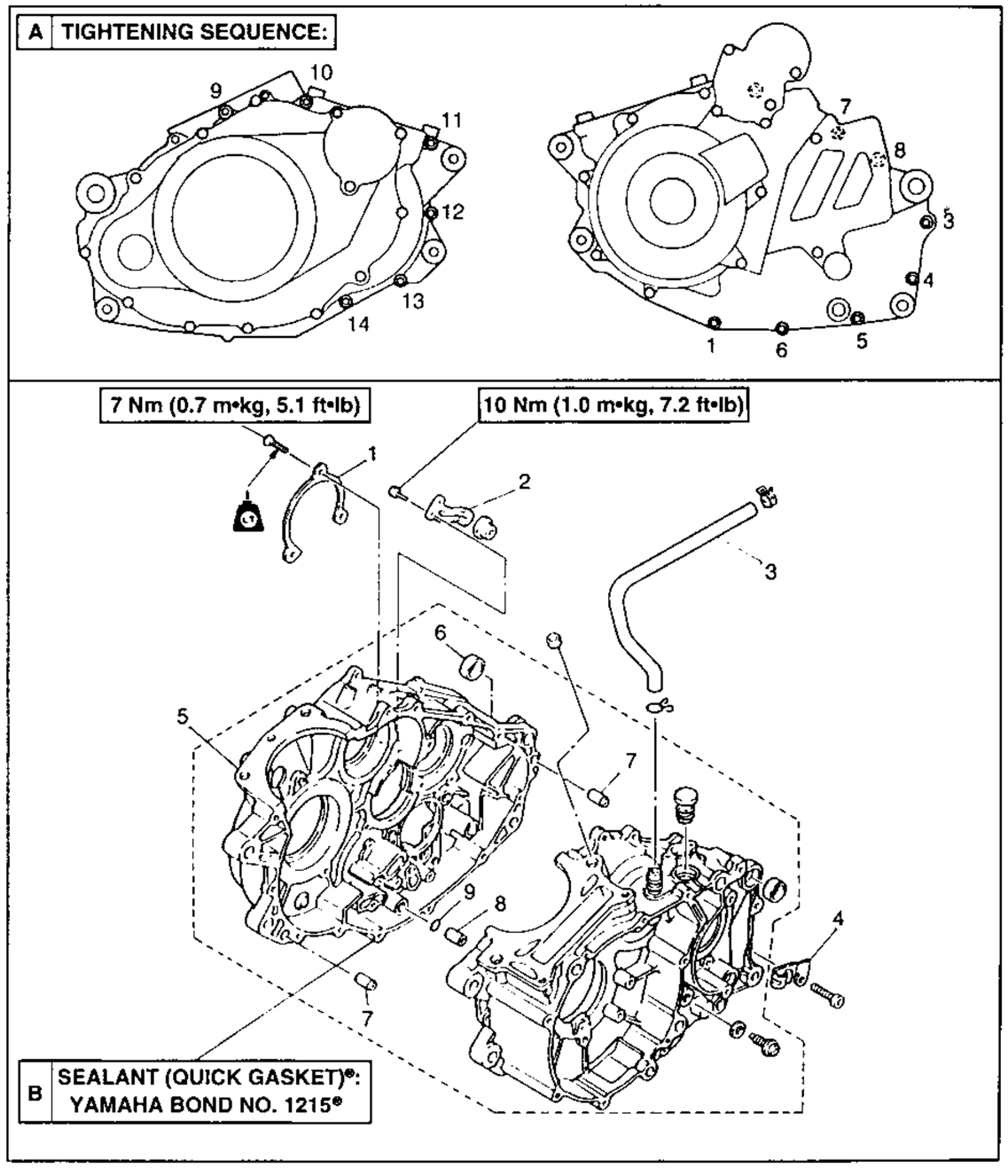
OIL STRAINER

(1) Oil strainer
(2) Oil duct oil
(3) Gasket



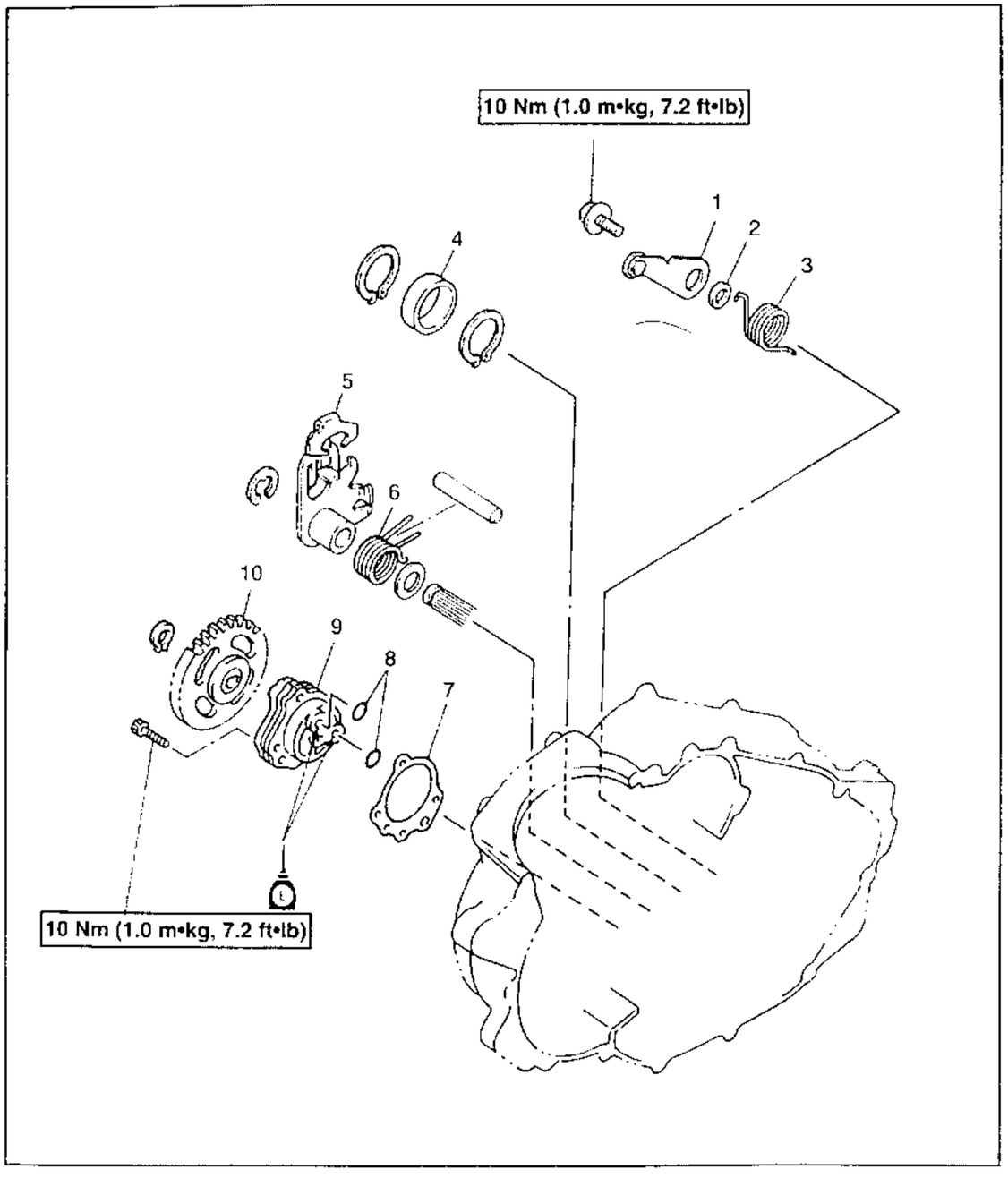
CRANKCASE

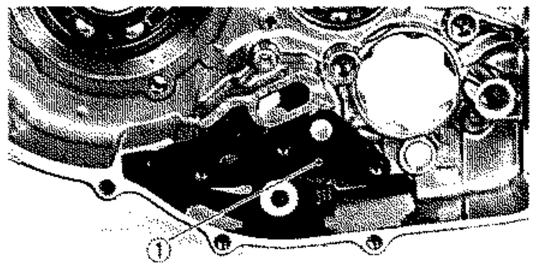
(1) Bearing cover plate
(2) Lock plate
(3) Crankcase ventilation hose
(4) Clamp
(5) Crankcase
(6) Collar
(7) Dowel pin
(8) Dowel pin
(9) O-ring



SHIFT LEVER AND OIL PUMP

(1) Stopper lever
(2) Collar
(3) Torsion spring
(4) Collar
(5) Shift lever
(6) Torsion spring
(7) Gasket
(8) O-ring
(9) Oil pump
(10) Oil pump gear

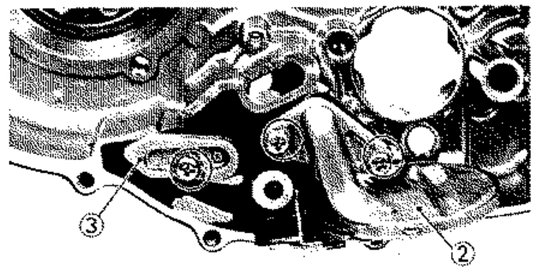




ENGINE OIL PUMP SUCTION

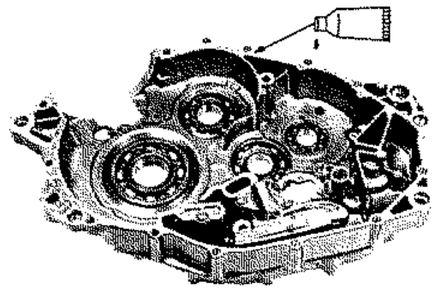
1. Install:
   - Gasket (1)
   - Oil pump suction (2)
   - Oil passage cover (3)

Screw (pump suction):
7 Nm (0.7 mkg)
Screw (oil passage cover):
7 Nm (0.7 mkg)



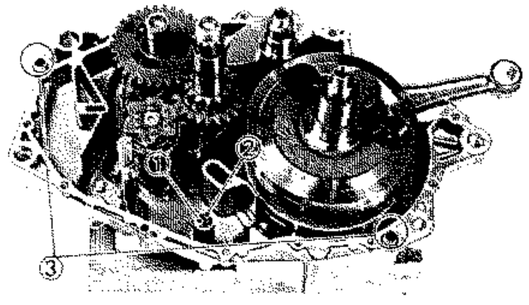
CRANKCASE

1. Apply:
   - Bonding agent
     (on the semicrank mating surfaces)



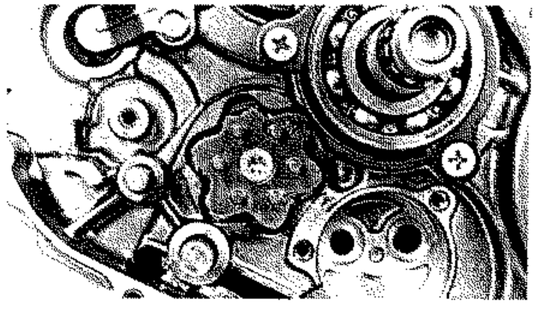
Bonding agent (Quick Gasket) ®:
P/N. ACC-11001-01
Yamaha bond N° 1215®:
P/N. 90890-85505

NOTE:
Do not allow any sealant to come in contact whit the oil gallery.

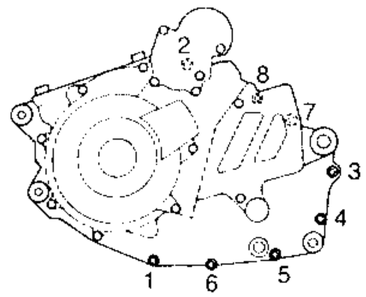


2. Install:
   - O-ring (1)
   - Dowel pin (2)
   - Dowel pins (3)
3. Assemble the left semicrank to the right semicrank. Beat gently with a soft hammer.

NOTE:
Turn the gear cam as shown in the figure so that it does not interfere with the crankcase during assembly.



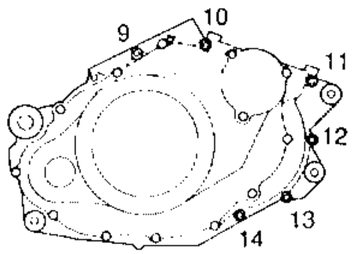
CAUTION:
Before installing and tightening the fastening screws, be sure that the transmission is working properly by hand, turning the gear cam in both directions.



4. Tighten:
   - Screws (crankcase) (1) ~ (14)

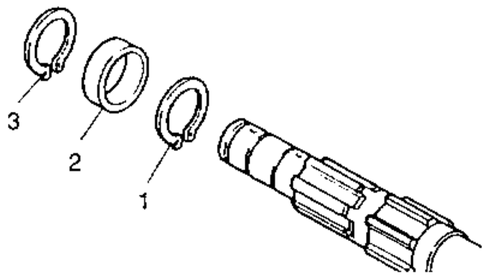
NOTE:
- Tighten the screws beginning with the one with the lowest number.
- Install the cable clamp on the bolt No. 4

	Screw (crankcase) (4): 10 Nm (1.0 mkg)



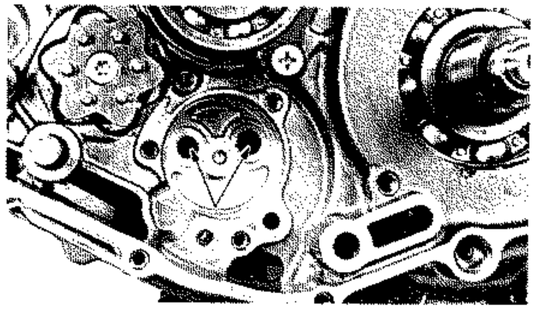
5. Apply:
   - 4-stroke engine oil (to the connecting rod pin, the bearing and the oil passage)

6. Check:
   - Gearbox and transmission functioning Jerky functioning → Repair.



SHIF LEVER AND OIL PUMP

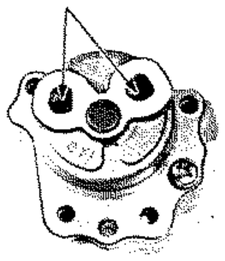
1. Install:
   - Circlip (1) (to drive axle)
   - Collar (2)
   - Circlip (3)



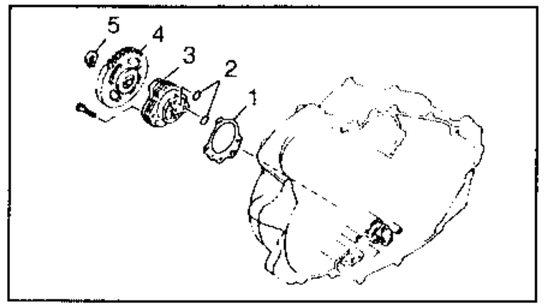
2. Apply
   - 4-stroke engine oil (to the oil pipes in crankcase)

CAUTION:

To avoid damage to the engine, lubricate the oil pump pipes in the crankcase liberally with 4-stroke engine oil.

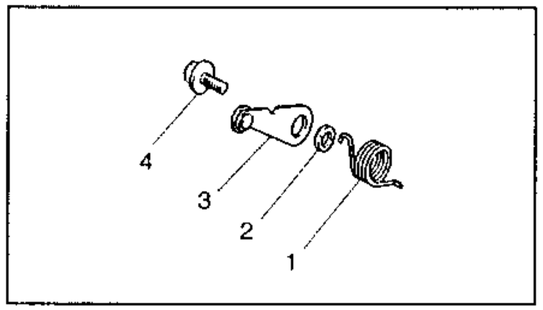


3. Apply:
   - 4-stroke engine oil (to the oil pump pipes)



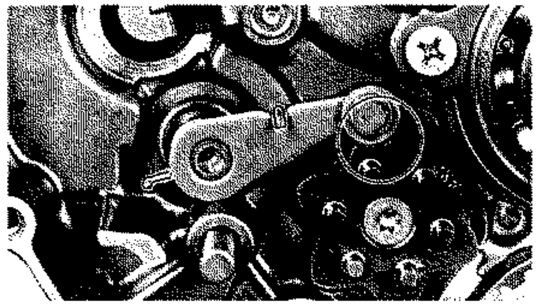
4. Install:
   - Gasket (1)
   - O-rings (2)
   - Oil pump (3)
   - Oil pump gear (4)
   - Circlip (5)

	Screw (oil pump): 10 Nm (1.0 mkg)

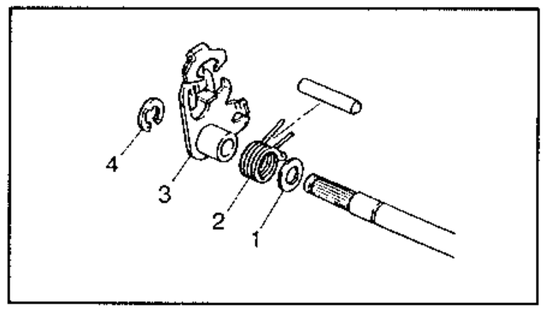


5. Install:
   - Spring (1)
   - Collar (2)
   - Stop lever (3)

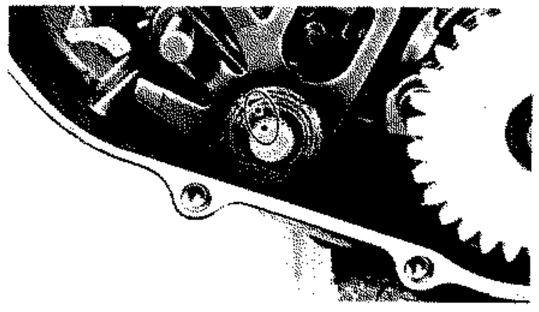
	Stop lever screw (4): 10 Nm (1.0 mkg)



NOTE:
Place the stop lever and the spring in the correct position.



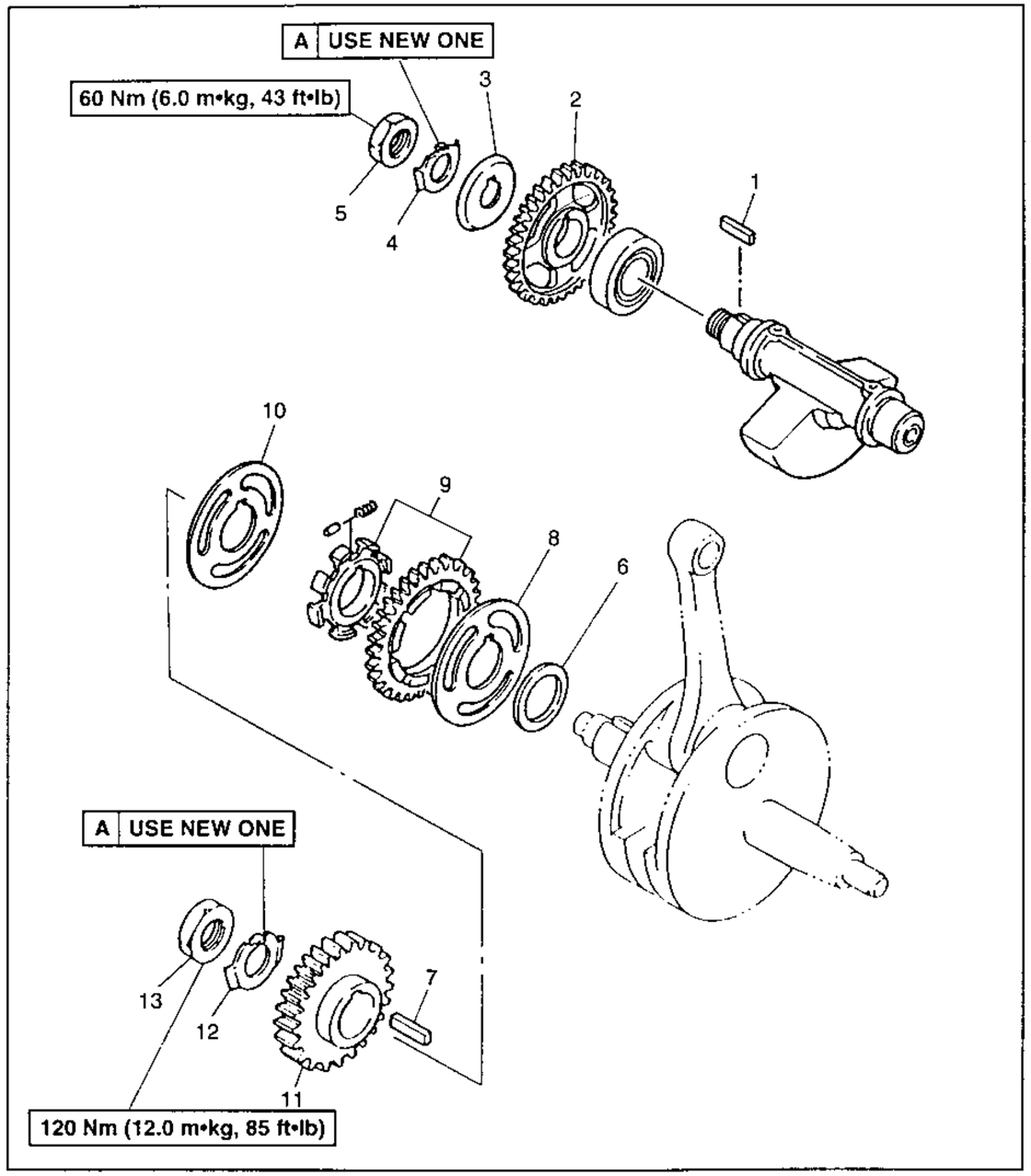
6. Install:
   - Flat washer (1)
   - Spring (2)
   - Shift lever (3)
   - Circlip (4)



NOTE:
When installing the shift lever, align the mark on the lever with that on the shitf shaft.

BALANCER SHAFT GEAR

(1) Key
(2) Balancer shaft gear
(3) Plate
(4) Lock washer
(5) Nut
(6) Washer
(7) Key
(8) Plate
(9) Balancer shaft transmission gear
(10) Plate
(11) Primary transmission gear
(12) Lock washer
(13) Nut



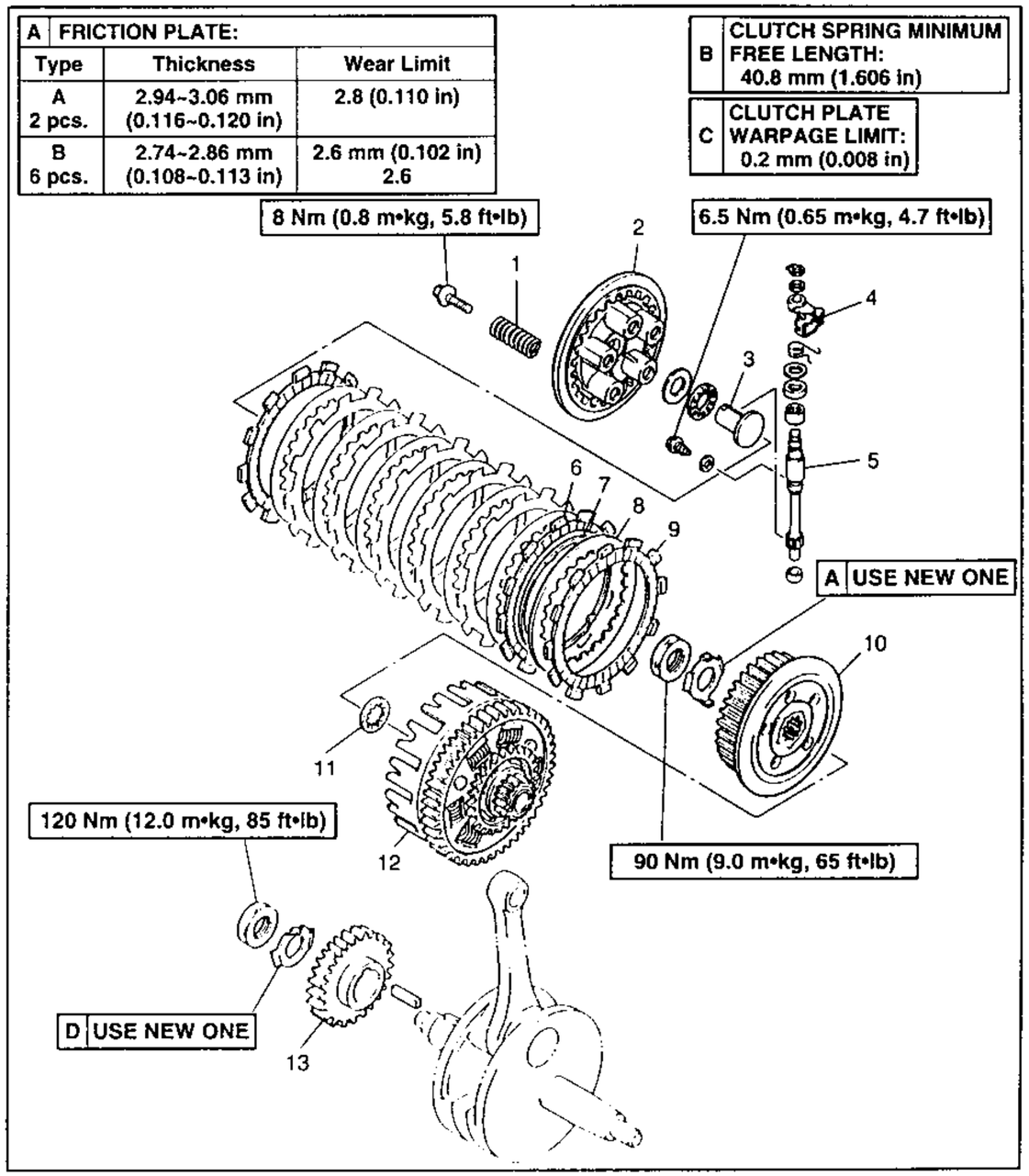
CLUTCH

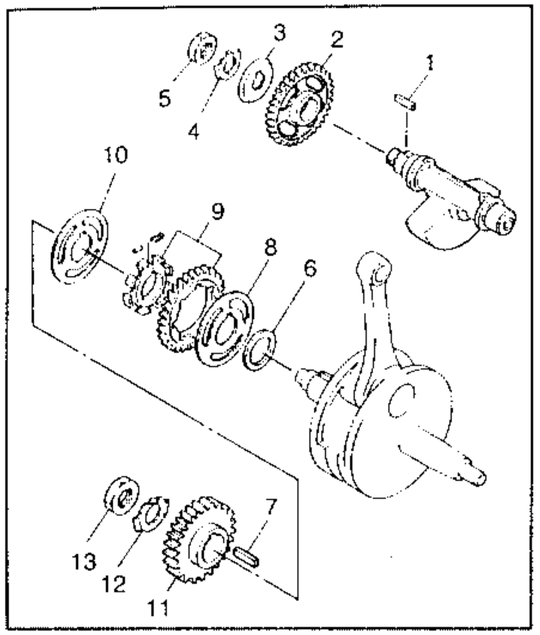
(1) Spring
(2) Pressure plate
(3) Push rod
(4) Push lever
(5) Push lever axle
(6) Friction plate (type A)
(7) Clutch boss spring
(8) Clutch plate
(9) Friction plate (type B)
(10) Clutch boss
(11) Thrust plate
(12) Gear assy
(13) Primary transmission gear

A	FRICTION PLATE:		
	Type	Thickness	Wear Limit
	A 2 pcs.	2.94~3.06 mm (0.116~0.120 in)	2.8 (0.110 in)
	B 6 pcs.	2.74~2.86 mm (0.108~0.113 in)	2.6 mm (0.102 in) 2.6

B CLUTCH SPRING MINIMUM FREE LENGTH: 40.8 mm (1.606 in)

C CLUTCH PLATE WARPAGE LIMIT: 0.2 mm (0.008 in)

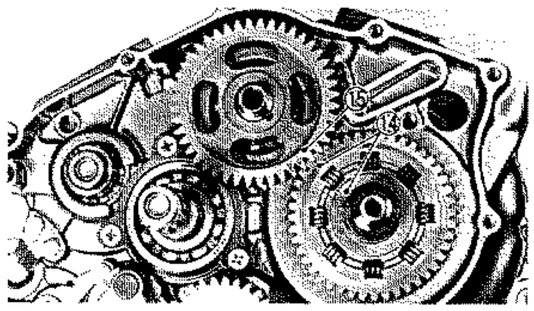




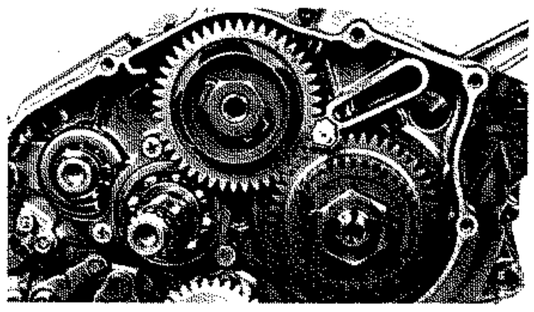
CLUTCH AND BALANCER GEAR

1. Install:
   - Key (1)
   - Balancer gear (2)
   - Plate (3)
   - Lock washer (4)
   - Nut (5) (balancer gear)
   - Plate washer (6)
   - Key (7)
   - Plate (8)
   - Balancer drive gear (9)
   - Plate (10)
   - Primary drive gear (11)
   - Lock washer (12)
   - Nut (13) (primary drive gear)

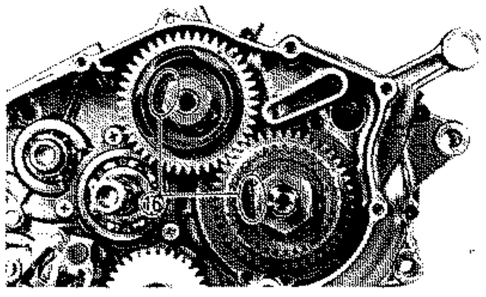
Nut (balancer gear):
60 Nm (6.0 mkg)
Nut (primary drive gear):
120 Nm (12.0 mkg)

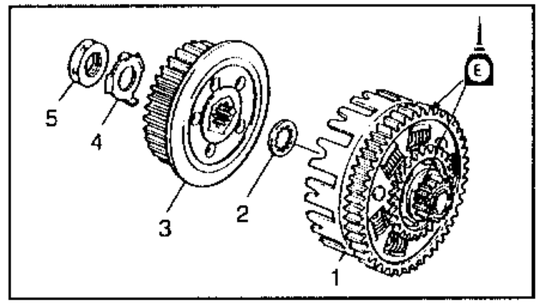


NOTE:
- When installing the drive gear, align the punched mark (14) on the drive gear with the punched mark (15) on the balancer gear.
- Place a folded rag or aluminum plate between the teeth of the balancer drive gear and balancer gear.
- Take care not to damage the gear teeth.



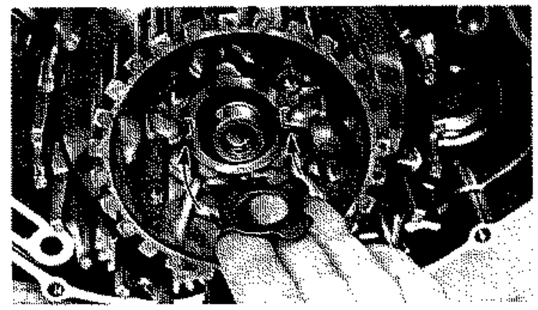
2. Bend the lock washer tab along the nut flat (16).



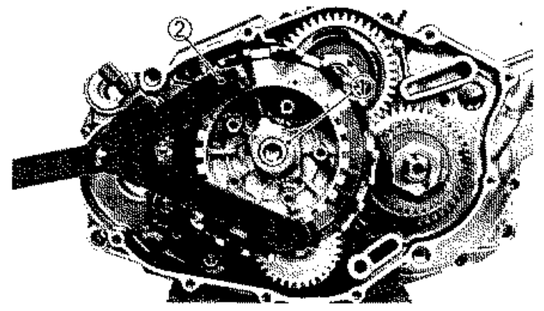


3. Apply:
   - Engine oil
     (onto bearing and gear teeth)

4. Install:
   - Clutch housing (1)
   - Thrust plate (2)
   - Clutch boss assembly (3)
   - Lock washer (4)
   - Nut (5) (clutch boss)



NOTE:
Fit the tabs of the lock washer to the groove of the clutch boss.



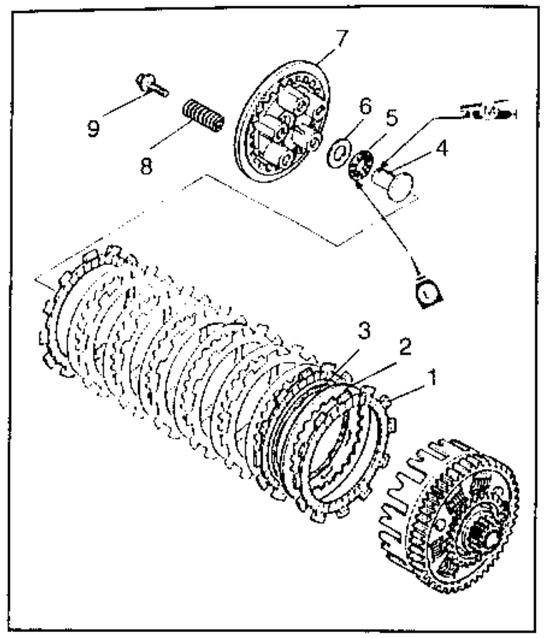
5. Tighten:
   - Nut (1) (clutch boss)

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

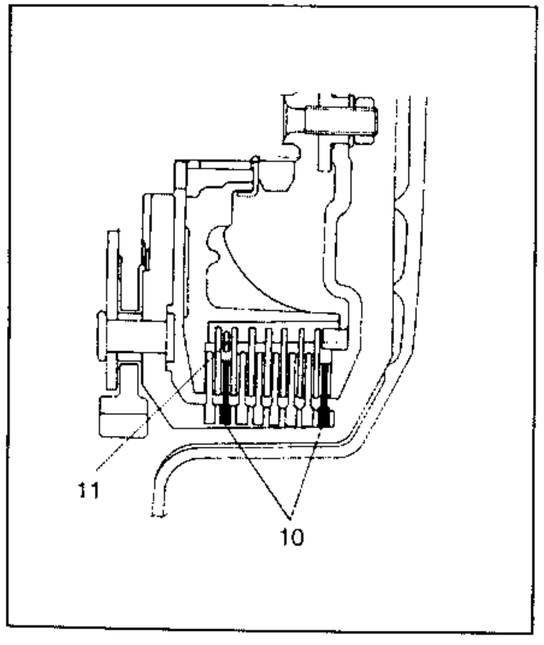
Universal clutch holder:
P/N YM-91042, 90890-04086

Nut (clutch boss):
90 Nm (9.0 mkg)

6. Bend:
   - Lock washer tab
     (along nut flat)
7. Apply:
   - Molybdenum disulfide grease
     (onto gear teeth of pull rod)
   - Engine oil
     (onto bearing pull rod)

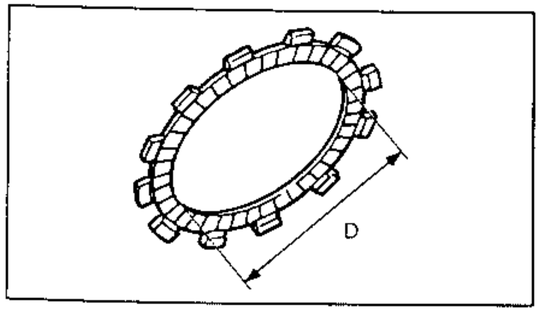


8. Install:
   - Friction plates (1)
   - Clutch plates (2)
   - Cushion spring (3)
   - Pull rod (4)
   - Bearing (5) (pull rod)
   - Washer (6)
   - Pressure plate (7)
   - Clutch springs (8)
   - Bolts (9)

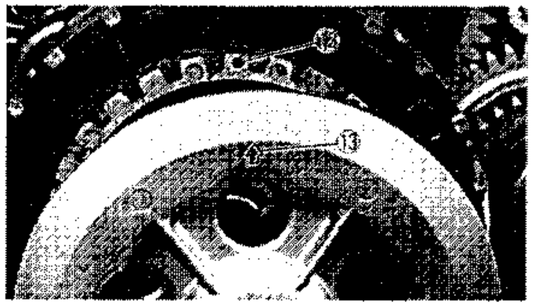


NOTE:
Install the clutch plates and friction plates alternately on the clutch boss, starting with a friction plate and ending with a friction plate.

CAUTION:
- **The friction plates (type A) (10) with the larger of the inside diameter must be installed in the second and last places.**
- **The cushion spring (11) must be placed on the inside of the second friction plate.**

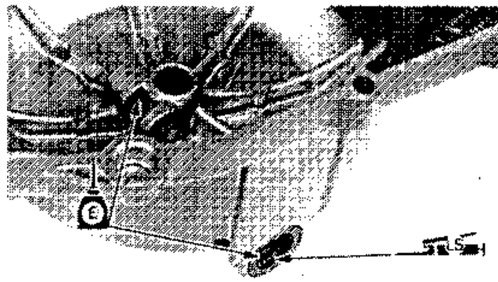


	Friction plate	
	Type "A"	Type "B"
Quantity	2 pcs	6 pcs
Inside diameter "D"	116 mm	113 mm

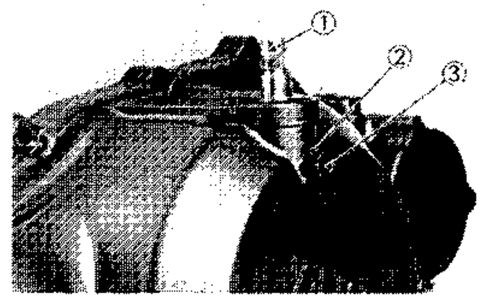


NOTE:
Align the punched mark (12) on the clutch boss with the arrow mark on the clutch pressure plate (13).

	Screw (pressure plate): 8 Nm (0.8 mkg)

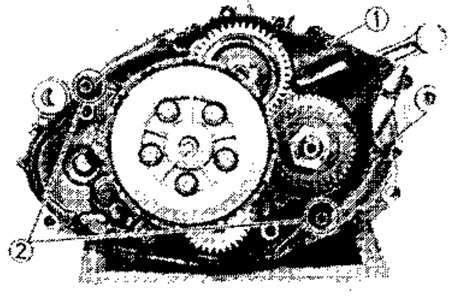


9. Apply:
   - Lithium soap base grease (onto seal lips in crankcase cover)
   - Engine oil (onto bearings in crankcase cover)

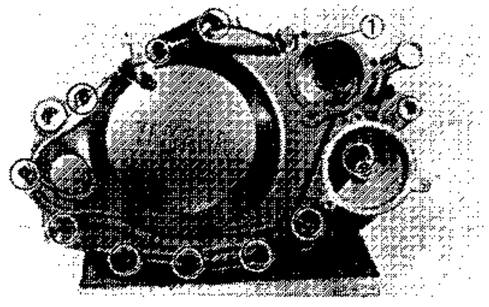


10. Install:
    - Pull lever axle (1)
    - Washer (2)
    - Bolt (3)

	Bolt (pull lever axle): 6.5 Nm (0.65 mkg)



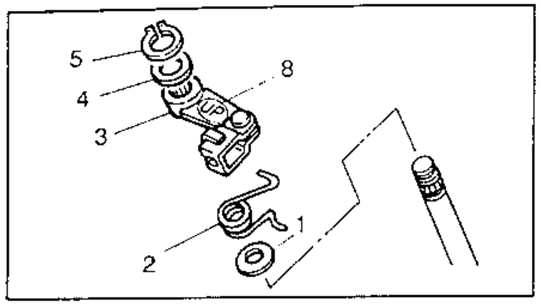
11. Install:
    - Gasket (1) (crankcase cover)
    - Dowel pins (2)



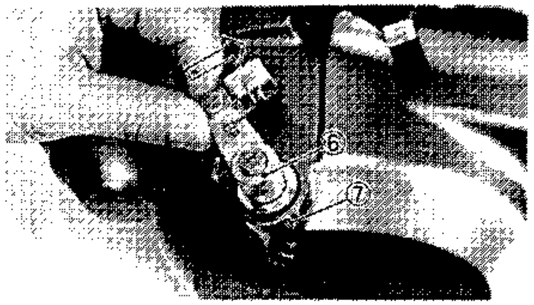
12. Install:
    - Crankcase cover (1) (right)

	Bolt (crankcase cover): 10 Nm (1.0 mkg)

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

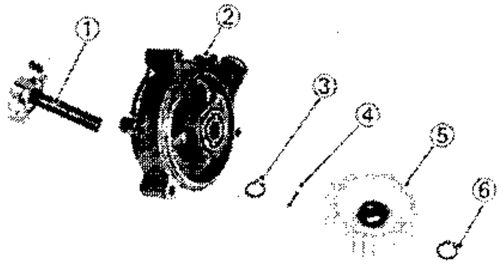


13. Install:
    - Washer (1)
    - Return spring (2)
    - Pull lever (3)
    - Washer (4)
    - Circlip (5)

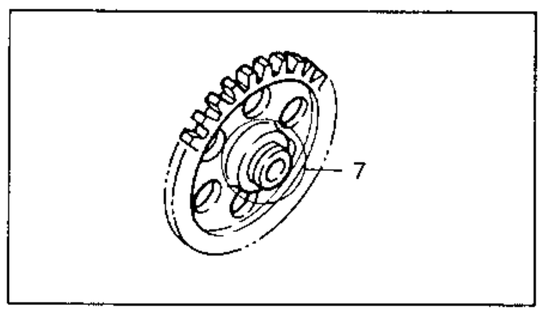


NOTE:
- Make sure that the mark (6) on the pull lever is aligned whit the embossed mark (7) on the crankcase while pushing the pull lever. If not, change the pull lever position.
- Install the pull lever whit the "UP" mark (8) facing upward.

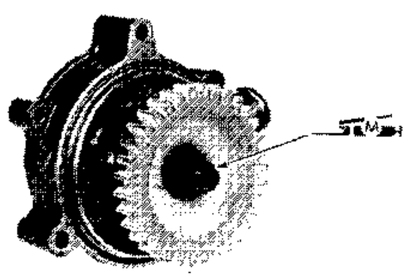
OIL FILTER AND WATER PUMP



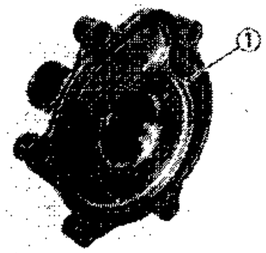
1. Install:
    - Impeller shaft (1)
    - Water pump housing (2)
    - Circlip (3)
    - Pin (4)
    - Water pump gear (5)
    - Circlip (6)



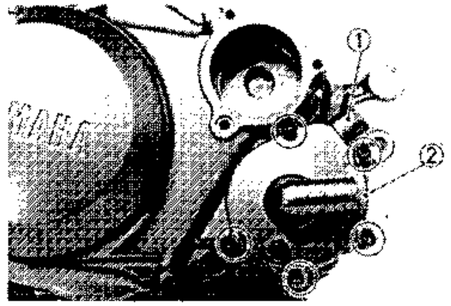
NOTE:
Install the water pump with embossed side (7) facing to inside.



2. Apply:
    - Molybdenum disulfide grease (onto impeller shaft end)

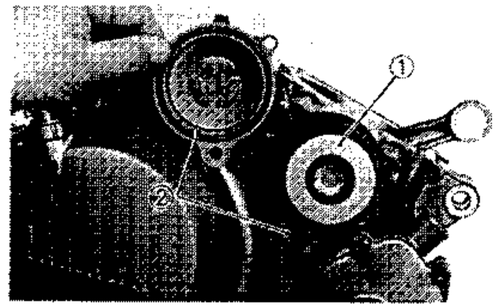


3. Install:
    - O-ring (1)

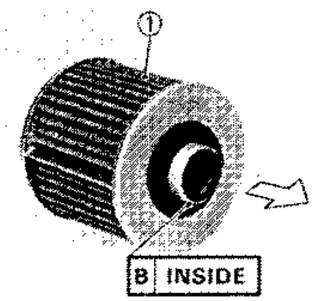


4. Install:
    - Water pump housing (1)
    - Water pump cover (2)

	Bolt (water pump): 10 Nm (1.0 mkg)

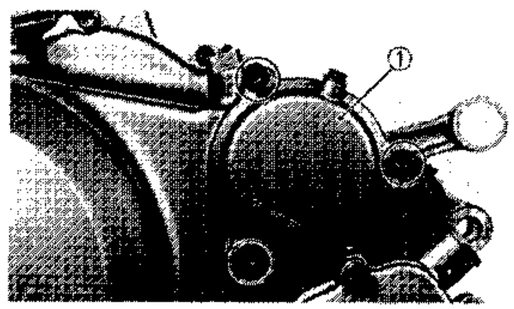


5. Install:
    - Oil filter (1)
    - O-rings (2)



CAUTION:
Install the oil filter as shown.

B INSIDE

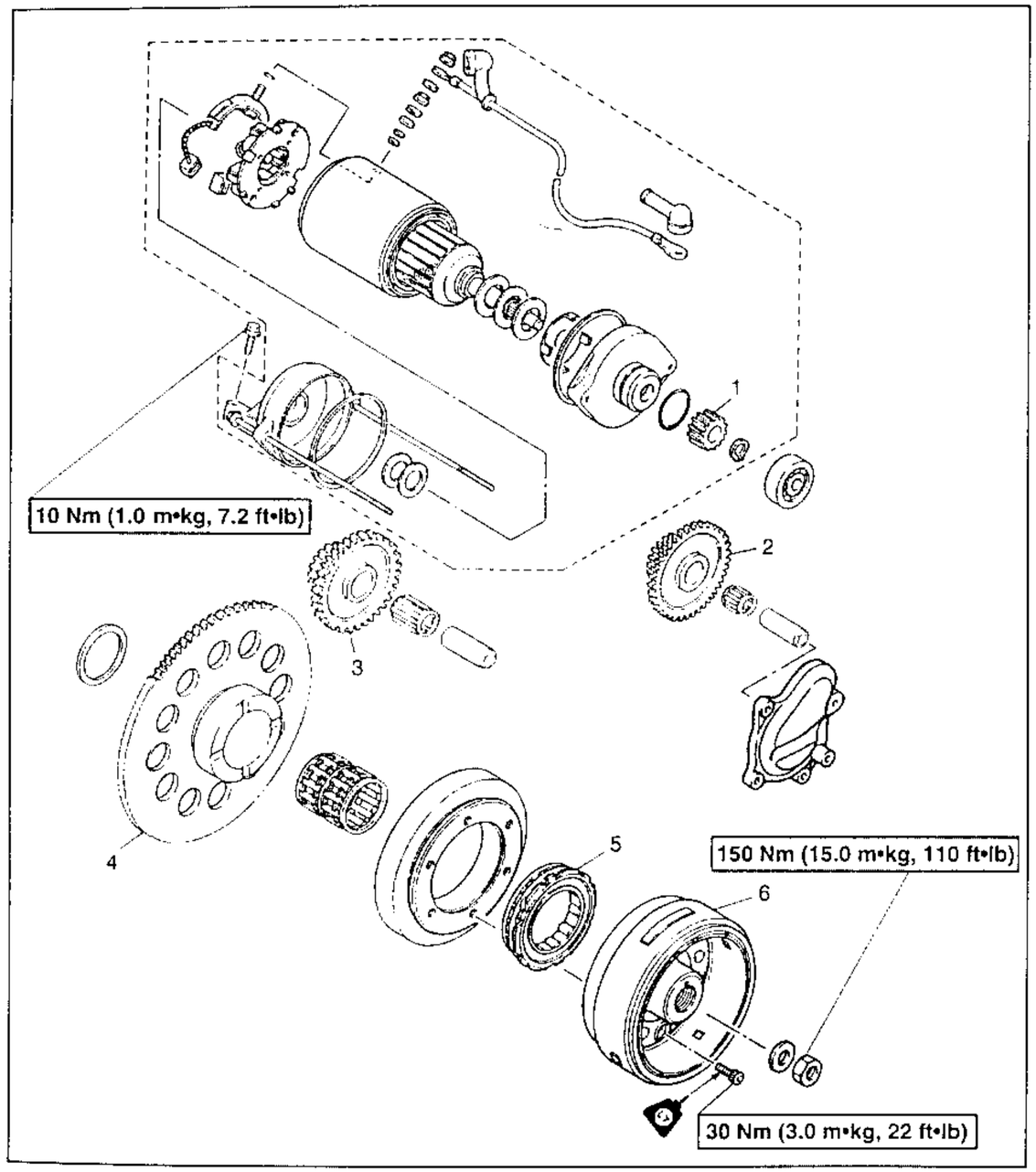


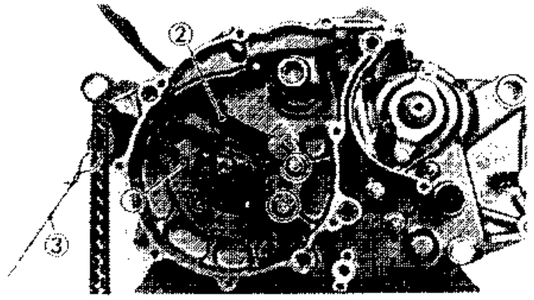
6. Install:
    - Oil filter cover (1)

	Bolt (oil filter cover): 10 Nm (1.0 mkg)

STARTER GEARS AND ROTOR

(1) Starter gear
(2) Starter neutral gear 1
(3) Starter neutral gear 2
(4) Starter gear
(5) Starter clutch
(6) Rotor (A.C.generator)



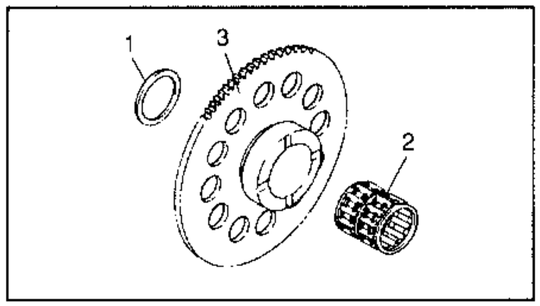


1. Install:
   - Timing chain (1)
   - Chain guide (2)

	Bolt (chain guide): 10 Nm (1.0 mkg)

NOTE:
Fasten a safety wire (3) to the timing chain to prevent it from falling into crankcase.

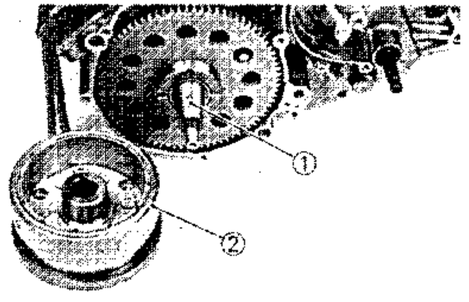
2. Apply:
   - Lithium soap base grease (onto bearing on starter drives)



3. Install:
   - Washer (1)
   - Needle bearing (2)
   - Wheel gear (3)

4. Install:
   - Woodruff key (1)
   - Rotor (2)

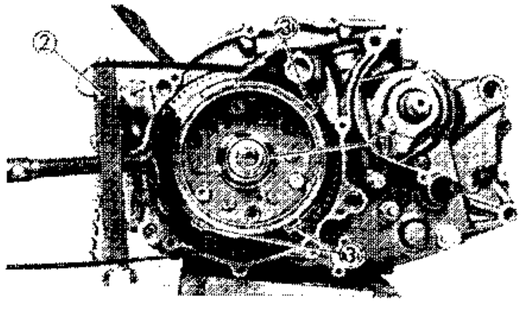
NOTE:
When installing the magneto rotor, make sure thet the woodruff key is properly seated in the keyway of the crankshaft.



5. Install:
   - Nut (1) (rotor)

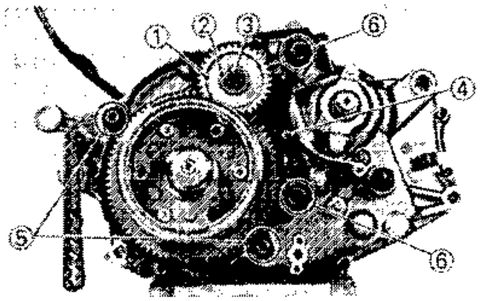
	Nut (rotor): 150 Nm (15.0 mkg)

NOTE:
Tighten the nut (rotor) while holding the rotor with the rotor holder (2).

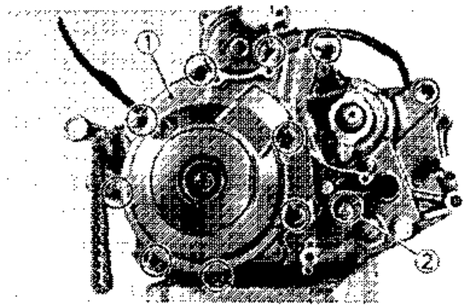


	Rotor holder: P/N YS-01880, 90890-01701

CAUTION:
Do not allow the rotor holder to touch the projections (3) on the rotor.



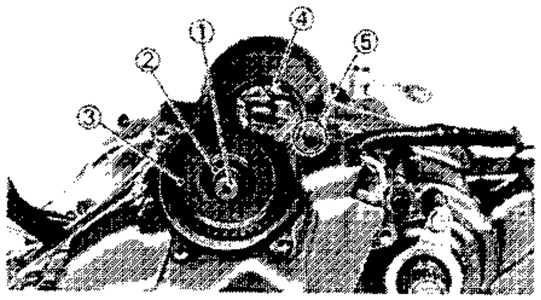
6. Install:
   - Starter idle gear 2 (1)
   - Needle bearing (2)
   - Shaft (3)
   - Gasket (4) (crankcase cover)
   - Dowel pins (5)
   - O-rings (6)



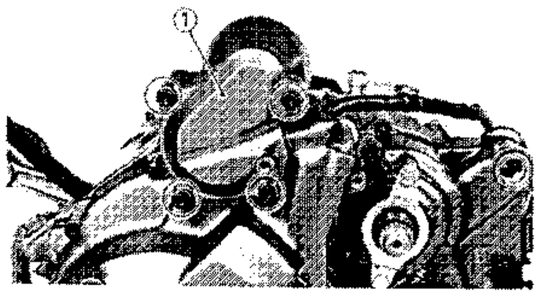
7. Install:
   - Crankcase cover (1) (left)

	Bolt (crankcase cover): 10 Nm (1.0 mkg)

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



8. Connect:
   - Neutral switch (2)
9. Install:
   - Shaft (1) (starter idle gear)
   - Needle bearing (2)
   - Starter idle gear (3)
   - Gasket (4)
   - Dowel pin (5)



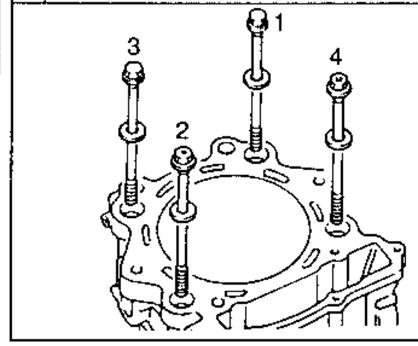
10. Install:
    - Cover (1)

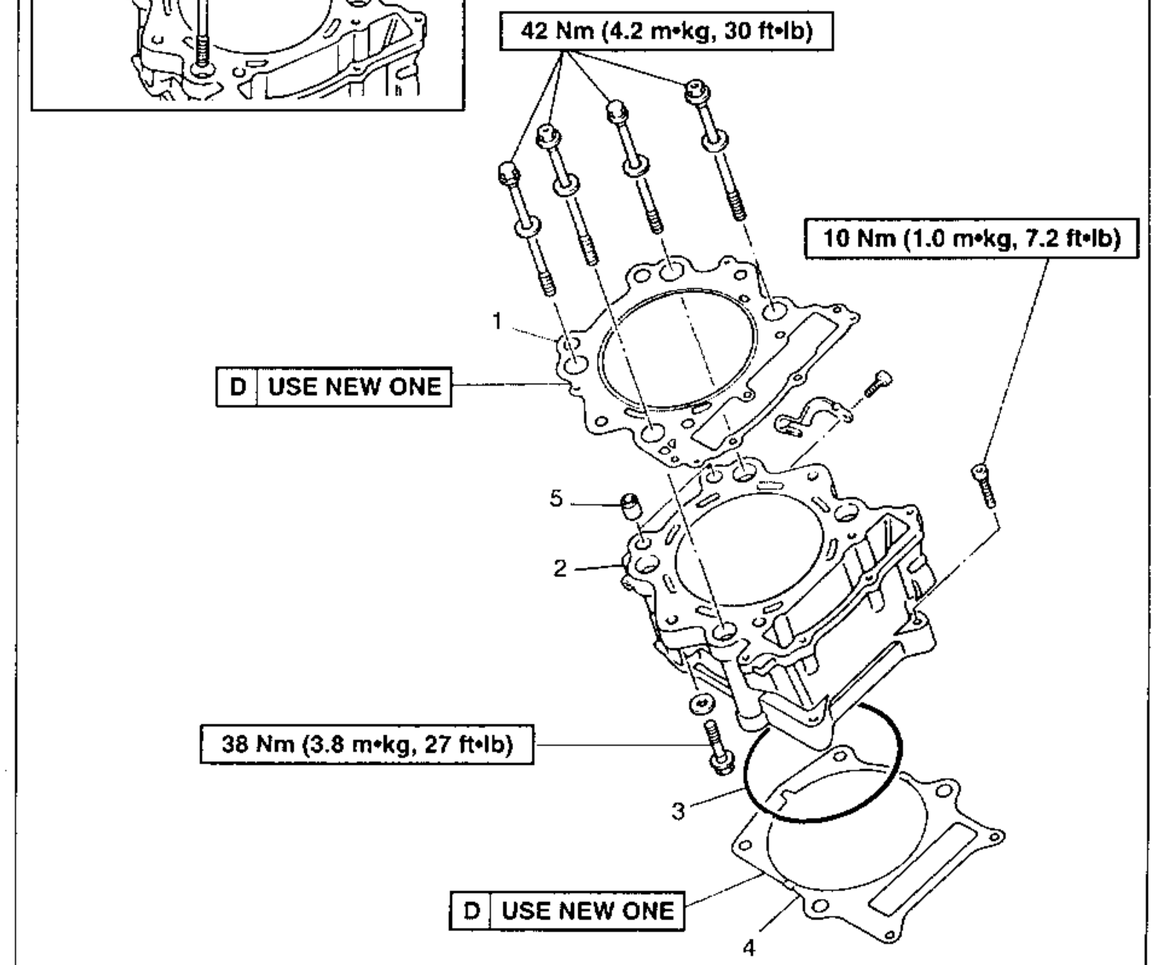
	Bolt (cover): 10 Nm (1.0 mkg)

CYLINDER

(1) Cylinder head gasket
(2) Cylinder
(3) O-ring
(4) Cylinder gasket
(5) Dowel pin

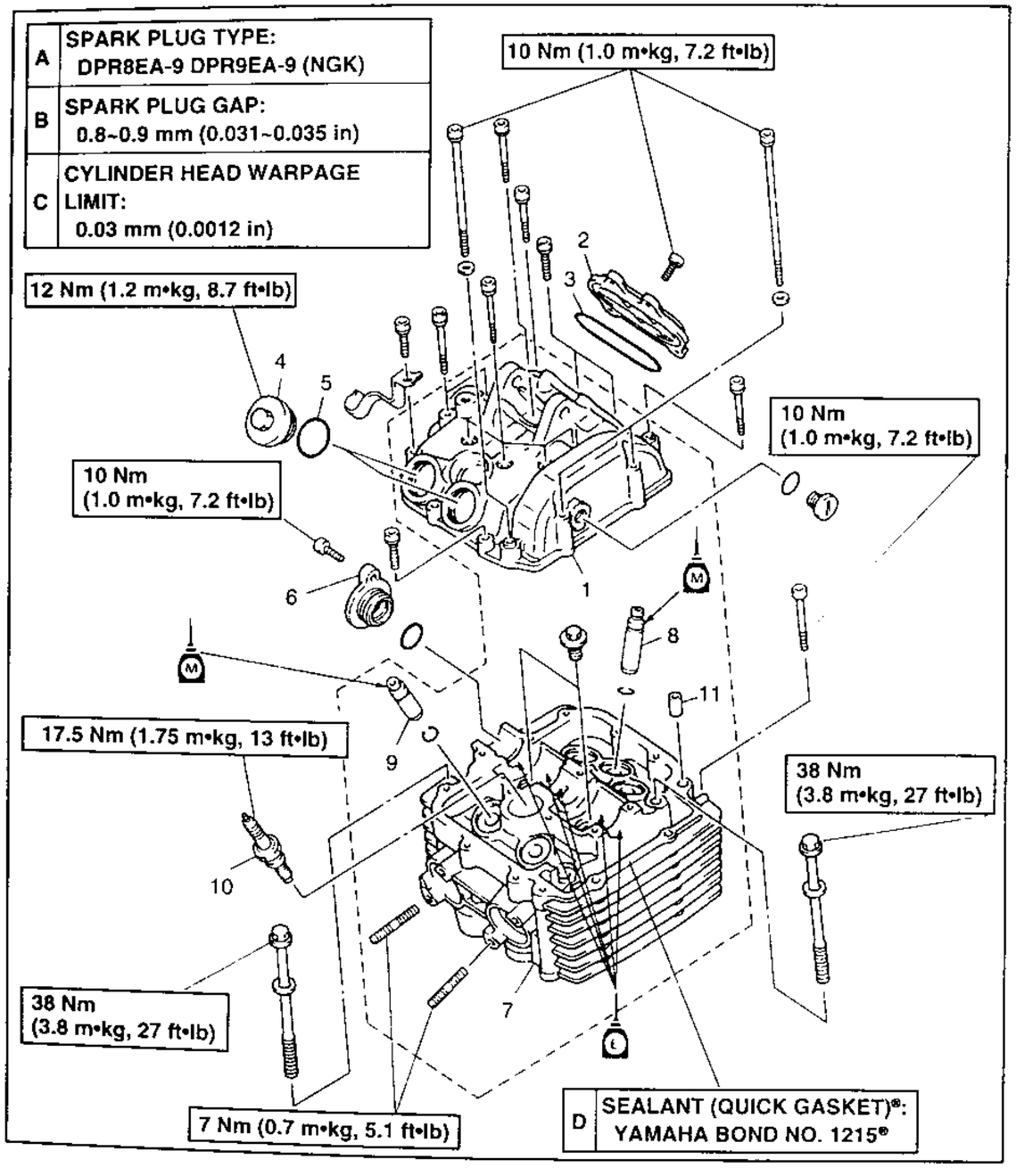
A	**TIGHTENING SEQUENCE:**
B	**BORE SIZE: 100.005~100.045 mm (3.9372~3.9388 in) <LIMIT>: <100.1 mm (3.941 in)>**
C	**PISTON-TO-CYLINDER CLEARANCE: 0.005~0.070 mm (0.0020~0.0028 in) <LIMIT>: <0.15 mm (0.0059 in)>**





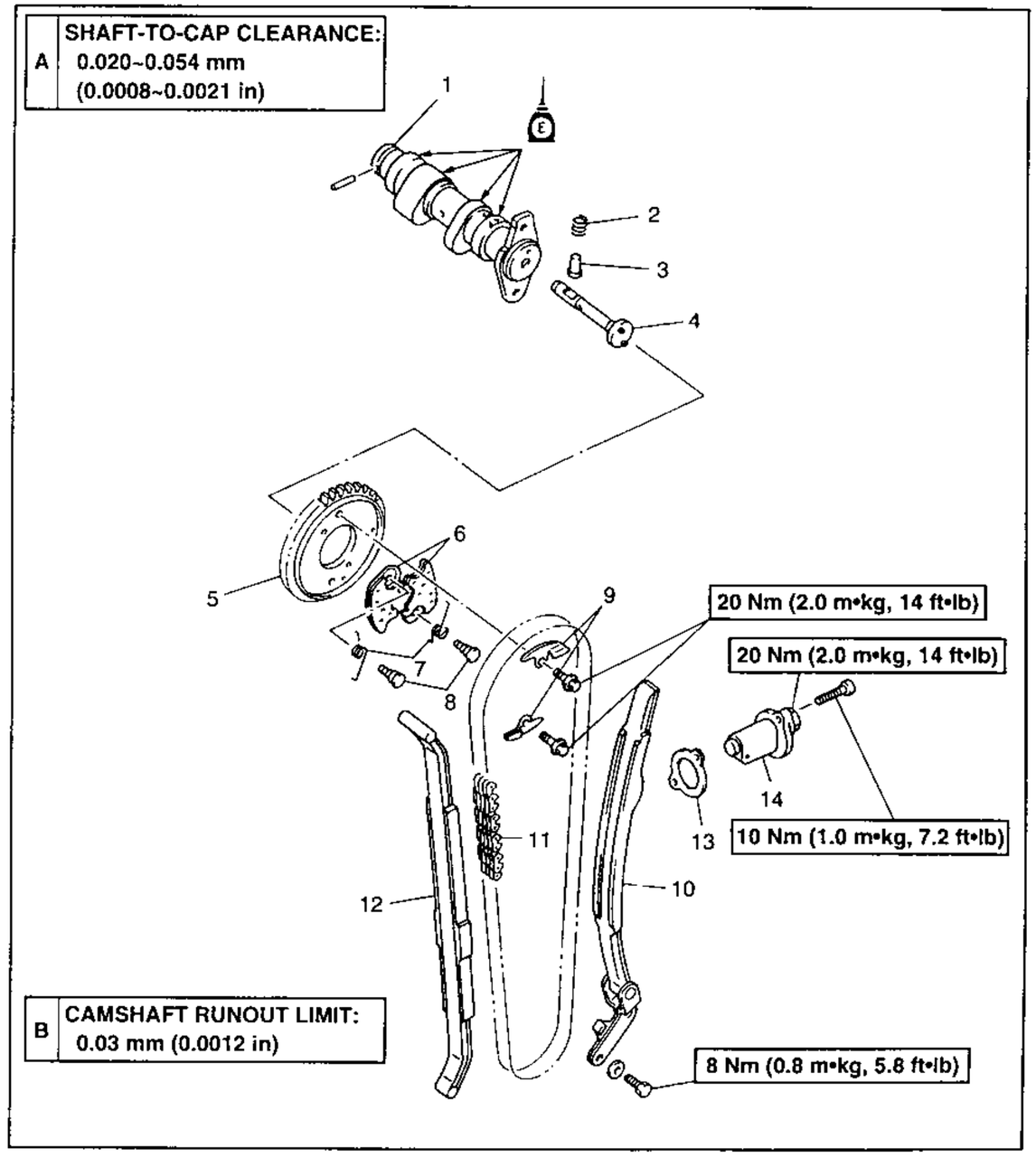
CYLINDER HEAD

(1) Cylinder head cover
(2) Tappet cover (intake)
(3) O-ring
(4) Tappet cover (exhaust)
(5) O-ring
(6) Cap
(7) Cylinder head
(8) Valve guide (intake valve)
(9) Valve guide (exhaust valve)
(10) Spark plug
(11) Dowel pin



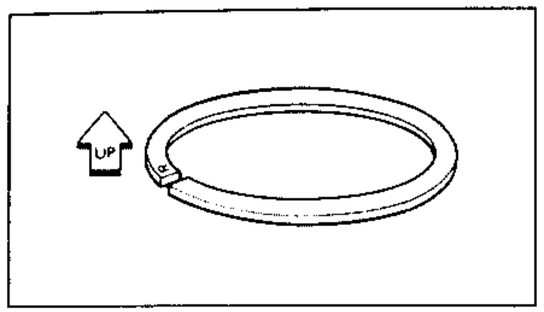
CAMSHAFT AND CAMSHAFT CHAIN

(1) Camshaft
(2) Spring
(3) Decompression lever pin
(4) Decompression lever
(5) Cam chain sprocket
(6) Decompression cam
(7) Spring
(8) Tensioner shaft
(9) Guide stopper plates
(10) Guide stopper (intake)
(11) Timing chain
(12) Guide stopper (exhaust)
(13) Gasket
(14) Cam chain tensioner



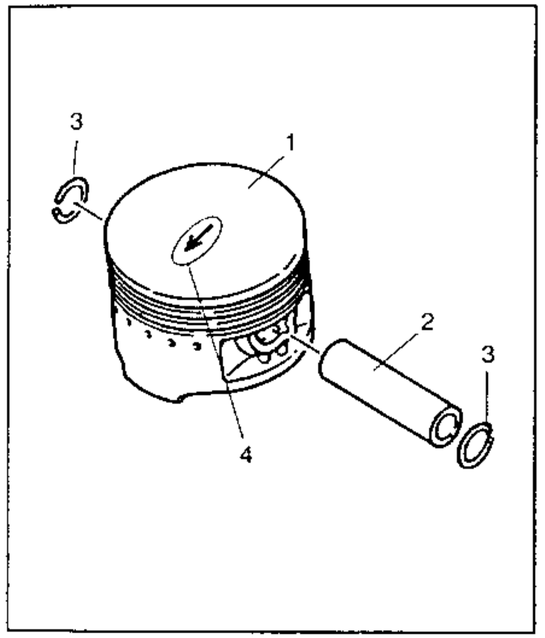
CYLINDER HEAD, CYLINDER AND PISTON

1. Apply:
   - Engine oil
     (onto piston rings and piston pin)



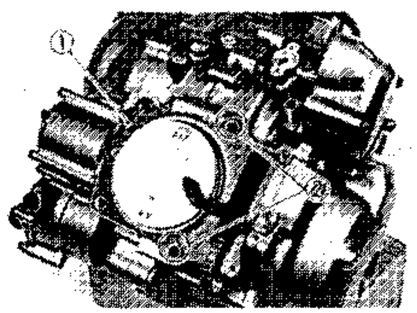
2. Install:
   - Piston rings

NOTE:
Be sure to install ring so that manufacture marks or numbers are located on the top side of the rings.

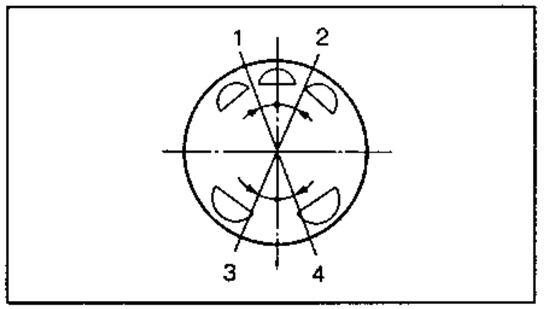


3. Install:
   - Piston (1)
   - Piston pin (2)
   - Circlips (3)

NOTE:
- The allow (4) on the piston must point to the front of the engine.
- Before installing the circlip, cover the crankcase with a clean towel or rag so you will not accidentally drop the pin clip and material into the crankcase.

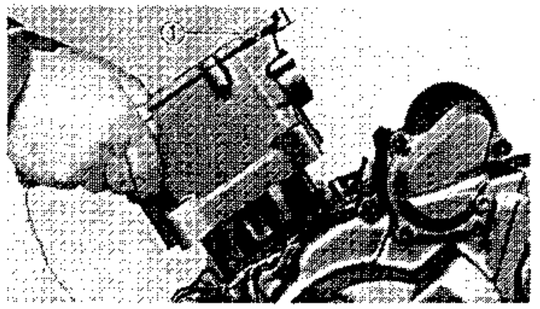


4. Install:
   - Gasket (1) (cylinder)
   - Dowel pins (2)

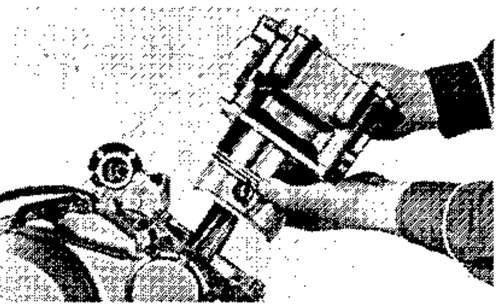


5. Position:
   - Top ring
   - 2nd ring
     Offset the piston ring end gaps as shown.

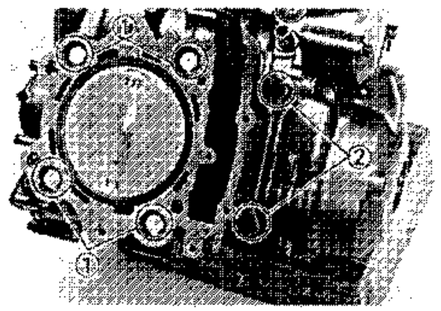
(1) Top ring end
(2) Oil ring end (lower)
(3) Oil ring end (upper)
(4) 2nd ring end



6. Install:
   - Cylinder (1)



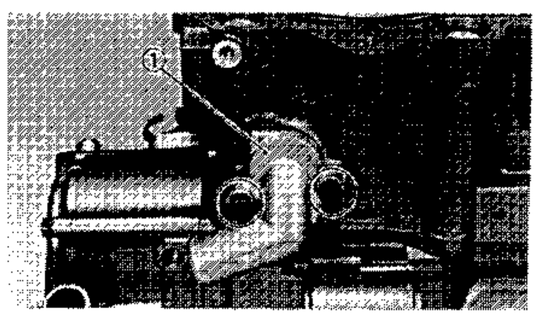
NOTE:
Install the cylinder while compressing the piston rings by the hand.



7. Install:
   - Bolts (1)
   - Bolts (2)

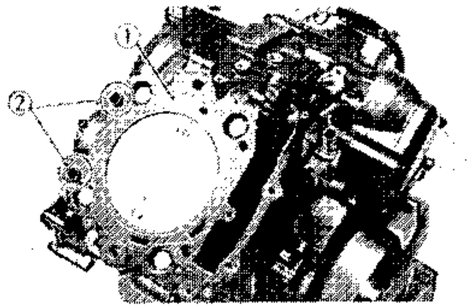
	Bolts (1): **42 Nm (4.2 mkg)** **Bolts (2):** **10 Nm (1.0 mkg)**

NOTE:
Tighten the bolts (1) in a crisscross pattern.

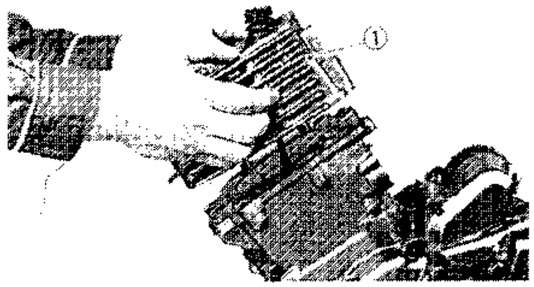


8. Install:
   - Pipe (1)

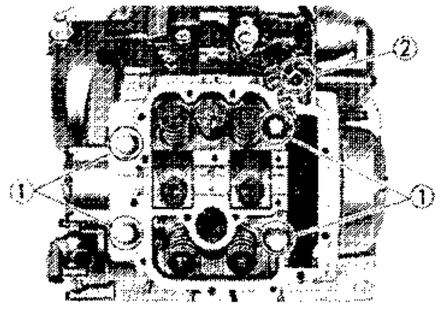
	Bolt (pipe): **10 Nm (1.0 mkg)**



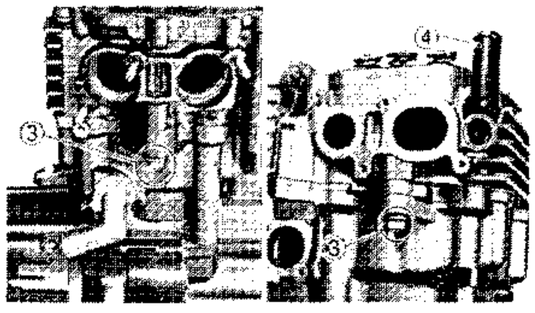
9. Install:
   - Gasket (1) (cylinder head)
   - Dowel pins (2)



10. Install:
    - Cylinder head (1)

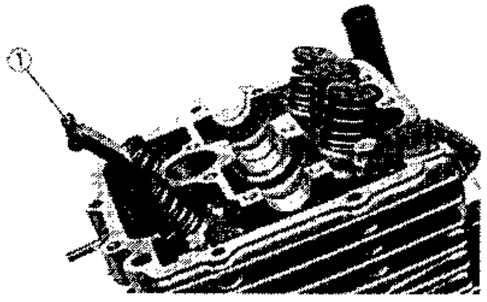


11. Install:
    - Bolts (1)
    - Bolt (2)
    - Bolts (3)
    - O-ring (pipe (4)
    - Pipe (4)

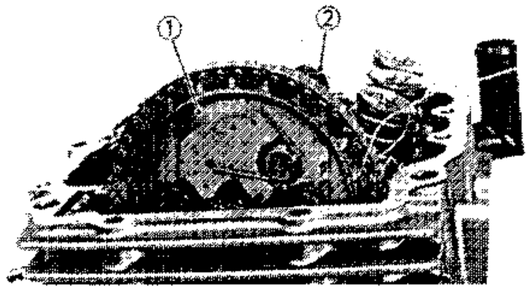


	Bolts (1), (3): **38 Nm (3.8 mkg)** **Bolt (2):** **10 Nm (1.0 mkg)**

NOTE:
- Apply the engine oil onto the O-ring.
- Tighten the bolts (1) in a crisscross pattern.

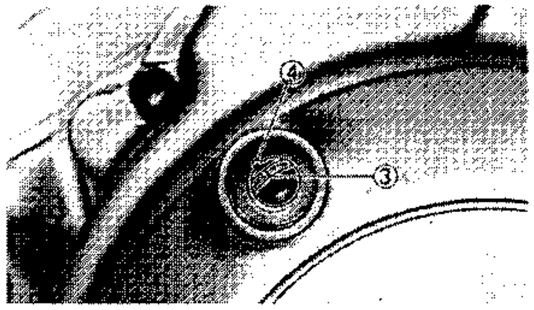


12. Install:
    - Chain guide (1) (exhaust)

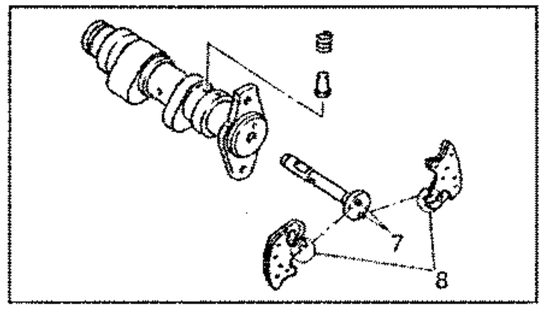


13. Install:
    - Cam sprocket (1)
    - Camshaft (2)

Installing steps:
- Turn the crankshaft counterclockwise until the TDC mark (3) is aligned whit the stationary pointer (4).
- Align the match mark on the camshaft with the punched mark on the decompression lever.
- Fit the timing chain onto cam sprocket and install the cam sprocket on the camshaft.

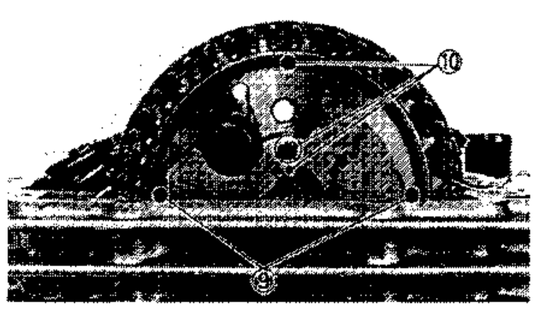


NOTE:
- When installing the cam sprocket, keep the timing chain as tense as possible on the exhaust side.
- Align the pins (7) on the decompression lever with the slots (8) in the decompression cam.
- Set the respective match marks (9) to be parallel with the case surface on the corresponding sides, and align the respective match marks (10) to be vertical.

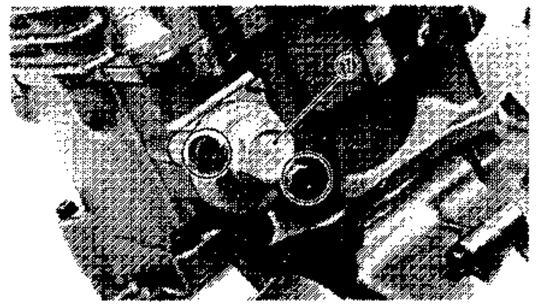


CAUTION:

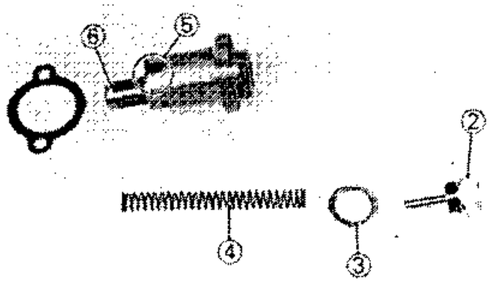
Do not turn crankshaft during the camshaft installation. Damage or improper valve timing will result.



- While holding the camshaft, temporary tighten the bolts.



14. Install:
    - Chain tensioner (1)



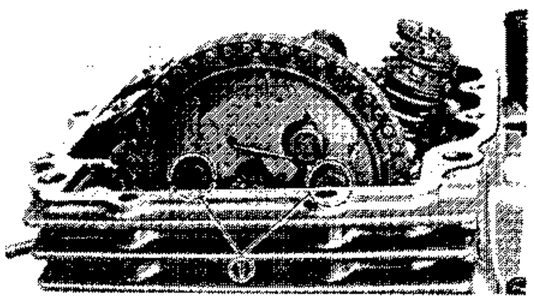
Installing steps:

- Remove the cap bolt (2), washer (3) and spring (4).
- Release the ratchet (5) and push the tension rod (6).
- Install the chain tensioner with the ratchet end facing downward.
- Tighten the bolts.

	Bolt (chain tensioner): **10 Nm (1.0 mkg)**

- Install the spring (4), washer (3) and cap bolt (2).

	Cap bolt (timing chain tensioner): **20 Nm (2.0 mkg)**



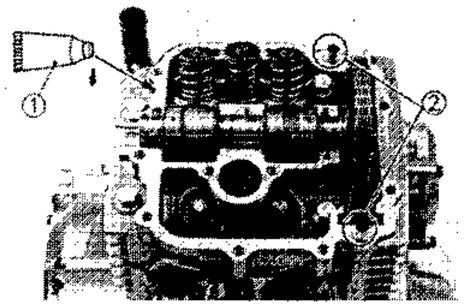
15. Tighten:
    - Bolts (1) (cam sprocket)

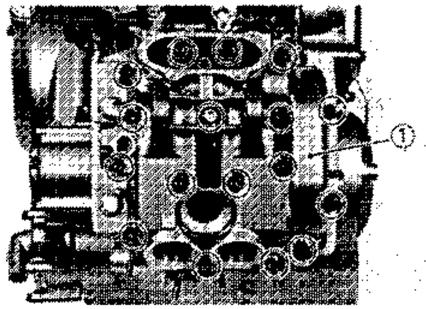
	Bolts (cam sprocket): **20 Nm (2.0 mkg)**

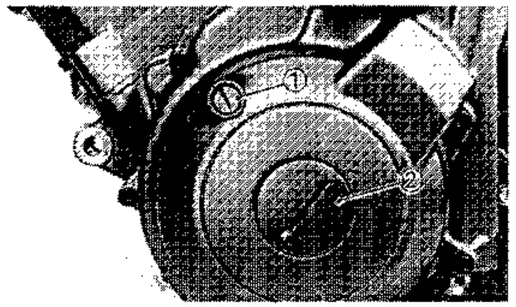
16. Check:
    - Valve timing
      Out of alignment → Adjust.
      Refer to above steps 13 ~ 15.

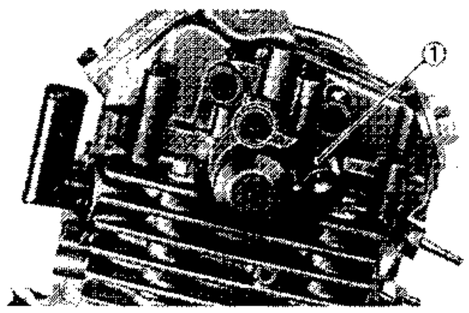
17. Check:
    - Valve clearance
      Out of specification → Adjust.
      Refer to "VALVE CLEARANCE ADJUSTMENT" section in CHAPTER 3.

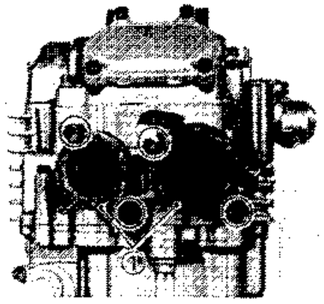
	Intake valve (cold): **0.10 ~ 0.15 mm** **Exhaust valve (cold):** **0.15 ~ 0.20 mm**











18. Apply:
    - Sealant (1)
      (onto the cylinder head mating surfaces)

	Sealant (quick gasket)®: **P/N. ACC-11001-01** **Yamaha Bond N° 1215®:** **P/N. 90890-85505**

19. Install:
    - Dowel pins (2)
20. Install:
    - Cylinder head cover (1)

NOTE:
Tighten the bolts in stage, using a crisscross pattern.

	Bolt (cylinder head cover): **10 Nm (1.0 mkg)**

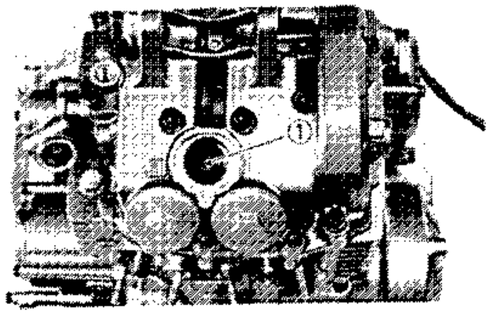
21. Install:
    - Timing plug (1)
    - Plug (2)

22. Install:
    - Cap (1)

	Bolt (cylinder head cap): **10 Nm (1.0 mkg)**

23. Install:
    - Intake manifolds (1)

	Bolt (intake manifold): **10 Nm (1.0 mkg)**

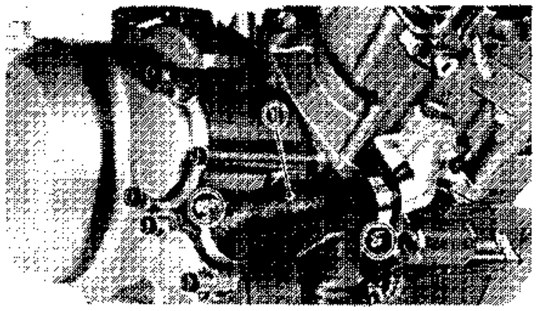


24. Install:
    - Spark plug (1)

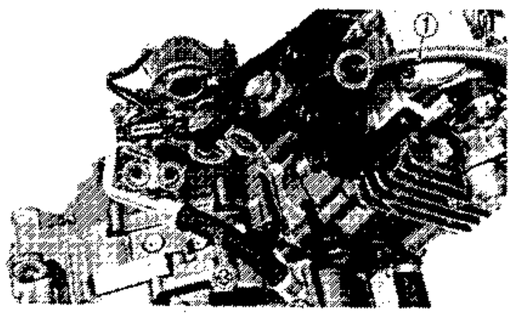
	Spark plug: **18 Nm (1.8 mkg)**

PIPES AND HOSES

1. Apply:
    - Lithium soap base grease (onto O-rings on oil pipes)

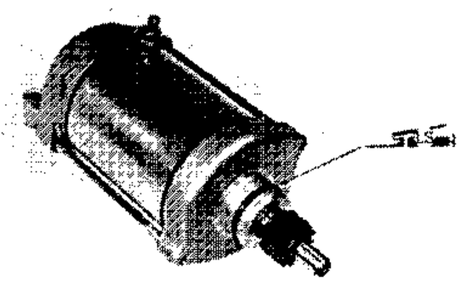


2. Install:
    - Coolant hose (1)

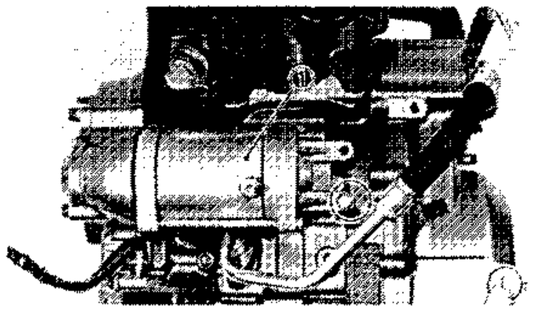


3. Install:
    - Breather hose (1) (crankcase)
    - Oil hose (3)

	Bolts (oil hose): **10 Nm (1.0 mkg)**

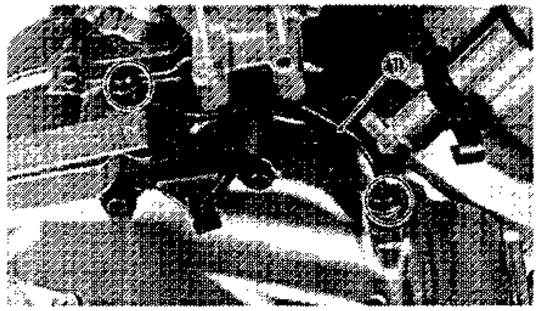


4. Apply:
    - Lithium soap base grease (onto O-ring on starter motor)



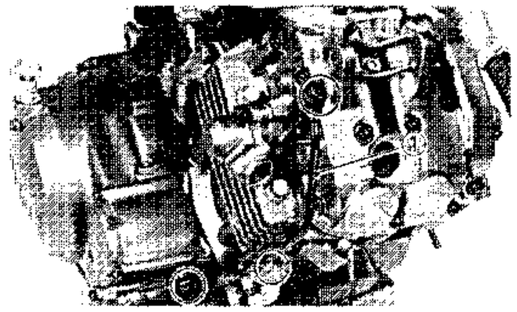
5. Install:
    - Starter motor (1)

	Bolt (starter motor): **10 Nm (1.0 mkg)**



6. Install:
    - Oil pipe (1)

	Union bolt (oil pipe): **20 Nm (2.0 mkg)** **Bolt:** **10 Nm (1.0 mkg)**



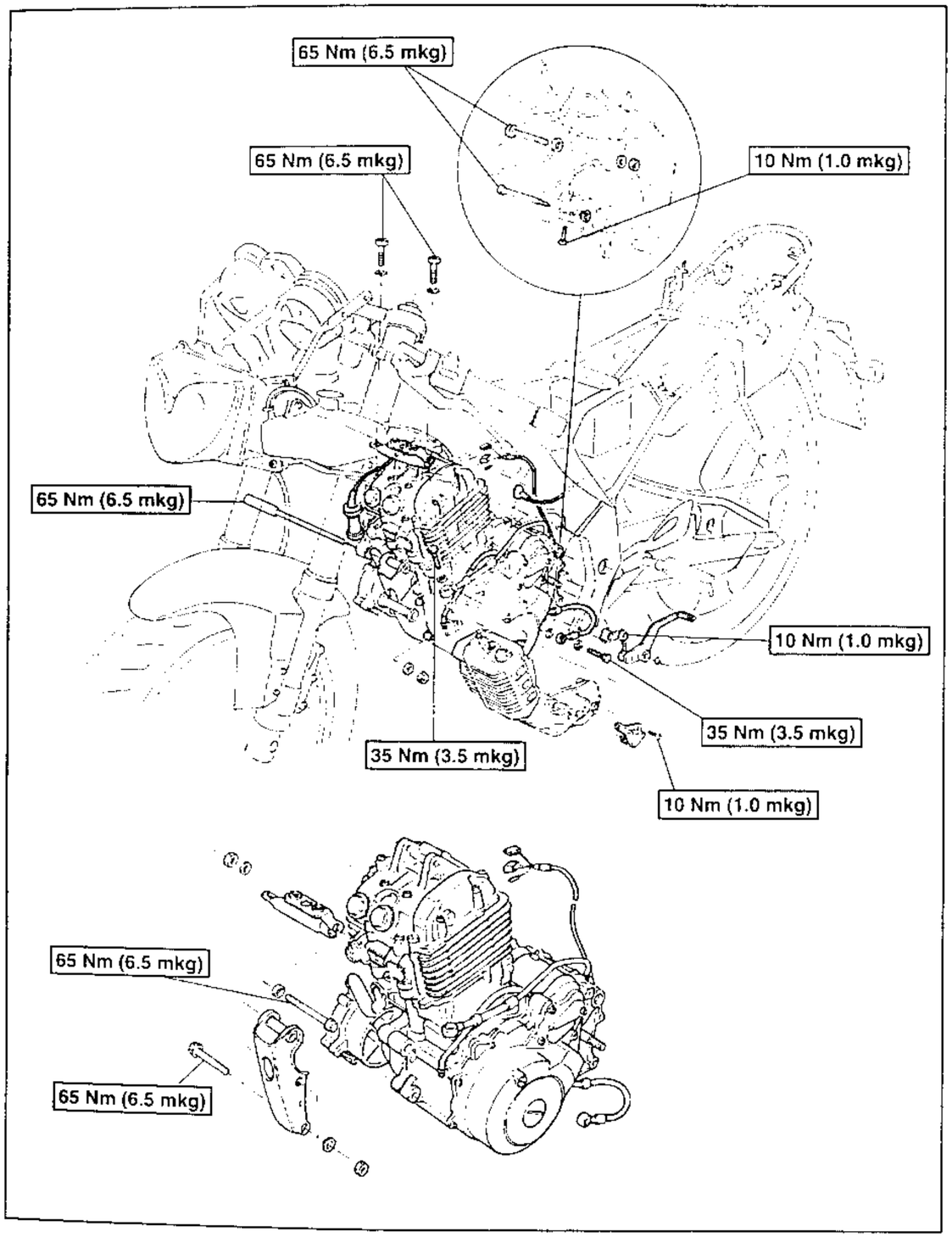
7. Install:
    - Oil pipe (1)

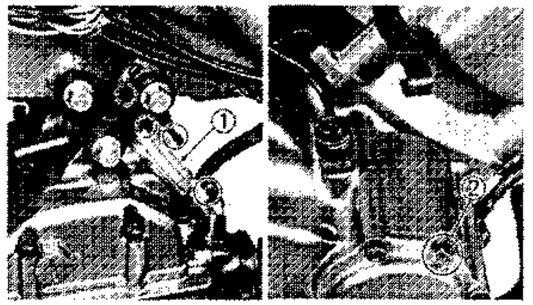
	Union bolt (oil pipe): **20 Nm (2.0 mkg)**

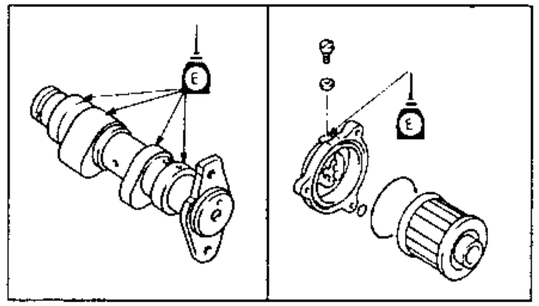
ENGINE REASSEMBLY

When reassembling the engine, reverse the removal procedure. Note the following points.

NOTE:
Install the bolts and nuts first, and then tighten the bolts and nuts to specifications.







1. Remove:
   - Tappet cover (1) (intake)
   - Air bleed screw (2) (oil filter cover)
2. Apply:
   - 4-stroke engine oil
     (to the camshaft upper side and into the oil filter chamber)

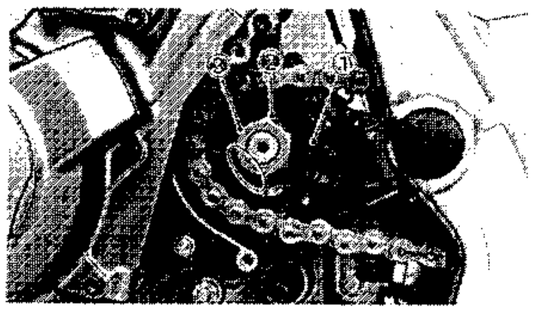
⚠ WARNING

Apply a liberal amount of 4-stroke engine oil to the oil passage in the crankcase, or the engine may be damaged.

Oil quantity:
Camshaft:
0.1 L
Oil filter chamber:
0.06 L

3. Install:
   - Tappet cover (intake)
   - Air bleed screw (oil filter cover)

Bolt (tapped cover):
10 Nm (1.0 mkg)
Air bleed screw:
5 Nm (0.5 mkg)



4. Install:
   - Drive sprocket (1)
   - Lock washer (2)
   - Nut (3)

Nut (drive sprocket):
110 Nm (11.0 mkg)

5. Bend:
   - Lock washer tab
     (along nut flat)
6. Adjust:
   - Drive chain slack
     Refer to the "DRIVE CHAIN SLACK ADJUSTMENT" section in CHAPTER 3°.

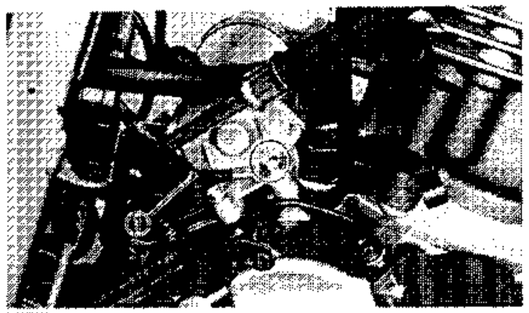
Drive chain slack:
25 ~ 40 mm

7. Install:
   - Sprocket cover

	Screw (sprocket cover): **10 Nm (1.0 mkg)**

8. Install:
   - Shift pedal

	Bolt (shift pedal): **10 Nm (1.0 mkg)**



9. Connect:
   - Ground lead (1)
     Refer to the "CABLE ROUTING" section in CHAPTER 2°.

	Nut (ground lead): **10 Nm (1.0 mkg)**

10. Adjust:
    - Clutch cable free play
      Refer to the "CLUTCH ADJUSTMENT" section in CHAPTER 3°.

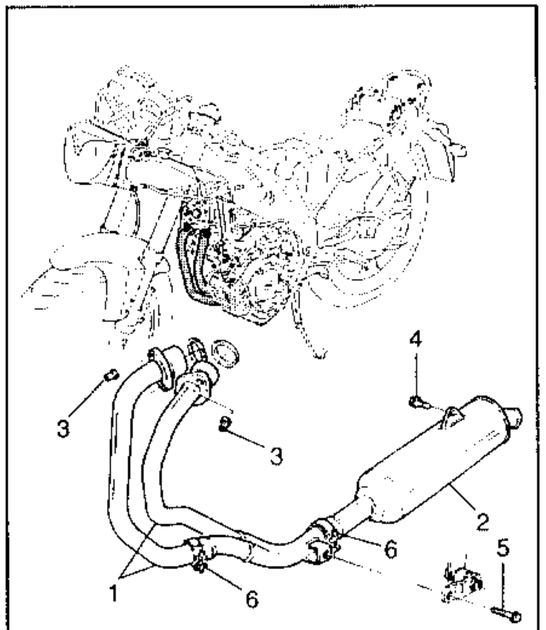
	Free play: **10 ~ 15 mm** **at clutch lever end**

11. Install:
    - Carburetor (to intake manifolds)

	Screw (carburetor joint clamp–left): **2 Nm (0.2 mkg)** **Screw (carburetor joint clamp–right):** **5 Nm (0.5 mkg)**

12. Connect:
    - Air cleaner joints to carburetors

	Screw (carburetor manifold clamp–left): **2 Nm (0.2 mkg)** **Screw (carburetor manifold clamp–right):** **5 Nm (0.5 mkg)**



13. Install:
    - Exhaust pipe (1)
    - Muffler (2)

	Nuts (3) (exhaust pipe): **10 Nm (1.0 mkg)** **Muffler mounting bolts (4):** **40 Nm (4.0 mkg)** **Bolt (5):** **23 Nm (2.3 mkg)** **Bolt (6) (clamp):** **10 Nm (1.0 mkg)**

14. Install:
    - Radiator

	Bolt (radiator): **10 Nm (1.0 mkg)**

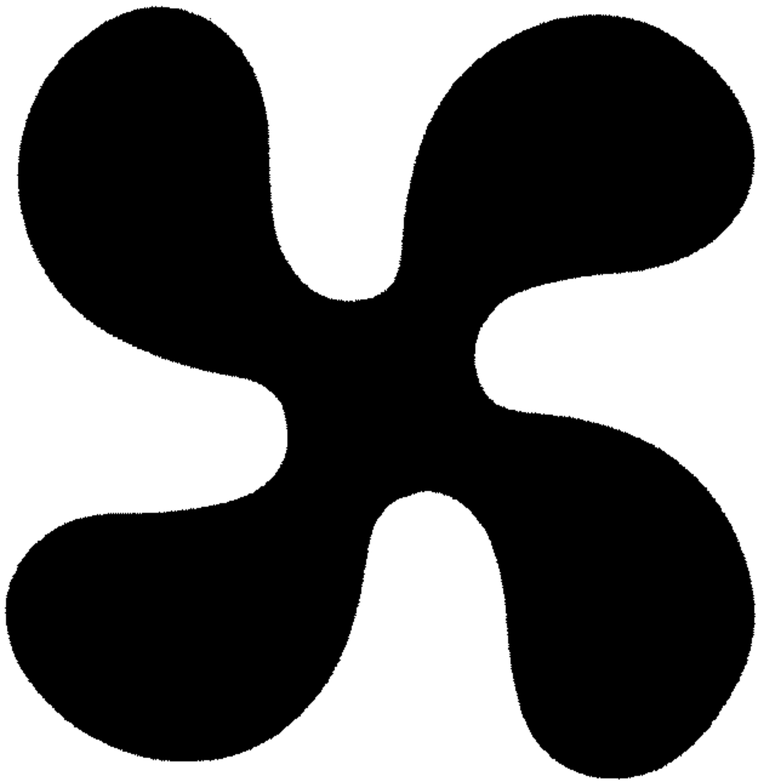
15. Connect:
    - Battery cables

CAUTION:

Connect first the positive (+) cable, then the negative (–) cable.

16. Fill:
    - Radiator
    - Coolant reservoir tank
      See the section "COOLANT CHANGE" in CHAPTER 3°.

17. Install:
    - Fuel tank
    - Seat
    - Cowling
      See the sections "SEAT, FUEL TANK AND REAR COWLING" and "COWLING" in CHAPTER 3°.

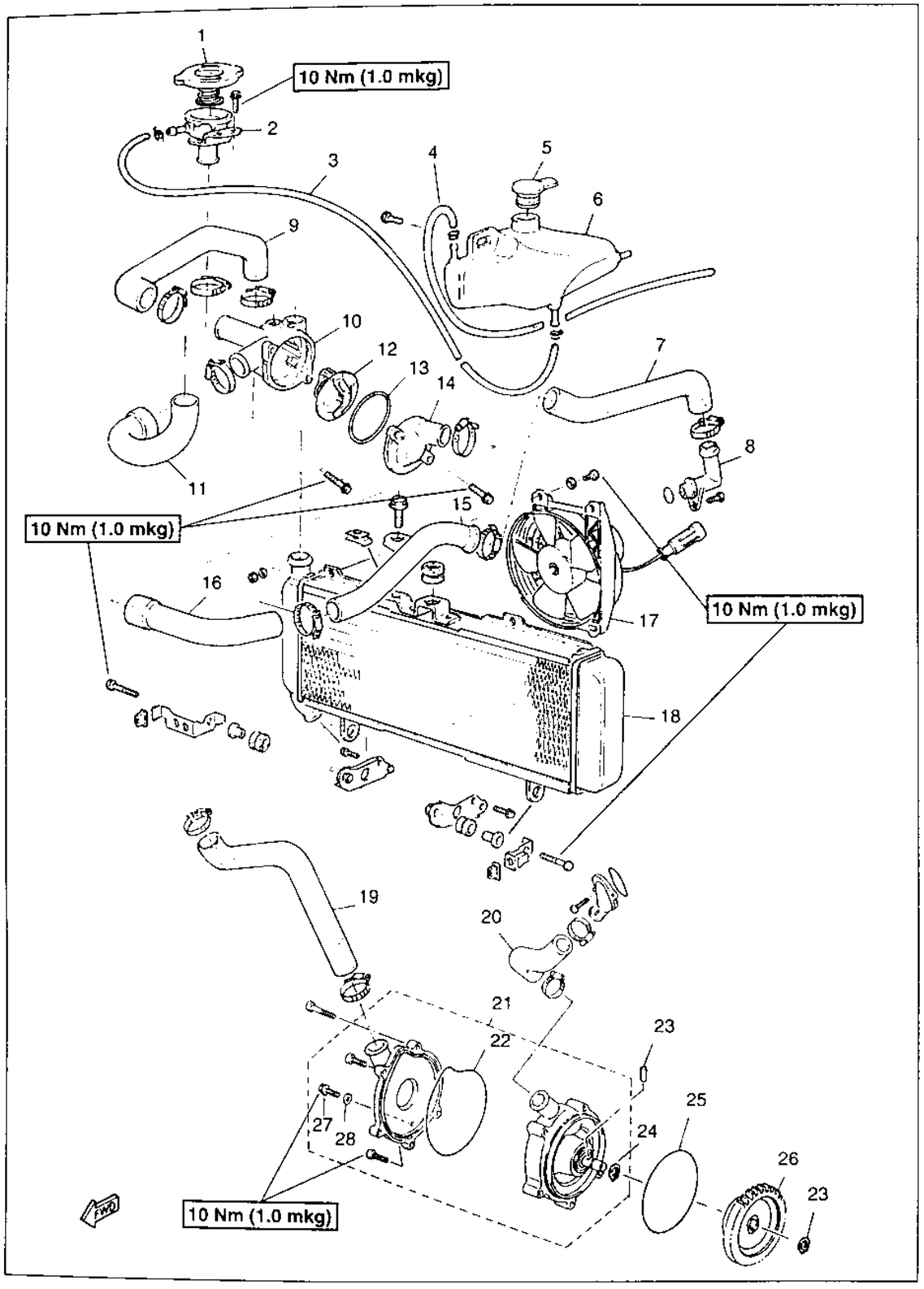


COOL 5

CHAPTER 5°

COOLING SYSTEM

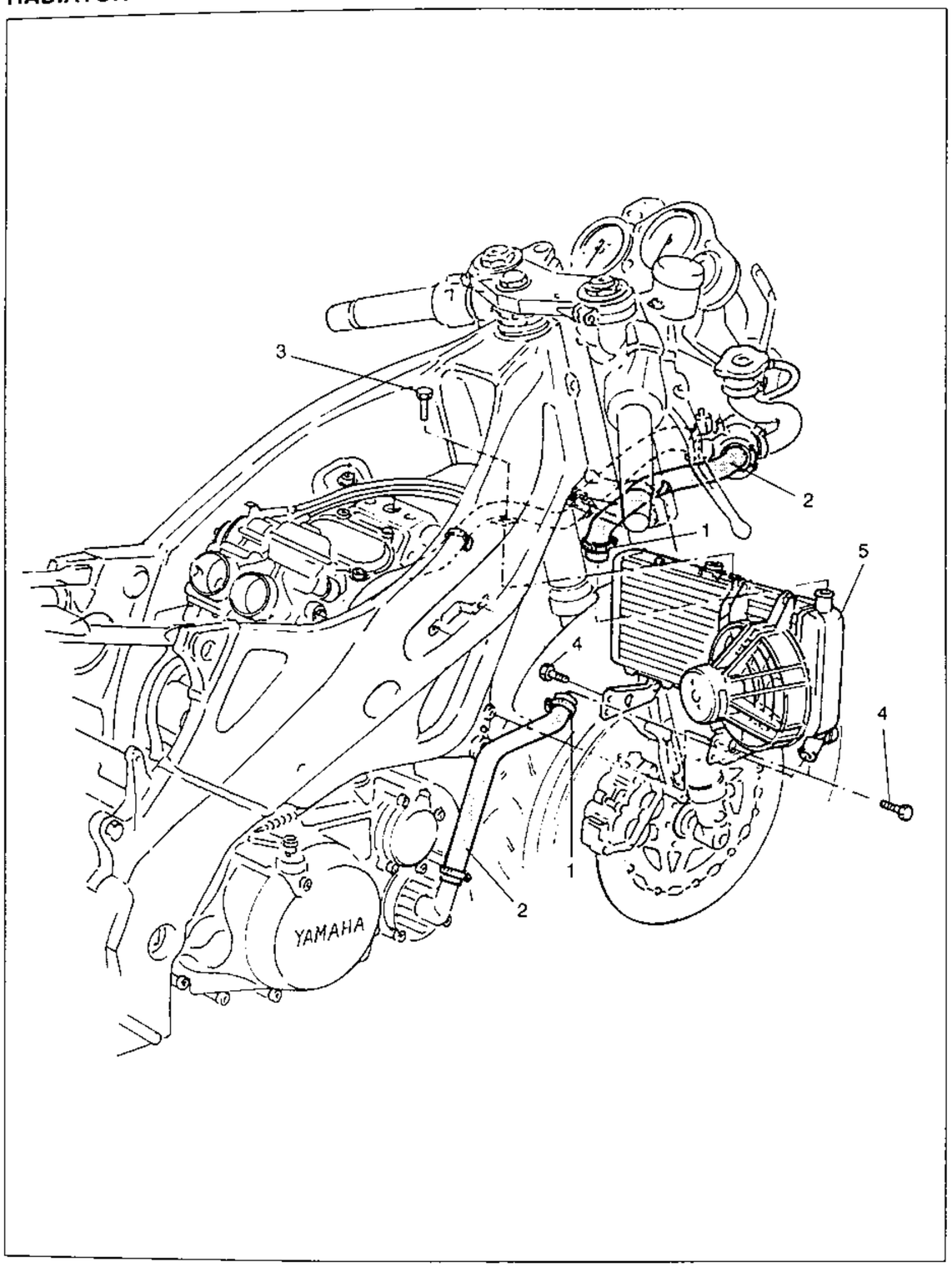
COOLING SYSTEM



(1) Radiator cap
(2) Conduction
(3) Tank level pipe
(4) Overflow pipe
(5) Tank cap
(6) Recovery tank
(7) Hose (from cylinder head)
(8) Pipe (cylinder head)
(9) Hose (from radiator to thermostat assembly)
(10) Thermostat housing
(11) Hose (from conduction to thermostat assembly)
(12) Thermostat
(13) O-ring
(14) Thermostat cover
(15) Pipe
(16) Hose (from thermostat cover to pipe)
(17) Flower assembly
(18) Radiator
(19) Hose (from radiator to water pump)
(20) Hose (from water pump to cylinder)
(21) Water pump assembly
(22) O-ring
(23) Dowel pin
(24) Circlip
(25) O-ring
(26) Impeller shaft gear
(27) Drain bolt
(28) Gasket

COOLANT AND WATER MIXED RATIO: 50%-50%
TOTAL AMOUNT OF LIQUID INTO THE CIRCUIT: 1,4 L
RESERVOIR TANK CAPACITY: 0.55 L

RADIATOR

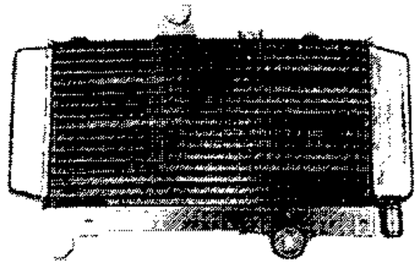


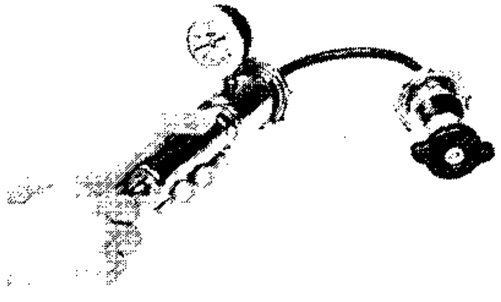
JOB INSTRUCTION CHART

Order	Job name/Part name	Q.ty	Remarks
	Removal of radiator		**Remove the parts in the order.**
			NOTE: When removing the radiator, drain off the cooling circuit. See the section "COOLANT CHANGE" in chapter 3°.
			NOTE: To approach the radiator, remove side panels of cowling. See the section "COWLING" in chapter 3°.
1	Clamp	2	
2	Hose (detach from radiator)	2	
3	Screw	1	
4	Screw	2	
5	Radiator (disconnect the connector)	1	
			Reverse the removal procedure for installation.
			NOTE: After installing the radiator, fill the cooling system with the specified coolant. See the section "COOLANT CHANGE" in chapter 3°

⚠ 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 open the radiator cap, note the following points. Wait until the engine has cooled. Place the thick rag like a towel over the radiator cap and 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.





INSPECTION

1. Inspect:
   - Radiator
     Obstruction → Blow out with compressed air through the rear of the radiator.
     Flattened fins → Repair.
   - Pipes
     Cracks/Damage → Replace.
2. Inspect:
   - Radiator cap
   - Radiator cap opening

Measurement steps:

- Attach the radiator cap tester to the radiator cap.
- Check the opening pressure of radiator cap valve.

Radiator cap tester:
P/N YU-24460-1, 90890-01325
Adapter:
P/N YU-33984, 90890-01352

- Radiator cap valve opens at a pressure below the specified pressure → Replace.

Cap valve opening pressure:
95~125 kPa
(0.95~1.25 kg/cm², 13.57~17.77 psi)

ASSEMBLY

Perform disassembling operations in reverse order. Pay attention to the following points.

1. Tighten:
   - Radiator bolts
   - Drain bolts

Bolts (radiator and drain):
10 Nm (1.0 mkg)

NOTE:
Replace copper seal gasket every time bolts are removed.

2. Fill:
   - Cooling circuit with prescribed coolant
     See the section "COOLANT CHANGE" in chapter 3°.

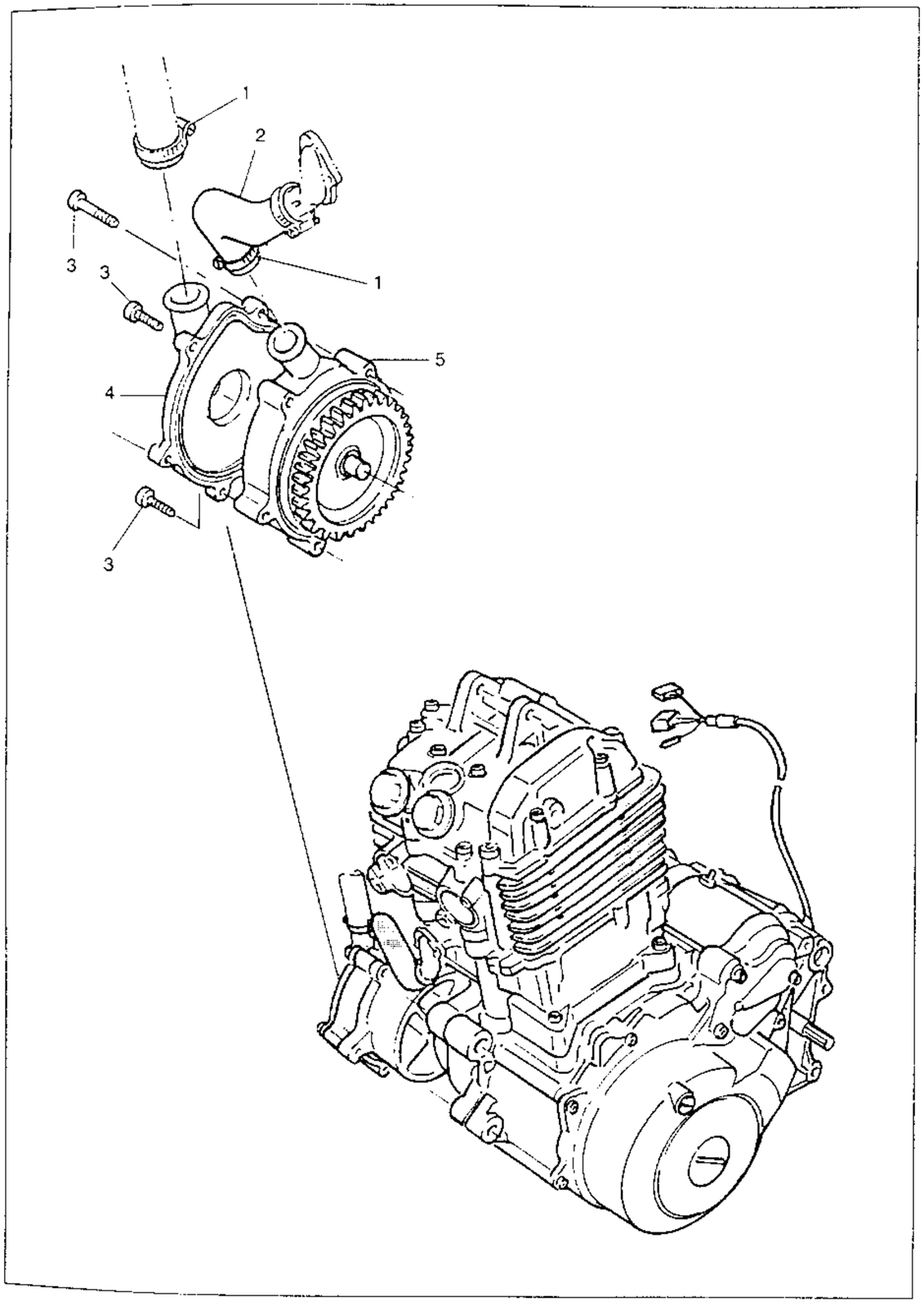
3. Inspect:
   - Cooling system for leakage

Measurement steps:

- Attach the radiator cap tester to the radiator cap.
- Apply a pressure of 1.0 kg/cm² (14.24 psi).
- Check pressure seal.
  Pressure drop (Leakage) → Repair.

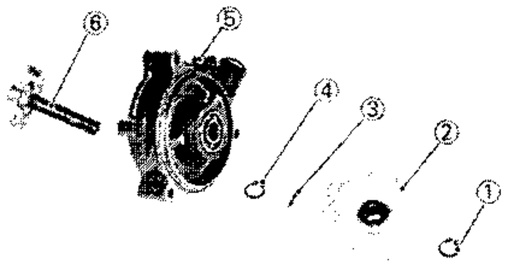
Radiator cap tester:
P/N YU-24460-1, 90890-01325
Adapter:
P/N YU-33984, 90890-01352

WATER PUMP



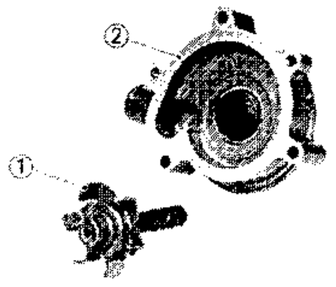
JOB INSTRUCTION CHART

Order	Job name/Part name	Q.ty	Remarks
	Removal of water pump		**Removal the parts in the order.** **NOTE:** When removing the water pump, drain off the cooling circuit. See the section "COOLANT CHANGE" in chapter 3°.
1	Clamp	2	
2	Hose (detach from pump)	2	
3	Screw	5	
4	Cover	1	
5	Water pump housing	1	
			Reverse the removal procedure for installation.
			NOTE: After installing the water pump, fill the cooling circuit with specified coolant. See the section "COOLANT CHANGE" in chapter 3°.

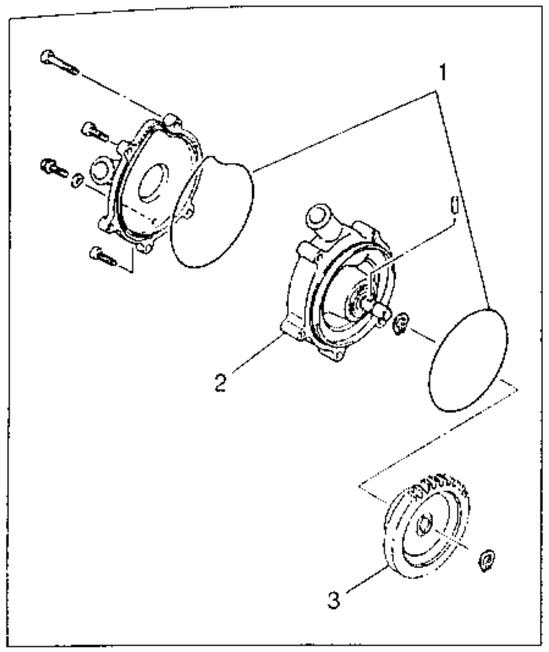


REMOVAL

1. Remove:
   - Circlip (1)
   - Impeller shaft gear (2)
   - Dowel pin (3)
   - Circlip (4)
   - Water pump housing (5)
   - Impeller shaft (6)

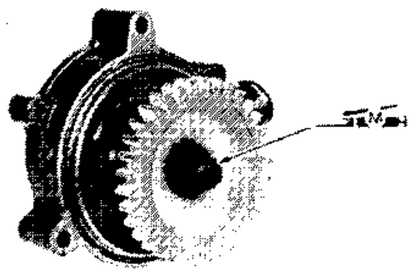


2. Eliminate:
   - Fur deposits
     From impeller shaft (1) and water pump housing (2)



INSPECTION

1. Check:
   - O-ring (1)
   - Water pump housing (2)
   - Impeller shaft gear (3)
     Cracks/Wear/Damage → Replace.

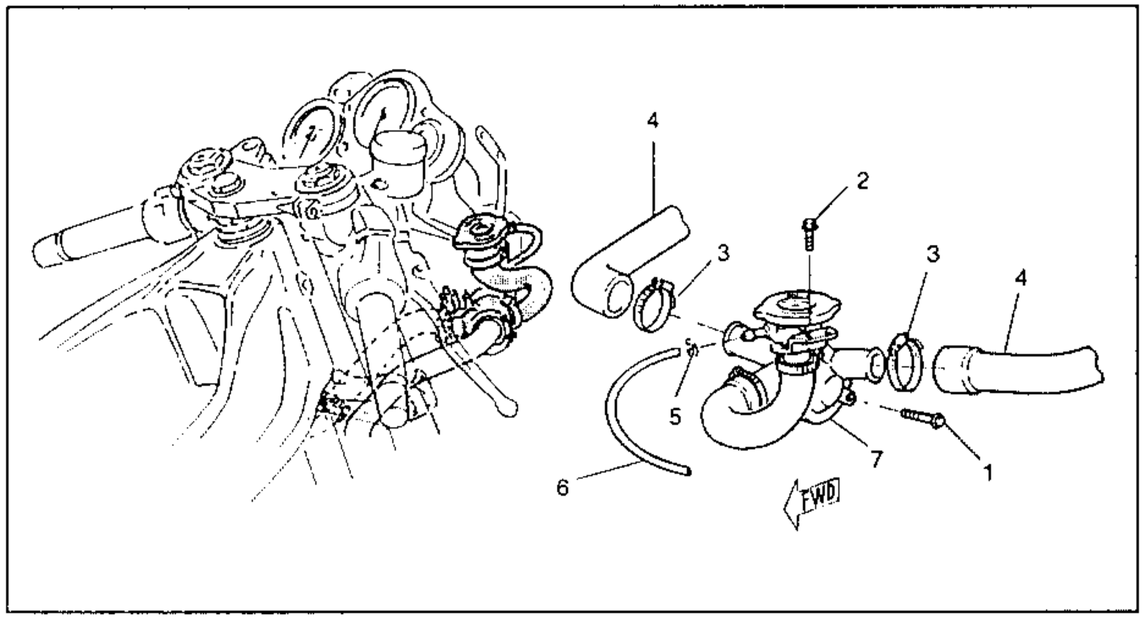


ASSEMBLY

Performance "DISASSEMBLY" operations in reverse order.

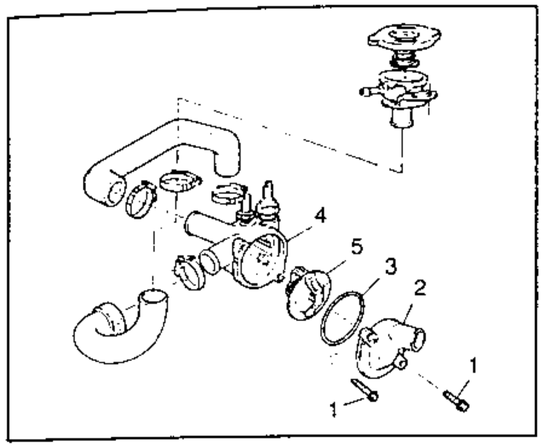
1. Apply:
   - Molybdenum disulfide grease
     (to the impeller shaft tip)

THERMOSTAT



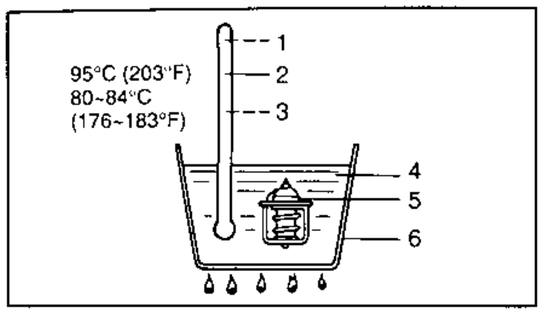
JOB INSTRUCTION CHART

Order	Job name/Part name	Q.ty	Remarks
	Removal of thermostat		**Remove the parts in the order.**
			NOTE: When removing the thermostat, drain off the cooling circuit. See the section "COOLANT CHANGE" in chapter 3°.
			NOTE: To approach the thermostat assembly, remove side panel (R) of cowling. See the section "COWLING" in chapter 3°.
1	Screw	1	
2	Screw	1	
3	Clamp	2	
4	Hose (detach)	2	
5	Clip	1	
6	Hose	1	**Reverse the removal procedure for installation.**
7	Thermostat assembly with radiator cap assembly	1	**NOTE:** After installing thermostat, fill the cooling system with the specified coolant. See the section "COOLANT CHANGE" in chapter 3°.



DISASSEMBLY

1. Remove:
   - Screws (1) (mounting the cover)
   - Cover (2)
   - O-ring (3)
   - Thermostatic valve (5) from housing (4)

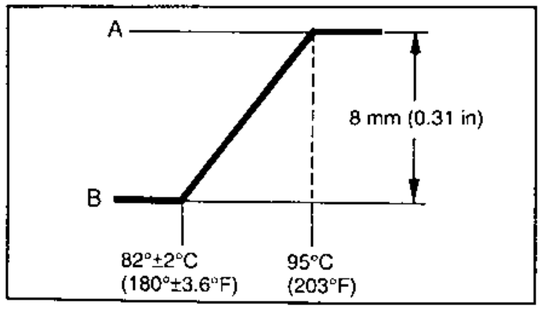


INSPECTION

1. Inspect:
   - Thermostatic valve (5)
     Valve does not open at 80°C~84°C (176~183°F) → Replace.

Inspection steps:

- Suspend the thermostatic valve in a vessel.
- Place a reliable thermometer in water.
- Slowly heat the water.
- Observe the thermometer, while continually stirring the water .



(1) Thermometer
(2) Full opening temperature
(3) Start opening
(4) Water
(5) Thermostatic valve
(6) Vessel
[A] FULL OPENING
[B] CLOSE

NOTE:
The thermostatic valve is sealed and its setting requires specialized work. If its accuracy is in doubt, replace it. A faulty unit could cause serious overheating or over-cooling.

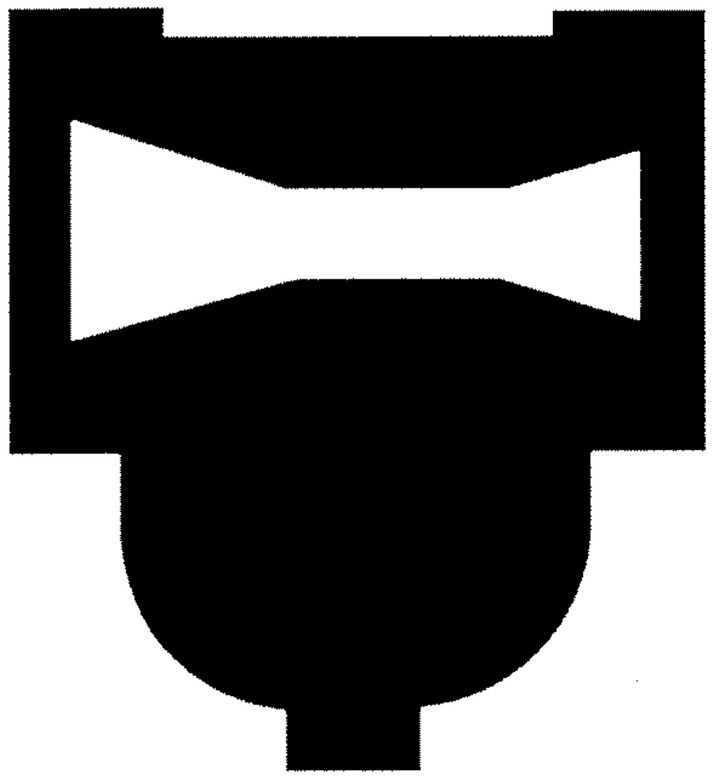
2. Inspect:
   - O-ring
     Wear/Damage → Replace.

ASSEMBLY

Performance "REMOVAL" operations in reverse order.

1. Install:
   - Thermostat (into housing)
   - O-ring
   - Thermostat cover
2. Tighten:
   - Screws (cover)

	Screws (housing cover): 10 Nm (1.0 mkg)



CARB 6

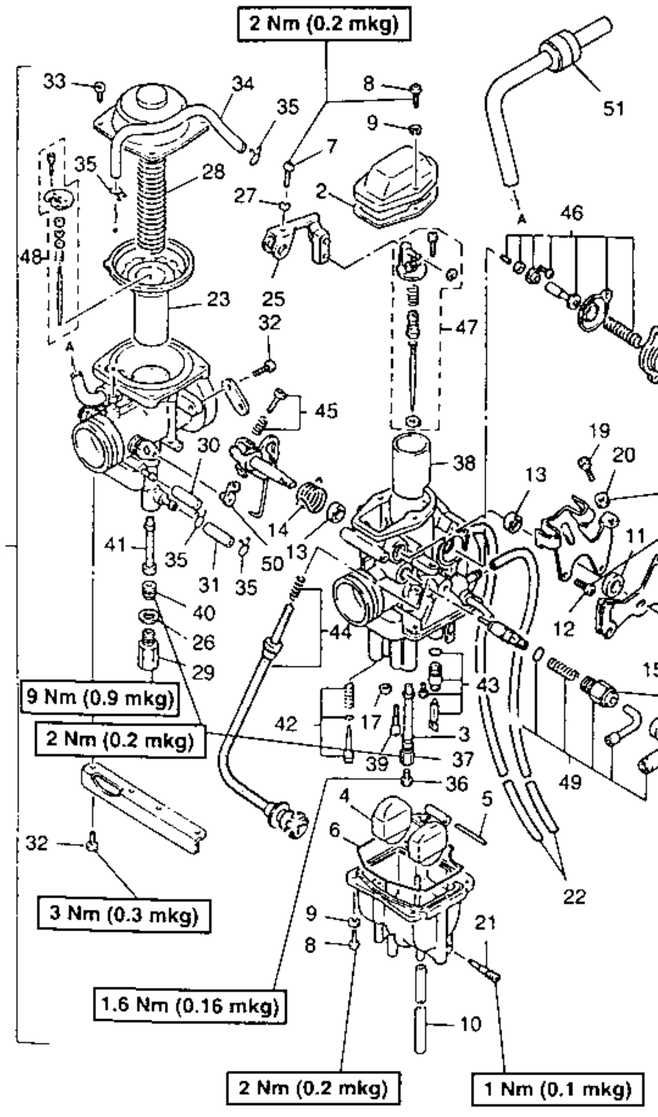
CHAPTER 6°

CARBURETOR

CARBURETOR

TYPE: Y26 PV-3J
MANUFACTURER:
TEIKEI

1. Carburettor assy
2. Cover gasket
3. Gasket, nozzle
4. Float
5. Float pin
6. Float chamber gasket
7. Screw
8. Float chamber fastening screw
9. Washer, spring
10. Hose
11. Spacer
12. Screw
13. Gasket
14. Throttle valve spring
15. Washer spring
16. Nut
17. Gasket
18. Screw
19. Lock screw
20. Nut
21. Float chamber drain screw
22. Hoses
23. Diaphragm
24. Cover
25. Connecter comp.
26. Washer
27. Washer spring
28. Spring
29. Bolt
30. Hose
31. Hose
32. Screw
33. Screw
34. Hose
35. Clamp
36. Main jet (FIRST)
37. Needle jet 1
38. Throttle valve 1
39. Pilot jet
40. Main jet (SEC.)
41. Needle jet 2
42. Pilot adjuster
43. Needle valve set (jet needle)
44. Stop screw knob
45. Throttle screw set
46. Diaphragm (1)
47. Needle jet
48. Needle jet
49. Starter set
50. Bracket, gas lever
51. Air intake hose



SPECIFICATIONS

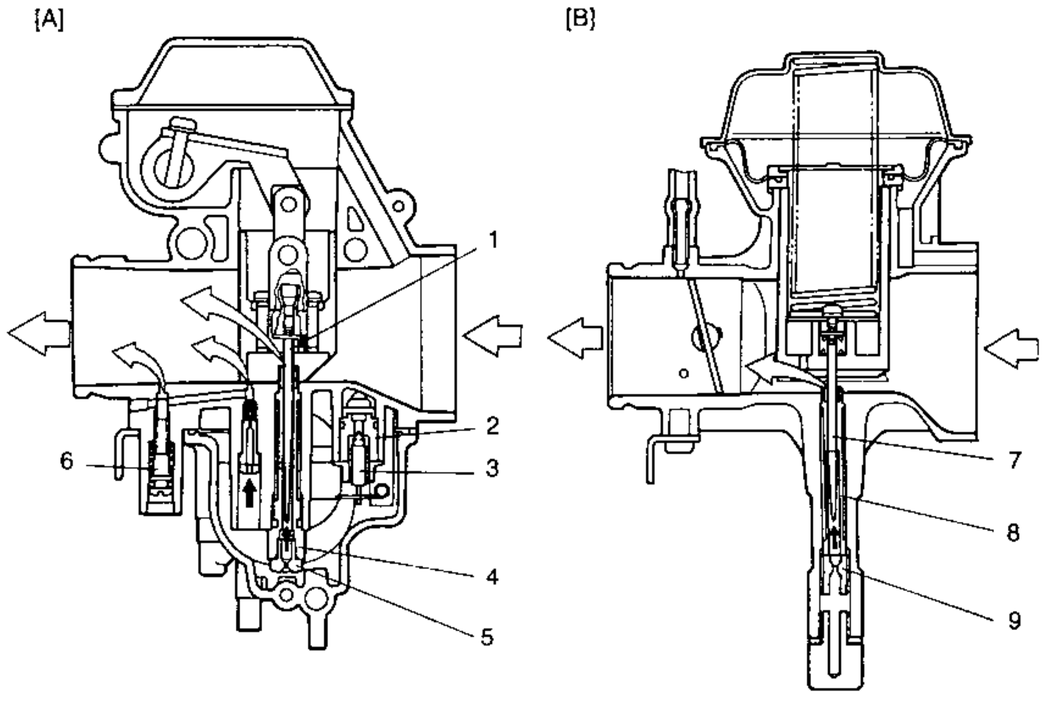
Type	Y26PV-3J/TEIKEI
Main jet	#140 FIRST 165 SEC.
Starter jet	#76
Jet needle	5D96-3/5 (FIRST) 5X7C-4/5 (SEC.)
Needle jet	V-00 (FIRST), O 2.7 (SEC.)
Pilot jet	#50
Pilot air screw	about 3 revs, open
Float height	25 ~ 27 mm
Fuel level	6 ~ 8 mm
Idle speed	1,300±50 rpm
Throttle valve housing	O 2.5 mm

SECTION VIEW

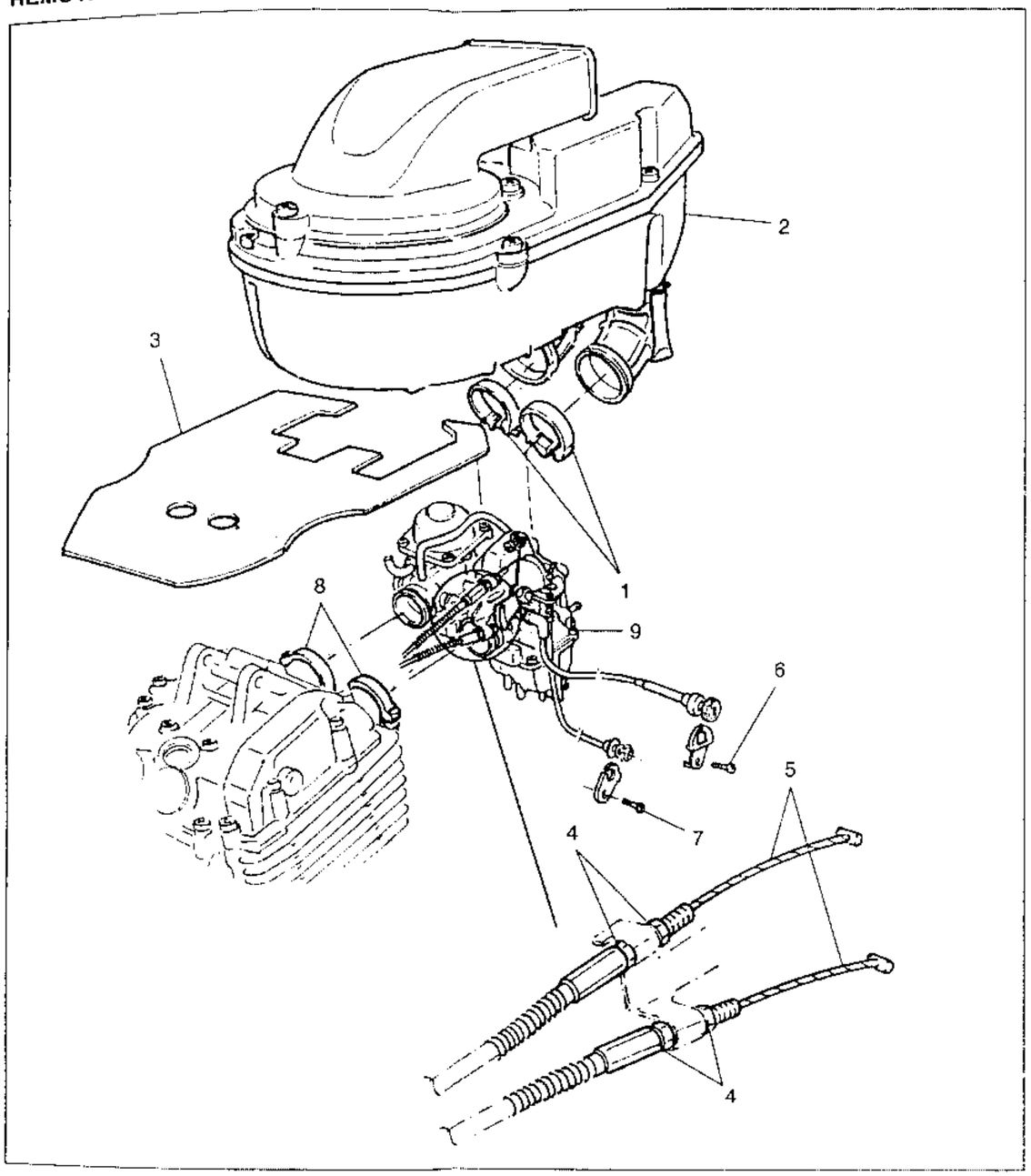
(1) Needle jet (primary)
(2) Valve housing
(3) Needle valve
(4) Main nipple (primary)
(5) Main jet (primary)
(6) Pilot air screw
(7) Needle jet (secondary)
(8) Main nipple (secondary)
(9) Main jet (secondary)

[A] Primary carburetor
[B] Secondary carburetor

⇦ Air
⬅ Fuel
⇦ Mixture



REMOVAL

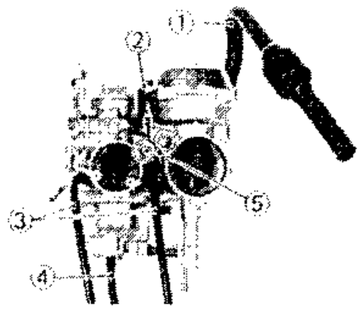


JOB INSTRUCTION CHART

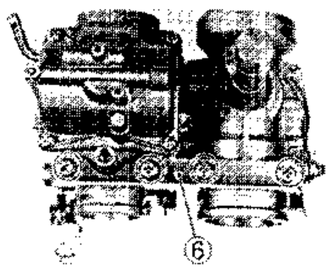
Order	Job name/Part name	Q.ty	Remarks
	Removal of carburetors		**Remove the parts in the order.**
			NOTE: To approach the carburetors, remove seat and fuel tank. See the section "SEAT, FUEL TANK AND REAR COWLING" in chapter 3°.
1	Clamp (air cleaner joint)	2	
2	Air cleaner case	1	
3	Panel	1	
4	Lock nut (loosen)	4	
5	Throttle control cable (disconnect)	2	
6	Screw (starter knob)	1	
7	Screw (idle speed knob)	1	
8	Clamp (intake manifold)	2	
9	Carburetor	2	
			Reverse the removal procedure for installation.

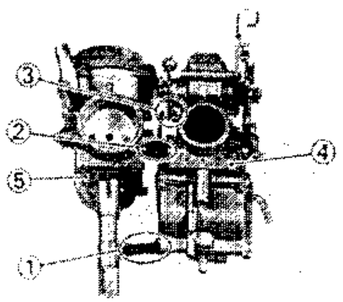
DISASSEMBLY

NOTE:
The following parts must be cleaned and examined without removing the carburetor from the engine.
- Diaphragm (enrichment)
- Starter control unit
- Throttle lock screw
- Idle speed screw

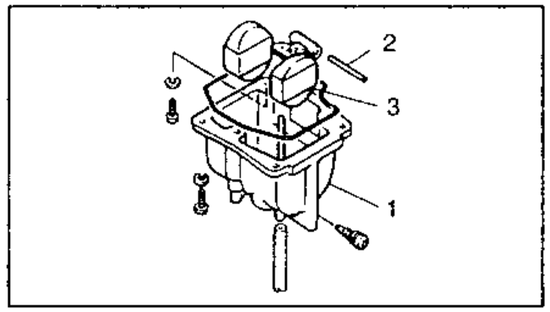


1. Detach:
   - Air ventilation pipe (1)
   - Suction pipe (2)
   - Air ventilation pipe (3)
   - Overflow hose (4)
2. Remove:
   - Support plate (5) (front)
   - Support plate (6) (rear)



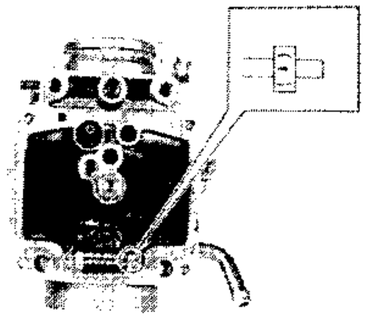


3. Detach:
   - Pipe (1)
   - Pipe (2)
   - Connecting bracket (3)
4. Separate:
   - Primary carburetor (4)
   - Secondary carburetor (5)

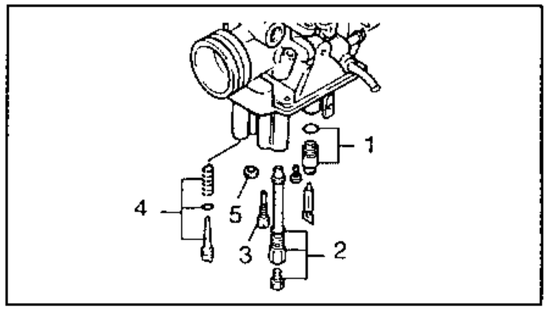


Primary carburetor

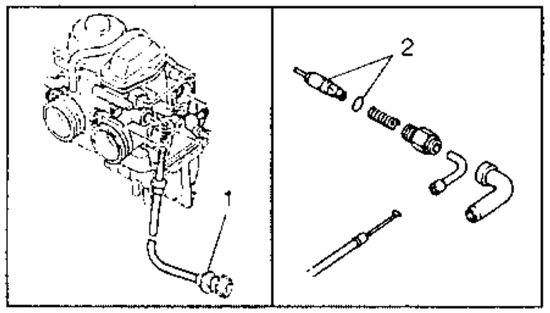
1. Remove:
   - Float chamber (1)
   - Float pin (2)
   - Float (3)



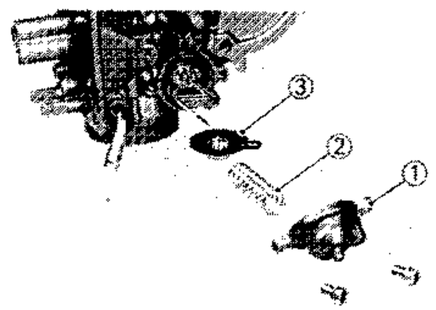
NOTE:
Remove the float needle in the direction of the arrow.



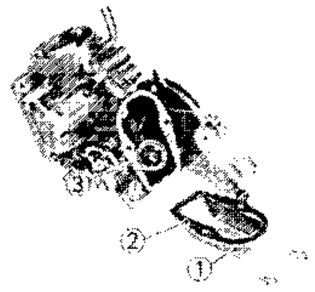
2. Remove:
   - Needle valve/Valve housing (1)
   - Main jet (FIRST)/Needle jet (2)
   - Pilot jet (3)
   - Idle speed screw (4)
   - O-ring (5)



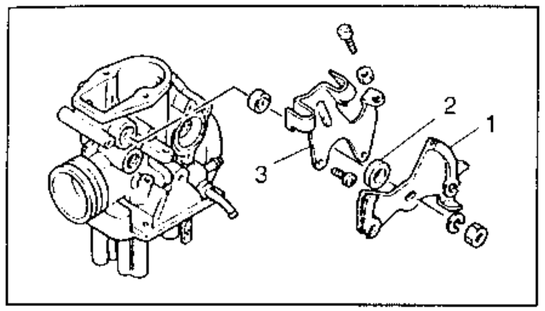
3. Disconnect:
   - Throttle stop knob (1)
4. Remove:
   - Starter cylinder (2) (from starter cable)



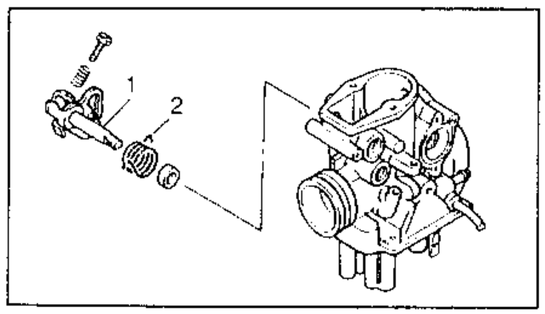
5. Remove:
   - Cover (1) (enrichment)
   - Spring (2)
   - Diaphragm (3)



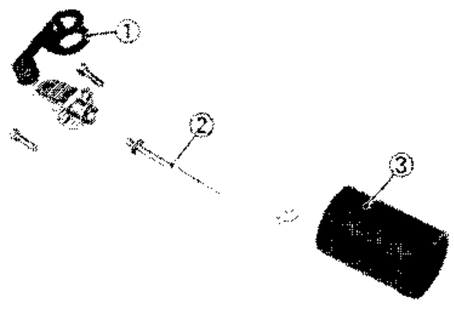
6. Remove:
   - Top cover (1)
   - Gasket (2)
   - Screw (3) (connecter comp.)



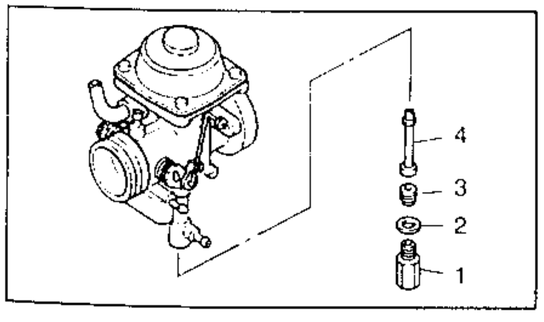
7. Remove:
   - Throttle lever (1)
   - Roller (2)
   - Cable support (3)



8. Remove:
   - Throttle shaft (1)
   - Spring (2)
   - Throttle valve (with connecter camp.)

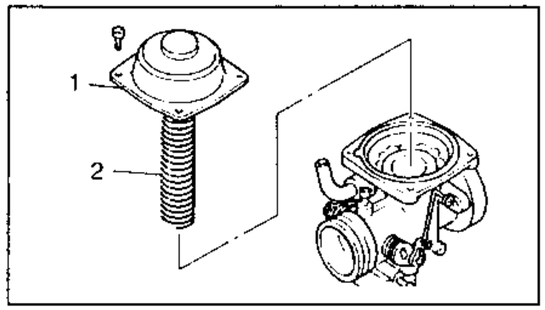


9. Remove:
   - Connecter comp. (1)
   - Needle jet (2)
   - Throttle valve (3)

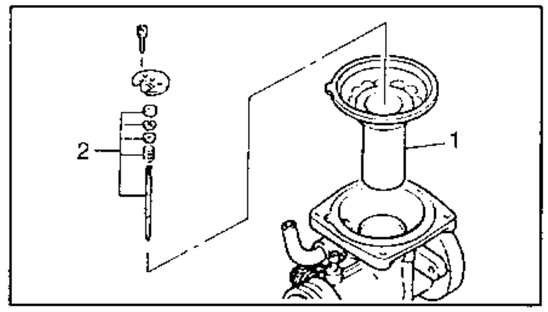


Secondary carburetor

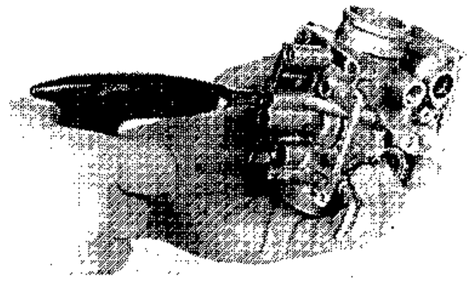
1. Remove:
   - Plug (1)
   - Gasket (2)
   - Main jet (SEC.) (3)
   - Needle jet 2 (4)



2. Remove:
   - Top cover (1)
   - Spring (2)



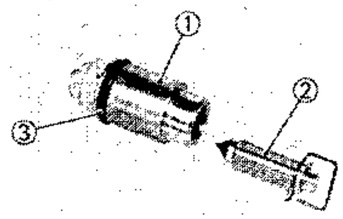
3. Remove:
   - Piston valve (1)
   - Needle jet (2)



INSPECTION

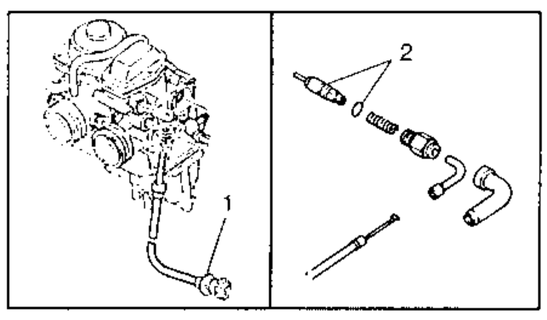
1. Inspect:
   - Carburetor body
     Soiled → Clean.
   - Float chamber
     Cracks/Damage → Replace.
   - Fuel passages
     Obstructed → Clean.

NOTE:
Use petroleum-based solutions to clean carburetor body (never use caustic solution). Clean all passages and jets with compressed air.

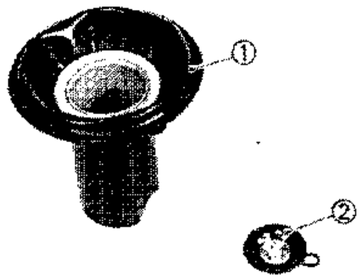


2. Inspect:
   - Valve housing (1)
   - Needle valve (2)
     Wear/Corrosion → Replace.
   - O-Ring (3)
     Damaged → Replace.

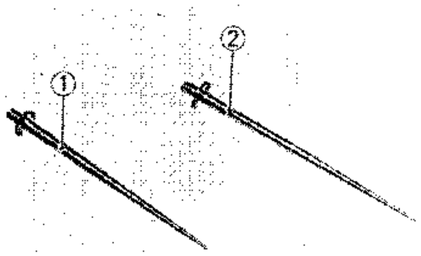
NOTE:
Always replace the needle valve and the valve housing together.



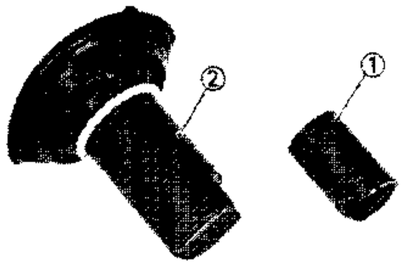
3. Inspect:
   - Throttle lock knob (1)
     Damaged → Replace.
   - Starter cylinder (2)
     Wear/Damage → Replace.



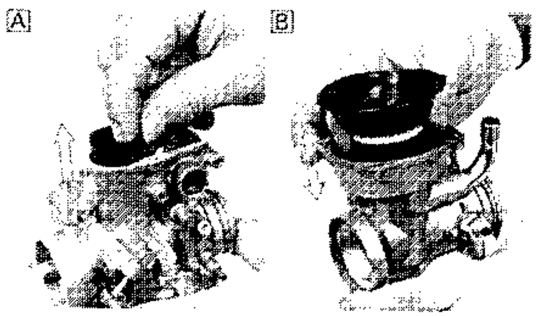
4. Inspect:
   - Diaphragm (1) (piston valve)
   - Diaphragm (2) (enrichment)
   Damaged → Replace.



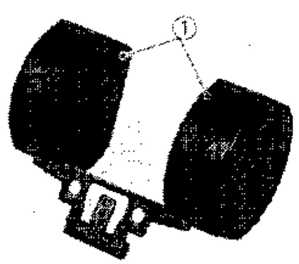
5. Inspect:
   - Needle jet (1) (primary)
   - Needle jet (2) (secondary)
   Curvature/Wear/
   Damage → Replace.



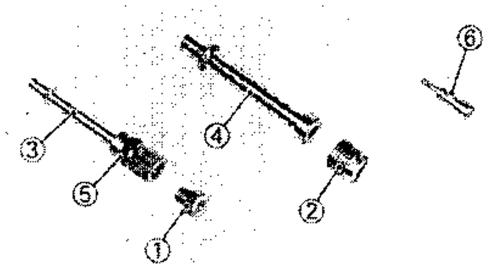
6. Inspect:
   - Throttle valve (1) (primary)
   - Piston valve (2) (secondary)
   Wear/Damaged → Replace.



7. Check:
   - Free movement
   Hampered → Replace.
   Fit the throttle valve and piston valve into the carburetor body and check that movement is free.
   [A] Primary carburetor
   [B] Secondary carburetor



8. Inspect:
   - Float (1)
   Damaged → Replace.



9. Inspect:
   - Main jet (1) (primary)
   - Main jet (2) (secondary)
   - Needle jet 1 (3) (primary)
   - Needle jet 2 (4) (secondary)
   - O-ring (5) (needle jet 1)
   - Pilot jet (6)

NOTE:
Clean jets with compressed air.

ASSEMBLY

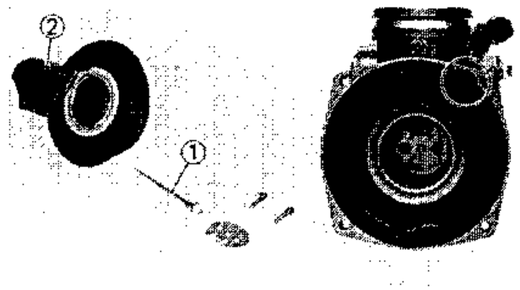
Perform "DISASSEMBLY" operations in reverse order. Pay attention to the following points.

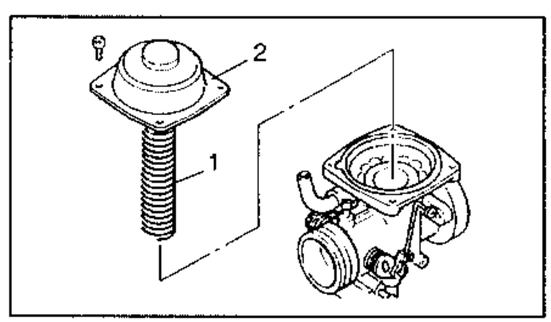
CAUTION:
- **Wash all parts with clean petrol prior to reassembly.**
- **Always use new gaskets.**

Secondary carburetor

1. Install:
   - Needle jet (1)
   - Piston valve (2)

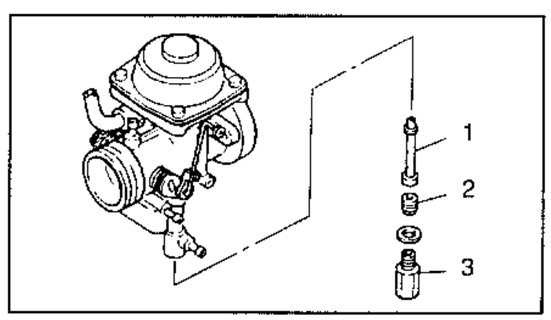
NOTE:
Draw the diaphragm tab level with the notch on the secondary carburetor.





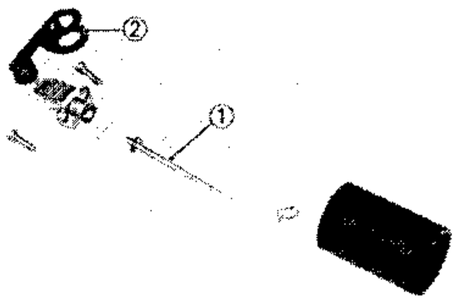
2. Install:
   - Spring (1)
   - Top cover (2)

	Screw (top cover): **2 Nm (0.2 mkg)**



3. Install:
   - Needle jet 2 (1)
   - Main jet (2) (secondary)
   - Plug (3)

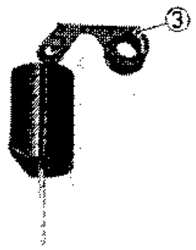
	Main jet: **2 Nm (0.2 mkg)**
	Plug: **9 Nm (0.9 mkg)**



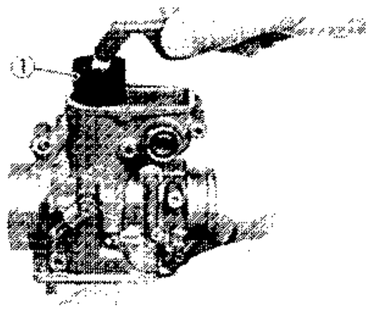
Primary carburetor

1. Install:
   - Needle jet (1)
   - Connecter comp. (2) (to throttle valve)

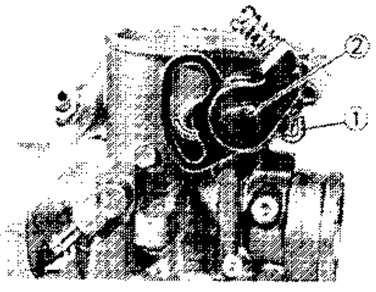
	Screw (connecter comp): **0.8 Nm (0.08 mkg)**



NOTE:
Check that the connecter unit (3) is in the position shown in the figure.

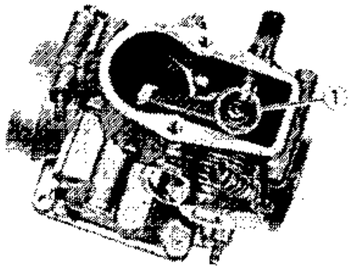


2. Install:
   - Throttle valve (1)



3. Install:
   - Spring (1)
   - Throttle shaft (2)

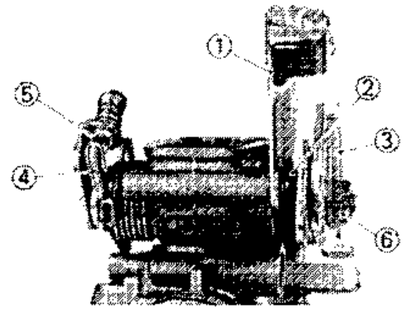
NOTE:
Assemble the spring as shown in the illustration.



4. Install:
   - Screw (1) (connecter comp.)

NOTE:
Turn the thrust shaft clockwise (1/2 turn) to preload the spring and then, holding it in position, tighten the screw (connecter comp.).

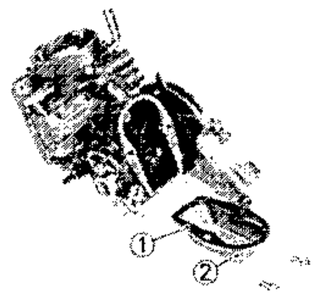
	Screw (connecter comp.): **2 Nm (0.2 mkg)**



5. Install:
   - Cable support (1)
   - Roller (2)
   - Throttle lever (3)

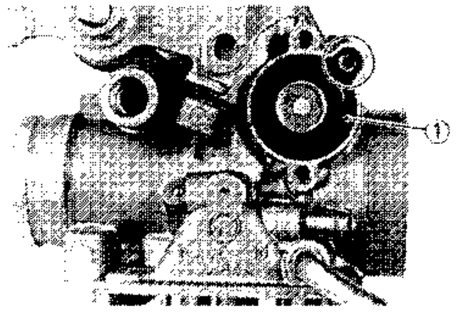
NOTE:
Check that the throttle shaft lever (4) and the adjuster bolt (5) are aligned when tightening the throttle lever nut (6).

	Screw (cable support): **3 Nm (0.3 mkg)** **Nut (throttle lever):** **3.5 Nm (0.35 mkg)**



6. Install:
   - Gasket (1)
   - Top cover (2)

	Screw (top cover): **2 Nm (0.2 mkg)**



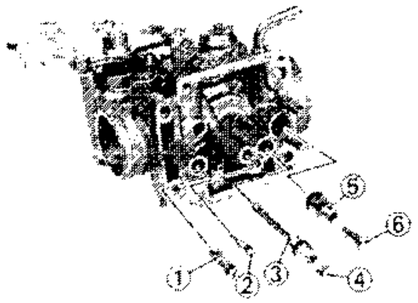
7. Install:
   - Diaphragm (1) (enrichment)

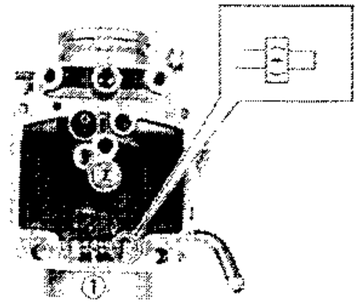
NOTE:
Make the diaphragm tab coincide with the gravity enricher notch.

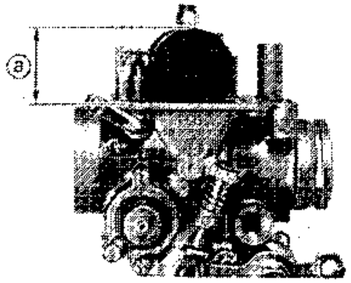
8. Connect:
   - Starter cylinder (to starter cable)

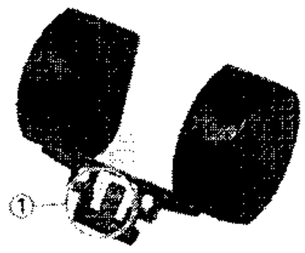
	Starter piston: **6 Nm (0.6 mkg)**

9. Install:
   - Throttle stop knob









10. Install:
    - Throttle stop screw (1)
    - Pilot jet (2)
    - Needle jet 1 (3)
    - Main jet (4) (primary)
    - Valve housing (5)
    - Needle valve (6) (with float)

	Needle jet 1: **2 Nm (0.2 mkg)**
	Main jet (primary): **1.6 Nm (0.16 mkg)**
	Screw (valve housing): **2 Nm (0.2 mkg)**

11. Install:
    - Float pin (1)

NOTE:
Assemble the float pin in the opposite direction to the arrow.

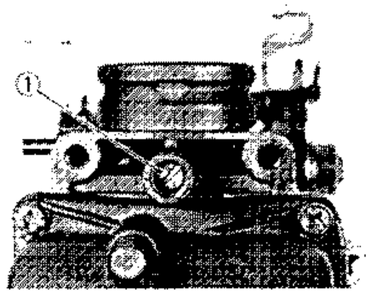
12. Measure:
    - Float height (a)
      Out of specification → Adjust.

	Float height: **25.0~27.0 mm**

Measurement and adjustment:
- Hold the carburetor upside down.
- Measure the distance from the joint plane of the float chamber (without the gasket) and the top of the float.

NOTE:
The float arm must rest on the neeedle valve without being pressed.

- If the float height is out of tolerance, check the valve housing and the needle valve.
- If either is worn, replace both.
- If both are perfect, adjust the float height by bending the wing tab of the float itself (1).
- Recheck the float height.



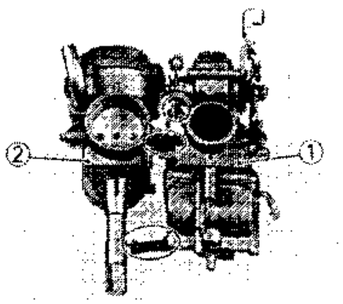
13. Install:
    - Float chamber

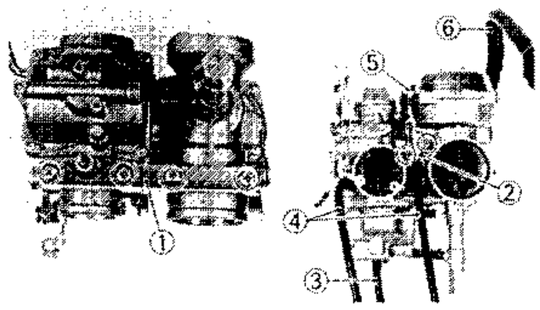
	Screw (float chamber): **2 Nm (0.2 mkg)**

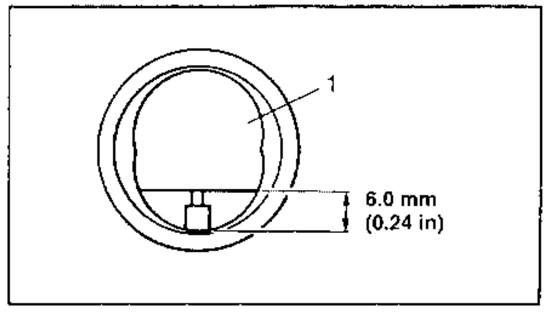
14. Adjust:
    - Pilot air screw (1)

Adjustment:
- Turn the screw until it is slightly locked.
- Unscrew by specified turns.

	Pilot air screw (unscrew): **Unscrew 3 turns**







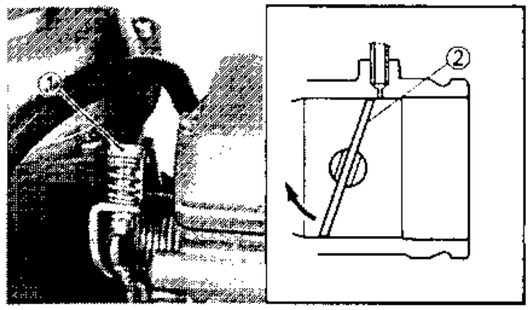
15. Install:
    - Primary carburetor (1)
    - Secondary carburetor (2)
16. Install:
    - Support plate (front) (1)
    - Support plate (rear) (2)

	Screw (support plate): **3 Nm (0.3 mkg)**

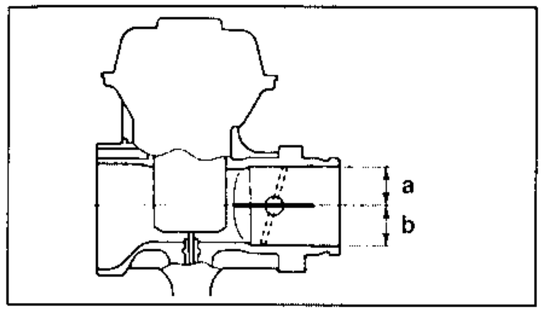
NOTE:
After screwing the plates, check that the throttle lever and throttle valve work properly and without sticking.

17. Connect:
    - Overflow hose (3)
    - Air ventilation pipe (4)
    - Air ventilation pipe (5)
    - Suction pipe (6)
18. Adjust:
    - Synchronisation of secondary carburetor

Adjustment:
- Move the primary throttle valve (1) to a height of 6.0 mm as shown in the figure.



- Tighten or loosen the synchronisation screw (1) until the secondary throttle valve (2) starts to open.



- Check that the secondary valve is open horizontally (a)=(b) when the primary carburetor valve is completely open.

INSTALLATION

Perform the "REMOVAL" procedures in reverse order, paying attention to the following points:

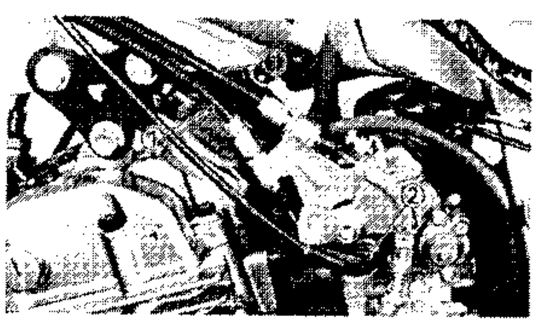
1. Install:
   - Carburetor unit

	Screw (clamp-left joint): **2 Nm (0.2 mkg)** **Screw (clamp-right joint):** **5 Nm (0.5 mkg)**

2. Install:
   - The air cleaner hose to the carburetor moving the air filter case towards the front part

	Screw (clamp-left manifold): **2 Nm (0.2 mkg)** **Screw (clamp-right manifold):** **5 Nm (0.5 mkg)**

3. Install:
   - Throttle cable (1)
   - Starter cable knob (2)



4. Adjust:
   - Throttle cable free play
     See section "THROTTLE CABLE FREE PLAY ADJUSTMENT" in CHAPTER 3°.

	Throttle cable free play: **3 ~ 5 mm**

5. Adjust:
   - Idle speed
     See section "IDLE SPEED ADJUSTMENT" in CHAPTER 3°.

	Engine idle speed: **1,300 ± 50 rpm**

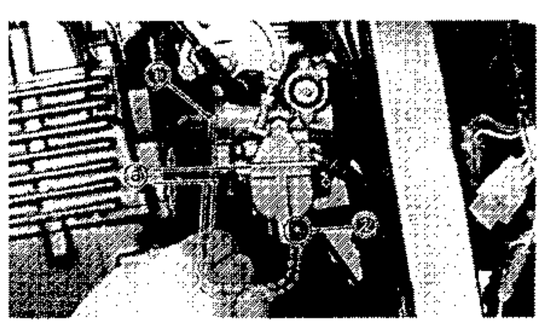
FUEL LEVEL ADJUSTMENT

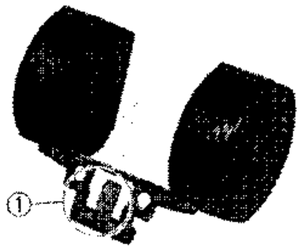
1. Place the motorcycle on a level surface.
2. Make sure that the carburetor is in a horizontal position by placing a jack under the engine.
3. Connect the fuel level gauge (1) to the drain pipe of the float chamber.

	Fuel level gauge: **P/N. YM-01312-A** **P/N. 90890-01312**

4. Loosen drainer screw (2) and heat the engine.
5. Make sure that fuel level gauge is in a vertical position near the match face of the float chamber.
6. Measure:
   - Fuel level (a)
     Out of specification → Adjust.

	Fuel level: **6.0~8.0 mm** **Under the edge of the match face of the float chamber**





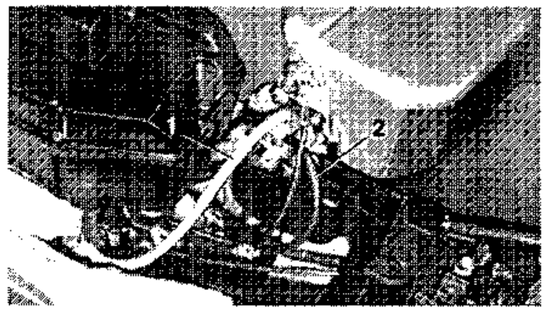
7. Adjust:
   - Fuel level

Fuel level adjustment:
- Remove carburetor unit.
- Inspect valve housing and needle valve. If either of the two is worn, replace both.
- If both are perfect, adjust float height by bending the wing tab of the float itself (1).
- Recheck the fuel level.

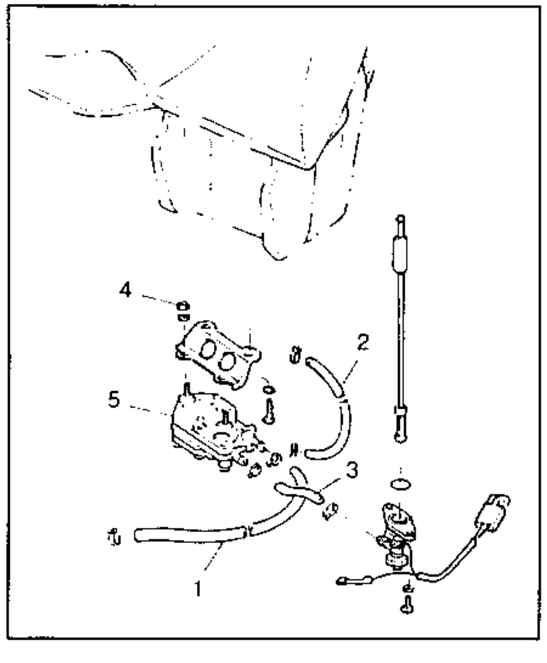
FUEL PUMP

CHECKING THE PUMP OPERATION

1. Inspect:
   - Fuel pump operation



Checking the operation:
- Disconnect the carburetor fuel delivery pipe (1).
- Place a container under the tip of the delivery pipe.
- Turn the main switch to "ON".
- Press the start button.
- Check that the fuel comes out of the delivery pipe. If the fuel does not come out, replace the fuel pump unit.
  Refer to the "INSPECTION" section.

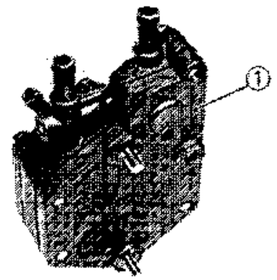


REMOVAL

1. Remove:
   - Seat
   - Fuel tank. See the section "SEAT, FUEL TANK AND REAR COWLING" in chapter 3°.
2. Disconnect:
   - Fuel delivery pipe (1) (to carburetor)
   - Suction pipe (2)
   - Fuel delivery pipe (3) (from fuel cock to pump)
3. Remove:
   - Nuts (4) (fuel pump)
   - Fuel pump assembly (5)

INSPECTION

1. Inspect:
   - Fuel pipes
   - Suction pipe
   - Cracks/Wear/Damage → Replace.



2. Inspect:
   - Fuel pump assembly (1)
     Cracks/Damage → Replace.

INSTALLATION

Perform the "REMOVAL" procedures in reverse order, paying attention to the following points.

1. Connect:
   - Suction pipe
   - Fuel delivery pipe to carburetor
   - Fuel pipe (from fuel cock to pump)

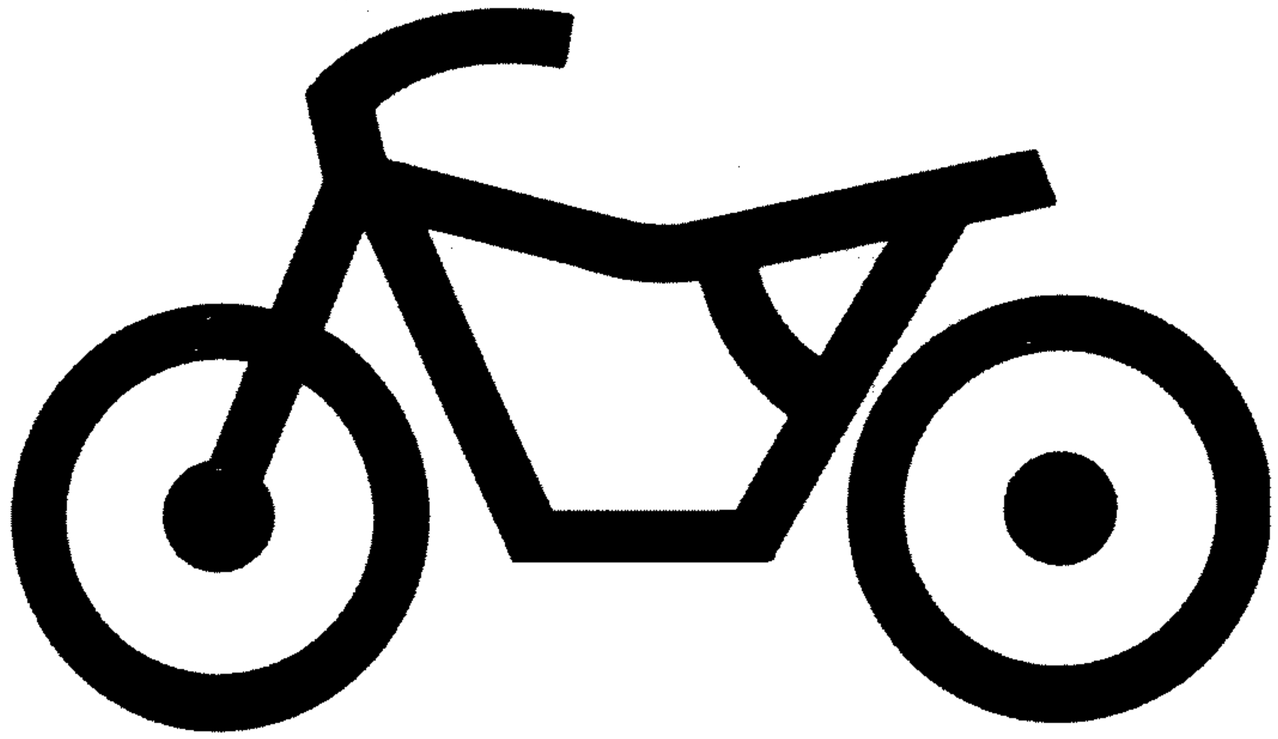
NOTE:
When connecting pipes, be careful to do so correctly.

2. Install:
   - Fuel pump assembly (to fuel tank bracket)
3. Tighten:
   - Fuel pump assembly mounting nuts

	Nuts (fuel pump to bracket): 5 Nm (0.5 mkg)

4. Install:
   - Fuel tank
   - Seat

   See the section "SEAT, FUEL TANK AND REAR COWLING" in chapter 3°.



CHAS 7

CHAPTER 7°

CHASSIS

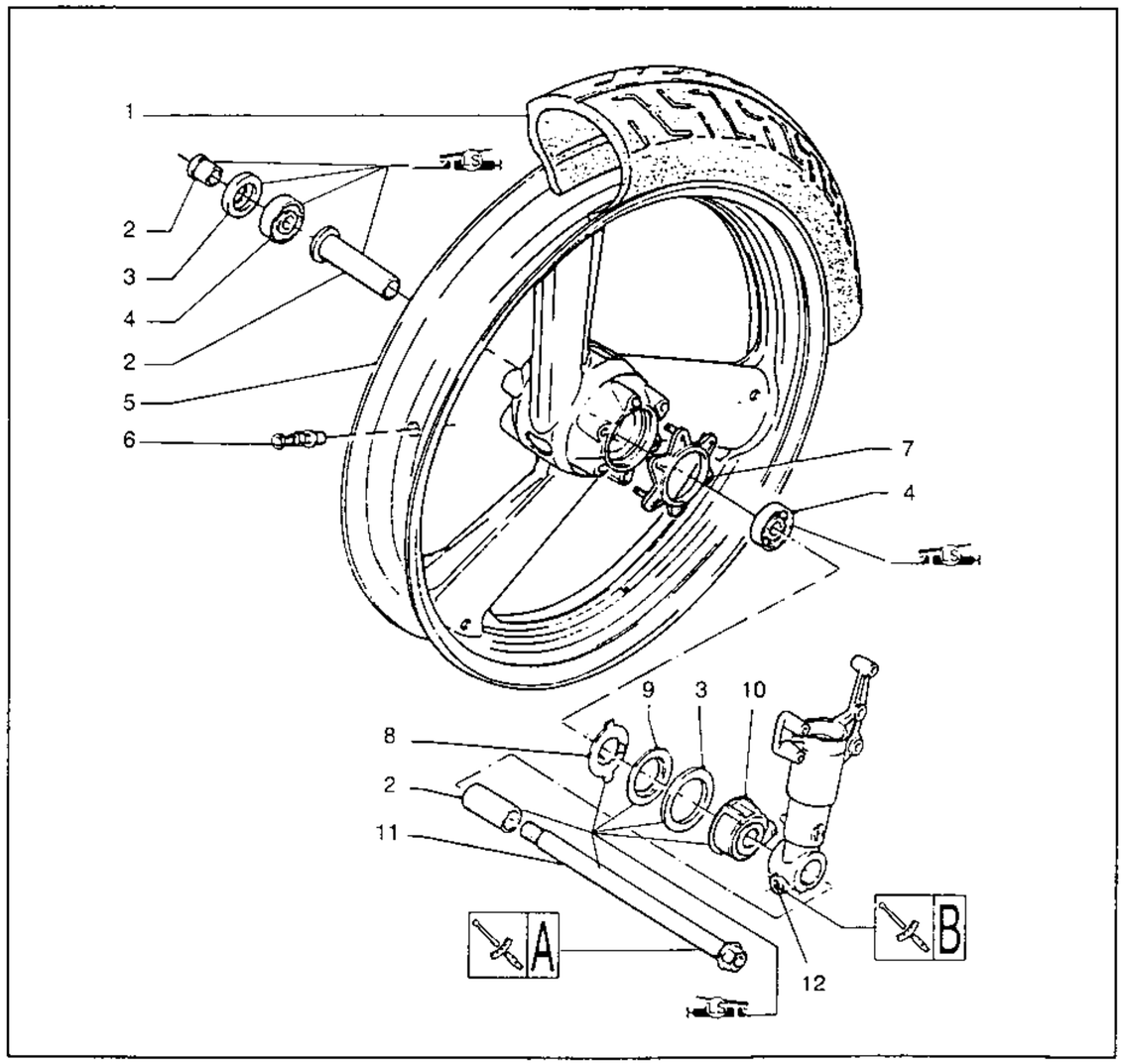
CHAS

CHASSIS

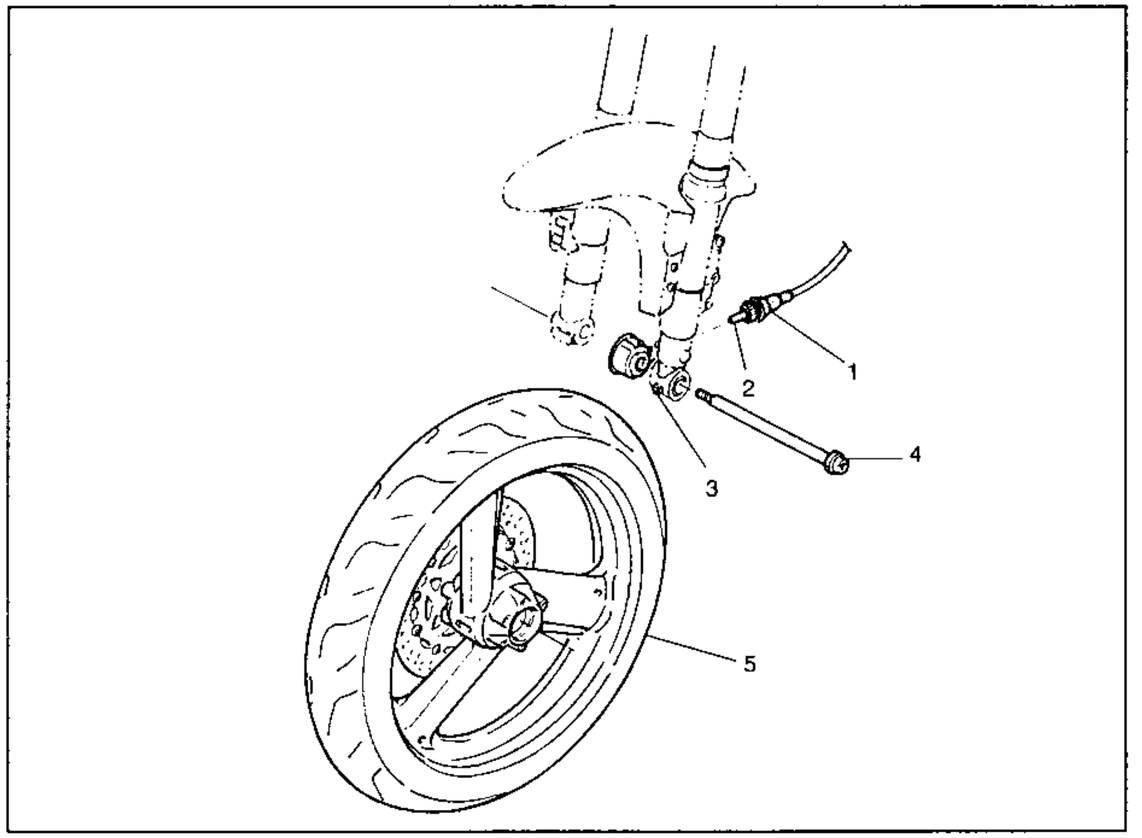
FRONT WHEEL

(1) Tyre
(2) Spacer
(3) Dust cover
(4) Bearing
(5) Cast wheel
(6) Valve
(7) Cover (gear unit housing)
(8) Meter clutch
(9) Clutch meter retainer
(10) Gear unit assembly
(11) Wheel axle
(12) Wheel axle retainer screw

[A] WHEEL AXLE TIGHTENING TORQUE: 70 Nm (7.0 mkg)
[B] WHEEL AXLE SCREW TIGHTENING TORQUE: 10 Nm (1.0 mkg)
TYRE MEASUREMENT AND TYPE:
110/70 ZR17 TX15 MICHELIN -
110/70 ZR17 TL DUNLOP
RIM MEASUREMENT: 3.00 x 17"
RUNOUT LIMIT:
VERTICAL: 0.5 mm
LATERAL: 0.5 mm
INFLATION PRESSURE IN bar-kg/cm²(psi):
WITH DRIVER ONLY: 2 (28)
WITH DRIVER AND PASSENGER: 2.2 (32)

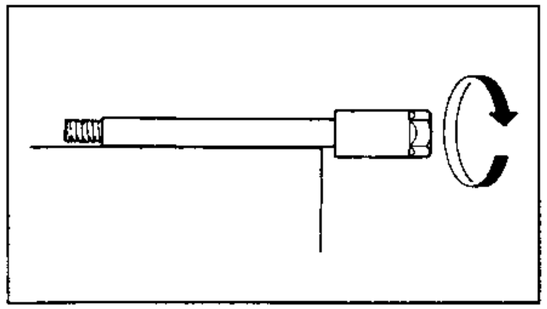


REMOVAL



JOB INSTRUCTION CHART

Order	Job name/Part name	Q.ty	Remarks
	Removal of front wheel		**Remove the parts in the order.**
			⚠ WARNING
1	Odometer cap (detach)	1	**Support the motorcycle securely so that it does not fall over when the wheel is removed.**
2	Odometer cable	1	
3	Axle retainer screw (loosen)	1	
4	Wheel axle	1	
5	Wheel	1	
			Reverse the removal procedure for installation.
			NOTE: Check that the odometer gear unit hits the cross on the fork stem and that the odometer cable is properly connected. Before retightening the wheel axle fastening screw to the fork, pump the fork repeatedly.



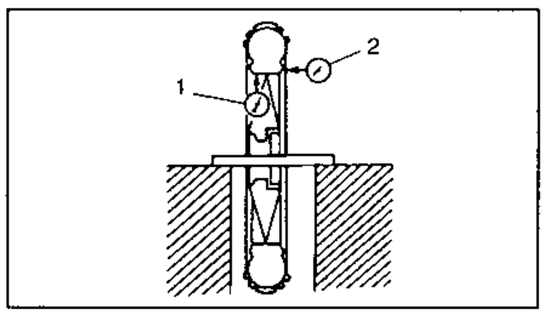
INSPECTION

1. Eliminate any traces of oxidisation from the parts.
2. Inspect:
   - Wheel axle
     Turn the axle on a level surface.
     Curvature → Replace.

⚠ WARNING

Never attempt to straighten a wheel axle.

3. Inspect:
   - Tyre
     Wear/Damaged → Replace.
     See section "TYRE INSPECTION" in CHAPTER 3°.
   - Wheel
     Cracks/Deformation/Curvature → Replace.
     See section "WHEEL INSPECTION" in CHAPTER 3°.



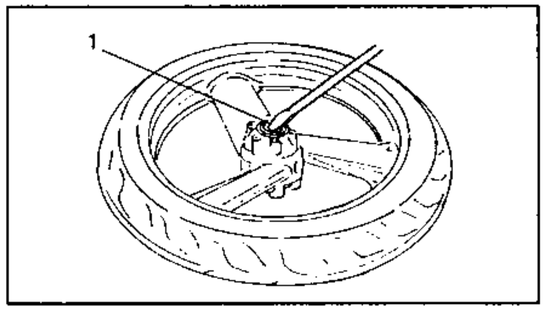
4. Measure:
   - Wheel runout
     Out of specification → Check the wheel and bearing free play.

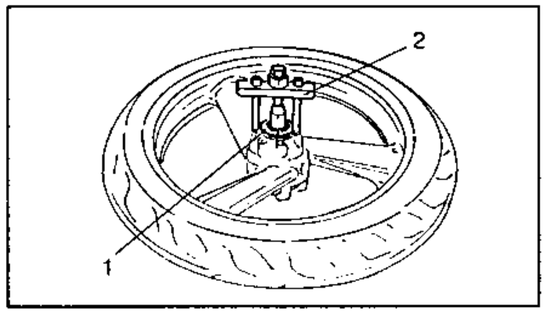
Wheel runout limits:
Vertical (1): 0.5 mm
Lateral (2): 0.5 mm

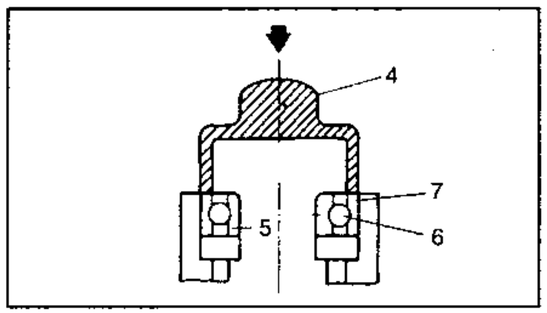
⚠ WARNING

After assembling a tyre, drive slowly to allow it to adapt to the rim. If this precaution is not observed, damage might be caused to the cycle and accidents to the driver.

5. Inspect:
   - Wheel bearings
     Free play in wheel hub or wheel which does not turn smoothly → Replace.
   - Oil seal
     Wear/Damage → Replace.







How to replace wheel bearings and dust covers:
- Clean the outside of the hub.
- Remove the dust cover (1) with a flat-headed screw driver.

NOTE:
Place a rag on the outside to avoid damaging the dust cover.

- Disassemble the bearing (1) with a normal puller (2).
- Install the new bearing and the dust cover by following the disassembly procedures in reverse order.

NOTE:
Use a wrench (4) with an external diameter equal to that of the bearing and dust cover.

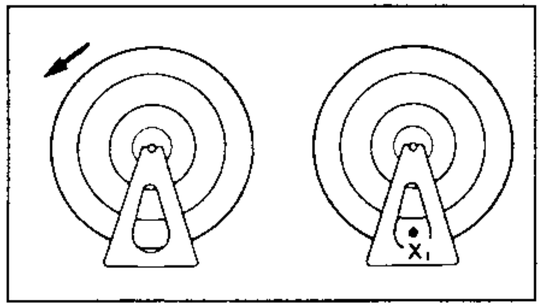
CAUTION:

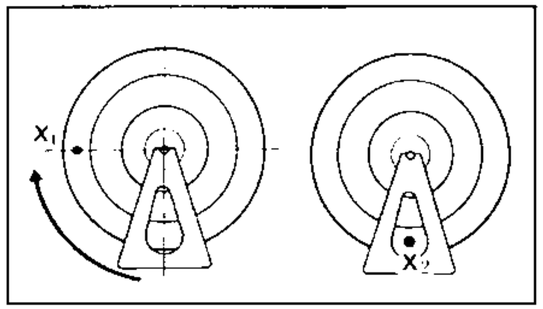
Do not strike the bearing inner race (5) or balls (6). The contact must only be made with the outer race (7).

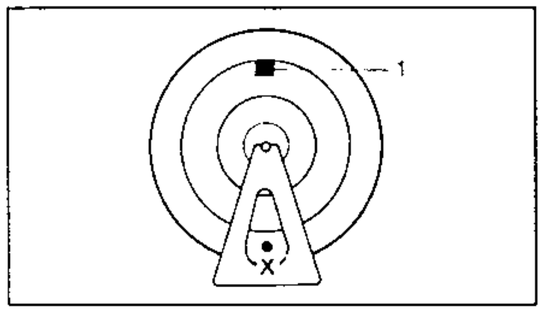
6. Inspect:
   - Tachometer socket
     Wear/Damage → Replace.

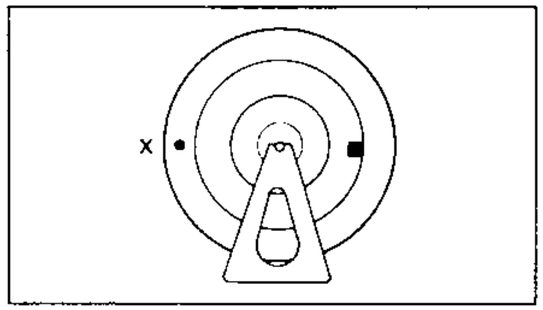
STATIC BALANCING

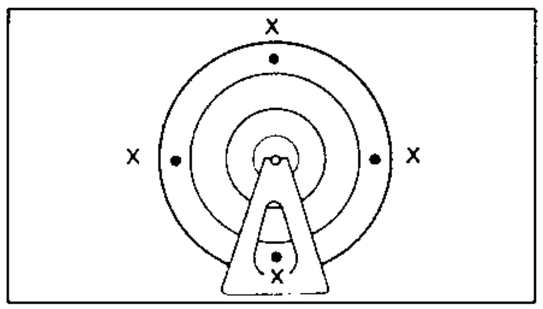
NOTE:
- After replacing the tyre and/or rim, it is necessary to balance the wheel.
- Balance the wheel with the brake disk installed.











1. Remove:
   - Balancing weight
2. Set the wheel on a suitable support.
3. Look for:
   - The heaviest point

Procedure:

a. Turn the wheel and wait for it to stop.
b. Make a mark "X1" on the lowest point of the wheel.
c. Move the mark "X1" to an angle of 90° to the starting position.
d. Let the wheel go and wait until it stops. Make a mark "X2" on the lowest point.
e. Repeat the preceding operations b, c and d various times until the two marks meet.
f. This point is heavy point "X".

4. Carry out:
   - Wheel balancing

Balancing procedure:

- Install a balancing weight (1) on the rim at the point exactly opposite "X".

NOTE:
Start with the lightest weight available.

- Turn the wheel so that the heavy point ends at 90° to the perpendicular.
- Check that the heavy point does not shift. Otherwise, try with another weight until the wheel is balanced.

5. Check:
   - Wheel balancing

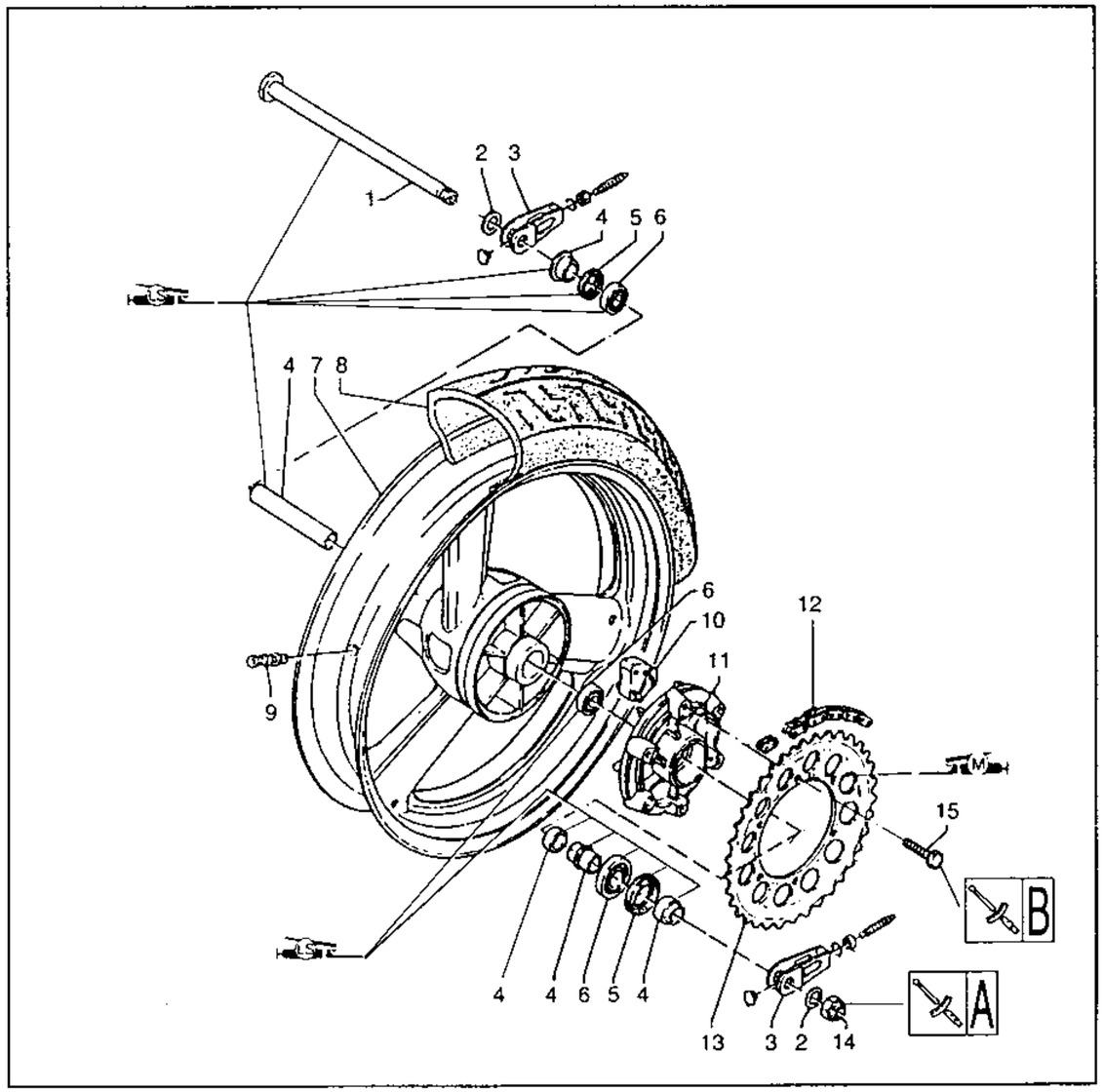
Control procedure:

- Set the wheel into any of the positions shown in the figure.
- Check that in each of the points the wheel is still. Otherwise, balance the wheel once again.

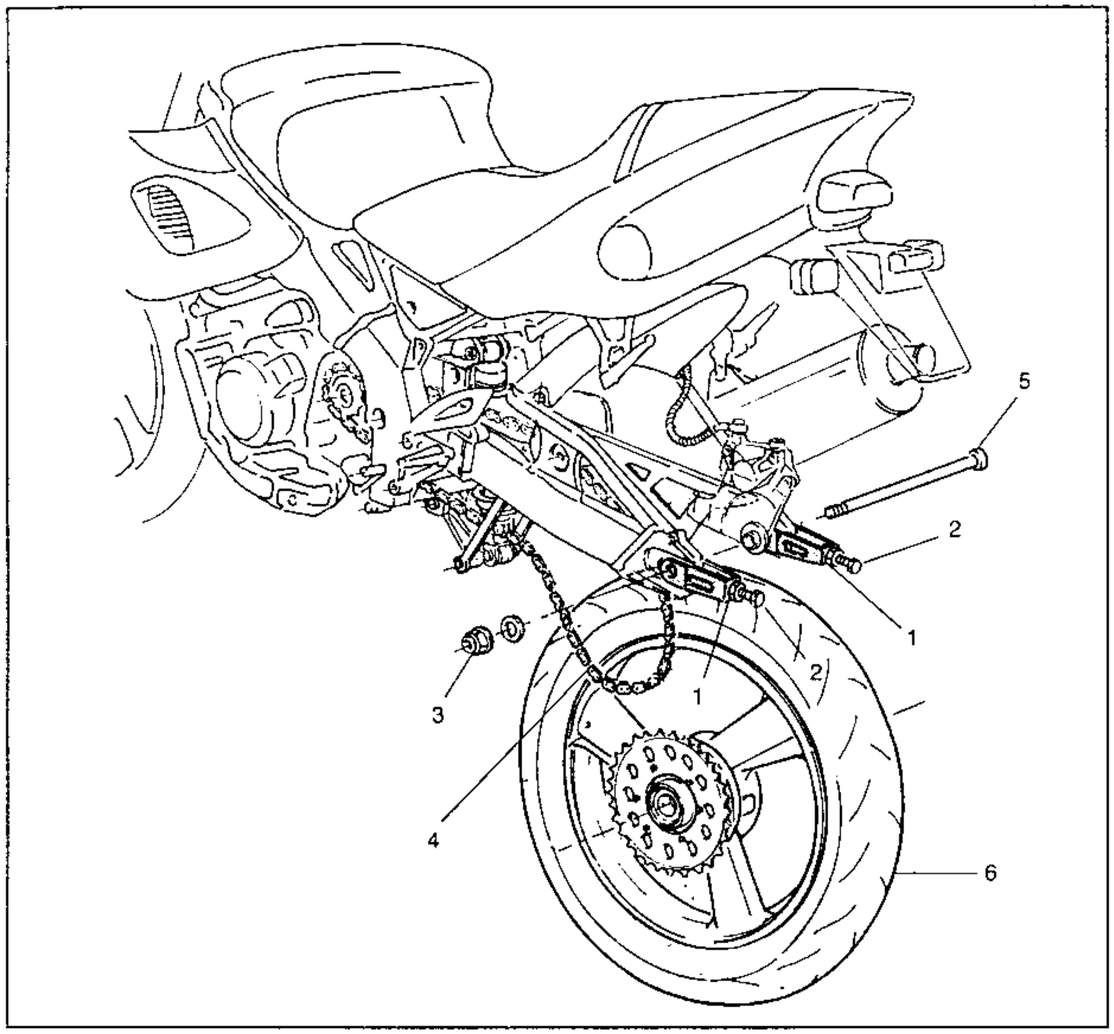
REAR WHEEL

(1) Wheel axle
(2) Flat washer
(3) Chain stretcher
(4) Spacer
(5) Dust cover
(6) Bearing
(7) Cast wheel
(8) Tyre
(9) Valve
(10) Damper
(11) Hub clutch
(12) Drive chain
(13) Crown
(14) Self-locking nut
(15) Crown mounting screw
[A] WHEEL AXLE NUT TIGHTENING TORQUE: 80 Nm (8.0 mkg)
[B] CROWN SCREW TIGHTENING TORQUE: 23 Nm (2.3 mkg)

TYRE MEASUREMENT AND TYPE:
150/60 ZR17 TX25 MICHELIN - 150/60 ZR17 TL DUNLOP
RUNOUT LIMIT:
LATERAL: 0.5 mm
VERTICAL: 0.5 mm
INFLATION PRESSURE IN bar-kg/cm² (psi)
WITH DRIVER ONLY: 2.2 (32)
WITH DRIVER AND PASSENGER: 2.5 (37)
DRIVE CHAIN SLACK: 25 ~ 40 mm



REMOVAL



JOB INSTRUCTION CHART

Order	Job name/Part name	Q.ty	Remarks
	Removal of rear wheel		**Remove the parts in the order.**
			⚠ WARNING
1	Stretcher lock nut (loosen)	2	**Support the motorcycle securely so that it does not fall over when the wheel is removed.**
2	Stretcher (unscrew)	2	
3	Wheel axle nut	1	
4	Drive chain (remove from crown)	1	**NOTE:** To remove the drive chain from crown push the rear wheel forward.
5	Wheel axle	1	
6	Rear wheel assembly	1	**NOTE:** The brake caliper bracket must be supported when the wheel is removed.
			CAUTION: **Do not operate the brake pedal when the wheel is removed.**
			Reverse the removal procedure for installation.
			CAUTION: **Adjust drive chain slack. Make sure that the chain stretchers are putted in the same position.**

INSPECTION

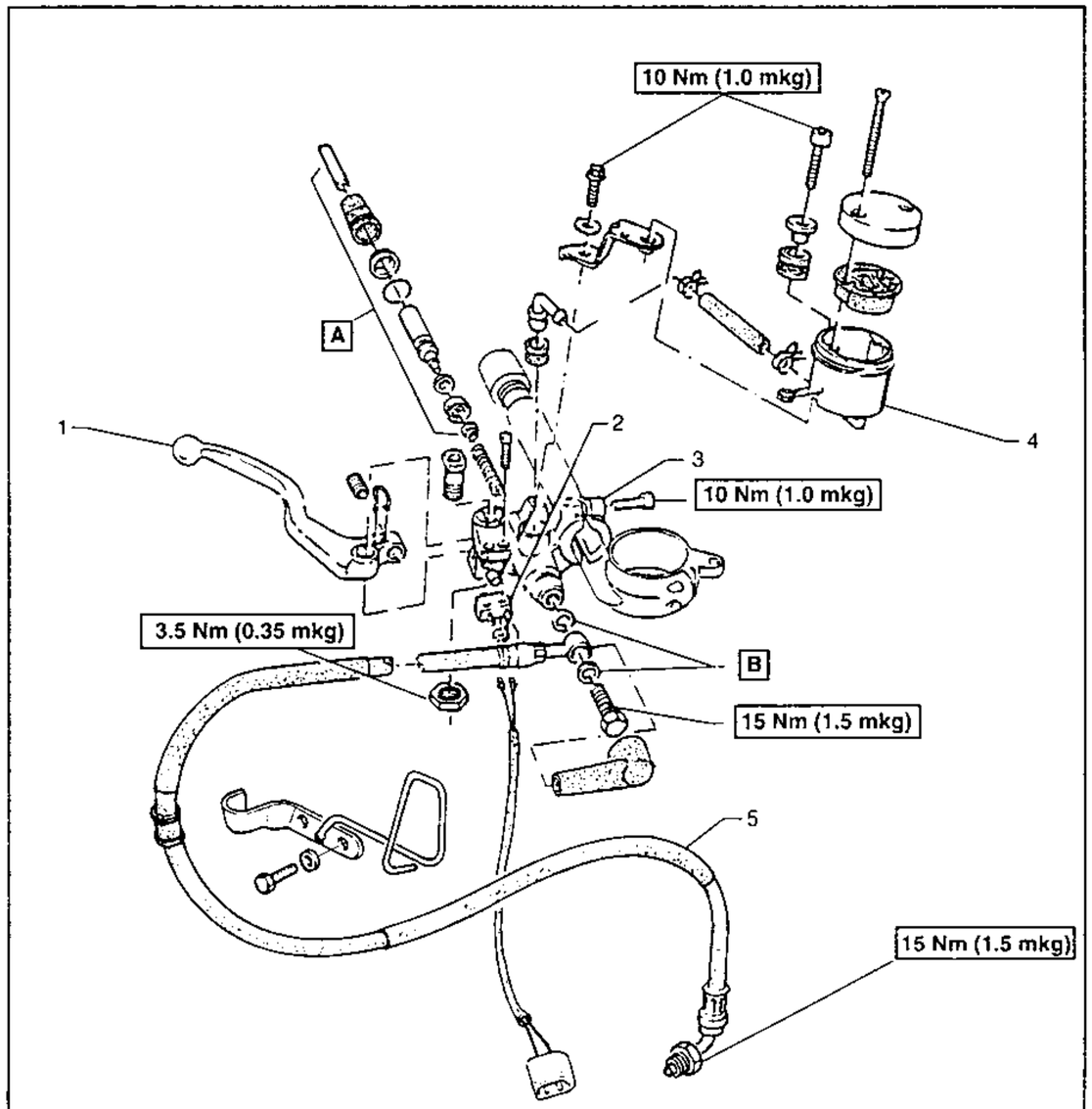
1. Inspect:
   - Rear wheel
     See section "FRONT WHEEL-INSPECTION".
2. Check:
   - Tyre
   - Wheel
     See section "FRONT WHEEL-INSPECTION".
3. Measure:
   - Wheel runout
     See section "FRONT WHEEL-INSPECTION".
4. Check:
   - Dust cover
   - Wheel bearings
     See section "FRONT WHEEL-INSPECTION".
5. Check:
   - Wheel balancing
     See section "FRONT WHEEL-STATIC BALANCING".

FRONT AND REAR BRAKE

FRONT MASTER CYLINDER

(1) Brake control lever
(2) Stop light switch
(3) Handle bar master cylinder fastening bracket
(4) Brake fluid tank
(5) Brake hose

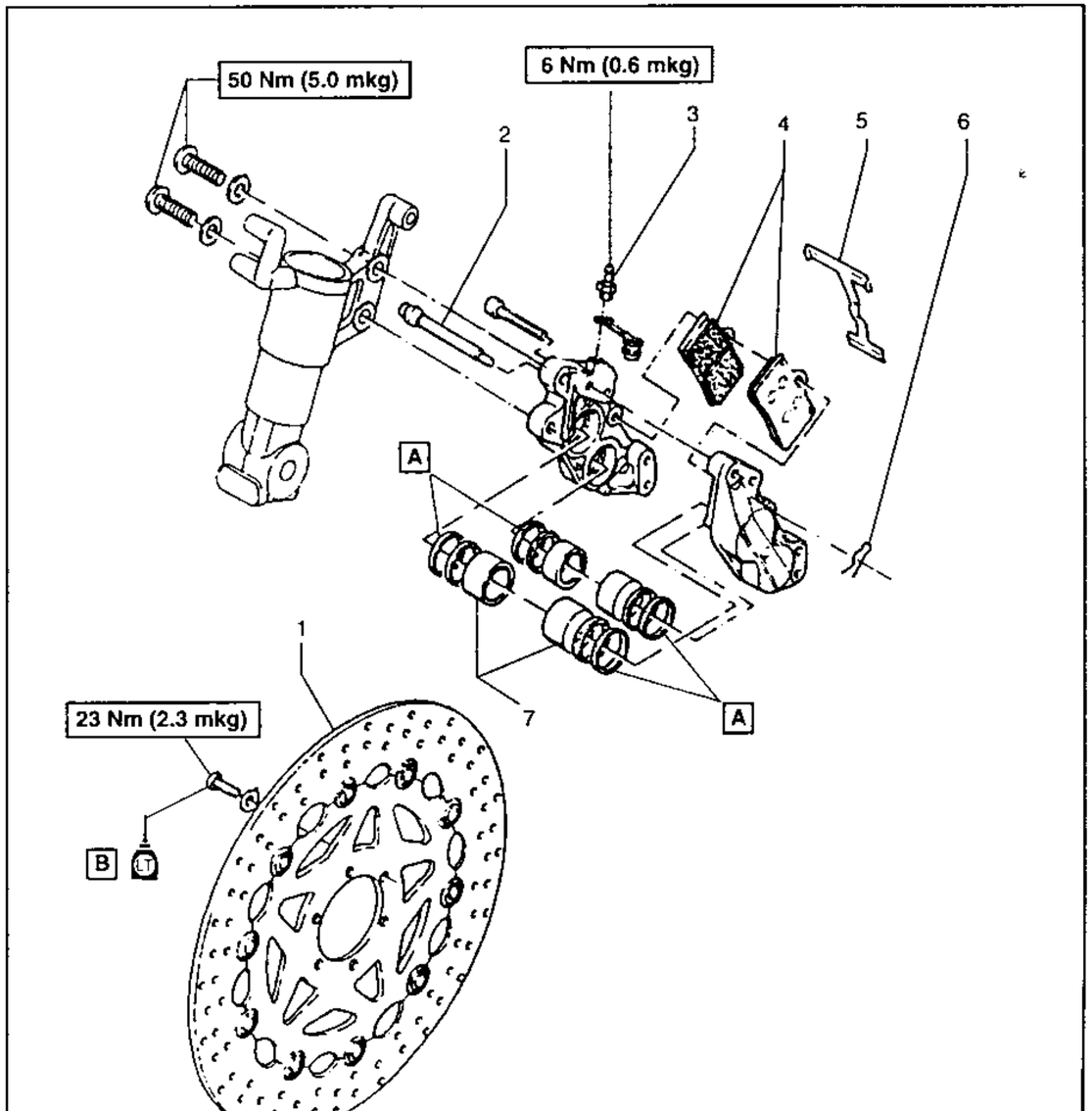
[A] PUMPER ASSEMBLY NOT SUPPLIED. REPLACE WHOLE MASTER CYLINDER UNIT IF NECESSARY.
[B] REPLACE COPPER SEAL GASKETS EVERY TIME MASTER CYLINDER IS REMOVED.
BRAKE FLUID: DOT #4



FRONT BRAKE CALIPER

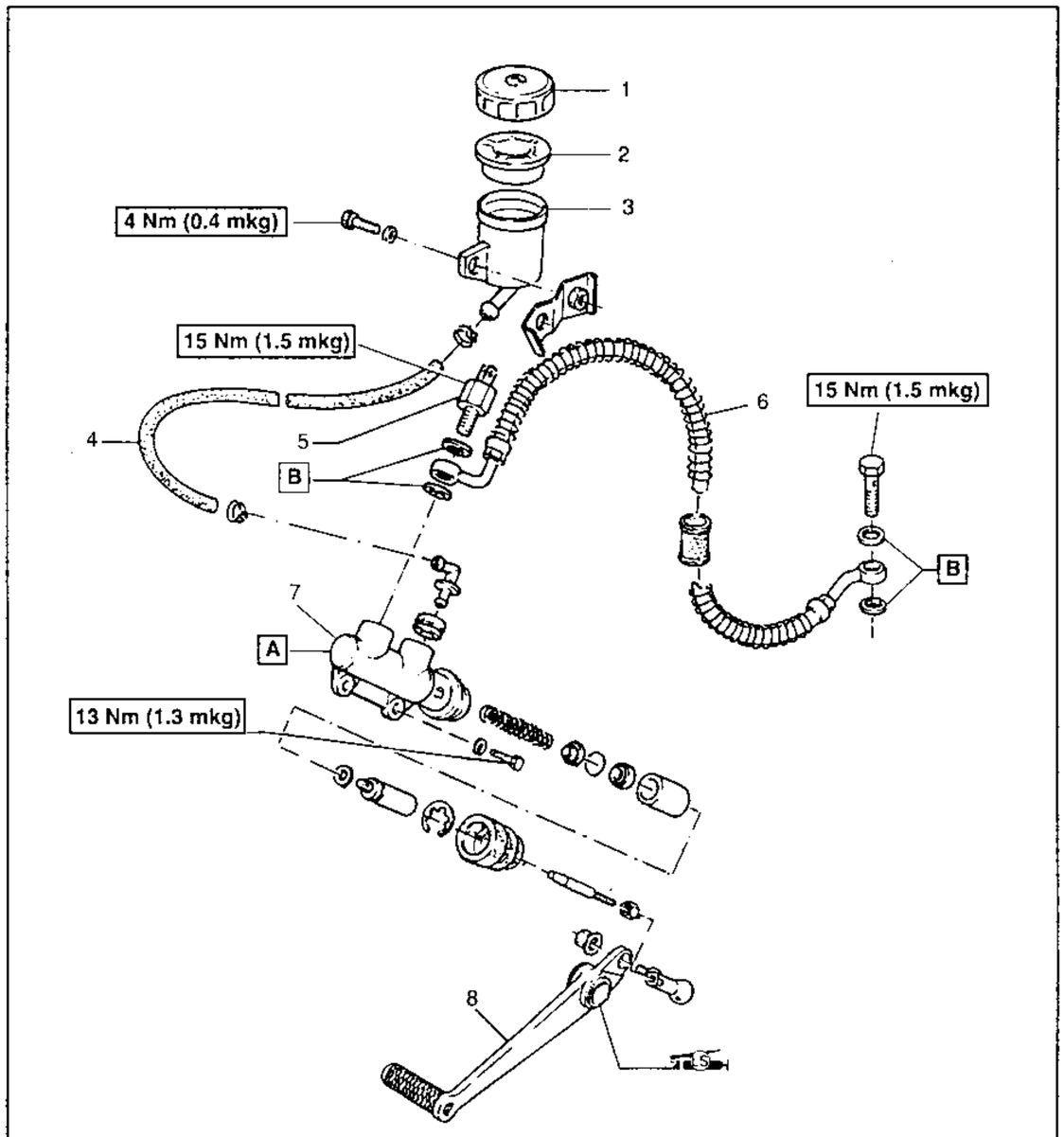
(1) Brake disk
(2) Brake pad lock pin
(3) Bleeder screw
(4) Brake pads
(5) Pad spring
(6) Pad pin lock spring
(7) Brake caliper piston unit

[A] PISTON GASKETS NOT SUPPLIED. REPLACE ENTIRE CALIPER UNIT, IF NECESSARY.
BRAKE FLUID: DOT#4
BRAKE PAD WEAR LIMIT: 0.8 mm
BRAKE DISK WEAR LIMIT: 3.5 mm
BRAKE DISK RUNOUT LIMIT: 0.3 mm
[B] USE LOCTITE® 242 MEDIUM THREAD LOCKING LIQUID



REAR MASTER CYLINDER

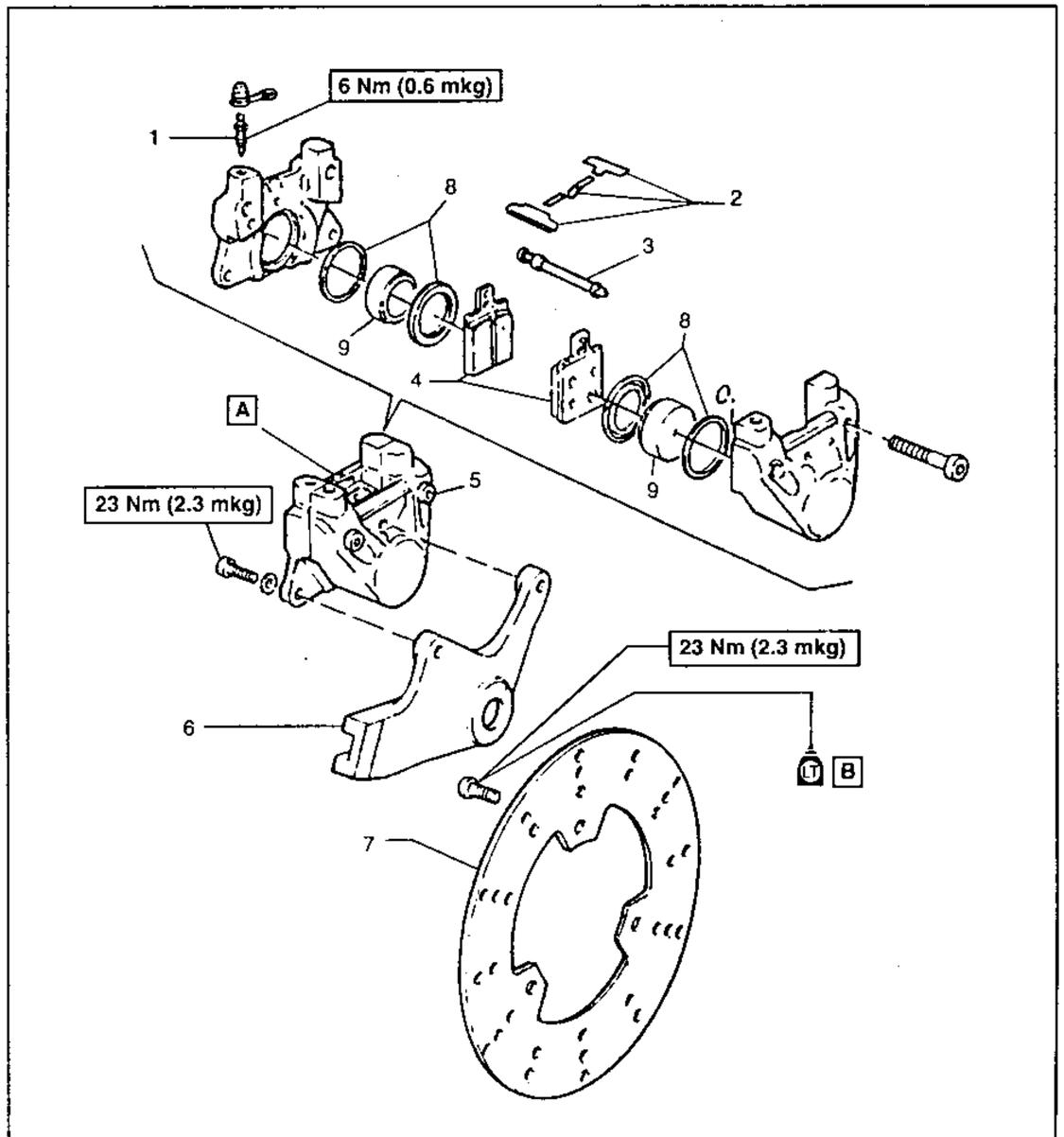
(1) Brake fluid tank cover
(2) Diaphragm
(3) Brake fluid tank
(4) Hose
(5) Stop light switch
(6) Brake hose
(7) Master cylinder
(8) Brake pedal
[A] PUMPER ASSEMBLY NOT SUPPLIED. REPLACE WHOLE MASTER CYLINDER UNIT IF NECESSARY.
[B] REPLACE COPPER SEAL GASKETS EVERY TIME MASTER CYLINDER IS REMOVED.
BRAKE FLUID: DOT #4



REAR BRAKE CALIPER

(1) Bleeder screw
(2) Pad spring
(3) Brake pad lock pin
(4) Brake pad
(5) Brake caliper
(6) Brake caliper bracket
(7) Brake disk
(8) Brake caliper cylinder gaskets
(9) Cylinder
[A] CYLINDER GASKETS NOT SUPPLIED. REPLACE WHOLE BRAKE CALIPER ASSEMBLY IF NECESSARY.

BRAKE FLUID: DOT#4
BRAKE PAD WEAR LIMIT: 0.8 mm
BRAKE DISK WEAR LIMIT: 4 mm
BRAKE DISK RUNOUT LIMIT: 0.3 mm
[B] USE LOCTITE® 242 MEDIUM THREAD LOCKING LIQUID



CAUTION:

Brake components rarely require disassembly. DO NOT:

- **Disassemble brake components unless absolutely necessary.**
- **Use solvents on internal brake components.**
- **Use brake fluid already used for bleeding.**
- **Allow brake fluid to come into contact with the eyes as it may cause injury.**
- **Allow brake fluid to come into contact with painted or plastic parts as it may damage them.**
- **Disconnect any hydraulic connection, otherwise the whole system must be disassembled, drained, cleaned, then properly filled and bled after reassembly.**

BRAKE PAD REPLACEMENT

NOTE:

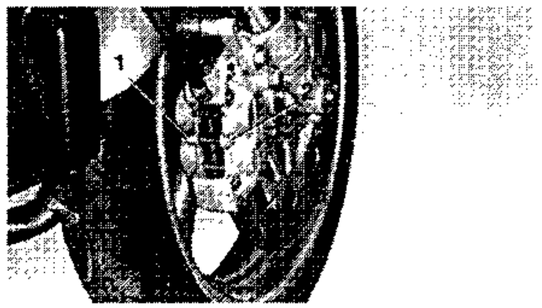
It is unnecessary to disassemble the brake caliper and hose to replace the pads.

⚠ WARNING

Support the motorcycle securely to prevent it falling over.

Front brake

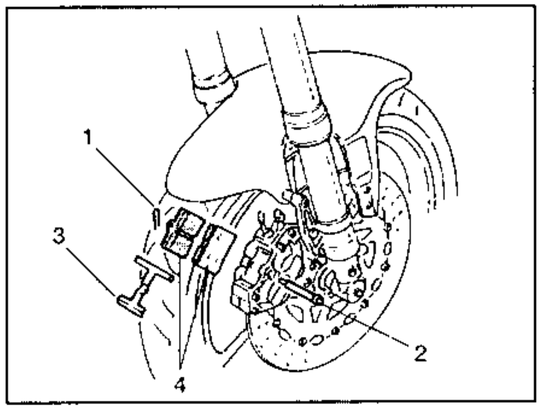
1. Remove:
   - Pad pin lock spring (1)

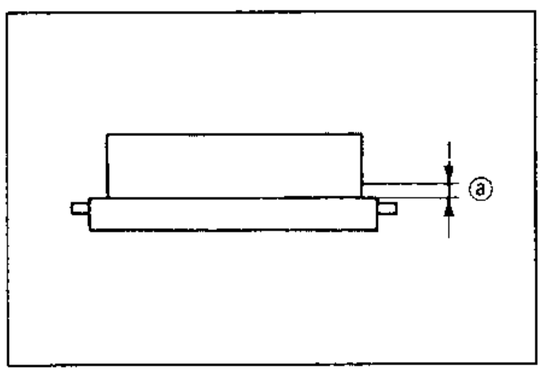


2. Remove:
   - Pad fastening pin (2)

NOTE:

To remove the pad fastening pin, strike from the inside with punch with a suitable diameter, being careful not to damage the pin housing.





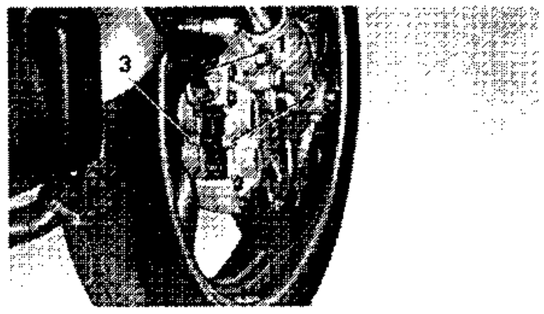
3. Remove:
   - Pad spring (3)
   - Brake pads (4)

NOTE:

- If you replace the pads, also replace the spring.
- If one of the two pads has to be replaced because it is worn, replace both.

	Wear limit (a): **0.8 mm**

4. Install:
   - Brake pads (new)
   - Pad spring (new)
   - Pad fastening pin
   - Pad pin lock spring



Installation procedure:

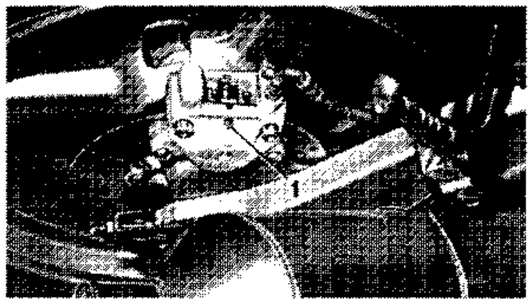
- Connect the hose firmly to the caliper bleeder screw (1). Place the other end of the hose in an open container.
- Loosen the caliper bleeder screw and push the pistons into the caliper with your finger.
- Retighten the bleeder screw.

	Caliper bleeder screw: **6 Nm (0.6 mkg)**

- Install the (new) brake pads and (new) spring.
- Fit the pad fastening pin (2) well into its housing by hammering from the outside with a punch with a suitable diameter.
- Install the lock spring (3) into pad fastening pin.

5. Check:
   - Level of brake fluid in tank
     See the section "BRAKE FLUID LEVEL CHECK" in CHAPTER 3".

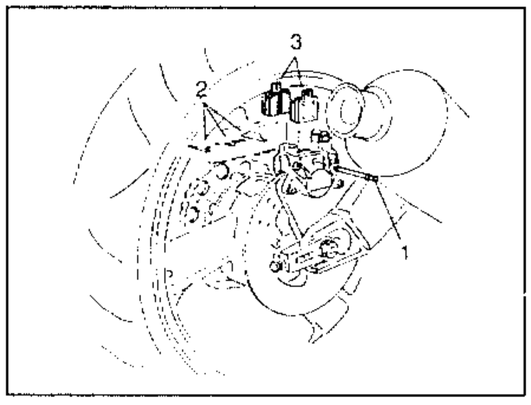
6. Check:
   - Brake lever functioning
     Lever soft and spongy → Bleed air from brake circuit.
     See the section "AIR BLEEDING" in CHAPTER 3".



Rear brake

1. Remove:
   - Brake pad fastening pin (1)

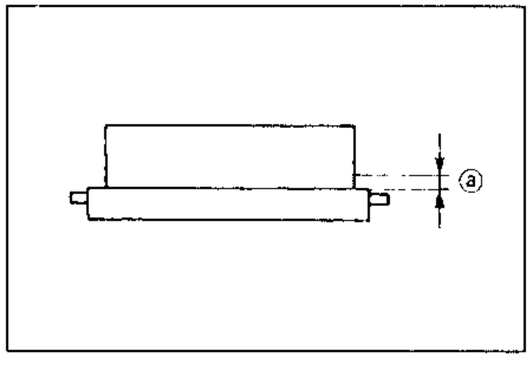
NOTE:
To remove the pad fastening pin, strike from the inside with punch with a suitable diameter, being careful not to damage the pin housing.

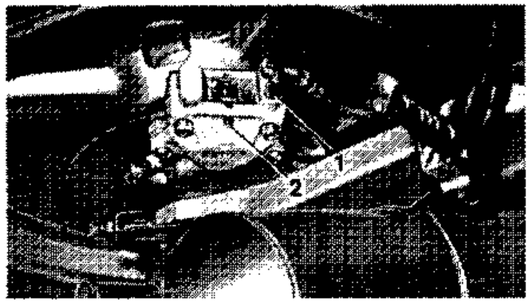


2. Remove:
   - Pad springs (2)
   - Brake pads (3)

NOTE:
- If you replace the pads, also replace the spring.
- If either of the two pads has to be replaced because it is worn, replace both.

	Wear limit (a): **0.8 mm**





Installation procedure:
- Connect the hose firmly to the caliper bleeder screw (1). Place the other end of the hose in an open container.
- Loosen the caliper bleeder screw and push the pistons into the caliper with your finger.
- Retighten the bleeder screw.

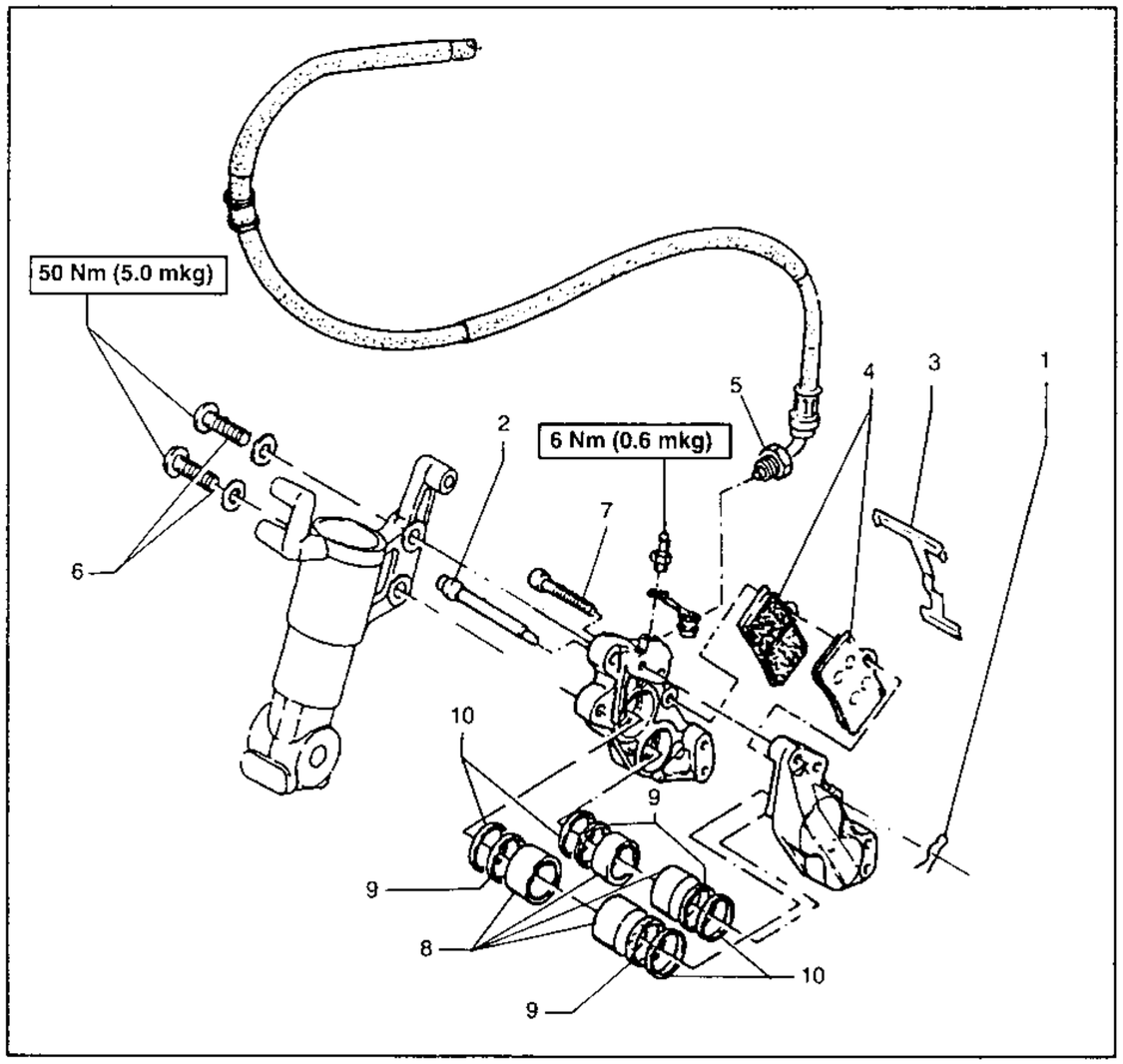
	Caliper bleeder screw: **6 Nm (0.6 mkg)**

- Install the (new) spring and (new) brake pads.
- Fit the pad fastening pin (2) well into its housing by hammering with a punch with a suitable diameter.

3. Check:
   - Level of brake fluid in tank
     See the section "BRAKE FLUID LEVEL CHECK" in CHAPTER 3".

4. Check:
   - Brake pedal functioning
     Pedal soft and pongy → Bleed air from brake circuit.
     See the section "AIR BLEEDING" in CHAPTER 3".

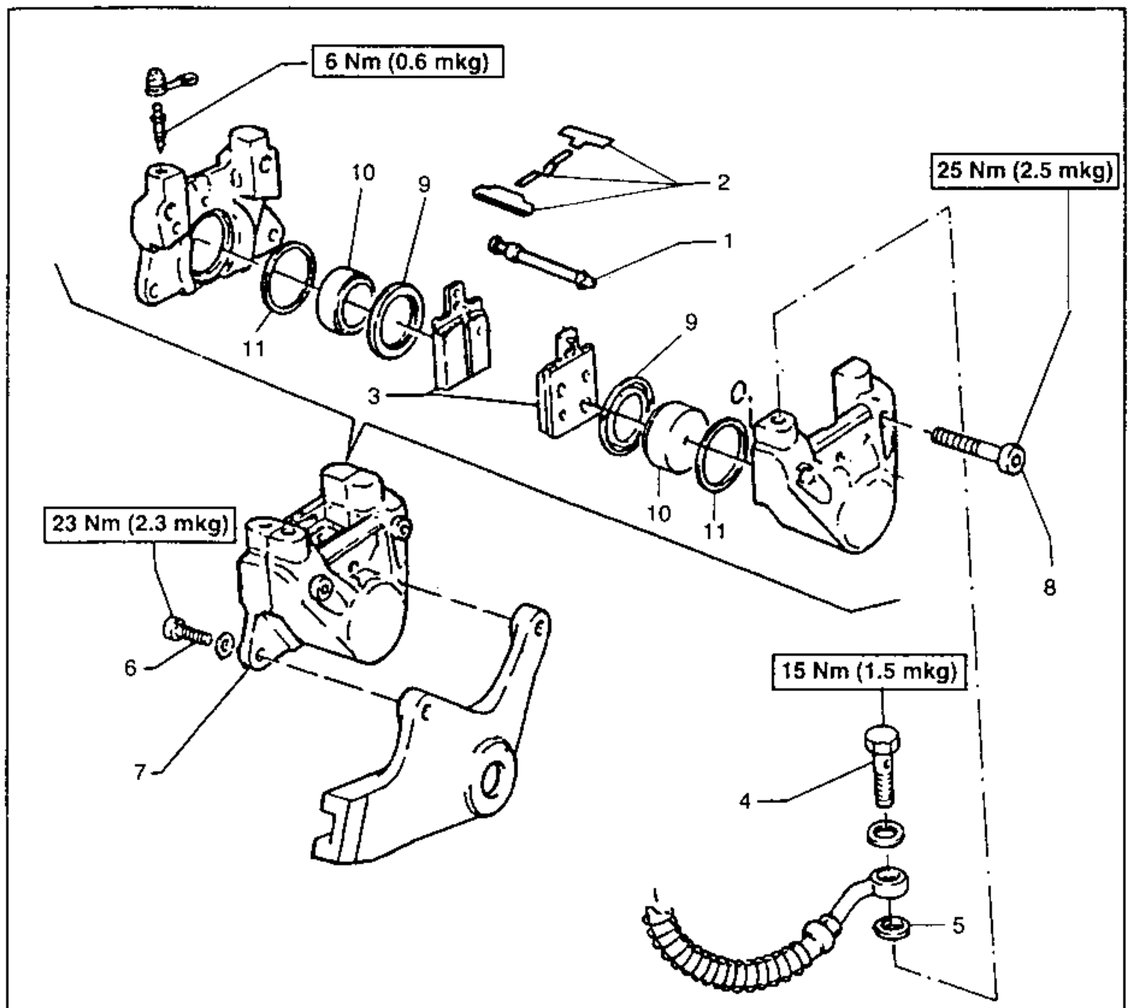
FRONT BRAKE CALIPER DISASSEMBLY



JOB INSTRUCTION CHART

Order	Job name/Part name	Q.ty	Remarks
	Removal and disassembling of front brake caliper		**Remove the parts in the order.** **NOTE:** Before disassembling the brake caliper drain off the fluid from the braking circuit. **⚠ WARNING** **Support the motorcycle securely to prevent it falling over.**
1	Lock spring	1	
2	Pad pin	1	
3	Spring	1	**NOTE:** Blowing compressed air into the hose connection, make the piston leave the body of the caliper.
4	Brake pad	2	
5	Screw (fastening the hose)	1	
6	Screw	2	
7	Screw	4	
8	Piston	4	**⚠ WARNING** • **Do not force the piston out with a lever or other tools.** • **Cover the piston with a rag. Be careful to prevent the piston from damaging the cylinder as it leaves it.**
9	Dust seal	4	
10	Oil seal	4	
			Reverse the procedure for assembling and installation.
			NOTE: After completing the reassembly operations, fill brake circuit with prescribed fluid. Bleed the air from the circuit. See the section "AIR BLEEDING" in chapter 3°.

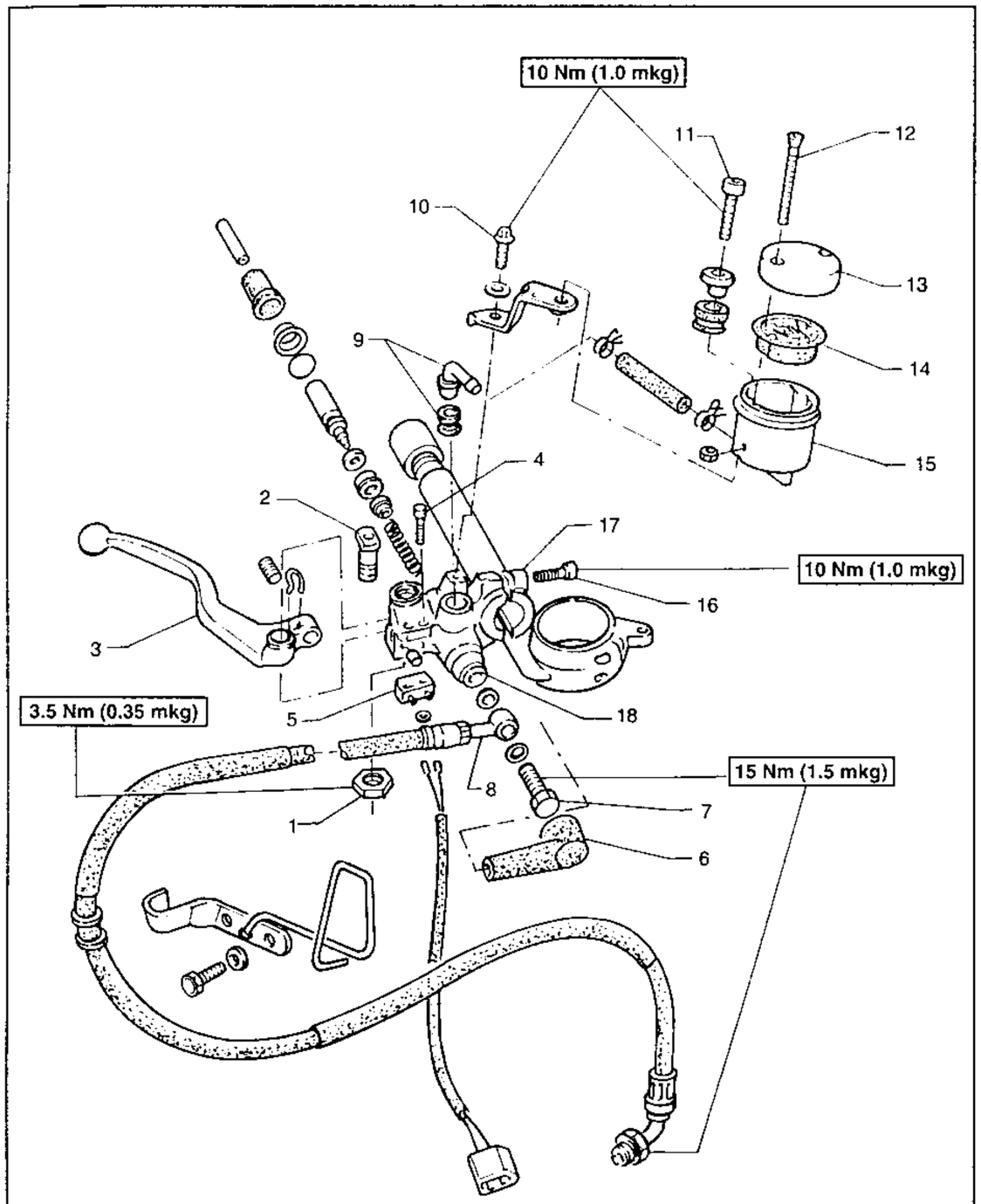
REAR BRAKE CALIPER DISASSEMBLY



JOB INSTRUCTION CHART

Order	Job name/Part name	Q.ty	Remarks
	Removal and disassembly of rear brake caliper		**Remove the parts in the order.** **NOTE:** Before disassembling the brake caliper drain off the fluid from the braking circuit.
1	Pad pin	1	
2	Spring	3	
3	Brake pad	2	**⚠ WARNING** **Support the motorcycle securely to prevent it falling over.**
4	Screw	1	
5	Brake hose	1	
6	Screw	2	
7	Caliper (unit)	1	**NOTE:** Blowing compressed air into the hose connection, make the piston leave the body of the caliper.
8	Screw	2	
9	Dust seal	2	
10	Piston	2	**⚠ WARNING** • **Do not force the piston out with a lever or other tools.** • **Cover the piston with a rag. Be careful to prevent the piston from damaging the cylinder as it leaves it.**
11	Oil seal	2	
			Reverse the procedure for assembling and installation.
			NOTE: After completing the reassembly operations, fill brake circuit with prescribed fluid. Bleed the air from the circuit. See the section "AIR BLEEDING" in chapter 3°.
			⚠ WARNING **Replace the copper seal gaskets of brake hose fastening screw every time the screw is removed.**

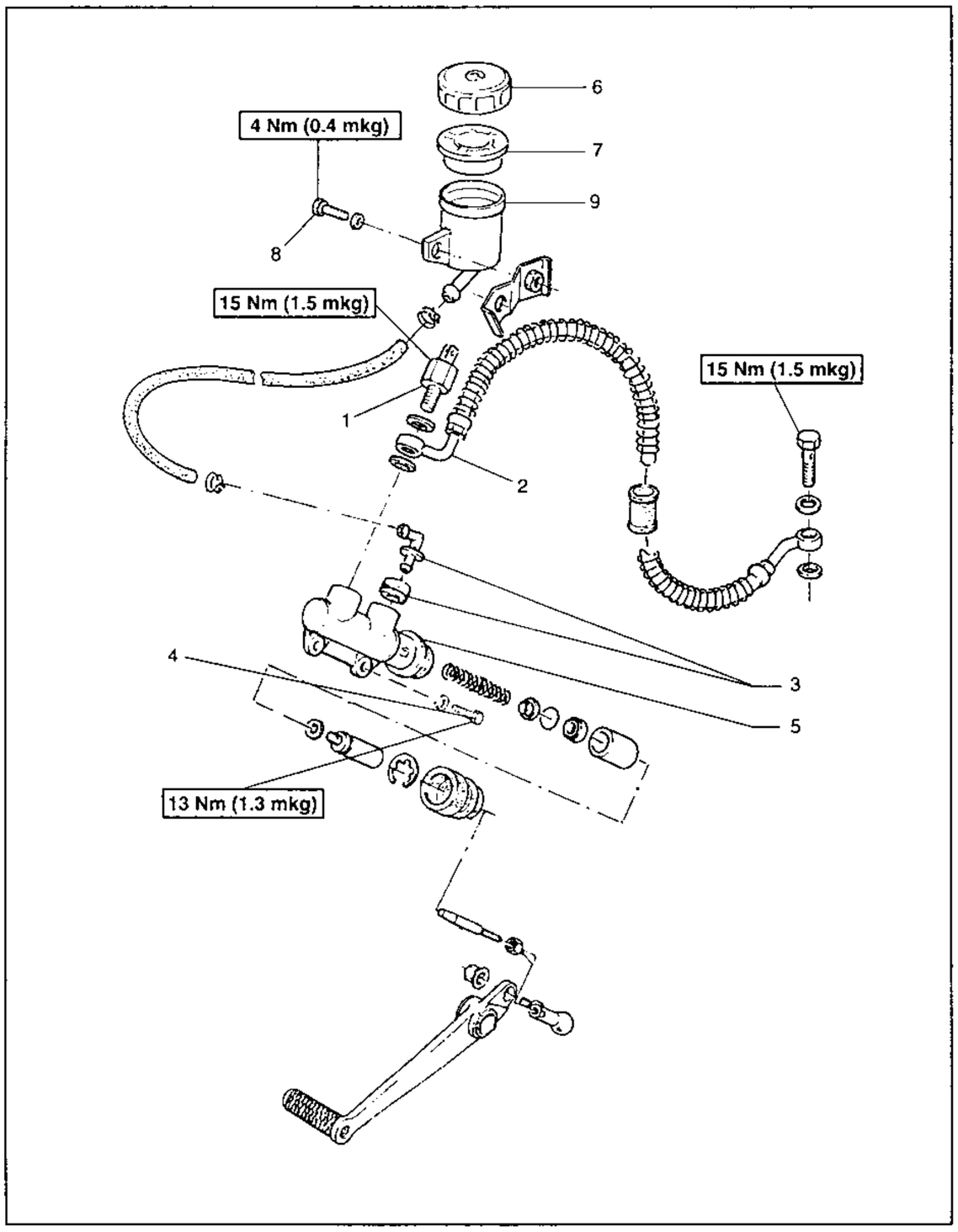
FRONT MASTER CYLINDER DISASSEMBLY



JOB INSTRUCTION CHART

Order	Job name/Part name	Q.ty	Remarks
	Removal and disassembly of front master cylinder		**Remove the parts in the order.** **NOTE:** Before removing the master cylinder, drain off the fluid from the braking circuit. **⚠ WARNING** **Support the motorcycle securely to prevent it falling over.**
1	Nut	1	
2	Bolt	1	
3	Brake lever	1	
4	Screw	2	
5	Stop switch	1	
6	Rubber cover (detach)	1	
7	Screw	1	
8	Brake hose	1	
9	Joint (whit gasket)	1	
10	Screw	1	
11	Screw	1	
12	Screw	2	
13	Cover	1	
14	Diaphragm	1	
15	Fluid tank	1	
16	Screw	2	
17	Bracket	1	
18	Master cylinder unit	1	**Reverse the procedure for assembling and installation.** **⚠ WARNING** **Replace the copper seal gaskets of brake hose fastening screw every time the screw is removed.** **NOTE:** After completing the reassembly operations, fill brake circuit with prescribed fluid. Bleed the air from the circuit. See the section "AIR BLEEDING" in chapter 3°.

REAR MASTER CYLINDER DISASSEMBLY



JOB INSTRUCTION CHART

Order	Job name/Part name	Q.ty	Remarks
	Removal and disassembling of rear master cylinder		**Remove the parts in the order.** NOTE: Before removing the master cylinder, drain off the fluid from the braking circuit. ⚠ WARNING **Support the motorcycle securely to prevent it falling over.**
1	Brake switch	1	NOTE: Before removing the brake switch, disconnect the switch connector.
2	Brake hose	1	
3	Joint (with gasket)	1	
4	Screw	2	
5	Master cylinder unit	1	
6	Tank cover	1	
7	Tank diaphragm	1	
8	Screw	1	
9	Fluid tank	1	**Reverse the procedure for assembling and installation.** ⚠ WARNING **Replace the copper seal gaskets of brake hose fastening screw every time the screw is removed.** NOTE: After completing the reassembly operations, fill brake circuit with prescribed fluid. Bleed the air from the circuit. See the section "AIR BLEEDING" in chapter 3".

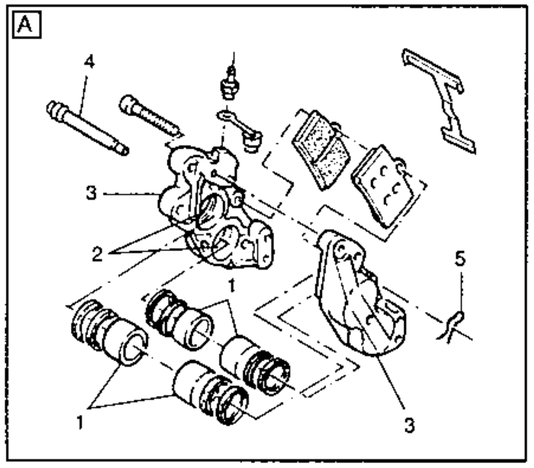
INSPECTION AND REPAIR

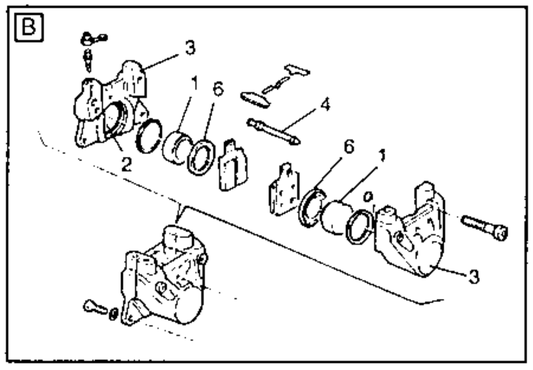
Recommended programme for the replacement of brake system components:

Pads	When necessary
Sealing elements, rear caliper dust cover	Every 2 years
Front and rear master cylinder unit, front caliper	In the event of brake fluid leakage
Brake hoses	Every 4 years
Brake fluid	Replace only after disassembling brake

⚠ WARNING

Internal parts must be washed only with clean brake fluid. Do not use solvents to prevent sealing elements from becoming misshapen or swollen.





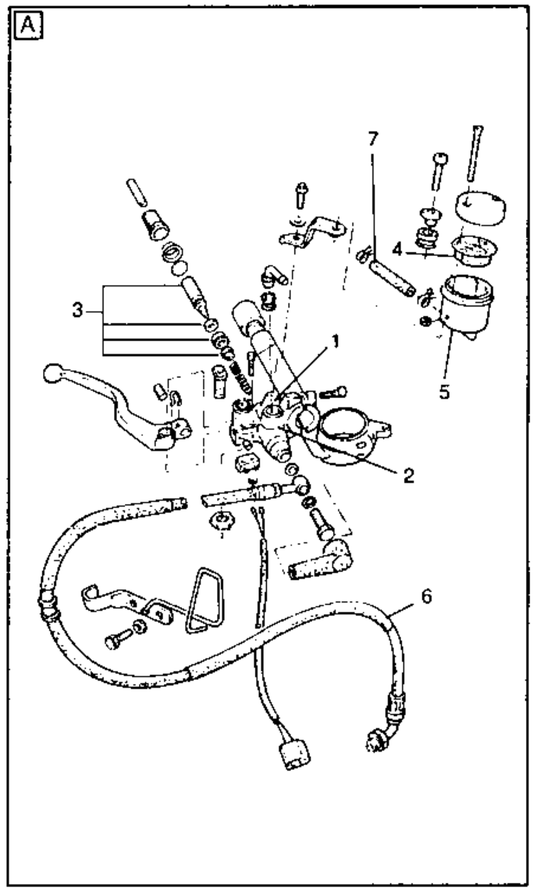
1. Inspect:
   - Caliper pistons (1)
     Rust/Wear/Damage → Replace caliper assembly.
   - Caliper cylinder (2)
     Scratching/Wear → Replace caliper assembly.

[A] Front
[B] Rear

2. Inspect:
   - Caliper body (3)
     Cracks/Damage → Replace.
   - Guide pin (4)
     Rust/Damage → Replace.
   - Lock spring (5)
     Rust/Damage → Replace.
   - Dust seals (6)
     Cracks/Wear/Damage → Replace.
   - Oil delivery passages (caliper body)
     Clean with a jet of compressed air.

⚠ WARNING

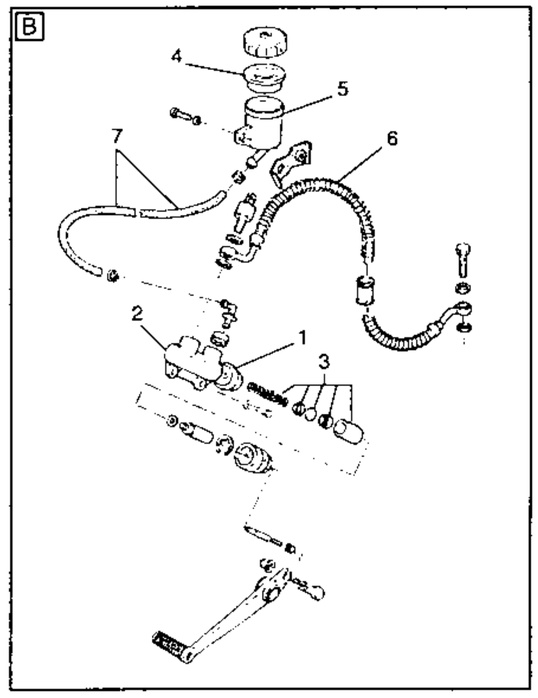
Replace the piston sealing element and dust seals every time the caliper is disassembled.

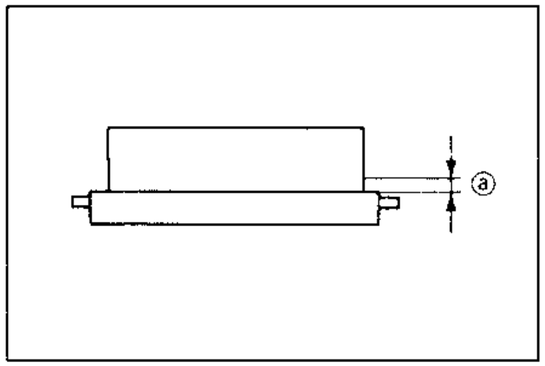


3. Inspect:
   - Master cylinder (1)
     Wear/Scratches → Replace master cylinder unit.
   - Master cylinder body (2)
     Cracks/Damage → Replace.
   - Oil feed passage (main cylinder)
     Clean with a jet of compressed air.

[A] Front
[B] Rear

4. Inspect:
   - Master cylinder piston unit (3)
     Scratches/Wear/Damage → Replace master cylinder unit.
5. Inspect:
   - Tank diaphragm (4)
     Wear/Damage → Replace.
   - Tank (5)
     Cracks/Damage → Replace.
6. Inspect:
   - Brake hoses (6)
   - Tank hose (7)
     Cracks/Wear/Damage → Replace.



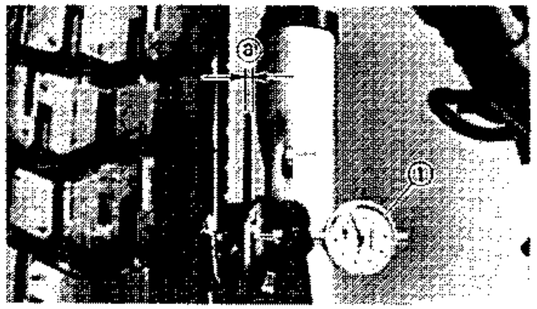


7. Measure:
   - Brake pad thickness
     Out of specification → Replace.

Pad wear limit (a):
Front: 0.8 mm
Rear: 0.8 mm

NOTE:
- Whenever you have to replace the pads, replace the spring too.
- Both pads have to be replaced even if only one is worn over the envisaged limit.

8. Inspect:
   - Brake disk (front and rear)
     Wear/Damage → Replace.



9. Measure:
   - Brake disk wobbling
     If over envisaged limits → Verify wheel centring.
     If the wheel centring is correct, replace the brake disk.

Maximum wobbling:
0.15 mm

   - Brake disk thickness
     If out of specified limits → Replace.

Minimum thickness (a):
Front: 3.5 mm
Rear: 4 mm

(1) Dial gauge

NOTE:
Tighten the brake disk screws in several successive stages in cross-over order.

Screws (brake disk):
Front: 23 Nm (2.3 mkg)
Rear: 23 Nm (2.3 mkg)
LOCTITE ® 242
MEDIUM THREAD LOCKING LIQUID

⚠ WARNING
- **All internal parts must be cleaned using only new brake fluid.**
- **Before reassembling the components, lubricate with brake fluid.**

Brake fluid:
DOT #4

- **Always use new copper washers.**
- **Always use new piston gaskets and dust covers.**

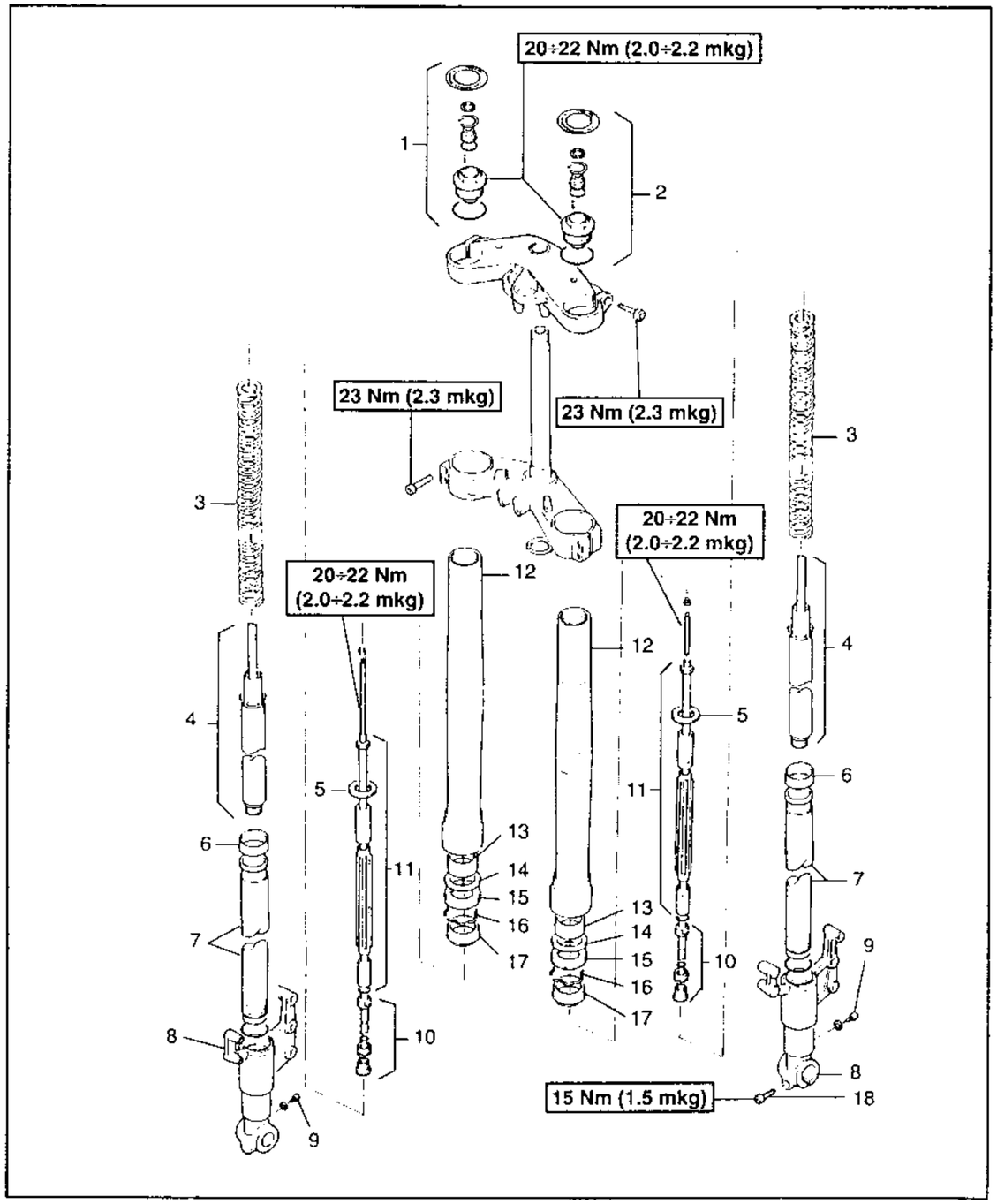
NOTE:
Apply lithium soap-base grease to the brake lever pin.

CAUTION:
The brake fluid may corrode painted surfaces and plastic parts. If it spills, clean immediately.

⚠ WARNING
- **The quality of the brake fluid used must conform to the prescribed standards, otherwise the rubber gaskets risk deteriorating, thus causing fluid leakage and poor brake functioning.**
- **Always use the same make of fluid. The mixing of different fluids may cause a chemical reaction harmful to the functioning of the brake.**
- **When adding fluid, be careful not to allow water to enter the tank. Water lowers the boiling point considerably provoking the so-called "vapour plug" phenomenon.**

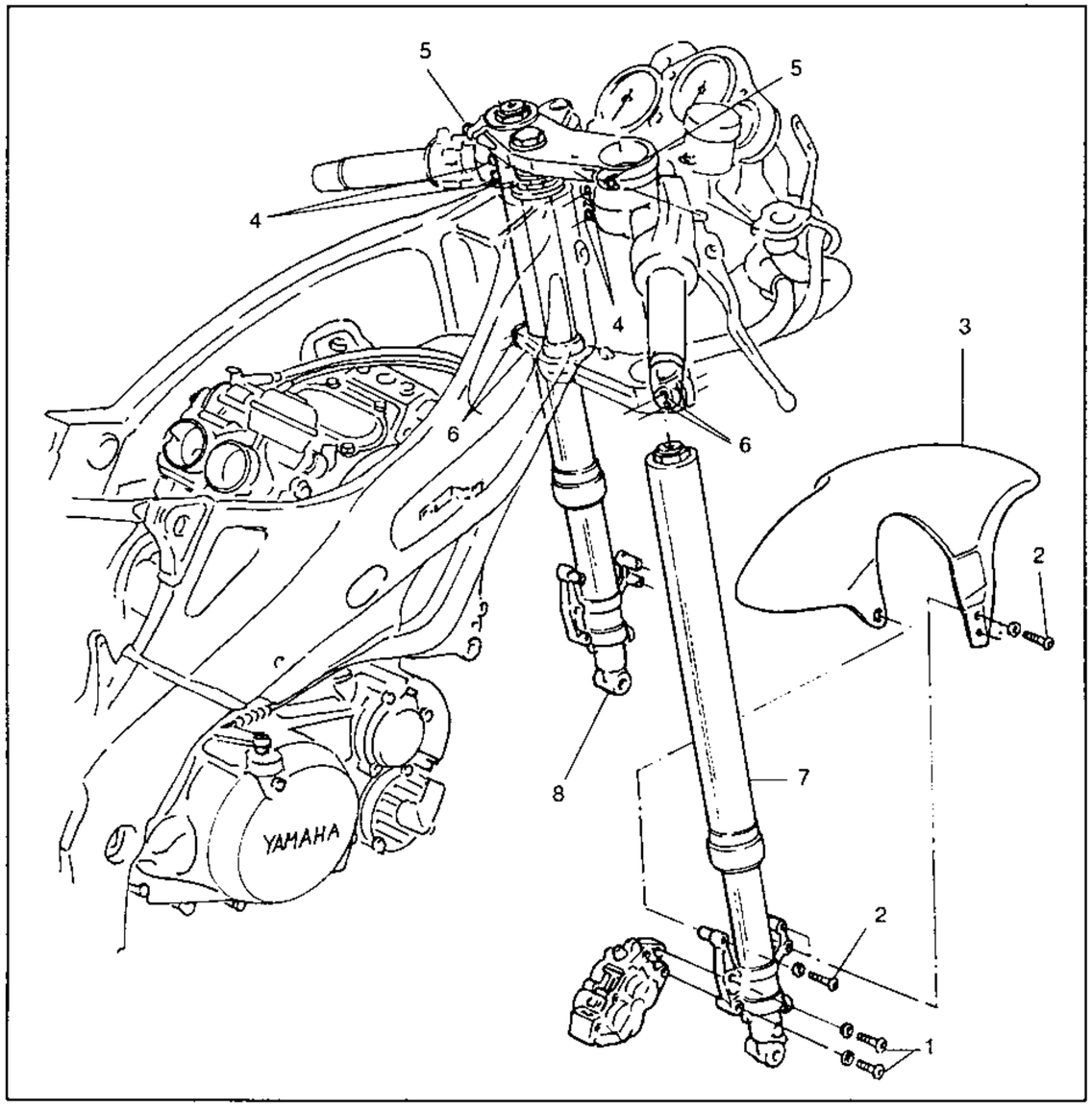
FRONT FORK

(1) Cap bolt assembly (R)
(2) Cap bolt assembly (L)
(3) Spring
(4) Cylinder unit
(5) Under spring sheet
(6) Metal slide
(7) Inner tube
(8) Axle bracket
(9) Binding head screw
(10) Plunger
(11) Damper rod
(12) Outer tube
(13) Metal slide
(14) Oil seal washer
(15) Oil seal
(16) Oil seal clip
(17) Dust seal
(18) Wheel axle fastening screw



FORK OIL CAPACITY (IN EACH TUBE): 300 cc
RECOMMENDED OIL: BEL RAY MC 10 SAE5
FORK OIL LEVEL: STANDARD: 130 mm From top of outer tube with inner tube and damper rod fully compressed without spring.
FORK SPRING FREE LENGTH: 402 mm
INNER TUBE BENDING LIMIT: 0.2 mm

REMOVAL



JOB INSTRUCTION CHART

Order	Job name/Part name	Q.ty	Remarks
	Removal of front fork		**Remove the parts in the order.**
			⚠ WARNING **Support the motorcycle securely to prevent it falling over.**
			NOTE: Before removing the forks, remove side panels (R and L) of cowling (see "COWLING" in chapter 3) and front wheel (see "REMOVAL - FRONT WHEEL in this chapter).
1	Screw (fastening brake caliper)	2	
2	Screw (fastening front fender)	6	
3	Fender	1	
4	Handle bar screw (loosen)	4	
5	Screw (handle crown)	2	
6	Screw (under bracket)	4	**NOTE:** Loosen the cap bolts before disassembling the front fork from the motorcycle.
7	Right fork	1	
8	Left fork	1	
			CAUTION: **Secure the brake caliper to frame to avoid damaging the brake hose.**
			NOTE: Secure odometer cable to frame to avoid damaging it.
			Reverse the removal procedure for installation.
			NOTE: Tighten the cap bolts after assembling the front fork to the motorcycle.

CAUTION:

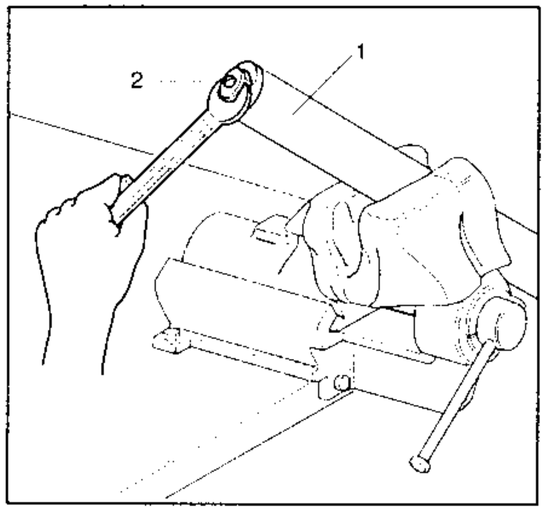
The operations described in the following paragraphs in this chapter refer to the disassembly of the left arm. To disassembly the right arm proceed as for the left, being especially careful not to confuse the components of the two arms at the reassembly stage, since they are not interchangeable.

OIL CHANGE

The quality of the oil contained in the suspensions is of fundamental importance for obtaining maximum performance and functioning.
For this reason it needs to be changed after the first 1,500 km to eliminate any residues due to the adaptation of the inner components and successively every 5,000÷6,000 km.

Recommended oil:
BEL RAY MC 10 SAE5

1. Clean:
   - Suspension forks
     Generally clean the suspension.

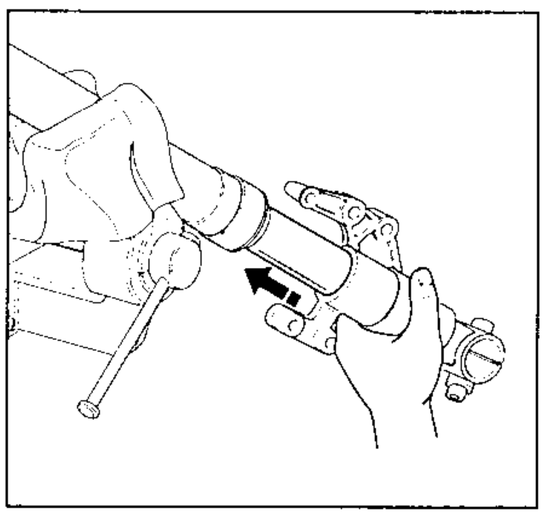


2. Block:
   - Suspension fork (1) in a vice (in the fixing zone of the lower bracket).

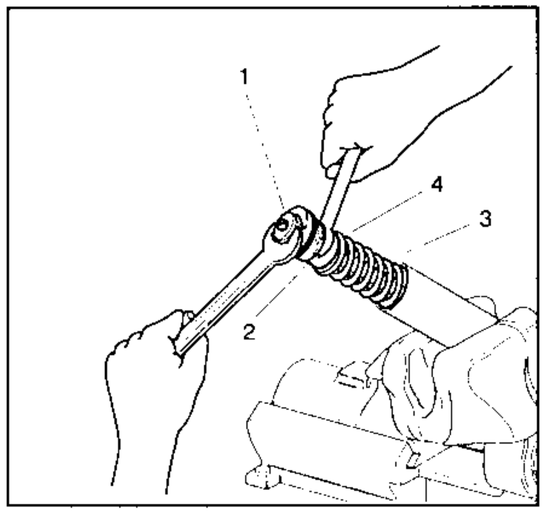
CAUTION:

Place a cloth between the teeth of the vice to protect the surface of the outer tube. Tighten the vice moderately in order not to ovalize the outer tube.

3. Remove:
   - Cap bolt (2) (loosen the cap bolt before disassembling the fork from the cycle)
     Use a 26 mm open-ended spanner.



NOTE:
To facilitate coming out of cap bolt push up the axle bracket as shown.

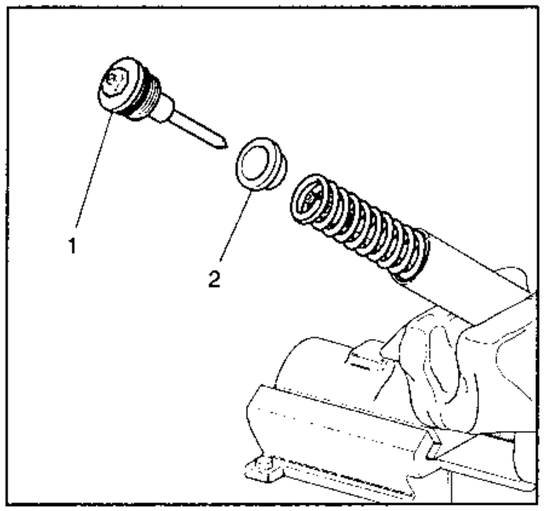


4. Withdraw:
   - Cap bolt (1) sufficiently in order to access the lock nut (2)

5. Lower:
   - Spring (3)

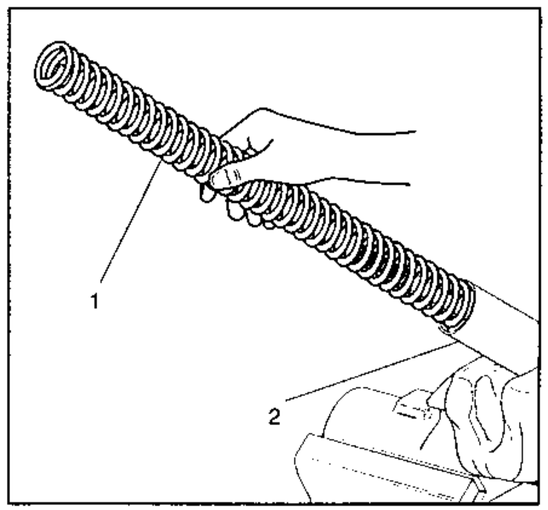
NOTE:
Lower the spring (3) using force keeping the spacer (4) against the spring.

6. Release:
   - Cap bolt (1) and lock nut (2)
     Use a 26 mm open-ended spanner on cap bolt and a 14 mm open-ended spanner on lock nut.



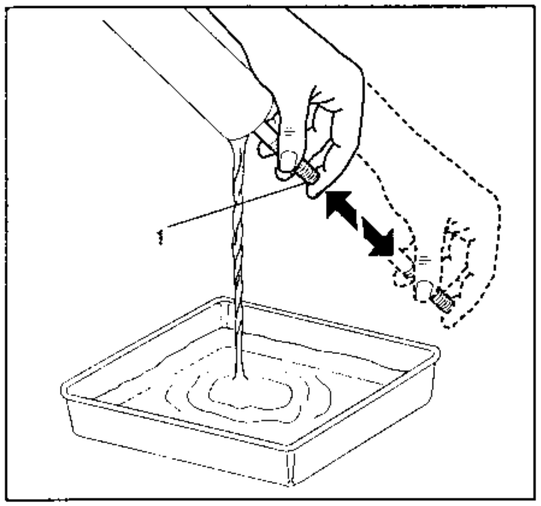
7. Unscrew:
   - Cap bolt (1) (completely)
8. Withdraw:
   - Spacer (2)

NOTE:
Place all the components in a clean area.



9. Withdraw:
   - Spring (1) from the outer tube (2)

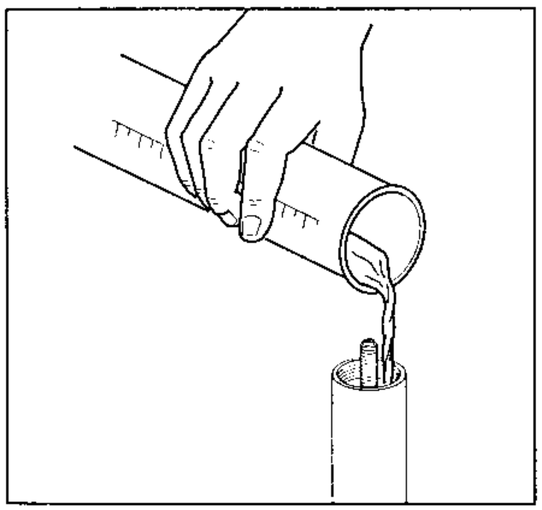
NOTE:
The spring, being immersed in oil could cause oil to drip onto the work surface when withdrawn. It is advisable therefore to withdraw it slowly and to dry it with a cloth.



10. Remove:
    - Outer tube from the vice
      Keep the cap bolt end upwards.

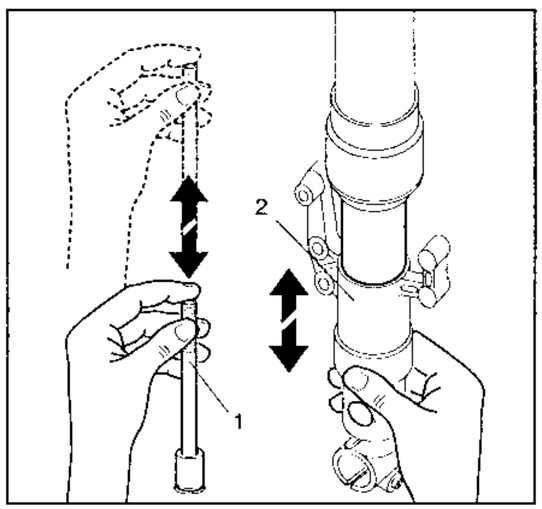
11. Pour:
    - Oil (into a tray)

NOTE:
While pouring the oil at the same time move the rod (1) backwards and forwards.



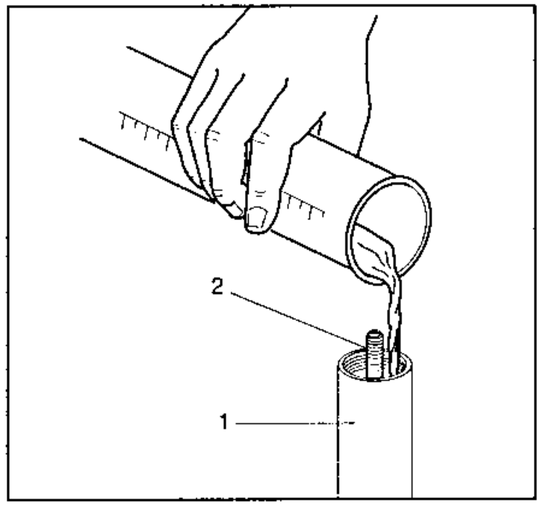
12. Pour in:
    - Part of the new oil (with the suspension in a vertical position)

Recommended oil:
BEL RAY MC 10 SAE5



13. Pump:
    - The rod (1) and axle bracket (2) attached to inner tube (alternatively until braking in the return run stroke feels homogenous).

NOTE:
During this operation it is advised to keep a finger over the hole on the end of the rod (1) in order to avoid possible oil splashes.



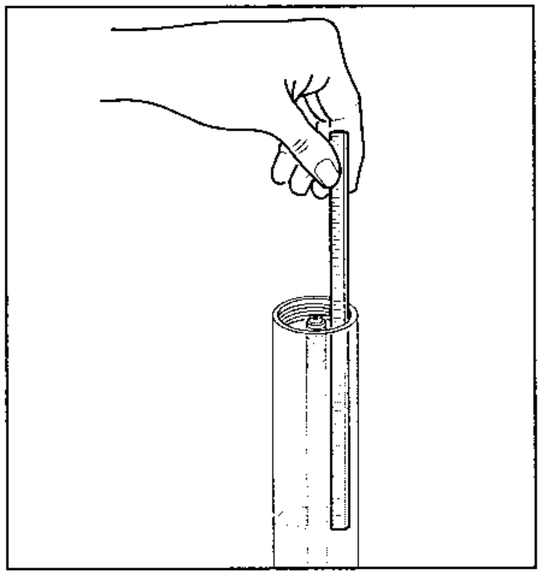
14. Compress:
    - Outer tube (1) and rod (2) (completely to the end of the stroke)

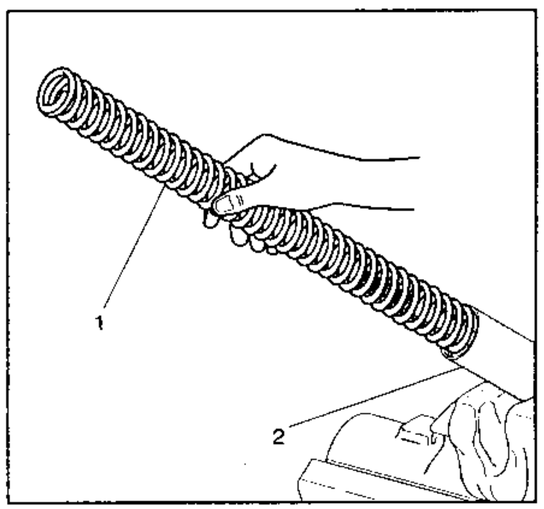
15. Complete:
    - Topping up of oil

Topping up procedure:
- Keep the fork in a perfectly upright position.
- Bring the level to 130 mm from the upper edge measured with a graduated dipstick or ruler.
- Only when the fork is completely dismounted in order to replace the seals/bushes or the inner tube can one use 300 cc of oil without measuring the level with a ruler. In all the other operations check the quantity of oil by measuring the level with a ruler.

Oil level:
130 mm from the upper edge (with inner tube and damper rod fully compressed without spring)

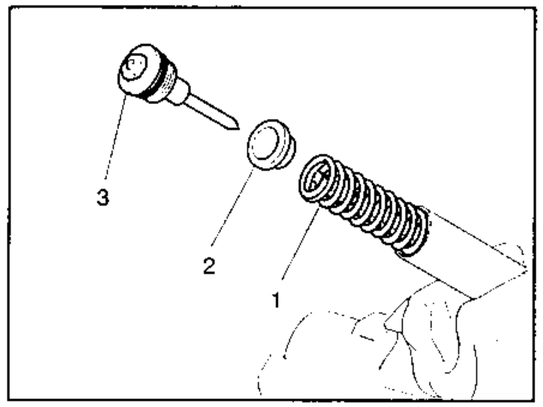
Recommended oil:
BEL RAY MC 10 SAE5



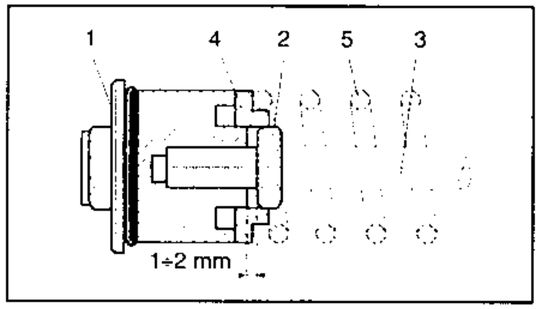


16. Insert:
    - Spring (1) into the outer tube (2)

NOTE:
Usually there is no particular sense in which the spring is mounted and so it may be inserted from either end.



17. Screw:
    - Lock nut (1) (by hand until it becomes tight)
18. Insert:
    - Spacer (2)
19. Install:
    - Cap bolt (3) (tighten until it becomes tight)

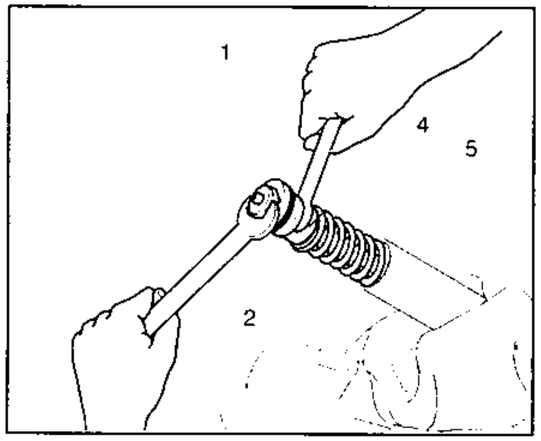


Cap bolt and spacer installation procedure:

- Check that there is a space of about 1÷2 mm between the cap bolt (1) and the lock nut (2) so ensuring that the cap bolt is completely tightened onto rod (3).

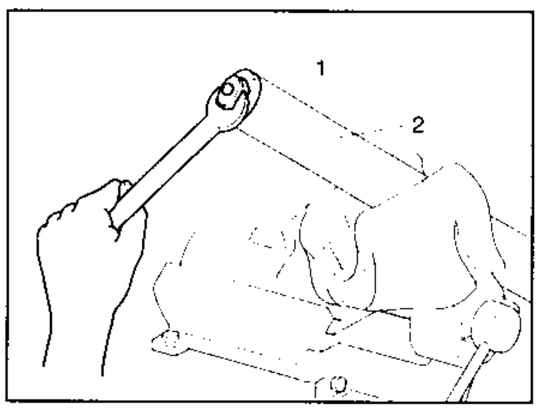
CAUTION:

This check ensures a maximum traction seal.



- Lower the spring using force keeping the spacer (4) tight against the spring (5), then insert a 14 mm open-ended spanner on lock nut (2) and a 26 mm open-ended spanner on cap bolt (1); tighten the two components to the specified torque.

	Cap bolt (1) and lock nut (2): 20 ÷ 22 Nm (2.0 ÷ 2.2 mkg)



20. Screw:
    - Cap bolt (1) onto the outer tube (2) (by hand for the first few turns, then using a 26 mm open-ended spanner)
21. Tighten:
    - Cap bolt (1) (to specified torque)

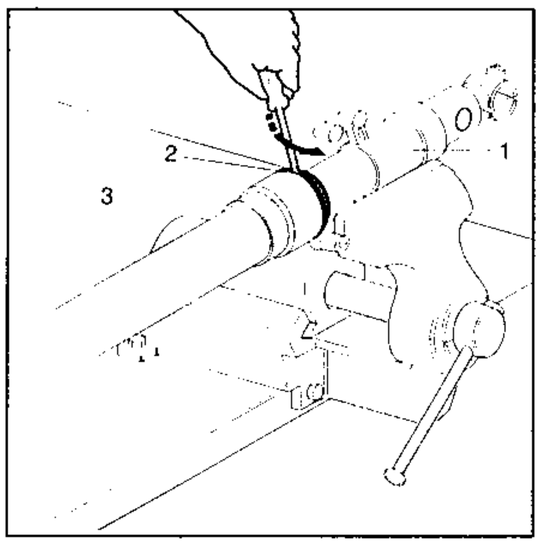
	Cap bolt: 20 ÷ 22 Nm (2.0 ÷ 2.2 mkg)

NOTE:

Tighten the cap bolts after assembling the front fork to the motorcycle.

CLEANING THE DUST SEAL

If dusty or muddy roads are frequently driven on it is advisable to clean the dust seal regularly in order to maintain the suspension at maximum efficiency. In fact, if dust infiltrates to the inside of the dust seal it can compromise the smoothness, and therefore the sensitivity of the suspension, and also cause the premature wear of the underlying oil seal.
Just a few simple operations then, guided by the following indications are necessary to maintain the optimum functioning of the suspension with time.

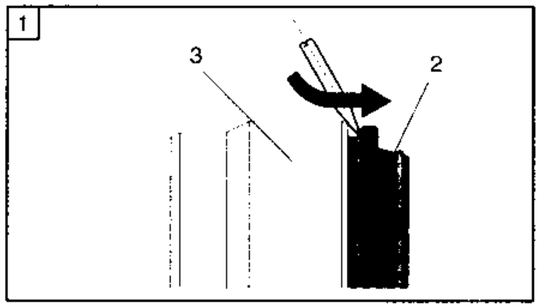


1. Block:
    - Suspension fork (1) in a vice (in horizontal position in the fixing zone of brake caliper onto axle bracket)

NOTE:

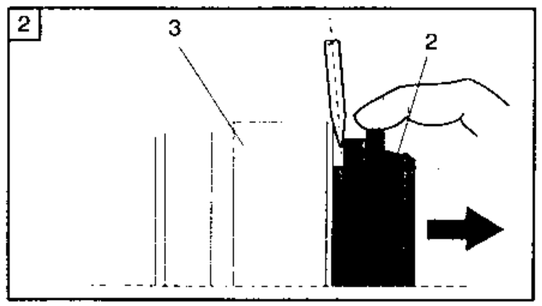
Place a cloth between the teeth of the vice to protect the surface of the axle bracket.

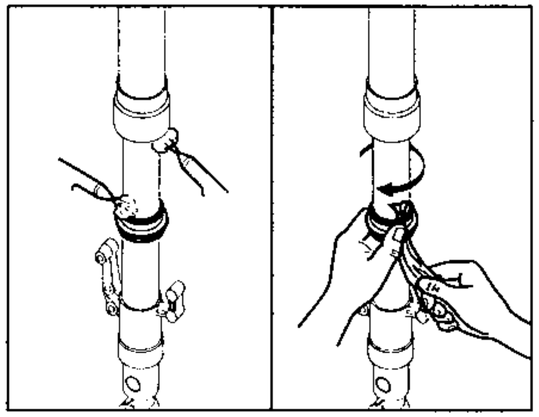
2. Dismount:
    - Dust seal (2) from outer tube (3)
3. Withdraw:
    - Dust seal (completely)

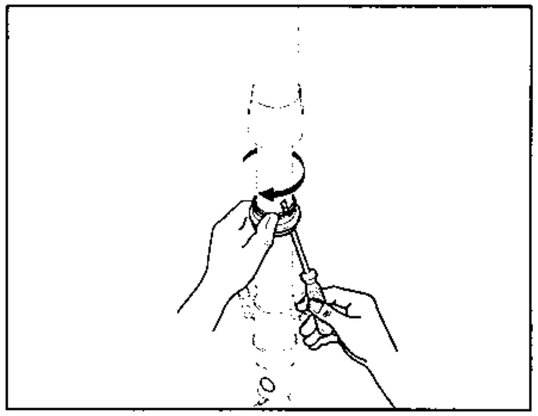


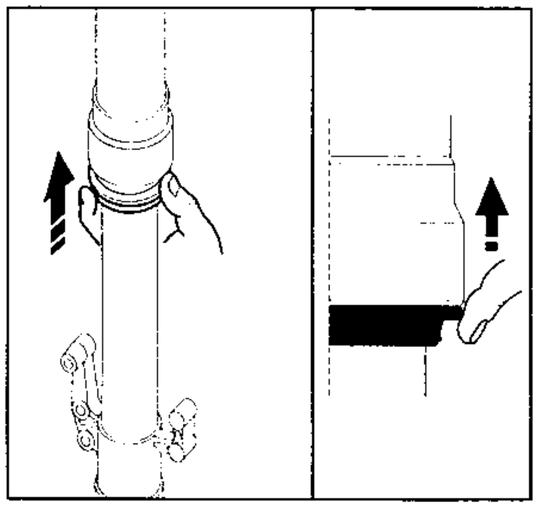
Dust seal dismounting sequence:

- With a screwdriver, prise the dust seal (2) from the outer tube (3).
- Then withdraw the dust seal using force.









4. Clean:
   - Dust seal

Dust seal cleaning procedure:

- Using a low pressure jet of compressed air clean the inside of the dust seal and the outer tube.
- Insert the edge of a cloth under the lip and, keeping the cloth steady, carefully clean the lip by rotating the dust seal.
- Using a small screwdriver take a small amount of silicon grease and insert it under the lip paying attention not to scratch it.
- Lubricate the dust seal by rotating it in such a manner that the grease is distributed in the inner part of the lip.

5. Remount:
   - Dust seal

Dust seal remounting sequence:

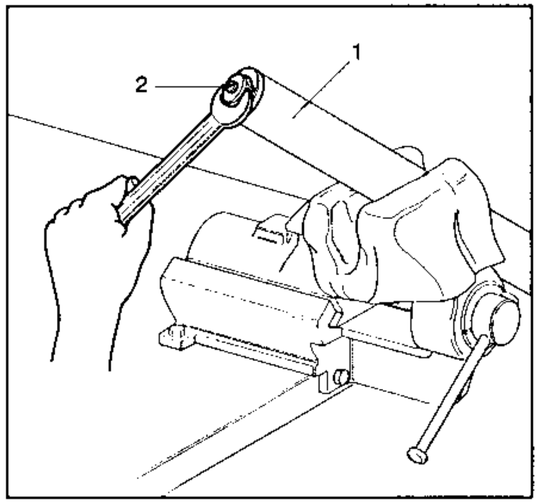
- Remount the dust seal inserting it with force into the outer tube.
- Check that the cup edge of the dust seal adheres perfectly to the cup.

REPLACING SEALS AND BUSHES

To ensure maximum efficiency of the suspension and therefore a greater duration and safety, every 10,000 km it is necessary to replace all the seals and slide bushes.

CAUTION:

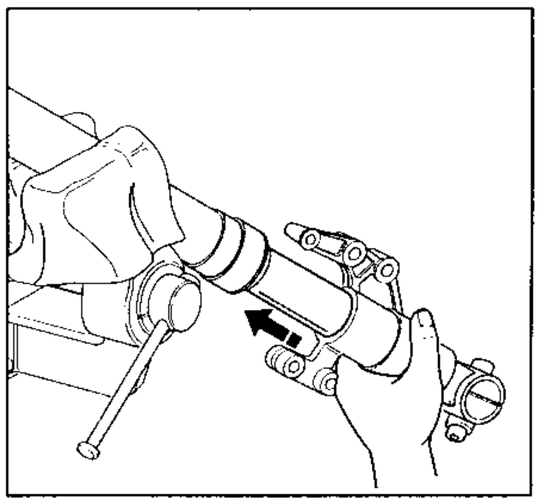
The operations sequence shown in the drawings in the following paragraph refer to the disassembly and reassembly of the left arm. It is fundamental to remember that the parts disassembled from this arm should be reassembled on it and not on the right arm, since - as it is possible to note when disassembling the arms, the adjustment rod of the left arm cap bolt is much shorter than the one on the right arm. Remember also that the cartridges are different. Be careful not to confuse them at the reassembly stage.



1. Clean:
   - Suspension forks
     Generally clean the suspension
2. Block:
   - Suspension fork (1) in a vice (in the fixing zone of the lower bracket)

CAUTION:

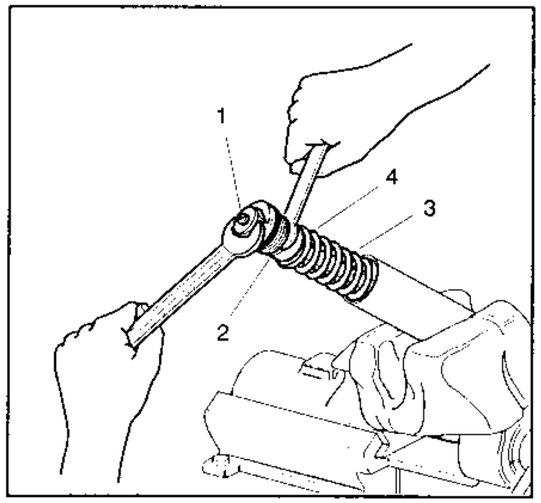
Place a cloth between the teeth of the vice to protect the surface of the outer tube. Tighten the vice moderately in order not to ovalize the outer tube.



3. Remove:
   - Cap bolt (2) (loosen the cap bolt before disassembling the fork from the cycle)
     Use a 26 mm open-ended spanner.

NOTE:

To facilitate coming out of cap bolt push up the axle bracket as shown.

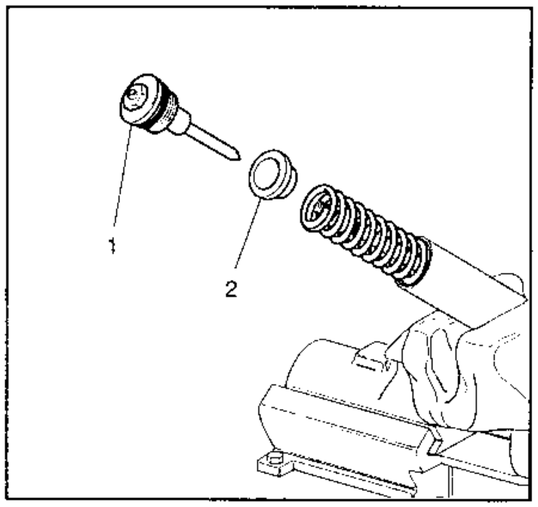


4. Withdraw:
   - Cap bolt (1) sufficiently in order to access the lock nut (2)

5. Lower:
   - Spring (3)

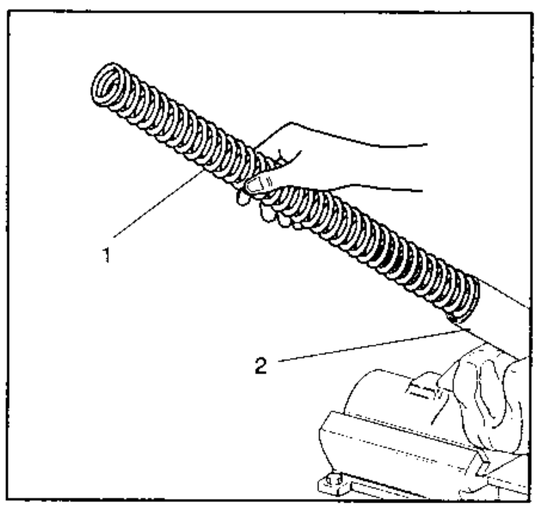
NOTE:
Lower the spring (3) using force keeping the spacer (4) against the spring.

6. Release:
   - Cap bolt (1) and lock nut (2)
     Use a 26 mm open-ended spanner on cap bolt and a 14 mm open-ended spanner on lock nut.



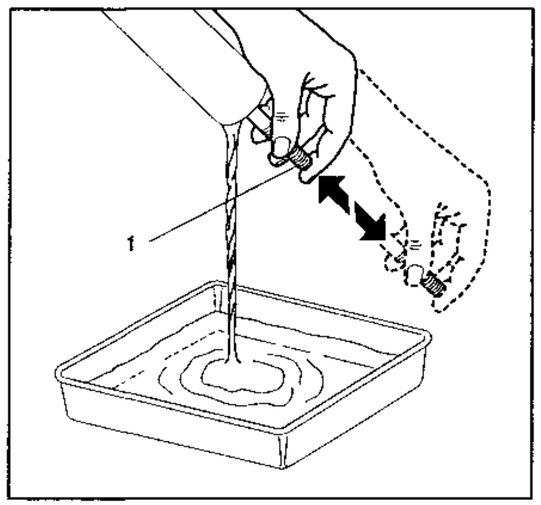
7. Unscrew:
   - Cap bolt (1) (completely)
8. Withdraw:
   - Spacer (2)

NOTE:
Place all the components in a clean area.



9. Withdraw:
   - Spring (1) from the outer tube (2)

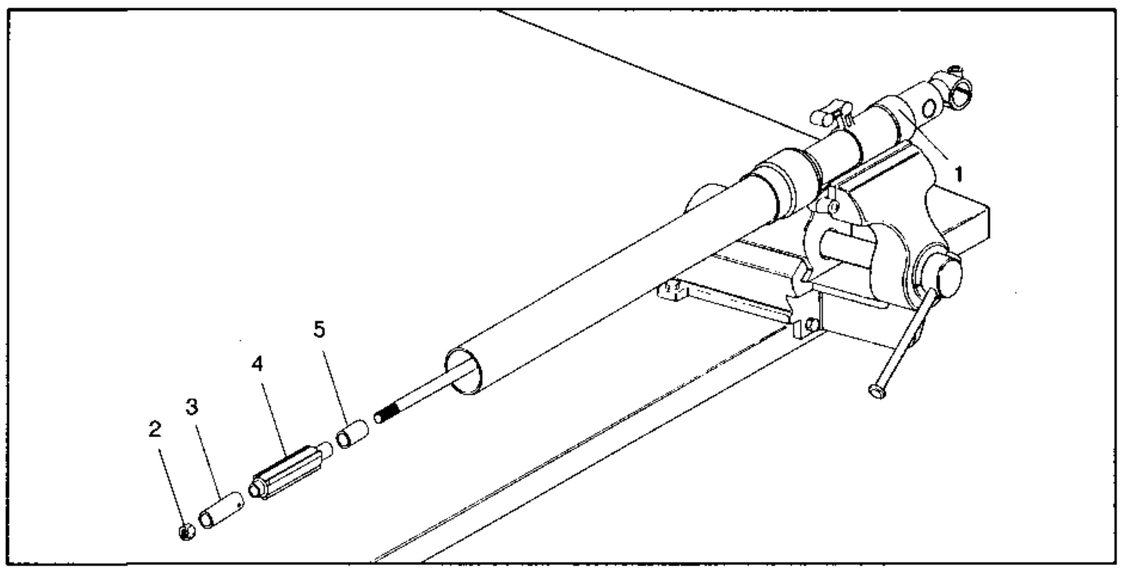
NOTE:
The spring, being immersed in oil could cause oil to drip onto the work surface when withdrawn. It is advisable therefore to withdraw it slowly and to dry it with a cloth.



10. Remove:
    - Outer tube from the vice
      Keep the cap bolt end upwards.

11. Pour:
    - Oil (into a tray)

NOTE:
While pouring the oil at the same time move the rod (1) backwards and forwards.

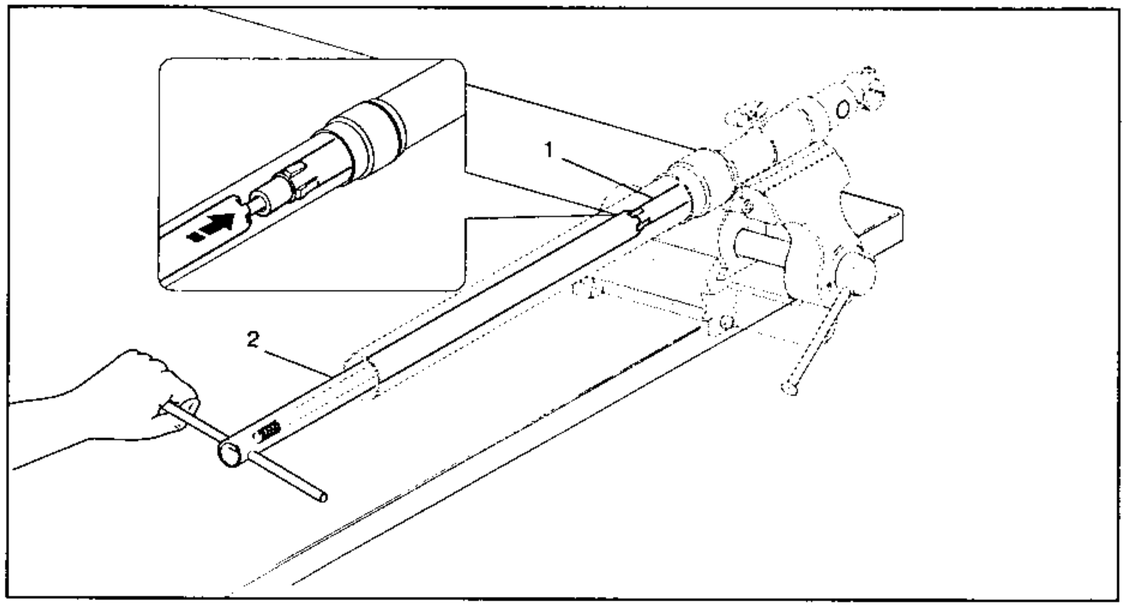


12. Block:
    - Suspension fork (1) in a vice (in horizontal position in the fixing zone of brake caliper onto axle bracket)

NOTE:
Place a cloth between the teeth of the vice to protect the surface of the axle bracket.

13. Uscrew:
    - Lock nut (2)
      Use a 14 mm open-ended spanner

14. Withdraw:
    - Lock nut (2)
    - Spacer (3)
    - Plastic spring guide (4)
    - Spacer (5)



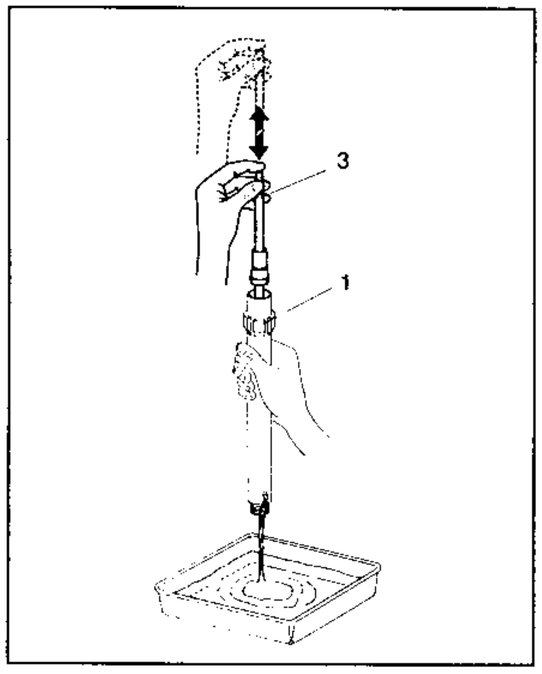
15. Loosen:
    - Cartridge (1)
      Use special tool (2) provided in the fork service kit assy

	Fork service kit assy: P/N 4SU-F8120-W0

16. Unscrew:
    - Cartridge (1) (completely)
17. Withdraw:
    - Cartridge (1)

NOTE:
During unscrewing ensure that the end of the spanner (2) is correctly engaged on the cartridge (1).

18. Empty:
    - Cartridge (1)



Draining oil procedure from the cartridge:

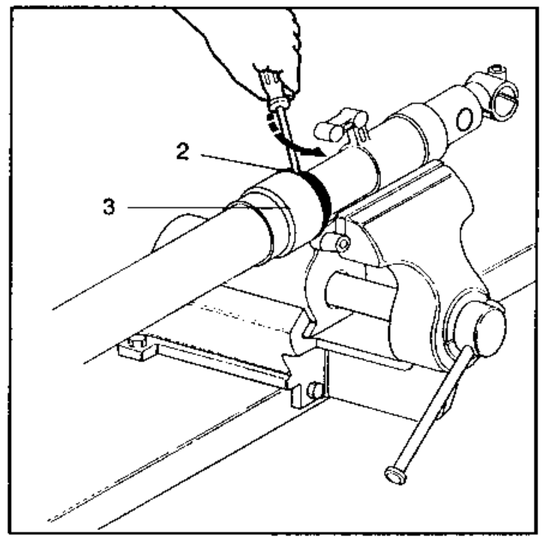
- Empty the cartridge completely by pumping the rod (3) backwards and forwards.

NOTE:
During this operation it is recommended to keep a finger over the hole on the end of rod (3) to avoid oil splashes.

19. Clean:
    - Outer tube (inside)
    - Cartridge (outside)

Cleaning procedure:

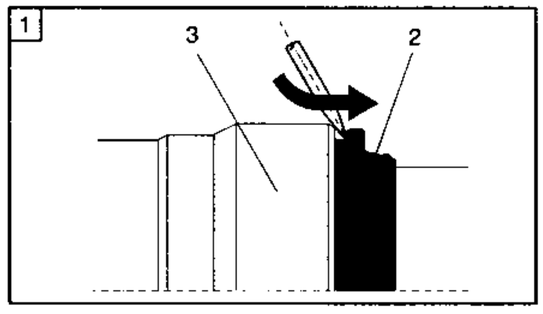
- Clean the inside of the outer tube and the outside of the cartridge with clean petrol taking care not to let petrol enter the inside of the cartridge through the two lower holes as it would seriously jeopardize its functioning.

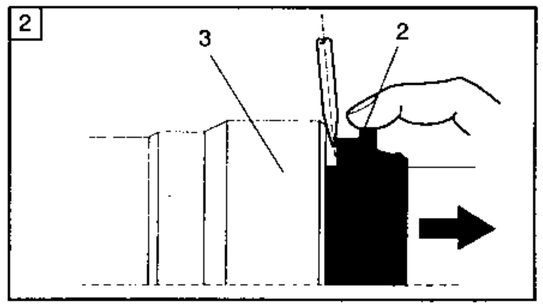


⚠ WARNING

Never tamper with the cartridge! Tampering with the cartridge can jeopardize the safety of the front fork.

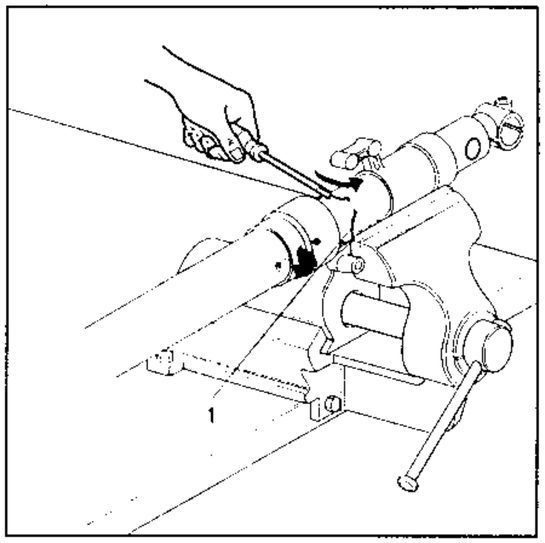
20. Prise:
    - Dust seal (2) from the outer tube (3)
21. Withdraw:
    - Dust seal (completely)





Dust seal dismounting sequence:

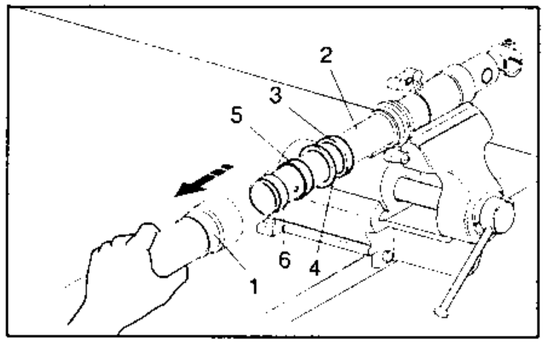
- With a screwdriver prise the dust (2) from the outer tube (3).
- Withdraw the dust seal using force.



22. Withdraw:
    - Oil seal clip (1) (from its seat)

CAUTION:

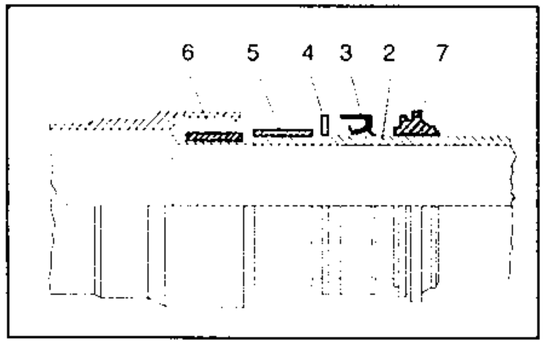
Use a screwdriver to withdraw the clip, taking care not to scratch the outer tube.



23. Withdraw:
    - Outer tube (1) from inner tube (2) (with a few sharp blows)

NOTE:

The oil seal (3), the washer (4), the DU bush (5) for the outer tube and the DU bush (6) for the inner tube are present on the inner tube and must be removed and substituted.

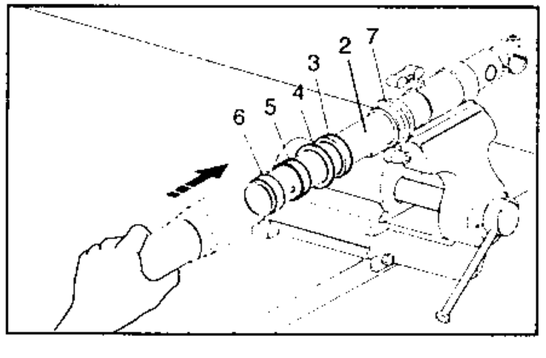


24. Withdraw:
    - All parts from inner tube (one at a time)

25. Replace (one at a time):
    - Dust seal (7)
    - Oil seal (3)
    - Washer (4)
    - DU bush (5) for the outer tube
    - DU bush (6) for the inner tube

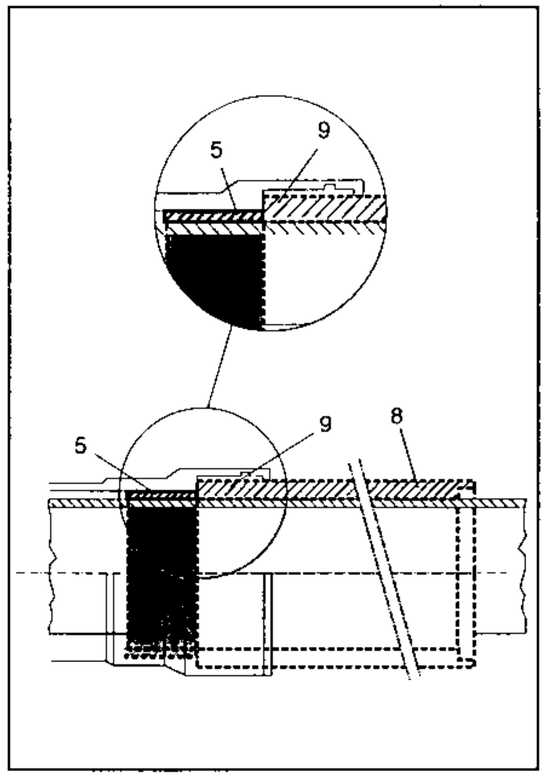
NOTE:

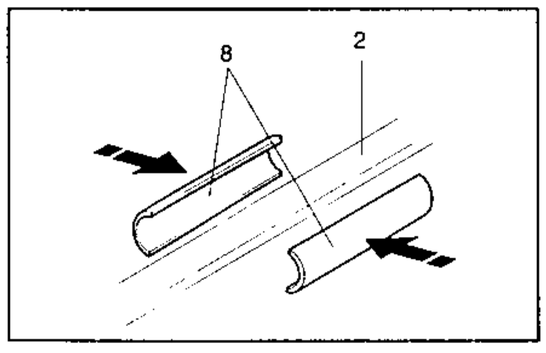
Check that the DU bush (6) for the inner tube is fitted properly inside its housing at the end of the inner tube (2).

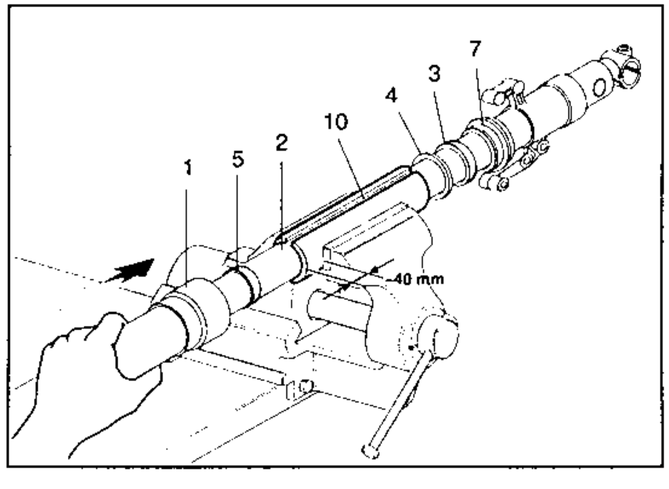


CAUTION:

Unlike the two DU bushes (5 and 6) and the washer (4), the oil seal (3) and dust seal (7) have to be fitted to the inner tube in a specific direction. This must be respected at all times avoid compromising the functioning of the front fork.







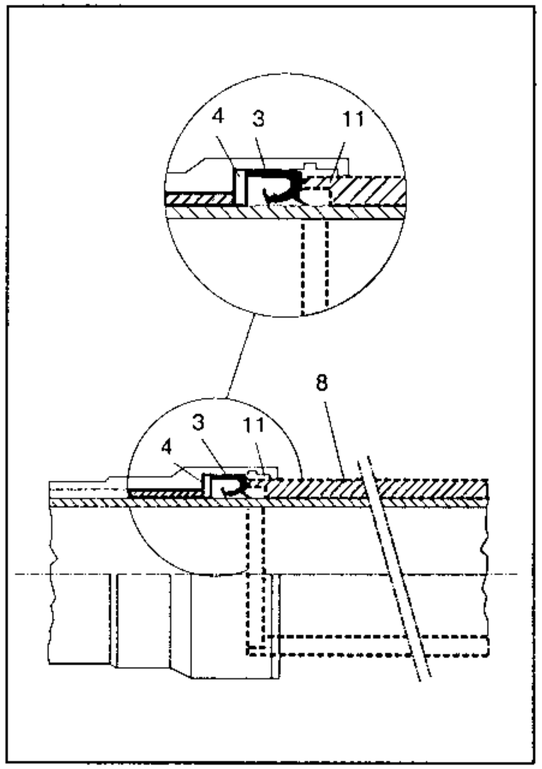
26. Assemble:
    - DU bush (5) into the outer tube

Sequence of DU bush assembly:

- Take the outer tube DU bush (5) by the outer tube housing side and assemble the special tool (8), supplied in the kit, to the inner tube (2).

Fork service kit assy:
P/N 4SU-F8120-W0

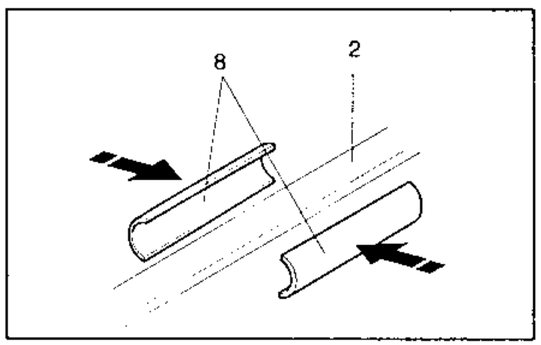
- Assemble the tool with bush fitting side (9) facing the outer tube DU bush (5), remembering to leave the dust seal (7), oil seal (3) and washer (4) on the other side of the vice on which the axle bracket is positioned.
- Lock tool (8) in a vice, holding the joint sides (10) facing upwards and downwards, and making the tool jut out sideways on the outer tube (1) and DU bush (5) by at least 40 mm from the vice.
- After locking the vice, hold the outer tube firmly, and then vigorously push it against the tool until the outer tube DU bush (5) enters tightly into its housing.
- Remove the suspension fork from the vice and disassemble the tool.

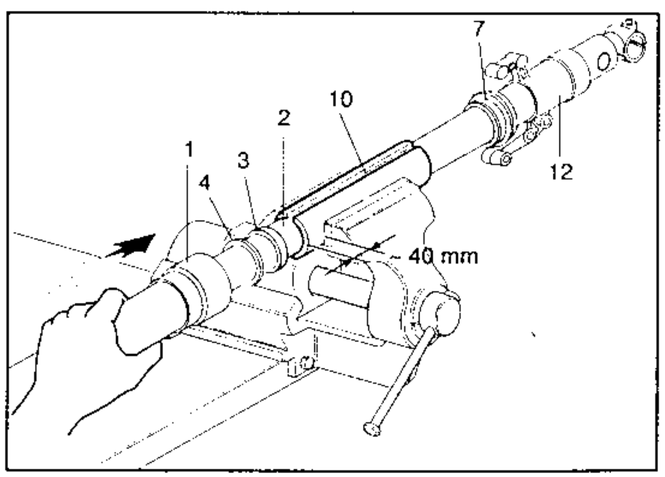


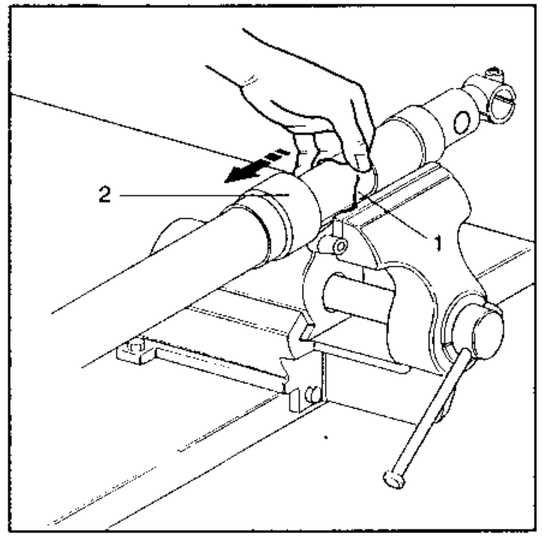
27. Install:
    - Oil seal (3) onto the outer tube

Oil seal mounting sequence:

- Take the washer (4) and oil seal (3) by the outer tube housing side and assemble the special tool (8) to the inner tube (2) with oil seal fitting side (11) facing the oil seal (3), remembering to leave the dust seal (7) on the other side of the vice on which the axle bracket (12) is positioned.
- Lock tool (8) in a vice, holding the joint sides (10) facing upwards and downwards, and making the tool jut out sideways on the outer tube (1) and oil seal (3) by at least 40 mm from the vice.
- After having tightened the vice, grip the outer tube and with a few energetic blows, hit it against the tool; after each blow rotate the outer tube slightly in order to mount the oil seal correctly and until it is completely in its seat.
- Remove the suspension fork from the vice and disassemble the tool.





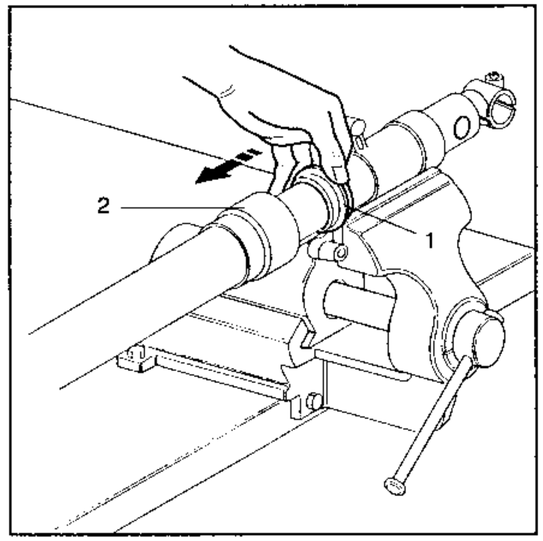


28. Clamp:
    - Suspension fork

NOTE:
Clamp the suspension horizontally in the vice fastening it by brake caliper attachment on the axle bracket.

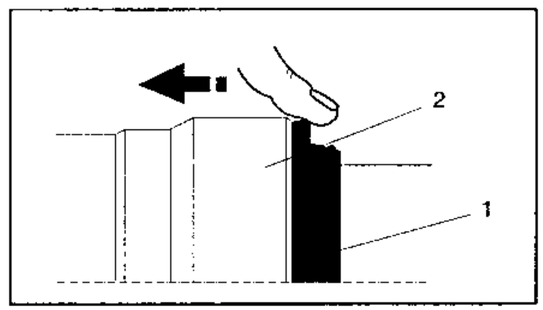
29. Install:
    - Oil seal clip (1)

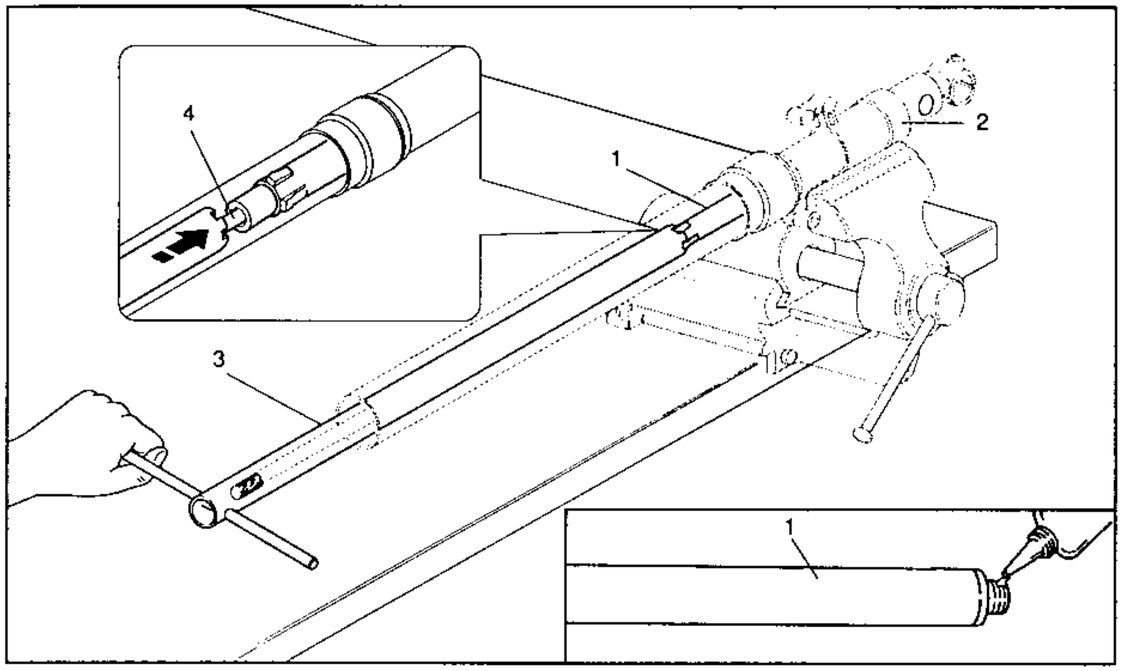
CAUTION:
Check that the stop ring is correctly seated inside the outer tube (2).



30. Install (using force):
    - Dust seal (1) (new) onto outer tube (2)

NOTE:
Check that the cup edge of the dust seal adheres perfectly to the outer tube.





31. Install:
    - Cartridge (1) into outer tube (2)

Mounting procedure:

- After having checked that the cartridge and the inside of the outer tube are clean, pour a few drops of medium thread locking compound LOCTITE® 242 on the first 2÷3 complete turns of the thread of the cartridge.

NOTE:

Remove any traces of oil that there may be on the cartridge thread and on the caliper bracket as it could jeopardize the locking properties of the thread locking liquid.

- Mount the cartridge using the socket spanner (3) provided in the fork service kit assy.

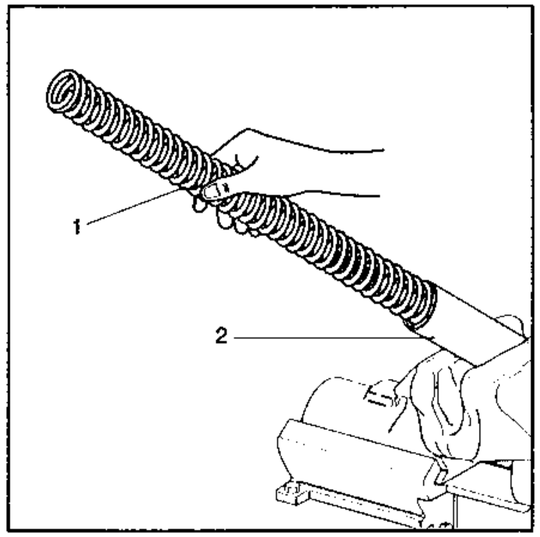
	Fork service kit assy: P/N 4SU-F8120-W0

- Tighten the cartridge to the specified torque.

	Cartridge: 25 Nm (2.5 mkg) LOCTITE® 242

CAUTION:

During tightening ensure that the end of the spanner (4) is correctly engaged on the cartridge (1).



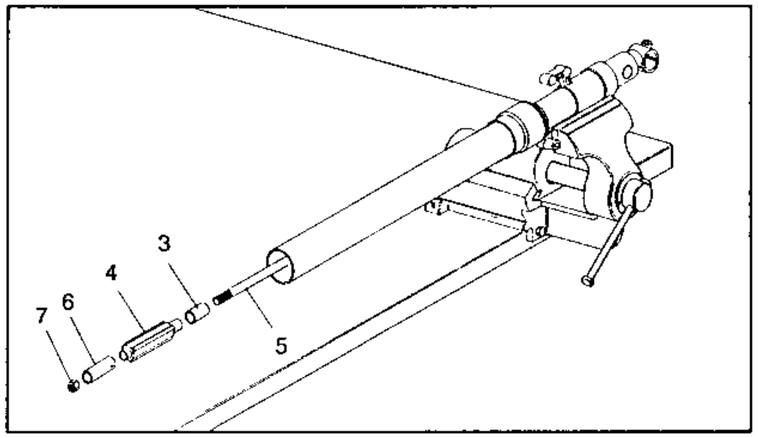
32. Insert:
    - Spring (1) in the outer tube (2)

NOTE:

Usually there is no particular sense in which the spring is mounted and so it may be inserted from either end.

33. Install (one at a time):
    - Spacer (3)
    - Plastic spring guide (4) onto inner tube (5)
    - Spacer (6) with holes corresponding with those on the rod

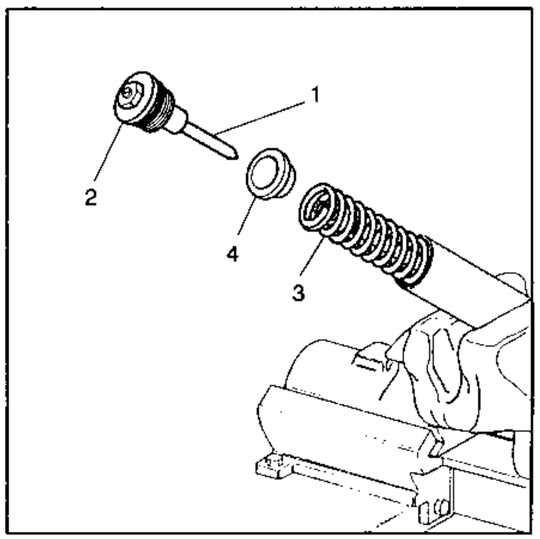
34. Screw:
    - Lock nut (7) (down to bottom of thread)



35. Remove:
    - Suspension fork (from the vice)

36. Fill:
    - New oil (in the suspension fork)

37. Check:
    - Oil level
      See the "OIL CHANGE" paragraph in this chapter.



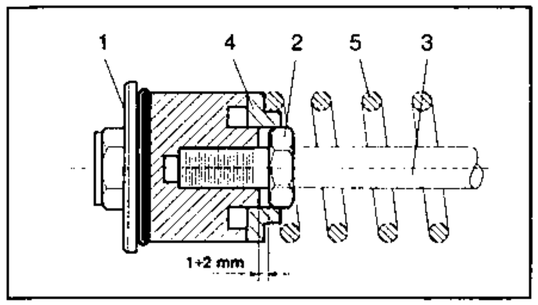
NOTE:

Remember that these operations and illustrations refer to the left arm. The only difference between the two arms is that the setting rod (1) of the cap bolt (2) on right arm is shorter than the one on the left arm cap.

38. Screw:
    - Lock nut (3) (by hand until it becomes tight)

39. Insert:
    - Spacer (4)

40. Install:
    - Cap bolt (2) (until it becomes tight)

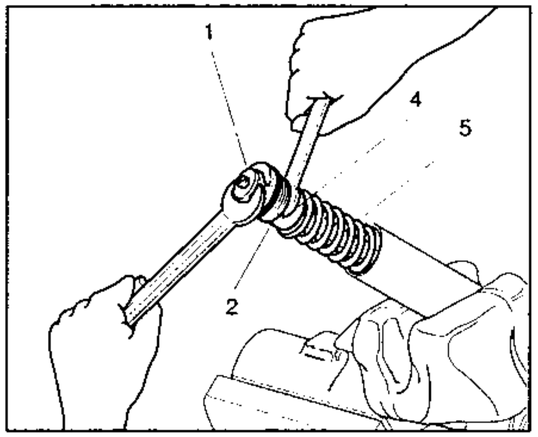


Cap bolt and spacer installation procedure:

- Check that there is a space of about 1÷2 mm between the cap bolt (1) and the lock nut (2) so ensuring that the cap bolt is completely tightened on to rod (3).

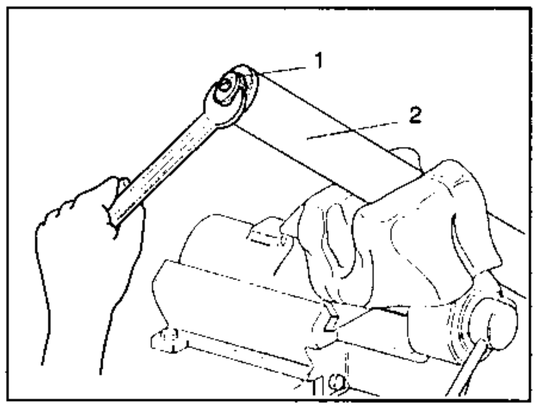
CAUTION:

This check ensures a maximum traction seal.



- Lower the spring using force keeping the spacer (4) tight against the spring (5), then insert a 14 mm open-ended spanner on lock nut (2) and a 26 mm open-ended spanner on cap bolt (1); tighten the two components with the specified torque.

	Cap bolt (1) and lock nut (2): 20 ÷ 22 Nm (2.0 ÷ 2.2 mkg)



41. Screw:
    - Cap bolt (1) onto the outer tube (2) (by hand for the first few turns, then using a 26 mm open-ended spanner)

42. Tighten:
    - Cap bolt (1) (to specified torque)

	Cap bolt: 20 ÷ 22 Nm (2.0 ÷ 2.2 mkg)

NOTE:

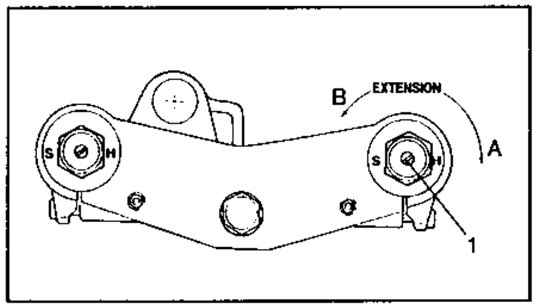
Tighten the cap bolts after assembling the front fork to the motorcycle.

ADJUSTMENT

Fork damper adjustable both in extension (right stem adjustment) and compression (left stem adjustment).

CAUTION:

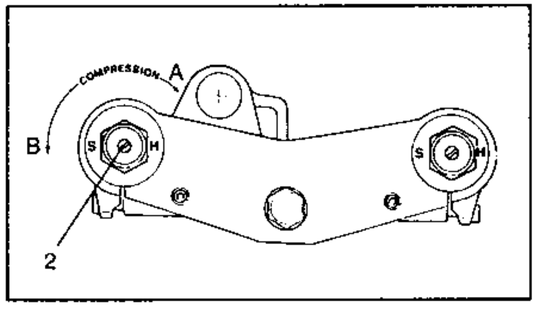
Do not force the adjusting screw beyond the minimum and maximum limits.



ADJUSTING THE REBOUND DAMPING EFFECT

1. Adjusting screw (rebound damping effect):
   A. Increase damping effect
   B. Decrease damping effect

ADJUSTMENT RANGE	
Maximum	**Minimum**
Screw fully turned clockwise (A)	Screw turned counterclockwise by 24 steps (B)
Standard adjustment: 13 steps from maximum	

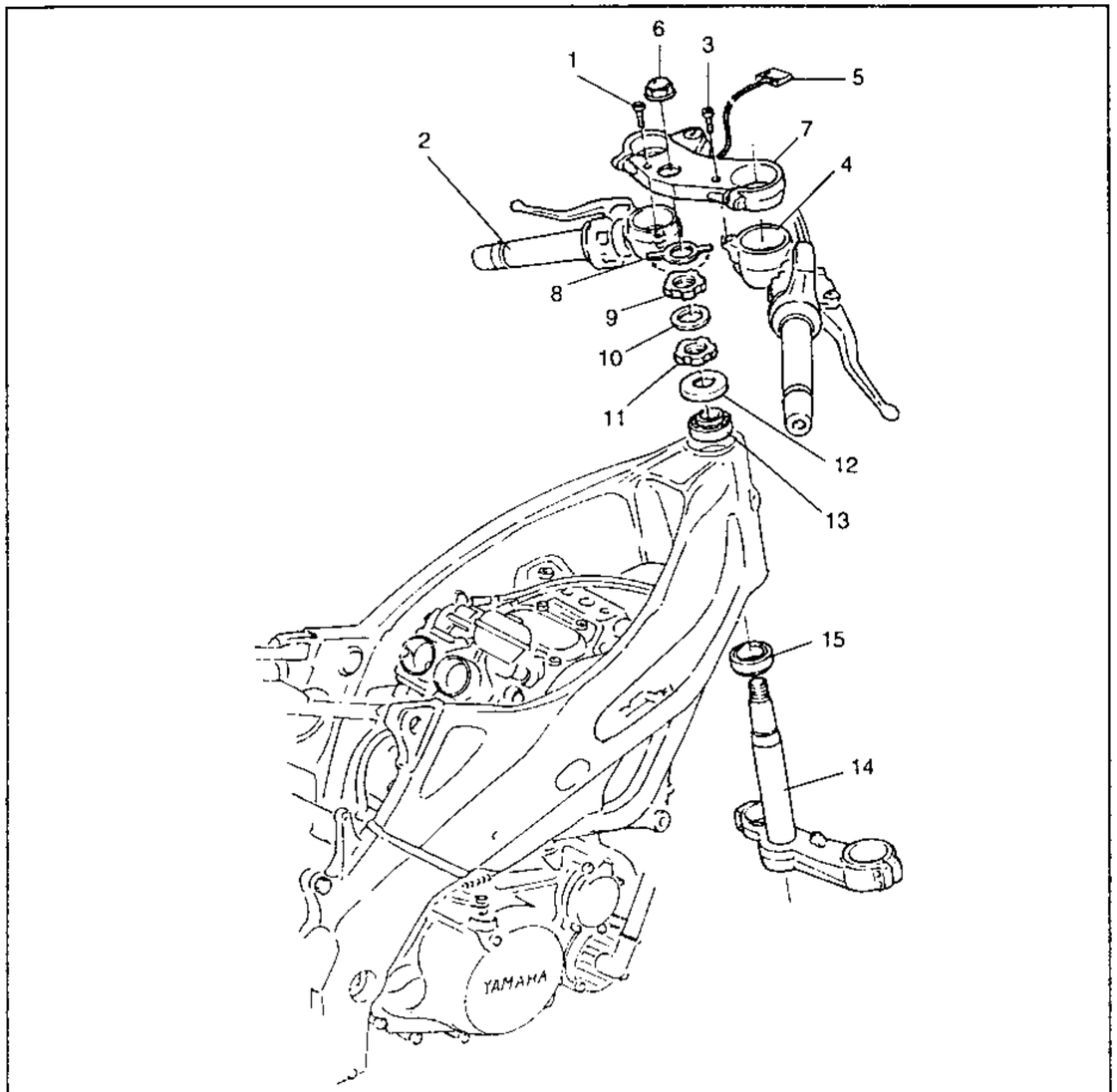


ADJUSTING THE COMPRESSION DAMPING EFFECT

2. Adjusting screw (compression damping effect):
   A. Increase damping effect
   B. Decrease damping effect

ADJUSTMENT RANGE
Maximum
Screw fully turned in
Standard setting
13 step from maximum
Minimum
24 steps counterclockwise (B) from maximum

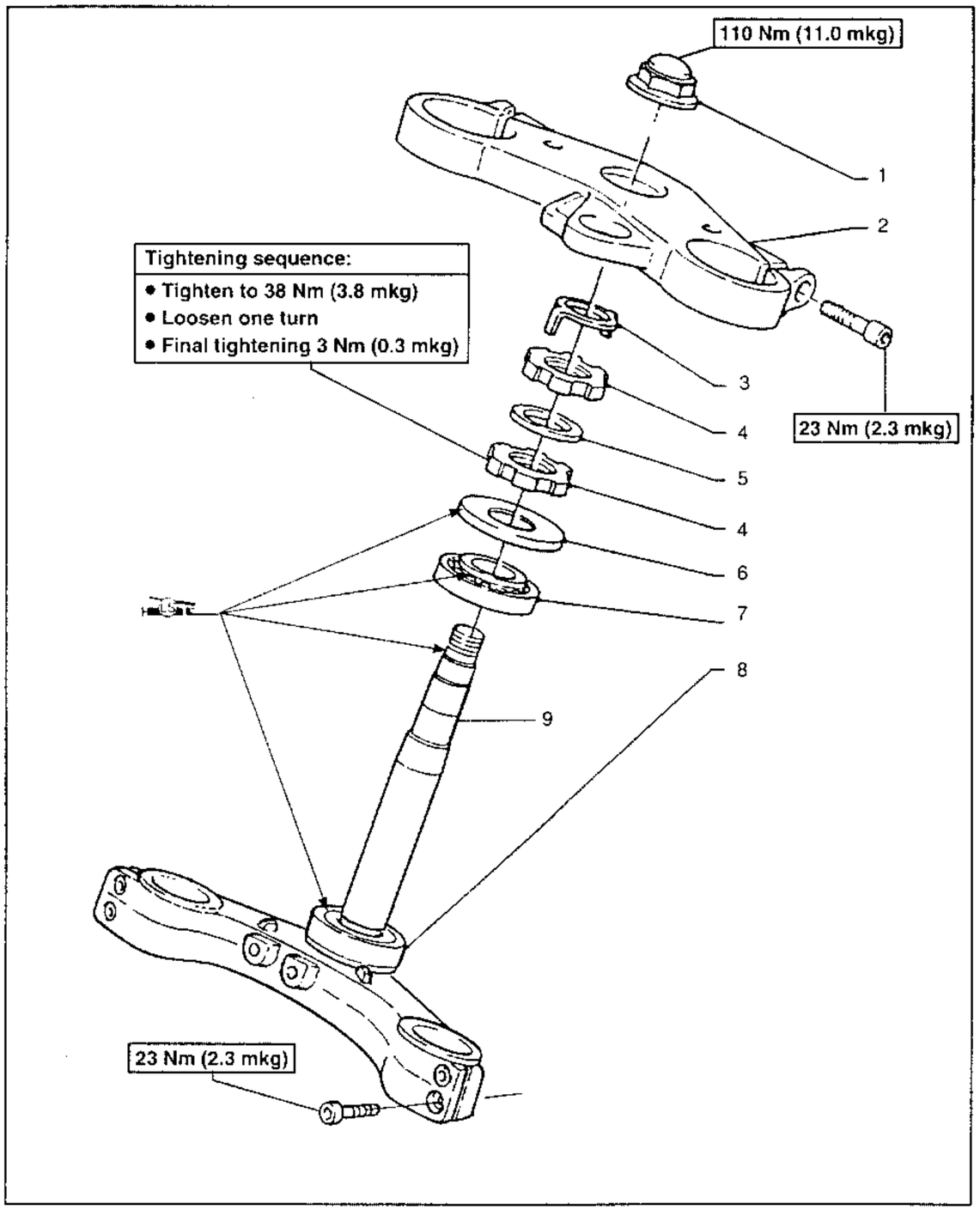
STEERING - REMOVAL

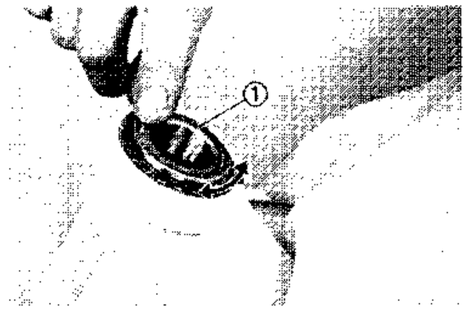


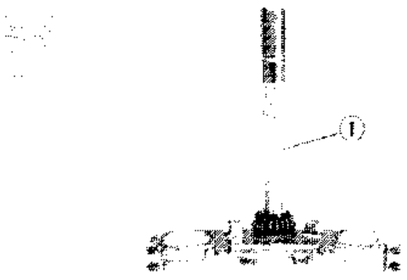
JOB INSTRUCTION CHART

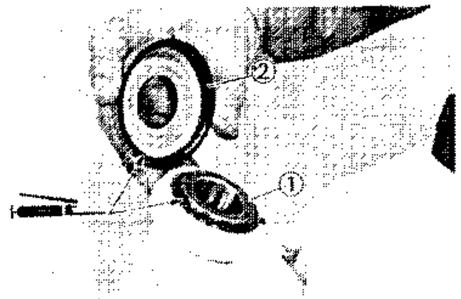
Order	Job name/Part name	Q.ty	Remarks
	Removal of steering		**Remove the parts in the order.**
			⚠ WARNING **Support the motorcycle securely to prevent it from falling over.**
			NOTE: Before removing the steering parts, remove the cowling (see "COWLING" in chapter 3), the front wheel and the suspension forks (see "REMOVAL-FRONT WHEEL" and "REMOVAL-FRONT FORK" in this chapter).
1	Screw	1	
2	Handle bar (L)	1	
3	Screw	1	
4	Handle bar (R)	1	
5	Main switch connector	1	
			NOTE: If the handle crown does not need to be replaced, do not disassemble the main switch, which is fixed with two special screws.
6	Crown nut	1	
7	Handle crown	1	
8	Special washer	1	
9	Ring nut (use special wrench)	1	
			Ring nut wrench: **P/N 90890-01385**
10	Plate washer	1	
11	Ring nut (use special wrench)	1	
12	Cover (upper bearing)	1	
13	Upper bearing	1	
14	Steering axle (with lower bracket)	1	
15	Lower bearing	1	**NOTE:** Disassemble the outer bearing rings only when they are to be replaced.
			Reverse the removal procedure for reassembly.
			NOTE: To reassemble, see also the instructions in the 'INSTALLATION' paragraph.

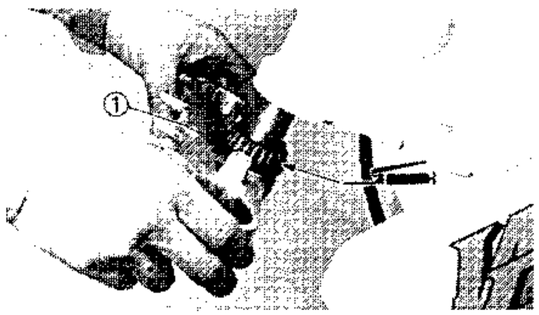
(1) Crown nut
(2) Handle crown
(3) Special washer
(4) Ring nut
(5) Plate washer
(6) Cover (upper bearing)
(7) Upper bearing
(8) Lower bearing
(9) Steering axle











INSPECTION

BEARINGS

1. Wash the bearings in clean solvent.
2. Inspect:
   - Bearing (upper and lower) (1)
     Corrosion/Damage → Replace races and bearing.
     Install the bearings in the races. Spin the bearing by hand.
     If the bearing rises or fails to run freely in the race, replace bearing and race.

STEERING AXLE

1. Inspect:
   - Steering axle (1)
     Bend/Damage → Replace.

INSTALLATION

Perform "REMOVAL" operations in reverse order. Note the following points.

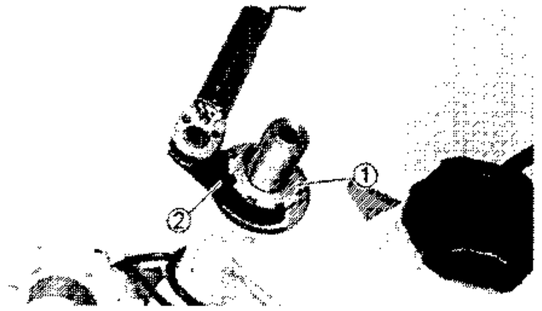
UNDER BRACKET

1. Install:
   - Bearing (1)
   - Ball race cover (2)

NOTE:
Apply lithium soap-base grease to the bearing and ball race cover lip.

2. Install:
   - Under bracket (1)

NOTE:
Apply lithium soap-base grease to the bearing.



3. Install:
   - Ring nut (lower) (1)
     Use the ring nut wrench (2)

	Ring nut wrench: **P/N 90890-01385**

NOTE:
Apply the lithium soap-base grease to the steering axle thread.

Ring nut tightening sequence:

- Tighten the ring nut using the ring nut wrench.

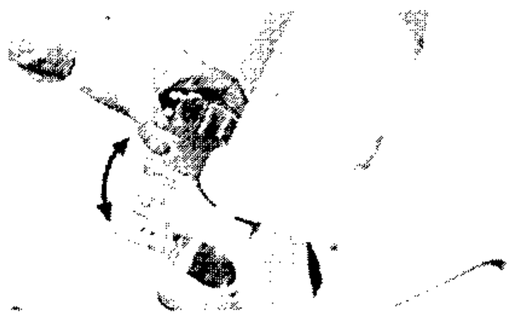
	Ring nut (lower) **(initial tightening):** **38 Nm (3.8 mkg)**

- Loosen the ring nut (1) completely and retighten it to specification.

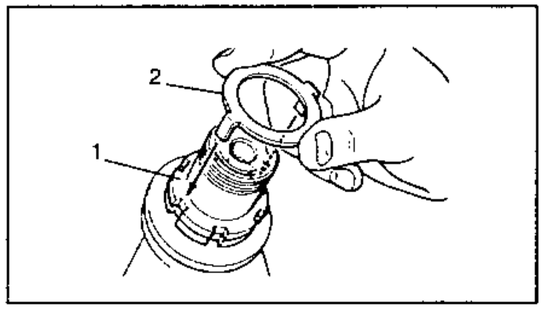
⚠ WARNING

Do not tighten excessively.

	Ring nut (lower) **(final tightening):** **3 Nm (0.3 kgm)**



4. Check the steering axle by turning it lock to lock. If there is any binding, remove the steering axle assembly and inspect the steering bearings.

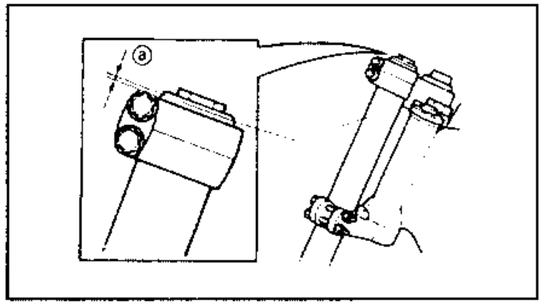


5. Install:
   - Plate washer
   - Ring nut (upper) (1)
   - Lock washer (2)

Installation sequence

- Install the plate washer on the lower ring nut.
- Install the ring nut (upper) (1).
- Finger tighten the ring nut (upper), then align the slots of both ring nuts. If not aligned, hold the lower ring nut and tighten the upper ring nut until they are aligned.
- Install the lock washer (2).

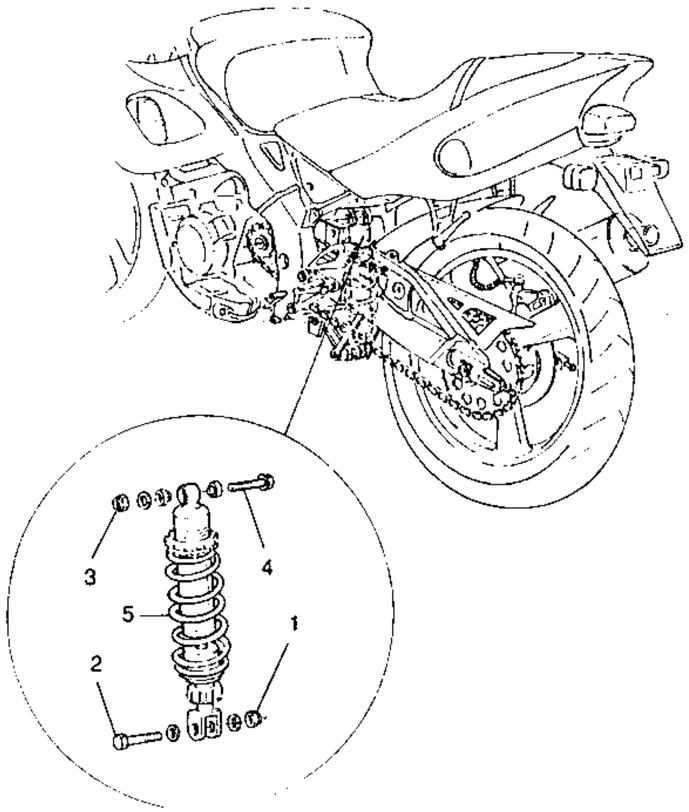
NOTE:
Make sure the lock washer tab is in the slots.



NOTE:
When reassembling the arms of the front fork, pay attention to the jut of the outer tubes in relation to handle crown.

	Front fork top end (a) **(Standard):** **0 ± 0.5 mm**

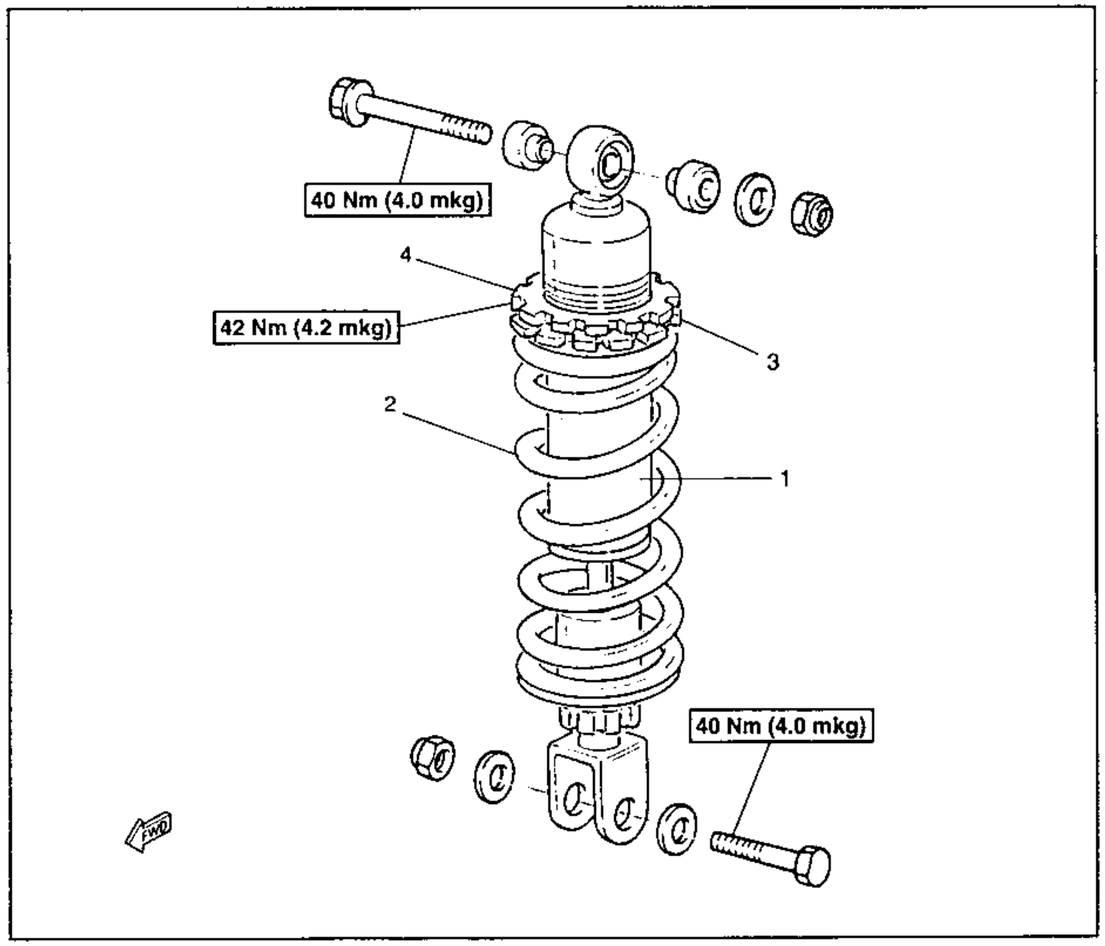
REAR SHOCK ABSORBER - REMOVAL



JOB INSTRUCTION CHART

Order	Job name/Part name	Q.ty	Remarks
	Removal of rear shock absorber		**Remove the parts in the order.**
			⚠ WARNING **Support the motorcycle securely to prevent it from falling over.**
1	Nut	1	
2	Screw (lower)	1	**⚠ WARNING** **Support the rear wheel when removing the lower screw.**
3	Nut	1	
4	Screw (upper)	1	
5	Shock absorber	1	**Reverse the removal procedure for installation.**

(1) Shock absorber
(2) Spring
(3) Spring adjuster nut
(4) Lock ring nut



⚠ WARNING

This shock absorber contains high-pressure nitrogen gas. Read the following information carefully before handling it. The manufacturer cannot be held responsible for any damage or injury that may result from improper handling.

- **Never tamper with or attempt to open the cylinder or the tank.**
- **Never expose the shock absorber to a naked flame or other source of heat. This might cause the pressurised gas to explode.**
- **Do not deform or damage the cylinder in any way. Damage to the cylinder would impair the damping effect.**
- **Be careful not to scratch the surface of the rod: this would cause the oil to leak.**
- **Before disposing of the shock absorber, read the section "NOTES ON DISPOSAL".**

NOTE ON DISPOSAL

* *

Before neutralising the rear shock absorber:
The gas pressure must be discharged before disposing of the shock absorber. To do this, bore a hole of 2~3 mm through the cylinder wall about 15~20 mm from the bottom of the gas chamber.

⚠ WARNING

Wear protective goggles to avoid eye injuries from escaping gas and/or metal chips.

* *

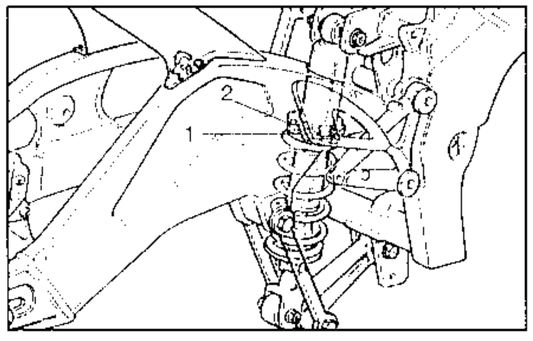
INSPECTION

1. Examine:
   - Shock absorber
     Oil leak/Damaged → Replace.

ADJUSTMENT

SPRING PRELOAD ADJUSTMENT

NOTE:
When adjusting the spring preload, use the special wrench provided. One complete turn of the adjuster will change the preload by 1 mm.



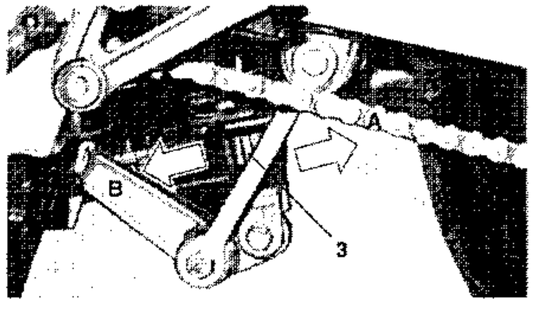
1. Adjuster
2. Lock nut

Spring adjuster lock nut:
42 Nm (4.2 mkg)

Spring length with preload:
Standard length: 166 mm
Minimum length: 161 mm
Maximum length: 170 mm

REBOUND DAMPING EFFECT ADJUSTMENT

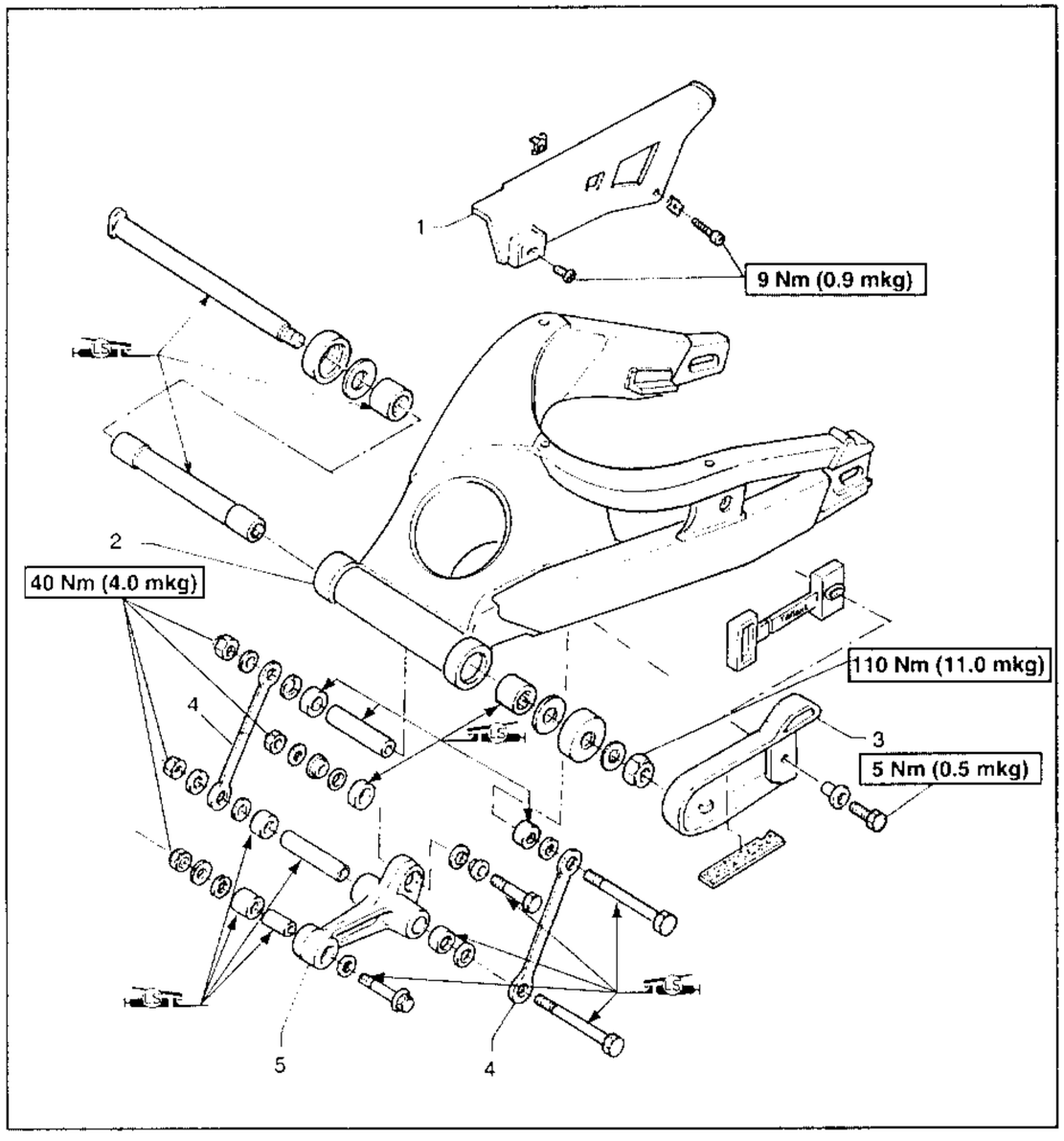
To increase the rebound damping effect, turn clockwise (A) the adjuster (3) located on the base of the shock absorber; to decrease it, turn the adjuster counterclockwise (B).



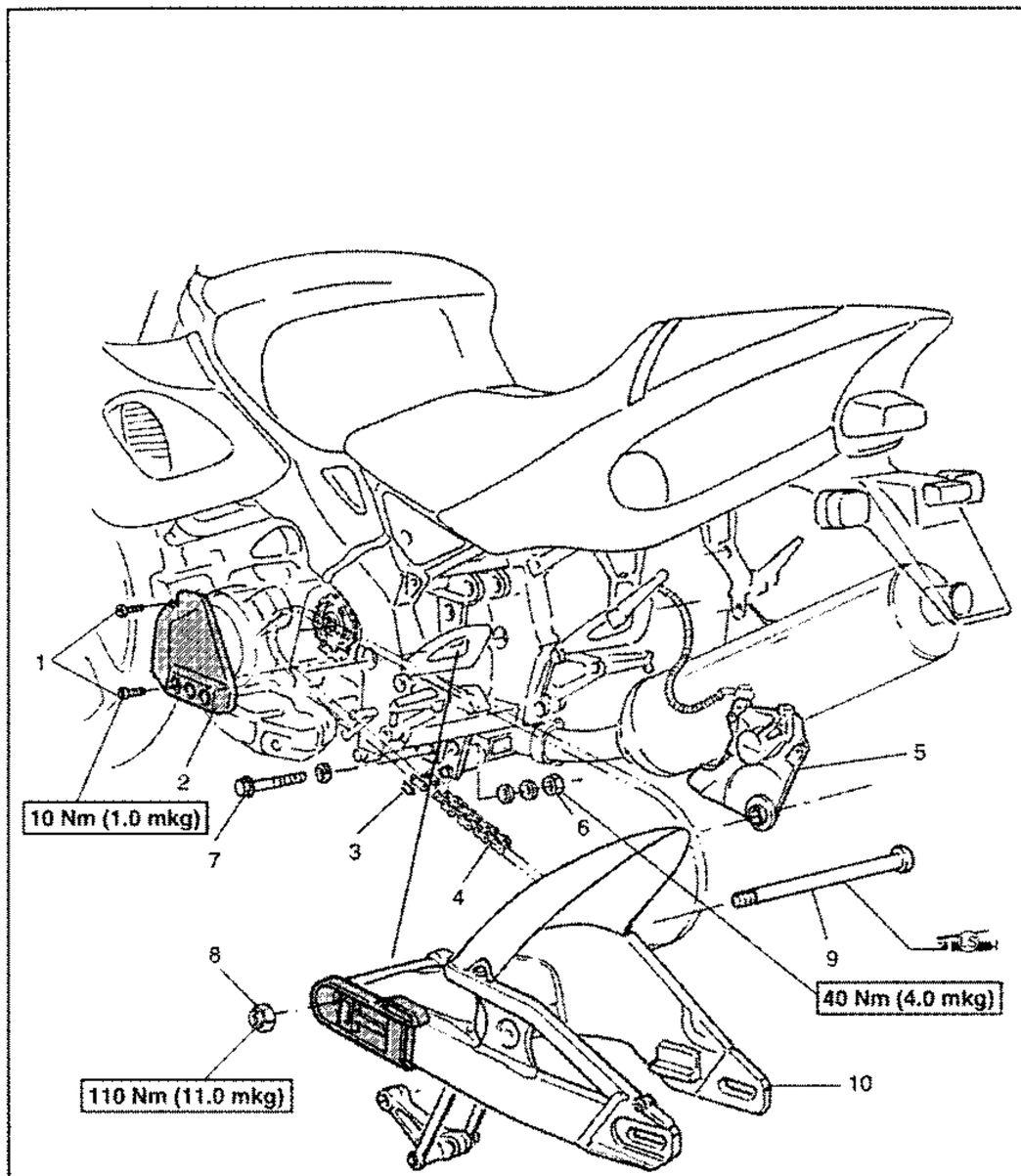
Adjustment range:
Maximum effect: adjuster completely screwed in.
Standard setting: adjuster turned by 10 steps from maximum.

SWING ARM

(1) Chain case
(2) Swing arm
(3) Guard seal chain
(4) Arm
(5) Arm relay



REMOVAL



JOB INSTRUCTION CHART

Order	Job name/Part name	Q.ty	Remarks
	Removal of swing arm		**Remove the parts in the order.**
			⚠ WARNING **Support the motorcycle securely to prevent it from falling over.**
			NOTE: Before removing the swing arm, remove the rear wheel (see "REMOVAL-REAR WHEEL" and "REAR SHOCK ABSORBER" in this chapter.
1	Screw	2	
2	Sproket cover	1	
3	Chain joint	1	
4	Chain	1	
5	Rear brake caliper	1	**CAUTION:** **After detaching the rear brake hose secure the rear brake caliper to chassis to avoid damaging the brake hose.**
6	Nut (arm relay)	1	
7	Screw	1	
8	Nut (swing arm axle)	1	
9	Swing arm axle	1	
10	Swing arm	1	**Reverse the removal procedure for installation.**

INSPECTION

1. Check:
   - Swing arm free play

NOTE:
Check swing arm free play after removing the rear shock absorber.

Inspection procedure:

- Check the tightening torque of the nut which fastens the swing arm axle.

	**Nut (swing arm axle): 110 Nm (11.0 mkg)**

- Check the lateral free play of the swing arm moving it laterally.
  If the free play seems excessive, verify the collar, bearings, washers and thrust covers.

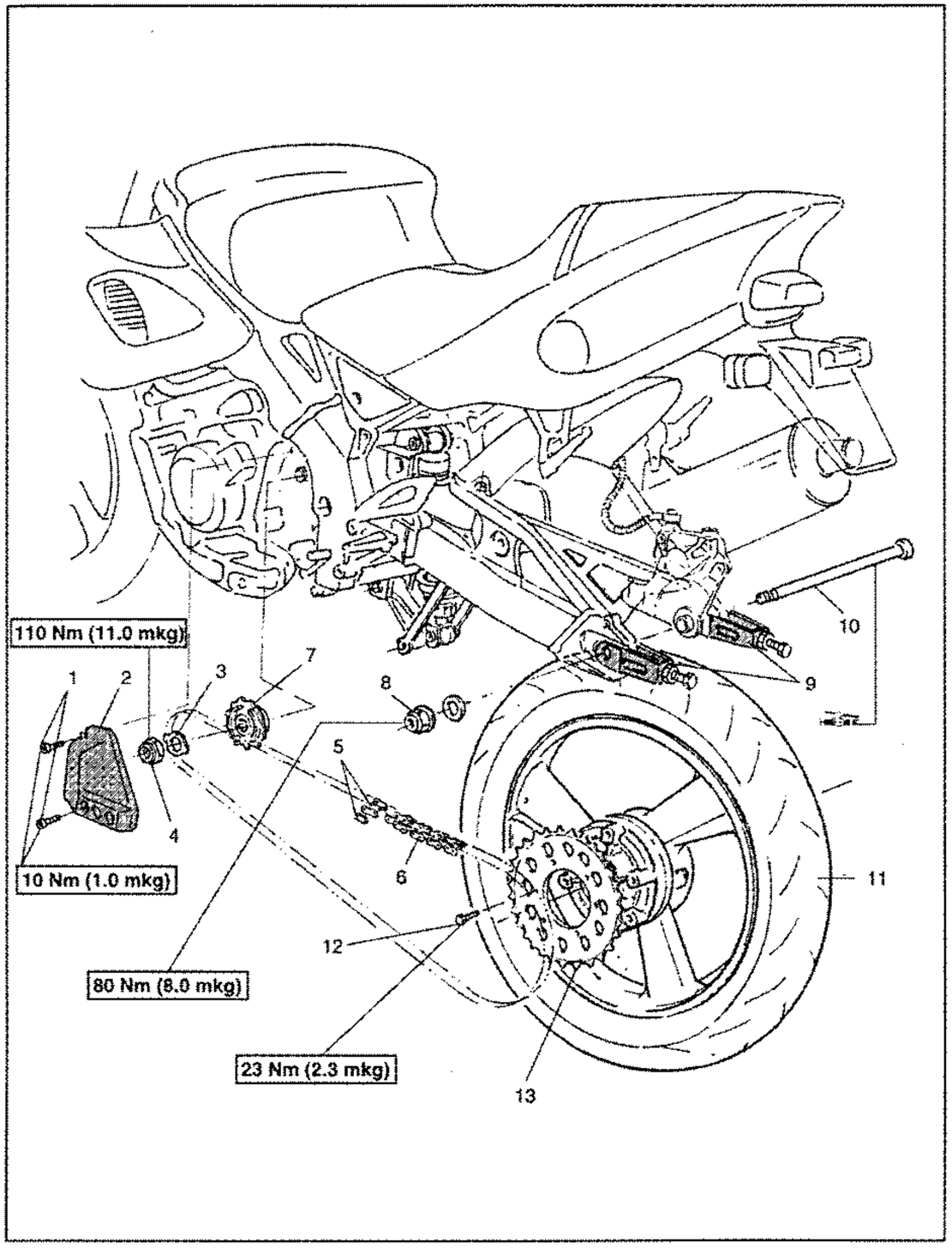
	**Lateral free play (at end of swing arm): Limit: 1.0 mm**

- Check the vertical movement of the swing arm, moving it up and down.
  If the movement seems rigid, unsmooth or jerky, inspect the internal collar, the bearings, the washers and the thrust covers.

2. Inspect:
   - Swing arm
     Deformation/Cracks/Damage → Replace.
3. Inspect:
   - Articulation
   - Rods
     Deformation/Cracks/Damage → Replace.

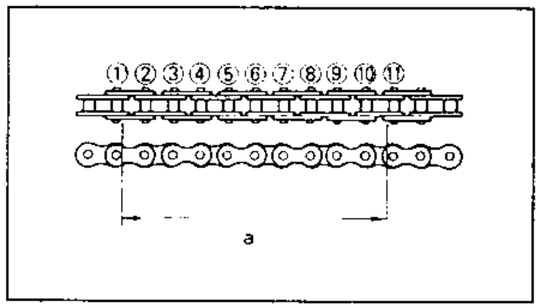
4. Inspect:
   - Oil seals
     Wear/Damaged → Replace.
   - Washers
   - Thrust cover
     Wear/Damaged → Replace.
   - Bearings
     Pitting/Damaged → Replace.
5. Inspect:
   - Chain guide
   - Chain protection
     Wear/Damage → Replace

DRIVE CHAIN, SPROCKET AND CROWN WHEEL - REMOVAL



JOB INSTRUCTION CHART

Order	Job name/Part name	Q.ty	Remarks
	Removal of drive chain, sprocket and crown wheel		**Remove the parts in the order.** **⚠ WARNING** **Support the motorcycle securely to prevent it from falling over.** **NOTE:** Check drive chain wear before removing it (see "INSPECTION" in the next page).
1	Screw (sprocket cover)	2	
2	Sprocket cover	1	
3	Lock washer (straight the tab)	1	
4	Sprocket nut	1	**NOTE:** Loosen the sprocket nut with the rear brake pulled.
5	Chain joint	1	
6	Drive chain	1	
7	Sprocket gear	1	
8	Nut (wheel axle)	1	
9	Chain stretcher (loosen)	2	
10	Wheel axle	1	
11	Wheel	1	
12	Screw	6	
13	Crown wheel	1	
			Reverse the removal procedure for installation. **NOTE:** Tighten the sproket nut with the rear brake pulled. Then adjust drive chain tightness (see "DRIVE CHAIN TIGHTNESS ADJUSTMENT" in chapter 3).



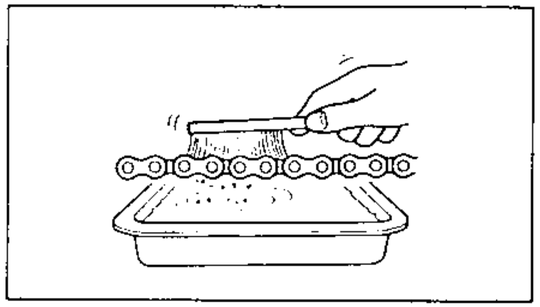
INSPECTION

1. Measure:
   - Length of 10 links (drive chain)
     Out of specification → Replace drive chain.

Maximum lenght of 10 links (a):
150.0 mm

NOTE:

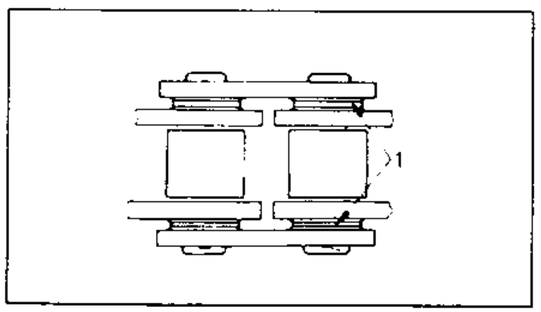
- Stretch the chain by hand to measure it.
- The length of the 10 links is recorded between the inside of the link pins (1) and (11) as shown.
- The length of the 10 links is measured at various points.

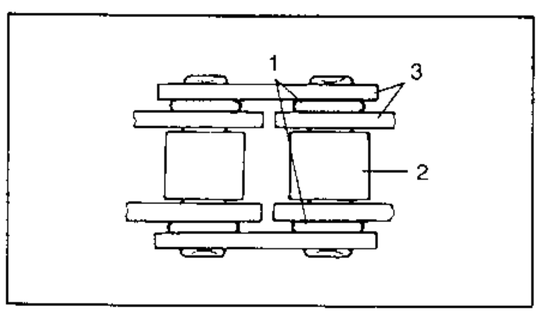


2. Clean:
   - Drive chain
     Immerge in kerosene and brush thoroughly to remove as much dirt as possible. Remove from kerosene and allow to dry.

CAUTION:

This motorcycle is fitted with a chain with small O-rings (1) fitted between its plates. Vapour cleaning, pressurised washing and certain types of solvents may damage these seal rings.
To clean the transmission chain use only kerosene.



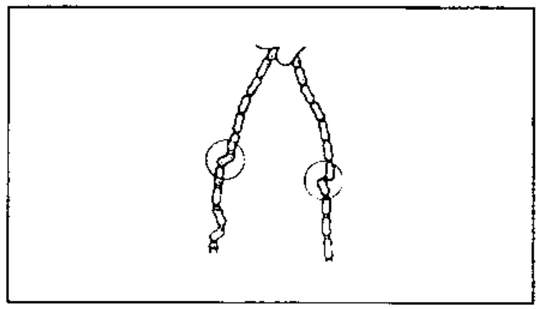


3. Inspect:
   - Seal rings (1) (drive chain)
     Damaged → Replace drive chain.
   - Rollers (2)
   - Lateral plates (3)
     Damage/Wear → Replace drive chain.

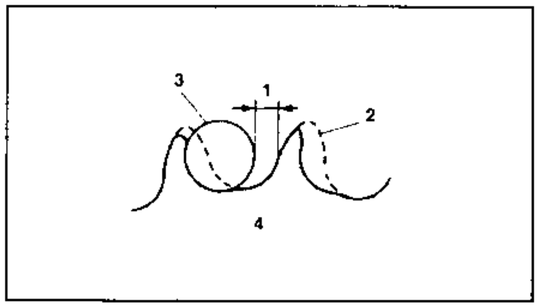
4. Inspect:
   - Chain joint
     Damage/Wear/Distortion of lock spring → Replace joint assembly.

5. Lubricate:
   - Drive chain

Lubricant for drive chain:
Engine oil SAE 30W ~ 50



6. Inspect
   - Drive chain
   - Rigid → Clean and lubricate, replace if necessary.



7. Inspect:
   - Sprocket gear
   - Crown wheel
   - Wear over 1/4 tooth (1) → Replace.
     Teeth bent → Replace.

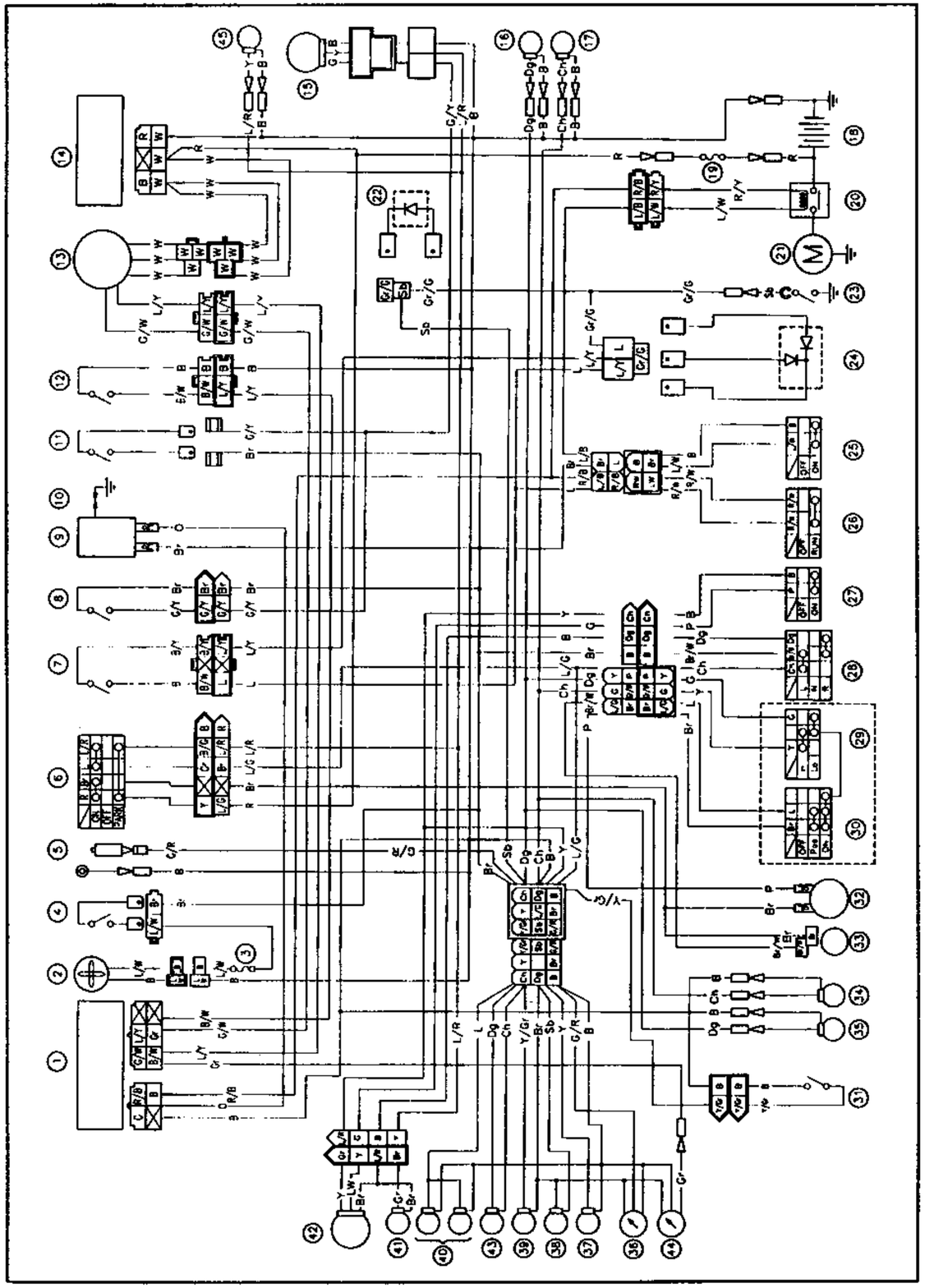
(2) Undamaged tooth profile
(3) Roller
(4) Sprocket

ELEC 8

CHAPTER 8°

ELECTRICALS

ELECTRICALS - ELECTRICAL CIRCUIT DIAGRAM



(1) CDI unit
(2) Fan motor
(3) Fuse (fan motor)
(4) Thermo switch
(5) Thermo unit
(6) Main switch
(7) Clutch switch
(8) Front brake switch
(9) Ignition coil
(10) Spark plug
(11) Rear brake switch
(12) Side stand switch
(13) AC generator
(14) Rectifier/Regulator
(15) Rear stop/tail light
(16) Right rear direction indicator light
(17) Left rear direction indicator light
(18) Battery
(19) Fuse (main)
(20) Starting motor relay
(21) Starting motor
(22) 1 diode (starting circuit)
(23) Neutral switch
(24) 2 diode (ignition circuit)
(25) Starting switch
(26) Engine stop emergency switch
(27) Horn switch
(28) Direction indicator lights switch
(29) Driving beam/dimmers lights switch
(30) Lights switch
(31) Low fuel warning light switch
(32) Horn
(33) Direction indicator lights relay
(34) Left front direction indicator light
(35) Right front direction indicator light
(36) Engine temperature cooling liquid indicator
(37) Driving beam light
(38) "N" neutral light
(39) Low fuel light
(40) Control light
(41) Front parking light
(42) Headlight (dipped/high beam)
(43) Direction indicator light
(44) Rev. counter
(45) Number plate light

COLOUR CODE

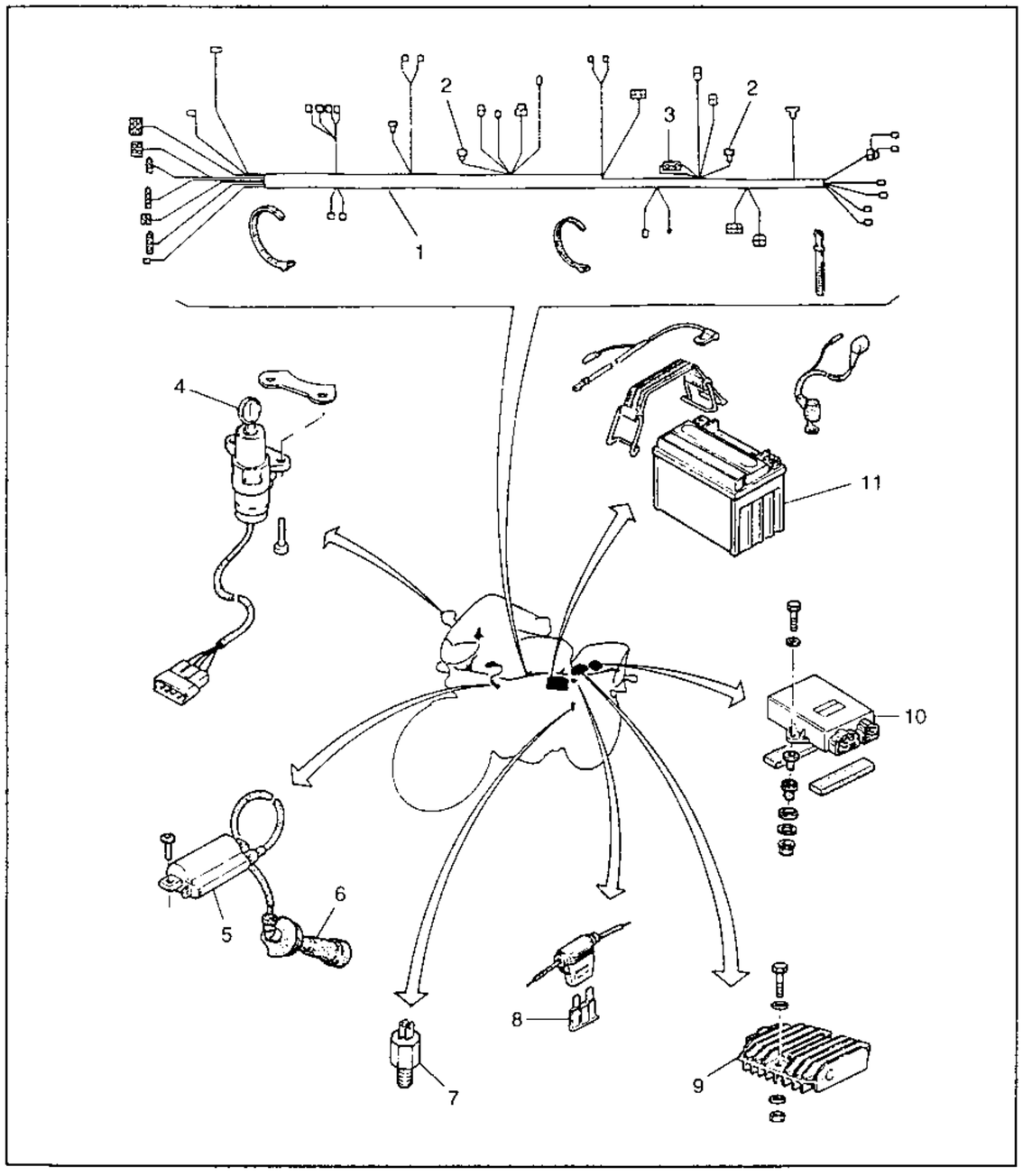
B	Black	B/W	Black/White
Br	Brown	B/Y	Black/Yellow
Ch	Chocolate	Br/W	Brown/White
Dg	Dark grey	G/W	Green/White
G	Green	G/Y	Green/Yellow
L	Blue	L/R	Blue/Red
O	Orange	L/Y	Blue/Yellow
P	Pink	L/W	Blue/White
R	Red	R/W	Red/White
Sb	Sky blue	R/Y	Red/Yellow
W	White	Y/R	Yellow/Red
Gy	Grey	G/R	Green/Red
Y	Yellow	W/L	White/Blue
B/R	Black/Red		

ELECTRICAL COMPONENTS

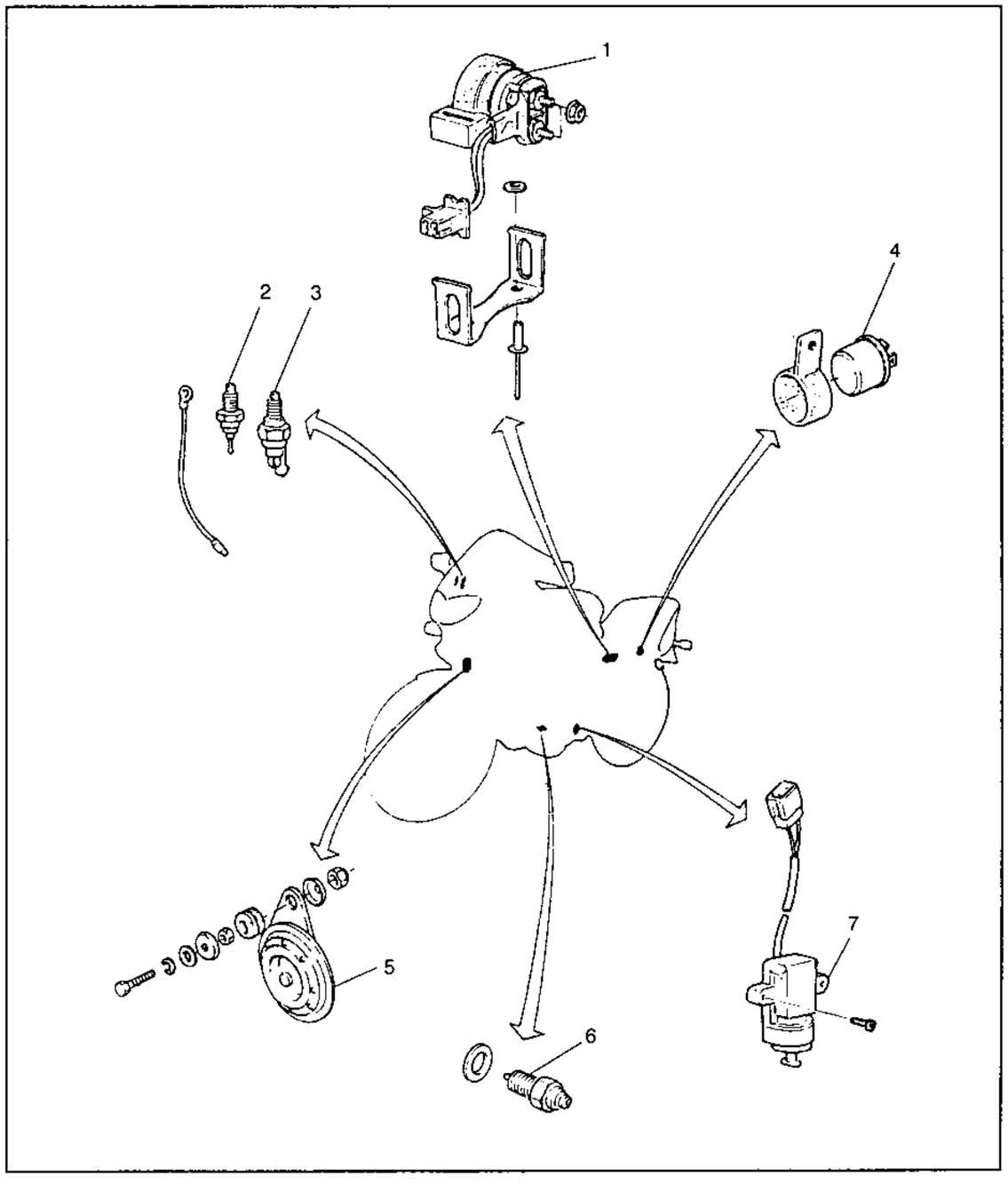
(1) Harness
(2) Diode
(3) Fuse 7.5A (fan motor)
(4) Main switch
(5) Ignition coil
(6) Spark plug cap
(7) Rear brake switch
(8) Fuse 20A (main)
(9) Rectifier/Regulator
(10) CDI ignition unit
(11) Battery (12V-8Ah)

IGNITION COIL:
PRIMARY WINDING RESISTANCE:
3.4 ~ 4.6 Ω at 20°C (68°F)
SECONDARY WINDING RESISTANCE:
10.4 ~ 15.6 kΩ at 20°C (68°F)

BATTERY: CAPACITY 12V - 8Ah
ELECTROLYTE DENSITY 1.320



(1) Starting motor relay assembly
(2) Thermo switch
(3) Thermo unit
(4) Flasher relay assembly
(5) Horn
(6) Neutral switch
(7) Side stand switch



SWITCH CHECK

Check the continuity between the switch terminals to verify whether connections are correct.

To check the switch, read the following points.

SWITCH CONNECTION

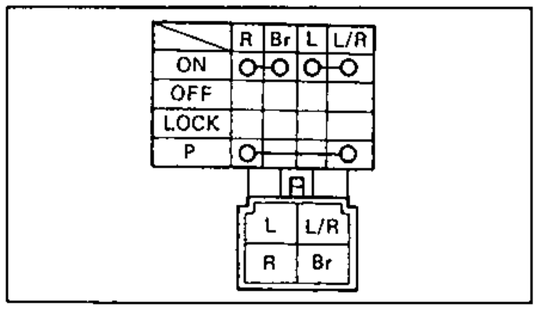
The table shown here contains the connections between the switch terminals (eg main switch, handlebar switches, brake switch, light switch etc).

The column on the far left shows the positions of the main switch and the top line indicates the colours of the cables connected with the terminals of the switch itself.

"o——o" indicates the terminals between which there is electrical continuity, ie a closed circuit on the respective switch positions.

For example, in this table:
"R and Br" and "L and L/R" are continuous when the switch is at ON.

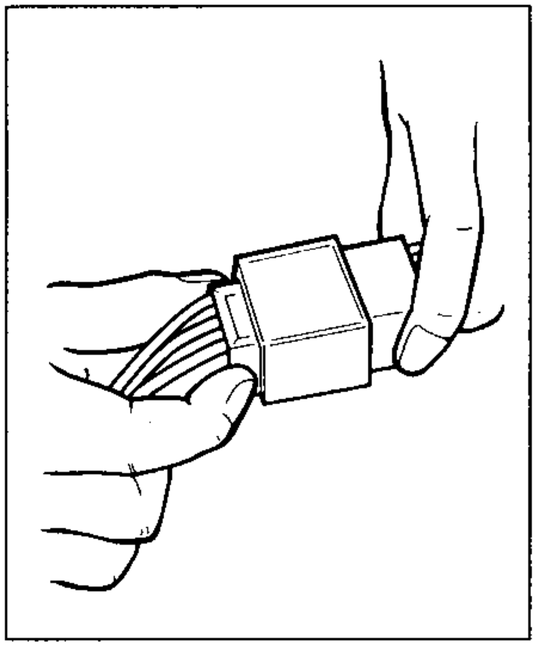
"R and L/R" are continuous when the switch is at PARK.

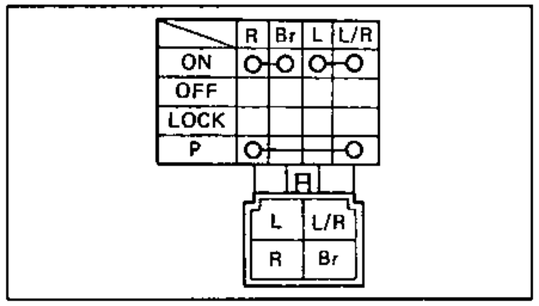


MAIN SWITCH INSPECTION

Before inspecting the switch, see the connection table shown above and check the terminal connections (closed circuit) by the colour combination.

1. Detach the main switch connector from the harness connector.





CAUTION:

When detaching the connector, do not pull by the cables. This way the cables might disconnect from the terminals inside the connector itself.

2. Check to see if any cables are disconnected from their terminal inside the connector. Reconnect, if necessary.

NOTE:

If the connector is blocked up with mud or dust, clean it with a jet of compressed air.

3. Use the connection table to check the combination of colours for continuity (closed circuit). In this example, continuity is as follows:

   "R and Br" and "L and L/R" are continuous when the switch is at ON.

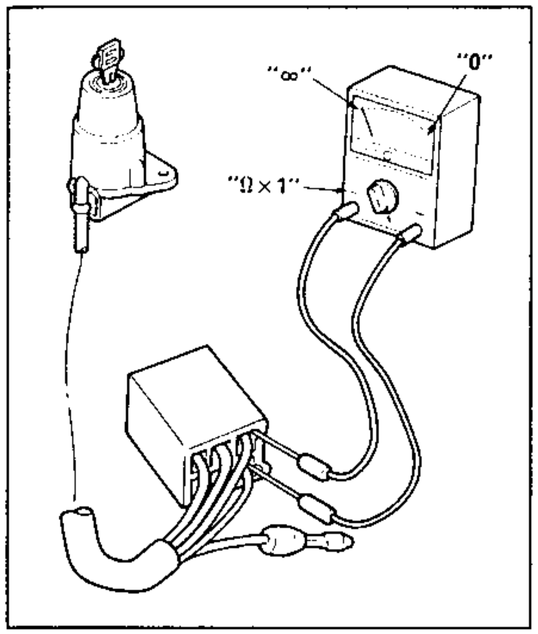
   "R and L/R" are continuous when the switch is at PARK.

   Note that there is no continuity (open circuit) for any of the combinations of a colour different from those mentioned.

4. Check the switch component for continuity between "R and Br" and "L and L/R" and "R and L/R".

Control procedure:

- Repeatedly shift the switch key to the various positions - ON, OFF, LOCK and P.
- Shift the tester selector to Ωx1.
- Connect the tester positive cable (+) to the terminal of cable R of the connector, and the negative cable (–) to cable terminal Br.

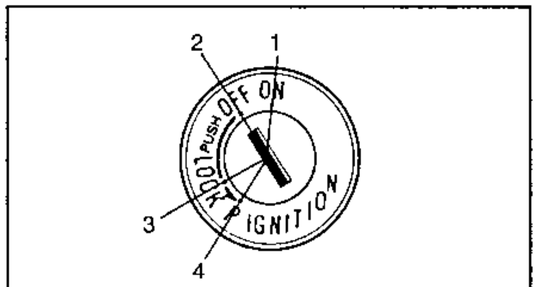


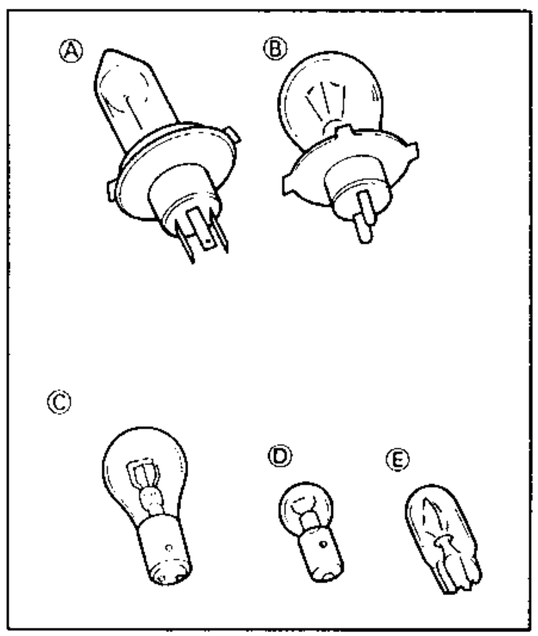
NOTE:
Use the thin tester terminals to check continuity, as the terminals might come into contact with others inside the connector.

- Check continuity between "R and Br" at switch positions ON (1), OFF (2), LOCK (3) and PARK (4). There must be continuity (ie the tester must show "0") at ON and there must be no continuity (ie the tester must show "∞") at OFF, LOCK and PARK. Something is not working between "R and Br" if there is no continuity between these two points at position ON, or if there is some continuity in one of the other positions OFF, LOCK or PARK.

NOTE:
Check switch continuity various times.

5. Continue to check continuity between "L and L/R" and "R and L/R" in the respective switch positions in the manner described above.
6. If anything wrong is noted in any of the combinations, replace the switch component.





LIGHT INSPECTION (HEADLIGHTS, TAIL LIGHT AND BRAKE LIGHTS, DIRECTION INDICATOR LIGHT, INSTRUMENT LIGHTS, ETC)

Check the continuity between the bulb terminals to see that they are undamaged.

BULB TYPES

The bulbs used are classified as shown to the left according to type of attachment.

(A) and (B) are used mainly for headlights.

(C) is used mainly for direction indicator lights and the rear and brake lights.

(D) and (E) are used especially for instrument and other indication lights.

BULB INSPECTION

1. Remove the bulb in question.

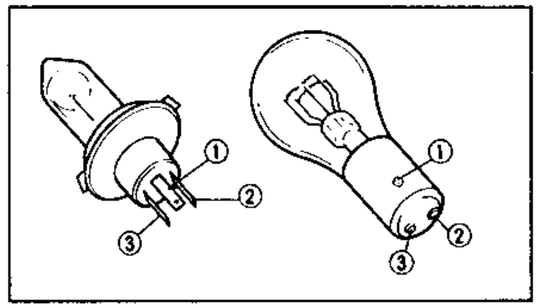
NOTE:
- Bulbs of type (A) and (B) use special supports (bulbholders). Remove the bulbholder before removing the bulb. Most of these bulbholders may be removed by turning in an anticlockwise direction.
- Most bulbs of type (C) and (D) may be removed from their housing by pushing them and turning them in an anticlockwise direction.
- Bulbs of type (E) may be removed simply by pulling them out.

CAUTION:
When removing a bulb be careful to hold the bulbholder or its housing firmly. Never pull the cable, as it might detach from the terminal inside the connector.

⚠ WARNING
Keep inflammable products and hands well away from bulbs when they are on (danger of burns and fire). Do not touch the bulb before it is cool.

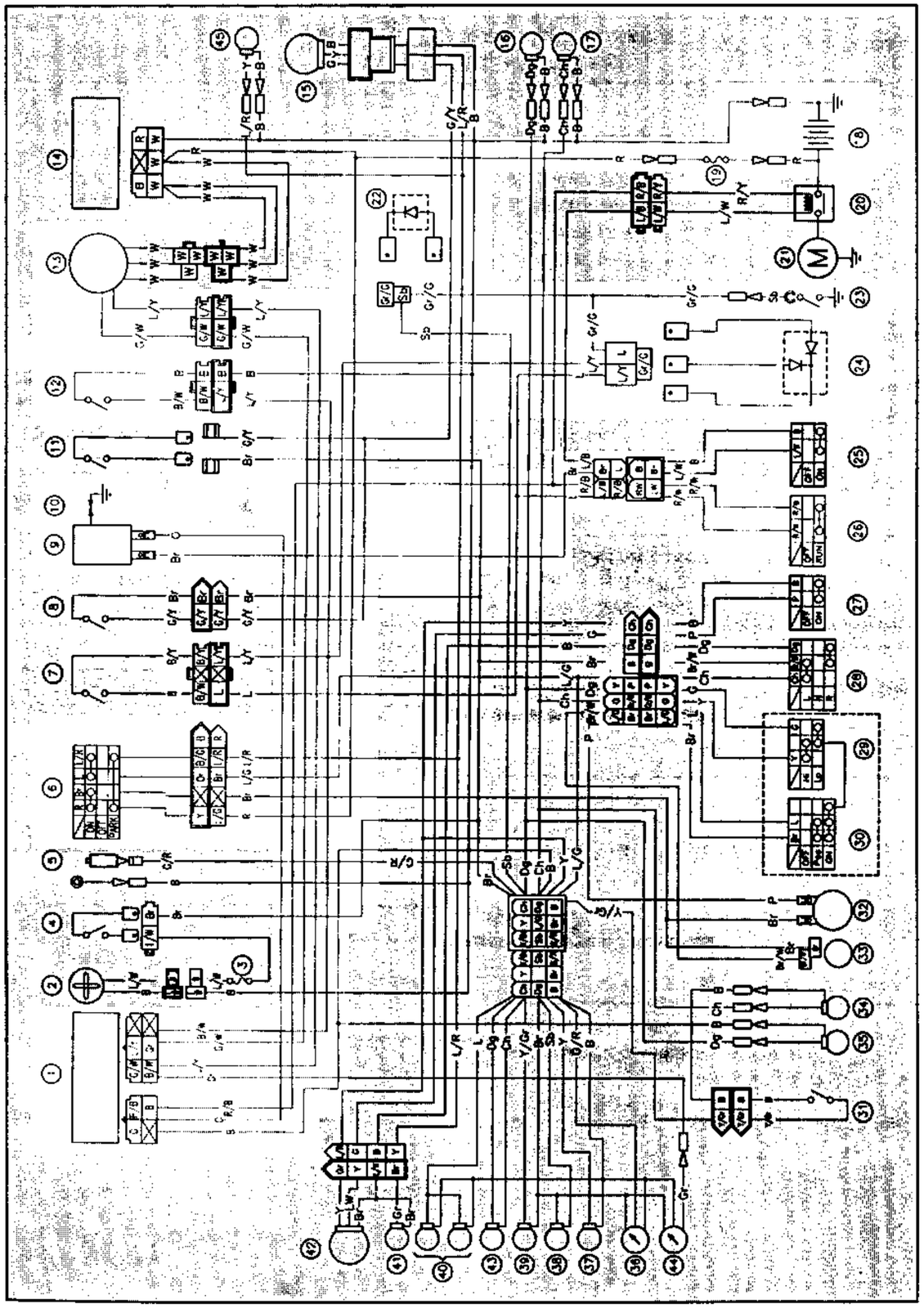
2. Check the continuity between the bulb terminals.

Control procedure:
- Set the tester selector to Ω x 1.
- Connect the tester terminals to the bulb pins. Take, for example, a three pin bulb as shown in the figure. First check continuity between pins (1) and (2), connecting tester terminal (+) to pin (1) and terminal (–) to pole (2). Then check the continuity between poles (1) and (3), again connecting tester terminal (+) to pole (1), and terminal (–) to pole (3). If the tester indicates ∞, even in one case only, the bulb must be replaced.



3. Check the bulb attachment by installing a test bulb. Furthermore, during inspection of the bulbs, connect the tester terminals to the respective socket cables and check continuity as described.

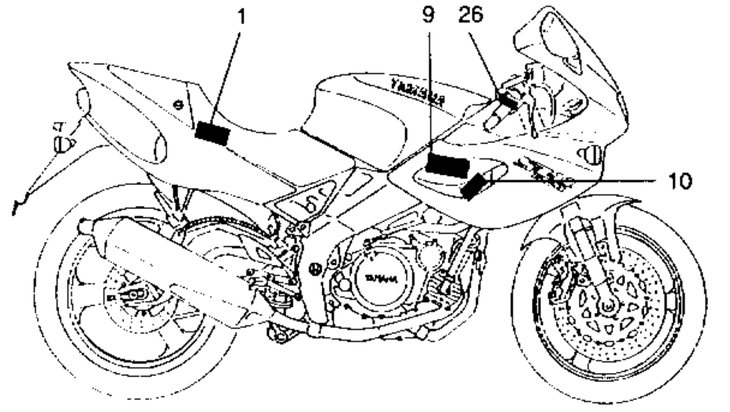
IGNITION SYSTEM - CIRCUIT DIAGRAM

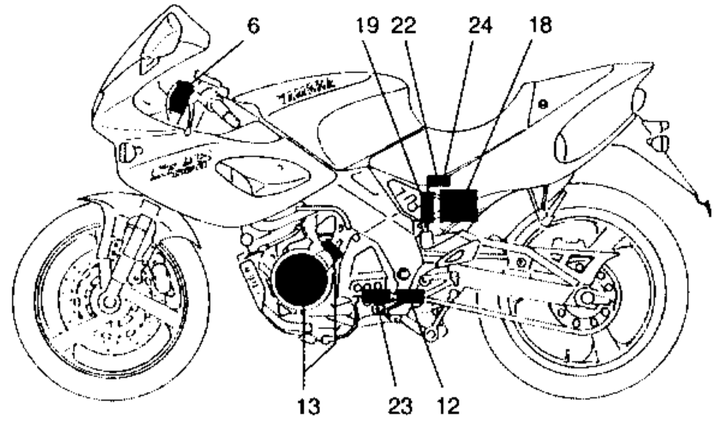


The diagram illustrates the ignition circuit inside the motorcycle electric system.

NOTE:
For the colour code and complete legend, see page 8-2.

(1) CDI unit
(6) Main switch
(9) Ignition coil
(10) Spark plug
(12) Side stand switch
(13) AC generator (source coil/pick-up coil)
(18) Battery
(19) Fuse 20A (main)
(22) 1 Diode
(23) Neutral switch
(24) 2 Diode
(26) Engine stop emergency switch





DIAGNOSTICS

IF THE IGNITION SYSTEM STOP WORKING (NO OR INTERMITTENT SPARK)

Procedure

Check:

1. Fuse 20A (main)
2. Battery
3. Spark plug
4. Amplitude of ignition spark
5. Spark plug cap resistance
6. Ignition winding resistance
7. Main switch
8. Engine stop emergency switch
9. Side stand switch
10. Neutral switch
11. 2 Diode
12. 1 Diode
13. Pick-up coil resistance
14. Wiring connections (whole connection system)

NOTE:

- Before making the inspections mentioned, remove the following parts:
  1. Side panel (left and right)
  2. Seat
  3. Rear cowling
  4. Fuel tank
  5. Air filter case
- To check functioning defects, use the following special tools.

Dinamic spark tester:
P/N. YM-34487
P/N. 90890-03144

Pocket tester:
P/N. YU-03112
P/N. 90890-03112

1. Fuse 20A (main).
   - Remove the fuse.
   - Connect the pocket tester (Ωx1) to the fuse.
   - Check the continuity of the fuse.
     See section "INSPECTION AND REPLACEMENT OF FUSE" in CHAPTER 3.

DISCONTINUITY → Replace the fuse.

CONTINUITY ↓

2. Battery.
   - Check the battery.
     Refer to the section "BATTERY INSPECTION" in CHAPTER 3.

   Voltage:
   12.8V or more at 20°C (68°F)

INCORRECT →
- Clean the battery terminals.
- Recharge or replace the battery.
- Refer to the corresponding section in CHAPTER 3.

CORRECT ↓

*

3. Spark plug.
   - Check the conditions of the spark plug.
   - Check the type of spark plug used.
   - Check the electrodes gap.
     See the section on CHAPTER 3 on "SPARK PLUG INSPECTION."

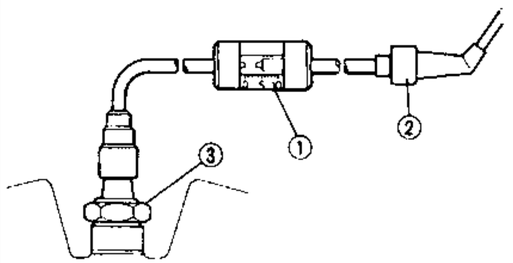
   Standard spark plug:
   DPR8EA-9 (NGK), DPR9EA-9 (NGK)

   Electrodes gap:
   0.8 ~ 0.9 mm

INCORRECT → Correct the electrodes gap or replace the spark plug.

CORRECT ↓

4. Amplitude of the ignition spark.
   - Detach the spark plug cap from the spark plug.
   - Connect the dynamic spark tester (1) as shown in the figure.
     (2) Spark plug cap (3) Spark plug
   - Turn the main switch to ON position.



- Check the amplitude of the ignition spark.
- Start the engine and increase the amplitude until the ignition becomes intermittent.

Spark amplitude if the ignition system is efficient:
6.0 mm

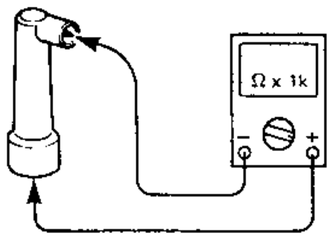
IN COMPLIANCE WITH SPECIFICATIONS → Minimum spark amplitude.

THE IGNITION SYSTEM IS INEFFICIENT OR THERE IS NO SPARK ↓

*

5. Spark plug cap resistance.

- Remove the spark plug cap.
- Connect the pocket tester (Ωx1k) to the spark plug cap.



- Check that the spark plug cap has the specified resistance.

Resistance of spark plug cap:
10 kΩ at 20°C (68°F)

OUT OF SPECIFICATION

The spark plug cap is defective.
Replace.

IN COMPLIANCE
WITH SPECIFICATIONS

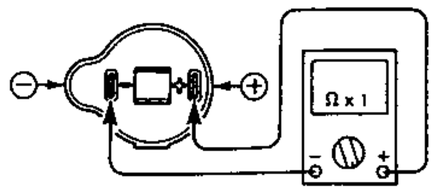
*

*

6. Ignition winding resistance.

- Disconnect the ignition coil cables.
- Connect the pocket tester (Ωx1) to the ignition coil.

Tester terminal (+) → Pole (+)
Tester terminal (–) → Pole (–)

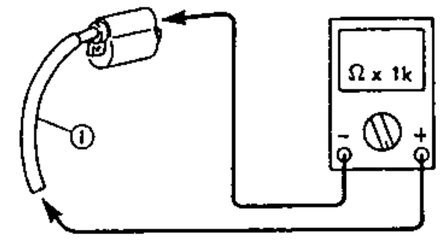


- Check that the primary coil winding has the specified resistance.

Primary winding resistance:
3.4 – 4.6 Ω at 20°C (68°F)
(Terminal (+) – Terminal (–)

- Connect the pocket tester (Ωx1) to the ignition coil.

Tester terminal (+) → Spark plug cable (1)
Tester terminal (–) → Pole (+)



- Check that the secondary coil winding has the specified resistance.

Secondary winding resistance:
10.4 – 15.6 kΩ at 20°C (68°F)
(Spark plug cable – Pole (+)

OUT OF SPECIFICATION

The ignition coil is defective.
Replace.

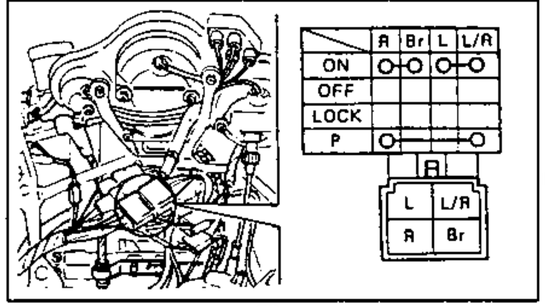
BOTH RESISTANCE
VALUES ARE CORRECT

*

*

7. Main switch.

- Disconnect the main switch connector from the bundle of cables.
- Connect the pocket tester (Ωx1) to the main switch cables.
- See section "SWITCH CHECK".



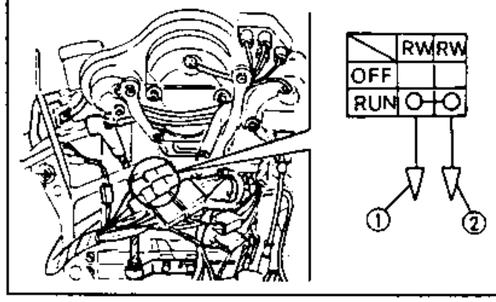
INCORRECT → The main switch is defective. Replace.

CORRECT

8. Engine stop emergency switch.

- Disconnect the switch cables Red/White (1) and Red/White (2) on handle bar (R) from the bundle of cables.
- Connect the pocket tester (Ωx1) to the switch cables.

Tester terminal (+) → Red/White (1) cable
Tester terminal (–) → Red/White (2) cable



INCORRECT → The engine stop emergency switch is defective. Replace the right handlebar switch.

CORRECT

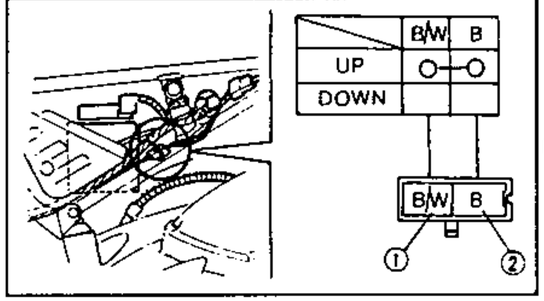
*

*

9. Side stand switch.

- Disconnect the side stand switch connector (Black/White and Black) from the bundle of cables.
- Connect the pocket tester (Ωx1) to the side stand switch cables.

Tester terminal (+) → Black/White cable (1)
Tester terminal (–) → Black cable (2)



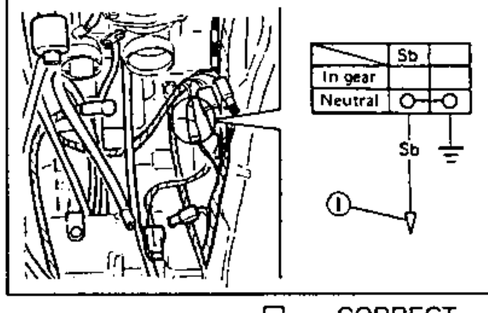
INCORRECT → The side stand switch is defective. Replace.

CORRECT

10. Neutral switch.

- Disconnect the neutral switch cable (Sky blue) from the bundle of cables.
- Connect the pocket tester (Ωx1) to the neutral switch cables.

Tester terminal (+) → Sky blue cable (1)
Tester terminal (–) → Earth on the frame



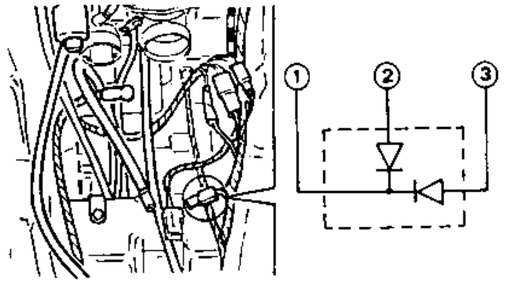
INCORRECT → The neutral switch is defective. Replace.

CORRECT

*

11. 2 Diode.

- Disconnect the diode cables from the harness.
- Connect the pocket tester (Ωx1) to the diode terminals.



- Check the continuity of the diode.

Tester connection table		Correct	Incorrect			
Cable (+)	Cable (–)					
1	2	O	O	X	O	O
1	3	O	X	O	O	O
2	3	X	X	X	O	X
3	2	X	X	X	X	O

O: Continuity X: Discontinuity

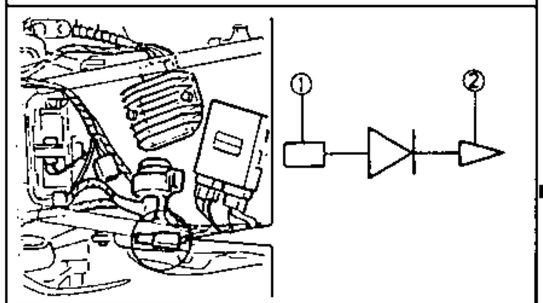
INCORRECT → The diode is defective. Replace.

CORRECT

★

12. 1 Diode.

- Disconnect the diode cables from the harness.
- Connect the pocket tester (Ω x 1) to the diode.



- Check the continuity of the diode.

Tester connection table		Correct	Incorrect		
Cable (+)	Cable (–)				
2	1	O	O	X	X
1	2	X	O	X	O

O: Continuity X: Discontinuity

INCORRECT → The diode is defective. Replace.

CORRECT

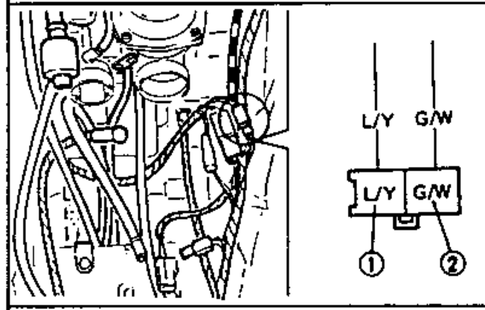
★

★

13. Pick-up coil resistance.

- Disconnect the generator connector (Blue/Yellow and Green/White) from the CDI unit.
- Connect the pocket tester (Ω x 100) to pick-up coil cables.

Tester terminal (+) →
Blue/Yellow cable (1)
Tester terminal (–) →
Green/White cable (2)



- Check that the pick-up coil resistance is as specified.

Pick-up coil resistance:
184 ~ 276 Ω at 20°C (68°F)
(Blue/Yellow - Green/White)

OUT OF SPECIFICATIONS → The pick-up coil is defective. Replace.

COMPLY WITH SPECIFICATIONS

★

14. Wiring connections.

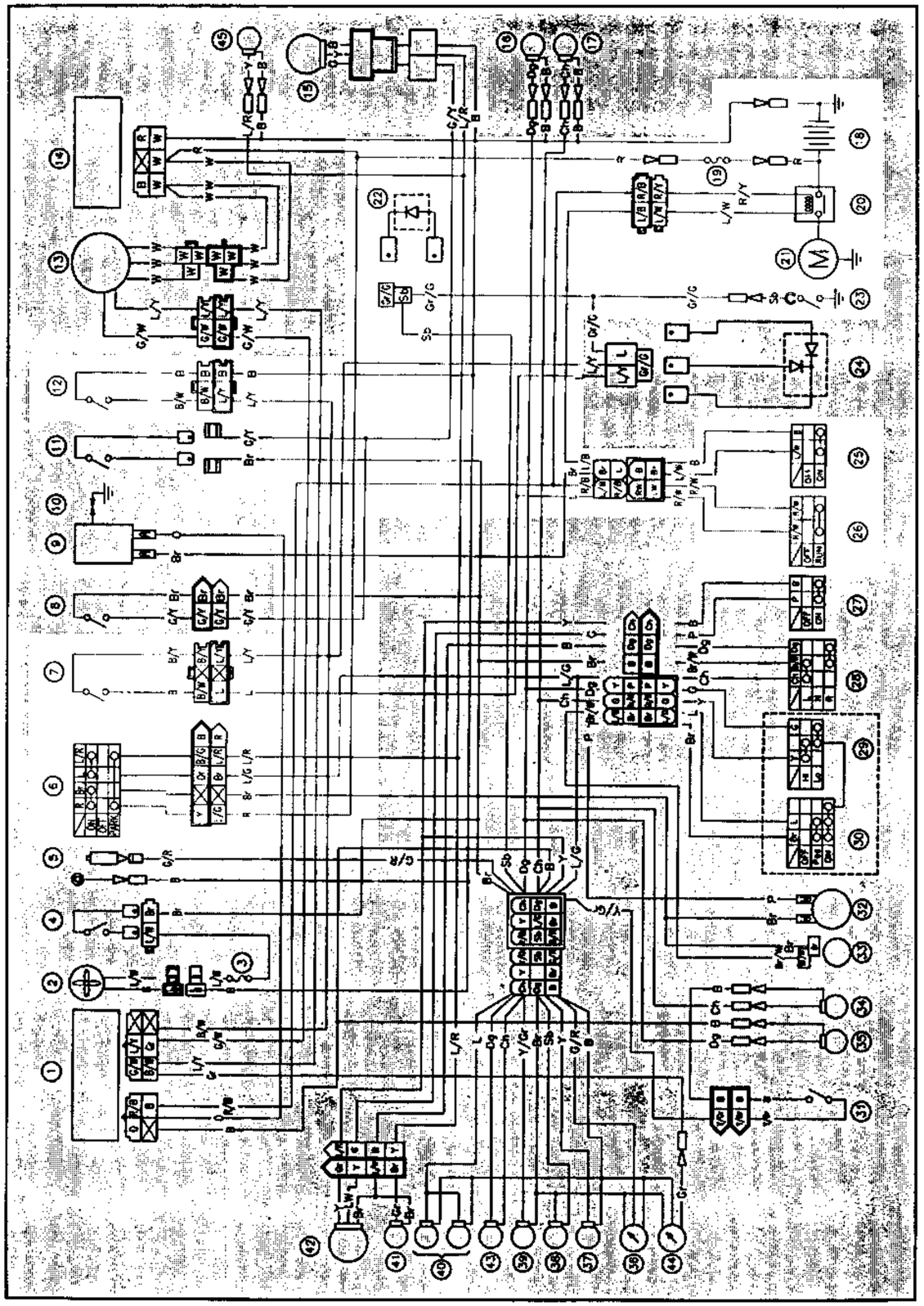
Check the connections of the entire ignition system. See the "ELECTRICAL CIRCUIT DIAGRAM" section.

UNCERTAIN CONNECTIONS → Repair.

CORRECT

The CDI unit is defective. Replace.

ELECTRICAL STARTING SYSTEM - CIRCUIT DIAGRAM

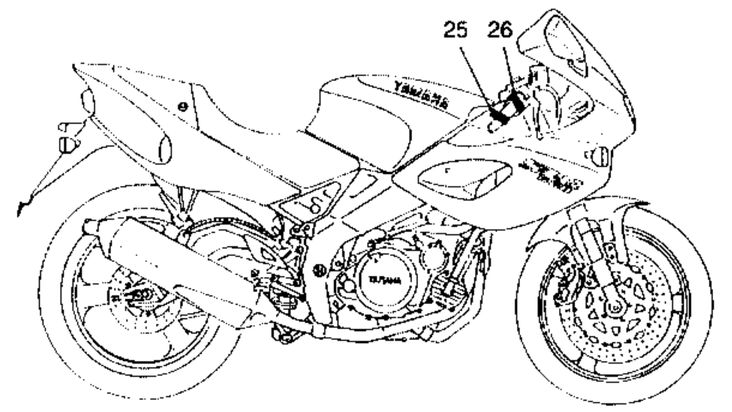


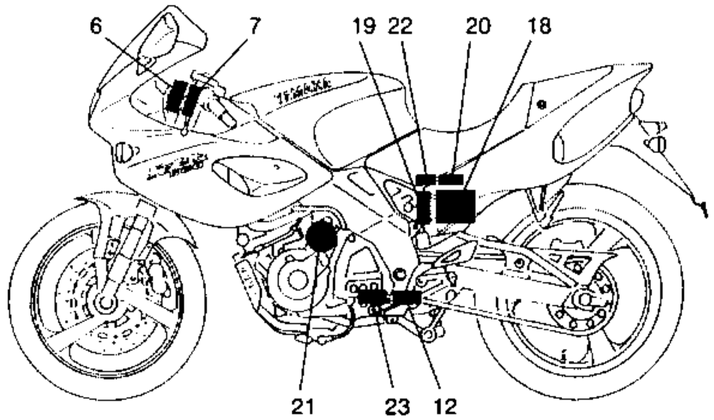
The diagram illustrates the electrical starting system circuit inside the motorcycle electric system.

NOTE:

For the colour code and complete legend, see page 8-2.

(6) Main switch
(7) Clutch switch
(12) Side stand switch
(18) Battery
(19) Fuse 20A (main)
(20) Starter relay
(21) Starter motor
(22) 1 Diode
(23) Neutral switch
(25) Starter switch
(26) Engine stop emergency switch





STARTER CIRCUIT FUNCTIONING

The starting circuit of this model consists of the starter, its relay switch and the 1 diode. If the engine stop emergency switch and main switch are both on, the starter can only work if:

. . . . . .

The transmission is in neutral (neutral switch on)

or if

the clutch lever is completely up against the handlebar (clutch switch on) and the side stand is raised (stand switch on).

. . . . . .

The 1 diode prevents the starter from starting when none of these conditions is met. In this case the starter feed is off. When one or both of these conditions are met, the motor engine may be started by pressing the start switch.

DIAGNOSTICS

THE STARTER FAILS TO WORK

Procedure

Check:

1. Fuse 20A (main)
2. Battery
3. Starter
4. Starter relay
5. Main switch
6. Engine stop emergency switch
7. Side stand switch
8. Neutral switch
9. Clutch switch
10. Starter switch
11. 1 Diode
12. Harness connection control (entire starter system)

NOTE:

- Before starting inspections, remove the following parts:
  1. Side panels (left and right)
  2. Seat
  3. Rear cowling
  4. Fuel tank
  5. Air filter case
- To inspect any operating faults defects use the following special tools.

Pocket tester:
P/N. YU-03112
P/N. 90890-03112

1. Fuse 20A (main).
   - Remove fuse.
   - Connect the pocket tester (Ωx1) to the fuse.
   - Check fuse continuity.
     See the "FUSE INSPECTION AND REPLACEMENT" section in CHAPTER 3.

DISCONTINUITY → Replace the fuse.

CONTINUITY ⇩

2. Battery.
   - Check the conditions of the battery.
     Consult the "BATTERY INSPECTION" section in CHAPTER 3.

Voltage:
12.8V or more at 20°C (68°F)

INCORRECT →
- Clean the battery terminals.
- Recharge or replace battery.
  See the "BATTERY INSPECTION" section in CHAPTER 3.

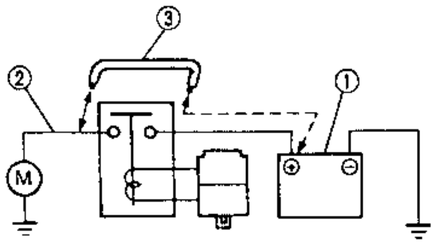
CORRECT ⇩

*

*

3. Starter.

- Connect the positive terminal of the battery (1) and the starter cable (2) using a connection cable (3) *.



- Check the functioning of the starter.

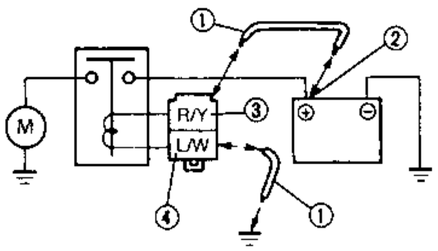
IT FAILS TO RUN → The starter is defective. Repair or replace.

IT RUNS ↓

4. Starter relay.

- Disconnect the starter relay connector.
- Connect the battery and frame to the starter relay connector, using a connection cable (1) as shown.

Battery terminal (+) (2) → Red/Yellow terminal (3)
Earth on frame → Blue/White terminal (4)



- Check the functioning of the starter.

IT FAILS TO RUN → The starter relay is defective. Repair.

IT RUNS ↓ *

*

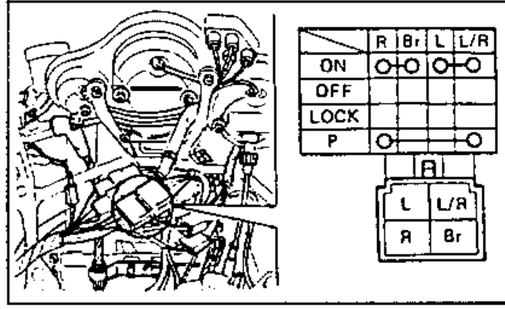
⚠ WARNING

The connection cable used must have a section equal or superior to that of the battery cable, which might otherwise get burnt.
This inspection is liable to produce sparks and should therefore be performed well away from inflammable substances.

*

5. Main switch.

- Disconnect the main switch connector from the harness.
- Connect the pocket tester (Ωx1) to the main switch terminal.
- Check the switch component for continuity between "Red (1) and Brown (2)". See the "SWITCH CHECK" section.

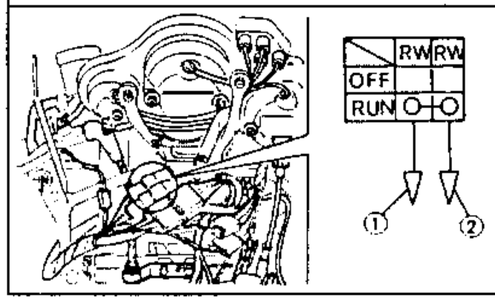


INCORRECT → The main switch is defective. Replace.

CORRECT ↓

6. Engine stop emergency switch.

- Disconnect the right handlebar switch connector from the harness.
- Connect the pocket tester (Ωx1) to the emergency engine stop switch terminal.
- Check the switch component for continuity between "Red/White (1) and Red/ White (2)". See the "SWITCH CHECK" section.



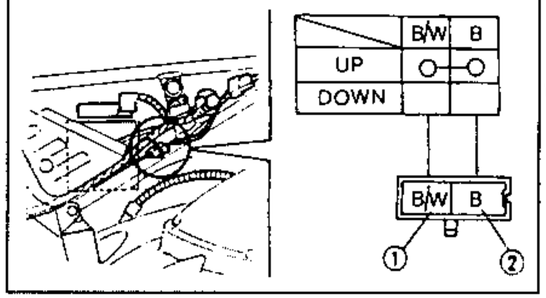
INCORRECT → The engine stop emergency switch is defective. Replace the right handlebar switch.

CORRECT ↓ *

*

7. Side stand switch.

- Disconnect the side stand switch connector from the harness.
- Connect the pocket tester (Ωx1) to the terminals of side stand switch.
- Check the switch component for continuity between "Black (1) and Black (2)". See the "SWITCH CHECK" section.

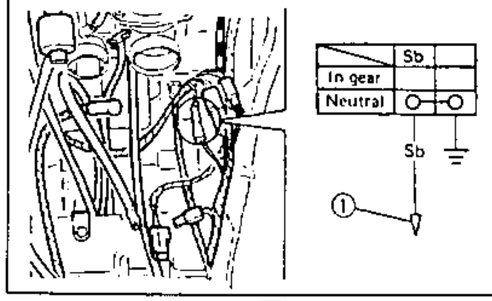


INCORRECT → The side stand switch is defective. Replace.

CORRECT ↓

8. Neutral switch.

- Disconnect the neutral switch cable from the harness.
- Connect the pocket tester (Ωx1) to the neutral switch terminal.
- Check the switch component for continuity between "Sky blue (1) and Earth on frame". See the "SWITCH CHECK" section.



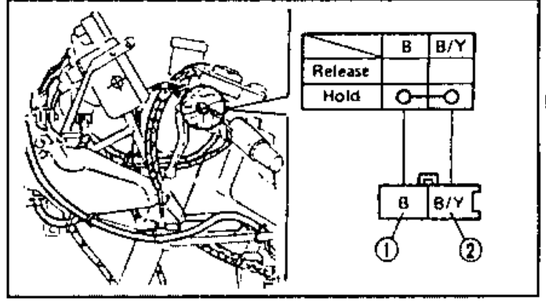
INCORRECT → The neutral switch is defective. Replace.

CORRECT ↓ *

*

9. Clutch switch.

- Disconnect the clutch switch connector from the harness.
- Connect the pocket tester (Ωx1) to the clutch switch terminal.
- Check the clutch switch for continuity between "Black (1) and Black/Yellow" (2). See the "SWITCH CHECK" section.

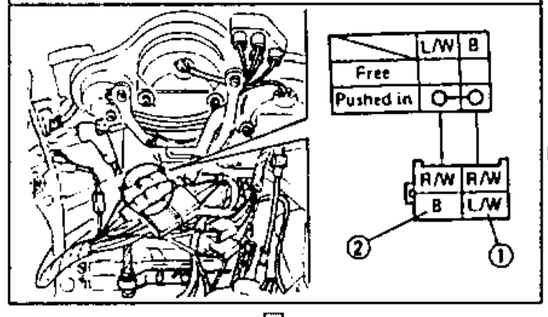


INCORRECT → The clutch switch is defective. Replace.

CORRECT ↓

10. Start switch.

- Disconnect the switch connector from the harness.
- Connect the pocket tester (Ωx1) to the handlebar switch terminal.
- Check the switch for continuity between "Blue/White (1) and Black (2)". See the "SWITCH CHECK" section.



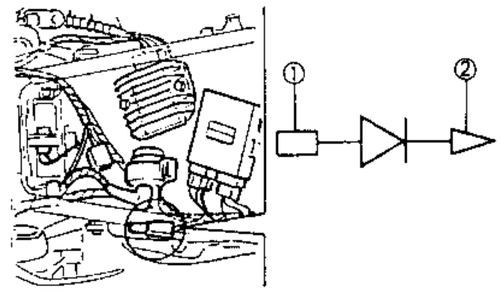
INCORRECT → The start switch is defective. Replace the right handlebar switch.

CORRECT ↓ *

*

11. 1 Diode.

- Disconnect the diode cables from the harness.
- Connect the pocket tester (Ω x 1) to the diode.



- Check the continuity of the diode.

Tester connection table		Correct	Incorrect		
Cable (+)	Cable (–)				
2	1	O	O	X	X
1	2	X	O	X	O

O: Continuity X: Discontinuity

INCORRECT → The diode is defective. Replace.

CORRECT ↓

12. Harness connection.

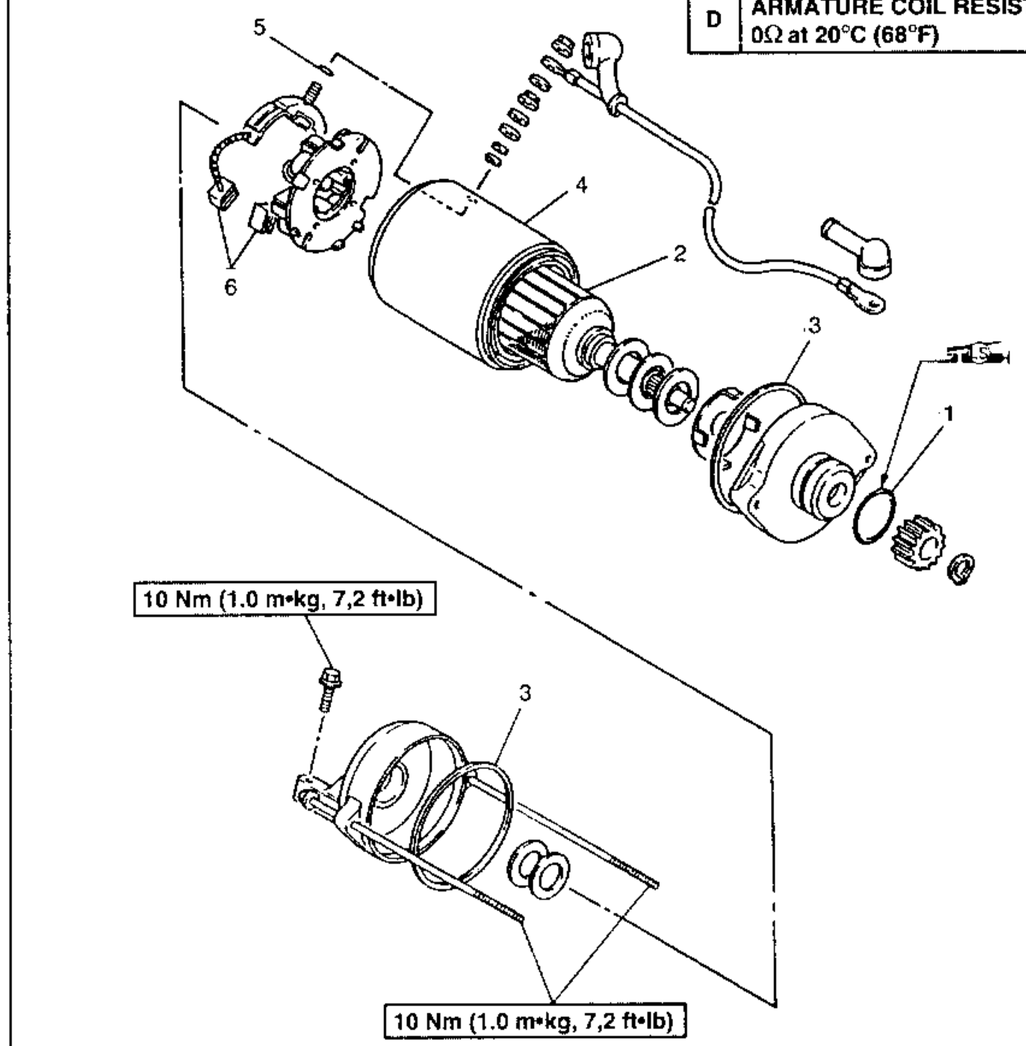
Check the connections of the whole starter system.
See "ELECTRICAL CIRCUIT DIAGRAM" section.

UNCERTAIN CONNECTIONS → Correct.

STARTER MOTOR

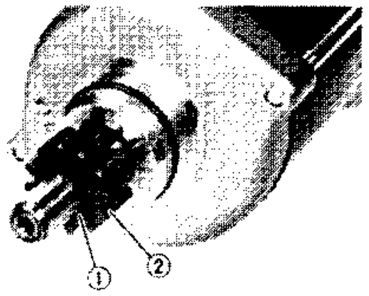
(1) O-ring
(2) Armature
(3) O-ring
(4) Stator
(5) O-ring
(6) Brushes

A	BRUSH WEAR LIMIT: 5.0 mm (0.20 in)
B	COMMUTATOR WEAR LIMIT: 27 mm (1.06 in)
C	MICA UNDERCUT: 0.7 mm (0.027 in)
D	ARMATURE COIL RESISTANCE: 0Ω at 20°C (68°F)



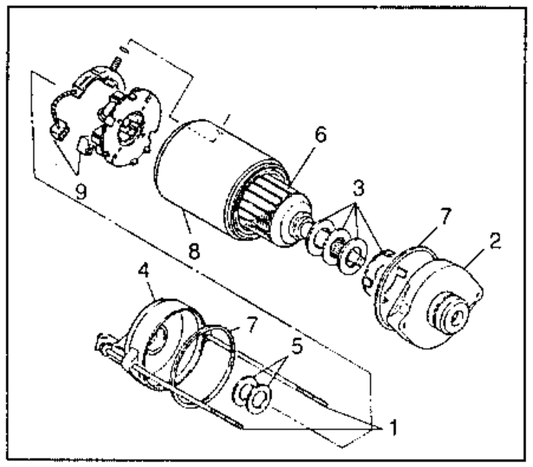
Removal

1. Remove:
   - Starter motor
     Refer to the "ENGINE REMOVAL AND SETTING" section in CHAPTER 4.

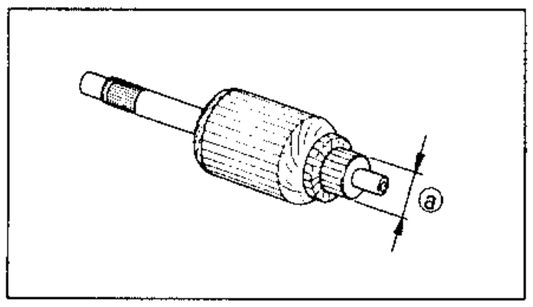


Disassembly

1. Remove:
   - Circlip (1)
   - Drive gear (2)



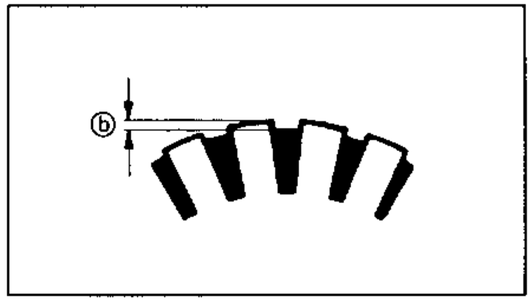
2. Remove:
   - Screws (1)
   - Bracket (2)
   - Washers (3)
   - Bracket (4)
   - Spacers (5)
   - Armature (6)
   - O-ring (7)
   - Stator (8)
   - Brushes assembly and bracket (9)



Inspection and repair

1. Inspect:
   - Armature
     Dirty → Clean with sandpaper no. 600.
2. Measure:
   - Diameter of the armature
     Out of specification → Replace the motor.

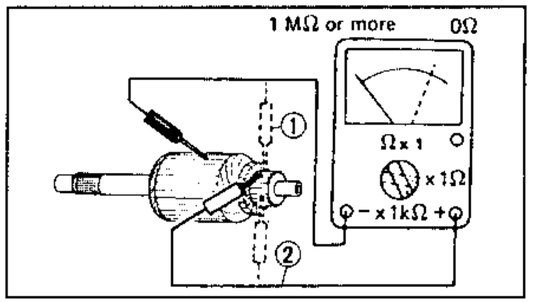
	Wear limit of armature (a): 27 mm



3. Measure:
   - The mica undercut (b).
     Out of specification → Level the undercut to the correct value using a hacksaw.

	Mica undercut (b): 0.7 mm

NOTE:
The mica insulation of the commutator must have an undercut to ensure proper functioning of the commutator.



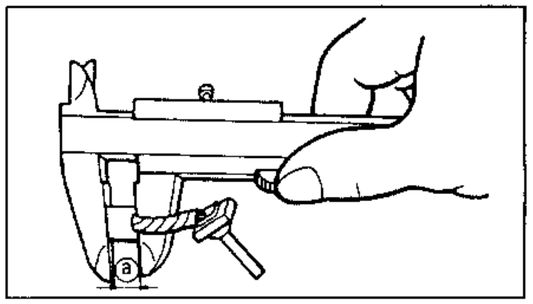
4. Inspect:
   - Armature coils (insulation/continuity)
     Defective → Replace the motor.

How to inspect the excitation coils:

- Connect the pocket tester and check continuity (1) and insulation (2).
- Check the armature resistance.

	Armature coil resistance: **Continuity check (1):** **0 Ω at 20°C (68°F)** **Insulation check (2):** **Over 1 MΩ at 20°C (68°F)**

- If the resistance is incorrect, replace the starter motor.

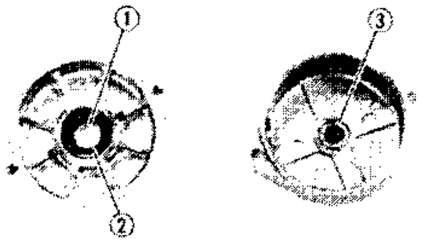


5. Measure:
   - Brush length
     Out of specification → Replace.

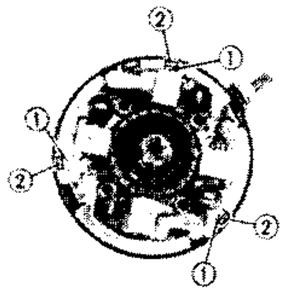
	Brush length limit (a): 5.0 mm

6. Inspect:
   - Brush spring strength
     Worn-out → Replace all springs at once.

	Brush spring strength: 680 ~ 920g



7. Inspect:
   - Bearings (1)
   - Oil seal (2)
   - O-rings
     Wear/Damage → Replace.
   - Bush (3)
     Damage → Replace the support.

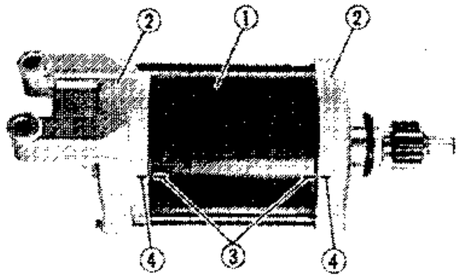


Assembly

Reverse the disassembly procedure.
Pay attention to the following points:

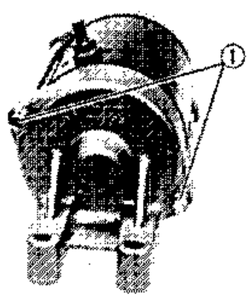
1. Install:
   - Brush assembly bracket

NOTE:
Align the jutting surface (1) on the brush housing with the slot (2).



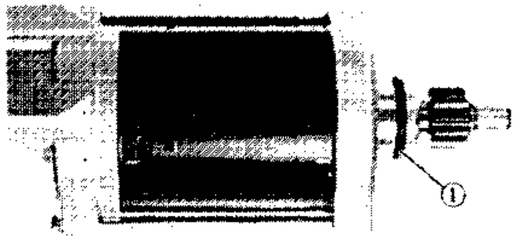
2. Install:
   - Stator (1)
   - Cover (2)

NOTE:
Align the reference marks (3) on the stator with the corresponding reference marks on the cover (4).



3. Install:
   - Screws (1)

	Screw (stator): **5 Nm (0.5 mkg)**



Installation

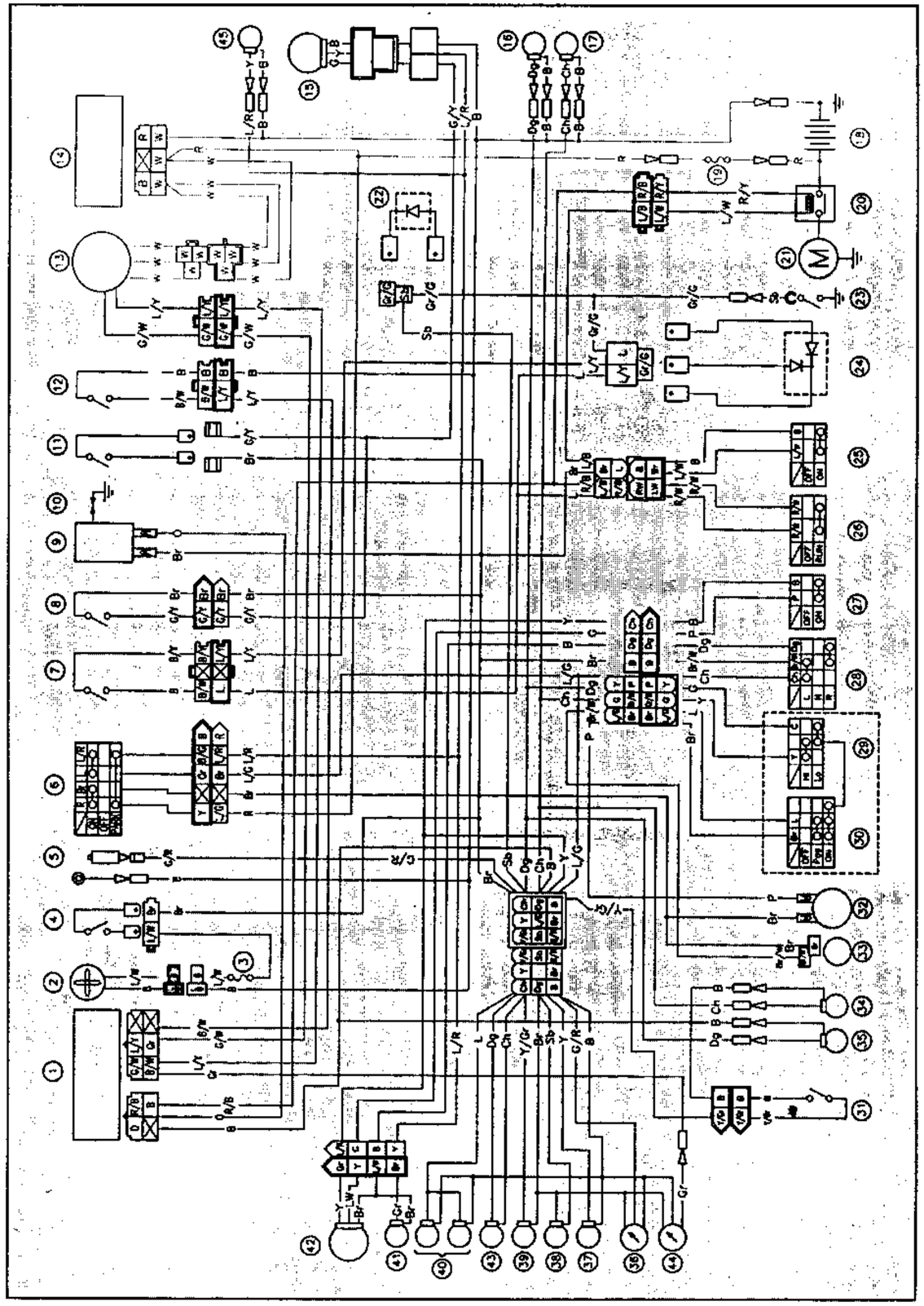
1. Install:
   - Starter motor

NOTE:
Slightly grease the O-ring (1).

	Bolt (starter motor): **10 Nm (1.0 mkg)**

See the "ENGINE OVERHAUL - ENGINE INSTALLATION" section in CHAPTER 4.

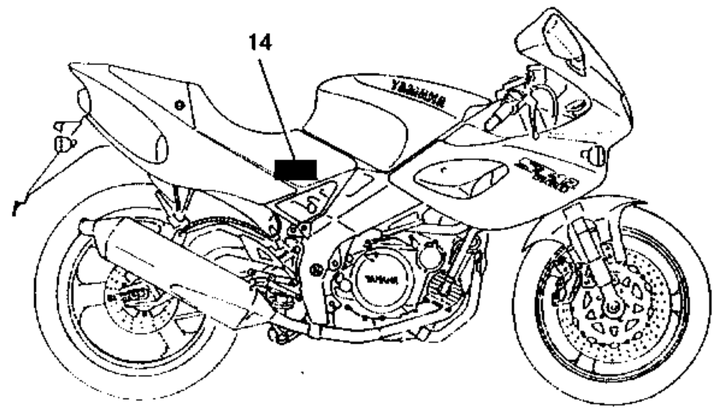
CHARGING SYSTEM - CIRCUIT DIAGRAM

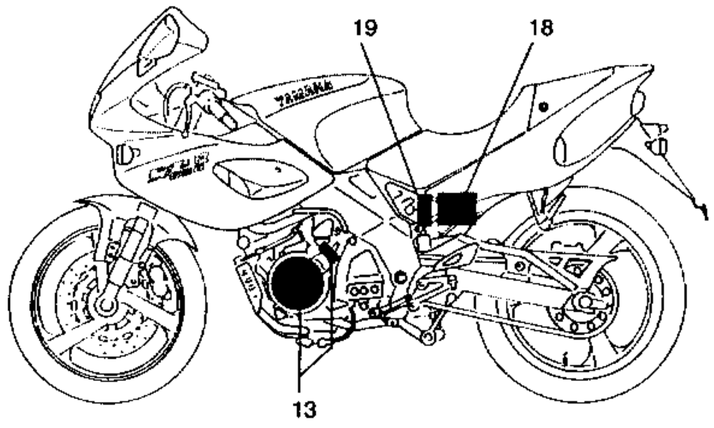


The diagram shows the charging circuit inside the motorcycle electric system.

NOTE:
For the colour codes and complete legend, see page 8-2.

(13) AC Generator
(14) Rectifier/Regulator
(18) Battery
(19) Fuse 20A (main)





DIAGNOSTICS

THE BATTERY CANNOT BE CHARGED

Procedure

Inspect:

1. Fuse 20A (main)
2. Battery
3. Charging voltage
4. Stator winding resistance
5. Harness connection (whole connection system)

NOTE:

- Before carring out inspections, remove the following parts:
  1) Seat
  2) Rear cowling
- To check for functioning defects, use the following special tools.

Pocket tester:
P/N. YU-03112
P/N. 90890-03112

1. Fuse 20A (main).
- Remove the fuse.
- Connect the pocket tester (Ω x 1) to the fuse.
- Check fuse continuity.
  See the "FUSE INSPECTION AND REPLACEMENT" section in CHAPTER 3.

DISCONTINUITY → Replace the fuse.

CONTINUITY ↓

2. Battery.
- Check the conditions of the battery.
  See the "BATTERY INSPECTION" section in CHAPTER 3.

Voltage:
12.8V or over at 20°C (68°F)

INCORRECT →
- Clean the battery terminals.
- Recharge or replace the battery.
  See the "BATTERY INSPECTION" section in CHAPTER 3.

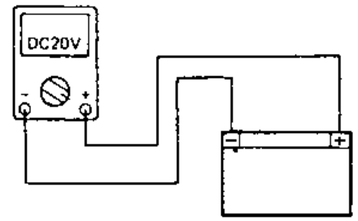
CORRECT ↓

*

*

3. Charging voltage.
- Connect the pocket tester (DC 20V) to the battery.

Tester cable (+) → Battery terminal (+)
Tester cable (–) → Battery terminal (–)



- Start the engine and rev to about 5,000 rpm.
- Check the charging voltage.

Charging voltage:
14.0 V at 5,000 rpm

NOTE:
Use a fully charged battery.

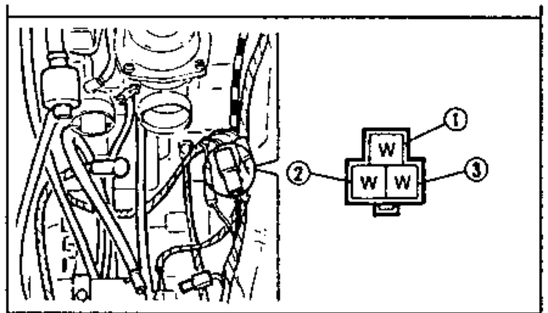
IN COMPLIANCE WITH SPECIFICATIONS → The charging system is correct.

OUT OF SPECIFICATIONS ↓

4. Stator coils resistance.
- Disconnect the AC generator connector from the harness.
- Connect the pocket tester (Ω x 1) to the stator.
- Check stator coils resistance.

Tester cable (+) → White cable (1)
Tester cable (–) → White cable (3)

Tester cable (+) → White cable (2)
Tester cable (–) → White cable (3)



Stator coil resistance:
0.20 ~ 0.30 Ω at 20°C (68°F)

OUT OF SPECIFICATIONS

Stator winding is defective.
Replace.

IN COMPLIANCE WITH SPECIFICATIONS

5. Connections.

- Check the connections of the entire charging system.
  See the "ELECTRICAL CIRCUIT DIAGRAM".

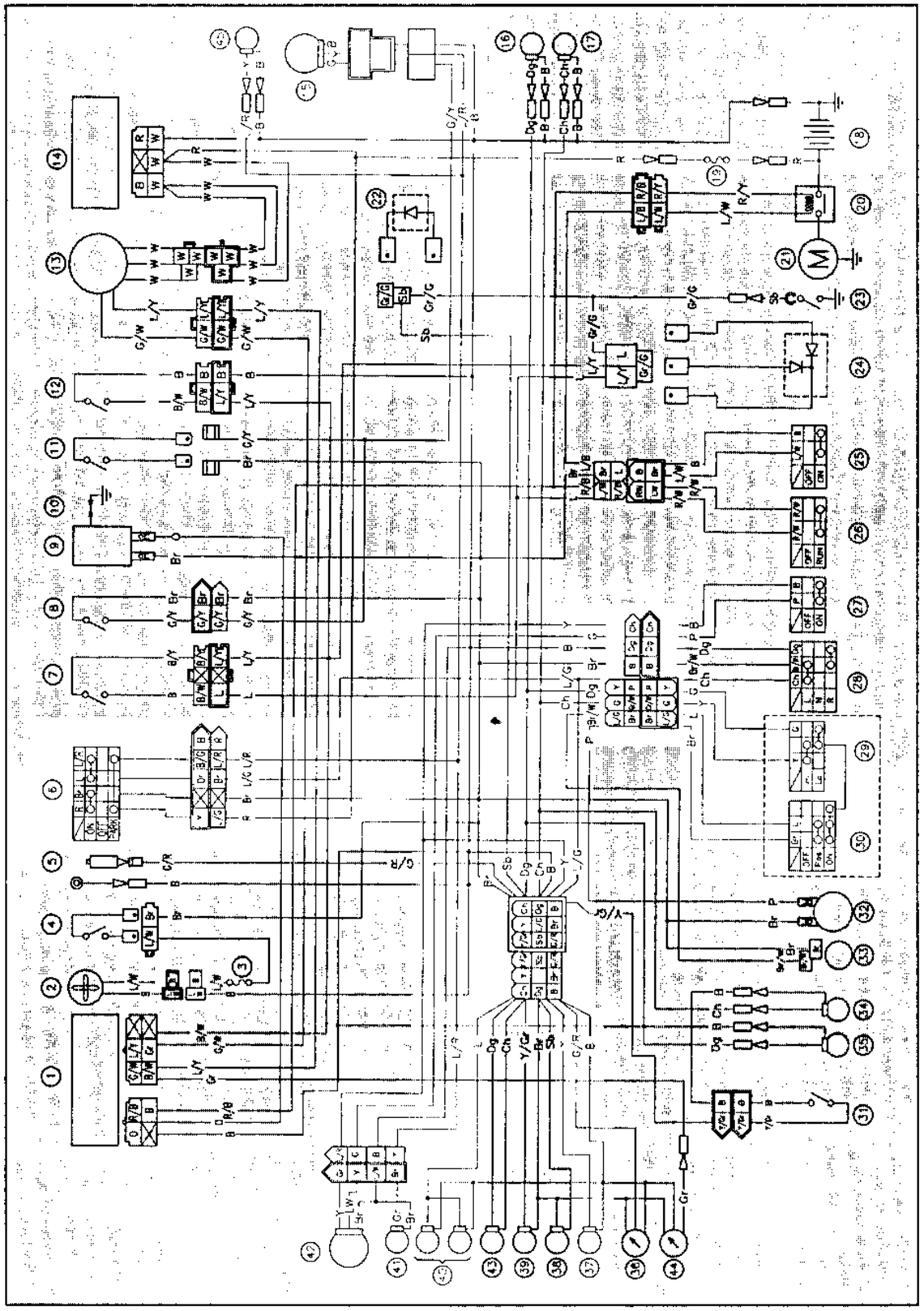
UNCERTAIN CONNECTIONS

Repair.

OK

The rectifier/regulator is defective. Replace.

LIGHT SYSTEM - CIRCUIT DIAGRAM

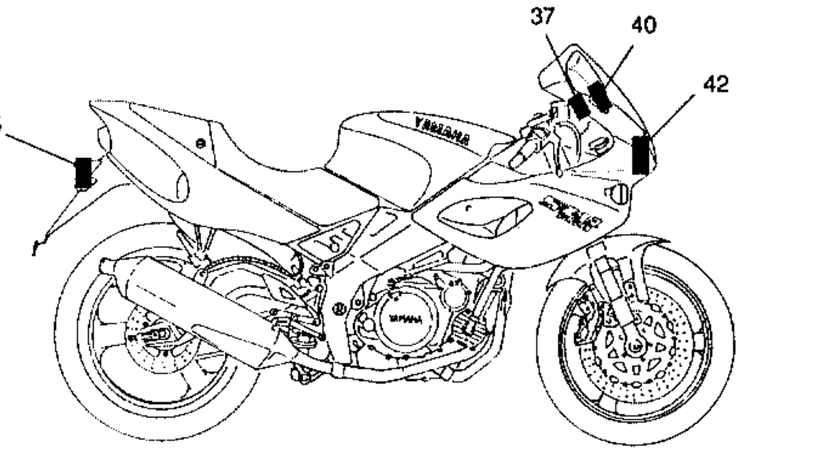


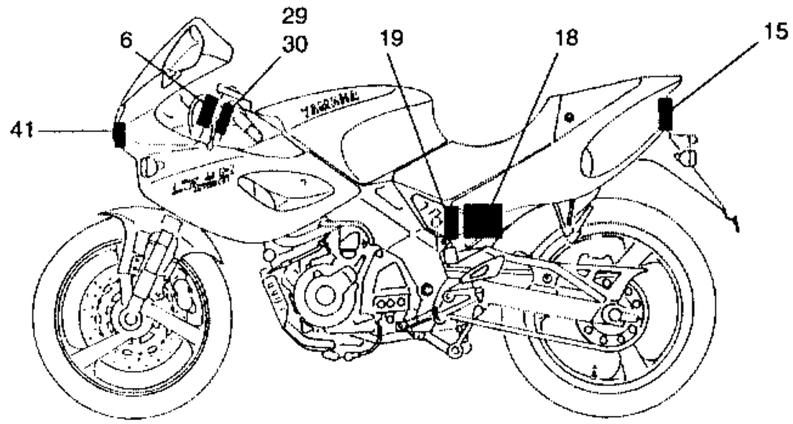
The diagram shows the light system circuit inside the electric system of the motorcycle.

NOTE:

For the colour codes and complete legend, see page 8-2.

(6) Main switch
(15) Rear tail/stop light
(18) Battery
(19) Fuse 20A (main)
(29) Dipped/high beam light switch
(30) Lights switch
(37) High beam light
(40) Instrument light
(41) Front parking light
(42) Dipped/high beam light
(45) Number plate light





DIAGNOSTICS

DIPPED/HIGH BEAM LIGHT, HIGH BEAM WARNING LIGHT, REAR STOP/TAIL LIGHT, NUMBER PLATE LIGHT, FRONT PARKING LIGHT AND/OR INSTRUMENT LIGHTS FAIL TO TURN ON

Procedure

Check:

1. Bulb
2. Fuse 20A (main)
3. Battery
4. Main switch
5. Lights switch and dipped/high beam light
6. Harness connections (full system of connections)

NOTE:

- Before beginning inspections, remove the following parts:
  1. Seat
  2. Rear cowling
  3. Cowling
- To check for defects use the following special tools.

Pocket tester:
P/N. YU-03112
P/N. 90890-03112

1. Bulb and bulbholder.
- Check the continuity of the bulb and bulbholder.
  See the "BULB INSPECTION" section.

DISCONTINUITY → The bulb and/or bulbholder are defective. Replace.

CONTINUITY ↓

2. Fuse 20A (main).
- Remove the fuse.
- Connect the pocket tester (Ωx1) to the fuse.
- Check fuse continuity.
  See the "FUSE INSPECTION AND REPLACEMENT" section in CHAPTER 3.

DISCONTINUITY → Replace the fuse.

CONTINUITY ↓

*

*

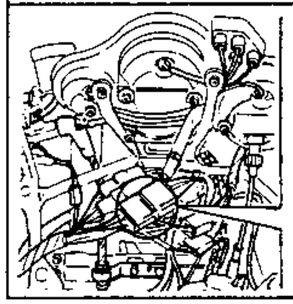
3. Battery.
- Check the conditions of the battery.
  See the "BATTERY INSPECTION" section in CHAPTER 3.

Voltage:
12.8V or over at 20°C (68°F)

INCORRECT →
- Clean the battery terminals.
- Recharge or replace the battery.
  See the "BATTERY INSPECTION" section in CHAPTER 3.

CORRECT ↓

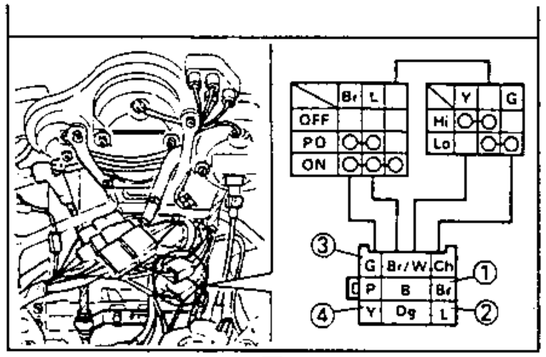
4. Main switch.
- Disconnect the main switch connector from the harness.
- Connect the pocket tester (Ωx1) to the main switch terminals.
- See the "SWITCH CHECK" section.



INCORRECT → The main switch is defective. Replace.

CORRECT ↓

5. Light switch and dipped/high beam commutator.
- Disconnect the left handlebar switch unit connector.
- Connect the pocket tester (Ωx1) to the connector terminals.
- Check the switch component for continuity between "Brown (1) and Blue (2)", "Brown (1) and Green (3)", "Brown (1) and Yellow (4)".
  See the "SWITCH CHECK" section.



INCORRECT

The lights switch and/or dipped/high beam commutator are defective. Replace the left handlebar switch.

CORRECT

6. Harness connections.

- Check the connections of the entire light system.

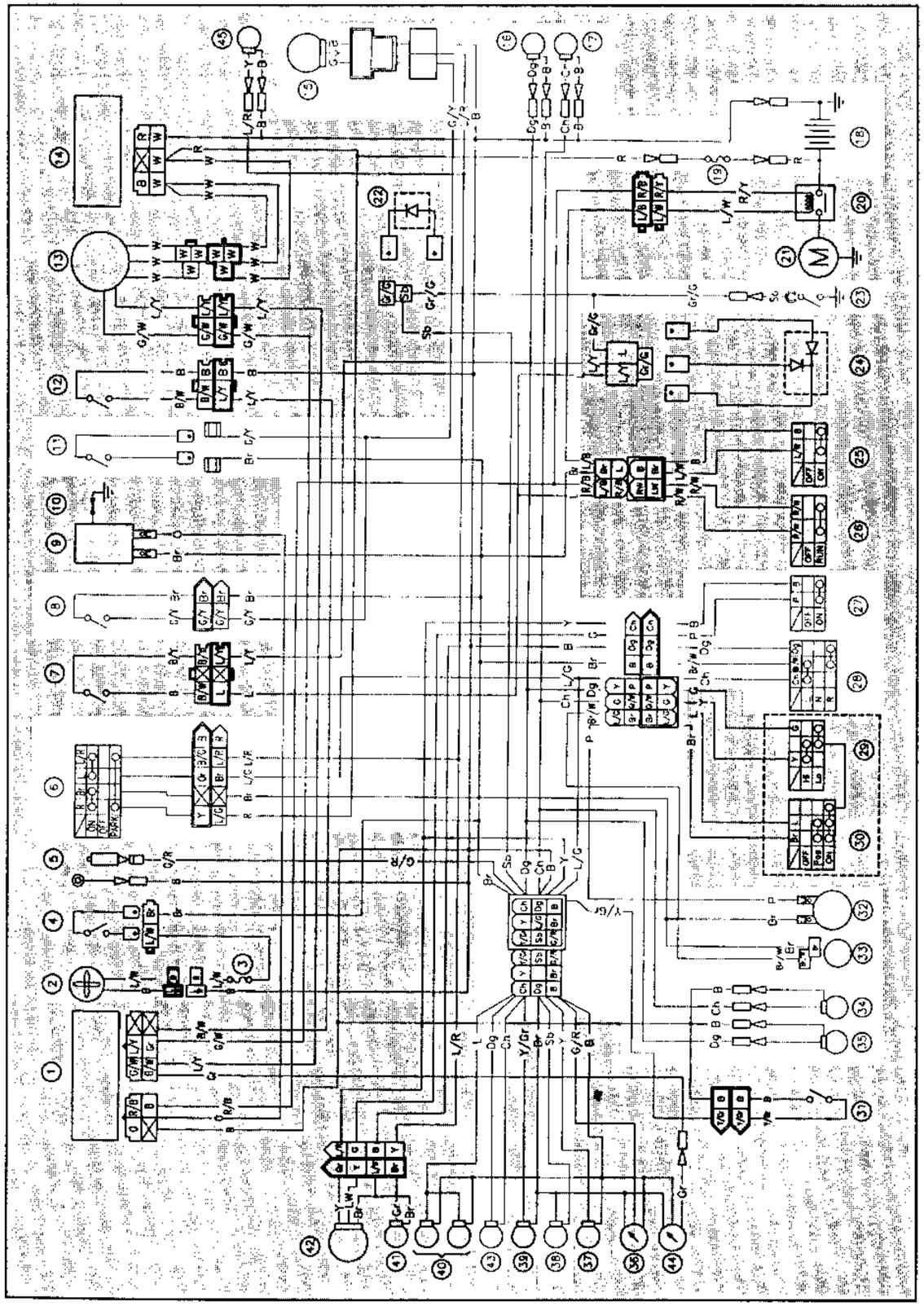
DEFECTIVE CONNECTIONS

Repair.

CORRECT

Check the conditions of each circuit for the entire light system.
See the "ELECTRIC CIRCUIT DIAGRAM".

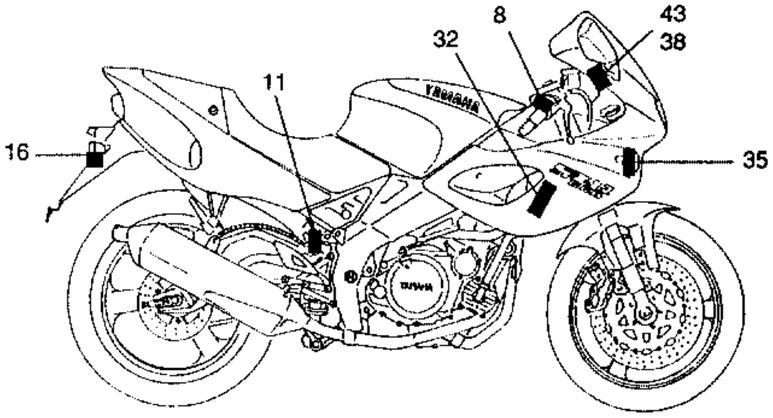
SIGNALLING SYSTEM - CIRCUIT DIAGRAM

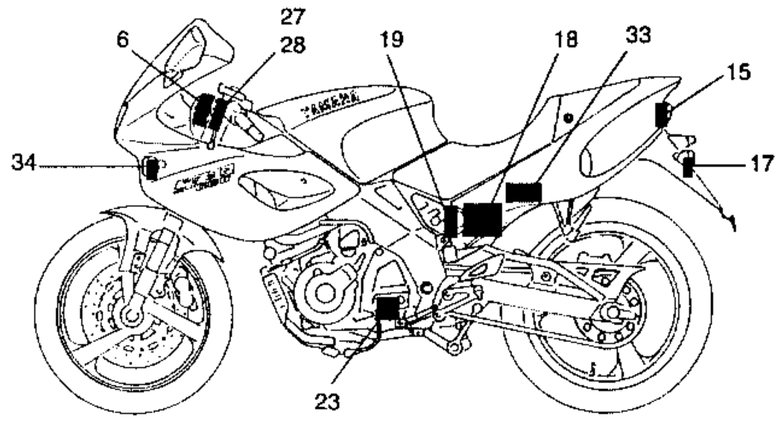


The diagram shows the signalling system circuit inside the electric system of the motorcycle.

NOTE:
For the colour codes and complete legend, see page 8-2.

(6) Main switch
(8) Front brake switch
(11) Rear brake switch
(15) Rear tail/stop light
(16) Right rear direction indicator light
(17) Left rear direction indicator light
(18) Battery
(19) Fuse 20A (main)
(23) Neutral switch
(27) Horn switch
(28) Turn direction indicator switch
(32) Horn
(33) Direction indicators intermittence
(34) Left front direction indicator light
(35) Right front direction indicator light
(38) Neutral light "N"
(43) Direction indicator light





DIAGNOSTICS

- **THE FLASHER LIGHTS, BRAKE LIGHT AND/OR WARNING LIGHTS FAIL TO TURN ON**
- **THE HORN FAILS TO SOUND**

Procedure

Check:

1. Fuse 20A (main)
2. Battery
3. Main switch
4. Harness connections
   (entire system of connections)

NOTE:

- Before starting inspections, remove the following parts:
  1. Seat
  2. Rear cowling
  3. Cowling
- To check for operating faults use the following special tools.

Pocket tester:
P/N. YU-03112
P/N. 90890-03112

1. Fuse 20A (main).

- Remove fuse.
- Connect the pocket tester (Ωx1) to the fuse.
- Check fuse continuity.
  See the "FUSE INSPECTION AND REPLACEMENT" section in CHAPTER 3.

DISCONTINUITY → Replace the fuse.

CONTINUITY ↓

2. Battery.

- Check the conditions of the battery.
  Consult the "BATTERY INSPECTION" section in CHAPTER 3.

Voltage:
12.8V or more at 20°C (68°F)

INCORRECT →

- Clean the battery terminals.
- Recharge or replace battery.
  Consult the "BATTERY INSPECTION" section in CHAPTER 3.

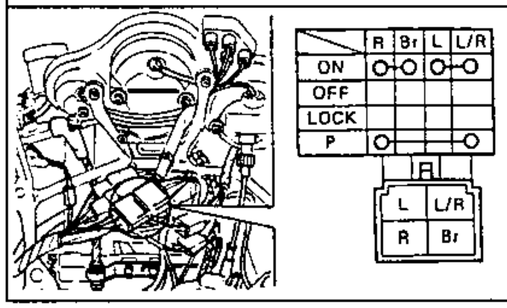
CORRECT ↓

*

*

3. Main switch

- Disconnect the main switch connector from the harness.
- Connect the pocket tester (Ωx1) to the main switch terminals.
- See the "SWITCH CHECK" section.



DISCONTINUITY → The main switch is defective. Replace.

CORRECT ↓

4. Harness connections.

Check the connections of the entire signalling system.
See the "ELECTRICAL CIRCUIT DIAGRAM" section.

UNCERTAIN CONNECTIONS → Repair.

CORRECT ↓

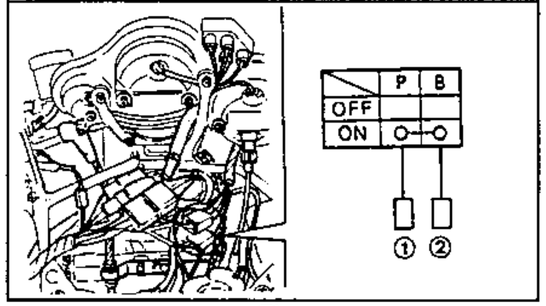
Check the conditions of each signalling system circuit.
See the "SIGNALLING SYSTEM CONTROL" section.

SIGNALLING SYSTEM CONTROL

1. The horn does not work.

1. Horn switch.

- Detach the left handlebar switch connectors from the harness.
- Connect the pocket tester (Ωx1) to the switch terminals.
- Check the switch component for continuity between "Pink (1) and Black (2)" cables. See the "SWITCH CHECK" section.



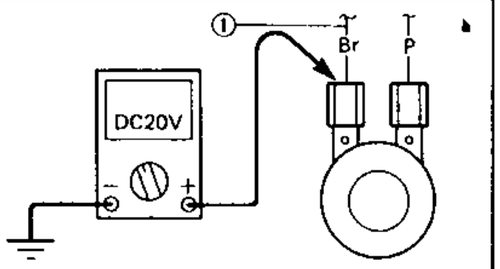
DISCONTINUITY → The switch is defective. Replace the left handlebar switch.

CORRECT ↓

2. Voltage.

- Connect the pocket tester (DC 20V) to the horn.

Tester terminal (+) → Brown terminal (1)
Tester terminal (–) → Earth on the frame



- Turn the main switch to ON.
- Check the voltage (12V) on the "Brown" terminal of the horn.

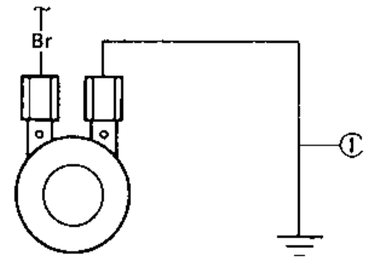
OUT OF SPECIFICATIONS → The circuit from the main switch to the horn terminal is defective. Repair.

IN COMPLIANCE WITH SPECIFICATIONS (12V) ↓

*

3. Horn.

- Detach the "Pink" cable from horn terminal.
- Connect a special cable (1) to the horn cable and earth the cable.
- Turn the main switch to ON.



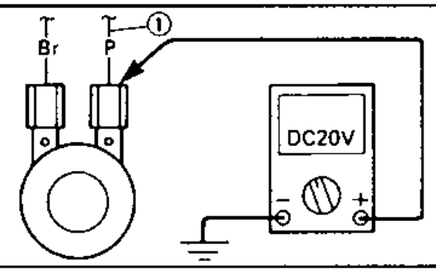
THE HORN WORKS → The horn is efficient.

THE HORN DOES NOT WORK ↓

4. Voltage.

- Connect the pocket tester (DC 20V) to the "Pink" terminal of the horn.

Tester terminal (+) → Pink cable (1)
Tester terminal (–) → Earth on the frame



- Turn the main switch to ON.
- Check the voltage (12V) on the "Red" terminal of the horn.

OUT OF SPECIFICATION → The horn is defective. Repair.

IN COMPLIANCE WITH SPECIFICATIONS (12V) ↓

Repair or replace the horn.

2. The brake light fails to turn on.

1. Bulb and bulbholder.

- Check the continuity of the bulb and bulbholder.
  See the "BULB INSPECTION" section.

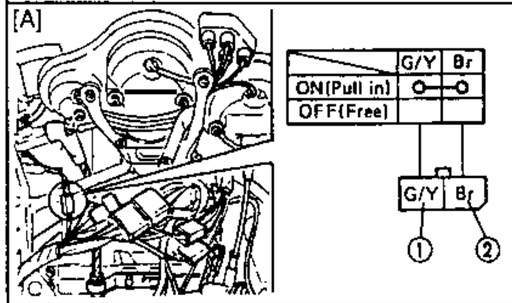
DISCONTINUITY → Replace the bulb and/or bulbholder.

CONTINUITY ⇩

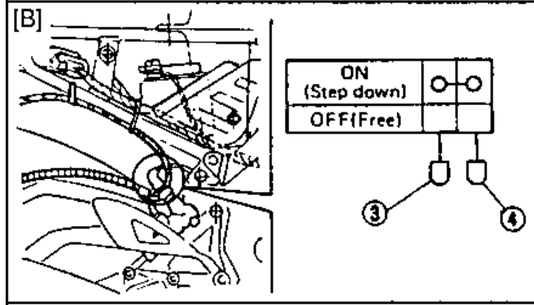
2. Brake switch.

- Disconnect the brake switch connectors from the harness.
- Connect the pocket tester (Ωx1) to the brake switch terminals.
- Check the front brake switch component for continuity between "Green/Yellow (1) and Brown (2)" terminals, and the rear brake switch for continuity between the terminals (3) and (4). See "SWITCH CHECK" section.

[A]



[B]



[A] Front brake switch
[B] Rear brake switch

INCORRECT → The brake switch is defective. Replace.

CORRECT ⇩

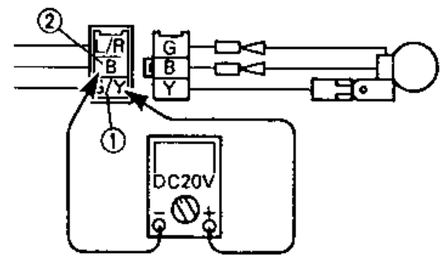
*

*

3. Voltage.

- Connect the pocket tester (DC 20V) to the bulbholder connector.

Tester terminal (+) → Green/Yellow cable (1)
Tester terminal (–) → Black cable (2)



- Turn the main switch to ON.
- The brake lever is pulled or the brake pedal is pressed.
- Check the voltage (12V) on the "Green/Yellow" cable of the bulbholder connector.

OUT OF SPECIFICATION → The circuit from the main switch to the bulbholder connector is defective. Repair.

IN COMPLIANCE WITH SPECIFICATIONS (12V) ⇩

The circuit is efficient.

3. The direction indicator light and/or the direction indicator warning light fail to flash.

1. Bulb and bulbholder.

- Check the continuity of the bulb and bulbholder.
  See the "BULB INSPECTION" section.

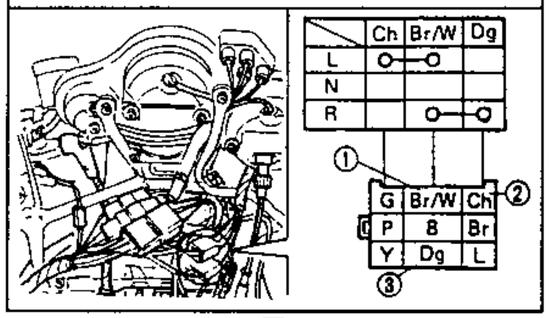
DISCONTINUITY → Replace the bulb and/or bulbholder.

CONTINUITY ⇩

2. Direction indicator lights switch.

- Disconnect the left handlebar switch connector from the harness.
- Connect the pocket tester (Ωx1) to the left handlebar switch cables.

- Check the switch component for continuity between "Brown/White (1) and Chocolate (2)" and "Brown/White (1) and Dark Green (3)". See the "SWITCH CHECK" section.



INCORRECT

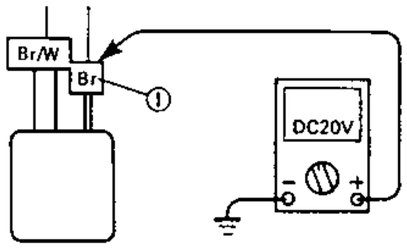
The direction indicator switch is defective. Replace.

CORRECT

3. Direction indicator intermittence.

- Connect the pocket tester (DC 20V) to the indicator intermittence.

Tester terminal (+) →
Brown terminal (1)
Tester terminal (–) → Earth on frame



- Turn the main switch to ON.
- Check the voltage (12V) on the "Brown" cable to the intermittence terminal.

OUT OF SPECIFICATIONS

The circuit from the main switch to the intermittence connector is defective. Repair.

IN COMPLIANCE WITH SPECIFICATIONS (12V)

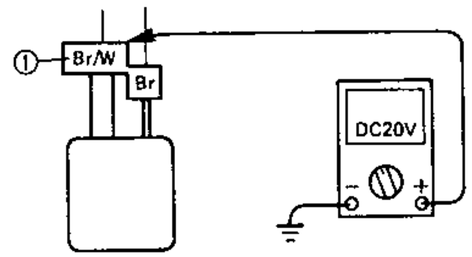
*

*

4. Voltage.

- Connect the pocket tester (DC 20V) to the bulbholder connector.

Tester terminal (+) →
Brown/White terminal (1)
Tester terminal (–) → Earth on frame



- Turn the main switch to ON.
- Check the voltage (12V) on the "Blue" cable to the bulbholder connector.

OUT OF SPECIFICATIONS

The intermittence is defective. Repair.

IN COMPLIANCE WITH SPECIFICATIONS (12V)

*

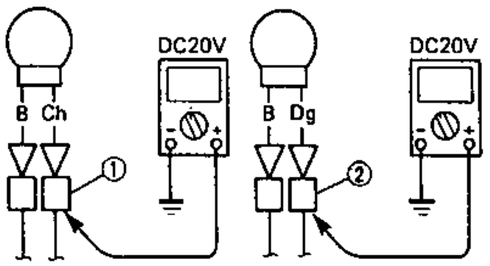
*

5. Voltage.

- Connect the pocket tester (DC 20V) to the bulbholder connector.
- Connect the left handlebar switch connector to the harness.

To the left flasher light:
Tester terminal (+) →
Chocolate terminal (1)
Tester terminal (–) → Earth on frame

To the right flasher light:
Tester terminal (+) →
Dark Green terminal (2)
Tester terminal (–) → Earth on frame



- Turn the main switch to ON.
- Turn the direction indicator switch to "L" or "R".
- Check the voltage (it flashes at 2-8V) on the "Chocolate" or "Dark green" cable at the bulbholder connector.

OUT OF SPECIFICATIONS

The circuit from the direction indicator switch to the bulbholder is defective. Repair.

IN COMPLIANCE WITH SPECIFICATIONS (12V)

The circuit is efficient.

4. The neutral warning light "N" fails to turn on.

1. Bulb and bulbholder.

- Check the continuity of the bulb and bulbholder.
  See the "BULB INSPECTION" section.

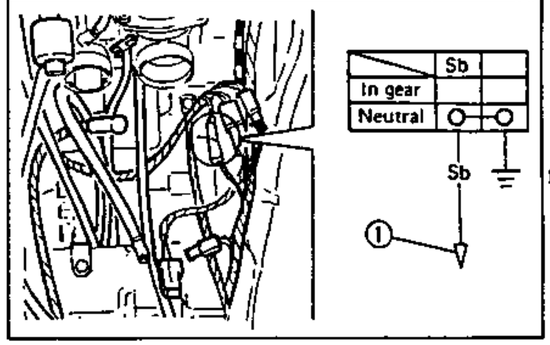
DISCONTINUITY

Replace the bulb and/or bulbholder.

CONTINUITY

2. Neutral switch.

- Disconnect the neutral switch cable from the harness.
- Connect the pocket tester (Ωx1) to the neutral switch terminals.
- Check the switch component for continuity between "Sky blue (1) and earth".
  See the "SWITCH CHECK" section.



INCORRECT

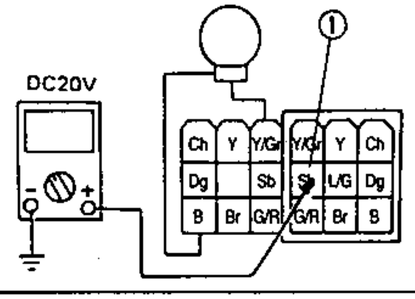
The neutral switch is defective. Replace.

CORRECT

3. Voltage.

- Connect the pocket tester (DC 20V) to the bulbholder connector.

Tester terminal (+) →
Sky blue cable (1)
Tester terminal (–) → Earth on frame



- Turn the main switch to ON.
- Check the voltage (12V) on the "Sky blue" cable of the bulbholder connector.

OUT OF SPECIFICATIONS

The circuit from the main switch to the bulbholder connector is defective. Repair.

IN COMPLIANCE WITH SPECIFICATIONS (12V)

4. Neutral switch cable.

- Disconnect the neutral switch connector from the harness and the bulbholder connector.
- Connect the pocket tester (Ωx1) to the neutral switch cable (on the harness side) (1) and the bulbholder connector (2).

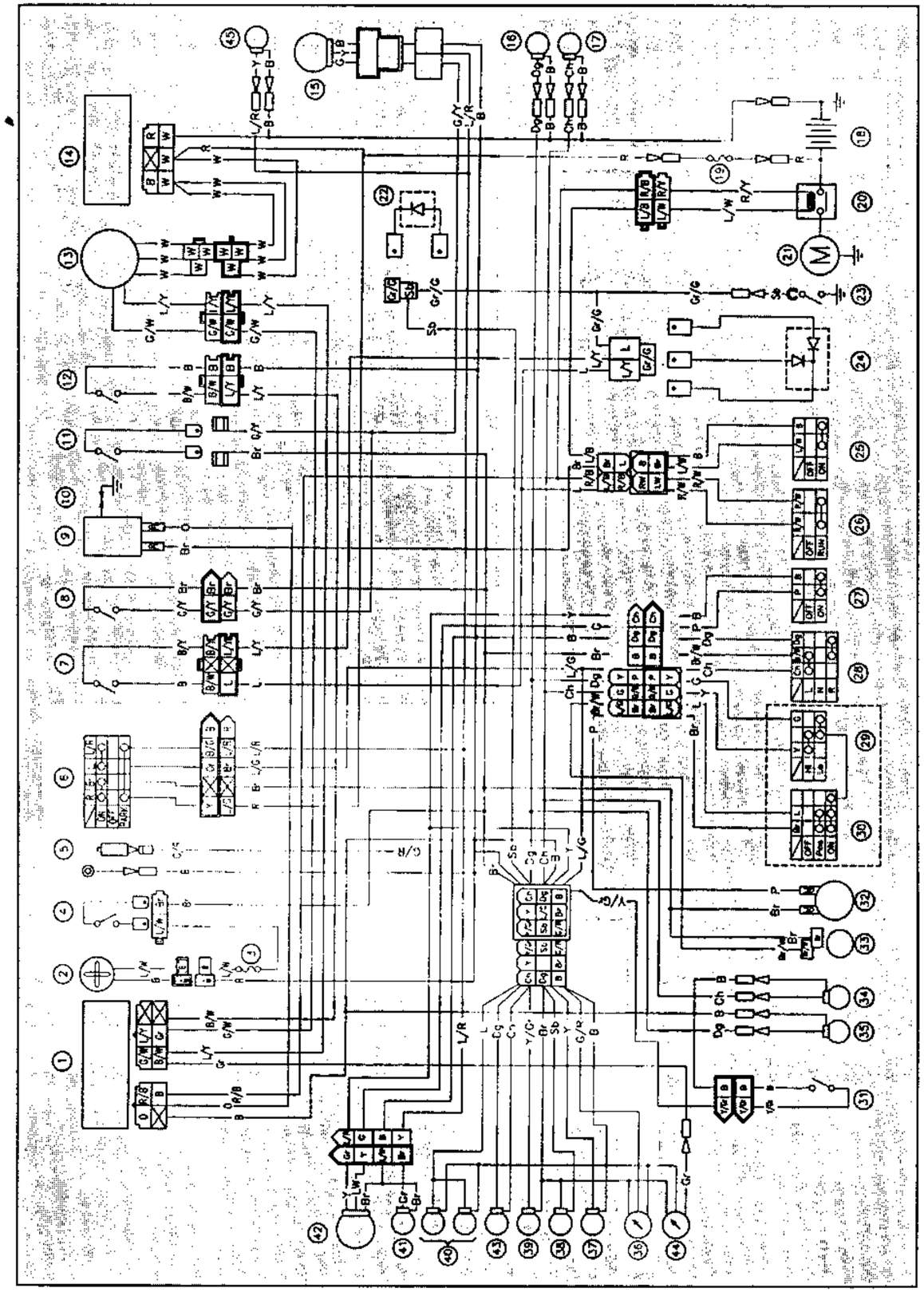
DISCONTINUITY

The circuit from the bulb connector to the neutral switch cable is defective. Repair.

CONTINUITY

The circuit is efficient.

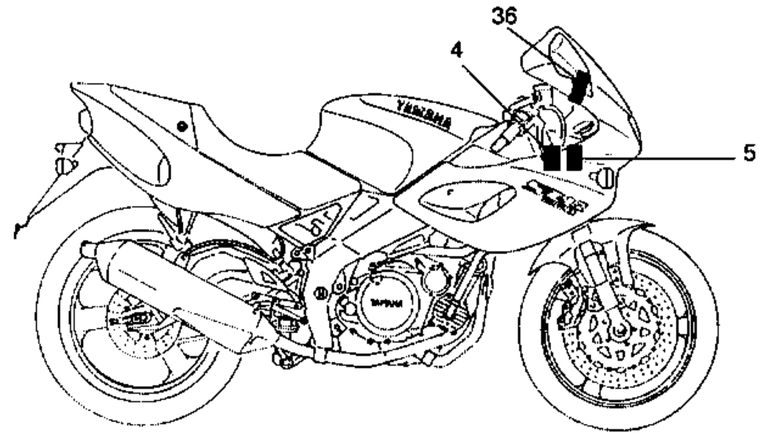
COOLING SYSTEM - CIRCUIT DIAGRAM

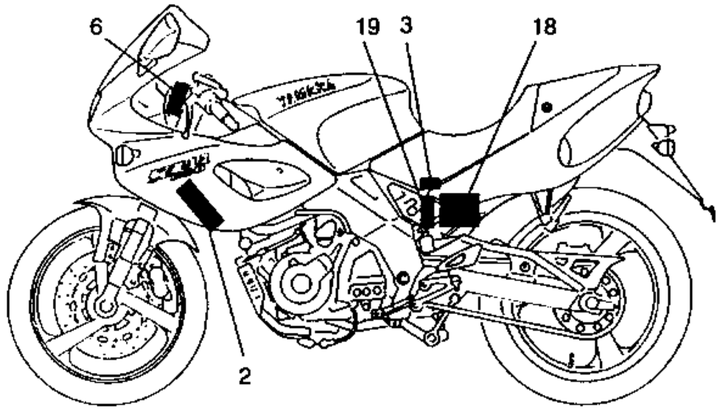


The diagram show the cooling system circuit inside the electric system of the motorcycle.

NOTE:
For the colour codes and complete legend, see page 8-2.

(2) Fan motor
(3) Fuse 7.5A (fan motor)
(4) Thermo switch
(5) Thermo unit
(6) Main switch
(18) Battery
(19) Fuse 20A (main)
(36) Engine temperature cooling liquid indicator





DIAGNOSTICS

THE FAN MOTOR FAILS TO RUN

Procedure

Check:

1. Fuses (main and fan motor)
2. Battery
3. Main switch
4. Fan motor (1st test)
5. Fan motor (2nd test)
6. Thermo switch
7. Harness connections (entire system of connections)

NOTE:

- Before making the inspections mentioned, remove the following parts:
  1. Seat
  2. Cowling
- To check for functioning defects, use the following special tools.

Pocket tester:
P/N. YU-03112
P/N. 90890-03112

1. Fuses (main and fan motor)

- Remove the fuses.
- Connect the pocket tester (Ω x 1) to the fuse.
- Check fuse continuity.
  See the "FUSE INSPECTION AND REPLACEMENT" section in CHAPTER 3.

DISCONTINUITY → Replace the fuse (es).

CONTINUITY ↓

2. Battery.

- Check the conditions of the battery.
  See the "BATTERY INSPECTION" section in CHAPTER 3.

Voltage:
12.8V or over at 20°C (68°F)

INCORRECT →

- Clean the battery terminals.
- Recharge or replace the battery.
  See the "BATTERY INSPECTION" section in CHAPTER 3.

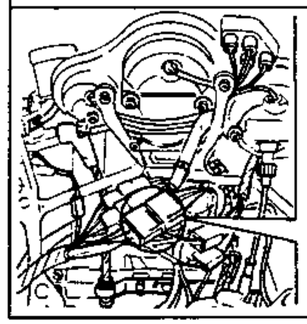
CORRECT ↓

*

*

3. Main switch.

- Disconnect the main switch connector from the harness.
- Connect the pocket tester (Ωx1) to the main switch terminals.
- See the "SWITCH CHECK" section.



	R	Br	L	L/R
ON	O	O	O	O
OFF				
LOCK				
P	O			O

R: L, L/R; R, Br

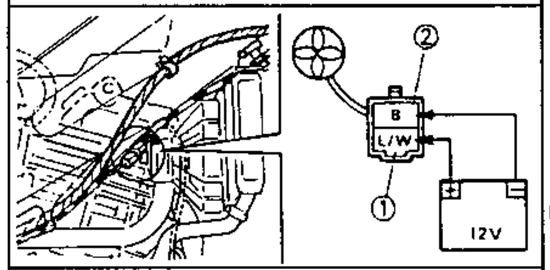
INCORRECT → The main switch is defective. Replace.

CORRECT ↓

4. Fan motor (1st Test).

- Disconnect the fan motor connector.
- Connect a battery (12V) as shown.

Tester terminal (+) →
Blu/White cable (1)
Tester terminal (–) → Black cable (2)

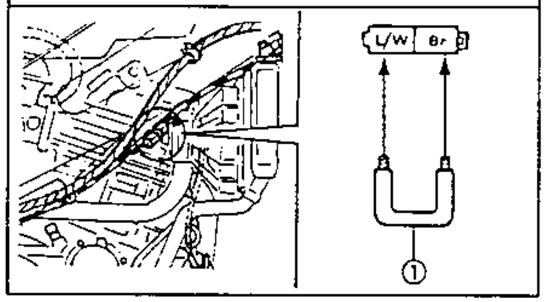


- Check the functioning of the fan motor.

IT FAILS TO RUN → The fan motor is defective. Replace.

5. Fan motor (2nd Test)

- Disconnect the thermo switch connector ("Blue/White" and "Brown").
- Turn the main switch to ON.
- Connect the connector terminals (harness side) using an auxiliary cable (1) as shown.



IT FAILS TO RUN

The circuit from the main switch to the fan motor terminals is defective. Repair.

TURN

6. Thermo switch.

- Remove the thermo switch from the thermostat housing.
- Connect the pocket tester (Ω x 1) to the thermo switch (1).
- Plunge the thermo switch into the coolant (2).
- Check thermo switch continuity.
- During the coolant heating take the temperatures by a thermometer (3).

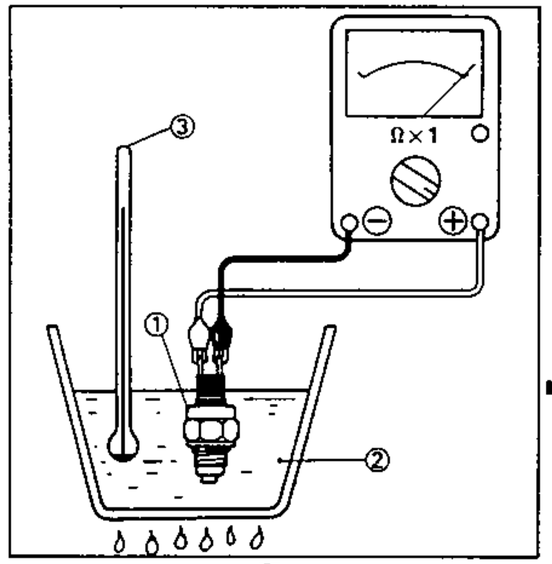
Test step	Coolant temperature	Correct
1	Less than 105 ± 3°C (221.0 ± 5.4°F)	X
2	More than 105 ± 3°C (221.0 ± 5.4°F)	O
3*	From 105 to 98°C (From 221.0 to 208.4°F)	O
4*	Less than 98°C (208.4°F)	X

1st and 2nd steps: overheating test
3rd and 4th steps: cooling test
O: Continuity X: Discontinuity

⚠ WARNING

Take care the thermo switch doesn't fall to the ground. In this case replace it.

Thermo switch:
28 Nm (2.8 mkg)
Water resistant sealant



BAD CONDITIONS

The thermo switch is defective. Replace.

GOOD CONDITIONS

7. Harness connections.

Check the connections of the entire cooling system. See the "ELECTRICAL CIRCUIT DIAGRAM" section.

UNCERTAIN CONNECTIONS

Correct.

CORRECT

The circuit is efficient.

WITH ENGINE HOT THE COOLANT TEMPERATURE GAUGE FAILS TO INDICATE

Procedure

Check:

1. Fuse 20A (main)
2. Battery
3. Main switch
4. Thermo unit
5. Voltage
6. Harness connections (entire system of connections)

NOTE:

- Before making the inspections mentioned, remove the following parts:
  1. Seat
  2. Cowling
- To check for functioning defects, use the following special tools.

Pocket tester:
P/N. YU-03112
P/N. 90890-03112

1. Fuse 20A (main).

- Remove the fuse.
- Connect the pocket tester (Ω x 1) to the fuse.
- Check fuse continuity.
  See the "FUSE INSPECTION AND REPLACEMENT" section in CHAPTER 3.

DISCONTINUITY → Replace the fuse.

CONTINUITY ↓

2. Battery.

- Check the conditions of the battery.
  See the "BATTERY INSPECTION" section in CHAPTER 3.

Voltage:
12.8V or over at 20°C (68°F)

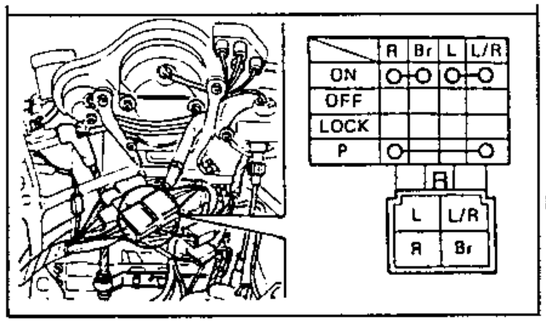
INCORRECT →

- Clean the battery terminals.
- Recharge or replace the battery.
  See the "BATTERY INSPECTION" section in CHAPTER 3.

CORRECT ↓

3. Main switch.

- Disconnect the main switch connector from the harness.
- Connect the pocket tester (Ωx1) to the main switch terminals.
- See the "SWITCH CHECK" section.



INCORRECT → The main switch is defective. Replace.

CORRECT ↓

4. Thermo unit.

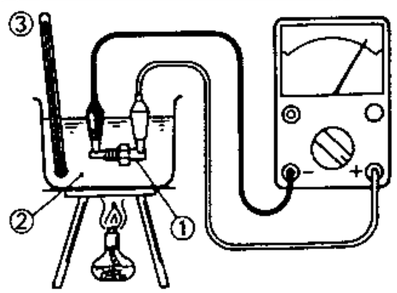
- Remove the thermo unit.

⚠ WARNING

Handle the thermocouple with great care. Avoid knocks and do not let it fall over. If it does fall, it must be replaced.

- Plunge the thermo unit (1) into the coolant (2).
- Measure resistance at various temperatures, as shown in the table.

(3) Thermometer



Coolant temperature	Resistance
50°C (122°F)	154Ω
80°C (176°F)	47~53Ω
100°C (212°F)	26~29Ω
120°C (248°F)	16Ω

- After checking the thermo unit, assemble it in its initial position.

Thermo unit:
15 Nm (1.5 mkg)
Water resistant sealant

CAUTION:
Never overtighten.

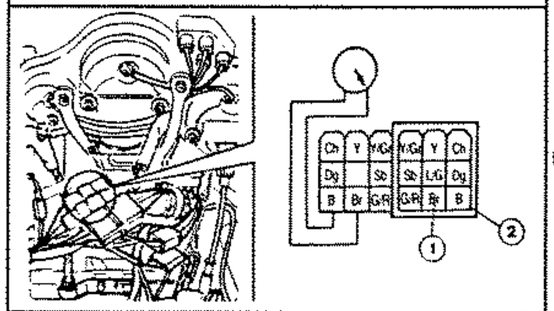
OUT OF SPECIFICATIONS → The thermo unit is defective. Replace.

IN COMPLIANCE WITH SPECIFICATIONS ⇩

5. Voltage.

- Connect the pocket tester (DC 20V) to the connector terminals of the instruments.

Tester terminale (+) → Brown cable (1)
Tester terminale (–) → Black cable (2)



OUT OF SPECIFICATIONS → The circuit from the main switch to the temperature gauge connector is defective. Repair.

- Turn the main switch to ON.
- Check the voltage (12V) on the "Brown" cable of the temperature gauge connector.

IN COMPLIANCE WITH SPECIFICATIONS ⇩

6. Harness connections.

Check the connections of the entire cooling system. See the "ELECTRICAL CIRCUIT DIAGRAM" section.

UNCERTAIN CONNECTIONS → Repair.

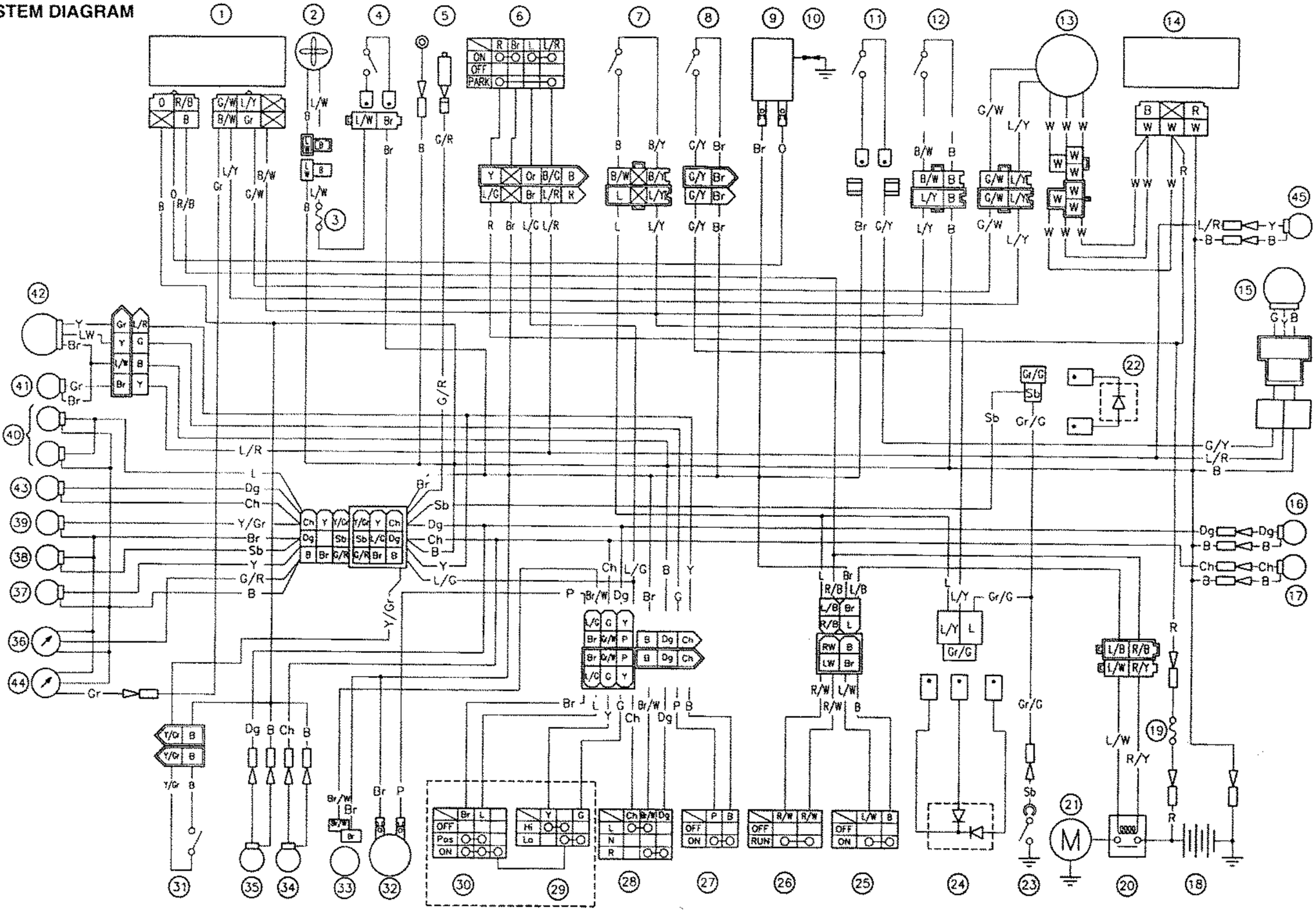
CORRECT ⇩

The circuit is efficient.

ELECTRICAL SYSTEM DIAGRAM

COLOUR CODE

B - Black
Br - Brown
Ch - Chocolate
Dg - Dark green
G - Green
L - Blue
O - Orange
P - Pink
R - Red
Sb - Sky blue
W - White
B/R - Black/Red
B/W - Black/White
Gy - Grey
Y - Yellow
L/W - Blue/White
B/Y - Black/Yellow
L/R - Blue/Red
G/Y - Green/Yellow
L/Y - Blue/Yellow
R/Y - Red/Yellow
R/W - Red/White
Y/R - Yellow/Red
G/R - Green/Red
G/W - Green/White
W/L - White/Blue



(1) CDI unit
(2) Fan motor
(3) Fuse (fan motor)
(4) Thermo switch
(5) Thermo unit
(6) Main switch
(7) Clutch switch
(8) Front brake switch
(9) Ignition coil
(10) Spark plug
(11) Rear brake switch
(12) Side stand switch
(13) AC generator
(14) Rectifier/Regulator
(15) Rear stop/tail light
(16) Right rear direction indicator light
(17) Left rear direction indicator light
(18) Battery
(19) Fuse (main)
(20) Starter motor relay
(21) Starter motor
(22) 1 diode (starter circuit)
(23) Neutral switch
(24) 2 diode (ignition circuit)
(25) Starter switch
(26) Engine stop emergency switch
(27) Horn switch
(28) Direction indicator lights switch
(29) Driving beam/dimmers lights switch
(30) Lights switch
(31) Low fuel warning light switch
(32) Horn
(33) Direction indicator lamp relay
(34) Left front direction indicator lights
(35) Right front direction indicator lights
(36) Engine temperature cooling liquid indicator
(37) High beam warning light
(38) "N" neutral light
(39) Low fuel light
(40) Control light
(41) Front parking light
(42) Headlight (dipped/high beam)
(43) Direction indicator warning light
(44) Rev. counter
(45) Number plate light

?

TRBL
SHTG

9

CHAPTER 9°

TROUBLESHOOTING

TROUBLESHOOTING

NOTE:

The troubleshooting tables that follow do not identify every cause of trouble. They may however prove helpful as a guide to identify trouble. To inspect, adjust or replace parts, refer to the appropriate section in the manual.

FAILURE TO START/DIFFICULTIES IN STARTING

FUEL SYSTEM	PROBABLE CAUSES
Fuel tank	• Empty • Fuel filter obstructed • Fuel tank air cap passage obstructed • Petrol contains water or impurities or is adulterated
Fuel tap	• Hose obstructed • Fuel filter obstructed
Carburetor	• Petrol contains water or impurities or is adulterated • Pilot jet obstructed • Pilot passage obstructed • Infiltrations of air • Deformation of float • Needle valve worn or scratched • Needle valve insufficiently sealed • Fuel level set wrongly • Pilot jet set wrongly • Starter jet obstructed • Malfunctioning of the starter piston
Air filter	• Air filter element obstructed
Fuel pump	• Fuel pump defective • Suction hose obstructed

ELECTRICAL SYSTEM	PROBABLE CAUSES
Spark plug	• Electrodes gap not correct • Electrodes worn • Feed cable interrupted • Wrong thermal grading of spark plug • Defective spark plug cap
Ignition coil	• Primary or secondary winding interrupted • High voltage cable defective • Defective coil
Ignition unit	• Defective unit • Defective pick-up coil • Woodruff tongue broken
Switches and conductors	• Main switch defective • Engine stop emergency switch defective • Harness with cable interrupted • Neutral switch defective • Starter switch defective • Side stand switch defective • Clutch switch defective
Starter	• Starter defective • Defective starter relay • 1and/or 2 diodes interrupted • Starter clutch defective

POOR ENGINE COMPRESSION	PROBABLE CAUSES
Cylinder and cylinder head	• Spark plug tightened insufficiently • Cylinder head or cylinder insufficiently tightened • Cylinder head gasket broken • Cylinder gasket broken • Cylinder worn, damaged or seized
Piston and piston rings	• Piston rings wrongly assembled • Piston rings worn, yielded or broken • Piston rings stuck together • Piston seized or damaged
Crankcase and valves, crankshaft	• Poor crankcase sealing • Borders of drive shaft oil seal damaged • Poor valve sealing • Valves and housing with insufficient contact • Valves out of phase • Valve spring broken • Crankshaft seized • Camshaft seized

POOR PERFORMANCE AT IDLE SPEED

PROBABLE CAUSES

- Carburetor
  - The starter piston fails to return freely
  - Pilot jet obstructed or loose
  - Pilot air jet obstructed
  - Pilot air screw wrongly set
  - Idle speed wrongly set (throttle valve locking screw)
  - Throttle cable free play wrongly set
  - Carburettor flooded
- Electrical system
  - Defective battery
  - Defective spark plug
  - Defective ignition unit
  - Pick-up coil defective
  - Defective ignition coil
- Valves
  - Valve free play wrongly set

UNSATISFACTORY PERFORMANCE AT MEDIUM-HIGH SPEED

See "FAILURE TO START/DIFFICULTIES IN STARTING".
(FUEL SYSTEM, ELECTRICAL SYSTEM, COMPRESSION SYSTEM and Valve clearance)

PROBABLE CAUSES

- Carburetor
  - Petrol contains water or impurities or is adulterated
  - Infiltrations of air
  - Deformation of float
  - Defective diaphragm
  - Needle valve worn or scratched
  - Needle valve housing insufficiently sealed
  - Needle stop position incorrect
  - Needle clip position incorrect
  - Fuel level set wrongly
  - Main jet obstructed or loose
  - Main nozzle obstructed or loose
- Air filter
  - Air filter element obstructed
- Fuel pump
  - Fuel pump defective

DIFFICULTIES IN CHANGING GEAR

GEAR CHANGE IMPOSSIBLE

PROBABLE CAUSES

- Clutch
  - Clutch cable wrongly set (clutch fails release)
  - Wrong position of driving lever
  - Irregular engagement of push lever and push rod
  - Pressure plate deformed
  - Clutch springs not preloaded uniformly
  - Reference marks not aligned
  - Push rod broken
  - Clutch gear assy nut loose or thrust rod deformed
  - Primary driven gear bearing defective
  - Driven plates deformed
  - Driving plates deformed
  - Clutch cable damaged
- Engine oil
  - Oil level over maximum
  - Excessive viscosity of engine oil
  - Degradation

THE GEAR PEDAL FAILS TO MOVE

PROBABLE CAUSES

- Gear shaft
  - Gear shaft deformed
- Gear cam, gear fork
  - Groove with impurities or foreign bodies
  - Gear fork stuck
  - Fork guide bar deformed
- Transmission
  - Transmission gears stuck
  - Gears stuck by impurities or foreign bodies
  - Wrong transmission assembly

DISENGAGING GEARS

PROBABLE CAUSES

- Gear shaft
  - Gear lever set wrongly
  - Drum stop lever fails to return freely
- Gear fork
  - Gear forks worn
- Gear cam
  - Shaft cam with thrust free play
  - Gear cam groove worn
- Transmission
  - Gear clutches worn

CLUTCH SLIDES OR FAILS TO RELEASE

CLUTCH SLIDES

PROBABLE CAUSES

- Clutch
  - Clutch cable wrongly set
  - Clutch springs loose
  - Clutch spring yielded
  - Friction plates worn
  - Clutch plates worn
  - Clutch improperly assembled
- Engine oil
  - Oil level below minimum
  - Incorrect gradation (low viscosity)
  - Degradation

CLUTCH FAILS TO RELEASE

See "GEAR CHANGE IMPOSSIBLE".

PROBABLE CAUSES

- Clutch
  - Pressure plate deformed
  - Clutch spring not preloaded uniformly
  - Reference marks not aligned
  - Clutch gear assy nut loose
  - Primary driven gear bearing defective
  - Drive plates deformed
  - Driven plates deformed
  - Push rod broken
- Engine oil
  - Oil level over maximum
  - Excessive viscosity of engine oil
  - Degradation

OVERHEATING OF ENGINE

PROBABLE CAUSES

- Ignition system
  - Incorrect electrode gap of spark plug
  - Spark plug thermal gradation wrong
  - Ignition unit defective
- Fuel feed system
  - Incorrect carburetor main jet (incorrect setting)
  - Incorrect fuel level
  - Air filter element obstructed
- Engine compression
  - Excess of carbon deposits
- Engine oil
  - Incorrect oil level
  - Incorrect oil viscosity
  - Incorrect oil gradation
- Brake
  - Pads fail to return freely (remains blocked)
- Cooling system
  - Engine coolant temperature gauge defective
  - Thermo unit defective
  - Engine coolant low level
  - Thermostat defective
  - Thermo switch defective
  - Dirty or damaged radiator
  - Fan motor shaft seized
  - Fan motor damaged
  - Fan motor fuse broken

EXCESSIVE ENGINE COOLING

THE ENGINE FAILS TO REACH STANDARD OPERATING TEMPERATURE

PROBABLE CAUSES

- Cooling system
  - Engine coolant temperature gauge defective
  - Thermo unit defective
  - Thermostat defective
  - Thermo switch defective
  - Fan motor fails to stop

DEFECTIVE BRAKES

POOR BRAKING

- Front and rear disk brake

PROBABLE CAUSES

- Brake pads worn
- Brake disk worn
- Water in the brake fluid
- Brake fluid leak
- Brake fluid tank defective
- Bleed cap not sealed to calipers
- Fastening bolt loose
- Brake hose cracked
- Brake disk dirty or greasy
- Brake pads dirty or greasy
- Incorrect brake fluid level

OIL LEAKS OR MALFUNCTIONING OF FRONT FORK

OIL LEAKS

PROBABLE CAUSES

- Inner tube deformed, damaged or rusty
- Outer tube damaged or cracked
- Oil seal lip damaged
- Oil seal assembled incorrectly
- Oil level incorrect (excessive)
- Shock-absorber rod stop bolt loose
- O-ring on cap broken
- Drain bolt loose
- Drain bolt gasket damaged

MALFUNCTIONING

PROBABLE CAUSES

- Inner tube deformed, damaged or rusty
- Outer tube deformed or damaged
- Fork spring damaged
- Piston worn or damaged
- Shock-absorber rod deformed or damaged
- Incorrect oil viscosity
- Incorrect oil level
- Cartridge defective (overhaul)

UNSTABLE STEERING

	PROBABLE CAUSES
Handle bar	• Assembled crooked or incorrectly
Steering	• Handle bar crown assembled incorrectly • Lower bracket crooked • Lower steering column installed incorrectly (ring nuts not tightened correctly) • Bearing or bearing tracks damaged
Front fork	• Oil level not the same in both tubes • Spring broken • Front fork crooked
Tyres	• Tyre pressure incorrect for type of load • Tyre pressure incorrect • Tyres worn non-uniformly
Wheels	• Wheels balanced incorrectly • Wheel deformed • Bearing loose • Wheel axle deformed or loose • Wheels excessively off-centre
Frame	• Deformed • Head tube damaged • Ball track installed incorrectly
Rear swing arm	• Bushes or bearings consumed • Deformed or damaged
Rear shock absorber	• Spring yielded • Spring preload incorrect • Oil leak
Transmission chain	• Chain set incorrectly
Cowling	• Damaged or broken • Assembled incorrectly

DEFECTIVE FUNCTIONING OF LIGHTS AND INDICATORS

POOR HEADLIGHT ILLUMINATION

PROBABLE CAUSES

- Incorrect bulb
- Excessive absorption of electrical accessories
- Difficulties in charging (charging coil broken and/ or rectifier/regulator defective)
- Uncertain connections
- Wrong negative earthing or defective contact
- Insufficient contacts (main switch or light switch)
- Bulb gone

FREQUENT BURNING OF BULB

PROBABLE CAUSES

- Incorrect bulb
- Defective battery
- Rectifier/regulator defective
- Wrong negative earthing
- Main switch and/or light switch defective
- Bulbs gone

DIRECTION INDICATORS FAIL TO TURN ON

PROBABLE CAUSES

- Wrong negative earthing
- Battery flat
- Defective turn indicators switch
- Indicator relay defective
- Harness cut off
- Coupler connection loose
- Bulb burnt out

DIRECTION INDICATORS FAIL TO TURN OFF

PROBABLE CAUSES

- Indicator relay defective
- Insufficient battery capacity (battery almost flat)
- Bulb (front or rear) burnt out
- Direction indicator switch defective

DELAYED TURNING ON OF INDICATORS

PROBABLE CAUSES

- Indicator relay defective
- Insufficient battery capacity (battery almost flat)
- Incorrect bulb
- Main or direction indicator switch defective

EXCESSIVE INDICATOR INTERMITTENCE FREQUENCY

PROBABLE CAUSES

- Incorrect bulb
- Indicator relay defective

THE HORN FAILS TO WORK

PROBABLE CAUSES

- Defective battery
- Main or horn switch defective
- Horn wrongly set
- Defective horn
- Harness cut off