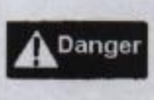
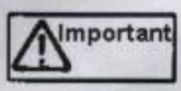
HONDA

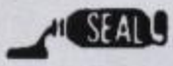
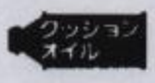
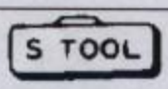
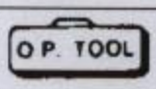
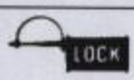
VTR 250

Workshop Manual

	Service Information	1
	Exterior Parts, Muffler	2
	Inspection and Adjustment	3
Engine	Lubrication System	4
	Cooling System	5
	Fuel System	6
	Engine Removal / Installation	7
	Cylinder Head,& Valve	8
	Clutch & Starter Clutch	9
	Gearshift Linkage	10
	Crankcase & Transmission	11
	Crankshaft, Cylinder & Piston	12
Frame	Front Wheel, Suspension and Steering	13
	Rear Wheel, Suspension	14
	Brake System	15
Electrical System	Battery & Charging System	16
	Ignition System	17
	Starter System	18
	Lamps, Instruments and Switches	19
	Circuit Diagram	20
	Troubleshooting	21

Symbol Marks

Symbol	Meaning	Symbol	Meaning
	Danger: Its neglect may lead to serious injuries.		Important: Its neglect may lead to minor injury or damaging the parts.
			General caution: Tips of the work

Symbol	Meaning	Symbol	Meaning
	Apply oil: Unless specified, use designated or recommended oil.		Apply sealant
	Apply Molybdenum solution: The solution is a mixture of engine oil and Molybdenum grease at		Replace with new parts whenever disassembled.
	Apply multi-purpose grease. (Lithium soap based NLG #2 equivalent. Example: SHELL Albania EP-2		Apply brake fluid. Use recommended grade (DOT4)
	Apply Molybdenum grease (3% or more Molybdenum, NLGI#2 equivalent) Mitsubishi multi purpose M2 Dow Corning Molycoat BR – 2 PLUS		Apply recommended cushion oil.
	Apply Molybdenum paste. (40% or more Disulphide Molybdenum. NLGI#2 equivalent). Local paste Molycote G-n Paste (Dow Corning)		Use exclusive tools
	Apply silicone grease Silicone grease G40M (ShinEtsu)		O.P. (Option) tool. Refer to parts list as these tools are considered to be parts.
	Apply screw locker. Use medium class unless specified.	-> 3-1	Reference pages.

Special grease not mentioned above are described each time without using symbols

SI Units

This service manual is written in both industrial metric units and SI units.

About SI Unit

Basically, SI unit is an expansion of the traditional metric unit. In an industrial metric unit, the unit of kg was used for both mass (kg) and force (kg/kgf), while the SI units separate these to mass (kg) and force (N). Weight means a gravitational force acting on an object in SI unit. Thus, the "weight" in SI is a multiplication of a mass and gravitational acceleration. Please note, therefore, the SI "weight" is not the same as the one in industrial metric units.

Format in this manual

SI unit is a primary unit, while industrial metric unit is expressed in brackets.

Example: <Pressure> 98kpa (1.0kgf/cm²)
SI Industrial metric unit

Force in industrial metric unit is expressed as "kgf" in order to distinguish from mass "kg" for SI unit.

Example: <Torque> 10N-m (1.0kgf-m)

Some examples of SI format:

Item	Example	Notes
Pressure	200 kPa (2.00 kgf/cm²) 33 kPa (250 mmHg)	1 kgf/cm² = 98.0665 kPa, 1 kPa = 1,000 Pa 1 mmHg = 133.322 Pa = 0.1333322 kPa
Torque	18 N-m (1.8 kgf-m)	1 kgf-m = 9.80665 N-m
Volume	419 cm³ or	1 cm³ = 1 cc 1 litre = 1,000 cm³
Force	12 N (1.2 kgf)	1 kgf = 9.80665 N

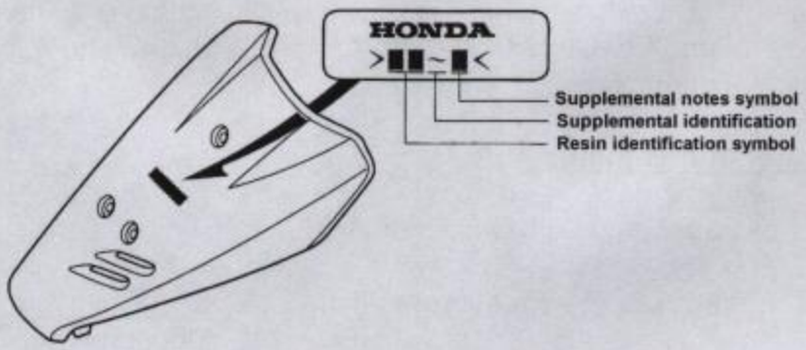
Specification and other data are based on the units initially specified.

Resin Parts

All resin parts with their mass of 100g or above have material identification labels.

Label Format

Information consists of resin identification and supplemental notes symbol.



- If the supplemental identification is "~", it is followed by strengthener identification. If it is "-", it is followed by the resin material characteristics.
- Refer to the following page for the symbols.
- If the part consists of (multiple) different materials, the name of the component for the material is also specified.

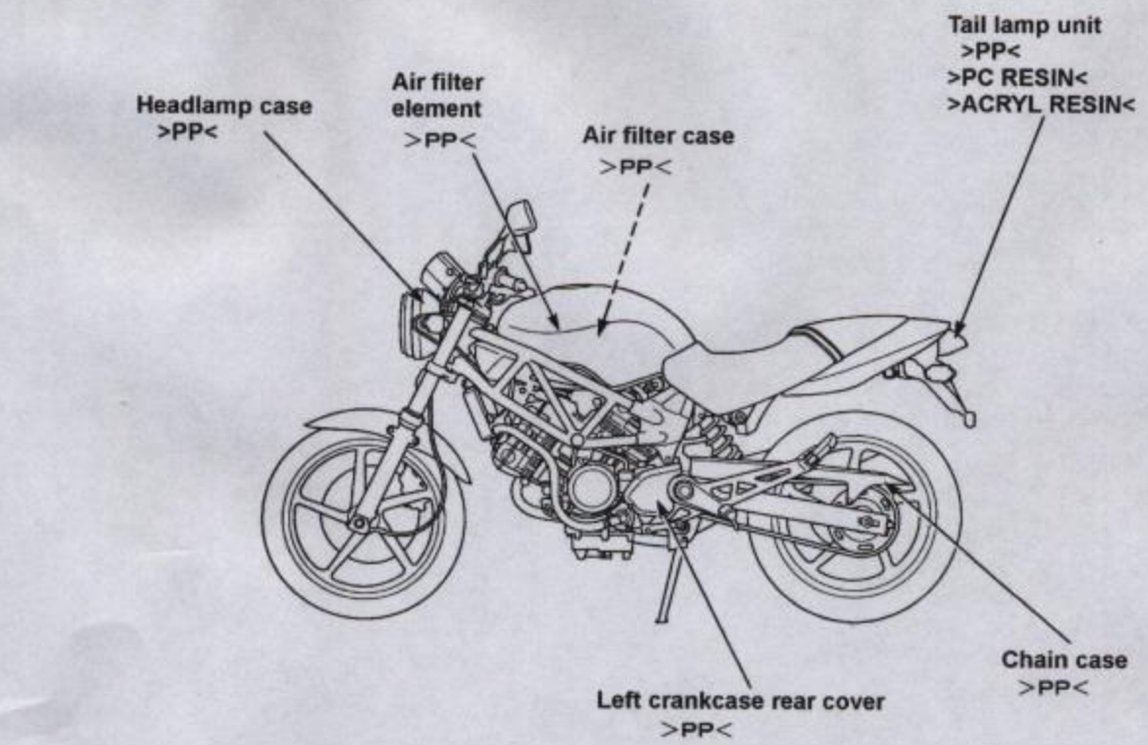
Example:

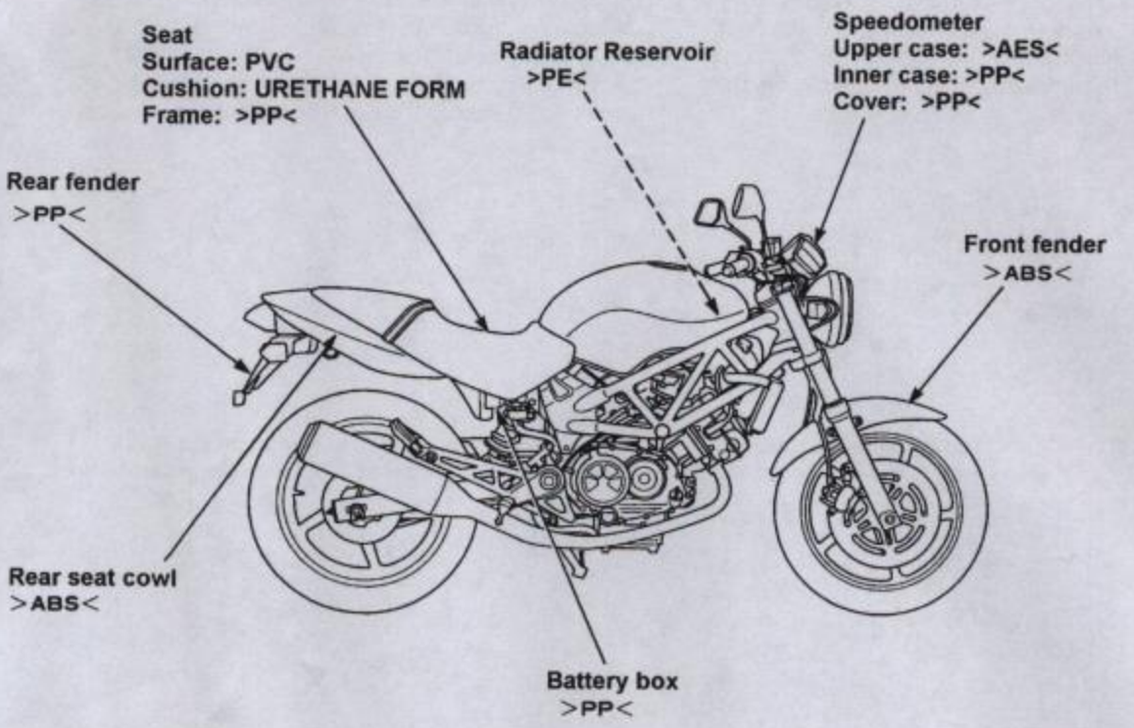
LENS > PMMA <
HSG > ABS <

Component

The lens consists of PMMA and the housing consists of ABS.

Material Identification





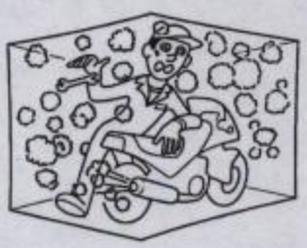
General.....	1 – 1	Torque Settings.....	1 – 16
Serial Number / Colour Label.....	1 – 6	Special Tools.....	1 – 19
Specifications.....	1 – 7	Oil / Grease / Sealant.....	1 – 21
Service Standards.....	1 – 9	Routing Diagrams.....	1 - 25

General

Safety Caution

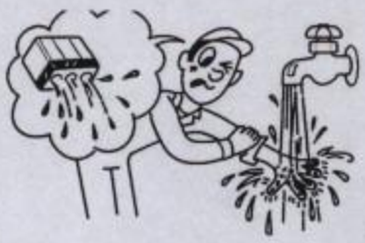
Warning

Exhaust fume is toxic. Make sure the working area is well ventilated if the engine is to be operated.



Warning

Battery fluid (sulphuric acid) is highly toxic. Never allow battery fluid to touch your skin, eyes, and clothing. In case your eyes or skin should contact the fluid, flush with water and change the clothing if necessary. Then, consult the specialist. Keep the battery/battery fluid out of reach of children.



Warning

Wear appropriate protective clothing, cap, and footwear. Wear goggles, mask and gloves and required.

Warning

Engine component and muffler are hot immediately after engine shutdown. Wear long sleeved work wear and gloves when servicing these parts.

Warning

Coolant is toxic. Keep it away from eyes, skin or clothes. In case your clothes or skin should contact the coolant, rinse with soap and water. If the coolant gets in your eyes, rinse with water and consult a doctor. If it is swallowed, induce vomiting, gargle and consult a doctor. Keep the coolant out of reach of children.

Warning

Petrol is highly inflammable. Keep any fire/spark away. Ventilate the working area as vaporised petrol is explosive.

Warning

Battery generates explosive Hydrogen gas while charging. Ventilate the area when charging the battery.

Warning

Dust on brake drums contains asbestos. Do not clean the drum with compressed air to prevent asbestos entering your lungs. Use brake cleaner available in market.

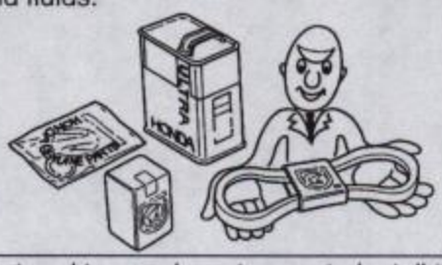
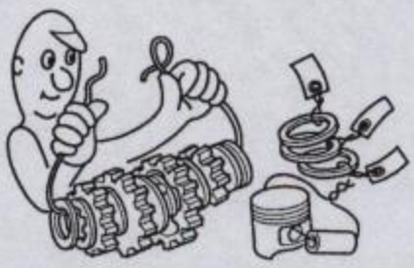
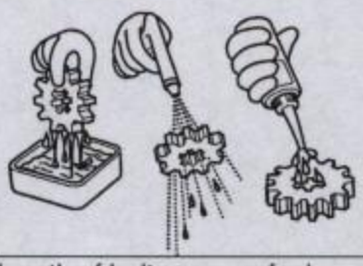
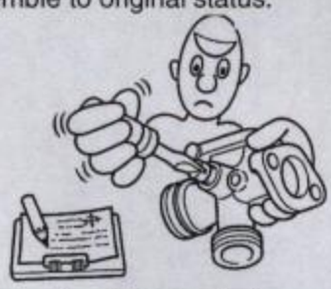
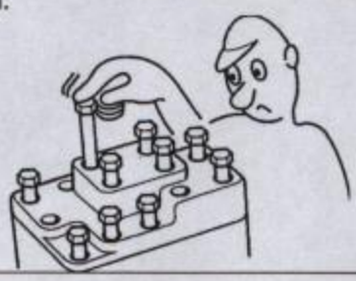
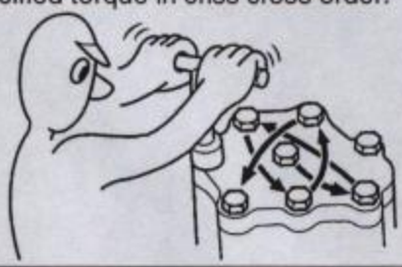
Warning

Exercise caution when servicing drive chain or sprockets not to catch your hands or clothes.

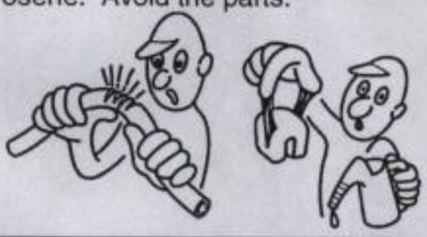
Warning

When working in pairs, always confirm your partner's safety.

Assembly / Disassembly Cautions

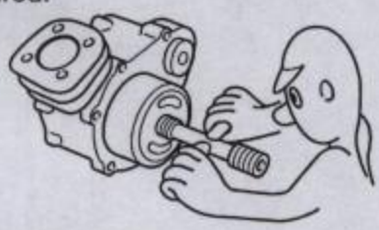
• Use genuine Honda or recommended parts and fluids. 	• Clean dirt/dust prior to starting servicing. 
• Sort and tag each part so as to install them to the correct place. 	• Replace gaskets, O-Rings, piston pin clips and cotter pins when disassembled. • Overstressed snap pins may fall off after re-installation. Do not re-use deformed snap rings. 
• Inspect, clean and dry the parts before measuring. Apply oil to contact area before installing them. 	• Conduct necessary inspection and measurement when disassembling in order to assemble to original status. 
• If the length of bolts are confusing, set all bolts so as to have same thread length to tighten. 	• When screwing bolts / nuts / screws, temporarily screw them then screw to specified torque in criss cross order. 

- Replace rubber parts when required. Some rubber parts get damaged by petrol or kerosene. Avoid the parts.

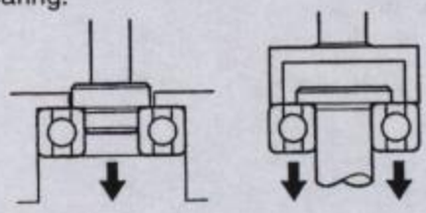


- Apply recommended grease to designated parts.

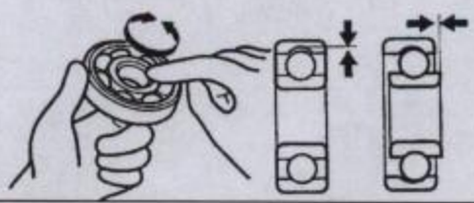
- Always use appropriate special tools when required.



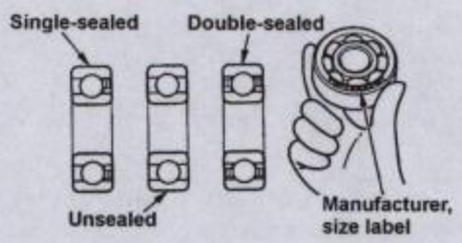
- If the bearing balls experienced force when removing the bearing, do not re-use the bearing.



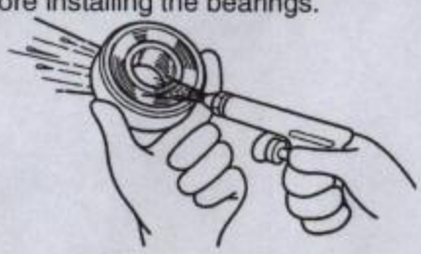
- Rotate the bearing with fingers to check smooth rotation.
  - Replace the bearing if the fitting is too loose.
  - If the rotation is not smooth, clean with oil and replace it if there is no improvement.
    (double-sealed type cannot be cleaned)
  - Replace it if the mount is loose.



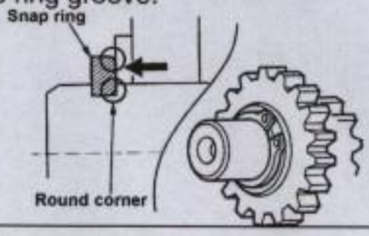
- Watch out for the installing direction of single side sealed bearings. For unsealed / double sealed bearings, face the labelled surface outwards.



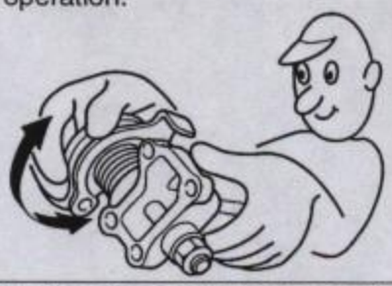
- Do not let the race rotate when cleaning it with compressed air. Excessive revaluation may damage the bearing. Apply oil / grease before installing the bearings.



- When installing snap rings, install the round corner side to the loading surface. Do not re-use deformed snap rings. After installation, rotate the ring to confirm it is set to the ring groove.

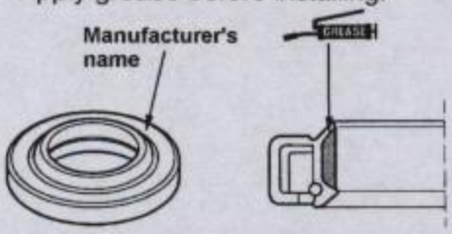


- After assembling the parts, check their fitting and operation.

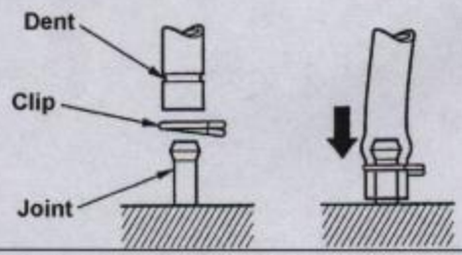


- Brake fluid and coolant damage painted surface and rubber / plastic parts. Clean the area with water if the fluid touches the parts.

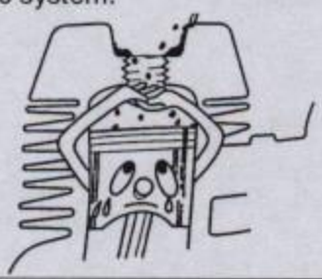
- Install oil seals so as to have manufacturer names outside (not oil side).
  - Do not peel or damage oil seal lips when installing.
  - Apply grease before installing.



- When connecting tubes, push the tube all the way to the joint root. Set the tube clip to the dent on the tube. Replace the tube if its end is loose.



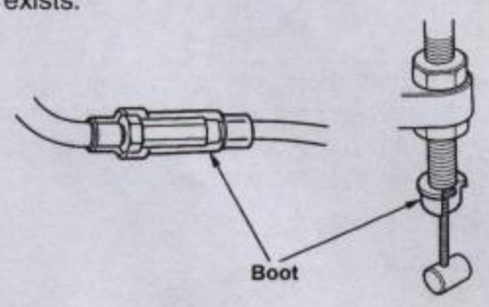
- Do not let dirt/debris enter the engine or hydraulic system.



- Remove old gasket before installing new ones. Roughness on the mating surfaces should be smoothened by an oil stone.

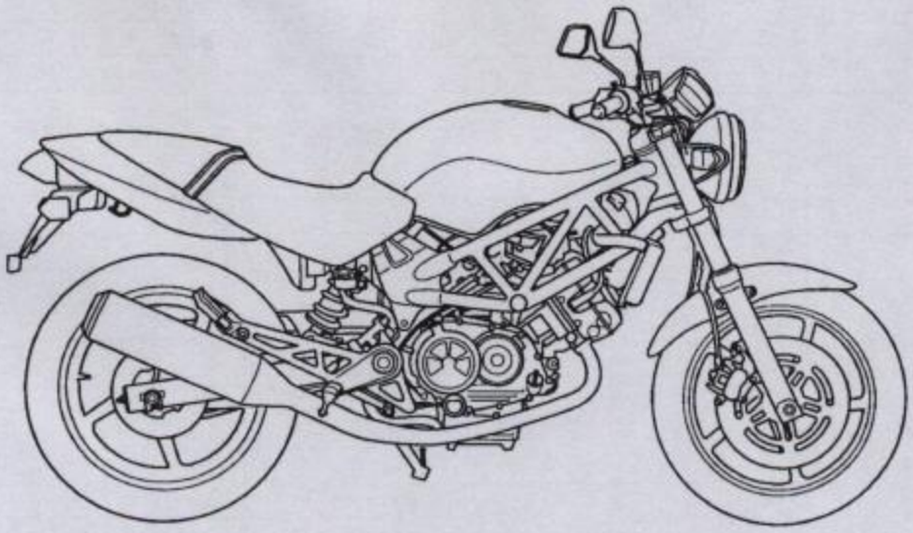
- Do not bend or twist cables hard. Damaged cables may cause failure.

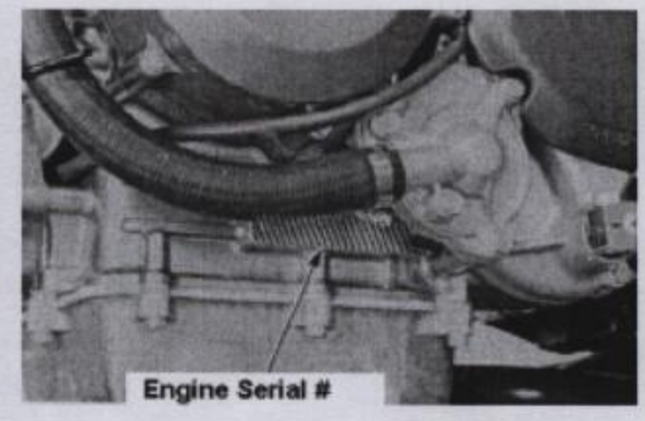
- Install boots whenever the boot groove exists.

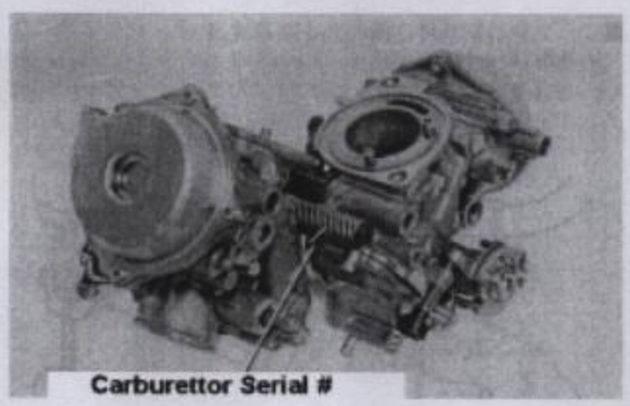


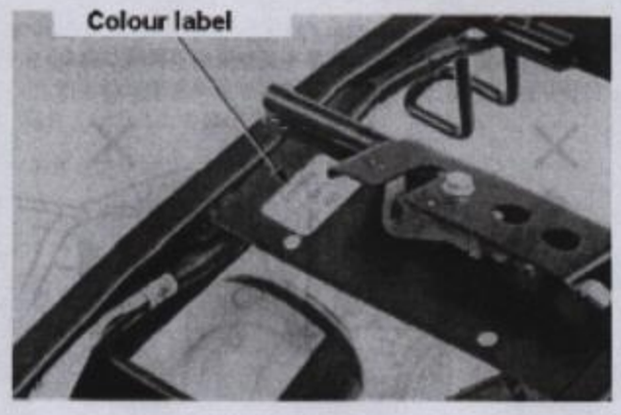
Serial Number and Colour Label

Frame # : MC33 - 1000001~
Engine # : MC15E – 1500001~









Specification

Item				Specification
Model				Honda MC33
Length				2,040mm
Width				720mm
Height				1,050mm
Wheelbase				1,410mm
Powerplant model				MC15E
Total displacement				0.249 litres
Fuel type				Petrol
Vehicle empty weight			Front	74 kg
			Rear	79 kg
			Total	153 kg
Maximum capacity				2
Vehicle gross weight			Front	92 kg
			Rear	171 kg
			Total	263 kg
Tyre			Front	110/70 – 17 54H
			Rear	140/70 – 17 66H
Minimum clearance				170mm
Minimum turning radius				2.7m
Powerplant	Starter type			Self start
	Type of engine			Petrol 4 cycle
	Cylinders			2 abreast
	Combustion chamber			Roof type
	Valve operation			DOHC chain driven Inlet: 2 Exhaust: 2
	Bore X Stroke			60.0 x 44.1mm
	Compression ratio			11.0
	Maximum output			32 PS / 10,500 rpm
	Maximum torque			2.4 kgf-m / 8,500 rpm
	Valve operation time	Inlet	Open	10° BTDC (1mm lifted)
			Close	20° ABDC (1mm lifted)
		Exhaust	Open	35° BBDC (1mm lifted)
			Close	0° BTDC (1mm lifted)
	Oil filter			Total flow, screen & paper filter
	Oil pump			Tolocoid
	Cooling system			Water cooled electrical
	Radiator			Closed type

Item				Specification
Fuel system	Air filter	Type		Filter paper
	Carburetor	Model		VD10
		Throttle valve dia.		32mm
		Venturi diameter		Variable (maximum lift : 29mm)
Transmission System	Clutch	Type		Multiple wet plate coil spring
		Operation		Mechanical
	Engine transmission linkage			Engine – clutch – transmission
	Engine to transmission reduction ratio			2.821
	Transmission	Type		Full time contact
		Operation		Left pedal
		Gear ratio	Low	2.733
			Second	1.800
			Third	1.375
			Fourth	1.111
			Top	0.965
	Reduction : First	Gear type		Chain
		Reduction ratio		2.928
Driving System	Front wheel axle	Caster		25° 30'
		Trail		98mm
Steering system	Steering angle	Left		35°
		Right		35°
Braking system	Type			
	Operating system and braking wheels			2 systems, one front, one rear braking
Shock absorbing system	Suspension	Front wheel		Telescopic
		Rear wheel		Swing arm
Frame	Type			Diamond

Service Specification

Lubrication System

Item		Standard	Service Limit
Engine oil capacity	Total capacity	2.4 litres	-
	Oil change	1.9 litres	-
	Oil and filter change	2.1 litres	-
Recommended engine oil (select suitable viscosity grade based on your operating temperature.		Genuine Honda Ultra GP (4 cycle motorcycle) SAE10W-40 or 20W-50 API – SF class engine oil	-
Oil pressure (at the oil pressure switch attachment)		490 – 588 kPa (5.0 – 6.0 kgf-cm²) 5,000 rpm / 80°c	-
Oil pump	Tip clearance	0.15mm	0.20mm
	Body clearance	0.15 – 0.22mm	0.35mm
	Side clearance	0.02 – 0.07mm	0.10mm

Cooling System

Item		Standard	Service Limit
Coolant capacity	Disassembled	1.16 litres	-
	Coolant change	0.96 litres	-
	Reservoir capacity	0.4 litres	-
Coolant standard density		50%	-
Radiator cap valve opening pressure		108 – 137 kPa (1.1-1.4kgf-cm²)	-
Thermostat	Valve opening temperature	82°c	-
	Full open temperature	95°c	-
	Full open lift	8mm or above	-

Fuel System

Item			Standard	Service Limit
Carburetor	Model		VD10L	-
	Setting mark		VD10LA	-
	Main jet (front/rear)		# 115	-
	Slow jet (front/rear)		# 35	-
	Pilot screw setting	Standard	1 – ½ winds back	-
		Idle drop	¾ winds back	-
	Float level		6.8mm	-
Idling rpm			1,300 ± 100 rpm	-
Throttle grip free play (grip flange)			2 – 6mm	-
Maximum carburetor synchronisation pressure difference			2,664 kPa (20mm Hg)	-
Referential carburetor for synchronisation			Rear carburetor	-

Cylinder Head and Valve

Item			Standard	Service Limit
Cylinder compression			1,323kPa (13.5kgf-cm²)-450rpm	-
Maximum compression difference			200 kPa (2.0kgf/cm²)	-
Cylinder head warpage			-	0.10mm
Rocker arm	Rocker arm shaft hole diameter		10.000 – 10.015mm	10.025mm
	Rocker arm shaft diameter		9.972 – 9.987mm	9.962mm
Valve clearance		IN	0.17 ± 0.03mm	-
		EX	0.22 ± 0.03mm	-
Cam shaft	Cam lobe height	IN	32.4612 – 32.6212mm	32.4412mm
		EX	32.3085 – 32.4685mm	32.2885mm
	Runout		-	0.02mm
	Journal diameter (centre)		21.861 – 22.882mm	21.851mm
	Journal diameter (both ends)		21.949 – 21.970mm	21.939mm
	Journal oil clearance (centre)		0.118 – 0.181mm	0.201mm
	Journal oil clearance (both ends)		0.030 – 0.091mm	0.111mm
Valve spring	Relaxed length	IN	36.47mm	34.77mm
		EX	36.47mm	34.77mm
Valve, Valve guide	Valve stem diameter	IN	4.975 – 4.990mm	4.97mm
		EX	4.955 – 4.970mm	4.95mm
	Valve guide bore	IN	5.000 – 5.012mm	5.04mm
		EX	5.000 – 5.012mm	5.04mm
	Valve stem guide clearance	IN	0.010 – 0.037mm	0.07mm
		EX	0.030 – 0.057mm	0.09mm
	Valve seat contact width	IN	0.9 – 1.2mm	1.5mm
		EX	0.9 – 1.2mm	1.5mm
	Valve guide installation height		11.4 – 11.6mm	-

Clutch

Item			Standard	Service Limit
Clutch	Clutch lever free play		10 – 20mm	-
	Clutch spring relaxed length		34.79mm	33.9mm
	Clutch disc thickness	Small bore	3.62 – 3.70mm	3.3mm
		Large bore	2.9 – 3.0mm	2.6mm
	Clutch plate warpage		-	0.3mm
	Clutch outer guide	Bore	21.995 – 22.015mm	22.05mm
		Diameter	28.967 – 28.980mm	28.93mm
	Clutch outer bore		29.00 – 29.021mm	29.06mm
	Main shaft diameter (at clutch outer)		21.980 – 21.993mm	21.97mm
	Oil pump drive sprocket bore		29.025 – 29.075mm	29.11mm

Transmission

Item			Standard	Service Limit
Transmission	Gear bore	M4, 5	25.000 – 25.021mm	25.05mm
		C1	23.000 – 23.021mm	23.05mm
		C2, C3	28.000 – 28.021mm	28.05mm
	Bush diameter	M4, 5	24.959 – 24.980mm	24.92mm
		C1	22.959 – 22.980mm	22.92mm
		C2, C3	27.959 – 27.980mm	27.92mm
	Bush bore	M4	21.985 – 22.006mm	22.07mm
		C1	20.020 – 20.041mm	20.06mm
		C2	25.000 – 25.021mm	25.05mm
	Main shaft diameter	M4 bush	21.959 – 21.980mm	21.92mm
	Counter shaft diameter	C1 bush	19.987 – 20.000mm	19.97mm
		C2 bush	24.967 – 24.980mm	24.95mm
	Gear bush clearance	M4, 5 bush	0.020 – 0.062mm	0.10mm
		C1, 2, 3 bush	0.020 – 0.062mm	0.10mm
	Shaft bush clearance	M4 bush	0.005 – 0.047mm	0.15mm
		C1, 2 bush	0.020 – 0.054mm	0.15mm
	Shift fork	Catch thickness	5.93 – 6.00mm	5.60mm
		Shaft hole bore	12.000 – 12.021mm	12.04mm
	Shift fork shaft diameter		11.969 – 11.980mm	11.90mm

Crankshaft, Cylinder and Piston

Item			Standard	Service limit
Cylinder	Bore		60.000 – 60.015mm	60.10mm
	Top surface warpage		-	0.10mm
	Out of round		-	0.05mm
	Taper		-	0.05mm
Piston, Piston Ring and Piston Pin	Piston diameter measuring position		10mm from the skirt lower end	-
	Piston diameter		59.970 – 59.990mm	59.86mm
	Cylinder piston clearance		0.010 – 0.045mm	0.1mm
	Piston pin hole diameter		16.002 – 16.008mm	16.028mm
	Piston pin diameter		15.994 – 16.000mm	15.98mm
	Connecting rod small end bore		16.016 – 16.034mm	16.08mm
	Piston – Piston pin clearance		0.002 – 0.014mm	0.048mm
	Connecting rod - Piston pin clearance		0.016 – 0.040mm	0.10mm
	Piston ring – ring groove gap	Top	0.025 – 0.060mm	0.10mm
		Second	0.025 – 0.055mm	0.10mm
	Piston ring installing direction (top/second)		Mark facing upwards	-
Connecting rod	Crank pin oil clearance		0.028 – 0.052mm	0.07mm
	Big end side clearance		0.1 – 0.3mm	0.4mm
Crankshaft	Runout		-	0.02mm
	Oil clearance main journal		0.028 – 0.052mm	0.07mm

Front Wheel, Suspension and Steering

Item			Standard	Service limit
Front tyre	Tread depth		-	1.5mm
	Pressure	One person	200 kPa (2.00kgf /cm²)	-
		Two people	200 kPa (2.00kgf / cm²)	-
	Type	Bridgestone	G601F Tubeless	-
	Size		110 / 70 – 17 54H	-
Front axle runout			-	0.20mm
Front wheel	Rim runout	Radial	-	2.0mm
		Axial	-	2.0mm
	Balance weight		-	60g or less
Front fork	Spring relaxed length		330.3mm	324mm
	Installing direction		Tapered end toward bottom	-
	Oil quantity		460 ± 2.5cm³	-
	Oil level		105mm	-
	Oil type		Honda ultra cushion oil # 10	-
	Tube bent		-	0.2mm
Steering load			10 – 16N (1.0 – 1.6kgf)	-

Rear Wheel & Suspension

Item			Standard	Service limit
Rear tyre	Tread depth		-	2.0mm
	Pressure	One person	225 kPa (2.25kgf /cm²)	-
		Two people	225 kPa (2.25kgf / cm²)	-
	Type	Bridgestone	G602 Tubeless	-
	Size		140 / 70 – 17 66H	-
Rear axle runout			-	0.20mm
Rear wheel	Rim runout	Radial	-	2.0mm
		Axial	-	2.0mm
	Balance weight		-	60g
Drive chain	Slack		25 – 35mm	-
	Size / Links	DID	520 V8 / 104 links	-
		RK	520 MOZ 6 / 104 links	-
Drive chain slider thickness			-	To wear limit

Brake System

Item		Standard	Service limit
Front Brake	Recommended brake fluid	DOT 4	-
	Pad thickness	-	To wear limit line
	Disc thickness	4.5mm	3.5mm
	Disc runout	-	0.3mm
	Master cylinder bore	11.000 – 11.043mm	11.06mm
	Master piston diameter	10.957 – 10.984mm	10.88mm
	Caliper cylinder bore	27.000 – 27.050mm	27.06mm
	Caliper piston diameter	26.918 – 26.968mm	26.91mm
Rear Brake	Recommended brake fluid	DOT4	-
	Pad thickness	-	To wear limit line
	Disc thickness	5.0mm	4.0mm
	Disc runout	-	0.3mm
	Master cylinder bore	12.700 – 12.743mm	12.755mm
	Master piston diameter	12.657 – 12.684mm	12.645mm
	Caliper cylinder bore	38.180 – 38.230mm	38.24mm
	Caliper piston diameter	38.098 – 38.148mm	38.09mm

Battery & Charging System

Item		Standard	Service limit
Battery	Capacity	12V – 6AH	-
	Leak current	0.1 mA or less	-
	Charging current / time (rapid)	3.0A / 1h	-
	Charging current / time (normal)	0.6A / 5 – 10h	-
Regulator / Rectifier	Type	Three phase AC SCR short circuit	-
	Regulated voltage	14.0 – 16.0 V / 5,000rpm	-
Alternator	Type	Three phase AC	-
	Output	0.32 kw / 5,000rpm	-
	Charging coil resistance	0.1 – 1.0 Ω	

Ignition System

Item		Standard	Service limit
Spark plug	Standard	CR8EH – 9 (NGK), U24FER9 (DENSO)	-
	OP (High speed operation)	CR9EH – 9 (NGK), U27FER9 (DENSO)	-
	Plug gap	0.8 – 0.9mm	-
Type		Full transistor battery ignition	-
Ignition timing		BTDC 10° / 1,300rpm	-
Ignition coil	Peak voltage	100V or above	-
Pulse generator	Peak voltage	0.7V or less	-

Starting System

Item	Standard	Service limit
Starter motor brush length	10.0 – 10.5mm	3.5mm

Lamps, Instruments & Switches

Item		Standard	Service limit
Fuses	Main	30A	-
	Sub	10A x 4	-
Bulbs	Headlamp	12V – 60 / 55W	-
	Brake / Tail lamp	12V – 23 / 8W	-
	Front turn signal lamps	12V – 18 / 5W x 2	-
	Rear turn signal lamps	12V – 15W x 2	-
	Instrument illuminating lamp	12V – 3.4W	-
	Turn signal pilot lamp	12V – 3.4W	-
	High beam pilot lamp	12V – 3.4W	-
	Neutral pilot lamp	12V – 3.4W	-
	Oil pressure lamp	12V – 3.4W	-
	Water temperature warning lamp	12V – 3.4W	-
	Speedometer warning lamp (option)	12V – 3.4W	-
Thermo switch operating temp (coolant density 50%)	OFF → ON	112 – 118°c	-
	ON → OFF	108°c or above	-
Fan motor switch operating temperature	OFF → ON	98 – 102°c	-
	ON → OFF	93 – 97°c	-

Torque Settings

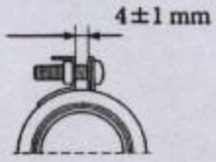
Standard Torque Setting

Type	Torque setting N-m (kgf-m)	Type	Torque setting N-m (kgf-m)
5mm)	5 (0.5)	5mm screw	4 (0.4)
6mm)	10 (1.0)	6mm screw, SH bolt	9 (0.9)
8mm) bolts / nuts	22 (2.2)	6mm)	12 (1.2)
10mm)	34 (3.5)	8mm) flange bolt / nut	26 (2.7)
12mm)	54 (5.5)	10mm)	39 (4.0)

The above standard values should be used unless specified below.

Notes:
1. Apply engine oil to thread and seat
2. U – nut
3. Alloc bolt (replace when removed)
4. Apply screw locker
5. Apply sealant
6. Apply grease

Engine

Item	Qty	Thread dia (mm)	Torque setting N-m (kgf-m)	Remark (note#)
Lubrication system				
Drain bolt	1	12	29 (3.0)	
Oil pump driven sprocket bolt	1	6	15 (1.5)	4
Oil filter centre bolt	1	12	18 (1.8)	
Oil pressure switch	1	PT 1/8	12 (1.2)	5
Oil pump mount bolt	3	6	12 (1.2)	
Oil pump cover bolt	3	6	13 (1.3)	
Oil pressure switch connector bolt	1	4	2 (0.2)	
Cooling system				
Water pump drain bolt	1	6	13 (1.3)	
Water pump mount bolt	3	6	13 (1.3)	
Fuel system				
Vacuum plug	2	5	3 (0.3)	
Carburettor insulator strap	4	5	1 (0.1) 	
Engine mount / dismounting				
Drive sprocket bolt	1	10	51 (5.2)	
Clutch / starter clutch				
Timing hole cap	1	45	18 (1.8)	6
Clutch centre lock nut	1	20	83 (8.5)	1
Starter clutch mount bolt	1	10	83 (8.5)	1
Starter clutch bolt	3	8	27 (2.8)	4

Engine

Item	Qty	Thread dia (mm)	Torque setting N-m (kgf-m)	Remark (note#)
Gear shift linkage				
Shift drum centre bolt	1	8	23 (2.3)	4
Shift return spring pin	1	8	24 (2.4)	
Cylinder head, valve				
Cylinder head sealing bolt	2	12	32 (3.3)	4
Camshaft holder bolt 8 x 130mm	8	8	23 (2.3)	1
Cylinder head bolt 8 x 80mm	4	8	32 (3.3)	1
Cam shaft holder 8 x 151mm	4	8	32 (3.3)	1
Cam shaft holder 6 x 40mm	4	6	12 (1.2)	1
Cam shaft holder 6 x 43mm	4	6	12 (1.2)	1
Cylinder head cover	8	6	10 (1.0)	
Cam sprocket	8	7	19 (1.9)	4
Valve adjust lock nut	8	5	10 (1.0)	1
Rocker arm shaft bolt	4	20	49 (5.0)	4
Spark plug	2	10	12 (1.2)	
Crankcase / Transmission				
Crankcase bolt (8mm)	7	8	23 (2.3)	1
Crankcase bolt (6mm)	11	6	12 (1.2)	1
Lower crankcase sealing bolt	1	8	18 (1.8)	4
Crankshaft, cylinder & piston				
Connecting rod cap nut	4	7	24 (2.4)	1
Charging system				
Flywheel	1	10	83 (8.5)	1
Starting system				
Starter motor terminal nut	1	6	12 (1.2)	
Starter motor front cover bolt	2	5	5 (0.5)	
Lamps, instruments & switches				
Neutral switch	1	10	12 (1.2)	
Others:				
6mm SH flange bolt	41	6	10 (1.0)	

Frame

Item	Qty	Thread dia (mm)	Torque setting N-m (kgf-m)	Remark (note#)
Exterior & Muffler				
Seat rail flange nut	3	10	44 (4.5)	
Battery box screw	2	6	12 (1.2)	
Rear fender screw	2	6	12 (1.2)	
Exhaust pipe joint nut	4	6	13 (1.3)	
Muffler mount bolt	1	8	29 (3.0)	
Muffler joint bolt	1	8	20 (2.0)	
Rear cowl screw	2	5	4 (0.4)	
Rear cowl tapping screw	8	5	3 (0.3)	
Cooling System				
Radiator mount bolt (SH bolt)	2	6	12 (1.2)	
Thermo switch	1	PT 1/8	9 (0.9)	
Fan motor switch	1	16	18 (1.8)	
Fuel System				
Air cleaner case cover screw	6	5	4 (0.4)	
Fuel auto lock	1	22	34 (3.5)	
Fuel cock lever screw	1	5	4 (0.4)	

Frame

Item	Qty	Thread dia (mm)	Torque setting N-m (kgf-m)	Remark (note#)
Engine mount / dismounting				
Front engine mount bolt	2	12	74 (7.5)	
Front engine hanger plate bolt	3	10	44 (4.5)	
Rear engine mount bolt	4	12	54 (5.5)	
Rear engine mount bolt / nut	2/1	12	54 (5.5)	
Lower engine mount bolt / nut	1/1	10	42 (4.3)	2
Shift pedal bolt	1	6	19 (1.9)	
Front wheel, Suspension & Steering				
Steering top thread	1	26	25 (2.5)	1
Steering stem nut	1	24	103 (10.5)	
Fork bottom bridge split bolt	2	10	39 (4.0)	
Fork top bridge split bolt	2	8	22 (2.2)	
Front axle nut	1	12	59 (6.0)	
Front axle holder bolt	1	8	22 (2.2)	
Front brake disc bolt	6	10	29 (3.0)	
Fork cap bolt	2	37	22 (2.2)	
Fork socket bolt	2	8	20 (2.0)	4
Handlebar mount bolt	4	8	26 (2.7)	
Front fender bolt	4	6	12 (1.2)	
Rear Wheel Suspension				
Rear axle nut	1	16	88 (9.0)	2
Rear brake disc bolt	4	8	41 (4.2)	
Driven sprocket nut	6	8	30 (3.1)	2
Chain case screw	1	6	7 (0.7)	
Swing arm pivot nut	1	14	88 (9.0)	2
Chain adjuster lock nut	2	8	21 (2.1)	
Rear cushion upper nut	1	10	36 (3.7)	
lower nut	1	10	36 (3.7)	
Pivot bracket bolt	2	12	44 (4.5)	
Step arm cap bolt	2	8	22 (2.2)	
Brake System				
Brake hose oil bolt	4	10	34 (3.5)	
Front caliper mount bolt	2	8	30 (3.1)	3
Front master cylinder mount bolt	2	6	12 (1.2)	
Rear master cylinder mount bolt	2	6	12 (1.2)	
Rear brake hose guide screw	2	5	4 (0.4)	
Pad pin	1	8	18 (1.8)	
Pad pin plug	1	10	3 (0.3)	
Caliper bleeder	2	8	6 (0.6)	
Rear caliper main slide pin bolt	1	12	28 (2.9)	
Rear caliper sub slide pin bolt	1	8	22 (2.2)	
Front master cylinder cap screw	2	4	2 (0.2)	
Front master cylinder brake switch screw	1	4	1 (0.1)	
Brake lever pivot bolt	1	6	1 (0.1)	
Nut	1	6	6 (0.6)	
Rear master cylinder joint screw	1	4	2 (0.2)	
Push rod lock nut	1	8	17 (1.7	
Lamps, Instruments & Switches				
Ignition switch	2	8	25 (2.5)	
Others:				
Side stand pivot bolt	1	10	10 (1.0)	
Side stand pivot nut	1	10	29 (3.0)	
Side stand switch bolt	1	6	10 (1.0)	

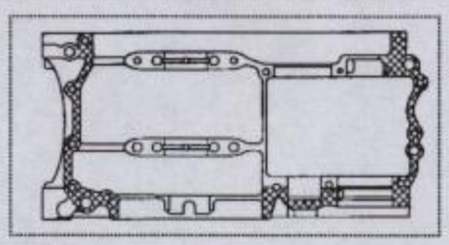
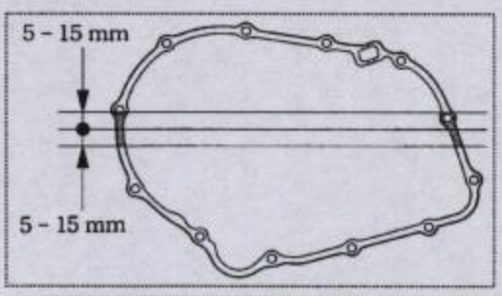
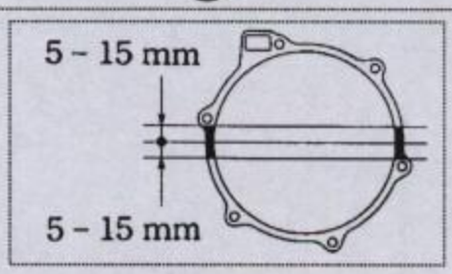
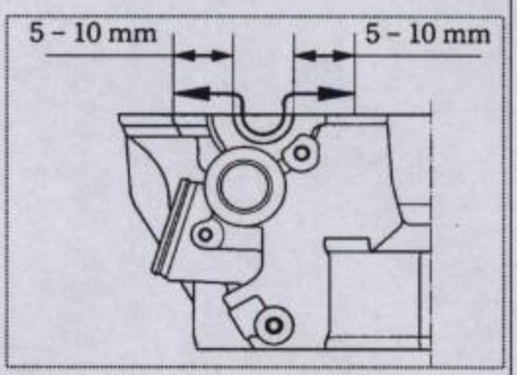
Special Tools

Tool name	Tool number	Section
Float level gauge	07401 – 0010000	6
Oil pressure gauge	07506 – 3000000	4
Oil pressure gauge attachment	07510 – 4220100	4
Wrench 8 x 9mm	07708 – 0030100	8
Wrench 17 x 27mm	07716 – 0020300	9
Extension bar	07716 – 0020500	9
Universal holder	07725 – 0030000	16
Rotor puller	07733 – 0020001	16
Outer driver 37 x 40mm	07746 – 0010200	14
Outer driver 42 x 47mm	07746 – 0010300	13, 14
Outer driver 52 x 55mm	07746 – 0010400	13
Inner handle	07746 – 0020100	11
Pilot 15mm	07746 – 0040300	13
Pilot 17mm	07746 – 0040400	14
Pilot 25mm	07746 – 0040600	14
Bearing remover shaft	07746 – 0050100	13, 14
Remover head 15mm	07746 – 0050400	13
Bearing remover head 17mm	07746 – 0050500	14
Driver handle A	07749 – 0010000	13, 14
Valve spring compressor	07757 – 0010000	8
Valve seal cutter 45° IN 24mm	00780 – 0010600	8
45° EX 22mm	07780 – 0010701	8
32° IN 25mm	07780 – 0012000	8
32° EX 22mm	07780 – 0012601	8
60° IN / EX 30mm	07780 – 0014000	8
Cutter holder 5mm	07781 – 0010400	8
Valve adjust wrench	07908 – MJ60100	8

Tool name	Tool number	Section
Snap ring pliers	07914 – 3230001	15
Steering stem socket	07916 – 3710101	13
Valve guide driver	07942 – MA60000	8
Outer driver 32 x 35mm	07946 – 0010100	14
28 x 30mm	07946 – 1870100	14
Ball race remover	07946 – 3710500	13
Steering stem driver	07946 – MB00000	13
Remover shaft	07946 – MJ00100	14
Fork seal driver	07947 – KA50100	13
Fork seal driver attachment	07947 – KF00100	13
Driver handle attachment	07949 – 3710001	14
Driver attachment	07953 – MJ10100	13
Driver handle	07953 – MJ10200	13
Piston slider	07954 – 3740000	12
Valve spring compressor attachment	07959 – KM30101	8
Valve guide remover (5mm)	07984 – MA60001	8
Clutch centre holder	07GMB – KT70101	9
Cam shaft lifter	07GMG – KV00100	8
Peak voltage adapter	07HGJ – 0020100	17
Needle bearing remover set	07LMC – KV30200	14

Oil, Grease and Sealant

Engine

Item	Remarks	Type of fluid
Crankcase mating surface Right crankcase cover mating surface Left crankcase cover mating surface	  	Sealant (three bond 1207B) or equivalent
Cylinder head cover Mating surface	 Apply to the area specified in the above figure	Sealant (three bond 5211C) or SHINETSU (KE45) or equivalent

Engine

Item	Remarks	Type of fluid
Oil pressure switch thread	Do not apply 3 to 4mm from the thread end.	Sealant
Crankcase sealing bolt Cylinder head sealing bolt Rocker arm shaft thread Cam sprocket bolt thread Cam chain tensioner holder bolt thread Cam chain guide bolt thread Oil pump driven sprocket thread Shift drum centre bolt Shift drum set plate mount bolt Starter clutch bolt		Screw locker
Crankshaft main bearing Connecting rod bearing Connecting rod small end Camshaft (cam, moving surface) IN / EX valve stem Rocker arm Clutch outer C1 / C2 / C3 gear collars M4 / M5 gear collars Each gear / bearings		Molybdenum Solution
Timing hole cap thread Oil seal lip		Multi-purpose grease

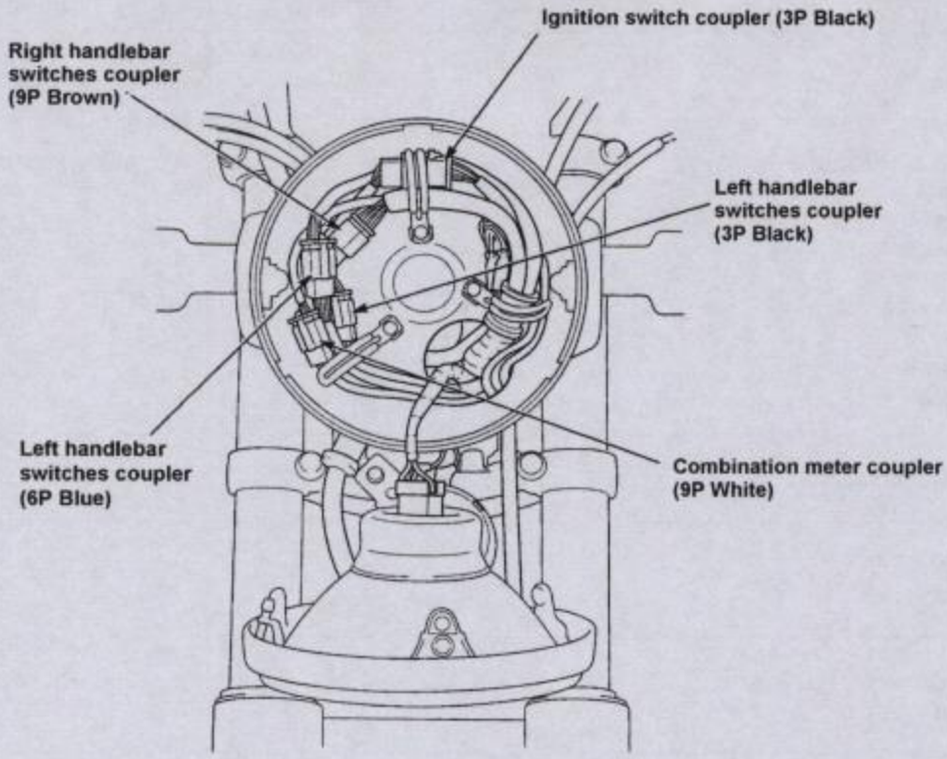
Engine

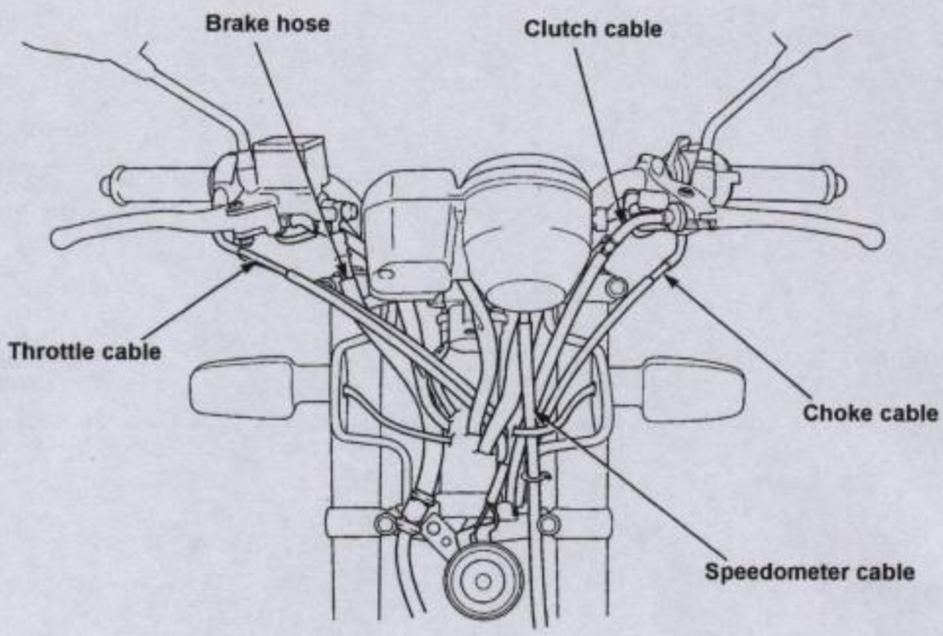
Item	Remarks	Type of fluid
Crankcase bolt thread Cylinder head bolt thread (8mm bolt) Piston ring, piston pin Connecting rod cap nut thread / seat Flywheel mount bolt thread / seat Starter clutch mount bolt thread / seat Valve clearance adjust lock nut thread / seat Clutch friction disc Clutch centre bolt Clutch centre lock nut thread / seat Main journal mount bolt thread / seat Cylinder head mount bolt thread / seat Camshaft holder mount bolt thread / seat Gear teeth Bearings O-Rings		Engine oil

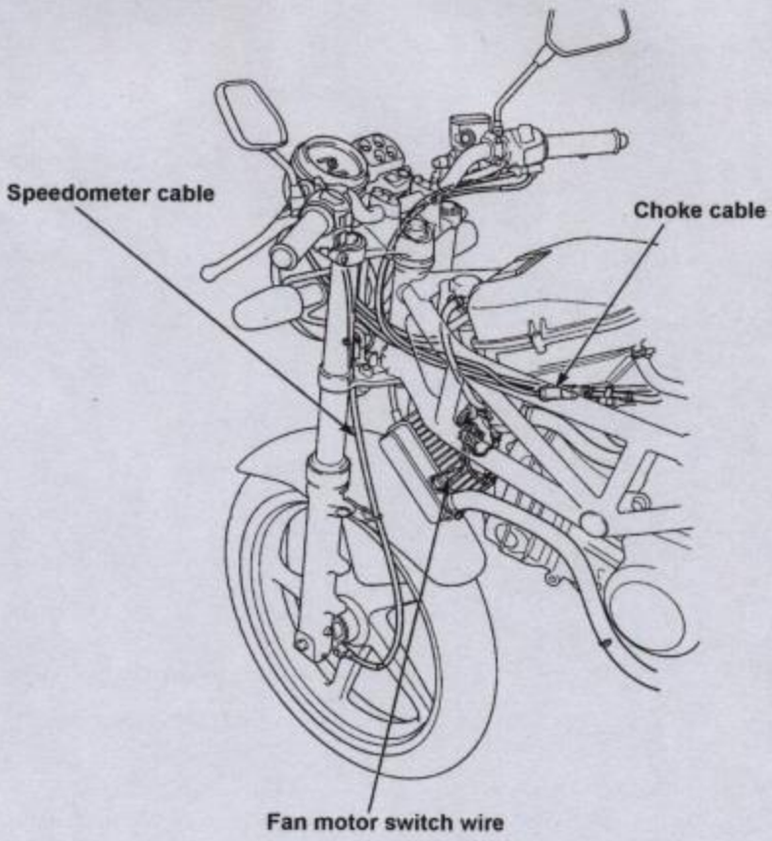
Frame

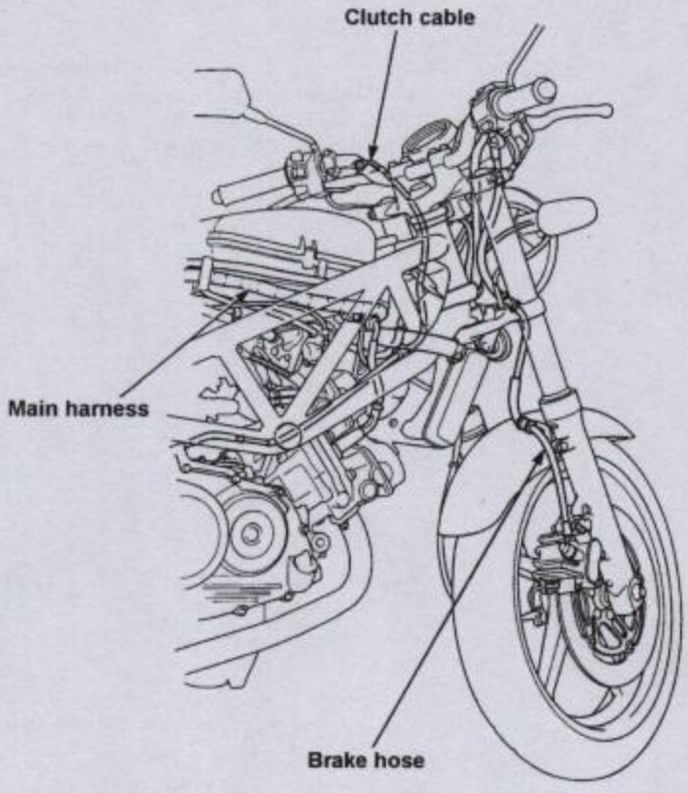
Item	Remarks	Type of fluid
Drive chain		Gear oil
Rear wheel hub / flange, O-Ring Each dust seal lips Swing arm needle bearing Side stand pivot Clutch lever pivot Throttle grip cable end R / L step holder Rear brake pedal Head pipe bearing		Multi-purpose grease
Speedometer gear box		Molybdenum grease
Top thread Driven sprocket nut		Engine oil
Master cylinder interior surface Master cylinder piston cap		Brake fluid
Front / rear caliper pin Brake lever, piston contact area Rear master cylinder push rod, piston contact area		Silicone grease
Fork socket bolt		Screw locker
Fork oil seal Fork dust seal lip Fork cap O-Ring		Honda Ultra Cushion Oil # 10
R / L Handlebar grip inner surface		Honda Bond A or Cemedine #540

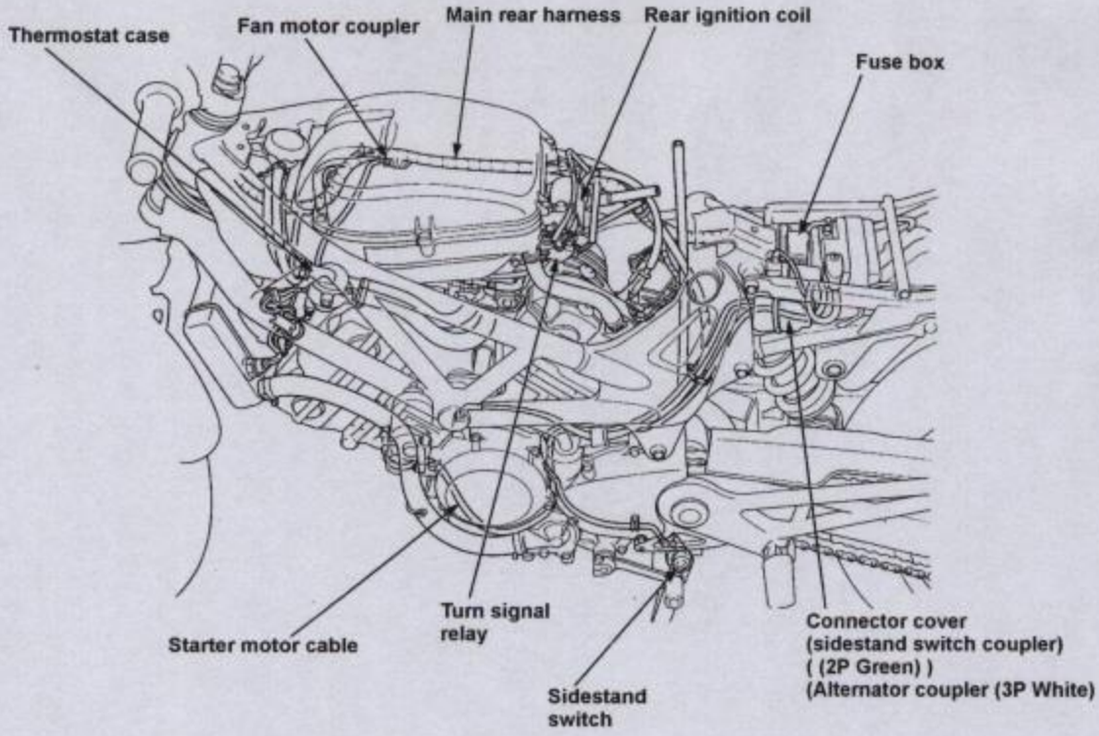
- Routing

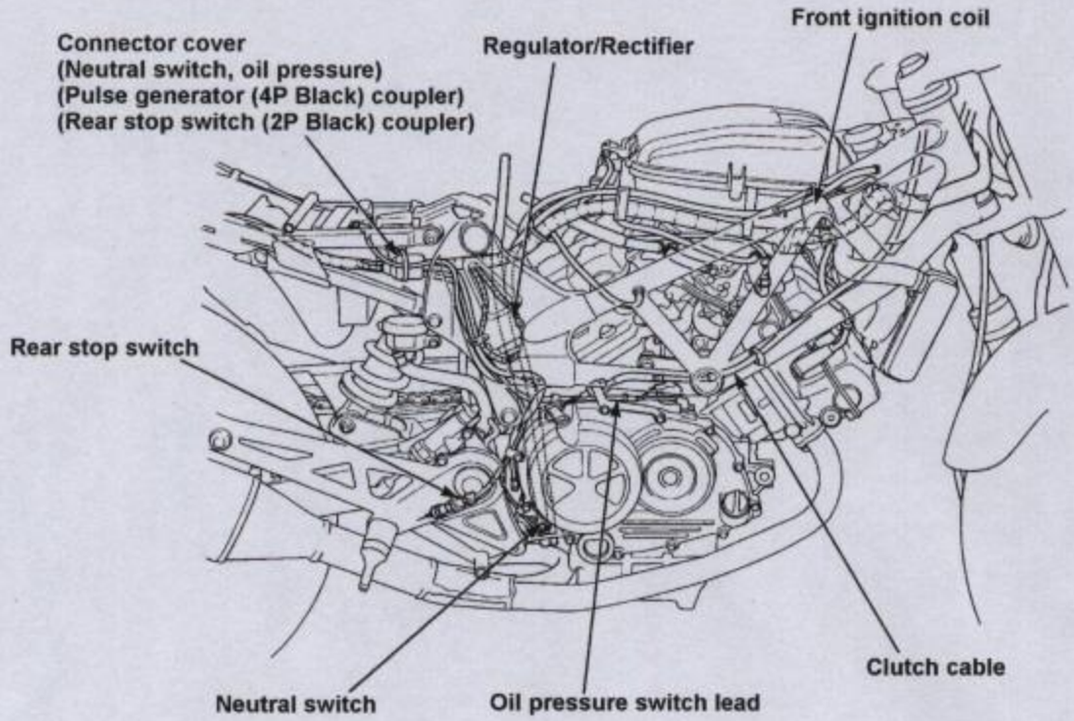

Ignition switch coupler (3P Black)
Right handlebar switches coupler (9P Brown)
Left handlebar switches coupler (3P Black)
Left handlebar switches coupler (6P Blue)
Combination meter coupler (9P White)

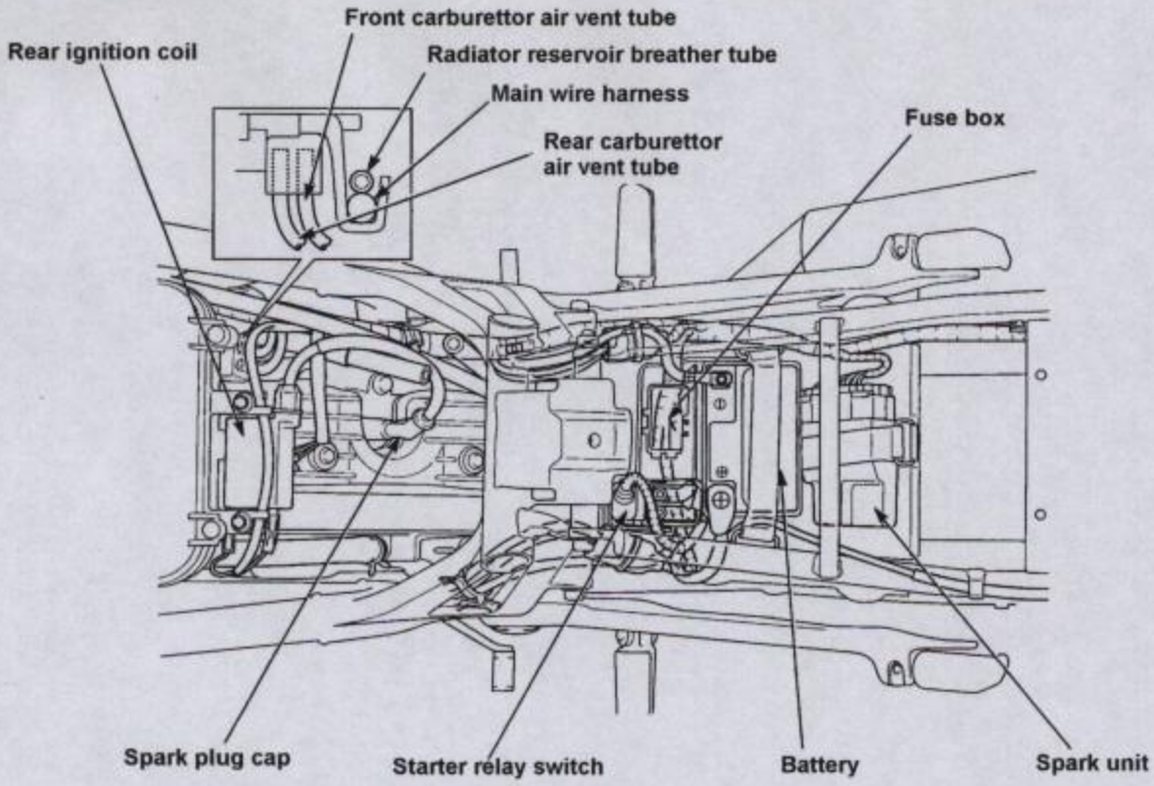

Brake hose
Clutch cable
Throttle cable
Choke cable
Speedometer cable

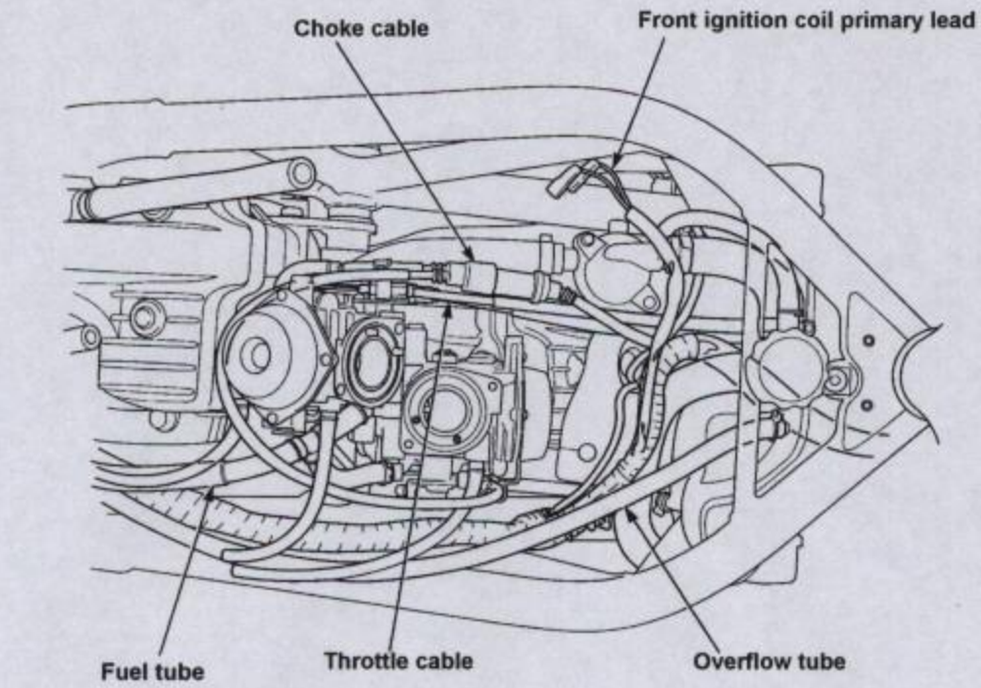

Speedometer cable
Choke cable
Fan motor switch wire

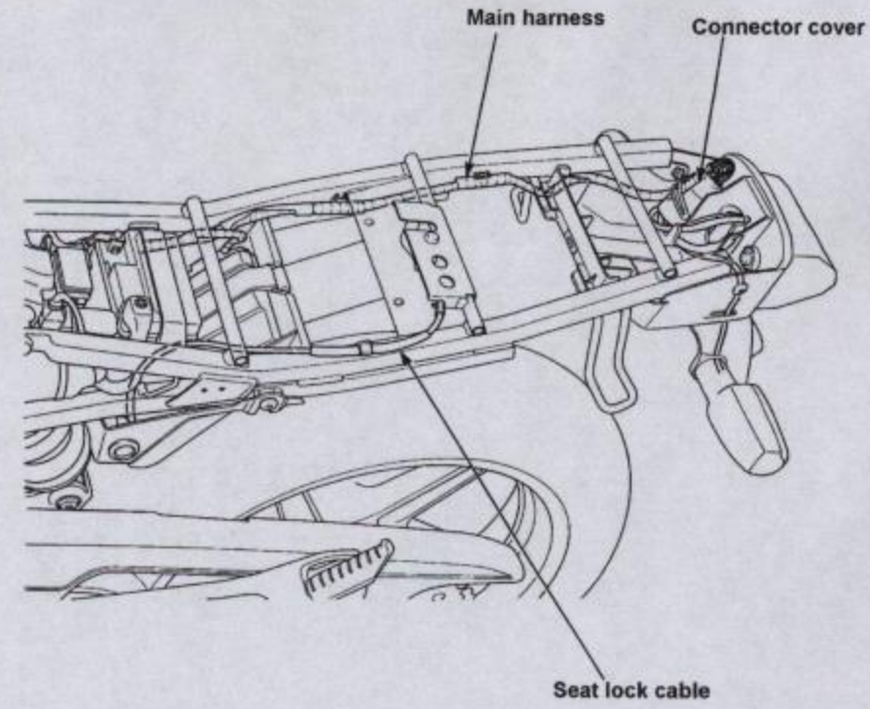

Clutch cable
Main harness
Brake hose

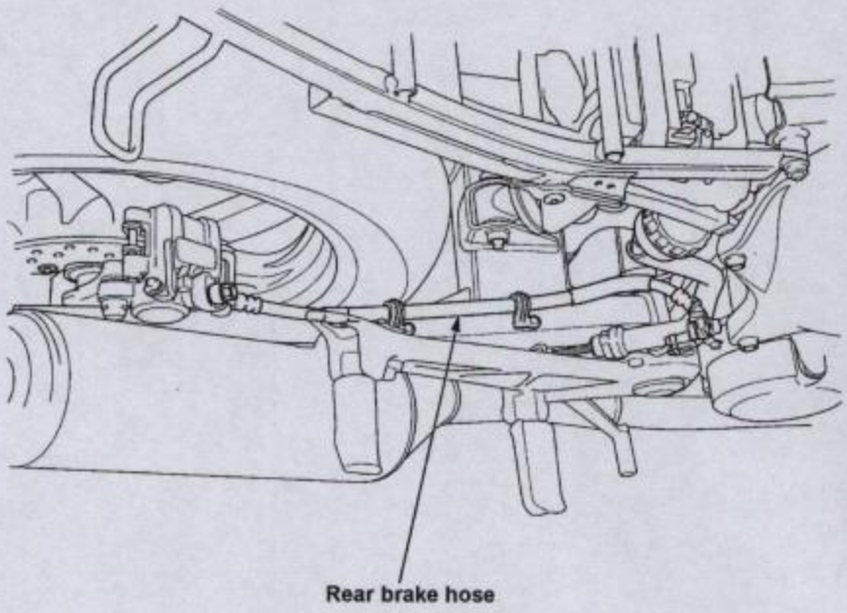

Thermostat case
Fan motor coupler
Main rear harness
Rear ignition coil
Fuse box
Starter motor cable
Turn signal relay
Sidestand switch
Connector cover (sidestand switch coupler) ((2P Green)) (Alternator coupler (3P White)


Connector cover (Neutral switch, oil pressure) (Pulse generator (4P Black) coupler) (Rear stop switch (2P Black) coupler)
Regulator/Rectifier
Front ignition coil
Rear stop switch
Neutral switch
Oil pressure switch lead
Clutch cable


Front carburettor air vent tube
Rear ignition coil
Radiator reservoir breather tube
Main wire harness
Fuse box
Rear carburettor air vent tube
Spark plug cap
Starter relay switch
Battery
Spark unit


Choke cable
Front ignition coil primary lead
Fuel tube
Throttle cable
Overflow tube


Main harness
Connector cover
Seat lock cable


Rear brake hose

Service Information.....	2 – 1	Rear fender.....	2 – 3
Troubleshooting.....	2 – 1	Battery Box.....	2 - 4
Seat.....	2 – 2	Seat rail.....	2 – 4
Fuel tank.....	2 – 3	Muffler / Exhaust Pipe.....	2 – 5

Service Information

General

Warning

- Petrol is highly inflammable. Keep any fire/spark away. Ventilate the working area as vaporised petrol is explosive.
- Service the muffler when it is cool.

- This section describes the procedure to remove/install exterior parts, muffler and fuel tank.
- Refer to (1-25) when routing cables/tubes.
- Replace gaskets when the muffler is removed.
- After installing the muffler, temporarily set all bolts/nuts. Screw joint nuts first, then mount bolts.
- Check exhaust leak after installing the muffler.

Torque Setting

Seat rail flange nut	44 Nm	(4.5kgf-m)
Battery box screw	12	(1.2kgf-m)
Rear fender screw	12	(1.2kgf-m)
Exhaust pipe joint nut	13	(1.3kgf-m)
Muffler mount bolt	29	(3.0kgf-m)
Muffler joint bolt	20	(2.0kgf-m)
Rear cowl screw	4	(0.4kgf-m)
Rear cowl tapping screw	3	(0.3kgf-m)

Troubleshooting

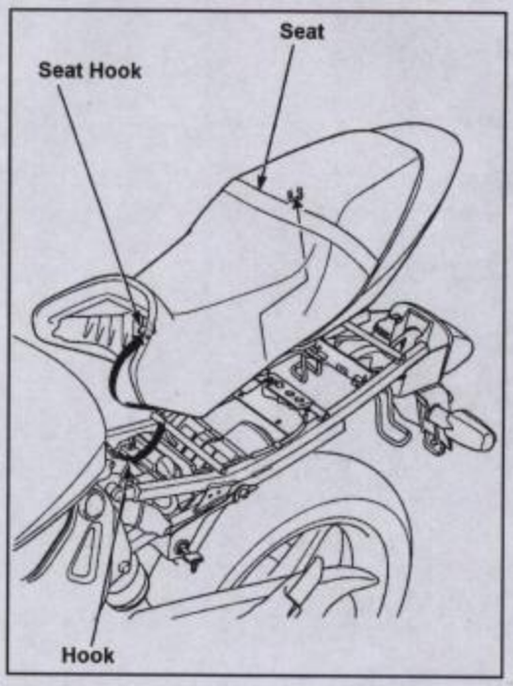
Exhaust noise too loud
- Muffler fault
- Exhaust leak

Lack of power
- Muffler deformation
- Exhaust leak
- Muffler

Seat

Removal

Unlock the seat lock with an ignition key.
Lift the seat up to the back to remove.



Installation

Set the seat hook to the frame hook. Insert the hook by pushing the seat forward.
Push the seat down until it is secured (click noise).

Notes

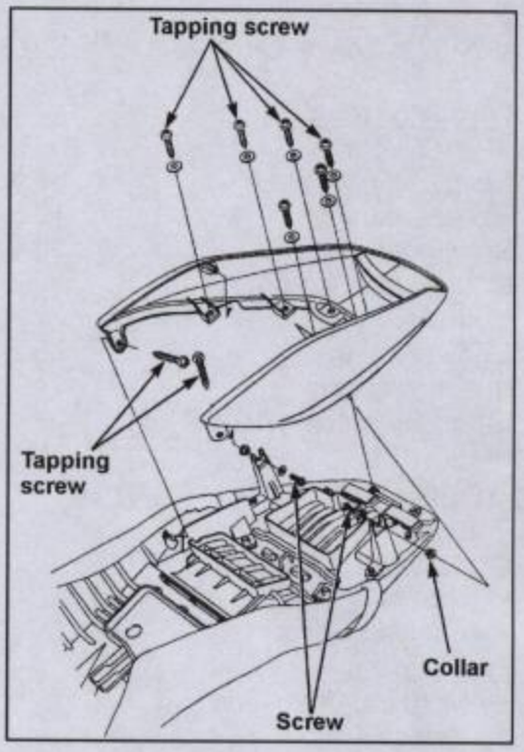
- Make sure there is no obstruction between the seat and the frame before installing the seat.
- Do not catch wire harness between the hook/frame and the seat.

Caution

After installing the seat, push it in all directions to confirm it is secured.

Disassembly

Remove the seat (see above).
Unscrew eight tapping screws and two screws to disassemble the seat.



Assembly

Install a rear counter to the seat.
Set tapping screws / washers and screws / washers / collars.

Tighten the tapping screws and screw to specified torque.

Torque:

Rear cowl screw	4N.m (0.4kgf-m)
Rear cowl tapping screw	3N.m (0.3kgf-m)

Fuel Tank

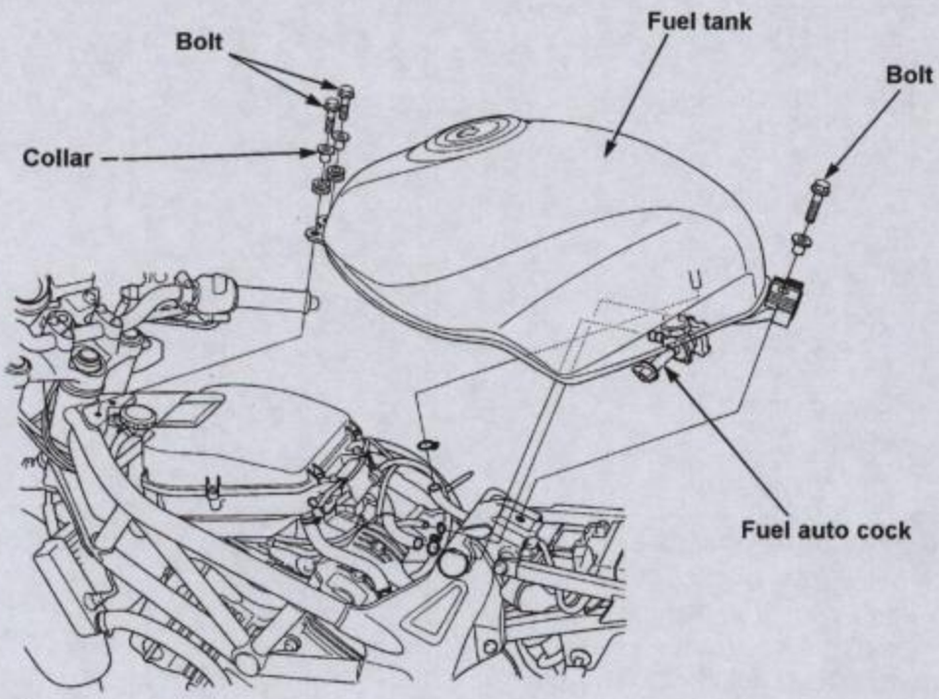
Warning

- Inflammable
- Wipe of spilt fuel immediately.

Remove a seat (2-2).
Turn a fuel cock "OFF".
Unscrew fuel tank bolts and lift the tank up. Disconnect a fuel auto cock vacuum tube, a fuel tube and a breather tube from the tank.
Lift the tank straight up to remove.

Installation

Reverse the removal procedure for installation.



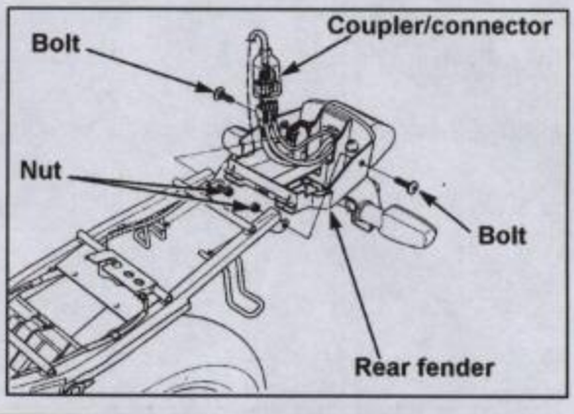
Rear fender

Removal

Remove a seat (2-2).
Disconnect tail lamp coupler and turn signal connector.
Unscrew to remove the rear fender.

Installation

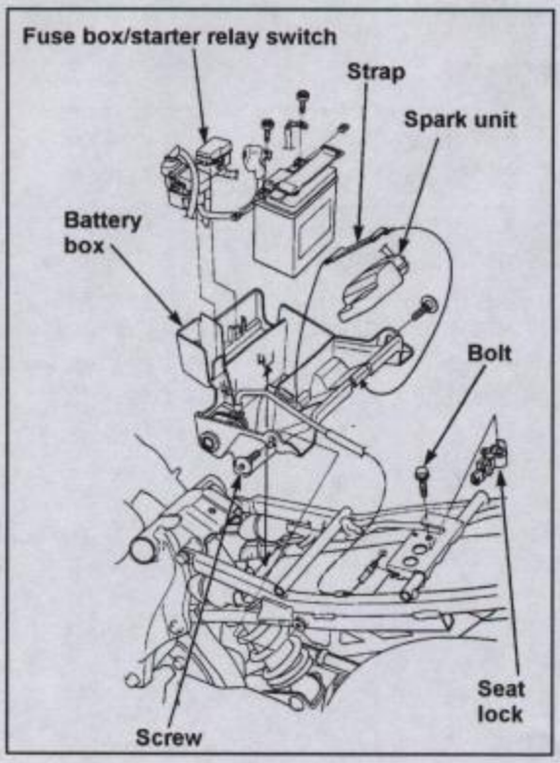
Reverse the removal procedure for installation.



Battery Box

Removal

Remove a battery (16-5).
Unstrap a spark unit and remove it.
Remove a fuse box and a starter relay switch.
Unscrew bolts to remove a seat lock.
Disconnect a seat lock cable and remove a battery box.



Installation

Reverse the removal procedure for installation.

Notes

Set the battery box clamp to the frame when installing.

Torque:
Battery box screw: 12N.m (1.2kgf-m)

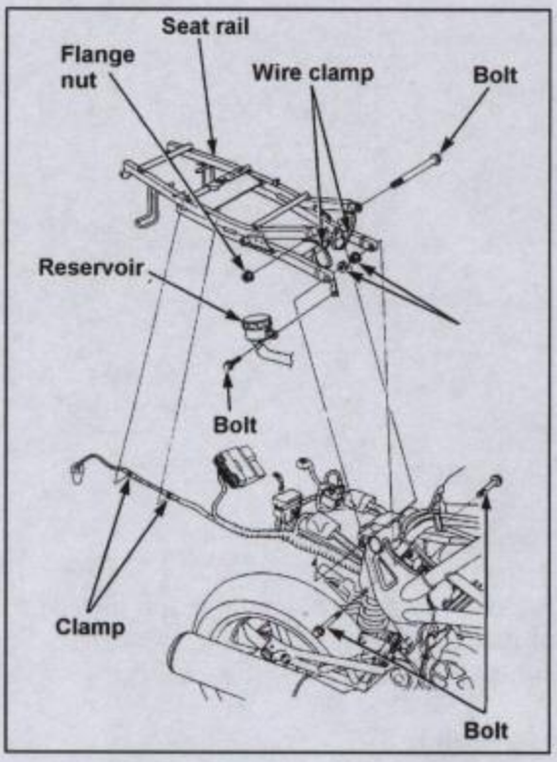
Seat Rail

Removal

Remove the following parts:

- Rear fender (2-3)
- Battery box (see above)

Unscrew to remove a rear master cylinder reservoir.
Release two wire straps and clamps to separate the reservoir main harness from a seat rail.
Unscrew seat rail flange nuts/bolts to remove the seat rail.

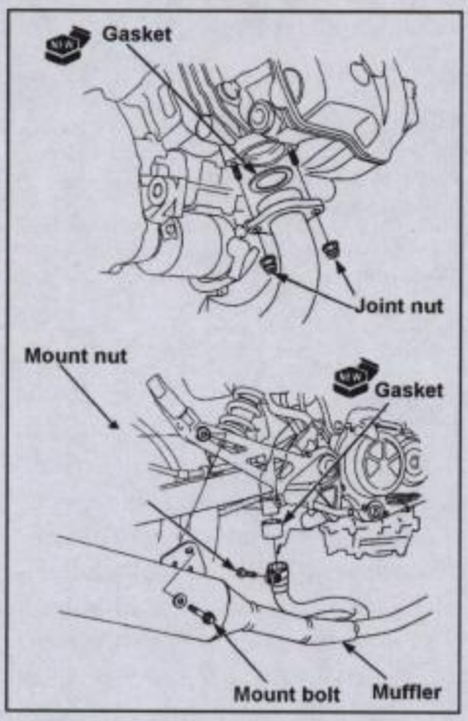


Installation

Reverse the removal procedure for installation.

Torque: Seat rail flange nut: 44N.m (4.5kgf-m)

Muffler / Exhaust Pipe



Muffler

Removal

Unscrew exhaust pipe joint nuts.
Loosen a muffler joint bolt.
Unscrew a muffler mount bolt/nut to remove the muffler.

Installation

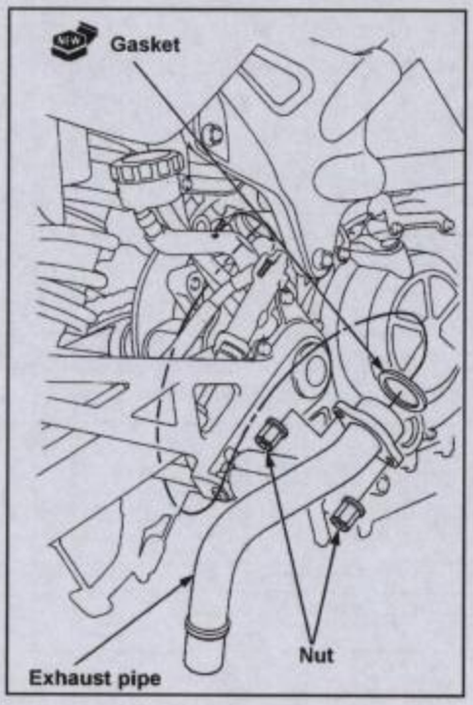
Install a new exhaust pipe gasket.
Temporarily set a muffler mount bolt.
Tighten exhaust pipe joint nuts and a muffler joint bolt to specified torque.

Torque:
Exhaust pipe joint nut: 13N.m (1.3kgf-m) joint bolt
Muffler joint bolt: 20N.m (2.0kgf-m)

Tighten a muffler mount nut to specified torque.

Torque: 29N.m (3.0kgf-m)

Exhaust Pipe



Removal

Remove a muffler (see above).
Unscrew exhaust pipe joint nuts to remove the exhaust pipe.
Remove an exhaust pipe gasket.

Installation

Install a new exhaust pipe gasket.
Install the exhaust pipe and temporarily secure the joint nuts.
Install a muffler (see above).

Notes

Temporarily tighten all bolts when installing a muffler.
Tighten exhaust / muffler joint nuts to specified torque.

Torque:
Exhaust pipe joint nut: 13N.m (1.3kgf-m)
Muffler joint bolt: 20N.m (2.0kgf-m)

Tighten the muffler mount bolt.
Torque: 29N.m (3.0kgf-m)

Regular parts replacement.....	3 – 1	Drive chain.....	3 – 9
Service schedule.....	3 – 2	Electrical system.....	3 – 14
Steering stem.....	3 – 4	Lubrication system.....	3 – 14
Brake.....	3 –4	Fuel system.....	3 – 16
Wheel.....	3 – 7	Cooling system.....	3 – 18
Suspension.....	3 – 8	Exterior lamps.....	3 – 19
Clutch.....	3 – 8	Others.....	3 - 19

Warning

- Exhaust fume contains toxic gas such as CO. Do not run the engine for a long period in poorly ventilated room.
- Engine/muffler are extremely hot immediately after shutting down the engine. Wear proper protective clothes if it is necessary to service while they are hot.
- Petrol is highly inflammable. Keep any fire/spark away. Ventilate the working area as vaporised petrol is explosive.
- Do not catch your arms/clothes in driving parts or other moving parts.
- Check the coolant level at the reservoir, not at the radiator. If the engine is suspected to be hot (above 100°c), do not open a radiator cap as the coolant may spurt.
- Cooling system should be serviced when the engine is cool.
- Coolant is toxic. Do not drink/let it touch your skin, eye or clothes.
  - If the coolant touches your skin or clothes, rinse with soap and water.
  - If the coolant gets in your eyes, rinse with water and consult a specialist.
  - If the coolant is swallowed, induce vomiting, gargle and consult a specialist.
- Keep the coolant away from small children.

Notes

Park the vehicle on level and flat surface and support it with its side stand or maintenance stand.

Regular Parts Replacement

Replace the parts when the distance/time reached the schedule (whichever the earlier).

Item	Schedule	Notes
Hydraulic brake related parts	Quadrennial	Master cylinder cup and rubber parts on a disc caliper
Brake fluid	Biennial	
Air filter element	Every 20,000km	Viscous type
Engine oil	Initial 1000km or one month, then every 6,000km	
Oil cleaner	Initial 13,000km, then every 12,000km	
Coolant	Quadrennial	

Service Schedule

● : Mandatory ❍ : Manufacturer recommendation ▭ : Does not apply

Parts		Item	Schedule			Standard
			Regular	6 months	12 months	
Steering system	Handlebar	Operation			●	
		Damage			●	
		Steering stem attachment			●	
		Steering stem bearing			●	
Braking System	Brake pedal & lever	Free play	●	●	●	
		Effectiveness	●	●	●	
	Rods / cables				●	
	Hose / pipe	Leak, damage and mount		●	●	
	Reservoir	Fluid level	●		●	Front: above lower limit Rear: between upper-lower limit lines
	Master cylinder & disc caliper	Function, wear and damage			●	
	Brake drum & shoe			●	●	
					●	
					●	
	Brake disc	Disc pad clearance			●	
		Pad wear			●	Wear limit line
		Disc wear / damage			●	F: Std thickness 4.5mm Service limit: 3.5mm R: Std thickness 5.0mm Service limit: 4.0mm
Driving System	Wheel	Tyre pressure	●	●	●	Front: 200kPa (2.0kgf/cm²) Rear: 225kPa (2.25kgf/cm²) One person: Front: 200kPa (2.0kgf/cm²) Rear: 225kPa (2.25kgf/cm²)
		Tyre crack / damage	●		●	
		Tyre tread depth and unusual wear	●		●	Wear indicator appears on the tread
		Wheel nut / bolt fitting		●	●	
		Front wheel bearing fitting			●	
		Rear wheel bearing fitting			●	
Shock Absorber	Suspension arm	Joint fitting and arm damage			●	
	Shock absorber	Oil leak and damage			●	
Transmission	Clutch	Clutch lever		●	●	10mm – 20mm at lever end
		Operation		●	●	
	Transmission			●	●	

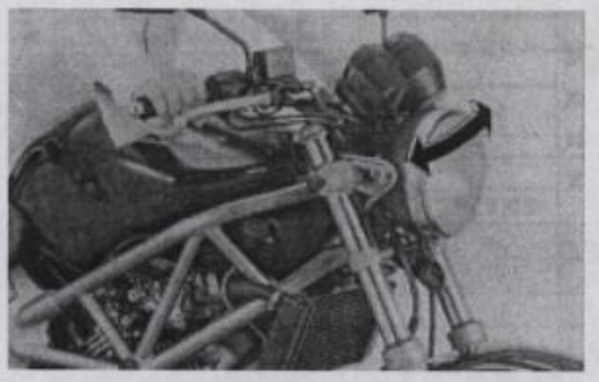
Service Schedule

Parts		Item	Schedule			Standard
			Regular	6 months	12 months	
Transmission	Propeller & Drive shaft			●	●	
					●	
					●	
	Chain & sprockets	Chain slack		●	●	25 – 35mm at midway between the sprockets, with a side stand extended
		Sprocket attachment & wear			●	
Electrical system	Ignition system	Spark plug		●	●	Plug gap : 0.8 – 0.9mm
				●	●	
	Battery		●	●	●	
					●	
		Terminal connection			●	
	Wiring	Connection / damage			●	
Powerplant	Main component	Starting and noise	●		●	
		Low speed and acceleration	●		●	Idling rpm : 1,300 ± 100 rpm
		Exhaust		●	●	
		Air filter element		●	●	
	Lubrication system	Oil leak		●	●	
		Oil quality / level			●	
	Fuel system	Fuel leak			●	
		Carburetor linkage			●	
		Throttle / choke valve status			●	Throttle grip free play 2-6mm at the flange
	Cooling system	Coolant level	●	●	●	
		Coolant leak			●	
Exterior lamps		Operation	●	●	●	
Horn and Lock		Operation			●	
Instruments		Operation			●	
Exhaust Pipe and Muffler		Attachment & damage			●	
		Muffler function			●	
Frame		Looseness & damage			●	
Others		Lubrication			●	
Defects discovered on previous day		Serviced	●			

Steering System

Lift the front wheel from surface.
Move the axle forward and backward to check its fitting.
If the fitting is loose, re-tighten the steering stem nut or service the stem (13-24).

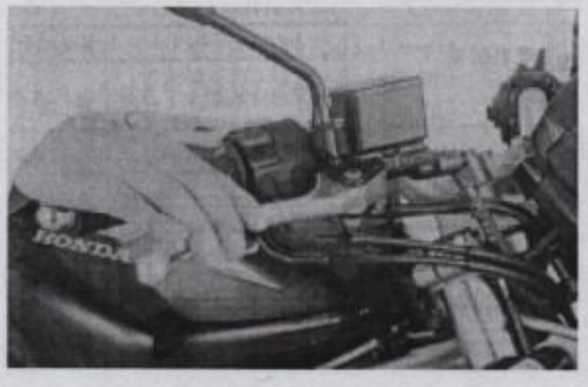
Lift the front wheel and turn the handlebar slowly to each side to check smooth steering.
If there is partial jamming, check wires and cables routing.
If the wires or cables are not interfering with the stem, disassemble the steering stem and inspect the stem cone race (13-24).



Brake

Brake free play

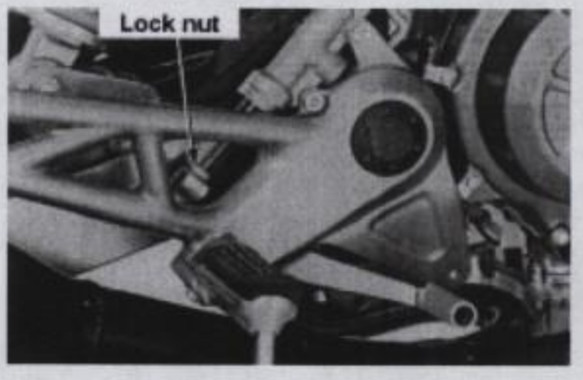
Depress brake lever/pedal hard to check there is no air in the brake system.
If the lever/pedal is soft, bleed air (15-4).



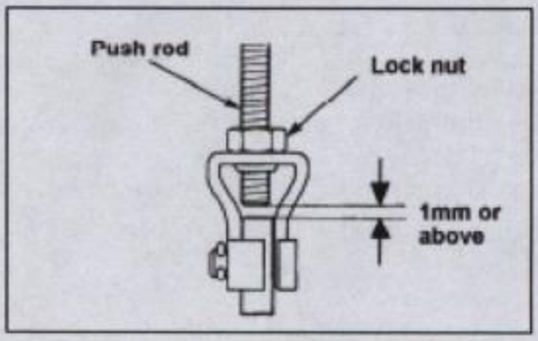
Brake pedal height adjustment

Loosen a locknut and turn a push rod to adjust the height of the brake pedal.

Notes
Check the operation of a stop lamp switch after adjustment.



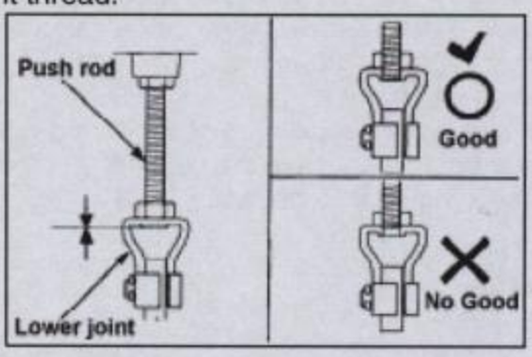
If the pedal needs to be lowered, adjust the pedal so as to have at lease 1mm clearance between the lower end of the push rod and the pedal joint.



If the pedal needs to be elevated, do not elevate beyond the height where the lower end of the push rod is at the same level with the lower joint thread.

Notes

The push rod lower end should not go into the lower joint thread.



Firmly tighten the lock nut after adjusting.

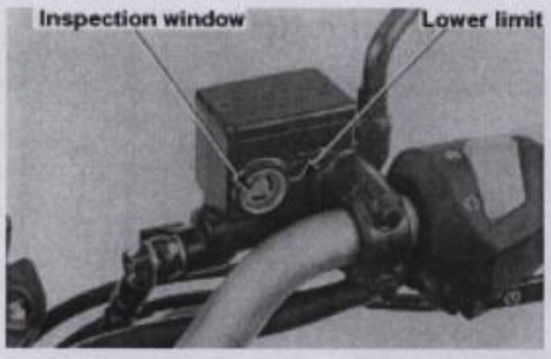
Torque: 17N.m (1.7kgf-m)

Inspect the brake effectiveness and the stop lamp switch operation.

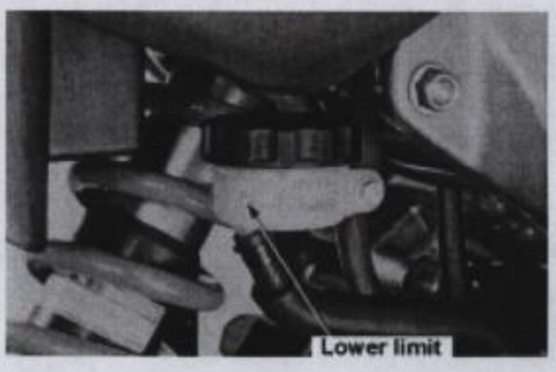
Reservoir fluid level check

Front
Level the master cylinder. Check the fluid level from an inspection window.

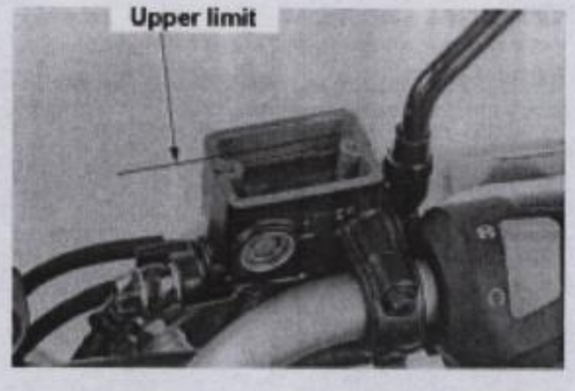
Rear
Support the vehicle vertically to level the reservoir.
Check the fluid level in the reservoir.



If the brake fluid level is close to the lower limit, inspect brake pads for wear.
If the pads are not worn out and the fluid level is low, inspect the hydraulic system for leakage and then fill the reservoir.

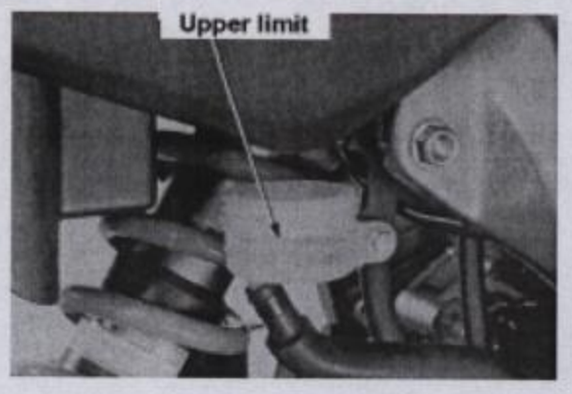


Filling Brake Fluid



Front
Level the master cylinder and unscrew two screws.
Remove a reservoir cap, a set plate and a diaphragm.
Fill the recommended brake fluid to the upper limit.

Rear
Support the vehicle vertically and remove a reservoir cap, a set plate and a diaphragm.



Recommended brake fluid: Honda brake fluid DOT4

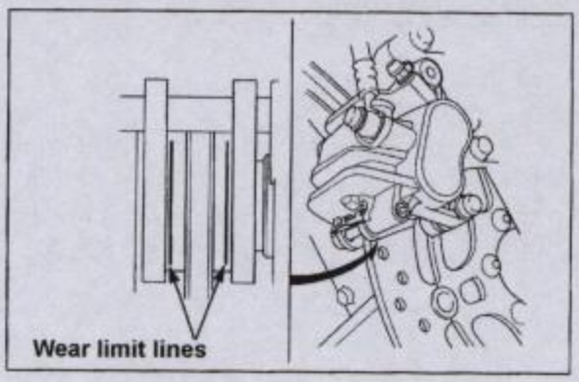
Warning

- Do not let the brake fluid contaminated by water or debris.
- Do not mix different products of brake fluid.

Caution

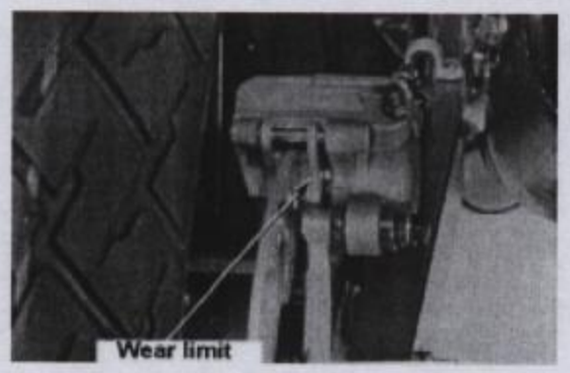
- Keep painted, plastic or rubber surfaces away from the brake fluid.

Install the diaphragm, the set plate and the reservoir cap after filling the fluid.



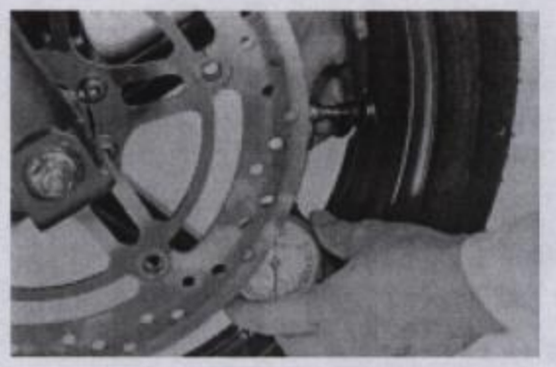
Brake pad wear

Front
Inspect brake pads from behind the caliper.
Replace pads in a pair if one of them is worn to the wear limit (Sec. 15).



Rear
Inspect brake pads from behind the caliper.
Replace pads in a pair if one of them is worn to the wear limit (Sec. 15).

Wheels



Tyre air pressure

Measure the tyre air pressure when tyres are cold.

Unit : kPa (kgf-cm²)

		Front	Rear
1 person	Normal/High speed	200 (2.00)	225 (2.25)
2 people	Normal	200 (2.00)	225 (2.25)
Tyre	Bridgestone	G601F Tubeless	G602 Tubeless

Warning

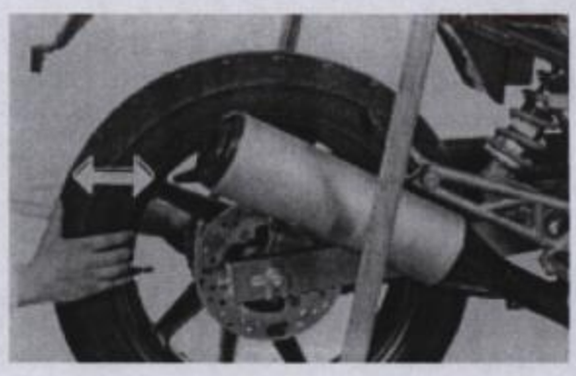
Excessive loading or continuous high speed operation with low tyre pressure may burst the tyre.

Wheel bearing fittings

Front

Lift the front wheel.
Fully steer either to the left or right, and shake the wheel in axial direction.
If the fitting is quite loose, remove the front wheel to inspect the wheel bearing (13-8).

Rear



Lift the rear wheel.
Shake the wheel in axial direction.
If the fitting is quite loose, remove the rear wheel to inspect the wheel bearing (14-3).

Notes

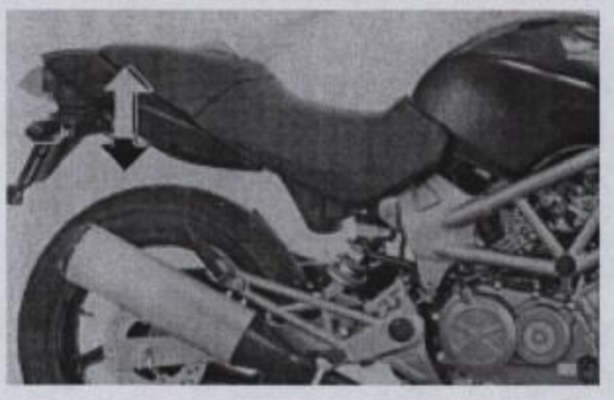
Looseness may come from swing arm pivot. Identify which is the cause.

Suspension

Operation

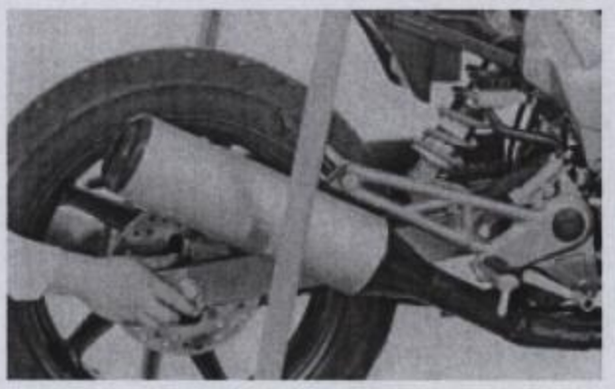
Apply front brake and push the handlebar to compress the front suspension for a few times. If there is any loose fit or noise, inspect the steering stem or the front fork. Inspect the front fork oil seal for oil leak and the fork tube for any damage.

Push the rear end of the seat for a few times to compress the rear suspension. If there is any loose fit or noise, inspect the swing arm pivot and the rear shock absorber mount for loose fittings.
Inspect the rear shock absorber for oil leak and damage.



Joint fitting

Lift the rear wheel. Hold near the axle and shake vertically to check the fitting of rear suspension joint.

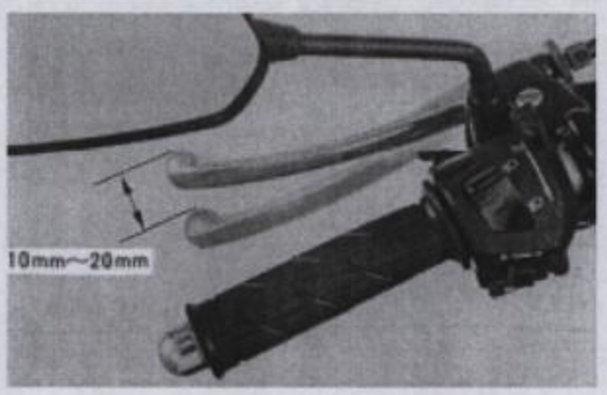


Clutch

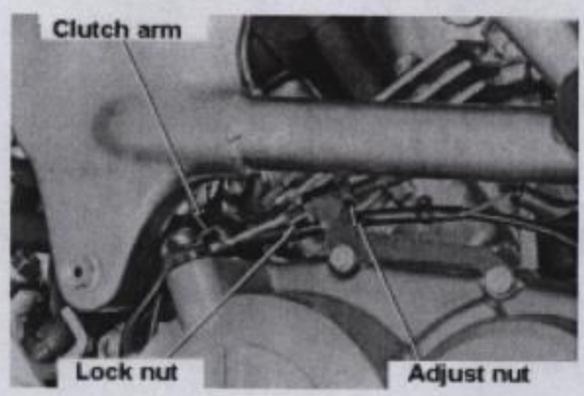
Clutch free play

Measure the free play at the lever end.

Free play: 10 – 20mm



Major adjustment should be done on the clutch arm end. Loosen a lock nut and turn the adjustment to adjust the free play of the lever.

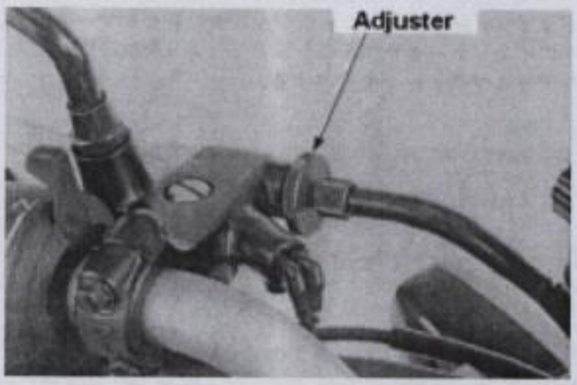


Note

Fully tighten the top adjuster (lever end) so as to allow easy adjustment for the next time (can be adjusted at the top adjuster.

Fix the adjust nut and screw the lock nut after adjusting.

Precise adjustment should be done by loosening the lock nut and turning the adjuster.



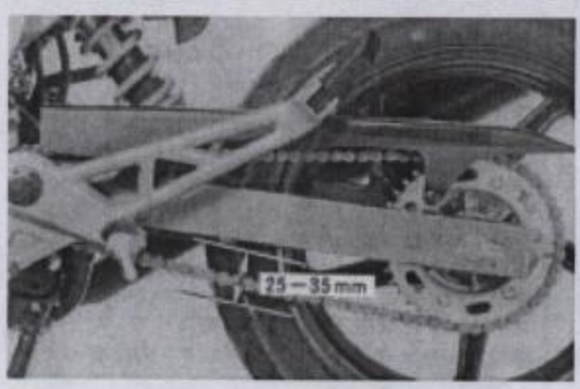
Notes

If the screw thread is exposed more than 8mm, fully tighten the adjuster and adjust at the clutch arm end as the screw may break.

If the free play cannot be adjusted to the standard or the clutch slips at the standard, service the clutch.

Drive chain

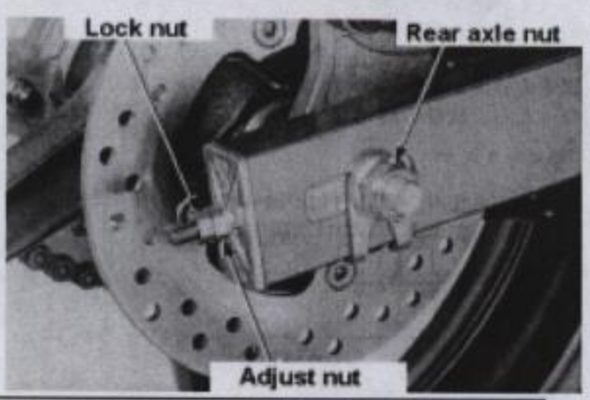
Chain slack
Inspection



Warning

It is critically important to shut down the engine when servicing the drive chain for your own safety.

Support the vehicle with a side stand. Measure the chain slack at the midpoint between the sprockets.
Free play : 25 – 35mm



Adjustment
Loosen the wheel nut to enable the wheel to move. Loosen lock nuts on both sides and turn the adjust nut to adjust the slack.

Warning

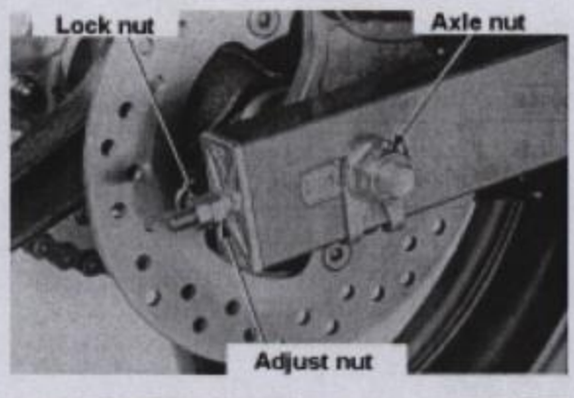
The adjuster has a scale. Both left and right sides should have some scale readings. Otherwise the wheel will be misaligned and it will be hard to control the direction.

Tighten the rear axle nut to specified torque.

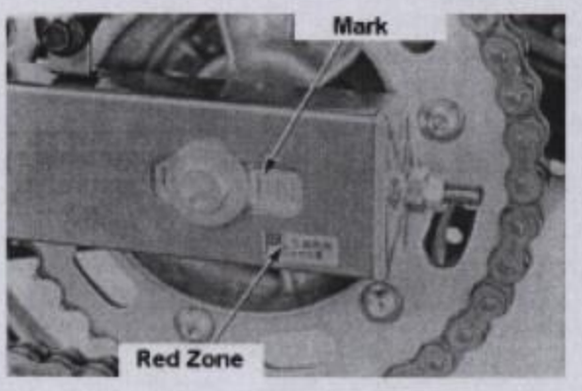
Torque : 88N.m (9.0kgf-m)

Check the chain slack again.
Tighten the adjust nut and the lock nut.

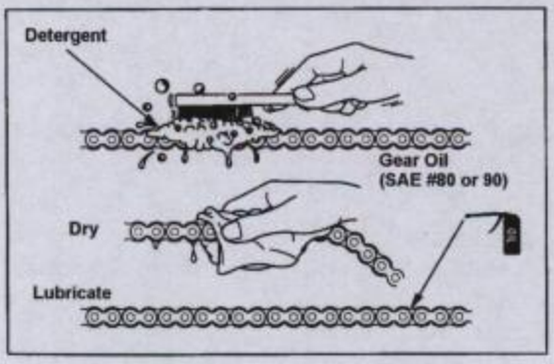
Torque : 21N.m (2.1kgf-m)



If the mark on the adjuster falls into the red zone on the chain indicator label, replace the drive chain.



Cleaning / Lubrication / Inspection
Clean the chain with detergent and dry it.
Apply #80 or #90 gear oil to the chain.
Wipe off excessive oil.

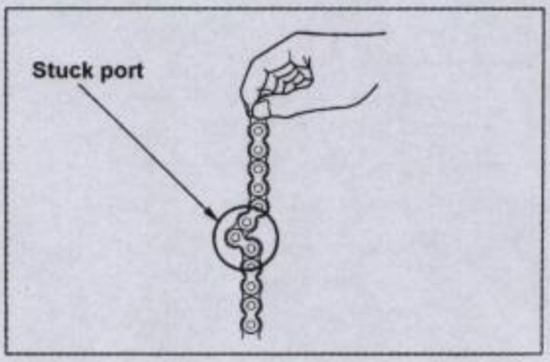


Notes

Do not conduct the following works, as the drive chain is equipped with O-Rings.
- Use of steam or high pressure water jet
- Use of chain spray containing solvent or use of petrol.

Inspect the chain for sticking links.
If the stuck part is not hard, loosen it in washing oil or kerosene. Dry it after loosening.

If the part is still stuck and the link is not moving smoothly, or if there is any damage on links or rollers, replace the chain.



Drive Chain Replacement

Caution

- Use exclusive replacement chain and special tool.
- Never use a clip type chain.

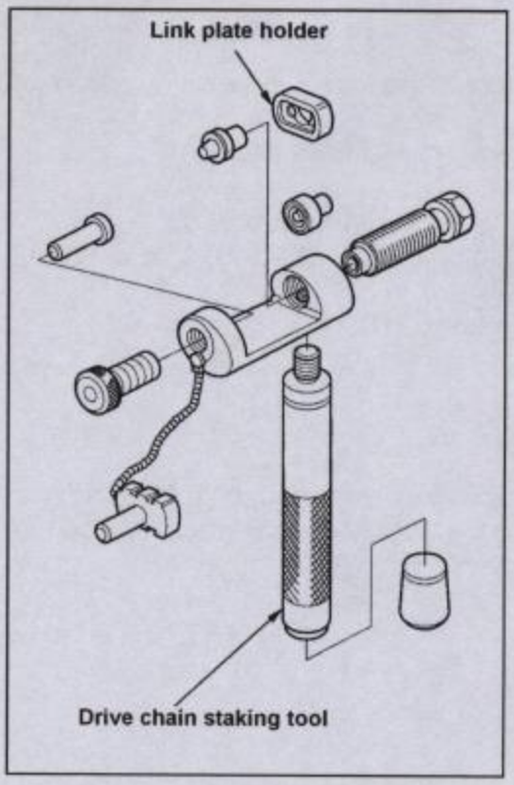
Loosen the drive chain.
Assemble the special tool.

Special tools

Drive chain staking tool	07HMH – MR10103
Link plate holder	07HMH – MR10130

Notes

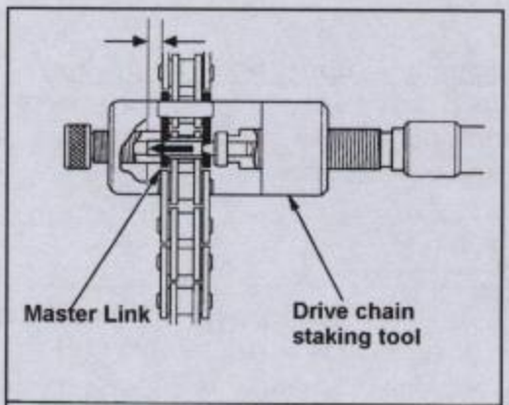
- Read the instructions before using the staking tool.
- Do not re-use a master link, O-Rings and a link plate.



Set the tool to the staked part of the drive chain to cut the stake.

Special tool

Drive chain staking tool	07HMH – MR10103

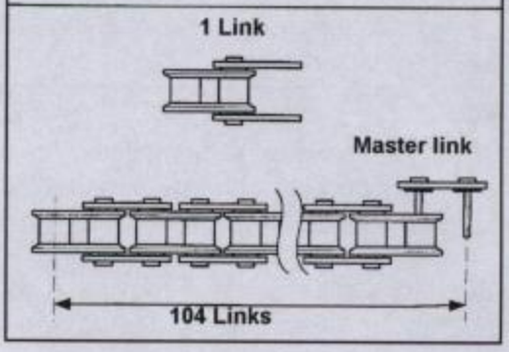


By using the staking tool, adjust the number of links to the standard.

Notes

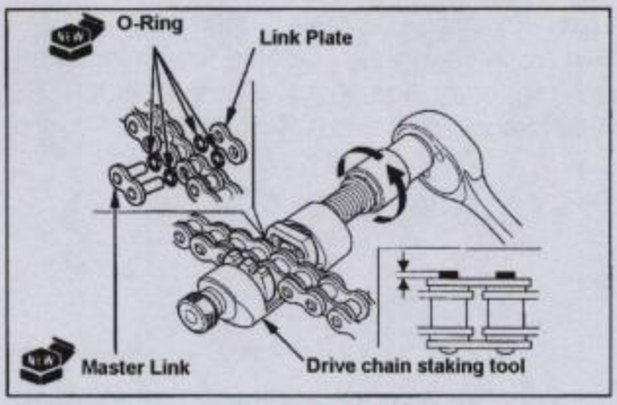
Count in the master link.

Standard links : 104 links
Designated replacement chains:
DID : 520 – V8
RK : 520 MOZ6



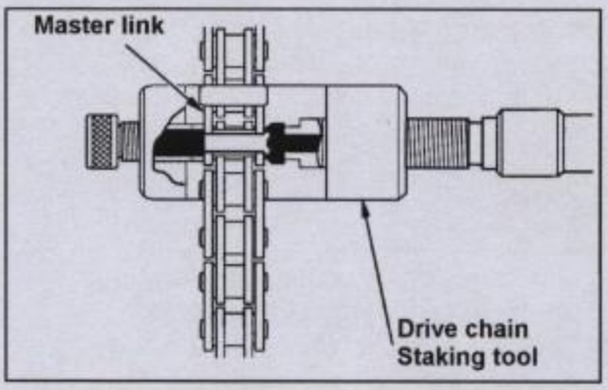
Install the drive chain after adjusting the link number.
Install new O-Rings to the new master link and install the link from inner side of the chain.
Set O-Rings and a link plate and measure the distance from the link plate to the master link joint pin (see the figure).

Standard : RK : 1.2 – 1.4mm
DID : 1.15 – 1.55mm



Notes

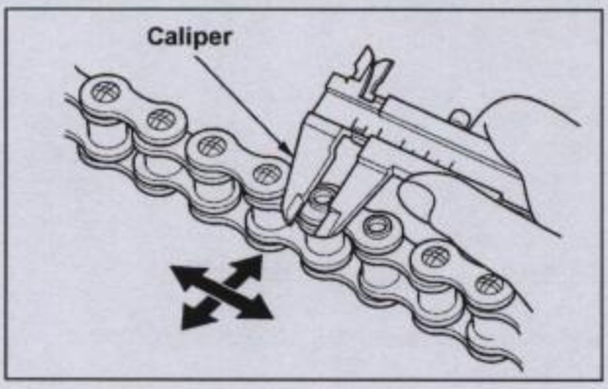
- The labeled surface on the master link should face outward.
- Do not catch O-Rings when installing.



Stake the end of master link joint pins by using the staking tool.

Measure the staked area with a caliper.

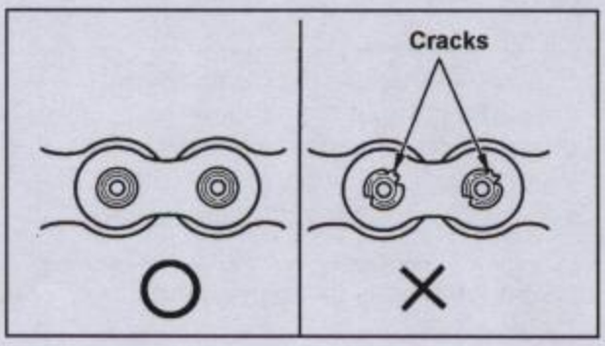
Staked area: RK : 5.50 – 5.80mm
DID : 5.40 – 5.60mm



Caution

If the measured value is out of the above range, re-stake with a new master link, link plate and O-Rings.

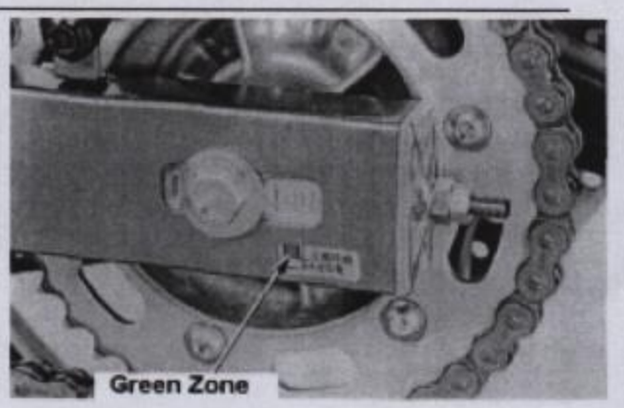
Inspect the staked area for crooks.
Re-stake with a new master link, link plate and O-Rings if there is any crack.



Caution

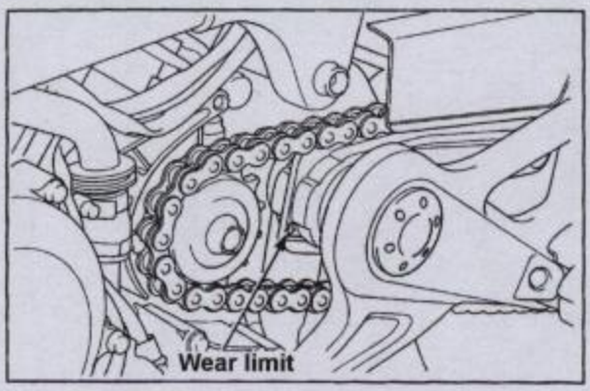
Never use a clip type chain.

Adjust the chain slack after replacing the drive chain. Align the beginning of the green zone (opposite side of the red zone) on the chain indicator label and stick the label.



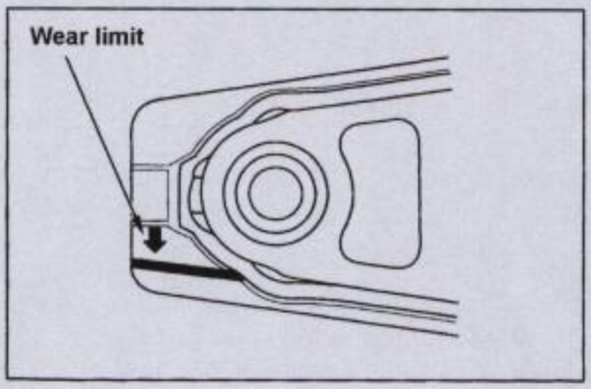
Drive chain slider inspection

Remove a drive sprocket cover (7-4). Inspect a drive chain slider for its wear and damage. Replace it if it is worn to the wear limit.



Notes

If the drive chain contacts the swing arm, it may damage both of them. Thus, early replacement is recommended.

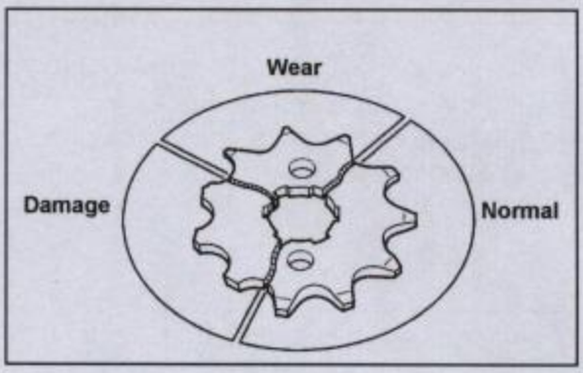


Sprocket attachment and wear

Inspect the drive/driven sprockets for wear and damage.

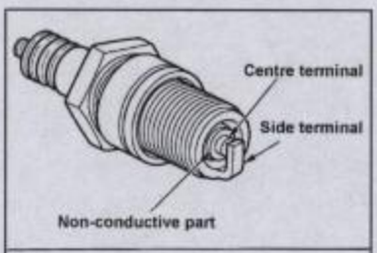
Caution

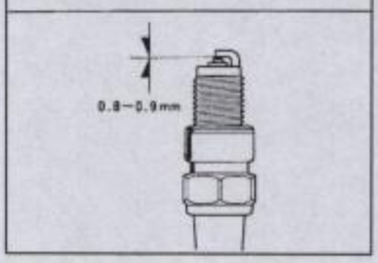
Replace both chain and sprockets at the same time. A combination of stretched chain and a new sprocket, or vice versa does not bring firm catch and result in damaging the worn side.



Inspect drive/driven sprockets mount bolts/nuts for their tension.

Electrical System





Ignition system

Spark plug status

Remove a spark plug cap.
Clean the plug seat with compressed air before removing the plug. Then remove the plug to inspect terminals for wear, corrosion and damage. Replace the plug if necessary.

Designated plugs:

	CR8EH – 9 (NGK)
	U24FER9 (DENSO)
	CR9EH-9 (NGK)
	U27FER9 (DENSO)

Clean the plug gap area with a wire brush or a plug cleaner.
Measure the plug gap with a wire type plug gauge and adjust the gap by bending the side terminal.
Standard: 0.8 ~ 0.9mm

Notes

In order to prevent damaging the cylinder head thread, set the plug to the cylinder head by hand, then tighten with the plug wrench.

If the plug is new, tighten ¼rev, after the sealing washer touches the seat.
Tighten to the specified torque for re-using plugs.

Torque: 12N.m (1.2kgf-m)

Lubrication System

Engine oil check

Warm up the engine.
Shut down the engine and leave the vehicle for a few minutes. Support the vehicle vertically and check the oil level from the inspection window. The oil level should be between upper and lower limits.

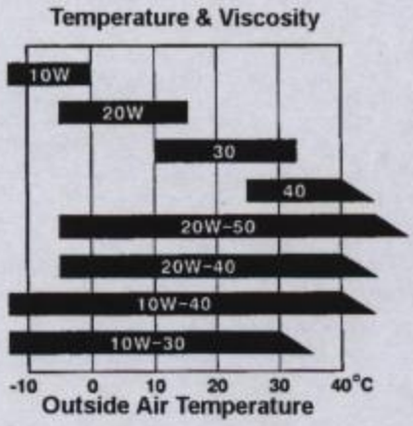
If the oil level is at or below the lower limit, remove an oil filter cap and fill recommended engine oil to the upper limit.

Recommended oil:

- Genuine Honda Ultra GP (4 cycle motorcycle) SAE 10W – 40 or 20W – 50

If the equivalent product is to be used, follow the standards below:

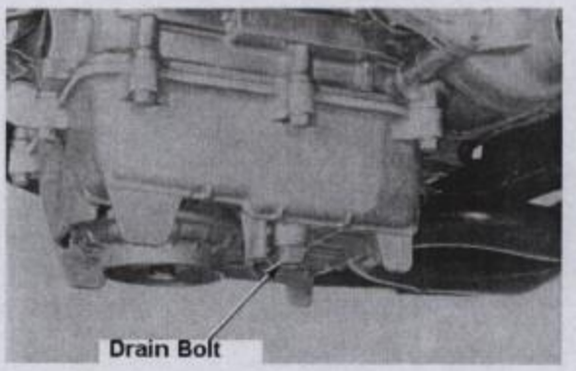
- API classification : SF class engine oil
- SAE standard : select from your operating temperature range.



Firmly secure the oil filler cap.

Engine oil change

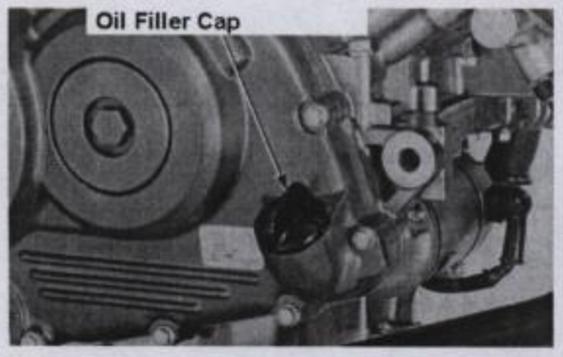
Warm up the engine.
Shut down the engine and remove an oil filler cap.
Unscrew oil drain bolt and support the vehicle vertically to drain oil.
After draining all oil, install new sealing washer and screw a cleaned drain bolt.



Torque: 29N.m (3.0kgf-m)

Supply specific amount of recommended engine oil from the oil filler.

Oil quantity: 1.9 ltrs (oil change)
2.1 ltrs (oil filter change)
2.4 ltrs (total capacity)

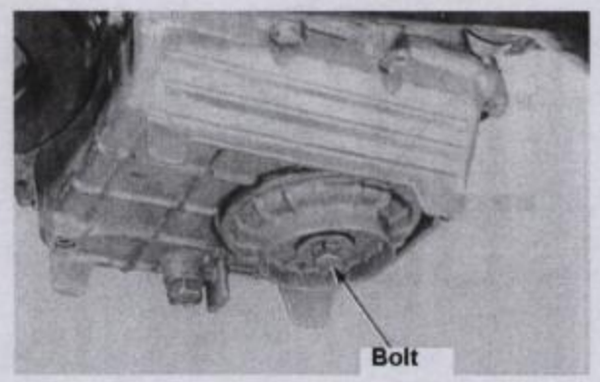


Start the engine and inspect the engine for oil leak.

Shut down the engine and measure the oil level (3-14).

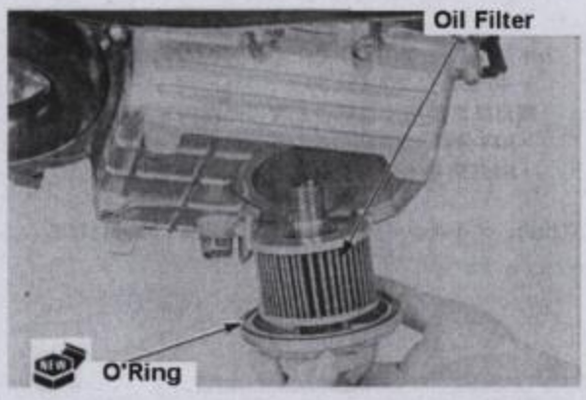
Oil Filter Change

Drain engine oil (3-15).
Unscrew a bolt to remove an oil filter cover.
Remove an oil filter.
Remove O-Rings from an oil filter mount bolt and an oil filter cover.
Install new O-Rings and apply oil.
Install a spring and a new oil filter. Set the oil filter cover.
Tighten the oil filter centre bolt to the specified torque.



Torque: 18N.m (1.8kgf-m)

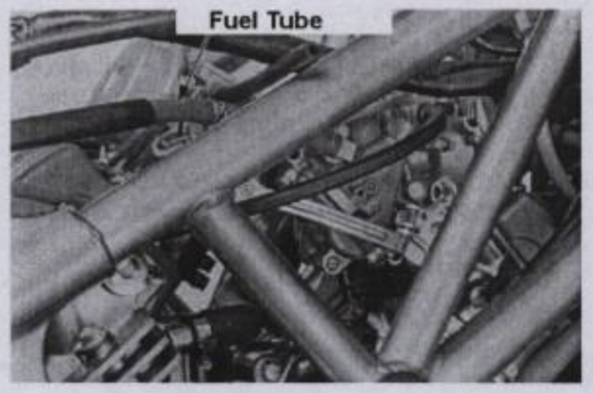
Fill engine oil. Check there is no oil leak and then check the oil level (3-14).



Fuel System

Fuel system status

Remove a fuel tank (2-3).
Inspect a fuel tube from a fuel cock to a carburetor.
Replace the tube if the tube is worn or damaged.

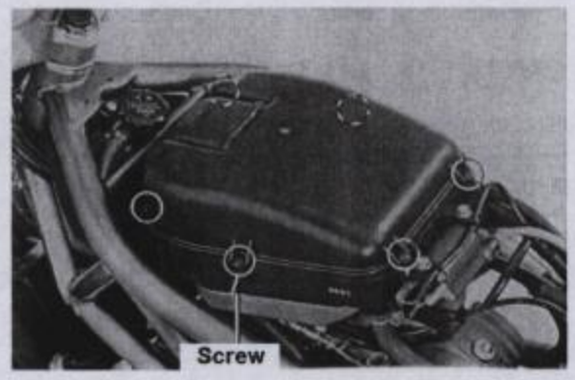


Air filter element change

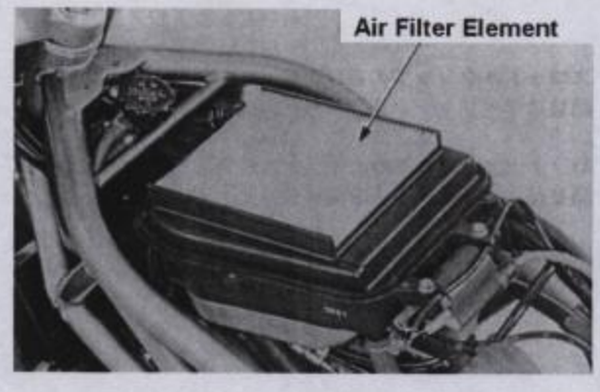
Notes

The air filter element cannot be cleaned. Replace the element in certain driving distance interval (3-1).

Remove a fuel tank (2-3).
Unscrew six screws to remove an air filter case cover.

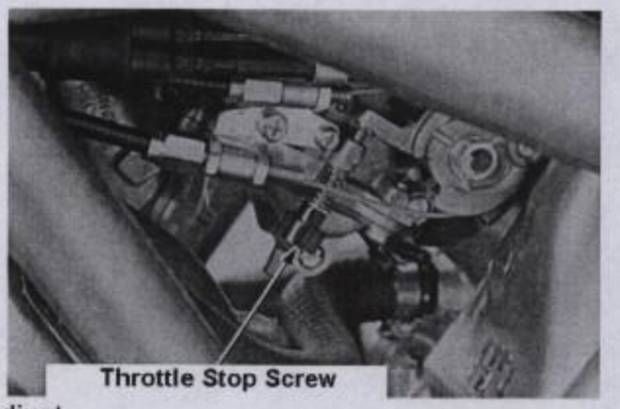


Remove the air filter element.
Reverse the procedure to install the air filter element.



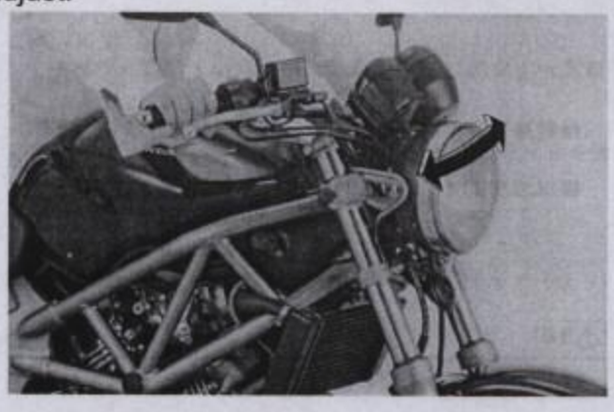
Notes
Clean the interior of the air filter case before installing the air filter element.

Torque:
Air filter case cover screw : 4N.m (0.4kgf-m)



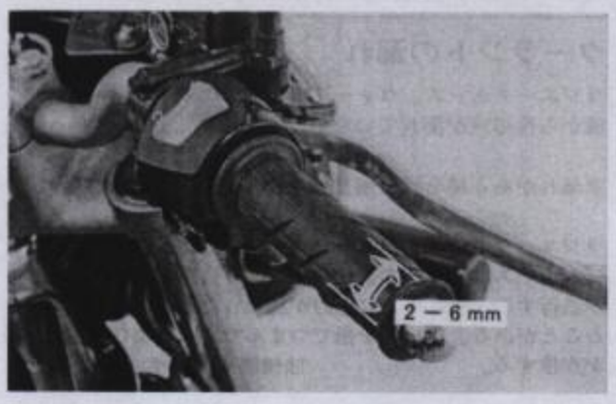
Idling adjustment
Warm up the engine.
Support the vehicle straight on a flat level surface, as the vehicle inclination affects the idling rpm.
Monitor the idling rpm after sufficient warm up.
Idling rpm : 1300 ± 100 rpm
Turn the throttle stop screw on a carburetor to adjust.

Idling status check
Snap a few times while idling to see the response of rpm.
Idling rpm should be the same after snapping.
Steer fully to the left and right to check the idling is not affected.
If the idling is affected by the steering, check the routing of the throttle cable and the throttle grip free play.

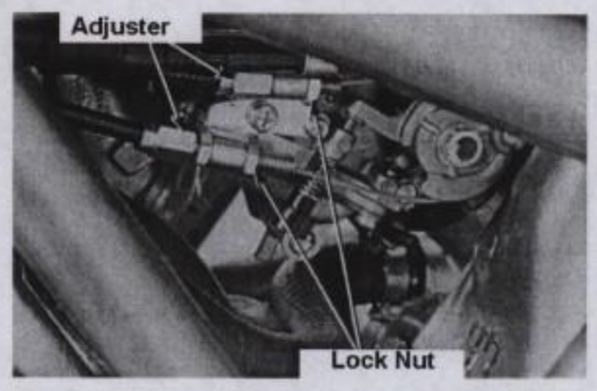


Throttle grip inspection
Operate the throttle grip to check smooth operation.
If it is not smooth, inspect the throttle cable for damage and the inner cable for rust.
Make sure the grip itself is not stuck.
Measure the grip free play at the flange external surface of the grip.

Throttle grip free play : 2 – 6mm



Adjust the free play if the measured value is out of the range.



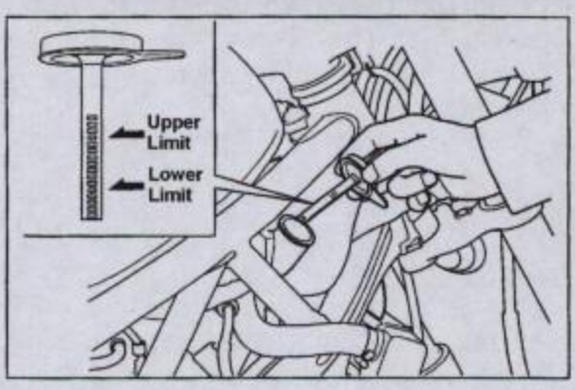
Throttle grip free play adjustment
Adjust at the carburetor end.
Loosen a lock nut and turn adjusters to adjust the free play.
Tighten the lock nut after adjusting.

Cooling system

Warning

Coolant level check should be done at the reservoir instead of the radiator.
The coolant may spurt if the radiator cap is removed when the engine is hot.

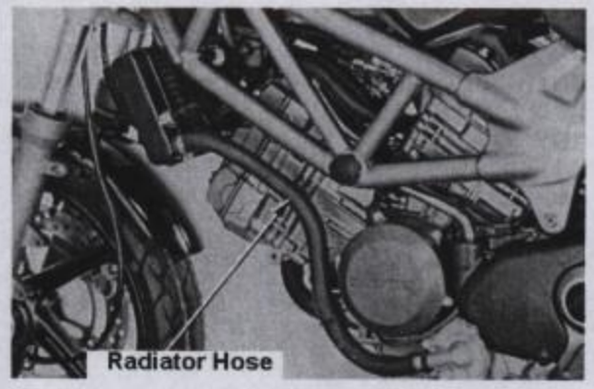
Warm up the engine.
Shut down the engine and support the vehicle vertically.
Remove a reservoir cap / level gauge.
Check the reservoir coolant level is between upper and lower limits.
If the coolant level is below the lower limit, fill coolant to the upper limit.



Recommended coolant:
Genuine Honda Ultra Radiator Fluid (original or supplement)
Standard density:
50% (the value affects freezing temp)
Adjust the density to your operating Temperature (5-4).

Caution

Do not use tap water instead of recommended coolant as the tap water may corrode / freeze and result in damaging the engine.

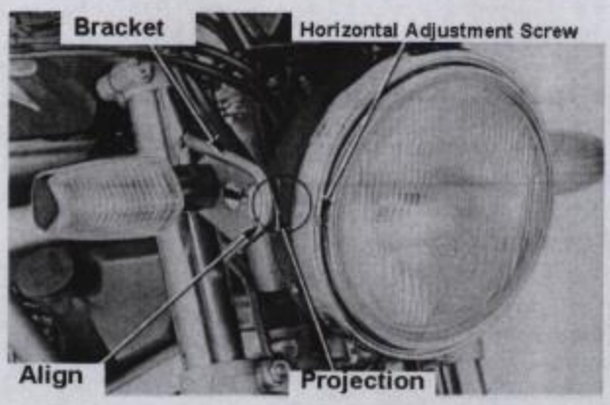


Coolant leak
Inspect a radiator hose, water pump and water hose for coolant leak.
Service the cooling system if any leak was found (Sec. 5).
Inspect the radiator / water hoses for wear and damage.
Rubber hoses decay by head and time.
Decayed hoses may split under pressure. Pick the hose and inspect for cracks.

Exterior Lamps

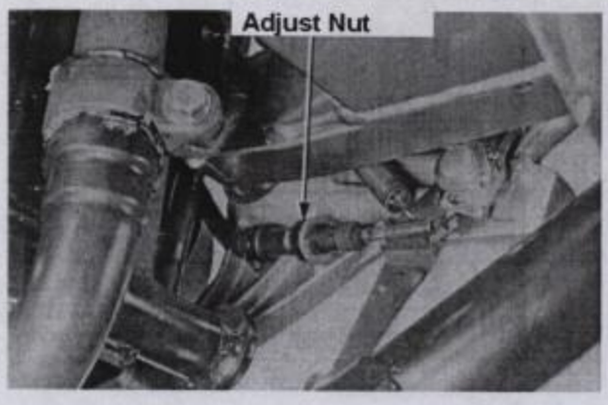
Headlamp axis adjustment

For vertical adjustment, loosen a headlamp mount bolt and tilt the lamp to align the punched mark on the bracket with the line on the case.
Turn the horizontal adjust screw on the headlamp trim to adjust horizontally.



Rear brake lamp operation adjustment

Operate rear brake pedal. The lamp should illuminate slightly before the brake is applied.
Adjust if necessary by turning the adjust nut on the rear brake lamp switch.



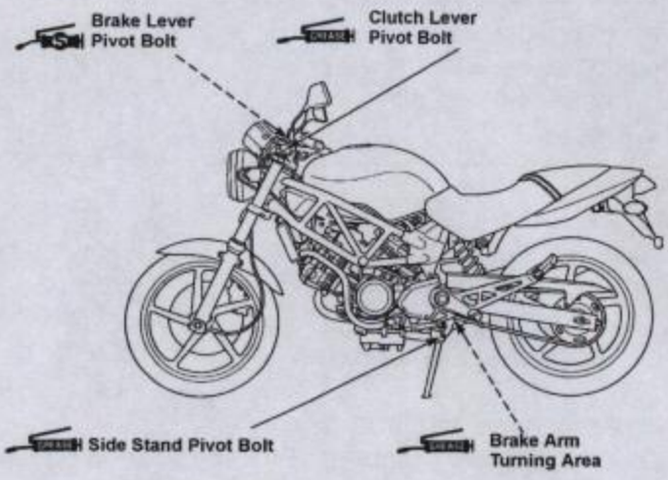
Caution

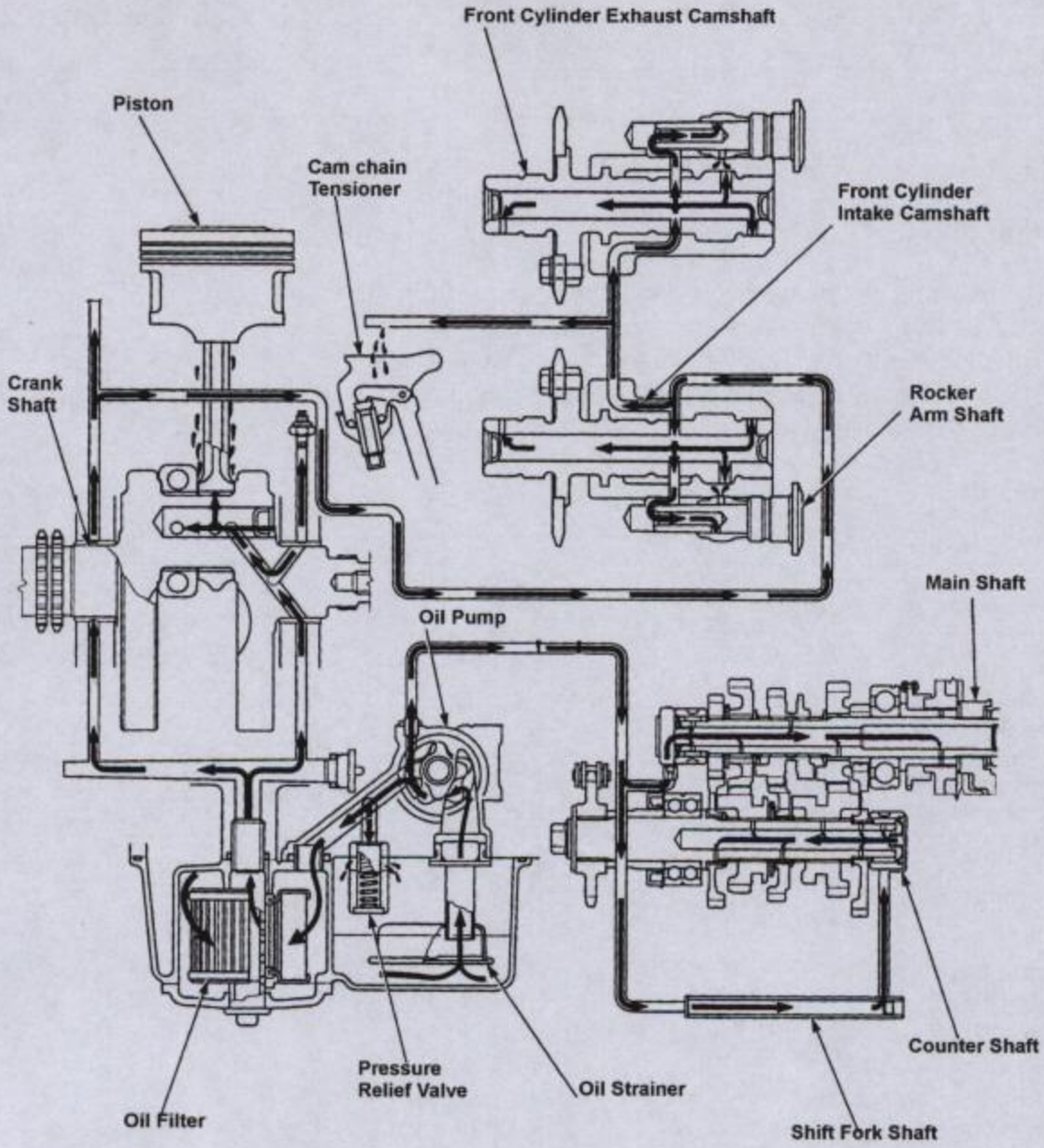
Do not turn the switch itself when adjusting as it may cause internal open circuit. Hold the switch when turning the nut.

Others

Frame Lubrication

Check the operation of all moving parts and lubricate with recommended fluid if necessary.




Front Cylinder Exhaust Camshaft
Piston
Cam chain Tensioner
Front Cylinder Intake Camshaft
Crank Shaft
Rocker Arm Shaft
Main Shaft
Oil Pump
Counter Shaft
Pressure Relief Valve
Oil Strainer
Oil Filter
Shift Fork Shaft

General.....	4 – 1	Oil strainer & pressure relief valve.....	4 – 4
Troubleshooting.....	4 – 2	Oil pump.....	4 – 7
Oil pressure check.....	4 – 3		

General

Caution:

- The oil pump can be serviced without removing it from the frame.
- If the oil pump is worn, replace whole Assy.
- Refer to Section 19, for oil pressure warning lamp check.
- Do not allow any objects to enter the engine when removing / installing the pump.
- Check oil leak and pressure after installing the pump.

Standard:

Item		Standard	Service Limit
Engine oil capacity	Total capacity	2.4 L	-
	Oil change	1.9L	-
	Oil filter change	2.1L	-
Recommended oil. Select suitable viscosity grade from your operating temperature.		• Genuine Honda Ultra GP (4 cycle motorcycle) SAE10W-20 or 20W-60 • API - SF class engine oil	-
Oil pressure at the oil pressure switch mount.		490 – 588kPa (5.0 – 6.0 kgf/cm²) / 5000rpm/80°c	-
Oil pump	Tip clearance	0.15mm	0.20mm
	Body clearance	0.15 – 0.22mm	0.35mm
	Side clearance	0.02 – 0.07mm	0.10mm

Torque Settings:

Drain bolt	29Nm (3.0kgf-m)
Oil filter centre bolt	18Nm (1.8kgf-m)
Oil pump driven sprocket	15Nm (1.5kgf-m)
Oil pressure switch	12Nm (1.2kgf-m)
Oil pump mount bolt	12Nm (1.2kgf-m)
Oil pump cover bolt	13Nm (1.3kgf-m)
Oil pressure switch connector bolt	2Nm (0.2kgf-m)

Special Tools:

Oil pressure gauge	07506-3000000
Oil pressure gauge attachment	07510-4220100

Troubleshooting

Insufficient amount of oil

- Normal oil consumption
- Oil leak (external)
- Piston ring worn / badly attached
- Valve guide / stem worn
- Valve stem seal damaged
- Cylinder and piston wear

Dirty oil

- Oil has not been changed
- Piston ring wear
- Head gasket fault

Burning engine

- Low or no oil pressure
- Oil orifice / passage clogged
- Internal oil leak
- Improper oil grade

Excessive oil pressure

- Oil pressure relief valve does not open
- Oil orifice / passage clogged
- Improper oil viscosity

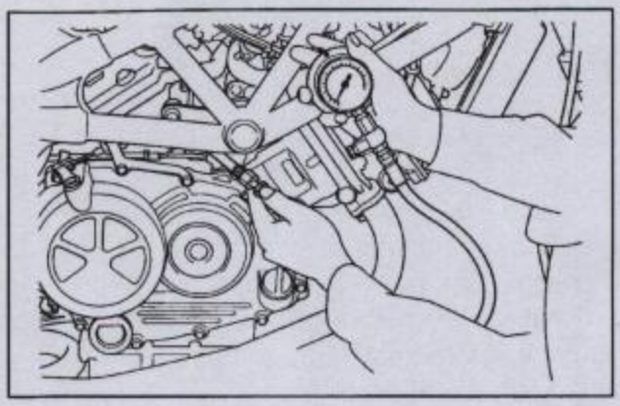
No oil pressure

- Insufficient amount of oil
- Oil pump drive chain / drive / driven sprocket fault
- Internal oil leak

Oil pressure warning remains illuminated

- Oil pressure switch fault
- Indicator wire short circuit
- Little or no oil pressure

Oil pressure check



Notes

Oil pressure may over-read when the engine and the oil are cold. Measure after warm up.

Shut down the engine.
Remove an oil pressure switch cover and its screw.
Disconnect oil pressure warning lamp wiring.
Remove the oil pressure switch.
Set an attachment to the oil pressure switch hole and connection oil pressure gauge.

Special Tool:

Oil pressure gauge	07506-3000000
Oil pressure gauge attachment	07510-4220100

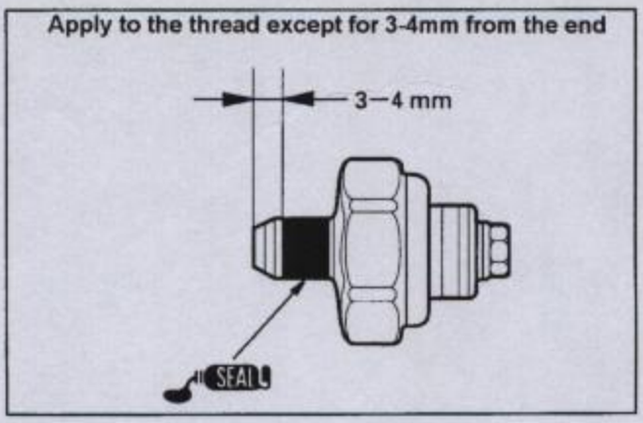
Measure the oil level.
Start the engine and measure the oil pressure.

Standard:

490 – 588kPa (5.0-6.0kgf/cm²) @ 5000rpm @ 80°c.

Shut down the engine and disconnect the gauge attachment.
Apply sealant to the thread on the oil pressure switch and tighten to the specified torque.

Torque: 12Nm (1.2kgf-m)



Caution

Overtightening may damage the crankcase.

Connect oil pressure switch leads and screw the bolt.
Torque: 2Nm (0.2kgf-m)

Start the engine and check the oil pressure warning lamp turns off 1-2 seconds after starting the engine.

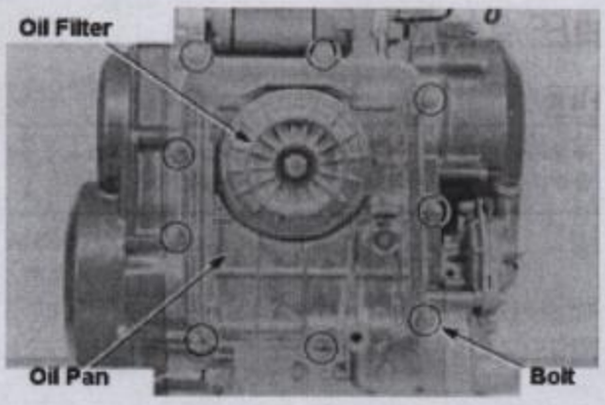
Check oil level and fill if necessary.

Oil Strainer & Pressure Relief Valve

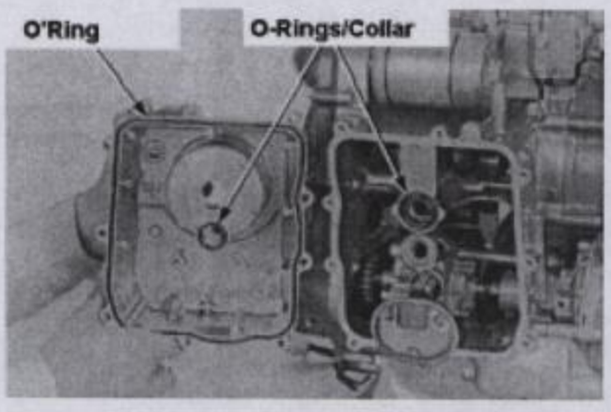
Removal

Remove a muffler (2-5).
Drain oil (3-15).
Remove an oil filter (3-16).

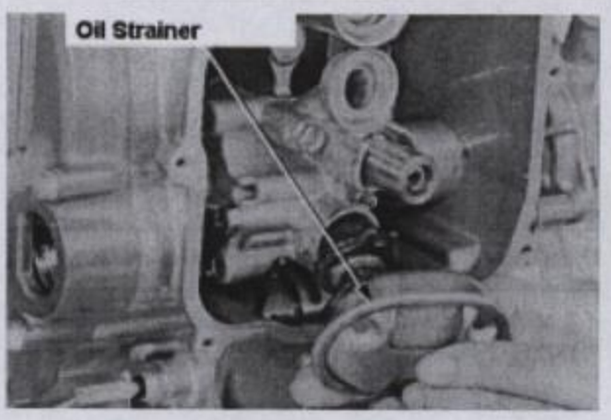
Unscrew 9 bolts and remove an oil pan.



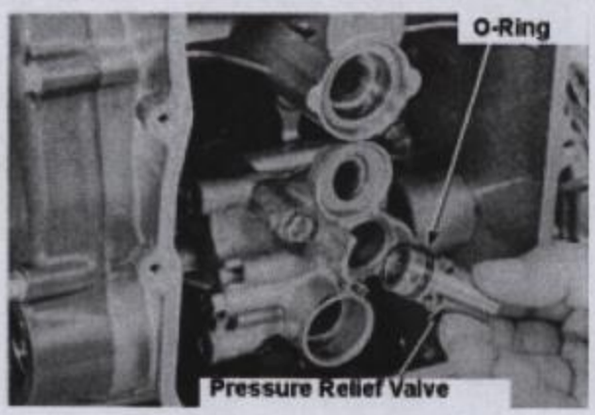
Remove O-Rings and collars.



Remove an oil strainer from the pump and clean the strainer.

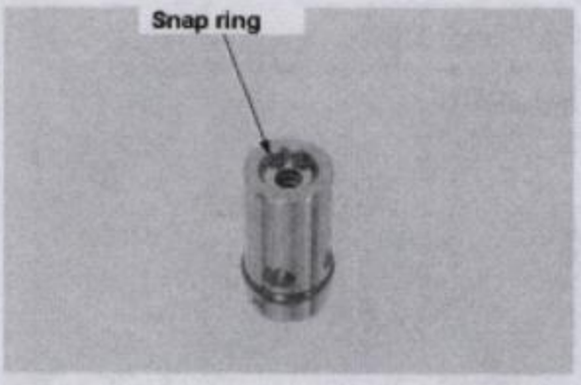


Remove an oil pressure relief valve.
Remove an O-Ring.



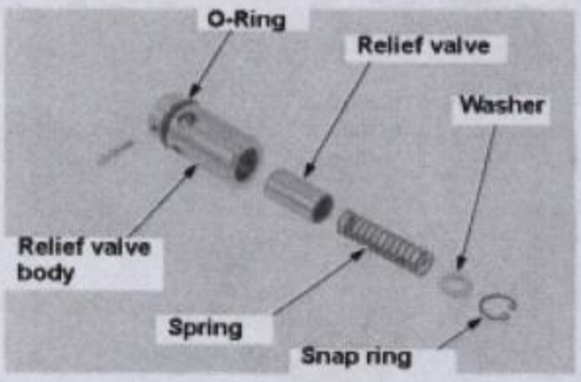
Relief valve disassembly

Remove a snap ring to disassemble the relief valve body.

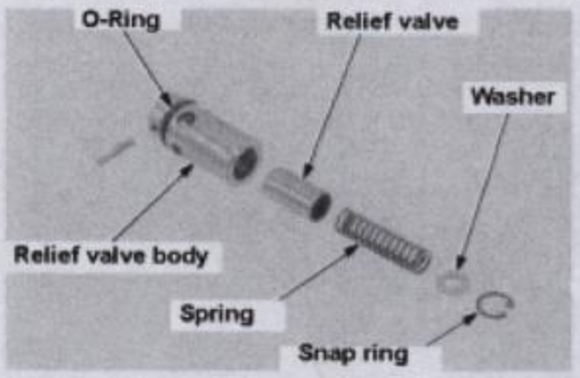


Relief valve inspection / assembly

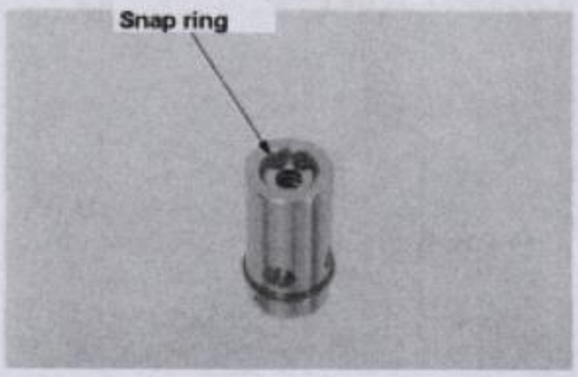
Inspect the spring for deformation and damage.
Inspect the valve and the body for damage and wear.



Assemble the relief valve.
Inspect the O-Ring for wear and damage.



Install the snap ring.

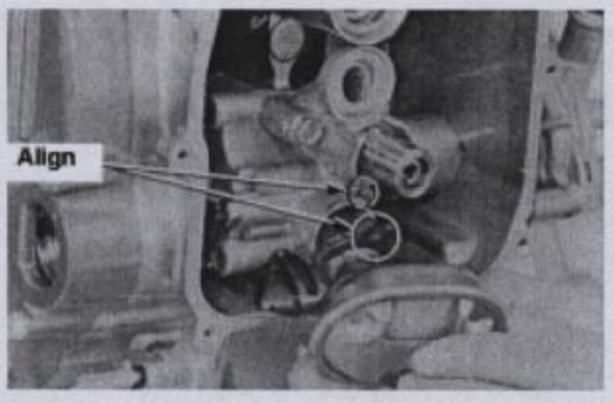


Installation

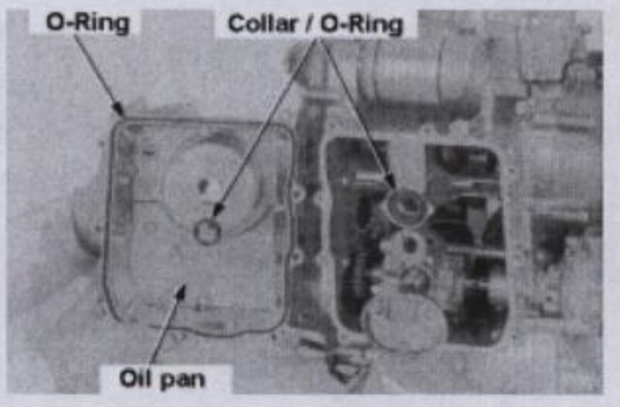
Apply oil to the O-Ring for the pressure relief valve.

Install the O-Ring.

Apply oil to the O-Ring for the oil strainer. Install the oil strainer by aligning its cutout with the pin on the oil pump.



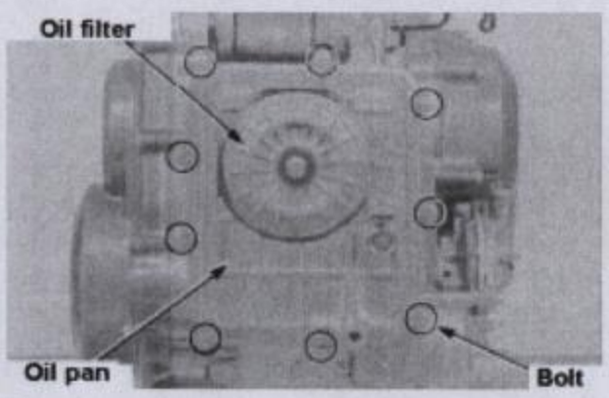
Apply oil to O-Rings and collars before installing them.



Install the oil pan and screw nine oil pan mount bolts.

Install the oil filter (3-16).
Fill engine oil (3-15).
Install a muffler (2-5).

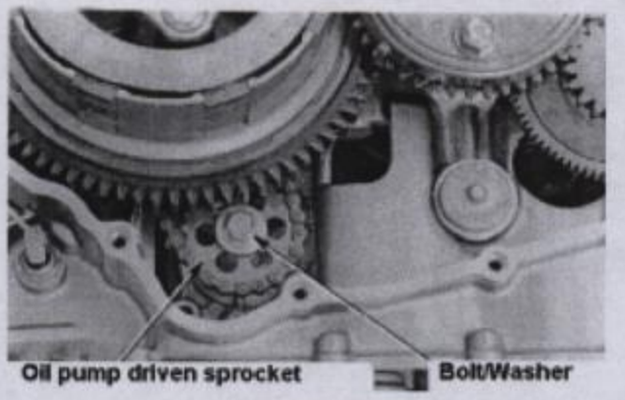
Start the engine and check for oil leak.



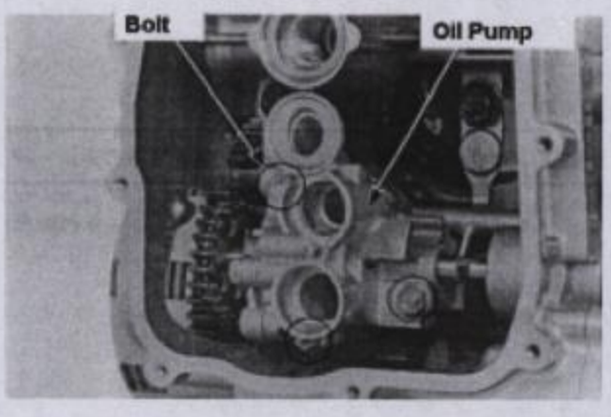
Oil Pump

Removal

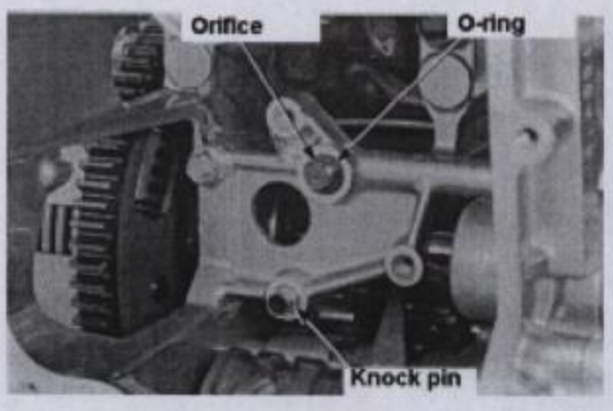
Remove oil strainer and a pressure relief valve.
Remove a bolt and a washer.
Remove a driven sprocket together with drive chain from an oil pump drive shaft.



Unscrew three bolts and remove the oil pump.

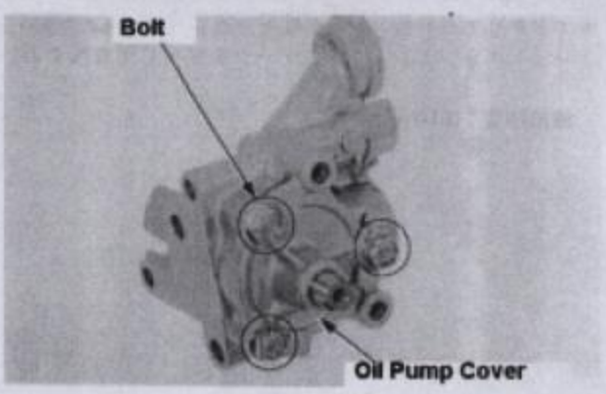


Remove a knock pin, an orifice and an O-Ring.

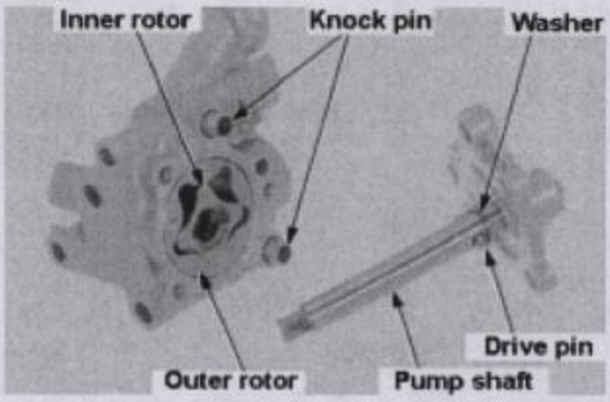


Disassembly

Unscrew three bolts to remove an oil pump cover.



Remove the following parts:
- knock pin
- inner rotor
- outer rotor
- pump shaft
- drive pin
- washer



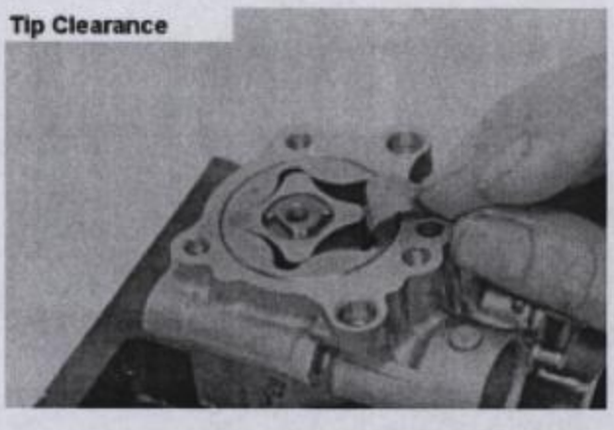
Inspection

Notes

Measure at several places and take the maximum value.

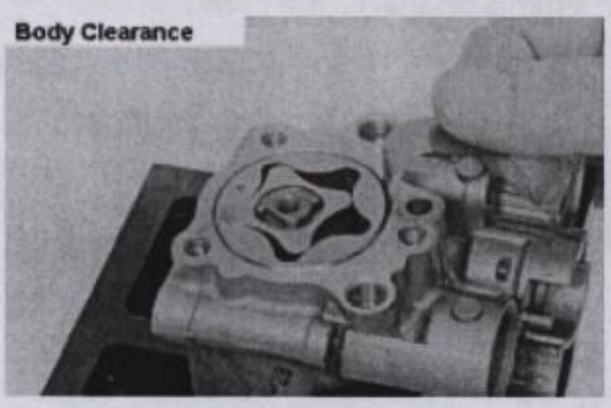
Measure the tip clearance (the clearance between an inner and an outer rotor), with a thickness gauge.

Service Limit: 0.20mm

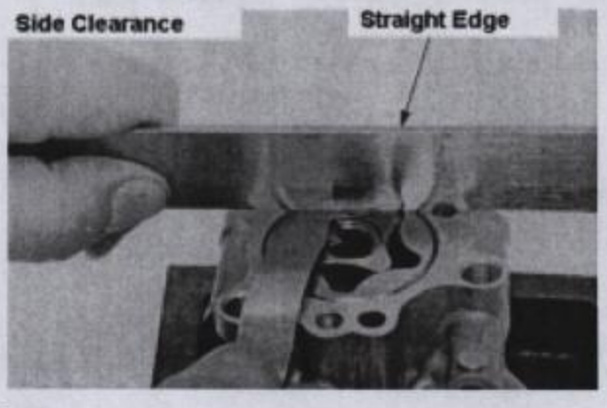


Measure the side clearance (the clearance between the rotor end and the pump body), with a straight edge and the thickness gauge.

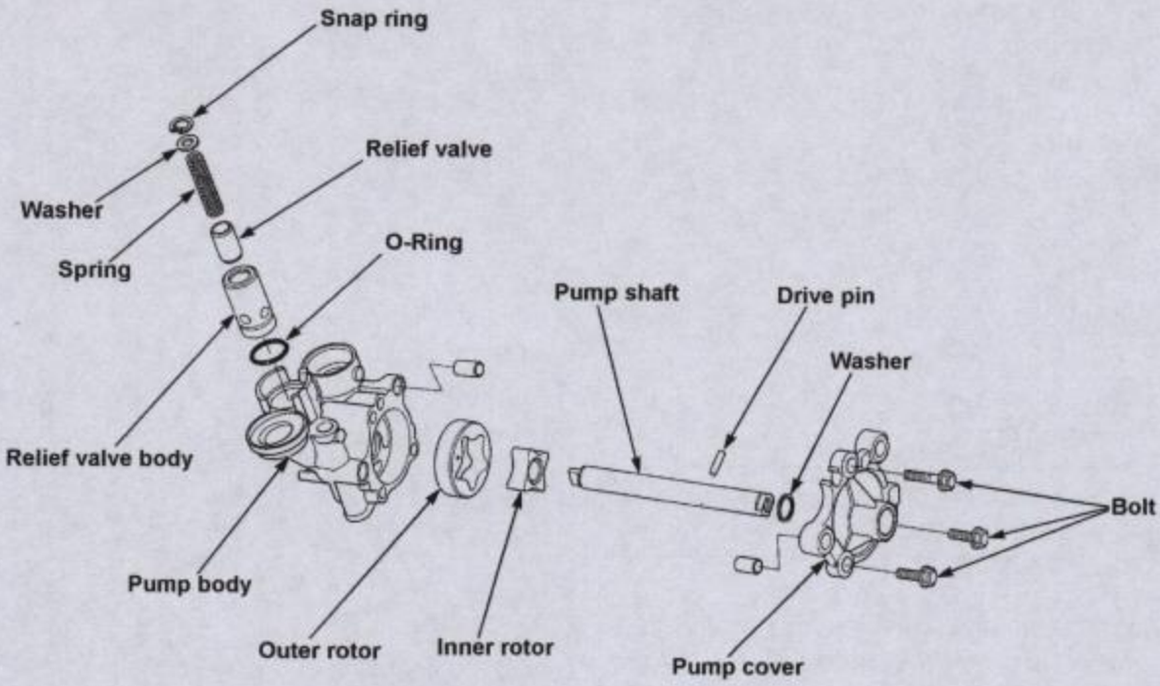
Service Limit: 0.35mm



Measure the side clearance (the clearance between the rotor end and the pump body) with a straight edge and the thickness gauge.



Assembly



Clean all parts with engine oil prior to assembling.

Install an outer rotor to the pump body by facing its punched mark to the pump cover.

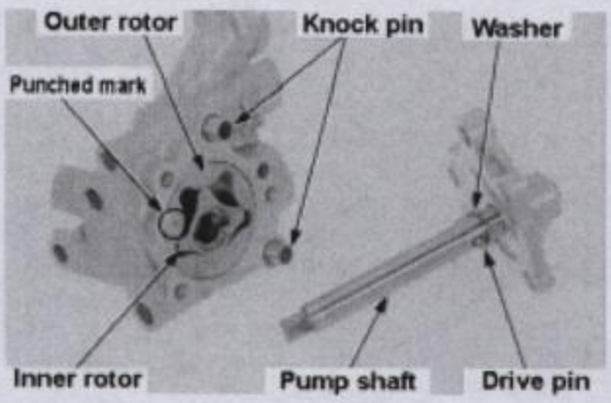
Install an inner rotor by facing its groove to the pump cover.

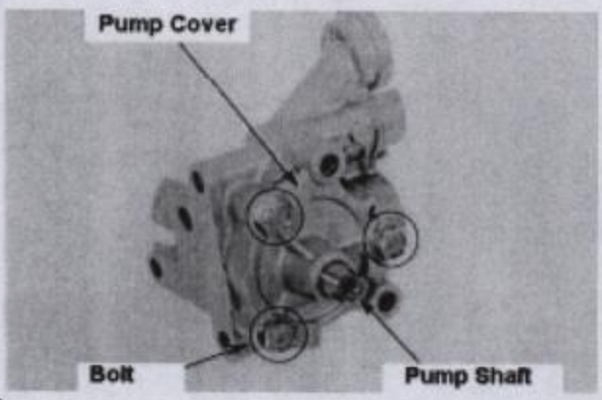
Install a washer and a drive pin to the pump shaft. Align the drive pin to the inner rotor groove to install the rotor to the shaft.

Install knock pins and the pump cover.

Screw three pump cover bolts.

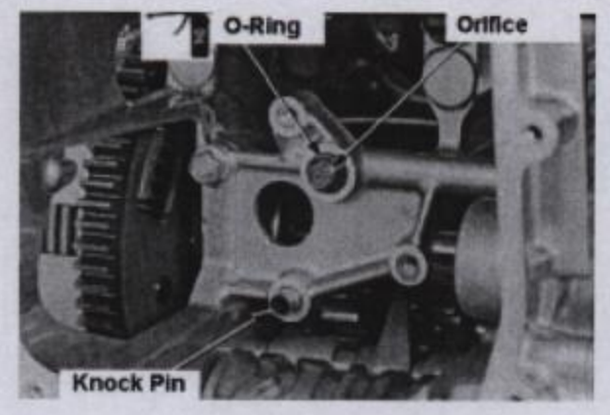
Check for smooth operation of the pump shaft.





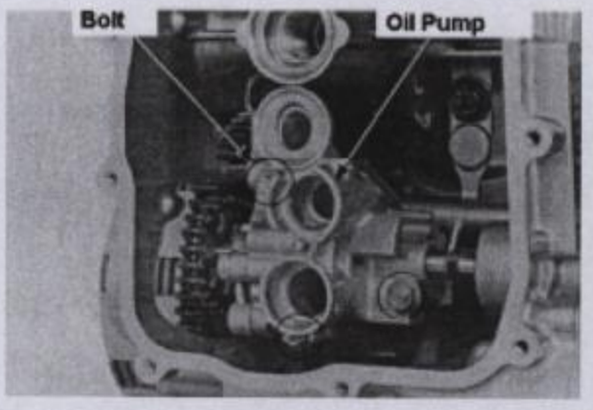
Installation

Apply oil to the O-Ring and install an orifice, the O-Ring and a knock pin.



Align the cutout of the water pump shaft and oil pump shaft to install the oil pump.

Screw three bolts.

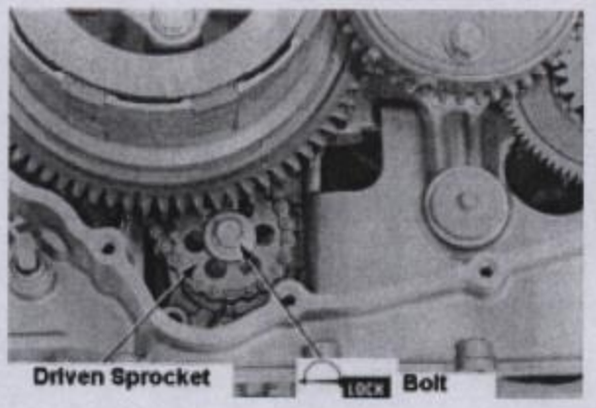


Set the drive chain to the oil pump driven sprocket and install the sprocket to the drive shaft by aligning cutouts.

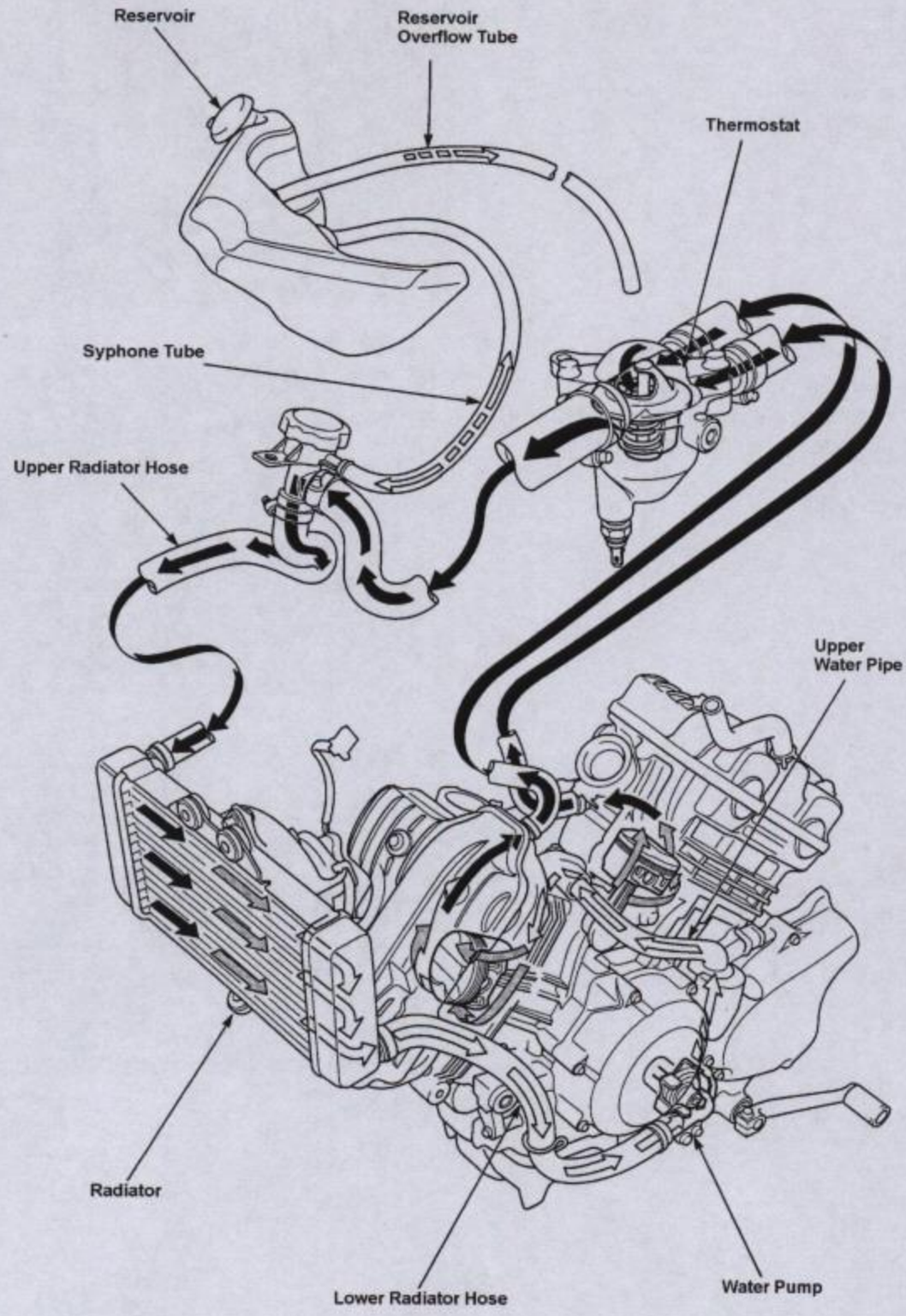
Apply screw locker to the oil pump driven sprocket bolt thread.

Install a washer and screw the bolt.

Torque: 15Nm (1.5kgf-m)



Install an oil strainer and a pressure relief valve (4-6).


Reservoir
Reservoir Overflow Tube
Thermostat
Syphone Tube
Upper Radiator Hose
Upper Water Pipe
Radiator
Lower Radiator Hose
Water Pump

Service Information.....	5 – 1	Reservoir.....	5 – 6
Troubleshooting.....	5 – 2	Thermostat.....	5 – 6
Performance Check.....	5 – 3	Radiator.....	5 – 8
Coolant Change, Air Bleeding.....	5 – 4	Water Pump.....	5 - 12

Service Information
General

Warning

- Do not open the radiator cap if the coolant temperature is suspected to be at or above 100°c or the boiled coolant may spout out. Wait for the coolant to cool down. Wrap the cap with a cloth and slowly open the cap.
- Service when the engine is cold.
- Coolant is toxic. Keep it away from your eyes, skin and clothes.
  - If the coolant touches your skin or clothing, rinse with soap.
  - If the coolant gets in your eyes, rinse with water and consult a specialist.
  - If the coolant was swallowed, induce vomiting, gargle and consult a specialist.
- Keep the coolant away from small children.

- Do not remove the radiator cap unless the coolant needs to be filled / drained.
- Cooling system can be serviced without removing it from the engine.
- Keep painted surfaces away from coolant. Rinse with water if the coolant touched the surface.
- After disassembling / assembling the cooling system, check for leakage by using a radiator cap tester.
- Thermo switch is quite sensitive. If the switch was dropped or it received any shock, check its operation before installing it.
- Refer to Section 19 for the fan motor switch and thermo switch service.

Standard

Item		Standard	Service Limit
Coolant capacity	Disassembled	1.16L	-
	Coolant change	0.96L	-
	Reservoir	0.4L	-
Standard specific gravity (density		50%	-
Radiator cap valve opening pressure		108 – 137kPa (1.1 – 1.4kgf/cm²)	-
Thermostat	Valve opening temperature	85°c	-
	Full open temperature	95°c	-
	Full open lifting	8mm or above	-

Torque Settings:

Water pump drain bolt	13Nm (1.3kgf-m)
Water pump mount bolt	13Nm (1.3kgf-m)
Radiator mount SH bolt	12Nm (1.2kgf-m)
Thermo switch	9Nm (0.9kgf-m)
Fan motor switch	18Nm (1.8kgf-m)

Troubleshooting

Excessive coolant temperature

- Water temperature gauge or thermo sensor fault
- Air in cooling system
- Thermostat fault (does not open)
- Radiator, hose, or water jacket clogged
- Fan motor fault
- Water pump fault
- Fan shroud attachment fault
- Insufficient amount of coolant

Water temperature does not / hardly rises

- Water temperature gauge or thermo sensor fault
- Thermostat fault (does not open)
- Fan motor switch fault

Coolant leak

- Water pump mechanical seal (water seal) fault
- O-Ring worn
- Hose attachment fault

Performance Check

Warning

Make sure the coolant is cool before removing the radiator cap.

Coolant specific gravity check

Remove a fuel tank (2-3)
Remove a radiator cap
Measure the coolant specific gravity with a hydrometer and make sure the coolant density is adequate to your operating temperature (5-4).

Inspect the coolant for dirt.

Radiator cap inspection

Remove a radiator cap (read above).

Notes

Apply water to the cap seal when attaching the radiator cap to the tester.

Use a radiator cap tester to find out the serviceability of the cap.
The cap should be able to hold the valve opening pressure for six seconds.

Radiator cap valve opening pressure:
108 – 137kPa (1.1 – 1.4 kgf/cm²)

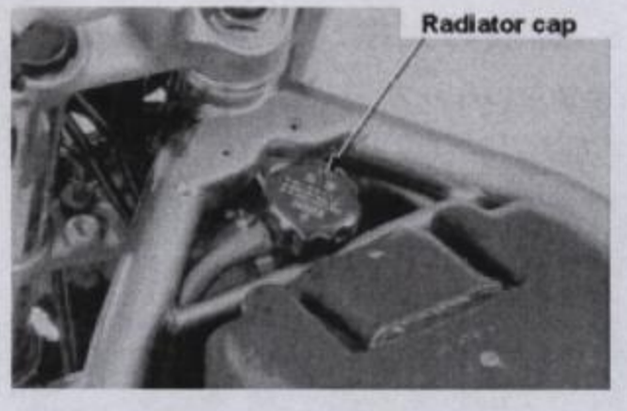
Radiator pressurisation test

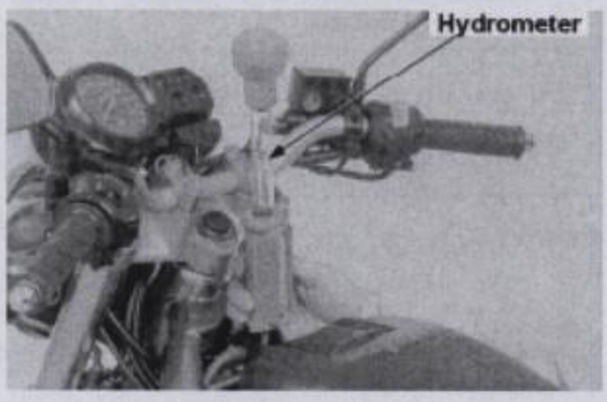
By using the radiator cap tester, apply radiator cap valve opening pressure to the cooling system. The system should be able to hold the pressure for six seconds.

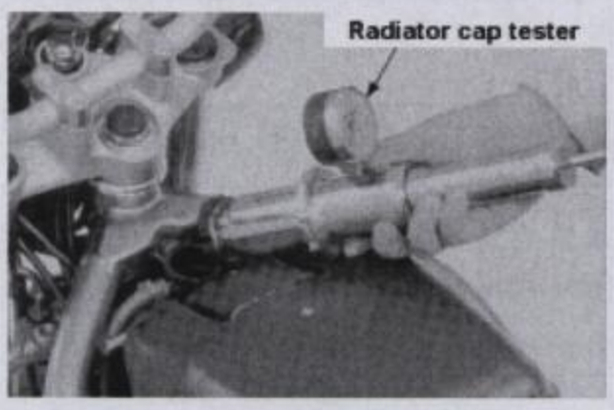
Caution

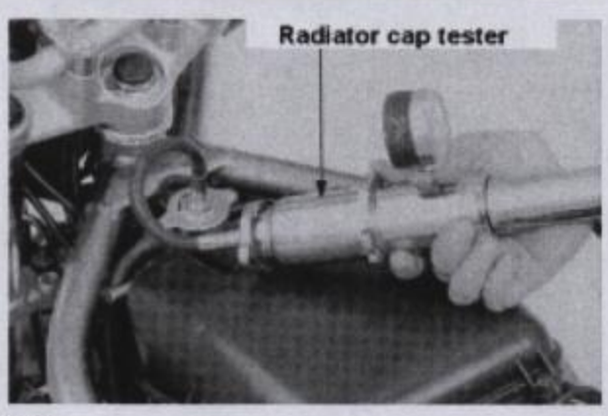
Do not apply pressure beyond 137kPa. Excessive pressure may cause damage.

If the system cannot hold the pressure, inspect each joint, water pump attachment, water hole inspection window (5-12) for water leak.

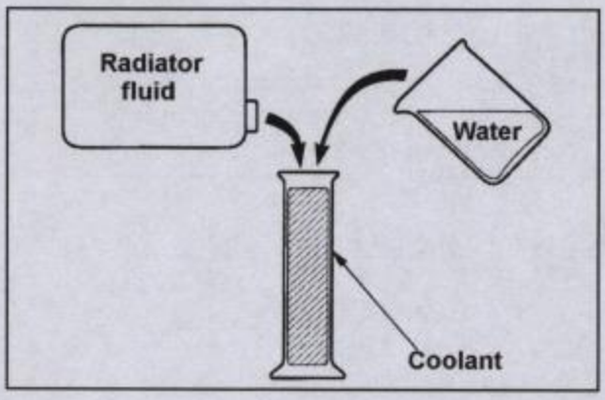








Coolant Change, Air Bleeding



Making Coolant

Warning

- Coolant is toxic. Keep it away from your skin, eyes and clothes.
  - If the coolant touches your skin or clothes, rinse with soap.
  - If the coolant gets in your eyes, rinse with water and consult a specialist.
  - If the coolant was swallowed, induce vomiting, gargle, then consult a specialist.
- Keep and store it away from children.

Notes

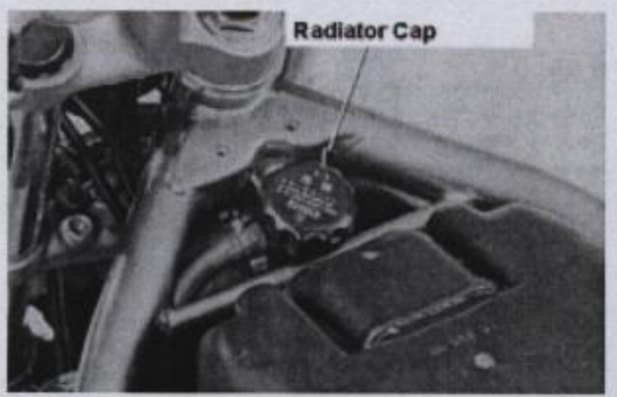
Mix the radiator fluid and soft water with the ratio shown in the table. Apply 5°c margin to the minimum temperature.

Radiator Fluid Mixture Ratio

Minimum outside temperature	Mixture Ratio	Honda Ultra Radiator Fluid	Soft Water
- 9°c	20%	232	928
-16°c	30%	348	812
-25°c	40%	464	696
-37°c	50%	580	580
-44.5°c	55%	638	522

Lean the radiator fluid with soft water to product coolant.

Recommended radiator fluid:
Honda Ultra Radiator fluid
Standard density (mixture ratio): 50%
Coolant total capacity: 1.16 litres



Coolant Change and Air Bleeding

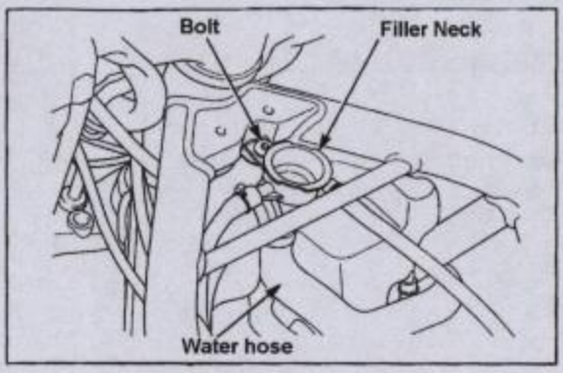
Warning

Remove a radiator cap after confirming the coolant is cool.

Remove a fuel tank (2-3).
Remove a radiator cap.

Unscrew a water pump drain bolt to drain coolant.
Install a new sealing washer and the drain bolt after draining.

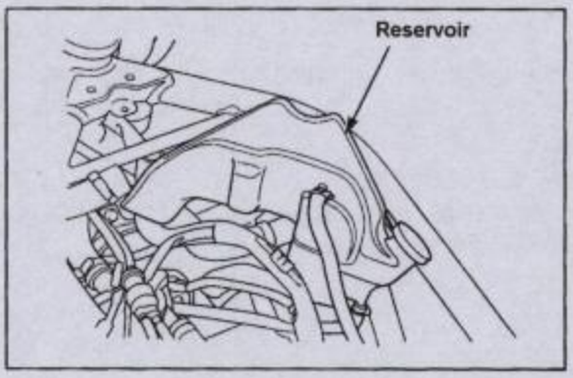
Remove a carburetor (6-5).
Disconnect a water hose from a filler neck.
Unscrew a bolt to remove the filler neck.



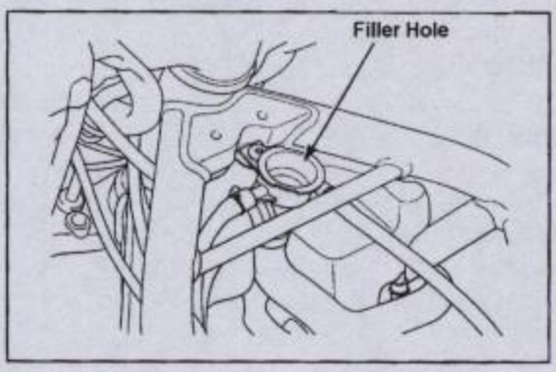
Remove a reservoir and drain coolant.
Clean the interior surface of the reservoir with water.

Reverse the removal procedure to install the reservoir.

Install the carburetor (6-18).



Fill coolant from the filler hole to the mouth.

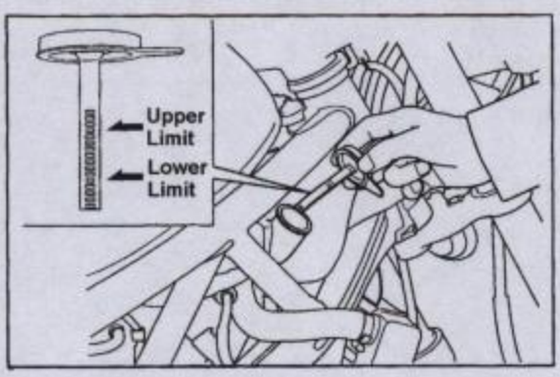


Straighten up the vehicle and fill coolant to the upper limit line on a reservoir cap / level gauge.

Bleed air in the following manner:

1. Set the transmission to neutral. Start the engine and idle for a few minutes.
2. Snap the throttle a few times to bleed air from the cooling system.
3. Fill coolant to the mouth of the filler hole and install the radiator cap.
4. Straighten up the vehicle. Check and add coolant if necessary.
   Install reservoir cap

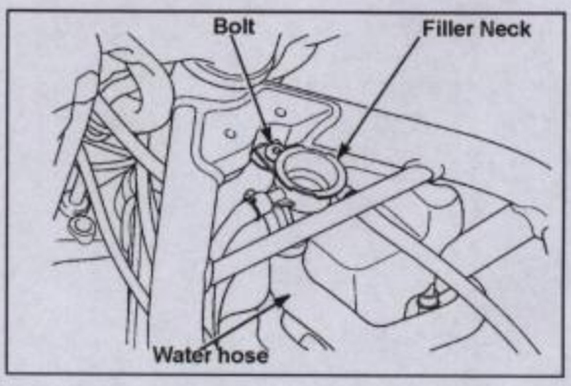
   Install a fuel tank (2-3)



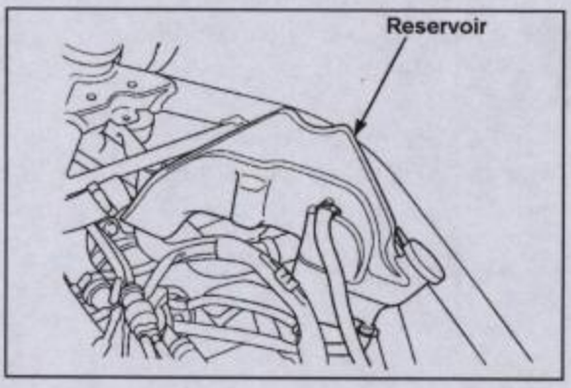
Reservoir

Removal / Installation

Remove a carburetor (6-5).
Disconnect a water hose from a filler neck.
Unscrew to remove the filler neck.



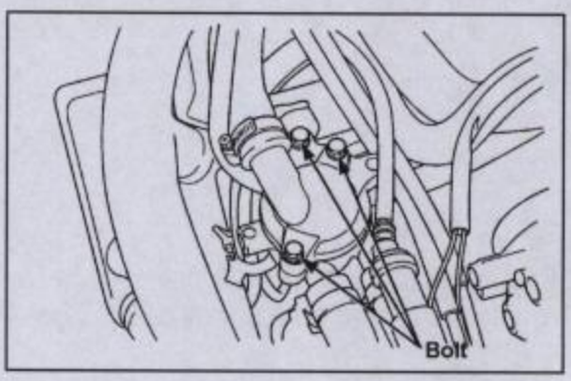
Remove a reservoir and drain the coolant.
Reverse the removal procedure to install the reservoir.
Install the carburetor (6-18).
Reverse the removal procedure for installation.
Fill coolant and bleed air (5-4).



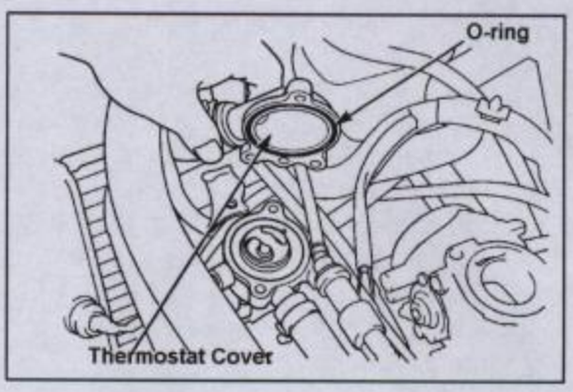
Thermostat

Removal

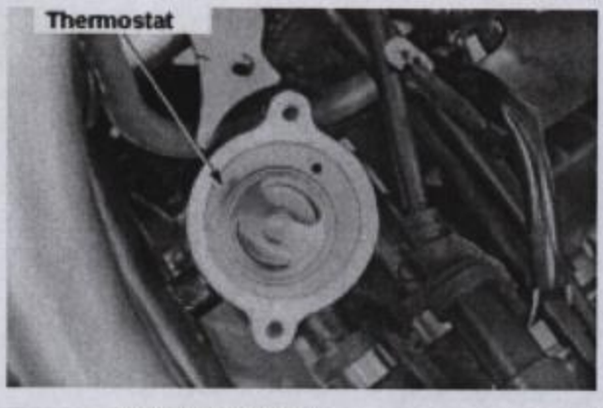
Remove a carburetor (6-5).
Drain coolant (5-4).
Unscrew three thermostat cover bolts.
Unscrew a thermostat mount bolt.



Remove the thermostat cover.
Remove an O-Ring.



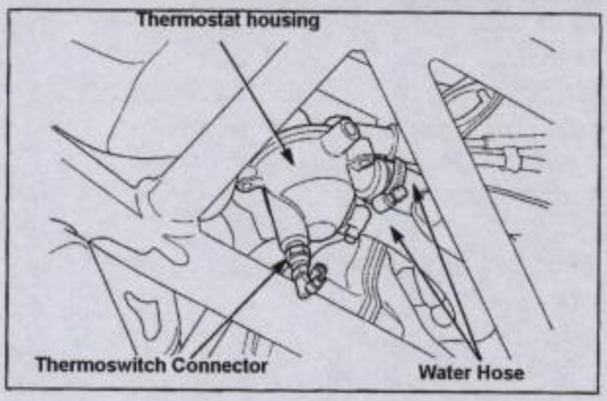
Remove the thermostat from the thermostat housing.



When removing a thermostat housing, disconnect a thermo switch connector and a water hose to remove the housing.

Notes

The thermo switch is quite sensitive. If the switch was dropped or it experienced any shock, check its operation before installation.

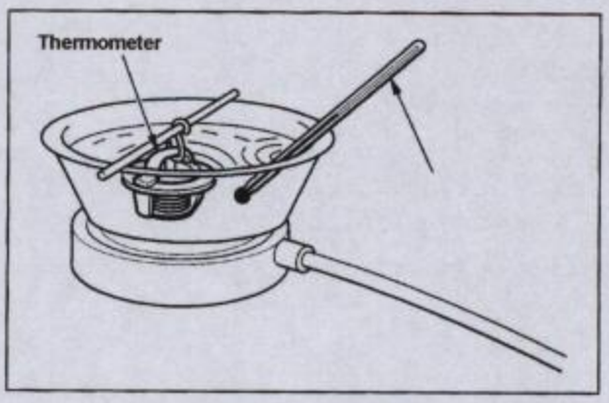


Thermo switch inspection (Sec. 19).

Inspection

Notes

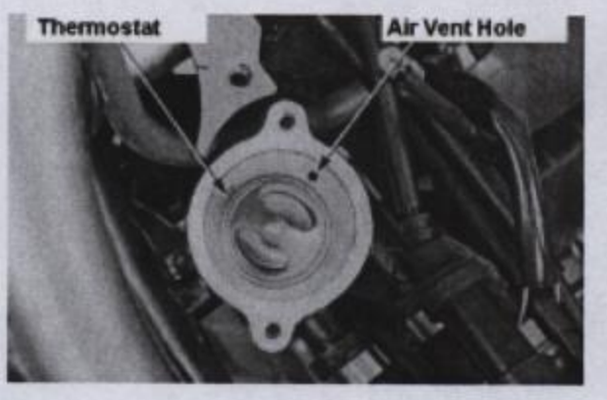
- Replace the thermostat if it is opened in normal temperature.
- The sensor of the thermostat is small and it has thermal inertia. Maintain full open temperature for five minutes before measuring the valve opening lift.
- The thermostat and a thermometer should not contact the bottom of testing container.



Place the thermostat in the container. Gradually increase the water temperature to check the valve opening temperature.

Valve opening commencing temperature: 82°c

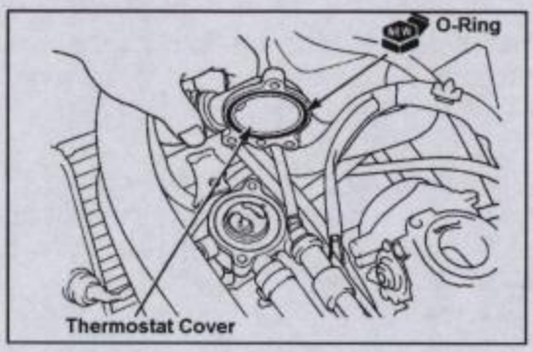
Fully opened lift @ temperature: 8mm or above @ 95°c.



Installation

Face the air bleeding hole on the thermostat in the direction shown in the photograph to install the thermostat to its housing.

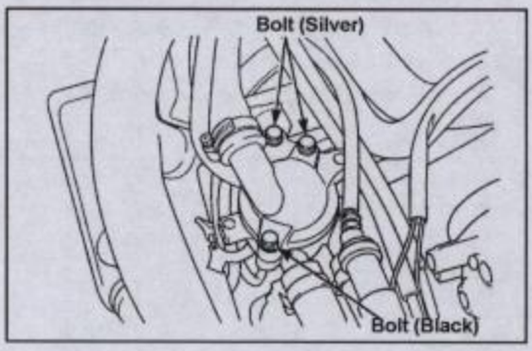
Install a new O-Ring to the housing cover.



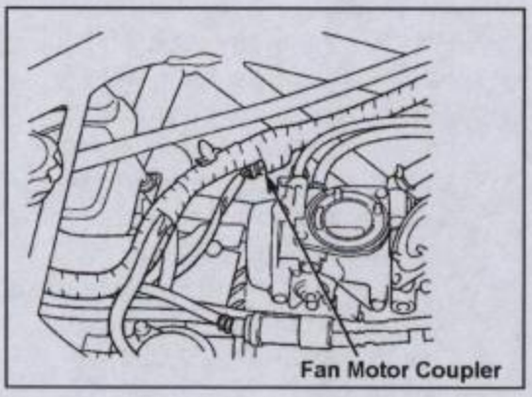
Set the cover to the housing and screw cover bolts and mount bolt.

Notes:

The front two bolts earth the thermo switch. Use unpainted (Silver) bolts.



Fill coolant and bleed air (5-4).
Install a fuel tank (2-3).



Radiator

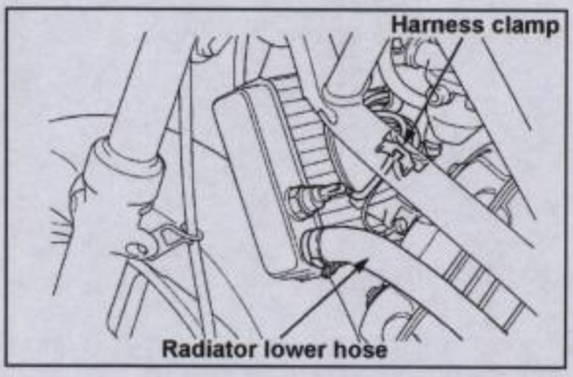
Notes:

Do not damage radiator fins.

Removal

Remove a carburetor (6-5).
Drain coolant (5-4).
Disconnect a fan motor coupler.
Disconnect

Disconnect a radiator lower hose.
Unclamp a fan motor switch harness from the harness clamp.



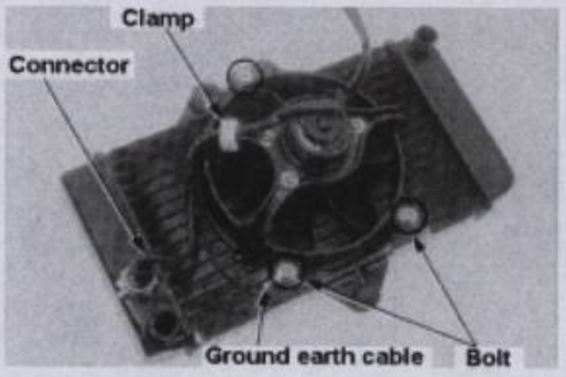
Unscrew radiator upper mount bolts.
Remove a mount rubber from a cylinder head cover mount bolt to remove the radiator.

Disassembly

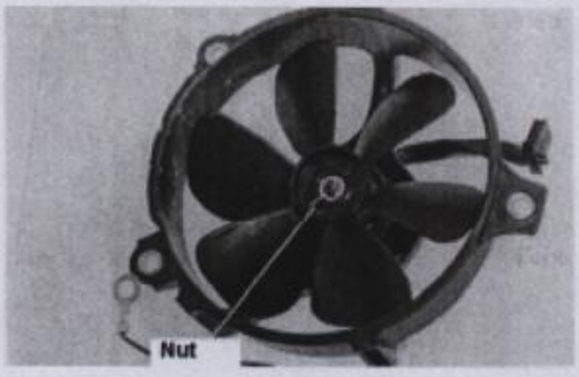
Disconnect a fan motor switch connector and unclamp a fan motor wire.

Unscrew three shroud bolts and disconnect an earth lead to remove a shroud fan motor Assy.

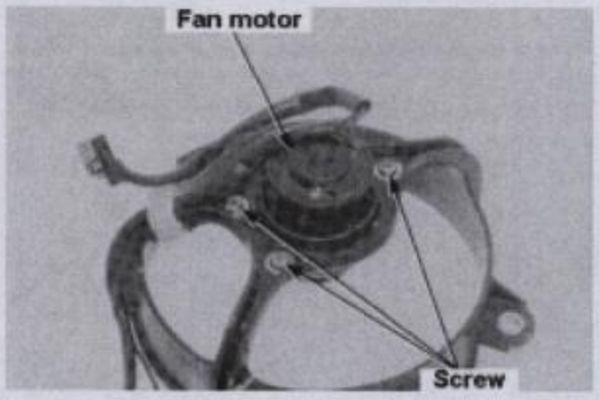
Fan motor switch inspection, removal / installation (Sec. 19).



Unscrew a nut to remove a cooling fan.



Unscrew three screws to remove a fan motor.

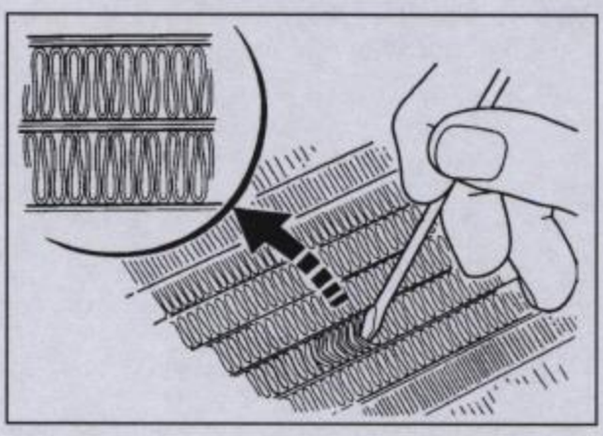


Radiator Inspection

Inspect the radiator for core clogging and fin bending.

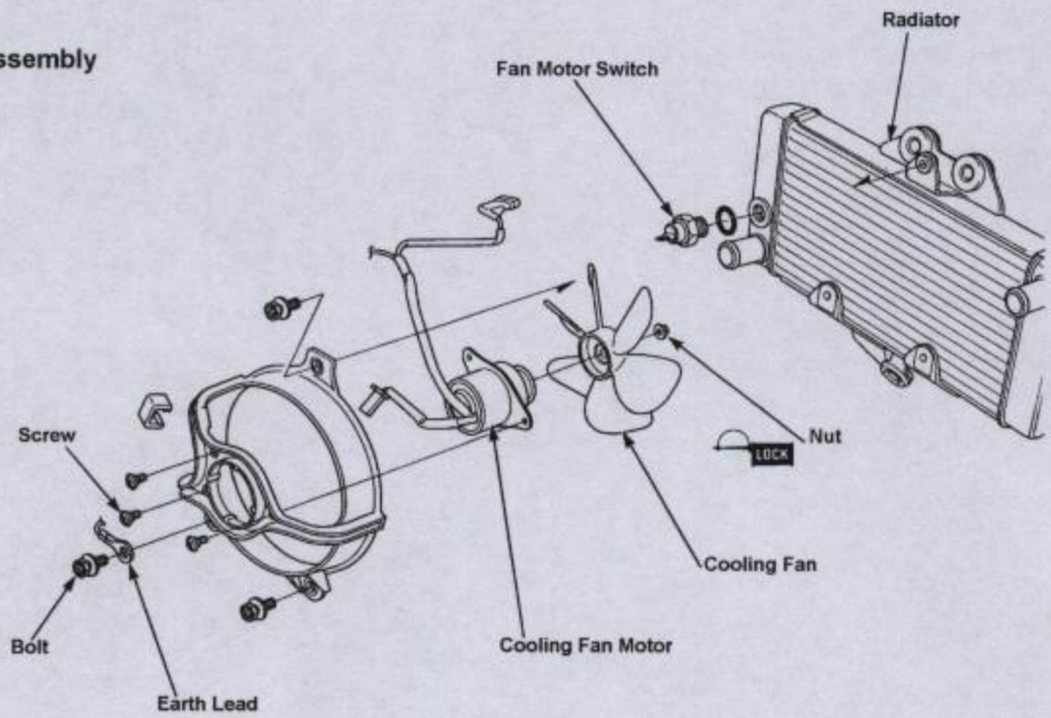
Notes:

If the clogged cores are more than 20% of the total area, adjust or replace the radiator.

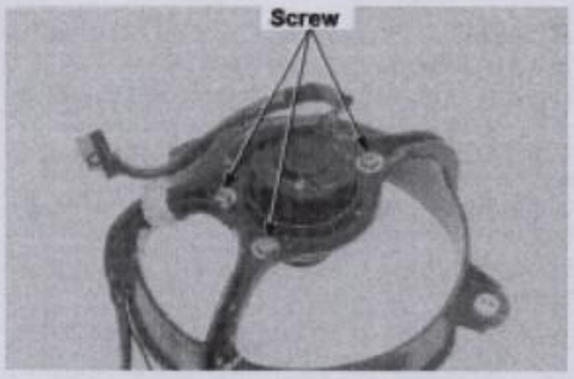


Straighten the bent fins with a wiring screwdriver.

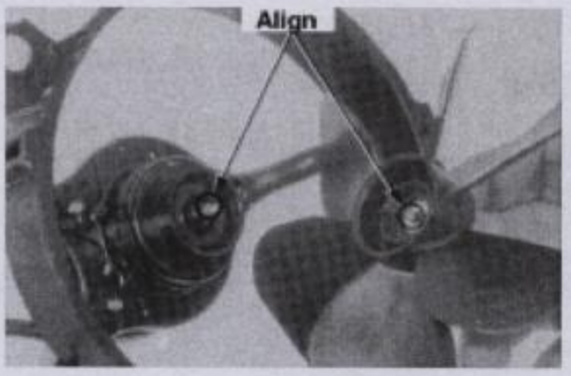
Assembly



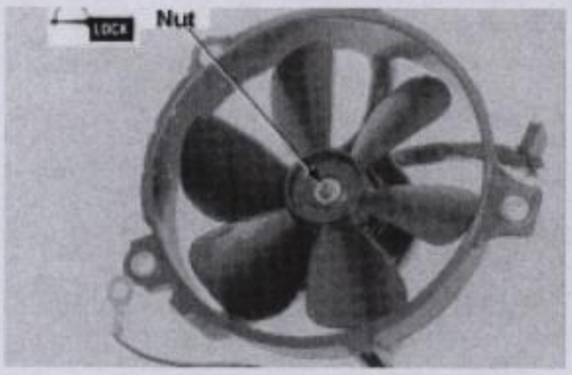
Set the fan motor to the shroud and tighten three screws.



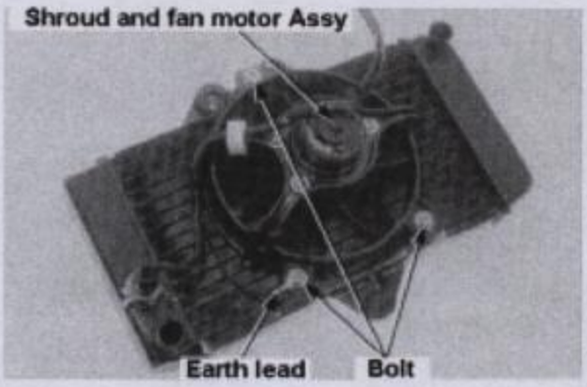
Set the fan to the shaft by aligning the flat part of the hole in the fan and the shaft.



Apply screw locker to the nut thread and screw the nut.



Install the shroud and the fan motor Assy to the radiator.
Connect the earth lead to the position shown in the figure and screw three bolts.
Connect a fan motor switch connector.

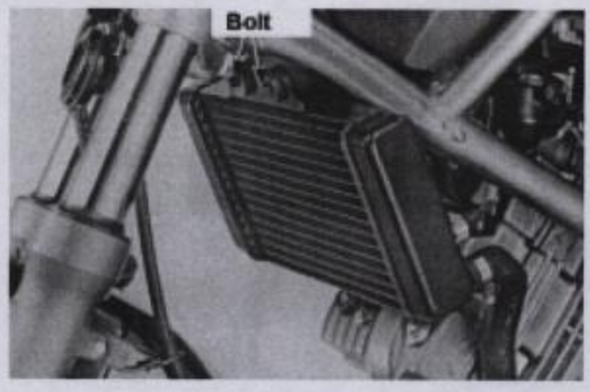


Installation

Reverse the removal procedure to install.

Torque: Radiator mount SH bolt: 12Nm (1.2kgf-m)

Fill coolant and bleed air (5-4).



Water Pump

Inspection

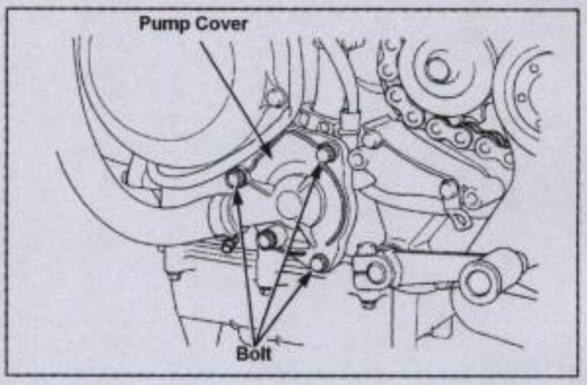
Check the inspection hole at the bottom of a water pump for coolant leak.

If the coolant is leaking, the water pump Assy should be replaced as it indicates the mechanical seal is broken.

Removal

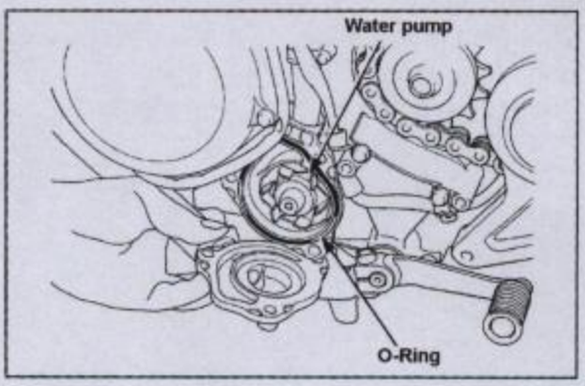
Drain coolant (5-4).

Unscrew three water pump cover bolts to remove a pump cover.

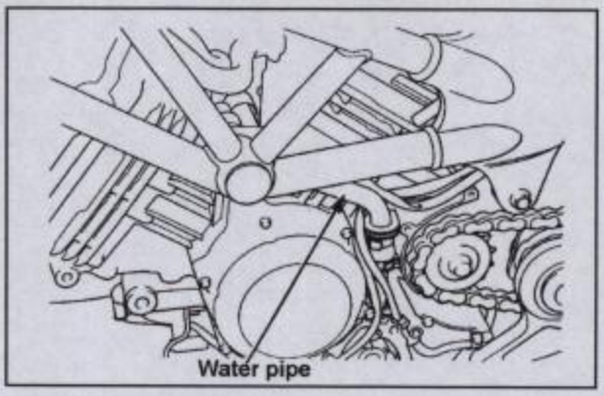


Remove an O-Ring.

Disconnect a water hose from the water pump cover.



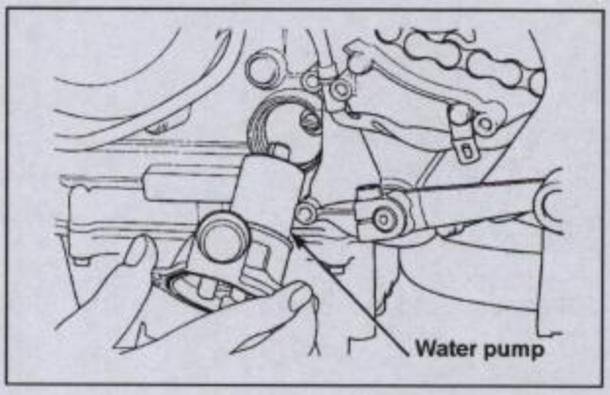
Disconnect a water pipe from the crankcase and the water pump.



Remove the water pump from the crankcase.

Notes:

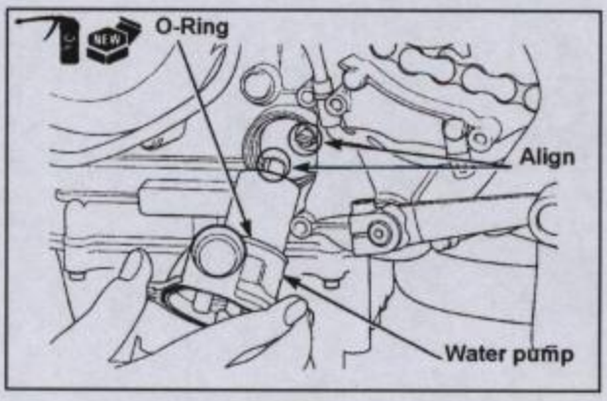
Do not disassemble the pump further on. Replace the pump Assy if any defect was found.



Installation

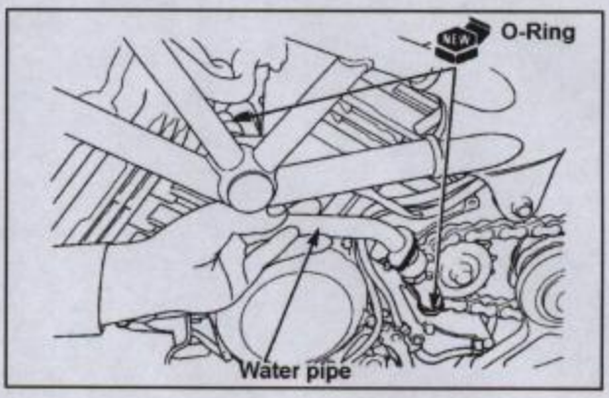
Apply engine oil to a new O-Ring.

Install the water pump by aligning the cutoff on the water pump shaft end with the oil pump shaft end.

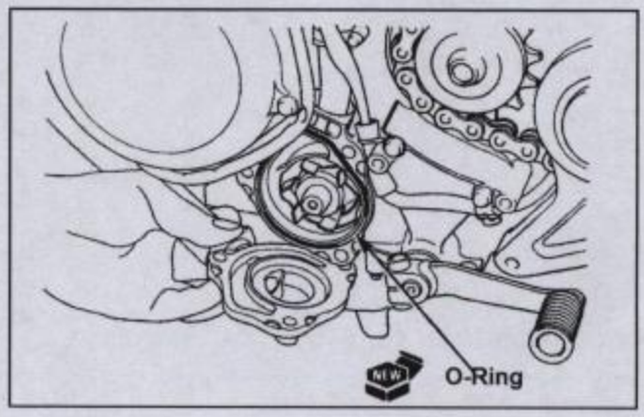


Install new O-Rings to both ends of the water pipe.

Install the water pipe.



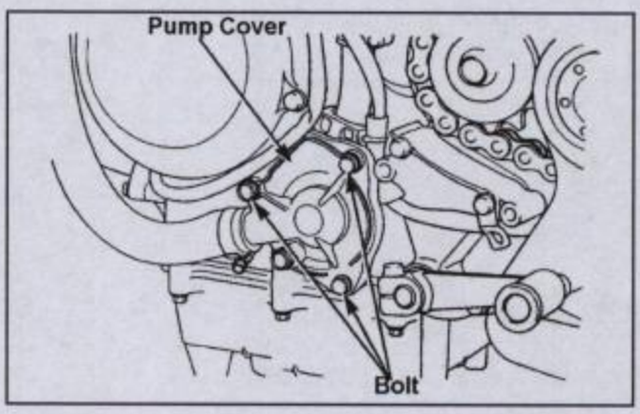
Set a new O-Ring to the groove on the water pump body.

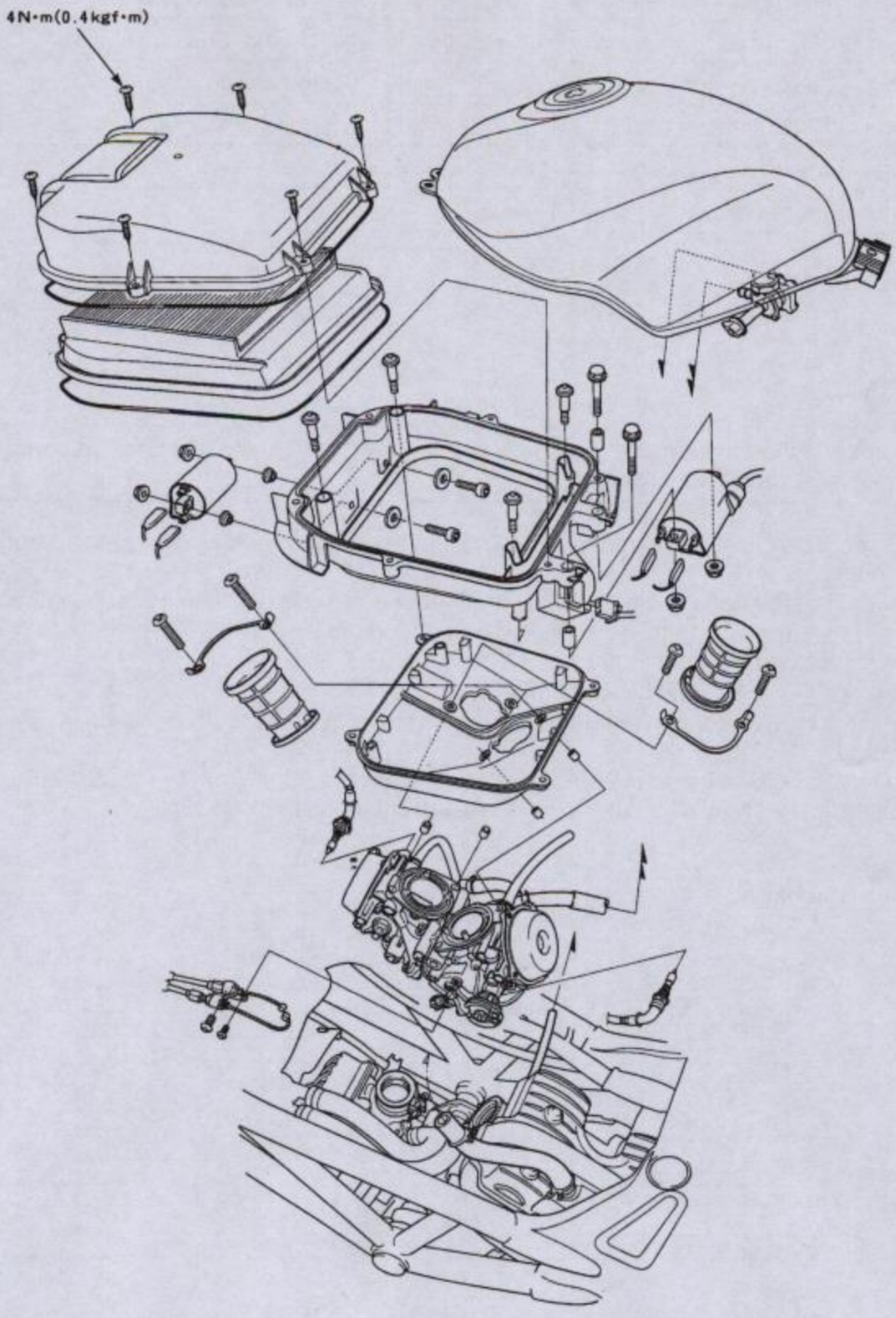


Install a water pump cover and screw three mount bolts.

Torque: 13Nm (1.3kgf-m)

Fill coolant and bleed air (5-5).




4N·m(0.4kgf·m)

Service Information.....	6 – 1	Carburettor Assembly.....	6 – 12
Troubleshooting.....	6 – 2	Carburettor Uniting.....	6 – 16
Fuel Auto Cock.....	6 – 3	Carburettor Installation.....	6 – 18
Carburettor Removal.....	6 – 5	Carburettor Synchronisation.....	6 – 20
Carburettor Separation.....	6 – 8	Pilot Screw Adjustment.....	6 – 21
Carburettor Disassembly.....	6 - 9		

Service Information

General

Warning

Petrol is highly inflammable. Keep away from any flame/spark. Evaporated petrol is explosive. Ventilate the working area.

- All service work in this chapter can be conducted without removing the engine from the frame.
- Do not twist or bend cables hard. Deformed or damaged cables may cause failure.
- Drain fuel from the carburettor by loosening the drain screw on a float chamber prior to disassembling the carburettor.
- Replace O-Rings when disassembled.
- Seal the carburettor intake port with a cloth or tape to prevent object falling into the engine.
- If the vehicle is to be stored for a month or longer, drain fuel from the float chamber. Degraded fuel may clog the slow system and cause unstable idling.

Service Standard

Item			Standard	Service Limit
Carburettor	Type		VD 10L	-
	Setting mark		VD 10LA	-
	Main Jet (front/rear)		# 115	-
	Slow jet (front/rear)		# 35	-
	Pilot screw setting	Standard	1 ½ turns rewind	-
		After idle drop	¾ turns rewind	-
	Float level		6.8mm	-
Idling rpm			1,300 ± 100rpm	-
Throttle grip free play (grip flange)			2 – 6mm	
Carburettor synchronising vacuum pressure difference			2,664 Pa (20mmHg)	
Carburettor synchronisation reference			Rear carburettor	

Torque Setting

Vacuum play	3Nm (0.3kgf-m)
Carburettor insulator strap	1Nm (0.1kgf-m)
Air filter case cover screw	4Nm (0.4kgf-m)
Fuel auto cock	34Nm (3.5kgf-m)
Fuel cock lever screw	4Nm (0.4kgf-m)

Special tool

Float level gauge	07401-0010000

Troubleshooting

The engine does not start
- Fuel cock is "OFF"
- Fuel auto cock tube disconnected
- No fuel in the tank
- No fuel in the carburettor
  - Clogged fuel strainer
  - Clogged fuel tube
  - Stuck float valve
  - Improper float level
- Excessive amount of fuel in the cylinder
  - Clogged air filter
  - Carburettor overflow
- Sucking secondary air
- Faulty auto bistarter valve
- Clogged slow system or auto bistarter system
- Faulty ignition system (Sec. 17)

The engine starts, but stops soon. Unstable idling
- Improper valve clearance
- Clogged fuel system
- Faulty ignition system (Sec. 17)
- Too lean / too rich mixture
- Contaminated fuel
- Sucking secondary air
- Improper idling rpm
- Improper pilot screw setting
- Clogged slow system
- Improper float level
- Faulty carburettor synchronisation
- Clogged fuel tank cap vent

Mixture is too lean
- Clogged fuel jets
- Faulty float valve
- Too low float level
- Clogged fuel system
- Clogged carburettor air vent tube
- Sucking secondary air
- Clogged fuel tank cap vent
- Faulty vacuum piston

Mixture is too rich
- Bistarter is activated
- Faulty float valve
- Too high float level
- Clogged air jets
- Dirty air filter
- Carburettor overflow

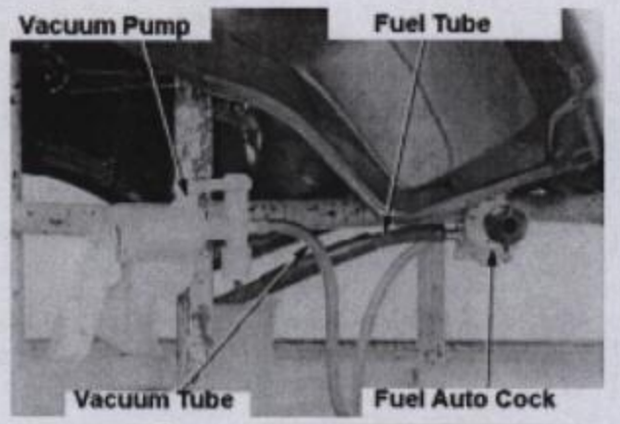
Backfire / Misfire
- Faulty ignition system (Sec. 17)
- Too lean mixture

After burn when using engine brake
- Too lean mixture on slow system

Fuel Auto Cock

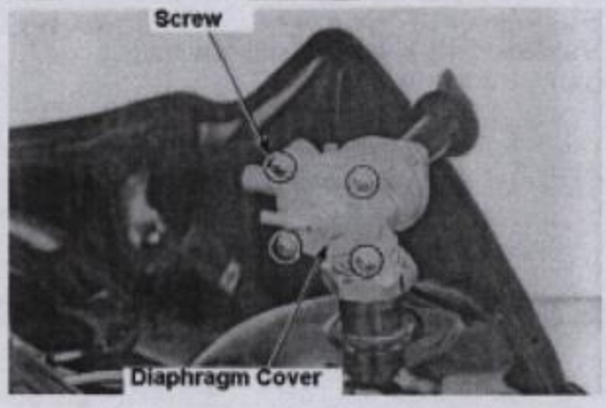
Inspection

Remove a fuel tank (2-3).
Apply vacuum to the fuel auto cock through its vacuum tube to check smooth fuel flow.
Inspect a fuel filter and a vacuum diaphragm if it is unsmooth.
If the fuel flows without applying vacuum, replace the vacuum diaphragm.

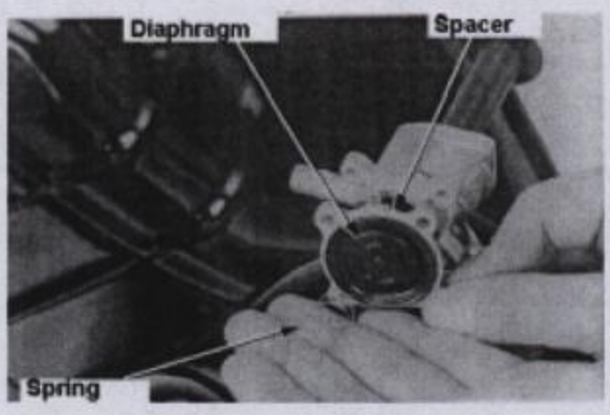


Disassembly

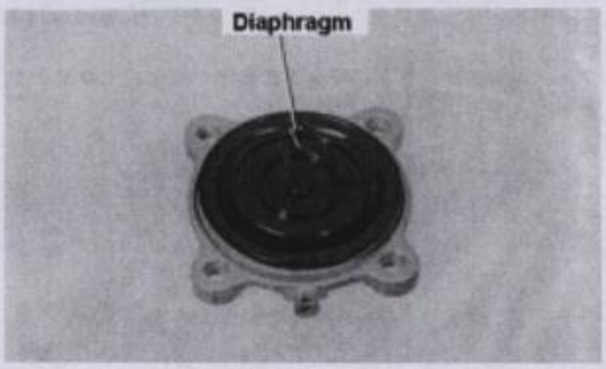
Unscrew four screws to remove a diaphragm.



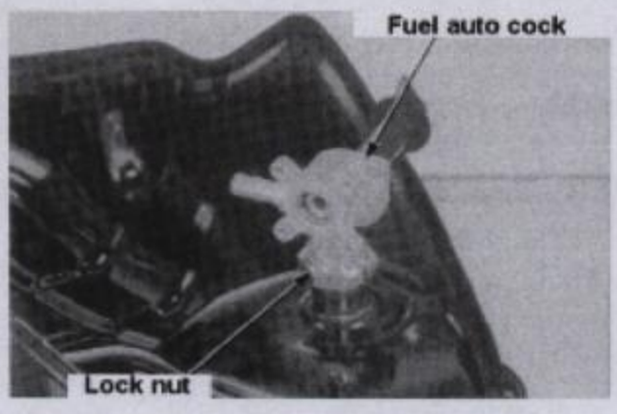
Remove a spring, a diaphragm and a spacer.



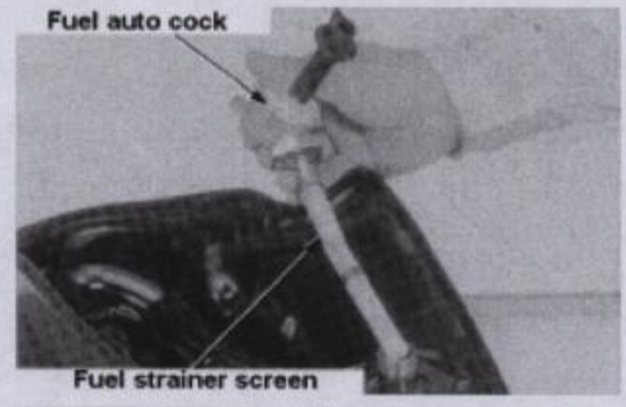
Inspect the diaphragm for wear, tear and damage.



Loosen a lock nut to disconnect a fuel auto cock from a fuel tank.

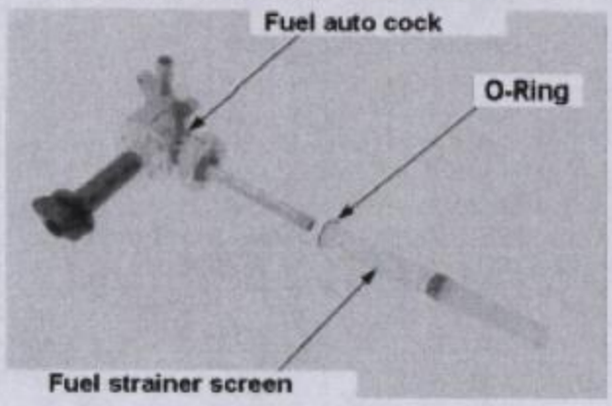


Remove a fuel strainer screen and an O-Ring.
Clean the fuel strainer screen.
Inspect the O-Ring for wear and damage.



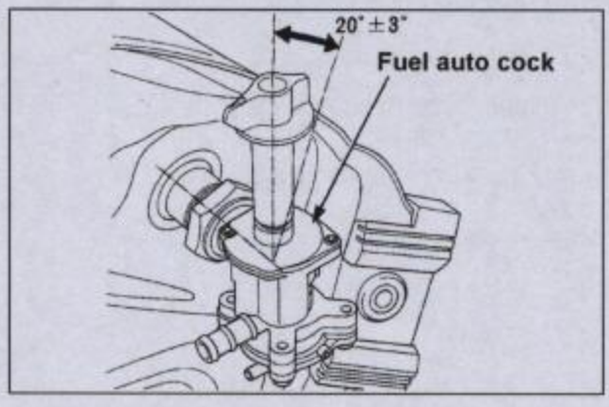
Assembly

Install the fuel strainer screen and the O-Ring to the fuel auto cock.

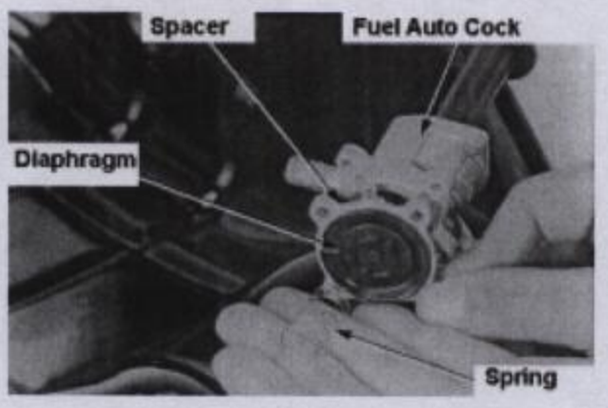


Install the fuel auto cock to the fuel tank. Fix the cock at an angle shown in the figure and secure the lock nut.

Torque Setting: 34Nm (3.5kgf-m)

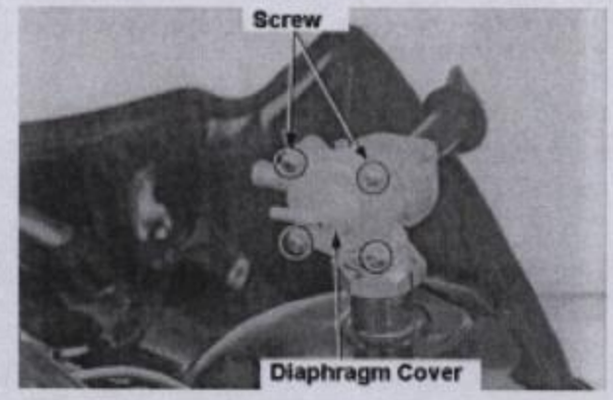


Install the spacer, the diaphragm, the diaphragm spring and the diaphragm cover to the fuel auto cock.



Screw four screws.
Install the fuel tank (2-3).

Check for fuel leak after installation.

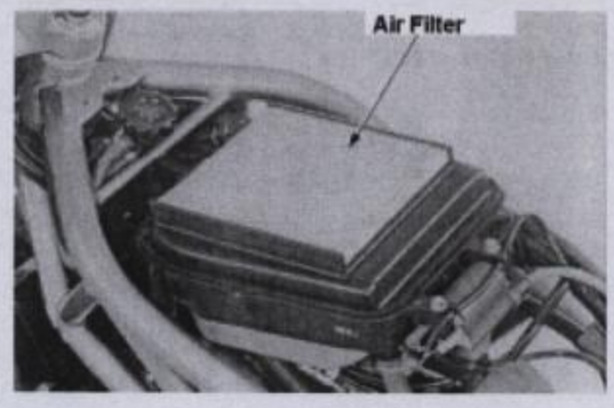


Carburettor Removal

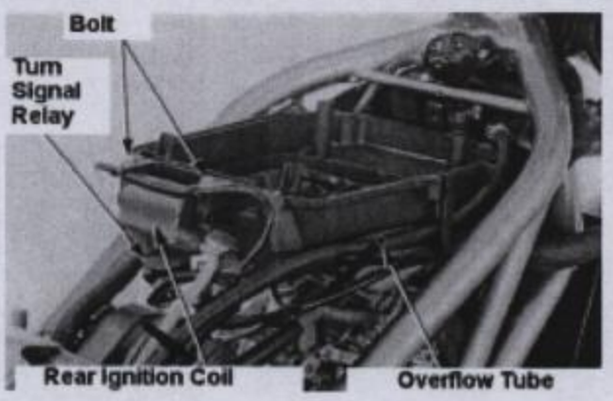
Warning

> Petrol is highly inflammable. Keep away from fire/spark. Evaporated petrol is explosive. Ventilate the working area.

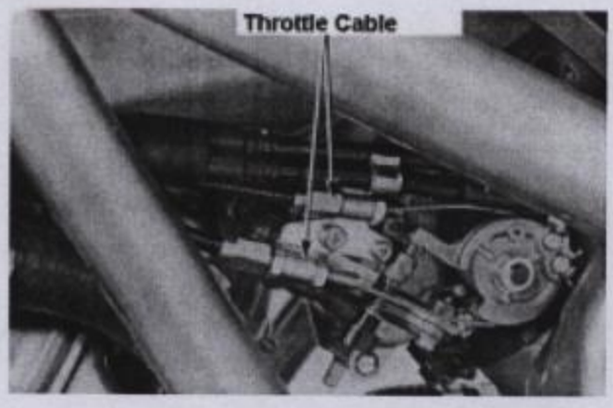
Remove an air filter element (3-16).
Loosen a carburettor drain screw to drain fuel from the float chamber.



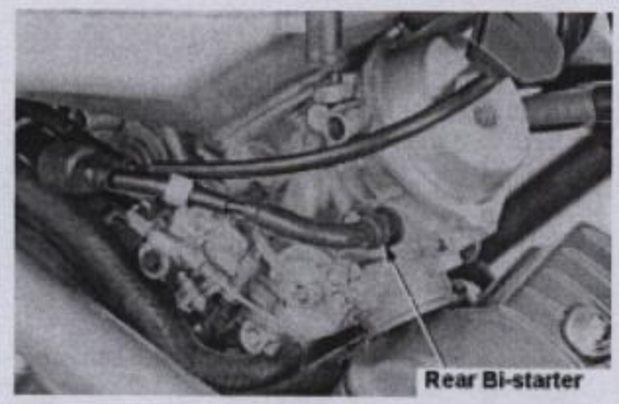
Unscrew two bolts to remove a rear ignition coil.
Unclamp a reservoir overflow tube and a wire harness.
Disconnect a turn signal relay.



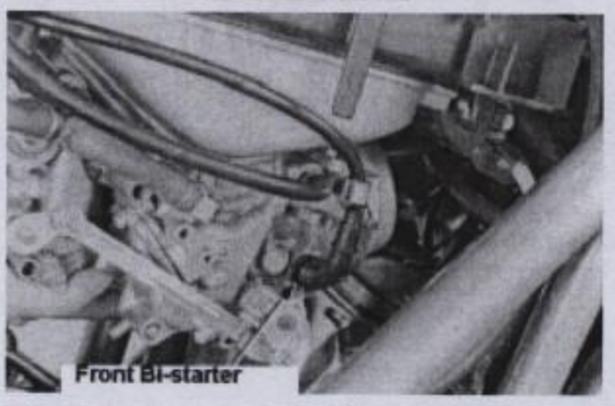
Disconnect a throttle cable.



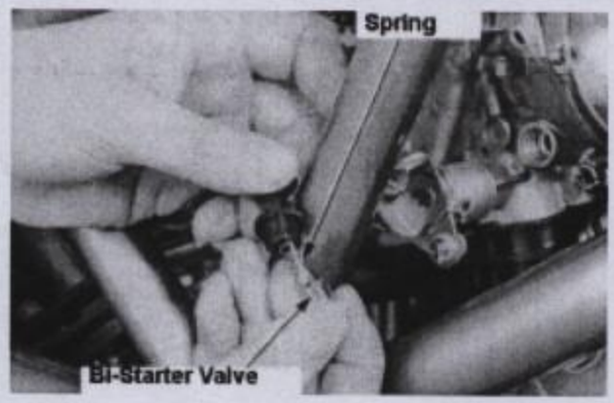
Loosen a rear carburettor bistarter valve nut to remove the bistarter valve.



Loosen a front carburettor bistarter valve nut to remove the bistarter valve.

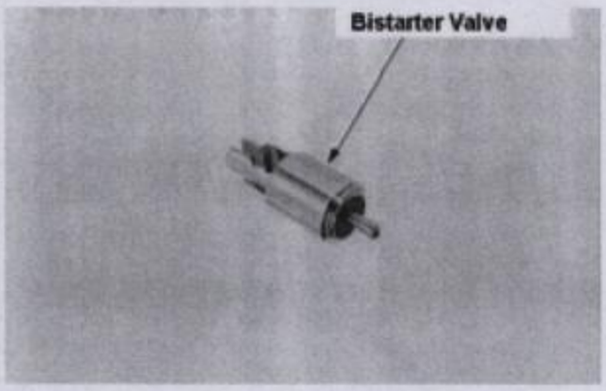


Remove front/rear bistarter valves/springs from a choke cable.



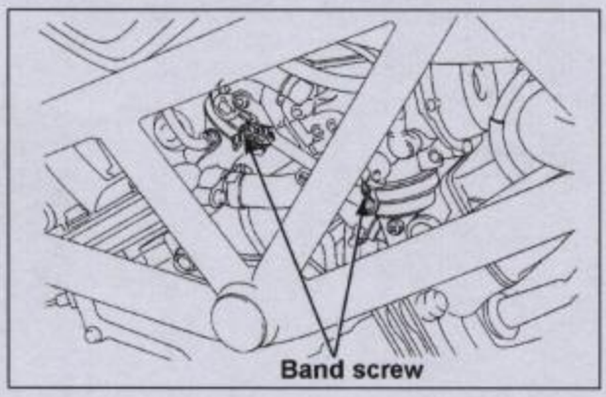
Inspect the valve surface for wear and scratch.

Inspect the valve end for step wear of the seat.



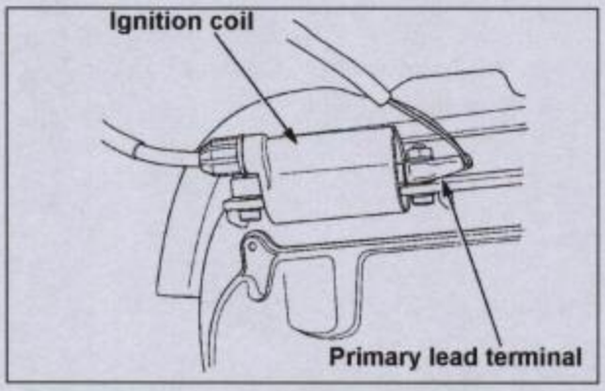
Unscrew two screws for a carburettor insulator band (strap).

Remove the carburettor / air filter Assy.

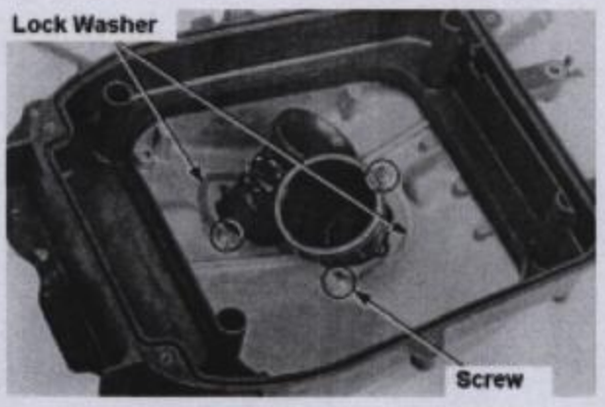


Disconnect a primary level from a front ignition coil.

Remove a spark plug cap from the spark plug.

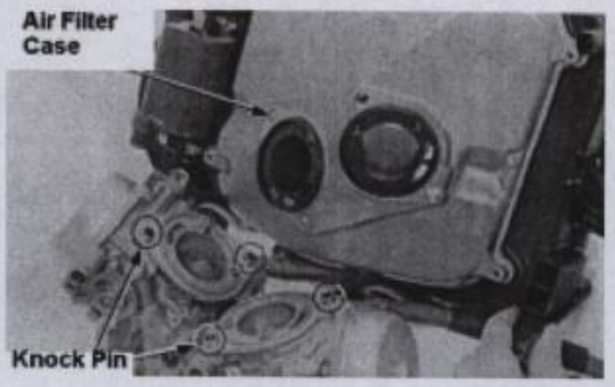


Lift the catches on lock washers and unscrew four screws.



Remove the air filter case with an air funnel.

Remove knock pins.

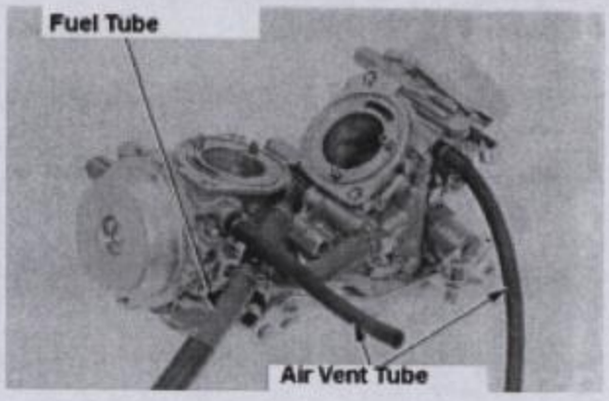


Carburettor Separation

Notes

A vacuum chamber, a float chamber, and a pilot screw can be serviced without separating the carburettor.

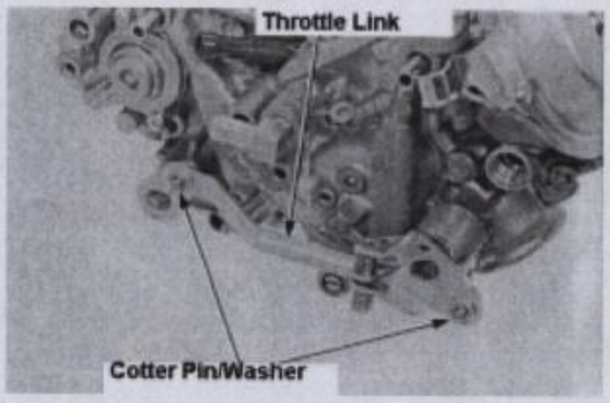
Disconnect air vent tubes and a fuel tube.



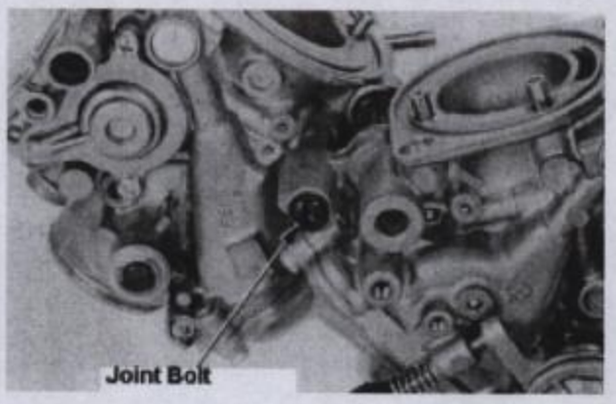
Remove cotter pins and washer / plastic washers to disconnect a throttle link.

Notes

Do not damage the throttle link on the throttle arm.

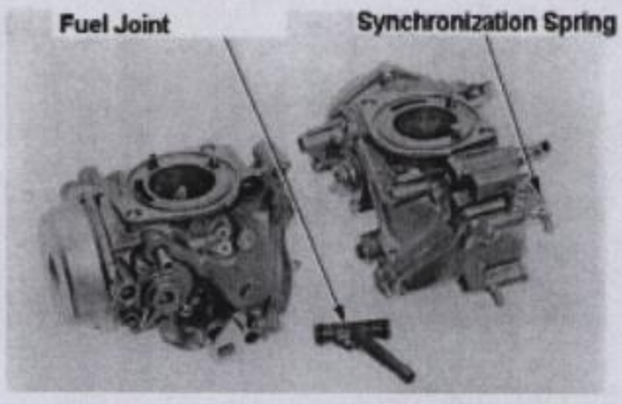


Unscrew a joint bolt.



Separate the carburettor and disconnect a fuel joint.

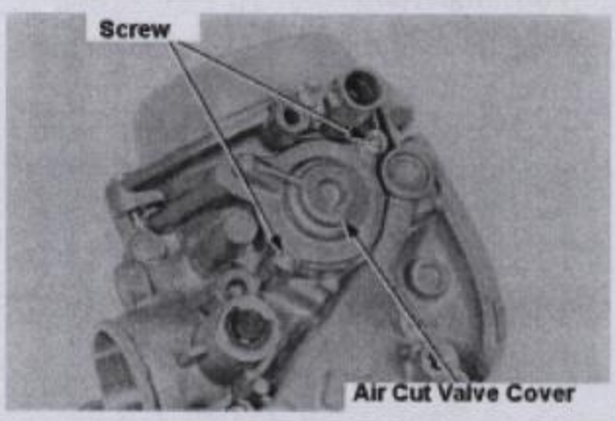
Remove a synchronisation spring.



Carburettor disassembly

Notes

- A vacuum chamber, a float chamber and a pilot screw can be serviced without separating the carburettor.
- Sort all removed parts for each carburettor.

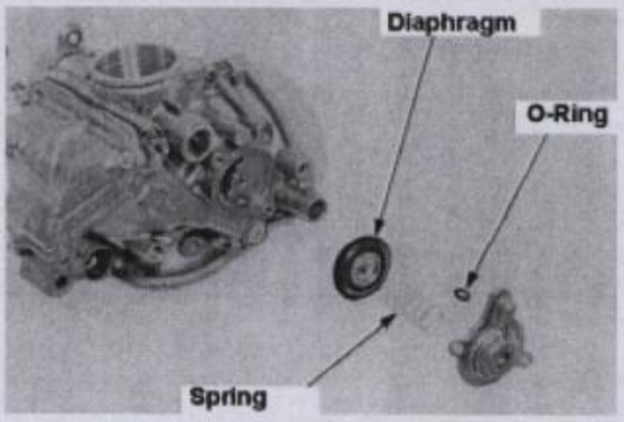


Air Cut Valve

Unscrew two screws to remove an air cut valve cover.

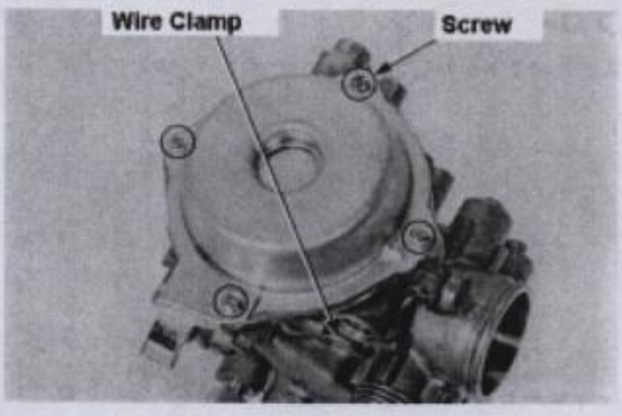
Remove a spring, an O-Ring and a diaphragm.

Inspect the diaphragm for wear / tear / damage.

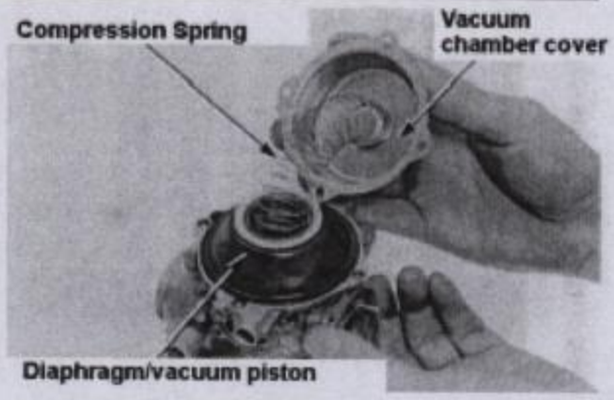


Vacuum Chamber

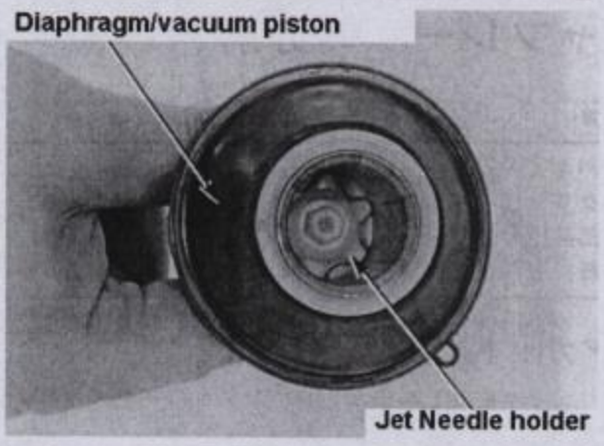
Unscrew four screws to remove a wire clamp (front only) and a vacuum chamber cover.



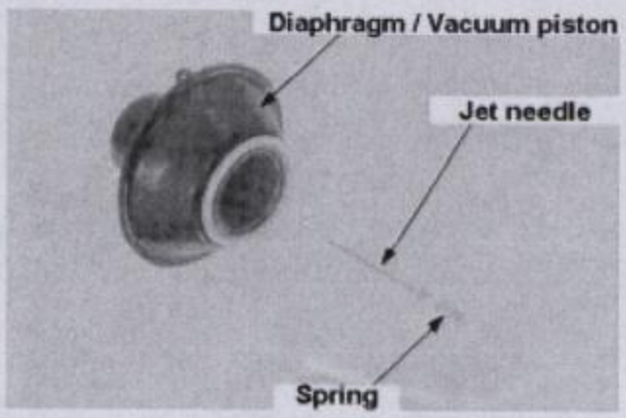
Remove a compression spring, a diaphragm / vacuum piston.



Turn a jet needle holder to the left and remove it.

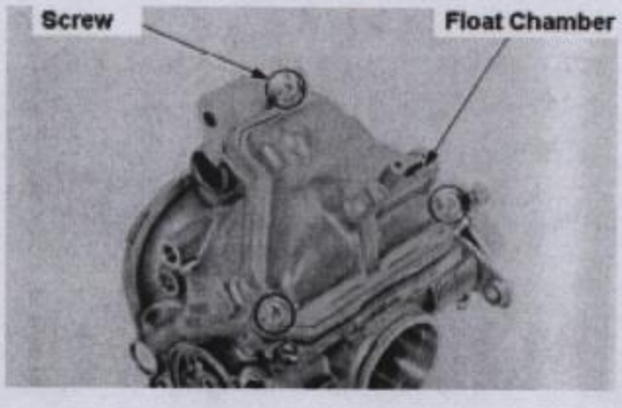


Remove a jet needle and a spring from a diaphragm vacuum piston.



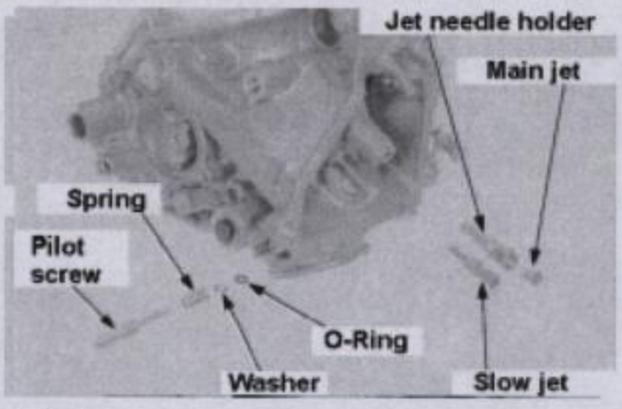
Float Chamber

Unscrew three screws to remove the float chamber.



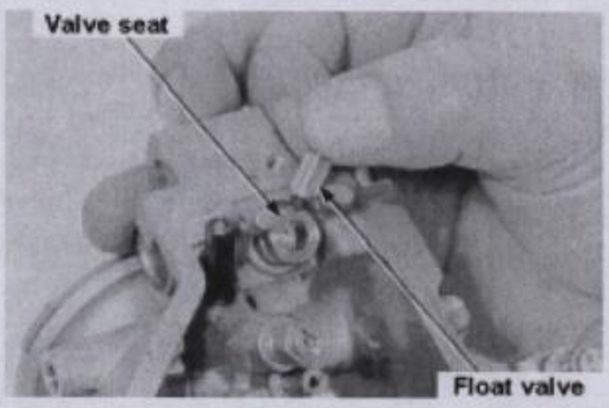
Remove a float pin to remove a float and a float valve.

Inspect the float for wear, damage, deformation and internal fuel leak.

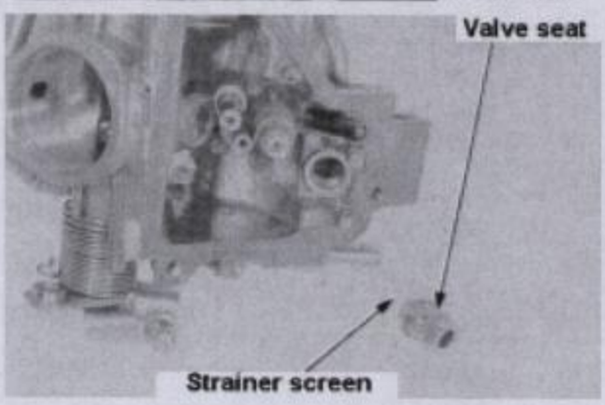


Inspect the float valve for damage, step wear and dirt. Replace or clean the valve seat set if the valve is faulty.

Inspect the valve seat for damage, step wear and dirt. Replace the valve seat set if necessary.



Remove a valve seat. Clean the strainer screen.



Remove a main jet, a needle jet holder, a needle jet, a slow jet and a pilot screw.

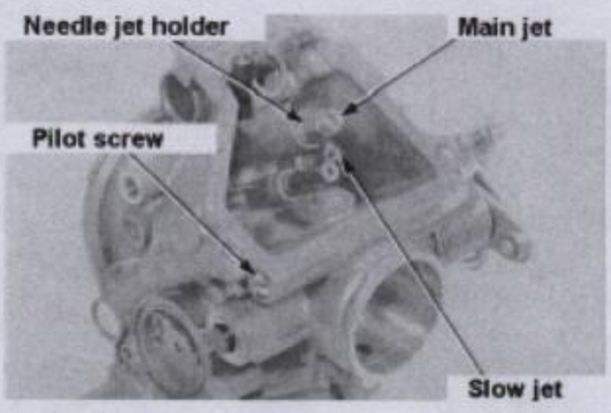
Notes

A pilot screw is pre-adjusted. No need to remove unless the carburettor is to be overhauled.

Wind the pilot screw and record the number of revs to fully tightened position. Then, remove the screw.

Notes

Do not over-tighten the screw to avoid damaging the seat surface.



Inspect jets and the pilot screw for wear and damage.

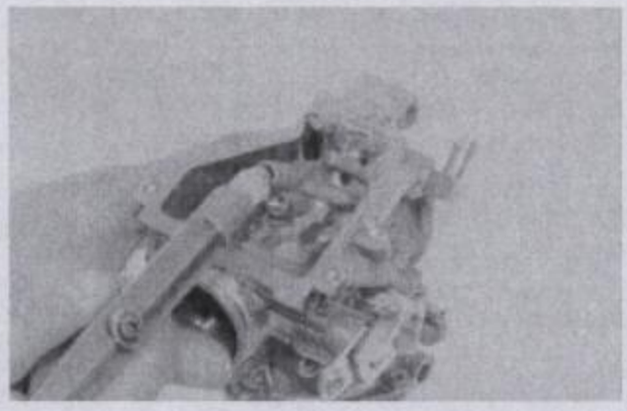
Clean the jets with washing oil and dry with compressed air.

Carburettor Cleaning

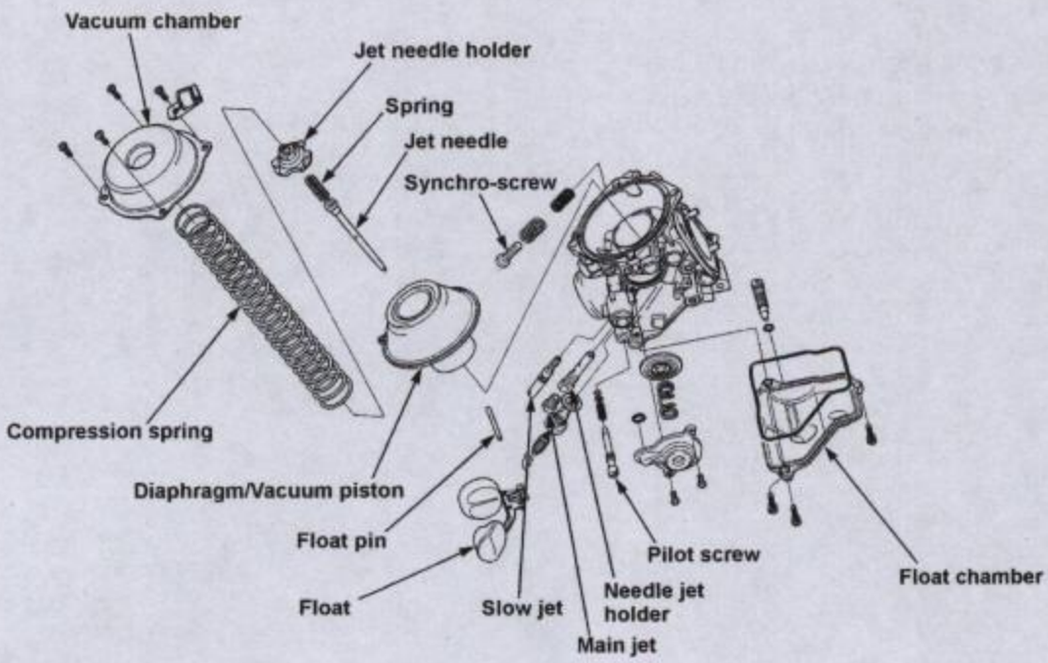
Caution

Do not use wires to clean the carburettor body.

Clean the air/fuel passage of the carburettor body with compressed air.



Carburettor Assembly



Install a main jet, a needle jet holder, a needle jet and a slow jet.

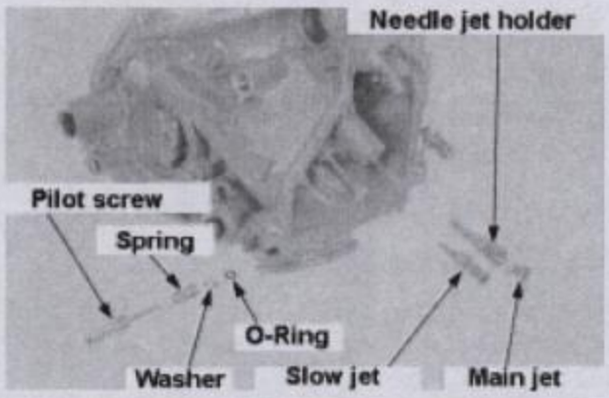
Install a pilot screw.

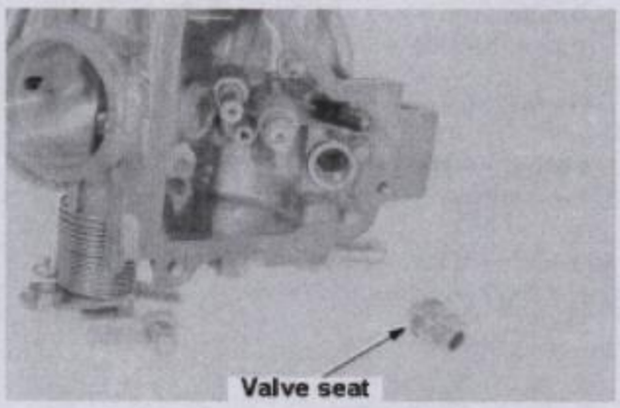
Notes
Do not over-tighten the pilot screw.

Fully tighten the pilot screw and wind back for the revs recorded.

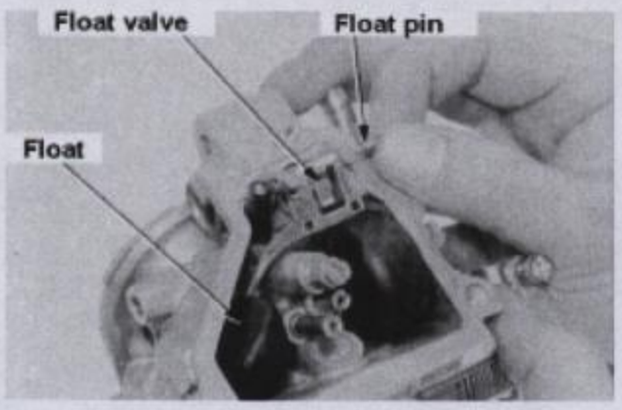
Adjust the pilot screw if the screw was replaced (6-21).

Install a clean valve seat.





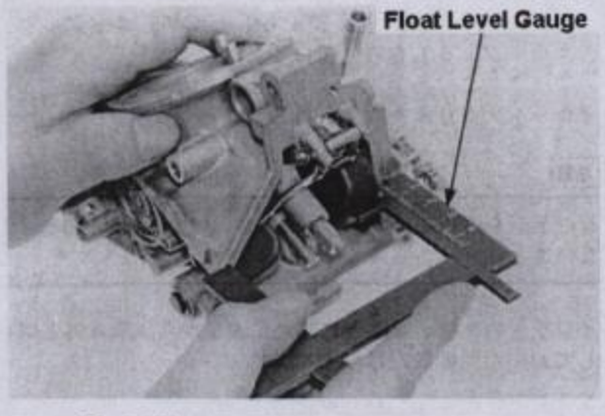
Set a float valve to a float arm lip and install the float and the float valve with a float pin to the carburettor body.



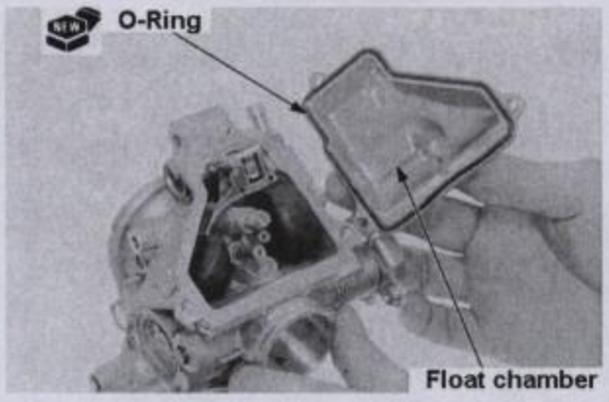
Float Level

Notes

- Conduct the float level check after inspecting the float and the float valve.
- Set the float level gauge perpendicular to the float chamber mating surface and measure at the highest part of the float.

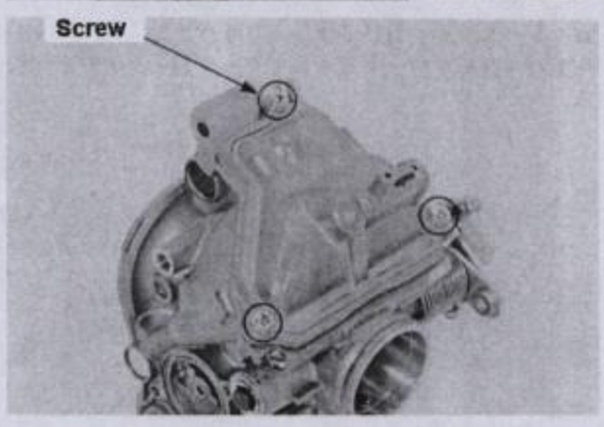


Tilt the carburettor to let the rear end of the float valve touch the float arm lip. Check the float valve edge is firmly touching the valve seat.
Measure the float level.
Special tool:
Float level gauge:07401-0010000
Standard: Float level: 6.8mm



If the float level is not in standard, bend the front arm lip to adjust the level.
Set a new O-Ring to the groove on the float chamber and install the float chamber.

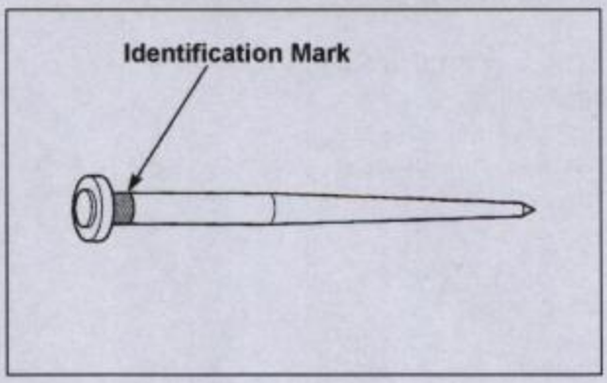
Firmly secure three screws.



Vacuum Chamber

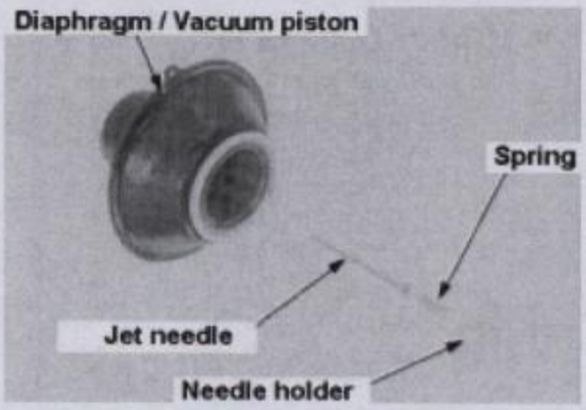
Refer to the identification marks on the jet needles to classify front and rear.

Identification: Front: AOVG
Rear: AOVD

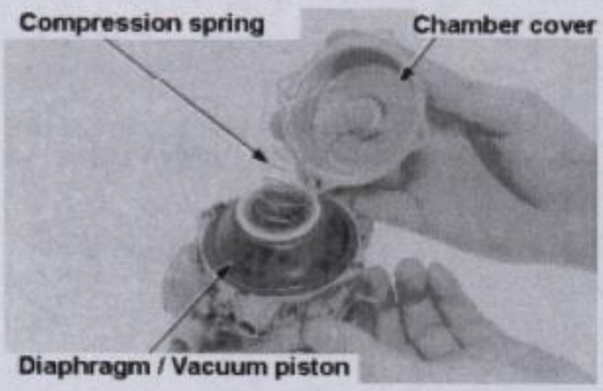


Install the jet needle and the spring to the diaphragm/vacuum piston.

Set a needle holder to the diaphragm/vacuum piston.
Insert the holder until you feel it is set to the groove in the vacuum piston and then turn it to the right.

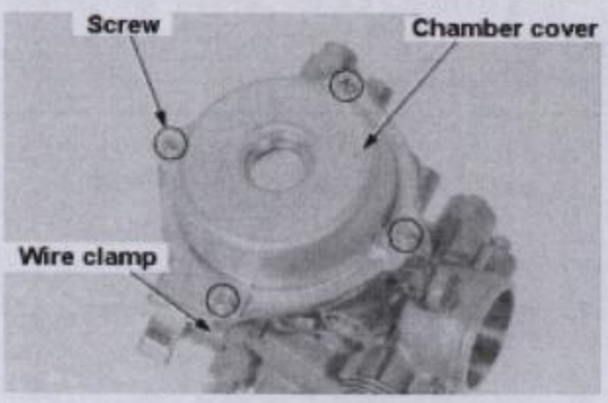


Push up the bottom of the vacuum piston to the vacuum chamber side (full-open position) and set the diaphragm rib to the body groove.



Secure four screws. Do not catch the diaphragm with a vacuum chamber cover.

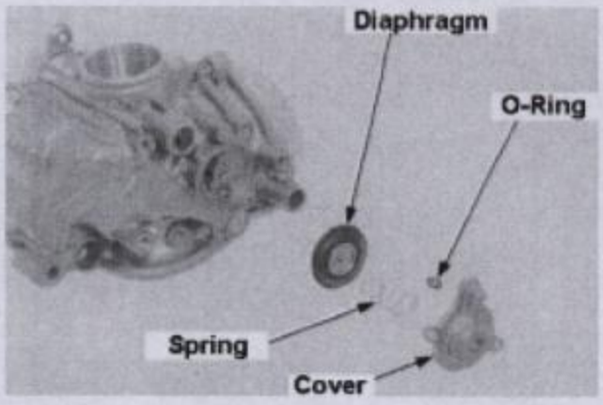
Notes
Install a wire clamp to the position shown in the figure.



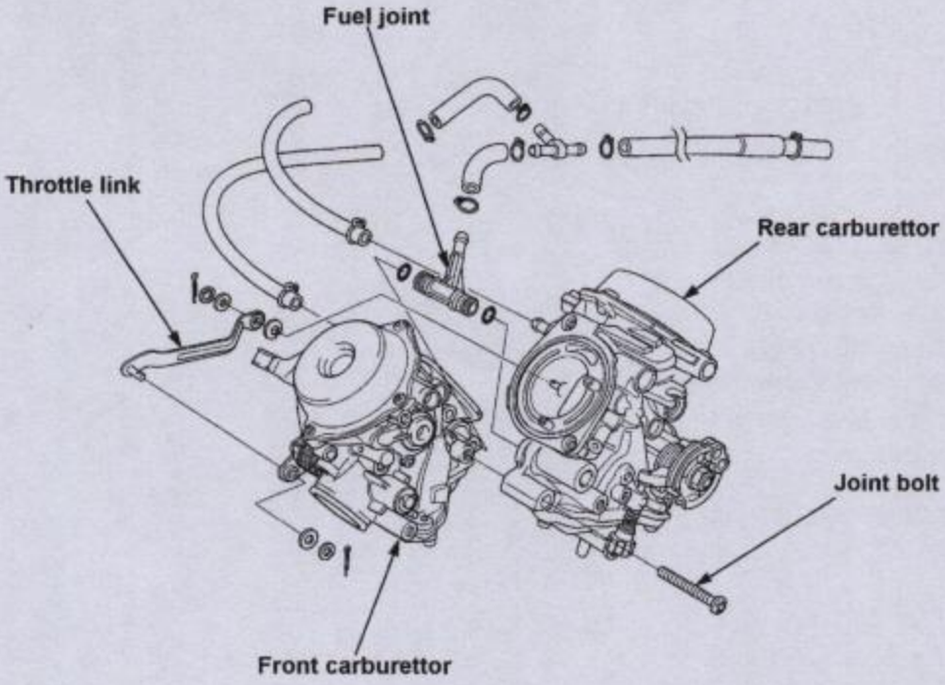
Air Cut Valve

Install a spring, an O-Ring and a diaphragm.

Install an air cut valve cover and secure two screws.



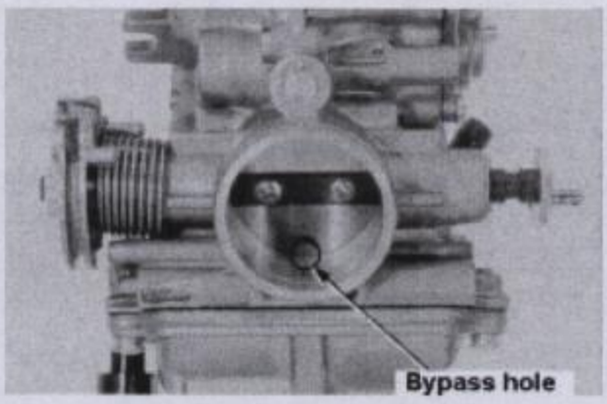
Carburettor Uniting



Notes

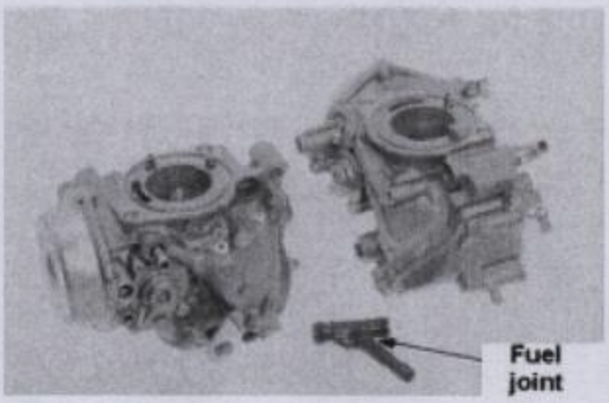
Replace all O-Rings.

Turn a throttle stop screw (synchro-screw for a rear carburettor) so that bypass holes can be seen.

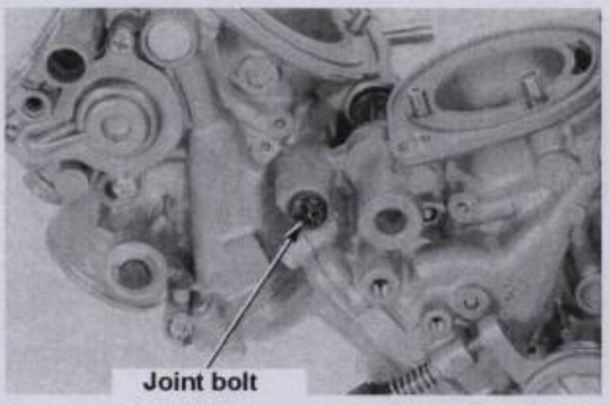


Install a fuel joint to unite the carburettors.

Install a synchro-spring.



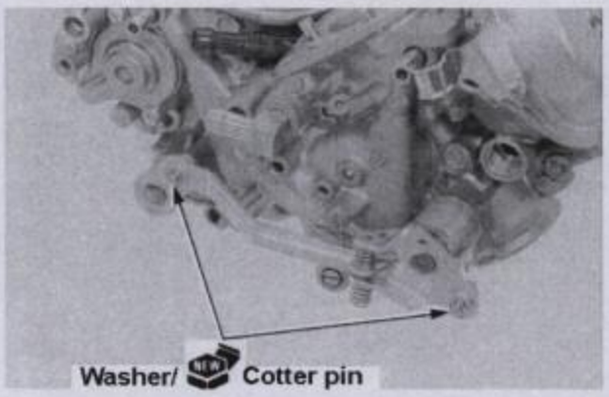
Temporarily secure a joint bolt.



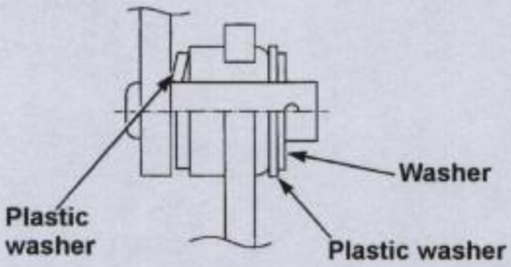
Install a throttle link, cotter pins, washers and plastic washers.

Notes

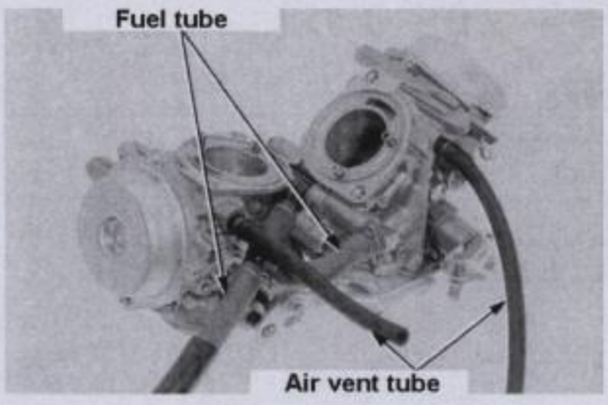
- Do not damage the throttle link and the throttle arm.
- Watch out for the position of the plastic washer on the rear carburettor side.



Throttle link washers layout (rear carburettor side).

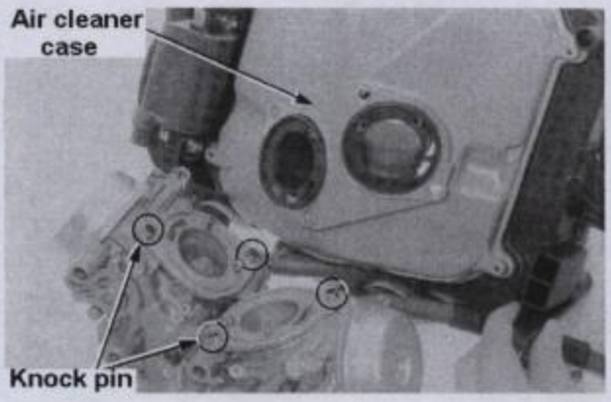


Connect air vent tubes and fuel tubes.

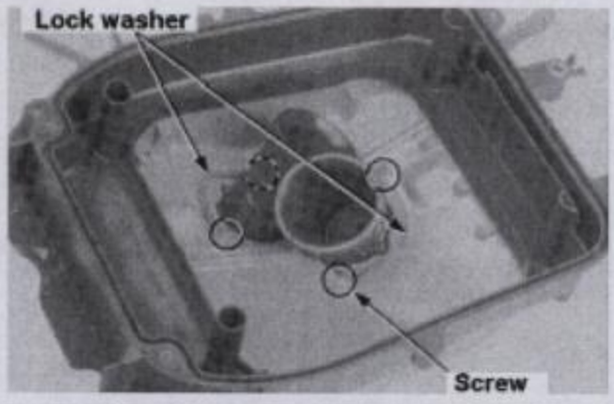


Install knock pins to the carburettor.

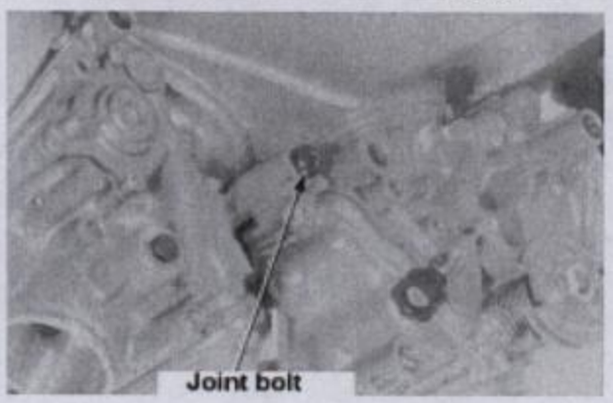
Install an air filter case to the carburettor.



Install lock washers and secure screws. Bend lock washer catches.



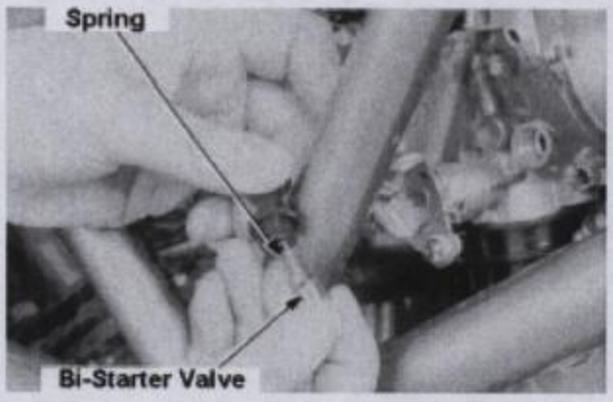
Firmly secure the joint bolt.



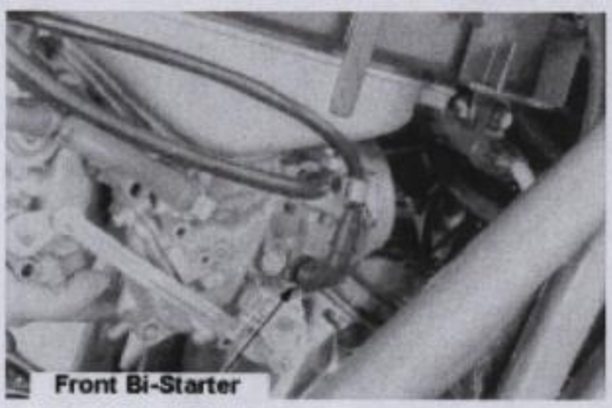
Carburettor Installation

Notes
Refer to routing diagrams (1-25) when routing cables and tubes.

Install front/rear bistarter valves and springs to the choke cable.



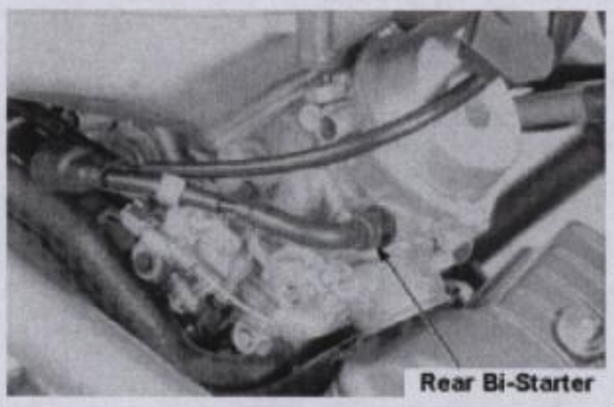
Install a float bistarter valve and secure the lock nut.



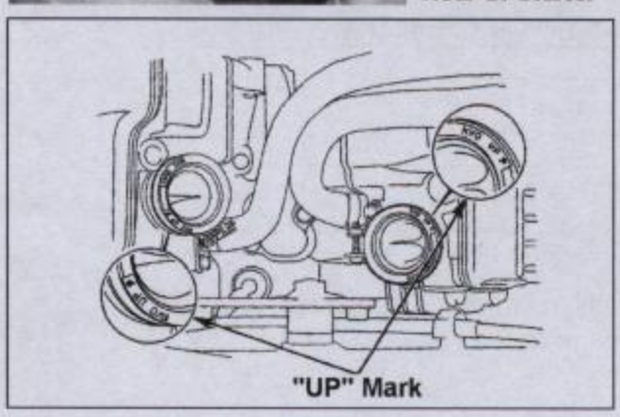
Connect throttle cables.


Throttle cable

Install a rear bistarter valve and secure the lock nut.


Rear Bi-Starter

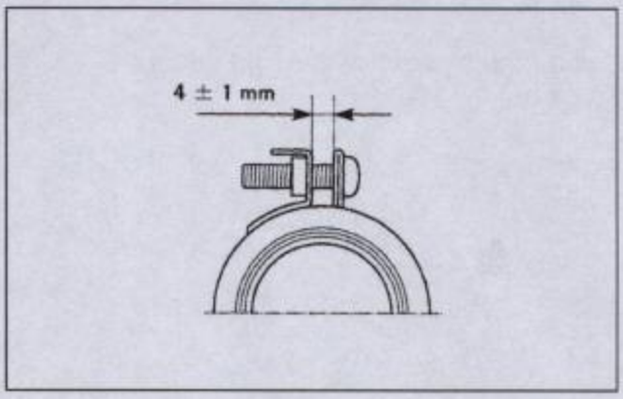
Confirm the "UP" mark on the intake pipe is facing upwards.


"UP" Mark

Install the carburettor/air filter Assy to the cylinder head.
Secure two screws on the carburettor insulator strap.

Torque: 1Nm (0.1kgf-m)

Install the following parts:
- Rear ignition coil (17-5)
- Turn signal relay (19-15)
- Air filter (3-16)
- Fuel tank (2-3)

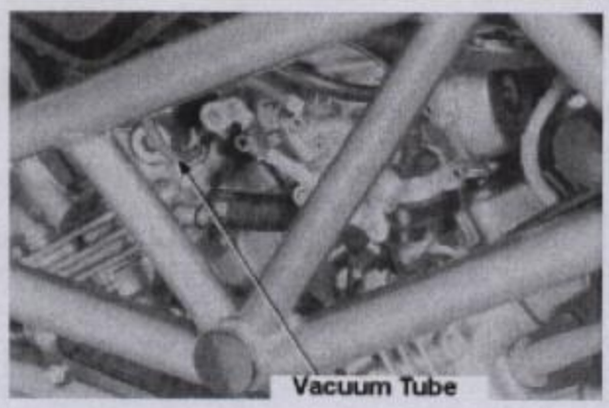


Carburettor Synchronisation

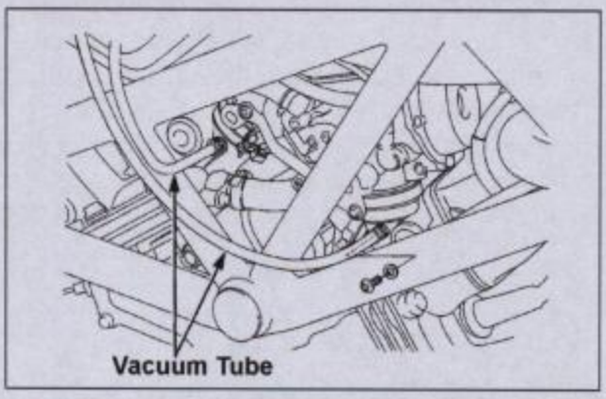
Notes

Adjust the synchronisation after warming up. Set the transmission to neutral and the vehicle straight up.

Start the engine. Set the tube clamp to the vacuum tube of the fuel auto cock. Then shut down the engine.


Vacuum Tube

Disconnect the vacuum tube from the rear cylinder head vacuum tube joint.
Remove a bolt and a washer from the front cylinder head vacuum port.
Install a boost joint (part #16214-MBO-000) and a washer to the front intake pipe.
Connect a vacuum gauge pipe to the front/rear boost joints.


Vacuum Tube

Start the engine and adjust idling rpm with a throttle stop screw.

Idling rpm: 1,300rpm ± 100rpm


Throttle stop screw

Use the rear cylinder intake manifold as a reference.
Turn the synchro-adjust screw to bring the manifold difference (with the front) into the standard.

Standard Pressure Difference: within 2,664Pa (20mmHg)
Snap the throttle a few times to check the adjustment has stabilised. Measure the pressure difference at idling rpm and adjust the screw if necessary.
Remove the boost joint from the front intake pipe and install a new washer and a vacuum plug.
Secure the vacuum plug.
Torque: 3Nm (0.3kgf-m)


Synchronisation screw

Pilot Screw Adjustment

Idle Drop Method

Notes

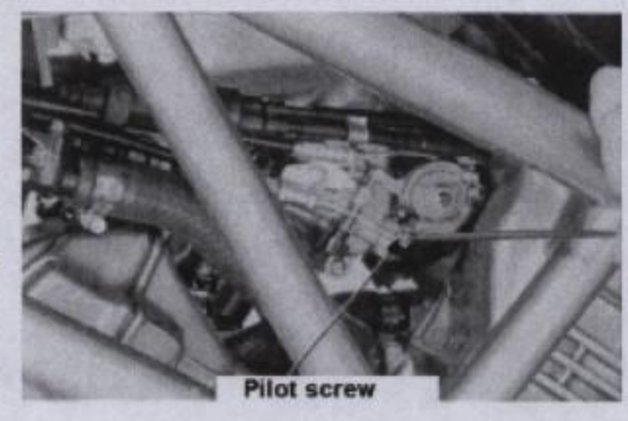
- The pilot screw is pre-adjusted. No need to re-adjust to other than recorded winds unless the screw or the carburettor body is replaced.
- Set and secure the vehicle in upright position.
- The idling rpm may vary with the operation of the cooling fan. Use external fan if necessary.
- Carburettors should be synchronised before adjusting the pilot screw.
- Adjust the carburettor after checking the engine condition (other than carburettor).

1. Install the 50rpm minimum reading tachometer by referring to its instruction.
2. Turn all pilot screws into stops and wind back for the standard revs.

Notes

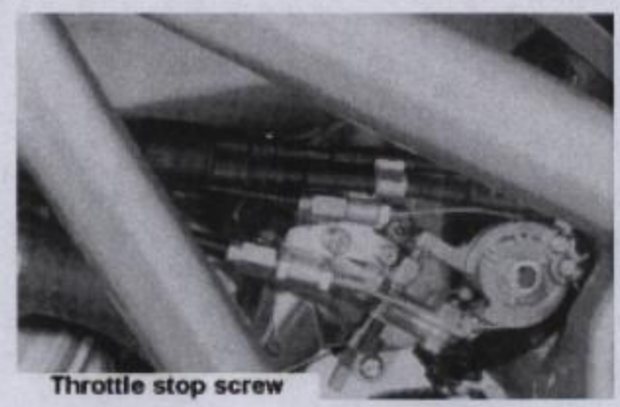
Do not over-tighten to avoid damaging the seat surface.

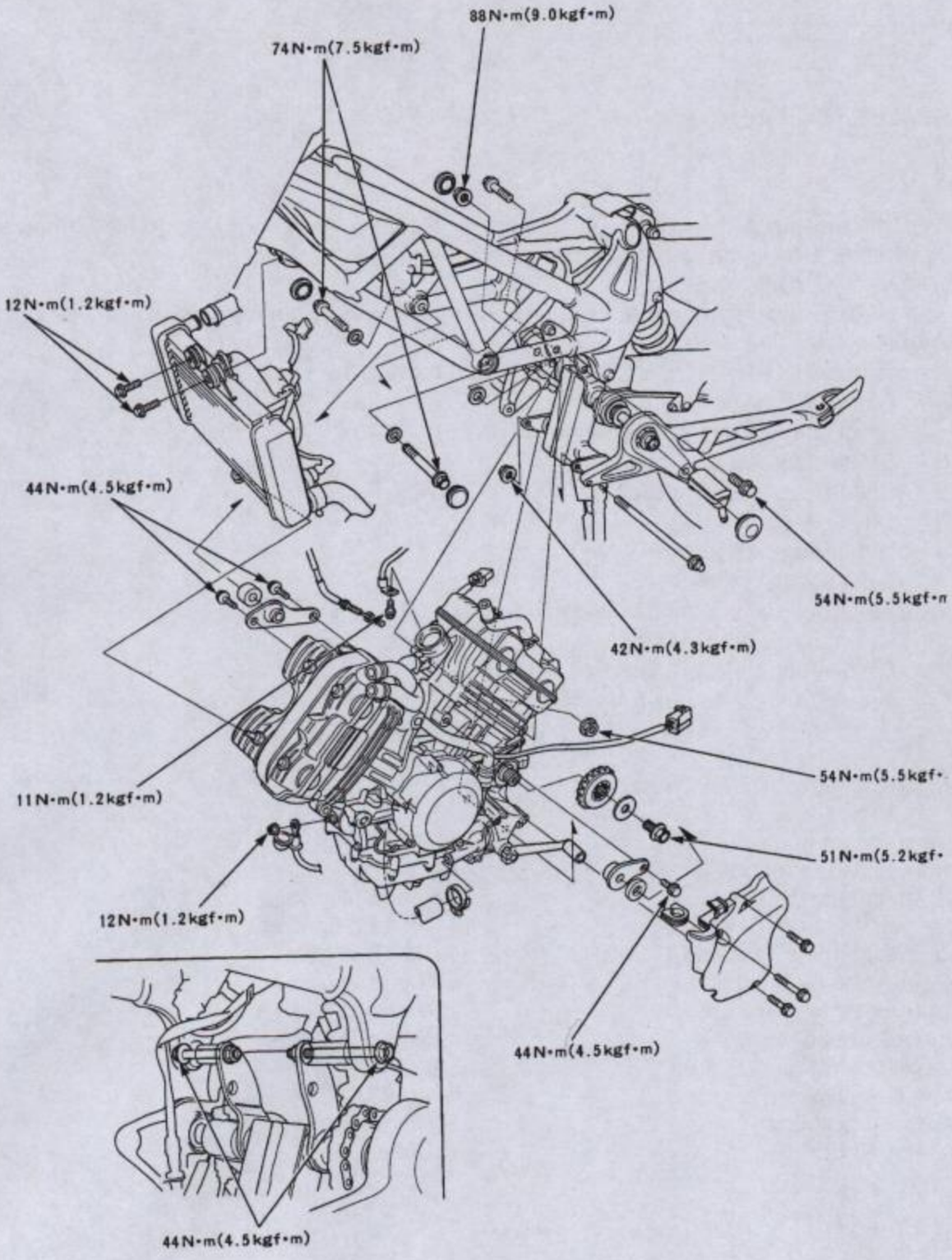
Standard rewinding revs: 1 – ½ revs


Pilot screw

3. Warm up the engine and adjust idling rpm with a throttle stop screw.
   Idling rpm: 1,300 ± 100rpm
4. Turn the rear carburettor pilot screw in either way to find out its position which gives maximum idling rpm.
5. Repeat (4) for the front carburettor.
6. Snap the throttle a few times and then adjust idling rpm with the throttle stop screw.
7. Slowly turn in the rear carburettor pilot screw to set it to the position which gives 50rpm lower idling rpm.
8. Wind back the pilot screw from the (7) position to the standard setting (after idle drop).

Standard pilot screw setting after idle drop:
¾ winds back
Repeat (7) and (8) for the front carburettor.
If the carburettors are still faulty, redo from (4).


Throttle stop screw


88N·m(9.0kgf·m)
74N·m(7.5kgf·m)
12N·m(1.2kgf·m)
44N·m(4.5kgf·m)
54N·m(5.5kgf·m
42N·m(4.3kgf·m)
54N·m(5.5kgf·
11N·m(1.2kgf·m)
51N·m(5.2kgf·
12N·m(1.2kgf·m)
44N·m(4.5kgf·m)
44N·m(4.5kgf·m)

Service Information.....	7 – 1	Engine Installation.....	7 - 6
Engine Removal.....	7 – 2		

Service Information

General

- When removing/installing the engine, support the vehicle properly and do not damage the frame, the engine, cables and harnesses.
- The engine mass is 46.3kg.
- When removing/installing the engine, protect the frame by applying adhesive tape on it surface.
- The following parts can be serviced without removing the engine:
  - Carburettor (Sec. 6)
  - Front camshaft, front cylinder head (Sec. 8)
  - Starter motor (Sec. 18)
  - Clutch, starter clutch (Sec. 9)
  - Oil pump (Sec. 4)
  - Water pump (Sec. 5)
  - Gear shift linkage (Sec. 10)
- The following parts need to be serviced after removing the engine:
  - Cylinder, piston (Sec. 12)
  - Crankshaft, transmission (Sec. 11)
  - Rear camshaft, rear cylinder head (Sec. 8)

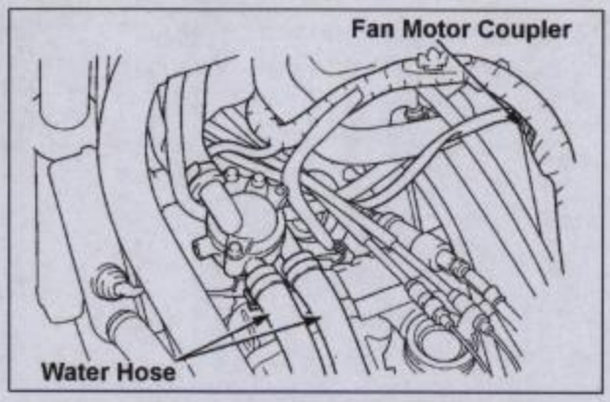
Torque Settings:

Drive sprocket bolt	51Nm (5.2kgf-m)
Front engine mount bolt	74Nm (7.5kgf-m)
Rear engine mount bolt	54Nm (5.5kgf-m)
Front engine hanger plate bolt	44Nm (4.5kgf-m)
Rear engine mount bolt/nut	54Nm (5.5kgf-m)
Lower engine mount bolt/nut	42Nm (4.3kgf-m)
Starter motor terminal nut	12Nm (1.2kgf-m)
Pivot bracket bolt	44Nm (4.5kgf-m)
Gearshift pedal bolt	19Nm (1.9kgf-m)
Swing arm pivot nut	88Nm (9.0kgf-m)
Crankcase bolt 6mm	12Nm (1.2kgf-m)
Radiator mount SH bolt	12Nm (1.2kgf-m)

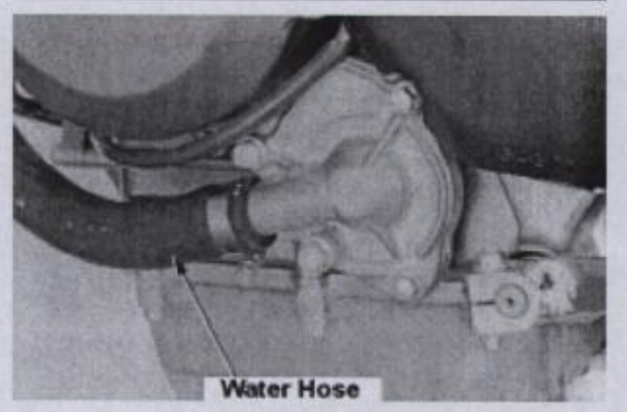
Engine Removal

Drain engine oil and coolant (3-15, 5-4).
Remove the following parts:
- Muffler (2-5)
- Carburettor (6-5)

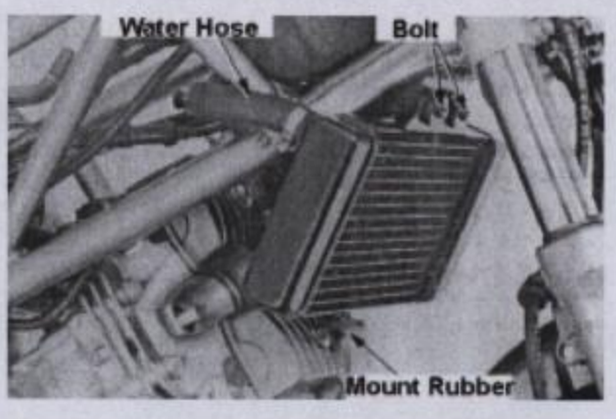
Disconnect a cooling fan motor coupler.
Disconnect water hoses from a thermostat.



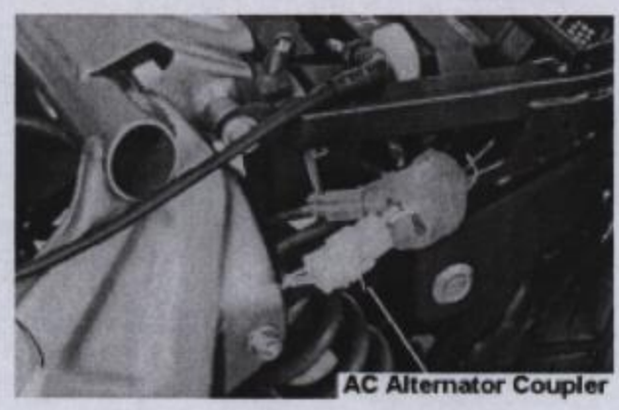
Disconnect a radiator lower hose at the water pump end.



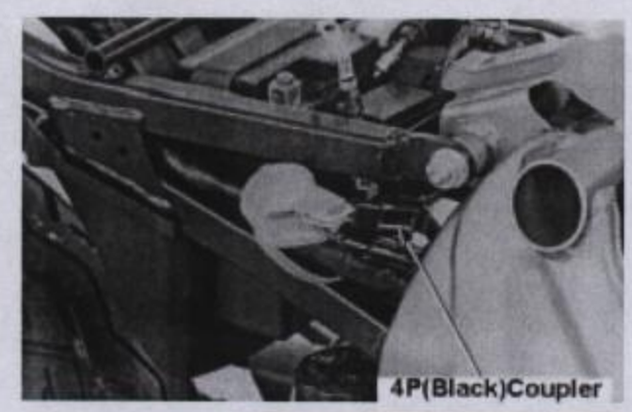
Disconnect the radiator upper hose.
Unscrew radiator upper mount bolts.
Remove a mount rubber from a cylinder head mount bolt and remove the radiator.



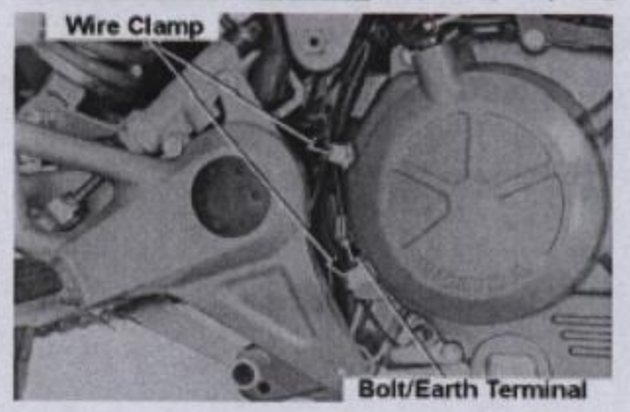
Disconnect an alternator coupler (3P White).



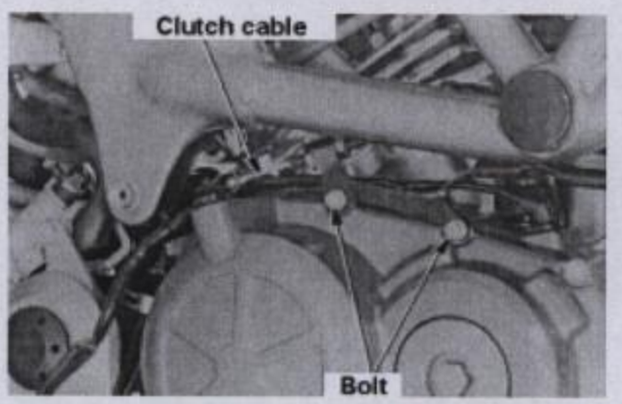
Disconnect a pulse generator, neutral switch, and oil pressure switch coupler (4P Black).



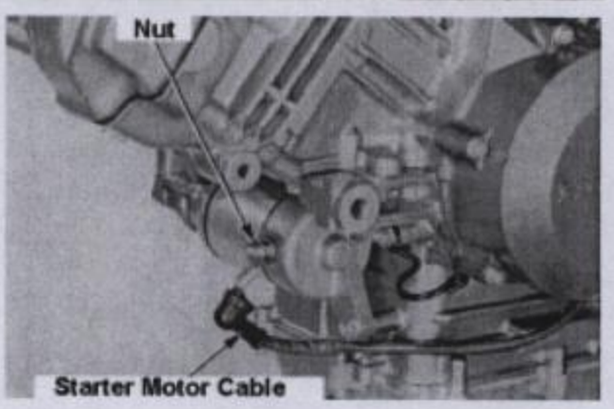
Unscrew a bolt to disconnect an earth terminal.
Unclamp a wire harness from the wire clamp.



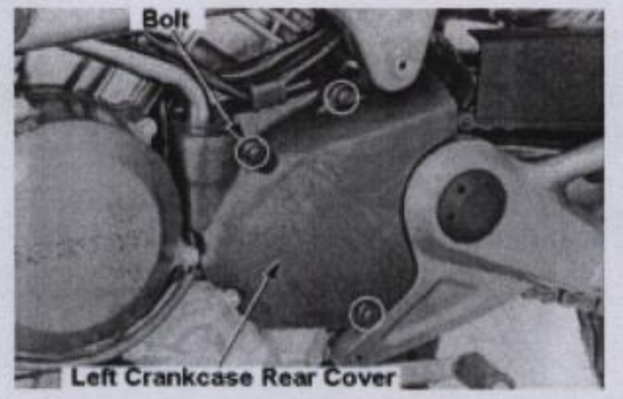
Unscrew two bolts to disconnect a clutch cable.



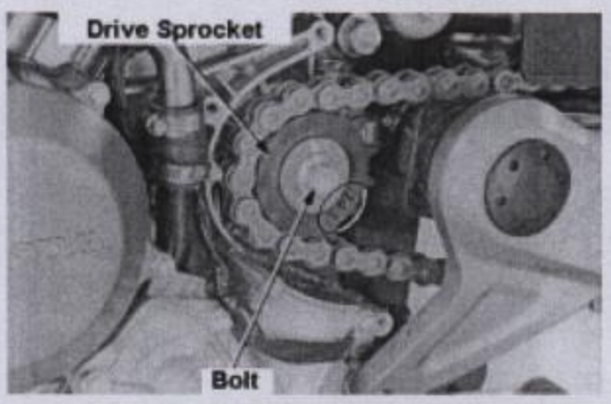
Unscrew a starter motor terminal nut to disconnect a starter motor cable.



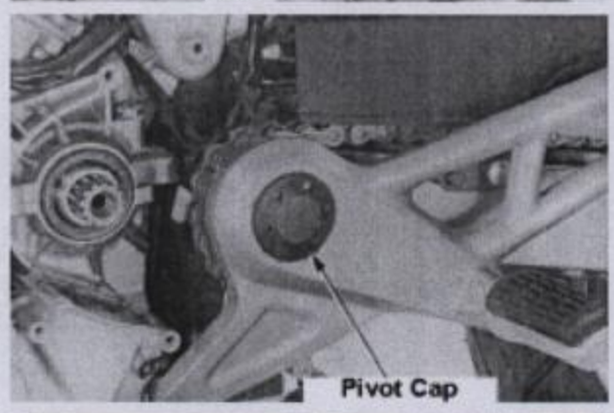
Remove a left crankcase rear cover.
Loosen the drive chain (3-9).



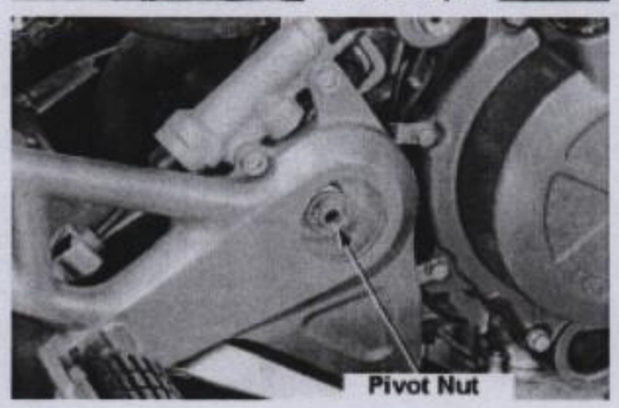
Unscrew a drive sprocket bolt to remove the drive sprocket.



Remove right/left pivot cap.



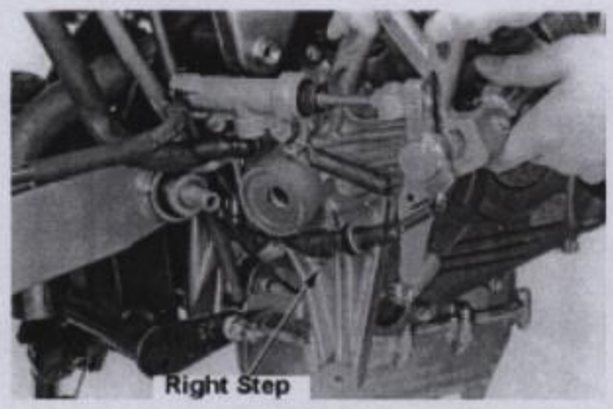
Unscrew a pivot nut.



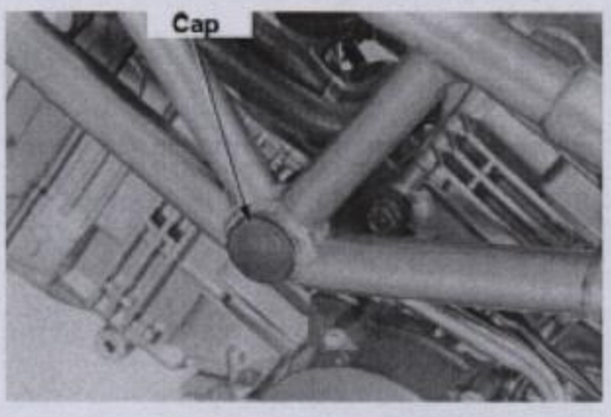
Remove a right step.
Support the vehicle properly and jack the bottom of the engine.

Notes

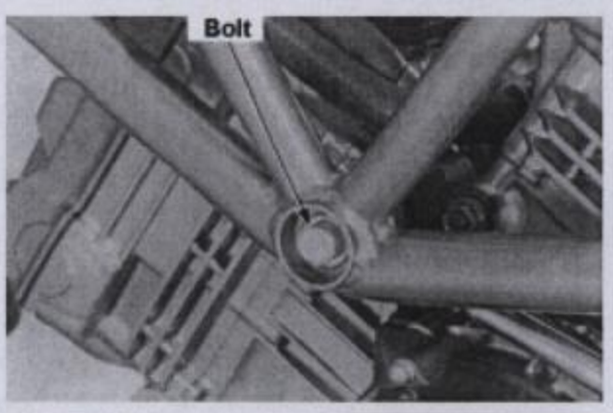
Adjust the jack so as not to apply load to the engine mount bolt.



Remove right/left front engine mount bolt caps.

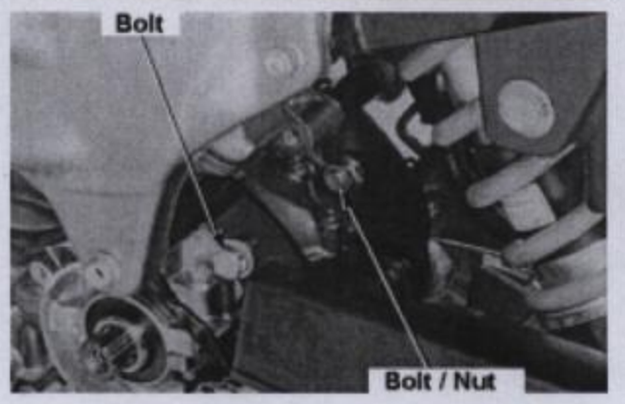


Remove right/left front engine mount bolts/washers and collars.



Unscrew left rear engine hanger bolt.

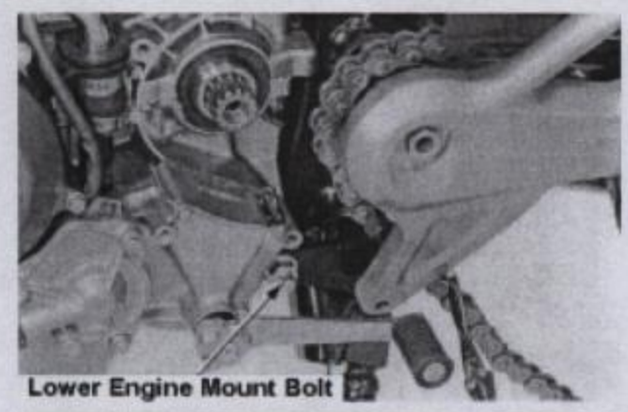
Unscrew right rear engine hanger bolt/nut.



Push the swing arm pivot bolt to the left and off-set the hole on the lower part of the step from the engine mount bolt.

Unscrew lower engine mount bolt/nut.

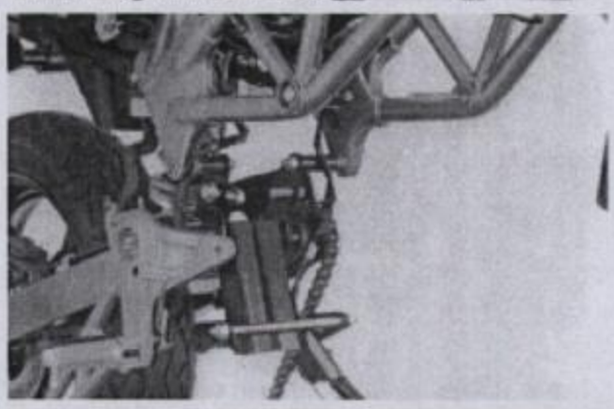
Remove the engine.



Engine Installation

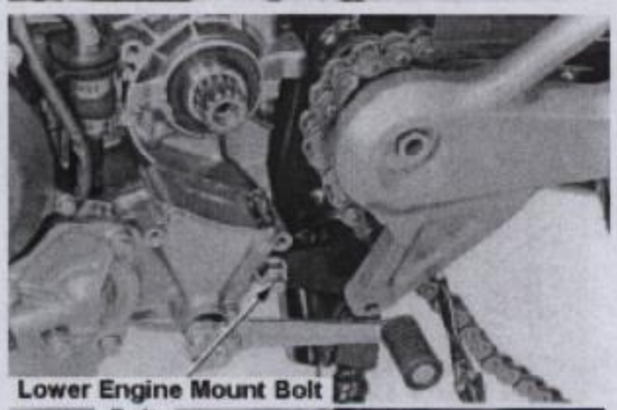
Notes

Adjust the jack and align all mount joints. Do not damage the engine, the frame drive chain, cables and harnesses.



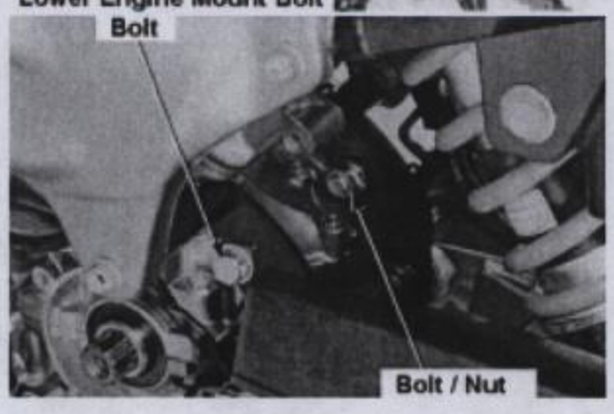
Install lower engine mount bolt/nut and screw to the specified torque.

Torque: 42Nm (4.3kgf-m)

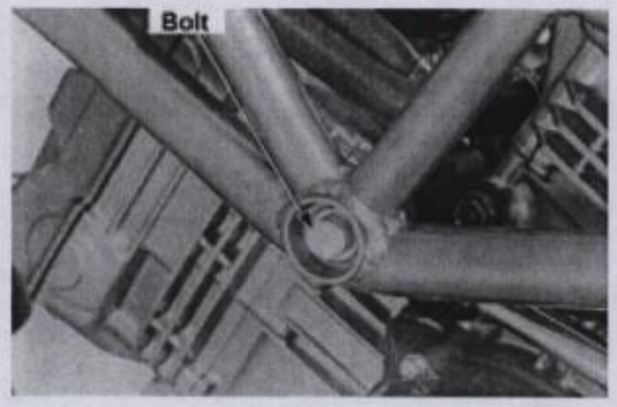


Install/secure the right rear engine mount bolt/nut.
Torque: 54Nm (5.5kgf-m)

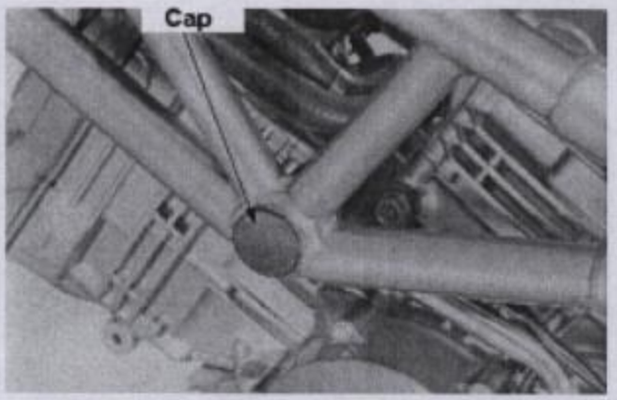
Install/secure the left rear engine mount bolt.
Torque: 54Nm (5.5kgf-m)



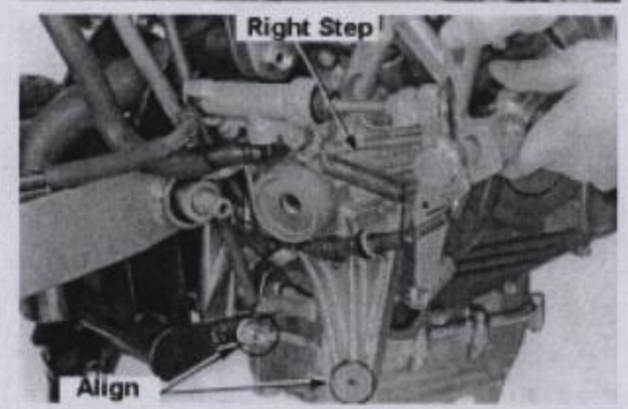
Install/secure right/left front engine mount bolts / washers / collars.
Torque: 74Nm (7.5kgf-m)



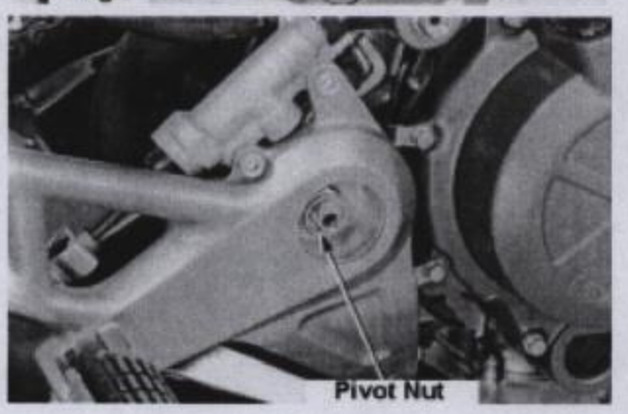
Install right/left front engine mount bolt caps.



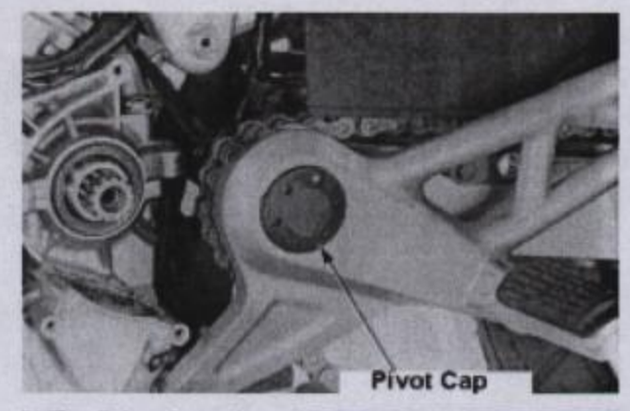
Align the hole on the lower end of the right step with a lower engine mount bolt to install the right step and its washer.



Secure the pivot nut.
Torque: 88Nm (9.0kgf-m)



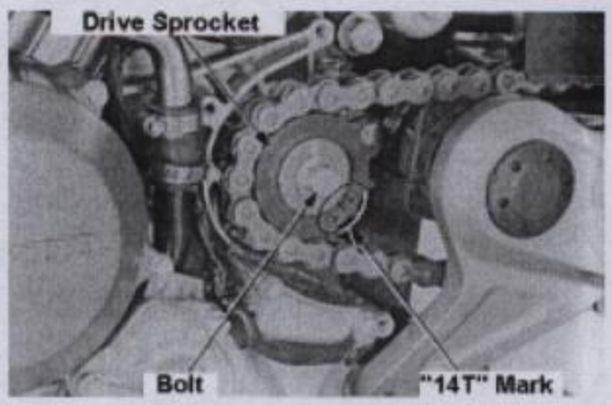
Install right/left pivot caps.



Set drive chain to a drive sprocket and install it to the countershaft.

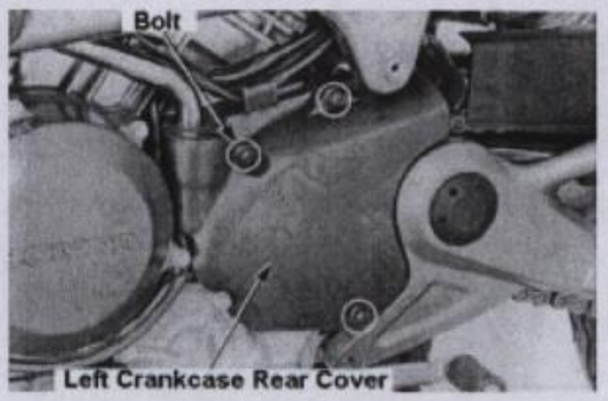
Notes

Face "14T" mark on the drive sprocket outwards.

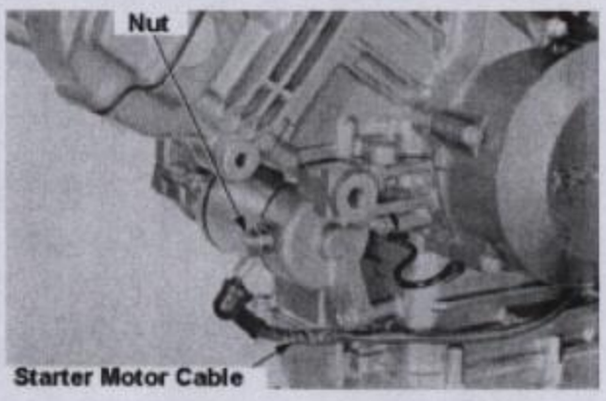


Secure the drive sprocket bolt.
Torque: 51Nm (5.2kgf-m)
Adjust the drive chain (3-9).

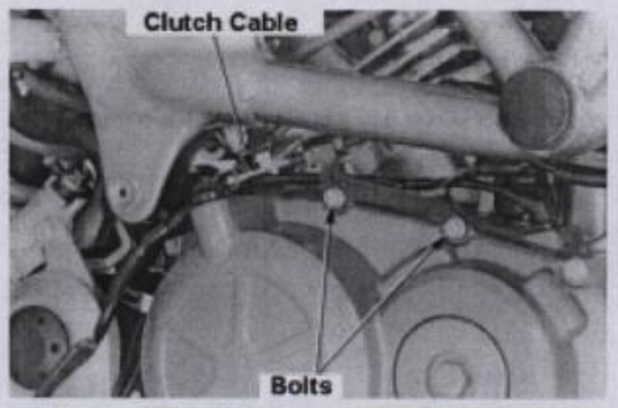
Install a left rear crankcase cover and secure three bolts.



Connect a starter motor cable and secure a starter motor terminal nut.
Torque: 12Nm (1.2kgf-m)

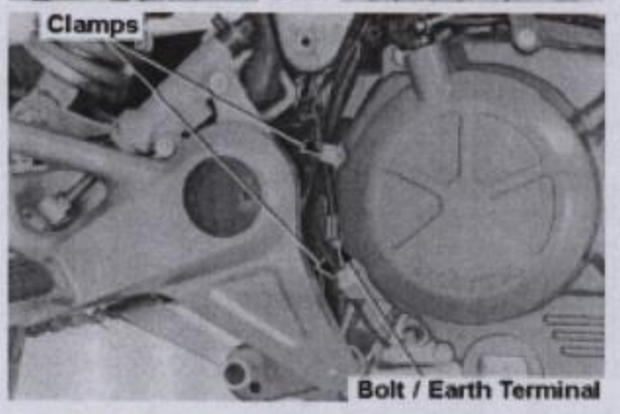


Connect a clutch cable and secure two bolts.
Adjust free play of the clutch lever (3-8).

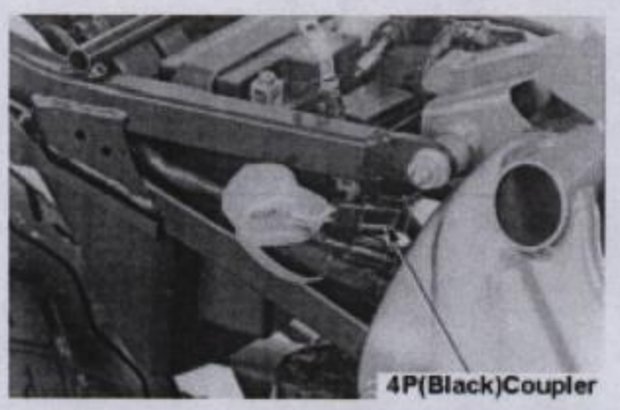


Install an earth terminal and secure a bolt.
Torque: 12Nm (1.2kgf-m)

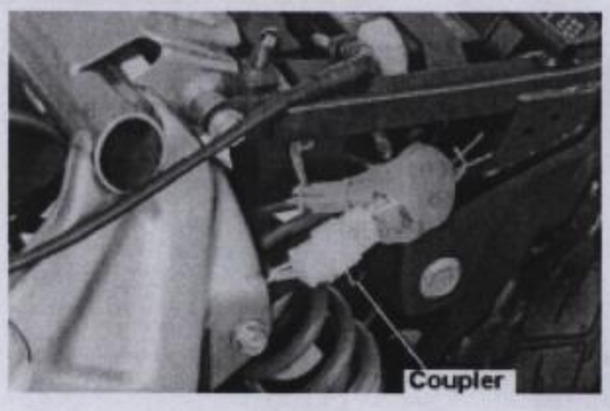
Install wire clamps.



Connect a pulse generator / neutral switch / oil pressure switch coupler (4P Black).

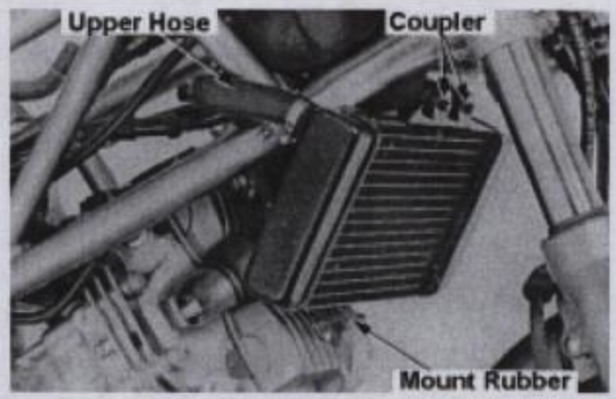


Connect an alternator coupler (3P White).

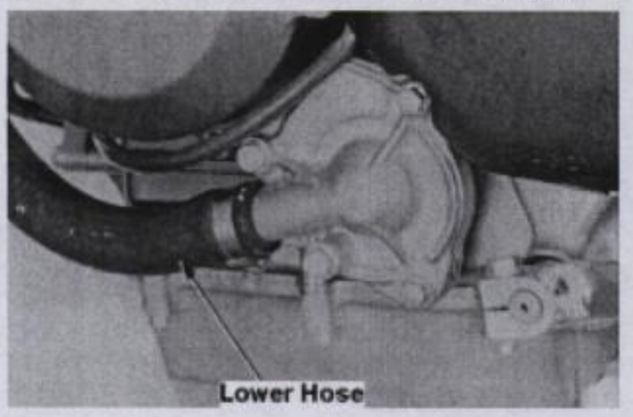


Install a radiator and set a mount rubber to a cylinder head mount bolt.
Secure the radiator upper mount bolt.
Torque: 12Nm (1.2kgf-m).

Connect a radiator upper hose.

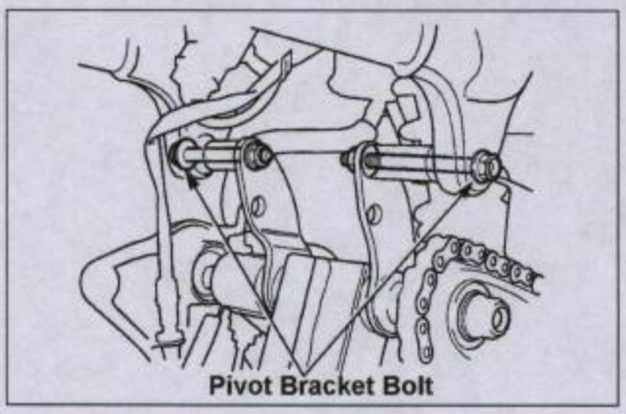


Connect a radiator lower hose.



Notes

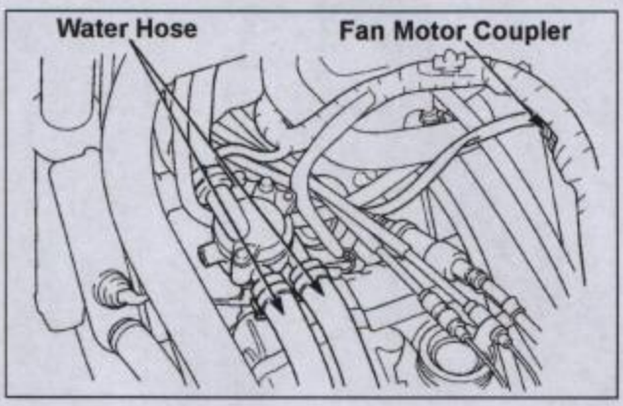
Confirm the torque of pivot bracket bolts after installing the engine.
Torque: 44Nm (4.5kgf-m)

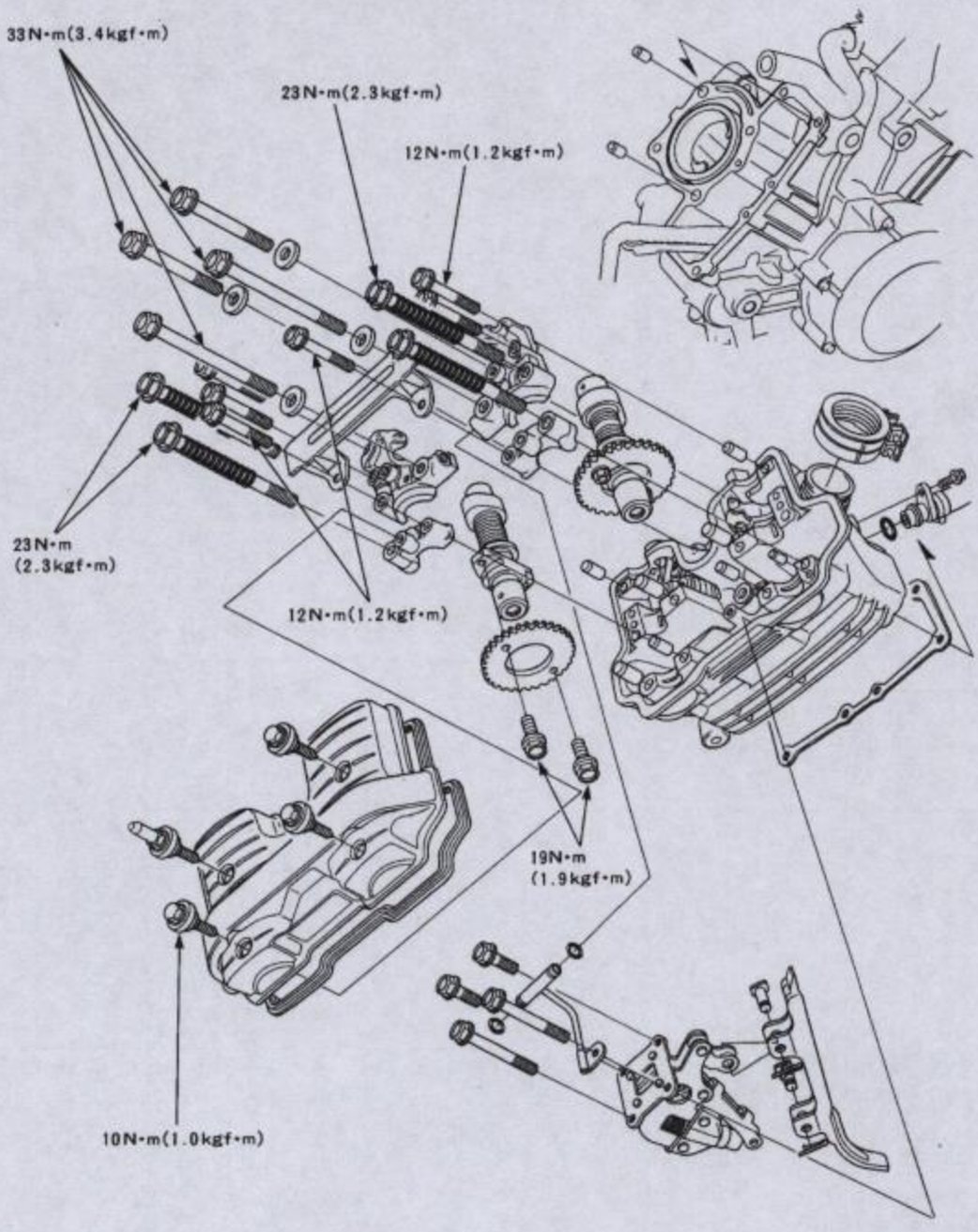


Connect a cooling fan motor coupler.
Connect water hoses to the thermostat.

Fill engine oil and coolant (3-15, 5-4).

Install the following parts:
- Muffler (2-5)
- Carburettor (6-18)



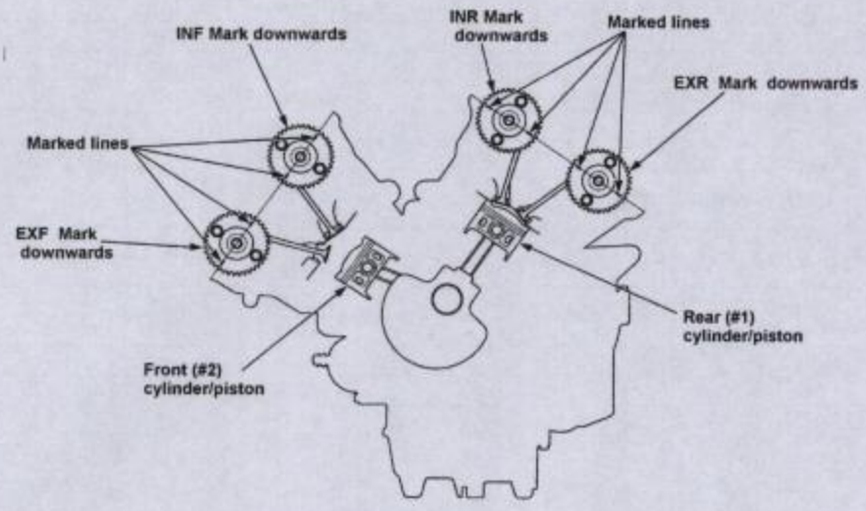

33N·m(3.4kgf·m)
23N·m(2.3kgf·m)
12N·m(1.2kgf·m)
23N·m
(2.3kgf·m)
12N·m(1.2kgf·m)
19N·m
(1.9kgf·m)
10N·m(1.0kgf·m)

Service Information.....	8 – 1	Cylinder Head Disassembly.....	8 – 13
Troubleshooting.....	8 – 3	Valve Guide Replacement.....	8 – 16
Cylinder Compression Measurement..	8 – 4	Valve Seat Adjustment.....	8 – 17
Valve Clearance.....	8 – 4	Cylinder Head Assembly.....	8 – 20
Cylinder Head Cover Removal.....	8 – 6	Cylinder Head Installation.....	8 – 22
Cam Shaft Removal.....	8 – 7	Cylinder Head Cover Installation.....	8 – 29
Cylinder Head Removal.....	8 - 11		

Service Information

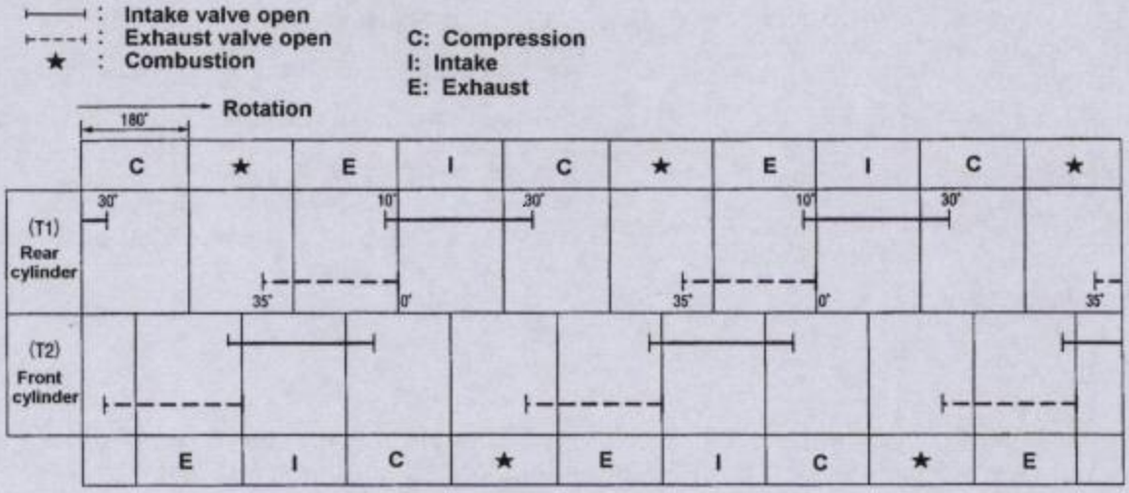
General

- Front camshaft / cylinder head can be serviced without removing the engine from the frame, while the rear camshaft / cylinder requires engine removal (Sec. 7).
- Apply Molybdenum Disulphide to the cam journal and the cam shaft slipper when assembling.
- Oil is supplied to the camshaft through the oil passage in the cylinder head. Clean the passage when assembling. After installing cylinder heads, supply oil to the oil reservoir in the cylinder head.
- Mark and sort all removed parts.
- Clean removed parts with compressed air and dry them before measuring.
- Do not damage the mating surface or the cylinder head when removing cylinder heads.
- Align the starter clutch TI mark to the mark on the right crankcase cover. The valve timing is correct if the marked lines on the front/rear cam sprockets align with the cylinder top when the rear cylinder is at TDC. Refer to the figure below for the direction of each mark.



General cont.

Valve Operation



Specification

Item			Standard	Service Limit
Cylinder Compression			1,323kPa(13.5kgf/cm²)-450rpm	-
Compression difference w/ #1 and #2			200kPa (2.0kgf/cm²)	-
Cylinder head warpage			-	0.10mm
Rocker Arm	Rocker arm shaft hole bore		10.000 – 10.015mm	10.025mm
	Rocker arm shaft diameter		9.972 – 9.987mm	9.962mm
Valve Clearance		IN	0.17 ± 0.03mm	-
		EX	0.22 ± 0.03mm	-
Cam Shaft	Cam lobe height	IN	32.4612 – 32.6212mm	32.4412mm
		EX	32.3085 – 32.4685mm	32.2855mm
	Runout		-	0.02mm
	Journal diameter (centre)		21.861 – 21.882mm	21.851mm
	Journal diameter (ends)		21.949 – 21.970mm	21.939mm
	Journal oil clearance (centre)		0.118 – 0.181mm	0.201mm
	Journal oil clearance (ends)		0.030 – 0.091mm	0.111mm
Valve Spring	Relaxed length	IN	36.47mm	34.77mm
		EX	36.47mm	34.77mm
Valve & Valve Guide	Valve stem diameter	IN	4.975mm – 4.990mm	4.97mm
		EX	4.955mm – 4.970mm	4.95mm
	Valve guide bore	IN	5.000 – 5.012mm	5.04mm
		EX	5.000 – 5.012mm	5.04mm
	Valve stem – guide clearance	IN	0.010 – 0.037mm	0.07mm
		EX	0.030 – 0.057mm	0.09mm
	Valve seat contact width	IN	0.9 – 1.2mm	1.5mm
		EX	0.9 – 1.2mm	1.5mm
	Valve guide installation height		11.4 – 11.6mm	-

Torque setting

Cylinder head scaling bolt	32 Nm (3.3.kgfm) apply screw locker
Cam shaft holder bolt 8x130 mm	23 Nm (2.3 kgfm) apply oil to the thread and the seat
Cylinder head bolt 8x80 mm	32 Nm (3.3 kgfm) as above
Cam shaft holder 8x151 mm	32 Nm (3.3 kgfm) as above
Cam shaft holder 6x4Omm	12 Nm (1.2 kgfm) as above
Cam shaft holder 6x43mm	12 Nm (1.2 kgfm) as above
Cylinder head cover	10 Nm (1. 0 kgfm)
Cam sprocket	19 Nm (1.9 kgfm) apply screw locker
Spark plug	12 Nm (1.2 kgfm)
Timing hole cap	18 Nm (1. 8 kgfm) apply grease to the thread)
Valve adjust lock nut	10 Nm (1.0 kgfm) apply oil to the thread and the seat
Rocker arm shaft bolt	49 Nm (5.0 kgfm) apply screw locker
Carburetor insulator strap screw	1 Nm (0. 1 kgfm)
Radiator mount SH bolt	12 Nm (1.2 kgfm)

Special Tools

Valve spring compressor	07757-0010000
Valve spring compressor attachment	07959-KM30101
Valve guide driver	07942-MA60000
Valve guide reamer (5mm)	07984-MA60001
Valve seat cutter 45 IN (24mm)	07780-0010600
Valve scat cutter 45 EX (22mm)	07780-0010701
Valve seat cutter 32 IN (25mm)	07780-0012000
Valve scat cutter 32 EX (22mm)	.07780-0012601
Valve seat cutter 60 IN/EX (30mm)	07780-0014000
Cutter holder 5mm	07781-0010400
Cam shaft lifter	07GMG-KVOOIOO
Wrench 8x9tnm	07708-0030100
Valve adjust wrench	07908-MJ60100

Troubleshooting

- The cylinder head-related troubles can be identified from the compression measurement (8-4) and the noise from the top of the cylinder.
- If it is difficult to start or idling is unstable, inspect the cylinder head cover breather pipe for smoke. If smoke is coming out, it is suspected that the piston cylinder is worn/damaged/stuck.

Unstable Idling:
- Too low compression
- Oil leak

Too low compression:

Valve
- Improper valve clearance
- Burnt or worn valve
- Improper valve timing
- Damaged valve spring
- Faulty valve seat contact

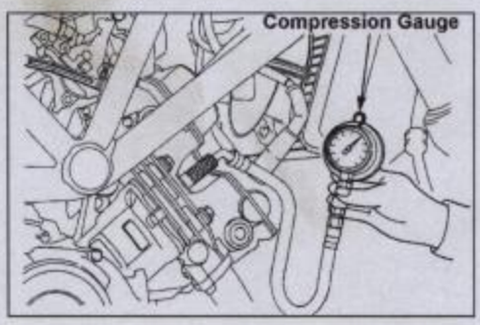
Cylinder Head
- Blown cylinder head gasket
- Warped / cracked cylinder head
- Faulty spark plug installation
- Faulty piston or cylinder (Sec. 12)

Too high compression:
- Carbon build up in combustion chambers

White smoke from a muffler
- Worn valve guide or valve stem
- Damaged valve stem seal
- Faulty piston, piston ring or cylinder (Sec. 12)

Engine noise
- Improper valve clearance
- Faulty lubrication system
- Burnt or damaged valve
- Worn or damaged camshaft
- Faulty piston (Sec. 12)
- Faulty connecting rod (Sec. 12)
- Worn/damaged cam chain tensioner and guide
- Worn/damaged cam chain and sprocket

Cylinder Compression Measurement



Notes:

Measure after warming up the engine.

Remove all spark plugs.
Connect a compression gauge.

Notes:

- Make sure there is no pressure leak at the connection.
- Do not crank for more than 7 seconds.

Fully open the throttle valve and measure the compression.

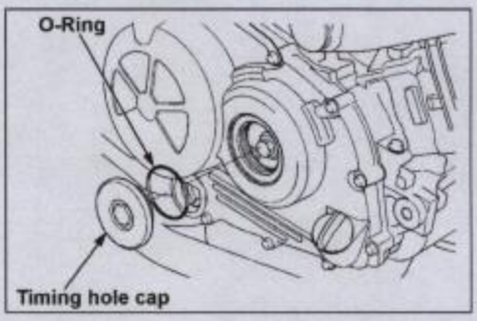
Compression: 1323kPa (13.5kgf/cm²) – 450rpm

If the compression is too high, remove carbon build up in the combustion chamber and the cylinder top surface.

If the compression is too low, apply small amount of oil from the plug hole and measure again.
If the compression increased, inspect the cylinder, the piston and the piston rings (Sec. 12).
If there is no improvement in compression, inspect the cylinder head and the valve.

Valve Clearance

Inspection / Adjustment

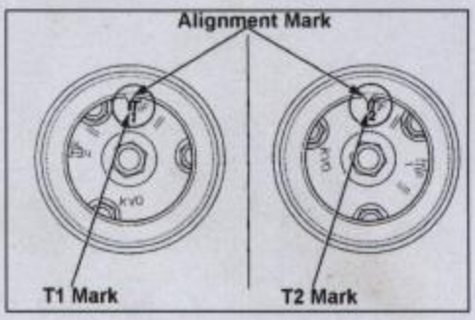


Notes:

Inspect/adjust the valve clearance when the engine is cool (below 35°c).

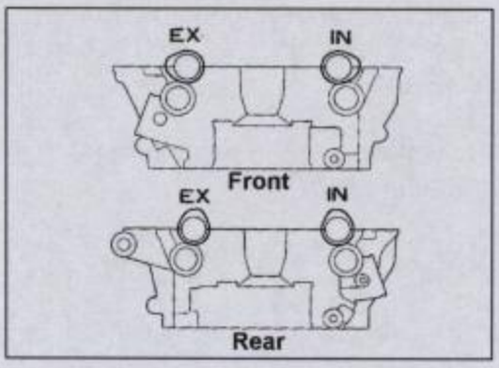
Remove front/rear cylinder head covers (8-6).
Remove a timing hole cap.

Turn the crankshaft clockwise and align T-Marks on the starter clutch (rear: T1 – front: T2) to the alignment marks on the crankcase cover.



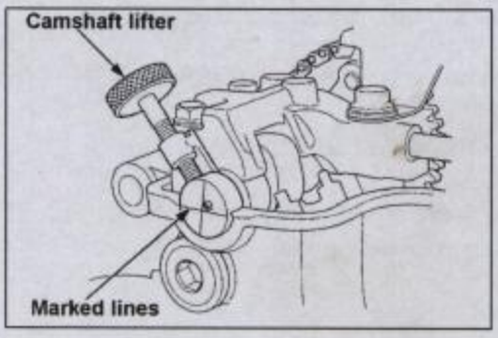
The cylinder should be at its TDC when measuring. The cam lobes should point in the directions shown in the figure.

If the cylinder is not at TDC, turn the crankshaft clockwise.



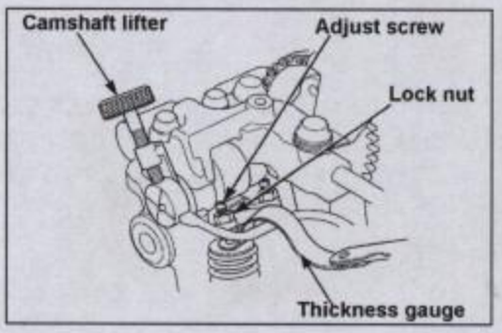
Install a camshaft lifter so as to have the marked circular line parallel to the top surface of the cylinder.

Special Tool:
Camshaft lifter 07GMG-KV00100



Insert a thickness gauge to measure the valve clearance.

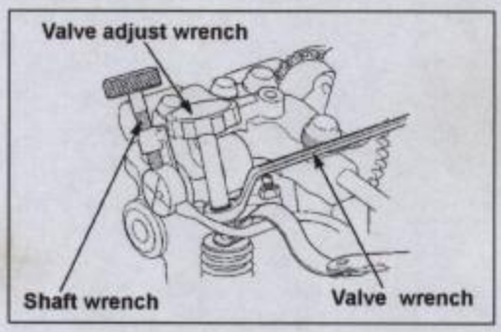
Valve Clearance:
IN: 0.17 ± 0.03mm
EX: 0.22 ± 0.03mm



Adjustment

Loosen a valve adjust lock nut and turn the adjust screw to adjust.

Special Tools:
Wrench 8 x 9mm 07708 – 0030100
Valve adjust wrench 07908 – MJ60100



Hold the adjust screw and screw the lock nut.

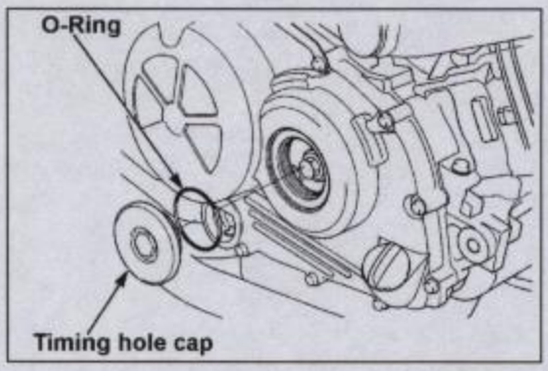
Torque: 10Nm (1.0kgf-m)

Re-measure the valve clearance after securing the lock nut.

Install the cylinder head covers (8-29).
Inspect the timing hole cap O-Ring and replace if necessary.

Apply grease to the timing hole cap thread and tighten the cap.

Torque: 18Nm (1.8kgf-m)

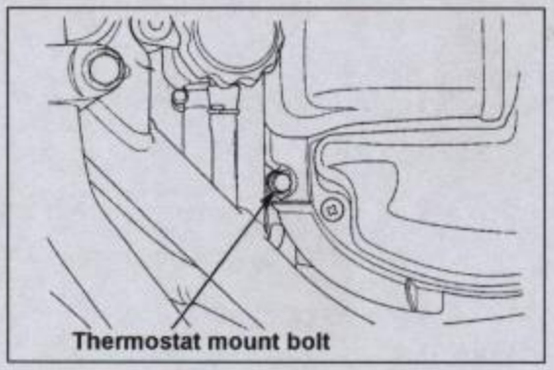


Cylinder Head Cover Removal

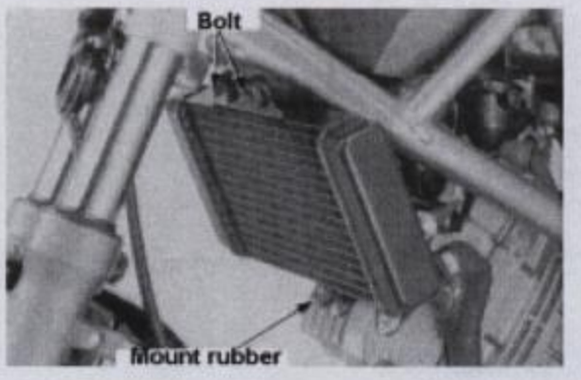
Front cylinder head cover

Remove a fuel tank (2-3).

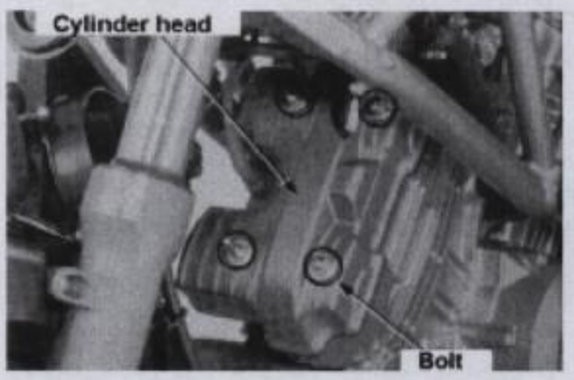
Unscrew a thermostat mount bolt and move the thermostat backwards.



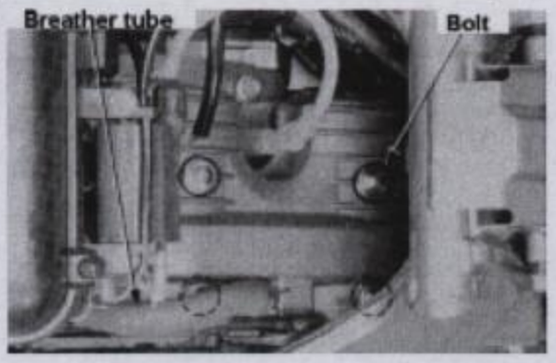
Unscrew two radiator upper mount bolts.
Remove a mount rubber from the cylinder head cover bolt and move the radiator to the right.



Unscrew four cylinder cover bolts.
Remove the cylinder head cover.

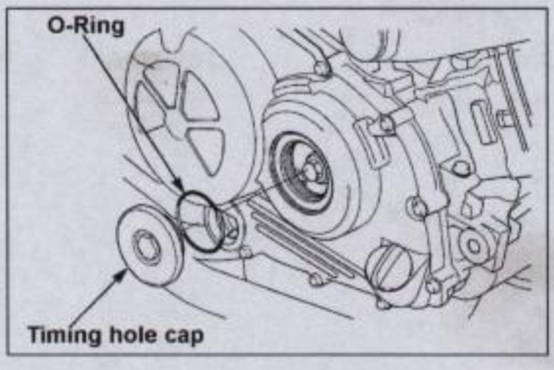


Rear Cylinder Head Cover



Remove a fuel tank (2-3).
Disconnect a cylinder head cover breather tube.
Unscrew four cylinder head cover bolts.
Remove the cylinder head cover.

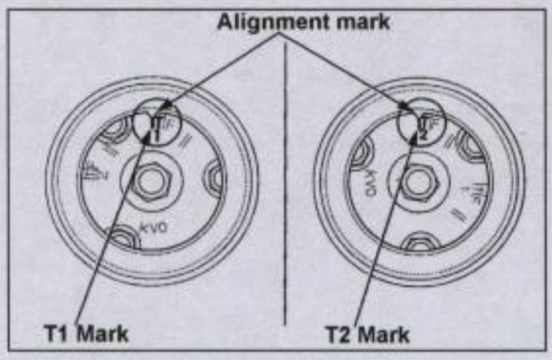
Camshaft Removal



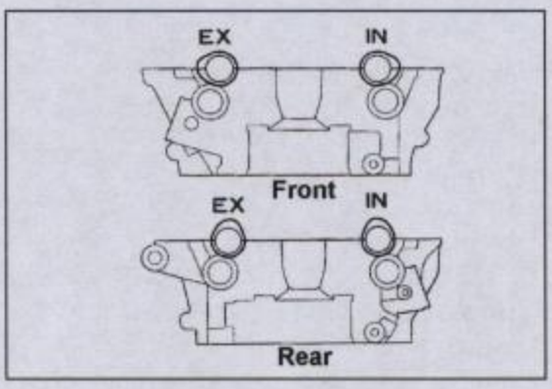
Remove a timing hole cap.
Remove a cylinder head cover (8-6).

Notes:

- The procedure describes for the front camshaft removal. Repeat the procedure for the rear camshaft removal.
- The engine may be mounted for the front, but it should be removed for the rear.



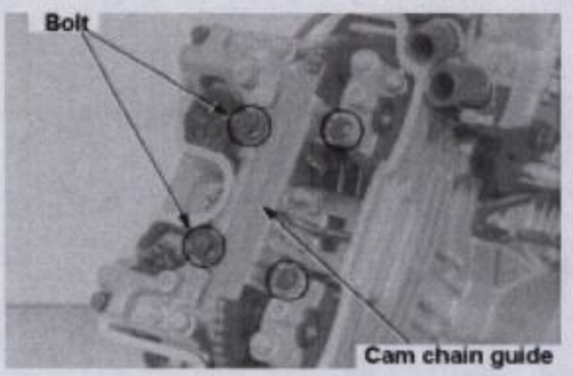
Turn the crankshaft clockwise. Align the starter clutch "T" marks (Rear: T1 – Front: T2) to the right crankcase cover alignment marks.



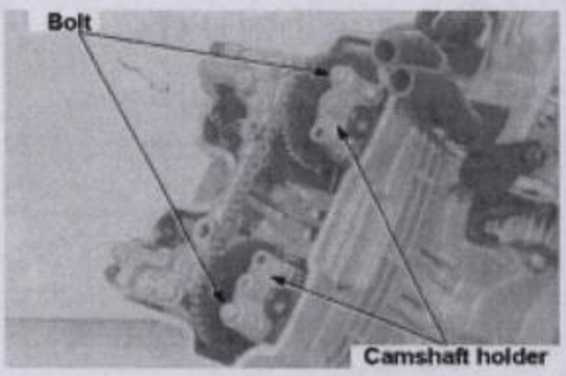
Confirm the removing cylinder is at TDC.
Its cam lobe should be facing the direction as shown in the figure.

Turn the crankshaft clockwise if it is not at TDC.

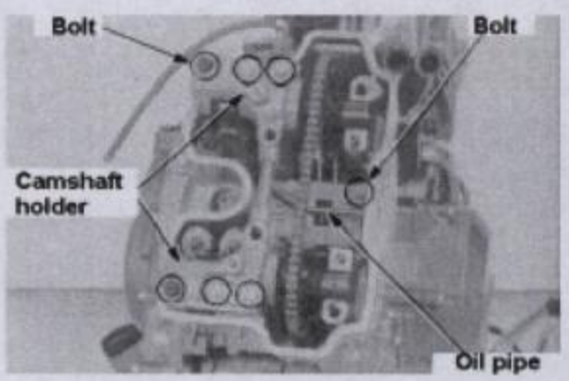
Unscrew four bolts to remove a cam chain guide.



Unscrew two bolts to remove inlet / exhaust camshaft holders.

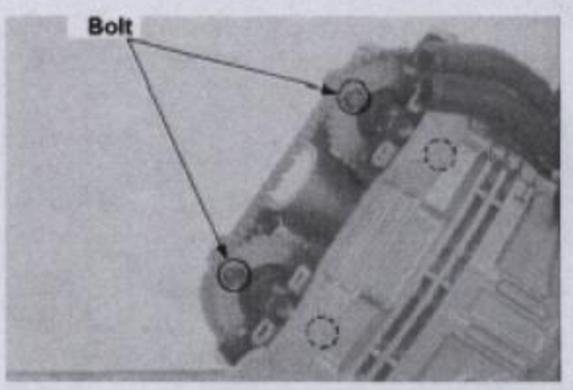


Unscrew an oil pipe bolt.
Unscrew six bolts and remove camshaft holders and the oil pipe at the same time.



Unscrew IN/EX cam sprocket bolts.

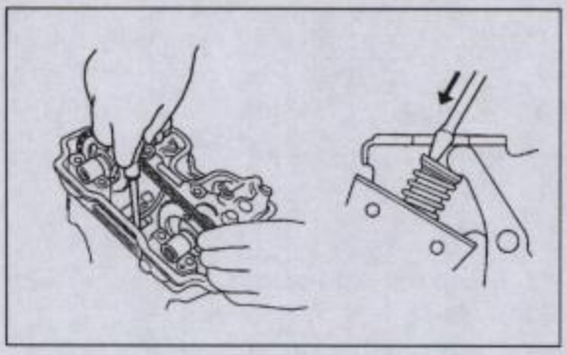
Turn the crankshaft for one rev and remove all cam sprocket bolts.



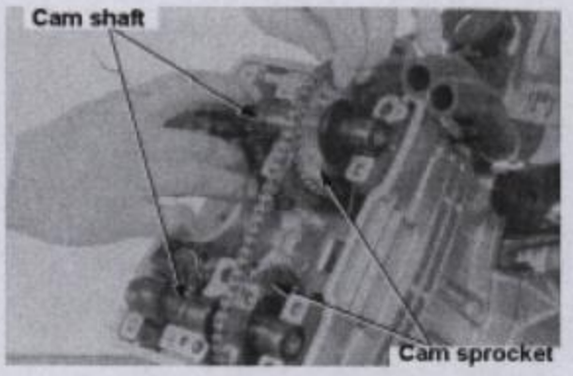
Notes:

Do not drop the sprocket bolts into the crankcase.

Slowly push down the tensioner arm A with a screwdriver a few times to drain oil in the tensioner.



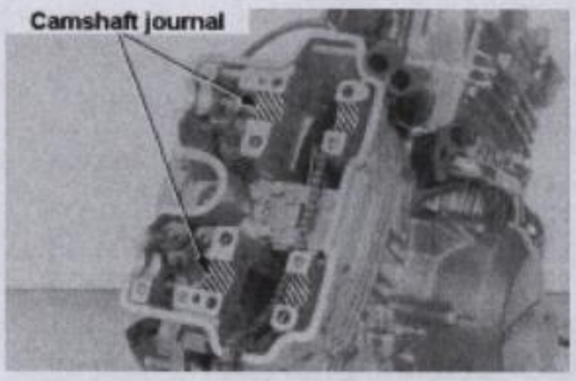
Remove cam sprockets from camshafts to remove the camshaft.



Inspection

Camshaft journal

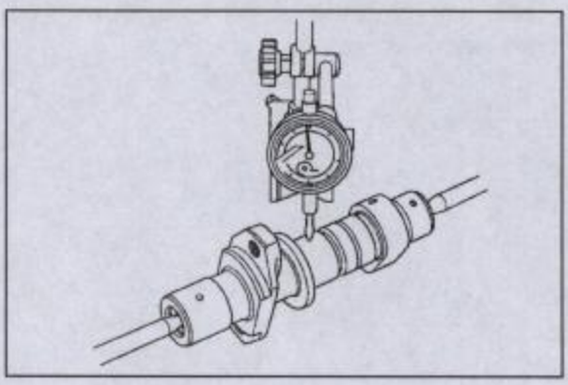
Inspect the cylinder head / camshaft holder journal surface for a scratch and separation.



Camshaft runout

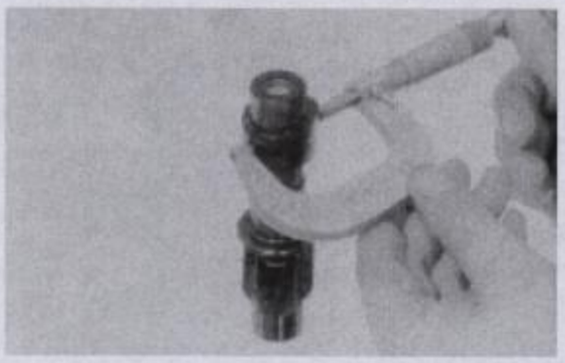
Support both ends of the camshaft with Vee-blocks and measure its runout at the centre journal with a dial gauge.
Take ½ of the reading as runout.

Service limit: 0.02mm



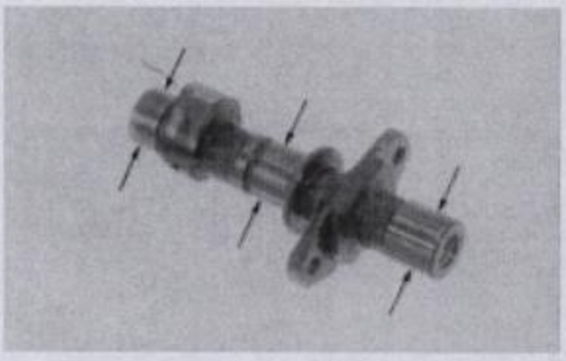
Inspect the camshaft for wear/damage.

Measure the cam lobe height with a micrometer.



Service limit: Inlet: 32.4412mm
Exhaust: 32.2855mm

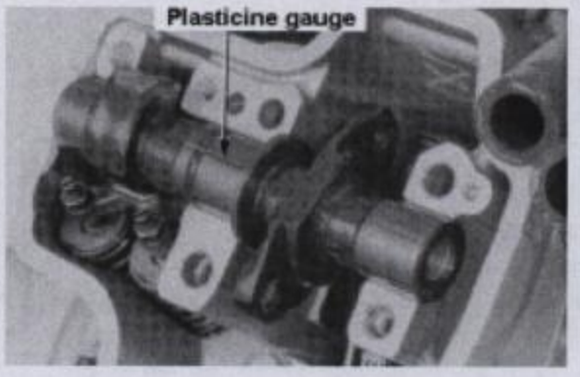
Measure the diameters of each camshaft journals.



Service limit: Centre: 21.851mm
Both ends: 21.939mm

Oil Clearance

Degrease the camshaft, cylinder head and camshaft holder journals.
Install the camshaft to the cylinder head and place a plasticine gauge on the camshaft journal.



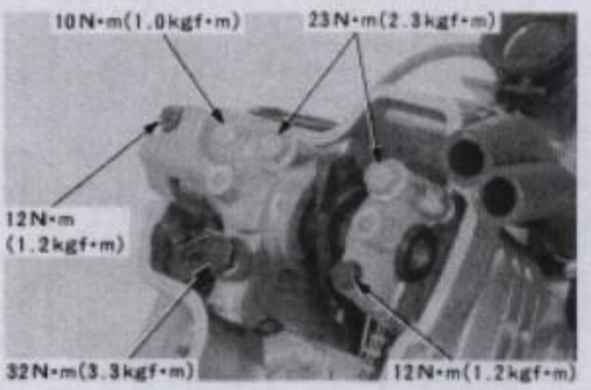
Notes:

Avoid oil hole on the shaft when placing the gauge.

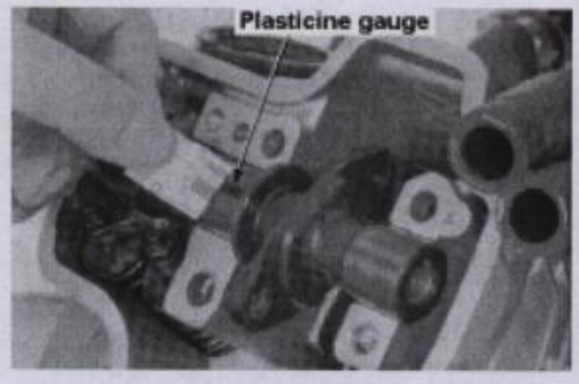
Install a camshaft holder.

Apply oil to bolts before installing them.

Screw bolts to the specified torque settings in a few sequences.



Remove the camshaft holder.
Take the maximum value of the plasticine gauges.



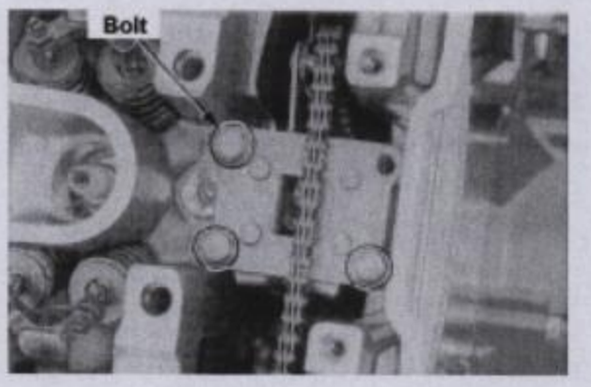
Service limit:	Centre:	0.201mm
	Both ends:	0.111mm

If the oil clearance is beyond the limit, replace the camshaft and re-measure.
If the re-measured value is still beyond the limit, replace the cylinder head.

Cylinder Head Removal

Cam tensioner removal

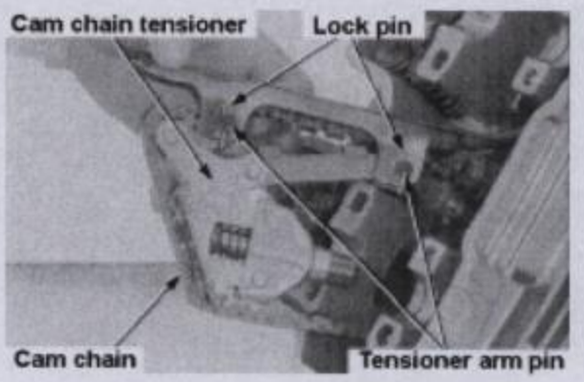
Unscrew three bolts.
Remove lock pins and tensioner arm pins.



Notes:

Do not drop the pins into the crankcase.

Remove a tensioner slipper and remove cam chain from a cam chain tensioner.



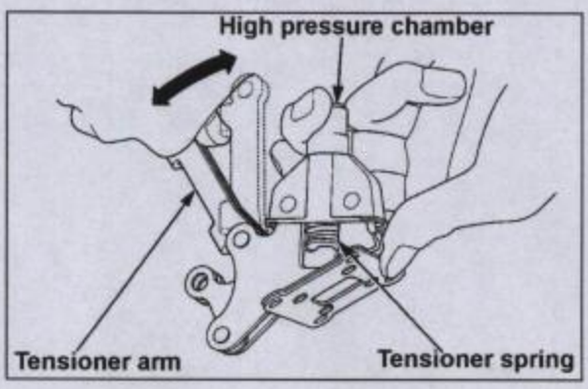
Notes:

Sling the cam chain with a wire to prevent it falling into the crankcase.

Inspection

Cam chain tensioner

Turn the cam chain tensioner upside down to drain oil from its oil chamber.
Slowly move the tensioner arm to drain oil from high pressure chamber.
Move the tensioner arm to check its spring tension.
Replace the tensioner if necessary.

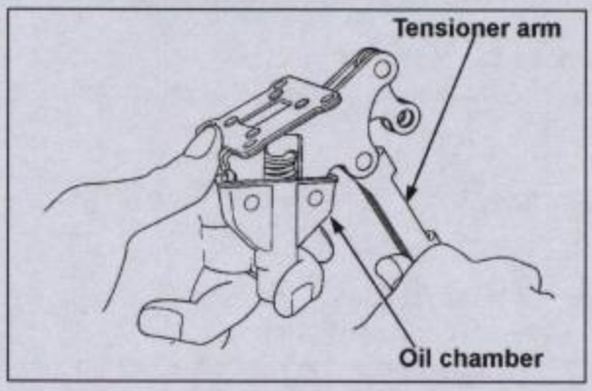


Fill oil to the tensioner oil chamber.

Slowly move the tensioner arm to fill oil to the high pressure chamber.

Confirm the arm locks when abruptly moved.
Replace the tensioner if it does not lock.

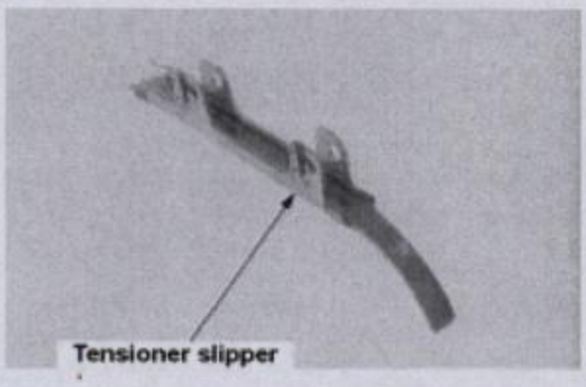
Drain oil from high pressure chamber after the inspection.



Tensioner slipper

Inspect the tensioner for wear/damage.

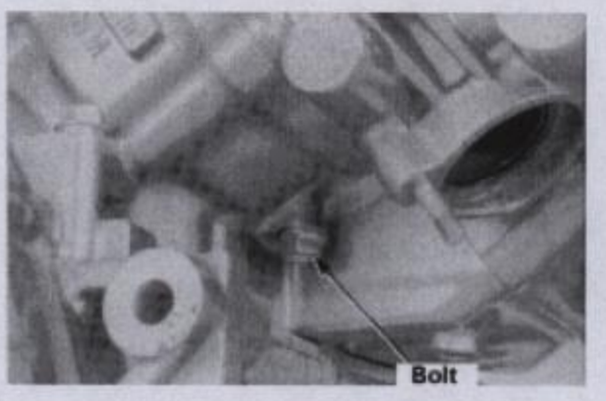
Replace it as necessary.



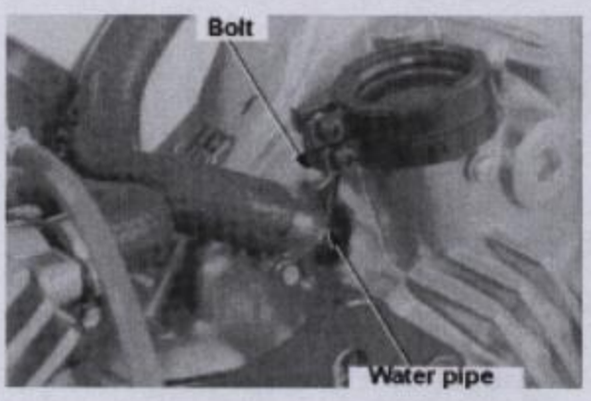
Cylinder head

Remove a carburettor (6-5).

Unscrew a bolt to drain coolant from a front cylinder.

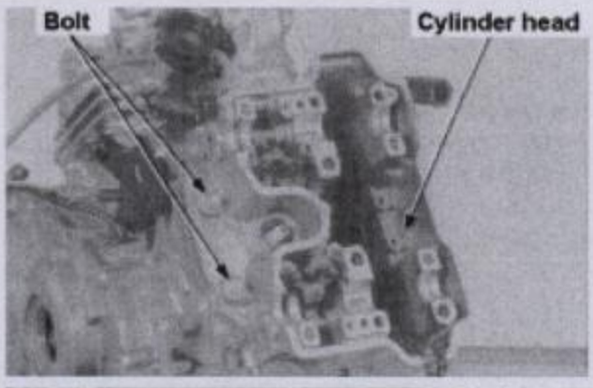


Unscrew a bolt to disconnect a water pipe.

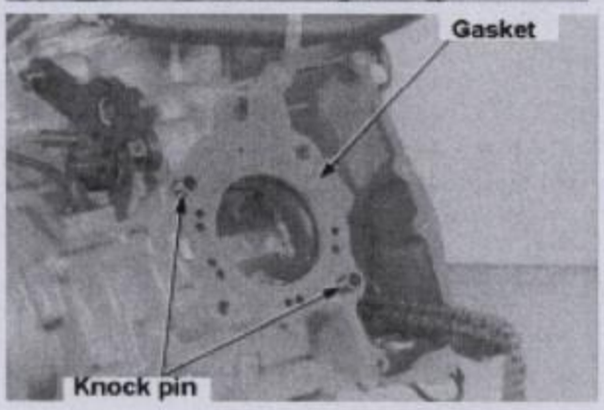


Unscrew two cylinder head bolts.

Remove the cylinder head.



Remove a gasket and knock pins.

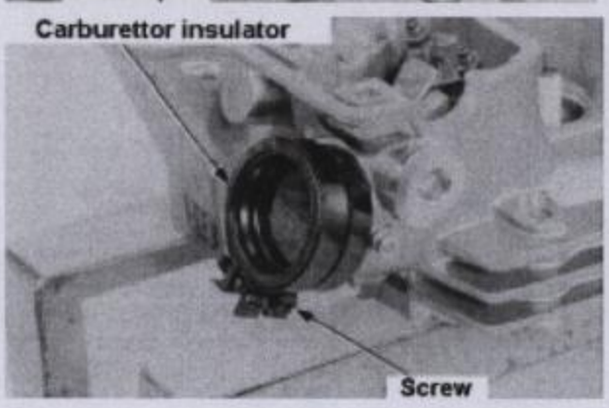


Cylinder Head Disassembly

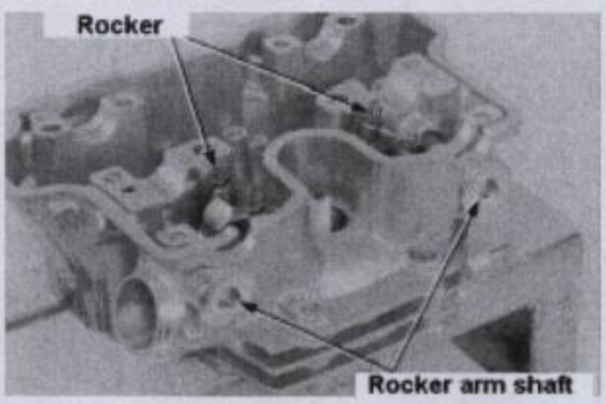
Notes:

Sort and store all removed parts.

Unscrew to remove a carburettor insulator.

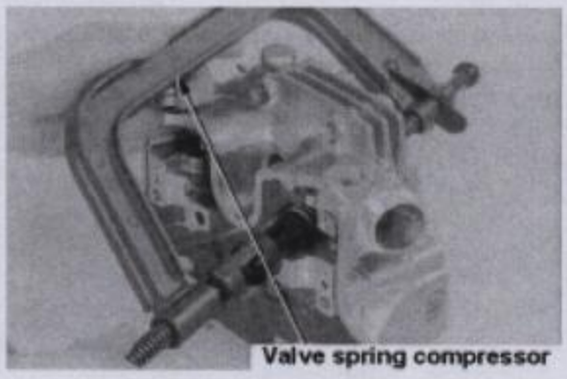


Unscrew rocker arm shaft bolts to remove spring washers and O-Rings.



Remove a valve cotter by using a valve spring compressor.

Special tools:
Valve spring compressor: 07757-0010000
Valve spring compressor attachment
07959-KM30101

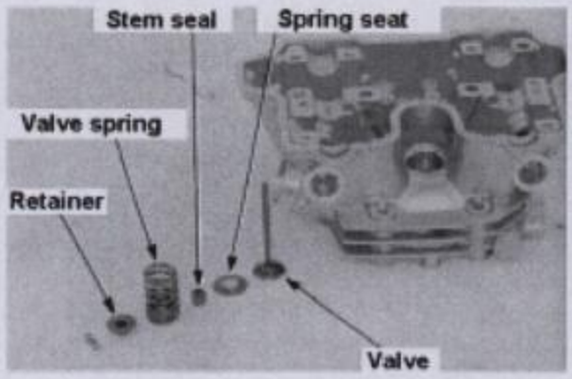


Notes:

Do not over compress the spring to avoid damaging it.

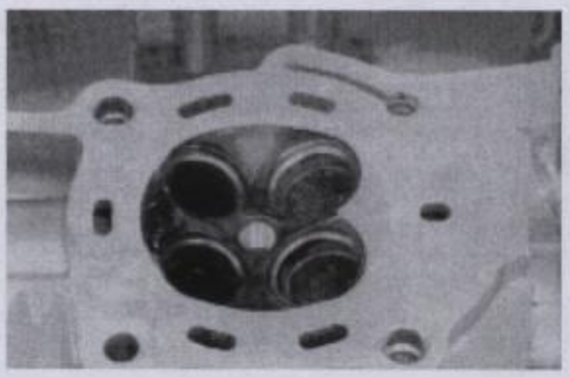
Remove the spring compressor and remove the following parts:

- Retainer
- Valve spring
- Spring seat
- Valve
- Stem seal



Notes:

Do not damage the cylinder mating surface and the valve seat.



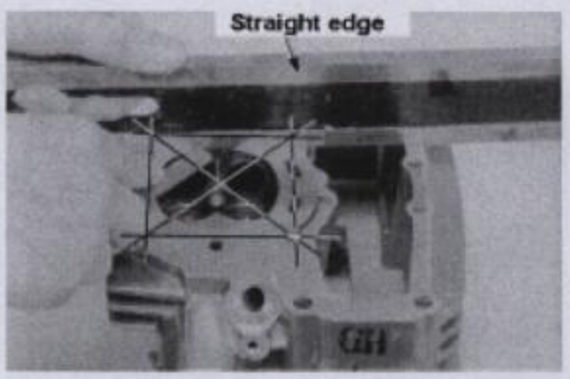
Remove carbon build up from combustion chamber.
Clean cylinder mating surface.

Notes:

Carbon can easily be removed by applying petrol.

Inspection

Cylinder head



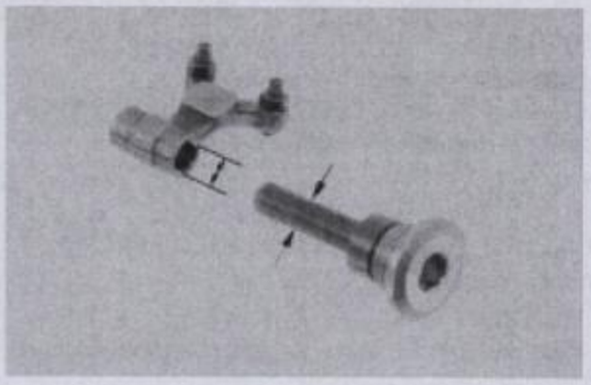
Inspect the spark plug holes and valve seats for cracks.
Measure the cylinder head warpage with a straight edge and a thickness gauge.

Service limit: 0.05mm

Rocker arm & Rocker arm shaft

Inspect the rocker arm and rocker arm shaft for wear and damage.
Measure the rocker arm shaft diameter.

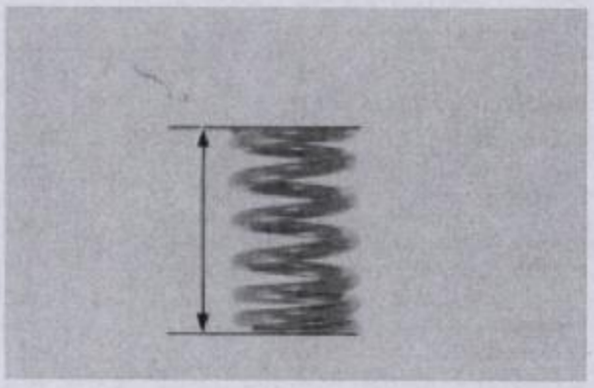
Service limit: 9.962mm
Measure the rocker arm shaft hole bore.
Service limit: 10.025mm



Valve Spring

Measure the relaxed length of the valve spring.

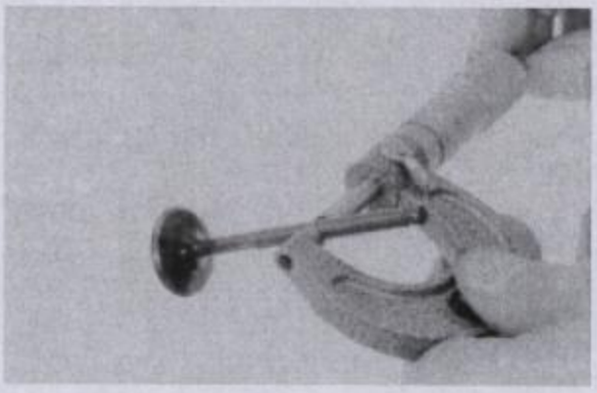
Service limit: 34.77mm



Valve Stem & Valve Guide

Inspect the valve for bending, burn and damage.
Insert the valve to the valve guide to check its operation.
Measure and record the valve stem diameter at the valve guide friction area.

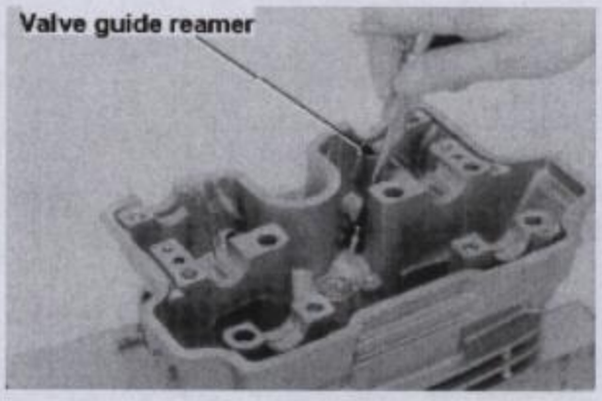
Service limit: IN: 4.97mm
EX: 4.95mm



Apply a valve guide reamer to the guide from the head cover side and remove carbon before measuring the valve guide bore.

Notes:

Rotate the reamer clockwise whenever pushing in/pulling out from/to the guide.

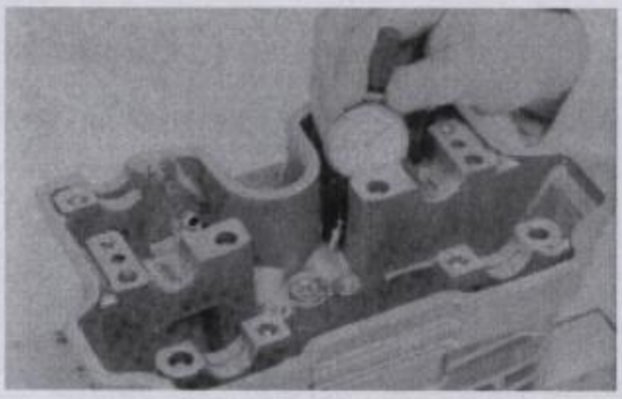


Special tool:
Valve guide reamer 5mm 07984-MA60001
Measure and record the valve guide bore.
Service limit: (IN/EX) 5.04mm

Calculate the valve – valve guide clearance

Service limit: IN: 0.07mm
EX: 0.09mm

If the clearance is beyond the limit, replace the valve.
Measure the new guide bore. If the calculated clearance is still beyond the limit, replace the valve also.



Notes:

Adjust the valve seat whenever the valve guide is replaced (8-17).

Valve Guide Replacement

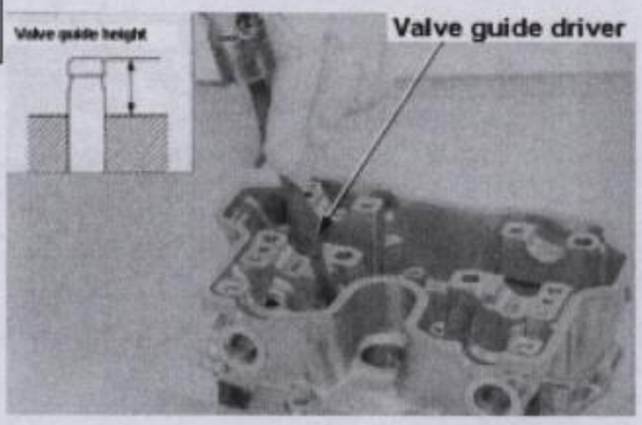
Warning:

Do not service with bare hands.

Notes:

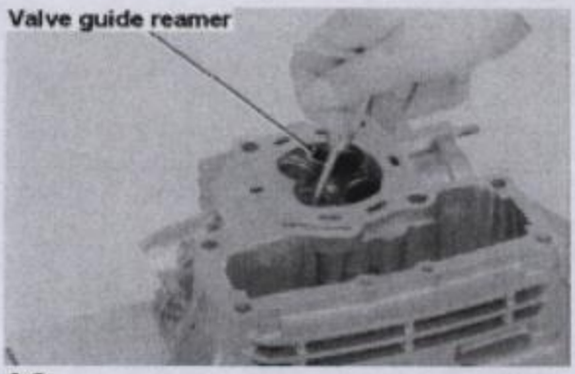
Do not warm the cylinder head with a gas burner. Such a local heating may warp the cylinder head.

Warm the entire cylinder head to 100 ~ 150°c.
Remove a valve guide from the combustion chamber side.
Special tool:
Valve guide driver: 07942-MA60000



Notes:

Do not damage the cylinder head mating surface.



Install a new valve guide from the camshaft side before the cylinder head cools down.
Special tool:
Valve guide driver: 07942-MA60000
Valve guide installation height:
IN/EX: 11.4 – 11.6mm

Wait for the cylinder to cool down. Insert the reamer from the combustion chamber to ream the valve guide of the cylinder head.

Notes:

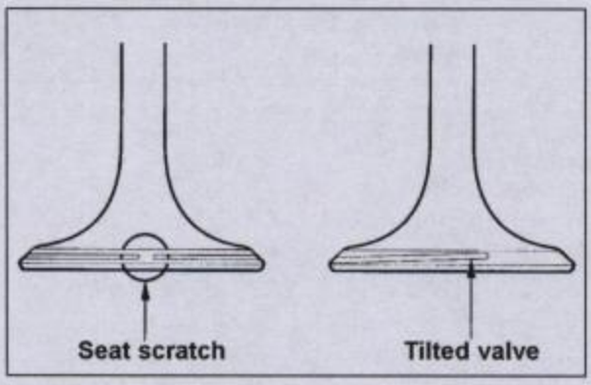
- Do not tilt the reamer to prevent incorrectable damage to the seat.
- Rotate the reamer clockwise when inserting or pulling out the reamer from the guide.

Adjust the valve seat contact width.

Valve Seat Adjustment

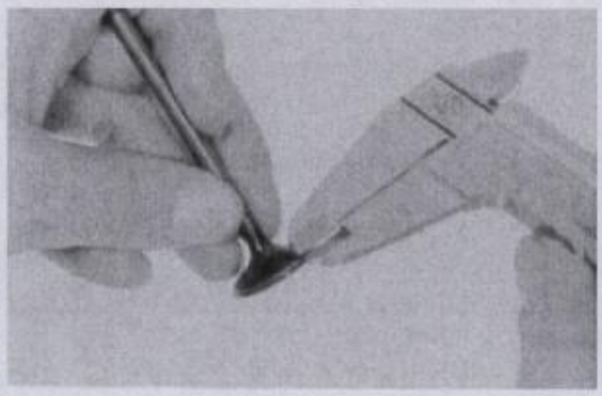
Inspection

Remove carbon build up from the valve.
Apply thin layer of red lead oxide over the valve seat.
Lap the valve seat contact area by using a hand-lapping tool.

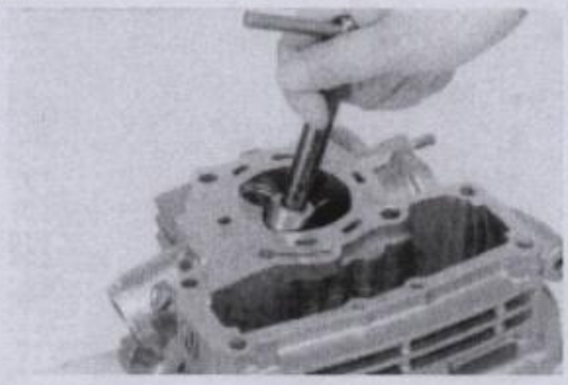


Notes:

The valve face cannot be adjusted. Should the valve face be rough or unequally worn, or not touching the seat, replace the valve.



Remove the valve and inspect the valve seat contact by observing the red oxide layer.
If there is damage on the valve seat, adjust the valve seat. If the valve is tilted, inspect the valve guide – valve stem clearance and replace the valve guide if the clearance is fine.
Measure the seat contact width.



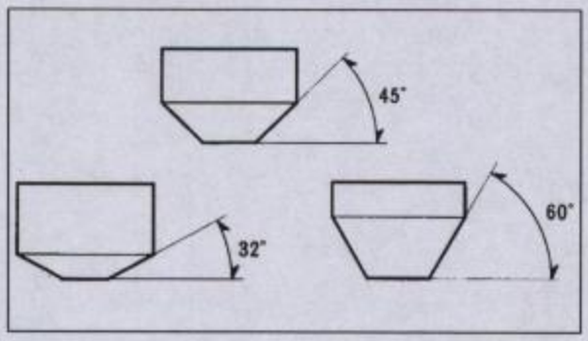
Valve seat contact width:

Standard:	0.9 – 1.2mm
Service limit:	1.5mm

Adjust the valve seat if the width is out of range or the contact is too high or low.

Valve seat adjustment

Apply 4~5kg force and turn the cutter in the same direction when adjusting.



Notes:

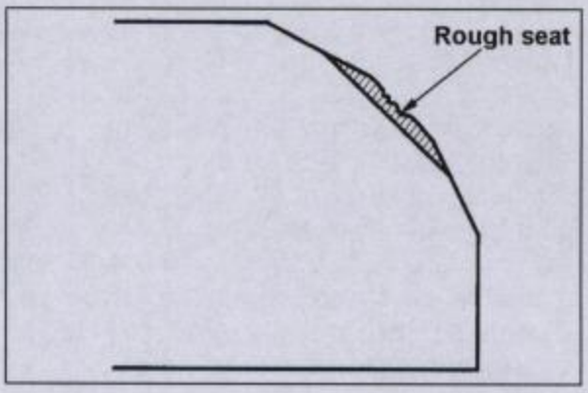
Apply engine oil to the cutter to wash off debris.

Special tools:

Valve seat cutter

45° IN (24mm)	07780-0010600
45°EX (22mm)	07780-0010701
32°IN (25mm)	07780-0012000
32°EX (22mm)	07780-0012601
60°IN/EX (30mm)	07780-0014000
Cutter holder 5mm	07781-0010400

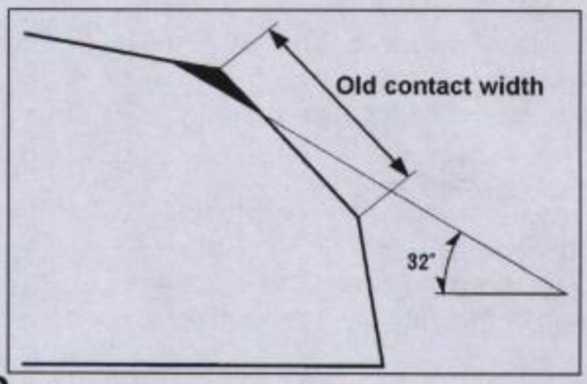
If there is roughness or scratches on the seat, grind with 45°cutter.



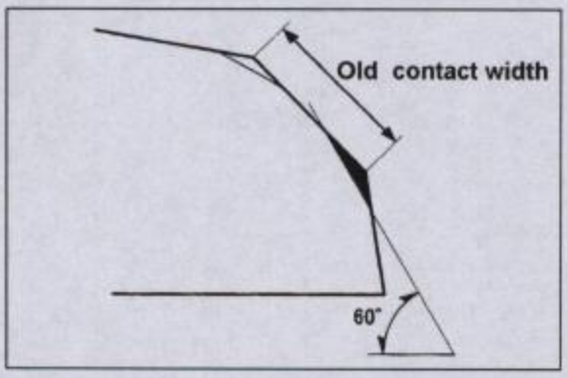
Notes:

- Grind the seat when the valve guide is replaced.
- Do not over-grind.

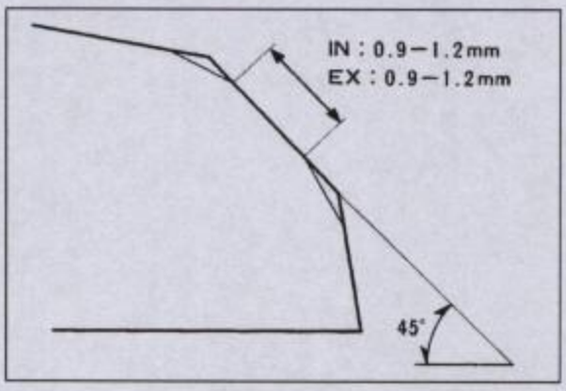
Gradually trim the flat surface with a 32°cutter.



Trim the surface with a 60° cutter.

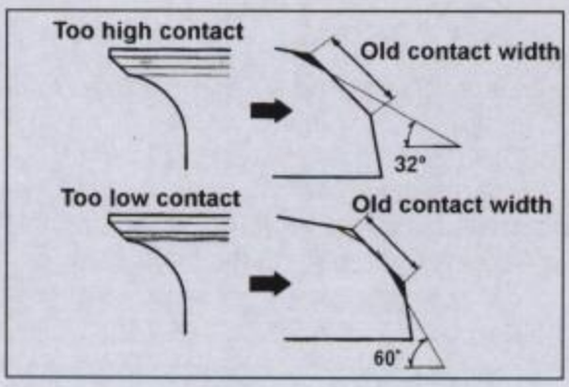


Trim the seat width to the standard with a 45° cutter.



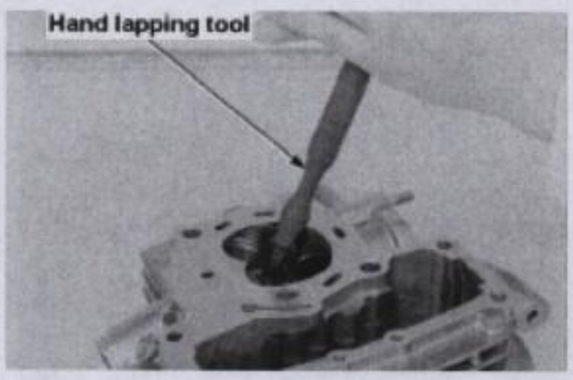
Re-check the valve seat contact.

If the contact is too high, grind with a 32° cutter and trim with a 45° cutter.
If the contact is too low, grind with a 60° cutter and trim with a 45° cutter.
Apply thin layer of valve seat compound after trimming and lap with a hand-lapping tool.



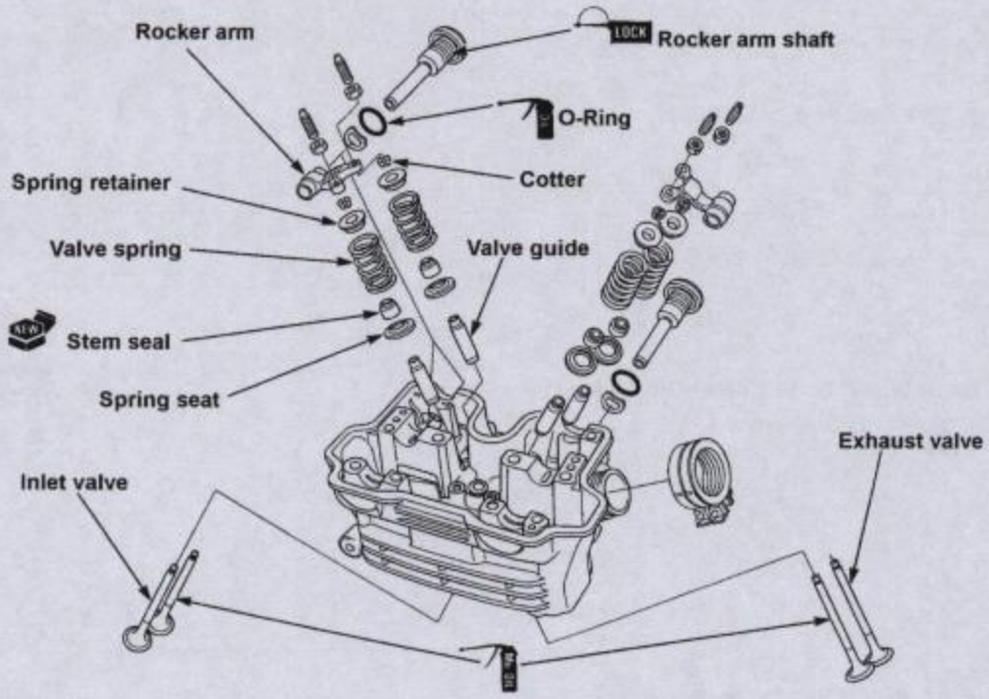
Caution

- Do not press the valve hard while lapping.
- Rotate the valve while lapping to prevent unequal wear of the seat surface.
- Do not let the compound enter the stem-guide gap.

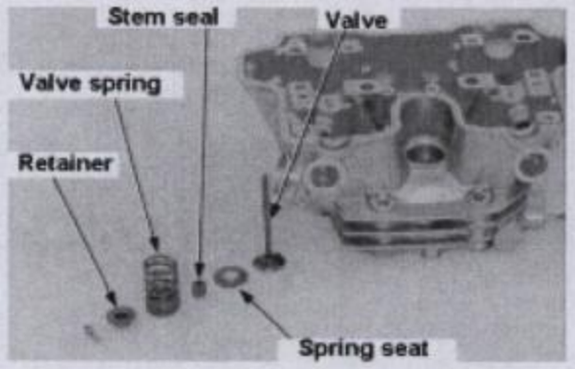


Clean the cylinder head and the valve after lapping.
Re-check the contact.

Cylinder Head Assembly

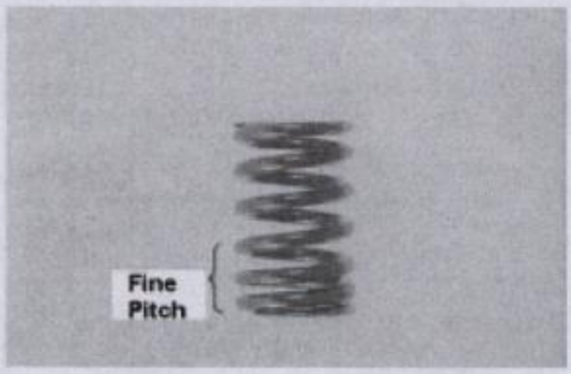


Install a spring seat and a new stem seal to the valve guide.
Apply Molybdenum solution to the interior surface of the valve stem and the valve guide.
Insert the valve to the valve guide by turning the valve to prevent damaging the stem seal.



Install a valve spring. A fine pitch side should face towards the combustion chamber.

Install a retainer.



Caution:

Do not over compress the spring to prevent damaging the valve spring.


Valve spring compressor

Notes:

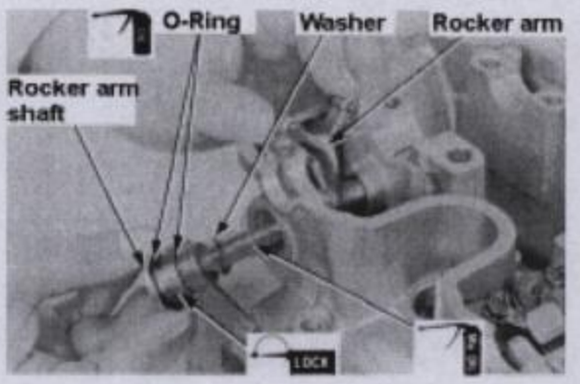
Apply small amount of grease to a valve cotter and fit it to the stem groove. This will prevent the cotter falling off.

Compress the valve spring with a valve spring compressor.

Special tool:
Valve spring compressor 07757-0010000
Valve spring compressor attachment 07959-KM30101
Install the valve cotter.
Gently hit the valve stem end to smooth the contact of the valve and the cotter.

Notes:

Do not damage the valve end.



Apply oil to the O-Ring before installing it to the rocker arm shaft.

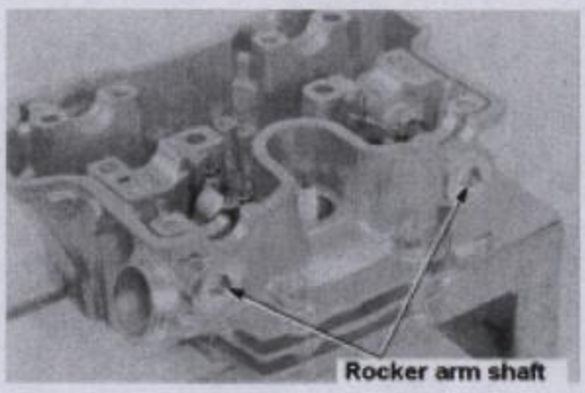
Apply Molybdenum solution to the rocker arm shaft friction surface.

Apply screw locker to the rocker arm shaft thread.

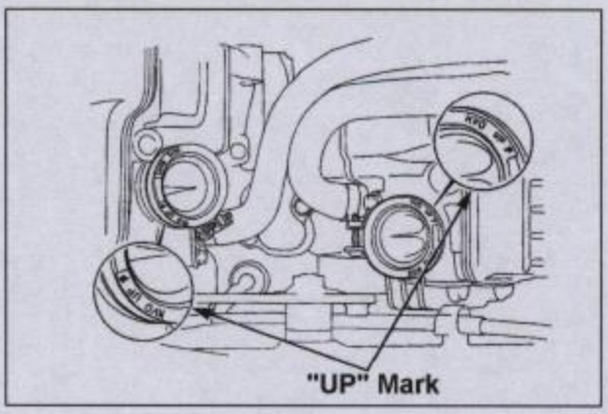
Install the rocker arm, the spring washer and the rocker arm shaft.

Tighten the rocker arm shaft to the specified torque.

Torque: 49Nm (5.0kgf-m)

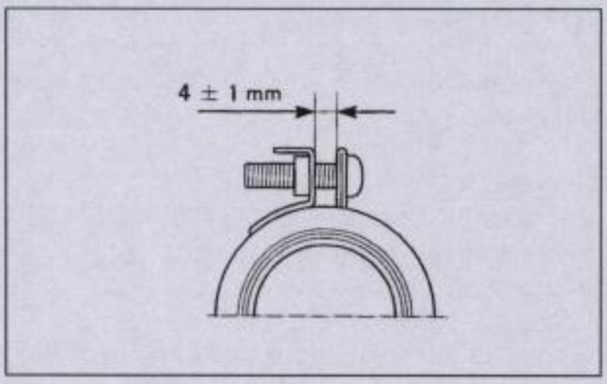

Rocker arm shaft

Install carburettor insulators by facing their "UP" marks upwards.



Tighten the screws to the specified torque.

Torque: 1Nm (0.1kgf-m)

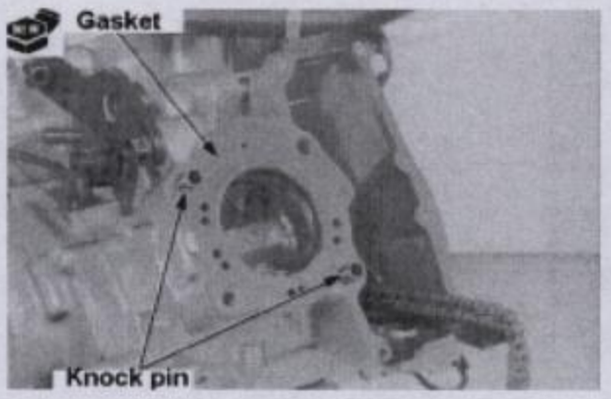


Cylinder Head Installation

Notes:

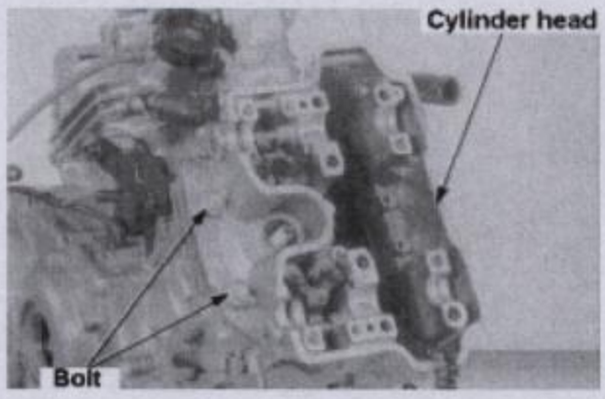
Wrap the cylinder hole and oil holes with cloths when cleaning the cylinder top to prevent dirt and debris falling into the engine.

Install knock pins and a new cylinder head gasket.

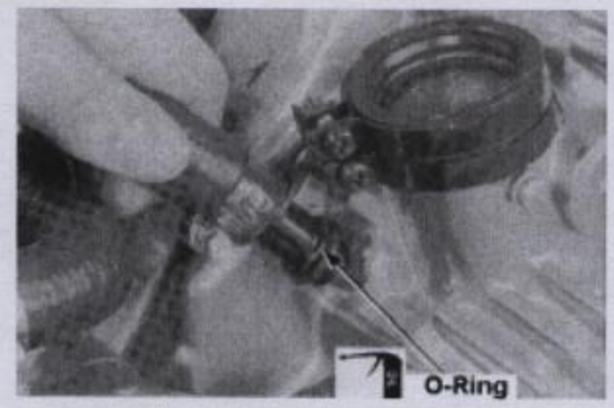


Install the cylinder head.

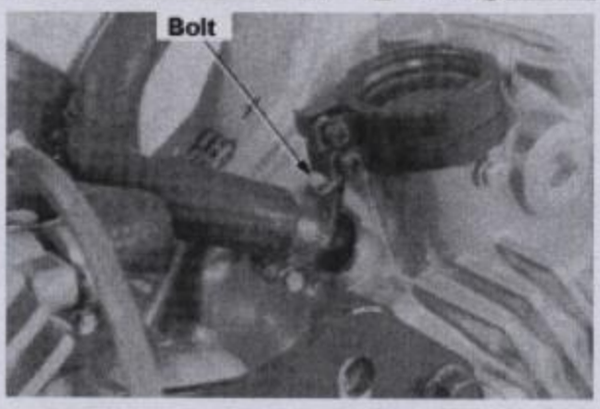
Apply oil to the cylinder head mount bolts and temporarily screw them.



Apply oil to the water pipe O-Ring before installing it.



Screw a bolt.

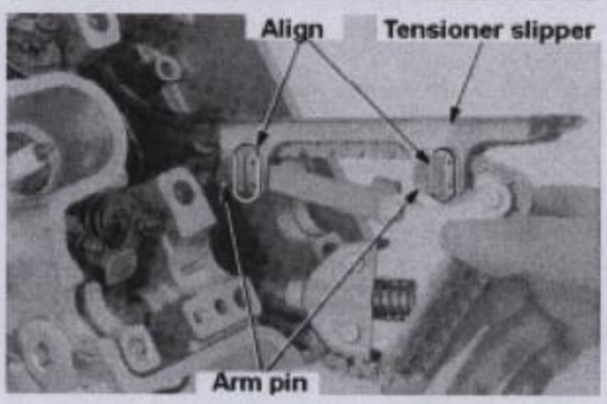


Cam chain tensioner installation

Apply cam chain to the tensioner and install a tensioner slipper.

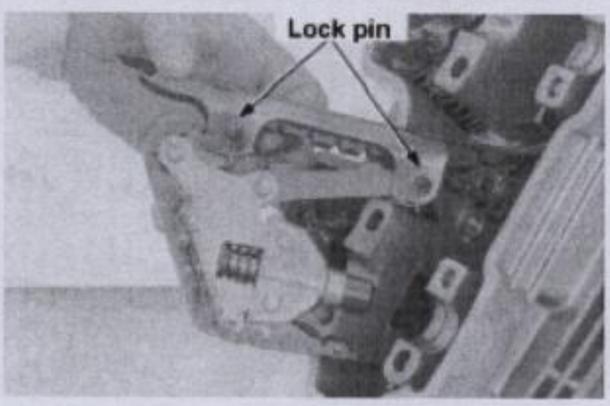
Notes:

The front cylinder tensioner arm is located at the intake side and the rear tensioner arm is at the exhaust side.

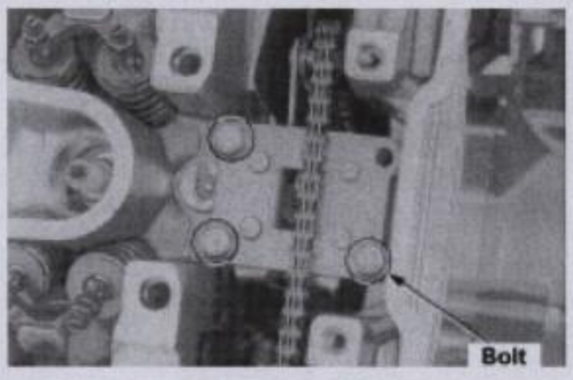


Align the pins and the flat surface of the slipper to install the arm pins.

Install lock pins.



Temporarily screw three cam tensioner bolts.



Apply Molybdenum solution to the slipper surfaces on the cam shaft journal rocker arm.

Install carburettors (6-18).
Fill coolant (5-4).

Camshaft Installation

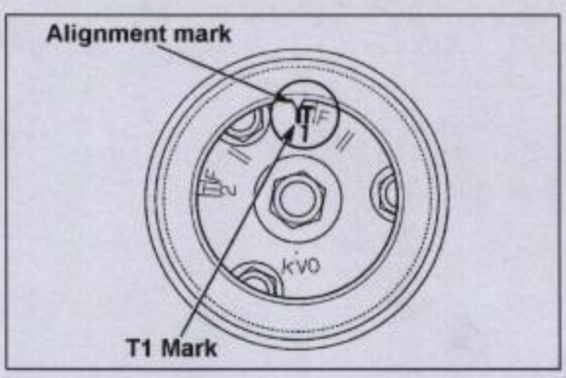
Install camshafts by referring to their identification marks.

ID Mark	Installing Position
INF	Front cylinder intake
EXF	Front cylinder exhaust
INR	Rear cylinder intake
EXR	Rear cylinder exhaust

Apply Molybdenum solution to the camshaft journal and the cam surface.

Notes:

Loosen the valve adjust screw to its full limit.

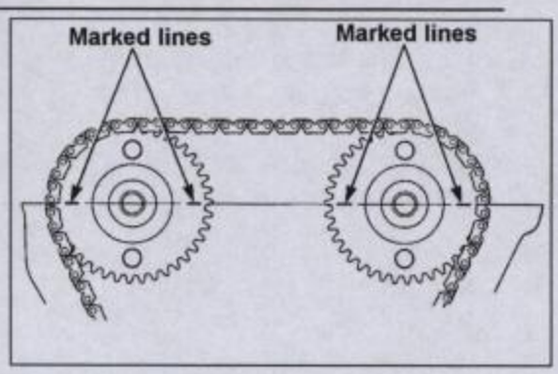


If the camshafts were removed at both front and rear

Rear:
Turn a crankshaft clockwise to align a starter clutch "T1" mark to the right crankcase alignment mark.

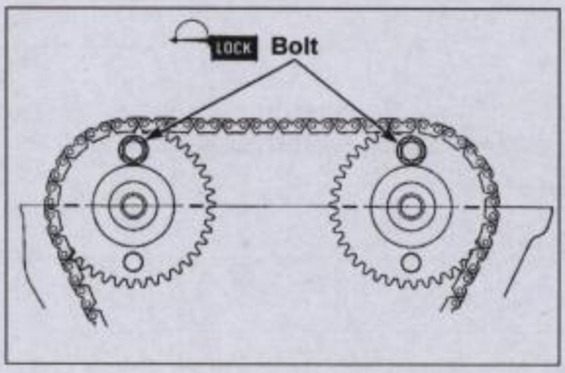
Set cam sprockets and cam chain to camshafts.
Install them to the cylinder by facing cam lobes upwards.

Adjust the cam chain and the cam sprockets so as to align the marked lines on the sprockets with the top surface of the cylinder to install.

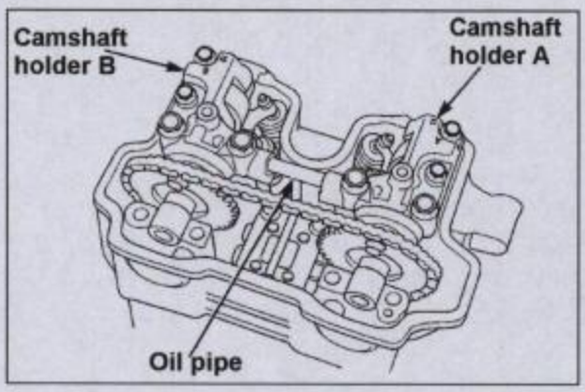


Apply screw locker to the cam sprocket bolt.

Align the bolt holes on the sprockets and the cam shafts and screw bolts until their seats touch the cam sprockets.



Apply oil to a new O-Ring and set it to the oil pipe.
Install the oil pipe to the camshaft holder and install four knock pins to the cylinder head.
Install camshaft holders and the oil pipe to the cylinder head.

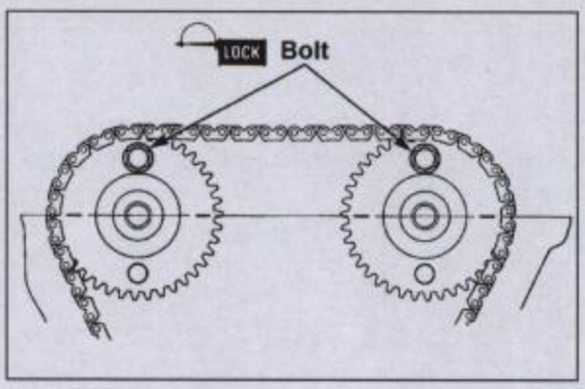


Turn the crankshaft clockwise for one rev.
Apply screw locker to the remaining two bolts and tighten them.

Torque: 19Nm (1.9kgf-m)

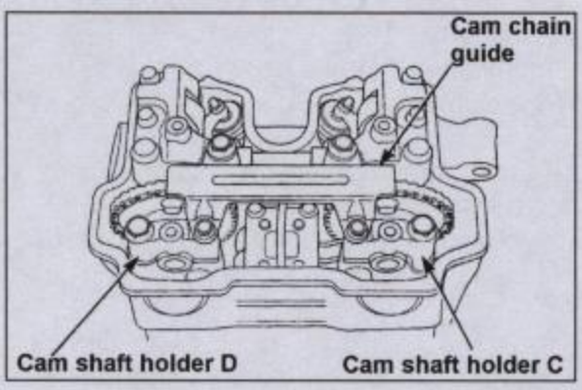
Turn the crankshaft clockwise for further one rev and screw two remaining bolts.

Torque: 19Nm (1.9kgf-m)



Install knock pins to the cylinder head and install camshaft holder Card D.

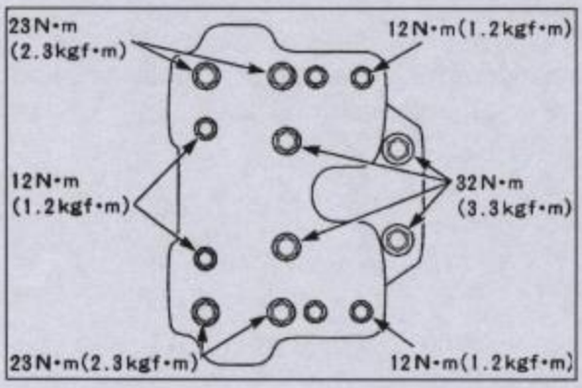
Remove two temporarily set 8mm bolts and install a cam chain guide.



Screw camshaft holder bolts and cylinder head bolts in crisscross pattern several times.

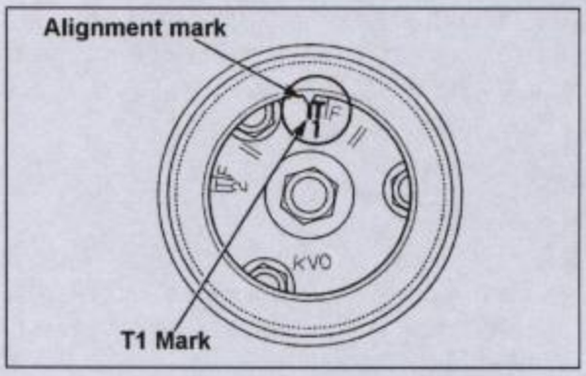
Notes:

Refer to the right for torque settings.

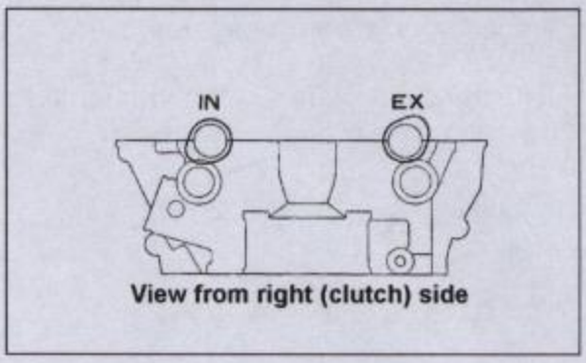


Front Side

Turn a crankshaft clockwise for one rev. Align the starter clutch "T1" mark with a right crankcase mark to bring the rear cylinder to TDC.

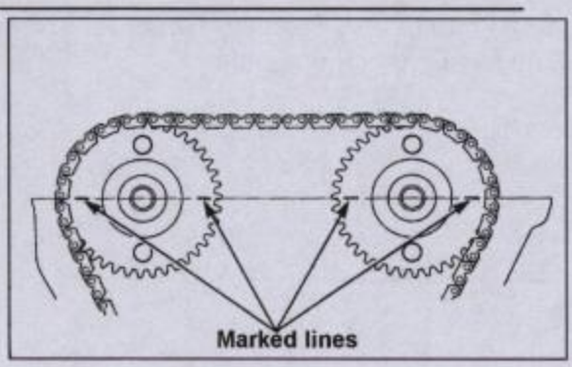


Install camshafts to the direction shown in the right figure.

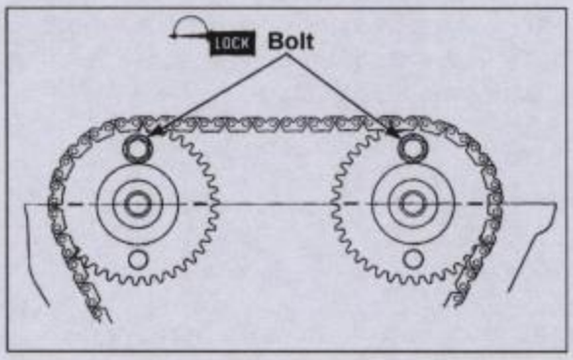


Apply cam sprockets and cam chain to the camshaft and install to the cylinder head.

Set cam chain and sprockets so as to align the marked lines on the sprockets with the top end of the cylinder head.

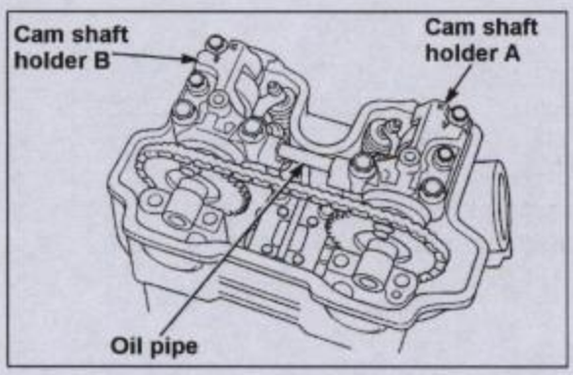


Apply screw locker to the cam sprocket bolts. Align the holes on the cam sprockets and camshafts to screw bolts until their seats touch the sprockets.



Apply oil to a new O-Ring and install it to the oil pipe.
Install the oil pipe to the camshaft holder and install four knock pins to the cylinder head.

Install camshaft holders and the oil pipe to the cylinder head and temporarily screw bolts.

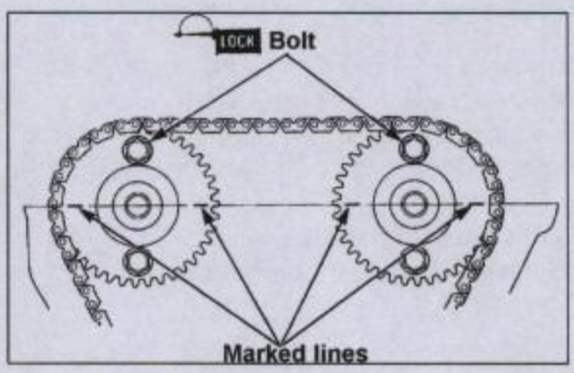


Turn the crankshaft clockwise for one rev. Apply screw locker to the remaining two bolts and screw them.

Torque: 19Nm (1.9kgf-m)

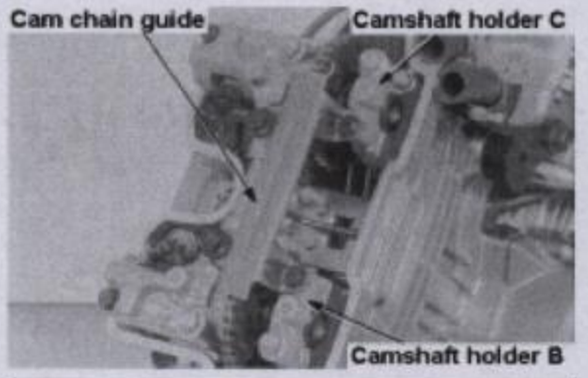
Turn the crankshaft clockwise for further one rev and screw the remaining two bolts.

Torque: 19Nm (1.9kgf-m)

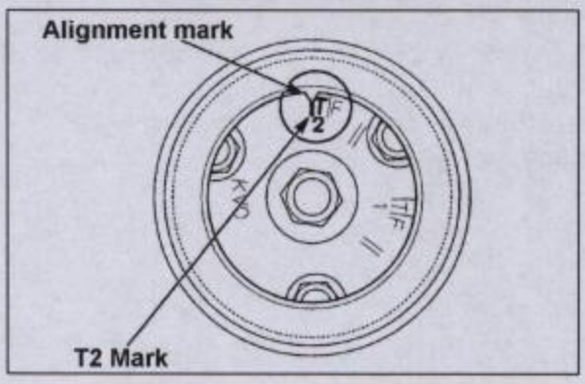


Install knock pins to the cylinder head and install camshafts C and D.

Remove temporarily installed two 8mm bolts and install a cam chain guide.



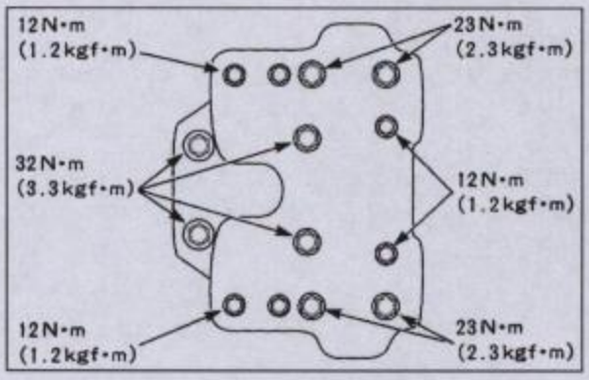
Turn the crankshaft clockwise for 1 ¼ revs (450°) to align the starter clutch "T2" mark with the mark on the right crankcase to bring the front cylinder to TDC.



Screw camshaft holder bolts and cylinder head bolts in crisscross pattern several times.

Notes:

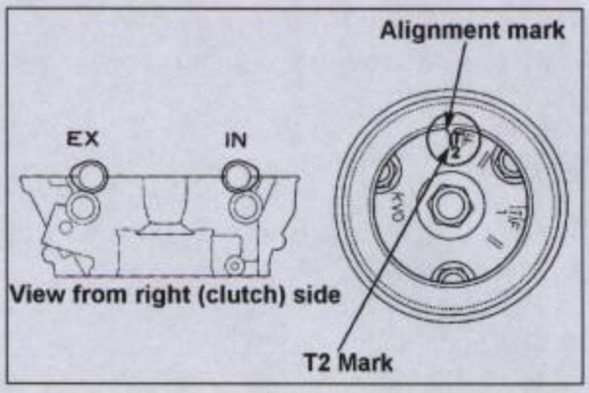
Refer to the right figure for the torque settings.



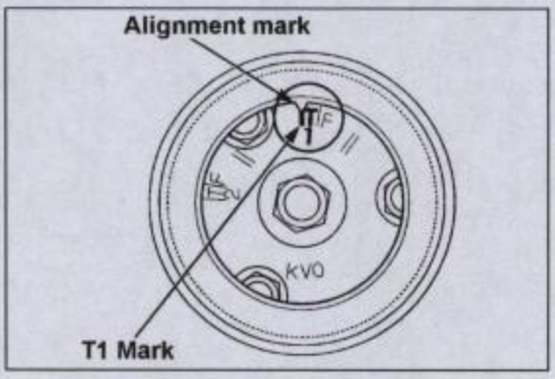
Adjust the valve clearance (8-4).

<u>If only the rear cylinder camshaft has been removed</u>:

Remove a front cylinder head cover (8-6).
Turn the crankshaft clockwise to align the starter clutch "T2" mark with the right crankcase mark to bring the front cylinder to its TDC.
Confirm the front cylinder is at TDC by referring to the cam lobe direction.



Turn the crankshaft clockwise for ¾ rev (270°) to align the "T1" mark with the alignment mark. Install the rear cylinder camshaft, the cam sprocket and the camshaft holder in the same manner as "If both front & rear camshafts are removed (8-24)".

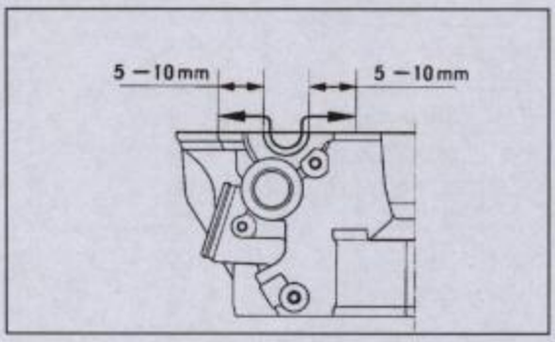


If only the front cylinder camshaft was removed:

Remove a rear cylinder head cover (8-7).

Turn the crankshaft clockwise to align the starter clutch "T1" mark with the alignment mark on the right crankcase to bring the rear cylinder to its TDC.

Install the front cylinder camshaft, the cam sprocket, and the camshaft holder in the same manner as "If both front & rear camshafts are removed (8-24)".



Cylinder Head Cover Installation

Install a new head cover seal to the cover. Apply sealant to the mating surface of the cylinder head cover.

Front Cylinder Cover

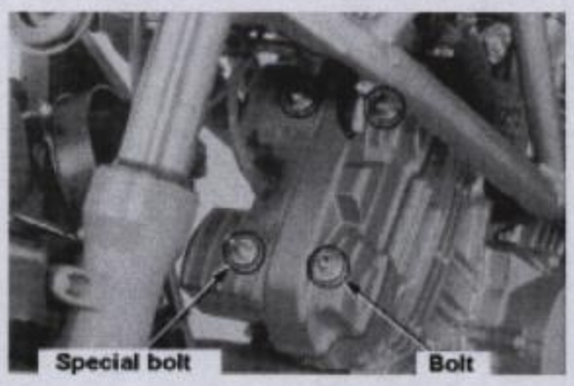
Install a cylinder head cover to the cylinder head.

Install washers and screw four bolts.

Torque: 10Nm (1.0kgf-m)

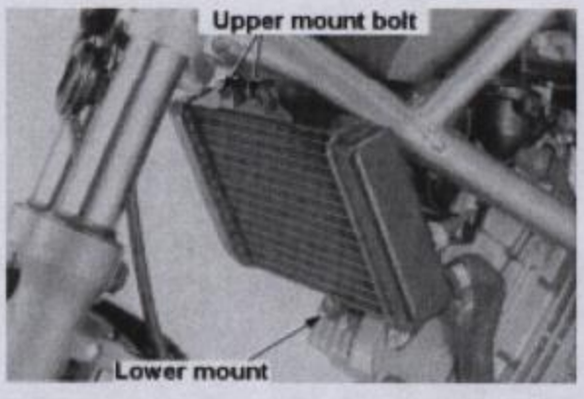
Notes:

Install a special bolt for a radiator lower mount to the place shown in the figure.



Install a radiator lower mount and screw upper mount bolts.

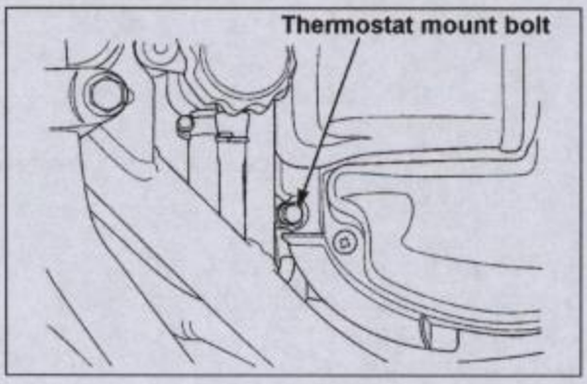
Torque: 12Nm (1.2kgf-m)



Screw a thermostat mount bolt.

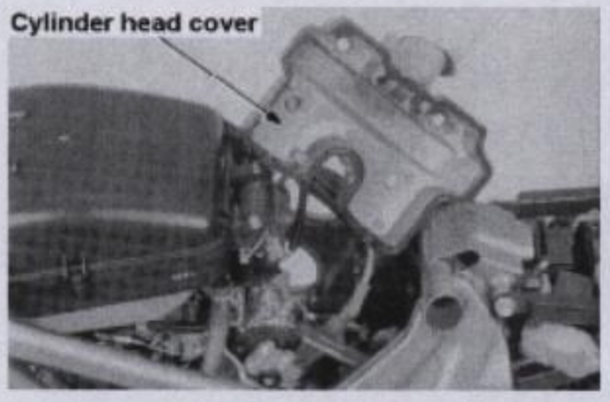
Notes:

The thermostat mount bolt has a function of earthing the thermo switch. Use unpainted bolt.



Rear Cylinder head cover

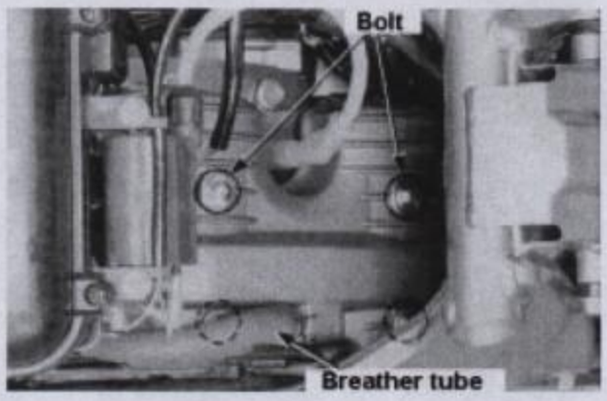
Install a cylinder head cover to the cylinder head.

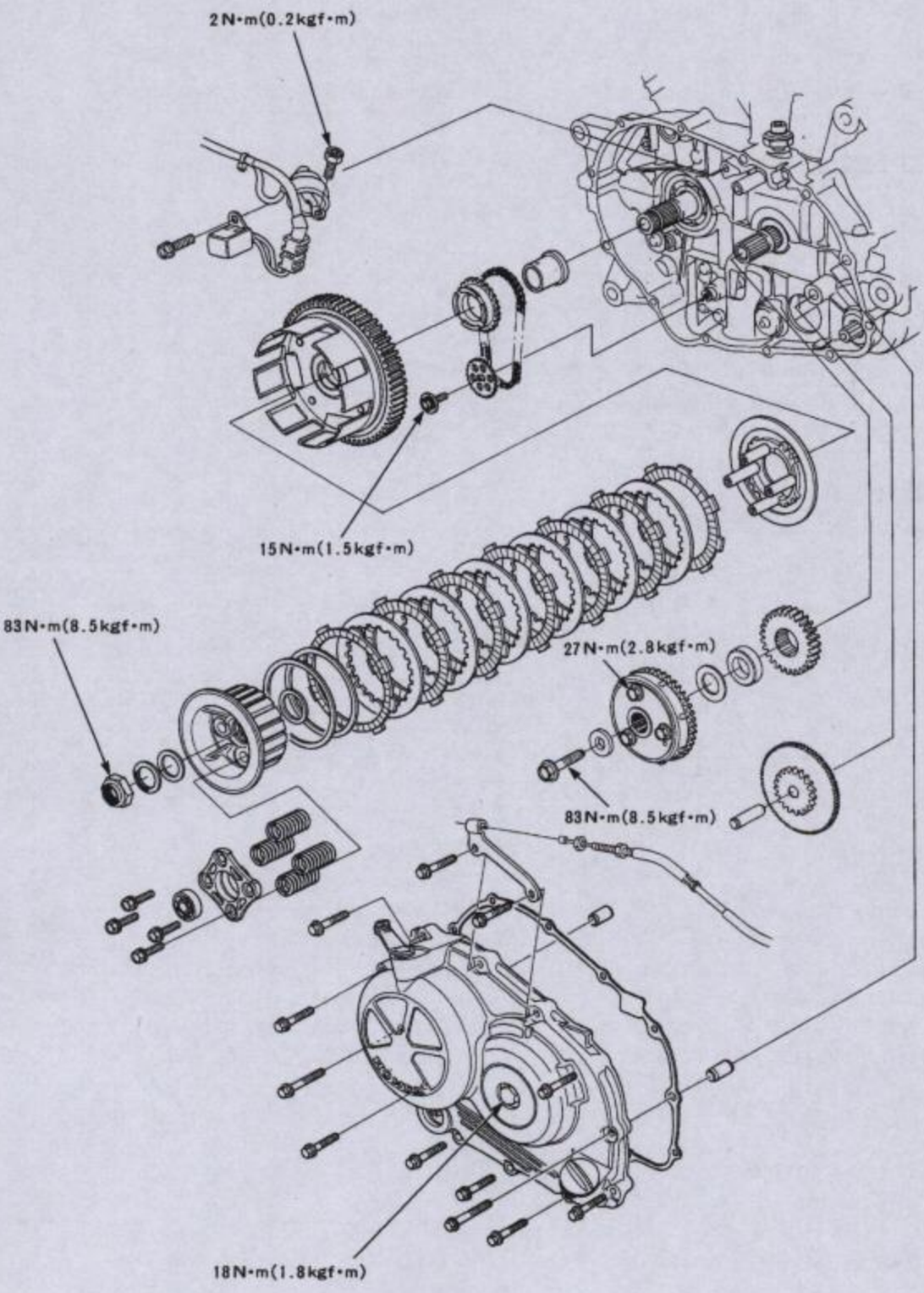


Install washers and screw four bolts.

Torque: 10Nm (1.0kgf-m)

Connect a cylinder head breather tube.
Install a fuel tank (2-3).




2N·m(0.2kgf·m)
15N·m(1.5kgf·m)
83N·m(8.5kgf·m)
27N·m(2.8kgf·m)
83N·m(8.5kgf·m)
18N·m(1.8kgf·m)

Service Information.....	9 – 1	Starter Clutch.....	9 – 5
Troubleshooting.....	9 – 2	Clutch.....	9 – 9
Right crankcase cover removal.....	9 – 3	Right crankcase cover installation.....	9 - 16

Service Information

General

- The service described in this section can be conducted without removing the engine.
- Engine oil level and viscosity affect clutch operation. Check oil level and viscosity prior to servicing the clutch.
- Remove sealant on the casing mating surface.
- Do not damage the mating surface when disassembling.
- Do not let dirt or debris enter the engine.

Specification

Item			Standard	Service limit
Clutch	Clutch lever free play		10 – 20mm	-
	Clutch spring relaxed length		34.79mm	33.9mm
	Clutch disc thickness	Large bore	3.62 – 3.70mm	3.3mm
		Small bore	2.9 – 3.0mm	2.6mm
	Clutch plate warpage		-	0.3mm
	Clutch outer guide	Bore	21.995 – 22.015mm	22.05mm
		Diameter	28.967 – 28.980mm	28.93mm
	Clutch outer bore		29.000 – 29.021mm	29.06mm
	Main shaft diameter (at clutch outer)		21.980 – 21.993mm	21.97mm
	Oil pump drive sprocket bore		29.025 – 29.075mm	29.11mm

Torque Setting

Timing hole cap	18Nm (1.8kgf-m)	Apply grease
Clutch centre lock nut	83Nm (8.5kgf-m)	]
Starter clutch mount bolt	83Nm (8.5kgf-m)	] Apply oil to the thread
Starter clutch bolt	27Nm (2.8kgf-m)	]
Oil pump driven sprocket bolt	15Nm (1.5kgf-m)	] Apply screw locker to the thread
Oil pressure switch connector bolt	2Nm (0.2kgf-m)	

Special Tools

Clutch centre holder	07GMB-KT70101
Universal holder	07725-0030000
Wrench 17 x 27mm	07716-0020300
Extension bar	07716-0020500

Troubleshooting

Lever is heavy
- Damaged/rusted clutch cable
- Damaged clutch lifter
- Damaged clutch lifter plate bearing
- Incorrect clutch cable routing

Unable to release the clutch
- Too much free play of the clutch lever
- Bent/warped clutch plate
- Loose clutch centre lock nut
- Excessive oil level or too high oil viscosity

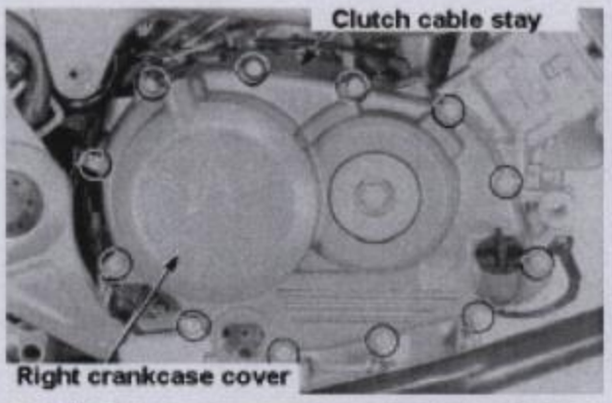
Clutch slips while accelerating
- Stuck clutch lifter
- Worn clutch disc
- Deformed clutch spring
- Too small free play of the clutch lever

Hard to select a gear
- Improper free play of the clutch lever
- Damaged/bent shift fork
- Damaged gear shift spindle
- Faulty transmission

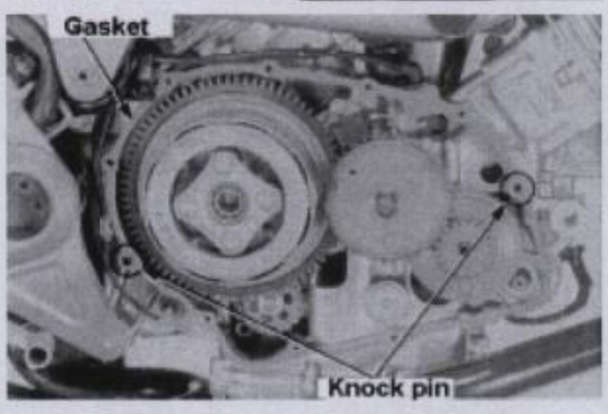
Gear releases
- Damaged/bent shift fork
- Damaged shift drum stopper
- Faulty transmission

Right crankcase cover removal

Drain engine oil (3-15).
Unscrew two bolts to remove a clutch cable stay.
Disconnect a clutch cable.
Unscrew ten right crankcase cover bolts to remove the right crankcase cover.



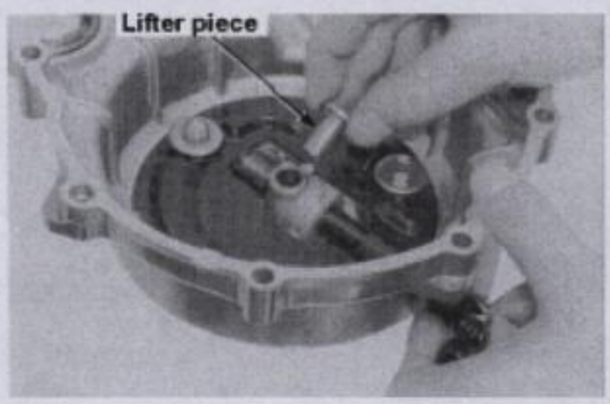
Remove a gasket and knock pins.



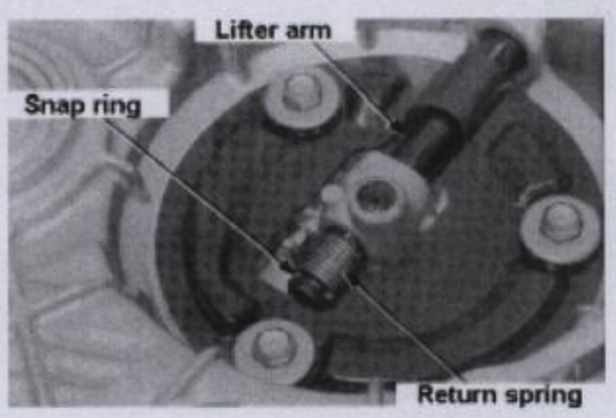
Clutch Lifter

Disassembly

Remove a lifter piece.



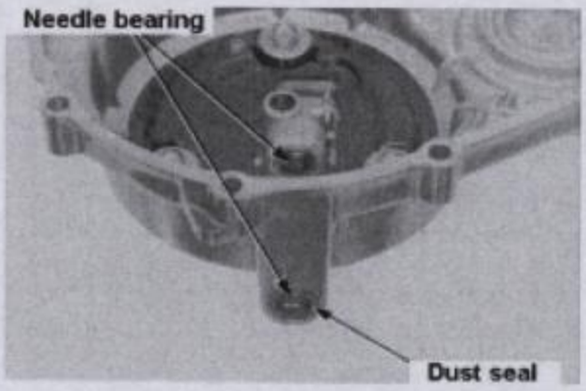
Remove a snap ring to remove a return spring.
Remove a clutch lifter arm.



Inspection

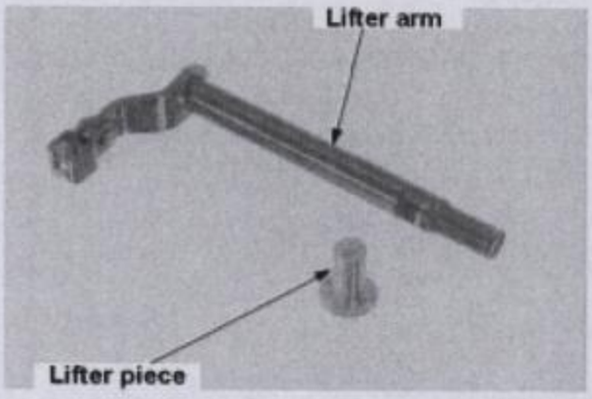
Inspect the oil seal for damage.
Inspect needle bearings for damage and loose fit.

Apply engine oil to a dust seal lip and bearings.



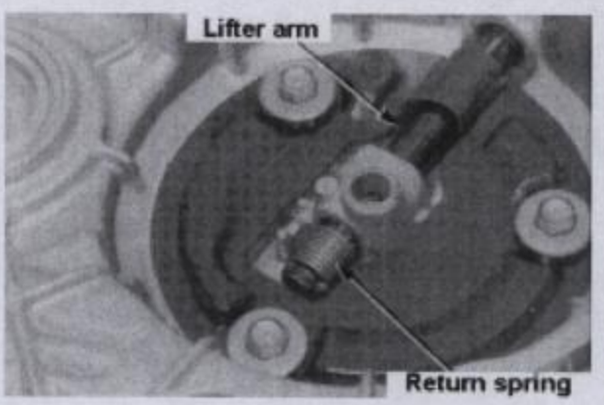
Inspect a clutch lifter arm and a lifter piece for wear and damage.

Inspect a return spring for deformation and damage.

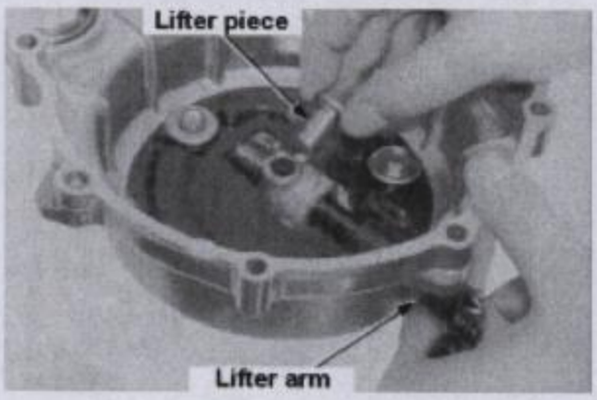


Assembly

Apply engine oil to the clutch lifter arm and install it to the right crankcase cover with a return spring.



Turn the lifter arm to the position where a lifter piece can be fitted to the lifter arm cutout to install the lifter piece.

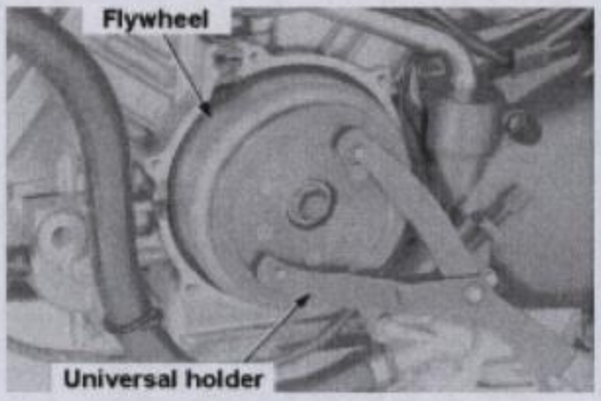


Starter Clutch

Removal

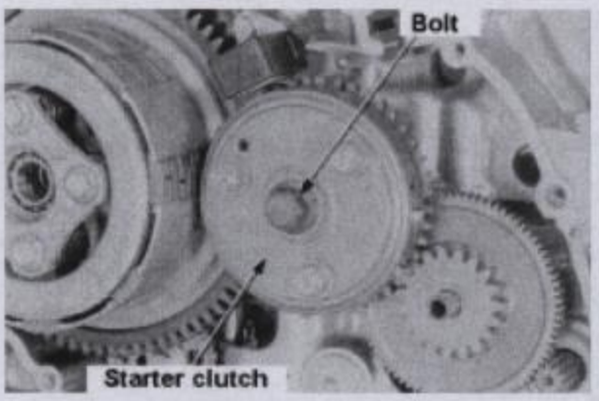
Remove an alternator cover (16-8).
Remove a right crankcase cover (9-3).
Fix a flywheel with a universal holder.

Special tool:
Universal holder 07725-0030000

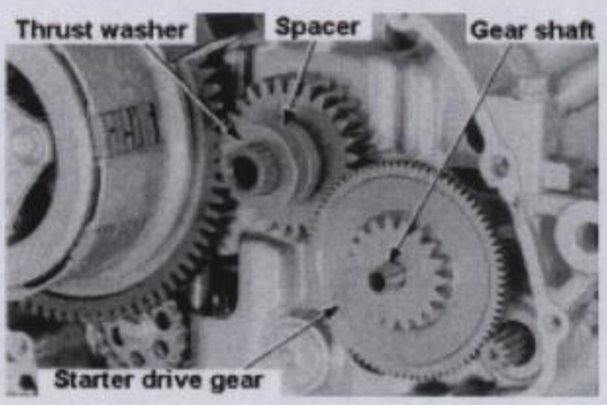


Remove a starter clutch mount bolt and a washer.

Remove a starter clutch Assy.



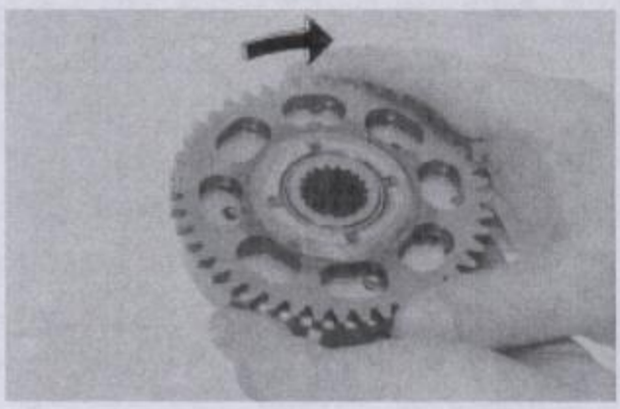
Remove the following parts:
- Thrust washer
- Spacer
- Primary drive gear
- Starter reduction gear
- Gear shaft



Disassembly / Inspection

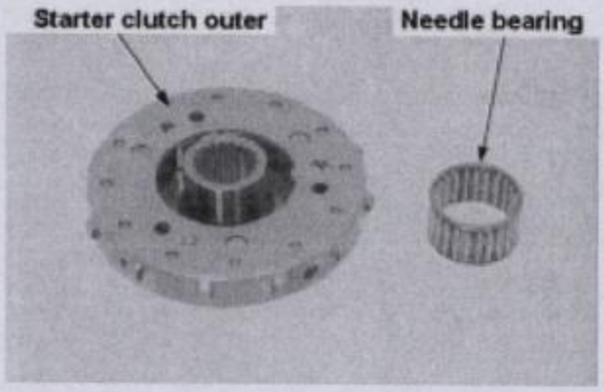
Confirm the starter driven gear turns only to the direction shown in an arrow.

Remove the starter driven gear from the clutch outer.

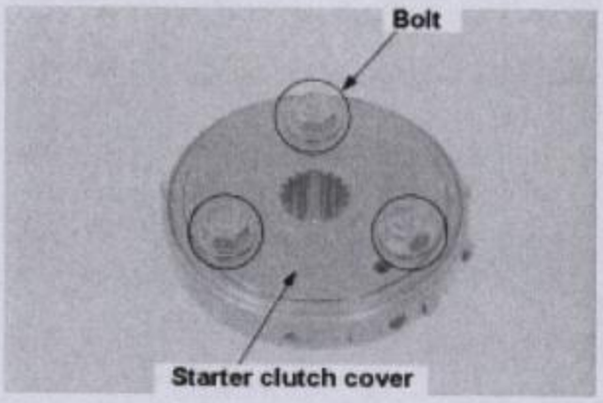


Remove a needle bearing.

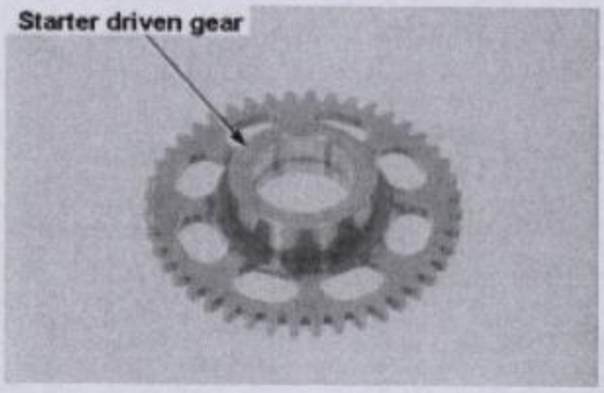
Inspect the starter clutch outer and the needle bearing for wear and damage.



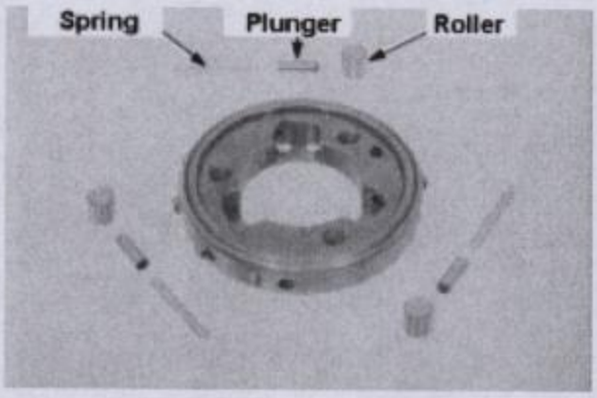
Unscrew three bolts to remove the starter clutch cover.



Inspect the starter driven gear for wear and damage.

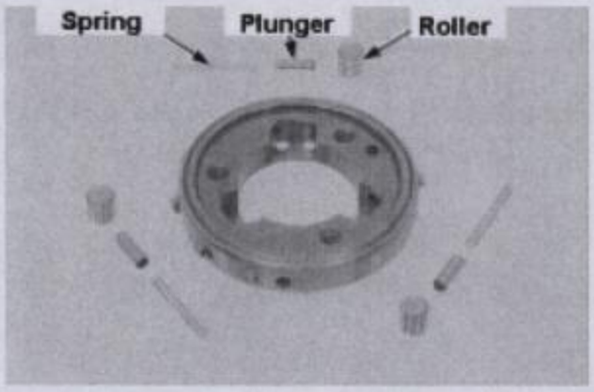


Remove a spring, a plunger and a roller.

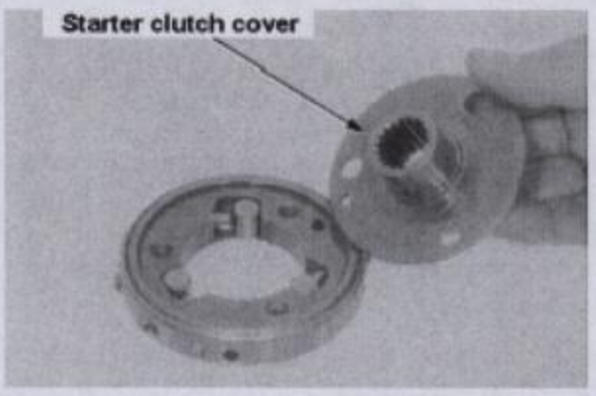


Assembly

Install a spring, a plunger and a roller.

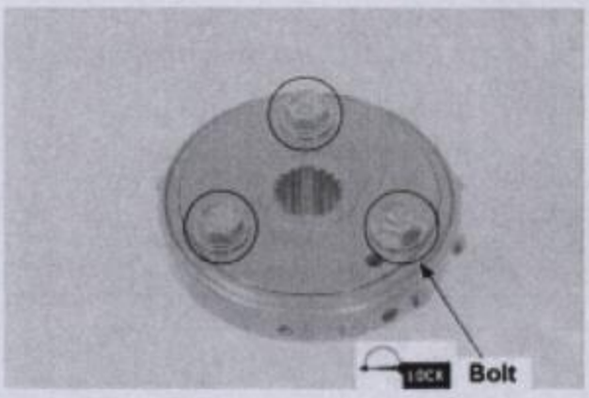


Install a starter clutch cover.

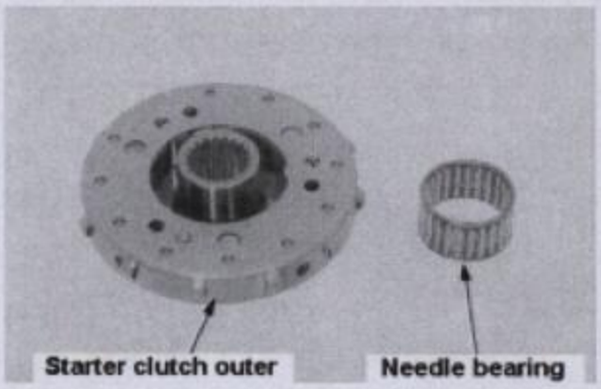


Apply screw locker to the bolts before securing them.

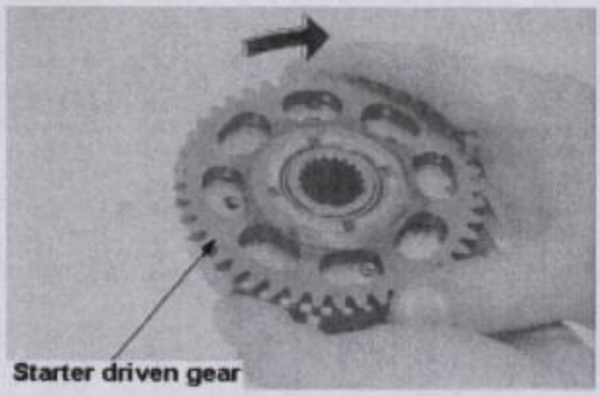
Torque: 27Nm (2.8kgf-m)



Install a needle bearing.

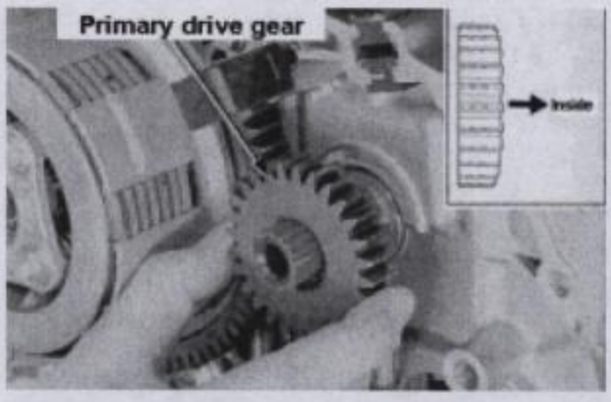


Install a starter driven gear to the starter clutch outer by turning it to the arrow indicated direction.



Installation

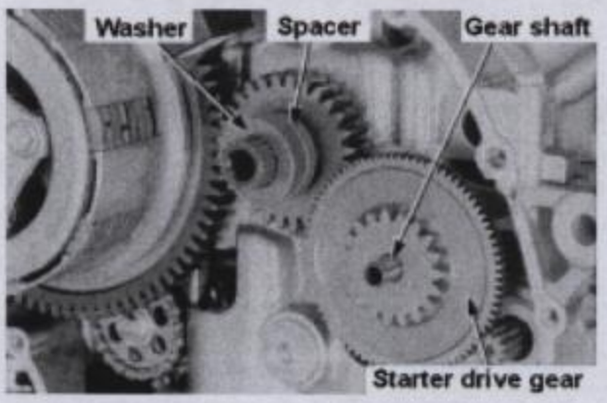
Install a primary drive gear by setting its cutout to the broad tooth of a crankshaft.



Notes
Face the round-edged side of the primary drive gear towards the inside.

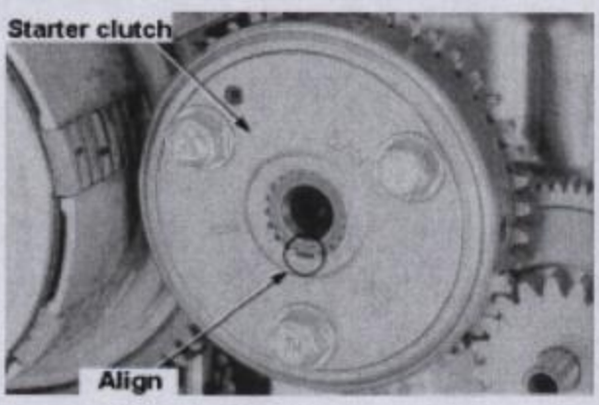
Install the following parts:

- Thrust washer
- Spacer
- Primary drive gear
- Starter reduction gear
- Gear shaft



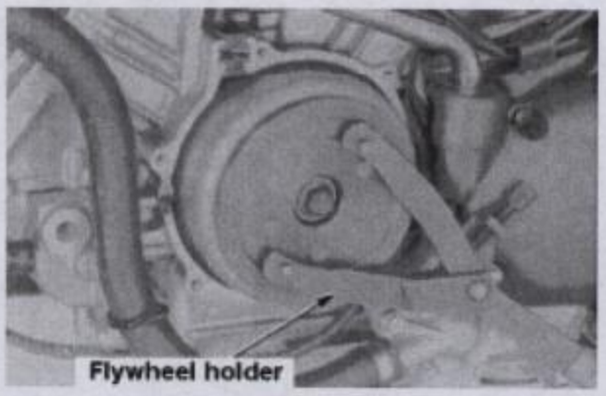
Notes
Set the cutouts of the spacer and the thrust washer to the broad tooth of the crankshaft.

Set the cutout of a starter driven gear to the broad tooth of a crankshaft to install a starter clutch Assy.



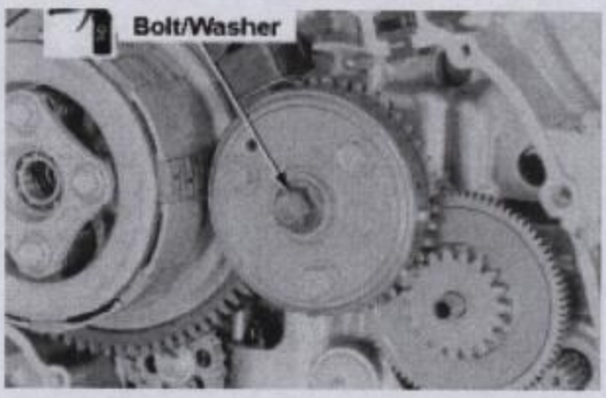
Fix a flywheel with a flywheel holder.

Special tool:
Flywheel holder 07725-0030000



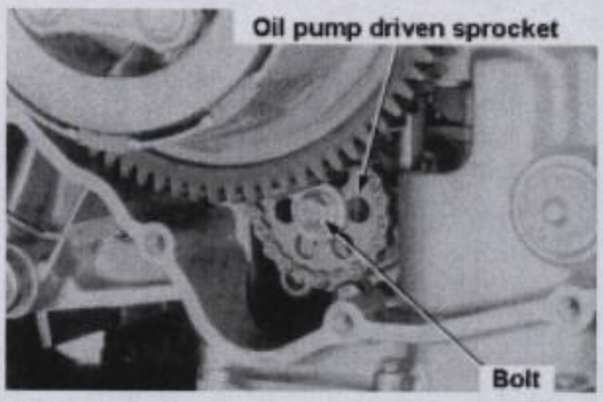
Install a washer. Apply engine oil to a starter clutch mount bolt and secure the bolt.

Torque: 83Nm (8.5kgf-m)



Install the following parts:
- Alternator cover (16-10)
- Right crankcase cover (9-16)

Fill engine oil (3-15).

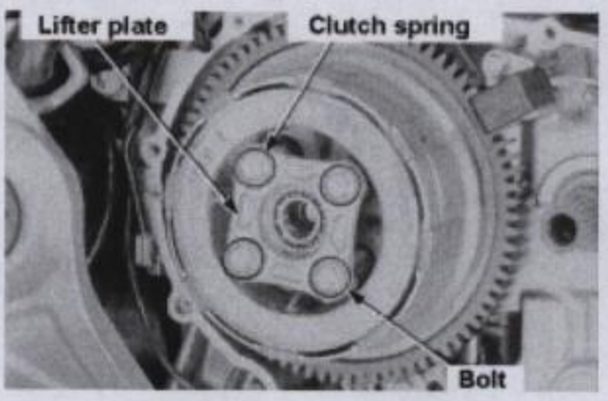


Clutch

Removal

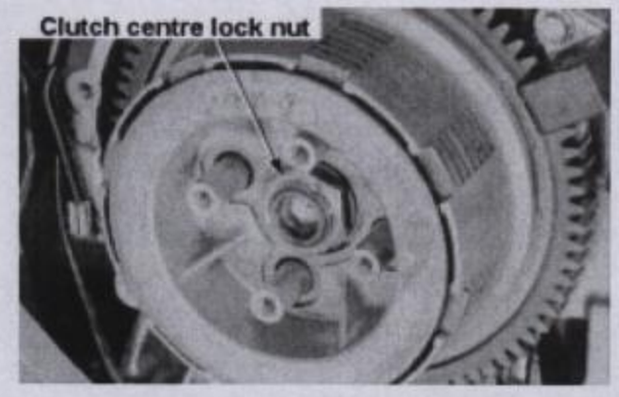
Remove a right crankcase cover (9-3).
Remove a starter clutch (9-5).

Notes
Loosen a bolt in advance while the clutch is mounted when removing an oil pump driven sprocket.



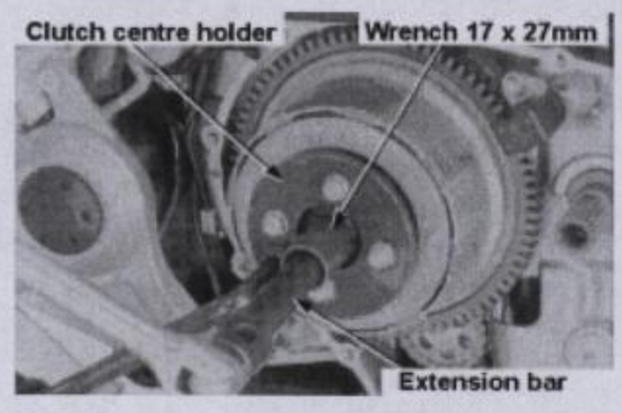
Loosen clutch lifter plate bolts in a crisscross pattern several times.
Remove the lifter plate and clutch springs.

Release the stake of a clutch centre lock nut.
Do not damage the main shaft.



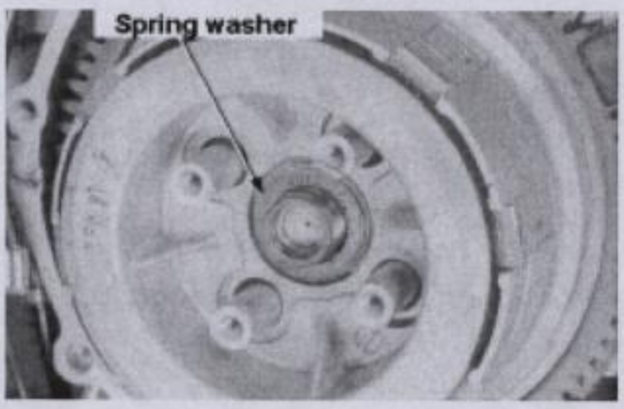
Fix a clutch centre with a clutch centre holder to loosen a clutch centre lock nut. Release the holder and remove the lock nut.

Special tools:
Clutch centre holder 07GMB-KT70101
Wrench 17 x 27mm 07716-0020300
Extension bar 07716-0020500

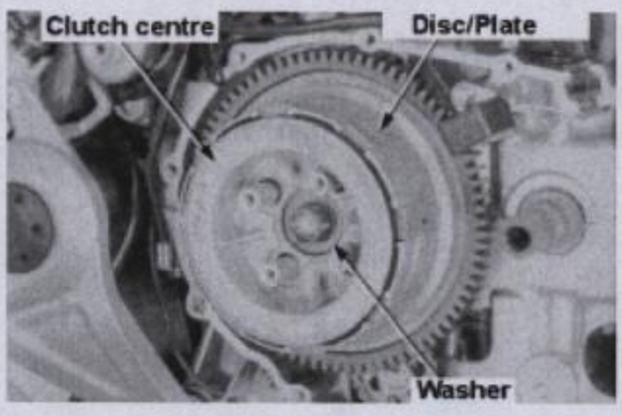


Remove the following parts:

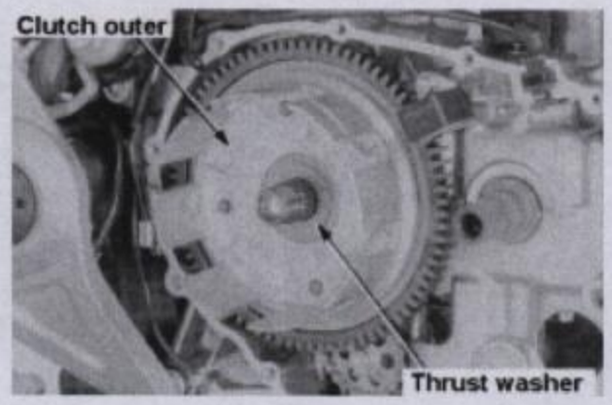
- Spring washer



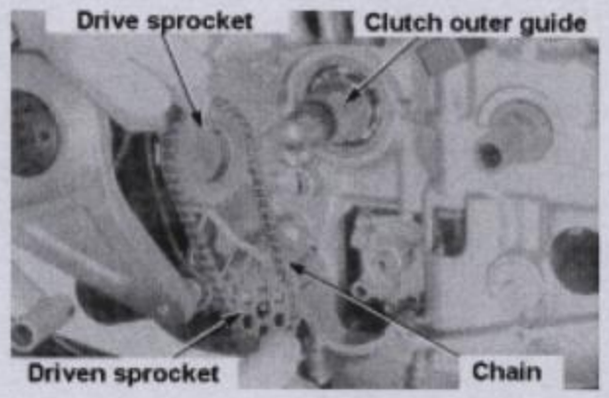
- Washer
- Clutch centre
- Judder spring
- Spring seat
- Clutch disc
- Clutch plate
- Pressure plate



Remove a thrust washer and a clutch outer.



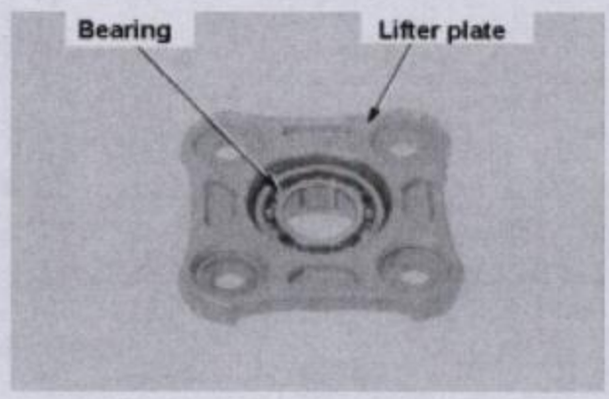
Unscrew an oil pump driven sprocket bolt.
Remove an oil pump driven sprocket, chain, an oil pump and a drive sprocket.
Remove a clutch outer guide.



Clutch Inspection

Lifter plate bearing inspection

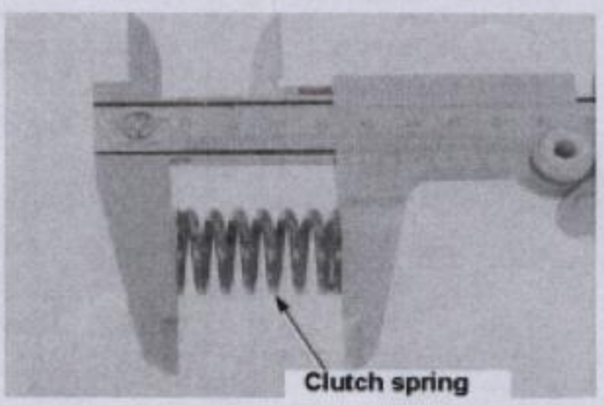
Turn the inner side of the clutch lifter bearing with a finger to check its fitting.
Inspect the fitting between the outside of the bearing and the lifter plate.



Clutch spring inspection

Measure the relaxed length of the spring.

Service limit: 33.9mm

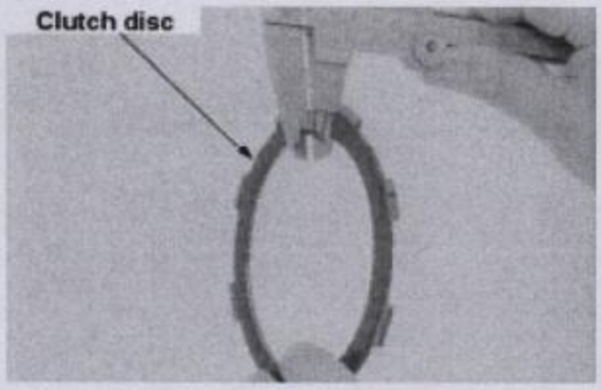


Clutch disc inspection

Replace the clutch disc if there is any damage or abnormal colour.

Measure the thickness of the disc.

Service limit:
Small bore: 2.6mm
Large bore: 3.3mm



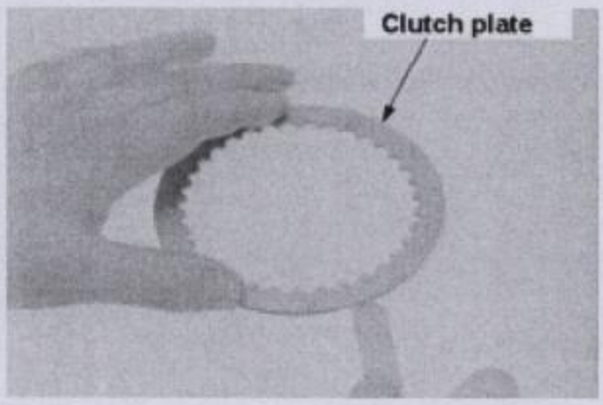
Notes

Replace both disc and plate at the same time.

Clutch plate inspection

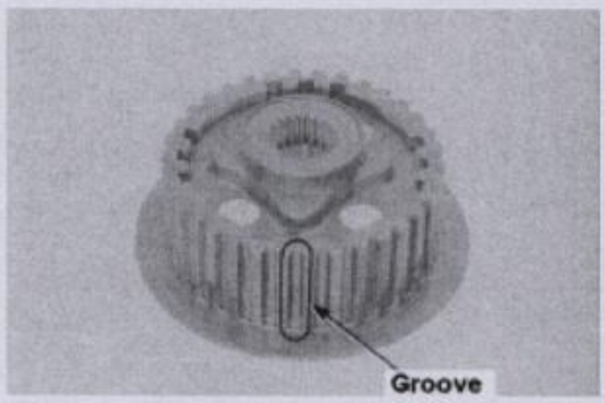
Measure the plate warpage with a thickness gauge on a flat plate.

Service limit: 0.3mm



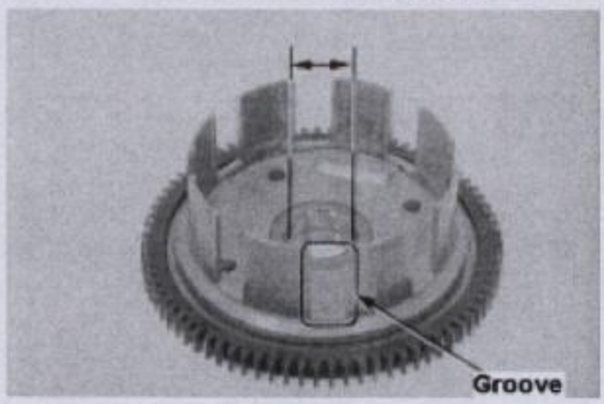
Clutch centre inspection

Inspect the clutch centre grooves for step wear, damage or cracks.



Clutch outer inspection

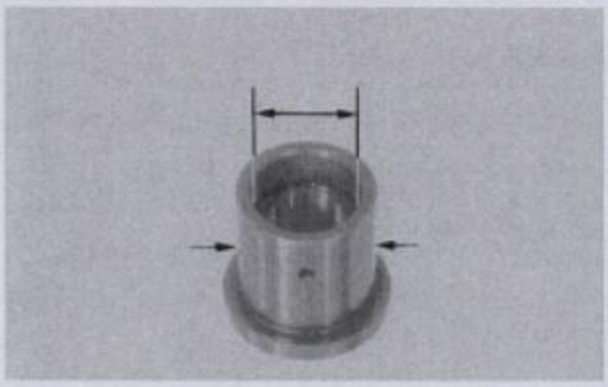
Inspect the clutch outer grooves for damage, cracks or uneven wear by the disc.
Inspect a primary driven gear for wear and damage.
Measure the clutch outer bore.
Service limit: 29.06mm



Clutch outer guide inspection

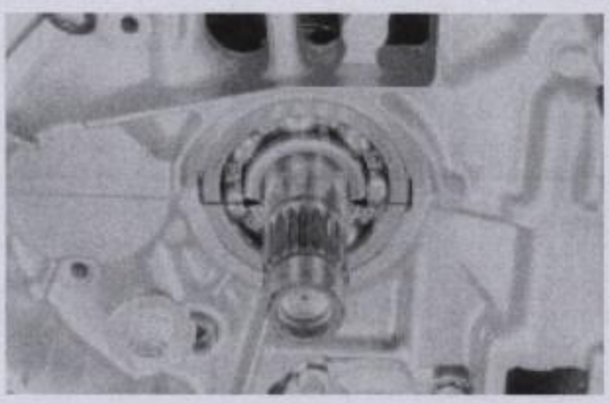
Measure the bore and the diameter of the guide.

Service limit:
Bore: 22.05mm
Diameter: 28.93mm



Main shaft inspection

Measure the diameter of the main shaft at the clutch outer guide frictioning area.

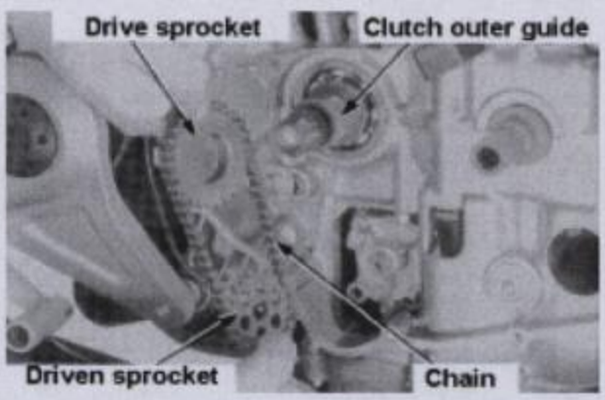


Installation

Install the clutch outer guide to the main shaft.

Install the oil pump drive sprocket, chain, the oil pump driven sprocket in Assy.

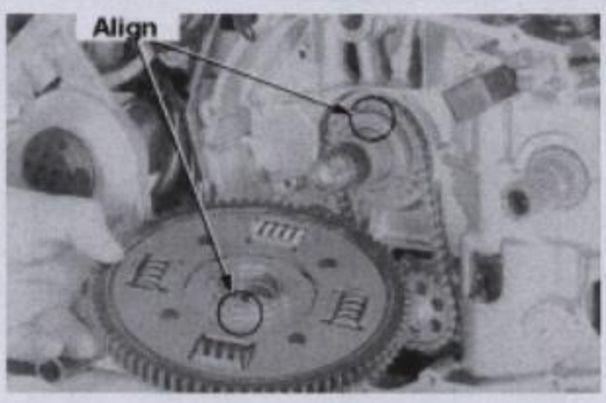
Apply screw locker to the driven sprocket mount bolt and screw it with a washer.



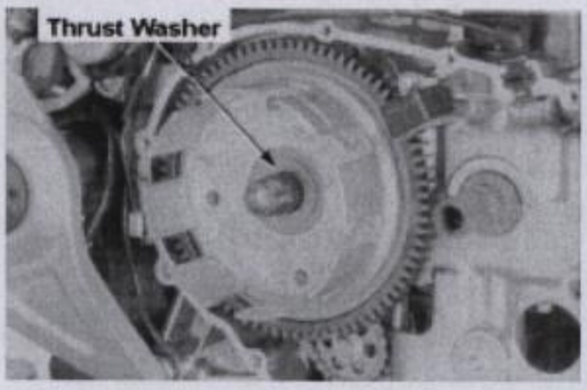
Notes

The marked lines on the oil pump driven sprocket should face towards inside.

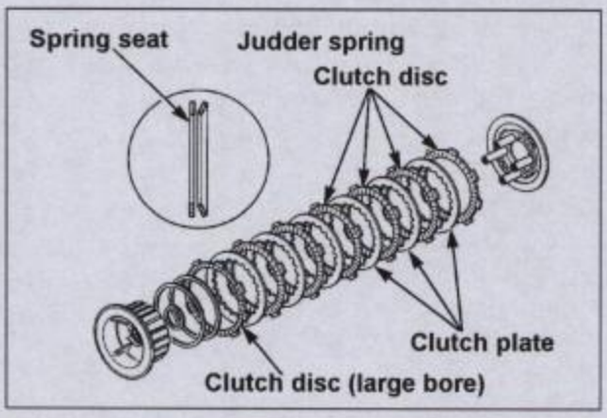
Align the projection of the clutch outer with the cutout of the oil pump drive gear to assemble.



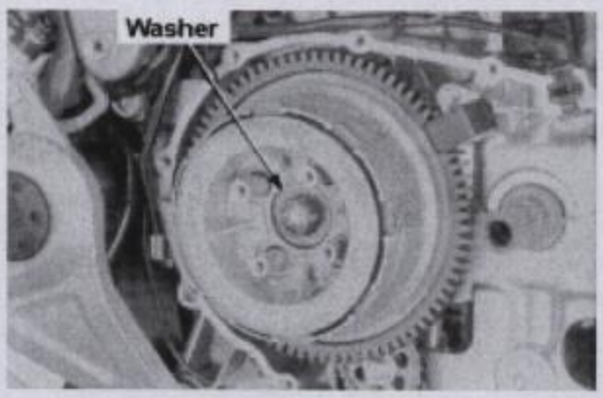
Install a thrust washer.



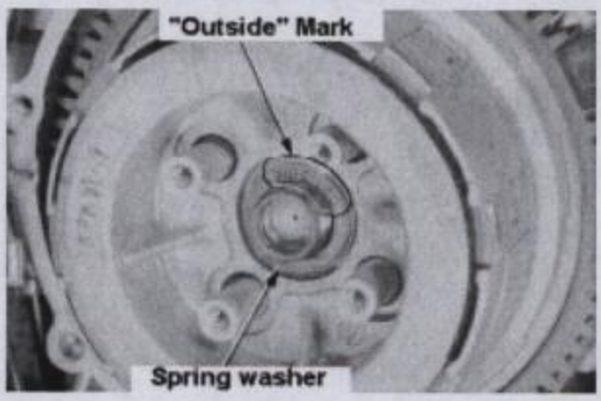
Apply oil to clutch discs and plates.
Install a spring seat and a judder spring to a clutch centre.
Install one clutch disc (large bore).
Install six clutch discs (small bore) and six clutch plates mutually to the clutch centre.
Install a pressure plate to the clutch centre.
Install pressure plate/clutch discs/clutch plates/clutch centre to the clutch outer in Assy.



Install a washer.

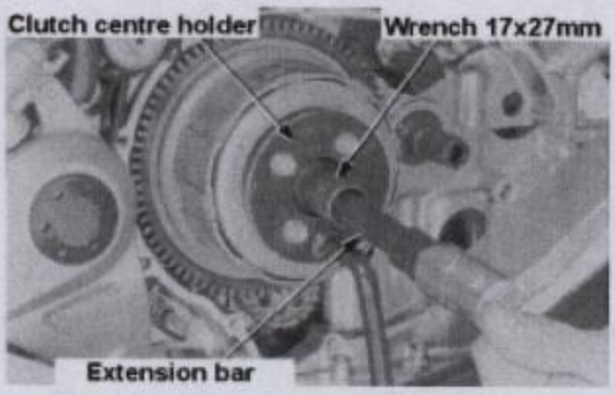


The "OUTSIDE" mark on the spring washer should face towards outside when installed.



Apply oil to a new clutch centre lock nut and install it.
Fix a clutch centre with a clutch centre holder.

Special tools:
Clutch centre holder 07GMB-KT70101
Wrench 17 x 27mm 07716-0020300
Extension bar 07716-0020500

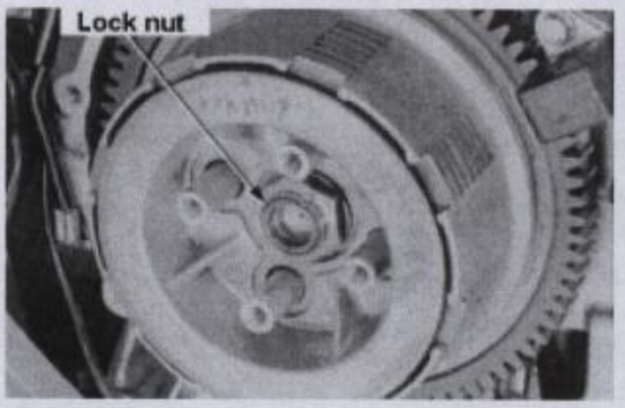


Secure the clutch centre lock nut.
Torque: 83Nm (8.5kgf-m)

Remove the clutch centre holder and stake the lock nut.

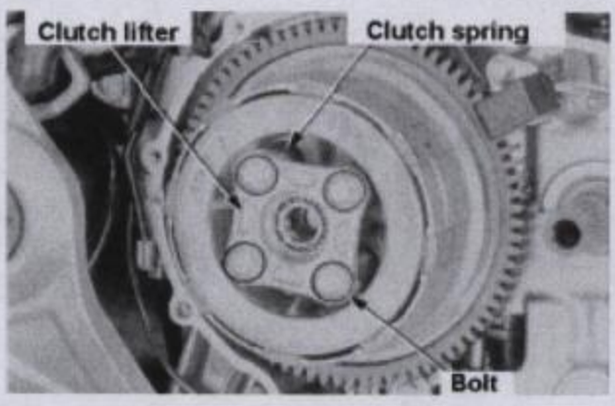
Caution

Do not damage the main shaft when staking.



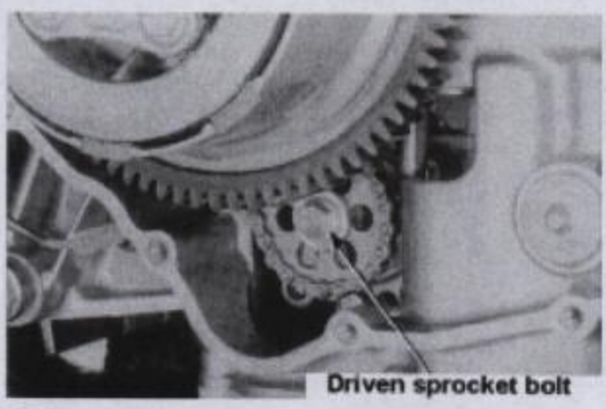
Install clutch springs and a clutch lifter.
Secure clutch lifter plate bolts in crisscross pattern.

Install a starter clutch (9-8).



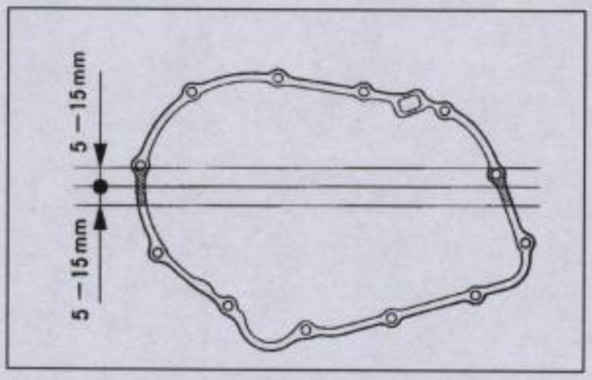
Secure the oil pump driven sprocket bolt if it has been removed.

Torque: 15Nm (1.5kgf-m)

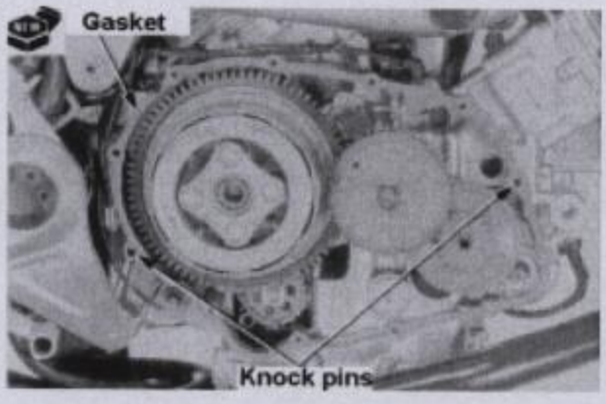


Right Crankcase Cover Installation

Clean the crankcase mating surfaces and apply sealant (refer to the figure).

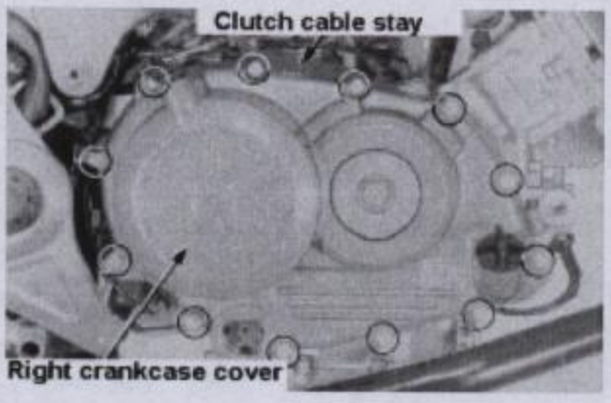


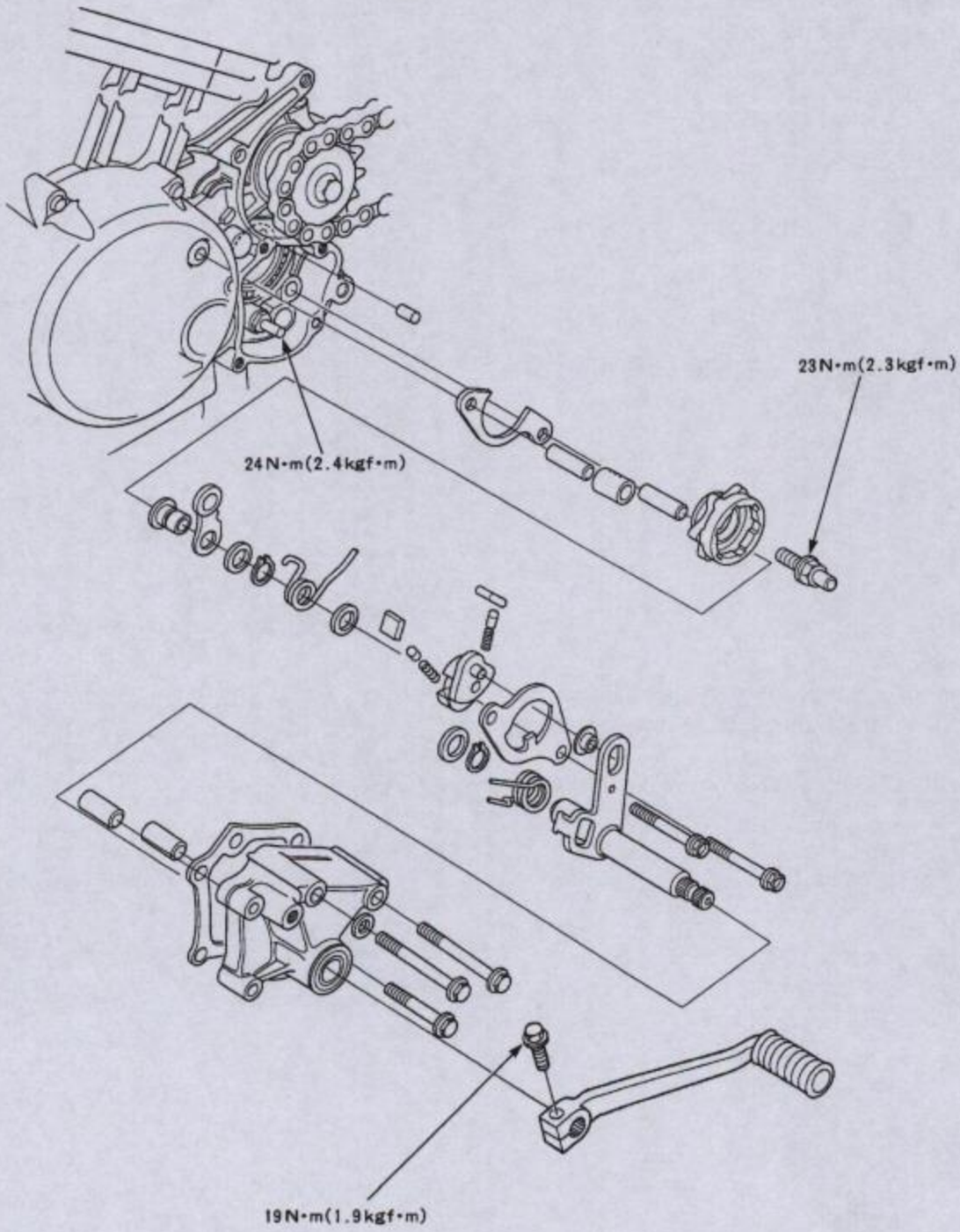
Install knock pins and a new gasket.



Connect a clutch cable to a lifter arm.
Install a right crankcase cover and a clutch cable stay.
Secure 12 bolts in crisscross pattern several times.

Fill engine oil (3-15).




23N·m(2.3kgf·m)
24N·m(2.4kgf·m)
19N·m(1.9kgf·m)

Service Information.....	10 – 1	Gear shift linkage removal.....	10 – 2
Troubleshooting.....	10 – 1	Gear shift linkage installation.....	10 - 4

Service Information

General

- The service described in this section can be conducted without removing the engine.
- Remove all sealant on the case mating surfaces.
- Do not damage the mating surfaces when disassembling.
- Do not let dirt or debris fall into the engine.
- If transmission, shift drum or shift fork require service, separate the crankcase.

Torque Settings

Shift drum centre bolt	23Nm (2.3kgf-m)	Apply screw locker to the thread
Shift return spring pin	24Nm (2.4kgf-m)	
Shift pedal bolt	19Nm (1.9kgf-m)	

Troubleshooting

Hard to select a gear

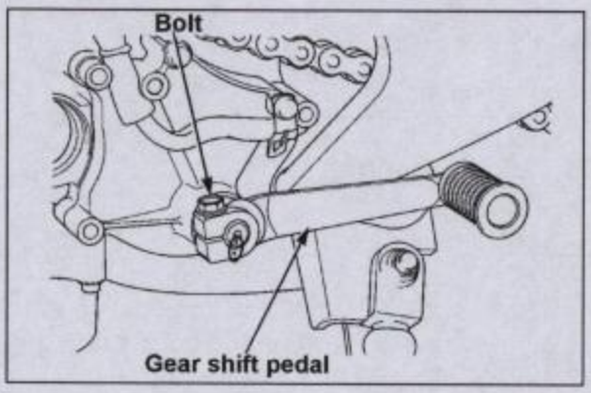
- Improper clutch lever free play
- Damaged / bent shift fork
- Bent shift fork shaft
- Damaged gear shift spindle
- Faulty transmission system

Gear disengages while driving

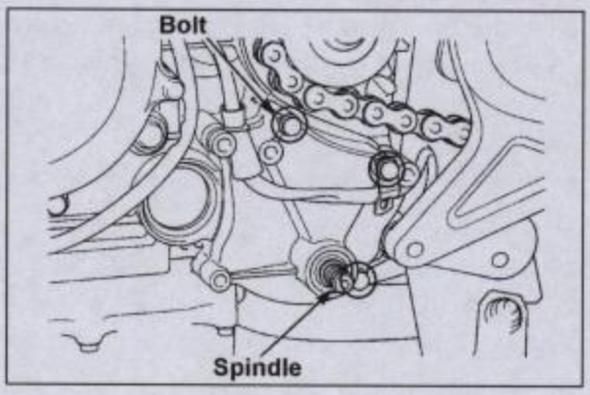
- Damaged / bent shift fork
- Bent shift fork shaft
- Damaged shift drum stopper
- Faulty transmission system

Gear Shift Linkage Removal

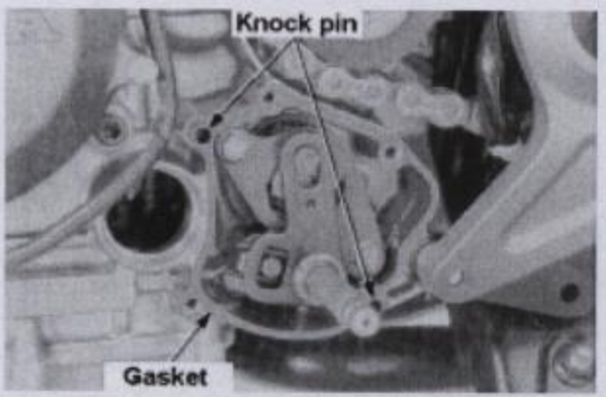
Remove a water pump (5-12).
Remove a left rear crankcase cover (7-4).
Set the transmission to neutral.
Remove a gear shift pedal.



Unscrew three gear shift linkage cover bolts.
Hold a spindle and remove the gear shift cover.



Remove a gasket and knock pins.

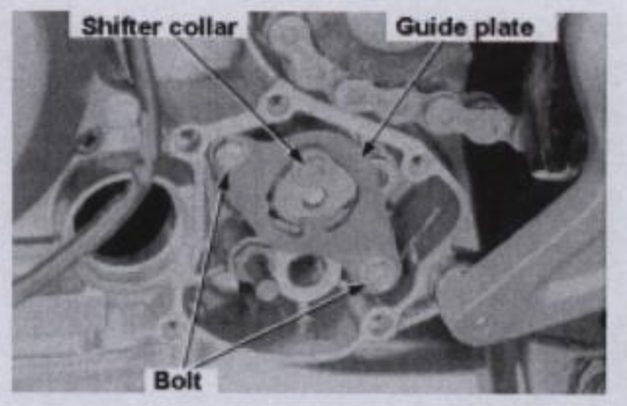


Remove a gear shift spindle and a washer.

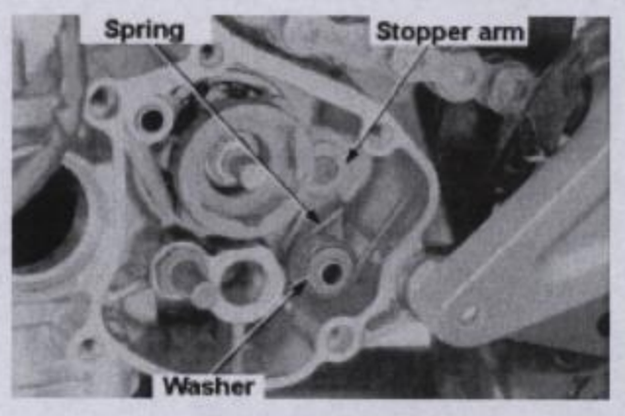
Remove a shifter collar.

Unscrew two bolts and remove a guide plate together with a drum shifter.

Notes
Watch out for the ratchet pawl jumping out.

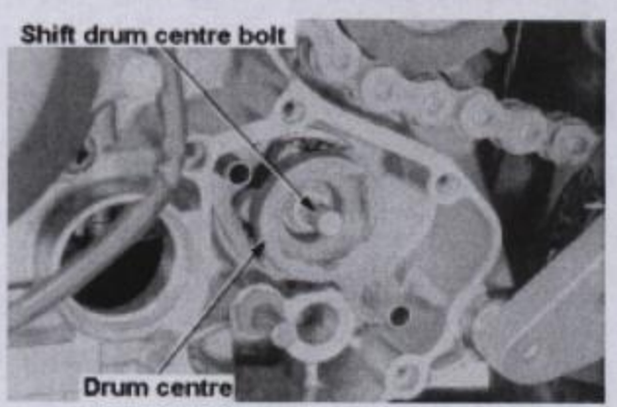


Remove a stopper arm, a spring, a collar and a washer.



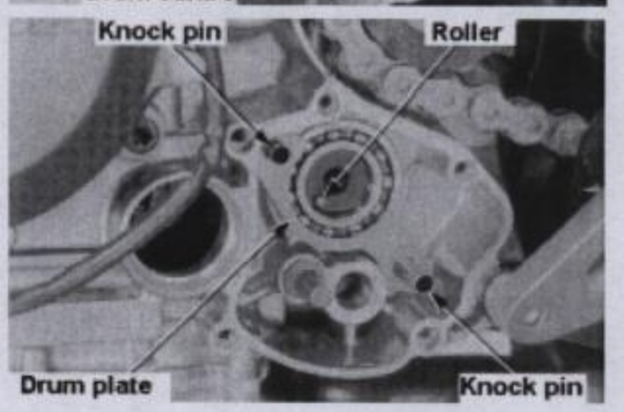
Unscrew a shift drum centre bolt.

Remove a drum centre.



Remove a roller.

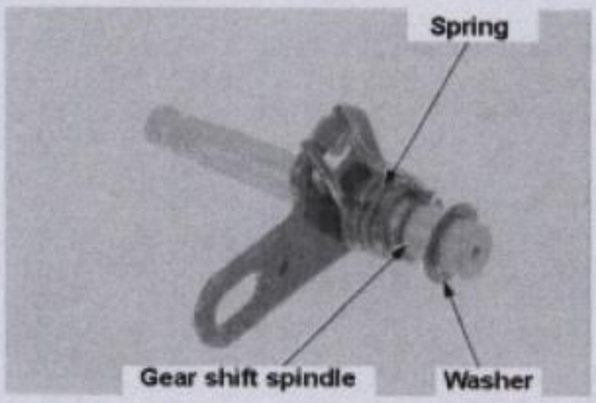
Remove a shift drum plate and knock pins.



Gear shift spindle inspection

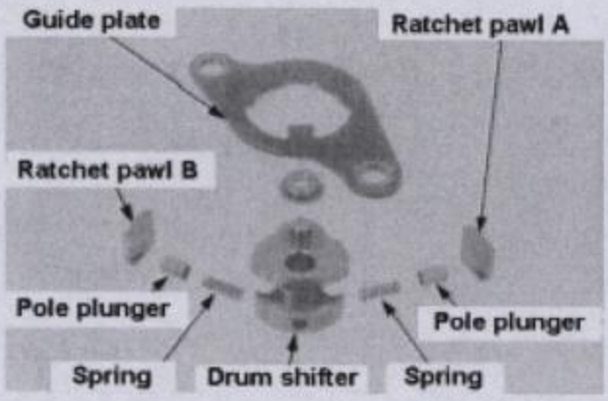
Inspect the gear shift spindle for wear and damage.

Inspect the spring for deformation and damage.

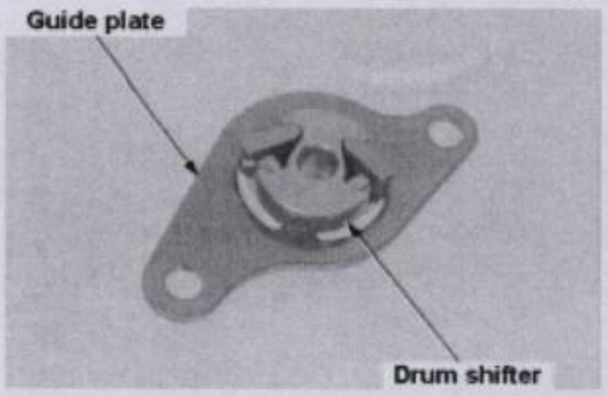


Drum shifter assembly

Apply engine oil to the following parts:
- Drum shifter
- Pole plunger
- Ratchet pawl A/B
- Spring



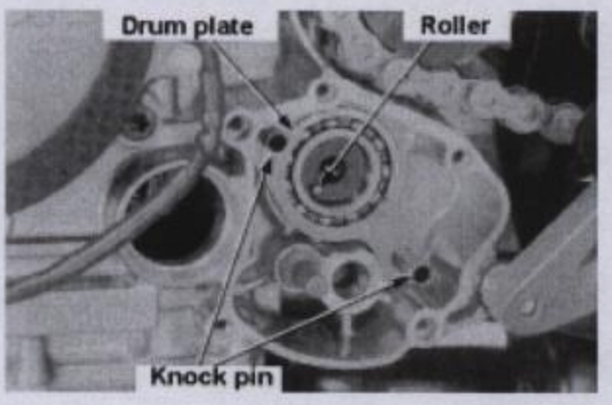
Assemble the above parts as shown in the figure.



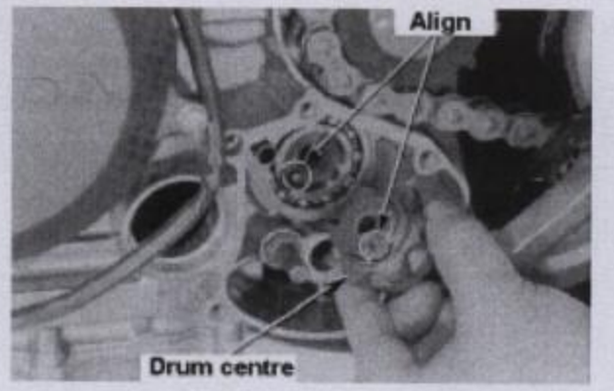
Gear Shift Linkage Installation

Install a shift drum plate and knock pins.
Install a roller.
Screw a gear shift return spring pin if it has been removed.

Torque: 24Nm (2.4kgf-m)



Install a drain centre by aligning its cutout with a roller.

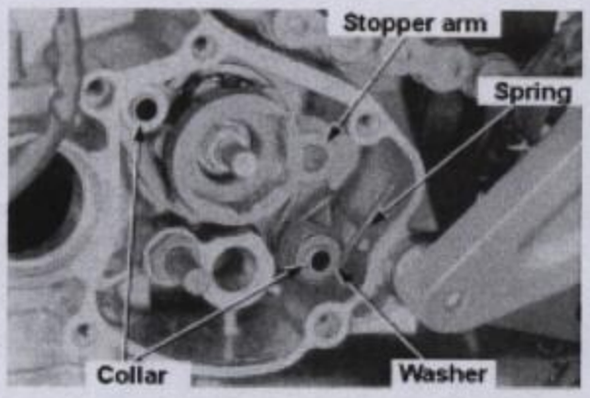


Apply screw locker to the shift drain centre bolt and secure it.

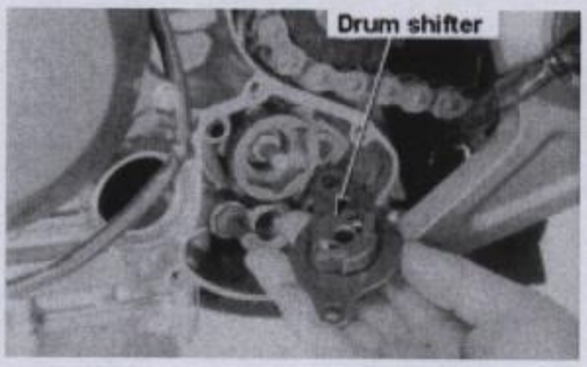
Torque: 23Nm (2.3kgf-m)

Install the following parts to knock pins:

- Collars
- Stopper arm
- Spring
- Washer

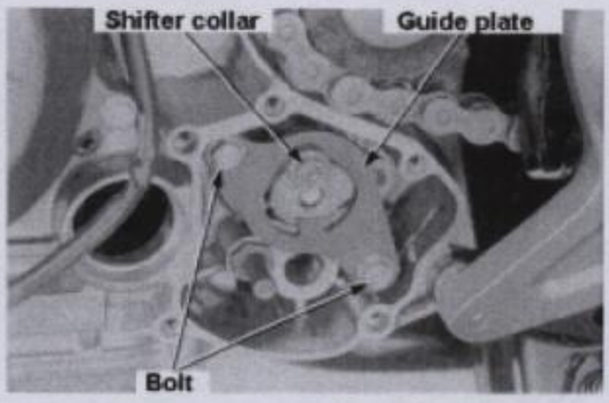


Install the drum shifter in Assy.



Install a guide plate and screw two bolts.

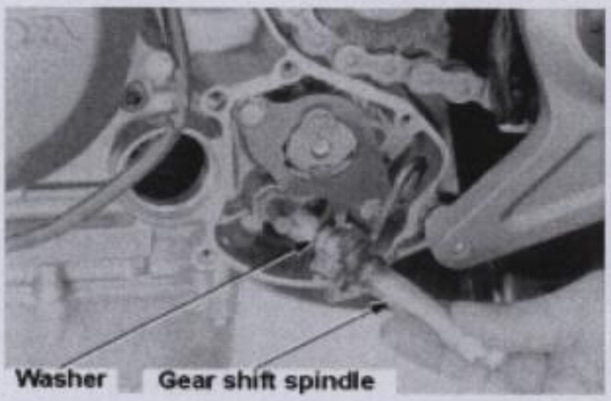
Set a shifter collar around the drum shifter projection.



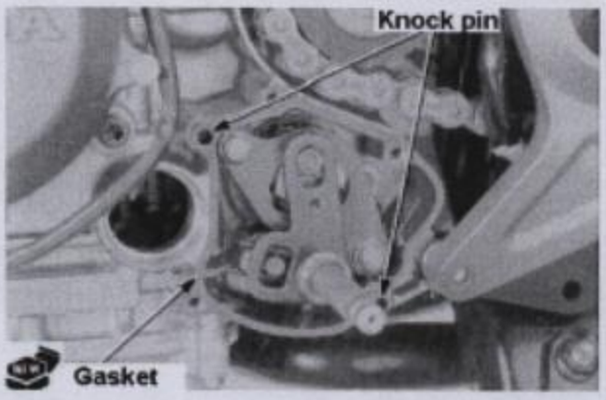
Install a gear shift spindle and a washer.

Notes

After installing, turn the gear shift spindle to confirm the linkage movement.

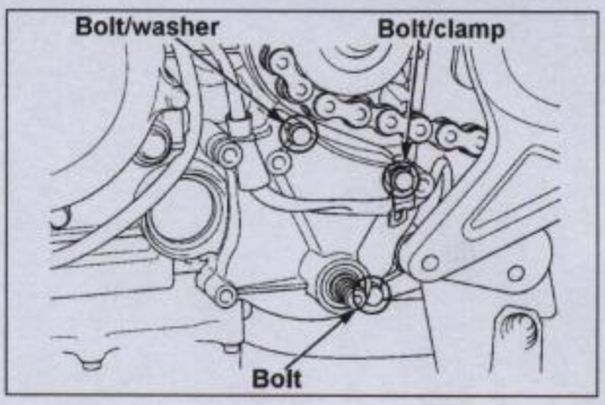


Install knock pins and a new gasket.



Install a gear shift linkage cover.

Install three bolts, a washer and a wire clamp.



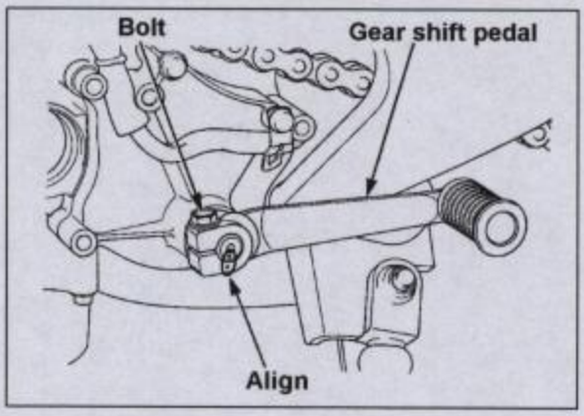
Align punched marks on the gear shift spindle and the gear shift pedal to install the pedal.

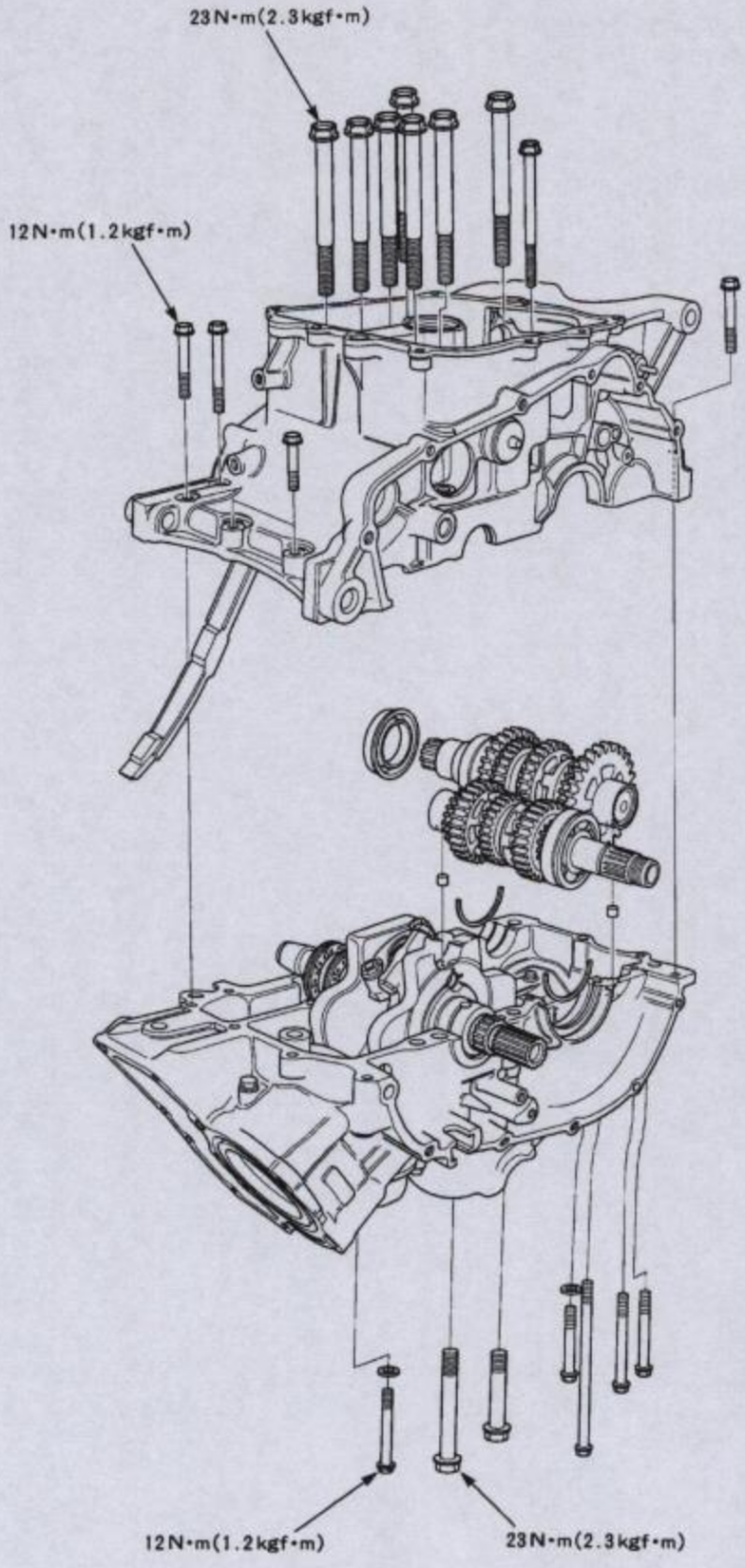
Secure the bolt.

Torque: 19Nm (1.9kgf-m)

Install a water pump (5-12).

Install a left rear crankcase cover (7-8).




23N·m(2.3kgf·m)
12N·m(1.2kgf·m)
12N·m(1.2kgf·m)
23N·m(2.3kgf·m)

Service Information.....	11 – 1	Transmission.....	11 – 3
Troubleshooting.....	11 – 2	Crankcase assembly.....	11 – 11
Crankcase separation.....	11 - 3		

Service Information

General

- Remove the engine to conduct service described in this section.
- Remove the following parts before separating the crankcase:
  - Oil pump (Sec. 4)
  - Water pump (Sec. 5)
  - Gear shift linkage (Sec. 10)
  - Starter motor (Sec. 18)
  - Alternator (Sec. 16)
  - Cylinder head (Sec. 8)
  - Clutch & Starter clutch (Sec. 9)
- Clean and dry all removed parts before inspection/measurement.
- Apply sealant to the crankcase mating surface. Wipe unnecessary sealant.

Specification

Item			Standard	Service limit
Transmission	Gear bore	M4, 5	25.000-25.021mm	25.05mm
		C1	23.000-23.021mm	23.05mm
		C2, 3	28.000-28.021mm	28.05mm
	Bush diameter	M4, 5	24.959-24.980mm	24.92mm
		C1	22.959-22.980mm	22.92mm
		C2, 3	27.959-27.980mm	27.92mm
	Bush bore	M4	21.985-22.006mm	22.07mm
		C1	20.020-20.041mm	20.06mm
		C2	25.000-25.021mm	25.05mm
	Main shaft diameter	M4 Bush	21.959-21.980mm	21.92mm
	Counter shaft diameter	C1 Bush	19.987-20.000mm	19.77mm
		C2 Bush	24.967-24.980mm	24.95mm
	Gear bush clearance	M4, 5 Bush	0.020-0.062mm	0.10mm
		C1, 2, 3 Bush	0.020-0.062mm	0.10mm
	Shaft bush clearance	M4 Bush	0.005-0.047mm	0.15mm
		C1, 2 Bush	0.020-0.054mm	0.15mm
	Shift fork	Catch thickness	5.93-6.00mm	5.60mm
		Shaft hole bore	12.000-12.021mm	12.04mm
	Shift fork shaft diameter		11.969-11.980mm	11.90mm

Torque Settings

Crankcase bolt (8mm)	23Nm (2.3kgf-m)	Apply oil to the thread and the seat
Crankcase bolt (6mm)	12Nm (1.2kgf-m)	As above
Lower crankcase sealing bolt	18Nm (1.8kgf-m)	Apply screw locker to the thread

Special Tools

Inner handle	07746-0020100

Troubleshooting

Hard to select a gear
- Improper free play of the clutch lever
- Too high oil viscosity
- Damaged / bent shift fork
- Bent shift fork shaft
- Damaged shift drum guide groove
- Damaged gear shift spindle
- Faulty transmission

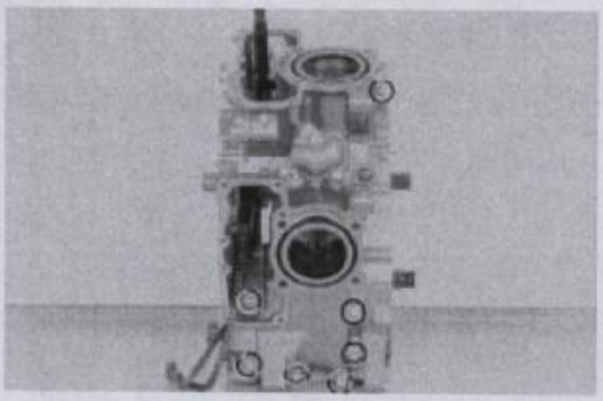
Gear releases
- Damaged / bent shift fork
- Bent shift fork shaft
- Damaged shift drum stopper
- Faulty transmission
- Damaged gear shift return spring

Engine noise
- Worn / damaged transmission gear
- Worn / damaged transmission bearing

Crankcase separation

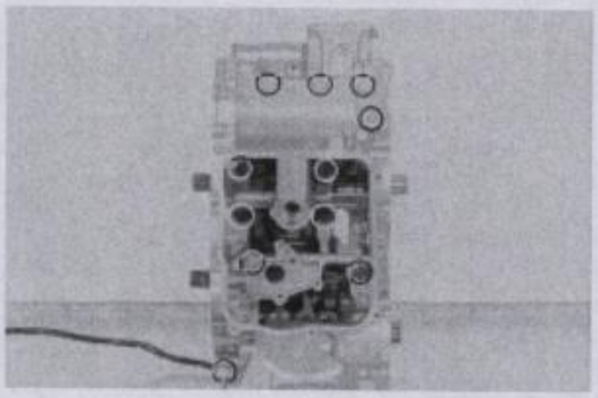
Prior to separating the crankcase, remove parts specified in 11-1.

Unscrew seven upper crankcase bolts and sealing washers.



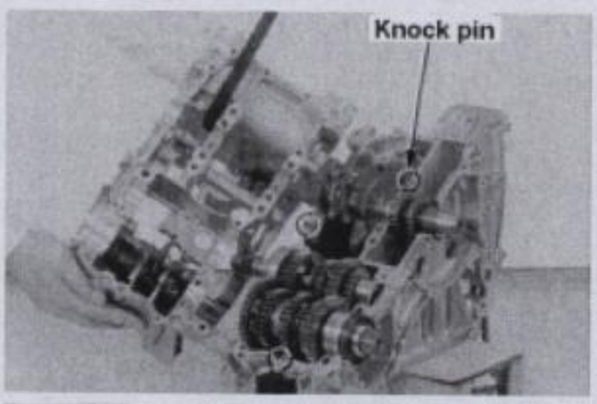
Turn a cylinder head down and unscrew 11 lower crankcase bolts in crisscross pattern several times.

Remove the lower crankcase.



Notes
Do not insert a screwdriver to the mating surface gap.

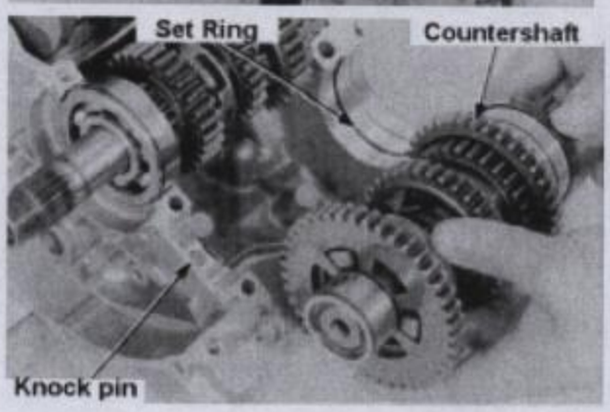
Remove knock pins.



Transmission

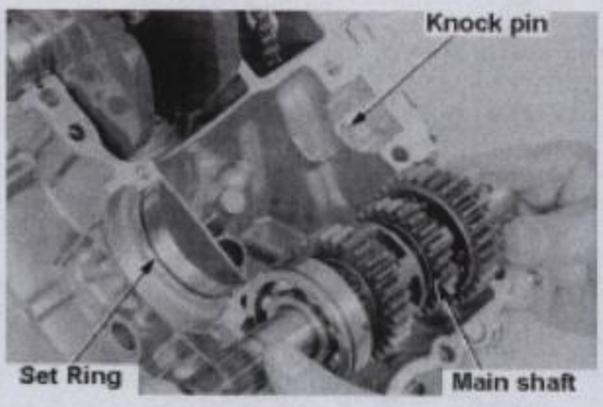
Removal

Remove a countershaft.
Remove a knock pin and a set ring.



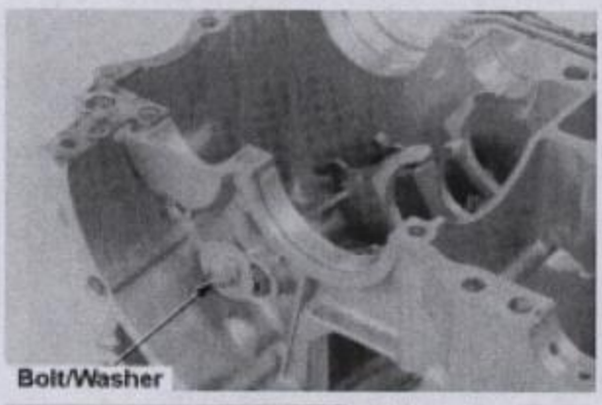
Remove a main shaft.

Remove a knock pin and a set ring.

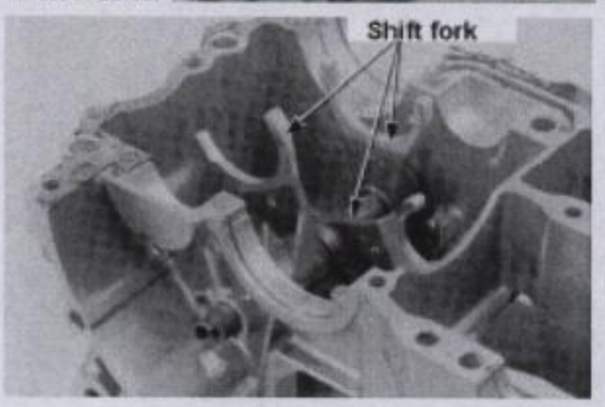


Shift fork and shift drum

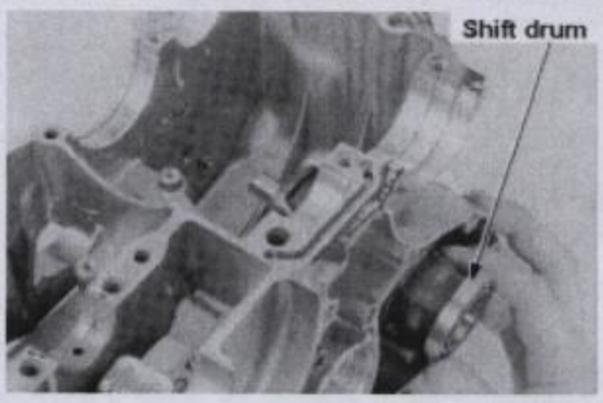
Remove a bolt and a washer.



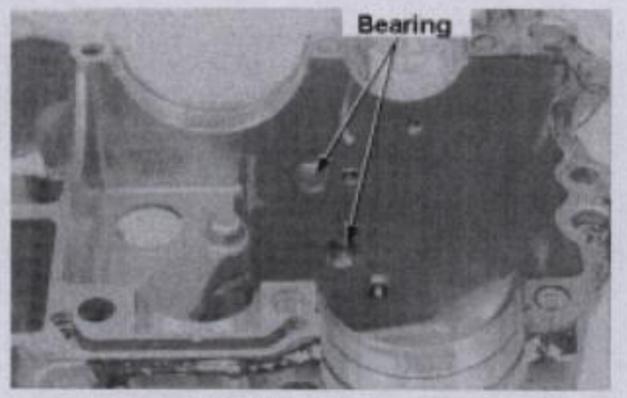
Pull out a shift fork shaft and remove shift forks.



Remove a shift drum.



Inspect bearings for the shift fork shaft and the shift drum for wear and damage.

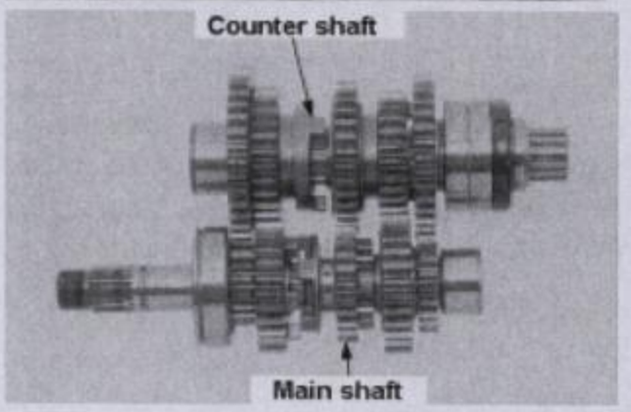


Disassembly

Disassemble the main / counter shafts.

Notes

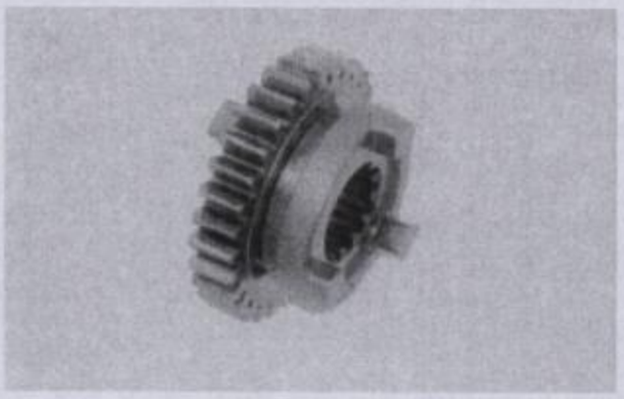
- Sort and store all removed parts.
- Minimise opening the snap ring. Remove it by keeping it perpendicular to the shaft. Do not re-use the snap ring if it is deformed. Watch out for a thrust washer at the edge of the transmission which may still be in the crankcase.



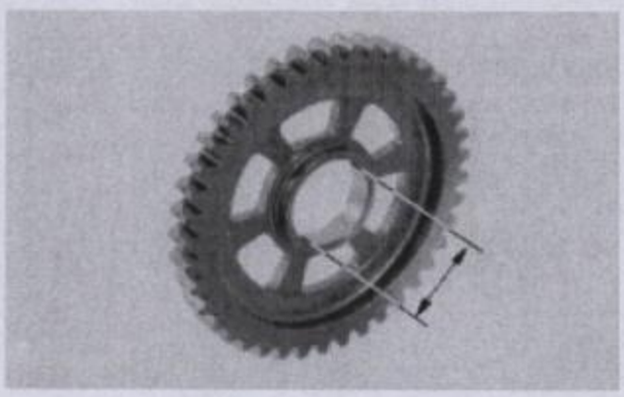
Inspection

Gear

Inspect the gear dock, dock hole and teeth and the shift fork grooves for damage, wear and scratch.



Measure the bore of each gear.



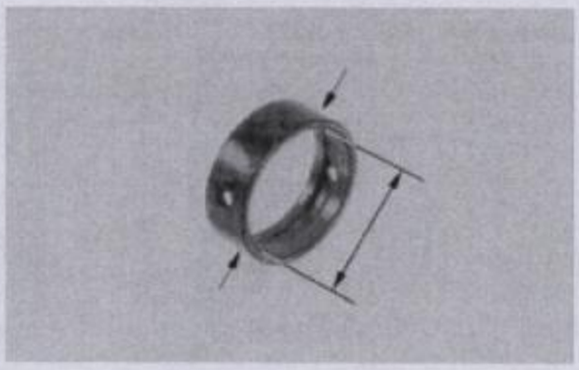
Service limit: M4, M5: 25.05mm
C1: 23.05mm
C2, C3: 28.05mm

Gear bush

Inspect the gear bushes for wear, burn and damage.

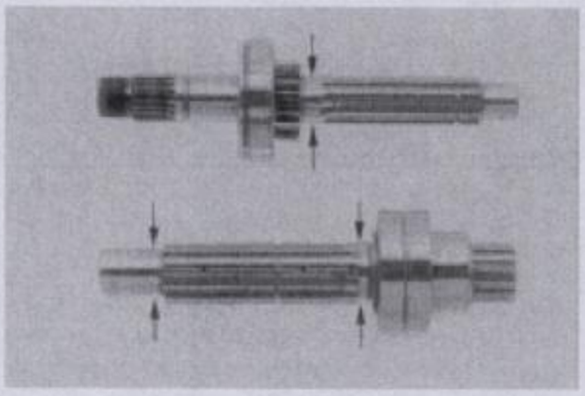
Measure the diameter of the bushes.

Service limit:	M4, 5:	24.92mm
	C1:	22.92mm
	C2, C3:	27.92mm



Measure the bores.

Service limit:	M4:	22.07mm
	C1:	20.06mm
	C2:	25.05mm



Main shaft and counter shaft

Inspect the main shaft for wear and damage on the grooves and friction surfaces.

Measure the diameter of the main and counter shafts.

Service limit:

Main shaft:	at M4 bush:	21.92mm
Counter shaft:	at C1 bush:	19.77mm
	at C2 bush:	24.95mm

Calculate the bush-shaft clearance.

Service limit:	M4:	0.15mm
	C1, 2:	0.15mm

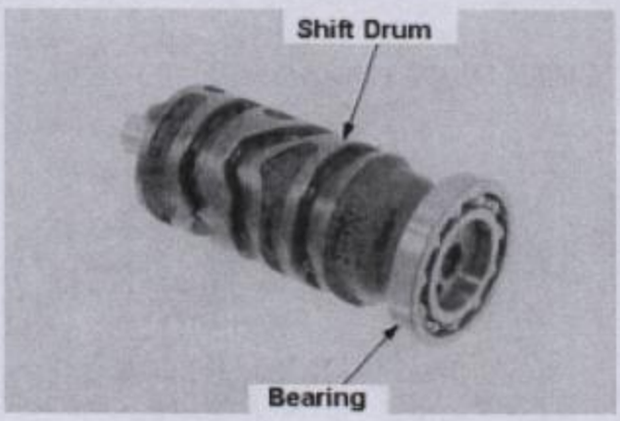
Calculate the gear-bush clearance.

Service limit:	M4:	0.10mm
	C1, 2:	0.10mm

Shift drum & shift drum bearing

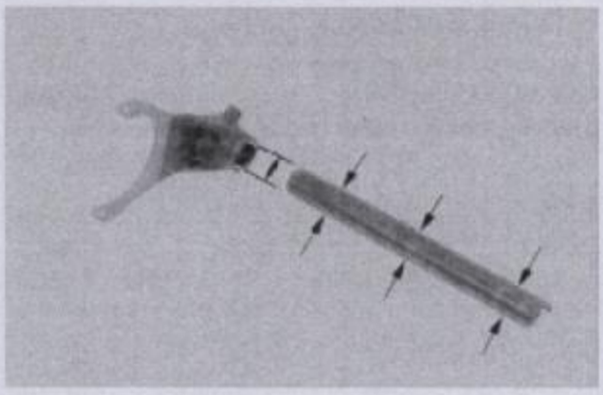
Turn the bearing inner race with a finger to check smooth revolution.

If it is not smooth or it is damaged, replace with a new one.



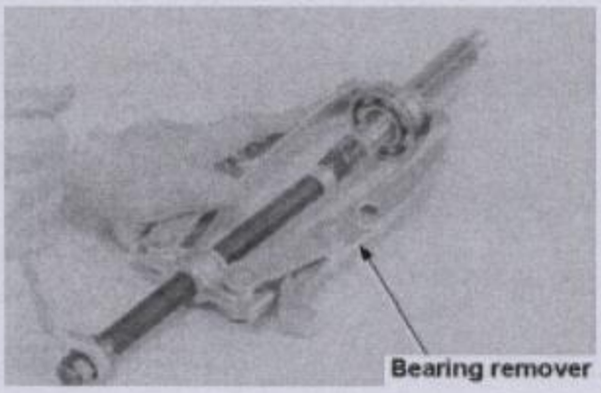
Shift fork & shift fork shaft

Inspect the shift fork for deformation and abnormal wear.
Measure the shift fork bore and the clutch thickness.
Service limit: Bore: 12.04mm
Catch thickness: 5.60mm
Measure the shift fork shaft diameter.
Service limit: 11.90mm



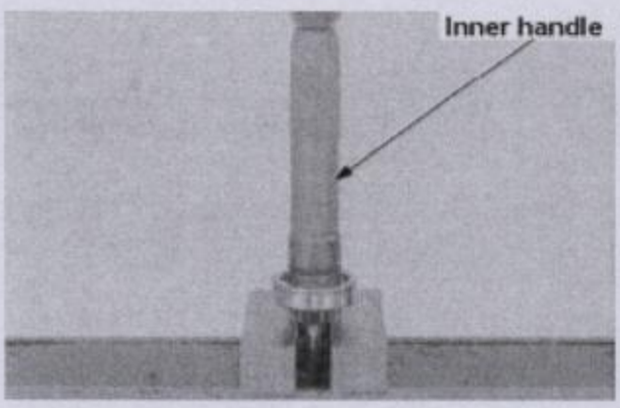
Main shaft bearing replacement

Use a bearing remover (available in market) to remove a main shaft bearing.



Insert a new main shaft bearing by using a press machine and an inner handle.

Special tool:
Inner handle 07746-0020100



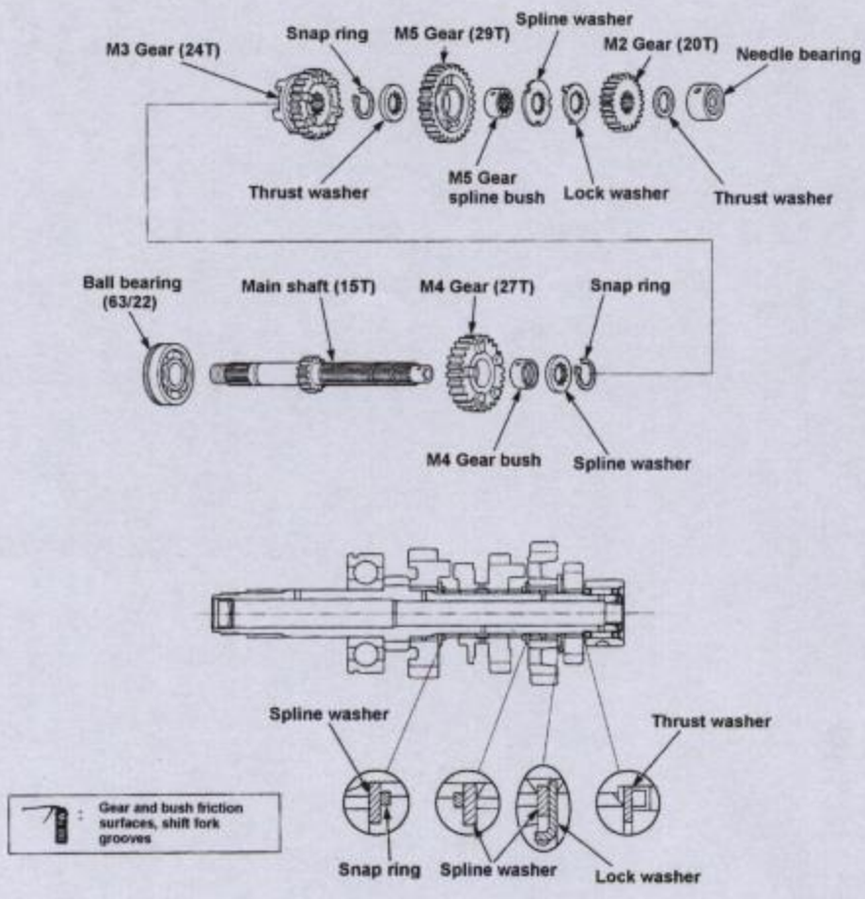
Transmission Assembly

Clean all disassembled parts with working oil.
Install the parts to the original places.

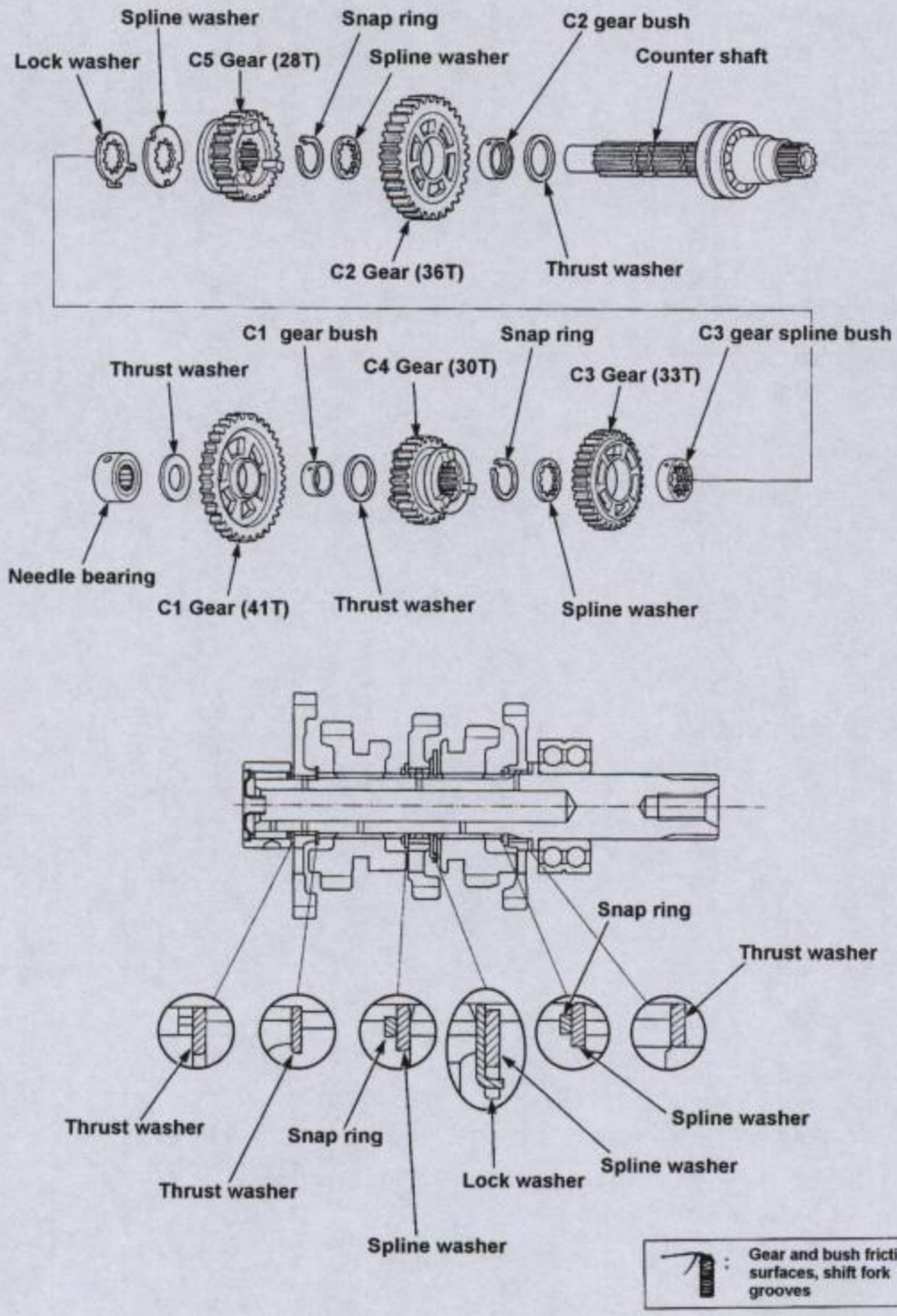
Notes

- Apply Molybdenum solution to the M3 gear, C4 gear, C5 gear shift fork grooves and C1, C2, M4 bushes.
- Confirm smooth operation of each gear on the shafts.
- Face the round-cornered side of the washers and snap rings towards the loading side.
- Do not re-use deformed snap rings.
- Snap rings should be fitted in the shaft grooves.
- Bring the snap ring end gaps to the spline cutouts when installing.
- Align oil holes of bushes and the shaft.

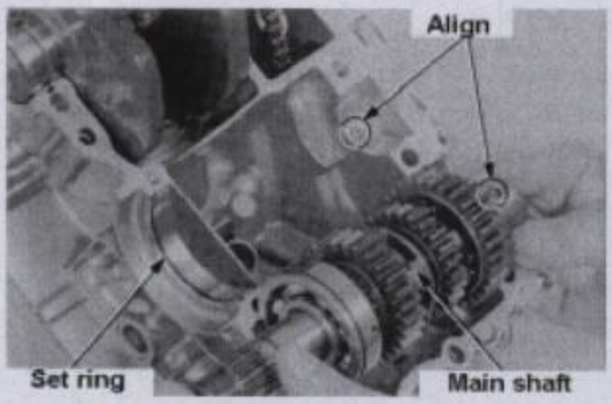
Main Shaft



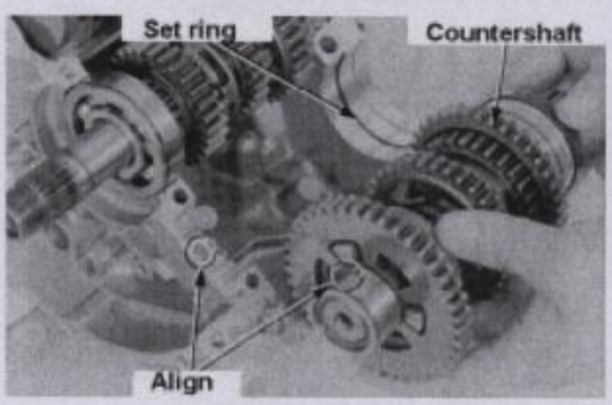
Countershaft



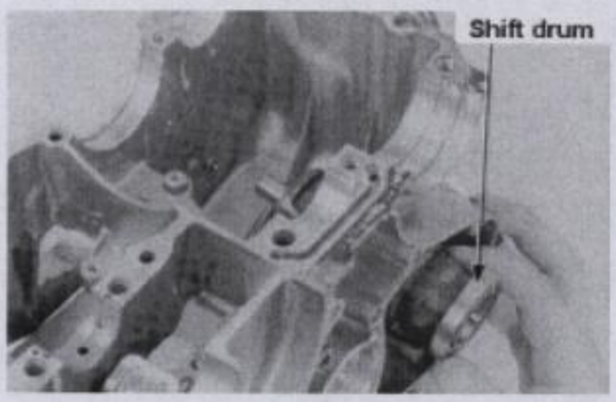
Install knock pins and a set ring.
Align the bearing grooves with holes on the ring and the collar and with knock pins to install a main shaft.



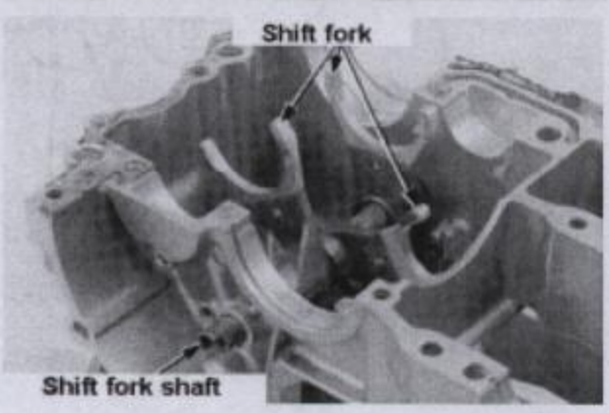
Install knock pins and a set ring.
Align the bearing grooves with holes on the ring and the collar, and with knock pins to install a counter shaft.



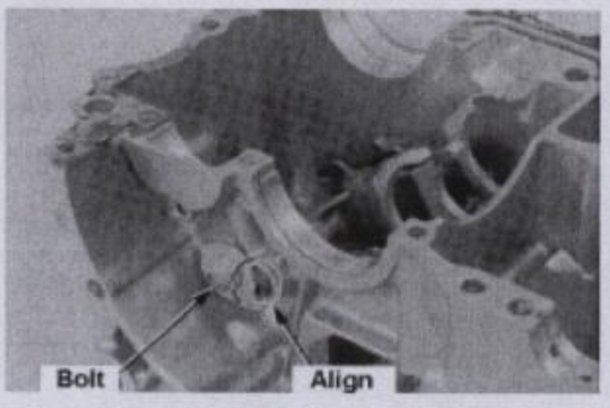
Install a shift drum and a bearing.



Install shift forks and a shift fork shaft by facing the ID marks on the shift forks, "R", "C" and "L" towards the clutch side.

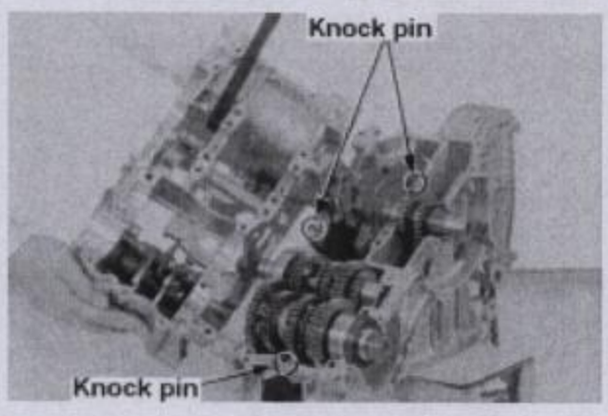


Bring the cutout of the shift fork shaft to the position shown in the figure to secure a shift fork bolt.



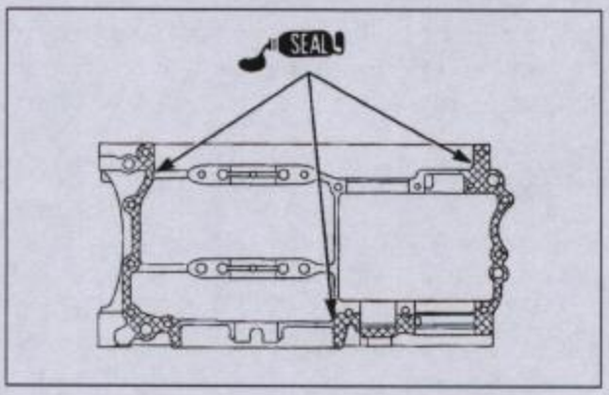
Crankcase Assembly

Clean the crankcase mating surfaces. Install knock pins to the cylinder block. Apply Molybdenum solution to the main bearing of upper/lower crankcase.

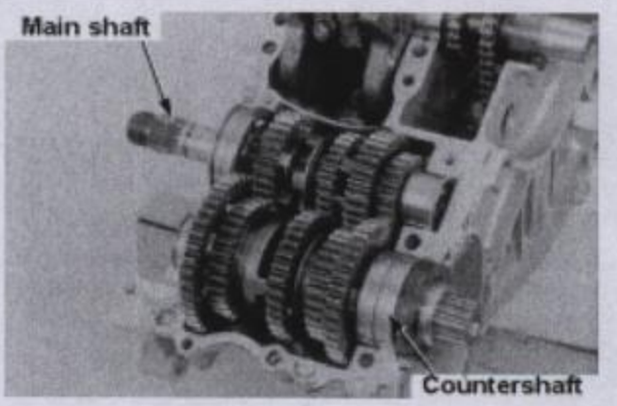


Apply sealant to the crankcase mating surfaces.

Notes
Do not apply sealant near the crankshaft main bearing and oil passage (refer to the figure).



Set the main / counter shafts neutral to make it easy to install a lower crankcase.

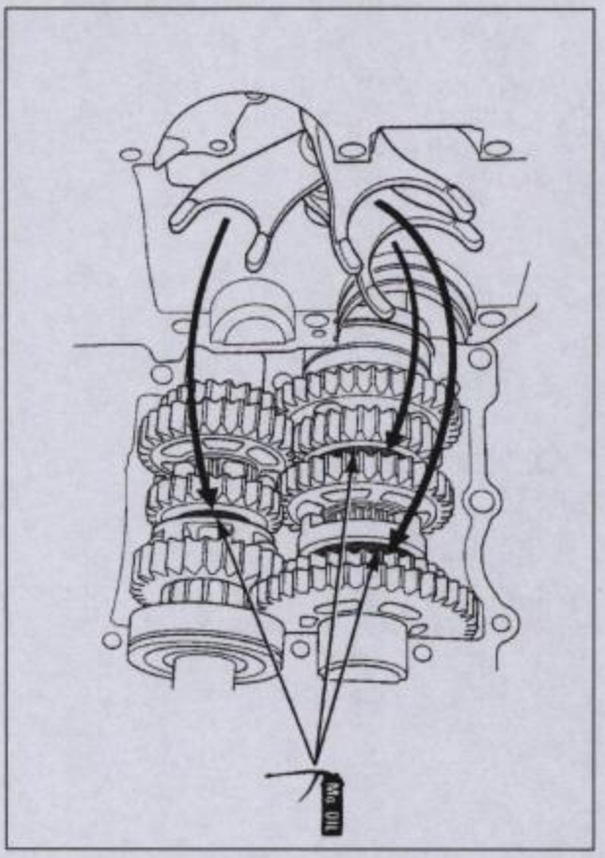


Set the shift drum and the shift fork to the neutral position (shift drum pushing the neutral switch).

Set the shift forks to the fork grooves and firmly attach upper and lower crankcases.

Notes

After mating the crankcases, make sure there is no gap on the mating surface. If they do not mate properly, remove the lower crankcase and try again.

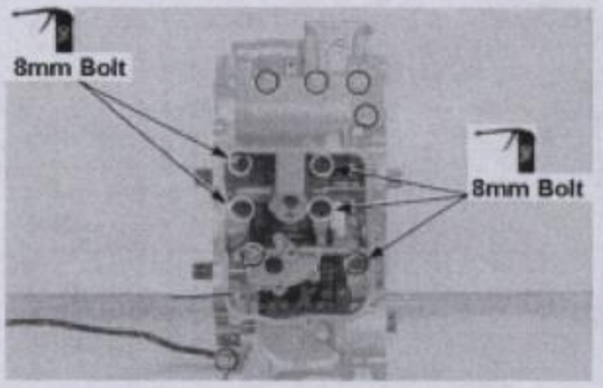


Apply engine oil to the lower crankcase bolts (8mm and 6mm). Secure five lower crankcase bolts (8mm) in crisscross pattern several times.

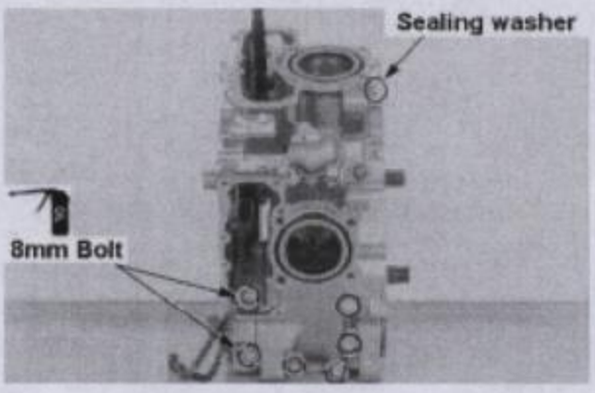
Torque: 23Nm (2.3kgf-m)

Secure six lower crankcase bolts (6mm) in crisscross pattern several times.

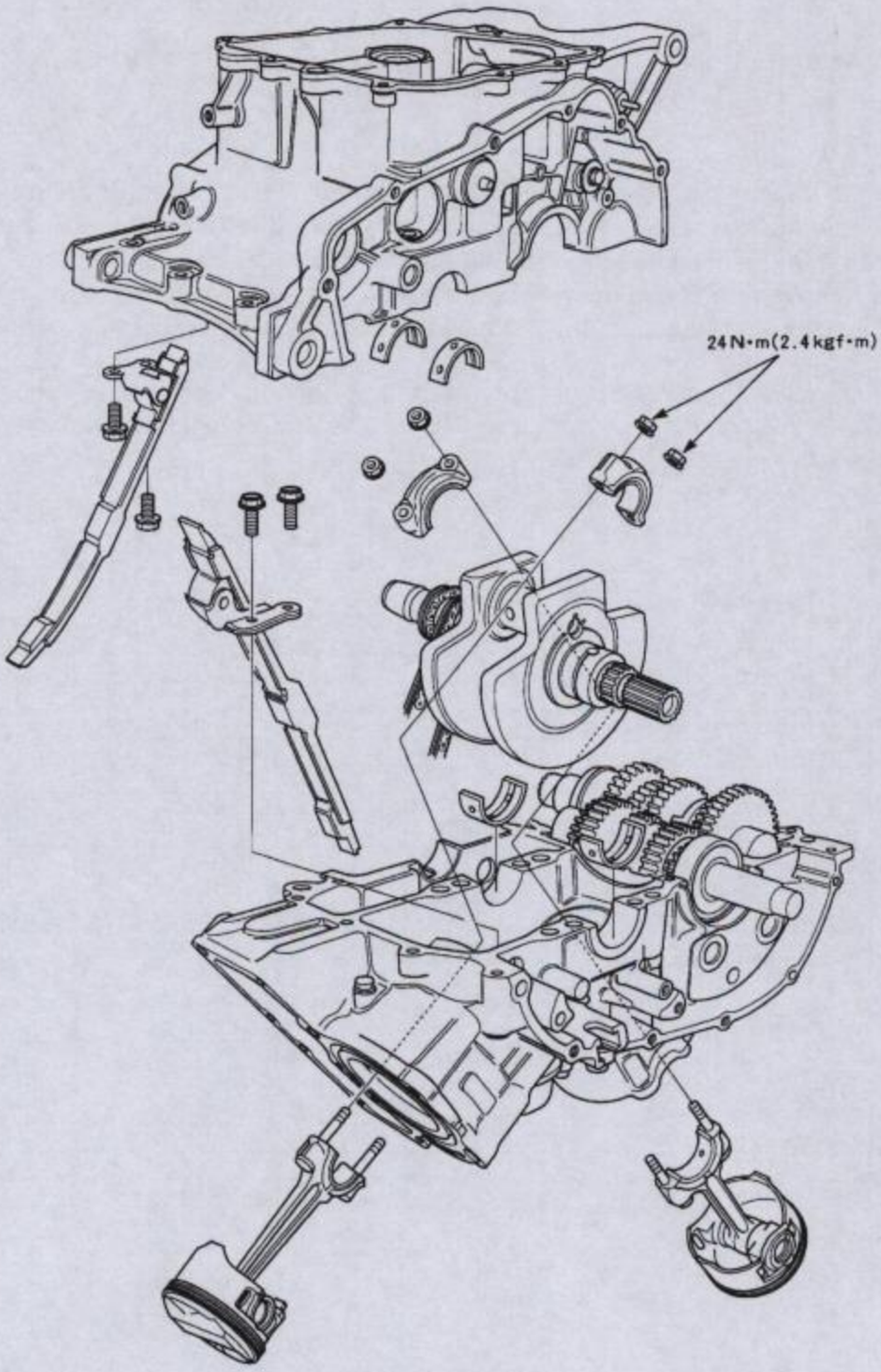
Torque: 12Nm (1.2kgf-m)



Apply oil to the upper crankcase bolts (8mm & 6mm).
Secure two upper crankcase bolts (8mm) mutually several times.
Torque: 23Nm (2.3kgf-m)
Install a sealing washer to the position shown in the figure. Secure five upper crankcase bolts (6mm) in crisscross pattern several times.
Torque: 12Nm (1.2kgf-m)
Re-install the removed parts listed in (11-1).



Crankshaft, Cylinder & Piston



Service Information.....	12 – 1	Main bearing.....	12 – 4
Troubleshooting.....	12 – 2	Connecting rod bearing.....	12 – 6
Crankshaft.....	12 – 3	Piston & Cylinder.....	12 - 8

Service Information

General

- Remove the engine to conduct the service described in this section (Sec. 7).
- Separate the crankcase to conduct the service described in this section (Sec. 11).
- Do not damage the main bearing when removing / installing the crankshaft.
- Clean all removed parts and dry with compressed air before inspection / measurement.
- Apply Molybdenum solution to the connecting rod / main bearing when assembling the crankshaft.
- Sort and store the connecting rods, connecting rod bearing caps and main bearings for each cylinder. Mix up of these parts may vary oil clearance, which results in burning the crankshaft.

Specification

Item			Standard	Service limit
Cylinder	Bore		60.000-60.015mm	60.10mm
	Top warpage		-	0.10mm
	Out of round		-	0.05mm
	Taper		-	0.05mm
Piston, Piston Ring, Piston pin	Piston diameter measuring position		10mm from the skirt edge	-
	Piston diameter		59.970-59.990mm	59.86mm
	Cylinder – Piston clearance		0.010-0.045mm	0.1mm
	Piston pin hole diameter		16.002-16.008mm	16.028mm
	Piston pin diameter		15.994-16.000mm	15.98mm
	Connecting rod small end bore		16.016-16.034mm	16.08mm
	Piston – piston pin gap		0.002-0.014mm	0.048mm
	Connecting rod – piston pin gap		0.016-0.040mm	0.10mm
	Piston ring – ring end gap	Top	0.150-0.300mm	0.60mm
		Second	0.150-0.300mm	0.45mm
		Oil (side rail)	0.20-0.70mm	0.85mm
	Piston ring – ring groove gap	Top	0.025-0.060mm	0.10mm
		Second	0.025-0.055mm	0.10mm
	Piston ring installing direction (top,second) marks facing upward			-
Connecting Rod	Crank pin oil clearance		0.028-0.052mm	0.07mm
	Large end side clearance		0.1-0.3mm	0.4mm
Crankshaft	Runout		-	0.02mm
	Main journal oil clearance		0.028-0.052mm	0.07mm

Torque Settings

Crankcase bolt 8mm	23Nm (2.3kgf-m)	Apply oil to the thread and the seat
Crankcase bolt 6mm	12Nm (1.2kgf-m)	As above
Connecting rod cap nut	24Nm (2.4kgf-m)	As above

Special Tools

Piston slider	07954-3740000

Troubleshooting

Too low compression
- Blown cylinder head gasket
- Worn piston ring
- Worn piston / cylinder

Too high compression
- Carbon build up in combustion chamber and the piston

Knocking sound from piston
- Worn cylinder, piston or piston ring
- Worn piston pin hole/piston pin
- Worn connecting rod small end

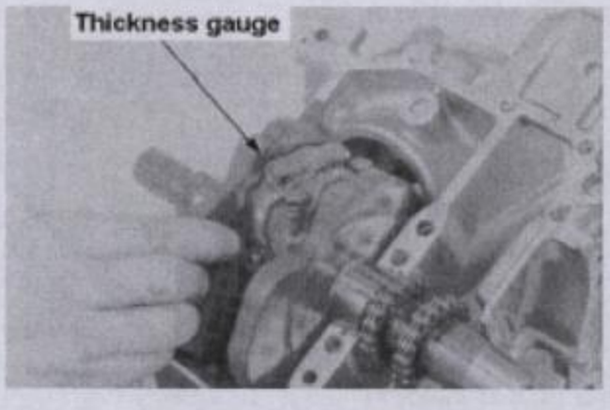
White smoke from a muffler
- Worn cylinder, piston or piston ring
- Improper piston ring attachment
- Scratched piston / cylinder
- Faulty cylinder head / valve

Noise from cylinder head
- Damaged piston / cylinder
- Worn connecting rod bearing
- Bent connecting rod

Crankshaft

Connecting rod large end side clearance

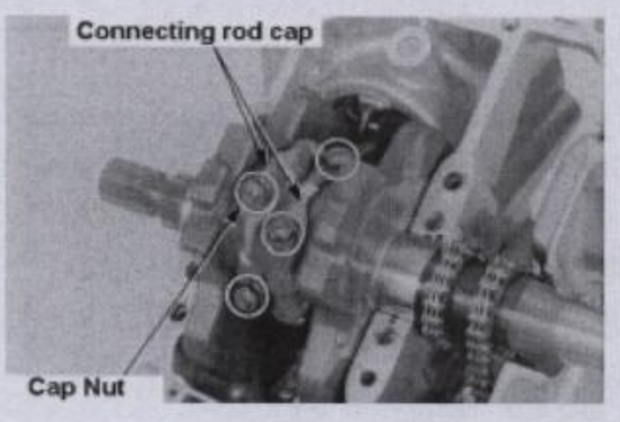
Separate the crankcase (11-3).
Measure the connecting rod large end side clearance.
Service limit: 0.4mm
Replace the connecting rod if the measured valve is beyond the limit. If the re-measured value with a new rod is still beyond the limit, replace the crankshaft.



Removal

Unscrew nuts to remove connecting rod bearing caps.

Notes
Mark removed connecting rod caps and rod bearings to avoid mixing

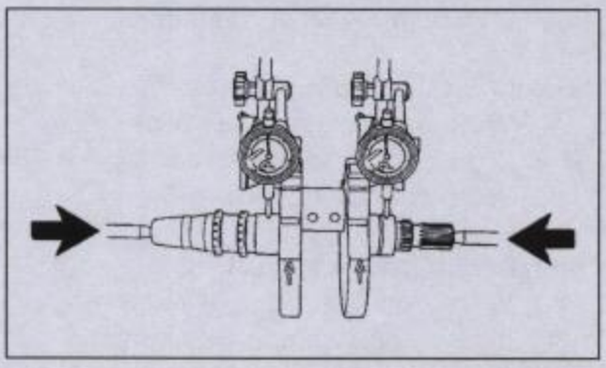


Remove a crankshaft.

Inspection

Crankshaft runout:
Support both ends of the shaft and measure its runout at the journal with a dial gauge.

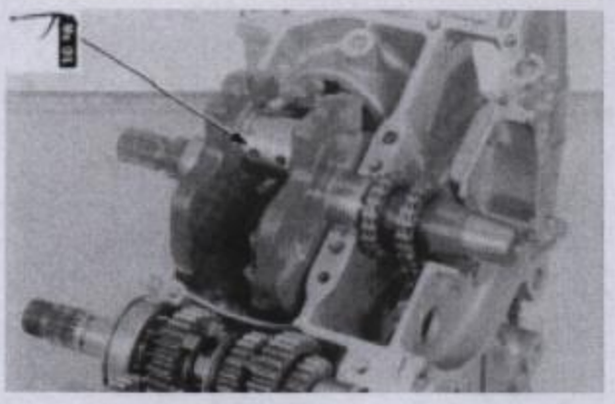
Service limit: 0.02mm



Installation

Apply Molybdenum solution to the crankpin and install bearing caps.

Notes
Install the bearing caps to their original places.

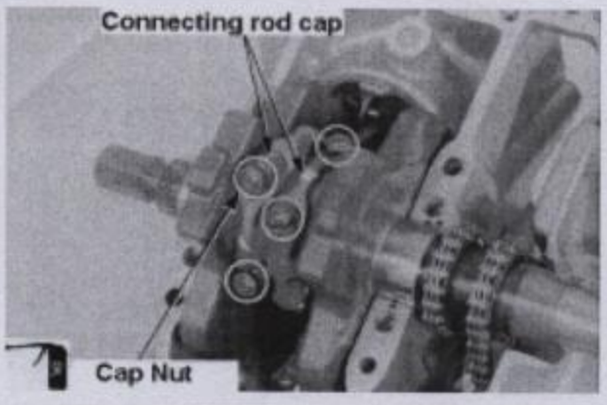


Apply engine oil to the connecting rod bearing cap thread and install it. Secure nuts mutually in several times.

Torque: 24Nm (2.4kgf-m)

After securing nuts, confirm the smooth operation of the connecting rod.

Assemble the crankcase (11-11).

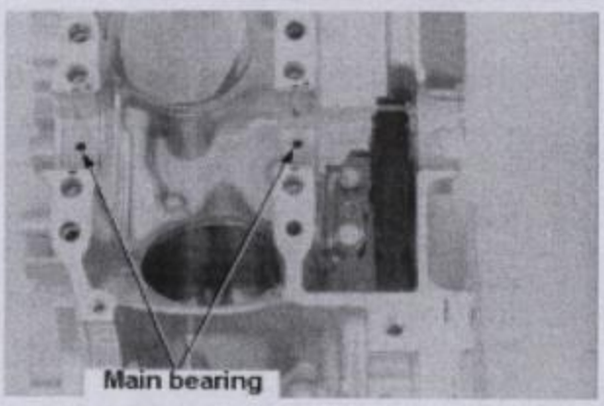


Main Bearing

Remove a crankshaft (12-3).

Bearing inspection

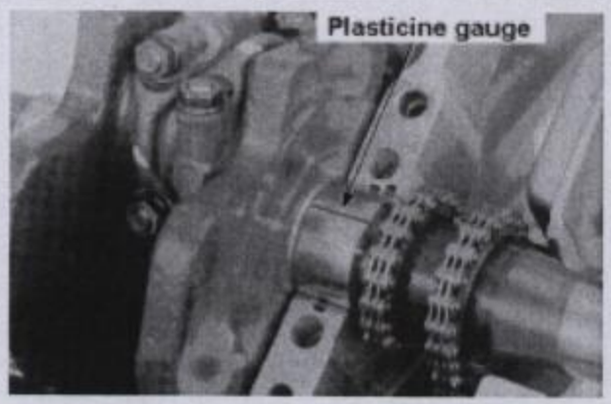
Inspect the main bearing for unusual wear, damage and separation.



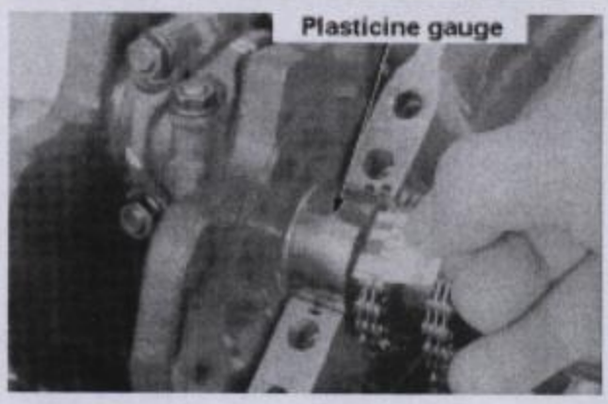
Oil clearance

Degrease the friction surfaces of the main bearing and the crankshaft.
Install the crankshaft to the upper crankcase.

Place a plasticine gauge away from an oil hole.
Install a lower crankcase (11-11).



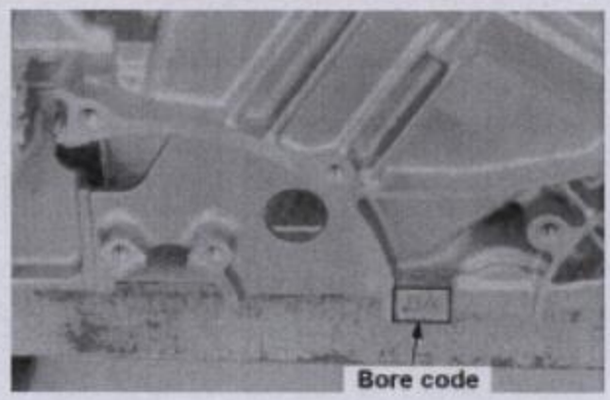
Notes
Never turn the crankshaft while inspecting.



Take the widest plasticine gauge as an oil clearance.
Service limit: 0.07mm
Replace the bearing by following the procedure on the next page if the measured value is beyond the limit.

Main bearing selection

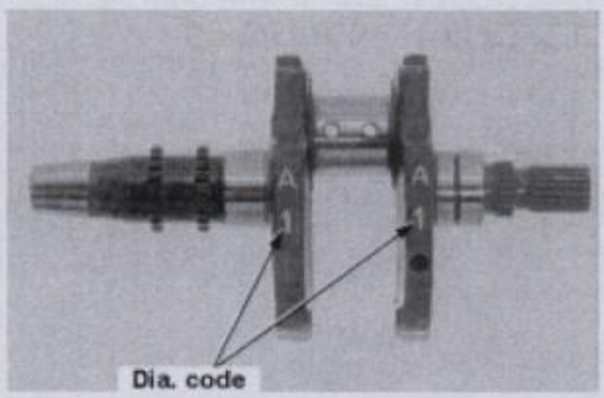
Record the crankcase bore code.



Notes

- The bore code is marked on the upper crankcase. It should be either A or B.
- The left code is for left journal and the right for the right journal.

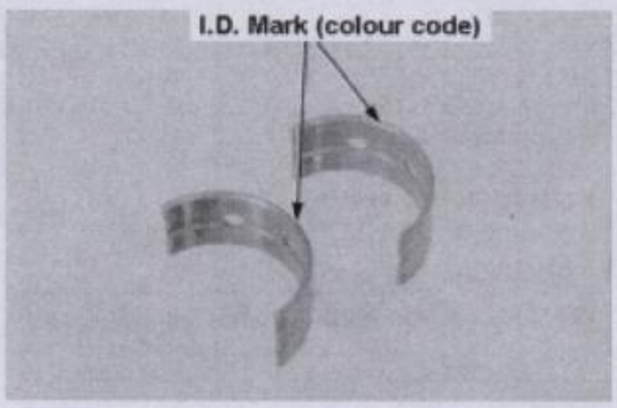
Record the crankshaft diameter code.



Notes

- When replacing the crankshaft, select the bearing according to the diameter code. If the crankshaft will not be replaced, measure the journal diameter with a micrometer.
- The main journal diameter code is marked on a crank weight and it should be either 1 or 2.

Select a main bearing from the crankcase and the crankshaft codes. The thickness of the main bearing is colour coded.



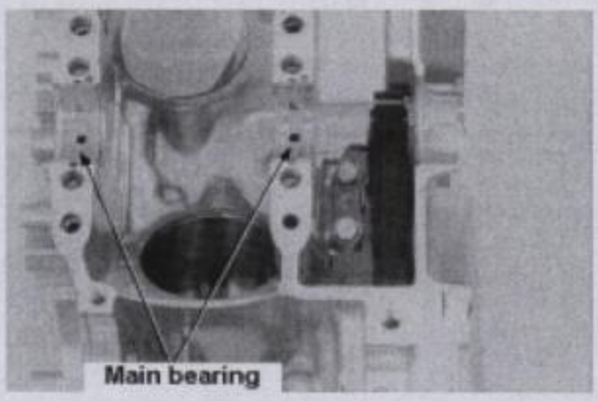
Crankcase Bore code / Crankshaft Diameter code		A	B
		35.000 – 35.008mm	35.008 – 35.016mm
1	32.002 – 32.010mm	C (Y)	B (G)
2	31.994 - 32.002mm	B (G)	A (Br)

Bearing thickness:

A	(Br) Thick	Brown
B	(G)	Green
C	(Y) Thin	Yellow

Bearing installation

Degrease the back surface of the main bearing and the mount surfaces of the upper / lower crankcase.
Set the projections of the main bearing to the groove on the upper / lower crankcases to install the bearing.

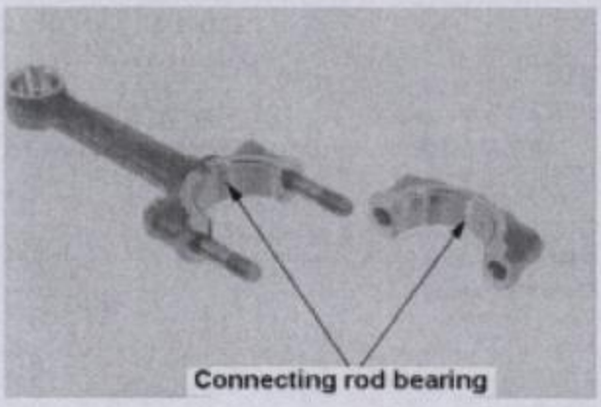


Connecting Rod Bearing

Remove a crankshaft (12-3).

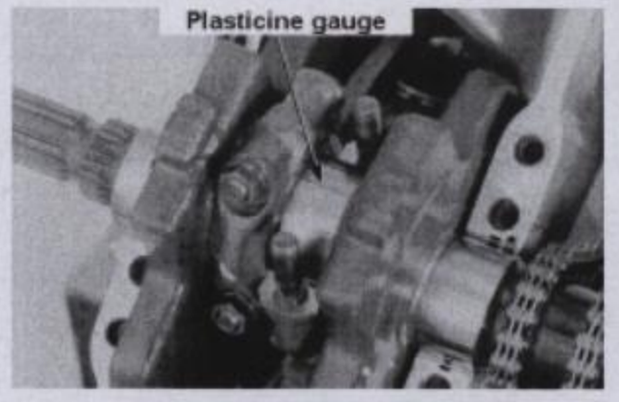
Connecting rod bearing inspection

Inspect the connecting rod bearing friction surface for unusual wear, damage or separation.

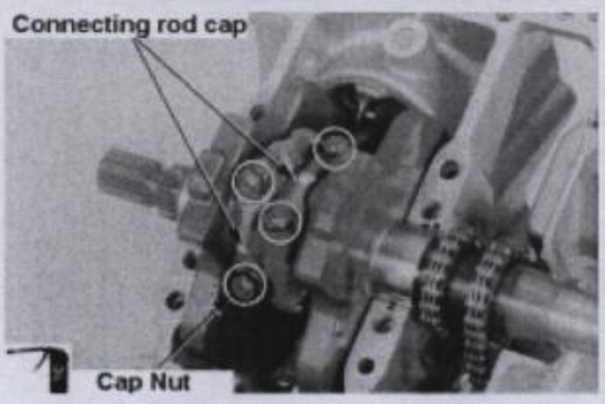


Crankpin oil clearance

Degrease the friction surface of the connecting rod bearing and the crankpins on the crankshaft.
Place the plasticine gauge away from the oil hole.



Re-install the connecting rod and the bearing caps to their original crankpins.
Apply oil to the connecting rod bearing cap nuts and secure the nuts mutually in several times.
Torque: 24Nm (2.4kgf-m)

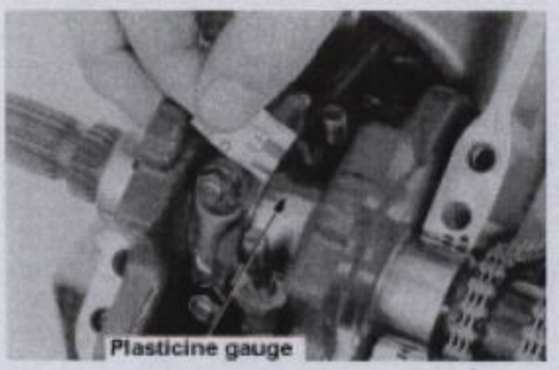


Notes

Never turn the crankshaft and the connecting rod while inspecting.

Remove a connecting rod bearing cap.
Take the widest reading of the plasticine gauge as an oil clearance.

Service limit: 0.07mm
Replace the bearing by following the procedure on the next page if the measured value is beyond the limit.



Connecting rod bearing selection

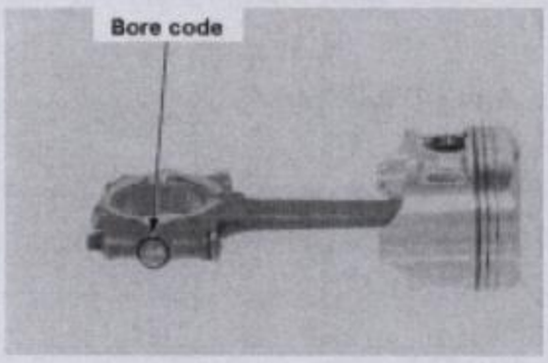
Notes

Select proper bearing when replacing a crankshaft or a connecting rod.

Record a connecting rod bore code.

Notes

The bore code is marked on the rod. It should be either 1 or 2.

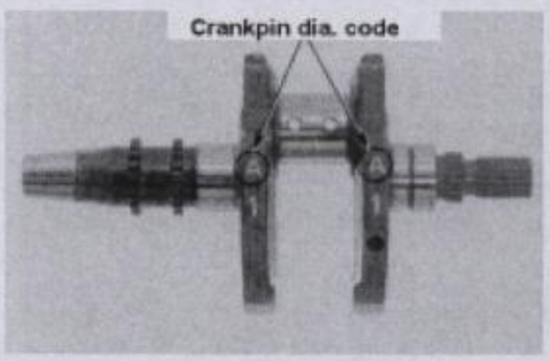


Record a crankpin diameter code.

Notes

The diameter code is marked on the crank weight. It should be either A or B.

Select a proper bearing from the bore code and the diameter code. Bearings are colour coded.

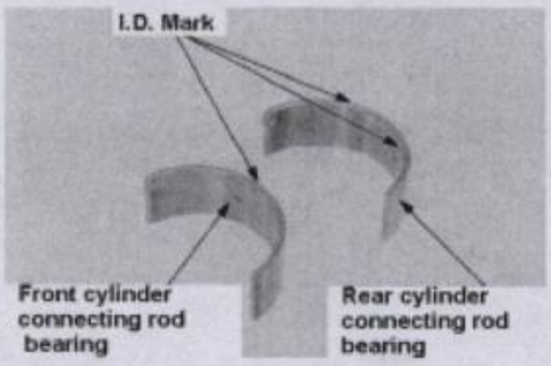


Notes

Do not mix up the front cylinder connecting rod bearing (one colour code) and the rear cylinder connecting rod bearing (two colour codes).

Connecting rod bearing selection table

Connecting Rod Bore code / Crankpin Diameter code		1		2	
		36.000 – 36.008mm		36.008 – 36.016mm	
		Front	Rear	Front	Rear
A	32.992 – 33.000mm	C (Y)	C (Y,Y)	B (G)	B (G, G)
B	32.984 – 32.992mm	B (G)	B (G, G)	A (Br)	A (Br, Br)

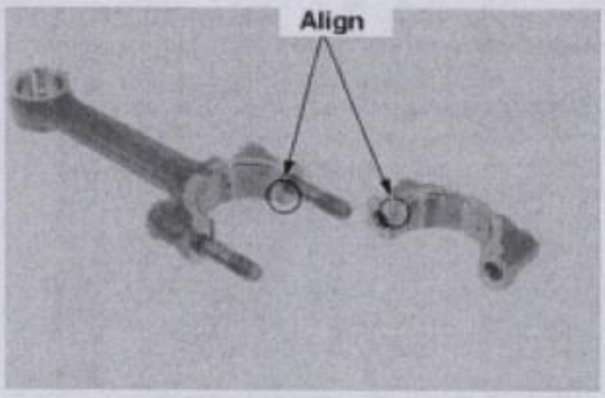


Bearing thickness:

A	(Br), (Br, Br)	Thick	Brown
B	(G) (G, G)		Green
C	(Y) (Y, Y)	Thin	Yellow

Bearing installation

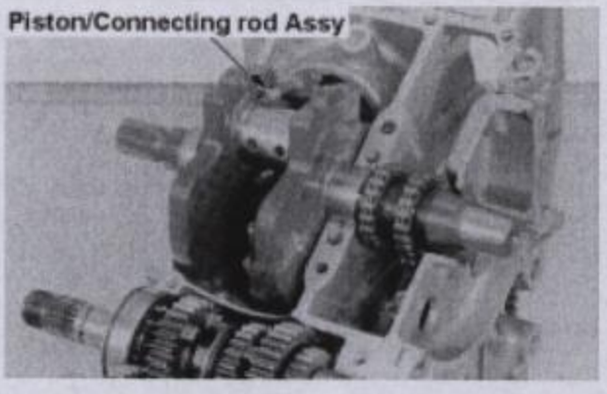
Degrease the back surface of the connecting rod bearing and the connecting rod mount surface.
Set the projections of the bearing to the connecting rod groove to install the bearing.



Piston & Cylinder

Piston removal

Separate the crankcase (11-3).
Remove a crankshaft (12-3).
Push the piston / connecting rod Assy to remove it from the cylinder.

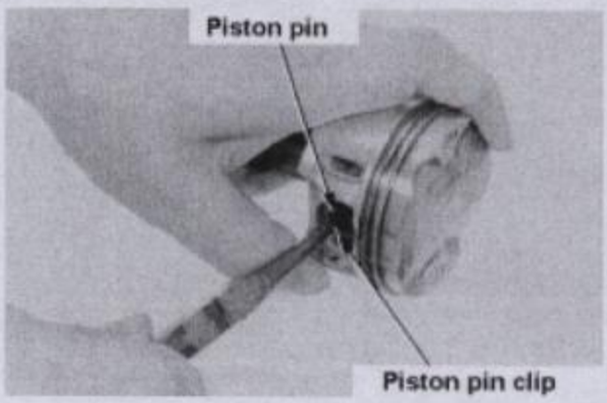


Notes

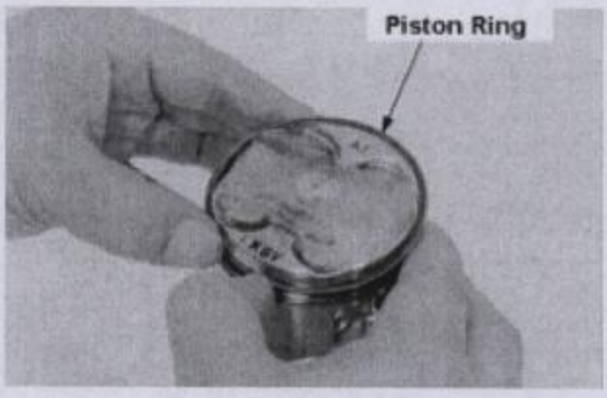
Mark all removed pistons, connecting rods, and connecting rod bearings to avoid mixing up.

Piston disassembly

Remove a piston pin clip.
Pull out a piston pin to remove a piston from the connecting rod.



Open the end gap of the piston ring and remove the ring from the opposite side of the end gap.



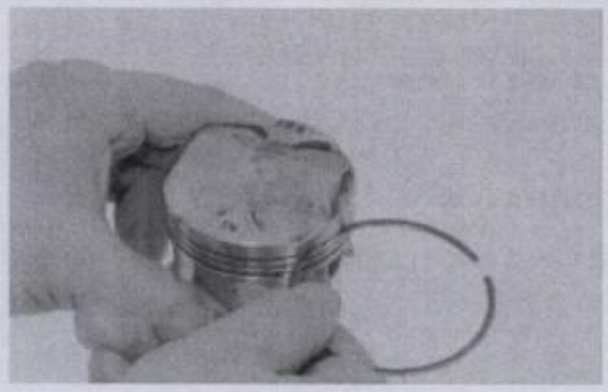
Notes

- Do not overstress the ring when expanding the gap.
- Do not damage the piston.

Remove carbon from the piston.
Remove carbon from the ring groove by using an old piston ring.

Notes

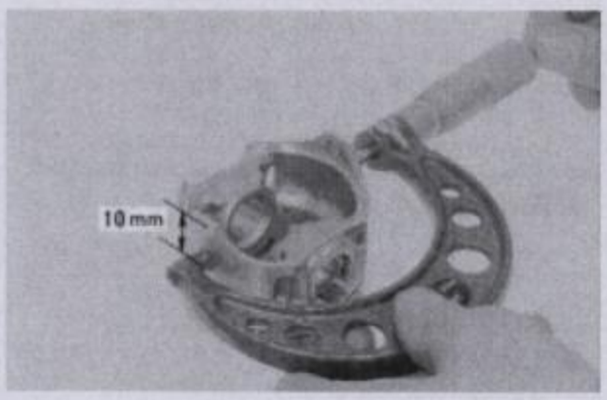
- Do not damage the groove.
- Do not use a wire brush.



Piston, Piston Ring, and Connecting Rod Inspection

Piston

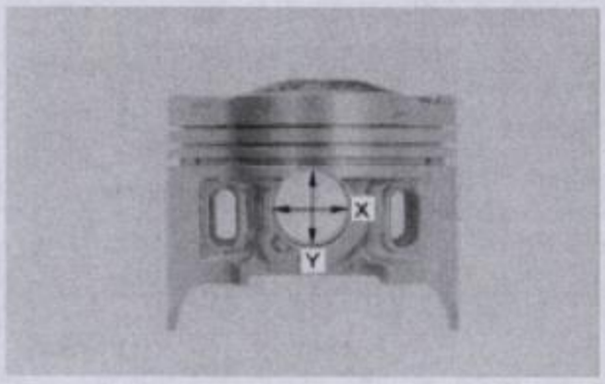
Inspect its exterior surface for scratch.
Inspect its ring groove for unequal wear and its oil hole for clogging.
Measure the piston diameter at 10mm from the bottom end of the piston skirt, perpendicular to the piston pin hole direction.



Service limit: 59.86mm

Calculate the piston – cylinder clearance (12-10).

Service limit: 0.1mm

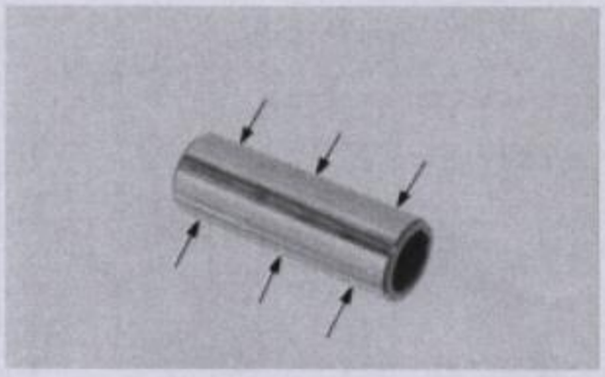


Measure the piston pin hole diameter in both X and Y direction.

Take the maximum value as a piston pin hole diameter.
Service limit: 16.028mm

Measure the piston pin diameter at three position.

Service limit: 15.98mm



Calculate the piston – piston pin gap.

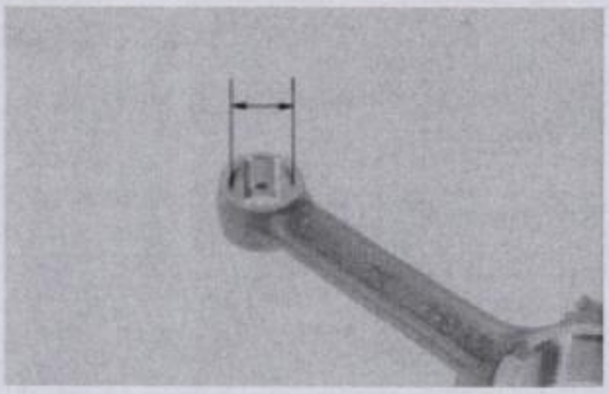
Service limit: 0.048mm

Measure the bore of the connecting rod small end.

Service limit: 16.08mm

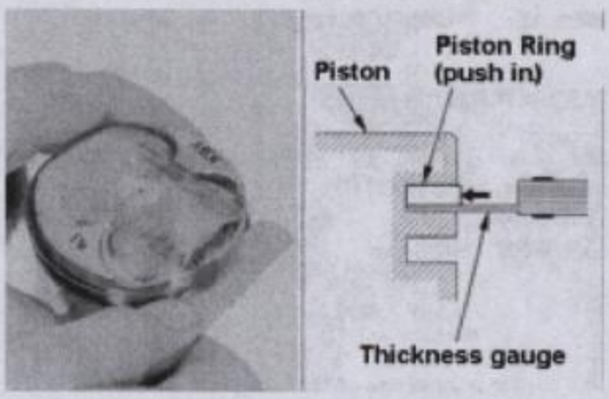
Calculate the piston pin – connecting rod gap.

Service limit: 0.10mm



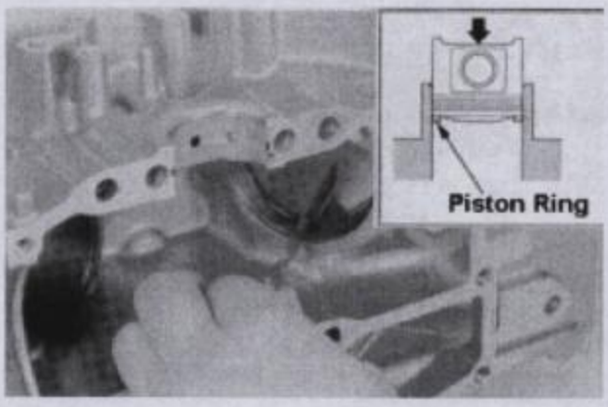
Inspect the piston ring for scratch or unequal wear on top or bottom surfaces.
Set the piston ring to the groove and push it until its surface is nearly flush with the piston.
Insert a thickness gauge to measure the piston ring groove gap.

Service limit: Top: 0.10mm
Second: 0.10mm



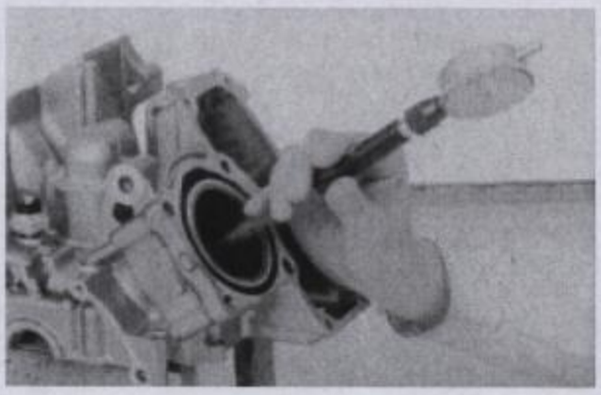
Install a piston ring to the bottom of the cylinder horizontally with the piston head.
Measure the ring end gap with a thickness gauge.

Service limit: Top: 0.60mm
Second: 0.45mm
Oil (side rail) 0.085mm



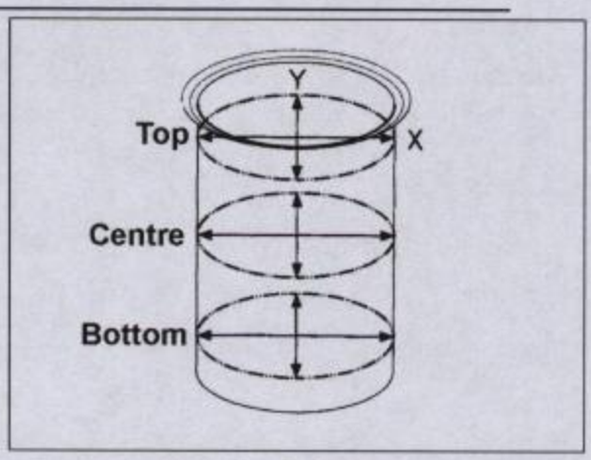
Cylinder inspection

Inspect the interior surface of the cylinder for scratch or wear.
Measure the bore at the top, centre, bottom and for both parallel and perpendicular to the piston pin (thus six in total).
Take the maximum value as a cylinder bore.
Service limit: 60.10mm



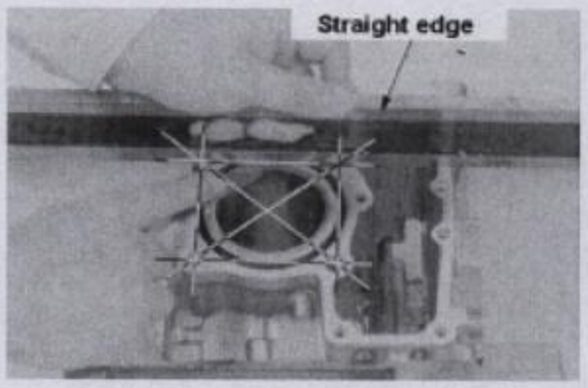
Calculate the out of round (difference between X and Y at three position) and taper (difference between top/centre/bottom for each X or Y) from the measured values.
Take maxima.

Service limit: Out of round: 0.05mm
Taper: 0.05mm



Measure the cylinder top warpage with a straight edge and a thickness gauge.

Service limit: 0.10mm



Piston ring installation

Caution

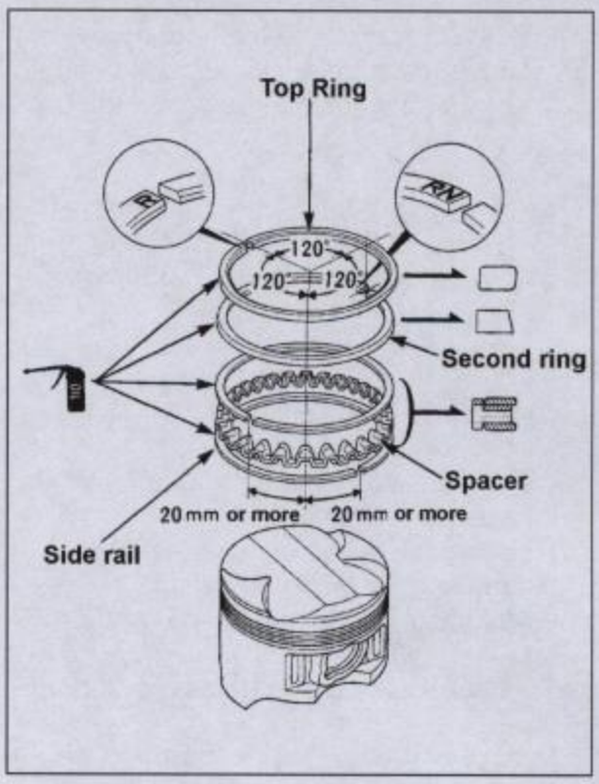
Do not damage the piston ring or the piston when installing the ring.

Install piston rings by facing their marked surfaces upwards.

Caution

- Do not mix up the top and the second rings.
- Install a spacer before a side rail when installing an oil ring.
- Off set the ring and gaps by 120° as shown in the figure.

After installation, check the smooth rotation of the rings.



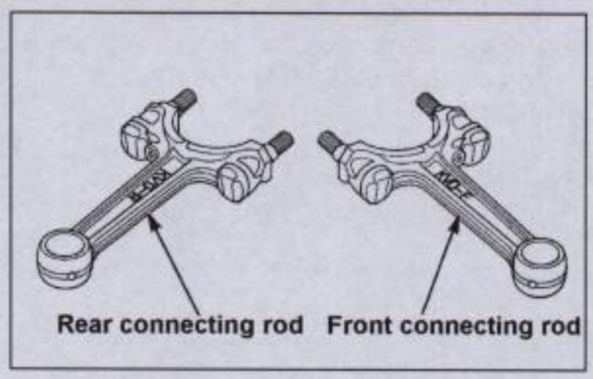
Piston & Connecting Rod assembly

Apply Molybdenum solution to the connecting rod small end.

Apply engine oil to the piston pin and the piston pin hole.

Notes

The front and the rear connecting rods are marked as KVO-F and KVO-R, respectively.

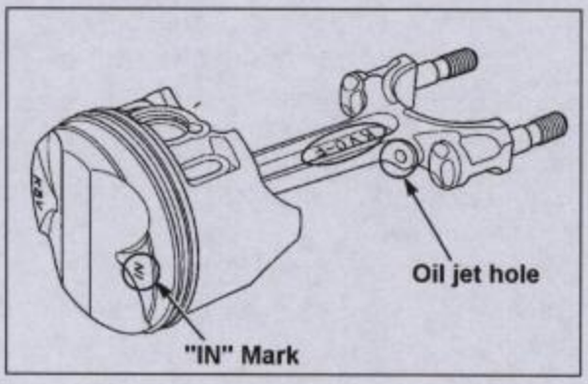


Front Piston

Align the piston "IN" mark with an oil jet hole to install.

Notes

Align the marks made when disassembling.

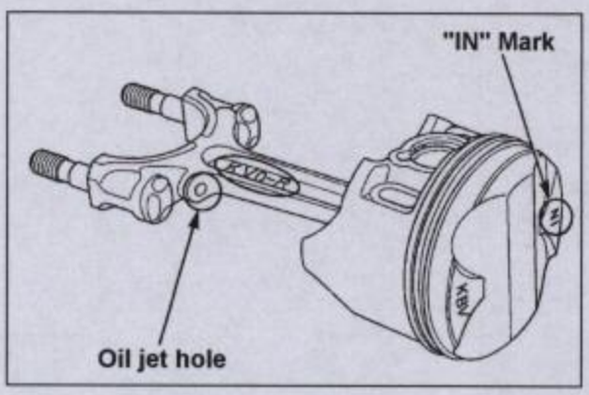


Rear Piston

Place the piston "IN" mark opposite to the connecting rod oil jet hole to install it.

Notes

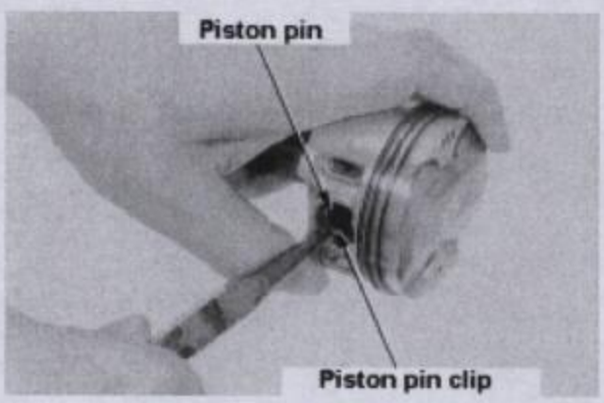
Align the marks made when disassembling.



Install piston pins to the piston and the connecting rod.
Install a new piston pin clip to the piston pin hole groove.

Notes

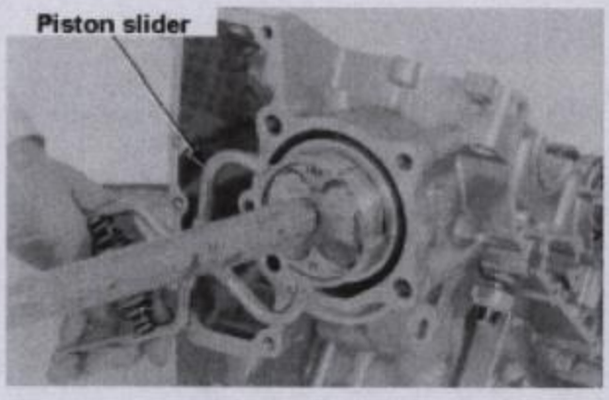
- Confirm that the piston pin clip is set to the groove properly.
- Keep the piston pin clip and gap away from the piston cutout.

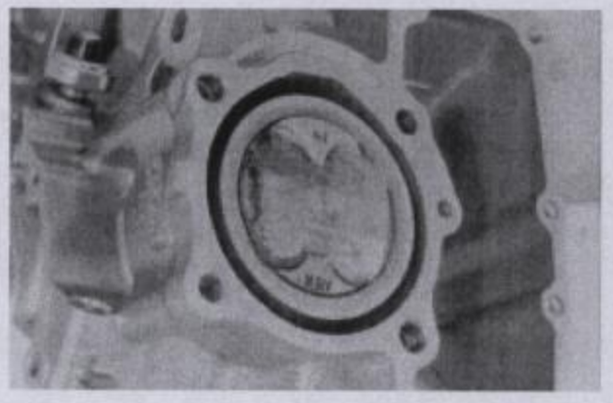


Apply oil to the piston.

Face the "IN" mark on the piston towards inside and compress the piston ring with a piston slider to insert the piston to a cylinder.

Special tool:
Piston slider: 07954-3740000





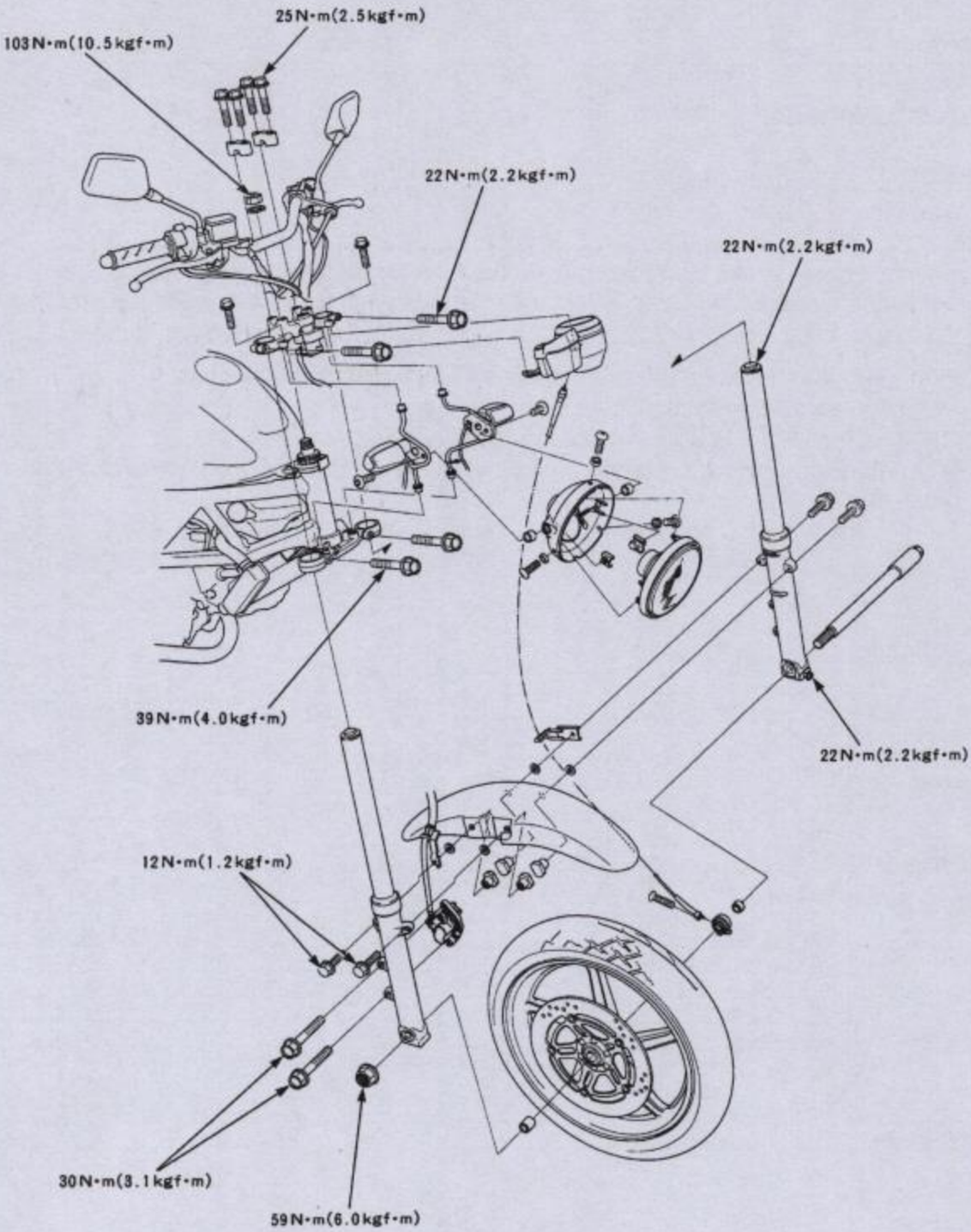
Caution

- Do not damage the cylinder mating surfaces and interior surface of the cylinder when inserting the piston.
- Align the connecting rod bore code with the bearing cap bore code to install to the crankshaft.

Confirm the piston "IN" mark is facing towards the intake.

Install the crankshaft (12-3).

Assemble the crankcase (11-11).


25N·m(2.5kgf·m)
103N·m(10.5kgf·m)
22N·m(2.2kgf·m)
22N·m(2.2kgf·m)
39N·m(4.0kgf·m)
22N·m(2.2kgf·m)
12N·m(1.2kgf·m)
30N·m(3.1kgf·m)
59N·m(6.0kgf·m)

VTR 250 13. Front Wheel, Suspension & Steering

Service Information.....	13 – 1	Front Wheel.....	13 – 8
Troubleshooting.....	13 – 2	Front Fork.....	13 – 14
Handlebar.....	13 – 3	Steering Stem.....	13 - 24

Service Information

General

Warning

A contaminated brake disc/pads reduce the braking performance. Replace contaminated pads and clean a contaminated disc with brake degreasing agent.

- Firmly support the frame when servicing a front wheel or suspension.
- Refer to Sec. 15 for brake system maintenance.
- Refer to Sec. 19 for lamps, instruments and switches service.
- When removing / installing a tyre front to a rim, use exclusive tyre lever and a rim protector.
- Refer to the common service manual to remove / install a tubeless tyre.

Specification

Item			Standard	Service limit
Front tyre	Tread depth		-	1.5mm
	Pressure	One person	200kPa (2.00kg/cm²)	-
		Two people	200kPa (2.00kg/cm²)	-
	Type	Bridgestone	G601F tubeless	-
	Size		110 / 70 – 17 54H	-
Front axle runout			-	0.20mm
Front wheel	Rim runout	Radial	-	2.0mm
		Axial	-	2.0mm
	Balance weight		-	60g or less
Front fork	Spring relaxed length		330.3mm	324mm
	Installing direction		Tapered end downwards	-
	Oil quantity		460 ± 2.5cm³	-
	Oil level		105mm	-
	Type of oil		Honda Ultra Cushion oil # 10	-
	Tube bending		-	0.2mm
Steering load			10 – 16N (1.0-1.6kgf)	-

Torque Settings

Stem nut	103Nm (10.5kgf-m)	
Top thread	25Nm (2.5kgf-m)	
Bottom bridge pinch bolt	39Nm (4.0kgf-m)	
Top bridge pinch bolt	22Nm (2.2kgf-m)	
Axle nut	59Nm (6.0kgf-m)	
Axle holder bolt	22Nm (2.2kgf-m)	
Brake disc bolt	29Nm (3.0kgf-m)	
Fork cap	22Nm (2.2kgf-m)	
Fork socket bolt	20Nm (2.0kgf-m)	Apply screw locker to the thread
Handlebar mount bolt	26Nm (2.7kgf-m)	
Front fender bolt	12Nm (1.2kgf-m)	
Master cylinder mount bolt	12Nm (1.2kgf-m)	
Caliper mount bolt	30Nm (3.1kgf-m)	
Front brake hose clamp	12Nm (1.2kgf-m)	

Special tools

Fork seal driver	07947-KA50100
Fork seal driver attachment	07947-KF00100
Steering stem driver	07946-MB00000
Driver attachment	07953-MJ10200
Steering stem socket	07916-3710101
Ball race remover	07946-3710500
Outer driver 42 x 47mm	07746-0010300
Driver handle A	07749-0010000
Pilot 15mm	07746-0040300
Outer driver 52 x 55mm	07746-0010400
Remover head 15mm	07746-0050400
Remover shaft	07746-0050100

Troubleshooting

Heavy steering
- Overtightened steering top thread
- Damaged steering head bearing
- Worn/damaged inner/outer race
- Deformed steering stem
- Low tyre pressure
- Worn tyre

Hard to maintain direction
- Damaged / loose steering bearing
- Unbalanced left/right cushion oil level
- Bent front axle, tilted tyre
- Worn tyre
- Loose fit of the wheel bearing

Tilted front wheel
- Deformed rim
- Loose front wheel bearing
- Faulty tyre
- Unbalanced wheel
- Loose tightening around an axle

Wheel rotation resistance
- Faulty ballbearing
- Bent front axle
- Dragging brake (Sec. 15)

Hard front suspension
- Bent fork tube
- Excessive amount of oil
- Jammed oil path
- Too high oil viscosity
- Low tyre pressure

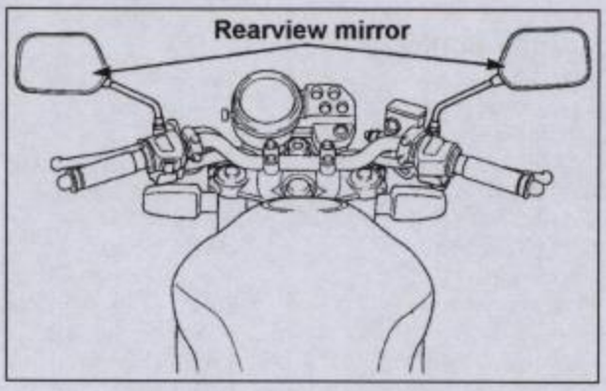
Soft front suspension
- Deformed spring
- Insufficient oil level
- Contaminated oil
- Low oil viscosity
- Low tyre pressure

Noise from front cushion
- Fork tube rubbing bottom case
- Insufficient oil level
- Loose cushion mounts

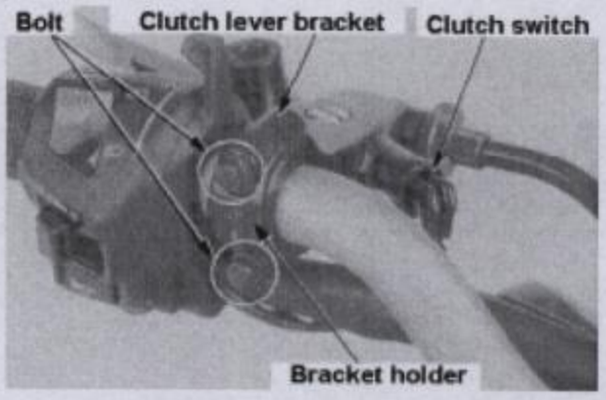
Handlebar

Removal

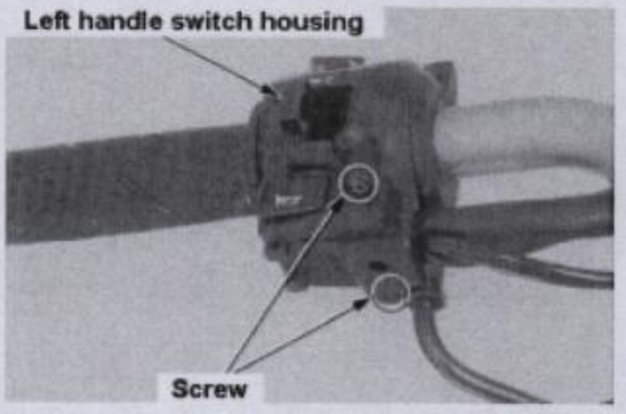
Remove a rearview mirror.



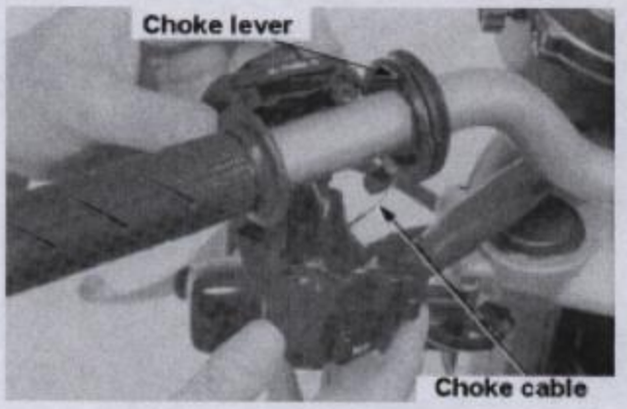
Disconnect a clutch switch connector. Unscrew two bolts to remove a bracket holder and a clutch lever bracket.



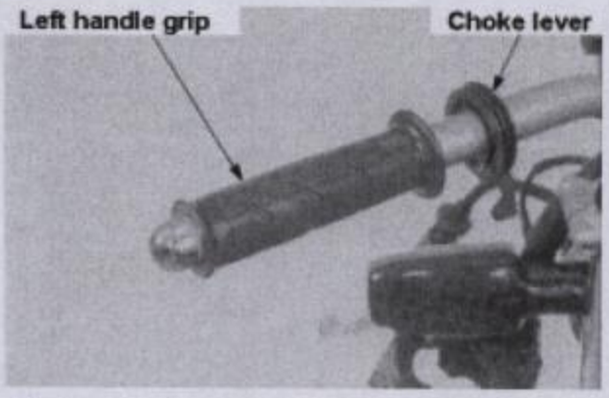
Unscrew two screws and remove a left handle switch housing.



Disconnect a choke cable from a choke lever.



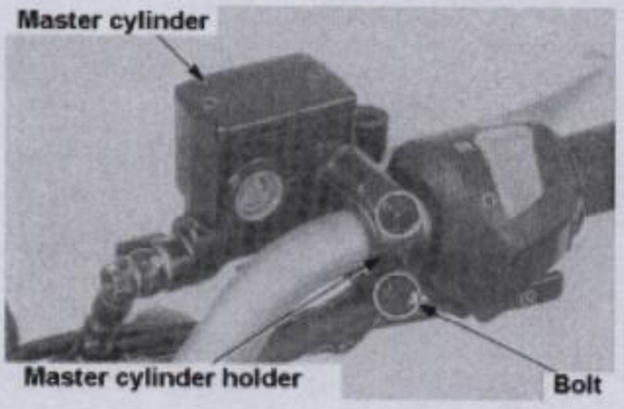
Remove a left handle grip and a choke lever from the handlebar.



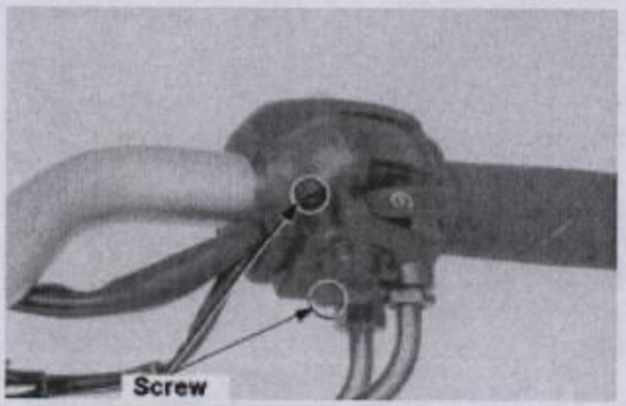
Disconnect a brake lamp switch connector. Unscrew two bolts to remove a master cylinder and a master cylinder holder.

Notes

After removing the front master cylinder, keep the master cylinder level to prevent air going into the brake system.

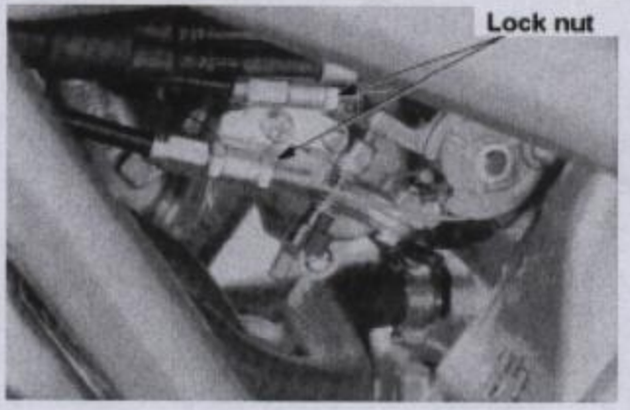


Remove two screws.



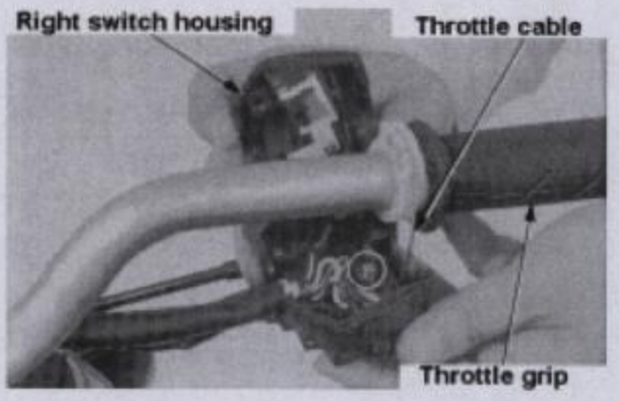
Loosen a lock nut on the carburettor end.

Loosen a throttle cable.

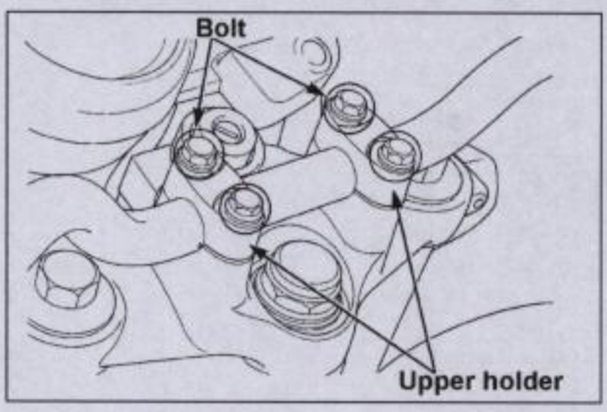


Remove a right switch housing.

Remove a throttle grip from a handlebar and disconnect a throttle cable from the grip.



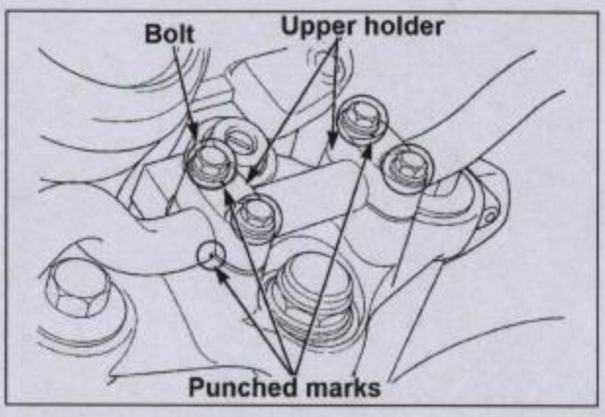
Unscrew four bolts to remove upper holders.
Remove the handlebar from a top bridge.



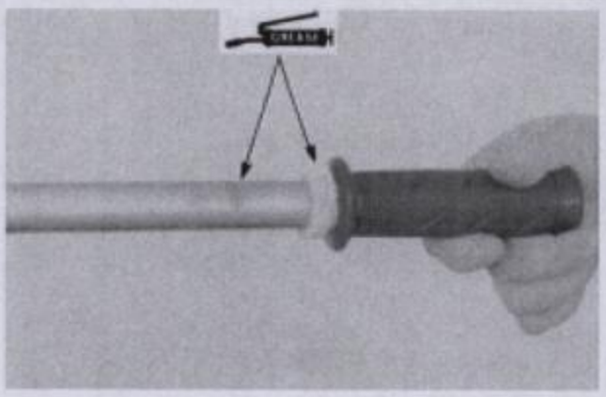
Installation

Set the handlebar to the top bridge and align the handlebar punched marks to the top bridge mating surface.
Install upper holders by facing the punched marks forward and temporarily secure four bolts.
Secure the front ones first, then the rear bolts.

Torque: 25Nm (2.5kgf-m)

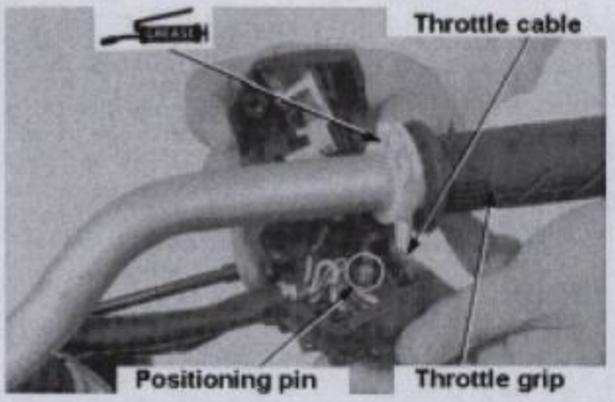


Apply grease to the flange groove of the throttle grip and the friction surface of the handlebar.

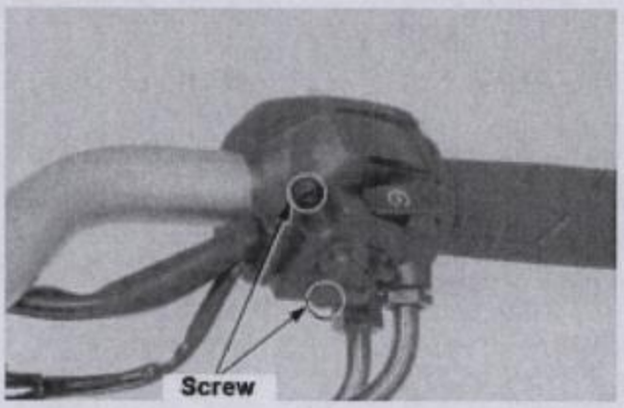


Connect a throttle cable to the throttle grip and install the grip to the handlebar.

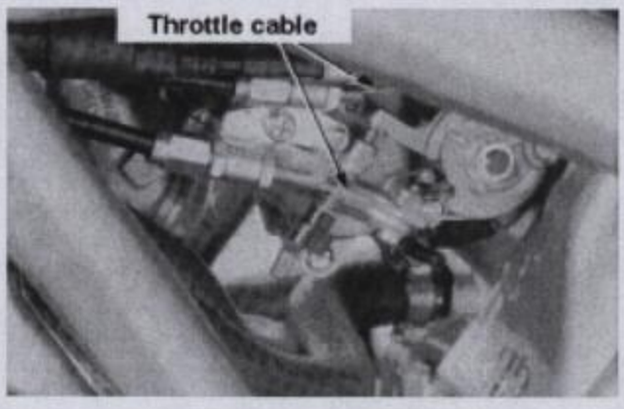
Align the positioning pin to the handlebar hole and install a right handle switch housing.



Secure two screws. Secure the front first.



Connect a throttle cable on the carburettor end and adjust the free play of the cable (3-18).



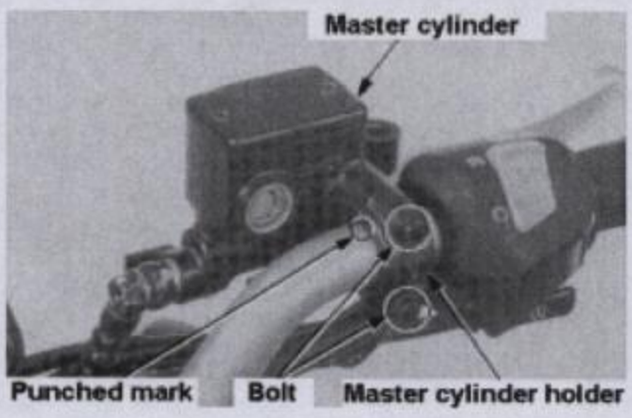
Install a master cylinder and a master cylinder holder to the handlebar by facing the "UP" mark on the holder upwards.

Align the master cylinder end surface with the pinched mark on the handlebar and secure the top bolt first.

Torque: 12Nm (1.2kgf-m)

Connect a brake lamp switch connector.

Install a choke lever to the handlebar.

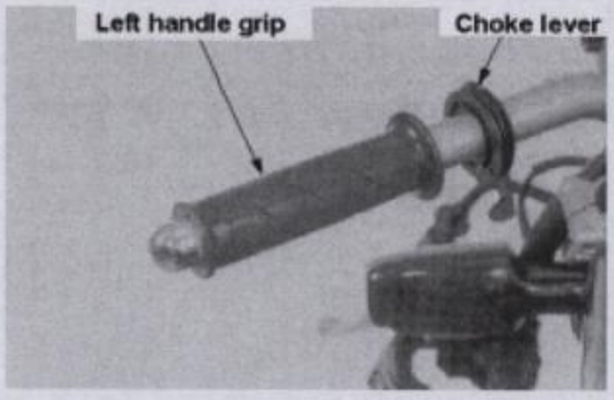


Remove dirt from the interior surface of the left handle grip and the handlebar contact surface and dry the area.

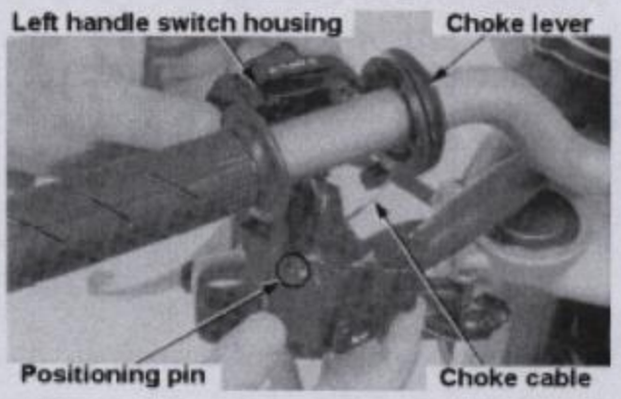
Apply thin layer of Genuine Honda "Honda Bond A" or "Cemedine #540" and install the grip by screwing it before the bond gets dry.

Notes

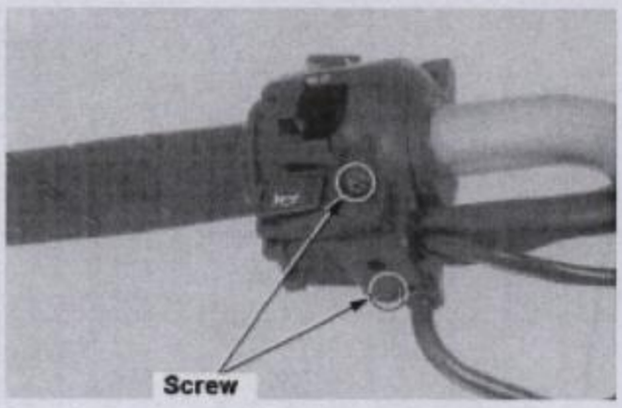
- Follow the instruction on the bond.
- Leave a few hours after bonding.



Connect a choke cable to the choke lever. Align a positioning pin to a handlebar hole to install a left handle switch housing to the handlebar.



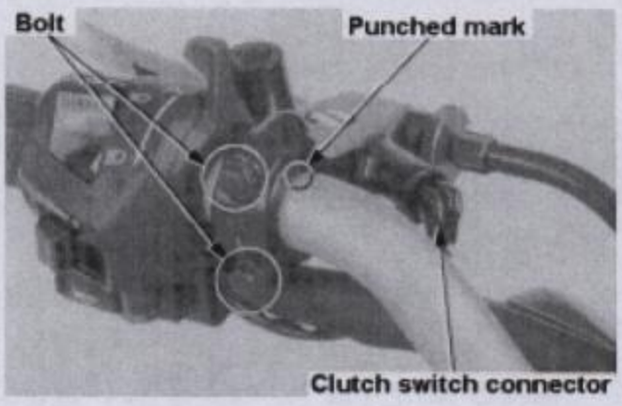
Secure two screws. Front one first.



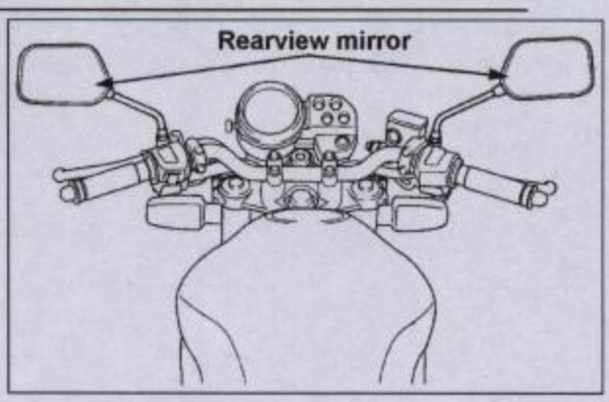
Install a clutch lever bracket and a bracket holder by facing the "UP" mark on the bracket holder upwards.

Align the clutch lever bracket end surface with the punched mark on the handlebar and secure the top bolt first.

Connect a clutch switch connector.



Install rearview mirrors.



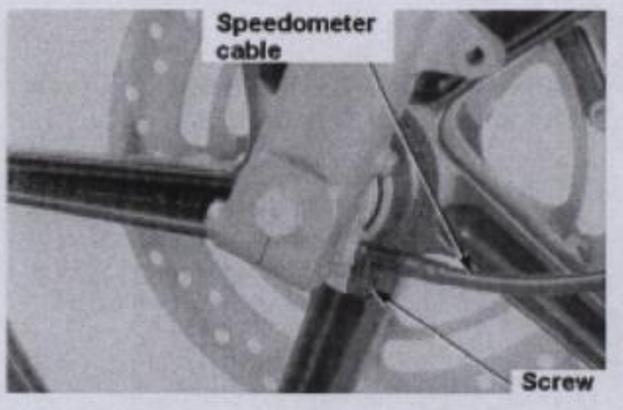
Notes

Refer to the routing diagram (1-25) to route cables, wires and harnesses correctly.

Front Wheel

Removal

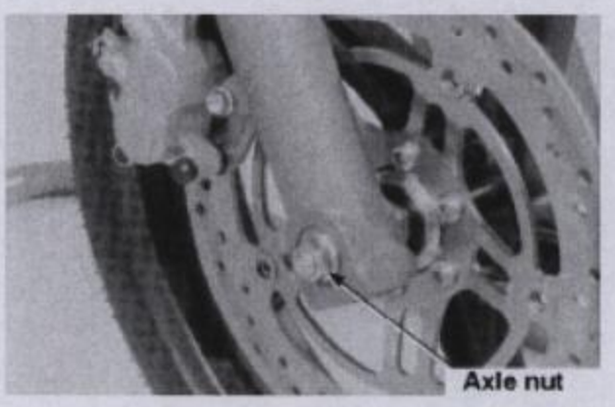
Firmly support the frame and lift a front wheel.
Unscrew and disconnect a speedometer cable.



Notes

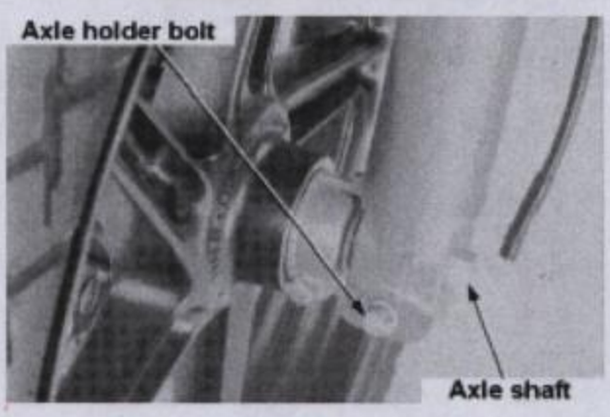
- Do not operate a front brake lever after removing the front wheel. It narrows the pad clearance and will make it difficult to install the wheel.
- If the brake hose has been disconnected, bleed air after servicing the area (15-4).

Unscrew an axle nut.

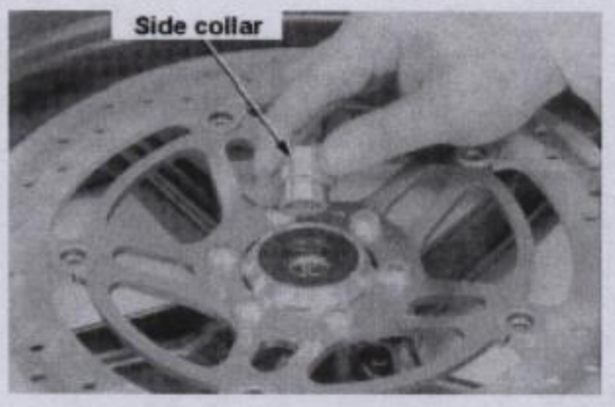


Loosen an axle holder bolt.

Pull out the axle shaft and remove the front wheel.



Remove a side collar from the right side of the wheel.



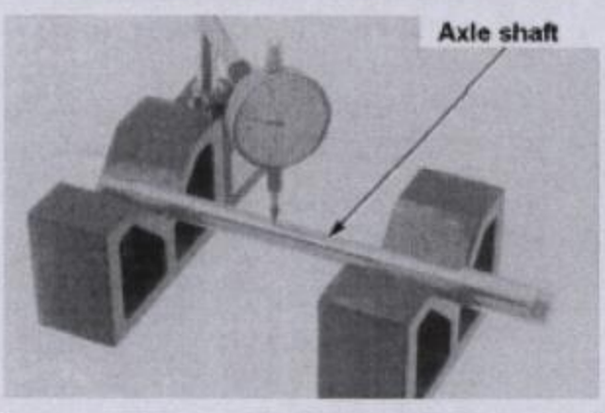
Remove a speedometer gear Assy from the left side of the wheel.

Inspection

Axle

Place the axle on Vee-blocks. Measure its runout with a dial gauge. Take ½ of its reading as a runout.

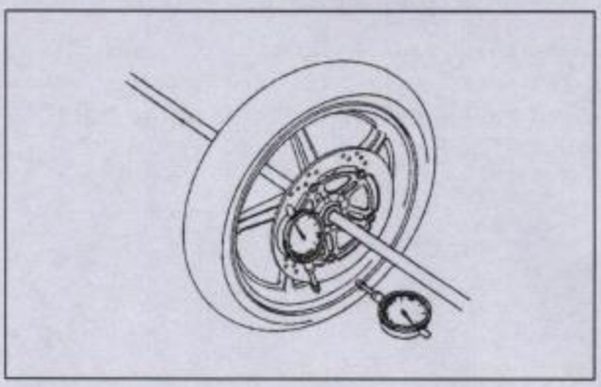
Service Limit: 0.2mm



Wheel Rim

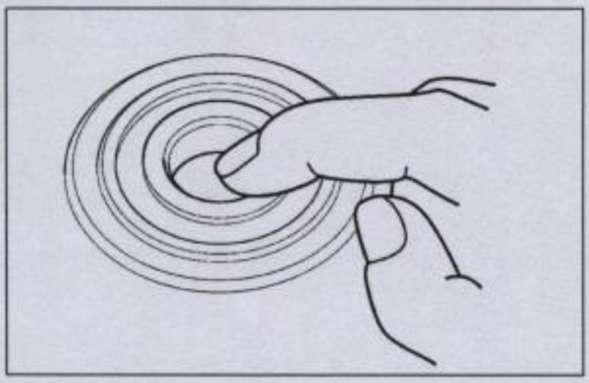
Measure the wheel runout.

Service Limit: Axial: 0.2mm
Radial: 0.2mm



Wheel Bearing

Check bearings for smooth revolution by turning the inner race with a finger. Replace the bearing if it does not revolute smoothly or there is any loose fit or damage on the motor race or hub.

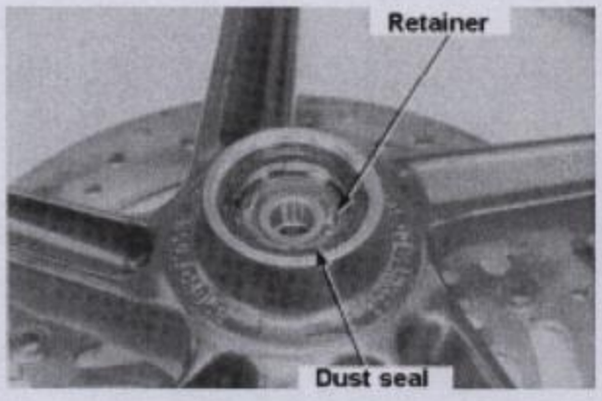


Notes

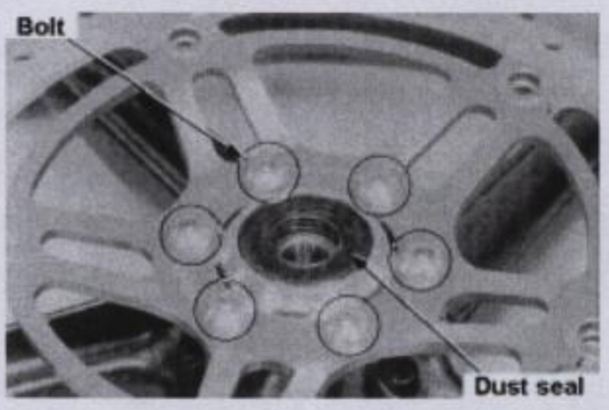
Replace both sides at the same time.

Disassembly

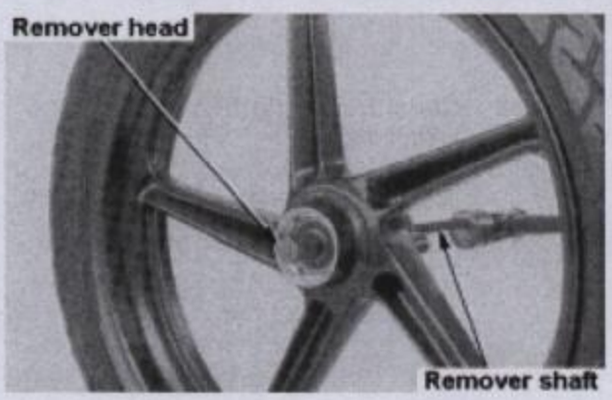
Remove a dust seal and a speedometer gear box retainer.



Unscrew six bolts to remove the brake disc. Remove its dust seal.



Set a remover head to the bearing.
Attach a remover shaft to the remover head and hit if in from the other side to remove the bearing.
Remove a distance collar and remove another bearing in the same manner.

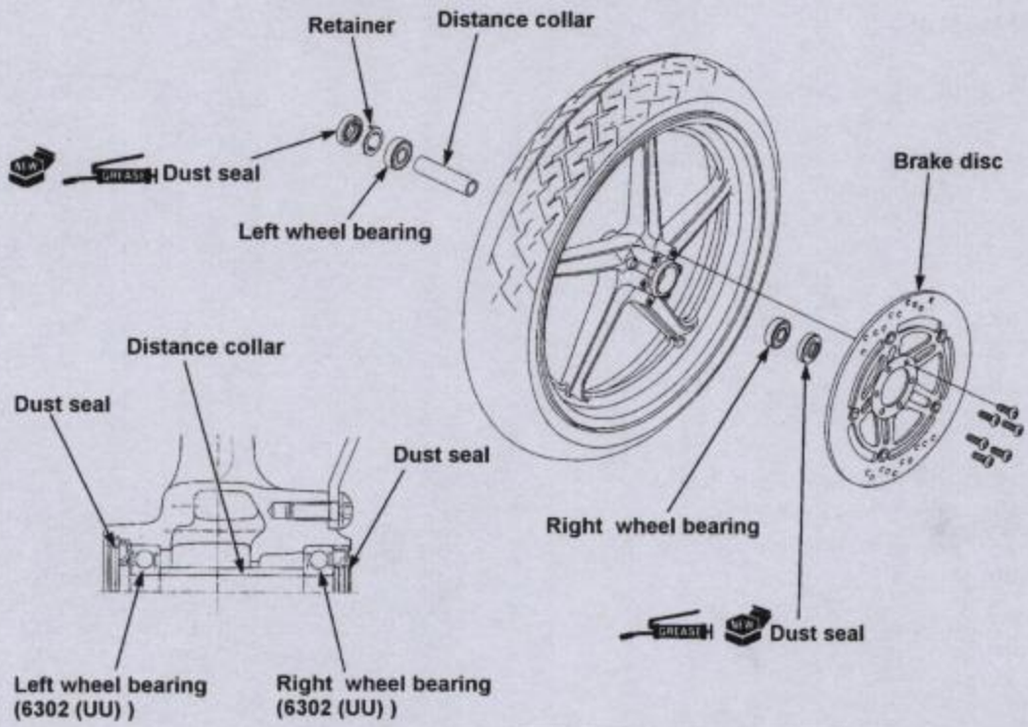


Special Tools:
Bearing remover head 15mm
07746-0050400
Bearing remover shaft
07746-0050100

Notes

Replace both bearings at the same time and never re-use removed bearings.

Assembly



Face the labelled surface of a new right wheel bearing upwards and install it straight until it touches the hub.
Install a distance collar.
Install a new left wheel bearing in the same manner until it touches the distance collar.

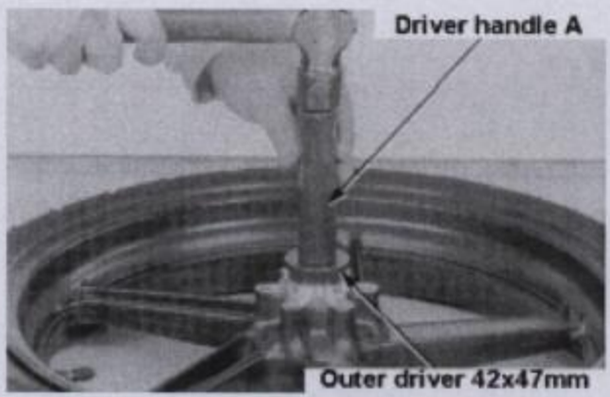
Special Tools:

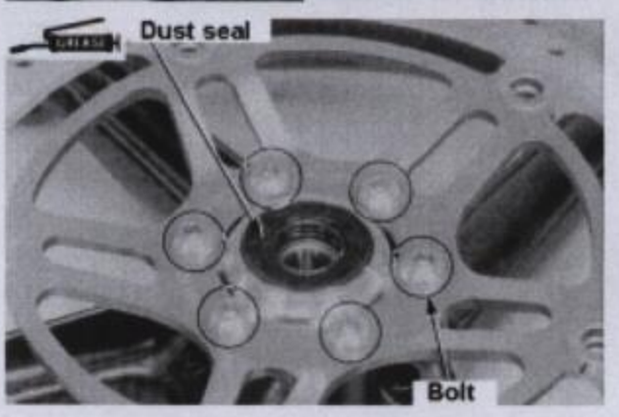
Driver Handle A	07749-0010000
Outer Driver 42 x 47mm	07746-0010300
Pilot 15mm	07746-0040300

Install a front brake disc by facing its "MIN.TH" mark outwards.
Secure six bolts.

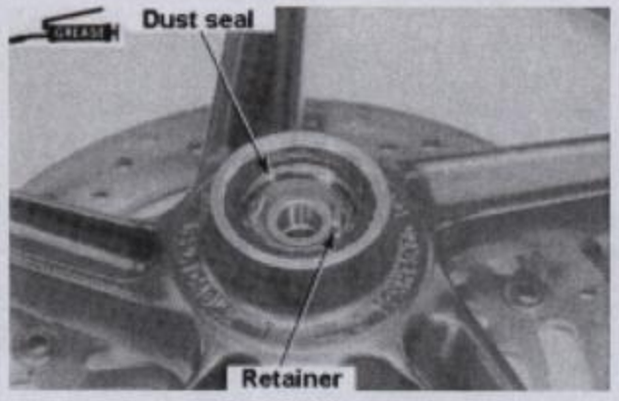
Torque: 29Nm (30kgf-m)

Apply grease to a new right dust seal lip and install it to the wheel hub.





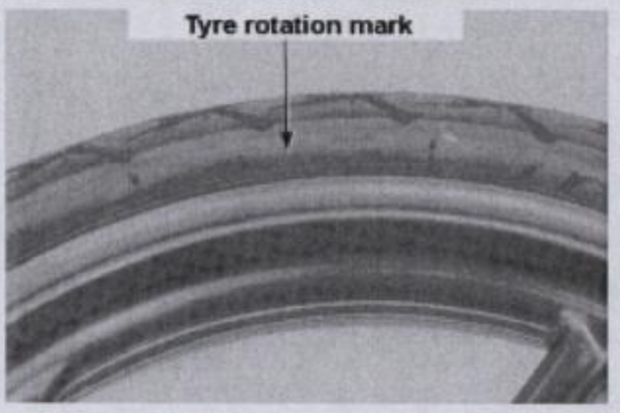
Install a speedometer gearbox retainer. Apply grease to a new left dust seal lip and install it to a wheel hub.



Tyre Rotation Mark

Notes

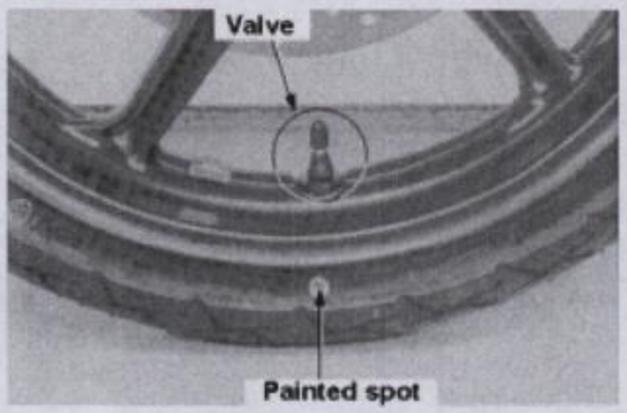
A tyre should be installed in the a direction which a tyre rotation mark indicates wheel rotating direction.



Wheel Balance

Notes

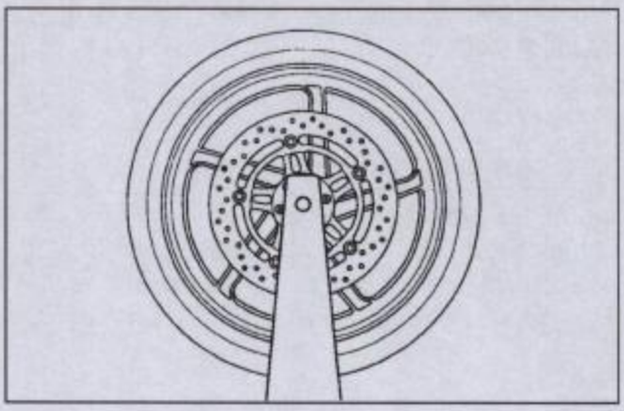
- Wheel balance directly affect the vehicle stability, controllability and general safety. Always check wheel balance whenever a tyre was removed from a wheel.
- Align a tyre balance mark (side wall painted spot) with a valve.



Set tyre/wheel/brake disc to an inspection stand.

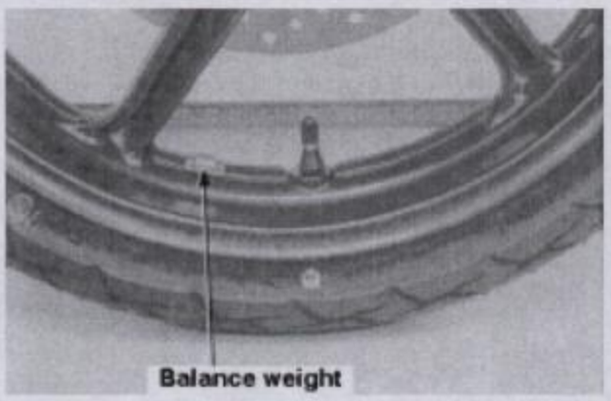
1. Let the wheel spin. When it stops, mark the lowest part of the rim (the heaviest part) with chalk. Repate this several times to identify the heaviest part. If the wheel stops at different places, it is considered to be in balance.
2. Attach a balance weight to the highest point of the rim (the lightest part) and conduct 1.

Repeat the above procedure and finally secure the balance weights.



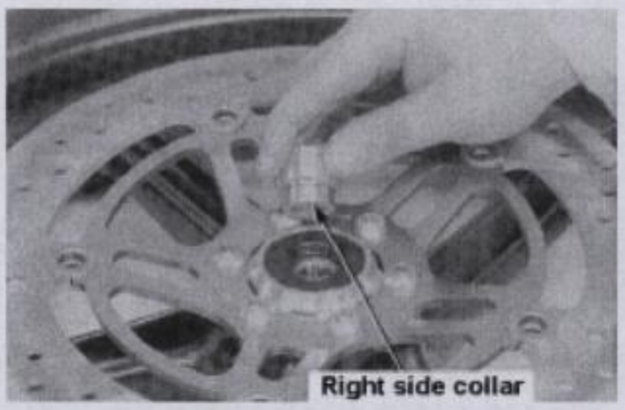
Notes

Gross weight of the balancer weight should not exceed 60g.

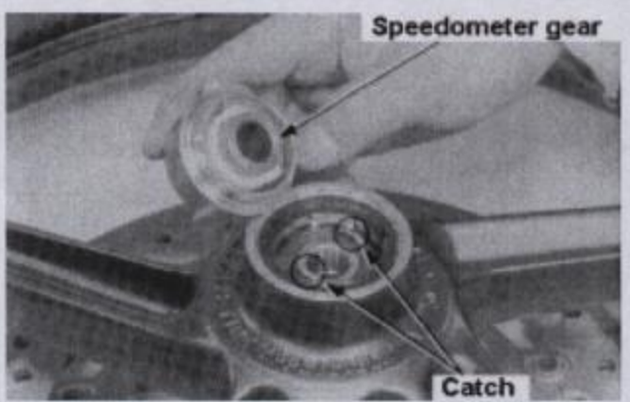


Installation

Install a right side collar to a wheel hub.



Set a speedometer gear catch to a retainer catch to install the speedometer gear box to a wheel hub.

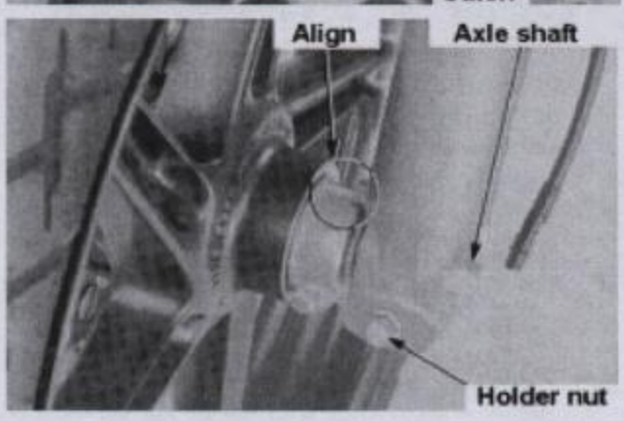


Set a brake disc between brake pads and install a front wheel.

Notes

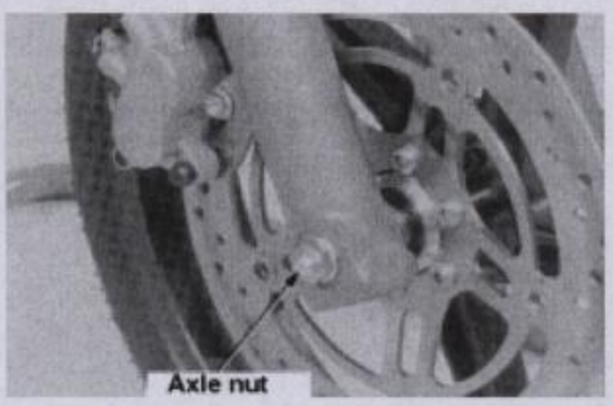
Do not damage brake pads.

Install an axle shaft.
Check the projection on the speedometer gearbox is aligned to the front fork stopper.
Temporarily secure an axle holder bolt.



Secure an axle nut.

Torque: 59Nm (6.0kgf-m)



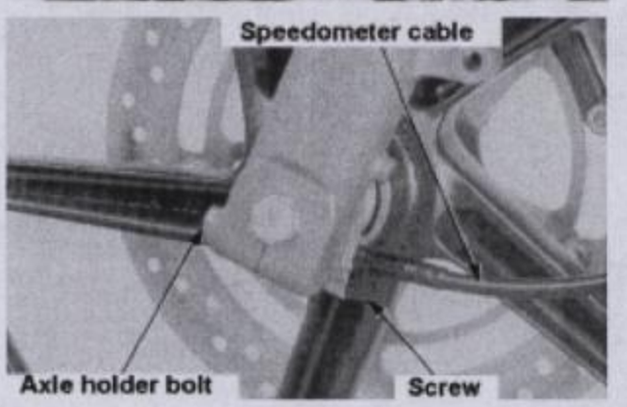
Apply the front brake several times.

Unsupport the frame. Apply front brake and move front forks vertically 5 or 6 strokes to smoothen the axle to forks.

Secure the axle holder bolt.

Torque: 22Nm (2.2kgf-m)

Connect a speedometer screw and secure a screw.



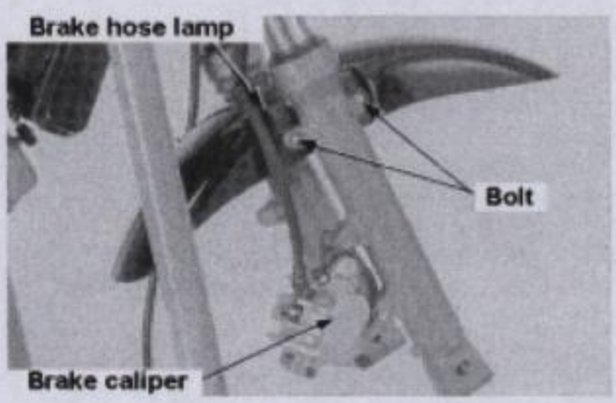
Front Fork

Removal

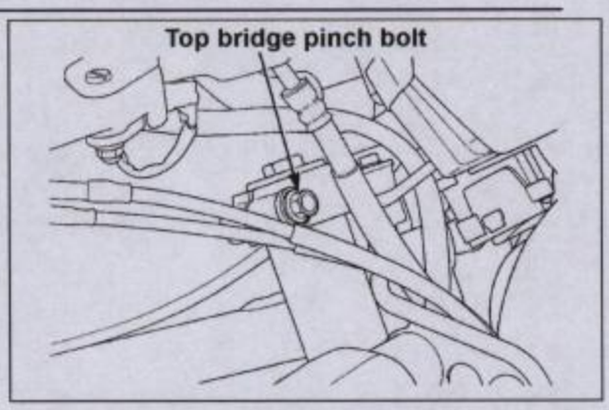
Remove a front wheel (13-8).
Unscrew bolts to remove a front fender and a brake hose clamp.
Remove a brake caliper (15-12).

Notes

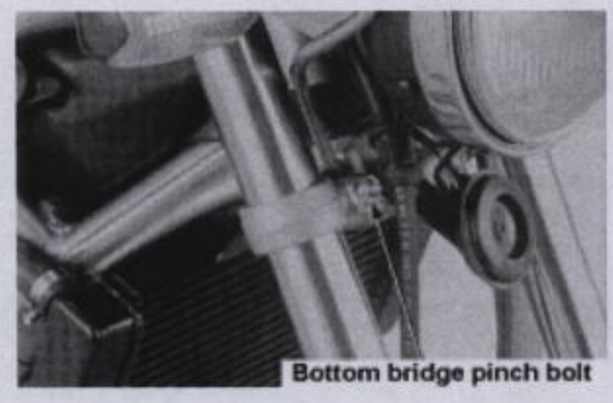
- Do not sling a caliper with a brake hose.
- Bleed air after servicing if the brake hose was disconnected.



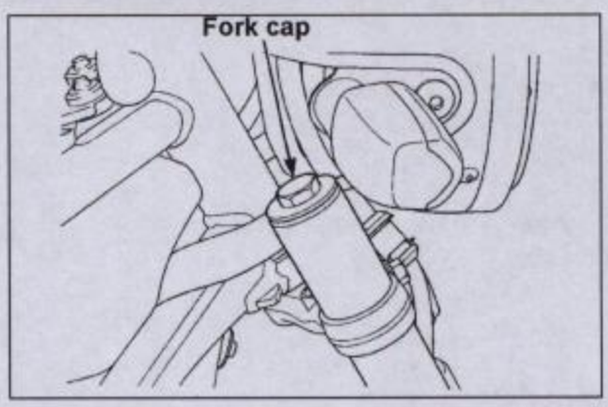
Loosen a top bridge pinch bolt.



Hold a front fork. Loosen a bottom bridge pinch bolt to remove the fork from the top bridge.



If the fork is to be disassembled, move the fork down and loosen a fork cap.

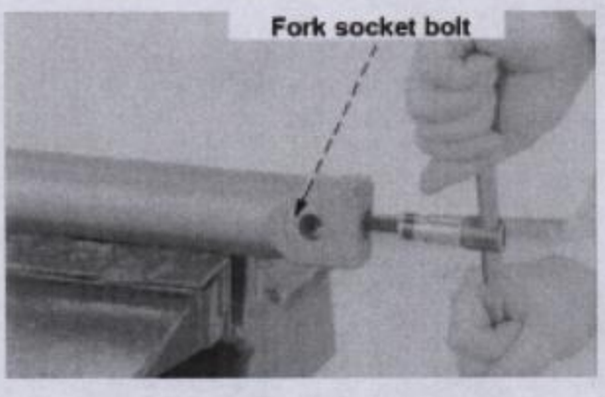


Disassembly

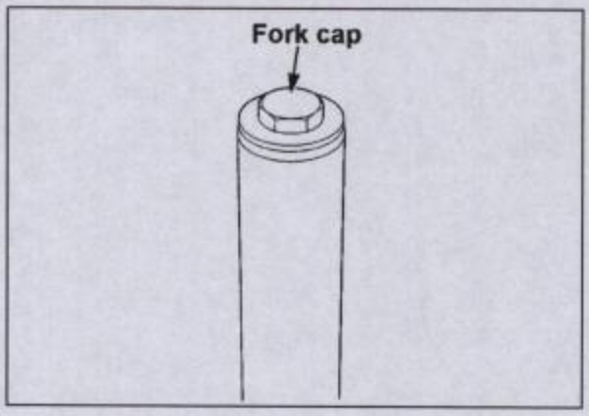
Cover a bottom case with a cloth and fix it with a vice.

Notes
Do not over-tighten the vice.

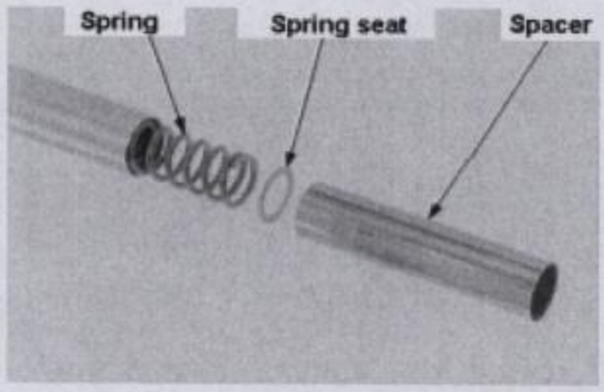
Loosen a fork socket bolt.



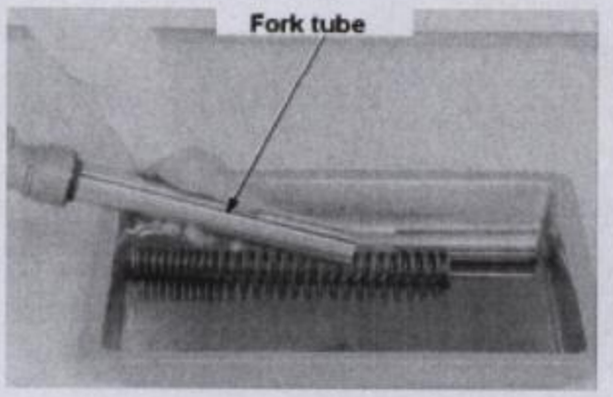
Remove a fork cap.



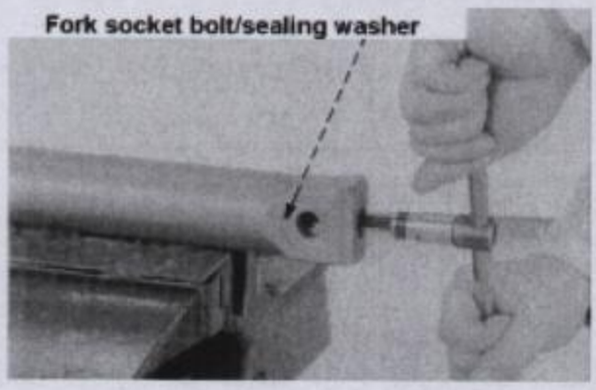
Remove a spacer, a spring seat and a spring.



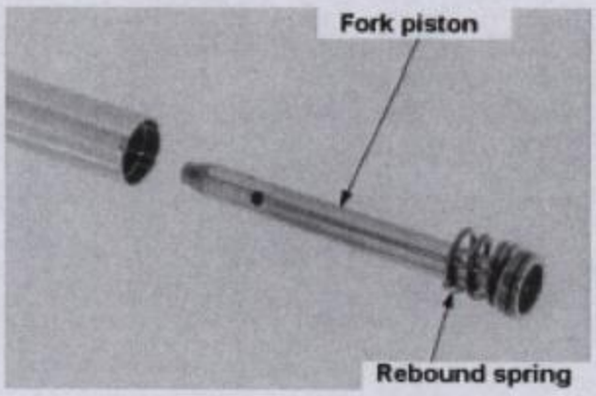
Stroke a fork tube several times to drain oil.



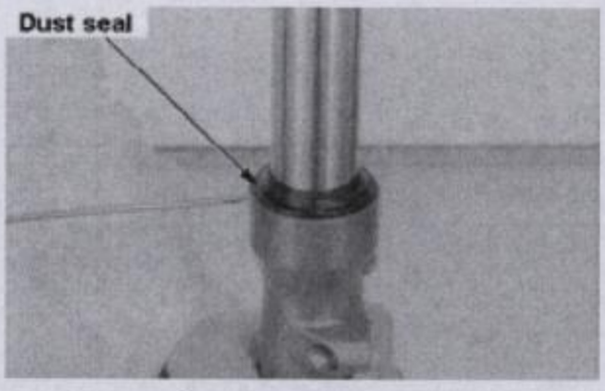
Remove a fork socket bolt and a sealing washer.



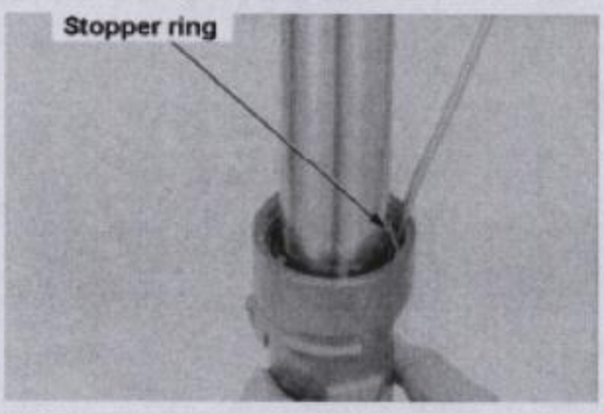
Remove a fork piston and a rebound spring.



Remove a dust seal.



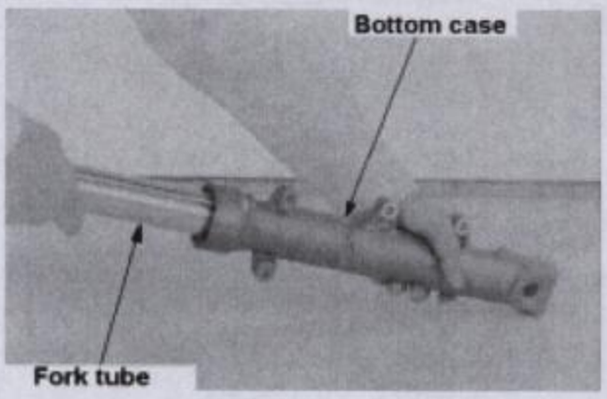
Remove a stopper ring from a bottom case groove.



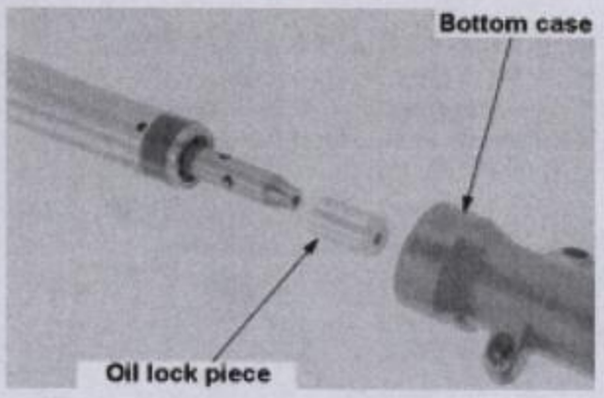
Notes

Do not damage the friction surface of the fork tube.

Pull the fork tube hard to its stopper several times to remove the tube from the bottom case.



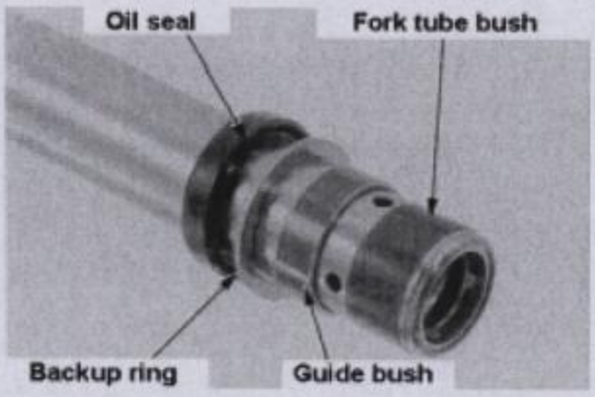
Remove an oil lock piece from a bottom case.



Remove an oil seal, a back up ring, and a guide bush from the fork tube.

Notes

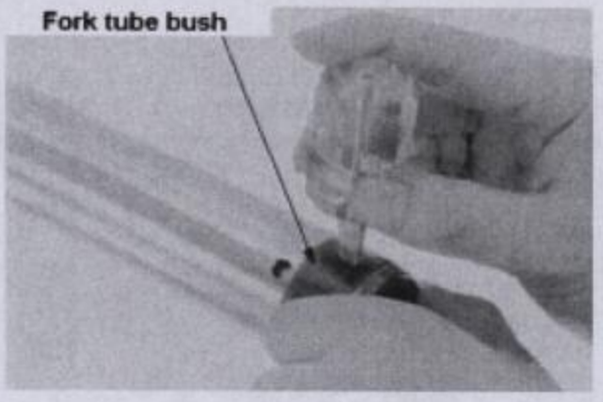
Do not remove a fork tube bush unless it is to be replaced with a new one.



When replacing a fork tube bush, open its end gap with a screwdriver to remove.

Notes

- Do not damage the coated area.
- Do not open the end gap too much.

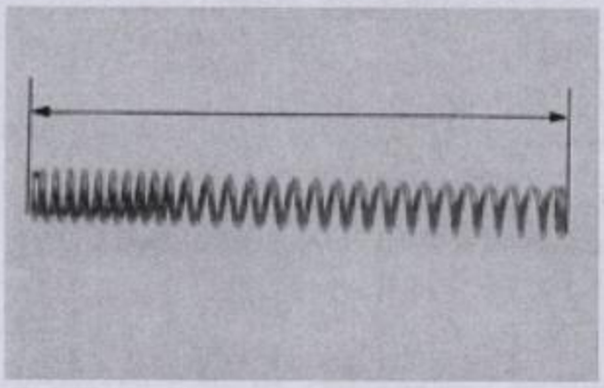


Inspection

Fork Spring

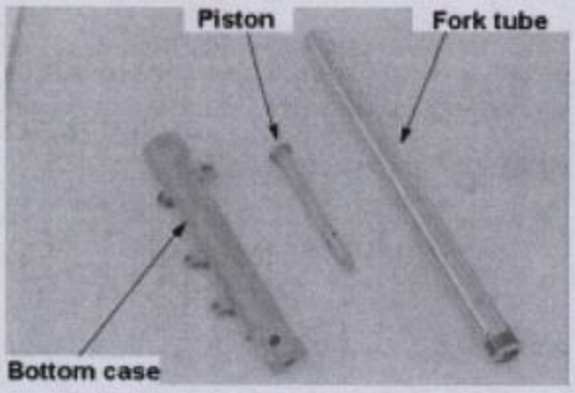
Measure the relaxed length of a fork spring.

Service Limit: 324mm

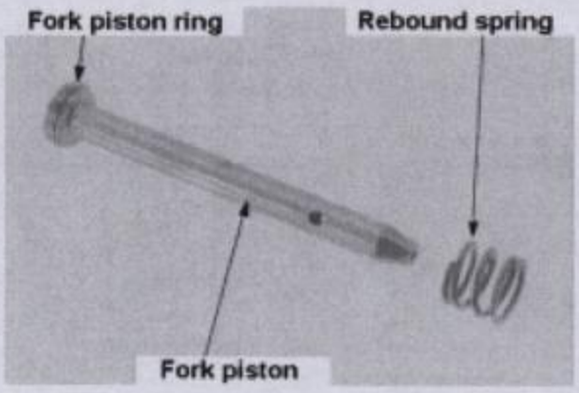


Fork Tube, Bottom Case and Piston

Inspect a fork tube, a bottom case and a fork piston friction surface for wear/damage/deformation.

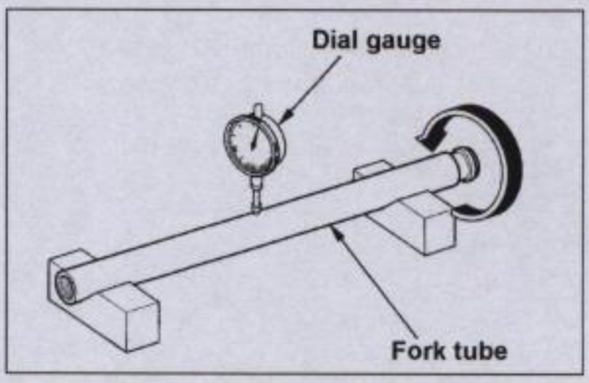


Inspect a fork piston ring for wear/damage.
Inspect a rebound spring for damage.



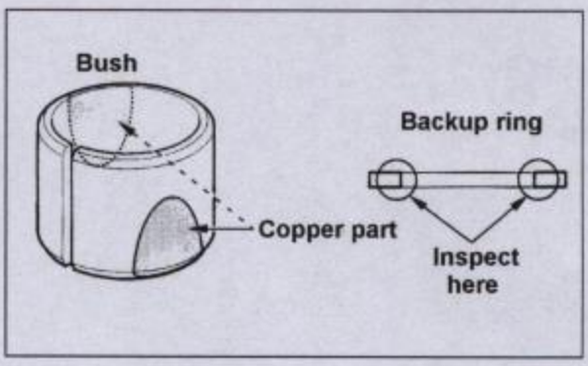
Support the fork tube with Vee-blocks.
Measure its runout with a dial gauge.
Take ½ of the measured value as its runout.

Service Limit: 0.2mm

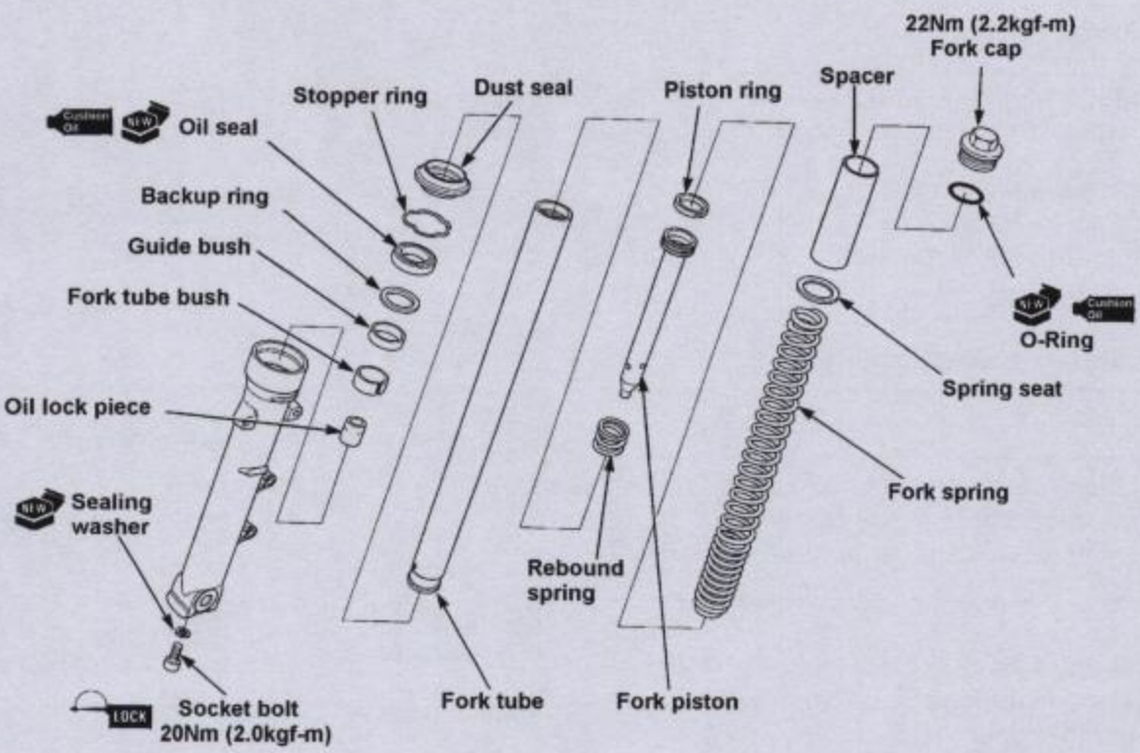


Fork Tube Bush, Guide Bush

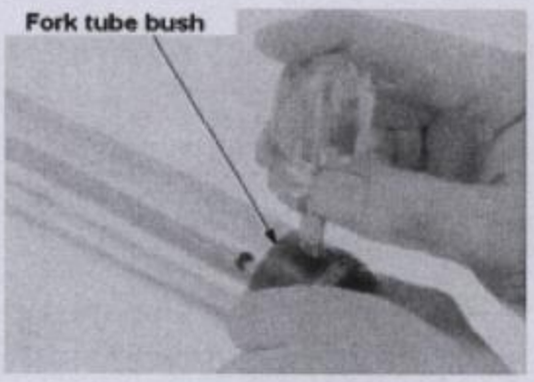
Visually inspect a fork tube bush and a guide bush.
Replace it if the copper is exposed (coating has peeled off) for more than ¾ of the total surface or if it has significant damage.
Inspect the specified area of a back-up ring and replace if the area is deformed.



Assembly



Install a new fork tube bush if it has been removed.

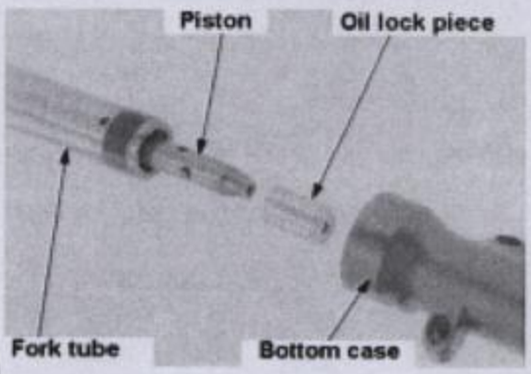


Notes

Trim the end gap of a new fork tube bush before installing by using a cutting knife.

Install a rebound spring to a fork piston.
Install the fork piston to a fork tube.
Install an oil lock piece to the fork piston.

Apply recommended fork oil to the fork tube bush and install the fork tube to a bottom case.



Protect a bottom case with a cloth and fix it with a vice.

Notes

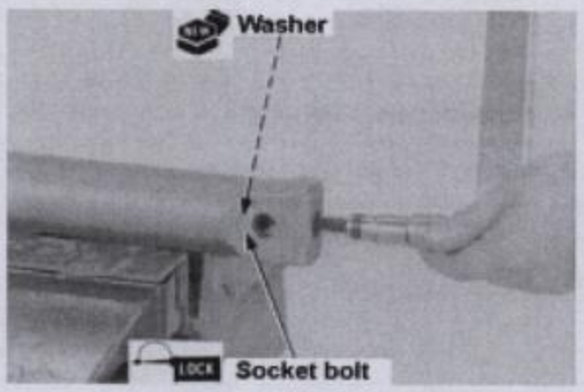
Do not over-tighten the vice.

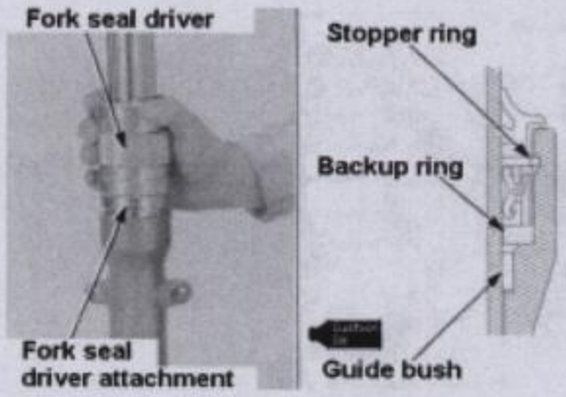
Replace a sealing washer with a new one.
Apply screw locker to a fork centre bolt and set it to the fork piston with a new washer.
Secure the bolt.

Torque: 20Nm (2kgf-m)

Notes

If the socket bolt spins with a fork piston, temporarily set a spring, a spring seat, a spacer and a fork cap.

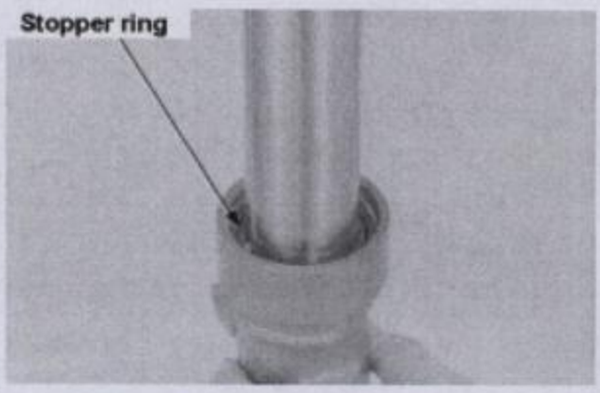




Apply recommended fork oil to the guide bush and install the guide bush and a back-up ring to the fork tube.

Install an oil seal by facing its mark upward to the fork tube.
Install a guide bush, a back-up ring and an oil seal with the following tools:

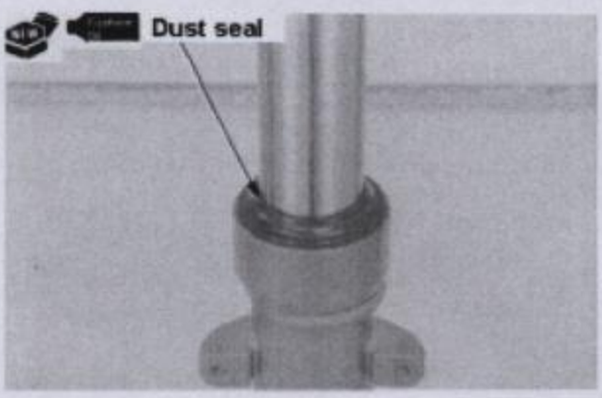
Special Tools:
Fork seal driver 07947-KA50100
Fork seal driver attachment 07947-KF00100



Notes

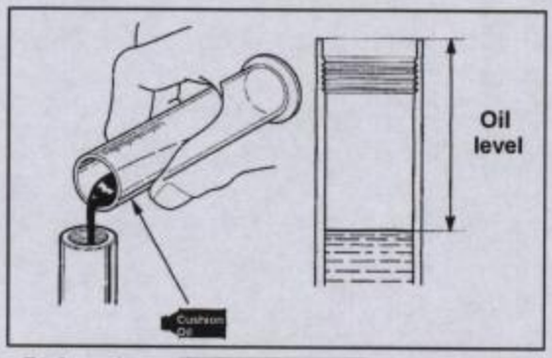
Install the oil seal until the stopper ring groove can be seen.

Install a stopper ring to the bottom case groove.



Apply fork oil to a new dust seal lip and install it to the bottom case.

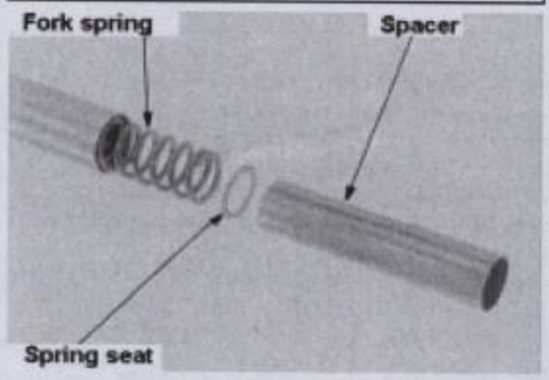
Fill fork oil.
Recommended: Honda Ultra Cushion Oil #10
Oil Quantity: 460 ± 2.5cm³



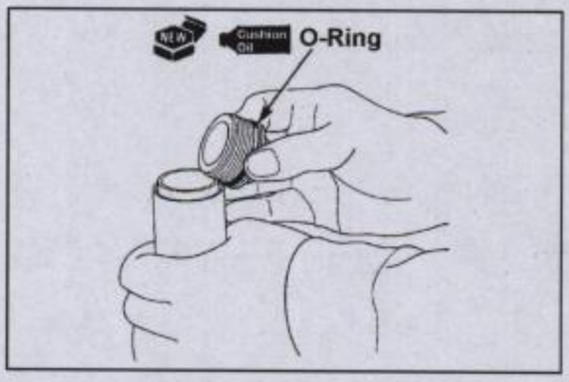
Slowly stroke the fork tube several times to bleed air.
Fully compress the fork tube and wait for the oil level to stabilise.

Measure the oil level.

Oil Level: 105mm



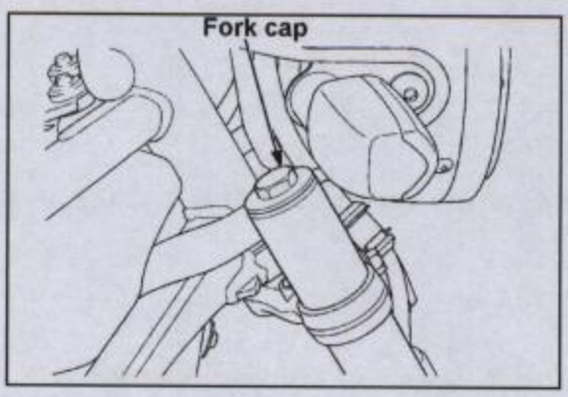
Stretch the fork tube.
Face the fine pitch end of the fork spring downward to install the spring to the fork tube.
Install a spring seat and a spacer.



Replace an O-Ring at the fork cap with a new one and apply fork oil.

Temporarily secure the fork cap to the fork tube.

Notes
Secure the fork cap to specified torque after installing the fork tube to the stem.



Installation

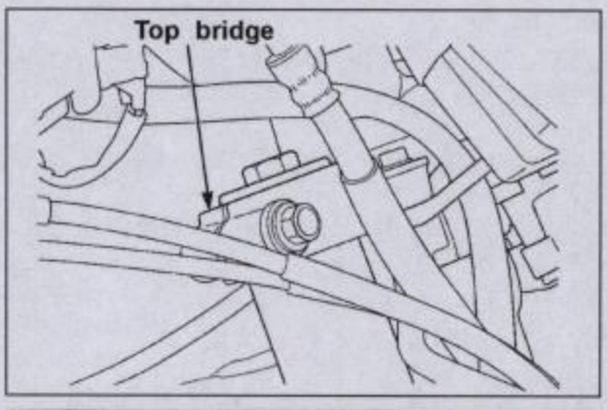
Install the fork to the way half and secure the bottom bridge.
Secure a fork cap.

Torque: 22Nm (2.2kgf-m)

Loosen the bottom bridge.

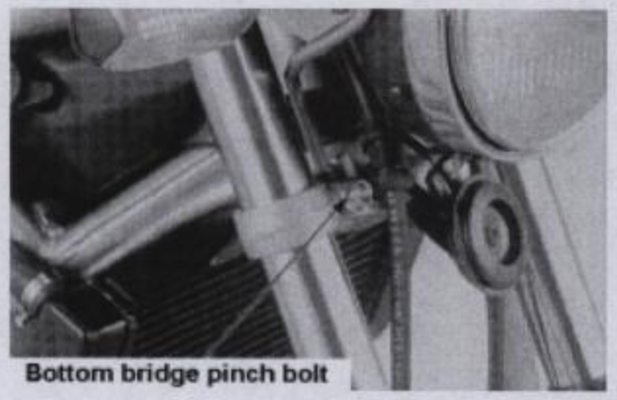
Set the fork to both bottom and top bridges.

Align the fork tube top end with the top bridge surface.



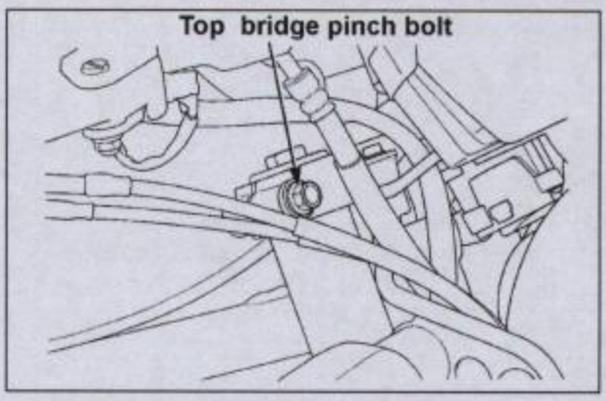
Secure the bottom bridge pinch bolt.

Torque: 39Nm (4.0kgf-m)



Secure the top bridge pinch bolt.

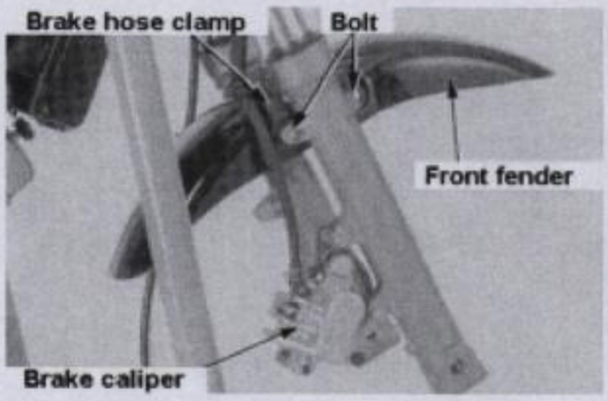
Torque: 22Nm (2.2kgf-m)



Install a front fender and brake clamp and secure bolts.

Torque: 12Nm (1.2kgf-m)

Install a brake caliper (15-14) and a front wheel (13-13).

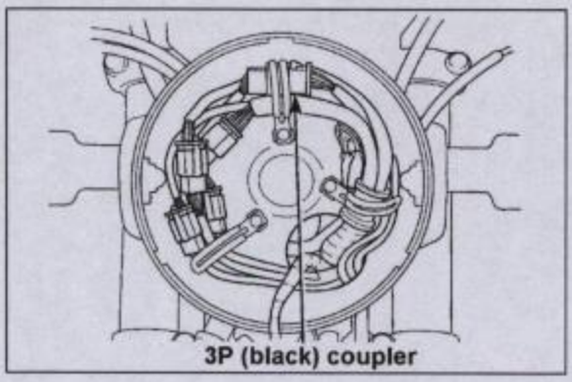


Steering Stem

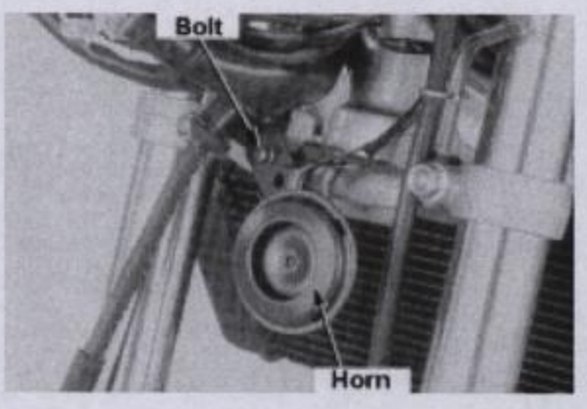
Removal

Remove a headlamp (19-3) and disconnect a main switch coupler (3P Black) in the lamp case.

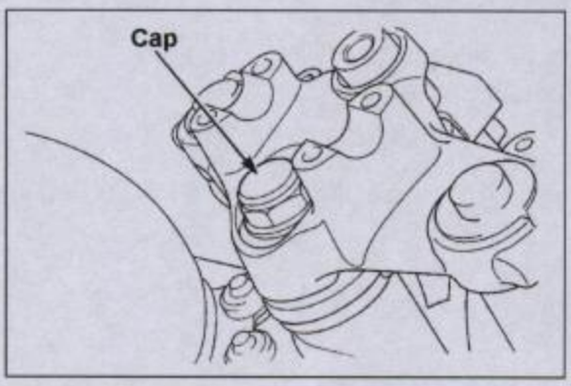
Remove the following parts:
- Headlamp case (19-4)
- Combination instrument (19-6)
- Handlebar (13-3)
- Front brake caliper (15-12)



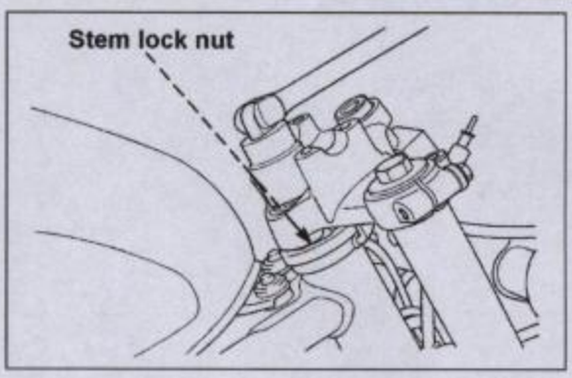
Unscrew a bolt to remove a horn and a brake hose clamp.



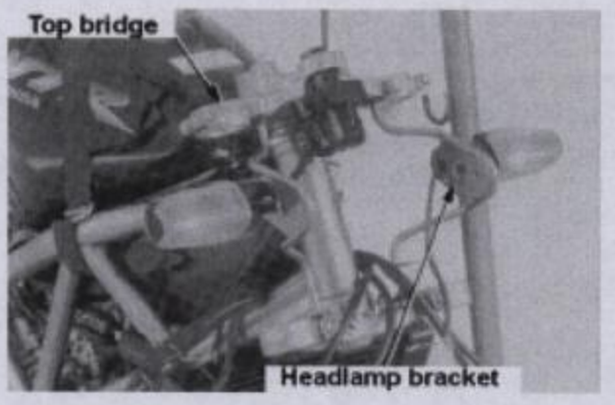
Remove a cap.



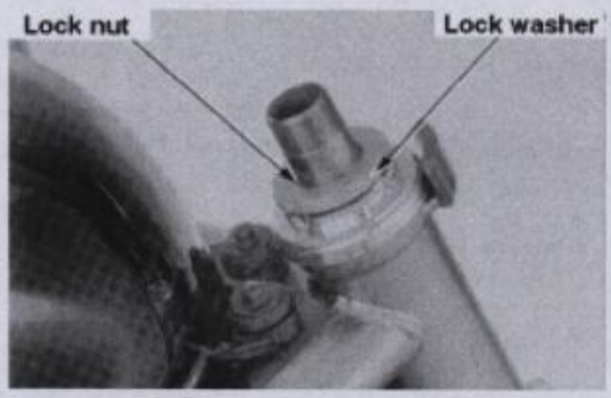
Remove a steering stem lock nut.
Remove a fork (13-14).



Remove a top bridge and a headlamp bracket.

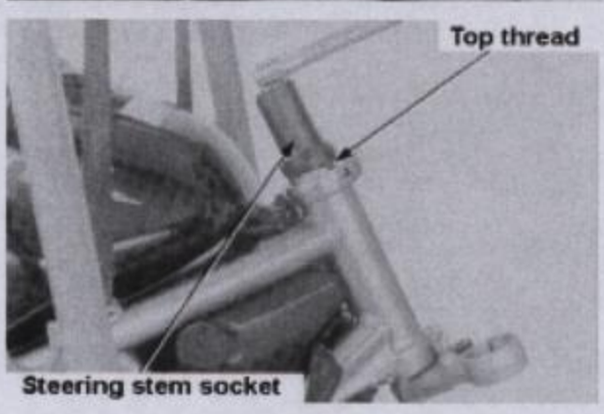


Open a lock washer catch to remove a lock nut and a lock washer.

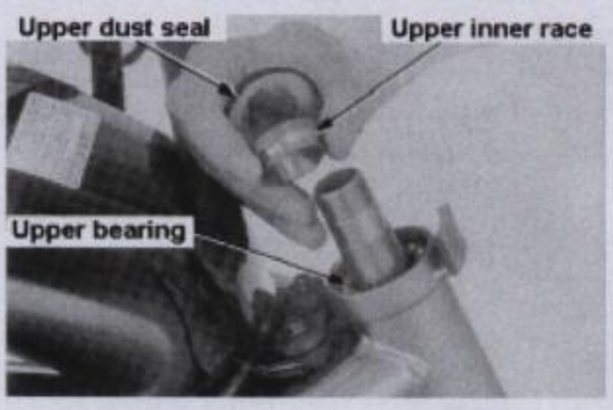


Hold a steering stem and loosen a steering top thread to remove.

Special Tools:
Steering stem socket 07916-3710101

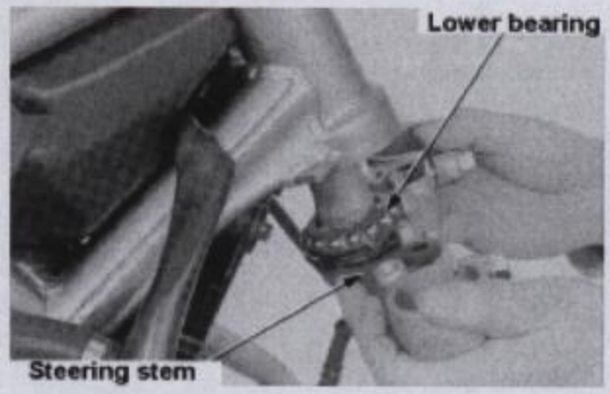


Remove an upper dust seal, an upper inner race, and an upper bearing.



Remove a steering stem and a lower bearing.

Inspect the steering bearing and the inner/outer race for wear and damage.

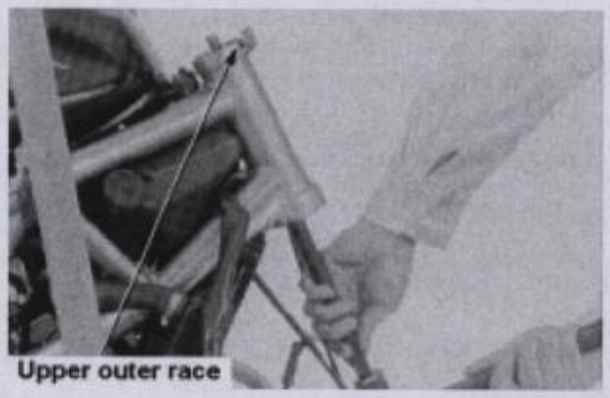


Steering Head Bearing Replacement

Notes

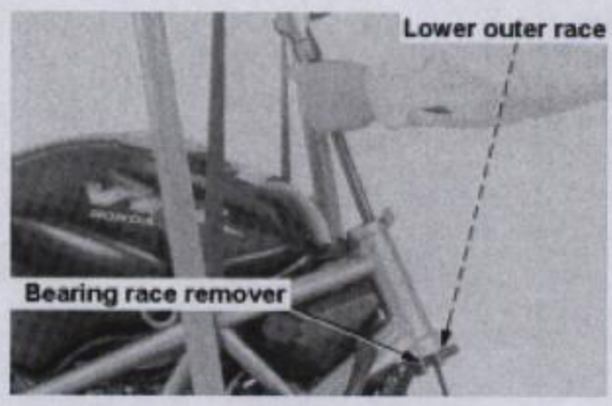
When replacing the bearing, replace the outer race at the same time.

Special Tools:
Driver attachment 07953-MJ10100
Driver handle07953-MJ10200



Remove a lower outer race with a shaft and a special tool.

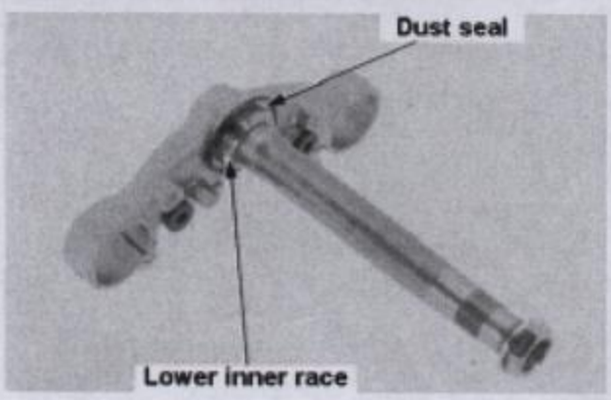
Special Tool:
Bearing race remover: 07946-3710500



Install stem nut to a steering stem.
Do not damage the thread.

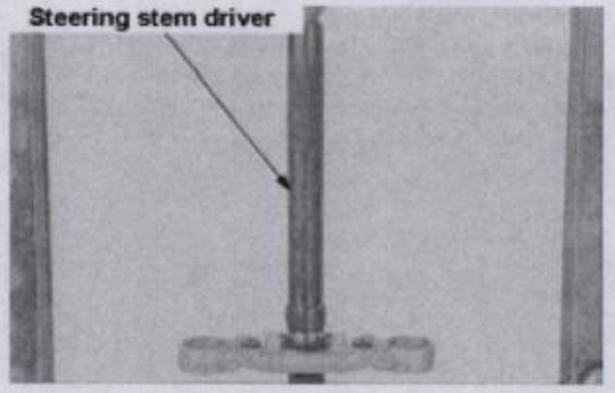
Remove a lower inner race.
Do not damage the stem.

Remove a dust seal.



Apply grease to a new dust seal lip and install it to the stem.

Install a new lower inner race to the stem.



Install a new lower outer race to the head pipe.

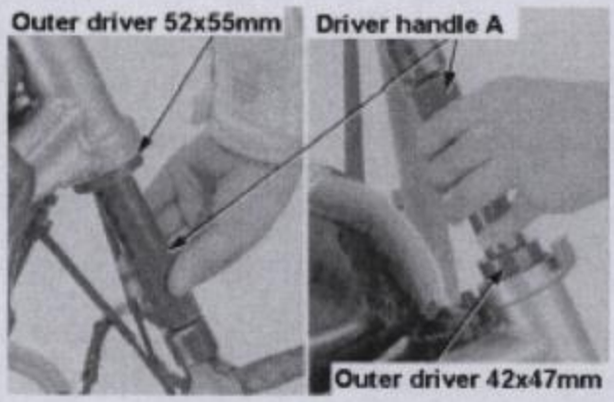
Special tools:

Driver handle A	07749-0010000
Outer Driver 52 x 55mm	07746-0010400

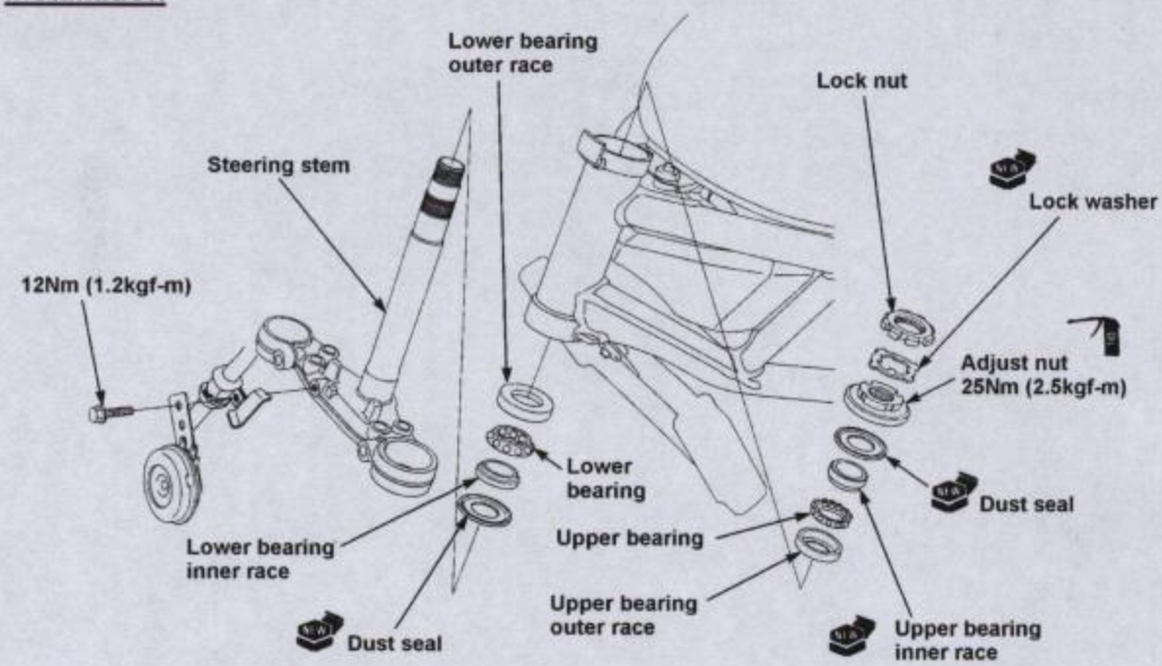
Install a new upper outer race to a head pipe.

Special tools:

Driver handle A	07749-0010000
Outer Driver 42 x 47mm	07746-0010300

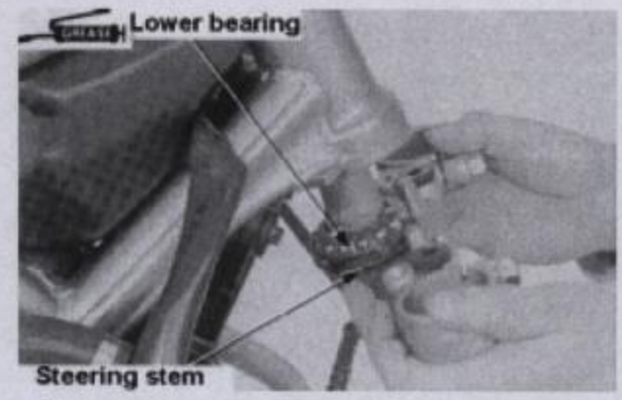


Installation



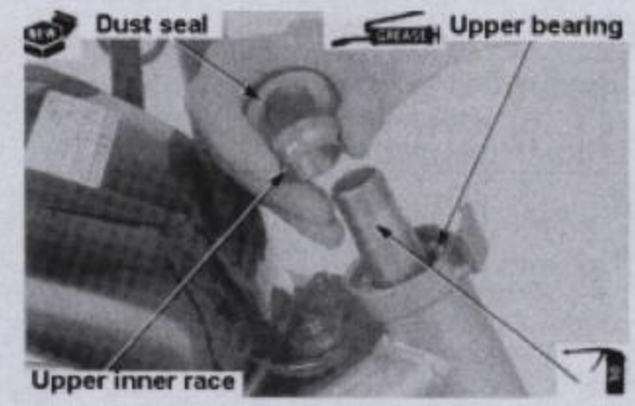
Apply grease to a lower bearing and install it to the stem.

Install the stem to a head pipe.



Apply grease to a new upper dust seal lip. Apply engine oil to the steering top thread. Install an upper bearing, an upper inner race, and adjust seal.

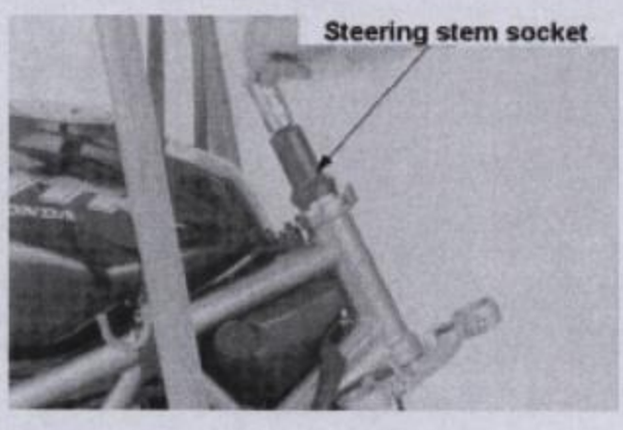
Temporarily secure the top thread.



Hold a steering stem from underneath and secure a top thread.

Torque: 25Nm (2.5kgf-m)

Special tool:
Steering stem socket 07916-3710101

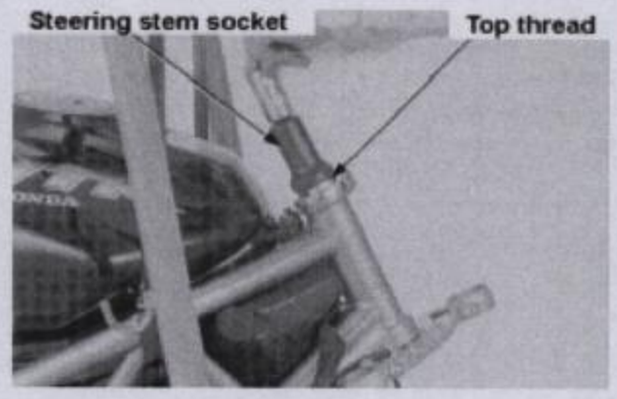


Move the stem in both directions for 5~6 times to smoothen the race and ball.

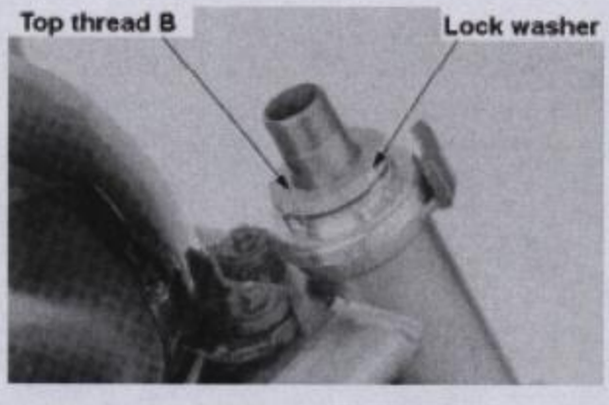
Re-secure the top thread.

Torque: 25Nm (2.5kgf-m)

Special tool:
Steering stem socket: 07916-3710101

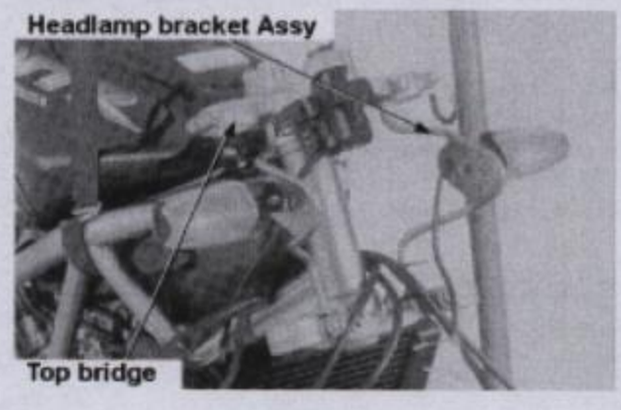


Install a new lock washer by setting its catches to the top thread groove.
Screw the top thread B by hand until it contacts the washer catch. Screw a lock nut for a further 90° to set its groove to lock washer catches.
Bend catches to lock the washer.



Install a headlamp bracket Assy.

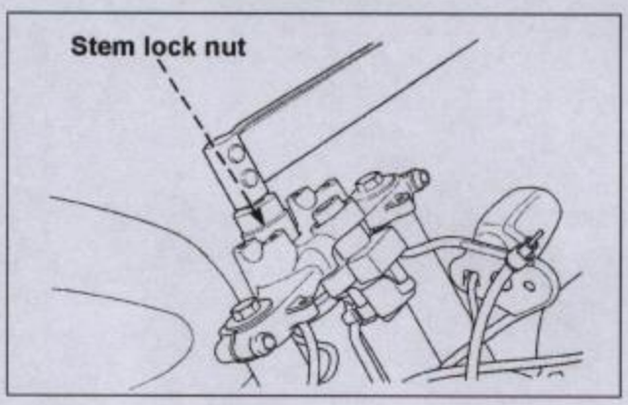
Notes
Refer to the routing diagram (1-25).



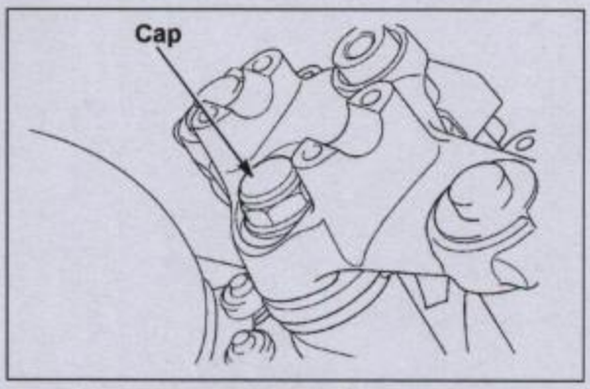
Install a top bridge Assy.
Install a stem lock nut.
Install forks (13-22).

Secure a stem lock nut.
Torque: 103Nm (10.5kgf-m)

Check the smooth operation of the steering stem.

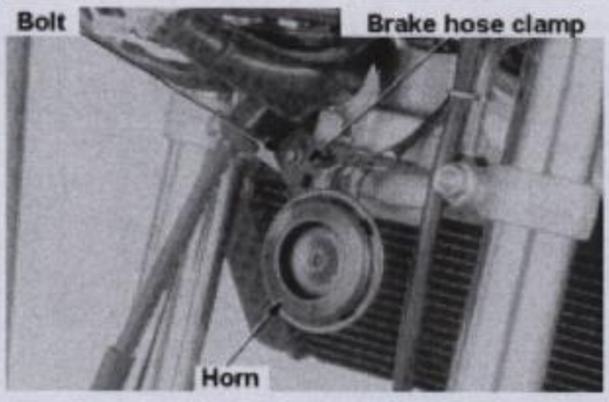


Install a cap.



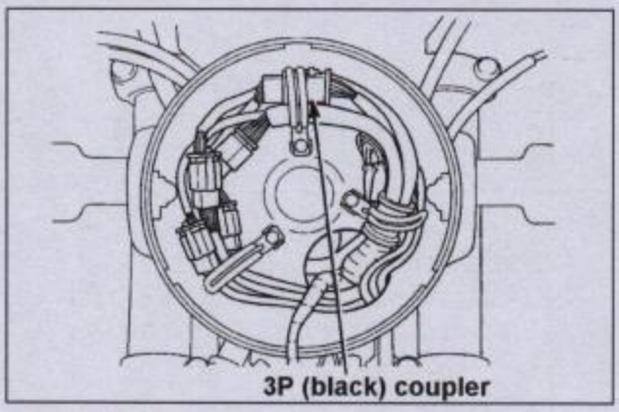
Install a horn and a brake hose clamp and secure the bolt.

Torque: 12Nm (1.2kgf-m)



Install the following parts:
- Combination instrument (19-6)
- Headlamp case (19-4)
- Handlebar (13-3)
- Front brake caliper (15-14)
- Front wheel (13-13)

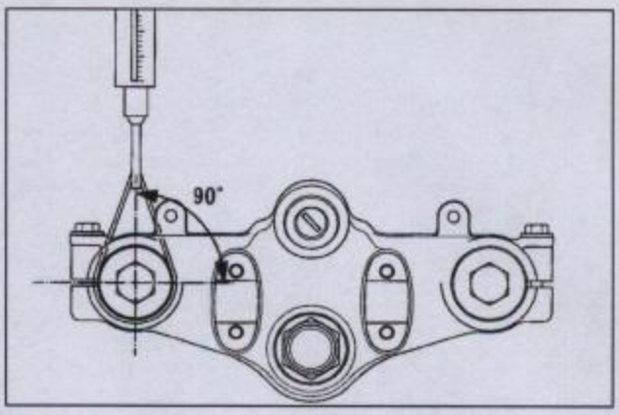
Connect a headlamp main switch coupler (3P Black).
Install a headlamp (19-3)

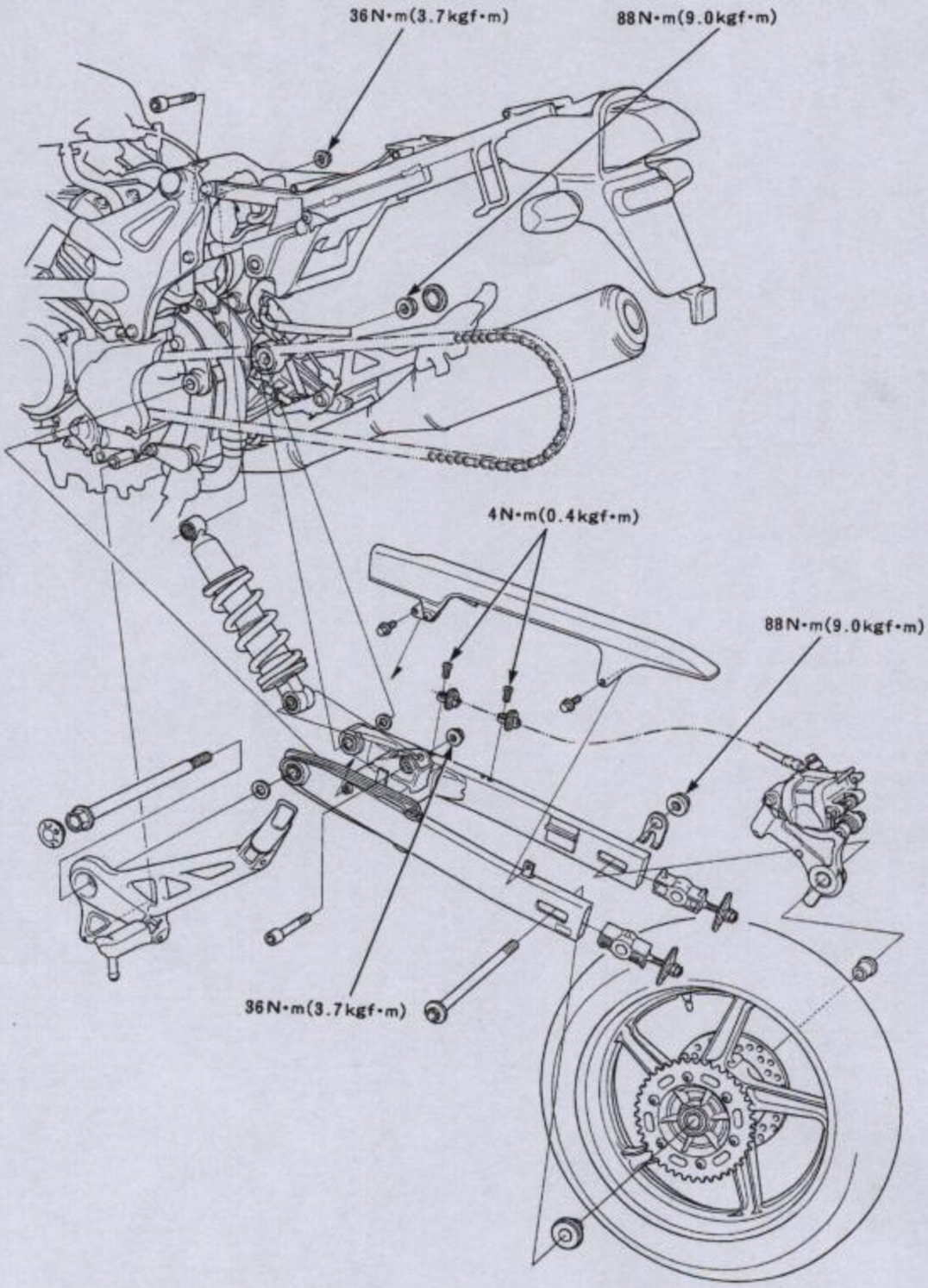


Steering Load

Notes
Make sure cables or wire harnesses are not interfering with the steering movement.

Lift a front wheel.
Set a spring scale to the fork tube between the fork top end and the stem.
Straighten the stem. Keep the scale perpendicular to the stem and pull the scale.
Measure the load when the stem starts moving.
Standard: 10-16Nm (1.0-1.5kgf-m)




36N·m(3.7kgf·m)
88N·m(9.0kgf·m)
4N·m(0.4kgf·m)
88N·m(9.0kgf·m)
36N·m(3.7kgf·m)

Service Information.....	14 – 1	Rear Cushion.....	14 – 12
Troubleshooting.....	14 – 2	Swing Arm.....	14 – 13
Rear Wheel.....	14 – 3		

Service Information

General

Warning

A contaminated brake disc/pad reduces the braking performance. Replace contaminated pads and clean a contaminated disc with brake degreasing agent.

- Firmly support the frame when servicing the front wheel and suspension.
- Do not operate the brake pedal while the rear wheel is removed.
- Refer to Sec. 15 for servicing the brake system.
- When removing/installing the rim from/to the tyre, use special "tyre lever" and "rim protector" to avoid damaging the rim.
- Refer to the common service manual for handling the tubeless tyre.

Specification

Item			Standard	Service limit
Rear tyre	Tread depth		-	2.0mm
	Air Pressure	One person	225kPa (2.25kg/cm²)	-
		Two people	225kPa (2.25kg/cm²)	-
	Type	Bridgestone	G602F tubeless	-
	Size		140 / 70 – 17 66H	-
Rear axle runout			-	0.20mm
Rear wheel	Rim runout	Radial	-	2.0mm
		Axial	-	2.0mm
	Balance weight		-	60g or less
Drive chain	Slack		25 – 35mm	-
	Size/links	DID	520 V8 / 104 links	-
		RK	520 MOZ 6 / 104 links	-
Drive chain slider thickness			-	Wear limit line

Torque Settings

Axle nut	88Nm (9.0kgf-m) apply oil to the thread and the seat
Driven sprocket nut	30Nm (3.1kgf-m) U-nut
Brake disc bolt	41Nm (4.2kgf-m)
Swing arm pivot nut	88Nm (9.0kgf-m) U-nut
Chain adjuster lock nut	21Nm (2.1kgf-m)
Rear cushion upper nut	36Nm (3.7kgf-m)
Rear cushion lower nut	36Nm (3.7kgf-m)
Step arm cap bolt	22Nm (2.2kgf-m)
Rear brake hose guide screw	4Nm (0.4kgf-m)
Muffler mount bolt	29Nm (3.0kgf-m)

Special Tools

Driver handle A	07749-0010000
Bearing remover head 17mm	07746-0050500
Bearing remover shaft	07746-0050100
Pilot 17mm	07746-0040400
Outer driver 37 x 40mm	07746-0010200
Outer driver 42 x 47mm	07746-0010300
Remover shaft	07946-MJ00100
Outer driver 28 x 30mm	07946-1870100
Driver handle attachment	07949-3710001
Outer driver 32 x 35mm	07946-0010100
Pilot 25mm	07746-0040600
Needle bearing remover set	07LMC-KV30200

Troubleshooting

Rear wheel deflection
- Deformed wheel/rim
- Damaged wheel bearing
- Faulty tyre
- Loose axle tightening
- Faulty swing arm pivot bearing
- Low tyre pressure
- Unbalanced wheel

Wheel rotation resistance
- Faulty wheel bearing
- Bent rear axle
- Dragging brake (Sec. 15)

Hard rear suspension
- Bent damper rod
- Faulty swing arm pivot bearing
- Lack of lubrication at pivot or friction area
- Too high tyre pressure

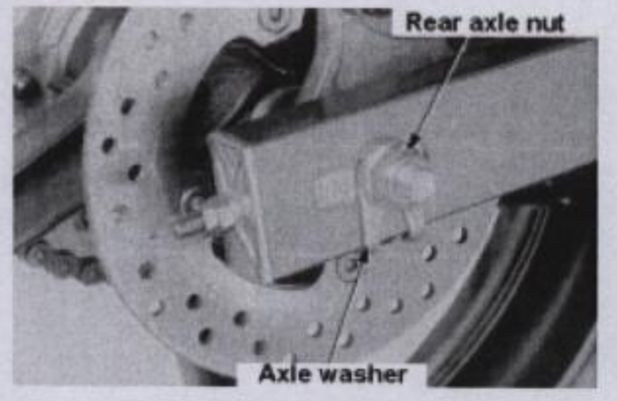
Soft front suspension
- Deformed cushion spring
- Deformed or oil leak at rear cushion damper
- Too low tyre pressure

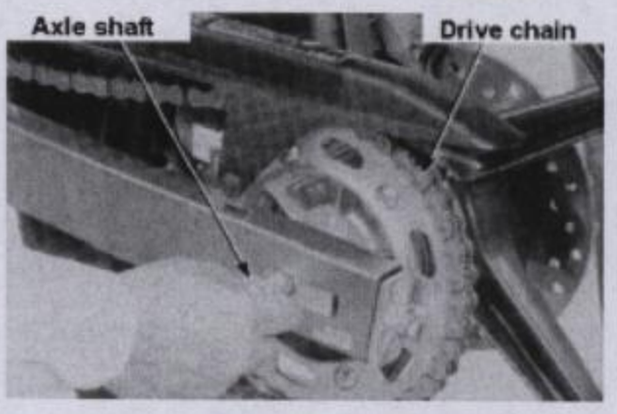
Rear suspension noise
- Rear cushion rubbing other parts
- Loose rear suspension tightening

Rear Wheel

Removal

Remove a rear axle nut and an axle washer.
Loosen a drive chain adjuster lock nut and an adjust nut.
Firmly support the frame and lift the wheel.
Slide the rear wheel forward to maximise the drive chain slack.
Remove the drive chain from a driven sprocket.
Pull out an axle shaft and remove a rear wheel.

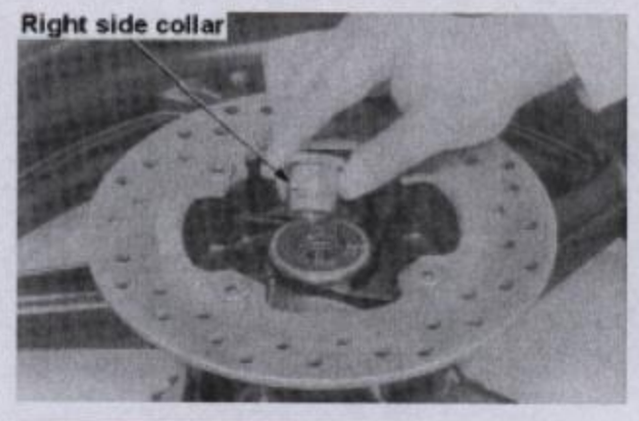




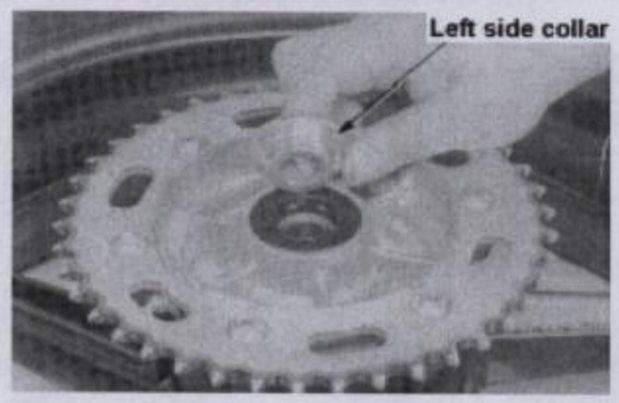
Notes

- Do not operate a brake pedal after removing the rear wheel.
- Do not sling the brake caliper with a brake hose.

Remove a right side collar.



Remove a left side collar.

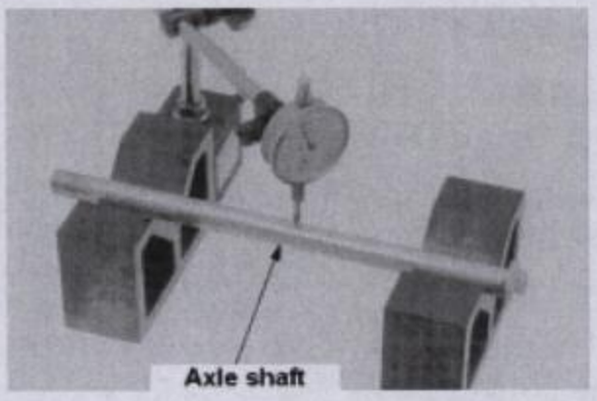


Inspection

Axle

Place the axle on Vee-blocks and measure its runout with a dial gauge. Take ½ of the reading.

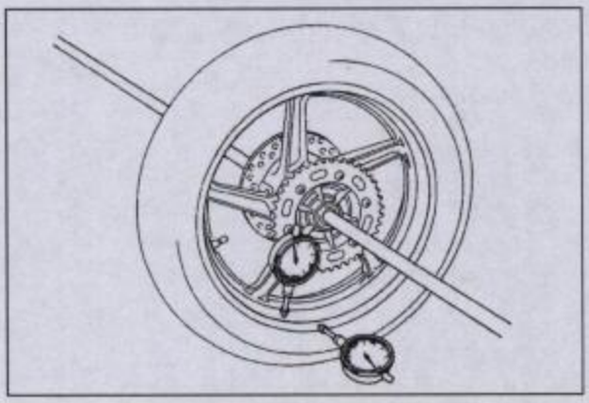
Service Limit: 0.2mm



Wheel Rim

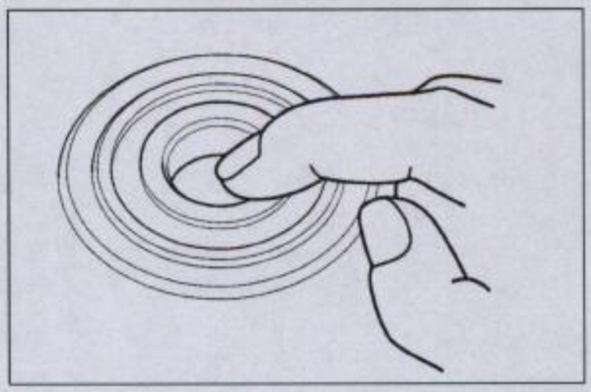
Measure the rim runout.

Service Limit: Radial: 2.0mm
Axial: 2.0mm



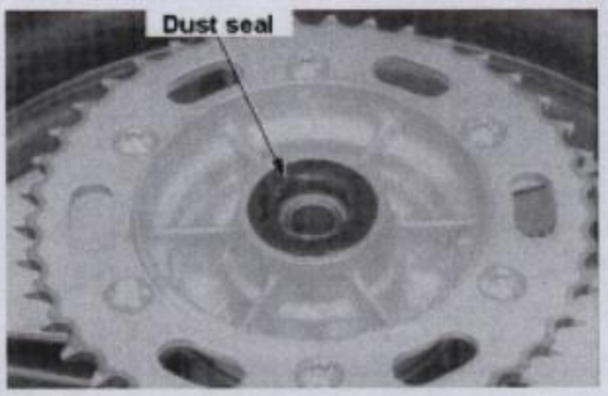
Wheel Bearing

Turn the inner race of each bearing with a finger to check smooth rotation. If it is not smooth or if there is any damage or loose fit on the outer race or a hub, replace with new ones.



Notes

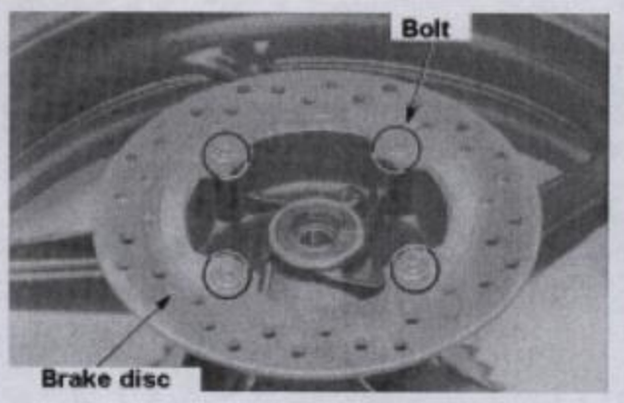
Replace both sides at the same time.



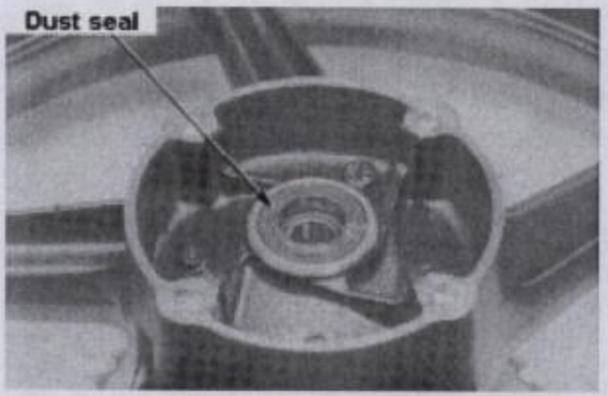
Disassembly

Remove a dust seal.

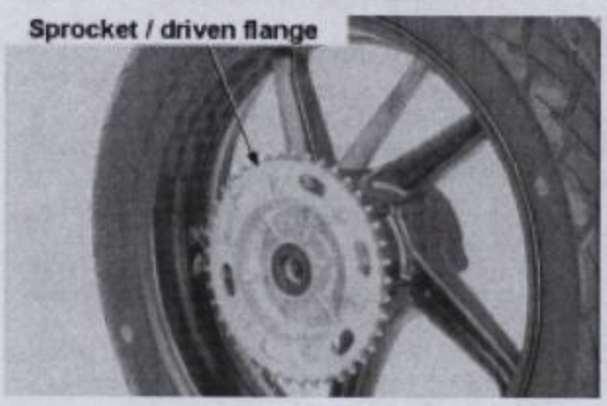
Unscrew four bolts to remove a brake disc.



Remove a dust seal.



Remove a final driven sprocket and a driven flange in Assy.

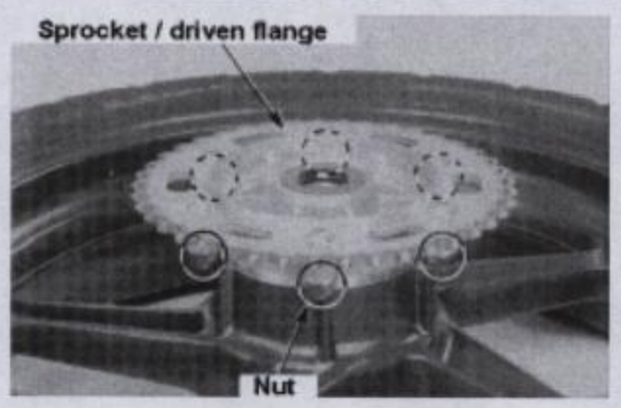


Notes

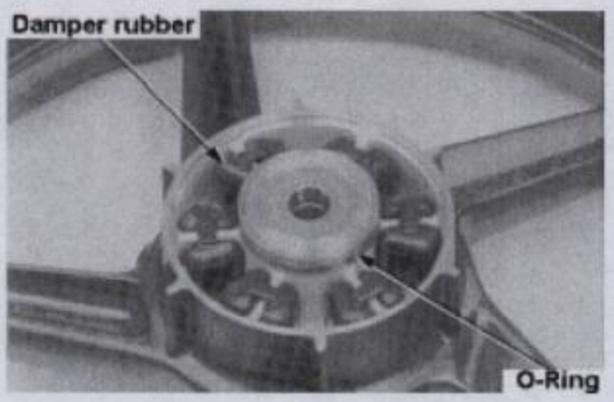
Do not disassemble the sprocket and the flange unless the driven sprocket or the driven flange is to be serviced or replaced.

When removing the driven sprocket, temporarily set a driven flange Assy to the wheel and unscrew six bolts.

Remove the driven sprocket.

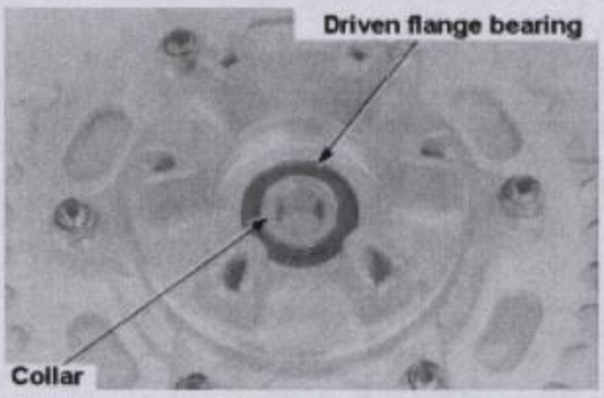


Remove a damper rubber.
Remove an O-Ring.



Driven flange bearing removal

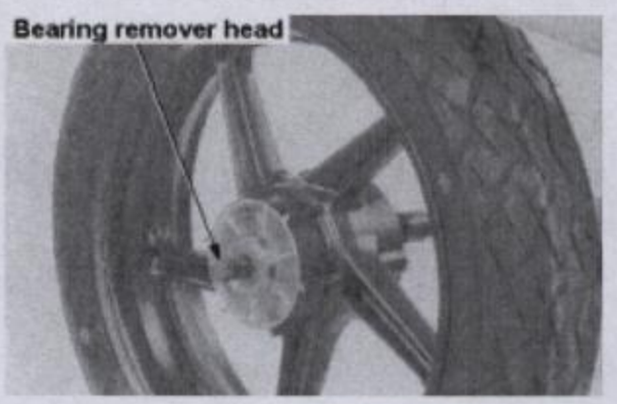
Remove a collar to remove a driven flange bearing.

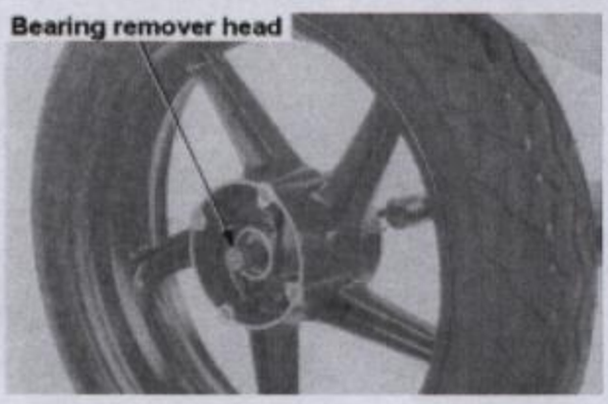


Wheel Bearing Removal

Set a remover head to the bearing.
Set a remover shaft to the remover head from the other side to remove the bearing.
Remove a distance collar and remove another bearing in the same manner.

Special Tools:
Bearing Remover Head 17mm
07746-0050500
Bearing Remover Shaft 07746-0050100

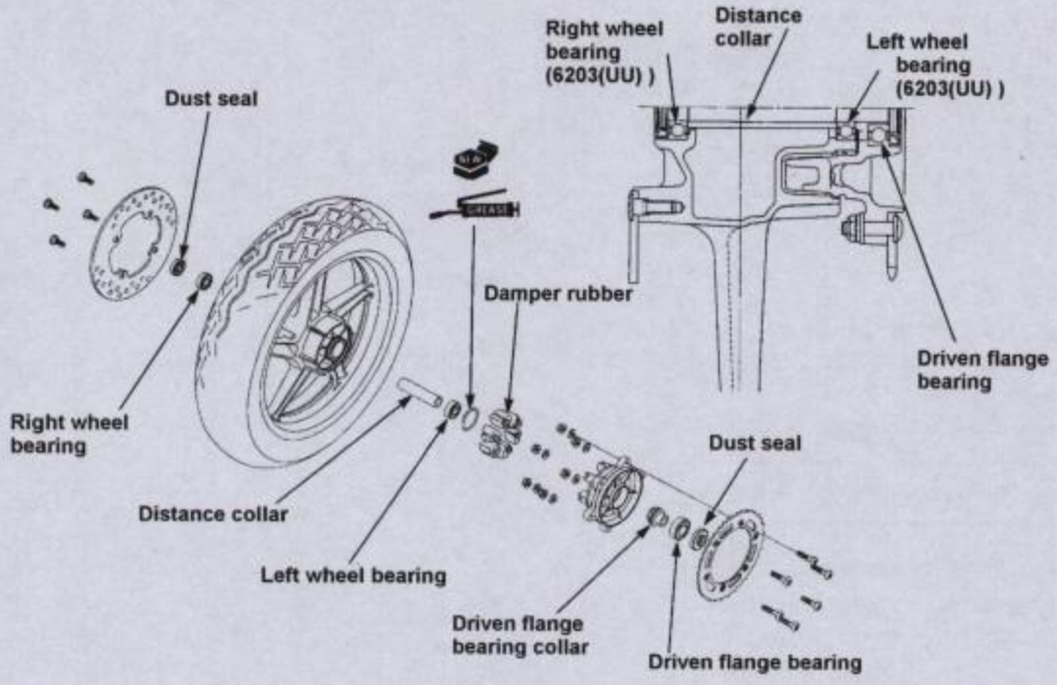




Notes

Replace both sides at the same time and do not re-use the removed bearing.

Assembly

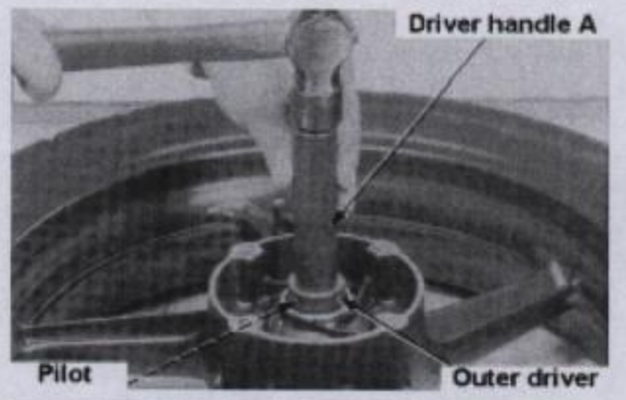


Wheel Bearing Installation

Face the labelled surface of a new right wheel bearing upwards and install it straightly until it contacts the hub.
Install a distance collar.
Install a new left wheel bearing in the same manner until it touches a distance collar.

Special Tools:

Driver Handle A	07749-0010000
Outer Driver 37x40mm	07746-0010200
Pilot 17mm	07746-0040400

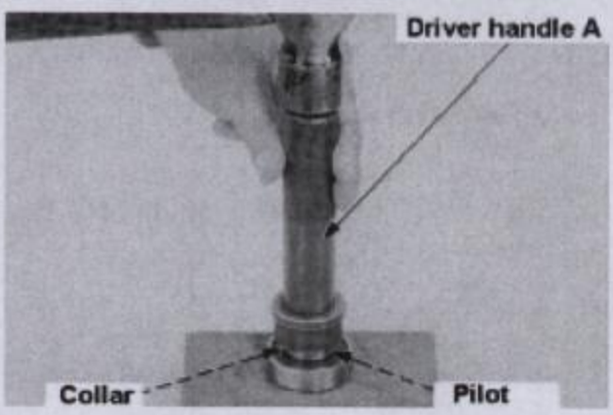


Driven Flange Bearing Installation

Face the labelled surface of a new bearing downwards and place it to a flat level surface.
Install a driven flange bearing collar.

Special Tools:

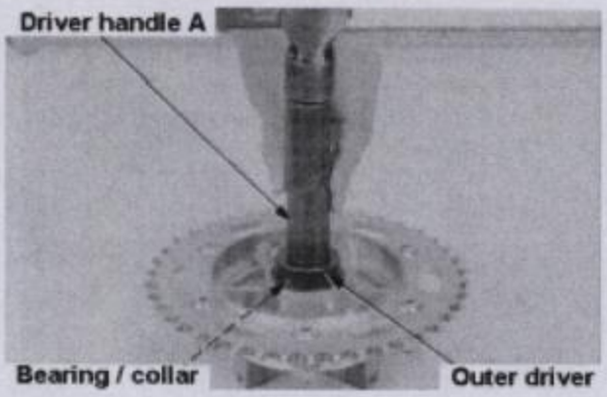
Driver Handle A	07749-0010000
Outer Driver 37x40mm	07746-0010200
Pilot 17mm	07746-0040400



Install a driven flange bearing / collar until it stops at the driven flange.

Special Tools:

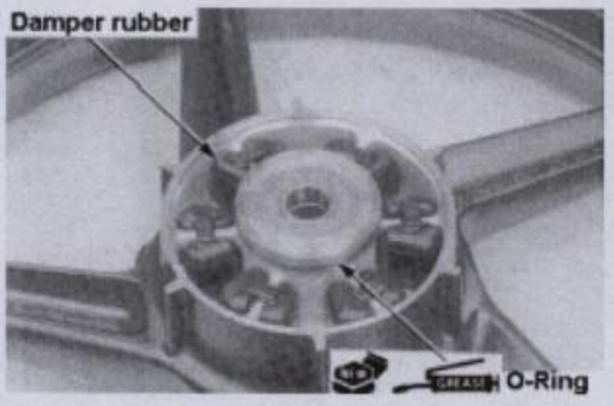
Driver Handle A	07749-0010000
Outer Driver 42x47mm	07746-0010300
Pilot 17mm	07746-0040400



Inspect damper rubbers for wear/damage. Replace if necessary.

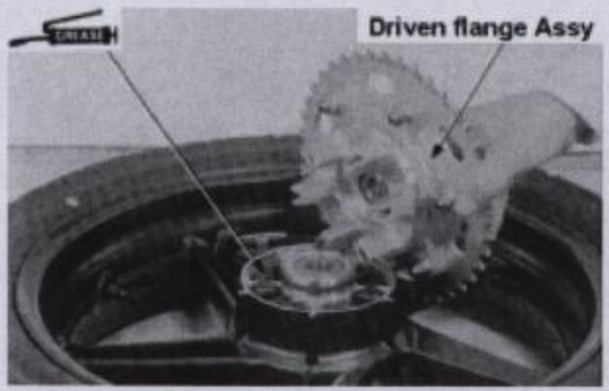
Notes

Replace the rubbers in a set.



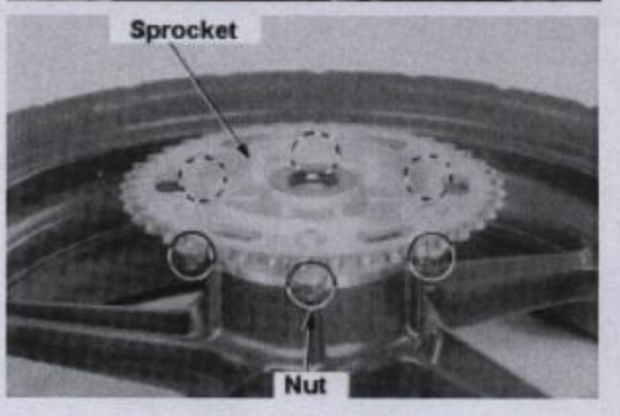
Install damper rubbers to a wheel hub. Apply grease to a new O-Ring and set it to the wheel hub groove.

Apply grease to the friction surface of the driven flange and the wheel hub.
Install the driven flange Assy to the wheel.



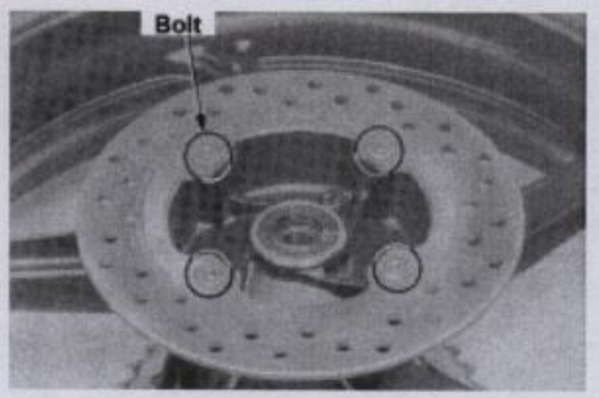
If a driven sprocket has been removed, install the sprocket, socket bolts and nuts.

Torque: 30Nm (3.1kgf-m)



Install a brake disc. It's "Drive" mark should face outwards.
Secure its bolts.

Torque: 41Nm (4.2kgf-m)

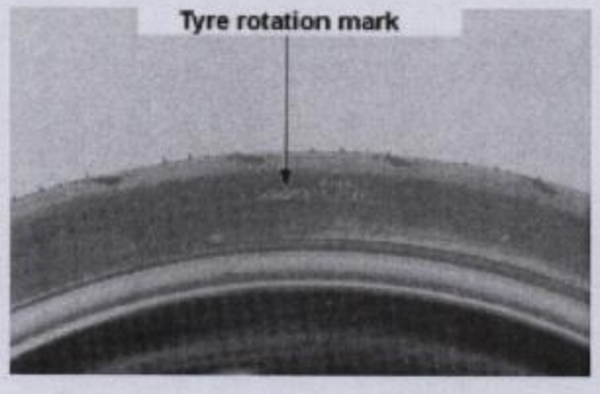


Warning

Tyre Rotation Mark

Notes

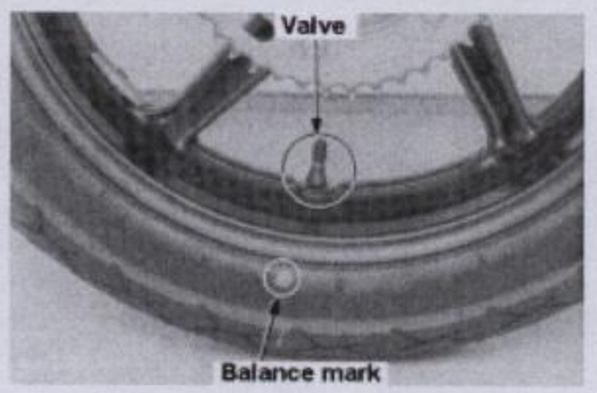
Install a tyre in a direction so that it's rotation mark indicates the wheel rotating direction.



Wheel Balance

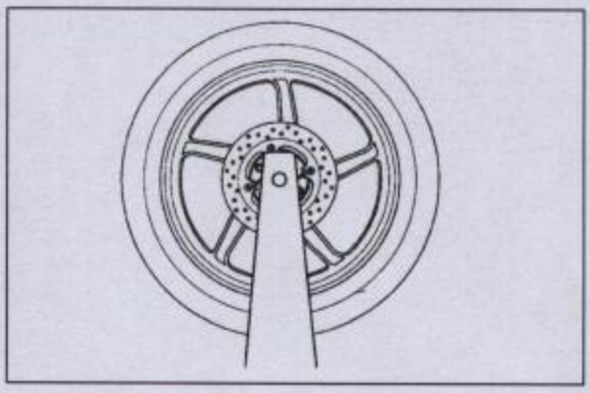
Notes

- Wheel balance directly affects the vehicle stability, controllability and general safety. Always check wheel balance whenever a tyre has been removed from a wheel.
- Align a tyre balance mark (side wall painted spot) with a valve.



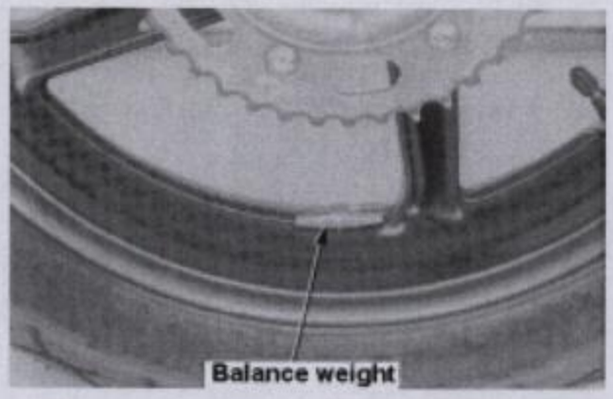
Set tyre/wheel/brake disc/driven flange Assy to an inspection stand.

1. Let the wheel spin. When it stops, mark the lowest part of the rim (the heaviest part) with chalk. Repeat this a few times. If the wheel stops at different places (different marks) each time, the wheel is balanced.
2. Attach a balance weight to the highest part of the rim (the lightest part) and conduct 1. Repeat the above 1 & 2 and finally secure the balance weights.

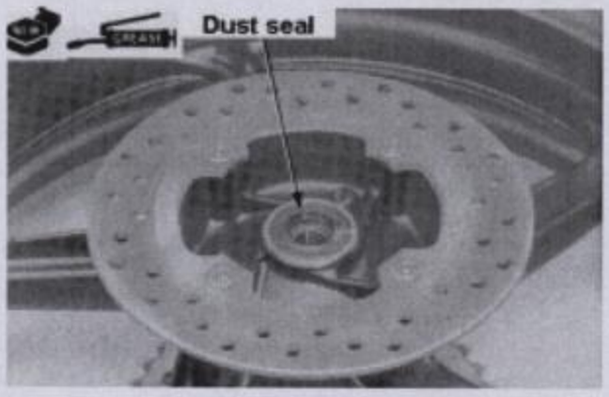


Notes

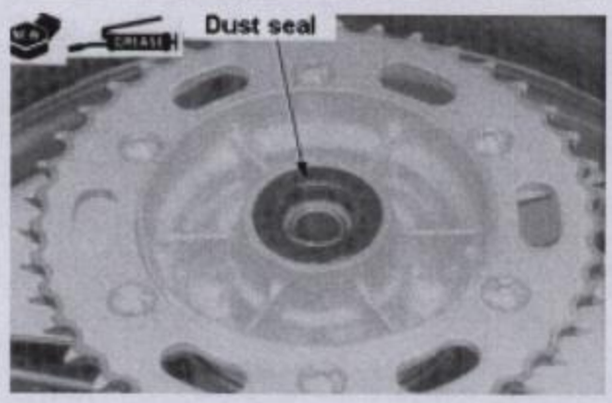
Overall weight of the balance weight should not exceed 60g.



Apply grease to a right dust seal lip.
Install the right dust seal.

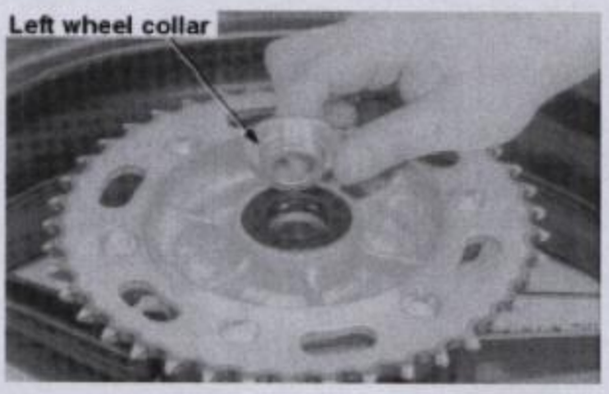


Apply grease to a left dust seal lip.
Install the left dust seal.

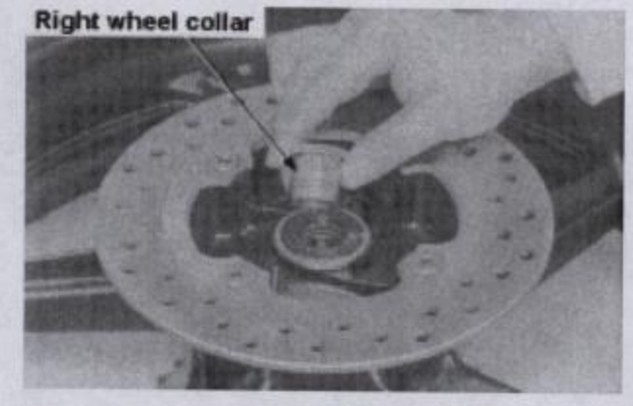


Installation

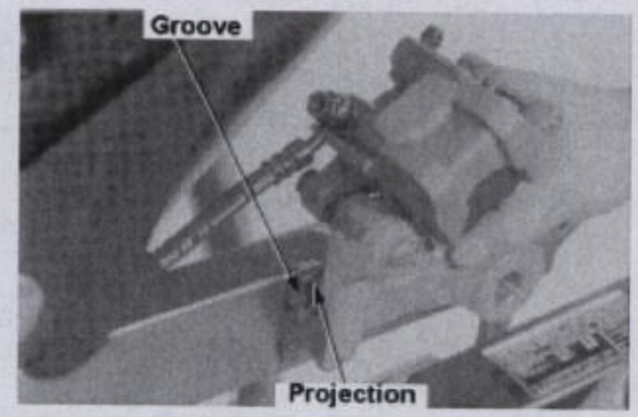
Install a left wheel collar.



Install a right wheel collar.



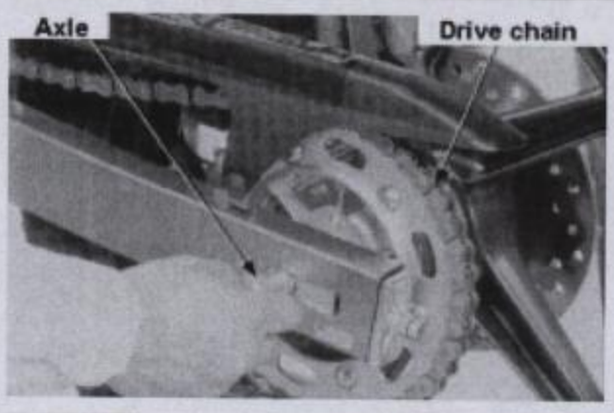
Set the projection of a rear caliper bracket to the spring arm groove.



Set a brake disc between pads and set a rear wheel between swing arms.

Notes

- Do not damage brake pads.
- If a drive chain adjuster has been removed, install it by facing the "UP" mark of the chain tensioner plate upwards.

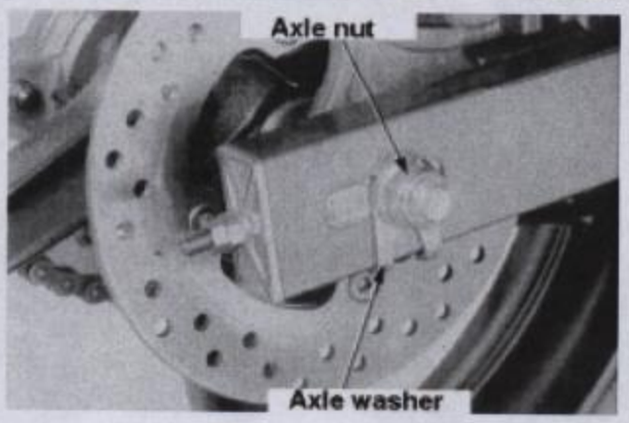


Install a rear axle.
Set drive chain to a driven sprocket.

Install an axle washer and an axle nut.
Adjust the drive chain slack (3-9).

Secure the rear axle nut.

Torque: 88Nm (9.0kgf-m)



Rear Cushion

Removal

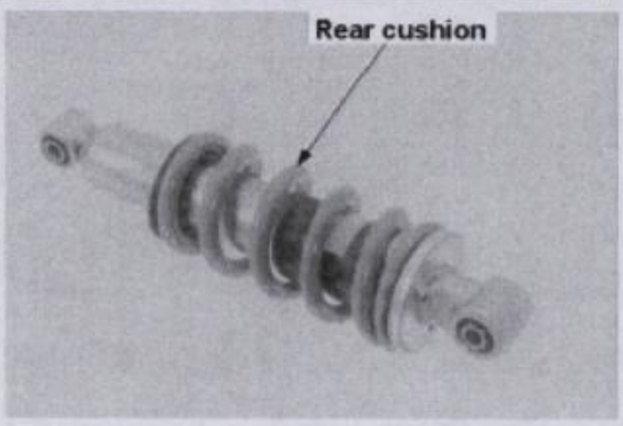
Remove a fuel tank (2-3).
Firmly support the frame to lift the rear wheel.
Unscrew rear cushion lower mount bolt/nut.

Remove the fuel tank (2-3).

Unscrew the rear cushion upper mount bolt/nut to remove a rear cushion Assy.

Inspection

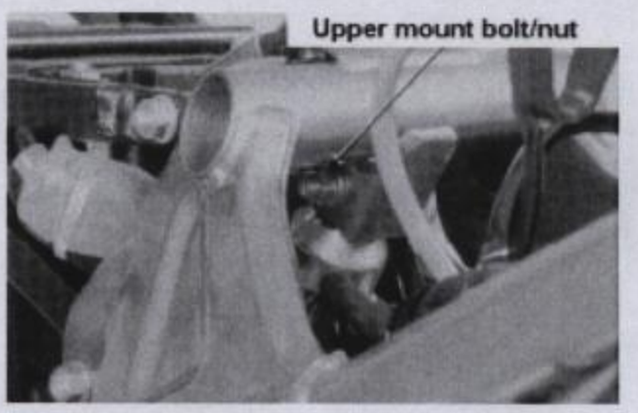
Inspect a damper unit for oil leak, rod runout, or wear/damage of the stopper rubber.
Replace if necessary.



Installation

Install the rear cushion and secure the upper mount bolt/nut.

Torque: 36Nm (3.7kgf-m)



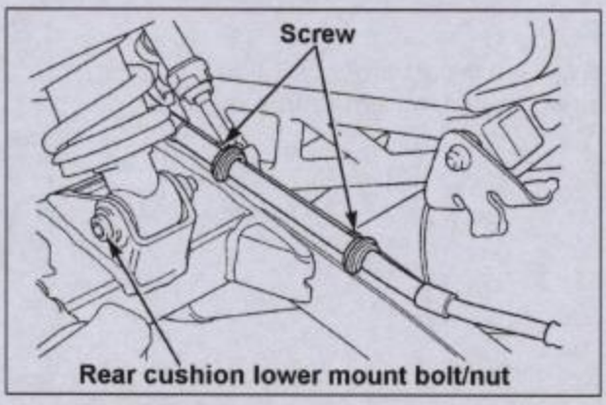
Secure the lower mount bolt/nut.

Torque: 36Nm (3.7kgf-m)

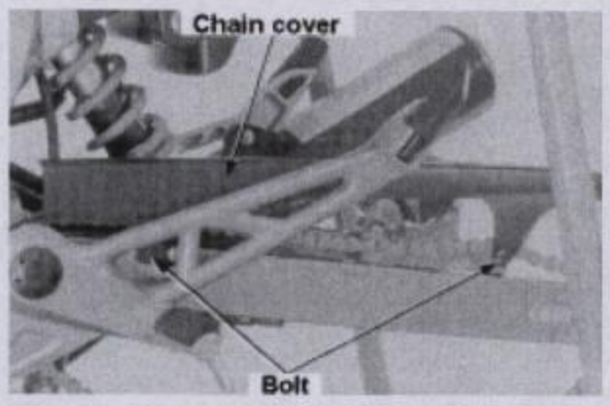
Swing Arm

Removal

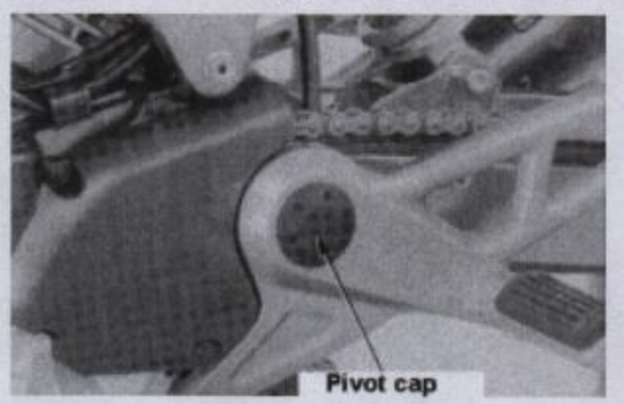
Firmly support the frame and lift the rear wheel.
Remove a rear wheel (14-3).
Unscrew two brake hose clamp screws.
Unscrew rear cushion lower mount bolt/nut.



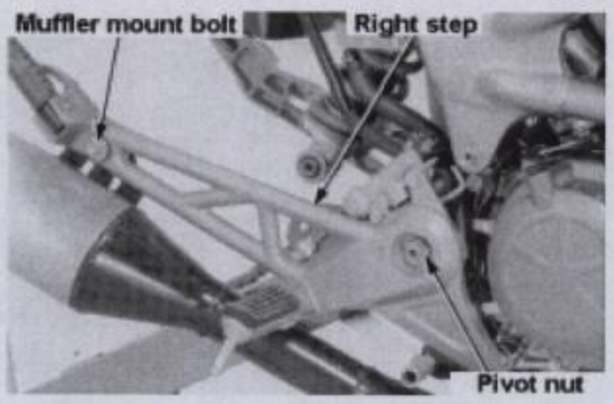
Unscrew two bolts to remove a drive chain cover.



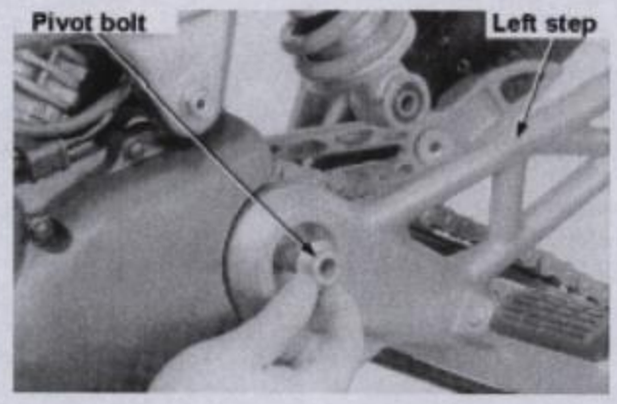
Remove right/left pivot caps.



Unscrew a swing arm pivot nut.
Unscrew a muffler mount bolt.
Remove a right step.

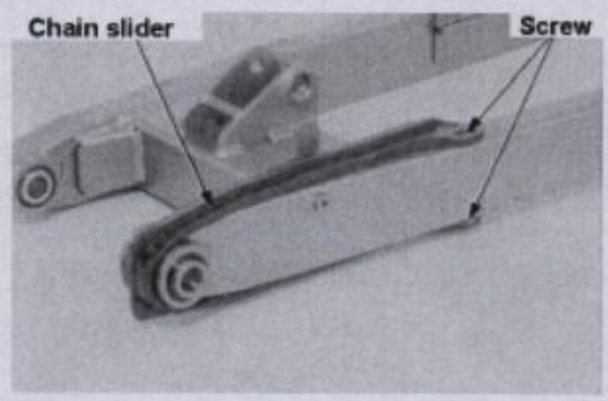


Unscrew a swing arm pivot bolt to remove the swing arm and a left step.

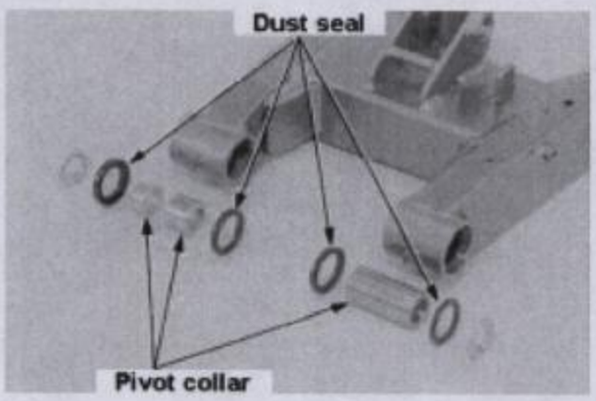


Disassembly

Unscrew two screws to remove a driven chain slider.

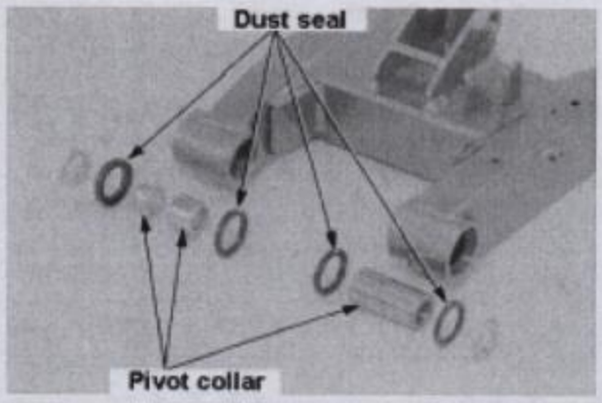


Remove pivot collars and dust seals.



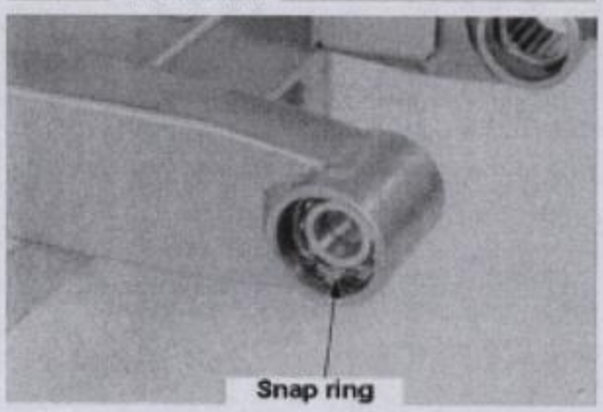
Inspection

Inspect dust seals for wear/damage and replace if necessary.
Inspect pivot collars, swing arm, and pivot bearings for damage.
Replace if necessary.



Swing Arm Pivot Bearing Replacement

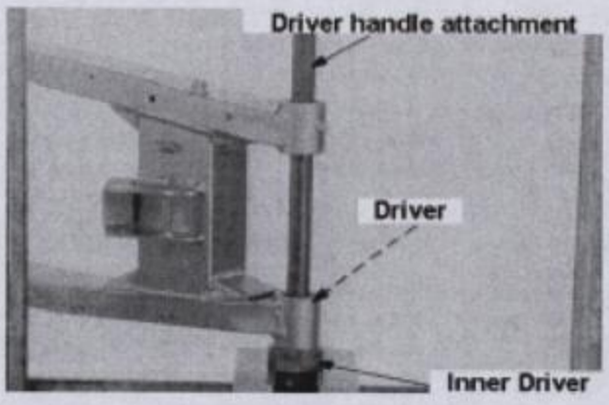
Remove a snap ring.



Remove a right pivot ball bearing with the following tools and a press machine.

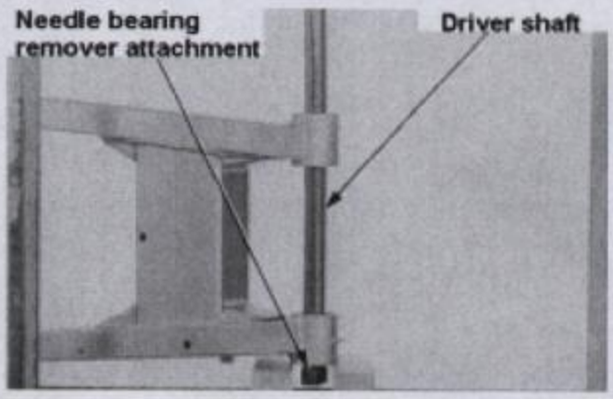
Special Tools:

Driver Handle Attachment	07949-3710001
Driver 28 x 30mm	07946-1870100
Inner Driver 35mm	07746-0030400



Remove a left pivot needle bearing with the following tools and a press machine.

Special Tools:
Needle Bearing Remover Attachment
07LMC-KV30200
Driver Shaft
07946-MJ00100



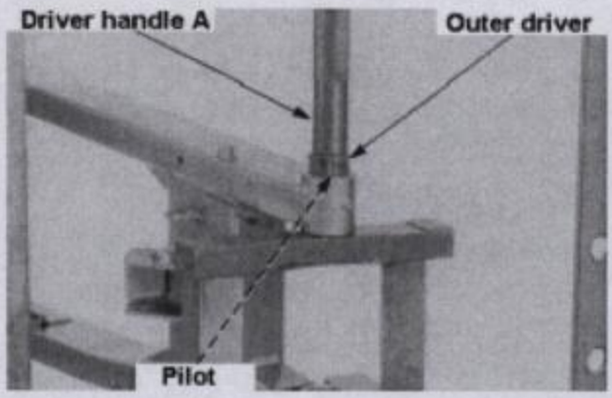
Install a new left pivot needle bearing to the swing arm with the following tools and a press machine.

Special Tools:

Driver Handle A	07749-0010000
Outer Driver 28 x 30mm	07946-1870100
Pilot 25mm	07746-0040600

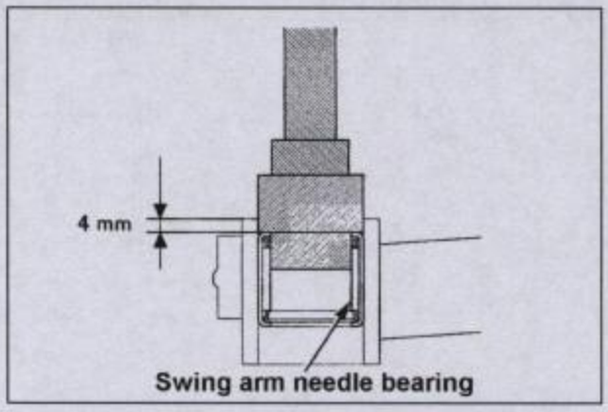
Notes

Press the labelled surface of the needle bearing.



Notes

Install the needle bearing to 4mm from the swing arm end.



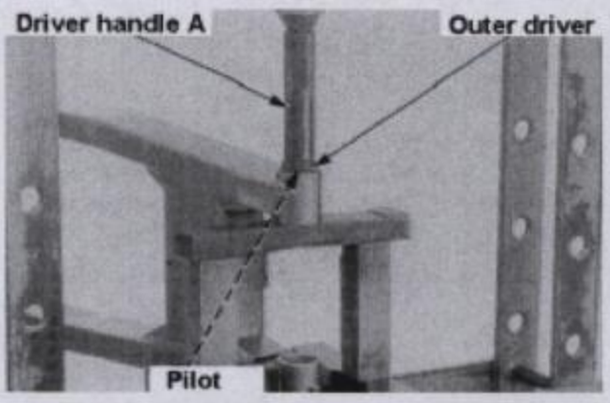
Install a new left pivot ball bearing to the swing arm with the following tools and a press machine.

Special Tools:

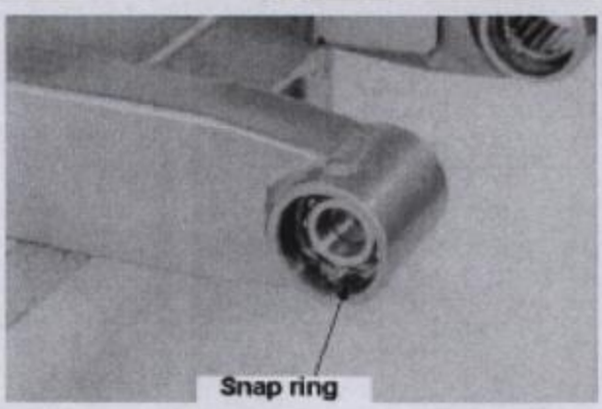
Driver Handle A	07749-0010000
Outer Driver 32x35m	07946-0010100
Pilot 17mm	07746-0040400

Notes

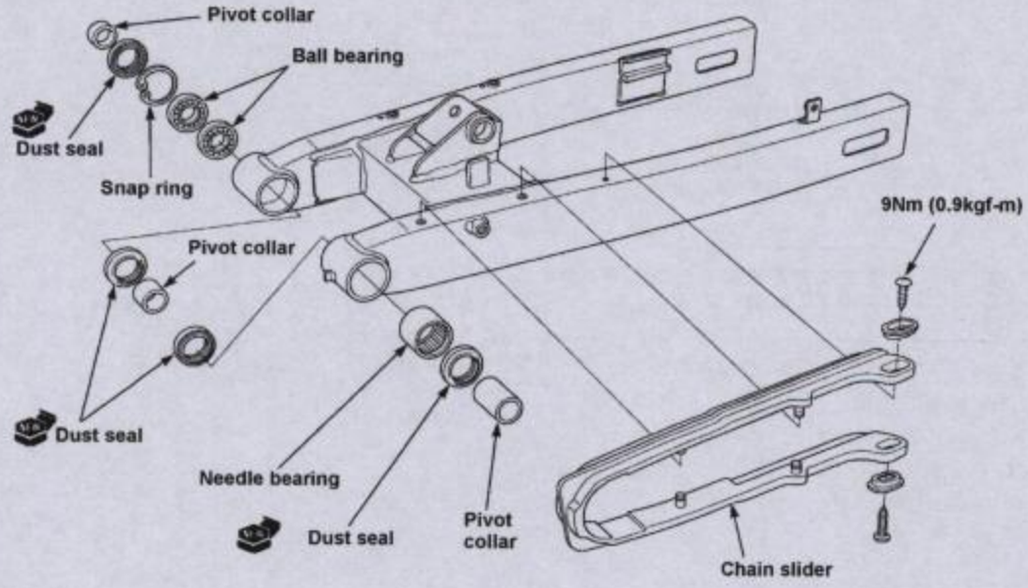
- Press the labelled surface of the ball bearing.
- Insert the bearing until it touches the stopper.



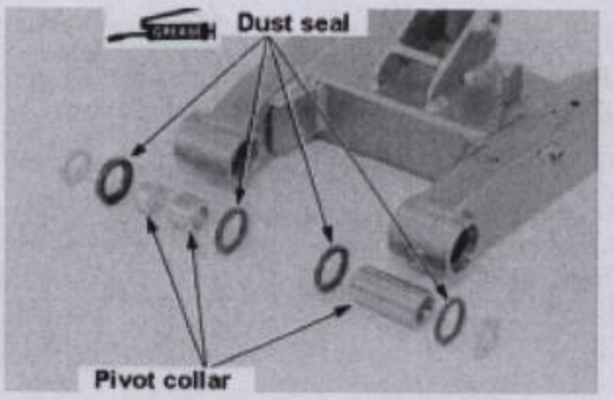
Set snap rings to the swing arm grooves.



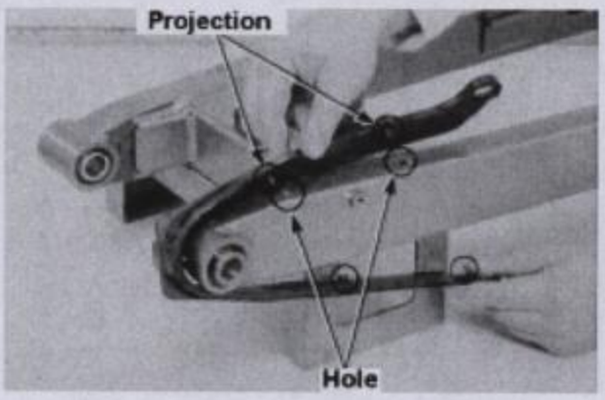
Assembly



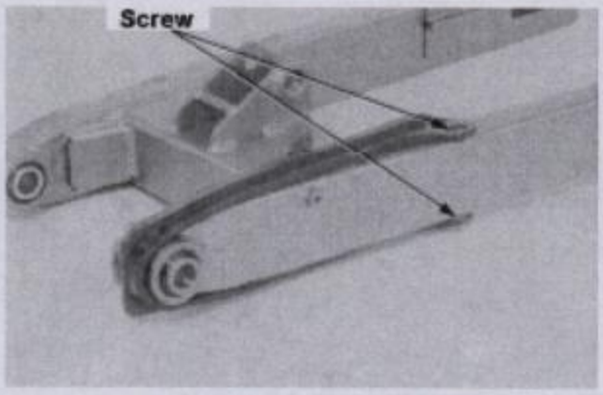
Apply grease to a right pivot dust seal lip and install it to the swing arm.
Install a swing arm pivot collar.
Apply grease to a left pivot dust seal lip and install it to the swing arm.
Install a swing arm pivot collar.



Align chain slider projection with swing arm holes to install the chain slider.

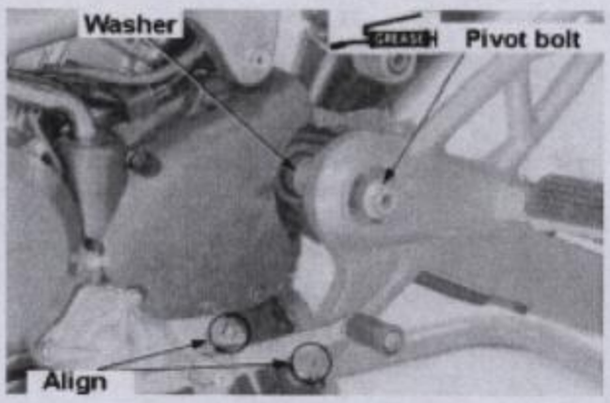


Screw chain slider mount screws.

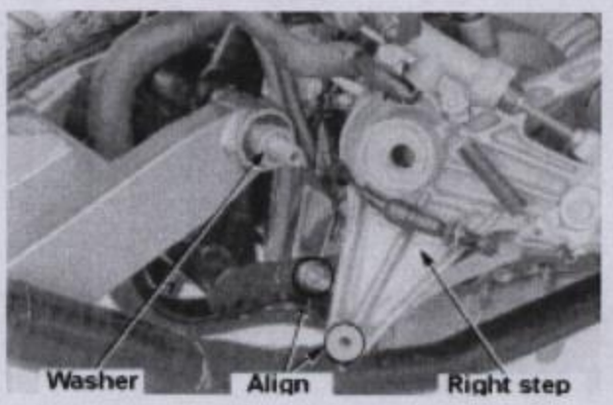


Installation

Apply grease to the friction area of the swing arm pivot bolt.
Install a swing arm and install a swing arm pivot bolt/washer to the left step.
Install a swing arm pivot bolt.
Align the end of engine mount bolt with a hole on the lower side of a left step to install the bolt.



Install a washer.
Align the end of engine mount bolt with a hole on the lower side of a right step to install the bolt.

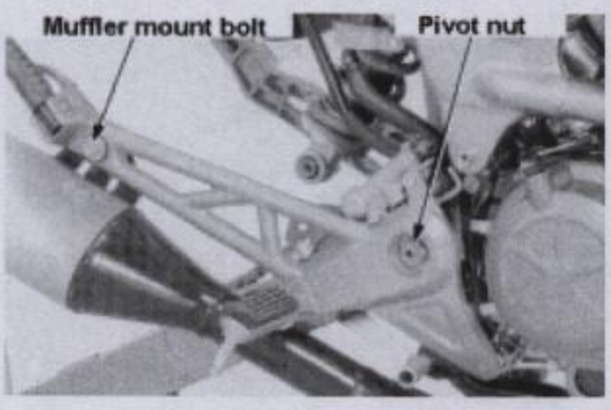


Install a muffler mount bolt and a swing arm pivot nut.
Secure the swing arm pivot nut.

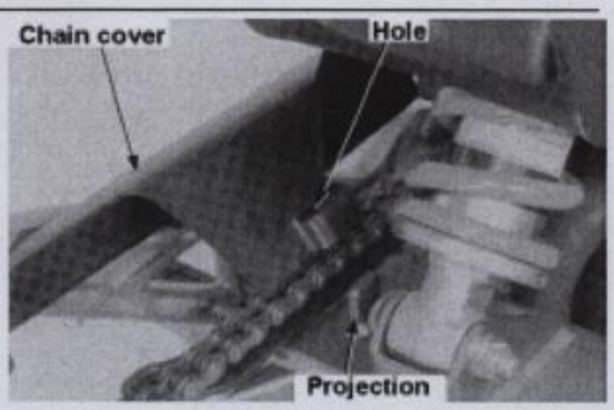
Torque: 88Nm (9.0kgf-m)

Secure the muffler mount bolt.

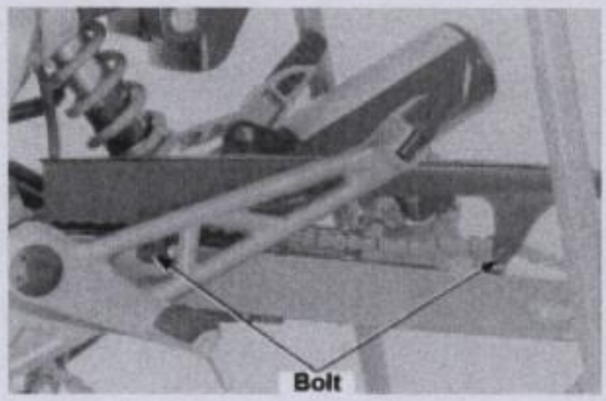
Torque: 29Nm (3.0kgf-m)



Install a chain cover by setting its hole to a projection on the swing arm.



Screw two bolts.



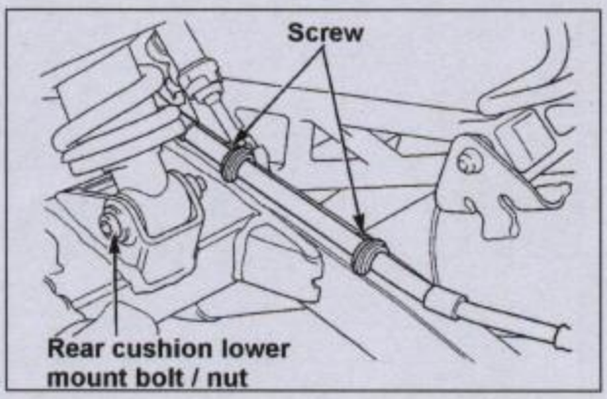
Secure a rear cushion lower mount bolt/nut.

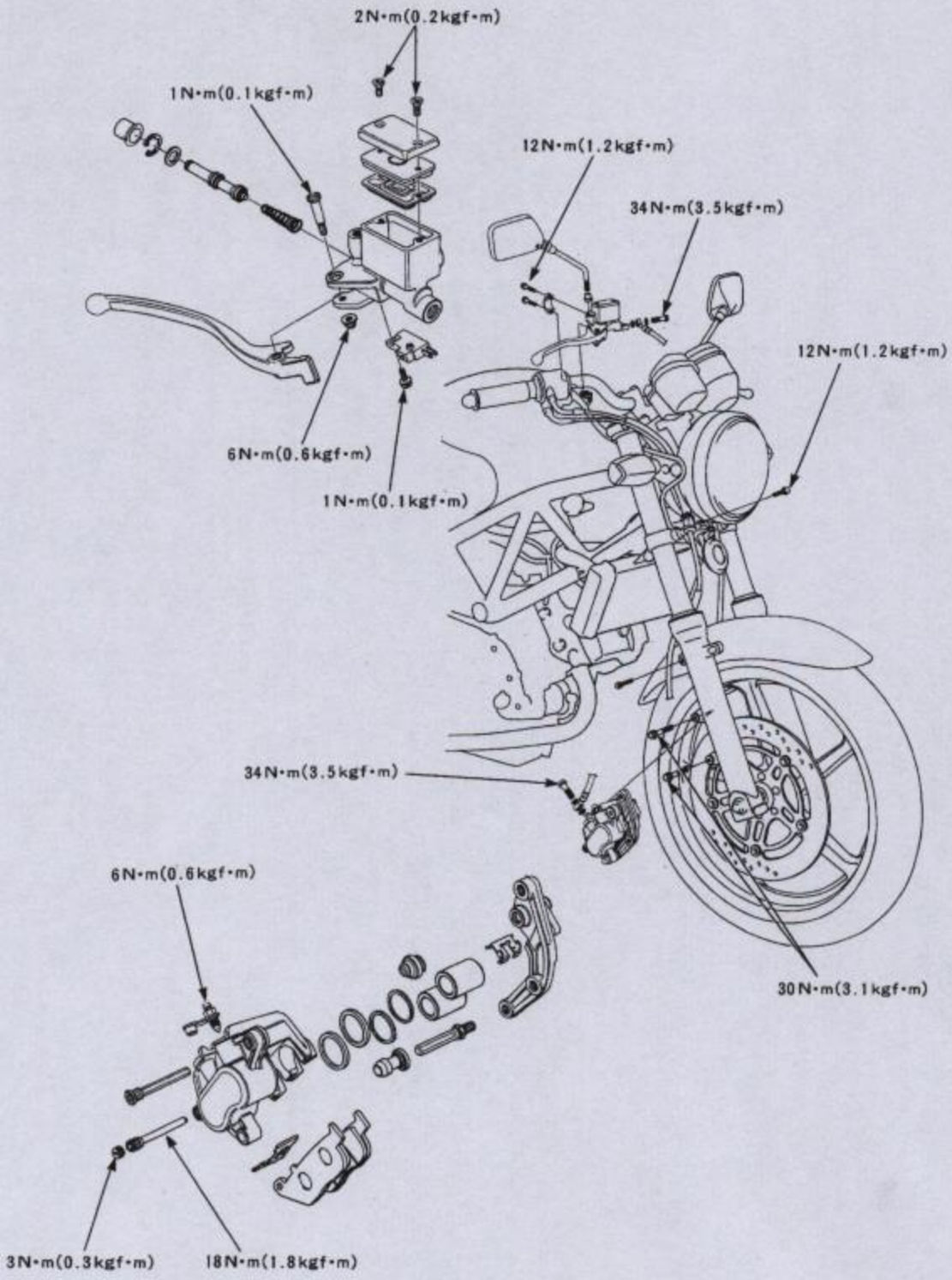
Torque: 36Nm (3.7kgf-m)

Secure two brake hose clamp bolts.

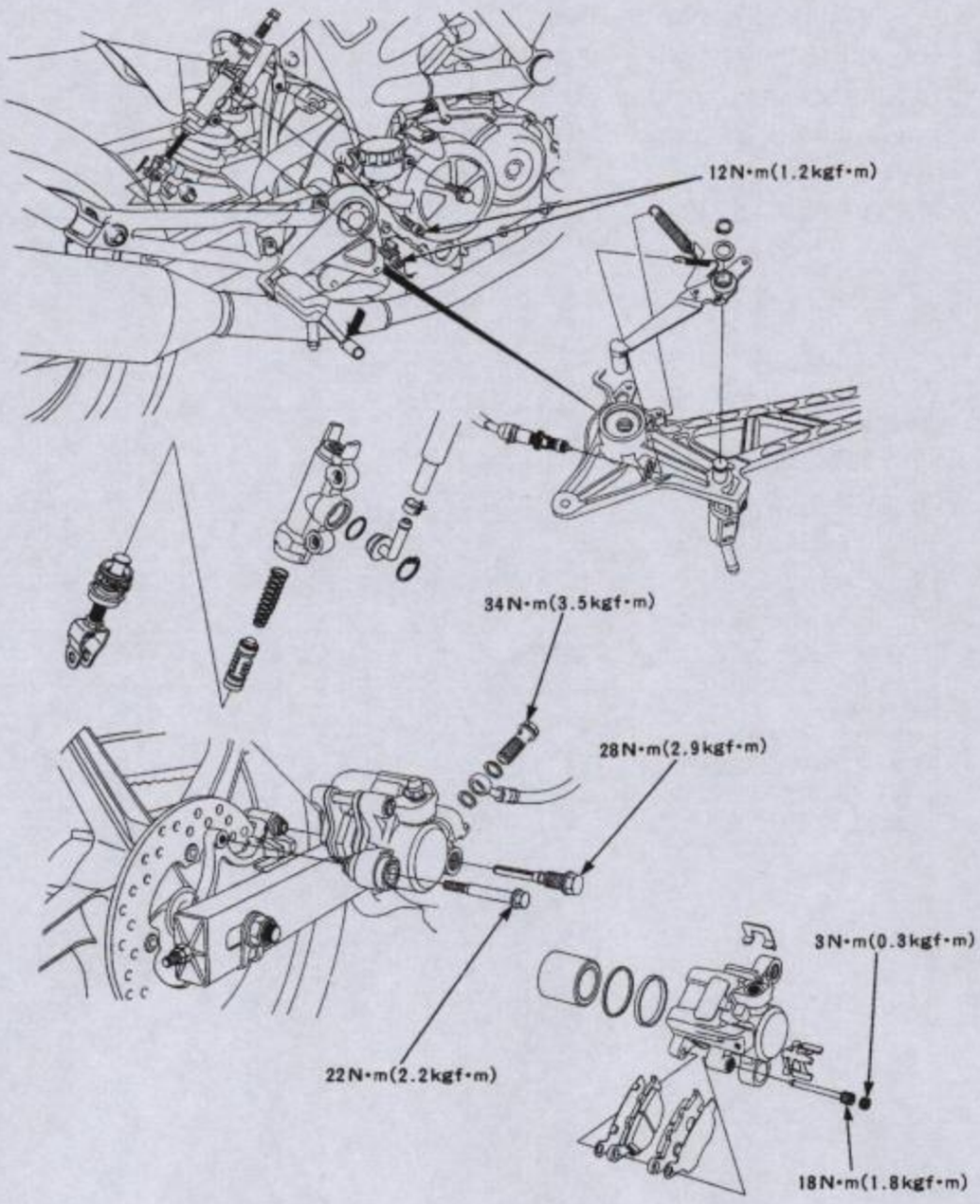
Torque: 4Nm (0.4kgf-m)

Install a rear wheel (14-10).




2N·m(0.2kgf·m)
1N·m(0.1kgf·m)
12N·m(1.2kgf·m)
34N·m(3.5kgf·m)
12N·m(1.2kgf·m)
6N·m(0.6kgf·m)
1N·m(0.1kgf·m)
34N·m(3.5kgf·m)
6N·m(0.6kgf·m)
30N·m(3.1kgf·m)
3N·m(0.3kgf·m)
18N·m(1.8kgf·m)

Service Information.....	15 – 2	Front brake caliper.....	15 – 12
Troubleshooting.....	15 – 3	Rear master cylinder.....	15 – 14
Brake fluid change, air bleed.....	15 – 4	Rear brake caliper.....	15 – 19
Brake pads / disc.....	15 – 6	Brake pedal.....	15 – 22
Front master cylinder.....	15 - 8		



Service Information

General

A contaminated brake disc/pad reduces the braking performance. Replace contaminated pads and clean a contaminated disc with brake degreasing agent.

- Do not contaminate brake fluid with water or debris.
- Do not mix different product of brake fluids.
- Keep the brake fluid away from plastic, rubber or painted surfaces.
- Do not re-use the sealing washer.
- Clean all removed parts with brake fluid and check air passage of each port with compressed air.
- Bleed air when air went into the system, i.e. disconnecting a brake hose.

Specifications

Item		Standard	Service limit
Front brake	Recommended brake fluid	DOT 4	-
	Pad thickness	-	Wear limit groove
	Disc thickness	4.5mm	3.5mm
	Disc runout	-	0.3mm
	Master cylinder bore	11.000-11.043mm	11.06mm
	Master piston diameter	10.957-10.984mm	10.88mm
	Caliper cylinder bore	27.000-27.050mm	27.06mm
	Caliper piston diameter	26.918-26.968mm	26.91mm
Rear brake	Recommended brake fluid	DOT 4	-
	Pad thickness	-	Wear limit groove
	Disc thickness	5.0mm	4.0mm
	Disc runout	-	0.3mm
	Master cylinder bore	12.700-12.743mm	12.755mm
	Master piston diameter	12.657-12.684mm	12.645mm
	Caliper cylinder bore	38.180-38.230mm	38.24mm
	Caliper piston diameter	38.098-38.148mm	38.09mm

Torque Settings

Brake hose oil bolt	34Nm (3.5kgf-m)
Front caliper mount bolt	30Nm (3.1kgf-m)
Front master cylinder mount bolt	12Nm (1.2kgf-m)
Rear master cylinder mount bolt	12Nm (1.2kgf-m)
Front brake hose clamp bolt	12Nm (1.2kgf-m)
Rear brake hose guide screw	4Nm (0.4kgf-m)
Pad pin	18Nm (1.8kgf-m)
Pad pin plug	3Nm (0.3kgf-m)
Caliper bleeder	6Nm (0.6kgf-m)
Rear caliper main slide pin bolt	28Nm (2.9kgf-m)
Rear caliper sub slide pin bolt	22Nm (2.2kgf-m)
Front master cylinder brake switch screw	1Nm (0.1kgf-m)
Brake lever pivot bolt	1Nm (0.1kgf-m)
Brake lever pivot nut	6Nm (0.6kgf-m)
Rear master cylinder push rod lock nut	17Nm (1.7kgf-m)

Special Tools

Snap ring pliers	07914-3230001

Troubleshooting

Poor braking performance
- Air in the brake system
- Vapour contamination of brake fluid
- Dirty brake pads/disc
- Worn master cylinder piston seal
- Worn brake pads
- Dirt in the caliper
- Faulty caliper sliding
- Uneven wear of brake pads and disc
- Too low brake fluid level
- Clogged brake fluid passage
- Runout/deformation of the disc
- Stuck/worn caliper piston
- Worn disc
- Dirty master cylinder
- Deformed lever/pedal

Heavy brake lever/pedal
- Clogged brake system
- Stuck/worn caliper piston
- Faulty caliper sliding
- Worn caliper piston seal
- Stuck/worn master cylinder piston
- Deformed lever/pedal

Dragging brake
- Dirty brake pads/disc
- Uneven/step wear on pads/disc
- Disc runout/deformation
- Faulty caliper sliding
- Debris jamming the hydraulics
- Faulty wheel mounting

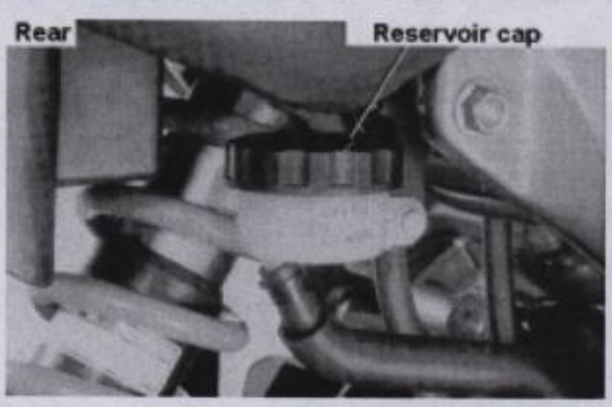
Brake Fluid Change, Air Bleed

Warning

A contaminated brake disc/pad reduces the braking performance. Replace contaminated pads and clean a contaminated disc with brake

Caution

- Do not contaminate brake fluid.
- Do not mix different products of brake fluid.
- Keep the brake fluid away from plastic, rubber or painted surfaces.

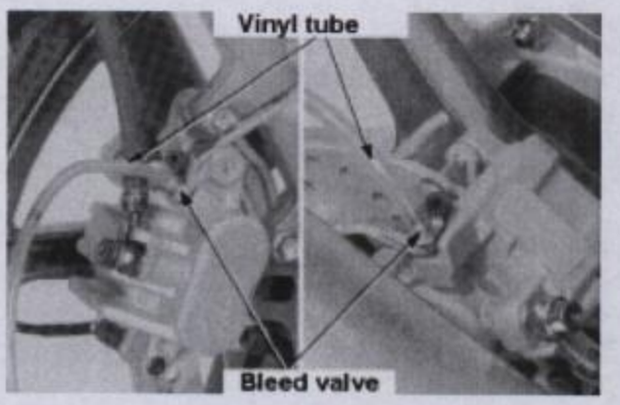


Brake Fluid Drain

Front:
Level the top surface of a master cylinder and remove a master cylinder cap, a set plate and a diaphragm.

Rear:
Remove a reservoir cap, a set plate and a diaphragm.

Connect a transparent tube to the caliper bleed valve.



Loosen the bleed valve and engage brakes repeatedly.

Repeat until no more brake fluid comes out from the bleed valve.

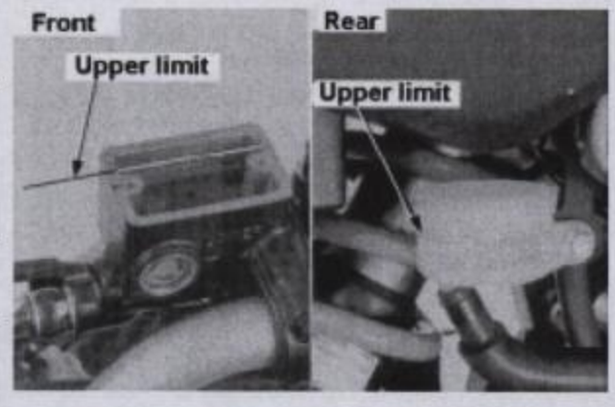
Filling Brake Fluid & Bleeding Air

Caution

- Use DOT4 brake fluid for front and rear.
- Do not mix different products of brake fluid.

Notes

Monitor the brake fluid level. Add brake fluid if the level approaches the minimum level.

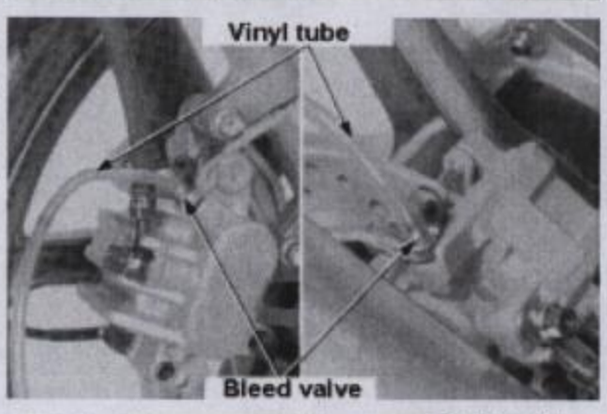


Tighten the bleed valve. Fill brake fluid up to the upper limit line.
Repeat applying brakes until bubbles stop coming out from the front/rear reservoir (until brake lever/pedal become heavy).
Connect a transparent tube to a caliper bleeder and place a container underneath.

1. Apply brakes a few times and hold the lever/pedal.
   Loosen bleed valve for ½ rev, then tighten tack.

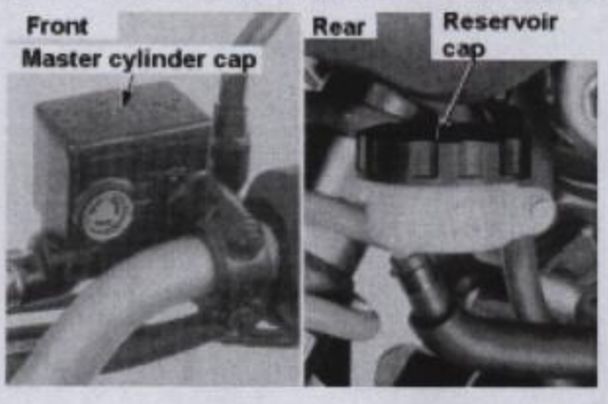
   Notes

   Do not release brakes until the bleed valve is re-tightened.



2. Slowly release the lever/pedal and leave for a few seconds at full-release position.
3. Repeat 1 & 2 until air stops coming out from the bleed valve.

Secure the bleed valve.
Torque: 6Nm (0.6kgf-m)
After bleeding air, fill brake fluid to the reservoir upper limit line.
Front:
Install a diaphragm, a set plate, a master cylinder cap and secure a master cylinder cap screw.
Torque: 2Nm (0.2kgf-m)
Rear:
Install a diaphragm, a set plate and a master cylinder cap.



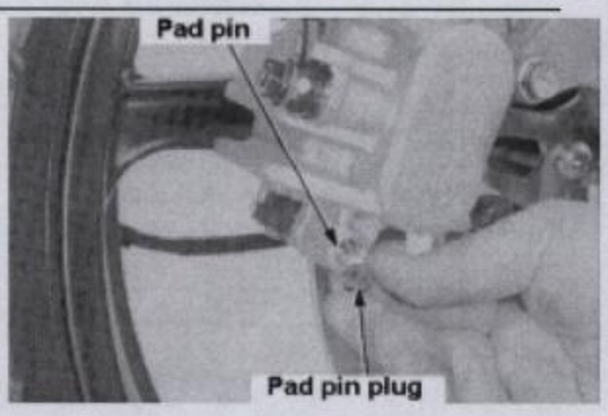
Brake Pad & Disc

Front brake pad replacement

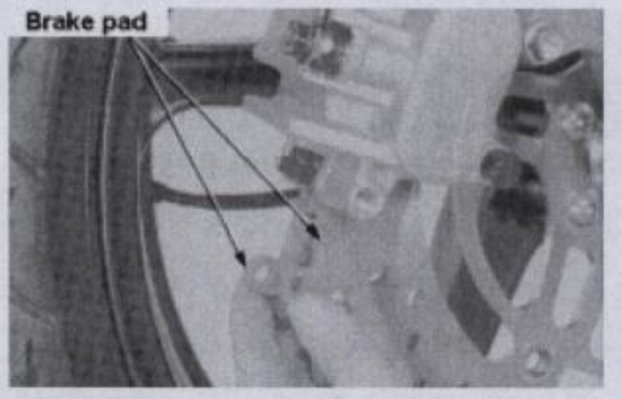
Caution

Replace brake pads in a pair.

Remove a pad pin plug and loosen a pad pin.



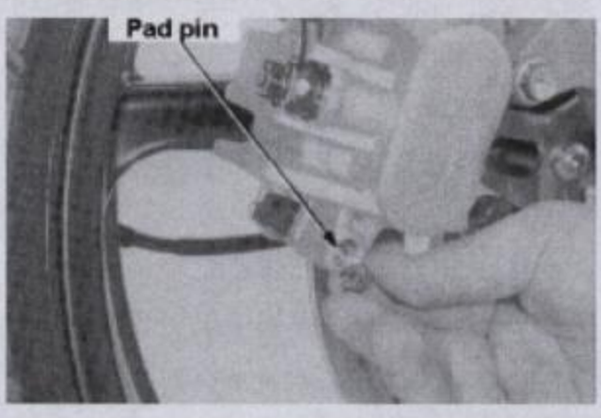
Remove a pad pin and remove brake pads.
Install outer pad. Press the caliper body and push back the piston.
Install inner pad.



Notes

Watch out for the fluid level on a master cylinder reservoir.

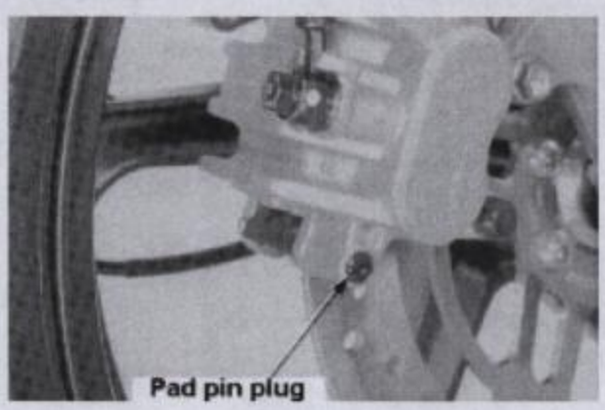
Press a pad spring to install a pad pin.



Secure the pad pin.

Torque: 18Nm (1.8kgf-m)

Install and secure a pad pin plug.



Torque: 3Nm (0.3kgf-m)

Caution

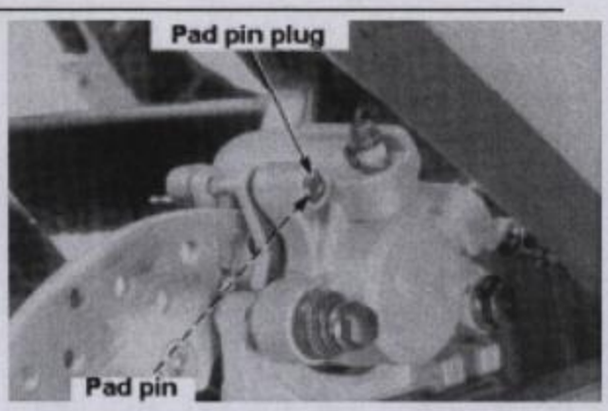
After replacing the pads, operate the brake lever to push out the piston.

Rear Brake Pedal Replacement

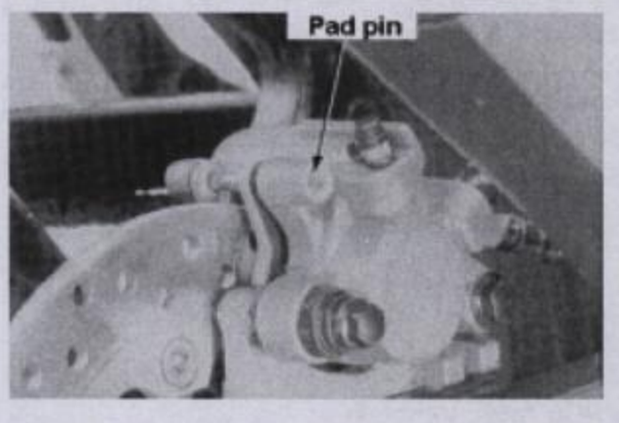
Notes

Replace pads in a pair.

Remove a pad pin plug and loosen a pad pin.



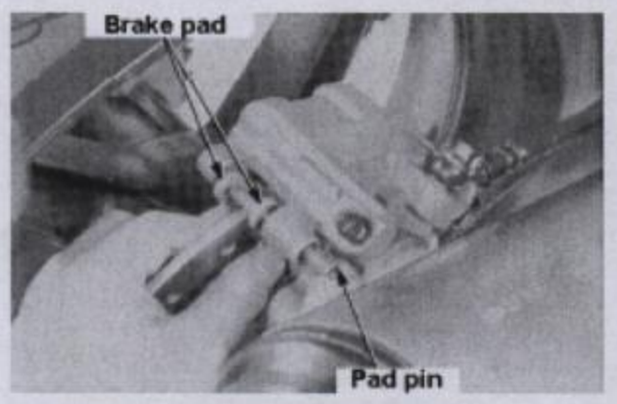
Remove a pad pin to remove brake pads.



Install outer pad. Press the caliper body and push back the piston.
Install inner pad.

Notes

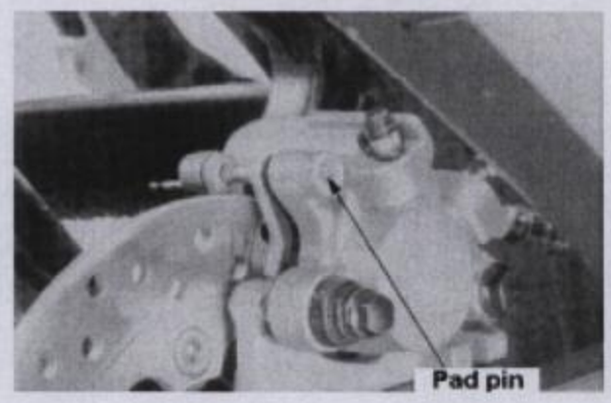
Watch out for the fluid level on a master cylinder reservoir.



Press a pad spring to install a pad pin.

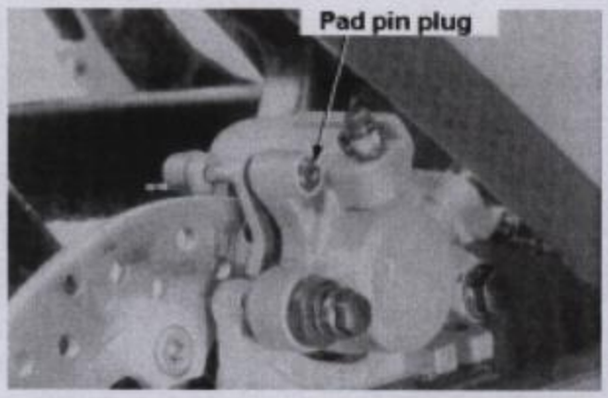
Secure the pad pin.

Torque: 18Nm (1.8kgf-m)



Install a pad pin plug and secure.

Torque: 3Nm (0.3kgf-m)



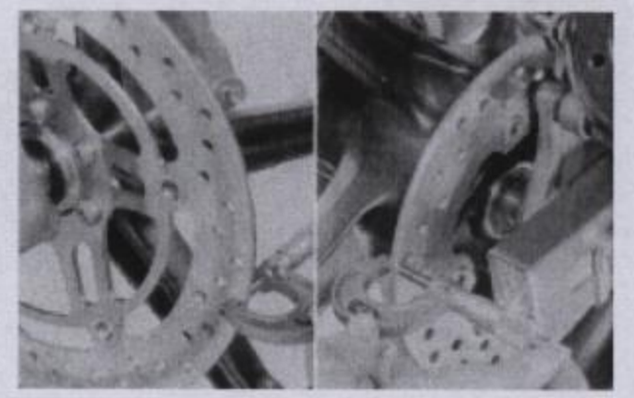
Notes

After replacing the pads, operate the brake pedal to push out the piston.

Brake Disc Inspection

Inspect the disc for cracks/damage.
Measure its thickness.

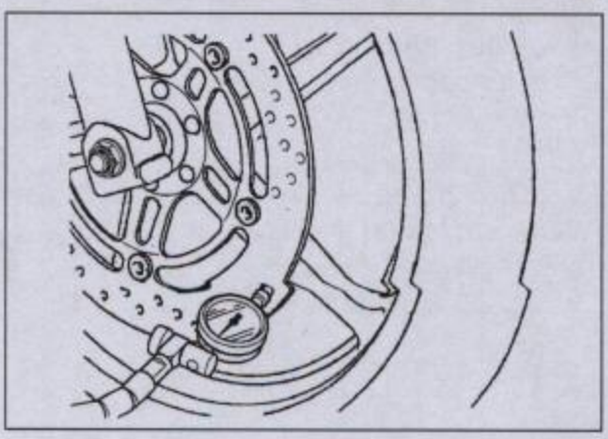
Service Limit: Front: 3.5mm
Rear: 4.0mm



Measure at a few places on friction surface.
If the minimum reading was below the limit, replace the disc.

Measure disc runout.

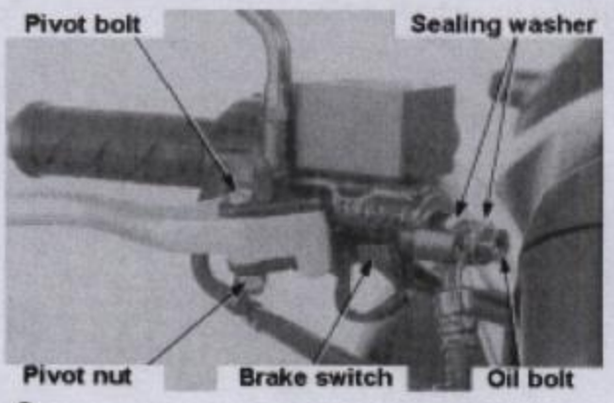
Service Limit: 0.3mm



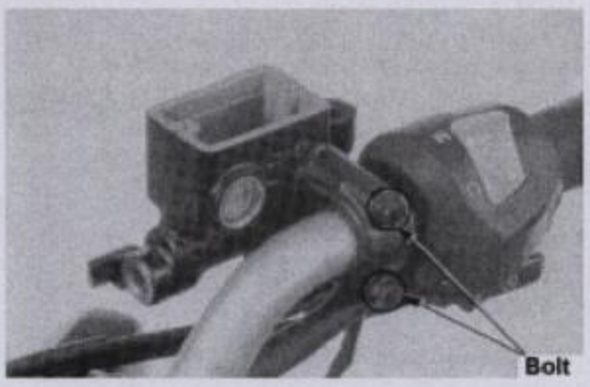
If the measured value is beyond the limit, inspect the wheel bearings.
If the bearings are fine, replace the disc.

Front Master Cylinder

Removal
Drain brake fluid (15-4).
Remove right rearview mirror.
Disconnect a front brake switch.
Unscrew a pivot nut, bolt to remove a brake lever.
Unscrew a brake hose oil bolt and a sealing washer and disconnect a brake hose.



Unscrew two bolts to remove a master cylinder holder and a master cylinder from a handlebar.

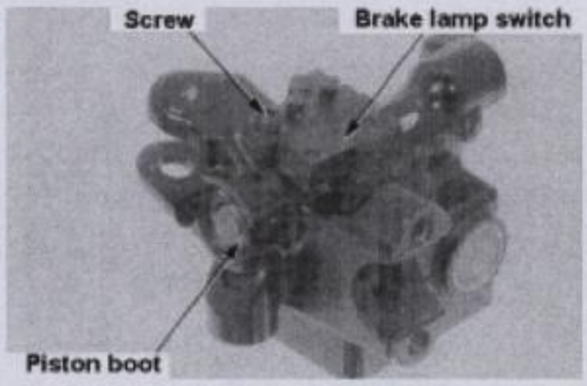


Caution

- Keep the brake fluid away from painted, rubber and plastic surfaces.
- When removing an oil bolt, wrap the brake hose end with a cloth to prevent leak and dust entering the

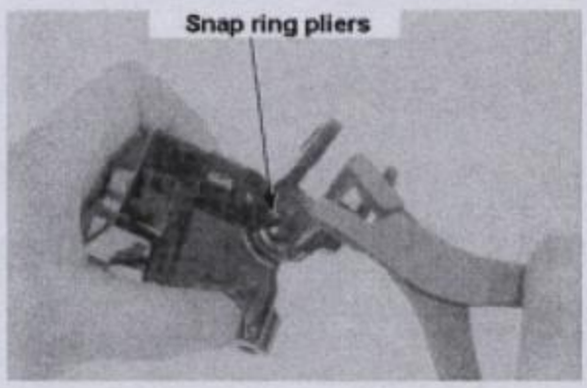
Disassembly

Unscrew to remove a brake lamp switch.
Remove a piston boot.

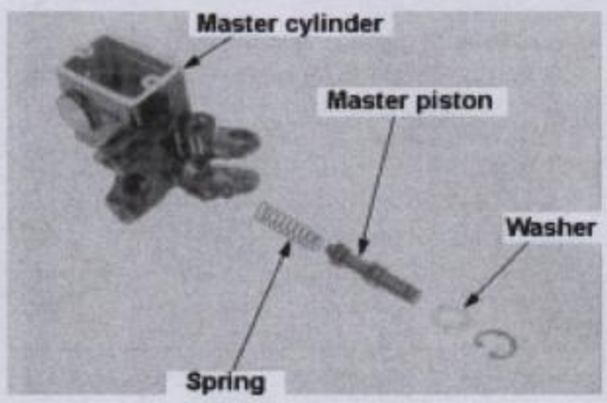


Remove a snap ring.

Special Tools:
Snap ring pliers 07914-3230001



Remove a washer, a master piston and a spring
Clean the master cylinder/piston with brake fluid.

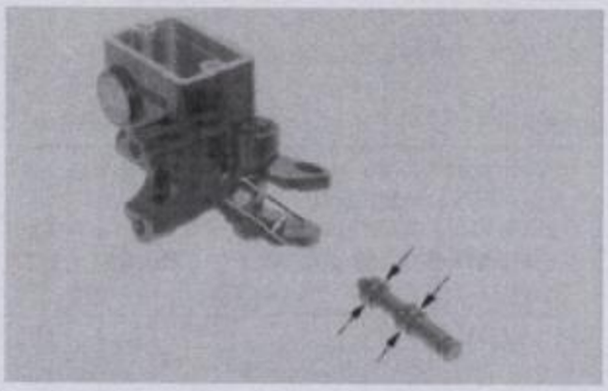


Notes

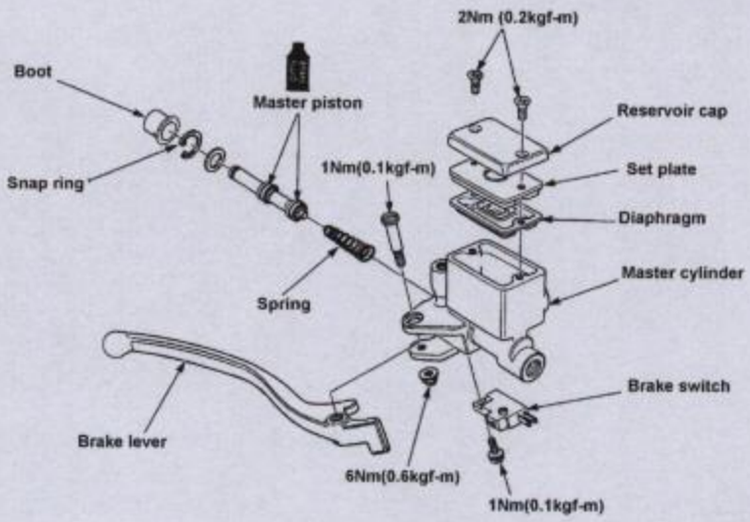
- Clean all removed parts with brake fluid and check air passages with compressed air.
- Sort and store all removed parts.

Inspect a piston cap for ageing / damage.

Inspect a master cylinder/piston for damage and step wear.
Measure the master cylinder bore.
Service Limit: 11.06mm
Measure the piston diameter.
Service Limit: 10.88mm

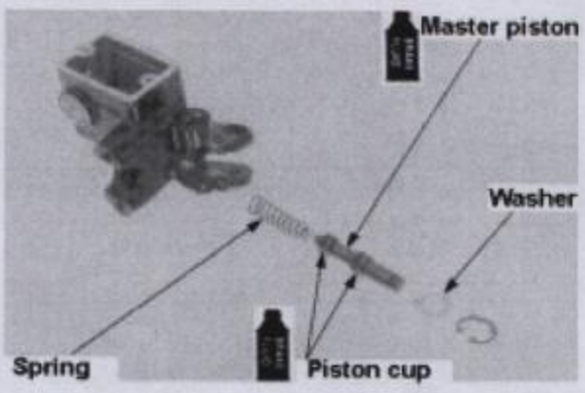


Assembly



Notes

- Replace the master piston, spring, cap and snap ring at the same time when disassembled.
- Replace the boot if there is any ageing / damage.
- Check all parts are free from dust before installing.



Apply brake fluid to the piston and the piston cap.
Install a piston spring to the master piston.
Install master piston/spring and a washer to the master cylinder.

Notes

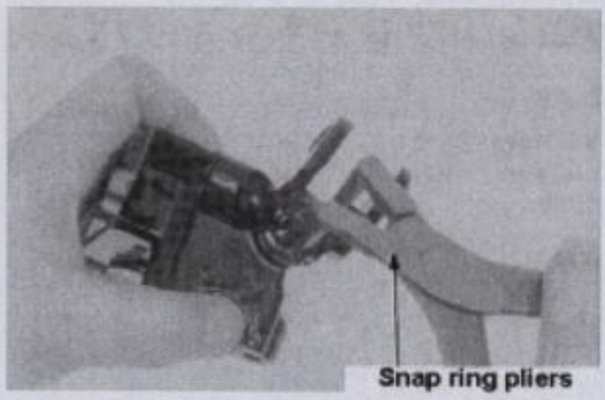
Do not peel the piston cap lip.

Set a snap ring to the groove on the master cylinder.

Special Tool:
Snap ring pliers 07914-3230001

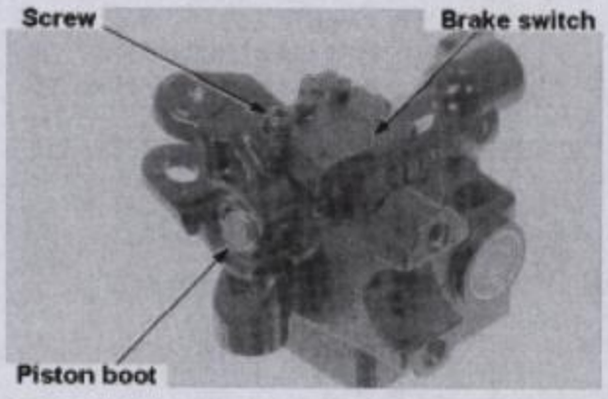
Notes

Face the round-edged side of the snap ring towards the inside and firmly set it to the groove.

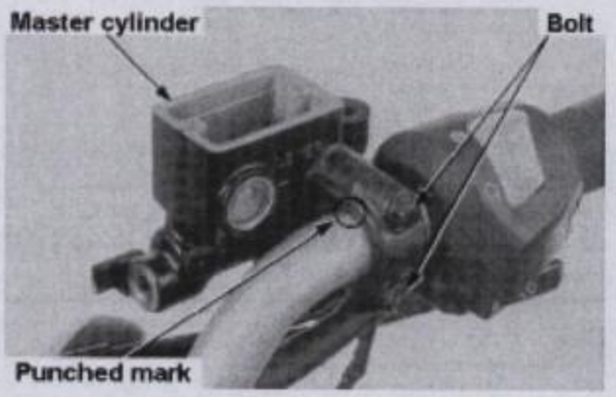


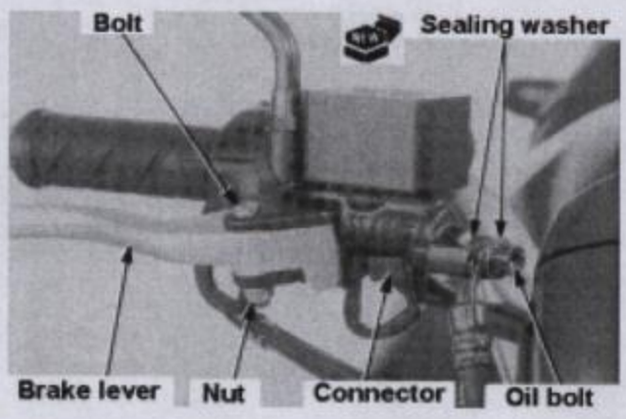
Set the boot to the grooves on the master cylinder/piston.
Apply silicone grease to the master piston where brake lever contacts.
Set the front brake switch projection to the master cylinder hole to install the switch.
Secure the switch screw.

Torque: 1Nm (0.1kgf-m)



Installation
Face the "UP" mark on the master cylinder holder upwards and install the master cylinder and its holder to a handlebar.
Align the master cylinder end with a punched mark on the handlebar.
Secure top bolt first.
Torque: 12Nm (1.2kgf-m)
Push brake hose to the master cylinder stopper and connect the hose with an oil bolt and a new sealing washer.
Secure the oil bolt.
Torque: 34Nm (3.5kgf-m)
Apply silicone grease to the brake lever pivot.
Install the brake lever and secure the pivot bolt.
Torque: 1Nm (0.1kgf-m)
Secure the pivot nut.
Torque: 6Nm (0.6kgf-m)
Connect a brake switch connector.
Fill brake fluid and bleed air (15-5).





Front Brake Caliper

Removal

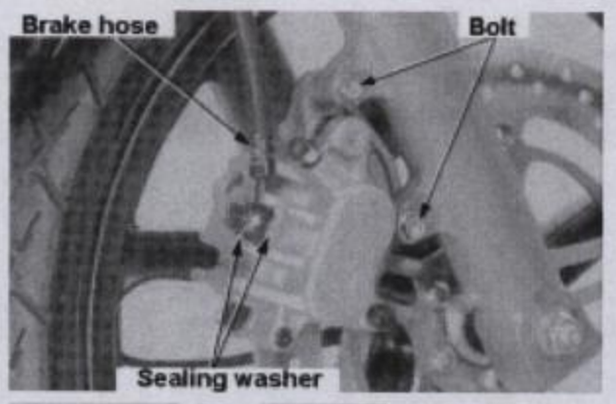
Drain brake fluid (15-4).
Remove brake pads (15-6).
Unscrew brake caliper mount bolts.
Unscrew an oil bolt and sealing washer to disconnect a brake hose.

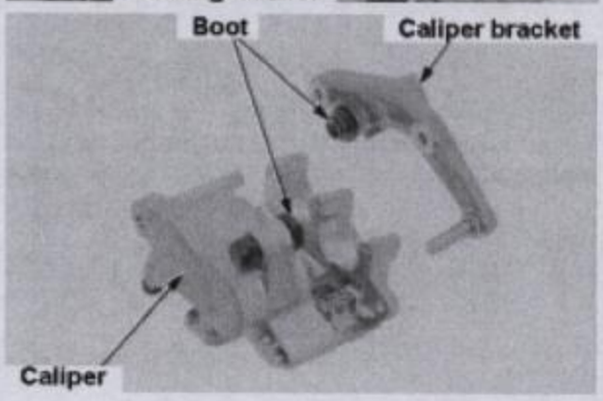
Caution

- Keep brake fluid away from painted, plastic or rubber surfaces.
- When removing an oil bolt, wrap the brake hose end with a cloth to prevent leak and dust entering the hose.

Remove the following parts:
- Caliper bracket
- Pad spring
- Bracket pin boot

Insert a wood piece between pistons.
Gently apply low-compressed air from the brake hose attachment to push the piston out of the caliper.



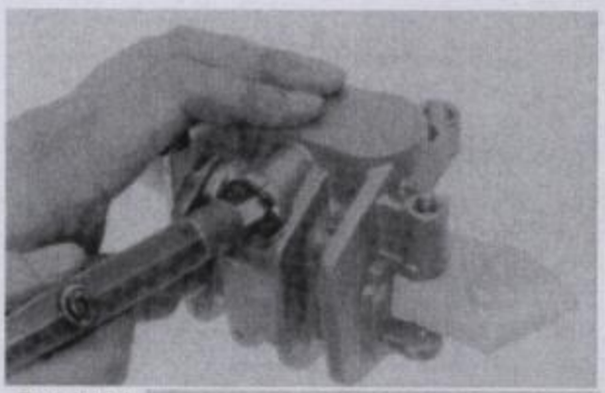


Warning

Do not use high-compressed air or bring a nozzle too close. Do not place your hand under the piston. The piston might pop out.

Notes

Mark the piston so that it can be installed to the original position.

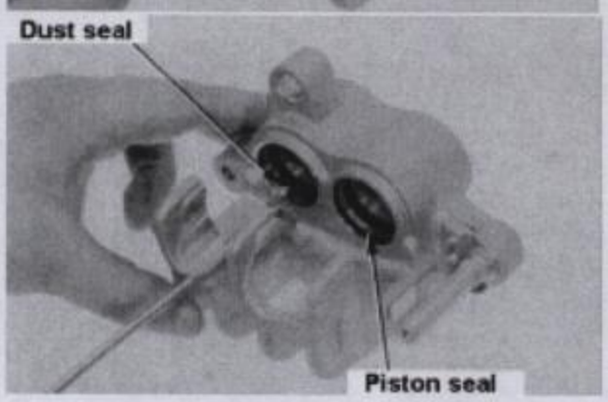


Remove a piston seal and adjust seal by pushing them in.

Caution

Do not damage the interior surface of the caliper cylinder.

Clean the interior surface of the caliper, the seal grooves and the piston with clean brake fluid.



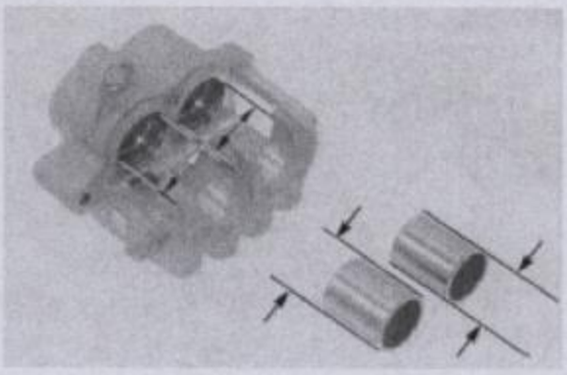
Inspection

Inspect a caliper cylinder for damage, scratch and step wear. Measure it's bore.

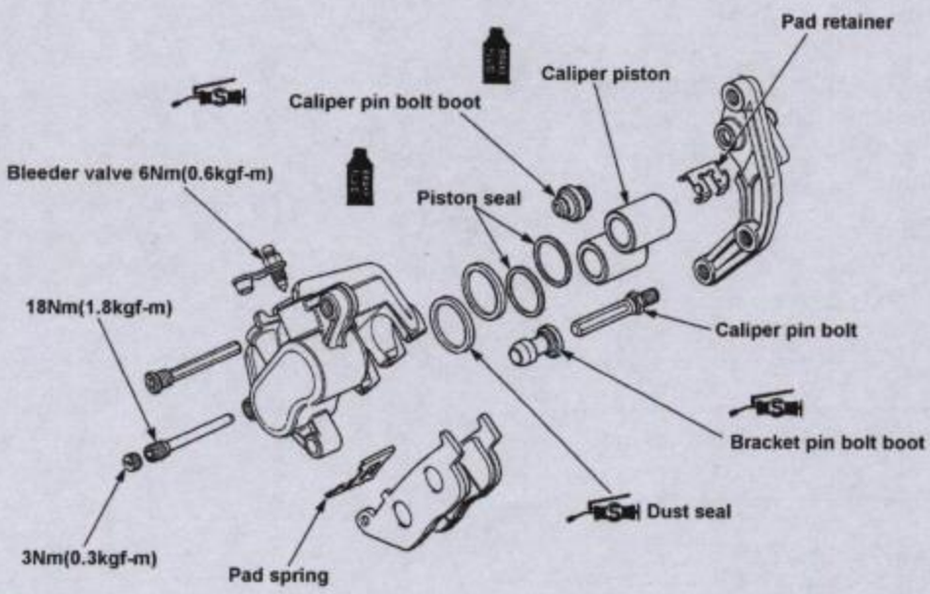
Service Limit: 27.06mm

Inspect a caliper piston for damage, scratch and step wear. Measure it's diameter.

Service Limit: 26.91mm



Assembly

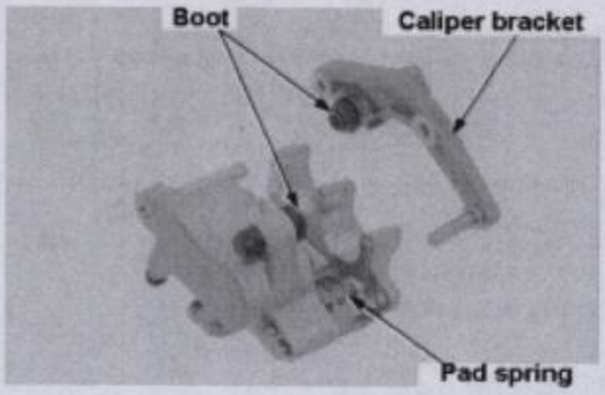


Notes

- Do not re-use drained brake fluid.
- Replace piston seal / dust seal with new ones.
- Make sure all parts are clean prior to installing.

Apply brake fluid to piston seals and install them to caliper cylinder seal grooves.
Apply silicone grease to a dust seal and install it to the caliper cylinder seal groove.
Apply brake fluid to the caliper piston.
Face the open end of the piston towards pads to install it to the caliper cylinder.

Install the following parts:
- Caliper bracket
- Pad spring
- Bracket pin boot

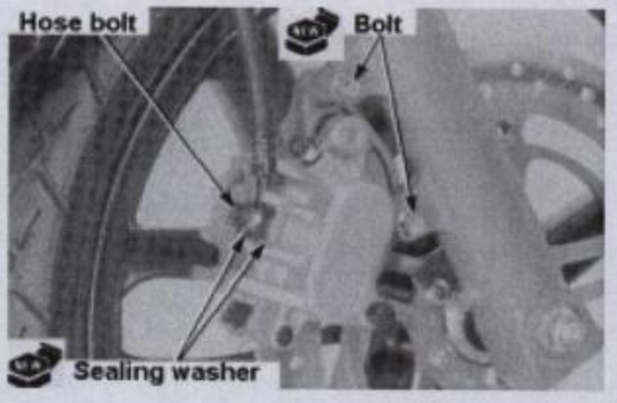


Installation

Install a brake caliper.
Secure a new caliper mount bolt.

Torque: 30Nm (3.1kgf-m)

Connect a brake hose to the caliper with a new sealing washer and secure the hose bolt.
Torque: 34Nm (3.5kgf-m)



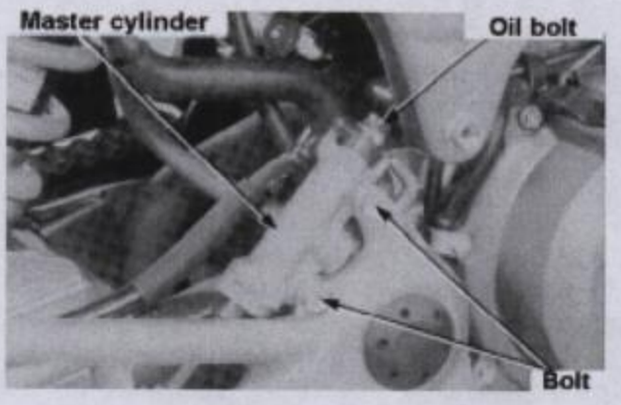
Caution
Do not twist the brake hose.

Notes
Press the hose to the caliper body stopper.

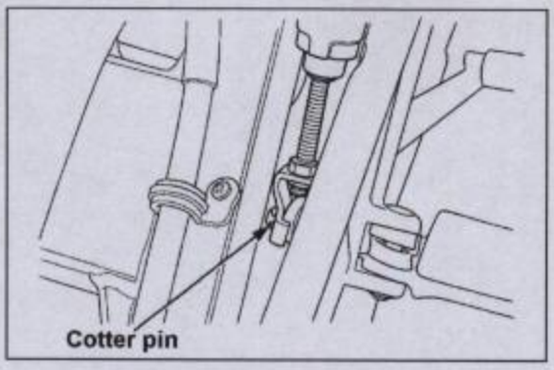
Install brake pads (15-6).
Fill brake fluid and bleed air (15-5).

Rear Master Cylinder

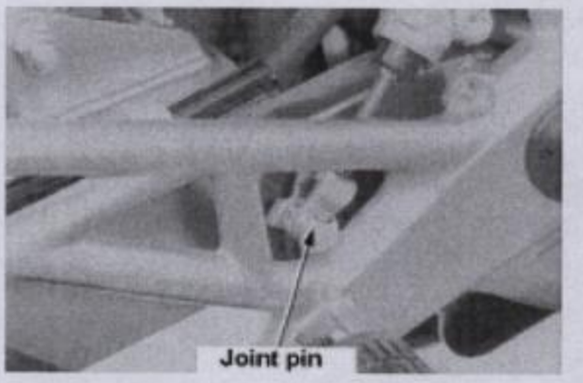
Removal
Drain brake fluid (15-4).
Loosen a brake hose oil bolt.
Unscrew two master cylinder mount bolts.



Remove a cotter pin.



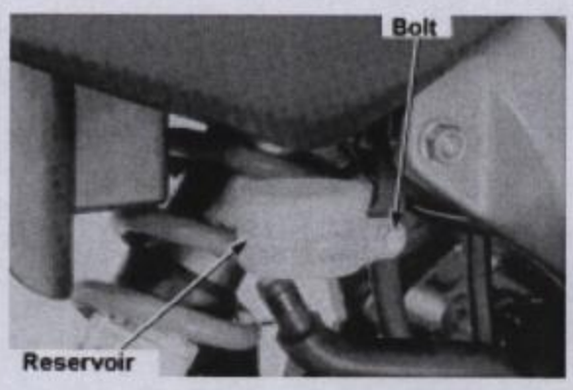
Push down the brake pedal.
Remove a joint pin and remove a push rod from a brake pedal arm.



Unscrew a bolt to remove a reservoir.
Unscrew a brake hose oil bolt to remove a brake hose and a sealing washer.

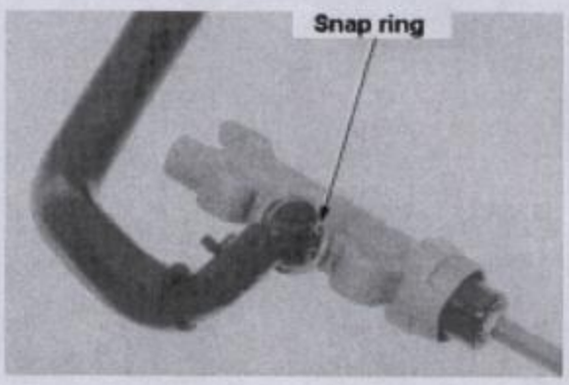
Caution

- Keep brake fluid away from painted, plastic and rubber surfaces.
- When removing an oil bolt, wrap the brake hose end with a clean cloth to prevent leak and dust entering the hose.

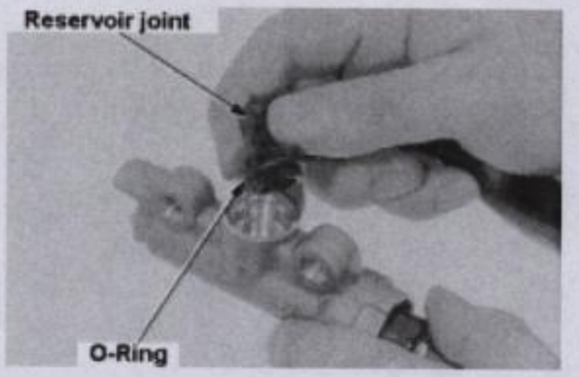


Remove a rear master cylinder.

Disassembly
Remove a snap ring.

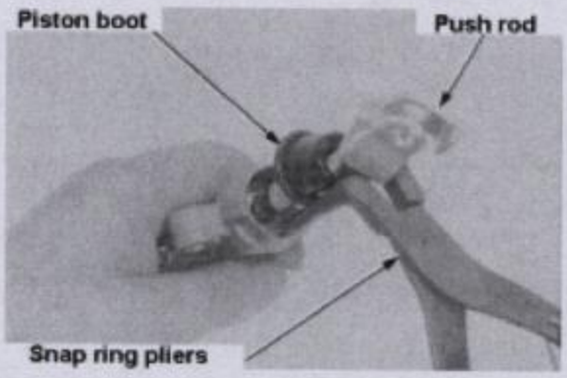


Remove a reservoir joint and an O-Ring from the master cylinder.



Remove a piston boot from the master cylinder and a push rod.
Remove a snap ring to remove the push rod.

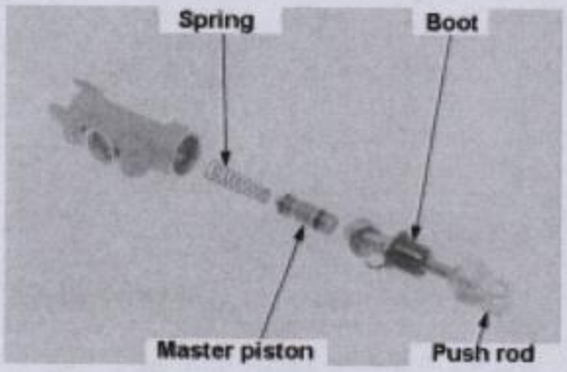
Special Tool:
Snap ring pliers 07914-3230001



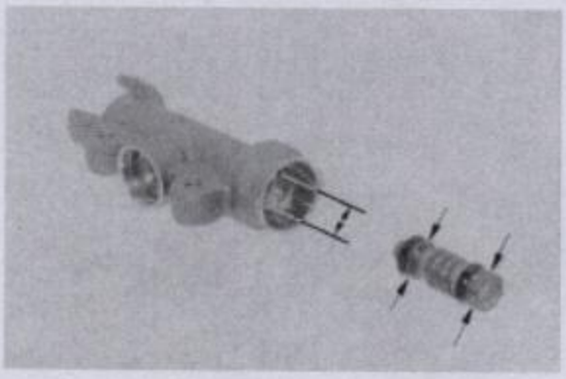
Remove a master piston and a spring.
Clean the master cylinder/piston with brake fluid.

Notes

- Clean all removed parts with brake fluid and check air passage with compressed air.
- Sort and store all removed parts.



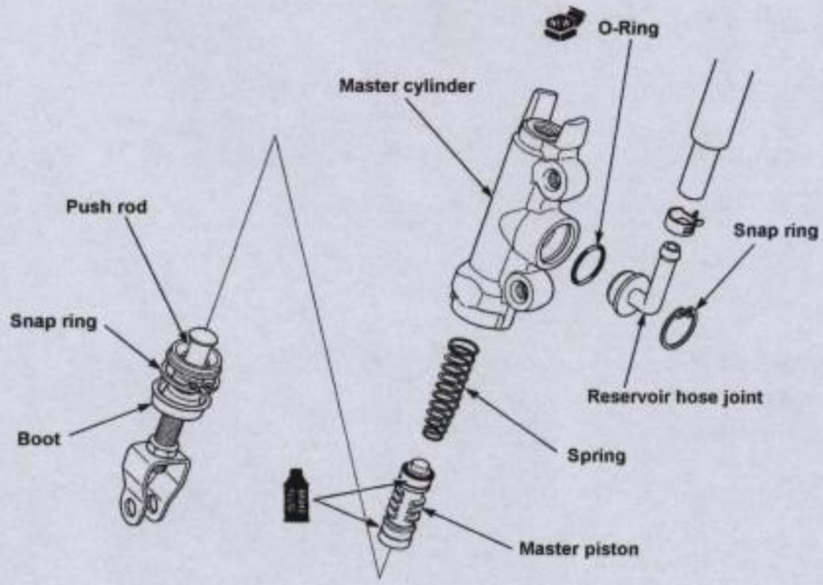
Inspection
Inspect a piston cap for ageing/damage.
Inspect the master cylinder/piston for damage/step wear.



Measure the master cylinder bore.
Service Limit: 12.755mm

Measure the piston diameter.
Service Limit: 12.645mm

Assembly

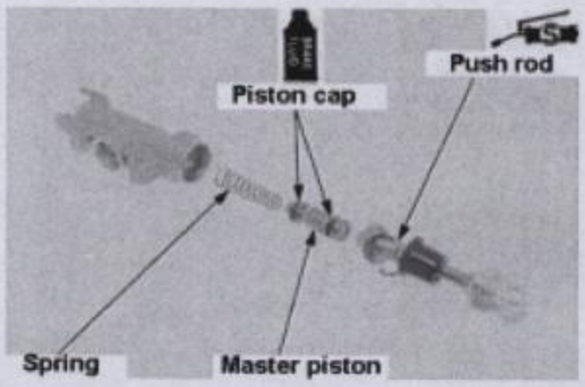


Apply brake fluid to the piston and the piston cap.
Install a piston spring to a master piston.
Install the master piston/spring to the master cylinder.

Notes

Do not peel the piston cap lip.

Apply silicone grease to the push rod piston contact area. Install the push rod to the master cylinder and set a snap ring to the groove on the master cylinder.

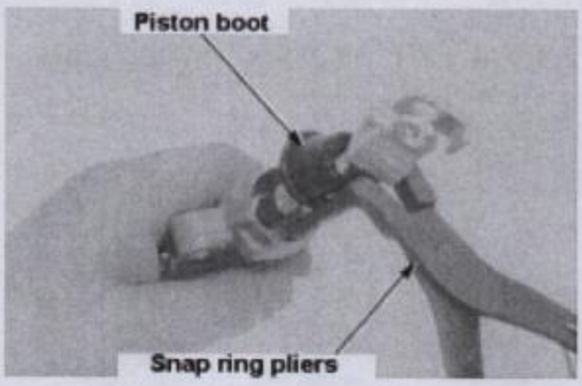


Special Tool:
Snap ring pliers 07914-3230001

Notes

Install the snap ring to the groove, facing it's round-cornered side towards the inside.

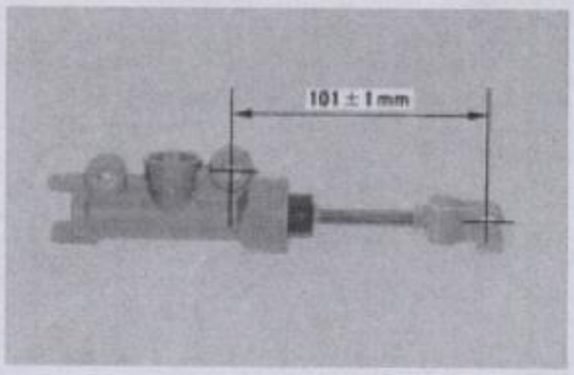
Apply silicone grease to the push rod boot groove.
Install the piston boot to the grooves on the master cylinder and the push rod.



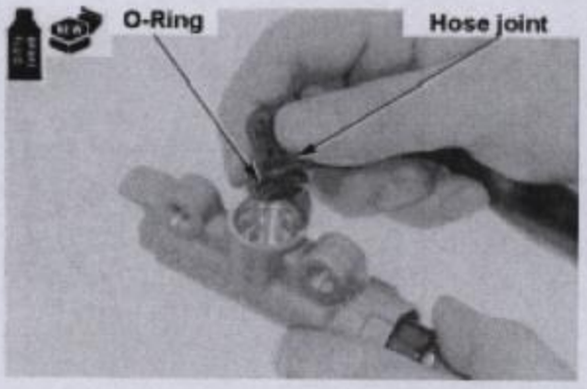
If the push rod joint has been removed, adjust the distance from the joint pin hole to the lower mount bolt hole to 101±1mm.

Secure the lock nut after adjusting.

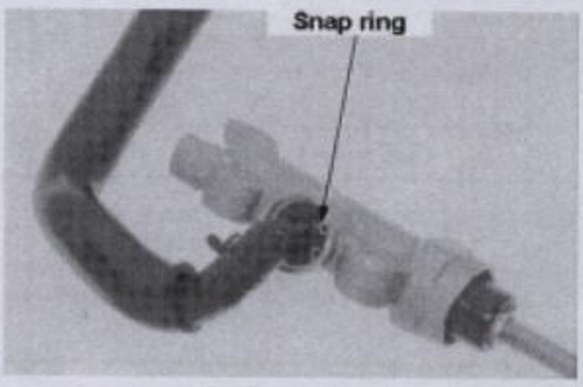
Torque: 17Nm (1.7kgf-m)



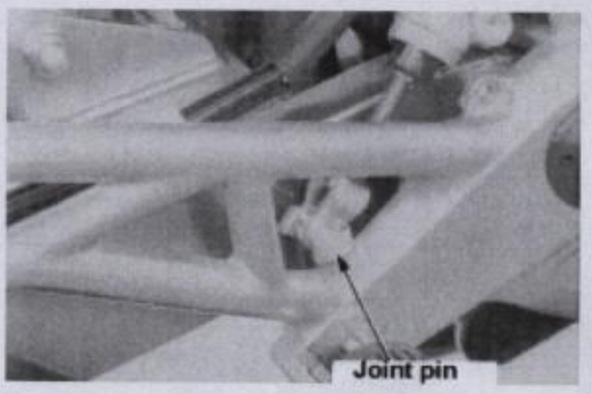
Apply brake fluid to a new O-Ring and install it to a reservoir hose joint.



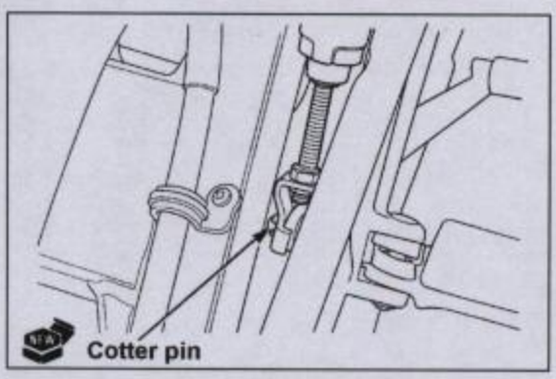
Install a snap ring.



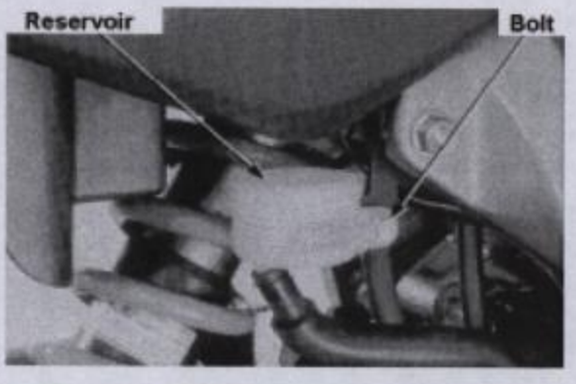
Installation
Connect a push rod to a brake arm and install a joint pin.



Install a new cotter pin.



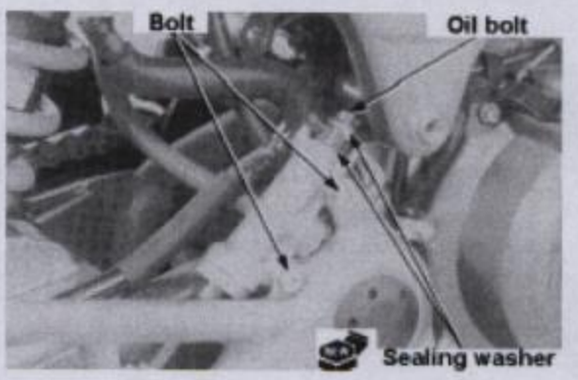
Install a reservoir and secure a bolt.



Connect a brake hose to the master cylinder.
Install new sealing washers and temporarily secure hose bolts.
Secure a master cylinder mount bolt.
Torque: 12Nm (1.2kgf-m)
Secure a brake hose oil bolt.
Torque: 34Nm (3.5kgf-m)

Notes

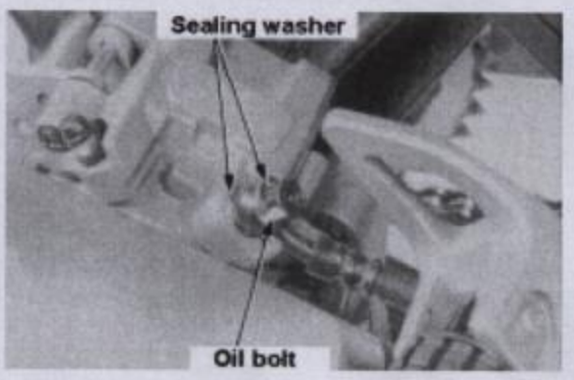
Push the brake hose to the master cylinder body stopper.



Fill brake fluid and bleed air (15-5).

Rear Brake Caliper

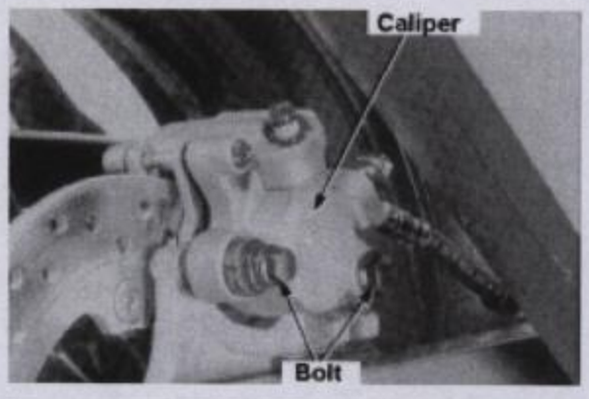
Removal
Drain brake fluid (15-4).
Remove a brake pad (15-7).
Remove a brake hose oil bolt and sealing washers to disconnect the brake hose.



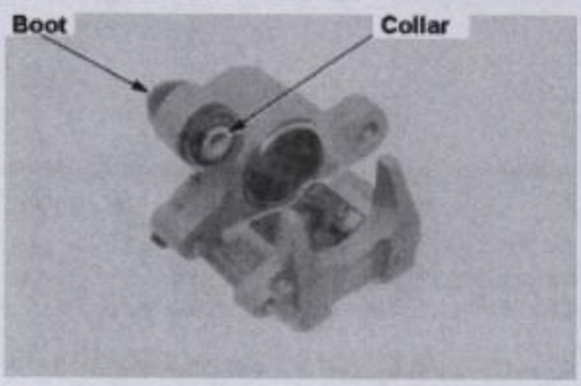
Caution

- Keep brake fluid away from painted, plastic, or rubber surfaces.
- When removing an oil bolt wrap the brake hose end with a clean cloth to prevent leakage and dust entering the hose.

Unscrew two bolts and remove a caliper from a caliper bracket.



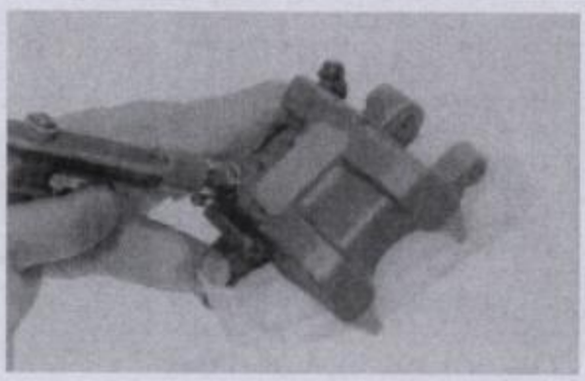
Remove a pad spring, a collar and a boot.



Wrap the caliper with a cloth to prevent the piston and brake fluid coming out suddenly. Slowly apply low compressed air from the brake hose attachment to push out the piston from the caliper.

Warning

Do not use high pressure air or bring the nozzle too close. Do not place your hand under the piston. The piston might pop out.

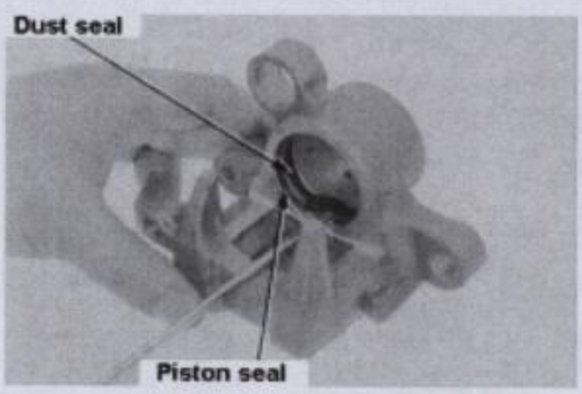


Remove a piston seal and a dust seal by pushing them in.

Caution

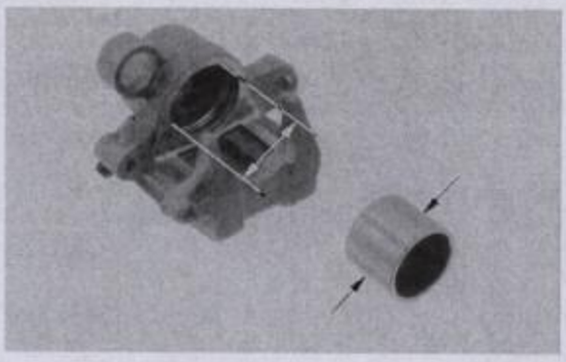
Do not damage the interior surface of the caliper cylinder.

Clean the interior surface, seal grooves and a piston with brake fluid.

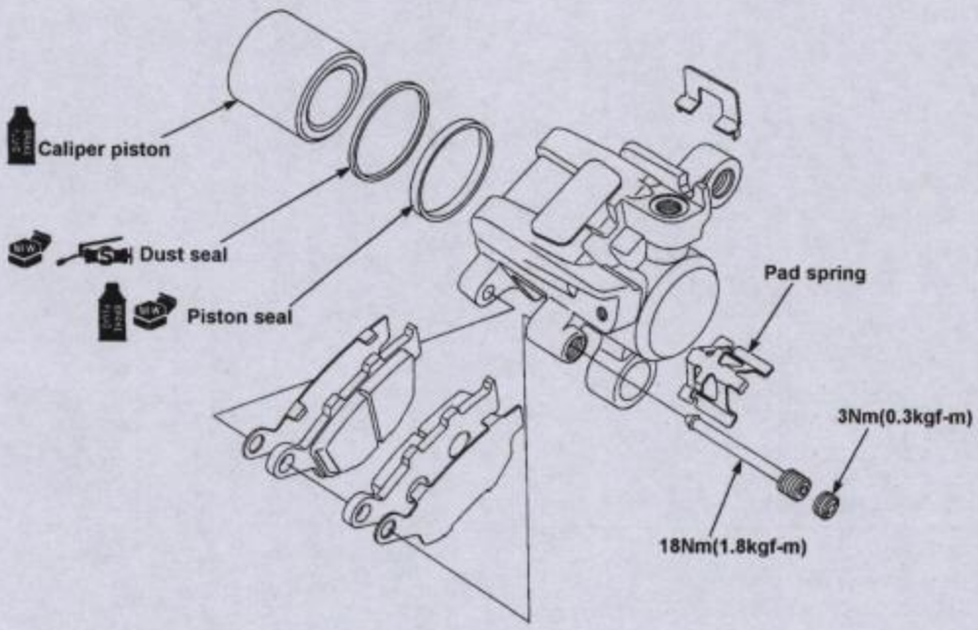


Inspection

Inspect the caliper cylinder for scratch and step wear.
Measure it's bore.
Service Limit: 38.24mm
Inspect the caliper piston for scratch and step wear.
Measure it's bore.
Service Limit: 38.09mm

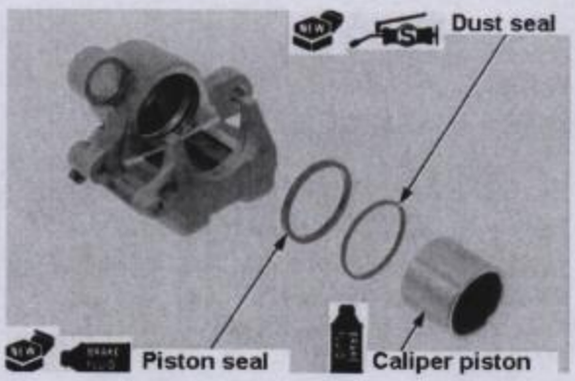


Assembly



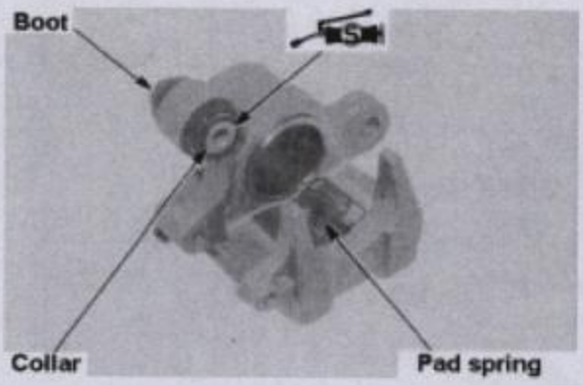
Notes

- Do not re-use drained brake fluid.
- Replace a piston seal and a dust seal with new ones.
- Make sure all parts are free from dirt and dust prior to assemble.



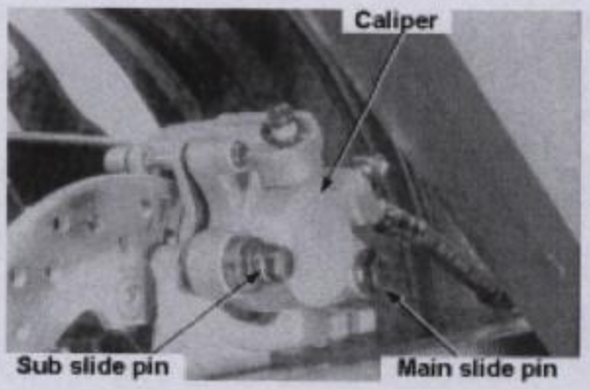
Apply brake fluid to a piston seal and install it to the caliper cylinder seal groove.
Apply silicone grease to a dust seal and install it to the caliper cylinder seal groove.
Apply brake fluid to a caliper piston and install the caliper cylinder by facing the open end of the piston towards the pad.

Install pad spring to the caliper body.
Apply silicone grease to the bracket pin boot and install the boot and a collar to the caliper body.



Install the caliper pin boot to the caliper bracket.
Install a caliper to the bracket.
Apply silicone grease to a caliper pin bolt and secure it.

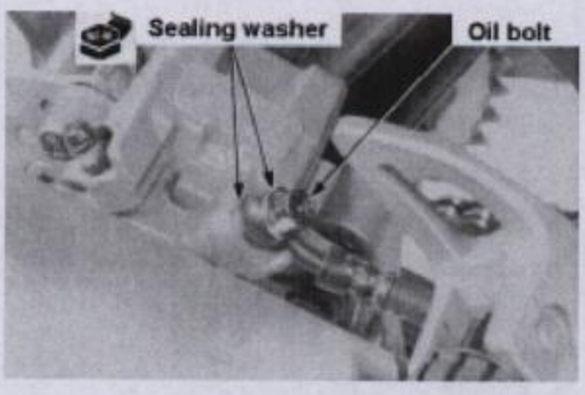
Torque:
Main slide pin: 28Nm (2.9kgf-m)
Sub slide pin: 22Nm (2.2kgf-m)
Install brake pads (15-7).



Connect brake hose to the caliper with a brake hose bolt and new sealing washers.
Secure the bolt.
Torque: 34Nm (3.5kgf-m)

Caution
Do not twist the brake hose.

Notes
Press the brake hose to the caliper body stopper.

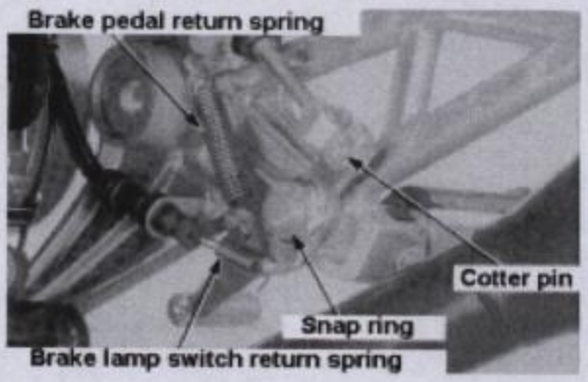


Fill the brake fluid and bleed air (15-5).

Brake Pedal

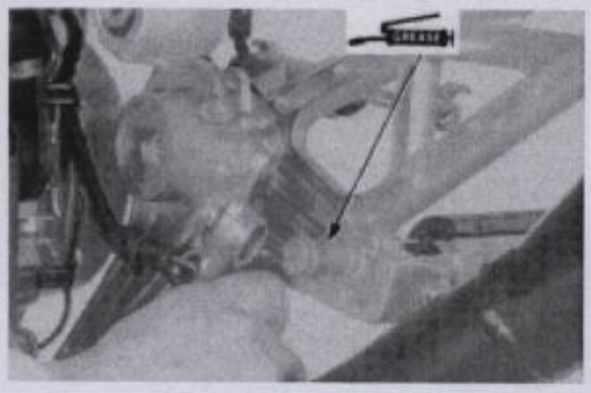
Removal

Remove a right step arm (14-14).
Unscrew two bolts to remove a rear master cylinder.
Remove a cotter pin and a joint pin to remove a push rod from the brake pedal.
Remove a brake lamp switch return spring, a brake pedal return spring.
Remove a snap ring and a washer.
Remove the pedal.



Installation

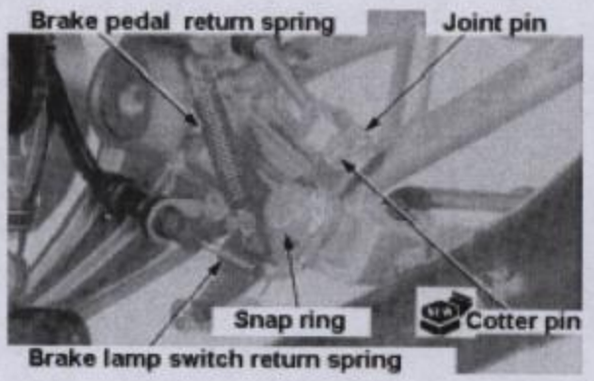
Apply grease to the friction area of the brake pedal and install it.

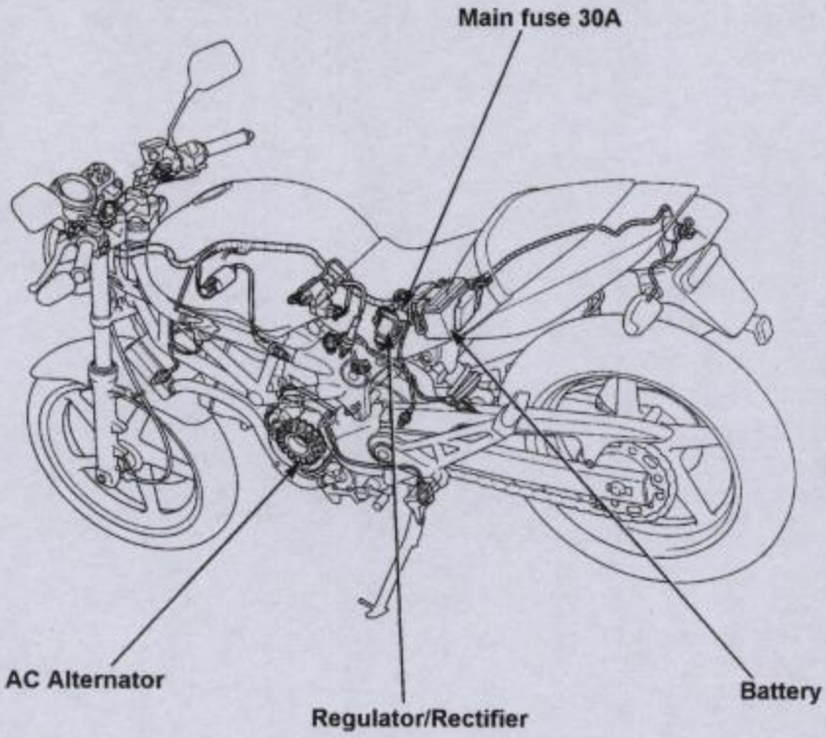


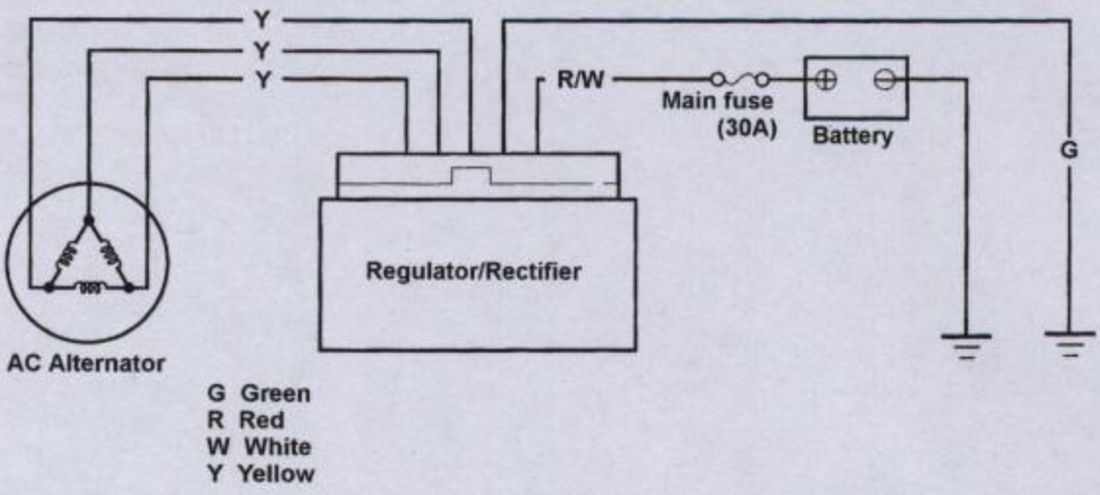
Install a washer and a snap ring.
Install a brake lamp switch return spring and a brake pedal return spring.
Install a push rod to a brake pedal arm.
Set a joint pin and install a new cotter pin.
Install a rear master cylinder and secure two bolts.

Torque: 12Nm (1.2kgf-m)

Install a right step (14-18).




Main fuse 30A
AC Alternator
Regulator/Rectifier
Battery


Y
Y
Y
R/W
Main fuse
(30A)
Battery
G
Regulator/Rectifier
AC Alternator
G Green
R Red
W White
Y Yellow

Service Information.....	16 – 1	Charging System.....	16 – 6
Troubleshooting.....	16 – 3	Regulator / Rectifier.....	16 – 7
Battery.....	16 – 5	Alternator.....	16 - 8

Service Information

General

Warning

- Although Hydrogen gas will not be generated during normal charging, keep the battery away from flame or spark. It may generate Hydrogen gas if it is overcharged.
- Battery fluid is highly toxic. Direct contact with clothes, skin or eyes may result in a serious burn or loss of vision. In case of contact, flush thoroughly with water, and consult a doctor if the battery fluid gets in your eyes.

Caution

- Connection/disconnection of couplers/terminals while current is existing may cause excess voltage and failure of electrical components. Turn an ignition key OFF prior to starting work.
- The motorcycle is equipped with a maintenance-free (MF) battery. The MF battery requires a different type of charging system and thus it is not compatible with conventional batteries.

Notes

Replace the battery after using for a certain period or if it is losing its performance.

- Turn the ignition switch OFF before disconnecting any electrical components.
- Disconnect the battery (-) cable if the battery is to be stored without removing from the motorcycle.
- Quick charging should be an emergency procedure, as it reduces the battery life.
- The battery performance may be reduced by leaving it flat or repeating full charging / full discharging. Normally, the performance drops after 2 to 3 years in conventional use. The reduced performance battery may recover its voltage with extra charging. However, it cannot sustain the electrical load and flattens easily.
- The battery may appear to be overcharged if there is a short circuit in one of the cells and it deactivates the regulator, resulting in excess charging voltage and consuming electrolyte.
- The new MF battery may not perform properly after filling electrolyte. The extra charging is required in the following cases.
  - Terminal voltage (10min after filling electrolyte) is less than 12.4 volts → normal charging until the voltage reaches 12.8V.
  - Electrolyte temperature below 0°c → charge for 2 to 3 hours @ standard charging current.
- Use the troubleshooting chart (16-3) to inspect the charging system.
- Refer to (16-0) for system location.
- Alternator can be serviced without dismounting it from the frame.

Specification

Item		Standard	Service Limit
Battery	Capacity	12V – 6 AH	-
	Leak current	0.1mA or less	-
	Charging current / time (Rapid)	3.0A / 1h	-
	Charging current / time (Standard)	0.6 A / 5 – 10h	-
Regulator / Rectifier	Type	Tri-phase AC regulator SCR type	-
	Regulated voltage	14 – 16V / 5,000rpm	-
Alternator	Type	Tri-phase AC	-
	Output	0.32kW / 5,000rpm	-
	Charging coil resistance	0.1 – 1.0 Ω	-

Torque Settings

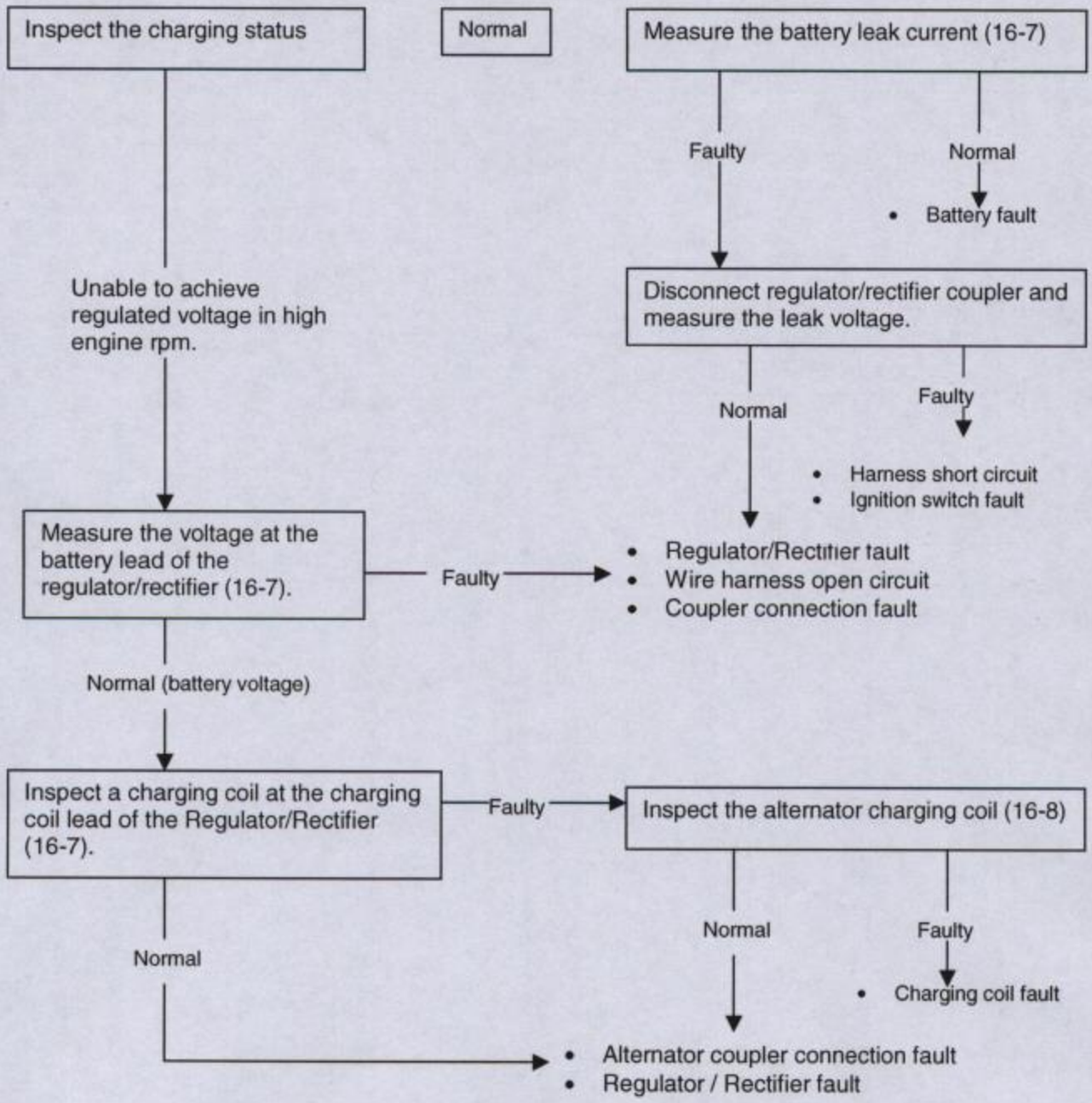
Flywheel	83Nm (8.5kgf-m) apply oil to the thread and the seat
6mm SH flange bolt	10Nm (1.0kgf-m)

Special Tools

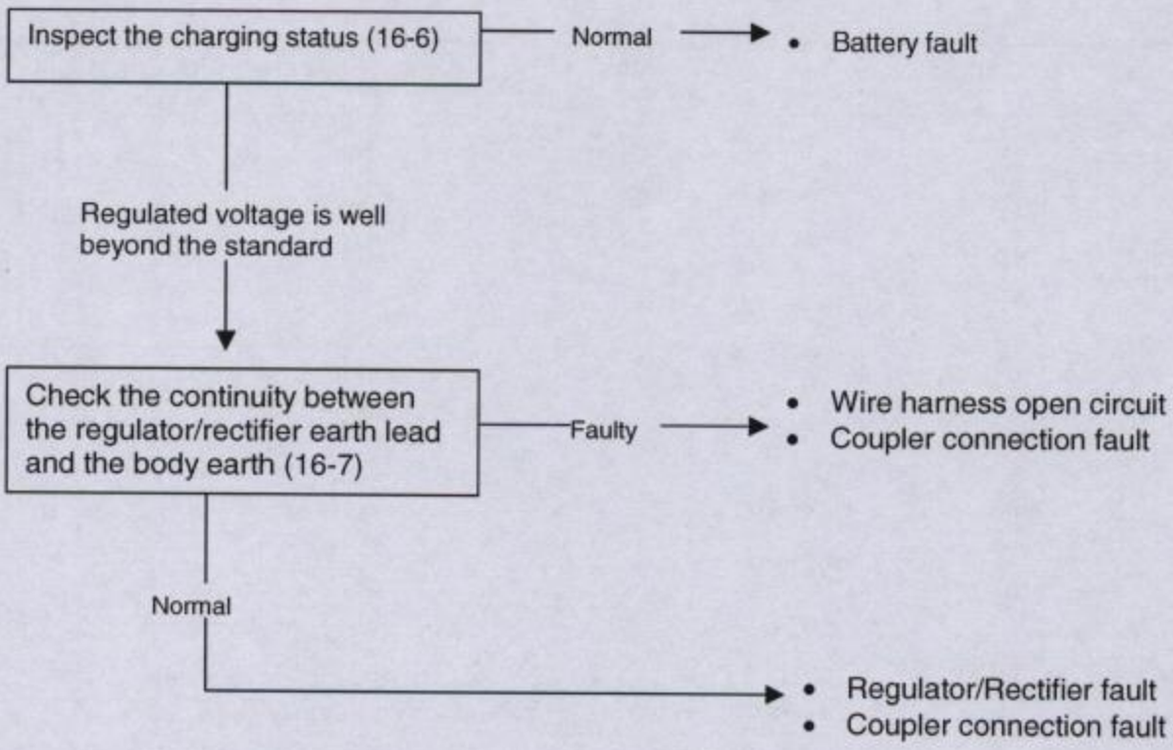
Rotor puller	07733-0020001
Universal holder	07725-0030000

Troubleshooting

Insufficient charging (unable to achieve regulated voltage).



Battery overcharging (Regulated voltage is well beyond the standard)



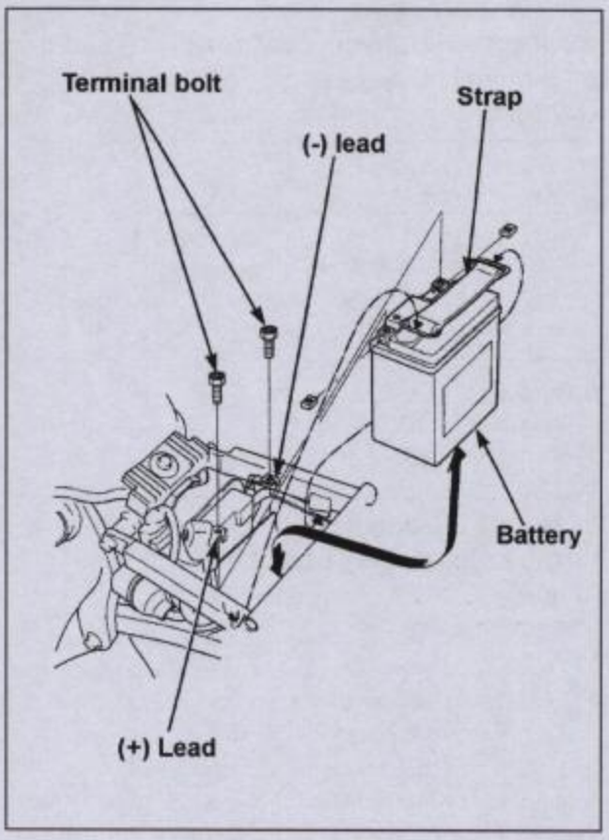
Battery

Removal

Notes

Turn the ignition switch OFF before starting work.

Remove a seat (2-2).
Unscrew a terminal bolt to disconnect battery (-) lead.
Unscrew a terminal bolt to disconnect battery (+) lead.
Remove a strap to pull out the battery.
Remove the battery.



Installation

Reverse the above procedure to install the battery.

Notes

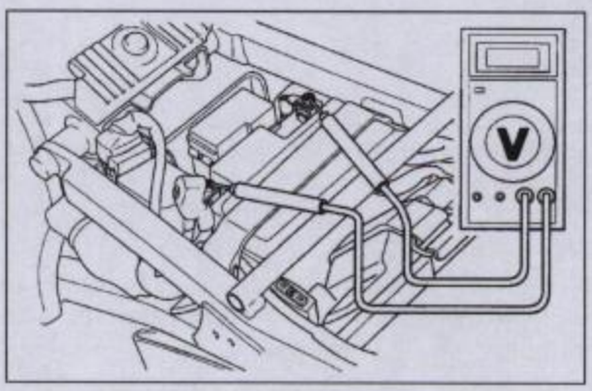
Apply grease to terminals after installation.

Inspection

Measure terminal voltage to check charging status.

Fully charged:	12.8V or above
Under charged:	12.3V or less

If it is undercharged, conduct a supplemental charging.



Notes

Measure the voltage at least 30min after charging. The terminal voltage tends to fluctuate immediately after charging.

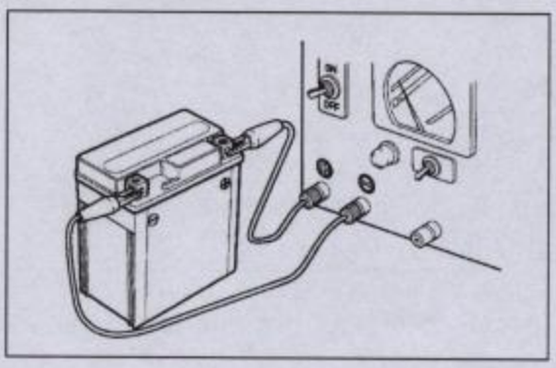
Battery Charging

Warning

Keep the battery away from flame or spark. It may generate Hydrogen gas when overcharged.

Refer to the charging current/time labeled on the battery to charge it.
Remove the battery from the frame.

Connect (+) lead from the battery charger to the (+) terminal of the battery.
Connect (-) lead from the battery charger to the (-) terminal of the battery.
Charging current time:Standard: 0.6A/5~10hrs
Rapid: 3.0A/1hr



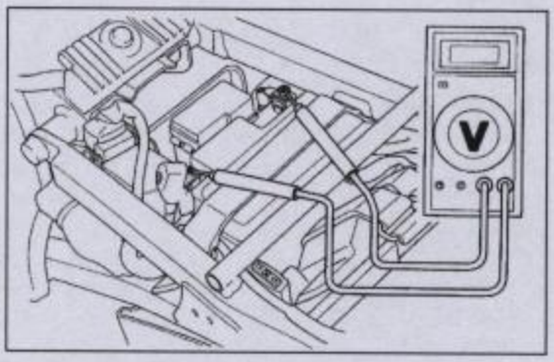
Warning

- Keep the battery fluid temp below 45°c. Reduce current if necessary to cool down.
- Rapid charging is for emergency use only. Avoid rapid charging as it reduces battery life.

Charging System

Charging status check

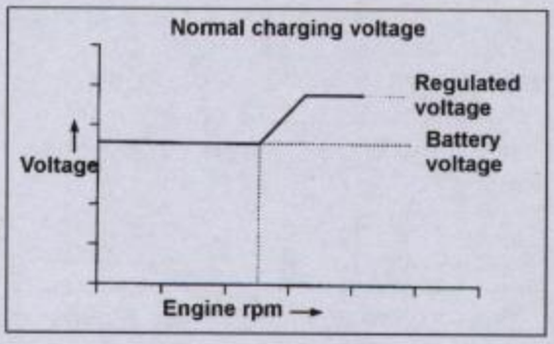
Remove a battery and install a fully charged battery.
Warm up the engine and connect a voltmeter between the battery terminals.



Notes

- Do not short circuit while measuring.
- Connection/disconnection of battery terminals should be done with the ignition OFF.
- Use fully-charged battery.

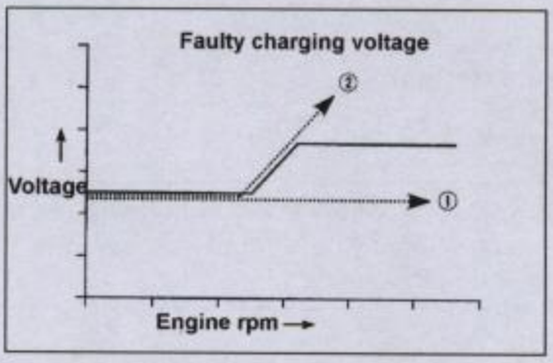
Start the engine and select High beam headlamp.
Gradually increase rpm. Measure the battery terminal voltage at 5,000rpm.
Regulated Voltage: 14.0~16.0V/5,000rpm
The measured voltage should be in the above range.



Notes

The voltage starts to increase at different rpm, depending on electrical load and alternator temperature.

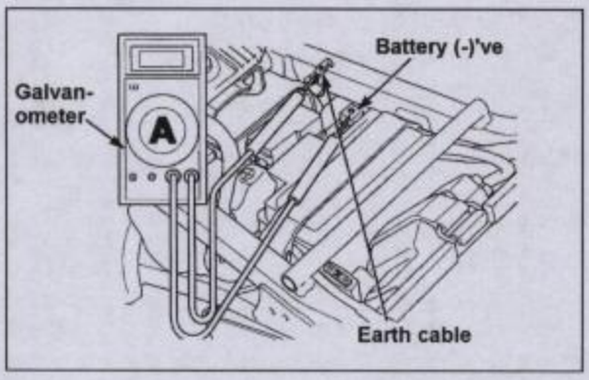
If the battery gets flat easily while the charging status is fine, it can be considered that the battery life has expired. Refer to the troubleshooting if the following symptoms were experienced.



1. Unable to achieve regulated voltage (16-3).
   - Open circuit or loose coupler connection in charging system.
   - Open/short circuit of alternator
   - Regulator/Rectifier fault
2. Regulated voltage well exceeds the standard range (16-4).
   - Battery fault
   - Regulator/Rectifier fault or Regulator/Rectifier earth fault

Leak Test

Turn the ignition switch OFF and disconnect (-) lead from the battery terminal.
Connect a galvanometer between the battery (-) terminal and the (-) lead.
Measure the leaking current with the ignition switch OFF.



Caution

- Select the maximum range on the galvanometer, then step down the range as required.
- Do not turn ON the ignition switch while measuring.

Leak current: 0.1mA or less

If the measured value is beyond the limit, the circuit is suspected to have a short-circuit. Disconnect couplers and connectors one by one to find out the defect.

Regulator / Rectifier

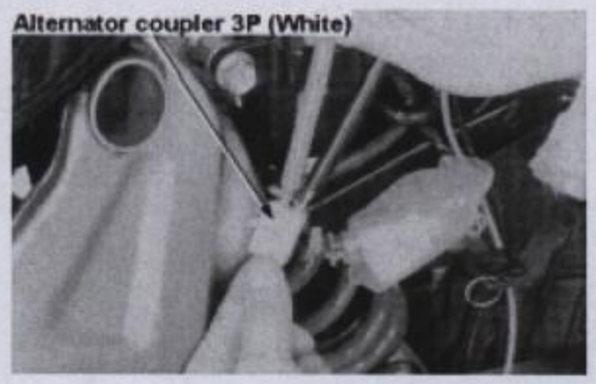
System Check

Disconnect the regulator/rectifier.
Inspect the coupler for loose connection, rust or deformation.
Measure the following items.

Item	Inspection
Battery lead (Red/White)	Battery voltage between Red/White (+) and Green (-)
Earth lead (Green)	Continuity between Green and body earth
Charging coil (Yellow)	Resistance between Yellow leads) 0.1 ~ 1.0Ω (20°c)

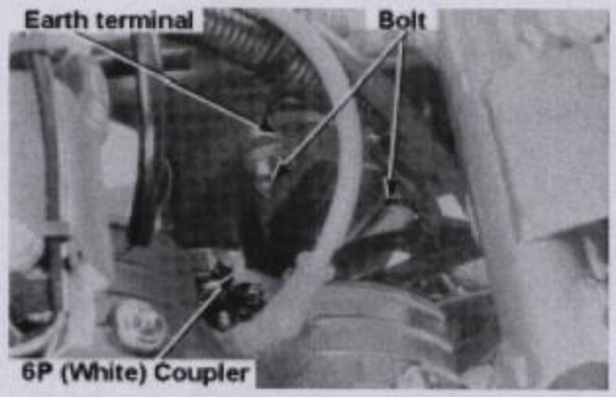
If the charging coil leads are faulty, inspect them at the alternator coupler 3P (White).


Regulator / Rectifier


Alternator coupler 3P (White)

Removal

Remove a fuel tank (2-3).
Disconnect a 6P (White) coupler.
Unscrew two bolts and disconnect an earth terminal.



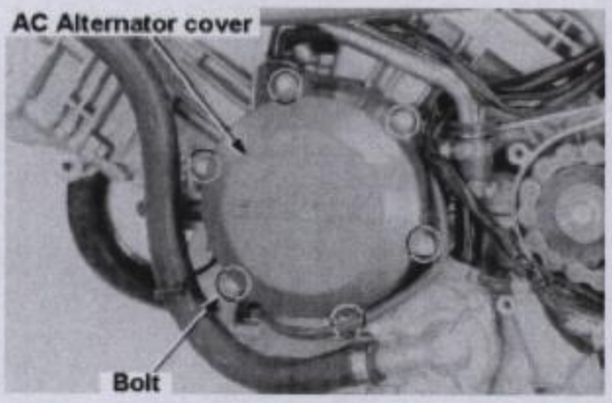
Installation

Reverse the above procedure for installation.

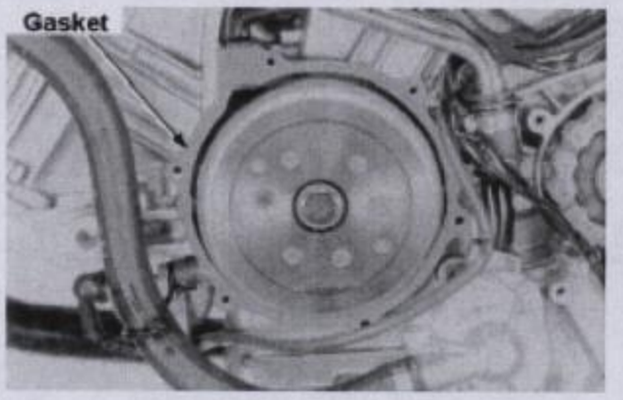
Alternator

Alternator cover removal

Remove a seat (2-2).
Remove a left rear crankcase cover (7-4).
Unscrew six bolts to remove an alternator cover.



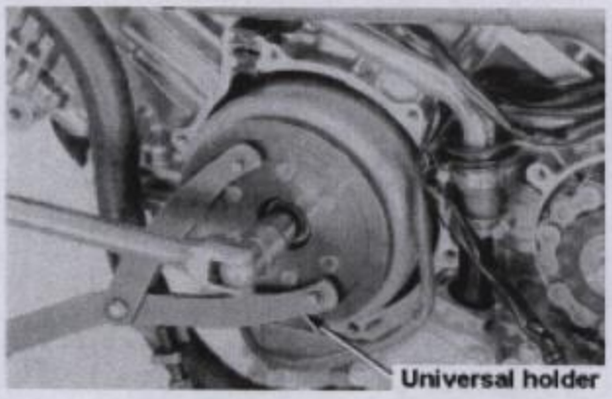
Remove a gasket.



Flywheel removal

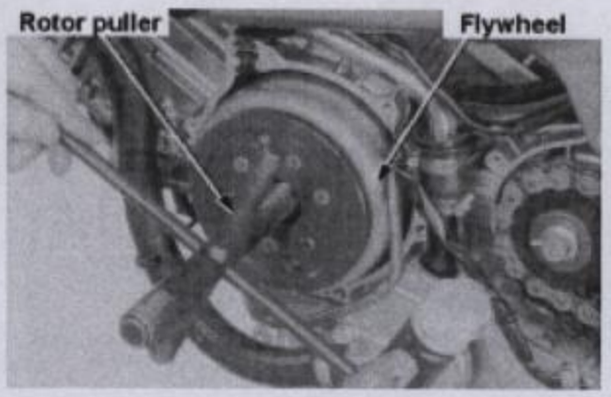
Fix the flywheel with a universal holder and unscrew a bolt.

Special Tool:
Universal Holder 07725-0030000



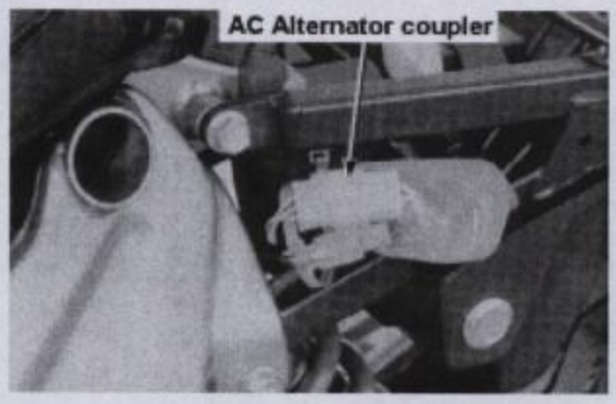
Use a rotor puller to remove a flywheel.

Special Tool:
Rotor puller 07733-0020001

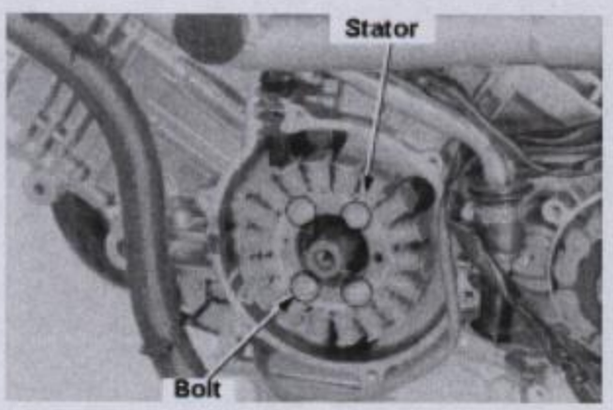


Stator Removal

Disconnect an alternator coupler



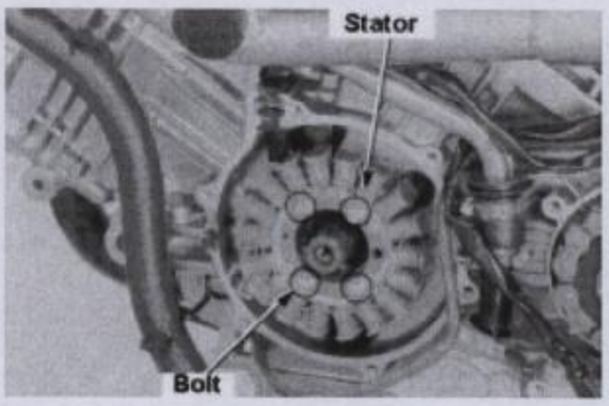
Unscrew four bolts to remove a stator.



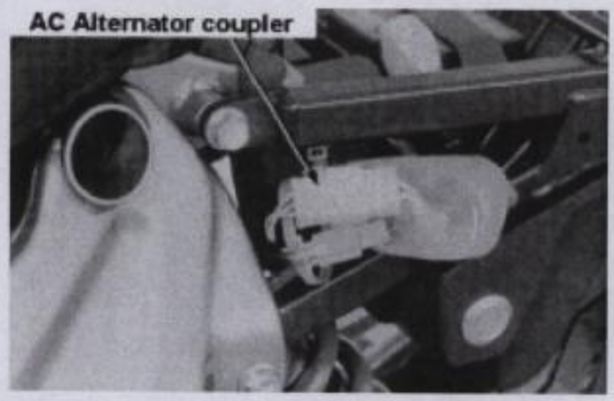
Stator Installation

Install a stator and secure four SH flange bolts.

Torque: 10Nm (1.0kgf-m)



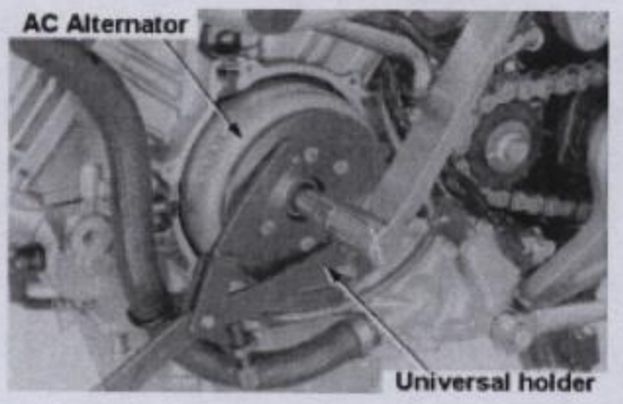
Connect an alternator coupler.



Flywheel Installation

Install a flywheel to a crankshaft.
Fix the flywheel with a universal holder.

Special Tool:
Universal Holder 07725-0030000

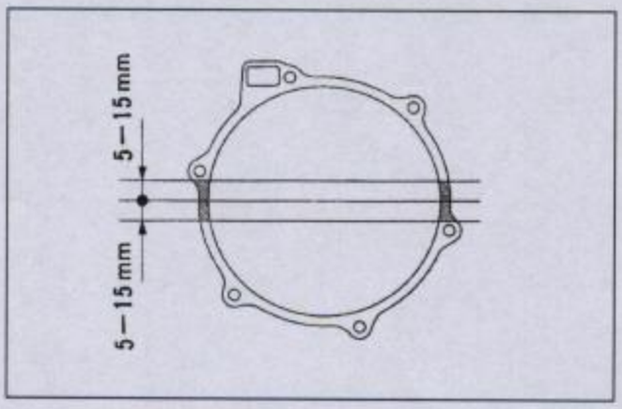


Apply oil to the thread and the seat of the flywheel and secure it.

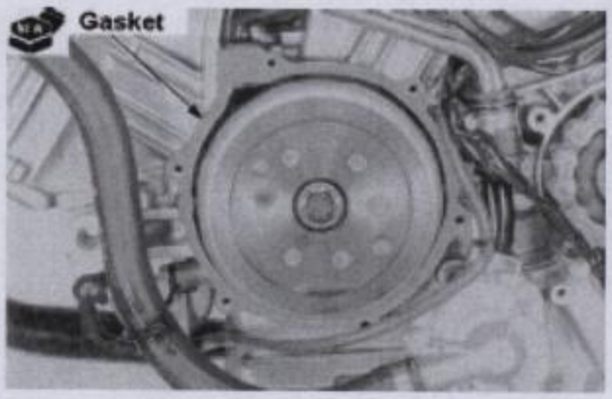
Torque: 83Nm (8.5kgf-m)

Alternator Cover Installation

Clean the crankcase mating surface and apply sealant to the hatched area in the figure.



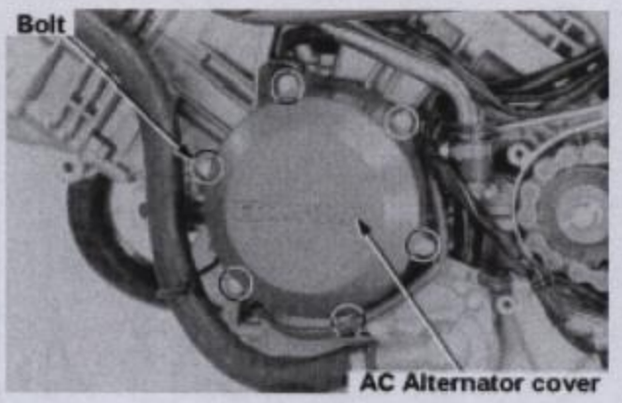
Install a new gasket to a crankcase.

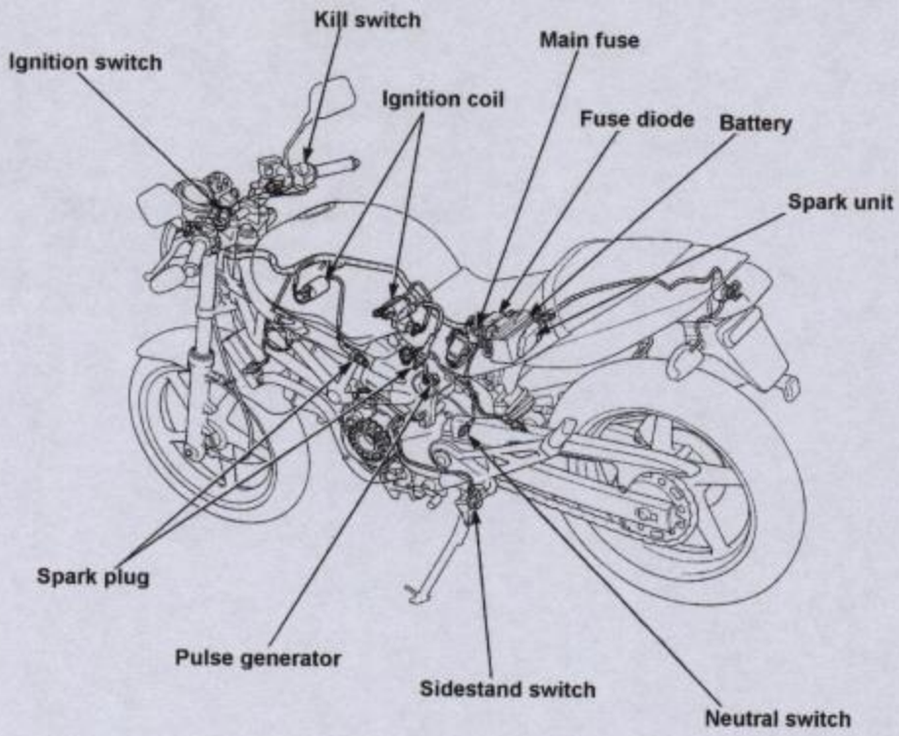


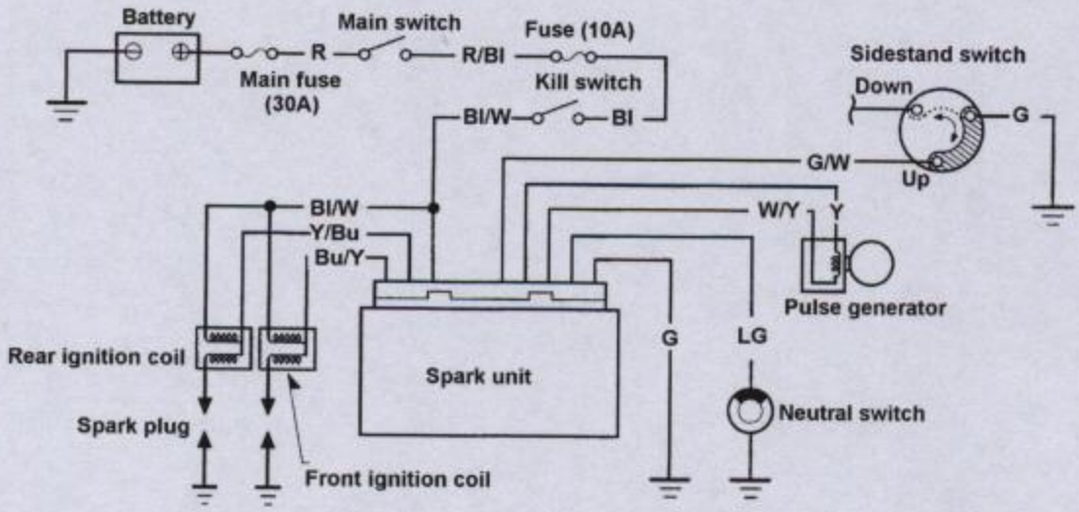
Install an alternator cover and secure six bolts in crisscross pattern.

Install a seat (2-2).

Install a left rear crankcase (7-8).



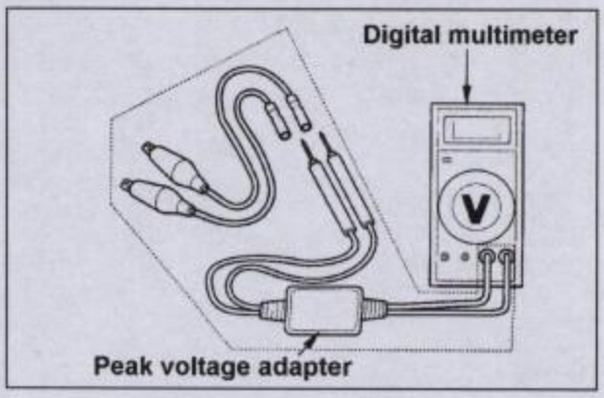

Kill switch
Main fuse
Ignition switch
Ignition coil
Fuse diode
Battery
Spark unit
Spark plug
Pulse generator
Sidestand switch
Neutral switch


Battery
Main switch
Fuse (10A)
R
R/Bl
Main fuse
(30A)
Kill switch
Bl/W
Bl
Sidestand switch
Down
G
G/W
Up
Bl/W
W/Y
Y
Y/Bu
Bu/Y
Pulse generator
Rear ignition coil
Spark unit
G
LG
Spark plug
Neutral switch
Front ignition coil

Ignition System Inspection

Notes

- If there is no spark from a spark plug, check wirings and then measure peak voltages.
- Use a digital multimeter which has 10MΩ/DCV or above impedance.



Connect a peak voltage adapter to the digital multimeter.

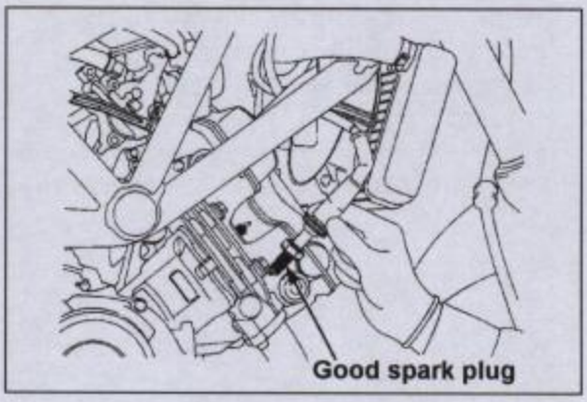
Special Tool:
Peak Voltage Adapter 07HGJ-0020100
(To be used in conjunction with a digital multimeter which has 10MΩ/DCV or above impedance).

Ignition coil primary voltage

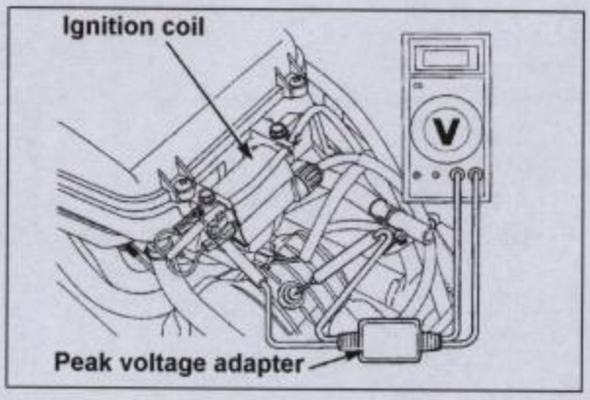
Notes

- Check all wirings before the measurement.
- Measure with cylinder compression and plugs/caps installed. The peak voltage may be over-read with the plugs/caps disconnected.

Cranking speed will become unstable if the engine ignites with normal cylinder spark. Leave the spark plug to the cylinder head and install good plugs to front and rear plug caps and earth to the engine, in the same manner with a normal spark test.



Peel a rubber cover of the ignition coil.
Leave the leads connected to the ignition coil and connect the peak voltage adapter to the primary terminal and the body earth.



Special Tool:
Peak voltage adapter 07HGJ-0020100
(To be used with a 10MΩ/DCV or above impedance digital multimeter)

Connection:
Front ignition coil:
Bu/Y lead terminal (+) Body earth (-)
Rear Ignition coil:
Y/Bu lead terminal (+) Body earth (-)

Turn the ignition switch ON and the kill switch RUN.
Check the initial voltage. It should read close to the battery voltage.
If there is no voltage reading, check the ignition coil power supply unit.
Follow the troubleshooting before measuring the peak voltage (17-3).
Set the transmission to neutral.
Turn the ignition switch ON, the kill switch RUN and crank the engine with a starter.
Measure the ignition coil primary voltage.

Peak voltage: 100V or above.

Warning
Do not touch the probes while measuring.

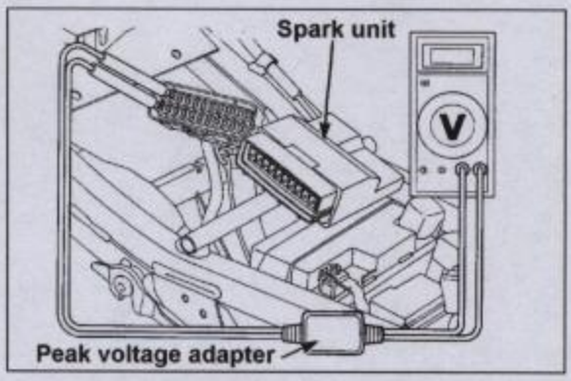
Notes
The peak voltage may vary with each ignition coil. It is acceptable as long as the individual values are above the standard.

If the value is below standard, follow the troubleshooting chart (16-3).

Pulse generator peak voltage.

Notes

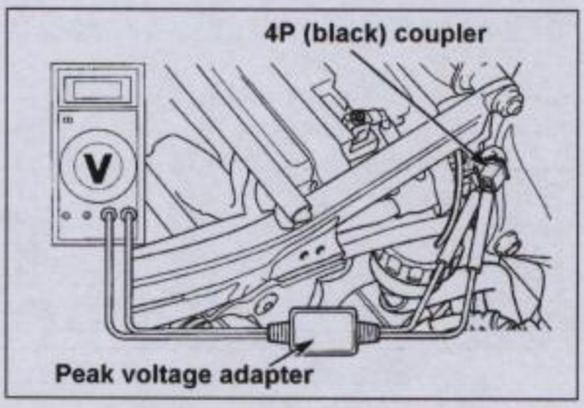
- Check all wirings are correct before measuring.
- Set a spark plug to a cylinder to provide proper compression.



Disconnect a spark unit 22P coupler.
Connect peak voltage adapter's multimeter probes to the following terminals on the harness end.
Special Tool:
Peak voltage adapter 07HGJ-0020100
(Use with a digital multimeter which has 10MΩ/DCV or above impedance)
Connection: White/Yellow lead - (+)
Yellow lead – (-)
Set a transmission to neutral.
Turn an ignition switch ON, a kill switch RUN and crank the engine with a starter button.
Measure the peak voltage of the pulse generator.
Peak Voltage: 0.7V or above

Warning

Do not touch the probe while measuring



If the peak voltage at the spark unit 22P coupler is faulty, measure at the pulse generator 4P (Black) coupler.
Disconnect the pulse generator 4P (Black) coupler.
Connect peak voltage adapter test probes to the following terminals on the engine end.
Connection: White/Yellow lead - (+)
Yellow lead – (-)
Crank the engine with a starter motor and measure the peak voltage.
Peak Voltage: 0.7V or above

Warning

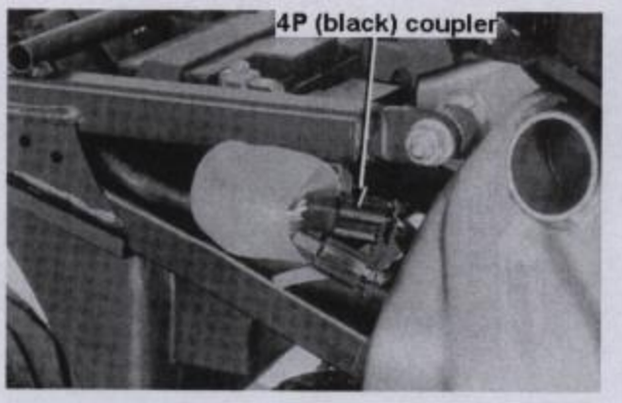
Do not touch the probe while measuring

- If the value at the spark unit coupler is faulty and the one at the pulse generator coupler is normal, inspect the wire harness and the coupler for faulty connection.
- If both values are faulty, follow the troubleshooting chart (16-3).

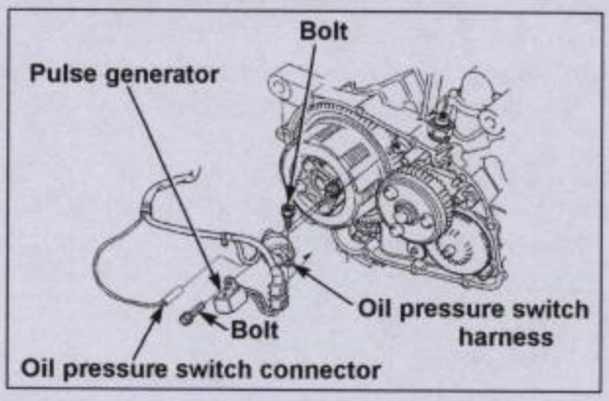
Pulse Generator

Removal

Remove a seat (2-2).
Disconnect a 4P (Black) coupler.



Remove a right crankcase cover (9-3).
Remove a dust cover and screws to disconnect a harness from an oil pressure switch.
Disconnect a neutral switch connector.
Unscrew bolts to remove the pulse generator.

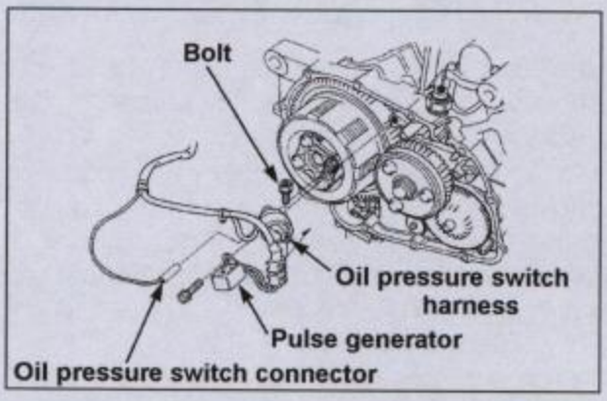


Installation

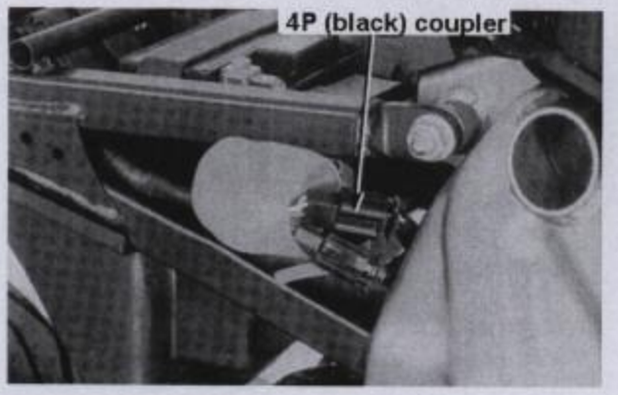
Install a pulse generator and secure bolts.
Connect a neutral switch.
Connect a harness to the oil pressure switch and secure a bolt.

Torque: 2Nm (0.2kgf-m)

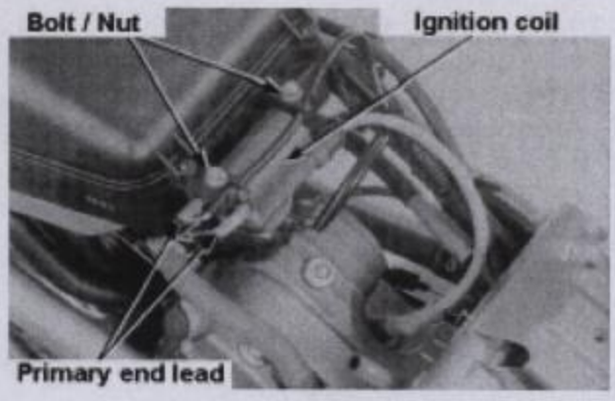
Install a right crankcase cover (9-16).



Connect a 4P (Black) coupler.
Install a seat (2-2).

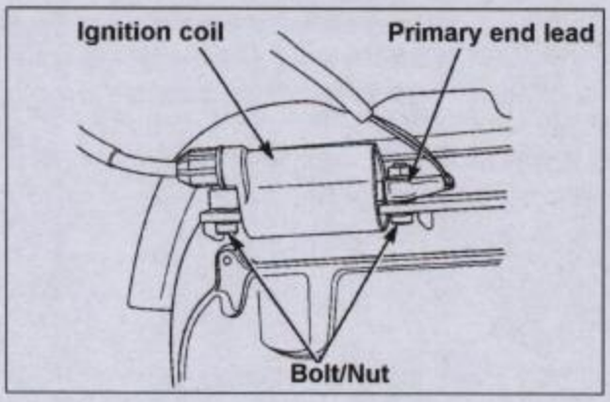


Ignition coil



Removal

- Rear ignition coil
  Remove a fuel tank (2-3)
  Remove a spark plug cap
  Disconnect ignition coil primary end terminals
  Unscrew two nuts
  Remove bolts and collars to remove the ignition coil



- Front ignition coil
  Remove a carburettor (6-3)
  Remove a spark plug cap
  Disconnect ignition coil primary end terminals
  Unscrew two nuts
  Remove bolts, collars and washers to remove the ignition coil.

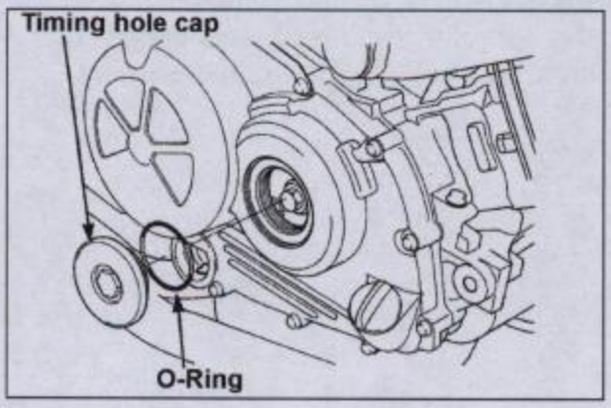
Installation

Reverse the removal procedure

Ignition Timing

Notes

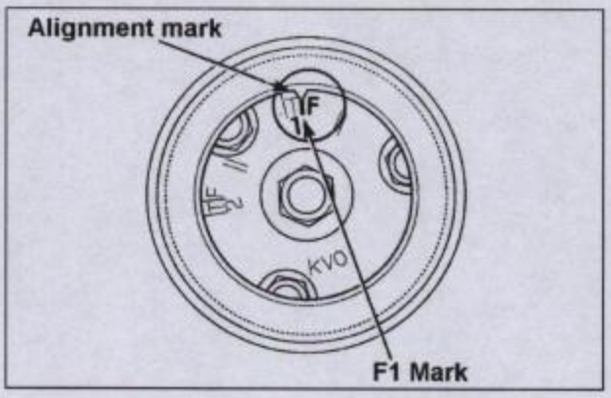
- Check the ignition timing after warming up the engine.
- The timing cannot be adjusted.
- If the timing is improper, inspect the spark unit and the pulse generator and replace if necessary.
- Refer to the instruction before using a timing light.



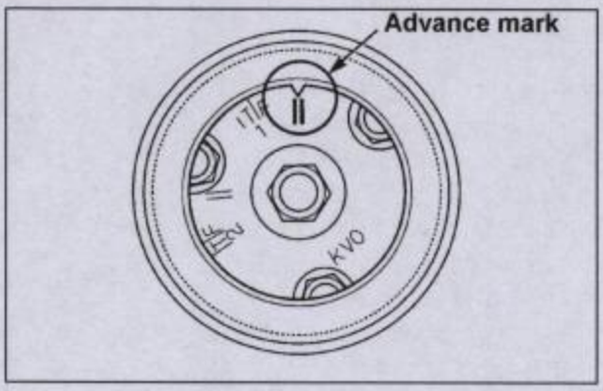
Warm up the engine.
Stop the engine and remove a timing hole cap.

Rear

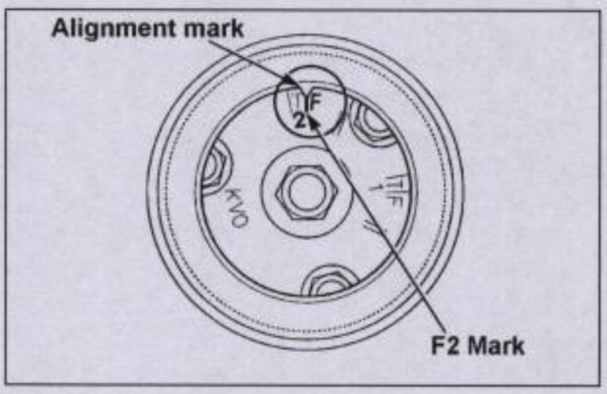
Connect a timing light to the high tension lead for the rear cylinder.
Start the engine. At idling, the "F1" mark on the starter clutch should align with an alignment mark on a right crankcase cover.



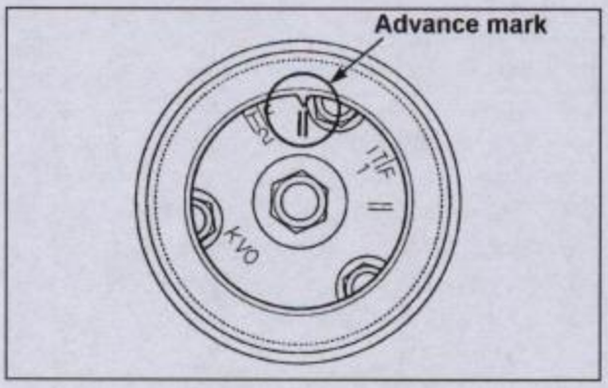
Increase rpm. The alignment mark on the right crankcase cover should be between the advance marks on the starter clutch at 7,500rpm.



Front
Connect a timing light to the high tension lead of the front cylinder.
Start the engine. The "F2" mark on the starter clutch should align with the mark on the right crankcase cover.

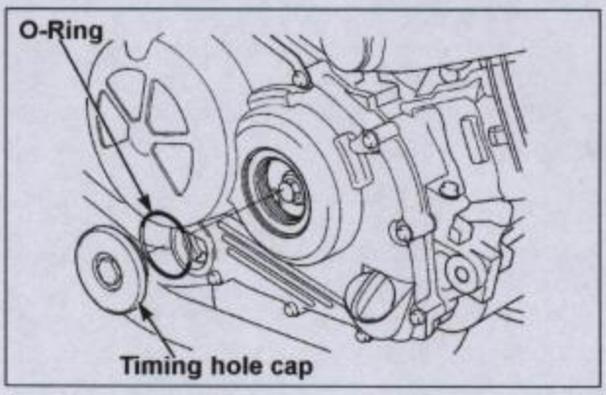


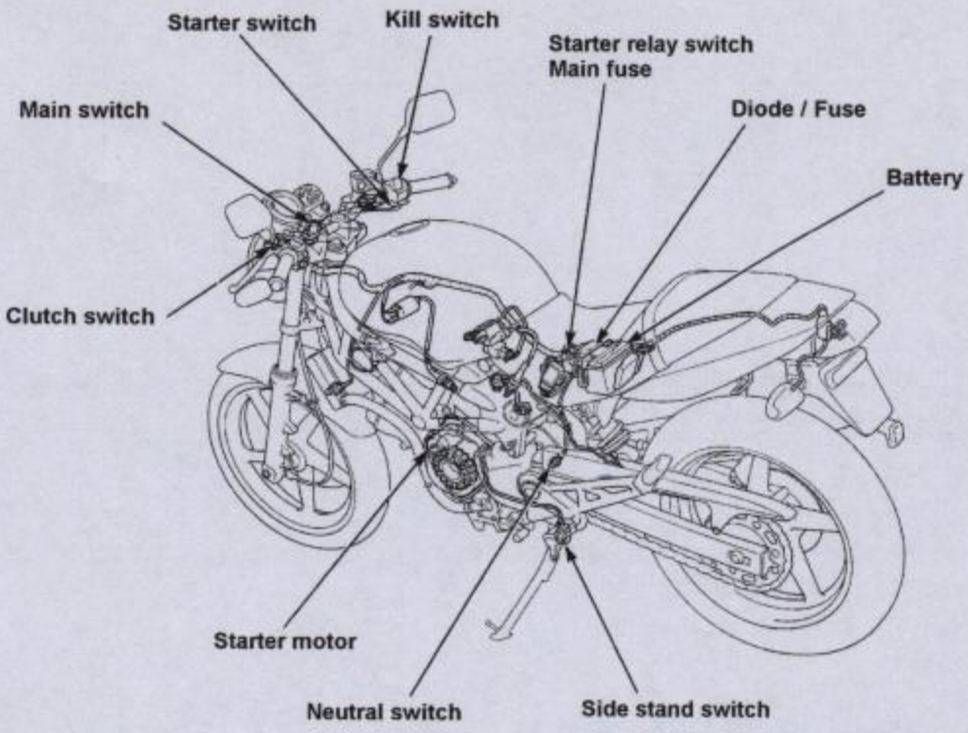
Increase engine rpm. the alignment mark on the right crankcase cover should be between the advance marks on the starter clutch.

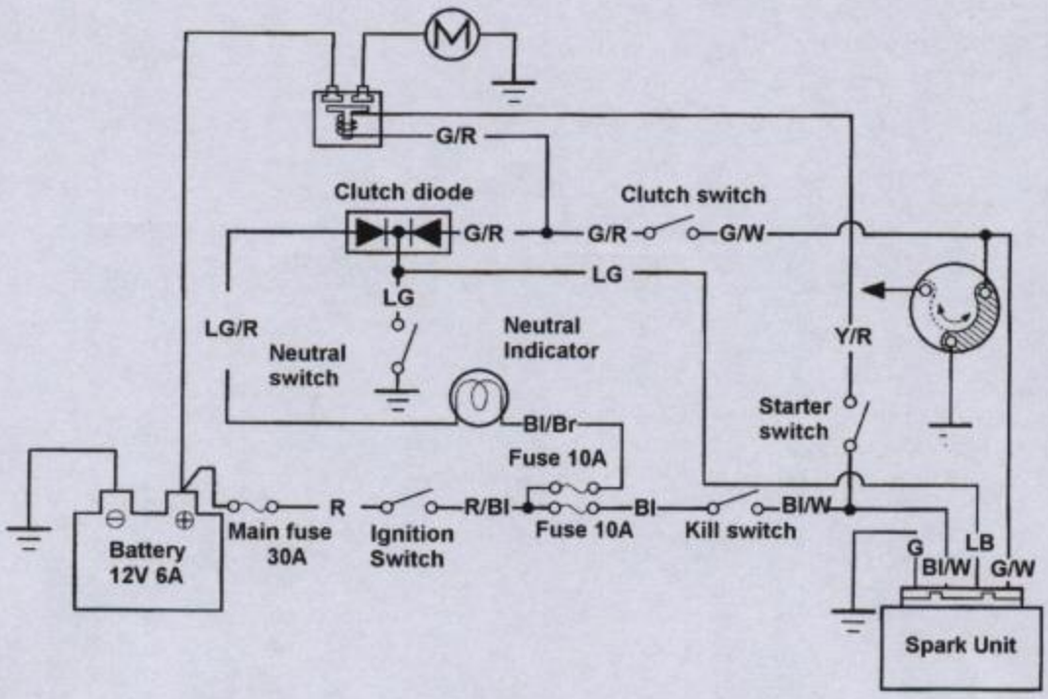


Apply engine oil to a new O-Ring.
Apply grease to the timing wheel cap thread and seat.
Secure the cap.

Torque: 18Nm (1.8kgf-m)




Starter switch
Kill switch
Starter relay switch
Main fuse
Main switch
Diode / Fuse
Battery
Clutch switch
Starter motor
Neutral switch
Side stand switch


M
G/R
Clutch diode
Clutch switch
G/R
G/R
G/W
LG
LG
LG/R
Neutral switch
Neutral Indicator
Y/R
Bl/Br
Starter switch
Fuse 10A
Battery 12V 6A
Main fuse 30A
R
Ignition Switch
R/Bl
Fuse 10A
Bl
Kill switch
Bl/W
G
Bl/W
LB
G/W
Spark Unit

Service Information.....	18 – 1	Starter relay switch.....	18 – 10
Troubleshooting.....	18 – 2	Clutch diode.....	18 – 11
Starter motor.....	18 – 5		

Service Information

General

Warning

Always turn the ignition switch OFF when servicing a starter motor or relevant area. It prevents injury by unexpected starting.

- Follow the troubleshooting for the starter system inspection (18-2).
- Refer to (18-0) for the starting system parts layout.
- A flat or weak battery cannot provide sufficient cranking. If there is any fault in starting, replace the battery with a new one and test.
- Excessive current to the motor may burn the starter motor coil. Do not overcrank.

Refer to Sec. 19 for servicing the following items:
- Sidestand switch
- Neutral switch
- Ignition switch
- Starter switch
- Clutch switch

Service specification

Starter motor brush length	Standard:	10.0-10.5mm	Service Limit: 3.5mm

Torque Setting:

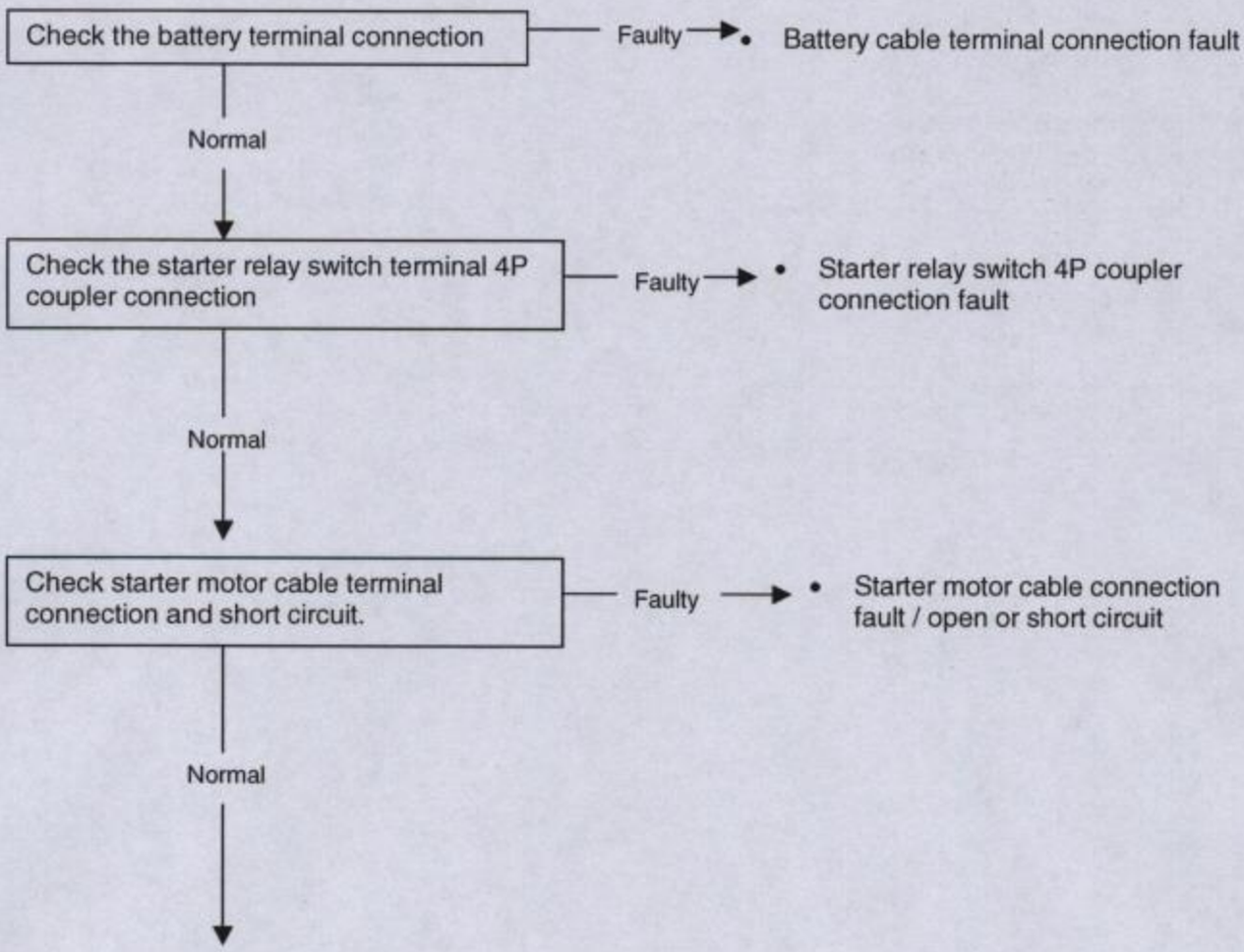
Starter motor terminal nut	12Nm (1.2kgf-m)
Starter motor front cover bolt	5Nm (0.5kgf-m)

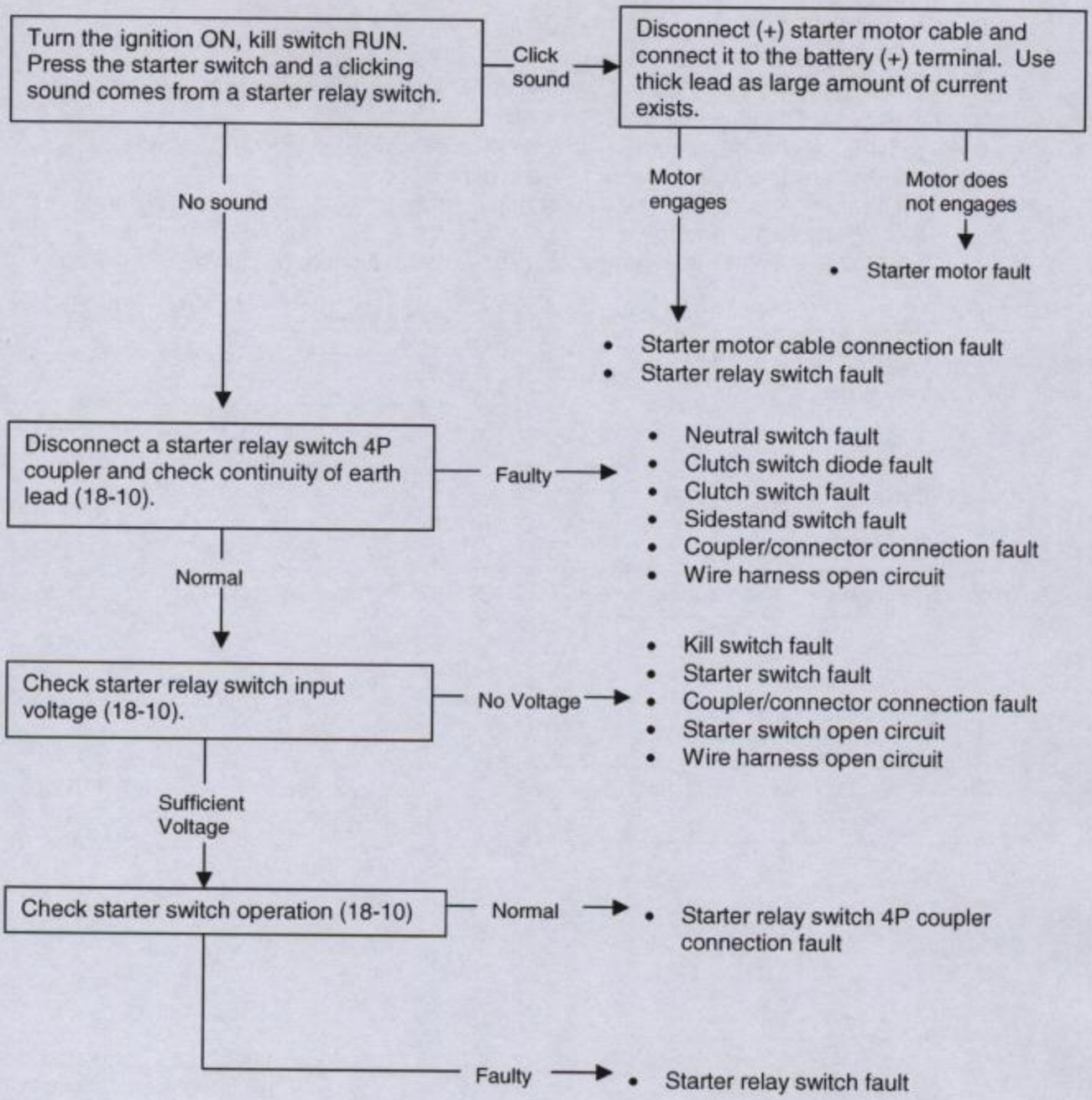
Troubleshooting

- Check a main (30A) and a sub (10A) fuse first.
- Check the connection of battery/starter motor cables.
- A flat or weak battery cannot provide sufficient cranking. If there is any fault in starting, replace the battery with a new one and test.
- Before inspecting the starter motor, check the ignition ON, kill switch RUN and the sidestand/transmission gear positions are in starting position.
  - If the gear is set to neutral, the starter can be engaged regardless of sidestand switch/clutch switch position.
  - If the gear is set other than neutral position, refer to the following table.

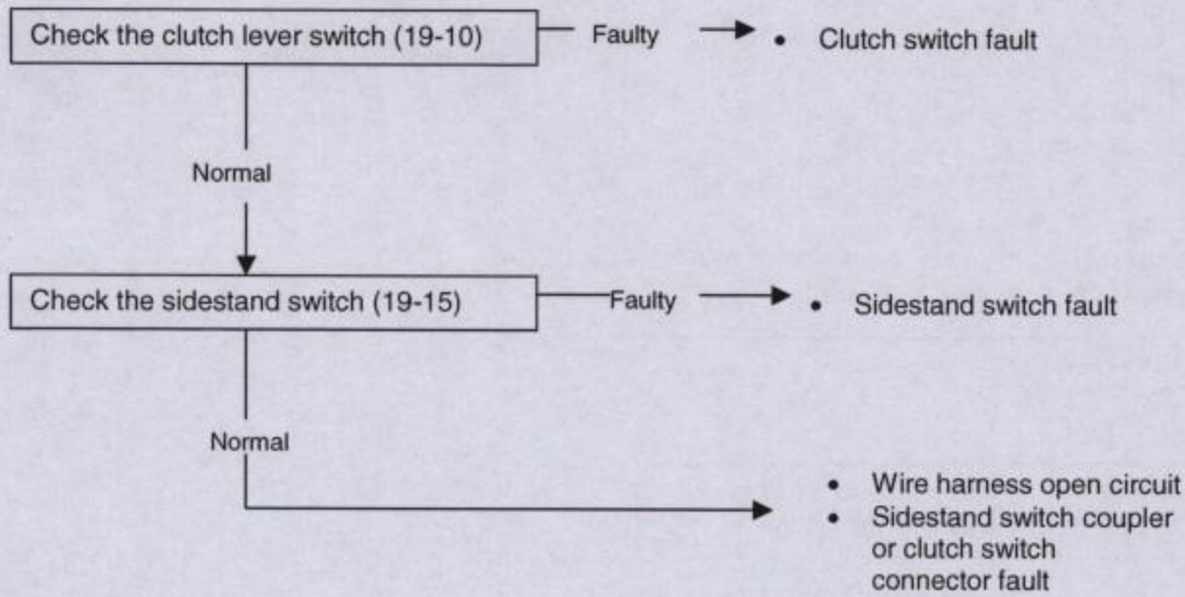
	Sidestand	Clutch Lever	Starter Motor
Gear position (other than neutral	Retracted	Held	ON
		Released	OFF
	Extended	Held	OFF
		Released	OFF

Starter Motor does not engage




Turn the ignition ON, kill switch RUN. Press the starter switch and a clicking sound comes from a starter relay switch.
Click sound
Disconnect (+) starter motor cable and connect it to the battery (+) terminal. Use thick lead as large amount of current exists.
No sound
Motor engages
Motor does not engages
• Starter motor fault
• Starter motor cable connection fault
• Starter relay switch fault
Disconnect a starter relay switch 4P coupler and check continuity of earth lead (18-10).
Faulty
• Neutral switch fault
• Clutch switch diode fault
• Clutch switch fault
• Sidestand switch fault
• Coupler/connector connection fault
• Wire harness open circuit
Normal
Check starter relay switch input voltage (18-10).
No Voltage
• Kill switch fault
• Starter switch fault
• Coupler/connector connection fault
• Starter switch open circuit
• Wire harness open circuit
Sufficient Voltage
Check starter switch operation (18-10)
Normal
• Starter relay switch 4P coupler connection fault
Faulty
• Starter relay switch fault

A starter motor engages with a gear in neutral. However, it does not engage with the gear other than neutral and the sidestand retracted, clutch lever held.



Weak/No cranking
- Flat / weak battery
- Battery cable terminal connection fault
- Starter motor cable terminal connection fault
- Starter motor fault
- Brush wear / damage

Starter motor slips
- Reversed motor rev
  - Reverse cable connection
- Slipping starter clutch

Starter motor is fine but unable to crank
- The crankshaft does not turn (engine fault)
- Starter reduction gear fault
- Starter idle gear fault

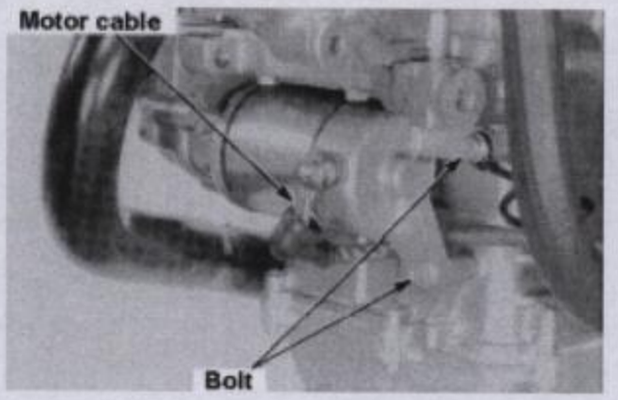
Starter Motor

Removal

Warning

Always turn the ignition OFF when servicing the starter motor or relevant area.
Unexpected cranking may cause serious injury.

Remove rubber caps and unscrew nuts.
Disconnect starter cables.
Unscrew bolts to remove the starter motor and a water hose clamp.



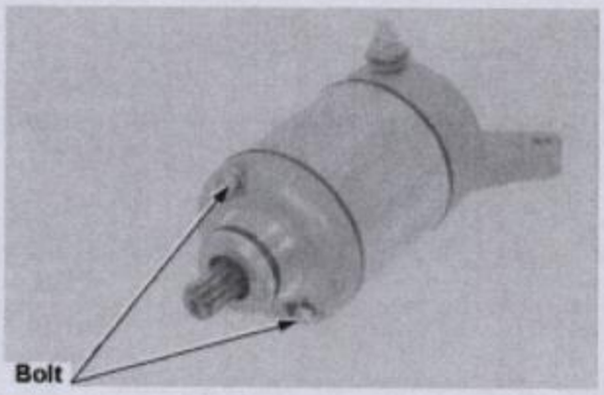
Disassembly

Notes

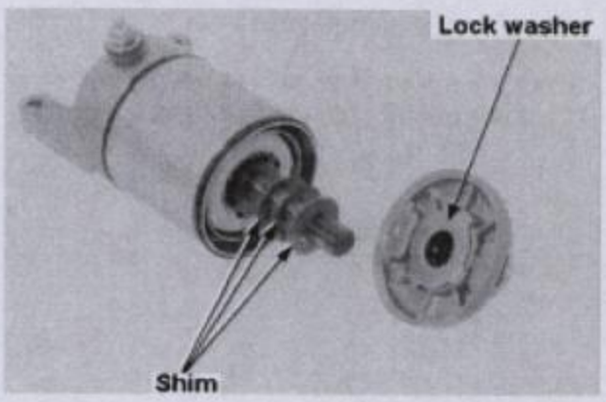
Record the sequence and numbers of shims/washers for re-assembly.

Remove the following parts:

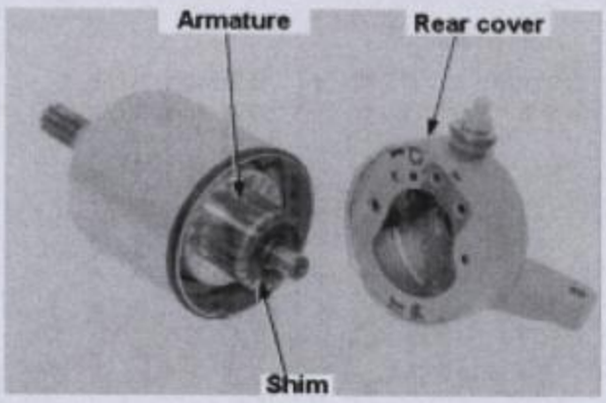
- Case bolt



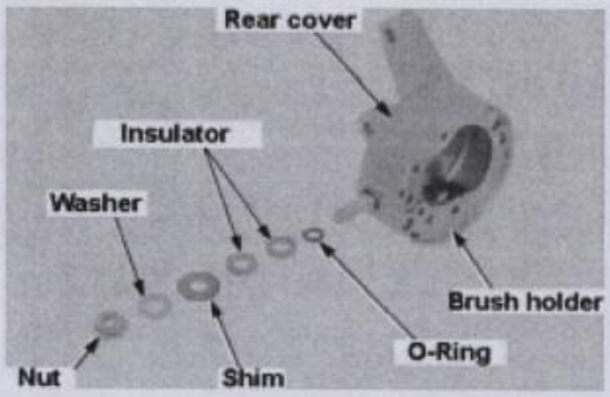
- Front cover
- Shim
- Lock washer



- Rear cover
- Shim
- Armature



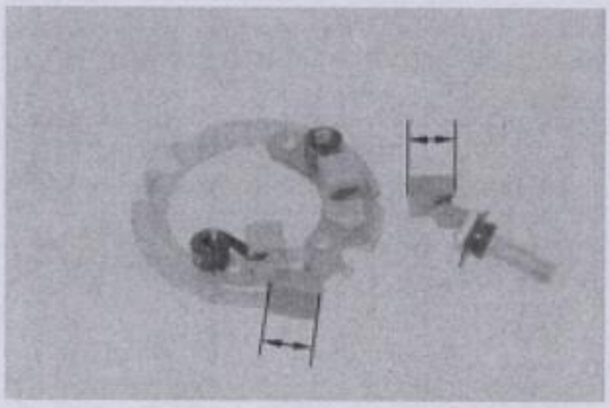
Remove a nut, a washer, a shim, insulators, and an O-Ring to disassemble a rear cover.



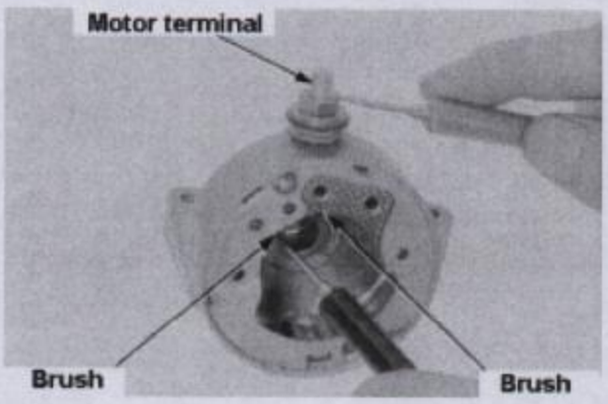
Inspection

Measure the brush length

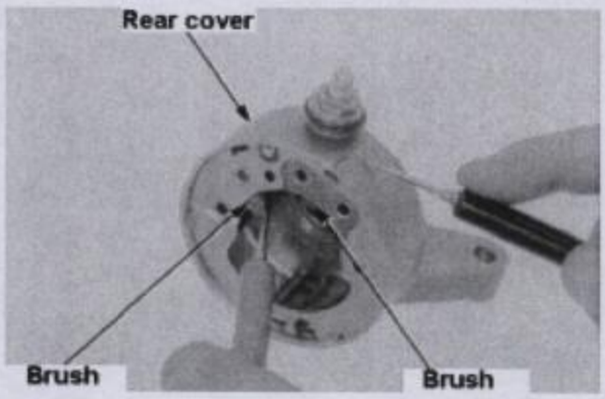
Service Limit: 3.5mm



Check continuity between terminals and the brush.
Motor terminal and brush (+) – continuity
Motor terminal and brush (-) – no continuity

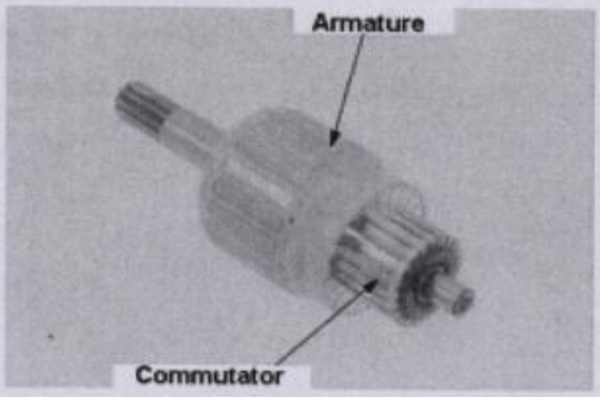


Check continuity between terminals and the brush.
Rear cover and brush (+) – no continuity
Rear cover and brush (-) – continuity

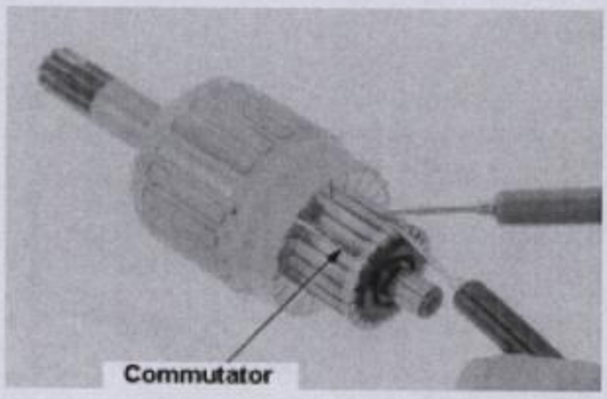


Inspect the armature commutator for unequal wear, damage or burn.

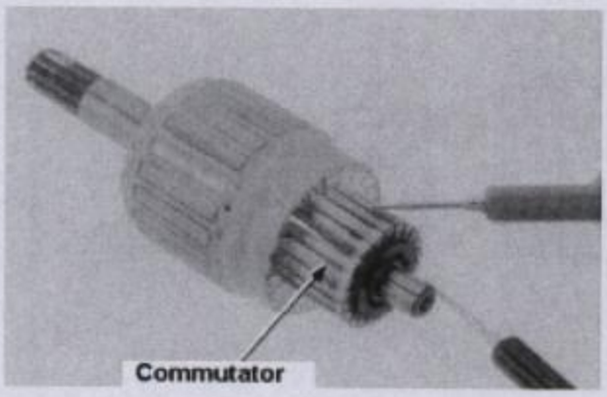
Clean segment gaps if there are metal particles.
Two or more burnt segments indicate the coil short circuit.
Replace in this case.



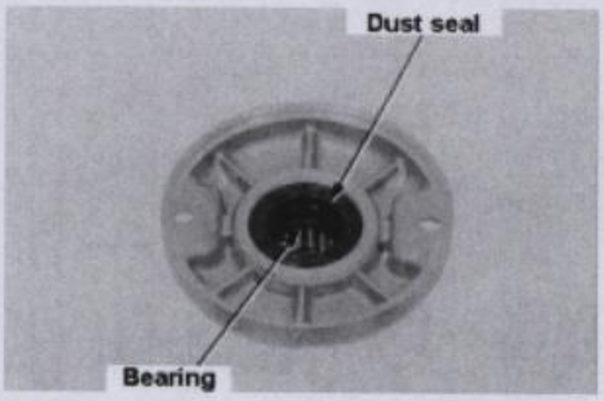
Check continuity between each segment.
Continuity should exist.
Replace the starter motor Assy if the continuity is faulty.



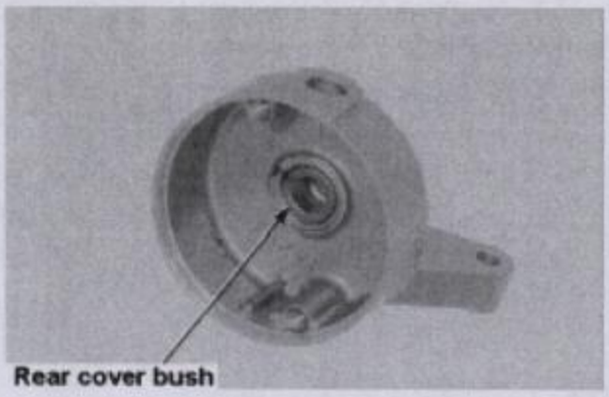
Check continuity between each segment and an armature shaft.
Continuity should not exist.
Replace the starter motor Assy if the continuity exists.



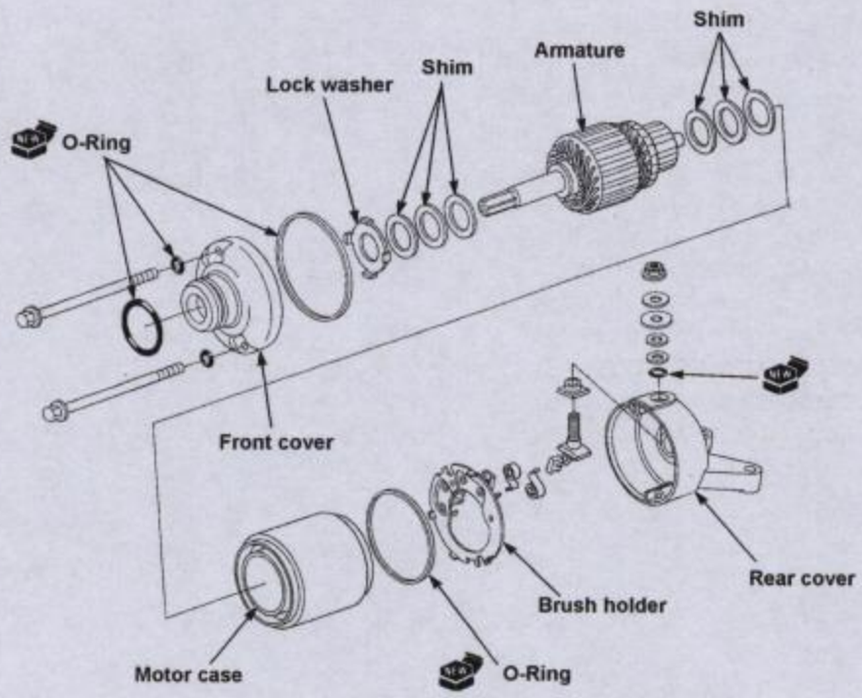
Check the needle bearing for damage, loose fit and smooth rev.
Check a dust seal for wear/aging.



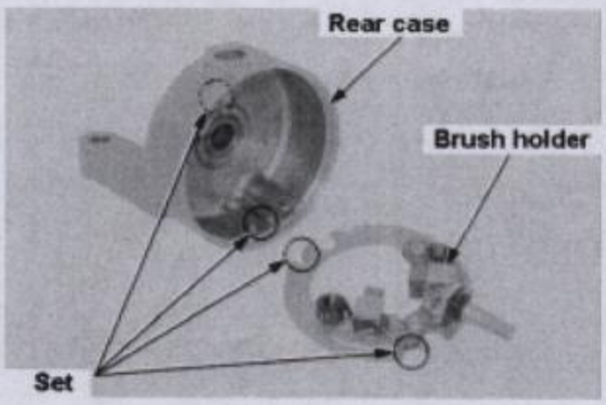
Inspect the rear cover bush for wear/damage.



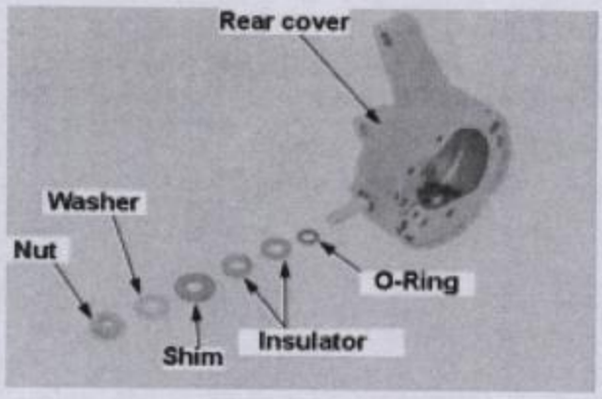
Assembly



Insert the brush to the brush holder. Set the projection on the holder to the cutout on the case to install the brush holder to the rear case.



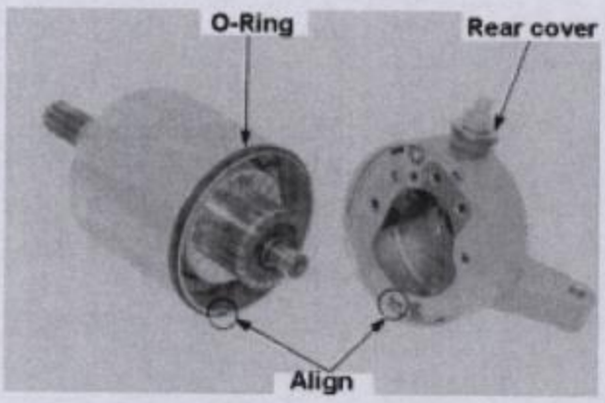
Install a washer, a shim, insulators and O-Rings and secure a nut.



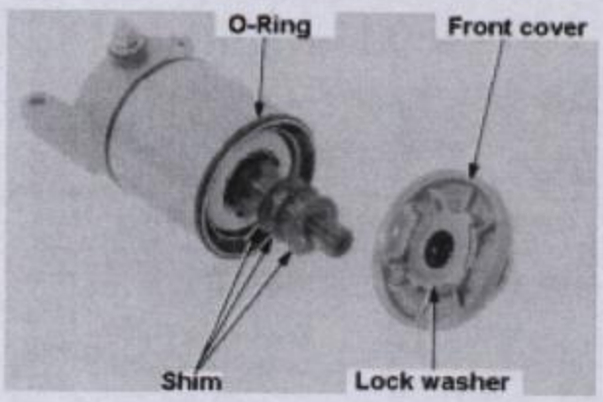
Insert the armature to its case and re-install shims to their recorded position.
Inspect an O-Ring for wear and deformation before installing it.
Set the projection on a brush holder to the cutout in the case to install the rear case.

Notes

When installing the armature to the brush holder, do not damage the armature contact surface on the brush.



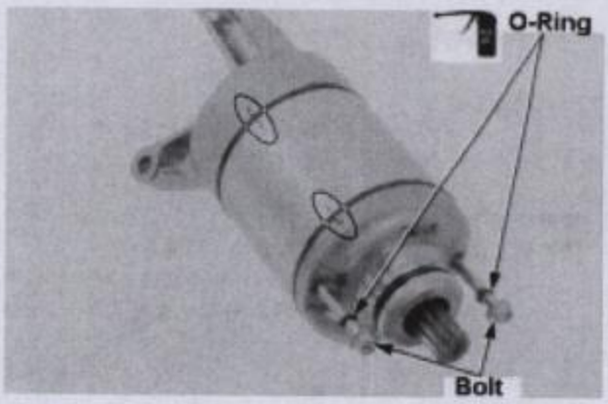
Install shims to the recorded position.
Install a lock washer to the front cover.



Check O-Rings for damage.
Apply oil to the O-Rings and set it to the bolts.

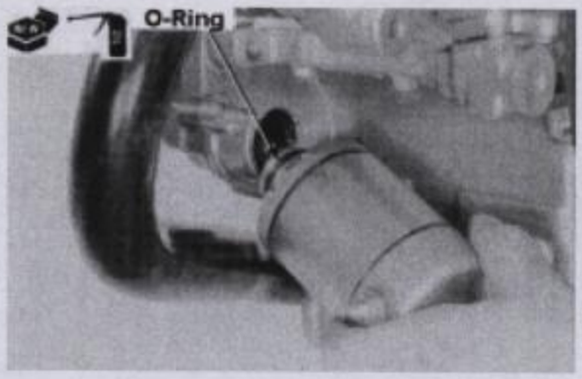
Align marked lines on the case and front/rear covers and secure bolts.

Torque: 5Nm (0.5kgf-m)



Installation

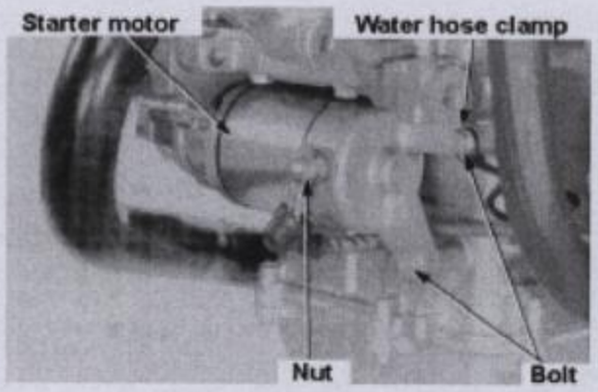
Apply engine oil to a new O-Ring and set the starter motor to the crankcase.



Connect a starter motor cable and secure the nut.

Torque: 12Nm (1.2kgf-m)

Install a rubber cap.
Install a water hose clamp and secure two bolts.

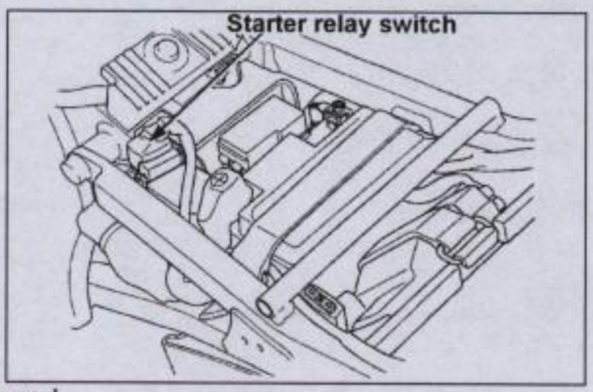


Starter Relay Switch

Inspection

Notes
Check battery status first.

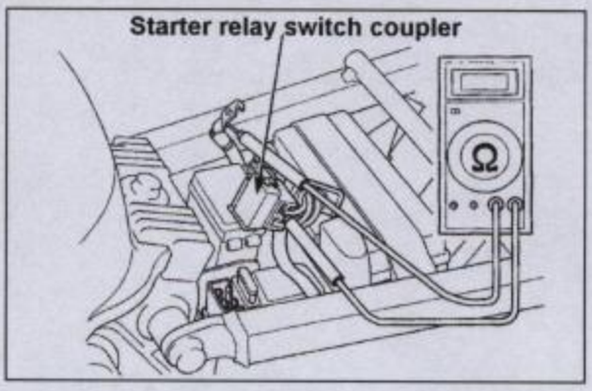
Remove a seat (2-2).
Set the transmission to neutral.
Turn the ignition ON, and the kill switch to RUN.
Press starter switch and check for a clicking sound from a starter relay switch.
Conduct the following inspection if there is no sound.



Earth Circuit Check

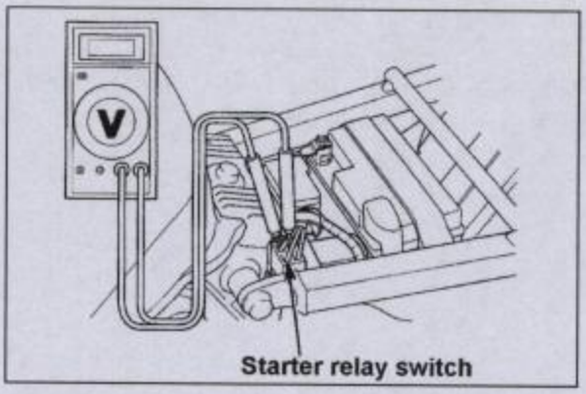
Disconnect a starter relay switch 4P coupler.
Check continuity on the harness end of the 4P coupler.

Connection: Green / Red - Body earth
Standard: Neutral gear - Continuity
Clutch lever held (Gear other than neutral and sidestand retracted) Continuity



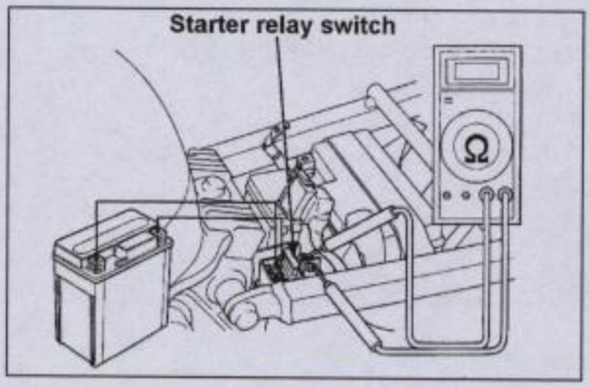
Input Voltage

Connect a starter relay switch 4P coupler to a relay switch.
Set the transmission to neutral.
Connect a voltmeter to 4P coupler Yellow/Red and Green/Red terminals.
Turn the ignition ON, the kill switch RUN.
Measure the voltage when the starter switch is depressed.
It should have battery voltage.
Connection: Yellow/Red (+) – Green/Red (-)
Standard: Battery Voltage



Operation Check

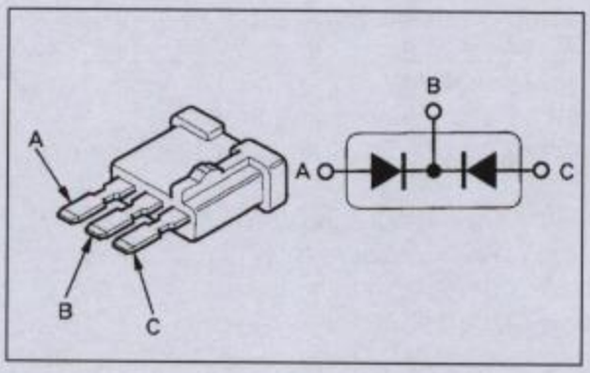
Disconnect a coupler and cables from a starter relay switch.
Check the continuity between the terminals when the fully-charged battery is connected to the starter relay switch terminals as follows:
Battery Terminal: Y/R – G/R
Standard: Continuity exists
Continuity should exist when there is a voltage.

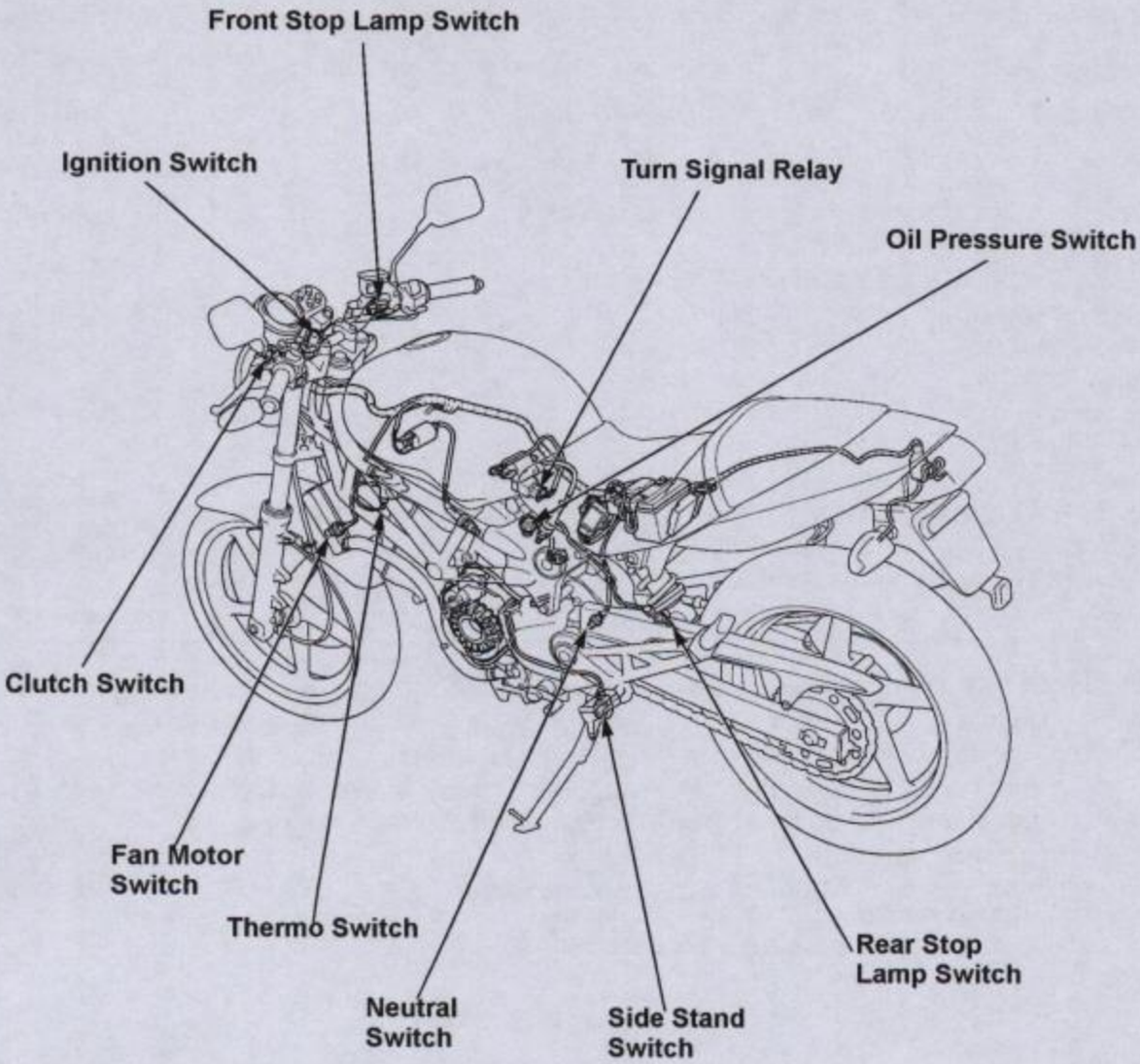


Clutch Diode

Inspection

Remove a seat (2-2).
Open the lid of a fuse box and pick up a diode.
Check continuity between A, B and C terminals.
As diode is a semi-conductor, a slight resistance is considered to be the continuity.
Continuity should exist in one direction.




Front Stop Lamp Switch
Ignition Switch
Turn Signal Relay
Oil Pressure Switch
Clutch Switch
Fan Motor Switch
Thermo Switch
Neutral Switch
Side Stand Switch
Rear Stop Lamp Switch

Service Information.....	19 – 1	Rear brake lamp switch.....	19 – 10
Headlamp.....	19 – 3	Clutch switch.....	19 – 10
Turn signal.....	19 – 4	Handlebar switch.....	19 – 10
Brake / tail lamp.....	19 – 5	Ignition switch.....	19 – 11
Combination instrument.....	19 – 6	Fan motor switch.....	19 – 12
Oil pressure switch.....	19 – 8	Thermo switch/water temp warpage.....	19 – 12
Neutral switch.....	19 – 9	Horn.....	19 – 14
Front brake lamp switch.....	19 – 10	Turn signal relay.....	19 – 15
		Sidestand switch.....	19 - 15

Service Information

General

Warning

- Do not touch the Halogen light bulb with bear hands immediately after turning off. Wait for it to cool down to service.
- Do not place inflammable objects close when inspecting a thermo sensor. Also watch out for burning injury.

- A Halogen headlamp bulb gets hot when it is on. When replacing a bulb, note the following items:
  - Do not replace while it is on. Turn the lamp off and wait for it to cool down.
  - Clean the contaminated surface with alcohol or thinner soaked cloth. A contaminated surface may result in breaking the bulb as a hot spot.
  - Secure a dust cover after replacing the bulb.
- Check battery condition when it is involved in inspection.

Specification

Item		Standard	Service limit
Fuses	Main	30A	-
	Sub	10A x 4	-
Bulbs	Headlamp	12V – 60/55 W	-
	Brake / tail lamp	12V – 23/8 W	-
	Front turn signal / position lamp	12V – 18/5 W x 2	-
	Rear turn signal lamp	12V – 15W x 2	-
	Instrument illumination lamp	12V – 3.4 W	-
	Turn signal pilot lamp	12V – 3.4 W	-
	High beam pilot lamp	12V – 3.4 W	-
	Neutral pilot lamp	12V – 3.4 W	-
	Oil pressure lamp	12V – 3.4 W	-
	Water temp warning	12V – 3.4 W	-
Thermo switch activation 50% coolant density	OFF → ON	112 – 118°c	-
	ON → OFF	108°c or above	-
Fan motor switch activation 50% coolant density	OFF → ON	98 – 102°c	-
	ON → OFF	93 – 97°c	-

Torque Settings

Oil pressure switch	12Nm (1.2kgf-m) apply sealant to the thread (but not to the end)
Oil pressure switch connector bolt	2Nm (0.2kgf-m)

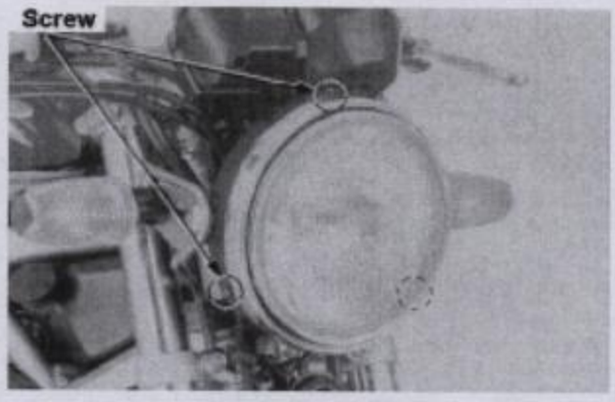
Headlamp

Bulb Replacement

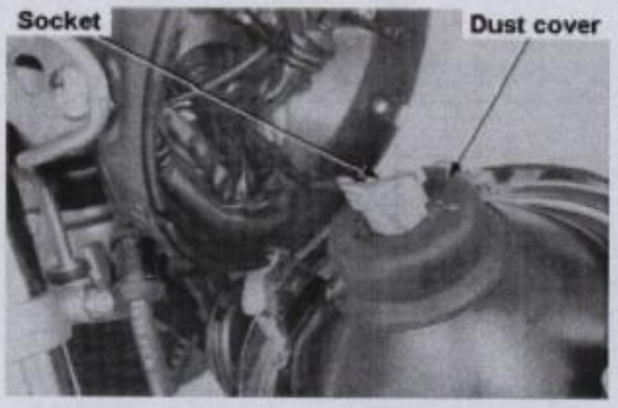
Warning

Do not touch the Halogen headlamp bulb immediately after turning it off. Wait for it to cool down.

Unscrew three screws from a headlamp case and remove the lamp.



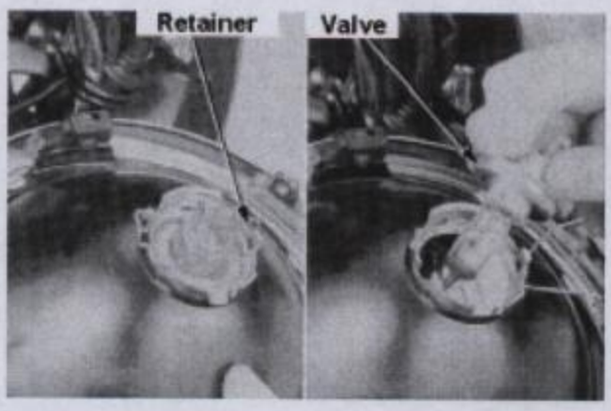
Disconnect a bulb socket and remove a dust cover.



Remove a retainer and replace the bulb.

Caution

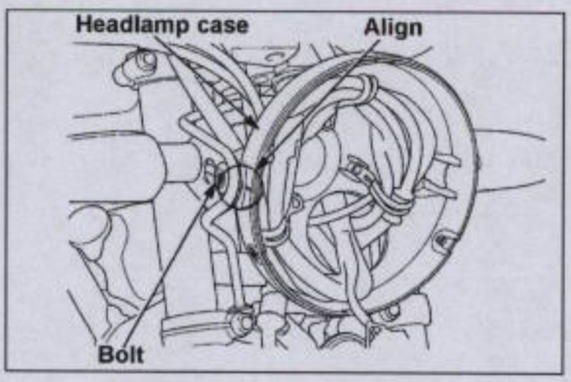
Wear clean gloves to prevent contaminating the bulb surface. Clean the contaminated surface with a clean cloth soaked with alcohol or thinner. Contaminated surface may result in breaking the bulb as a "hot spot".



Face "TOP" mark upwards to install a dust cover to a headlamp.

Reverse the removal procedure to install the headlamp to the case.

Headlamp case removal/installation
Remove a headlamp (19-3).
Disconnect all couplers and pull out the harness from the headlamp case.
Unscrew two bolts to remove the headlamp case.
Reverse the above procedure to install.



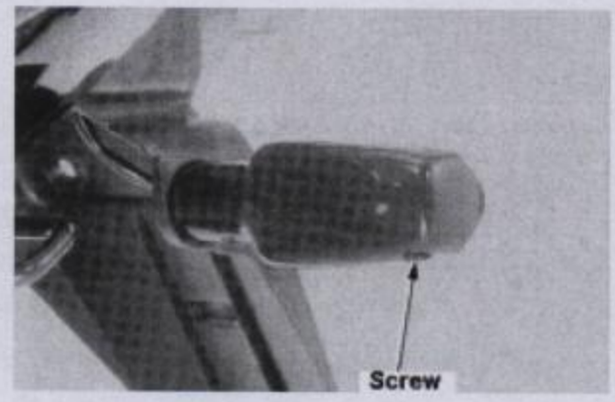
Notes

- Align the marks on a lamp stay and the case when installing.
- Adjust headlamp axis after installation
- Refer to routing diagram (1-25) for routing cables/wires.

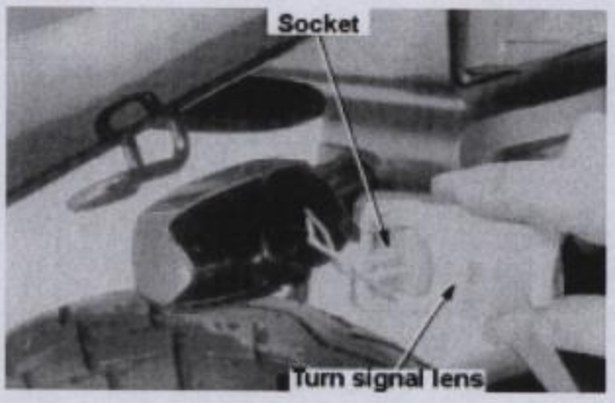
Turn Signals

Bulb replacement

Unscrew and remove a turn signal lens.



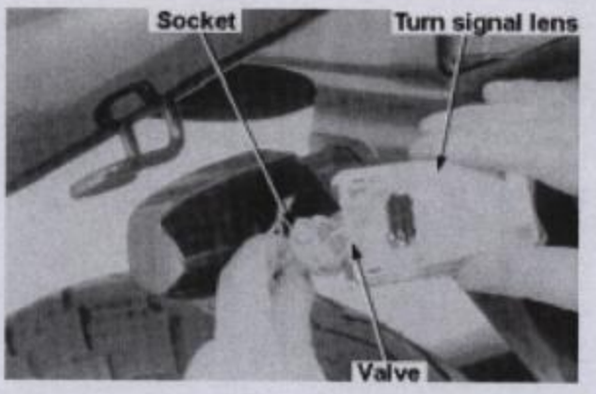
Turn a socket counter clockwise to remove it.



Remove a bulb from the socket.

Reverse the above procedure to install a new bulb.

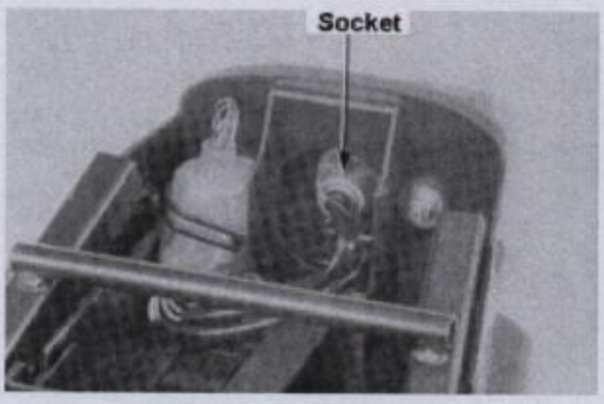
Install a turn signal lens and secure a screw.



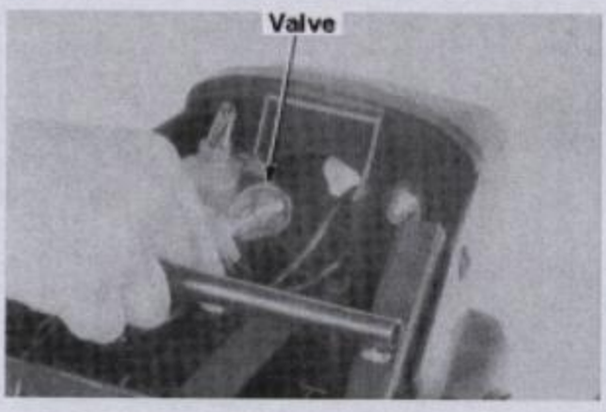
Brake / Tail Lamp

Bulb Replacement

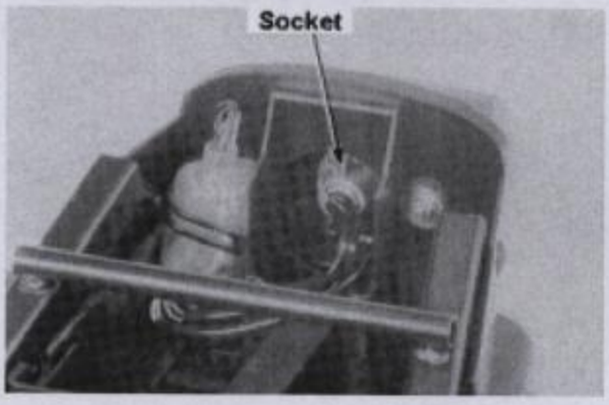
Remove a seat (2-2).
Turn a bulb socket counter clockwise to remove it.



Turn a bulb counter clockwise to remove it.
Reverse the above procedure to install a new bulb.



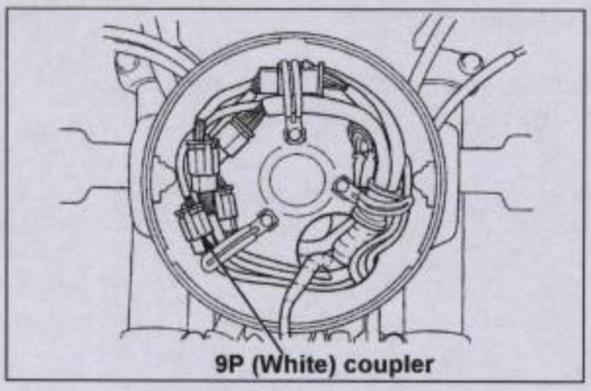
Turn the bulb socket clockwise to install it.
Install a seat (2-2).



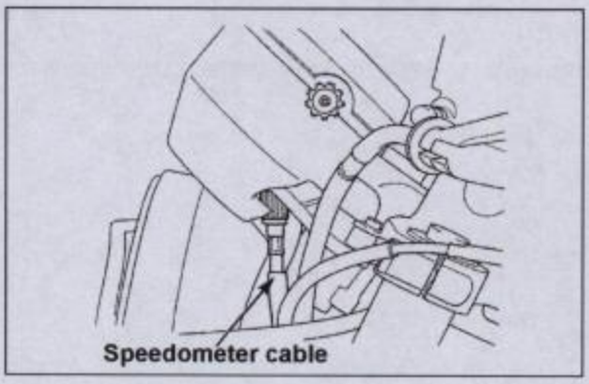
Combination Instrument

Removal

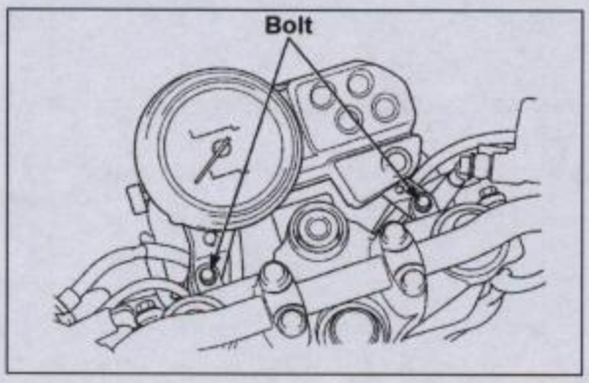
Remove a headlamp (19-3) and disconnect a motor coupler (9P White).



Disconnect a speedometer cable.

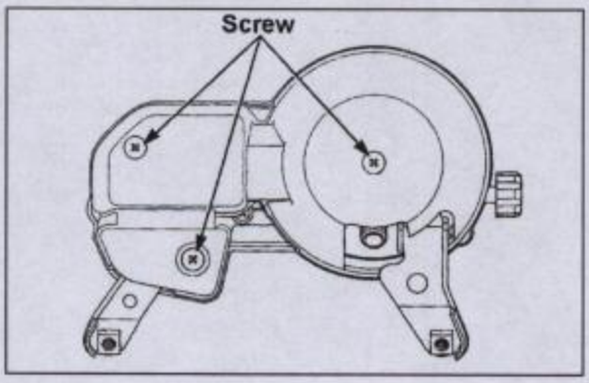


Unscrew two bolts to remove the instrument.



Disassembly

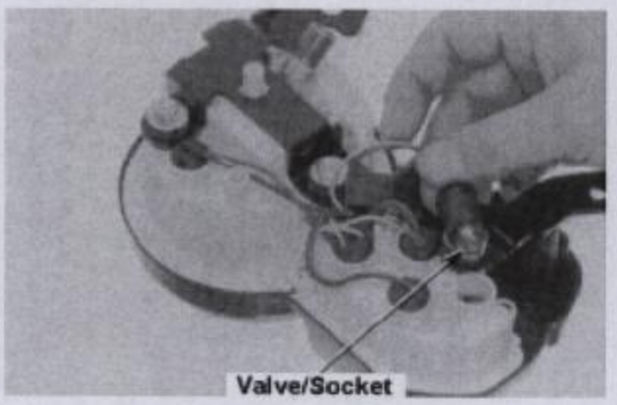
Unscrew three screws to remove an instrument under cover.



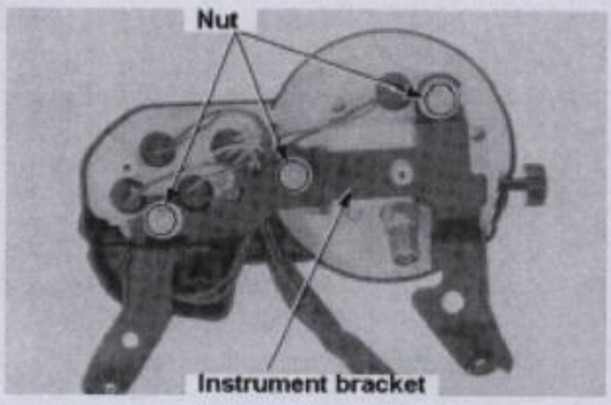
Bulb Replacement

Pull a bulb socket out of the instrument case and replace it with a new one.

Install the socket to the instrument case.

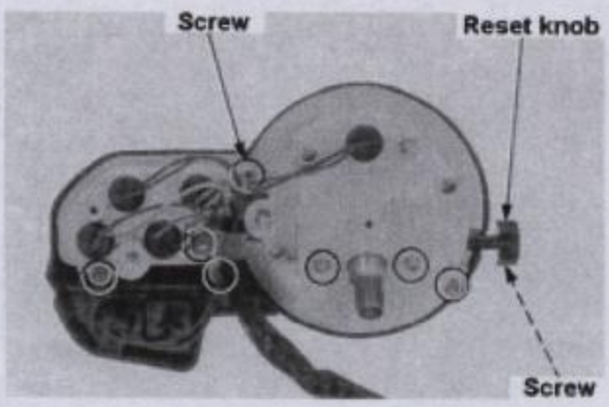


Unscrew three nuts to remove a bracket.

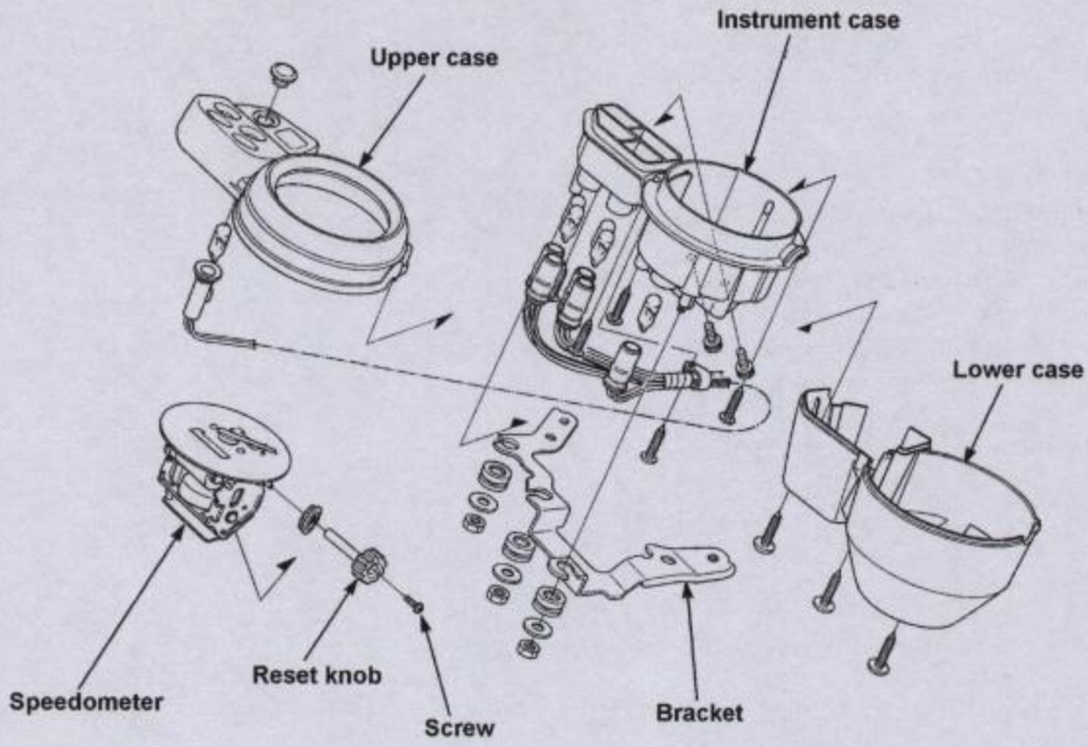


Unscrew to remove a reset knob.

Unscrew to disassemble the instrument.

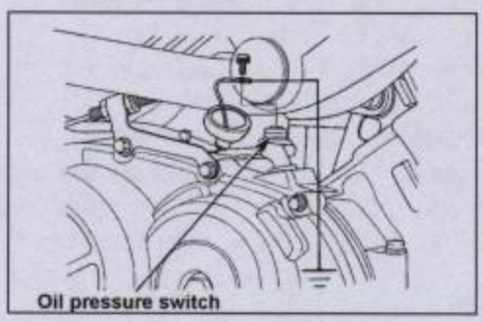


Assembly



Oil Pressure Switch

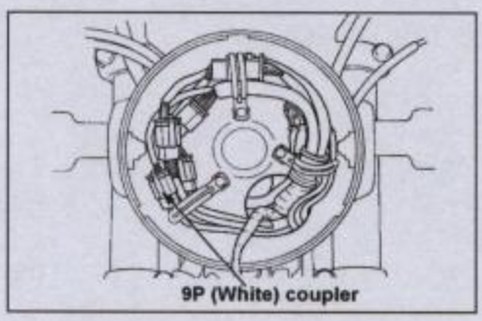
Inspection



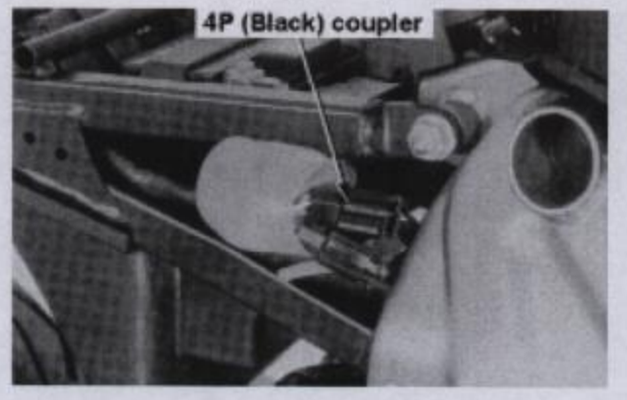
No oil pressure warning when ignition is ON

Remove a dust cover from an oil pressure switch and disconnect the switch lead.
Earth the switch lead with a jumper wire.
Check oil pressure warning when ignition is on.

- Warning ON
  - Oil pressure switch fault
- Warning OFF
  - Remove a headlamp (19-3)
    Body earth the Blue/Red lead terminals with a jumper lead while a 9P (White) coupler inside the headlamp case is connected. Turn ignition ON and check the warning lamp.



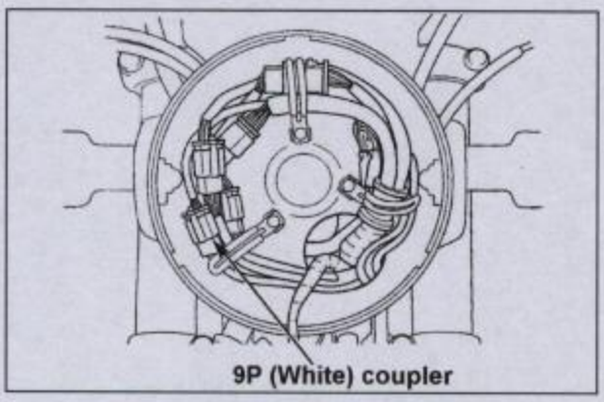
- Warning ON
  - Blue/Red between 9P (White) coupler and oil pressure switch open circuit.
  - Faulty connection of 4P (Black) coupler for a pulse generator, a neutral switch and an oil pressure switch.



Warning OFF
Turn ignition ON. There should be battery voltage between 9P (White) coupler Black/Brown terminal and battery terminal(-).

Battery voltage: oil pressure warning bulb blown or instruments wire harness open circuit.

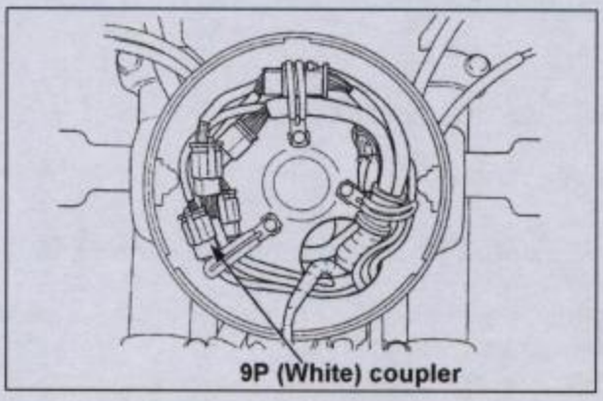
Little/No voltage: open circuit between 9P (White) coupler and fuse box (Black/Brown lead).



Oil pressure warning always ON
Remove a dust cover from an oil pressure switch and disconnect a switch lead.
Remove a headlamp (19-3).
Disconnect a 9P (White) coupler in the headlamp case.
Check continuity between the 9P (White) coupler blue/red terminal and body earth.

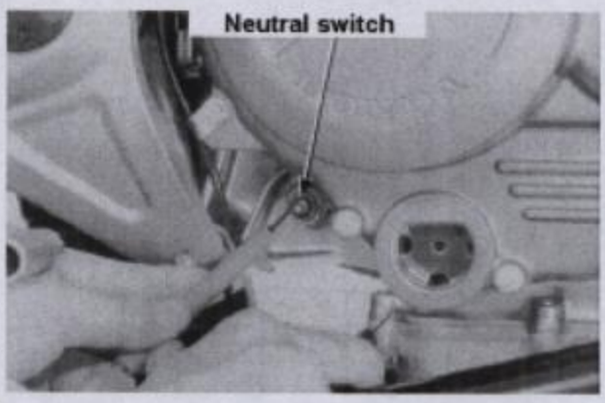
Continuity: Blue/Red lead open circuit between oil pressure switch and instrument coupler.

No Continuity: If oil level is normal (4-3), oil pressure switch fault.

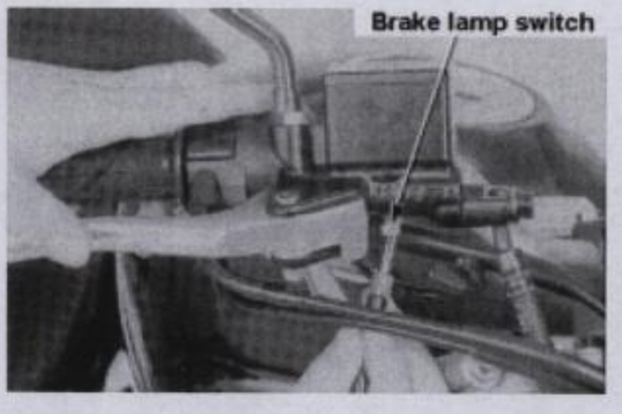


Neutral Switch

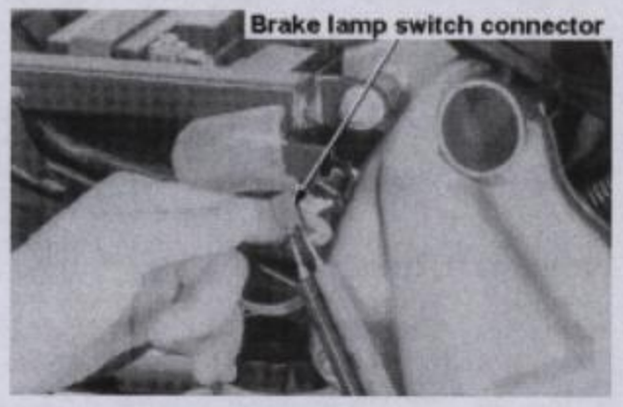
Inspection
Remove a left side cover.
Disconnect a neutral switch connector and check continuity between the neutral switch and body earth.
Continuity should only exist when the transmission is in neutral position.



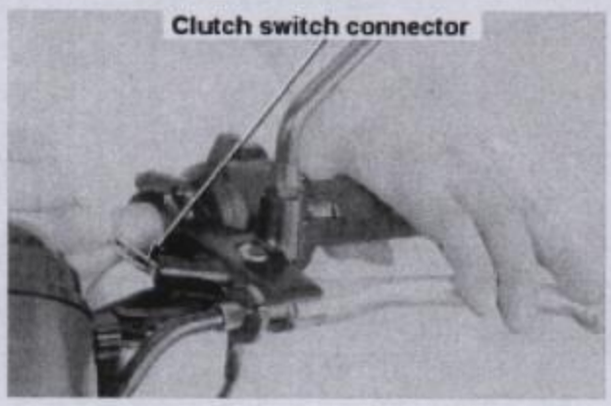
Front Brake Lamp Switch
Disconnect a front brake lamp switch connector and check continuity between switch terminals.
Continuity should only exist when the brake lever is held.


Brake lamp switch

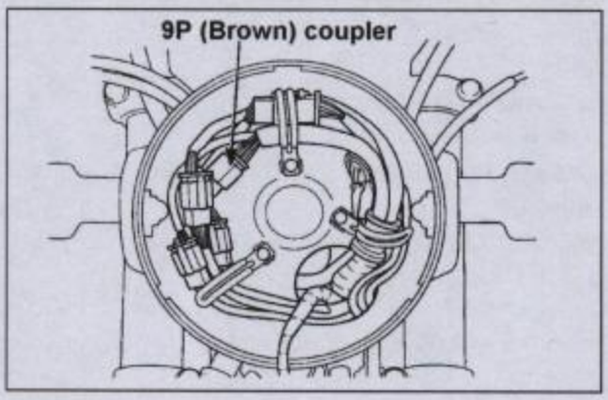
Rear Brake Lamp Switch
Remove a seat (2-2).
Disconnect a rear brake lamp switch connector and check continuity between switch terminals.
Continuity should exist when brake pedal is depressed.


Brake lamp switch connector

Clutch Switch
Disconnect a clutch switch connector and check continuity between switch terminals.
Continuity should exist when clutch lever is held.


Clutch switch connector

Handlebar Switch
Check continuity listed in the tables below at handlebar switch end coupler terminals.
Continuity should exist between O-O.
Remove a headlamp (19-3).
Disconnect a 9P (Brown) coupler.


9P (Brown) coupler

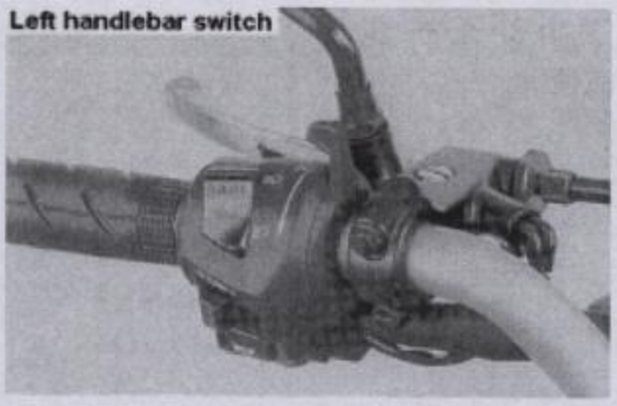
Kill Switch

	Bl / W	Br
OFF		
RUN	O	O

Starter Switch

	Y/R	Bl/W	Bu/W	Bl/R
FREE			O	O
PUSH	O	O		

Left Handlebar Switch
Remove a headlamp (19-3).
Disconnect 6P (blue) and 3P (black) couplers.
Continuity should exist on O-O.



Horn Switch

	Bl	Bl/Br
FREE		
PUSH	O	O

Overtaking Switch

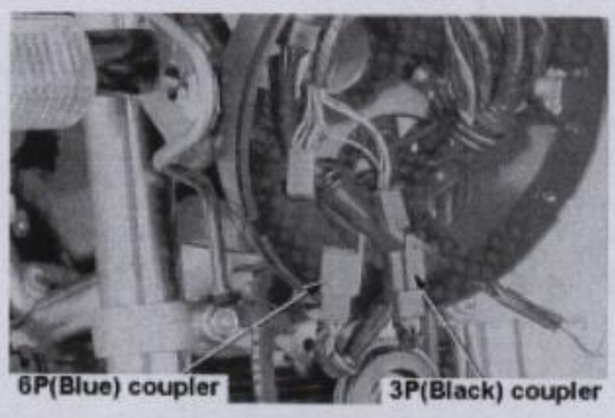
	Bl/W	Bu
FREE		
PUSH	O	O

Dimmer Switch

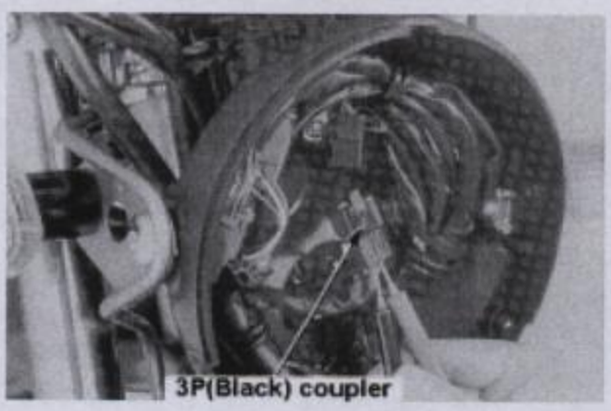
	Bu/W	W	Bu
Lo	O	O	
(N)	O	O	O
Hi	O		O

Turn Signal Switch

	G	LB	A	Bl/Br	Lb/W	A/W
R	O	O		O		O
N				O	O	O
L	O		O	O	O	



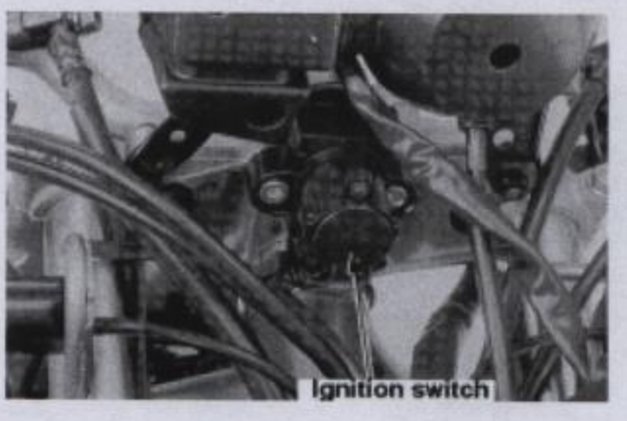
Ignition Switch
Inspection
Remove a headlamp (19-3).
Disconnect the ignition switch 3P (black) coupler and connector.
Check the following continuity between coupler terminals on ignition switch end.



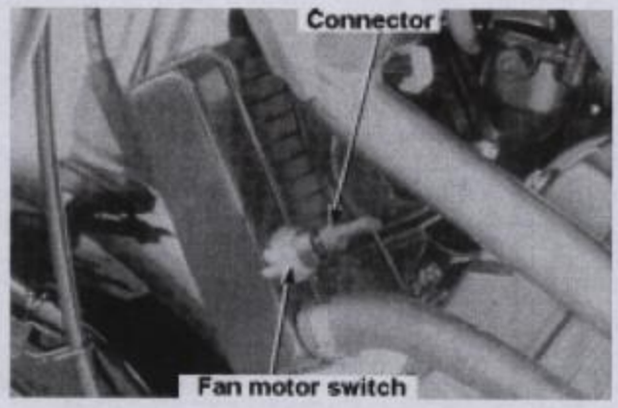
	R	R/Bl	Bu/A
ON	O	O	O
OFF			
LOCK			

Removal / Installation
Remove a headlamp (19-3).
Disconnect an ignition switch 3P (black) coupler.
Remove an ignition switch mount bolt by using a Torx bit T-60.

Reverse the above procedure for installation.



Fan Motor Switch



Inspection

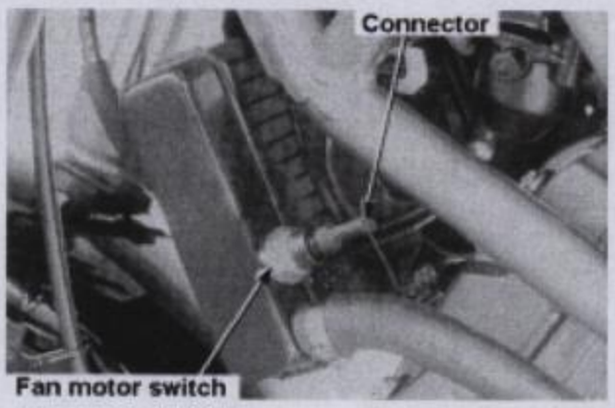
Fan motor does not stop
Turn ignition OFF. Disconnect the fan motor switch and turn ignition ON.

- If the fan motor does not stop, there is a short circuit between the motor and its switch.
- If the fan motor stops, replace the switch.

Fan motor does not work
Disconnect a connector from a fan motor switch and body earth the connector with a jumper lead.
Turn the ignition on.

- If the motor spools, check connection and then replace the fan motor switch.
- If the motor does not spool, check the voltage between a fan motor connector and the earth.

- Battery voltage exists: Fan motor fault
- Little / no voltage: Blown fuse (10A)
  - Wire harness open circuit
  - Coupler connection fault (between ignition switch –fuse box – fan motor switch).



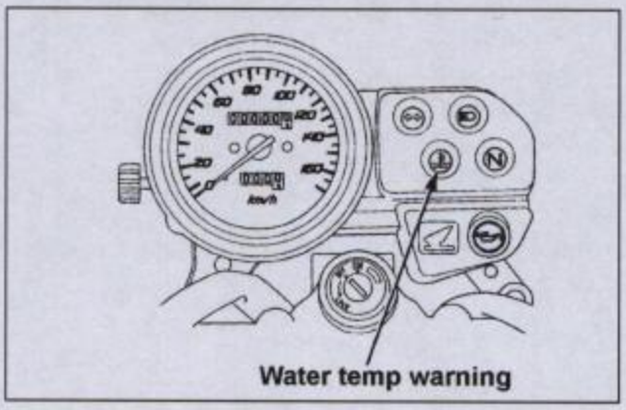
Removal / Installation

Remove a switch connector and remove a fan motor switch.
Install an O-Ring to a fan motor switch and secure the switch.
Torque: 18Nm (1.8kgf-m)

Thermo switch / Water temp warning

Troubleshooting

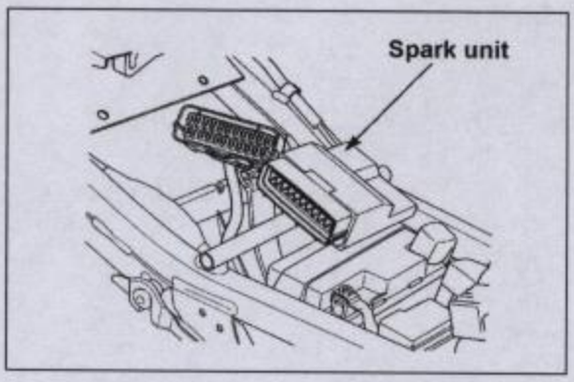
Notes
The water temp warning illuminates when the ignition is turned on and turns off after a few seconds.



Water temp warning does not turn on

Remove a seat (2-2).
Disconnect a spark unit coupler and earth the coupler G/Bu with a jumper lead.
Turn ignition ON and check the water temp warning:

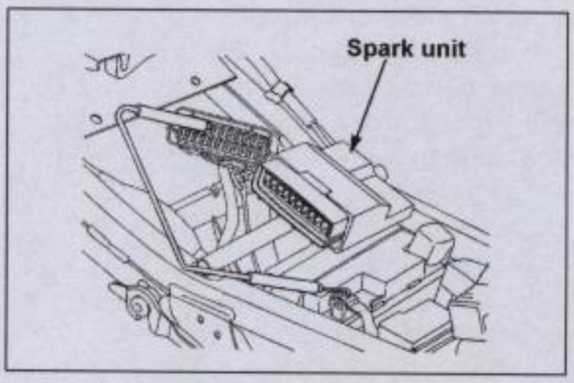
- Warning turns on
  Measure voltage between Bl/W end terminals of the spark unit.
  - Battery voltage: Faulty spark unit
  - Little/No voltage: Bl/W wire open circuit
    G terminal wire open circuit
- Warning does not turn on
  Check G/Bu terminal continuity and replace the warning lamp bulb.



Water temp warning stays on

Remove a seat (2-2).
Disconnect a spark unit coupler and turn the ignition on.
Check the warning lamp.

- Warning turns on
  Check G/Bu terminal for short circuit then replace the thermo switch.
- Warning does not turn on
  Connect a spark unit coupler and turn ignition on.
  Check the warning.
  - Goes on but never turns off
    - Spark unit failure



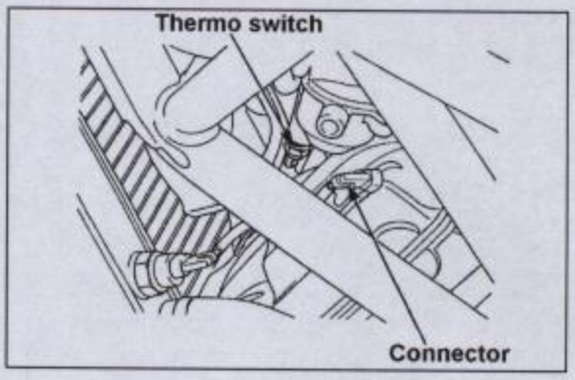
Thermo Switch

Removal

Notes

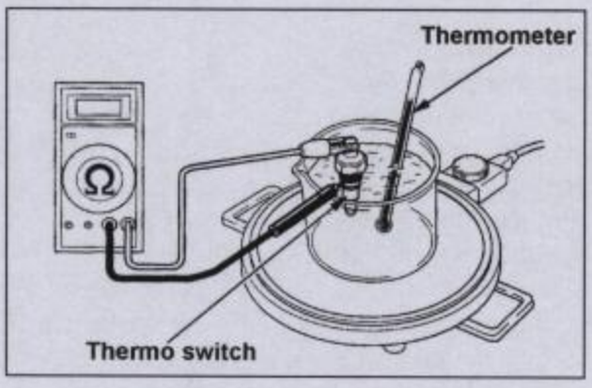
The thermo switch is sensitive to external shock. Check its operation before installing back if the thermostat has received any shock before.

Disconnect a connector.
Remove a thermostat switch from a thermostat housing.



Inspection

Place the thermo switch into a container filled with 50% coolant. Gradually increase the coolant temperature and check the continuity of the thermo switch.



Warning

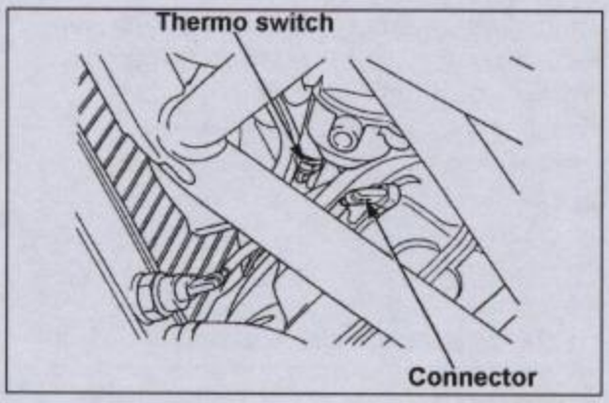
Do not place inflammable objects around.
Exercise caution for burning injury.

Notes

- Dip the switch up to its thread. Its end should be at least 40mm clear from the bottom of the container.
- Maintain constant coolant temperature for three minutes before starting measurement. Do not increase temp rapidly and do not touch the bottom of the container with a thermo-meter.

Standard

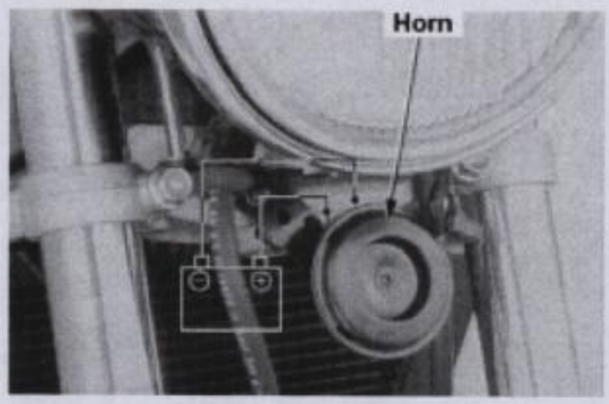
OFF – ON: 112 – 118°c
ON – OFF: 108°c or above
If the measured value is out of the above range, replace the thermo switch.



Installation

Apply sealant to the thermo switch thread (do not apply to its end).
Set the thermo switch to the thermostat case.
Connect the connector.

Horn



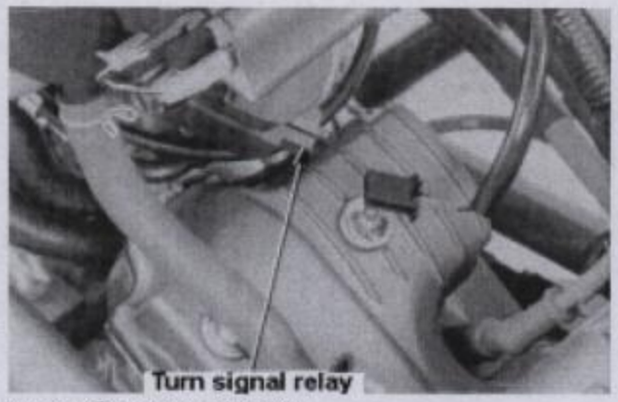
Inspection

Disconnect a horn connector.
Connect a fully-charged 12V battery.
The horn should activate on the moment the battery is connected.

Turn Signal Relay

Inspection

Remove a fuel tank (2-2).
Disconnect a turning signal relay coupler.
Connect the relay coupler Bl/Br and grey terminals with a jump lead.
Turn the ignition ON and operate the turn signal switch and check the signal activation.

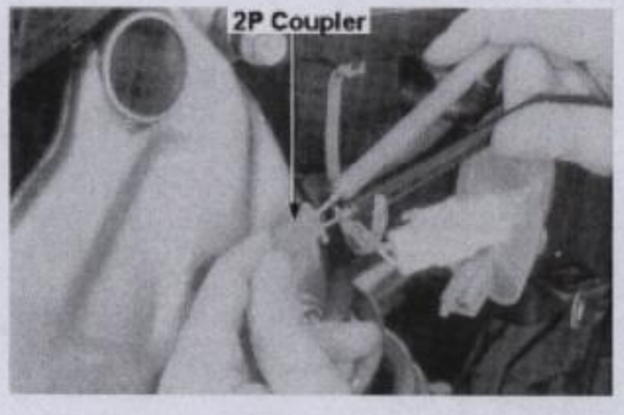


- If the signal does not activate, inspect a turn signal switch (19-11) or check grey or Bl/Br lead for open circuit.
- If the signal activates, check continuity between Green and earth.
  - No continuity: Green lead open circuit
  - Continuity exists: faulty relay coupler connection or faulty relay

Sidestand Switch

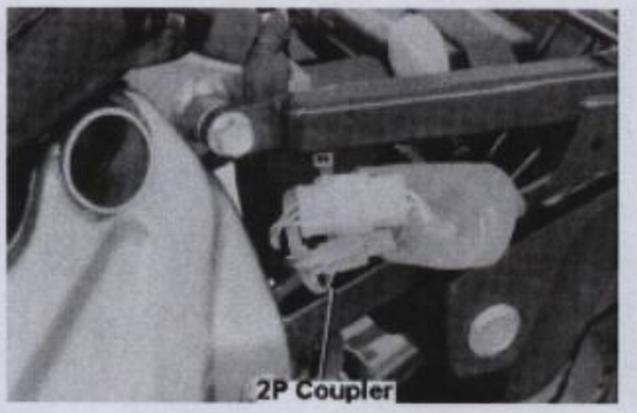
Inspection

Remove a seat (2-2).
Disconnect a sidestand switch 2P coupler.
Check continuity of the coupler terminals on the sidestand switch end.
Continuity should exist between green/white and green lead when the sidestand is extended.

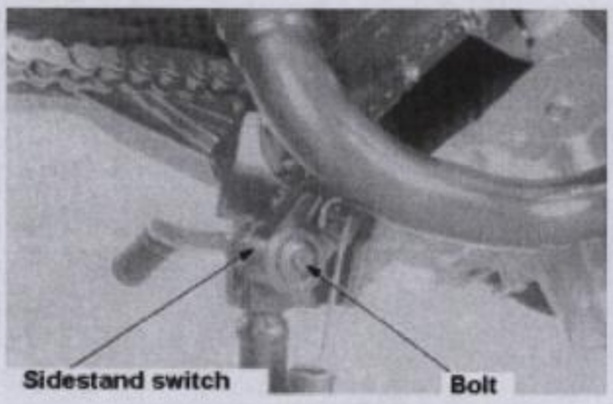


Removal

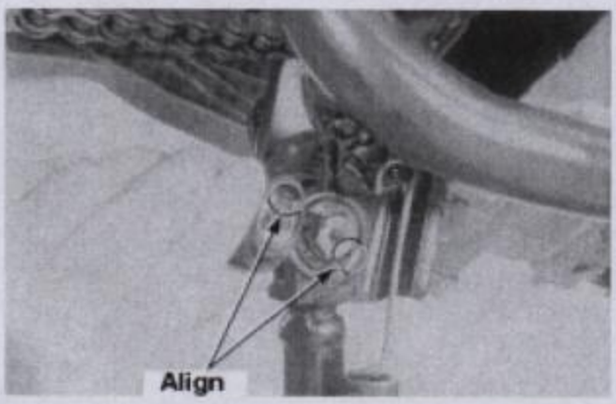
Remove a seat (2-2).
Disconnect the 2P coupler and remove a wire strap.



Unscrew a bolt to remove a sidestand switch.

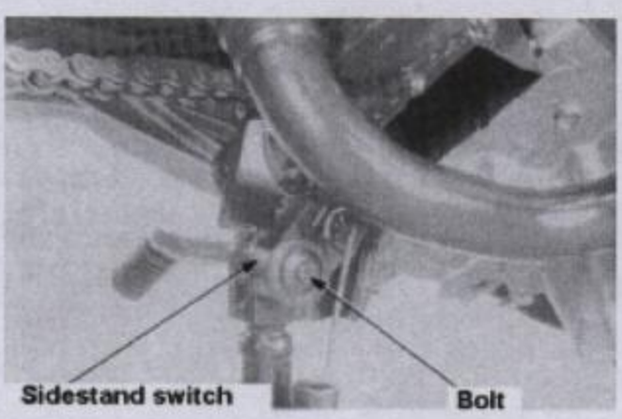


Installation
Install a sidestand switch by aligning a switch pin with a sidestand hole.



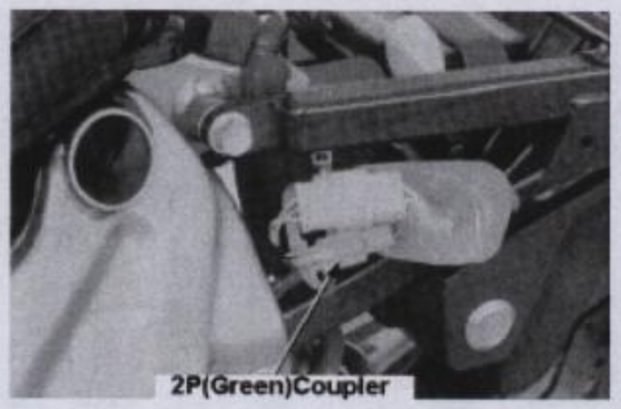
Secure a bolt

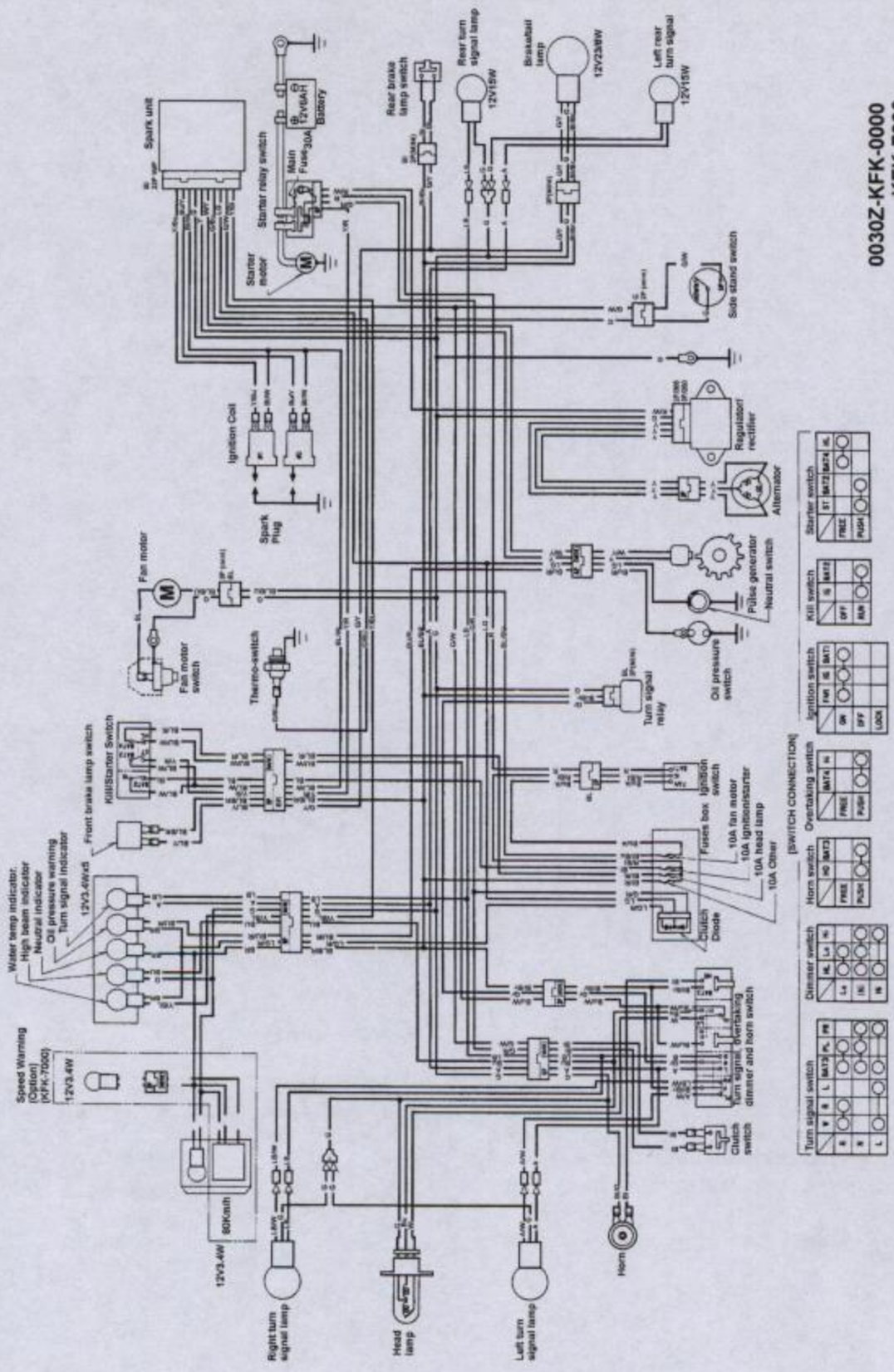
Torque: 10Nm (1.0kgf-m)



Connect a sidestand switch coupler 2P (Green) and secure with a wire strap.

Install a seat (2-2).

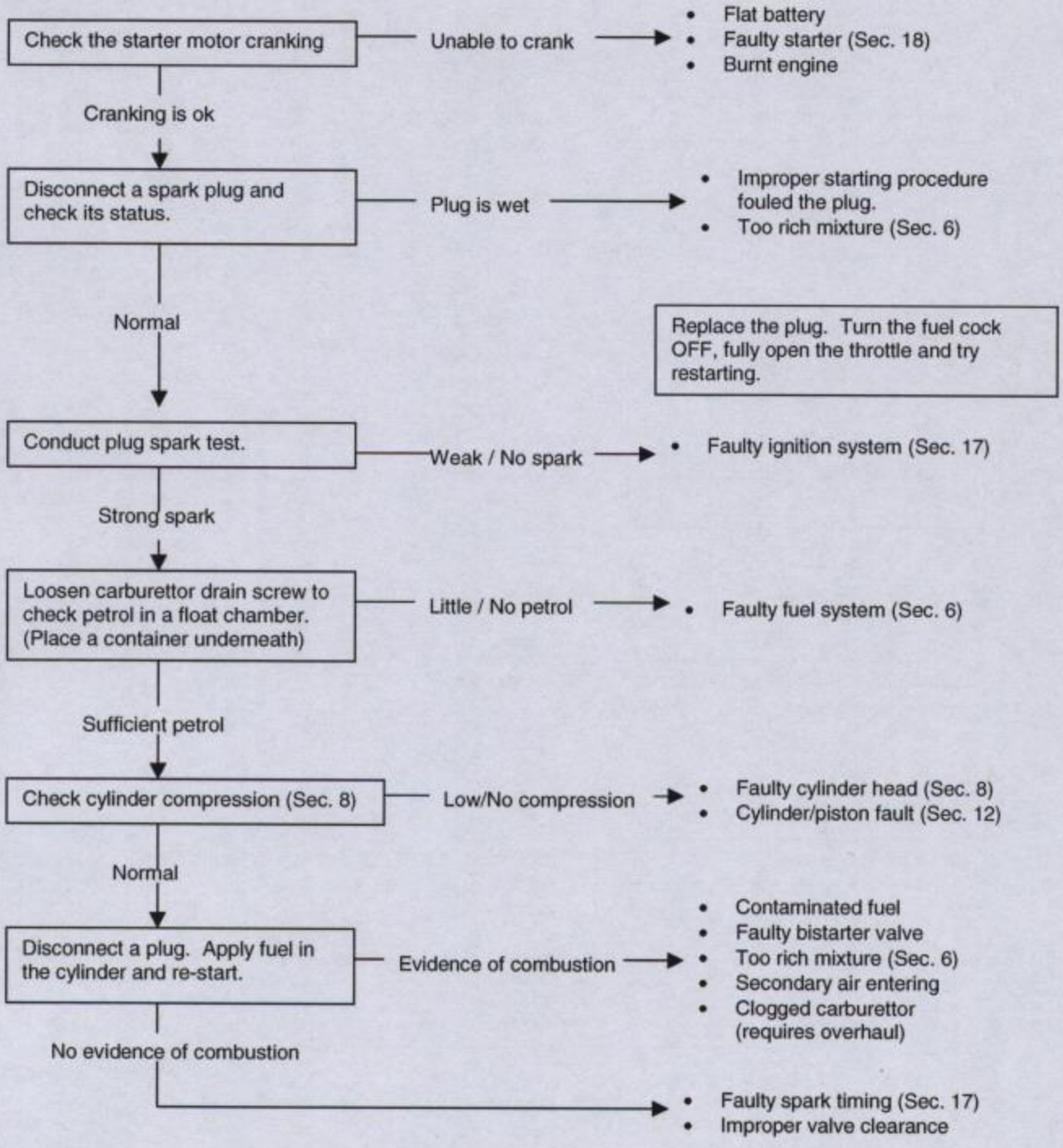



0030Z-KFK-0000
KFK-7000
Spark unit
Starter relay switch
Main Fuse 30A
Battery
Starter motor
Rear brake lamp switch
Rear turn signal lamp 12V15W
Brake/tail lamp 12V23/8W
Left rear turn signal 12V15W
Side stand switch
Ignition Coil
Spark Plug
Regulator/ rectifier
Alternator
Fan motor
Fan motor switch
Thermo-switch
Pulse generator
Neutral switch
Oil pressure switch
Turn signal relay
Front brake lamp switch
Kill/Starter Switch
Ignition switch
Fuses box
10A fan motor
10A Ignition/starter
10A head lamp
10A Other
Clutch Diode
Water temp indicator
High beam indicator
Neutral indicator
Oil pressure warning
Turn signal indicator
12V3.4Wx5
Speed Warning (Option) (KFK-7000)
12V3.4W
80Km/h
12V3.4W
Right turn signal lamp
Head lamp
Left turn signal lamp
Horn
Clutch switch
Turn signal switch
Dimmer switch
Horn switch
Overtaking switch
Kill switch
Starter switch
[SWITCH CONNECTION]

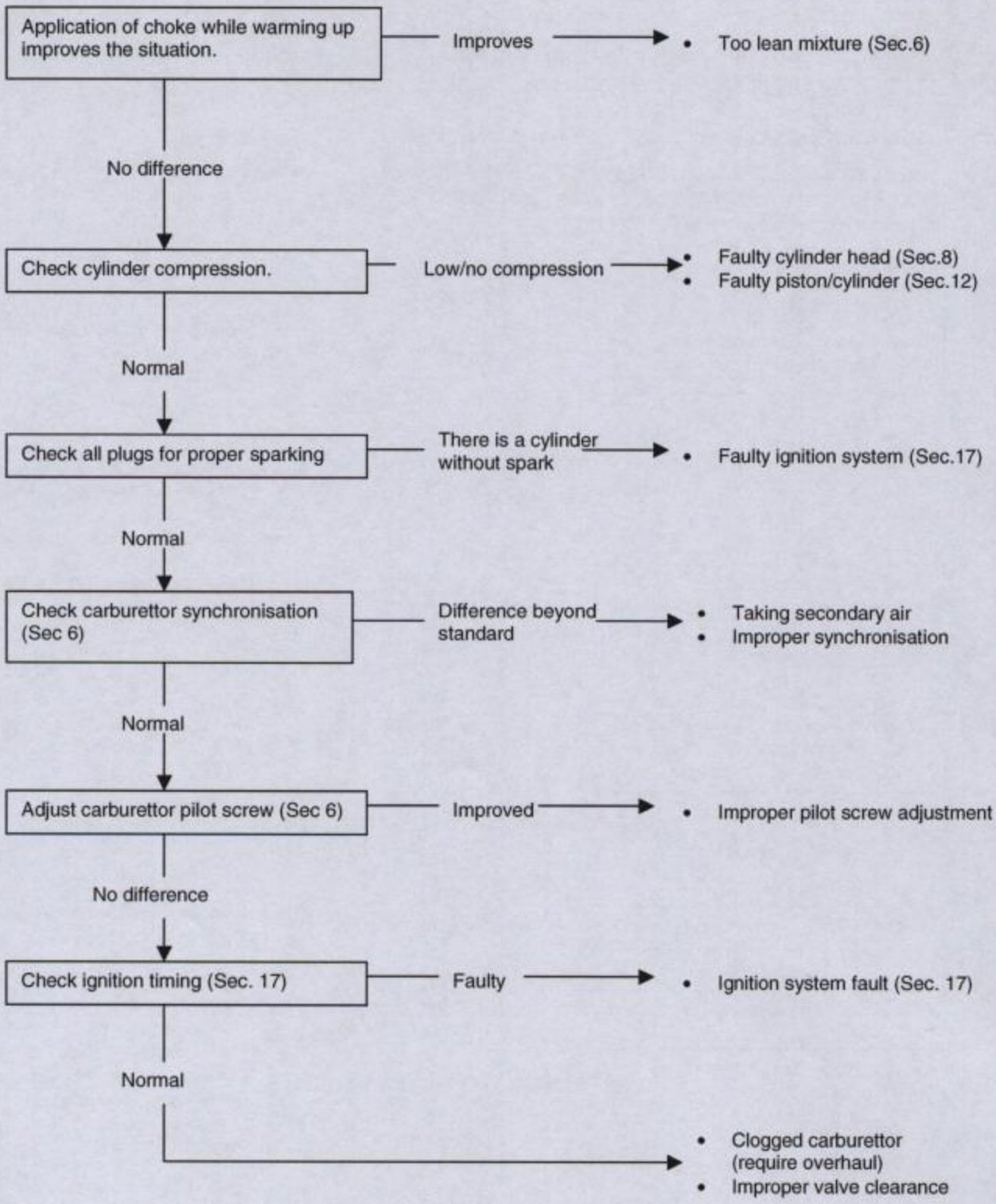
Unable/Difficult to start.....	21 – 1	Unstable mid/high rpm.....	21 – 3
Unstable idling / low rpm.....	21 – 2	Lack of power / acceleration.....	21 - 4

Some major troubleshootings with regards to the engine are described in this section. Refer to each section for the rest of troubleshootings.

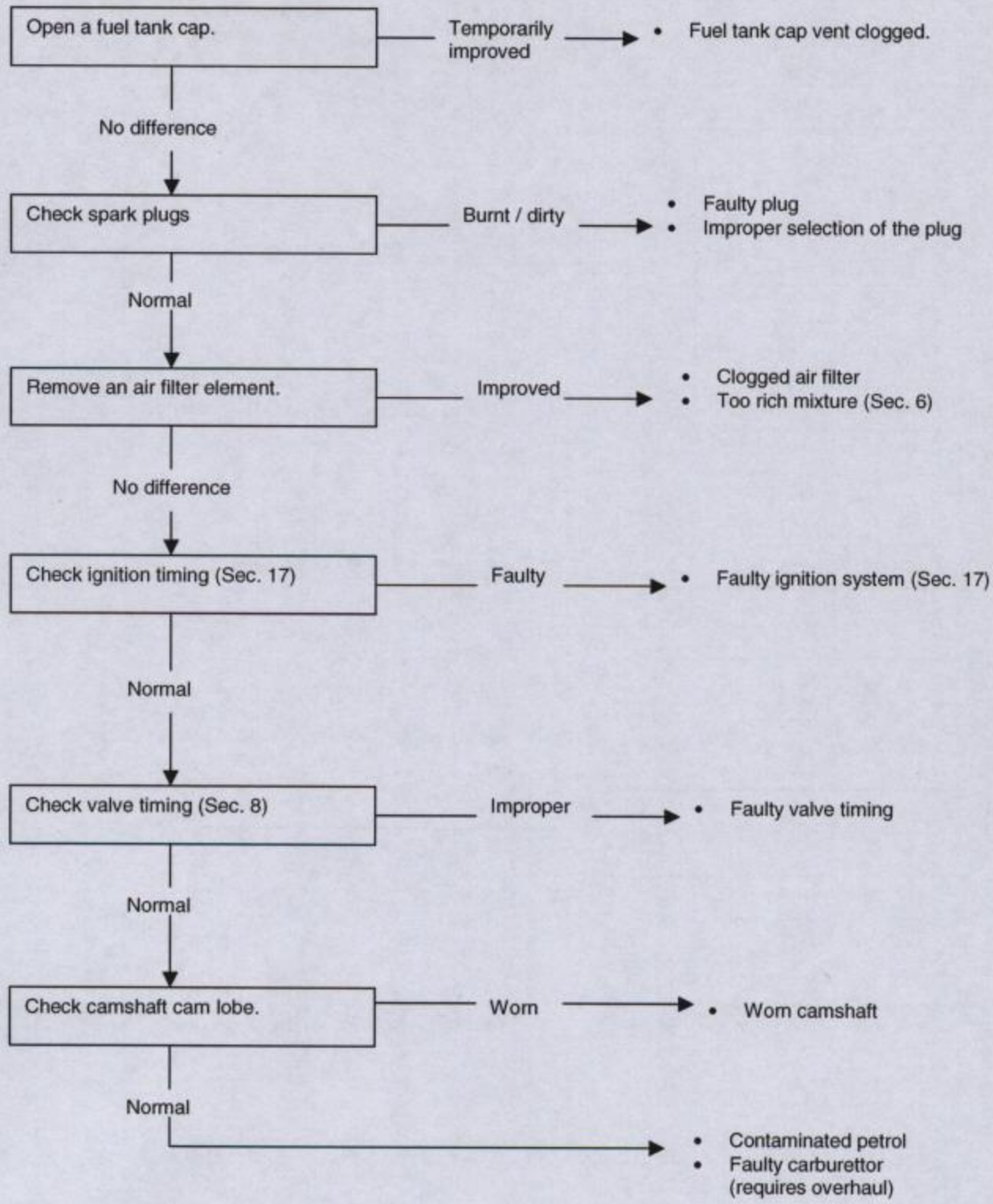
Unable / difficult to start



Unable idling / low rpm



Unstable mid/high rpm



Lack of power/acceleration