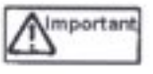
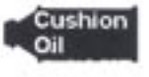
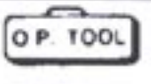
HONDA
CRM250R

WORKSHOP
SERVICE
MANUAL

Table Of Contents

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.

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

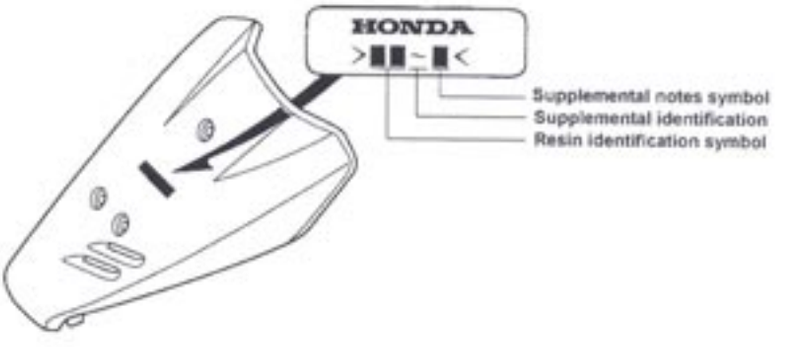
Specification and other data are based on the units initially specified.

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:

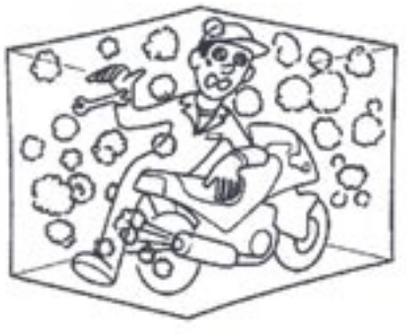
LENS > PMMA <
HSG > ABS <

Component

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

Caution

Exhaust fumes are toxic always operate the engine in a well ventilated area.



Caution

Exhaust and engine components become very hot during operation. Allow machine to cool before commencing work

Caution

Battery acid is corrosive and can burn skin
If splashed on skin or eves. rinse with fresh.

Caution

Working around any machinery can be dangerous. Always wear proper footwear and protective clothing

Caution

Radiator Coolant is toxic and should not be swallowed. Keep out of reach of children.

Caution

Gasoline is highly flammable. Do not smoke and keep naked flame away at all

Caution

Fumes given off by batteries are explosive. Keep sparks or flame away at all times

Caution

Brake dust is dangerous to your health. Do not blow dust out with compressed air. Avoid breathing dust during work on brake system.

Caution

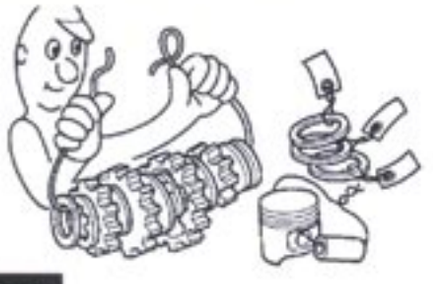
Keep hands and feet away from moving parts at all times.

Caution

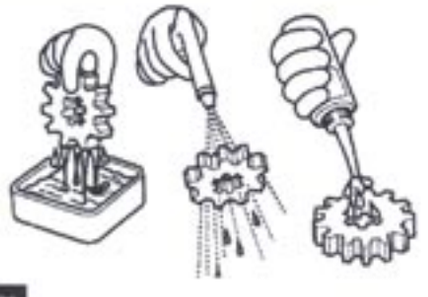
Always be aware of others and take care when working together.

Caution Always use and insist on Genuine Honda Parts.

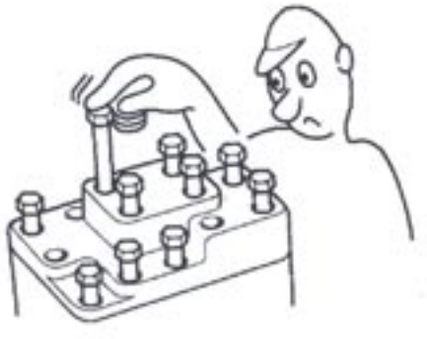
Caution Keep all parts together to avoid confusion on reassembly.



Caution Clean all parts thoroughly, blow them dry and lubricate with clean oil, prior to assembly.



Caution Note the position of bolts or washers on disassembly, to avoid confusion on reassembly.

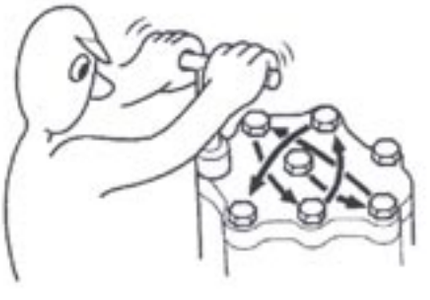


Caution Clean machine and all parts prior to commencing work.

Caution Always replace "O" rings, split pins, circlips and gaskets with new ones, on reassembly.

Caution Note the number of turns the pilot screw is out, to enable correct setting on reassembly..

Caution Always tighten bolts in the correct sequence, as per workshop manual.



Caution Do not use solvents or engine oil on rubber components as they may cause cracking or matting.

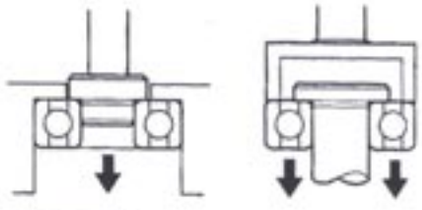
Caution Always use correct/special tools – where specified.

Caution Check bearings for "gritty" operation and excessive free play in ball races.

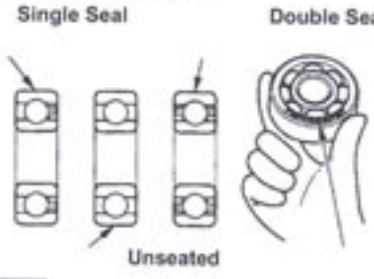
Caution Thoroughly blow-dry the bearing after washing – but do not over-speed bearing as it may fly apart.

Caution Always apply the correct grease to seals and bushes on reassembly.

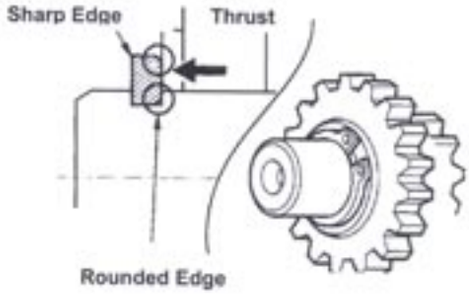
Caution Wherever bearings are removed by pressing or force – do not re-use. Replace with new bearing..



Caution Ensure the bearing is correctly installed – with seals facing correctly – if fitted.

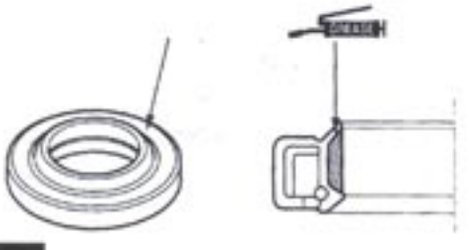


Caution Ensure that circlips are installed correctly – rounded edge should face the thrust direction

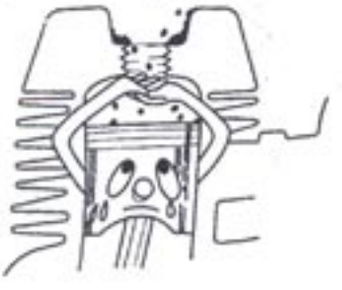


Caution Check for smooth/correct operation after reassembly.

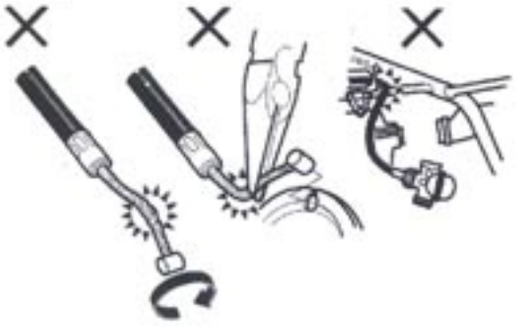
Caution Apply the correct grease to all seals on reassembly.



Caution Be careful not to allow dirt/carbon to fall into spark plug hole when plugs are removed.

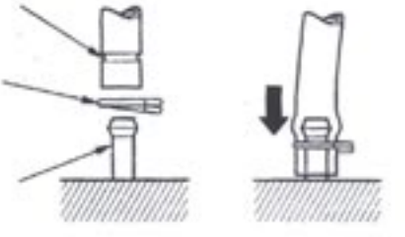


Caution Be careful not to sharply bend cables or wiring or improper operation or failure may occur.



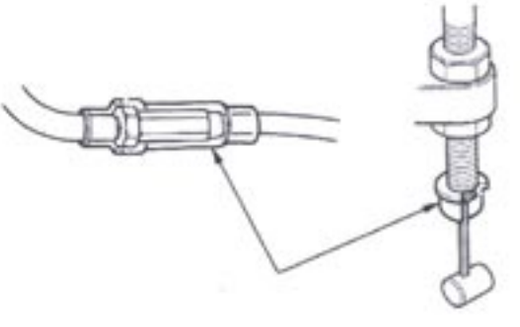
Caution Thoroughly clean machine and inspect for oil/coolant leaks after reassembly.

Caution When refitting vacuum fuel or breather hoses, ensure that hose is fully home and circlip is correctly fitted. Hose must be replaced if it is loose, split or hardened.



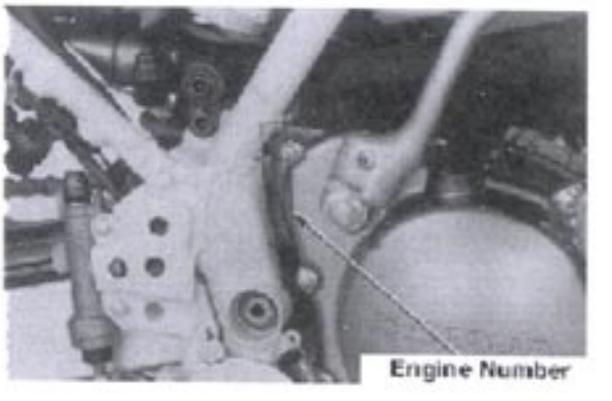
Caution Carefully remove old gaskets and clean mating surfaces with a fine oil stone.

Caution Ensure that cable covers or dust seals are correctly fitted or cable operation maybe affected.

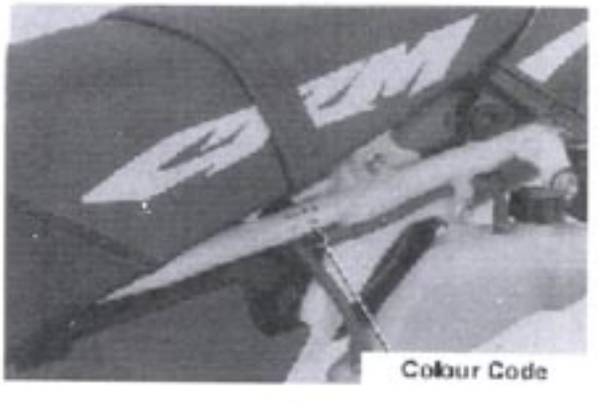


- ⇨ Frame Number: MD32 – 1000001~
- ⇨ Engine Number: MD32E – 1000001~


Frame/VIN Number


Engine Number


Carburettor Number


Colour Code

- **Major specifications**

Item		Specification
Model		Honda MD32
Overall length		2,195 mm
Overall span		825 mm
Overall height		1,215 mm
Wheelbase		1,460 mm
Powerplant		MD32E
Engine capacity		0.249 litres
Type of fuel		petrol
Vehicle weight	front axle	62 kg
	rear axle	65 kg
	Total	127 kg
Capacity		2 people
Vehicle gross weight	front axle	89 kg
	rear axle	148 kg
	Total	237 kg
Tyre size	front	3.00-2151P
	rear	4.60-1863P
Rim size	front	21x1.60
	rear	18x2.15
Minimum clearance		320mm
Brake-stop distance		14.5m from 50kph
minimum turning radius		2.3m
Powerplant starting method		kick-start
type		petrol two-stroke
cylinder layout		single cylinder, horizontal
combustion chamber		hemisphere
valve operation		dual lead and piston valves
bore x stroke		66.4x72.0 mm
compression ratio		6.7 : 1
maximum power		40PS @ 8,000 rpm
maximum torque		4.0 kgm @ 6,500 rpm
port operation inlet	open	Automatic control
	close	Automatic control
exhaust	open	56-93 deg. BBDC
	close	56-93 deg. ABDC
transfer	open	55 deg. BBDC
	close	55 deg. ABDC
valve clearance	inlet	-
	exhaust	-
unloaded revolution		1,400 +/- 100rpm
lubrication		separate lubrication
oil pump		plunger
oil filter		total flow, screen
oil capacity		1.2 litres
cooling system		water cooling, sealed
Fuel system air filter		Urethane foam
fuel tank capacity		11 litres
carburettor type		PE1A
valve diameter		34mm

Item		Specification
Electrical system	Ignition type	CDI magnet
Ignition timing		15° BTDC @ 1,400rpm
Spark plug	Standard	BR8ES(NGK), W24ESR-U(DENSO)
	Low speed	BR7ES(NGK), W22ESR-U(DENSO)
	High speed	BR9ES(NGK), W27ESR-U(DENSO)
plug gap		0.7 - 0.8 mm
Transmission	Clutch Type	Multiple wet-plate coil spring
	Operation	mechanical
Initial reduction		Gear
Ratio		2.600 (65/25)
Gear box		Full time contact
Operation		Left foot pedal
Ratio	1st	2.58 (33/13)
	2nd	1.764 (30/17)
	3rd	1.400 (28/20)
	4th	1.090 (24/22)
	5th	0.909 (20/22)
	6th	0.807 (21/26)
Final reduction		chain
Ratio		3.000 (42/14)
Driving system	Caster	27°35'
	Trail	113 mm
Tyre pressure	front	1.50 kg/cm^2
	rear	1.50 kg/cm^2
Steering system left	Steering angle	45°
	right	45°
Braking system Type	Front	Hydraulic disc
	Rear	Hydraulic disc
Suspension	Front	Telescopic
	Rear	Swing arm
Frame type		Semi-double cradle
Frame serial number		MD32-1000001 -
Engine serial number		MD32E-1000001 -

- **Service specification**

Lubrication system

Item		Standard	Service Limit
Engine oil capacity		1.2 litres	-
Designated engine oil		Genuine Honda Ultra GR2 or Equivalent	-
Transmission oil	Total capacity	0.65 litres	-
	Oil change	0.54 litres	-
Recommended transmission oil		Honda Ultra-U (Two-stroke motorcycle, SAE 10W-30) or API-SE, -SF, -SG class oil	-
Lubrication style		Separate filling	-
Oil filter type		Total flow, filter screen	-
Oil pump type		Plunger	-

Cooling system

Item		Standard	Service Limit
Coolant capacity on disassembly		1.25 litres	-
	coolant change	1.2 litres	-
	reservoir capacity	0.2 litres	-
Standard coolant density		30%	-
Radiator cap valve opening pressure		108-137 kPa (1.1-1.4 kgf/cm^2)	-
Thermostat Valve opening temperature		62°	-
Full-open temperature		72°	-
Full-open lifting		4 mm or above	-

Fuel system

Item		Standard	Service Limit
Carburettor	Type	PE1AA	-
	Setting mark	PE1AA -A	-
	Venturi diameter	32	-
	Air screw opening	1 + 3/4	-
	Float level	16.0	-
	Idling rpm	1,400 +/- 100 rpm	-
	Main jet	#148	-
	Slow jet	#48	-
Throttle grip free play		2 to 6	-

Cylinder head, cylinder and piston

Item		Standard	Service Limit
Cylinder compression		1,225kPa (12.5kg/cm^2)@400rpm	-
Cylinder and piston selection		refer to 8-10	
Cylinder head and cylinder Top warpage			0.10
Bore	At "A" mark	66.420 - 66.415	-
	At "B" mark	66.414 - 66.410	-
	At "C" mark	66.409 - 66.405	-
Warpage			0.10
	Out-of-round		0.05
	Taper		0.05
Piston, Piston ring and piston pin Installing direction		"IN"mark towards inside	-
Piston diameter (15mm from skirt bottom end) At "A" mark		66.370 - 66.365	-
	At a symbol	66.364 - 66.360	-
	At "C" mark	66.359 - 66.355	-
Piston pin hole bore		19.002 - 19.008	19.03
Piston pin diameter		18.994 - 19.000	18.97
Connecting rod small end bore		22.997 - 23.009	23.03
Cylinder-piston clearance		0.070 - 0.080	0.10
Piston-piston pin clearance		0.002 - 0.014	0.03
Piston ring end gap	Top	0.40 - 0.55	0.60
	Second	0.40 - 0.55	0.60
Piston ring installing direction		A mark facing upwards	-

Clutch, Kick starter, and gear shift linkage

Item		Standard	Service Limit
Clutch Clutch lever free play		10 - 20	-
Clutch spring free play		44.8	43.30
Clutch disc thickness		3.0	2.90
Clutch outer bore		32.025 - 32.000	-
Clutch outer guide Diameter		27.987 - 28.000	27.97
Bore		23.000 - 23.021	23.03
Clutch plate warpage		-	0.20
Main shaft diameter (at a clutch outer guide)		22.959 - 22.980	22.94
Kick starter Spindle diameter		19.959 - 19.980	19.94
Pinion gear bore		23.020 - 23.041	23.06
Pinion gear bush Diameter		22.979 - 23.000	22.97
Bore		20.000 - 20.021	20.03
Idling gear bore		20.020 - 20.041	22.06
Idling gear bush Diameter		19.979 - 20.000	19.96
Bore		16.800 - 16.818	16.79
Counter shaft diameter at idling gear		16.766 - 16.784	16.75

Front wheel, suspension and steering

Item		Standard	Service Limit
Front wheel	Axle bending	-	0.2
Rim runout	Axial	2.0	-
	Radial	2.0	-
Tyre	Tread	-	3.0
Pressure	One person	150kPa(1.50kgf/cm^2)	-
	Two people	150kPa(1.50kgf/cm^2)	-
Fork	Spring relaxed length	486.3	481.4
Oil quantity		693cm^3	-
Oil level		95	-
Type of oil		Honda Ultra cushion oil #10	-
Tube bending		-	0.2
Steering load		2.0 - 2.7Nm(0.2 - 0.28kgfm)	-

Rear wheel and suspension

Item		Standard	Service Limit
Rear wheel	Axle bending	-	0.2
Rim runout	Axial	2.0	-
	Radial	2.0	-
Tyre	Tread	-	3.0
Pressure	One person	150kPa (1.50kgf/cm^2)	-
	Two people	150kPa (1.50kgf/cm^2)	-
Drive chain	Slack	30 - 40	-
Size/Link	RK	520 MOZ9/110 LE	-
	DID	520 VC5/110 LE	-
Drive chain slider thickness		-	wear limit
Rear cushion spring standard set length		232.4 (cushion-free)	-

Brake system

Item		Standard	Service Limit
Brake fluid		DOT 4	
Front Brake Lever Free Play		10~20mm	
Rear Brake Lever Free Play		10~20mm	
Brake Pad Thickness		-	
Brake Disc Runout		-	0.15
Brake Disc Thickness	Front	3.5	3.0
	Rear	4.5	4.0
M/Cylinder I.D	Front	12.700-12.743	12.76
	Rear	14.000-14.043	14.06
M Cylinder Piston O.D	Front	12.657-12.684	12.64
	Rear	13.957-13984	13.95
Brake Caliper I.D	Front	27.000-27.050	27.10
	Rear	27.000-27.050	27.10
Caliper Piston O.D	Front	26.900-26.950	26.84
	Rear	26.935-26.968	26.89

Lighting System

Item		Standard
Alternator	Type	Three Phase AC
	Output	211 W / 5,000 rpm
	Lighting Coil Resistance (20°C)	0.2 – 0.4 Ω
Regulator / Rectifier	Type	Three Phase Regulation SCR Short Circuit
	Regulating Voltage	14.0-14.8 V/3,000 rpm Headlamp Hi-Beam, Neutral, Measured with a Digital multimeter DC range.

Ignition system

Item	Standard
Ignition type	CDI, magnet ignition
Spark plug Standard	NGK:BR8ES DENSO:W24ESR-U
Low-speed operation	BR7ES W22ESR-U
High-speed operation	BR9ES W27ESR-U
Spark plug gap	0.7 - 0.8mm
Ignition timing "F" mark	15° BTDC@1,400rpm
Maximum advance angle	27° BTDC@3,500rpm
Ignition coil Type	MP13
Resistance@20°C Primary coil	0.1 - 1.0 Ohm
Secondary coil (with plug cap)	8 - 14 Ohm
Secondary coil (without plug cap)	4 - 8 Ohm
Peak voltage	100V or above
Pulse generator Resistance@20°C	290 - 360 Ohm
Peak voltage	0.7V or above

Lamps, Instruments, and Switches

Item	Standard
Fuses	5A
Bulbs Head lamp illumination	DC, magnet
Head lamp	12V-60/55W
Stop and tail lamp	12V-5/18W
Front turn signal	12V-15/(5)W x2
Rear turn signal	12V-15W x2
Instrument lamp	12V-3.4W
Turn signal pilot lamp	12V-3.4W
High beam pilot lamp	12V-1.7W
Neutral lamp	12V-3.4W
Side stand pilot lamp	12V-3.4W
Thermo-sensor resistance @50°C	9 - 10 kOhm
@80°C	2.5 - 3.5 kOhm
@120°C	0.6 - 0.75 kOhm

- **Torque Settings**

Standard Torque Settings

Type	Torque Nm(kgfm)	Type	Torque Nm(kgfm)
5mm bolt, nut	5 (0.5)	5mm screw	4 (0.4)
6mm bolt, nut	10 (1.0)	6mm screw, SH bolt	9 (0.9)
8mm bolt, nut	22 (2.2)	6mm flange bolt, nut	12 (1.2)
10mm bolt, nut	34 (3.5)	8mm flange bolt, nut	26 (2.7)
12mm bolt, nut	54 (5.5)	10mm flange bolt, nut	39 (4.0)

All bolts/nuts should be tightened to the standard torque unless specified in the following tables:

Notes: 1. Apply sealant to the thread
2. Apply screw locking agent to the thread
3. Apply transmission oil to the thread and the seat
4. Alloc bolt (replace if removed)
5. Apply grease
6. U-nut
7. Stake

Engine

Item	qty	screw dia. (mm)	Torque setting Nm (kgfm)	Notes
Oil check bolt	1	6	10 (1.0)	
Drain bolt	1	12	25 (2.6)	
Spark plug	1	14	18 (1.8)	
Water pump drain bolt	1	6	10 (1.0)	
Water pump impeller	1	7	12 (1.2)	
Needle jet holder	1	-	2.5 (0.25)	
Reed valve screw	3	3	1 (0.1)	1.
Cylinder head cap nut	4	8	26 (2.7)	
Cylinder head bolt	2	8	26 (2.7)	
Cylinder stud bolt	4	8	12 (1.2)	
Cylinder flange nut	4	10	42 (4.3)	
Cylinder Assy flange bolt	6	6	10 (1.0)	
ARC/V shaft nut	1	6	12 (1.2)	
Clutch centre nut	1	18	74 (7.5)	7.
Shift drum centre pin	1	8	22 (2.2)	2.
Primary drive gear bolt	1	10	78 (8.0)	3.
Balancer driven gear nut	1	12	54 (5.5)	7.
Flywheel nut	1	12	70 (7.1)	
Pulse generator bolt	4	5	6 (0.6)	
Gear shift switch wire clamp bolt	1	5	6 (0.6)	

Frame

Item	Qty	Screw dia.(mm)	Torque Nm (kgfm)	Notes
Exterior parts, muffler, sub frame				
Rear fender mount bolt	2	6	12 (1.2)	
Exhaust pipe joint cap nut	2	8	26 (2.7)	
Muffler joint strap nut	1	8	12 (1.2)	
Chamber protector bolt	2	6	18 (1.8)	
Inspection/Adjustment				
Rear master cylinder rid lock nut	1	8	18 (1.8)	
Spoke nipple	68	-	2.45-4.9 (0.25-0.50)	
Fuel system				
Fuel cock	1	18	26 (2.7)	
Air filter case mount bolt	1	6	12 (1.2)	
(Title in the figure: Insulator strap screw)				
Engine mount				
Engine hanger bolt (front/lower)	2	10	74 (7.5)	
Cylinder head hanger plate bolt (cyl. Head)	1	10	49 (5.0)	
(frame)	2	8	26 (2.7)	
Swing arm pivot bolt	1	14	108 (11.0)	6
Front wheel, fork, steering				
Front axle nut	1	14	84 (8.6)	
Front axle holder nut	4	8	20 (2.0)	
Front brake disc bolt	4	6	20 (2.0)	4
Top bridge bolt	4	8	31 (3.2)	
Steering stem nut	1	24	98 (10.0)	
Steering top thread	1	26	6.4 (0.65)	
Rear wheel, suspension				
Rear axle nut	1	16	93 (9.5)	6
Rear brake disc bolt	4	8	42 (4.3)	4
Driven sprocket nut	6	8	32 (3.3)	6
Swing arm pivot nut	1	14	108 (11.0)	6
Rear cushion mount bolt (upper)	1	10	74 (7.5)	
bolt/nut (lower)	1	10	54 (5.5)	6
Rear cushion spring lock nut	1	56	88 (9.0)	
Shock link plate bolt/nut	2	10	54 (5.5)	6
Shock arm bolt/nut (frame end)	1	10	54 (5.5)	6
Chain slider screw	2	5	4.2 (0.43)	4

Item	Qty	Screw dia. (mm)	Torque Nm (kgfm)	Notes
Brake system				
Front reservoir cover screw	2	4	1.5 (0.15)	
Front stop lamp switch screw	1	4	1.2 (0.12)	
Brake lever pivot bolt	1	6	6 (0.6)	5
nut	1	6	6 (0.6)	
Brake hose oil bolt	4	10	34 (3.5)	
Front caliper mount bolt	2	8	30 (3.1)	4
Caliper hanger pin	2	10	18 (1.8)	
Caliper plug pin	2	10	2.5 (0.25)	
Caliper pin bolt	2	8	12 (1.2)	2
Caliper bleeder	2	8	5.5 (0.55)	
Front caliper pin bolt A	1	8	22 (2.2)	2
Rear master cylinder mount bolt	2	6	10 (1.0)	2
Rear master cylinder rod lock nut	1	8	18 (1.8)	
Rear brake hose guide screw	2	5	4.2 (0.43)	4
Rear caliper pin bolt	1	12	27 (2.8)	
Turn signal, switches				
Turn signal screw	4	4	0.9 (0.09)	
Ignition switch bolt	2	8	26 (2.7)	2
Others				
Side stand pivot bolt	1	10	10 (1.0)	Tighten and wind back 45-90°
Side stand nut	1	10	39 (4.0)	6
Side stand switch bolt	1	6	10 (1.0)	4
Pillion step bracket	4	8	26 (2.7)	4
Kick starter arm bolt	1	8	37 (3.8)	4

Special tools

Tool name	Tool number	Section
Float level gauge	07401-0010000	6
Clutch centre holder	07724-0050002	9
Universal holder	07725-0030000	14
Fly wheel puller	07733-0010000	14
Remover weight	07741-0010201	10
Outer driver 32x35mm	07746-0010100	9
Outer driver 37x40mm	07746-0010200	9
Outer driver 42x47mm	07746-0010300	11
Outer driver 52x55mm	07746-0010400	10
Outer driver62x68mm	07746-0010500	10
Outer driver24x26mm	07746-0010700	5, 12
Pilot 12mm	07746-0040200	5
Pilot 25mm	07746-0040600	10
Pilot 28mm	07746-0041100	10
Bearing remover shaft	07746-0050100	11
Bearing remover head 17mm	07746-0050500	11
Driver handle A	07749-0010000	5, 10, 11, 12
Snap ring pliers	07914-3230001	13
Steering stem socket	07916-KA50100	11
Bearing remover set 12mm	07936-1660001	5, 10
Bearing remover 12mm	07936-1660110	
Remover shaft	07936-1660120	
Remover weight	07741-0010201	
Remover handle	07936-3710100	10
Bearing remover 17mm	07936-3710300	10
Bearing remover set 15mm	07936-KC10000	12
Bearing remover 15mm	07936-KC10200	
Remover shaft	07936-KC10100	
Remover weight	07741-0010201	
Bearing remover set 25mm	07936-ZV10000	10
Bearing remover 25mm	07936-ZV10100	
Remover weight	07741-0010201	
Steering stem driver	07946-4300101	11
Spherical bearing remover	07946-KA30200	12
Needle bearing remover	07946-KA50000	12
Driver shaft	07946-MJ00100	12
Oil seal (ball race) remover	07948-4630100	11
Crankcase assembly tool set	07965-1660102	10
Assembly shaft	07965-1660200	
Assembly collar	07965-1660302	

Special tools (cont'd)

Tool name	Tool number	Section
Needle bearing remover	07GMD-KT80100	12
Peak voltage adapter	07HGJ-0020200	15
Drive chain cutter	07HMH-MR10103	3
Oil seal driver	07KMD-KZ30100	11
Fork slider spacer	07KMZ-KZ30101	11
Mechanical seal driver attachment	07PMD-KBP0100	5

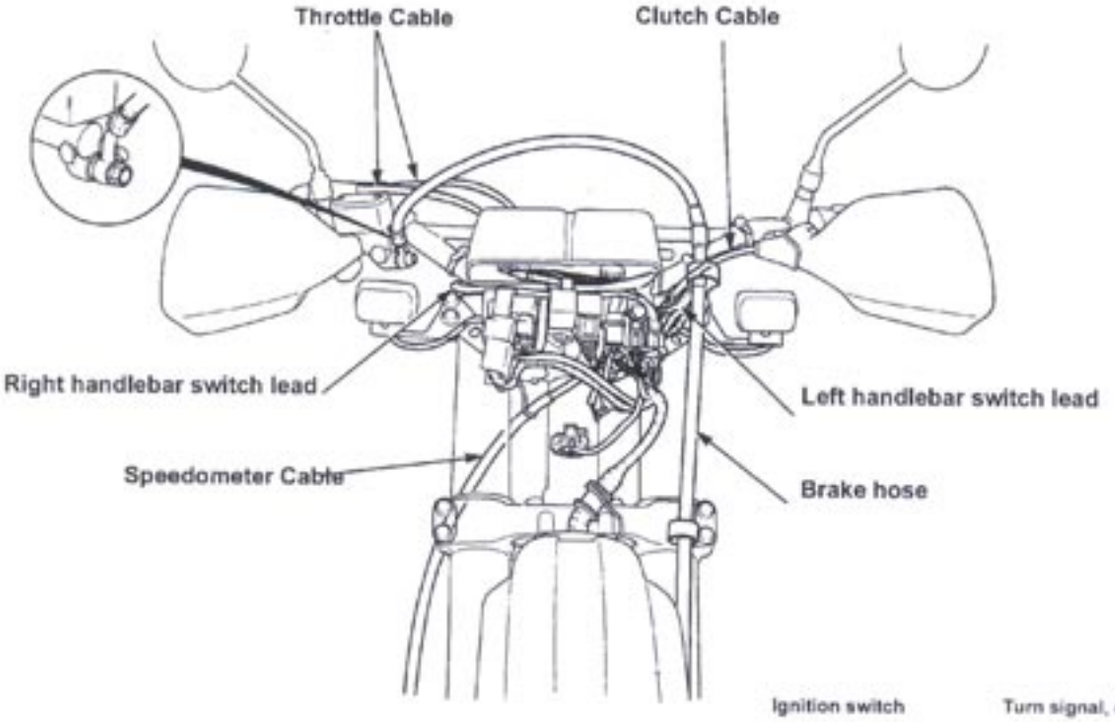
Lubrication, Sealant

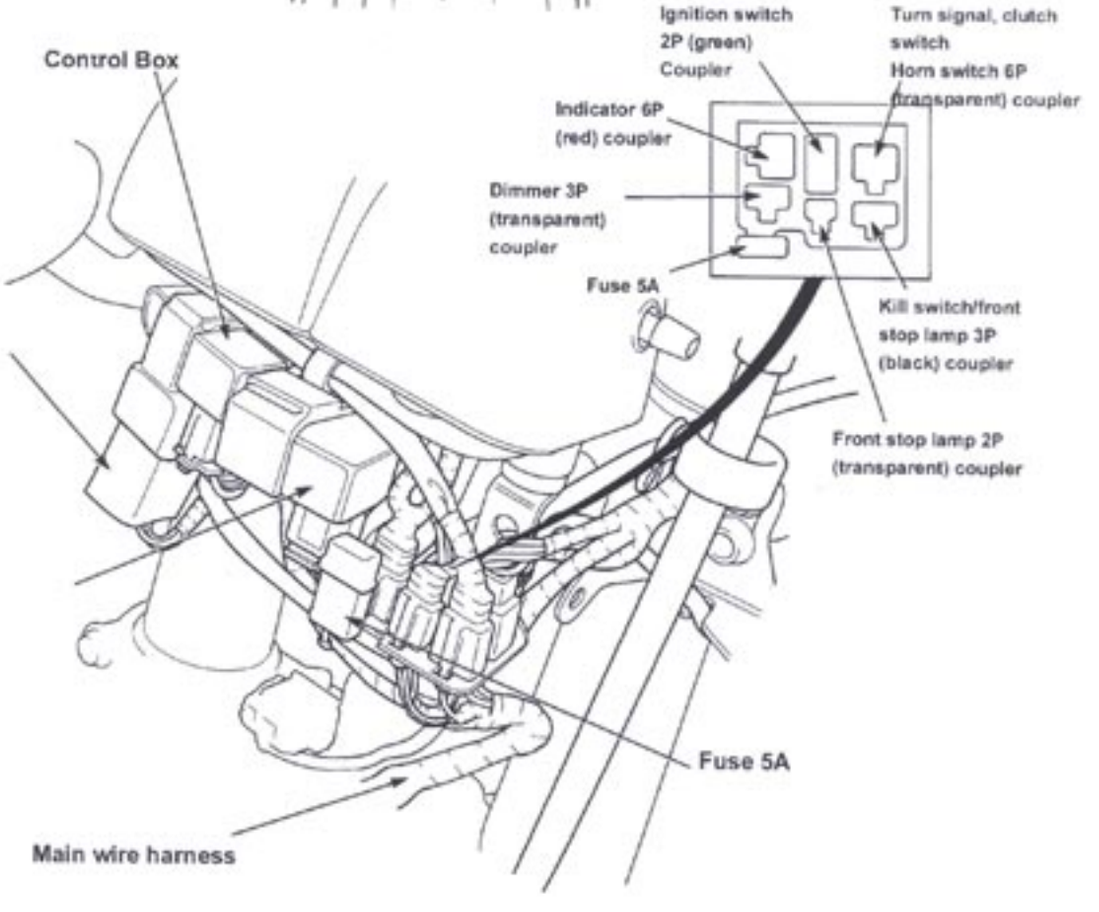
Engine

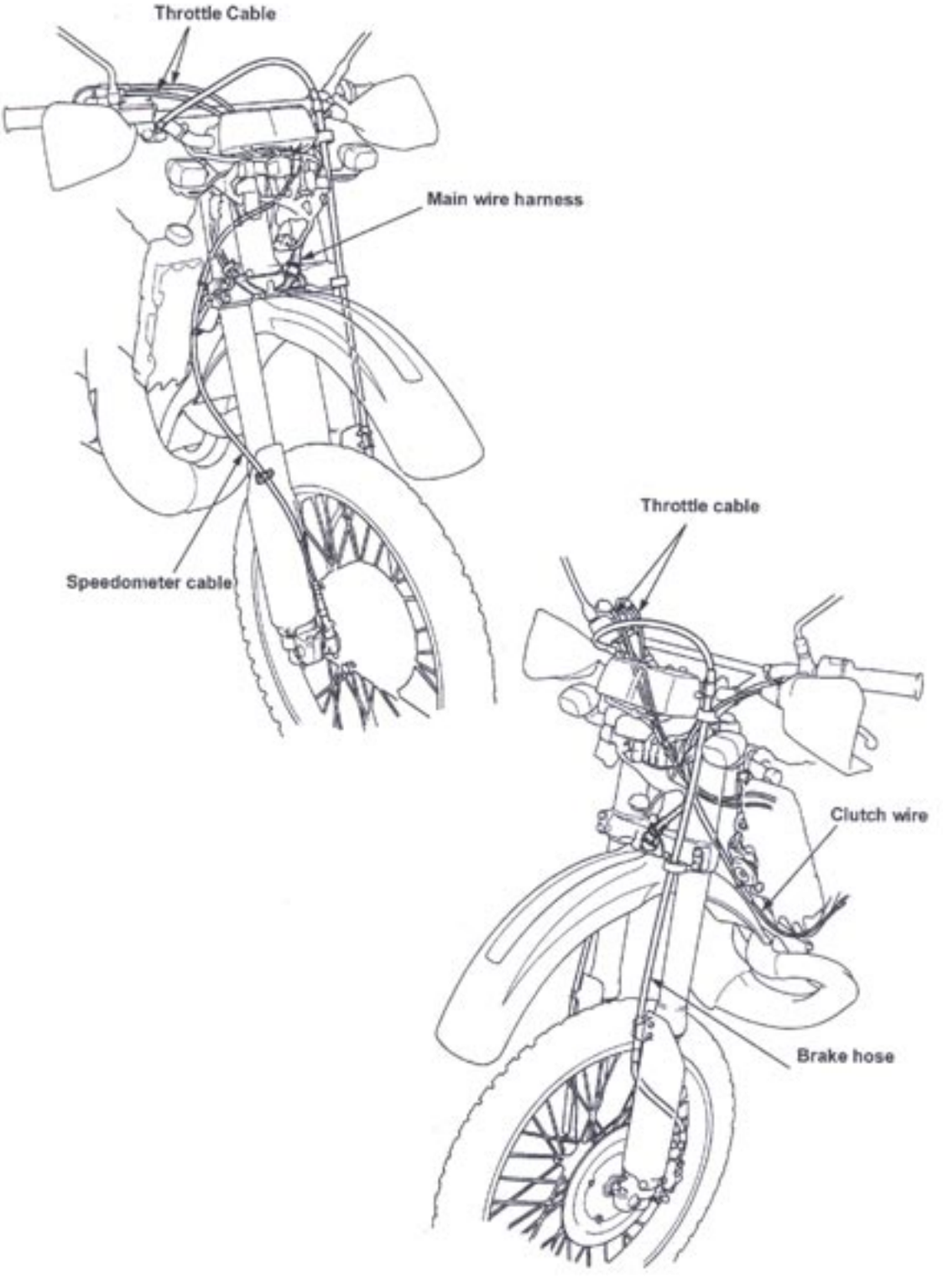
Item	Notes	Type of fluid
Connecting rod big end needle bearing small end needle bearing Main shaft spline area, gear area Counter shaft spline area, gear area Kick starter spindle cellation are, gear area Clutch lifter piece Balancer shaft needle bearing		Molybdenum solution (Transmission oil) Molybdenum grease = 1:1)
ARC valve shaft, collar exterior surface Clutch lifter cam		Molybdenum paste
Piston, cylinder friction surface Piston pin friction surface Piston ring Crank shaft bearing Oil pump interior		Engine oil (Honda Ultra GR2)
Clutch disc friction surface Transmission gear teeth, motion area Washer primary gear seat Other gear teeth or motion area Other bearings		Transmission oil (Honda Ultra U or Ultra M)
Oil path plate bolt thread Main shaft bearing holder bolt thread Balancer shaft bearing holder thread Shift drum bearing holder thread Shift drum centre pin thread Shift guide plate bolt thread Kick stopper plate bolt thread Left crankcase bolt (6x60mm) thread		Screw locking agent (Three-bond 1324, 1360, or 2415)
Oil seal lip O-ring		Multi-purpose grease
Cylinder, valve (front cover attachment) Thermo sensor thread	Do not apply to its end	Sealant

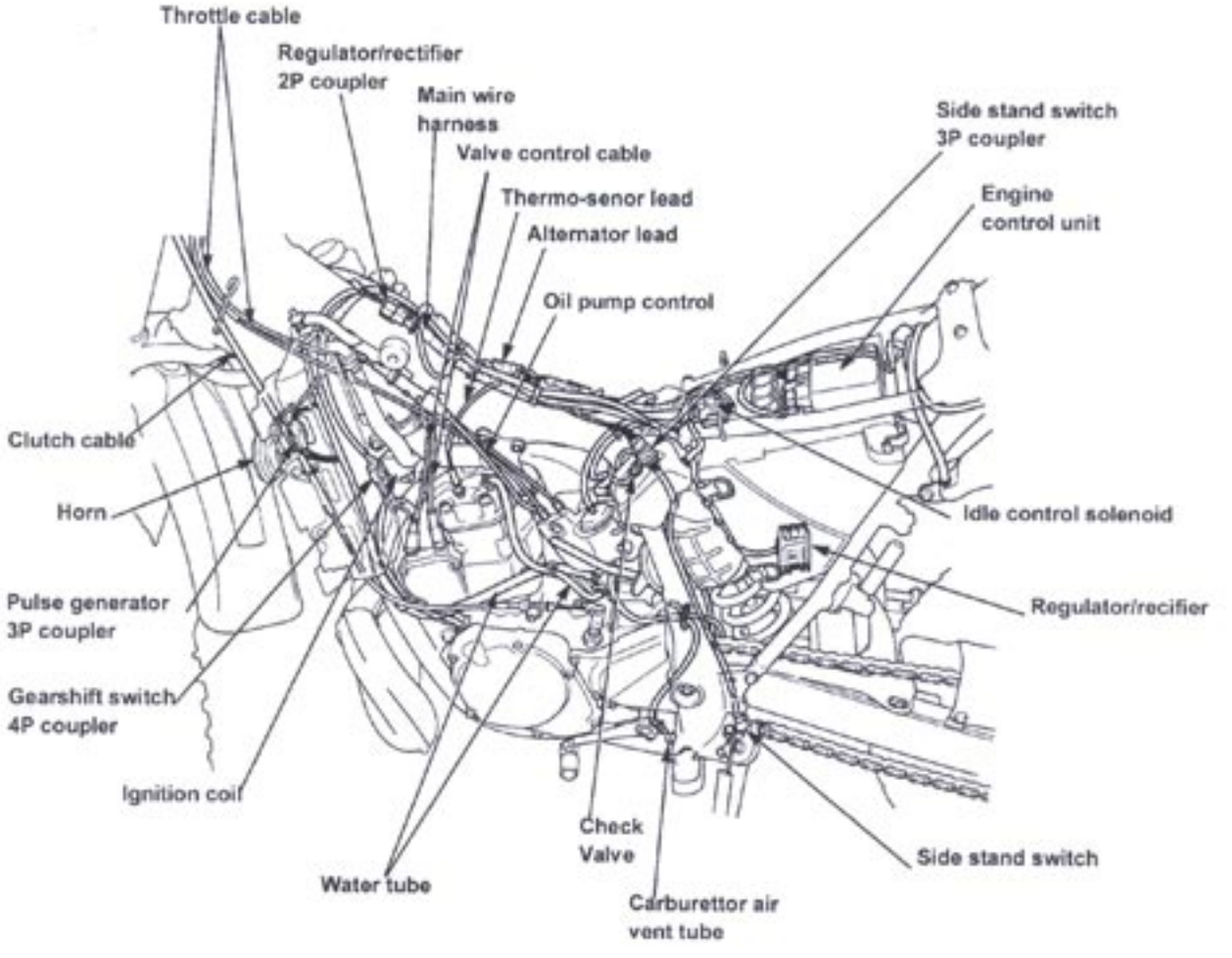
Frame

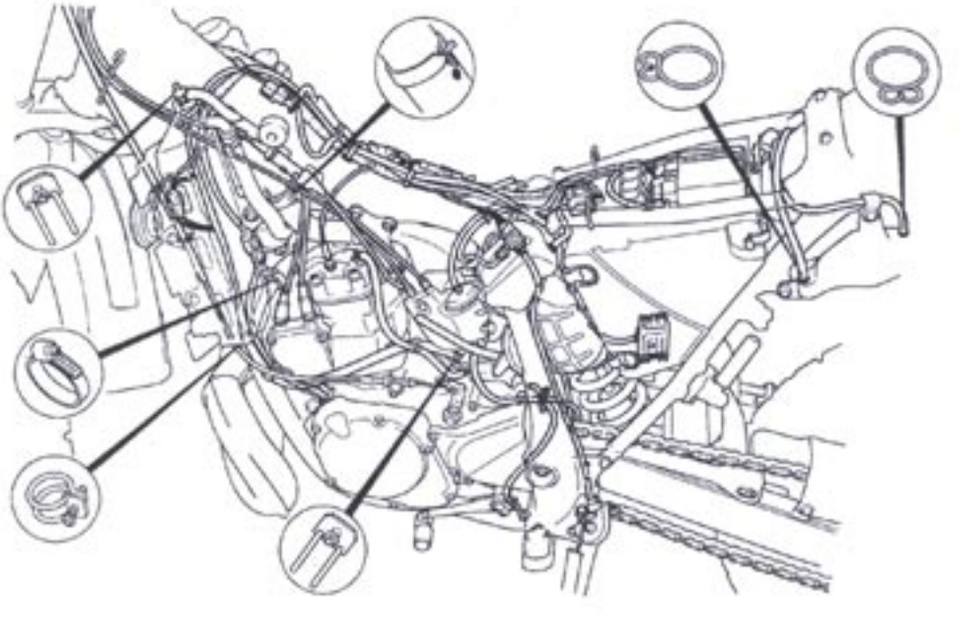
Item	Notes	Type of fluid
Steering head bearing Steering stem dust seal lip Rear cushion upper bearing Rear cushion upper dust seal lip Swing arm lower bearing Swing arm lower dust seal lip Swing arm pivot bearing Swing arm pivot dust seal lip Front & rear wheel dust seal lip Speedometer gear/pinion gear and shaft Front master cylinder piston lever contact surface Brake lever pivot Clutch lever pivot Brake pedal pivot Throttle grip pipe reel/contact area Throttle slider cable groove Side stand pivot Chain roller exterior surface Kick starter arm joint		Multi purpose grease
Left/right handlebar grip rubber inner surface		Honda Bond A Cemedine #540
Brake master cylinder inner surface Brake master piston exterior surface Caliper piston exterior surface Caliper cylinder inner surface Brake master piston cup		Brake fluid DOT 4
Caliper pin bolt, boot Caliper piston seal		Silicone grease
Fork dust seal lip Fork oil seal lip Fork cap bolt O-ring		Honda Ultra cushion oil #10
Caliper pin bolt thread Ignition switch bolt thread		Screw locking agent

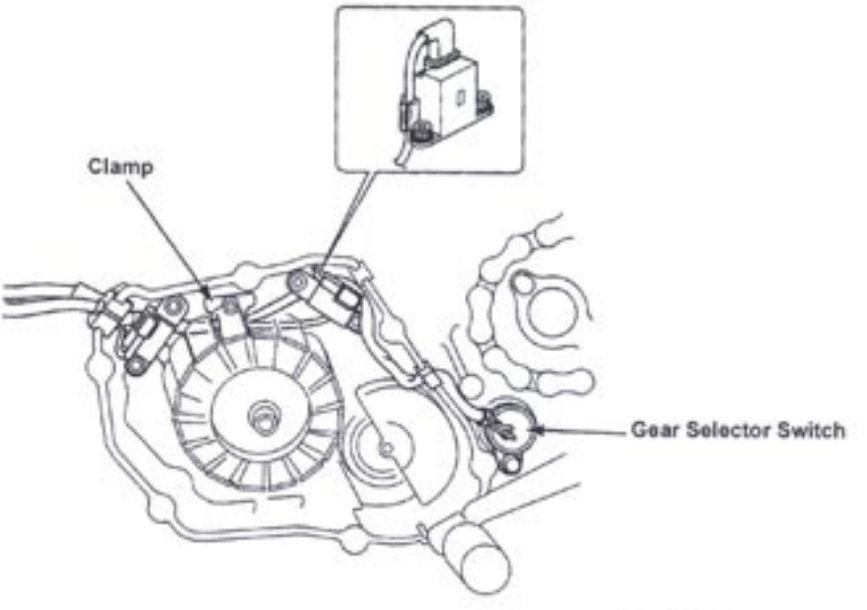

Throttle Cable
Clutch Cable
Right handlebar switch lead
Left handlebar switch lead
Speedometer Cable
Brake hose

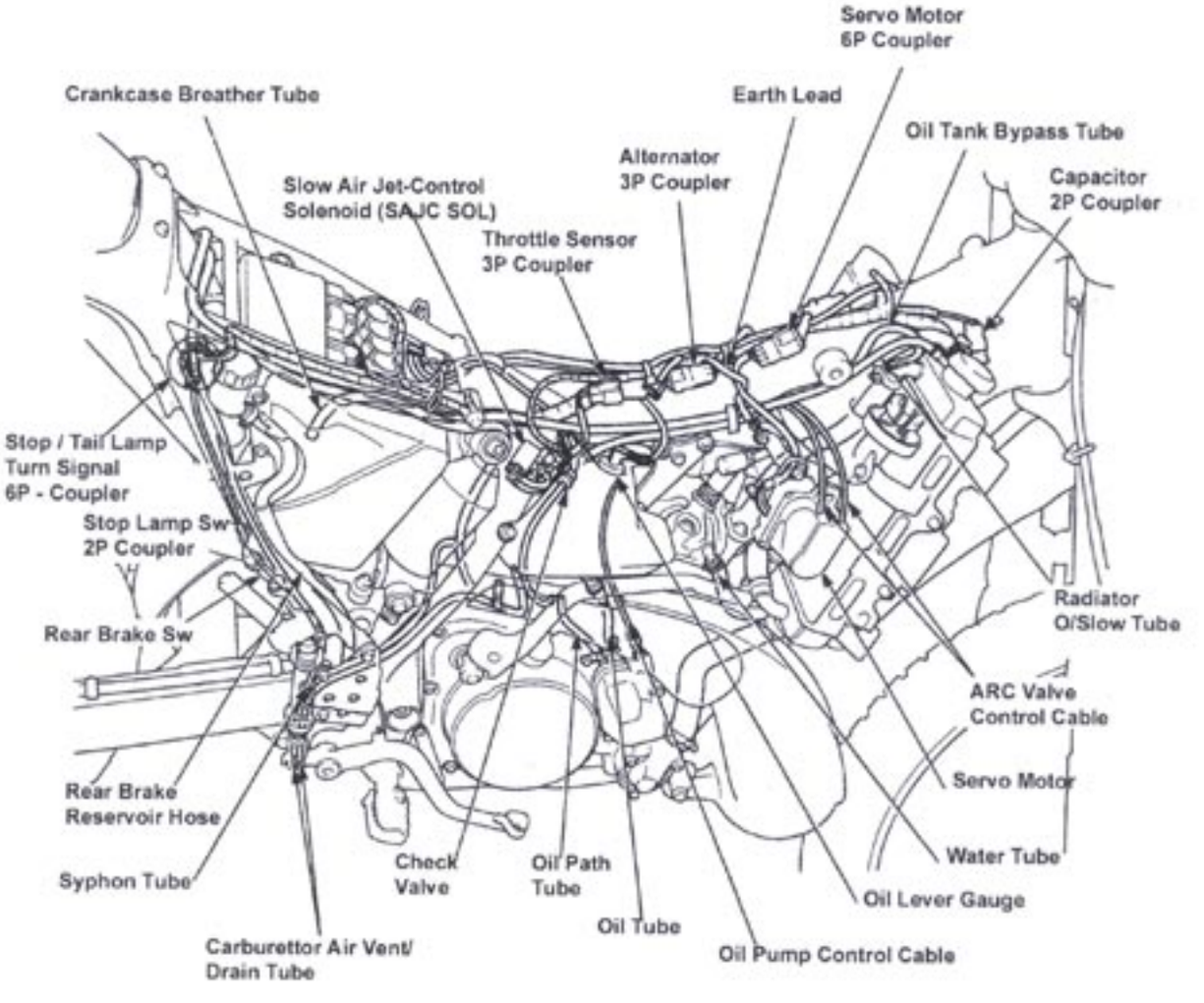

Control Box
Ignition switch 2P (green) Coupler
Turn signal, clutch switch Horn switch 6P (transparent) coupler
Indicator 6P (red) coupler
Dimmer 3P (transparent) coupler
Fuse 5A
Kill switch/front stop lamp 3P (black) coupler
Front stop lamp 2P (transparent) coupler
Fuse 5A
Main wire harness

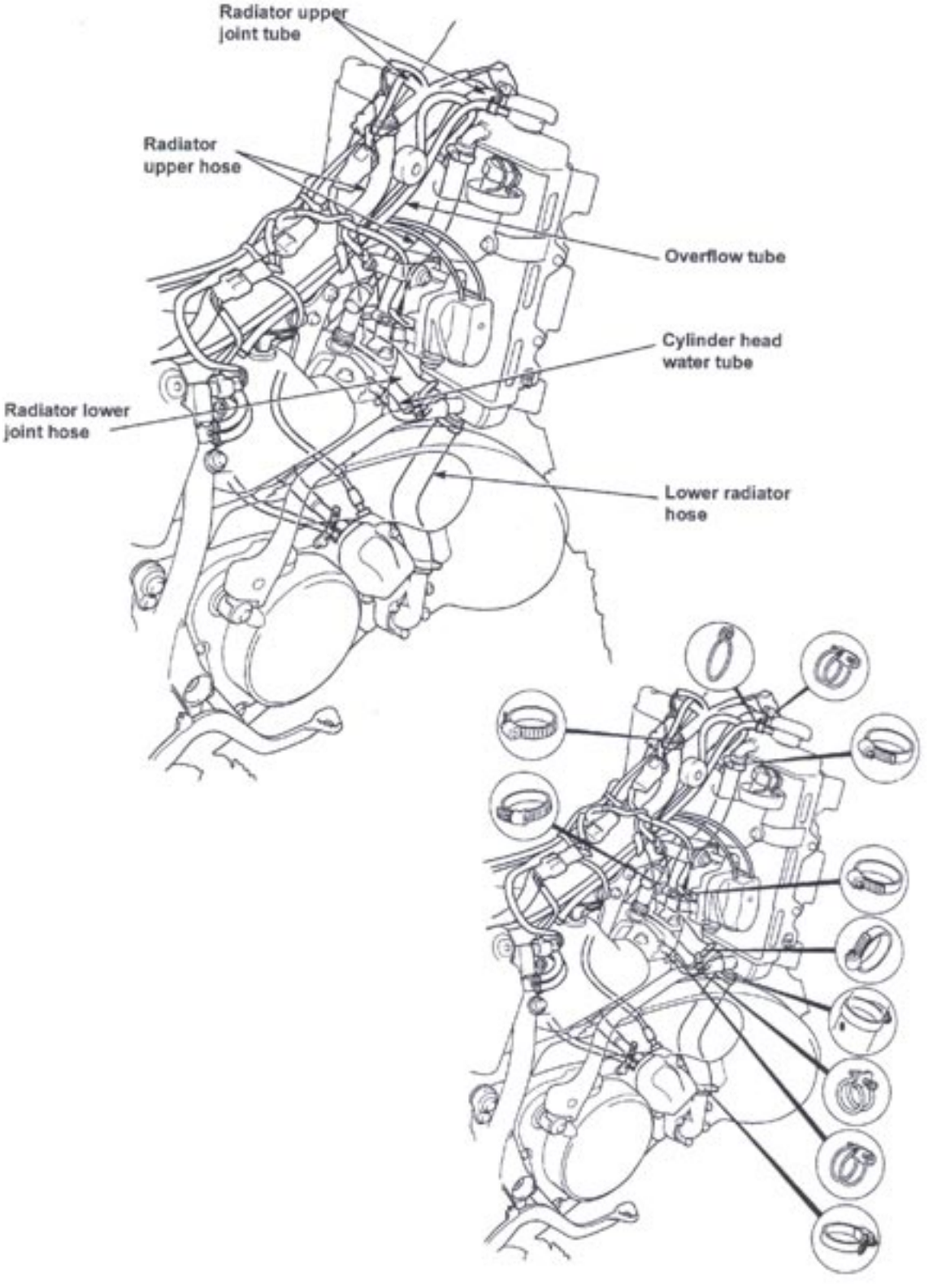

Throttle Cable
Main wire harness
Speedometer cable
Throttle cable
Clutch wire
Brake hose

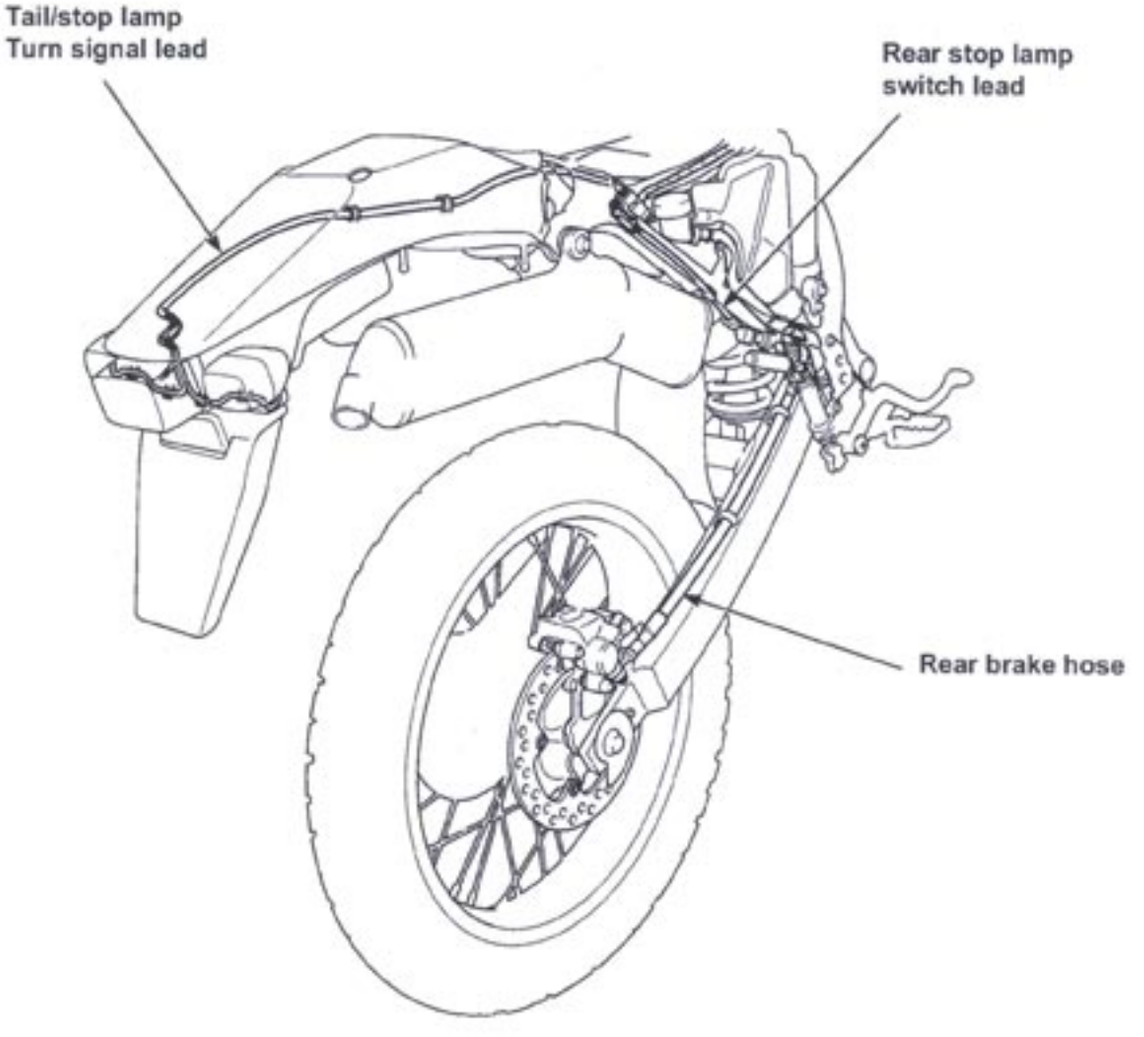

Throttle cable
Regulator/rectifier 2P coupler
Main wire harness
Valve control cable
Thermo-senor lead
Alternator lead
Oil pump control
Side stand switch 3P coupler
Engine control unit
Clutch cable
Horn
Pulse generator 3P coupler
Gearshift switch 4P coupler
Ignition coil
Water tube
Check Valve
Carburettor air vent tube
Idle control solenoid
Regulator/recifier
Side stand switch

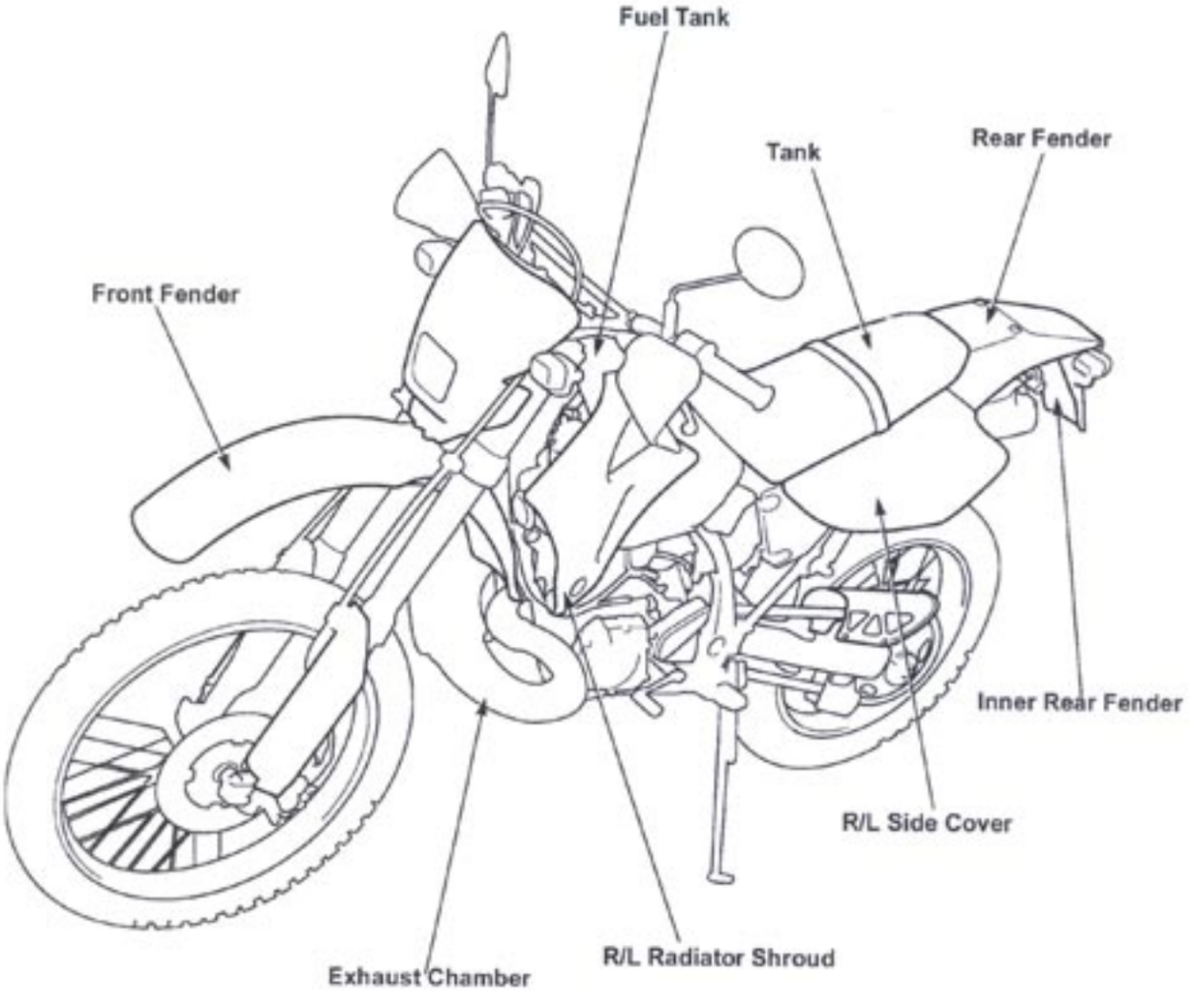



Clamp
Gear Selector Switch


Servo Motor
6P Coupler
Crankcase Breather Tube
Earth Lead
Oil Tank Bypass Tube
Alternator
3P Coupler
Capacitor
2P Coupler
Slow Air Jet-Control
Solenoid (SAJC SOL)
Throttle Sensor
3P Coupler
Stop / Tail Lamp
Turn Signal
6P - Coupler
Stop Lamp Sw
2P Coupler
Radiator
O/Slow Tube
Rear Brake Sw
ARC Valve
Control Cable
Servo Motor
Rear Brake
Reservoir Hose
Water Tube
Check
Valve
Oil Path
Tube
Syphon Tube
Oil Lever Gauge
Oil Tube
Carburettor Air Vent/
Drain Tube
Oil Pump Control Cable


Radiator upper joint tube
Radiator upper hose
Overflow tube
Cylinder head water tube
Radiator lower joint hose
Lower radiator hose


Tail/stop lamp
Turn signal lead
Rear stop lamp
switch lead
Rear brake hose


Fuel Tank
Tank
Rear Fender
Front Fender
Inner Rear Fender
R/L Side Cover
R/L Radiator Shroud
Exhaust Chamber

2. Exterior Parts, Muffler and Sub Frame

Service Information

General

Warning

- Petrol is highly inflammable. Keep away from open flame and electrical spark. Evaporated petrol is explosive. Ventilate the working area.
- Service muffler when it is cold.

- This section describes how to install/remove exterior parts, muffler, and sub frames.
- Refer to the routing diagrams (1-23) when connecting tubes and cables.
- Replace gasket when re-installing a muffler.
- When installing muffler, temporally secure all bolts and nuts. Tighten joint nuts first, then mount bolts.
- Check for exhaust leak after installing the muffler.

Torque setting

Rear fender mount bolt	12 Nm	(1.2 kgfm)
Exhaust chamber joint cap nut	26 Nm	(2.7 kgfm)
Muffler joint strap nut	12 Nm	(1.2 kgfm)
Chamber protector bolt	18 Nm	(1.8 kgfm)

Troubleshooting

Too loud exhaust noise

- Damaged muffler
- Exhaust leak

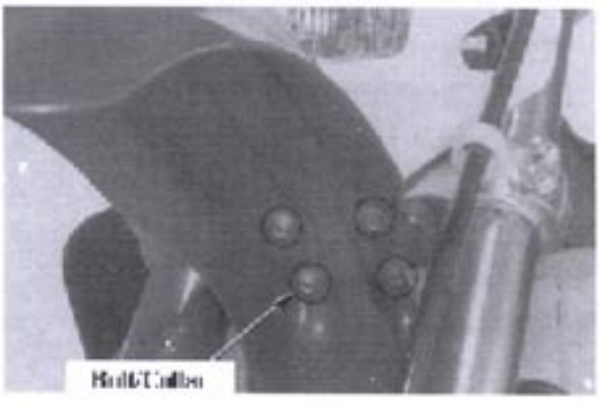
Lack of power

- Deformed muffler
- Deformed expansion chamber
- Exhaust leak
- Clogged muffler

Front fender

Removal

Remove bolts and collars to remove the front fender.



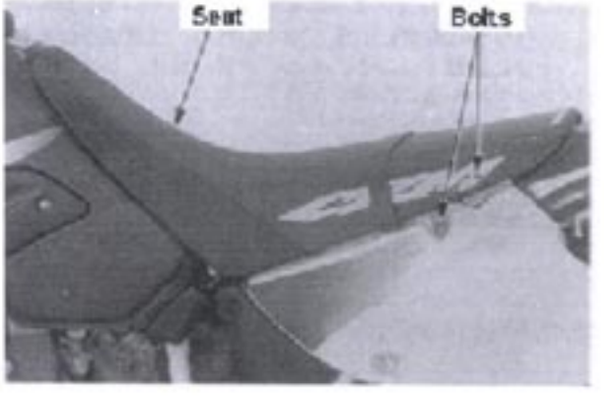
Installation

Reverse the removal procedure for the installation

Seat

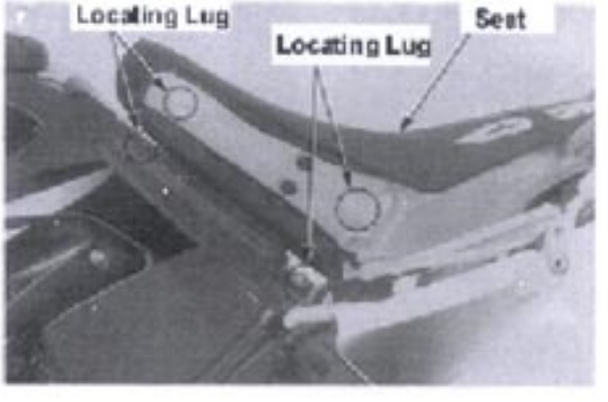
Removal

remove bolts and pull the seat backwards to remove it.

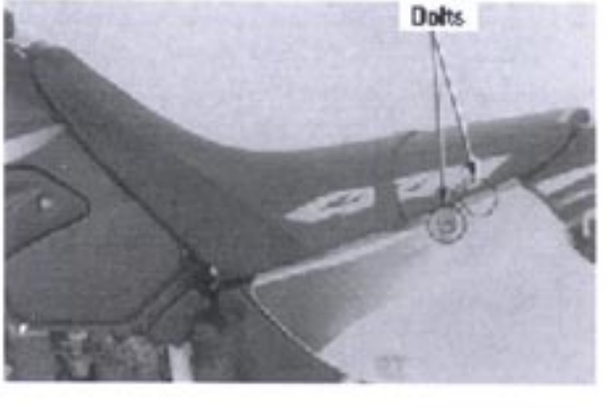


Installation

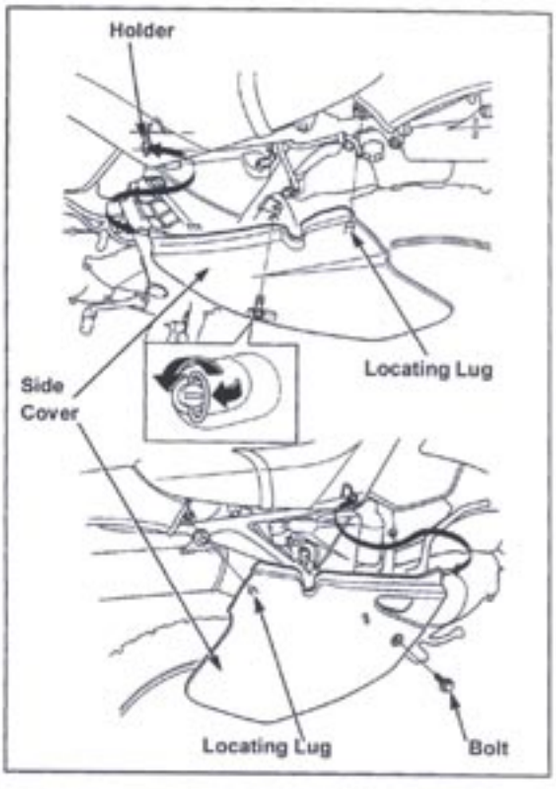
Set the seat front hook to a hook on a fuel tank . Install the seat by setting its rear hook to the rear frame hook.



Secure bolts.



Side cover



Removal/installation

Remove bolt (right side cover).
Turn the stud to the left (left side cover).

Release the projection on the back of the side cover from grommet and release pin at the front of the cover from holder on the frame to remove the side cover.

Reverse the above procedure for installation.

Fuel tank

Removal/installation

- Inflammable
- Wipe off spilt fuel.

Note: Turn the fuel cock OFF when servicing.

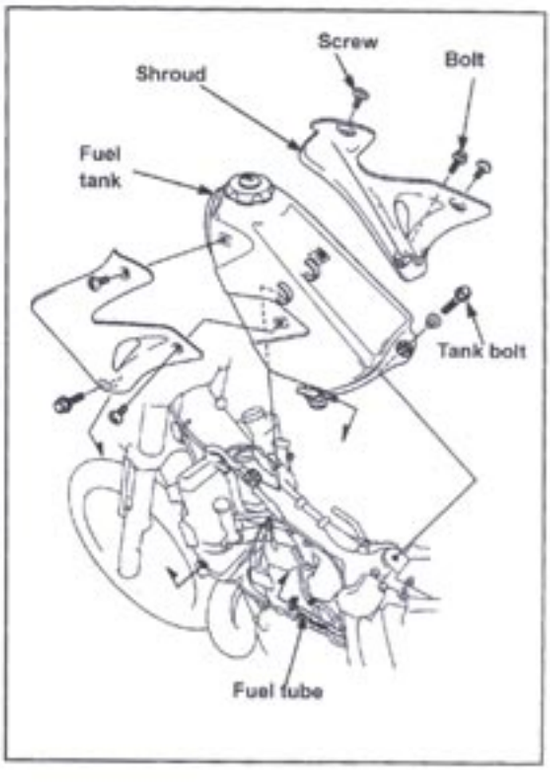
Remove the seat (2-2).
Remove two bolts, four screws, and a shroud.

Note: By removing two bolts, the fuel tank and the shroud can be detached together.

Disconnect fuel tube from fuel cock.
Remove tank mount bolt and remove fuel tank.

Reverse the procedure for installation.

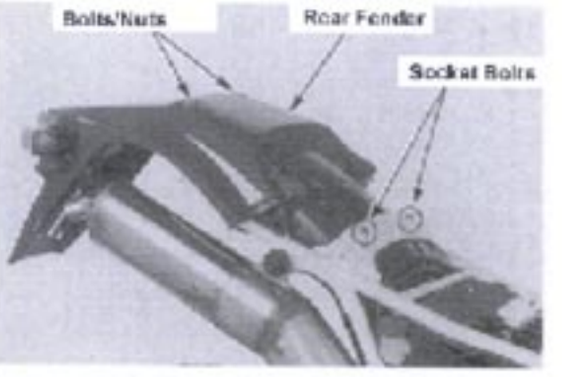
Note: After servicing, turn the fuel cock ON and check for fuel leak.



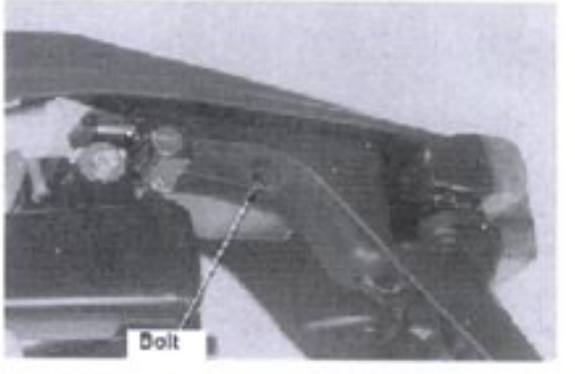
Rear fender

Removal

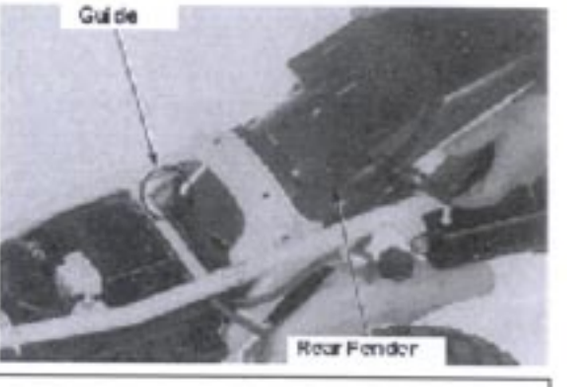
Remove seat and side cover (2-2, 2-3)
Remove bolts/nuts and socket bolts.



Remove bolt.



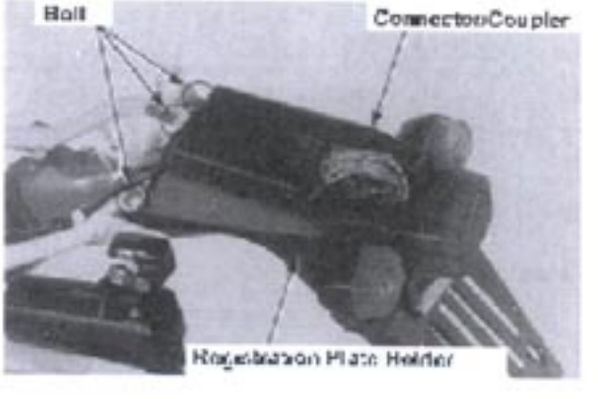
Remove the rear fender.



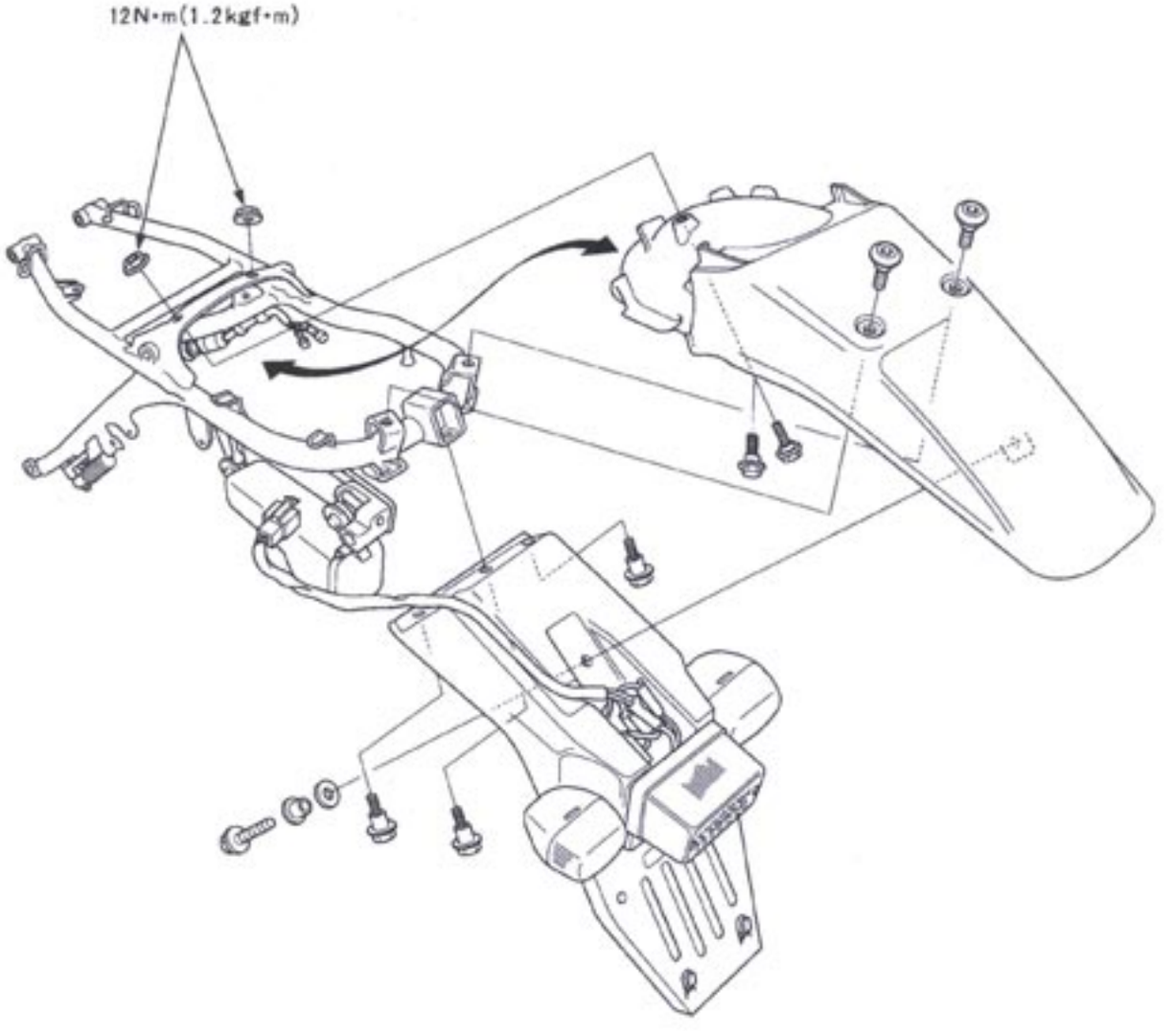
- **NOTE:**
- **Disconnect right/left turn signal wire, tail/stop lamp wire 6P(natural) coupler and radiator breather tube from guide on the fender.**
- **Pull the rear fender back and twist it for 90° right or left and pull it up.**

Registration plate holder

Disconnect right/left turn signal connector, registration plate lamp 2P(red) coupler.
Disconnect all wire harnesses from the plate holder clamp.
Remove rear fender and bolts.
Remove the registration number holder and a rear turn signal unit.



♦ Rear Fender



Rear fender

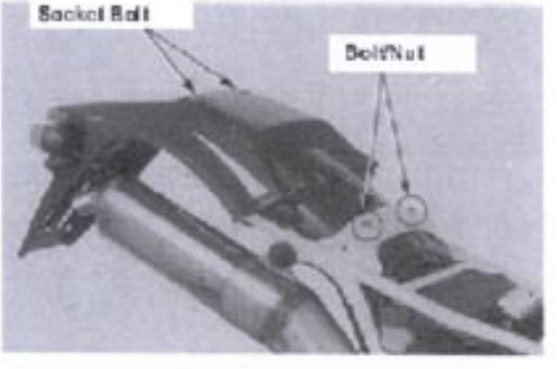
Install the rear fender.

- **Note:**
- **Tilt the rear fender for 90° either to the right or to the left and insert it to the rear sub frame. Then re-tilt the fender.**
- **Refer to the routing diagram (1-23) for correct routing of the right/left rear turn signal wires, tail/stop lamp wires, 6P (transparent) coupler, and radiator breather tube.**

Caution

A clogged breather tube may cause radiator fluid leak and other damage to the radiator.

Tighten the bolt.



Tighten bolts/nuts to the specified torque.

Torque : 12 Nm (1.2 kgfm)

Secure socket bolts.

Muffler

Silencer removal

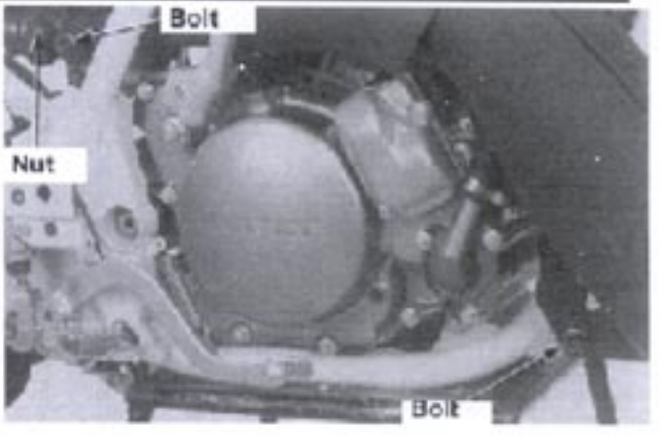
Remove the following parts:

- Right side cover (2-3)
- Muffler joint strap
- Muffler mount bolt
- Muffler seal

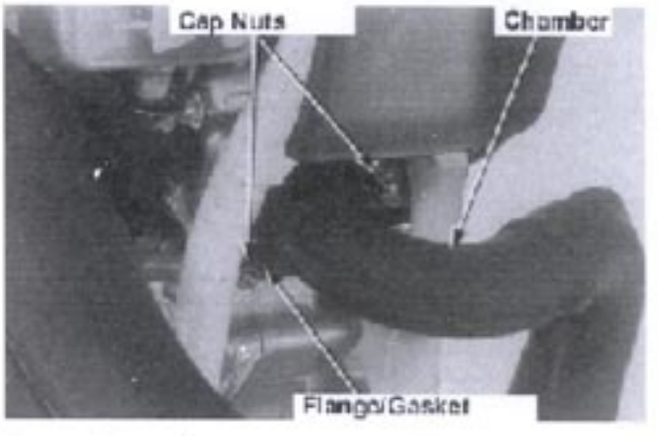
Exhaust chamber removal

Remove the following parts:

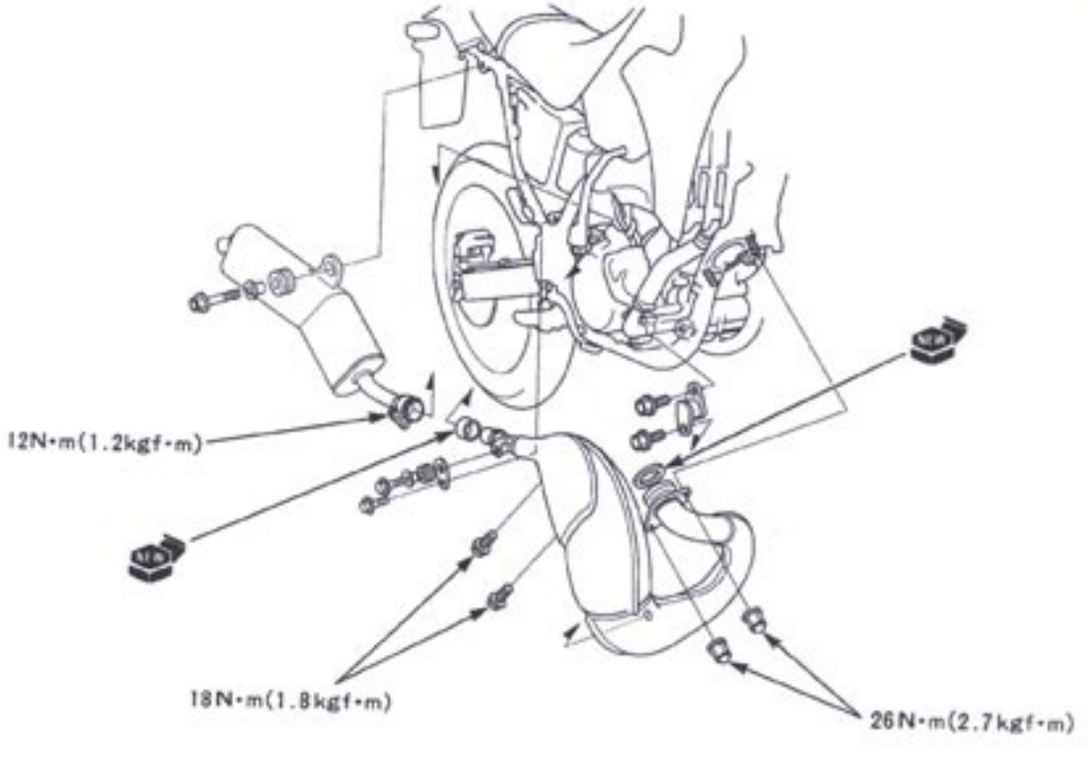
- Muffler joint strap nut
- Chamber mount bolt



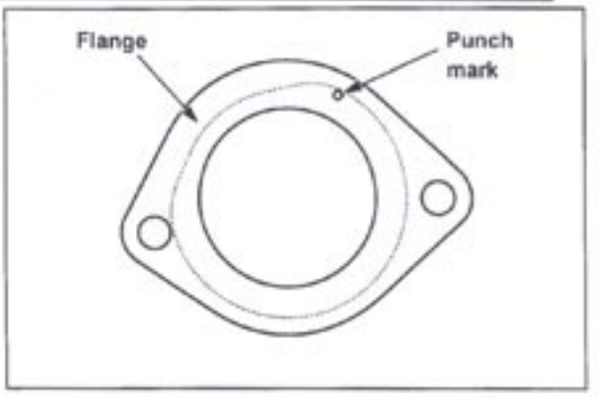
- Exhaust chamber joint cap nut
- Chamber flange (remove from bolts)
- Exhaust pipe gasket



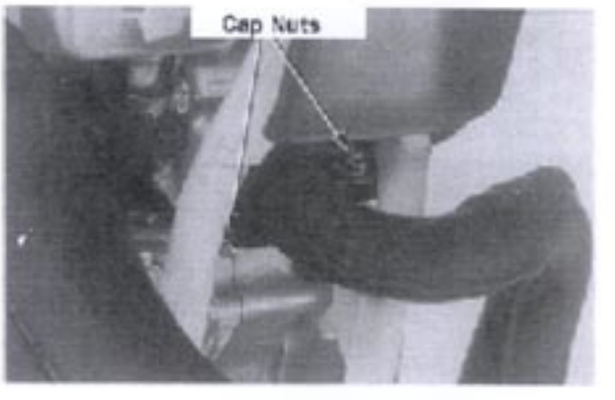
Assembly



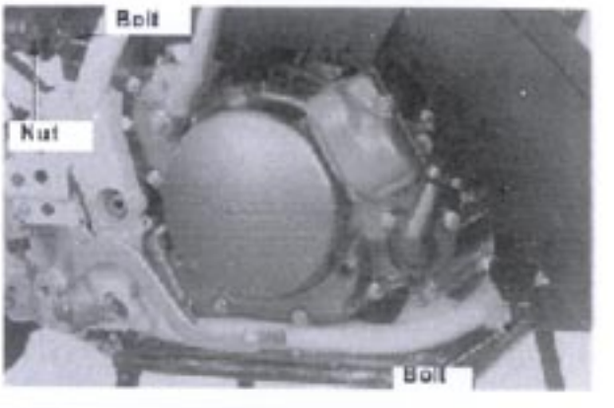
Exhaust chamber installation
Install new exhaust pipe gasket to the chamber mouth.
Install the expansion chamber to the cylinder by facing the punched mark of the chamber flange upwards.



Temporarily tighten the chamber joint cap nuts.



Temporarily set the muffler to the chamber.
Temporarily tighten the chamber mount bolt.
Secure chamber joint cap nut and muffler joint nut to the specified torque.
Secure the chamber mount bolt to the specified torque.



NOTE
- **Replace the muffler seal when inserting chamber to the muffler.**
- **Secure in order of chamber joint nut, chamber mount, and muffler.**

Torque settings:
- Chamber joint cap nut : 26 Nm (2.7 kgfm)
- Muffler joint nut : 12 Nm (1.2 kgfm)

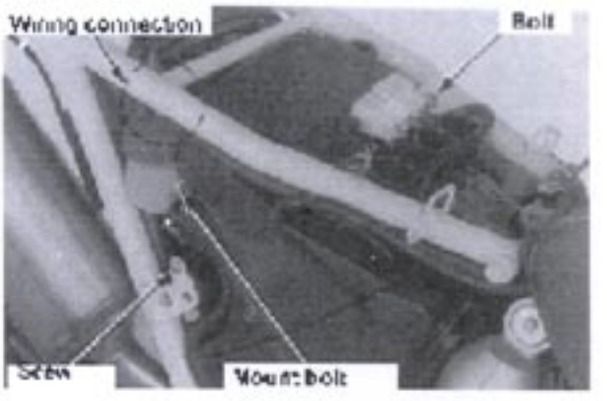
Install a new muffler seal.
Secure muffler mount bolt.
Secure muffler joint nut to the specified torque.

Torque setting:
- 12 Nm (1.2kgfm)

Sub frame

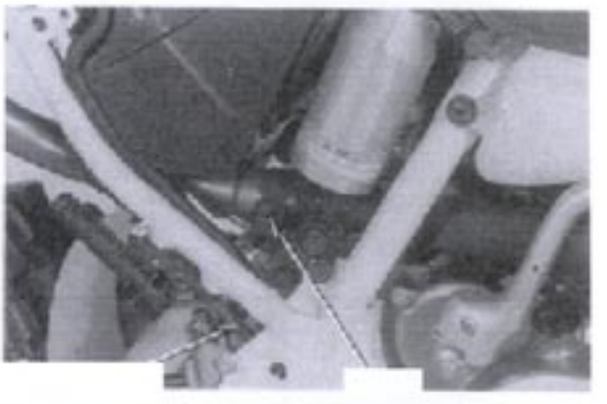
Removal

Remove seat (2-2).
Remove right/left side cover (2-3).
Remove screw, bolt, and rear brake reservoir mount bolt.
Disconnect right/left turn signal wires,tail/stop lamp 6P(transparent) coupler, and rear brake stop switch connector (black).

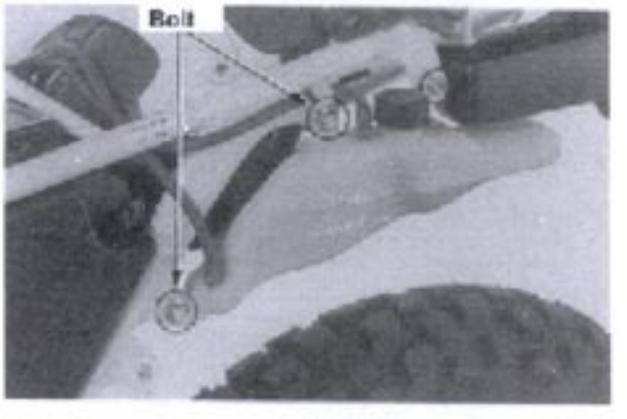


Unscrew muffler joint nut.
Disconnect stop switch rod from rear brake pedal.

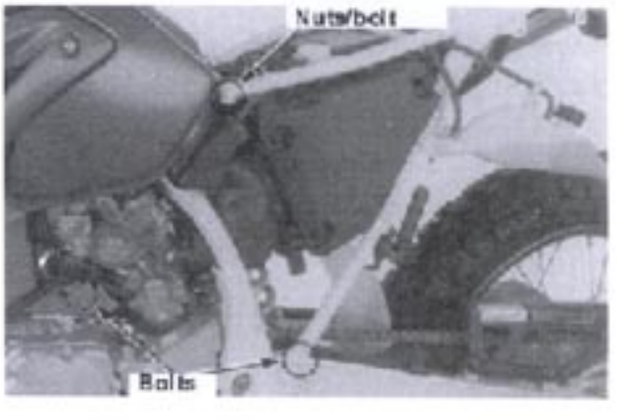
Note
Do not bend the rod when disconnecting it from the pedal.



Remove reservoir mount bolts.

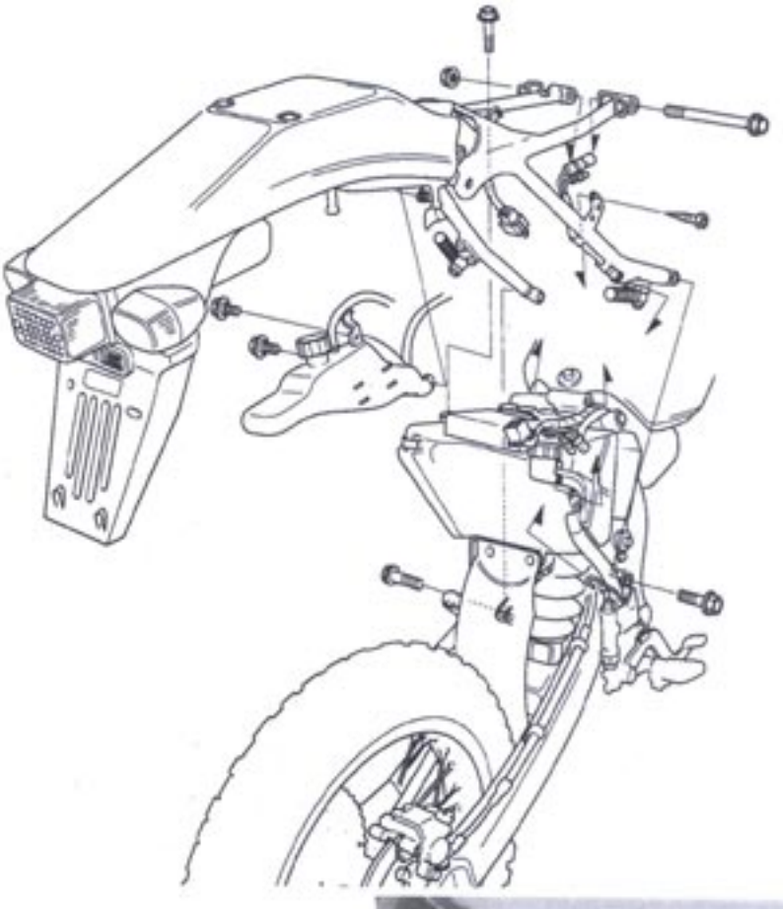


Remove upper sub frame bolt/nut and the lower sub frame mount bolt.



Remove the sub frame.

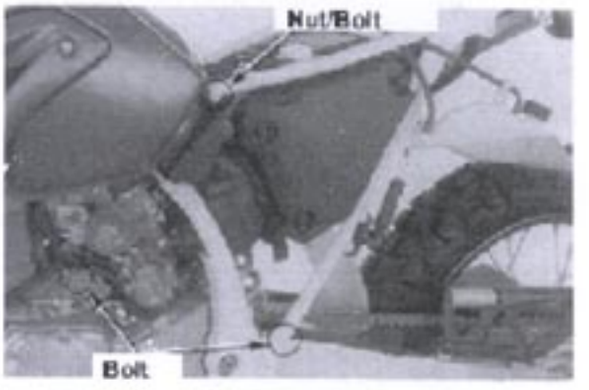
Assembly



Installation

Install the sub frame.

Secure upper sub frame mount bolt/nut, and lower sub frame mount bolts.



Install radiator reservoir.

Note
Refer to routing diagram (1-23) when routing right/left turn signal wires, tail/stop lamp wire 6P (transparent) coupler, radiator breather tube, and rear master cylinder hose.

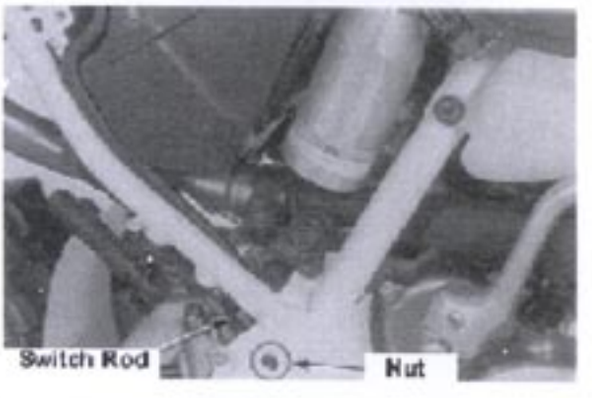
Caution

Clogged breather tube may cause radiator fluid leak and may damage the radiator

Secure muffler joint nut to the specified torque.

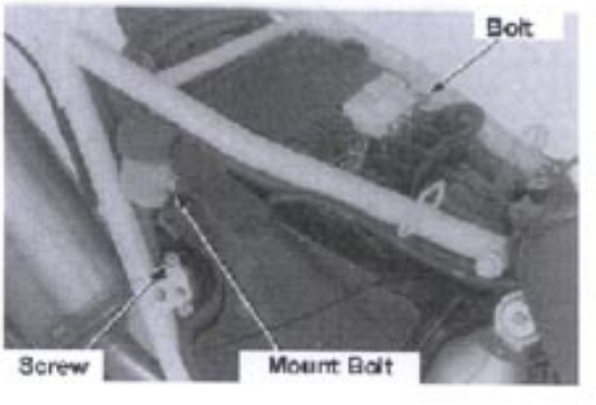
Torque : 12 Nm (1.2 kgfm)

Install stop switch rod to the brake pedal.



Note
Make sure the frame hole is aligned with A/C case mount when securing a screw.

Secure screw, bolt, and rear brake reservoir mount bolt.



Notes
Set the brake switch rod through the guide inside the frame

Check the rear brake lamp function.
Install right/left side covers and a seat.

General

Warning

- Exhaust fumes are toxic. Avoid running the engine in poorly-ventilated area for a prolonged period.
- Do not touch the engine or muffler immediately after shutting down the engine. Wear proper protective wear (i.e, long-sleeved clothing, gloves) when servicing such components.
- Petrol is highly inflammable. Keep away from any naked flame or electric spark. Evaporated petrol is explosive. Ventilate the working area.
- Do not let the moving parts catch your hand or clothing.
- Coolant level should be checked at reservoir, instead of radiator. Coolant may spurt out when the engine is hot. Wait for the engine to cool down if it is necessary to open the radiator cap.
- Service the coolant when the engine is cool.
- Coolant is toxic. Keep away from skin, eyes, or clothing.
  - If the coolant makes contact with skin or clothing, wash with detergent and rinse with water.
  - If the coolant makes contact with eyes, rinse with water and consult a specialist.
  - If the coolant is swallowed, induce vomiting, gargle, and consult a specialist.
- Keep the coolant out of reach of children when storing it.

Notes:
Place the motorcycle on a flat surface and firmly support the vehicle with a side stand or a maintenance stand.

Regular replacement

The following parts should be service at certain intervals (period or distance, whichever reached first).

Item	Interval	Notes
Hydraulic brake system	Every four years	Rubber parts on master cylinder cup and disc caliper
Brake fluid	Biannual	
Coolant	Every four years	
Transmission oil	Biennial or 10,000km	Two-stroke engine only

♦ **Service schedule**

Parts name	Inspection	Regular	Biannual	Annual	Standard
Handlebar	Controllability			*	
	Damage			*	
	Steering stem attachment			*	
	Steering stem bearing fit			*	
Brake pedal/lever	Free play	*	*	*	
	Braking performance	*	*	*	
Hose & pipe	Leak, damage & mount		*	*	
Reservoir	Fluid level	*		*	Front : Above lower limit Rear : Between low/high limit
Master cylinder & disc caliper	Function, wear & damage			*	
Brake disc	Disc-pad clearance			*	
	Pad wear		**	*	Above wear indication
	Disc wear & damage			*	Front : 3.5mm (limit 3.0mm) Rear : 4.5mm (limit 4.0mm)
Wheel	Tyre pressure	*	*	*	Front : 150 kPa (1.50kgf/cm^2) Rear : 150 kPa (1.50kgf/cm^2)
	Tyre damage	*		*	
	Tread depth & wear	*		*	Wear indicator is not exposed
	Wheel nut & bolt fitting		*	*	
	Front wheel bearing			*	
	Rear wheel bearing			*	
Suspension arm	Joint fitting & arm damage			*	
Shock absorber	Oil leak & damage			*	
Clutch	Clutch lever free play		*	*	10mm - 20mm at lever end
	Operation		*	*	
Transmission	Oil leak & oil level		*	*	Oil level hole

Parts name	Inspection	Regular	Biannual	Annual	Standard
Chain & Sprocket	Chain slack		*	*	30mm - 40mm at midpoint with a side stand extended
	Sprocket mounting & wear			*	
Ignition system	Spark plug		*	*	Plug gap : 0.7 - 0.8mm
Wiring	Connectors condition			*	
Engine body	Starting & noise	*		*	
	Low speed & acceleration	*		*	Idling rpm : 1400 ±100rpm
	Exhaust		*	*	
	Air filter		*	*	
Engine lubrication	Oil leak		*	*	
	Oil quality & quantity	*	*	*	Pilot lamp should be OFF
Fuel system	Fuel leak			*	
	Carburettor linkage			*	
	Throttle valve & choke valve			*	Throttle grip free play : 2 - 6mm at flange
Cooling system	Coolant level	*	*	*	Between upper& lower limit
	Coolant leak			*	
Lighting system	Operation	*	*	*	
Horn & Lock	Operation			*	
Instruments	Operation			*	
Exhaust pipe & muffler	Fitting & damage Muffler function			* *	
Frame	Attachment & damage			*	
Others	Chassis lubrication			*	
Any reported defects	Check for the status	*			

** : Manufacturer's recommendation

Steering stem

Steering head bearing inspection

Support the bottom of the engine and lift up the front wheel.
Move the fork and check for the smooth movement and both axial and sideways fittings.

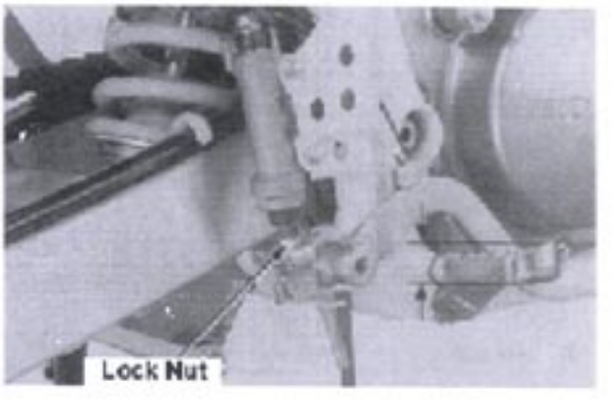
If there is axial loose fitting, inspect the steering head bearing and replace if necessary (11-28).
Check for wire and cable routing for obstruction.

Brake system

Inspect the brake system for brake fluid leak and replace parts if necessary.

Brake pedal height adjustment

Check the rear brake height. Adjust its height by loosening the lock nut and rotating the push rod.



■ **Rear brake pedal height : 20mm**

Secure the lock nut after adjusting the height.

■ **Torque : 18 Nm (1.8 kgfm)**

Notes
Check the operation of the brake/stop lamp after adjusting the pedal height

Brake pad wear

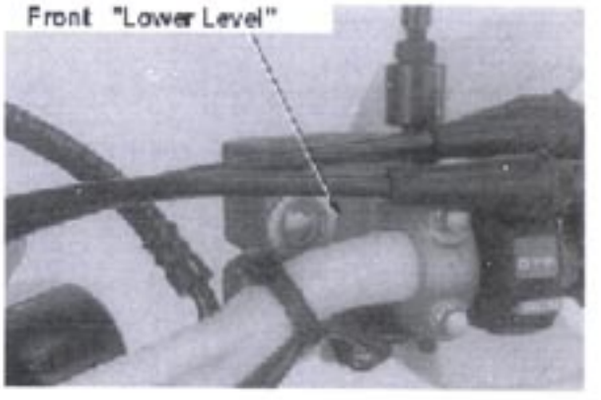
Visually inspect the brake pad wear.
Replace the pad if it is worn to the wear limit indicator.

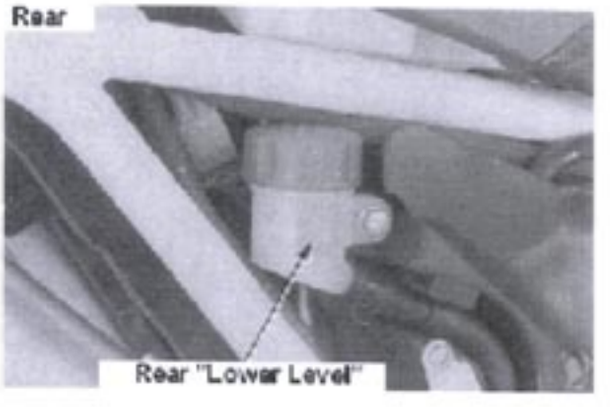
Notes
Replace brake pads in a pair.

Brake fluid

Brake fluid is at least at the "Lower level" line.

Notes
Check the fluid level when the top surface of the reservoir cover is level

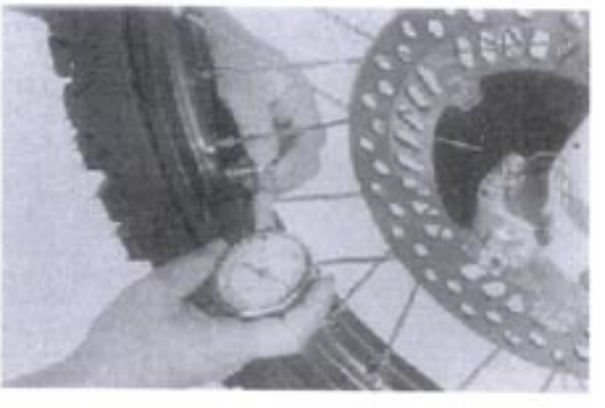




Tyre pressure

Measure the tyre air pressure.

Notes
Measure when tyres are cool.



unit : kPa (kg/cm²)

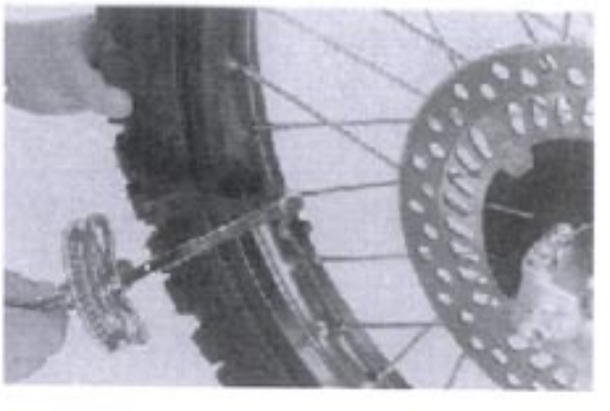
	Front	Rear
One person Normal	150 (1.50)	150 (1.50)
High speed	150 (1.50)	150 (1.50)
With a pillion passenger	150 (1.50)	150 (1.50)
Tyre IRC Size	3.00 - 2151P	4.60 - 1863P
Type	GP - 21F	GP - 22R

Spoke inspection

Inspect spokes for distortion and loose fittings.
Tighten spoke nipples if the spokes are loose.

Special tool : Nipple wrench
07701-0020300

Torque setting : 2.45 - 4.9 Nm
(0.25 - 0.5 kgfm)



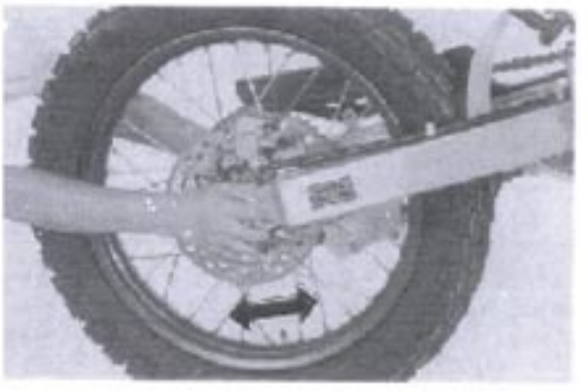
Tyre & rim damage

Inspect tyres for damage & wear.
Check the fitting of the wheel bearing and replace it if necessary.
Inspect front/rear rim for corrosion and distortion of the wheel (11-10, 12-3).

Suspension
Apply front brake and compress the front fork a few times. Inspect the fork for oil leak, damages, and loose fittings.

Compress the rear cushion a few times. Inspect the rear cushion for oil leak, damages, and loose fittings.

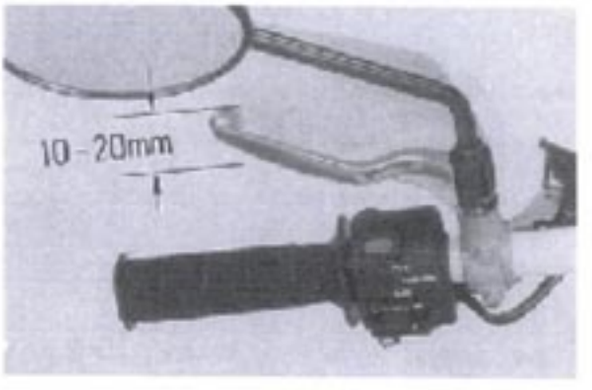
Support the bottom part of the engine and lift up the rear wheel.
Push the swing arm to left and right to check the swing arm pivot bearing fitting.
If the bearing is loose, inspect the bearing and replace if necessary (12-6).



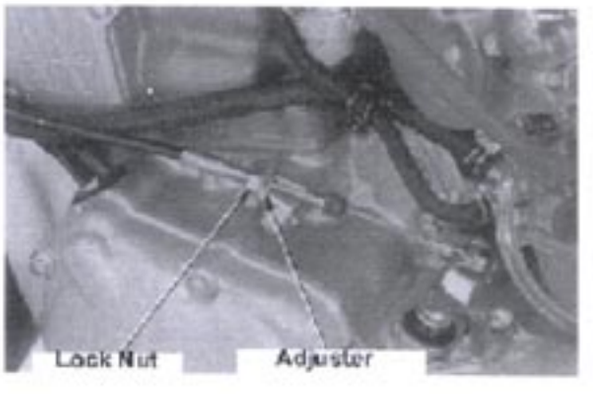
Clutch

Measure the free play of the clutch lever.

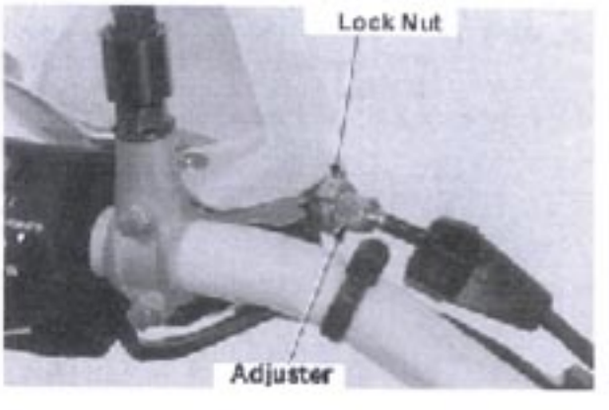
Lever free play : 10 - 20 mm



For coarse adjustment, loosen the lock nut on the clutch arm end and rotate the adjust nut.



For fine adjustment, remove clutch lever cover, loosen lock nut and rotate the adjuster.



Transmission oil

Notes
Hold the vehicle upright on a level surface when checking the oil level.

Start the engine and warm up for three minutes.
Shut down the engine and leave it for three minutes.
Hold the vehicle upright and remove the oil filler cap and oil check bolt to check the oil level (should be up to the check hole).


Oil Filler Cap

Add or change the oil if necessary.
Install a new washer and secure the oil check bolt.
Torque : Oil check bolt : 10 Nm (1.0 kgfm)


Washer/Oil Check Bolt

If the oil level is too high, drain oil until it stops flowing out from the check hole.
If the oil level is below the check hole, add recommended oil from the hole until oil comes out from the check hole.
After securing the oil filler cap and the oil check bolt, start the engine and repeat the above procedure.

Notes
Firmly secure the oil check bolt and the oil filler cap. Check for oil leak after securing them.

Oil change

Notes
After warming up the engine, hold the vehicle upright to drain oil.


Oil Drain Bolt/Washer

Remove the oil filler cap and the oil drain bolt on the right crankcase cover to drain oil.
After draining oil, install a new sealing washer and secure the oil drain bolt and fill oil.

Torque setting: 25 Nm (2.6 kgfm)
Transmission oil capacity : Oil change : 0.54 litre
Total : 0.65 litre

Recommended oil: Genuine Honda Ultra U (or equivalent)
(Four-stroke motorcycle, SAE10W-30) or SE, SF, or SG class API engine oil. After filling oil, check and adjust the oil level.

Warning

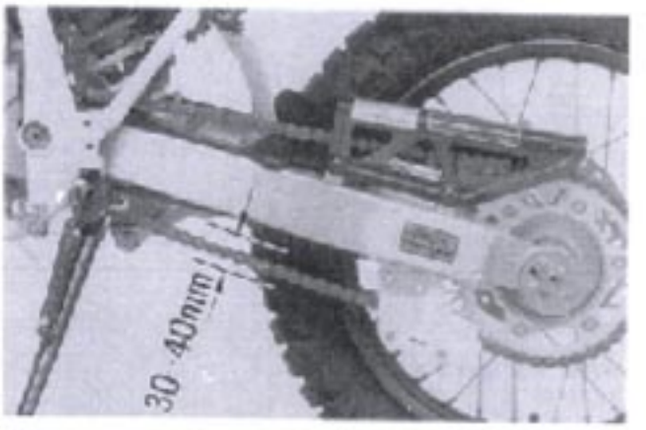
Never inspect or adjust the chain while the engine is running.

Chain Slack Adjustment

Stop the engine, shift the transmission into neutral and support the motorcycle on its side stand.

Measure the drive chain slack in the lower run of the chain, between the sprockets.

Slack: 30~40mm

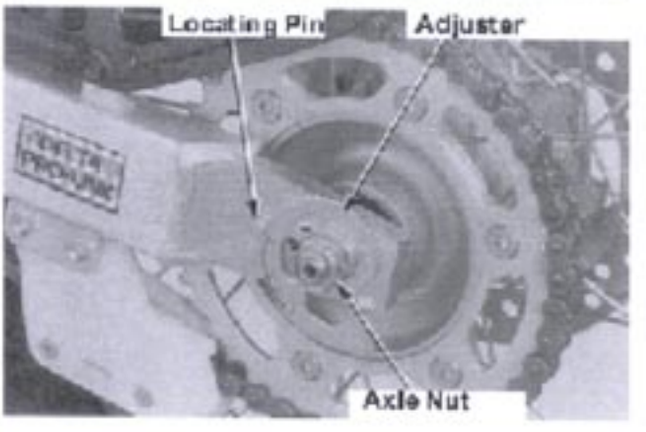


Caution

Excessive Chain Slack, 40mm or more, may damage the frame.

Adjustment

Loosen the axle nut, then turn both adjusting cams equally until the chain slack is correct.

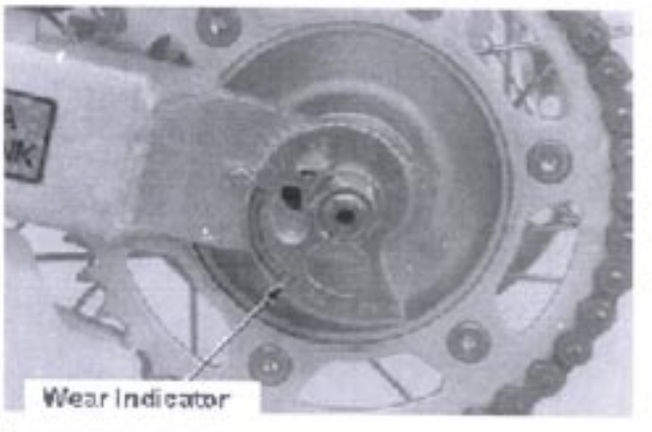


Caution

Ensure that the wheel is pushed forward so that adjusting cams are hard against Locating Pins. Also, that the adjusting cams are in the same place on both sides.

Tighten the axle nut:

93N.m (9.3 kgf/in)



Check the chain slack and free wheel rotation.

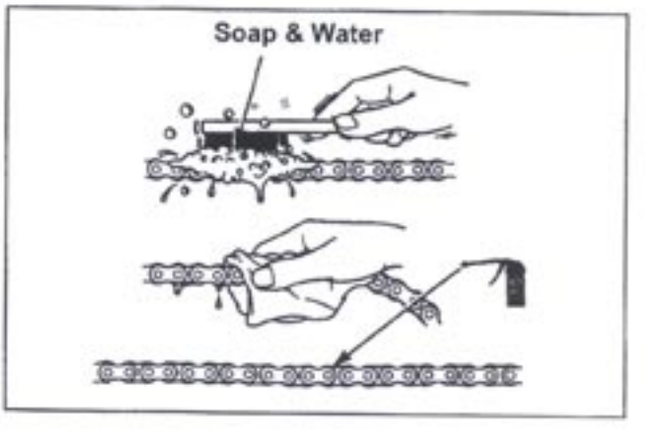
Check the wear indicator and ensure that the chain is within Service Limit.

Thoroughly clean the drive chain, with warm soapy water – or a low flammability solvent.

Dry the chain with a shop towel or rag and lubricate with SAE 80 or 90 Gear Oil.

Note

Use of some commercial chain lubes may damage rubber "O" Rings.



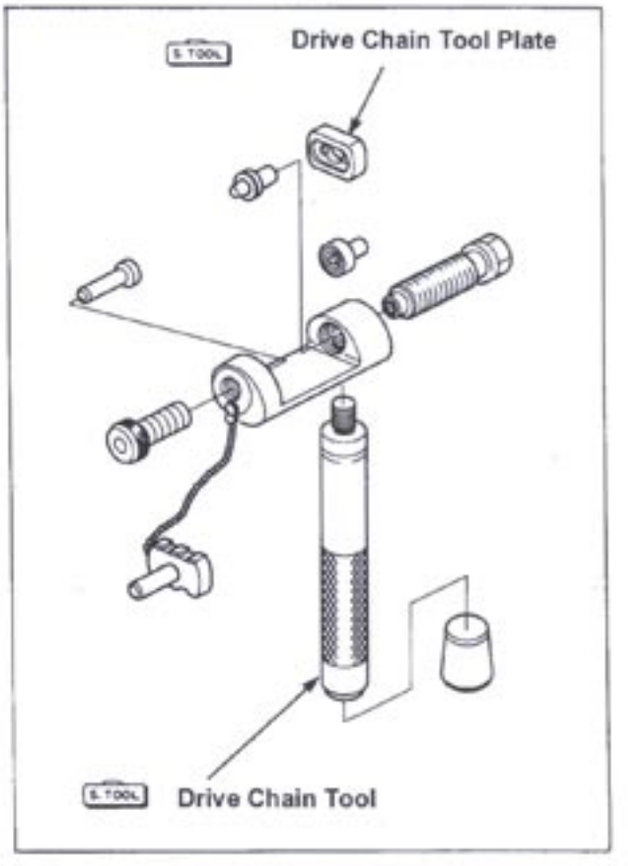
Caution

Steam cleaners, pressure washers and high flammability solvents can damage "O" Rings.

Replacement
This motorcycle uses a Drive Chain with a staked Master Link.

Loosen the Drive Chain (Page 3-9).

Assemble the special tool as shown.

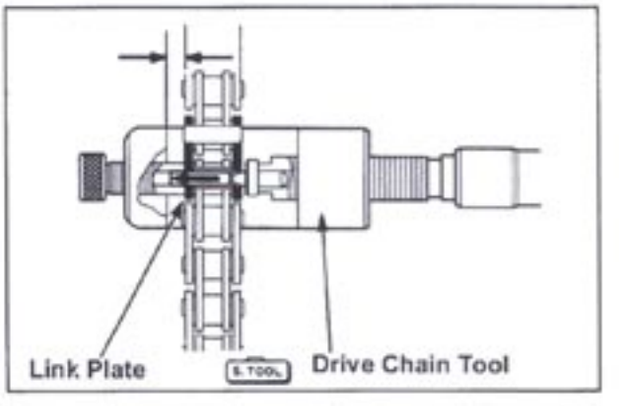


Tools

Drive Chain Tool:
07HMH-MR10103

Drive Chain Tool Plate:
07HMH-ME10130

Locate the crimped pin ends of the master link from the outside of the chain and remove the link with the Drive Chain Tool Set.

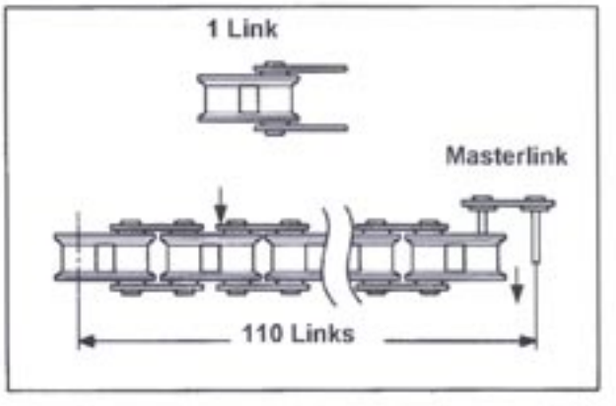


Tool:
Drive Chain Tool Set:
07HMH-MR10103

Remove the Drive Chain

Remove the excess chain links from the new chain, using the Drive Chain Tool.

> **Note**
> **Include the master link when you count the drive chain links.**



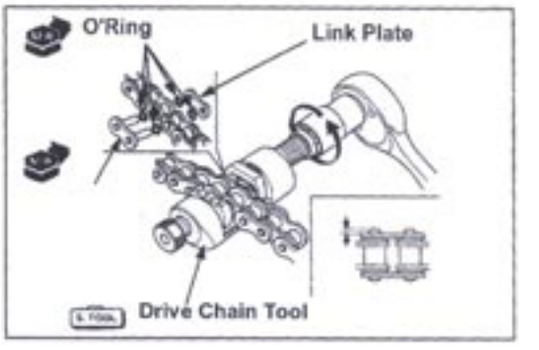
Standard Length: 110 Links

Replacement Chain:
RK: 520MOZ9/11OLE
DID: 52OVC5/11OLE

Install the drive chain after adjusting the number of links.

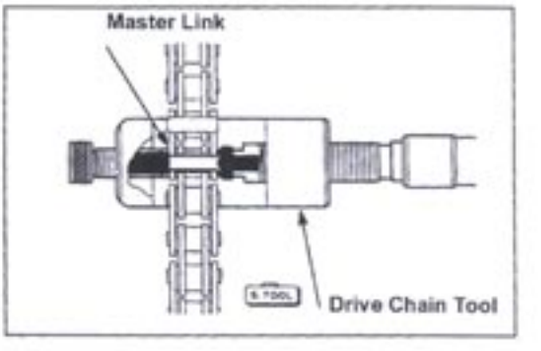
Install O-rings to the new master link and install the link from inner side of the chain. Do not let the master link catch the O-ring when installing.
Set O-rings and a link plate.
Measure the distance from the link plate to the edge of the master link joint pin.

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



Caution

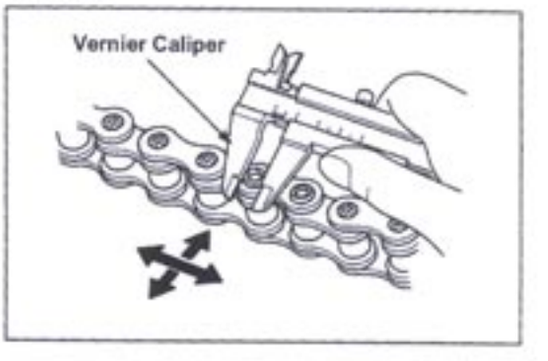
- The label on the master link plate should face outside.
- Do not catch O-rings with the master link plate.



Stake the edge of the master link joint pin with a special tool.

After staking the master link, measure the staked area with a vernier caliper.

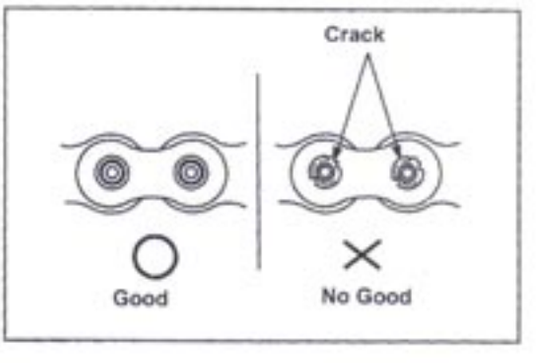
Staked area : RK : 5.5 - 5.8mm
DID : 5.4 - 5.6mm



Caution

If the measured value is out of the above range, redo staking.

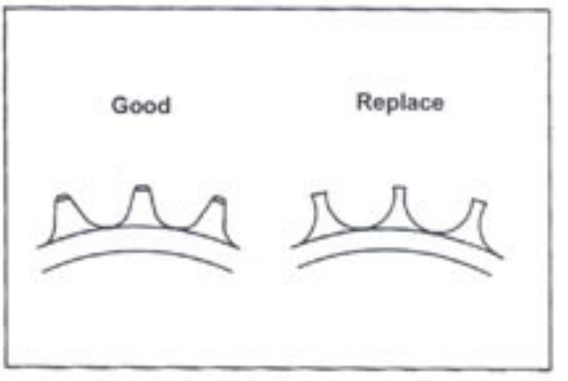
Check the staked area for cracks. If there is a crack, redo staking.



Caution

Do not use clip-type chain.

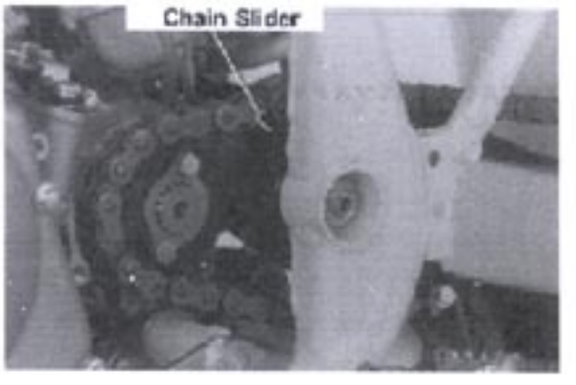
Sprockets inspection
Check gear teeth of drive/driven sprockets and replace if teeth are worn or damaged.



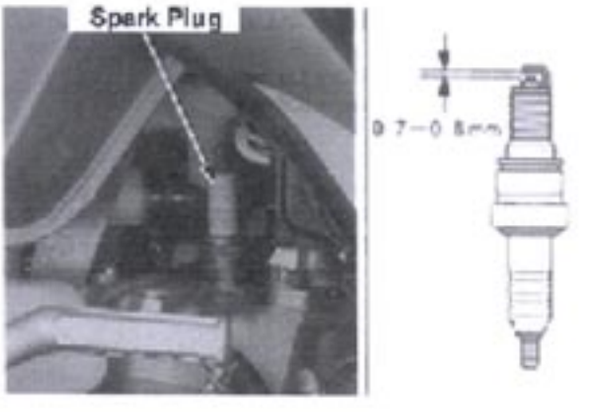
Notes
Replace both drive and driven sprockets at the same time.

Drive chain slider
Check the drive chain slider for wear and damage. Replace if necessary.

Notes: If drive chain makes contact with the swing arm, both parts may receive damage or wear out. Replace the slider if there is any evidence of contact.



Electrical system
Spark plug
Remove the spark plug cap.
Remove the spark plug and inspect for damage and dirt.
If there is dirt build-up, clean the plug with plug cleaner or a wire brush.



Designated plug :

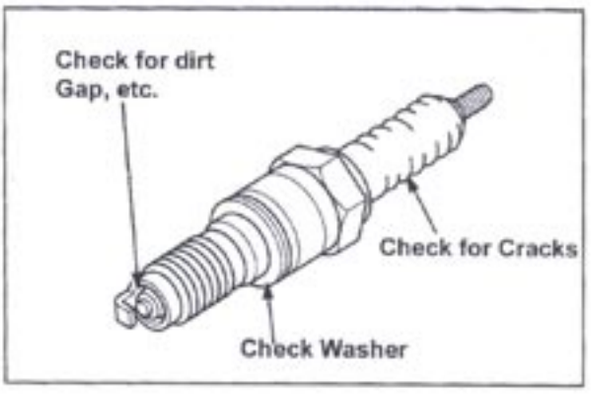
NGK - BR8ES	Standard
BR7ES	Low-speed operation
BR9ES	High-speed operation
DENSO - W24ESR-U	Standard
W22ESR-U	Low-speed operation
W27ESR-U	High-speed operation

Adjust the plug gap.

Standard : 0.7 - 0.8mm

Install the spark plug and tighten to the specified torque.

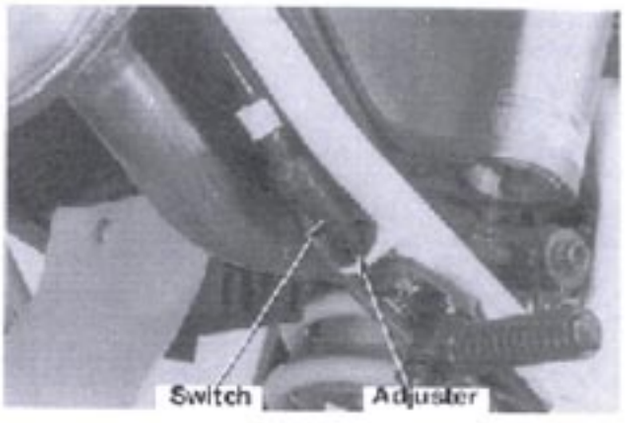
Torque : 18 Nm (1.8 kgfm)



Stop lamp switch

Notes
Adjust the stop lamp switch after adjusting the brake pedal height.

Adjust the stop lamp switch so as to illuminate the stop lamp when the brake is applied.
Adjust the switch by rotating the adjuster while holding the switch.
After adjusting, check its operation by depressing the brake pedal.

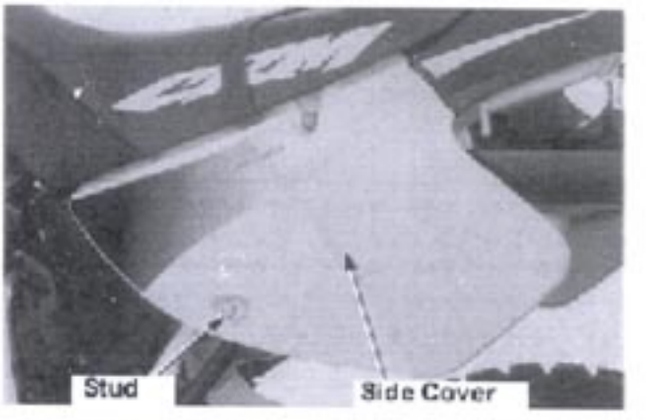


Notes
The front brake lamp switch does not require any adjustment.

Fuel system

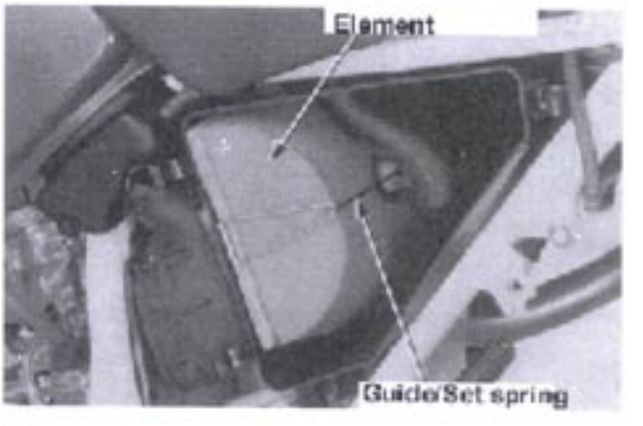
Air filter

Remove the stud and the left side cover.

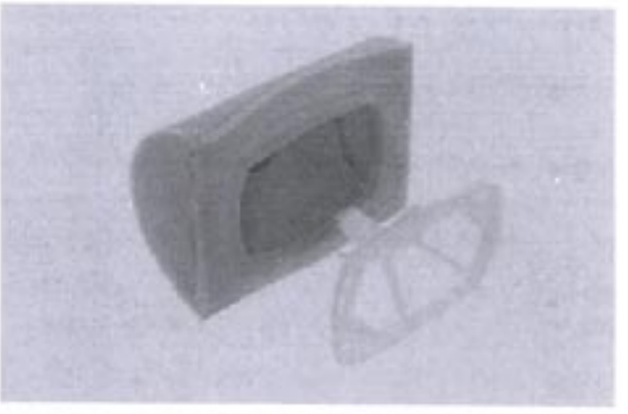


Remove Airbox lid springs.

Remove the set spring and the air filter element and its base.



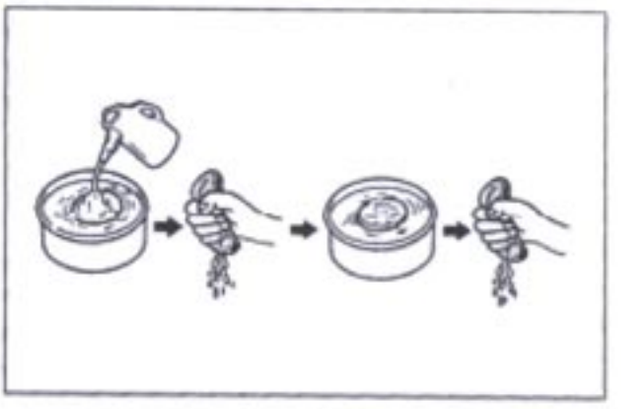
Check the filter element condition.
Clean the filter if necessary.
Check to ensure that foam element is not split or "holed".



Air filter cleaning
Wash the filter with washing solvent or kerosene. Squeeze it and wrap it with a dry cloth and squeeze again.

Warning

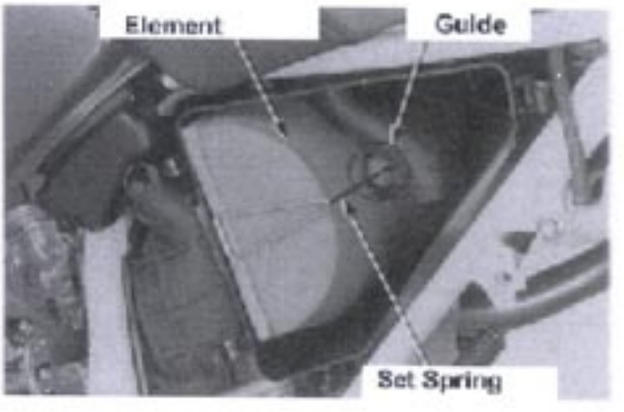
Do not use petrol, acid or alkaline detergent, or alcoholic detergent. The filter element may catch on fire or may receive damage.



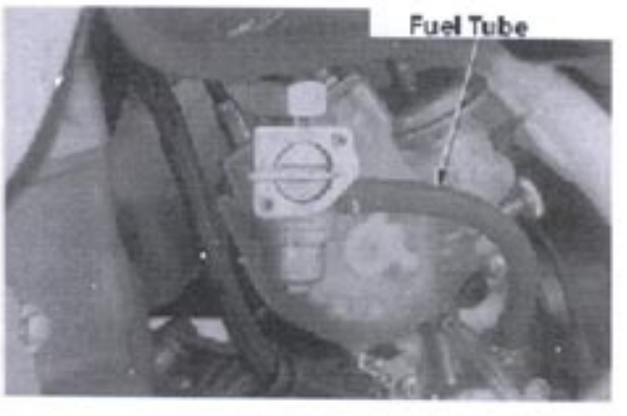
Dip the filter into clean oil and squeeze.

Caution

Do not damage the element.



Set the filter element to the base and fix it by installing a set spring to the base guide.
Install the air filter cover.
Install left side cover (2-3).

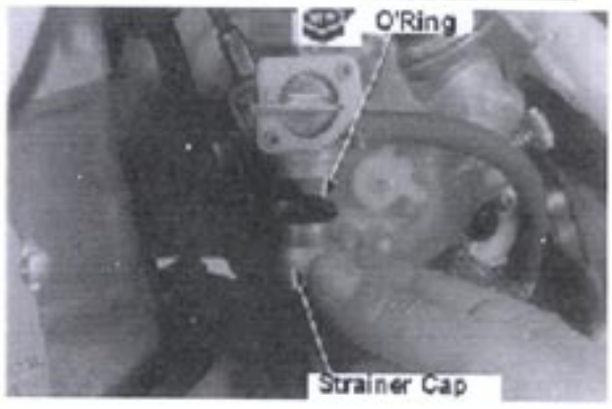


Fuel tube
Inspect the fuel tube for damage and fuel leak. Replace it if necessary.

Fuel cock
Turn the fuel cock OFF.
Remove a strainer cup.
Clean the strainer cup with cleaning solvent.
Install a new O-ring to the strainer cup and secure the cup.

Torque : 26 Nm (2.7 kgfm)

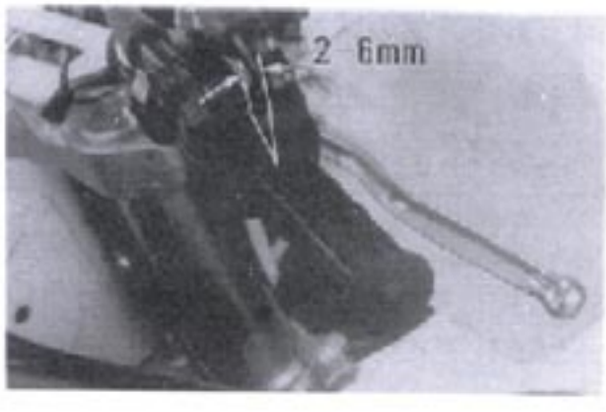
After installing, turn the fuel cock ON and check for fuel leak.



Measure the throttle grip free play at the grip flange.

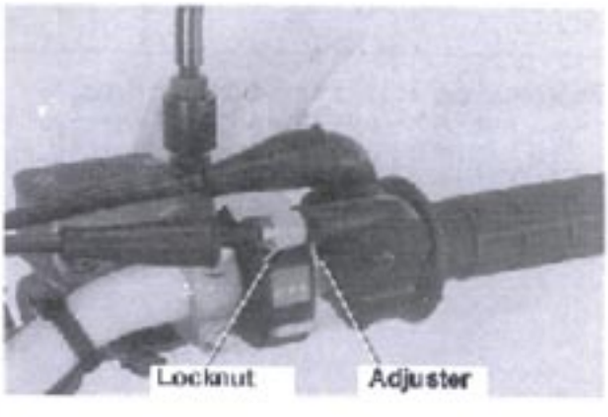
Free play : 2 – 6mm

Inspect the throttle cable for wear, twist, and damage.
Check the smooth movement of the throttle grip in all handlebar steering angle.



Fine adjustment can be done at the throttle holder.

Loosen the lock nut and turn the adjuster for fine adjustment.

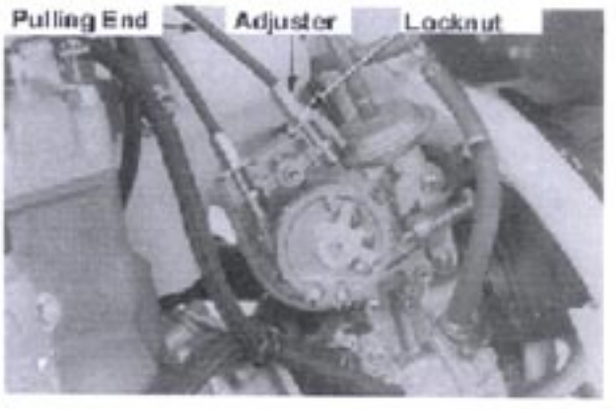


Remove screws and carburettor cover.

Coarse adjustment can be made on carburettor end.

Loosen lock nut on the pulling end and turn the adjuster to make an adjustment.

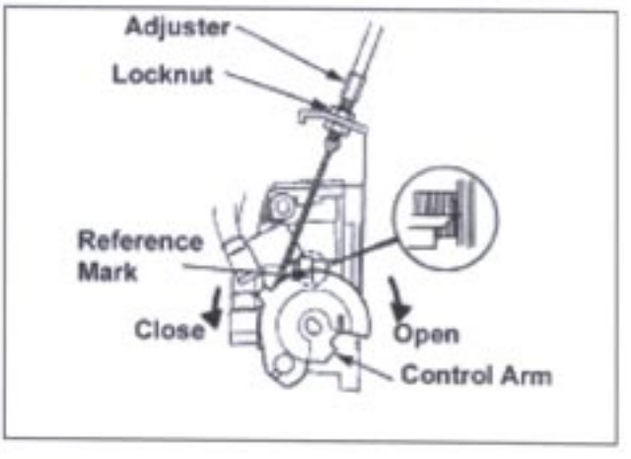
If the specified free play or smooth movement cannot be achieved by the above adjustment, replace the throttle cable.



Notes
Adjust the oil pump control cable after adjusting the throttle cable.

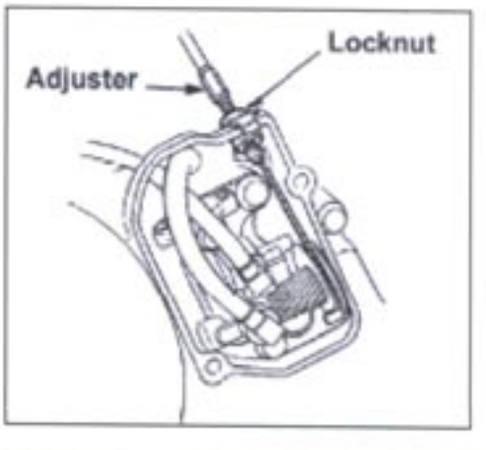
Oil pump adjustment

Check that the oil pump body marking is aligned with the reference mark on the control arm when the throttle is fully opened.



If the marks are not aligned, loosen the lock nut and turn the adjust bolt to make an adjustment.

Notes: 1mm offset towards "open" does not affect the engine.



If the adjustment is incorrect, the following symptoms may appear:

- Excessive control arm opening
- White smoke or starting difficulty
- Lack of control arm opening
- Burnt piston

Carburettor idling adjustment

Notes
- **Warm up the engine before adjusting the idling rpm.**
- **After having a carburettor overhaul, adjust the air screw and then adjust the idling rpm.**

Start and warm up the engine.
Support the vehicle upright on a level surface as the surface inclination may affect the idling rpm.

Check the idling rpm after sufficient warm-up.

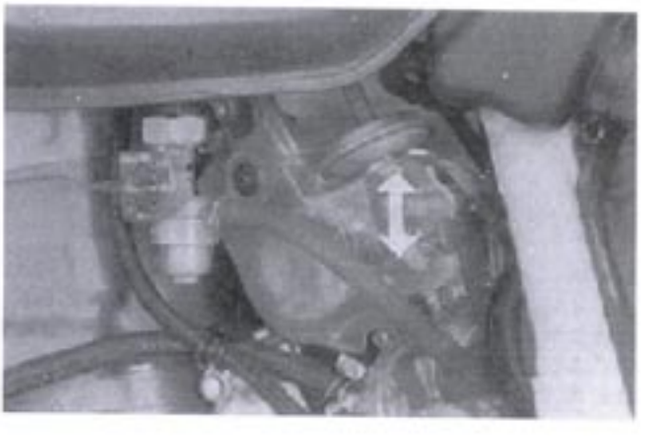
Idling rpm : 1,400 ± 100 rpm

Turn the idle adjust screw on the carburettor for adjustment.

Idling status check
Repeat few snappings while idling to check the rpm response.
Idling rpm should not change after the snappings.

Fully turn the handlebar to left and right to make sure there is no change in idling rpm.
If the idling rpm varies with the steering angle, check the throttle cable for its routing.

Starter lever operation
Check the starter lever for its smooth operation.



Cooling system

Warning

Check the coolant level at the reservoir, instead of radiator. When the engine is hot (above 100 °C), coolant may spurt if you open the radiator cap. Let the engine cool down before opening the cap.

Remove the left side cover(2-3).

Start and warm up the engine.
Shut down the engine and support the vehicle upright on a level surface.

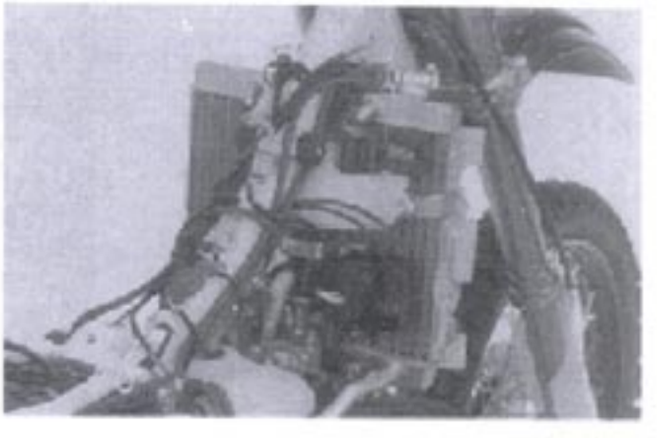
Check the coolant level is between the upper limit ("UPPER") and the lower limit ("LOWER").

If the coolant level is below the LOWER level, remove the reservoir cap and fill coolant to UPPER level.

Recommended coolant :
Genuine Honda Ultra radiator fluid (refill) or Genuine Honda Ultra radiator fluid (original)
Standard density :
30% (this mixture ratio affects the coolant's freezing temperature) adjust the figure according to your operating temperature(5-4).

Caution

Coolant contains anti-freezing and anti-corrosive substances, unlike tap water. Using tap water as a coolant may result in damaging the engine by corrosion or freezing.



Coolant leak

Remove seat and fuel tank (2-2, 2-3).

Check the radiator hose, water pump, water hose, and each joint for coolant leak.

If any leak has been detected, dismantle the part for full service (sec.5).

Check the radiator hose and water hose for wear and damage. A rubber hose naturally degrades with age and heat. Such an aged hose is fragile and may split when it is pressurized. Pinch the hose and check if there is any crack on its surface.

Lamps

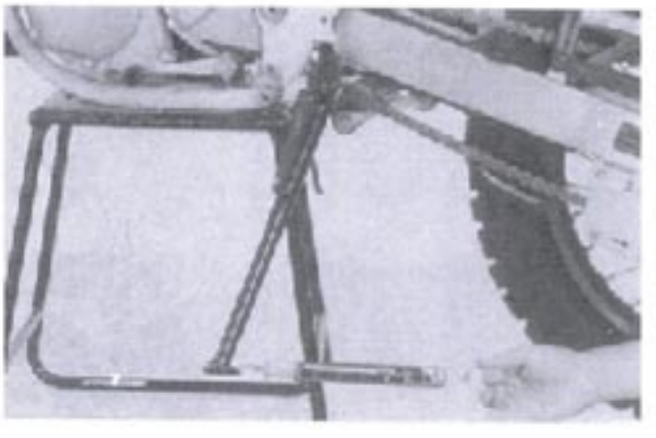
Head lamp beam axis adjustment
Turn the adjust screw to adjust the beam axis.

Others

Side stand
Support the bottom of the engine to lift the rear wheel.
Check if the side stand smoothly retracts when 2.0 – 3.0kg of load is applied.

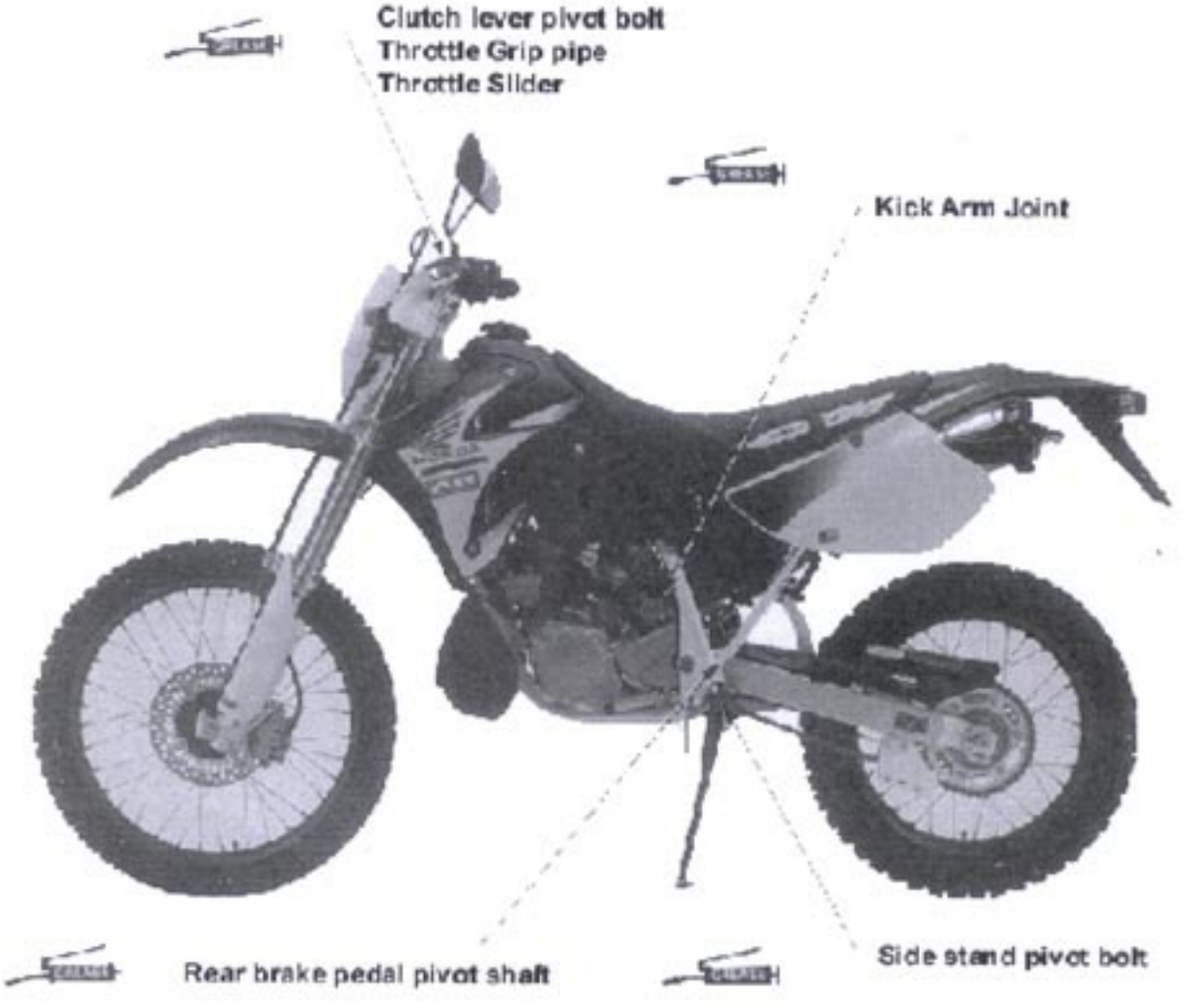
If the retraction is not smooth, apply grease to its pivot and re-check.

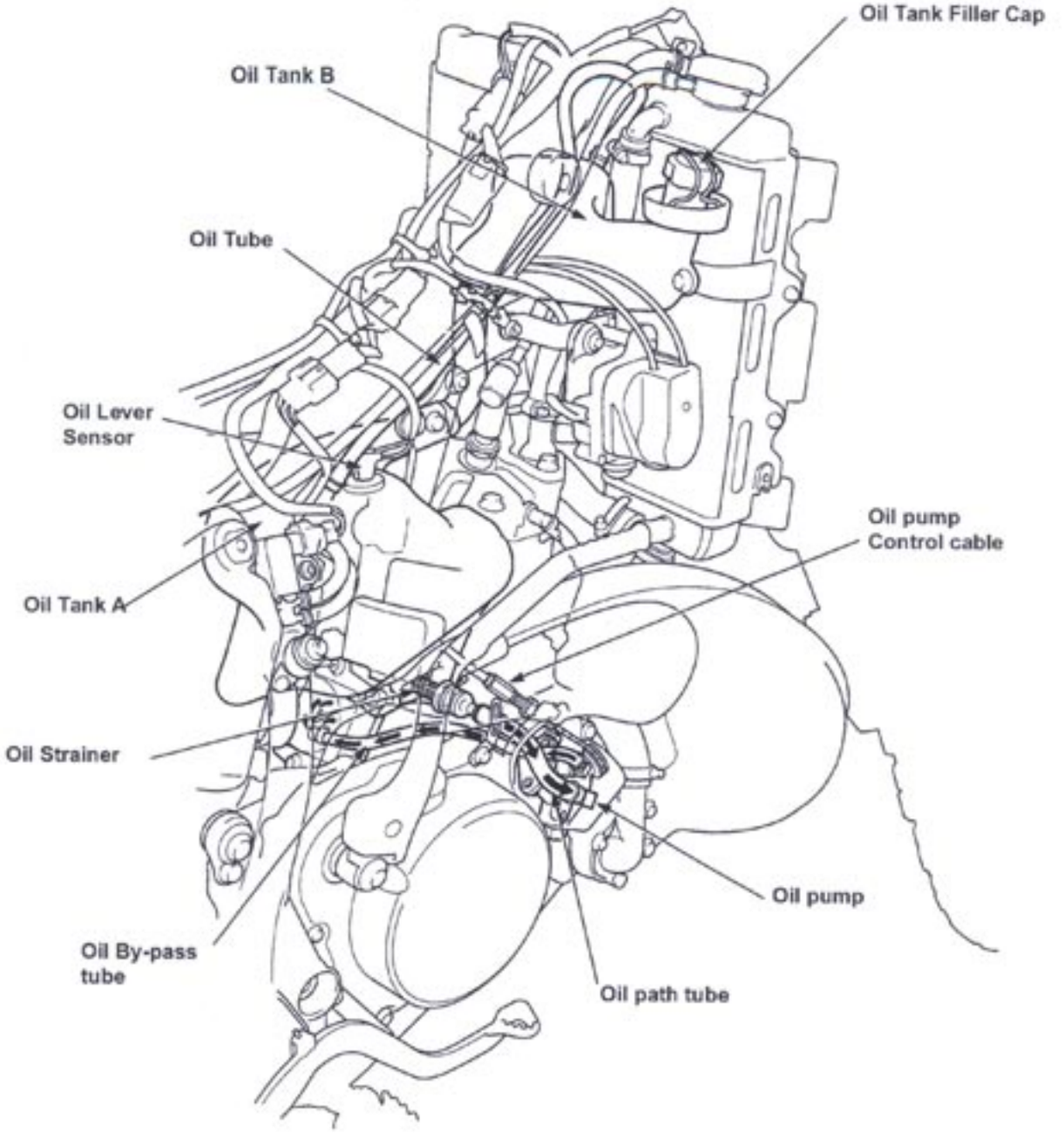
If the stand retracts to easily, check the return spring for deformation.



Lubrication of each components

Check all moving parts for smooth operation. If the operation is not smooth, apply recommended grease to the following recommended area.




Oil Tank Filler Cap
Oil Tank B
Oil Tube
Oil Lever Sensor
Oil pump Control cable
Oil Tank A
Oil Strainer
Oil pump
Oil By-pass tube
Oil path tube

General

Caution

If there is air in the oil path, the engine may seize.
Bleed air after servicing the lubrication system.

- Do not disassemble the oil pump.
- The oil pump can be serviced without removing it from the chassis.
- Extreme care must be taken to prevent debris falling into the engine and the oil tube when removing/installing the oil pump.
- When the oil tube is disconnected, bleed air in the oil tube, the oil pump, and the oil path tube.
- When the oil path tube is disconnected, bleed air in the oil path tube.
- When the oil tube is disconnected, pinch the oil tube to prevent oil flowing out of the tube.

Specification

Item		Standard	Service Limit
Engine oil capacity	Total capacity	1.2 litres	-
Designated engine oil		Genuine Honda Ultra GR2 (or equivalent)	-
Transmission Oil capacity	Total capacity	0.65 litres	-
	Oil change	0.54 litres	-
Recommended transmission oil (refer to the operating temperature chart to select a suitable viscosity)		• Honda Ultra-U (4-stroke motorcycle, SAE 10W-30) • API-SE, -SF, or –SG class engine oil	-
Lubrication type		Separate refilling	-
Oil filter		Total flow filtering/screen filter	-
Oil pump		Plunger	-

Troubleshooting

Overheated or seized engine

- Improper adjustment of engine oil (insufficient flow)
- Low grade engine oil (quality)
- Insufficient oil level or clogged/bent strainer screen or oil tube
- Air in the oil tube system
- Oil pump failure
- Air in the oil pump
- No oil feed from the tank
- Clogged vent hole on the oil tank cap
- Clogged oil strainer screen

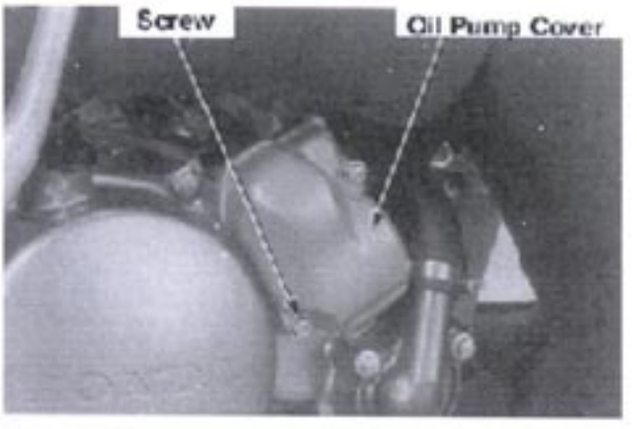
Excessive smoke, carbon build-up on a spark plug

- Improper adjustment of the oil pump
- Low grade engine oil (quality)

Oil pump

Notes:
Clean the oil pump and the crankcase before removing the oil pump to prevent debris entering the oil line.

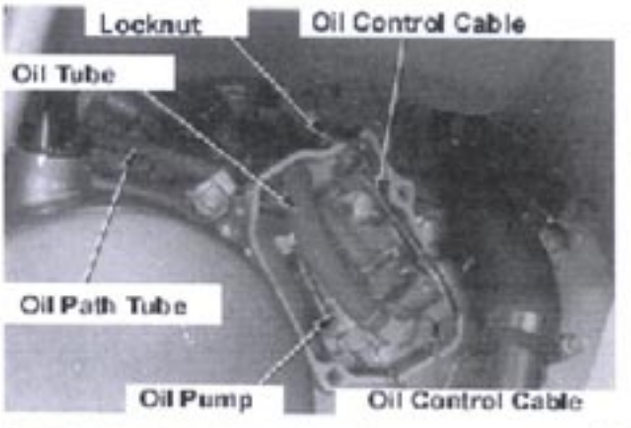
Remove the oil pump cover.



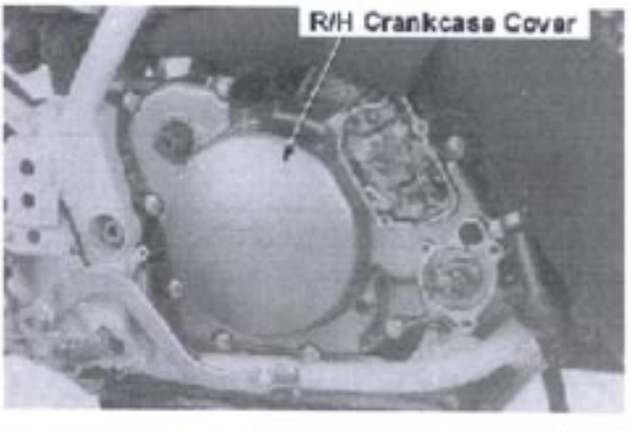
Loosen the lock nut.
Disconnect the oil control cable from the oil control lever.

Notes:
When the oil line is disconnected, pinch the line to prevent oil flowing out.

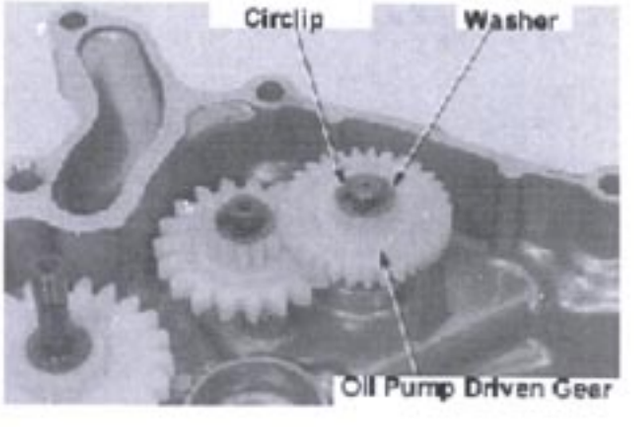
Disconnect the oil tube and the oil path tube from the oil pump.
Disconnect the oil line from the right crankcase cover's guide, while exercising caution to the oil flow-out.



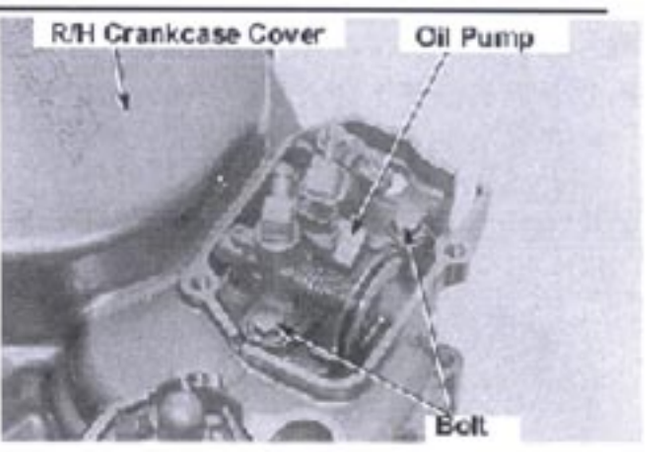
Remove the right crankcase cover (9-3).



Remove the circlip to remove the washer and the oil pump driven gear.



Remove bolts to remove the oil pump from the right crankcase cover.

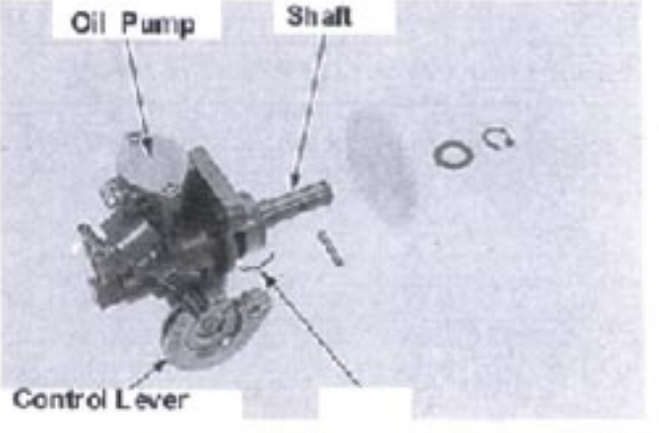


Inspection

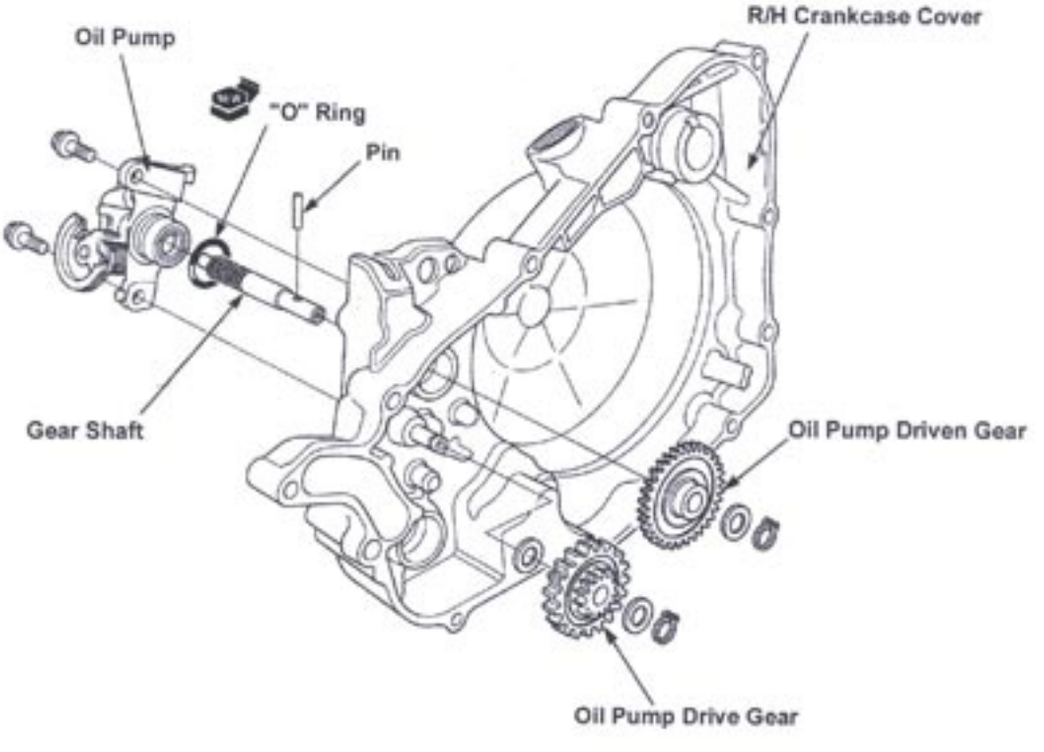
Notes:
Do not disassemble the oil pump assembly.

After removing the oil pump, check the following items:

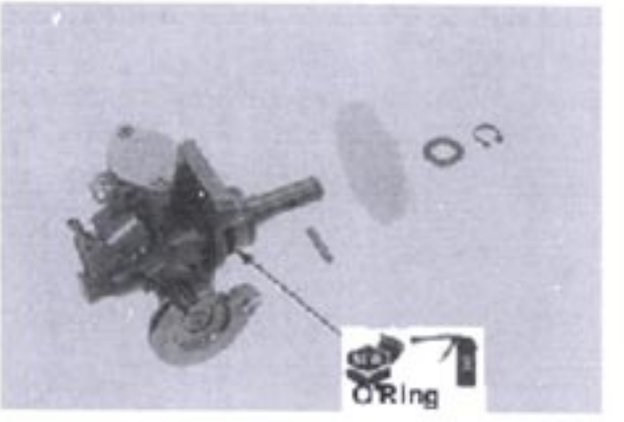
- O-ring deformation
- Right crankcase cover and joint repair
- Damage to the oil pump body
- Operation of oil pump control lever
- Oil pump shaft revolution



Assembly

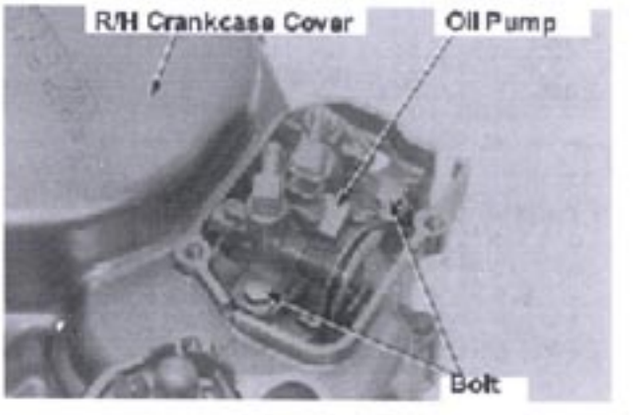


Installation
Apply new recommended transmission oil to the new O-ring.

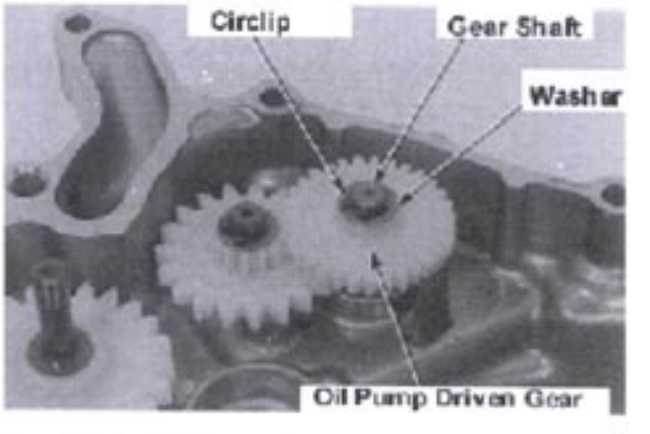


Notes: Bleed oil pump (4-6).

Install the oil pump to the right crankcase cover.

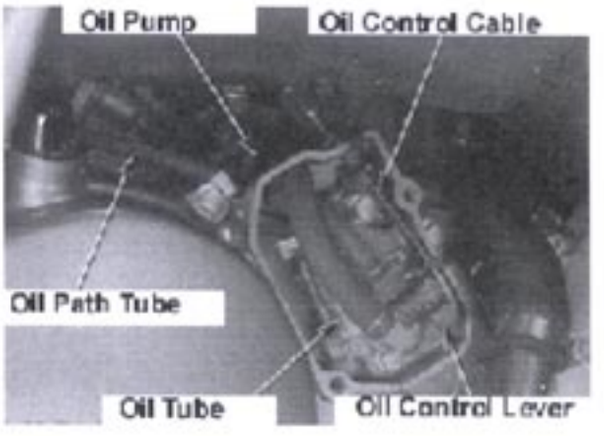


Install the oil pump driven gear to the gear shaft and set the circlip.



Install the right crankcase cover to the crankcase.

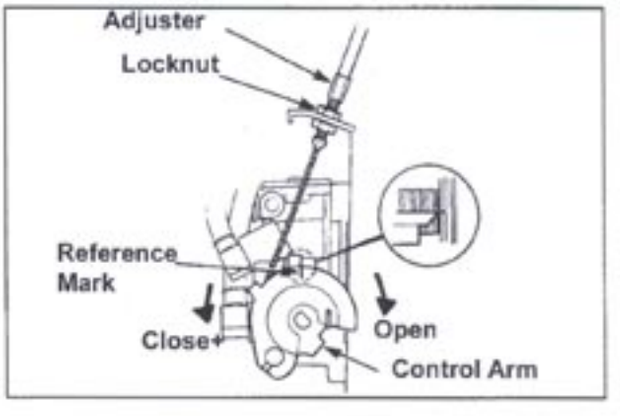
Set the oil tube, the oil path tube to the oil pump.



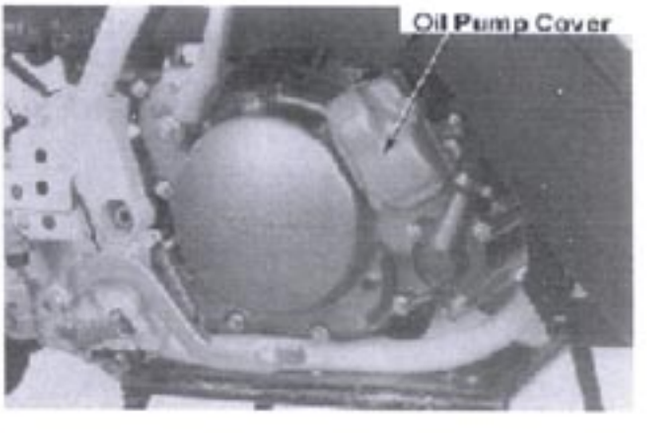
Notes:
Bleed air from the oil tube and the oil path tube (4-6).

Connect the oil control cable to the oil control lever.

Adjust the oil pump (3-16).



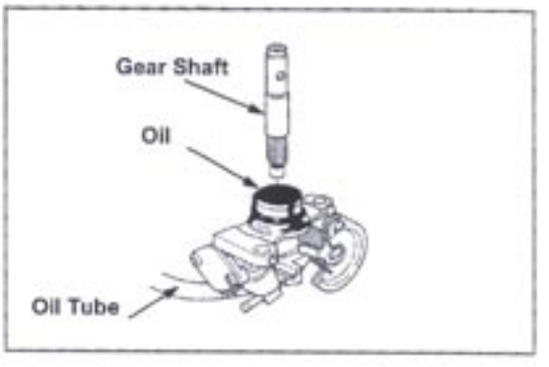
Install the oil pump cover.



Oil pump bleeding

- Air in the oil path may result in seizing the engine. Bleed air after servicing the lubrication system.
- When the oil tube is disconnected or oil has run out, bleed air from the oil tube and the oil pump.

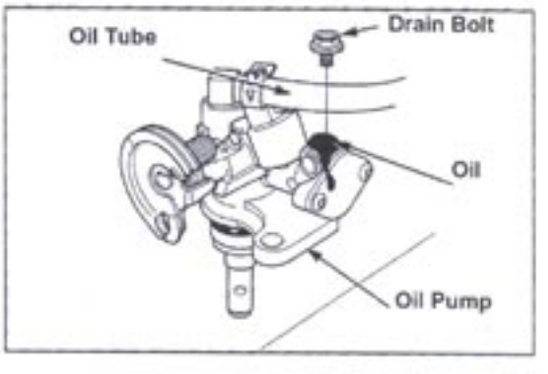
Remove the right crankcase cover and remove the oil pump from the right crankcase cover (4-2).
Bleed oil from the oil tube and bleed air from the tube.



Connect the oil tube to the pump.
Face the oil pump mount upwards and pull out the gear shaft. Oil should spill from the shaft hole.
Wait until the air bubble stops coming out from the shaft hole and twist the gear shaft into the hole.

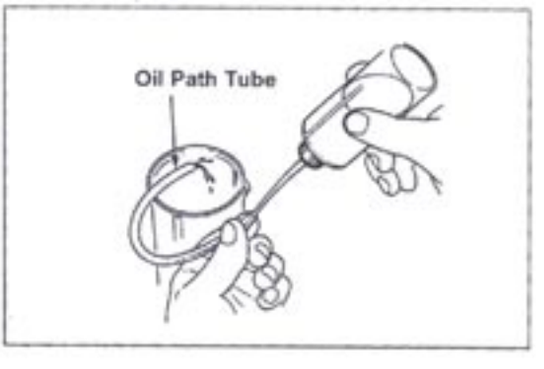
Notes:
Do not let debris enter the oil pump when installing the shaft.

While the oil tube is connected, face the drain bolt upwards and bring the oil pump mount surface level. Then remove the drain bolt and fill oil from the hole. Oil should spill from the drain bolt hole.
Let the oil spill until no air bubble comes out.
Secure the drain bolt and disconnect the oil tube.
Pinch the tube to prevent air entering the tube.



Set the oil pump to the right crankcase cover.
Install the right crankcase cover to the crankcase and connect the oil tube to the oil pump.

Disconnect the oil path tube from carburettor Insulator and fill with engine oil.
Connect the oil path tube to the carburettor insulator and the oil pump.
Fill engine oil.
Start the engine and let it run at idling.
Adjust the oil pump control lever to fully-opened position and leave it for two minutes.



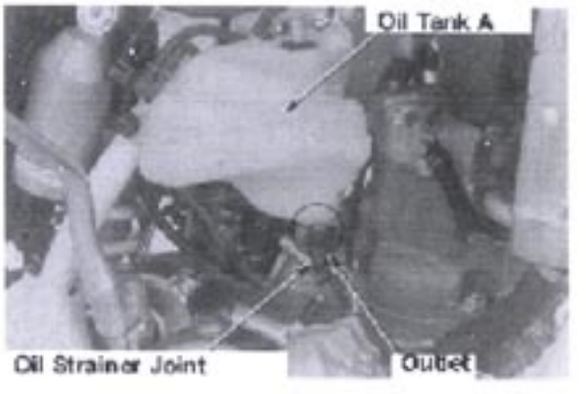
Notes:
Do not run the engine in a poorly-ventilated area.

Engine oil strainer

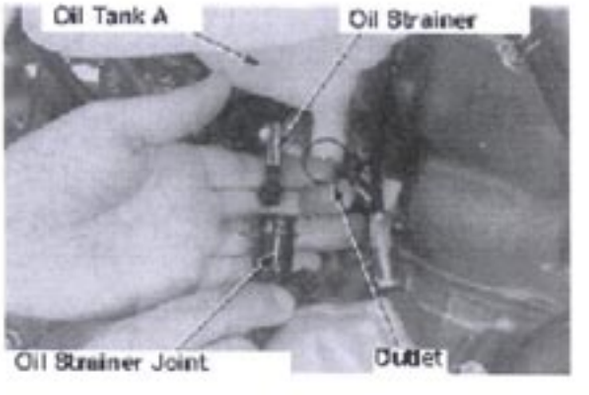
Removal/installation

Remove the fuel tank (2-3).

Remove the exhaust chamber (2-7).
Disconnect the oil tank A and the oil strainer joint.
Drain engine oil.

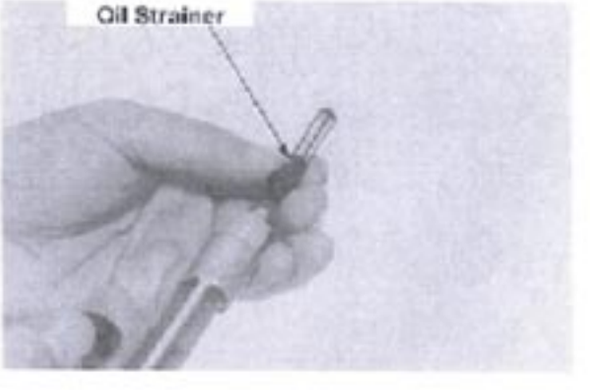


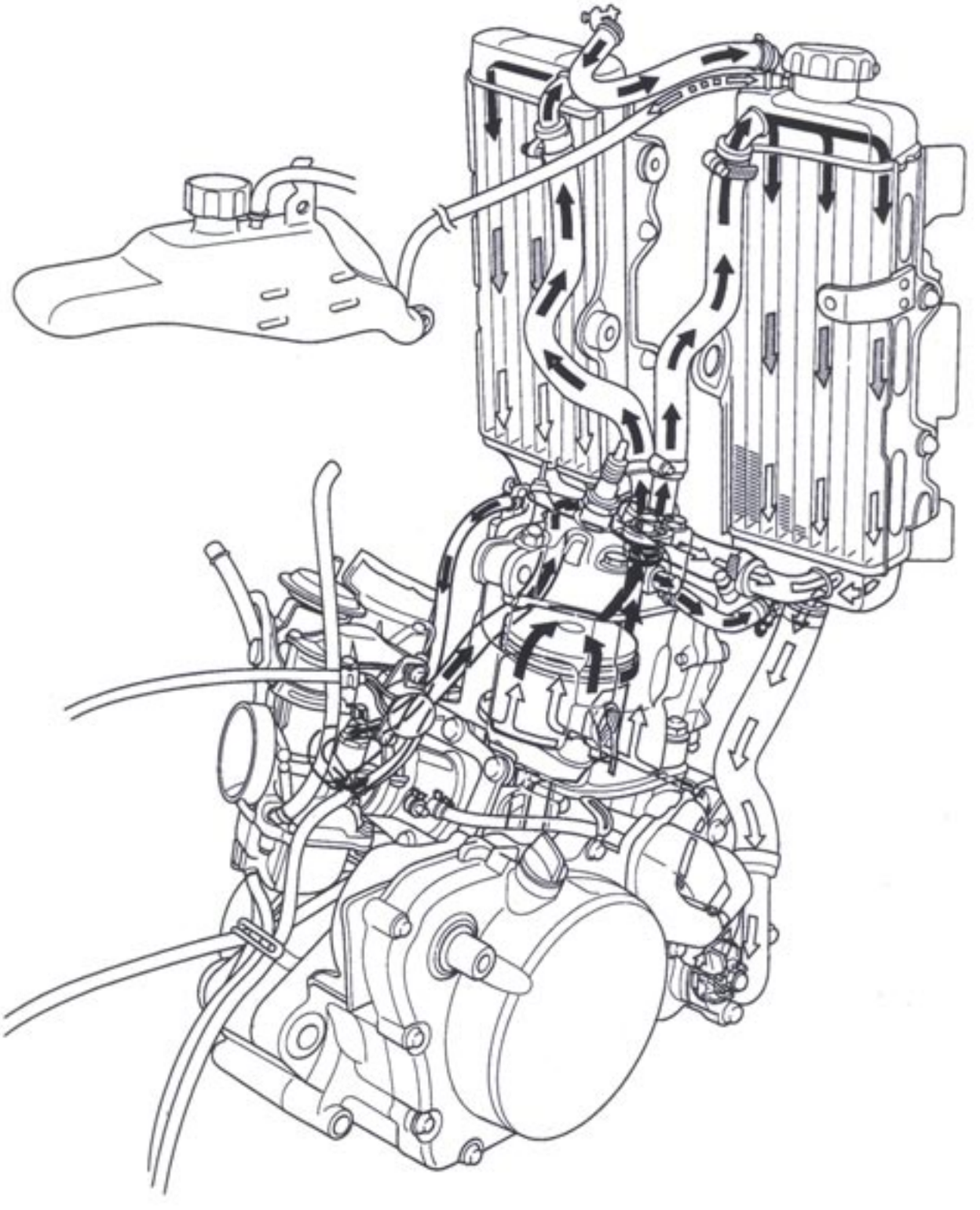
Remove the oil strainer joint from the engine oil tank A.
Pull out the oil strainer which is inserted in the outlet of the engine oil tank A.
Reverse the above procedure for installation.



Engine oil strainer cleaning

Clean the oil path of the engine oil with compressed air.





General

- If the coolant temperature is suspected to be above 100°C, do not open the radiator cap because the coolant may spurt from the radiator cap. Wait until the engine gets cold. Wrap the cap with a cloth and slowly open the cap.
- Cooling system should be serviced when the engine is cold.
- Coolant is toxic. Keep it away from your skin, eyes, and clothing.
  - If it gets contact with skin or clothing, wash with soap and rinse with water.
  - If it gets contact with eyes, rinse with water and consult a specialist.
  - If the coolant is swallowed, induce vomiting, gargle, and consult a specialist.
- When storing the coolant, keep it out of reach of children.

- Do not remove the radiator cap except for certain occasions, such as:
  - refilling coolant after the coolant system overhaul
  - draining all coolant from the system.
- Cooling system can be serviced while the engine is mounted in the frame.
- Coolant may damage painted surface. If the coolant comes in contact with the painted surface, immediately wash with water.
- After servicing the cooling system, check for coolant leak by using a radiator cap tester.
- The contacts in the thermo switch are fragile. If the thermo switch is dropped or it has experienced impact, check its function before installing to the system.
- Refer to section 19 for the thermo switch inspection.

Specification

Item		Standard	Service Limit
Coolant capacity	Disassembled	1.25 litre	-
	Coolant change	1.2 litre	-
	Reservoir capacity	0.2 litre	-
Coolant density		30%	-
Radiator cap valve opening pressure		108-137kPa (1.1-1.4kgf/cm²)	-
Thermostat	Valve opening temperature	62°C	-
	Full open temperature	72°C	
	Full open lifting	4mm or above	

Torque setting

Water pump drain bolt	10 Nm (1.0 kgfm)
Water pump impeller	12 Nm (1.2 kgfm)
Cylinder head hanger plate bolt (cylinder head)	49 Nm (5.0 kgfm)
(frame)	26 Nm (2.7 kgfm)

Special tools

Mechanical seal driver attachment	07PMD-KBP0100
Bearing remover set 12mm	07936-1660001
- Remover head 12mm	07936-1660110
- Remover shaft	07936-1660120
- Remover weight	07741-0010201
Driver handle A	07749-0010000
Outer driver 24x26mm	07746-0010700
Pilot 12mm	07746-0040200

Troubleshooting

Too high coolant temperature

- Thermo sensor failure
- Air in the cooling system
- Thermostat failure (the thermostat does not open)
- Clogged radiator, hose, or water jacket
- Water pump failure

Too low coolant level

- Coolant temperature too low or rises very slowly
- Thermostat failure (the thermostat does not close)

Coolant leak

- Water pump mechanical seal failure
- Radiator cap failure
- O-ring wear, lack of contact
- Hose attachment failure
- Hose, water tube damage
- Radiator crack

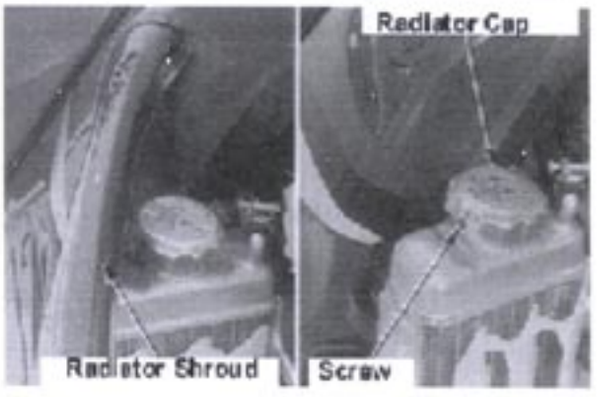
● **Performance check**

Warning

Make sure the coolant is cold before opening the radiator cap.

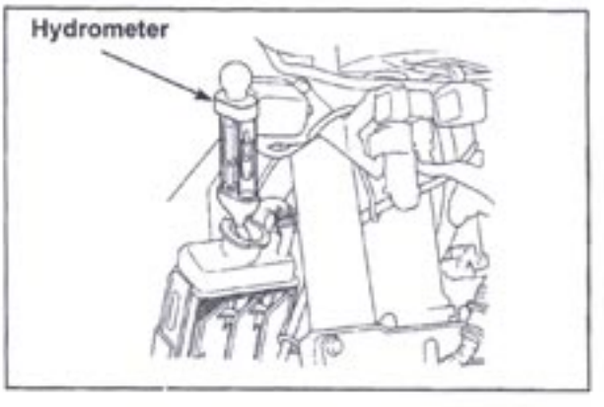
Coolant specific gravity check.

Remove the right radiator shroud.



Use a hydrometer to measure the coolant density. It should be appropriate to the operating temperature (5-4).

Check the coolant for contamination.



Radiator cap inspection

Remove the radiator cap.

Notes: When setting the radiator cap to the tester, wet the cap seal with water.

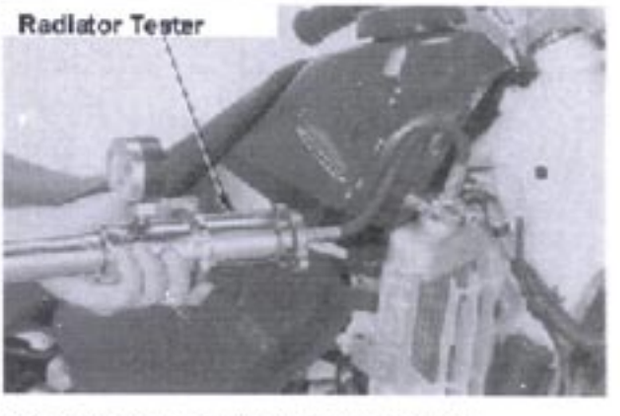
Check the cap condition with the radiator cap tester.

The cap should hold radiator cap valve opening pressure for six seconds.

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

Radiator pressurisation test

Apply specific pressure (radiator cap valve opening pressure) to the cooling system with the radiator cap tester and check the system holds within the range for six seconds.



Caution

Do not apply pressure beyond specified valve opening pressure, or the cooling system may receive damage.

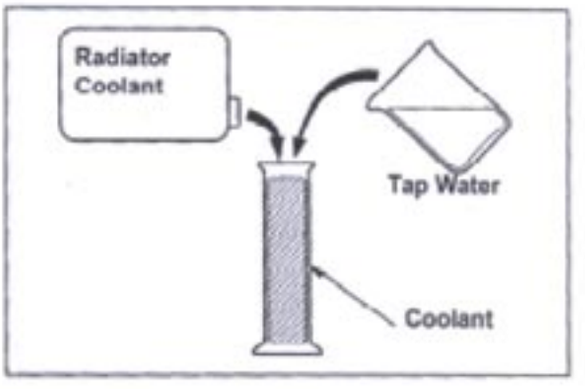
If there is any pressure leak, check each joint, water pump mount, and water pump inspection hole (5-10) for leaks.

Coolant change, air bleed

Preparing coolant

Warning

- Coolant is toxic. Keep it away from your skin, eyes, and clothing.
  - If it gets contact with skin or clothing, wash with soap and rinse with water.
  - If it gets contact with eyes, rinse with water and consult a specialist.
  - If the coolant is swallowed, induce vomiting, gargle, and consult a specialist.
  - When storing the coolant, keep it out of reach of children



Minimum operating temperature	Mixture ratio	Honda Ultra radiator fluid (cm³)	Tap water (cm³)
-9 °C	20%	344	1,376
-16 °C	30%	516	1,204
-25 °C	40%	688	1,032
-37 °C	50%	860	860
-44.5 °C	55%	946	774

Notes:
Mix the radiator fluid and tap water.
Allow approx. 5°C buffer to your operating environment.

Mix the radiator fluid with tap water to make coolant.

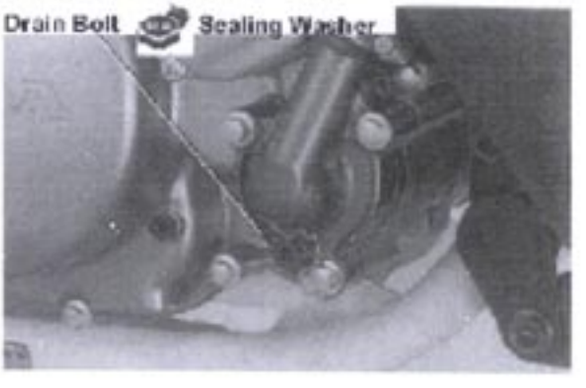
Standard Coolant

Recommended radiator fluid : Honda Ultra radiator fluid
density : 30%
total capacity : 1.25 litre

Coolant change and air bleeding

Warning

Make sure that the coolant is cold before opening the radiator cap.

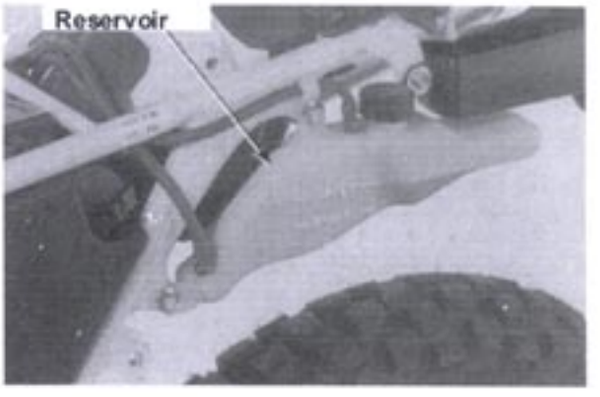


Remove the radiator cap.

Remove the water pump drain bolt to drain coolant.

After draining all coolant, install a new sealing washer to the drain bolt.

Remove the left side cover (2-3).
Remove the reservoir bolt to remove the reservoir. Drain coolant from the tank.
After draining all coolant, wash the interior of the tank.
Install the reservoir and secure the bolt.



Fill coolant from refilling hole (radiator cap hole) until the coolant level comes up to the opening.

Remove the reservoir.
Hold the vehicle upright and fill coolant up to the upper limit line on the reservoir.
Bleed air in the following procedure.

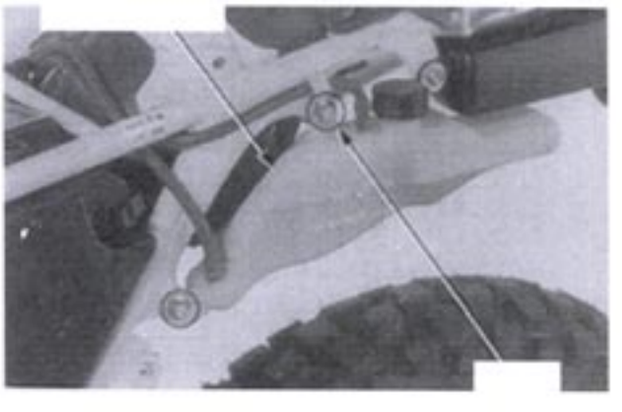
1. Set the gear neutral. Start the engine and run at idling rpm for a few minutes.
2. Snap the throttle for few times to bleed air in the cooling system.
3. Re-fill coolant to the top. Install the radiator cap.
4. Hold the vehicle upright and fill coolant up to the upper limit line on the reservoir. Set the reservoir cap.
5. Install the left side cover (2-3).

Reservoir

Removal/installation

Remove the left side cover (2-3).
Remove the reservoir to drain all coolant.
Disconnect the siphon tube and the over flow tube to remove the tank.

Reverse the above procedure for installation.

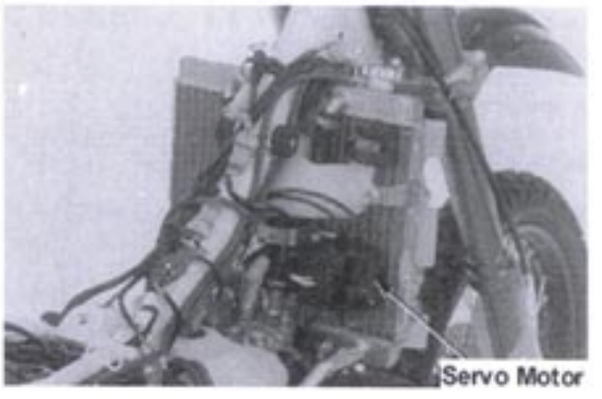


Thermostat

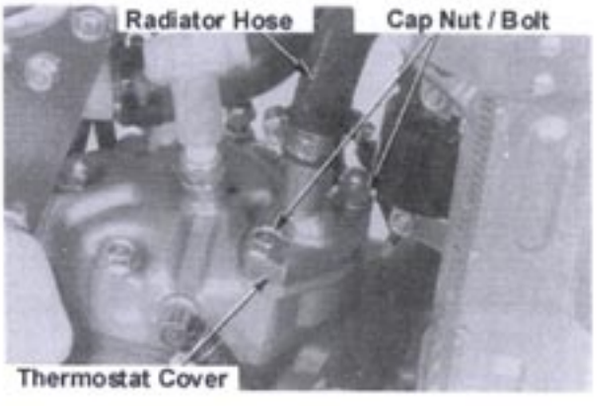
Removal

Remove the seat and the fuel tank (2-2, 2-3).

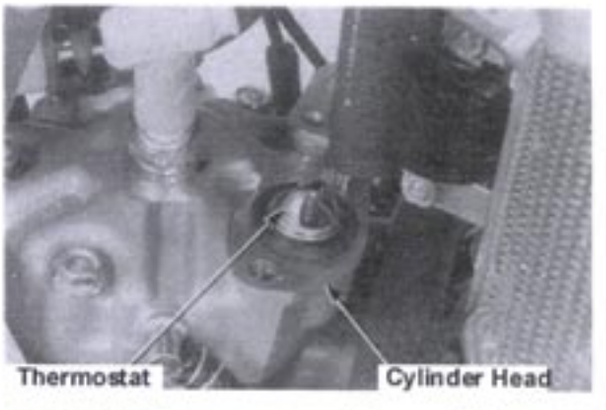
Drain the coolant (5-4).



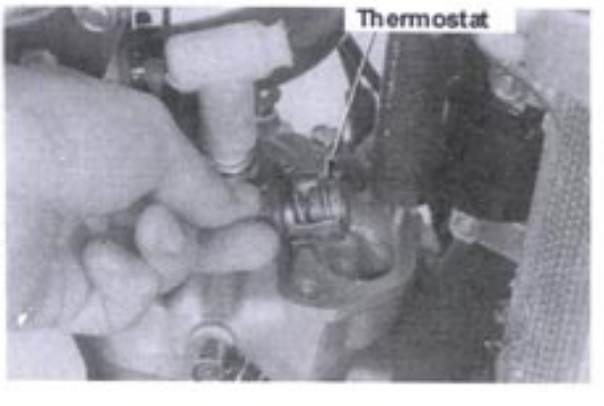
Disconnect the upper radiator hose.
Remove thermostat cover cap nuts/bolts.
Remove the thermostat cover.



Remove the thermostat from the cylinder head.

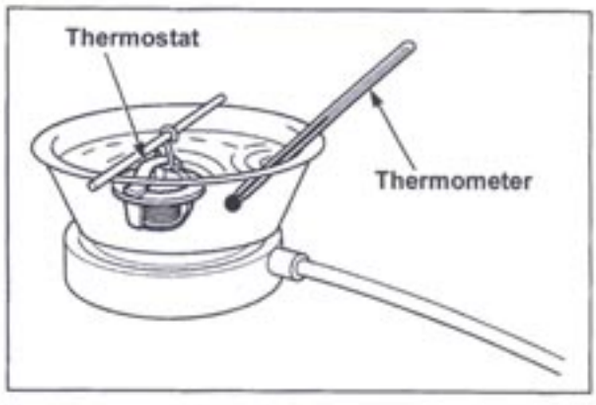


Remove the thermostat and inspect it (5-7).



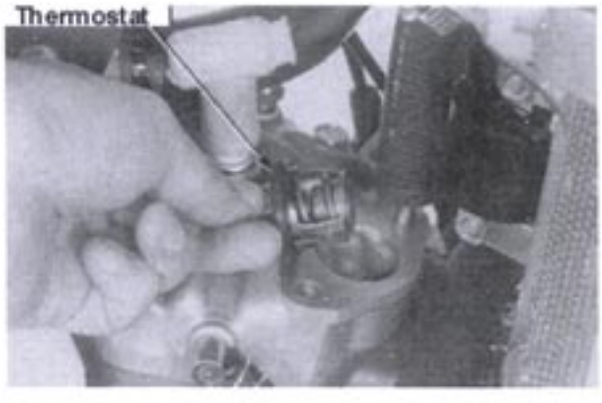
Inspection

- Notes:
- Replace the thermostat if it is open at room temperature.
- The thermostat has a delay in response because of its small sensing area. When checking the valve opening lift, maintain fully-open temperature for five minutes.
- Do not let the thermostat or the thermometer touch the bottom of the testing container.



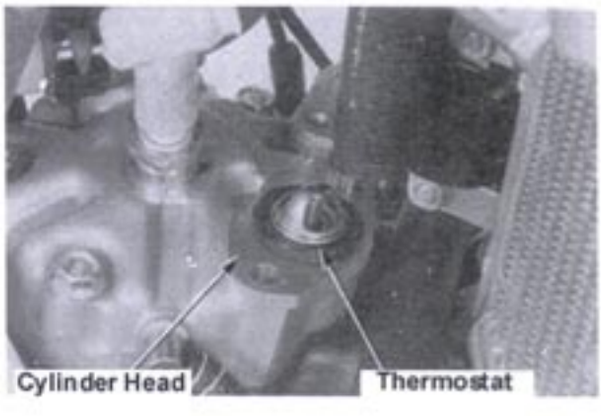
Place the thermostat into the container and gradually raise the temperature to check the valve opening temperature.

Valve opening temperature : 62°C
Fully-open lift/temperature : 4mm or above/72°C



Installation

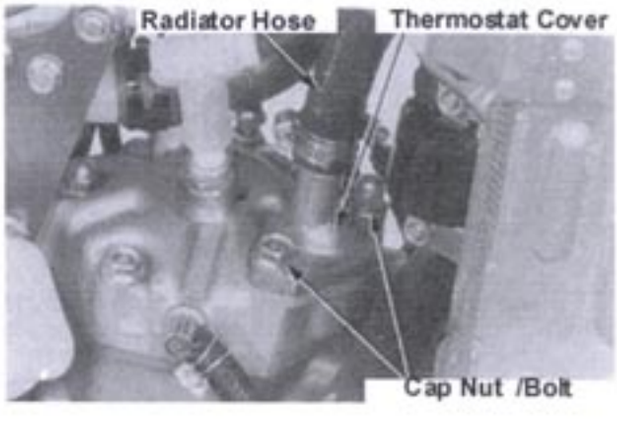
Notes:
Apply coolant to the thermostat sealing area.



Install the thermostat to the cylinder head.

Connect the upper radiator hose.
Set the thermostat cover and secure bolts/nuts to specified torque.

Torque : 26Nm (2.7 kgm)



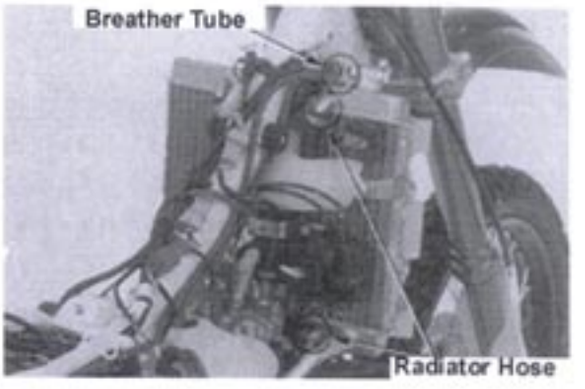
Fill coolant and bleed air (5-4).
Install the fuel tank and the seat (2-2, 2-3).

Radiator

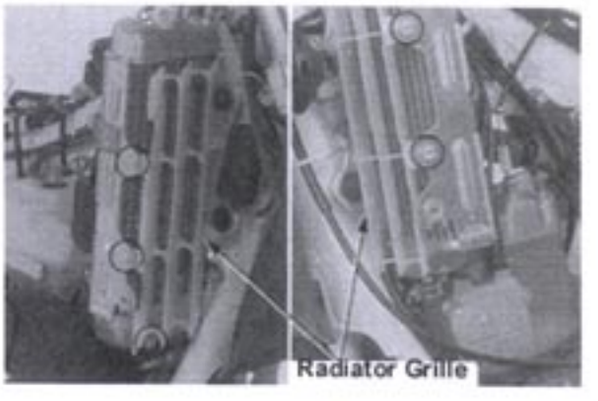
Notes: Do not damage the radiator fin.

Removal

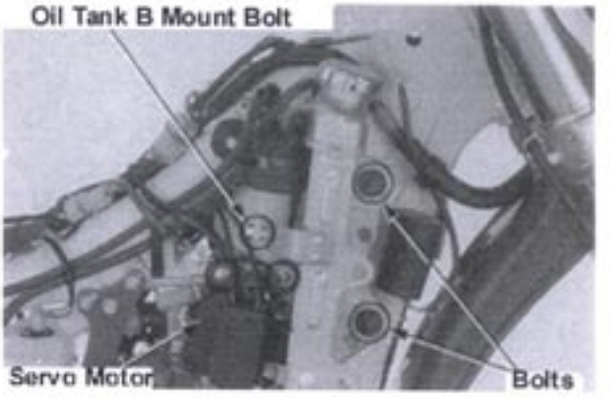
Drain coolant (5-4).
Disconnect the radiator hose and the breather tube.
Remove the radiator hose.



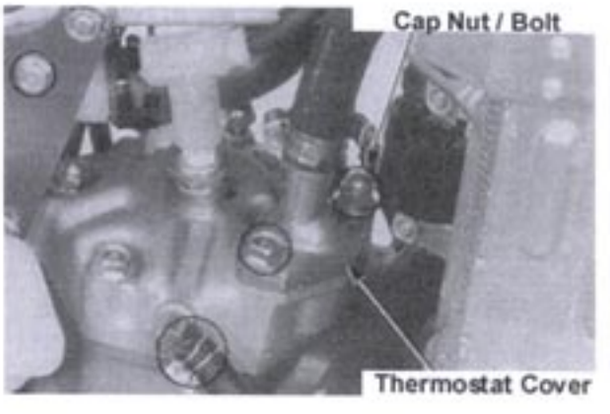
Remove right/left radiator grills.



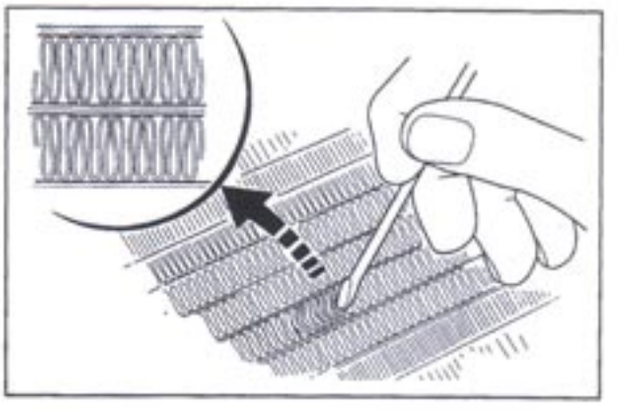
Remove right/left radiator mount bolts.
Remove the thermo-motor.
Remove the oil tank B mount bolt.



Remove the thermostat cover.
Remove right/left radiators.

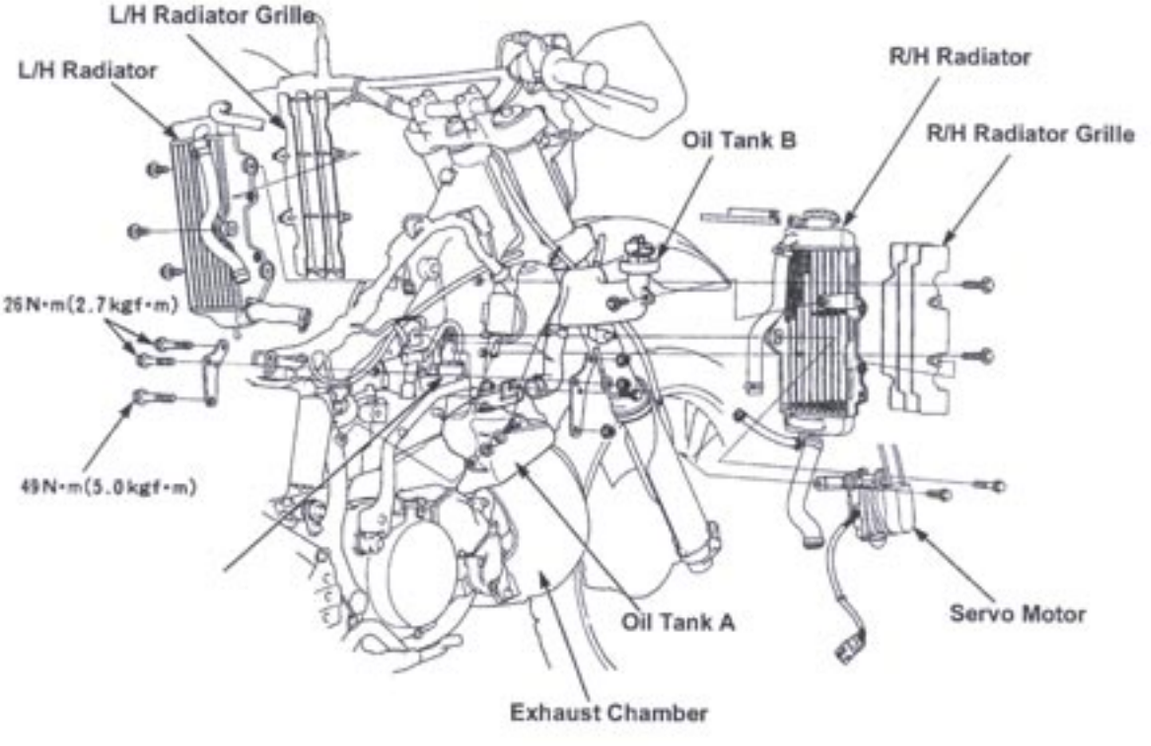


Radiator inspection
Make sure the radiator core is clean and the fin is not bent.



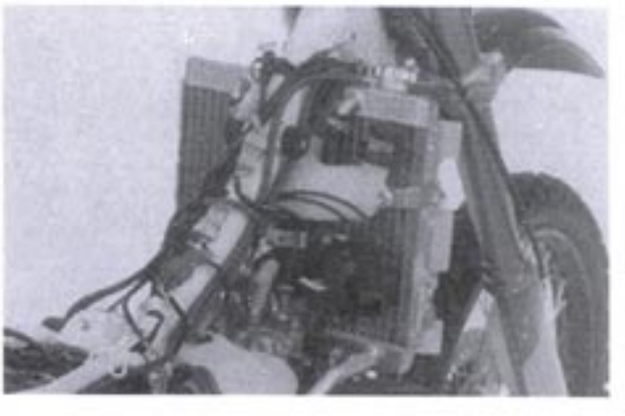
- **Notes**
- **If the clogging of the radiator core is beyond 20% of total radiation area, adjust or replace the radiator.**

Assembly



Reverse the procedure to install.

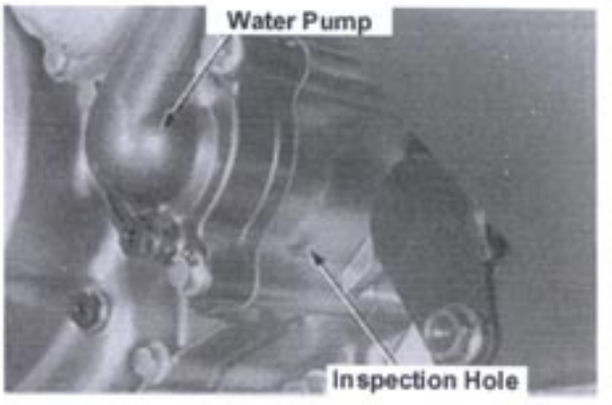
Fill coolant and bleed air (5-4)..



Water pump

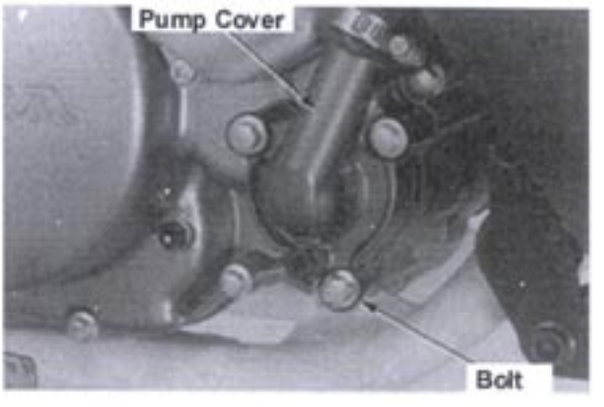
Inspection

Inspect the bottom part of the water pump and the inspection hole for coolant leak.
If there is any leak from the inspection hole, replace the mechanical seal.

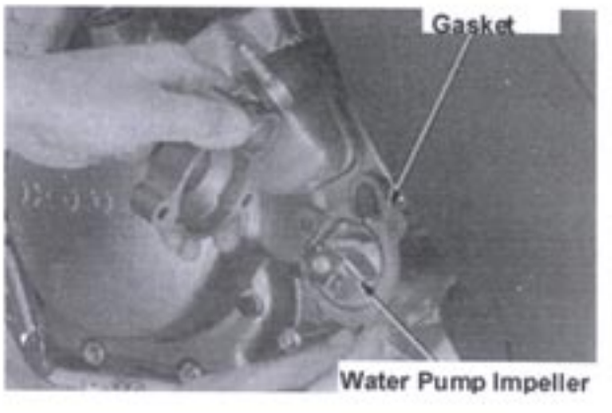


Removal

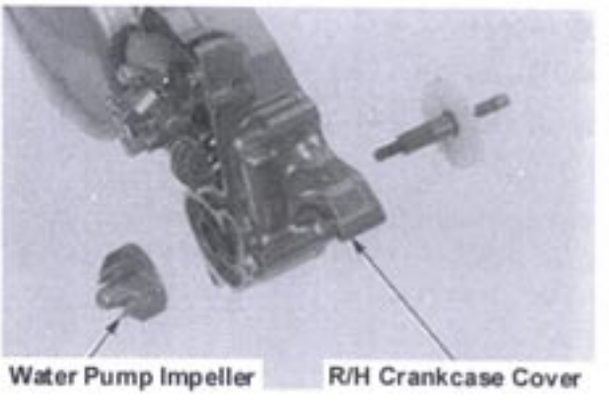
Drain coolant (5-4).
Remove three water pump bolts to remove the pump cover.



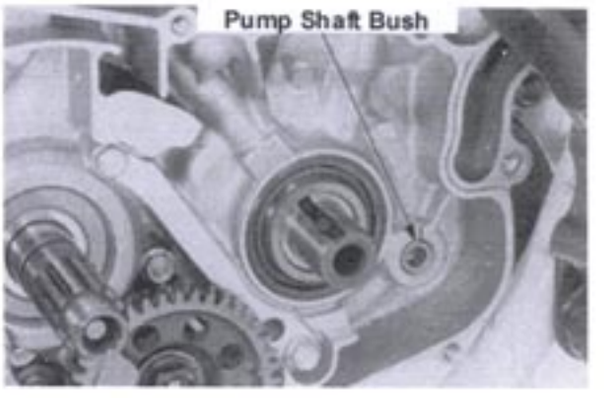
Remove the gasket.
Set the transmission gear.
Loosen the water pump impeller.



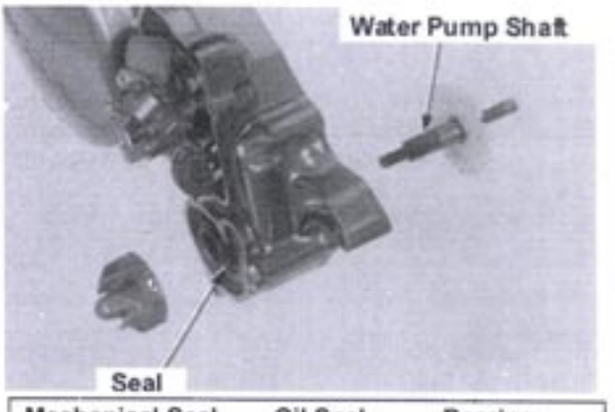
Remove the right crankcase cover (9-3).
Remove the water pump impellor.



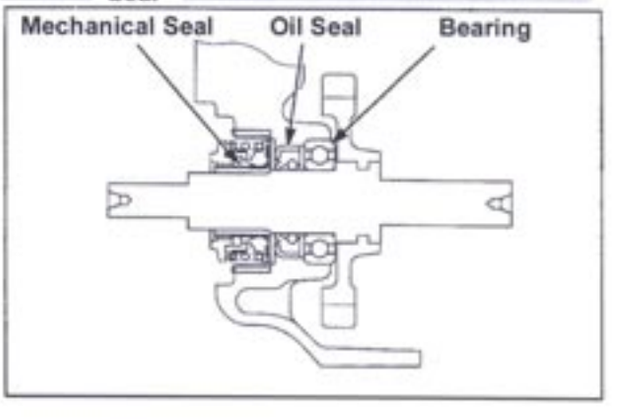
Water pump shaft bush inspection
Visually inspect the water pump shaft bush. Replace if there is damage or wear.



Water pump shaft/seal inspection
Inspect the water pump shaft for damage or bending. Replace if necessary.
Check the mechanical seal, oil seal, and lips for damage. Replace if necessary.



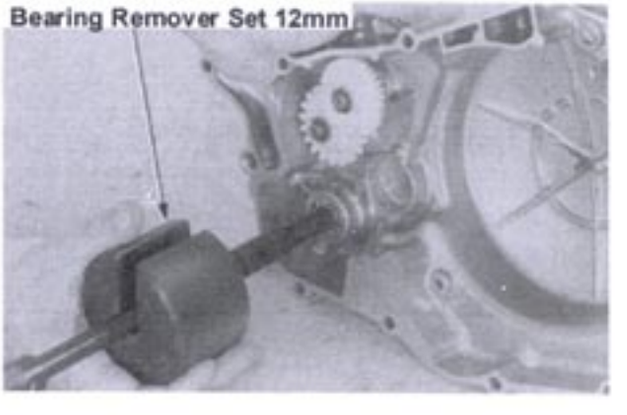
Water pump bearing/seal change
Rotate the inner race in the water pump bearing on the right crankcase cover with a finger to check smooth revolution.
If the revolution is not smooth, or the outer race and its cover are fitted loose or damaged, replace the bearing.



Remove the bearing from the right crankcase.

Special tools :

Bearing remover set 12mm	**07936-1660001**
Remover head 12mm	**07936-1660110**
Remover shaft 12mm	**07936-1660120**
Sliding weight	**07741-0010201**

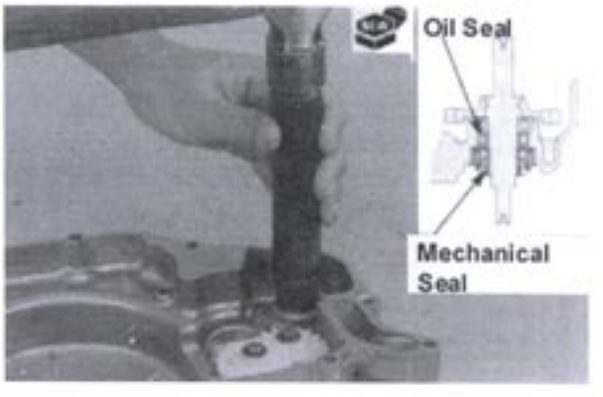


Remove the mechanical seal and the oil seal.

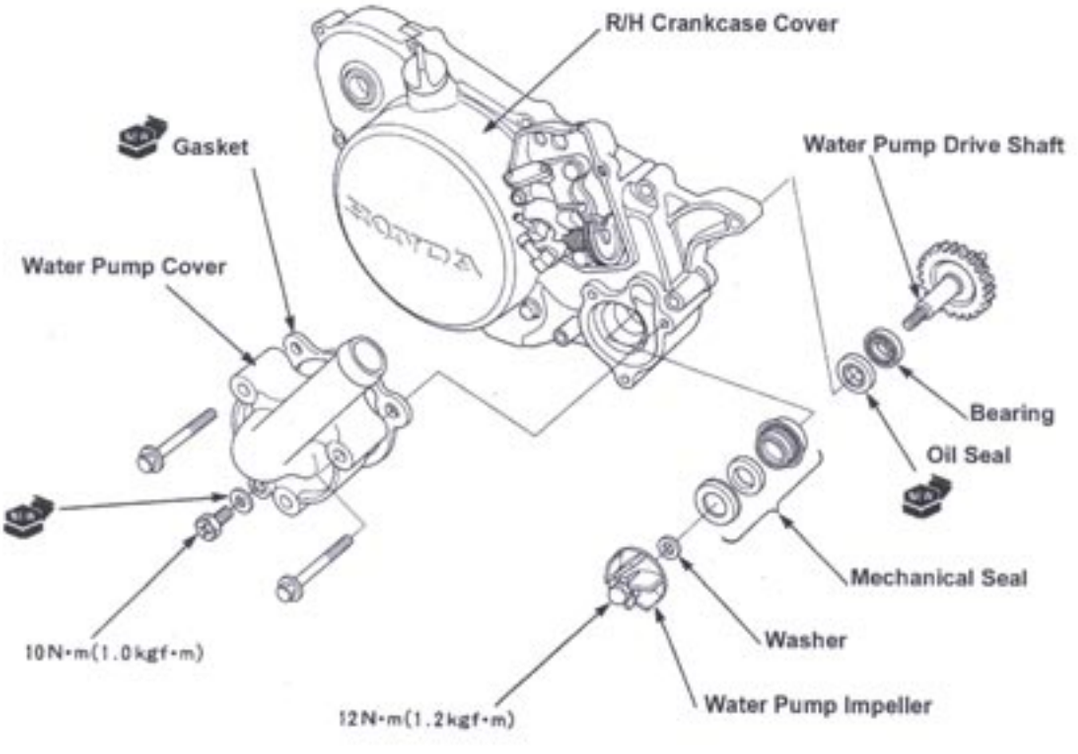
Install a new mechanical seal to the right crankcase cover.
Special tool : Mechanical seal driver attachment
07PMD-KBP0100

Install a new oil seal.
Install a new water pump shaft bearing.
Special tool :

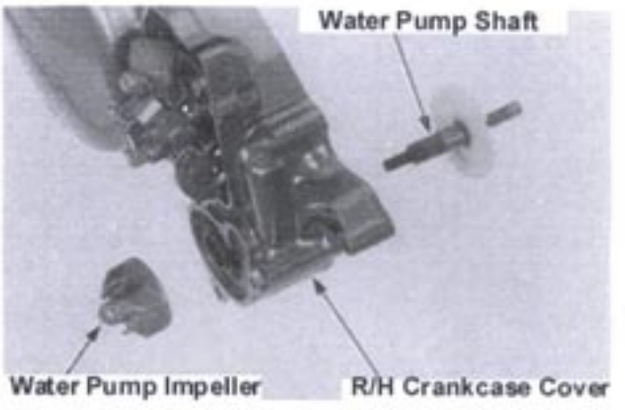
Driver handle A	**07749-0010000**
Outer driver 24x26mm	**07746-0010700**
Driver pilot 12mm	**07746-0040200**



Assembly

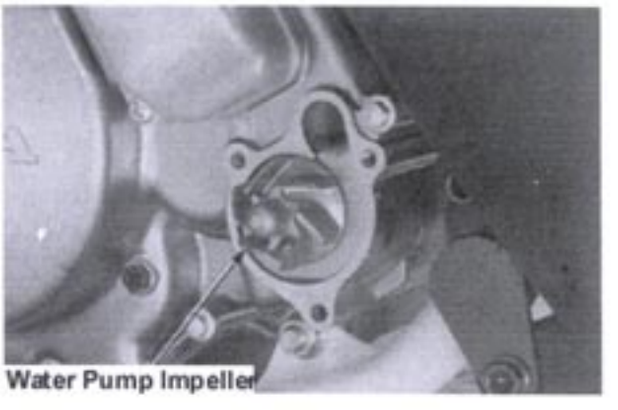


Installation
Apply transmission oil to the water pump shaft and insert the shaft to the right crankcase cover.
Temporarily assemble the water pump impellor.

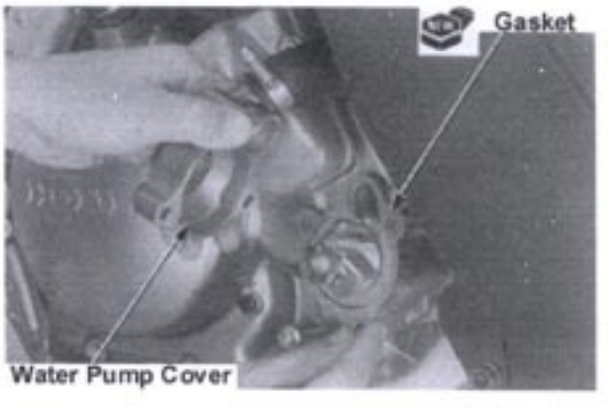


Install the right crankcase cover (9-19).
Set the transmission gear.
Secure the water pump impellor to the specified torque.

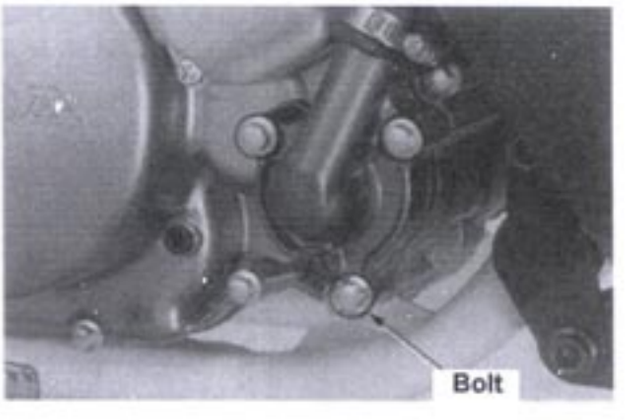
Torque : 12 Nm (1.2 kgfm)

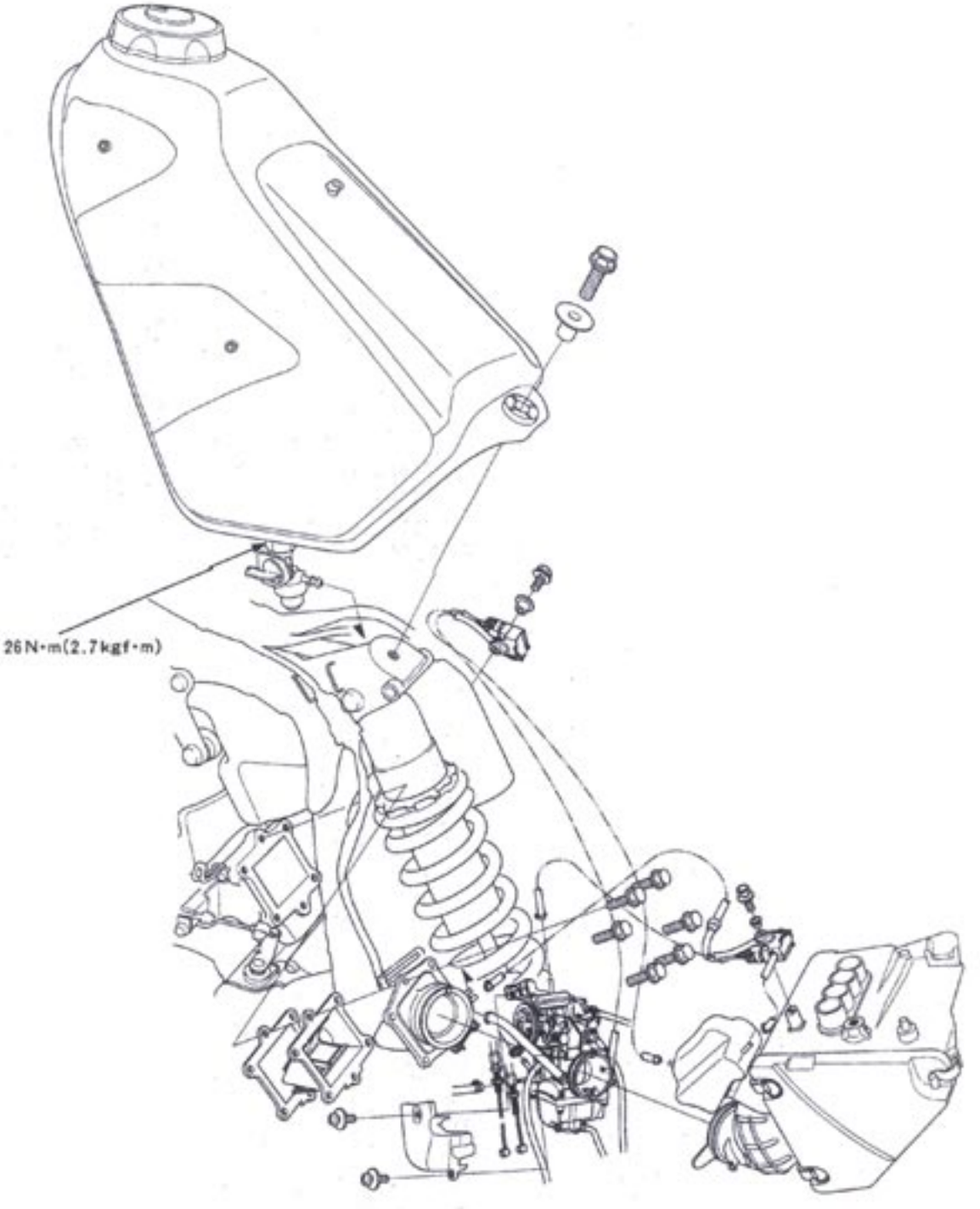


Install new gasket.



Install the water pump cover and secure three bolts.
Fill coolant and bleed air (5-4).
Inspect the bottom part of the water pump and the inspection hole for coolant leak (5-10).




26N·m(2.7kgf·m)

General

Warning

Petrol is highly flammable. Keep away from naked flame and electric spark.
Evaporated petrol is also explosive. Ventilate the working area properly.

- The service work described in this section can be done without removing engine from the frame.
- After servicing any item that requires the fuel cock to be OFF, check for fuel leak after turning the cock back ON again.
- Do not overtwist or bend the cables. Damaged or twisted cables may cause mechanical failure.
- Replace O-rings when re-assembling.
- Drain fuel from the carburettor before disassembling by loosening the drain screw at the float chamber.
- Wrap the intake with a cloth or adhesive tape to prevent debris falling into the engine after removing the carburettor.
- Drain petrol from the carburettor if the vehicle is to be stored for a month or longer. This will prevent idling problem created by contaminated fuel clogging the slow jet.

Specification

Item		Standard (in – mm)
Carburettor	Type	PE1AA
	Setting Mark	PE1AA-A
	Venturi diameter	32
	Air Screw opening	1 – ¾
	Float Level	16.0
	Idling rpm	1.400 ± 100 rpm
	Main jet	#148
	Slow Jet	# 48
Throttle Grip free play		2-6

Torque setting

Fuel cock lock nut	26 Nm (2.7 kgfm)
Air filter case mount bolt	12 Nm (1.2 kgfm)
Needle jet holder	2.5 Nm (0.25 kgfm)
Reed valve screw	1 Nm (0.1 kgfm)

Carburettor insulator strap
(adjust to the following scale)

Special tool
Float level gauge 07401-0010000

Trouble shooting

The engine does not start
- Fuel cock is OFF
- No fuel in the tank
- No fuel in the carburettor
  - Clogged fuel strainer
  - Clogged fuel tube
  - Float valve failure
  - Improper fuel level in the carburettor
  - Clogged tank cap vent
- Excessive fuel in the cylinder
  - Clogged air filter
  - Carburettor overflow
- Secondary air intake
- Fuel contamination
- Clogged slow system
- Bistarter failure
- Ignition system failure (Sec.15)

Difficult to start, stalls soon, or unstable idling
- No pressure on the diaphragm
- Clogged fuel system
- Ignition fault
- Too lean/rich mixture
- Fuel contamination
- Improper idling rpm
- Improper airscrew setting
- Clogged slow system
- Faulty connection of tube #4
- Improper fuel level in the carburettor
- Clogged tank cap vent

Too lean mixture
- Clogged jet
- Float valve failure
- Too low fuel level in the carburettor
- Clogged fuel system
- Clogged carburettor air vent tube
- Secondary air to manifold
- Clogged tank cap vent

Too rich mixture
- Bistarter is activated
- Float valve failure
- Too high fuel level in the carburettor
- Clogged air jet
- Clogged air filter element
- Carburettor overflow
- Slow air jet control solenoid failure

Misfire in acceleration
- Ignition system failure
- Too lean mixture

Lack of power, high fuel consumption
- Clogged air filter
- Ignition system fault
- Too lean/rich mixture

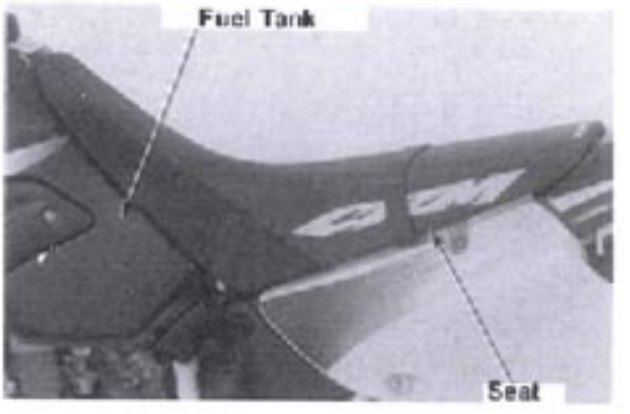
Carburettor

Warning

Petrol is highly inflammable. Keep the working area clear of naked flames or electric sparks. Evaporated petrol is also explosive. Ventilate the working area.

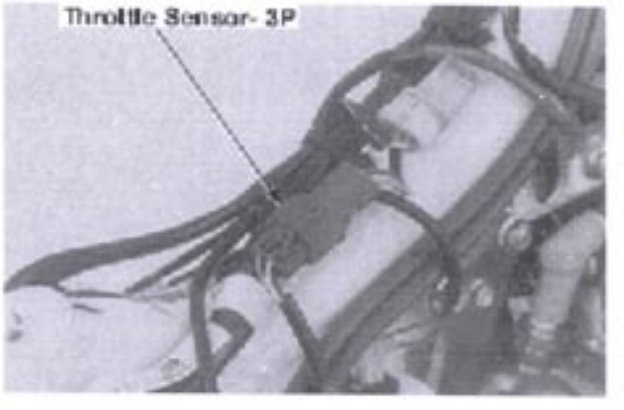
Removal

Remove the seat and the fuel tank (2-2, 2-3)

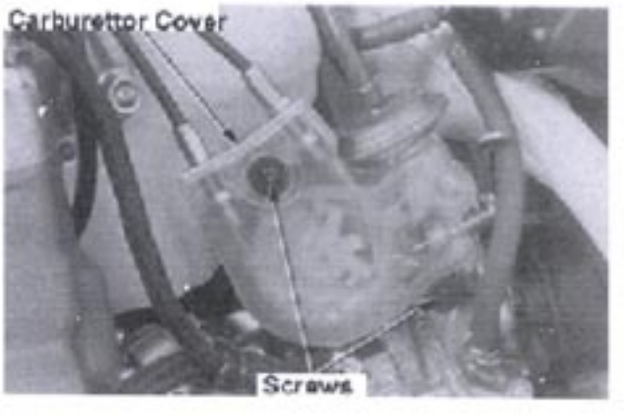


Remove the following parts:

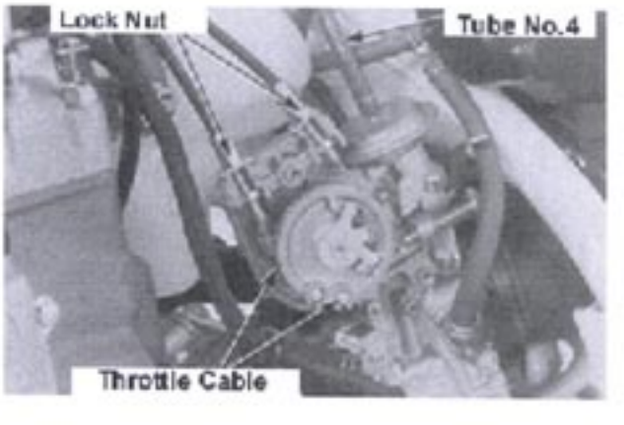
- Throttle sensor 3P(grey) coupler



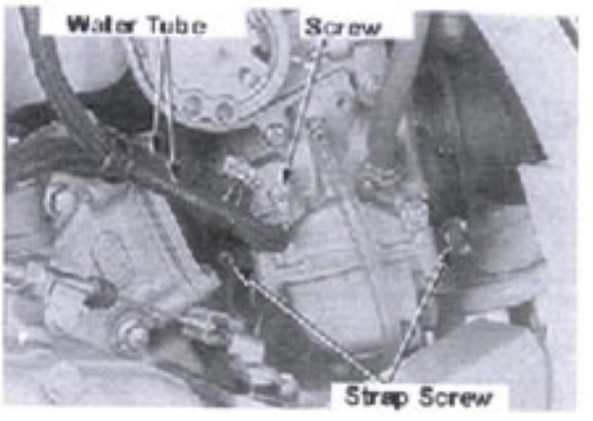
- Screws
- Carburettor cover



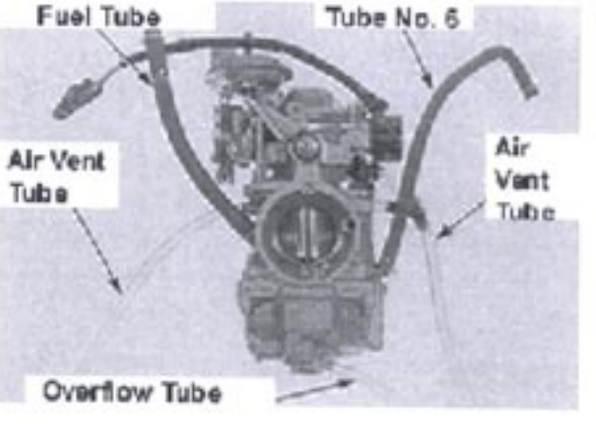
Loosen the lock nut and remove the throttle cable from the throttle drum.
Disconnect tube #4.



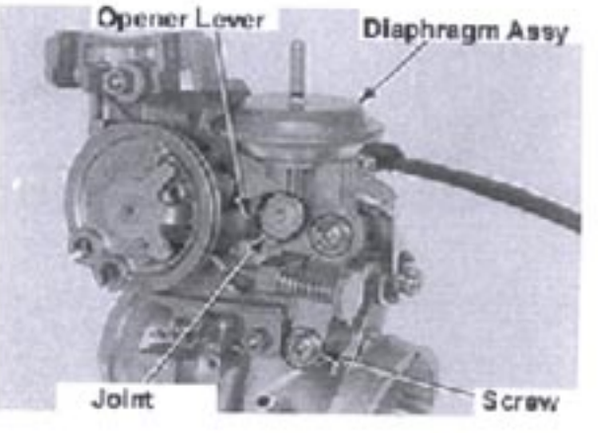
Disconnect the water tube together with its joint.
Loosen the connecting tube strap screw.
Loosen the insulator strap screw.
Remove the carburettor Assy.



Disassembly
Remove the following parts:
- Fuel tube
- Tube #6
- Carburettor overflow tube
- Air vent tube

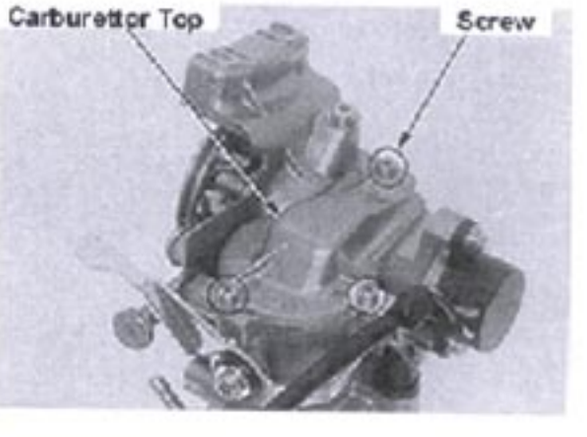


Remove the screw to remove the diaphragm Assy.

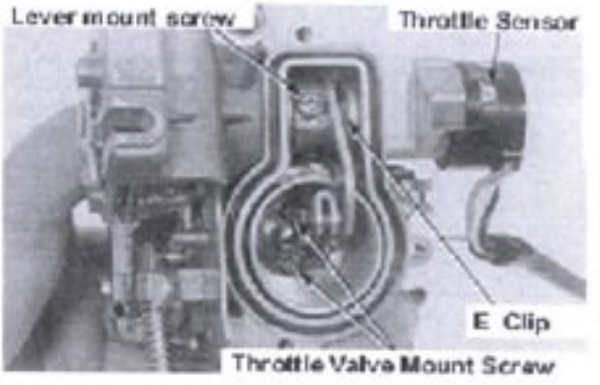


- **Notes**
- **When removing the diaphragm, push the opener lever joint and the diaphragm rod in by holding them with pliers.**
- **Do not deform the opener lever.**
- **Do not remove the bush on the joint.**

Remove the carburettor top.



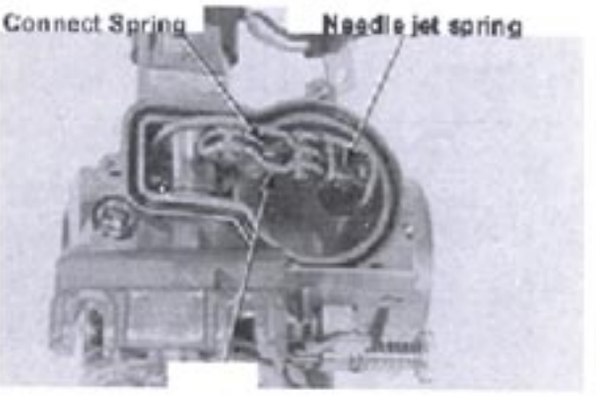
Remove the lever mount screw to free the lever.
Remove the throttle valve mount screw.



Caution

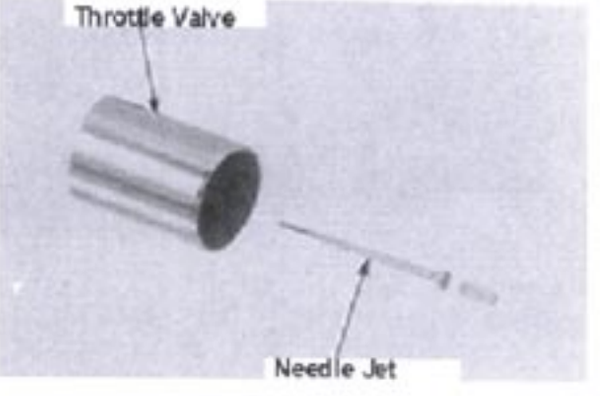
- Do not remove the E-clip or the throttle sensor.
- If the throttle sensor is faulty, replace the carburettor Assy.

Remove the following parts:
- Link

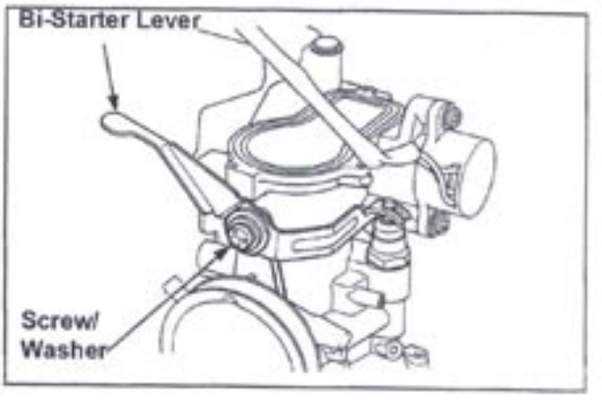


- **Notes**
- **Do not damage the connecting spring when removing it from the lever groove.**
- **Do not lose the spring.**

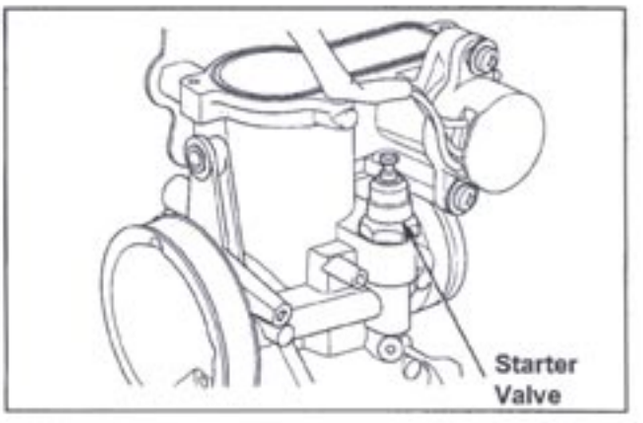
- Throttle valve
- Jet needle



- Screw/washer
- Bi-Starter lever

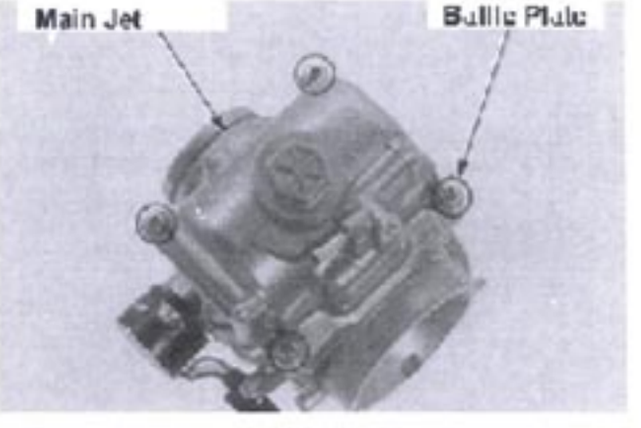


Remove the starter valve.

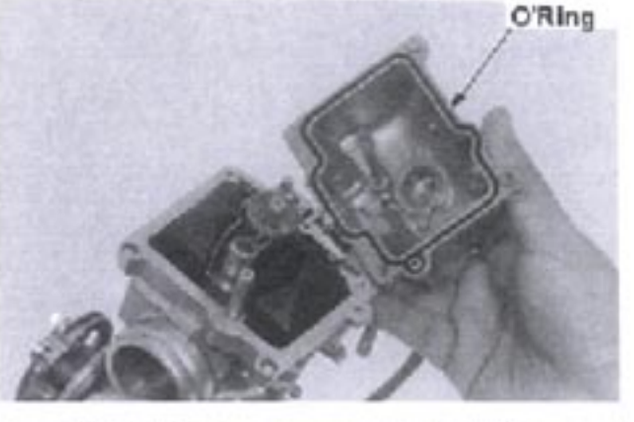


- **Notes**
- **The throttle stop screw should not be disassembled unless necessary. If it is to be disassembled, record the exposed shaft length.**
- **The throttle stop screw is secured counterclockwise.**

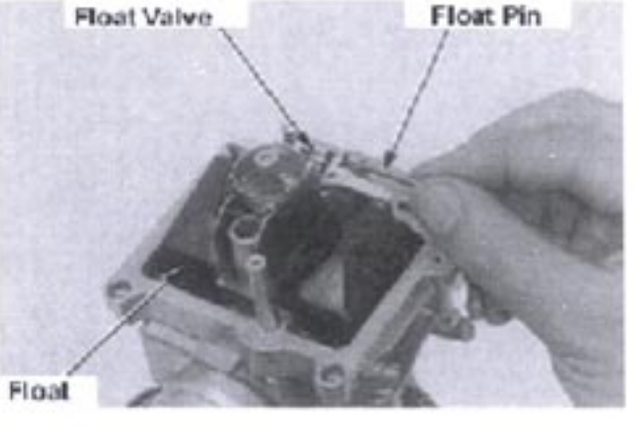
- Do not disassemble the top part of the carburettor any further.
- If the throttle sensor is faulty, replace the carburettor Assy.
- If the throttle shaft is faulty, replace the carburettor Assy.



Remove the following parts:
- Screw
- Float chamber

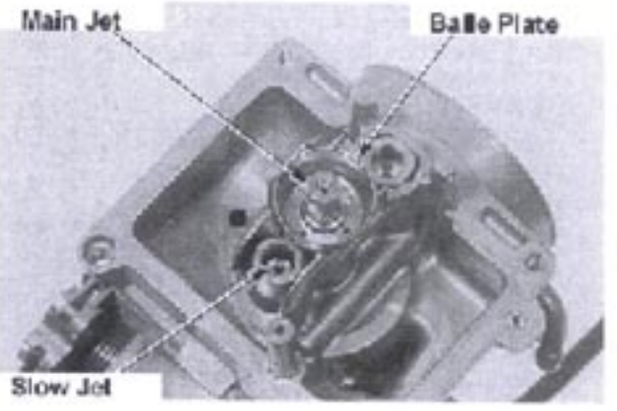


- O-ring

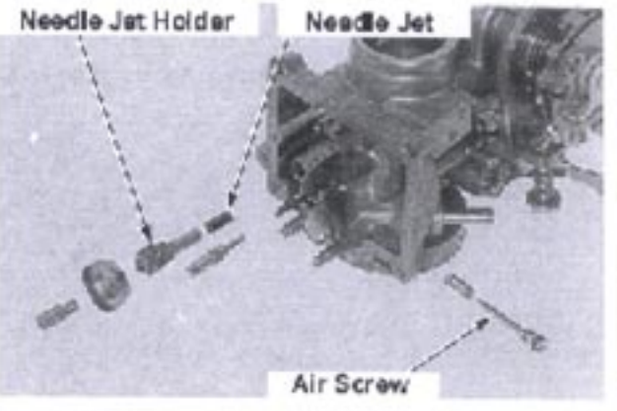


- Float pin
- Float valve
- Float

Remove the following parts:
- Main jet
- Baffle plate
- Slow jet



- Needle jet holder
- Needle jet
- Air screw

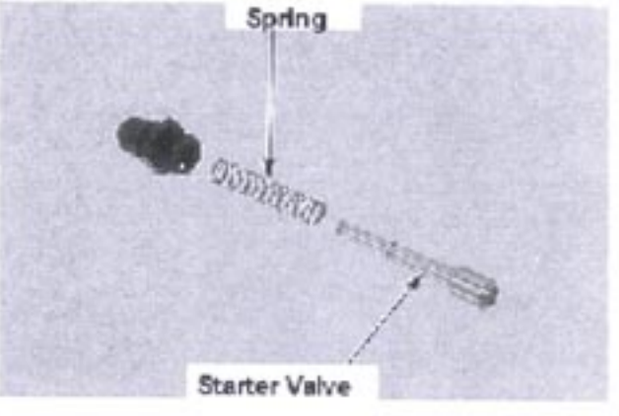


- **Notes**
- **Secure the air screw and record the number of turns for it to contact the seat.**

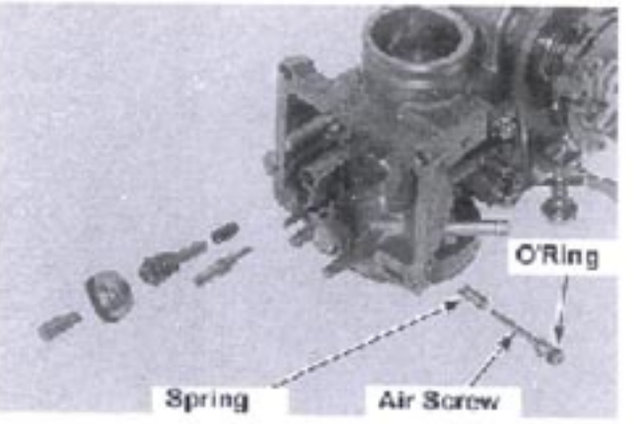
Carburettor passage cleaning
Clean air/fuel passage in the carburettor body by using compressed air.

Inspection

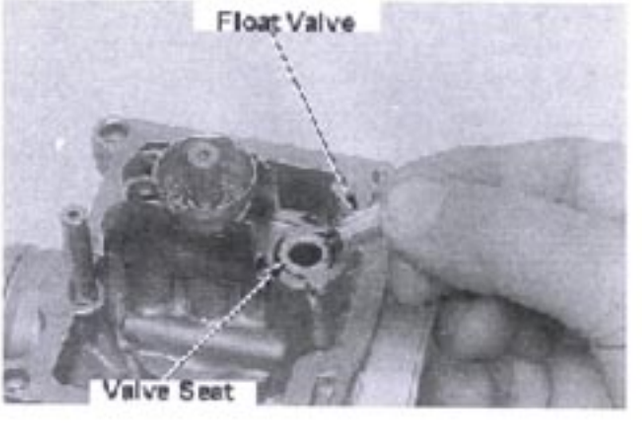
Starter valve
Damage/deformation of the starter valve – replace
Damage/deformation of the spring - replace



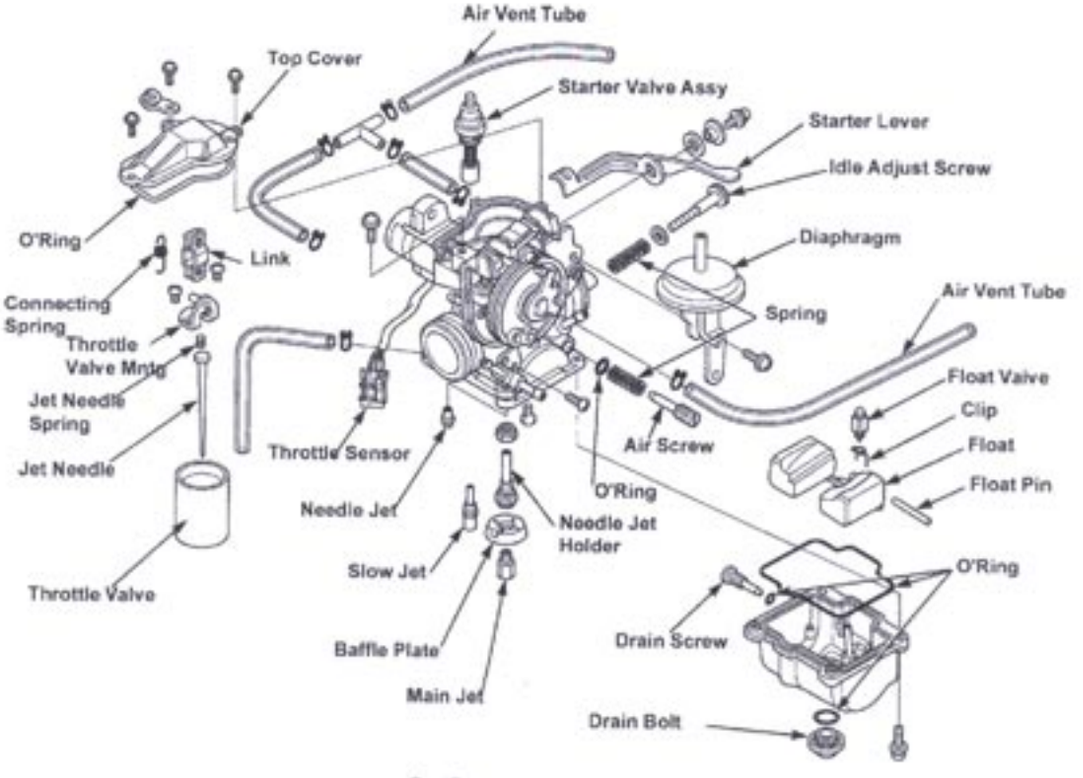
Air screw
Damage/deformation of the air screw needle – replace
Damage/deformation of the spring – replace
Worn/damaged O-ring – replace



Float valve & valve seat
Damaged float – replace
Damaged, clogged, or scratched float valve & valve seat – clean or replace
Worn valve/seat contact area – replace



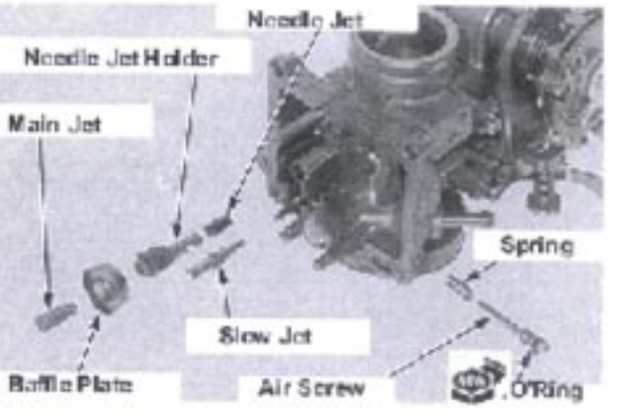
Assembly



Install the following parts:
- Main jet/baffle plate
- Needle jet /needle jet holder
-

Caution

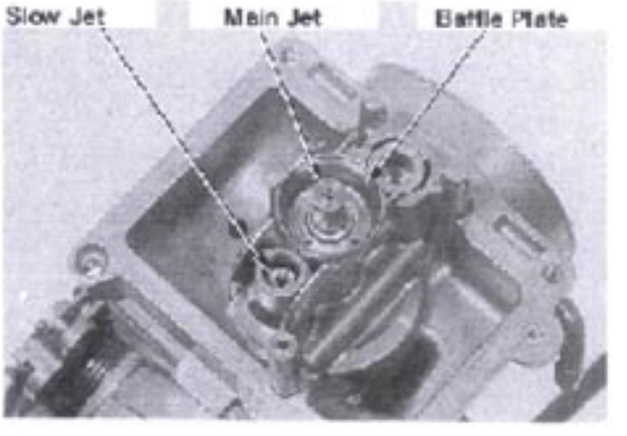
Do not overtighten the needle jet holder to prevent deforming the bleed hole.



Torque : 2.5 Nm (0.25 kgfm)

- Slow jet
- Air screw/spring/O-ring

Notes
Tighten the air screw until it contacts the seat and rewind for the amount recorded.

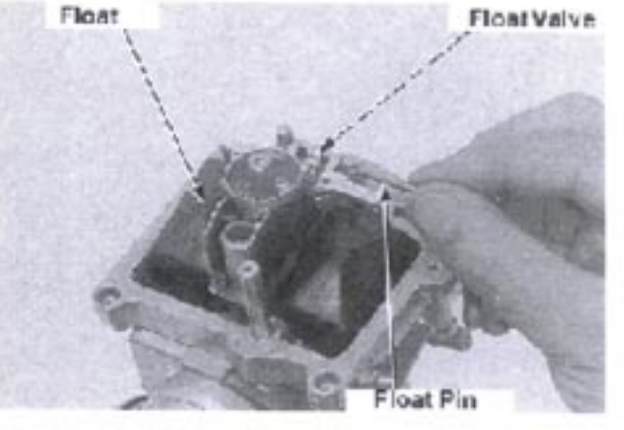


- Float pin
- Float
- Float valve

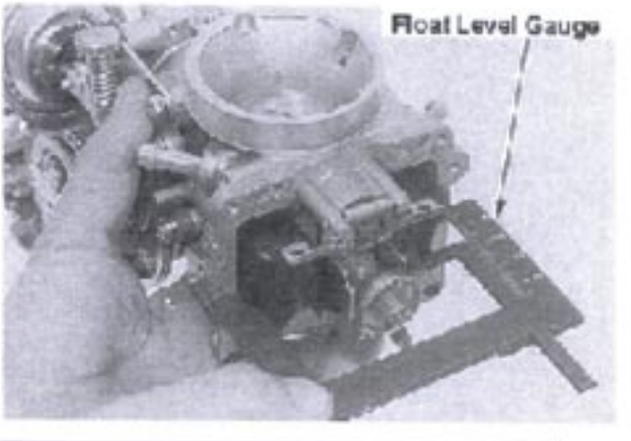
Float level inspection
Measure the float level at the point where the float valve and the float lip make contact.

Float level : 16.0 mm

Special tool : Float level gauge
07401-0010000



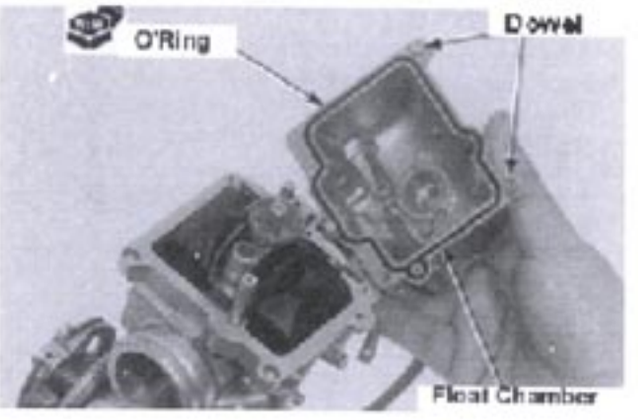
Notes
Keep the float level gauge perpendicular to the float chamber mount surface and at the main jet.



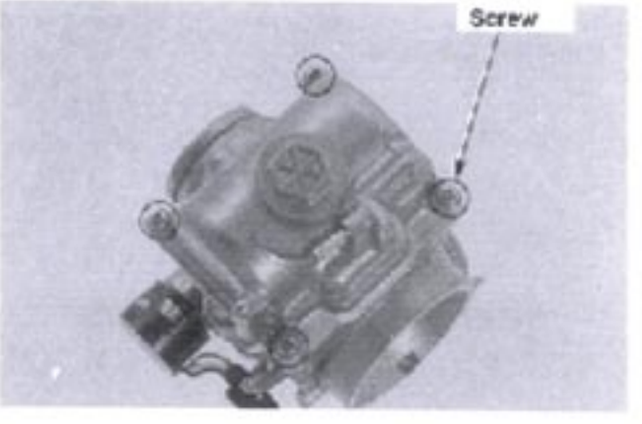
If the float level is out of the specification, check the float valve and the valve seat. Replace them if necessary.

Install the following parts:
- A new O-ring
- Float chamber

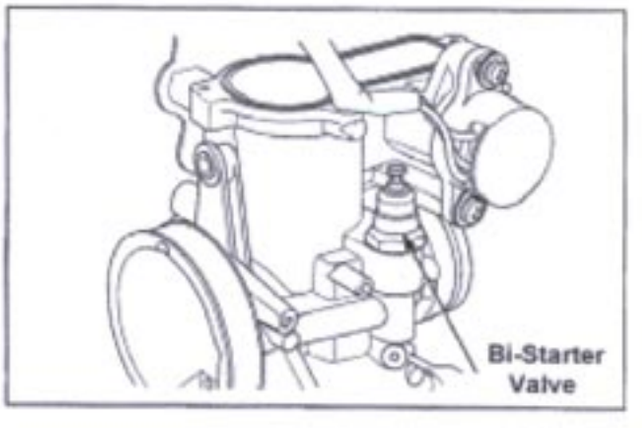
Notes
The dowel end of the float chamber should face towards the front side of the carburettor.



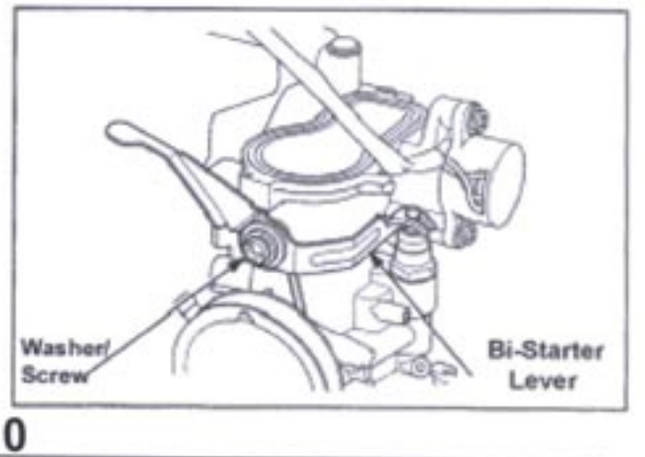
- Screw



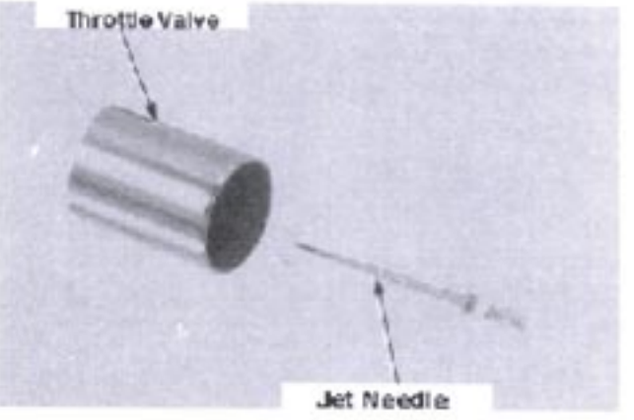
- Bi-Starter valve



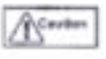
- Bi-Starter lever
- Washer/screw



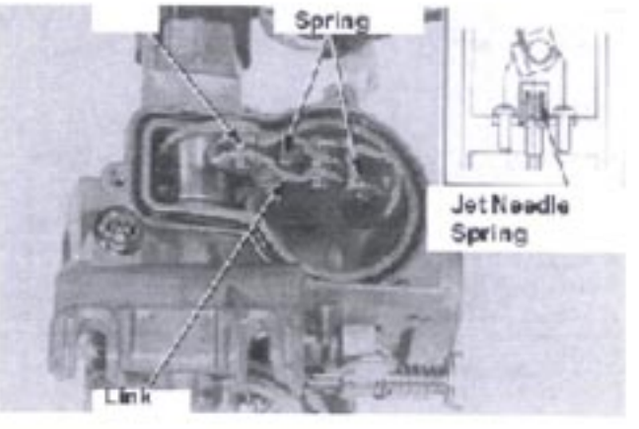
Insert the jet needle to the throttle valve.



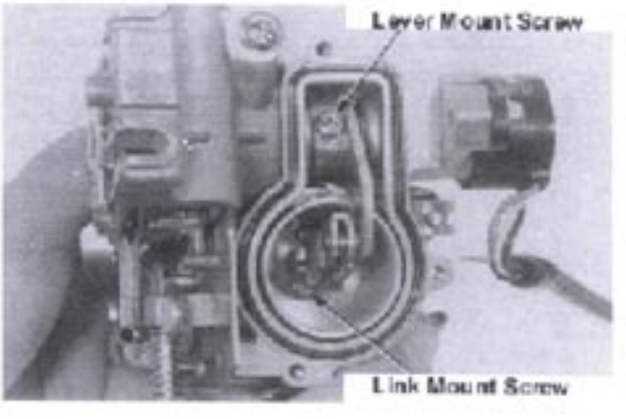
Install the link.



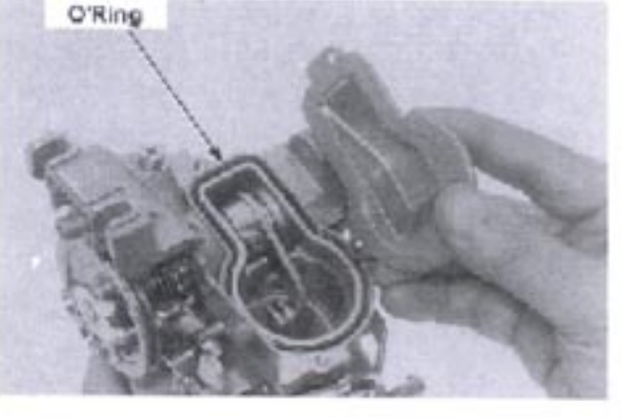
- The cutaway of the throttle valve should face A/C side.
- Do not mistake the installing direction.
- Check the direction of the jet needle spring before installing.
- Install and cneck that the connecting spring is installed to the groove of the lever.
- Do not damage parts when installing.



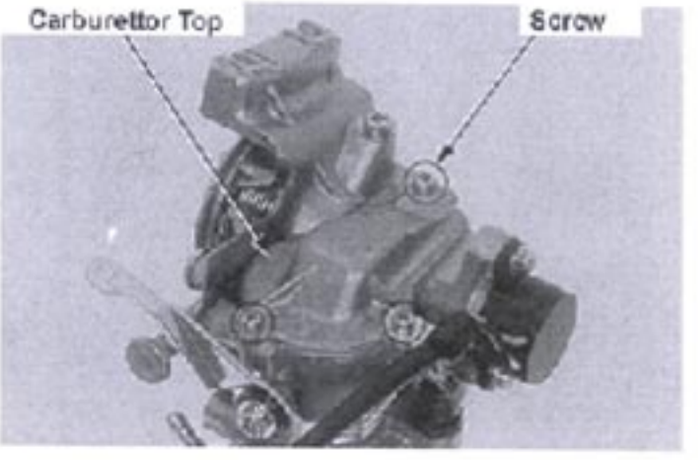
Install the following parts:
- Link mount screw
- Lever mount screw



- O-ring

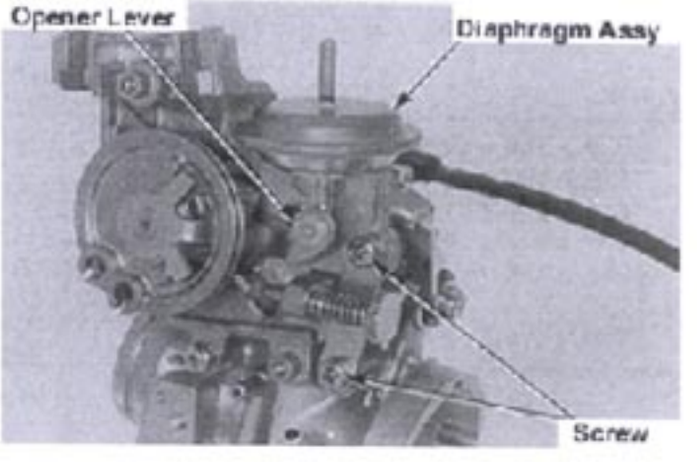


- Carburettor top
- Screw

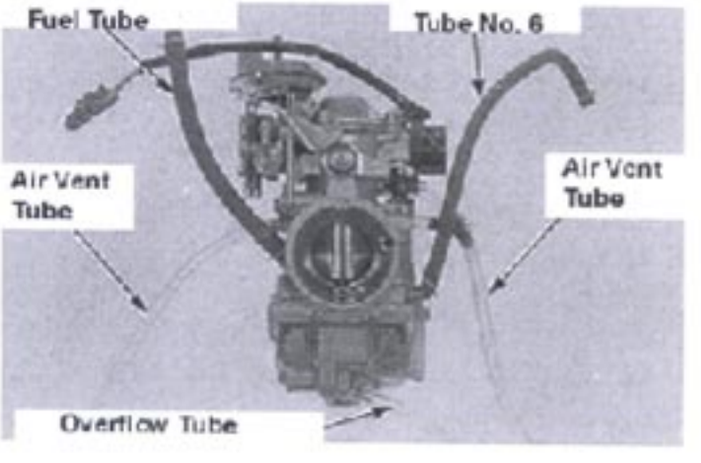


Insert the diaphragm shaft to the opener lever.
Install the diaphragm with two screws.

Notes
When installing the diaphragm, do not bend the opener lever.

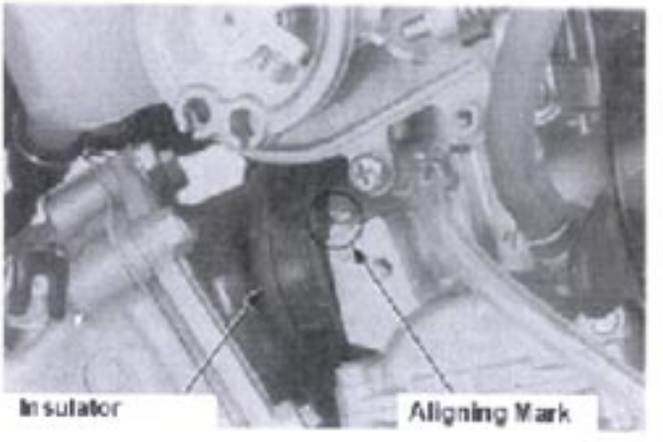


Install the following parts:
- Fuel tube
- Tube #6
- Overflow tube
- Air vent tube



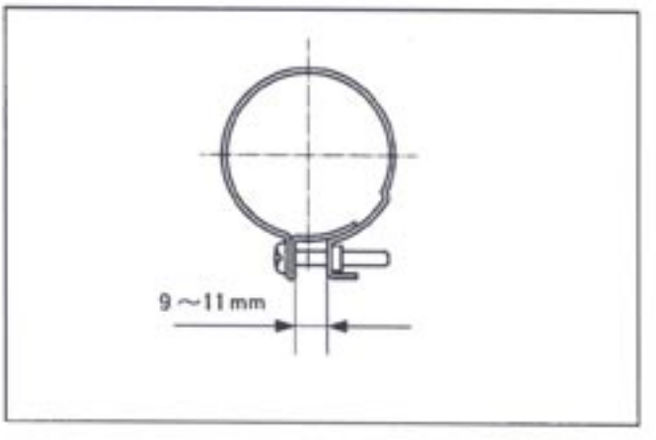
Installation

Install the carburettor Assy. to the insulator.

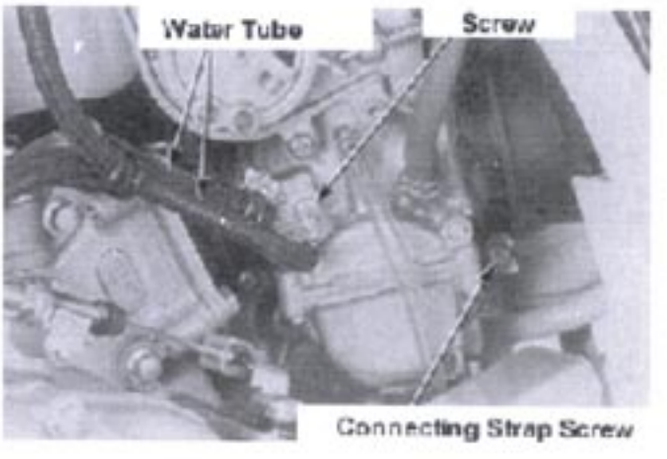


- **Notes**
- **Before securing the screw, align the insulator projection to the arrow symbol on the carburettor body.**

Secure the insulator strap screw to recommended length.

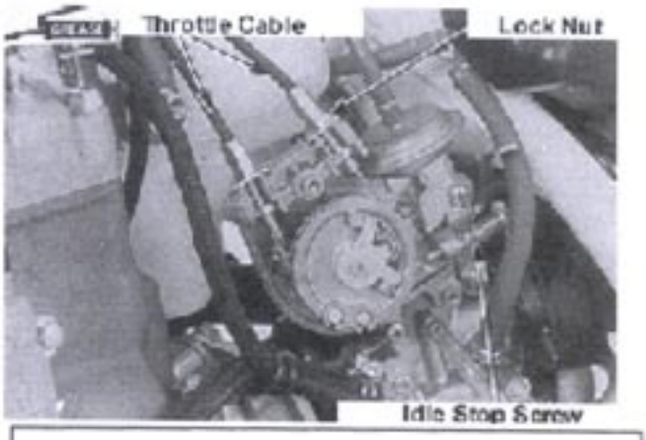


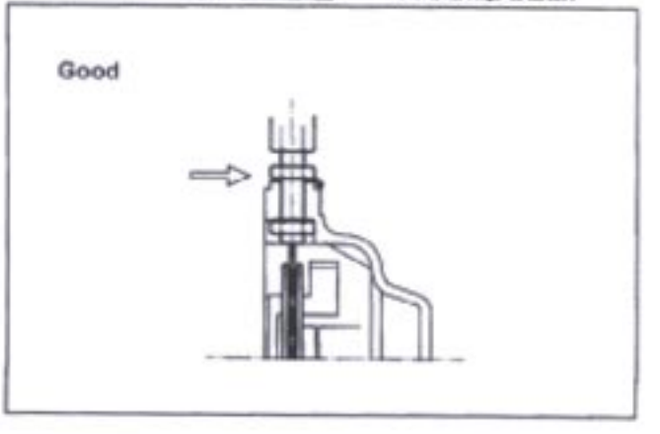
Secure the connecting tube strap screw. Connect the water tube.



Connect the throttle cable and adjust the free play before securing the lock nut.

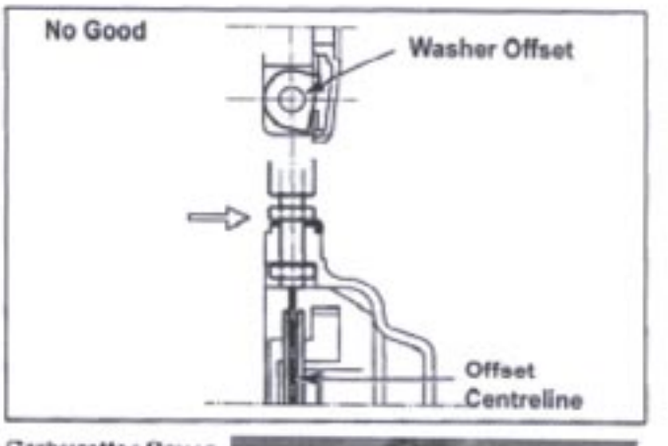
- Adjust the free play when there is no pressure to the diaphragm (engine is stopped).
- If the idling stop screw has been removed, adjust the projection to the recorded value.
- Idling stop screw turns counterclockwise.





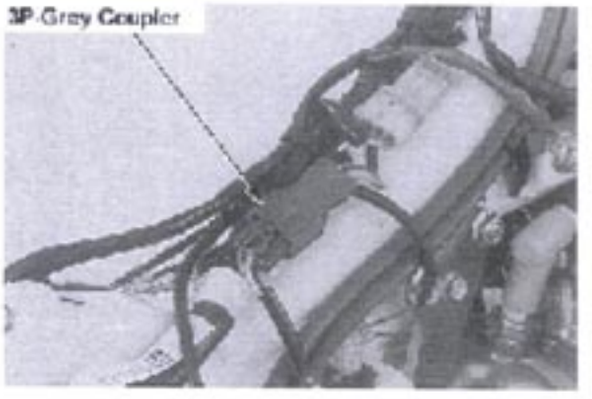
- Check the following items before attaching the cover.

- Washer is correctly installed
- Throttle cable and drum are aligned



Install the cover.
Adjust the idling rpm (3-17).

Connect a throttle sensor 3P (grey) coupler.



Caution

- Refer to the routing diagram (1-23) when routing the throttle sensor wire.

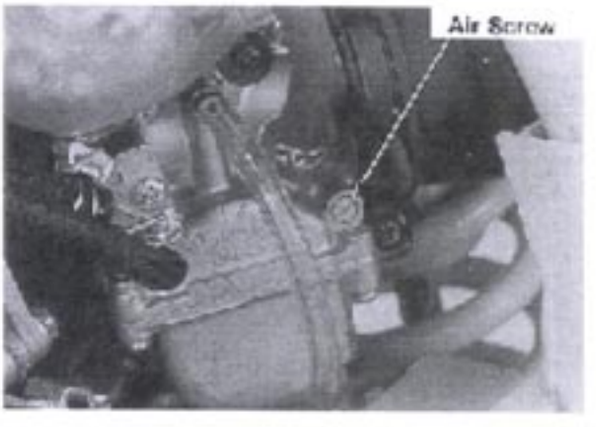
Install the fuel tank (2-3).
Install the seat (2-2).

Air screw adjustment

- **Notes**
- **The air screw is factory pre-adjusted. It only requires adjustment when the air screw itself is replaced or the carburettor body is replaced. Otherwise, loosen back to the recorded number.**
- **Support the vehicle upright and confirm safety.**
- **Adjust the throttle cable free play before adjusting the air screw.**
- **Adjust the air screw after warming up the engine.**

1. Connect a tachometer which is able to read 50rpm difference.
2. Wind in the carburettor air screw until it makes the contact with the seat and wind back to the standard value:

Standard wind-back : 1 & 3/4 turns

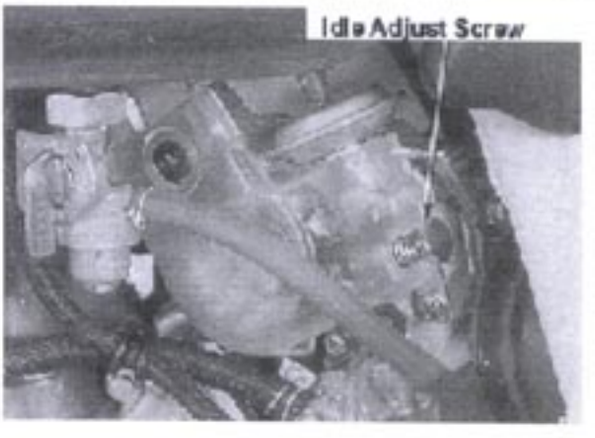


Caution

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

3. Start and warm up the engine. Set specified idling rpm:

   Idling rpm : 1,400 ± 100 rpm
4. Snap a few times from idling and check the rpm response. Follow the procedure below if it is necessary to adjust:
5. Adjust the air screw for ±1/4 turn from the standard and find the best rpm-response position.
6. If the adjustment requires more than ±1/4 turn, inspect the other items (3-17).

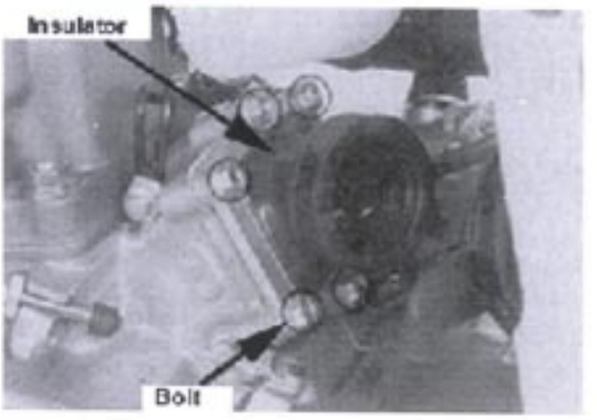


Reed valve

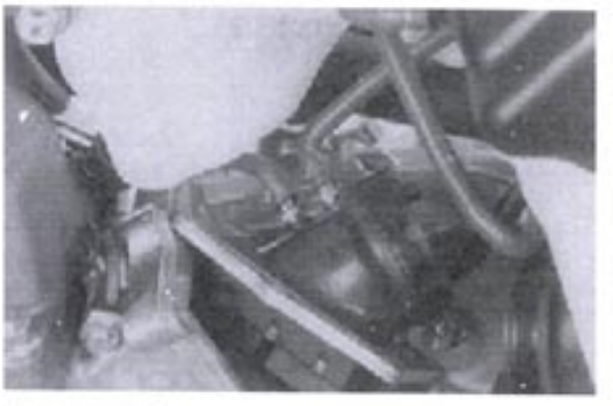
Removal

Remove the following parts:

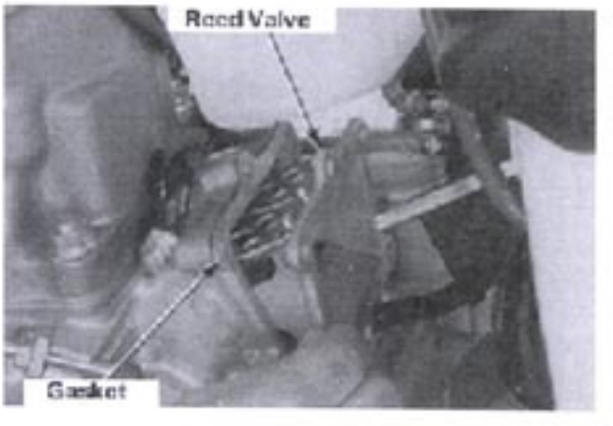
- Carburettor (6-3).
- Six bolts



Remove the insulator by turning it on an angle.



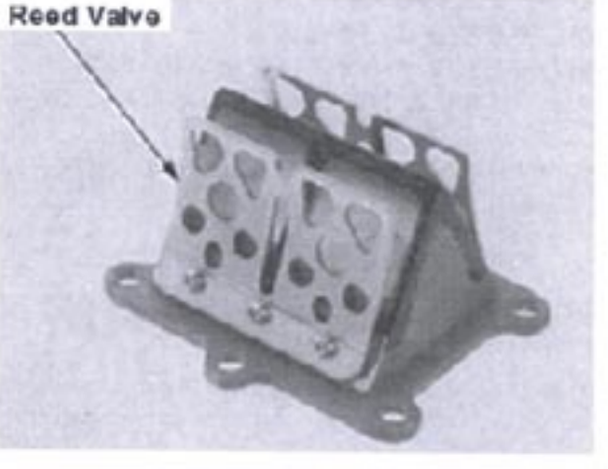
- **Notes**
- **Insert a screwdriver to the projection at the bottom of the insulator.**



Remove a reed valve Assy. and a gasket.

Caution

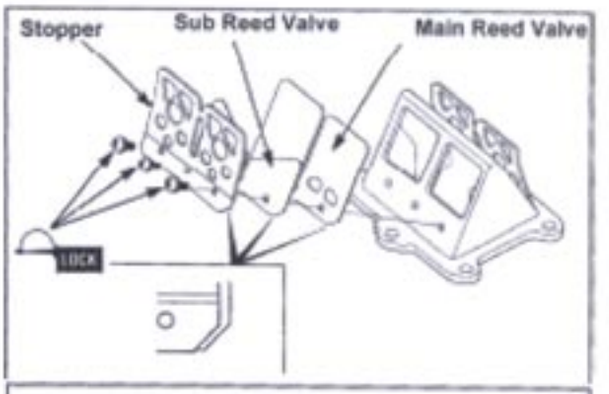
Do not deform the stopper when removing the reed valve Assy.



Inspection

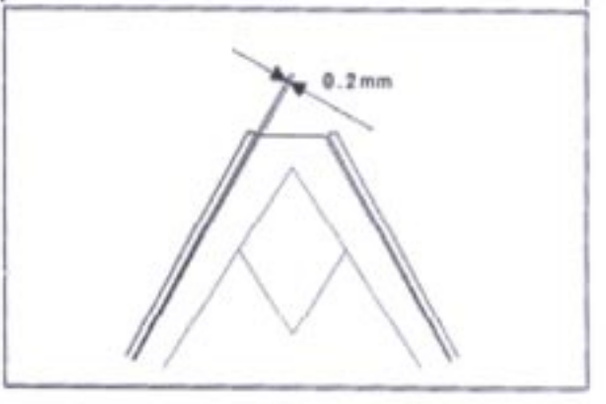
Deformed/damaged reed valve – replace
Valve end clearance – replace
Crack on the reed valve seat surface - replace

Disassembly/re-assembly
Remove screws to remove the stopper, main/sub reed valves.
Clean the screw thread and apply locking agent.
Align the cut-outs of the reed valves and the stopper to assemble and secure the screws.
Torque : 1 Nm (0.1 kgfm)

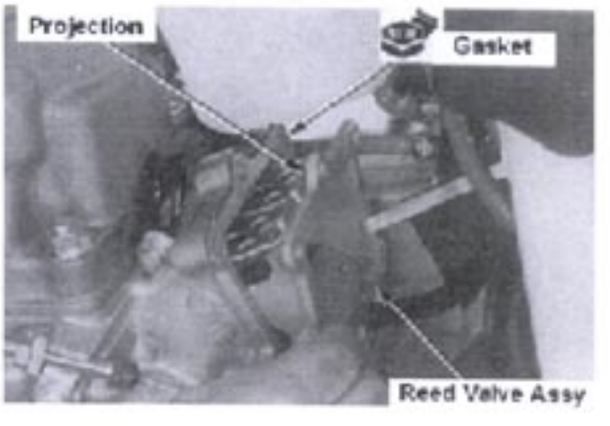


Notes
Screw locking agent should not stick on the reed valve when securing the screws.

After assembling, Check the main reed valve is floating for 0.2mm or less.



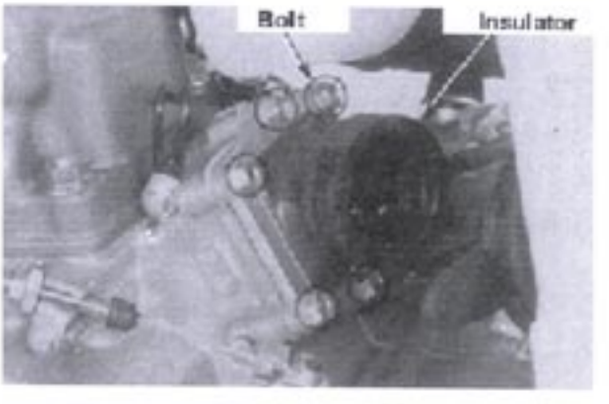
Installation
Install a new gasket.
Install the reed valve Assy. by facing its round projection upwards.



Install the insulator.
Secure bolts.

Install a carburettor (6-13).

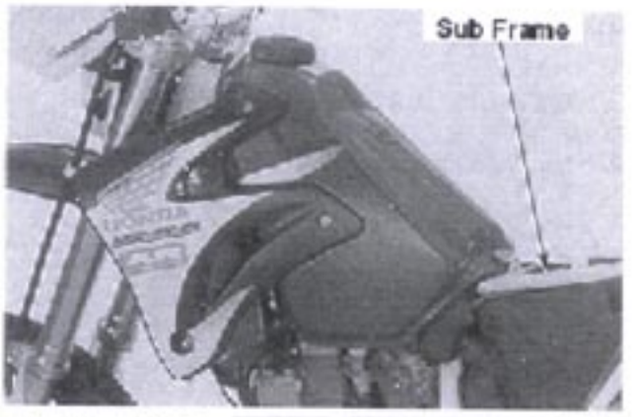
After this service, turn the fuel cock ON and check for fuel leak from joints and air intake around the insulator.



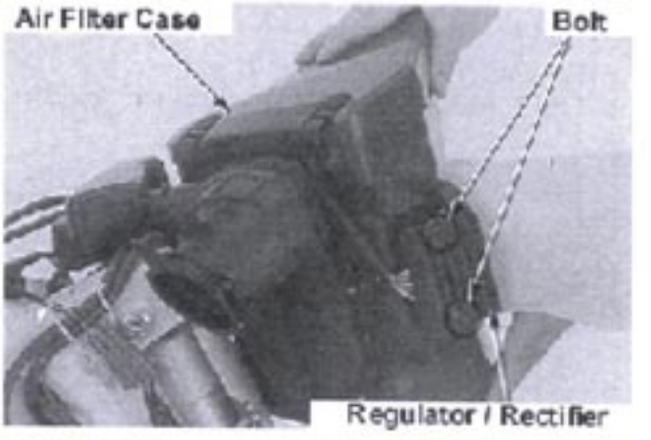
Air filter case

Removal/installation

Remove the following parts:
- Seat (2-2)
- Sub frame/muffler (2-9)

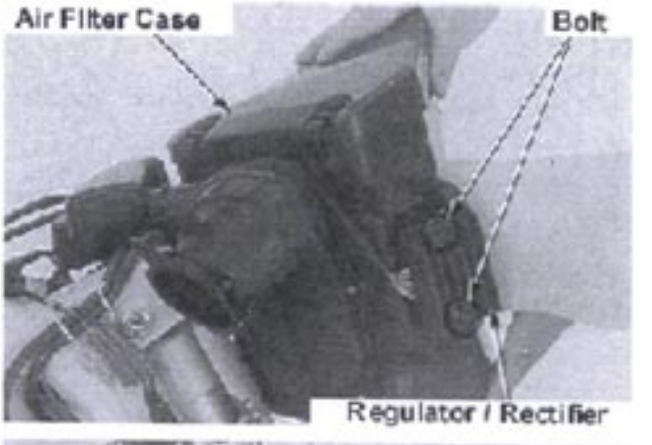


- Fuel cock
- Engine control unit
- Idling control solenoid
- Crankcase breather tube
- Connecting tube strap



- Bolt
- Regulator/rectifier (14-6)

Disconnect tubing to the resonator.

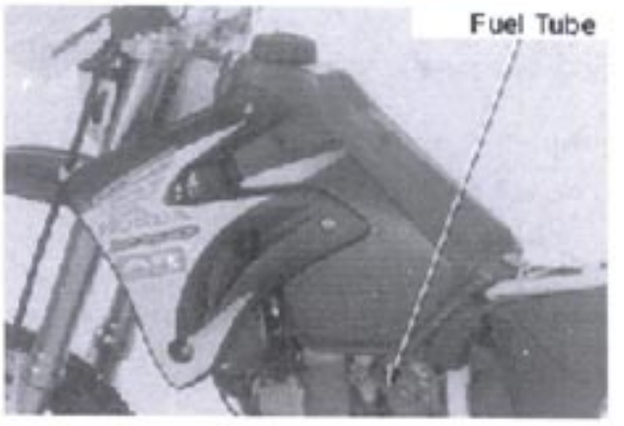


Notes
- **Refer to the routing diagram (1-23) when routing wires and harnesses.**
- **Make sure the crankcase breather tube is connected.**

Reverse the above procedure for installation.

Fuel tank

Petrol is highly inflammable. Keep the working area clear of naked flame or electric spark. Evaporated petrol is also explosive. Ventilate the working area.

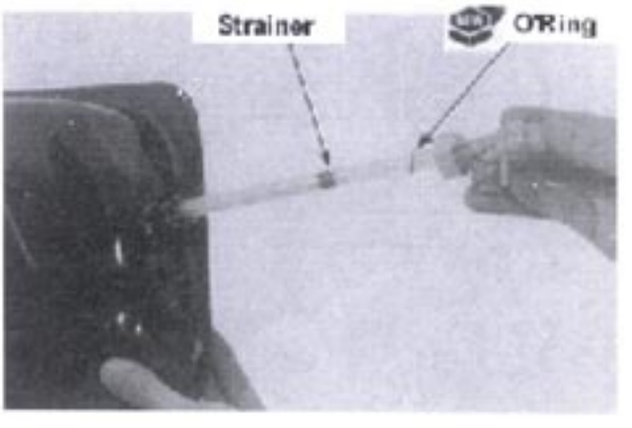


Removal
Disconnect the fuel tube.

Remove the seat (2-2).
Remove the fuel tank mount bolt to remove the fuel tank.

Disassembly
Remove the fuel cock lock nut.

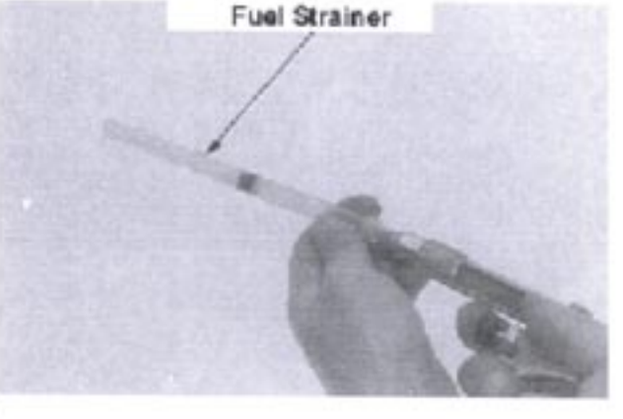
Remove the fuel strainer and the O-ring.
Inspect the strainer and clean it if necessary.



Assembly
Install the new O-ring and the fuel strainer.

Install a fuel cock.
Secure the fuel cock lock nut to specified torque.

Torque : 26 Nm (2.7 kgfm)

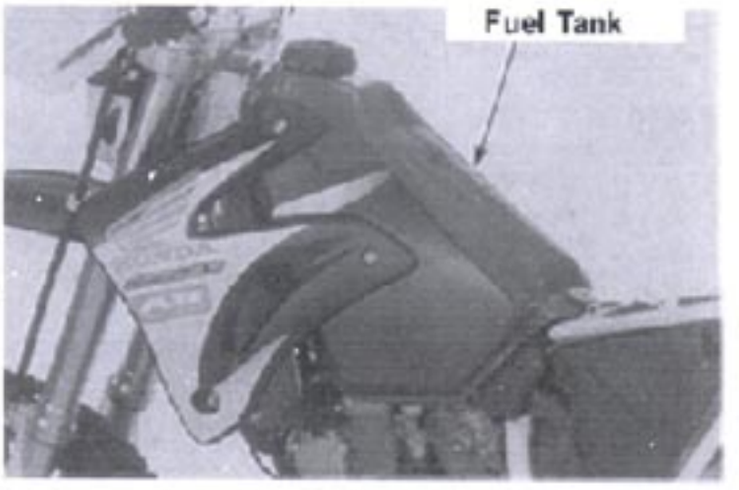


Cleaning
Clean the fuel strainer with solvent.
Clean the tube with compressed air.

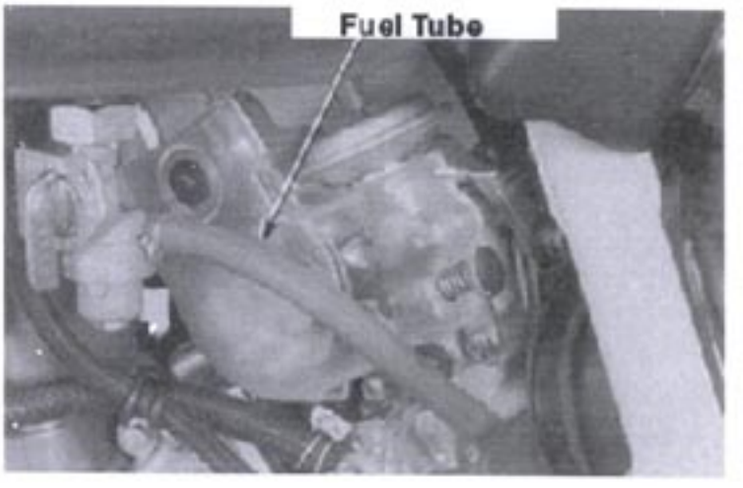
Installation
Install the fuel tank.

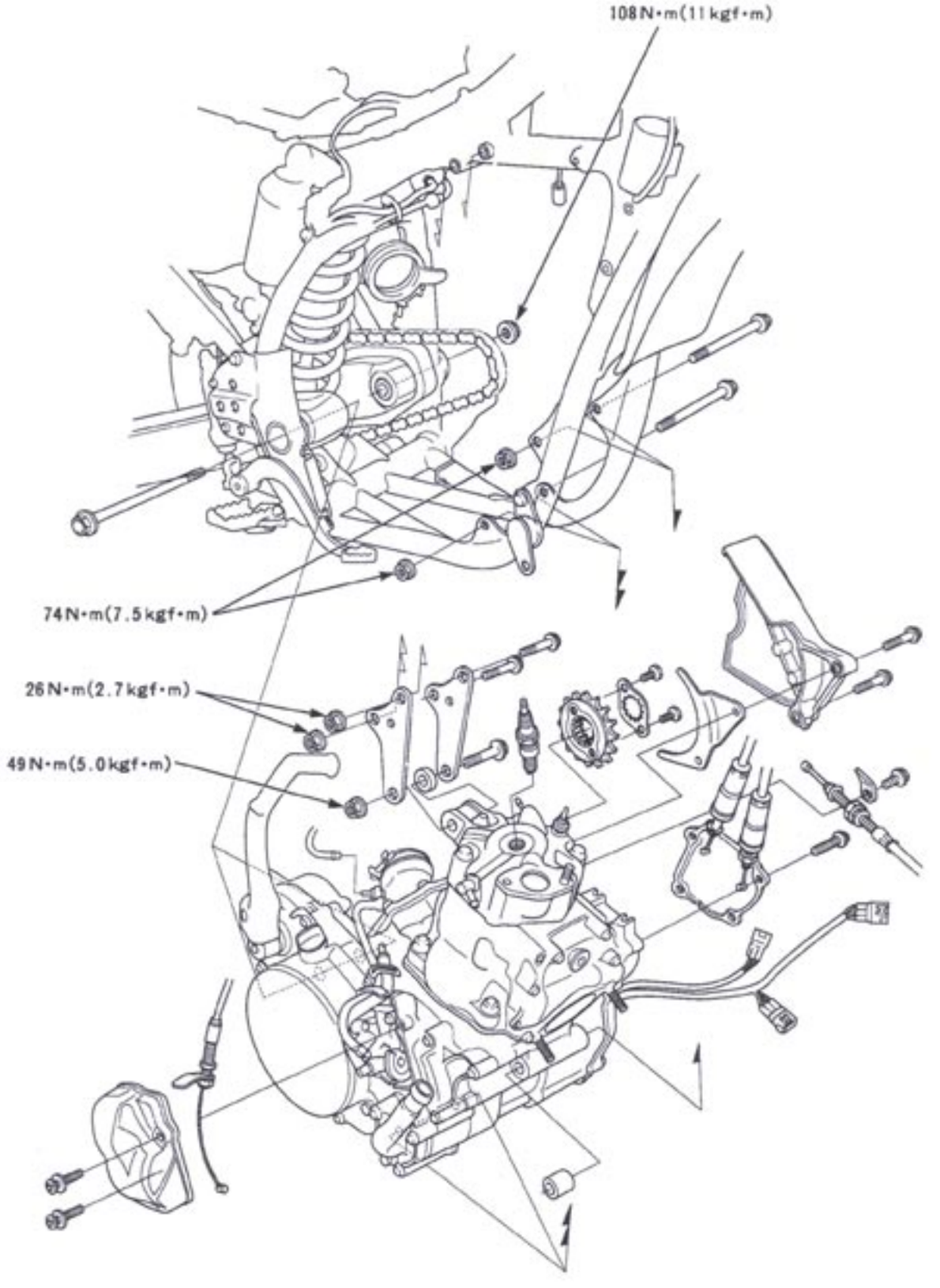
Notes
Set the fuel tank hook to the frame rubber mount.

Secure the fuel tank mount bolt.



Connect the fuel tube.
Install the seat (2-2).
After this service, turn the fuel cock ON and check for fuel leak from joints.




108N·m(11kgf·m)
74N·m(7.5kgf·m)
26N·m(2.7kgf·m)
49N·m(5.0kgf·m)

General

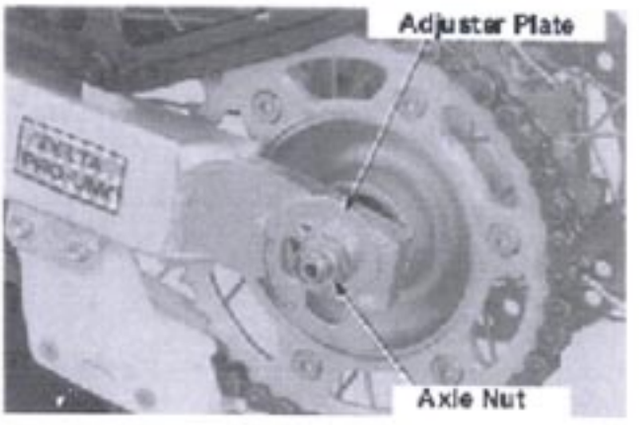
- When removing /installing the engine, support the vehicle with jacks. Exercise caution to prevent damaging the frame, engine, cables, and harnesses.
- The mass of the engine is approximately 29kg.
- Wrap the frame with tape when removing/installing the engine.
- The following services can be done while the engine is on board:
  - Carburettor (Sec.6)
  - Cylinder head, cylinder, piston, ARC valve (Sec.8)
  - Clutch, kick starter, gear shift linkage (Sec.9)
  - Balancer (Sec.10)
  - Oil pump (Sec.4)
  - Water pump (Sec.5)
- The following services require the engine to be removed:
  - Crank shaft and transmission (Sec.10)
- After installing the engine, check/adjust the following items:
  - Throttle cable (3-15)
  - Clutch cable (3-7)
  - Drive chain (3-9)

Torque setting

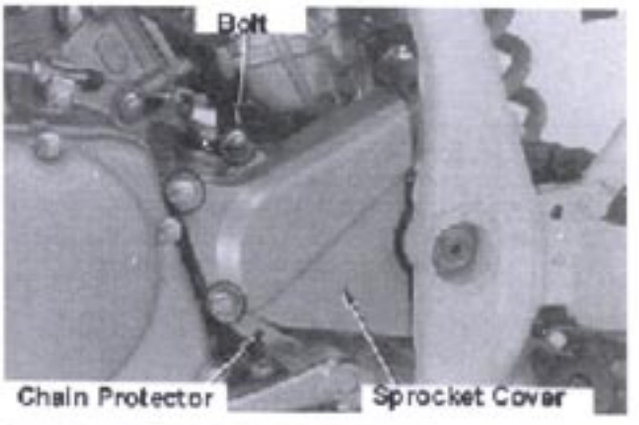
Swing arm pivot bolt/nut		108Nm (11kgfm)
Front engine hanger bolt/nut upper/lower		74Nm (7.5kgfm)
Cylinder head hanger plate bolt/nut	(cylinder head)	49Nm (5.0kgfm)
	(frame)	26Nm (2.7kgfm)

Drive sprocket removal

Loosen the rear axle nut and rotate the adjust plates on both sides to loosen the drive chain.

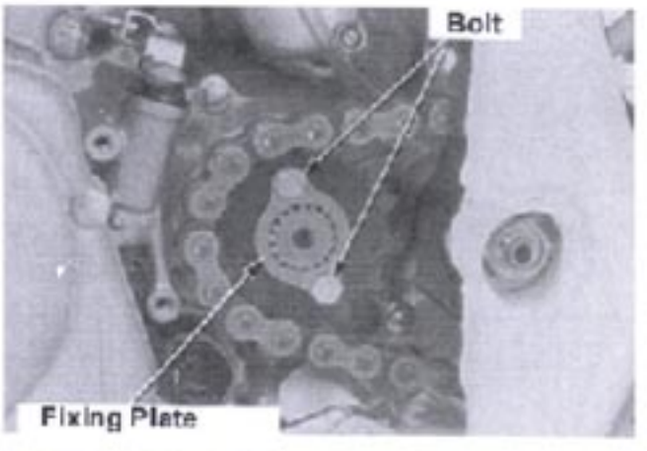


Remove the following parts:
- bolt
- drive sprocket cover
- drive chain protector



- drive sprocket bolt
- fixing plate

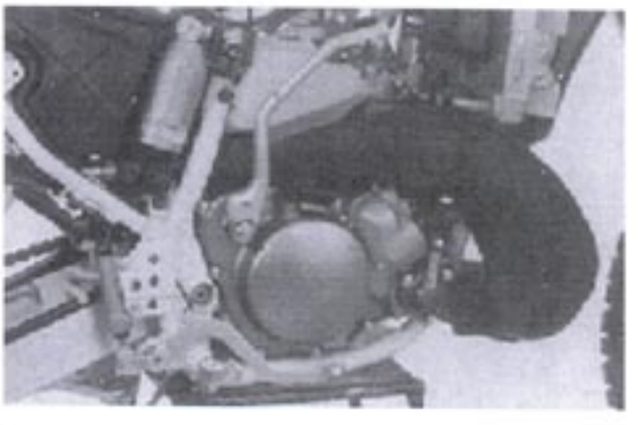
> - **Notes**
> - **The fixing plate can be removed in the following manner:**
> - **Remove the drive sprocket bolt**
> - **Turn the fixing plate and align its teeth with the ones on the counter shaft.**



Remove the drive sprocket.

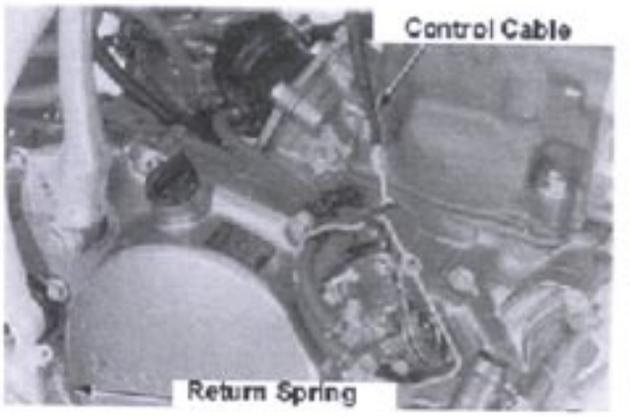
Engine removal

Remove the seat and the fuel tank (2-2, 2-3).
Drain coolant (5-4).
Remove the exhaust chamber (2-6).
Drain engine oil (4-7).

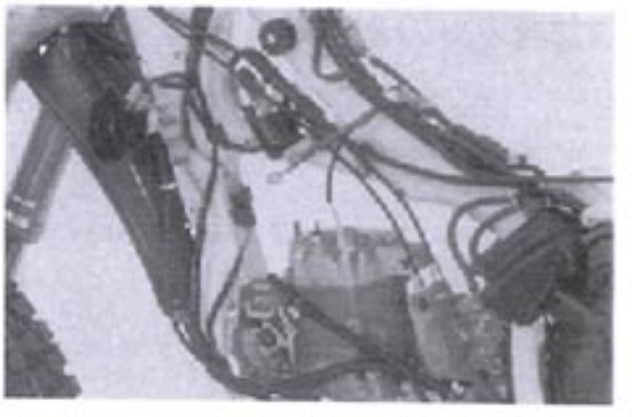


Remove the following parts:
- Servo-motor (16-5)
- Spark plug cap
- Oil tank A&B (8-3)
- Radiator Assy. (5-8)

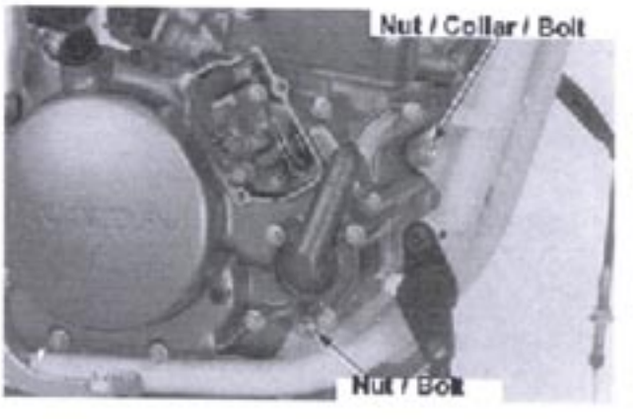
Brake pedal return spring
- Oil pump control cable
- Oil pump cover



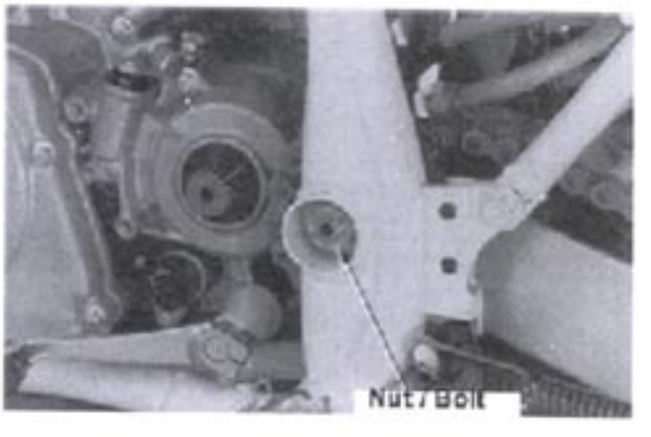
- Clutch cable
- Carburettor
- Ignition coil Comp.
- ARC valve control cable
- Pulse generator 3P(transparent) coupler
- Alternator 3P(transparent) coupler
- Shift sensor 4P(transparent) coupler



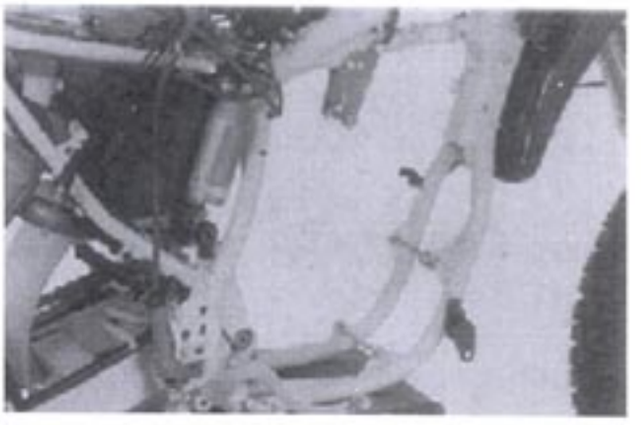
- Engine hanger (upper) nut/collar/bolt
- Engine hanger (lower) bolt/nut



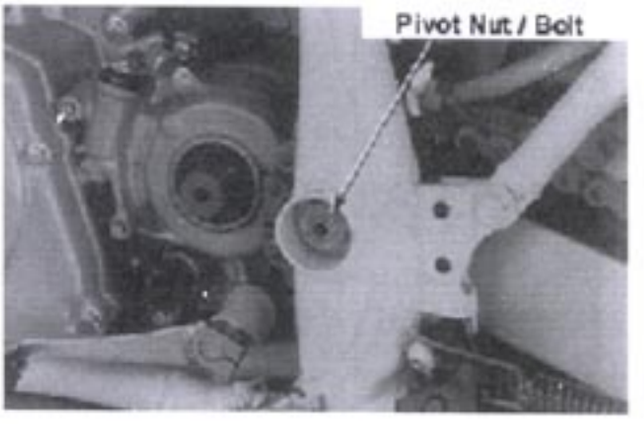
- Swing arm pivot bolt/nut



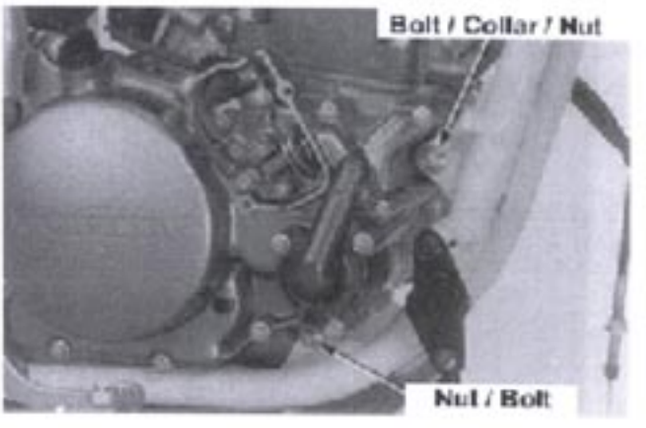
Remove the engine.



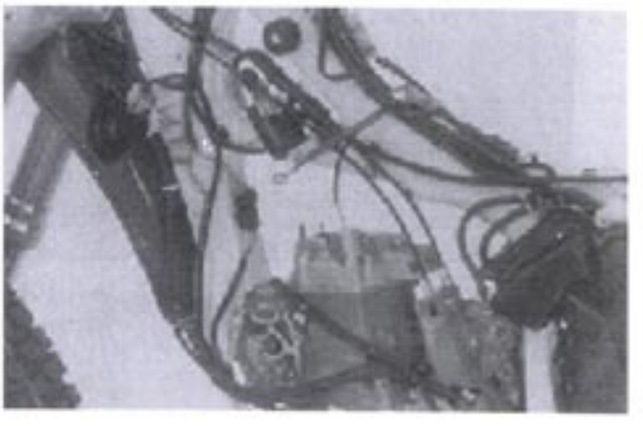
Engine installation
Install the engine.
Install the upper/lower front engine hangers.
Secure the following bolts:
Swing arm pivot nut : 108Nm (11kgfm)



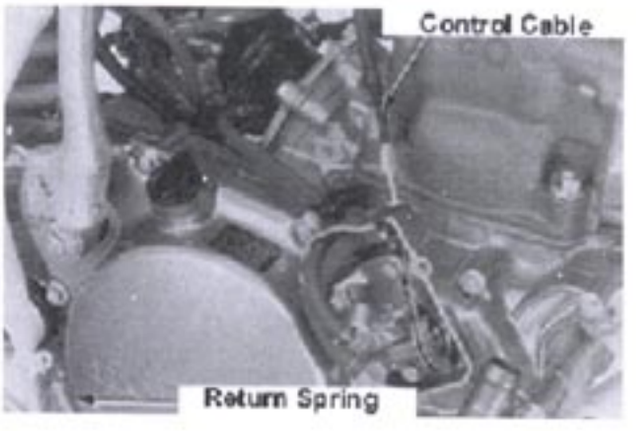
Engine hanger bolt (upper/lower) :
74Nm(7.5kgfm)



- Shift sensor 4P(transparent) coupler
- Alternator 3P(transparent) coupler
- Pulse generator3P(transparent) coupler
- ARC control cable
- Ignition coil
- Carburettor
- Clutch cable

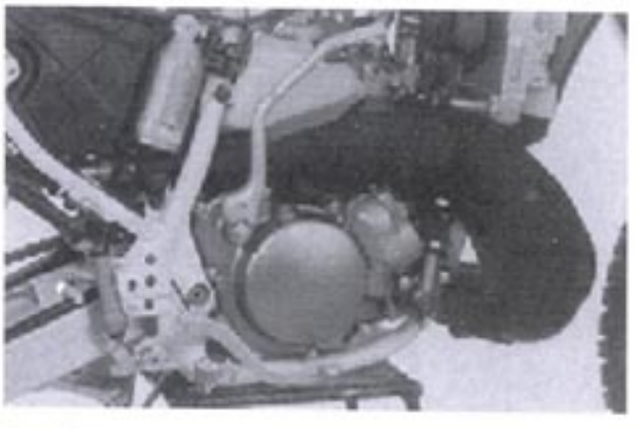


- Oil pump control cable (4-5)
- Oil pump cover (4-5)
- Rear brake pedal return spring



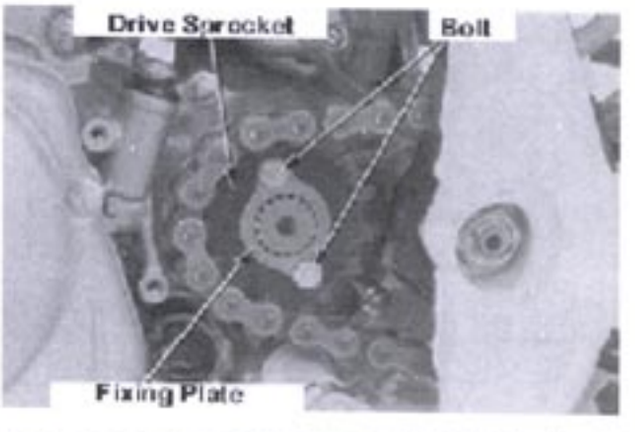
- Radiator Assy. (5-9)
- Oil tank A,B
- Spark plug cap
- Servo motor
- Exhaust chamber (2-8)

Fill coolant (5-4).
Install the seat and the fuel tank (2-2, 2-3).
Adjust the chain slack after installing.



Drive sprocket installation

Set the drive chain to the drive sprocket and install the sprocket to the counter shaft.

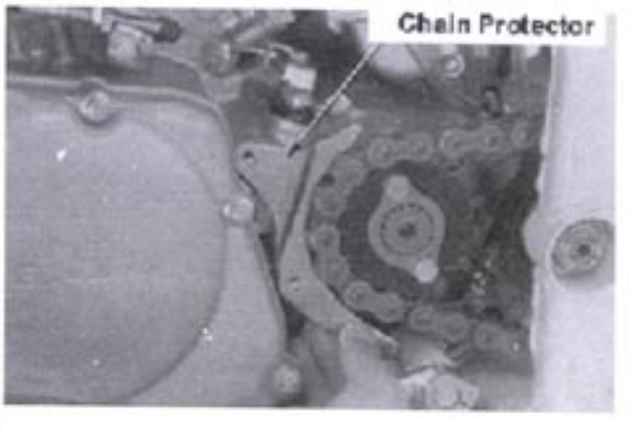


Notes
The marked surface of the drive chain should face outwards.

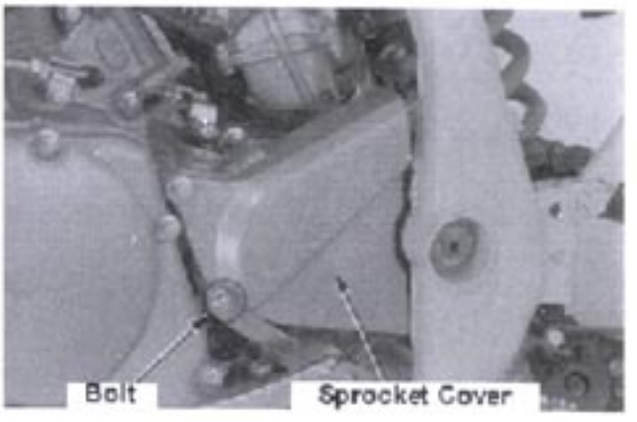
Install the following parts:
- Fixing plate

Notes
Align the teeth of the fixing plate with those of the counter shaft when installing. Then rotate it to align the drive sprocket and the bolt hole.

- Drive sprocket bolt
- Drive chain protector

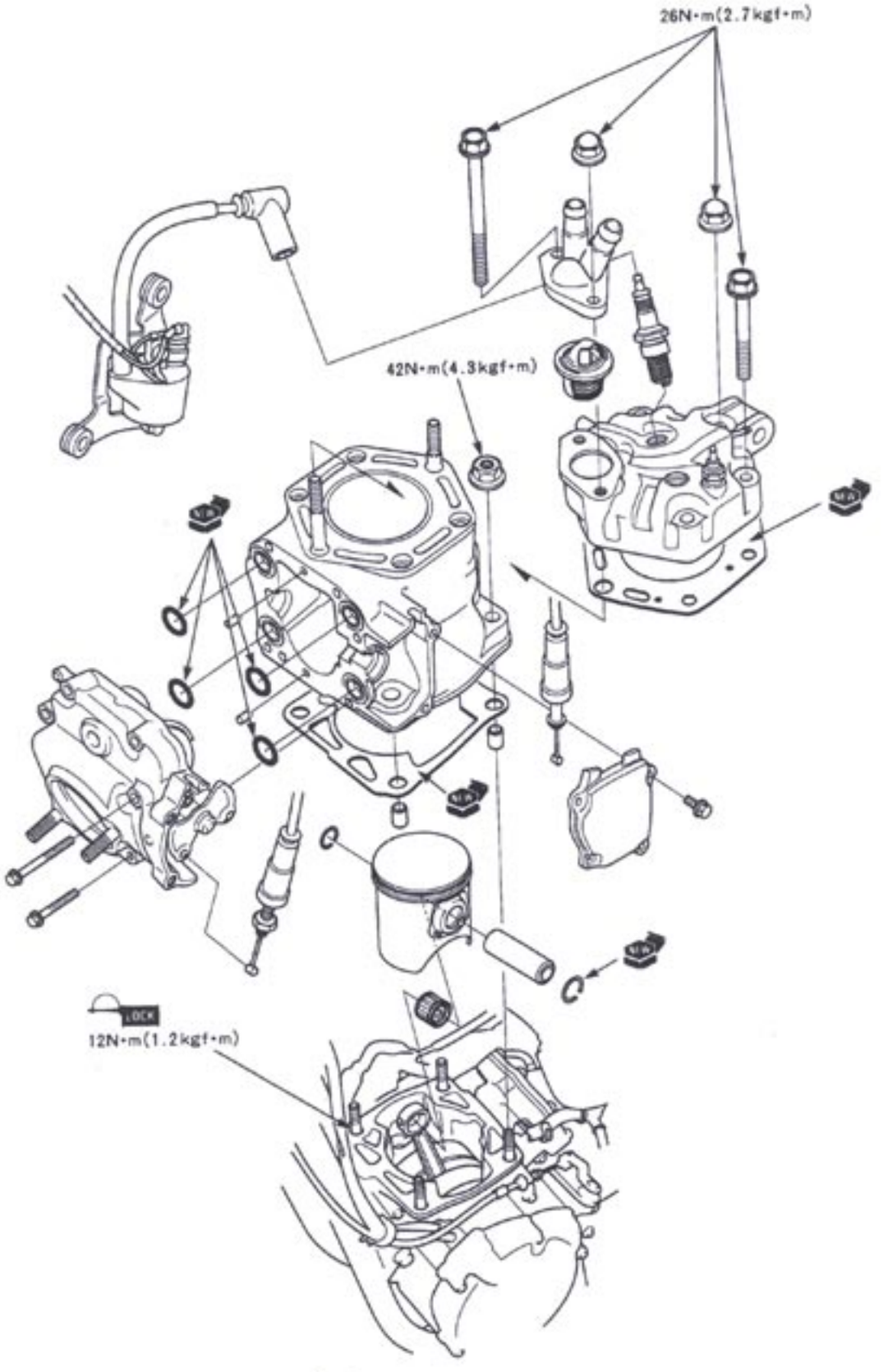


- Drive sprocket cover
- Bolt



Adjust the drive chain after installation (3-9).

8. Cylinder head, Cylinder, piston & ARC Valve



CRM250R 8. Cylinder head, Cylinder, piston & ARC Valve

General

- Clean and dry with compressed air before inspecting/measuring the parts.
- Do not damage the cylinder head and cylinder mating surface when removing/installing them.
- Do not scratch the interior surface of the cylinder and the piston outer surface.

Specification

Item			Specification	Service limit
Cylinder compression			1,225kPa (12.5kgf/cm²)-400rpm	-
Cylinder, piston selection			(page 8-10)	-
Cylinder head & cylinder		Top warpage		0.1
	Bore	"A" mark	66.420 – 66.415	-
		"B" mark	66.414 – 66.410	-
		"C" mark	66.409 – 66.405	-
Warpage			-	0.10
Out of round			-	0.05
Taper			-	0.05
Piston	Installing direction		"IN" facing inside	-
Piston ring .& piston pin	Piston dia (15mm from skirt edge)	"A" mark	66.370 – 66.365	-
		"B" mark	66.364 – 66.360	-
		"C" mark	66.359 – 66.355	-
Piston pin hole diameter			19.002 – 19.008	19.03
Piston pin diameter			18.994 – 19.000	18.97
Connecting rod small end bore			22.997 – 23.009	23.03
Cylinder-piston clearance			0.070 – 0.080	0.10
Piston-piston pin clearance			0.002 – 0.014	0.03
Piston ring end gap		Top	0.40 – 0.55	0.6
		Second	0.40 – 0.55	0.6
Piston ring installing direction		(top, second)	Mark facing upwards	-

Torque setting

Cylinder head cap nut	26Nm (2.7kgfm)
Cylinder head bolt	26Nm (2.7kgfm)
Cylinder head hanger plate bolt/nut (cylinder head)	49Nm (5.0kgfm)
(frame)	26Nm (2.7kgfm)
Cylinder stud bolt	12Nm (1.2kgfm) screw locking agent
Cylinder flange nut	42Nm (4.3kgfm)
Cylinder Assy. flange bolt	10Nm (1.0kgfm)
ARC/V shaft nut	12Nm (1.2kgfm)

8. Cylinder head, Cylinder, piston & ARC Valve

Troubleshooting

Low compression

- Cylinder head
  - Head gasket damage
  - Head warpage/crack
- Cylinder, piston wear/damage
- Piston ring wear/stick/damage
- Crankcase primary compression leak
- Crankshaft seal leak

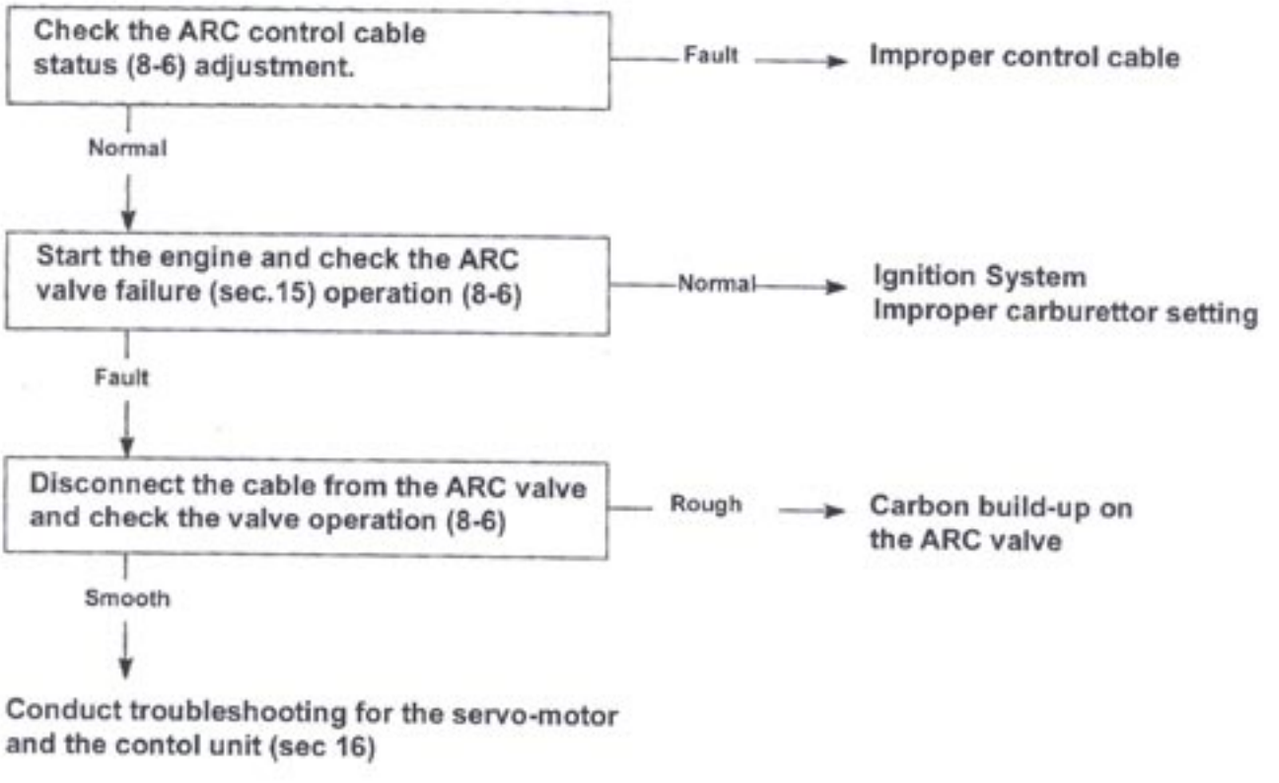
High compression

- Carbon on piston and combustion chamber

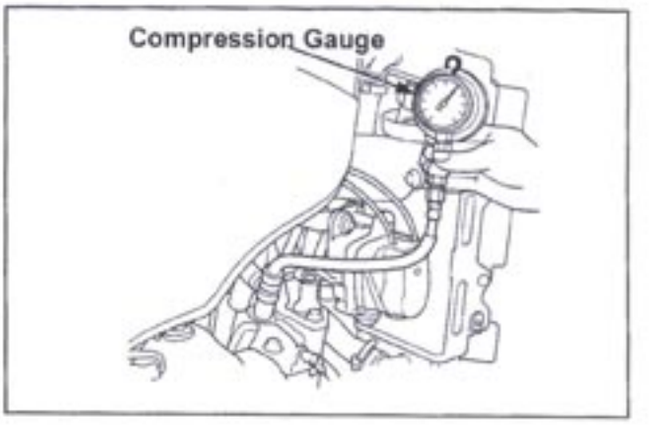
Knocking

- Cylinder, piston, piston ring wear
- Piston pin hole and piston pin wear
- Connecting rod small end bearing wear

Lack of power in low speed, or significant reduction in maximum speed



Cylinder compression



Notes
Warm up the engine before the measurement.

Remove the spark plug.
Set the compression gauge attachment to the cylinder plug hole.
Connect the compression gauge.

Notes
Make sure there is no compression leak from the gauge attachment.

Fully-open the throttle and operate the kick starter a few times to measure the compression.

Compression : 1,225kPa (12.5kgf/cm²) - 400rpm

If the compression is too high, check the piston head and combustion chamber for carbon build-up.
If the compression is too low, check the head, cylinder, piston, and piston ring.

Cylinder head
Cylinder head removal

Notes
Clean dirt off from the engine surface before starting the work.

Drain coolant (5-4).
Drain oil from the oil tank(4-7).

Remove the following parts:

- Seat and fuel tank (2-2, 2-3)
- Servo-motor (together with its stay(

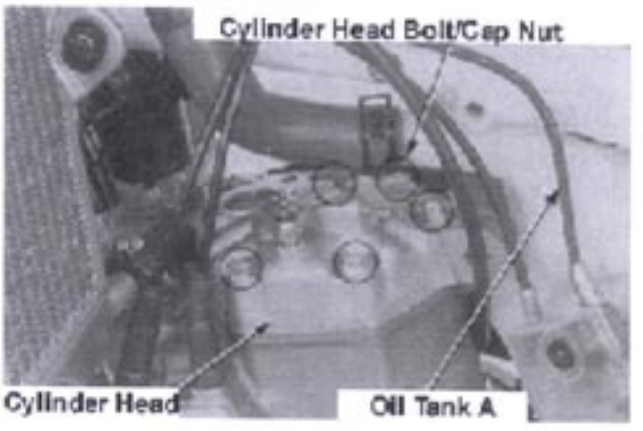
- Spark plug cap, spark plug
- Thermostat, Thermostat cover
- Engine hanger plate
- Oil tank B mount bolt (one)

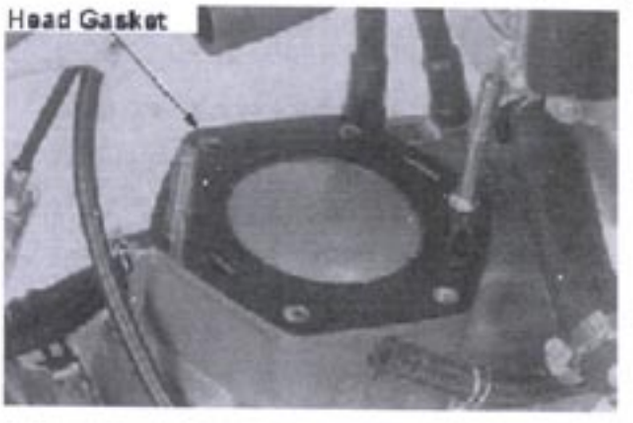
Disconnect the water temp. sensor connector.
Loosen the hose clamp to disconnect the water hose from the cylinder head.

Remove the following parts:
- Exhaust chamber
- Oil tank A
- Cylinder head bolt/cap nut

Loosen bolts/nuts in crisscross pattern to prevent cylinder head warpage.

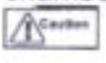
Remove cylinder head, and cylinder head gasket.



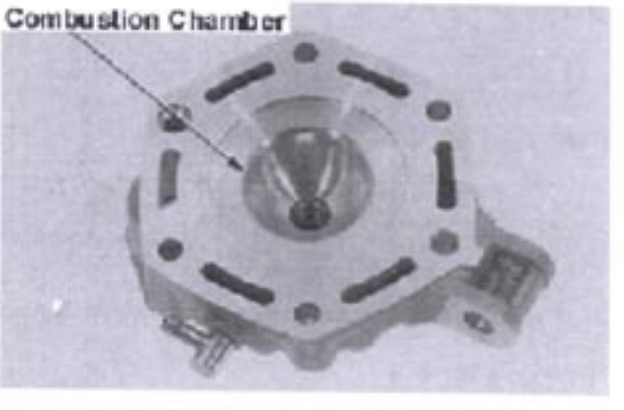


Cylinder head inspection

Remove carbon from the combustion chamber.



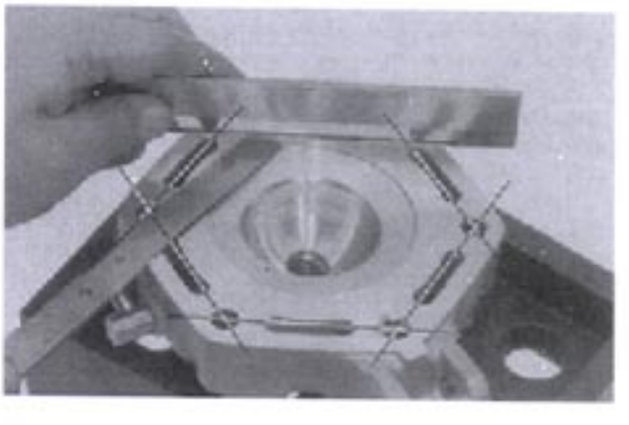
Do not damage the chamber or the gasket surface.



Check the spark plug hole for crack.

Measure the warpage of the mating surface for the cylinder.

Service limit :
0.05mm or above – replace



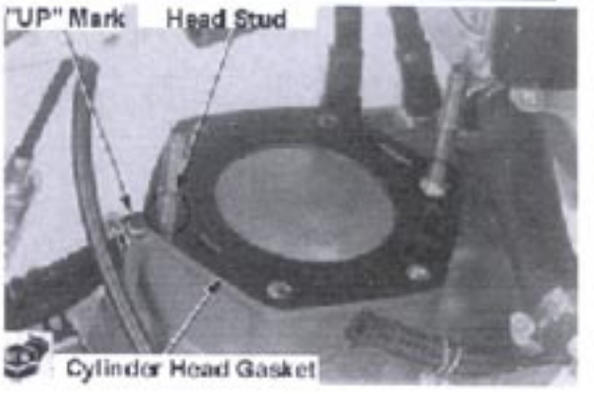
Cylinder head installation

Before installing the head, check that the cylinder stud bolt is secured.

If the bolt is loose, secure to the specified torque:

Torque : 12Nm (1.2kgfm)

Install a new cylinder head gasket.



> **Notes**
> **The "UP" mark on the gasket should face upwards and face its projection to the intake side.**

Install the cylinder head and secure the nut.

Torque : 26Nm (2.7kgfm)

Caution

> Secure the nuts in crisscross pattern in order to prevent the cylinder head warpage.

Install the following parts:

- Oil tank A
- Thermostat, thermostat cover, bolt, nut

Torque : 26Nm (2.7kgfm)

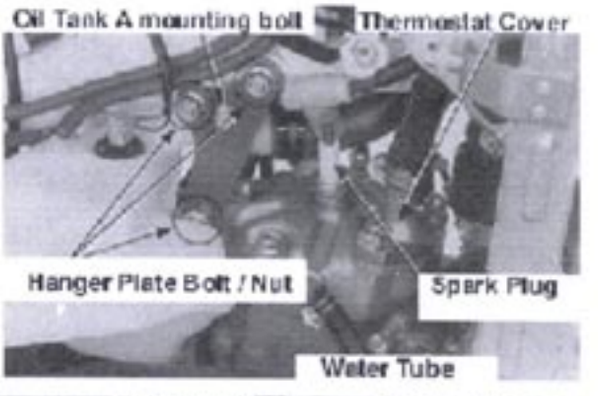
- Cylinder head hanger plate, collar, bolt, nut

Torque : 49Nm (5.0kgfm) : head end
26Nm (2.7kgfm) : frame end

- Spark plug

Torque : 18Nm (1.8kgfm)

- Spark plug cap
- Oil tank A mount bolt
- Water tube
- Thermo-sensor coupler
- Servo-motor (together with stay)



Caution

> Ensure that Earth lead is attached under stay

- Exhaust chamber

Fill the oil tank (4-7).

Install the fuel tank and the seat (2-3,2-2)

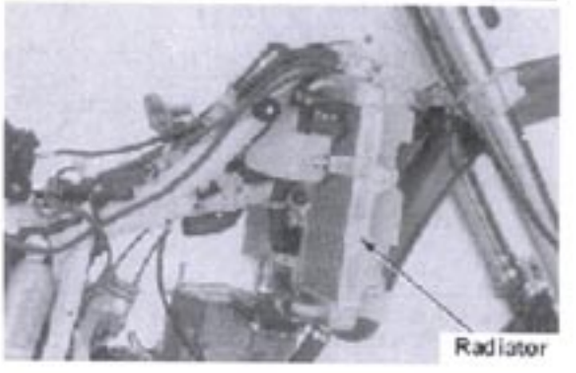
Fill coolant and bleed air (5-4).

Cylinder and piston removal

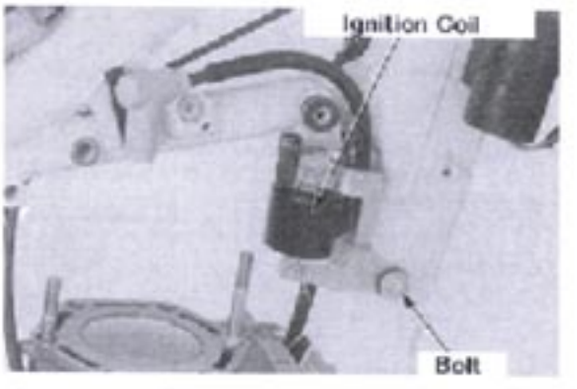
Cylinder removal

Remove the following parts:

- Cylinder head (8-3)
- ARC valve cable (8-11)
- Radiator (5-8)



- Bolt
- Ignition coil unit (together with its stay)



■ Cylinder nut x4

Caution

Loosen the nuts in crisscross times pattern to avoid warpage

- Cylinder
- Knock pin
- Gasket

■ **Notes**
■ **Turn the crankshaft to bring the piston to BDC.**
■ **Lift the cylinder to the height where the stud bolt can be removed. Pull out the dowel if it stays in the cylinder.**
■ **Pull the cylinder back and lift it up without tilting it to the position where the stud bolt on the front cover does not interfere with the cylinder.**
■ **Cover the crankcase open area with a cloth to prevent remaining coolant, dirt, debris entering the crankcase.**

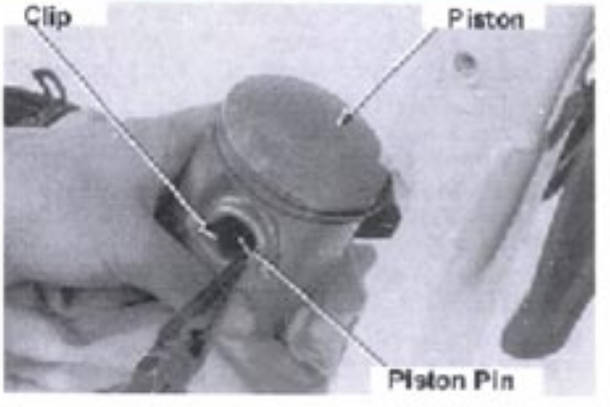
Caution

If the gasket is sticking to the bottom surface of the cylinder, remove it after removing the cylinder.

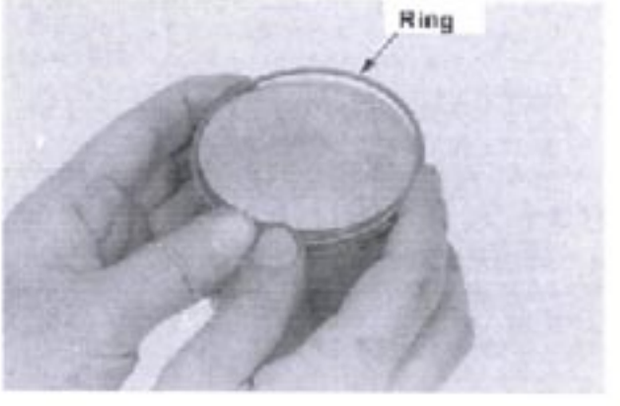
Piston removal

Notes
Wrap the crankcase open area with a cloth to prevent dropping the piston pin clip into the crankcase.

Remove the following parts:
- Piston pin clip
- Piston pin
- Piston
- Connecting rod small end bearing



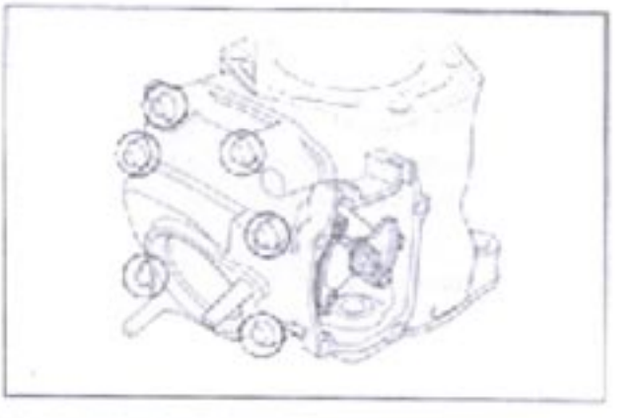
Expand the piston ring carefully and remove the piston ring from the opposite side of the groove.



Cylinder inspection

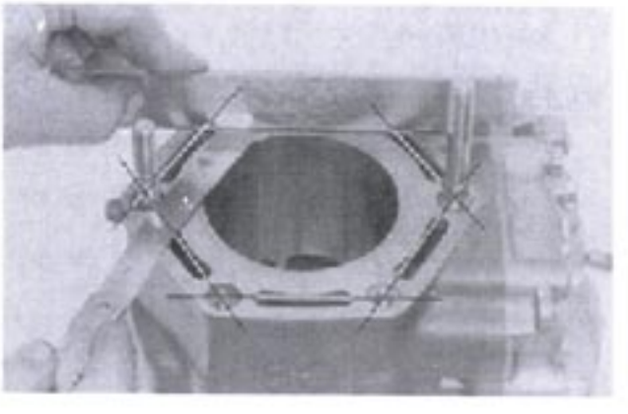
Remove carbon built up in the exhaust port.

Notes
Do not remove carbon around the valve or disassemble the front cover unless there is significant carbon build up in the exhaust port, or significant friction of the ARC valve shaft which result in blocking smooth ARC valve operation.
ARC valve inspection (8-10).
Do not peel off the NS coating on the cylinder interior surface and the exhaust port entrance.



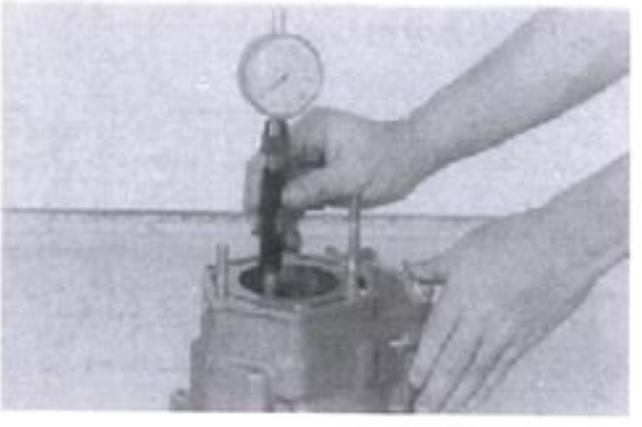
Measure the cylinder top warpage with a straight edge and a thickness gauge.

Service limit :
Replace if 0.05mm or above



Check the cylinder-piston interface for wear and damage.

Measure the cylinder bore in two rectangular direction (X-Y) at top, centre, and bottom (six measurements in total) and record the values. Take the maximum value as the cylinder bore measurement. Calculate the cylinder-piston clearance and take the maximum value as the clearance.



Service limit :

Replace if 0.1mm or above

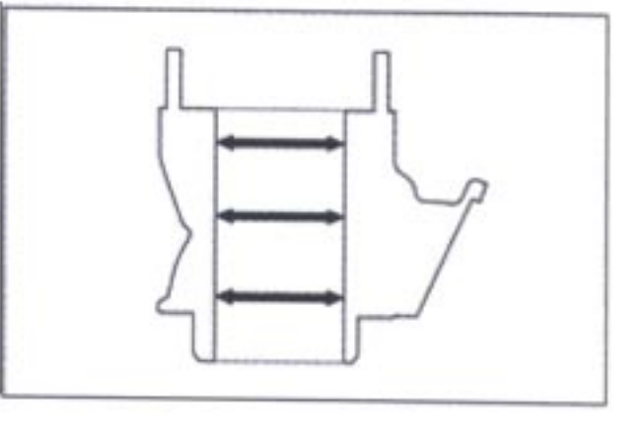
Measure the piston diameter (page 8-9).
Calculate the out-of-round(difference between X and Y) and taper (difference of top, centre, and bottom bore at either X or Y direction).
Take maximum values.

Out-of-round :

Replace if 0.05mm or above
Taper : Replace if 0.05mm or above

Notes

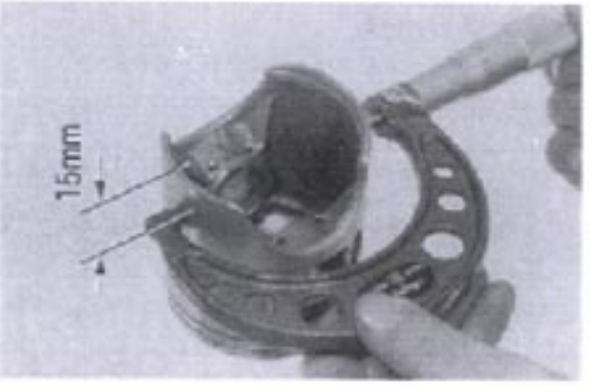
- **Condition of the honing surface may be a measure to find out whether to replace the cylinder. It is recommended to replace the cylinder if the honing is damaged or fading out.**
- **The cylinder cannot be bored because of its NS surface coating.**
- **Check the clearance between the piston and cylinder when replacing the cylinder (8-6).**



Piston and piston pin inspection

Remove carbon build-up from the piston head.
Inspect the piston for scratch, crack, ring groove damage, wear, and carbon build-up.
Measure the piston diameter.

Notes
- Measure at 15mm from the skirt bottom end and perpendicular to the piston pin hole. (8-10).
- The piston identification mark is on the piston head.



Measure the piston pin hole diameter.

Service limit :
Replace if 19.03mm or above

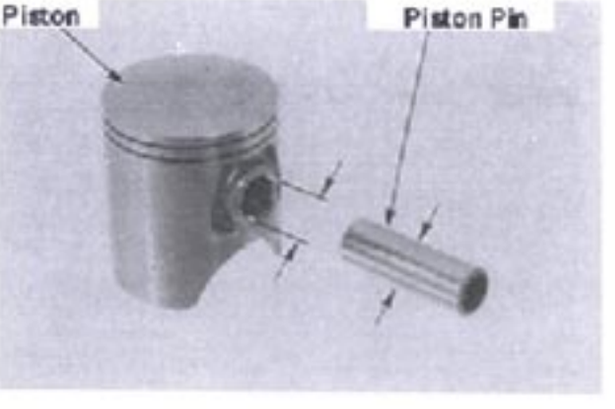
Measure the piston pin diameter.

Service limit : Replace if 18.97mm or less

Calculate the clearance between the pin and the pin hole.

Service limit : Replace if 0.03mm or more

Replace the piston pin if the clearance comes within the limit by using a new pin. If the clearance is still expected to be more than the limit, replace both pin and piston.

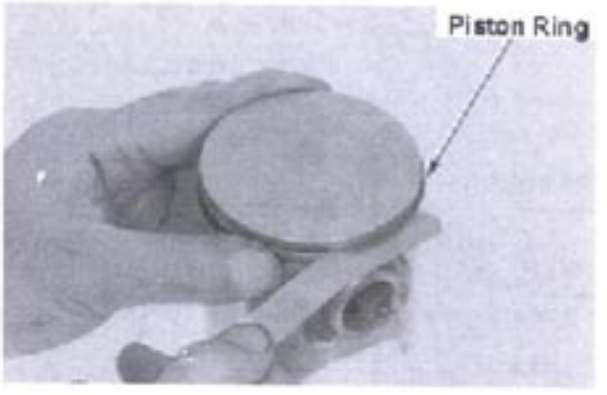


Notes
- Replace the piston if there is a scratch or other damage.
- Check the clearance between the cylinder and piston before replacing the piston (8-15).

Piston ring inspection

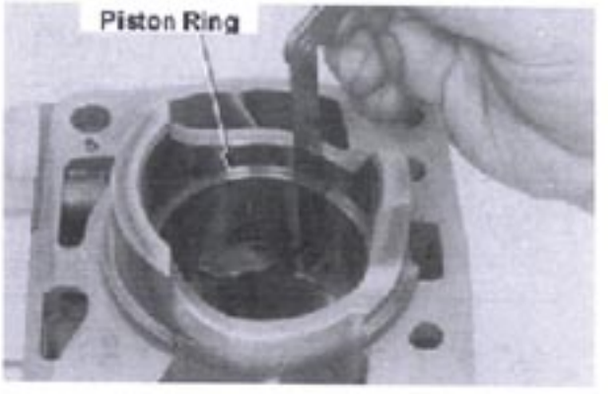
Measure the clearance between the ring and the ring groove.

Service limit:Replace if 0.12mm or above



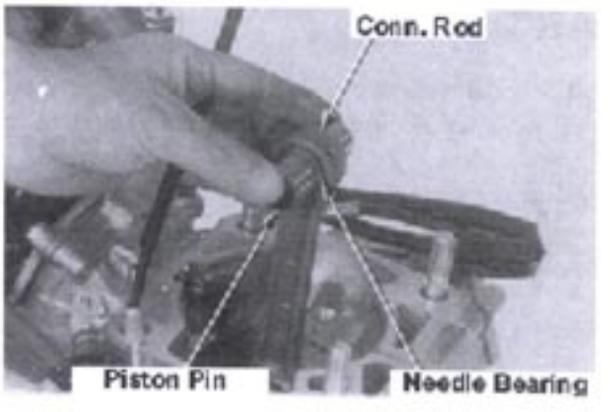
Measure the piston ring end gap.

Service limit : Replace if 0.6mm or above (both top and second)

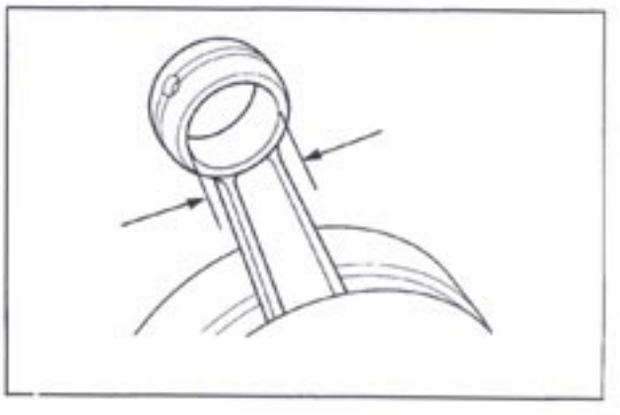


Notes
Set the ring perpendicular to the cylinder wall by using the piston crown.

Connecting rod small end inspection
Set the connecting rod small end needle bearing and the piston pin to the connecting rod small end and check for the fitting.
If the fitting of the bearing is loose, replace the bearing.



Measure the connecting rod small end bore.
Service limit:
Replace if 23.03mm or above

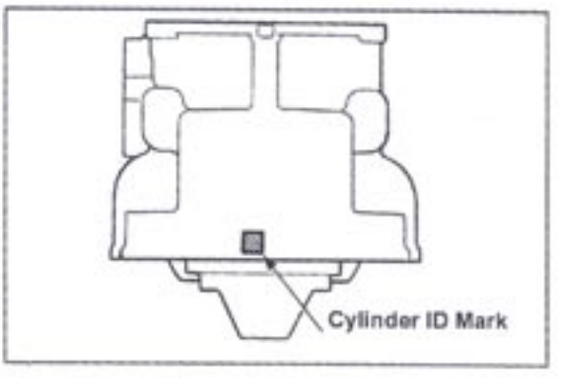


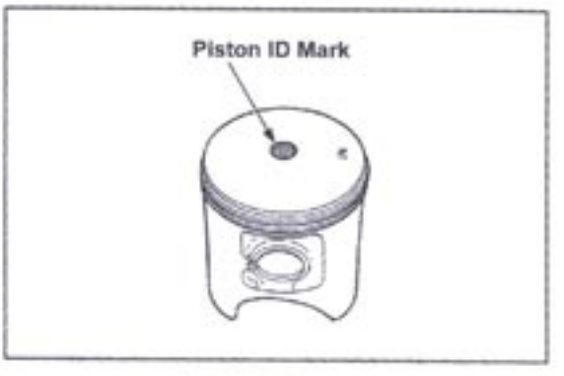
Cylinder and piston selection

When replacing the cylinder or the piston, select the same identification mark.

Matching identification (unit : mm)

Piston Dia. Cylinder bore	66.365 ~ 66.370	66.360 ~ 66.364 (no mark)	66.355 ~ 66.359
66.415 ~ 66.420	Identification mark A		
66.410 ~ 66.414		No mark (mark B)	
66.405 ~ 66.409			Identification mark C





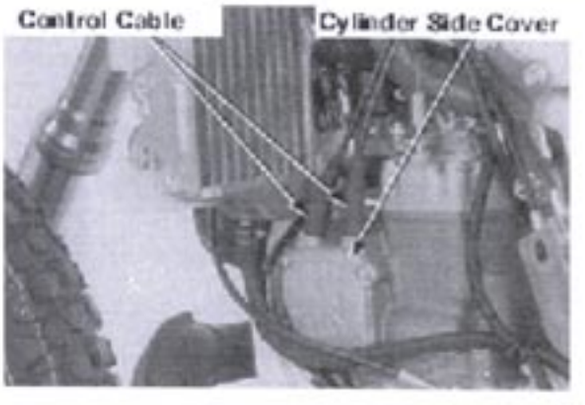
ARC Valve

Control cable removal

Remove four bolts and the cylinder side cover.

Notes

- **Do not remove parts around ARC valve unless adjusting the cable.**

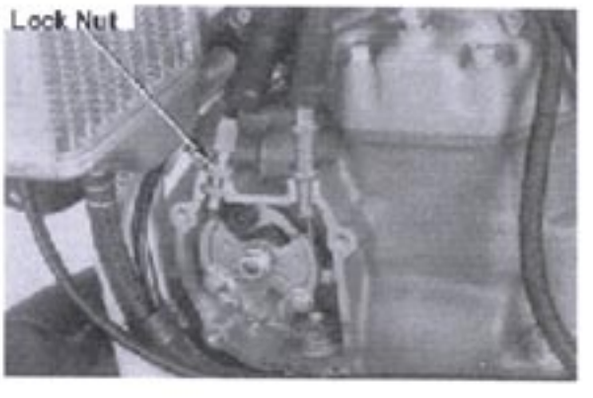


Loosen the control cable lock nut.
Disconnect two cables from the cable guide.

Caution

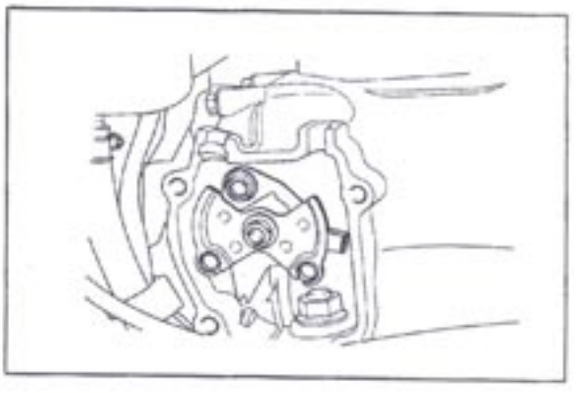
- Do not bend or twist the cables.

Disconnect the rear valve cable first, then turn the valve cable guide counterclockwise to disconnect the front valve cable.



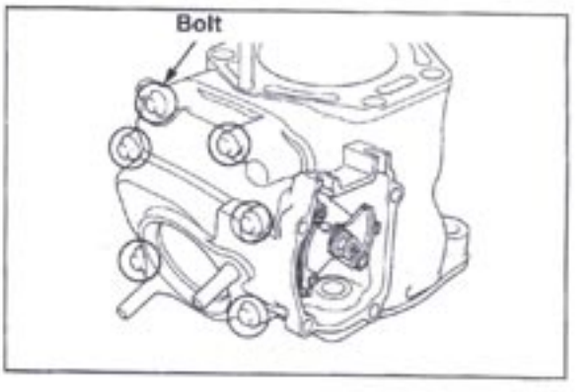
Front Cover Assy.
Removal

Remove the cylinder (9-3).

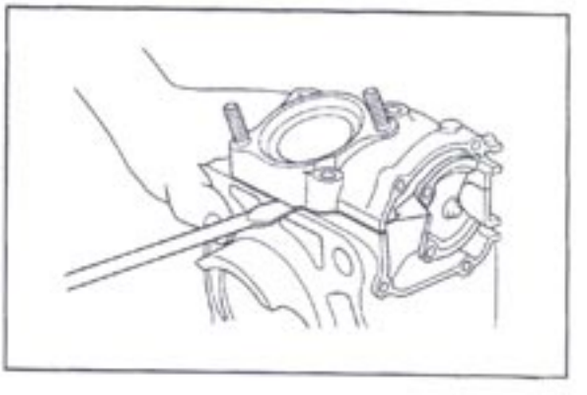


Notes
Do not remove carbon around the valve or disassemble the front cover unless there is significant carbon build up in the exhaust port, or significant friction of the ARC valve shaft which is preventing smooth ARC valve operation.

Remove bolts.

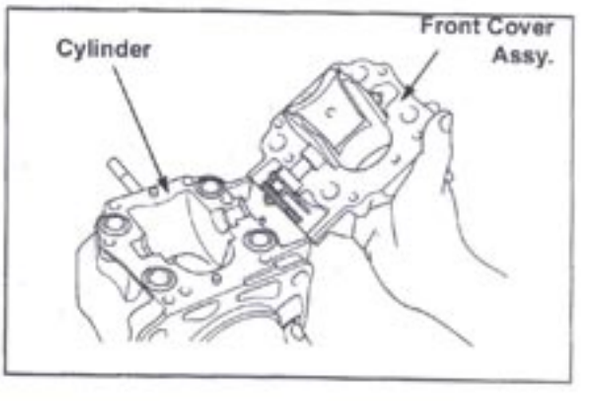


Insert a flathead screwdriver between the cylinder and the front cover and open the gap.

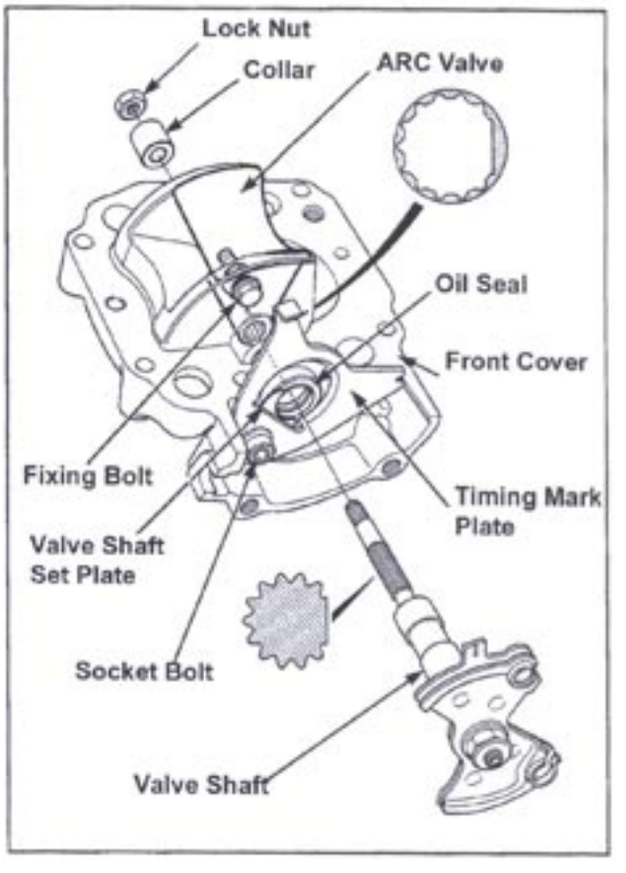


Notes
- **Do not damage the mating surface.**
- **If the surface is damaged, fix with an oil stone.**

Remove the front cover Assy.



Loosen the lock nut and remove the valve shaft and the ARC valve.



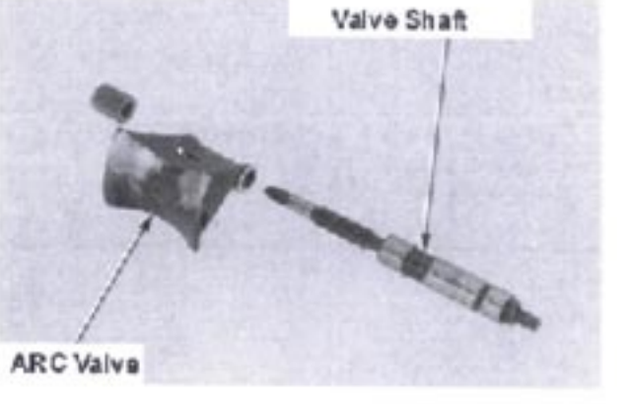
Notes
Fix the valve and the front cover with a 6mm bolt when loosening the lock nut.

Remove the following parts:

Caution

The shaft timing must be re-adjusted when the socket bolt is loosened.
Do not loosen the socket bolt unless it is absolutely necessary.

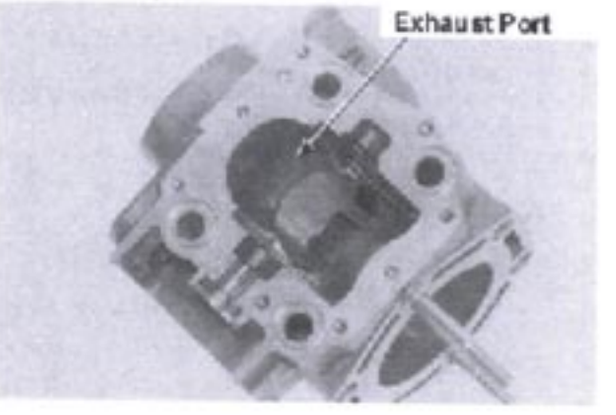
- Socket bolt
- Timing mark plate
- Valve shaft set plate
- Oil seal



Inspection

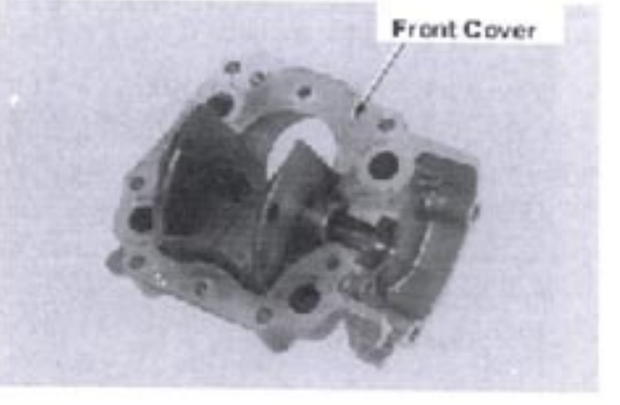
Inspect for ARC valve damage, valve shaft bending or damage.
Set the valve to the cylinder and check for smooth revolution.
If it is not smooth, check the bearing and replace it if necessary.

Remove carbon from the exhaust port and the valve shaft rotating area.

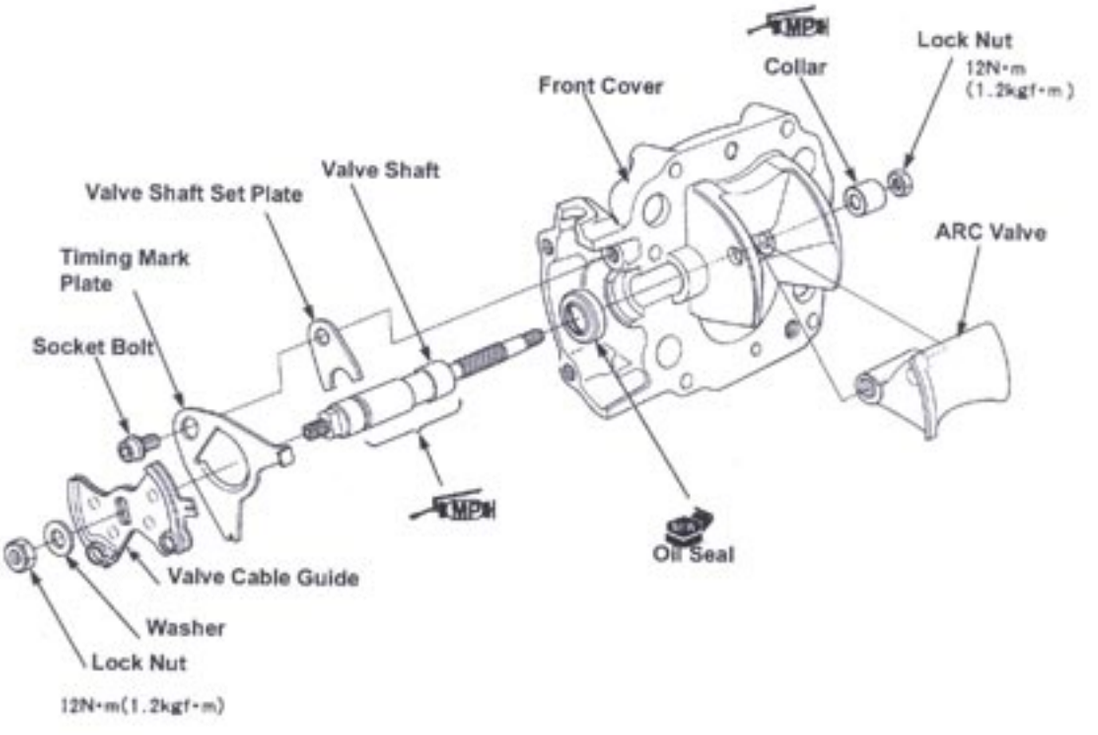


Notes
When removing the carbon built up around the cylinder exhaust port, do not scratch the coating on the cylinder interior surface or the exhaust port mouth.

Remove gasket on the sealing surface.



Inspect the front cover for damage. Replace the front cover and the cylinder as a whole assy, if necessary.



Installation

Temporally set the ARC valve, the valve shaft, the collar and the lock nut to the front cover.
Align the hole on the side of the ARC valve with the one on the front cover guide and set the 6mm bolt to fix them.
Secure the lock nut.

Torque setting : 12Nm (1.2kgfm)

Apply Molybdenum grease to the shaft rotating area.

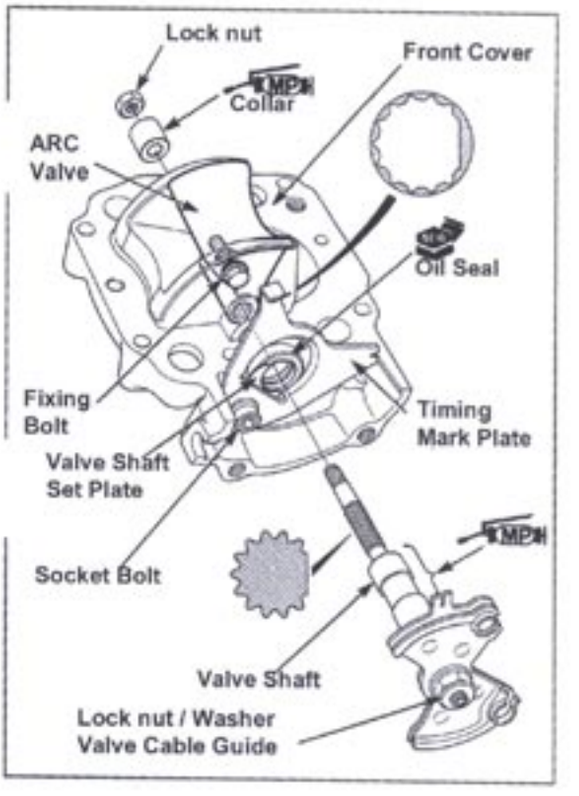
Properly insert and set a new oil seal without tilting.
Set the valve set plate to the shaft groove to install the timing plate and temporally tighten the socket bolt.
Align the hole on the side of the ARC valve with the one on the front cover guide and set the 6mm bolt to fix them.
Install the following parts:

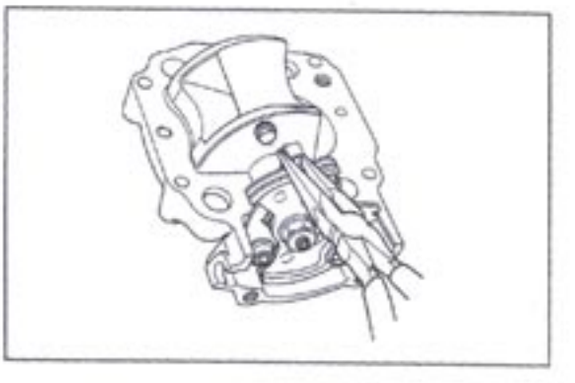
- Valve cable guide
- Washer

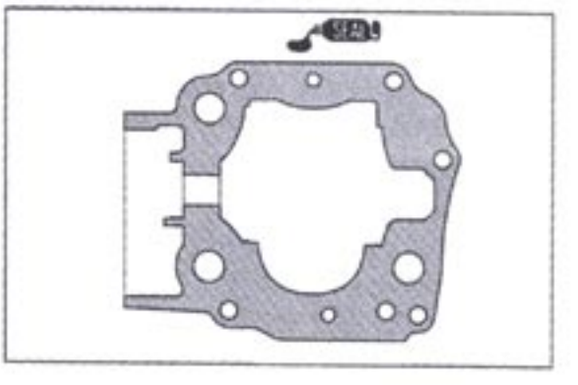
Secure the lock nut:

Torque setting : 12Nm (1.2kgfm)

Leave the front cover fixed with the bolt and move the timing plate to align the mark on the valve cable guide plate and the one on the timing mark plate and secure the socket bolt.



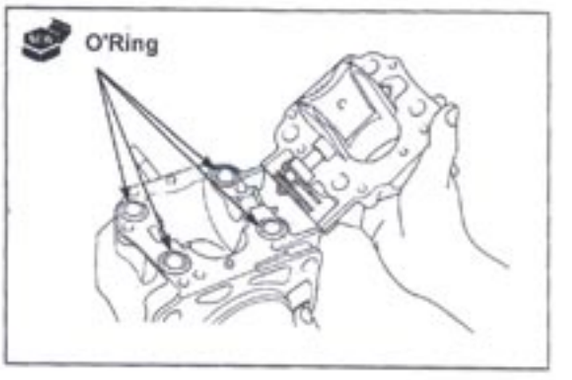




Notes

- **It is recommended that both projections on the marks are fixed with pliers to prevent losing the alignment when tightening. The timing plate should be pressed in the opposite direction to the front cover gasket otherwise it may be difficult to install it to the cylinder.**

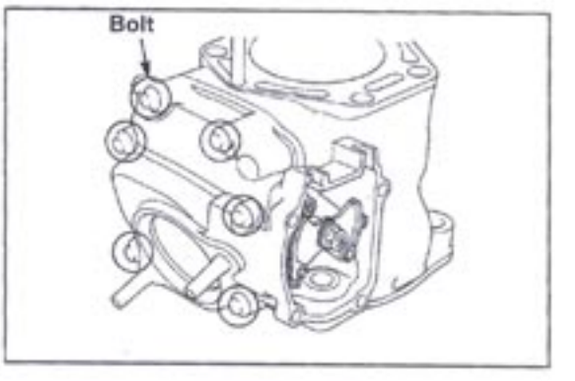
Install a new oil seal and set the front cover Assy.



Secure the bolts:

Torque setting : 10Nm (1.0kgfm)

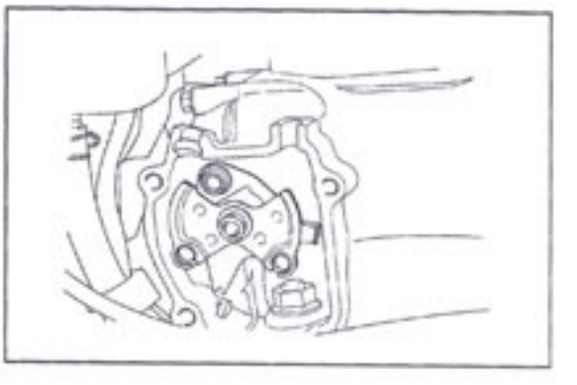
- **Notes**
- **Do not apply oil to the bolt thread or the bolt hole. Moreover, it is better to wipe off.**
- **Check that the valve moves full stroke with its own weight.**
- **If the revolution is not smooth, remove the front cover and investigate.**



Control cable installation

Install the following parts:

- Cylinder (8-16)

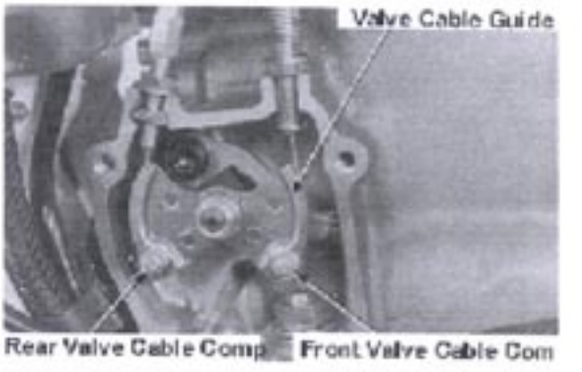


Notes
Check that the valve cables on the servo motor end are firmly set to each guide.

Start the engine and shut down immediately.

Caution

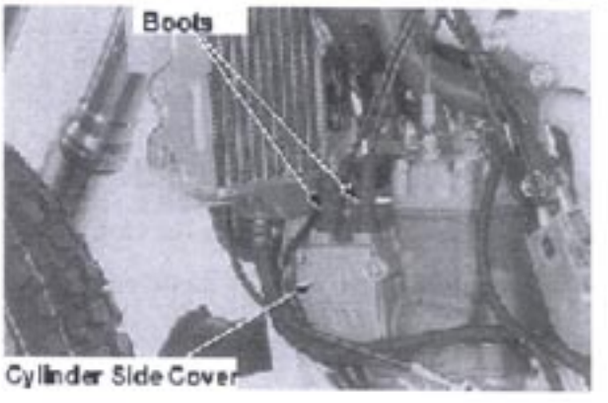
This operation sets the servo motors to specific positions.



Notes
Restart the engine and snap the throttle a few times to check the smooth operation of the valve.
Re-check the timing mark alignment.

Install a cylinder side cover and bolts.

Notes
Firmly refit the boots for the valve cables.

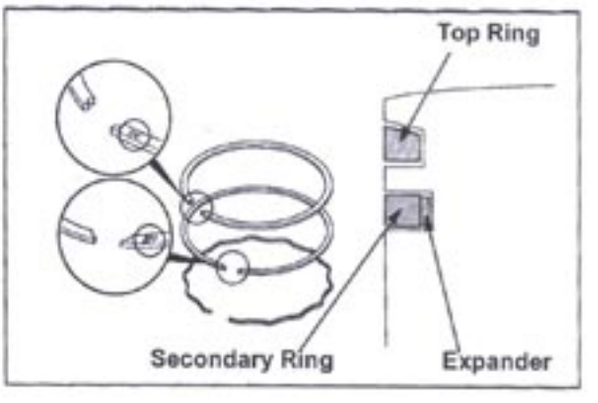


Cylinder and piston installation

Piston ring installation

Set piston rings to the piston.

- **Notes**
- **The marks on the rings should face upwards.**
- **The top and the second rings are not identical - do not confuse them.**
- **The top ring has a tapered cross section.**
- **Replace both rings at a same time.**



Piston installation

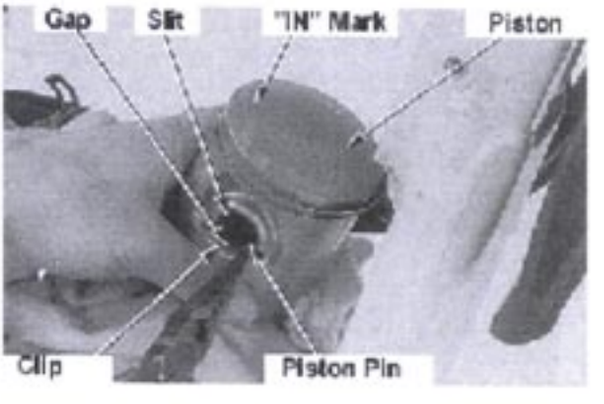
Apply recommended engine oil to the connecting rod small end bearing and piston before assembling them.
Set the piston with the piston pin.

Notes
The "IN" mark on the piston head should face towards inlet.

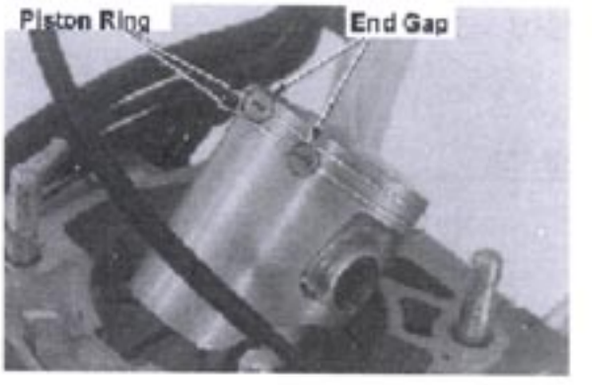
Install a new piston pin clip.

Caution

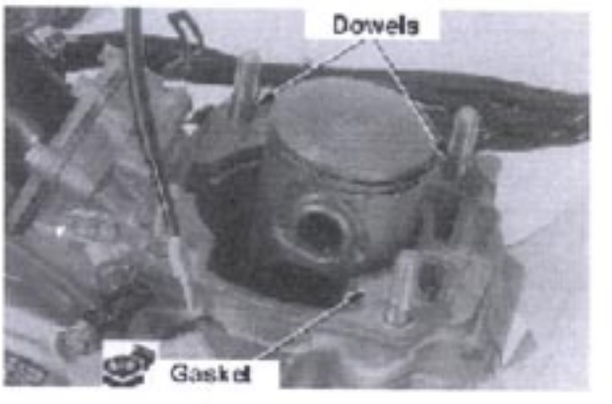
Do not align the clip end gap with the slit on the piston.



Align the piston ring end gap with the piston ring stopper pin.



Install a new cylinder gasket and dowel.



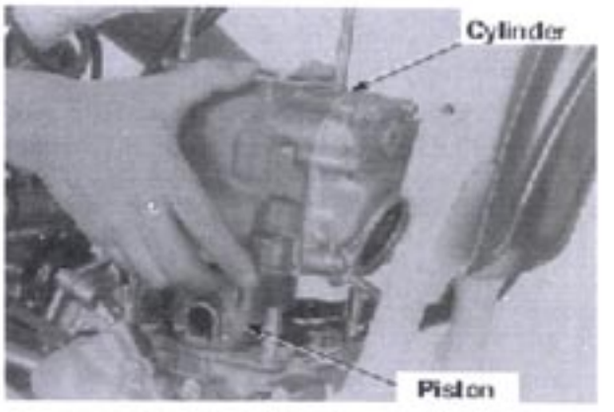
Notes
Install a new cylinder gasket.

Check the tightness of the cylinder stud bolt.
Secure if loose.

Torque setting : 12Nm (1.2 kgfm)

Cylinder installation

Apply recommended two-stroke engine oil to the interior surface of the cylinder and set the piston to the cylinder.



Notes

- **Set the piston at the position where the front cover stud bolt does not interfere with the frame.**
- **When installing the piston, slightly offset the rotating direction to bring the piston top ring end gap to the skirt angled corner.**
- **Check the status after installing the piston to the cylinder.**
- **Push the cylinder down to the cylinder stud bolt end.**
- **Push the cylinder front to align the cylinder stud hole with the stud bolt.**

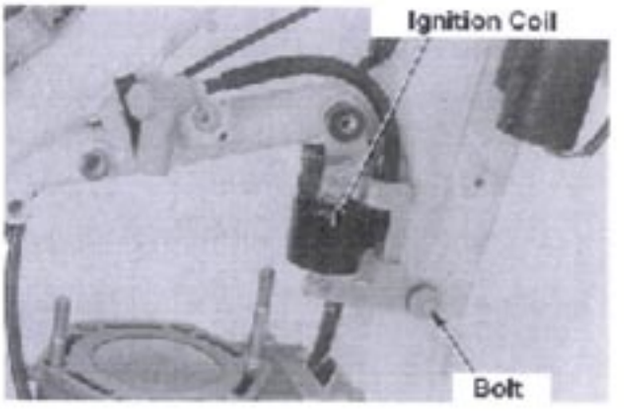
Caution

If the piston cannot be installed smoothly, the piston ring may be catching the cylinder skirt. Remove the cylinder and re-set the piston ring to the stopper and try again.

Secure four nuts on the cylinder.
Torque setting : 42Nm (4.3kgfm)

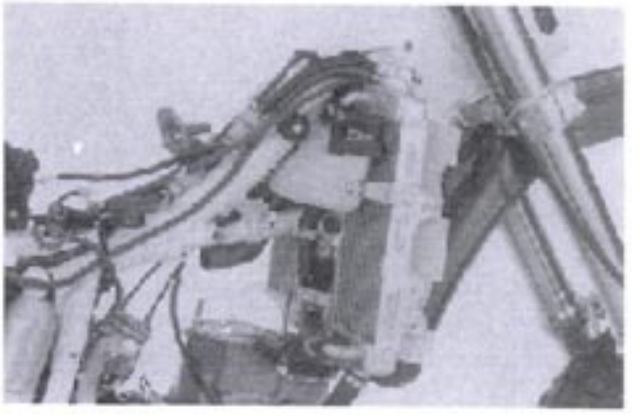
Notes
Secure the nuts in crisscross pattern and in several stages.

Set the ignition coil Comp. bolt.

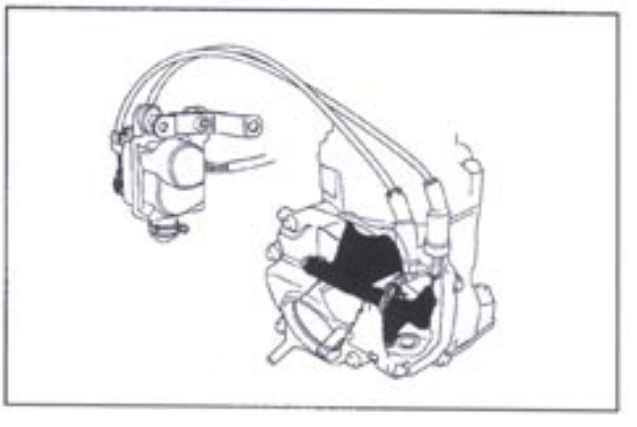


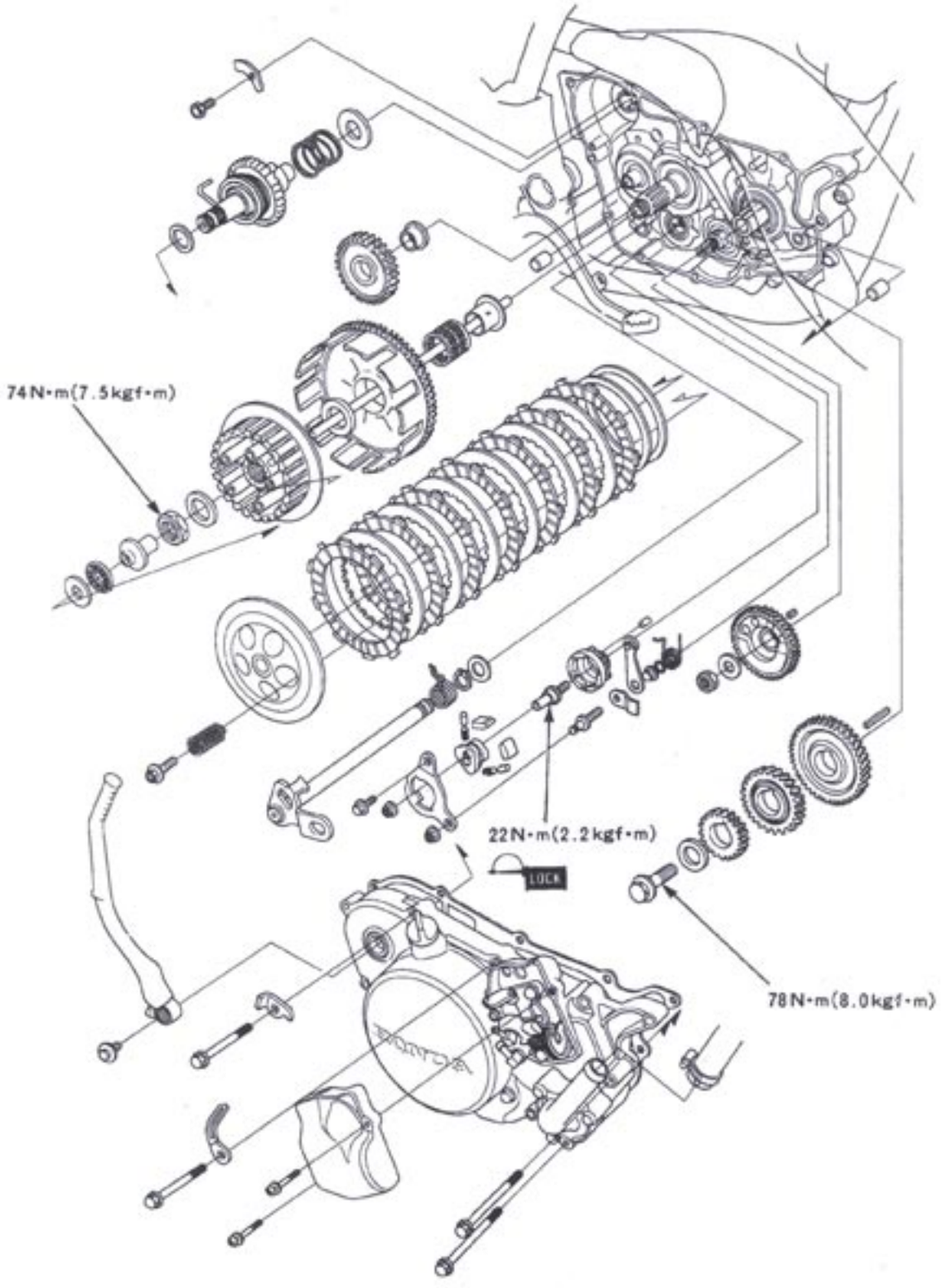
Install the following parts:

- Radiator (5-9)
- ARC valve cable (8-14)
- Cylinder head (8-5)



ARC valve control cable connection
Connect the ARC control cables as shown in the figure.




74N·m(7.5kgf·m)
22N·m(2.2kgf·m)
LOCK
78N·m(8.0kgf·m)

General

- Service works described in this section can be done without removing the engine from the frame.
- The transmission oil viscosity and oil level affect clutch operation. Before checking the clutch, check the oil.
- Remove sealant on the mating surfaces of the case.
- Do not damage the mating surfaces when disassembling.
- Do not allow debris and mud enter inside the engine.

Specification

Item		Specification	Service limit
Clutch Clutch lever free play		10 – 20	-
Clutch spring relaxed length		44.8	43.30
Clutch disc thickness		3.0	2.90
Clutch outer bore		32.000 – 32.025	-
Clutch outer guide	Diameter	27.987 – 28.000	27.97
	Bore	23.000 – 23.021	23.03
Clutch plate warpage			0.20
Main shaft diameter (at the clutch outer guide)		22.959 – 22.980	22.94
Kick starter Spindle diameter		19.959 – 19.980	19.94
Pinion gear bore		23.020 – 23.041	23.06
Pinion gear bush	Diameter	22.979 – 23.000	22.97
	Bore	20.000 – 20.021	22.03
Idle gear bore		20.020 – 20.041	22.06
Idle gear bush	Diameter	19.979 – 20.000	19.96
	Bore	16.800 – 16.818	16.79
Counter shaft diameter (at idle gear)		16.766 – 16.784	16.75

Torque setting

Clutch centre nut	74Nm (7.5kgfm)
Shift drum centre pin	22Nm (2.2kgfm) screw locking agent
Primary gear bolt	78Nm (8.0kgfm)

Special tools

Clutch centre holder	07724-0050002

Troubleshooting

Heavy lever
- Damaged clutch cable
- Damaged clutch lifter mechanism
- Damaged clutch lifter plate bearing
- Incorrect clutch cable routing

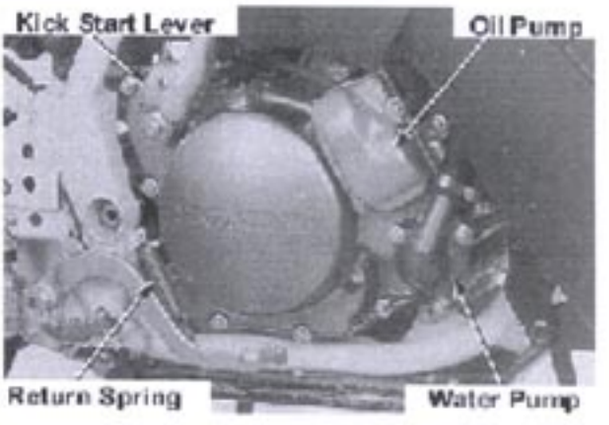
Unable to disengage the clutch
- Excessive clutch lever free play
- Clutch plate bend/strain
- Loose clutch centre lock nut
- Excessive transmission oil
- Too viscous transmission oil

Clutch slips while accelerating
- Stuck clutch lifter mechanism
- Worn clutch disc
- Deformed clutch spring
- Too little clutch lever free play

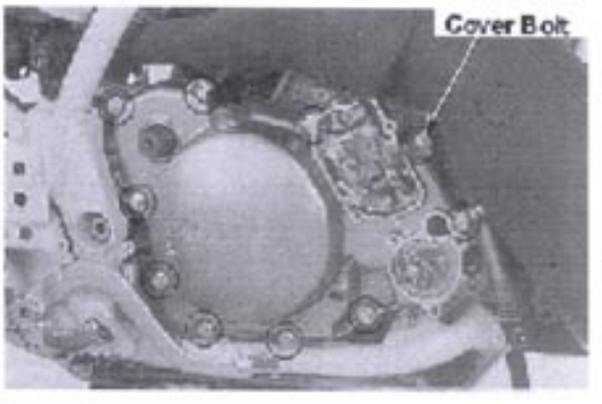
Difficult to set the gear
- Improper clutch lever free play
- Damaged/bent shift fork
- Bent shift fork shaft
- Transmission fault

Gear disengages while driving
- Damaged/bent shift fork
- Bent shift fork shaft
- Damaged shift drum stopper
- Transmission fault

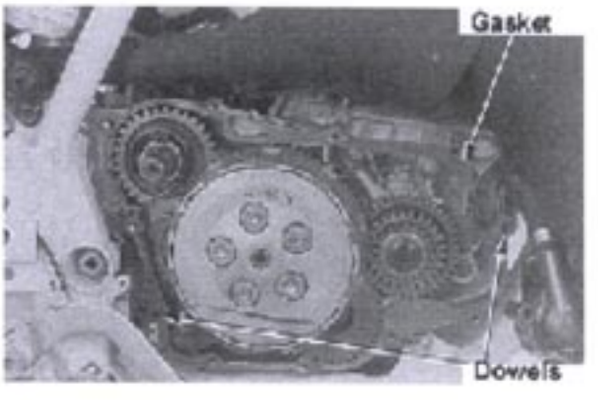
Right crankcase cover removal
Drain engine oil (4-7).
Drain coolant (5-4).
Disconnect oil pump control cable and engine oil tube (4-2).
Drain transmission oil (3-14).
Remove brake pedal return spring.
Remove kick starter pedal.



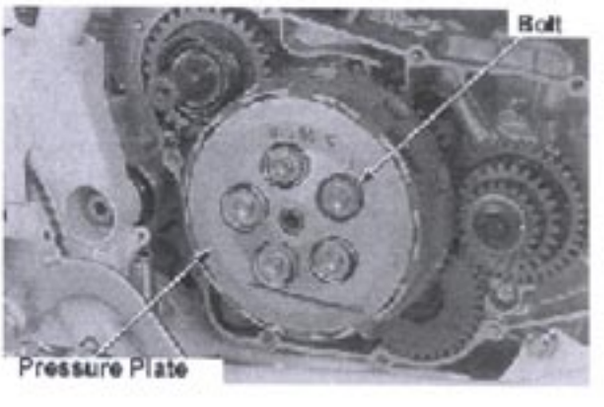
Remove right crankcase cover bolts to remove the cover.



Remove gasket and dowels.

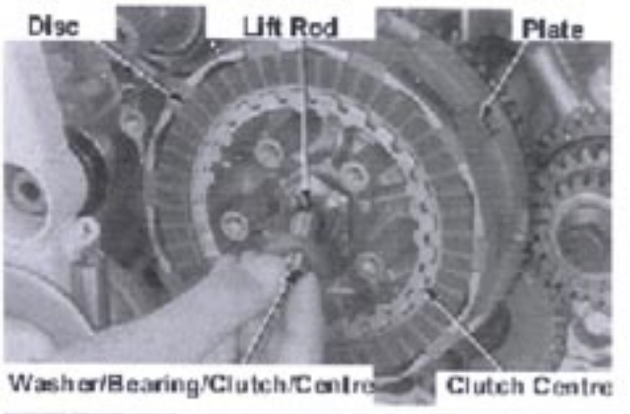


Clutch removal and inspection
Remove the right crankcase cover (see above).
Remove clutch spring bolts and remove the clutch pressure plate and clutch spring.

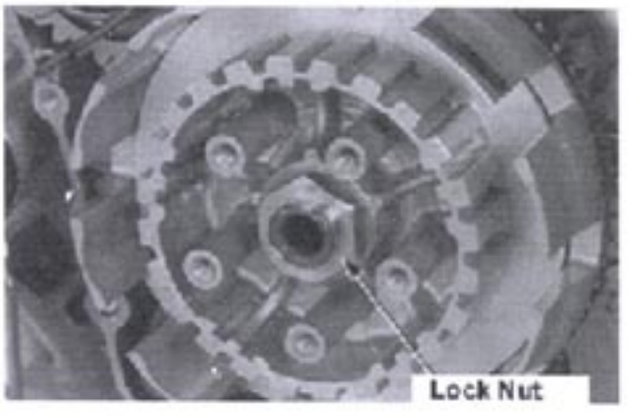


Notes
Loosen the clutch spring bolts in crisscross pattern in several stages.

Remove the following parts:
- Washer/needle bearing
- Clutch lifter piece
- Clutch friction disc (seven)
- Clutch plate (six)
- Judder spring
- Judder spring seat
- Clutch lifter rod

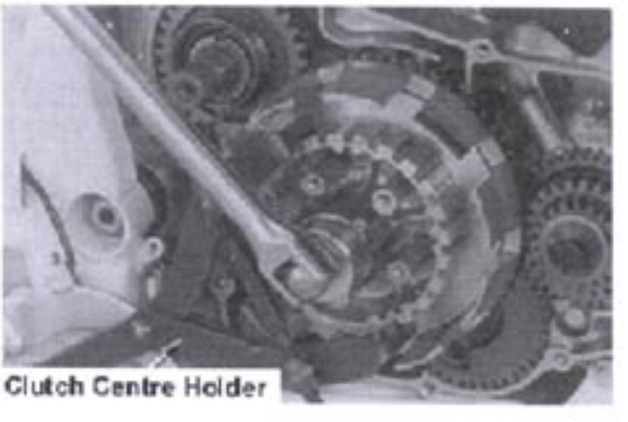


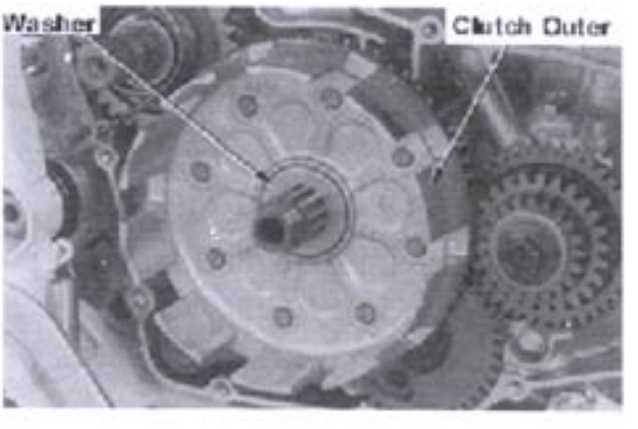
Unstake the clutch centre lock. Do not damage the main shaft.



Hold the clutch centre with the clutch centre holder and loosen the clutch centre lock nut to remove the thrust washer and the clutch centre.

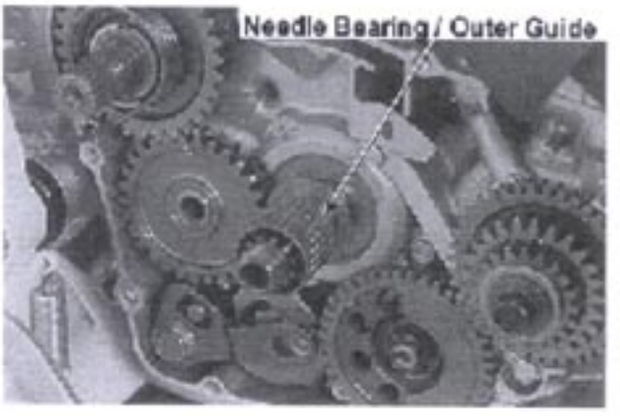
Special tool :
Clutch centre holder 07724-0050002



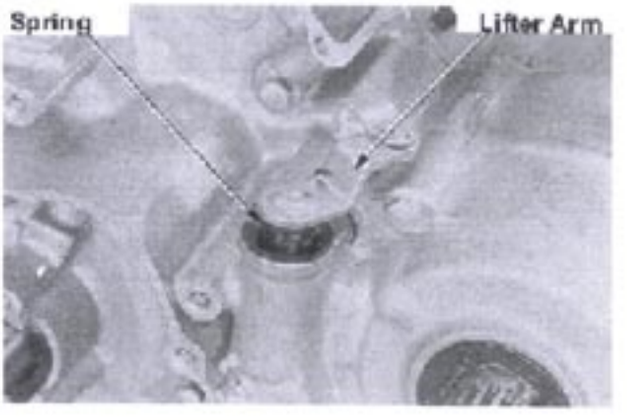


Remove the thrust washer and the clutch outer.

Remove the needle bearing and the clutch outer guide.

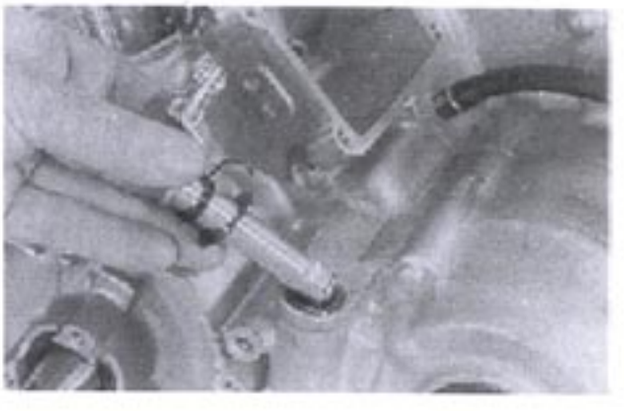


Clutch lifter arm removal/installation
Disconnect the clutch cable from the lifter arm.
Remove the clutch lifter arm and the spring.



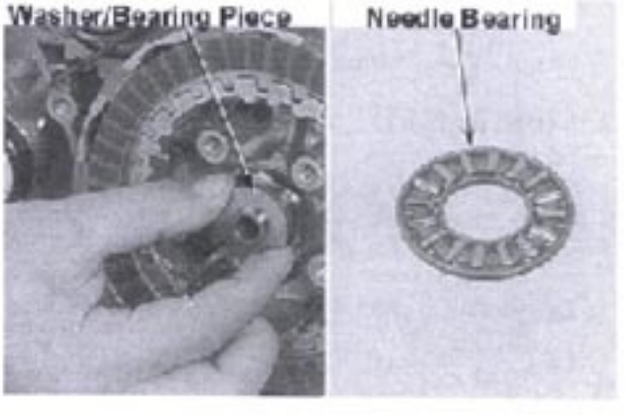
Damaged oil seal – Replace
Loose fitting/damaged needle bearing – Replace

- **Notes**
- **When replacing the oil seal, press the new seal to the edge of the case.**
- **When installing the clutch lifter arm, set the clutch lifter rod to the lifter cam groove.**

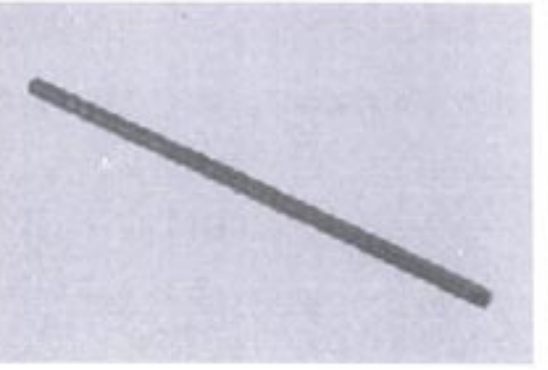


Clutch inspection

Lifter piece and needle bearing inspection
Rotate the bearing with a finger. If the fitting is loose, replace the bearing.



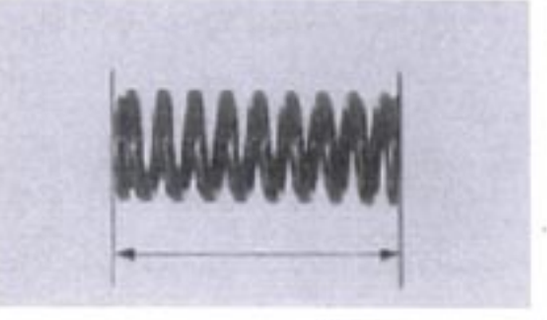
Clutch lifter rod inspection
Bent/damaged lifter rod – Replace



Clutch spring inspection
Measure the spring relaxed length

Service limit : Replace if 44.7mm or less

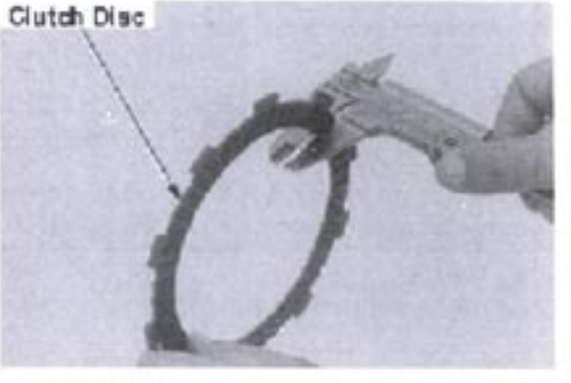
Note	Replace all springs at the same time.



Clutch disc inspection
Replace the disc if there is any damage or color change.
Measure the disc thickness:

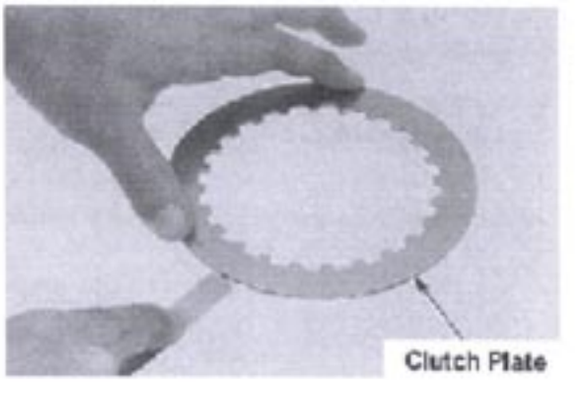
Service limit : Replace if 2.9mm or less

Note	Replace both disc and plate at the same time.

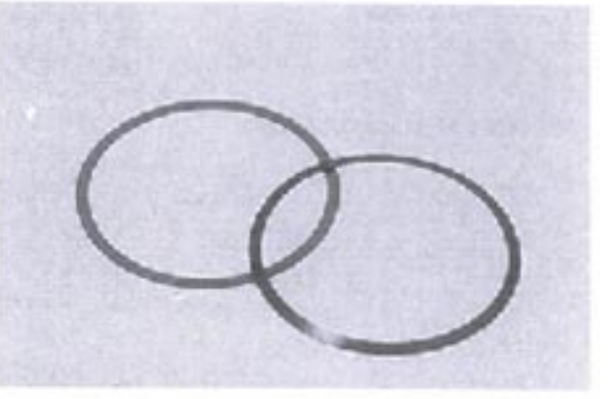


Clutch plate inspection
Measure the plate warpage on a flat surface with a thickness gauge.

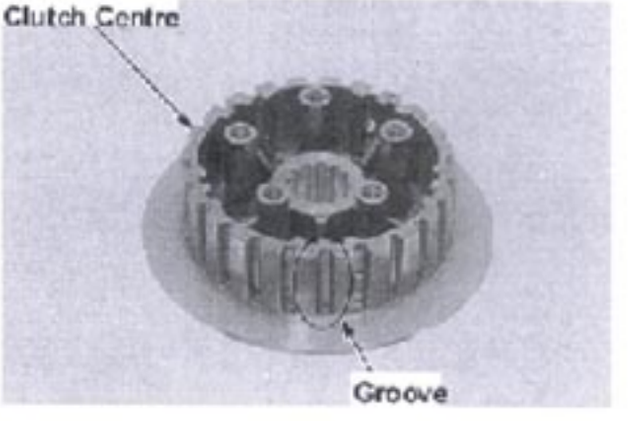
Service limit : Replace if 0.2mm or above



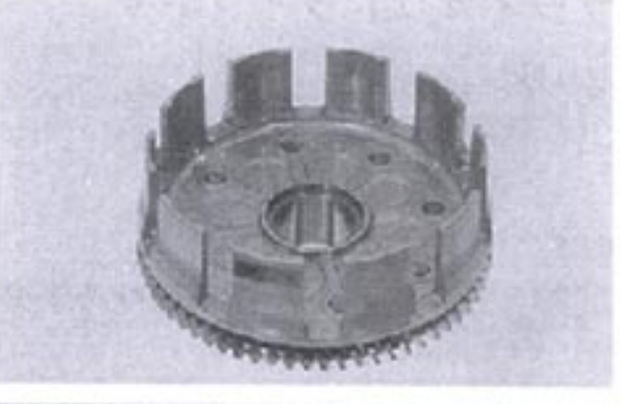
Judder spring and judder spring seat inspection
Inspect the spring and seat for deformation and damage.



Clutch centre inspection
Inspect the clutch centre for step wear, damage, and crack.

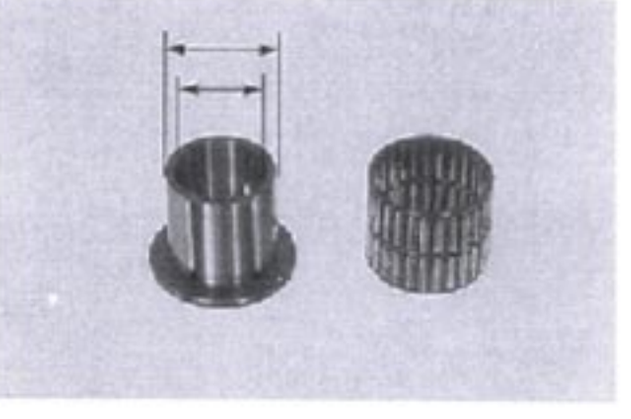


Clutch outer and clutch outer guide inspection
Inspect the clutch outer groove for scratch, crack, or step wear by the disc.



Inspect the clutch outer guide for step wear and inspect the needle bearing for damage.
Measure the outside and internal diameter of the clutch outer guide.

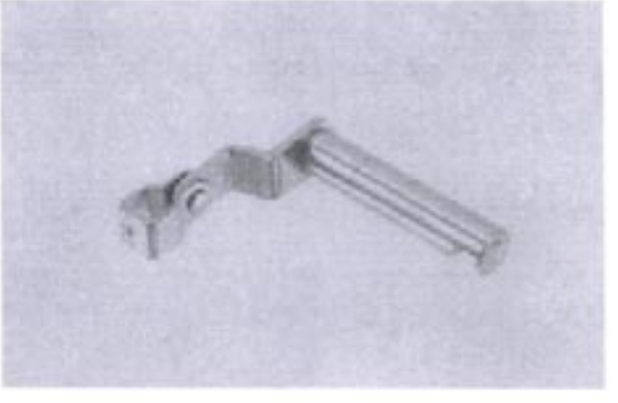
Service limit : I.D:
Replace if 23.03mm or above
O.D: Replace if 27.97mm or less



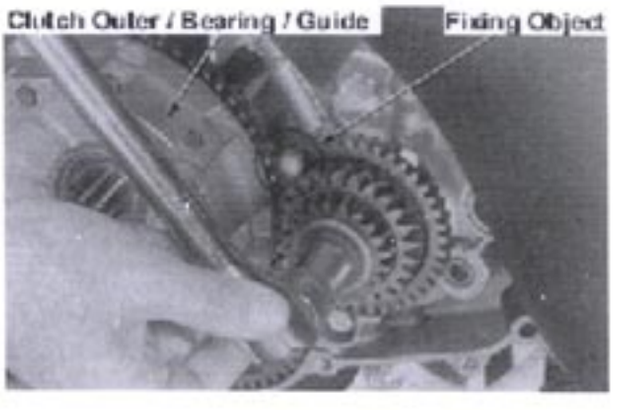
Main shaft inspection
Measure the main shaft clutch outer guide diameter.

Service limit : Replace if 22.94mm or less

Damaged clutch lifter arm – Replace
Apply grease to the clutch lifter arm shaft.

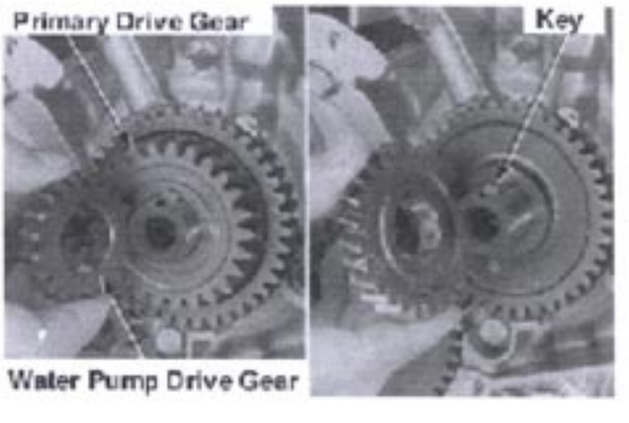


Primary drive gear
Removal
Remove the clutch (9-3).
Temporally install the clutch outer guide, the needle bearing, and the clutch outer to the main shaft.

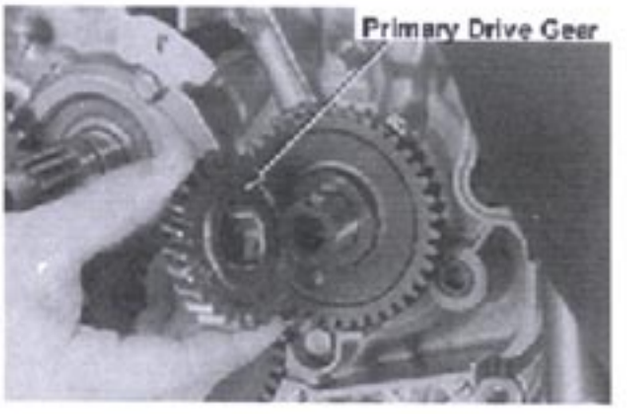


Notes
Insert a piece of wood or a soft piece of metal (brass tube, aluminium pipe, etc) into the gap between the primary drive gear and the clutch outer (as shown in the figure) to fix the gear.

Remove the following parts:
- Water pump drive gear
- Primary drive gear
- Key



Installation
Set the cutout of the primary drive gear to the crankshaft key to assemble.



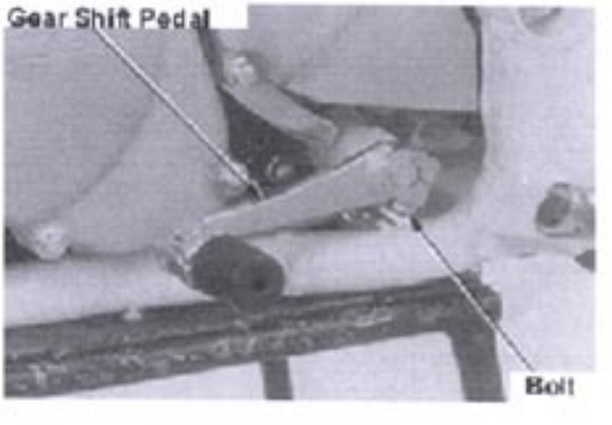
Set the water pump drive gear in a similar manner.

Apply transmission oil to the seat of the washer.

Secure the primary gear bolt.
Torque setting : 78Nm (8.0kgfm)

Notes
Insert a piece of wood or a soft piece of metal (brass tube, aluminium pipe, etc) into the gap between the balancer drive gear and the balancer driven gear (as shown in the figure) to fix the gear.

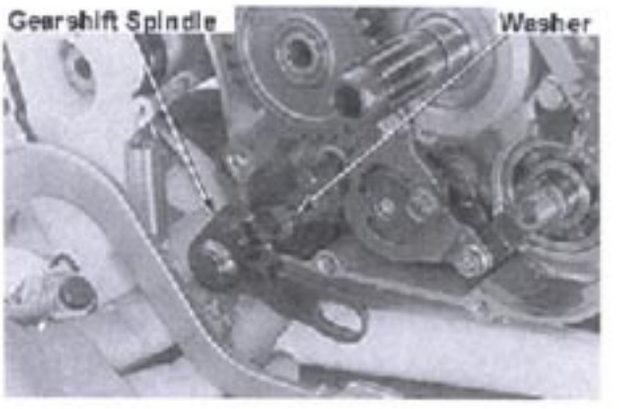
Install the clutch (9-17).



Gear shift linkage

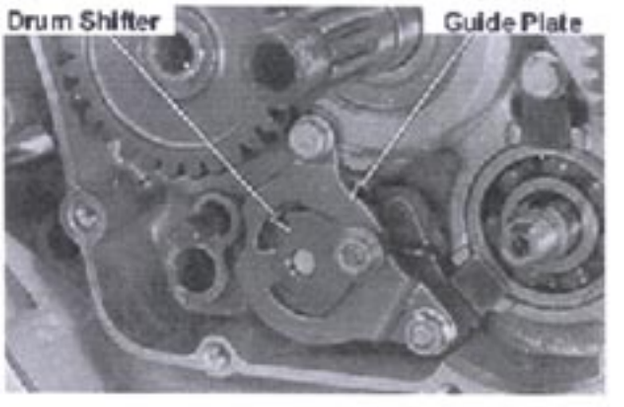
Removal
Remove the clutch (9-3).
Set the transmission neutral.
Remove the gear shift pedal.

Remove the gearshift spindle and washer.

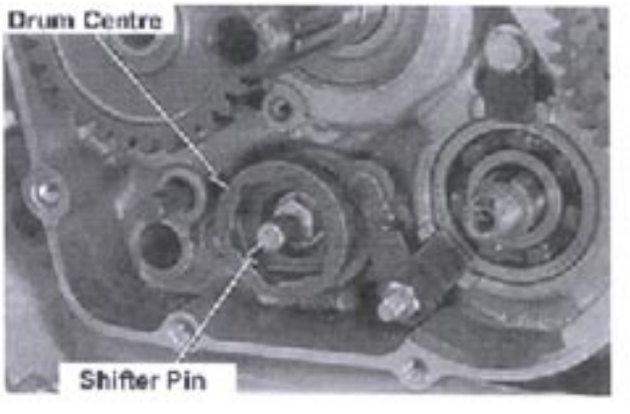


Remove bolts and nuts to remove the drum shifter together with the guide plate.
Hold two ratchet pawls with fingers to prevent popping out and separate the guide plate and the drum shifter.

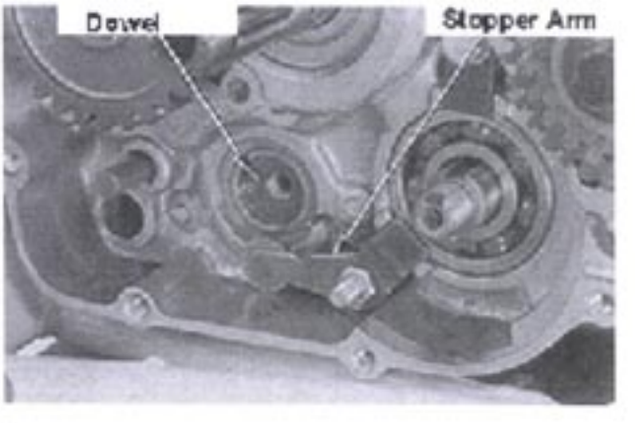
Notes
Exercise caution when handling the ratchet pawls, pole plunger, or spring to prevent them popping out.



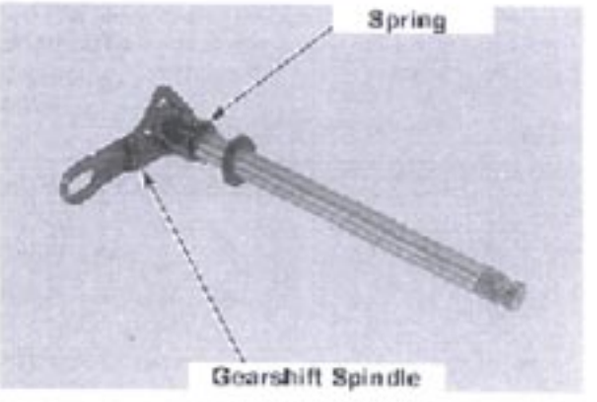
Remove the shifter pin.
Remove the drum centre.



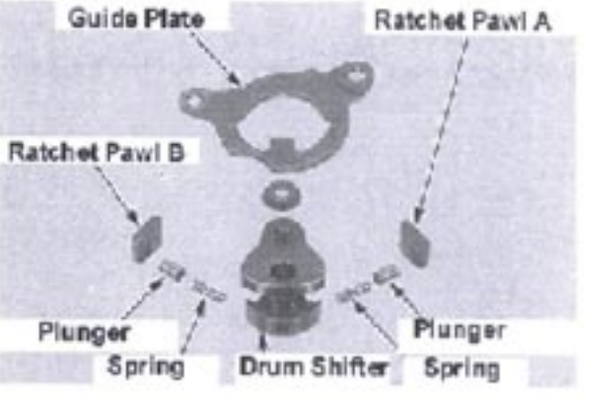
Remove the stopper arm, spring, dowel, and the washer.



Gear shift spindle inspection
Inspect the gearshift spindle for wear, bending, and damage.
Inspect the spring for deformation and damage.

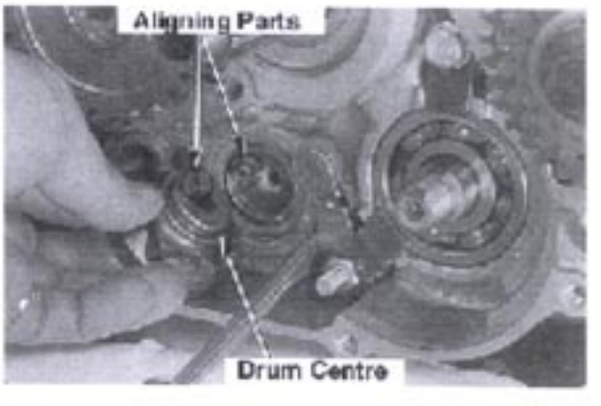


Drum shifter assembly
Clean the drum shifter, pole plunger, ratchet pawl A/B, and springs with transmission oil.



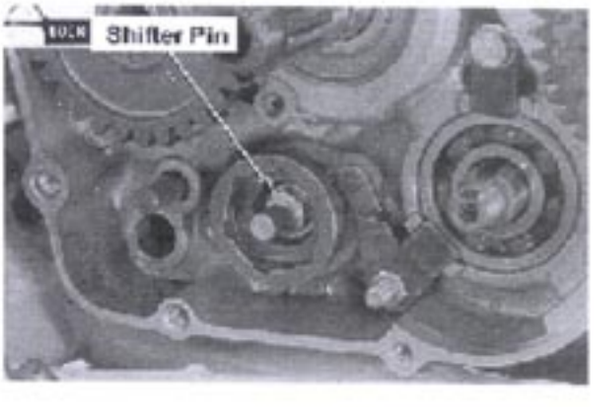
Installation
Install the following parts:
- Dowel
- Stopper arm
- Spring
- Bolt

Install the drum centre by setting its cut-out to the knock pin.



Notes
Hold the stopper arm with a flathead screwdriver as shown in the figure when installing the drum centre.

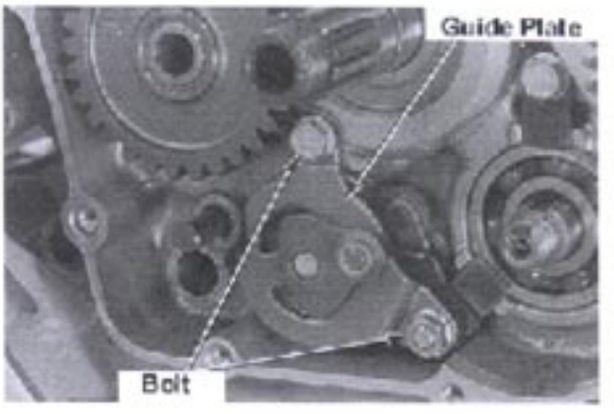
Apply screw locking agent to the shifter pin thread and secure it.



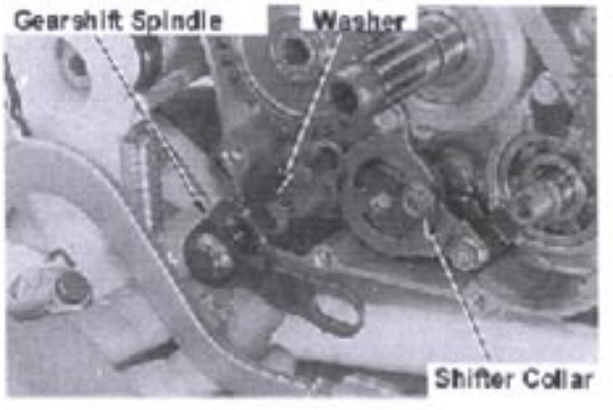
Torque setting : 22Nm (2.2kgfm)

Turn the shift drum to set the gear to other than neutral. Install the guide plate and ratchet pawls to the centre drum.
Secure guide plate bolts/nuts.

Notes
Hold the ratchet pawls with fingers when installing.

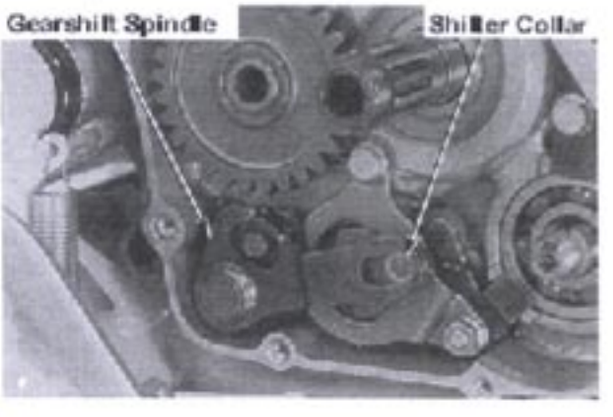


Install washers to the gearshift spindle.
Align the return spring end with the pin bolt and the shift arm hole with the shifter collar to install the gearshift spindle.

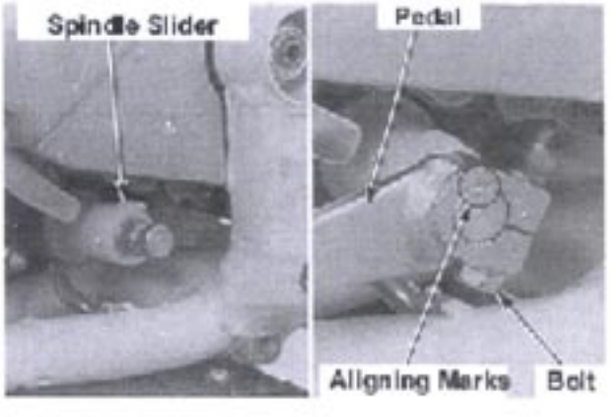


Align the shifter collar to the drum shifter projection
Install the gearshift spindle and the washer.

Notes
After installing, turn the gear shift spindle to check the linkage operation.

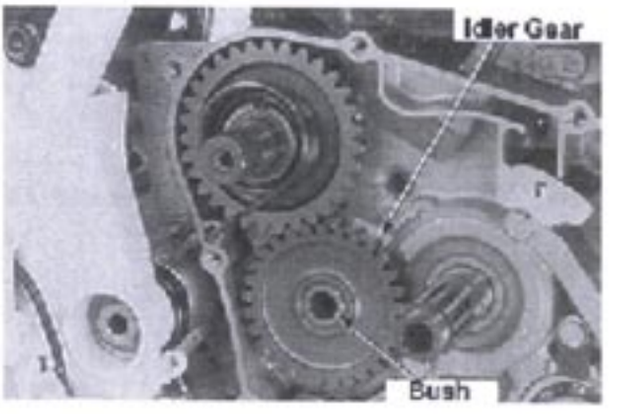


Set the change spindle slider to the gearshift spindle.
Align the cut-out with the punched mark on the gearshift spindle to install the gearshift pedal.
Secure the bolt.

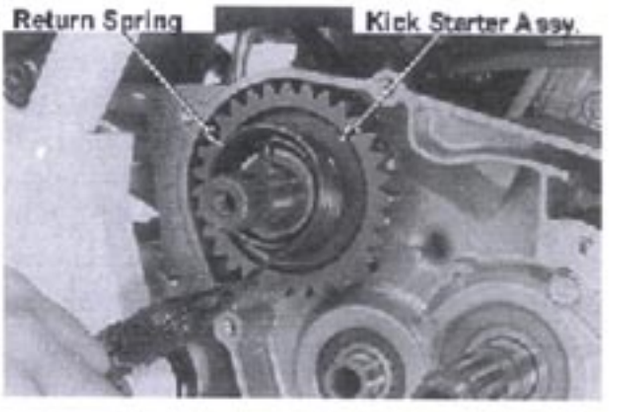


Kick starter removal/disassembly

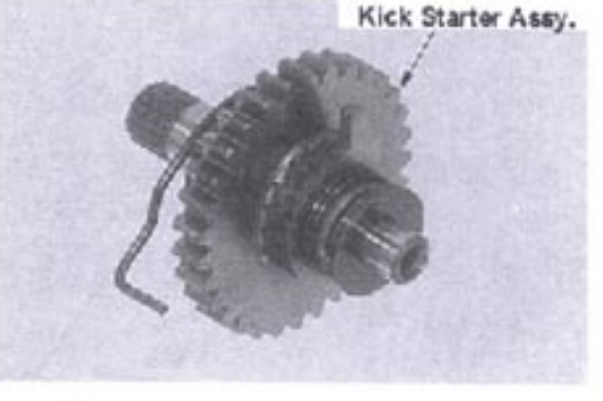
Remove the following parts:
- Clutch (9-3)
- Starter idle gear
- Idle gear bush



Disengage the return spring hook from the right crankcase.
- Kick starter Assy.

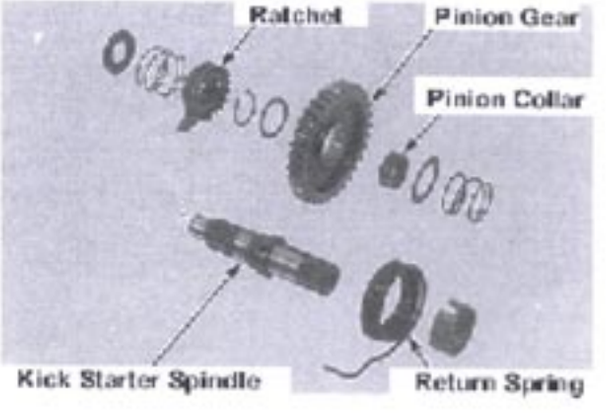


Remove the following parts from the spindle:
- Snap washer
- Ratchet spring
- Ratchet
- Snap ring
- Thrust washer
- Starter pinion gear
- Pinion collar
- Spring collar
- Return spring
- Thrust washer
- Friction spring



Kick starter inspection

Damaged return spring – Replace
Damaged starter pinion ratchet – Replace
Measure the starter pinion bore.
Service limit :
Replace if 23.06mm or above
Measure the starter spindle pinion contact area.
Service limit : Replace if 19.94mm or less
Damaged pinion collar - Replace

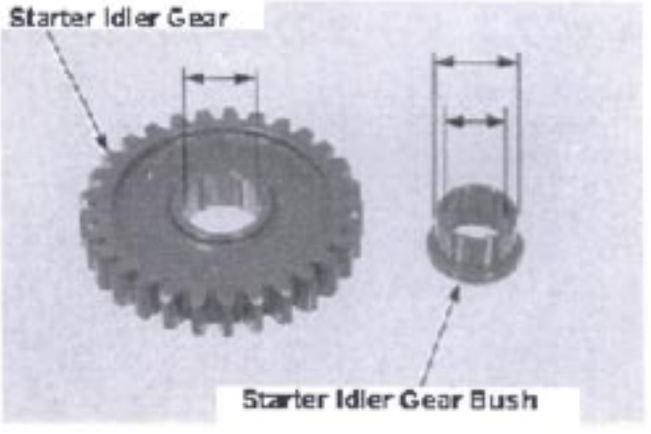


Damaged starter idle gear – Replace
Damaged starter idle gear bush – Replace
Measure the starter idle gear bore.

Service limit : Replace if 20.06mm or above

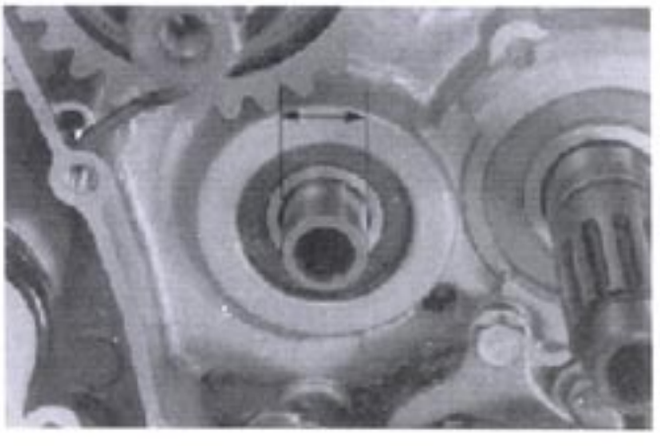
Measure the starter idle gear bush inside and outside diameter.

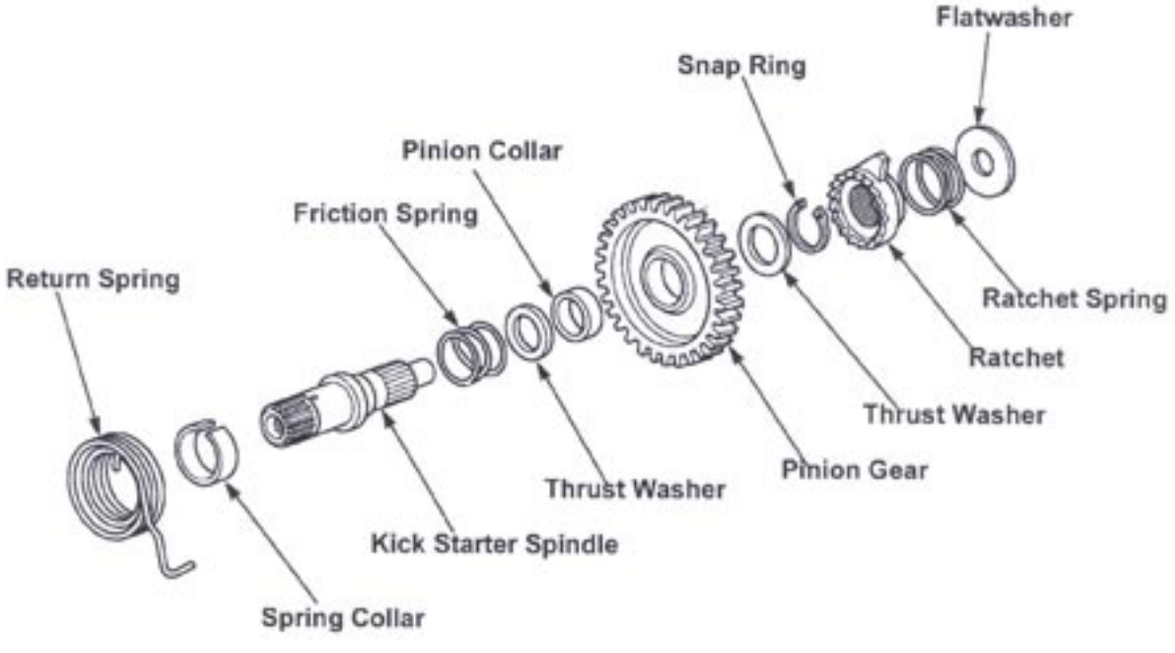
Service limit : I.D. Replace if 16.79mm or above
O.D. Replace if 19.96mm or less



Measure the diameter of the counter shaft at the starter idle gear bush contact area.

Service limit : Replace if 16.75mm or less

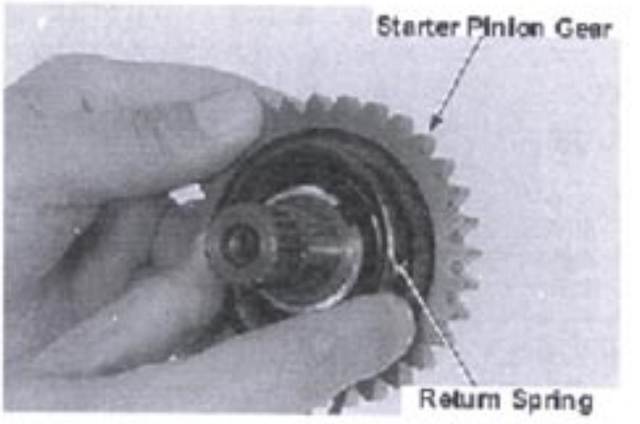




Kick starter assembly/installation

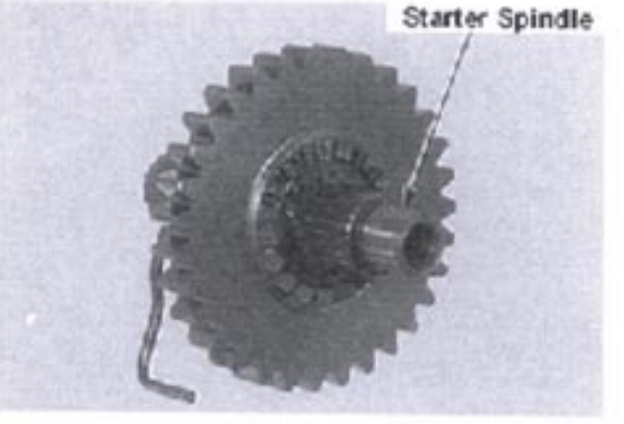
Set the following parts to the starter spindle:

- Friction spring
- Thrust washer
- Pinion collar
- Starter pinion gear
- Return spring



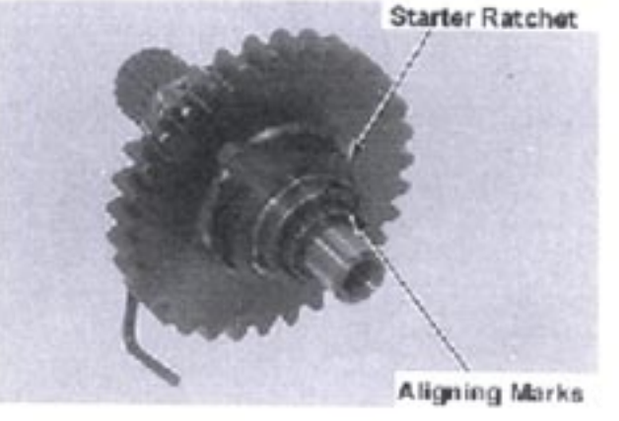
Notes
Insert the return spring hook to the spindle hole.

- Spring collar



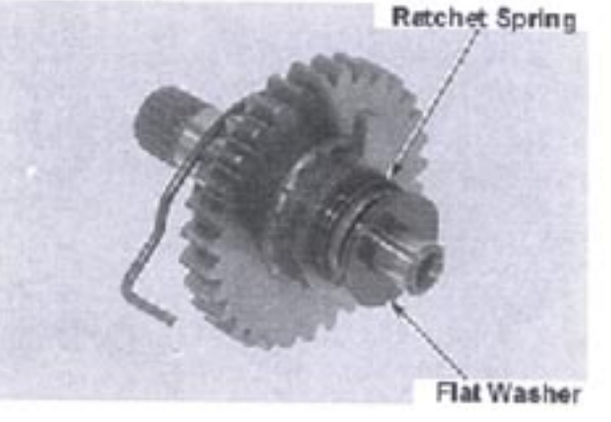
Notes
Install by aligning the collar cut-out with the return spring hook.

- Thrust washer
- Snap ring



- Starter ratchet

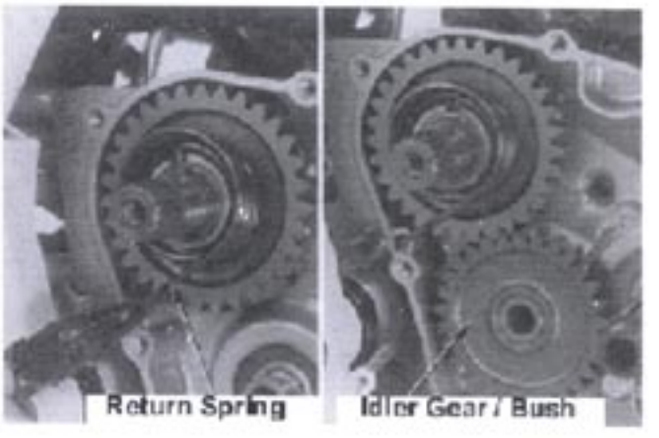
Notes
Align the marks on the spindle and the starter ratchet.



- Ratchet spring
- Snap washer

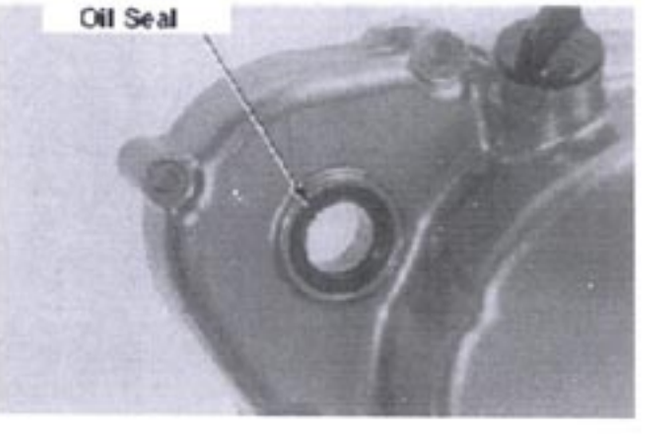
Set the kick starter Assy. to the right crankcase and the return spring hook to the right crankcase hole.

Notes
Make sure that the return spring is not on the starter spindle collar. If the spring is on the collar, unhook and adjust the spring.



Install the following parts to the counter shaft:
- Starter idle gear bush
- Starter idle gear

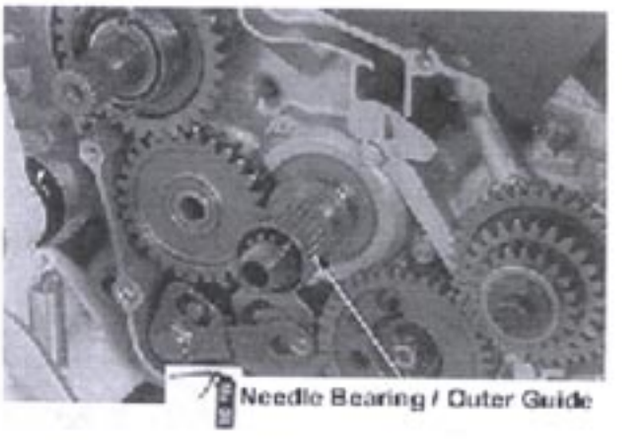
Damaged/worn starter spindle oil seal – replace



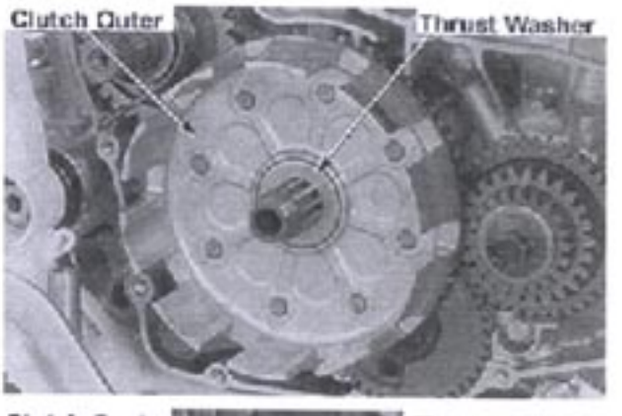
Clutch installation

Apply Molybdenum solution to the exterior surface of the clutch outer guide.
Install the clutch outer guide.
Install the following parts:

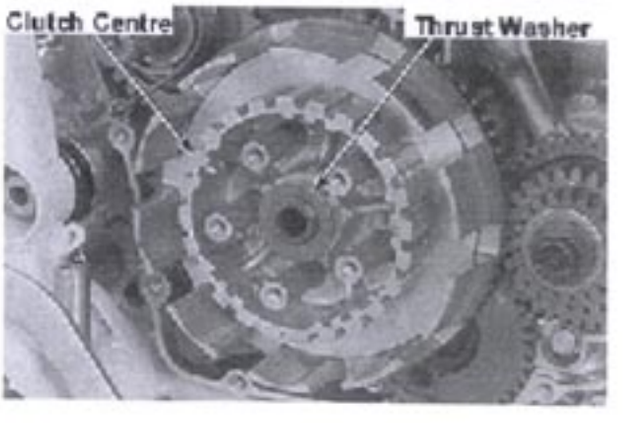
- Needle bearing



- Clutch outer
- Thrust washer

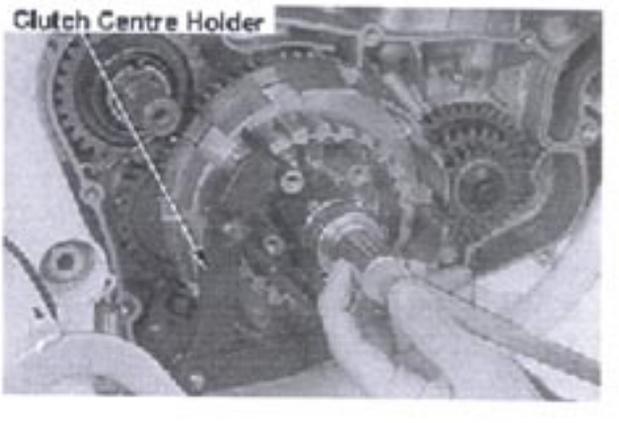


- Clutch centre
- Thrust washer

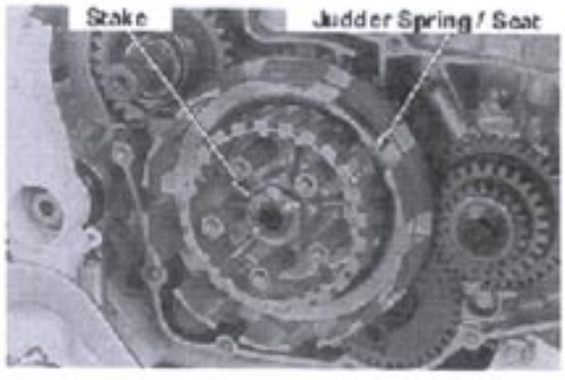


Hold the clutch centre with the clutch centre holder and secure the lock nut.

Special tool
Clutch centre holder 07724-0050002
Torque setting : 74Nm (7.5kgfm)



Stake the lock nut.

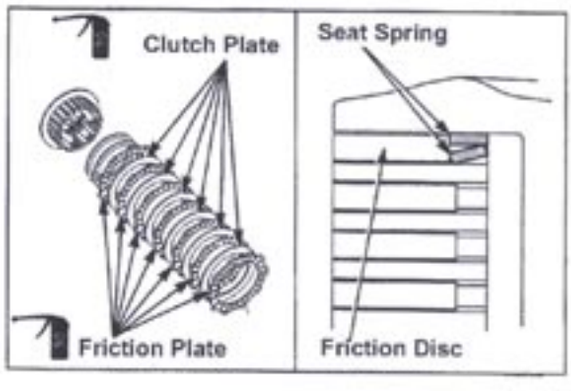


Caution

Do not damage the main shaft.

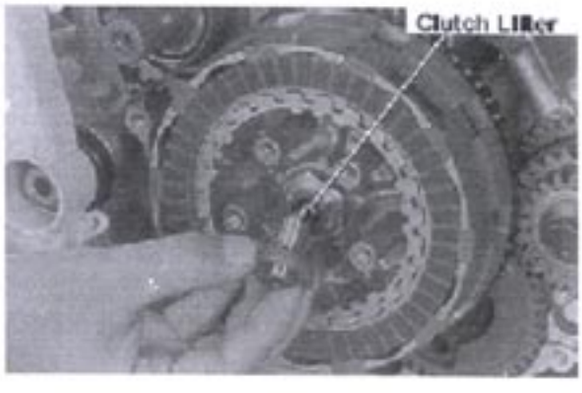
Install the judder spring seat and the judder spring.

Notes
Refer to the figure below for the judder spring installing direction.



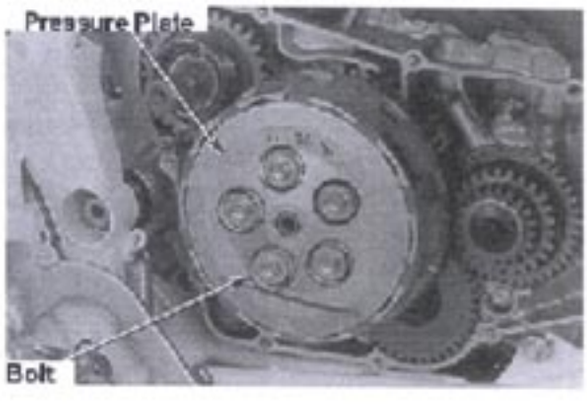
Notes
The most inner friction disc has a larger bore. This should be installed to the position shown in the figure.

Apply transmission oil to seven friction discs and six clutch plates and install them.
Apply transmission oil to the lifter thrust bearing and the lifter rod.
Install the lifter rod and the clutch lifter to the main shaft.



Install the following parts:
- Pressure plate
- Clutch spring
- Bolts

Notes
Tighten the bolts in crisscross pattern in several stages.



Install the following parts:
- Right crankcase cover (9-19)

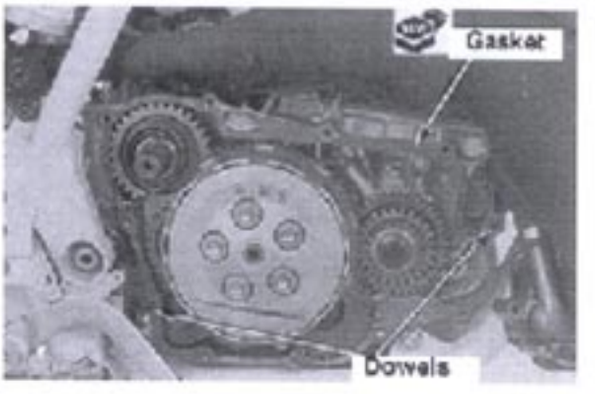
After installing, inspect/adjust the following items:
- Filling coolant (5-4)
- Filling transmission oil (3-8)
- Clutch lever free play (3-7)

Right crankcase cover installation
Install the clutch (9-17).
Install dowels and a new gasket.

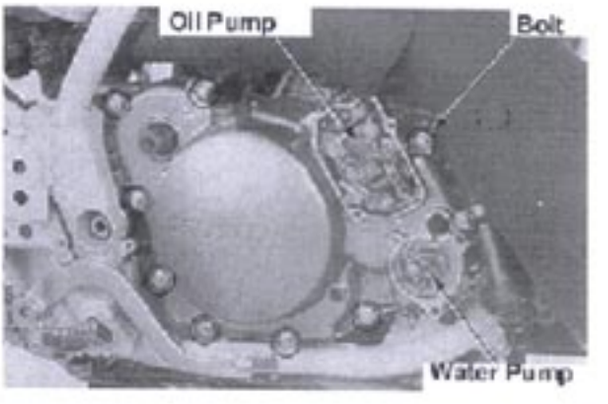
Notes

Check that the kick starter spindle is installed.

Install the right crankcase cover and secure bolts.

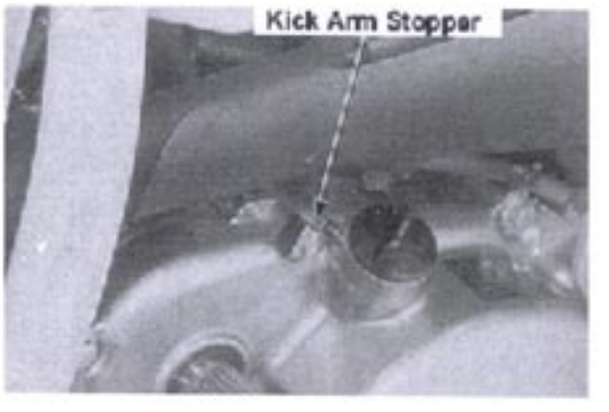


Notes
- **Temporally install the kick starter pedal.**
- **Slowly move the kick pedal to check the matching of water pump drive gear, the oil pump drive gear, and the primary drive. Then install the cover.**



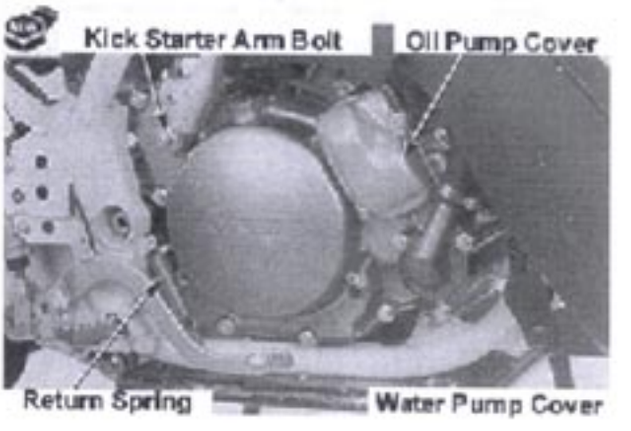
Install the following parts:
- Oil pump
- Water pump cover

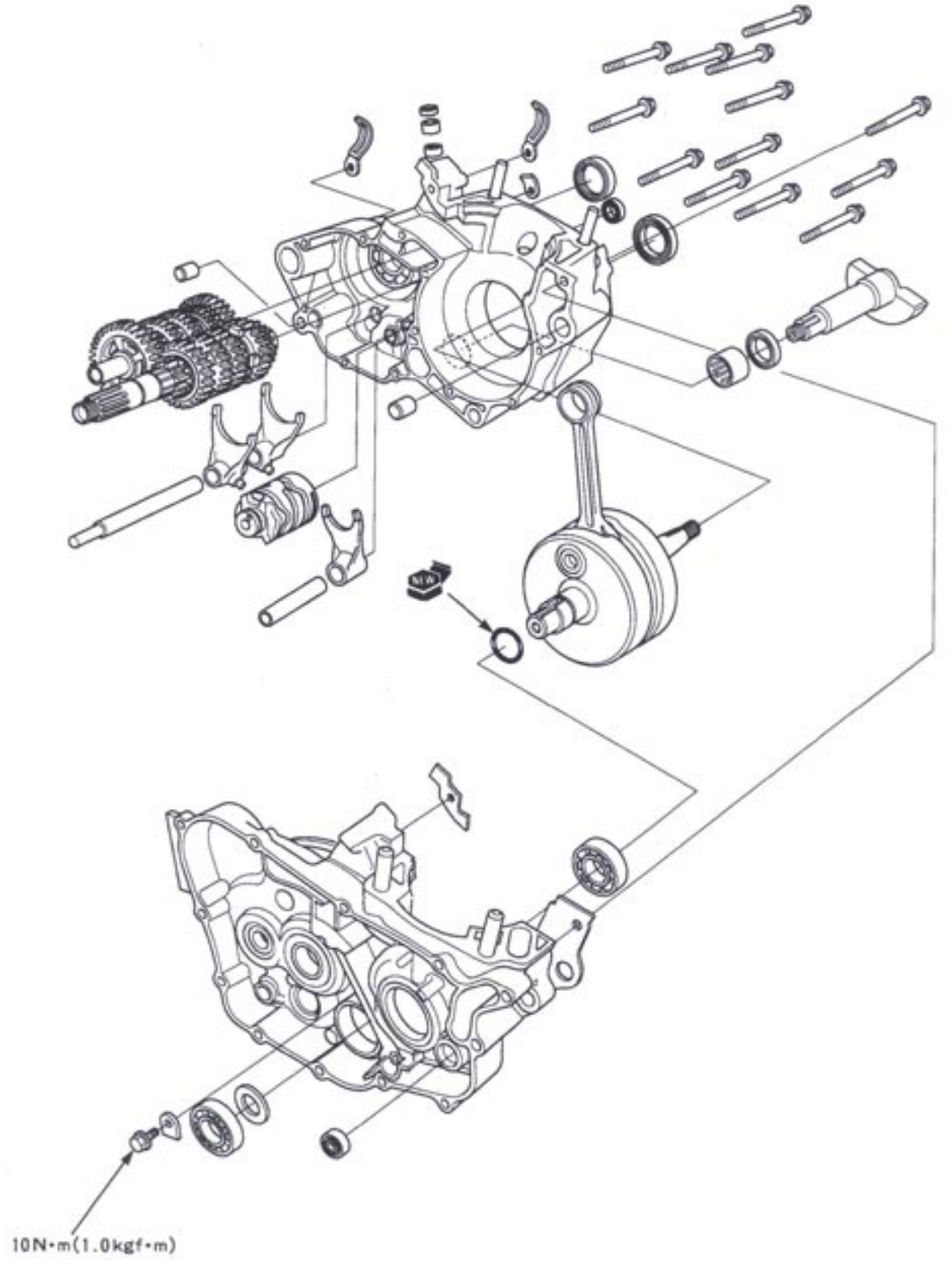
Notes
Set the kick arm stopper as shown in the figure.



Fit a new kick starter arm bolt.
Torque setting : 38Nm (3.8kgfm)
Fill coolant (5-4).
Fill transmission oil (3-8).
After filling, check/adjust the clutch lever free play (3-7).

Start the engine and check the following items:
- Coolant leak
- Oil leak
- Kick starter operation




10N·m(1.0kgf·m)

10. Crankshaft, Transmission & Balancer

General

- This section describes the crankcase separation procedure for the purpose of servicing the crankshaft and other relevant area.
- The following works are required before conducting the work described in this section:
  - Oil pump (Sec.4)
  - Carburettor (Sec.5)
  - Engine (Sec.6)
  - Cylinder head, cylinder, and piston (sec.8)
  - Clutch and gear shift linkage (Sec.9)
  - Alternator (Sec.14)
- When assembling the crankcase and the crankshaft, place the special tool to the inner race of the crankshaft bearing and pull the crankshaft. In order to do this, remove bearings on the crankshaft when disassembling and install new bearings to the case.
- After assembly, check the smooth operation of the crankshaft.

Specification

Item		Specification	Service limit
Crankshaft Con-rod big end Side clearance		0.400 – 0.800	0.85
Radial clearance		-	0.05
Runout		-	0.10
Transmission Gear I.D.	M5, M6	25.020 – 25.041	25.08
	C1	23.020 – 23.041	23.08
	C2	30.020 – 30.041	30.08
	C3, C4	28.020 – 28.041	25.07
Bush I.D	M6	22.000 – 22.021	22.06
	C1	20.000 – 20.021	20.06
	C2	27.000 – 27.021	27.06
	C3	25.000 – 25.021	25.06
Bush O.D.	M5, M6	24.979 – 25.000	24.94
	C1	22.979 – 23.000	22.94
	C2	29.979 – 30.000	29.94
	C3, C4	27.979 – 28.000	27.94
Main shaft O.D.	(M6)	21.959 – 21.980	21.92
Counter shaft O.D.	C1	19.959 – 19.980	19.92
	C2	26.959 – 26.980	26.92
	C3, C4	24.959 – 24.980	24.92

10. Crankshaft, Transmission & Balancer

Specification

Item		Specification	Service limit
Transmission Gear-bush clearance	M5, M6	0.020 – 0.061	0.10
	C1, C2, C3	0.020 – 0.062	0.10
Bush-shaft clearance	M6	0.020 – 0.061	0.10
	C1, C2, C3	0.020 – 0.062	0.10
Shift fork bore		12.041 – 12.056	12.08
Shift fork shaft diameter		11.983 – 11.994	11.95
Shift fork end thickness		4.930 – 5.000	4.50
Shift drum diameter (Right case axle)		19.959 – 19.980	19.90

Torque settings:

Primary drive gear bolt	78Nm (8.0kgfm)
Balancer driven gear nut	54Nm (5.5kgfm)

Special tools:

Bearing remover 17mm	07936-3710300
Remover handle	07936-3710100
Remover weight	07741-0010201
Bearing remover set 25mm	07936-ZV10000
Bearing remover 25mm	07936-ZV10100
Remover weight	07741-0010201
Bearing remover set 12mm	07936-1660001
Bearing remover 12mm	07936-1660110
Remover weight	07741-0010201
Driver handle A	07749-0010000
Outer driver 32x25mm	07746-0010100
Pilot 25mm	07746-0040600
Universal bearing puller	07631-0010000
Driver handle A	07749-0010000
Outer driver 62x68mm	07746-0010500
Pilot 28mm	077746-0040600
Crankcase assembly tool set	07965-1660102
Assembly shaft	07965-1660200
Assembly collar	079651660302

Troubleshooting

Difficult to select a gear
- Excessive clutch free play
- Bent shift fork
- Bent shift fork shaft
- Damaged gear shift spindle
- Damaged shift drum guide groove
- Damaged shift drum guide pin

Engine noise
- Bent connecting rod
- Damaged crankshaft main bearing
- Worn transmission gear

Gear disengages
- Bent/worn shift fork
- Bent shift fork shaft
- Worn gear dock
- Damaged shift drum cam groove
- Damaged gear shift linkage return spring
- Deformed stopper arm spring

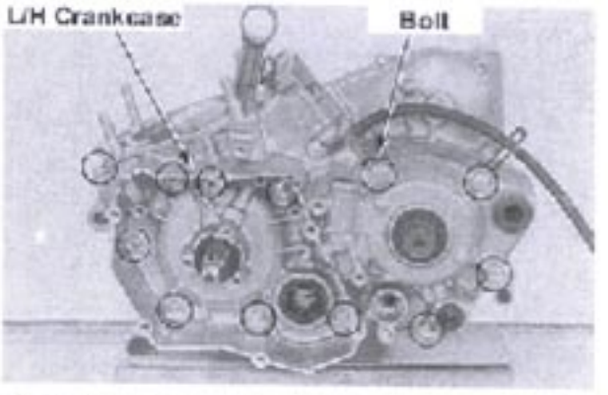
Crankcase separation

Remove the engine from the frame (7-0, 7-2)
Remove the following parts from the engine:

- Cylinder head (8-3)
- Cylinder (8-6)
- Piston (8-7)
- Alternator (14-7) / Change switch (17-11)
- Clutch (9-3)
- Primary gear (9-8)
- Balancer (10-16)
- Gear shift linkage (9-8)
- Kick starter

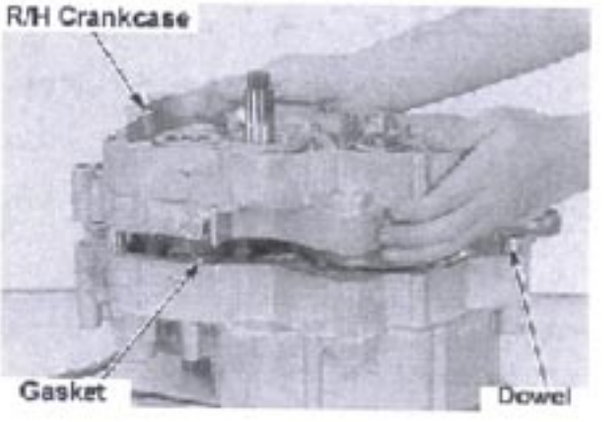
Remove the washer and drive sprocket.
Remove crankcase bolts.

Notes
Loosen the bolts in crisscross pattern in several stages.



Separate the crankcase.

Notes
Place the left side down and remove the right side. The crankshaft should remain on the left side.

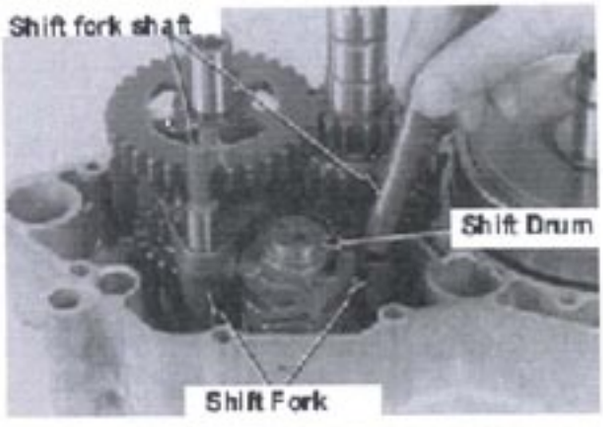


Remove the gasket and dowel.

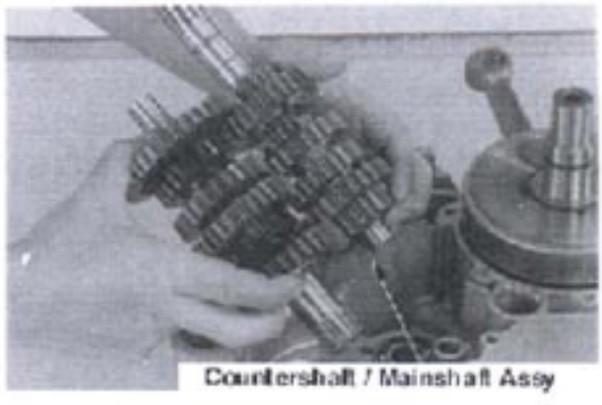
Transmission removal/disassembly

Separate the crankcase (see above).

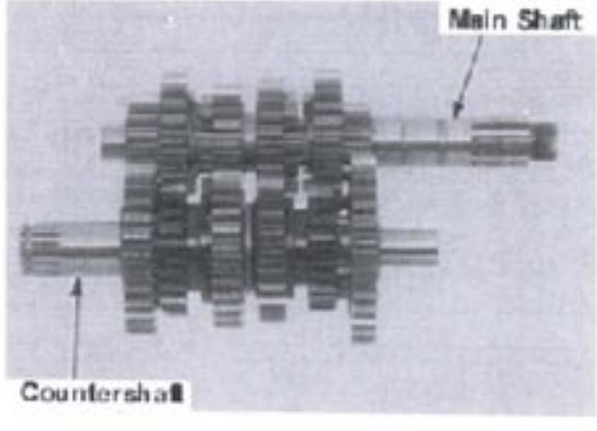
Remove the following parts from the crankcase:
- Shift fork shaft
- Shift fork
- Shift drum



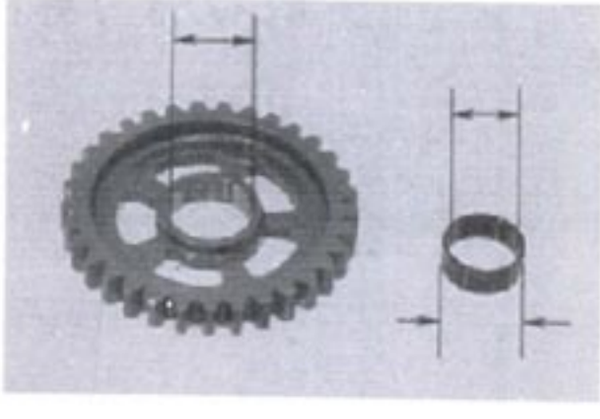
Remove the counter shaft/main shaft Assy. from the right crankcase.



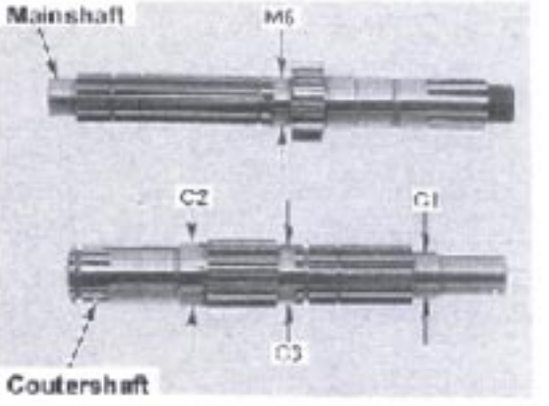
Transmission inspection
- Unequal wear or damage on gear teeth, dogs, shift fork groove, and bore – Replace
- Unequal wear or damage on main shaft, counter shaft gear, bush contact area, or splines – Replace
- Unequal wear or burn on bush, spline bush – Replace



Measure the inside diameter of the following gears: **Service limit :**
M5, M6 : 25.08mm or above – Replace
C1 : 23.08mm or above
C2 : 30.08mm or above
C3, C4 : 25.07mm or above
Measure the following bush inside and outside diameter:
Service limit : Inside diameter :
M6 : 22.06mm or above – Replace
C1 : 20.06mm or above
C2 : 27.06mm or above
C3 : 25.06mm or above
Outside diameter : M5,M6: 24.94mm or less
C1 : 22.94mm or less
C2 : 29.94mm or less
C3,C4 : 25.06mm or less

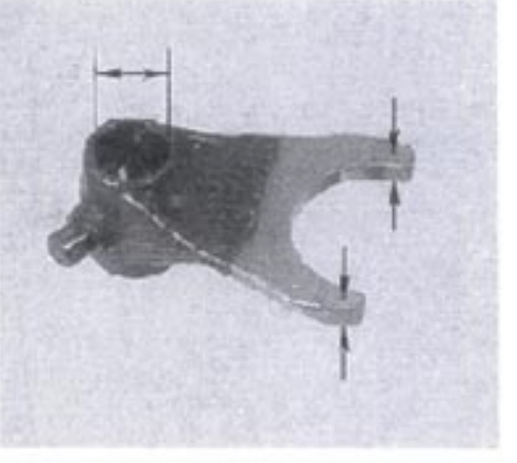


Measure the shaft outside diameter:
Service limit :M6 : 21.92mm or less – Replace
C3,C4 : 24.92mm or less
C1 bush : 19.92mm or less
C2 bush : 26.92mm or less



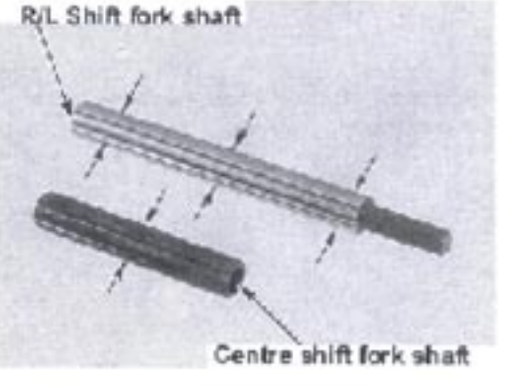
Bent/damaged shift fork – Replace

Measure the shift fork inside diameter and the end thickness.
Service limit : End thickness
4.5mm or less – Replace
Inside diameter
12.08mm or above - Replace

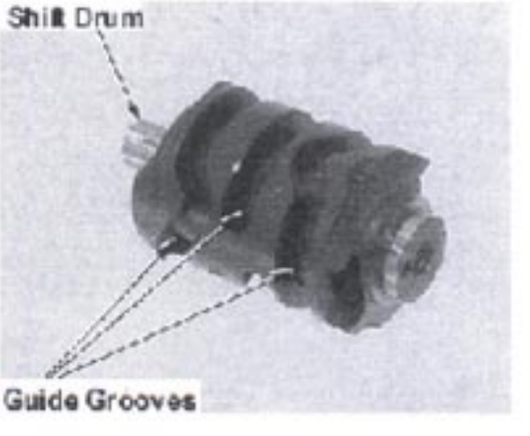


Bent/damaged shift fork shaft – Replace

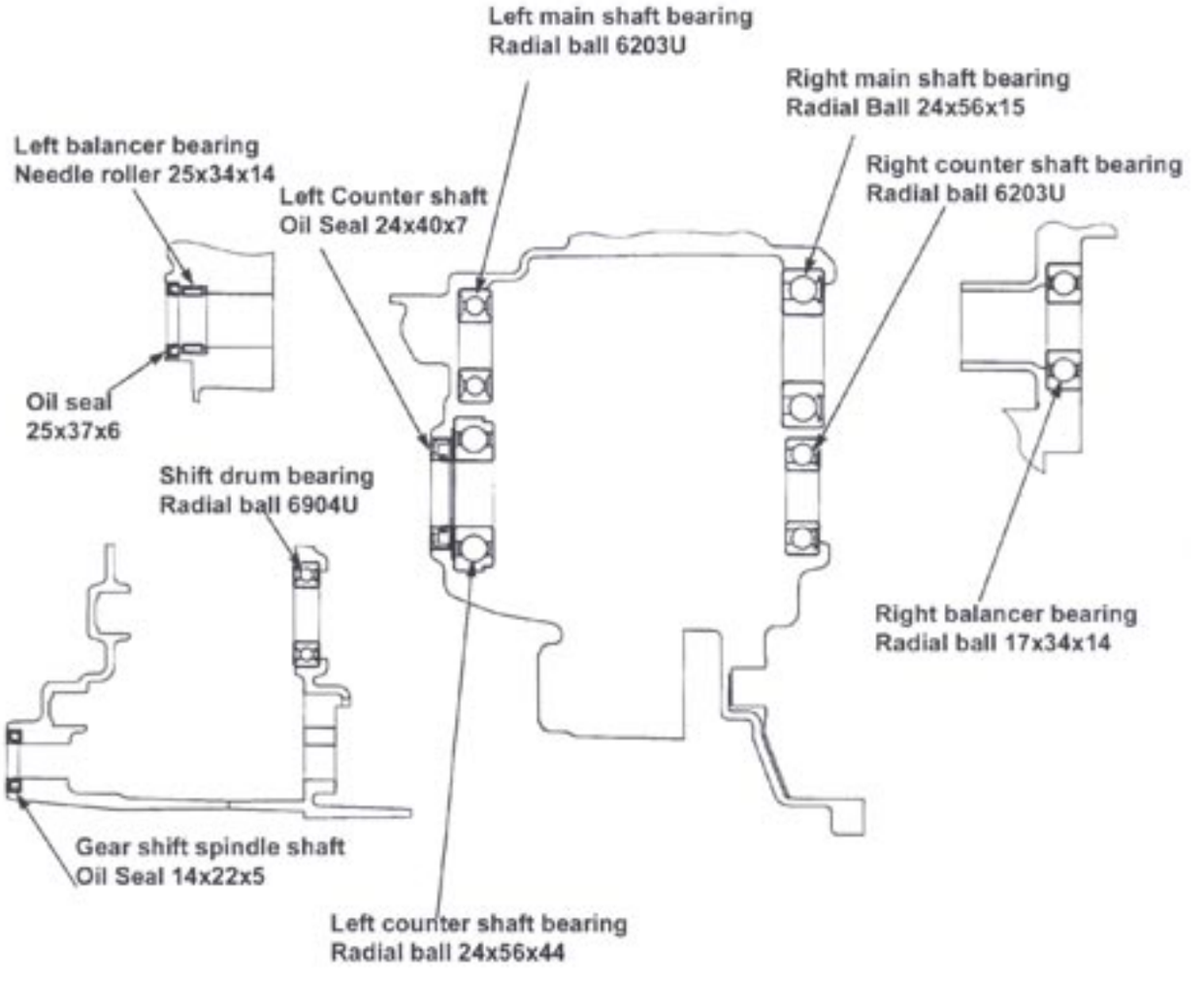
Measure the shift fork shaft outside diameter.
Service limit : Shift fork shaft :
11.95mm or less – Replace



Damaged/unequally worn shift drum guide groove - Replace

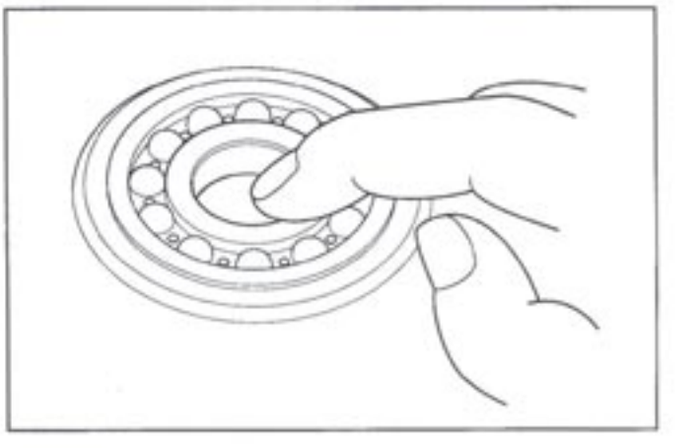


Crankcase bearing and oil seal layout



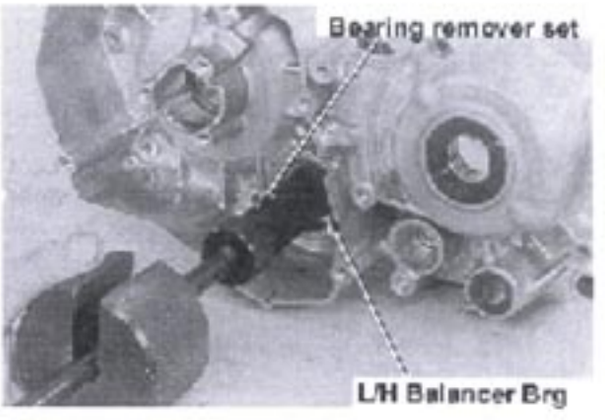
Transmission bearing inspection/replacement

Transmission bearing inspection/replacement
Turn the inner race with a finger to check its smooth rotation.
If it is not smooth or there is loose fitting or damage, replace the bearing.



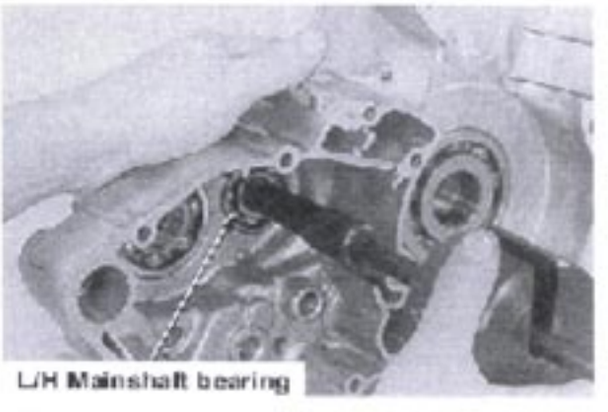
Left crankcase
Remove defective bearings from the left crankcase.
Remove the left balancer bearing and left main shaft bearing with the following tools:
Special Tools :
Left balancer bearing :

Bearing remover set 25mm	07936-ZV10000
Bearing remover 25mm	07936-ZV10100
Remover weight	07741-0010201



Left main shaft bearing :

Bearing remover 17mm	07936-3710300
Remover handle	07936-3710100
Remover weight	07741-0010201



Install new bearings to the left crankcase with driver handle A (07749-0010000) and the following tools:

Notes	Install the bearings squarely.

■ **Left balancer bearing :**
Special tool :

Outer driver 37x40mm	07746-0010200

■ **Left main shaft bearing :**
Special tools :

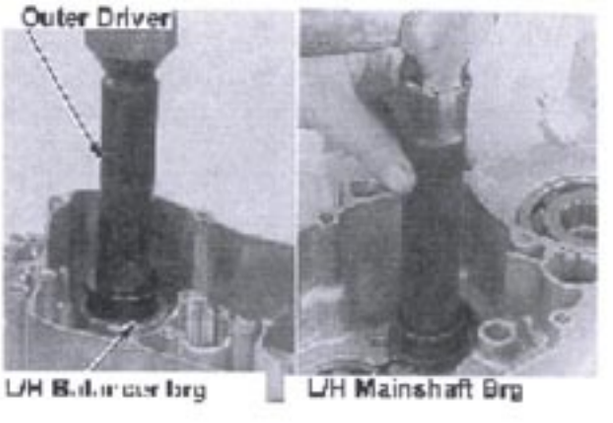
Outer driver 32x35mm	07746-0010100
Pilot 17mm	07746-0040400

■ **Left counter shaft bearing :**
Special tool :

Outer driver 42x47mm	07746-0010300

Apply screw locking agent to the thread of left counter shaft bearing set plate screws.

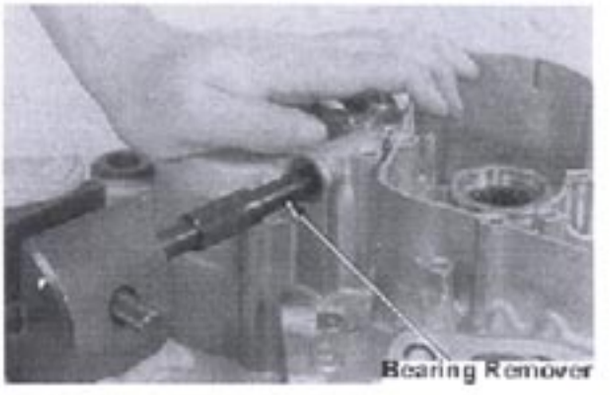
Torque setting : 10Nm (1.0kgfm)
Apply grease to the counter shaft oil seal lip.



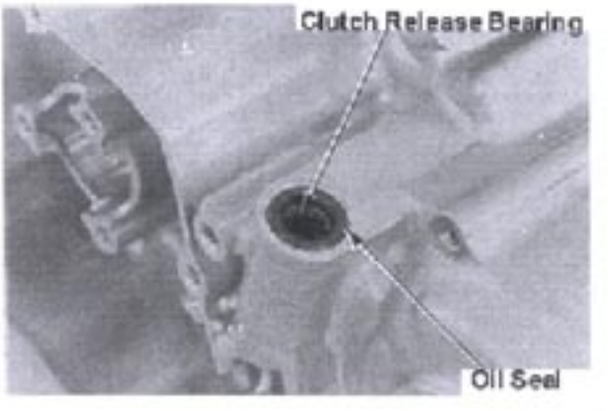
Clutch release bearing
Inspect and replace if necessary.

Special tools :

Bearing remover set 12mm	07936-1660001
Bearing remover 12mm	07936-1660110
Remover weight	07741-0010201
Remover handle	07936-1660120

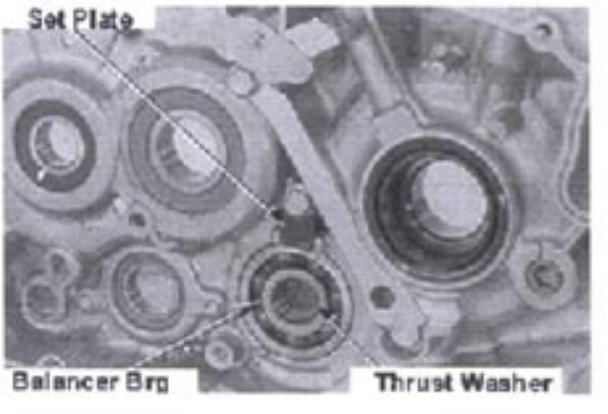


Install the bearing and the oil seal.
Apply grease to the oil seal lip.

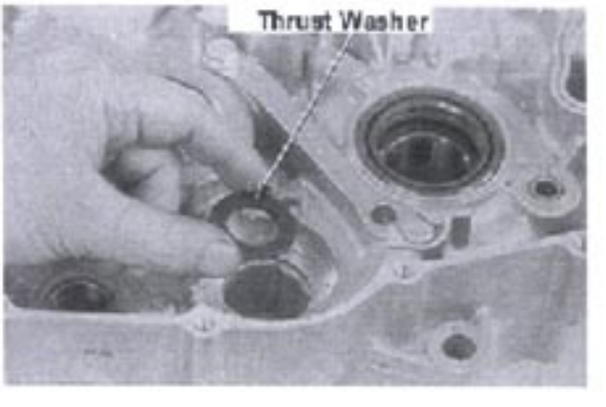


Right crankcase
Remove defective bearings from the right crankcase.
Remove the set plate when removing/installing the right balancer bearing.

Remove the bearing with driver handle A (07749-0010000).
Remove the thrust washer.



Notes
Do not forget to install the thrust washer.



Install new bearings to the right crankcase with driver handle A (07749-0010000) and the following tools.

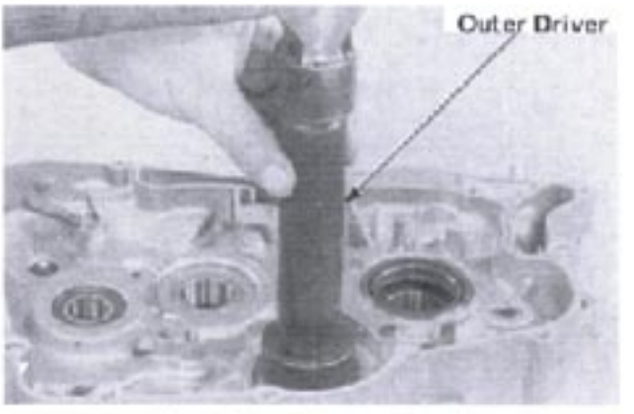
Notes	Install the bearings horizontally.

■ **Right balancer bearing:**

Special tools :

Outer driver 32x35mm	07746-0010100
Pilot 17mm	07746-0040500

Apply screw locking agent to the balancer bearing set plate before installing it.



Remove set plates for the main shaft bearing and shift drum bearing.

■ **Right main shaft bearing :**

Special tools :

Outer driver 42x47mm	07746-0010300
Pilot 20mm	07746-0040500

■ **Right counter shaft bearing :**

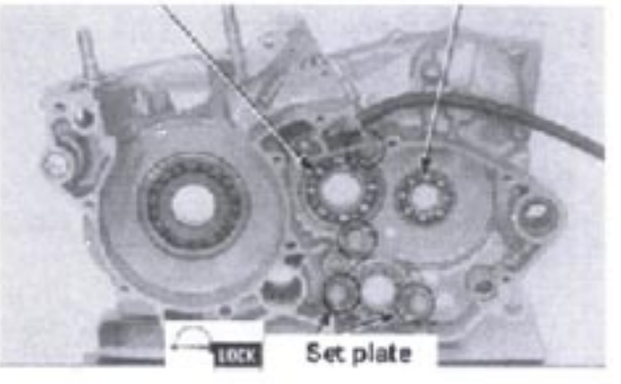
■ **Special tools :**

Outer driver 32x35mm	07746-0010100
Pilot 17mm	07746-0040400

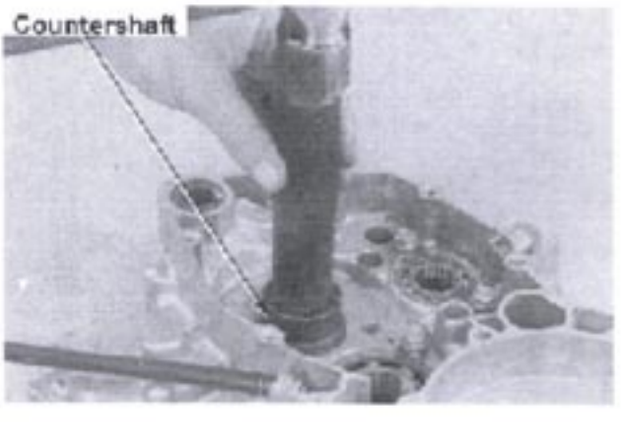
■ **Right shift drum bearing :**

Special tools :

Outer driver 42x47mm	07746-0010300
Pilot 25mm	07746-0040600



Apply screw locking agent to the set plates for the main shaft bearing and the shift drum bearing before installing them.

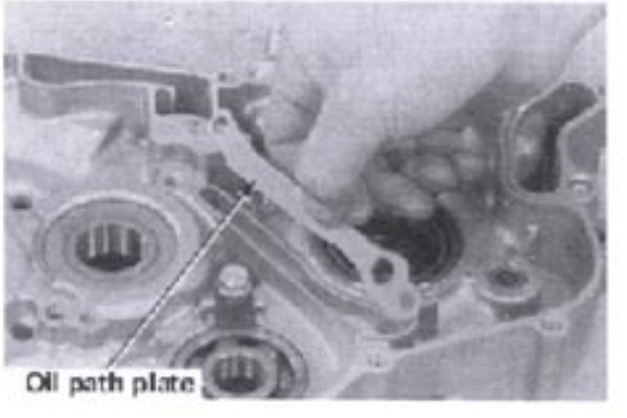


Transmission oil path inspection

Unscrew two bolts and remove the oil path plate.

Clean the oil path.

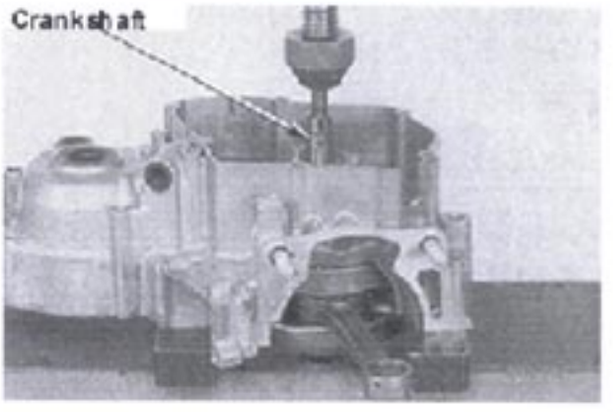
Apply screw locking agent to the bolts and secure them.



Crankshaft removal
Separate the crankcase (10-3).

Remove the following parts:
- Shift fork shaft
- Shift fork
- Shift drum
- Mainshaft, countershaft Assy.

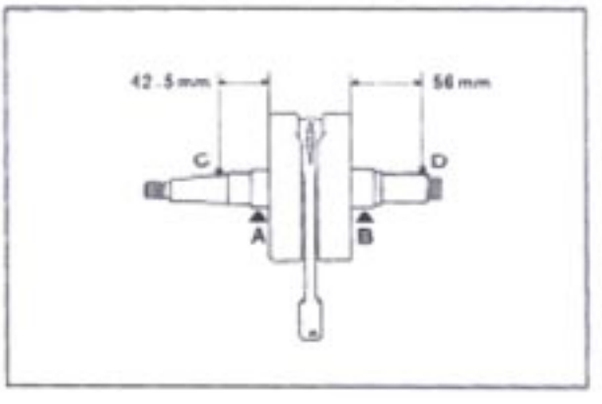
Remove the crankshaft by using a press



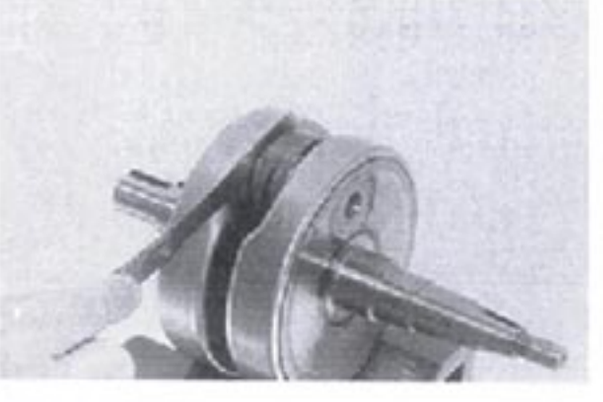
Caution

Do not damage the crankshaft.

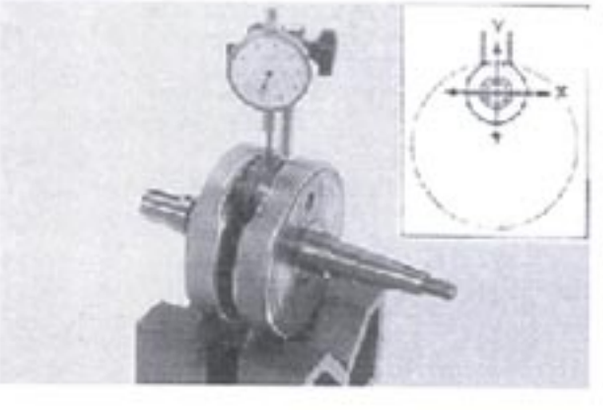
Crankshaft inspection
Support the crankshaft at A and B and measure the deflection at C and D with a dial gauge.
Service limit :
C : 0.05mm or above – replace
D : 0.02mm or above – replace



Measure the connecting rod big end gap with a thickness gauge.
Service limit :
0.85mm or above – replace



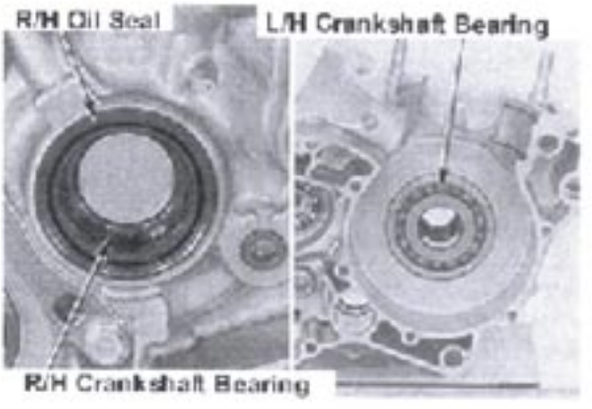
Measure the gap at the connecting rod big end for both X and Y direction shown in the figure.
Service limit :
0.05mm or above – replace



Crankshaft bearing replacement

Remove the following parts by using a press and driver handle A (07749-0010000).

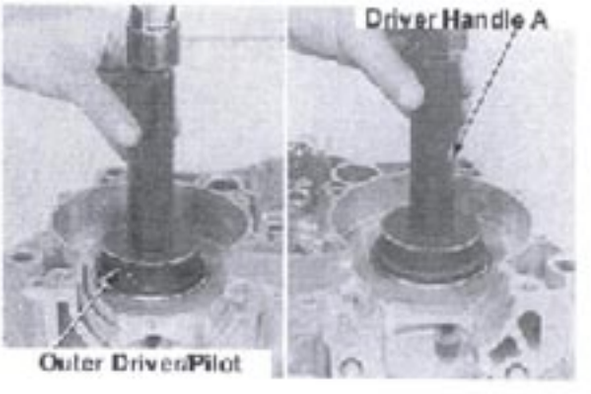
- Crankshaft oil seal
- Crankshaft bearing



Install a new crankshaft bearing to the crankcase by using a press or the following tools:

Special tools :

Driver handle A	07749-0010000
Outer driver 62x68mm	07746-0010500
Pilot 28mm	07746-0040600



Notes

- **Refer to the recommended crank bearing installation size (10-12).**
- **Install the bearing slowly and horizontally.**

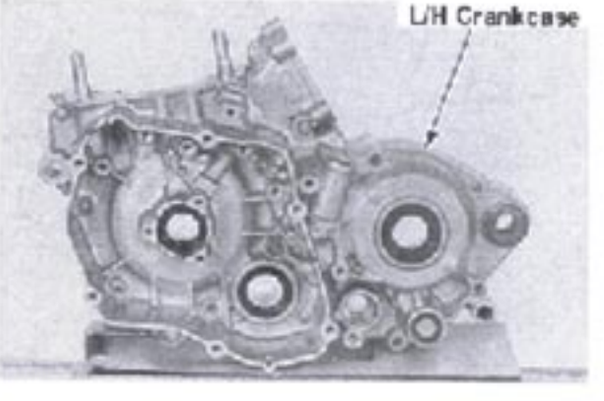
Crankshaft

Installation

Clean the crankcase with cleaning solvent and inspect it for crack and damage.

Notes

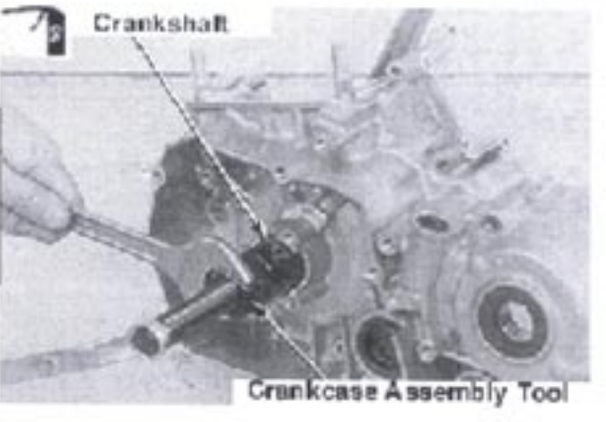
Clean the gasket from the mating surface and the cover and repair the damaged area with an oil stone.



Apply engine oil to the crankshaft bearing and the connecting rod big end and set the crankshaft to the left crankcase by using the following tools:

Special tools :

Crankcase assembly tool : 07965-1660102
Crankcase assembly shaft: 07965-1660200
Crankcase assembly collar: 07965-1660302



Notes

- **Refer to the recommended crank bearing installation size (10-12).**
- **Do not hit the right crankcase with the connecting rod when installing the crankshaft.**

Apply grease to new left crankshaft oil seal lip and install it.

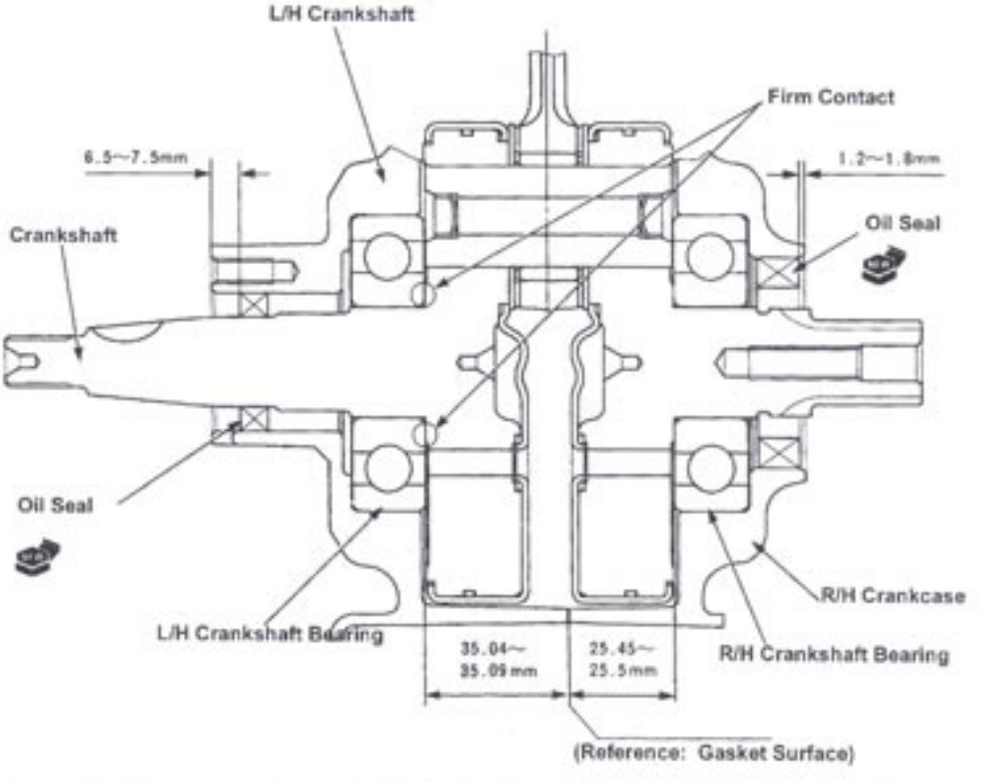
Crank bearing recommended installation size

The recommended installation size is meant to cover the manufacturing tolerance of the bearing thickness.

Notes
Take the right side surface of the crankcase gasket (right crankcase finished surface) as a reference.

Prepare spacers or jigs of the recommended size. Otherwise, measure the installing depth from the reference with vernier calipers or a micrometer to adjust it to the recommended value.

Notes **Install bearings horizontally. Do not tilt them.**

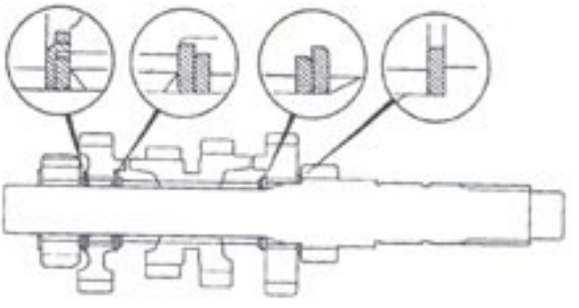


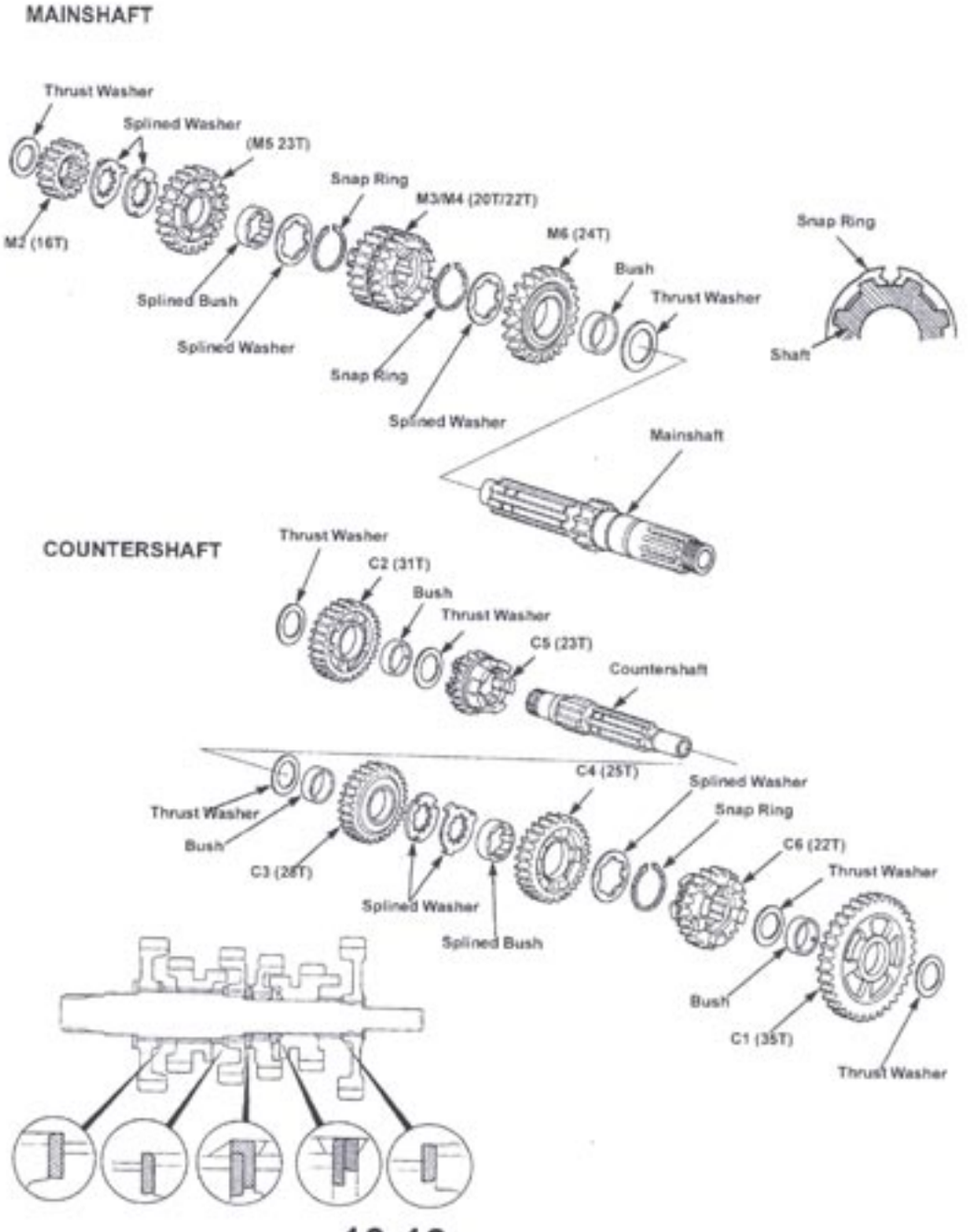
Notes
When installing the bearing, it should not touch the bottom end of the case. If the clearance is below the following figures, re-install the bearing:
Right : less than 0.05mm - Left : less than 0.06mm

Insert the oil seals to the recommended size.

Transmission assembly/installation

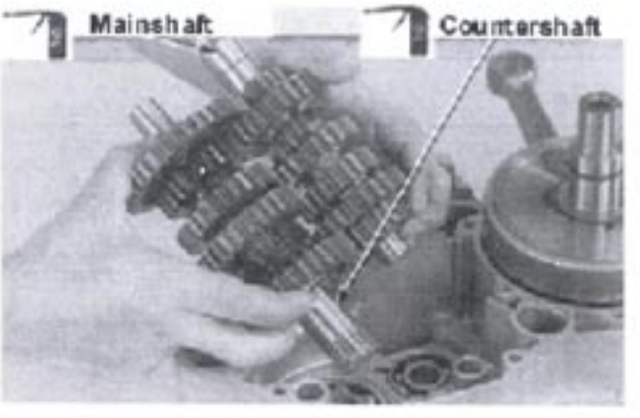
Notes
- Align the teeth of the snap ring end gap and the shaft when installing the snap ring, as shown below.
- Apply Molybdenum grease to the inner holes of each gear and bush.





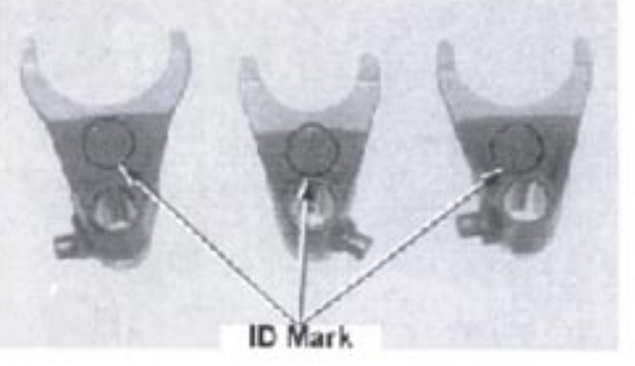
Apply transmission oil to the following parts:
- Main shaft
- Counter shaft
- Each gear
- Main shaft bearing
- Counter shaft bearing
- Shift drum bearing

Install the main shaft and counter shaft Assy. to the right crankcase.



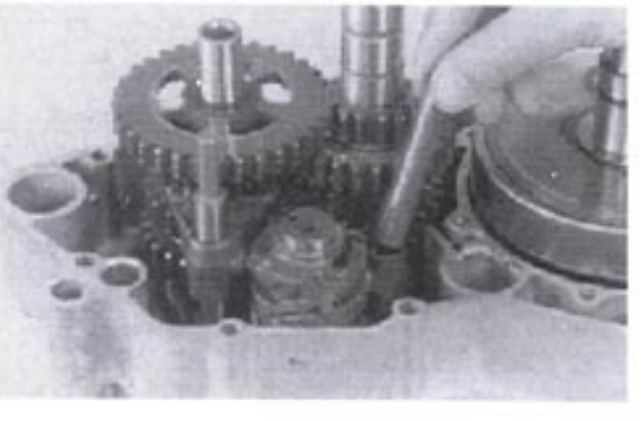
Notes
Wrap the counter shaft with a vinyl tape to prevent damaging the oil seal lip.

Refer to each mark (R, C, or L) when installing the shift forks.



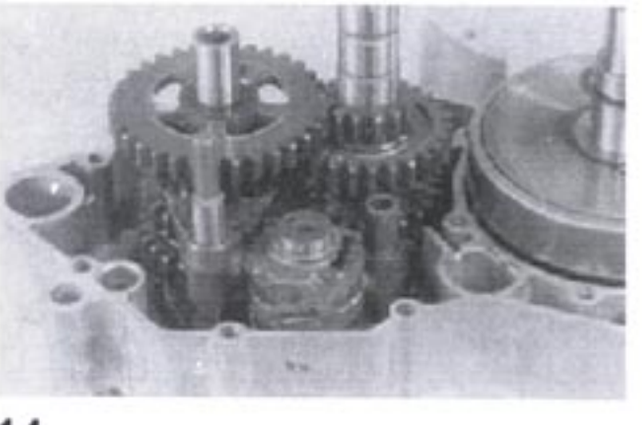
Apply transmission oil to the following parts:
- Shift drum guide groove
- Shift fork end
- Shift fork guide pin
- Fork bore
- Shift fork shaft (left and right)

Install the following parts:
- Shift drum
- Shift fork



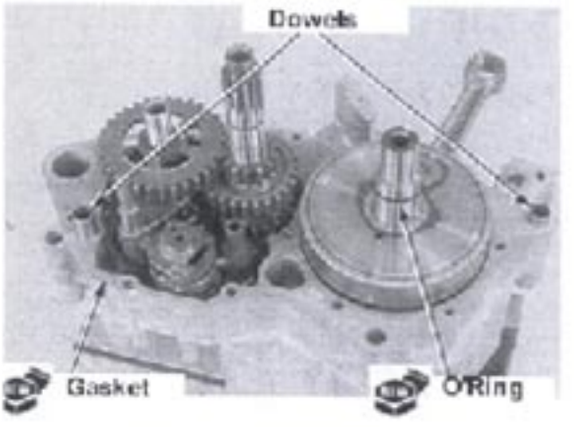
Notes
Install the shift forks by facing "R" and "C" marks on the shift fork upwards and the "L" mark downwards.

- Shift fork shaft (c)

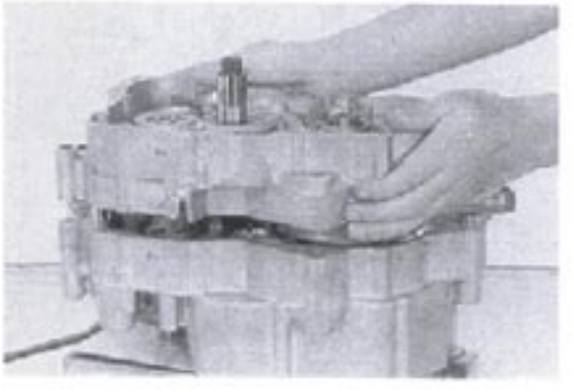


Crankcase assembly

Install dowels, a new gasket, and a new O-ring.



Install the right crankcase.

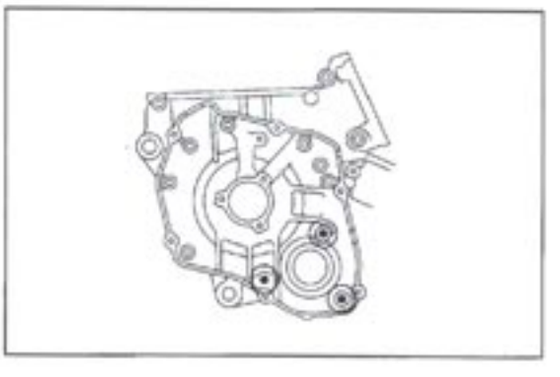


Notes **Install evenly.**

Caution

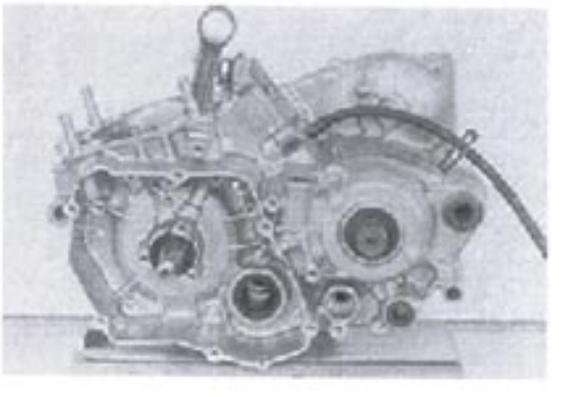
If there is any difficulty in installing the right crankcase, remove it and check all parts are set in correct

Notes
Apply screw locking agent to the three screws around the balancer installation.



Notes
Do not forget to install the breather tube.

Secure the crankcase bolts.

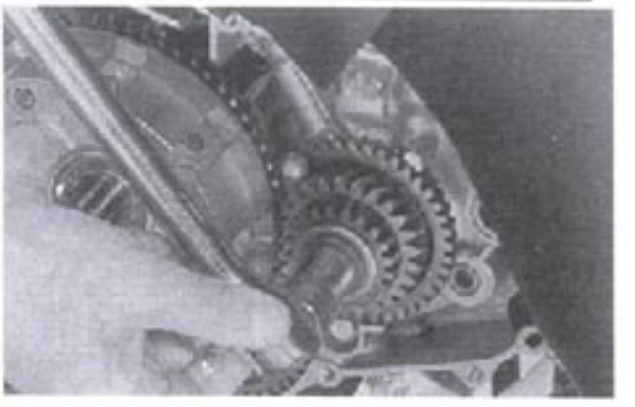


Balancer drive gear

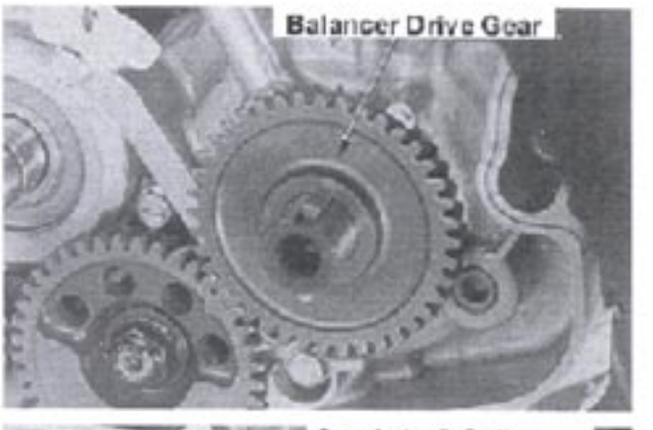
Removal

Notes
When disassembling the crankcase, remove the clutch outer and the balancer driven gear beforehand (10-17).

Remove the primary drive gear (9-8).

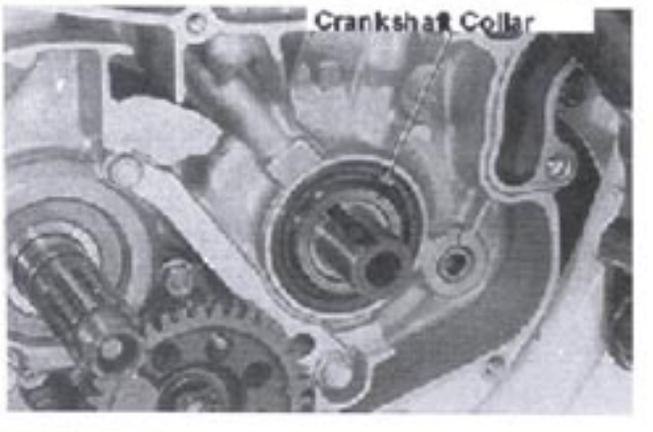


Remove the balancer drive gear.



Remove the key.

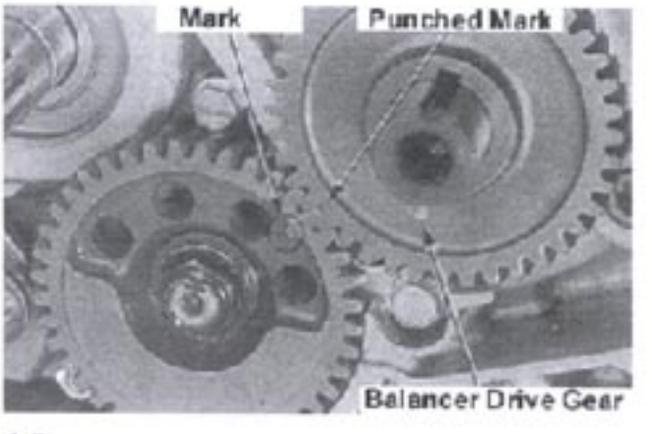
Notes
When disassembling the crankcase, remove the crankshaft collar beforehand.



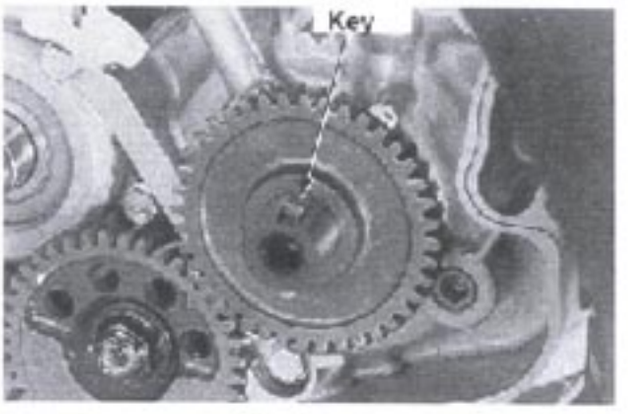
Installation

Set the balancer drive gear.

Notes
Align the punch mark on the balancer drive gear and the mark on the balancer driven gear to install.

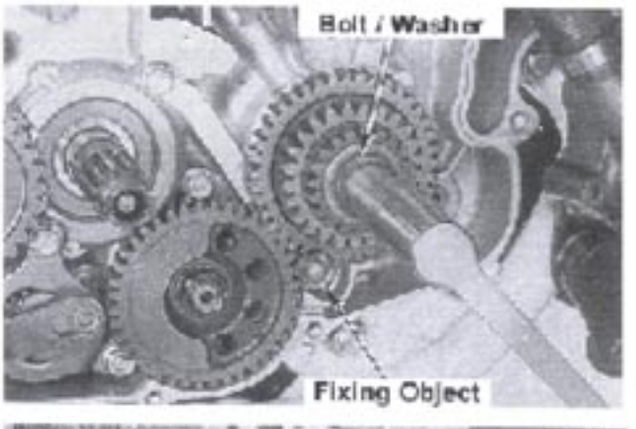


Rotate the balancer drive gear to install the key to the key groove on the crankshaft.



Apply transmission oil to the washer seat. Secure the primary drive gear, the water pump drive gear, and the bolt/washer (9-9).
Torque setting : 78Nm (8.0kgfm)

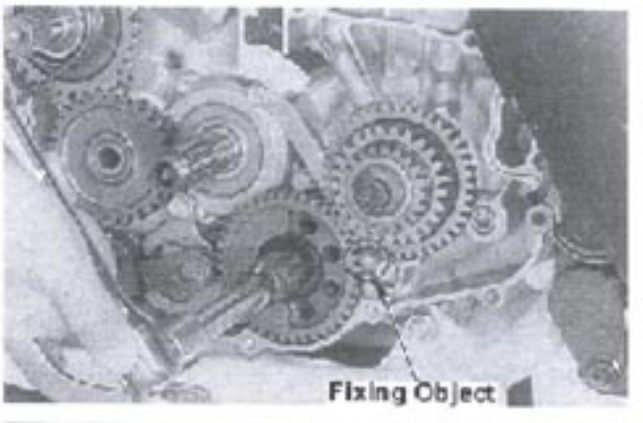
Notes
Insert a wood piece or a soft metal (brass tube, aluminium pipe, etc) between the primary drive gear and the clutch outer (as shown in the figure) to fix the gear.

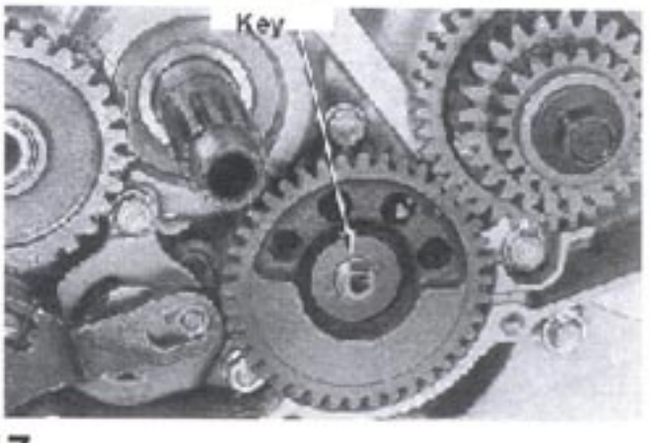


Balancer driven gear

Removal
Unstake the lock nut. Do not damage the balancer shaft.
Remove the lock nut.

Notes
Insert a wood piece or soft metal (brass tube, aluminium pipe, etc) between the balancer drive gear and the balancer driven gear (as shown in the figure) to fix the gears.

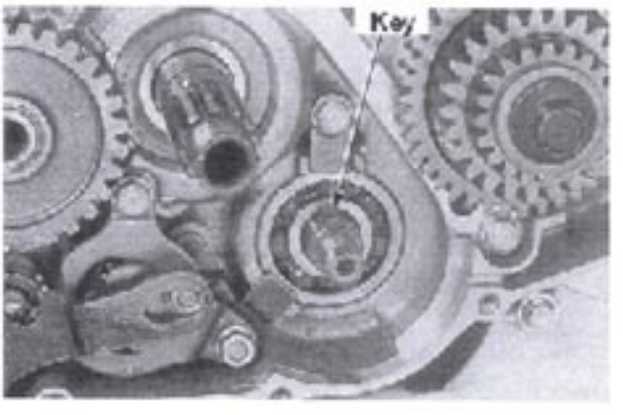




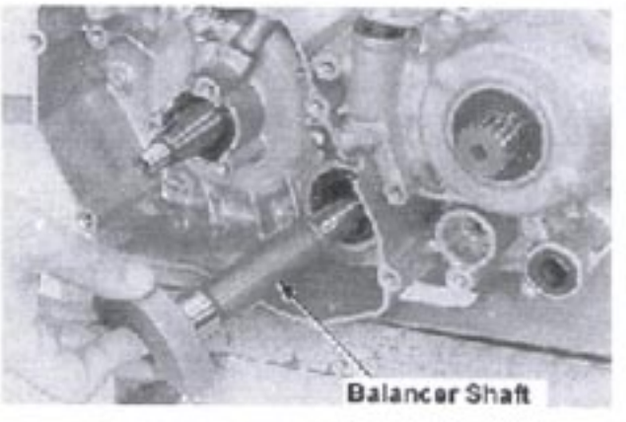
Remove the washer.

Remove the following parts:
- Balancer driven gear

- Key

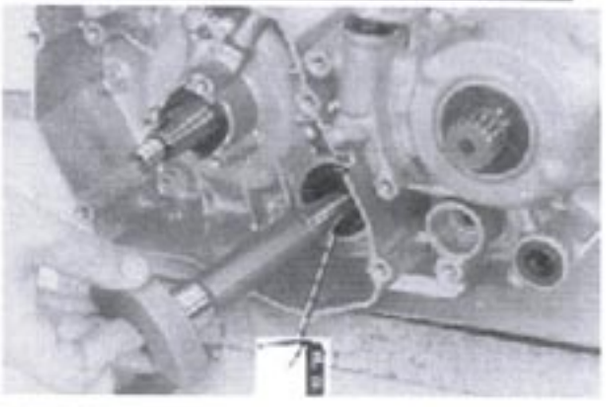


Remove the balancer shaft from the left crankcase side.



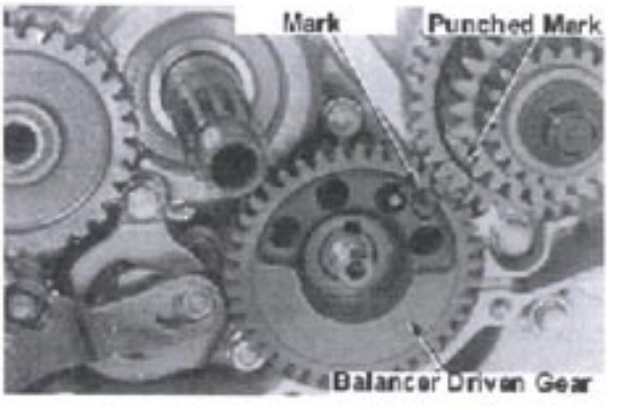
Balancer shaft inspection
Inspect the balancer shaft. Replace if it is damaged.

Installation
Apply Molybdenum solution to the left balancer bearing and install the balancer shaft.

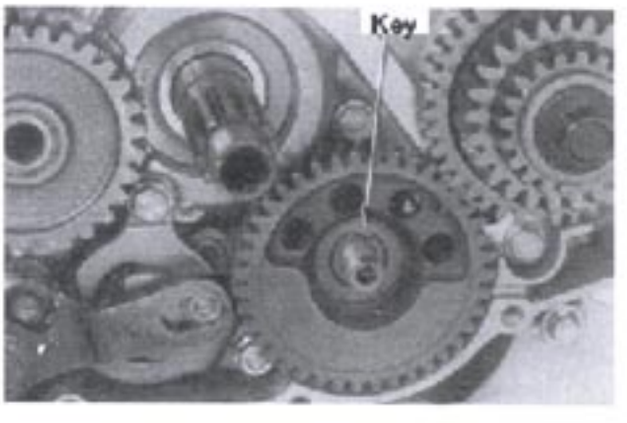


Install the balancer driven gear.

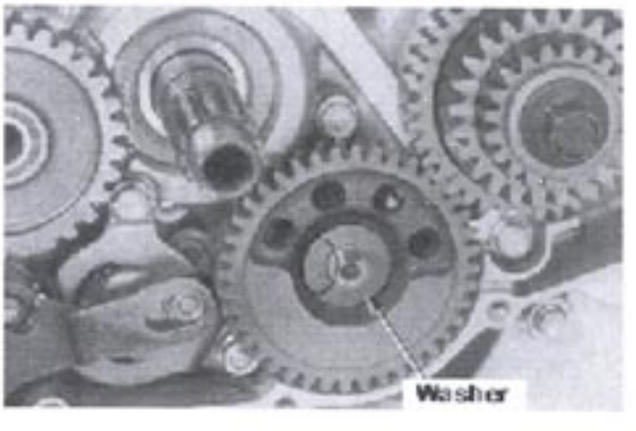
Notes
Align the punched mark on the balancer drive gear and the mark on the balancer driven gear to align the balancer shaft key position.



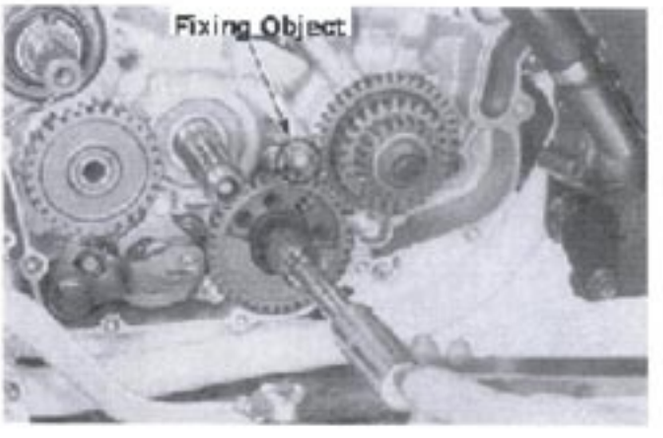
Install the key.



Install the washer.

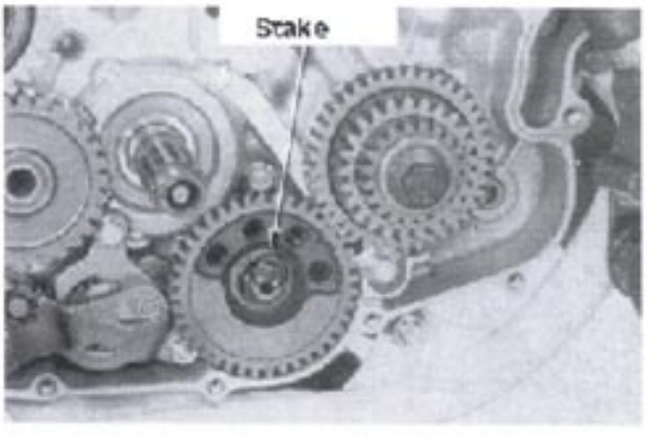


Secure the lock nut.
Torque setting : 54Nm (5.5kgfm)

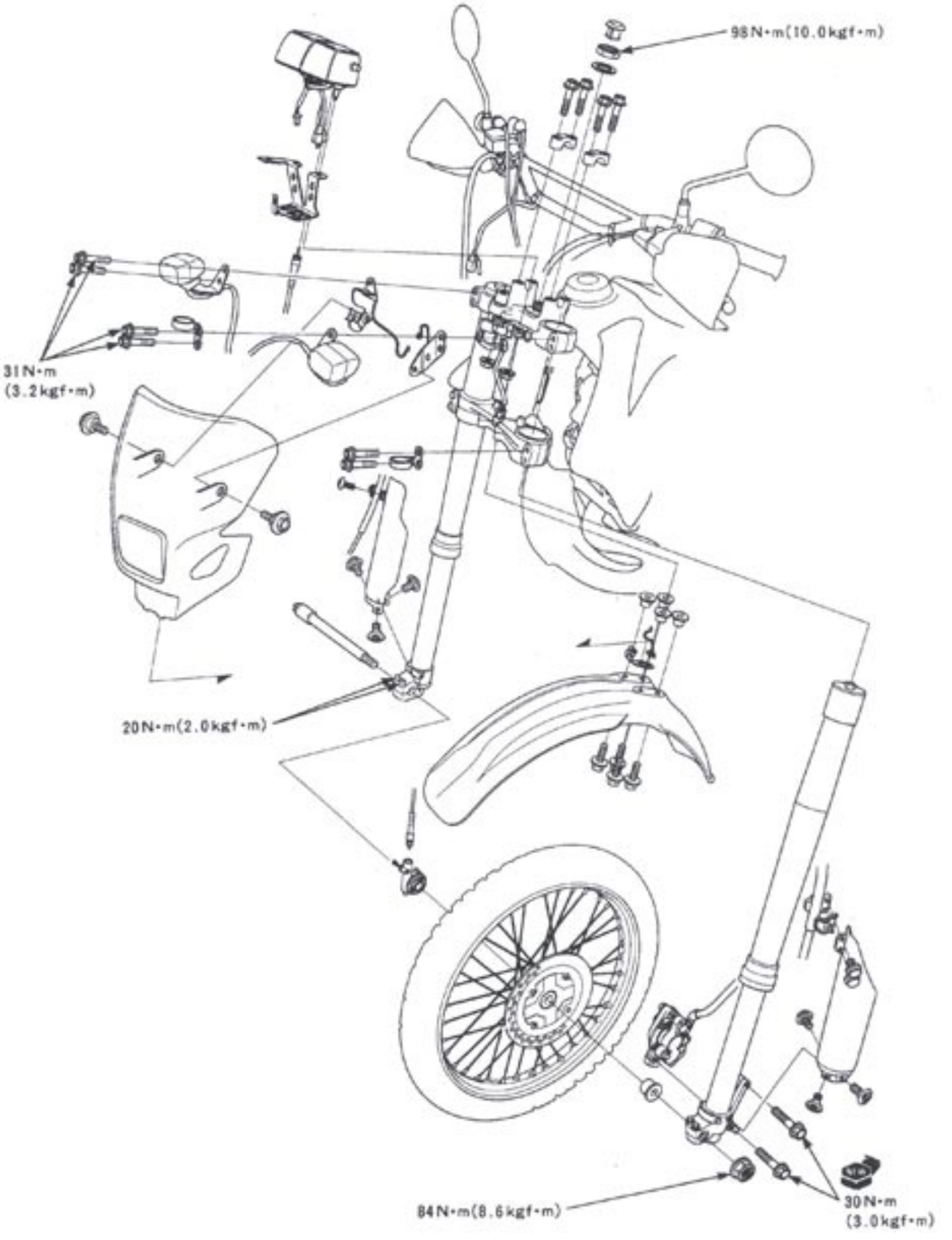


Notes
Insert a wood piece or soft metal (brass tube, aluminium pipe, etc) between the balancer drive gear and the balancer driven gear (as shown in the figure) to fix the gears.

Stake the nut.



Notes
Do not damage the balancer shaft.


98N·m(10.0kgf·m)
31N·m
(3.2kgf·m)
20N·m(2.0kgf·m)
84N·m(8.6kgf·m)
30N·m
(3.0kgf·m)

General

Warning

Keep brake discs and pads away from oil or grease. Should the discs or pads become contaminated, replace the pads and de-grease the discs.

- When servicing the front wheel and suspension, support the bottom of the engine with jacks.
- Do not operate a brake lever when the front wheel is detached.
- Refer to Sec. 13 for the brake system maintenance.
- Refer to Sec. 17 for lamps, instruments, and switches inspection.
- Do not step on spokes and avoid overstressing the wheel. Avoid damaging the wheel, too.
- When removing the tyre from its rim, use special "Tyre lever" and "Rim protector" to avoid damaging the rim.

Specification

Item		Specification	Service limit
Front wheel	Axle runout	-	0.2
Rim deflection	Radial	2.0	-
	Axial	2.0	-
Tyre	Tread	-	3.0
	Pressure	150kPa (1.50kgf/cm²)	-
Fork	Spring relaxed length	486.3	481.4
	Oil quantity	693 cm³	-
	Oil level	95	-
	Oil type	Honda Ultra cushion oil #10	-
	Tube bending	-	0.2
Steering load		2.0 – 2.7Nm(0.2-0.28kgfm)	-

Torque settings

Steering stem nut	98Nm (10.0kgfm)
Steering top thread	6.4Nm (0.64kgfm)
Spoke nipple	2.5–5Nm (0.25-0.5kgfm)
Front brake disc bolt	20Nm (2.0kgfm) Alloc bolt (replace when removed)
Front axle nut	84Nm (8.6kgfm)
Front axle holder bolt	20Nm (2.0kgfm)
Top bridge bolt	31Nm (3.2kgfm)
Front caliper bracket bolt	30Nm (3.0kgfm) Alloc bolt (replace when removed)

Special tools

Steering stem socket	07916-KA50100
Steering stem driver	07946-4300101
Oil seal remover	07948-4630100
Fork slider	07KMZ-KZ30101
Oil seal driver	07KMD -KZ30100
Bearing remover shaft	07746-0050100
Bearing remover head 17mm	07746-0050500
Driver handle A	07749-0010000
Outer driver 37x40mm	07746-0010200
Pilot 17mm	07746-0040400
Outer driver 42x47mm	07746-0010300

Troubleshooting

■ **Heavy steering**
- Overtightened steering top thread
- Damaged/worn steering head bearing
- Tyre wear
- Low tyre pressure
- Bent fork
- Deformed frame

■ **Directional instability**
- Bent fork
- Damaged/loose steering head bearing
- Unequal left/right cushions
- Deformed frame
- Worn/deformed tyre
- Loose wheel bearing
- Deflected front axle

■ **Shaking front wheel**
- Bent fork
- Damaged/loose steering head bearing
- Worn tyre

■ **Front suspension is too soft**
- Deformed cushion spring

■ **Front suspension is too hard**
- Too high tyre pressure

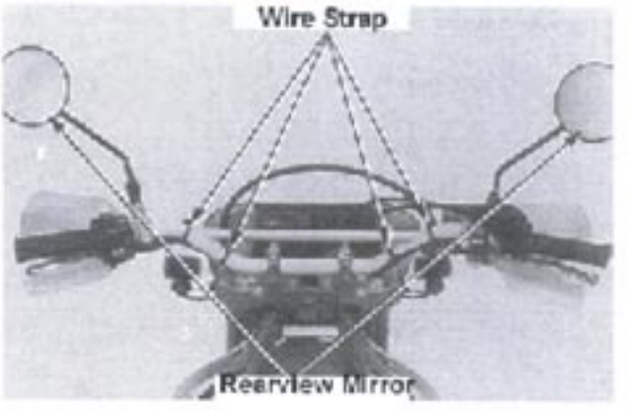
■ **Noise from the front suspension**
- Cushion case contact
- Loose fitting of the front suspension

■ **Resistance in wheel revolution**
- Wheel bearing fault
- Bent front axle
- Brake cannot be disengaged (13-3)
- Speedometer gear box fault

Handlebar

Removal

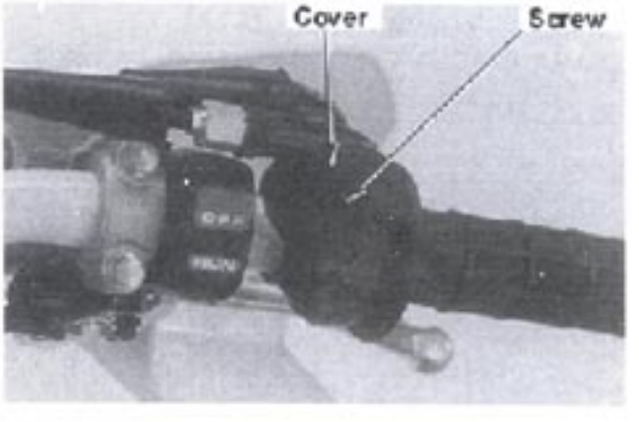
Remove wire straps and rear-view mirrors.
Remove the front master cylinders (13-12).



Notes
Keep the removed master cylinders level to prevent air entering the brake system.

Remove a head lamp (17-3).

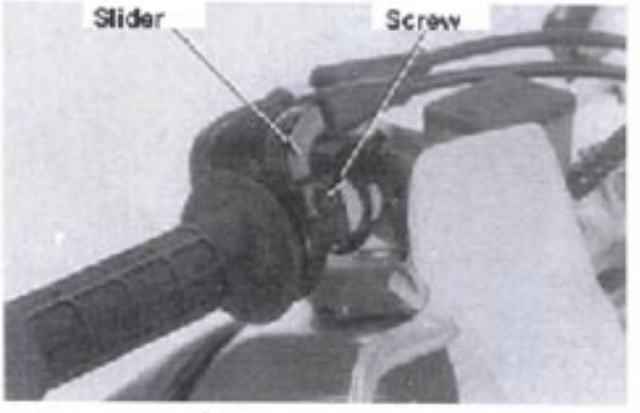
Remove the following parts:
- Right handlebar switch
- 3P(black) coupler (17-9)
- Left handlebar switch
- 3P(black) coupler (17-9)
- Left handlebar switch
- 3P(transparent) coupler (17-9)



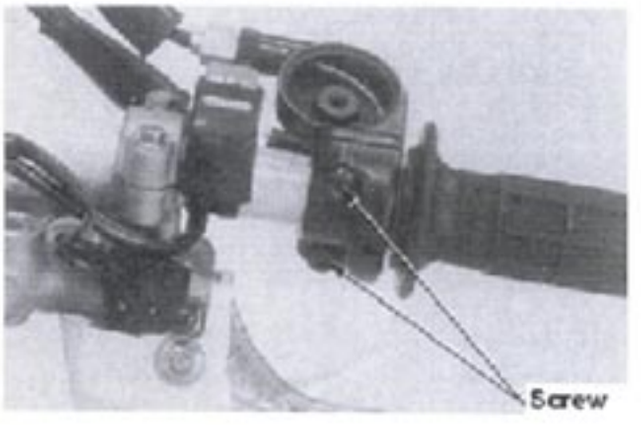
- Throttle pulley pivot screw
- Throttle pulley cover

- Throttle pulley
- Throttle pulley seal

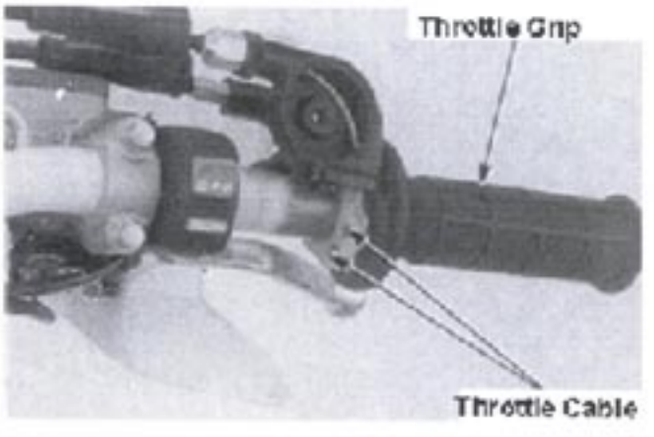
Remove the following parts:
- Screw
- Throttle slider



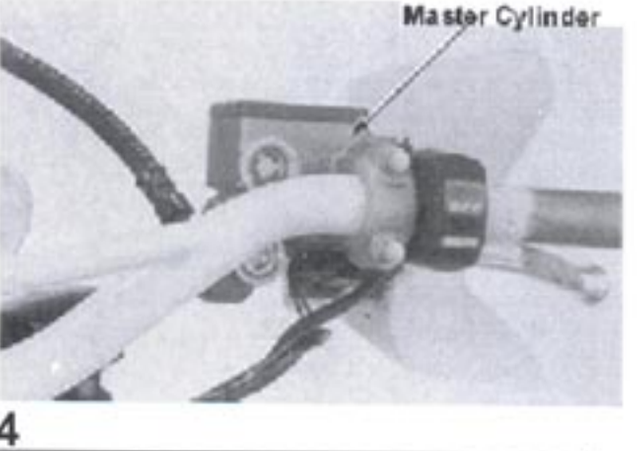
- Throttle housing mount screw



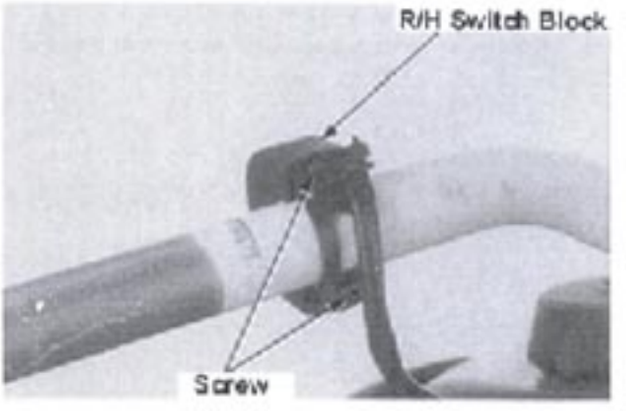
- Throttle cable
- Throttle grip



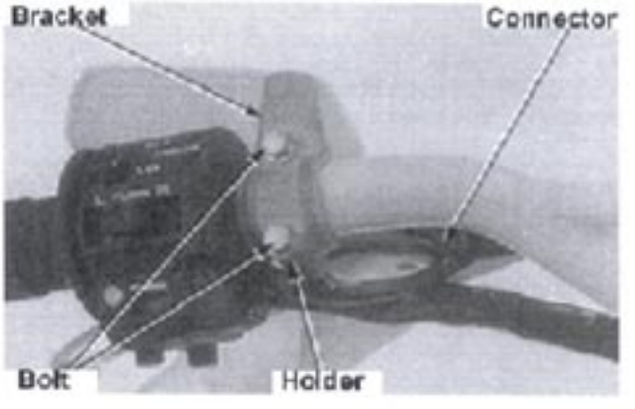
- Front master cylinder



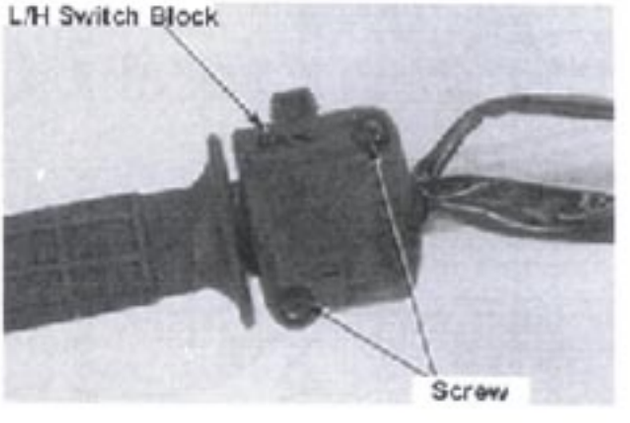
Remove the following parts:
- Screw
- Right handlebar switch



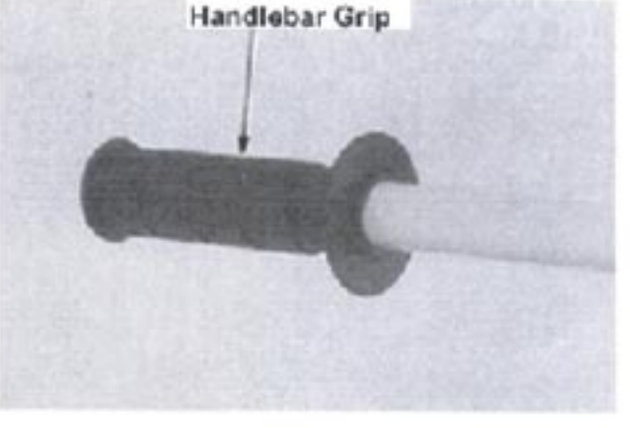
- Clutch switch connector
- Bolt
- Clutch lever bracket holder
- Clutch lever bracket



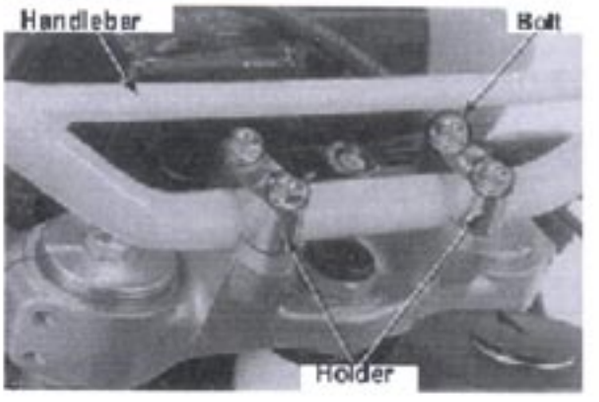
- Screw
- Left handlebar switch



- Handlebar grip

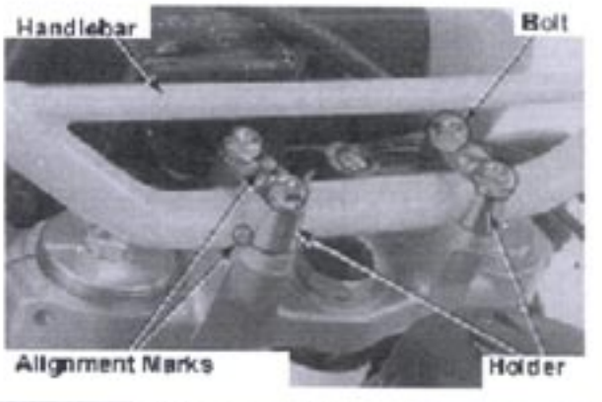


Remove handlebar holder bolts.
Remove the handlebar holders to remove the handlebar.



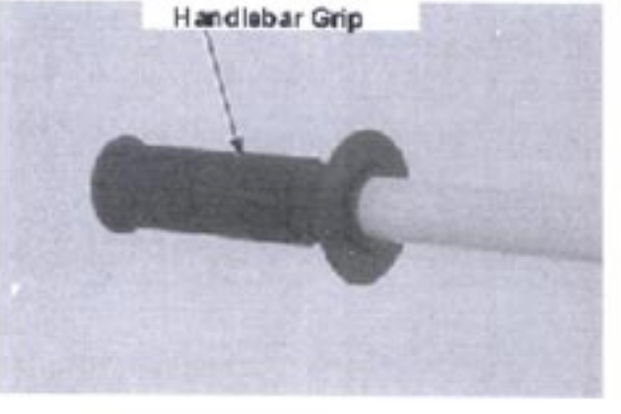
Installation
Install the handlebar.
Attach handlebar holders and secure handlebar holder bolts from the front.

Notes
- **Align the punched marks on the handlebar with the contact surface of the holders.**
- **The punched marks on the holders should face the front.**

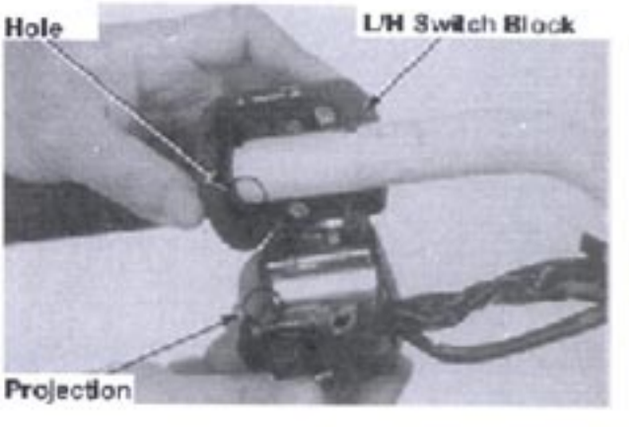


Clean the handlebar grip bonding surface and dry the area.
Apply Genuine Honda Bond A or Cemedine #540 to the bonding surface and install the grip by twisting it before the bond dries.

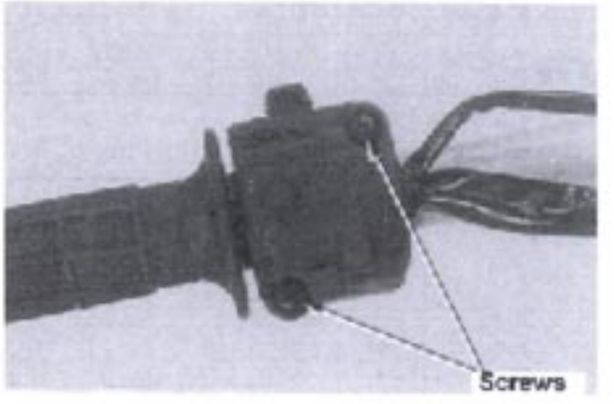
Notes
- **Do not touch the grip for at least few hours after bonding to let the bond dry.**



Install the left handlebar switch by setting its projection to the hole on the handlebar.

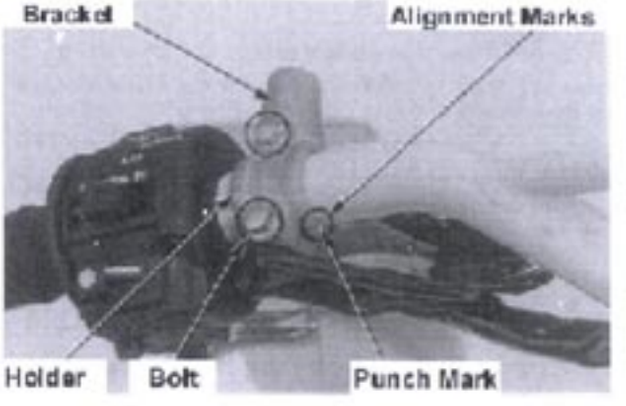


Secure screws (front one first)

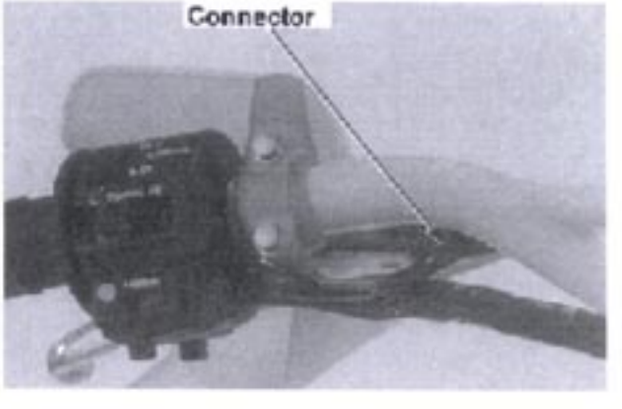


Install the clutch lever bracket.
Install the clutch lever bracket holder and secure bolts from the top.

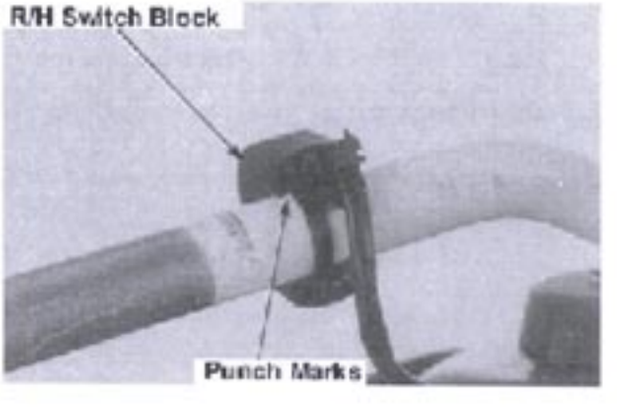
Notes
Align the clutch lever bracket contact surface with the punched mark on the handlebar.



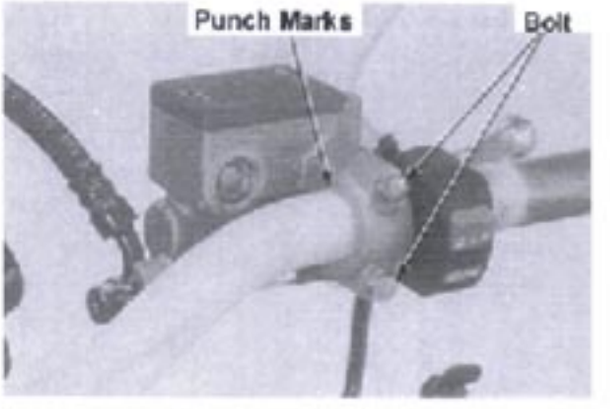
Connect the clutch switch connector.



Install the right handlebar switch aligning with the punched mark on the handlebar.

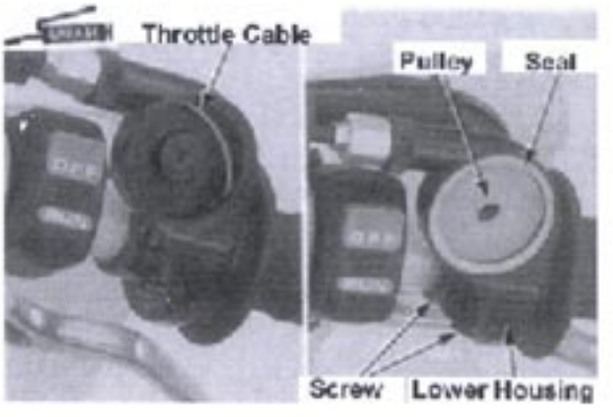


Secure bolts (top one first).



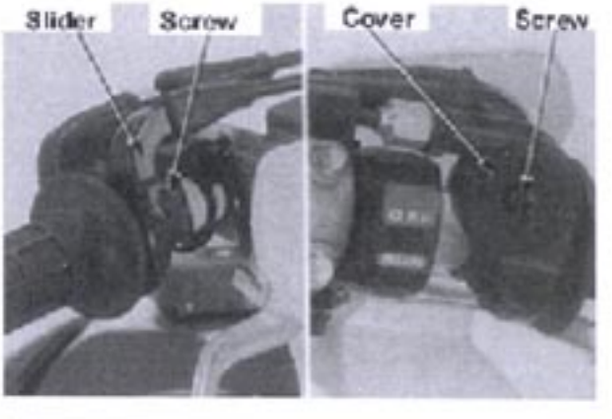
Notes
Align the master cylinder mount surface to the punched mark on the handlebar.

Apply grease to the interior surface of the throttle grip and install it to the handlebar.
Apply grease to the end and connect the throttle cable to the throttle grip.
Install the throttle housing.
Apply grease to the throttle cable contact area and install the throttle pulley and the seal.
Install the throttle lower housing and secure the screws.



Notes
Align the contact surface of the throttle housing to the punched mark on the handlebar.

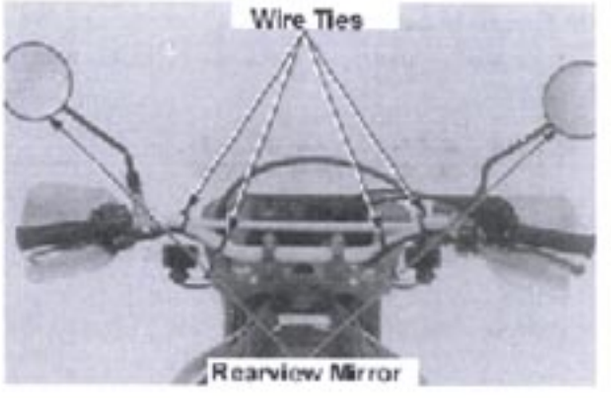
Install the throttle slider and throttle pulley cover and secure the screws.



Connect the right handlebar switch 3P(black), 2P(transparent), left handlebar switch 3P(transparent), and the left handlebar switch 6P(transparent) couplers.

Install the head lamp (17-2).

Install wire straps and rear-view mirrors.

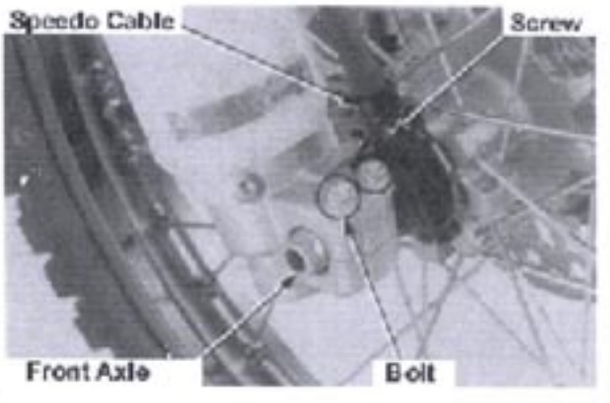


Notes
Refer to the routing diagram when routing the cables, wires, and harnesses (1-23).

Front wheel

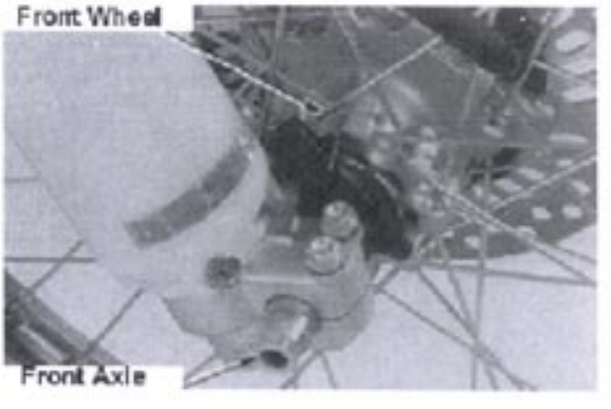
Removal

Unscrew and disconnect the speedometer cable.
Loosen front axle nut (left).
Loosen front axle holder bolt.



Notes
The front axle bolt need not be removed.

Support the bottom of the engine and lift the front wheel.
Remove the front axle and the front wheel.



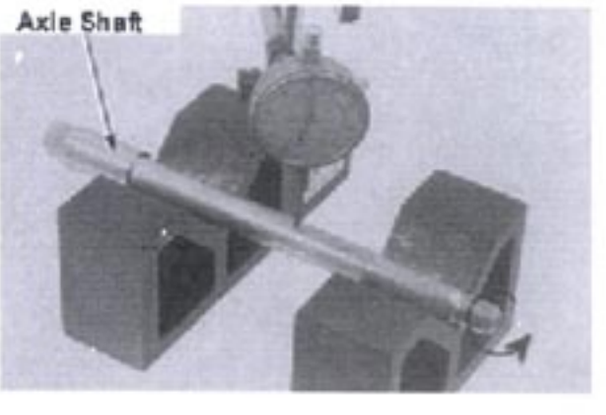
Notes
Do not operate the brake lever after removing the front wheel.

Axle runout inspection

Support the axle shaft with Vee-blocks and measure the axle shaft distortion with a dial gauge.

Service limit : Replace if 0.2mm or above

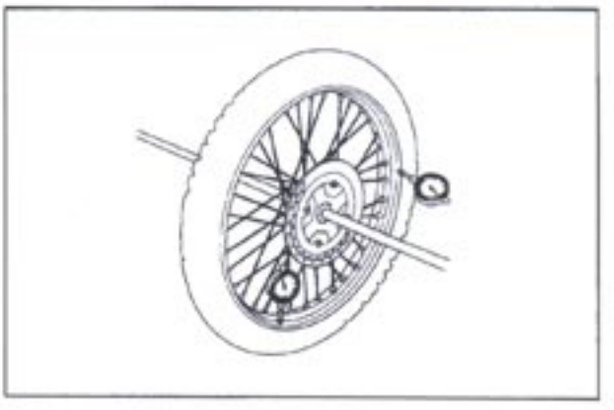
Take the 1/2 of the reading.



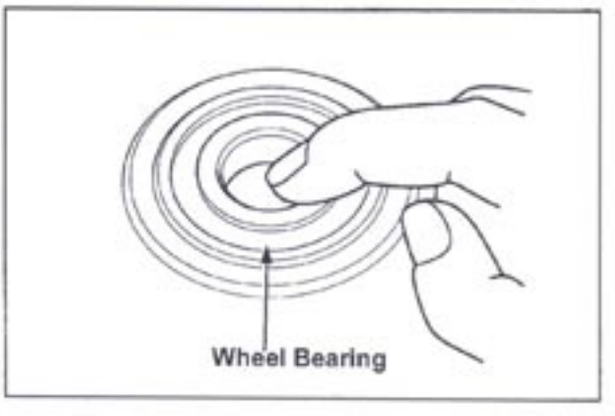
Wheel rim inspection
Rotate the wheel slowly to measure the wheel rim deflection with a dial gauge.

Service limit :
Radial : 2.0mm or above – replace
Axial : 2.0mm or above – replace

Replace the rim if there is any local (spot) deflection.
Inspect the fitting, bending, and damage of the spokes.



Wheel bearing inspection
Rotate the bearing inner race with a finger and check its smooth movement.
If the revolution is not smooth or there is loose fitness or damage on the outer race and the hub, replace with a new one.

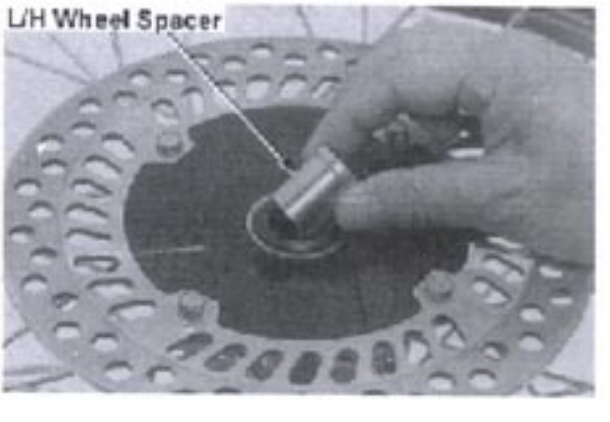


Notes
Replace bearings on both sides at the same time.

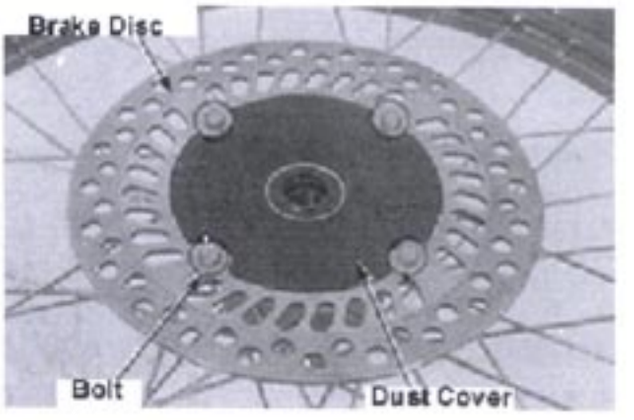
Disassembly

Remove the following parts:
- Speedometer gear box

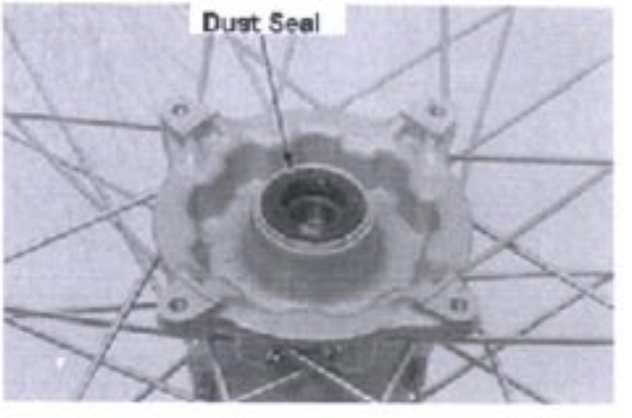
- Left wheel collar



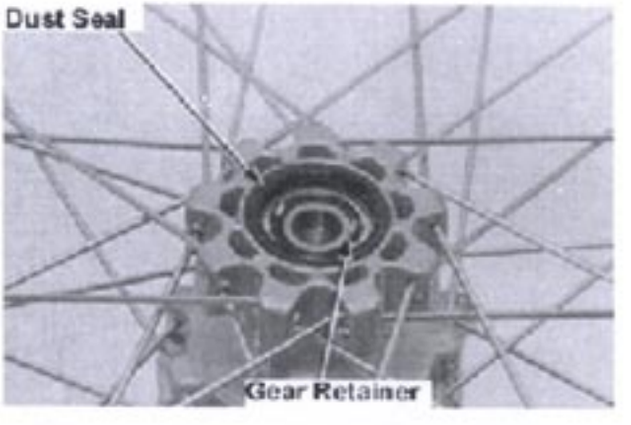
Remove the following parts:
- Front brake disc bolt
- Front brake disc
- Hub cover



- Left seal



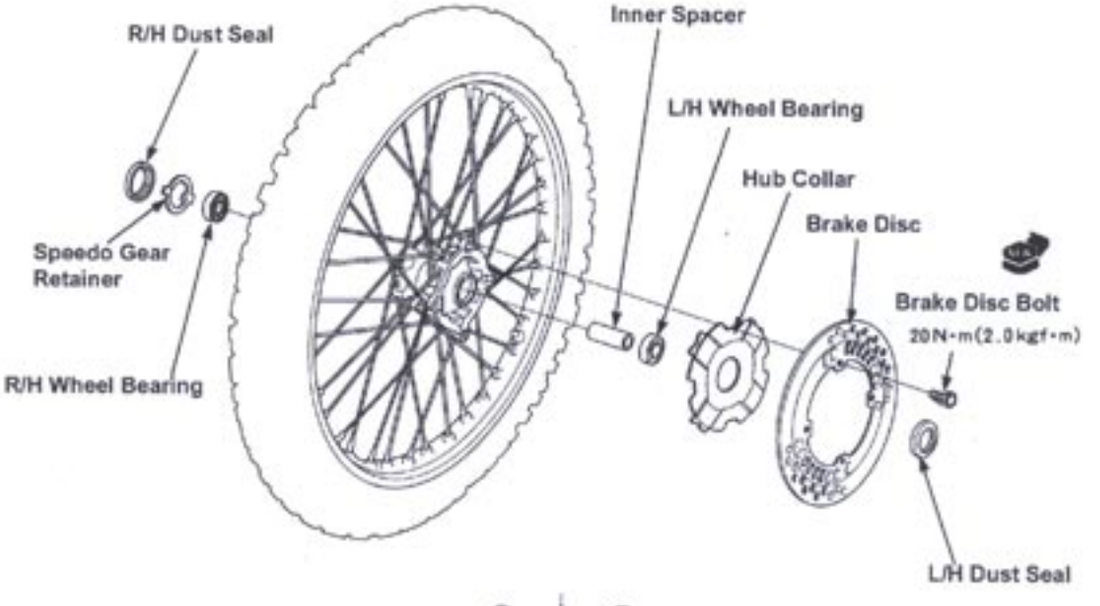
- Right dust seal
- Speedometer gear retainer

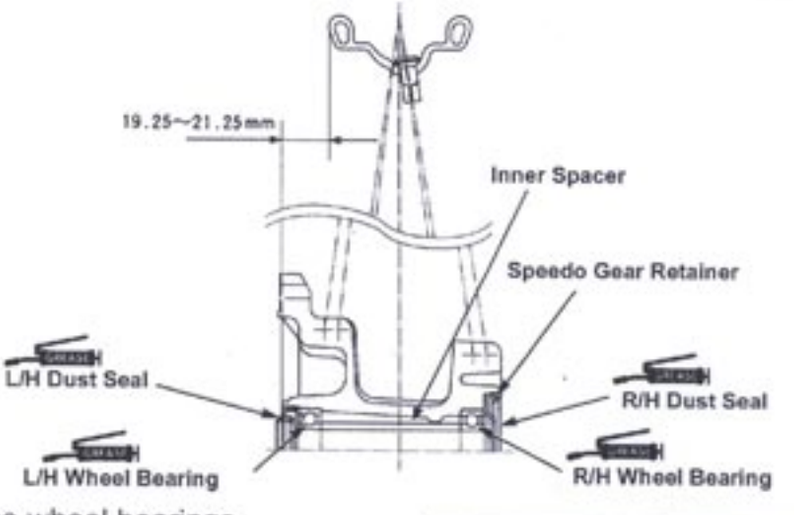


Remove the bearing and the distance collar by using the following tools:

Special tools :
Bearing remover shaft
07746-0050100
Bearing remover head 17mm
07746-0050500

Assembly





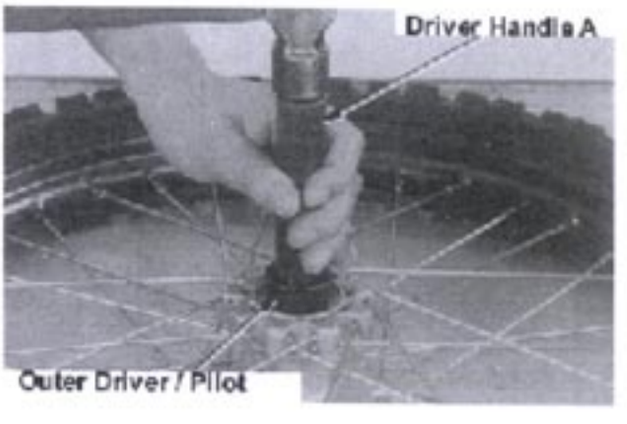
Apply grease to the wheel bearings.

Install the right wheel bearing by using the following tools:

Special tools :

Driver handle A	07749-0010000
Outer driver 37x40mm	07746-0010200
Pilot 17mm	07746-0040400

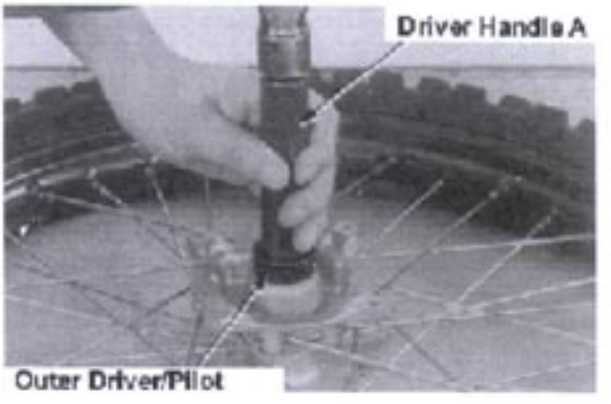
- **Notes**
- **The sealed surface of the bearing should face outside.**
- **Do not tilt the bearing when installing.**



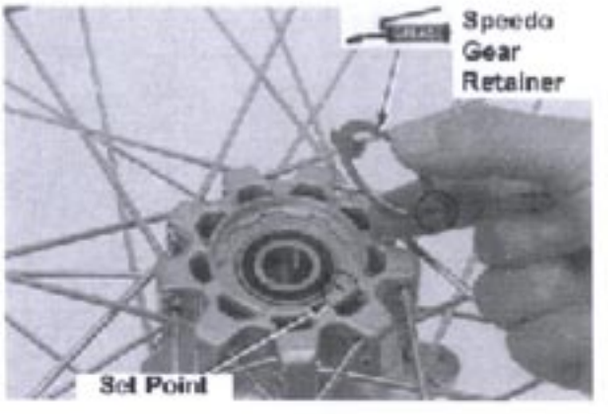
Install the distance collar.
Install the left wheel bearing by using the following tools:

Special tools :

Driver handle A	07749-0010000
Outer driver 37x40mm	07746-0010200
Pilot 17mm	07746-0040400

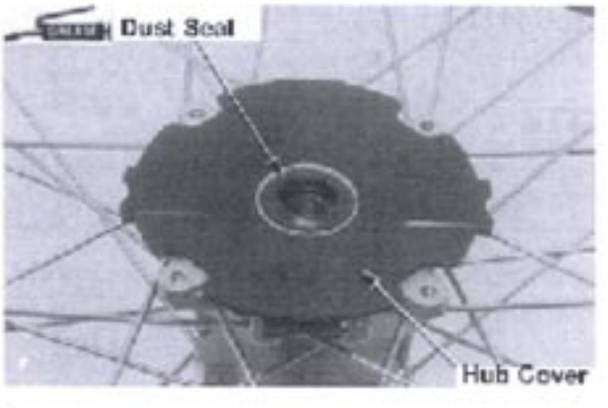


Apply grease to the speedometer gear retainer.
Install the speedometer gear retainer by setting its projection to the dent on the wheel.

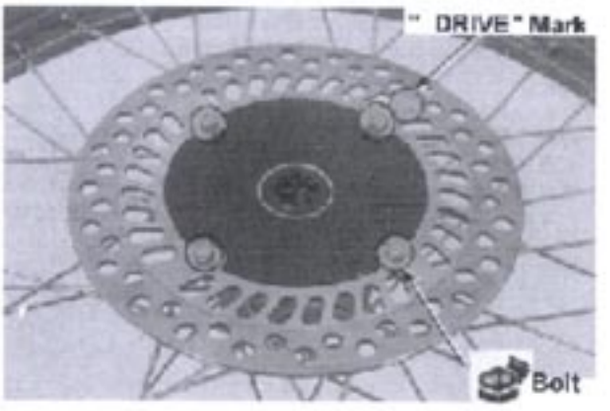


Apply grease to the right dust seal lip and install it to the wheel.

Apply grease to the left dust seal lip.
Install the left dust seal and the hub cover.



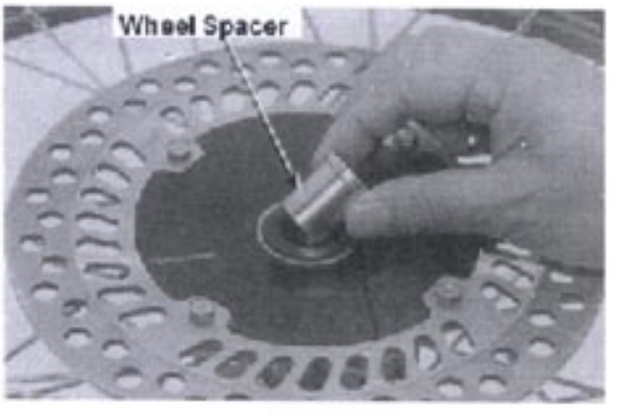
Install the front brake disc.



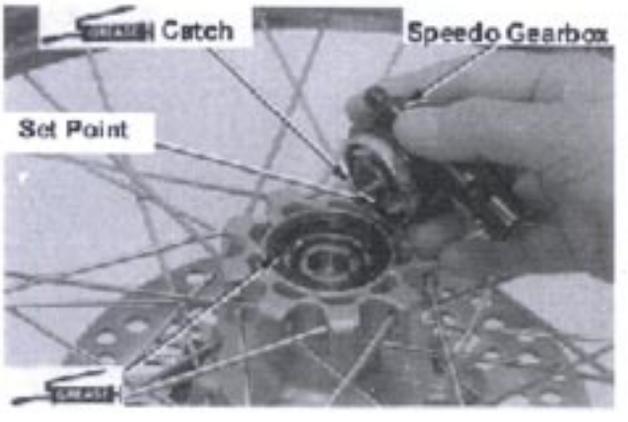
Notes
Install the front brake disc so as to have its "DRIVE" mark facing outside.

Secure new front brake bolts.

Torque setting : 20Nm (2.0kgfm)



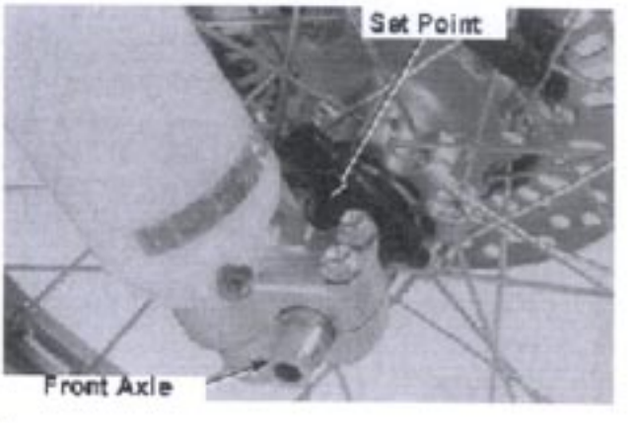
Install the left wheel spacer.



Apply grease to the catches of the speedometer gear box and the gear retainer. Install the speedometer gear box by setting its catch to the one on the gear retainer.

Installation
Install the front wheel.

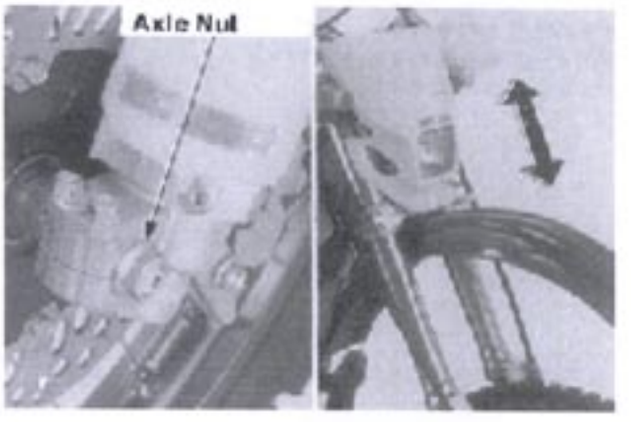
Notes
Set the brake disc between the brake pads when installing the front wheel.



Install the front axle.
Confirm that the speedometer gear box boss is touching the stopper of the front fork.

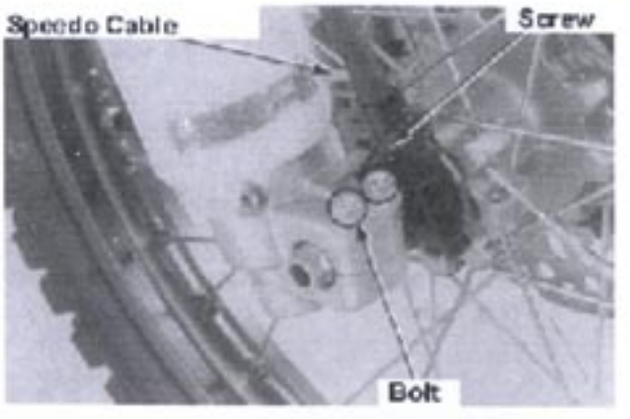
Secure the front axle nut.

Torque setting : 20Nm (2.0kgfm)
Remove the support of the engine. Apply brake and compress the front fork 5 to 6 times to settle the front axle to the axle holder.



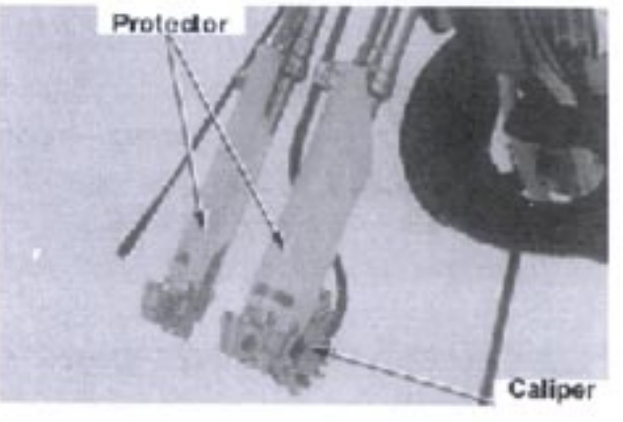
Secure axle holder bolts on both ends.

Torque setting : 20Nm (2.0kgfm)
Connect the speedometer cable and firmly secure the screw.

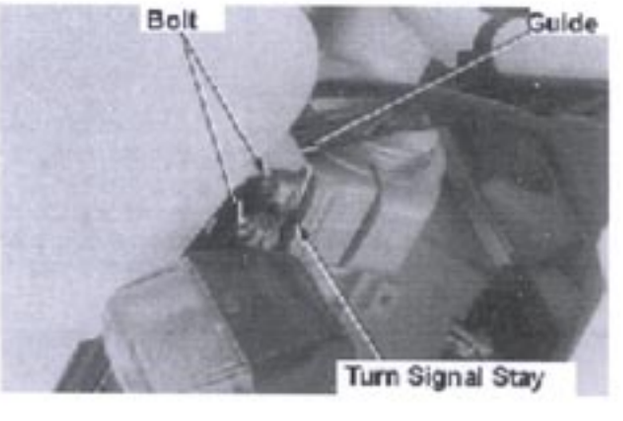


Fork
Removal
Remove the following parts:
- Front wheel (11-9)
- Front brake caliper (left) (13-8)
- Fork protector

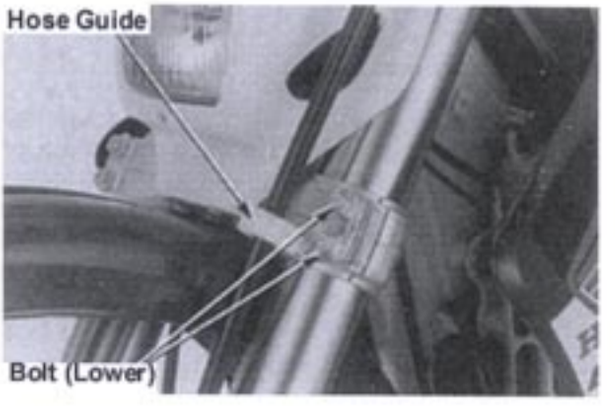
Notes
- **Do not suspend the caliper with the brake hose.**
- **Bleed air from the brake system if the brake hose is disconnected (13-4).**



- Fork split bolt (upper)
- Brake hose guide
- L/R front turn signal stay



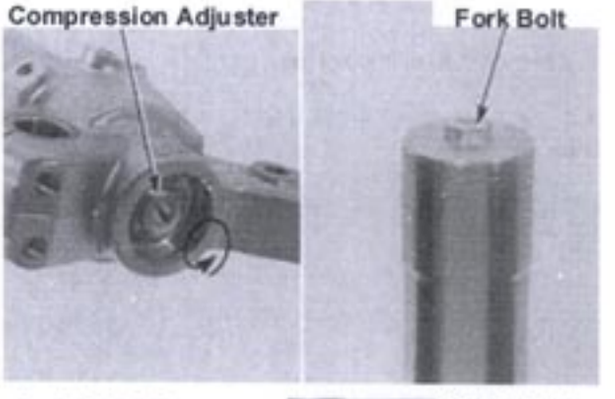
Remove the following parts:
- Fork split bolt (lower)
- Brake hose guide



Clean the fork before disassembling it, particularly around the slide pipe and the centre bolt.

Caution

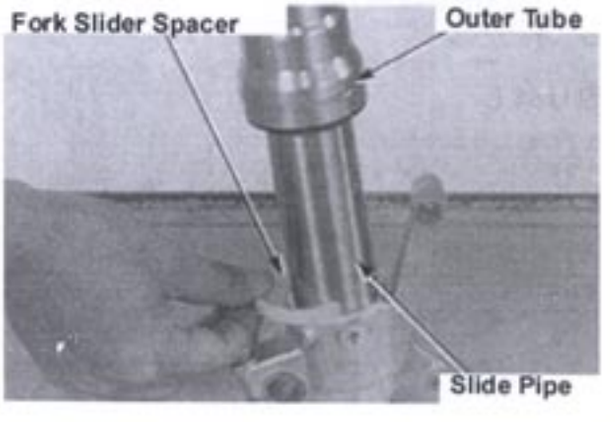
- Do not damage the slide pipe contact area and the dust seal. Use neutral detergent and sponge and rinse well with water.
- Before removing the centre bolt, set the compression adjuster to the weakest position (record the number of turns and its position).



Set the following tool above the axle holder of the slide pipe

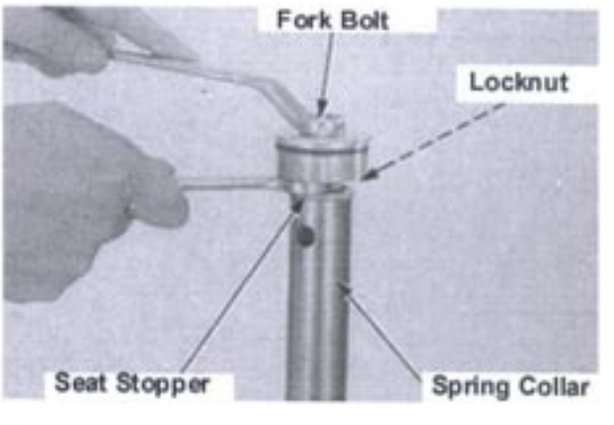
Special tool :

Fork slider spacer 07KMZ-KZ30101



Remove the fork bolt from the outer tube. Slowly push the tube to the spacer.

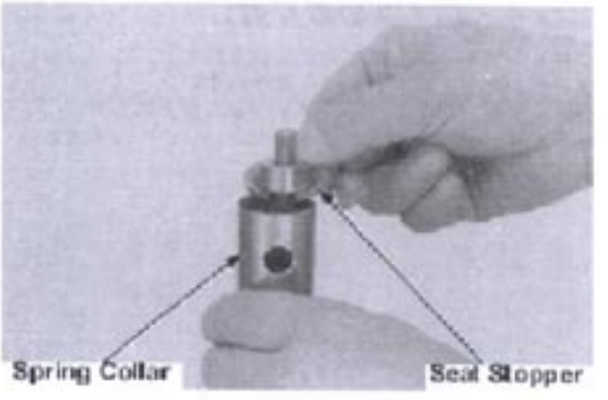
Hold the lock nut and remove the fork bolt from the piston rod.



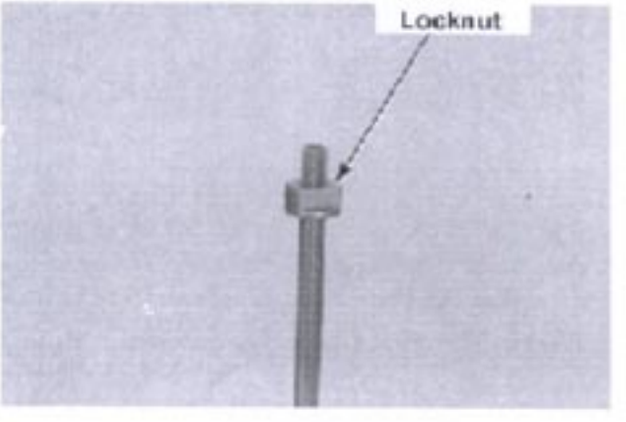
Caution

- Hold both outer tube and slide pipe when removing the fork bolt from the slide pipe. This is to prevent the slide tube coming out and damaging the bush or oil seal, or leaking oil from the side hole of the slide pipe.

Fork centre bolt removal
Remove the seat stopper and remove the spring collar.

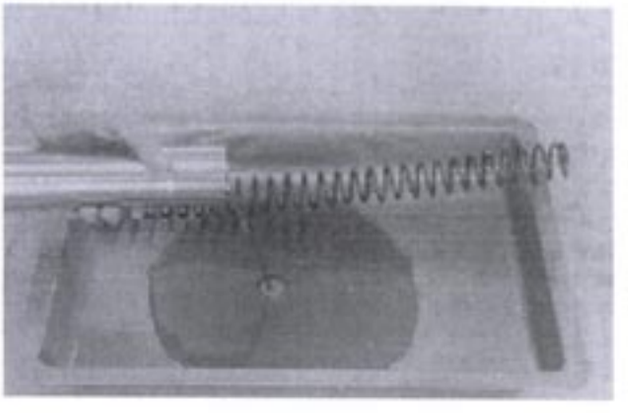


Remove the lock nut.



Remove the fork spring.
Compress the fork 8 to 10 times to drain oil.

Protect the axle holder of the slide pipe with a cloth and clamp the pipe.



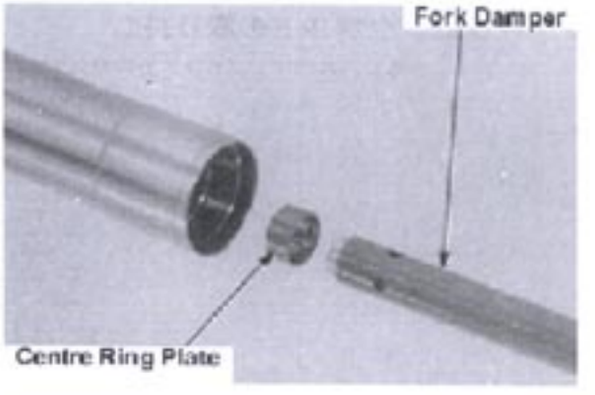
Caution

- Do not clamp too tight.
- Handle the centre bolt with extreme care, as the bolt needle is fragile.

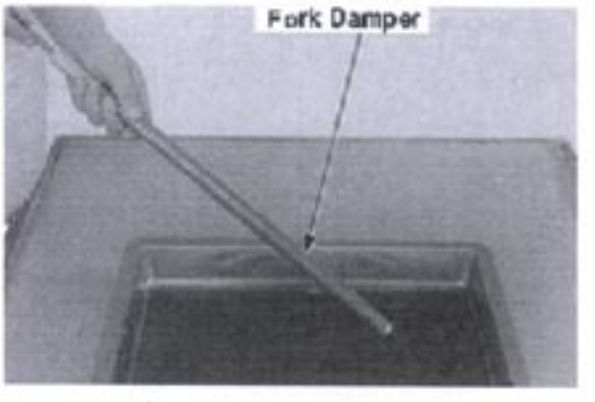
Loosen the fork bolt and remove it.
Remove the sealing washer.

Notes
If the fork cylinder turns together and you are unable to loosen the centre bolt, temporarily set the fork spring, spring collar, seat stopper, lock nut, and fork bolt to remove.

Slide pipe removal
Remove the front fork from the clamp.
Remove the fork slider spacer.
Pull out fork damper from the pipe.
Pull out centre ring plate from the pipe.



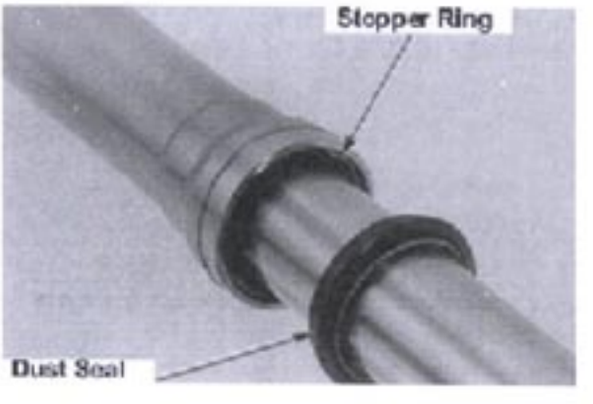
Compress the piston rod 8 to 10 times to drain oil.



Remove the dust seal to remove stopper ring.

Caution

Do not scratch the slide pipe friction area.

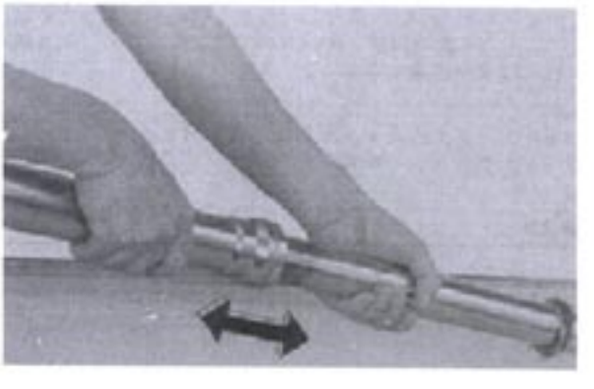


Check the smooth movement of the pipe inside the outer tube.
If it does not move smoothly, inspect the pipe for bending and bush wear/damage (11-20).
If the above parts are OK, inspect the outer tube.

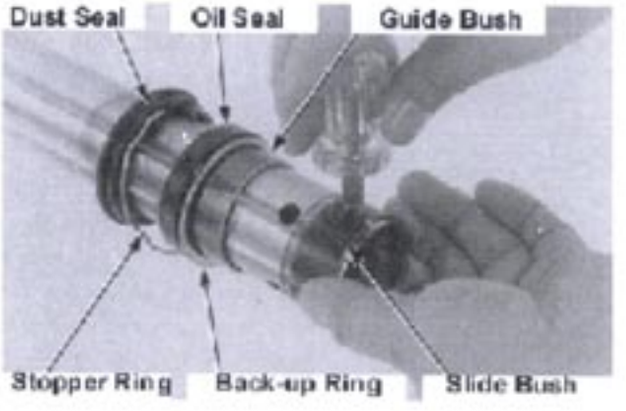
Pull out the slide pipe from the outer tube.

Caution

Repeat some strokes to gradually pull out the pipe together with its oil seal, back up ring, guide bush, and slide bush.

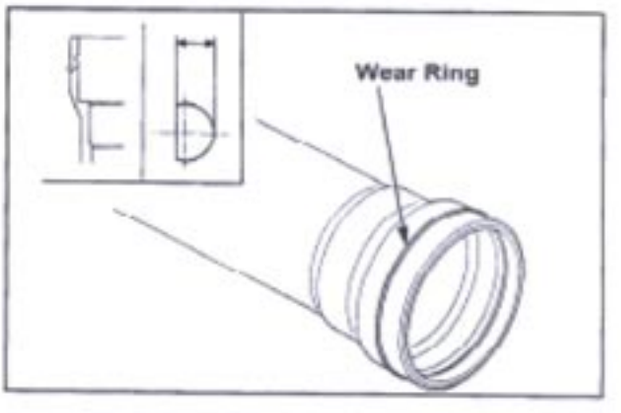


Remove the slide bush by widening its gap with a screwdriver.

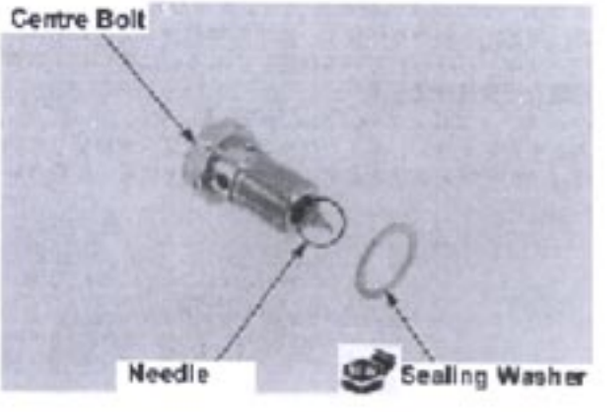


Notes
- **Do not scratch the surface coating.**
- **Do not open the gap more than necessary.**

Remove the following parts from the slide pipe:
- Guide bush
- Back up ring
- Oil seal
- Stopper ring
- Dust seal



Wear Inspection
Inspect the outer tube for its wear ring.
If the ring is worn to the level where it is flush with the outer tube surface, replace the ring.

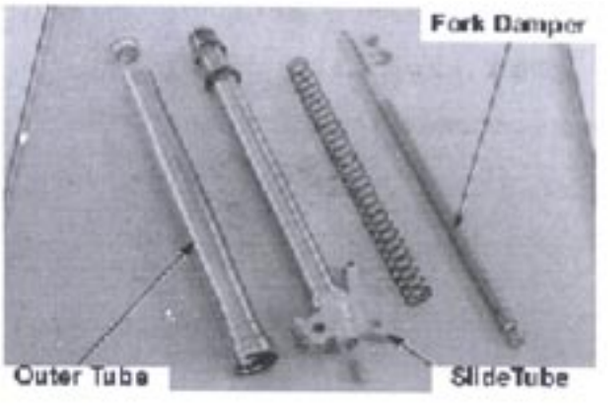


Front fork Inspection
Damaged centre bolt – Replace
Bent/damaged centre bolt needle – Replace

Caution

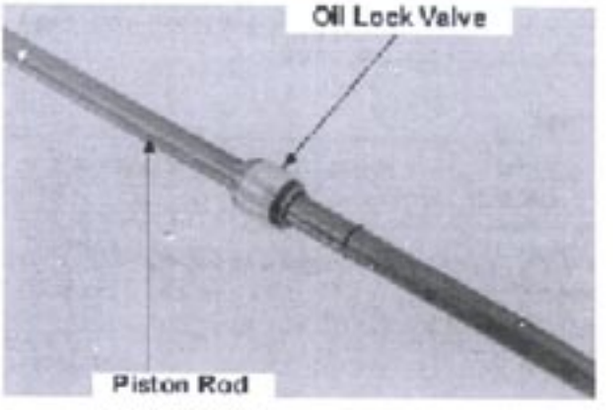
Such defects of the needle result in reducing the fork compressibility.

Replace the sealing washer with a new one.

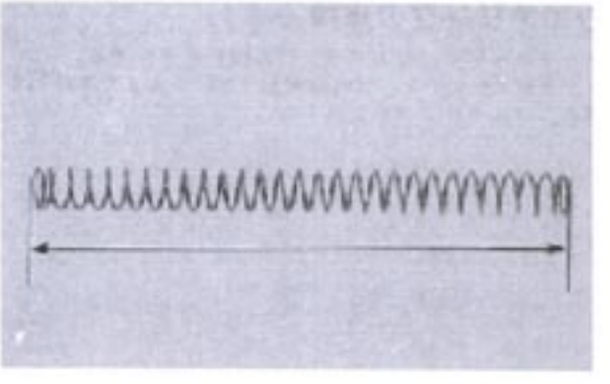


Scratch on the slider pipe outer tube contact area – Replace
Interior warpage due to deformation of the outer tube – Replace
Worn/damaged fork damper – Replace

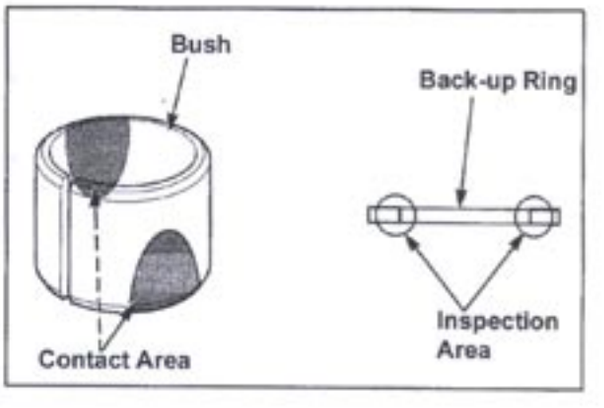
Bent/worn/damaged fork damper piston rod – Replace
Worn/damaged fork damper oil lock valve – Replace



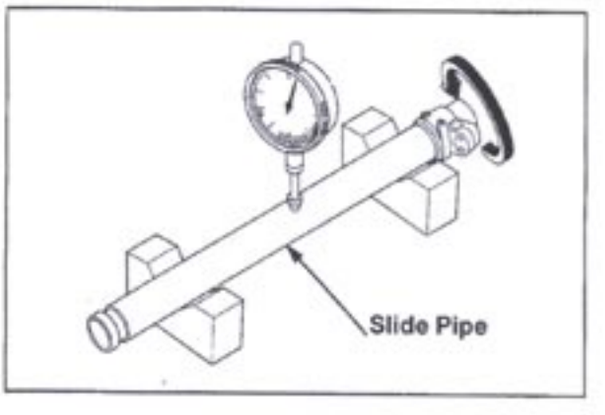
Measure the relaxed length of the fork spring.
Service limit : Replace if 481.4mm or less



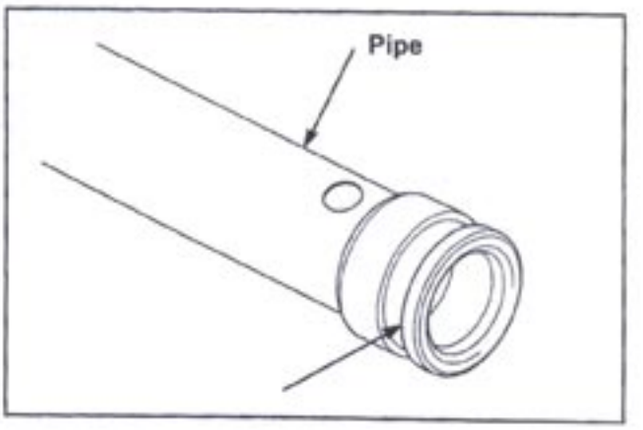
Visually inspect the slide bush and the guide bush friction surface. Replace if there is any obvious scratch or peeled coating (copper surface is exposed).
Deformed back up ring (inspection spot) – Replace
If metal particle can be seen on the slide bush or the guide bush, clean them by using the Nylon brush and the fork oil.



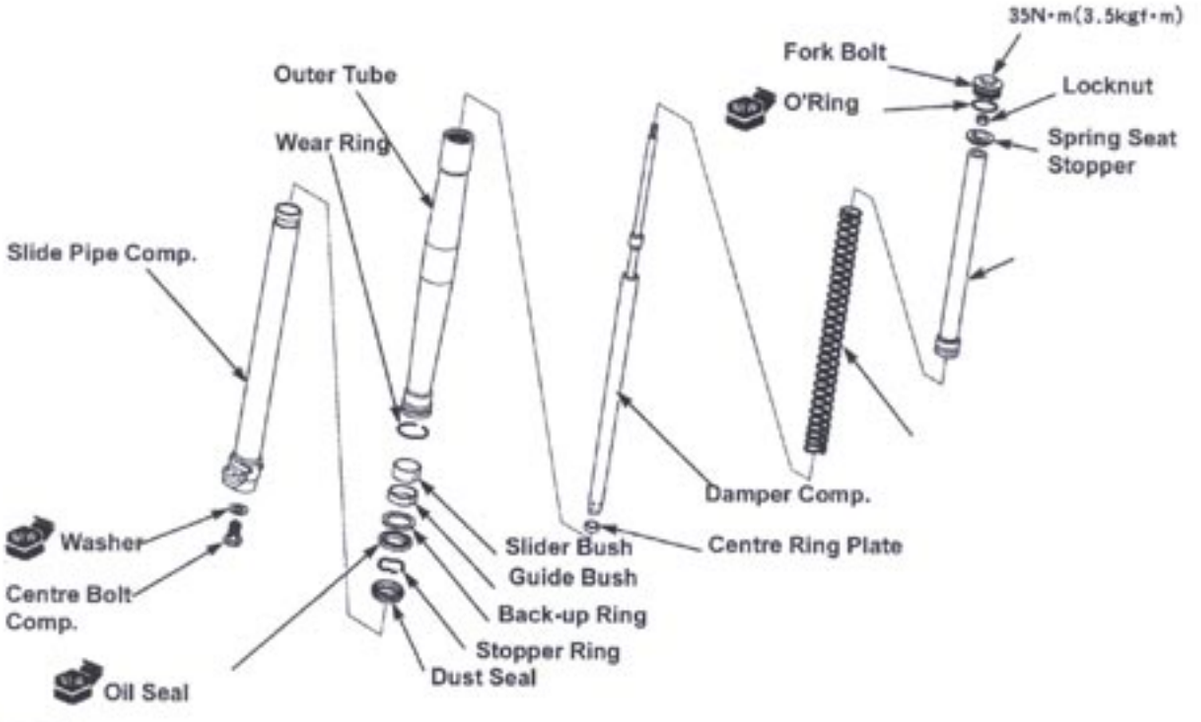
Measure the slide pipe runout.
Service limit : Replace if 0.2mm or above
Take the 1/2 of the measured value.



Visually inspect the spring collar.
Damaged pipe – Replace

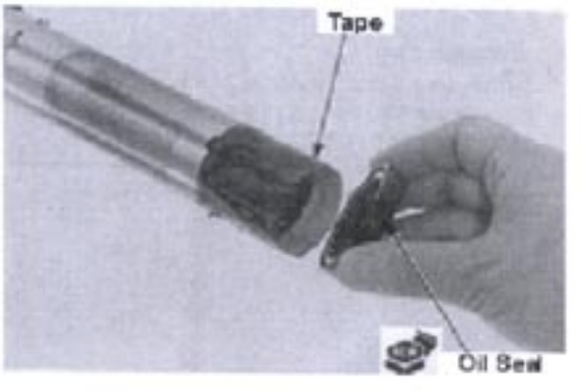


- **Oil seal installation**



Caution

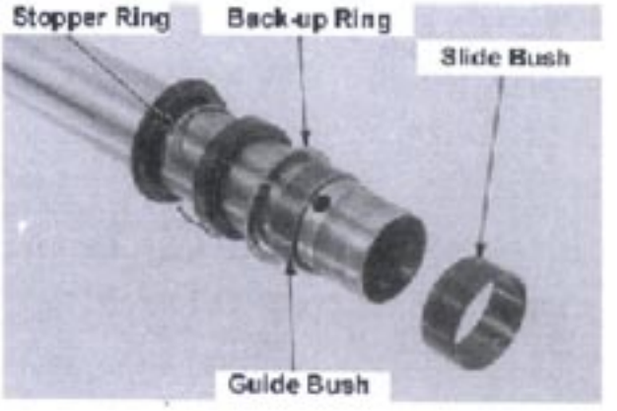
Wrap the bush installation slit and its end with vinyl tape to prevent damaging the lip when installing the dust seal and the oil seal.



Apply cushion oil to the seal lip.
Install the following parts to the slide pipe:
- Dust seal
- Stopper ring
- Oil seal

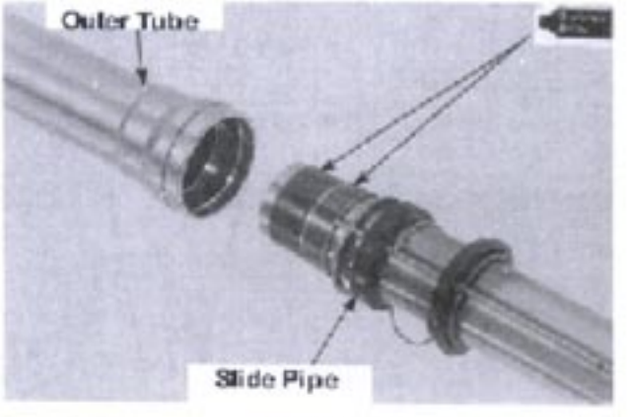
Notes
Face the marked surface of the oil seal to the dust seal.

Remove the tape.
Install the back up ring, guide bush, and the slide bush.



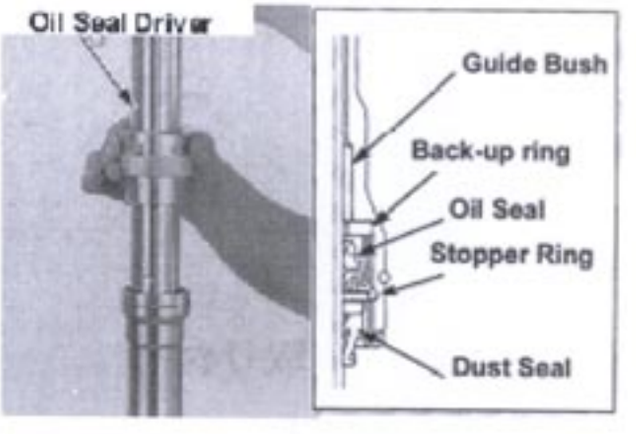
Notes
- **Clean the edge of the gap surface before installing the slide bush.**
- **If the edge is not clean, remove the unnecessary bits with a cutting knife without damaging the coating.**

Apply cushion oil to the slide bush and the guide bush and install the slide pipe to the outer tube.



Support the oil seal at the seal case holder.
Install the guide bush to the outer tube through the back up ring.
Install the oil seal to the position where the stopper ring groove can be seen.

Special tool :
Oil sea driver 07KMD-KZ30100

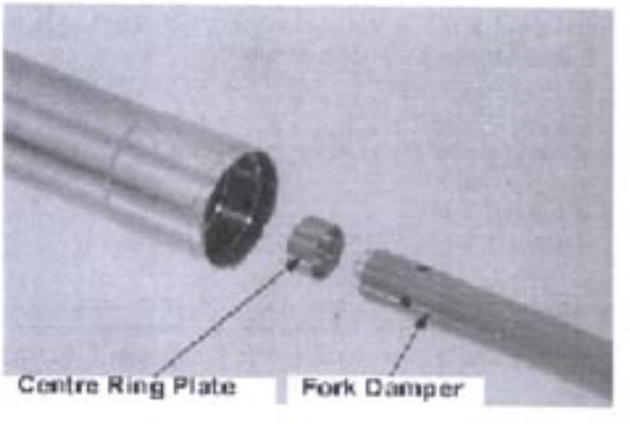


Install the stopper ring to the oil seal groove.
Install the dust seal.

Install the centre ring plate to the fork damper.

Notes
The bigger bore of the centre ring plate should face towards the fork damper.

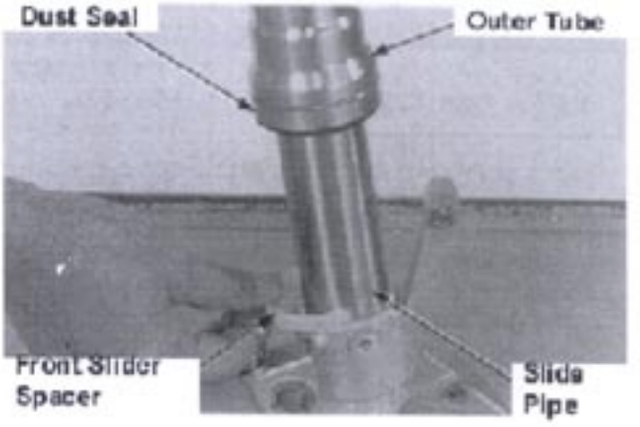
Install the fork damper to the front fork.



Fork centre bolt installation
Set the special tool between the outer tube and the axle holder.

Special tool :
Fork slider spacer 07KMZ-KZ30101

Slowly push the outer tube to the spacer.

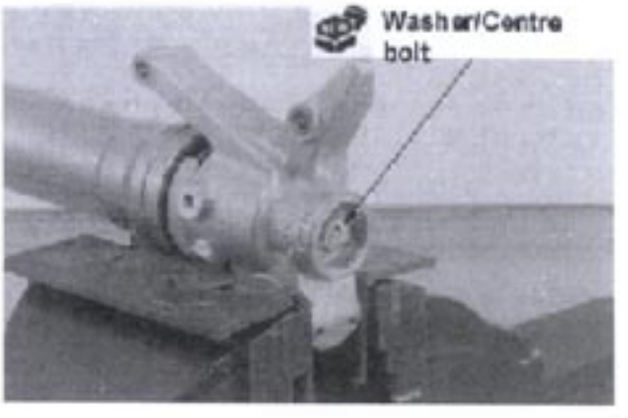


Protect the axle holder of the slide pipe with a cloth and clamp the pipe.

Caution

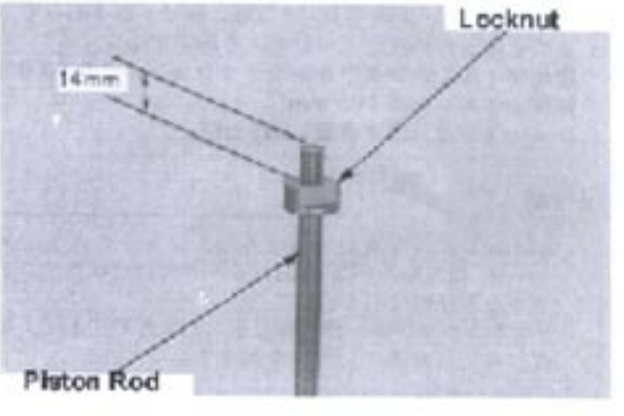
Do not clamp too tight.

Secure the centre bolt together with a new sealing washer.



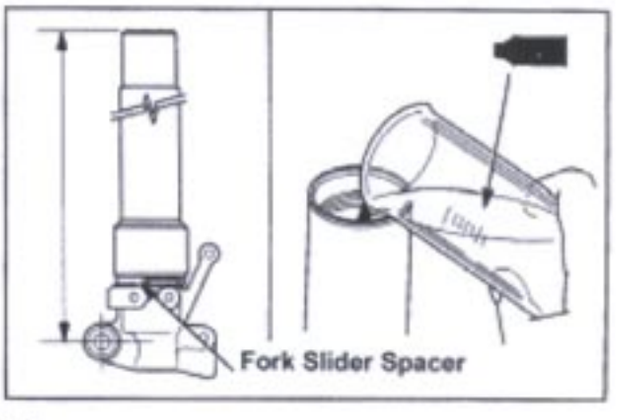
Notes
- **Set the compression adjuster to the minimum compression position.**
- **If the fork cylinder turns together and you are unable to secure the centre bolt, temporarily set the fork spring, spring collar, seat stopper, lock nut, and fork bolt to tighten.**

Fork oil refill
Set the lock nut to the piston rod and turn it into the rod for 14mm.



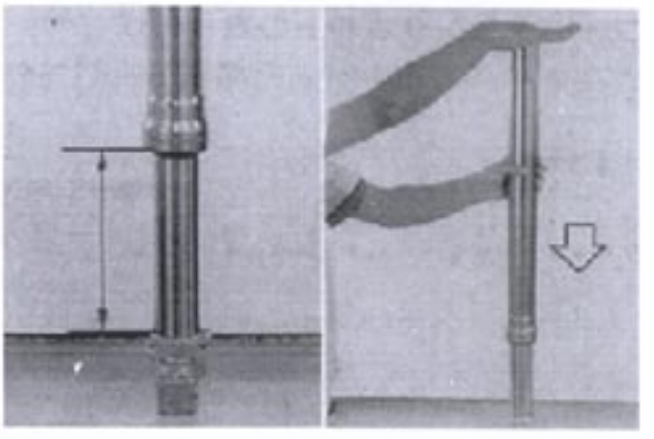
Notes
- **When measuring the oil level, fully compress the fork while the fork slider spacer is installed.**

Fill cushion oil to the half level.



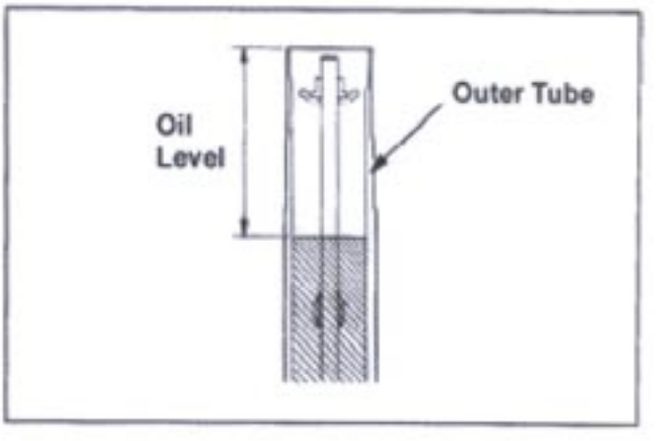
Caution

When stretching the front fork, do not pull the outer tube for more than 250mm from the axle holder.



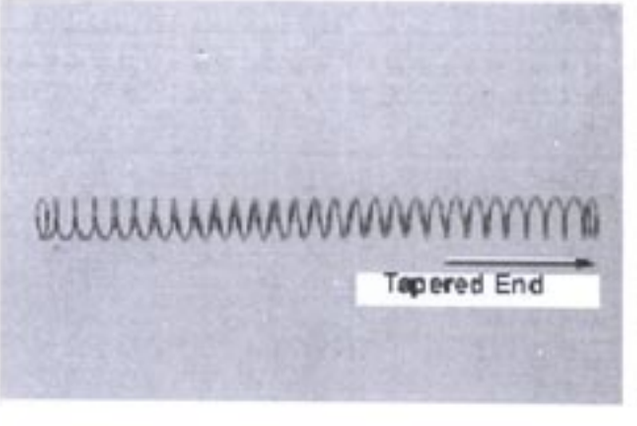
Stretch the front fork and seal the outer tube fork bolt hole with a hand and slowly compress the outer tube.
Remove your hand from the hole and stretch the fork.
Repeat the above procedure for a several times. This is to fill oil to the fork damper by pressurising the oil.

Fill remaining oil to the fork and slowly stroke the outer tube and the piston rod for 8 to 10 times each to bleed air.
Then, re-stroke the outer tube and the piston rod for another 8 to10 times and leave for at least five minutes.



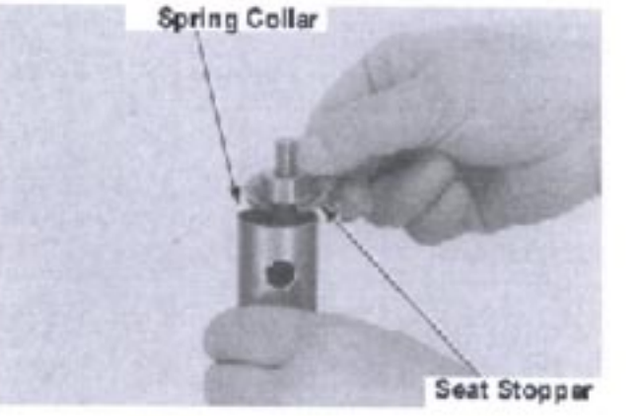
Measure the oil level once it has stabilised.
Designated oil : Genuine Honda Ultra cushion oil #10
Standard oil level : 95mm
Fork oil standard capacity : 693cm³

Notes
- **When measuring the oil level, install the fork slider spacer (07KMZ-KZ30101) and fully compress the fork.**
- **Also, press the piston rod all the way in and set the fork vertical when measuring.**

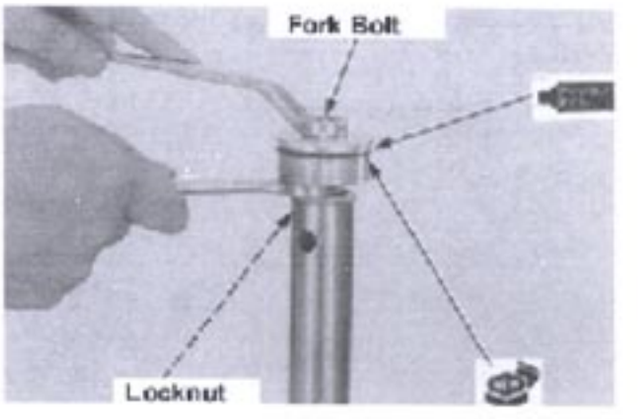


Fork bolt installation
Install the fork spring by setting its tapered end upwards.

Pull out the piston rod from fully-pressed-in position by using a jig.
Install the spring collar and compress the fork spring by the collar to install the seat stopper.

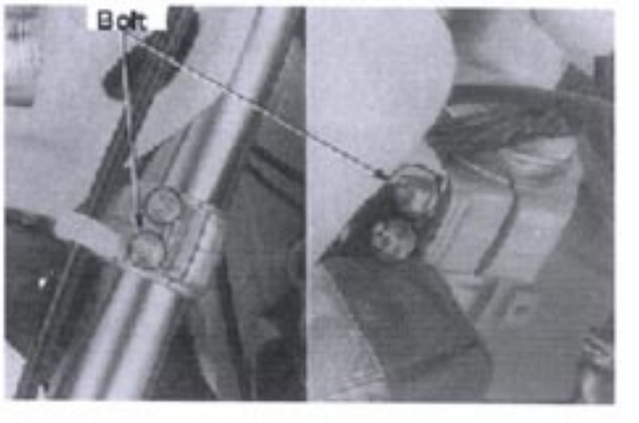


Hold the lock nut and tighten the fork bolt until it touches the lock nut.
Hold the lock nut and secure the fork bolt.



Install the fork and temporally secure the bottom bridge split bolts.
Secure the fork bolts.

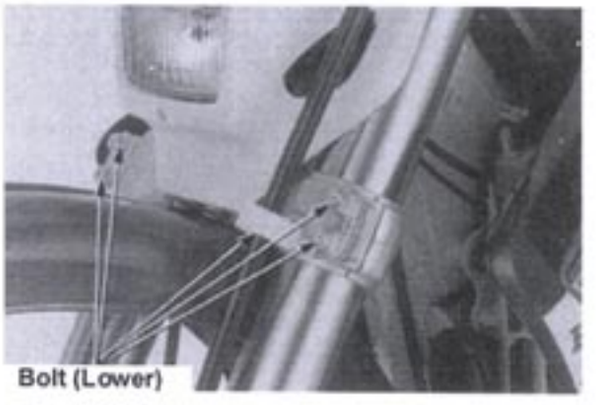
Loosen the bottom bridge split bolts and install the front fork (11-26).



Notes
Re-wind the compression adjuster to the recorded turns.

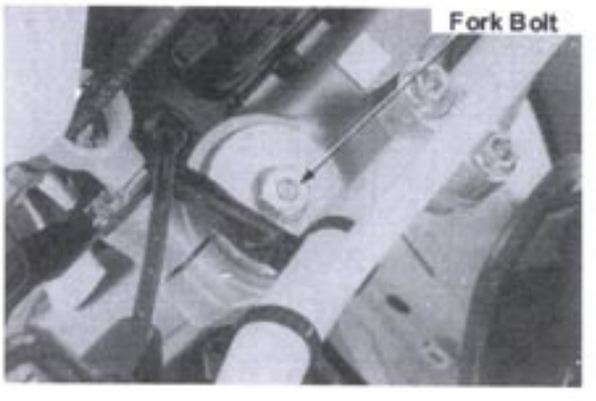
Installation
Install the fork and secure the brake hose guide and the fork split bolt (lower).

Notes
Align the cutout of the outer tube top with the top bridge top surface.



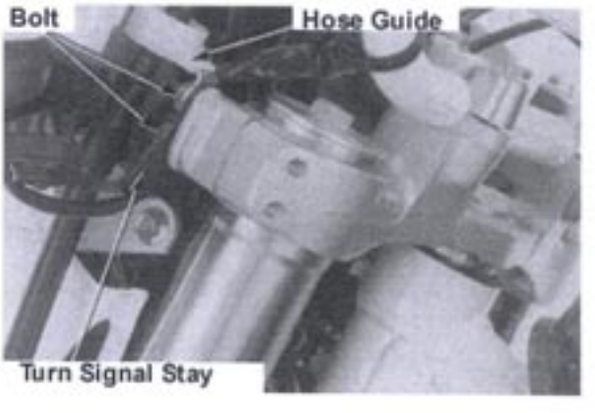
Secure the fork bolt if the fork has been disassembled.

Torque setting : 35Nm (3.5kgfm)

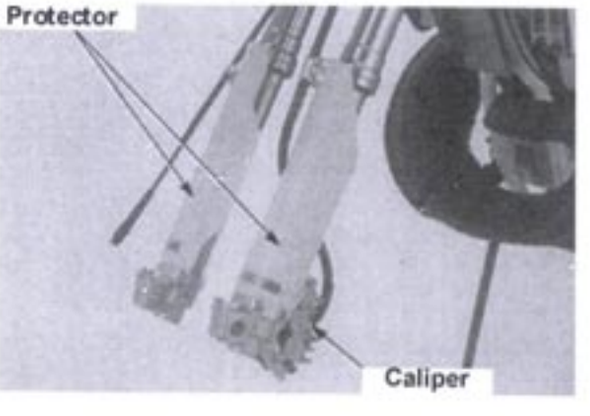


Secure L/R front turn signal stay, brake hose guide, and the fork split bolts (upper).

Torque setting : 32Nm (3.2kgfm)



- Front brake caliper (left) (13-8)
- Front wheel (11-9)
- Protector

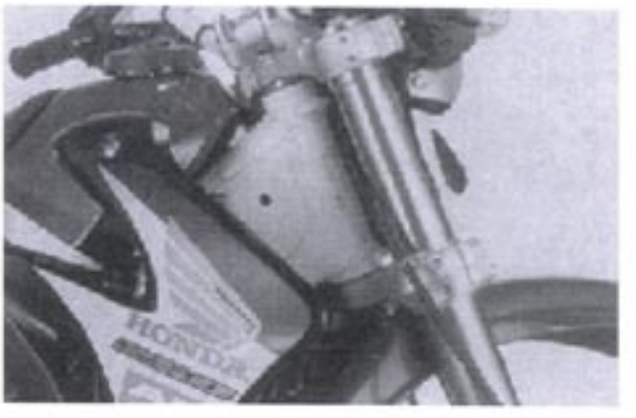


Steering stem

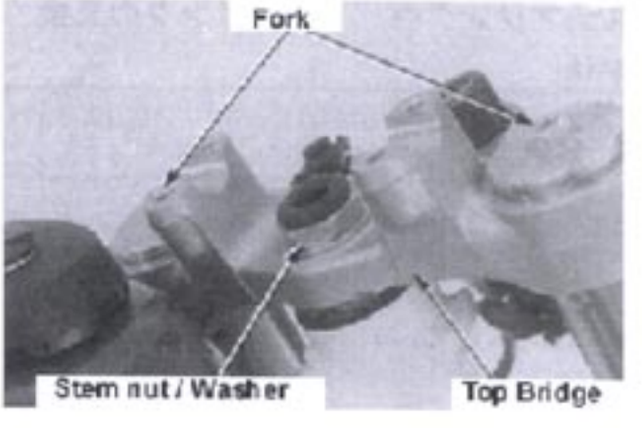
Removal

Remove the following parts:

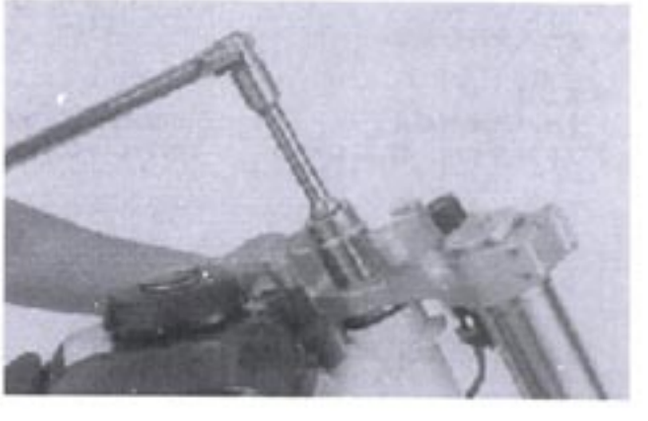
- Front wheel (11-9)
- Front fender (2-2)
- Head lamp case
- Speedometer cable
- Speedometer
- Fork split bolt (upper/lower)
- Brake hose guide (left)
- L/R front turn signal stay



- Handlebar
- Steering stem nut
- Washer

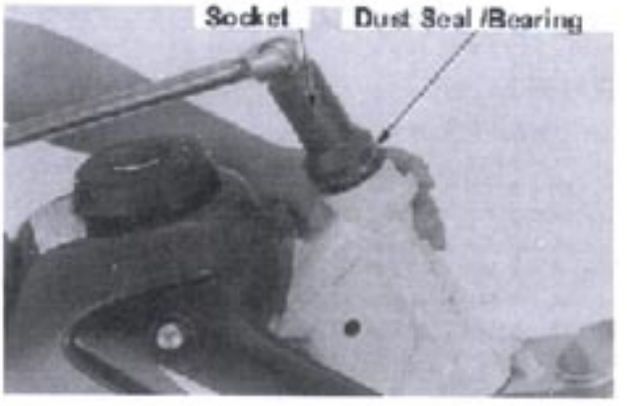


- Top bridge
- Fork (11-15)

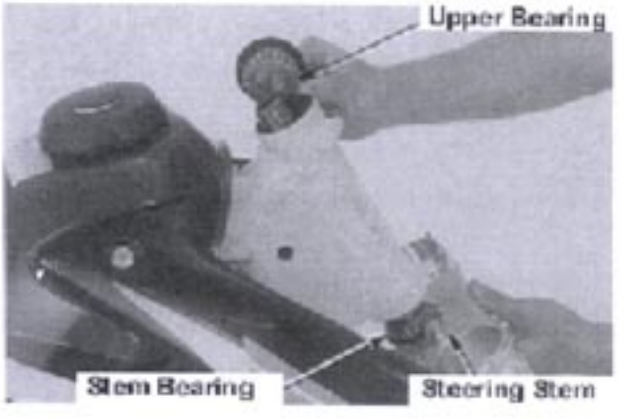


Remove the following parts:
- Steering top thread

Special tool : Steering stem socket
07916-KA50100
- Upper dust seal
- Upper bearing



Remove the steering stem.
Damaged upper bearing – Replace
Damaged steering head pipe bearing outer race – Replace
Damaged stem bearing – Replace



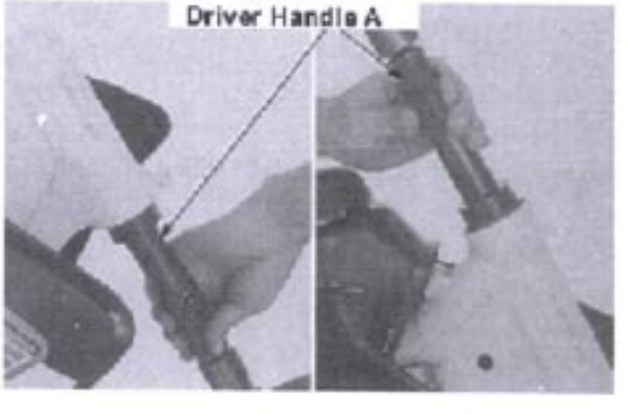
Steering head bearing removal

Notes
When replacing the bearing, change the bearing and its outer race at the same time.

Remove the steering head upper/lower outer races.
Special : Oil seal remover
07948-4630100

Install the steering head upper/lower outer races by using the following tools:

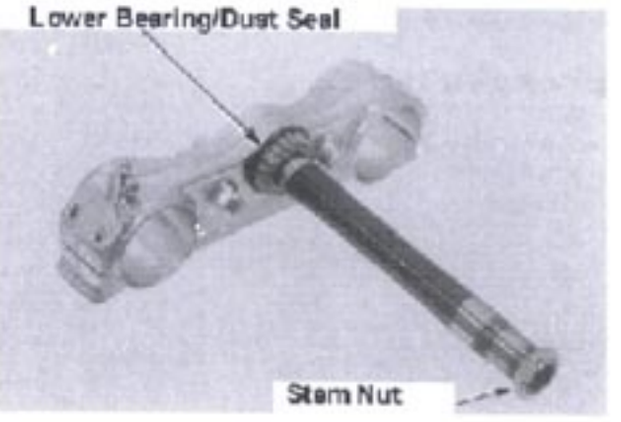
Special tools :
Driver handle A 07749-0010000
Outer driver 42x47mm 07746-0010300



Remove the lower bearing and the dust seal.

Caution

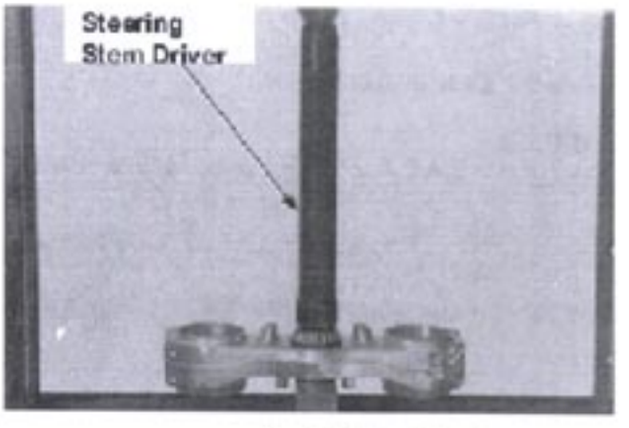
- Temporarily set the stem nut to protect the thread.
- Do not damage the stem.



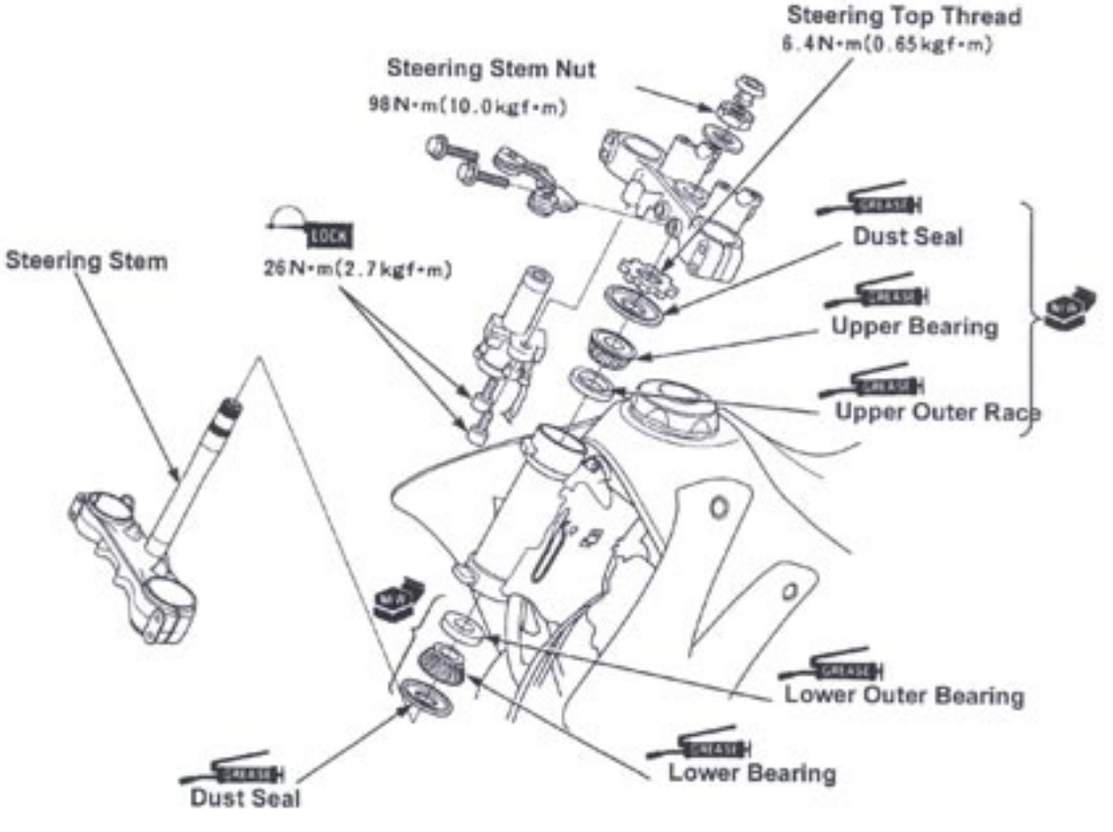
Install a new dust seal, lower bearing inner race, and a lower bearing.

Special tool :

Steering stem driver 07946-4300101

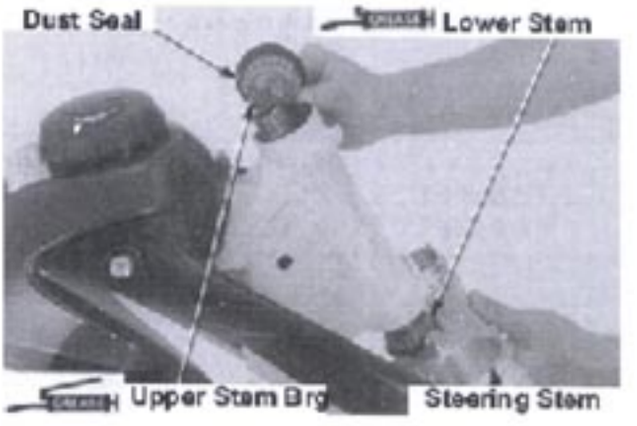


Installation



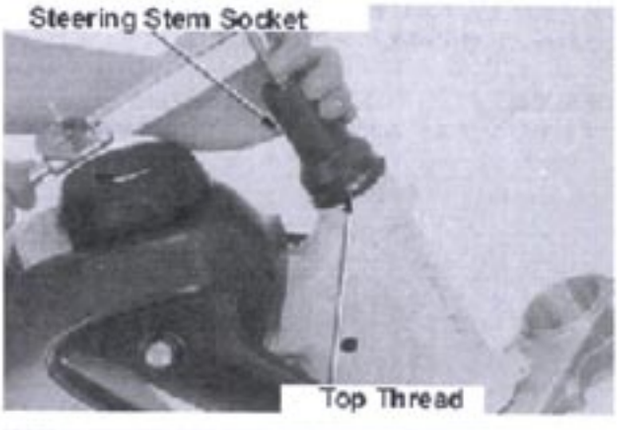
Apply grease to the upper/lower bearings.

Install the following parts:
- Steering stem
- Upper bearing
- Dust seal



- Steering top thread

Torque setting : 6.4Nm (0.65kgfm)
Special tool : Steering stem socket 07916-KA50100



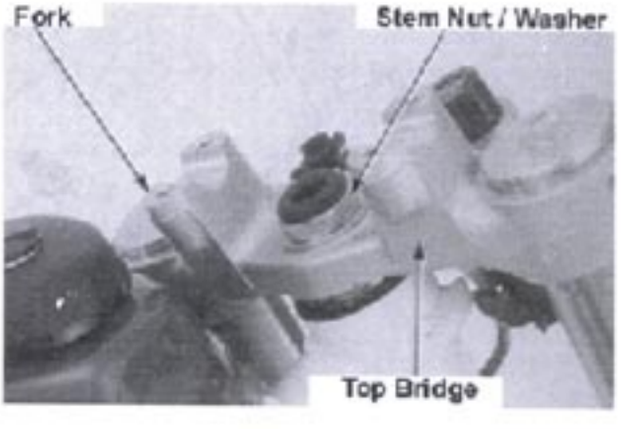
Turn the stem to each side at least five times to smoothen the bearing.
Re-tighten the steering top thread.

Torque setting : 6.4Nm (0.65kgfm)

Special tool :
Steering stem socket 07916-KA50100

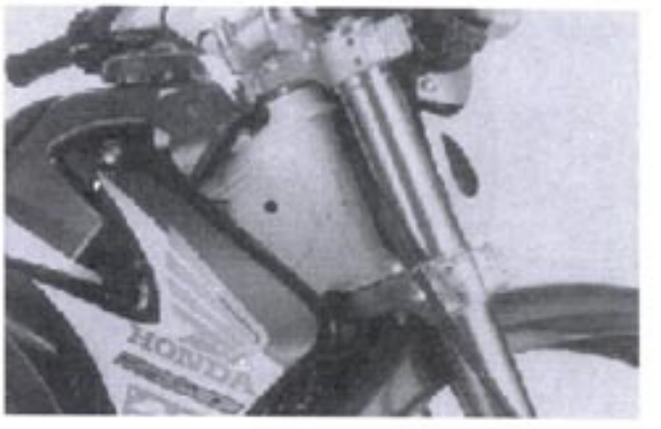
- Top bridge
- Fork (11-15)
- Washer
- Steering stem nut

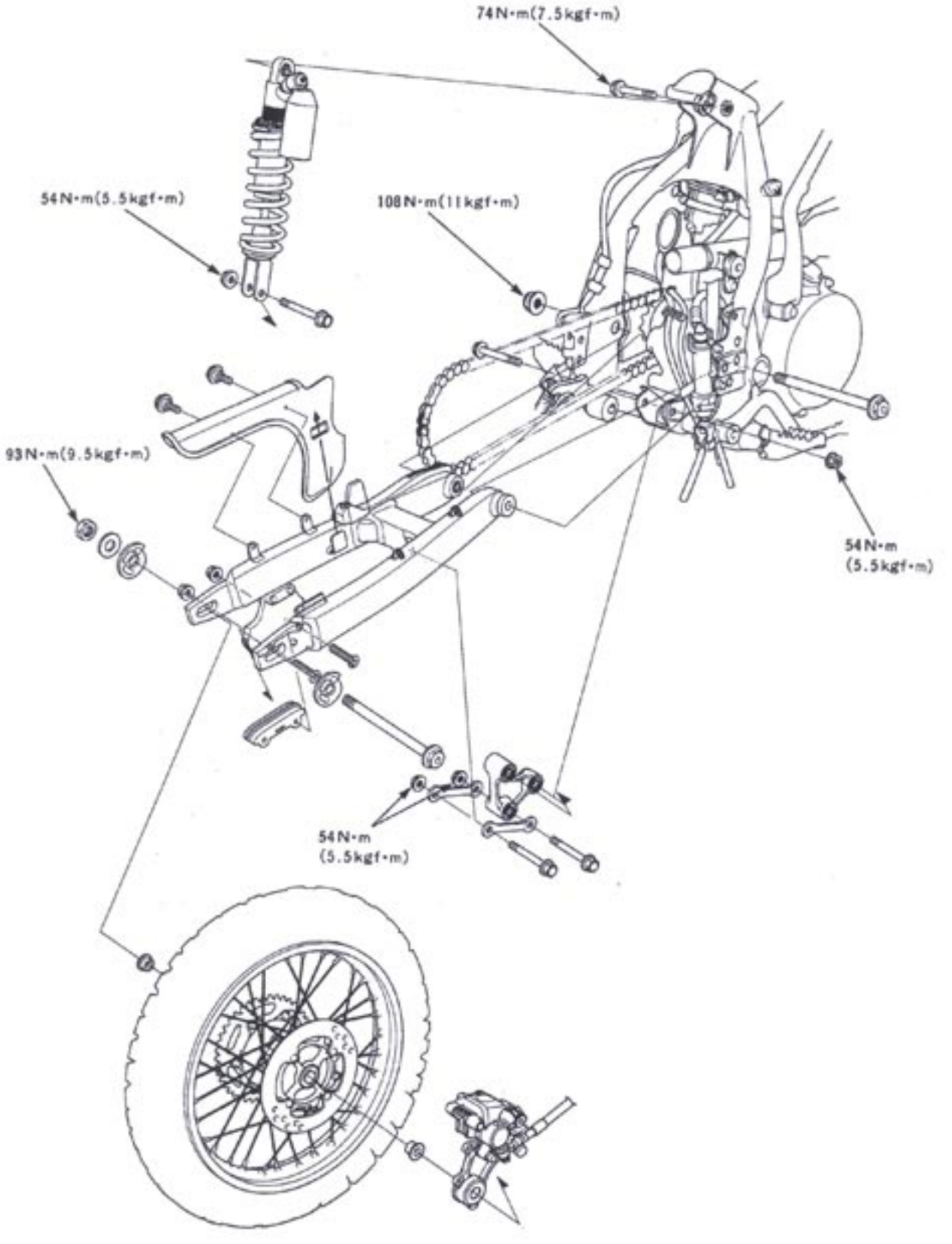
Torque setting : 98Nm (10.0kgfm)



Install the following parts:

- Handlebar (11-10)
- L/R front turn signal stay
- Brake hose guide (left) (11-26)
- Speedometer
- Speedometer cable
- Headlamp hose
- Fork split bolt (upper/lower) (11-26)




74N·m(7.5kgf·m)
54N·m(5.5kgf·m)
108N·m(11kgf·m)
93N·m(9.5kgf·m)
54N·m
(5.5kgf·m)
54N·m
(5.5kgf·m)

General

Warning

Keep brake discs and pads away from oil or grease. Should the discs or pads become contaminated, replace the pads and de-grease the discs.

- When servicing the rear wheel and suspension, support the bottom of the engine with jacks.
- Do not operate a brake pedal when the front wheel is detached.
- Refer to Sec. 13 for the brake system maintenance.
- Do not step on spokes and avoid overstressing the wheel. Avoid damaging the wheel, too.
- When removing the tyre from its rim, use special "Tyre lever" and "Rim protector" to avoid damaging the rim.

Specification

Item	Specification	Service limit
Rear wheel Axle runout	-	0.2
Rim deflection Radial	2.0	-
Axial	2.0	-
Tyre Tread	-	3.0
Pressure	150kPa (1.50kgf/cm²)	-
Drive chain Slack	30-40	-
Size /Links RK	520MOZ9/110LE	-
DID	520VC5/110LE	-
Drive chain slider thickness	-	Wear limit
Rear cushion spring standard set length	232.4 (when the cushion is free)	-

Torque Settings

Driven sprocket nut	32Nm (3.3kgfm)
Rear brake disc bolt	42Nm (4.3kgfm) Replace when removed
Rear axle nut	93Nm (9.5kgfm)
Spoke nipple	2.5-5Nm (0.25-0.5kgfm)
Rear brake hose guide screw	4.2Nm (0.43kgfm) Replace when removed
Rear cushion bolt (upper)	74Nm (7.5kgfm)
(lower)	54Nm (5.5kgfm)
Cushion connecting rod nut	
(cushion arm end)	54Nm (5.5kgfm)
(frame end)	54Nm (5.5kgfm)
Cushion arm nut (swing arm end)	54Nm (5.5kgfm)
Swing arm pivot nut	108Nm (11kgfm)

Special tools

Bearing remover set 15mm	07936-KC10000
- Bearing remover 15mm	07936-KC10200
- Remover handle	07936-KC10100
- Remover weight	07741-0010201
Bearing remover 17mm	07936-3710300
- Remover handle	07936-3710100
- Remover weight	07741-0010201
Needle bearing remover	07946-KA50000
Driver shaft	07946-MJ00100
Spherical bearing driver	07946-KA30200
Bearing remover shaft	07746-0050100
Bearing remover head 17mm	07746-0050500
Driver handle A	07749-0010000
Outer driver 24x26mm	07746-0010700
Outer driver 37x40mm	07746-0010200
Outer driver 42x47mm	07746-0010300
Pilot 15mm	07746-0040300
Pilot 17mm	07746-0040400

Troubleshooting

Rear wheel deflection
- Deformed wheel rim
- Damaged wheel bearing
- Tyre failure
- Pivot or friction parts fault/no lubrication
- Loose rear axle mount
- Low tyre pressure

Resistance in wheel rotation
- Faulty wheel bearing
- Deformed rear axle
- Brake binding (13-3)

Too soft rear suspension
- Deformed cushion spring
- Faulty rear cushion damper

Too hard rear suspension
- Bent rear cushion damper rod
- Too high tyre pressure
- Pivot or friction parts fault/no lubrication

Noise from the rear suspension
- Rear cushion contact
- Loose rear suspension mount

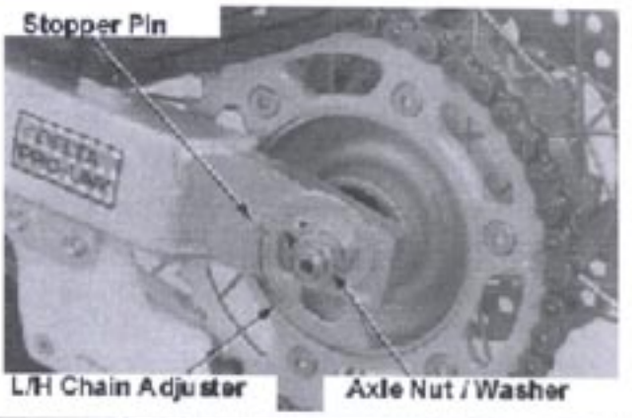
Rear wheel

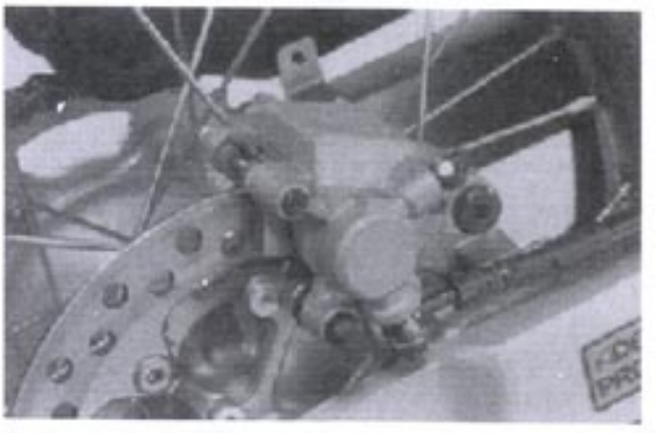
Removal

Support the bottom of the engine to lift the rear wheel.
Loose rear axle nut and fully wind back Left/Right chain adjuster.
Move the rear wheel forward to maximise the drive chain slack.
Unhook the drive chain from the driven sprocket.
Remove the following parts:

- Axle nut
- Washer
- Left chain adjuster
- Axle shaft
- Right chain adjuster

Remove the rear wheel.
Remove the rear brake caliper.

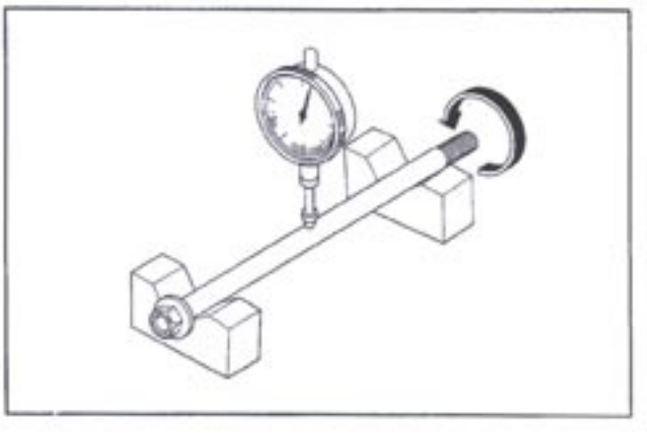




Notes

- **Do not operate the brake pedal after removing the brake caliper.**
- **Do not sling the brake caliper by the hose.**

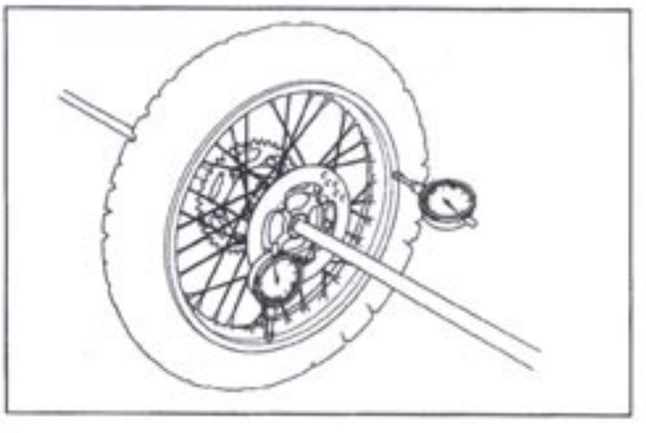
Axle runout check
Support the rear axle shaft with Vee-blocks to measure its runout.



Service limit :
Replace if 0.2mm or above
Take the 1/2 of the measured value.

Wheel rim inspection

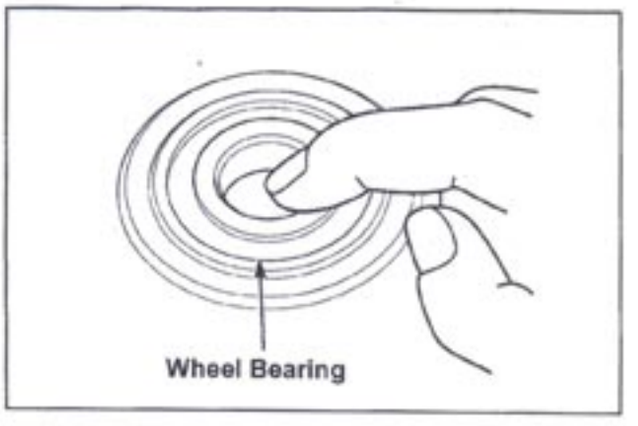
Slowly rotate the wheel to measure the wheel rim runout with a dial gauge.



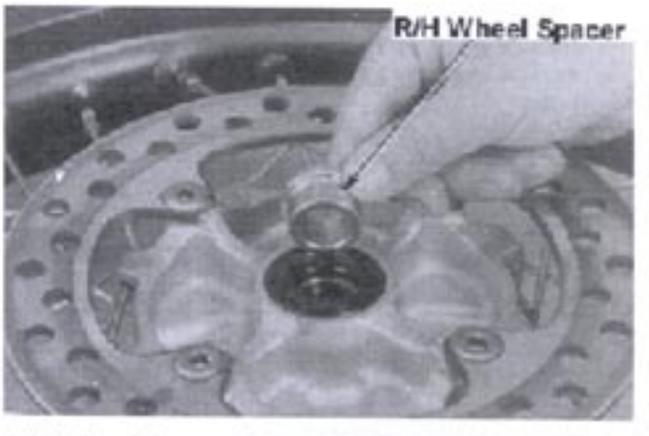
Service limit : Axial :
Replace if 2.0mm or above
Radial : Replace if 2.0mm or above
Replace if there is any spot deformation.
Inspect spokes for bending, loose fitting, and damage.

Wheel bearing inspection
Rotate the wheel bearing inner race to check its smooth rotation. If the rotation is not smooth or there is a loose fitting on its outer race and the hub, replace with a new one.

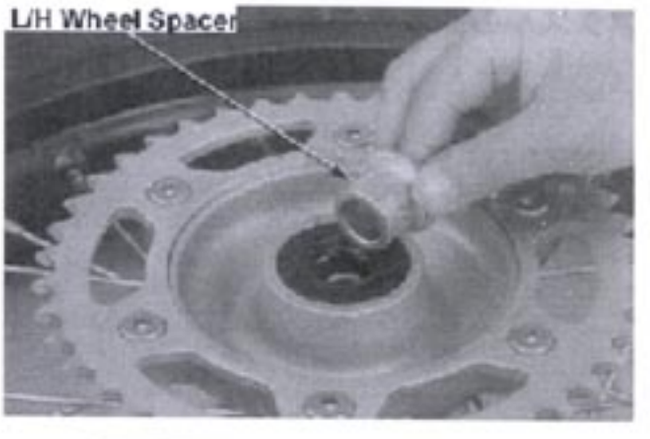
Notes
Replace both left and right bearings at the same time.



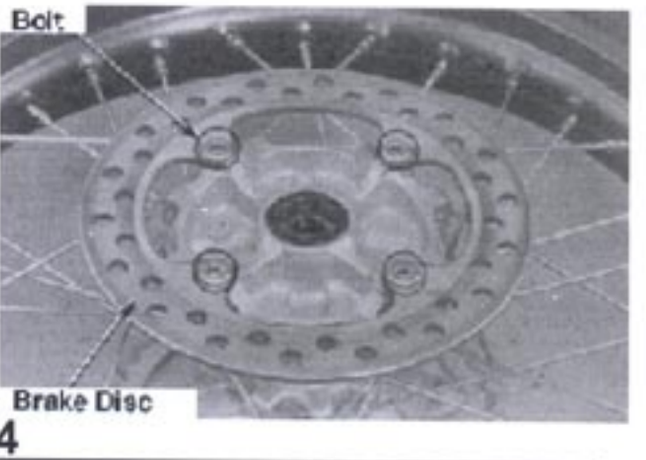
Disassembly
Remove the following parts:
- Right wheel collar



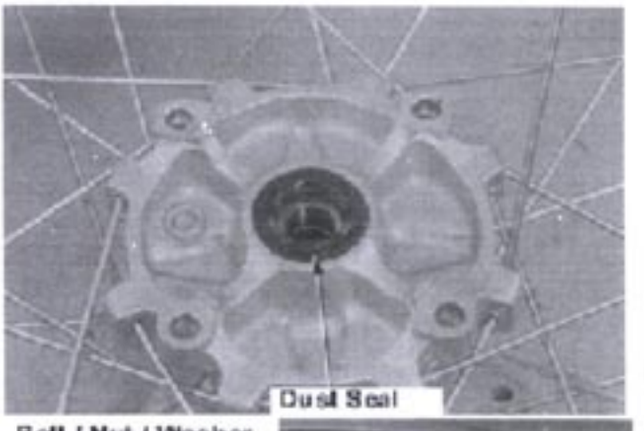
- Left wheel collar



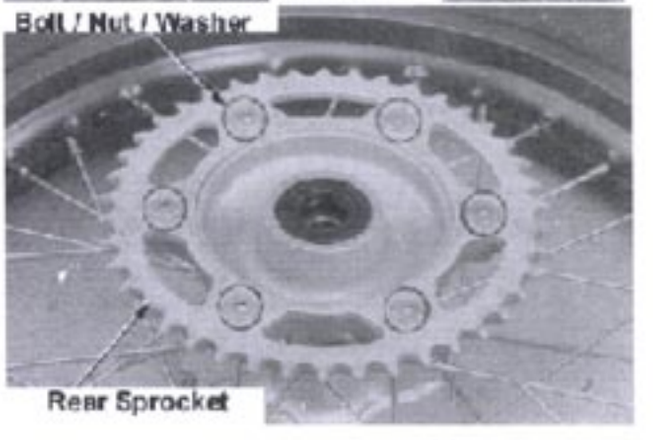
- Rear brake disc bolt
- Rear brake disc



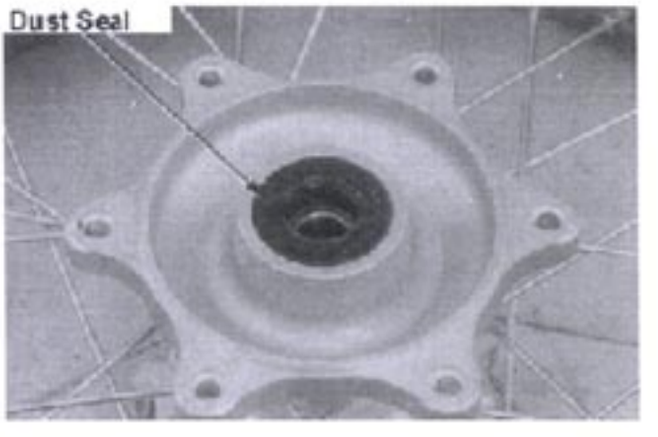
Remove the following parts:
- Right dust seal



- Driven sprocket bolt/nut
- Washer
- Driven sprocket



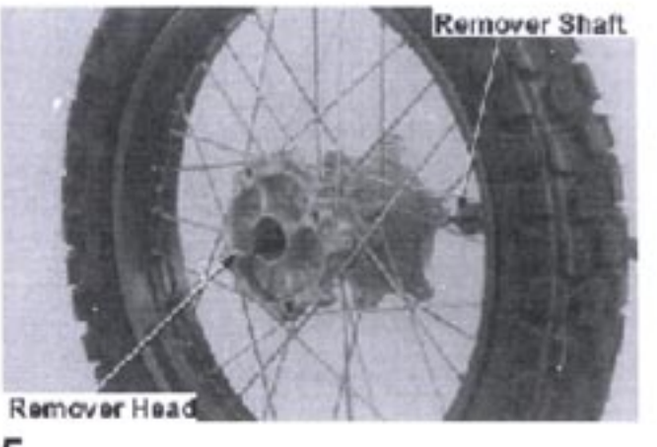
- Left dust seal



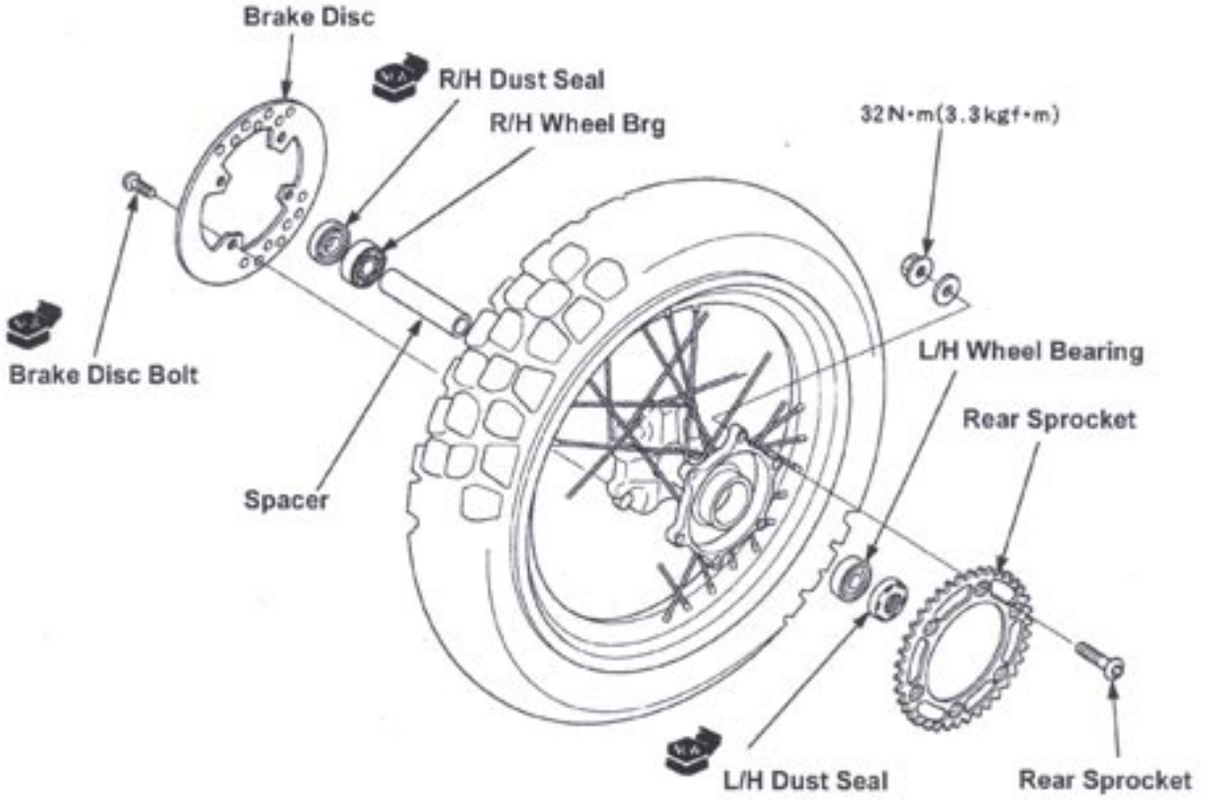
Remove the bearing and the distance collar with the following tools:

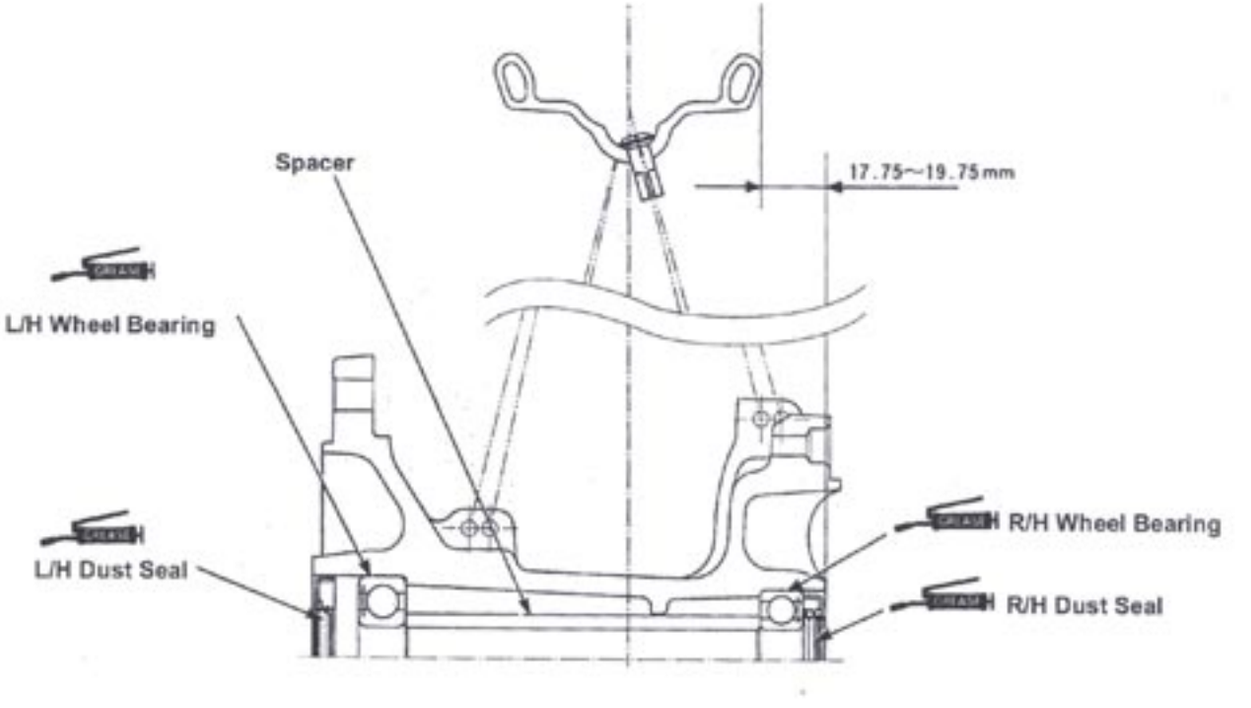
Special tools:
Bearing remover shaft
- 07746-0050100

Bearing remover head 17mm
- 07746-0050500



Assembly


Brake Disc
R/H Dust Seal
R/H Wheel Brg
32N·m(3.3kgf·m)
Brake Disc Bolt
L/H Wheel Bearing
Rear Sprocket
Spacer
L/H Dust Seal
Rear Sprocket

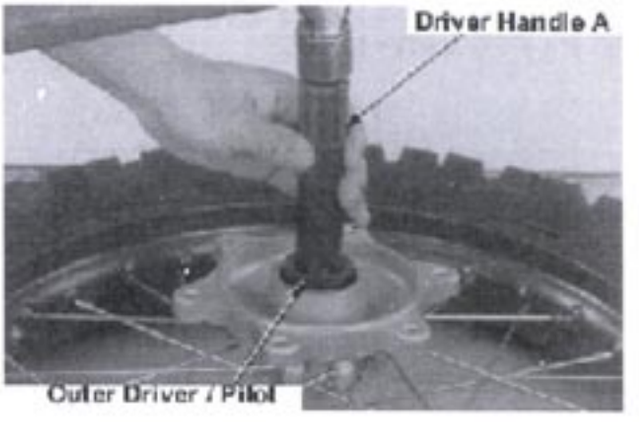

Spacer
17.75~19.75mm
GREASE
L/H Wheel Bearing
GREASE
L/H Dust Seal
GREASE
R/H Wheel Bearing
GREASE
R/H Dust Seal

Apply grease to the wheel bearing.

Install the left wheel bearing to the wheel with the following tools:

Special tools :

Driver handle A	07749-0010000
Outer driver 42x47mm	07746-0010300
Pilot 17mm	07746-0040400



Notes
- **The sealed surface of the bearing should face outside.**
- **Do not tilt the bearing when installing.**

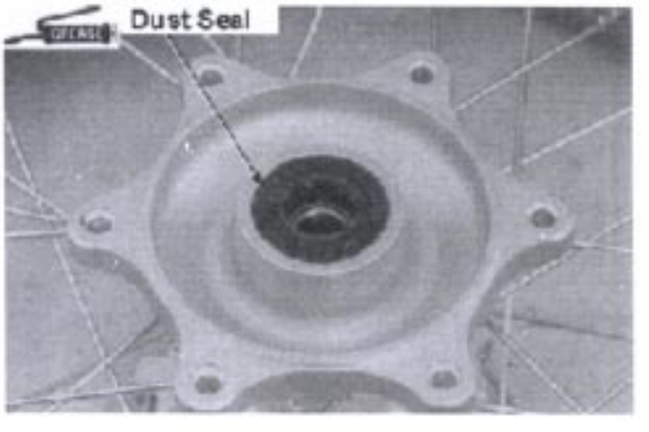
Install distance collar.

Install the right wheel bearing to the wheel with the following tools:

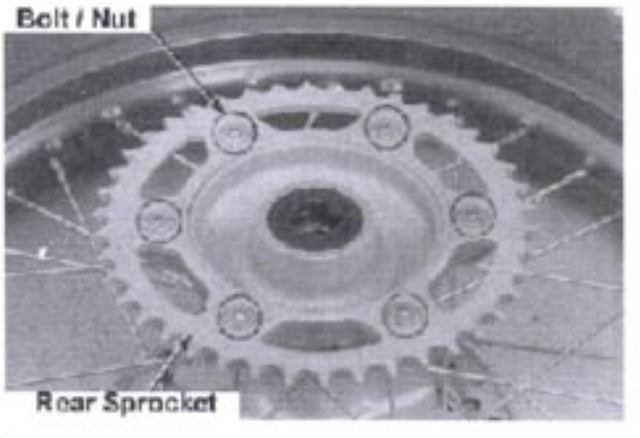
Special tools :

Driver handle A	07749-0010000
Outer driver 37x40mm	07746-0010200
Pilot 17mm	07746-0040400

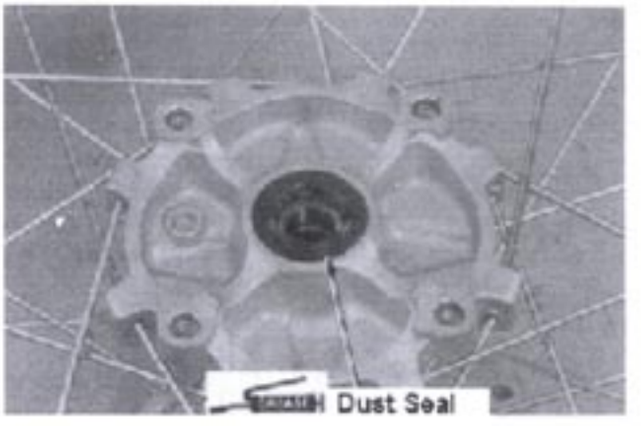
Apply grease to the left dust seal lip.
Install the left dust seal.



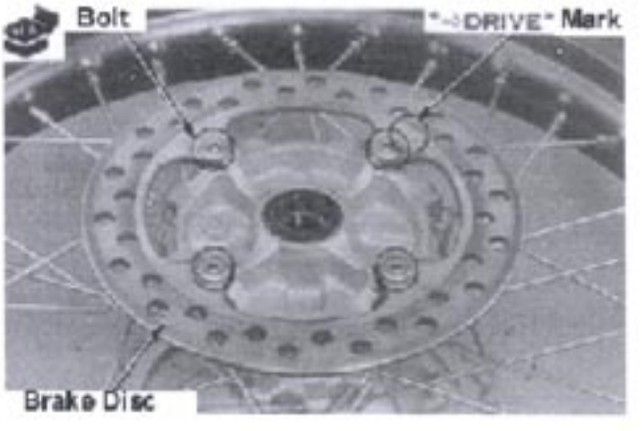
Install the driven sprocket.
Install the driven sprocket bolt.
Install the washer and secure the nut.
Torque setting : 32Nm (3.3kgfm)



Apply grease to the right dust seal lip.
Install the right dust seal.



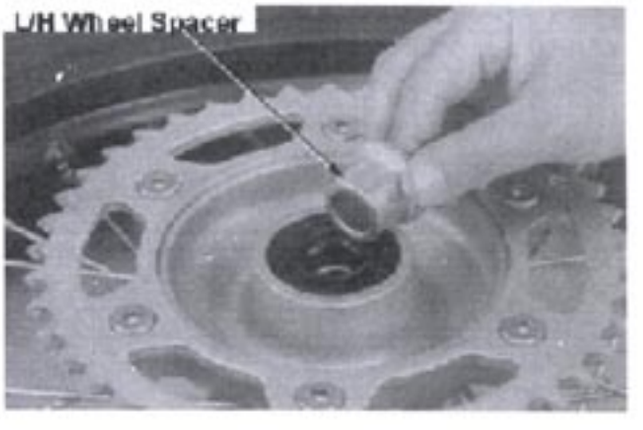
Install the rear brake disc.



Notes
The "DRIVE" mark on the disc should face outside.

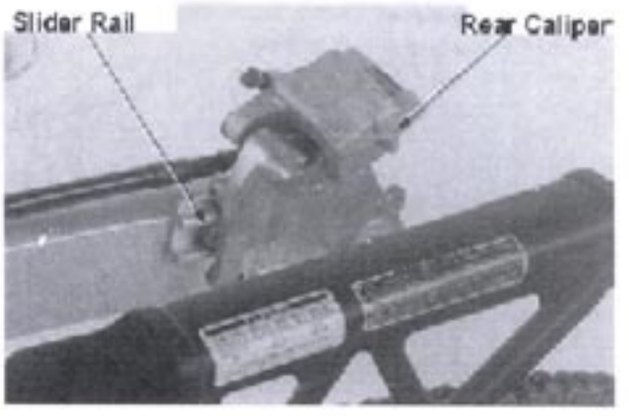
Secure new rear brake disc bolts.
Torque setting : 42Nm (4.3kgfm)

Install the left wheel collar.

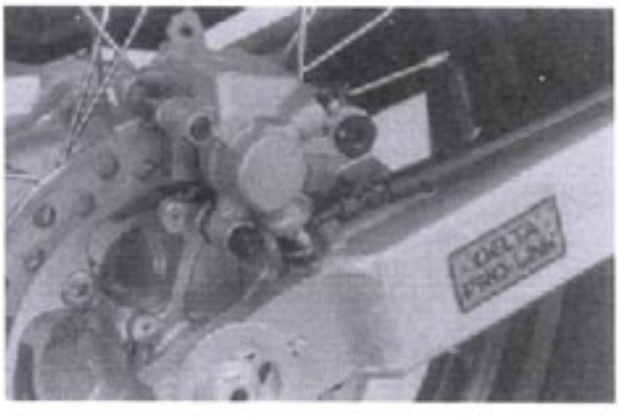


Install the right wheel collar.

Installation
Set the rear caliper bracket to the slide rail on the swing arm.



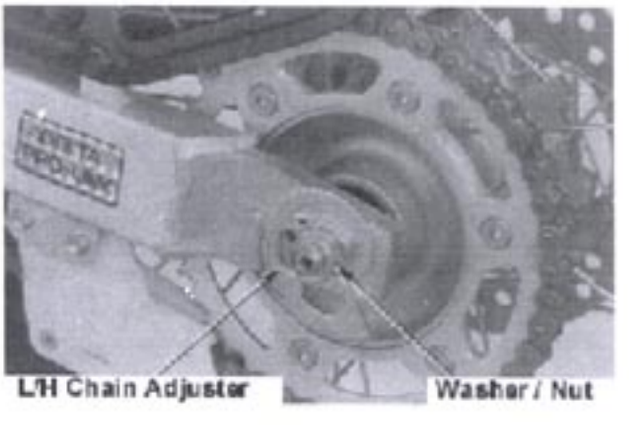
Install the rear wheel and set the right chain adjuster and the axle shaft.



Notes	Check the position of the pads.

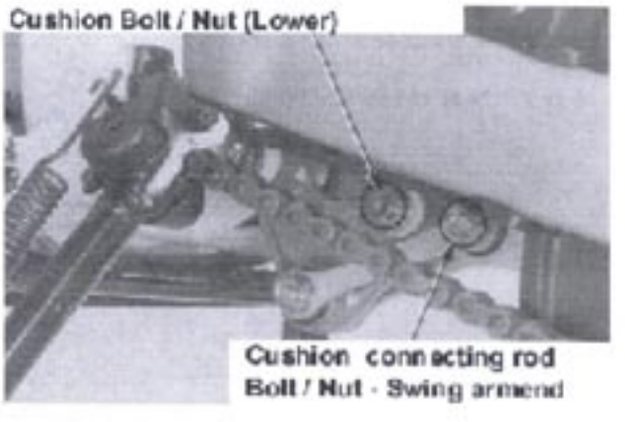
Install the drive chain to the driven sprocket.
Move the rear wheel to the front and set it to the left/right chain adjusters, washer/axle nut, and the rear axle shaft.
Adjust the drive chain slack (3-9).
Secure the rear axle nut.

Torque setting : 93Nm (9.5kgfm)

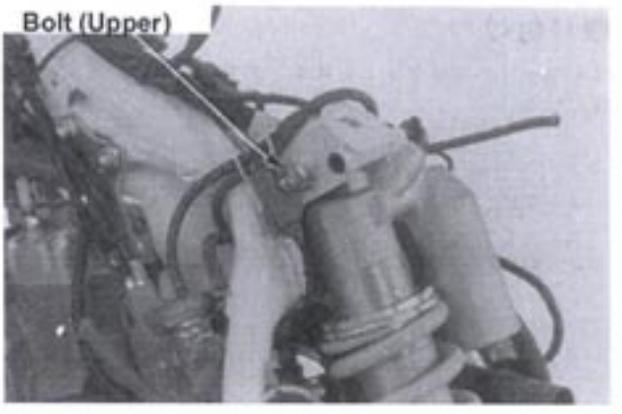


<u>Rear cushion</u>
Removal
Remove the air filter case (6-18).
Support the bottom of the engine and lift the rear wheel.

Remove the following parts:
- Cushion bolt/nut (lower side)
- Cushion connecting rod bolt/nut (swing arm end)



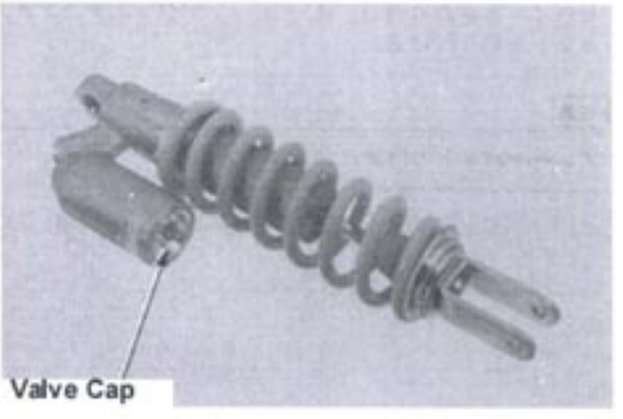
Remove the following parts:
- Rear cushion bolt (upper)
- Rear cushion/cushion arm



Inspection
Damper case for deformation, oil leak, rod bending → replace
Stopper rubber worn, damaged → replace
Check the damper unit operation is smooth.

Caution

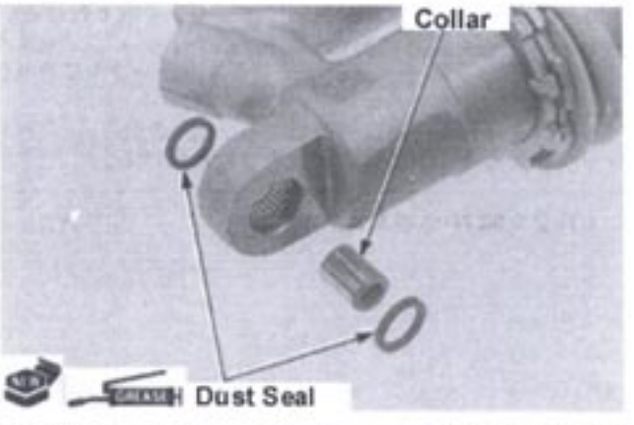
Never open the valve cap. Pressurised Nitrogen gas is contained in the sub tank.



Apply grease to the new dust seal lip before installing it.

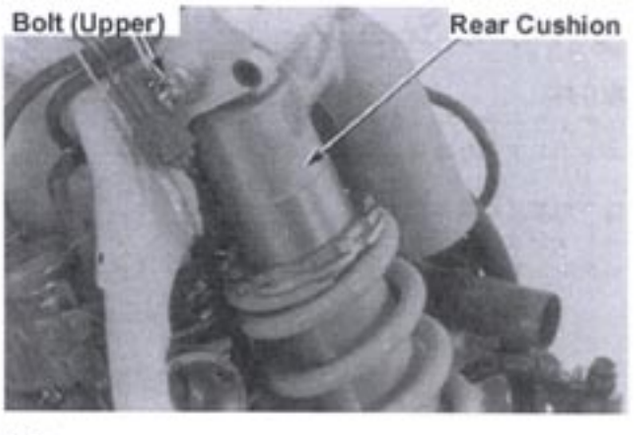
Notes
The grooved surface should face outside.

Install the collar.



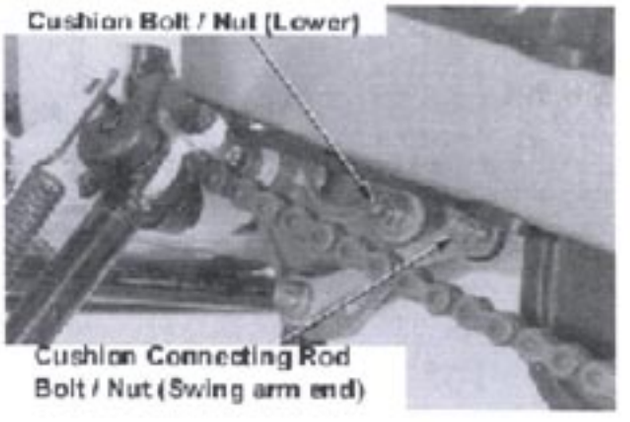
- Rear cushion
- Rear cushion bolt (upper)

Torque setting : 74Nm (7.5kgfm)

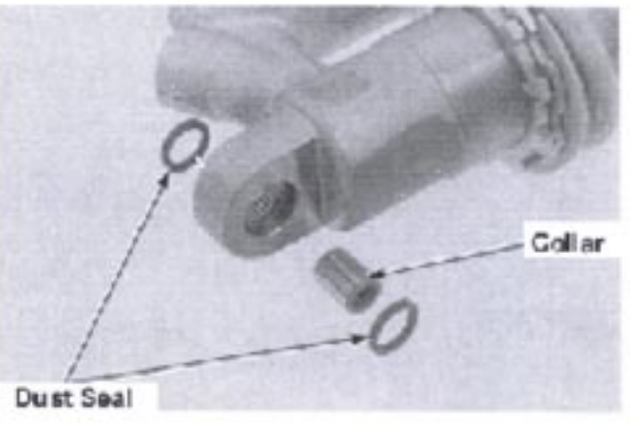


- Cushion bolt/nut (cushion arm end)
  Torque setting : 54Nm (5.5kgfm)

- Cushion connecting rod bolt/nut (swing arm end)
  Torque setting : 54Nm (5.5kgfm)

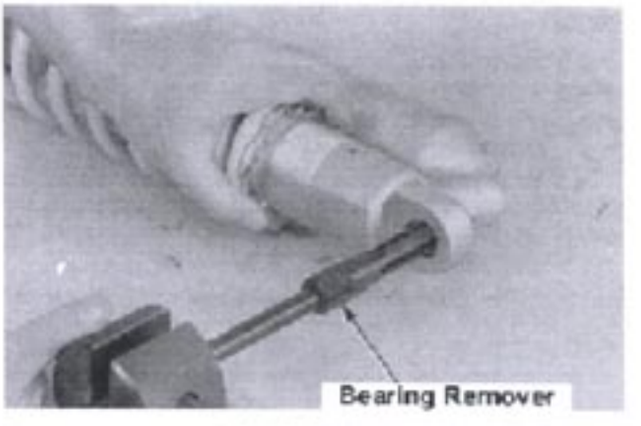


Needle roller bearing replacement
Remove the collar and dust seals.



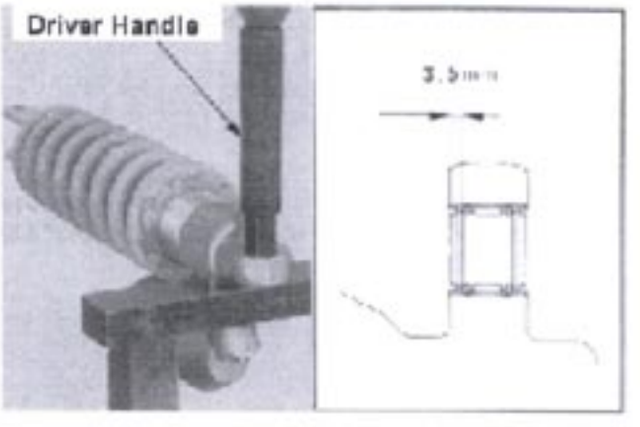
Remove the needle roller bearing by using the following tools:

Special tools:
Needle bearing remover set 15mm
07936-KC10000
Bearing remover 15mm
07936-KC10200
Remover handle
07936-KC10100
Remover weight
07741-0010201



Apply grease to the new needle roller bearing.
Install the needle roller bearing to specified position by using the following tools and a press machine:

Special tools:
Needle bearing driver
07946-KA50000
Driver handle A
07749-0010000



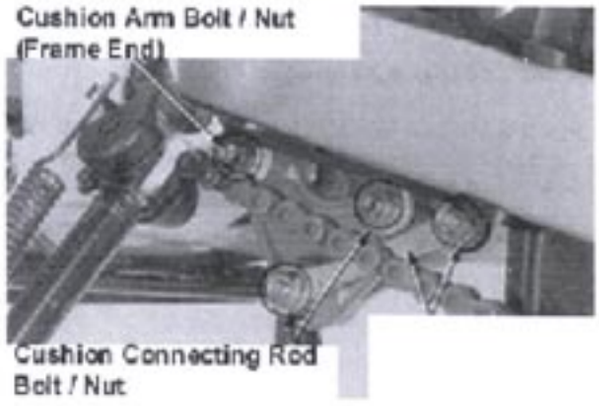
Cushion linkage

Removal

Cushion arm/cushion connecting rod

Support the bottom of the engine and remove the following parts:

- Cushion arm bolt/nut (cushion arm end)
- Cushion arm bolt/nut (frame end)
- Cushion connecting rod/bolt/nut (swing arm end)

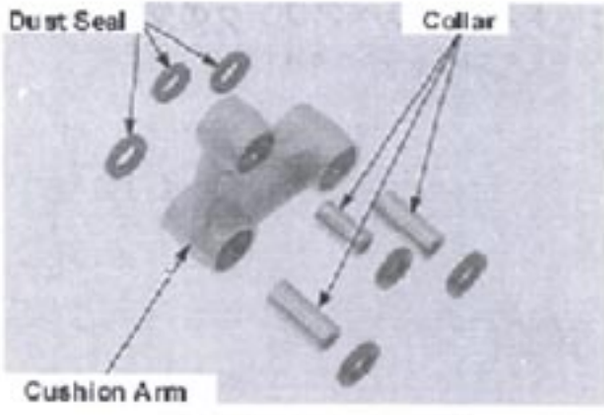


Disassembly

Cushion arm

Remove the following parts:

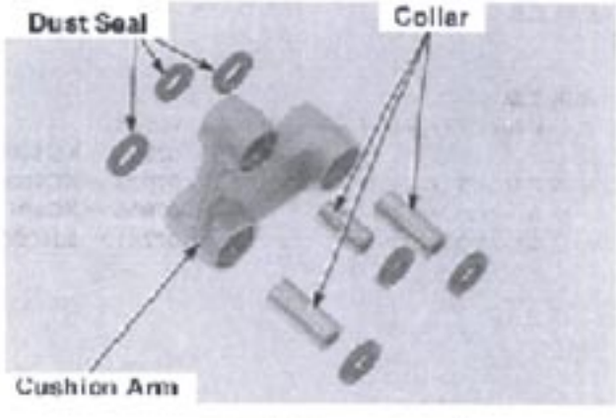
- Dust seal
- Collar
- Cushion connecting rod



Inspection

Cushion arm

Cushion connecting rod cracked/damaged → Replace
Dust seal worn/damaged → Replace
Collar damaged → Replace
Needle bearing damaged → Replace



Cushion connecting rod

Cushion connecting rod deformed/damaged → Replace

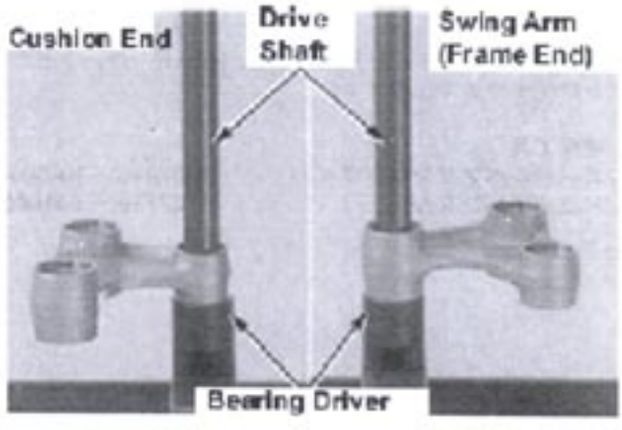
Needle bearing replacement

Cushion arm

Remove the needle bearing from the cushion arm by using the following tools and a press machine:

Special tools:

Driver shaft 07946-MJ000100
Spherical bearing driver 07946-KA30200



Apply grease to a new needle bearing.
Install the needle bearing by using the following tools and a press:
Special Tools :

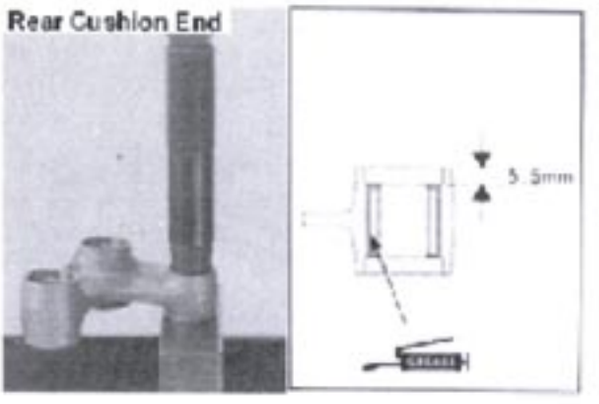
Rear cushion end:

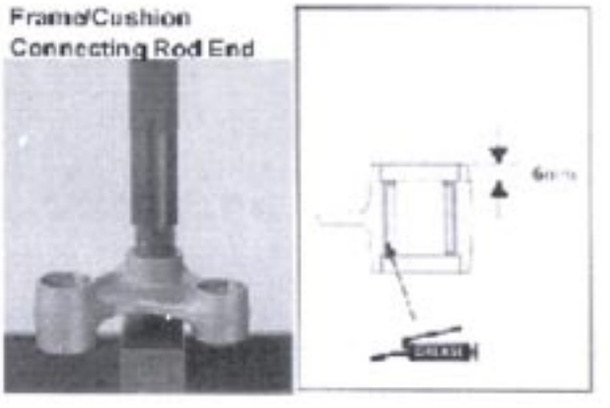
Driver handle A	07749-0010000
Outer driver 24x26mm	07746-0010700
Pilot 15mm	07746-0040300

Frame/cushion end:

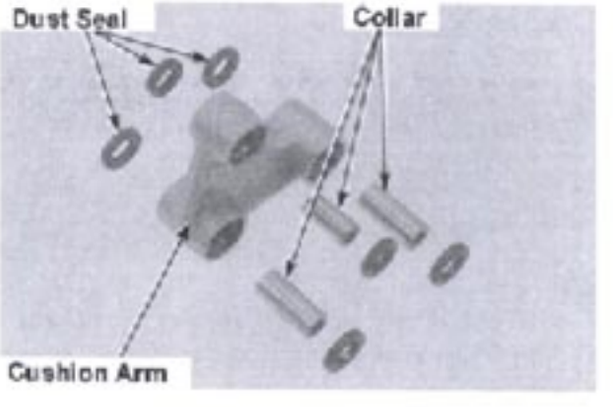
Driver handle A	07749-0010000
Outer driver 24x26mm	07746-0010700
Pilot 17mm	07746-0040400

Notes
- **Press the labelled side of the needle bearing.**
- **Press the bearing to the specified depth.**



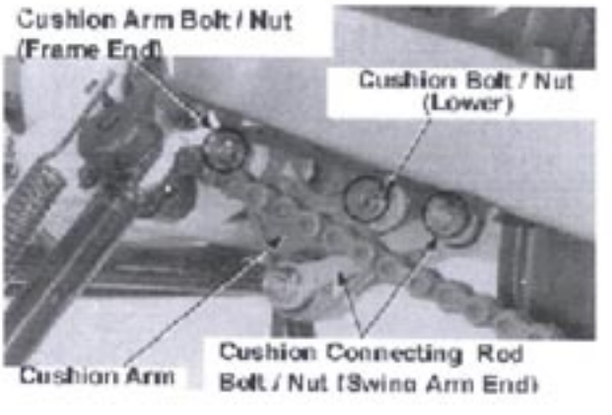


Assembly
Cushion arm
Install the following parts:
- Cushion connecting rod
- Collar
- Dust seal



Installation
Cushion arm/cushion connecting rod
Temporarily install the cushion rod to the cushion arm.
Install the following parts:
- Cushion arm bolt/nut (frame end)
- Cushion connecting rod bolt/nut (swing arm end)
- Cushion bolt/nut (lower)

Secure relevant parts to specified torque.
Torque setting : 54Nm (5.5kgfm)



Notes
Apply grease to the thread and the seat of bolts/nuts.

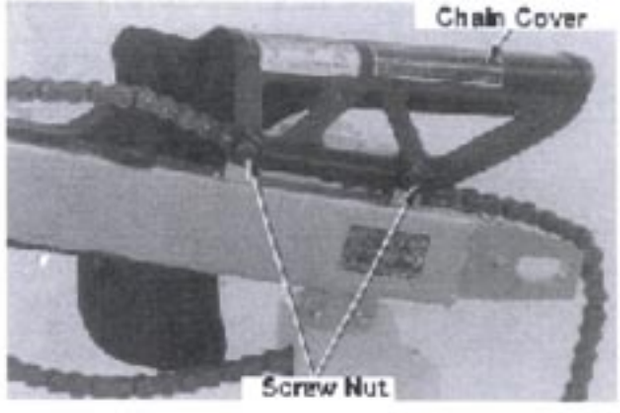
Swing arm

Removal

Remove the following parts:

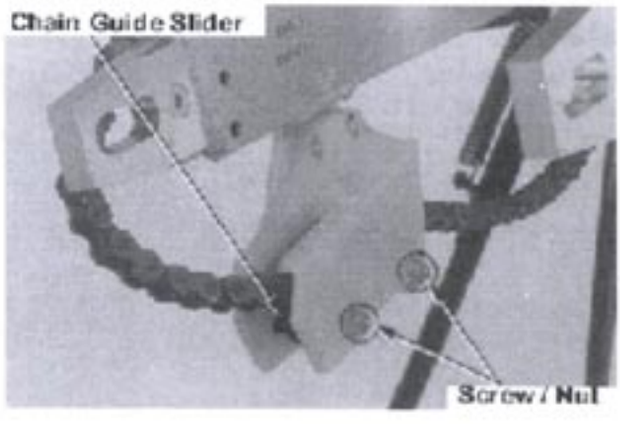
- Rear wheel (12-3)
- Screw
- Brake hose guide

- Bolt
- Chain cover

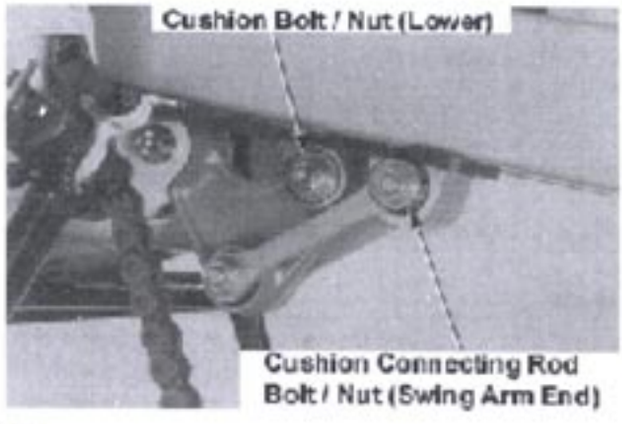


- Chain guide screw/nut
- Chain guide slider

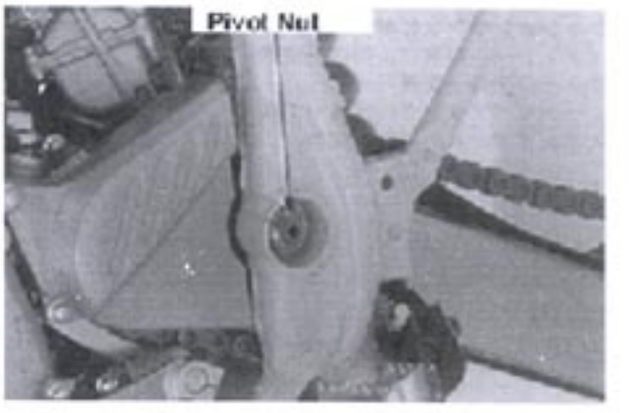
Replace the chain guide slider if it is damaged or worn.



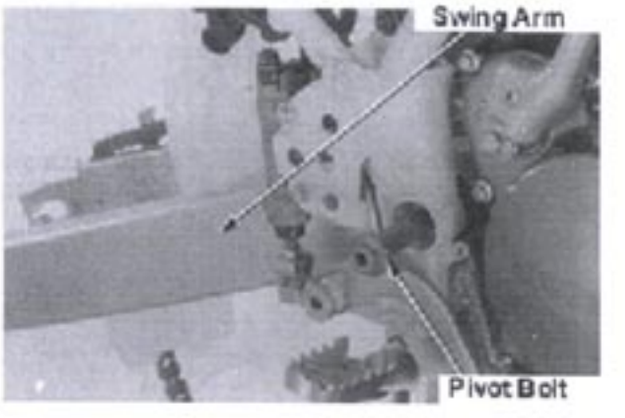
- Cushion connecting rod bolt/nut
- (swing arm end)
- Cushion bolt/nut (lower)



Remove the following parts:
- Swing arm pivot bolt



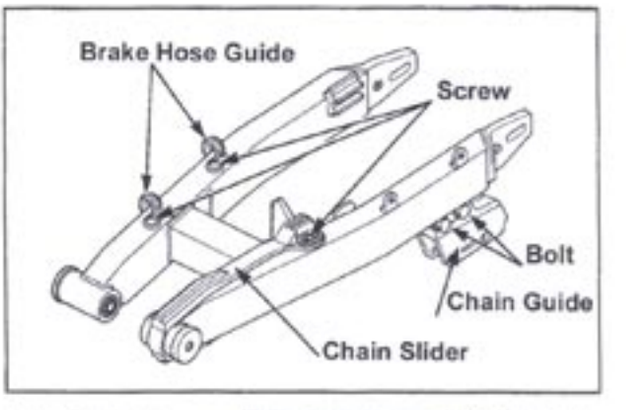
- Swing arm pivot bolt
- Swing arm



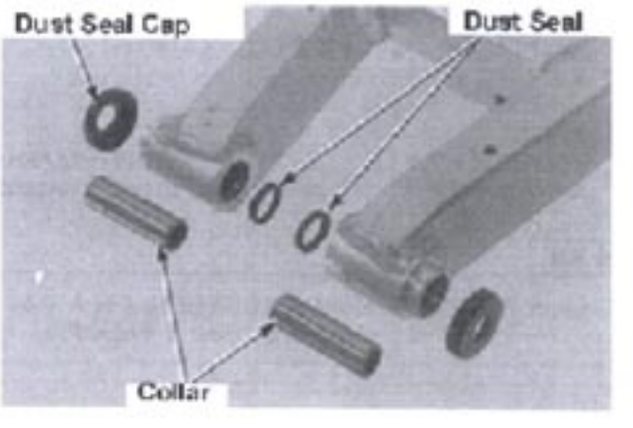
Disassembly
Remove the following parts:
- Bolt
- Chain slider screw
- Chain guide
- Brake hose guide screw
- Brake hose guide

Note
The chain slider screw may be very hard to remove because of screw locking agent.

- Chain slider



Replace the chain slider if it is damaged or worn to the service limit.
Remove the following parts:
- Dust seal cap
- Dust seal
- Collar

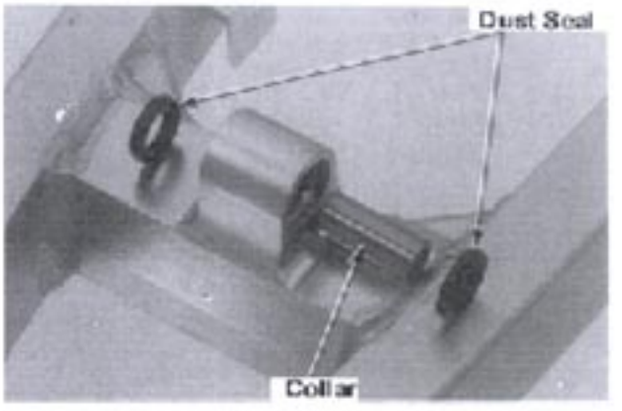


Inspection
Swing arm pivot

Dust seal cap worn/damaged	→	Replace
Dust seal worn/damaged	→	Replace
Collar damaged	→	Replace
Needle bearing damaged	→	Replace
Swing arm damaged	→	Replace

Cushion link pivot

Dust seal worn/damaged	→	Replace
Collar damaged	→	Replace
Needle bearing damaged	→	Replace
Swing arm damaged	→	Replace

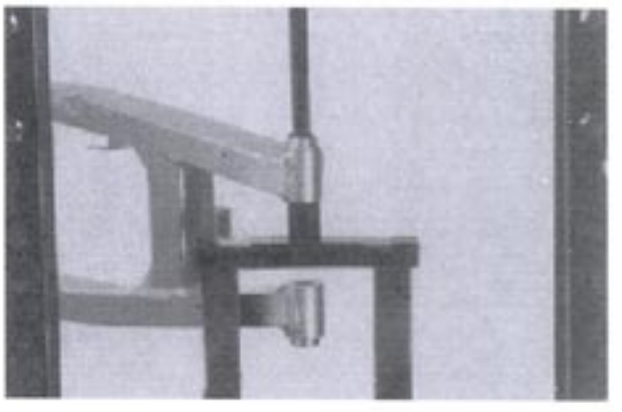


Needle bearing replacement

Remove the outer and inner needle bearings from the swing arm by using the following tools:

Special tools :

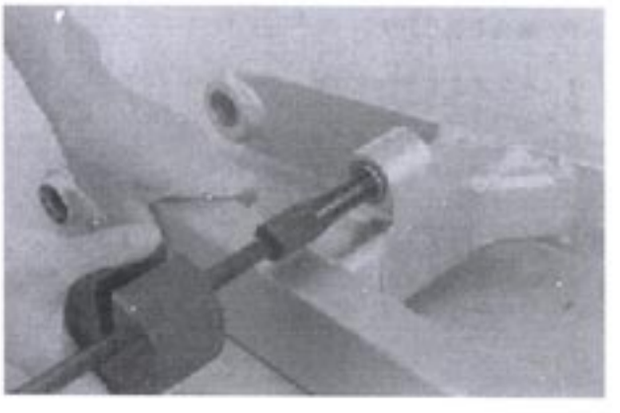
Driver shaft 07946-MJ00100
Spherical bearing remover 07946-KA30200



Remove the needle bearing from the swing arm by using the following tools:

Special tools :

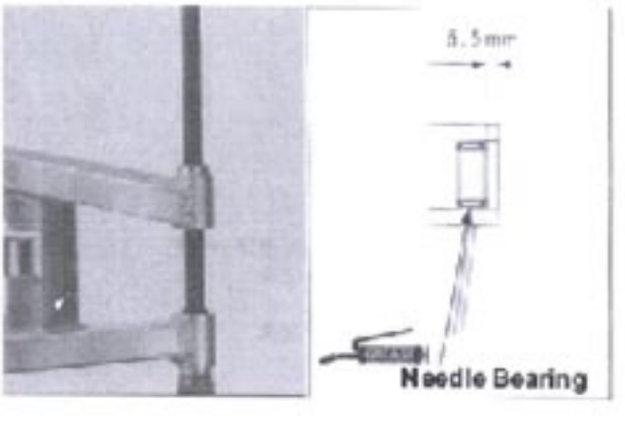
Bearing remover 17mm	07936-3710300
Remover handle	07936-3710100
Remover weight	07936-0010201



Apply grease to the new needle bearing. Install the inner needle bearing to the swing arm by using the following tools and a press:

Special tools :

Driver shaft 07946-MJ00100
Spherical bearing remover 07946-KA30200



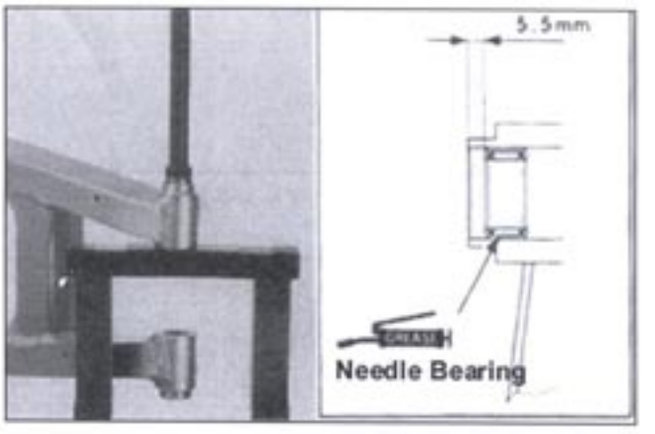
Notes

- **Press the labelled side of the bearing.**
- **Press the bearing to specified depth.**

Apply grease to the new needle bearing.
Install the outer needle bearing to the swing arm by using the following tools and a press:

Special tools :

Driver shaft	07946-MJ00100

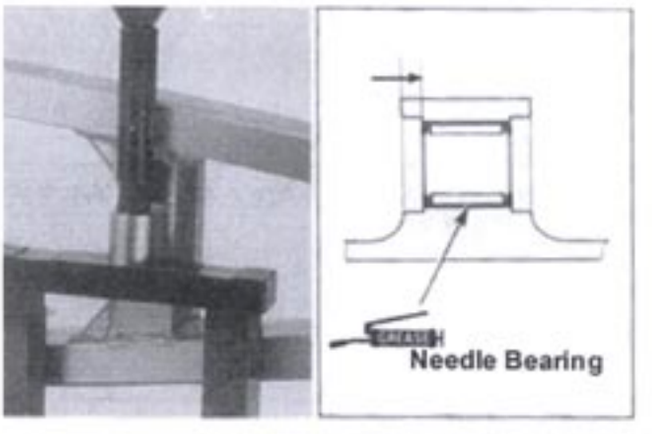


Note
- **Press the labelled side of the bearing.**
- **Press the bearing to specified depth.**

Apply grease to the new needle bearing.
Install the pivot needle bearing to the swing arm by using the following tools and a press:

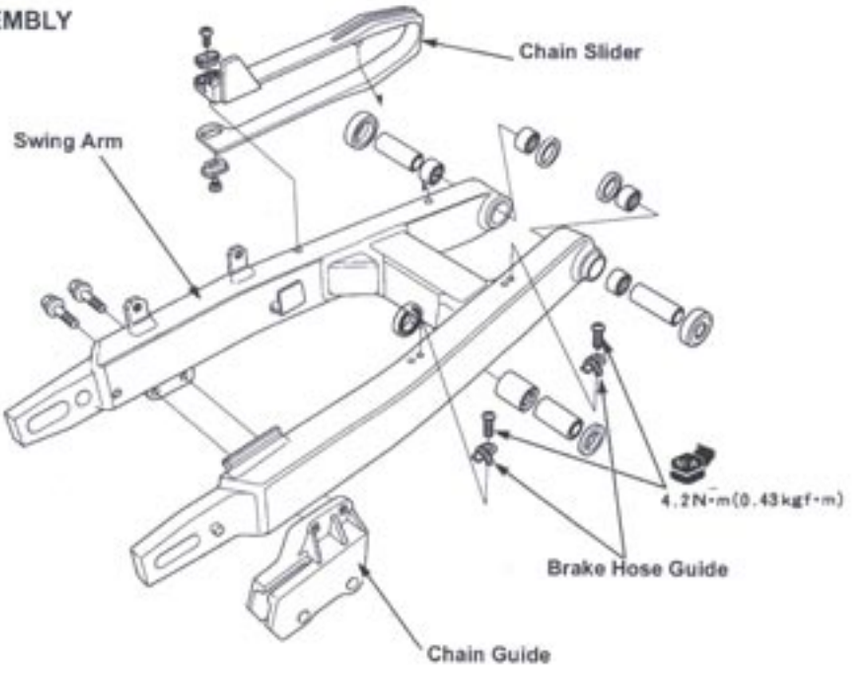
Special tools :

Driver handle A	07749-0010000
Outer driver 24x26mm	07746-0010700
Pilot 12mm	07746-0040200

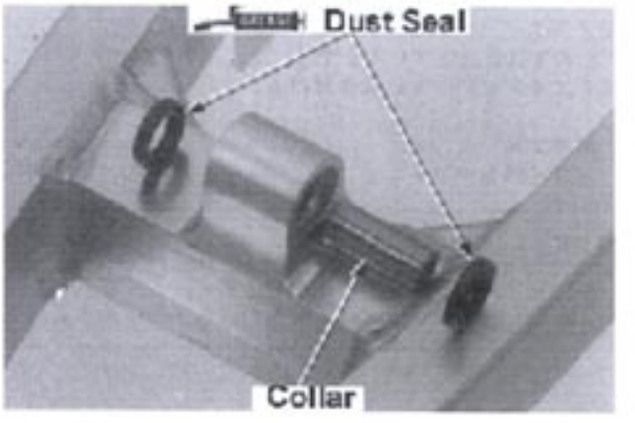


Notes
- **Press the labelled side of the bearing.**
- **Press the bearing to the bottom end of the pivot.**

ASSEMBLY

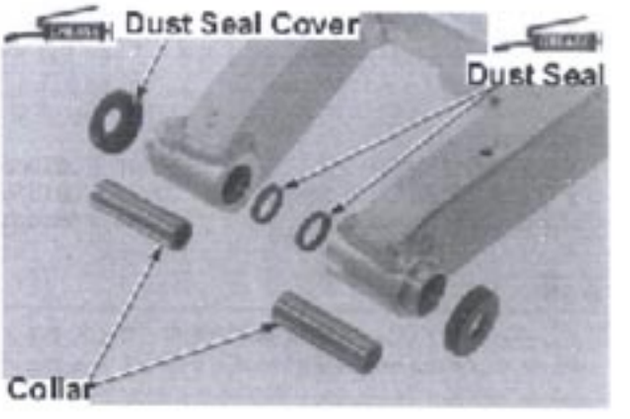


Install the following parts:
- Collar
- Dust seal



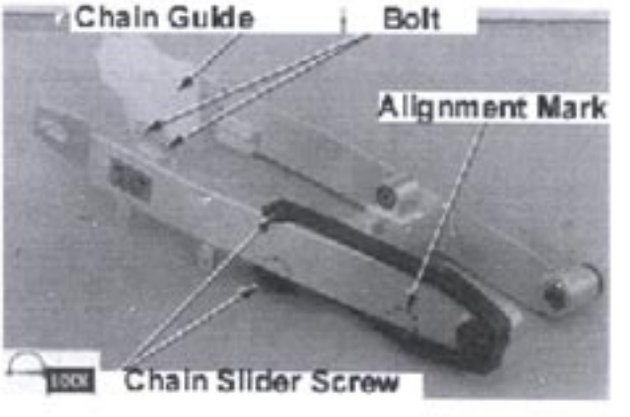
Note
Apply grease to the dust seal lip before installing.

- Collar
- Dust seal
- Dust seal cap



Note
Apply grease to the dust seal and the dust seal cap lips before installing.

- Chain slider

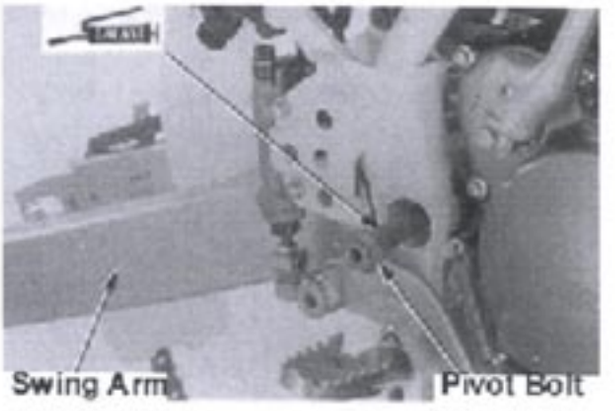


Note
Align the chain slider hole with swing arm projection.

- Chain slider screw

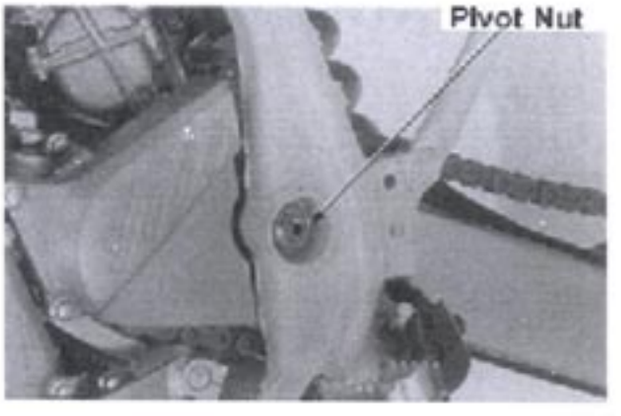
Note
Clean the slider screw thread and apply screw locking agent before installing.

Installation
Apply small amount of grease to the swing arm pivot.
Install the swing arm and install the swing arm pivot bolt.



Secure the swing arm pivot nut.

Torque setting : 108Nm (11.0kgf-m)

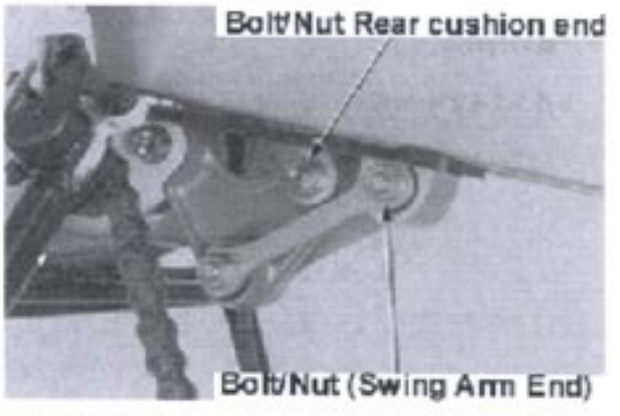


Install the cushion arm bolt/nut and secure the nut.

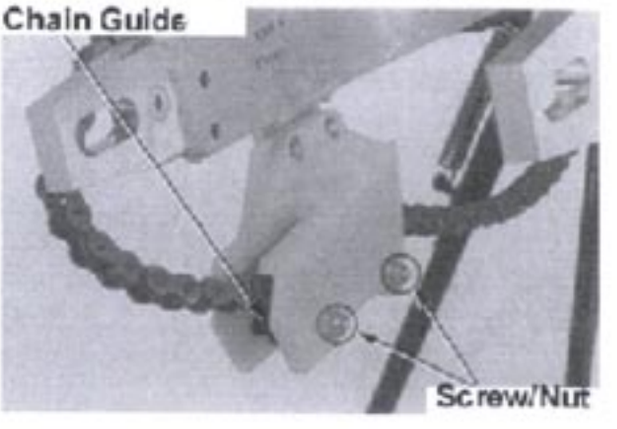
Torque setting : 54Nm (5.5kgfm)

Install the cushion connecting rod bolt/nut (cushion arm end) and secure the nut.

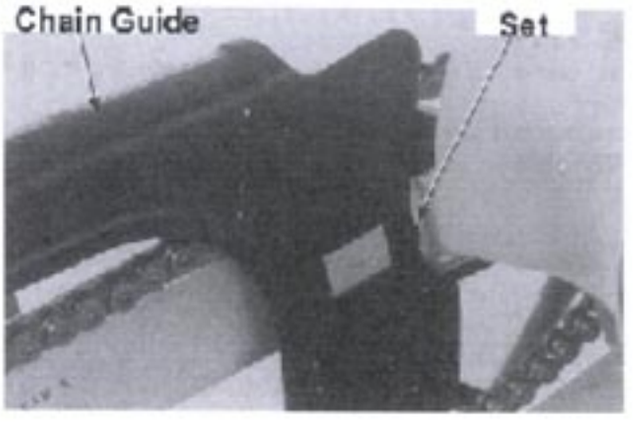
Torque setting : 54Nm (5.5kgfm)



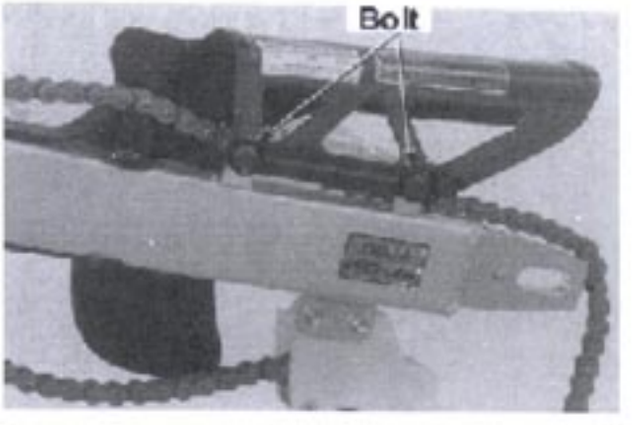
Install the chain guide slider.
Install the chain guide screw/nut.



Install the chain cover by setting its groove to the projection on the swing arm.



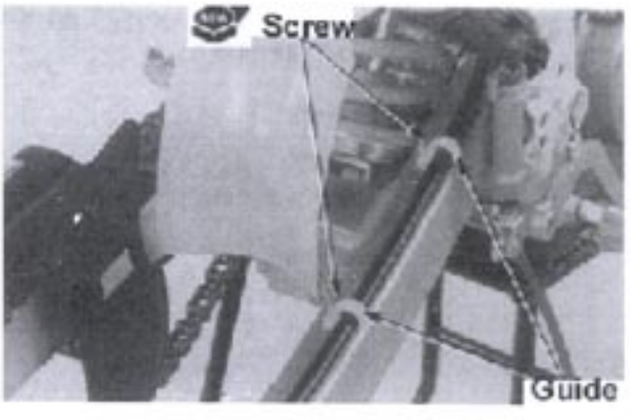
Secure the chain cover bolt.

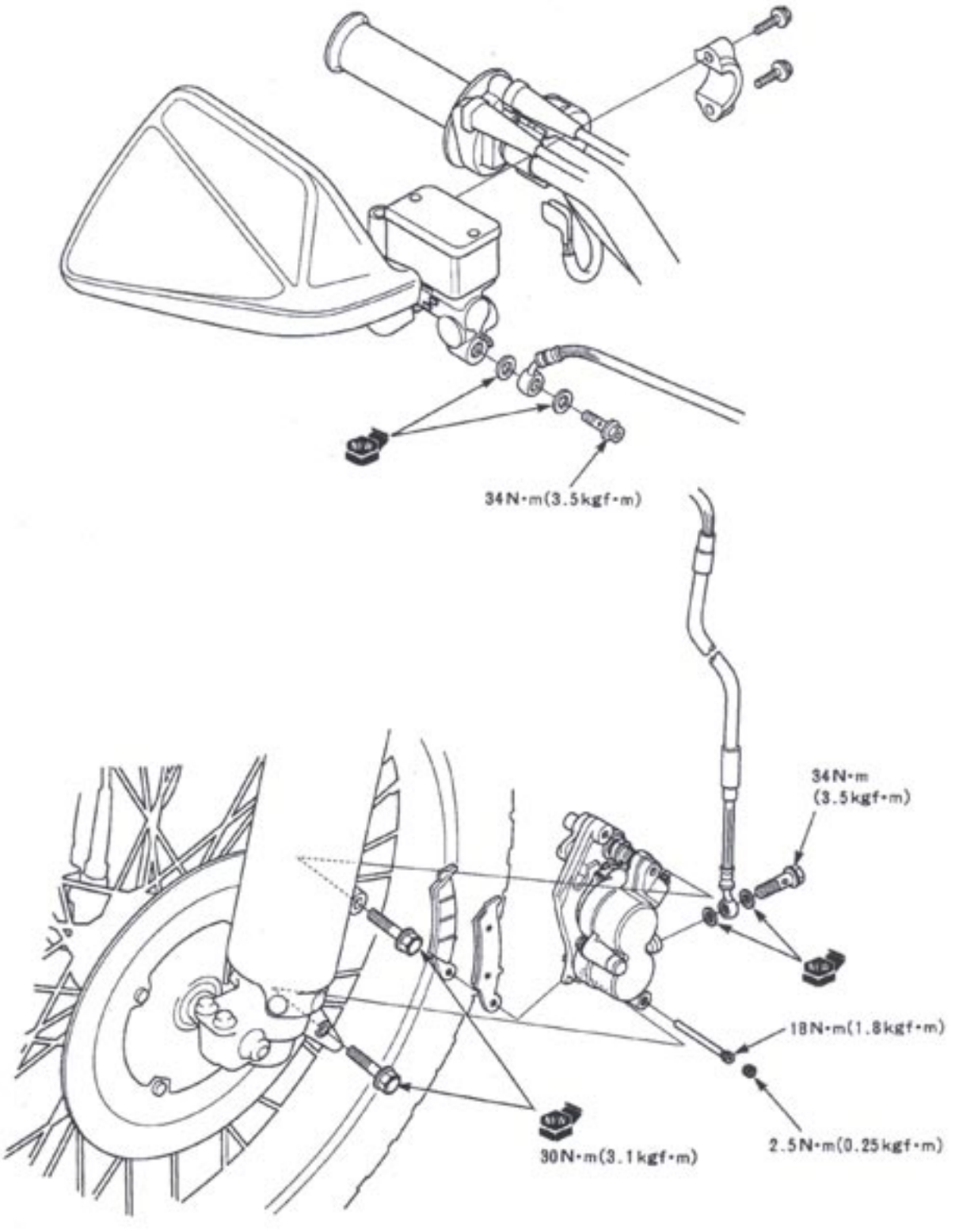


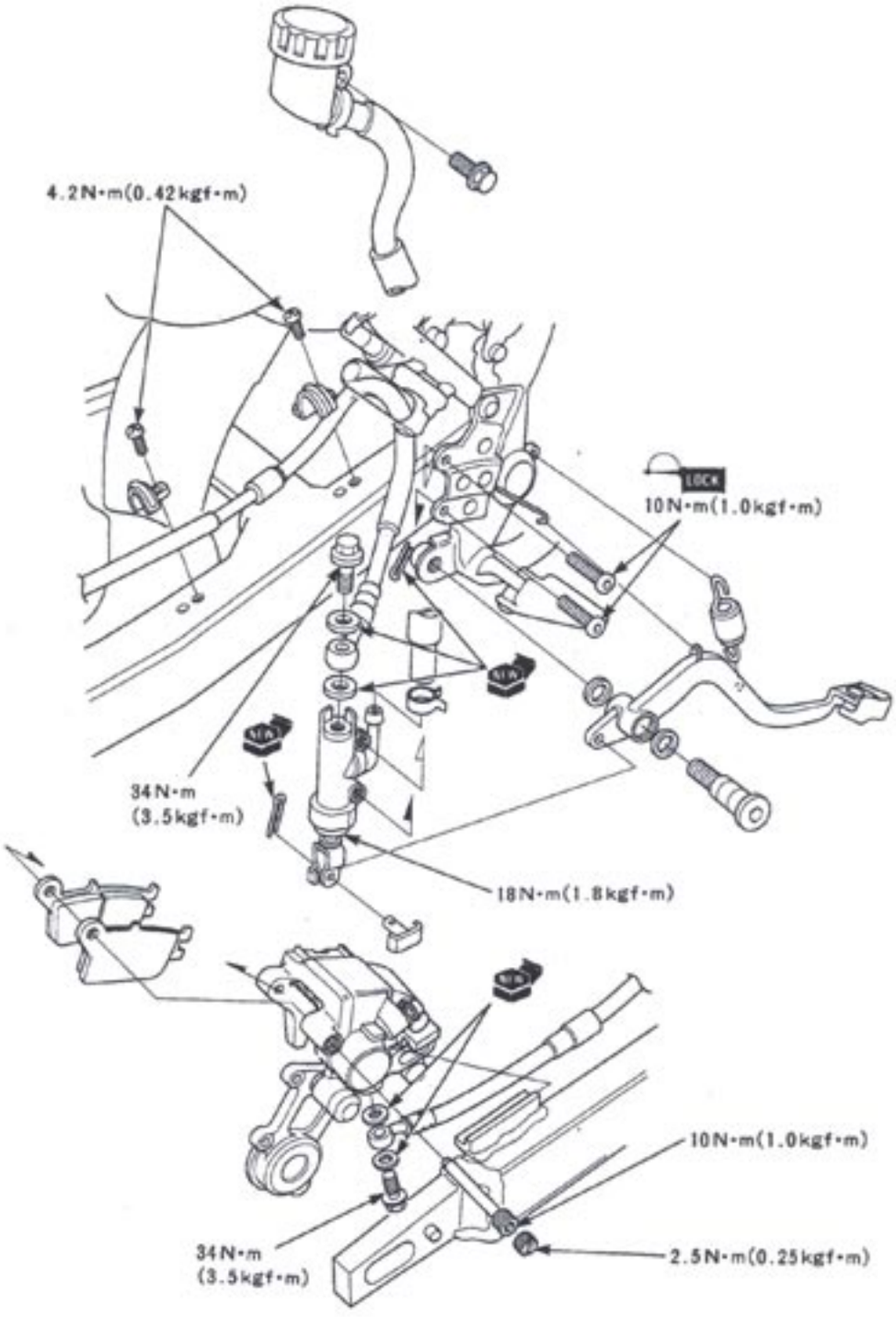
Install the brake hose guide and fit the new screws.

Torque setting : 4.2Nm (0.42kgfm)

Install the rear wheel (12-9).




34N·m(3.5kgf·m)
34N·m
(3.5kgf·m)
18N·m(1.8kgf·m)
2.5N·m(0.25kgf·m)
30N·m(3.1kgf·m)



General

Warning

Keep brake discs and pads away from oil or grease. Should the discs or pads become contaminated, replace the pads and de-grease the discs.

- Do not contaminate the brake fluid with dust and debris when refilling the fluid.
- Do not mix different tyres of brake fluid.
- Do not re-use the drained brake fluid.
- Keep the painted, plastic, and rubber surfaces away from the brake fluid.
- Do not re-use the sealing washer.
- Wash all disassembled parts with brake fluid and check the fluid path with compressed air.
- If the brake hose is disconnected, bleed air from the system.
- Replace both brake pads at the same time.

Specification

Item		Specification	Service limit
Brake fluid		DOT 4	-
Front brake lever free play		10-20	-
Rear brake pedal free play		10-20	-
Brake pad thickness		-	Wear limit
Brake disc deflection		-	0.15
Brake disc thickness	Front	3.5	3.0
	Rear	4.5	4.0
Master cylinder bore	Front	12.700 – 12.743	12.76
	Rear	14.000 – 14.043	14.06
Master piston diameter	Front	12.657 – 12.684	12.64
	Rear	13.957 – 13.984	13.95
Caliper cylinder	Front	27.000 – 27.050	27.10
	Rear	27.000 – 27.050	27.10
Caliper piston diameter	Front	26.900 – 26.950	26.84
	Rear	26.935 – 26.968	26.89

Torque settings

Brake hose bolt	34Nm (3.5kgfm)	
Rear brake hose guide screw	4.2Nm (0.43kgfm)	Apply screw locking agent
Front reservoir cover screw	1.5Nm (0.15kgfm)	
Front brake lamp switch screw	1.2Nm (0.12kgfm)	
Front brake lever pivot bolt	6Nm (0.6kgfm)	Apply silicon grease
Nut	6Nm (0.6kgfm)	
Rear master cylinder holder bolt	10Nm (1.0kgfm)	Apply screw locking agent
Rear push rod lock nut	18Nm (1.8kgfm)	
Front caliper bracket bolt	30Nm (3.1kgfm)	Alloc bolt (replace when removed)
Front caliper pad pin	18Nm (1.8kgfm)	
Front caliper pad pin plug	2.5Nm (0.25kgfm)	
Front caliper bleeder valve	5Nm (0.55kgfm)	
Front caliper pin bolt A	23Nm (2.3kgfm)	Apply screw locking agent
Front caliper bolt B	13Nm (1.3kgfm)	Apply screw locking agent
Rear caliper pad pin	10Nm (1.0kgfm)	
Rear caliper pad pin plug	2.5Nm (0.25kgfm)	
Rear caliper bleeder valve	6Nm (0.6kgfm)	
Rear caliper pin bolt	27Nm (2.8kgfm)	
Rear caliper bracket pin bolt	12Nm (1.2kgfm)	Apply screw locking agent

Special tool

Snap ring pliers	07914-3230001

Troubleshooting

Brake ineffective
- Air in the brake system
- Moisture in the brake fluid
- Dirty brake pad/disc
- Worn caliper piston seal
- Worn aster cylinder piston cup
- Worn brake pads
- Dirty caliper
- Faulty caliper sliding
- Unequal wear of the pad/disc
- Low brake fluid level
- Clogged brake lines
- Distorted/deformed disc
- Stuck/worn caliper piston
- Worn disc
- Dirty master cylinder
- Bent lever (pedal)

Brake lever (pedal) is heavy/does not return
- Stuck/worn caliper piston
- Faulty caliper sliding
- Clogged brake lines
- Worn caliper piston seal
- Stuck/worn master cylinder piston
- Bent lever (pedal)

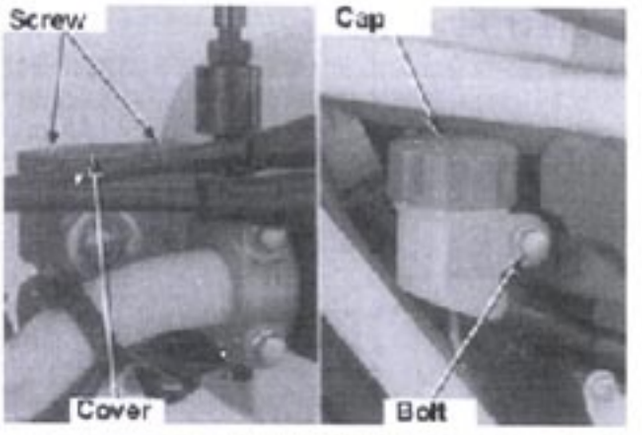
Brake lever (pedal) sticks, or unbalanced braking
- Faulty brake disc/wheel alignment
- Dirty brake pad/disc
- Distorted/deformed disc
- Faulty caliper sliding

Brake dragging
- Dirty/worn brake disc/pad
- Unequal/step wear on the pad/disc
- Distorted/deformed disc
- Faulty caliper sliding

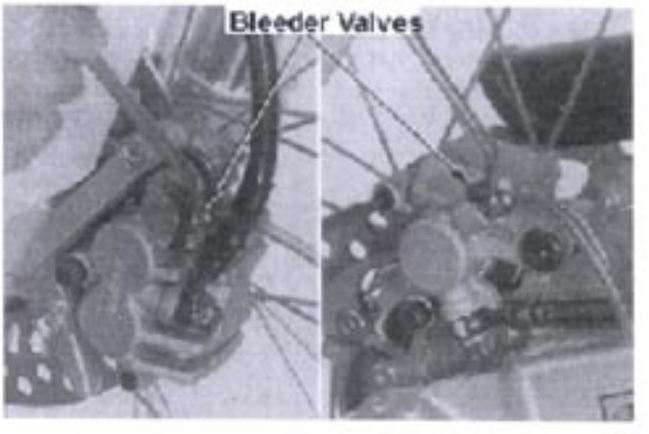
Brake fluid change/air bleed
Brake fluid drain

Front:
Unscrew and remove the reservoir cover.

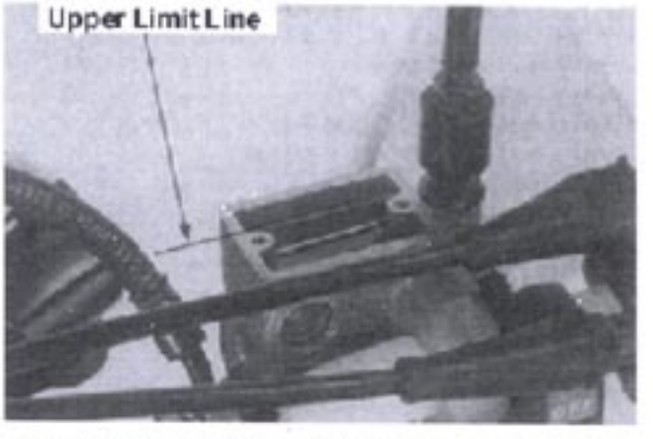
Rear:
Remove a right side cover (2-3).
Remove a reservoir bracket bolt.
Remove a reservoir cap.



Notes
- **Keep out of debris/water when refilling the brake fluid.**
- **Do not mix different types of brake fluid.**
- **Keep the brake fluid away from painted, plastic, and rubber surfaces.**
- **Remove the reservoir cover only after levelling the reservoir top.**
- **Use DOT4 brake fluids for both front and rear brakes.**



Connect a transparent vinyl tube to the bleeder valve.
Loosen the bleeder valve on the caliper and operate the brake lever (pedal) slowly until all brake fluid is drained from the valve.

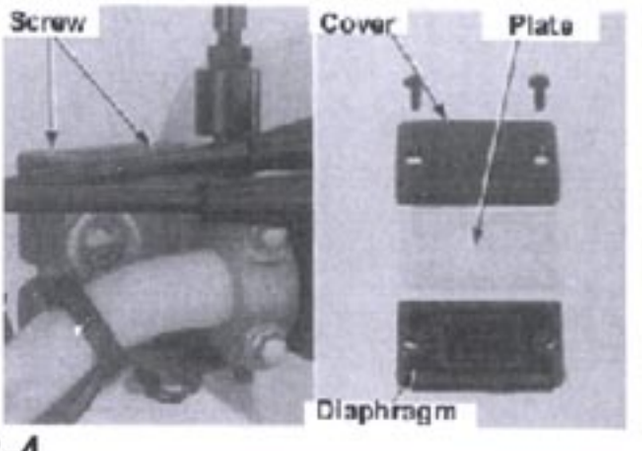


Warning

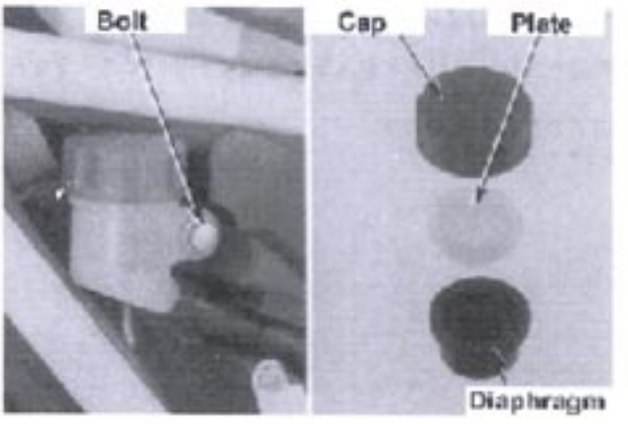
Keep the pads/discs away from oil/grease. If contaminated, replace the pads and degrease the disc.

Secure the bleeder valve and refill the brake fluid to the upper limit line on the reservoir.

Bleed air.
Front:
Install the diaphragm, diaphragm plate, and a reservoir cover.
Secure the screw.
Torque setting : 1.5Nm (0.15kgfm)



Rear:
Install the diaphragm, diaphragm plate, and reservoir cover.
Secure the reservoir bracket bolt.



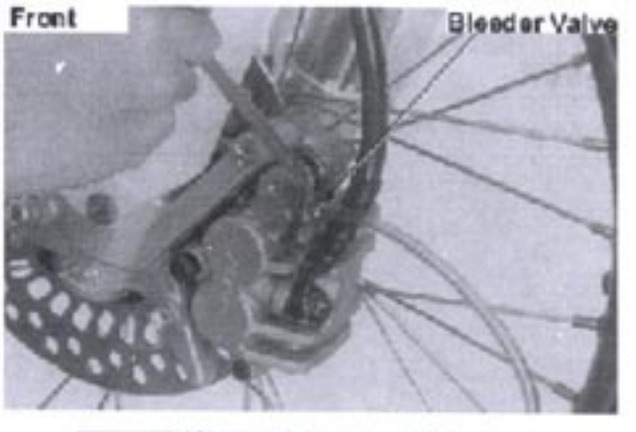
Air bleed

> **Note**
> **Occasionally check the brake fluid level. Refill the brake fluid if the level is approaching the lower limit line.**

Refill the brake fluid to the upper limit line.
Operate the brake lever (pedal) until no more air appears in front/rear reservoirs.

Connect a transparent vinyl tube to the caliper bleeder and place a container underneath.

1. Operate the brake lever (pedal) slowly for a few times and loosen the bleeder valve for 1/2 turn while holding the lever (pedal). Then re-tighten the valve.

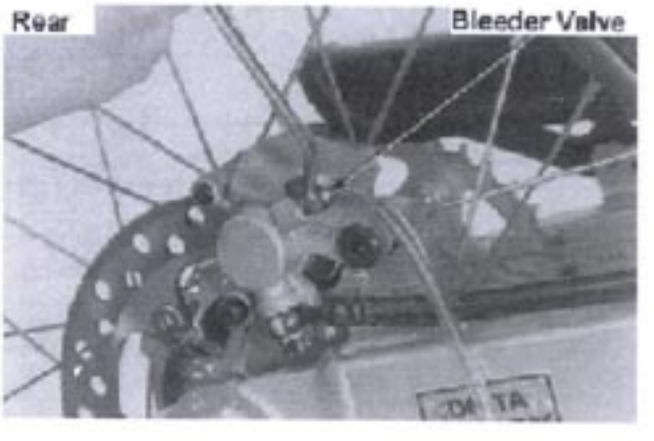


Warning

> Do not release the lever (pedal) slowly until the valve is re-tightened.

2. Slowly release the lever (pedal) and leave it for a few seconds in its fully-returned position.

3. Repeat the above procedure until no more air come out from the valve.

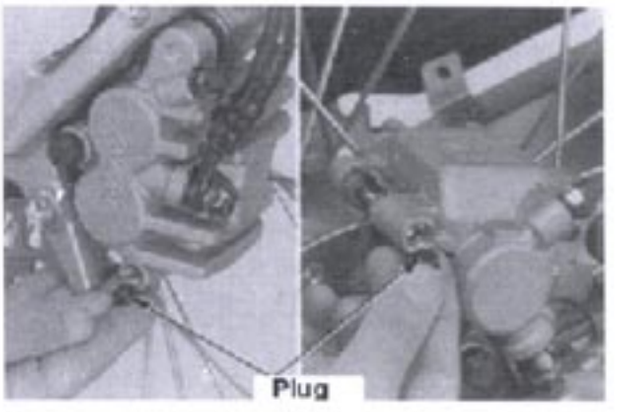


Secure the bleeder valve.
Torque setting : 5.4Nm (0.55kgfm)

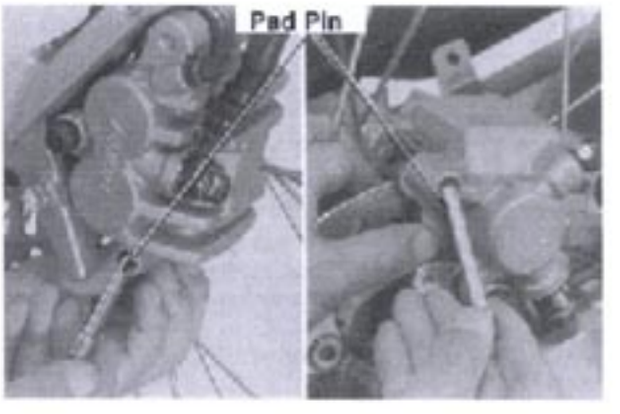
Refill the brake fluid to the upper limit line and install the reservoir cover (cap).

Brake pad replacement
Push in the caliper piston to install the new brake pads.

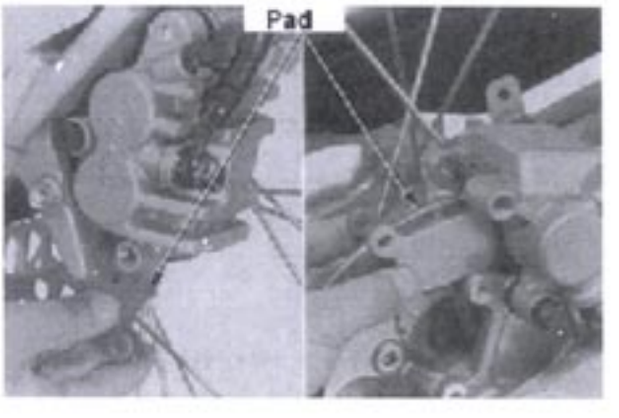
Remove the following parts:
- Pad pin plug



- Pad pin

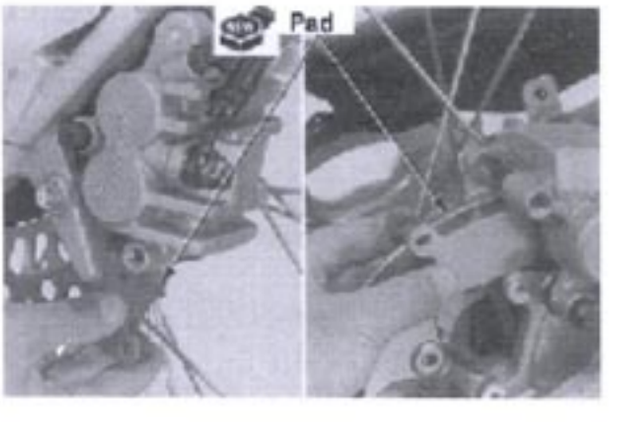


- Brake pad



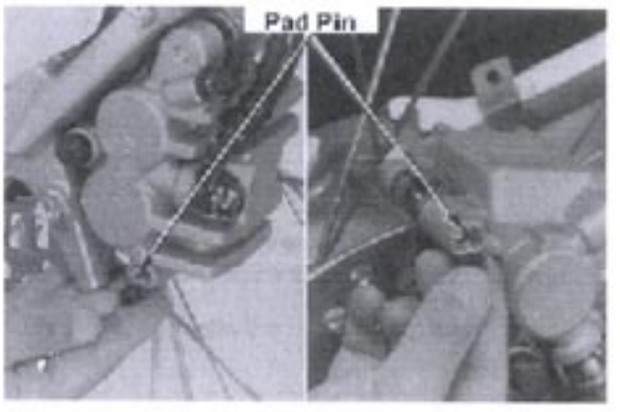
Note
Replace the brake pads in a pair.

Check the position of the pads and the retainers and install the new pads to the caliper.



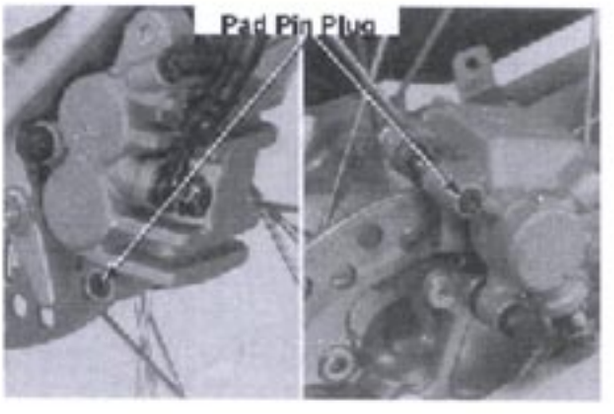
Install pad pins and tighten to the specified torque:

Torque settings :
Front : 18Nm (1.8kgfm)
Rear : 10Nm (1.0kgfm)



Install pad pin plugs and tighten them.

Torque settings :
Front : 2.5Nm (0.25kgfm)
Rear : 2.5Nm (0.25kgfm)

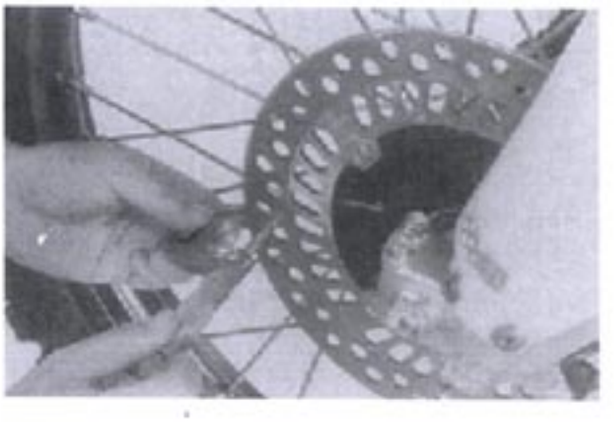


Warning

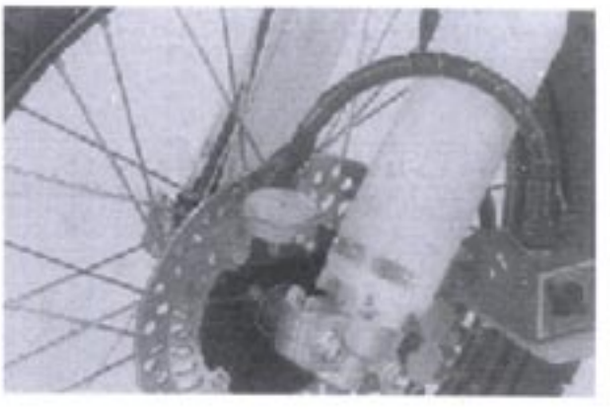
Operate the brake lever/pedal after replacing the pads to bring the piston out.

Brake disc inspection
Measure the disc thickness.

Service limit :
Front : 3.0mm or less → Replace
Rear : 4.0mm or less → Replace

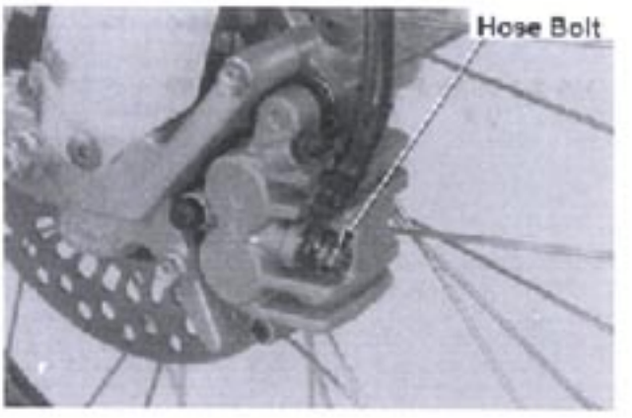


Measure the disc distortion.
Service limit : 0.15mm or less → Replace

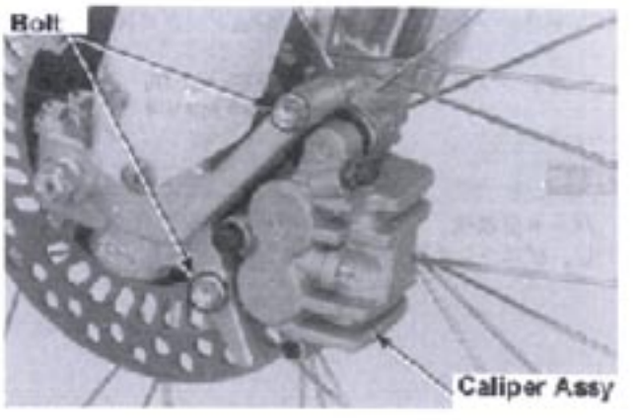


Front brake caliper
Removal

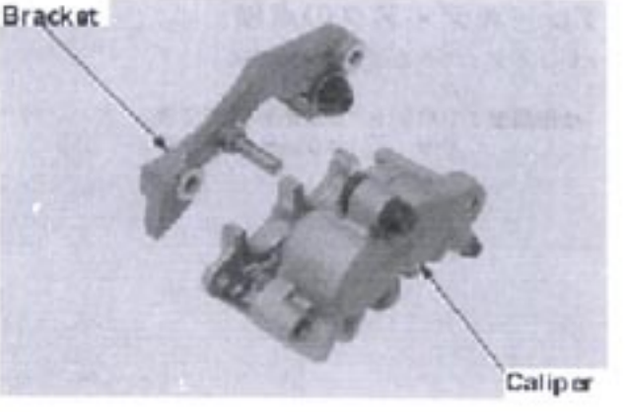
Notes
- Keep the brake fluid away from painted, plastic, or rubber surfaces.
- Do not re-use sealing washers.
- Wash the disassembled parts and check all ports with compressed air.
- Clean and sort all disassembled parts.



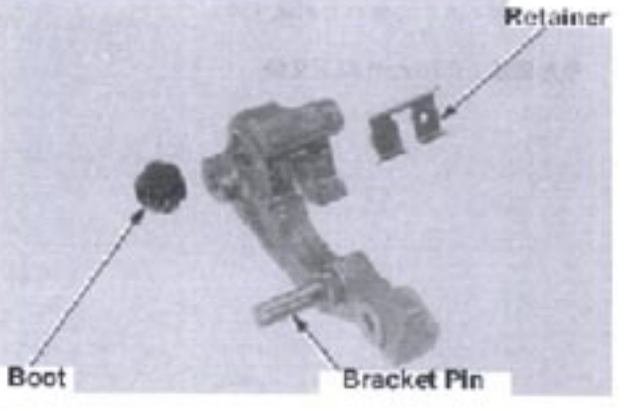
Drain brake fluid (13-4).
Remove the following parts:
- Brake hose bolt
- Sealing washer
- Front brake caliper bracket bolt
- Front brake caliper Assy.



Disassemble
Remove front brake caliper bracket from the caliper.

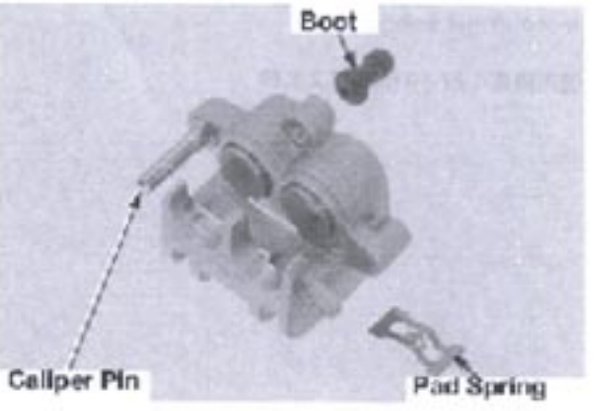


Remove the following parts:
- Caliper pin boot
- Retainer

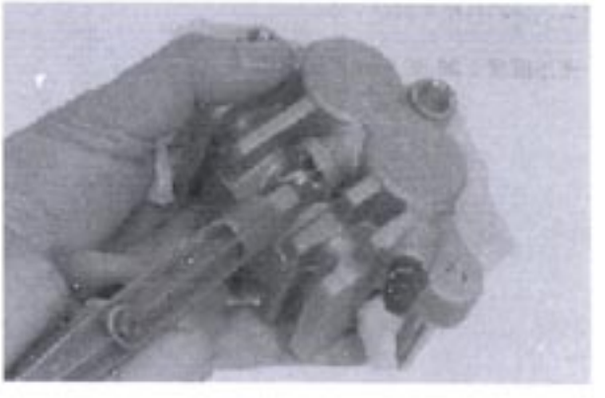


Remove the following parts:
- Bracket pin boot
- Pad spring

Notes
Do not remove the caliper pin unless replacing.



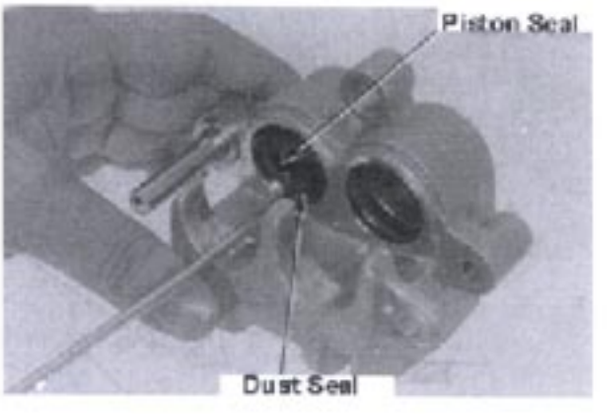
Wrap the piston with a cloth to prevent the piston and brake fluid coming out.
Turn the piston downwards and gradually blow low-compressed air from the brake hose attachment to remove the piston from its caliper.



Warning

- Do not apply excessive pressure.
- Do not touch the interior surface of the caliper.

Remove the piston seal and the dust seal.

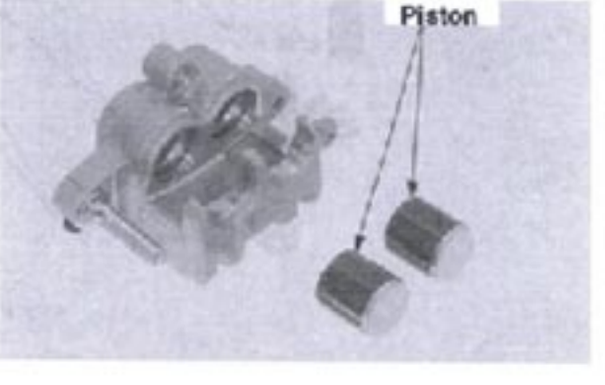


Caution

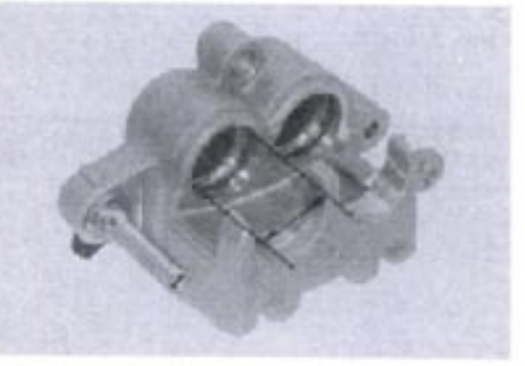
- Do not damage the interior surface of the caliper cylinder.

Wash the caliper cylinder and the piston with clean brake fluid.

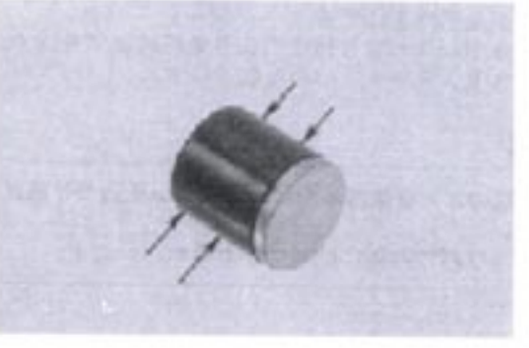
Inspection
Damaged/scratched piston/cylinder
→ Replace

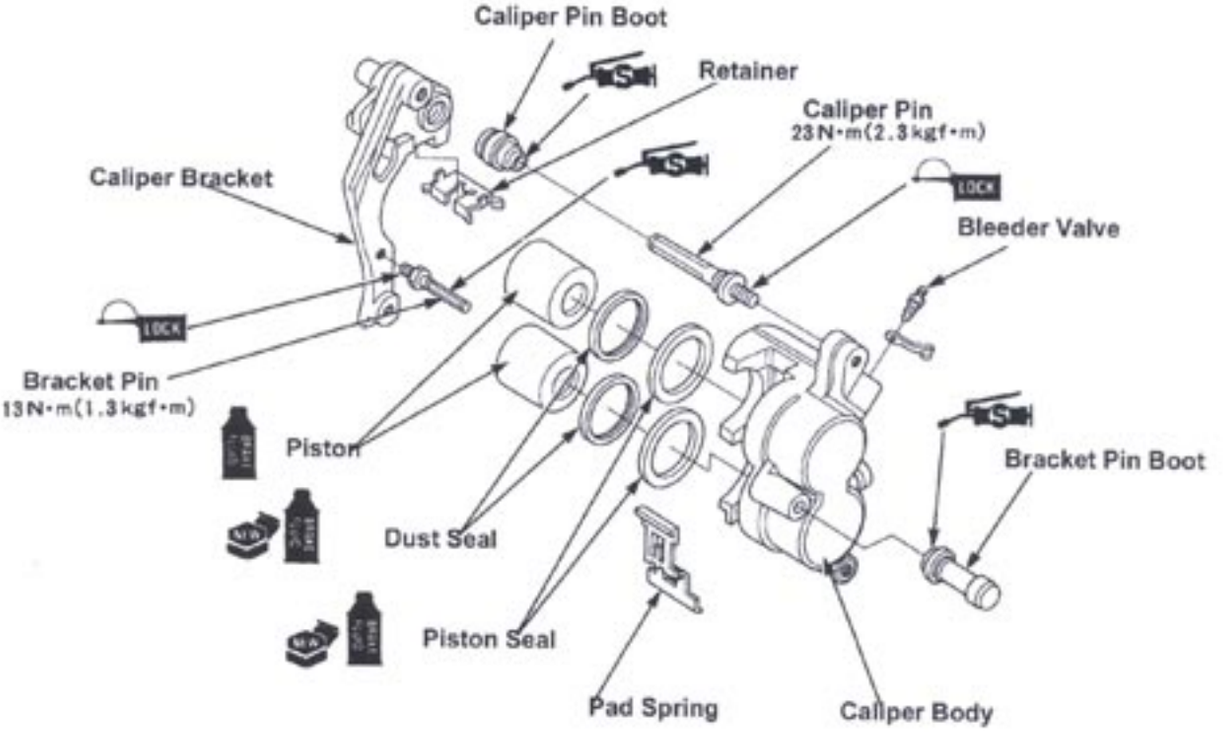


Measure the cylinder bore.
Service limit : 27.10mm or above → Replace

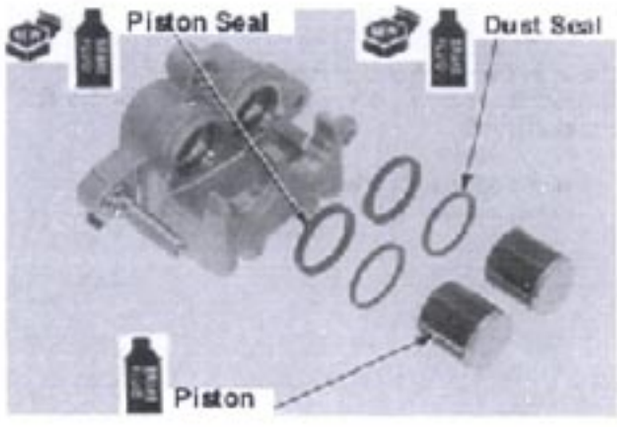


Measure the piston diameter.
Service limit : 26.89mm or above → Replace

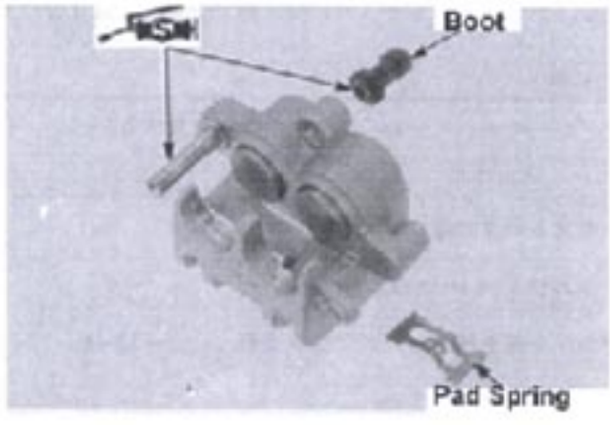




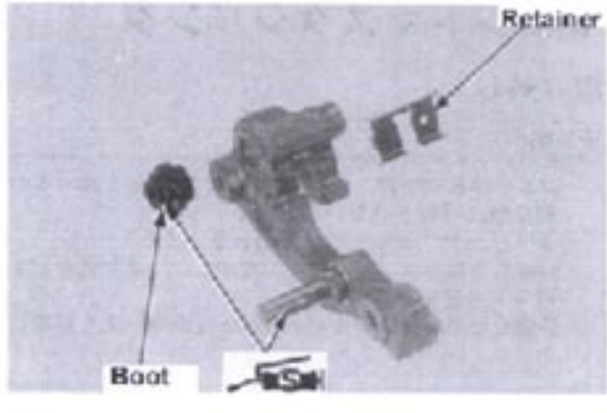
Notes
- Do not reuse drained brake fluid.
- Replace the piston seals and the dust seals with new ones.
- Replace the boots if there is any damage or worn out.
- Apply silicon grease to the interior surface of the boot.
- Clean all parts before installing.



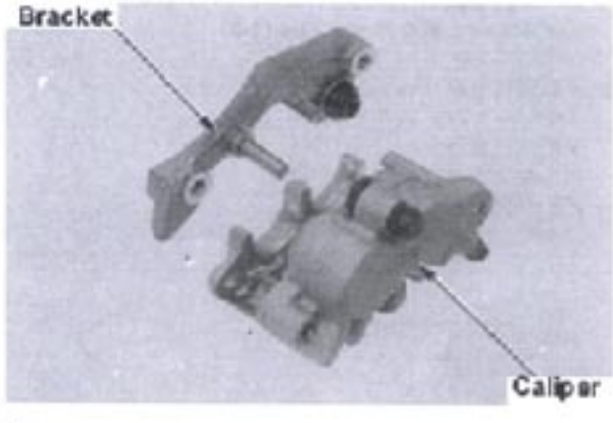
Apply brake fluid to the piston seal and the dust seal.
Apply brake fluid to the piston.



Install the following parts:
- New piston seal
- New dust seal
- Piston
- Pad spring
- Bracket pin boot

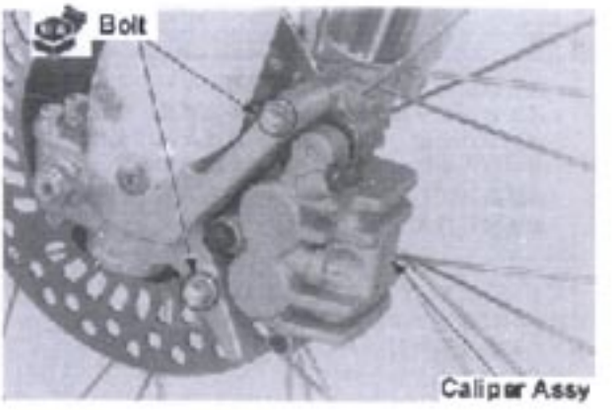


- Retainer
- Caliper pin boot



Install the front brake caliper bracket to the caliper.

Installation
Set the front brake caliper Assy.
Install the new front brake caliper bracket bolt.
Torque setting : 30Nm (3.0kgfm)

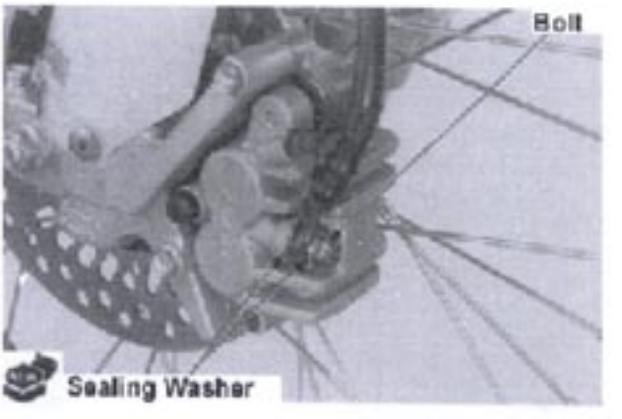


Connect the brake hose by pushing it to the caliper.

Caution

Do not twist the hose.

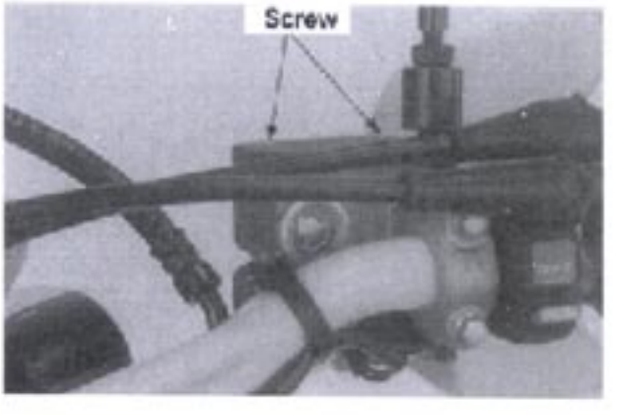
Install a new sealing washer and tighten the brake hose bolt.



Torque setting : 34Nm (3.5kgfm)

Fill brake fluid and bleed air (13-4).

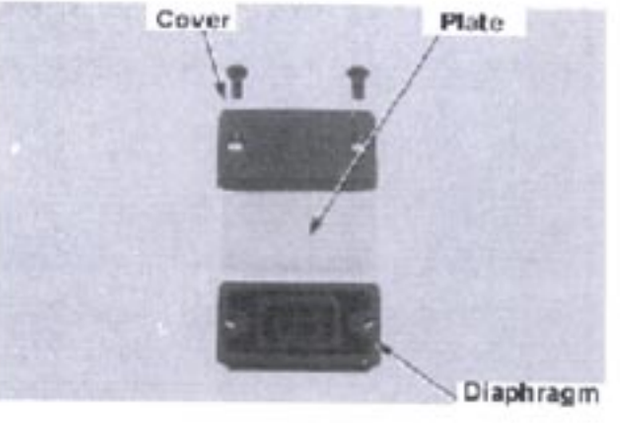
Front master cylinder
Removal



Notes
- **Keep painted, plastic, and rubber surfaces away from the brake fluid.**
- **Do not reuse the sealing washer.**
- **Wash all disassembled parts with brake fluid and check all ports with compressed air.**
- **Clean and store all disassembled parts.**

Drain brake fluid (13-4).
Remove rearview mirrors (11-3).

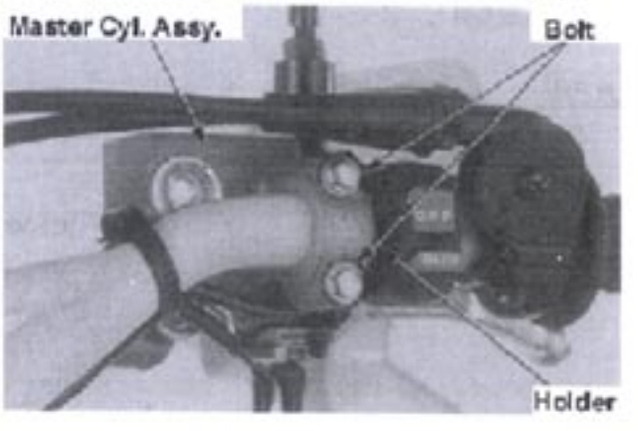
Remove the following parts:
- Reservoir cover screw
- Reservoir cover
- Diaphragm plate
- Diaphragm



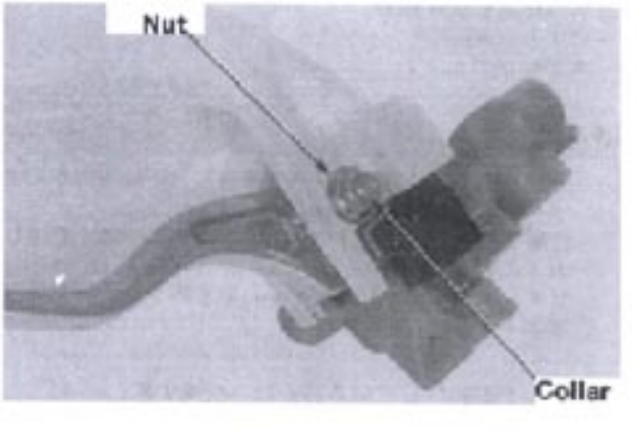
Remove the following parts:
- Stop lamp switch connector

- Brake hose bolt
- Sealing washer
- Brake hose

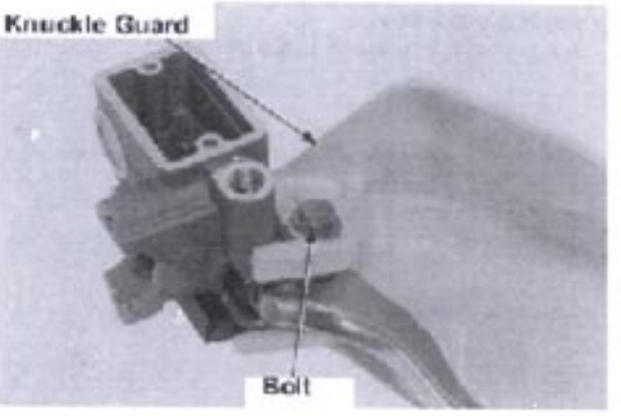
- Front master cylinder holder bolt
- Front master cylinder holder
- Front master cylinder Assy.



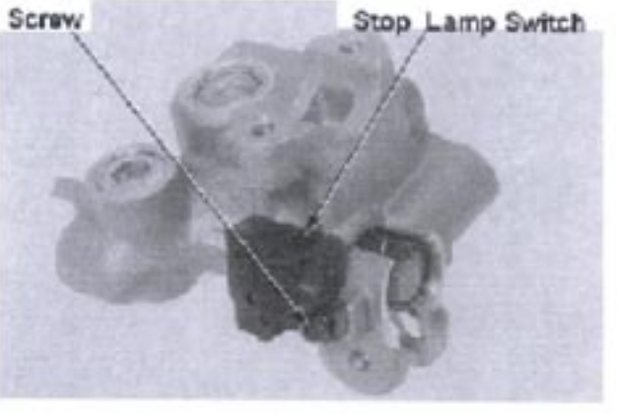
Disassembly
Remove the following parts:
- Front brake lever pivot nut
- Collar



Remove the following parts:
- Front brake lever pivot bolt
- Knuckle guard



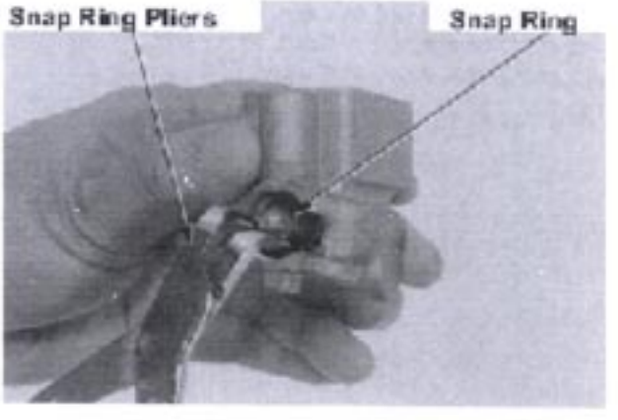
- Front stop lamp switch screw
- Front stop lamp switch



Remove the boot and the snap ring.

Notes Do not damage the boot.

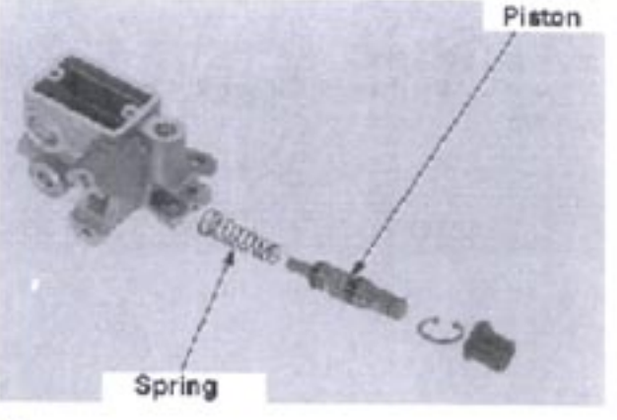
Special tool : Snap ring pliers
07914-3230001



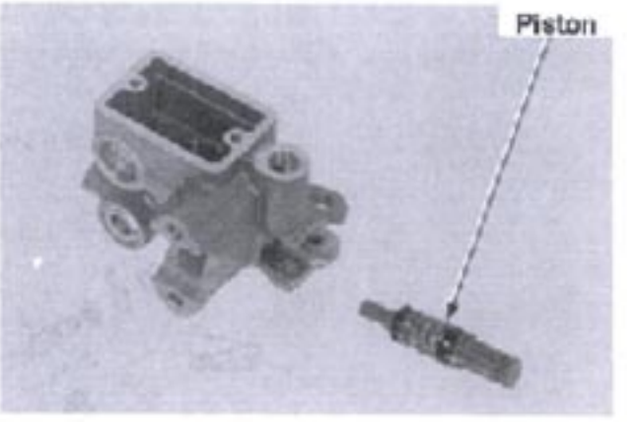
Remove the following parts:
- Piston Assy.
- Spring

Notes
- **Wash all disassembled parts with brake fluid and check all ports with compressed air.**
- **Clean and store all disassembled parts.**
- **Do not remove the piston cup from the piston. Replace the whole piston Assy. if necessary.**

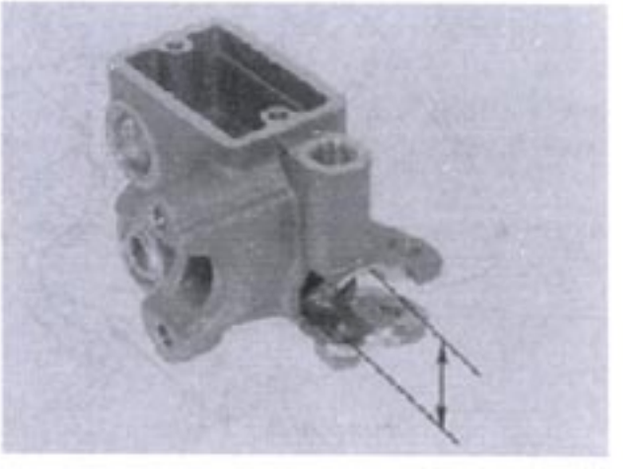
Replace the spring if it is damaged.



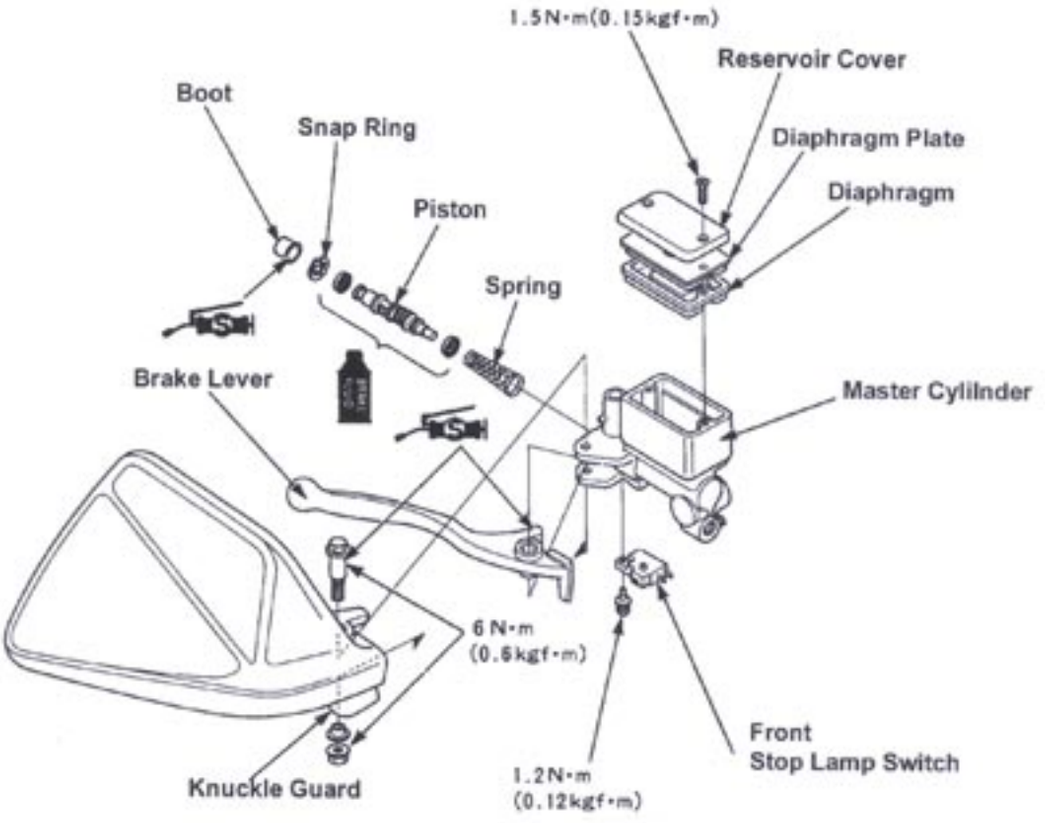
Inspection
Damaged/scratched piston or cylinder
→ Replace



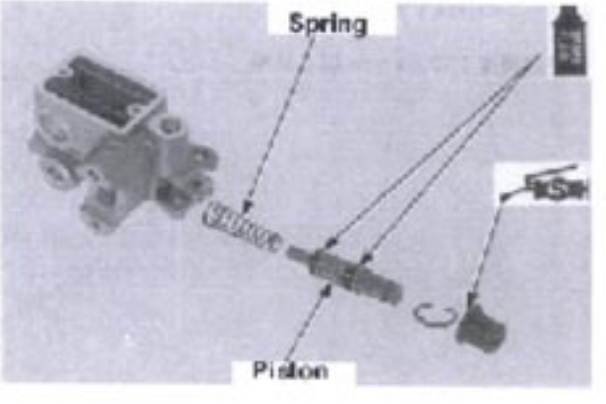
Measure the cylinder bore.
Service limit : 12.76mm or above →
Replace



Measure the piston diameter.
Service limit : 12.64mm or above →
Replace



Notes
- Replace the master piston Assy. and the spring at a same time.
- Replace the boot if it is damaged or worn.
- Apply Silicon grease to the interior surface of the boot.
- Clean all parts before installing.

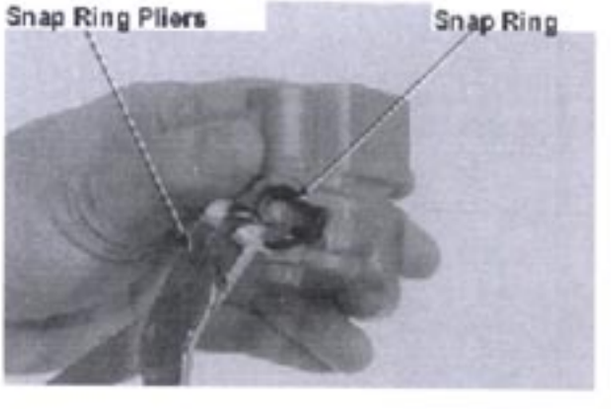


Apply brake fluid to the piston cup.
Install the following parts:
- Spring
- Piston Assy.

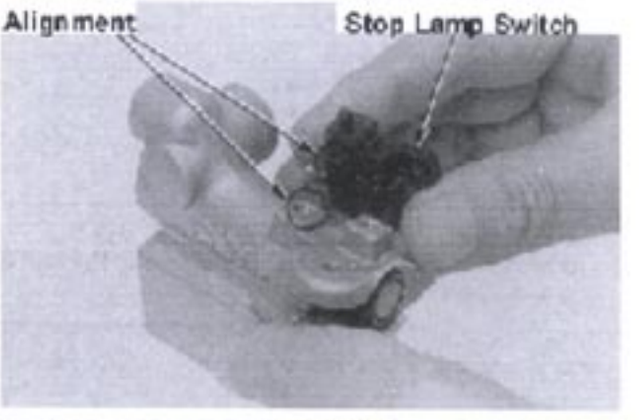
Install the snap ring.
Special tool : Snap ring pliers
07914-3230001

Install the boot.

Notes Do not damage the boot.

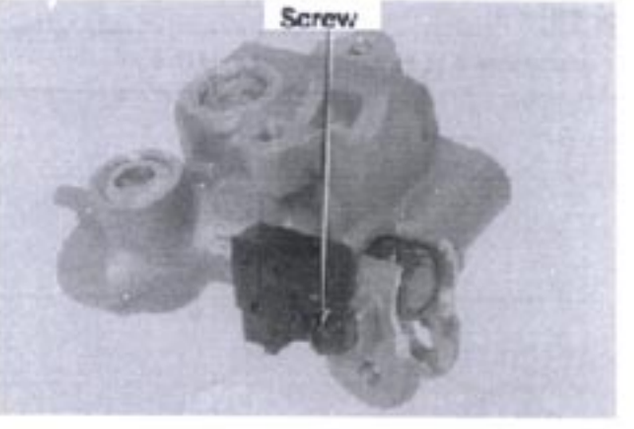


Align the front stop lamp switch projection with the master cylinder hole to set the front brake lamp switch.



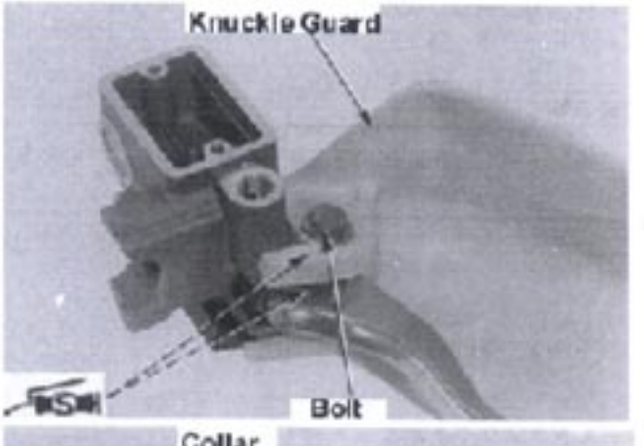
Tighten the front stop lamp switch screw.

Torque setting : 1.2Nm (0.12kgfm)



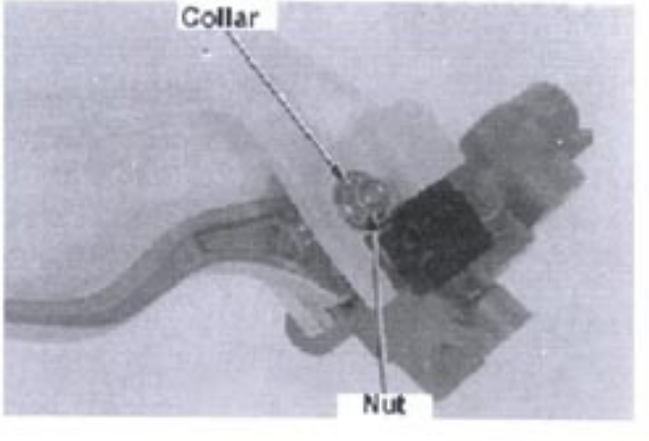
Apply Silicon grease to the master cylinder piston contact area of the front brake lever and the front brake lever pivot bolt thread.
Install the knuckle guard.
Tighten the front brake lever pivot bolt.

Torque setting : 6Nm (0.6kgfm)



Install the collar.
Tighten the front brake lever pivot nut.

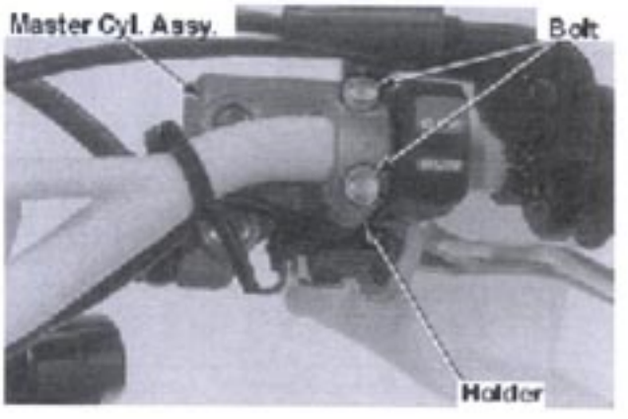
Torque setting : 6Nm (0.6kgfm)



Installation

Install the following parts:

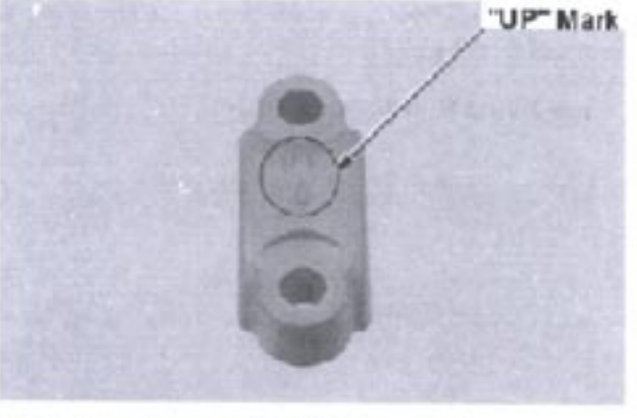
- Front master cylinder Assy.
- Front master cylinder holder



Notes

- **Set the "UP" mark on the holder upwards.**
- **Align the mating surfaces of the holder and the master cylinder with the punched mark on the handlebar.**

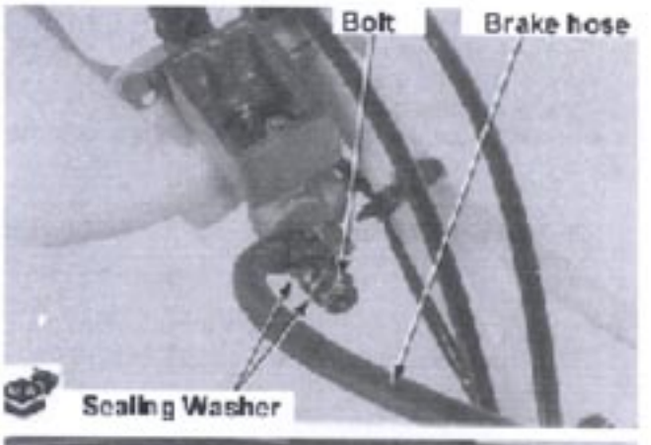
- Front master cylinder holder bolt



Notes

Tighten the top holder bolt first.

- New sealing washers
- Brake hose

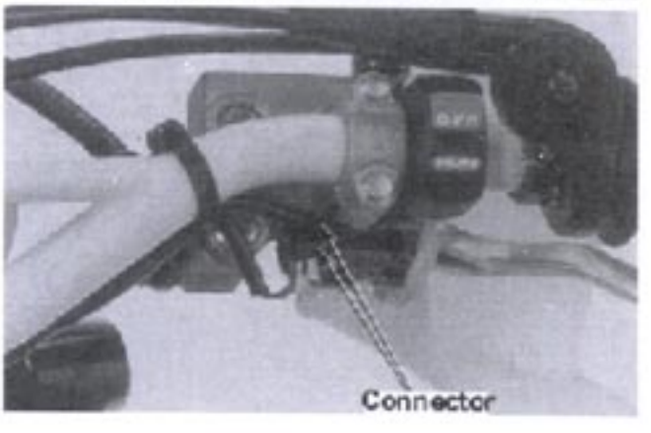


Notes

Push the brake hose to the master cylinder stopper.

- Brake hose bolt

Torque setting : 34Nm (3.5kgfm)

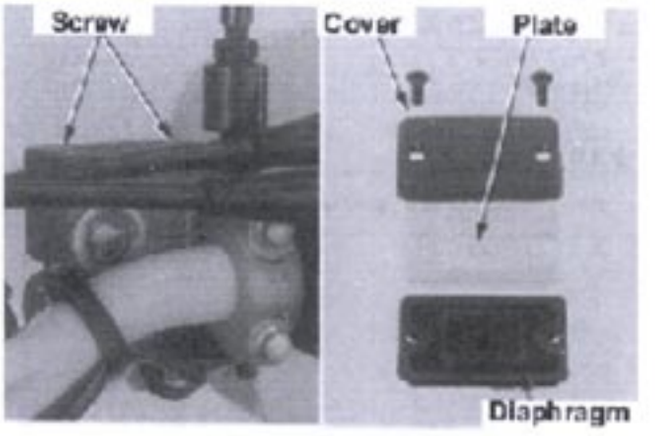


- Stop lamp switch connector

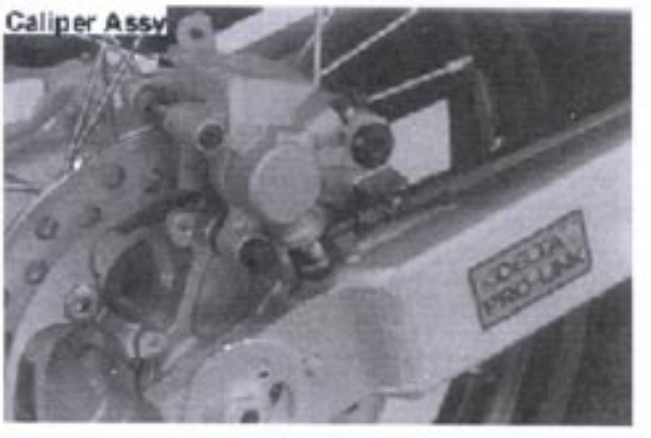
Install the following parts:
- Diaphragm
- Diaphragm plate
- Reservoir cover
- Reservoir cover screw
-

Torque setting : 1.5Nm (0.15kgfm)

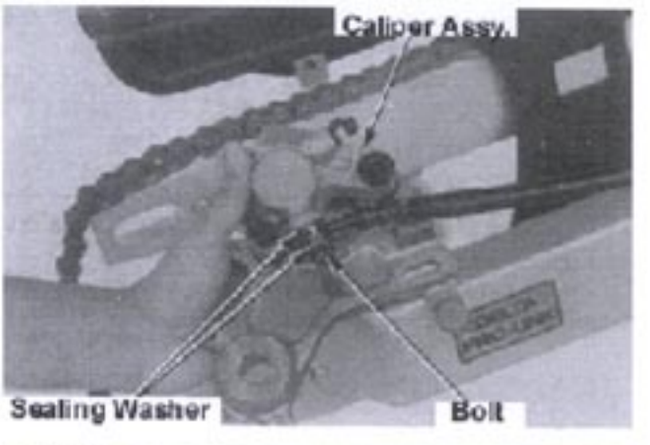
Refill brake fluid and bleed air (13-4).



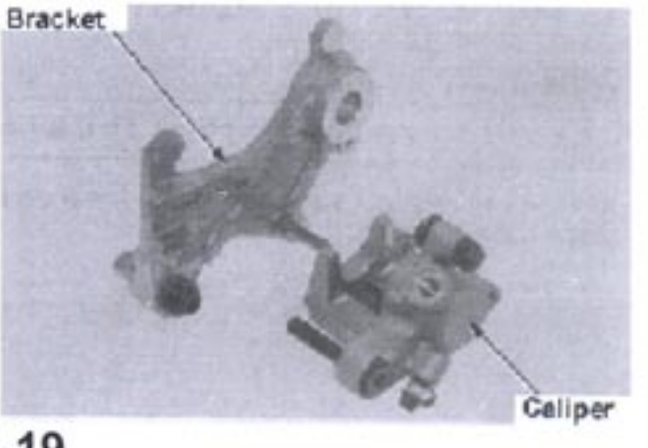
Rear brake caliper
Removal
Remove the rear wheel (12-3).
Drain brake fluid (13-4).
Remove the rear brake caliper.



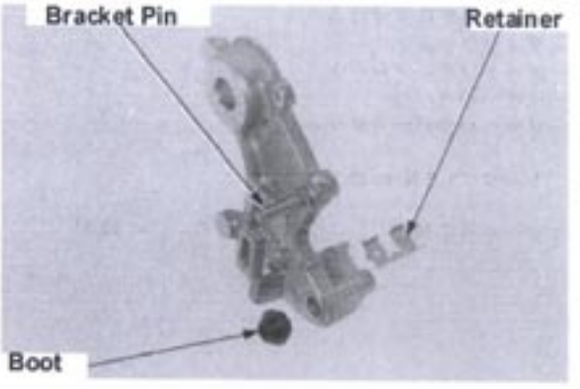
Remove the following parts:
- Brake hose bolt
- Sealing washer
- Rear brake caliper Assy.



Disassembly
Remove the rear brake caliper bracket from the caliper.

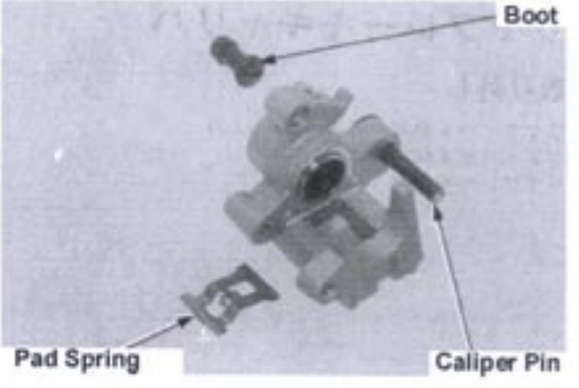


Remove the following parts:
- Caliper pin boot
- Retainer



Notes
Do not remove the bracket pin unless replacing it.

- Bracket boot
- Pad spring



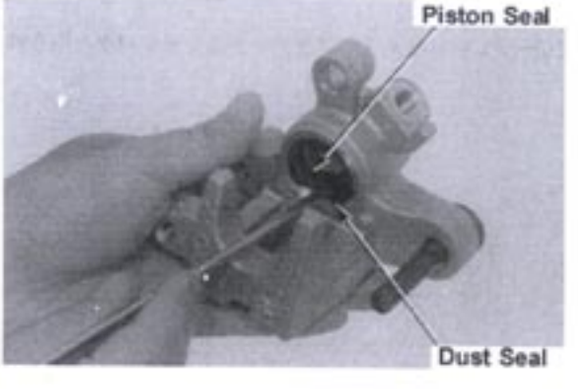
Notes **Do not remove the caliper pin unless replacing it.**

Wrap the caliper with a cloth and tilt it downwards.
Gradually apply low-compressed air from the brake hose mount to remove the piston from the caliper.

Warning

- Do not use highly-compressed air or an air-gun.
- Do not touch the interior surface of the caliper.

Remove the piston seal and dust seal.

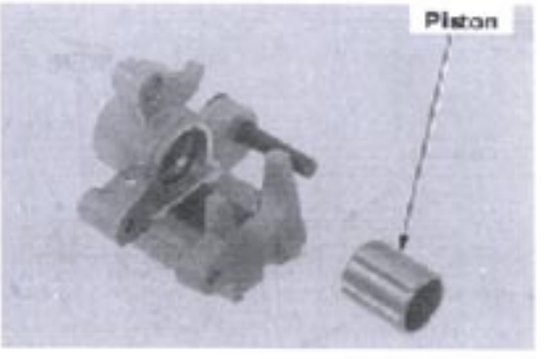


Caution

Do not damage the interior surface of the caliper cylinder.

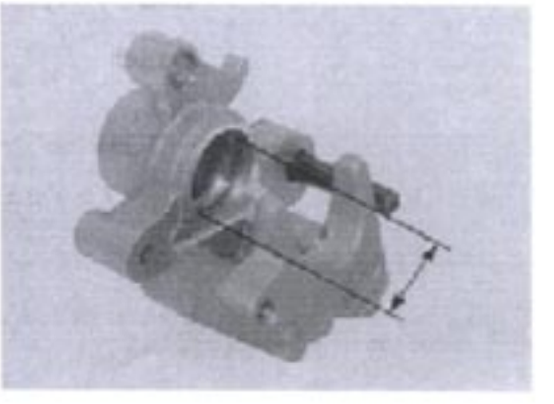
Wash the caliper cylinder and the piston with clean brake fluid. Remove dirt from the groove.

Inspection
Damaged/scratched piston/cylinder → Replace



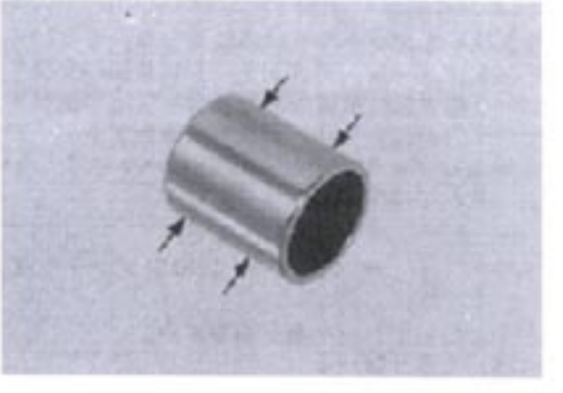
Measure the cylinder bore.

Service limit : 27.10mm or above → Replace

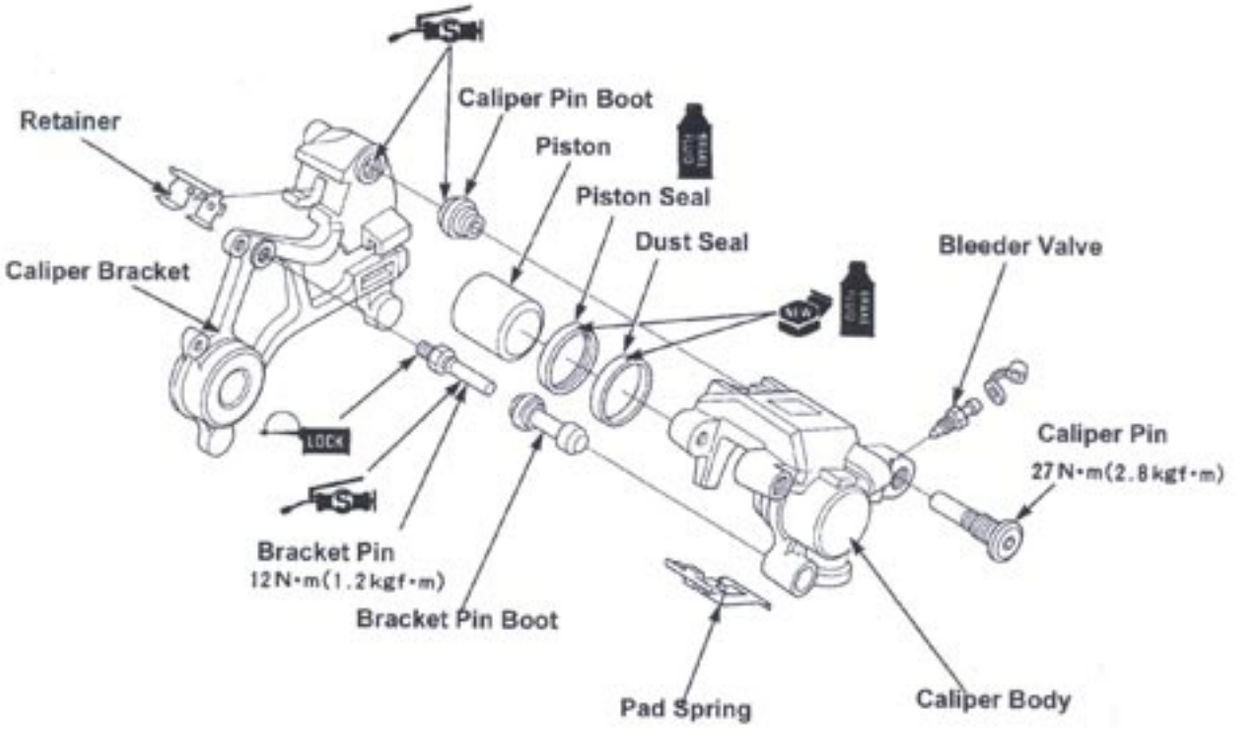


Measure the piston diameter.

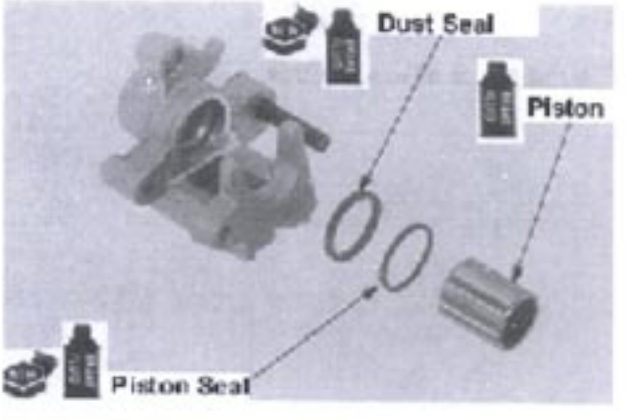
Service limit : 26.89mm or above → Replace



Assembly

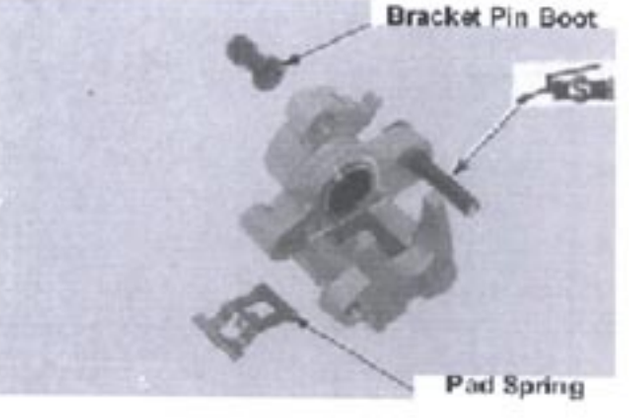


Notes
- Do not re-use drained brake fluid.
- Replace the piston seal and the dust seal with new ones.
- Replace the boot if it is damaged or worn.
- Apply Silicon grease to the interior surface of the boot.
- Make sure all parts are clean before assembling.

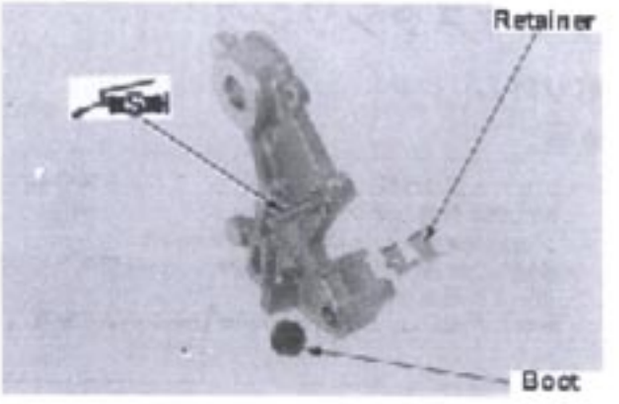


Apply brake fluid to the piston seal and the dust seal.
Apply brake fluid to the piston.

Install the following parts:
- Piston seal
- Dust seal
- Piston
- Pad spring
- Bracket pin boot



Install the following parts:
- Retainer
- Caliper pin boot



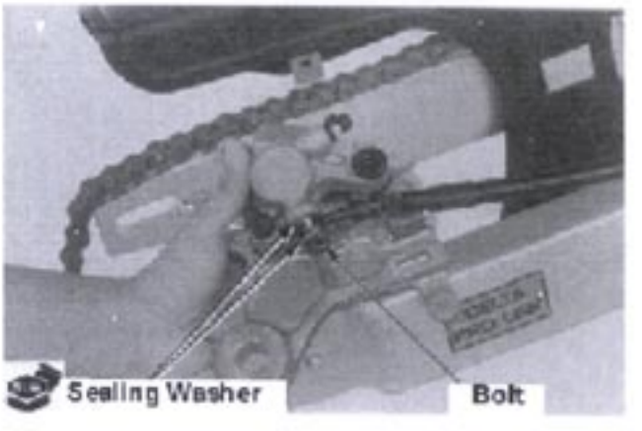
Install the rear brake caliper bracket to the caliper.

Connect the brake hose by pushing it to the caliper.

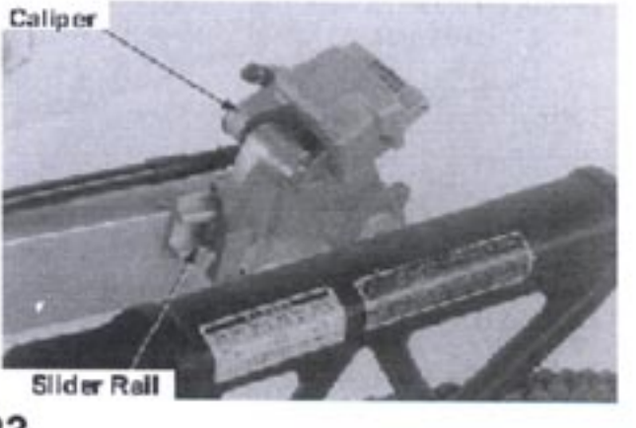
● Notes	Do not twist the hose.

Install new sealing washers and secure the brake hose bolts.

Torque setting : 34Nm (3.5kgfm)



Align the rear brake caliper bracket with the swing arm slide rail to install the rear wheel and the axle shaft.
Adjust the drive chain slack (3-9).
Refill the brake fluid and bleed air (13-4).

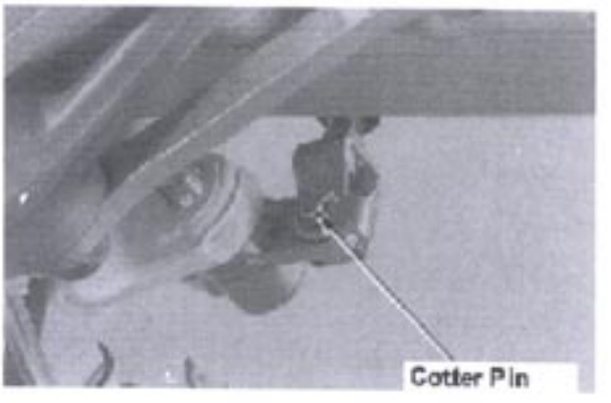


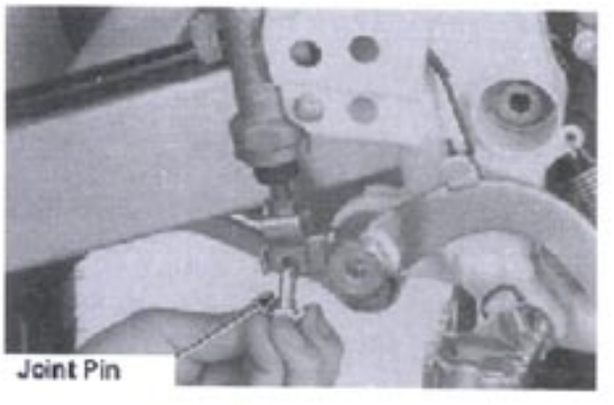
Rear master cylinder
Removal

Notes
- **Keep the painted, plastic, and rubber surfaces away from the brake fluid.**
- **Do not re-use the sealing washers.**
- **Wash all removed parts with brake fluid and check all ports with compressed air.**
- **Sort and store all removed parts and keep them away from dust.**

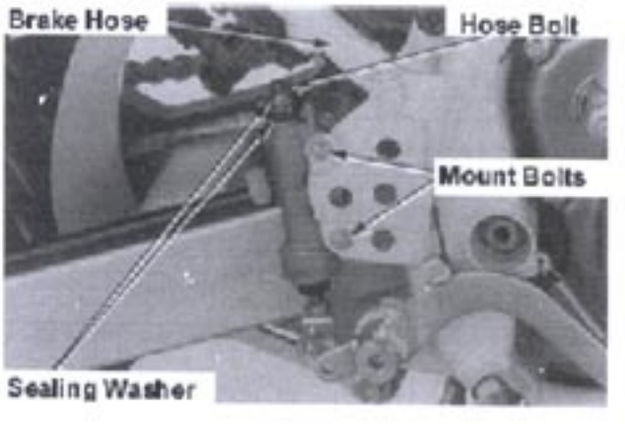
Drain brake fluid (13-4).

Remove the following parts:
- Cotter pin
- Joint pin

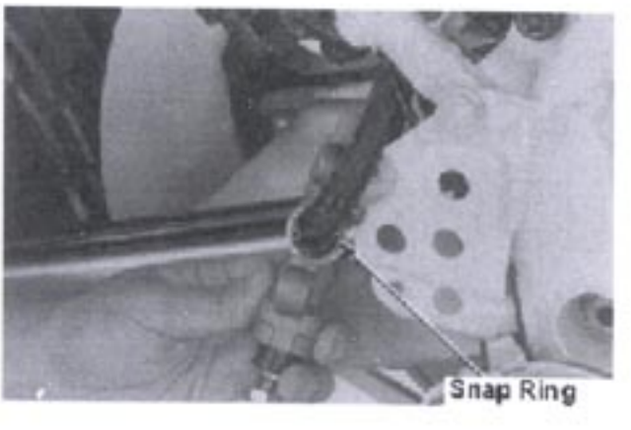




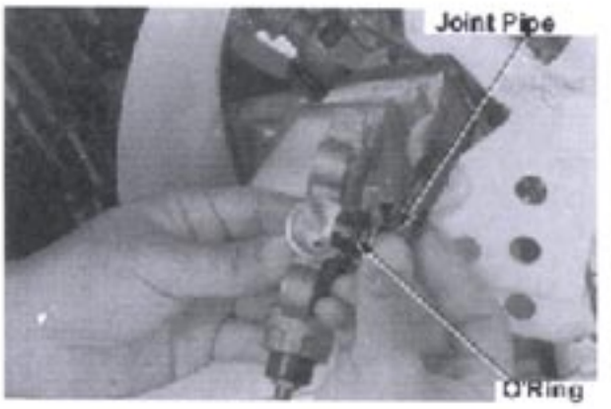
- Brake hose bolt
- Sealing washer
- Brake hose
- Rear master cylinder mount bolt



- Snap ring

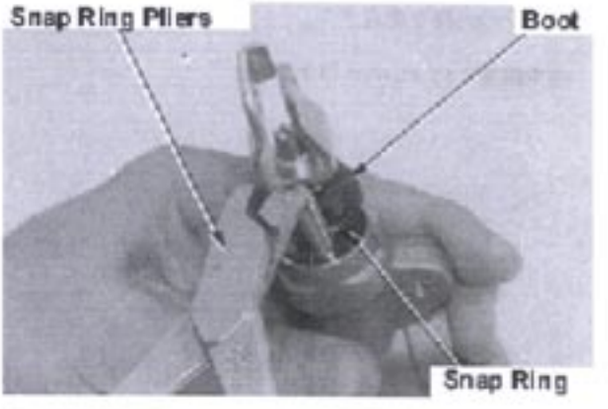


- Joint pipe
- O-ring



Disassembly
Remove the following parts:
- Boot

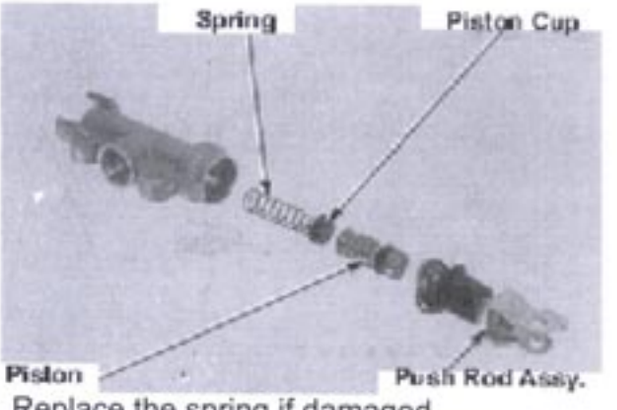
Notes	Do not damage the boot.



- Snap ring

Special tool :
Snap ring pliers 07914-3230001

- Push rod Assy.
- Piston Assy.
- Piston cup
- Spring

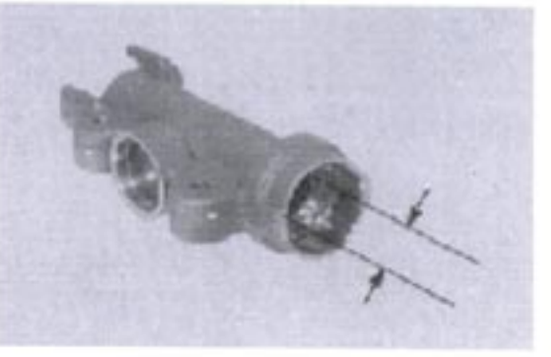


Replace the spring if damaged.

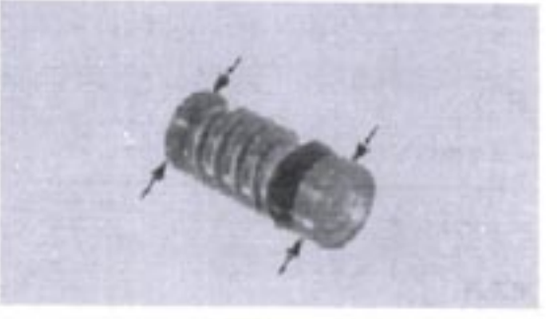
Notes
• Wash all removed parts with brake fluid and check all ports with compressed air. • Sort and store all removed parts and keep them away from dust. • Do not remove the piston cup from the piston. Replace whole piston Assy. if necessary

Inspection
Damaged/scratched piston/cylinder → Replace

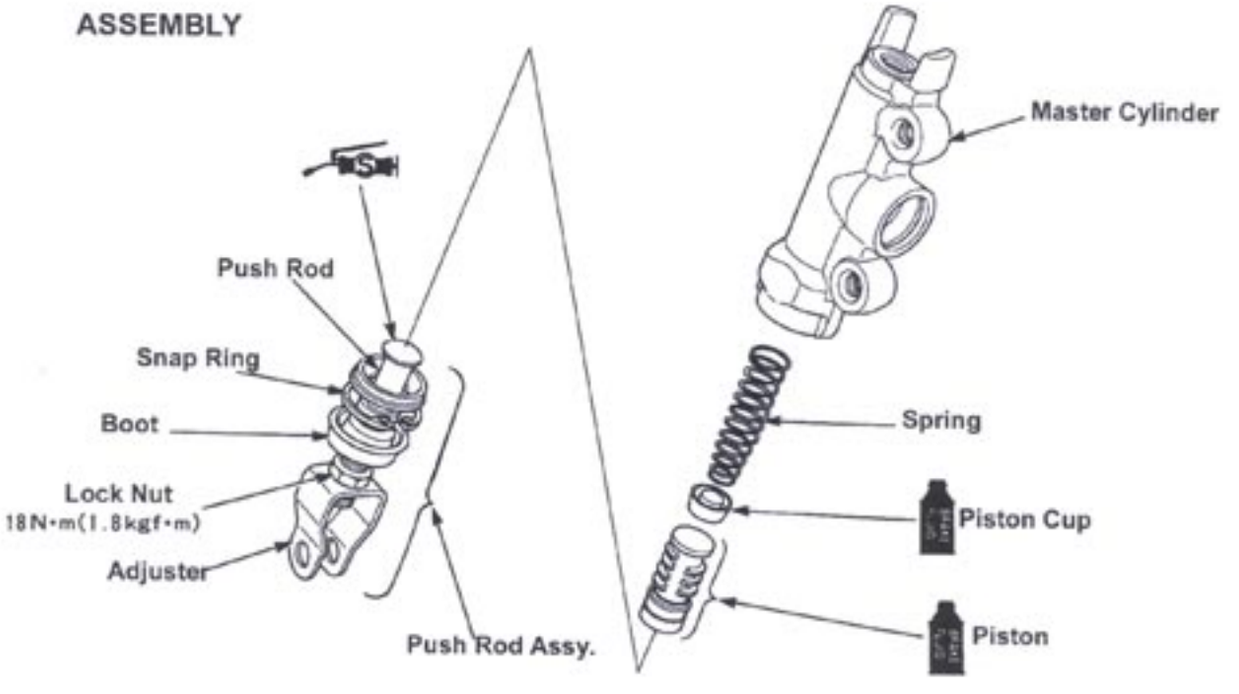
Measure the cylinder bore.
Service limit : 14.06mm or above → Replace



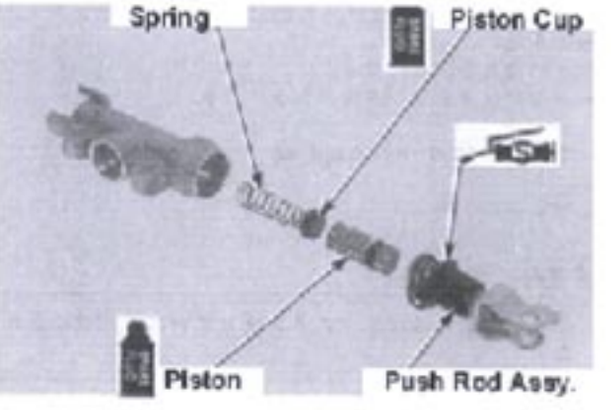
Measure the piston diameter.
Service limit : 13.95mm or below → Replace



ASSEMBLY

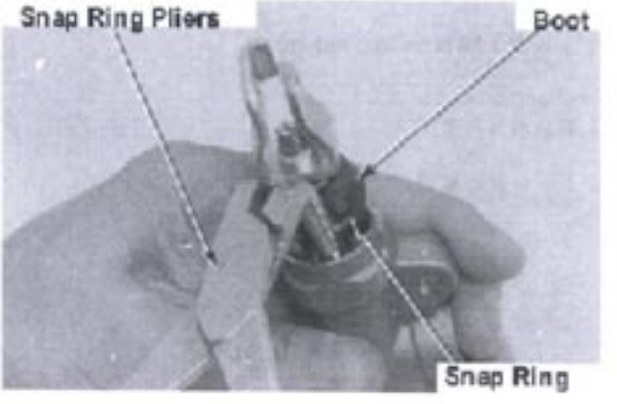


- Notes
- Replace the master piston Assy. and the spring at the same time.
- Replace the boot if damaged/worn.
- Apply silicon grease to the interior surface of the boot.
- Make sure all parts are clean before assembling.



Apply brake fluid to the piston cup.

Install the following parts:
- Spring
- Piston cup
- Piston Assy.
- Push rod Assy.
- Snap ring



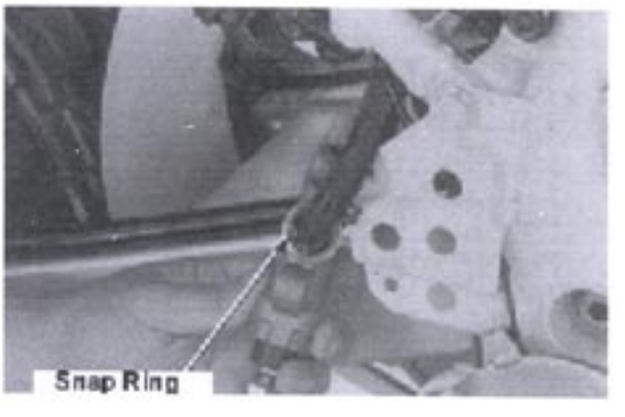
Special tool :
Snap ring pliers 07914-3230001

- Boot

Notes	Do not damage the boot.

Installation
- New O-ring
- Joint pipe

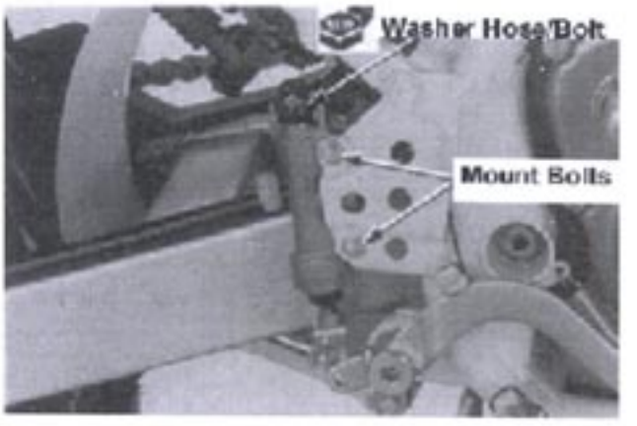
- Snap ring



Apply screw locking agent to the rear master cylinder mount bolt.
Install the following parts:
- Rear master cylinder mount bolt

Torque setting : 10Nm (1.0kgfm)

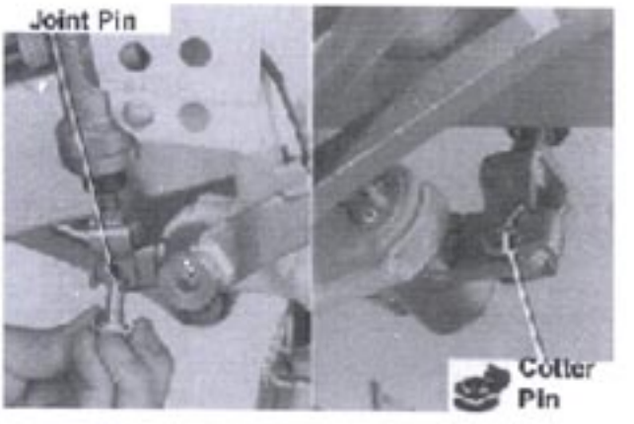
- Brake hose



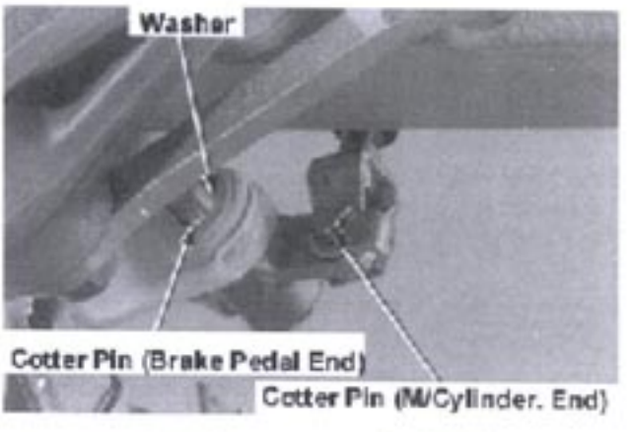
Notes
- **Set the brake hose to the stopper on the master cylinder.**

- New sealing washers
- Brake hose bolts

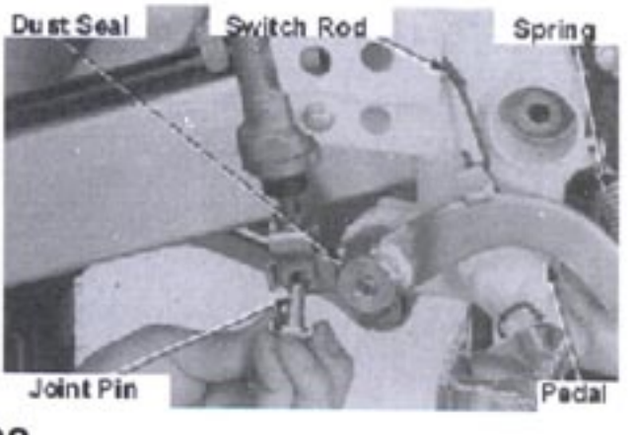
Torque setting : 34Nm (3.5kgfm)
- Joint pin
- New cotter pin
- Refill brake fluid and bleed air (13-4).



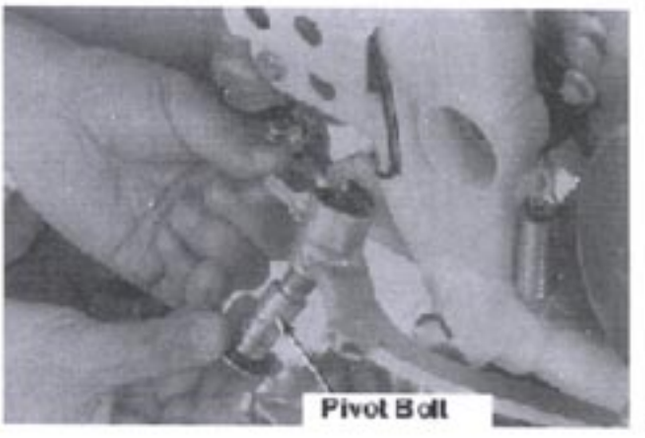
Brake pedal
Removal
Remove the following parts:
- Cotter pin (master cylinder end)
- Cotter pin (brake pedal end)



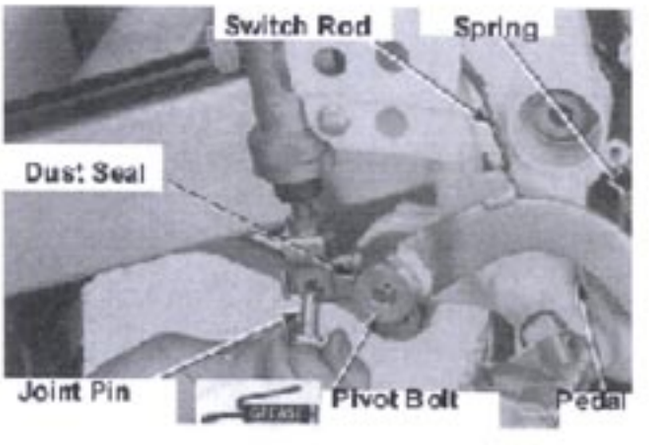
- Joint pin
- Brake pedal return spring
- Brake switch rod
- Brake pedal
- Dust seal



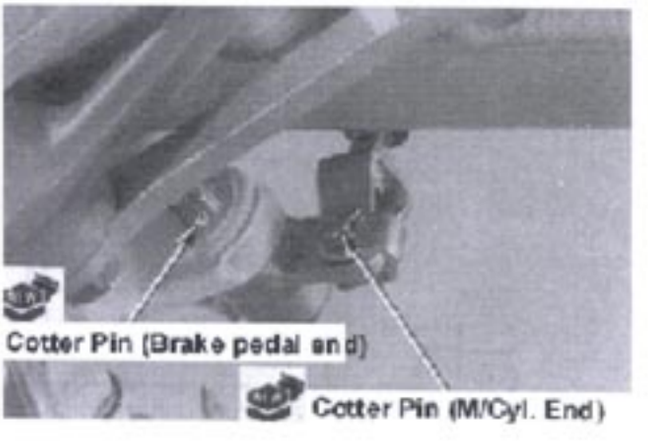
Remove the following parts:
- Brake pedal pivot bolt

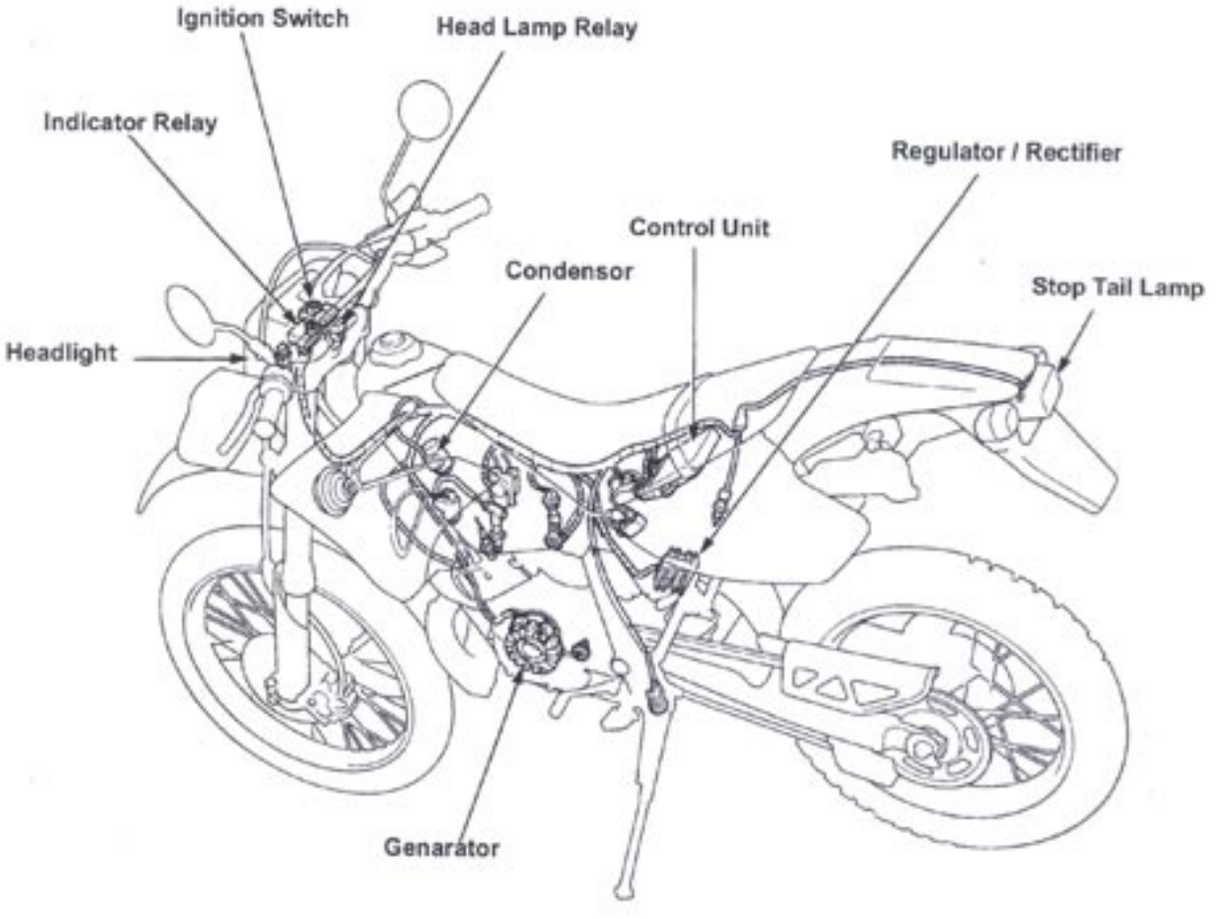


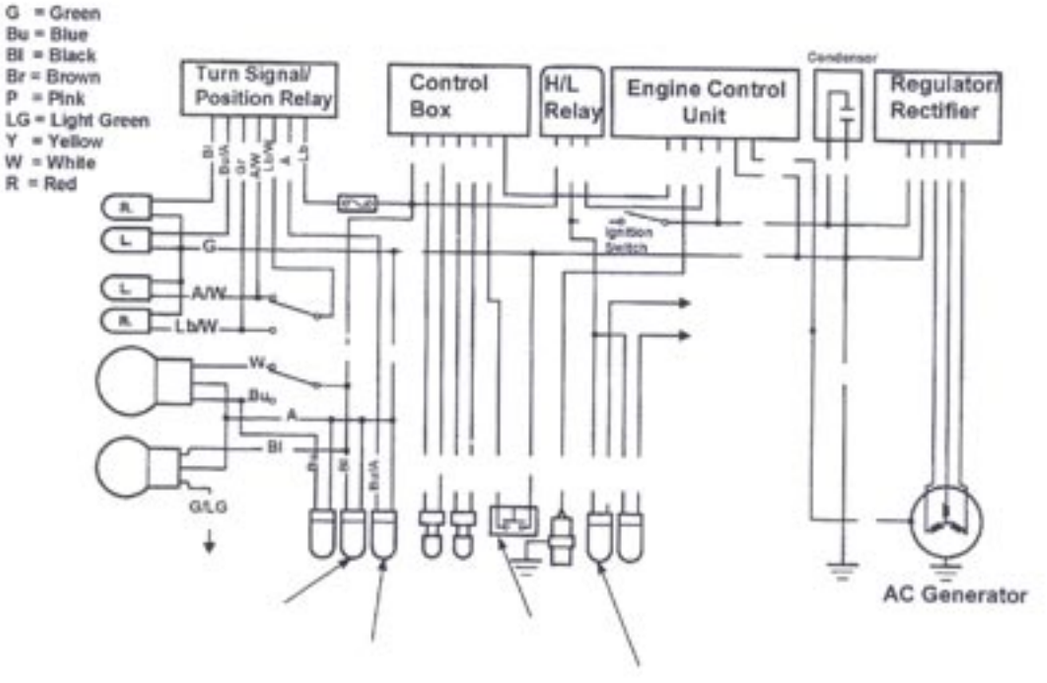
Installation
Apply grease to the brake pedal pivot.
Install the following parts:
- Dust seal
- Brake pedal
- Brake pedal pivot bolt
- Brake pedal return spring
- Brake switch rod
- Joint pin

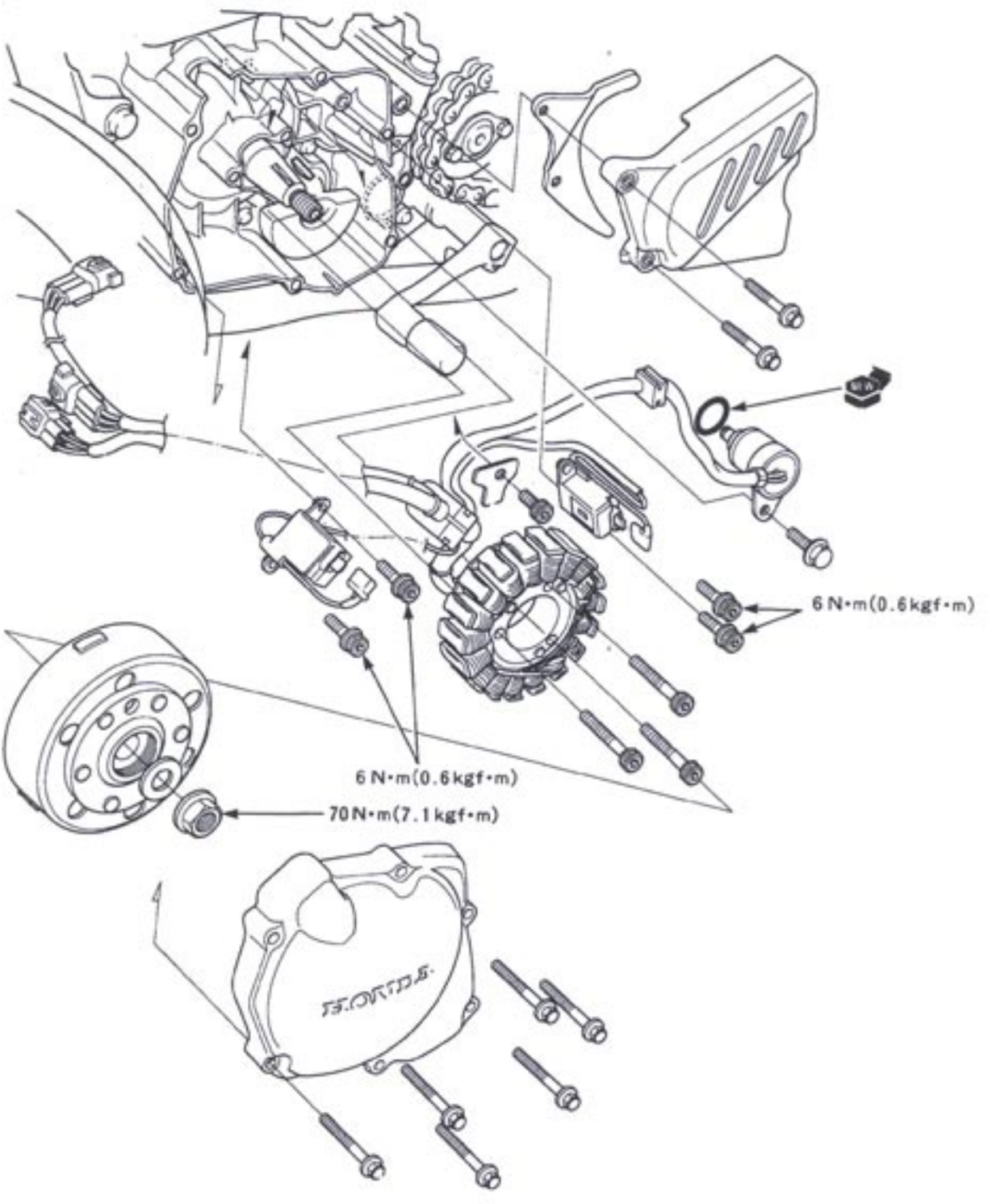


- New cotter pin (brake pedal end)
- New cotter pin (master cylinder end)




Ignition Switch
Head Lamp Relay
Indicator Relay
Regulator / Rectifier
Control Unit
Condensor
Stop Tail Lamp
Headlight
Genarator


G = Green
Bu = Blue
Bl = Black
Br = Brown
P = Pink
LG = Light Green
Y = Yellow
W = White
R = Red
Turn Signal/ Position Relay
Control Box
H/L Relay
Engine Control Unit
Condensor
Regulator/ Rectifier
Ignition Switch
AC Generator



General

Caution

- Always turn off the ignition switch before servicing electrical system. Opening/closing the circuit with eiectric current may result in damaging the regulator/rectifier or other electrical components with excessive current.
- When inspecting the circuit with a multimeter while running the engine, exercise extreme caution not to short the circuit.

- Use a designated digital multimeter or an equivalent product, which has impedance of 10M/DCV or above.
  - **Genuine KOWA or equivalent digital multimeter - 07411-0020000**
- Follow the troubleshooting chart for the circuit inspection.
- Refer to the circuit diagram for the ignition switch, the lighting switch, and the dimmer switch continuity check.
- This vehicle has an electrical fuse system. If the engine does not start, check the electrical wiring first. If the fuses blow, check for a reason before just replacing the blown fuse.

Specification

Item		Specification
Alternator	Type	Three-phase AC
	Output	211W@5,000rpm
	Lighting Coil	0.2-0.4
	Resistance (20°C)	Three-phase regulation, SCR short circuit
Regulator/Rectifier	Regulated voltage	14.0-14.8V@3,000rpm (head lamp at high beam, gear neutral, digital multimeter at DC range).

Torque settings

Flywheel nut	70Nm (7.1kgfm)
Pulse generator bolt	6Nm (0.6kgfm)

Special tools

Digital multimeter	07411-0020000
(or equivalent product with an impedance of 10M/DCV or above)	
Universal holder	07725-0030000
Flywheel puller	07733-0010000

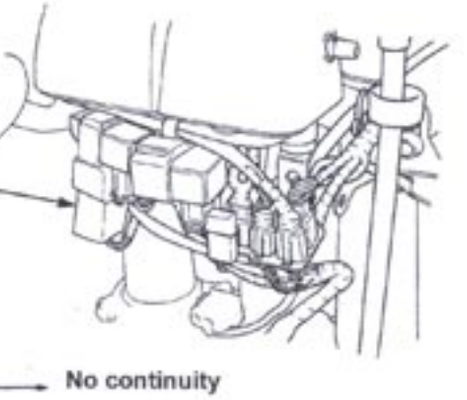
Troubleshooting

The engine starts but the following equipment are dead.

- Head lamp
- Stop/tail lamp
- Turn signal/position lamp
- Turn signal indicator
- High beam indicator
- Instrument panel light
- Horn

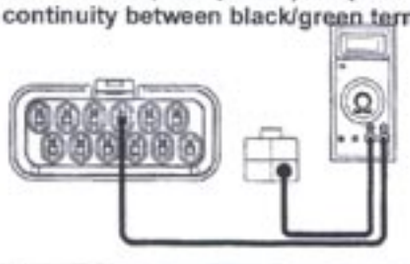
Inspect Head Lamp Relay - (17-14)

Fault → Replace Headlamp Relay



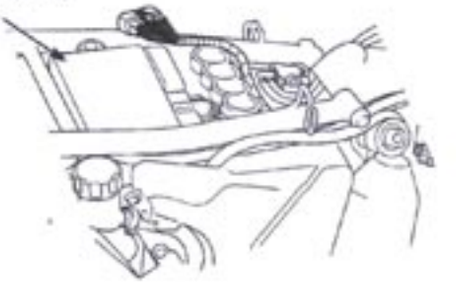
Normal

Disconnect the headlamp relay 4P wire harness open circuit coupler and the engine control unit 12P (transparent) coupler. Check the continuity between black/green terminals.



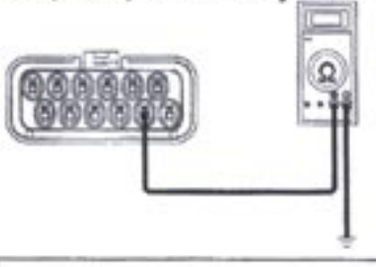
→ No continuity

Engine control
Unit



Continuity

Check the continuity between the engine Wire harness open circuit control unit 12P (transparent) and the body earth.



→ No Continuity

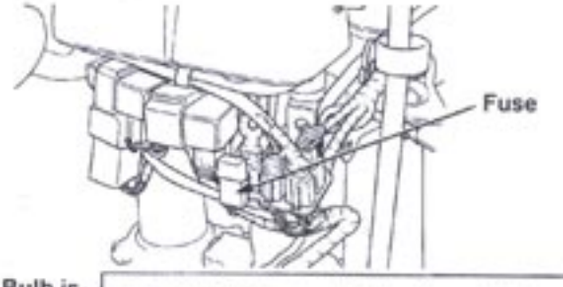
Continuity

- Headlamp relay or engine control Unit coupler connection fault.
- Engine control unit fault.

The engine starts but the turn signal is dead. The headlamp is dead or very weak.

TURN SIGNAL

Check the fuse — Fuse is blown → Wire harness Short Circuit



Normal

Check the turn signal bulb — Bulb is Blown → Measure the regulated voltage (14-6)

Normal

Measure the regulated voltage (14-6): Normal; Faulty

Check the Turn Signal Relay (17-14) — Faulty → Replace Turn Signal Relay

Normal → Socket, Coupler Connection Fault
Wire harness open circuit
Turn Signal Switch Fault

HEADLAMP

Measure the H/L regulated voltage (14-6) — Normal → Socket or Connection Fault
Faulty Bult

Faulty

Measure the Regulator/Rectifier regulated voltage (14-6) — Normal → Coupler Connection Fault
Wire Harness open Circuit
Dimmer Switch Fault

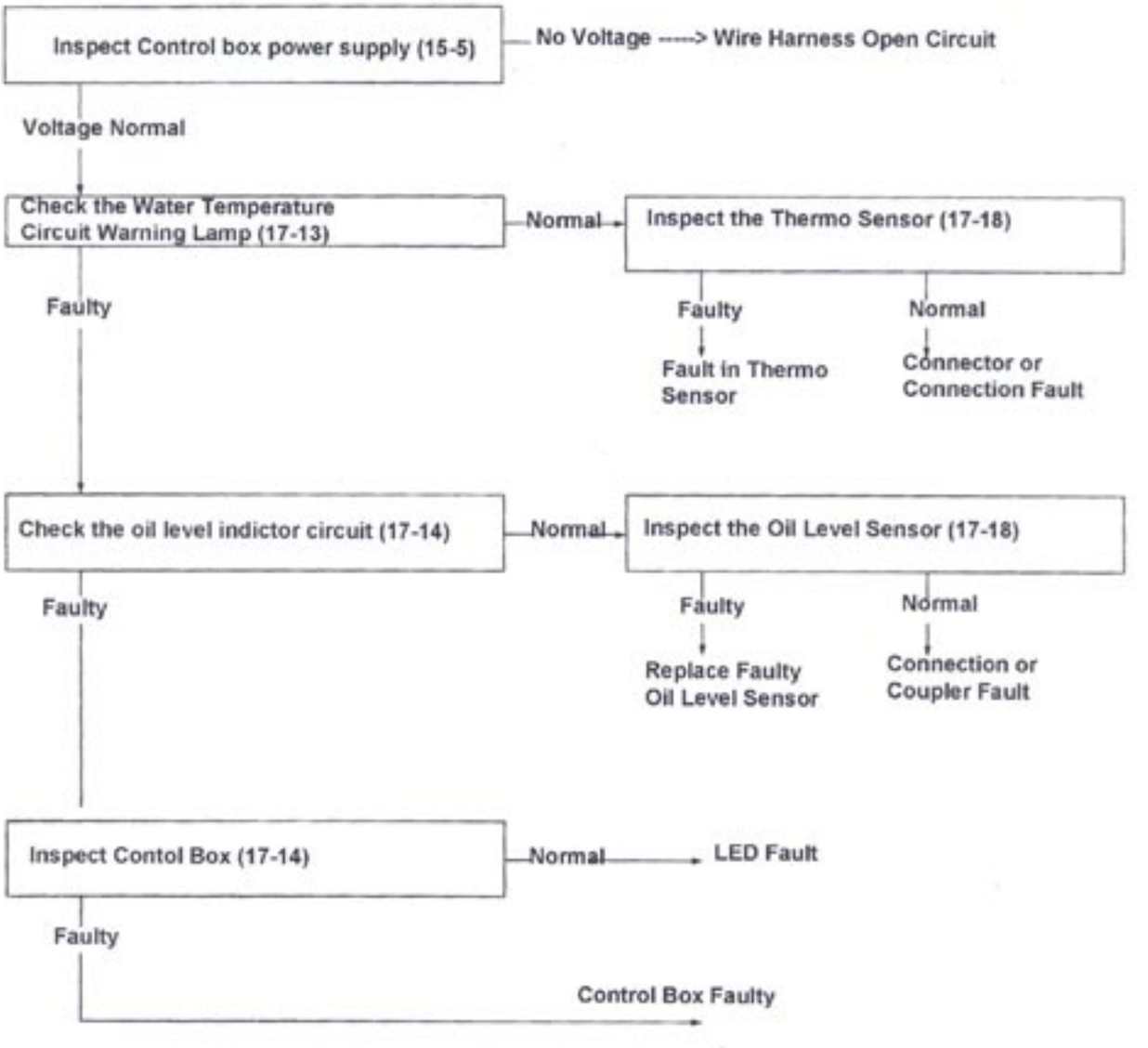
Faulty

Measure the alternator coil resistance (14-7) — Normal → Check for Regulator / Rectifier (14-7)

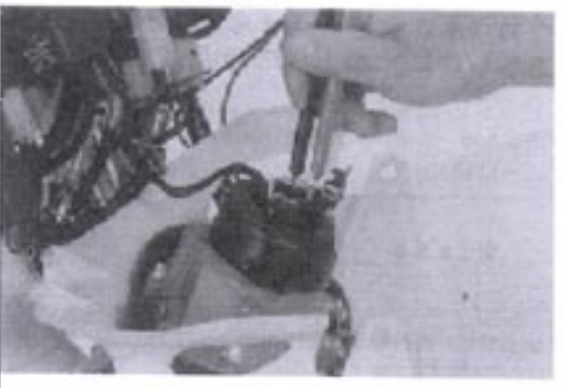
Faulty → Faulty ACG

Check for Regulator / Rectifier (14-7): Faulty → Faulty Regulator/Rectifier; Normal → Wire Harness Open Circuit

LED Does not illuminate when it should (ie Water Temperature Rises Excessively)
While engine running or the oil tank is empty.



Regulated voltage check



Notes

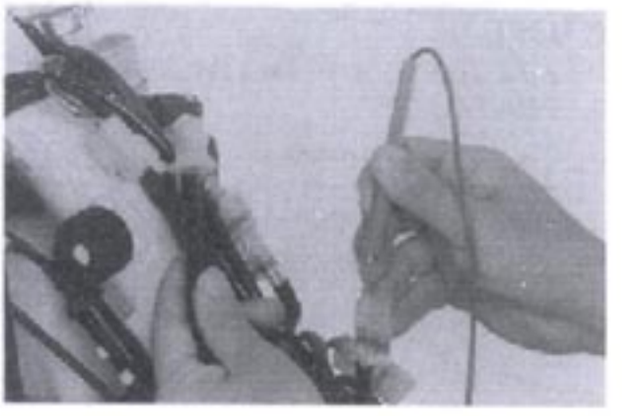
- **This vehicle is equipped with DC circuits. Measure the voltage with DC range.**
- **Use the following recommended multimeter for the measurement:**
  - **Genuine KOWA digital multimeter 07411-0020000**
  - **A digital multimeter with an impedance of 10M/DCV or above**
- **Leave the couplers and the connectors connected.**

Head lamp and turn signal regulated voltage:
Warm up the engine.
Headlamp:
Remove the head lamp case (17-4) and connect the multimeter between the head lamp connector blue(+) and green(-) terminals.
Set the gear to the neutral and start the engine.
Turn the head lamp on and select Hi-beam.
Slowly increase the engine rpm and measure the regulated voltage.
Regulated voltage : 12.5 - 14.5V

Turn signal:
Remove the head lamp case (17-4) and connect the multimeter between the turn signal connector amber or light blue(+) and green(-) terminals.
Set the gear to the neutral and start the engine.
Turn the head lamp on and select Hi-beam.
Slowly increase the engine rpm and measure the regulated voltage.
Regulated voltage : Position lamp ON : 3.5 - 5.5V
Turn signal ON : 8.0 - 14.5V

Regulator/rectifier regulated voltage:
Remove the seat and the fuel tank (2-2, 2-3).
Connect the multimeter between the regulator/rectifier 2P coupler red(+) and green (-).
Set the gear to the neutral and start the engine.
Turn the head lamp on and select Hi-beam.
Slowly increase the engine rpm and measure the regulated voltage.
Regulated voltage : 14.0 - 14.8V
Inspect the regulator/rectifier component if the voltage is out of the range.

Regulator/Rectifier



Check the regulator/rectifier coupler connection.
Measure the resistance between the couplers (refer to the table).

Notes
- **Do not touch the probe when measuring.**
- **Use the following recommended multimeter for the measurement:**
  - **Genuine KOWA digital multimeter 07411-0020000**
  - **A digital multimeter with an impedance of 10M/DCV or above**
- **Set the range to "k".**
- **Replace the battery for the multimeter if it shows faulty value.**

Unit : kΩ

(-) (+)	Red	Yellow	Yellow	Yellow	Green
Red	-	∞	∞	∞	∞
Yellow	0.5-15	-	∞	∞	∞
Yellow	0.5-15	∞	-	∞	∞
Yellow	0.5-15	∞	∞	-	∞
Green	0.5-20	0.5-15	0.5-15	0.5-15	-

If the resistance between the terminals are faulty, replace the regulator/rectifier.

Alternator

Inspection

Notes
The alternator does not have to be removed from the engine.

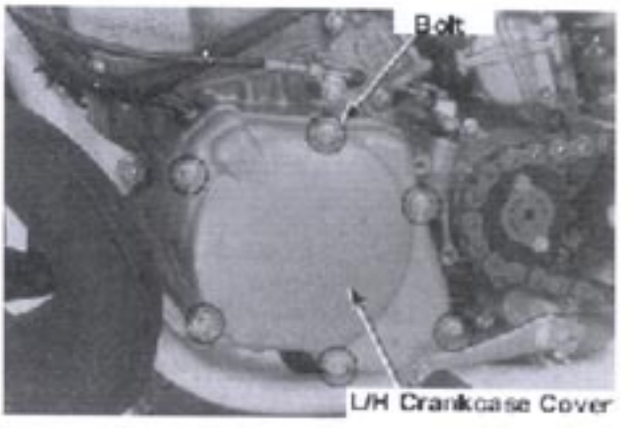
Remove the seat and the fuel tank (2-2, 2-3).
Disconnect the alternator 3P (transparent) coupler.
Measure the resistance between the yellow terminals at the engine end coupler.

Specification: 0.1 - 1.0 (20)

Replace the stator if the measured resistance is out of the range.
Check there is no continuity between the yellow terminal on the engine end coupler and the body earth.
Replace the stator if there is continuity.

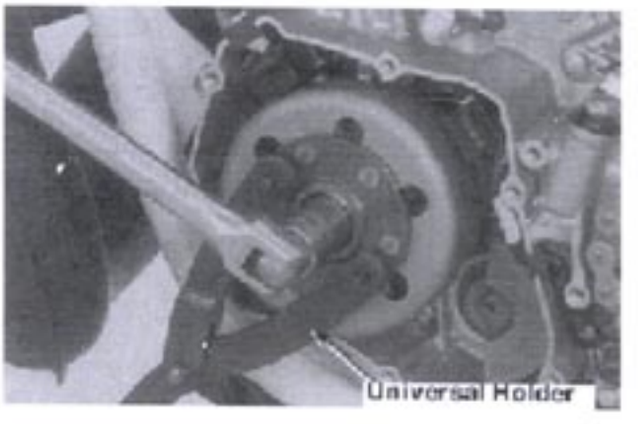
Removal
Remove the drive sprocket cover (7-2).
Remove the following parts:

- Left crankcase cover bolts
- Left crankcase cover



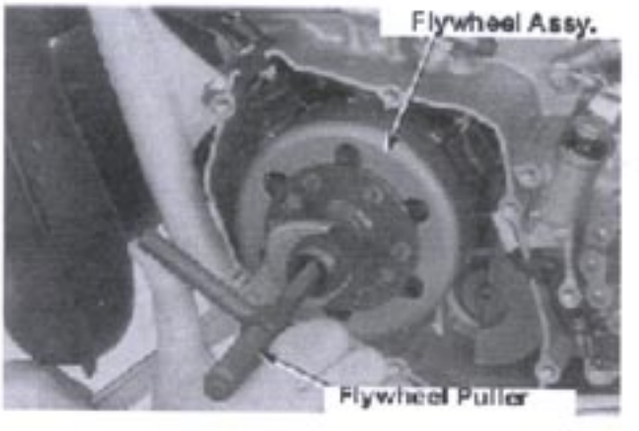
- Flywheel nut/washer

Special tool :
Universal holder 07725-0030000



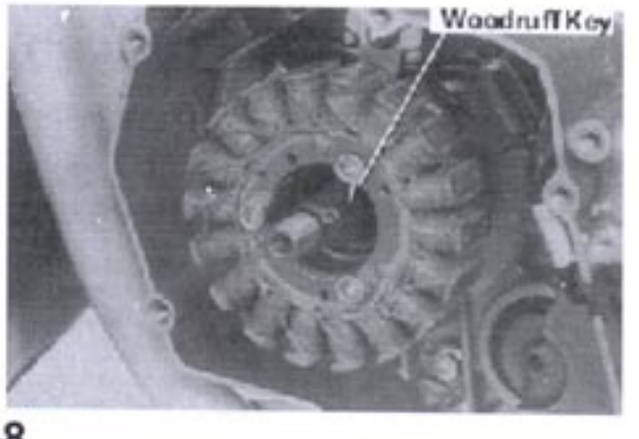
- Flywheel Assy.

Special tool :
Flywheel puller 07733-0010000

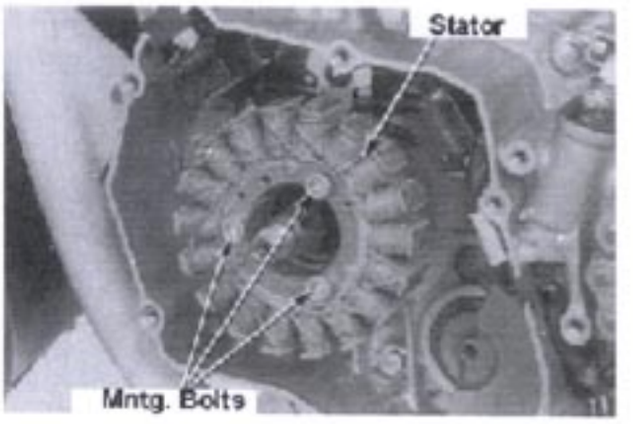


- Woodrough key

Notes
- **When removing the key, do not damage the key way and the crankshaft. Do not lose the key after removing.**

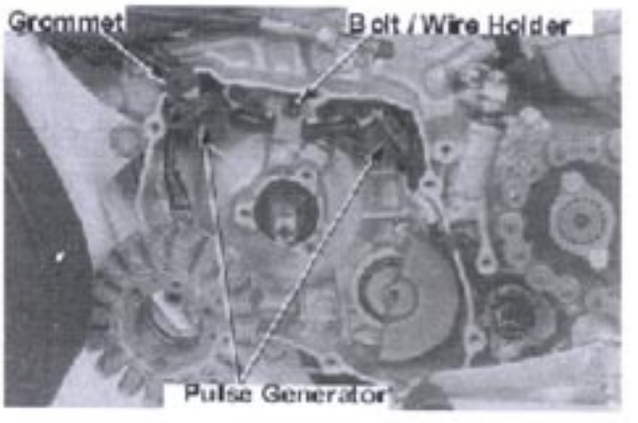


- Stator mount socket bolt
- Stator



- Pulse generator 1,2
- Wire holder/bolt

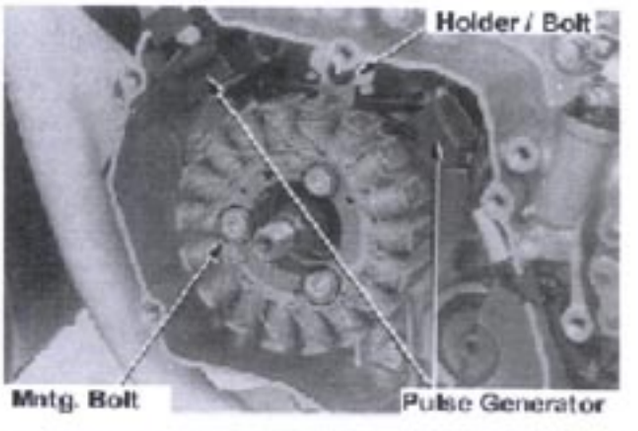
Remove the grommet from the left crankcase and remove each couplers.



Installation

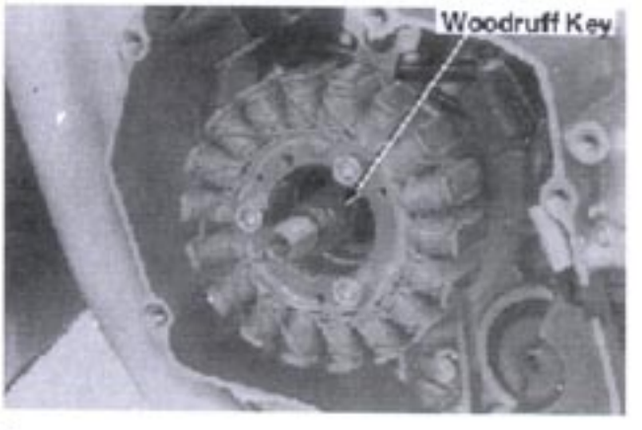
Install the following parts:

- Pulse generator 1,2
- Wire holder/bolt
- Stator mount socket bolt

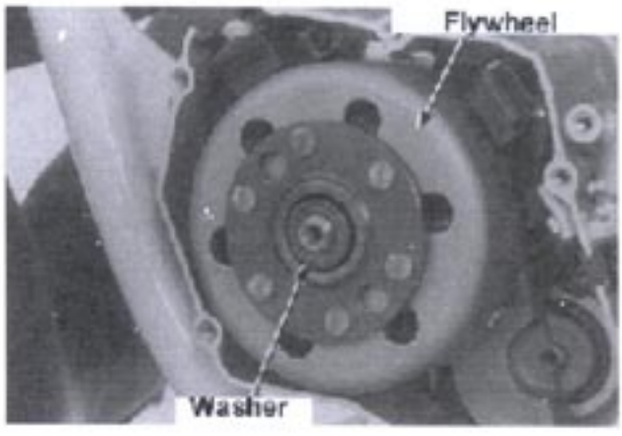


Notes
If the stator and the pulse generator are removed from the left crankcase, refer to the routing diagram (1-23) when installing the parts.

- Woodruff key



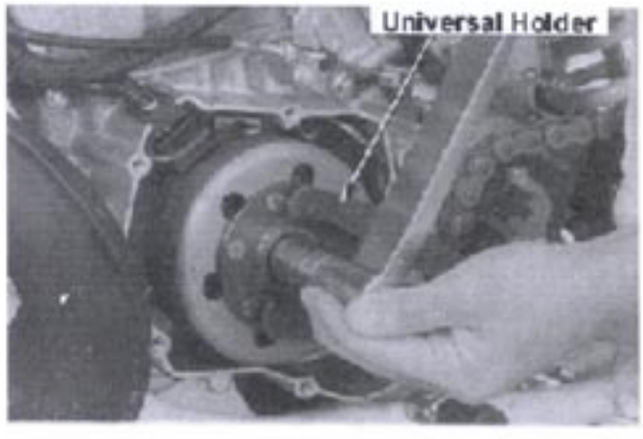
- Flywheel Assy.
- Washer



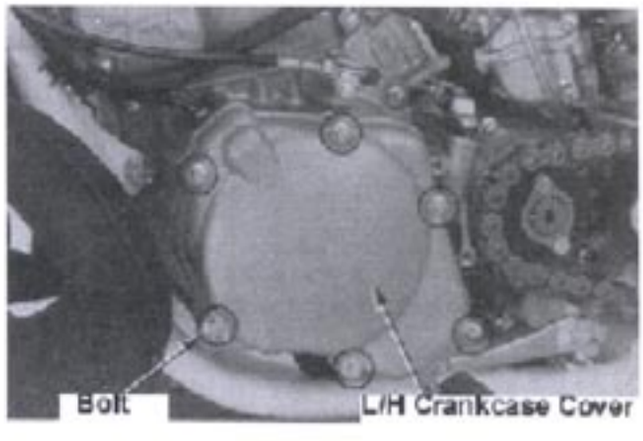
Fix the flywheel with a universal holder to secure the flywheel nut.

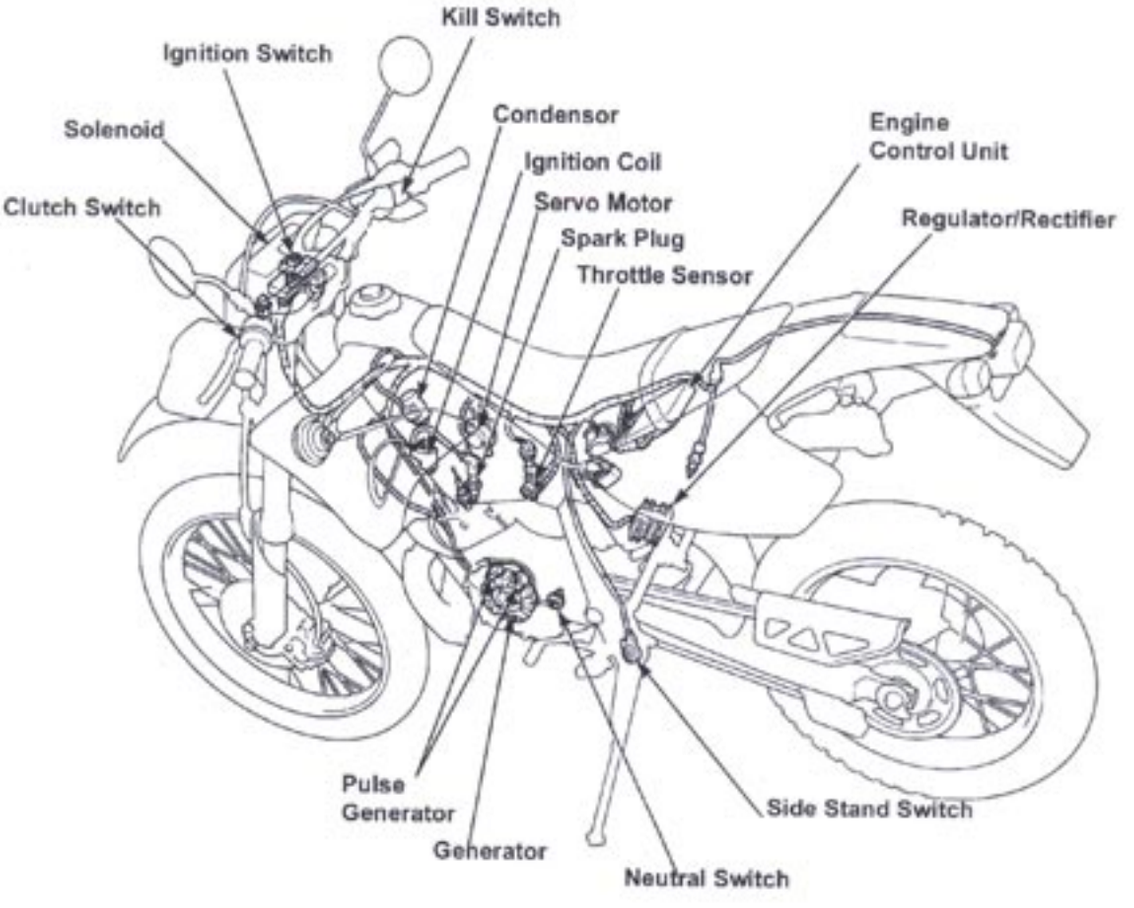
Special tool :
Universal holder 07725-0030000

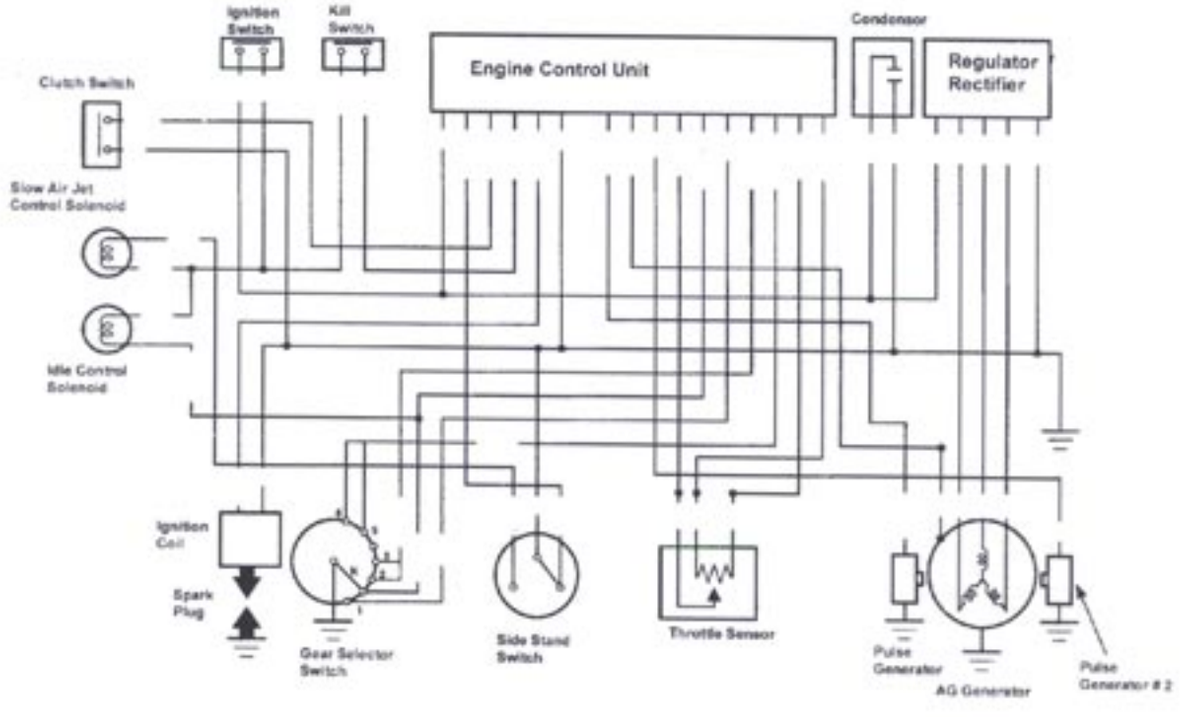
Torque setting : 70Nm (7.1kgfm)



Install the left crankcase cover and its bolts.
Set the drive sprocket cover (7-5).




Kill Switch
Ignition Switch
Solenoid
Clutch Switch
Condensor
Ignition Coil
Servo Motor
Spark Plug
Throttle Sensor
Engine
Control Unit
Regulator/Rectifier
Pulse
Generator
Geherator
Neutral Switch
Side Stand Switch


Ignition Switch
Kill Switch
Engine Control Unit
Condensor
Regulator Rectifier
Clutch Switch
Slow Air Jet Control Solenoid
Idle Control Solenoid
Ignition Coil
Spark Plug
Gear Selector Switch
Side Stand Switch
Throttle Sensor
Pulse Generator
AC Generator
Pulse Generator # 2

General

Caution

Warning

Exhaust fumes are toxic.
Do not run the engine for a prolonged period in closed or poorly-ventilated area.

- Follow the troubleshooting chart for the ignition system check (15-2).
- Refer to the figure on 15-0 for the layout of each components.
- The ignition system has an electrical advancing system in the control unit. The ignition timing cannot be adjusted.
- The engine control unit is fragile. Avoid applying external shock to the unit such as dropping it to the floor. Turn the ignition switch OFF when connecting/ disconnecting the couplers.
- Majority of ignition system faults are caused by faulty coupler / connector connections. Check the connection before servicing the system.
- Use well-charged battery for service work.
- Use appropriately-rated spark plugs. Inappropriate spark plugs may cause engine trouble.
- This vehicle is equipped with an ignition cutoff side stand. This equipment allows the ignition system to operate only when the gear is set to neutral or the side stand is retracted, or both.
- Refer to Sec.17 for the following switches:
  - Side stand switch
  - Gear shift switch
  - Ignition switch
  - Kill switch
  - Clutch switch
  - Throttle sensor

Specifications

Item		Standard	
Ignition type		CDI magnet	
Spark plug		NGK	DENSO
	Standard	BR8ES	W24ESR-U
	Low speed ops.	BR7ES	W22ESR-U
	High speed ops.	BR9ES	W27ESR-U
Spark plug gap		0.7 – 0.8	
Ignition timing	"F" mark Max. Advance	15° BTDC @1,400rpm 27° BTDC @3,500rpm	
Ignition coil	Type Resistance (20°C) Primary coil Secondary coil (w/cap) Secondary coil (w/o cap) Peak voltage	MP13 0.1 – 1.0• 8 – 14k• 4 – 8k• 100V or above	
Pulse generator	Resistance (20°C) Peak voltage	290 – 360• 0.7V or above	

- **Special tools**

Peak voltage adapter **07HGJ-0020100**
(use in conjunction with a digital multimeter of 10M•/DCV impedance or above)

Digital multimeter **07411-0020000**
(any digital multimeter of 10M•/DCV impedance or above)

Troubleshooting

Before conducting the troubleshooting, check with a new spark plug to eliminate the possibility of the plug fault. Also, check all wire connections and secondary current leak from the ignition coil caused by the moisture.

No spark

Symptom	Possible cause (check from top to bottom)
Low peak voltage	- Using a low impedance multimeter - Too low cranking speed (weak kick) - Multimeter sampling time problem (repeat few times). - Ignition wiring/connection fault - Ignition coil fault - Fault (loose connection, open circuit) in side stand or gear shift circuits (Green/white, Green, Light green/black, Light green, Light green/yellow, Light green/white) - Engine control unit fault (if all of the above items are fine)
Very low or no peak voltage	- Misconnection of the adapter - Ignition/kill switch fault or short circuit - Engine control unit coupler connection fault - Engine control unit Black/white lead open circuit, coupler connection fault, or DC power supply circuit fault - Engine control unit green lead open circuit or connection fault - Fault (loose connection, open circuit) in side stand or gear shift circuits (Green/white, Green, Light green/black, Light green, Light green/yellow, Light green/white) - Pulse generator fault (measure the peak voltage) - Peak voltage adapter fault - Engine control unit fault (if all of the above items are fine)
Peak voltage is normal but no spark	- Spark plug fault or secondary current leak - Ignition coil fault
Low peak voltage	- Using a low impedance multimeter - Too low cranking speed (weak kick) - Multimeter sampling time problem (repeat few times). - Pulse generator fault (if all of the above items are fine)
Very low or no peak voltage	- Peak voltage adapter fault - Pulse generator fault

Troubleshooting

Unable to start the engine

Before conducting the following troubleshooting, check the fuel system and the cylinder compression (19-1).

Conduct a spark test with a new (good) Spark plug.
→ Sparks → Spark plug fault.

Does not spark

Check the fitting of the high tension Lead and engine control unit 12P coupler. Then repeat the spark test.
→ Sparks → Loose wire connections

Does not spark

Disconnect the engine control unit 12P coupler and check the following items:
- Ignition coil
- Pulse generator
- Side stand switch
- Gear shift switch
- Clutch switch
- Throttle sensor

→ Fault → Replace the relevant parts.
- Ignition coil (15-8)
- Pulse generator (15-9)
- Side stand switch(17-12)
- Gear shift switch(17-11)
- Clutch switch (17-10)
- Throttle sensor (17-16)

If the engine does not start after replacing the parts:

Normal

- Open/short circuit between the part and the engine control unit.
- Frame earth fault

Check the ground earth of the engine
→ Fault → Wire harness open/short control unit (15-6) circuit.

Normal

Check the continuity between the Red terminals on the engine control unit 12P(transparent) coupler (harness end) and on the regulator /rectifier 2P coupler (harness end) (15-6).
→ No → Open circuit between the continuity regulator/rectifier and the engine control unit.

Continuity

Check the continuity between the Black/white terminal on the engine control unit 12P(transparent) coupler (harness end) and the red terminal on the regulator/rectifier 2P coupler (harness end) (15-6).
→ No → continuity
Check the ignition and kill switches. If they are fine, the wire harness has an open circuit.

Continuity

Measure the voltage between the Black/white terminal on the engine control unit 12P(transparent) coupler (harness end) and the body ground earth, or between the red terminal and the body ground earth (15-6).
→ Normal→ Engine control unit fault

Faulty

Check the alternator coil (14-7).
→ Faulty→ Alternator fault

Normal

Check the regulator/rectifier (14-7). → Faulty→ Regulator/rectifier fault

Engine control unit

Ignition system circuit check

Remove the seat (2-2).
Disconnect the engine control unit 12P (transparent, black) coupler.
Check each circuits specified in the following table, and check individually if there is any fault:

Item	Terminals	Specification
Ignition coil (primary)	Black-Yellow – Green	0.2 – 0.4• or less (20°C)
Pulse generator	Blue/Yellow – Body ground earth White – Body ground earth	290 – 360• (20°C)
Side stand switch	Green/White – Body ground earth	Put the machine in gear. Stand extended-no continuity Stand retracted – continuity
Clutch switch	Green/Brown – Body ground earth	Continuity : normal
Gear shift switch	(17-11)	
Throttle sensor	(17-16)	

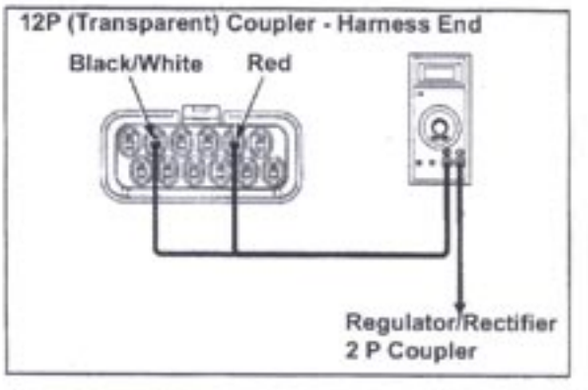
DC Circuit check

Remove the seat and a fuel tank (2-2, 2-3).
Disconnect the engine control unit 12P (transparent) coupler and the regulator/rectifier 2P (transparent) coupler.
Turn the ignition switch ON and the kill switch to RUN.
Check the continuity between:

- Red terminals on the harness end coupler
- Black/white terminal on the control unit 12P (transparent) coupler end and the red terminal on the regulator/rectifier 2P (transparent) coupler harness end.

Inspect the following parts if there is no continuity:

- Ignition switch
- Kill switch
- Power supply circuit

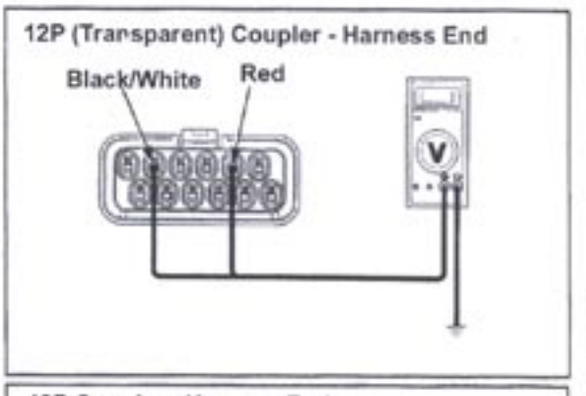


Disconnect the engine control unit 12P(transparent) coupler.
Turn the ignition switch ON and the kill switch RUN.
Crank the engine with the kick starter and measure the voltage between:

- Black/white terminal on the control unit 12P (transparent) coupler end and the body ground earth
- Red lead terminal and the body ground earth

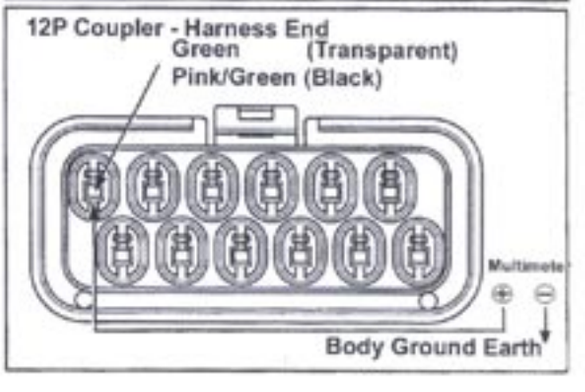
Specification : 8V

If there is no or insufficient voltage, set the gear



to neutral and extend the stand. Then crank the engine to check the neutral indicator lamp and the side stand indicator lamp turn on.
Inspect the following parts if the lamps do not illuminate:

- Capacitor (14-11)
- Alternator coil (14-7)
- Regulator/rectifier (14-7)
-

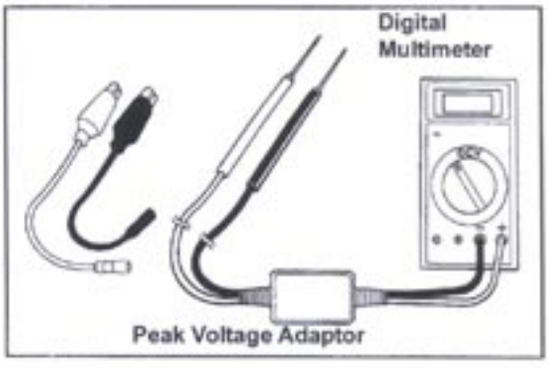


Ground earth circuit check

Disconnect the engine control unit 12P (transparent, black) couplers.
Check the continuity between the green lead terminal (transparent), the pink/green lead terminal (black) on the harness end coupler and the body ground earth.
If there is no continuity, inspect for the harness open or short circuit.

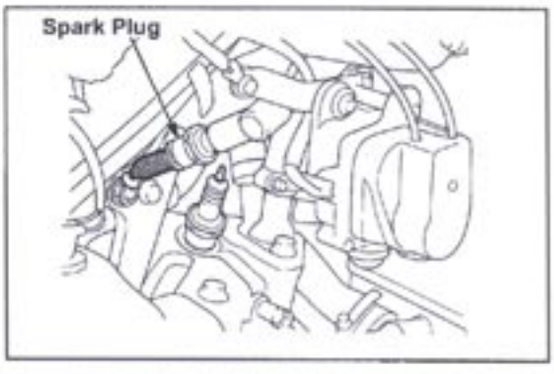
Ignition system check

Notes
- **If there is no spark, check all connections and then measure the peak voltage.**
- **Use a digital multimeter with an impedance of 10MΩ/DCV or above, or false indication may be experienced.**



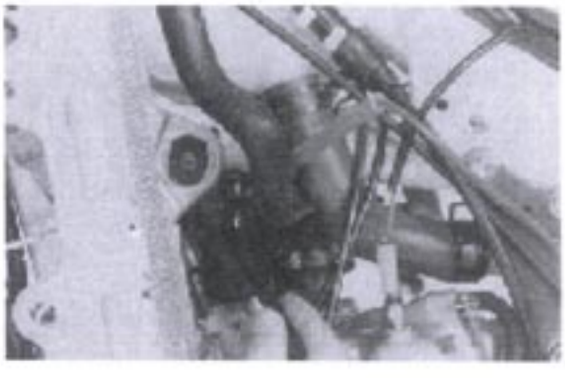
Connect a peak voltage adaptor to the digital multimeter.

Special tools:
Peak voltage adapter 07HGJ-0020100
Genuine KOWA digital multimeter
07411-0020000 or a digital impedance with an impedance of 10MΩ/DCV or above

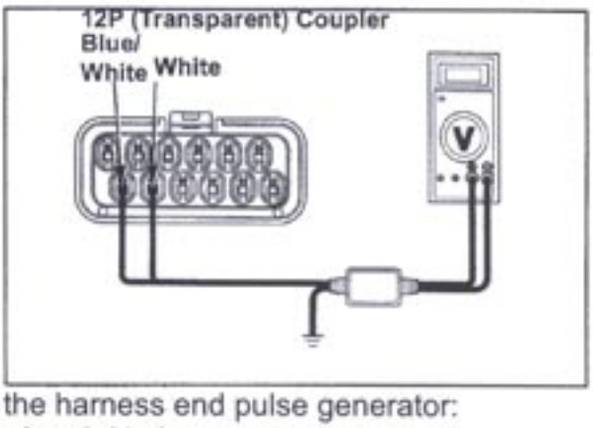


Ignition coil primary voltage

Notes
- **Make sure all connections are fine and correct before measuring the voltage.**
- **The peak voltage should be measured with appropriate compression and the plug/plug cap installed.**



Remove the seat and fuel tank (2-2, 2-3).
Remove the left radiator mount bolt.
Leave the ignition coil primary leads connected and connect the negative probe of the peak voltage adaptor to the Black/yellow lead terminal. Then connect the positive probe to the body ground earth.
Set the gear to neutral. Turn the ignition ON and the kill switch RUN.
Crank the engine with the kick starter and measure the peak voltage at the ignition coil primary end. **Peak voltage : 140V or above**



Caution

- **Do not touch the probes while measuring to avoid possible electric shock.**

Pulse generator circuit check

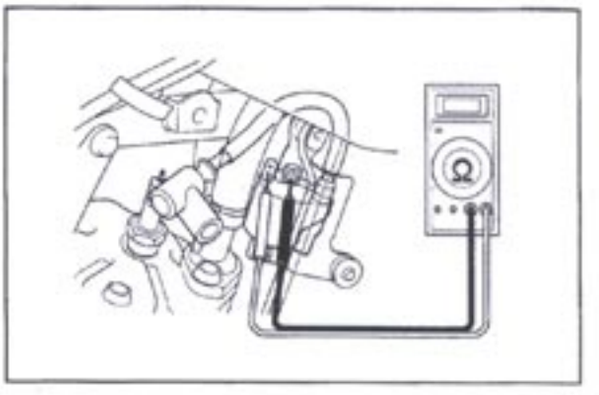
Remove seat (2-2).
Disconnect the engine control unit 12P (black) coupler and connect the peak voltage adaptor to the harness end pulse generator:
Pulse generator 1 : Blue/Yellow (+'ve) – Body ground earth (-'ve)
Pulse generator 2 : White (+'ve) – Body ground earth (-'ve)
Crank the engine with the kick starter and measure the peak voltage at the pulse generator: **Peak voltage : 2.1V or above.**

Ignition coil inspection

Remove the ARC valve servo motor (16-5).

Disconnect leads from the ignition coil and measure the coil resistance at the primary end terminals:

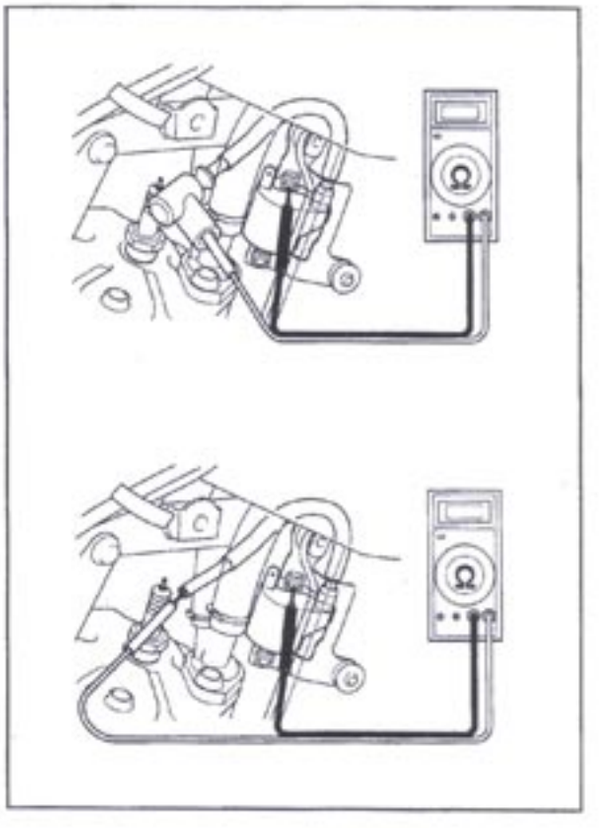
Specification : 0.2 – 0.4• (20°C)



Measure the secondary coil resistance between the primary terminal and the high tension leads.

Specification :

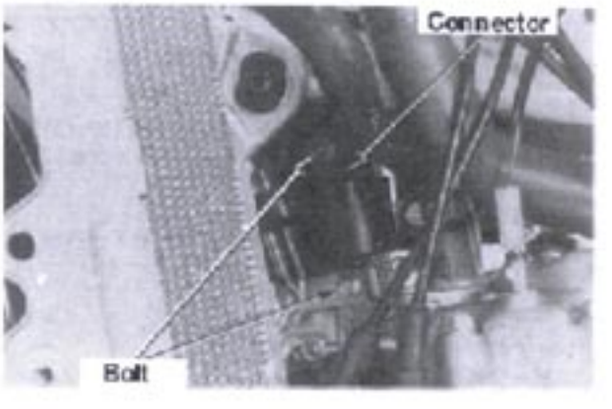
with plug cap : 8 – 14• (20°C)
without plug cap: 4 – 8• (20°C)



Removal and installation

Remove the left radiator mount bolt.
Remove the seat and fuel tank (2-2, 2-3).
Disconnect the ignition coil primary end connector.
Remove the spark plug cap.
Unscrew bolts to remove ground earth lead and the ignition coil.

Reverse the above procedure to install the ignition coil.



Pulse generator inspection

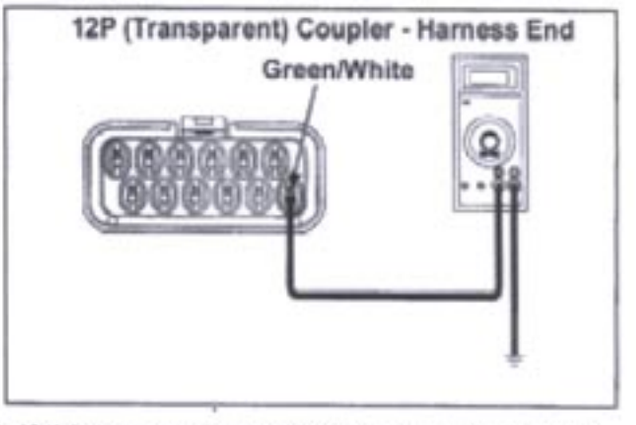
Notes
The pulse generator does not have to be removed from the engine for inspection.

Remove the left radiator grill.
Disconnect the pulse generator 3P (transparent) coupler.
Measure the pulse generator resistance between:

- Blue/Yellow terminal on the pulse generator end coupler and the body ground earth
- White terminal and the body ground earth

Specification : 290 – 360• (20°C)

Side stand switch circuit check



Remove the seat (2-2).
Disconnect the control unit 12P (transparent) coupler.
Check the continuity between the Green/white terminal on the harness end and the body ground earth.

1. Set the gear other than neutral and retract the side stand. Check the continuity exists in this configuration and no continuity with the stand extended. If this cannot be achieved, inspect the side stand and Green/white leads between the side stand switch and the control unit for open/short circuit or loose connection.

2. Set the side stand extended. Check the continuity exists if the gear is set to other than neutral and the continuity does not if it is set to neutral.

Inspect the gear shift switch circuit if the result is unsatisfactory (17-11).
If the circuit is fine, inspect the leads between the control unit and the instrument (black/red and yellow/black) for open/short circuits or loose connections.

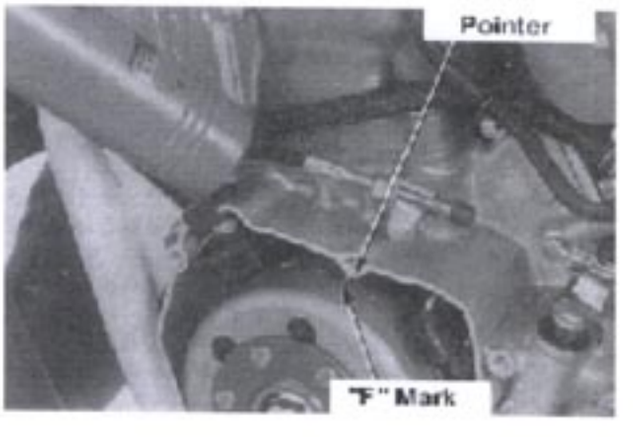
Ignition timing check

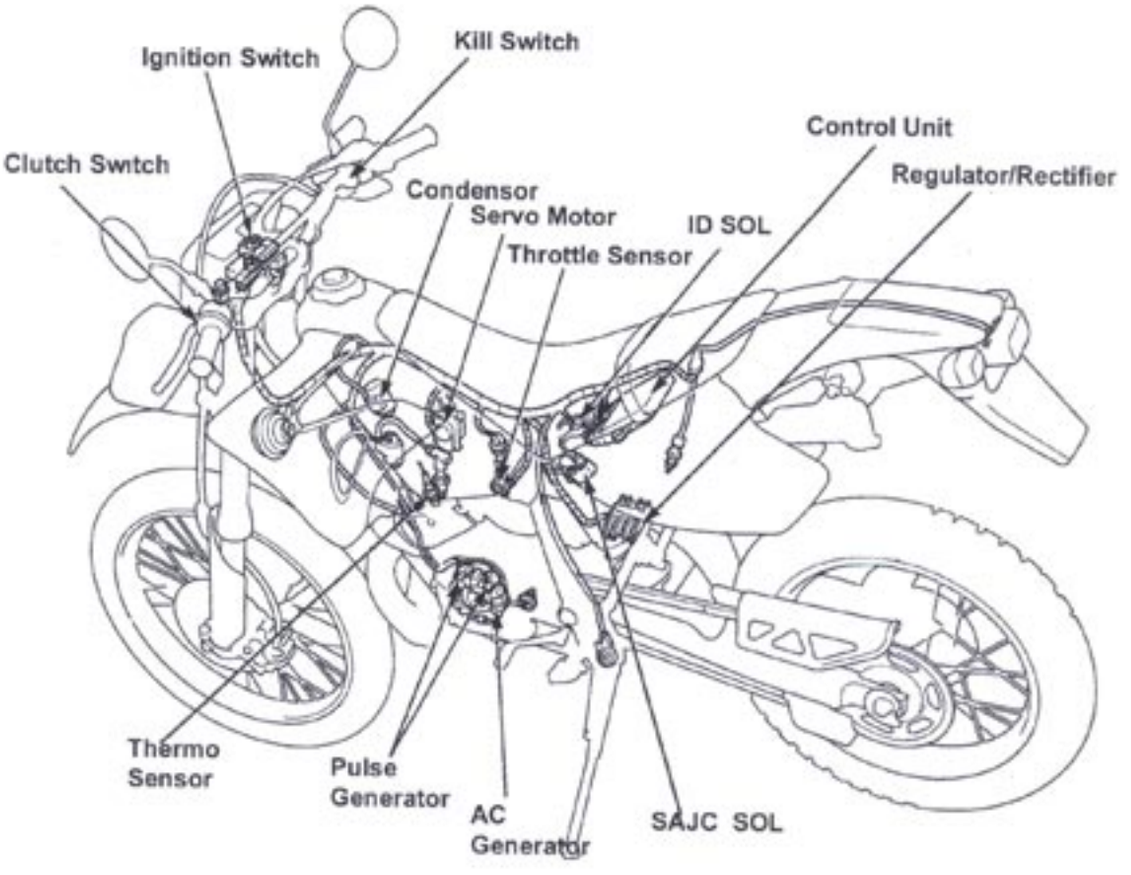
Notes
- **Warm up the engine before checking the ignition timing.**
- **The ignition timing cannot be adjusted as the unit is equipped with an electrical advancing unit.**
- **If the ignition timing is out of tune, inspect the engine control unit and the pulse generator. Replace them if necessary.**
- **Read the instructions before using the timing lamp.**

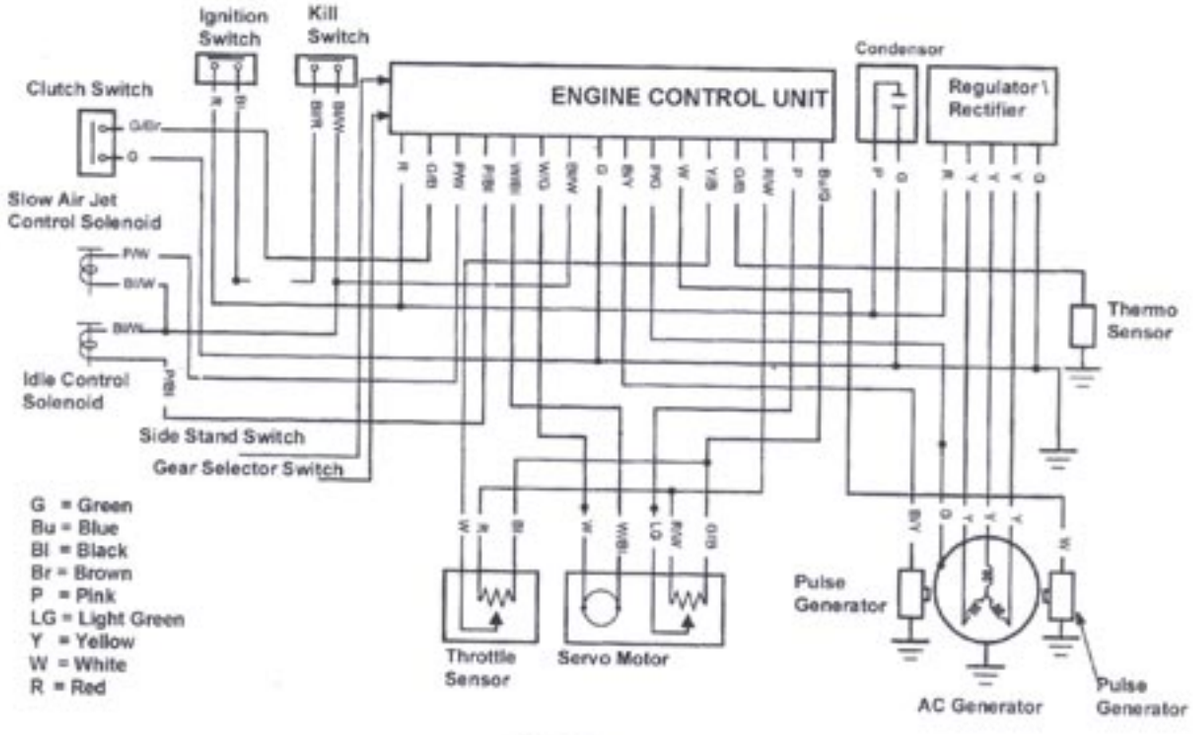
Warm up the engine.
Remove the left crankcase cover.

Shut down the engine and connect a timing lamp to the high tension lead.
Install an engine tachometer

Start the engine and check that the "F" mark on the flywheel is aligned with the mark on the left crankcase cover at idling rpm (1,400±100rpm).

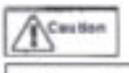



Ignition Switch
Kill Switch
Clutch Switch
Control Unit
Regulator/Rectifier
Condensor
Servo Motor
ID SOL
Throttle Sensor
Thermo Sensor
Pulse Generator
AC Generator
SAJC SOL


Ignition Switch
Kill Switch
Condensor
Clutch Switch
ENGINE CONTROL UNIT
Regulator\ Rectifier
Slow Air Jet Control Solenoid
Thermo Sensor
Idle Control Solenoid
Side Stand Switch
Gear Selector Switch
G = Green
Bu = Blue
Bl = Black
Br = Brown
P = Pink
LG = Light Green
Y = Yellow
W = White
R = Red
Throttle Sensor
Servo Motor
Pulse Generator
AC Generator
Pulse Generator

General

- Refer to Sec.8 for ARC valve inspection.
- Follow the troubleshooting charts for the control device and the servo motor inspection.
- Majority of the control device and the servo motor failures are caused by the faulty coupler connections. Check the connections before starting the troubleshooting.



Do not short circuit the battery while testing.

Special tool

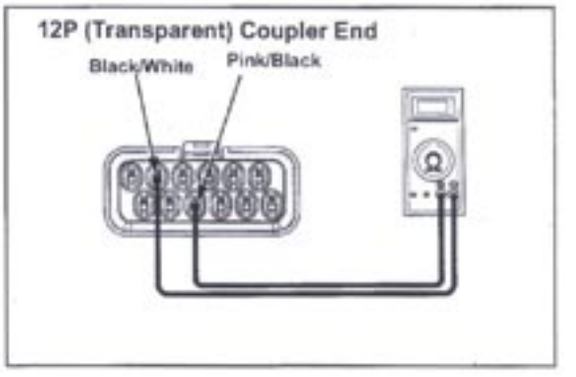
Digital multimeter 07411-0020000
(or a product with an impedance of 10M/DCV or above)

Troubleshooting

The engine does not start

Check the following items before starting the troubleshooting.
- The fuel is not coming to the carburettor (Sec.6).
- Low compression (Sec.8).
- Faulty ignition system or the engine control unit (Sec.15).

Idle control solenoid check



Remove the fuel tank (2-3).

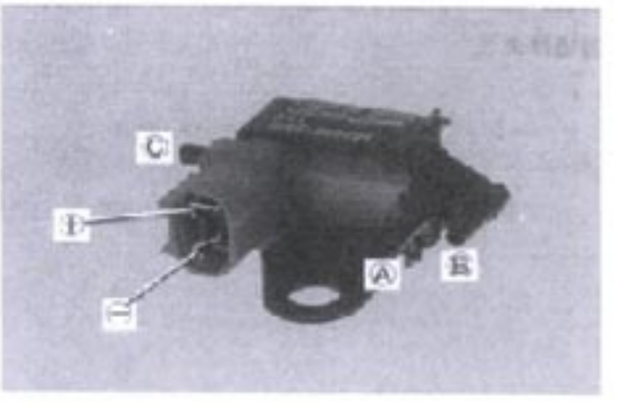
Function check

1. Turn on the ignition switch and set the kill switch to RUN position.
   Hold the vehicle and kick the pedal for several times. The solenoid should work when the pedal is kicked. If the solenoid does not work, inspect the following parts:
   - pulse generator
   - Control unit power supply unit

2. Disconnect the engine control unit 12P (transparent) coupler.
   Check the continuity between the Pink/Black and Black/White terminals on the harness end. If there is no continuity, inspect the following parts:
   - Idle control solenoid (read the following)
   - Wirings

Idle control unit inspection

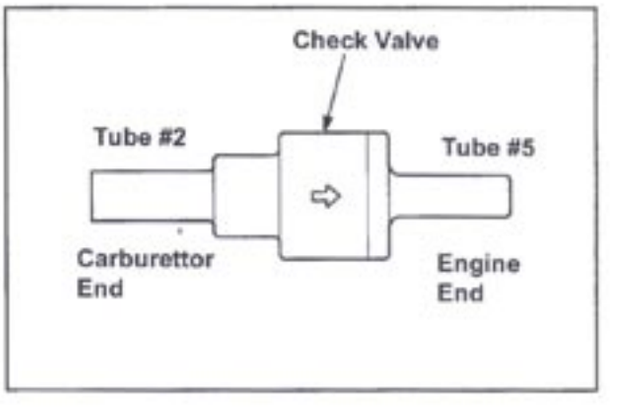
Notes
- **Use a fully-charged 12V battery for the inspection.**
- **Do not short-circuit the battery.**



Check the air passage between joints A and B, A and C, with and without 12V at the coupler terminals.

With 12V	A-B Close
	A-C Open
Without 12V	A-B Open
	A-C Close

Replace the solenoid if the above condition cannot be satisfied.

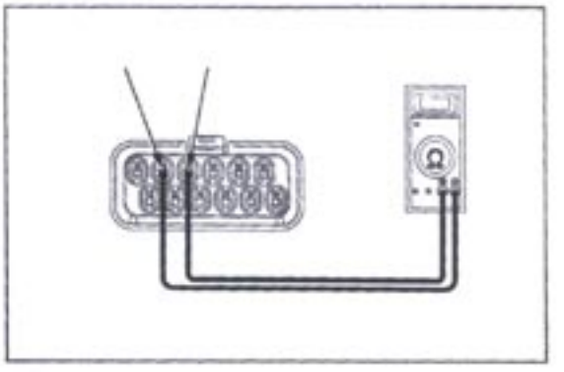


Check valve

The check valve allows single-direction airflow, as shown in the figure. Replace the valve if the flow direction is different.

Notes **Check its direction when installing.**

Slow air jet control solenoid check



Circuit check

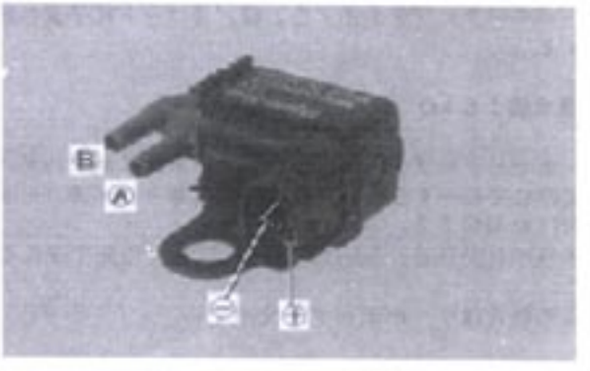
Disconnect the engine control unit 12P (transparent) coupler.
Check the continuity between Pink/White and Black/White terminals on the harness end coupler.
Inspect the following parts if there is no continuity.

- Slow air jet control solenoid unit (see below)
- Wirings

Slow air jet control unit inspection

Notes

- **Use a fully-charged 12V battery for the inspection.**
- **Do not short-circuit the battery.**



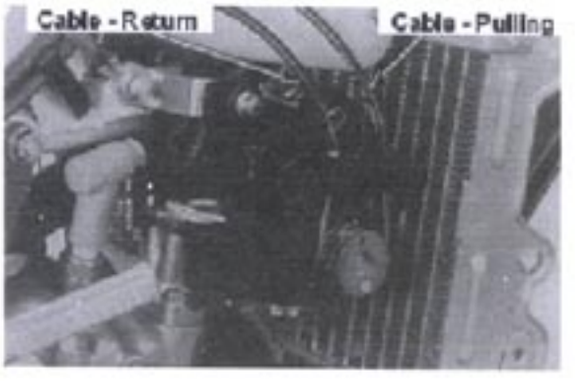
Check the air passage between joints A and B, A and C, with and without 12V at the coupler terminals.

With 12V A-B Close
Without 12V A-B Open

Replace the solenoid if the above condition cannot be satisfied.

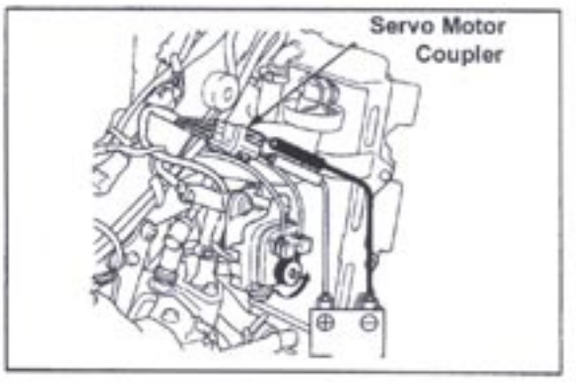
Servo-motor check

Remove a fuel tank (2-2).
Disconnect a servo motor coupler.
Remove a servo motor cover.



Disconnect servo motor cables.

Motor check

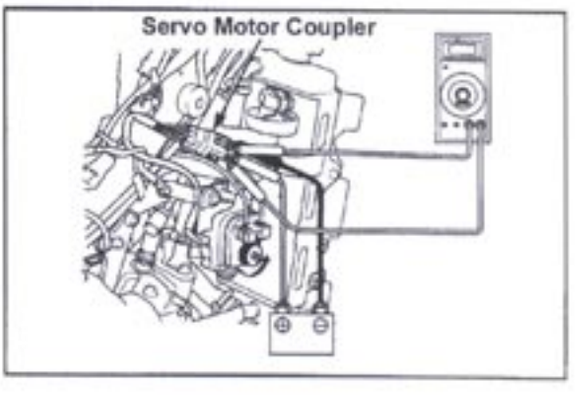


Notes
- **Use a fully-charged 12V battery for the inspection.**
- **Do not short-circuit the battery.**

Connect the positive terminal of the 12V battery to the White/Black lead terminal of the servo motor coupler, and the negative terminal to the White lead terminal.

The pulley shaft should turn counterclockwise. Also check that the shaft turns clockwise when the connection is reversed.

Potentiometer check

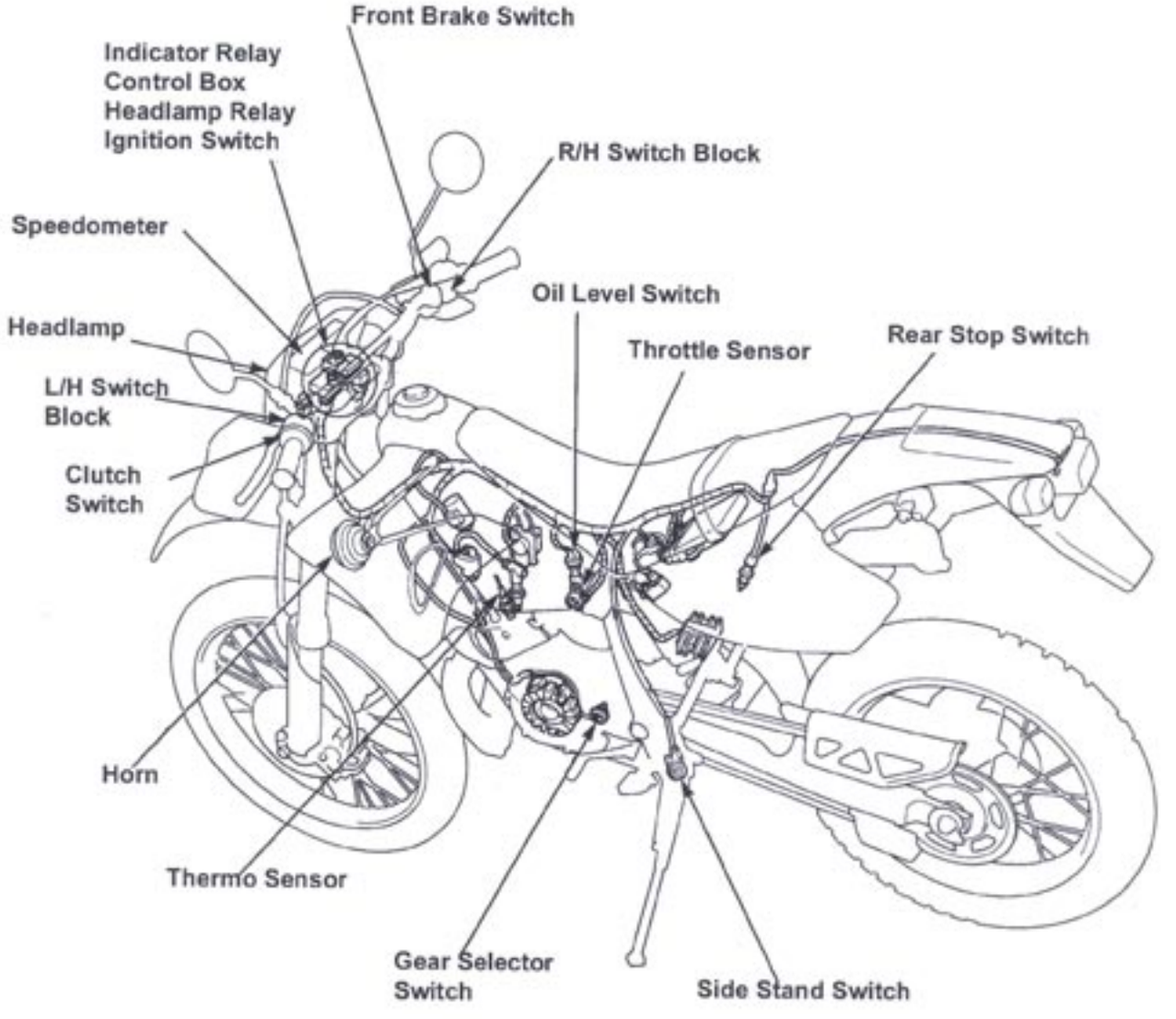


Measure the resistance between the Red/White and the Green/Blue terminals on the servo-motor coupler.

Specification : 5 k

Connect the 12V battery between the White/Black and the White leads on the servo motor coupler to turn the motor and measure the resistance between the Light green and the Green/Blue terminals on the coupler.
The reading should fluctuate between zero, 5 k, and infinity.

Replace the servo motor if the result is incorrect.


Front Brake Switch
Indicator Relay
Control Box
Headlamp Relay
Ignition Switch
R/H Switch Block
Speedometer
Oil Level Switch
Headlamp
Throttle Sensor
Rear Stop Switch
L/H Switch
Block
Clutch
Switch
Horn
Thermo Sensor
Gear Selector
Switch
Side Stand Switch

General

Warning

- The Halogen head lamp becomes extremely hot when illuminated. After turning off the lamp, wait until the bulb cools down.
- Do not locate flammable materials near fire. Avoid any fire damage..

The Halogen lamp becomes extremely hot. When replacing the bulb, do not touch the bulb surface with a bare hand or a dirty grove. Contaminated surface will create a hot-spot, which may damage the bulb. When replacing the bulb:

- Do not change while the lamp is on. Turn off the ignition switch and wait for the bulb to cool down.
- Wipe the contamination from the bulb surface with alcohol or thinner soaked clean cloth.
- Firmly attach the dust cover after replacing the bulb.

When using a battery for inspection, check the charging status of the battery first.

Specification

Item	Specification		
Fuses	5A		
Lamps, bulbs Head lamp illumination	DC illumination, magnet style		
Head lamp	12V-60/55W		
Stop&Tail lamp	12V-5/18W		
Front turn signal	12V-15/(5)Wx2		
Rear turn signal	12V-15Wx2		
Instrument lamp	12V-3.4W		
Turn signal pilot lamp	12V-3.4W		
High beam pilot lamp	12V-1.7W		
Neutral lamp	12V-3.4W		
Side stand pilot lamp	12V-3.4W		
Thermo sensor resistance Temp.(°C)	50	80	120
Resistance(kΩ)	9~10	2.5~3.5	0.6~0.75

- **Torque setting**

Ignition switch mount bolt	26 Nm (2.7 kgfm) apply screw locking agent

- **Special tools**

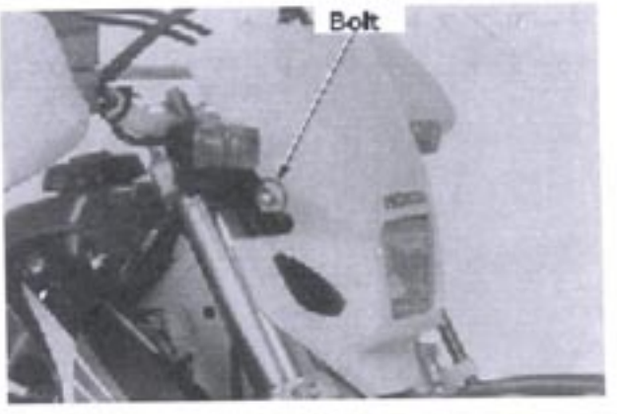
Peak voltage adapter	07HGJ-0020100
Digital multimeter (or a product with 10MΩ/DCV or above)	07411-0020000

Head lamp
Bulb replacement

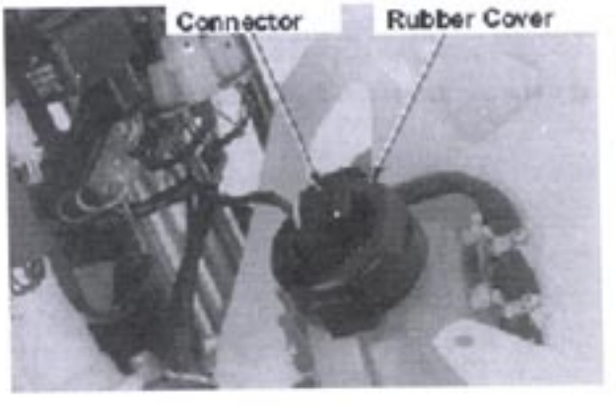
Warning

The Halogen head lamp bulb gets extremely hot when illuminated. Wait for the bulb to cool down to touch after turning it off.

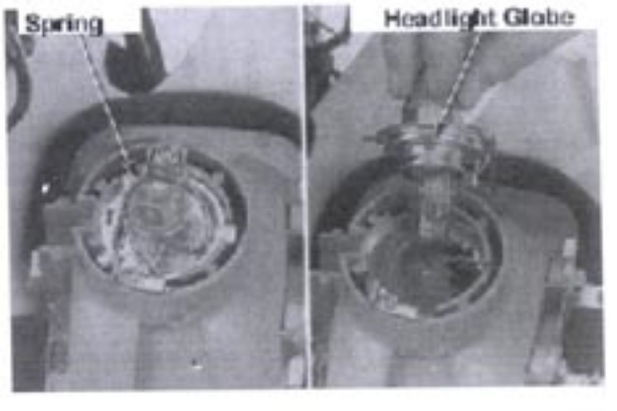
Remove two bolts from a head lamp case lower stay.



Disconnect the bulb socket to remove a dust cover.



Remove a retainer to replace the bulb.



Caution

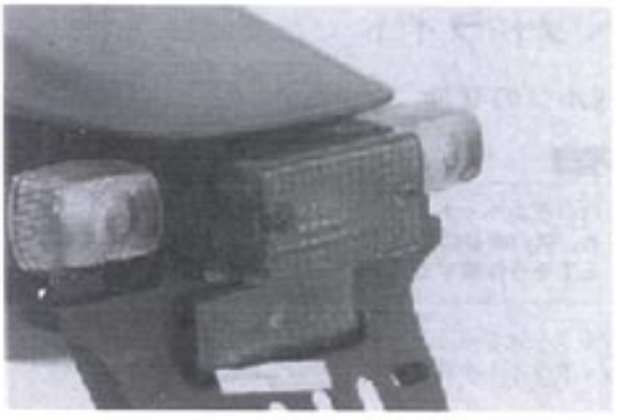
When replacing the bulb, do not touch the bulb surface with a bare hand or a dirty grove. Contaminated surface will create a hot-spot, which may damage the bulb.

Set the dust cover firmly to the head lamp by setting its "TOP" mark facing towards the top.

Reverse the procedure to re-attach the head lamp to the case.

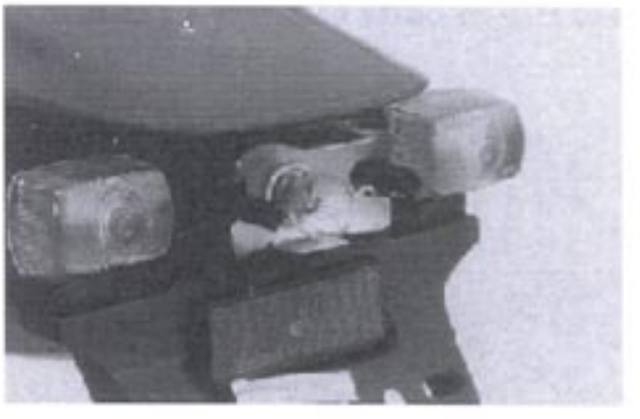
Tail/stop lamp

Unscrew to remove a tail/stop lamp lens.



Turn the tail/stop lamp counterclockwise to remove the bulb.

Reverse the procedure to install.

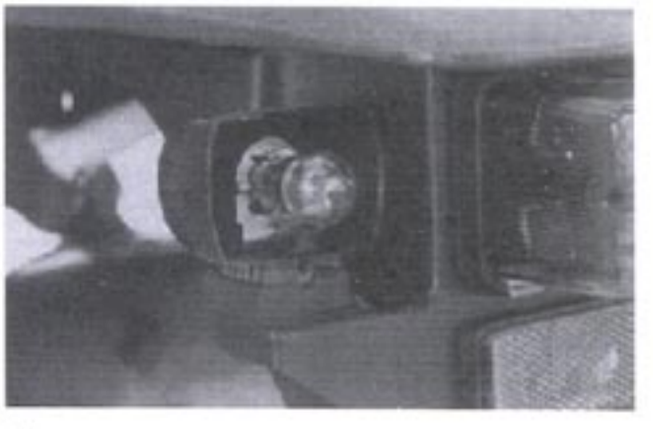


Turn signal bulb

Insert a screwdriver to the gap of the turn signal casing to remove the turn signal lenses.

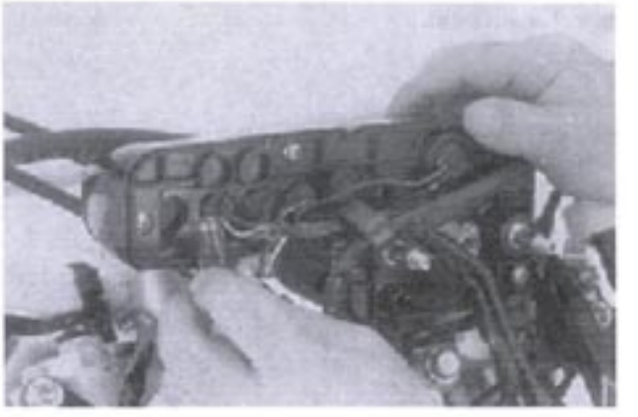
Notes	Do not damage the lens or its case.

Turn the turn signal bulb counterclockwise to remove.
Reverse the procedure for assembly.



Instrument illumination

Remove a speedometer Assy (Read below).
Remove a socket from an undercase Assy. to replace bulbs.

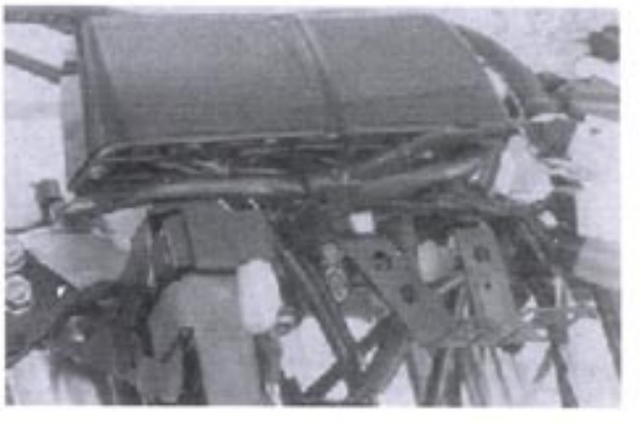


Speedometer

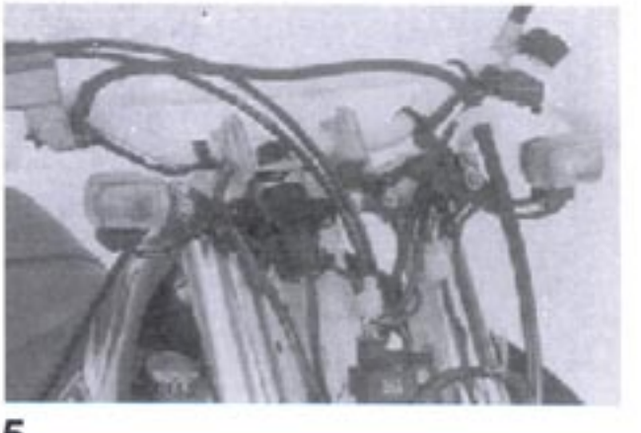
Removal
Remove the head lamp case (17-3).
Remove the following parts:

- Right handlebar switch 3P(black) and 2P(transparent) couplers
- Left handlebar switch 3P(transparent) coupler
- Left handlebar switch 6P(transparent) coupler
- Ignition switch 2P(green) coupler
- Turn signal relay
- Fuses (transparent)

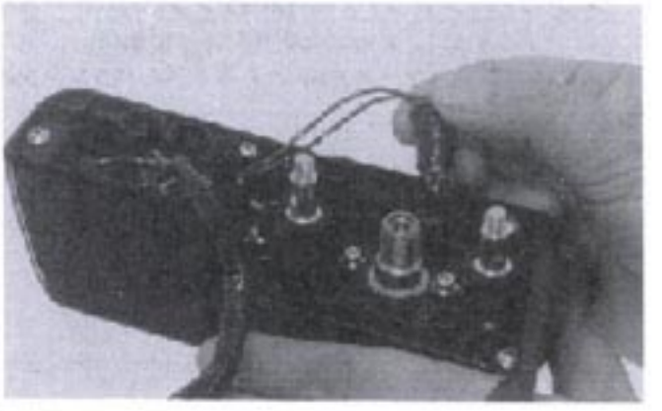
- Control box
- Head lamp relay
- Coupler stay



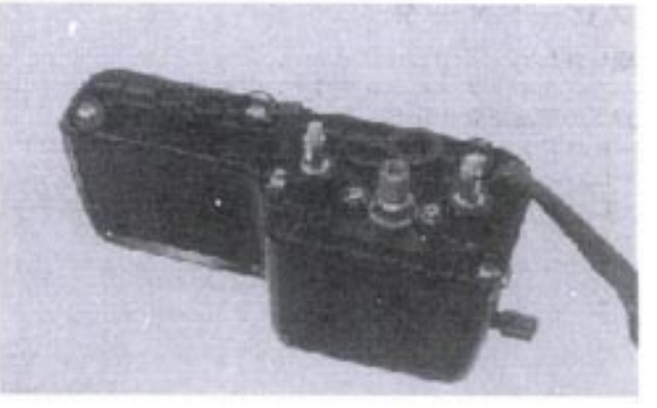
- Speedometer Assy.



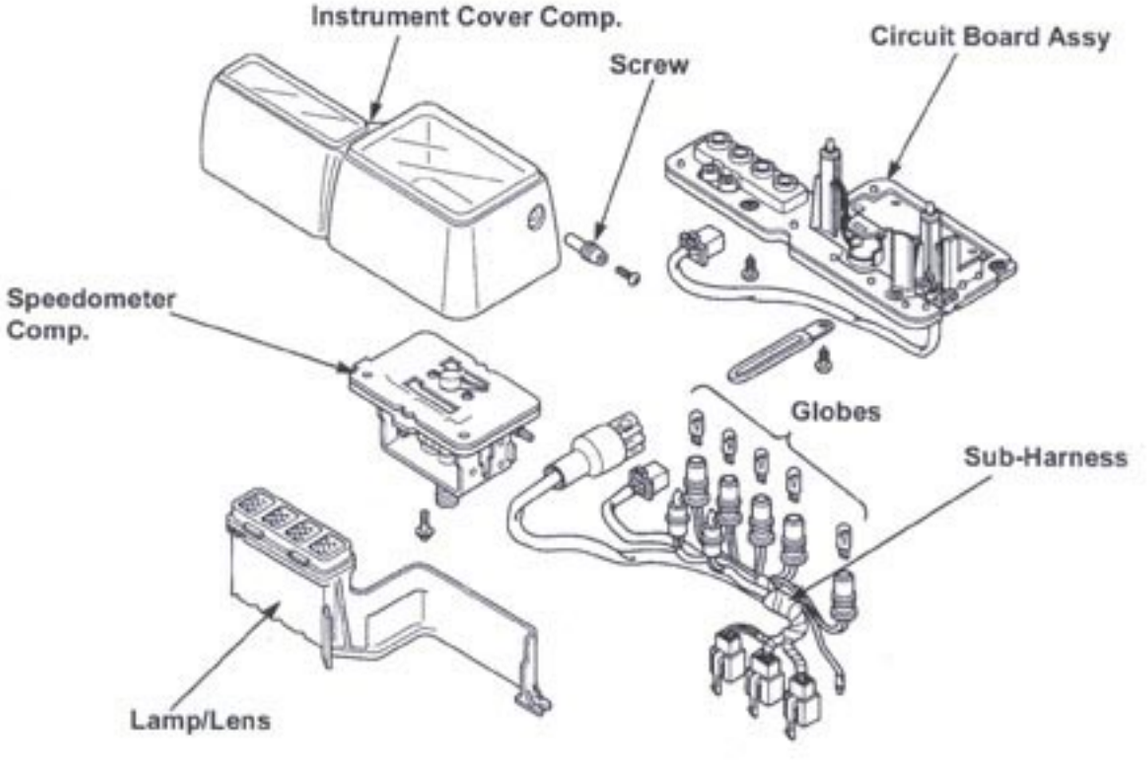
- Socket comp.



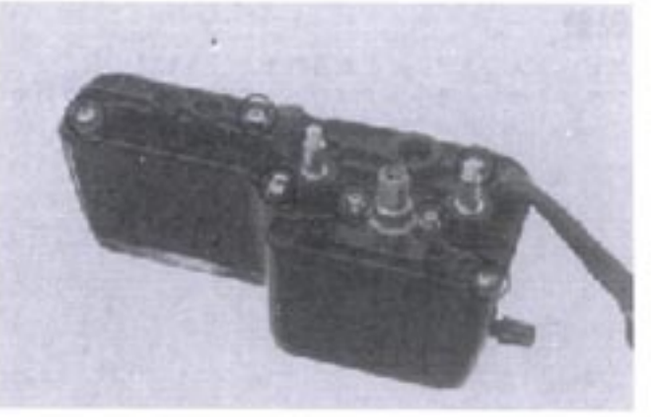
Unscrew to remove the instrument main body from the lower case Assy.



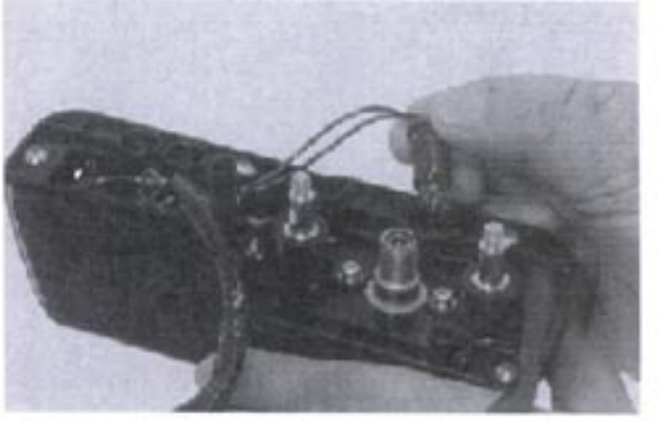
Assembly



Set the instrument main body to the inner case Assy. and secure the screws.



Install the socket Comp.
Reverse the removal procedure for installation.



Notes
Refer to the routing diagram (1-23) when routing wire harnesses.

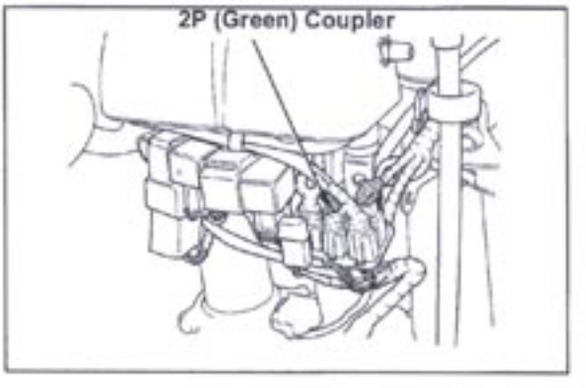
Ignition switch

Inspection

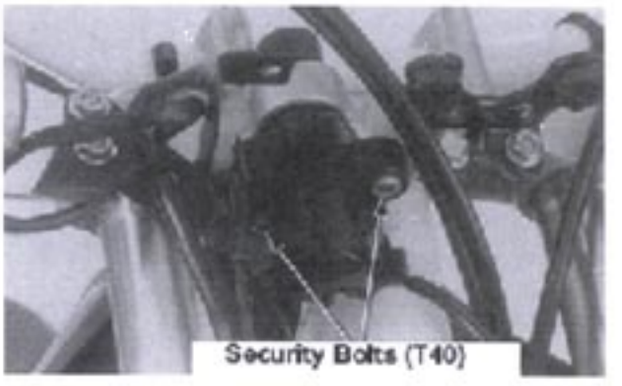
Remove a head lamp (17-3).
Disconnect the ignition switch 2P (green) coupler.
Check the following continuity of the coupler at the ignition switch end:

	BAT1	BAT2
ON	Yes	Yes
OFF		
LOCK		
Colour	Red	Red/Black

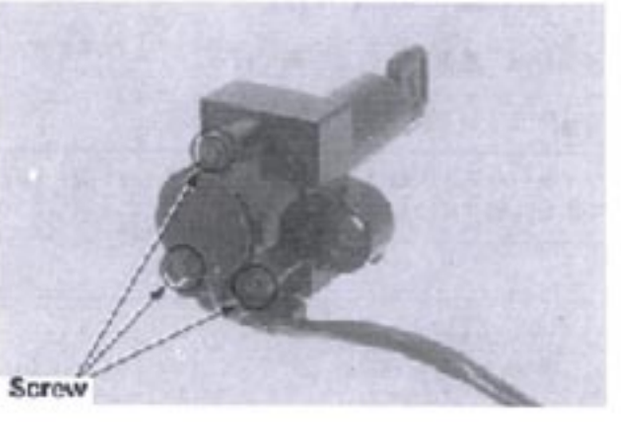
Replace the contact base Comp. if the check result does not match with the table above.



Removal / Installation
Remove the speedometer Assy. (17-5).
Remove socket bolts with a torques bit T40.

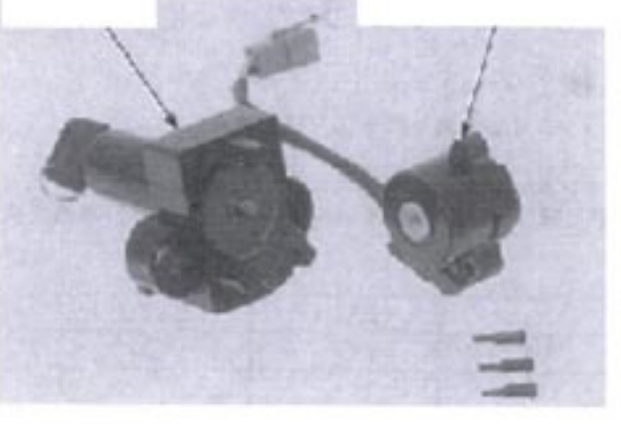


Remove screws.



Check the continuity of the ignition switch at the contact base (17-7).

Reverse the procedure for the assembly.



Secure socket bolts with T40.

Torque setting : 26Nm (2.7kgfm)

Install the speedometer (17-6).
Install the head lamp(17-3).

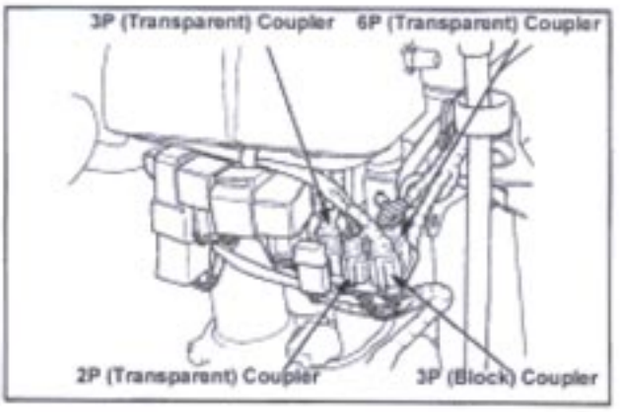
Handlebar switches

Inspection

Remove the head lamp(17-3).
Disconnect the following couplers:

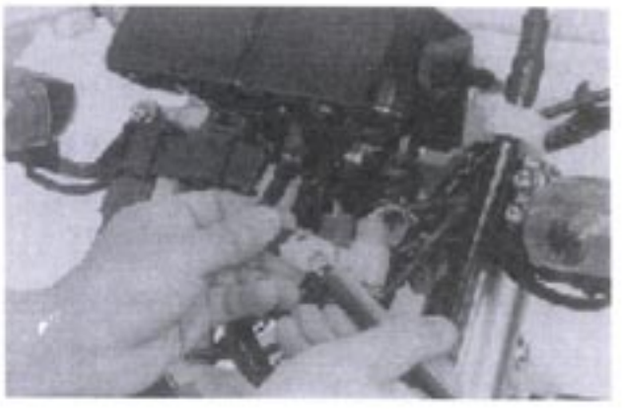
- Right handlebar switch 3P(black), 2P(transparent) couplers
- Left handlebar switch 3P (transparent) coupler
- Left handlebar switch 6P (transparent) coupler

Check the continuity of the right handlebar switch coupler.



Kill switch

	BAT2	IG
OFF		
RUN	O	O
Colour	Black/Red	Black/White



Replace the right handlebar if the above check was unsuccessful (11-3).

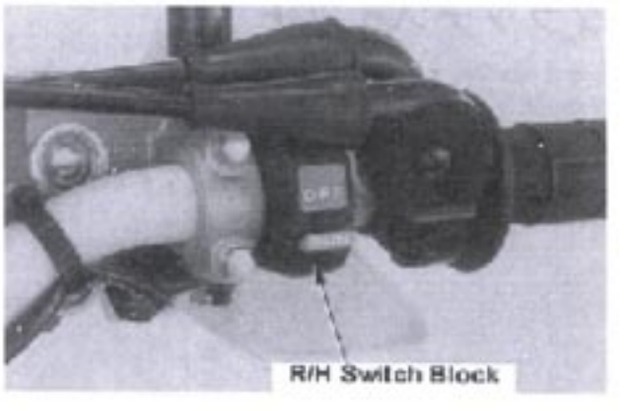
Check the continuity of the left handlebar switch coupler.

Horn switch

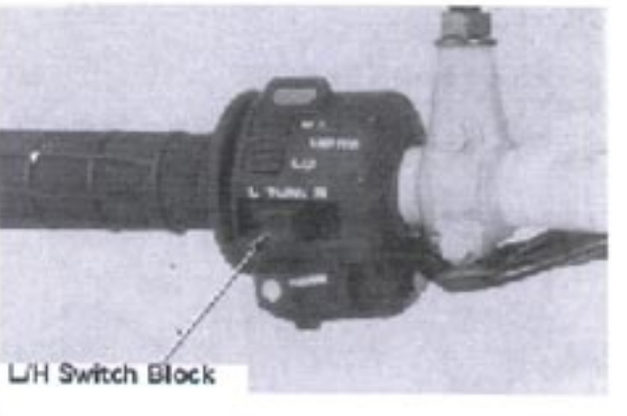
	BAT3	HO
FREE		
PUSH	O	O
Colour	Black	Light Green

Dimmer switch

	HI	HL	LO
H	O	O	
(N)	O	O	O
L		O	O
Colour	Blue	Black	White



	L	W	R
L	O	O	
N			
R		O	O
Colour	Amber/White	Grey	Light Blue/White

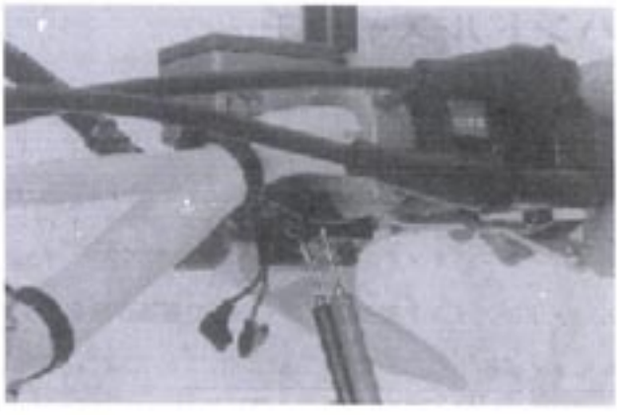


Replace the left handlebar switch if the above inspections are unsuccessful.

Stop lamp switch

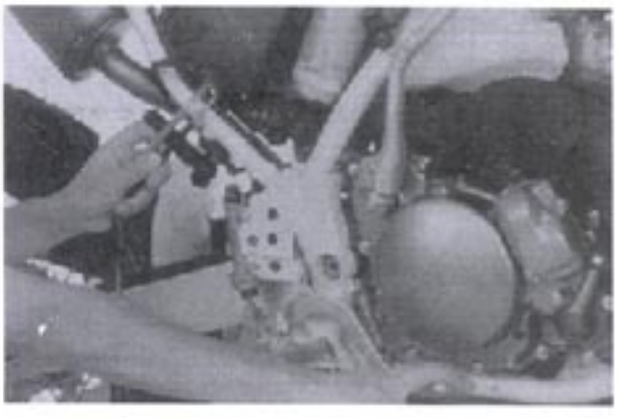
Front

Disconnect the front stop lamp switch connector.
Check there is continuity when the brake lever is pulled.
Check there is no continuity when the brake lever is released.
Replace the front stop lamp switch if the above check is unsuccessful (13-13).



Rear Brake Switch

Remove a rear side cover (2-3).
Disconnect a rear stop lamp switch 2P(black) connector.
Check there is continuity when the brake pedal is depressed.
Check there is no continuity when the brake pedal is released.
Replace the rear stop lamp switch if the above check is unsuccessful.

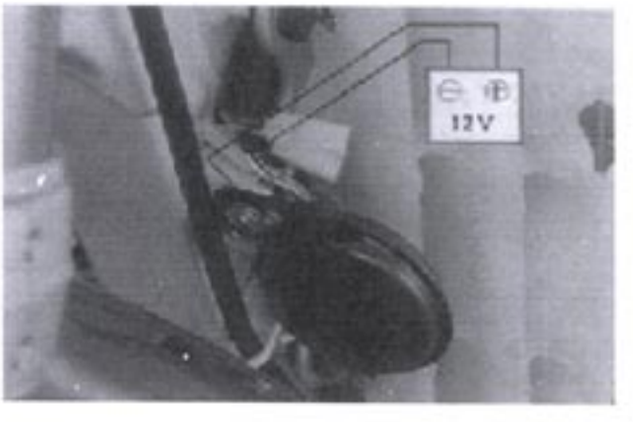


Clutch switch

Disconnect a clutch switch connector.
Check there is continuity when the clutch lever is pulled.
Check there is no continuity when the clutch lever is released.
Replace the clutch switch if the above check is unsuccessful.

Disconnect a horn connector.
Remove a bolt to remove the horn.
Connect a fully charged battery to the horn terminals to check the operation.

Replace the horn if the above check is unsuccessful.

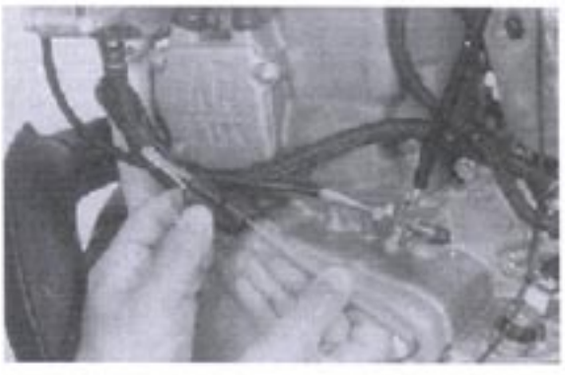


Gear shift switch

Inspection

Remove a left radiator grill and three left radiator mount bolts.
Disconnect a gear shift switch 4P coupler (black).
Check the continuity between each terminals of the coupler and a body earth for each gear position.

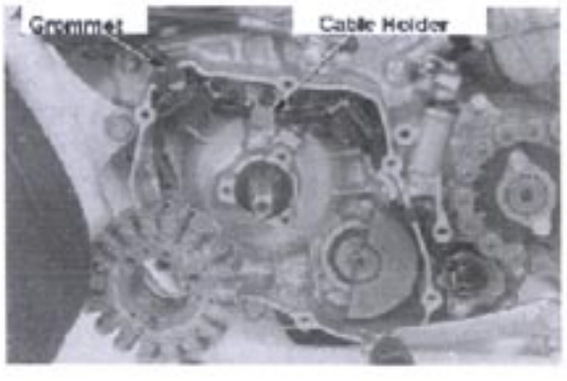
Notes
- **This check can be done without removing the engine.**
- **Operate the gear shift pedal and check for each gears.**



Gear position and continuity

Gear Colour	Light green/ Black	Light green	Light green/ Yellow	Light green/ White
1		•		
N	•			
2 & 3			•	
4				
5 & 6				•

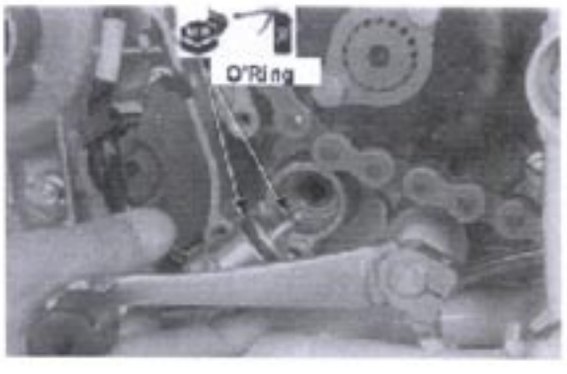
Replace the gear shift switch if the above check is unsuccessful (refer to the following).



Removal / Installation

Remove the gear shift switch 4P (black) coupler
Remove an alternator and a pulse generator
Remove a wire holder and remove a grommet from the left crankcase.
Unscrew bolts to remove the gear shift switches.

Notes
Insert a flathead screwdriver between the gear shift switch stay and the left crankcase to make it easy to remove the switch.



Replace a big and a small O-rings with new ones. Apply transmission oil to new O-rings before installing them.

Notes
Align the pin on the gear shift switch shaft and the groove on the shift drum edge.

Check the continuity of the gearshift switch after the installation.
Reverse the removal procedure for installation.

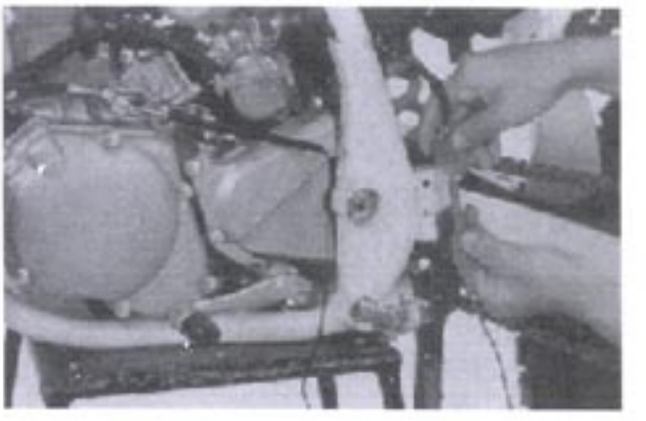
Side stand switch

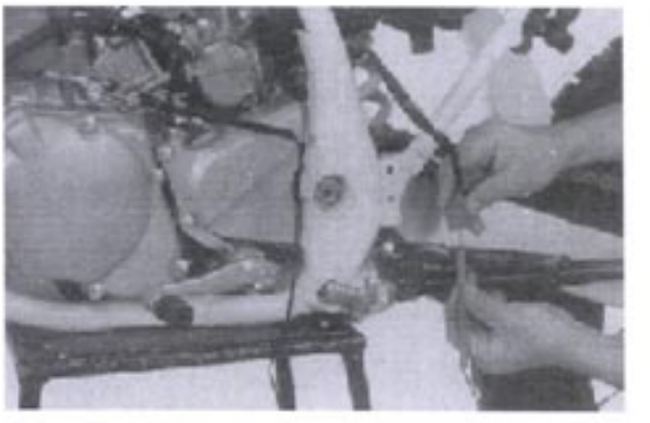
Inspection

Disconnect a side stand switch 3P coupler (green).
Check the continuity between the coupler side stand switches.

- **Gear position and continuity**

	Green/ White	Yellow/ Black	Green
Side stand retracted	□		□
Side stand extended		□	□

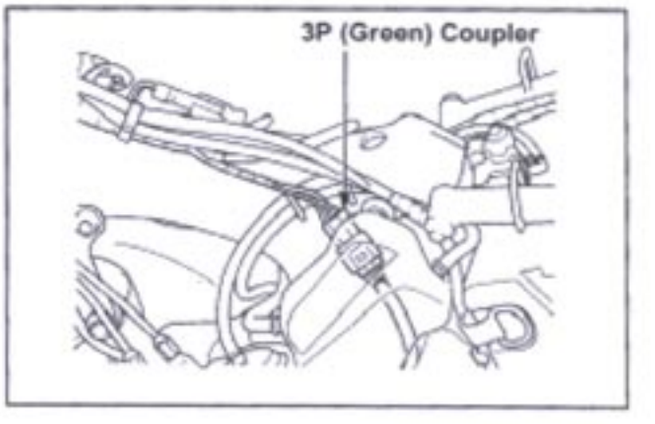




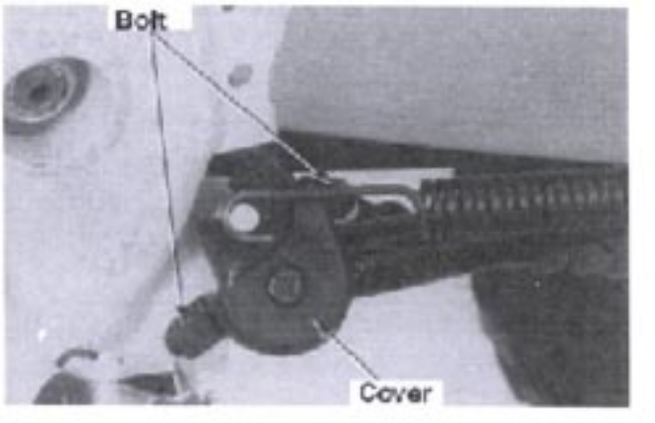
Replace the side stand switch if the above check is unsuccessful (refer to the following).

Removal/Installation

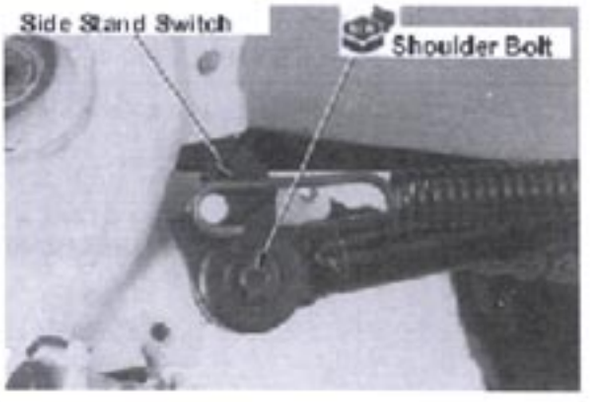
Remove a side stand switch 3P (green) coupler from the stay.
Disconnect the side stand switch 3P (green) coupler connection.
Disconnect all wiring from the connecting tube guide.



Remove the following parts:
- Bolts
- Side stand switch cover

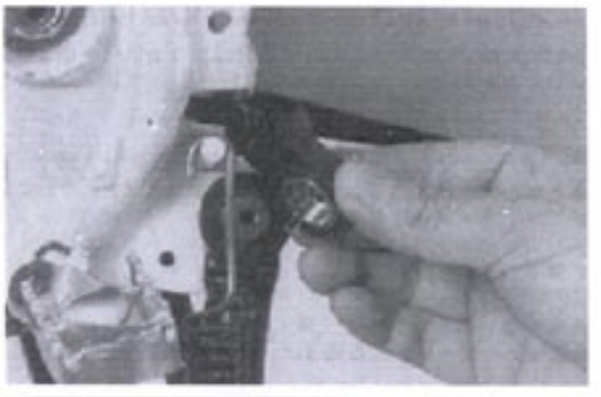


- Side stand switch bolt
- Side stand switch



Reverse the removal procedure for the installation.

Notes:
- **Align the side stand switch pin with the hole on the side stand.**
- **Set the cutout of the side stand switch to the side stand return spring pin when installing.**
- **Route the side stand switch leads according to the routing diagram (1-23).**

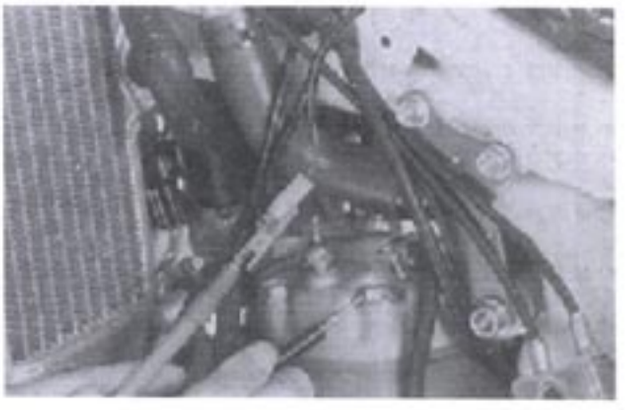


Control box

Notes:
- **Conduct all checks while the engine is running.**
- **Stop the engine before opening/closing any circuits. Beware of short circuits.**

Control box power unit inspection

Remove a head lamp case (17-3).
Connect a multimeter to the black terminal (+) and the green terminal (-) of the control box power unit.
Start the engine and measure the regulated voltage.
Regulated voltage : 12.5 – 14.5 V



Water temperature warning circuit inspection

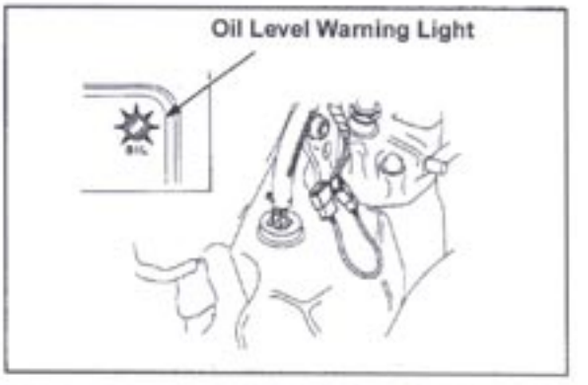
If appropriate regulated voltage exists, disconnect a connector from a thermo-sensor. Short-circuit between the thermo-sensor and the body earth. The water temperature warning lamp should illuminate.

If the warning lamp does not illuminate, check the Green/Blue lead between the control box and the thermo-sensor for open circuit. Check the control box if the lead is fine.

Oil level warning lamp circuit inspection
Remove a seat and a fuel tank (2-2, 2-3).

If appropriate regulated voltage exists, short-circuit the oil level sensor connector on the harness end. The oil level warning lamp should illuminate.

If the lamp does not illuminate, check the Green/Red lead between the control box and the oil level sensor for open circuit. Check the control box if the lead is fine.

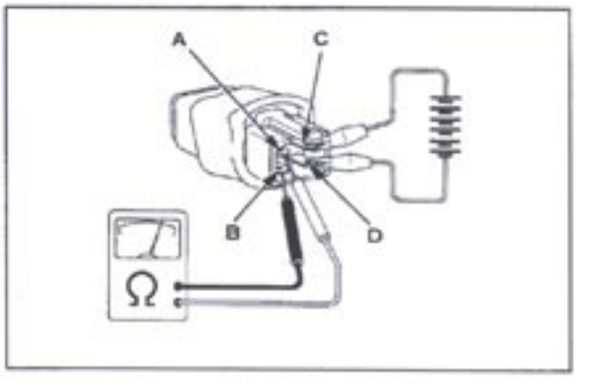


Control box inspection
Check the coupler connection of the control box before trying the following inspection:

Disconnect the thermo-sensor connector and short-circuit between the body earth. Measure the voltage between Blue/Green terminals at the control box 4P (white) coupler.
Specification : 1 – 3V (20°C)
If the voltage is fine, replace the LED.
Replace the control unit if the value is well outside the specification.

Disconnect the oil level switch connector and short the circuit between the terminals. Measure the voltage between the Red and the White/Green terminals at the control box 4P (white) coupler.
Specification : 1 – 3V (20°C)

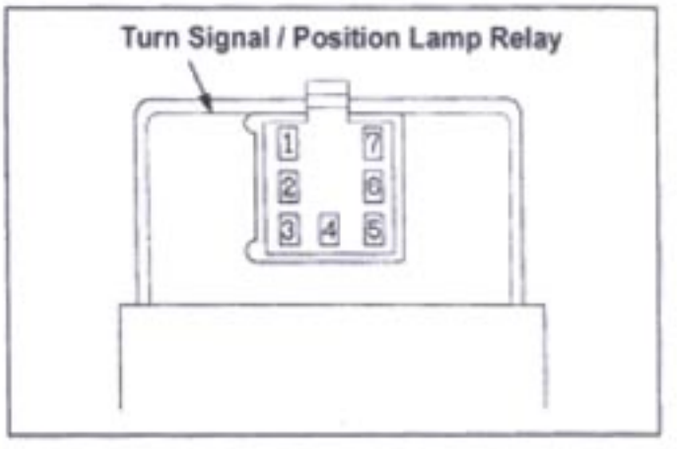
If the voltage is fine, replace the LED.
Replace the control unit if the value is well outside the specification.



Head lamp relay inspection
Remove the head lamp case (17-3).
Remove the head lamp relay.
Check there is no continuity between A and B terminals of the head lamp relay. Replace the relay if there is continuity.
Apply battery voltage between terminals C and D of the head lamp relay and check the continuity between terminals A and B.
Replace the relay unit if there is no continuity.

Turn signal/position relay inspection
Remove a head lamp cover (17-3).

Check the coupler connection of the relay before measuring the resistance between terminals.



Notes:
- **Do not touch the probe while measuring.**
- **Use the following designated multimeter. Different impedance value may give false reading:**
  - **Genuine KOWA digital multimeter 07411-0020000**
  - **A digital multimeter with an inpedance of 10MΩ/DCV or above.**
- **Set the measuring range to kΩ.**
- **Weak battery for the multimeter may affect the reading. Check the battery level if the multimeter gives false indication.**

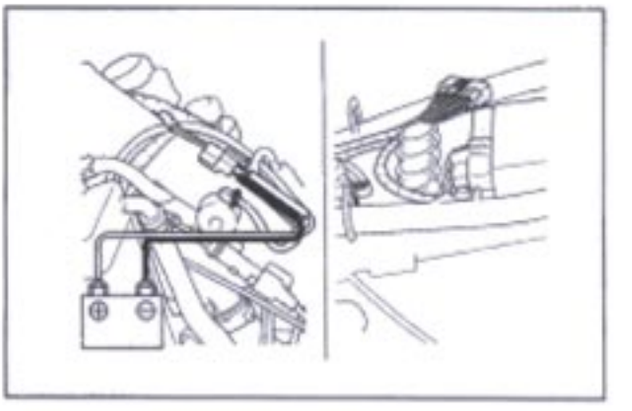
Unit : kΩ

	1	2	3	4	5	6	7
1	-	3-∞	∞	3-∞	3-∞	3-∞	0.09-1500
2	∞	-	15-∞	∞	∞	∞	15-∞
3	∞	0.09-∞	-	0.09-∞	∞	∞	∞
4	∞	∞	15-∞	-	∞	∞	15-∞
5	6-∞	3-∞	∞	3-∞	-	6-∞	3-1500
6	6-∞	3-∞	∞	3-∞	6-∞	-	3-1500
7	0.6-1500	0.09-∞	∞	0.09-∞	0.6-1500	0.6-1500	-

Replace the turn signal and stop lamp relay unit.

Throttle sensor

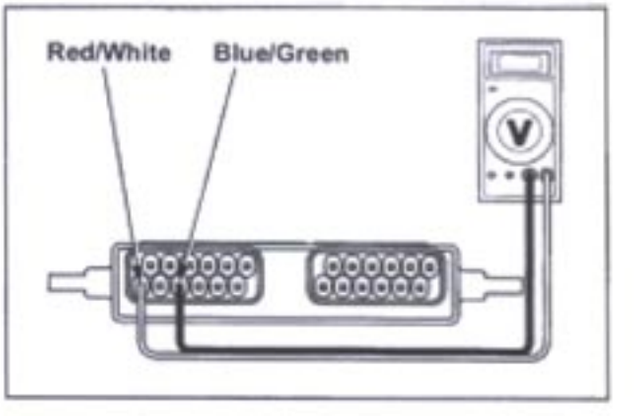
Power unit inspection



Notes
- **This check requires fully-charged 12V battery.**

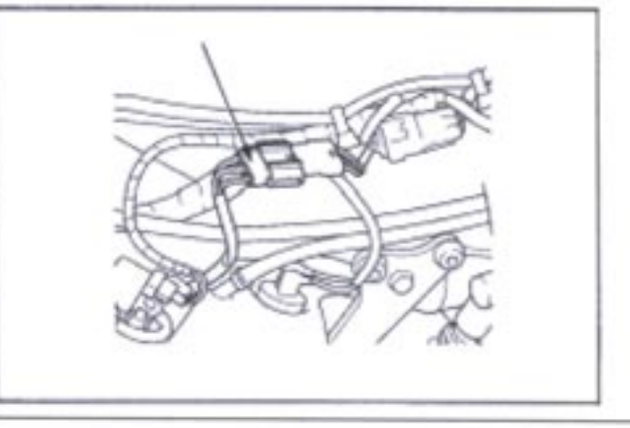
Remove a seat and a fuel tank (2-2, 2-3).
Disconnect an engine control unit 12P(black) coupler.
Disconnect a regulator/rectifier 2P(transparent) coupler.
Connect a 12V battery to the 2P coupler male end.

Connection :
Coupler Red terminal _ (+) battery terminal
Coupler Green terminal _ (-) battery terminal



Note Do not reverse the connection.

Input voltage
Turn on the ignition switch.
Measure the voltage between the terminals on the unit end of the engine control unit 12P (black) coupler.
Connection :
Blue/Green (+) _ Red/White (-)
Specification : 4 – 5 V



Check the DC power supply circuit of the engine control unit if the above check was unsuccessful (15-6).

Output voltage
Connect the engine control unit 12P (black) coupler.
Connect the throttle sensor 3P(Gray) coupler and turn the ignition switch on to measure the voltage.

Note
The throttle sensor 3P(gray) is water-proof. Stick a needle to the rubber collar to check the continuity.

Connection : Yellow/Blue (+) – Red/White (-)
Condition : Throttle fully opened/Fully closed
Compare your measured value with the calculated ones.

Pre-measured input voltage : Va

Throttle full open
Vo=Va x 4.16/5.0
The measured value should fall within +/- 10% of Vo.

Throttle fully closed
Vc=Va x 0.63/5.0
The measured value should fall within +/- 10% of Vc.

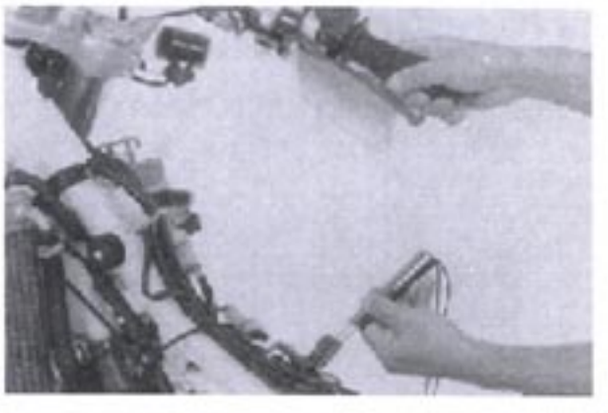
Replace the multimeter with an analogue multimeter to check the smooth variation in voltage when slowly opening the throttle.

Check the continuity if the above test was unsuccessful.

Continuity check
Disconnect the engine control unit 12P (black) coupler and measure the resistance on the harness end.

Connection : Red/White – Blue/Green
Specification : 4 – 6 k• (20°C)

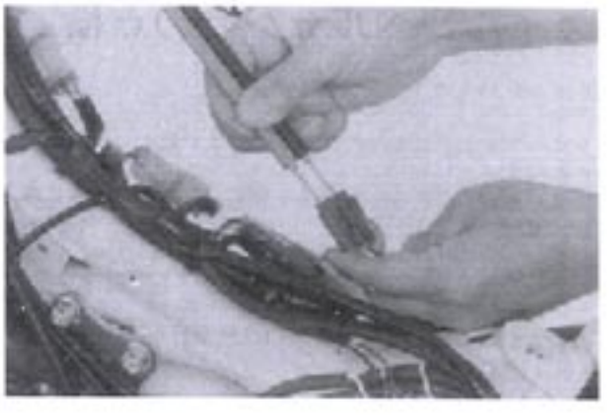
Connection : Yellow/Blue – Blue/Green
Specification : Throttle fully closed : 3.6 – 5.4 k• (20°C)
Throttle fully opened : 0.4 – 0.6 k• (20°C)



Repeat the above check at the throttle sensor 3P coupler if the above check was unsuccessful.

Disconnect the throttle sensor 3P(gray) coupler. Measure the resistance on the throttle sensor end.

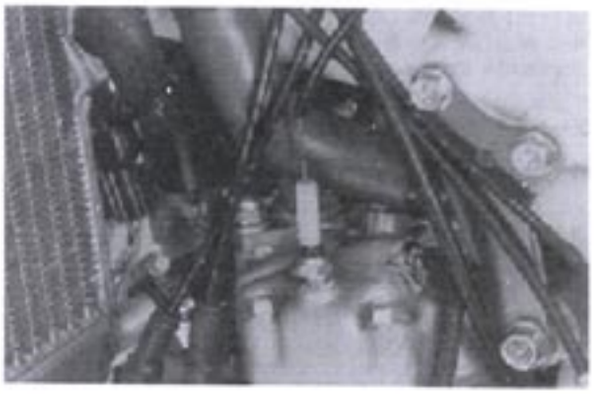
Connection :
Red – Black Specification : 4 – 6 k• (20°C)



Connection : White – Black
Specification :
Throttle fully closed :3.6 – 5.4 k• (20°C)
Throttle fully opened : 0.4 – 0.6 k• (20°C)

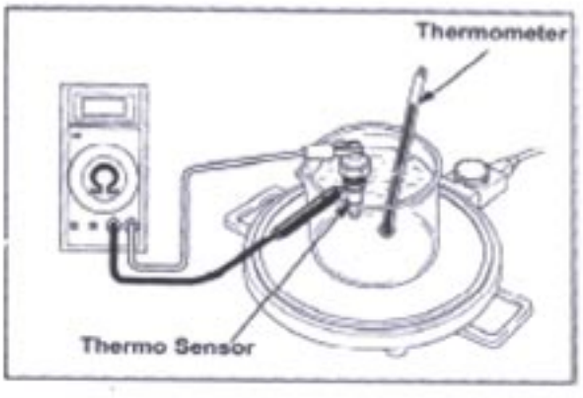
If the above check was successful, replace wire harness.
If unsuccessful, replace the throttle sensor.

Thermo-sensor
Remove a cylinder head (8-3).
Remove a thermo-sensor from the cylinder head.
Place the sensor into a container filled with 50% density coolant.
Gradually increase the temperature and monitor the thermostat resistance.



Warning

Do not place inflammable materials nearby. Also watch out for burning.



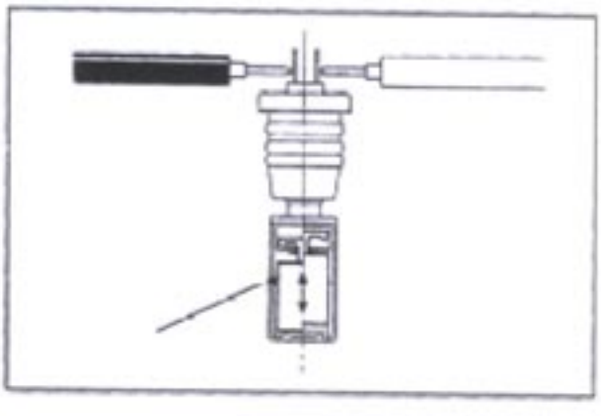
Notes
- **Dip the sensor up to its thread and keep the end of the sensor at least 40mm away from the bottom of the coolant container.**
- **Maintain constant room temperature for at least three minutes and then slowly increase the temperature.**

Standard temperature	Resistance (kΩ)
50°C	9 – 10
80°C	2.5 – 3.5
120°C	0.6 – 0.75

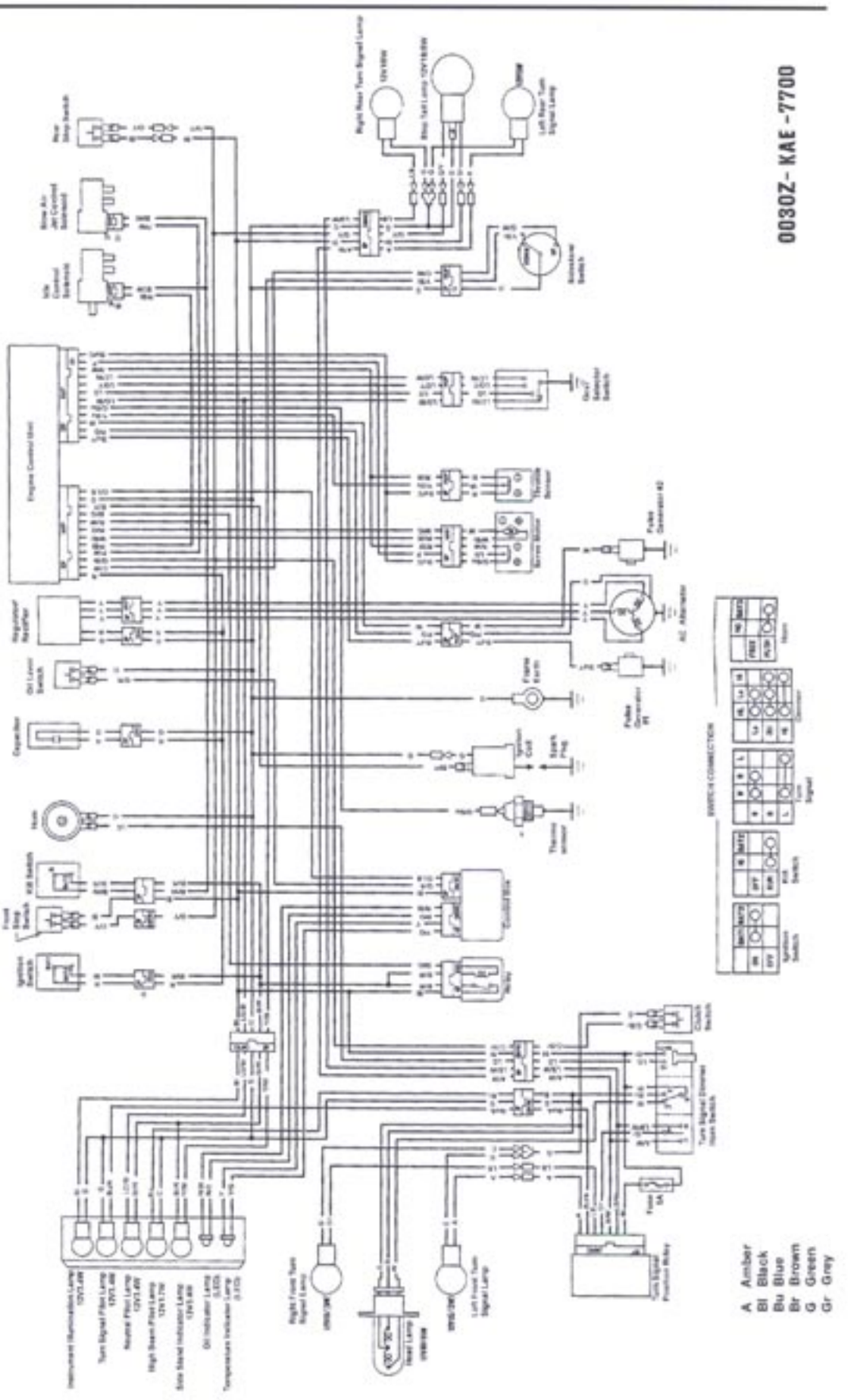
If the measured value is out of the above range, replace the thermo sensor.

Apply sealant to the thread of the thermo sensor and install the sensor back to the cylinder head.

Oil level sensor inspection
Remove an oil level switch.
Check the continuity by moving a float up and down.
Continuity only exists when the float is at its highest position.



Replace the oil level sensor if the above check was unsuccessful.
If the sensor is fine but the oil level indicator is faulty, check all illumination circuits (17-14).


0030Z-KAE-7700
A Amber
Bl Black
Bu Blue
Br Brown
G Green
Gr Grey

19. Troubleshooting

This section describes the troubleshooting procedure of major engine trouble. Refer to relevant sections for the troubleshooting of the topics not covered in this section.

Unable or difficult to start the engine

Remove the spark plug and check the plug. –Plug terminal is wet * Fouled plug (bad starting)
| * Too rich mixture
Normal
|
Test the spark with a new plug. – Weak or no spark * Ignition system fault
| * Short circuit
Strong spark
|
Loosen the craburettor drain screw - Little or no fuel * Fuel system fault
to check that the fuel is in the float chamber.
|
Sufficient fuel
|
Check cylinder compression. – Low or * Cylinder head fault
| no compression * Cylinder/piston fault
Normal compression * Crankcase compression leak
| * Crankshaft seal leak
Remove the plug. Put some fuel - Proper combustion * Bistarter fault
in the cylinder and restart the engine * Too lean mixture
(open the throttle rather than using * Sucking secondary air
a bistarter). * Contaminated fuel
| * Clogged carburettor
No combustion
|

- Inproper spark timing
- Inproper ARC valve set angle
- Idle control solenoid fault
- Idle control solenoid manifold leak (tube #2,4,5)

19-2

Rough engine running at idling and low speed

Use a bistarter while warming up. - Improved * Too lean mixture
|
No difference
|
Check the spark plug. - Burnt and damaged * Plug fault
| * Inappropriate plug type
Normal
|
Check the spark. - Weak spark * Ignition system fault
|
Normal
|
Measure the cylinder compression. - Weak compression * Cylinder head fault
| * Cylinder/piston fault
Normal
|
Adjust the carburettor air screw to setting - Improved * Improper air screw setting
the standard setting.
|
No difference
|
Check ignition timing. - Faulty * Improper ignition timing
|
Normal
|
Clogged carburettor.

19-3

Rough engine running at medium to high speed

Open a fuel tank cap. - Temporally improved * Clogged tank cap vent
|
No difference
|
Check the spark plug. - Burnt or damaged * Plug fault
* Improper plug selection
|
Normal
|
Use a bistarter while running. - Improved * Too lean mixture
|
Become worse
|
Remove an air filter element. - Improved * Clogged air filter
* Too rich mixture
|
No difference
|
Check ignition timing. - Faulty * Ignition system fault
|
Normal
|
Does the engine gets overheated? - Yes * Cooling system fault
* Carbon build-up in the combustion chamber
|
Normal
|

- Contaminated fuel
- Carburettor fault

19-4

Lack of power and speed at high speed

Lift a front wheel and spool by hand. - Heavy * Unable to disengage the brake
|
Spins easily * Excessive drive chain tension
* Wheel bearing fault
|
Check tyre pressure. - Low pressure * Normal air leak
* Valve fault
|
Normal * Puncture
|
Check ignition timing. - Faulty * Ignition timing fault
|
Normal
|
Check the clutch contact. - Slips * Clutch slipping
|
Normal
|
Check the transmission oil. - Excessive oil * Excessive friction due to oil
|
Normal
|
Disconnect a fuel tube at the carburettor and check for fuel drain. - Low fuel flow * Clogged fuel tube
* Clogged fuel tank cap vent
|
Normal flow * Clogged fuel strainer screen
* Clogged fuel valve
|
Check the carburettor. - Clogged * Clean the carburettor
|
Check the ARC valve control setting. - Out of range * Improper ARC valve cable
cable adjustment.
|
Normal
|
Fuel contamination

AR (Active Radical) Combustion

In general, there are two ways of preventing irregular combustion of the two-stroke engine in low-torque running.

The first way is to concentrate the air-fuel mixture gas to the spark plug and separate it from exhaust gas, and another way is to mix the air-fuel gas with the remaining exhaust gas to create self-ignition by using the heat, pressure, and radical (molecule structure which makes chemical reaction very easily) in the remaining exhaust.

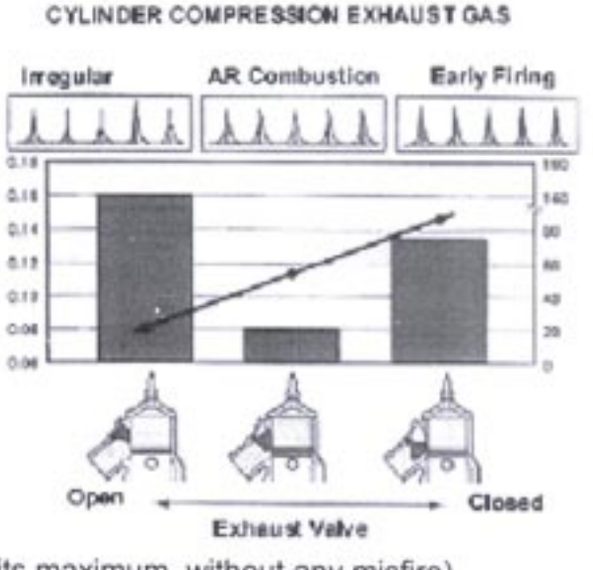
The AR combustion is based on the latter way. The ignition timing is regulated.

Principle of AR combustion

The self-ignition of the two-stroke engine has been known well through the fact that the engine keeps running with the ignition off, and so-called run-on. Majority of our efforts were made to minimise this self-ignition.
However, our new approach to this problem is to enhance the self-ignition and regulate the ignition timing at the same time. The ignition timing is regulated by changing the cylinder pressure before the compression sequence by means of an exhaust control valve, named "ARC valve", at the exhaust port.

The exhaust control valve opening and combustion

The exhaust control valve prevents irregular combustion in low-torque condition by regulating the amount of exhaust gas from the previous stroke in the cylinder.
If you have more exhaust gas in the cylinder and if the cylinder pressure is high; the ignition timing becomes earlier because of more active radical. However, excessively early ignition will result in detonation. The figure shows the variation of exhaust gas contents and the ignition timing with the change in valve opening. The AR combustion controls the ignition timing so as to have an ideal combustion (minimum HC in exhaust) created by self-ignition. In such condition, self-ignition occurs in entire combustion chamber so that the combustion efficiency is at its maximum, without any misfire).

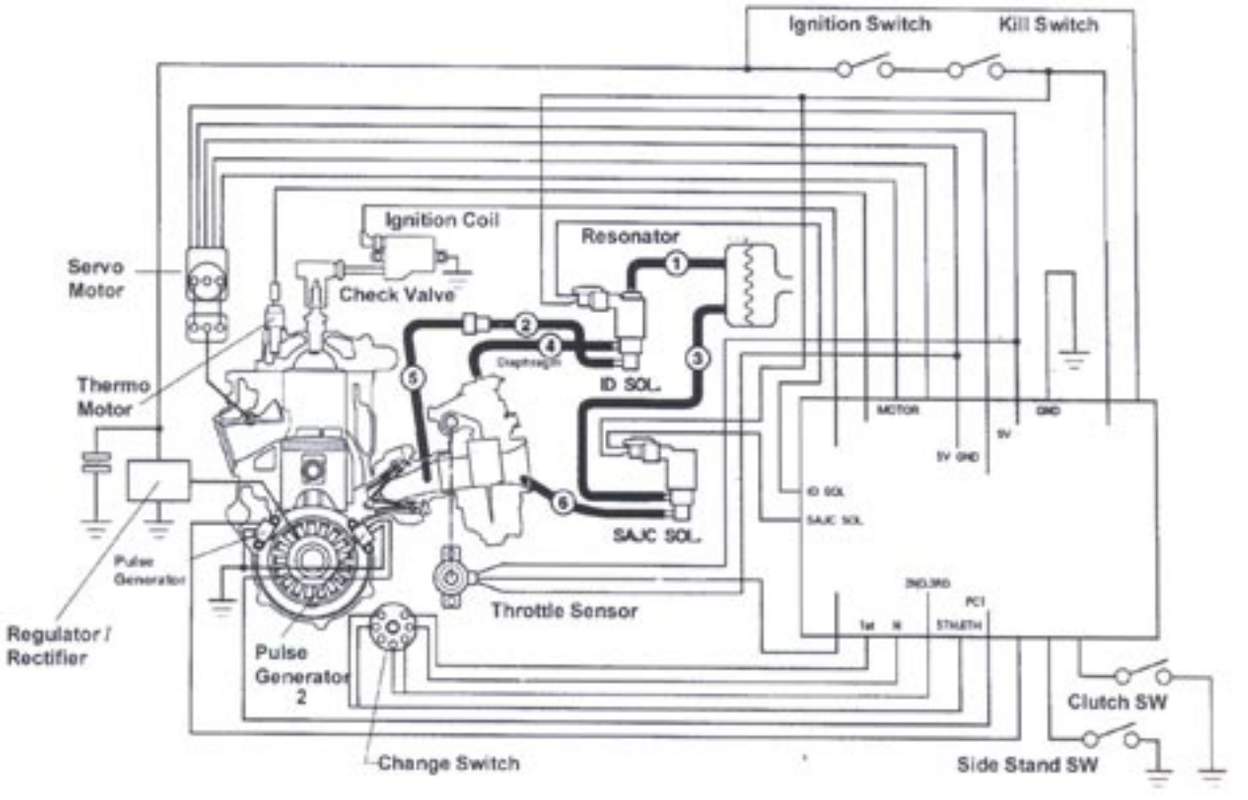


CRM250AR -AR Combustion system

The AR combustion system has been introduced to the CRM250AR model. With this system, the fuel consumption of the CRM250AR has improved by 30% (@60km/h) and the HC mission value has dropped by 50% (ECE40 mode) compared to the conventional CRM250R model.
Moreover, the torque curve became more linear in low-torque region, as well as increase in its absolute value, which resulted in significant improvement in acceleration performance and engine handling.

There are three major elements in the AR combustion control system:
1. AR combustion control valve (ARC valve) mechanism and the servo-motor
2. Idling control system and a carburettor with valve opening sensor
3. ECU-based control system (PGM-I, ARC valve opening control, solenoid control: ID SOL, SAJC SOL)

CRM250 AR-AR Combustion System

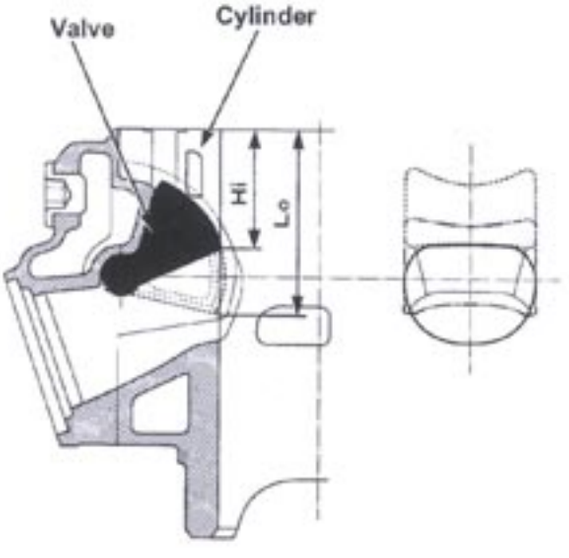


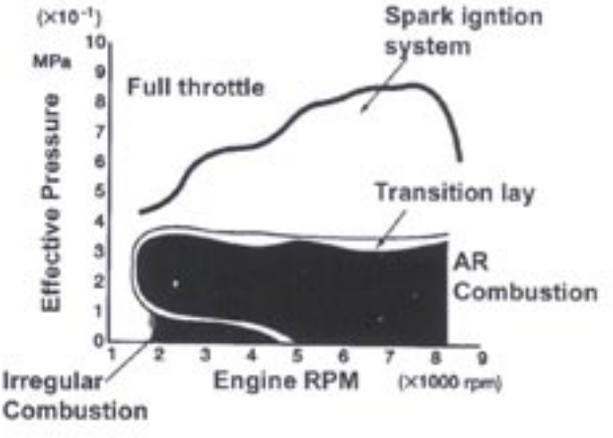
AR Combustion system -abstract

The AR combustion control valve is based on the conventional "RC valve", but comes with wider operation angle and higher sealing capability. It is operated by a servo-motor (ARC valve opening control).
Engine start and idling is identical to conventional ignition system. However, once the gear is engaged, the combustion gradually makes transition from conventional combustion to AR combustion, depending on throttle opening angle and rpm. There is a "transition phase" where both AR and conventional combustion exist. While in this transitioning phase, the ignition timing is appropriately controlled to enable smooth riding (PGM-1G). Normal ignition (spark) will be resumed even after making full transition to AR combustion.

Conditions for AR combustion:
1. ARC valve height (from cylinder top to the bottom end of the valve centre) is 55mm or above
2. Engine rpm is 3,500rpm or above
3. Throttle opening : 8 to 20%
4. Air to fuel ratio : 13 to 15

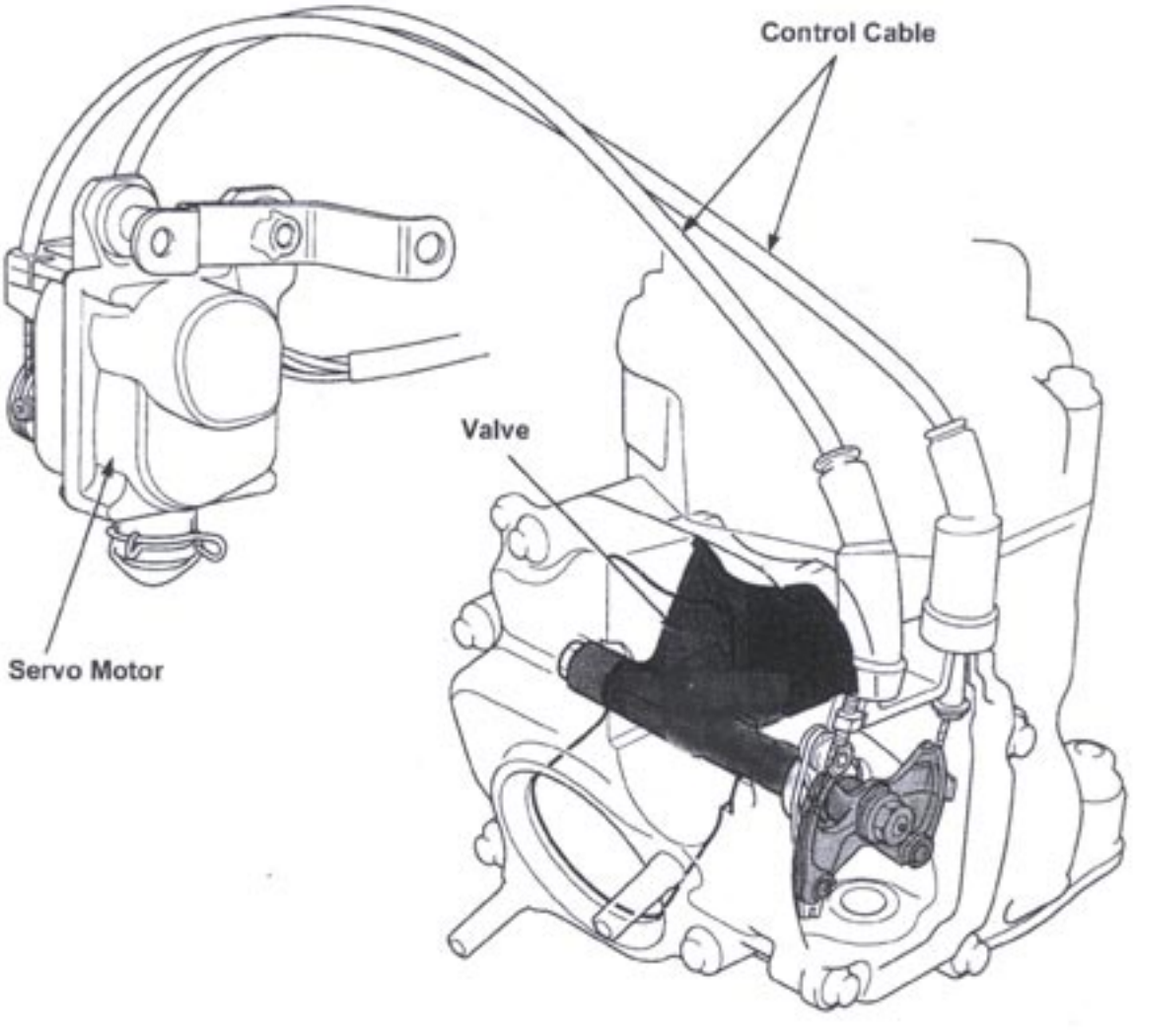
The transition will commence only when all of the above four conditions are satisfied. However under certain condition, AR combustion extends close to idling. The idle control unit (described later) will assist smooth deceleration with ECU control. The carburettor is also controlled by ECU (slow air jet control) in order to improve driving control.





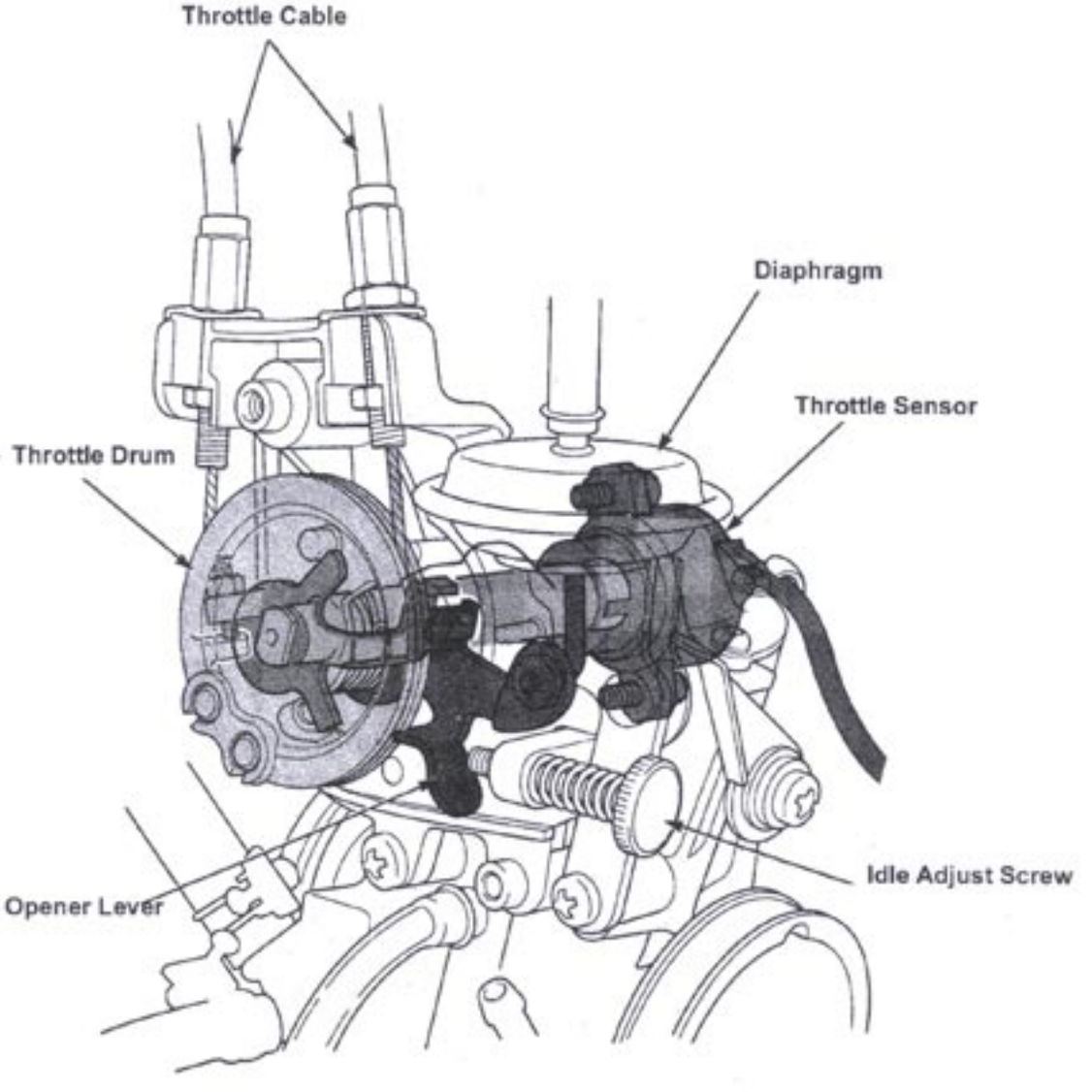
1. AR Combustion control valve mechanism and servo motor

The ARC valve is operated by the servo motor.
It regulates the cylinder pressure at the beginning of the compression sequence.



2. Idle control system and an opening sensor equipped carburettor

PGM piston type carburettor (PE-L type)
The idling is controlled by a lost motion mechanism (consists of an opener lever and a diaphragm), which is mount on the throttle drum attached to the throttle shaft.



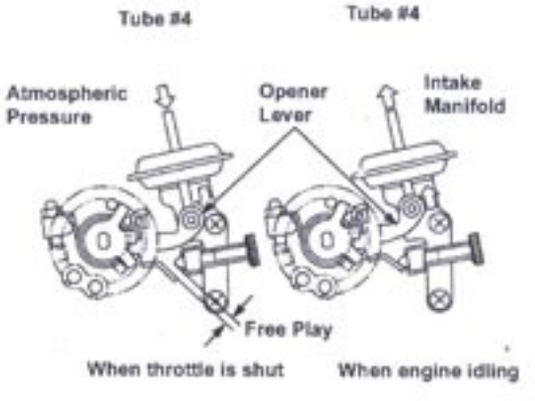
Idling control mechanism

When the engine is stopped :
The throttle opening is below idling. Atmospheric pressure exists on top of the diaphragm.

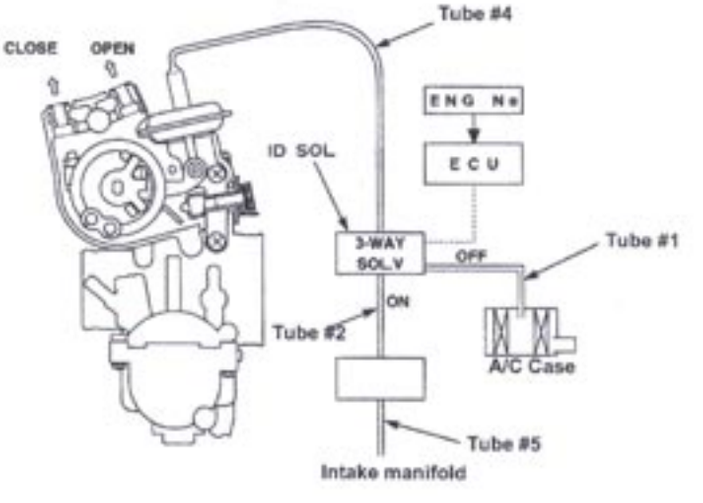
Starting & idling :
By starting the engine with a kick-starter when the ignition is ON and the kill switch is RUN, a signal from ECU activates the idle control solenoid (ID SOL). This would affect a diaphragm. Once the diaphragm moves, the rod will lift up the opener lever. The throttle comes down to idling.

Engine shutdown:
By turning either the ignition or the kill switch to OFF, the signal from ECU to ID SOL will stop.
This will deform the diaphragm to close throttle down to idling (manifold becomes atmospheric pressure).

Deceleration Opening an Idle Opening



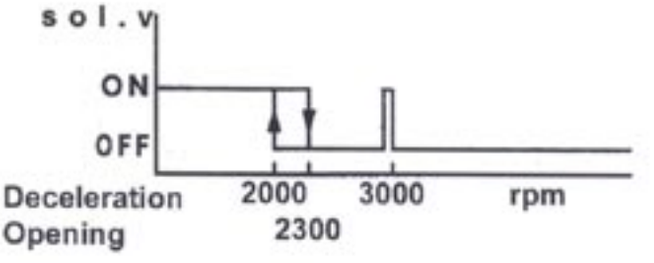
Idling Control



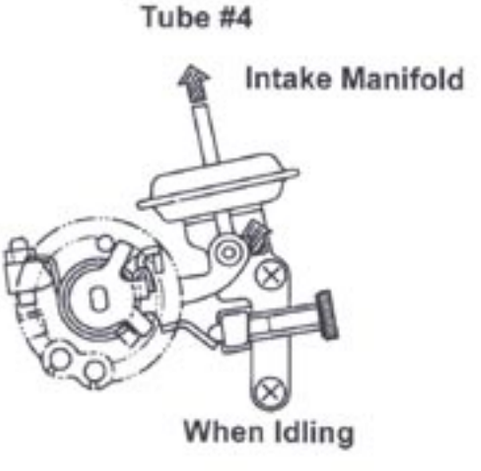
Idling control mechanism (cont'd)

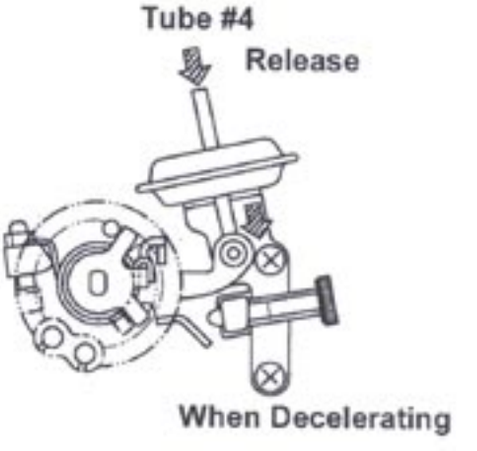
Deceleration at or above 2,300 rpm:
The throttle sensor detects "idling position" of the throttle. The ECU sends signal to ID SOL to switch from idling position to decelerating position.

Deceleration Valve Opening Control



Deceleration Mechanism





Slow air jet control
For the purpose of improving the control of required air to fuel ratio, on/off-road driving capability, and fuel consumption, this system adjusts some elements which cannot be controlled by the carburettor jetting. The elements include engine rpm, throttle position, coolant temperature, gear position, kill switch and clutch switch operation (refer to SAJC SOL).

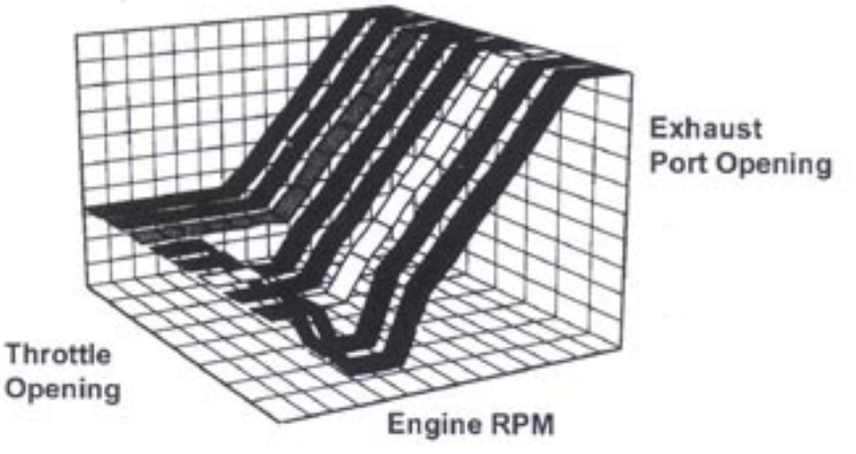
3. ECU based control system

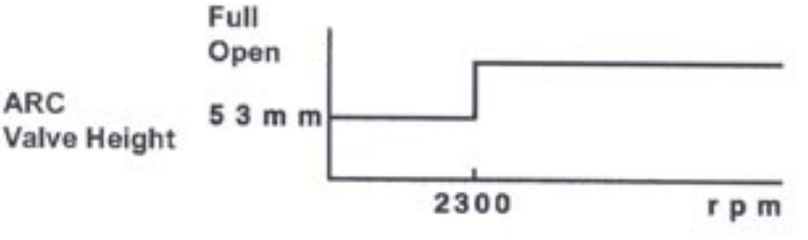
PGM-IG

A conventional two-pulse system is used to prevent irregular cranking of the engine when kick-starting.
The ignition timing is controlled between 13 to 27° BTDC, depending on engine rpm and throttle opening. The ECU particularly controls the ignition timing when the combustion is in conventional spark mode or in AR transition to provide smooth riding.

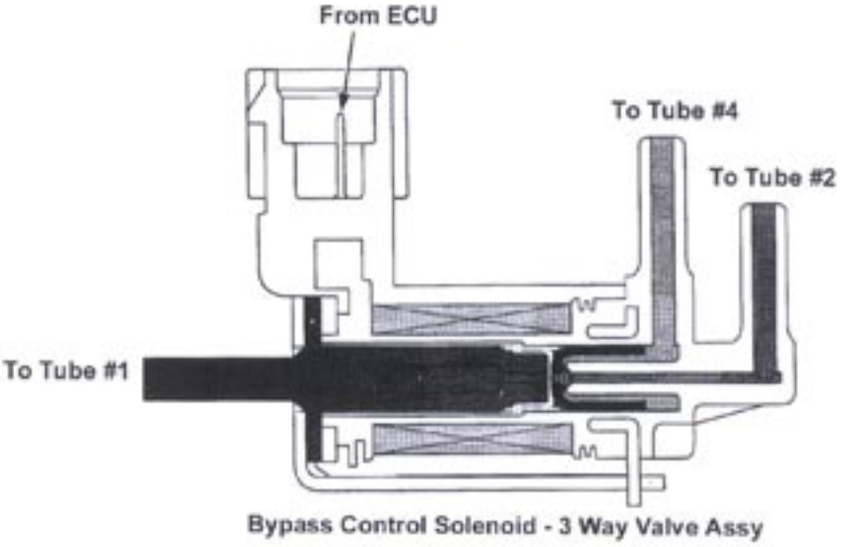
ARC valve opening control

The ARC valve position is controlled, based on the engine rpm and throttle opening. The valve height at idling (initial) is approx. 53mm and it generally closes while in AR combustion. When either ignition or kill switch is turned off, the valve moves to full-open position, which AR combustion does not happen. However, the valve opening remains 53mm below 2,300rpm to keep the ability of re-starting.





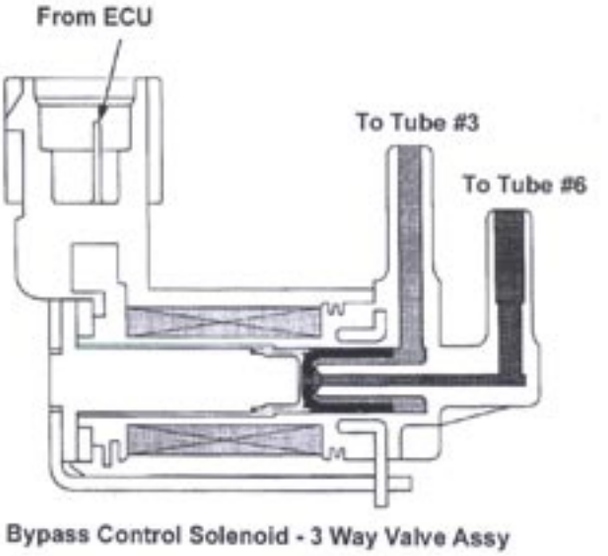
Solenoid control:
1. Idle control solenoid (ID SOL)
Refer to the idle control mechanism.



Bypass Control Solenoid - 3 Way Valve Assy

2. Slow air jet control solenoid (SAJC SOL)
The ECU conducts ON/OFF control by reading the engine rpm, throttle opening, coolant temperature, gear position, kill switch and clutch switch.
Major role of the sensors are:

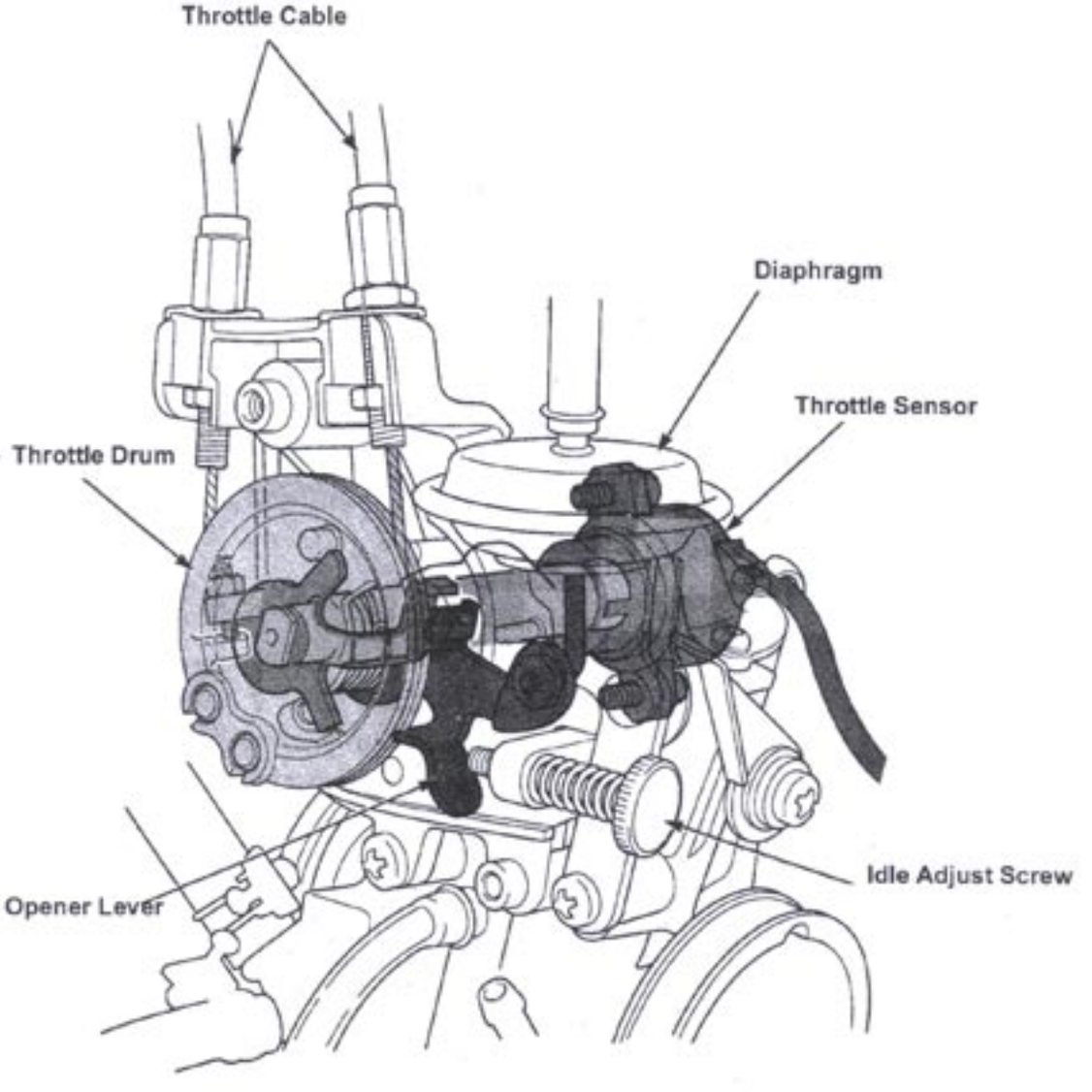
Thermo-sensor :	Stops the SAJC SOL at or below 60°C coolant temperature to keep the engine warm. Does ON/OFF control above 60°C coolant temperature, Depending on the engine rpm and the throttle setting.
Gear position sensor :	Optimises the ARC valve, ignition timing, and the carburettor control for each gears.
Clutch switch :	suspends AR combustion when the clutch is disengaged.



Bypass Control Solenoid - 3 Way Valve Assy

2. Idle control system and an opening sensor equipped carburettor

PGM piston type carburettor (PE-L type)
The idling is controlled by a lost motion mechanism (consists of an opener lever and a diaphragm), which is mount on the throttle drum attached to the throttle shaft.



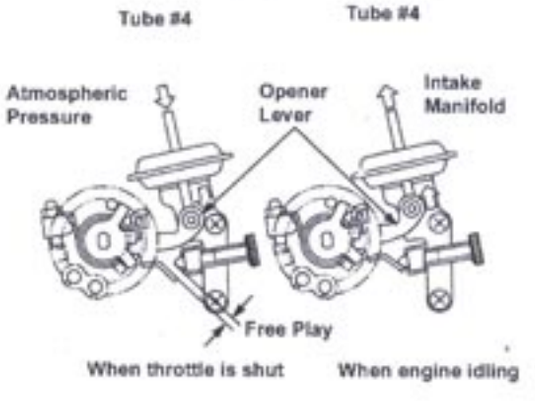
Idling control mechanism

When the engine is stopped :
The throttle opening is below idling. Atmospheric pressure exists on top of the diaphragm.

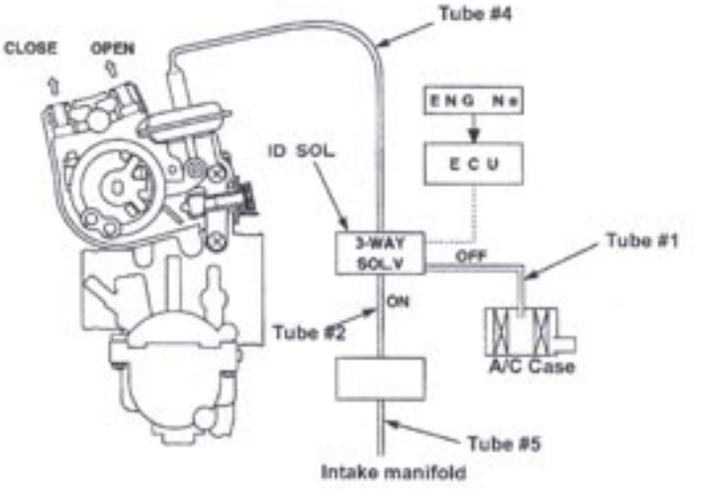
Starting & idling :
By starting the engine with a kick-starter when the ignition is ON and the kill switch is RUN, a signal from ECU activates the idle control solenoid (ID SOL). This would affect a diaphragm. Once the diaphragm moves, the rod will lift up the opener lever. The throttle comes down to idling.

Engine shutdown:
By turning either the ignition or the kill switch to OFF, the signal from ECU to ID SOL will stop.
This will deform the diaphragm to close throttle down to idling (manifold becomes atmospheric pressure).

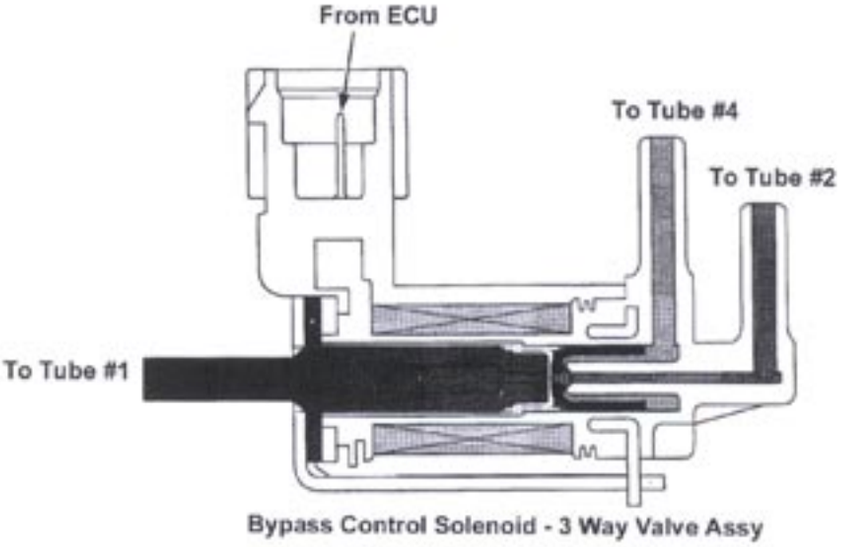
Deceleration Opening an Idle Opening



Idling Control



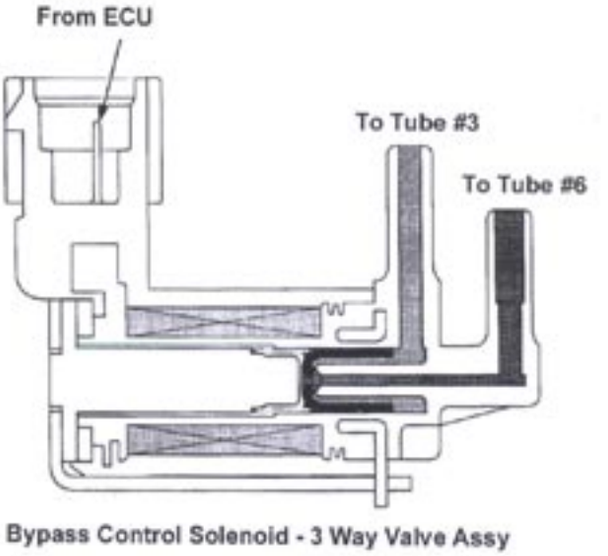
Solenoid control:
1. Idle control solenoid (ID SOL)
Refer to the idle control mechanism.



Bypass Control Solenoid - 3 Way Valve Assy

2. Slow air jet control solenoid (SAJC SOL)
The ECU conducts ON/OFF control by reading the engine rpm, throttle opening, coolant temperature, gear position, kill switch and clutch switch.
Major role of the sensors are:

Thermo-sensor :	Stops the SAJC SOL at or below 60°C coolant temperature to keep the engine warm. Does ON/OFF control above 60°C coolant temperature, Depending on the engine rpm and the throttle setting.
Gear position sensor :	Optimises the ARC valve, ignition timing, and the carburettor control for each gears.
Clutch switch :	suspends AR combustion when the clutch is disengaged.



Bypass Control Solenoid - 3 Way Valve Assy

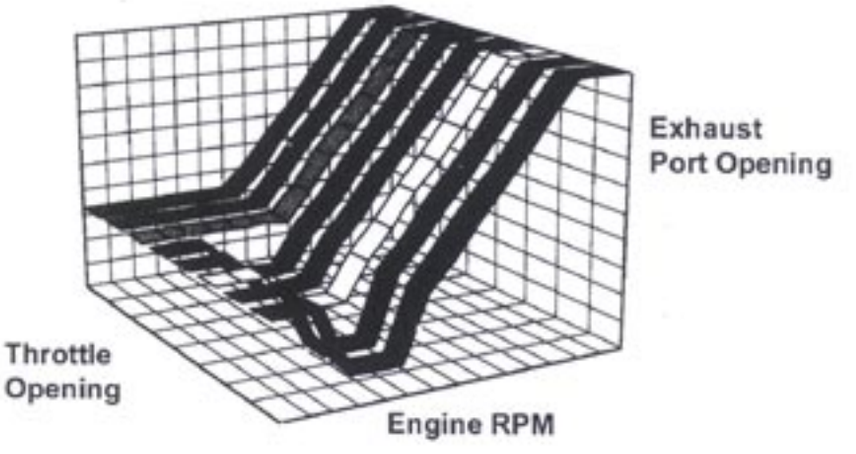
3. ECU based control system

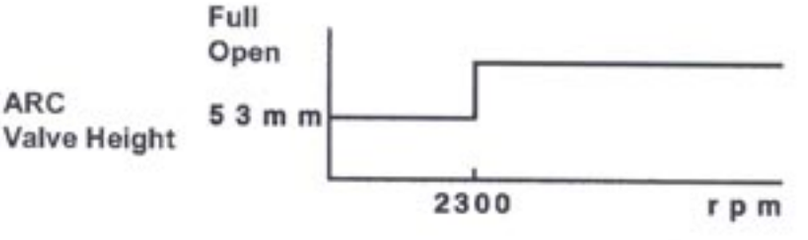
PGM-IG

A conventional two-pulse system is used to prevent irregular cranking of the engine when kick-starting.
The ignition timing is controlled between 13 to 27° BTDC, depending on engine rpm and throttle opening. The ECU particularly controls the ignition timing when the combustion is in conventional spark mode or in AR transition to provide smooth riding.

ARC valve opening control

The ARC valve position is controlled, based on the engine rpm and throttle opening. The valve height at idling (initial) is approx. 53mm and it generally closes while in AR combustion. When either ignition or kill switch is turned off, the valve moves to full-open position, which AR combustion does not happen. However, the valve opening remains 53mm below 2,300rpm to keep the ability of re-starting.

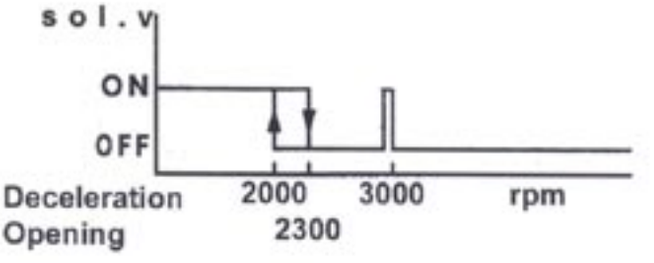




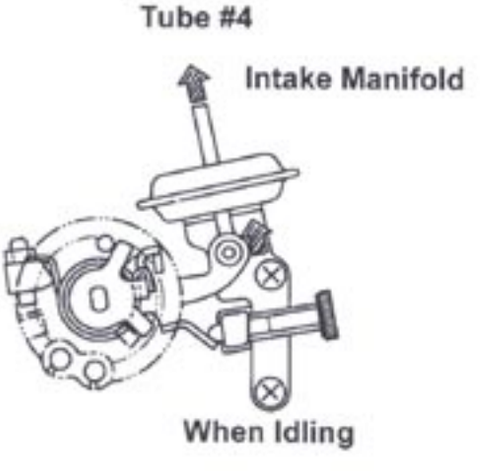
Idling control mechanism (cont'd)

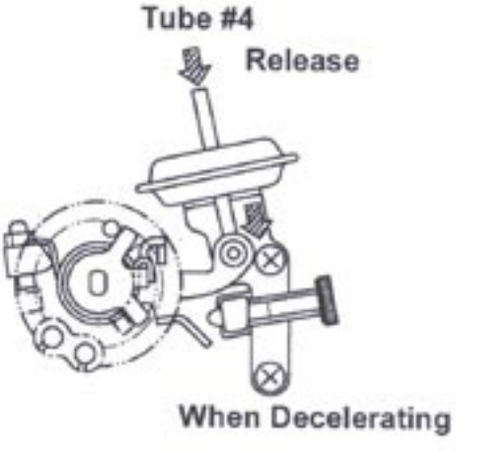
Deceleration at or above 2,300 rpm:
The throttle sensor detects "idling position" of the throttle. The ECU sends signal to ID SOL to switch from idling position to decelerating position.

Deceleration Valve Opening Control



Deceleration Mechanism





Slow air jet control
For the purpose of improving the control of required air to fuel ratio, on/off-road driving capability, and fuel consumption, this system adjusts some elements which cannot be controlled by the carburettor jetting. The elements include engine rpm, throttle position, coolant temperature, gear position, kill switch and clutch switch operation (refer to SAJC SOL).

SCRUBS WOZ ERE . . .