

1 9 9 8 - 2 0 0 3



SERVICE MANUAL

1998-2003

VTR1000F

SUPER HAWK®

61MBB05

HOW TO USE THIS MANUAL

This service manual describes the service procedures for the VTR1000F.

Follow the Maintenance Schedule (Section 3) recommendations to ensure that the vehicle is in peak operating condition and the emission levels are within the standards set by the U.S. Environmental Protection Agency and California Air Resources Board.

Performing the first scheduled maintenance is very important. It compensates for the initial wear that occurs during the break-in period.

Sections 1 and 3 apply to the whole motorcycle. Section 2 illustrates procedures for removal/installation of components that may be required to perform service described in the following sections. Sections 4 through 19 describe parts of the motorcycle, grouped according to location.

Find the section you want on this page, then turn to the table of contents on the first page of the section.

Most sections have an assembly or system illustration, service information and troubleshooting for the section.

The subsequent pages give detailed procedures.

If you don't know the source of the trouble, go to section 21, Troubleshooting.

CONTENTS

	GENERAL INFORMATION	1
	FRAME/BODY PANELS/EXHAUST SYSTEM	2
	MAINTENANCE	3
ENGINE AND DRIVE TRAIN	LUBRICATION SYSTEM	4
	FUEL SYSTEM	5
	COOLING SYSTEM	6
	ENGINE REMOVAL/INSTALLATION	7
	CYLINDER HEAD/VALVE	8
	CLUTCH/GEARSHIFT LINKAGE	9
	ALTERNATOR/STARTER CLUTCH	10
	CRANKCASE/TRANSMISSION	11
	CRANKSHAFT/PISTON/CYLINDER	12
CHASSIS	FRONT WHEEL/SUSPENSION/STEERING	13
	REAR WHEEL/SUSPENSION	14
	HYDRAULIC BRAKE	15
ELECTRICAL	BATTERY/CHARGING SYSTEM	16
	IGNITION SYSTEM	17
	ELECTRIC STARTER	18
	LIGHTS/METERS/SWITCHES	19
	WIRING DIAGRAM	20
	TROUBLESHOOTING	21
	INDEX	22

1. GENERAL INFORMATION

GENERAL SAFETY	1-1	LUBRICATION & SEAL POINTS	1-16
SERVICE RULES	1-2	CABLE & HARNESS ROUTING	1-18
MODEL IDENTIFICATION	1-3	EMISSION CONTROL SYSTEMS	1-30
SPECIFICATIONS	1-4	EMISSION CONTROL INFORMATION LABELS	1-33
TORQUE VALUES	1-11		
TOOLS	1-14		

1

GENERAL SAFETY

CARBON MONOXIDE

If the engine must be running to do some work, make sure the area is well ventilated. Never run the engine in an enclosed area.

▲WARNING

The exhaust contains poisonous carbon monoxide gas that can cause loss of consciousness and may lead to death.

Run the engine in an open area or with an exhaust evacuation system in an enclosed area.

GASOLINE

Work in a well ventilated area. Keep cigarettes, flames or sparks away from the work area or where gasoline is stored.

▲WARNING

Gasoline is extremely flammable and is explosive under certain conditions. KEEP OUT OF REACH OF CHILDREN.

HOT COMPONENTS

▲WARNING

Engine and exhaust system parts become very hot and remain hot for some time after the engine is run. Wear insulated gloves or wait until the engine and exhaust system have cooled before handling these parts.

USED ENGINE OIL

▲WARNING

Used engine oil may cause skin cancer if repeatedly left in contact with the skin for prolonged periods. Although this is unlikely unless you handle used oil on a daily basis, it is still advisable to thoroughly wash your hands with soap and water as soon as possible after handling used oil. KEEP OUT OF REACH OF CHILDREN.

BRAKE DUST

Never use an air hose or dry brush to clean brake assemblies. Use an OSHA-approved vacuum cleaner or alternate method approved by OSHA, designed to minimize the hazard caused by airborne asbestos fibers.

▲WARNING

Inhaled asbestos fibers have been found to cause respiratory disease and cancer.

BRAKE FLUID

CAUTION:

Spilling fluid on painted, plastic or rubber parts will damage them. Place a clean shop towel over these parts whenever the system is serviced. KEEP OUT OF REACH OF CHILDREN.

GENERAL INFORMATION

COOLANT

Under some conditions, the ethylene glycol in engine coolant is combustible and its flame is not visible. If the ethylene glycol does ignite, you will not see any flame, but you can be burned.

▲WARNING

- *Avoid spilling engine coolant on the exhaust system or engine parts. They may be hot enough to cause the coolant to ignite and burn without a visible flame.*
- *Coolant (ethylene glycol) can cause some skin irritation and is poisonous if swallowed. KEEP OUT OF REACH OF CHILDREN.*
- *Do not remove the radiator cap when the engine is hot. The coolant is under pressure and could scald you.*
- *Keep hands and clothing away from the cooling fan, as it starts automatically.*

CAUTION:

Using coolant with silicate corrosion inhibitors may cause premature wear of water pump seals or blockage of radiator passages. Using tap water may cause engine damage.

SERVICE RULES

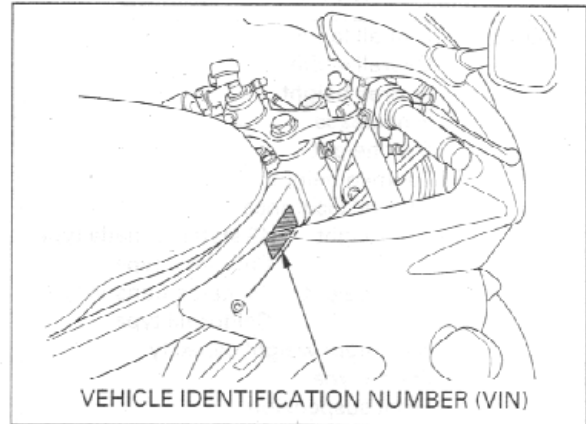
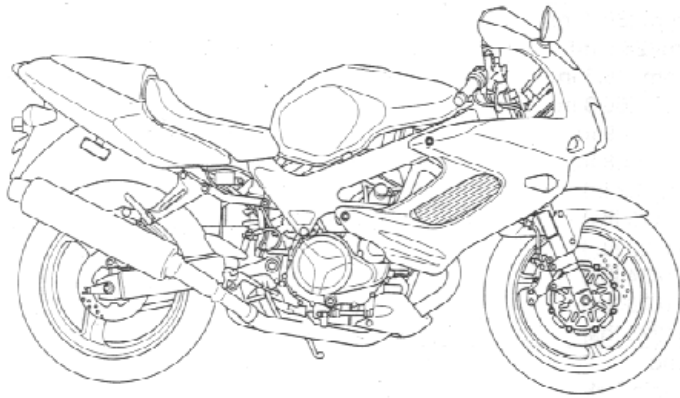
1. Use genuine HONDA or HONDA-recommended parts and lubricants or their equivalents. Parts that do not meet HONDA's design specifications may cause damage to the motorcycle.
2. Use the special tools designed for this product to avoid damage and incorrect assembly.
3. Use only metric tools when servicing the motorcycle. Metric bolts, nuts and screws are not interchangeable with English fasteners.
4. Install new gaskets, O-rings, cotter pins, and lock plates when reassembling.
5. When tightening bolts or nuts, begin with the larger diameter or inner bolt first. Then tighten to the specified torque diagonally in incremental steps unless a particular sequence is specified.
6. Clean parts in cleaning solvent upon disassembly. Lubricate any sliding surfaces before reassembly.
7. After reassembly, check all parts for proper installation and operation.
8. Route all electrical wires as shown on pages 1-18 through 1-29, Cable & Harness routing.

BATTERY HYDROGEN GAS & ELECTROLYTE

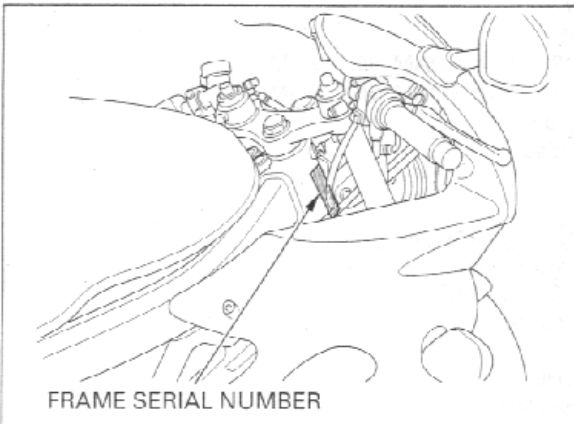
▲WARNING

- *The battery gives off explosive gases; keep sparks, flames and cigarettes away. Provide adequate ventilation when charging.*
- *The battery contains sulfuric acid (electrolyte). Contact with skin or eyes may cause severe burns. Wear protective clothing and a face shield.*
 - *If electrolyte gets on your skin, flush with water.*
 - *If electrolyte gets in your eyes, flush with water for at least 15 minutes and call a physician immediately.*
- *Electrolyte is poisonous.*
 - *If swallowed, drink large quantities of water or milk and follow with milk of magnesia or vegetable oil and call a physician. KEEP OUT OF REACH OF CHILDREN.*

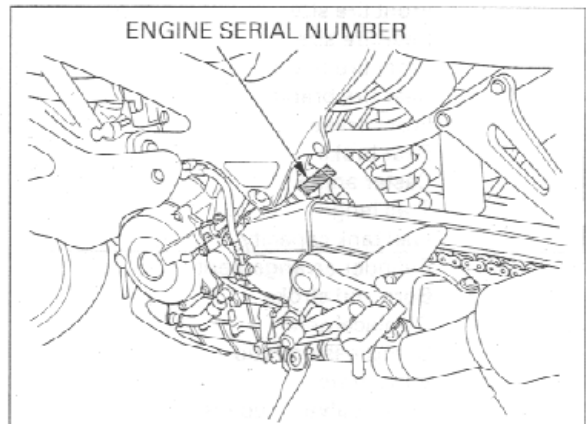
MODEL IDENTIFICATION



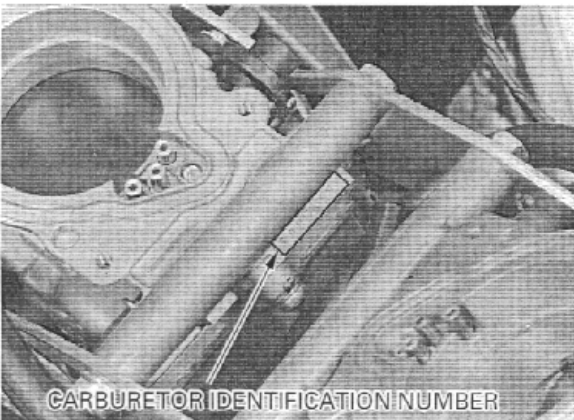
The Vehicle Identification Number (VIN) is located on right side of the frame near the steering head.



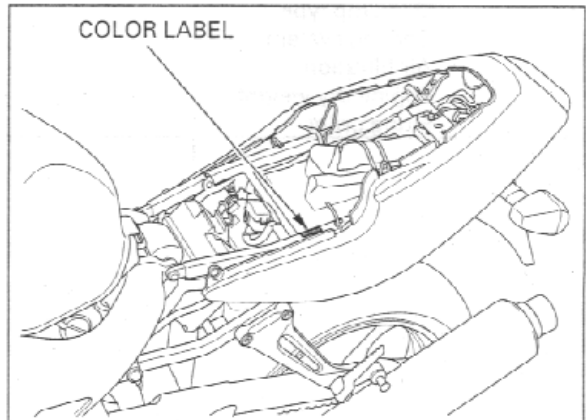
The frame serial number is stamped on the right side of the steering head.



The engine serial number is stamped on the rear of the upper crankcase.



The carburetor identification number is stamped on the intake side of the carburetor body.



The color label is attached on the seat rail under the seat. When ordering color-coded parts, always specify the designated color code.

GENERAL INFORMATION

SPECIFICATIONS

GENERAL		
	ITEM	SPECIFICATIONS
DIMENSIONS	Overall length	2,050 mm (80.7 in)
	Overall width	710 mm (28.0 in)
	Overall height	1,155 mm (45.5 in)
	Wheelbase	1,430 mm (56.3 in)
	Seat height	810 mm (31.9 in)
	Footpeg height	377 mm (14.8 in)
	Ground clearance	135 mm (5.3 in)
	Dry weight 49 states/Canada type	193 kg (425 lbs)
	California type	194 kg (428 lbs)
	Curb weight 49 states/Canada type	215 kg (474 lbs)
	California type	216 kg (476 lbs)
	Maximum weight capacity	178 kg (392 lbs)
FRAME	Frame type	Diamond
	Front suspension	Telescopic fork
	Front axle travel	109 mm (4.3 in)
	Front fork stroke	120 mm (4.7 in)
	Rear suspension	Swingarm
	Rear axle travel	124 mm (4.9 in)
	Front tire size	120/70ZR17 (58W)
	Rear tire size	180/55ZR17 (73W)
	Front tire brand	D204FK (DUNLOP), MACADAM 90X G (MICHELIN)
	Rear tire brand	D204K (DUNLOP), MACADAM 90X G (MICHELIN)
	Front brake	Hydraulic double disc
	Rear brake	Hydraulic single disc
	Caster angle	24°50'
ENGINE	Trail length	97 mm (3.8 in)
	Fuel tank capacity	16.0 l (4.23 US gal, 3.52 Imp gal)
	Cylinder arrangement	2 cylinders 90° V transverse
	Bore and stroke	98.0 × 66.0 mm (3.90 × 2.60 in)
	Displacement	995.7 cm³ (60.74 cu-in)
	Compression ratio	9.4 : 1
	Valve train	Chain driven, DOHC
	Intake valve opens	20° BTDC (At 1 mm lift)
	Intake valve closes	45° ABDC (At 1 mm lift)
	Exhaust valve opens	50° BBDC (At 1 mm lift)
	Exhaust valve closes	15° ATDC (At 1 mm lift)
	Lubrication system	Forced pressure and wet sump
	Oil pump type	Trochoid
	Cooling system	Liquid cooled
	Air filtration	Viscous paper element
	Engine dry weight	74.2 kg (163.6 lbs)
	Firing order	Front — 270° — Rear — 450° — Front

GENERAL (Cont'd)

ITEM		SPECIFICATIONS
CARBURETOR	Carburetor type	CV semi-downdraft
	Throttle bore	48 mm (1.9 in)
DRIVE TRAIN	Clutch system	Multi-plate, wet
	Clutch operation system	Hydraulic operating
	Transmission	Constant mesh, 6-speeds
	Primary reduction	1.681 (74/44)
	Final reduction	2.562 (41/16)
	Gear ratio 1st	2.733 (41/15)
	2nd	1.812 (29/16)
	3rd	1.428 (30/21)
	4th	1.206 (35/29)
	5th	1.080 (27/25)
	6th	0.961 (25/26)
	Gearshift pattern	Left foot operated return system, 1-N-2-3-4-5-6
ELECTRICAL	Ignition system	DC-CDI
	Starting system	Electric starter motor
	Charging system	Triple phase output alternator
	Regulator/rectifier	SCR shorted, triple phase full wave rectification
	Lighting system	Battery

GENERAL INFORMATION

Unit: mm (in)

LUBRICATION SYSTEM		STANDARD	SERVICE LIMIT
ITEM			
Engine oil capacity	After draining	3.7 ℓ (3.9 US qt, 3.3 Imp qt)	_____
	After draining/filter change	3.9 ℓ (4.1 US qt, 3.4 Imp qt)	_____
	After disassembly	4.5 ℓ (4.8 US qt, 4.0 Imp qt)	_____
Recommended engine oil		Honda GN4 4-stroke oil or equivalent motor oil API service classification SF or SG Viscosity: SAE 10W-40	_____
Oil pressure (at oil pressure switch)		588 kPa (6.0 kgf/cm ² , 85 psi) at 5,000 rpm/80 °C (176 °F)	_____
Oil pump	Tip clearance	0.15 (0.006)	0.20 (0.008)
	Body clearance	0.15—0.21 (0.006—0.008)	0.35 (0.014)
	Side clearance	0.02—0.09 (0.001—0.004)	0.12 (0.005)

FUEL SYSTEM		SPECIFICATIONS
ITEM		
Carburetor identification number	49 state/Canada type	'98—'00: VPT2A, After '00: VPT3B
	California type	'98—'00: VPT1A, After '00: VPT3C
Main jet		Front: # 175 , Rear: # 178
Slow jet		# 45
Jet needle number		Front: A1UF , Rear: A1UE
Pilot screw opening		See page 5-21
Float level		16.6 ± 0.5 mm (0.65 ± 0.02 in)
Idle speed		1,200 ± 100 rpm

COOLING SYSTEM		SPECIFICATIONS
ITEM		
Coolant capacity	Radiator and engine	2.9 ℓ (3.1 US qt, 2.6 Imp qt)
	Reserve tank	0.71 ℓ (0.188 US gal, 0.156 Imp gal)
Radiator cap relief pressure		108—137 kPa (1.1—1.4 kgf/cm ² , 16—20 psi)
Thermostat	Begins to open	73—77 °C (163—171 °F)
	Fully open	90 °C (194 °F)
	Valve lift	8 mm (0.3 in) minimum
Recommended antifreeze		Pro Honda HP coolant or an equivalent high quality ethylene glycol antifreeze containing silicate-free corrosion inhibitors

Unit: mm (in)

CYLINDER HEAD/VALVE			STANDARD	SERVICE LIMIT	
ITEM					
Cylinder compression at 350 rpm			1,128 kPa (11.5 kgf/cm ² , 164 psi)	_____	
Valve clearance		IN	0.16 ± 0.03 (0.006 ± 0.001)	_____	
		EX	0.31 ± 0.03 (0.012 ± 0.001)	_____	
Camshaft	Cam lobe height	IN	40.080 – 40.240 (1.5779 – 1.5842)	39.780 (1.5661)	
		EX	40.230 – 40.390 (1.5839 – 1.5902)	39.930 (1.5720)	
	Runout		_____	0.05 (0.002)	
	Oil clearance		0.020 – 0.062 (0.0008 – 0.0024)	0.088 (0.0035)	
Valve lifter	Valve lifter O.D.		33.978 – 33.993 (1.3377 – 1.3383)	33.97 (1.337)	
	Valve lifter bore I.D.		34.010 – 34.026 (1.3390 – 1.3396)	34.04 (1.340)	
Valve, valve guide	Valve stem O.D.	IN	5.975 – 5.990 (0.2352 – 0.2358)	5.965 (0.2348)	
		EX	5.965 – 5.980 (0.2348 – 0.2354)	5.955 (0.2344)	
	Valve guide I.D.		IN/EX	6.000 – 6.012 (0.2362 – 0.2367)	6.040 (0.2378)
	Stem-to-guide clearance	IN	0.010 – 0.037 (0.0004 – 0.0015)	0.075 (0.0030)	
		EX	0.020 – 0.047 (0.0008 – 0.0019)	0.085 (0.0033)	
	Valve guide projection above cylinder head		14.0 – 14.2 (0.55 – 0.56)	_____	
	Valve seat width	IN	1.1 – 1.3 (0.04 – 0.05)	1.7 (0.07)	
EX		1.3 – 1.5 (0.05 – 0.06)	1.9 (0.07)		
Valve spring	Free length	Inner	37.0 (1.46)	36.0 (1.42)	
		Outer	41.9 (1.65)	40.9 (1.61)	
Cylinder head warpage			_____	0.10 (0.004)	

CLUTCH/GEARSHIFT LINKAGE			Unit: mm (in)	
ITEM		STANDARD	SERVICE LIMIT	
Specified clutch fluid		DOT 4 brake fluid		
Clutch master cylinder	Cylinder I.D.	14.000 – 14.043 (0.5512 – 0.5529)	14.055 (0.5533)	
	Piston O.D.	13.957 – 13.984 (0.5495 – 0.5506)	13.945 (0.5490)	
Clutch	Spring free length	49.6 (1.95)	46.6 (1.83)	
	Disc thickness	3.72 – 3.88 (0.146 – 0.153)	3.5 (0.14)	
	Plate warpage		0.30 (0.012)	
Clutch outer guide	I.D.	28.000 – 28.021 (1.1024 – 1.1032)	28.031 (1.1036)	
	O.D.	34.975 – 34.991 (1.3770 – 1.3776)	34.965 (1.3766)	
Mainshaft O.D. at clutch outer guide		27.980 – 27.993 (1.1016 – 1.1021)	27.970 (1.1012)	

ALTERNATOR/STARTER CLUTCH			Unit: mm (in)	
ITEM		STANDARD	SERVICE LIMIT	
Starter driven gear boss O.D.		57.749 – 57.768 (2.2736 – 2.2743)	57.639 (2.2692)	

GENERAL INFORMATION

Unit: mm (in)

CRANKCASE/TRANSMISSION ITEM			STANDARD	SERVICE LIMIT
Shift fork	I.D.		12.000—12.021 (0.4724—0.4733)	12.03 (0.474)
	Claw thickness		5.93—6.00 (0.233—0.236)	5.9 (0.23)
Shift fork shaft Transmission	O.D.		11.957—11.968 (0.4707—0.4712)	11.95 (0.470)
	Gear I.D.	M5, M6	31.000—31.016 (1.2205—1.2211)	31.04 (1.222)
		C2, C3, C4	33.000—33.025 (1.2992—1.3002)	33.05 (1.301)
		M5, M6	30.955—30.980 (1.2187—1.2197)	30.93 (1.218)
	Gear bushing O.D.	C2	32.955—32.980 (1.2974—1.2984)	32.93 (1.296)
		C3, C4	32.950—32.975 (1.2972—1.2982)	32.93 (1.296)
		M5, M6	0.020—0.061 (0.0008—0.0024)	0.10 (0.004)
	Gear-to-bushing clearance	C2	0.020—0.070 (0.0008—0.0028)	0.11 (0.004)
		C3, C4	0.025—0.075 (0.0010—0.0030)	0.11 (0.004)
		M5	27.985—28.006 (1.1018—1.1026)	28.02 (1.103)
	Gear bushing I.D.	C2	29.985—30.006 (1.1805—1.1813)	30.02 (1.182)
		at M5	27.967—27.980 (1.1011—1.1016)	27.94 (1.100)
	Mainshaft O.D.	at C2	29.950—29.975 (1.1791—1.1801)	29.92 (1.178)
	Bushing-to-shaft clearance	M5	0.005—0.039 (0.0002—0.0015)	0.06 (0.002)
		C2	0.010—0.056 (0.0004—0.0022)	0.06 (0.002)

Unit: mm (in)

Unit: mm (in)

CRANKSHAFT/PISTON/CYLINDER ITEM			STANDARD	SERVICE LIMIT
Crankshaft	Connecting rod side clearance		0.10—0.30 (0.004—0.012)	0.40 (0.016)
	Crankpin bearing oil clearance		0.032—0.050 (0.0013—0.0020)	0.060 (0.0024)
	Main journal bearing oil clearance		0.020—0.038 (0.0008—0.0015)	0.048 (0.0019)
	Runout		—	0.10 (0.004)
Piston, piston pin, piston ring	Piston O.D. at 20 (0.8) from bottom		97.965—97.985 (3.8569—3.8577)	97.900 (3.8543)
	Piston pin hole I.D.		24.002—24.008 (0.9450—0.9452)	24.03 (0.946)
	Piston pin O.D.		23.994—24.000 (0.9446—0.9449)	23.984 (0.9443)
	Piston-to-piston pin clearance		0.002—0.014 (0.0001—0.0006)	0.046 (0.0018)
	Piston ring end gap	Top	0.25—0.40 (0.010—0.016)	0.55 (0.022)
		Second	0.40—0.55 (0.016—0.022)	0.70 (0.028)
		Oil (side rail)	0.20—0.70 (0.008—0.028)	0.90 (0.035)
	Piston ring-to-ring groove clearance	Top	0.065—0.100 (0.0026—0.0039)	0.115 (0.0045)
Second		0.035—0.070 (0.0014—0.0028)	0.085 (0.0033)	
Cylinder	I.D.		98.005—98.025 (3.8585—3.8592)	98.100 (3.8622)
	Out of round		—	0.10 (0.004)
	Taper		—	0.10 (0.004)
	Warpage		—	0.05 (0.002)
Cylinder-to-piston clearance			0.020—0.060 (0.0008—0.0024)	0.200 (0.0079)
Connecting rod small end I.D.			24.020—24.041 (0.9457—0.9465)	24.051 (0.9469)
Connecting rod-to-piston pin clearance			0.020—0.047 (0.0008—0.0019)	0.067 (0.0026)

Unit: mm (in)

FRONT WHEEL/SUSPENSION/STEERING		STANDARD	SERVICE LIMIT
ITEM			
Minimum tire tread depth			1.5 (0.06)
Cold tire pressure	Up to 90 kg (200 lbs) load	250 kPa (2.50 kgf/cm ² , 36 psi)	
	Up to maximum weight capacity	250 kPa (2.50 kgf/cm ² , 36 psi)	
Axle runout			0.20 (0.008)
Wheel rim runout	Radial		2.0 (0.08)
	Axial		2.0 (0.08)
Wheel balance weight			60 g (2.1 oz) max.
Fork	Spring free length	309.9 (12.20)	303.7 (11.96)
	Tube runout		0.20 (0.008)
	Recommended fluid	Pro-Honda Suspension Fluid SS-8	
	Fluid level	130 (5.1)	
	Fluid capacity	448 ± 2.5 cm ³ (15.2 ± 0.08 US oz, 15.8 ± 0.09 Imp oz)	
Steering head bearing preload		1.0 – 1.6 kgf (2.2 – 3.3 lbf)	

Unit: mm (in)

REAR WHEEL/SUSPENSION		STANDARD	SERVICE LIMIT
ITEM			
Minimum tire tread depth			2.0 (0.08)
Cold tire pressure	Up to 90 kg (200 lbs) load	290 kPa (2.90 kgf/cm ² , 42 psi)	
	Up to maximum weight capacity	290 kPa (2.90 kgf/cm ² , 42 psi)	
Axle runout			0.20 (0.008)
Wheel rim runout	Radial		2.0 (0.08)
	Axial		2.0 (0.08)
Wheel balance weight			60 g (2.1 oz) max.

Unit: mm (in)

HYDRAULIC BRAKE		STANDARD	SERVICE LIMIT
ITEM			
Front	Specified brake fluid	DOT 4	
	Brake disc thickness	4.4 – 4.6 (0.17 – 0.18)	3.5 (0.14)
	Brake disc runout		0.30 (0.012)
	Master cylinder I. D.	14.000 – 14.043 (0.5512 – 0.5529)	14.055 (0.5533)
	Master piston O. D.	13.957 – 13.984 (0.5495 – 0.5506)	13.945 (0.5490)
	Caliper cylinder I. D.	A	30.23 – 30.28 (1.190 – 1.192)
		B	27.000 – 27.050 (1.0630 – 1.0650)
	Caliper piston O. D.	A	30.148 30.198 (1.1869 – 1.1889)
		B	26.918 – 26.968 (1.0598 – 1.0617)
Rear	Specified brake fluid	DOT 4	
	Brake disc thickness	4.8 – 5.2 (0.19 – 0.20)	4.0 (0.16)
	Brake disc runout		0.30 (0.012)
	Master cylinder I. D.	14.000 – 14.043 (0.5512 – 0.5529)	14.055 (0.5533)
	Master piston O. D.	13.957 – 13.984 (0.5495 – 0.5506)	13.945 (0.5490)
	Caliper cylinder I. D.	38.18 – 38.23 (1.503 – 1.505)	38.24 (1.506)
	Caliper piston O. D.	38.098 – 38.148 (1.4999 – 1.5019)	38.09 (1.500)

GENERAL INFORMATION

BATTERY/CHARGING SYSTEM

ITEM			SPECIFICATIONS
Battery	Capacity		12 V - 10 Ah
	Current leakage		0.1 mA max.
	Voltage (20 °C/68 °F)	Fully charged	13.0 - 13.2 V
		Needs charging	Below 12.3 V
	Charging current	Normal	1.2 A × 5 - 10 h
		Quick	5.0 A × 1.0 h
Alternator	Capacity		0.280 kW/5,000 rpm
	Charging coil resistance (20 °C/68 °F)		0.2 - 0.5 Ω

IGNITION SYSTEM

ITEM			SPECIFICATIONS
Spark plug			DPR9EVX-9 (NGK)
Spark plug gap			0.80 - 0.90 mm (0.031 - 0.035 in)
Ignition coil primary peak voltage			100 V minimum
Ignition pulse generator peak voltage			0.7 V minimum
Ignition timing ("F" mark)			15° BTDC at idle
Engine coolant temperature (ECT) sensor resistance	At 20 °C (68 °F)		2 - 3 kΩ
	At 80 °C (176 °F)		200 - 400 Ω
Throttle sensor	Resistance (20 °C/68 °F)		4 - 6 kΩ
	Input voltage		4.7 - 5.3 V

Unit: mm (in)

ELECTRIC STARTER

ITEM	STANDARD	SERVICE LIMIT
Starter motor brush length	12.0 - 13.0 (0.47 - 0.51)	6.5 (0.26)

LIGHTS/METERS/SWITCHES

ITEM			SPECIFICATIONS
Bulbs	Headlight (high/low beam)		12 V - 60/55 W
	Position light		12 V - 5 W
	Brake/taillight		12 V - 21/5 W × 2
	License light		12 V - 4 CP
	Front turn signal/running light		12 V - 32/3 CP × 2
	Rear turn signal light		12 V - 32 CP × 2
	Instrument light		'98 - '00: 12 V - 1.7 W × 3, After '98: 14 V - 1.4 W × 3
	Turn signal indicator		'98 - '00: 12 V - 1.7 W × 2, After '98: 14 V - 1.4 W × 2
	High beam indicator		'98 - '00: 12 V - 1.7 W, After '98: 14 V - 1.4 W
	Neutral indicator		'98 - '00: 12 V - 1.7 W, After '98: 14 V - 1.4 W
	Oil pressure indicator		'98 - '00: 12 V - 1.7 W, After '98: 14 V - 1.4 W
	Side stand indicator ('98 - '00 only)		12 V - 1.7 W
Fuse	Main fuse		30 A
	Sub-fuse		10 A, 20 A
Thermosensor resistance	At 80 °C (176 °F)		47 - 57 Ω
	At 120 °C (248 °F)		14 - 18 Ω
Fan motor switch	Starts to close (ON)		98 - 102 °C (208 - 216 °F)
	Stops to open (OFF)		93 - 97 °C (199 - 207 °F)

TORQUE VALUES

STANDARD

FASTENER TYPE	TORQUE N·m (kgf·m, lbf·ft)	FASTENER TYPE	TORQUE N·m (kgf·m, lbf·ft)
5 mm bolt and nut	5 (0.5, 3.6)	5 mm screw	4 (0.4, 2.9)
6 mm bolt and nut	10 (1.0, 7)	6 mm screw	9 (0.9, 6.5)
8 mm bolt and nut	22 (2.2, 16)	6 mm flange bolt (8 mm head, small flange)	10 (1.0, 7)
10 mm bolt and nut	34 (3.5, 25)	6 mm flange bolt (8 mm head, large flange)	12 (1.2, 9)
12 mm bolt and nut	54 (5.5, 40)	6 mm flange bolt (10 mm head) and nut	12 (1.2, 9)
		8 mm flange bolt and nut Engine	23 (2.3, 17)
		Frame	26 (2.7, 20)
		10 mm flange bolt and nut	39 (4.0, 29)

- Torque specifications listed below are for important fasteners.
- Others should be tightened to standard torque values listed above.

NOTES: 1. Apply sealant to the threads.
 2. Apply locking agent to the threads.
 3. Replace with a new one.
 4. Stake.
 5. Apply oil to the threads and seating surface.
 6. Apply engine oil to the O-ring.
 7. U-nut.
 8. ALOC bolt/screw: replace with a new one.
 9. Apply grease to the threads.

ENGINE

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
MAINTENANCE:				
Spark plug	2	12	14 (1.4, 10)	
Crankshaft hole cap	1	30	15 (1.5, 11)	NOTE 9
Timing hole cap	1	14	10 (1.0, 7)	NOTE 9
Engine oil filter cartridge	1	20	10 (1.0, 7)	NOTE 5, 6
Engine oil drain bolt	1	12	29 (3.0, 22)	
LUBRICATION SYSTEM:				
Oil pressure switch	1	PT 1/8	12 (1.2, 9)	NOTE 1
Oil pressure switch terminal screw	1	4	2 (0.2, 1.4)	
Oil pump bolt	2	6	13 (1.3, 9)	
Oil filter boss	1	20	18 (1.8, 13)	NOTE 2
FUEL SYSTEM:				
Carburetor insulator band bolt	4	5	1 (0.1, 0.7)	
Vacuum joint	1	5	3 (0.3, 2.2)	
Reed valve cover bolt	4	5	5 (0.5, 3.6)	NOTE 2
ENGINE MOUNTING:				
Drive sprocket bolt	1	10	54 (5.5, 40)	
CYLINDER HEAD/VALVE:				
Cylinder head cover bolt	8	6	10 (1.0, 7)	
Breather plate bolt	4	6	12 (1.2, 9)	NOTE 2
Cam sprocket bolt	4	7	20 (2.0, 14)	NOTE 2
Camshaft holder bolt	16	7	21 (2.1, 15)	NOTE 5
Cylinder head bolt	12	10	53 (5.4, 39)	NOTE 5
Cylinder head sealing bolt	2	12	32 (3.3, 24)	NOTE 2
Intake manifold vacuum port socket bolt	1	5	3 (0.3, 2.2)	

GENERAL INFORMATION

ENGINE (Cont'd)				
ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N-m (kgf-m, lbf-ft)	REMARKS
CLUTCH/GEARSHIFT LINKAGE:				
Clutch slave cylinder bleed valve	1	8	9 (0.9, 6.5)	
Clutch bolt	5	6	12 (1.2, 9)	
Clutch center lock nut	1	25	127 (13.0, 94)	NOTE 4, 5
Oil pump driven sprocket bolt	1	6	15 (1.5, 11)	NOTE 2
Gearshift cam bolt	1	8	23 (2.3, 17)	NOTE 2
Gearshift spindle return spring pin	1	8	23 (2.3, 17)	
Primary drive gear bolt	1	12	88 (9.0, 65)	NOTE 5
ALTERNATOR/STARTER CLUTCH:				
Flywheel bolt	1	12	157 (16.0, 116)	NOTE 5
Starter clutch bolt	6	8	23 (2.3, 17)	NOTE 2
Alternator stator bolt	3	6	12 (1.2, 9)	
CRANKCASE/TRANSMISSION:				
Cam chain tensioner bolt	2	8	23 (2.3, 17)	NOTE 2
Cam chain guide bolt	2	8	23 (2.3, 17)	NOTE 2
Crankcase flange bolt	1	10	39 (4.0, 29)	
Crankcase special bolt	8	10	42 (4.3, 31)	NOTE 5
Crankcase sealing bolt	1	18	29 (3.0, 22)	NOTE 2
Crankcase sealing bolt	1	22	29 (3.0, 22)	NOTE 2
Crankcase sealing bolt	1	24	49 (5.0, 36)	NOTE 2
CRANKSHAFT/PISTON/CYLINDER:				
Connecting rod bolt	4	9	29 (3.0, 22) + 120°	NOTE 3, 5
IGNITION SYSTEM:				
Ignition pulse generator bolt	2	6	12 (1.2, 9)	
Engine coolant temperature (ECT) sensor	1	12	23 (2.3, 17)	
ELECTRIC STARTER:				
Starter motor terminal nut	1	6	10 (1.0, 7)	
LIGHTS/METERS/SWITCHES:				
Thermosensor	1	PT 1/8	10 (1.0, 7)	NOTE 1
Neutral switch	1	10	12 (1.2, 9)	

FRAME					
ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N-m (kgf-m, lbf-ft)	REMARKS	
FRAME/BODY PANELS/EXHAUST SYSTEM:					
Front fairing setting bolt	4	6	7 (0.7, 5.1)	Page 7-7	
Exhaust pipe joint nut	4	7	12 (1.2, 9)		
Muffler band bolt	2	8	26 (2.7, 20)		
Seat rail 10 mm flange bolt	2	10	39 (4.0, 29)		
Seat rail 10 mm socket bolt	2	10	44 (4.5, 33)		
ENGINE MOUNTING:					
Front engine hanger nut	1	12	64 (6.5, 47)		
Front engine hanger adjusting bolt	1	20	3 (0.3, 2.2)		
Front engine hanger lock nut	1	20	54 (5.5, 40)		
Center engine hanger bolt	2	10	39 (4.0, 29)		
Left center engine hanger adjusting bolt	1	20	3 (0.3, 2.2)		
Left center engine hanger lock nut	1	20	54 (5.5, 40)		
Rear engine hanger nut	1	12	64 (6.5, 47)		
Rear engine hanger adjusting bolt	1	22	3 (0.3, 2.2)		
Rear engine hanger lock nut	1	22	54 (5.5, 40)		
Shock link bracket nut	2	10	44 (4.5, 33)		
CLUTCH/GEARSHIFT LINKAGE:					
Clutch reservoir mounting screw	1	4	2 (0.2, 1.4)	NOTE 2	
Clutch reservoir cap stopper plate screw	1	4	1 (0.1, 0.7)		
Clutch lever pivot nut	1	6	6 (0.6, 4.3)		
Clutch hose oil bolt	2	10	34 (3.5, 25)		

FRAME				
ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N-m (kgf-m, lbf-ft)	REMARKS
FRONT WHEEL/SUSPENSION/STEERING:				
Handlebar weight mounting screw	2	6	10 (1.0 , 7)	NOTE 8
Front master cylinder holder bolt	2	6	12 (1.2 , 9)	
Front axle bolt	1	14	59 (6.0 , 43)	NOTE 8
Front axle holder bolt	4	8	22 (2.2 , 16)	
Front brake disc bolt	12	6	20 (2.0 , 14)	NOTE 8
Fork cap	2	37	23 (2.3 , 17)	
Fork socket bolt	2	8	20 (2.0 , 14)	NOTE 2
Fork top bridge pinch bolt	2	8	23 (2.3 , 17)	
Fork bottom bridge pinch bolt	2	10	49 (5.0 , 36)	NOTE 2
Front brake hose clamp bolt (fork side)	2	6	10 (1.0 , 7)	
Steering stem nut	1	24	103 (10.5 , 76)	Page 13 27
Steering bearing adjustment nut	1	26	25 (2.5 , 18)	
Steering bearing adjustment nut lock nut	1	26		
Front brake hose clamp bolt (stem side)	1	6	10 (1.0 , 7)	
Front brake hose 3-way joint bolt	1	6	10 (1.0 , 7)	
REAR WHEEL/SUSPENSION:				
Rear axle nut	1	18	93 (9.5 , 69)	NOTE 8
Rear brake disc bolt	4	8	42 (4.3 , 31)	
Final driven sprocket nut	5	12	108 (11.0 , 80)	NOTE 8
Shock absorber upper mounting bolt	1	10	44 (4.5 , 33)	
Shock absorber lower mounting nut	1	10	44 (4.5 , 33)	NOTE 7
Shock arm-to-swingarm nut	1	10	44 (4.5 , 33)	NOTE 7
Shock arm-to-shock link nut	1	10	44 (4.5 , 33)	NOTE 7
Shock link to bracket nut	1	10	44 (4.5 , 33)	NOTE 7
Swingarm pivot nut	1	18	93 (9.5 , 69)	NOTE 7
Drive chain slider bolt	2	6	9 (0.9 , 6.5)	NOTE 8
Rear brake hose clamp screw	2	5	4 (0.4 , 2.9)	NOTE 8
HYDRAULIC BRAKE:				
Brake caliper bleed valve	3	8	6 (0.6 , 4.3)	NOTE 7
Brake pad pin plug	3	10	3 (0.3 , 2.2)	
Brake pad pin	3	10	18 (1.8 , 13)	NOTE 7
Brake hose oil bolt	5	10	34 (3.5 , 25)	
Front brake lever pivot nut	1	6	6 (0.6 , 4.3)	NOTE 7
Front brake fluid reservoir mounting nut	1	6	6 (0.6 , 4.3)	
Rear brake fluid reservoir mounting bolt	1	6	9 (0.9 , 6.5)	NOTE 7
Rear master cylinder mounting bolt	2	6	10 (1.0 , 7)	
Rear master cylinder joint nut	1	8	18 (1.8 , 13)	NOTE 8
Front brake caliper mounting bolt	4	8	30 (3.1 , 22)	
Front brake caliper assembly bolt	8	8	32 (3.3 , 24)	NOTE 2
Rear brake caliper bolt	1	8	23 (2.3 , 17)	NOTE 2
Rear brake caliper pin bolt	1	12	27 (2.8 , 20)	
IGNITION SYSTEM:				
Ignition coil mounting bolt	4	6	10 (1.0 , 7)	
LIGHTS/METERS/SWITCHES:				
Side stand switch bolt	1	6	10 (1.0 , 7)	
Ignition switch mounting bolt	2	8	25 (2.5 , 18)	
Fan motor switch	1	16	18 (1.8 , 13)	
OTHERS:				
Side stand pivot bolt	1	10	10 (1.0 , 7)	NOTE 8
Side stand pivot lock nut	1	10	29 (3.0 , 22)	
Side stand bracket bolt	1	10	44 (4.5 , 33)	NOTE 8
Passenger footpeg bracket bolt	4	8	26 (2.7 , 20)	
Bank sensor bolt	2	8	22 (2.2 , 16)	
Gearshift pedal pivot bolt	1	8	26 (2.7 , 20)	

GENERAL INFORMATION

TOOLS

DESCRIPTION	TOOL NUMBER	ALTERNATIVE TOOL	TOOL NUMBER
Float level gauge	07401-0010000	Equivalent commercially available in U.S.A.	
Oil pressure gauge	07506-3000000		
Oil pressure gauge attachment	07510-4220100	Equivalent commercially available in U.S.A.	
Gear holder	07724-0010100		
Flywheel holder	07725-0040000	Equivalent commercially available in U.S.A.	
Rotor puller	07733-0020001	Rotor puller	07933-3290001
Bearing remover weight	07741-0010201	Bearing remover weight	07936-3710200 (U.S.A. only)
Valve guide driver, 5.5 mm	07742-0010100	Equivalent commercially available in U.S.A.	07742-0010100
Clutch center holder	07742-0050002		
Valve guide driver	07743-0020000	Valve guide driver, 5.5 mm	
Attachment, 32 × 35 mm	07746-0010100	Equivalent commercially available in U.S.A.	
Attachment, 37 × 40 mm	07746-0010200		
Attachment, 42 × 47 mm	07746-0010300	Equivalent commercially available in U.S.A.	
Attachment, 52 × 55 mm	07746-0010400		
Attachment, 24 × 26 mm	07746-0010700	Equivalent commercially available in U.S.A.	
Driver, 40 mm I.D.	07746-0030100		
Attachment, 35 mm I.D.	07746-0030400	Equivalent commercially available in U.S.A.	
Pilot, 10 mm	07746-0040100		
Pilot, 17 mm	07746-0040400	Equivalent commercially available in U.S.A.	
Pilot, 20 mm	07746-0040500		
Pilot, 22 mm	07746-0041000	Equivalent commercially available in U.S.A.	
Pilot, 28 mm	07746-0041100		
Bearing remover shaft	07746-0050100	Equivalent commercially available in U.S.A.	
Bearing remover head, 20 mm	07746-0050600		
Driver	07749-0010000	Equivalent commercially available in U.S.A.	
Valve spring compressor	07757-0010000		
Valve seat cutter, 40 mm (IN/EX 45°)	07780-0010500	Equivalent commercially available in U.S.A.	
Flat cutter, 35 mm (EX 32°)	07780-0012300		
Flat cutter, 38.5 mm (IN 32°)	07780-0012400	Equivalent commercially available in U.S.A.	
Interior cutter, 37.5 mm (IN/EX 60°)	07780-0014100		
Snap ring pliers	07914-3230001	Steering stem socket	07916-3710100
Steering stem socket	07916-3710101		
Bearing remover handle	07936-3710100	Equivalent commercially available in U.S.A.	
Bearing remover, 17 mm	07936-3710300		
Bearing remover set	07936-GE00000	Mechanical seal installer	07965-415000A (U.S.A. only)
— Bearing remover shaft	07936-GE00100		
— Bearing remover, 10 mm	07936-GE00200	Not available in U.S.A. (See page 13-25)	
Mechanical seal driver attachment	07945-4150400		
Attachment, 28 × 30 mm	07946-1870100	Not available in U.S.A. (See page 13-25)	
Main bearing driver attachment	07946-ME90200		
Ball race remover set	07946-KM90001	Not available in U.S.A. (See page 13-25)	
— Driver attachment A	07946-KM90100		
— Driver attachment B	07946-KM90200	Not available in U.S.A. (See page 13-25)	
— Driver shaft assembly	07946-KM90300		
— Bearing remover A	07946-KM90401	Not available in U.S.A. (See page 13-25)	
— Bearing remover B	07946-KM90500		
— Assembly base	07946-KM90600	Not available in U.S.A. (See page 13-25)	
Steering stem driver	07946-MB00000		
Fork seal driver weight	07947-KA50100	Not available in U.S.A. (See page 13-25)	
Fork seal driver	07947-KF00100		

DESCRIPTION	TOOL NUMBER	ALTERNATIVE TOOL	TOOL NUMBER
Pin driver	07GMD-KT80100	Not available in U.S.A.	
Oil filter wrench	07HAA-PJ70100		
Peak voltage adaptor	07HGJ-0020100	Peak voltage tester	(U.S.A.only)
Lock nut wrench	07HMA-MR70200		
Drive chain tool set	07HMH-MR10103	Drive chain tool set	07HMH-MR1010B (U.S.A.only)
Pilot screw wrench	07KMA-MN90100	Pilot screw wrench	07MMA-MV9010A (U.S.A.only)
Lock nut wrench	07VMA-MBB0100		
Installer shaft	07VMF-KZ30200		
Cutter holder, 6 mm	07VMH-MBB0100	Equivalent commercially available in U.S.A.	
Valve guide reamer	07VMH-MBB0200	Valve guide reamer	07VMH-MBB020A (U.S.A.only)
Inspection adaptor	07VMJ-0020100	Equivalent commercially available in U.S.A.	

GENERAL INFORMATION

LUBRICATION & SEAL POINTS

ENGINE

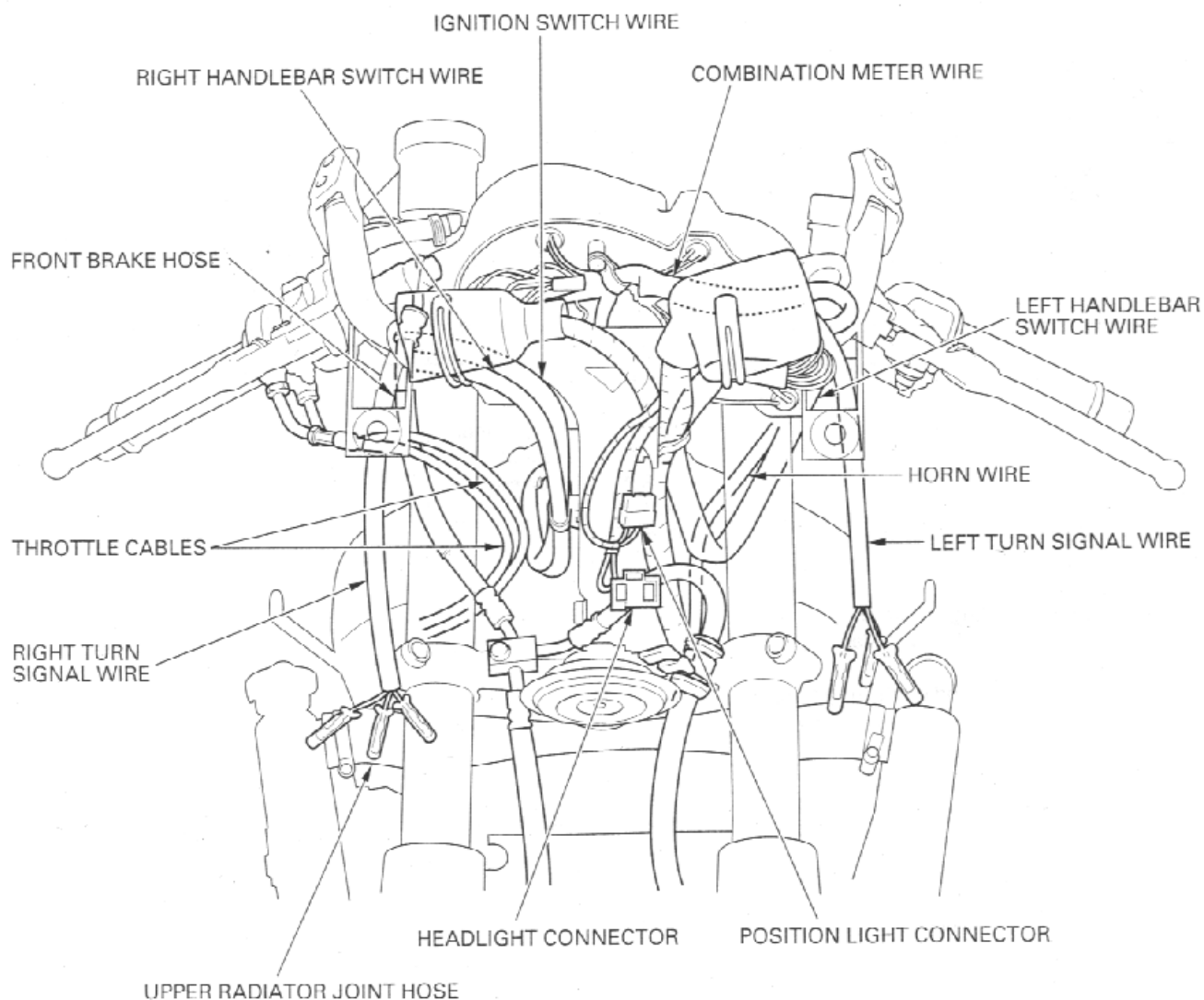
LOCATION	MATERIAL	REMARKS
Crankcase mating surfaces Crankcase mating surfaces (right side) Crankcase mating surfaces (left side) Oil pan mating surface Cylinder head semi-circular area Cylinder head cover gasket mating surface (cover side) Oil pressure switch threads Thermosensor threads Alternator stator wire grommet seating surface	Sealant	See page 11-10 See page 6-14 See page 10-3 Do not apply to the sensor head.
Crankshaft main journal bearing sliding surface Crankpin bearing sliding surface Connecting rod small end inner surface Valve stem sliding surface Valve lifter outer surface Camshaft journals and cam lobes Clutch outer sliding surface M3/4, C5, C6 gear shift fork grooves Gear teeth and sliding surfaces Other rotating and sliding area	Molybdenum oil solution (a mixture of 1/2 engine oil and 1/2 molybdenum disulfide grease)	
Primary drive gear and sub gear sliding surface	Molybdenum disulfide grease	
Engine oil filter cartridge threads and seating surface Camshaft holder bolt threads and seating surface Cylinder head bolt threads and seating surface Clutch disc lining surface Clutch center lock nut threads and seating surface Primary drive gear bolt threads and seating surface Flywheel bolt threads and seating surface Piston outer surface and piston pin hole Piston ring whole surface Connecting rod bolt threads and seating surface 10 mm crankcase special bolt threads and seating surface Each bearing rotating area Each O-ring whole surface	Engine oil	
Timing hole cap threads Crankshaft hole cap threads Each oil seal lips	Multi-purpose grease	
Oil pump driven sprocket bolt threads Oil filter boss threads Reed valve cover bolt threads Breather plate bolt threads Cam sprocket bolt threads Cylinder head 12 mm sealing bolt threads Gearshift cam bolt threads Starter clutch bolt threads Cam chain tensioner bolt threads Cam chain guide bolt threads Crankcase 18 mm sealing bolt threads Crankcase 22 mm sealing bolt threads Crankcase 24 mm sealing bolt threads Mainshaft bearing set plate bolt threads Shift drum bearing set plate bolt threads	Locking agent	

FRAME

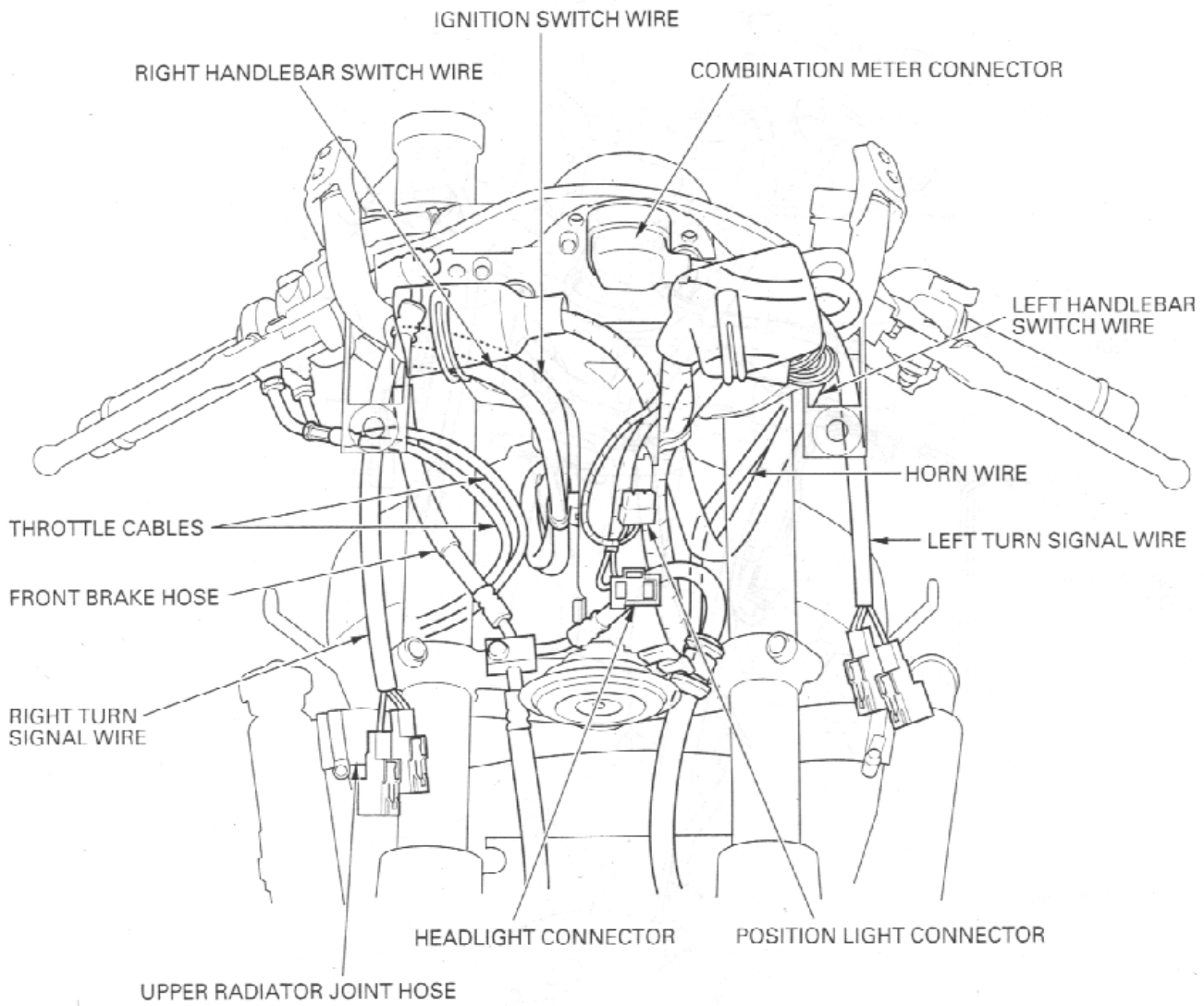
LOCATION	MATERIAL	REMARKS
Front wheel dust seal lips Rear wheel dust seal lips Rear wheel side collar inner surfaces Driver footpeg sliding area Passenger footpeg sliding area Throttle grip pipe flange Seat catch hook sliding area Gearshift pedal link tie-rod ball joints Gearshift pedal pivot Rear brake pedal pivot	Multi-purpose grease	
Side stand pivot Steering head bearings Steering head bearing dust seal lips Shock absorber dust seal lips Shock absorber needle bearing Shock arm and link dust seal lips Shock arm and link needle bearings Swingarm pivot bearings Swingarm pivot dust seal lips	Molybdenum disulfide grease	
Shock absorber spring adjuster cam surface	Molybdenum disulfide past	
Throttle cable outer (inside) Choke cable outer (inside)	Cable lubricant	
Left handlebar grip rubber (inside)	Honda bond A, Honda Hand Grip Cement (U.S.A. only) or equivalent	
Steering bearing adjustment nut threads	Engine oil	
Front brake lever-to-master piston contacting area Front brake lever pivot Rear brake caliper pin bolt sliding surfaces Rear brake master piston-to-push rod contacting area Clutch lever pivot Clutch lever joint piece-to-push rod contacting area Clutch master piston-to-push rod contacting area	Silicone grease	
Brake master piston and cups Brake caliper piston and piston seals Clutch master piston and cups	DOT 4 brake fluid	
Fork dust seal and oil seal lips	Pro-Honda Suspension Fluid SS-8	
Clutch fluid reservoir mounting screw threads Fork socket bolt threads Front brake caliper assembly bolt threads Rear brake caliper pin bolt threads	Locking agent	

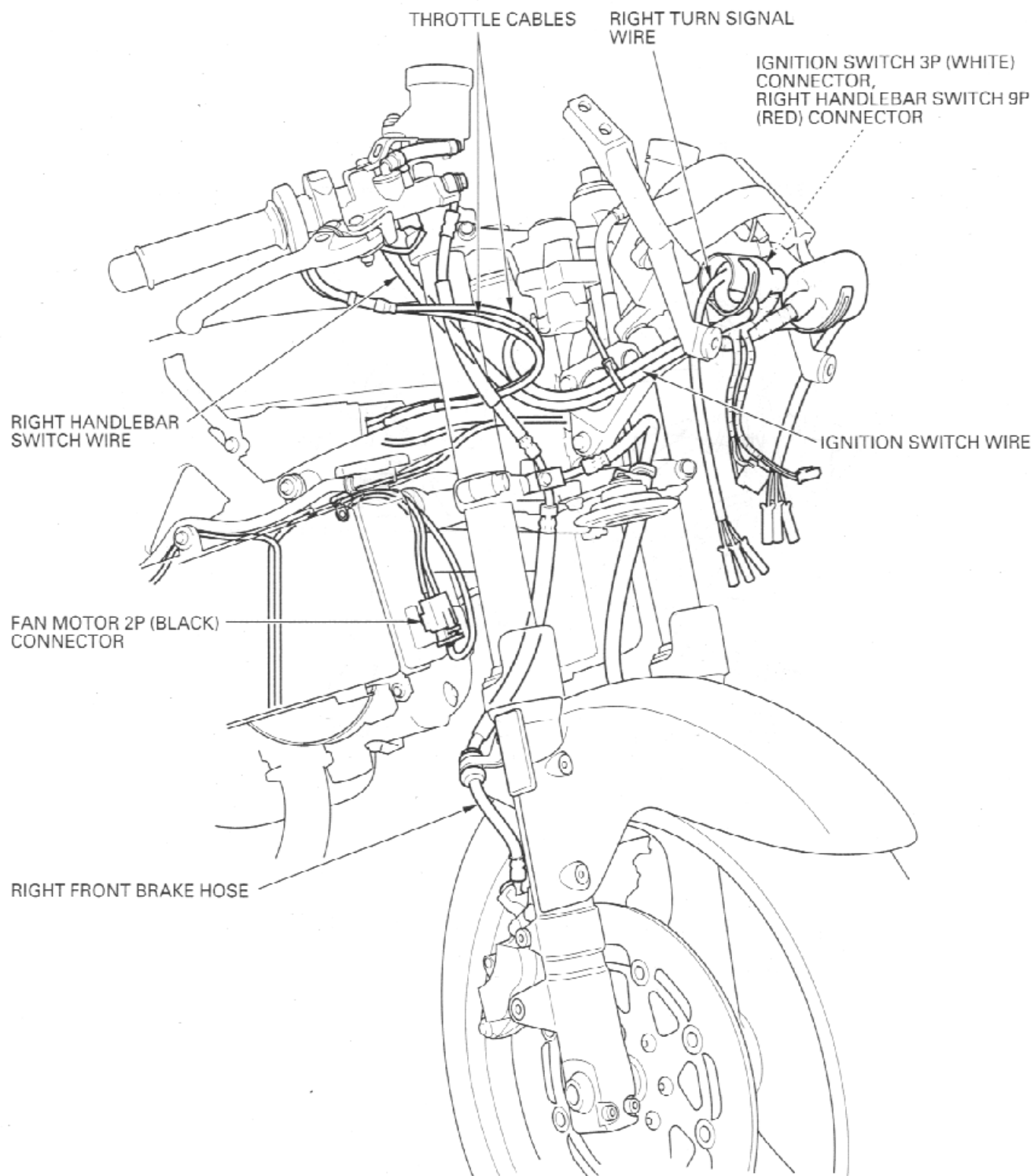
CABLE & HARNESS ROUTING

'98-'00:



After '00:





LEFT HANDLEBAR SWITCH 9P
('98 - '00: GREEN, After '00: BLUE)
CONNECTOR,
LEFT HANDLEBAR SWITCH 6P
(GREEN) CONNECTOR,
COMBINATION METER 6P (BLACK)
CONNECTOR ('98 - '00 only),
COMBINATION METER 9P (BLACK)
CONNECTOR ('98 - '00 only)

LEFT HANDLEBAR SWITCH WIRE

CLUTCH HOSE

LEFT TURN SIGNAL WIRE

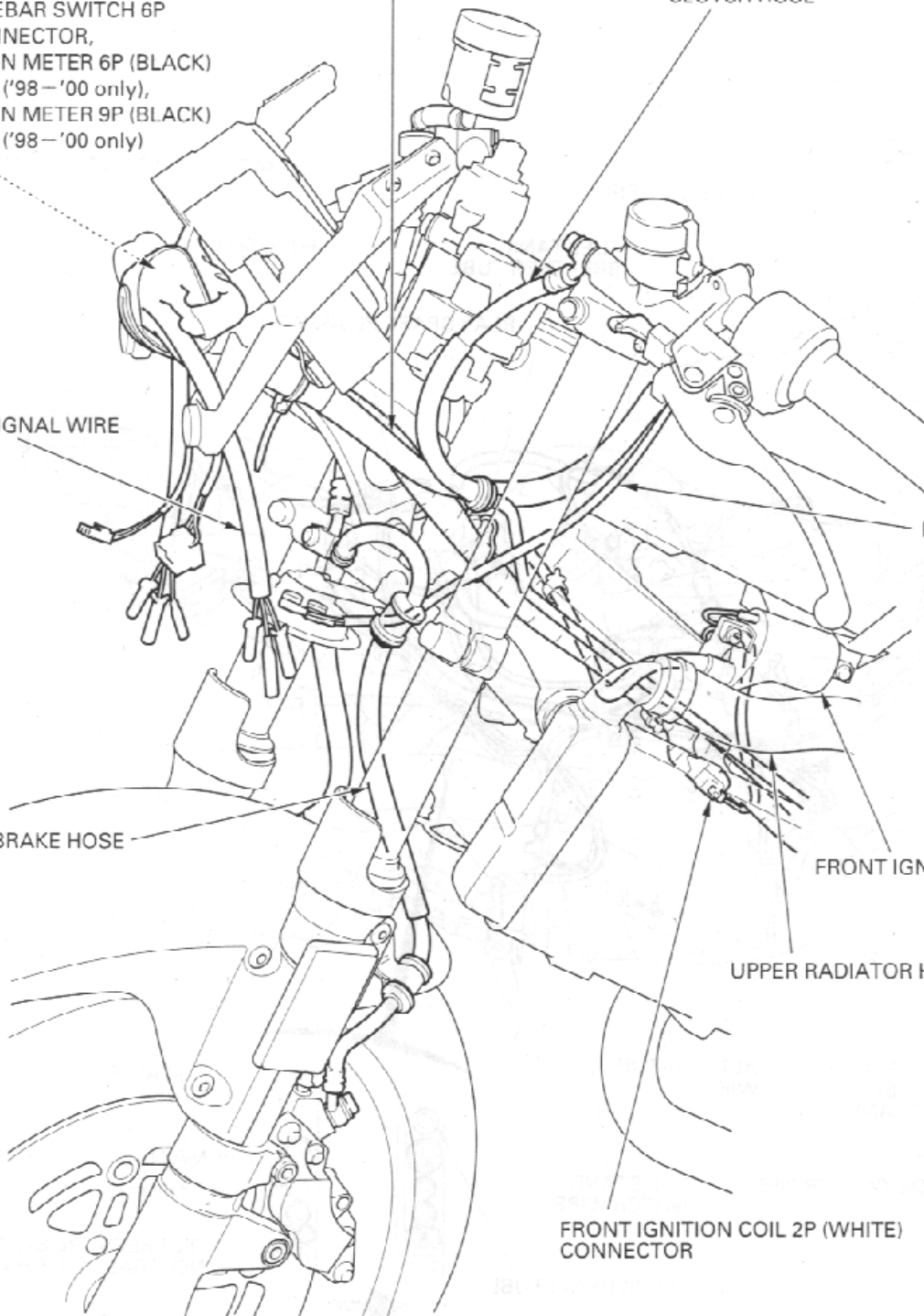
HORN WIRE

LEFT FRONT BRAKE HOSE

FRONT IGNITION COIL

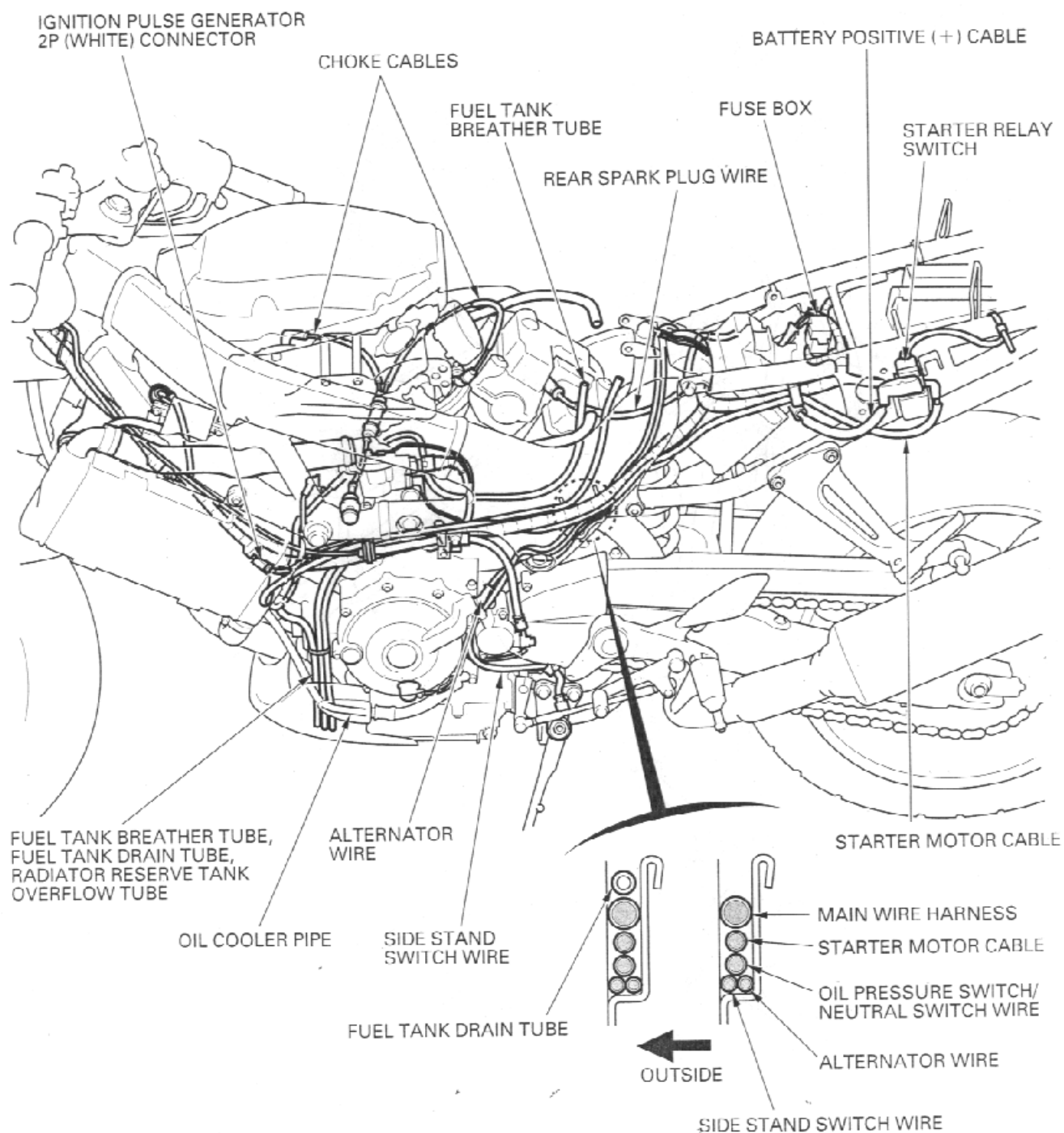
UPPER RADIATOR HOSE

FRONT IGNITION COIL 2P (WHITE)
CONNECTOR

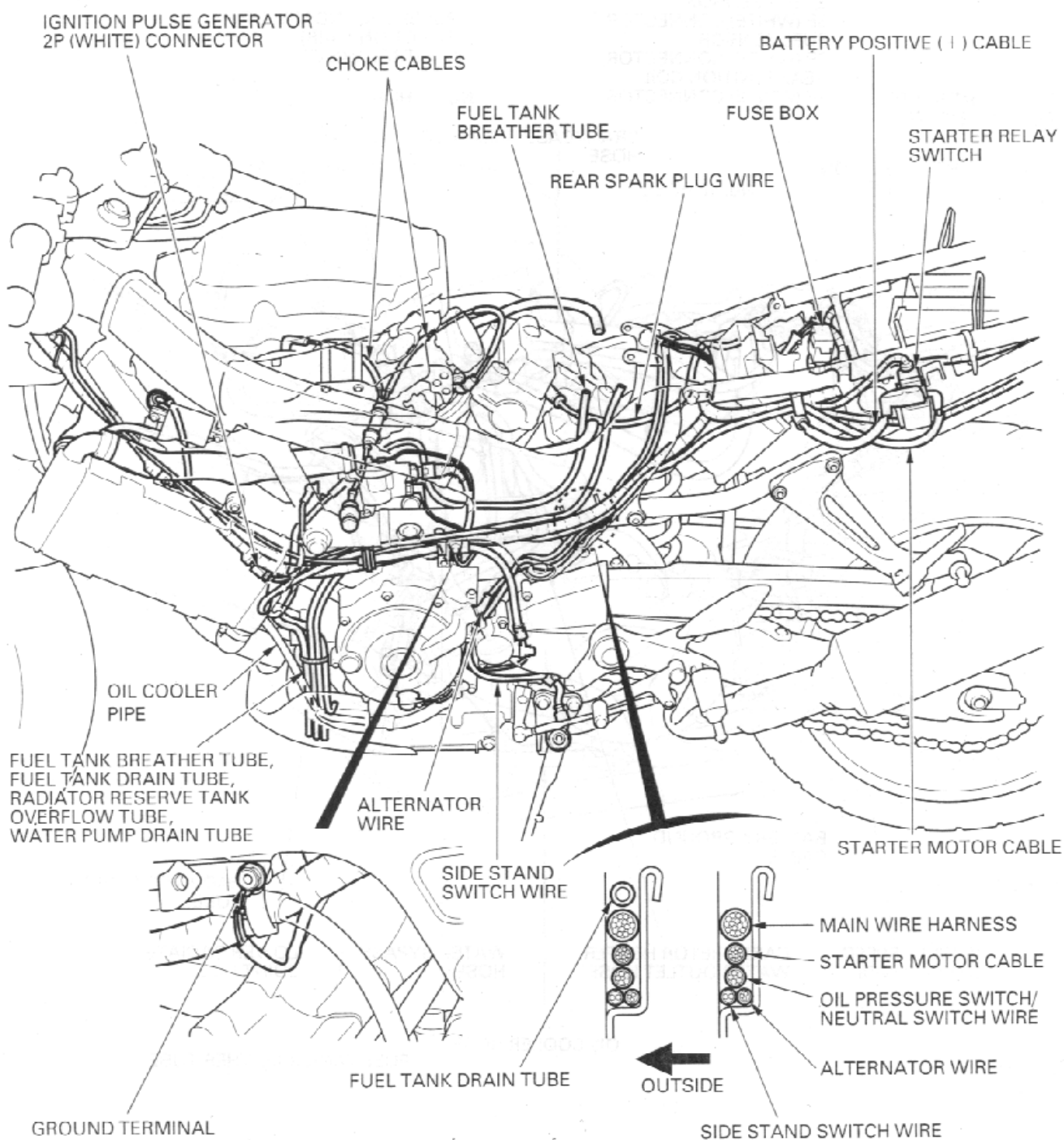


GENERAL INFORMATION

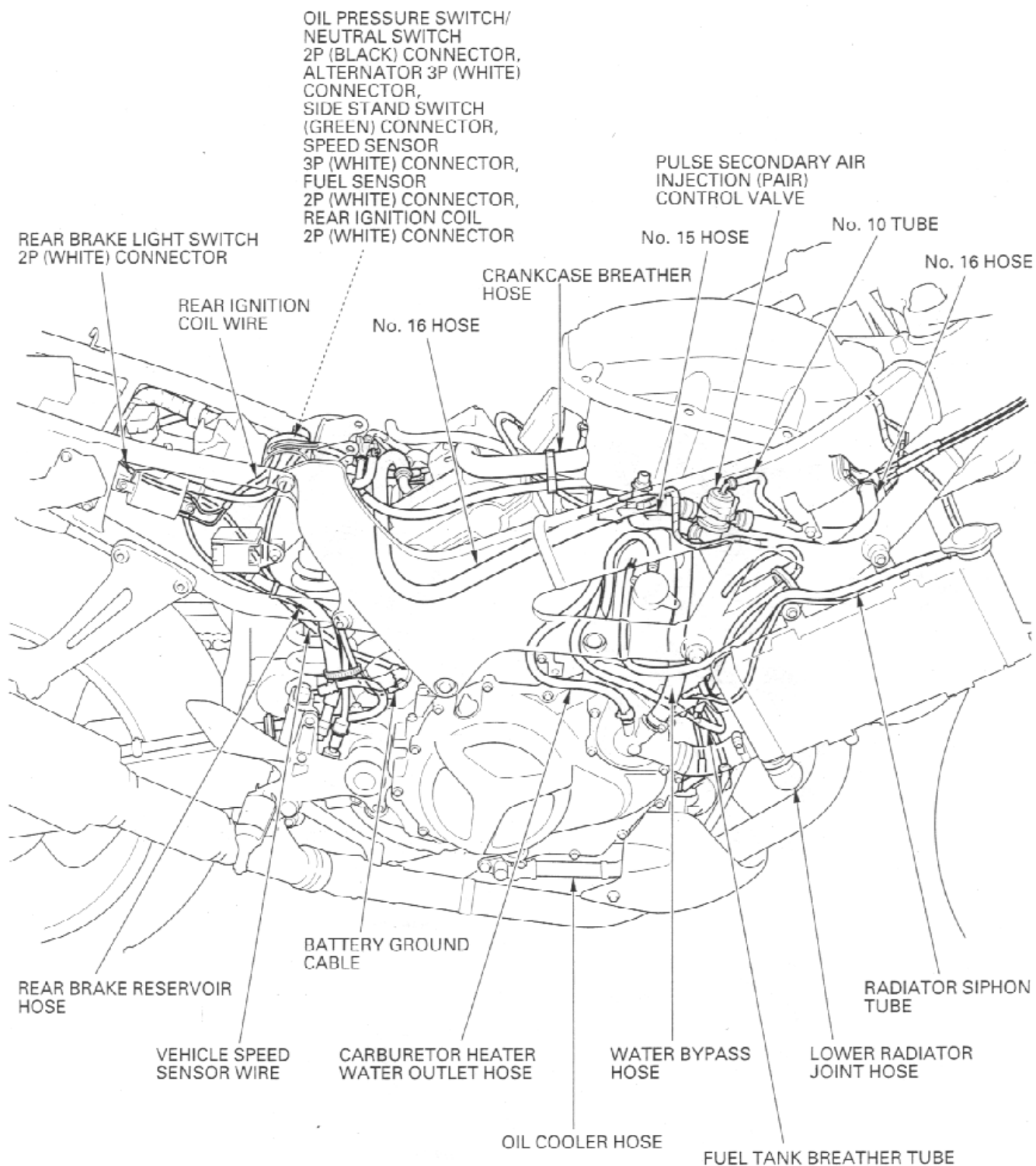
'98-'00:



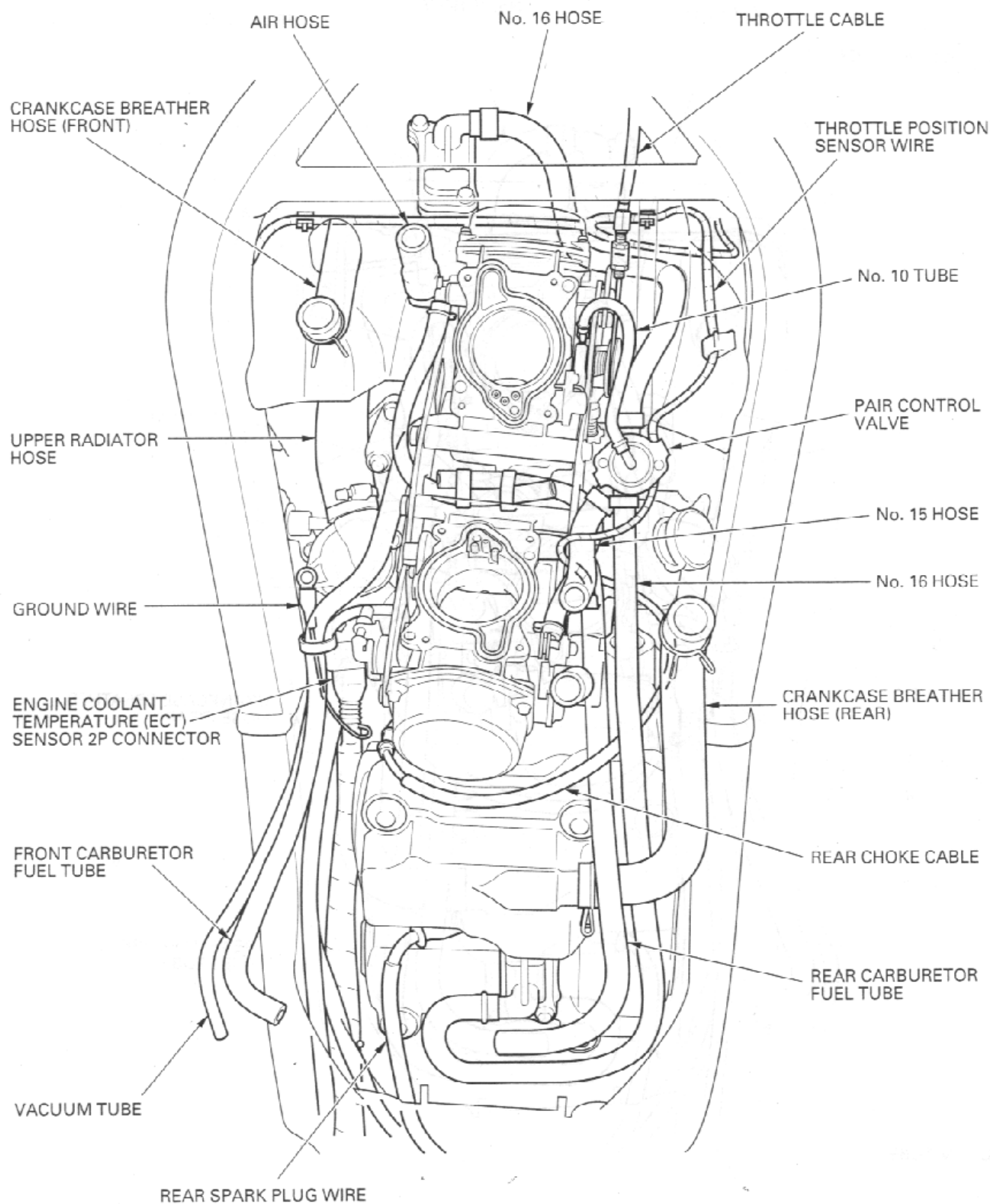
After '00:



GENERAL INFORMATION

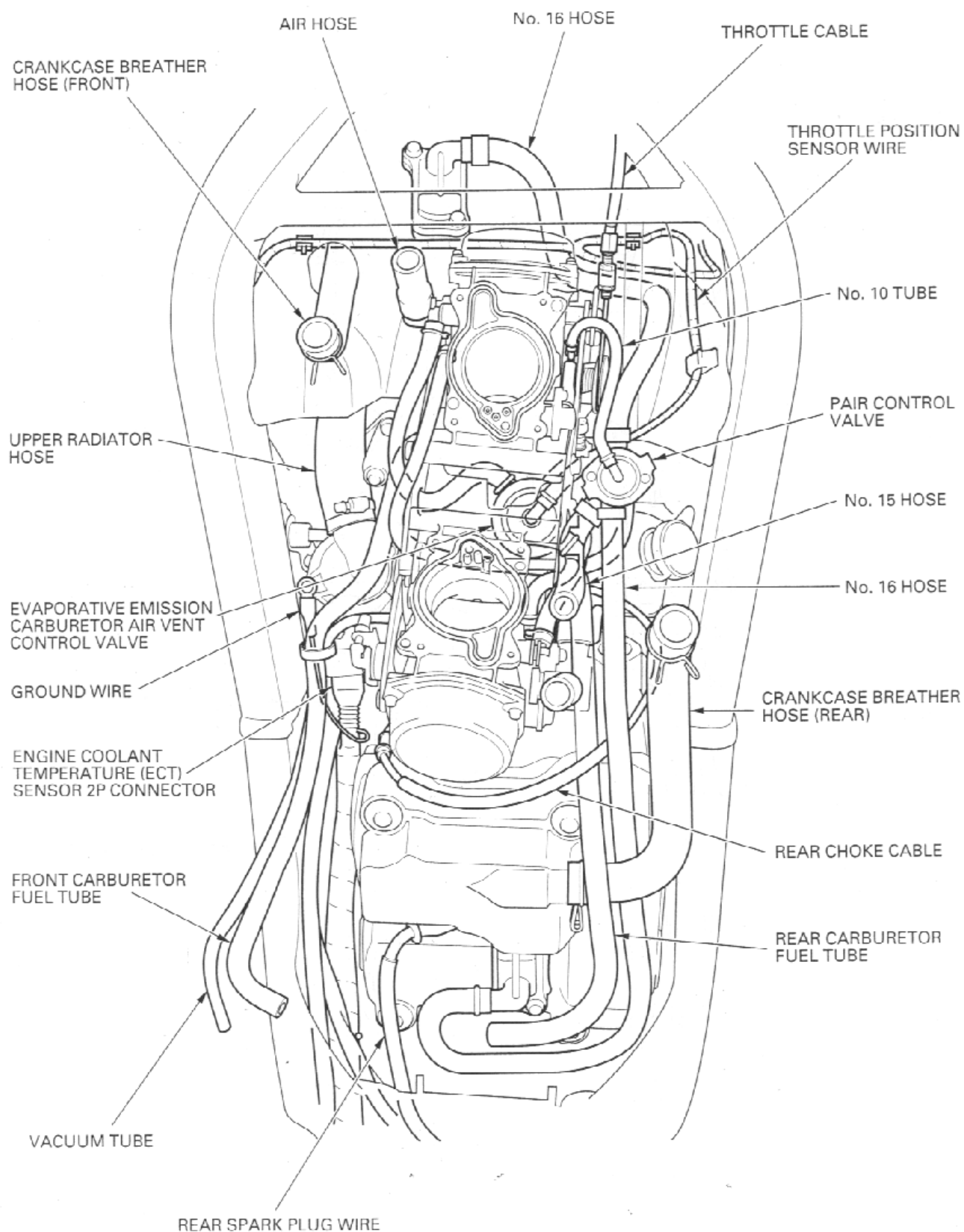


49 state/Canada type



GENERAL INFORMATION

California type



'98 - '00:

REAR TURN SIGNAL CONNECTORS

REAR BRAKE LIGHT SWITCH
2P (WHITE) CONNECTOR

SEAT LOCK CABLE

BATTERY POSITIVE
(+) CABLE

IGNITION CONTROL MODULE (ICM)

STARTER MOTOR CABLE

STARTER RELAY SWITCH

SEAT LOCK CABLE

VEHICLE SPEED SENSOR WIRE

BATTERY GROUND
CABLE

CONVERTER UNIT

ICM

TURN SIGNAL RELAY

REGULATOR/RECTIFIER

REAR IGNITION COIL

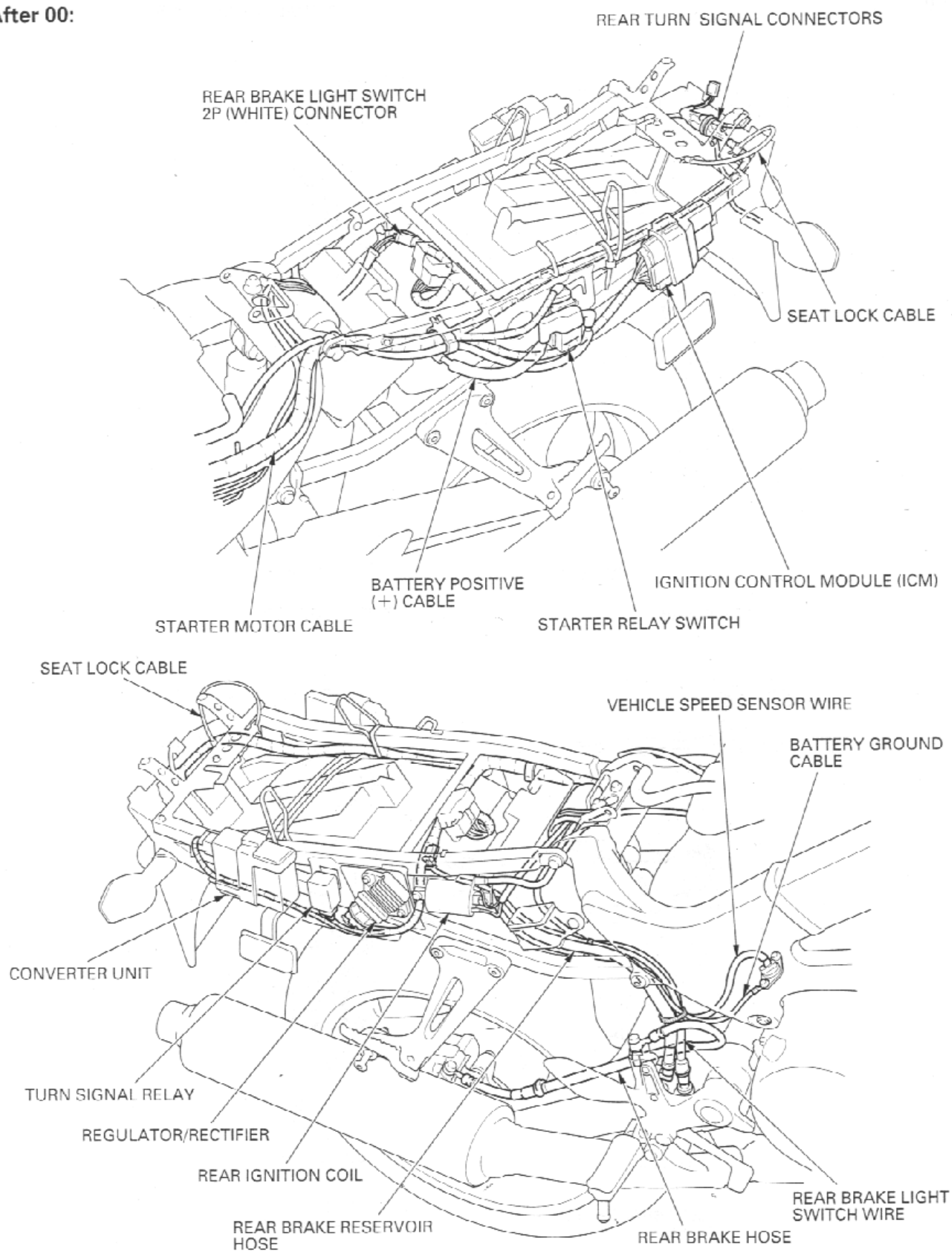
REAR BRAKE RESERVOIR
HOSE

REAR BRAKE HOSE

REAR BRAKE LIGHT
SWITCH WIRE

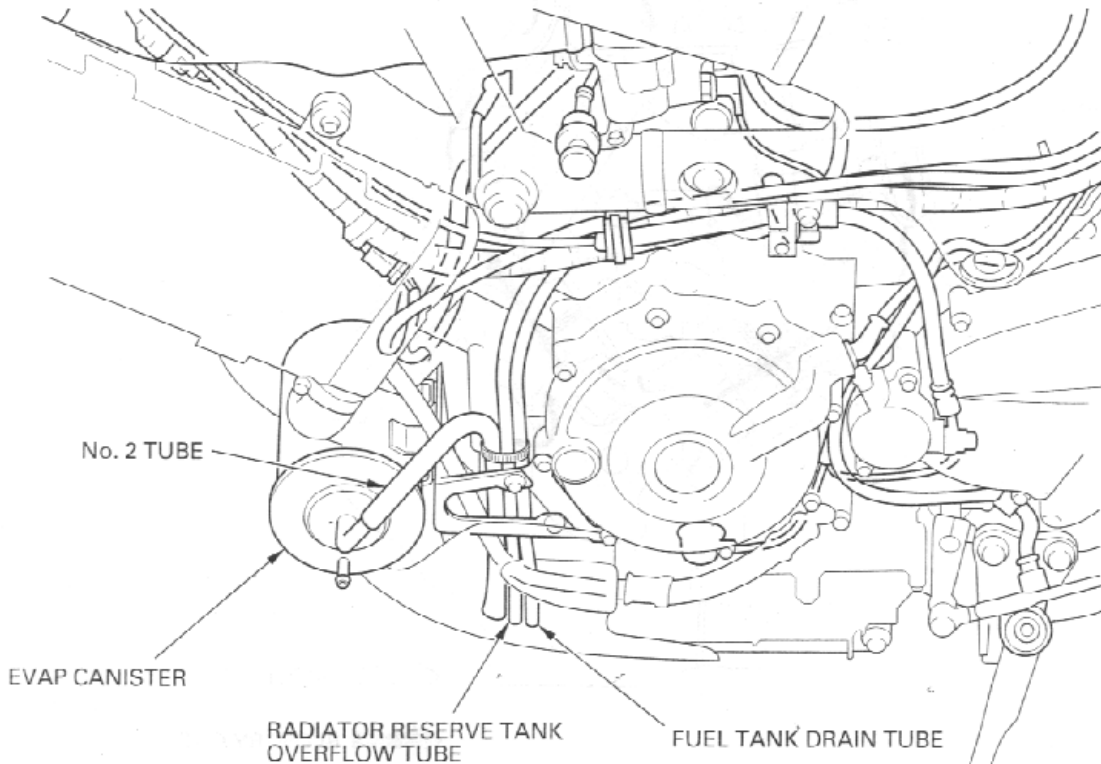
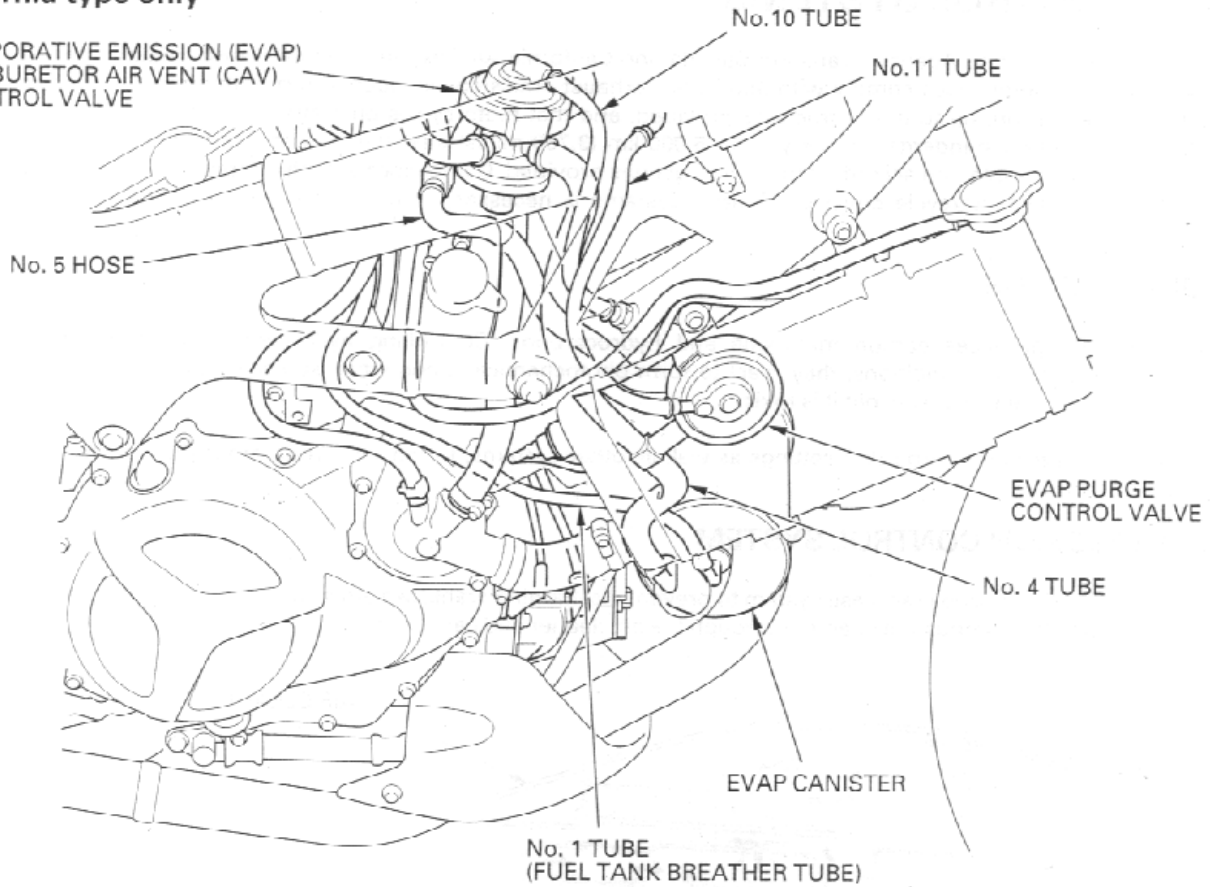
GENERAL INFORMATION

After 00:



California type only

EVAPORATIVE EMISSION (EVAP)
CARBURETOR AIR VENT (CAV)
CONTROL VALVE



EMISSION CONTROL SYSTEMS

The U.S. Environmental Protection Agency, Transport Canada and California Air Resources Board (CARB) require manufacturers to certify that their motorcycles comply with applicable exhaust emissions standards during their useful life, when operated and maintained according to the instructions provided, and that motorcycles built after January 1, 1983 comply with applicable noise emission standards for one year or 6,000 km (3,730 miles) after the time of sale to the ultimate purchaser, when operated and maintained according to the instructions provided. Compliance with the terms of the Distributor's Limited Warranty for Honda Motorcycle Emission Control Systems is necessary in order to keep the emissions system warranty in effect.

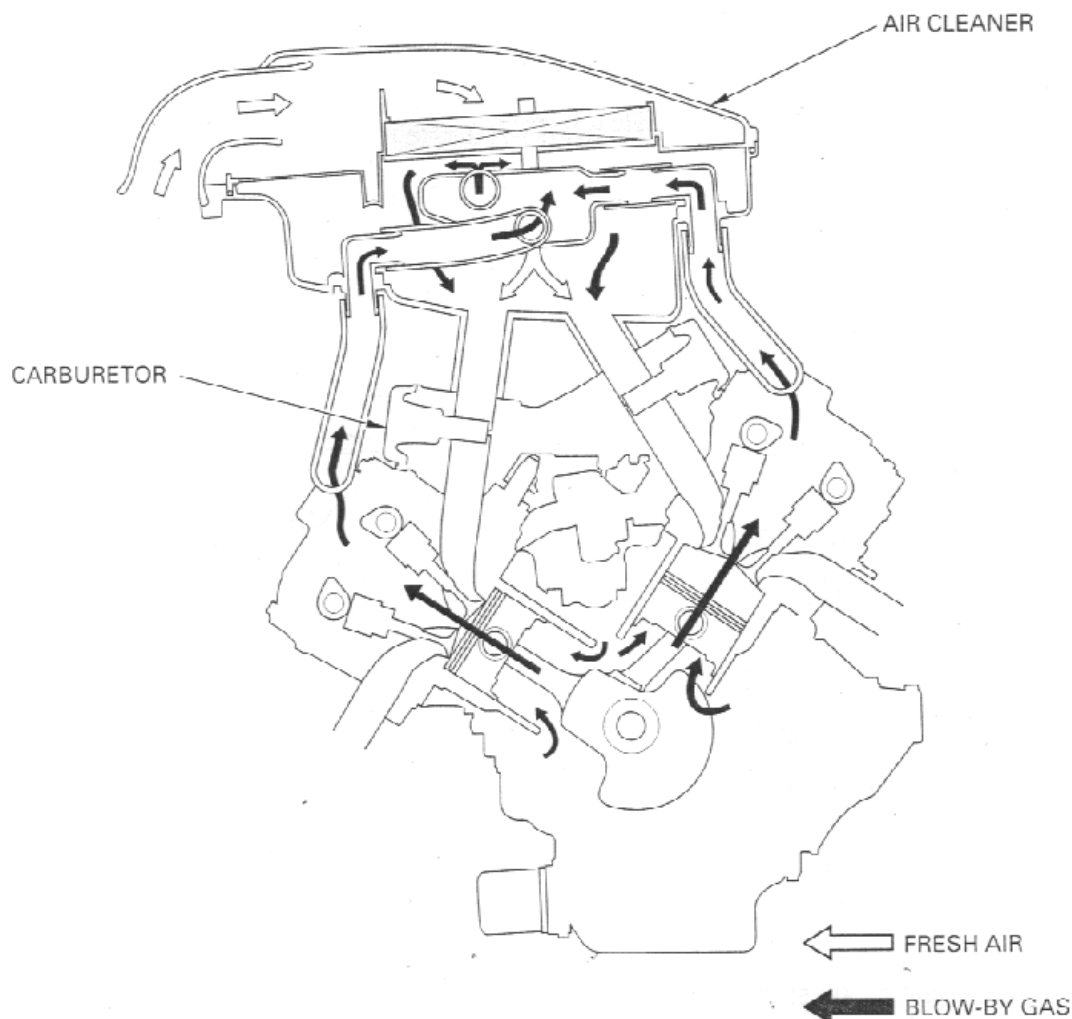
SOURCE OF EMISSIONS

The combustion process produces carbon monoxide and hydrocarbons. Controlling hydrocarbon emissions is very important because, under certain conditions, they react to form photochemical smog when subjected to sunlight. Carbon monoxide does not react in the same way, but it is toxic.

Honda Motor Co., Ltd. utilizes lean carburetor settings as well as other systems, to reduce carbon monoxide and hydrocarbons.

CRANKCASE EMISSION CONTROL SYSTEM

The engine is equipped with a closed crankcase system to prevent discharging crankcase emissions into the atmosphere. Blow-by gas is returned to the combustion chamber through the air cleaner and carburetor.



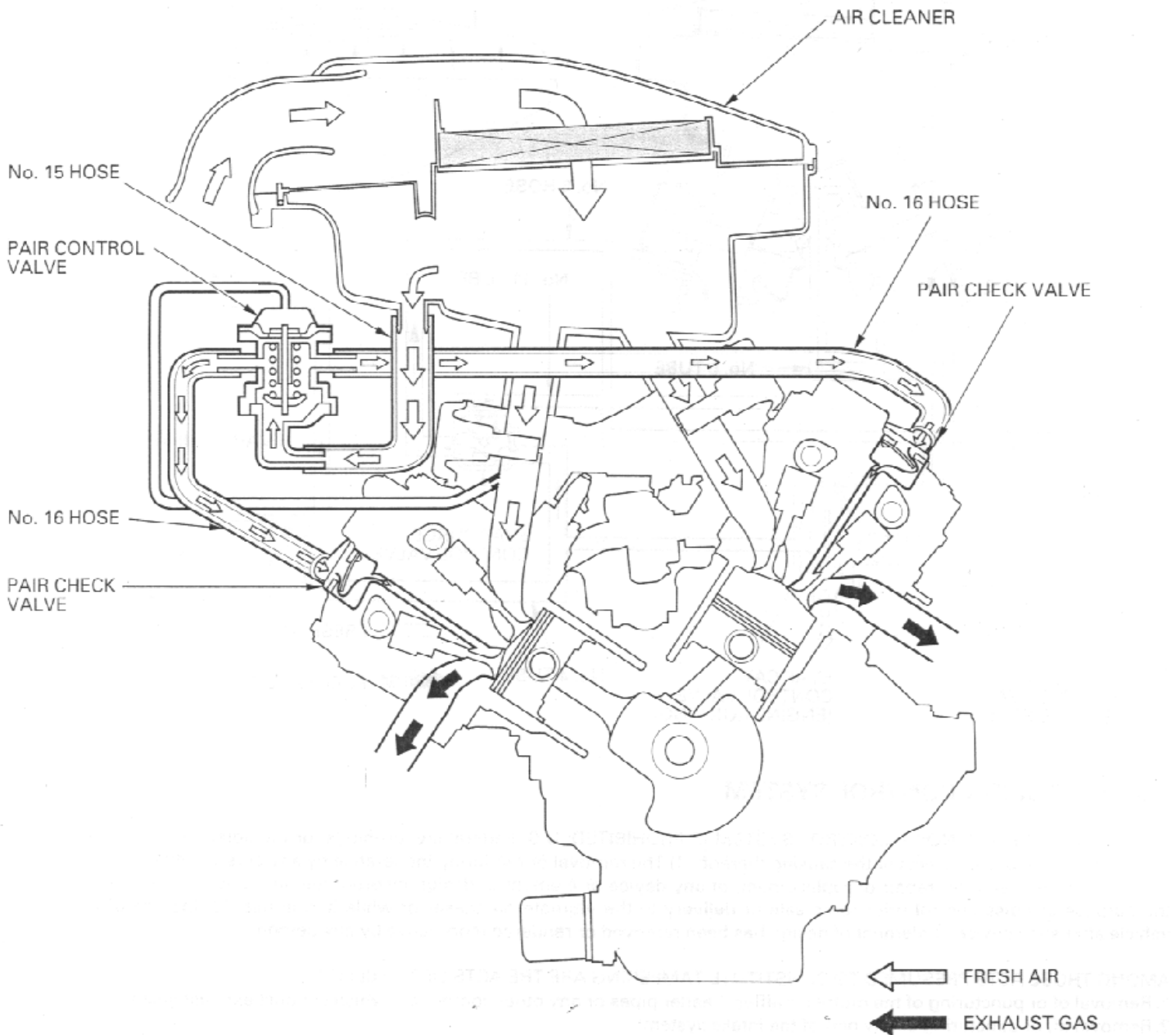
EXHAUST EMISSION CONTROL SYSTEM

PULSE SECONDARY AIR INJECTION SYSTEM

The exhaust emission control system consists of a secondary air supply system which introduces filtered air into the exhaust gases in the exhaust port. Fresh air is drawn into the exhaust port whenever there is a negative pressure pulse in the exhaust system. This charge of fresh air promotes burning of the unburned exhaust gases and changes a considerable amount of hydrocarbons and carbon monoxide into relatively harmless carbon dioxide and water vapor.

This model has the pulse secondary air injection (PAIR) control valve and PAIR check valves. PAIR check valve prevents reverse air flow through the system. The PAIR control valve reacts to high intake manifold vacuum and will cut off the supply of fresh air during engine deceleration, thereby preventing afterburn in the exhaust system.

No adjustment to the pulse secondary air injection system should be made, although periodic inspection of the components is recommended.

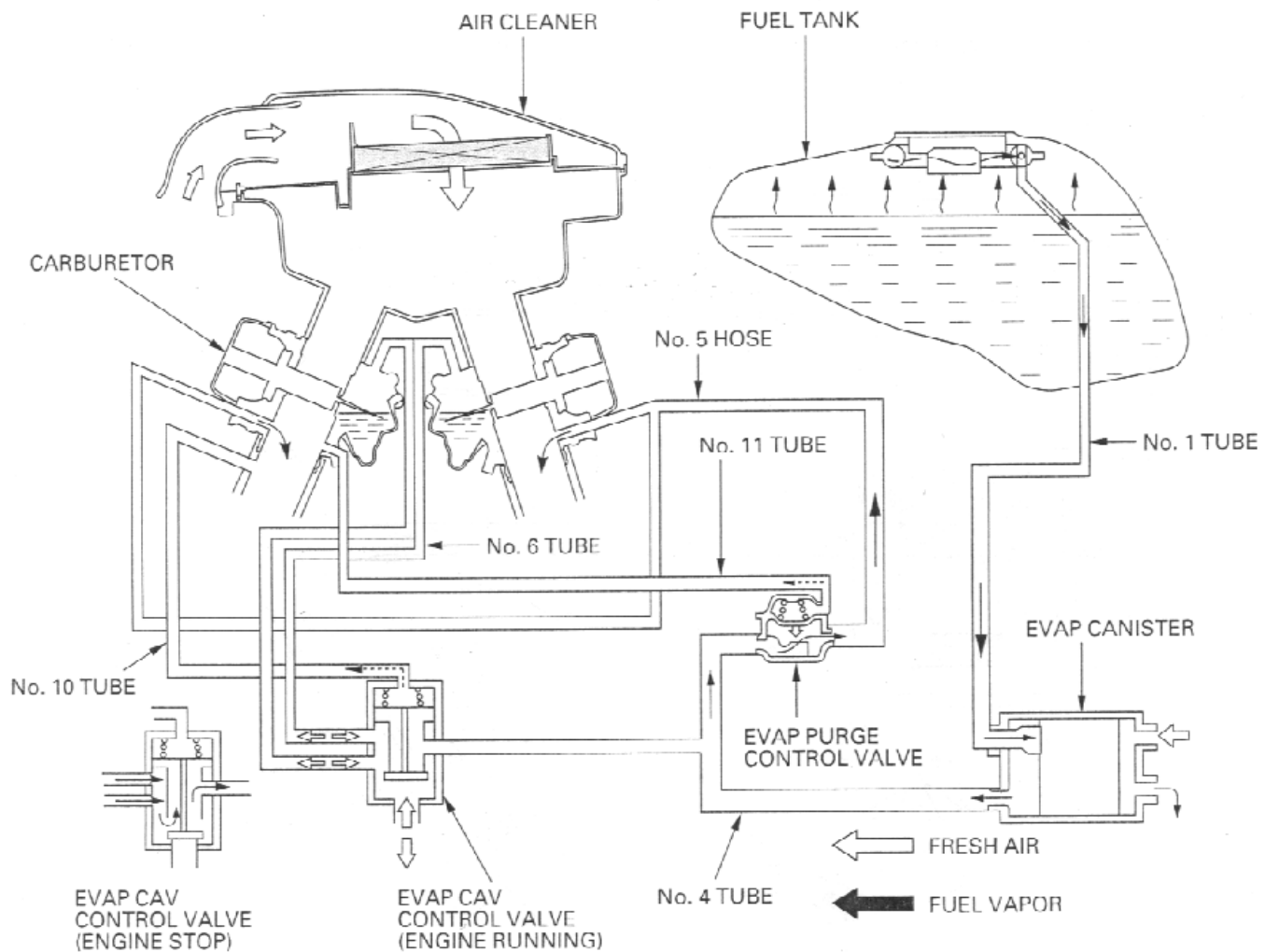


GENERAL INFORMATION

EVAPORATIVE EMISSION CONTROL SYSTEM (California type only)

This model complies with California Air Resources Board evaporative emission requirements.

Fuel vapor from the fuel tank and carburetors is routed into the evaporative emission (EVAP) canister where it is adsorbed and stored while the engine is stopped. When the engine is running and the EVAP purge control valve is open, fuel vapor in the EVAP canister is drawn into the engine through the carburetor. At the same time, the EVAP carburetor air vent (CAV) control valve is open and air is drawn into the carburetor through the valve.



NOISE EMISSION CONTROL SYSTEM

TAMPERING WITH THE NOISE CONTROL SYSTEM IS PROHIBITED: U.S. Federal law prohibits, or Canadian provincial law may prohibit the following acts or the causing thereof: (1) The removal or rendering inoperative by any person, other than for purposes of maintenance, repair or replacement, of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use; (2) the use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

AMONG THOSE ACTS PRESUMED TO CONSTITUTE TAMPERING ARE THE ACTS LISTED BELOW:

1. Removal of or puncturing of the muffler, baffles, header pipes or any other component which conduct exhaust gases.
2. Removal of, or puncturing of any part of the intake system.
3. Lack of proper maintenance.
4. Replacing any moving parts of the vehicle, or parts of the exhaust or intake system, with parts other than those specified by the manufacturer.

EMISSION CONTROL INFORMATION LABELS

An Emission Control Information Label is located on the left down tube of the frame near the steering head as shown. It gives basic tune-up specifications.

VEHICLE EMISSION CONTROL INFORMATION UPDATE LABEL

After making a high altitude carburetor adjustment, attach an update label on the left side of the frame near the steering head as shown.

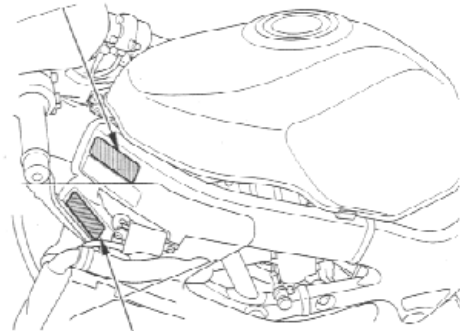
Instructions for obtaining the update label are given in Service Letter No. 132.

When readjusting the carburetors back to the low altitude specifications, be sure to remove this update label.

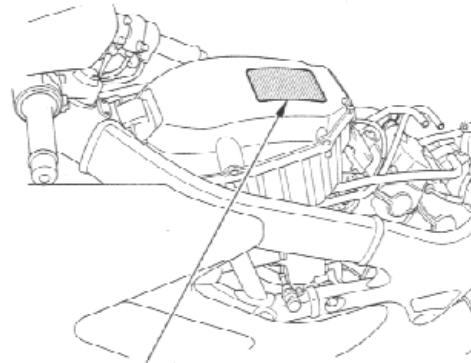
VACUUM HOSE ROUTING DIAGRAM LABEL (California type)

The Vacuum Hose Routing Diagram Label is located on the air cleaner housing cover as shown. The fuel tank must be removed to read it.

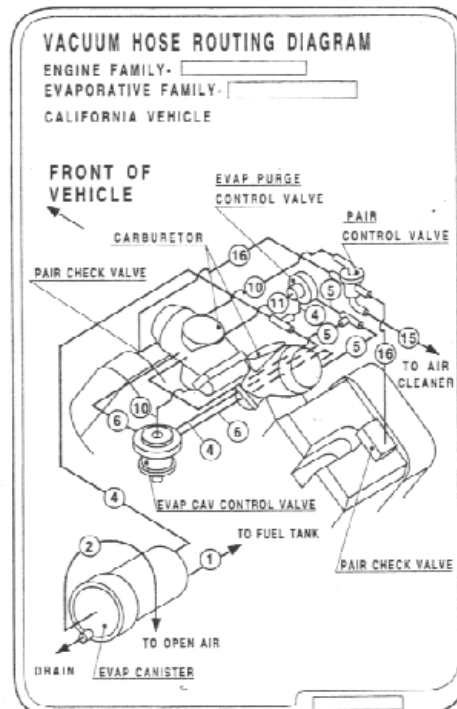
UPDATE LABEL



EMISSION CONTROL INFORMATION LABEL



VACUUM HOSE ROUTING DIAGRAM LABEL



MEMO

2. FRAME/BODY PANELS/EXHAUST SYSTEM

SERVICE INFORMATION	2-1	ENGINE UNDER COVER	2-4
TROUBLESHOOTING	2-1	FUEL TANK	2-4
SEAT	2-2	EXHAUST SYSTEM	2-5
SEAT COWL	2-2	REAR FENDER/SEAT RAIL	2-7
FRONT FAIRING	2-3		

SERVICE INFORMATION

GENERAL

▲WARNING

- Gasoline is extremely flammable and is explosive under certain conditions. KEEP OUT OF REACH OF CHILDREN.
- Serious burns may result if the exhaust system is not allowed to cool before components are removed or serviced.

- Work in a well ventilated area. Smoking or allowing flames or sparks in the work area or where gasoline is stored can cause a fire or explosion.
- This section covers removal and installation of the body panels, fuel tank and exhaust system.
- Always replace the exhaust pipe gasket when removing the exhaust pipe from the engine.
- Always inspect the exhaust system for leaks after installation.

TORQUE VALUES

Front fairing setting bolt	7 N·m (0.7 kgf·m, 5.1 lbf·ft)
Exhaust pipe joint nut	12 N·m (1.2 kgf·m, 9 lbf·ft)
Muffler band bolt	26 N·m (2.7 kgf·m, 20 lbf·ft)
Seat rail 10 mm flange bolt	39 N·m (4.0 kgf·m, 29 lbf·ft)
Seat rail 10 mm socket bolt	44 N·m (4.5 kgf·m, 33 lbf·ft)

TROUBLESHOOTING

Excessive exhaust noise

- Broken exhaust system
- Exhaust gas leaks

Poor performance

- Deformed exhaust system
- Exhaust gas leaks
- Clogged muffler

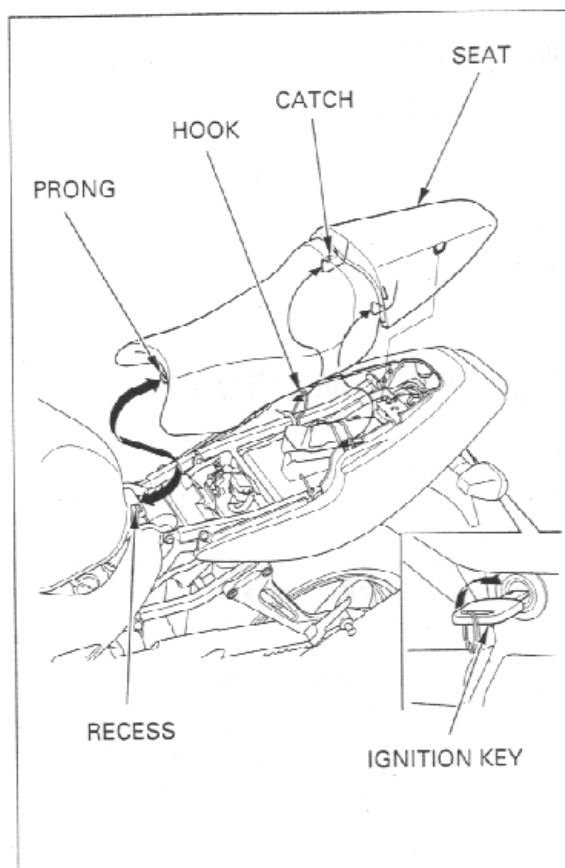
SEAT

REMOVAL

Unlock the seat with the ignition key.
Pull the seat back and remove it.

INSTALLATION

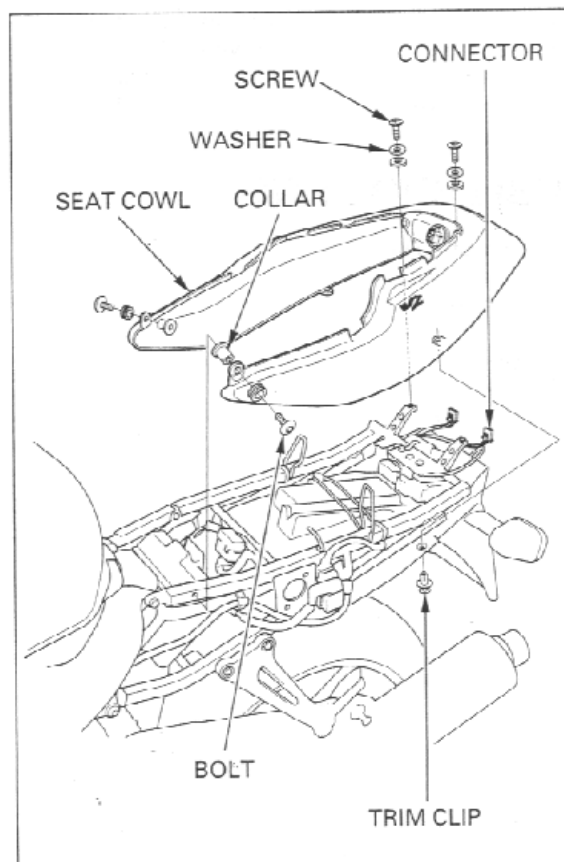
Install the seat, inserting the prong into the recess under the frame and the catches into the hooks of the frame.
Push the seat forward, then down to lock it.



SEAT COWL

Remove the seat.
Disconnect the taillight connectors.
Remove the two trim clips, screws and washers.
Remove the two bolts, collars and the seat cowl.

Install the seat cowl in the reverse order of removal.



FRONT FAIRING

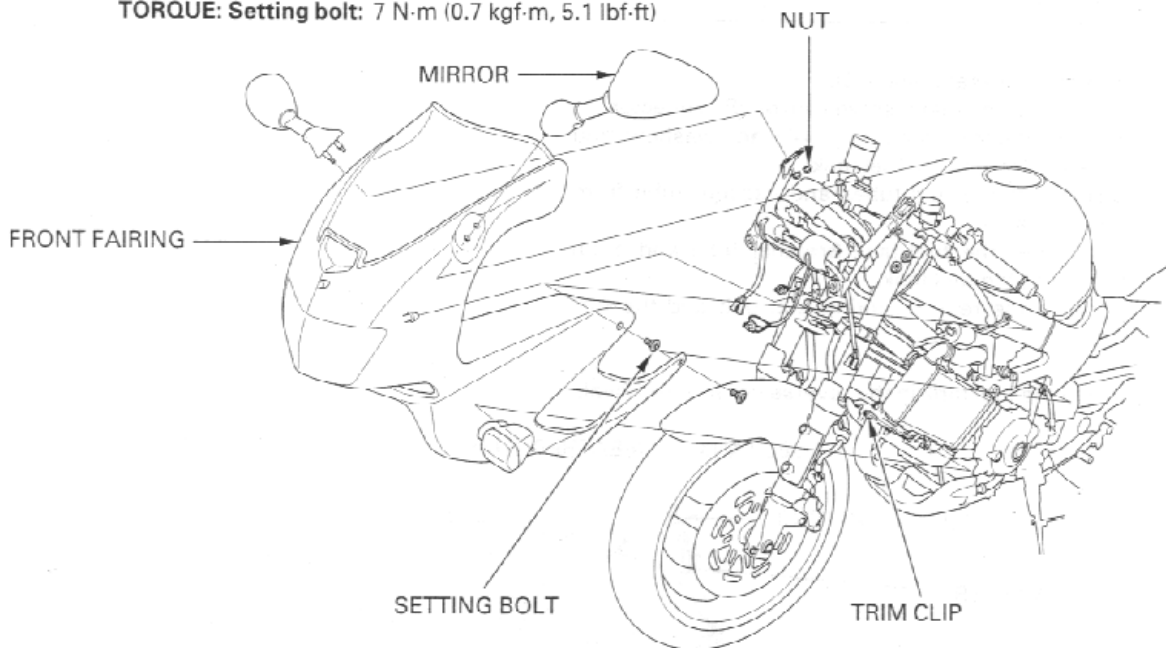
REMOVAL

Disconnect the front turn signal connectors.
 Remove the two trim clips.
 Remove the nuts and rear view mirrors.
 Remove the four setting bolts.
 Slide the front fairing forward, and disconnect the headlight connector and the position light connector.
 Remove the front fairing.

INSTALLATION

Install the front fairing, and connect the headlight and position light connectors.
 Insert the bosses of the front fairing into the grommets in the stay.
 Install the removed parts in the reverse order of removal.

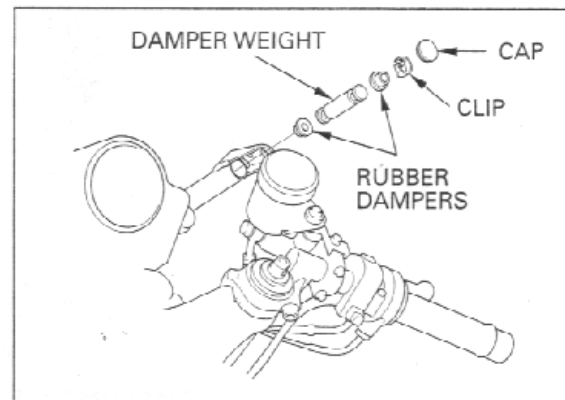
TORQUE: Setting bolt: 7 N·m (0.7 kgf·m, 5.1 lbf·ft)



DYNAMIC DAMPER REPLACEMENT

Remove the cap from the fairing stay end.
 Push the clip tabs in and remove the damper weight and rubber dampers from the fairing stay.

Install a new dynamic damper and the cap into the fairing stay.

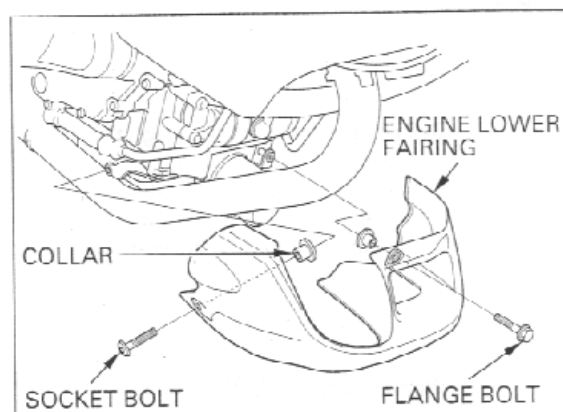


ENGINE LOWER FAIRING

Remove the two bolts, collars and the engine lower fairing.

Use the socket bolt for the right side mounting.

Install the engine lower fairing and tighten the bolts.



FUEL TANK

▲WARNING

Gasoline is extremely flammable and is explosive under certain conditions. KEEP OUT OF REACH OF CHILDREN.

Remove the seat (page 2-3).

Disconnect the fuel reserve sensor 2P connector.

Remove the front mounting bolts and washers, and raise the front of the fuel tank.

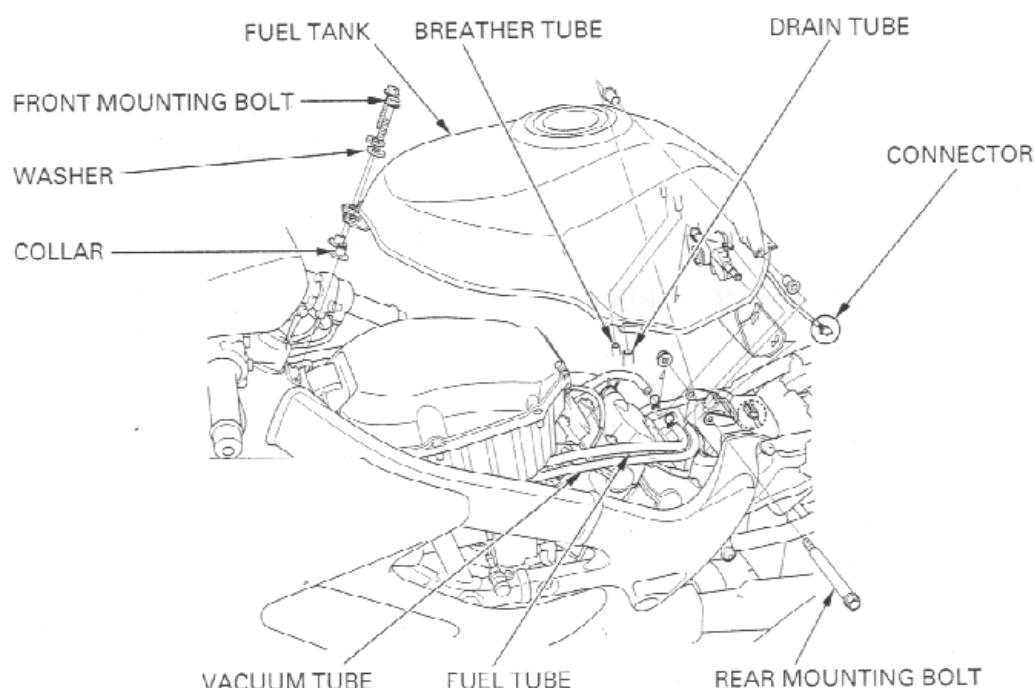
Disconnect the fuel tubes and vacuum tube from the fuel valve.

Disconnect the fuel tank breather tube and drain tube from the fuel tank.

Remove the rear mounting nut, bolt and the fuel tank.

It may be necessary to slightly lift the tank to remove the rear mounting bolt.

Install the fuel tank in the reverse order of removal.



EXHAUST SYSTEM

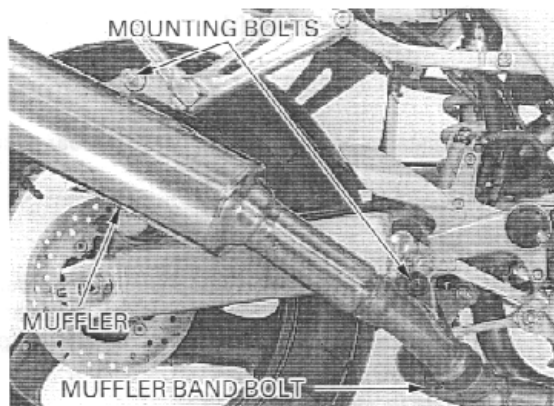
REMOVAL

▲WARNING

Do not service the exhaust system while it is hot.

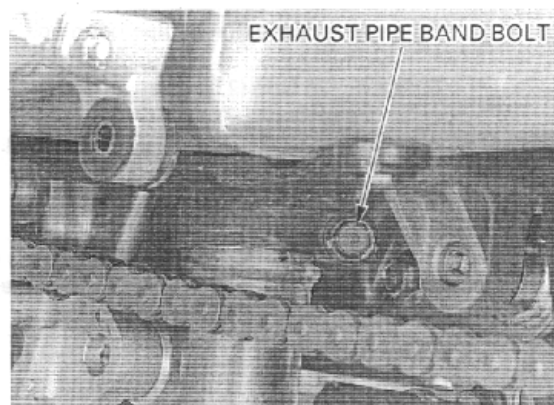
MUFFLER

Loosen the muffler band bolt.
Remove the upper and lower muffler mounting bolts, washers and the muffler.
Remove the muffler gasket.

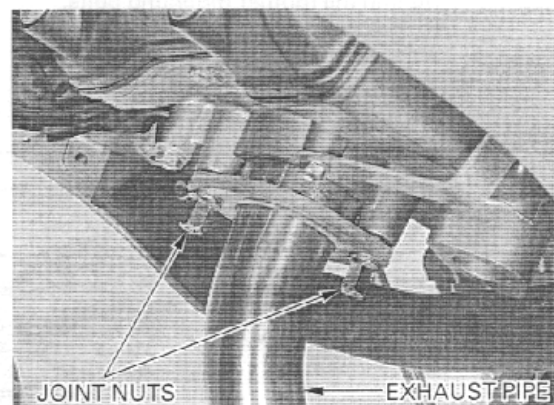


EXHAUST PIPE

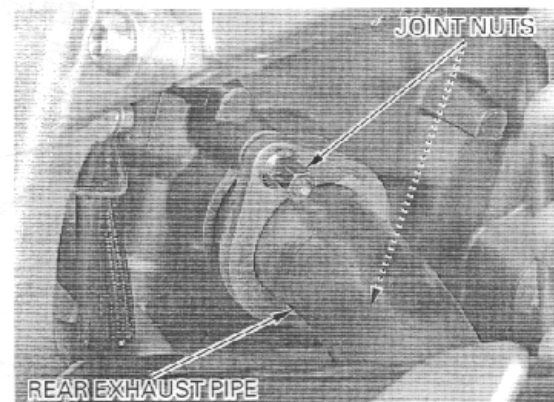
Remove the left and right mufflers.
Remove the engine lower fairing (page 2-4).
Loosen the rear exhaust pipe band bolt.



Remove the front exhaust pipe joint nuts and the exhaust pipe.
Remove the front exhaust pipe joint gasket and the exhaust pipe gasket.



Remove the rear exhaust pipe joint nuts and the rear exhaust pipe.
Remove the rear exhaust pipe joint gasket.



INSTALLATION

EXHAUST PIPE

Install a new joint gasket and the rear exhaust pipe.
Tighten the joint nuts.

TORQUE: 12 N·m (1.2 kgf·m , 9 lbf·ft)

Install a new gasket into the exhaust pipe.
Install new joint gasket and the exhaust pipe onto
the front cylinder head and rear exhaust pipe.
Tighten the joint nuts.

TORQUE: 12 N·m (1.2 kgf·m , 9 lbf·ft)

Tighten the rear exhaust pipe band bolt.

TORQUE: 26 N·m (2.7 kgf·m , 20 lbf·ft)

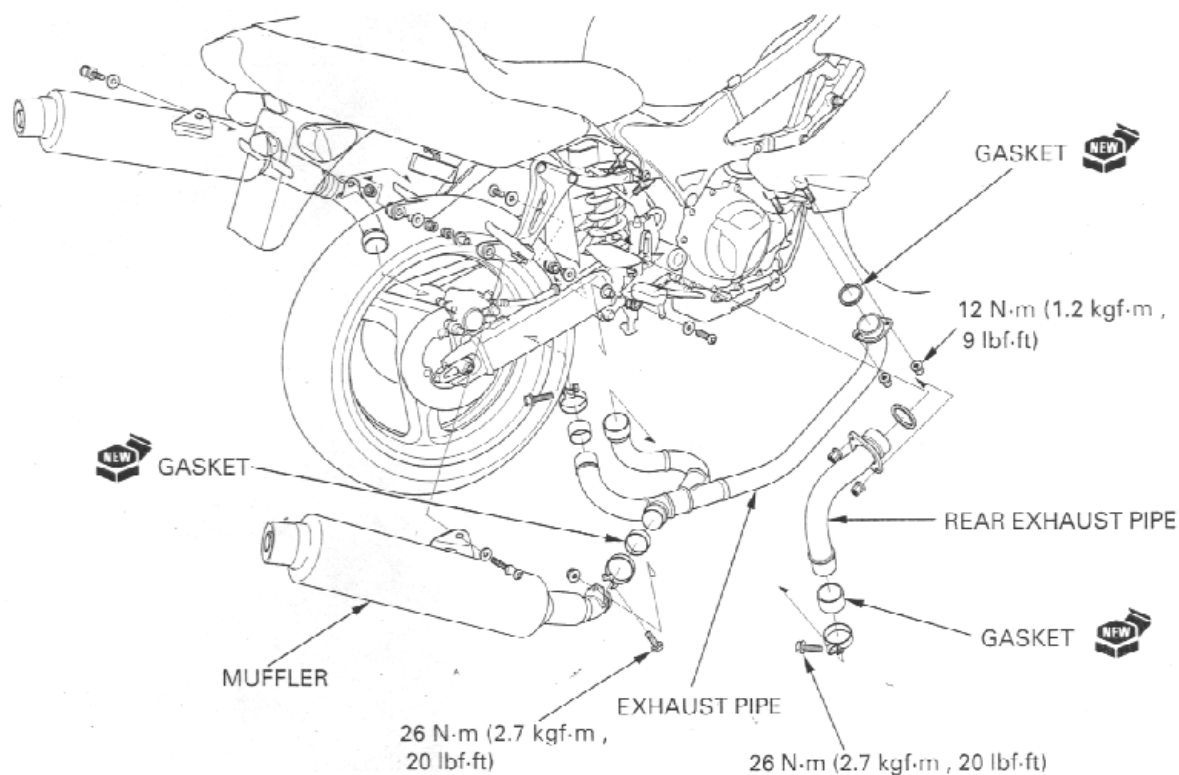
Install the engine lower fairing (page 2-4).

MUFFLER

Install the muffler onto the exhaust pipe, driver and
passenger footpeg brackets, and temporarily
tighten all bolts.
Tighten the muffler band bolt.

TORQUE: 26 N·m (2.7 kgf·m , 20 lbf·ft)

Tighten the muffler mounting bolts.



REAR FENDER/SEAT RAIL

REMOVAL

Remove the seat cowl (page 2-2).
Remove the battery (page 16-4).
Remove the license light from the rear fender (page 19-6).

Remove the following:

- bolt and rear cylinder ignition coil from the seat rail
- fuse box from the rear fender
- bolt and seat lock from the seat rail
- bolt and rear brake reservoir from the rear fender

Secure the reservoir so that it remains upright.

Open the left side wire harness clip.

Disconnect the four (After '00: two) turn signal wire connectors.

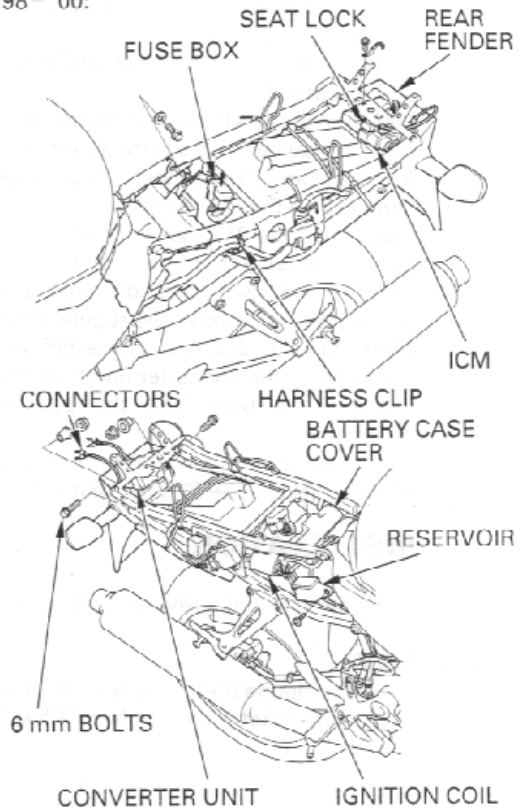
Remove the two 6 mm bolts, nuts and collars.

Release the rear fender from the seat rail cross member.

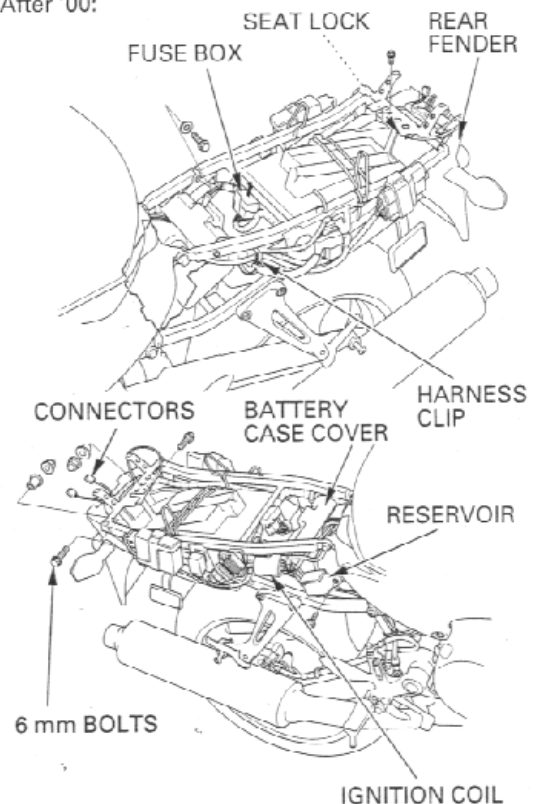
Remove the battery case cover from the rear fender.
'98-'00 only: Remove the converter unit and Ignition control module (ICM) from the stay of the rear fender.

Slide the rear fender rearward and remove it.

'98-'00:



After '00:



'98-'00: Remove the two wire bands from each side of the seat rail.

After '00: Remove the wire band from the left side of the seat rail.

Disconnect the 4P red connector and remove the starter relay switch from the seat rail.

After '00 only: Disconnect the 22P black connector and remove the ICM from the seat rail.

Disconnect the 3P black connector and remove the turn signal relay from the seat rail.

Remove the two bolts, disconnect the 5P white connector and remove the regulator/rectifier.

After '00 only: Disconnect the 6P white connector and remove the converter unit from the seat rail.

Remove the bolts and the passenger footpeg brackets.

Remove the two upper 10 mm flange bolts, lower 10 mm socket bolts and the seat rail.

INSTALLATION

Route the wire harnesses, cable and hose properly (pages 1-27, 28).

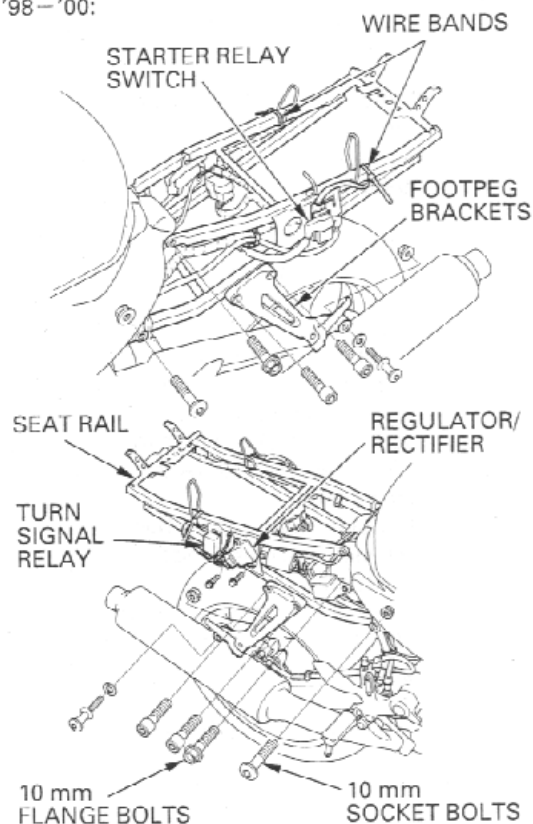
Installation is in the reverse order of removal.

TORQUE:

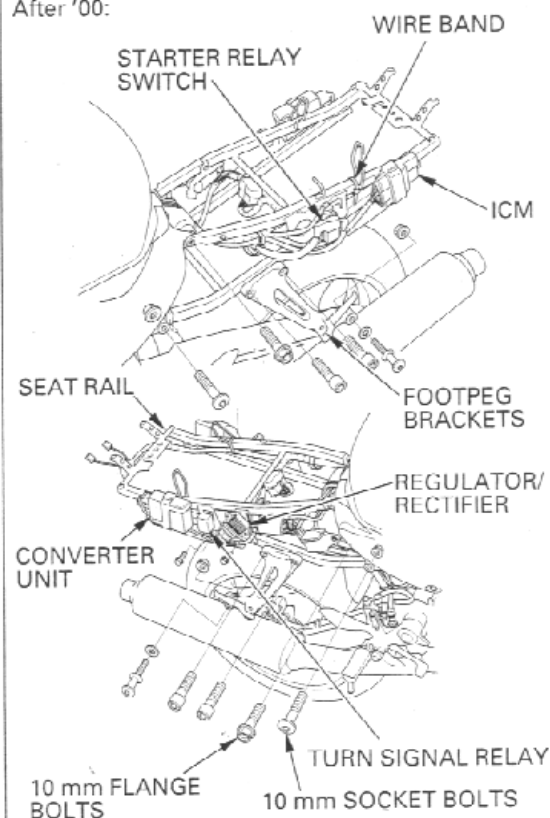
10 mm flange bolt: 39 N·m (4.0 kgf·m, 29 lbf·ft)

10 mm socket bolt: 44 N·m (4.5 kgf·m, 33 lbf·ft)

'98-'00:



After '00:



3. MAINTENANCE

3

SERVICE INFORMATION	3-1	DRIVE CHAIN	3-15
MAINTENANCE SCHEDULE	3-3	DRIVE CHAIN SLIDER	3-19
FUEL LINE	3-4	BRAKE FLUID	3-19
THROTTLE OPERATION	3-4	BRAKE PAD WEAR	3-20
CARBURETOR CHOKE	3-5	BRAKE SYSTEM	3-21
AIR CLEANER	3-5	BRAKE LIGHT SWITCH	3-21
SPARK PLUG	3-6	HEADLIGHT AIM	3-22
VALVE CLEARANCE	3-7	CLUTCH SYSTEM	3-22
ENGINE OIL	3-10	CLUTCH FLUID	3-23
ENGINE OIL FILTER	3-11	SIDE STAND	3-23
CARBURETOR SYNCHRONIZATION	3-12	SUSPENSION	3-24
ENGINE IDLE SPEED	3-13	NUTS, BOLTS, FASTENERS	3-25
RADIATOR COOLANT	3-13	WHEELS/TIRES	3-26
COOLING SYSTEM	3-14	STEERING HEAD BEARINGS	3-26
SECONDARY AIR SUPPLY SYSTEM	3-14		
EVAPORATIVE EMISSION CONTROL SYSTEM (California type only)	3-15		

SERVICE INFORMATION

GENERAL

▲WARNING

When the engine must be running to do some work, make sure the area is well-ventilated. Never run the engine in an enclosed area. The exhaust contains poisonous carbon monoxide gas that may cause loss of consciousness and lead to death. Run the engine in an open area or with an exhaust evacuation system in an enclosed area.

SPECIFICATIONS

ITEM		SPECIFICATIONS
Throttle grip free play		2–6 mm (1/12–1/4 in)
Spark plug		DPR9EVX-9 (NGK)
Spark plug gap		0.80–0.90 mm (0.031–0.035 in)
Valve clearance	Intake	0.16 ± 0.03 mm (0.006 ± 0.001 in)
	Exhaust	0.31 ± 0.03 mm (0.012 ± 0.001 in)
Recommended engine oil		Honda GN4 4-stroke oil or equivalent motor oil API service classification: SF or SG Viscosity: SAE 10W-40
Engine oil capacity	After draining	3.7 ℓ (3.9 US qt, 3.3 Imp qt)
	After draining/filter change	3.9 ℓ (4.1 US qt, 3.4 Imp qt)
	After disassembly	4.5 ℓ (4.8 US qt, 4.0 Imp qt)
Carburetor vacuum difference		20 mm Hg (0.8 in Hg)

MAINTENANCE

ITEM			SPECIFICATIONS
Engine idle speed			1,200 ± 100 rpm
Drive chain slack			30 – 40 mm (1.2 – 1.6 in)
Recommended brake fluid			DOT 4
Recommended clutch fluid			DOT 4 brake fluid
Cold tire pressure	Up to 90 kg (200 lbs) load	Front	250 kPa (2.50 kgf/cm ² , 36 psi)
		Rear	290 kPa (2.90 kgf/cm ² , 42 psi)
	Up to maximum weight capacity	Front	250 kPa (2.50 kgf/cm ² , 36 psi)
		Rear	290 kPa (2.90 kgf/cm ² , 42 psi)
Tire size		Front	120/70ZR17 (58W)
		Rear	180/55ZR17 (73W)
Tire brand	DUNLOP	Front	D204FK
		Rear	D204K
	MICHELIN	Front	MACADAM 90X G
		Rear	MACADAM 90X G
Minimum tread depth		Front	1.5 mm (0.06 in)
		Rear	2.0 mm (0.08 in)

TORQUE VALUES

Spark plug	14 N·m (1.4 kgf·m, 10 lbf·ft)	
Crankshaft hole cap	15 N·m (1.5 kgf·m, 11 lbf·ft)	Apply grease to the threads.
Timing hole cap	10 N·m (1.0 kgf·m, 7 lbf·ft)	Apply grease to the threads.
Oil filter cartridge	10 N·m (1.0 kgf·m, 7 lbf·ft)	Apply oil to the threads and O-ring.
Engine oil drain bolt	29 N·m (3.0 kgf·m, 22 lbf·ft)	
Vacuum port socket bolt	3 N·m (0.3 kgf·m, 2.2 lbf·ft)	
Rear axle nut	93 N·m (9.5 kgf·m, 69 lbf·ft)	
Rear reservoir mounting bolt	9 N·m (0.9 kgf·m, 6.5 lbf·ft)	
Clutch reservoir stopper plate screw	1 N·m (0.1 kgf·m, 0.7 lbf·ft)	

TOOLS

Oil filter wrench	07HAA-PJ70100
Drive chain tool set	07HMH-MR10103 or 07HMH-MR1010B (U.S.A. only)

MAINTENANCE SCHEDULE

Perform the PRE-RIDE INSPECTION in the Owner's Manual at each scheduled maintenance period.

I: Inspect and clean, adjust, lubricate or replace if necessary.

C: Clean

R: Replace

A: Adjust

L: Lubricate

The following items require some mechanical knowledge. Certain items (particularly those marked * and **) may require more technical information and tools. Consult your authorized Honda dealer.

ITEM	FREQUENCY	WHICHEVER COMES FIRST → ↓ NOTE	ODOMETER READING (NOTE 1)								REFER TO PAGE
			× 1,000 mi	0.6	4	8	12	16	20	24	
			× 1,000 km	1	6	12	18	24	30	36	
* FUEL LINE						I		I		I	3-4
* THROTTLE OPERATION						I		I		I	3-4
* CARBURETOR CHOKE						I		I		I	3-5
* AIR CLEANER		NOTE 2					R			R	3-5
SPARK PLUG						R		R		R	3-6
* VALVE CLEARANCE								I			3-7
ENGINE OIL				R		R		R		R	3-10
ENGINE OIL FILTER				R		R		R		R	3-11
* CARBURETOR SYNCHRONIZATION			I		I		I		I		3-12
* ENGINE IDLE SPEED			I	I	I	I	I	I	I	I	3-13
RADIATOR COOLANT		NOTE 3				I		I		R	3-13
* COOLING SYSTEM						I		I		I	3-14
* SECONDARY AIR SUPPLY SYSTEM						I		I		I	3-14
* EVAPORATIVE EMISSION CONTROL SYSTEM		NOTE 4					I		I		3-15
DRIVE CHAIN			Every 500 mi (800 km) I, L								3-15
DRIVE CHAIN SLIDER						I		I		I	3-19
BRAKE FLUID		NOTE 3			I	I	R	I	I	R	3-19
BRAKE PAD WEAR					I	I	I	I	I	I	3-20
BRAKE SYSTEM			I			I		I		I	3-21
* BRAKE LIGHT SWITCH						I		I		I	3-21
* HEADLIGHT AIM						I		I		I	3-22
CLUTCH SYSTEM						I		I		I	3-22
CLUTCH FLUID		NOTE 3			I	I	R	I	I	R	3-23
SIDE STAND						I		I		I	3-23
* SUSPENSION						I		I		I	3-24
* NUTS, BOLTS, FASTENERS			I			I		I		I	3-25
** WHEELS/TIRES						I		I		I	3-26
** STEERING HEAD BEARINGS			I			I		I		I	3-26

* Should be serviced by your authorized Honda dealer, unless the owner has proper tools and service data and is mechanically qualified.

** In the interest of safety, we recommend these items be serviced only by your authorized Honda dealer.

NOTES: 1. At higher odometer readings, repeat at the frequency interval established here.

2. Service more frequently when riding in unusually wet or dusty areas.

3. Replace every 2 years, or at indicated odometer interval, whichever comes first. Replacement requires mechanical skill.

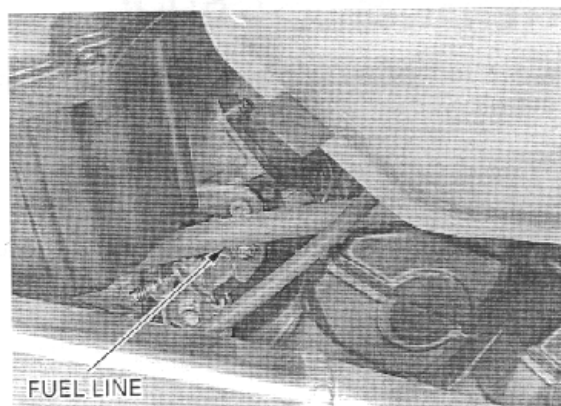
4. California type only.

FUEL LINE

Remove the fuel tank front mounting bolts and raise the front of the fuel tank (page 2-4).

Check the fuel lines for deterioration, damage or leakage.

Replace the fuel lines if necessary.



THROTTLE OPERATION

Check for any deterioration or damage to the throttle cables. Check that the throttle grip for smooth operation. Check that the throttle opens and automatically closes in all steering positions.

If the throttle grip does not return properly, lubricate the throttle cables and overhaul and lubricate the throttle grip housing.

For cable lubrication: Disconnect the throttle cables at their upper ends. Thoroughly lubricate the cables and their pivot points with a commercially available cable lubricant or a lightweight oil.

If the throttle grip still does not return properly, replace the throttle cables.

▲WARNING

Reusing a damaged or abnormally bent or kinked throttle cable can prevent proper throttle slide operation and may lead to a loss of throttle control while riding.

With the engine idling, turn the handlebar all the way to the right and left to ensure that the idle speed does not change. If idle speed increases, check the throttle grip free play and the throttle cable connection.

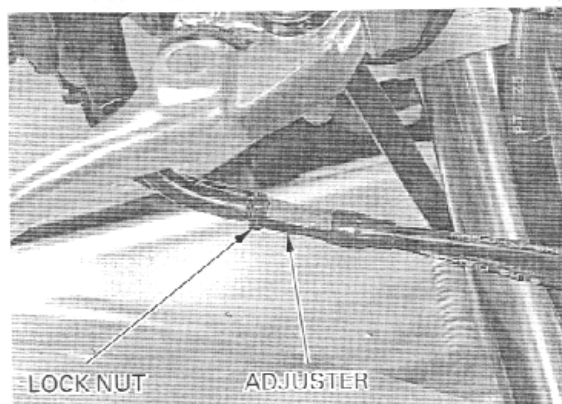
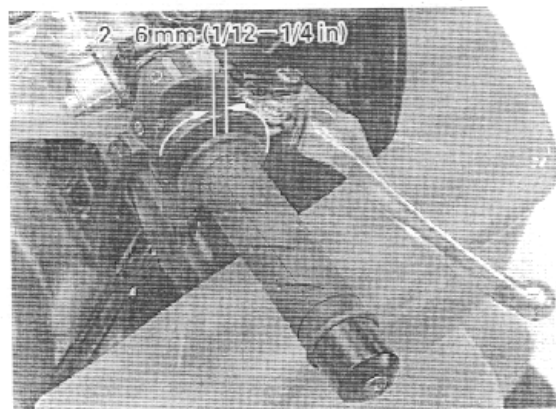
Measure the throttle grip free play at the throttle grip flange.

THROTTLE GRIP FREE PLAY:

2 – 6 mm (1/12 – 1/4 in)

Throttle grip free play can be adjusted at either end of the throttle cable. Minor adjustments are made with the upper adjuster.

Loosen the lock nut, turn the adjuster as required and tighten the lock nut.



Major adjustments are made with the lower adjuster.

Remove the air cleaner housing (page 5-4).
Loosen the lock nut, turn the adjusting nut as required and tighten the lock nut.

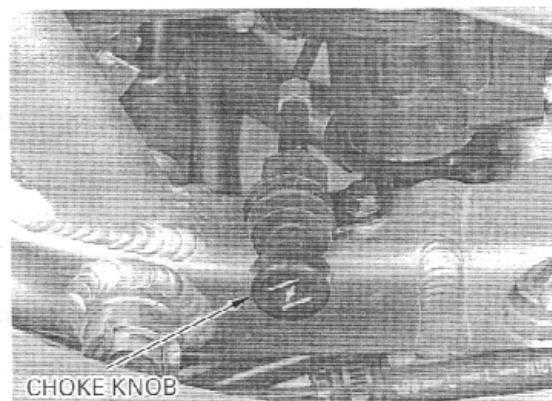
Recheck the throttle operation and install the air cleaner housing (page 5-4).



CARBURETOR CHOKE

This model's choke system uses a fuel enriching circuit controlled by a starting enrichment (SE) valve. The SE valve opens the enriching circuit via a cable when the choke knob on the left side of the frame is pulled out.

Check for smooth choke knob operation. If operation is not smooth, check the cable condition (page 5-20).



AIR CLEANER

NOTE:

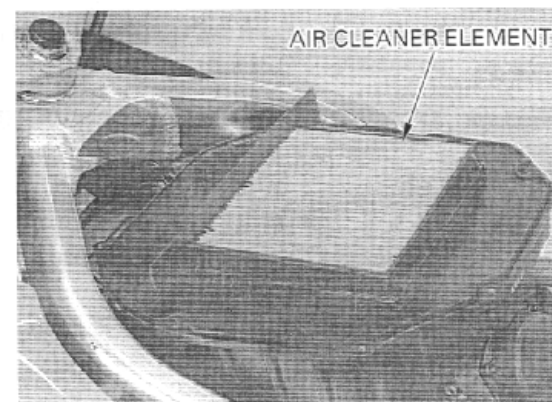
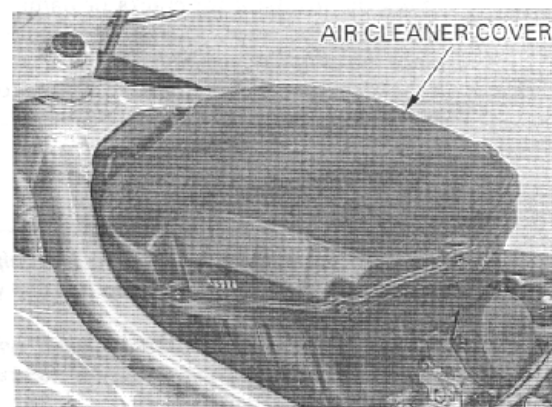
- The viscous paper element type air cleaner cannot be cleaned because the element contains a dust adhesive.
- If the motorcycle is used in wet or dusty areas, more frequent inspections are required.

Remove the fuel tank (page 2-4).

Remove the eight air cleaner cover screws.
Remove the air cleaner cover together with the element.
Replace the element in accordance with the maintenance schedule or any time it is excessively dirty or damaged.

Install the air cleaner element and cover, and tighten the screws.

Install the fuel tank (page 2-4).



SPARK PLUG

Rear cylinder only Remove the seat (page 2-2).

It may be necessary to slightly lift the tank to remove the mounting bolt. Remove the fuel tank rear mounting nut and bolt.

Rear cylinder only Raise the rear of the fuel tank and support it with the maintenance bar in the supplied tool kit.

Both cylinders Disconnect the spark plug caps and clean around the spark plug bases.

NOTE:

Clean around the spark plug bases with compressed air before removing the plugs, and be sure that no debris is allowed to enter the combustion chamber.

Remove the spark plugs.

Check the insulator for cracks or damage, and the electrodes for wear, fouling or discoloration. Replace the plug if necessary. If the electrode is contaminated with carbon deposits, clean the electrode using the spark plug cleaner.

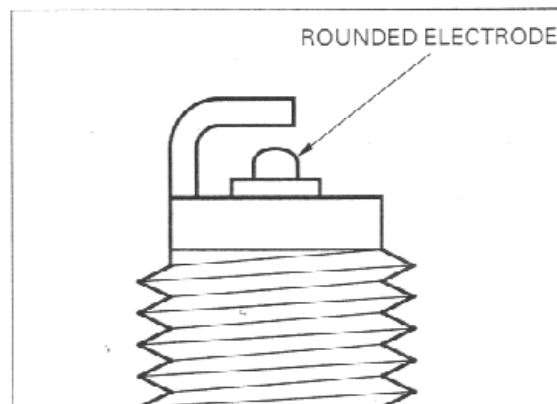
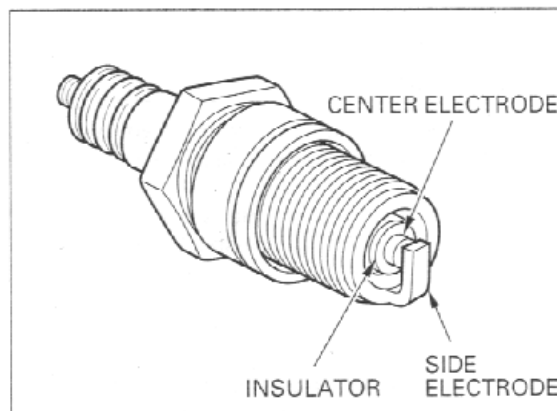
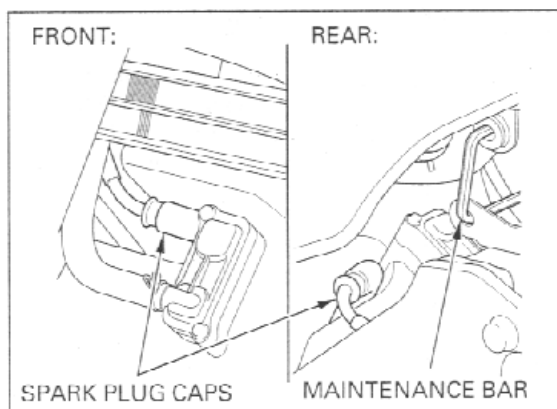
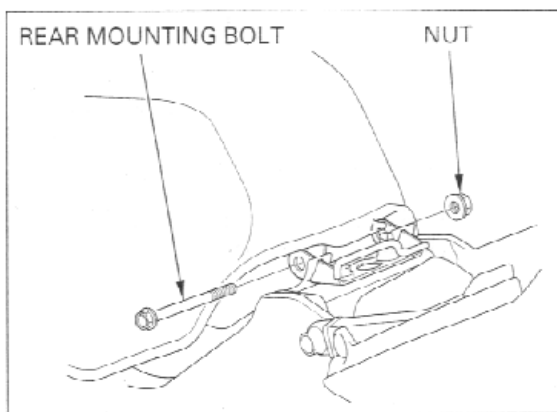
CAUTION:

- *This motorcycle's spark plug is equipped with platinum type electrodes. Do not use wire brush to clean the electrodes.*
- *The plug cleaner should be used with the air pressure of less than 6 kgf/cm² (85 psi) and for less than 20 seconds.*

Replace the plug if the center electrode is rounded as shown.

Always use specified spark plugs on this motorcycle.

SPECIFIED SPARK PLUG: DPR9EVX-9 (NGK)



Measure the spark plug gap between the center and side electrodes with a wire-type feeler gauge.

CAUTION:

To prevent damaging the platinum coating of the center electrode, use a wire type feeler gauge to check the spark plug gap.

Make sure that the 1.0 mm (0.04 in) wire type feeler gauge cannot be inserted into the gap.
If the gauge can be inserted into the gap, replace the plug with a new one.

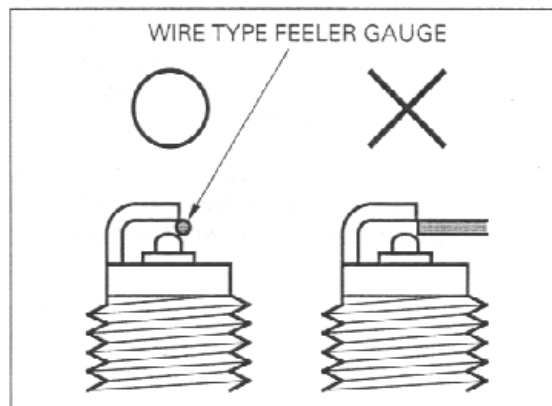
CAUTION:

Do not adjust the spark plug gap. If the gap is out of specification, replace with a new one.

With the plug washer attached, screw the spark plug in by hand to prevent cross-threading.
Tighten the spark plug.

TORQUE: 14 N·m (1.4 kgf·m, 10 lbf·ft)

Install the removed parts in the reverse order of removal.



VALVE CLEARANCE

INSPECTION

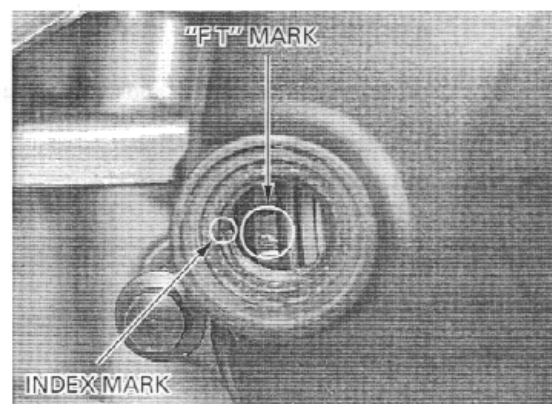
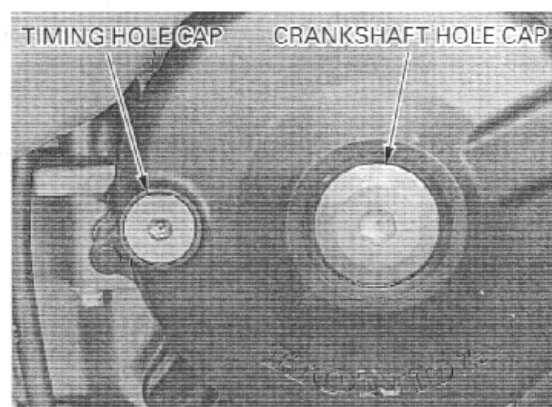
NOTE:

Inspect and adjust the valve clearance while the engine is cold (below 35 °C, 95 °F).

Remove the front and rear cylinder head covers (page 8-3).

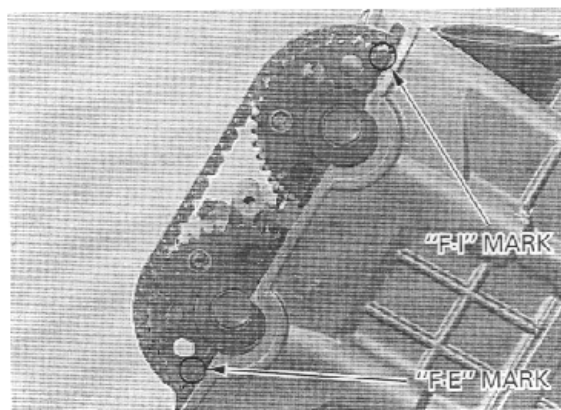
Remove the timing hole cap and crankshaft hole cap.

Rotate the crankshaft counterclockwise and align the "F T" mark on the flywheel with the index mark on left crankcase cover.



The timing marks ("F.I" for intake and "F.E" for exhaust) on the front cylinder cam sprockets must be flush with the cylinder head surface and facing outward as shown.

If the timing marks are facing inward, rotate the crankshaft counterclockwise 360° (1 full turn) and align the "F T" mark with the index mark.



Measure the front cylinder valve clearance by inserting a feeler gauge between the valve lifter and cam lobe.

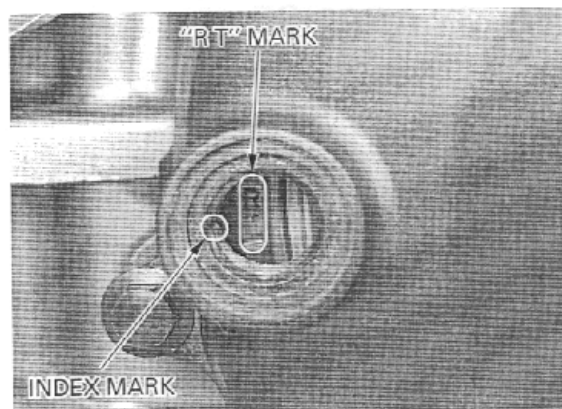
VALVE CLEARANCES:

IN: 0.16 ± 0.03 mm (0.006 ± 0.001 in)

EX: 0.31 ± 0.03 mm (0.012 ± 0.001 in)



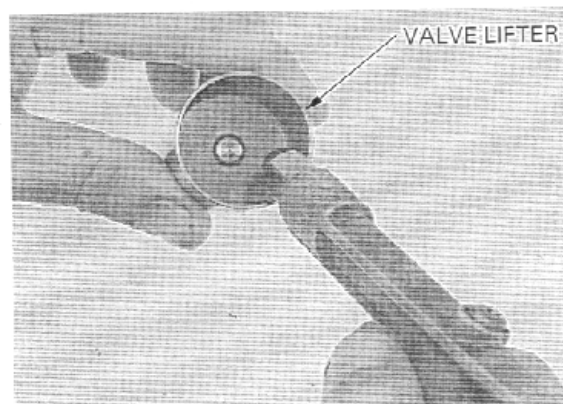
Rotate the crankshaft counterclockwise 270° and align the "R T" mark with index mark. Check the rear cylinder valve clearances.



ADJUSTMENT

Remove the valve lifters and shims (page 8-4).

Clean the valve shim contact area in the valve lifter with compressed air.



Measure the shim thickness and record it.

NOTE:

Fifty-one different thickness shims are available from the thinnest (1.200 mm thickness) shim to the thickest (2.450 mm thickness) in intervals of 0.025 mm.

Calculate the new shim thickness using the equation below.

$$A = (B - C) + D$$

A: New shim thickness

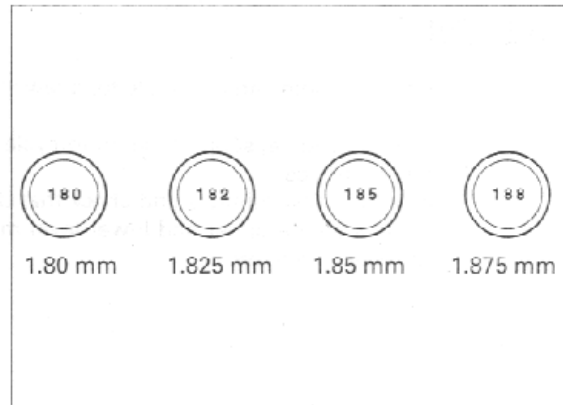
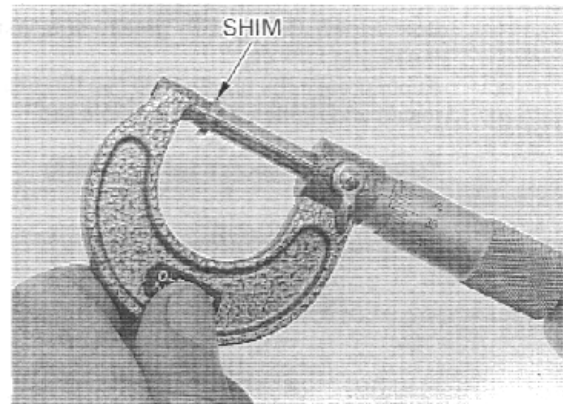
B: Recorded valve clearance

C: Specified valve clearance

D: Old shim thickness

NOTE:

- Make sure of the correct shim thickness by measuring the shim with the micrometer.
- Reface the valve seat if carbon deposits result in a calculated dimension of over 2.450 mm.

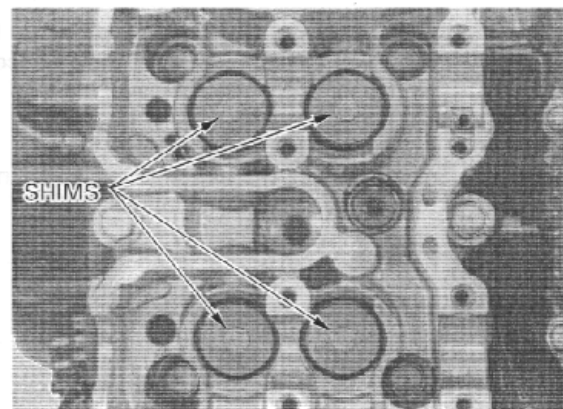


Install the newly selected shims on the valve retainers.

Install the valve lifters and camshafts (page 8-19).

Rotate the camshafts by rotating the crankshaft counterclockwise several times.
Recheck the valve clearances.

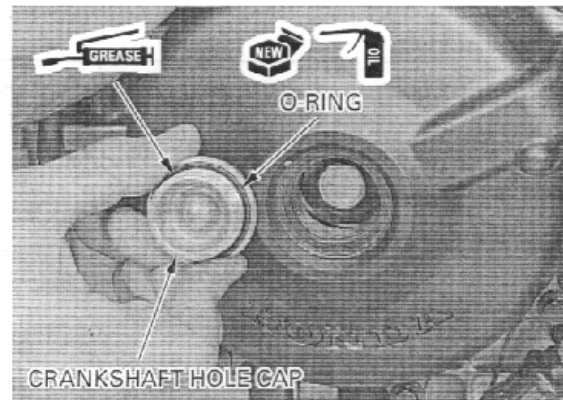
Install the cylinder head covers (page 8-23).



Coat a new O-ring with grease and install it onto the crankshaft hole cap.

Apply grease the crankshaft hole cap threads.
Install and tighten the crankshaft hole cap.

TORQUE: 15 N·m (1.5 kgf·m, 11 lbf·ft)



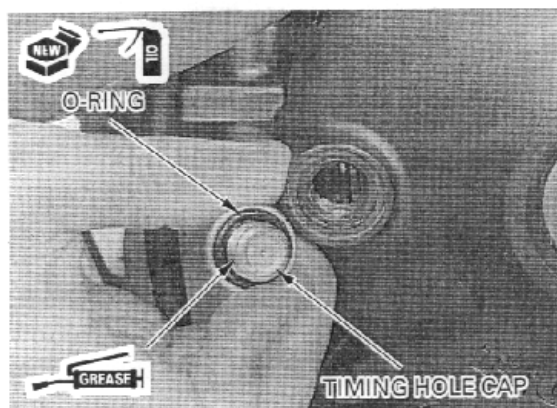
MAINTENANCE

Coat a new O-ring with grease and install it onto the timing hole cap.

Apply grease to the timing hole cap threads.

Install and tighten the timing hole cap.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

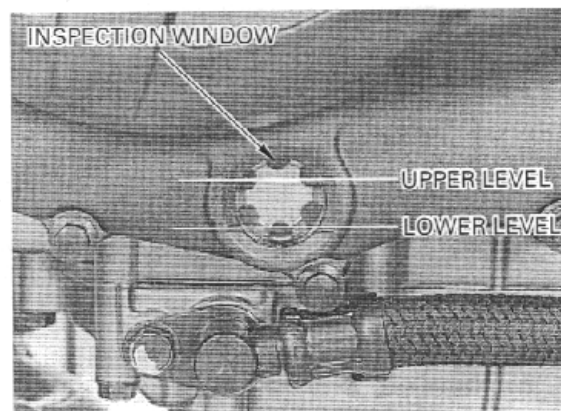


ENGINE OIL

Start the engine and let it idle for a few minutes.

Stop the engine, support the motorcycle upright on a level surface.

Wait for a few minutes and check that the oil level is between the upper and lower level marks in the inspection window.



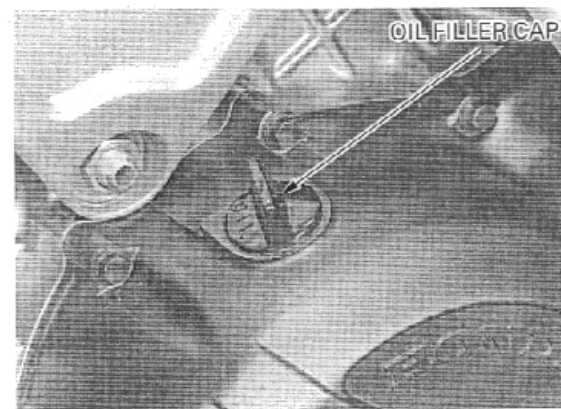
If the oil level is below or near the lower level mark, remove the oil filler cap and add the recommended engine oil up to the upper level mark.

RECOMMENDED ENGINE OIL:

Honda GN4 4 stroke oil or equivalent motor oil

API service classification: SF or SG

Viscosity: SAE 10W-40

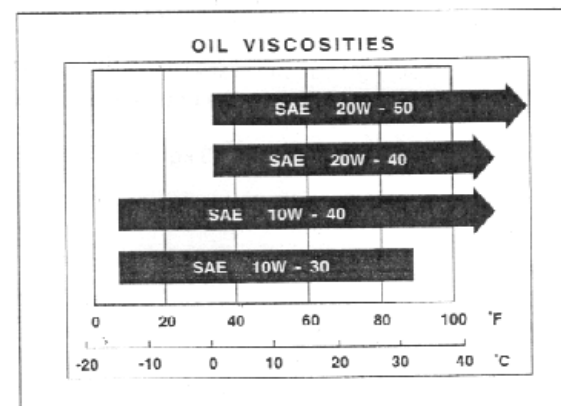


NOTE:

Other viscosities shown in the chart may be used when the average temperature in your riding area is within the indicated range.

Reinstall the filler cap.

For engine oil change, see next page.



ENGINE OIL FILTER

NOTE:

Change the oil with engine warm and the motorcycle on its side stand to assure complete and rapid draining.

⚠ WARNING

Engine and exhaust system parts become very hot and remain hot for some time after the engine is run. Wear insulated gloves or wait until the engine and exhaust system have cooled before handling these parts.

Warm up the engine.

Stop the engine and remove the engine lower fairing (page 2-4).

Remove oil filler cap and drain bolt, and drain the oil.

Remove the oil filter cartridge and let the remaining oil drain out. Discard the filter cartridge.

TOOL:

Oil filter wrench 07HAA-PJ70100

CAUTION:

Used engine oil may cause skin cancer if repeatedly left in contact with the skin for prolonged periods. Although this is unlikely unless you handle used oil on a daily basis, it is still advisable to thoroughly wash your hands with soap and water as soon as possible after handling used oil.

Apply oil to the O-ring and threads of a new oil filter cartridge and install the filter cartridge.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

After draining the oil completely check that the sealing washer on the drain bolt is in good condition and replace it if necessary. Install and tighten the drain bolt.

TORQUE: 29 N·m (3.0 kgf·m, 22 lbf·ft)

Fill the crankcase with the recommended oil (page 3-10).

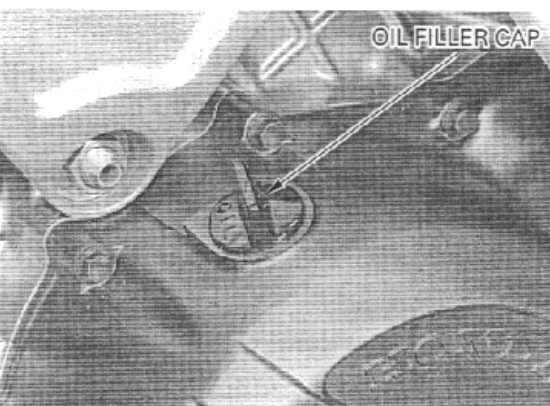
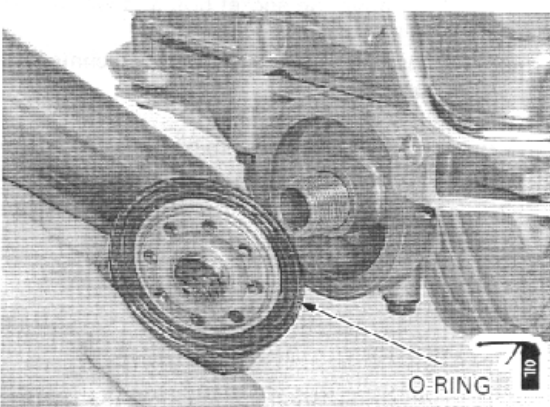
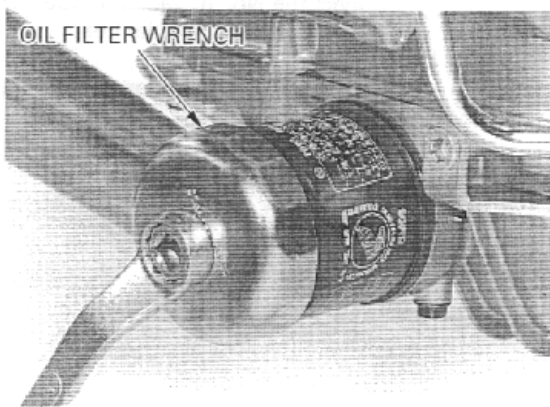
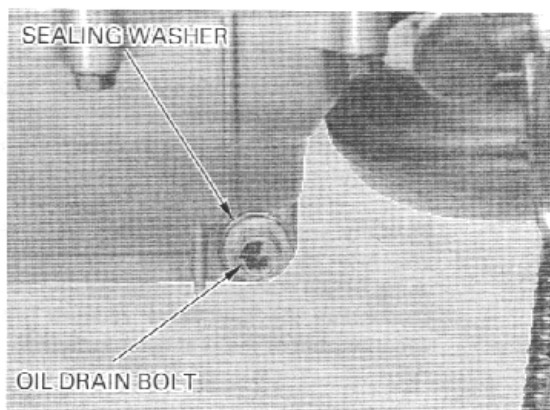
OIL CAPACITY: 3.9 l (4.1 US qt, 3.4 Imp qt)
after draining/filter change
4.5 l (4.8 US qt, 4.0 Imp qt)
at disassembly

Reinstall the oil filler cap.

Check the engine oil level (page 3-9).

Make sure there are no oil leaks.

Install the engine lower fairing (page 2-4).



CARBURETOR SYNCHRONIZATION

NOTE:

Perform this maintenance with the engine at normal operating temperature and transmission in neutral. Place the motorcycle on a level surface.

Start the engine, pinch the fuel valve vacuum tube and No. 10 vacuum tube (California type only) using a tube clamp, and stop the engine. Disconnect the fuel valve vacuum tube from the vacuum joint of the rear cylinder head.

California type:

Disconnect the No. 10 vacuum tube from the vacuum joint of the front cylinder head.

Connect the vacuum gauge tubes to the vacuum joints.

49 states/Canada type:

Remove the socket bolt and washer from the front cylinder head vacuum port. Install the vacuum gauge attachment into the vacuum port.

Connect the vacuum gauge tubes to the attachment and vacuum joint.

Start the engine and adjust the idle speed with the throttle stop screw.

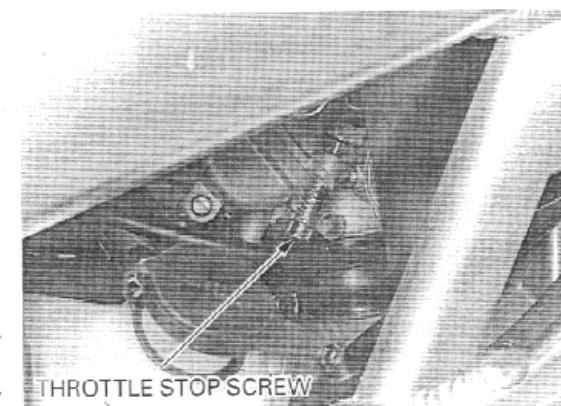
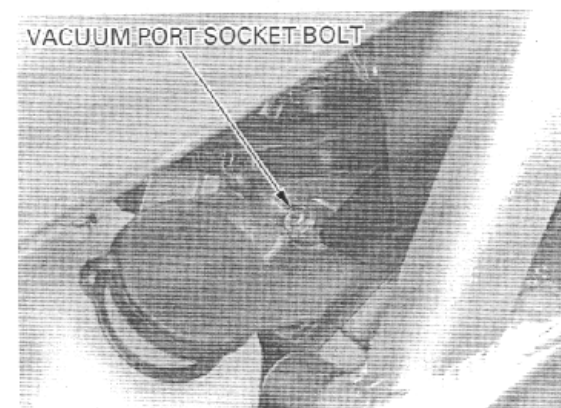
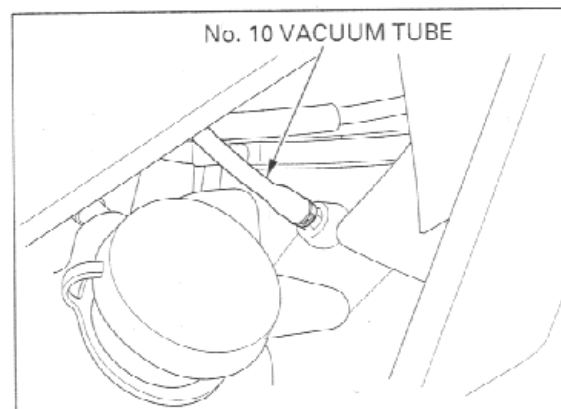
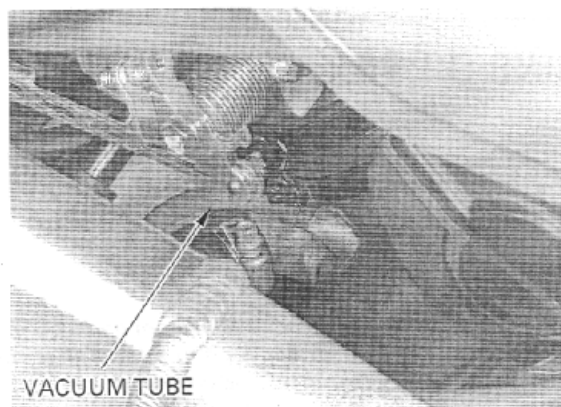
IDLE SPEED: $1,200 \pm 100$ rpm

Check the difference between the front and rear carburetors.

CARBURETOR VACUUM DIFFERENCE:
20 mm Hg (0.8 in Hg)

NOTE:

The base carburetor is the front carburetor.

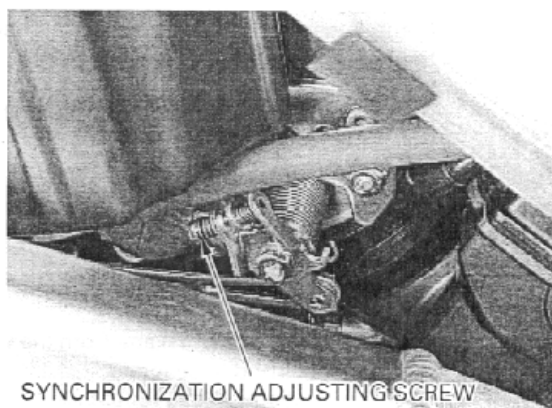


Synchronize to specification by turning the synchronization adjusting screw.
Rev the engine up several times.
Recheck the idle speed and synchronization.

Remove the vacuum gauge.
49 state/Canada type only: Install and tighten the vacuum port socket bolt.

TORQUE: 3 N·m (0.3 kgf·m, 2.2 lbf·ft)

Remove the tube clamp(s) from the vacuum tube(s) and connect the vacuum tube(s) to the vacuum joint(s).



SYNCHRONIZATION ADJUSTING SCREW

ENGINE IDLE SPEED

NOTE:

- Inspect and adjust the idle speed after all other engine maintenance items have been performed and are within specifications.
- The engine must be warm for accurate idle speed inspection and adjustment.

Warm up the engine, shift the transmission into neutral and place the motorcycle on its side stand on a level surface.

Check the idle speed and adjust by turning the throttle stop screw as required.

IDLE SPEED: 1,200 ± 100 rpm



THROTTLE STOP SCREW

RADIATOR COOLANT

Check the coolant level of the reserve tank with the engine running at normal operating temperature. The level should be between the "UPPER" and "LOWER" level lines with the motorcycle upright on a level surface.

If the level is low, remove the reserve tank cap and fill the tank to the "UPPER" level line with a 1:1 mixture of distilled water and antifreeze.

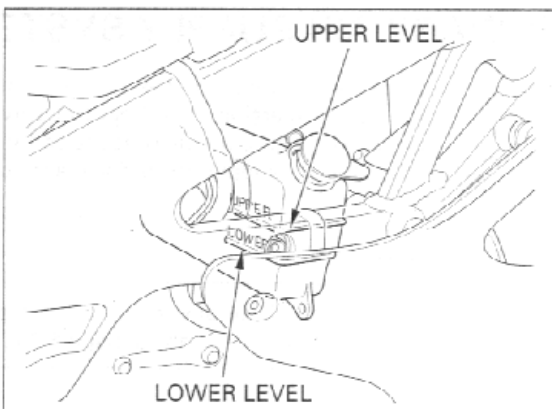
RECOMMENDED ANTIFREEZE

Pro Honda HP coolant or an equivalent high quality ethylene glycol antifreeze containing silicate-free corrosion inhibitors

CAUTION:

Using coolant with silicate corrosion inhibitors may cause premature wear of water pump seals or blockage of radiator passages. Using tap water may cause engine damage.

Check to see if there are any coolant leaks when the coolant level decreases very rapidly.



RESERVE TANK CAP

If the reserve tank becomes completely empty, there is a possibility of air getting into the cooling system.

Be sure to remove all air from the cooling system (page 6-6).

COOLING SYSTEM

Remove the front fairing (page 2-3).

Check for any coolant leakage from the water pump, radiator hoses and hose joints.

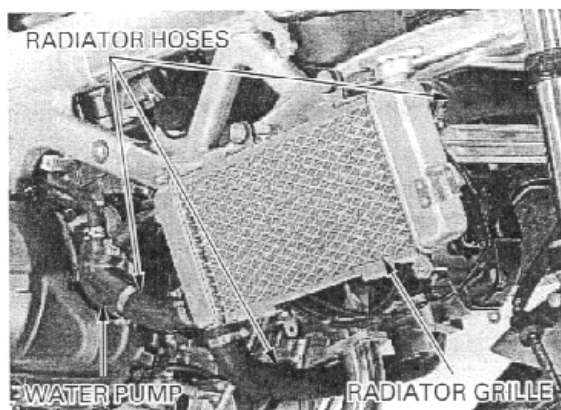
Check the radiator hoses for cracks or deterioration and replace if necessary.

Check that all hose clamps are tight.

Remove the radiator grille.

Check the radiator air passage for clogs or damage. Straighten bent fins with a small, flat blade screwdriver and remove insects, mud or other obstructions with compressed air or low pressure water. Replace the radiator if the air flow is restricted over more than 20 % of the radiating surface.

Install the radiator grille and front fairing (page 2-3).



SECONDARY AIR SUPPLY SYSTEM

Check the air supply hoses between the pulse secondary air injection (PAIR) control valve and PAIR check valves for damage or loose connections.

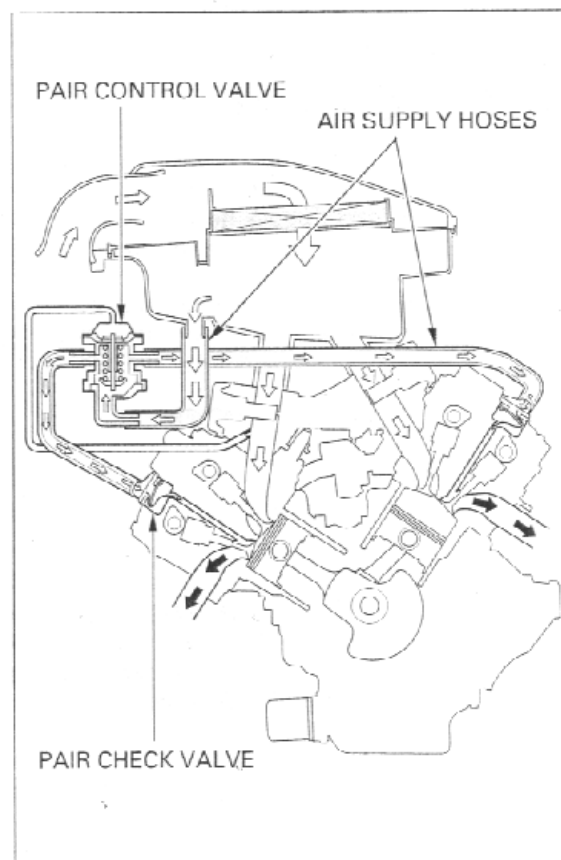
Check the air supply hoses for cracks or deterioration.

NOTE:

If the hoses show any signs of heat damage, inspect the PAIR check valves (page 5-25).

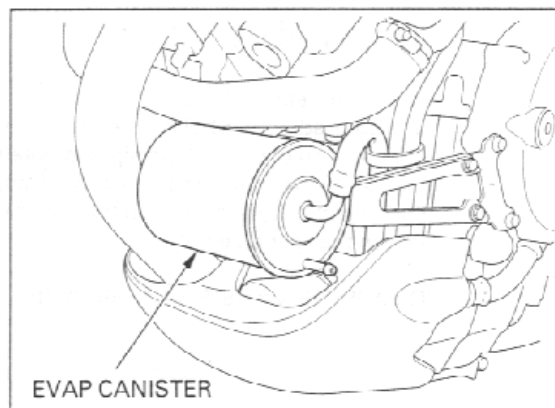
Check the vacuum tube between the front carburetor and PAIR control valve for deterioration, damage or loose connections. Also check that the tube is not kinked or pinched.

For PAIR control valve inspection, see page 5-24.



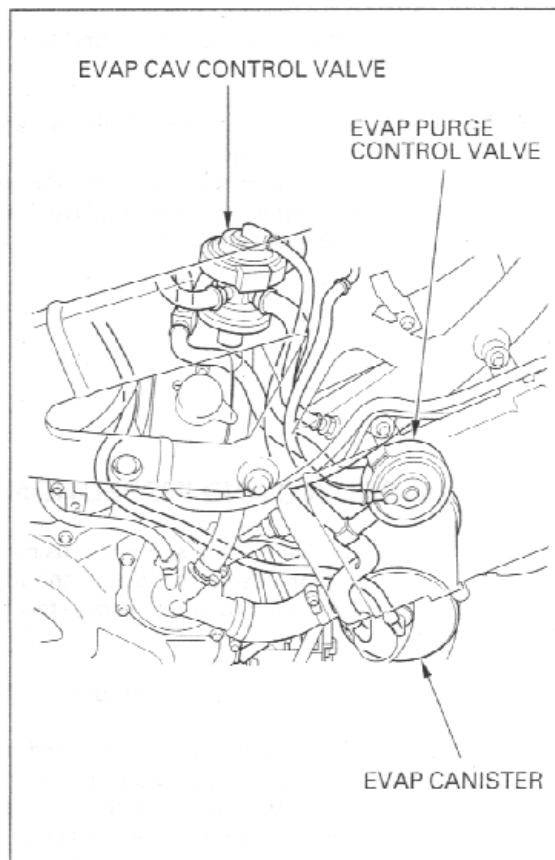
EVAPORATIVE EMISSION CONTRTOL SYSTEM (California type only)

Check the evaporative emission (EVAP) canister for cracks or damage.



Check the tubes between the fuel tank, EVAP canister, EVAP purge control valve, EVAP carburetor air vent (CAV) control valve and carburetors for deterioration, damage or loose connections. Also check that the tubes are not kinked or pinched.

Refer to the Vacuum Hose Routing Diagram Label and Cable & Harness Routing (page 1-29) for tube connections and routing.



DRIVE CHAIN

CHAIN SLACK INSPECTION

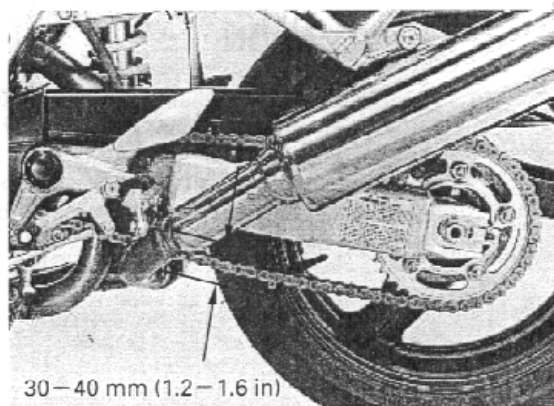
▲WARNING

Never inspect and adjust the drive chain while the engine is running.

Turn the ignition switch OFF, place the motorcycle on its side stand and shift the transmission into neutral.

Check the slack in the drive chain lower run midway between the sprockets.

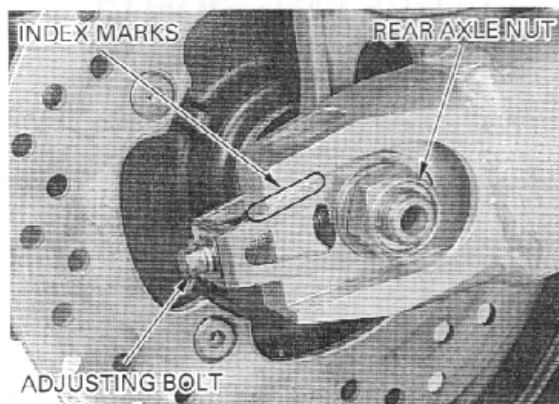
CHAIN SLACK: 30–40 mm (1.2–1.6 in)



ADJUSTMENT

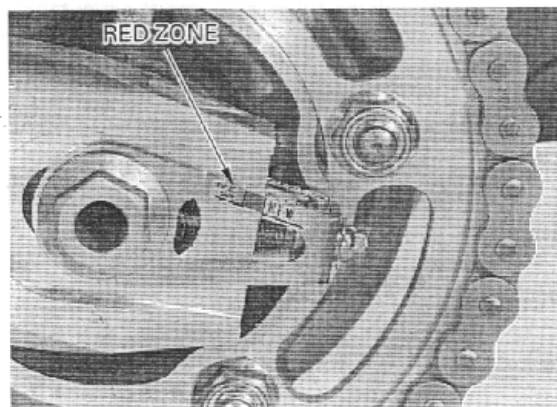
Loosen the rear axle nut.
Turn both adjusting bolts an equal number of turn until the correct drive chain slack is obtained.
Make sure the index marks on both adjusters are aligned with the index line on the swingarm.
Tighten the rear axle nut.

TORQUE: 93 N·m (9.5 kgf·m, 69 lbf·ft)



Recheck the drive chain slack and free wheel rotation.

Check the drive chain wear indicator label attached on the left drive chain adjuster.
If the red zone of the indicator label reaches the index line on the swingarm, replace the drive chain with a new one (page 3-17).

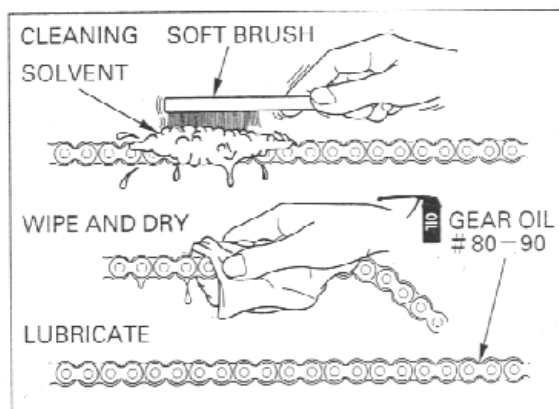


CLEANING AND INSPECTION

Clean the chain with a soft brush using a non-flammable or high flash point solvent and wipe it dry.
Be sure the chain has dried completely before lubricating.

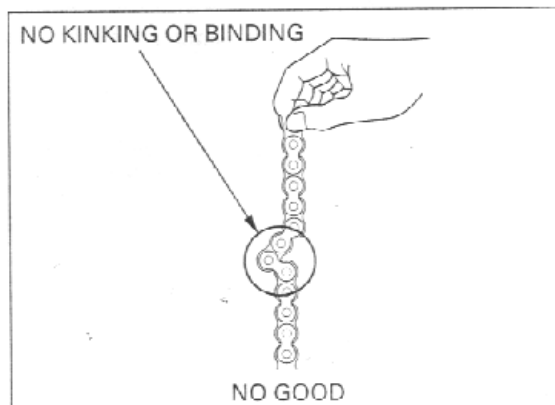
Inspect the drive chain for possible damage or wear.

Replace any chain that has damaged rollers, loose fitting links, or otherwise appears unserviceable.
Installing a new chain on badly worn sprockets will cause the new chain to wear quickly. Inspect and replace the sprockets as necessary.



LUBRICATION

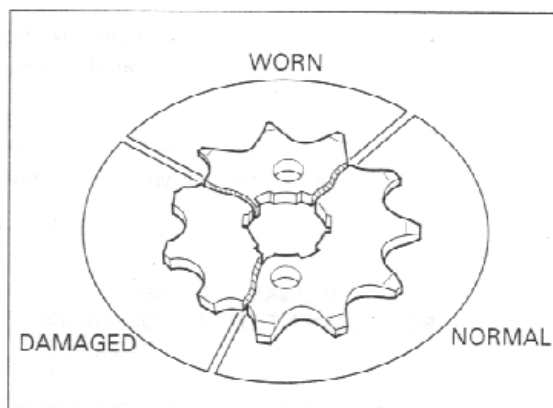
Lubricate the drive chain with #80-90 gear oil or equivalent chain lubricant designed for specifically for use on O-ring chains.
Some commercially available chain lubricants may contain solvents which could damage the O-rings.
Wipe off the excess chain lube.



SPROCKET INSPECTION

Inspect the drive and driven sprocket teeth for damage or wear. Replace if necessary. Never use a worn chain on new sprockets. Both chain and sprockets must be in good condition, or the new replacement parts will wear rapidly.

Check the attachment bolt and nuts on the drive and driven sprockets. If any are loose, torque them.



REPLACEMENT

This motorcycle uses a drive chain with a staked master link.

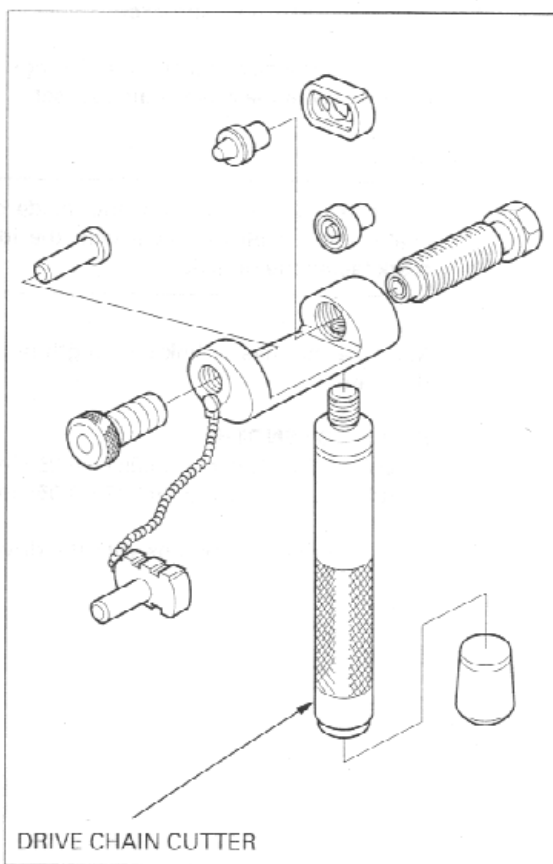
Loosen the drive chain.
Assemble the special tool.

TOOL:

Drive chain tool set

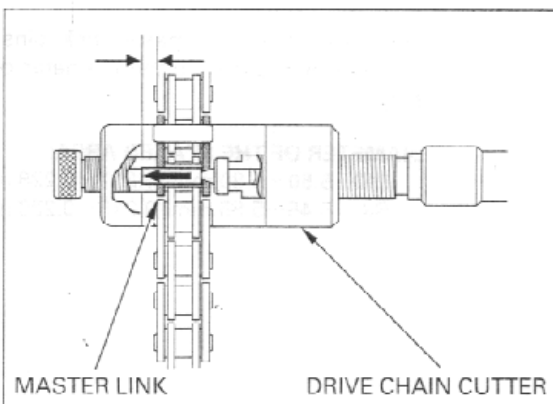
07HMH-MR10103 or
07HMH-MR1010B
(U.S.A. only)

When using the special tool, follow the manufacturer's instruction.



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.

Remove the drive chain.



MAINTENANCE

Remove the excess drive chain links from the new drive chain with the drive chain tool set.

NOTE:

Include the master link when you count the drive chain links.

SPECIFIED LINKS: 102 links

REPLACEMENT CHAIN: DID 50ZVM
RK50LFOZ2

Remove the drive sprocket cover (page 7-4).
Install the new drive chain on the sprockets over the drive and driven sprockets.

Assemble the new master link, O-rings and master link plate with the drive chain tool set.

NOTE:

Insert the master link from the inside of the drive chain, and install the plate with the identification mark facing the outside.

Measure the master link pin length projected from the plate.

SPECIFIED LENGTH:

DID: 1.30–1.50 mm (0.051–0.059 in)

RK: 1.20–1.40 mm (0.047–0.055 in)

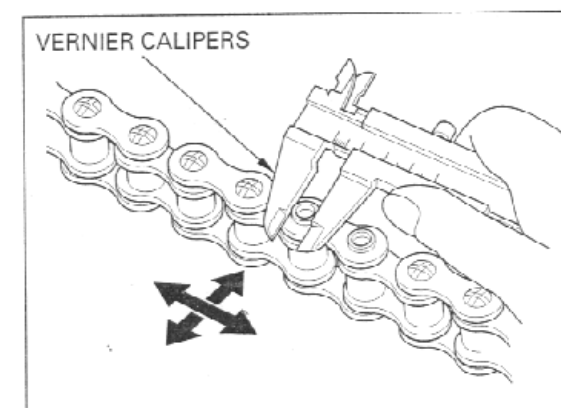
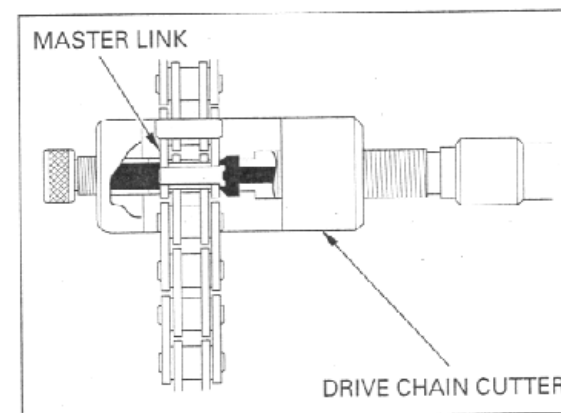
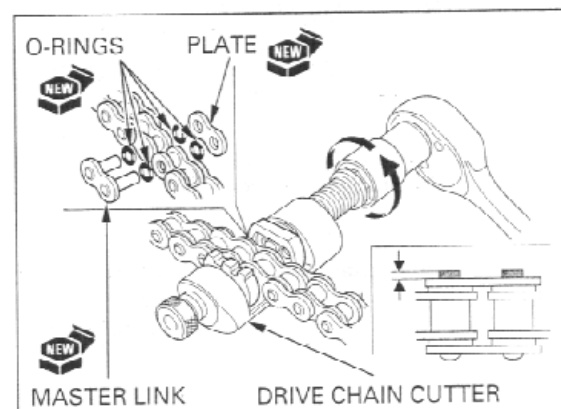
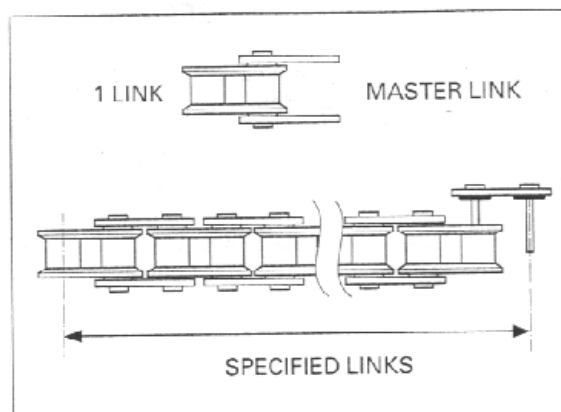
Stake the master link pins with the drive chain tool set.

Make sure that the master link pins are staked properly by measuring the diameter of the staked area.

DIAMETER OF THE STAKED AREA:

DID: 5.50–5.80 mm (0.217–0.228 in)

RK: 5.45–5.85 mm (0.215–0.230 in)

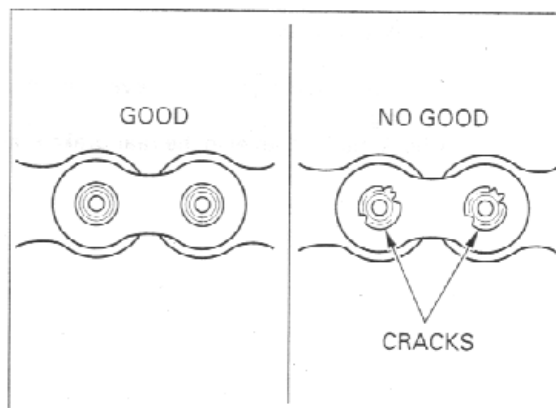


After staking, check the staked area of the master link for cracks.
If there is any cracking, replace the master link, O-rings and plate.

CAUTION:

A drive chain with a clip-type master link must not be used.

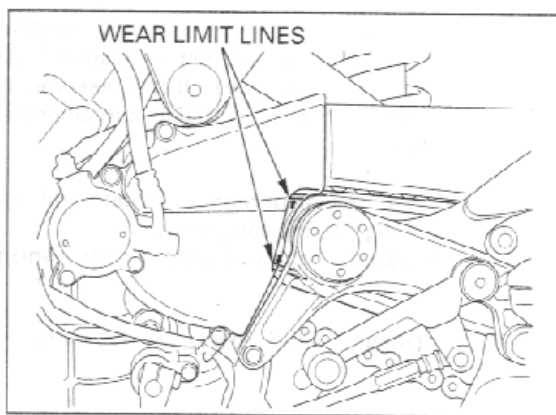
Install the drive sprocket cover (page 7-11).



DRIVE CHAIN SLIDER

Check the drive chain slider for wear.
Replace the chain slider if it is worn to the wear limit line.

Refer to section 14 for drive chain slider replacement.



BRAKE FLUID

CAUTION:

- Do not mix different types of fluid, as they are not compatible with each other.
- Do not allow foreign material to enter the system when filling the reservoir.
- Avoid spilling fluid on painted, plastic or rubber parts. Place a rag over these parts whenever the system is serviced.

NOTE:

When the fluid level is low, check the brake pads for wear (page 3-20). A low fluid level may be due to wear of the brake pads. If the brake pads are worn, the caliper pistons are pushed out, and this accounts for a low reservoir level.

If the brake pads are not worn and the fluid level is low, check entire system for leaks (page 3-21).

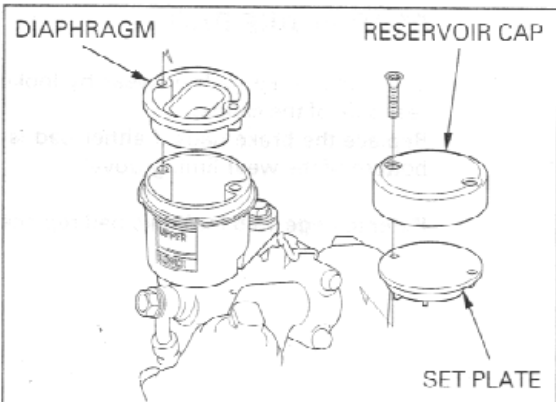


FRONT BRAKE

Turn the handlebar to the left side so that the reservoir is level and check the fluid level in the front brake reservoir.

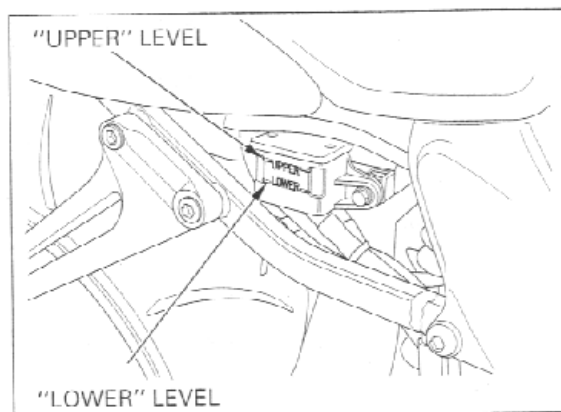
If the level is near the "LOWER" level line, remove the reservoir cap, set plate and diaphragm, and fill the reservoir with DOT 4 brake fluid from a sealed container to the "UPPER" level line.

Install the diaphragm, set plate and reservoir cap and tighten the cap screws.



REAR BRAKE

Place the motorcycle on a level surface, and stand it upright.
Check the fluid level in the rear brake reservoir.

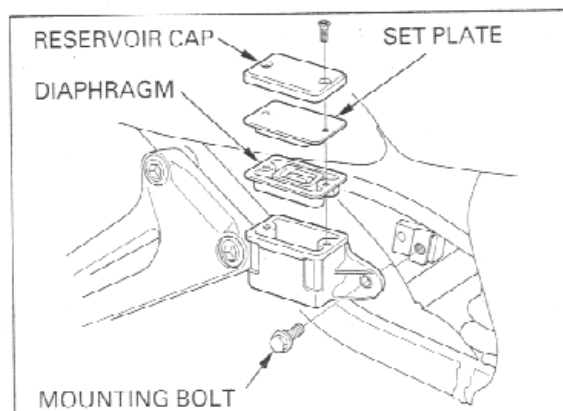


If the level is near the "LOWER" level line, remove the reservoir mounting bolt, reservoir cap, set plate and diaphragm, and fill the reservoir with DOT 4 brake fluid from a sealed container to the upper level line.

Install the diaphragm, set plate and reservoir cap and tighten the cap screws.

Install the reservoir onto the stay and tighten the mounting bolt.

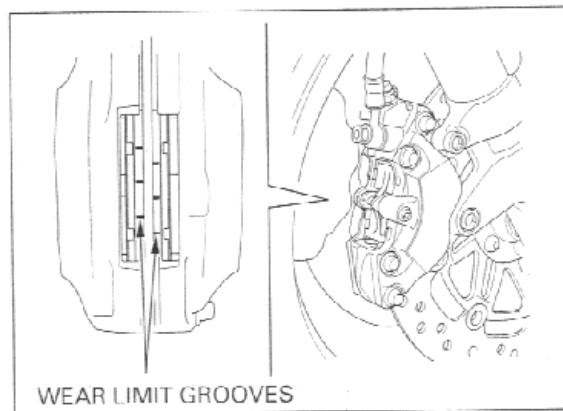
TORQUE: 9 N·m (0.9 kgf·m , 6.5 lbf·ft)



BRAKE PAD WEAR

FRONT BRAKE PAD

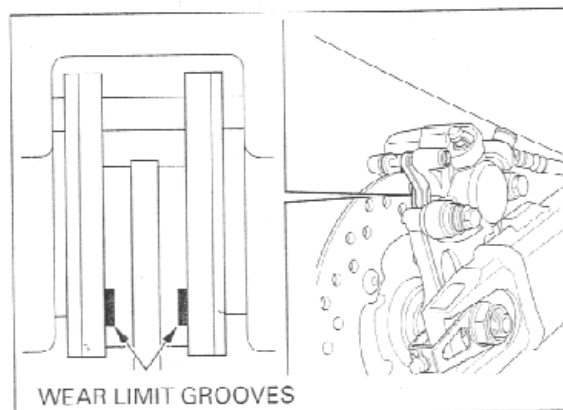
Check the brake pad for wear.
Replace the brake pads if the wear limit groove of either pad is worn out.



REAR BRAKE PAD

Check the brake pad for wear by looking from the rear side of the caliper.
Replace the brake pads if either pad is worn to the bottom of the wear limit groove.

Refer to page 15-5 for brake pad replacement.

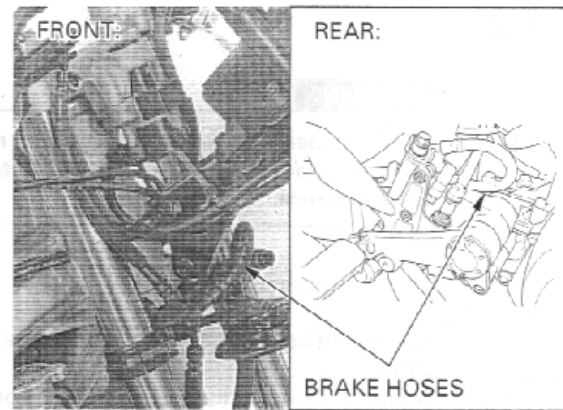


BRAKE SYSTEM

Firmly apply the brake lever or pedal, and check that no air has entered the system. If the lever or pedal feels soft or spongy when operated, bleed the air from the system.

Refer to page 15-3 for air bleeding procedures.

Inspect the brake hoses, pipes and fittings for deterioration, cracks, damage or signs of leakage. Tighten any loose fittings. Replace hoses, pipes and fittings as required.

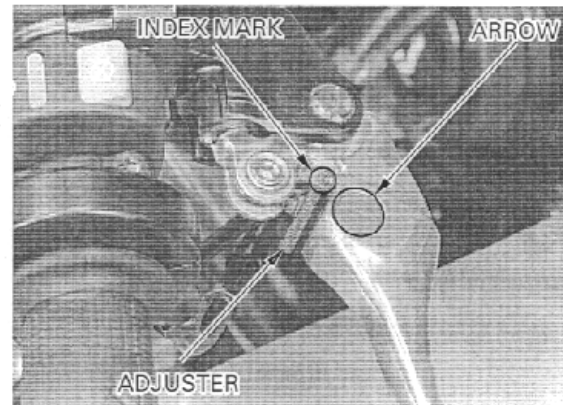


BRAKE LEVER ADJUSTMENT

The distance between the tip of the brake lever and the grip can be adjusted by turning the adjuster.

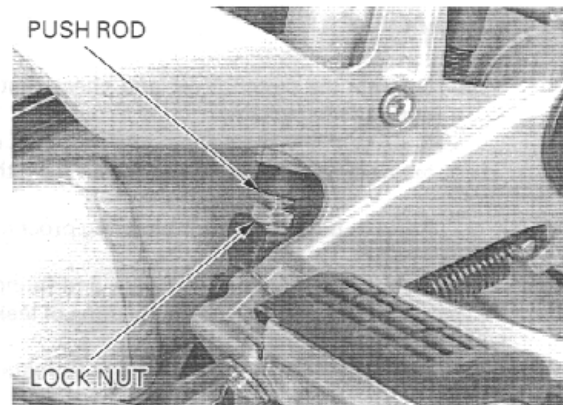
CAUTION:

Align the arrow on the brake lever with the index mark on the adjuster.



BRAKE PEDAL HEIGHT ADJUSTMENT

Loosen the lock nut and turn the push rod until the correct pedal height is obtained.

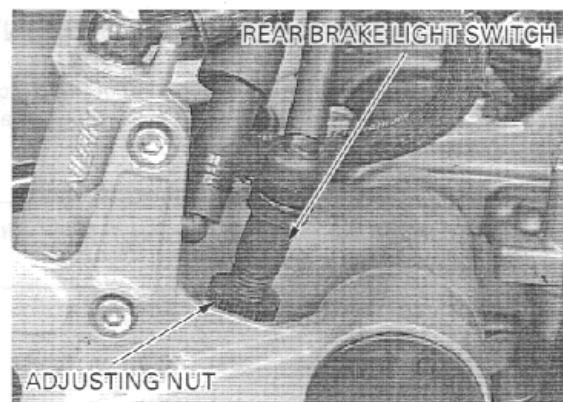


BRAKE LIGHT SWITCH

NOTE:

The brake light switch on the front brake master cylinder cannot be adjusted. If the front brake light switch actuation and brake engagement are off, either replace the switch unit or the malfunctioning parts of the system.

Check that the brake light comes on just prior to the brake actually being engaged. If the light fails to come on, adjust the switch so that the light comes on at proper time. Hold the switch body and turn the adjusting nut. Do not turn the switch body.



HEADLIGHT AIM

▲WARNING

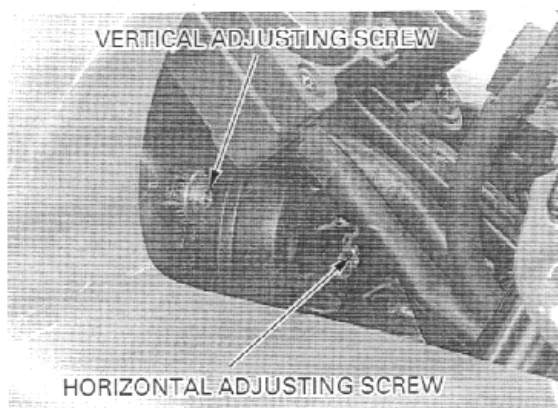
An improperly adjusted headlight may blind oncoming drivers, or it may fail to light the road for a safe distance.

Adjust headlight beam as specified by local laws and regulations.

Place the motorcycle on a level surface.

Adjust vertically by turning the vertical adjusting screw.

Adjust horizontally by turning the horizontal adjusting screw.



CLUTCH SYSTEM

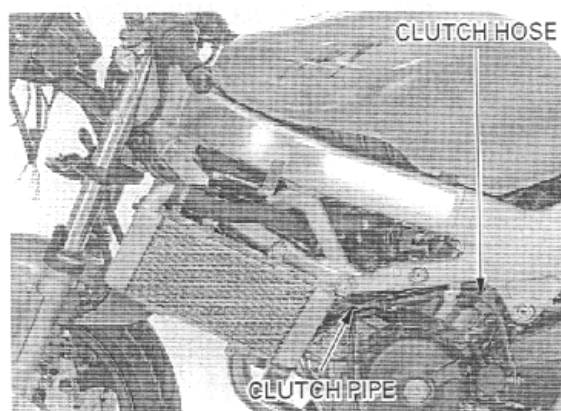
Operate the clutch lever and check that no air has entered the system.

If the clutch is not disengaged properly, or the lever feels soft or spongy, bleed the air from the system.

Refer to page 9-4 for air bleeding procedures.

Inspect the clutch hoses, pipe and fittings for damage, deterioration, cracks or signs of leakage. Tighten any loose fittings.

Replace hoses, pipe and fittings as required.

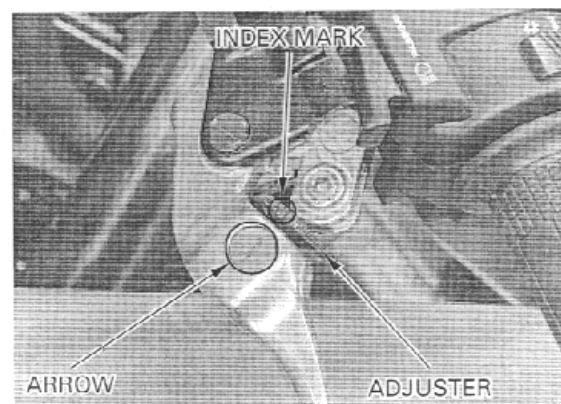


CLUTCH LEVER ADJUSTMENT

The distance between the tip of the clutch lever and the grip can be adjusted by turning the adjuster.

CAUTION:

Align the arrow on the clutch lever with the index mark on the adjuster.



CLUTCH FLUID

CAUTION:

- Do not mix different types of fluid, as they are not compatible with each other.
- Do not allow foreign material to enter the system when filling the reservoir.
- Avoid spilling fluid on painted, plastic or rubber parts. Place a rag over these parts whenever the system is serviced.

NOTE:

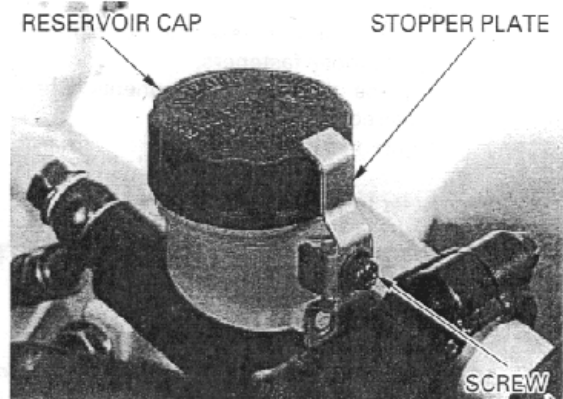
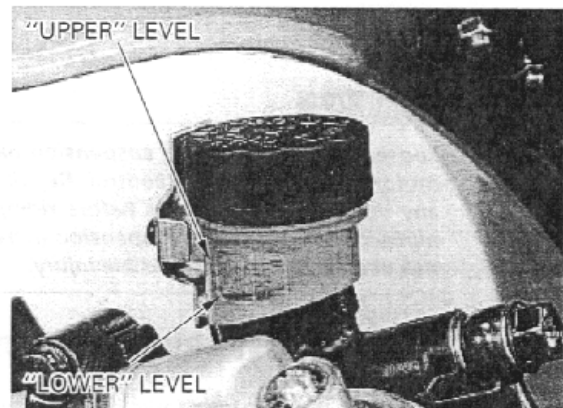
When the fluid level is low, check the entire system for leaks (page 3-22).

Turn the handlebar to the right side so the reservoir is level and check the fluid level in the clutch reservoir.

If the level is near the "LOWER" level line, remove the screw, stopper plate, reservoir cap, set plate and diaphragm, and fill the reservoir with DOT 4 brake fluid from a sealed container to the "UPPER" level line.

Install the diaphragm, set plate, reservoir cap and stopper plate, and tighten the stopper plate screw.

TORQUE: 1 N·m (0.1 kgf·m, 0.7 lbf·ft)



SIDE STAND

Support the motorcycle on a level surface.

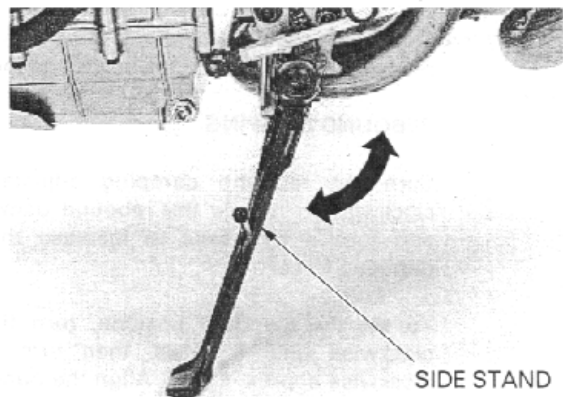
Check the side stand spring for damage or loss of tension.

Check the side stand assembly for freedom of movement and lubricate the side stand pivot if necessary.

Check the side stand ignition cut-off system according to the following procedure:

1. Sit astride the motorcycle and raise the side stand.
2. Start the engine with the transmission in neutral, then shift the transmission into gear, while squeezing the clutch lever.
3. Fully lower the side stand.
4. The engine should stop as the side stand is lowered.

If there is a problem with the system, check the side stand switch (page 19-23).



SUSPENSION

⚠ WARNING

Loose, worn or damaged suspension parts impair motorcycle stability and control. Repair or replace any damaged components before riding. Riding a motorcycle with faulty suspension increases your risk of an accident and possible injury.

FRONT SUSPENSION INSPECTION

Check the action of the forks by operating the front brakes and compressing the front suspension several times.

Check the entire assembly for signs of leaks, damage or loose fasteners.

Replace damaged components which cannot be repaired.

Tighten all nuts and bolts.

Refer to section 13 for fork service.

FRONT SUSPENSION ADJUSTMENT

SPRING PRELOAD

Turn the preload adjuster counterclockwise to reduce the spring preload, and turn it clockwise to increase the preload.

To set the standard position, align the 4th groove on the adjuster with the top surface of the fork cap.

REBOUND DAMPING

Turn the rebound damping adjuster counterclockwise to reduce the rebound damping force, and turn it clockwise to increase the rebound damping force.

To set the standard position, turn the adjuster clockwise until it stops, then turn it counterclockwise approx. 1 turn. Align the punch mark on the adjuster with the reference mark.

REAR SUSPENSION INSPECTION

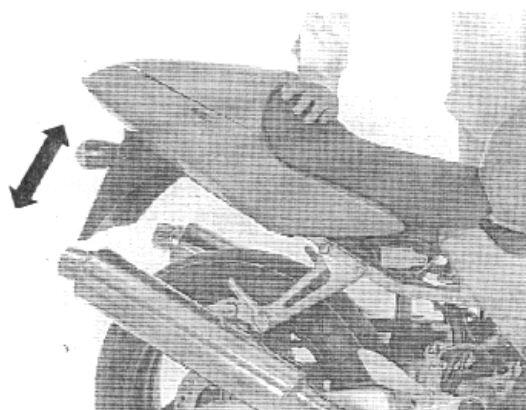
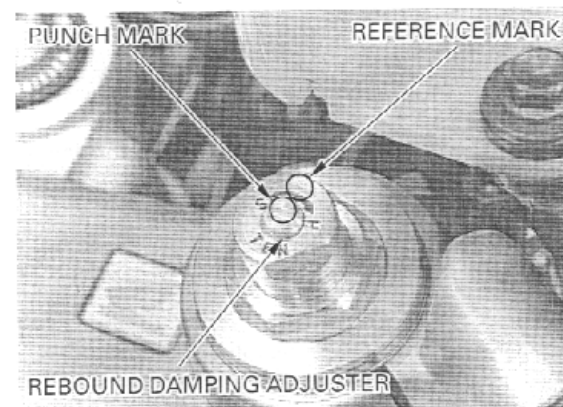
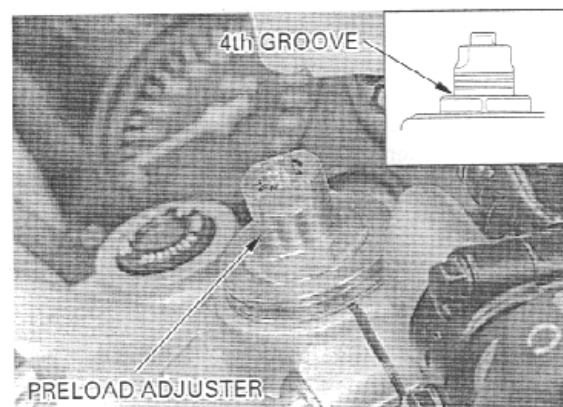
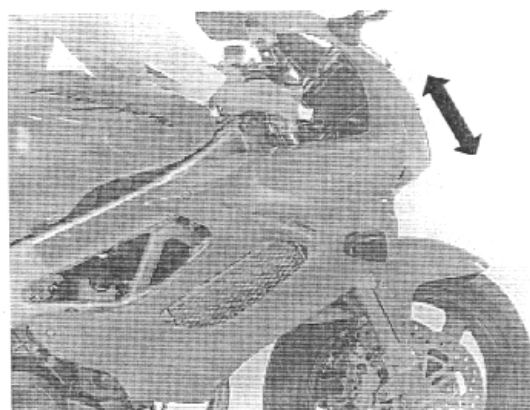
Check the action of the shock absorber by compressing it several times.

Check the entire shock absorber assembly for signs of leaks, damage or loose fasteners.

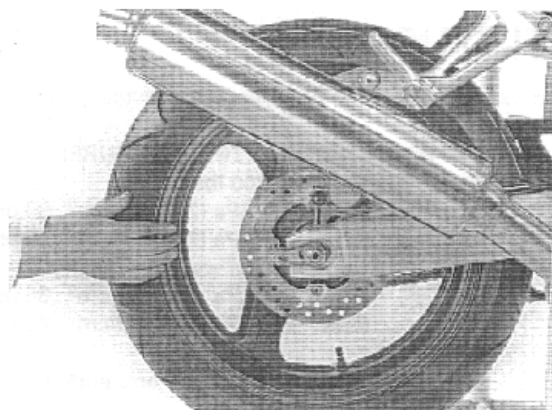
Replace damaged components which cannot be repaired.

Tighten all nuts and bolts.

Refer to section 14 for shock absorber service.



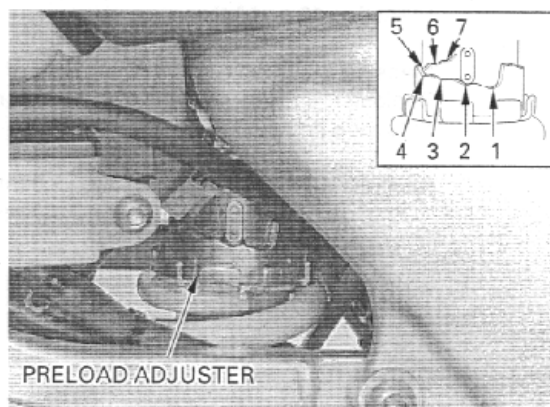
Raise the rear wheel off the ground and support the motorcycle securely.
Check for worn swingarm bearings by grabbing the rear wheel and attempting to move the wheel side to side.
Replace the bearings if any looseness is noted (section 14).



REAR SUSPENSION ADJUSTMENT

SPRING PRELOAD

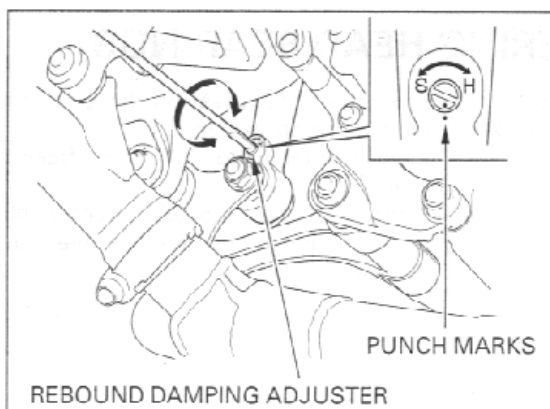
The spring preload adjuster has 7 positions.
To change the spring preload, turn the adjuster with the pin spanner.
Position 2 is the standard position.
Position 1 is for soft spring preload.
Positions 3 to 7 are for hard spring preload.



REBOUND DAMPING

Turn the rebound damping adjuster counter-clockwise to reduce the rebound damping force, and turn it clockwise to increase the rebound damping force.

To set the standard position, turn the adjuster clockwise until it stops, then turn it counter-clockwise approx. 1 turn. Align the punch marks on the adjuster and shock absorber lower joint.



NUTS, BOLTS, FASTENERS

Check that all chassis nuts and bolts are tightened to their correct torque values (page 1-13).
Check that all cotter pins, safety clips, hose clamps and cable stays are in place and properly secured.

WHEELS/TIRES

Tire pressure should be checked when the tires are COLD. Check the tire pressure with the tire pressure gauge.

RECOMMENDED TIRE PRESSURE:

Up to 90 kg (200 lbs) load:

Front: 250 kPa (2.50 kgf/cm², 36 psi)

Rear: 290 kPa (2.90 kgf/cm², 42 psi)

Up to maximum weight capacity:

Front: 250 kPa (2.50 kgf/cm², 36 psi)

Rear: 290 kPa (2.90 kgf/cm², 42 psi)

Check the tires for cuts, embedded nails, or other damage.

Check the front and rear wheels for trueness (refer to section 13 and 14).

Measure the tread depth at the center of the tires.
Replace the tires when the tread depth reaches the following limits.

MINIMUM TREAD DEPTH: Front: 1.5 mm (0.06 in)

Rear: 2.0 mm (0.08 in)



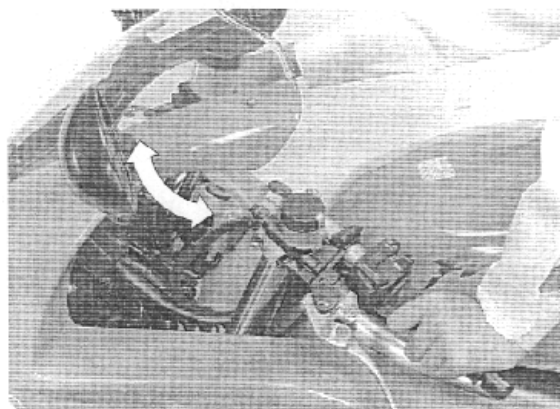
STEERING HEAD BEARINGS

Check that the control cables do not interfere with handlebar rotation.

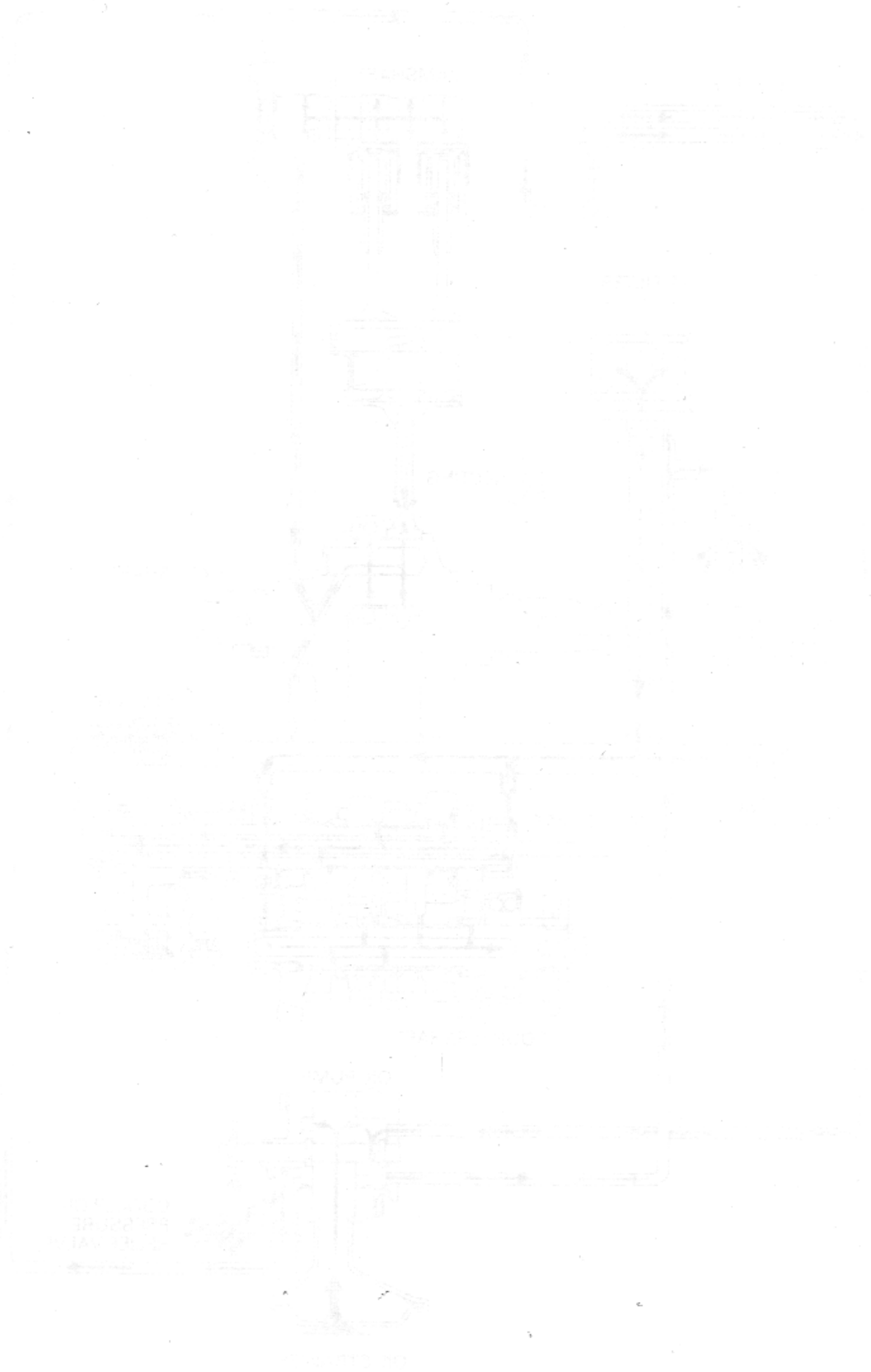
Raise the front wheel off the ground and support the motorcycle securely.

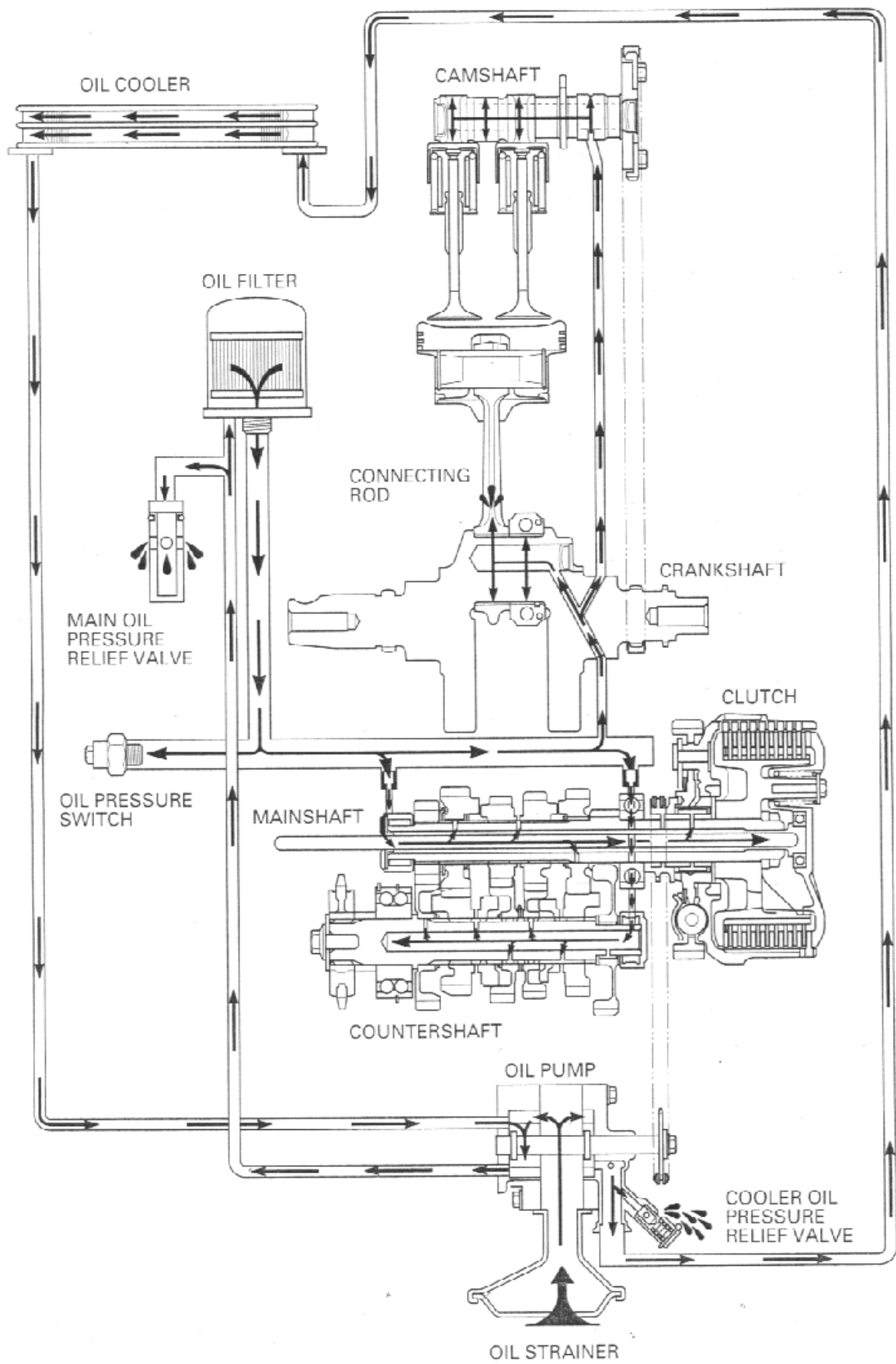
Check that the handlebar moves freely from side to side.

If the handlebar moves unevenly, binds, or has vertical movement, inspect the steering head bearings (section 13).



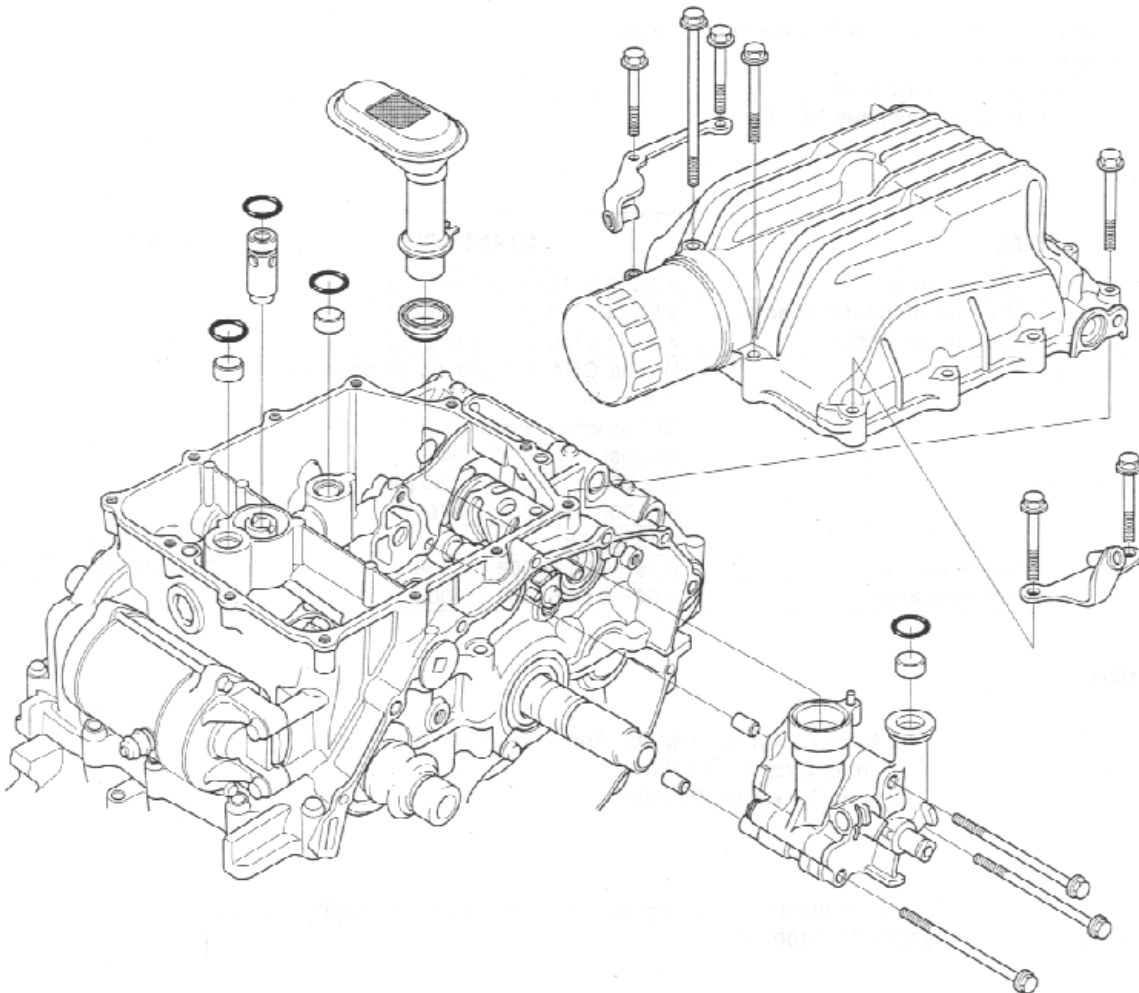
MEMO





4. LUBRICATION SYSTEM

SERVICE INFORMATION	4-2	OIL PUMP	4-7
TROUBLESHOOTING	4-3	OIL COOLER	4-11
OIL PRESSURE CHECK	4-4		
OIL STRAINER/PRESSURE RELIEF VALVE	4-5		



SERVICE INFORMATION

GENERAL

▲WARNING

- When the engine must be running to do some work, make sure the area is well-ventilated. Never run the engine in an enclosed area. The exhaust contains poisonous carbon monoxide gas that may cause loss of consciousness and lead to death. Run the engine in an open area or with an exhaust evacuation system in an enclosed area.
- Used engine oil may cause skin cancer if repeatedly left in contact with the skin for prolonged periods. Although this is unlikely unless you handle used oil on a daily basis, it is still advisable to thoroughly wash your hands with soap and water as soon as possible after handling used oil. **KEEP OUT OF REACH OF CHILDREN.**

- The oil pump can be serviced with the engine installed in the frame.
- For engine oil level check, see page 3-10.
- For engine oil and filter change, see page 3-11.
- For oil pressure indicator inspection, see page 19-19.

SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Engine oil capacity	After draining	3.7 ℓ (3.9 US qt, 3.3 Imp qt)	_____
	After draining/filter change	3.9 ℓ (4.1 US qt, 3.4 Imp qt)	_____
	After disassembly	4.5 ℓ (4.8 US qt, 4.0 Imp qt)	_____
Recommended engine oil		Honda GN4 4-stroke oil or equivalent motor oil API service classification SF or SG Viscosity: SAE 10W-40	_____
Oil pressure (at oil pressure switch)		588 kPa (6.0 kgf/cm ² , 85 psi) at 5,000 rpm /80 °C (176 °F)	_____
Oil pump	Tip clearance	0.15 (0.006)	0.20 (0.008)
	Body clearance	0.15—0.21 (0.006—0.008)	0.35 (0.014)
	Side clearance	0.02 0.09 (0.001—0.004)	0.12 (0.005)

TORQUE VALUES

Oil pressure switch	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply sealant to the threads
Oil pressure switch terminal screw	2 N·m (0.2 kgf·m, 1.4 lbf·ft)	
Oil pump bolt	13 N·m (1.3 kgf·m, 9 lbf·ft)	

TOOLS

Oil pressure gauge	07506-3000000	or equivalent commercially available in U.S.A.
Oil pressure gauge attachment	07510-4220100	

TROUBLESHOOTING

Oil level too low

- Oil consumption
- External oil leak
- Worn piston rings
- Improperly installed piston rings
- Worn cylinders
- Worn stem seals
- Worn valve guide

Low oil pressure

- Oil level low
- Clogged oil strainer
- Faulty oil pump
- Internal oil leak
- Incorrect oil being used

No oil pressure

- Oil level too low
- Oil pressure relief valve stuck open
- Broken oil pump drive chain
- Broken oil pump drive or driven sprocket
- Damaged oil pump
- Internal oil leak

High oil pressure

- Oil pressure relief valve stuck closed
- Clogged oil gallery or metering orifice
- Incorrect oil being used

Oil contamination

- Oil or filter not changed often enough
- Worn piston rings

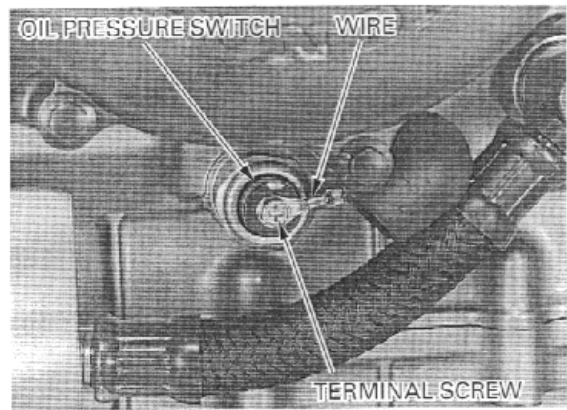
Oil emulsification

- Blown cylinder head gasket
- Leaky coolant passage
- Entry of water

OIL PRESSURE CHECK

Start the engine and warm it up to normal operating temperature.

Stop the engine, remove the rubber cap and disconnect the oil pressure switch wire by removing the terminal screw.

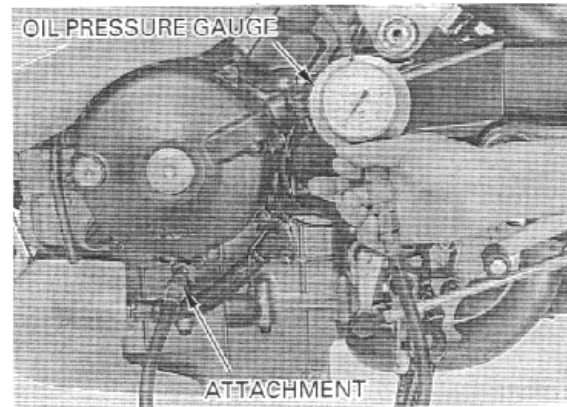


Remove the oil pressure switch and connect an oil pressure gauge attachment and gauge to the pressure switch hole.

TOOLS:

Oil pressure gauge	07506-3000000 or equivalent commercially available in U.S.A.
Oil pressure gauge attachment	07510-4220100 or equivalent commercially available in U.S.A.

Check the oil level and add the recommended oil if necessary (page 3-10).



Start the engine and check the oil pressure.

OIL PRESSURE: 588 kPa (6.0 kgf/cm², 85 psi)
at 5,000 rpm/80 °C (176 °F)

Stop the engine.

Apply sealant to the oil pressure switch threads as shown.

Remove the oil pressure gauge and attachment and install the oil pressure switch.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

CAUTION:

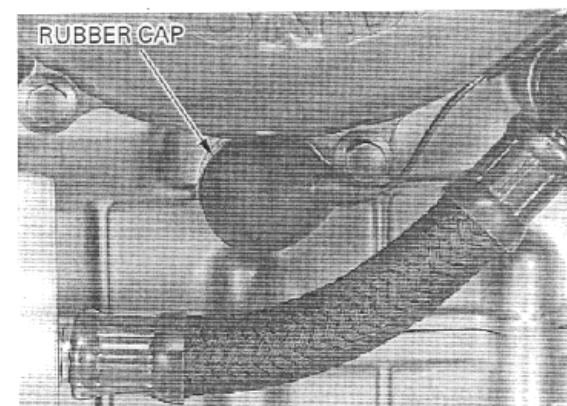
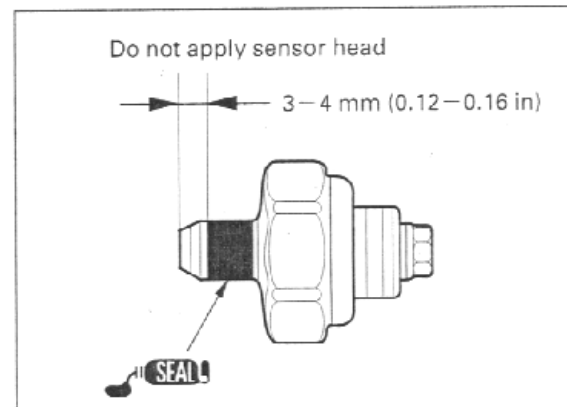
To prevent crankcase damage, do not overtighten the switch.

Connect the oil pressure switch cord and install the rubber cap.

Start the engine.

Check that the oil pressure indicator goes out after one or two seconds.

If the oil pressure indicator stays on, stop the engine and check the indicator system (page 19-14).

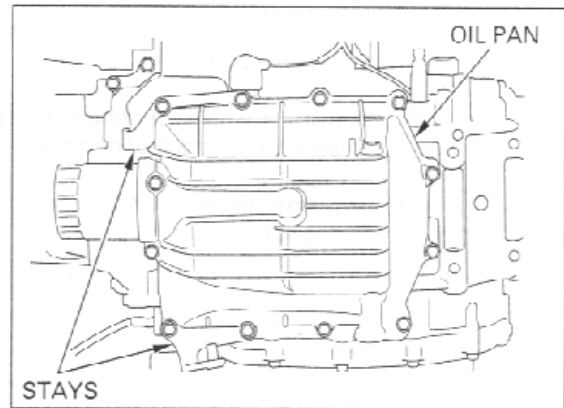


OIL STRAINER/PRESSURE RELIEF VALVE

OIL PAN REMOVAL

Drain the engine oil (page 3-10).
Remove the exhaust pipe (page 2-5).

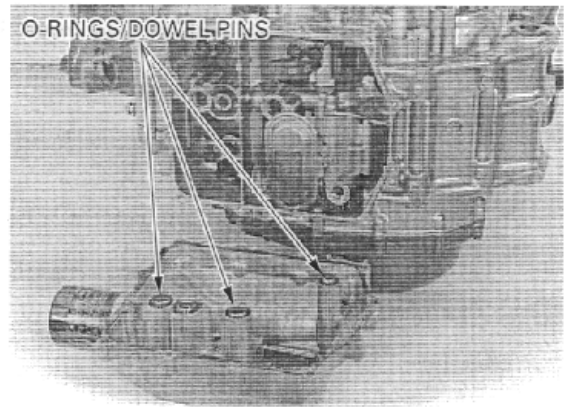
Remove the twelve oil pan mounting bolts, engine lower fairing stays and the oil pan.



Remove the dowel pins and O-rings.

CAUTION:

If the engine has been removed from the frame, do not set the engine onto the oil pan mating surface.



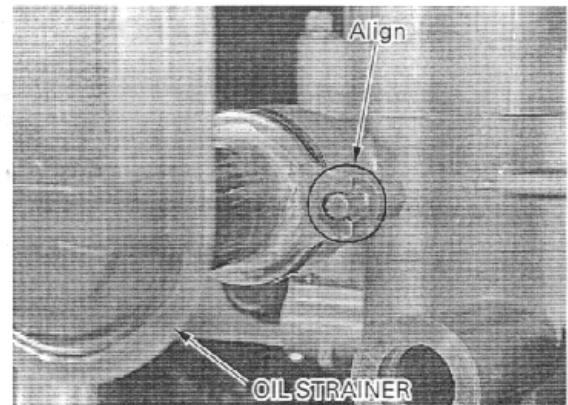
OIL STRAINER

Remove the oil strainer and seal rubber from the oil pump.

Clean the oil strainer screen thoroughly.

Coat a new seal rubber with oil and install it onto the strainer.

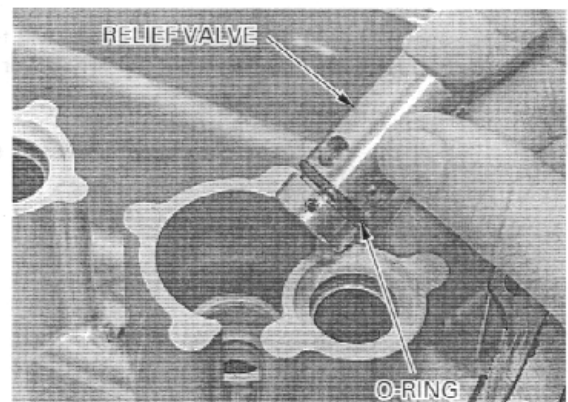
Install the strainer, aligning its groove with the pin on the oil pump.



OIL PRESSURE RELIEF VALVE

Remove the oil pressure relief valve from the oil pan.

Remove the O-ring from the relief valve body.

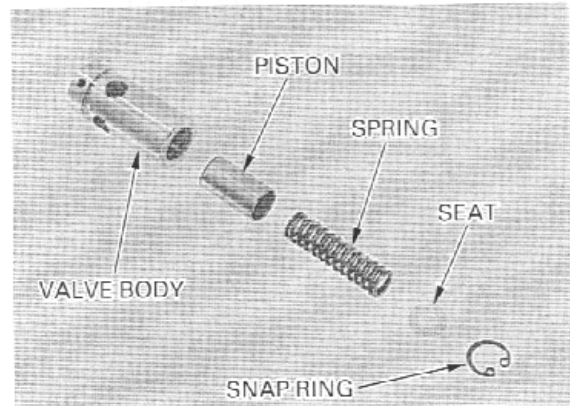


LUBRICATION SYSTEM

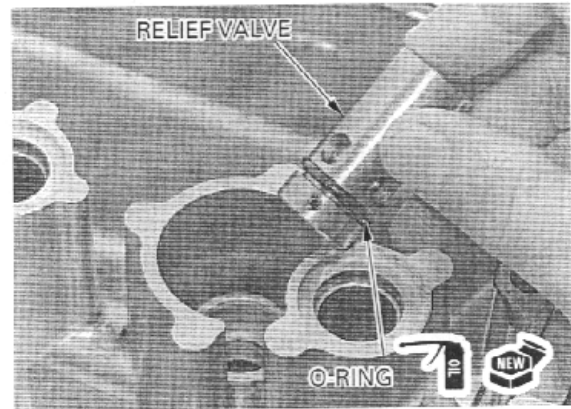
Remove the snap ring, spring seat, spring and piston from the valve body.

Check the piston for wear, sticking or other damage.
Check the spring for fatigue or damage.

Install the piston, spring and spring seat and secure them with the snap ring.

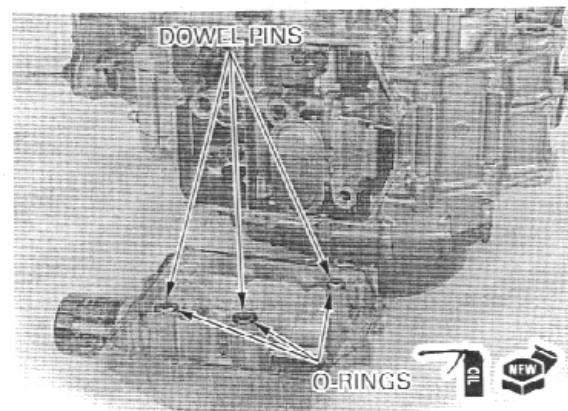


Coat a new O-ring with oil and install it into the relief valve body groove.
Install the relief valve into the oil pan.



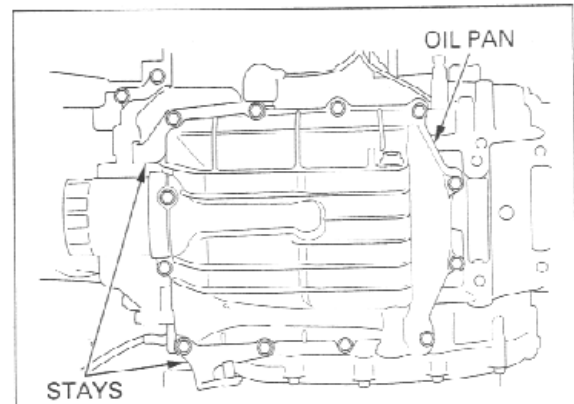
OIL PAN INSTALLATION

Clean the oil pan mating surfaces thoroughly.
Apply sealant to the oil pan mating surface.
Install the dowel pins.
Coat new O-rings with oil and install them onto the dowel pins.



Install the oil pan and cover stays, and tighten the twelve bolts in a crisscross pattern in 2 or 3 steps.

Install the exhaust pipe (page 2-6).
Fill the crankcase with recommended engine oil (page 3-10).



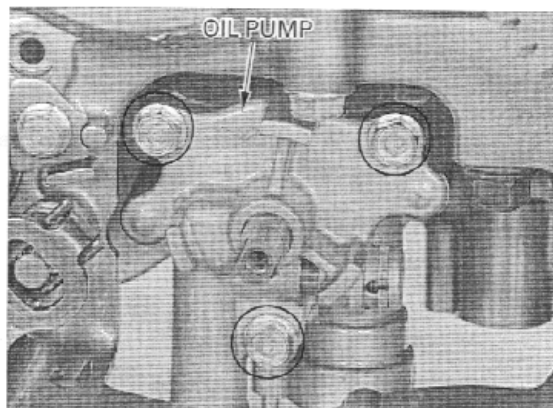
OIL PUMP

REMOVAL

Remove the oil pan and oil strainer (page 4-5).
Remove the clutch and oil pump driven sprocket (page 9-12).

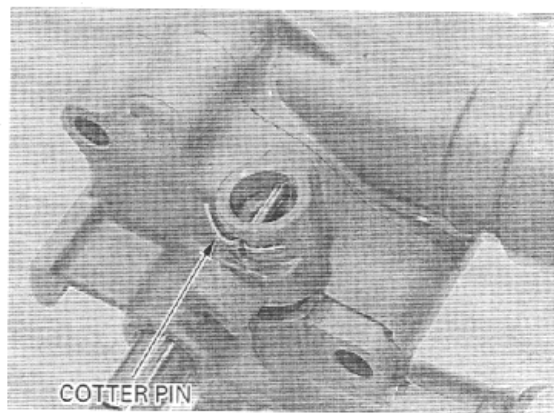
Remove the oil pump mounting bolts and the oil pump.

Remove the dowel pins.



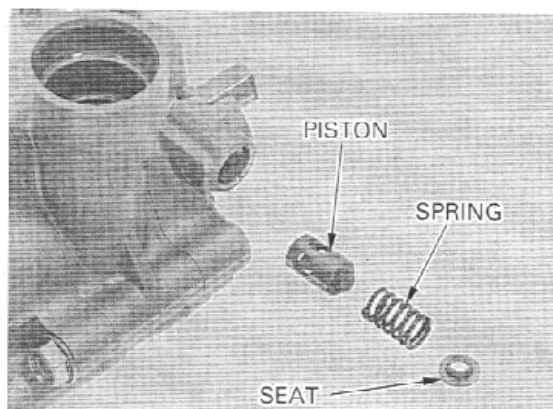
COOLER PUMP RELIEF VALVE

Remove the cotter pin, spring seat, spring and piston.



Check the piston for wear, sticking or other damage.
Check the spring for fatigue or damage.

Install the piston, spring and spring seat and secure them with a new cotter pin.

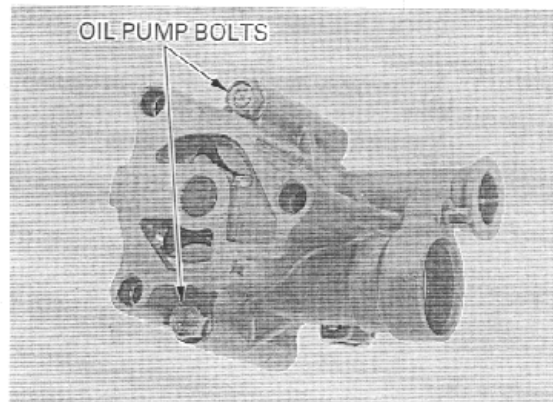


DISASSEMBLY

Remove the following:

- oil pump bolts
- cooler pump body
- dowel pins
- cooler pump outer and inner rotors
- drive pin
- main pump body
- pump shaft
- thrust washer
- drive pin
- main pump inner and outer rotors

Clean the all disassembled parts thoroughly.

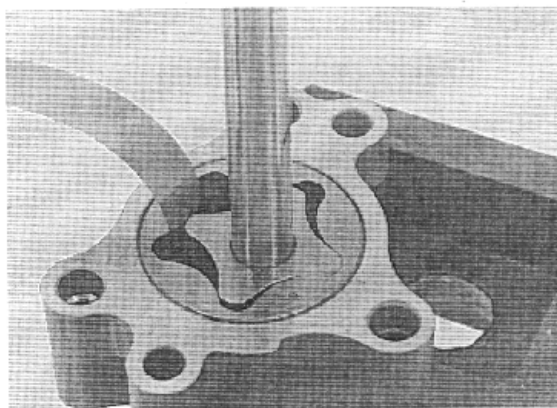


INSPECTION

MAIN PUMP

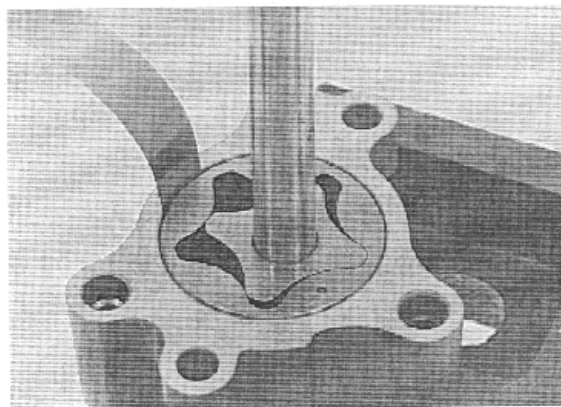
Temporarily assemble the main pump (page 4-9).
Measure the rotor tip clearance.

SERVICE LIMIT: 0.20 mm (0.008 in)



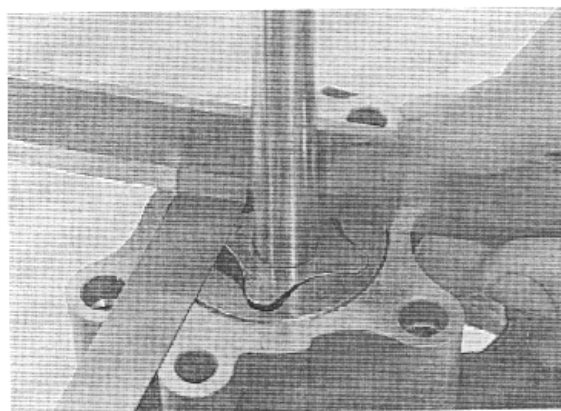
Measure the pump body clearance.

SERVICE LIMIT: 0.35 mm (0.014 in)



Measure the pump side clearance.

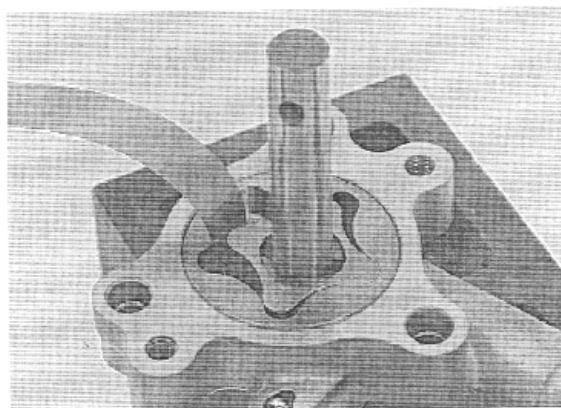
SERVICE LIMIT: 0.12 mm (0.005 in)



COOLER PUMP

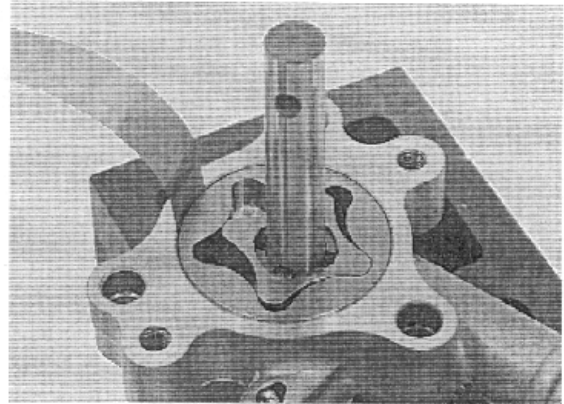
Temporarily assemble the cooler pump outer rotor,
inner rotor, pump shaft and drive pin.
Measure the rotor tip clearance.

SERVICE LIMIT: 0.20 mm (0.008 in)



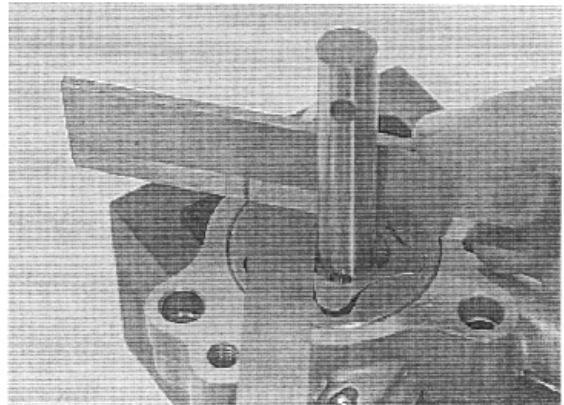
Measure the pump body clearance.

SERVICE LIMIT: 0.35 mm (0.014 in)



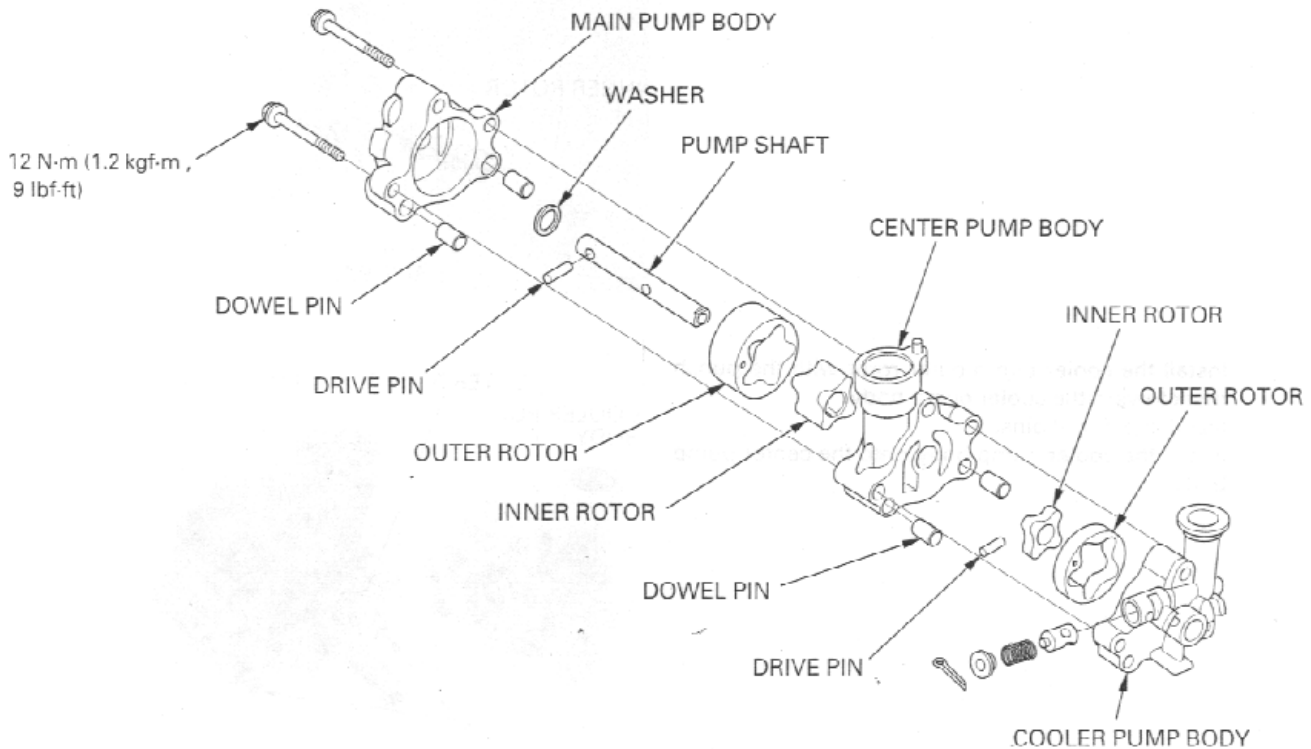
Measure the pump side clearance.

SERVICE LIMIT: 0.12 mm (0.005 in)



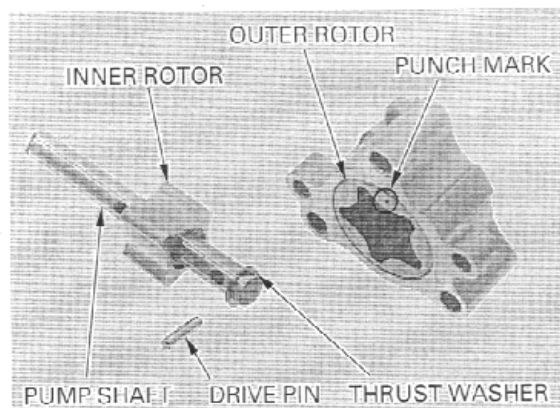
ASSEMBLY

Dip all parts in clean engine oil.

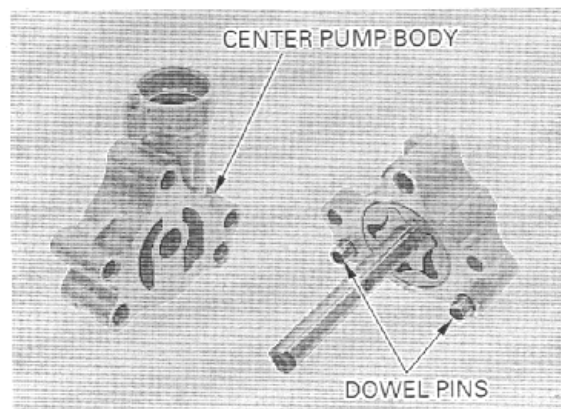


LUBRICATION SYSTEM

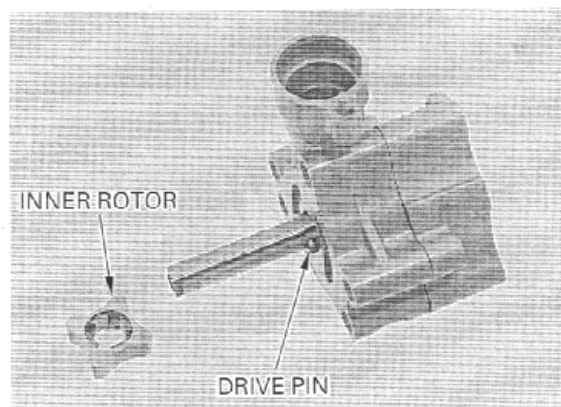
Install the main pump outer rotor into the pump body with the punch mark facing out.
Install the drive pin into the pump shaft, and install the main pump inner rotor onto the shaft, aligning the slots with the drive pin.
Install the thrust washer, shaft and inner rotor into the main pump body.



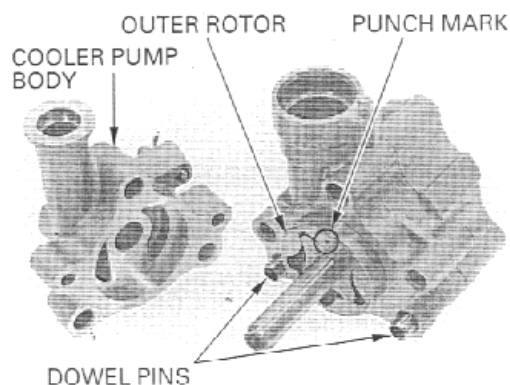
Install the dowel pins.
Install the main pump assembly onto the center pump body.



Install the drive pin into the pump shaft and install the cooler pump inner rotor onto the shaft, aligning the slots with the drive pin.



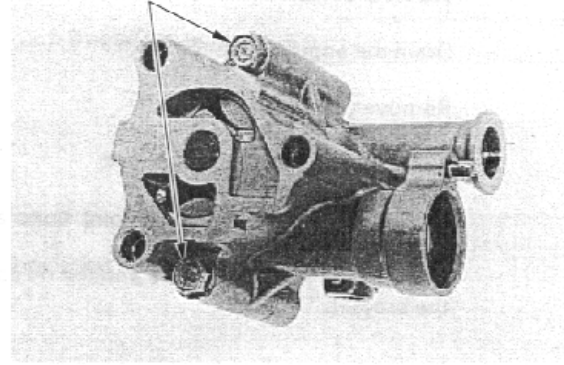
Install the cooler pump outer rotor with the punch mark toward the cooler pump body.
Install the dowel pins.
Install the cooler pump body onto the center pump body.



Install the oil pump bolts and tighten them.

TORQUE: 13 N·m (1.3 kgf·m, 9 lbf·ft)

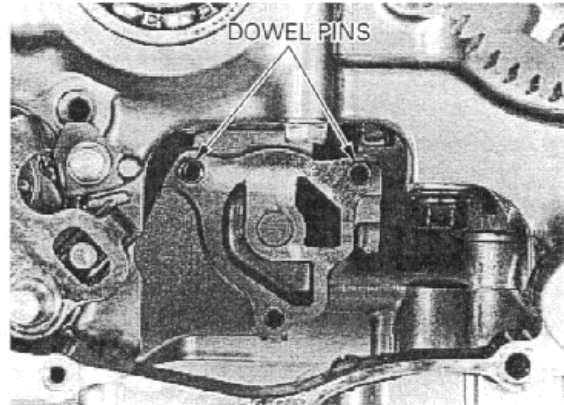
OIL PUMP BOLTS



INSTALLATION

Install the dowel pins.

DOWEL PINS

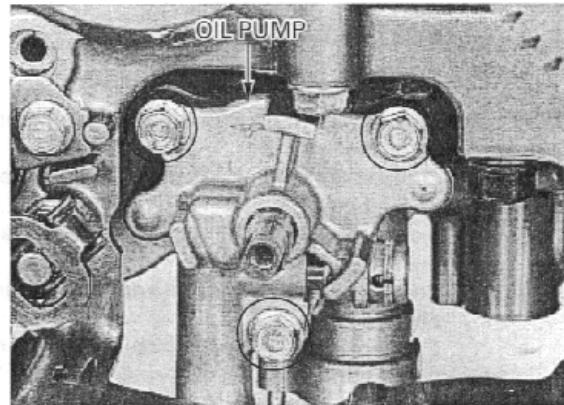


Install the oil pump and tighten the mounting bolts securely.

Install the clutch (page 9-17).

Install the oil pan (page 4-6).

OIL PUMP



OIL COOLER

INSPECTION

Remove the front fairing (page 2-3).

Check the oil cooler pipe joints and seams for leaks. Check the oil cooler air passage for clogs or damage.

Straighten bent fins with a small, flat blade screwdriver and remove insects, mud or other obstructions with compressed air or low pressure water.

OIL COOLER



REMOVAL

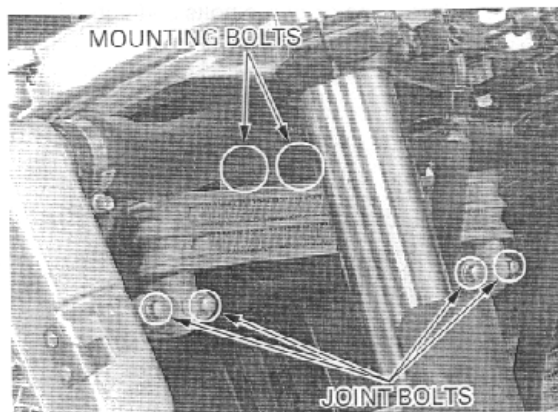
Drain the engine oil (page 3-10).

Remove the following:

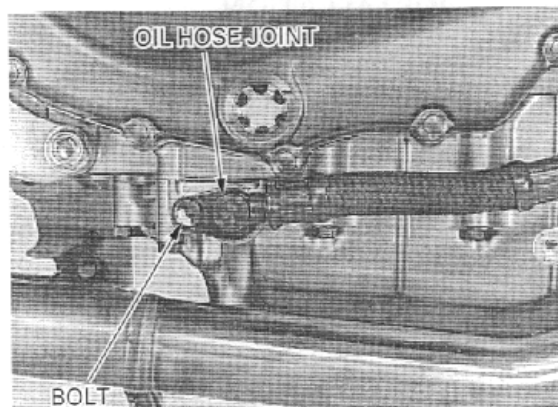
- front fairing (page 2-3)
- engine lower fairing (page 2-4)

Remove the oil cooler pipe joint bolts and joints from the oil cooler.

Remove the mounting bolts and the oil cooler from the bracket.



Remove the oil hose joint bolts and joints from the engine, then remove the oil hoses/pipes.



INSTALLATION

Install the oil hoses/pipes.

Coat new O-rings with oil and install them onto the oil hose joints.

Connect the oil hose joints to the engine and tighten the bolts.

Install the oil cooler onto the bracket and tighten the mounting bolts.

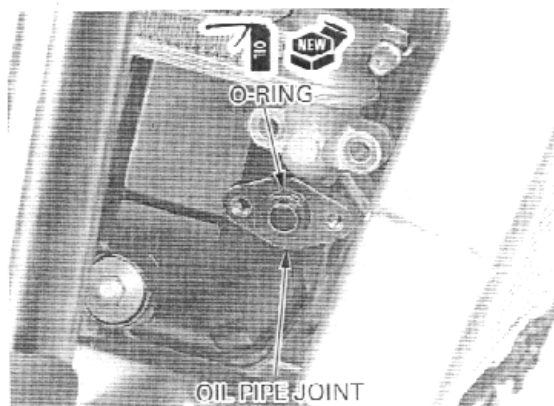
Coat new O-rings with oil and install them onto the oil pipe joints.

Connect the oil pipe joints to the oil cooler and tighten the bolts.

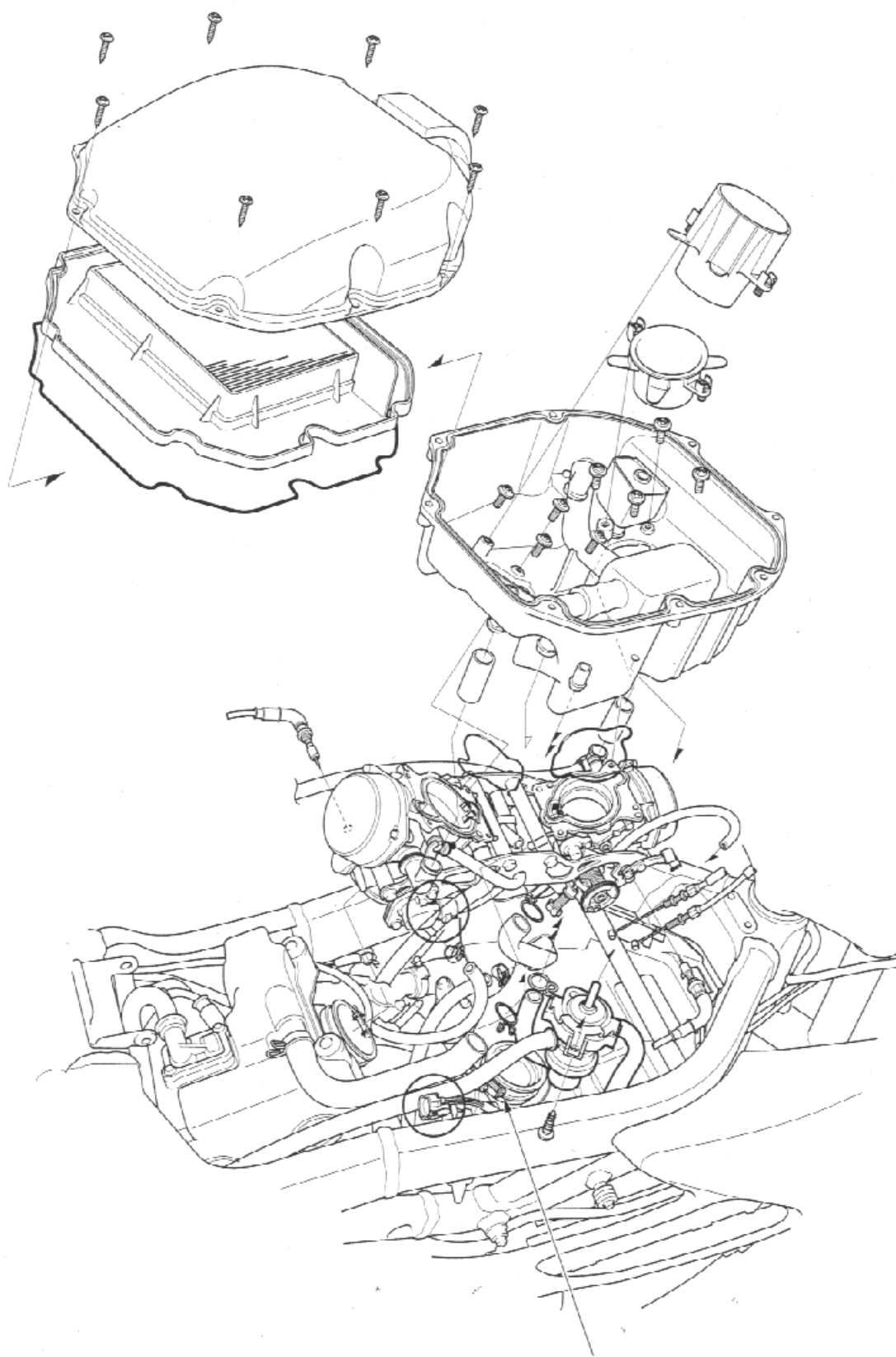


Install the removed parts in the reverse order of removal.

Fill the crankcase with recommended engine oil (page 3-10).



MEMO



1 N·m (0.1 kgf·m , 0.7 lbf·ft)

5. FUEL SYSTEM

SERVICE INFORMATION	5-1	CARBURETOR COMBINATION	5-15
TROUBLESHOOTING	5-3	CARBURETOR INSTALLATION	5-18
AIR CLEANER HOUSING	5-4	CHOKE SYSTEM	5-20
CARBURETOR REMOVAL	5-5	PILOT SCREW ADJUSTMENT	5-21
CARBURETOR SEPARATION	5-8	HIGH ALTITUDE ADJUSTMENT	5-22
CARBURETOR DISASSEMBLY/ INSPECTION	5-9	SECONDARY AIR SUPPLY SYSTEM	5-24
CARBURETOR ASSEMBLY	5-12	EVAPORATIVE EMISSION CONTROL SYSTEM (California type only)	5-25

SERVICE INFORMATION

GENERAL

▲WARNING

- Gasoline is extremely flammable and is explosive under certain conditions. **KEEP OUT OF REACH OF CHILDREN.**
- If the engine must be running to do some work, make sure the area is well-ventilated. Never run the engine in an enclosed area. The exhaust contains poisonous carbon monoxide gas that may cause loss of consciousness and may lead to death. Run the engine in an open area or with an exhaust evacuation system in an enclosed area.
- Bending or twisting the control cable will impair smooth operation and could cause the cable to stick or bind, resulting in loss of vehicle control.

Work in a well ventilated area. Smoking or allowing flames or sparks in the work area or where gasoline is stored can cause a fire or explosion.

CAUTION:

Be sure to remove the diaphragms before cleaning air and fuel passages with compressed air. The diaphragms might be damaged.

- For fuel tank removal and installation; see page 2-4.
- Before disassembling the carburetors, place an approved fuel container under the float chambers, loosen the drain screws and drain the carburetors.
- After removing the carburetors, cover the intake ports of the cylinder heads with shop towels to prevent any foreign material from dropping into the engine.
- When disassembling the fuel system parts, note the locations of the O-rings. Replace them with new ones on reassembly.
- The vacuum chamber and float chamber can be serviced with the carburetors combined.
- All hoses used in the evaporative emission control system (California type only) and secondary air supply system are numbered for identification. When connecting any of these hoses, compare the hose number with the Vacuum Hose Routing Diagram Label for its proper routing.
- For carburetor synchronization, see page 3-12.

NOTE:

If the vehicle is to be stored for more than one month, drain the float bowls. Fuel left in the float bowls may cause clogged jets, resulting in hard starting or poor driveability.

FUEL SYSTEM

SPECIFICATIONS

ITEM		SPECIFICATIONS
Carburetor identification number	49 state/Canada type	'98-'00: VPT2A, After '00: VPT3B
	California type	'98-'00: VPT1A, After '00: VPT3C
Main jet		Front: # 175, Rear: # 178
Slow jet		# 45
Jet needle number		Front: A1UF, Rear: A1UE
Pilot screw opening		See page 5-21
Float level		16.6 ± 0.5 mm (0.65 ± 0.02 in)
Idle speed		1,200 ± 100 rpm

TORQUE VALUES

Carburetor insulator band bolt	1 N·m (0.1 kgf·m , 0.7 lbf·ft)	
Reed valve cover bolt	5 N·m (0.5 kgf·m , 3.6 lbf·ft)	Apply locking agent to the threads.

TOOLS

Float level gauge	07401-0010000
Pilot screw wrench	07KMA-MN90100 or 07MMA-MV9010A (U.S.A. only)

TROUBLESHOOTING

Engine cranks but won't start

- No fuel in tank
- No fuel to carburetor
 - Clogged fuel strainer
 - Clogged fuel line
 - Clogged fuel valve vacuum tube
 - Disconnected fuel valve vacuum tube
 - Clogged fuel tank breather tube
- Too much fuel getting to the engine
 - Clogged air cleaner
 - Flooded carburetor
- Intake air leak
- Contaminated/deteriorated fuel
- Improper choke operation
- Improper throttle operation
- No spark at plug (faulty ignition system-section 17)

Lean mixture

- Clogged fuel jets
- Faulty float valve
- Float level too low
- Restricted fuel line
- Clogged carburetor air vent tube
- Restricted fuel tank breather tube
- Intake air leak
- Faulty vacuum piston
- Faulty EVAP control system (California type only)
 - Faulty EVAP carburetor air vent (CAV) control valve
 - Clogged hose of the EVAP CAV system

Rich mixture

- Starting enrichment valve open
- Clogged air jets
- Faulty float valve
- Float level too high
- Dirty air cleaner
- Faulty vacuum piston
- Faulty EVAP control system (California type only)
 - Faulty EVAP purge control valve
 - Clogged hose of EVAP purge system

Engine stalls, hard to start, rough idling

- Restricted fuel line
- Fuel mixture too lean/rich
- Contaminated/deteriorated fuel
- Intake air leak
- Misadjusted idle speed
- Misadjusted pilot screw
- Restricted fuel tank breather tube
- Clogged air cleaner
- Clogged slow circuit
- Starting enrichment valve open
- Faulty EVAP control system (California type only)
 - Faulty EVAP CAV control valve
 - Faulty EVAP purge control valve
 - Clogged hose of the EVAP control system
- Faulty ignition system (section 17)

Afterburn when engine braking is used

- Lean mixture in slow circuit
- Faulty air cut-off valve
- Faulty pulse secondary air injection (PAIR) system
 - Faulty PAIR control valve
 - Faulty PAIR check valve
 - Clogged hose of the PAIR system
- Faulty ignition system (section 17)

Backfiring or misfiring during acceleration

- Lean mixture
- Faulty ignition system (section 17)

Poor performance (driveability) and poor fuel economy

- Clogged fuel system
- Faulty EVAP control system (California type only)
 - Faulty EVAP CAV control valve
 - Clogged hose of the EVAP CAV system
- Faulty ignition system (section 17)

AIR CLEANER HOUSING

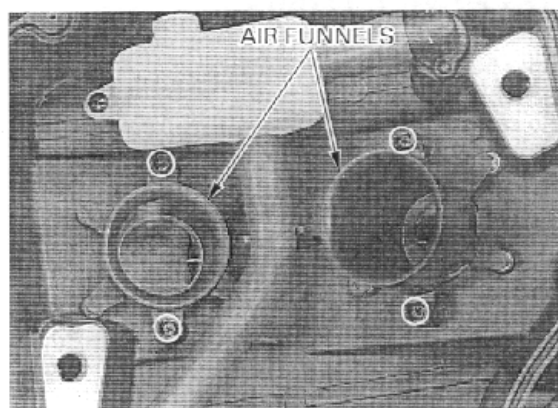
REMOVAL/INSTALLATION

NOTE:

Do not remove the air cleaner housing from the carburetors unless the carburetor overhaul is required.

Remove the air cleaner element (page 3-5).

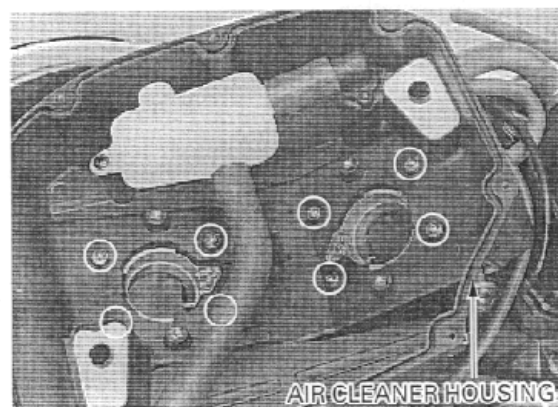
Remove the screws and air funnels.



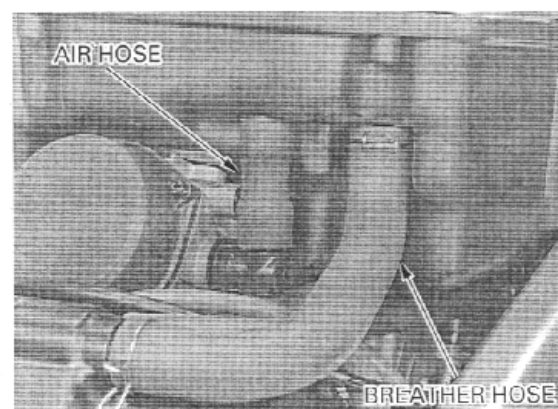
Remove the eight air cleaner housing mounting screws.

CAUTION:

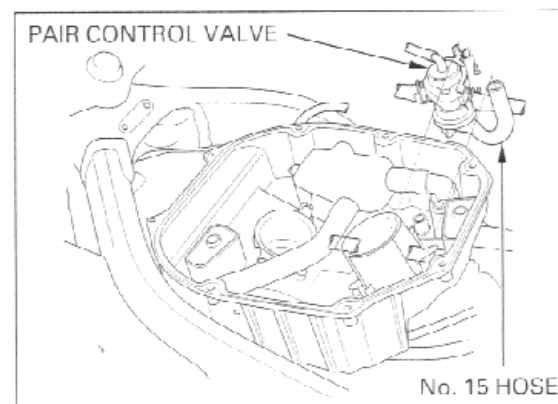
Do not overtighten the screws when installing, as the threaded holes in the carburetors will be stripped.



Disconnect the front and rear crankcase breather hoses and air hoses from the air cleaner housing. Remove the air cleaner housing.

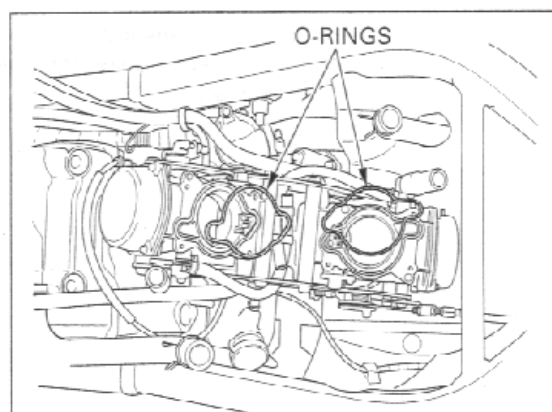


Remove the screw and the pulse secondary air injection (PAIR) control valve with the stay, and disconnect the air supply (No. 15) hose from the air cleaner housing.



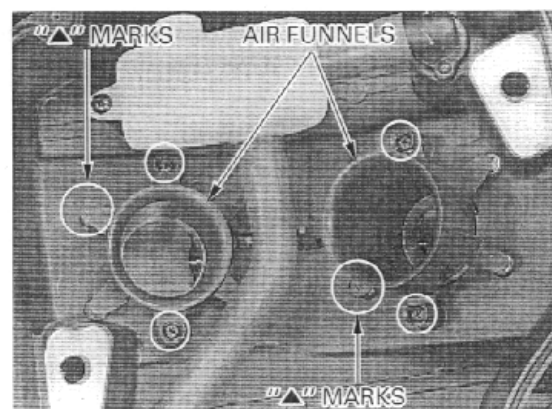
Remove the O-rings.

Install new O-rings into the carburetor grooves.
Install the removed parts in the reverse order of removal.



NOTE:

- Note that the rear air funnel is longer than the front air funnel.
- Install the air funnels by aligning the "▲" marks on the air funnel and air cleaner housing.



CARBURETOR REMOVAL

Drain the coolant (page 6-5).
Remove the air cleaner housing (page 5-4).

NOTE:

When the carburetors will not be serviced, remove the carburetor assembly with the air cleaner housing attached to prevent the threaded holes in the carburetor from damaging.

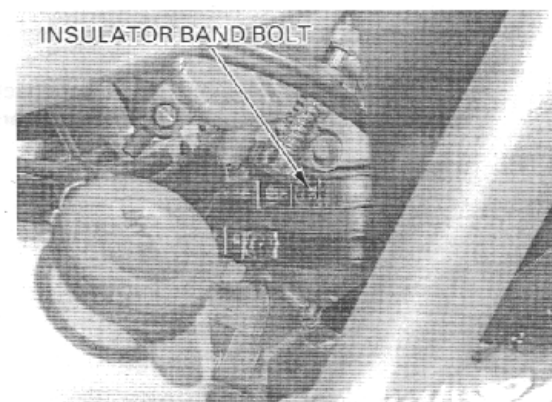
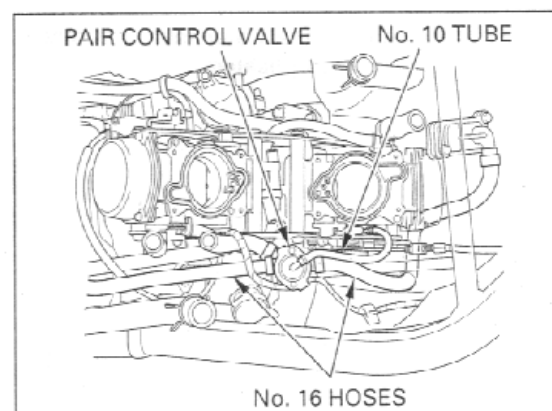
Remove the pulse secondary air injection (PAIR) control valve by disconnecting the No. 10 vacuum tube and No. 16 air supply hoses.

Loosen the carburetor insulator band bolts from the right side.

NOTE:

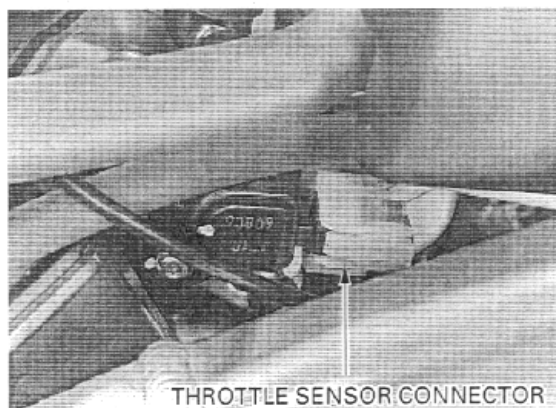
Insert the screwdriver through the hole in the heat guard to loosen the front carburetor insulator band bolt.

Remove the carburetor assembly from the insulators.



FUEL SYSTEM

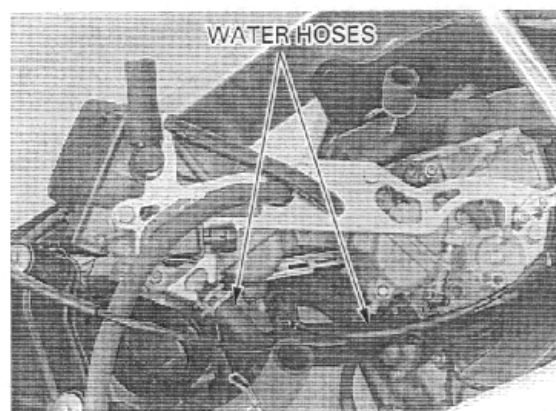
Disconnect the throttle sensor 3P (white) connector. Remove the throttle sensor wire from the clamp on the carburetor set plate.



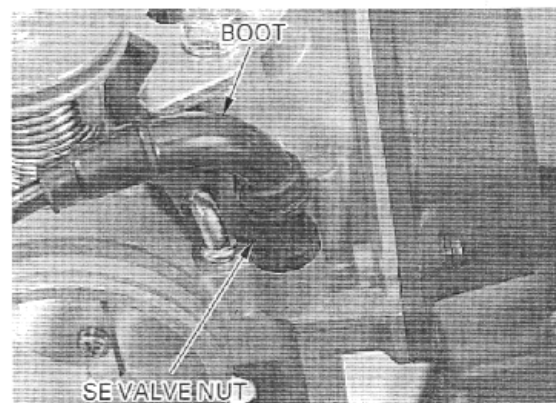
Remove the throttle cables from the cable stay and disconnect them from the throttle drum.



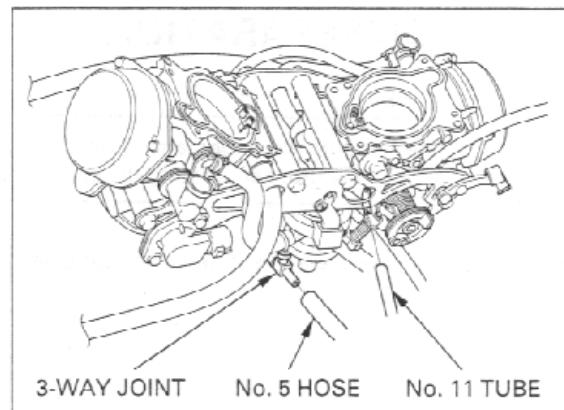
Disconnect the water inlet and outlet hoses from the carburetor heaters.



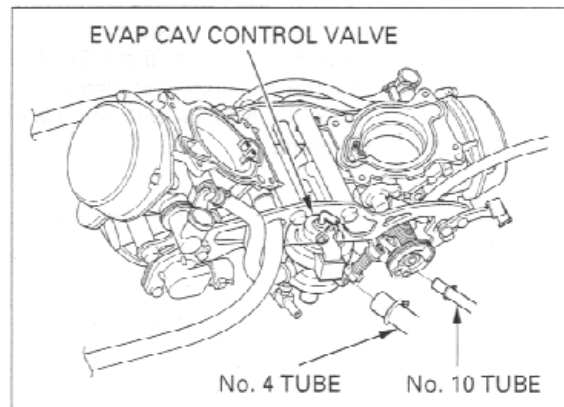
Slide off the boots from the starting enrichment (SE) valve nuts. Loosen the SE valve nuts and disconnect the choke cables from the front and rear carburetors.



California type only: Disconnect the No. 5 hose from the 3-way joint.
Disconnect the No. 11 vacuum tube from the vacuum joint of the front carburetor.



California type only: Disconnect the No. 10 vacuum tube and No. 4 hose from the evaporative emission (EVAP) carburetor air vent (CAV) control valve.



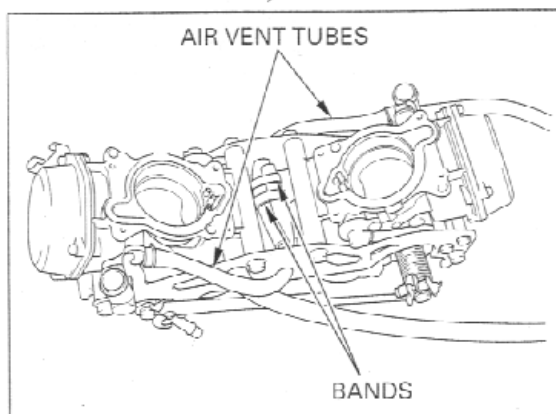
CARBURETOR SEPARATION

NOTE:

The vacuum chamber and float chamber can be serviced without separating the carburetors.

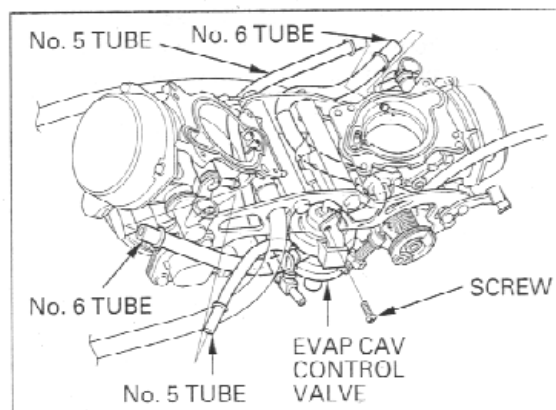
49 states/Canada
type only:

Remove the air vent tubes and tube bands.

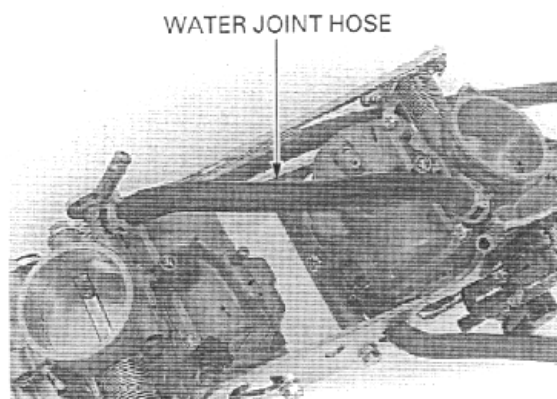


California type
only:

Disconnect the No. 6 tubes from the carburetors, and remove the screw and the EVAP CAV control valve from the carburetor set plate. Remove the No. 5 tubes with the 3-way joint from the carburetors.



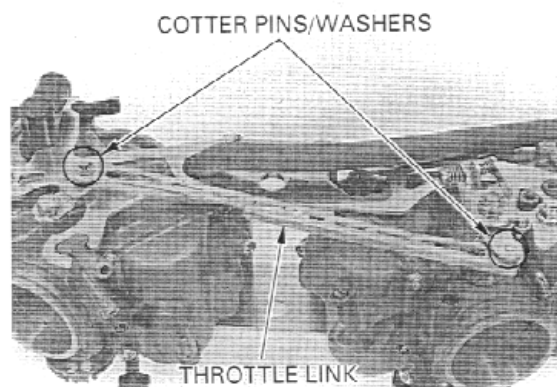
Remove the water joint hose.



Remove the cotter pins, washers and throttle link.

CAUTION:

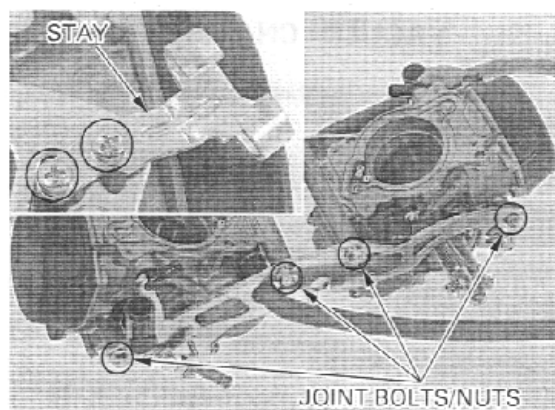
Be careful not to bend or damage the throttle arm and link.



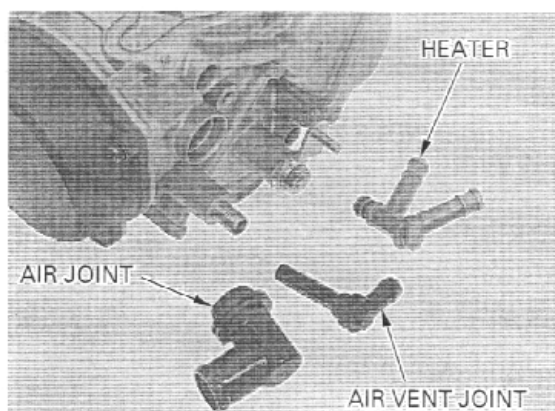
Remove the cable stay from the front carburetor.
Remove the four nut and joint bolts, and separate the carburetors.
Remove the set plates, dowel pins and fuel tubes.

CAUTION:

*Do not remove the throttle sensor from the set plate unless it requires replacement.
It can cause the throttle sensor getting out of position resulting in improper ignition timing.*



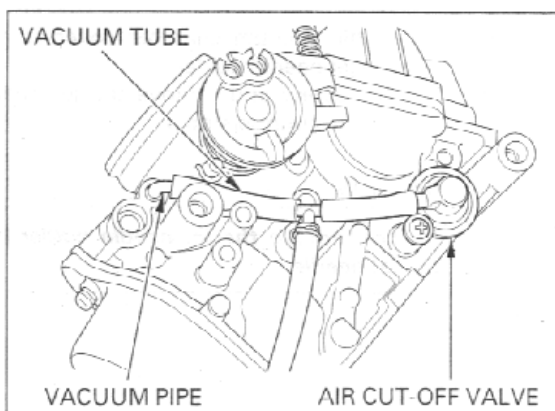
Remove the air joint, air vent joint and carburetor heater from each carburetor.



CARBURETOR DISASSEMBLY/INSPECTION

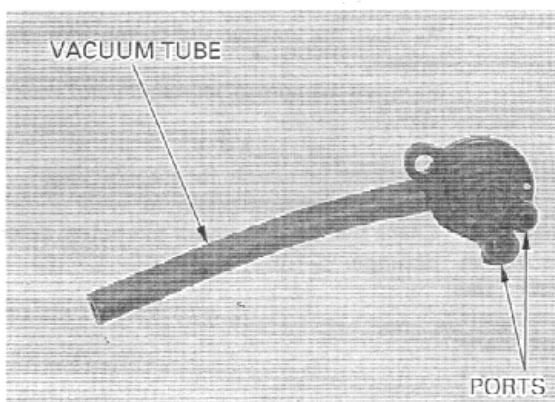
AIR CUT-OFF VALVE

Disconnect the vacuum tube from the vacuum pipe.
Remove the attaching screw, washer and the air cut-off valve.
Remove the O-rings and joint pipe.



Apply vacuum to the vacuum tube.

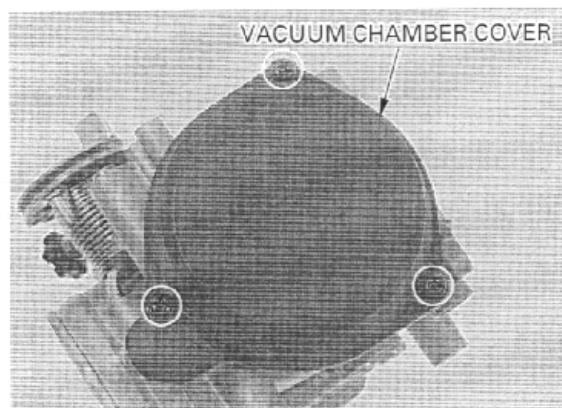
The vacuum should maintained.
Air should not flow through the valve ports when the vacuum is applied, and should flow when the vacuum is not applied.



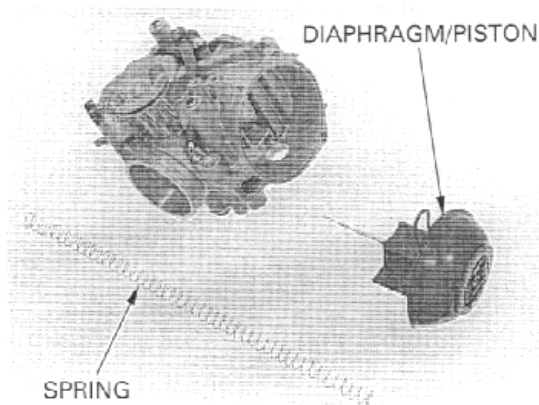
VACUUM CHAMBER

As the compression spring is very long, it will jump out of the carburetor when the cover is removed.

Remove the three screws and the vacuum chamber cover.

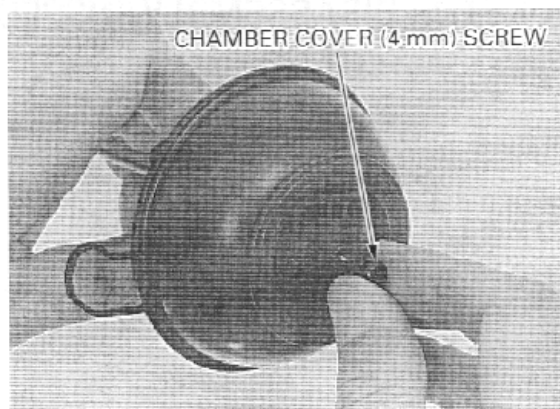


Remove the compression spring and diaphragm/vacuum piston from the carburetor body.



Be careful not to damage the diaphragm.

Screw the vacuum chamber cover (4 mm) screw into the jet needle holder. Pull the screw and remove the jet needle holder from the vacuum piston.



CAUTION:

Do not remove the jet needle holder by pushing the jet needle.

Remove the washer and O ring from the jet needle holder.

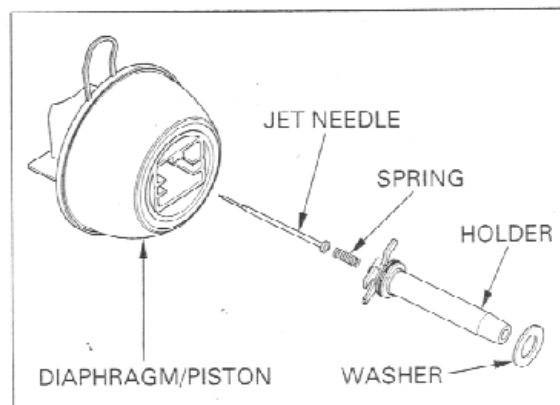
Remove the spring, jet needle and washer from the vacuum piston.

Check the jet needle for stepped wear.

Check the vacuum piston for wear or damage.

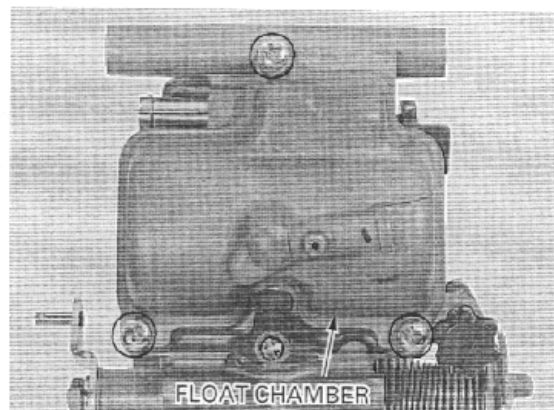
Check the diaphragm for pin holes, deterioration or damage.

Air can leak out of the vacuum chamber if the diaphragm is damaged in any way, even if only a pin hole.



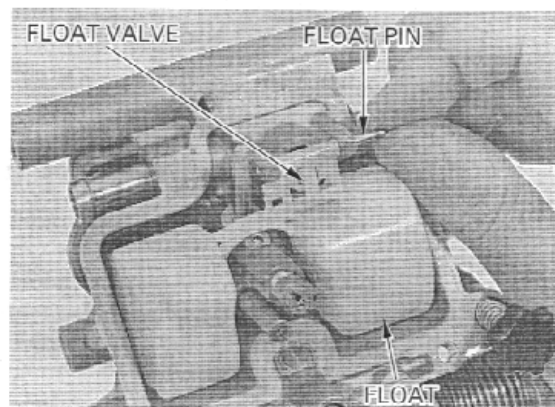
FLOAT CHAMBER

Remove the three screws and the float chamber.



Remove the float pin, float and float valve.

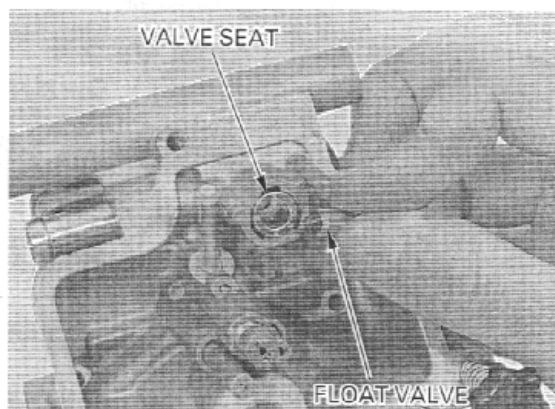
Check the float for damage or fuel in the float.



Check the float valve and valve seat for scoring, scratches, clogging or damage.

Check the tip of the float valve, where it contacts the valve seat, for stepped wear or contamination.

Check the operation of the float valve.



Remove the main jet, needle jet holder and slow jet.

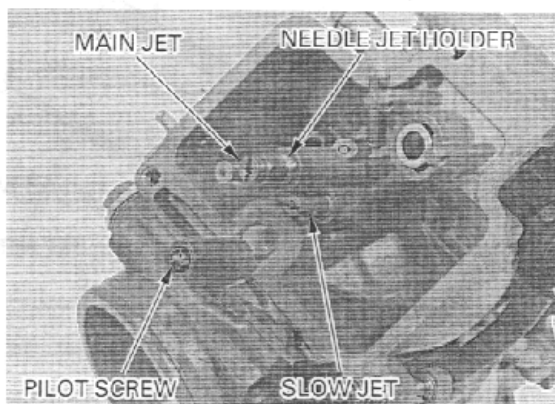
CAUTION:

Handle the jets with care. They can easily be scored or scratched.

Turn the pilot screw in and carefully count the number of turns until it seats lightly. Make a note of this to use as a reference when reinstalling the pilot screw.

CAUTION:

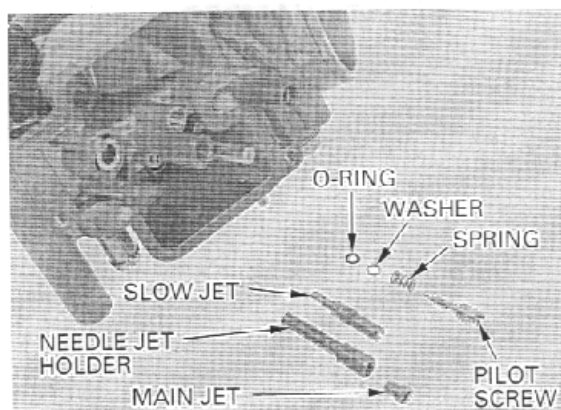
Damage to the pilot screw seat will occur if the pilot screw is tightened against the seat.



Remove the pilot screw, spring, washer and O-ring.

Check each jet for wear or damage.
Check the pilot screw for wear or damage.

Clean the jets with cleaning solvent and blow open with compressed air.



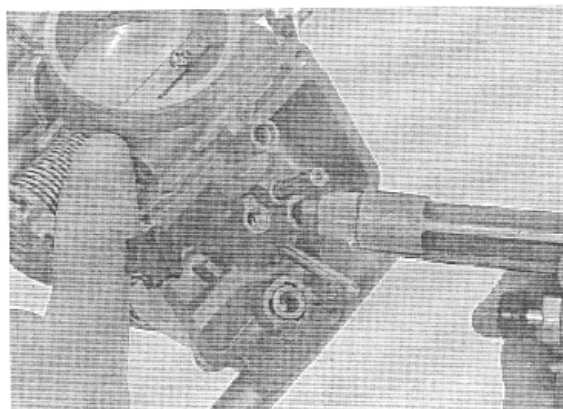
CARBURETOR CLEANING

Remove the following:

- air cut-off valve
- diaphragm/vacuum piston
- main jet, needle jet holder and slow jet
- pilot screw

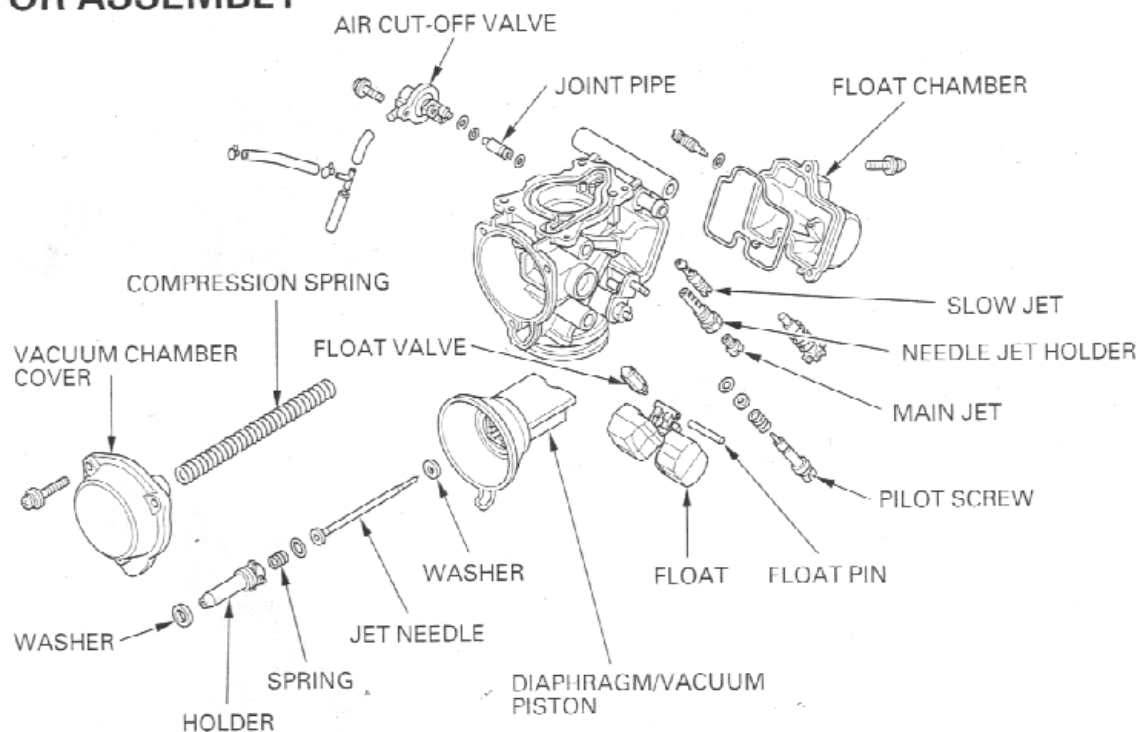
CAUTION:

Cleaning the air and fuel passages with a piece of wire will damage the carburetor body.



Blow open all air and fuel passages in the carburetor body with compressed air.

CARBURETOR ASSEMBLY



FLOAT CHAMBER

Install the pilot screw and return them to their original position as noted during removal.
Perform the pilot screw adjustment if new pilot screw is installed.

CAUTION:

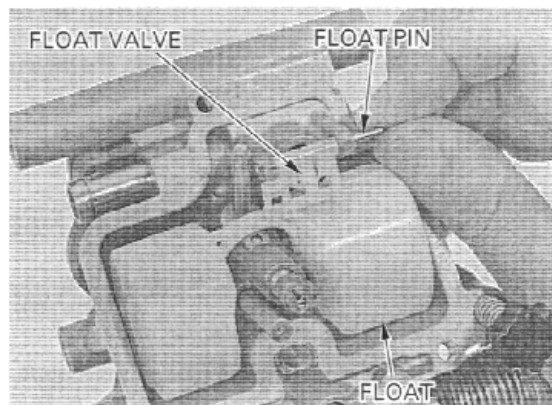
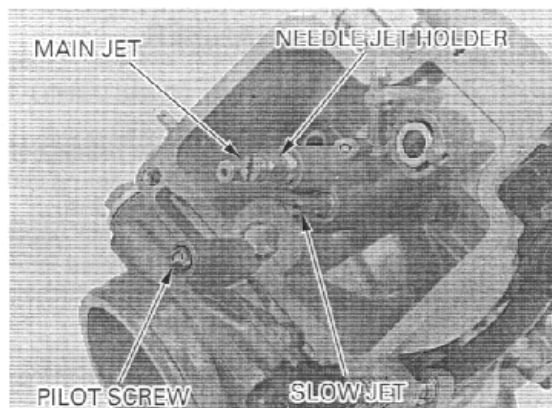
Damage to the pilot screw seat will occur if the pilot screw is tightened against the seat.

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

CAUTION:

Handle the jets with care. They can easily be scored or scratched.

Hang the float valve onto the float arm lip.
Install the float valve, float and float pin.



FLOAT LEVEL INSPECTION

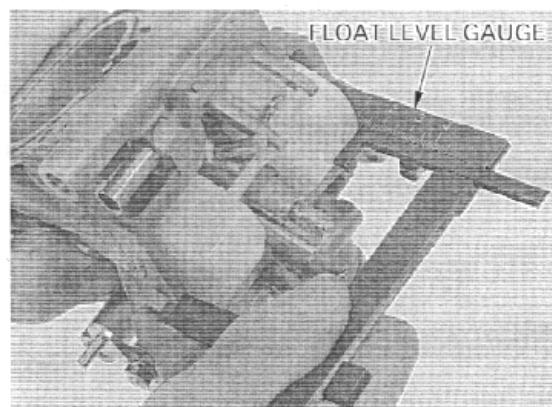
With the float valve seated and the float arm just touching the valve, measure the float level with the float level gauge.

TOOL:

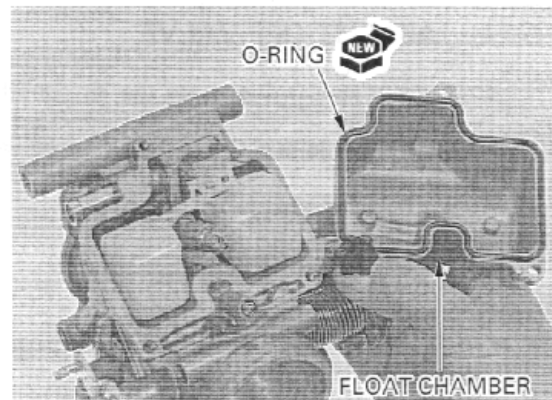
Float level gauge 07401-0010000

FLOAT LEVEL: 16.6 ± 0.5 mm (0.65 ± 0.02 in)

The float cannot be adjusted.
Replace the float assembly if the float level is out of specification.



Install a new O-ring into the float chamber groove.
Install the float chamber and tighten the three screws.



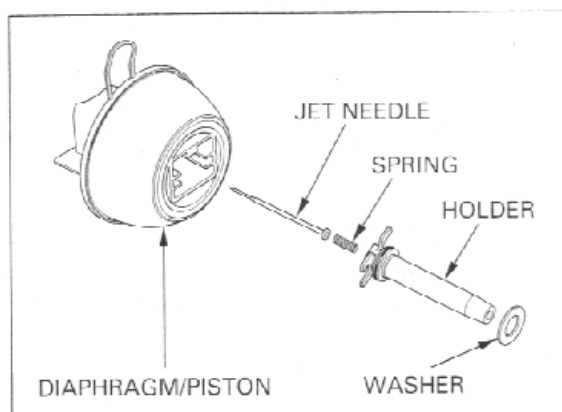
VACUUM CHAMBER

Coat a new O-ring with oil and install it onto the jet needle holder.

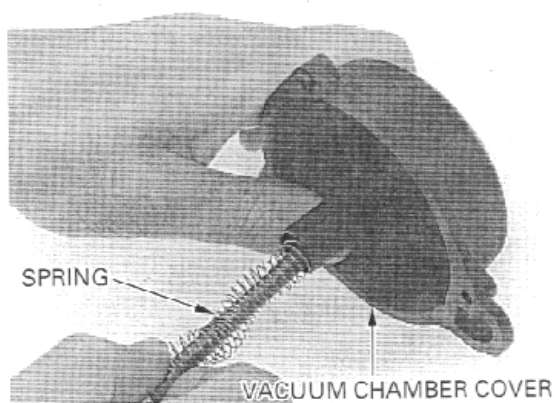
Install the washer onto the jet needle holder.

Install the washer, jet needle, spring and jet needle holder into the vacuum piston.

Press the jet needle holder until you feel a click indicating that the O-ring is seated into the groove in the vacuum piston.



Install and compress the compression spring into the spring hole in the vacuum chamber cover using a screwdriver as a guide as shown.

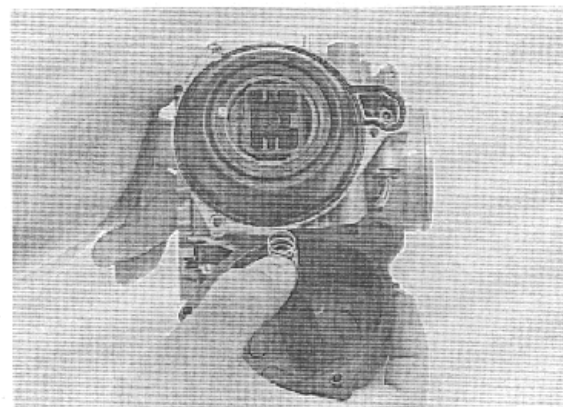


Install the diaphragm/vacuum piston into the carburetor body.

Be careful not to pinch the diaphragm under the chamber cover.

Lift the bottom of the piston with your finger to set the diaphragm rib in the groove in the carburetor body, and install the spring and vacuum chamber cover.

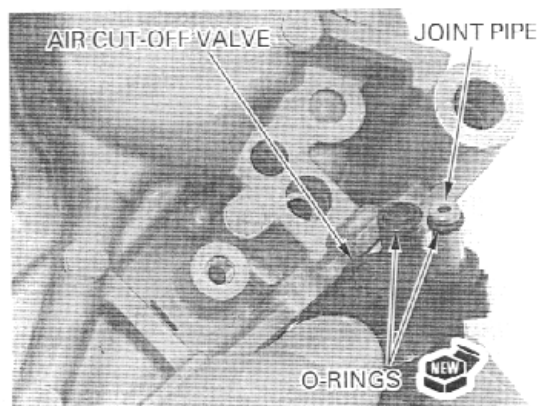
Install and tighten the three screws.



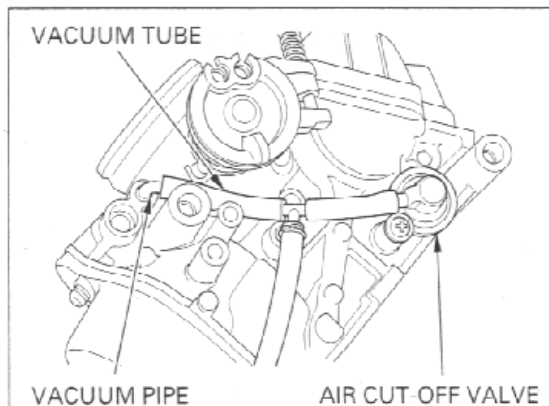
AIR CUT-OFF VALVE

Install new O-rings onto the air cut off valve and joint pipe.

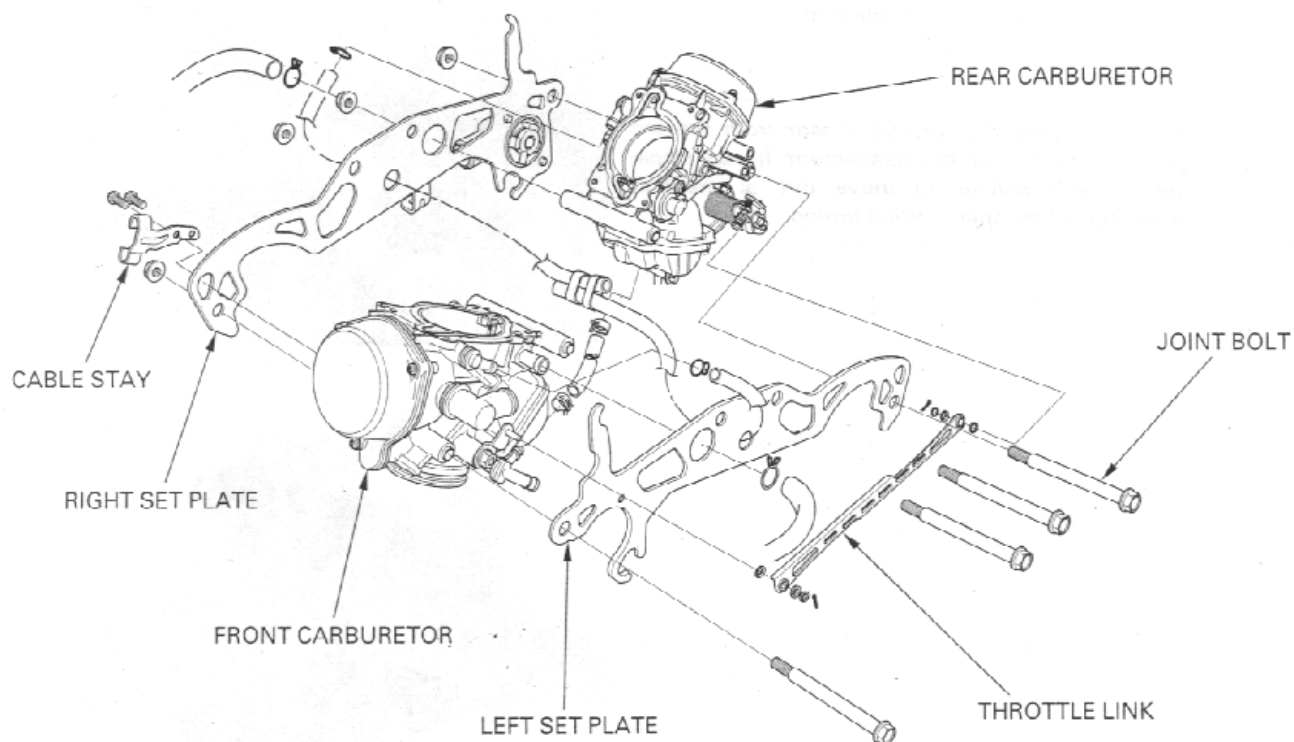
Install the joint pipe into the air cut-off valve.



Install the air cut-off valve and secure it with the washer and screw.
Connect the vacuum tube to the vacuum pipe of the carburetor body.



CARBURETOR COMBINATION

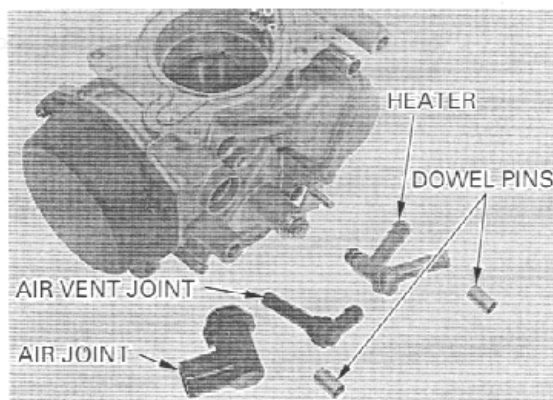


NOTE

Always replace the O-rings with new ones.

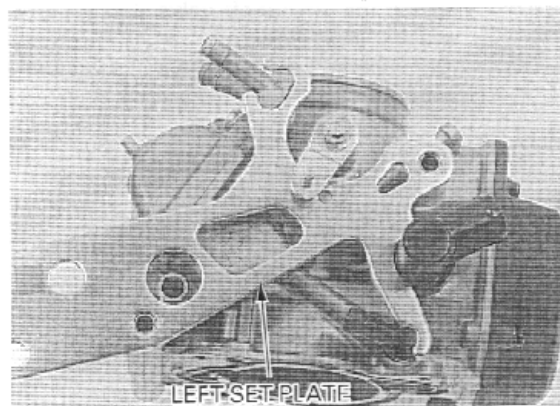
Install the following onto each carburetor:

- carburetor heater with new O-rings
- air vent joint with a new O ring
- air joint with a new O-ring
- dowel pins



FUEL SYSTEM

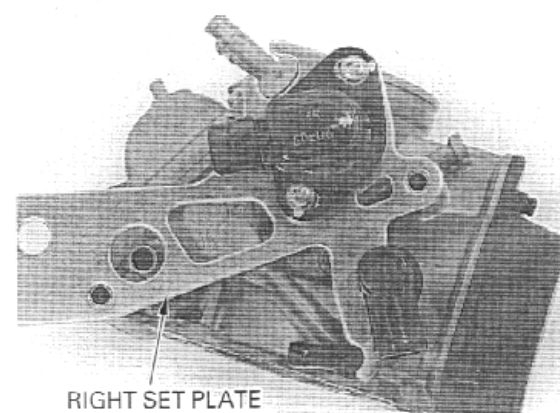
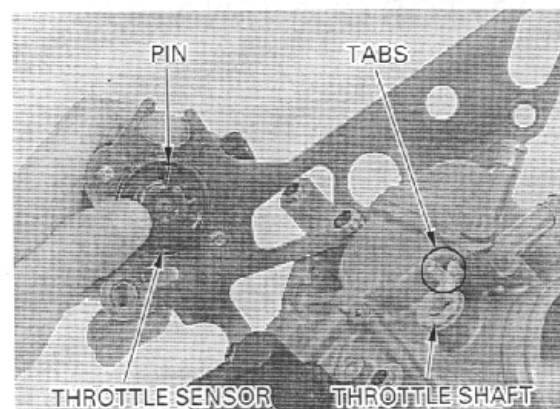
Install the left set plate onto the front carburetor as shown.



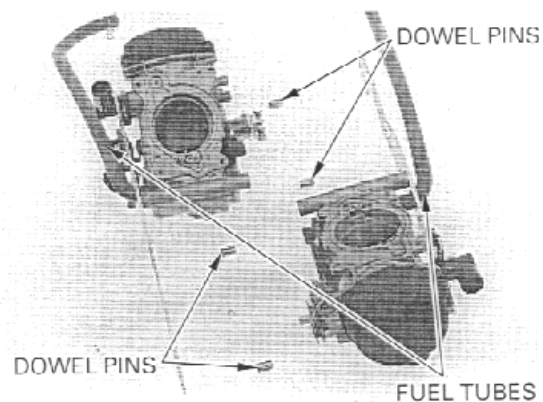
Install the right set plate onto the rear carburetor so that the pin of the throttle sensor is positioned between the tabs of the throttle shaft.

CAUTION:

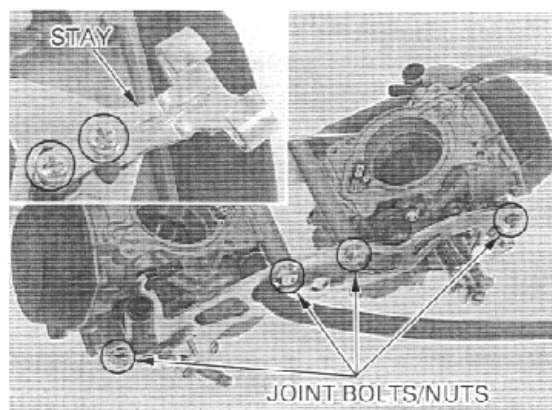
Do not remove the throttle sensor from the set plate unless it requires replacement. It may cause the throttle sensor to move out of position resulting in improper ignition timing.



Install the fuel tubes and dowel pins, and assemble the front and rear carburetors.



Install the four joint bolts and tighten the nuts.
Install the cable stay onto the front carburetor and tighten the screws.



Install the following onto the throttle arm pin:

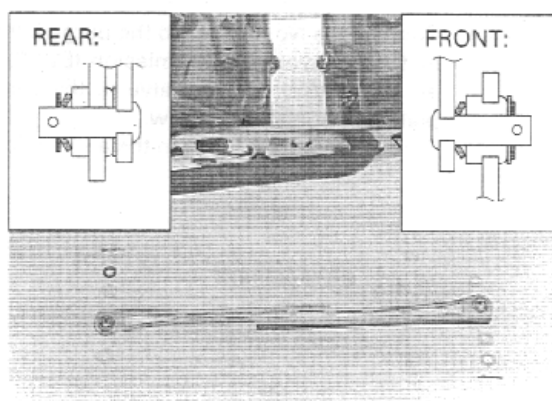
Front carburetor:

Install the plastic cone washer with the concave side facing to the throttle link.

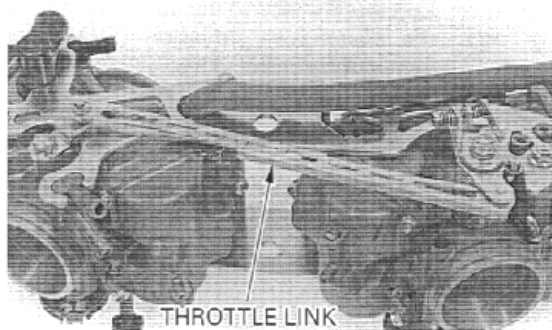
- plastic cone washer
- throttle link
- plastic plain washer
- metallic washer
- new cotter pin

Rear carburetor:

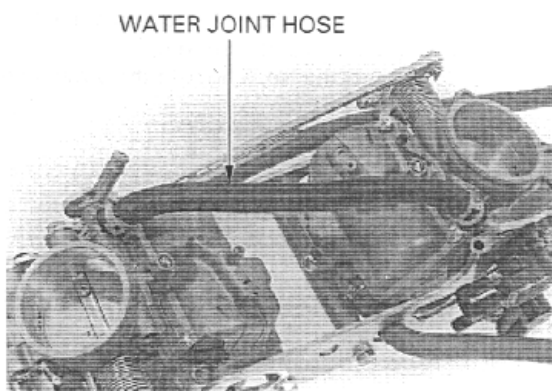
- plastic plain washer
- throttle link
- plastic cone washer
- metallic washer
- new cotter pin



Move the throttle drum and check that throttle valves move smoothly and return automatically without binding.

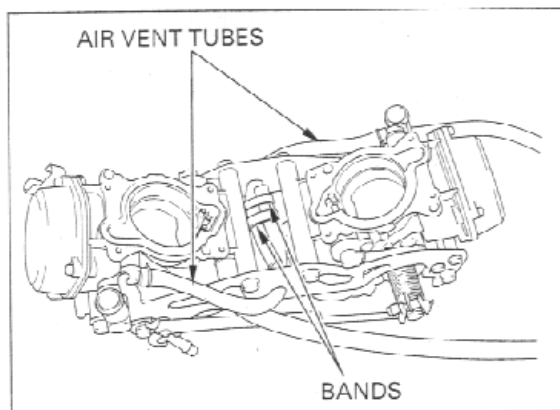


Connect the water joint hose to the front and rear carburetor heaters.

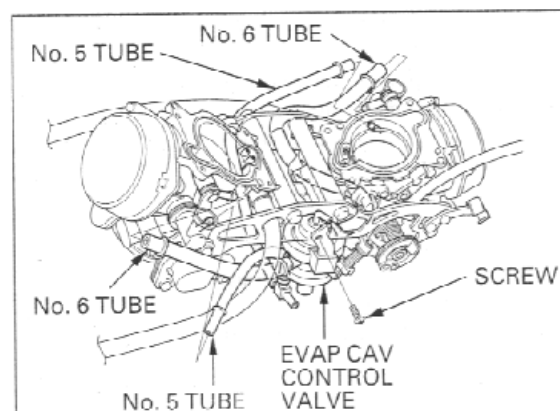


FUEL SYSTEM

49 states/Canada type: Connect the air vent tubes to the air vent joints and install the tube bands as shown.

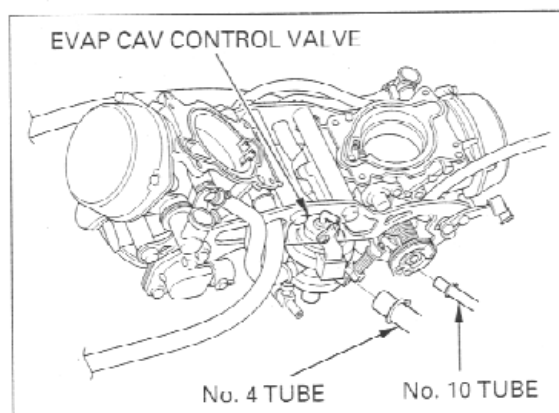


California type: Connect the No. 5 tubes to the purge joints. Install the evaporative emission (EVAP) carburetor air vent (CAV) control valve to the carburetor set plate and tighten the screw. Connect the No. 6 tubes to the air vent joints.

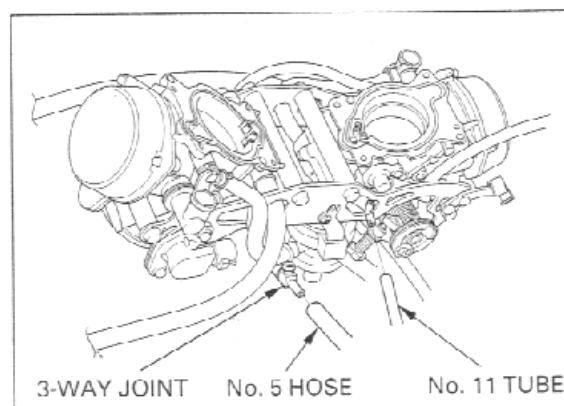


CARBURETOR INSTALLATION

California type only: Connect the No. 10 vacuum tube and No. 4 hose to the evaporative emission (EVAP) carburetor air vent (CAV) control valve.



California type only: Connect the No. 11 vacuum tube to the vacuum joint of the front carburetor. Connect the No. 5 hose to the 3 way joint.



Install the SE valve into each carburetor and tighten the SE valve nut.

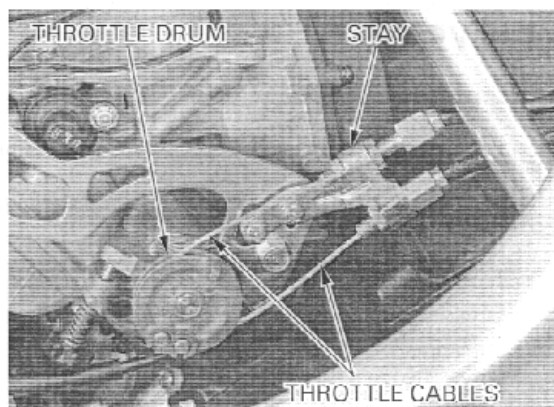


Connect the water inlet hose to the rear carburetor heater and the outlet hose to the front carburetor heater.

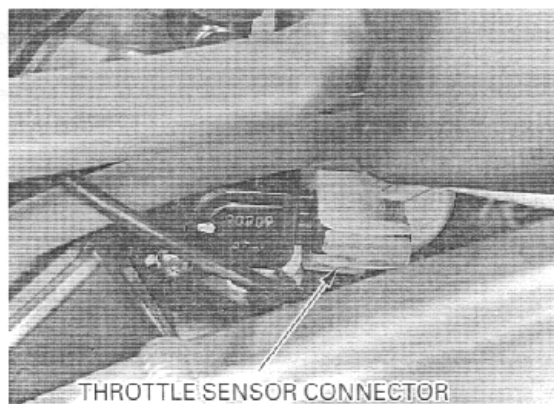


Connect the throttle cables to the throttle drum and install them onto the cable stay.

Adjust the throttle cable (page 3 4).



Connect the throttle sensor 3P (white) connector and clamp the throttle sensor wire to the carburetor set plate.

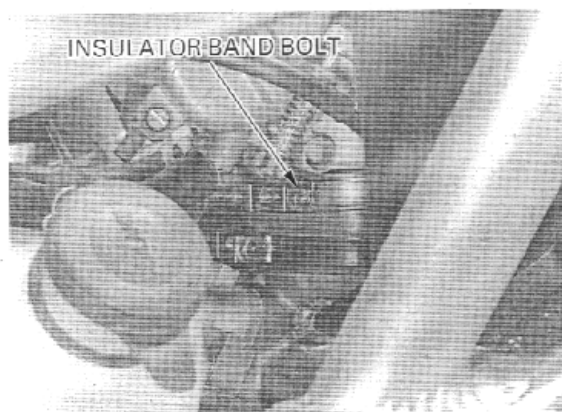


FUEL SYSTEM

Insert the screwdriver through the hole in the heat guard to tighten the front carburetor insulator band bolt.

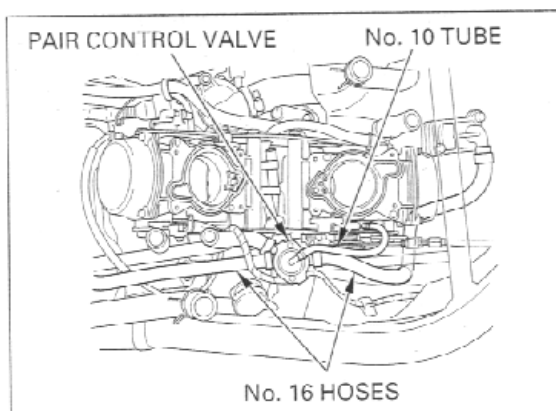
Install the carburetor assembly into the carburetor insulators and tighten the insulator band bolts.

TORQUE: 1 N·m (0.1 kgf·m, 0.7 lbf·ft)



Connect the No. 16 air supply hoses and No. 10 vacuum tube to the pulse secondary air injection (PAIR) control valve.

Install the air cleaner housing (page 5-4).
Fill and bleed the cooling system (page 6-5).



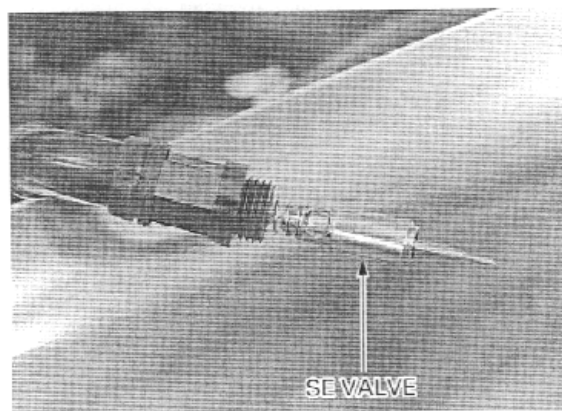
CHOKE SYSTEM

Remove the carburetors (page 5-5).

Check the starting enrichment (SE) valve for scoring, scratches or wear.

Check the seat at the tip of the SE valve for stepped wear.

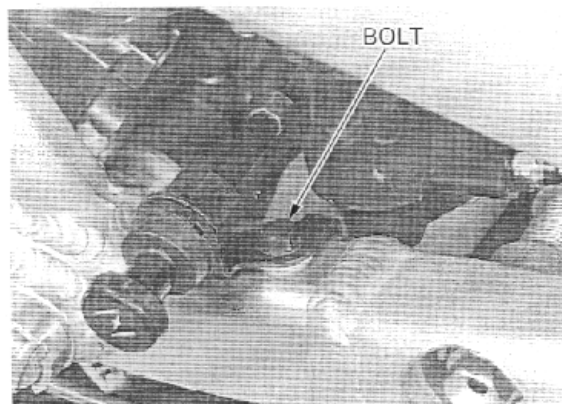
Replace the SE valve set if necessary.



Check the choke cables for frayed, kinked or other damage.

Remove the bolt and replace the choke cable assembly if necessary.

Install the carburetors (page 5-18).



PILOT SCREW ADJUSTMENT

IDLE DROP PROCEDURE

NOTE:

- Make sure the carburetor synchronization is with in specification before pilot screw adjustment.
- The pilot screws are factory pre-set and no adjustment is necessary unless the pilot screws are replaced.
- Use a tachometer with graduations of 50 rpm or smaller that will accurately indicate a 50 rpm change.

1. Turn each pilot screw clockwise until it seats lightly, then back it out to the specification given. This is an initial setting prior to the final pilot screw adjustment.

CAUTION:

Damage to the pilot screw seat will occur if the pilot screw is tightened against the seat.

TOOL:

Pilot screw wrench 07KMA-MN90100 or
07MMA-MV9010A
(U.S.A. only)

INITIAL OPENING:

49 states/Canada type: 2-3/4 turns out
California type: 3 turns out

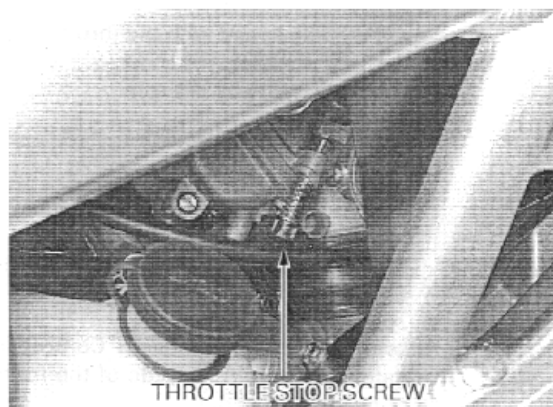
2. Warm up the engine to operating temperature. Stop and go driving for 10 minutes is sufficient.
3. Stop the engine and connect a tachometer according to the tachometer manufacturer's instructions.
4. Start the engine and adjust the idle speed with the throttle stop screw.

IDLE SPEED: 1,200 \pm 100 rpm

5. Turn the front carburetor pilot screw in or out slowly to obtain the highest engine speed.
6. Perform step 5 for rear carburetor pilot screw.
7. Lightly open the throttle 2 or 3 times, then adjust the idle speed with the throttle stop screw.
8. Turn the front carburetor pilot screw in until the engine speed drops by 50 rpm.
9. Turn the front carburetor pilot screw out to the final opening from the position obtained in step 8.

FINAL OPENING: 1/2 turn out

10. Adjust the idle speed with the throttle stop screw.
11. Perform steps 8, 9 and 10 for the rear carburetor pilot screw.



HIGH ALTITUDE ADJUSTMENT

These adjustment must be made at high altitude to ensure proper high altitude operation.

When the vehicle is to be operated continuously above 2,000 m (6,500 feet), the carburetors must be readjusted as described below to improve drivability and decrease exhaust emissions.

Remove the carburetor assembly with the air cleaner housing attached (page 5-5).

Drain the carburetors and remove the float chambers.

Change each main jet for a high altitude one.

HIGH ALTITUDE MAIN JET: Front: # 172
Rear: # 175

Install the float chambers.

Install the carburetor assembly (page 5-18).

Warm up the engine to operating temperature. Stop and go driving for 10 minutes is sufficient. Turn each pilot screw in to the specification given.

TOOL:

Pilot screw wrench 07KMA-MN90100 or
07MMA-MV9010A
(U.S.A. only)

HIGH ALTITUDE SETTING: 1/2 turn in

Adjust the idle speed with the throttle stop screw.

IDLE SPEED: 1,200 \pm 100 rpm

Attach the Vehicle Emission Control Information Update label on the left side of the frame near the steering head as shown.

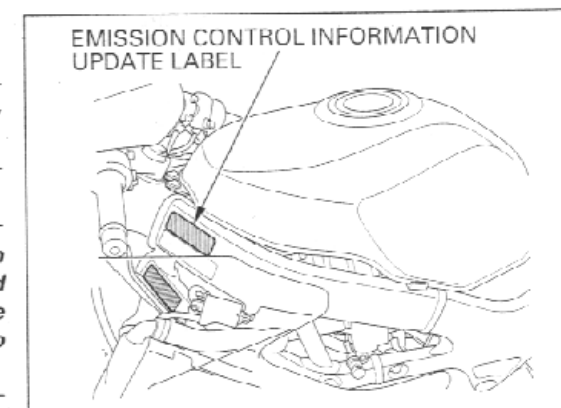
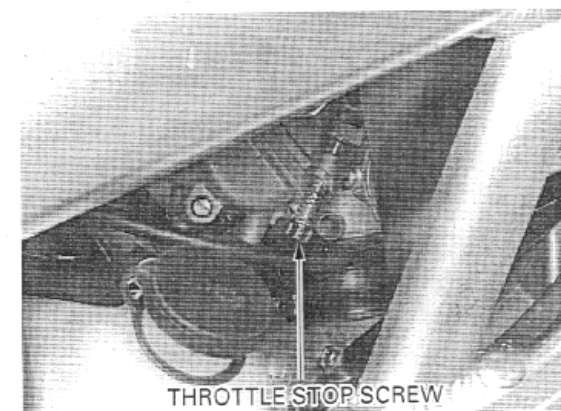
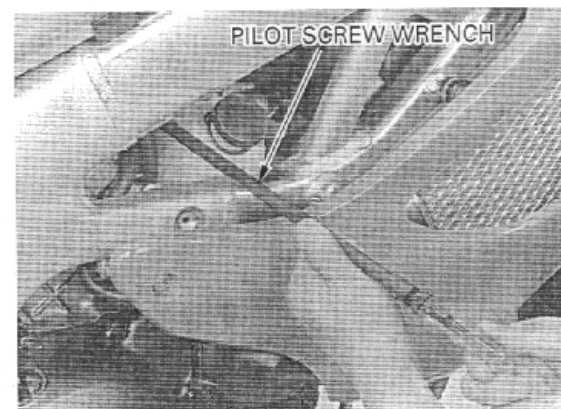
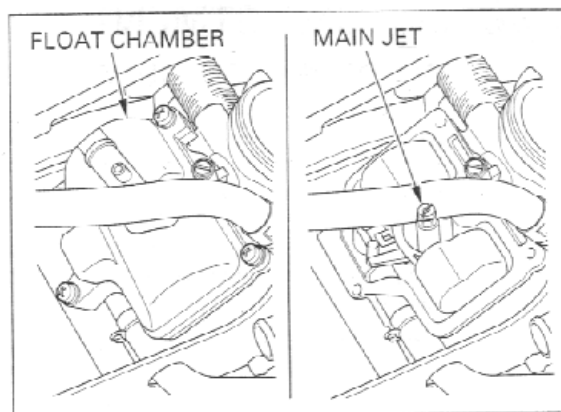
See Service Letter No. 132 for information on obtaining the label.

NOTE:

Do not attach the label to any part that can be easily removed from the vehicle.

CAUTION:

Sustained operation at an altitude lower than 1,500 m (5,000 feet) with the carburetors adjusted for high altitude may cause the engine to idle roughly and the engine stall in traffic. It may also cause engine damage due to overheating.

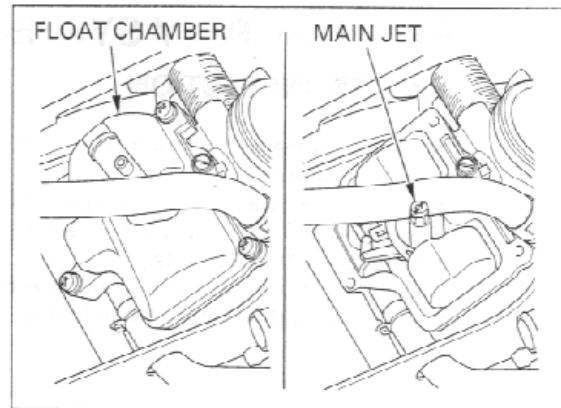


These adjustment must be made at low altitude to ensure proper low altitude operation.

When the vehicle is to be operated continuously below 1,500 m (5,000 feet), readjust the carburetors as follows:

Change each main jet to the standard one.

STANDARD MAIN JET: Front: #175
Rear: #178



Warm up the engine to operating temperature. Stop and go driving for 10 minutes is sufficient. Turn each pilot screw out 1/2 turn to its original position.

TOOL:

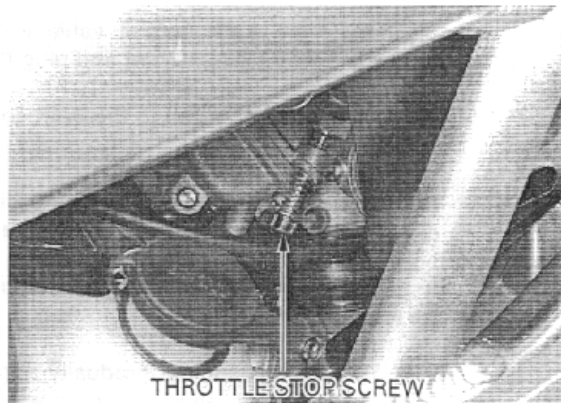
Pilot screw wrench 07KMA-MN90100



Adjust the idle speed with the throttle stop screw.

IDLE SPEED: 1,200 \pm 100 rpm

Remove the Vehicle Emission Control Information Update label that is attached to the left side of the frame after adjusting for low altitude.



SECONDARY AIR SUPPLY SYSTEM

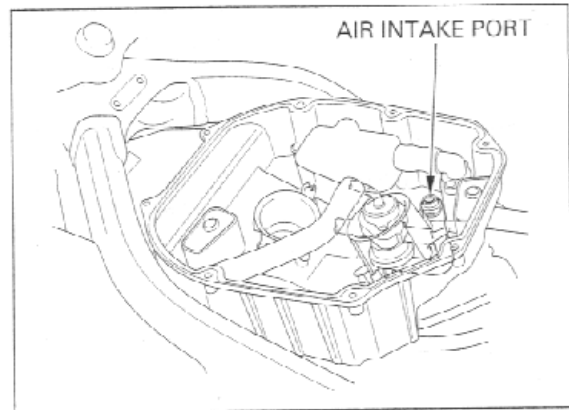
SYSTEM INSPECTION

Start the engine and warm it up to normal operating temperature.

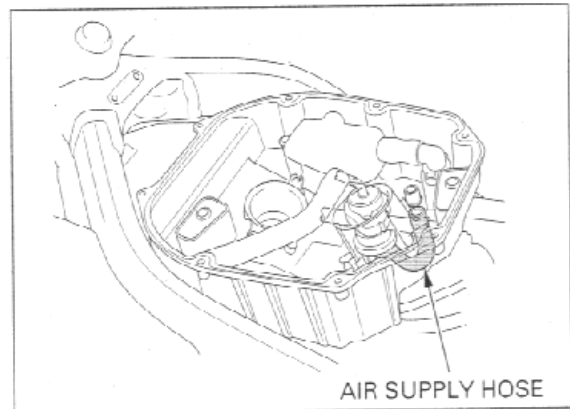
Remove the air cleaner element (page 3-6).

Check that the secondary air intake port is clean and free of carbon deposits.

Check the pulse secondary air injection (PAIR) check valves if the port is carbon fouled.



Disconnect the air supply (air cleaner housing-to-PAIR control valve) hose from the air cleaner housing.



Disconnect the PAIR control valve vacuum tube from the 3-way vacuum joint and plug the vacuum joint.

Connect a vacuum pump to the PAIR control valve vacuum tube.

Start the engine and open the throttle slightly to be certain that air is sucked in through the air supply hose.

If the air is not drawn in, check the air supply hoses for clogging.

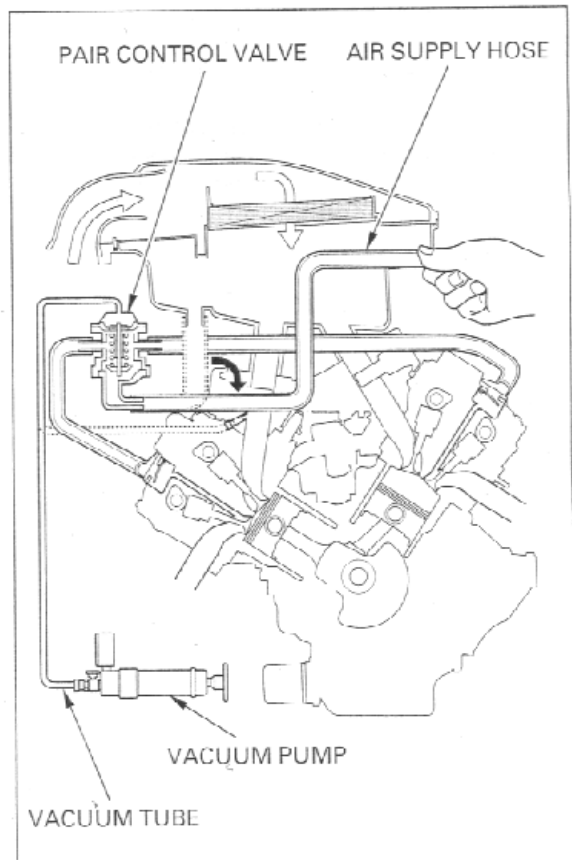
With the engine running, gradually apply vacuum to the PAIR control valve vacuum tube.

Check that the air supply hose stops drawing air, and that the vacuum does not bleed.

SPECIFIED VACUUM: 400 mm Hg (15.7 in Hg)

If the air is drawn in, or if the specified vacuum is not maintained, install a new PAIR control valve.

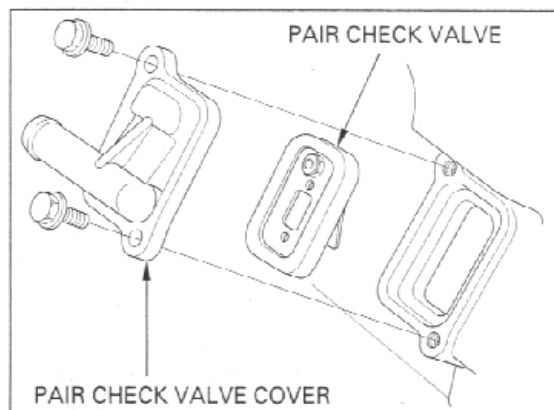
If afterburn occurs on deceleration, even when the secondary air supply system is normal, check the air cut-off valve.



PAIR CHECK VALVE INSPECTION

For the rear cylinder PAIR check valve removal, remove the fuel tank (page 2-4).

Remove the bolts, PAIR check valve cover and PAIR check valve from the cylinder head cover.



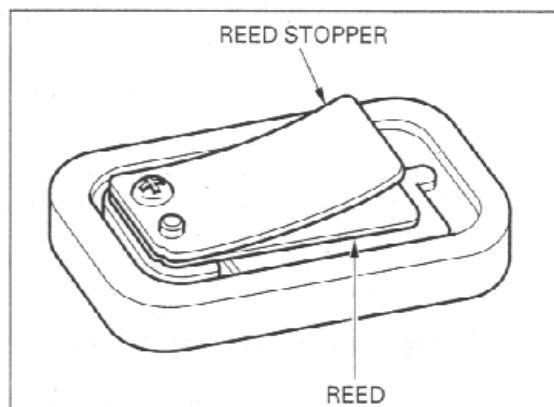
Check the reed for damage or fatigue. Replace if necessary.

Replace the PAIR check valve if the rubber seat is cracked, deteriorated or damaged, or if there is clearance between the reed and seat.

Install the PAIR check valve and cover onto the cylinder head cover.

Apply locking agent to the cover bolt threads. Install and tighten the bolts.

TORQUE: 5 N·m (0.5 kgf·m, 3.6 lbf·ft)



EVAPORATIVE EMISSION CONTROL SYSTEM (California type only)

NOTE:

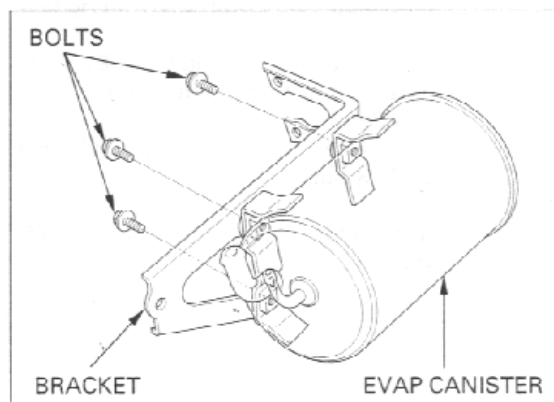
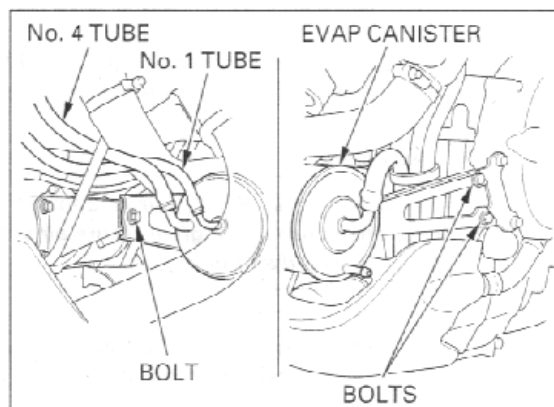
Refer to the Vacuum Hose Routing Diagram and Cable & Harness Routing (page 1-29) for the tube connections and routing.

EVAPORATIVE EMISSION (EVAP) CANISTER REMOVAL/INSTALLATION

Disconnect the No. 1 and No. 4 tubes from the EVAP canister, and remove the three bolts and the EVAP canister with the bracket.

Remove the three bolts and EVAP canister from the bracket.

Install the EVAP canister in the reverse order of removal.



EVAP PURGE CONTROL VALVE INSPECTION

NOTE:

The EVAP purge control valve should be inspected if hot restart is difficult.

Remove the EVAP purge control valve.

Connect a vacuum pump to the No. 5 tube fitting (output port) that goes to the carburetors. Apply the specified vacuum to the EVAP purge control valve.

SPECIFIED VACUUM: 250 mm Hg (9.8 in Hg)

The specified vacuum should be maintained. Replace the EVAP purge control valve if vacuum is not maintained.

Remove the vacuum pump and connect it to the No. 11 tube fitting (vacuum port) that goes to the front carburetor. Apply the specified vacuum to the EVAP purge control valve.

SPECIFIED VACUUM: 250 mm Hg (9.8 in Hg)

The specified vacuum should be maintained. Replace the EVAP purge control valve if vacuum is not maintained.

Connect a pressure pump to the No. 4 tube fitting (input port) that goes to EVAP canister.

CAUTION:

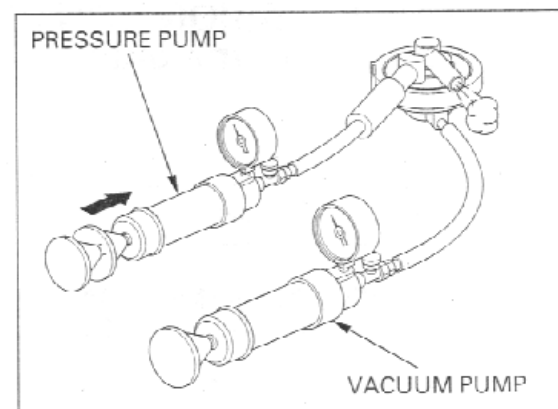
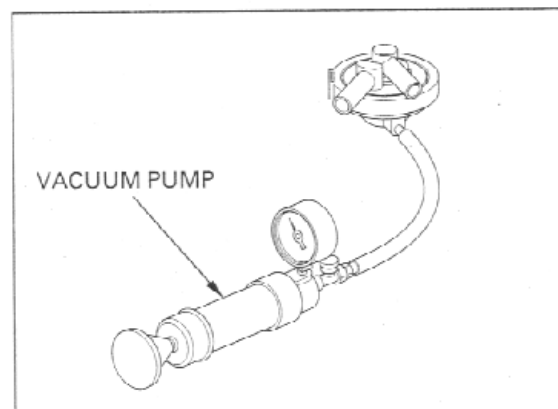
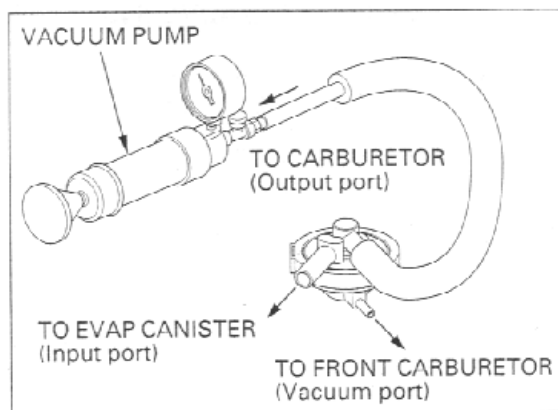
Damage to the EVAP purge control valve may result from use of a high pressure air source. Use a hand-operated air pump only.

While applying the specified vacuum to the EVAP purge control valve vacuum port, pump air through the input port.

SPECIFIED VACUUM: 250 mm Hg (9.8 in Hg)

Air should flow through the EVAP purge control valve and out the output port that goes to the carburetors. Replace the EVAP purge control valve if air does not flow out.

Remove the pumps and install the EVAP purge control valve.



EVAP CARBURETOR AIR VENT (CAV) CONTROL VALVE INSPECTION

NOTE:

The EVAP CAV control valve should be inspected if hot restart is difficult.

Remove the EVAP CAV control valve.

Connect a vacuum pump to the No. 10 tube fitting (vacuum port) that goes to the front cylinder intake manifold.

Apply the specified vacuum to the EVAP CAV control valve.

SPECIFIED VACUUM: 250 mm Hg (9.8 in Hg)

The specified vacuum should be maintained.

Replace the EVAP CAV control valve if vacuum is not maintained.

Remove the vacuum pump and connect it to the air vent fitting (open air port).

Apply vacuum to the EVAP CAV control valve. The vacuum should hold steady.

Replace the EVAP CAV control valve if vacuum leaks.

Remove the vacuum pump and reconnect it to the No. 10 tube fitting (vacuum port).

Connect a pressure pump to the open air port.

CAUTION:

Damage to the EVAP CAV control valve may result from use of a high pressure air source. Use a hand-operated air pump only.

While applying vacuum to the EVAP CAV control valve vacuum port, pump air through the open air port.

Air should flow through the EVAP CAV control valve and out the air vent ports (No. 6 tube fittings) that go to the carburetor air vent joints.

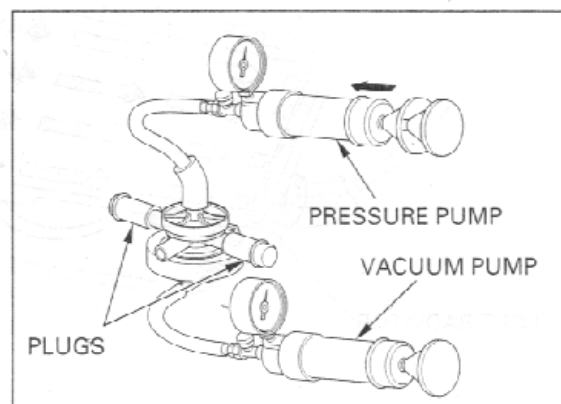
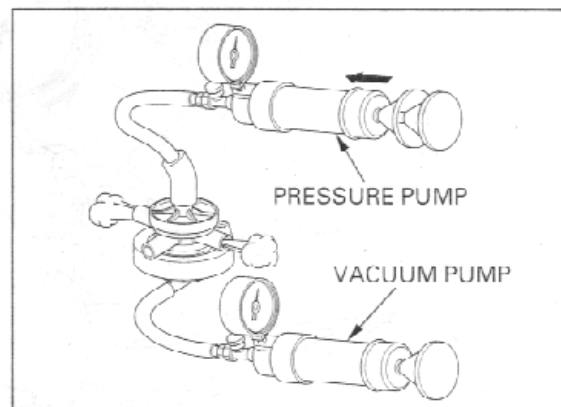
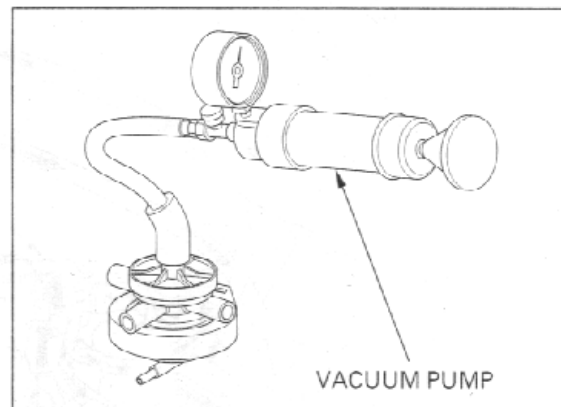
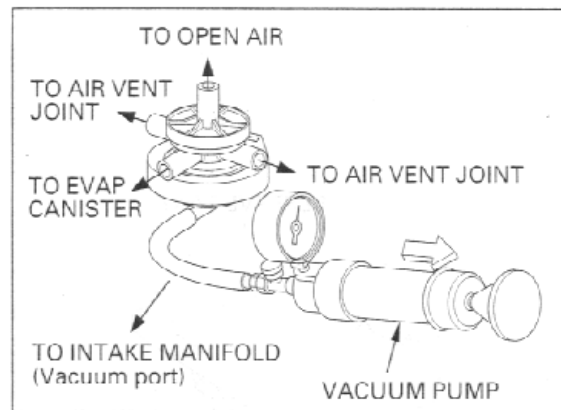
Plug the air vent ports (No. 6 tube fittings) that go to the carburetor air vent joints.

While applying vacuum to the EVAP CAV control valve vacuum port, pump air through the open air port.

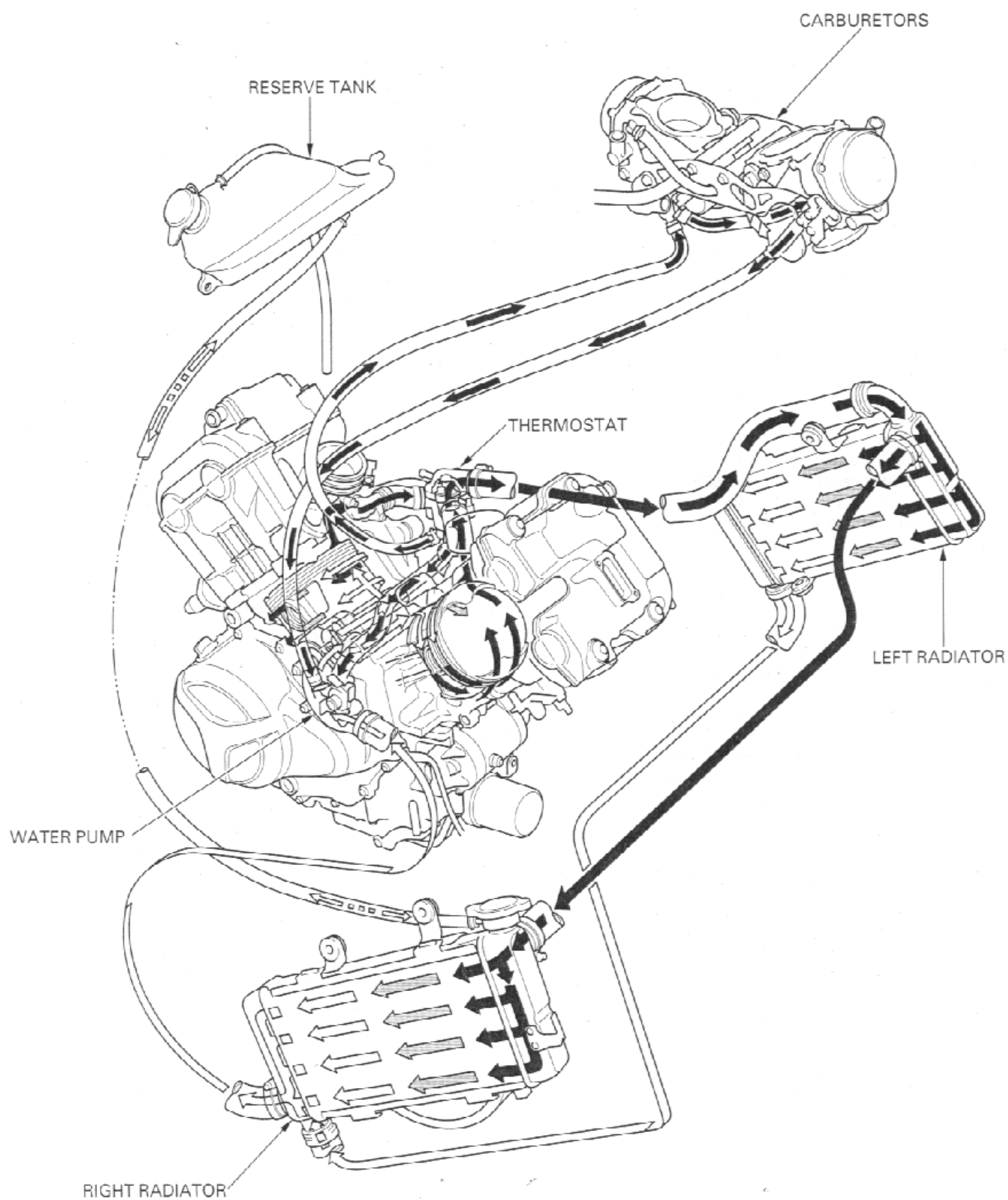
It should hold steady.

Replace the EVAP CAV control valve if pressure is not retained.

Remove the pumps and install the EVAP CAV control valve.



COOLING SYSTEM



6. COOLING SYSTEM

SERVICE INFORMATION	6-1	RADIATOR/COOLING FAN	6-6
TROUBLESHOOTING	6-2	RADIATOR RESERVE TANK	6-9
SYSTEM TESTING	6-3	THERMOSTAT	6-10
COOLANT REPLACEMENT	6-4	WATER PUMP	6-11

SERVICE INFORMATION

GENERAL

▲WARNING

6

- Wait until the engine is cool before slowly removing the radiator cap. Removing the cap while the engine is hot and the coolant is under pressure may cause serious scalding.
- Radiator coolant is toxic. Keep it away from eyes, mouth, skin and clothes.
 - If any coolant gets in your eyes, rinse them with water and consult a doctor immediately.
 - If any coolant is swallowed, induce vomiting, gargle and consult a physician immediately.
 - If any coolant gets on your skin or clothes, rinse thoroughly with plenty of water.
- KEEP OUT OF REACH OF CHILDREN.

CAUTION:

Using coolant with silicate corrosion inhibitors may cause premature wear of water pump seals or blockage of radiator passages. Using tap water may cause engine damage.

- Add coolant at the reserve tank. Do not remove the radiator cap except to refill or drain the system.
- All cooling system service can be done with the engine in the frame.
- Avoid spilling coolant on painted surfaces.
- After servicing the system, check for leaks with a cooling system tester.
- Refer to section 19 for coolant temperature indicator and fan motor switch.

SPECIFICATIONS

ITEM		SPECIFICATIONS
Coolant capacity	Radiator and engine	2.9 l (3.1 US qt, 2.6 Imp qt)
	Reserve tank	0.71 l (0.188 US gal, 0.156 Imp gal)
Radiator cap relief pressure		108 – 137 kPa (1.1 – 1.4 kgf/cm ² , 16 – 20 psi)
Thermostat	Begins to open	73 – 77 °C (163 – 171 °F)
	Fully open	90 °C (194 °F)
	Valve lift	8 mm (0.3 in) minimum
Recommended antifreeze		Pro Honda HP coolant or an equivalent high quality ethylene glycol antifreeze containing silicate-free corrosion inhibitors

TOOLS

Bearing remover set, 10 mm	07936-GE00000	or equivalent commercially available in U.S.A.
– Bearing remover shaft	07936-GE00100	
– Bearing remover, 10 mm	07936-GE00200	
Bearing remover weight	07741-0010201	
Driver	07749-0010000	
Attachment, 28 x 30 mm	07946-1870100	
Pilot, 10 mm	07746-0040100	
Mechanical seal driver attachment	07945-4150400	or 07965-415000A (U.S.A. only)

TROUBLESHOOTING

Engine temperature too high

- Faulty temperature gauge or thermosensor
- Thermostat stuck closed
- Faulty radiator cap
- Insufficient coolant
- Passages blocked in radiator, hoses or water jacket
- Air in system
- Faulty cooling fan
- Faulty fan motor switch
- Faulty water pump

Engine temperature too low

- Faulty temperature gauge or thermosensor
- Thermostat stuck open
- Faulty fan motor switch

Coolant leaks

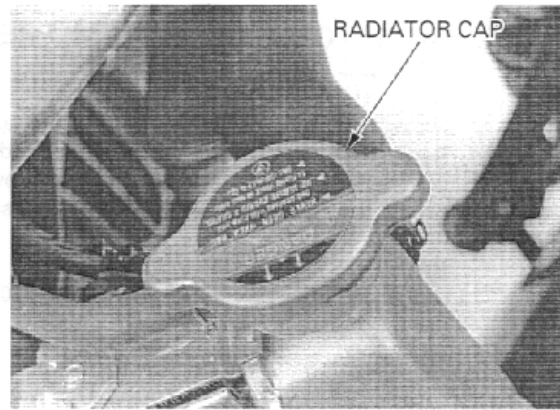
- Faulty water pump mechanical seal
- Deteriorated O-rings
- Faulty radiator cap
- Damaged or deteriorated cylinder head gasket
- Loose hose connection or clamp
- Damaged or deteriorated hoses

SYSTEM TESTING

⚠ WARNING

The engine must be cool before removing the radiator cap, or severe scalding may result.

Remove the front fairing (page 2-3).
Remove the radiator cap.

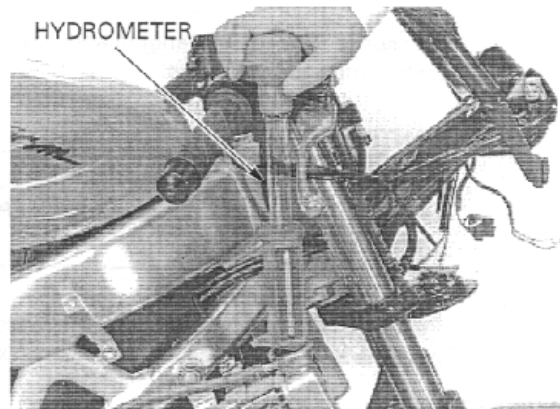


COOLANT (HYDROMETER TEST)

Test the coolant gravity using a hydrometer.

STANDARD COOLANT CONCENTRATION: 50%

Look for contamination and replace the coolant if necessary.



Coolant temperature °C (°F)	0 (32)	5 (41)	10 (50)	15 (59)	20 (68)	25 (77)	30 (86)	35 (95)	40 (104)	45 (113)	50 (122)
Coolant ratio %											
5	1.009	1.009	1.008	1.008	1.007	1.006	1.005	1.003	1.001	0.999	0.997
10	1.018	1.017	1.017	1.016	1.015	1.014	1.013	1.011	1.009	1.007	1.005
15	1.028	1.027	1.026	1.025	1.024	1.022	1.020	1.018	1.016	1.014	1.012
20	1.036	1.035	1.034	1.033	1.031	1.029	1.027	1.025	1.023	1.021	1.019
25	1.045	1.044	1.043	1.042	1.040	1.038	1.036	1.034	1.031	1.028	1.025
30	1.053	1.052	1.051	1.049	1.047	1.045	1.043	1.041	1.038	1.035	1.032
35	1.063	1.062	1.060	1.058	1.056	1.054	1.052	1.049	1.046	1.043	1.040
40	1.072	1.070	1.068	1.066	1.064	1.062	1.059	1.056	1.053	1.050	1.047
45	1.080	1.078	1.076	1.074	1.072	1.069	1.066	1.063	1.060	1.057	1.054
50	1.086	1.084	1.082	1.080	1.077	1.074	1.071	1.068	1.065	1.062	1.059
55	1.095	1.093	1.091	1.088	1.085	1.082	1.079	1.076	1.073	1.070	1.067
60	1.100	1.098	1.095	1.092	1.089	1.086	1.083	1.080	1.077	1.074	1.071

COOLING SYSTEM

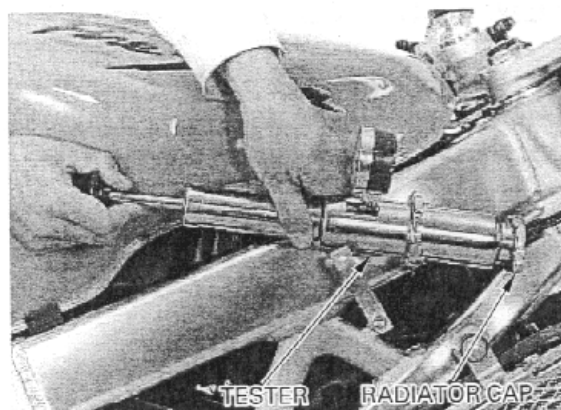
RADIATOR CAP/SYSTEM PRESSURE INSPECTION

Before installing the cap in the tester, wet the sealing surfaces.

Pressure test the radiator cap using the tester. Replace the radiator cap if it does not hold pressure, or if relief pressure is too high or too low. It must hold the specified pressure for at least 6 seconds.

RADIATOR CAP RELIEF PRESSURE:

108 – 137 kPa (1.1 – 1.4 kgf/cm², 16 – 20 psi)

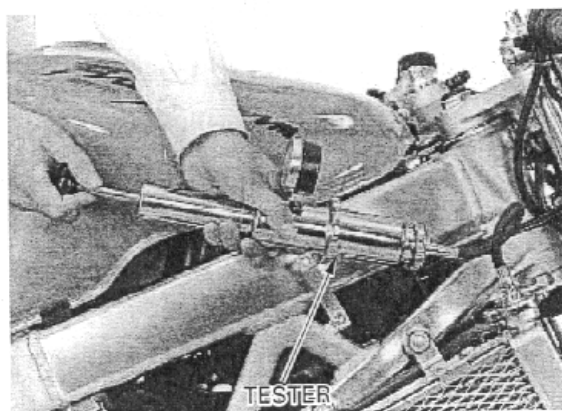


Pressurize the radiator, engine and hoses using the tester, and check for leaks.

CAUTION:

Excessive pressure can damage the cooling system components. Do not exceed 137 kPa (1.4 kgf/cm², 20 psi).

Repair or replace components if the system will not hold the specified pressure for at least 6 seconds.



COOLANT REPLACEMENT

PREPARATION

⚠ WARNING

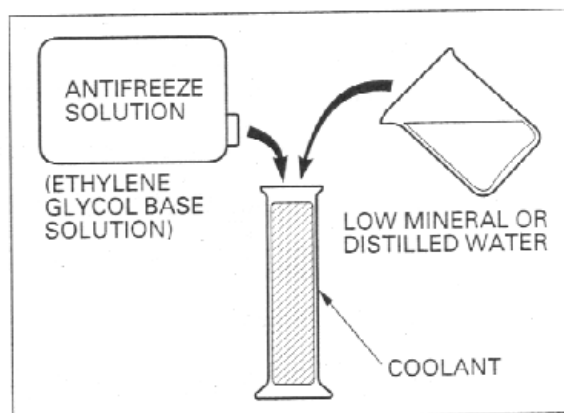
- *Radiator coolant is toxic. Keep it away from eyes, mouth, skin and clothes.*
 - *If any coolant gets in your eyes, rinse them with water and consult a doctor immediately.*
 - *If any coolant is swallowed, induce vomiting, gargle and consult a physician immediately.*
 - *If any coolant gets on your skin or clothes, rinse thoroughly with plenty of water.*
- **KEEP OUT OF REACH OF CHILDREN.**

CAUTION:

Using coolant with silicate corrosion inhibitors may cause premature wear of water pump seals or blockage of radiator passages. Using tap water may cause engine damage.

NOTE:

- The effectiveness of coolant decreases with the accumulation of rust or if there is a change in the mixing proportion during usage. Therefore, for best performance change the coolant regularly as specified in the maintenance schedule.
- Mix only distilled, low mineral water with the antifreeze.



RECOMMENDED ANTIFREEZE

Pro Honda HP coolant or an equivalent high quality ethylene glycol antifreeze containing silicate-free corrosion inhibitors.

RECOMMENDED MIXTURE

1 : 1 (distilled water and recommended antifreeze)

REPLACEMENT/AIR BLEEDING

⚠WARNING

The engine must be cool before servicing the cooling system, or severe scalding may result.

NOTE:

When filling the system, place the motorcycle on its side stand on a flat, level surface.

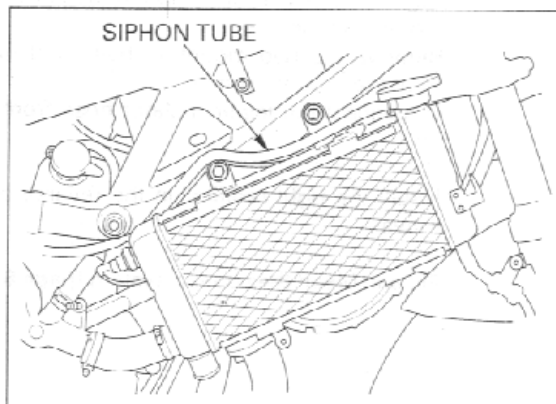
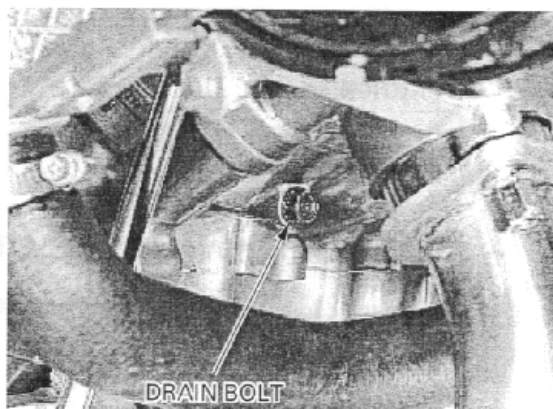
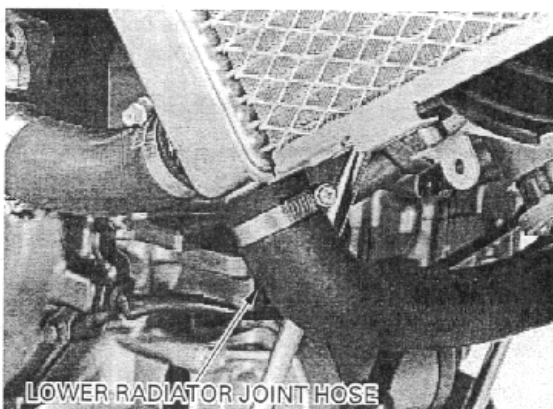
Remove the front fairing (page 2-3).
Remove the radiator cap.

Disconnect the lower radiator joint hose at the right radiator by loosening the hose band screw and drain the coolant from the system.

Remove the drain bolt and drain the coolant from the front cylinder.

Disconnect the radiator siphon tube from the filler neck and drain the coolant from the reserve tank.

Connect the radiator lower joint hose and siphon tube, and install the drain bolt with a new sealing washer.

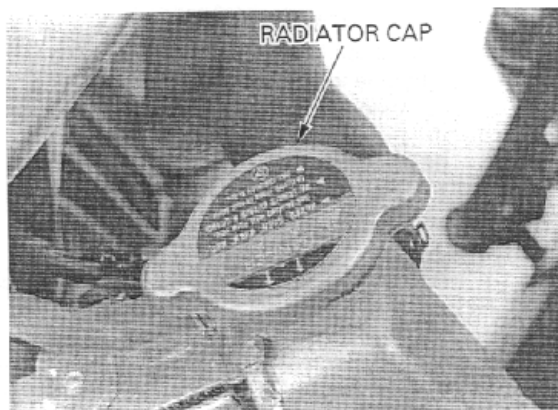


COOLING SYSTEM

Fill the system with recommended coolant up to the filler neck with the motorcycle on its side stand.

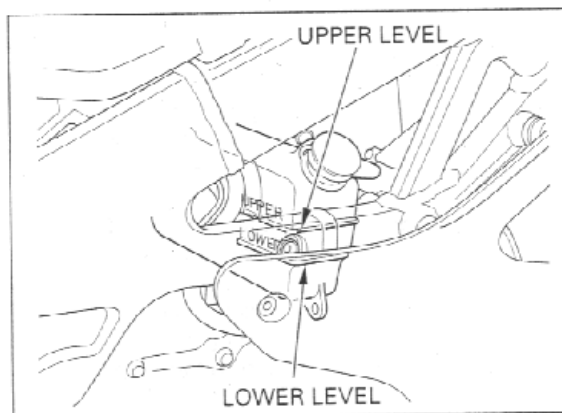
Bleed air from the system as follows:

1. Shift the transmission into neutral.
Start the engine and let it idle for 2–3 minutes.
2. Snap the throttle 3–4 times to bleed air from the system.
3. Stop the engine and add coolant up to the filler neck.
4. Install the radiator cap.



Fill the reserve tank to the upper level line with the motorcycle upright on a flat, level surface.

Install the front fairing (page 2-3).



RADIATOR/COOLING FAN

CAUTION:

Be careful not to damage the radiator fins while servicing the radiator.

RADIATOR REMOVAL/INSTALLATION

Drain the coolant from the system (page 6-5).

RIGHT RADIATOR

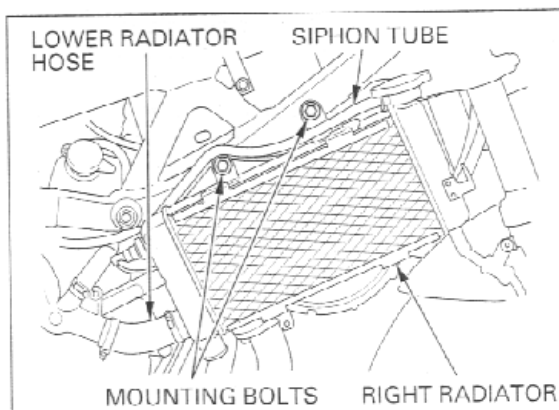
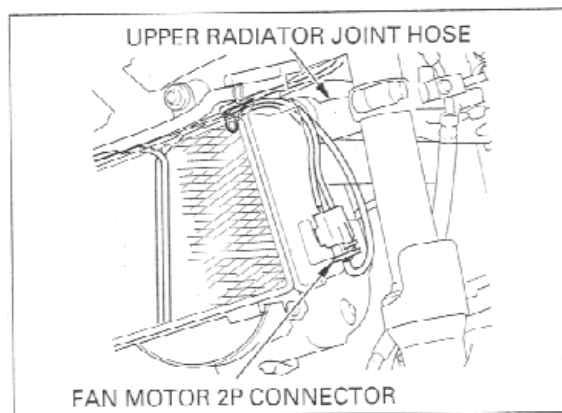
Disconnect the fan motor 2P (black) connector. Disconnect the radiator siphon tube and upper radiator joint hose.

Remove the two mounting bolts and the radiator from the mounting stay.

Disconnect the lower radiator hose from the radiator.

Install the right radiator in the reverse order of removal.

Fill and bleed the cooling system (page 6-5).

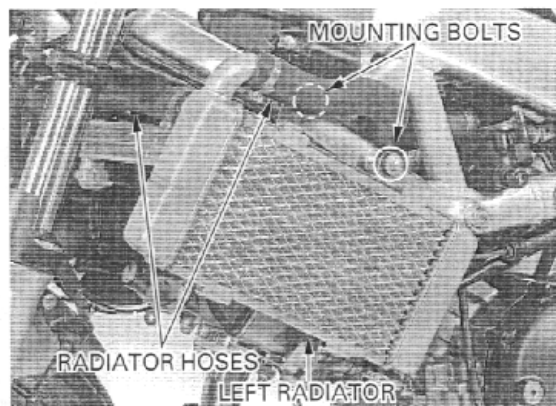


LEFT RADIATOR

Disconnect the upper radiator hose, upper and lower radiator joint hoses.
Remove the two mounting bolts and the radiator from the mounting stay.

Install the left radiator in the reverse order of removal.

Fill and bleed the cooling system (page 6-5).

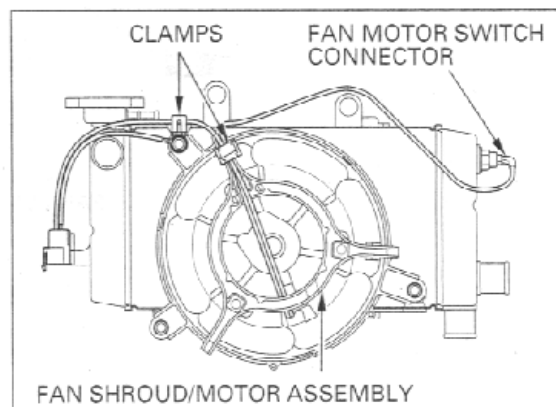


COOLING FAN DISASSEMBLY

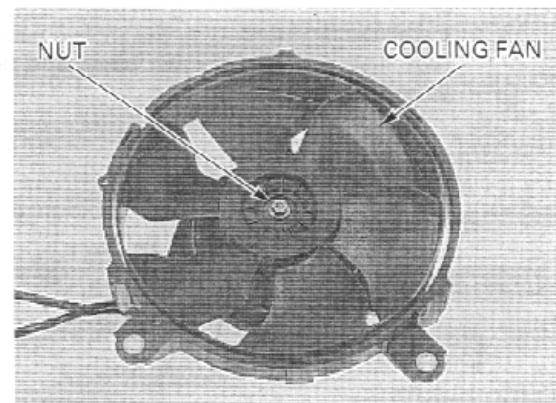
Remove the right radiator (page 6-6).

Disconnect the fan motor switch connector.
Free the fan motor wires from the clamps.

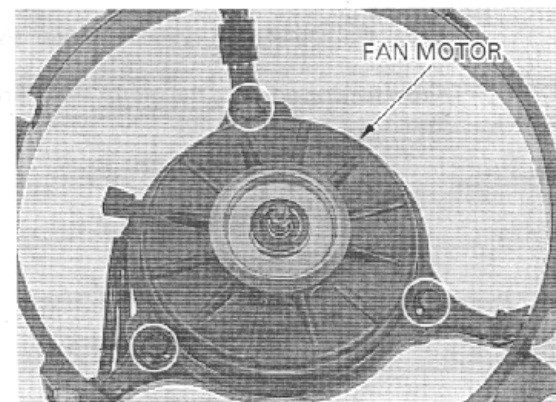
Remove the three bolts, clamp and fan shroud/motor assembly from the radiator.



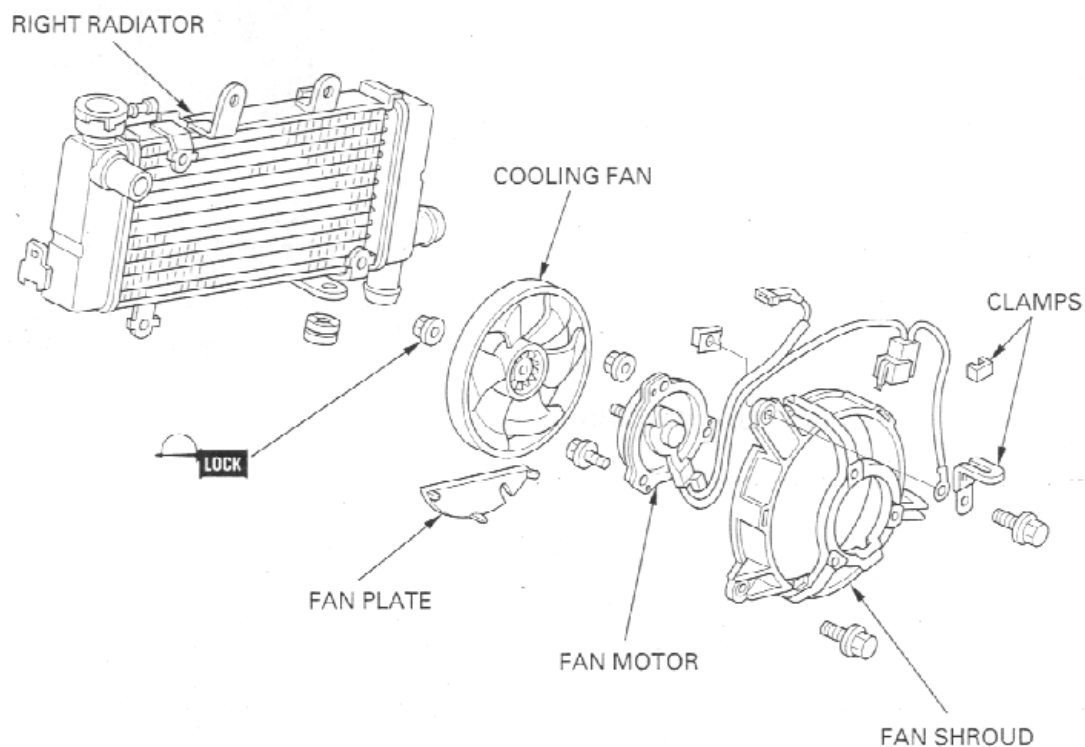
Remove the nut and cooling fan from the motor.



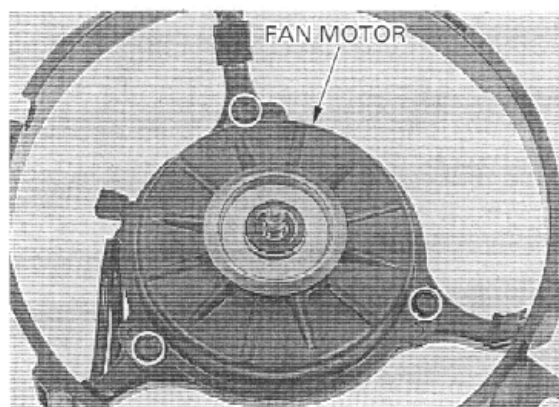
Remove the three bolts and the fan motor from the shroud.



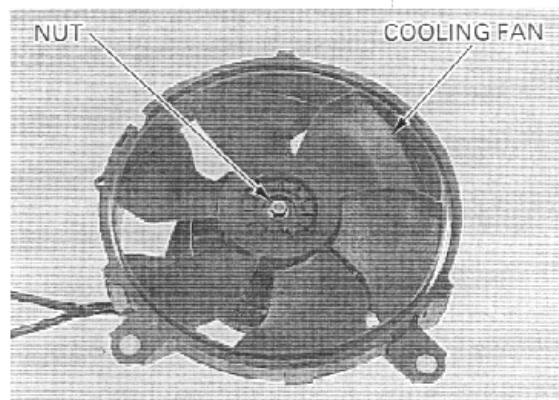
COOLING FAN ASSEMBLY



Install the fan motor onto the shroud with the drain tube facing toward the fan plate, and tighten the three bolts.



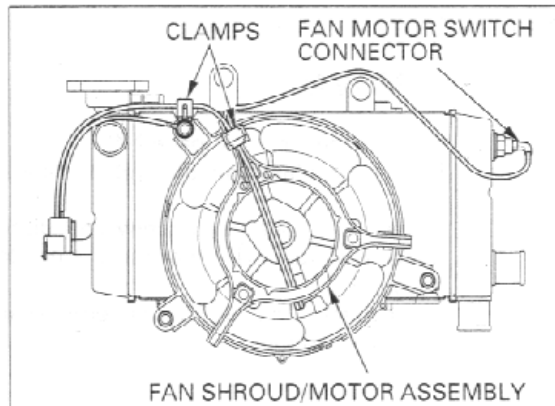
Install the cooling fan onto the motor shaft, aligning the flat surfaces. Apply locking agent to the motor shaft threads. Install and tighten the nut.



Install the fan shroud/motor assembly with the clamps and ground terminal onto the right radiator as shown and tighten the bolts.

Route and clamp the fan motor wires properly as shown.

Install the right radiator (page 6-6).



RADIATOR RESERVE TANK REMOVAL/INSTALLATION

Remove the front fairing (page 2-3).

Disconnect the radiator siphon tube from the radiator filler neck and drain the coolant from the reserve tank.

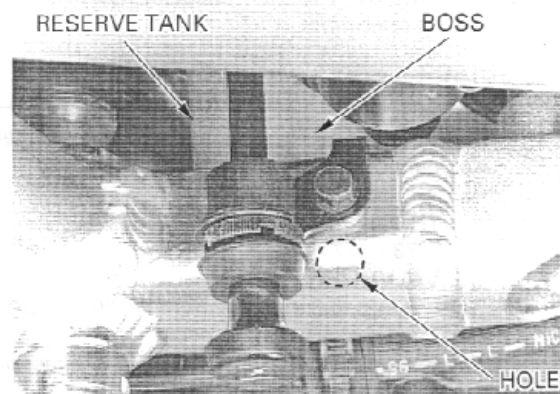
Remove the mounting bolt and the reserve tank from the frame.



Install the reserve tank in the frame and insert its boss into the hole in the frame.

Install the removed parts in the reverse order of removal.

Fill the reserve tank with recommended coolant to the upper level line.



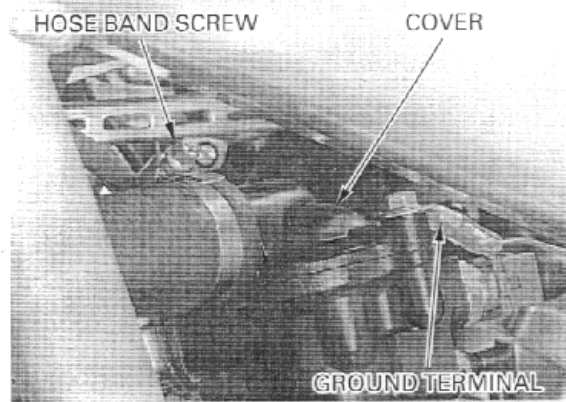
THERMOSTAT

REMOVAL

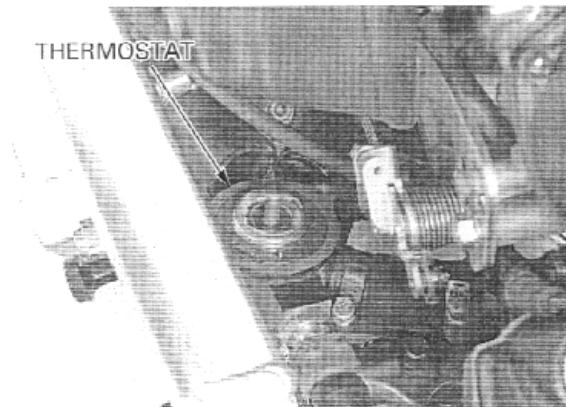
Remove the fuel tank (page 2-4).
Drain the coolant from the system (page 6-5).

Loosen the hose band screw and disconnect the upper radiator hose from the thermostat housing cover.

Remove the two bolts, ground terminal and thermostat housing cover.



Remove the thermostat from the housing.



INSPECTION

▲WARNING

- *Wear insulated gloves and adequate eye protection.*
- *Keep flammable materials away from the electric heating element.*

Visually inspect the thermostat for damage.
Replace the thermostat if the valve stays open at room temperature.

Heat the water with an electric heating element to operating temperature for 5 minutes.
Suspend the thermostat in heated water to check its operation.

NOTE:

Do not let the thermometer or thermostat touch the pan, or you will get false readings.

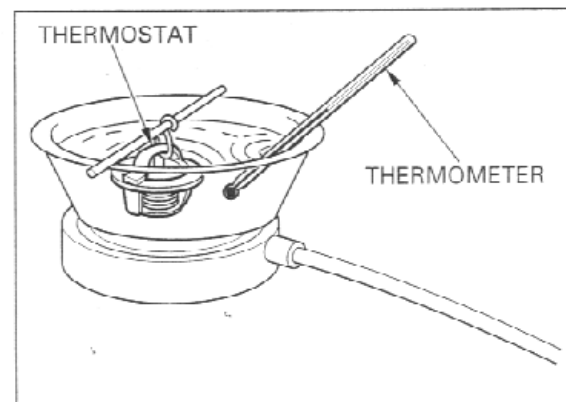
THERMOSTAT BEGINS TO OPEN:

73 – 77 °C (163 – 171 °F)

VALVE LIFT:

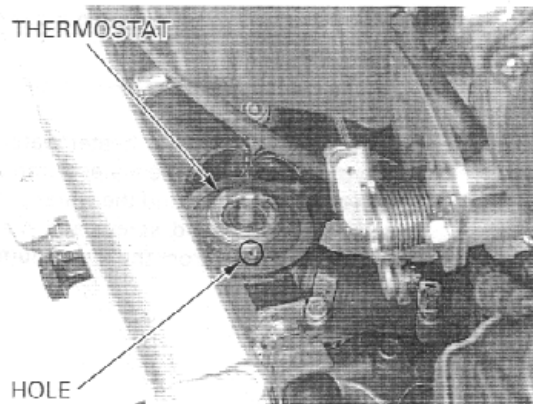
8 mm (0.3 in) minimum at 90 °C (194 °F)

Replace the thermostat if the valve responds at temperature other than those specified.



INSTALLATION

Install the thermostat into the housing with its hole facing rearwards.

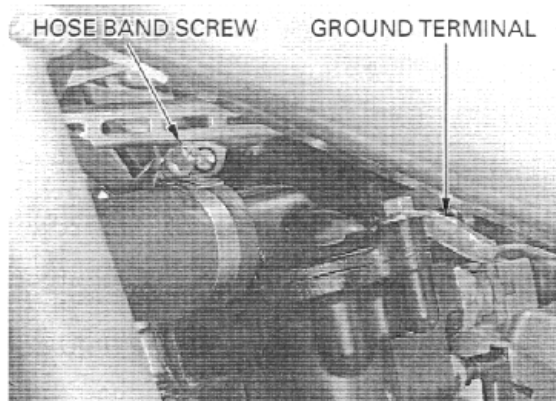


Install a new O ring into the groove in the housing cover and install the cover onto the housing.



Install the cover bolts with the ground terminal and tighten them.
Connect the upper radiator hose to the thermostat housing cover.

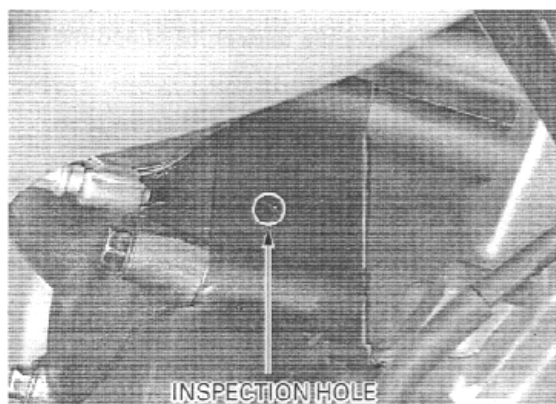
Fill and bleed the cooling system (page 6-5).
Install the fuel tank (page 2-4).



WATER PUMP

MECHANICAL SEAL INSPECTION

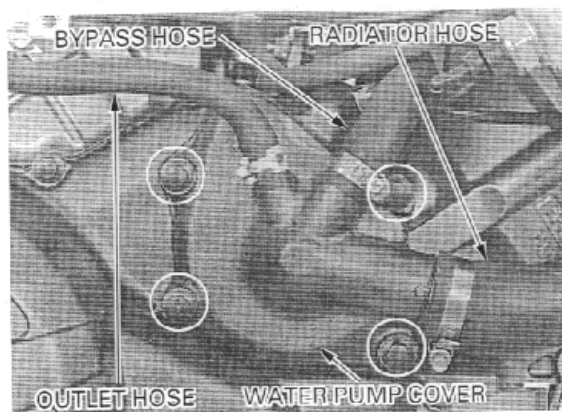
Check the inspection hole for signs of coolant leakage.
If there is leakage, the mechanical seal is defective, and it should be replaced (page 6-13).



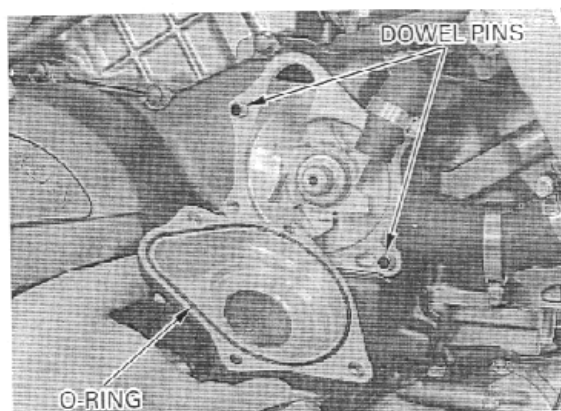
RIGHT CRANKCASE COVER REMOVAL

Drain the coolant from the system (page 6-5).

Disconnect the carburetor heater water outlet hose and bypass hose from the water pump cover. Remove the four bolts and the water pump cover. Loosen the hose band screw and disconnect the lower radiator hose from the water pump cover.



Remove the O-ring and dowel pins.

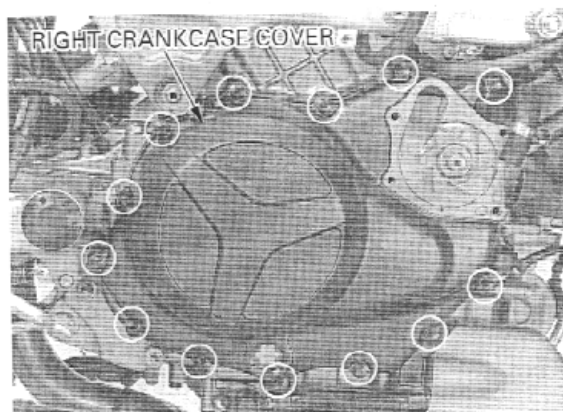


Disconnect the ignition pulse generator 2P (white) connector.



Remove the thirteen bolts and the right crankcase cover.

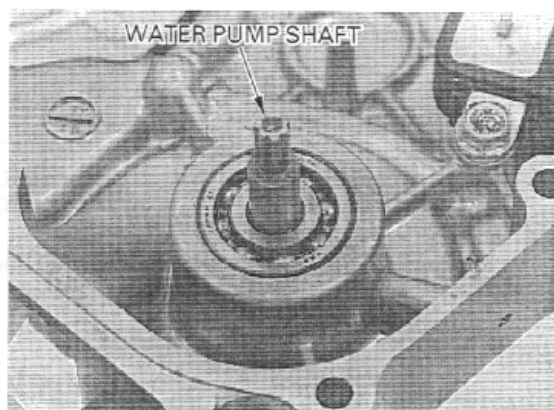
Remove the gasket and dowel pins.



MECHANICAL SEAL REPLACEMENT

Press out the water pump shaft from the right crankcase cover using a hydraulic press.

Remove the mechanical seal mating ring from the pump shaft.



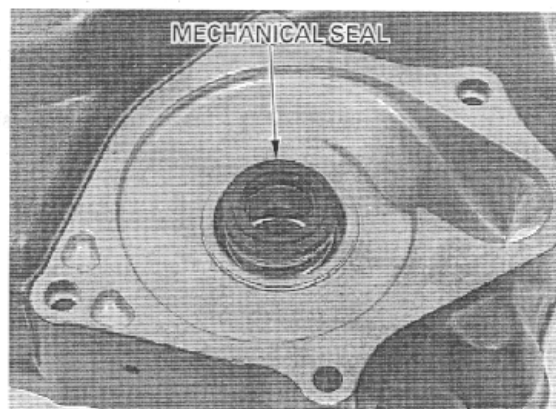
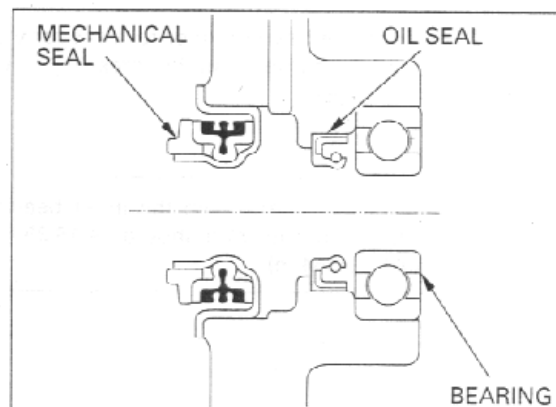
Remove the bearing using the special tools.

TOOLS:

Bearing remover set, 10 mm	07936-GE00000 not available in U.S.A.
— Bearing remover shaft	07936-GE00100 not available in U.S.A.
— Bearing remover, 10 mm	07936-GE00200 not available in U.S.A.
— Bearing remover weight	07741-0010201 not available in U.S.A.

or Equivalent commercially available in U.S.A.

Remove the oil seal and mechanical seal from the right crankcase cover.

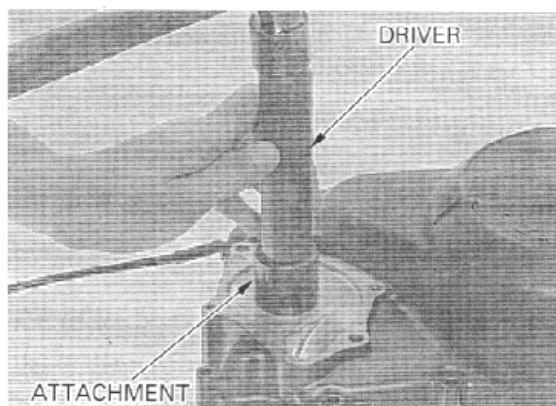


Drive a new mechanical seal using the special tool.

TOOLS:

Driver	07749-0010000
Mechanical seal driver attachment	07945-4150400
or	
Mechanical seal installer	07965-415000A (U.S.A. only)

Apply grease to a new oil seal lip and install the oil seal into the right crankcase cover.



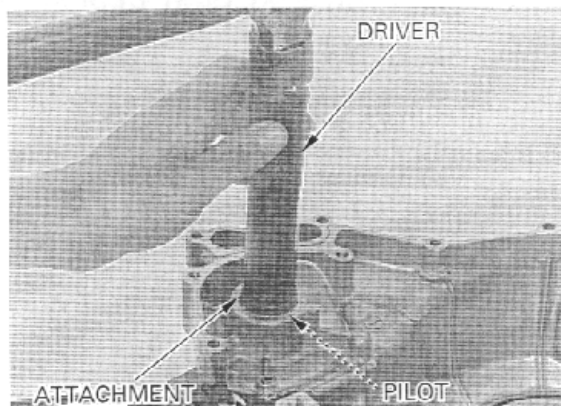
COOLING SYSTEM

Drive a new bearing with the markings facing out, using the special tools.

TOOLS:

Driver	07749-0010000
Attachment, 28 × 30 mm	07946-1870100
Pilot, 10 mm	07746-0040100

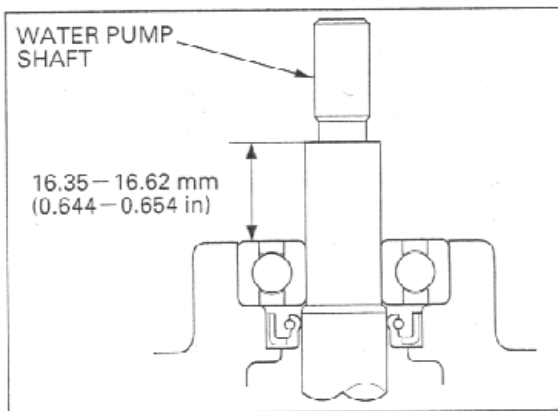
Install new mechanical seal mating ring into the impeller groove of the water pump shaft.



Support the bearing inner race properly and install the water pump shaft by pressing it with a hydraulic press.

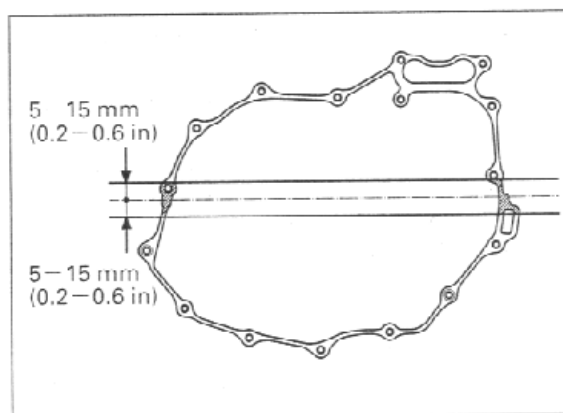
NOTE:

The measurement from the inner bearing race to the flange of the shaft should be 16.35–16.62 mm (0.644–0.654 in)

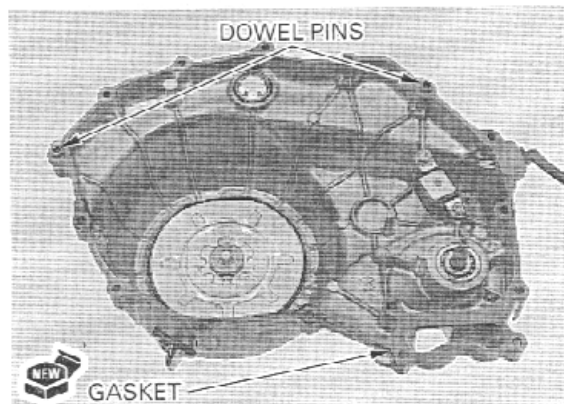


RIGHT CRANKCASE COVER INSTALLATION

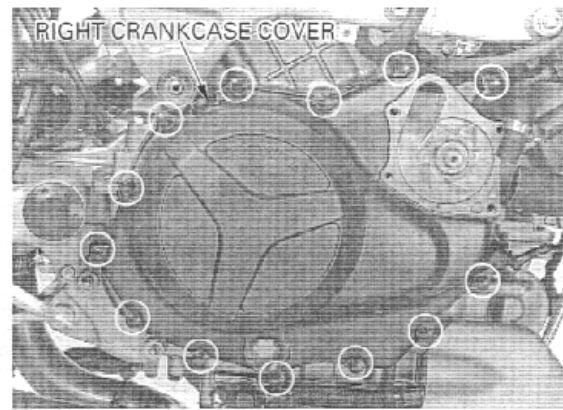
Apply sealant to the crankcase mating surfaces as shown.



Install the dowel pins and a new gasket.



Install the right crankcase cover and tighten the thirteen bolts.

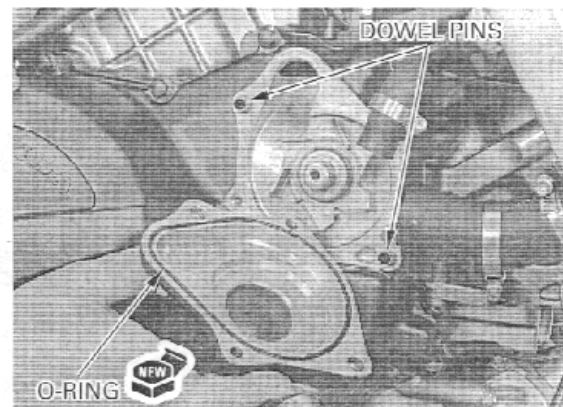


Route the ignition pulse generator wire properly (page 1-18).

Connect the ignition pulse generator connector.

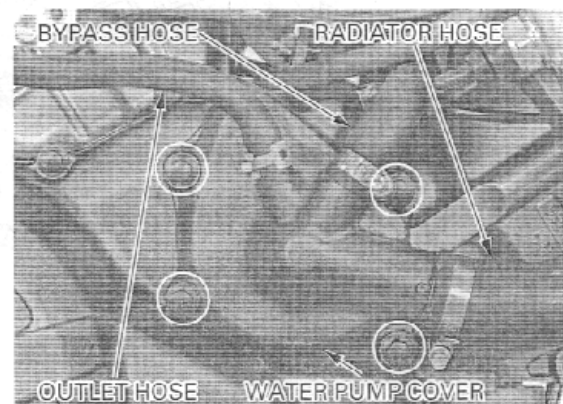


Install the dowel pins and a new O-ring into the water pump cover groove.

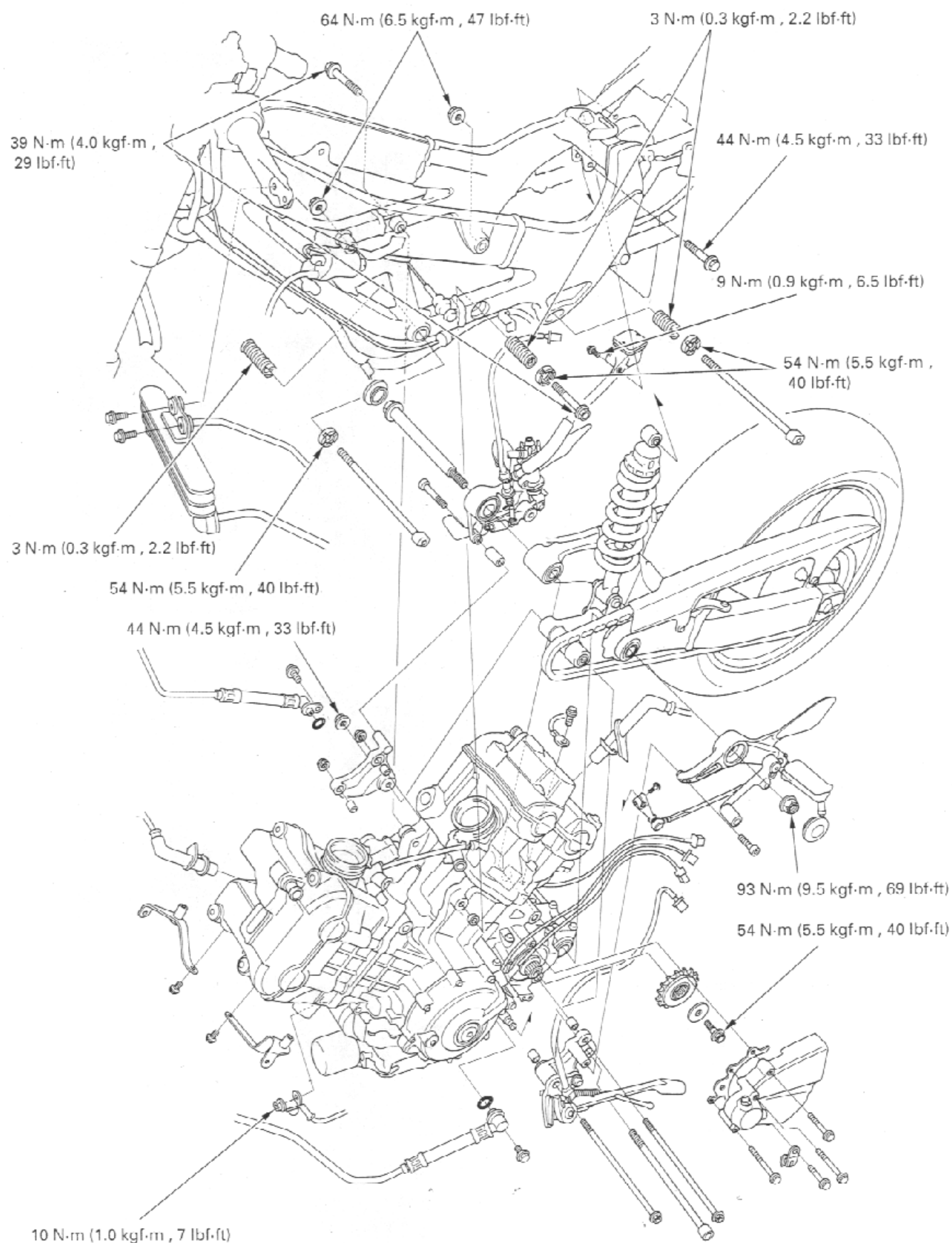


Connect the lower radiator hose to the water pump cover.
Install the water pump cover onto the right crankcase cover and tighten the four bolts.
Connect the carburetor heater water outlet hose and bypass hose to the water pump cover.

Fill and bleed the cooling system (page 6-5).



ENGINE REMOVAL/INSTALLATION



7. ENGINE REMOVAL/INSTALLATION

SERVICE INFORMATION

7-1

ENGINE INSTALLATION

7-7

ENGINE REMOVAL

7-3

SERVICE INFORMATION

GENERAL

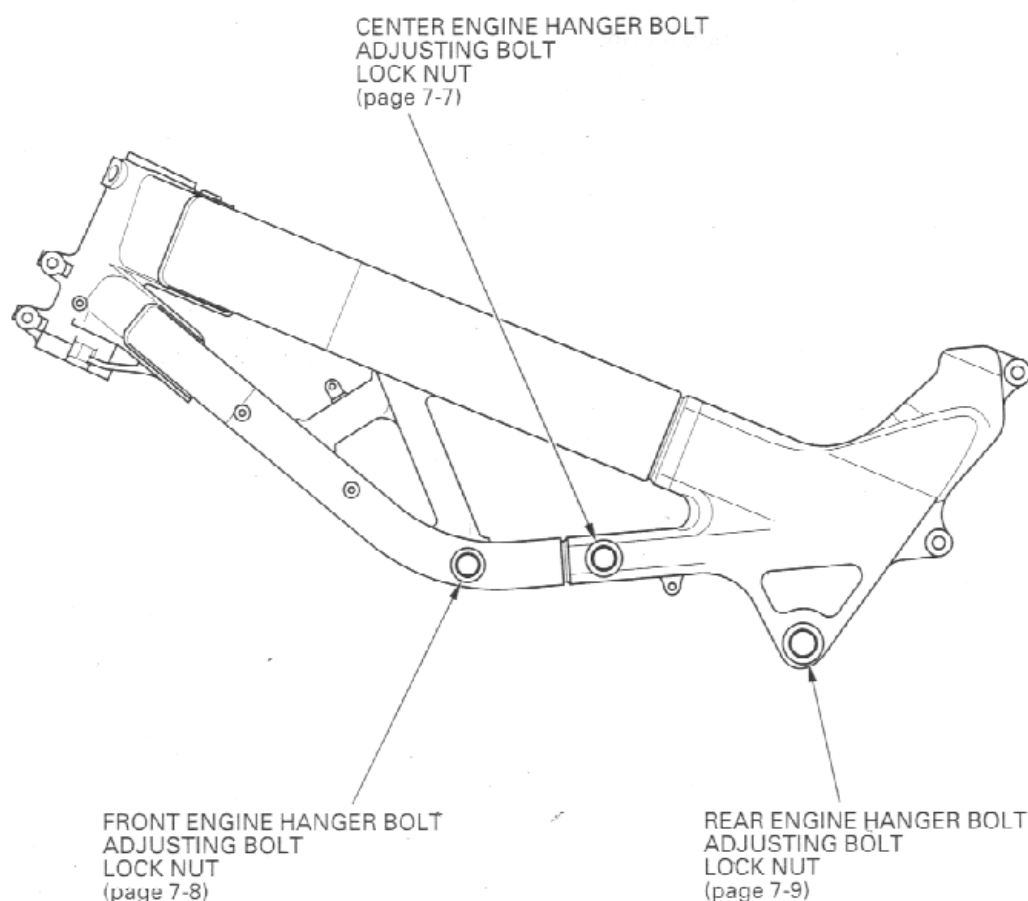
- A hoist or equivalent is required to support the motorcycle when removing and installing the engine.
- A floor jack or other adjustable support is required to support and maneuver the engine.

CAUTION:

Do not use the oil filter as a jacking point.

7

- When using the lock nut wrench for the adjusting bolt lock nut, use a deflecting beam type torque wrench 20 inches long. The lock nut wrench increases the torque wrench's leverage, so the torque wrench reading will be less than the torque actually applied to the lock nut. The specification given is the actual torque applied to the lock nut, not the reading on the torque wrench. Do not overtighten the lock nut. The specification later in the text gives both actual and indicated.
- The following components require engine removal for service:
 - transmission (section 11)
 - crankshaft/piston/cylinder (section 12)
- When installing the engine, be sure to tighten the engine mounting fasteners to the specified torque in the specified sequence. If you mistake the tightening torque or sequence, loosen all mounting fasteners, then tighten them again to the specified torque in the correct sequence.



ENGINE REMOVAL/INSTALLATION

SPECIFICATIONS

ITEM	SPECIFICATIONS
Engine dry weight	74.2 kg (163.6 lbs)
Engine oil capacity after disassembly	4.5 l (4.8 US qt, 4.0 Imp qt)
Coolant capacity (radiator and engine)	2.86 l (0.756 US gal, 0.629 Imp gal)

TORQUE VALUES

Center engine hanger bolt	39 N·m (4.0 kgf·m, 29 lbf·ft)
Left center engine hanger adjusting bolt	3 N·m (0.3 kgf·m, 2.2 lbf·ft)
Left center engine hanger lock nut	54 N·m (5.5 kgf·m, 40 lbf·ft)
Rear engine hanger adjusting bolt	3 N·m (0.3 kgf·m, 2.2 lbf·ft)
Rear engine hanger lock nut	54 N·m (5.5 kgf·m, 40 lbf·ft)
Front engine hanger adjusting bolt	3 N·m (0.3 kgf·m, 2.2 lbf·ft)
Front engine hanger lock nut	54 N·m (5.5 kgf·m, 40 lbf·ft)
Rear engine hanger nut	64 N·m (6.5 kgf·m, 47 lbf·ft)
Front engine hanger nut	64 N·m (6.5 kgf·m, 47 lbf·ft)
Shock link bracket nut	44 N·m (4.5 kgf·m, 33 lbf·ft)
Swingarm pivot nut	93 N·m (9.5 kgf·m, 69 lbf·ft)
Shock absorber lower mounting nut	44 N·m (4.5 kgf·m, 33 lbf·ft)
Shock link-to-bracket nut	44 N·m (4.5 kgf·m, 33 lbf·ft)
Rear brake reservoir mounting bolt	9 N·m (0.9 kgf·m, 6.5 lbf·ft)
Drive sprocket bolt	54 N·m (5.5 kgf·m, 40 lbf·ft)
Starter motor cable terminal nut	10 N·m (1.0 kgf·m, 7 lbf·ft)

TOOLS

Lock nut wrench	07VMA-MBB0100
Lock nut wrench	07HMA-MR70200

ENGINE REMOVAL

Drain the engine oil (page 3-11).

Remove the following:

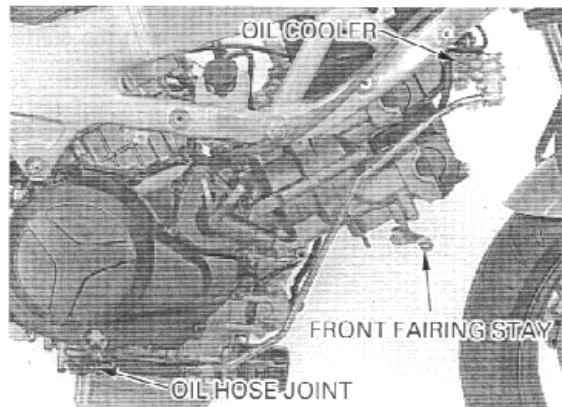
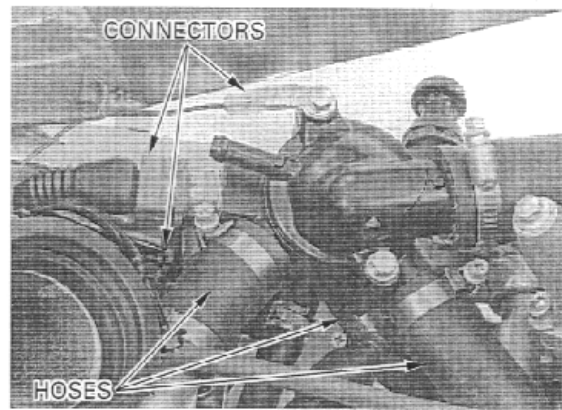
- front fairing (page 2-3).
- exhaust system (page 2-5).
- left and right radiators (page 6-6).
- carburetor assembly (page 5-5).
- California type only: evaporative emission (EVAP) canister (page 5-25).

Remove the thermostat housing assembly by disconnecting the following:

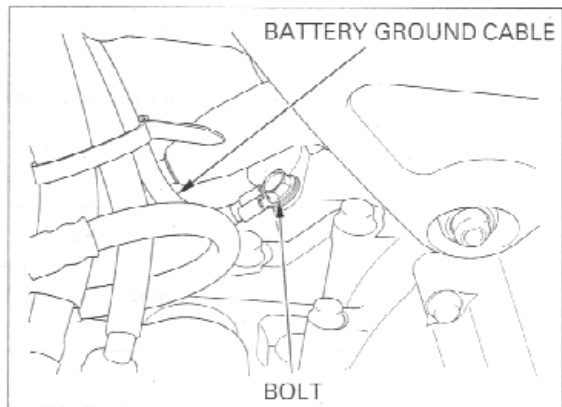
- ground wire connector
- engine coolant temperature sensor connector
- thermosensor connector
- bypass hose from the water pump
- water hoses from the cylinder heads

Remove the front fairing stays from the front cylinder head.

Remove the oil hose joints, mounting bolts and the oil cooler assembly.

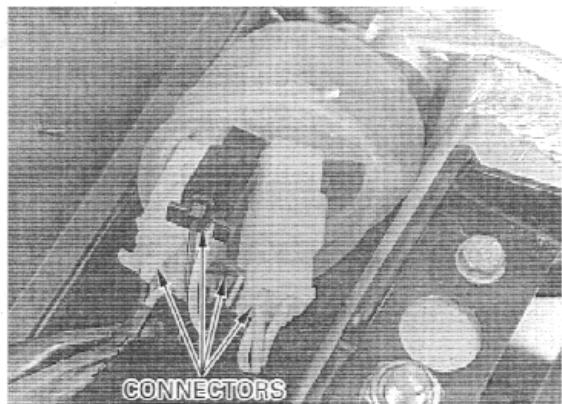


Remove the bolt and the battery ground cable from the engine.



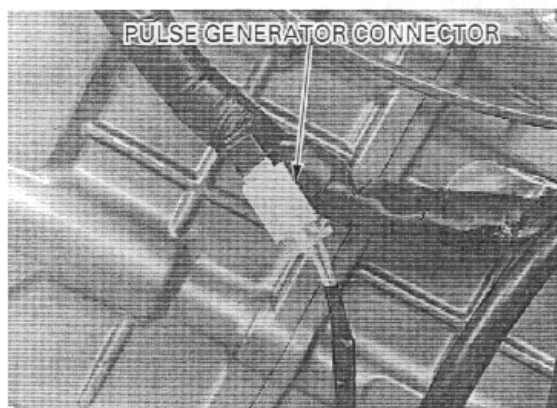
Disconnect the following:

- alternator 3P (white) connector
- oil pressure switch/neutral switch wire 2P (black) connector
- speed sensor 3P (white) connector
- side stand switch 3P (green) connector

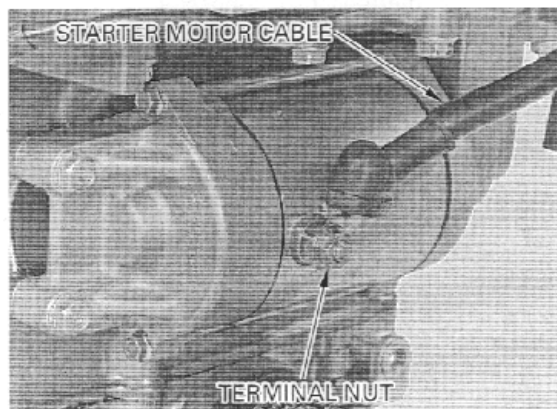


ENGINE REMOVAL/INSTALLATION

- pulse generator 2P (white) connector



Remove the terminal nut and the starter motor cable from the starter motor.

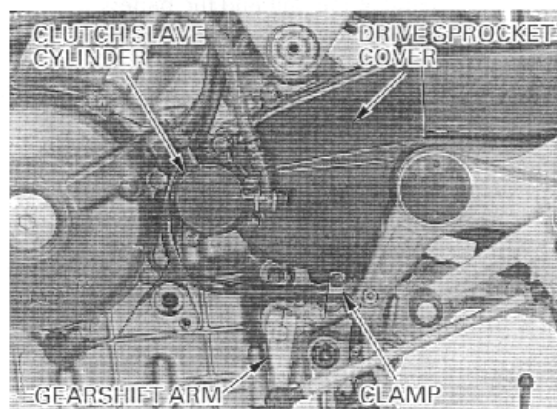


Remove the following:

- bolt and gearshift arm
- three bolts, clutch slave cylinder, dowel pins and gasket

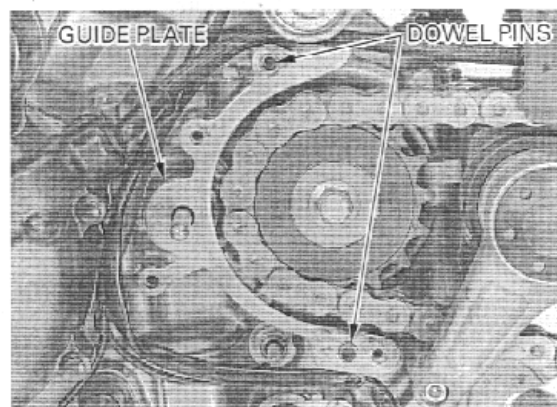
NOTE:

- Do not disconnect the clutch hose.
- To keep slave cylinder piston from being forced out of the cylinder, squeeze the clutch lever and tie it to the handlebar.

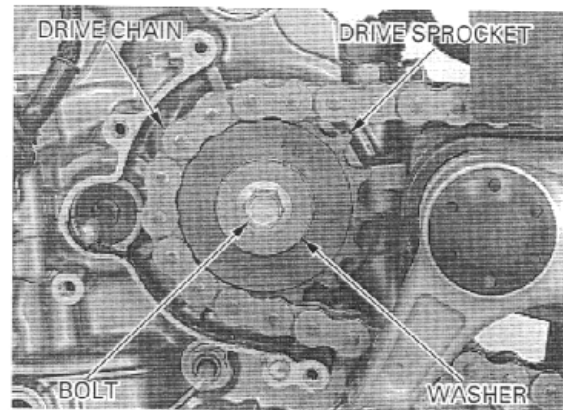


- two bolts, wire clamp and drive sprocket cover

Remove the gasket, guide plate and dowel pins.



Loosen the rear axle nut and drive chain adjusters. Remove the drive sprocket bolt, washer and the drive sprocket with the drive chain from the countershaft.



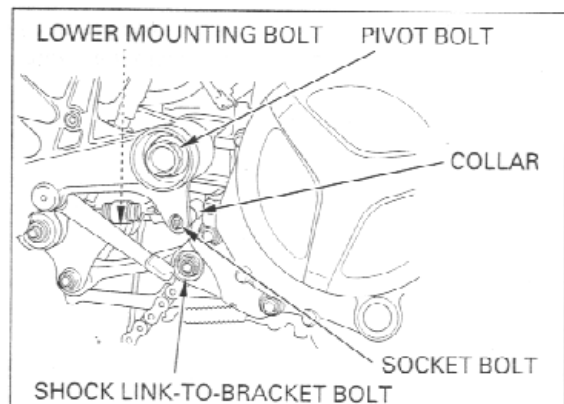
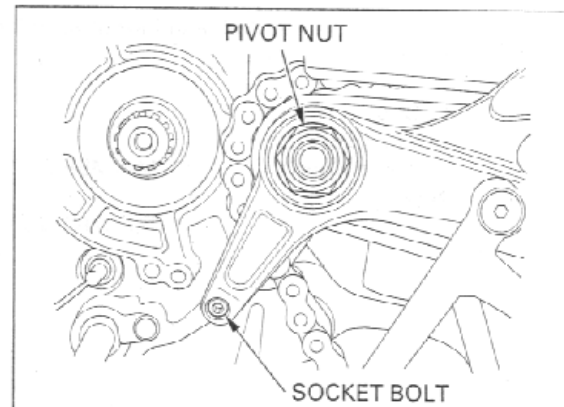
Disconnect the rear brake light switch connector. Remove the rear brake reservoir mounting bolt and the reservoir.



Support the motorcycle securely with a hoist or equivalent.

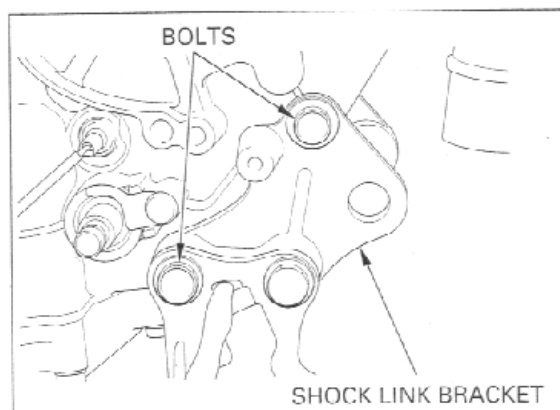
Remove the following:

- swingarm pivot caps
- shock link to bracket nut and bolt
- shock absorber lower mounting nut and bolt
- swingarm pivot nut, socket bolt, left driver footpeg bracket
- socket bolt, collar, swingarm pivot bolt, right driver footpeg bracket
- rear wheel, swingarm and rear brake system as an assembly



ENGINE REMOVAL/INSTALLATION

Remove the shock link bracket mounting nuts, bolts, and brackets along with the side stand and four dowel pins.

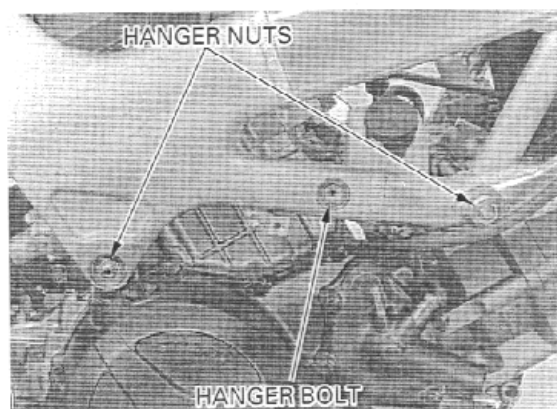


Place a floor jack or other adjustable support under the engine.

NOTE:

The jack height must be continually adjusted to relieve stress for ease of bolt removal.

Loosen and remove the front engine hanger nut, center engine hanger bolt and rear engine hanger nut from the right side.



Hold each hanger bolt and loosen each lock nut using the special tool.

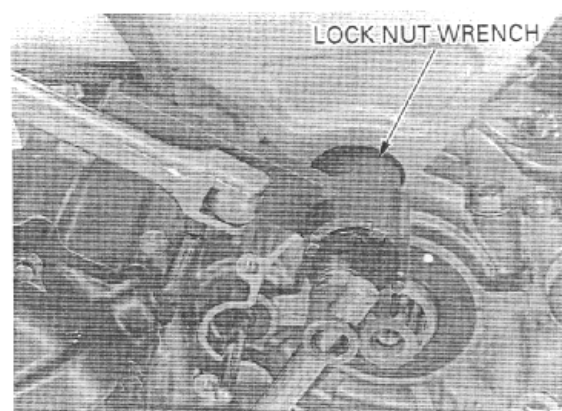
TOOLS:

Front and center:

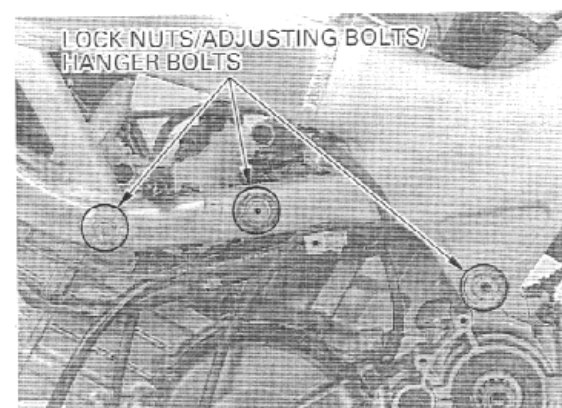
Lock nut wrench 07VMA-MBB0100

Rear:

Lock nut wrench 07HMA-MR70200



Remove the lock nuts, adjusting bolts, engine hanger bolts and the engine from the frame.



ENGINE INSTALLATION

NOTE:

- When tightening the lock nut with the lock nut wrench, refer to torque wrench reading information on page 7-1 "SERVICE INFORMATION".
- The jack height must be continually adjusted to relieve stress from the mounting fasteners.

CAUTION:

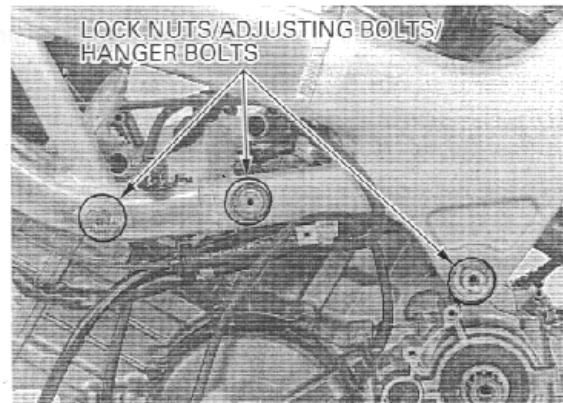
Be sure to tighten all engine mounting fasteners to the specified torque in the specified sequence described below. If you mistake the tightening torque or sequence, loosen all mounting fasteners, then tighten them again to the specified torque in the specified sequence.

Install the front engine hanger adjusting bolt into the frame.

Install the engine in the frame.

Install the engine hanger bolts, adjusting bolts and lock nuts from the left side.

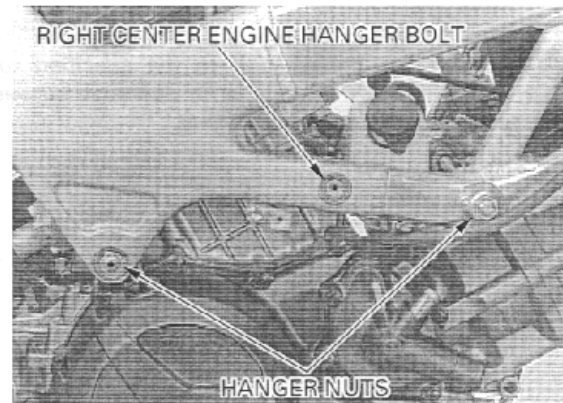
The left center engine hanger bolt is longer than the right center engine hanger bolt.



Install the center engine hanger bolt, and the front and rear engine hanger nut from the right side.

1. Tighten the right center engine hanger bolt to the specified torque.

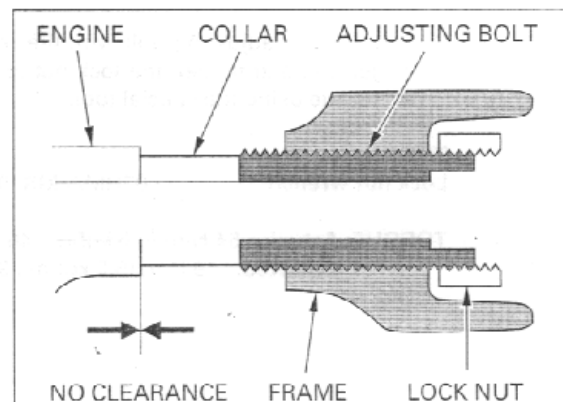
TORQUE: 39 N·m (4.0 kgf·m, 29 lbf·ft)



2. Install the distance collar between the left center adjusting bolt and engine.

Tighten the left center adjusting bolt to the specified torque and check that there is no clearance between the distance collar and engine.

TORQUE: 3 N·m (0.3 kgf·m, 2.2 lbf·ft)



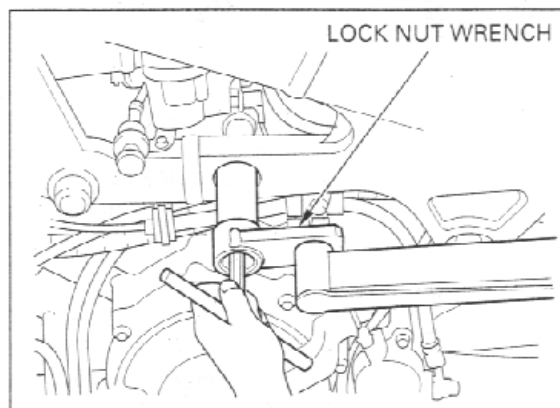
ENGINE REMOVAL/INSTALLATION

3. Hold the left center adjusting bolt and tighten the lock nut to the specified torque using the special tool.

TOOL:

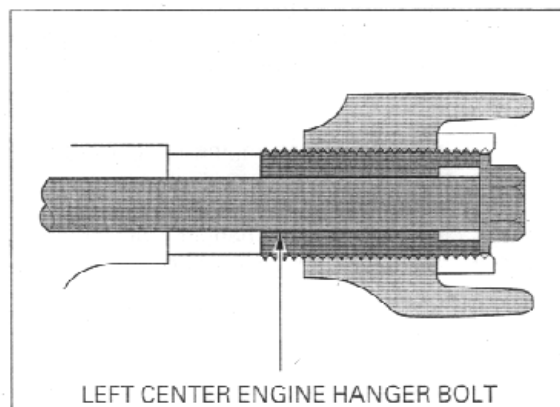
Lock nut wrench 07VMA-MBB0100

TORQUE: Actual: 54 N·m (5.5 kgf·m, 40 lbf·ft)
Indicated: 49 N·m (5.0 kgf·m, 36 lbf·ft)



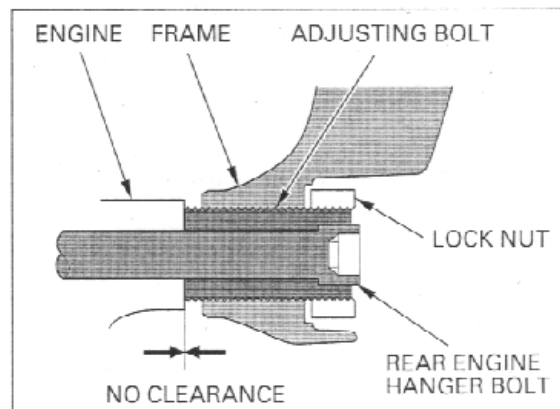
4. Install and tighten the left center engine hanger bolt to the specified torque.

TORQUE: 39 N·m (4.0 kgf·m, 29 lbf·ft)



5. Tighten the rear adjusting bolt with the rear engine hanger bolt to the specified torque and check that there is no clearance between the adjusting bolt and engine.

TORQUE: 3 N·m (0.3 kgf·m, 2.2 lbf·ft)

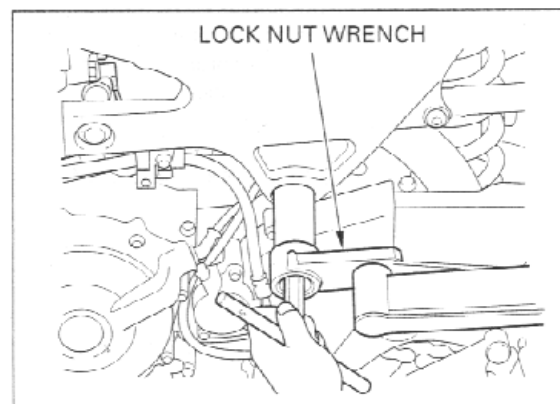


6. Hold the rear adjusting bolt with the rear engine hanger bolt and tighten the lock nut to the specified torque using the special tool.

TOOL:

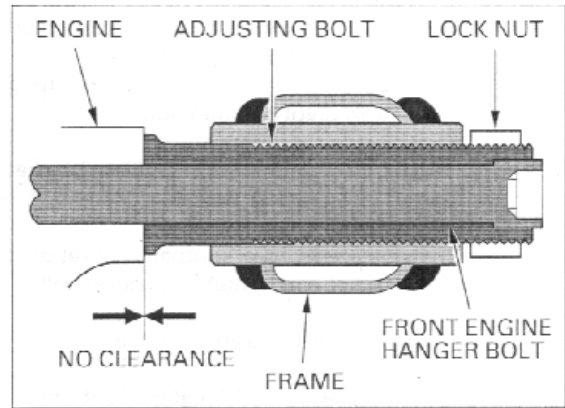
Lock nut wrench 07HMA-MR70200

TORQUE: Actual: 54 N·m (5.5 kgf·m, 40 lbf·ft)
Indicated: 49 N·m (5.0 kgf·m, 36 lbf·ft)



7. Tighten the front adjusting bolt with the front engine hanger bolt to the specified torque and check that there is no clearance between the adjusting bolt and engine.

TORQUE: 3 N·m (0.3 kgf·m , 2.2 lbf·ft)

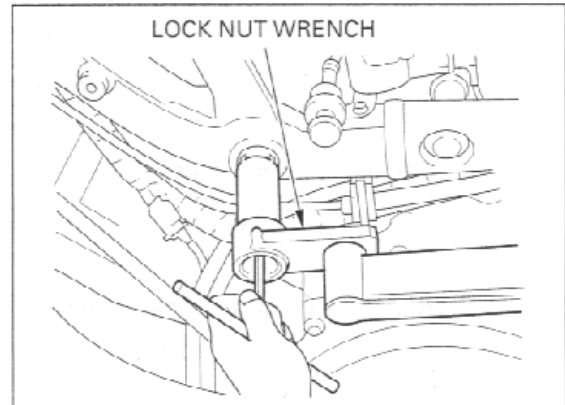


8. Hold the front adjusting bolt with the front engine hanger bolt and tighten the lock nut to the specified torque using the special tool.

TOOL:

Lock nut wrench 07VMA-MBB0100

TORQUE: Actual: 54 N·m (5.5 kgf·m , 40 lbf·ft)
Indicated: 49 N·m (5.0 kgf·m , 36 lbf·ft)

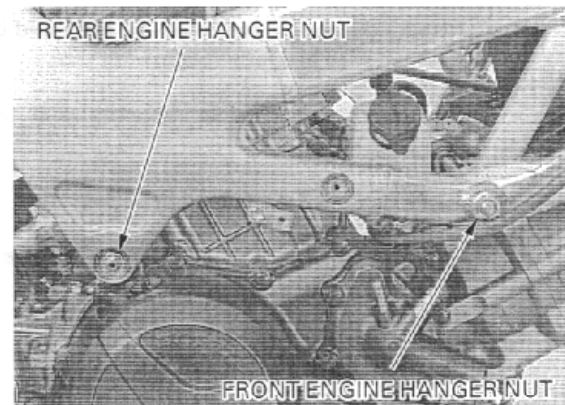


9. Tighten the rear engine hanger nut to the specified torque.

TORQUE: 64 N·m (6.5 kgf·m , 47 lbf·ft)

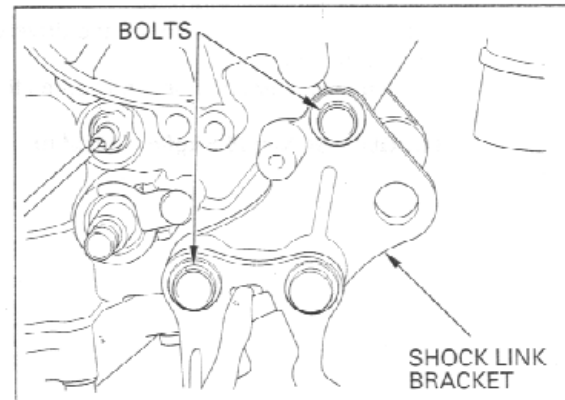
10. Tighten the front engine hanger nut to the specified torque.

TORQUE: 64 N·m (6.5 kgf·m , 47 lbf·ft)



Install the four dowel pins, shock link brackets and tighten the mounting nuts.

TORQUE: 44 N·m (4.5 kgf·m , 33 lbf·ft)



ENGINE REMOVAL/INSTALLATION

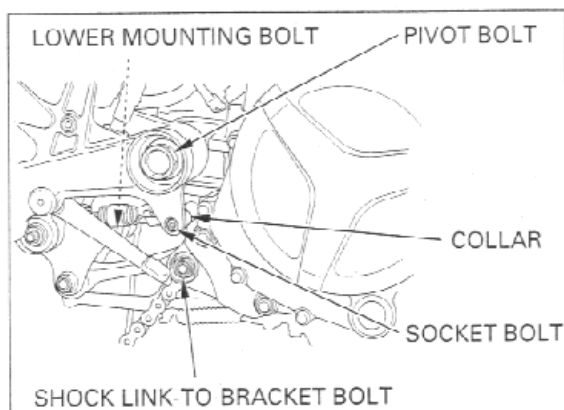
Install the rear wheel, swingarm and rear brake system assembly onto the engine.
Install the left and right driver footpeg brackets, swingarm pivot bolt and nut.

Install the right driver footpeg bracket onto the shock link bracket with the collar and tighten the socket bolt.

Install the left driver footpeg bracket onto the shock link bracket and tighten the socket bolt.

Tighten the swingarm pivot nut.

TORQUE: 93 N·m (9.5 kgf·m , 69 lbf·ft)



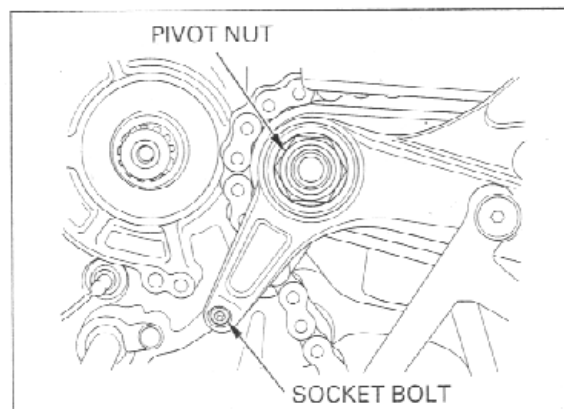
Install the swingarm pivot caps.

Install the shock absorber lower mounting bolt and tighten the nut.

TORQUE: 44 N·m (4.5 kgf·m , 33 lbf·ft)

Install the shock link-to-bracket bolt and tighten the nut.

TORQUE: 44 N·m (4.5 kgf·m , 33 lbf·ft)

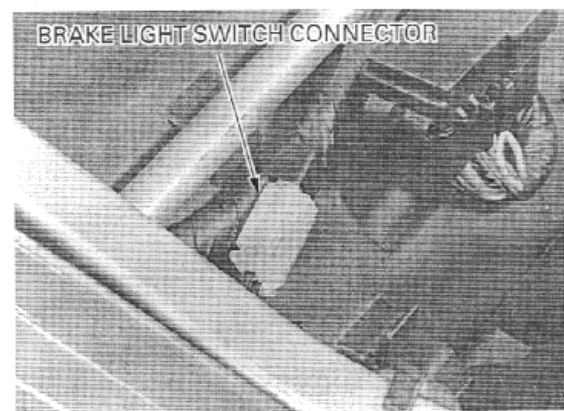


Route the rear brake reservoir hose and brake light switch wire properly (page 1-18).

Install the rear brake reservoir and tighten the mounting bolt.

TORQUE: 9 N·m (0.9 kgf·m , 6.5 lbf·ft)

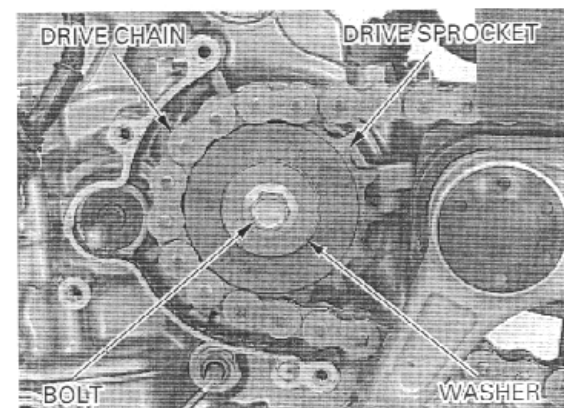
Connect the rear brake light switch connector.



Install the drive sprocket with the drive chain onto the countershaft.

Install the washer and bolt, and tighten the bolt.

TORQUE: 54 N·m (5.5 kgf·m , 40 lbf·ft)

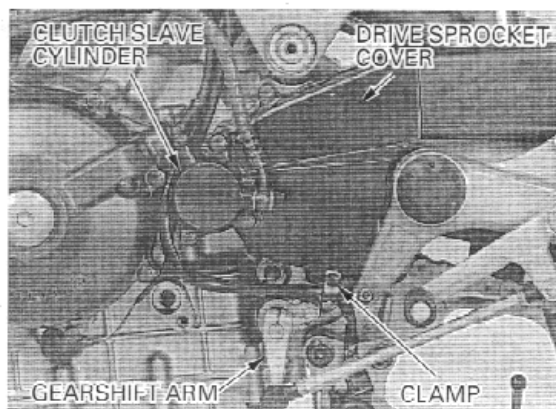


Install the dowel pins and guide plate.



Install a new gasket, drive sprocket cover and clamp, and tighten the two bolts.
Install the dowel pins and a new gasket (page 9-11).
Install the clutch slave cylinder and tighten the bolts.

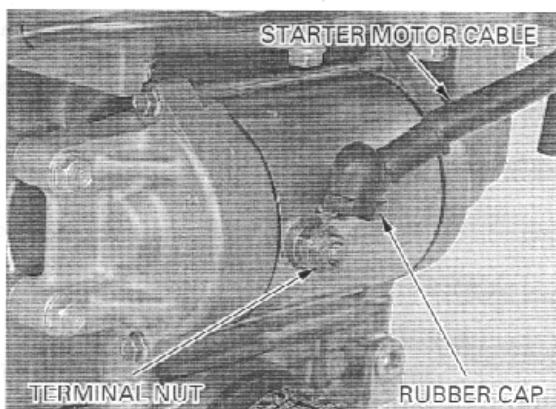
Release the clutch lever from the handlebar.
Install the gearshift arm (page 9-22).



Connect the starter motor cable.
Install and tighten the terminal nut.

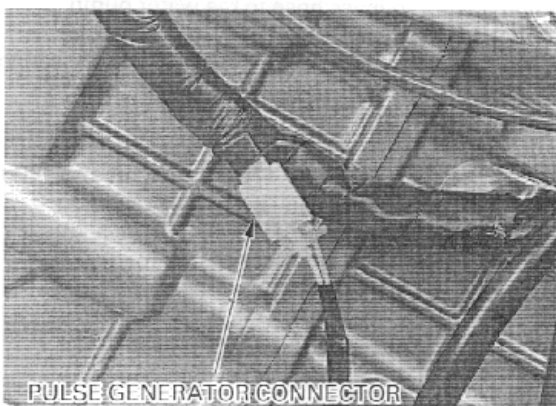
TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Install the rubber cap securely.



Route the wires properly (page 1-18).

Connect the following:
— pulse generator 2P (white) connector

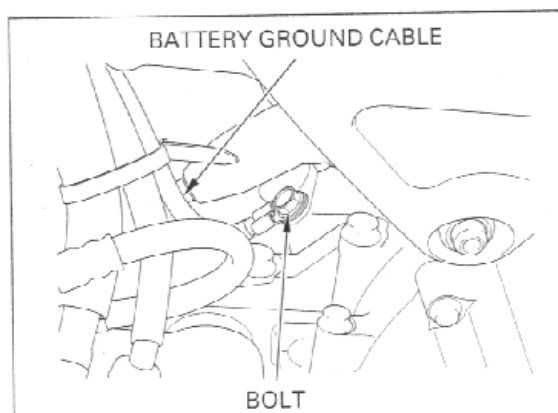


ENGINE REMOVAL/INSTALLATION

- alternator 3P (white) connector
- oil pressure switch/neutral switch wire 2P (black) connector
- speed sensor 3P (white) connector
- side stand switch 3P (green) connector

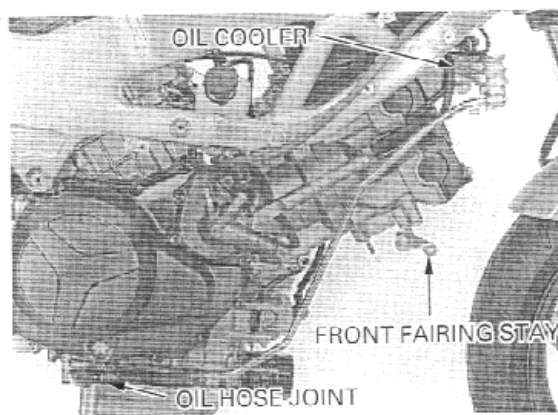


Install the battery ground cable and tighten the bolt.



Install the oil cooler assembly onto the stay and tighten the mounting bolts.
Coat new O-rings with oil and install them onto the oil hose joints.
Connect the oil hose joints to the engine and tighten the bolts.

Install the front fairing stays onto the front cylinder head and tighten the bolts.



Install the thermostat housing assembly and connect the following:

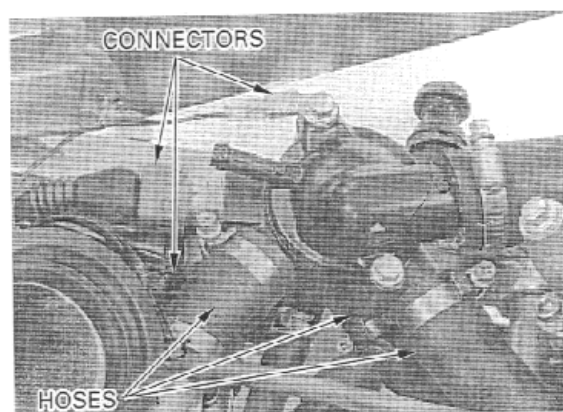
- water hoses to the cylinder heads
- bypass hose to the water pump
- thermosensor connector
- engine coolant temperature sensor connector
- ground wire connector

Install the following:

- California type only: evaporative emission (EVAP) canister (page 5-25)
- carburetor assembly (page 5-18)
- left and right radiators (page 6-6)
- exhaust system (page 2-6)

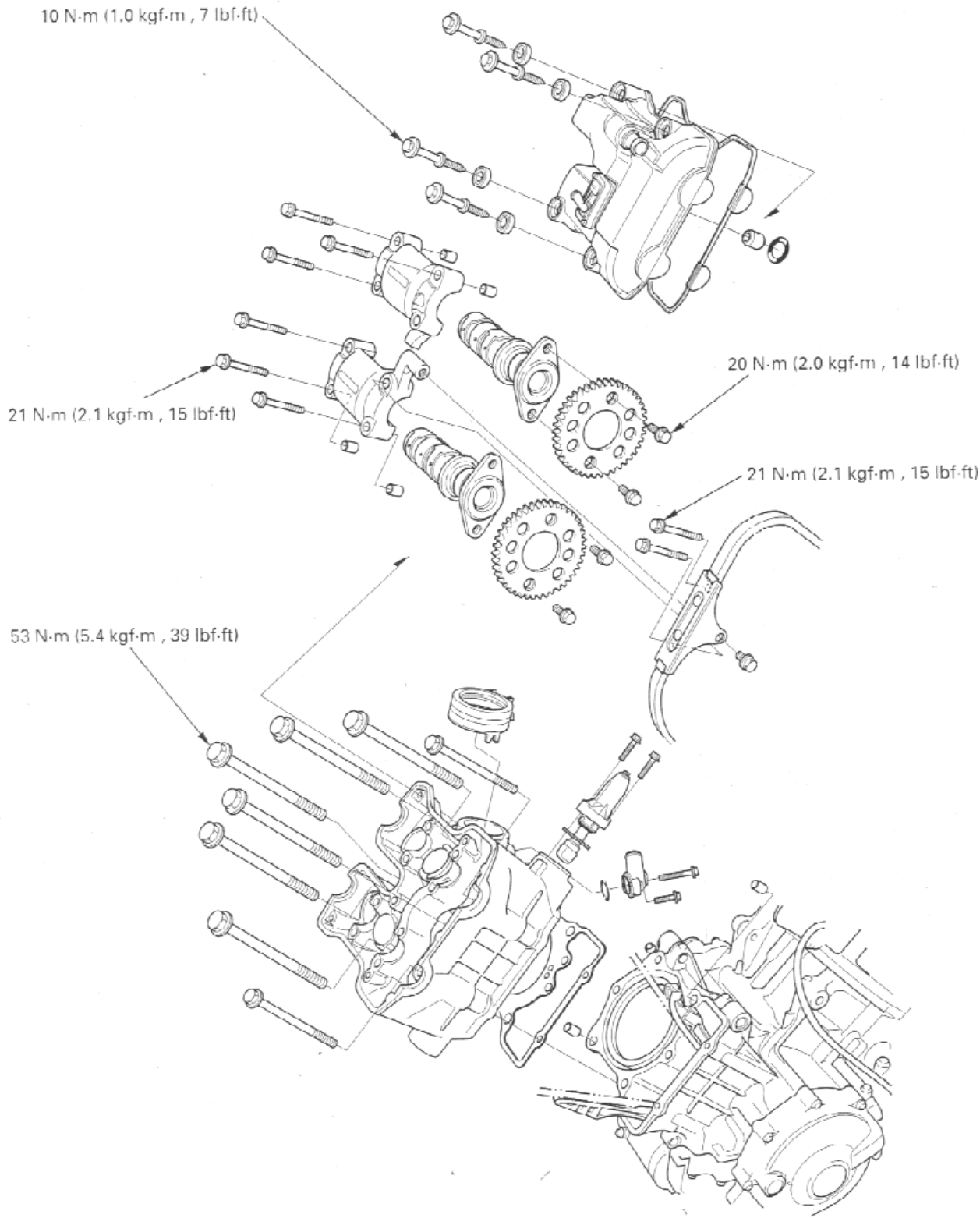
Adjust the drive chain (page 3-15).

Fill the crankcase with recommended engine oil (page 3-11).



MEMO

CYLINDER HEAD/VALVE



8. CYLINDER HEAD/VALVE

SERVICE INFORMATION	8-1	VALVE GUIDE REPLACEMENT	8-12
TROUBLESHOOTING	8-2	VALVE SEAT INSPECTION/REFACING	8-13
CYLINDER COMPRESSION	8-3	CYLINDER HEAD ASSEMBLY	8-16
CYLINDER HEAD COVER REMOVAL	8-3	CYLINDER HEAD INSTALLATION	8-17
CAMSHAFT REMOVAL	8-4	CAMSHAFT INSTALLATION	8-19
CYLINDER HEAD REMOVAL	8-7	CYLINDER HEAD COVER INSTALLATION	8-23
CYLINDER HEAD DISASSEMBLY	8-8		

SERVICE INFORMATION

GENERAL

- This section covers service of the camshafts, cylinder head and valves.
- The camshafts, cylinder head and valves can be serviced with the engine installed in the frame.
- When disassembling, mark and store the disassembled parts to ensure that they are reinstalled in their original locations.
- Clean all disassembled parts with cleaning solvent and dry them by blowing them off with compressed air before inspection.
- Camshaft lubricating oil is fed through oil passages in the cylinder head. Clean the oil passages before assembling cylinder head.
- Be careful not to damage the mating surfaces when removing the cylinder head cover and cylinder head.

SPECIFICATIONS

Unit: mm (in)

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT	
Cylinder compression at 350 rpm			1,128 kPa (11.5 kgf/cm ² , 164 psi)	—	
Valve clearance		IN	0.16 ± 0.03 (0.006 ± 0.001)	—	
		EX	0.31 ± 0.03 (0.012 ± 0.001)	—	
Camshaft	Cam lobe height	IN	40.080–40.240 (1.5779–1.5842)	39.780 (1.5661)	
		EX	40.230–40.390 (1.5839–1.5902)	39.930 (1.5720)	
	Runout		—	0.05 (0.002)	
Oil clearance			0.020–0.062 (0.0008–0.0024)	0.088 (0.0035)	
Valve lifter	Valve lifter O.D.		33.978–33.993 (1.3377–1.3383)	33.97 (1.337)	
	Valve lifter bore I.D.		34.010–34.026 (1.3390–1.3396)	34.04 (1.340)	
Valve, valve guide	Valve stem O.D.	IN	5.975–5.990 (0.2352–0.2358)	5.965 (0.2348)	
		EX	5.965–5.980 (0.2348–0.2354)	5.955 (0.2344)	
	Valve guide I.D.		IN/EX	6.000–6.012 (0.2362–0.2367)	6.040 (0.2378)
	Stem-to-guide clearance	IN	0.010–0.037 (0.0004–0.0015)	0.075 (0.0030)	
		EX	0.020–0.047 (0.0008–0.0019)	0.085 (0.0033)	
	Valve guide projection above cylinder head		—	14.0–14.2 (0.55–0.56)	—
	Valve seat width	IN	1.1–1.3 (0.04–0.05)	1.7 (0.07)	
EX		1.3–1.5 (0.05–0.06)	1.9 (0.07)		
Valve spring	Free length	Inner	37.0 (1.46)	36.0 (1.42)	
		Outer	41.9 (1.65)	40.9 (1.61)	
Cylinder head warpage			—	0.10 (0.004)	

CYLINDER HEAD/VALVE

TORQUE VALUES

Cylinder head cover bolt	10 N·m (1.0 kgf·m , 7 lbf·ft)	
Cam sprocket bolt	20 N·m (2.0 kgf·m , 14 lbf·ft)	Apply locking agent to the threads
Camshaft holder bolt	21 N·m (2.1 kgf·m , 15 lbf·ft)	Apply oil to the threads and seating surface
Cylinder head bolt (10 mm)	53 N·m (5.4 kgf·m , 39 lbf·ft)	Apply oil to the threads and seating surface
Cam chain tensioner bolt	23 N·m (2.3 kgf·m , 17 lbf·ft)	Apply locking agent to the threads
Cam chain guide bolt	23 N·m (2.3 kgf·m , 17 lbf·ft)	Apply locking agent to the threads
Carburetor insulator band screw	1 N·m (0.1 kgf·m , 0.7 lbf·ft)	
Spark plug	14 N·m (1.4 kgf·m , 10 lbf·ft)	

TOOLS

Valve spring compressor	07757-0010000	
Valve guide driver, 5.5 mm	07742-0010100	
Valve guide driver	07743-0020000	not available in U.S.A.
Valve guide reamer	07VMH-MBB0200	or 07VMH-MBB020A (U.S.A. only)
Valve seat cutter, 40 mm (IN/EX 45°)	07780-0010500	or equivalent commercially available in U.S.A.
Flat cutter, 38.5 mm (IN 32°)	07780-0012400	—
Flat cutter, 35 mm (EX 32°)	07780-0012300	—
Interior cutter, 37.5 mm (IN/EX 60°)	07780-0014100	—
Cutter holder, 6 mm	07VMH-MBB0100	—

TROUBLESHOOTING

Engine top-end problems usually affect engine performance. These can be diagnosed by a compression test, or by tracing top-end noise with a sounding rod or stethoscope.

Compression too low, hard starting or poor performance at low speed

- Valves
 - Incorrect valve adjustment
 - Burned or bent valves
 - Incorrect valve timing
 - Broken valve spring
 - Uneven valve seating
- Cylinder head
 - Leaking or damaged cylinder head gasket
 - Warped or cracked cylinder head
 - Loose spark plug
- Cylinder/piston (section 12)

Compression too high

- Excessive carbon build-up on piston head or combustion chamber

Excessive smoke

- Worn valve stem or valve guide
- Damaged stem seal
- Cylinder/piston problem (section 12)

Excessive noise

- Incorrect valve clearance
- Sticking valve or broken valve spring
- Worn or damaged camshaft
- Worn or damaged valve lifter
- Worn cam chain
- Worn or damaged cam chain tensioner
- Worn cam sprocket teeth
- Cylinder/piston problem (section 12)

Rough idle

- Low cylinder compression

CYLINDER COMPRESSION

Warm up the engine to normal operating temperature.

Stop the engine and remove the spark plug caps and spark plugs.

Install the compression gauge into the spark plug hole.

Shift the transmission in neutral.

Open the throttle all the way and crank the engine with the starter motor until the gauge reading stops rising. The maximum reading is usually reached within 4 – 7 seconds.

COMPRESSION PRESSURE:

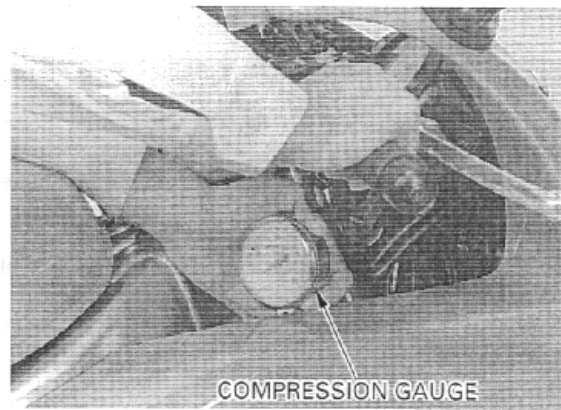
1,128 kPa (11.5 kgf/cm², 164 psi)
at 350 rpm

Low compression can be caused by:

- blown cylinder head gasket
- improper valve adjustment
- valve leakage
- worn piston ring or cylinder

High compression can be caused by:

- carbon deposits in combustion chamber or on piston head



CYLINDER HEAD COVER REMOVAL

FRONT:

Remove the front fairing (page 2-3).

Remove the spark plug wire from the clamp.

Remove the two bolts and the oil cooler and bracket from the frame.

Move the oil cooler forward.



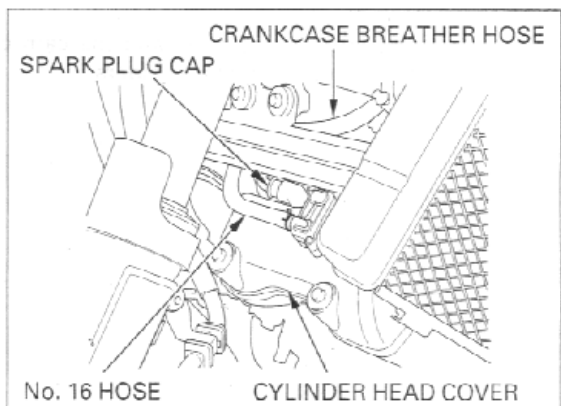
Disconnect the No. 16 air supply hose from the pulse secondary air injection (PAIR) check valve.

Disconnect the crankcase breather hose from the cylinder head cover.

Remove the spark-plug cap.

Remove the four cylinder head cover bolts, special washers and the cylinder head cover.

Remove the dowel pin, O-ring and gasket.



CYLINDER HEAD/VALVE

REAR:

Remove the fuel tank (page 2-4).

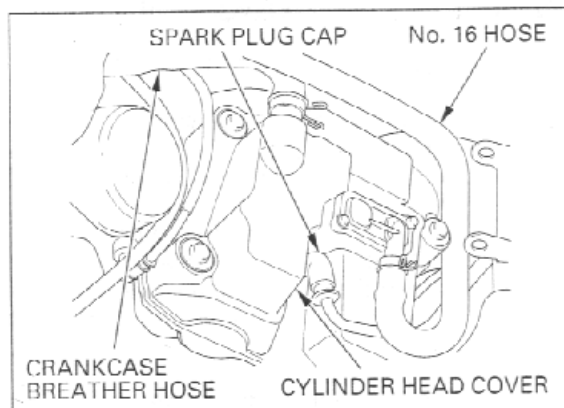
Disconnect the No. 16 air supply hose from the PAIR check valve.

Disconnect the crankcase breather hose from the cylinder head cover.

Remove the spark plug cap.

Remove the four cylinder head cover bolts, special washers and the cylinder head cover.

Remove the dowel pin, O-ring and gasket.



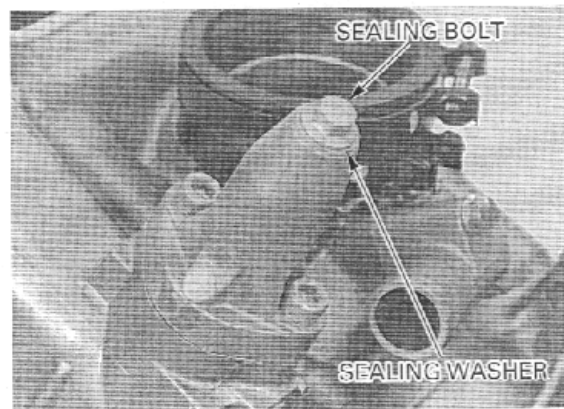
CAMSHAFT REMOVAL

For the front cylinder, remove the following:

- carburetor assembly (page 5-5)
- left radiator (page 6-6)

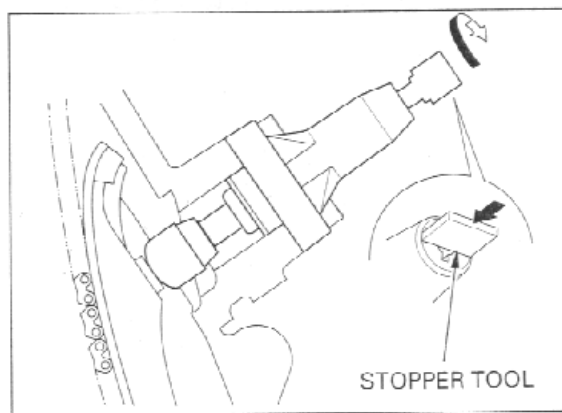
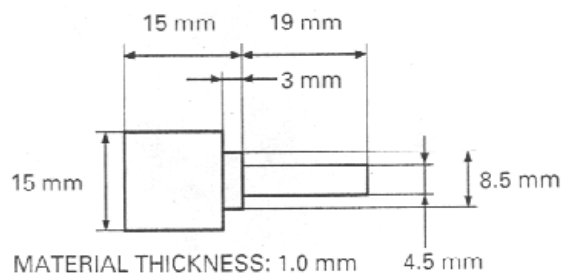
Remove the cylinder head cover (page 8-3).

Remove the cam chain tensioner lifter sealing bolt and sealing washer.

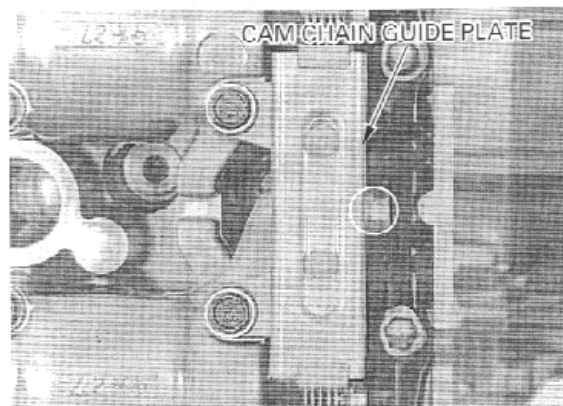


Turn the cam chain tensioner lifter shaft clockwise fully and secure it with a stopper tool.

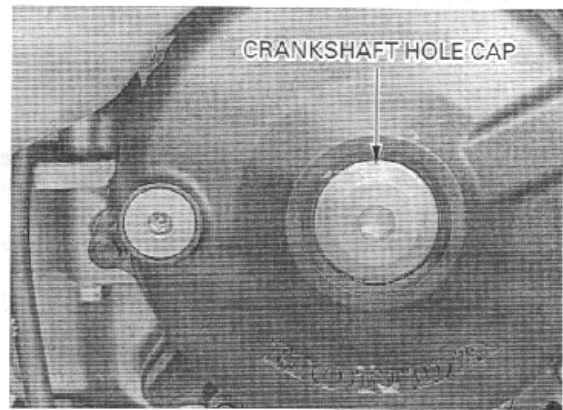
This tool can easily be made from a thin (1 mm of thickness) piece of steel as shown below.



Remove the three bolts and the cam chain guide plate from the camshaft holders.



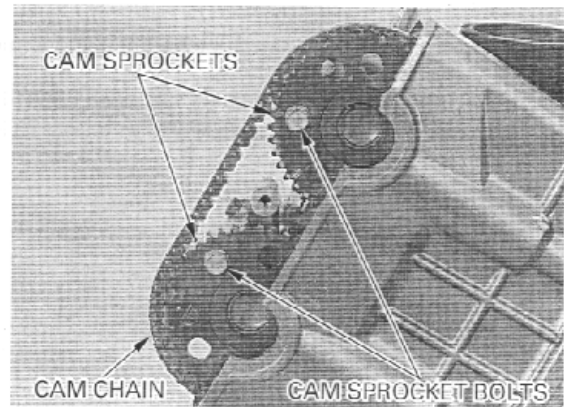
Remove the crankshaft hole cap.



Be careful not to drop the cam sprocket bolts into the crankcase.

Remove the cam sprocket bolts from the intake and exhaust camshafts. Turn the crankshaft counterclockwise one turn, and remove the other cam sprocket bolts.

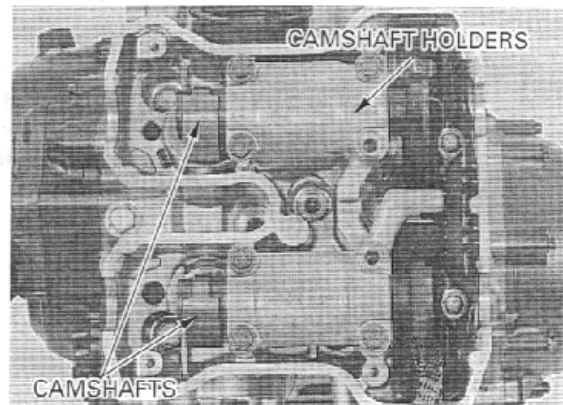
Remove the cam sprockets from the camshafts, and suspend the cam chain with a piece of wire to prevent it from falling into the crankcase.



Remove the camshaft holder bolts, camshaft holders, dowel pins and camshafts.

NOTE:

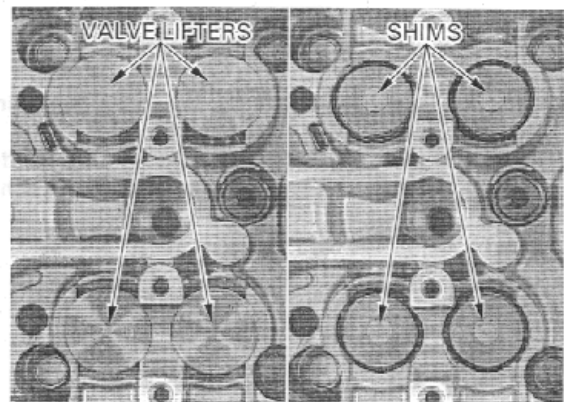
Do not forcibly remove the dowel pins from the camshaft holders.



Remove the valve lifters and shims.

NOTE:

- Be careful not to damage the valve lifter bore.
- Shim may stick to the inside of the valve lifter. Do not allow the shims to fall into the crankcase.
- Mark all valve lifters and shims to ensure correct reassembly in their original locations.
- The valve lifter can be easily removed with a valve lapping tool or magnet.
- The shims can be easily removed with a tweezers or magnet.



INSPECTION

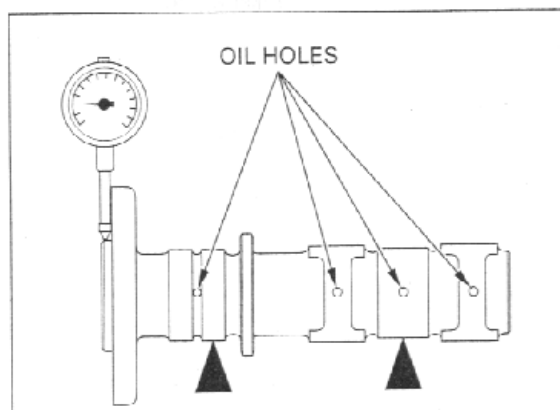
CAMSHAFT

Check the cam and journal surfaces of the camshaft for scoring, scratches or evidence of insufficient lubrication.

Check the oil holes in the camshaft for clogging.

Measure the camshaft runout using a dial indicator.

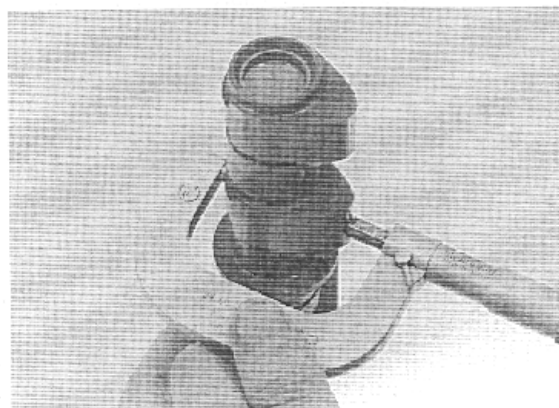
SERVICE LIMIT: 0.05 mm (0.002 in)



Measure each cam lobe height using a micrometer.

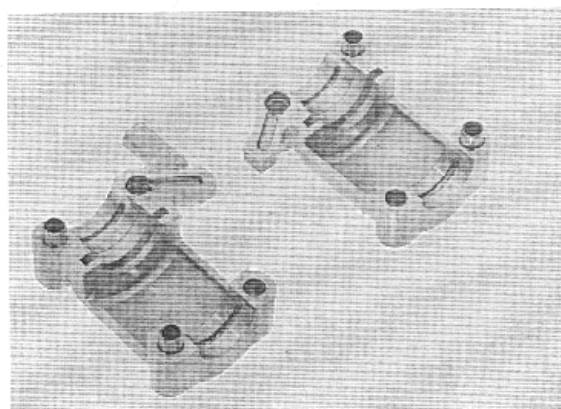
SERVICE LIMITS: IN: 39.780 mm (1.5661 in)

EX: 39.930 mm (1.5720 in)



CAMSHAFT JOURNAL

Check the camshaft journal surfaces of the camshaft holders and cylinder head for scoring, scratches or evidence of insufficient lubrication.

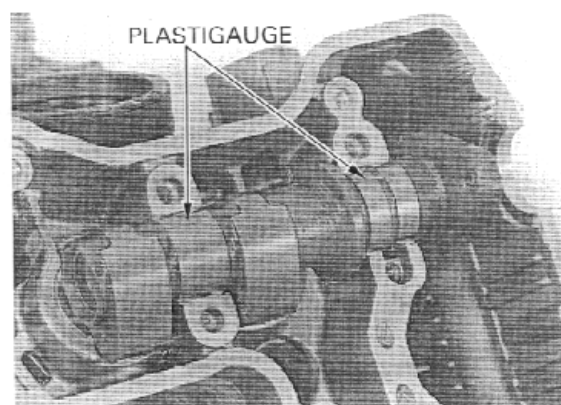


Do not rotate the camshaft during inspection.

CAMSHAFT OIL CLEARANCE

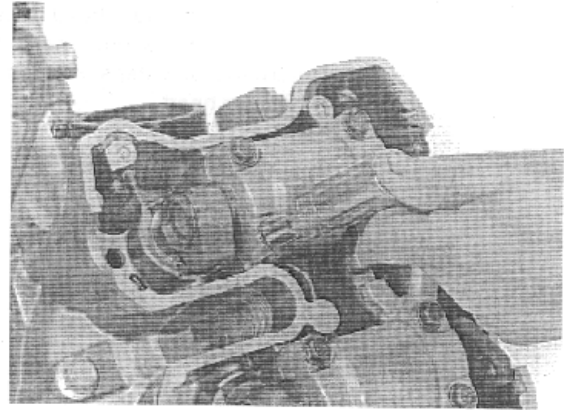
Wipe any oil from the journals of the cylinder head, camshaft and camshaft holder.

Put the camshaft onto the cylinder head and lay a strip of plastigauge lengthwise on each camshaft journal.



Apply oil to the threads and seating surfaces of the camshaft holder bolts.
Install the camshaft holder and tighten the bolts in a crisscross pattern in 2 or 3 steps.

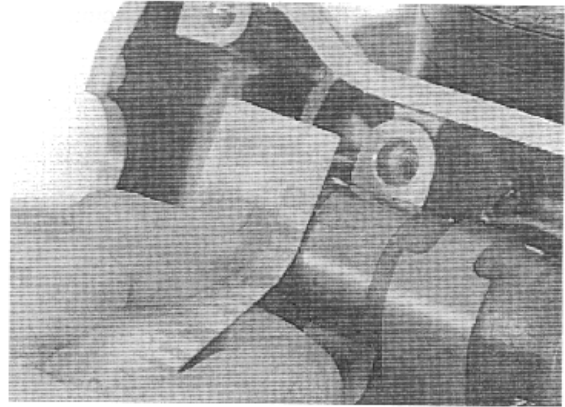
TORQUE: 21 N·m (2.1 kgf·m, 15 lbf·ft)



Remove the camshaft holder and measure the compressed plastigauge at its widest point on the camshaft to determine the oil clearance.

SERVICE LIMIT: 0.088 mm (0.0035 in)

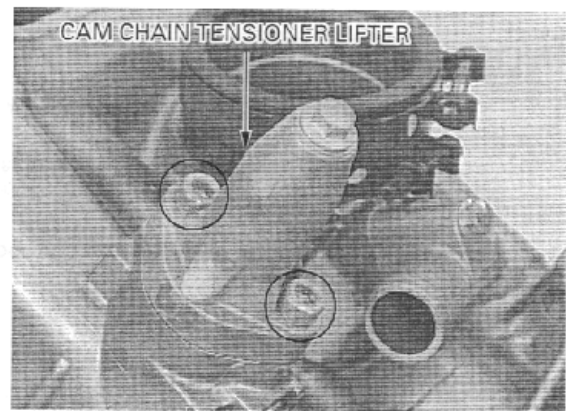
If the oil clearance exceeds the service limit, replace the camshaft and recheck the oil clearance. Replace the cylinder head and camshaft holders as a set if the oil clearance still exceeds the service limit.



CYLINDER HEAD REMOVAL

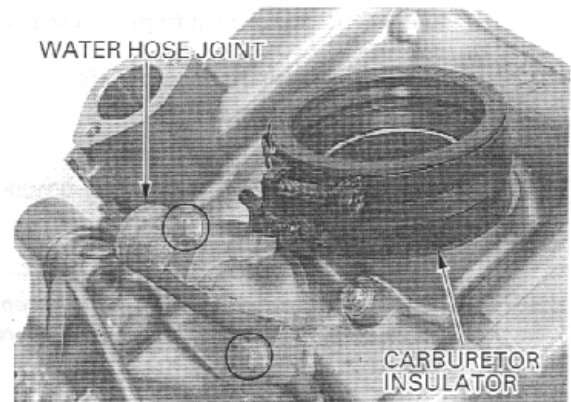
Remove the following:

- carburetor assembly (page 5-5)
- camshafts (page 8-4)
- two bolts and cam chain tensioner lifter



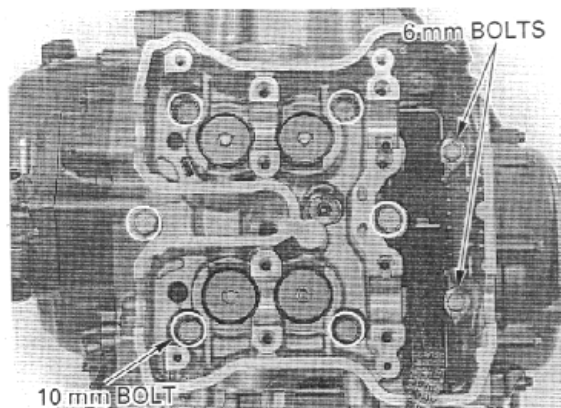
If necessary, remove the following:

- carburetor insulator
- two bolts and water hose joint

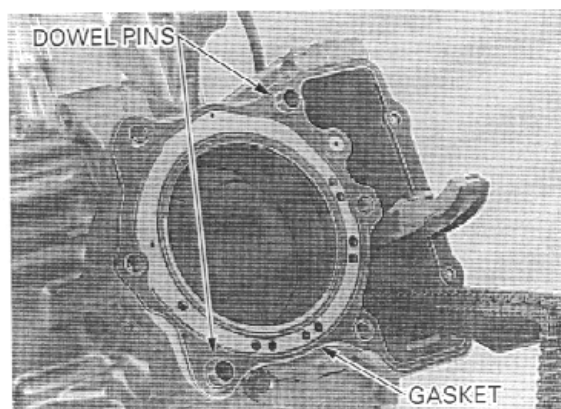


CYLINDER HEAD/VALVE

Remove the two 6 mm cylinder head bolts.
Loosen the six 10 mm cylinder head bolts in a crisscross pattern in 2 or 3 steps, and remove them.
Remove the cylinder head.



Be careful not to drop the dowel pins into the crankcase.
Remove the gasket and dowel pins.

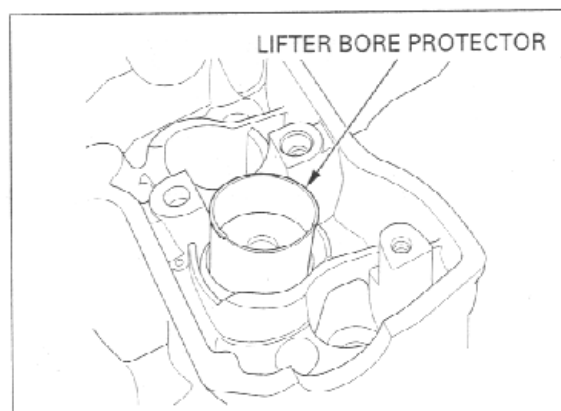


CYLINDER HEAD DISASSEMBLY

Remove the spark plug from the cylinder head.

Make a lifter bore protector from a plastic 35 mm film container by cutting the bottom of the container.

Install the protector into the valve lifter bore.



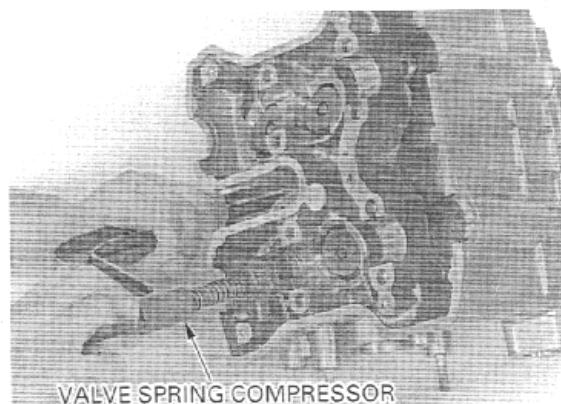
Remove the attachment from the valve spring compressor.
Remove the valve spring cotters using the valve spring compressor.

TOOL:

Valve spring compressor 07757-0010000

CAUTION:

To prevent loss of tension, do not compress the valve springs more than necessary to remove the cotters.

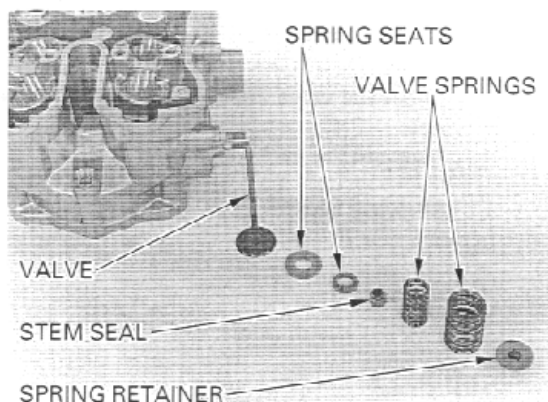


Remove the following:

- spring retainer
- inner and outer valve springs
- valve
- stem seal
- inner and outer valve spring seats

NOTE:

Mark all parts during disassembly so they can be placed back in their original locations.

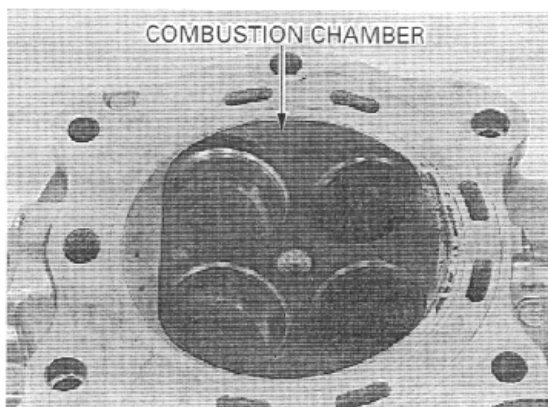


INSPECTION

CYLINDER HEAD

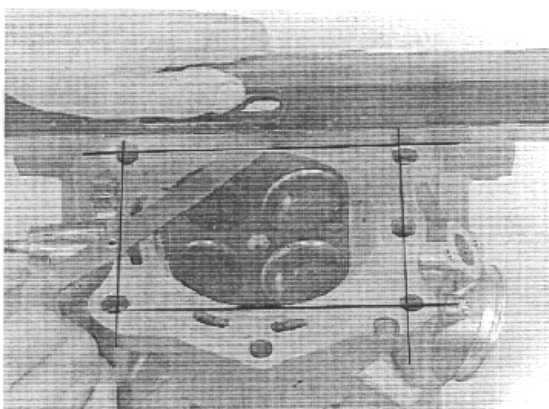
Remove the carbon deposits from the combustion chamber, being careful not to damage the gasket surface.

Check the spark plug hole and valve areas for cracks.



Check the cylinder head for warpage with a straight edge and feeler gauge.

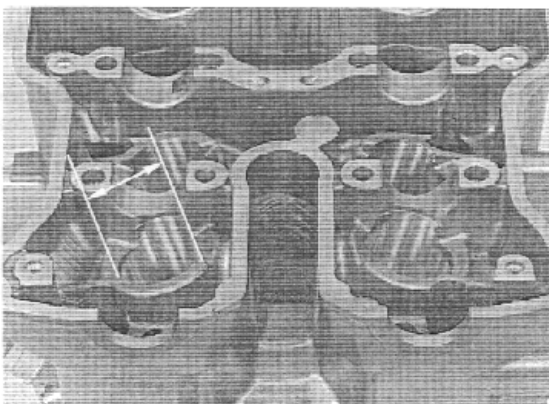
SERVICE LIMIT: 0.10 mm (0.004 in)



Check the valve lifter bore for scoring, scratches or damage.

Measure the each valve lifter bore I.D.

SERVICE LIMIT: 34.04 mm (1.340 in)



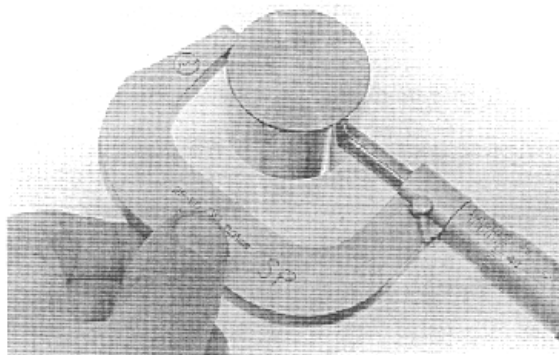
CYLINDER HEAD/VALVE

VALVE LIFTER

Check the valve lifter for scoring, scratches or damage.

Measure the each valve lifter O.D.

SERVICE LIMIT: 33.97 mm (1.337 in)

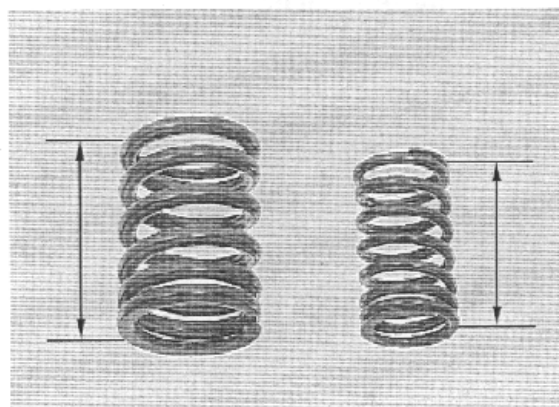


VALVE SPRING

Measure the valve spring free length.

SERVICE LIMITS: Inner: 36.0 mm (1.42 in)

Outer: 40.9 mm (1.61 in)



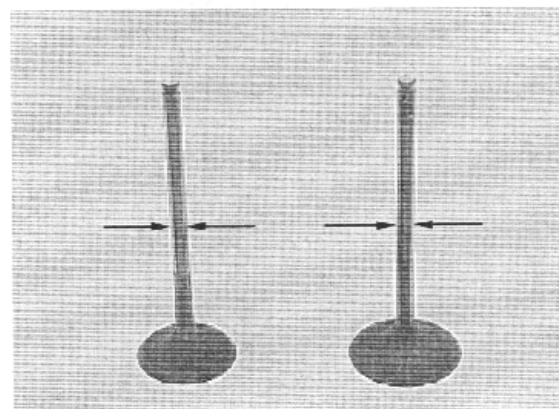
VALVE/VALVE GUIDE

Check that the valve moves smoothly in the guide.
Check the valve for bending, burning or abnormal wear.

Measure each valve stem O.D. and record it.

SERVICE LIMITS: IN: 5.965 mm (0.2348 in)

EX: 5.955 mm (0.2344 in)

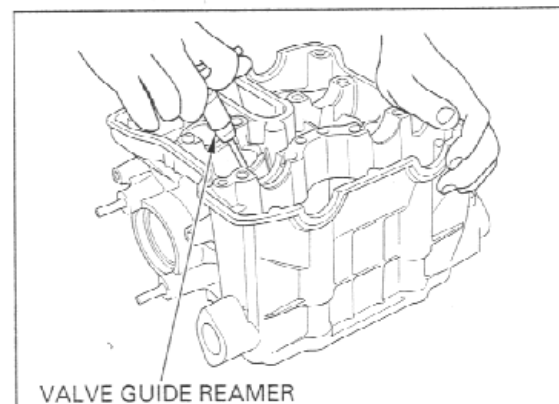


Ream the valve guide to remove any carbon build-up before measuring the guide.
Insert the reamer from the combustion chamber side of the head and always rotate the reamer clockwise.

TOOL:

Valve guide reamer

07VMH-MBB0200 or
07VMH-MBB020A
(U.S.A. only)



Measure each valve guide I.D. and record it.

SERVICE LIMIT: 6.040 mm (0.2378 in)

Subtract each valve stem O.D. from the corresponding guide I.D. to obtain the stem-to-guide clearance.

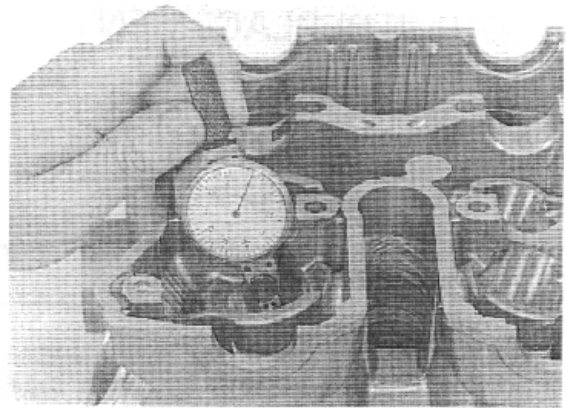
SERVICE LIMITS: IN: 0.075 mm (0.0030 in)
EX: 0.085 mm (0.0033 in)

If the stem-to-guide clearance exceeds the service limit, determine if a new guide with standard dimensions would bring the clearance within tolerance. If so, replace any guides as necessary and ream to fit.

If the stem-to-guide clearance exceeds the service limit with a new guide, also replace the valve.

NOTE:

Inspect and reface the valve seats whenever the valve guides are replaced (page 8-12).



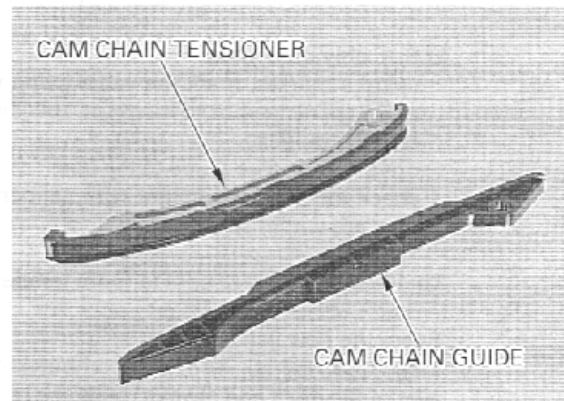
CAM CHAIN TENSIONER/GUIDE

Check the cam chain tensioner and guide for excessive wear or damage and replace them if necessary.

To remove the cam chain tensioner and guide:

Front cylinder: Remove the flywheel (page 10-4).

Rear cylinder: Remove the primary drive gear (page 9-22).



Remove the bolts, cam chain tensioner and guide.

Apply locking agent to the bolt threads.

Install the cam chain tensioner and guide, and tighten the bolts.

TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)

Install the primary drive gear (page 9-23).

Install the flywheel (page 10-7).



VALVE GUIDE REPLACEMENT

Chill new valve guides in the freezer section of a refrigerator for about an hour.

Heat the cylinder head to 130 – 140 °C (275 – 290 °F) with a hot plate or oven.

⚠ WARNING

Wear heavy gloves to avoid burns when handling the heated cylinder head.

CAUTION:

Using a torch to heat the cylinder head may cause warpage.

Support the cylinder head and drive the valve guides out of the cylinder head from the combustion chamber side.

TOOL:

Valve guide driver, 5.5 mm 07742-0010100

While the cylinder head is still heated, drive new valve guides in the cylinder head from the camshaft side until the exposed height is 14.0 – 14.2 mm (0.55 – 0.56 in).

TOOL:

Valve guide driver 07743-0020000
not available in U.S.A. or
07742 0010100

U.S.A. only procedure:

- using a marker, mark the valve guide with a line at the correct exposed height as specified above.
- chill the guides.
- drive in the valve guide to the line.
- check the exposed height with calipers to verify they are within specification.

Let the cylinder head cool to room temperature.

Ream the new valve guides.

Insert the reamer from the combustion chamber side of the head and always rotate the reamer clockwise.

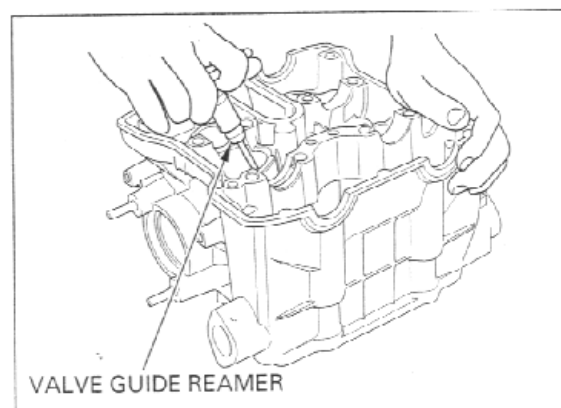
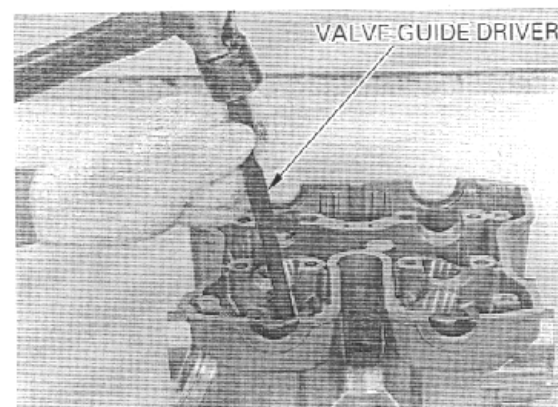
TOOL:

Valve guide reamer 07VMH-MBB0200 or
07VMH-MBB020A
(U.S.A. only)

NOTE:

- Take care not to tilt or lean the reamer in the guide while reaming.
- Use cutting oil on the reamer during this operation.

Clean the cylinder head thoroughly to remove any metal particles after reaming and reface the valve seat (page 8-14).



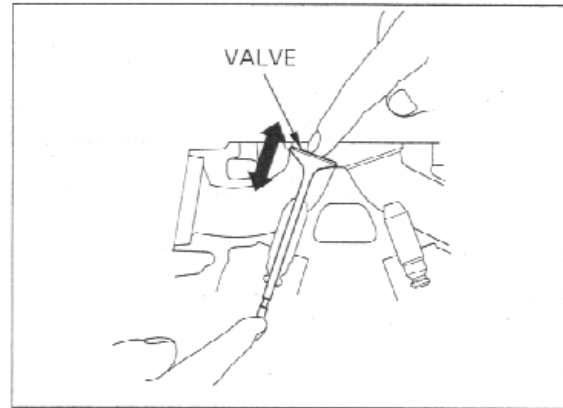
VALVE SEAT INSPECTION/REFACING

INSPECTION

Clean all intake and exhaust valves thoroughly to remove carbon deposits.

Apply a light coating of Prussian Blue to each valve seat.

Tap the valve against the valve seat several times without rotating the valve, to check for proper valve seat contact.



Remove the valve and inspect the valve seat face. The valve seat contact should be within the specified width and even all around the circumference.

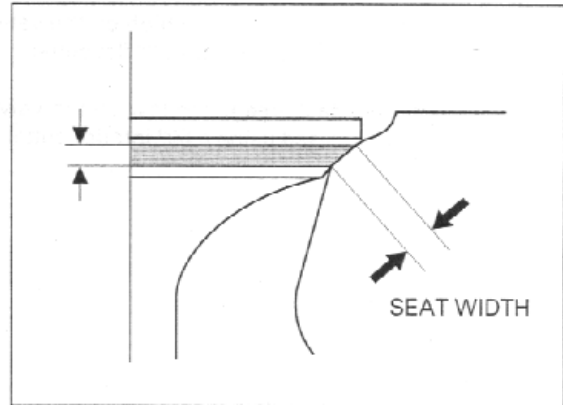
STANDARD: IN: 1.1–1.3 mm (0.04–0.05 in)

EX: 1.3–1.5 mm (0.05–0.06 in)

SERVICE LIMIT: IN: 1.7 mm (0.07 in)

EX: 1.9 mm (0.07 in)

If the valve seat width is not within specification, reface the valve seat (page 8-14).

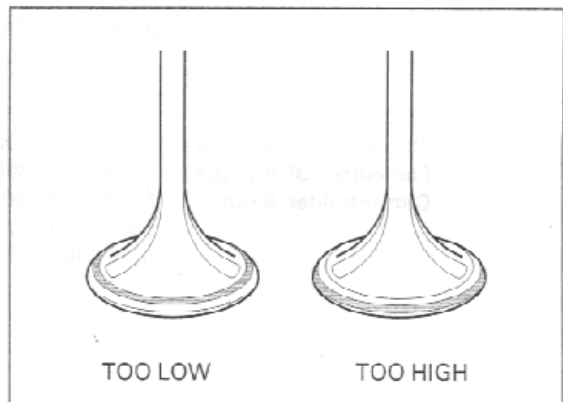
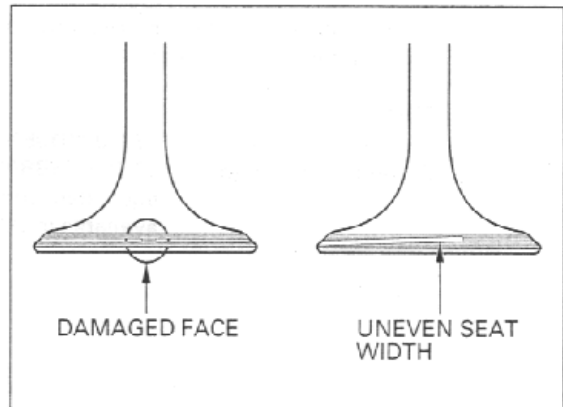


Inspect the valve seat face for:

- Uneven seat width:
 - Replace the valve and reface the valve seat.
- Damaged face:
 - Replace the valve and reface the valve seat.
- Contact area (too high or too low)
 - Reface the valve seat.

NOTE:

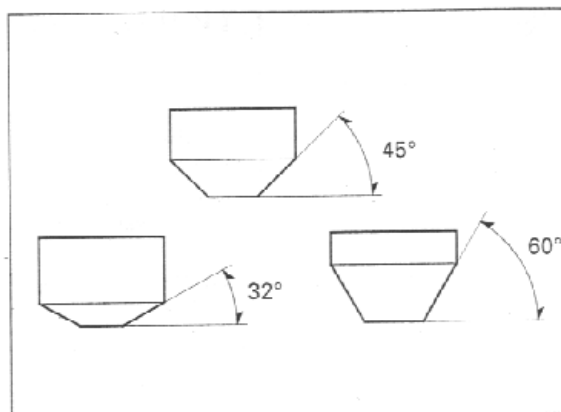
The valve cannot be ground. If the valve face is burned or badly worn or if it contacts the seat unevenly, replace the valve.



REFACING

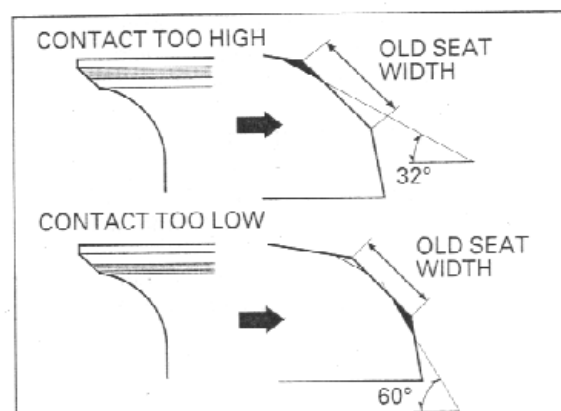
NOTE:

- Follow the refacing manufacturer's operating instructions.
- Be careful not to grind the seat more than necessary.



If the contact area is too high on the valve, the seat must be lowered using a 32° flat cutter.

If the contact area is too low on the valve, the seat must be raised using a 60° interior cutter.

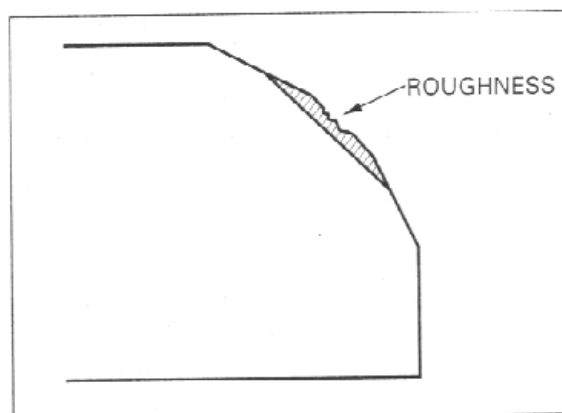


Using a 45° seat cutter, remove any roughness or irregularities from the seat.

TOOLS:

Seat cutter, 40 mm
Cutter holder, 6 mm

07780-0010500
07VMH-MBB0100 or
equivalent commercially
available in U.S.A.

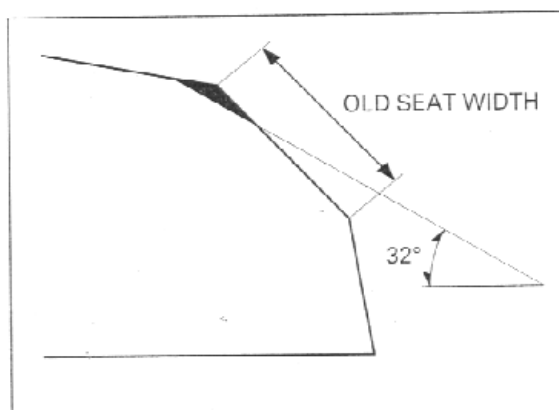


Using a 32° flat cutter, remove 1/4 of the existing valve seat material.

TOOLS:

Flat cutter, 38.5 mm (IN)
Flat cutter, 35 mm (EX)
Cutter holder, 6 mm

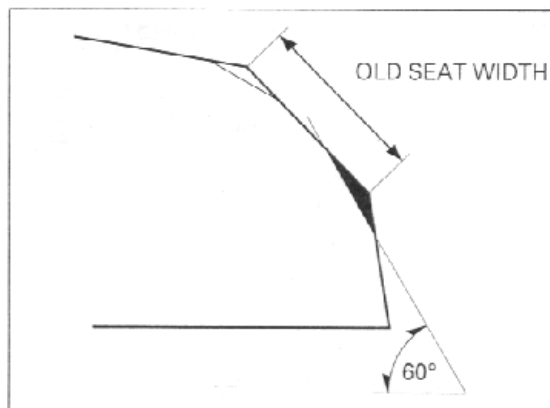
07780-0012400
07780-0012300
07VMH-MBB0100 or
equivalent commercially
available in U.S.A.



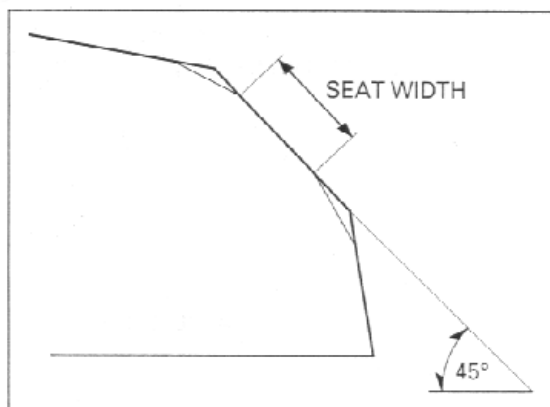
Using a 60° interior cutter, remove 1/4 of the existing valve seat material.

TOOLS:

Interior cutter, 37.5 mm 07780-0014100
Cutter holder, 6 mm 07VMH-MBB0100 or
equivalent commercially
available in U.S.A.



Using a 45° seat cutter, cut the seat to the proper width.

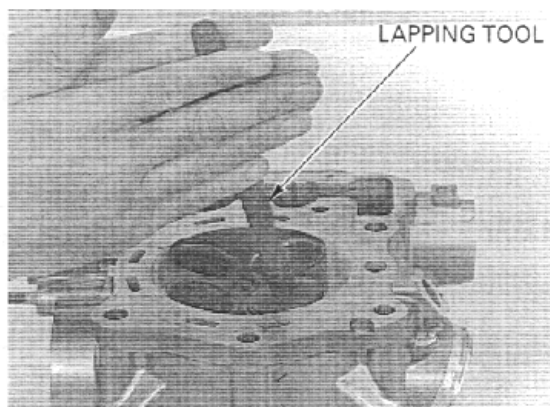


After cutting the seat, apply lapping compound to the valve face, and lap the valve using light pressure.

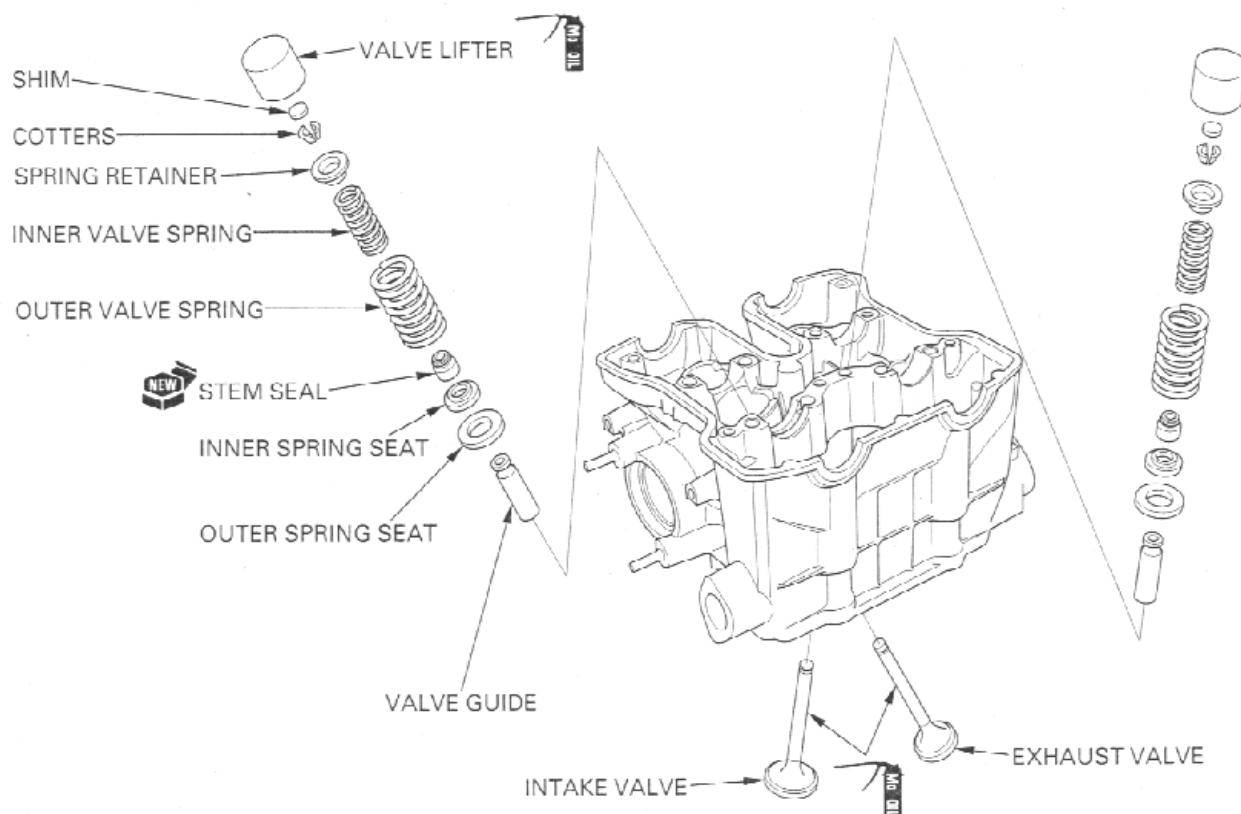
CAUTION:

- Excessive lapping pressure may deform or damage the seat.
- Change the angle of lapping tool frequently to prevent uneven seat wear.
- Do not allow lapping compound to enter the guides.

After lapping, wash any residual compound off the cylinder head and valve and recheck the seat contact.



CYLINDER HEAD ASSEMBLY



Blow through all oil passages in the cylinder head with compressed air.
 Install the inner and outer valve spring seats.
 Install new stem seals.

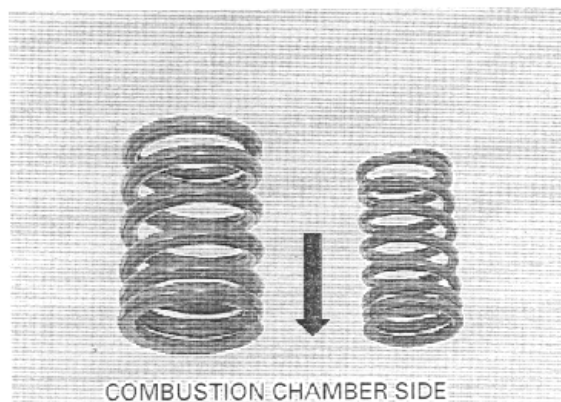
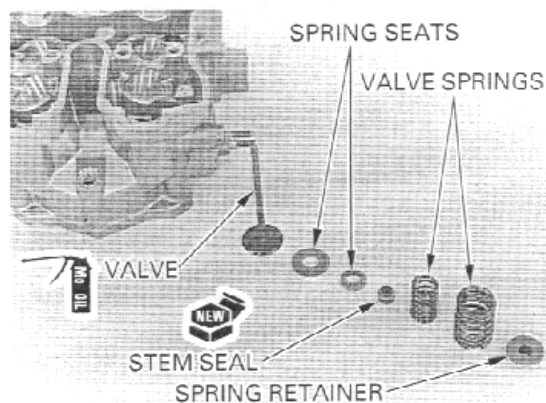
NOTE:

Do not interchange the intake and exhaust stem seals.
 The intake stem seal has silver spring and the exhaust stem seal has black spring.

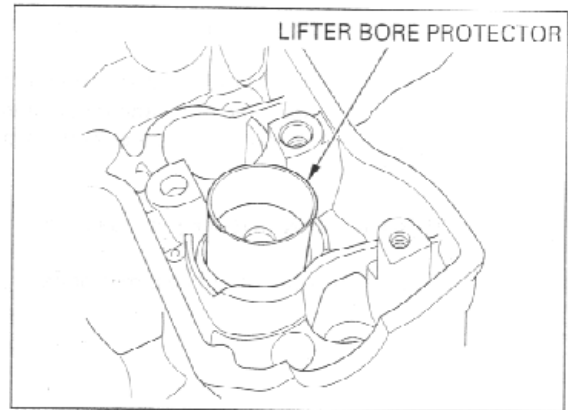
Lubricate the valve stem sliding surface with molybdenum oil solution.
 Insert the valve into the guide while turning it slowly to avoid damage to the stem seal.

Install the inner and outer valve springs with the tightly wound coils facing the combustion chamber.

Install the spring retainer.



Install the lifter bore protector made from the film container into the valve lifter bore.



Grease the cotters to ease installation.

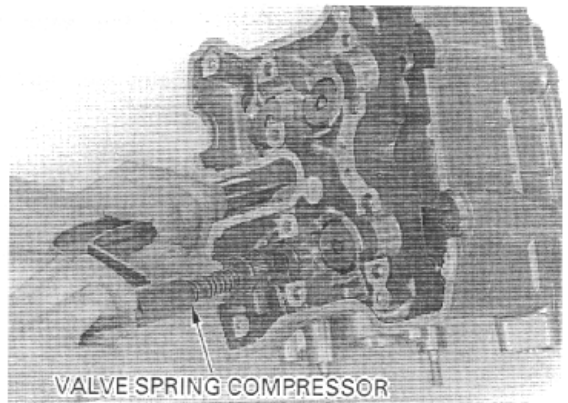
Remove the attachment from the valve spring compressor. Install the valve spring cotters using the valve spring compressor.

TOOL:

Valve spring compressor 07757-0010000

CAUTION:

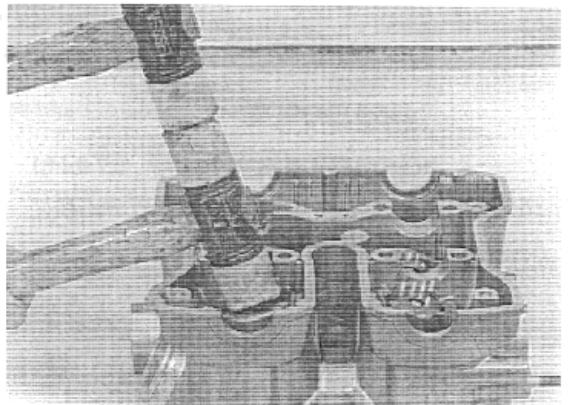
To prevent loss of tension, do not compress the valve springs more than necessary to install the cotters.



Support the cylinder head so that the valve heads will not contact anything that cause damage. Tap the valve stems gently with two plastic hammers as shown to seat the cotters firmly.

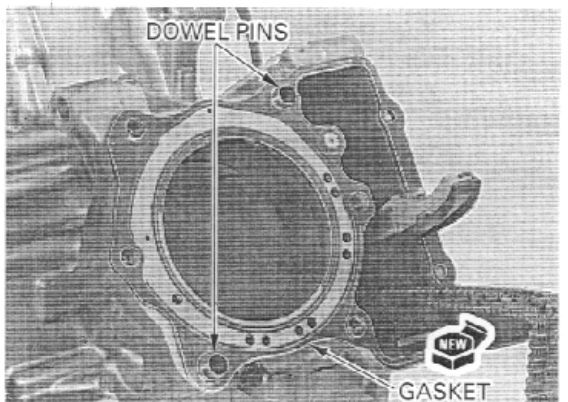
Install and tighten the spark plug.

TORQUE: 14 N·m (1.4 kgf·m, 10 lbf·ft)



CYLINDER HEAD INSTALLATION

Install the dowel pins and a new gasket.



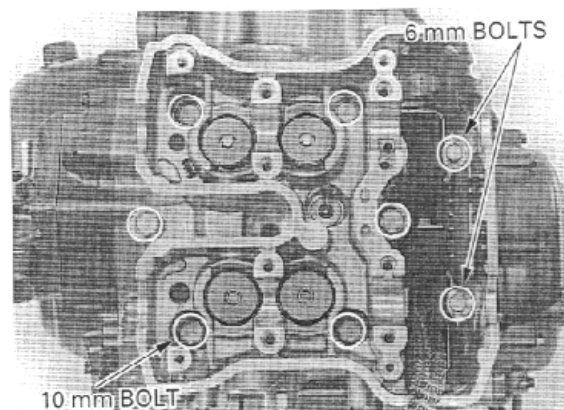
CYLINDER HEAD/VALVE

Install the cylinder head onto the cylinder.

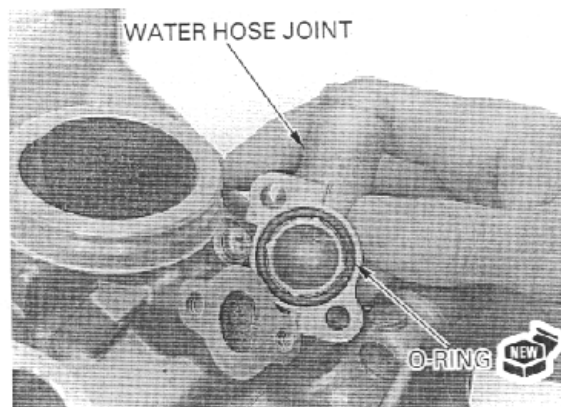
Apply oil to the threads and seating surfaces of the 10 mm cylinder head bolts and install them. Tighten the 10 mm bolts in a crisscross pattern in 2 or 3 steps.

TORQUE: 53 N·m (5.4 kgf·m , 39 lbf·ft)

Install and tighten the two 6 mm bolts.

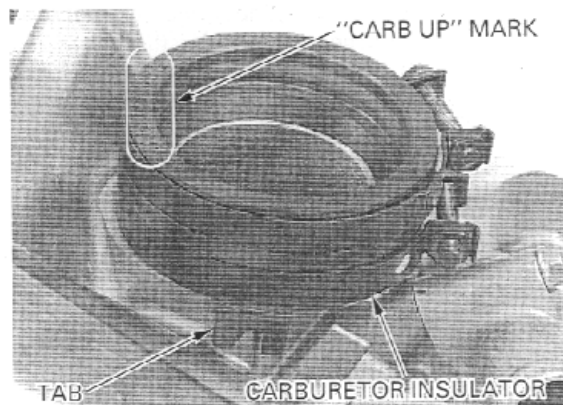


Install a new O-ring into the water hose joint groove. Install the water hose joint and tighten the two bolts.

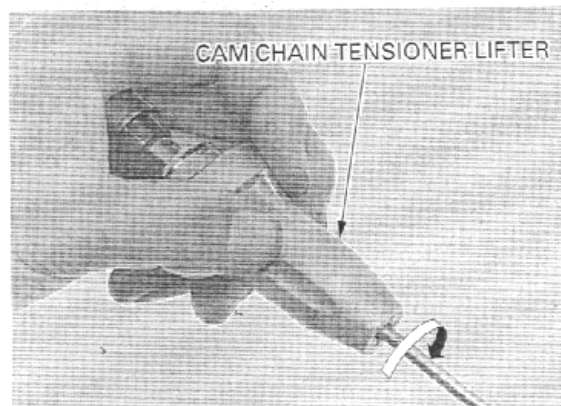


Install the carburetor insulator with the "CARB UP" mark facing out and up so that the tab is positioned as shown. Tighten the carburetor insulator band screw.

TORQUE: 1 N·m (0.1 kgf·m , 0.7 lbf·ft)

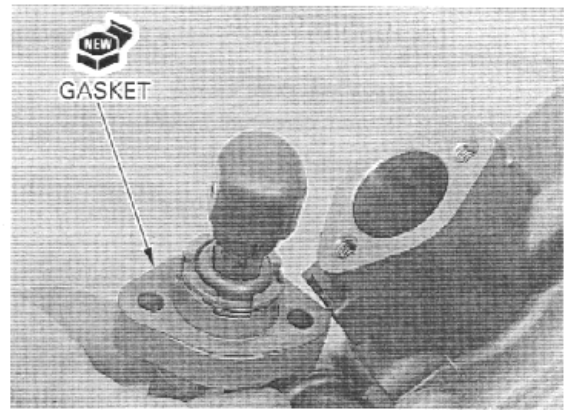


Turn the cam chain tensioner lifter shaft clockwise fully to retract the tensioner lifter and secure it with a stopper tool.



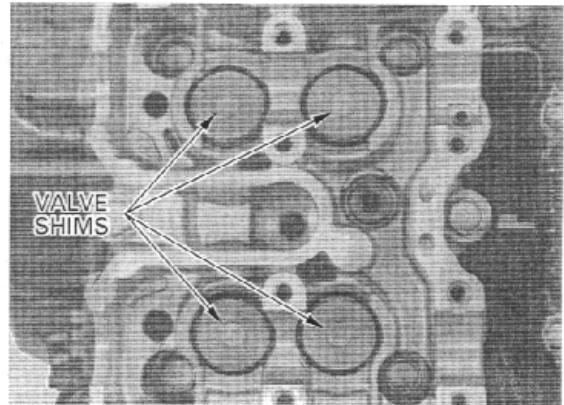
Install a new gasket onto the tensioner lifter.
Install the tensioner lifter onto the cylinder head and tighten the two bolts.

Rear cylinder: Install the carburetor assembly (page 5-18).

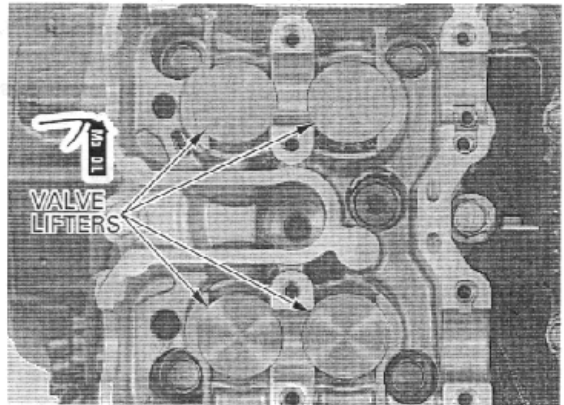


CAMSHAFT INSTALLATION

Install the valve shims in their original locations.



Coat the outer surfaces of the valve lifters with molybdenum oil solution.
Install the valve lifters in their original lifter bores, being careful not to damage the sliding surfaces of the lifters and bores.

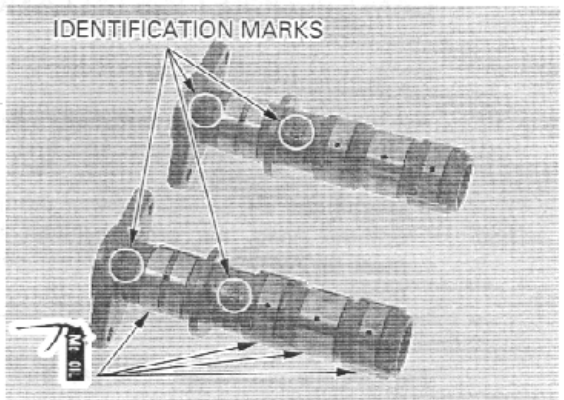


Apply molybdenum oil solution to the camshaft journals and cam lobes.

The camshafts have the following identification marks:

- FR IN: Front cylinder intake camshaft
- FR EX: Front cylinder exhaust camshaft
- RR IN: Rear cylinder intake camshaft
- RR EX: Rear cylinder exhaust camshaft

Install the camshafts in their proper locations.

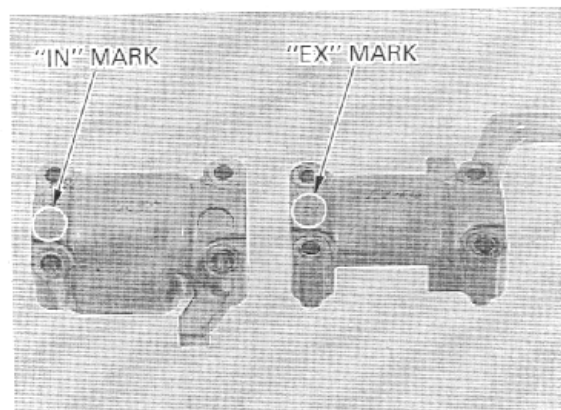


CYLINDER HEAD/VALVE

The camshaft holders have the following identification marks:

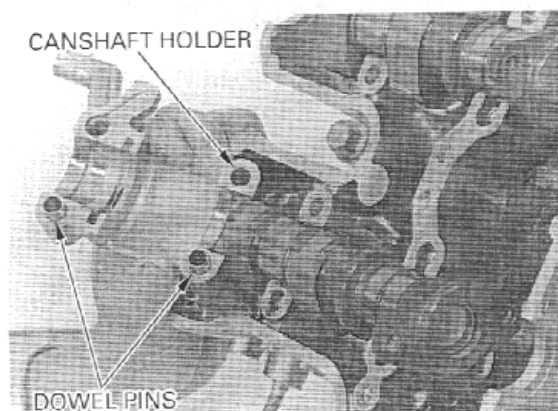
IN: Intake camshaft holder

EX: Exhaust camshaft holder



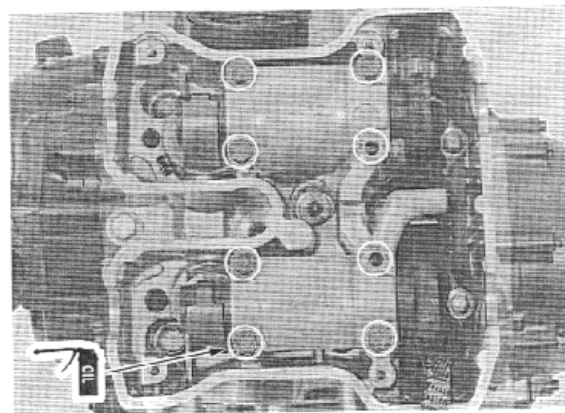
Install the dowel pins.

Install the camshaft holders in their proper locations.



Apply oil to the threads and seating surfaces of the camshaft holder bolts.
Install the bolts and tighten them in a crisscross pattern in 2 or 3 steps.

TORQUE: 21 N·m (2.1 kgf·m, 15 lbf·ft)

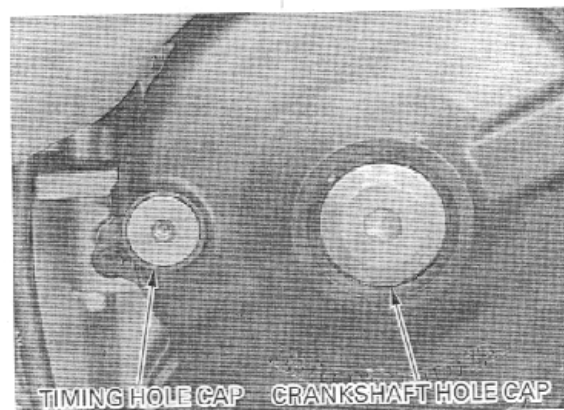


CAM SPROCKET INSTALLATION

NOTE:

- If both front and rear camshafts were serviced, install the front cam sprockets first, then install the rear cam sprockets.
- Even if you are servicing either the front or rear cylinder head, the other cylinder head cover must be removed and the other cam sprocket position must be checked.

Remove the crankshaft hole cap and timing hole cap.

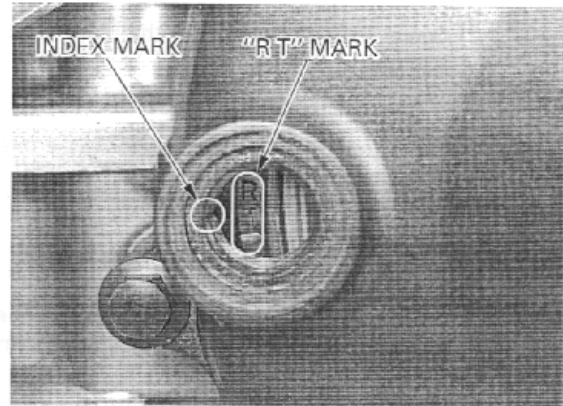


FRONT CAM SPROCKETS:

If the rear cylinder has not been serviced, remove the rear cylinder head cover and check the rear cam sprocket position as follows:

Be careful not to jam the cam chain at the crankshaft when turning the crankshaft.

Turn the crankshaft counterclockwise and align "RT" mark on the flywheel with the index mark on the left crankcase cover.

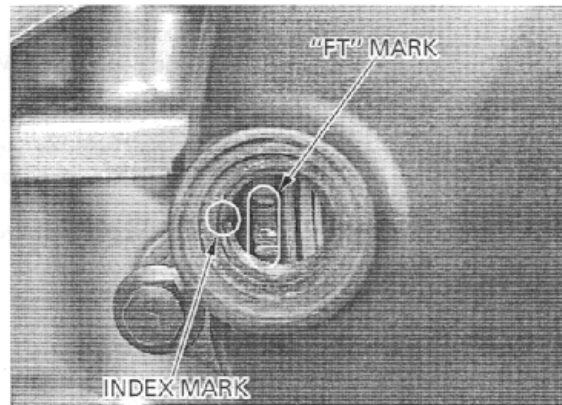


Check the timing marks ("R-I" for intake and "R-E" for exhaust) on the rear cylinder cam sprockets.



If the timing marks are facing outward, turn the crankshaft counterclockwise 1-1/4 turn (450°) and align the "FT" mark with the index mark.

If the timing marks are facing inward, turn the crankshaft counterclockwise 1/4 turn (90°) and align the "FT" mark with the index mark.



Install the cam sprockets onto the cam chain and camshaft flanges so that the timing marks ("F-I" for intake and "F-E" for exhaust) on the sprockets are flush with the cylinder head surface and facing outward as shown.

Make sure that both intake and exhaust cam lobes are facing up, align the bolt holes in the cam sprockets and camshafts.



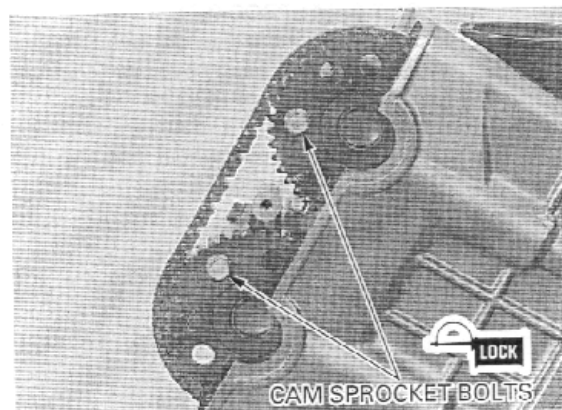
CYLINDER HEAD/VALVE

Apply locking agent to the cam sprocket bolt threads.
Install the cam sprocket bolts.

Turn the crankshaft counterclockwise one turn and install the remaining cam sprocket bolts.
Tighten the cam sprocket bolts.

TORQUE: 20 N·m (2.0 kgf·m, 14 lbf·ft)

Turn the crankshaft counterclockwise one turn and tighten the other sprocket bolts to the same torque.



Remove the two camshaft holder bolts to attach the cam chain guide plate.
Apply oil to the threads and seating surfaces of the camshaft holder bolts.
Install the cam chain guide plate.
Tighten the camshaft holder bolts.

TORQUE: 21 N·m (2.1 kgf·m, 15 lbf·ft)

Tighten the 6 mm bolt.



Remove the stopper tool from the cam chain tensioner lifter and install the sealing bolt with a new sealing washer.

If the rear cylinder head has been serviced, install the rear cylinder cam sprockets (see below).

Install the crankshaft hole cap and timing hole cap (page 3-9).

Install the following:

- cylinder head cover (page 8-23)
- left radiator (page 6-6)
- carburetor assembly (page 5-18)

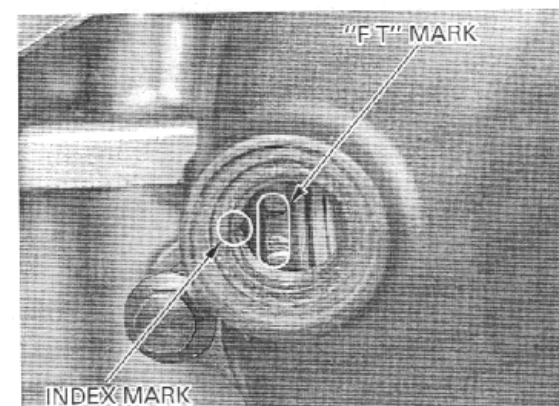


REAR CAM SPROCKET:

If the front cylinder has not been serviced, remove the front cylinder head cover and check the front cam sprocket position as follows:

Turn the crankshaft counterclockwise and align "FT" mark on the flywheel with the index mark on the left crankcase cover.

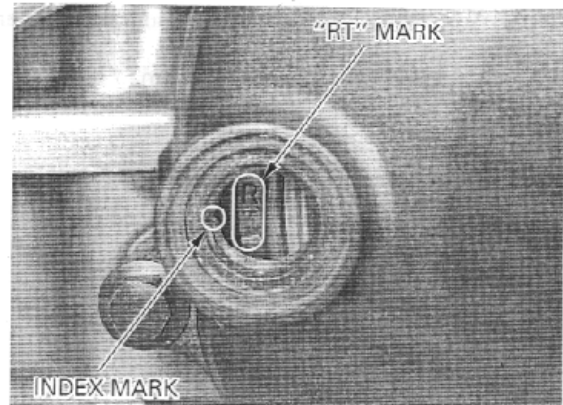
Be careful not to jam the cam chain at the crankshaft when turning the crankshaft.



Check the timing marks ("F-I" for intake and "F-E" for exhaust) on the front cylinder cam sprockets.

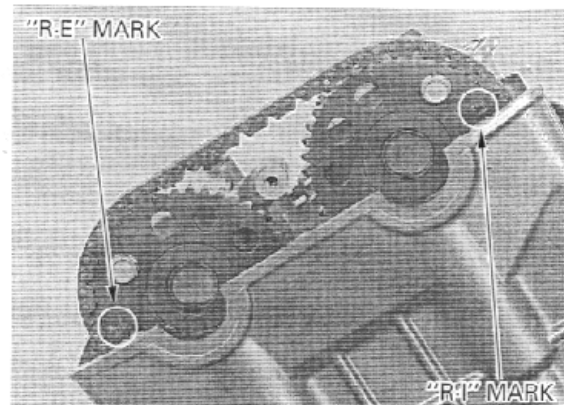


If the timing marks are facing outward, turn the crankshaft counterclockwise $3/4$ turn (270°) and align the "RT" mark with the index mark.



If the timing marks are facing inward, turn the crankshaft counterclockwise $1-3/4$ turn (630°) and align the "RT" mark with the index mark.

Install the cam sprockets onto the cam chain and camshaft flanges so that the timing marks ("R-I" for intake and "R-E" for exhaust) on the sprockets are flush with the cylinder head surface and facing outward as shown.



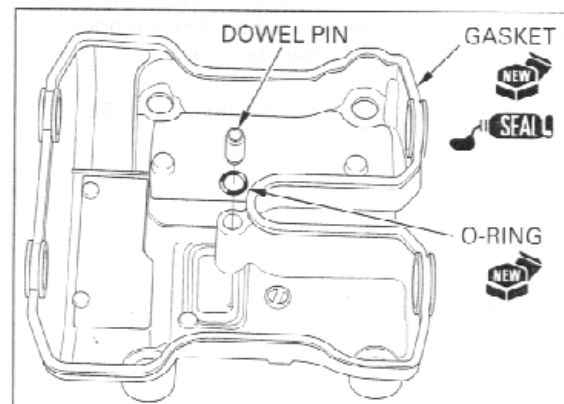
Install the cam sprocket bolts and cam chain guide plate in the same procedures as for the front cylinder.

CYLINDER HEAD COVER INSTALLATION

Apply sealant to the cylinder head cover side of a new gasket.

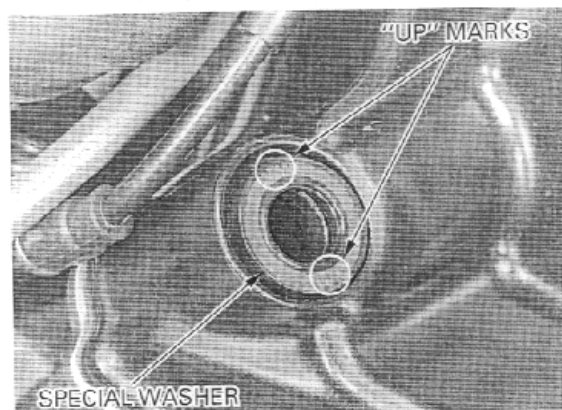
Install the gasket into the groove in the head cover. Install the dowel pin and a new O-ring.

Apply sealant to the cylinder head semi-circular areas.



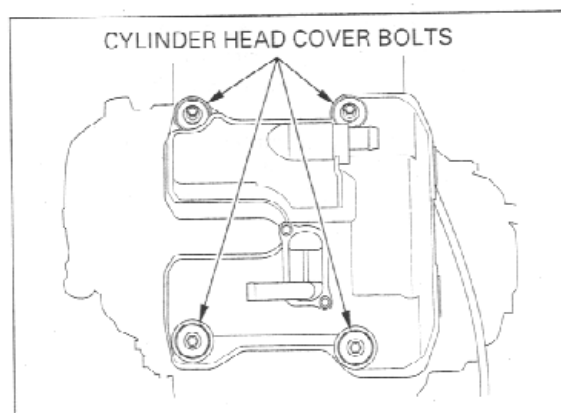
CYLINDER HEAD/VALVE

Install the cylinder head cover and special washers with the "UP" marks facing up.



Install and tighten the cylinder head cover bolts.

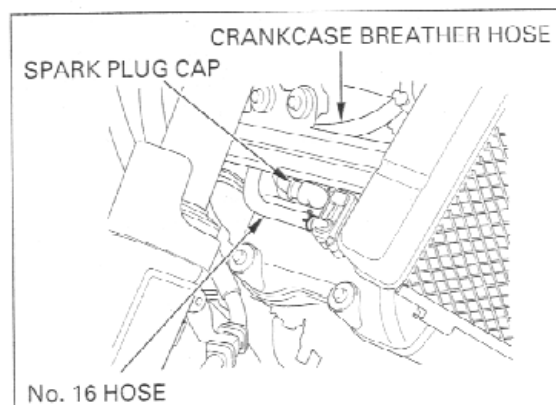
TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)



FRONT:

Install the spark plug cap onto the plug.
Connect the breather hose to the cylinder head cover.

Connect the No. 16 air supply hose to the pulse secondary air injection (PAIR) check valve.



Install the oil cooler bracket with the cooler onto the frame and tighten the two bolts.
Clamp the spark plug wire.

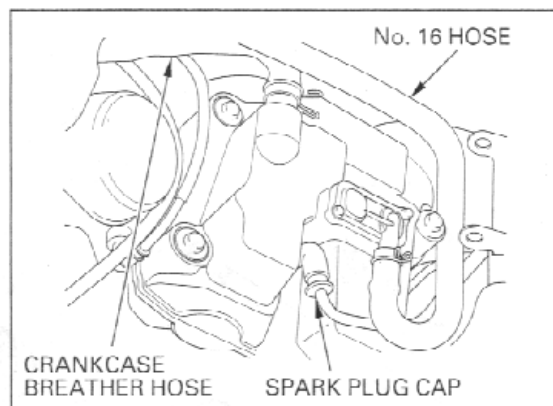
Install the front fairing (page 2-3).



REAR:

Install the spark plug cap onto the plug.
Connect the breather hose to the cylinder head cover.
Connect the No. 16 air supply hose to the PAIR check valve.

Install the fuel tank (page 2-4).



CLUTCH/GEARSHIFT LINKAGE

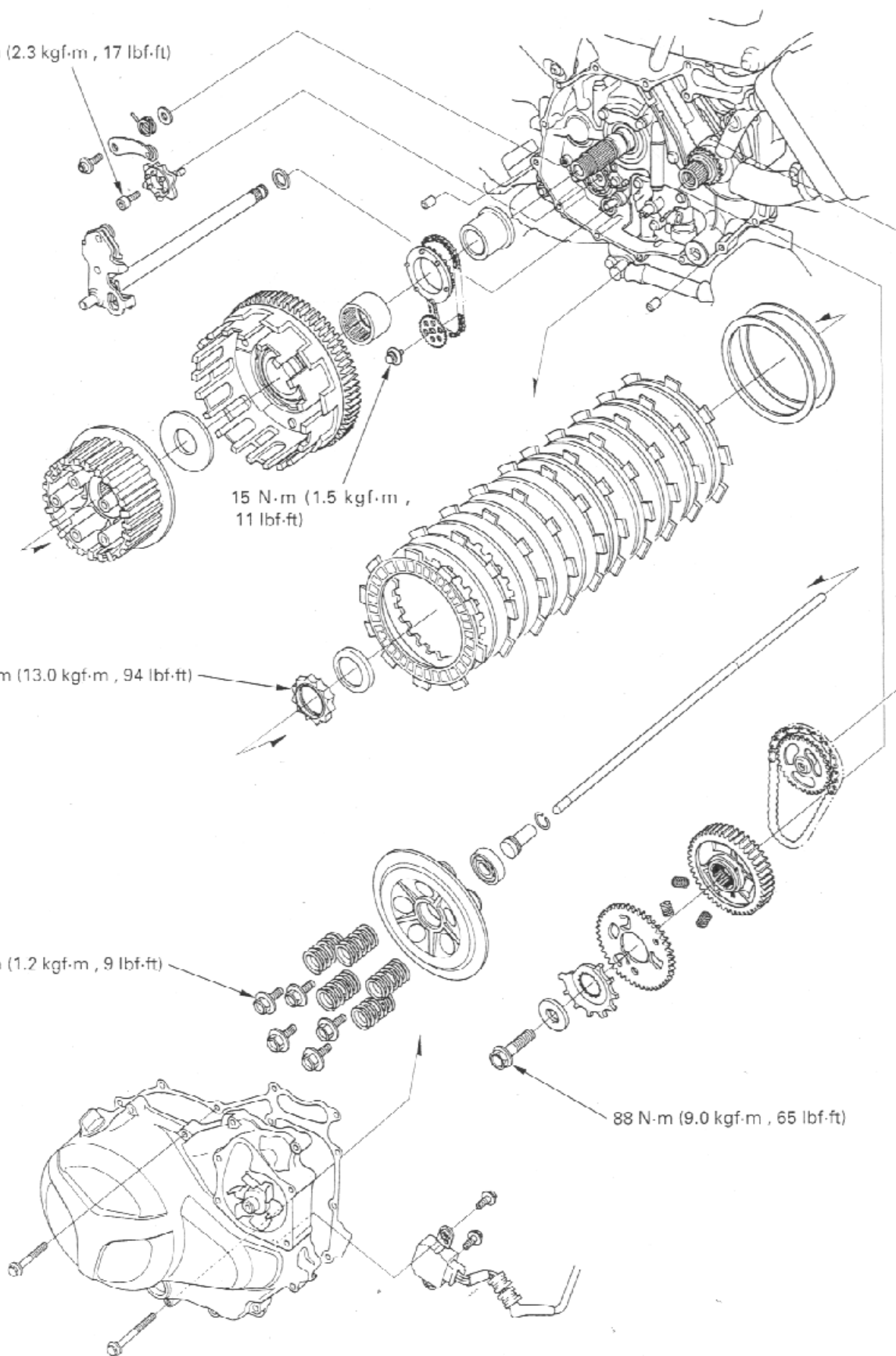
23 N·m (2.3 kgf·m , 17 lbf·ft)

15 N·m (1.5 kgf·m ,
11 lbf·ft)

127 N·m (13.0 kgf·m , 94 lbf·ft)

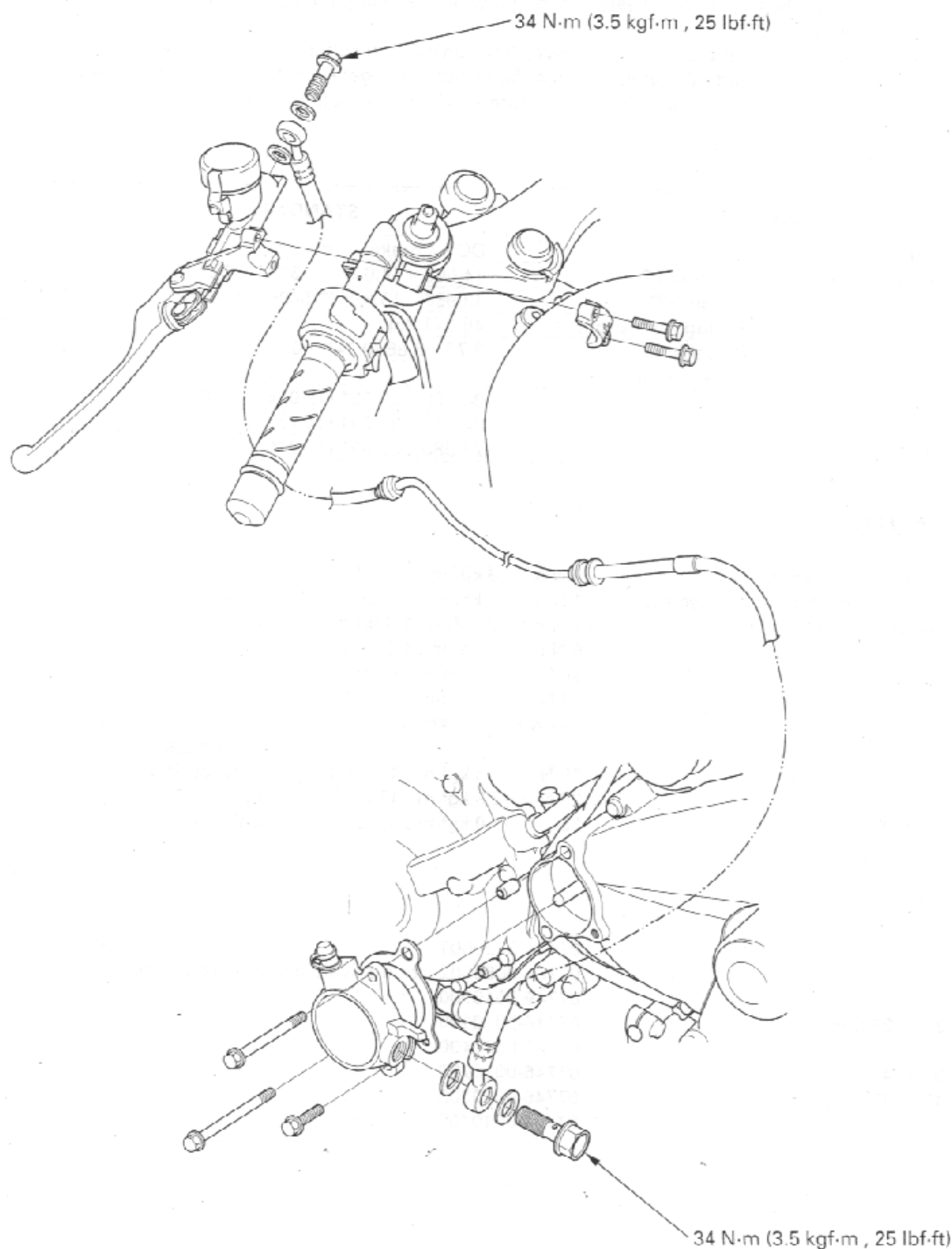
12 N·m (1.2 kgf·m , 9 lbf·ft)

88 N·m (9.0 kgf·m , 65 lbf·ft)



9. CLUTCH/GEARSHIFT LINKAGE

SERVICE INFORMATION	9-2	CLUTCH SLAVE CYLINDER	9-10
TROUBLESHOOTING	9-3	CLUTCH	9-12
CLUTCH FLUID REPLACEMENT/ AIR BLEEDING	9-4	GEARSHIFT LINKAGE	9-20
CLUTCH MASTER CYLINDER	9-5	PRIMARY DRIVE GEAR	9-22



SERVICE INFORMATION

GENERAL

- The clutch system can be serviced with the engine in the frame.
- DOT 4 brake fluid is used for the hydraulic clutch and is referred to as clutch fluid in this section. Do not use other types of fluid as they are not compatible.
- Spilled clutch (brake) fluid will severely damage the plastic parts and painted surfaces. It is also harmful to some rubber parts. Be careful whenever you remove the reservoir cap; make sure the reservoir is horizontal first.
- Never allow contaminants (dirt, water, etc.) to get into an open reservoir.
- Once the hydraulic system has been opened, the system must be bled.
- Always use fresh DOT 4 brake fluid from a sealed container when servicing the system. Do not mix different types of fluid as they may not be compatible.
- Engine oil viscosity and level and the use of oil additives have an effect on clutch disengagement. Oil additives of any kind are specifically not recommended. When the clutch does not disengage or the motorcycle creeps with the clutch disengaged, inspect the engine oil viscosity and level before servicing the clutch system.

SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Specified clutch fluid		DOT 4 brake fluid	
Clutch master cylinder	Cylinder I.D.	14.000–14.043 (0.5512–0.5529)	14.055 (0.5533)
	Piston O.D.	13.957–13.984 (0.5495–0.5506)	13.945 (0.5490)
Clutch	Spring free length	49.6 (1.95)	46.6 (1.83)
	Disc thickness	3.72–3.88 (0.146–0.153)	3.5 (0.14)
	Plate warpage		0.30 (0.012)
Clutch outer guide	I.D.	28.000–28.021 (1.1024–1.1032)	28.031 (1.1036)
	O.D.	34.975–34.991 (1.3770–1.3776)	34.965 (1.3766)
Mainshaft O.D. at clutch outer guide		27.980–27.993 (1.1016–1.1021)	27.970 (1.1012)

TORQUE VALUES

Clutch slave cylinder bleed valve	9 N·m (0.9 kgf·m, 6.5 lbf·ft)	
Clutch fluid reservoir cap stopper plate screw	1 N·m (0.1 kgf·m, 0.7 lbf·ft)	
Clutch fluid reservoir mounting screw	2 N·m (0.2 kgf·m, 1.4 lbf·ft)	Apply locking agent to the threads
Clutch lever pivot nut	6 N·m (0.6 kgf·m, 4.3 lbf·ft)	
Clutch hose oil bolt	34 N·m (3.5 kgf·m, 25 lbf·ft)	
Clutch bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	
Clutch center lock nut	127 N·m (13.0 kgf·m, 94 lbf·ft)	Apply oil to the threads and seating surface and stake
Oil pump driven sprocket bolt	15 N·m (1.5 kgf·m, 11 lbf·ft)	Apply locking agent to the threads
Gearshift cam bolt	23 N·m (2.3 kgf·m, 17 lbf·ft)	Apply locking agent to the threads
Primary drive gear bolt	88 N·m (9.0 kgf·m, 65 lbf·ft)	Apply oil to the threads and seating surface

TOOLS

Snap ring pliers	07914-3230001	
Clutch center holder	07724-0050002	or equivalent commercially available in U.S.A.
Driver	07749-0010000	
Attachment, 32 × 35 mm	07746-0010100	
Pilot, 17 mm	07746-0040400	
Attachment, 37 × 40 mm	07746-0010200	
Attachment, 42 × 47 mm	07746-0010300	
Gear holder	07724-0010100	

TROUBLESHOOTING

Clutch lever too hard

- Sticking piston(s)
- Clogged hydraulic system

Clutch slips

- Sticking piston(s)
- Clogged hydraulic system
- Discs worn
- Weak clutch spring

Clutch will not disengage or motorcycle creeps with clutch disengaged

- Air in hydraulic system
- Low clutch fluid level
- Sticking piston(s)
- Leaking hydraulic system
- Warped plates.
- Oil level too high, improper oil viscosity or oil additive used.

CLUTCH FLUID REPLACEMENT/AIR BLEEDING

CAUTION:

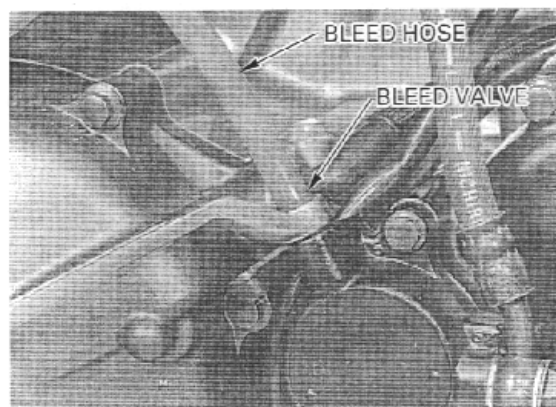
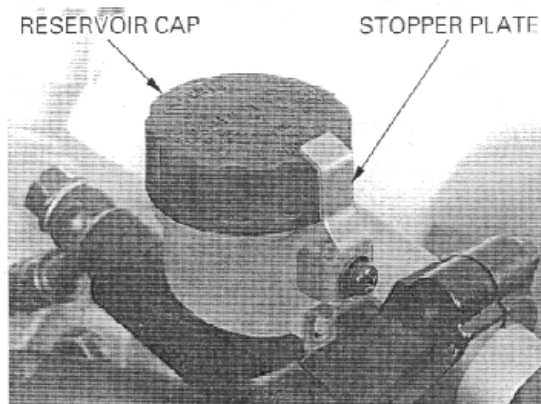
- Do not allow foreign material to enter the system when filling the reservoir.
- Avoid spilling fluid on painted, plastic or rubber parts. Place a rag over these parts whenever the system is serviced.

CLUTCH FLUID DRAINING

Turn the handlebar to the right until the reservoir is level, and remove the stopper plate, reservoir cap, set plate and diaphragm.

Connect a bleed hose to the clutch slave cylinder bleed valve.

Loosen the bleed valve and pump the clutch lever until no more fluid flows out of the bleed valve.



CLUTCH FLUID FILLING/BLEEDING

Fill the reservoir with DOT 4 brake fluid from a sealed container.

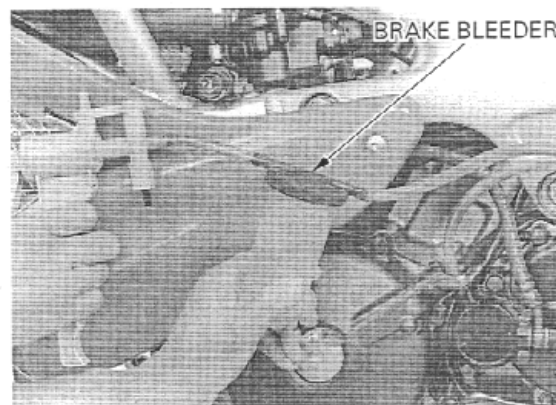
CAUTION:

- Use only DOT 4 brake fluid from a sealed container.
- Do not mix different types of fluid. They are not compatible.

Connect a commercially available brake bleeder to the bleed valve.

Loosen the bleed valve and pump the brake bleeder.

Add brake fluid when the fluid level in the reservoir is low.



NOTE:

- Check the fluid level often while bleeding the clutch to prevent air from being pumped into the system.
- When using a brake bleeding tool, follow the manufacturer's operating instructions.

Repeat the above procedures until new fluid appear coming out of the bleed valve and air bubbles do not appear in the plastic hose.

NOTE:

If air is entering the bleeder from around the bleed valve threads, seal the threads with teflon tape.

If a brake bleeder is not available, use the following procedure:
 Pump up the system pressure with the clutch lever until the lever resistance is felt.

Connect a bleed hose to the bleed valve and bleed the system as follows:

1. Squeeze the clutch lever, open the bleed valve 1/2 turn and then close it.

NOTE:

Do not release the clutch lever until the bleed valve has been closed.

2. Release the clutch lever slowly and wait several seconds after it reaches the end of its travel.

Repeat the steps 1 and 2 until air bubbles do not appear in the bleed hose.

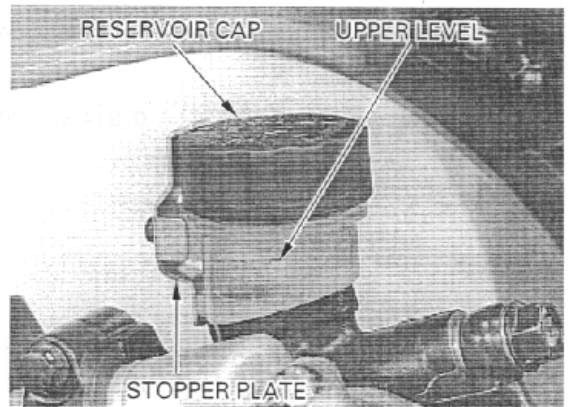
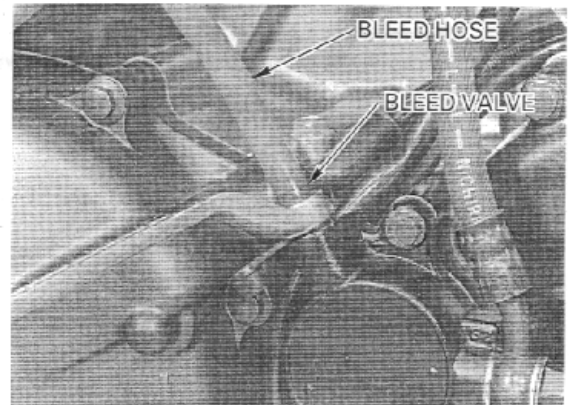
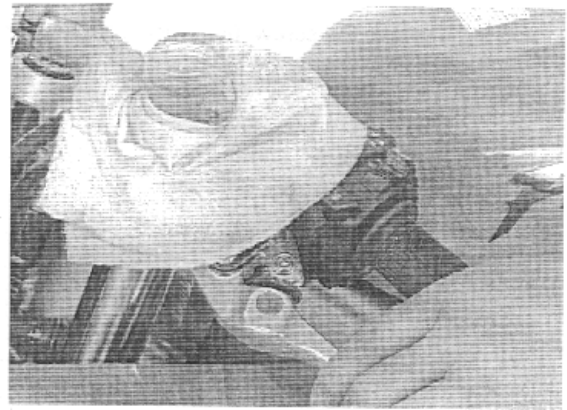
Tighten the bleed valve.

TORQUE: 9 N·m (0.9 kgf·m, 6.5 lbf·ft)

Fill the reservoir to the upper level mark with DOT 4 brake fluid from a sealed container.

Install the diaphragm, set plate, reservoir cap and stopper plate, and tighten the stopper plate screw.

TORQUE: 1 N·m (0.1 kgf·m, 0.7 lbf·ft)



CLUTCH MASTER CYLINDER

CAUTION:

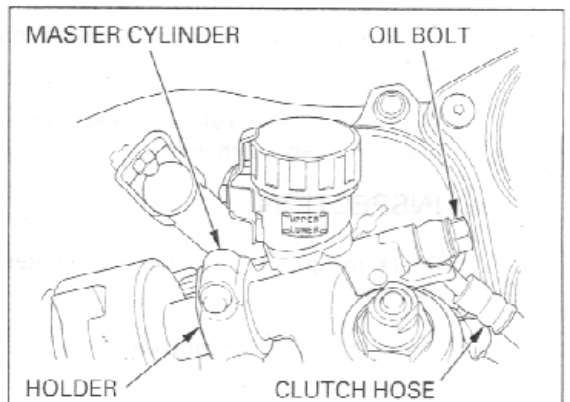
- Avoid spilling clutch fluid on painted, plastic, or rubber parts. Place a rag over these parts whenever the system is serviced.
- When removing the oil bolt, cover the end of the hose to prevent contamination.

DISASSEMBLY

Drain the clutch fluid from the hydraulic system (page 9-4).

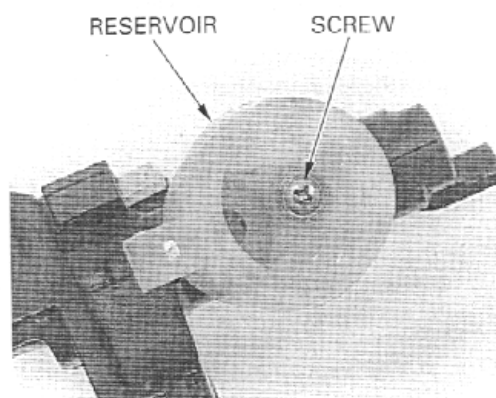
Disconnect the clutch switch connectors.
 Disconnect the clutch hose from the master cylinder by removing the oil bolt and sealing washers.

Remove the master cylinder holder bolts, holder and the master cylinder.

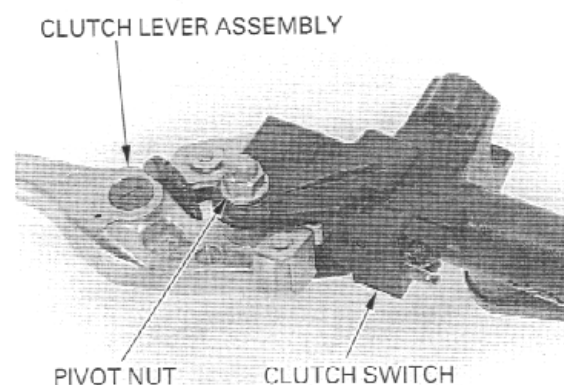


CLUTCH/GEARSHIFT LINKAGE

Remove the screw, fluid reservoir and O-rings from the master cylinder.



Remove the screw and clutch switch.
Remove the pivot nut, bolt and clutch lever assembly.
Remove the push rod and piston boot.

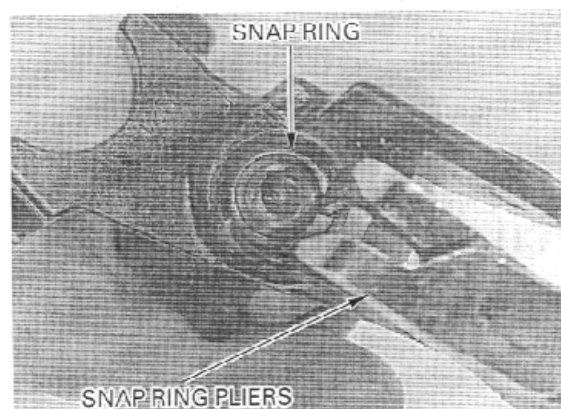


Remove the snap ring with the special tool.

TOOL:

Snap ring pliers

07914-3230001



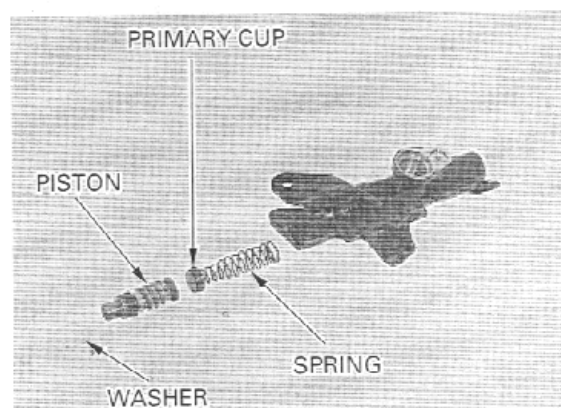
Remove the washer, master piston, primary cup and spring.

Clean the master cylinder, reservoir and master piston in clean clutch fluid.

INSPECTION

Check the piston cups for wear, deterioration or damage.

Check the spring for damage.



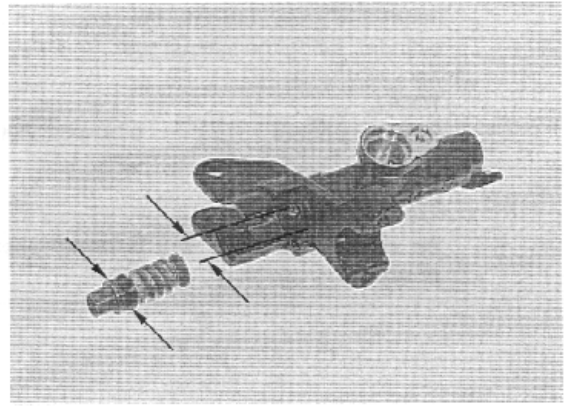
Check the master cylinder and piston for scoring or damage.

Measure the master cylinder I.D.

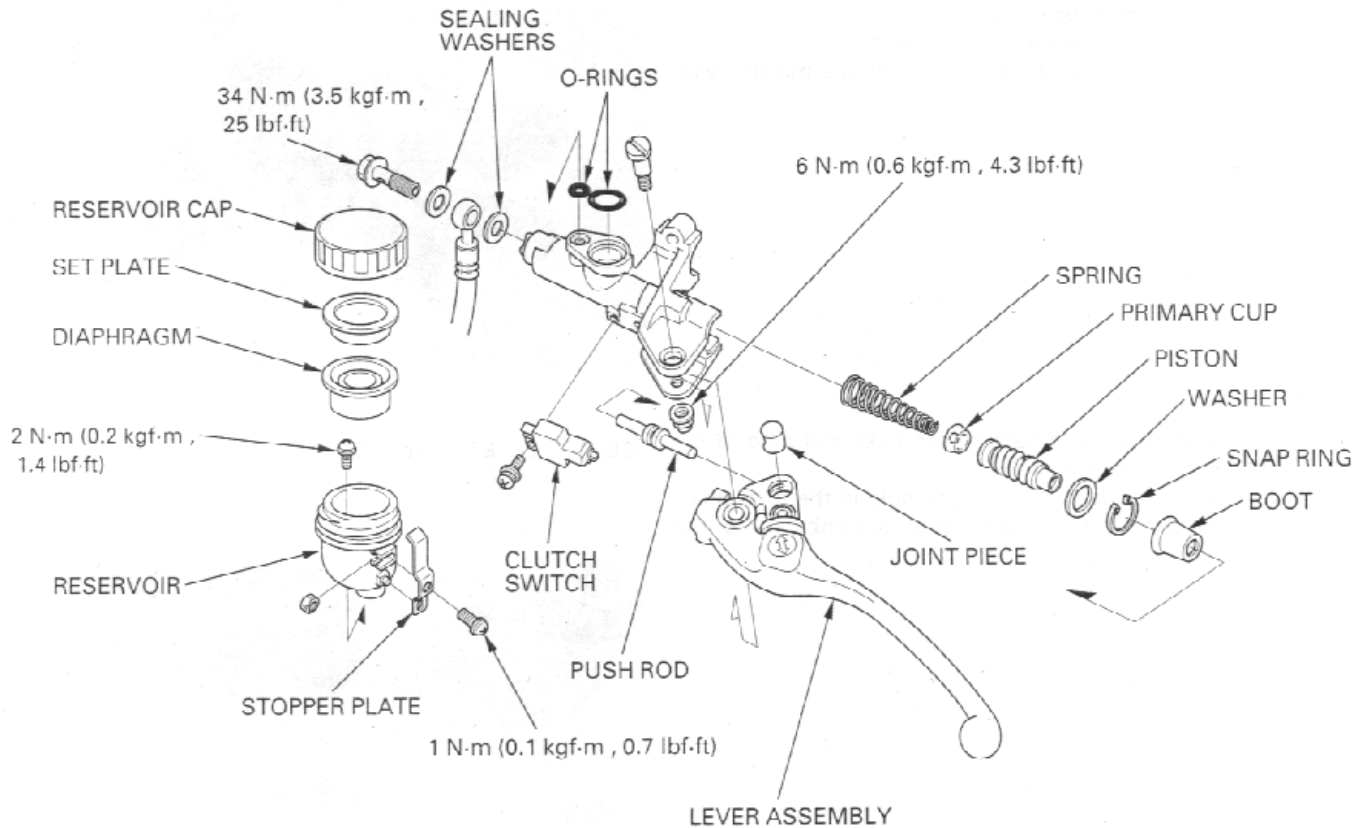
SERVICE LIMIT: 14.055 mm (0.5533 in)

Measure the master piston O.D.

SERVICE LIMIT: 13.945 mm (0.5490 in)



ASSEMBLY



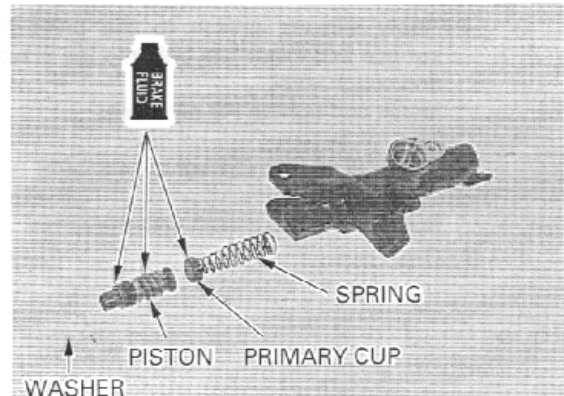
Coat the master piston and piston cups with clean clutch fluid.

Install the spring onto the primary cup.

Install the spring, primary cup, master piston and washer into the master cylinder.

CAUTION:

Do not allow the piston cup lips to turn inside out.



Install the snap ring into the groove in the master cylinder, using the special tool.

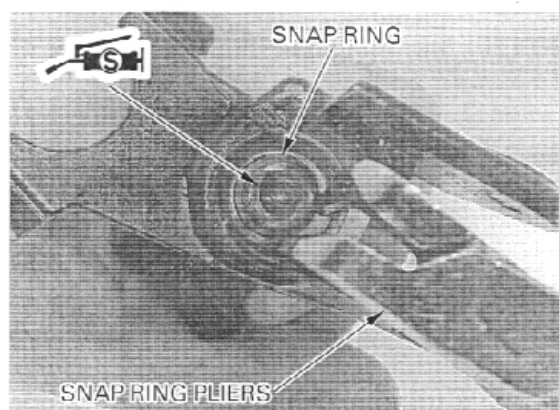
TOOL:

Snap ring pliers

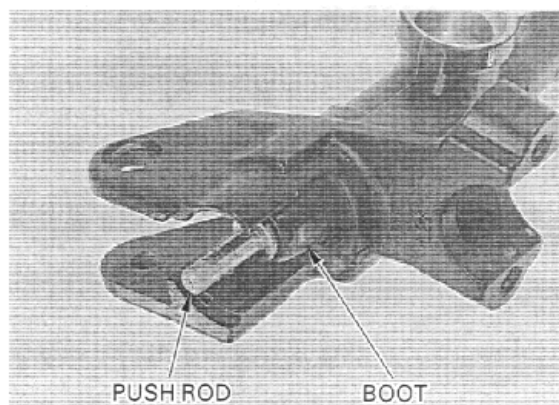
07914-3230001

CAUTION:

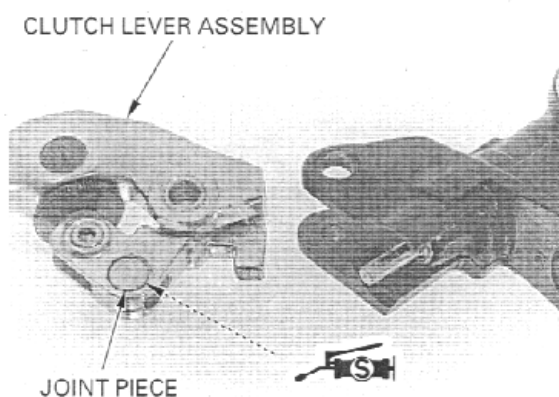
Be certain the snap ring is firmly seated in the groove.



Apply silicone grease to the push rod contacting area of the master piston.
Install the boot onto the push rod.
Install the boot and push rod into the master cylinder.



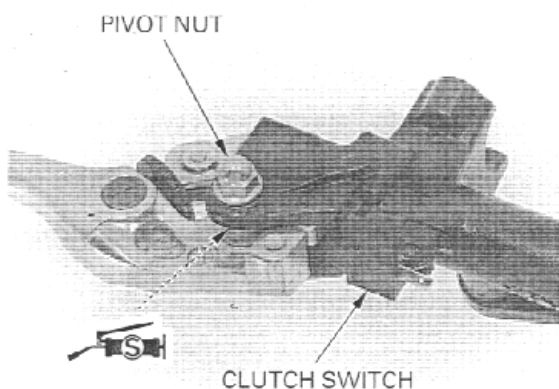
Apply silicone grease to the push rod hole in the clutch lever joint piece.
Insert the push rod into the hole in the joint piece and install the clutch lever assembly onto the master cylinder.



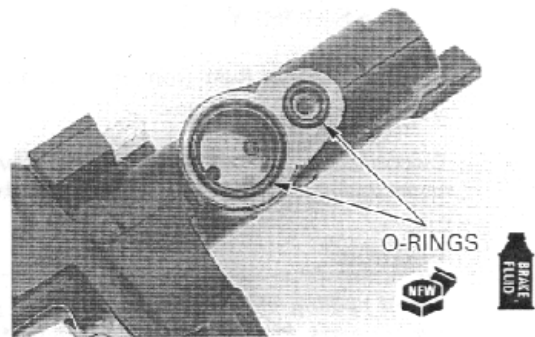
Apply silicone grease to the pivot bolt sliding surface and install the bolt into the master cylinder and clutch lever.
Install and tighten the pivot nut.

TORQUE: 6 N·m (0.6 kgf·m, 4.3 lbf·ft)

Install the clutch switch with the screw.

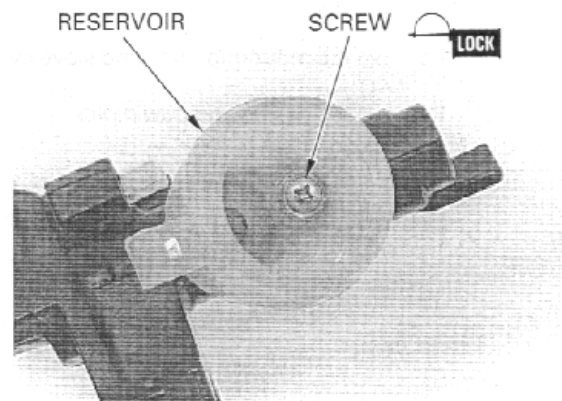


Coat new O-rings with clutch fluid and install them onto the master cylinder.



Apply locking agent to the reservoir mounting screw threads. Install the reservoir and tighten the mounting screw.

TORQUE: 2 N·m (0.2 kgf·m, 1.4 lbf·ft)



Install the master cylinder and holder with the "UP" mark facing up. Align the end of the master cylinder with the punch mark on the handlebar, and tighten the upper bolt first, then tighten the lower bolt.



Connect the clutch hose to the master cylinder with the oil bolt and new sealing washers, and tighten the oil bolt.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

Connect the clutch switch connectors.

Fill and bleed the clutch hydraulic system (page 9-4).



CLUTCH SLAVE CYLINDER

DISASSEMBLY

Drain the clutch fluid from the hydraulic system (page 9-4).

Disconnect the clutch hose from the slave cylinder by removing the oil bolt and sealing washers.

CAUTION:

Avoid spilling clutch fluid on painted, plastic, or rubber parts. Place a rag over these parts whenever the system is serviced.

Remove the mounting bolts and slave cylinder.

Remove the gasket and dowel pins.

Remove the piston from the slave cylinder. If piston removal is hard, place a shop towel over the piston, position the cylinder body with the piston down and apply small squirts of air pressure to the fluid inlet.

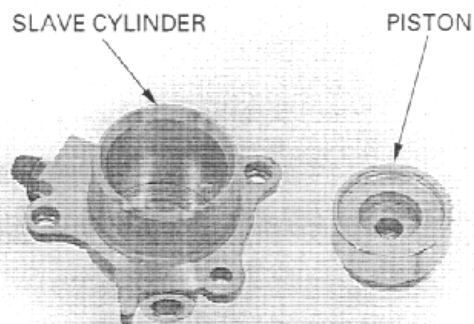
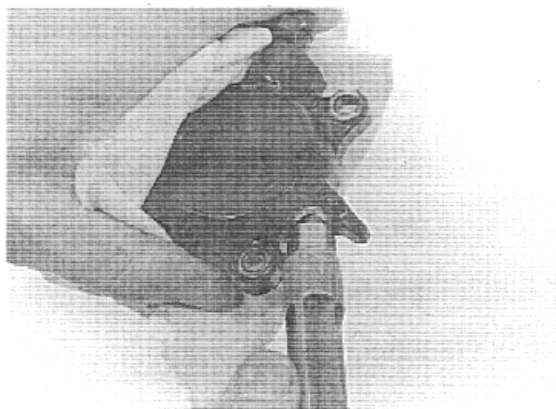
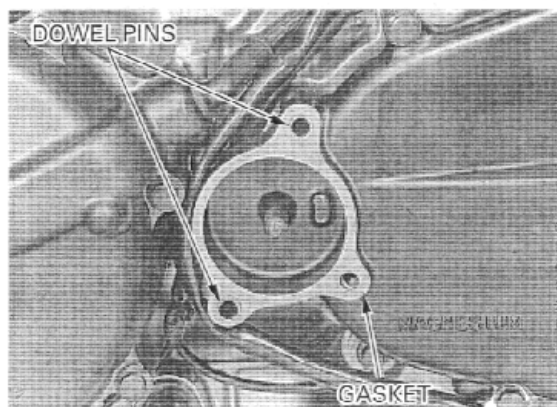
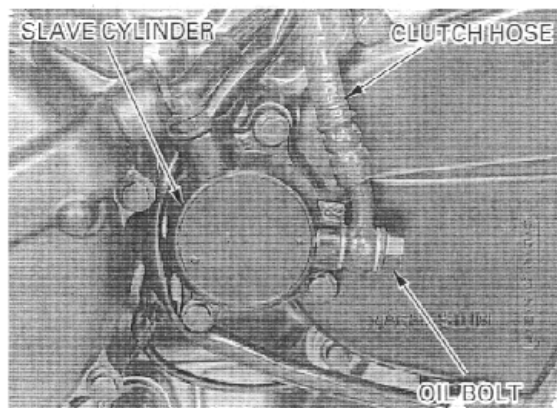
▲WARNING

Do not use high pressure air or bring the nozzle too close to the inlet.

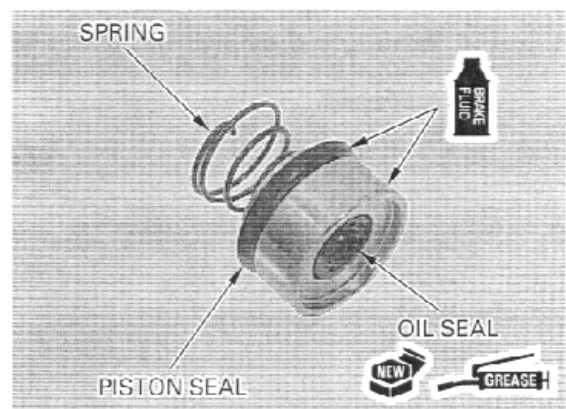
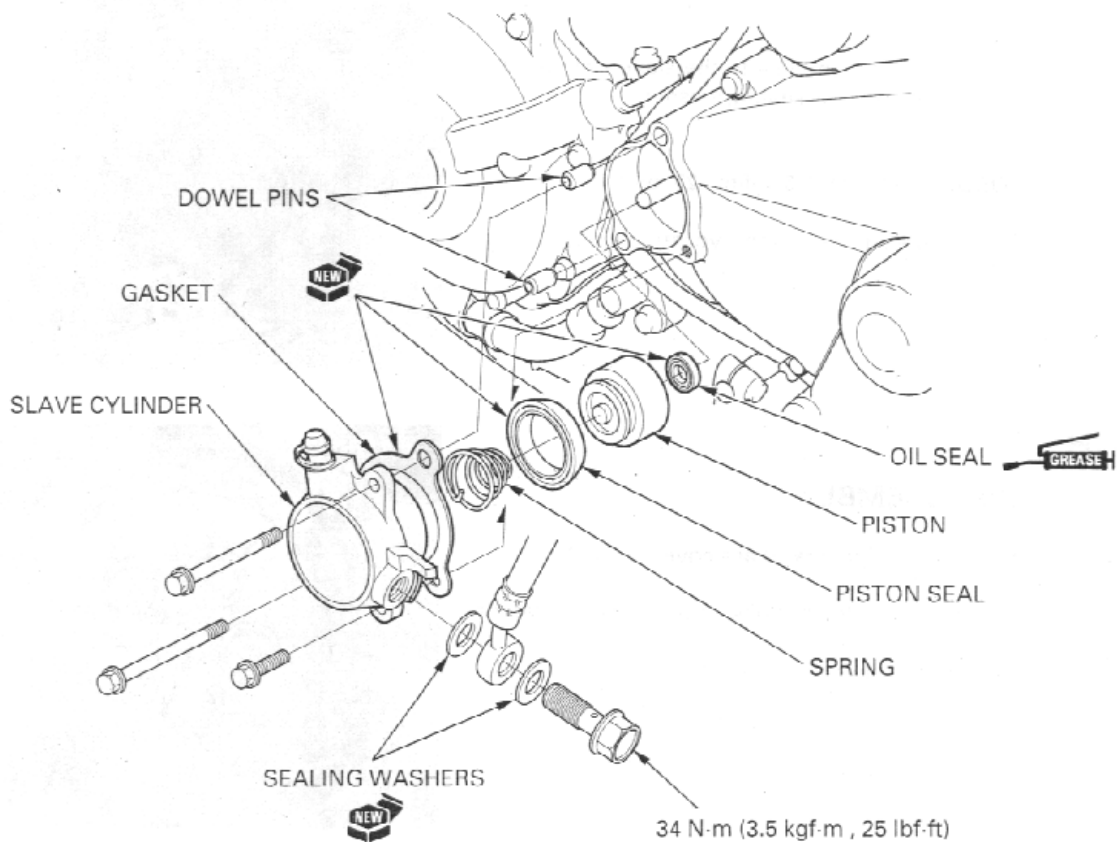
Remove the spring, piston seal and oil seal from the piston.

INSPECTION

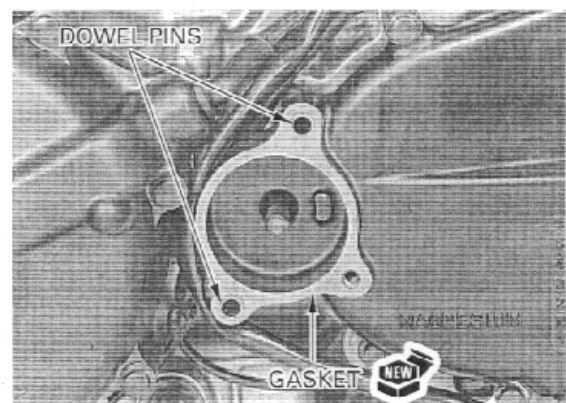
Check the piston spring for weakness or damage. Check the slave cylinder and piston for scoring or damage.



ASSEMBLY



Install the dowel pins and a new gasket.



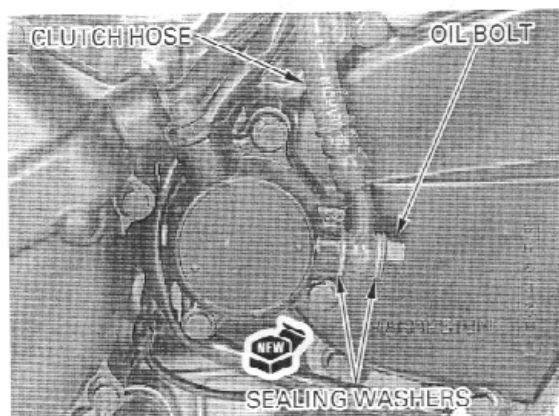
CLUTCH/GEARSHIFT LINKAGE

Install the slave cylinder and tighten the mounting bolts securely.

Connect the clutch hose to the slave cylinder with the oil bolt and new sealing washers. Tighten the oil bolt.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

Fill and bleed the clutch hydraulic system (page 9-4).



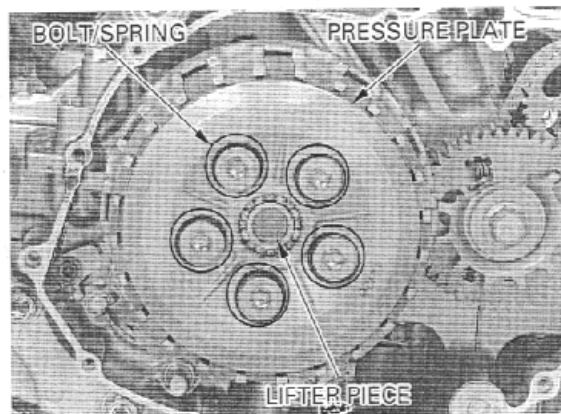
CLUTCH

DISASSEMBLY

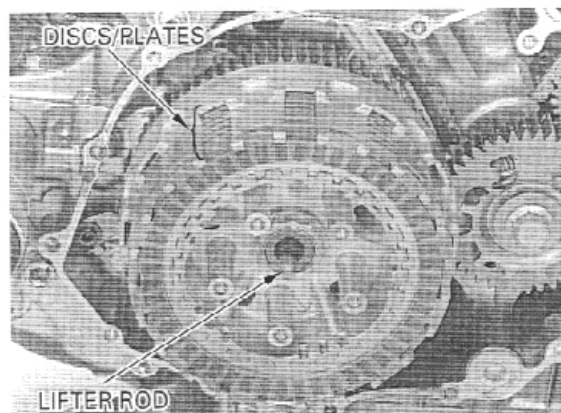
Remove the right crankcase cover (page 6-12).

Remove the clutch bolts, springs and pressure plate.

Remove the clutch lifter piece.

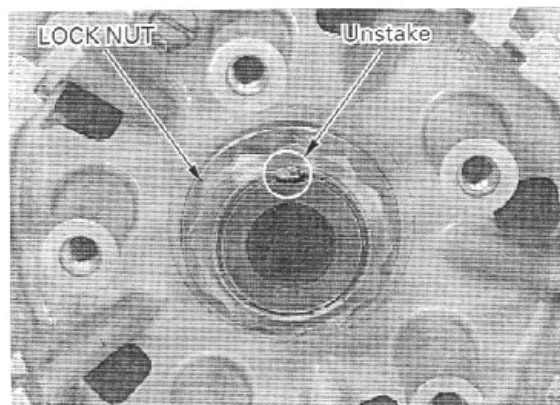


Remove the clutch lifter rod from the mainshaft. Remove the clutch discs, plates, judder spring and spring seal.



Be careful not to damage the mainshaft threads.

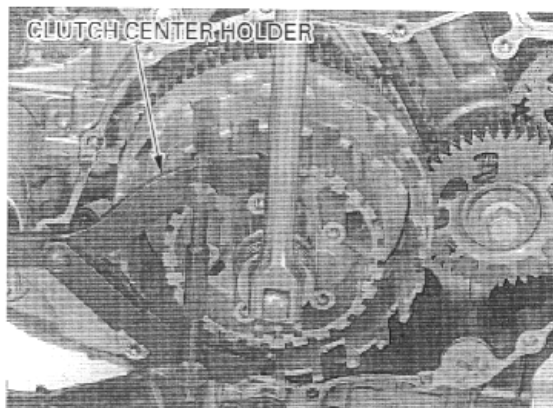
Unstake the clutch center lock nut.



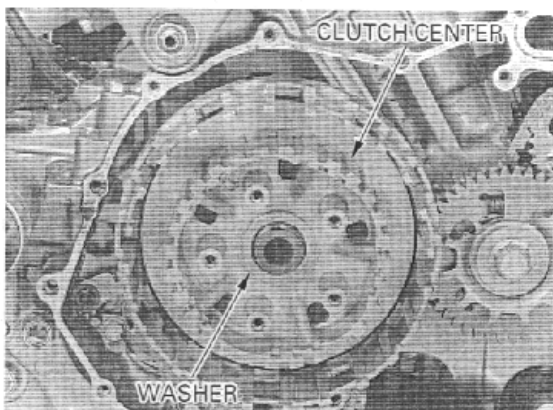
Hold the clutch center with the special tool and remove the clutch center lock nut.

TOOL:

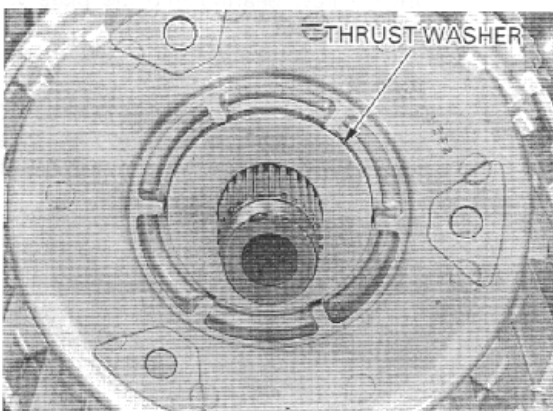
Clutch center holder 07724-0050002 or equivalent commercially available in U.S.A.



Remove the special washer and clutch center.

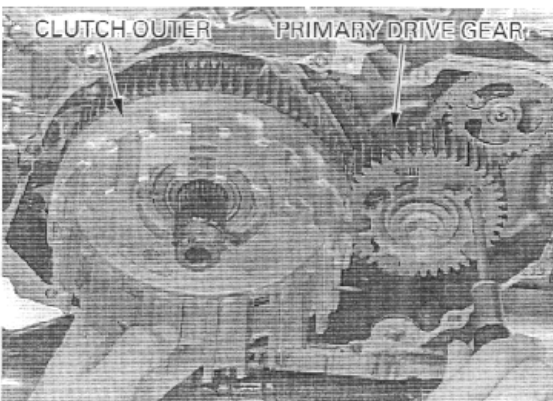


Remove the thrust washer.



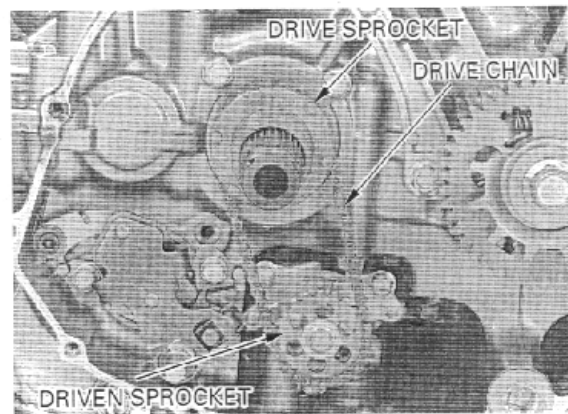
When the oil pump driven sprocket will be removed, loosen the driven sprocket bolt with the clutch outer still installed.

Align the gear teeth of the scissors gears (primary drive gear and sub-gear) by inserting a screwdriver into the gear holes, and remove the clutch outer.



CLUTCH/GEARSHIFT LINKAGE

Remove the oil pump driven sprocket bolt and washer.
Remove the oil pump driven sprocket, drive chain and drive sprocket as a set.
Remove the clutch outer guide.



INSPECTION

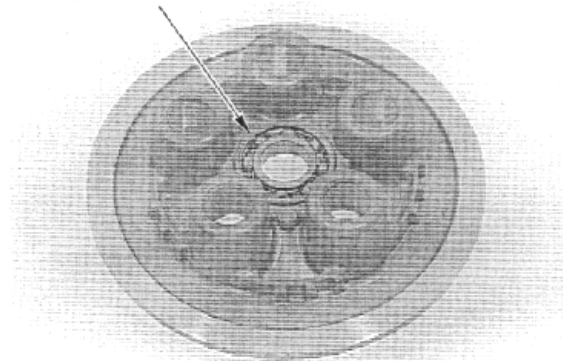
LIFTER BEARING

Turn the inner race of the lifter bearing with your finger.
The bearing should turn smoothly and quietly.
Also check that the outer race of the bearing fits tightly in the pressure plate.
Replace the bearing if the inner race does not turn smoothly, quietly, or if the outer race fit loosely in the pressure plate.

Drive the bearing out of the pressure plate.

Drive a new bearing into the plate with its mark side facing out.

LIFTER BEARING



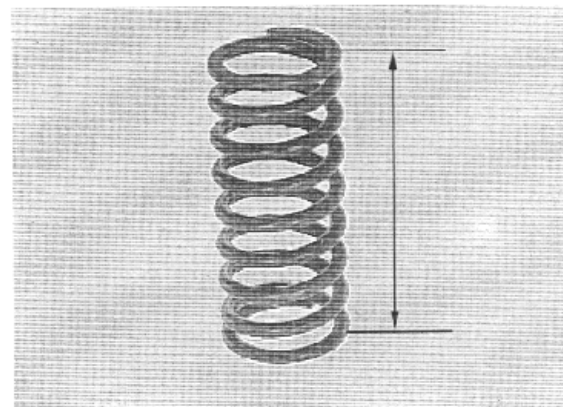
TOOLS:

Driver	07749-0010000
Attachment, 32 × 35 mm	07746-0010100
Pilot, 17 mm	07746-0040400

CLUTCH SPRING

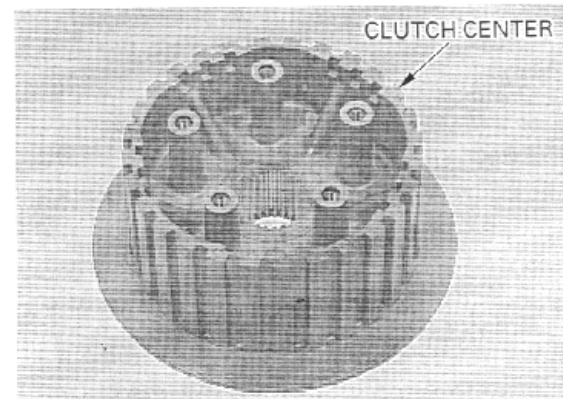
Replace the clutch springs as a set Measure the clutch spring free length.

SERVICE LIMIT: 46.6 mm (1.83 in)



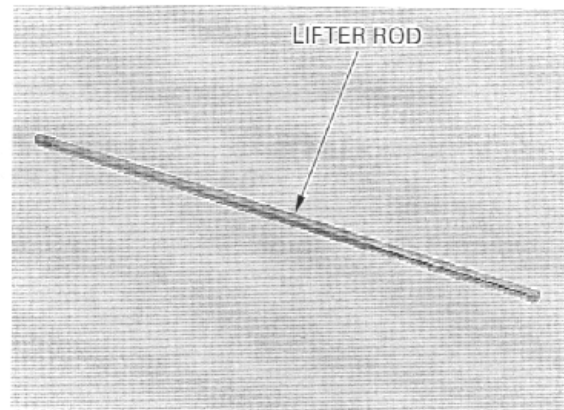
CLUTCH CENTER

Check the clutch center and pressure plate for nicks, indentations or abnormal wear made by the plates.



CLUTCH LIFTER ROD

Check the clutch lifter rod for bending or damage.

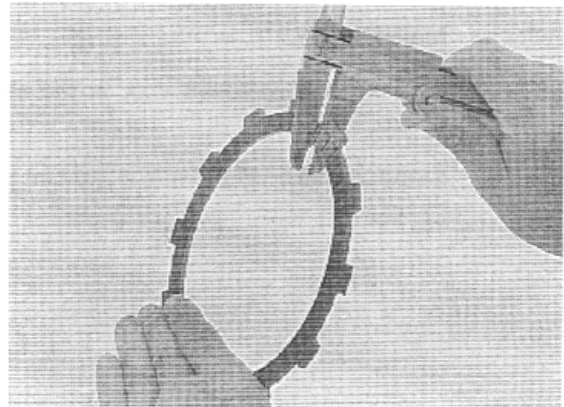


CLUTCH DISC

Replace the clutch discs and plates as a set.

Check the clutch discs for signs of scoring or discoloration.
Measure the clutch disc thickness.

SERVICE LIMIT: 3.5 mm (0.14 in)

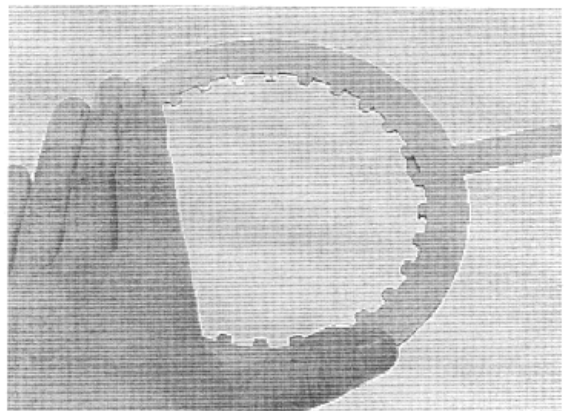


CLUTCH PLATE

Replace the clutch discs and plates as a set.

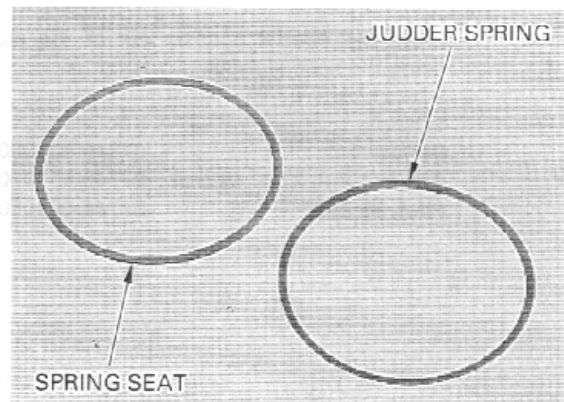
Check the plates for discoloration.
Check the plate warpage on a surface plate using a feeler gauge.

SERVICE LIMIT: 0.30 mm (0.012 in)



JUDDER SPRING, SPRING SEAT

Check the judder spring and spring seat for distortion, wear or damage.

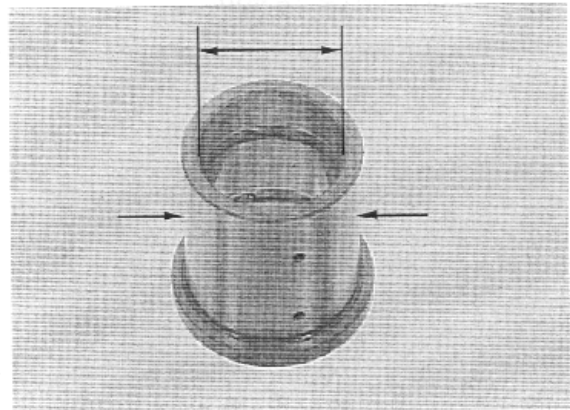


CLUTCH/GEARSHIFT LINKAGE

CLUTCH OUTER GUIDE

Measure the clutch outer guide I.D. and O.D.

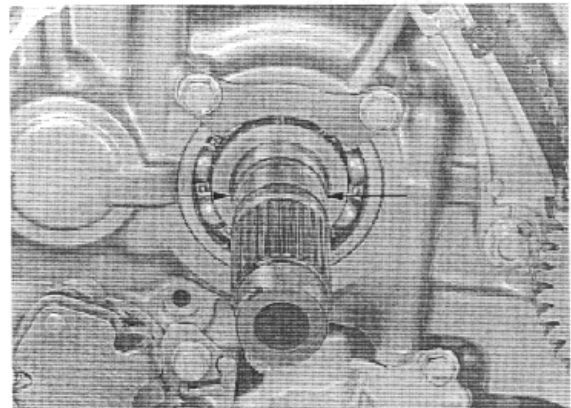
SERVICE LIMITS: I.D. : 28.031 mm (1.1036 in)
O.D. : 34.965 mm (1.3766 in)



MAINSHAFT

Measure the mainshaft O.D. at the clutch outer guide.

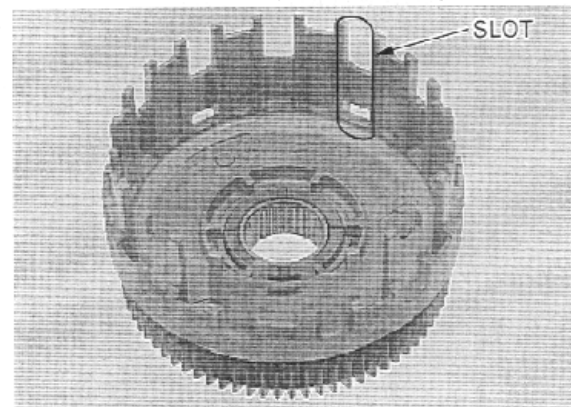
SERVICE LIMIT: 27.970 mm (1.1012 in)



CLUTCH OUTER

Check the slots in the clutch outer for nicks, indentation or abnormal wear made by the clutch discs.

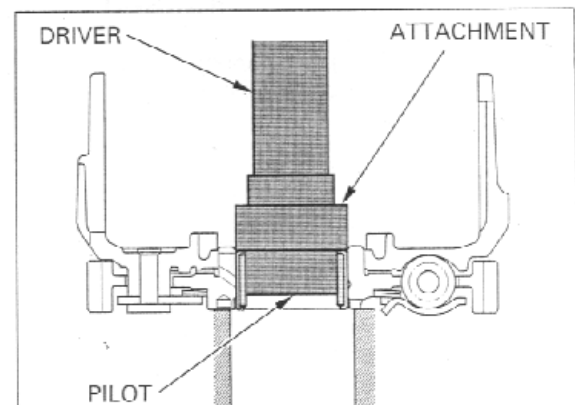
Check the needle bearing for wear or damage.
Replace the bearing if necessary.



Press the needle bearing out of the clutch outer using the special tools.

TOOLS:

Driver	07749-0010000
Attachment, 37 × 40 mm	07746-0010200
Pilot, 35 mm	07746-0040800

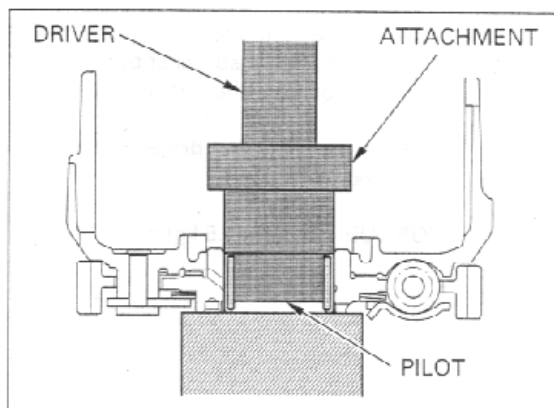


Press in the bearing with the marking side facing up.

Press the needle bearing in the clutch outer until it is flush with the inner edge of the clutch outer, using the special tools.

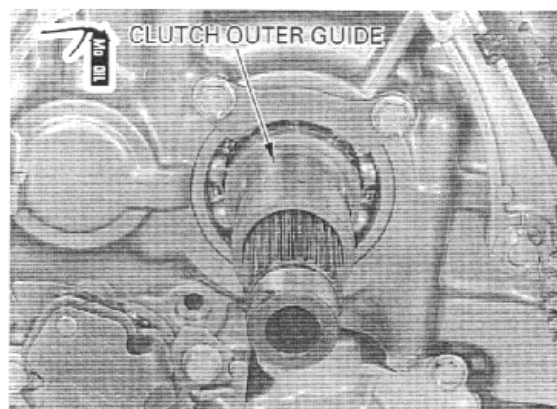
TOOLS:

Driver	07749-0010000
Attachment, 42 × 47 mm	07746-0010300
Pilot, 35 mm	07746-0040800



ASSEMBLY

Coat the clutch outer guide with molybdenum oil solution and install it onto the mainshaft with the flange side facing the crankcase.

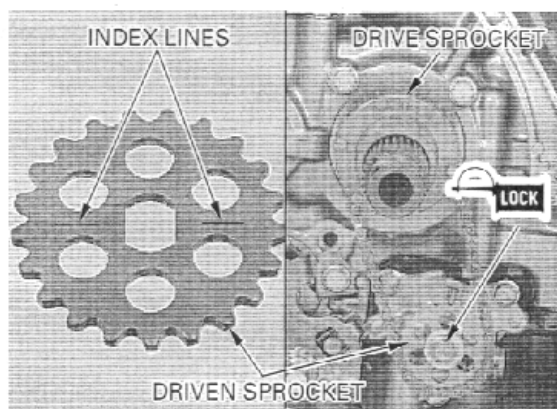


Install the oil pump drive sprocket, drive chain and driven sprocket as a set with the index lines on the driven sprocket facing in.

Apply locking agent to the oil pump driven sprocket bolt threads and install the washer and bolt.

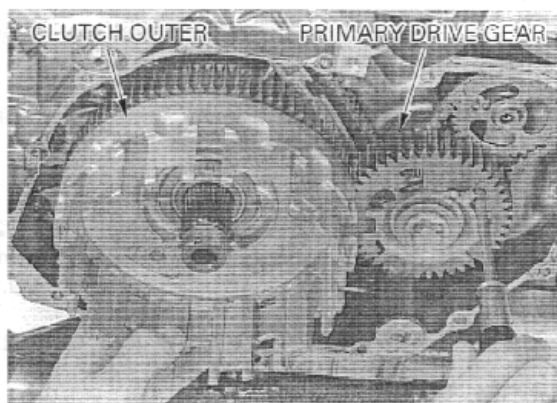
NOTE:

Tighten the driven sprocket bolt to the specified torque after installing the clutch outer.



Apply molybdenum oil solution to the clutch outer needle bearing.

Align the gear teeth of the scissors gears (primary drive gear and sub-gear) by inserting a screwdriver into the gear holes, and install the clutch outer.

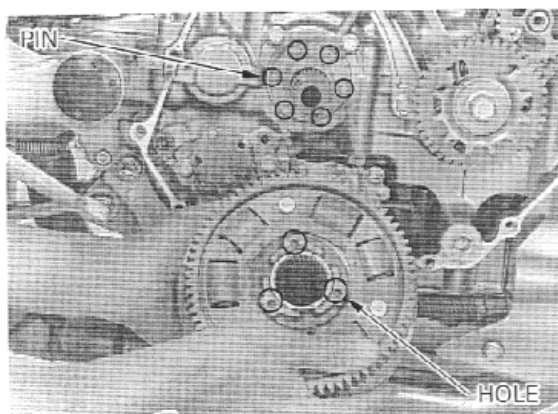


CLUTCH/GEARSHIFT LINKAGE

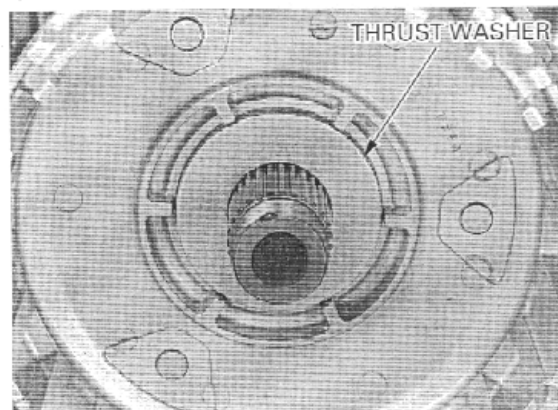
Align the holes in the clutch outer with the pins on the oil pump drive sprocket by turning the oil pump driven sprocket while pushing in the clutch outer.

Tighten the oil pump driven sprocket bolt if it was removed.

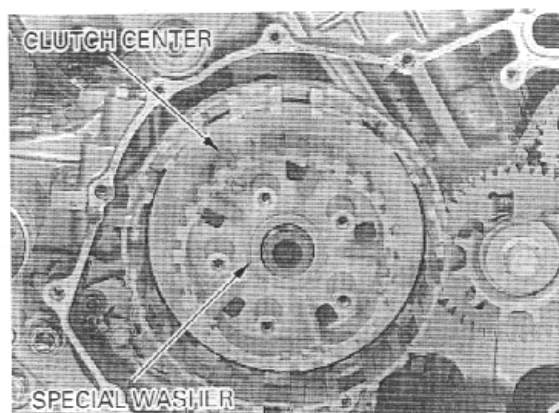
TORQUE: 15 N·m (1.5 kgf·m , 11 lbf·ft)



Install the thrust washer.



Install the clutch center and special washer.



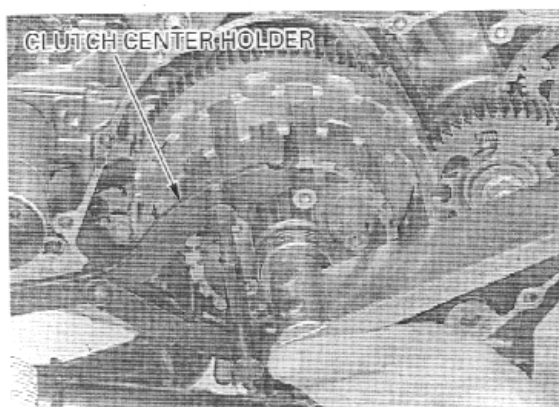
Apply oil to the threads and seating surface of a new clutch center lock nut and install it onto the mainshaft.

Hold the clutch center with the special tool and tighten the lock nut.

TOOL:

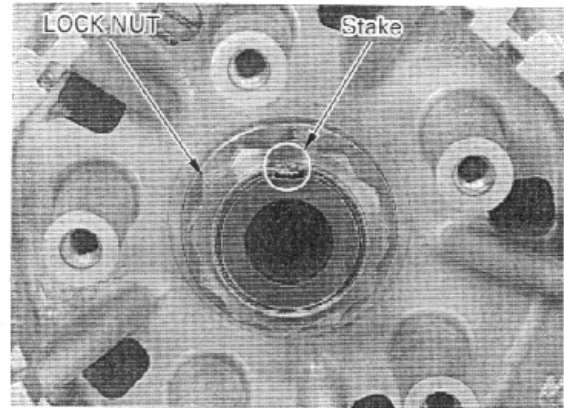
Clutch center holder 07724-0050002 or equivalent commercially available in U.S.A.

TORQUE: 127 N·m (13.0 kgf·m , 94 lbf·ft)



Be careful not to damage the mainshaft threads.

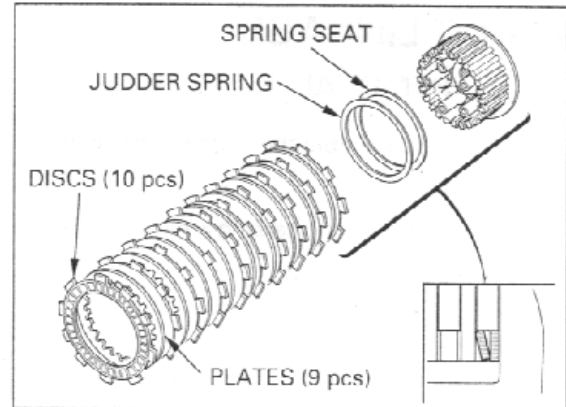
Stake the clutch center lock nut into the mainshaft groove.



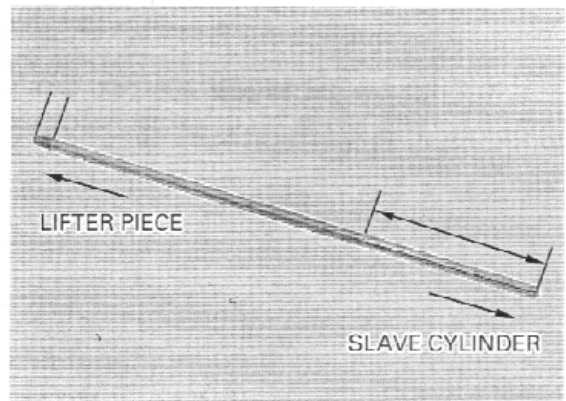
Install the spring seat and judder spring, with the concaved side facing out, onto the clutch center.

Install the outside clutch disc tabs into the shallow slots of the clutch outer.

Coat the clutch discs with clean engine oil. Install the ten clutch discs and nine plates alternately, starting with the disc.



Note the clutch lifter rod installation direction and install it into the mainshaft.



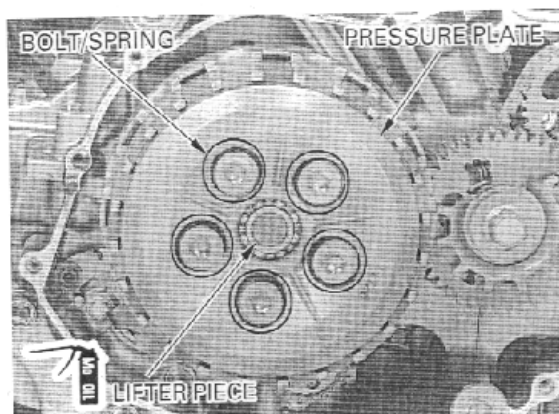
CLUTCH/GEARSHIFT LINKAGE

Coat the clutch lifter piece with molybdenum oil solution.

Install the clutch lifter piece and pressure plate. Install the clutch springs and clutch bolts, and tighten the bolts.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Install the right crankcase cover (page 6-14).



GEARSHIFT LINKAGE

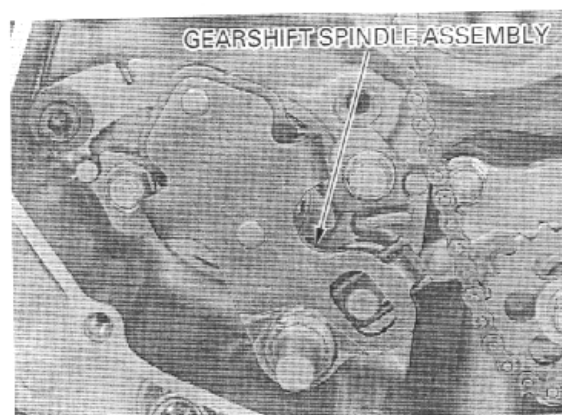
REMOVAL

Disassemble the clutch to the clutch outer (page 9-12).

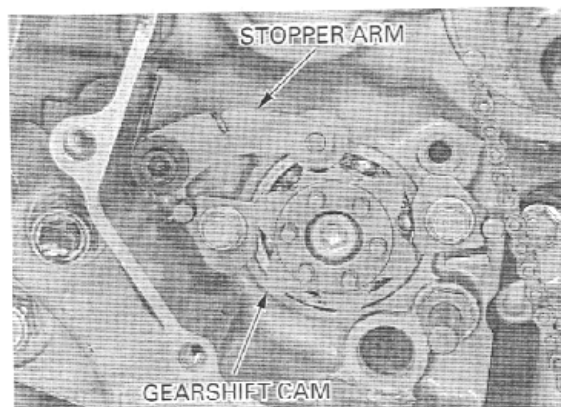
Remove the gearshift arm.



Remove the gearshift spindle assembly and thrust washer.

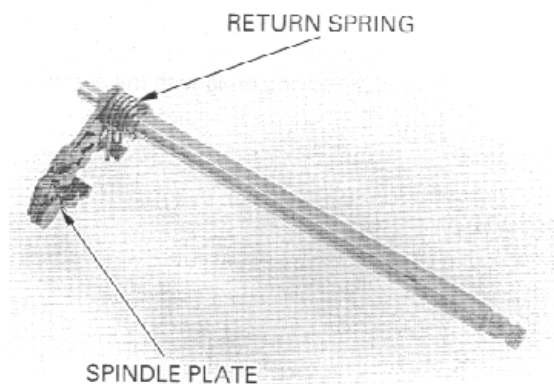


Remove the gearshift cam bolt and gearshift cam. Remove the dowel pin from the shift drum. Remove the stopper arm bolt, arm, washer and return spring.



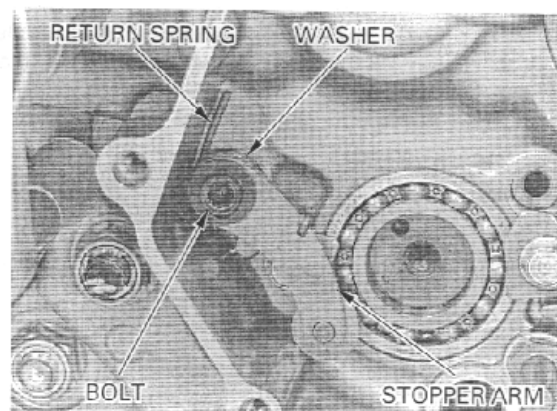
INSPECTION

Check the gearshift spindle for bending.
Check the spindle plate for wear or damage.
Check the spindle return spring for fatigue or damage.

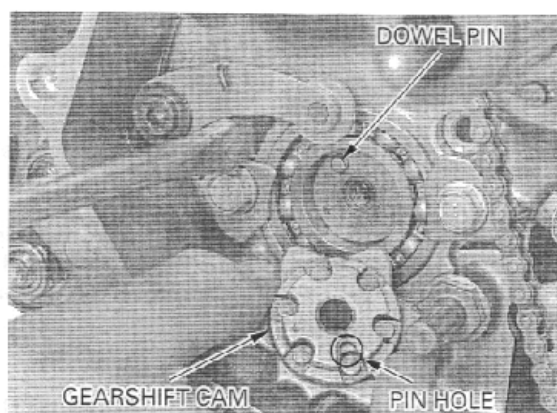


INSTALLATION

Install the washer, return spring, stopper arm and bolt, and tighten the bolt.

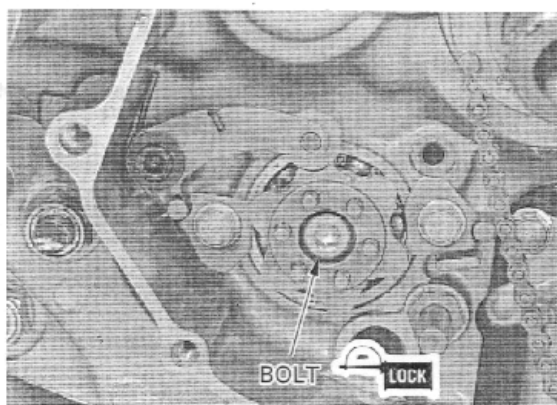


Install the dowel pin into the shift drum.
Lift the stopper arm with a screwdriver and install the gearshift cam by aligning the pin hole in the cam with the dowel pin.



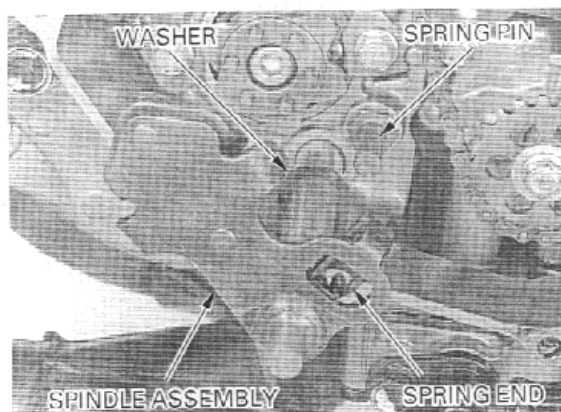
Apply locking agent to the gearshift cam bolt threads.
Install and tighten the bolt.

TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)



CLUTCH/GEARSHIFT LINKAGE

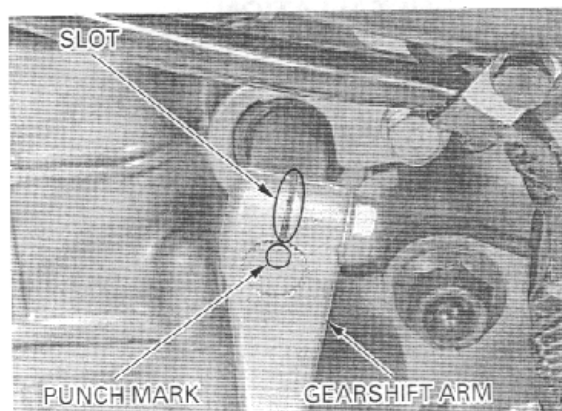
Install the thrust washer onto the gearshift spindle, and insert the spindle into the crankcase, aligning the return spring ends with the spring pin.



Install the gearshift arm onto the spindle, aligning the slit of the arm with the punch mark on the spindle.

Tighten the gearshift arm bolt securely.

Assemble the clutch (page 9-17).



PRIMARY DRIVE GEAR

REMOVAL

Disassemble the clutch to the clutch center thrust washer (page 9-12).

Install the special tool between the primary drive and driven gears as shown, loosen the primary drive gear bolt, and remove the bolt and special washer.

TOOL:

Gear holder

07724-0010100



Remove the clutch outer (page 9-13).

Remove the ignition pulse generator rotor and primary drive gear assembly.



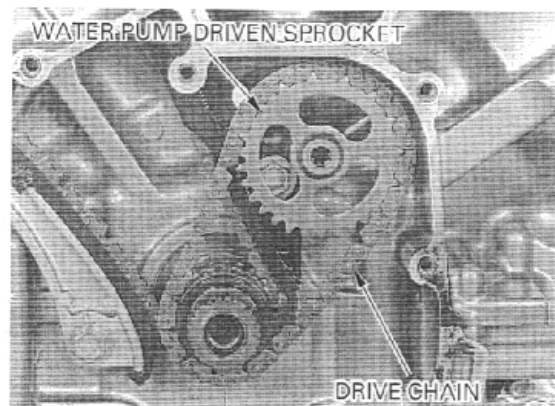
Remove the water pump driven sprocket and drive chain.

INSTALLATION

Apply molybdenum oil solution to the water pump driven sprocket shaft.

Install the water pump drive chain over the drive and driven sprockets.

Install the driven sprocket shaft into the crankcase.

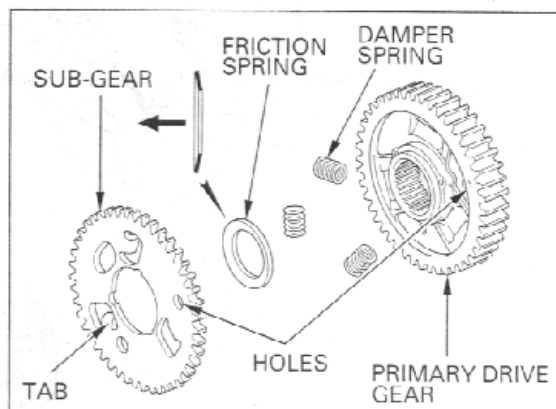


Install the damper springs into the primary drive gear grooves.

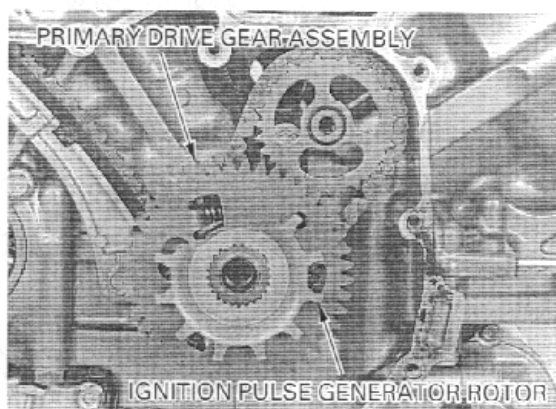
Install the friction spring onto the primary drive gear with the concaved side toward the sub-gear.

Apply molybdenum disulfide grease to the primary drive gear and sub gear sliding surfaces.

Install the sub-gear onto the primary drive gear boss so that the sub-gear tabs are positioned against the damper spring and holes are aligned.



Install the primary drive gear assembly and ignition pulse generator rotor by aligning the wide grooves with the wide tooth.



Apply oil to the threads and seating surface of the primary drive gear bolt.

Install the special washer and primary drive gear bolt.

Install the clutch outer (page 9-17).

Install the special tool between the primary drive and driven gears as shown and tighten the primary drive gear bolt.

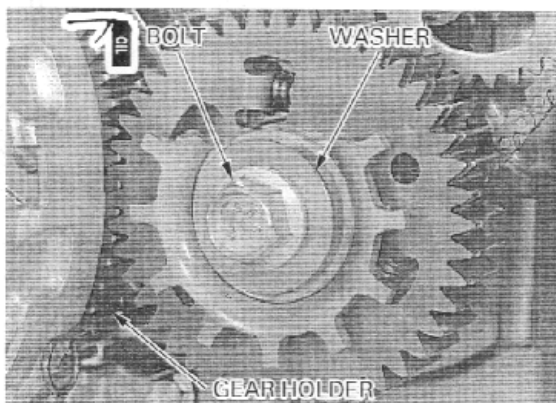
TOOL:

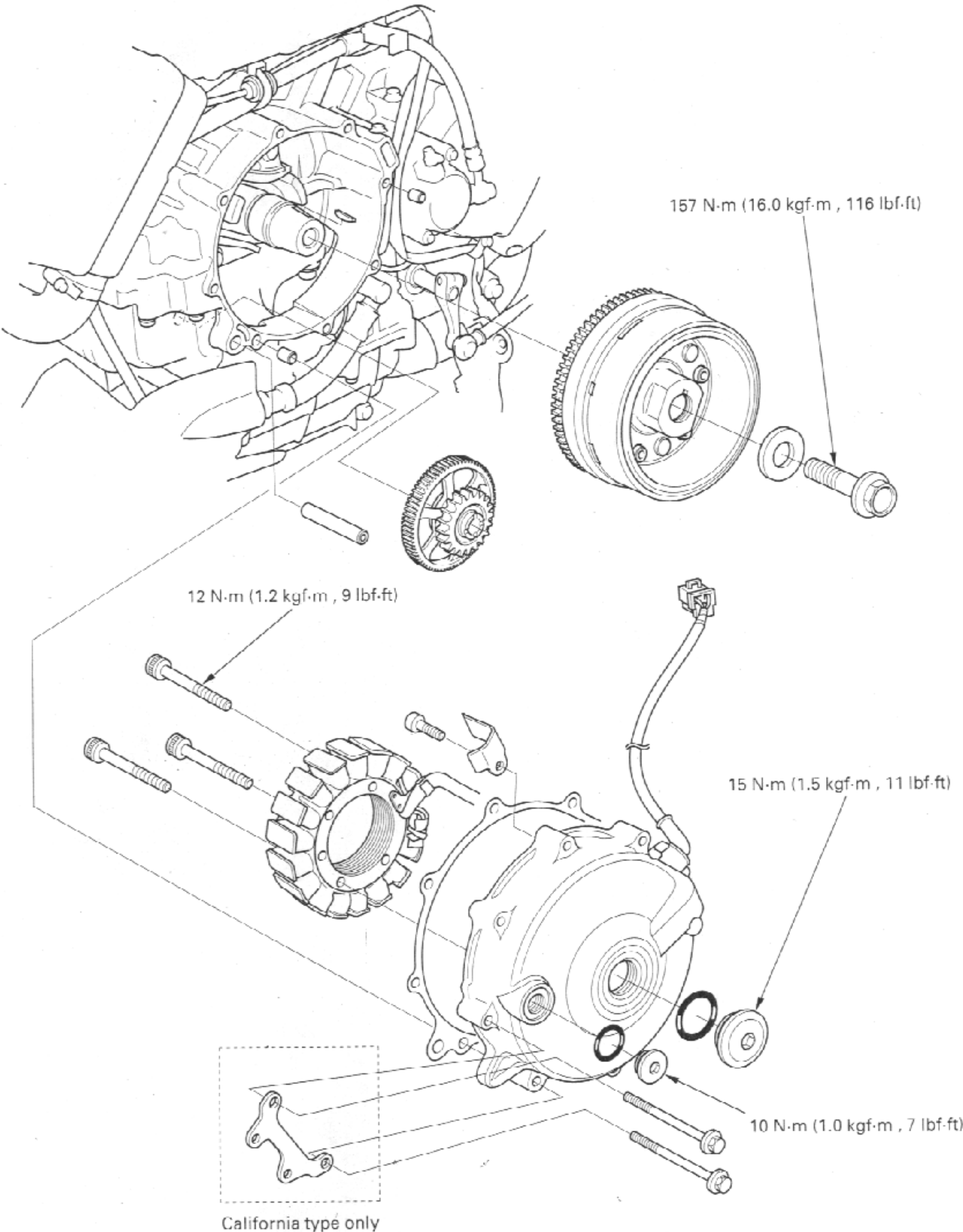
Gear holder

07724-0010100

TORQUE: 88 N·m (9.0 kgf·m, 65 lbf·ft)

Assemble the clutch (page 9-17).





10. ALTERNATOR/STARTER CLUTCH

SERVICE INFORMATION	10-1	FLYWHEEL REMOVAL	10-3
TROUBLESHOOTING	10-1	STARTER CLUTCH	10-4
ALTERNATOR STATOR	10-2	FLYWHEEL INSTALLATION	10-7

SERVICE INFORMATION

GENERAL

- This section covers service of the alternator stator, flywheel and starter clutch. These parts can be removed with the engine installed in the frame.
- The front cylinder cam sprockets must be removed to remove the starter reduction gear.
- Refer to section 16 for alternator stator inspection.
- Refer to section 18 for starter motor servicing.

SPECIFICATION

ITEM	STANDARD	Unit: mm (in)
		SERVICE LIMIT
Starter driven gear boss O.D.	57.749—57.768 (2.2736—2.2743)	57.639 (2.2692)

10

TORQUE VALUES

Flywheel bolt	157 N·m (16.0 kgf·m , 116 lbf·ft)	Apply oil to the threads and seating surface.
Starter clutch bolt	23 N·m (2.3 kgf·m , 17 lbf·ft)	Apply locking agent to the threads.
Alternator stator bolt	12 N·m (1.2 kgf·m , 9 lbf·ft)	

TOOLS

Flywheel holder	07725-0040000 or equivalent commercially available in U.S.A.
Rotor puller	07733-0020001 or 07933-3290001

TROUBLESHOOTING

Engine does not turn

- Faulty starter clutch
- Damaged starter reduction gear

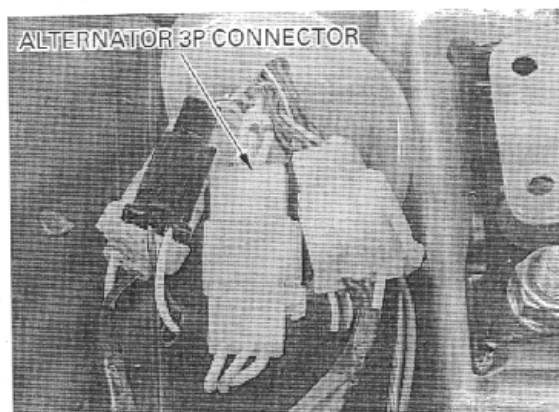
ALTERNATOR STATOR

LEFT CRANKCASE COVER REMOVAL

Remove the following:

- seat (page 2-2)
- front fairing (page 2-3)

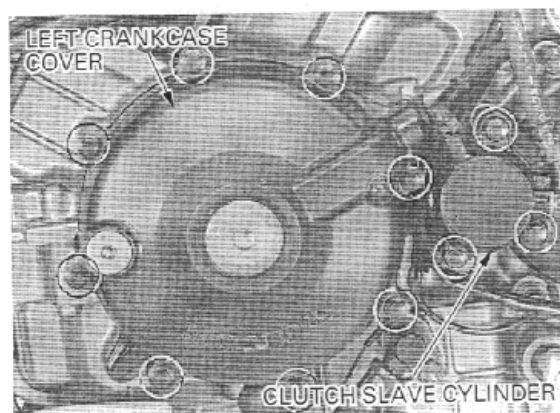
Disconnect the alternator 3P (white) connector.



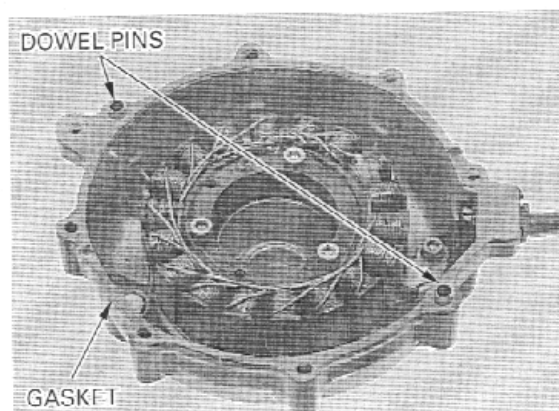
Remove the three bolts and clutch slave cylinder from the drive sprocket cover.

Remove the eight bolts, left canister bracket stay (California type only) and left crankcase cover.

Temporarily install the clutch slave cylinder.



Remove the dowel pins and gasket.

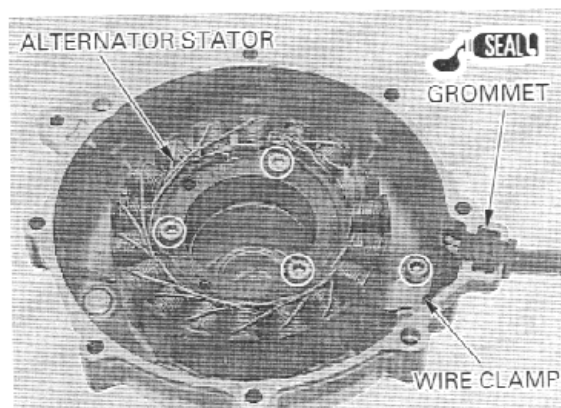


STATOR REPLACEMENT

Remove the four bolts, wire clamp, grommet and stator from the left crankcase cover.

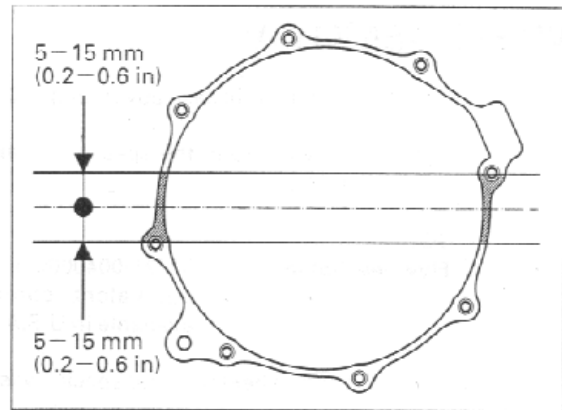
Install a new stator onto the left crankcase cover.
Apply sealant to the grommet seating surface and install it into the cover groove properly.
Install the wire clamp.
Tighten the four bolts.

TORQUE: 12 N·m (1,2 kgf·m, 9 lbf·ft)

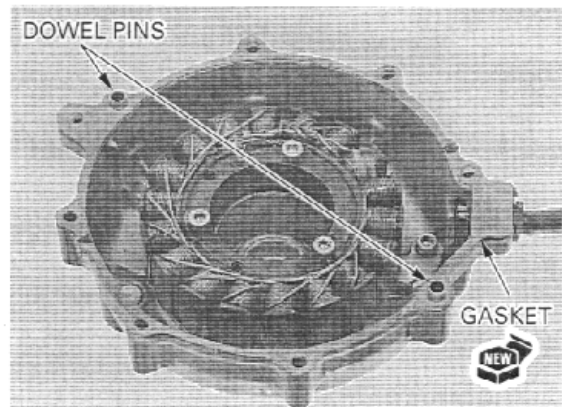


LEFT CRANKCASE COVER INSTALLATION

Apply sealant to the crankcase mating surfaces as shown.



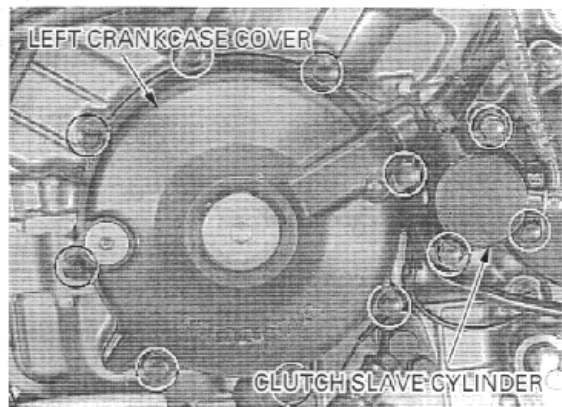
Install the dowel pins and a new gasket.



Remove the three bolts and clutch slave cylinder.

Install the left crankcase cover and left canister bracket stay (California type only), and tighten the eight bolts securely.

Reinstall the clutch slave cylinder and tighten the three bolts securely.



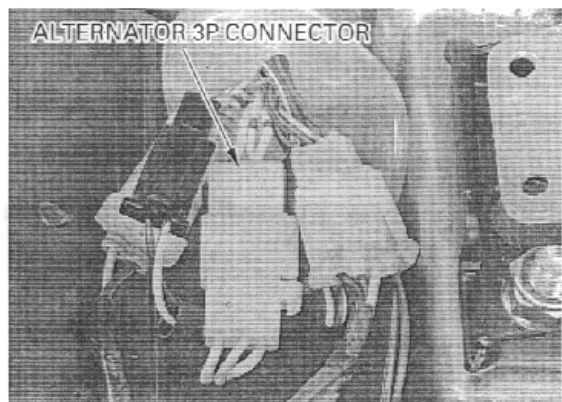
Route the alternator wire properly (page 1-18).

Connect the alternator 3P (white) connector.

Install the following:

- front fairing (page 2-3)
- seat (page 2-2)

Check the oil level and add recommended engine oil if necessary (page 3-10).



FLYWHEEL REMOVAL

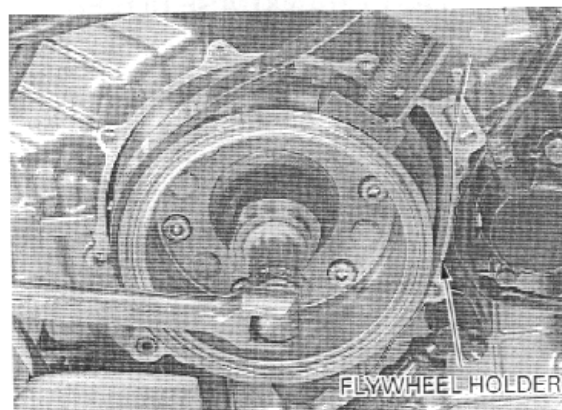
Remove the left crankcase cover (page 10-2).

Hold the flywheel with the special tool and loosen the flywheel bolt.

TOOL:

Flywheel holder 07725-0040000 or
equivalent commercially
available in U.S.A.

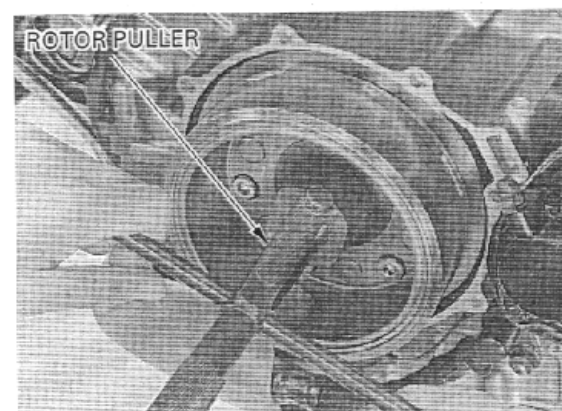
Remove the flywheel bolt and special washer.



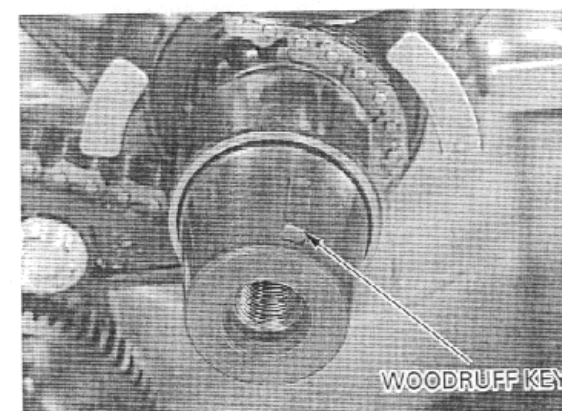
Remove the flywheel using the special tool.

TOOL:

Rotor puller 07733-0020001 or
07933-3290001



Remove the woodruff key from the crankshaft.

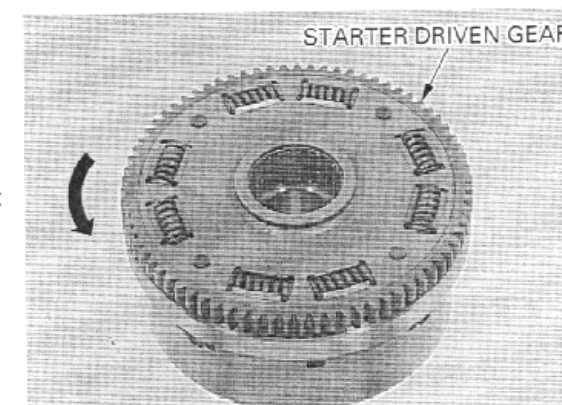


STARTER CLUTCH

REMOVAL

Remove the flywheel.

Remove the starter driven gear while turning it counterclockwise.



Hold the flywheel with the special tool and remove the starter clutch bolts.

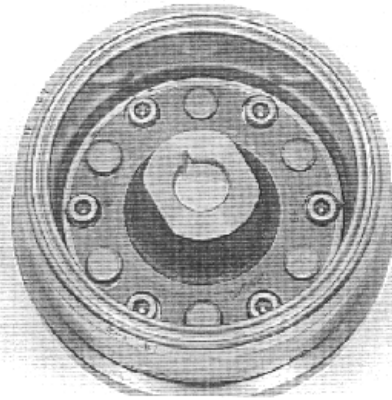
TOOL:

Flywheel holder

07725-0040000 or
equivalent commercially
available in U.S.A.

Remove the starter clutch assembly from the flywheel.

Remove the sprag clutch from the starter clutch outer.

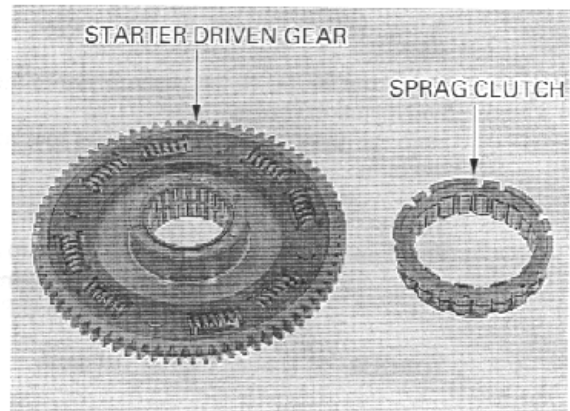


INSPECTION

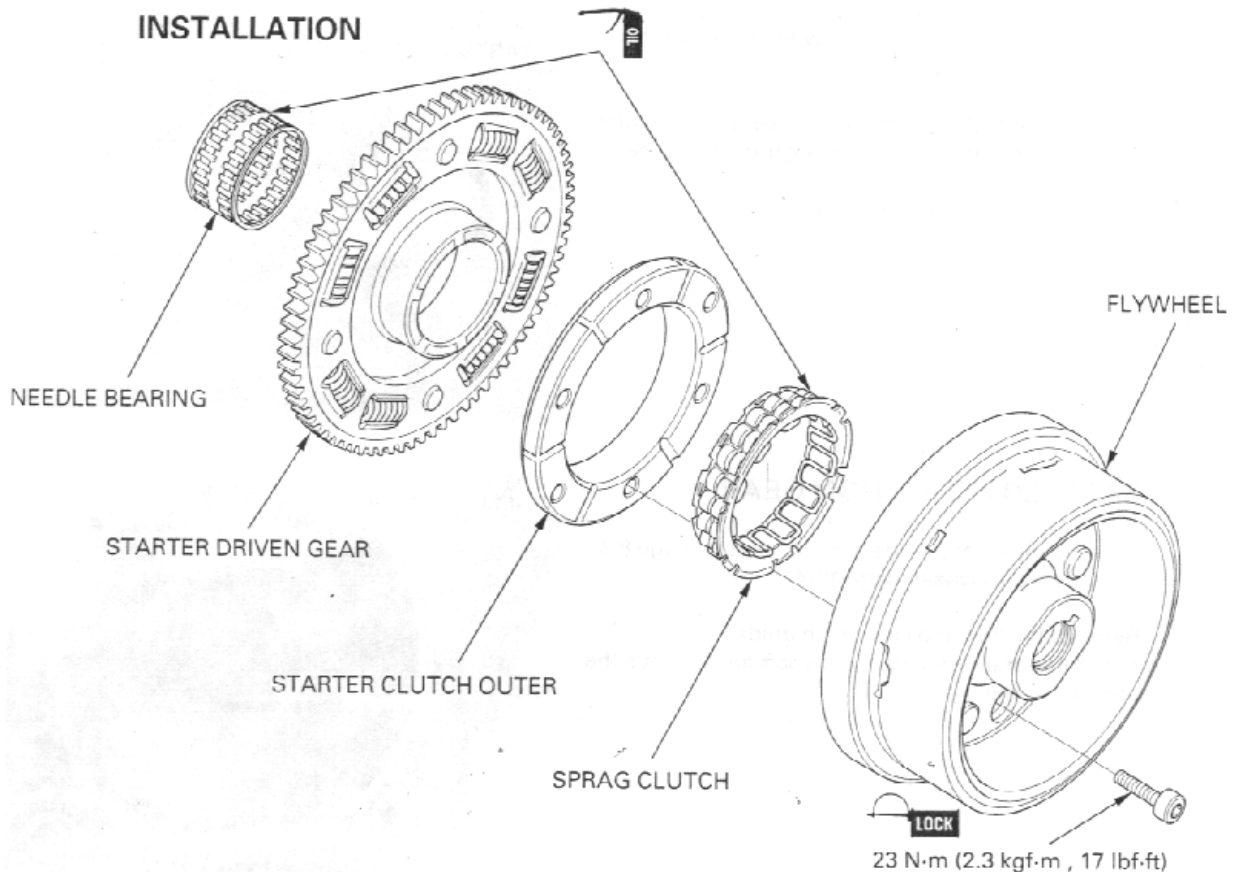
Check the starter driven gear and sprag clutch for abnormal wear or damage.

Measure the starter driven gear O.D.

SERVICE LIMIT: 57.639 mm (2.2692 in)

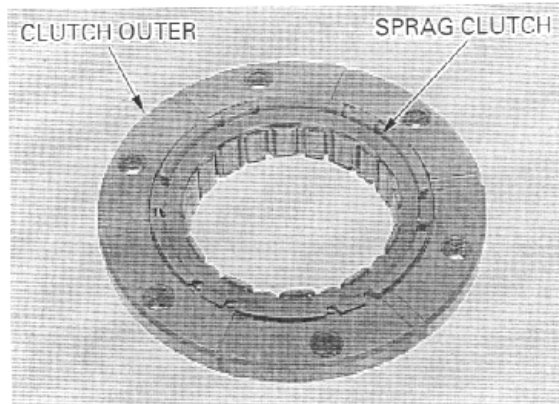


INSTALLATION



ALTERNATOR/STARTER CLUTCH

Install the sprag clutch into the starter clutch outer as shown.



Apply locking agent to the starter clutch bolt threads.

Install the starter clutch assembly onto the flywheel and install the bolts.

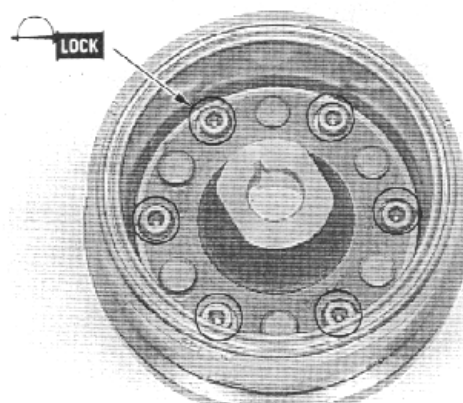
Hold the flywheel with the special tool and tighten the bolts.

TOOL:

Flywheel holder

07725-0040000 or
equivalent commercially
available in U.S.A.

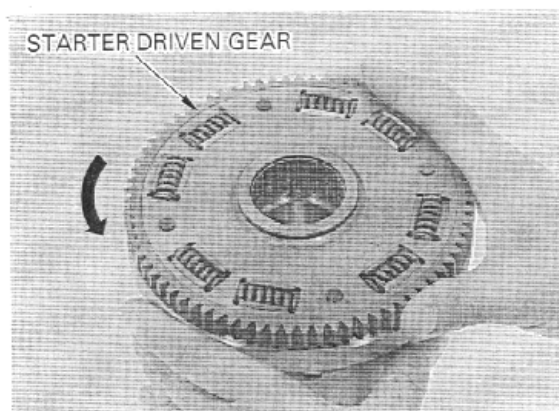
TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)



Install the starter driven gear while turning it counterclockwise.

Make sure that the starter driven gear turns counterclockwise smoothly and does not turn clockwise.

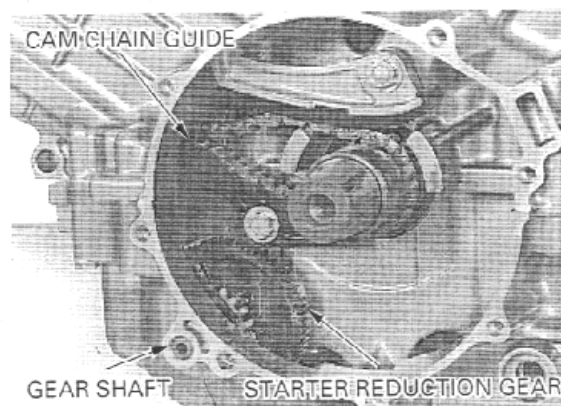
Install the flywheel (page 10-7).



STARTER REDUCTION GEAR

Remove the front cylinder cam sprockets (page 8-4).
Remove the flywheel (page 10-4).

Remove the bolt and cam chain guide.
Pull the starter reduction gear shaft and remove the reduction gear.



Check the starter reduction gear for wear or damage.

Coat the reduction gear shaft with molybdenum oil solution.

Install the starter reduction gear and insert the shaft with the holed end facing out.

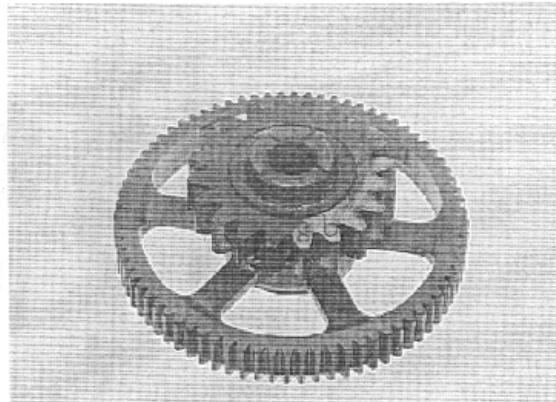
Apply locking agent to the cam chain guide bolt threads.

Install the cam chain guide and tighten the bolt.

TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)

Install the flywheel (see below).

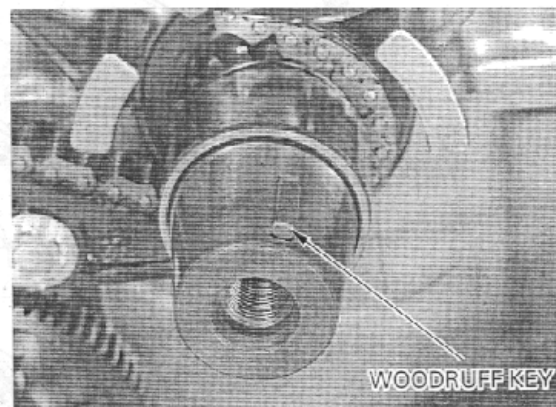
Install the front cylinder cam sprockets (page 8-20).



FLYWHEEL INSTALLATION

Clean any oil from the tapered portion of the crankshaft and flywheel.

Install the woodruff key in the crankshaft key groove.

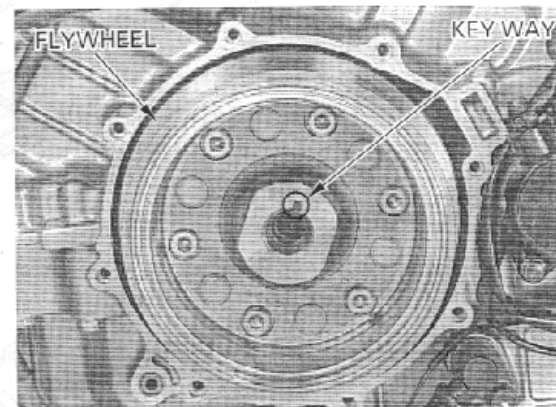


Apply oil to the needle bearing in the starter driven gear.

Install the flywheel on the crankshaft, aligning the key way with the woodruff key, and mesh the starter driven and reduction gears.

If necessary, remove the starter motor and check that the starter driven and reduction gears are meshed by turning the reduction gear.

The reduction gear should turn clockwise and not turn counterclockwise as viewed from starter motor side.



Apply oil to the flywheel bolt threads and seating surface and install the special washer and bolt.

Hold the flywheel with the special tool and tighten the bolt.

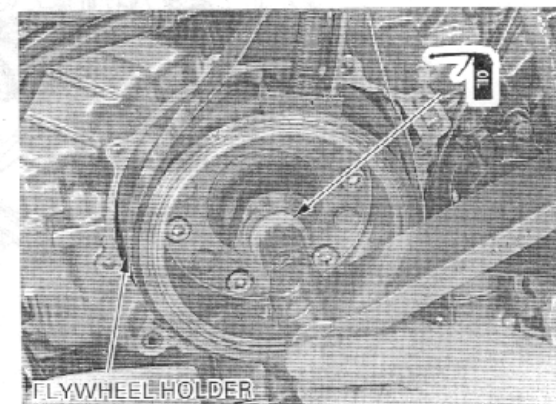
TOOL:

Flywheel holder

07725-0040000 or equivalent commercially available in U.S.A.

TORQUE: 157 N·m (16.0 kgf·m, 116 lbf·ft)

Install the left crankcase cover (page 10-3).



CRANKCASE/TRANSMISSION

42 N·m (4.3 kgf·m , 31 lbf·ft)

23 N·m (2.3 kgf·m , 17 lbf·ft)

23 N·m (2.3 kgf·m , 17 lbf·ft)

39 N·m (4.0 kgf·m , 29 lbf·ft)

23 N·m (2.3 kgf·m , 17 lbf·ft)

11. CRANKCASE/TRANSMISSION

SERVICE INFORMATION	11-1	SHIFT FORK/SHIFT DRUM	11-4
TROUBLESHOOTING	11-2	TRANSMISSION	11-6
CRANKCASE SEPARATION	11-3	CRANKCASE ASSEMBLY	11-10

SERVICE INFORMATION

GENERAL

- The crankcase must be separated to service the following:
 - transmission
 - crankshaft (section 12)
 - piston/connecting rod (section 12)
- Be careful not to damage the crankcase mating surfaces when servicing.
- Prior to assembling the crankcase halves, apply sealant to their mating surfaces. Wipe off excess sealant thoroughly.

SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Shift fork	I. D.		12.000—12.021 (0.4724—0.4733)	12.03 (0.474)
	Claw thickness		5.93—6.00 (0.233—0.236)	5.9 (0.23)
Shift fork shaft	O. D.		11.957—11.968 (0.4707—0.4712)	11.95 (0.470)
Transmission	Gear I. D.	M5, M6	31.000—31.016 (1.2205—1.2211)	31.04 (1.222)
		C2, C3, C4	33.000—33.025 (1.2992—1.3002)	33.05 (1.301)
	Gear bushing O. D.	M5, M6	30.955—30.980 (1.2187—1.2197)	30.93 (1.218)
		C2	32.955—32.980 (1.2974—1.2984)	32.93 (1.296)
		C3, C4	32.950—32.975 (1.2972—1.2982)	32.93 (1.296)
	Gear-to-bushing clearance	M5, M6	0.020—0.061 (0.0008—0.0024)	0.10 (0.004)
		C2	0.020—0.070 (0.0008—0.0028)	0.11 (0.004)
		C3, C4	0.025—0.075 (0.0010—0.0030)	0.11 (0.004)
	Gear bushing I. D.	M5	27.985—28.006 (1.1018—1.1026)	28.02 (1.103)
		C2	29.985—30.006 (1.1805—1.1813)	30.02 (1.182)
	Mainshaft O. D.	at M5	27.967—27.980 (1.1011—1.1016)	27.94 (1.100)
	Countershaft O. D.	at C2	29.950—29.975 (1.1791—1.1801)	29.92 (1.178)
	Bushing-to-shaft clearance	M5	0.005—0.039 (0.0002—0.0015)	0.06 (0.002)
		C2	0.010—0.056 (0.0004—0.0022)	0.06 (0.002)

11

TORQUE VALUES

Cam chain tensioner bolt	23 N·m (2.3 kgf·m, 17 lbf·ft)	Apply locking agent to the threads.
Cam chain guide bolt	23 N·m (2.3 kgf·m, 17 lbf·ft)	Apply locking agent to the threads.
Crankcase 10 mm flange bolt	39 N·m (4.0 kgf·m, 29 lbf·ft)	
Crankcase 10 mm special bolt	42 N·m (4.3 kgf·m, 31 lbf·ft)	Apply oil to the threads and seating surface.

TOOLS

Driver, 40 mm I. D.	07746-0030100
Attachment, 35 mm I. D.	07746-0030400

TROUBLESHOOTING

Hard to shift

- Improper clutch operation (section 9)
- Incorrect engine oil weight
- Bent shift forks
- Bent shift fork shaft
- Bent shift fork claw
- Damaged shift drum cam grooves
- Bent gearshift spindle

Transmission jumps out of gear

- Worn gear dogs
- Worn gear shifter groove
- Bent shift fork shaft
- Broken shift drum stopper arm
- Worn or bent shift forks
- Broken drum stopper arm spring
- Broken gearshift spindle return spring

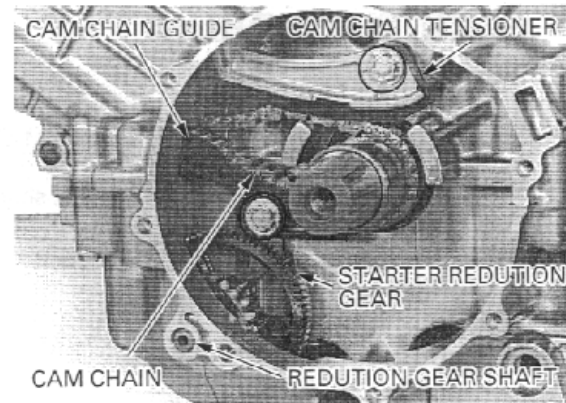
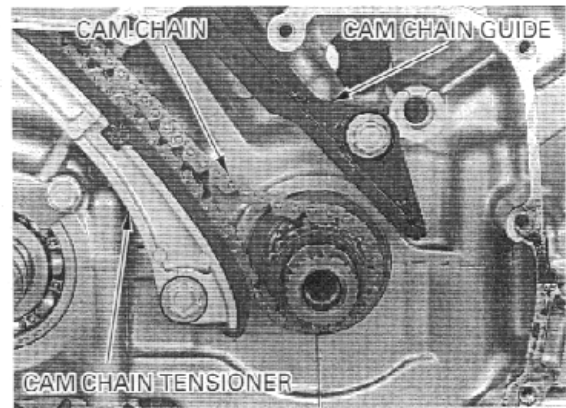
Excessive engine noise

- Worn or damaged transmission gears
- Worn or damaged transmission bearings

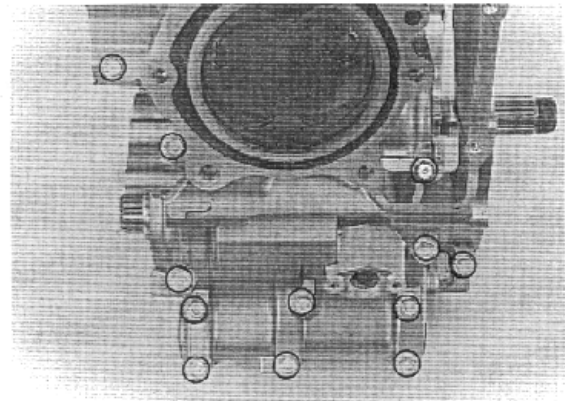
CRANKCASE SEPARATION

Remove the following:

- engine (section 7)
- cylinder head (section 8)
- clutch, gearshift linkage, primary drive gear (section 9)
- flywheel (section 10)
- starter motor (section 18)
- oil pump (section 4)
- bolts and cam chain tensioners
- bolts and cam chain guides
- starter reduction gear and shaft (section 10)
- cam chains



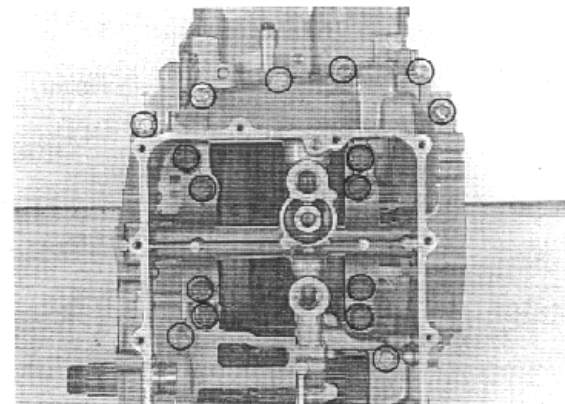
Loosen the two 6 mm bolts, nine 8 mm bolts and 10 mm bolt in a crisscross pattern in 2 or 3 steps and remove them from the upper crankcase.



Place the engine with the upper side down.

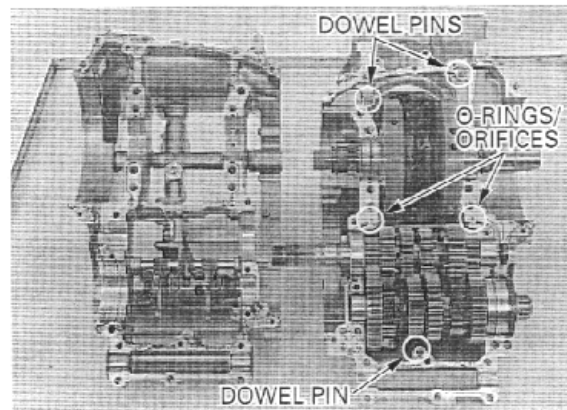
Loosen the two 6 mm bolts, six 8 mm bolts and eight 10 mm bolt in a crisscross pattern in 2 or 3 steps and remove them from the lower crankcase.

Separate the lower crankcase from the upper crankcase.



Remove the dowel pins, oil orifices and O-rings.

Clean any sealant from the crankcase mating surfaces.



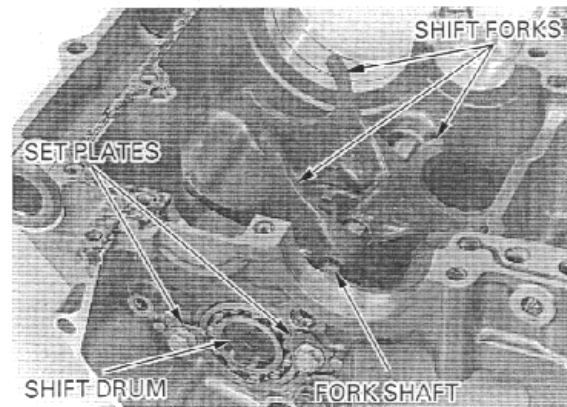
SHIFT FORK/SHIFT DRUM

REMOVAL

Separate the crankcase halves (page 11-3).

Remove the shift fork shaft set plate, shift fork shaft and shift forks.

Remove the shift drum bearing set plate and shift drum.



INSPECTION

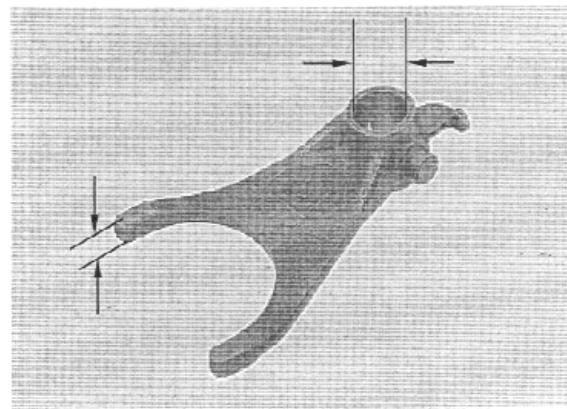
Check the shift fork guide pins for abnormal wear or damage.

Measure the shift fork I. D.

SERVICE LIMIT: 12.03 mm (0.474 in)

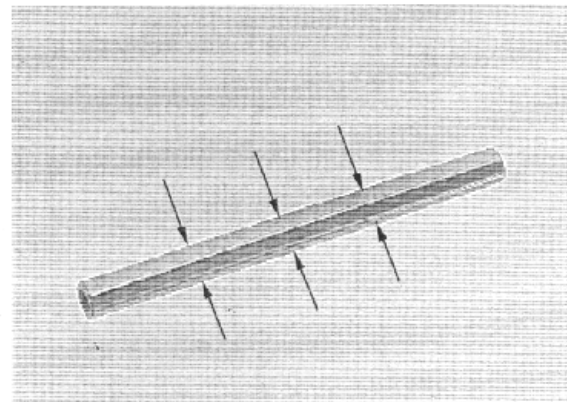
Measure the shift fork claw thickness.

SERVICE LIMIT: 5.9 mm (0.23 in)



Measure the shift fork shaft O.D.

SERVICE LIMIT: 11.95 mm (0.470 in)



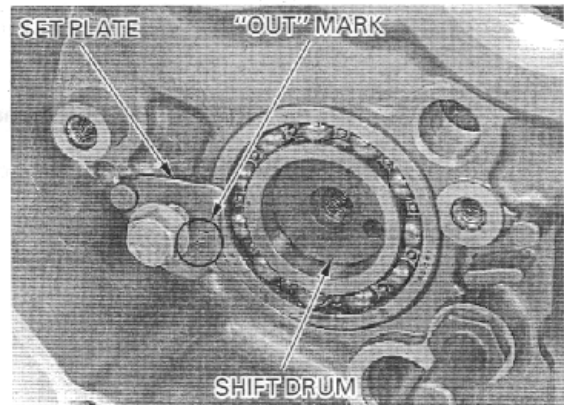
Check the shift drum guide groove for abnormal wear or damage.

Check the shift drum bearings for smooth rotation.



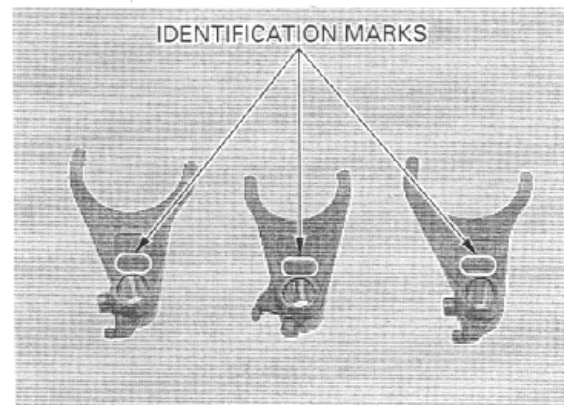
INSTALLATION

Apply locking agent to the set plate bolt threads. Install the shift drum and bearing set plate with the "OUT" mark facing out, and its cutout aligned with the pin on the crankcase. Install and tighten the set plate bolt.



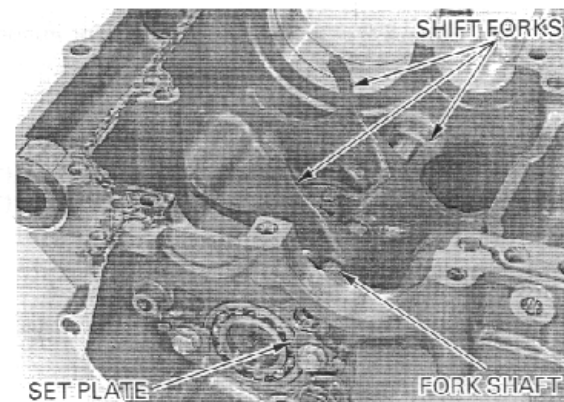
The shift forks have the following identification marks:

RL: right and left shift forks
C: center shift fork



Install the shift forks into the shift drum guide groove with the identification marks facing toward the right side of the engine and insert the fork shaft. Install the set plate in the same manner as that of the shift drum.

Assemble the crankcase halves (page 11-10).

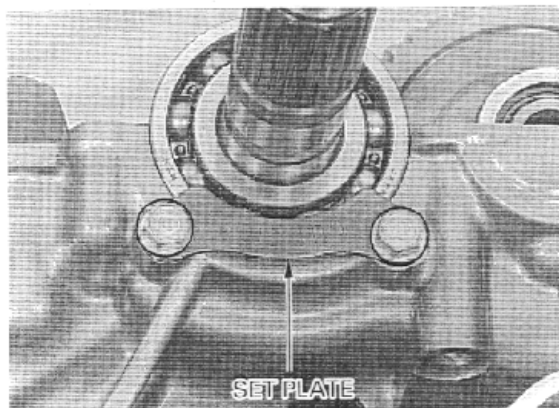


TRANSMISSION

DISASSEMBLY

Separate the crankcase halves (page 11-3).

Remove the mainshaft bearing set plate.

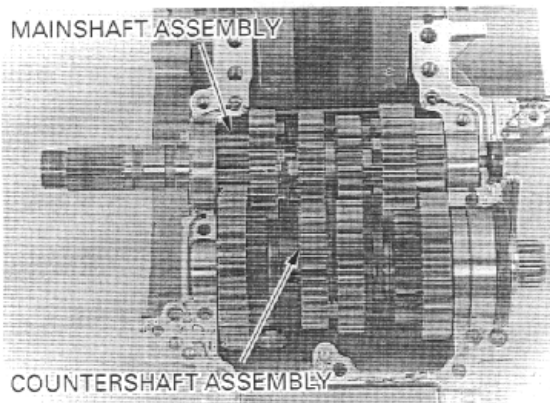


Remove the mainshaft and countershaft assemblies.

Disassemble the mainshaft and countershaft.

Clean all disassembled parts in solvent thoroughly.

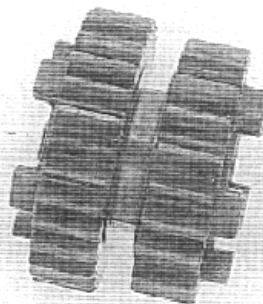
MAINSHAFT ASSEMBLY



COUNTERSHAFT ASSEMBLY

INSPECTION

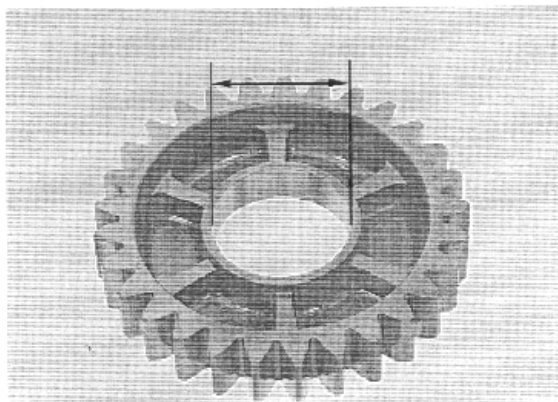
Check the gear shifter groove for abnormal wear or damage.



Check the gear dogs and teeth for abnormal wear or damage.

Measure the gear I.D.

SERVICE LIMITS: M5, M6: 31.04 mm (1.222 in)
C2, C3, C4: 33.05 mm (1.301 in)



Measure the gear bushing O. D.

SERVICE LIMITS: M5, M6: 30.93 mm (1.218 in)
C2, C3, C4: 32.93 mm (1.296 in)

Calculate the gear-to-bushing clearance.

SERVICE LIMITS: M5, M6: 0.10 mm (0.004 in)
C2, C3, C4: 0.11 mm (0.004 in)

Measure the gear bushing I. D.

SERVICE LIMITS: M5: 28.02 mm (1.103 in)
C2: 30.02 mm (1.182 in)

Check the mainshaft and countershaft for abnormal wear or damage.

Measure the mainshaft O. D. at the M5 gear.

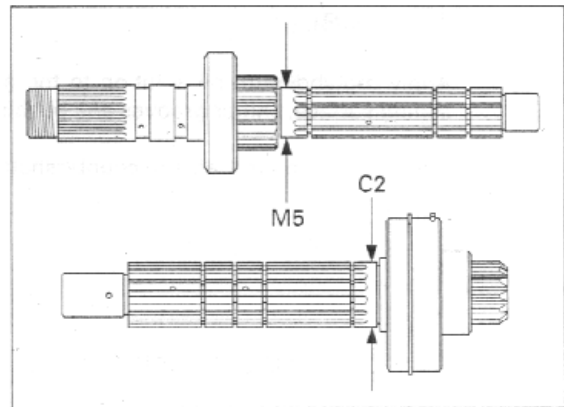
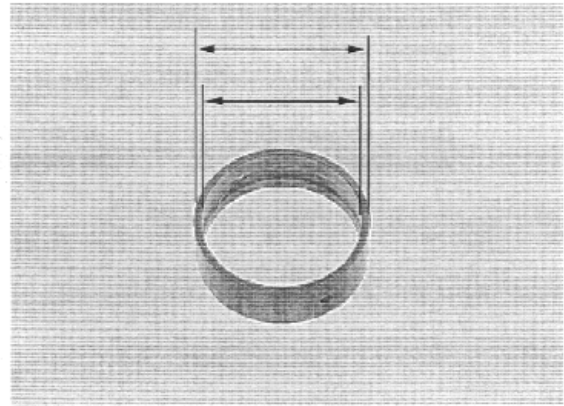
SERVICE LIMIT: 27.94 mm (1.100 in)

Measure the countershaft O. D. at the C2 gear.

SERVICE LIMIT: 29.92 mm (1.178 in)

Calculate the gear bushing-to-shaft clearance.

SERVICE LIMIT: 0.06 mm (0.002 in)

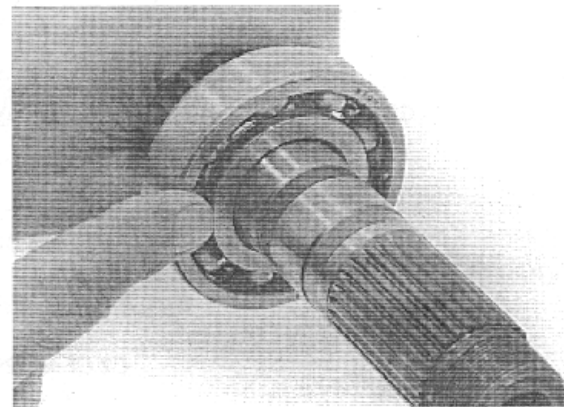


Turn the bearing outer race with your finger. The bearing should turn smoothly and quietly. Also check that the bearing inner race fits tightly on the shaft.

Replace the bearing if the outer race does not turn smoothly, quietly, or if the inner race fit loosely on the shaft.

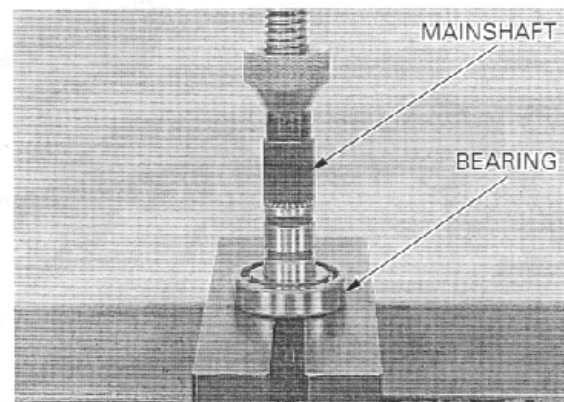
NOTE:

The countershaft bearing cannot be replaced. If the countershaft bearing is faulty, replace the countershaft.



MAINSHAFT BEARING REPLACEMENT

Press the mainshaft out of the bearing.



Press a new bearing onto the mainshaft with the special tools.

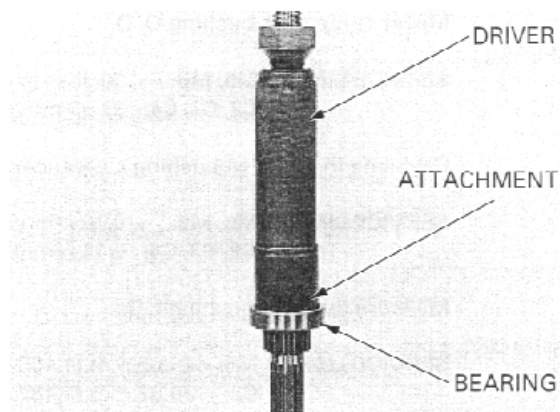
TOOLS:

Driver, 40 mm I. D.

07746 0030100

Attachment, 35 mm I. D.

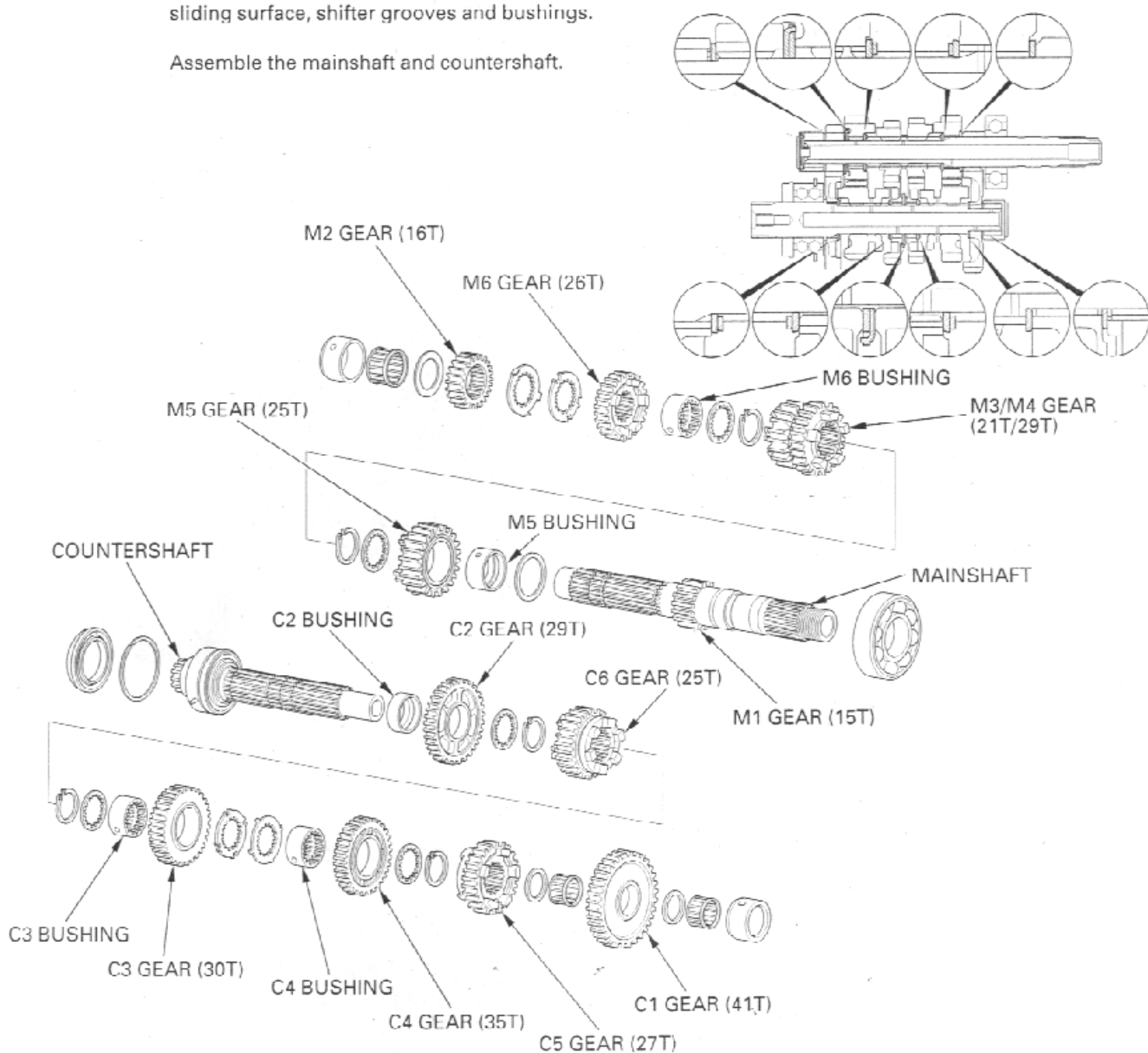
07746-0030400



ASSEMBLY

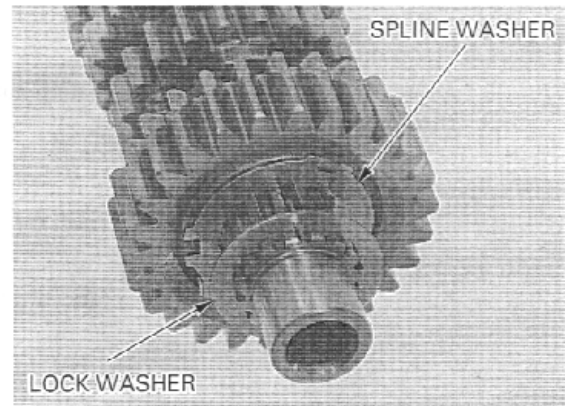
Apply molybdenum oil solution to the gear teeth, sliding surface, shifter grooves and bushings.

Assemble the mainshaft and countershaft.

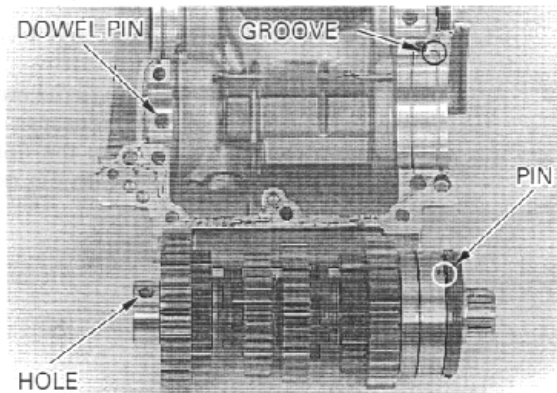


NOTE:

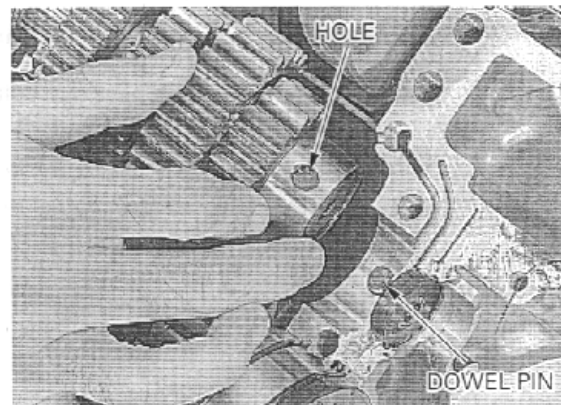
- Align the lock washer tabs with the spline washer grooves.
- Always install the thrust washer and snap ring with the chamfered (rolled) edge facing away from the thrust load.
- Install the snap ring so that its end gap aligns with the groove in the splines.
- Make sure that the snap ring is fully seated in the shaft groove after installing it.



Install the countershaft assembly, aligning the hole in the needle bearing outer race with the dowel pin, and the set ring with the ring groove. Rest the pin on the ball bearing into the pin groove.

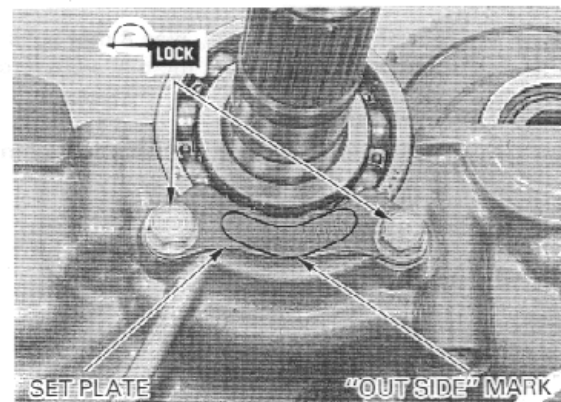


Install the mainshaft assembly, aligning the hole in the needle bearing outer race with the dowel pin.



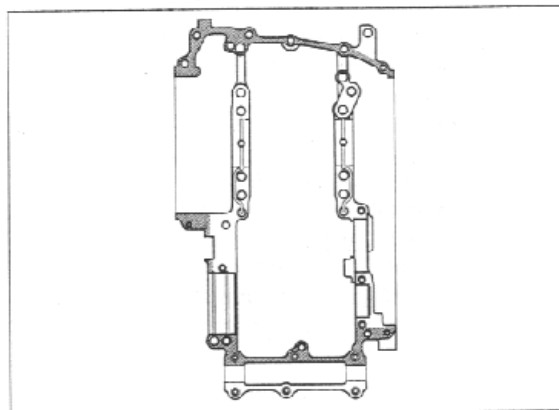
Apply locking agent to the set plate bolt threads. Install the mainshaft bearing set plate with the "OUT SIDE" mark facing out and tighten the bolts.

Assemble the crankcase halves (page 11-10).



CRANKCASE ASSEMBLY

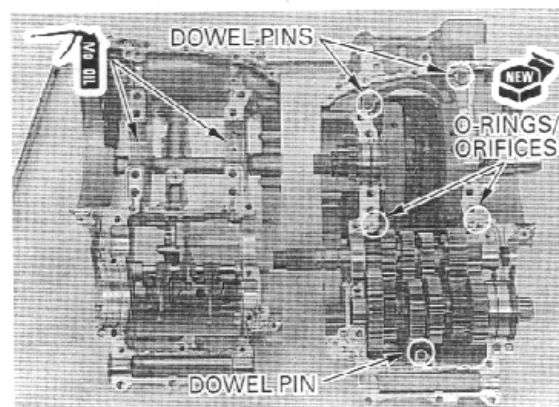
Apply sealant to the crankcase mating surfaces as shown.



Install the dowel pins, oil orifices and new O-rings.

Apply molybdenum oil solution to the main journal bearing surfaces on the lower crankcase.

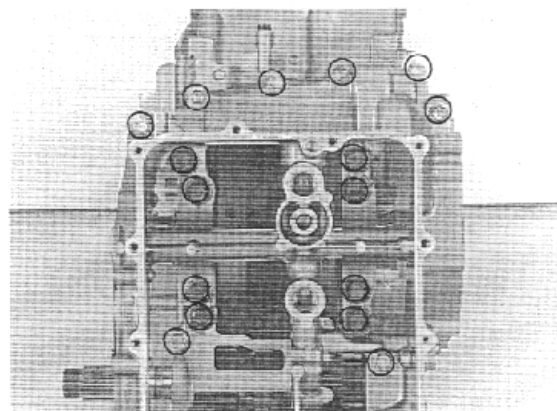
Install the lower crankcase onto the upper crankcase, aligning the shift forks with the gear shifter grooves.



Apply oil to the 10 mm special bolt threads and seating surfaces.

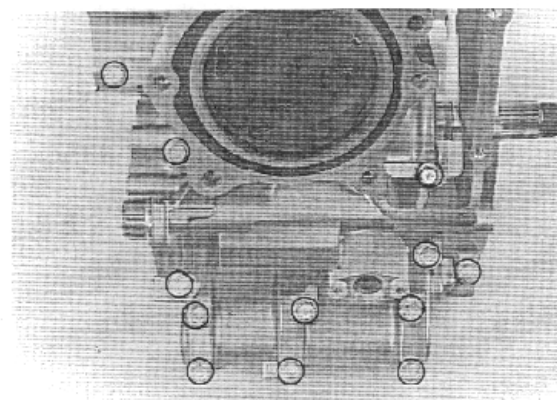
Install the eight 10 mm bolt, six 8 mm bolts and two 6 mm bolts, and tighten them in a crisscross pattern in 2 or 3 steps.

TORQUE: 10 mm bolt : 42 N·m (4.3 kgf·m , 31 lbf·ft)



Install the 10 mm bolt, nine 8 mm bolts and two 6 mm bolts, and tighten them in a crisscross pattern in 2 or 3 steps.

TORQUE: 10 mm bolt : 39 N·m (4.0 kgf·m , 29 lbf·ft)



Coat the reduction gear shaft with molybdenum oil solution.

Install the starter reduction gear and insert the shaft with the holed end facing out.

Install the cam chains.

Apply locking agent to the threads of the cam chain tensioner and guide bolts.

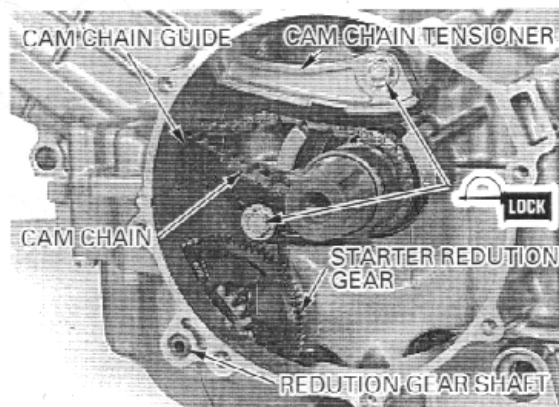
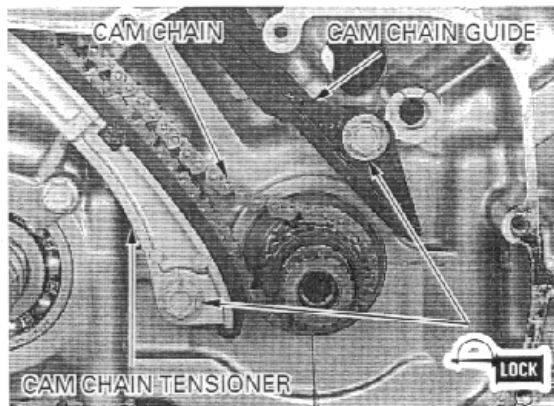
Install the collars into the cam chain tensioners and guides with the flange to the inside of the engine.

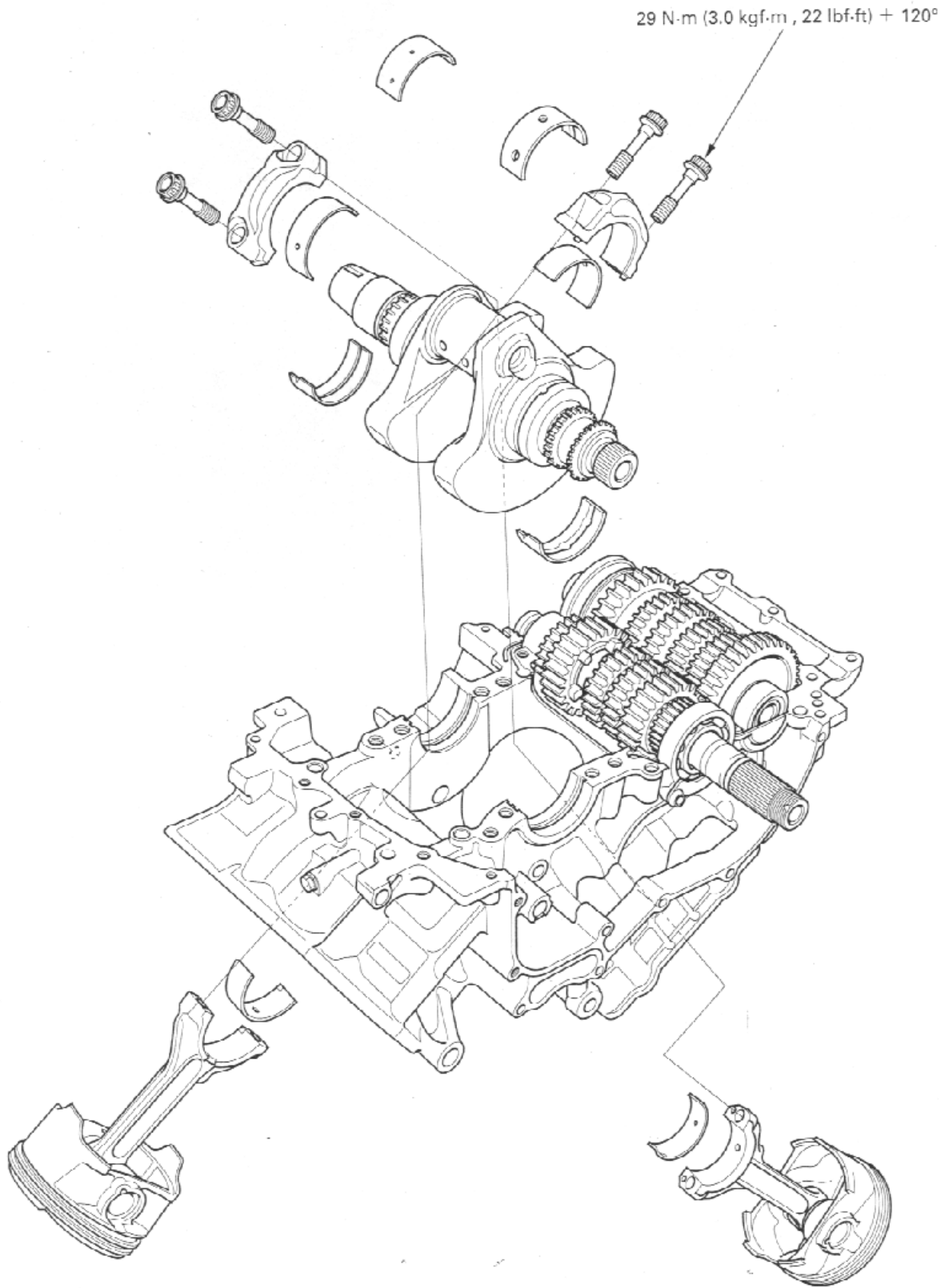
Install the cam chain tensioners and guides into the engine, and tighten the bolts.

TORQUE: 23 N·m (2.3 kgf·m , 17 lbf·ft)

Install the following:

- oil pump (section 4)
- starter motor (section 18)
- flywheel (section 10)
- clutch, gearshift linkage, primary drive gear (section 9)
- cylinder head (section 8)
- engine (section 7)





12. CRANKSHAFT/PISTON/CYLINDER

SERVICE INFORMATION	12-1	MAIN JOURNAL BEARING	12-4
TROUBLESHOOTING	12-2	CRANKPIN BEARING	12-6
CRANKSHAFT	12-3	PISTON/CYLINDER	12-8

SERVICE INFORMATION

GENERAL

- The crankcase must be separated to service the crankshaft and piston/connecting rod. Refer to section 11 for crankcase separation and assembly.
- Mark and store the connecting rods, bearing caps and bearing inserts to be sure of their correct locations for reassembly.
- The crankpin and main journal bearing inserts are select fit and are identified by color codes. Select replacement bearings from the code tables. After selecting new bearings, recheck the oil clearance with a plastigauge. Incorrect oil clearance can cause major engine damage.

SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Crankshaft	Connecting rod side clearance	0.10 - 0.30 (0.004 - 0.012)	0.40 (0.016)
	Crankpin bearing oil clearance	0.032 - 0.050 (0.0013 - 0.0020)	0.060 (0.0024)
	Main journal bearing oil clearance	0.020 - 0.038 (0.0008 - 0.0015)	0.048 (0.0019)
	Runout	-----	0.10 (0.004)
Piston, piston pin, piston ring	Piston O. D. at 10 (0.4) from bottom	97.965 - 97.985 (3.8569 - 3.8577)	97.900 (3.8543)
	Piston pin hole I. D.	24.002 - 24.008 (0.9450 - 0.9452)	24.03 (0.946)
	Piston pin O. D.	23.994 - 24.000 (0.9446 - 0.9449)	23.984 (0.9443)
	Piston-to-piston pin clearance	0.002 - 0.014 (0.0001 - 0.0006)	0.046 (0.0018)
	Piston ring end gap	Top	0.25 - 0.40 (0.010 - 0.016)
		Second	0.40 - 0.55 (0.016 - 0.022)
		Oil (side rail)	0.20 - 0.70 (0.008 - 0.028)
	Piston ring-to-ring groove clearance	Top	0.065 - 0.100 (0.0026 - 0.0039)
		Second	0.035 - 0.070 (0.0014 - 0.0028)
Cylinder	I. D.	98.005 - 98.025 (3.8585 - 3.8592)	98.100 (3.8622)
	Out of round	-----	0.10 (0.004)
	Taper	-----	0.10 (0.004)
	Warpage	-----	0.05 (0.002)
Cylinder-to-piston clearance		0.020 - 0.060 (0.0008 - 0.0024)	0.200 (0.0079)
Connecting rod small end I. D.		24.020 - 24.041 (0.9457 - 0.9465)	24.051 (0.9469)
Connecting rod-to-piston clearance		0.020 - 0.047 (0.0008 - 0.0019)	0.067 (0.0026)

TORQUE VALUES

Connecting rod bolt	29 N·m (3.0 kgf·m, 22 lbf·ft)	120°	Apply oil to the threads and seating surface
Crankcase 10 mm special bolt	42 N·m (4.3 kgf·m, 31 lbf·ft)		Apply oil to the threads and seating surface

TROUBLESHOOTING

Compression too low, hard starting or poor performance at low speed

- Leaking cylinder head gasket
- Worn, stuck or broken piston ring
- Worn or damaged cylinder and piston

Compression too high, overheating or knocking

- Excessive carbon built-up on piston head or combustion chamber

Excessive smoke

- Worn cylinder, piston or piston rings
- Improper installation of piston rings
- Scored or scratched piston or cylinder wall

Abnormal noise

- Worn piston pin or piston pin hole
- Worn connecting rod small end
- Worn cylinder, piston or piston rings
- Worn main journal bearings
- Worn crankpin bearings

CRANKSHAFT

Separate the crankcase halves (page 11-3).

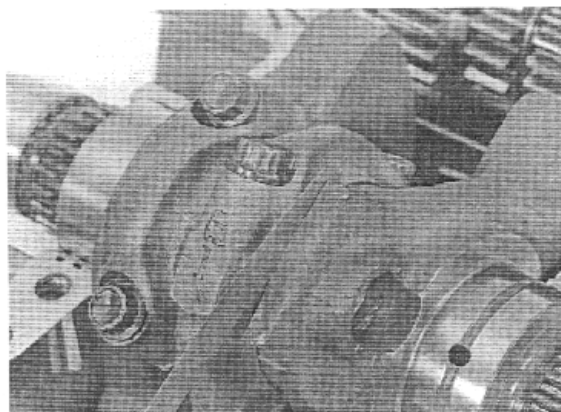
SIDE CLEARANCE INSPECTION

Measure the connecting rod side clearance.

SERVICE LIMIT: 0.40 mm (0.016 in)

If the clearance exceeds the service limit, replace the connecting rod.

Recheck and if still out of limit, replace the crankshaft.



REMOVAL

Remove the connecting rod bolts and bearing caps. Remove the crankshaft.

INSPECTION

Place the crankshaft on V-blocks.

Rotate the crankshaft two revolutions and read the runout with a dial indicator.

Divide the total indicator reading in half to get the actual runout.

SERVICE LIMIT: 0.10 mm (0.004 in)

INSTALLATION

Apply molybdenum oil solution to the main journal bearing sliding surfaces on the upper crankcase, and crankpin bearing sliding surfaces on the connecting rods and bearing caps.

Install the crankshaft onto the upper crankcase.

Set the connecting rods onto the crankpin.

Install the bearing caps, aligning the dowel pins with the holes in the connecting rods.

Apply oil to new connecting bolt threads and seating surfaces and install the bolts.

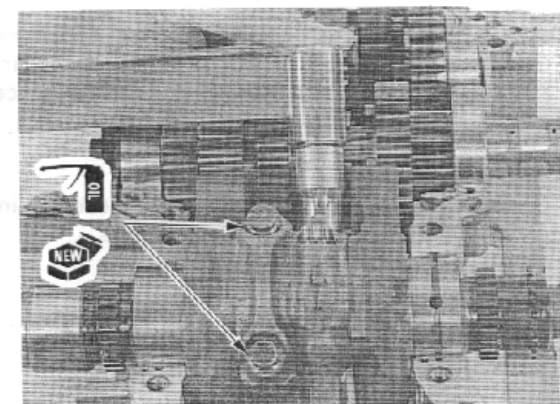
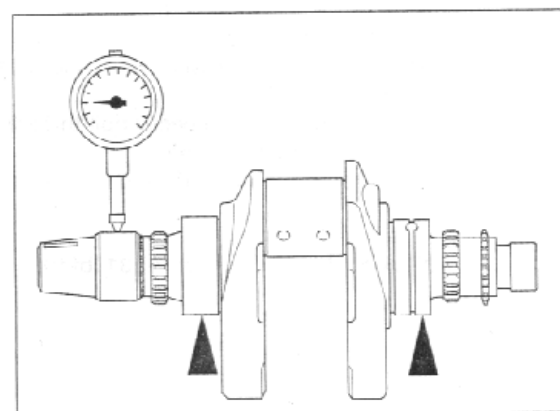
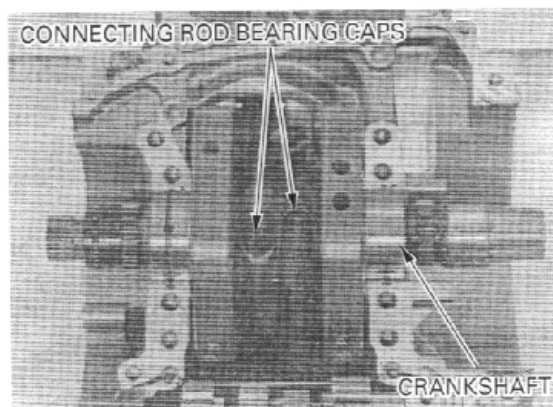
CAUTION:

The connecting rod bolts cannot be reused. Once the connecting rod bolts have been loosened replace them with new ones.

Tighten the bolts in 2 or 3 steps alternately.

TORQUE: 29 N·m (3.0 kgf·m, 22 lbf·ft) + 120°

Assemble the crankcase halves (page 11-10).



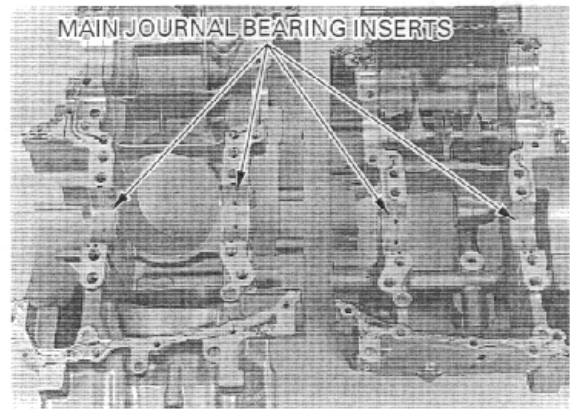
MAIN JOURNAL BEARING

Remove the crankshaft (page 12-3).

BEARING INSPECTION

Check the bearing inserts for unusual wear or peeling.

Check the bearing tabs for damage.



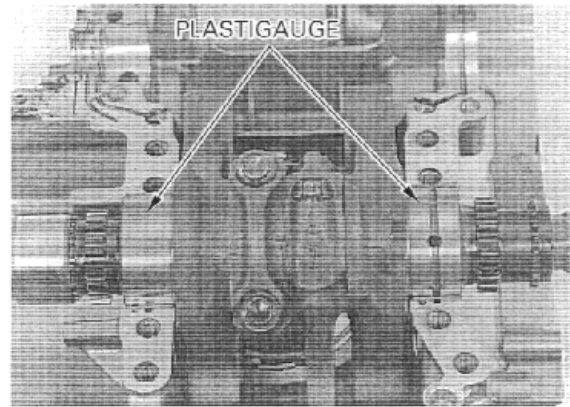
OIL CLEARANCE INSPECTION

Do not rotate the crankshaft during inspection.

Clean off any oil from the bearing inserts and main journals.

Install the crankshaft onto the upper crankcase.

Put a strip of plastigauge lengthwise on each main journal avoiding the oil hole.



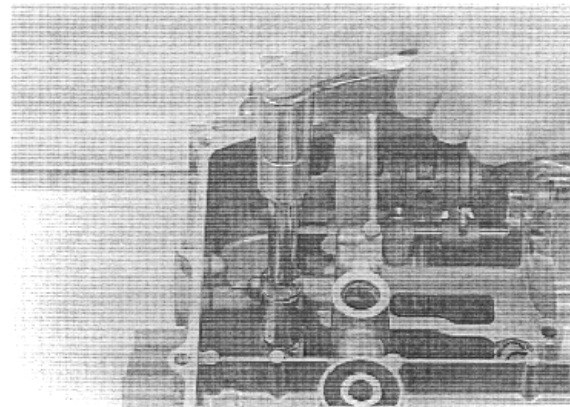
Install the dowel pins.

Carefully install the lower crankcase on the upper crankcase.

Apply oil to the 10 mm special bolt threads and seating surfaces and install them.

Tighten the bolts in a crisscross pattern in 2 or 3 steps.

TORQUE: 42 N·m (4.3 kgf·m , 31 lbf·ft)



Remove the lower crankcase and measure the compressed plastigauge at its widest point on each main journal to determine the oil clearance.

SERVICE LIMIT: 0.048 mm (0.0019 in)

If the oil clearance exceeds the service limit, select the correct replacement bearings.



BEARING SELECTION

Record the main journal O. D. code numbers.

NOTE:

Number 1, 2 or 3 on the crank weight is the code for the main journal O. D.

Record the crankcase bearing support I. D. code letters.

NOTE:

Letters A, B or C on the left side of the upper crankcase are the codes for the bearing support I. D.

Cross reference the main journal and bearing support codes to determine the replacement bearing color code.

Bearing support I. D. code Main journal O. D. code	A	B	C
1	Yellow	Green	Brown
2	Green	Brown	Black
3	Brown	Black	Blue

MAIN JOURNAL BEARING INSERT THICKNESS:

Yellow: 1.488 – 1.491 mm (0.0586 – 0.0587 in)

Green: 1.491 – 1.494 mm (0.0587 – 0.0588 in)

Brown: 1.494 – 1.497 mm (0.0588 – 0.0589 in)

Black: 1.497 – 1.500 mm (0.0589 – 0.0591 in)

Blue: 1.500 – 1.503 mm (0.0591 – 0.0592 in)

CAUTION:

After selecting new bearings, recheck the oil clearance with plastigauge. Incorrect oil clearance can cause major engine damage.

BEARING INSTALLATION

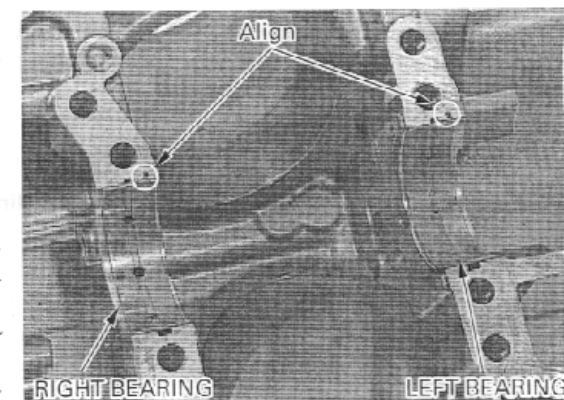
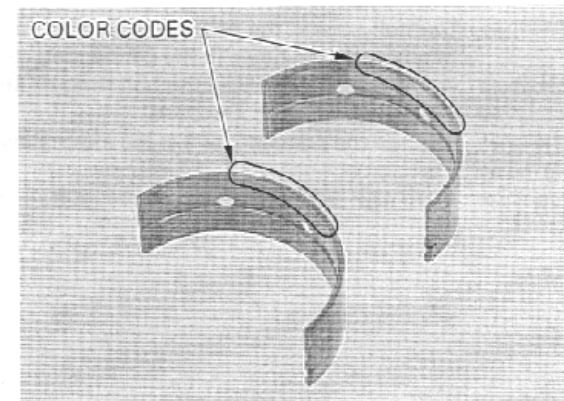
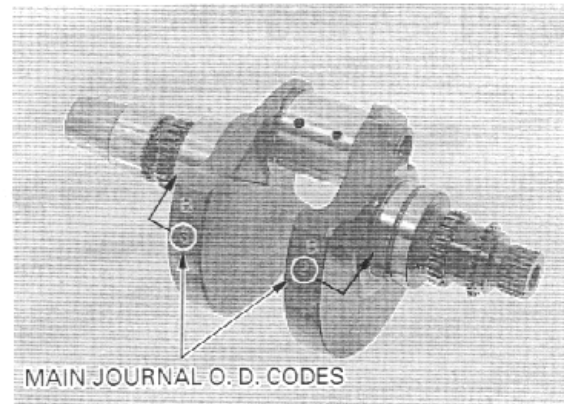
Clean the bearing outer surfaces and crankcase bearing supports.

Install the main journal bearing inserts onto the crankcase bearing supports, aligning each tab with each groove.

CAUTION:

Do not interchange the left and right bearing inserts.

The oil holes in the right bearing insert are larger than the ones in the left bearing insert.



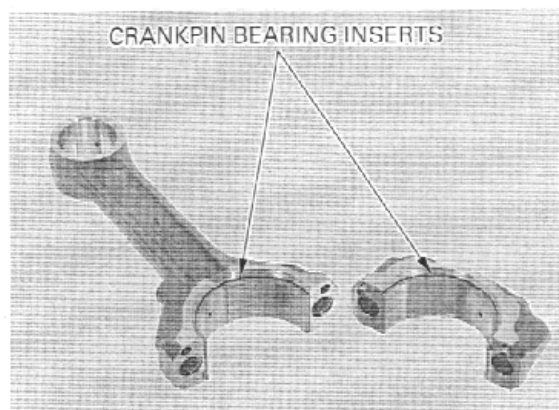
CRANKPIN BEARING

Remove the crankshaft (page 12-3).

BEARING INSPECTION

Check the bearing inserts for unusual wear or peeling.

Check the bearing tabs for damage.



OIL CLEARANCE INSPECTION

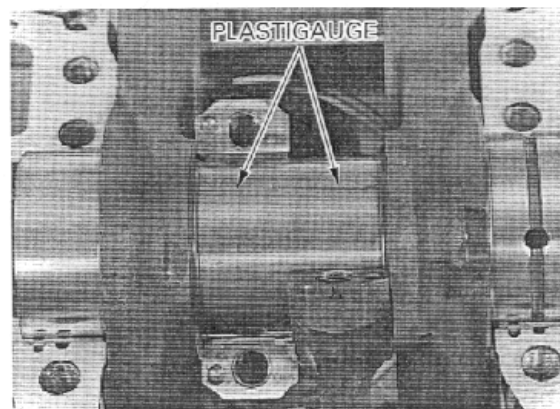
Do not rotate the crankshaft during inspection.

Clean off any oil from the bearing inserts and crankpin.

Install the crankshaft onto the upper crankcase.

Set the connecting rods onto the crankpin.

Put a strip of plastigauge lengthwise on the crankpin avoiding the oil hole.



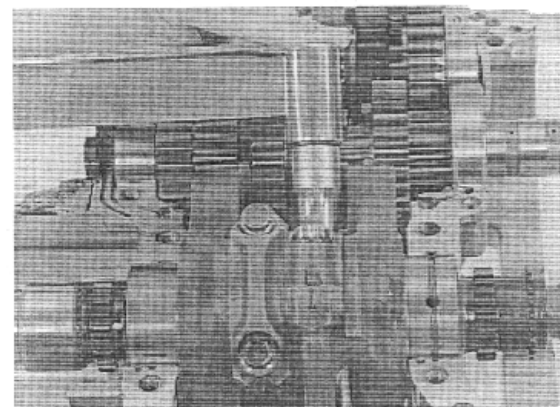
Use the removed connecting rod bolts when checking the oil clearance.

Carefully install the bearing caps, aligning the dowel pins with the holes in the connecting rods.

Apply oil to the connecting bolt threads and seating surfaces and install the bolts.

Tighten the bolts in 2 or 3 steps alternately.

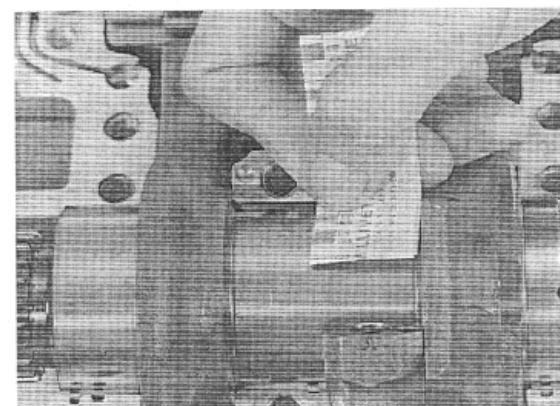
TORQUE: 20 N·m (2.0 kgf·m, 14 lbf·ft) + 120°



Remove the bearing caps and measure the compressed plastigauge at its widest point on the crankpin to determine the oil clearance.

SERVICE LIMIT: 0,060 mm (0.0024 in)

If the oil clearance exceeds the service limit, select the correct replacement bearings.



BEARING SELECTION

Record the connecting rod I. D. code numbers.

NOTE:

Number 1, 2 or 3 on the connecting rod is the code for the connecting rod I. D.

Record the crankpin O. D. code letters.

NOTE:

Letter A, B or C on the crank weight is the code for the crankpin O. D.

Cross reference the connecting rod and crankpin codes to determine the replacement bearing color code.

Connecting rod I. D. code	1	2	3
Crankpin O. D. code			
A	Yellow	Green	Brown
B	Green	Brown	Black
C	Brown	Black	Blue

CRANKPIN BEARING INSERT THICKNESS:

Yellow: 1.485–1.488 mm (0.0585–0.0586 in)

Green: 1.488–1.491 mm (0.0586–0.0587 in)

Brown: 1.491–1.494 mm (0.0587–0.0588 in)

Black: 1.494–1.497 mm (0.0588–0.0589 in)

Blue: 1.497–1.500 mm (0.0589–0.0591 in)

NOTE:

There is one painted mark on the bearing insert for the front connecting rod, and two painted marks for the rear connecting rod. Use correct bearing inserts.

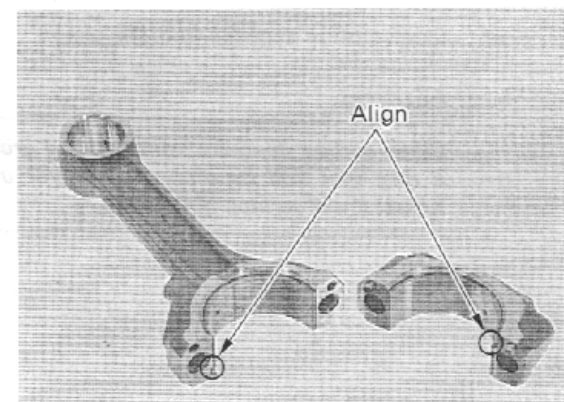
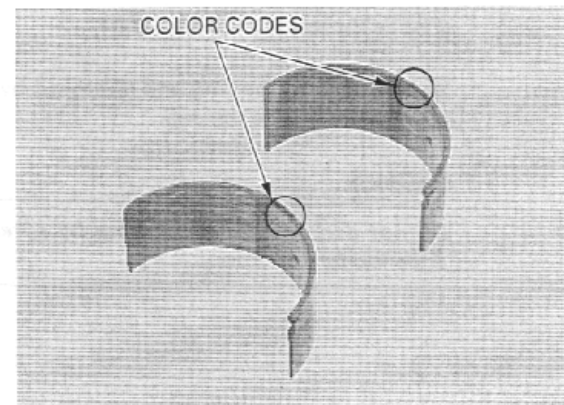
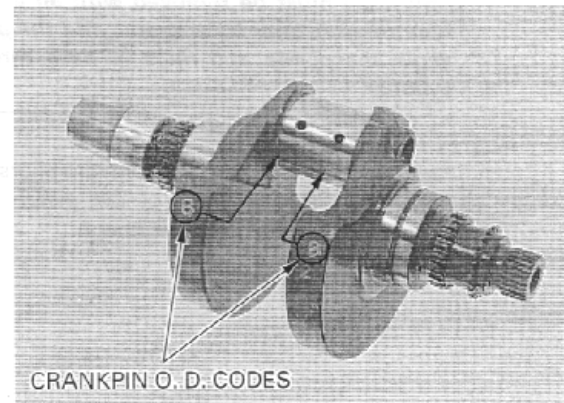
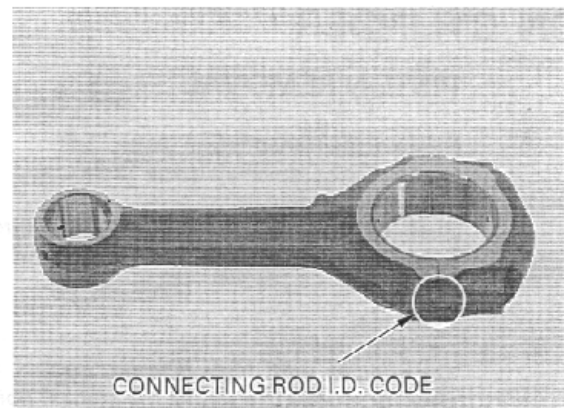
CAUTION:

After selecting new bearings, recheck the oil clearance with plastigauge. Incorrect oil clearance can cause major engine damage.

BEARING INSTALLATION

Clean the bearing outer surfaces, bearing cap and connecting rod.

Install the crankpin bearing inserts onto the bearing cap and connecting rod, aligning each tab with each groove.



PISTON/CYLINDER

PISTON REMOVAL

Remove the transmission (page 11-6).
Remove the crankshaft (page 12-3).

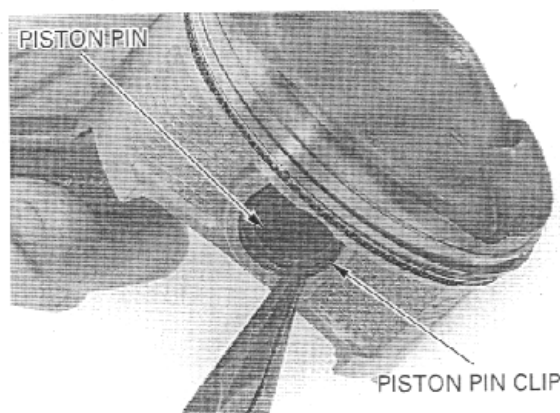
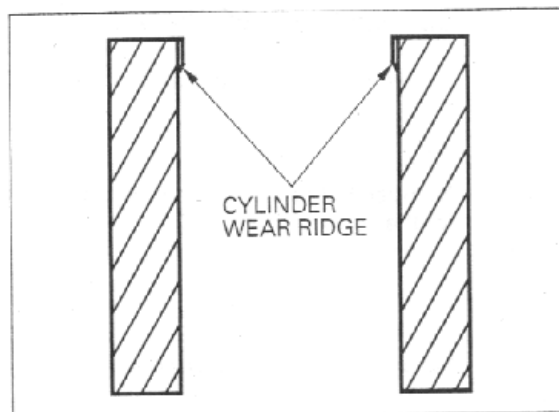
Push each piston/connecting rod out through the top of the cylinder bore.

CAUTION:

On engines with high mileage, inspect the cylinders for a ridge just above the highest point of ring travel.

Any ridge must be removed with an automotive type ridge reamer before removing the pistons to allow the piston and rings to pass through the cylinder.

Remove the piston pin clips with the pliers.
Push the piston pin out of the piston and connecting rod, and remove the piston.

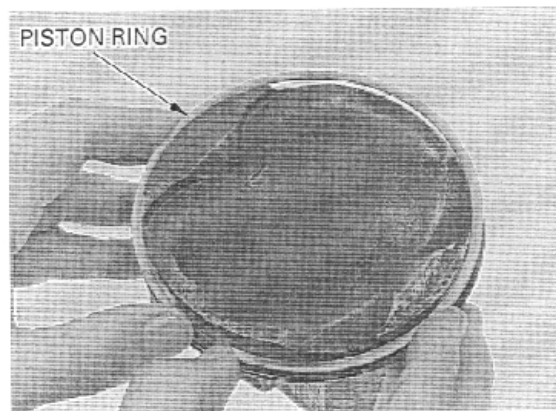


PISTON RING REMOVAL

Spread each piston ring and remove it by lifting up at a point opposite the gap.

CAUTION:

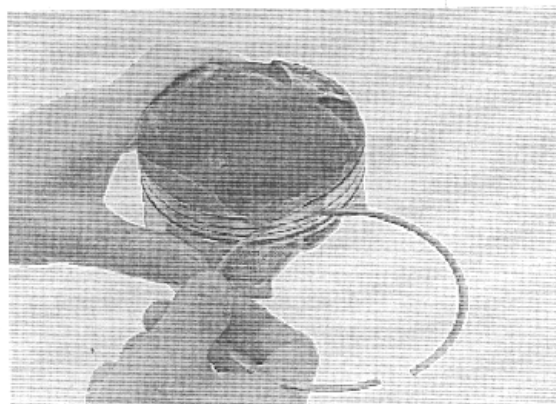
Do not damage the piston ring by spreading the ends too far.



Clean carbon deposits from the piston.

CAUTION:

Clean carbon deposits from the ring grooves with a ring that will be discarded. Never use a wire brush; it will scratch the groove.

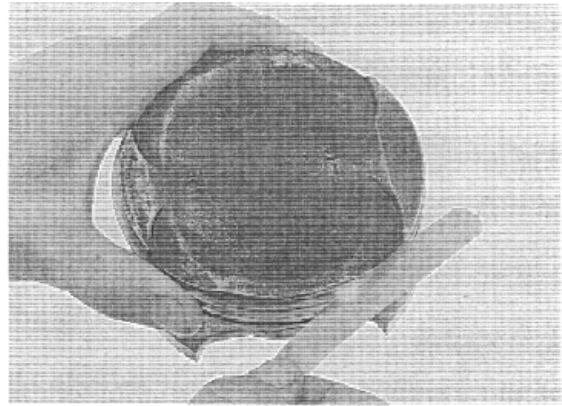


PISTON INSPECTION

Inspect the piston rings for movement by rotating the rings. The rings should be able to move in their grooves without catching.

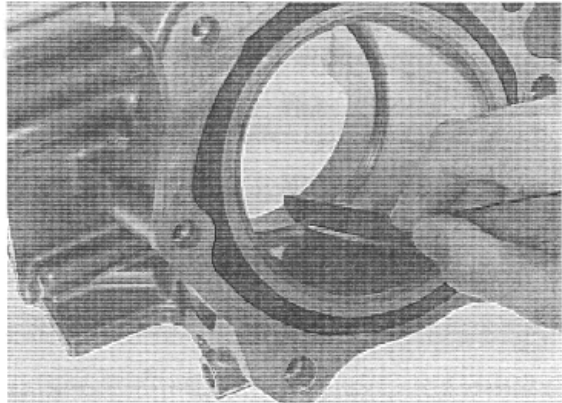
Push the ring until the outer surface of the piston ring is nearly flush with the piston and measure the ring-to-ring groove clearance.

SERVICE LIMITS: Top: 0.115 mm (0.0045 in)
Second: 0.085 mm (0.0033 in)



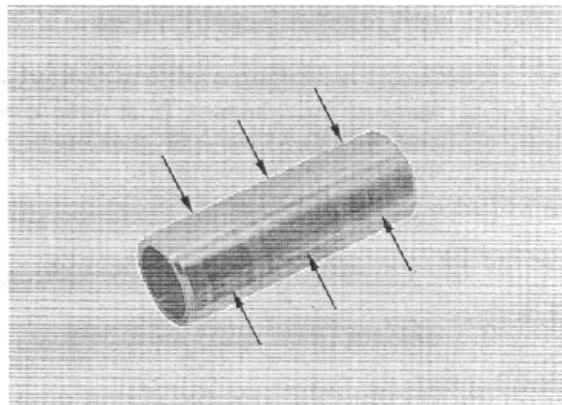
Insert each piston ring into the bottom of the cylinder squarely using the piston. Measure the ring end gap.

SERVICE LIMITS: Top: 0.55 mm (0.022 in)
Second: 0.70 mm (0.028 in)
Oil (side rail) : 0.90 mm (0.035 in)



Measure the piston pin O. D. at piston and connecting rod sliding areas.

SERVICE LIMIT: 23.984 mm (0.9443 in)

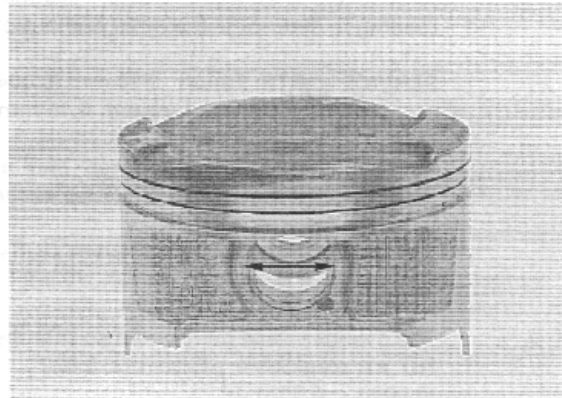


Measure the piston pin hole I. D.

SERVICE LIMIT: 24.03 mm (0.946 in)

Calculate the piston-to-piston pin clearance.

SERVICE LIMIT: 0.046 mm (0.0018 in)

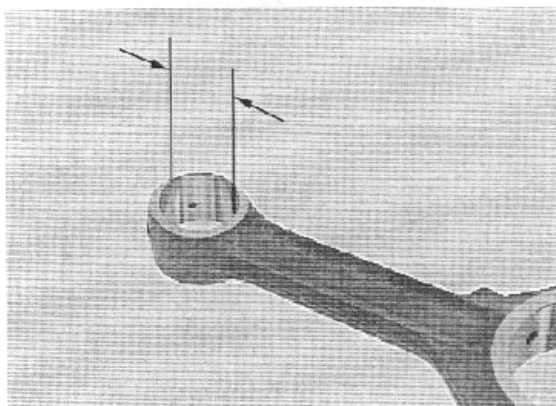


Measure the connecting rod small end I. D.

SERVICE LIMIT: 24.051 mm (0.9469 in)

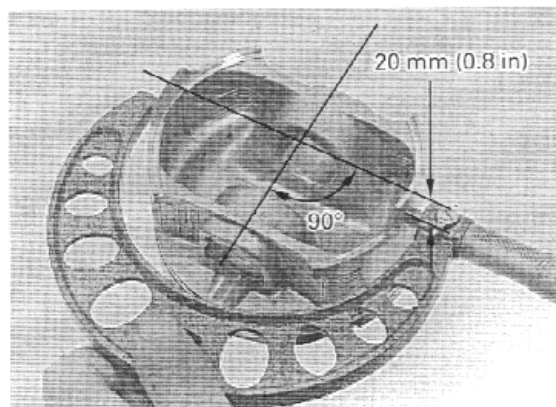
Calculate the connecting rod-to-piston pin clearance.

SERVICE LIMIT: 0.067 mm (0.0026 in)



Measure the piston O. D. at a point 20 mm (0.8 in) from the bottom and 90° to the piston pin hole.

SERVICE LIMIT: 97.900 mm (3.8543 in)



CYLINDER INSPECTION

Inspect the cylinder wall for scratch or wear. Measure the cylinder I. D. at three levels in an X and Y axis. Take the maximum reading to determine the cylinder wear.

SERVICE LIMIT: 98.100 mm (3.8622 in)

Calculate the cylinder-to-piston clearance.

SERVICE LIMIT: 0.200 mm (0.0079 in)

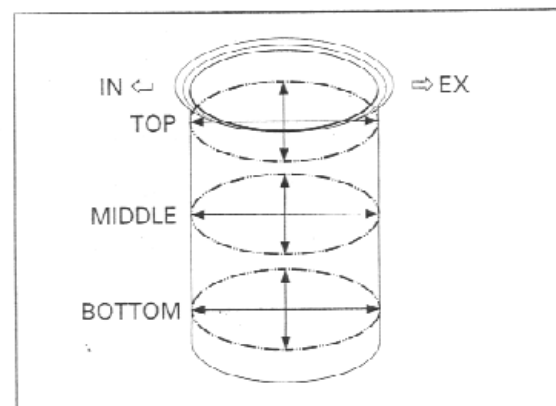
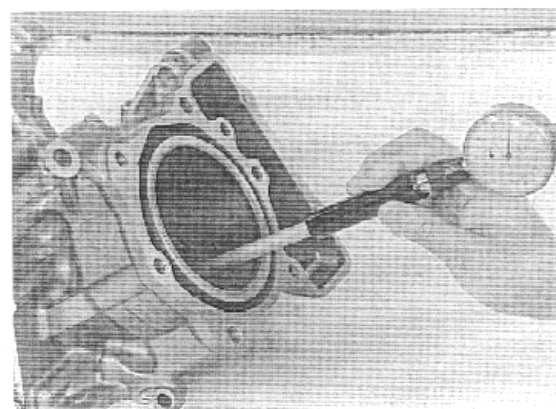
Calculate the cylinder taper and out-of-round at three levels in an X and Y axis. Take the maximum reading to determine the taper and out-of-round.

SERVICE LIMITS: Taper: 0.10 mm (0.004 in)
Out-of-round: 0.10 mm (0.004 in)

The cylinder must be rebored and an oversize piston fitted if the service limits are exceeded.

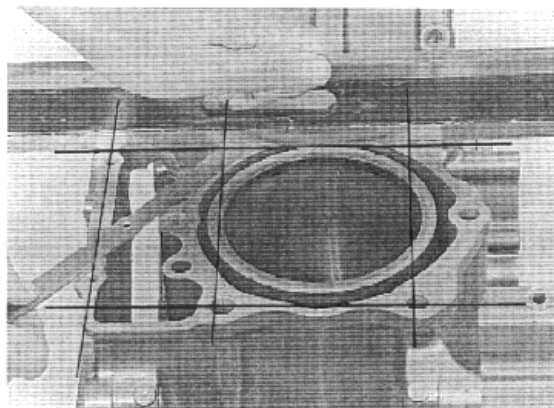
The following oversize pistons are available:
0.25 mm (0.010 in), 0.50 mm (0.020 in).

The cylinder must be rebored so that the clearance for an oversize piston is 0.020 – 0.060 mm (0.0008 – 0.0024 in).



Check the top of the cylinder for warpage with a straight edge and feeler gauge.

SERVICE LIMIT: 0.05 mm (0.002 in)



PISTON RING INSTALLATION

Carefully install the piston rings into the piston ring grooves with the markings facing up.

CAUTION:

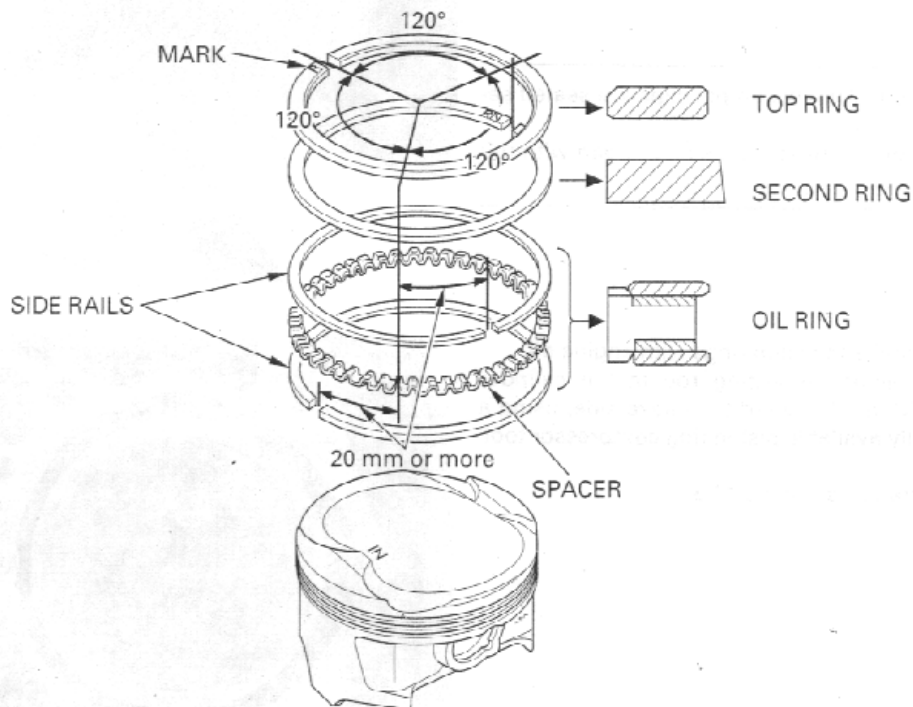
Be careful not to damage the piston and rings during installation.

NOTE:

To install the oil ring, install the spacer first, then install the side rails.

Stagger the piston ring end gaps 120 degrees apart from each other.

Stagger the side rail end gaps as shown.

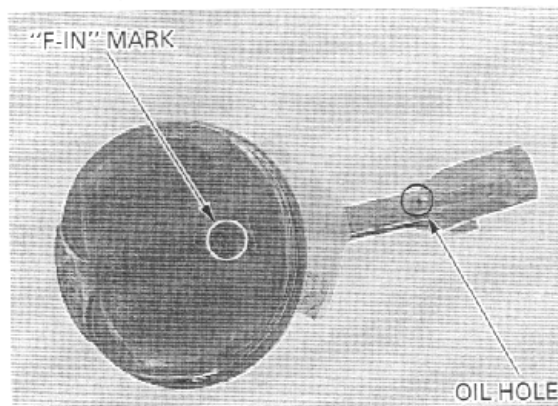


PISTON INSTALLATION

Apply molybdenum oil solution to the connecting rod small end inner surfaces.
Apply oil to the piston pin hole.

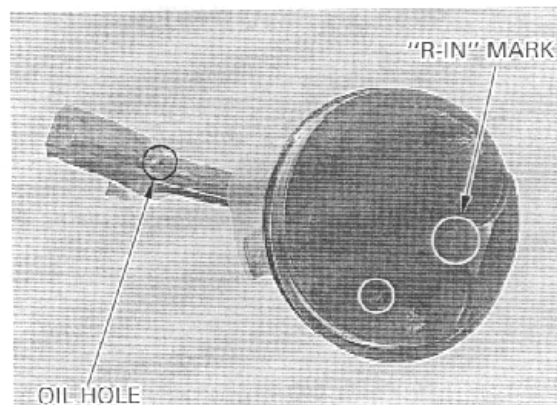
Front cylinder piston:

Note that the connecting rod has "MBBF" mark.
Install the piston on the connecting rod so that the "F-IN" mark is facing the same direction as the oil hole in the rod.



Rear cylinder piston:

Note that the connecting rod has "MBBR" mark.
Install the piston on the connecting rod so that the "R-IN" mark is opposite the oil hole in the rod.

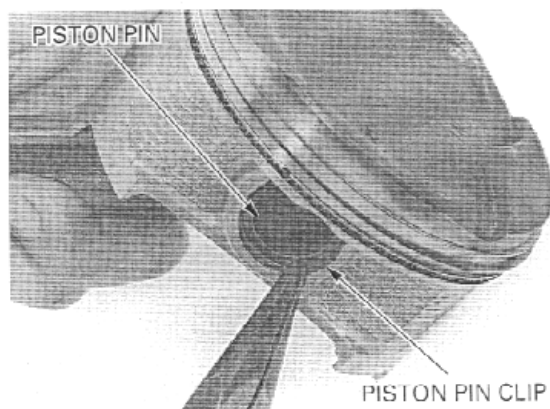


Install the piston pin into the piston and connecting rod.

Install new piston pin clips into the groove of the piston pin hole.

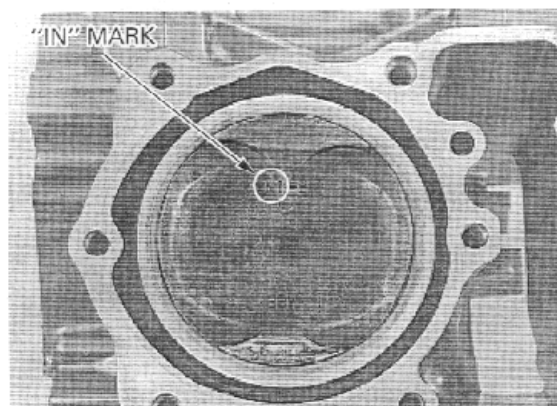
NOTE:

- Make sure that the piston pin clips are seated securely.
- Do not align the piston pin clip end gap with the piston cutout.

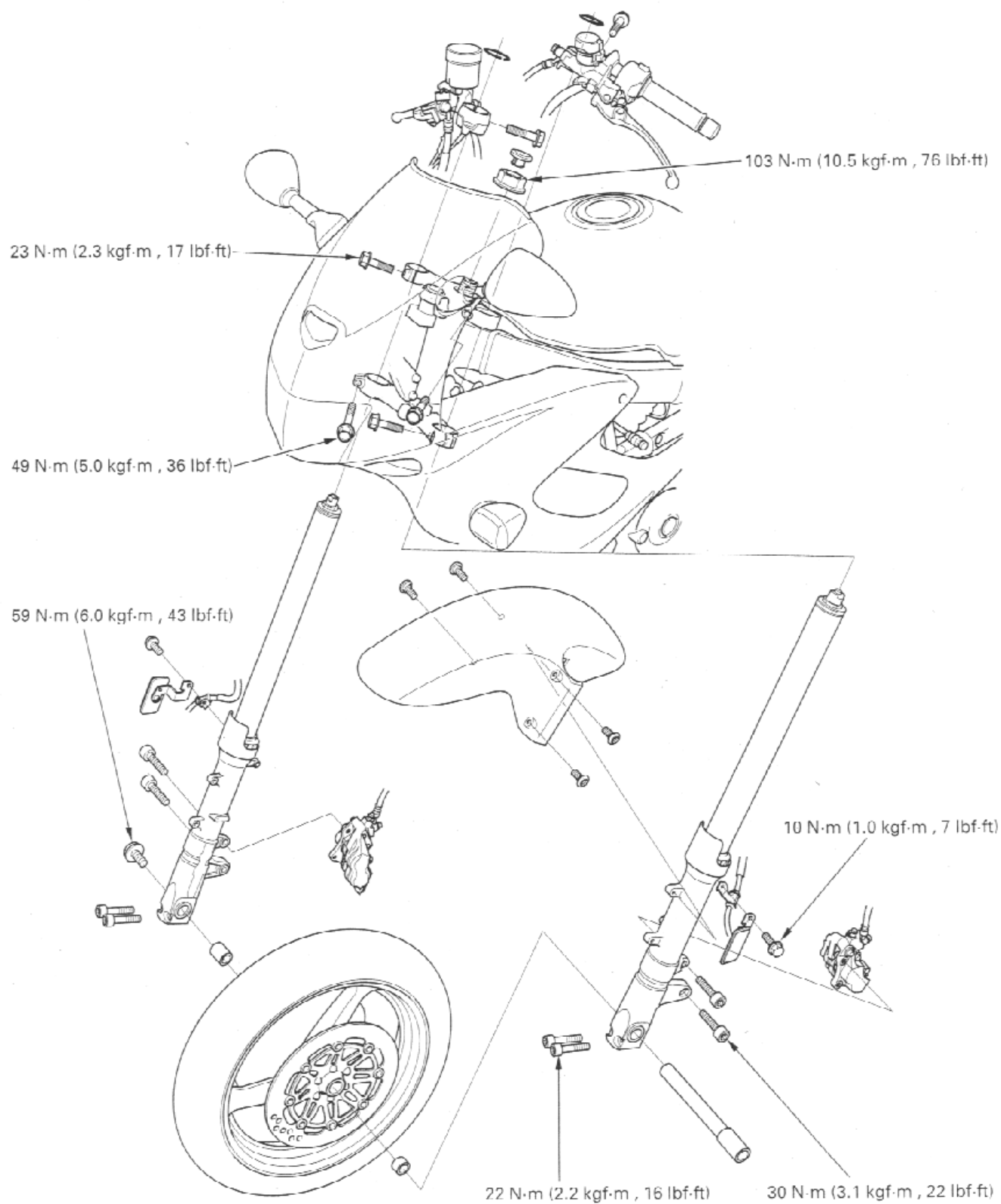


Coat the piston and piston rings with engine oil.
Install the piston/connecting rod in the cylinder with the "IN" mark toward the intake side, using a commercially available piston ring compressor tool.

Install the crankshaft (page 12-3).



MEMO



13. FRONT WHEEL/SUSPENSION/STEERING

SERVICE INFORMATION	13-1	FRONT WHEEL	13-6
TROUBLESHOOTING	13-2	FORK	13-12
HANDLEBAR	13-3	STEERING STEM	13-21

SERVICE INFORMATION

GENERAL

▲WARNING

- Riding on damaged rims impairs safe operation of the vehicle.
- A contaminated brake disc or pad reduces stopping power. Discard contaminated pads and clean a contaminated disc with a high quality brake degreasing agent.

- A hoist or equivalent is required to support the motorcycle when servicing the front wheel, fork and steering stem.
- Refer to section 15 for brake system service.

SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		—	1.5 (0.06)
Cold tire pressure	Up to 90 kg (200 lbs) load	250 kPa (2.50 kgf/cm ² , 36 psi)	—
	Up to maximum weight capacity	250 kPa (2.50 kgf/cm ² , 36 psi)	—
Axle runout		—	0.20 (0.008)
Wheel rim runout	Radial	—	2.0 (0.08)
	Axial	—	2.0 (0.08)
Wheel balance weight		—	60 g (2.1 oz) max.
Fork	Spring free length	309.9 (12.20)	303.7 (11.96)
	Tube runout	—	0.20 (0.008)
	Recommended fluid	Pro-Honda Suspension Fluid SS-8	—
	Fluid level	130 (5.1)	—
	Fluid capacity	448 ± 2.5 cm ³ (15.2 ± 0.08 US oz, 15.8 ± 0.09 Imp oz)	—
Steering head bearing preload		1.0–1.6 kgf (2.2–3.5 lbf)	—

13

TORQUE VALUES

Handlebar weight mounting screw	10 N·m (1.0 kgf·m, 7 lbf·ft)	ALOC screw
Front master cylinder holder bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	
Front axle bolt	59 N·m (6.0 kgf·m, 43 lbf·ft)	
Front axle holder bolt	22 N·m (2.2 kgf·m, 16 lbf·ft)	
Front brake disc bolt	20 N·m (2.0 kgf·m, 14 lbf·ft)	ALOC bolt
Front brake caliper mounting bolt	30 N·m (3.1 kgf·m, 22 lbf·ft)	ALOC bolt
Fork cap	23 N·m (2.3 kgf·m, 17 lbf·ft)	
Fork socket bolt	20 N·m (2.0 kgf·m, 14 lbf·ft)	Apply locking agent to the threads
Fork top bridge pinch bolt	23 N·m (2.3 kgf·m, 17 lbf·ft)	
Fork bottom bridge pinch bolt	49 N·m (5.0 kgf·m, 36 lbf·ft)	
Front brake hose clamp bolt (fork side)	10 N·m (1.0 kgf·m, 7 lbf·ft)	
Steering stem nut	103 N·m (10.5 kgf·m, 76 lbf·ft)	
Steering bearing adjustment nut	25 N·m (2.5 kgf·m, 18 lbf·ft)	
Front brake hose clamp bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	
Front brake hose 3-way joint bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	

FRONT WHEEL/SUSPENSION/STEERING

TOOLS

Bearing remover shaft	07746-0050100	└ or equivalent commercially available in U.S.A.
Bearing remover head, 20 mm	07746-0050600	
Driver	07749-0010000	
Attachment, 42 × 47 mm	07746-0010300	
Pilot, 20 mm	07746-0040500	
Fork seal driver weight	07947-KA50100	
Fork seal driver	07947-KF00100	
Steering stem socket	07916-3710101	or 07916-3710100
Ball race remover set	07946-KM90001	└ not available in U.S.A.
— Driver attachment A	07946-KM90100	
— Driver attachment B	07946-KM90200	
— Driver shaft assembly	07946-KM90300	
— Bearing remover A	07946-KM90401	
— Bearing remover B	07946-KM90500	└ U.S.A. only
— Assembly base	07946-KM90600	
Main bearing driver attachment	07946-ME90200	
Fork seal driver weight	07947-KA50100	
Oil seal driver	07965-MA60000	
Installer shaft	07VMF-KZ30200	
Installer attachment A	07VMF-MAT0100	
Installer attachment B	07VMF-MAT0200	
Remover attachment A	07VMF-MAT0300	
Remover attachment B	07VMF-MAT0400	
Steering stem driver	07946-MB00000	

TROUBLESHOOTING

Hard steering

- Steering bearing adjustment nut too tight
- Worn or damaged steering head bearings
- Bent steering stem
- Insufficient tire pressure

Steers one side or does not track straight

- Damaged or loose steering head bearings
- Bent forks
- Bent axle
- Wheel installed incorrectly
- Bent frame
- Worn or damaged wheel bearings
- Worn or damaged swingarm pivot bearings

Front wheel wobbling

- Bent rim
- Worn or damaged front wheel bearings
- Faulty front tire
- Unbalanced front tire and wheel

Front wheel turns hard

- Faulty front wheel bearings
- Bent front axle
- Front brake drag

Soft suspension

- Insufficient fluid in fork
- Incorrect fork fluid weight
- Weak fork springs
- Insufficient tire pressure

Hard suspension

- Bent fork tubes
- Too much fluid in fork
- Incorrect fork fluid weight
- Clogged fork fluid passage

Front suspension noise

- Insufficient fluid in fork
- Loose fork fasteners

HANDLEBAR

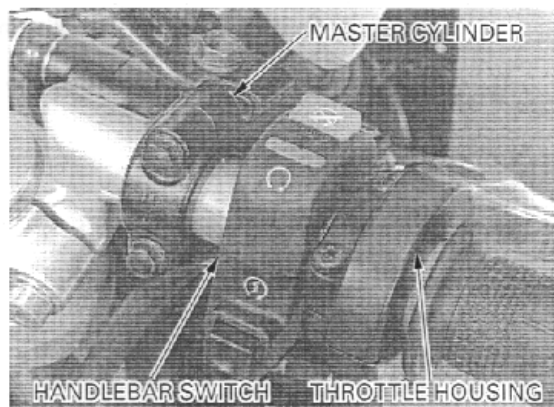
RIGHT HANDLEBAR

REMOVAL

Hold the handlebar weight and remove the mounting screw and the weight.



Disconnect the front brake light switch connectors. Remove the two bolts, holder and the front brake master cylinder assembly. Remove the two screws and upper throttle housing. Remove the two screws and right handlebar switch.



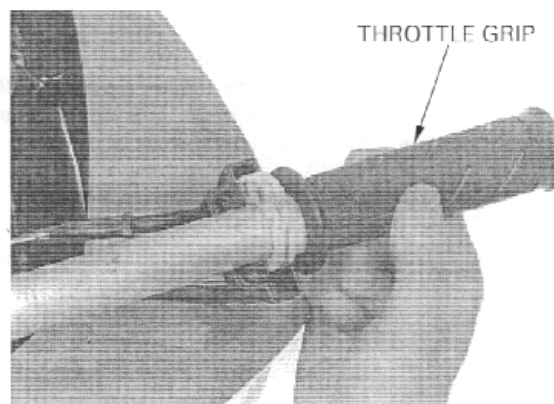
Loosen the handlebar pinch bolt, and remove the stopper ring and handlebar from the fork.



Remove the throttle grip pipe from the handlebar.

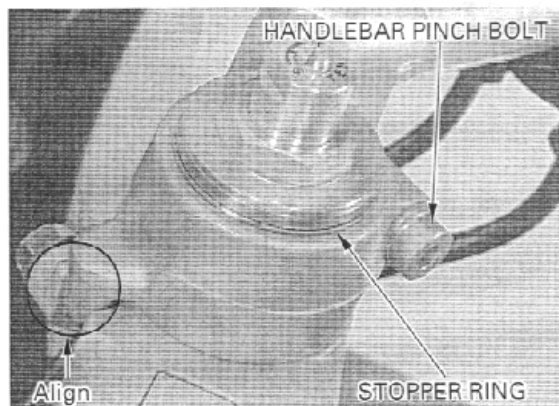
INSTALLATION

Apply grease to the throttle grip pipe flange and install the throttle grip pipe onto the handlebar.

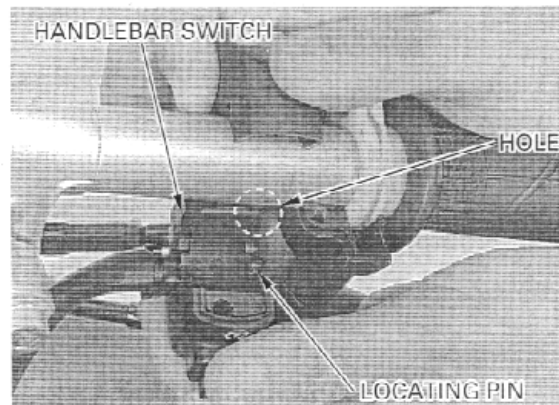


FRONT WHEEL/SUSPENSION/STEERING

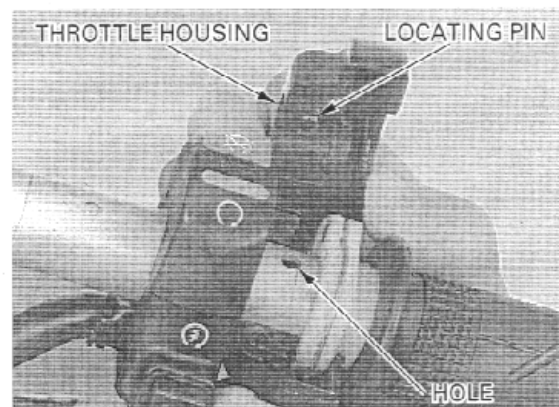
Install the handlebar onto the fork, aligning its boss with the groove in the fork top bridge. Install the stopper ring and tighten the handlebar pinch bolt.



Install the right handlebar switch, aligning its locating pin with the hole in the handlebar. Tighten the forward screw first, then the rear screw.



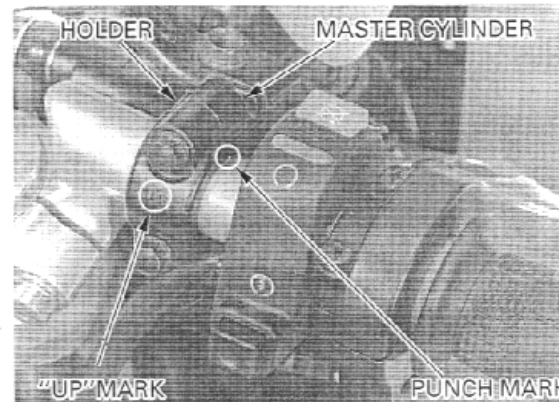
Install the upper throttle housing over the throttle grip pipe flange, aligning its locating pin with the hole in the handlebar. Tighten the forward screw first, then the rear screw.



Install the front brake master cylinder and holder with the "UP" mark facing up. Align the end of the master cylinder with the punch mark on the handlebar, and tighten the upper bolt first, then lower bolt.

TORQUE: 12 N·m (1.2 kgf·m , 9 lbf·ft)

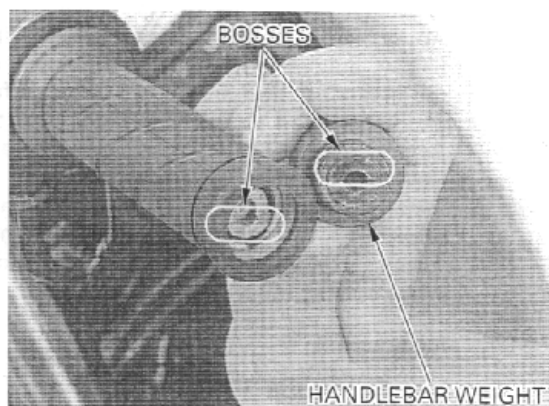
Connect the front brake light switch connectors.



Install the handlebar weight onto the inner weight, aligning the bosses and grooves each other. Install a new weight mounting screw and tighten it while holding the weight.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

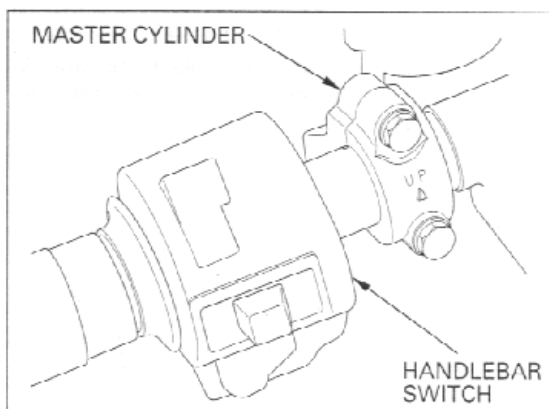
Check the throttle grip operation and free play (page 3-4).



LEFT HANDLEBAR

REMOVAL

Disconnect the clutch switch connectors. Remove the two bolts, holder and the clutch master cylinder assembly. Remove the two screws and left handlebar switch.



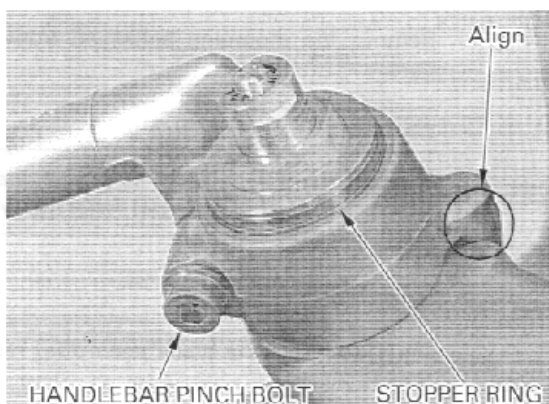
Hold the handlebar weight and remove the mounting screw and the weight. Remove the left handlebar grip.



Loosen the handlebar pinch bolt, and remove the stopper ring and handlebar from the fork.

INSTALLATION

Install the handlebar onto the fork, aligning its boss with the groove in the fork top bridge. Install the stopper ring and tighten the handlebar pinch bolt.



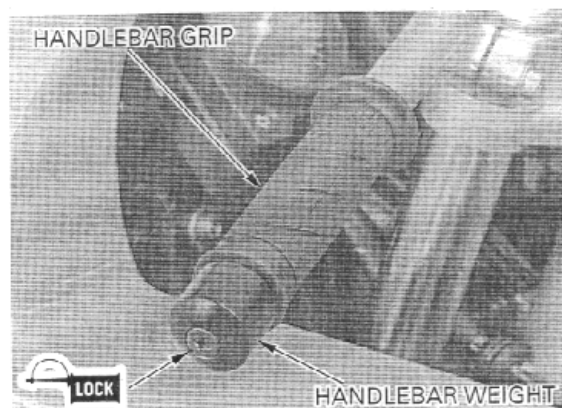
FRONT WHEEL/SUSPENSION/STEERING

Apply Honda Bond A, Honda Hand Grip Cement (U.S.A. only) or equivalent to the inside surface of the handlebar grip and to the clean surface of the handlebar. Wait 3–5 minutes and install the grip. Rotate the grip for even application of the adhesive.

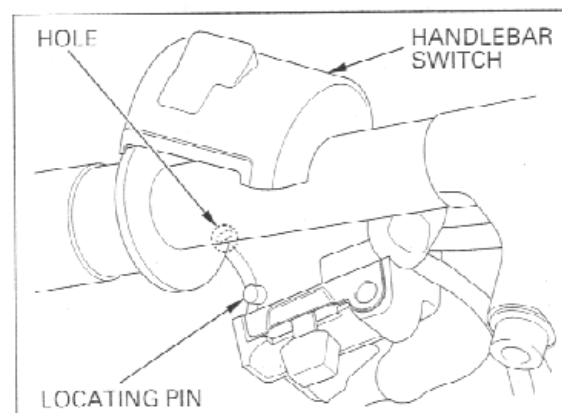
Allow the adhesive to dry for an hour before using.

Install the handlebar weight onto the inner weight, aligning the bosses and grooves each other. Install a new weight mounting screw and tighten it while holding the weight.

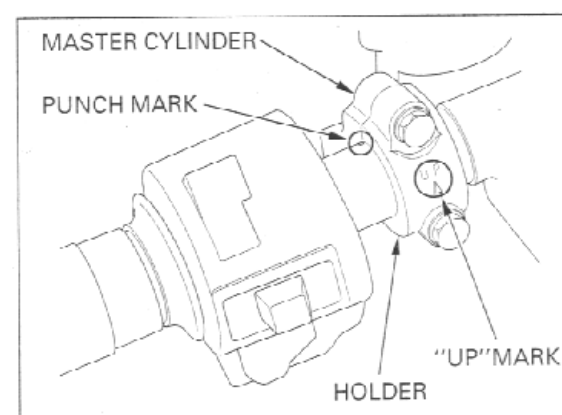
TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)



Install the left handlebar switch, aligning its locating pin with the hole in the handlebar. Tighten the forward screw first, then the rear screw.



Install the clutch master cylinder and holder with the "UP" mark facing up. Align the end of the master cylinder with the punch mark on the handlebar, and tighten the upper bolt first, then lower bolt. Connect the clutch switch connectors.



FRONT WHEEL

REMOVAL

Support the motorcycle securely using a hoist or equivalent and raise the front wheel off the ground.

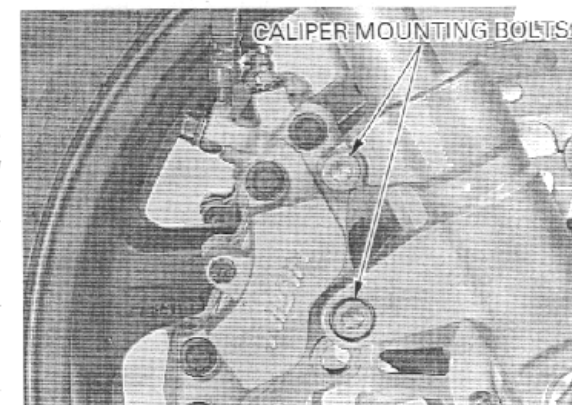
Remove the mounting bolts and front brake calipers.

CAUTION:

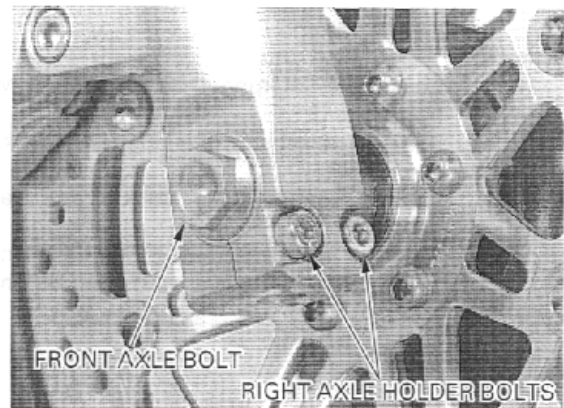
Support the brake caliper so that it does not hang from the brake hose. Do not twist the brake hose.

NOTE:

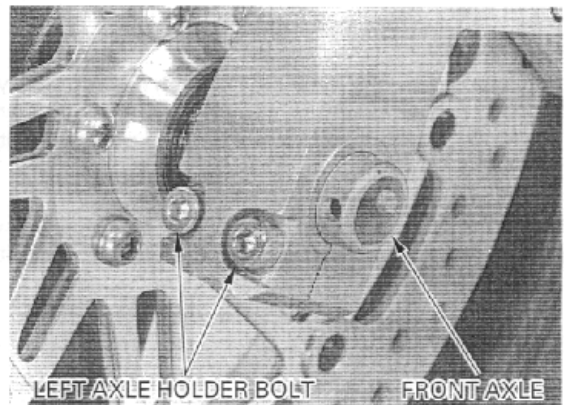
Do not operate the brake lever after removing the brake calipers.



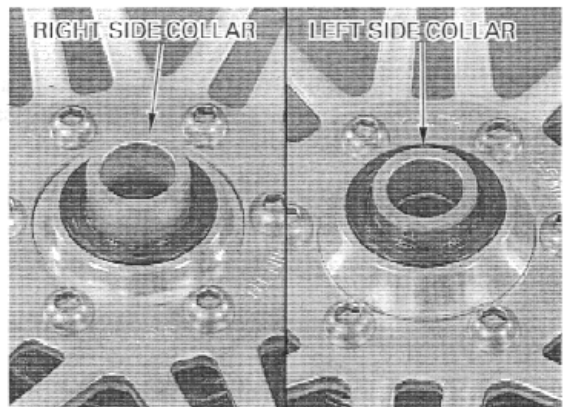
Loosen the right front axle holder bolts.
Remove the front axle bolt.



Loosen the left front axle holder bolts.
Remove the front axle and the front wheel.



Remove the side collars.

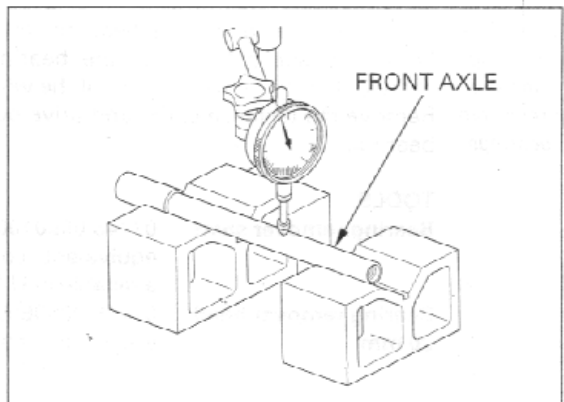


INSPECTION

AXLE

Set the front axle in V-blocks.
Turn the front axle and measure the runout using a dial indicator.
Actual runout is 1/2 the total indicator reading.

SERVICE LIMIT: 0.20 mm (0.008 in)



WHEEL RIM

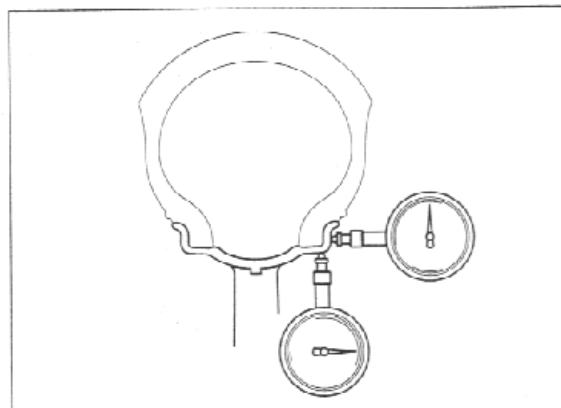
Check the rim runout by placing the wheel in a truing stand.

Spin the wheel slowly and read the runout using a dial indicator.

Actual runout is 1/2 the total indicator reading.

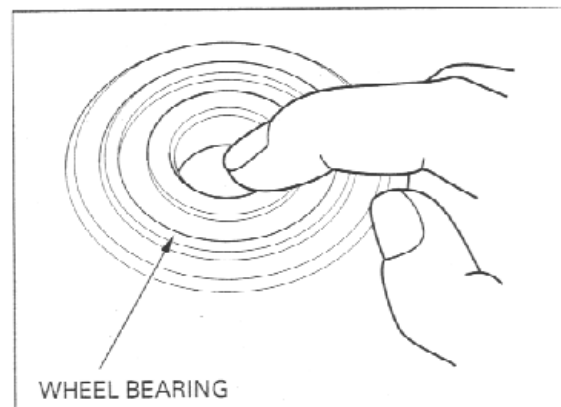
SERVICE LIMITS: Radial: 2.0 mm (0.08 in)

Axial: 2.0 mm (0.08 in)



WHEEL BEARING

Turn the inner race of each bearing with your finger. The bearings should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the hub.



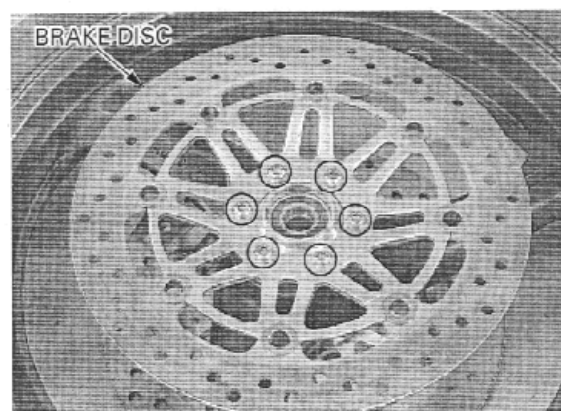
Replace the wheel bearings in pairs.

Remove and discard the bearings if the races do not turn smoothly and quietly, if they fit loosely in the hub.

DISASSEMBLY

Remove the dust seals from the wheel hub.

Remove the disc bolts and brake discs from the wheel hub.



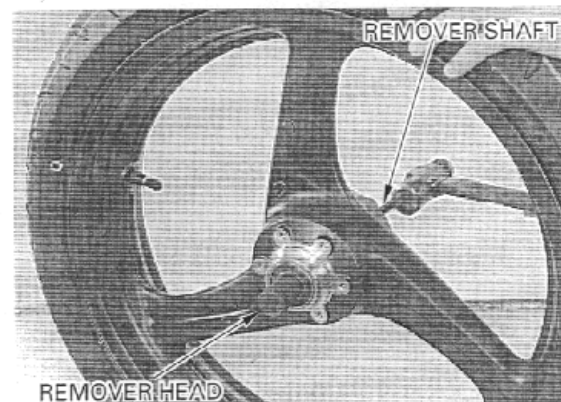
Replace the wheel bearings in pairs. Do not reuse old bearings.

Install the bearing remover head into the bearing. From opposite side, install the bearing remover shaft and drive the bearing out of the wheel hub. Remove the distance collar and drive out the other bearing.

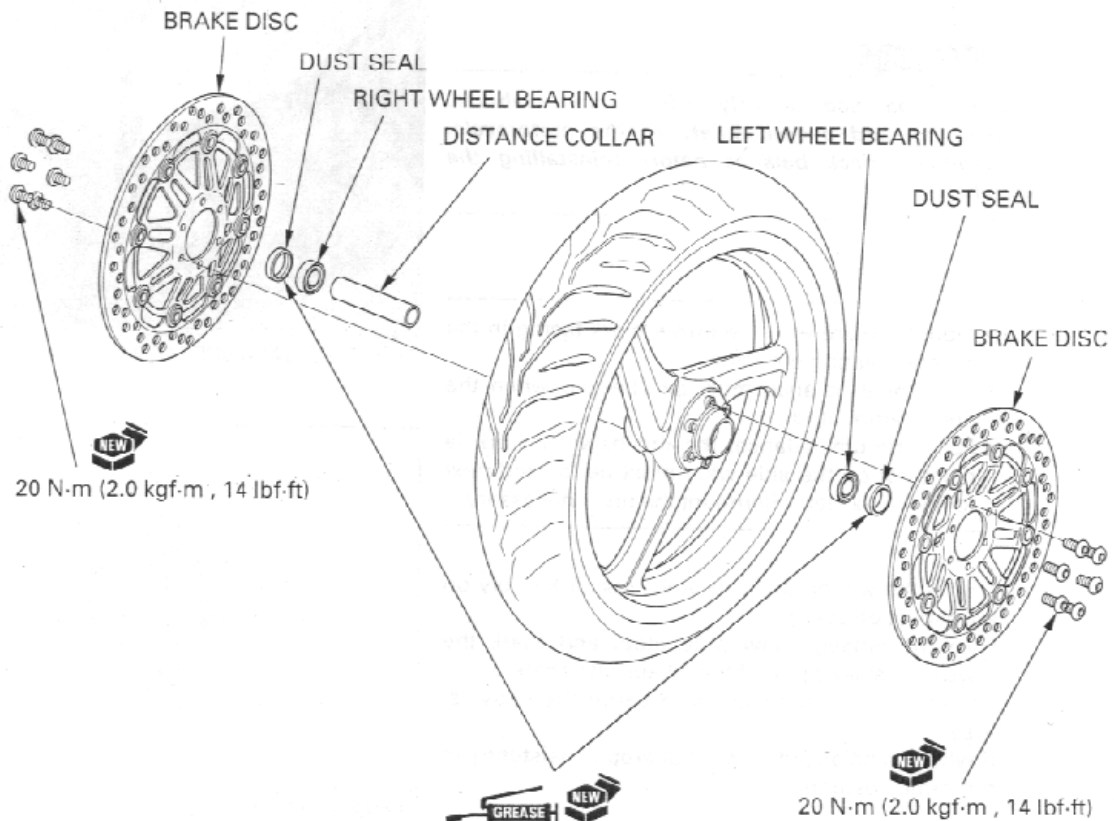
TOOLS:

Bearing remover shaft 07746-0050100 or equivalent commercially available in U.S.A.

Bearing remover head, 20 mm 07746-0050600 or equivalent commercially available in U.S.A.



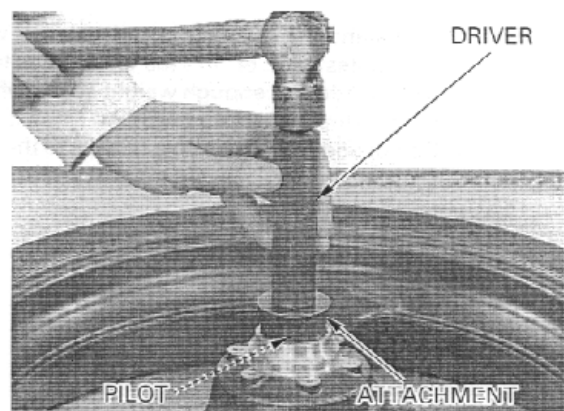
ASSEMBLY



Drive in a new left bearing squarely with the marking side facing up until it is fully seated. Install the distance collar. Drive in a new right bearing squarely with the marking side facing up until it is fully seated.

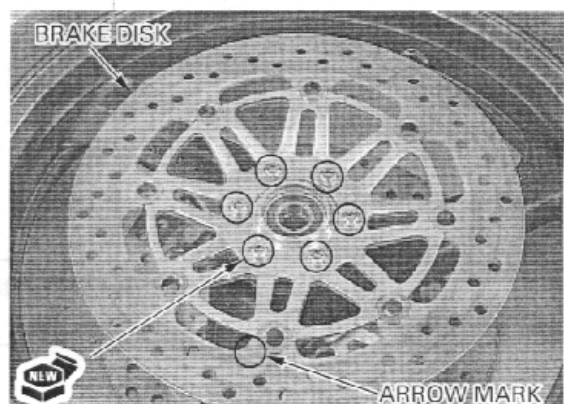
TOOLS:

Driver	07749-0010000
Attachment, 42 × 47 mm	07746-0010300
Pilot, 20 mm	07746-0040500



Install the brake discs with the arrow mark facing in the normal rotating direction. Install new disc bolts and tighten them in a criss-cross pattern in 2 or 3 steps.

TORQUE: 20 N-m (2.0 kgf-m, 14 lbf-ft)



WHEEL BALANCE

▲WARNING

Wheel balance directly affects the stability, handling and overall safety of the motorcycle. Carefully check balance before reinstalling the wheel.

NOTE:

- Mount the tire with the arrow mark facing in the normal rotating direction.
- The wheel balance must be checked when the tire is remounted.
- For optimum balance, the tire balance mark (a paint dot on the side wall) must be located next to the valve stem. Remount the tire if necessary.

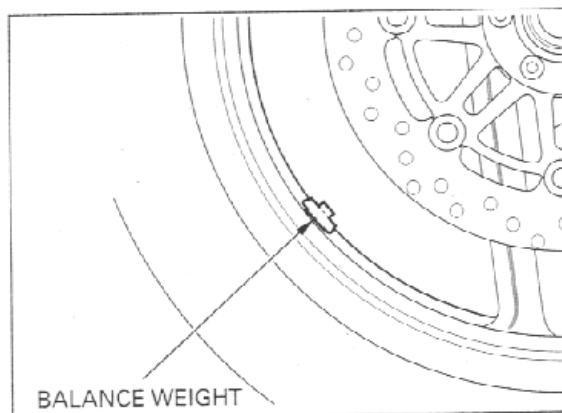
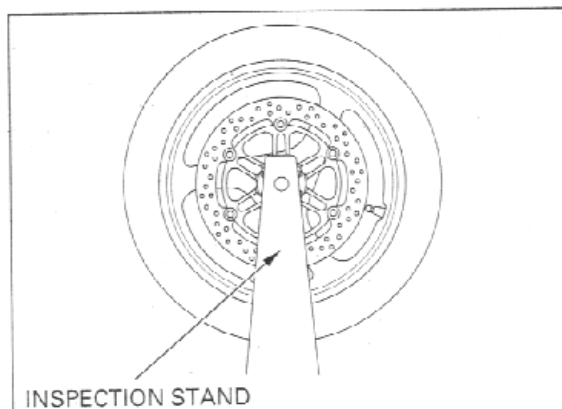
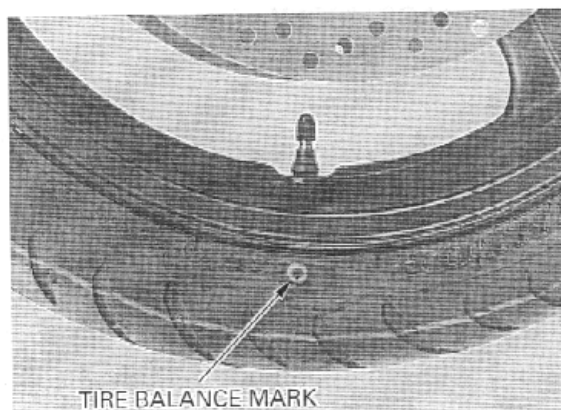
Mount the wheel, tire and brake disc assembly on an inspection stand.

Spin the wheel, allow it to stop, and mark the lowest (heaviest) part of the wheel with chalk.

Do this two or three times to verify the heaviest area.

If wheel is balanced, it will not stop consistently in the same position.

To balance the wheel, install balance weights on the lightest side of rim, the side opposite the chalk marks. Add just enough weight so the wheel will no longer stop in the same position when it is spun. Do not add more than 60 g (2.1 oz) to the wheel.



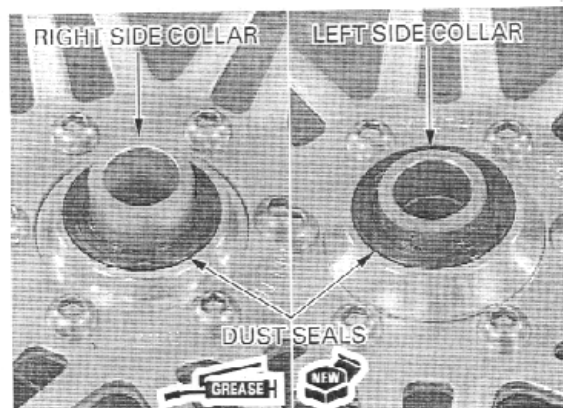
Apply grease to new dust seal lips.
Install the dust seals into the wheel hub.

INSTALLATION

Install the side collars.

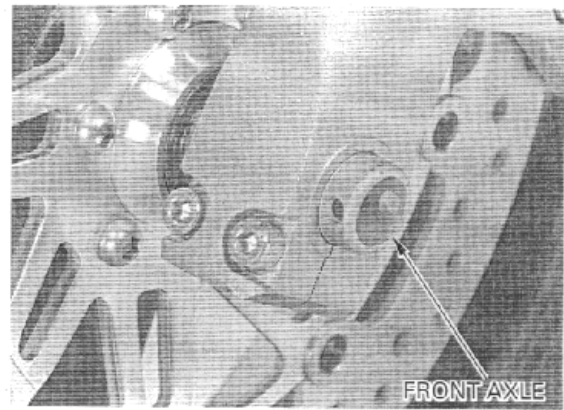
NOTE:

The right side collar is longer than the left side collar.



Install the front wheel between the fork legs.

Apply thin coat of grease to the front axle.
Install the front axle.

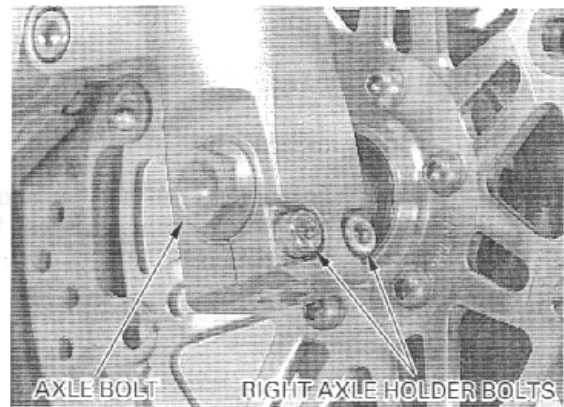


Install the axle bolt and tighten it while holding the axle.

TORQUE: 59 N·m (6.0 kgf·m , 43 lbf·ft)

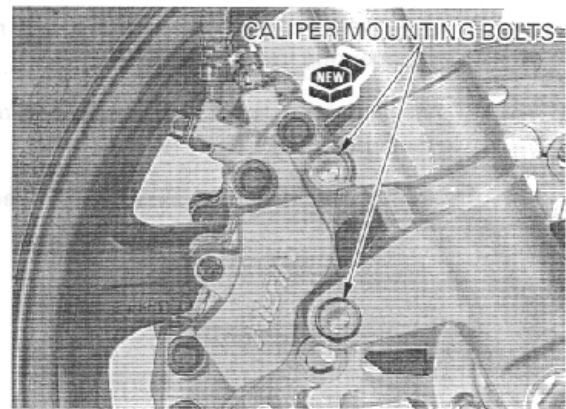
Tighten the right axle holder bolts.

TORQUE: 22 N·m (2.2 kgf·m , 16 lbf·ft)

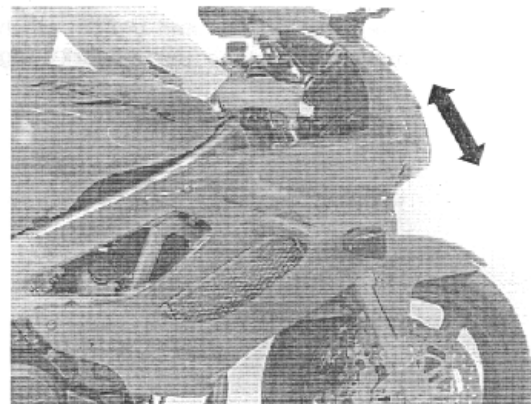


Install the brake calipers with new mounting bolts and tighten the mounting bolts.

TORQUE: 30 N·m (3.1 kgf·m , 22 lbf·ft)

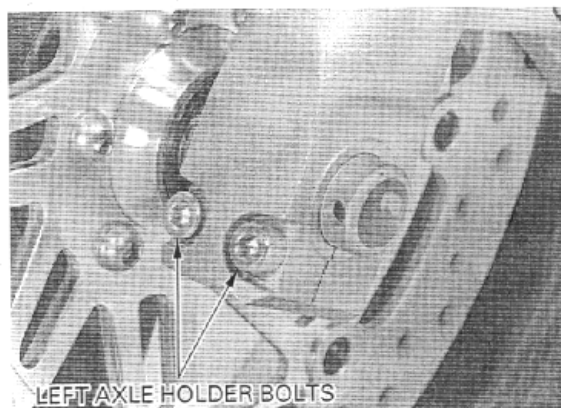


With the front brake applied, pump the forks up and down several times to seat the axle and check brake operation.



Tighten the left axle holder bolts.

TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)

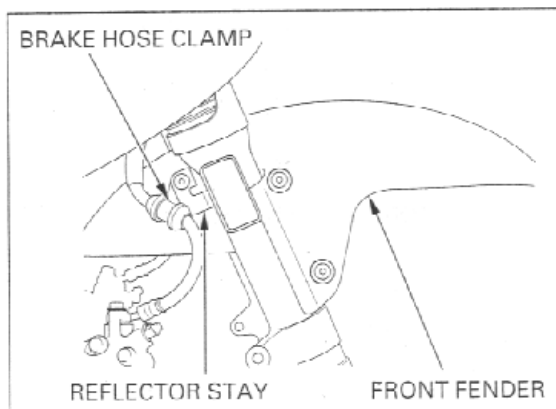


FORK

REMOVAL

Remove the front wheel (page 13-6).

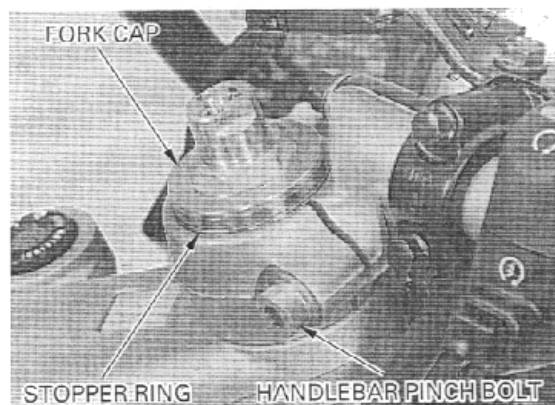
Remove the four bolts and the front fender. Remove the reflector stay and front brake hose clamp from the fork leg.



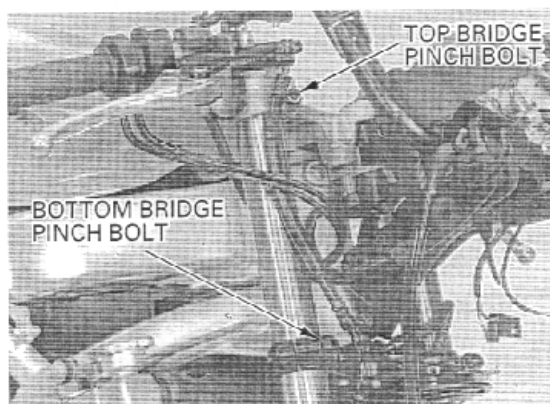
Loosen the handlebar pinch bolt and remove the stopper ring from the fork.

When the fork is ready to be disassembled, loosen the fork cap, but do not remove it.

Remove the handlebar assembly and secure it.

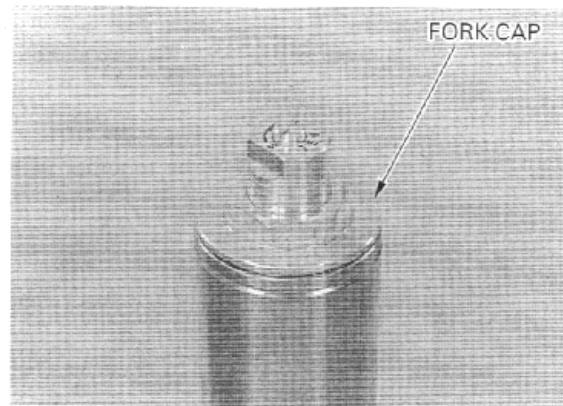


Loosen the fork top and bottom pinch bolts, and remove the fork tube from the fork bridges.



DISASSEMBLY

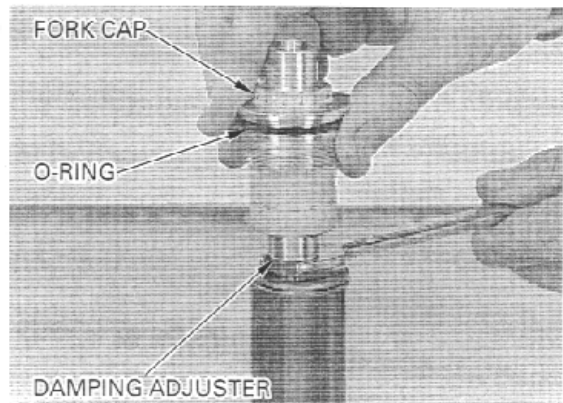
Remove the fork cap from the fork tube.



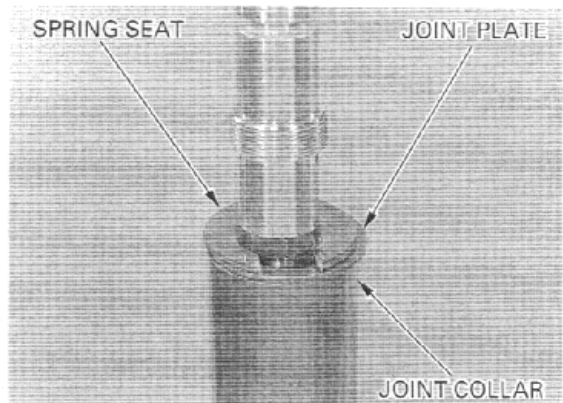
Hold the rebound damping adjuster and remove the fork cap from the damping adjuster. Remove the O-rings from the fork cap and rebound damping adjuster.

CAUTION:

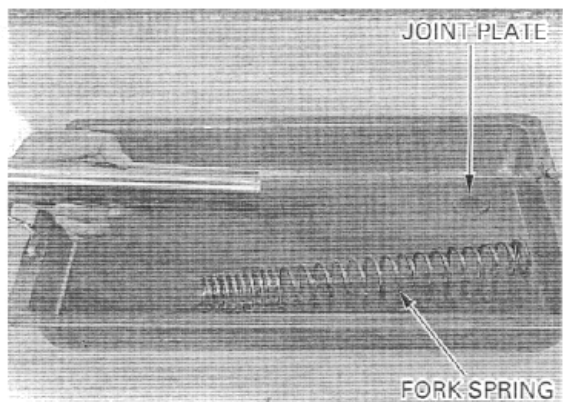
Do not remove the rebound damping adjuster from the damper rod, or fork damping force will be changed.



Remove the spring seat, joint plate and joint collar.



Remove the joint plate and fork spring. Pour out the fork fluid by pumping the fork tube several times.

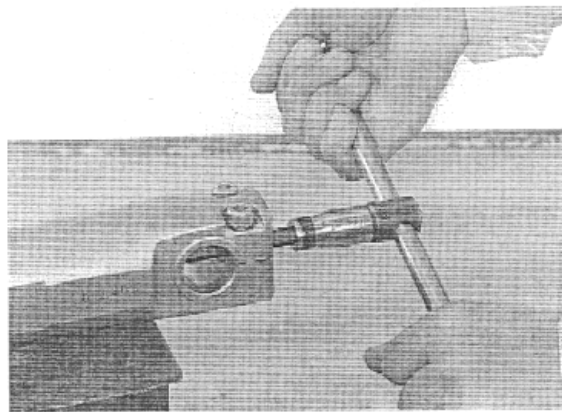


FRONT WHEEL/SUSPENSION/STEERING

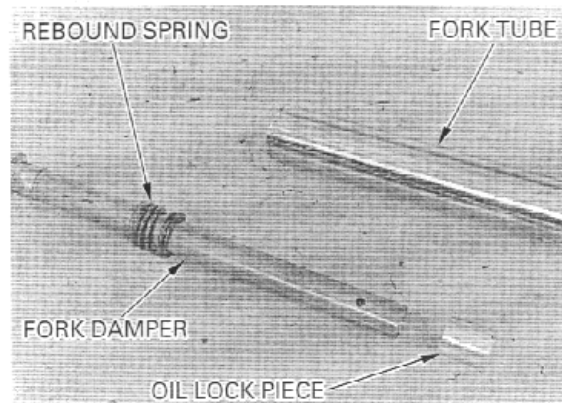
Hold the fork slider in a vise with a soft jaws or shop towel and remove the socket bolt.

NOTE:

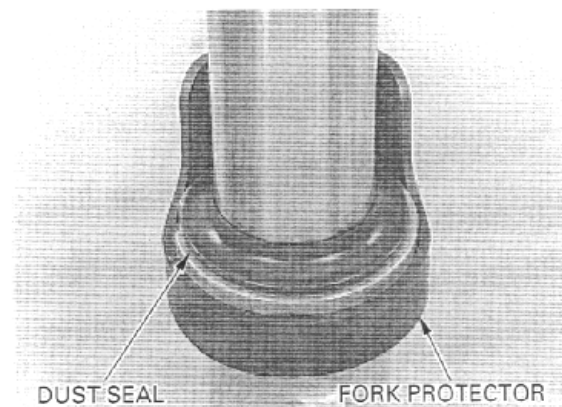
If the fork damper turns together with the socket bolt, temporarily install the fork spring, spring collar and spring seat.



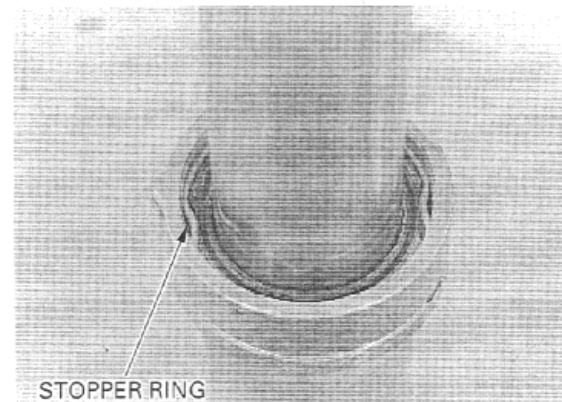
Remove the fork damper, rebound spring and oil lock piece from the fork tube.



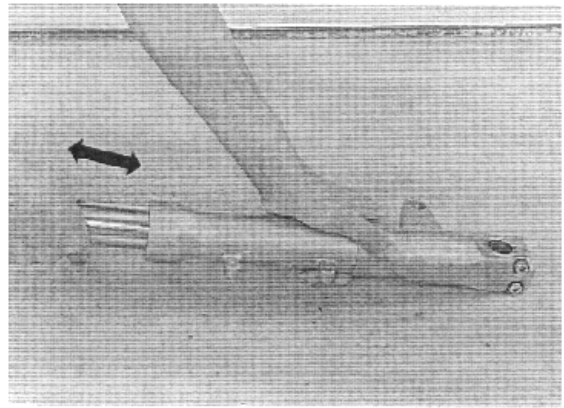
Remove the dust seal and fork protector.



Remove the stopper ring being careful not to scratch the fork tube sliding surface.



Using quick successive motions, pull the fork tube out of the fork slider.

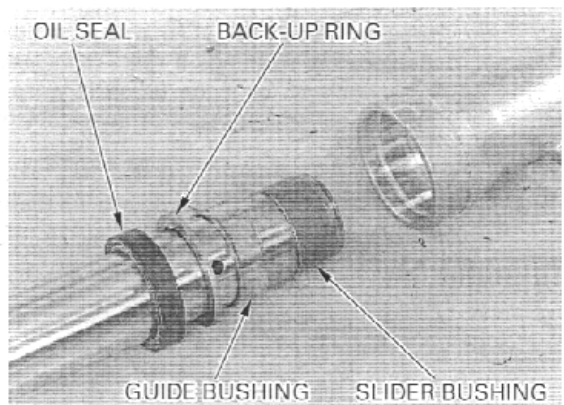


Remove the oil seal, back-up ring and guide bushing from the fork tube.

NOTE:

Do not remove slider bushing unless it is necessary to replace it with a new one.

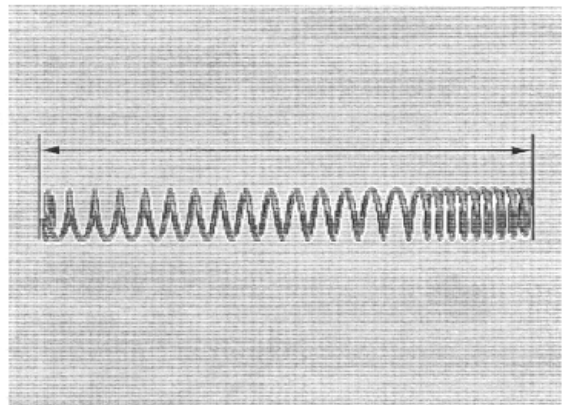
Carefully remove the slider bushing by prying the slot with a screwdriver until the bushing can be pulled off by hand.



INSPECTION

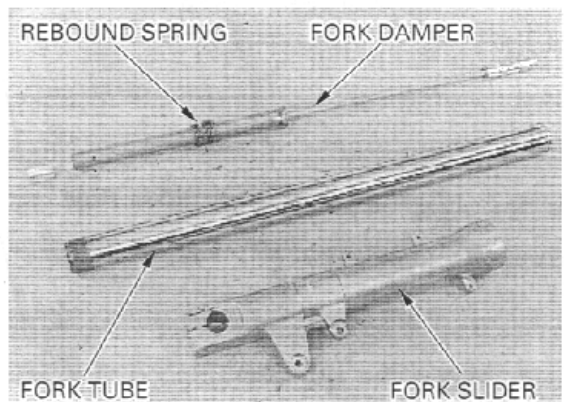
Measure the fork spring free length.

SERVICE LIMIT: 303.7 mm (11.96 in)



Check the fork tube, slider and damper piston for score marks, and excessive or abnormal wear. Check the rebound spring for fatigue or damage.

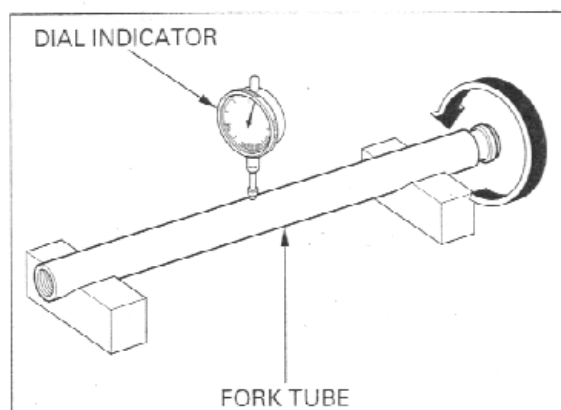
Replace the component if necessary.



FRONT WHEEL/SUSPENSION/STEERING

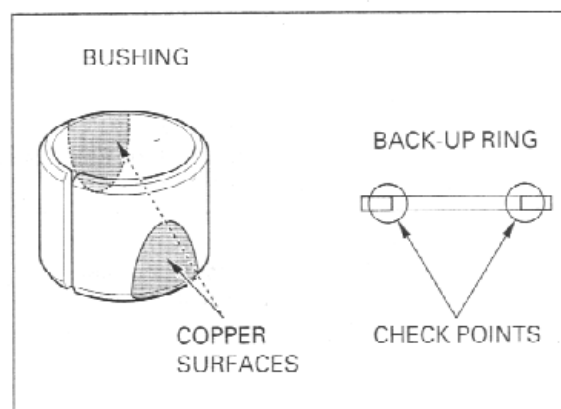
Set the fork tube in V-blocks and measure the fork tube runout with a dial indicator. Actual runout is 1/2 the total indicator reading.

SERVICE LIMIT: 0.20 mm (0.008 in)



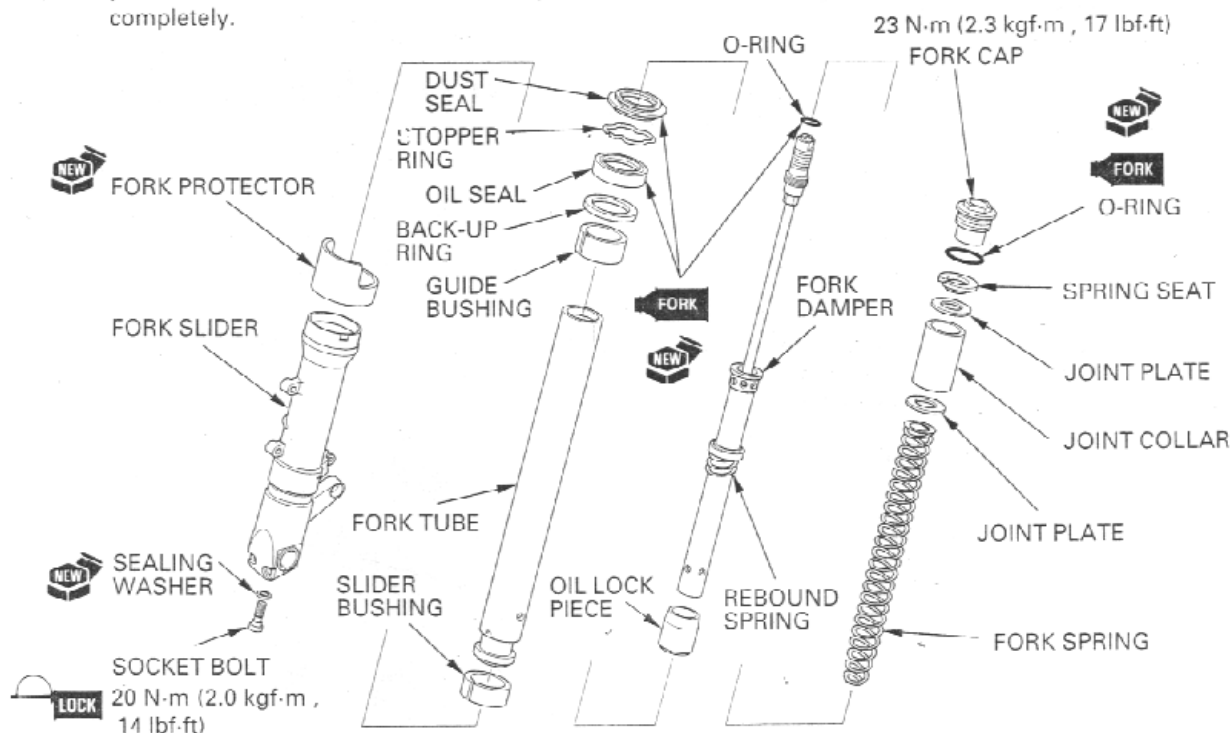
Visually inspect the slider and guide bushings. Replace the bushings if there is excessive scoring or scratching, or if the teflon is worn so that the copper surface appears on more 3/4 of the entire surface.

Check the back-up ring; replace it if there is any distortion at the points shown.



ASSEMBLY

Before assembly, wash all parts with a high flash point or non-flammable solvent and wipe them off completely.



Install a new slider bushing if it has been removed.

CAUTION:

- *Be careful not to damage the coating of the bushing.*
- *Do not open the bushing more than necessary.*

NOTE:

Remove the burrs from the bushing mating surface, being careful not to peel off the coating.

Install the guide bushing and back-up ring.

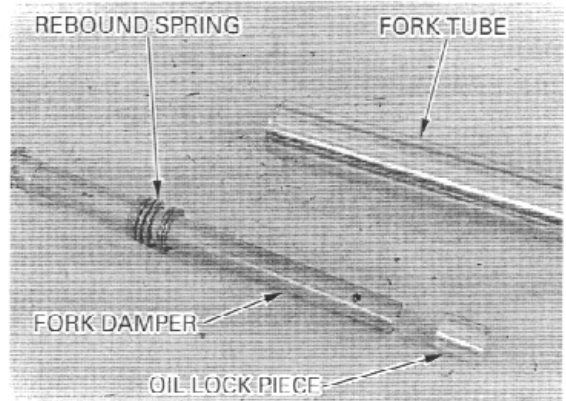
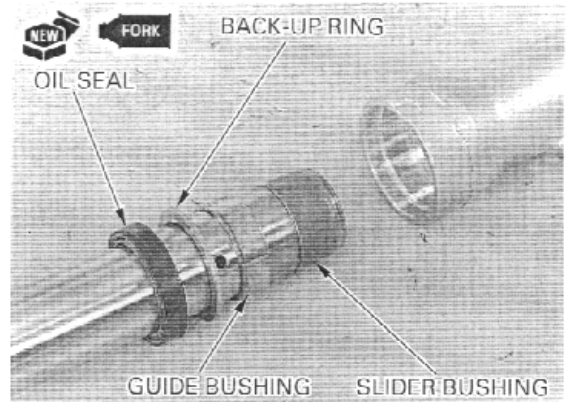
Apply fork fluid to a new oil seal lip.

Install the oil seal with the marking side facing up.

Install the fork tube into the fork slider.

Install the rebound spring and oil lock piece onto the damper piston.

Install the fork damper into the fork tube.



Hold the fork slider in a vise with a soft jaws or shop towel.

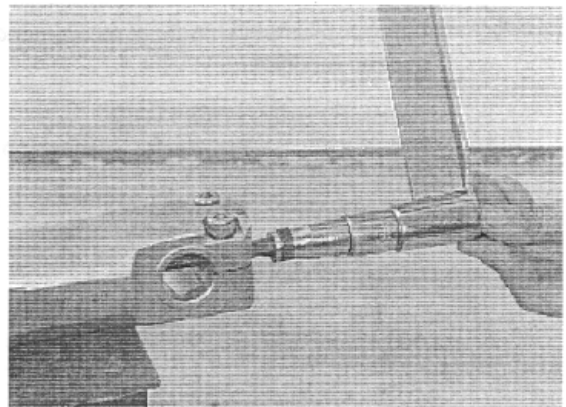
Apply locking agent to the socket bolt threads.

Install the socket bolt with a new sealing washer and tighten it.

TORQUE: 20 N·m (2.0 kgf·m , 14 lbf·ft)

NOTE:

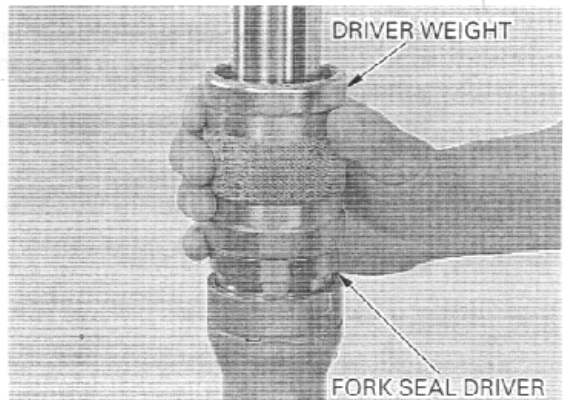
If the fork damper turns together with the socket bolt, temporarily install the fork spring, spring collar and spring seat.



Drive the oil seal into the fork slider until the stopper ring groove is visible, using the special tool.

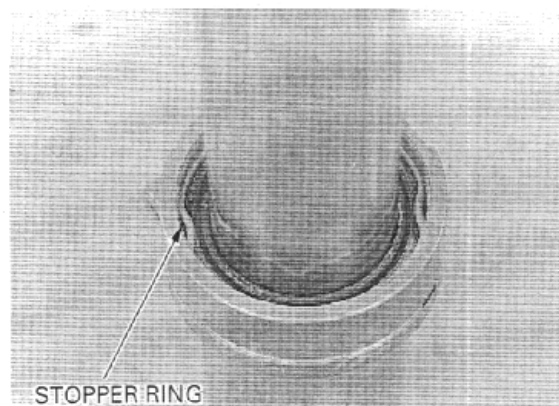
TOOLS:

Fork seal driver weight 07947 KA50100
Fork seal driver 07947-KF00100

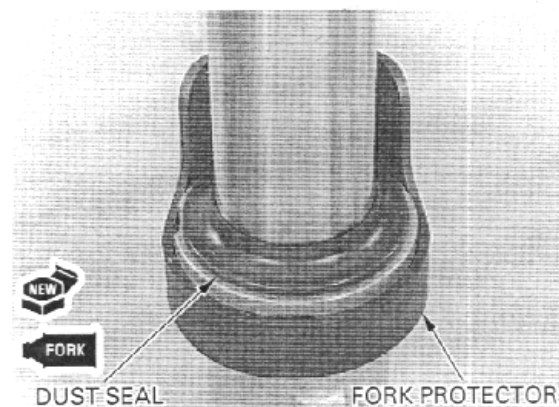


FRONT WHEEL/SUSPENSION/STEERING

Install the stopper ring into the groove in the fork slider.



Apply fork fluid to a new dust seal lip and install the dust seal into the fork slider.
Install the fork protector onto the fork slider.



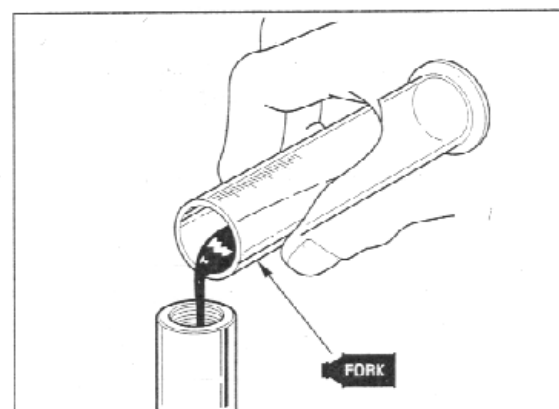
Pour the specified amount of recommended fork fluid in the fork tube.

RECOMMENDED FORK FLUID:

Pro-Honda Suspension Fluid SS-8

FORK FLUID CAPACITY:

$448 \pm 2.5 \text{ cm}^3$ ($15.2 \pm 0.08 \text{ US oz.}$)
 $15.8 \pm 0.09 \text{ Imp oz.}$



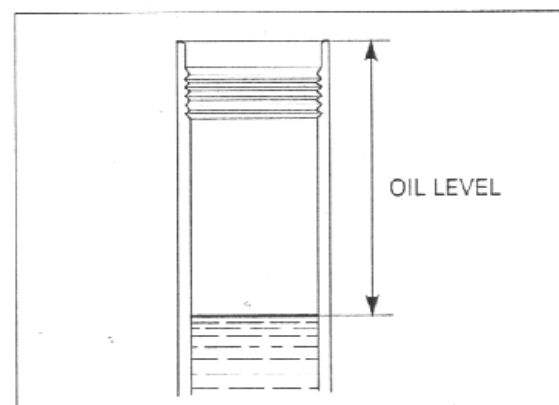
Pump the damper rod several times until the fork fluid flow out of the oil hole in the rebound damping adjuster.

Slowly pump the fork tube several times to remove trapped air.

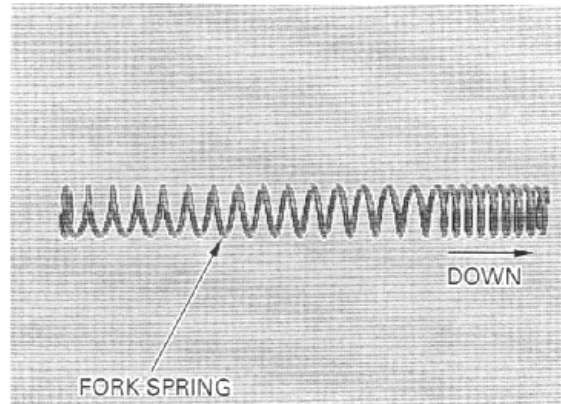
Compress the fork tube fully.

Measure the oil level from the top of the fork tube.

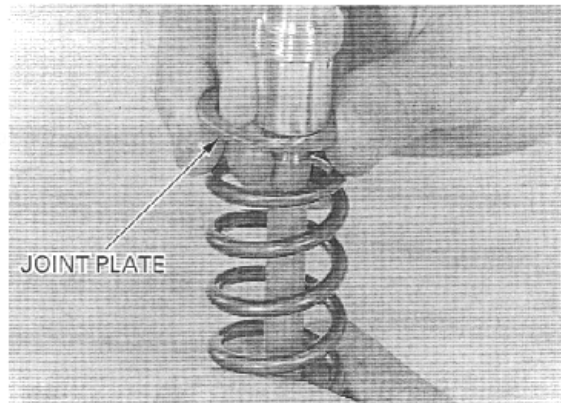
OIL LEVEL: 130 mm (5.1 in)



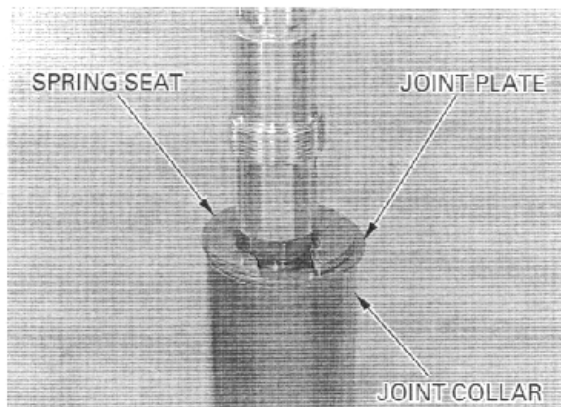
Pull up the damper rod fully.
Install the fork spring with the tightly wound end facing down.



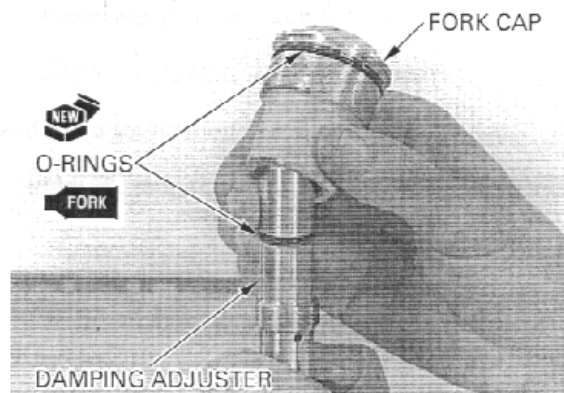
Install the joint plate.



Install the spring collar, joint plate and spring seat.



Coat new O-rings with fork fluid and install them into the grooves in the rebound damping adjuster and fork cap.
Install the fork cap onto the rebound damping adjuster.



FRONT WHEEL/SUSPENSION/STEERING

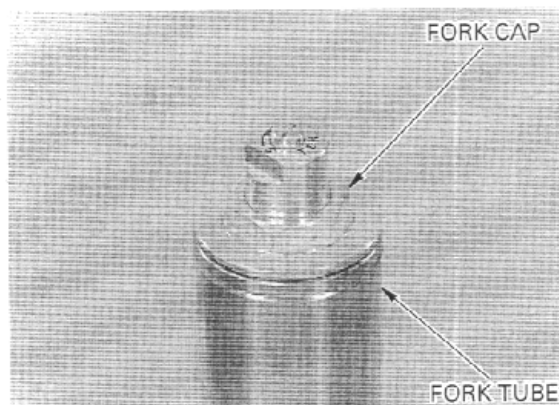
Hold the rebound damping adjuster and screw in the fork cap.



Install the fork cap into the fork tube.

NOTE:

Tighten the fork cap after installing the fork tube into the fork bridges.



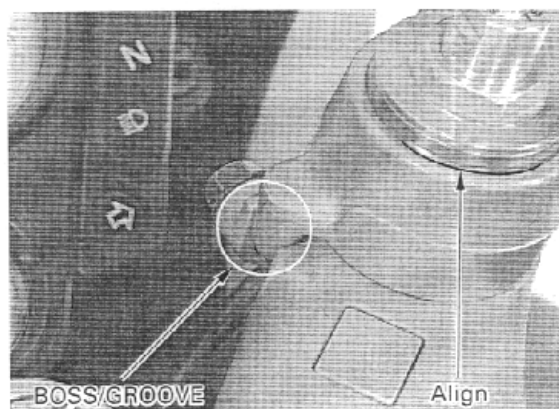
INSTALLATION

Route the cables, wire harnesses and hoses properly (page I-18).

Install the fork tube into the fork bridges and handlebar.

Make sure that the handlebar boss is positioned in the fork top bridge groove.

Align the stopper ring groove with the top surface of the handlebar.



Tighten the fork top bridge pinch bolt.

TORQUE: 23 N·m (2.3 kgf·m , 17 lbf·ft)

Tighten the fork bottom bridge pinch bolt.

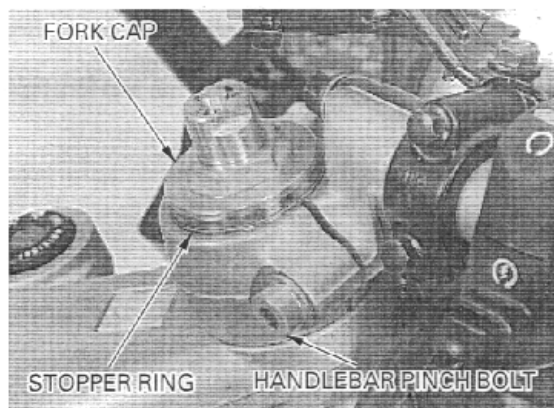
TORQUE: 49 N·m (5.0 kgf·m , 36 lbf·ft)



Tighten the fork cap.

TORQUE: 23 N·m (2.3 kgf·m , 17 lbf·ft)

Install the stopper ring and tighten the handlebar pinch bolt.

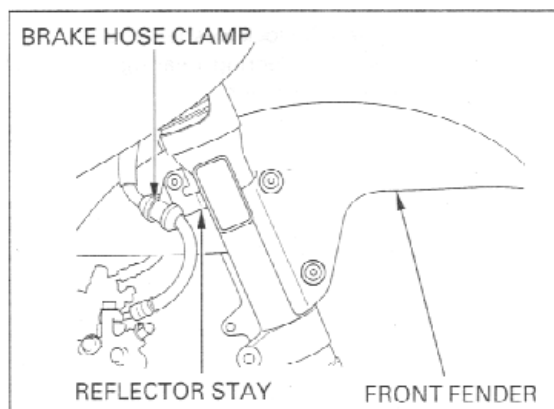


Install the front brake hose clamp and reflector stay onto the fork leg and tighten the bolt.

TORQUE: 10 N·m (1.0 kgf·m , 7 lbf·ft)

Install the front fender and tighten the four bolts.

Install the front wheel (page 13-10).



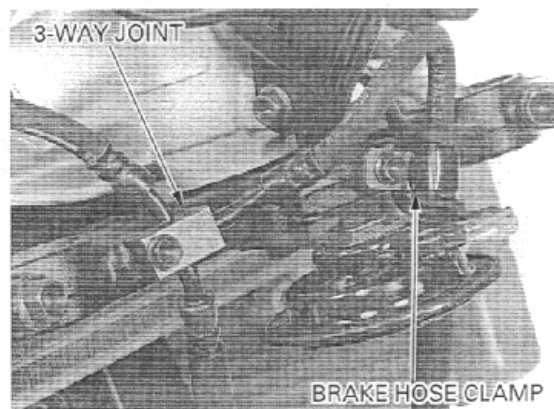
STEERING STEM

REMOVAL

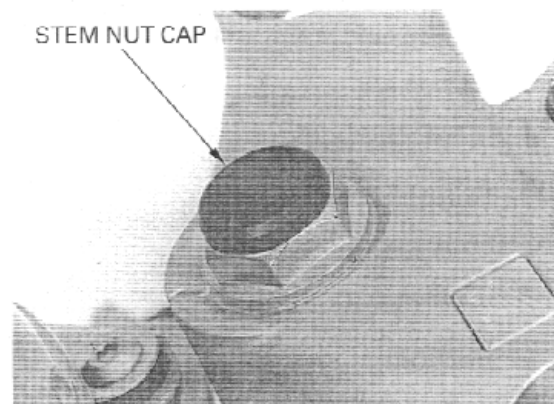
Remove the front fairing (page 2-3).

Remove the left and right forks (page 13-12).

Remove the front brake hose clamp and 3-way joint from the steering stem.

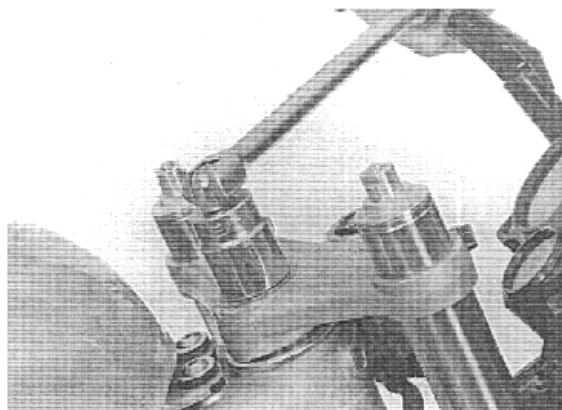


Remove the steering stem nut cap.

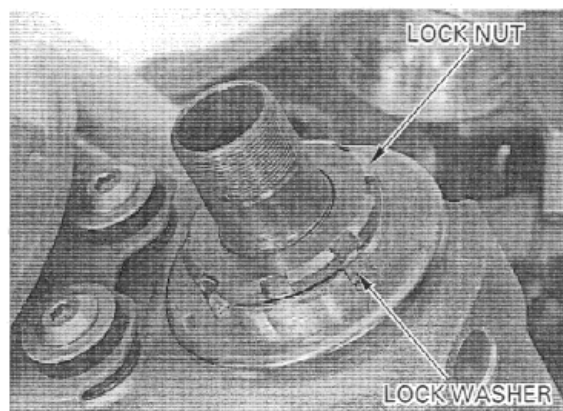


FRONT WHEEL/SUSPENSION/STEERING

Temporarily install the forks into the fork bridges.
Loosen the steering stem nut.
Remove the forks, stem nut and fork top bridge.



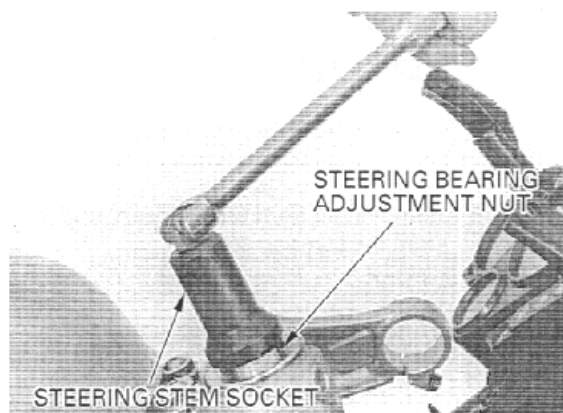
Straighten the lock washer tabs.
Remove the steering bearing adjustment nut lock nut and lock washer.



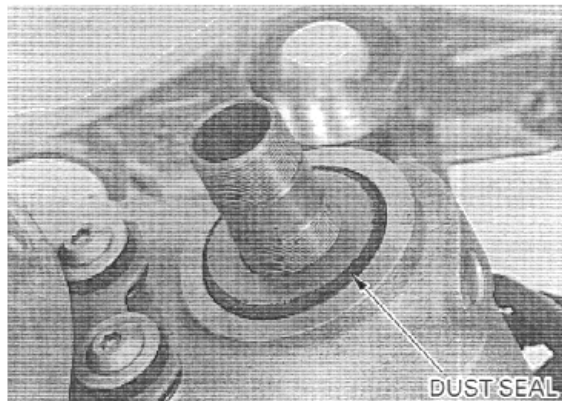
Remove the steering bearing adjustment nut using the special tool.

TOOL:

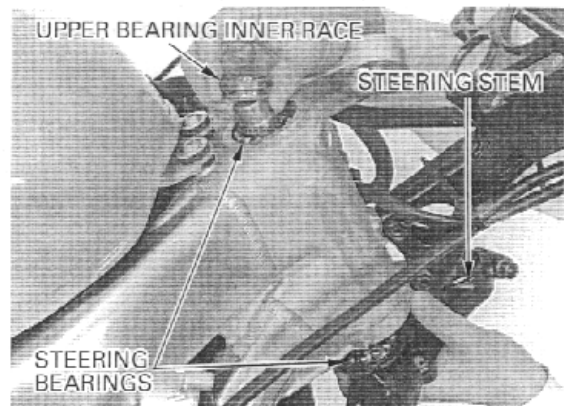
Steering stem socket 07916-3710101 or
 07916-3710100



Remove the dust seal.



Remove the upper bearing inner race, steering stem, upper and lower steering bearings.



STEERING BEARING REPLACEMENT

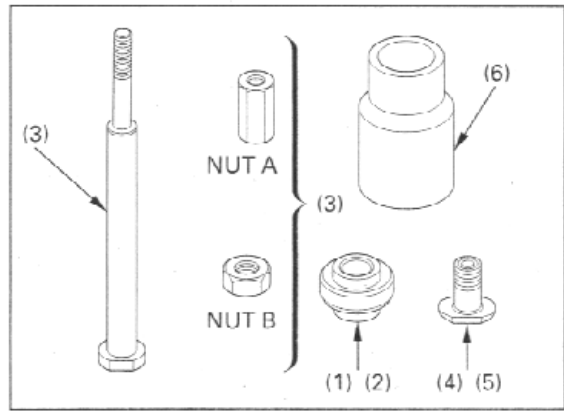
Always replace the bearings and races as a set.

Except U.S.A.:

Replace the steering bearing outer races using the ball race remover set.

TOOLS:

Ball race remover set	07946-KM90001
– Driver attachment A (1)	07946-KM90100
– Driver attachment B (2)	07946-KM90200
– Driver shaft assembly (3)	07946-KM90300
– Bearing remover A (4)	07946-KM90401
– Bearing remover B (5)	07946-KM90500
– Assembly base (6)	07946-KM90600



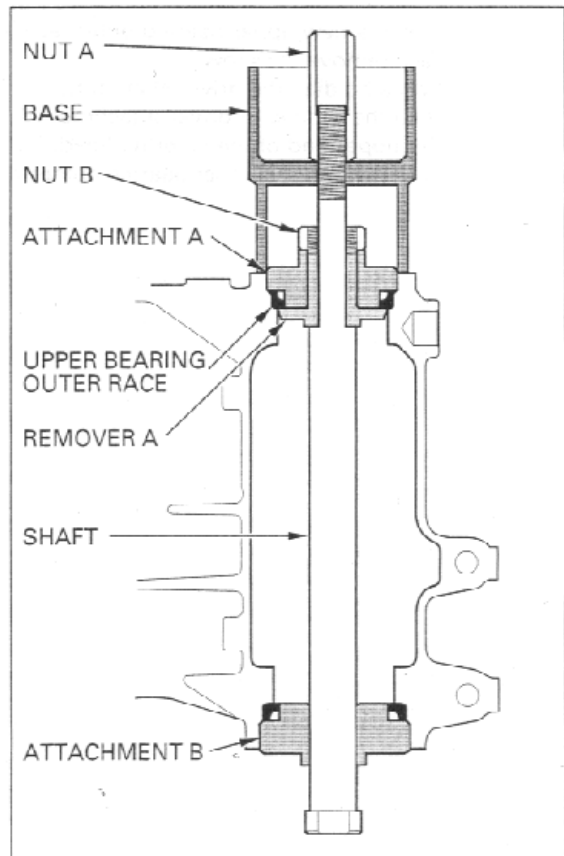
Note the installation direction of the assembly base.

Install the ball race remover into the steering head pipe as shown.

Align bearing remover A with the groove in the steering head.

Lightly tighten nut B.

While holding the driver shaft, turn nut A gradually to remove the upper bearing outer race.



FRONT WHEEL/SUSPENSION/STEERING

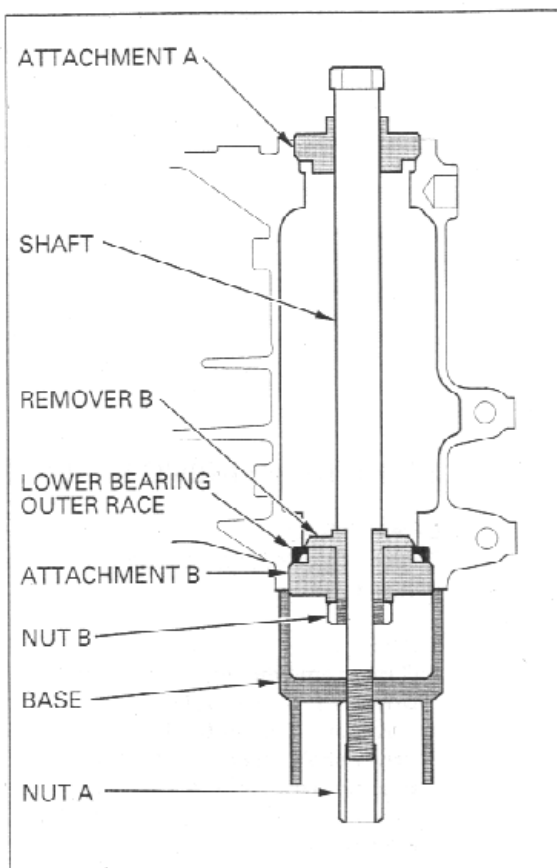
Note the installation direction of the assembly base.

Install the ball race remover into the steering head pipe as shown.

Align bearing remover B with the groove in the steering head.

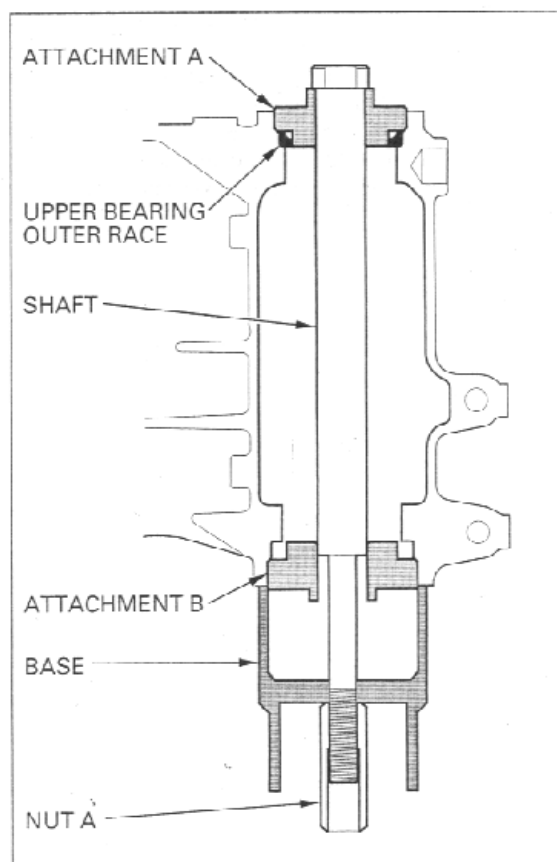
Lightly tighten nut B.

While holding the driver shaft, turn nut A gradually to remove the lower bearing outer race.



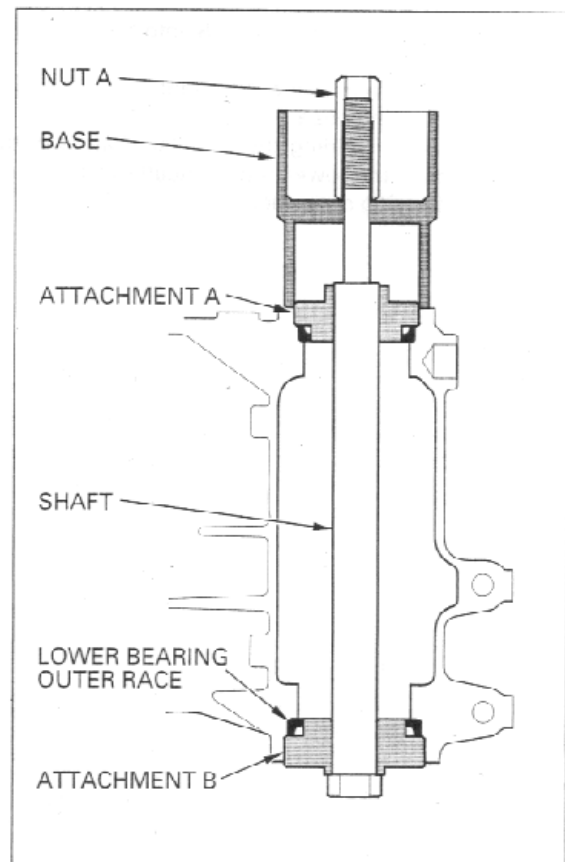
Install a new upper bearing outer race and the ball race remover as shown.

While holding the driver shaft, turn nut A gradually until the groove in driver attachment A aligns with the upper end of the steering head. This will allow you to install the upper bearing outer race.



Install a new lower bearing outer race and the ball race remover as shown.

While holding the driver shaft, turn nut A gradually until the groove in driver attachment B aligns with the lower end of the steering head. This will allow you to install the lower bearing outer race.



Always replace the bearings and races as a set.

U.S.A. only:

Replace the steering bearing outer races using the special tools listed below.

TOOLS:

Main bearing driver attachment

07946-ME90200

Fork seal driver weight

07947-KA50100

Oil seal driver

07965-MA60000

Installer shaft

07VMF-KZ30200

Installer attachment A

07VMF-MAT0100

Installer attachment B

07VMF-MAT0200

Remover attachment A

07VMF-MAT0300

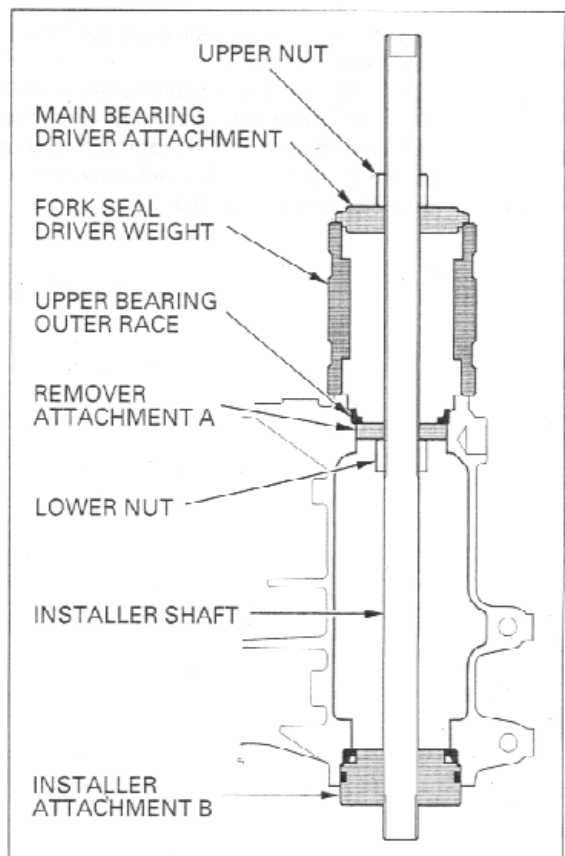
Remover attachment B

07VMF-MAT0400

Install the special tools into the steering head pipe as shown.

Align remover attachment A with the groove in the steering head.

While holding the installer shaft with the wrench, turn the upper nut gradually to remove the upper bearing outer race.

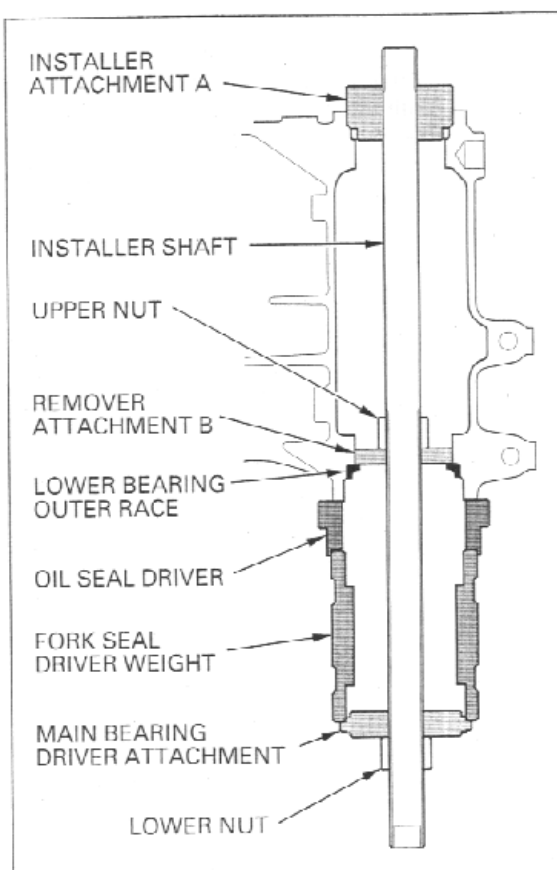


FRONT WHEEL/SUSPENSION/STEERING

Install the special tools into the steering head pipe as shown.

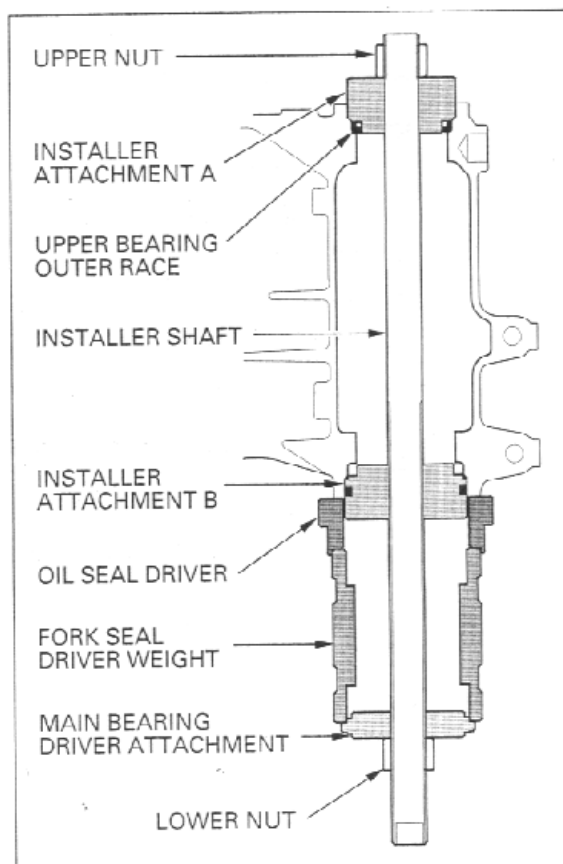
Align remover attachment B with the groove in the steering head.

While holding the installer shaft with the wrench, turn the lower nut gradually to remove the lower bearing outer race.

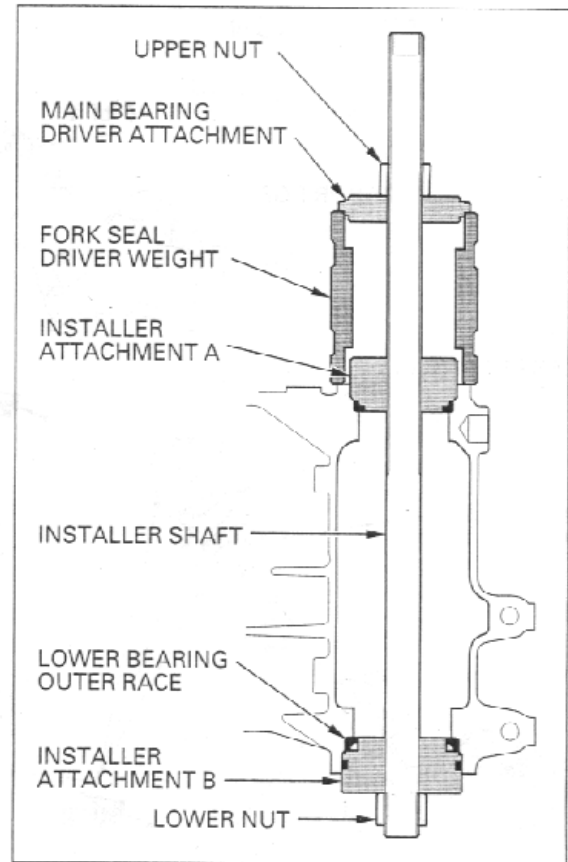


Install a new upper bearing outer race and the special tools as shown.

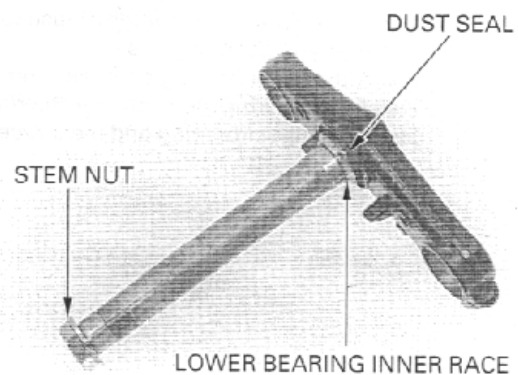
While holding the installer shaft with the wrench, turn the lower nut gradually until the groove in installer attachment A aligns with the upper end of the steering head. This will allow you to install the upper bearing outer race.



Install a new lower bearing outer race and the special tools as shown.
While holding the installer shaft with the wrench, turn the upper nut gradually until the groove in installer attachment B aligns with the lower end of the steering head. This will allow you to install the lower bearing outer race.

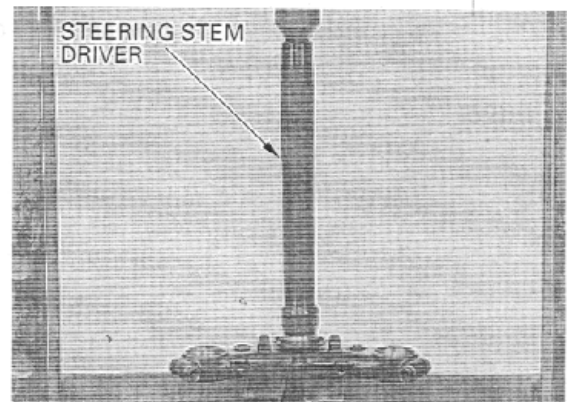


Install the stem nut onto the stem to prevent the threads from being damage when removing the lower bearing inner race from the stem.
Remove the lower bearing inner race with a chisel or equivalent tool, being careful not to damage the stem.
Remove the dust seal.

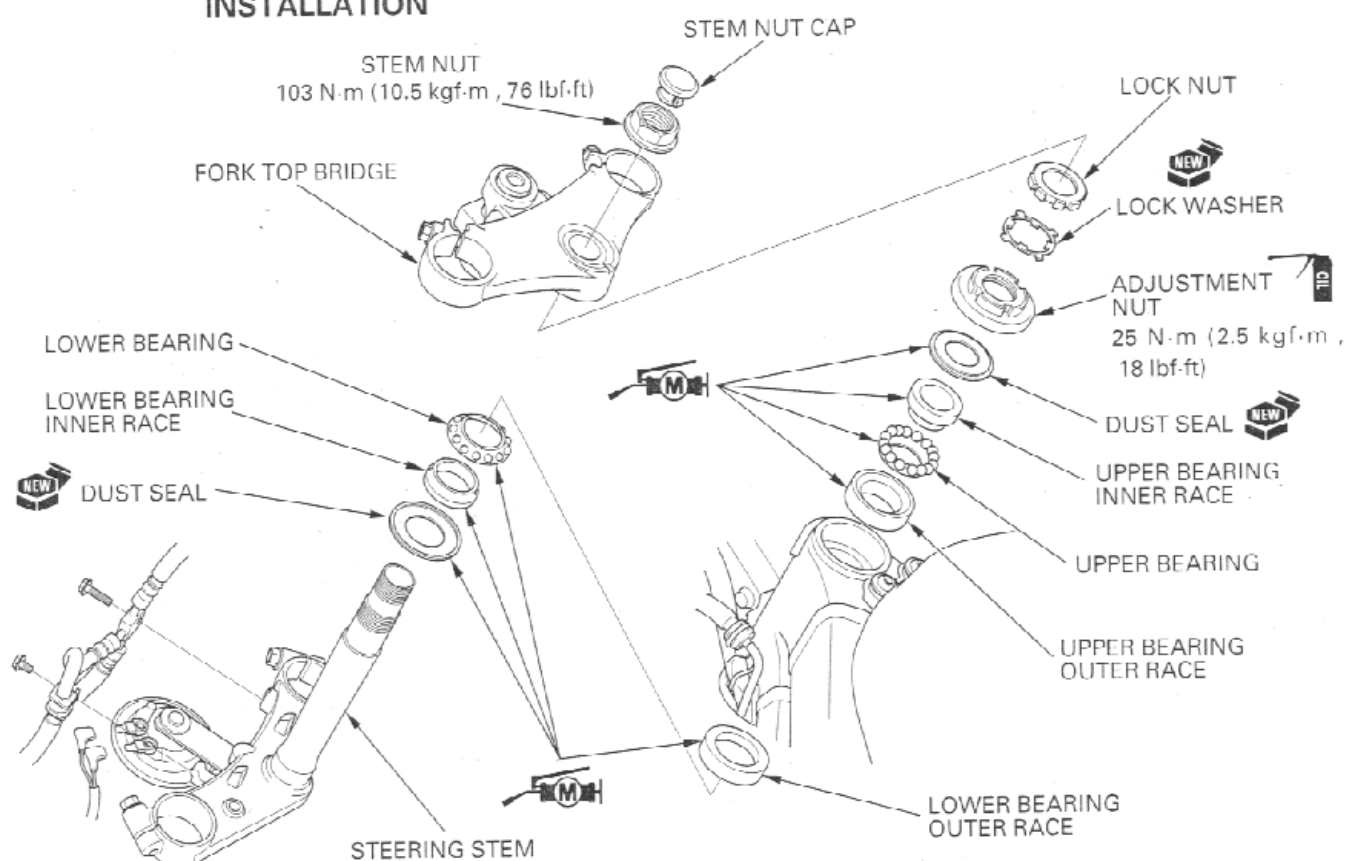


Apply molybdenum disulfide grease to a new dust seal lip and install it to the steering stem.
Press a new lower bearing inner race onto the steering stem using the special tool.

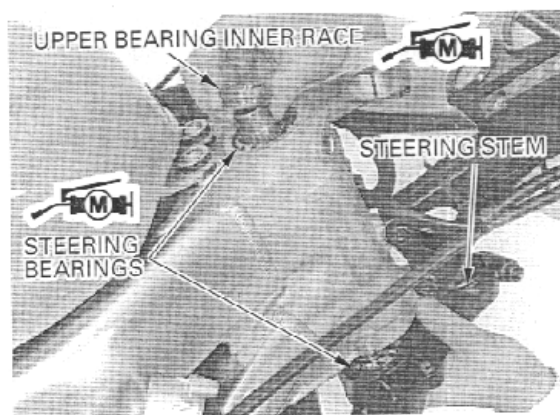
TOOL:
Steering stem driver 07946-MB00000



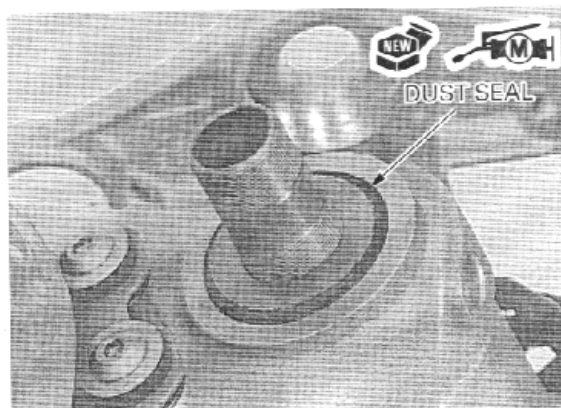
INSTALLATION



Apply molybdenum disulfide grease to the steering bearings and bearing races.
Install the lower bearing onto the steering stem.
Install the steering stem into the steering head pipe.
Install the upper bearing and inner race.



Apply molybdenum disulfide grease to a new dust seal lip and install it.



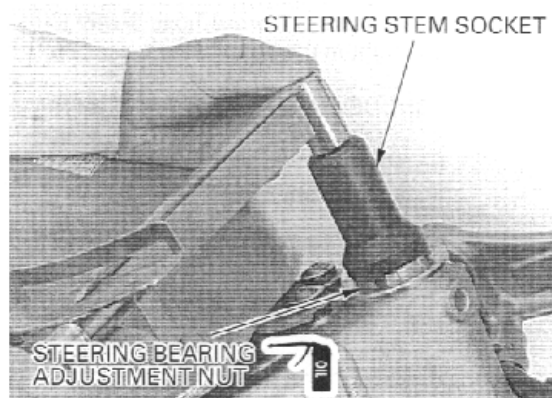
Apply oil to the bearing adjustment nut threads.
Install and tighten the steering stem adjustment nut.

TOOL:

Steering stem socket 07916-3710101 or
07916-3710100

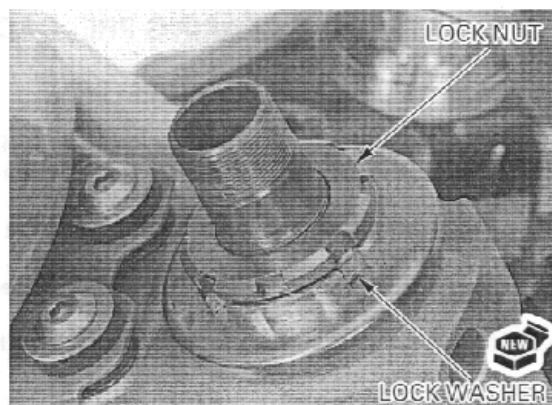
TORQUE: 25 N·m (2.5 kgf·m , 18 lbf·ft)

Turn the steering stem right and left, lock to lock at least five times to seat the bearings.
Retighten the steering stem adjustment nut to the same torque.



Install a new lock washer and bend the two opposite tabs down into the grooves in the adjustment nut.

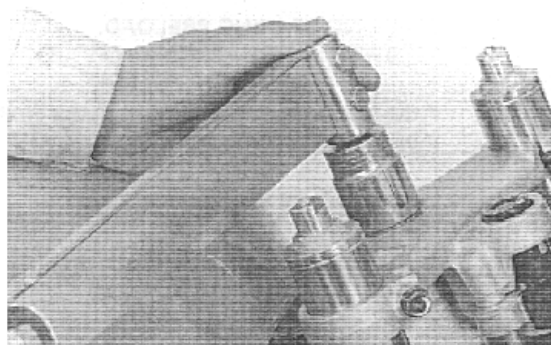
Install and finger tighten the lock nut all the way.
Hold the steering adjustment nut and further tighten the lock nut, within 90 degrees, to align its grooves with the tabs of the lock washer.
Bend up the lock washer tabs into the grooves of the lock nut.



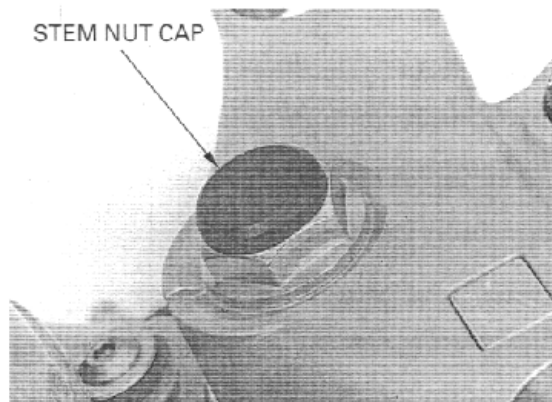
Install the fork top bridge and steering stem nut.
Temporarily install the forks into the fork bridges.
Tighten the steering stem nut.

TORQUE: 103 N·m (10.5 kgf·m , 76 lbf·ft)

Remove the forks.
Make sure that the steering stem moves smoothly, without play or binding.



Install the steering stem nut cap.

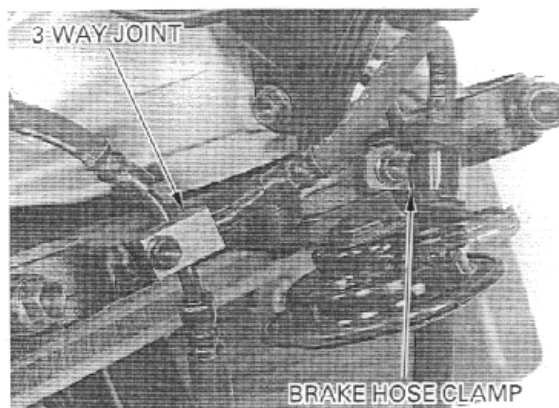


Install the front brake hose 3-way joint and clamp, and tighten the bolts.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Install the forks (page 13-20).

Install the front fairing (page 2-3).



STEERING BEARING PRELOAD

Remove the front fairing (page 2-3).

Support the motorcycle securely using safety stands or a hoist and raise the front wheel off the ground.

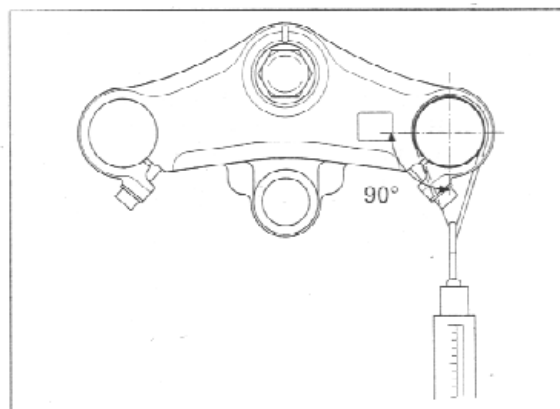
Position the steering stem to the straight ahead position.

Hook a spring scale to the fork tube between the fork top and bottom bridges.

Make sure that there is no cable, wire harness or hose interference.

Pull the spring scale keeping it right angle to the steering stem.

Read the scale at the point where the steering stem just starts to move.



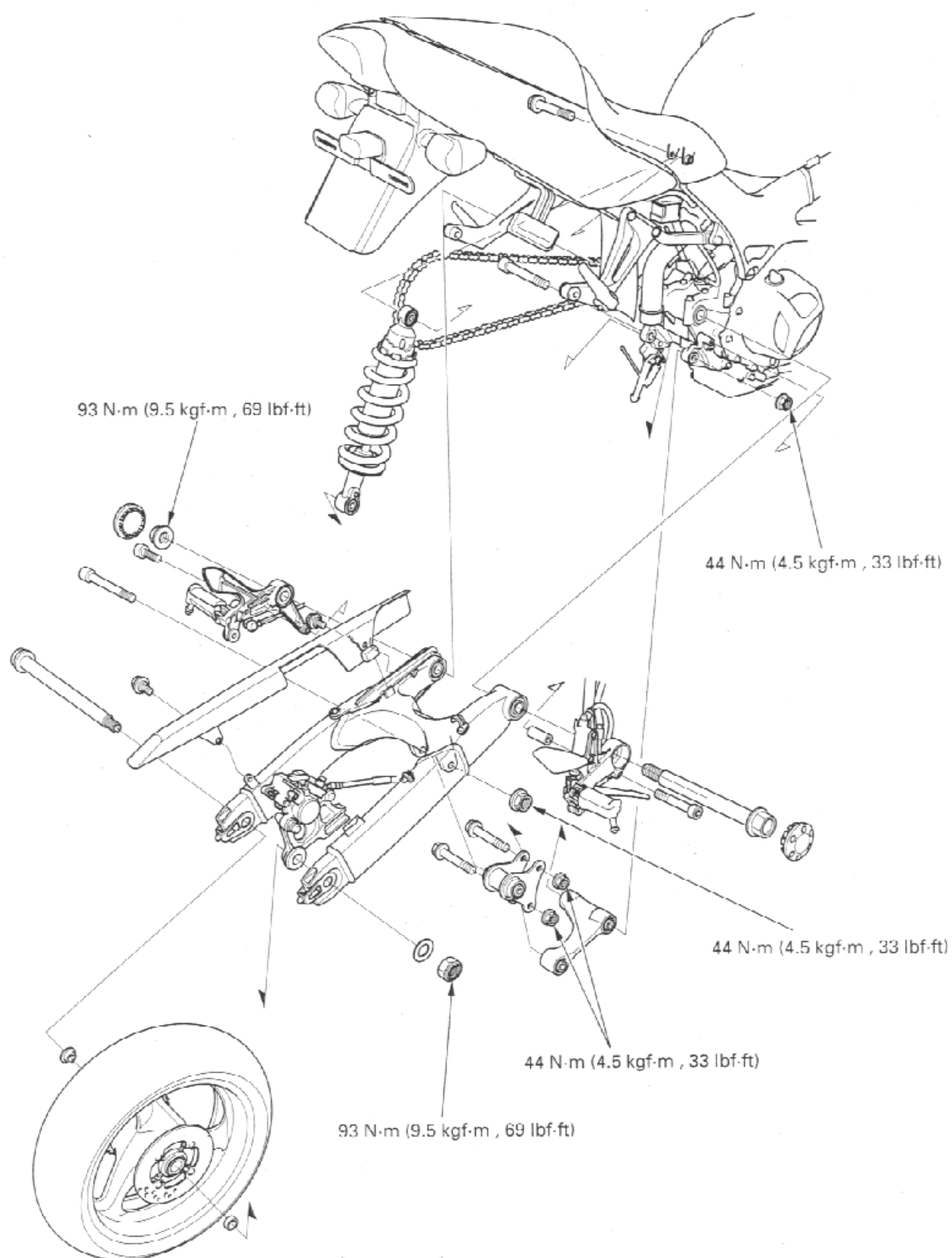
STEERING BEARING PRELOAD:

1.0 – 1.6 kgf (2.2 – 3.5 lbf)

If the readings do not fall within the limits, readjust the steering bearing adjustment.

Install the front fairing (page 2-3).

MEMO



14. REAR WHEEL/SUSPENSION

SERVICE INFORMATION	14-1	SHOCK ABSORBER	14-8
TROUBLESHOOTING	14-2	SUSPENSION LINKAGE	14-11
REAR WHEEL	14-3	SWINGARM	14-15

SERVICE INFORMATION

GENERAL

▲WARNING

- *Riding on damaged rims impairs safe operation of the vehicle.*
- *A contaminated brake disc or pad reduces stopping power. Discard contaminated pads and clean a contaminated disc with a high quality brake degreasing agent.*
- *The shock absorber contains nitrogen gas under high pressure. Do not allow fire or heat near the shock absorber.*
- *Before disposal of the shock absorber, release the nitrogen.*
- *The damper unit is filled with nitrogen gas under high pressure, do not try to disassemble.*

- A hoist or equivalent is required to support the motorcycle when servicing the rear wheel and suspension.
- Use genuine Honda replacement bolts and nuts for all suspension pivots and mounting points.
- Refer to section 15 for brake system service.

SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		_____	2.0 (0.08)
Cold tire pressure	Up to 90 kg (200 lbs) load	290 kPa (2.90 kgf/cm ² , 42 psi)	_____
	Up to maximum weight capacity	290 kPa (2.90 kgf/cm ² , 42 psi)	_____
Axle runout		_____	0.20 (0.008)
Wheel rim runout	Radial	_____	2.0 (0.08)
	Axial	_____	2.0 (0.08)
Wheel balance weight		_____	60 g (2.1 oz) max.

14

TORQUE VALUES

Rear axle nut	93 N·m (9.5 kgf·m, 69 lbf·ft)	
Rear brake disc bolt	42 N·m (4.3 kgf·m, 31 lbf·ft)	ALOC bolt
Final driven sprocket bolt	108 N·m (11.0 kgf·m, 80 lbf·ft)	U-nut
Shock absorber upper mounting bolt	44 N·m (4.5 kgf·m, 33 lbf·ft)	ALOC bolt
Shock absorber lower mounting nut	44 N·m (4.5 kgf·m, 33 lbf·ft)	U-nut
Shock arm-to-swingarm nut	44 N·m (4.5 kgf·m, 33 lbf·ft)	U-nut
Shock arm-to-shock link nut	44 N·m (4.5 kgf·m, 33 lbf·ft)	U-nut
Shock link-to-bracket nut	44 N·m (4.5 kgf·m, 33 lbf·ft)	U-nut
Swingarm pivot nut	93 N·m (9.5 kgf·m, 69 lbf·ft)	U-nut
Drive chain slider bolt	9 N·m (0.9 kgf·m, 6.5 lbf·ft)	ALOC bolt
Rear brake hose clamp screw	4 N·m (0.4 kgf·m, 2.9 lbf·ft)	ALOC screw

REAR WHEEL/SUSPENSION

TOOLS

Bearing remover shaft	07746-0050100	┌ or equivalent commercially available in U.S.A.
Bearing remover head, 20 mm	07746-0050600	
Driver	07749-0010000	
Attachment, 42 × 47 mm	07746-0010300	
Pilot, 20 mm	07746-0040500	
Attachment, 52 × 55 mm	07746-0010400	
Pilot, 22 mm	07746-0041000	
Pin driver	07GMD-KT80100	┌ not available in U.S.A.
Attachment, 24 × 26 mm	07746-0010700	
Pilot, 17 mm	07746-0040400	
Fork seal driver weight	07947-KA50100	
Fork seal driver	07947-KF00100	
Installer shaft	07VMF-KZ30200	
Main bearing driver attachment	07946-ME90200	
Attachment, 32 × 35 mm	07746-0010100	
Attachment, 37 × 40 mm	07746-0010200	
Pilot, 28 mm	07746-0041100	
Bearing remover, 17 mm	07936-3710300	┌ or equivalent commercially available in U.S.A.
Bearing remover handle	07936-3710100	
Bearing remover weight	07741-0010201	

TROUBLESHOOTING

Soft suspension

- Weak shock absorber spring
- Incorrect suspension adjustment
- Oil leakage from damper unit
- Insufficient tire pressure

Hard suspension

- Incorrect suspension adjustment
- Damaged rear suspension pivot bearings
- Bent damper rod
- Tire pressure too high

Rear wheel wobbling

- Bent rim
- Worn or damaged rear wheel bearings
- Faulty rear tire
- Unbalanced rear tire and wheel
- Insufficient rear tire pressure
- Faulty swingarm pivot bearings

Rear wheel turns hard

- Faulty rear wheel bearings
- Bent rear axle
- Rear brake drag
- Drive chain too tight

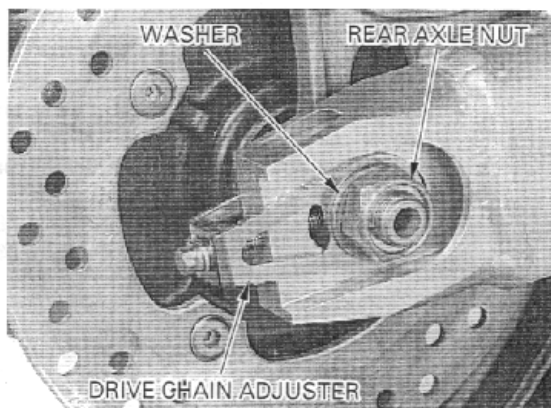
Rear suspension noise

- Faulty rear shock absorber
- Loose rear suspension fasteners
- Worn rear suspension pivot bearings

REAR WHEEL

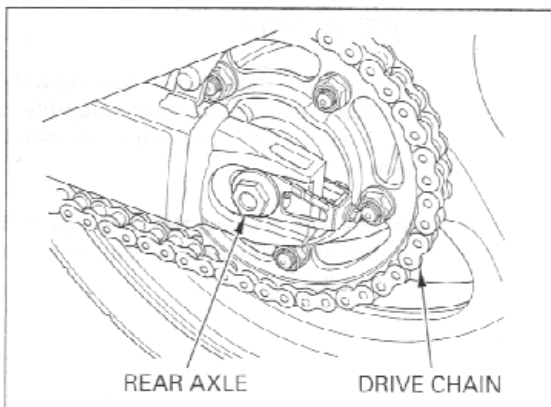
REMOVAL

Loosen the drive chain adjusters and rear axle nut. Raise the rear wheel off the ground and support the motorcycle securely with a hoist or equivalent. Remove the rear axle nut and washer.

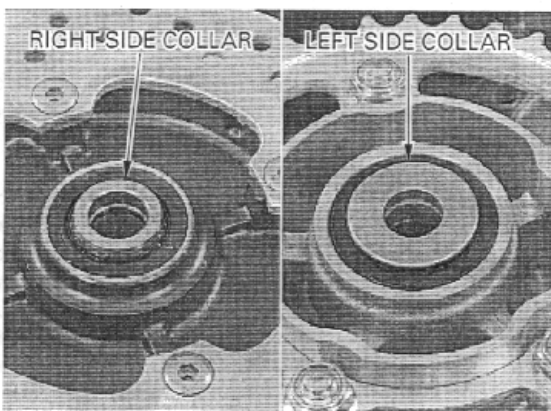


Push the rear wheel forward and derail the drive chain from the final driven sprocket.

Remove the rear axle and the rear wheel.



Remove the side collars.

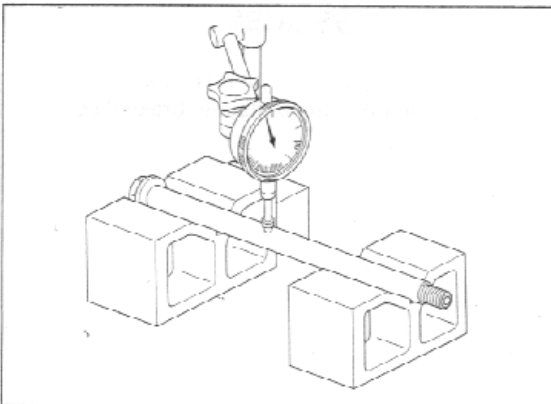


INSPECTION

AXLE

Place the axle in V-blocks and measure the runout. Actual runout is 1/2 the total indicator reading.

SERVICE LIMIT: 0.20 mm (0.008 in)

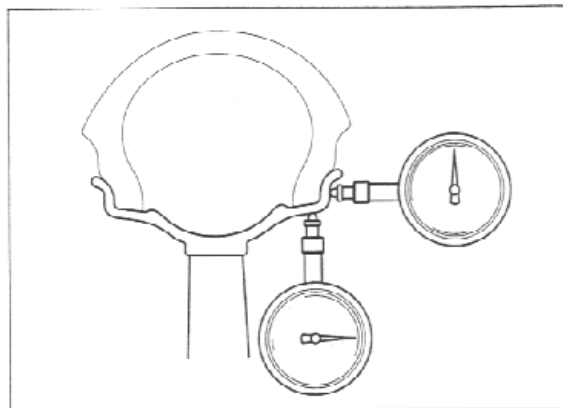


REAR WHEEL/SUSPENSION

WHEEL

Check the rim runout by placing the wheel in a truing stand. Spin the wheel slowly and read the runout using a dial indicator. Actual runout is 1/2 the total indicator reading.

SERVICE LIMITS: RADIAL: 2.0 mm (0.08 in)
AXIAL: 2.0 mm (0.08 in)

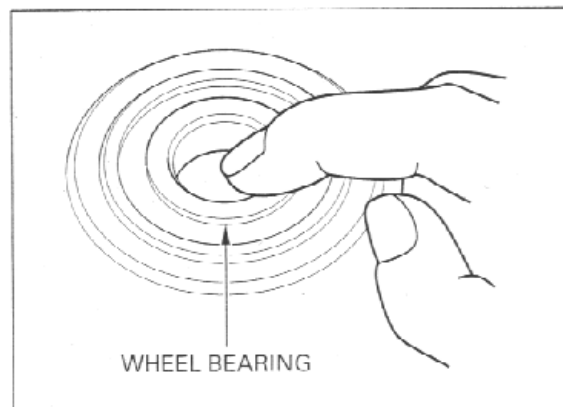


WHEEL BEARING

Turn the inner race of each bearing with your finger. The bearings should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the hub.

Replace the wheel bearings in pairs.

Remove and discard the bearings if the races do not turn smoothly and quietly, or if they fit loosely in the hub.

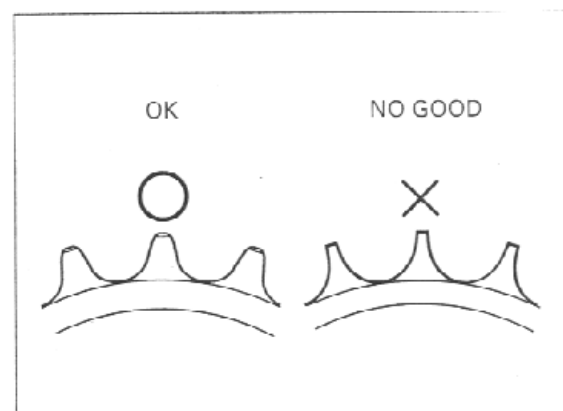


DRIVEN SPROCKET

Check the condition of the driven sprocket teeth. Replace the sprocket if worn or damaged.

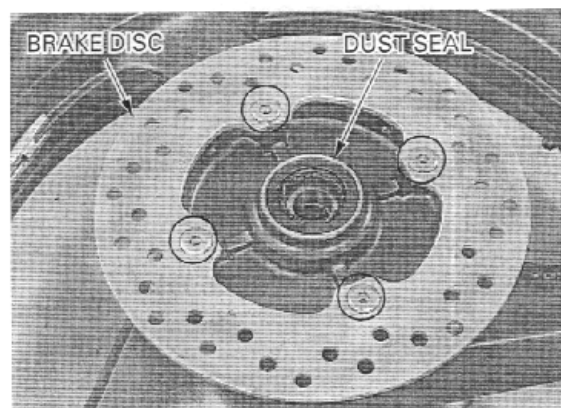
NOTE:

- If the driven sprocket requires replacement, inspect the drive chain and drive sprocket.
- Never install a new drive chain on a worn sprocket or a worn chain on new sprockets. Both chain and sprocket must be in good condition, or the replacement chain or sprocket will wear rapidly.



DISASSEMBLY

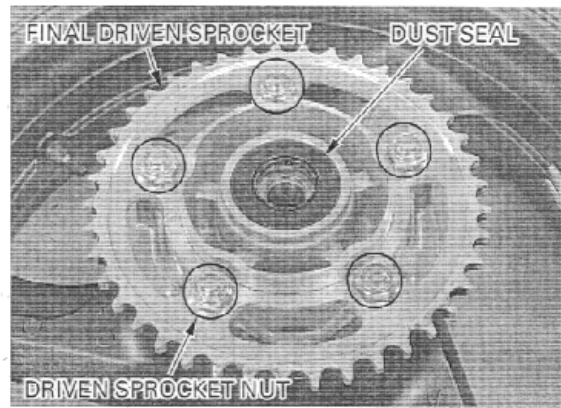
Remove the right dust seal.
Remove the bolts and brake disc.



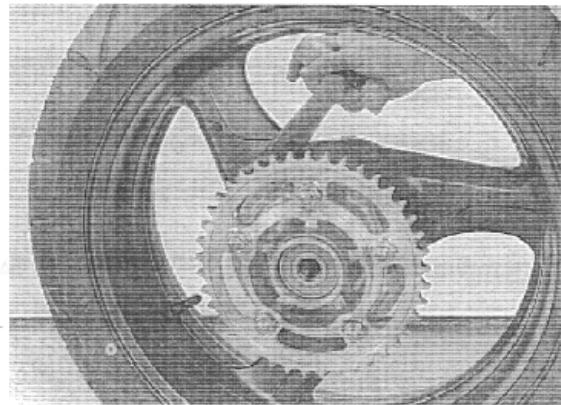
Remove the left dust seal.

NOTE:

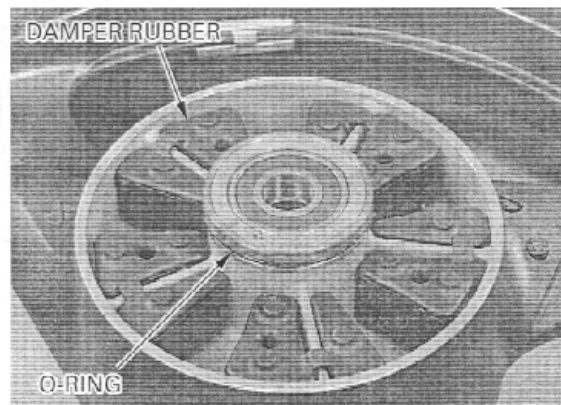
If you will replace the final driven sprocket, loosen the driven sprocket nuts.



Remove the final driven flange assembly from the left wheel hub.



Remove the damper rubbers and O-ring.



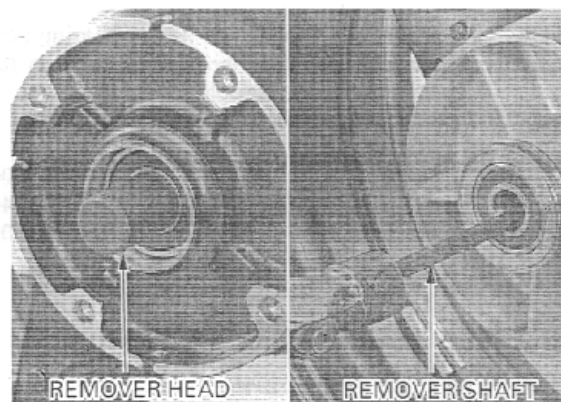
Replace the wheel bearings in pairs. Do not rouse old bearings.

Install the bearing remover head into the bearing. From opposite side, install the bearing remover shaft and drive the bearing out of the wheel hub. Remove the distance collar and drive out the other bearing.

TOOLS:

Bearing remover shaft 07746-0050100 or equivalent commercially available in U.S.A.

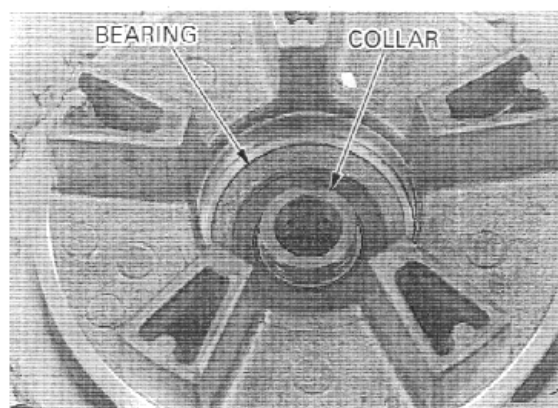
Bearing remover head, 20 mm 07746-0050600 or equivalent commercially available in U.S.A.



REAR WHEEL/SUSPENSION

Remove the driven flange collar.

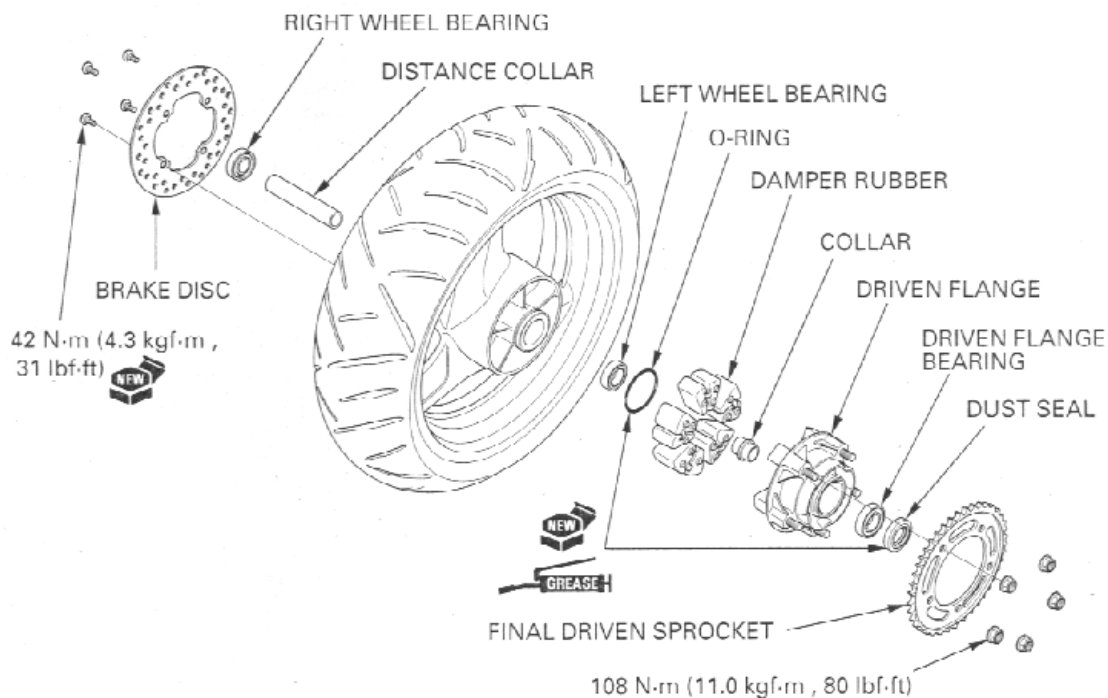
Remove the driven flange bearing.



ASSEMBLY

NOTE:

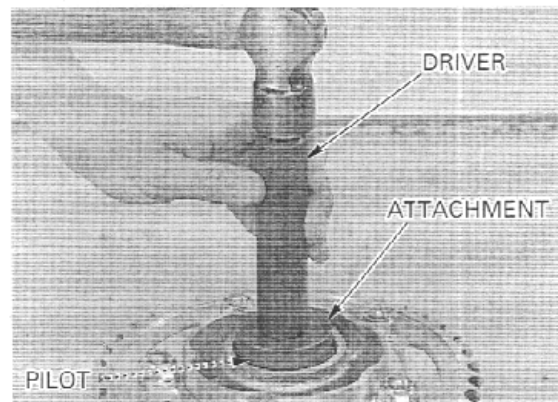
Refer to page 13-10 for wheel balance.



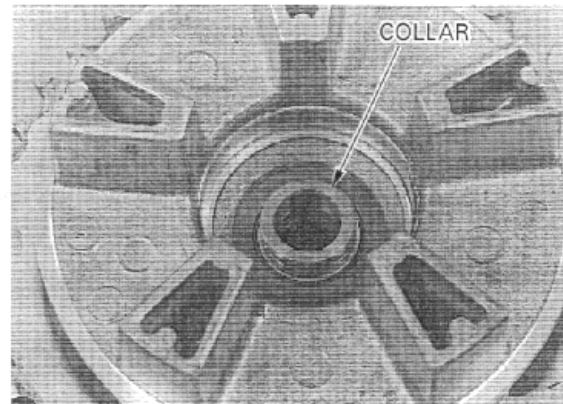
Drive in a new driven flange bearing squarely with the marking side facing up until it is fully seated, using the special tools.

TOOLS:

Driver	07749-0010000
Attachment, 52 × 55 mm	07746-0010400
Pilot, 22 mm	07746-0041000



Install the driven flange collar.



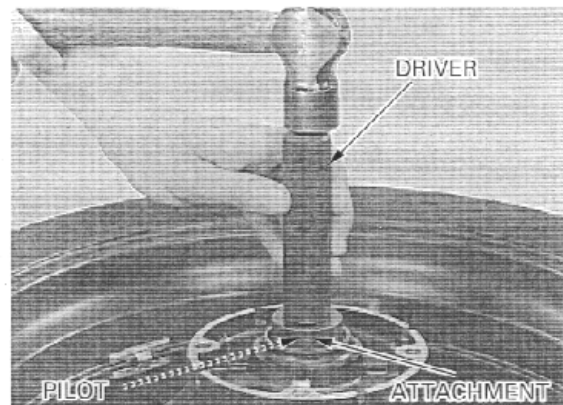
Drive in a new right bearing squarely with the marking side facing up until it is fully seated, using the special tools.

Install the distance collar.

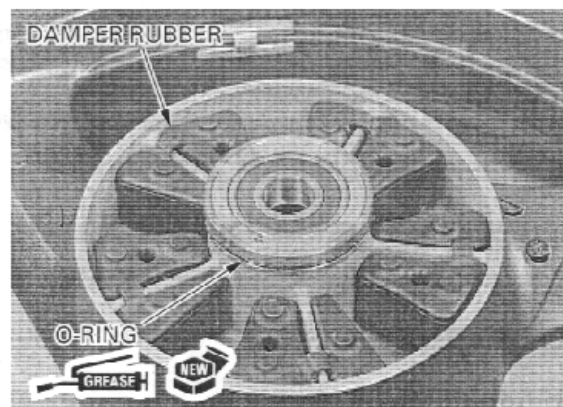
Drive in a new left bearing squarely with the marking side facing up until it is fully seated.

TOOLS:

Driver	07749-0010000
Attachment, 42 × 47 mm	07746-0010300
Pilot, 20 mm	07746-0040500



Install the damper rubbers into the left wheel hub. Coat a new O-ring with grease and install it into the left wheel hub groove.

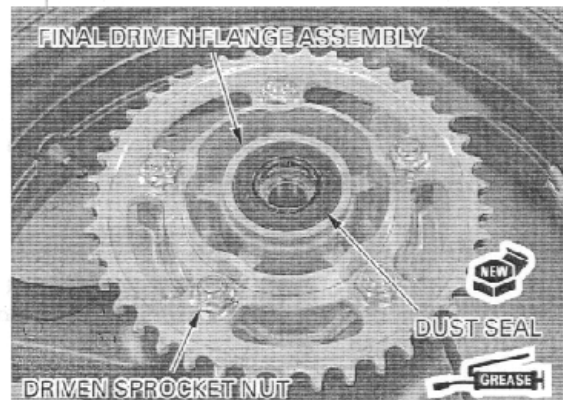


Install the driven flange assembly into the left wheel hub.

When the driven sprocket is replaced, install a new sprocket and tighten the nuts.

TORQUE: 108 N·m (11.0 kgf·m, 80 lbf·ft)

Apply grease to a new dust seal lip and install it into the driven flange.

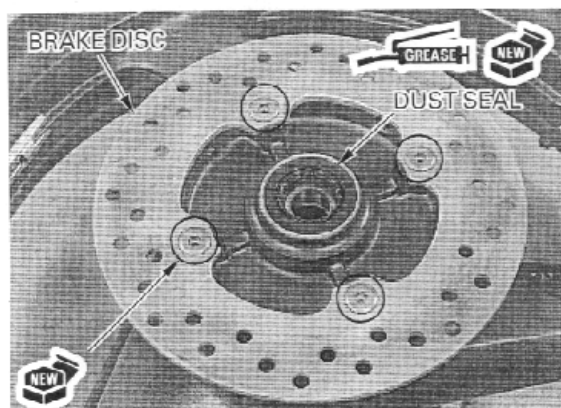


REAR WHEEL/SUSPENSION

Install the brake disc onto the right wheel hub.
Install new disc bolts and tighten them in a criss-cross pattern in 2 or 3 steps.

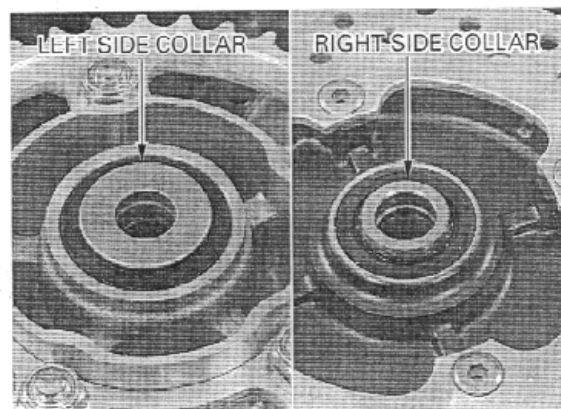
TORQUE: 42 N·m (4.3 kgf·m, 31 lbf·ft)

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



INSTALLATION

Install the side collars.



Make sure that the rear brake caliper is in position.
Place the rear wheel in the swingarm and install the drive chain over the driven sprocket.
Insert the rear axle through the swingarm, wheel and caliper bracket.
Install the washer and axle nut.

Adjust the drive chain slack (page 3-14).



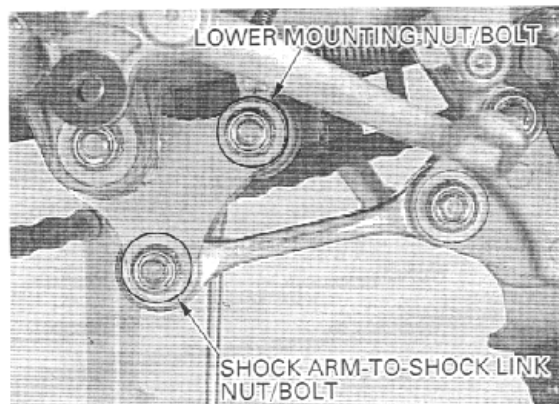
SHOCK ABSORBER

REMOVAL

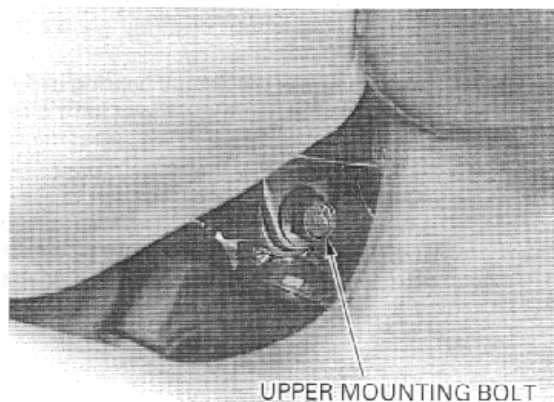
Support the motorcycle securely with a hoist or equivalent.

Remove the exhaust pipe (page 2-5).

Remove the shock arm-to-shock link nut and bolt.
Remove the shock absorber lower mounting nut and bolt.

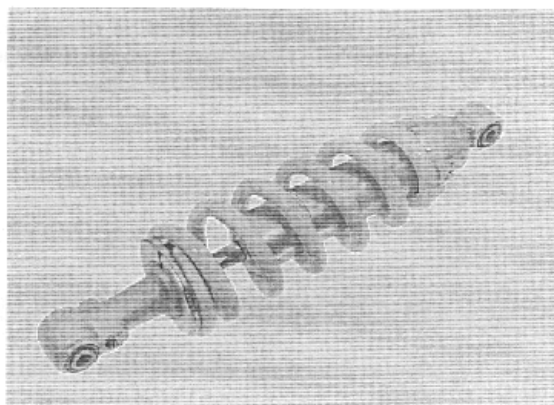


Remove the shock absorber upper mounting bolt and the shock absorber.



INSPECTION

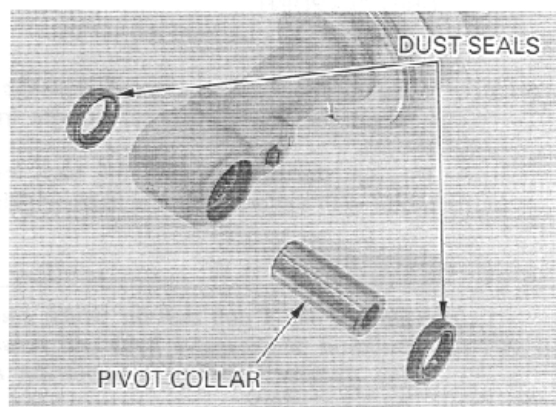
Check the damper unit for leakage or other damage.
Check the upper joint bushing for wear or damage.
Replace the shock absorber assembly if necessary.



Remove the lower joint pivot collar.
Check the dust seals and needle bearing for wear or damage; replace them if necessary.

NEEDLE BEARING REPLACEMENT

Remove the dust seals.

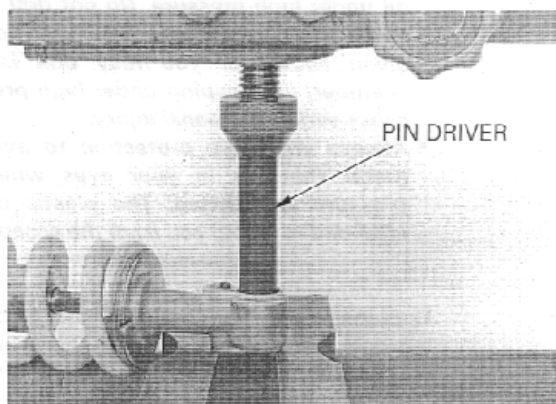


Set the lower joint in a hydraulic press with the rebound damping adjuster facing up when pressing in and out the bearing.

Press the needle bearing out of the lower joint using the special tool.

TOOL:
Pin driver

07GMD-KT80100

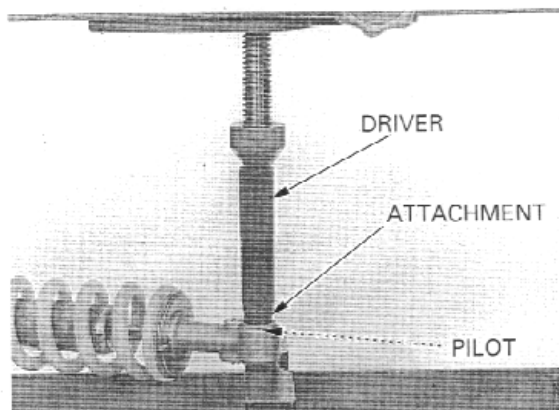


REAR WHEEL/SUSPENSION

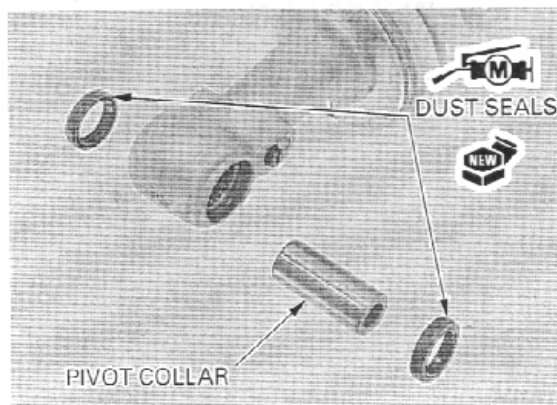
Press in the bearing with the marking side facing up. Apply molybdenum disulfide grease to the needle rollers of a new bearing. Carefully press the needle bearing in the lower joint until the depth from the lower joint outer surface is 5.0–5.5 mm (0.20–0.22 in), using the special tool.

TOOLS:

Driver	07749-0010000
Attachment, 24 × 26 mm	07746-0010700
Pilot, 17 mm	07746-0040400



Apply molybdenum disulfide grease to new dust seal lips and install them into the lower joint. Install the lower joint pivot collar.



SHOCK ABSORBER DISPOSAL

Center punch the damper case to mark the drilling point.

DRILLING POINT:

30.0 mm (1.18 in) from top surface

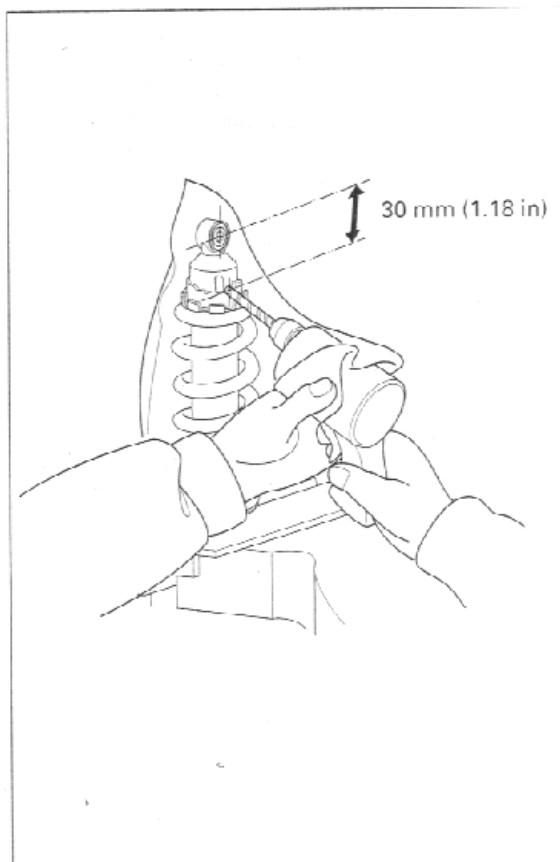
Wrap the shock absorber inside a plastic bag. Support the shock absorber upright in a vise as shown.

Through the open end of the bag, insert a drill motor with a sharp 2–3 mm (5/64–1/8 in) drill bit.

⚠ WARNING

- *Do not use a dull drill bit which could cause a build-up of excessive heat and pressure inside the damper, leading to explosion and severe personal injury.*
- *The shock absorber contains nitrogen gas and oil under high pressure. Do not drill any further down the damper case than the measurement given above, or you may drill into the oil chamber; oil escaping under high pressure may cause serious personal injury.*
- *Always wear eye protection to avoid getting metal shavings in your eyes when the gas pressure is released. The plastic bag is only intended to shield you from the escaping gas.*

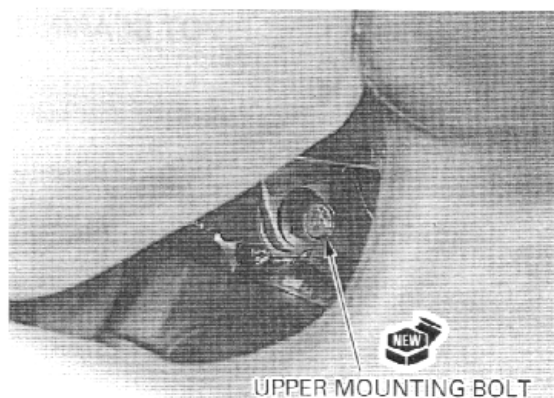
Hold the bag around the drill motor and briefly run the drill motor inside the bag; this will inflate the bag with air from the motor and help keep the bag from the getting caught in the bit when you start.



INSTALLATION

Install the shock absorber in the frame with the rebound damping adjuster facing to the right. Install and tighten a new upper mounting bolt.

TORQUE: 44 N·m (4.5 kgf·m , 33 lbf·ft)



Install the lower mounting bolt and tighten the nut.

TORQUE: 44 N·m (4.5 kgf·m , 33 lbf·ft)

Install the shock arm-to-shock link bolt and tighten the nut.

TORQUE: 44 N·m (4.5 kgf·m , 33 lbf·ft)

Install the exhaust pipe and mufflers (page 2-6).



SUSPENSION LINKAGE

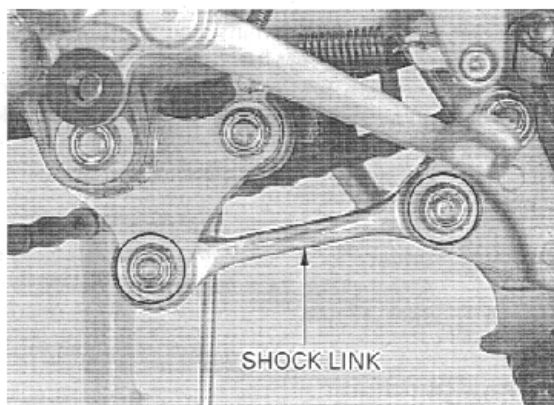
REMOVAL

Support the motorcycle securely with a hoist or equivalent.

Remove the exhaust pipe (page 2-5).

Remove the following:

- shock arm-to-shock link nut and bolt
- shock link-to-bracket nut and bolt
- shock link

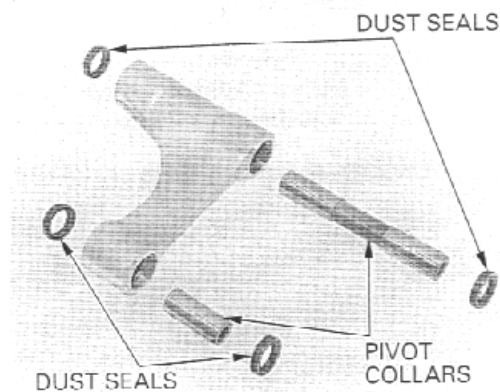


- shock arm-to-swingarm nut and bolt
- shock absorber lower mounting nut and bolt
- shock arm



SHOCK LINK PIVOT BEARING REPLACEMENT

Remove the pivot collars and dust seals.



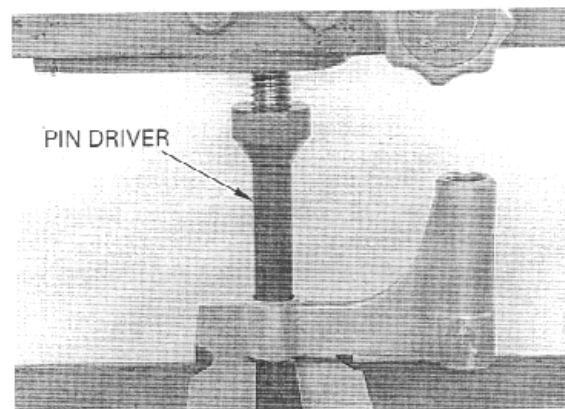
SHOCK ARM SIDE

Press the needle bearing out of the shock link pivot using the special tool.

TOOL:

Pin driver

07GMD-KT80100



Press in the bearing with the marking side facing up.

Apply molybdenum disulfide grease to the needle rollers of a new bearing. Carefully press the needle bearing in the shock link pivot until the depth from the shock link outer surface is 5.2–5.7 mm (0.20–0.22 in), using the special tool.

TOOLS:

Driver

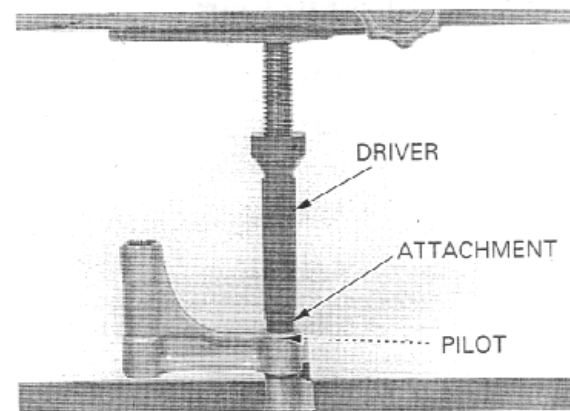
07749-0010000

Attachment, 24 × 26 mm

07746-0010700

Pilot, 17 mm

07746-0040400



SHOCK LINK BRACKET SIDE

Remove the needle bearings from the shock link pivot using the special tools.

TOOLS:

Bearing remover, 17 mm

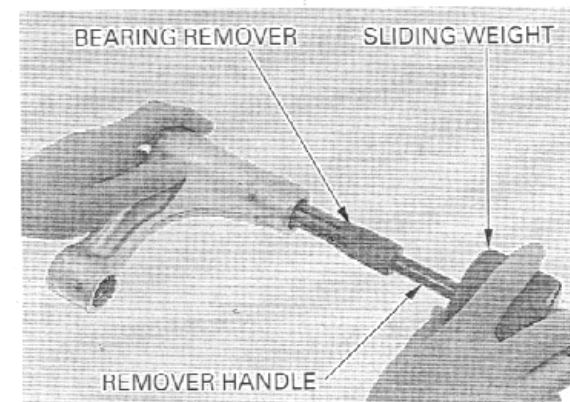
07936-3710300 or equivalent commercially available in U.S.A.

Bearing remover handle

07936-3710100 or equivalent commercially available in U.S.A.

Bearing remover weight

07741-0010201 or equivalent commercially available in U.S.A.

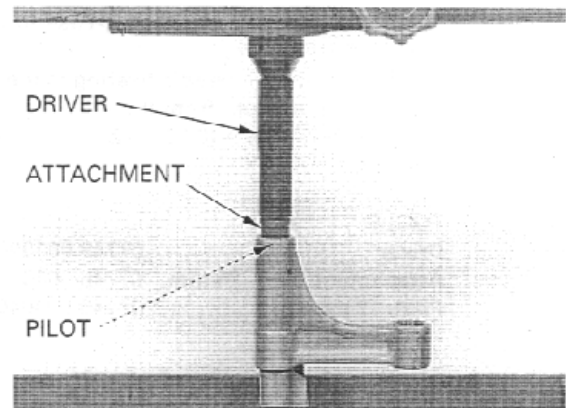


Press in the bearing with the marking side facing up.

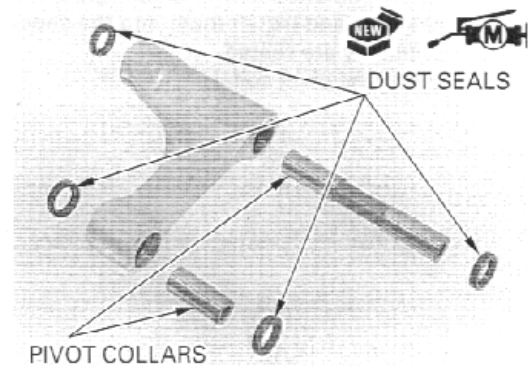
Apply molybdenum disulfide grease to the needle rollers of new bearings. Carefully press the needle bearing in the shock link pivot until the depth from the shock link outer surface is 5.2–5.7 mm (0.20–0.22 in), using the special tool.

TOOLS:

Driver	07749-0010000
Attachment, 24 × 26 mm	07746-0010700
Pilot, 17 mm	07746-0040400

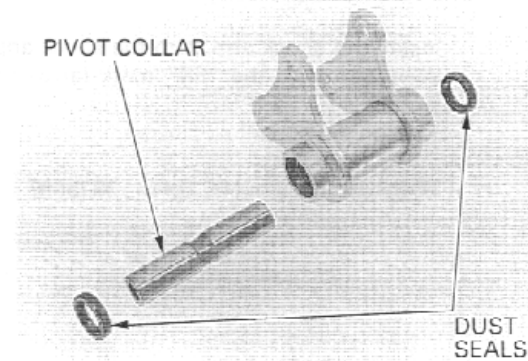


Apply molybdenum disulfide grease to new dust seal lips and install them into the shock link pivots until they are seated. Install the pivot collars.



SHOCK ARM PIVOT BEARING REPLACEMENT

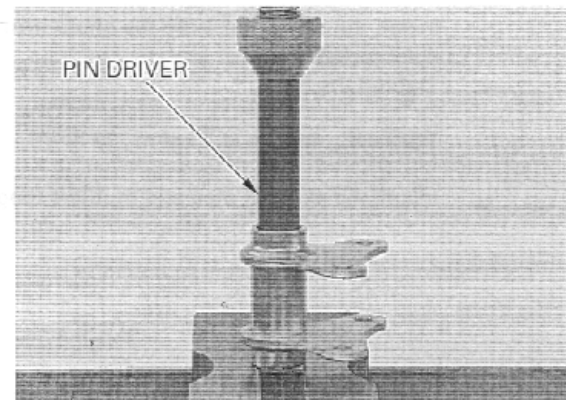
Remove the pivot collar and dust seals.



Press the needle bearings out of the shock arm pivot using the special tool.

TOOL:

Pin driver	07GMD-KT80100
-------------------	---------------



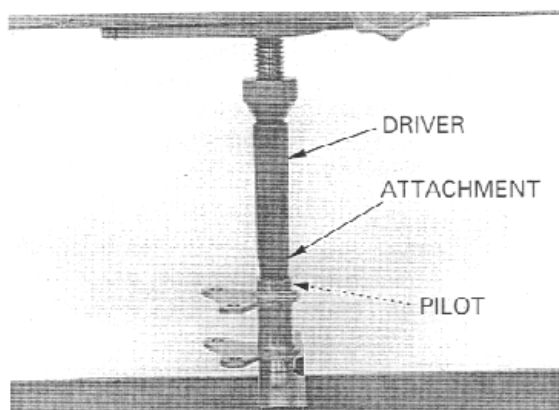
REAR WHEEL/SUSPENSION

Press in the bearing with the marking side facing up.

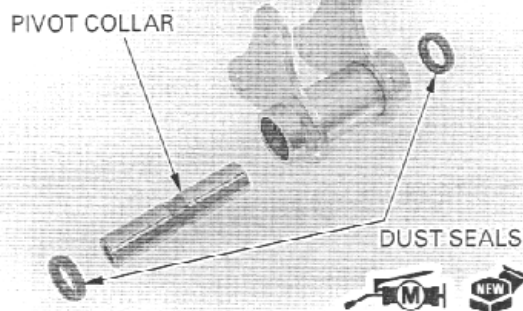
Apply molybdenum disulfide grease to the needle rollers of new bearings. Carefully press the needle bearing in the shock link pivot until the depth from the shock link outer surface is 5.2–5.7 mm (0.20–0.22 in), using the special tool.

TOOLS:

Driver	07749-0010000
Attachment, 24 × 26 mm	07746-0010700
Pilot, 17 mm	07746-0040400



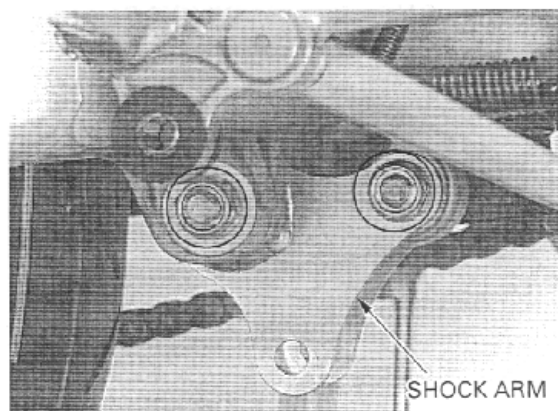
Apply molybdenum disulfide grease to new dust seal lips and install them into the shock link pivots until they are seated. Install the pivot collar.



INSTALLATION

Install the shock arm onto the shock absorber and swingarm with the "FR" mark (arrow) facing forward. Tighten the nuts.

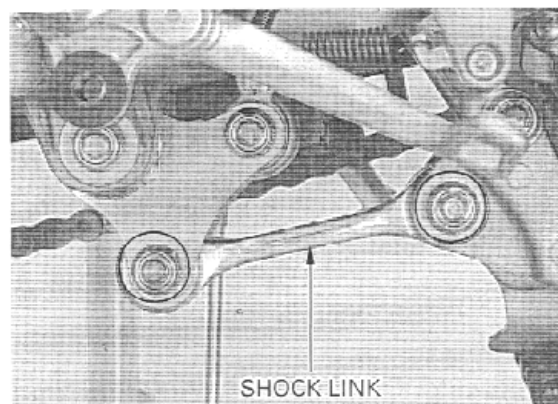
TORQUE: 44 N·m (4.5 kgf·m, 33 lbf·ft)



Install the shock link onto the shock arm and shock link bracket. Tighten the nuts.

TORQUE: 44 N·m (4.5 kgf·m, 33 lbf·ft)

Install the exhaust pipe and mufflers (page 2-6).



SWINGARM

REMOVAL

Remove the left and right mufflers (page 2-5).
Remove the rear wheel (page 14-3).

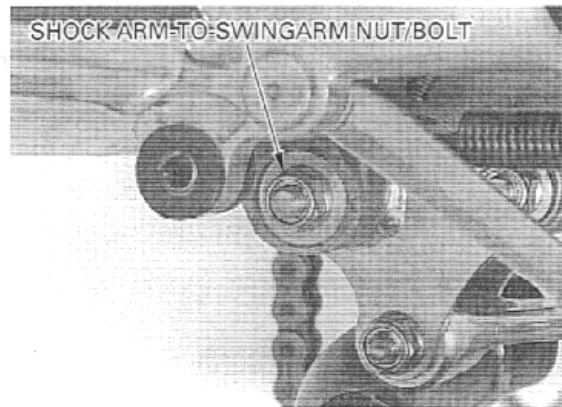
Remove the two bolts and drive chain cover.



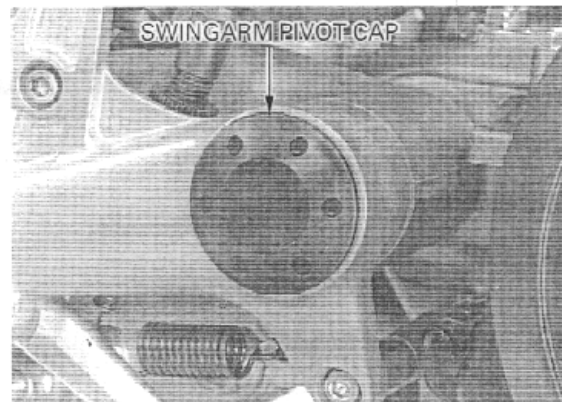
Remove the rear brake hose from the clamps and remove the rear brake caliper/bracket assembly from the swingarm.



Remove the shock arm-to-swingarm nut and bolt.

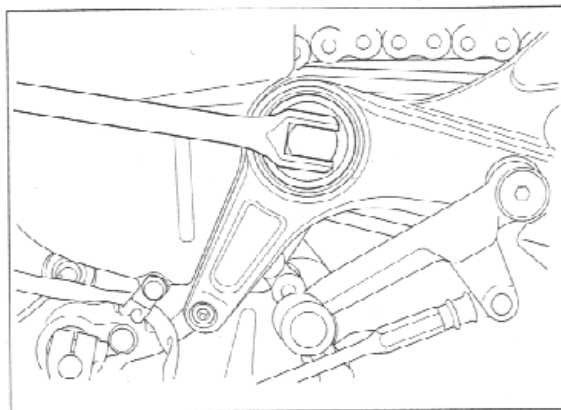


Remove the left and right swingarm pivot caps.

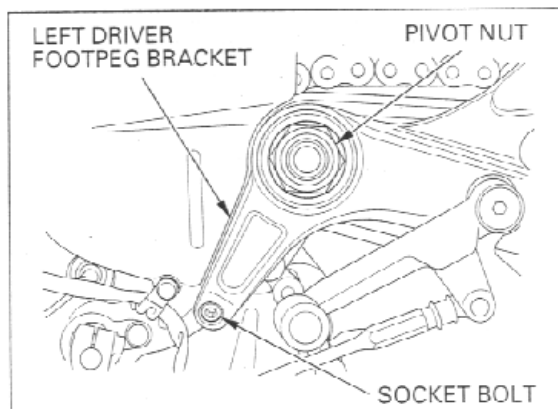


REAR WHEEL/SUSPENSION

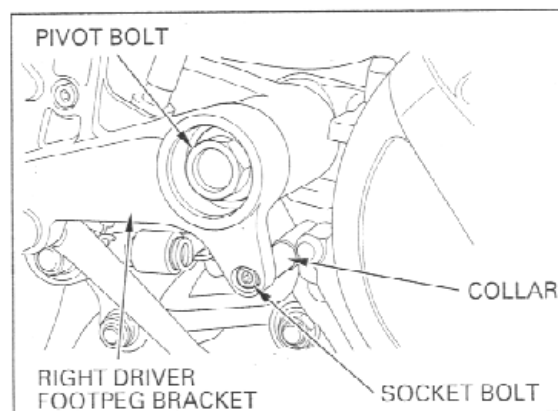
Loosen the swingarm pivot nut.



Remove the socket bolt, swingarm pivot nut and left driver footpeg bracket.

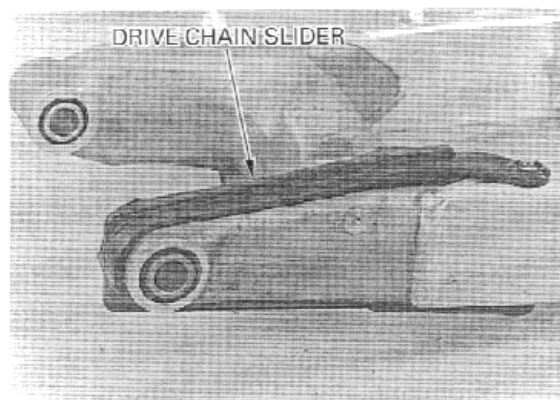


Remove the socket bolt and collar.
Remove the swingarm pivot bolt and right driver footpeg bracket.
Remove the swingarm from the engine.

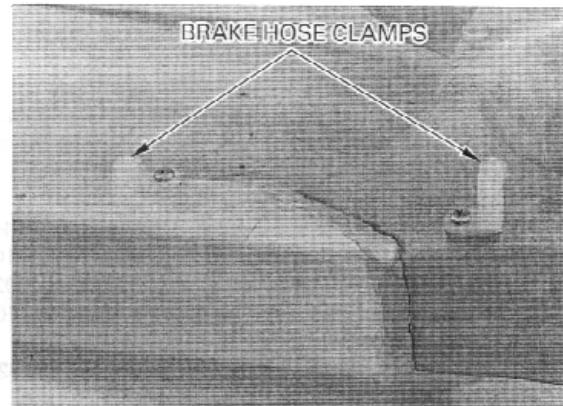


DISASSEMBLY

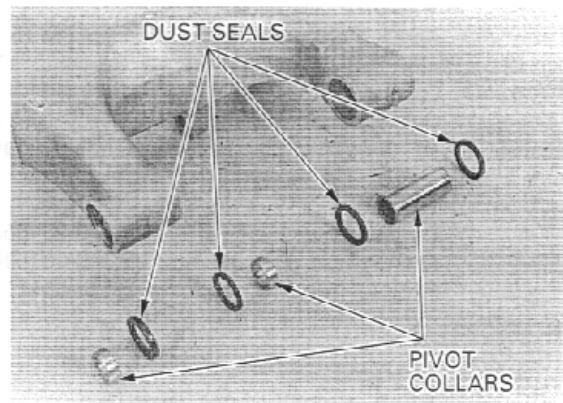
Remove the two bolts and drive chain slider if necessary.



Remove the screws and brake hose clamps if necessary.



Remove the pivot collars and dust seals.



PIVOT BEARING REPLACEMENT

RIGHT PIVOT BEARING

Remove the snap ring.
Drive ball bearings and distance collar out of the pivot.

Pack new bearing cavities with molybdenum disulfide grease.

Press the inner bearing into the pivot with the marking side facing up until it is fully seated, using the special tools.

TOOLS:

Driver	07749-0010000
Attachment, 32 × 35 mm	07746-0010100
Pilot, 20 mm	07746-0040500

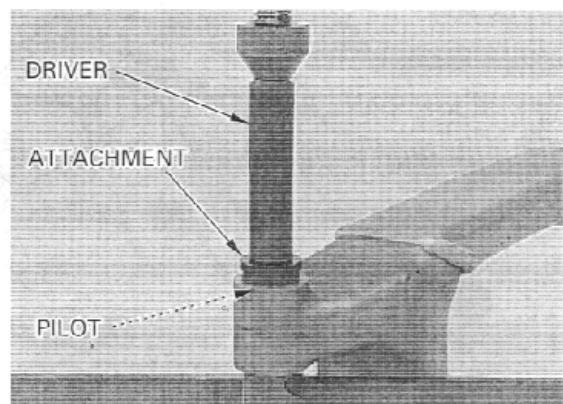
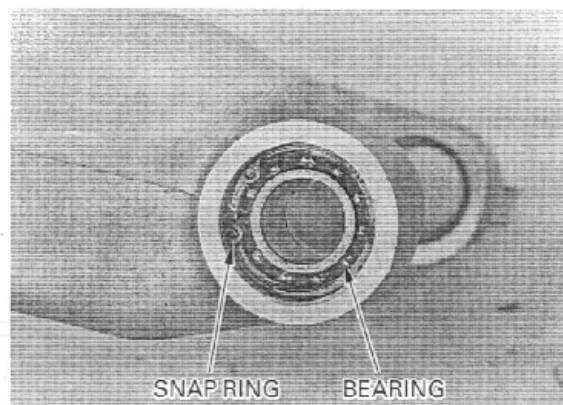
Install the distance collar.

Press the outer bearing into the pivot with the marking side facing up until it is seated, using the special tools.

TOOLS:

Driver	07749-0010000
Attachment, 37 × 40 mm	07746-0010200
Pilot, 20 mm	07746-0040500

Install the snap ring.



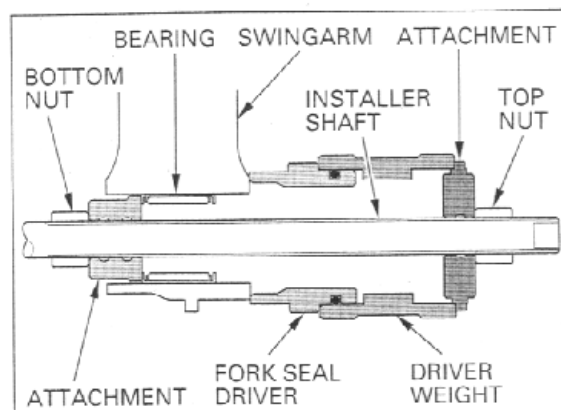
REAR WHEEL/SUSPENSION

LEFT PIVOT BEARING

Assemble the special tools as shown.
Hold the installer shaft with the wrench and remove the needle bearing by tightening the top nut.

TOOLS:

Fork seal driver weight	07947-KA50100
Fork seal driver	07947-KF00100
Installer shaft	07VMF KZ30200
Attachment, 32 × 35 mm	07746-0010100
Main bearing driver attachment	07946-ME90200

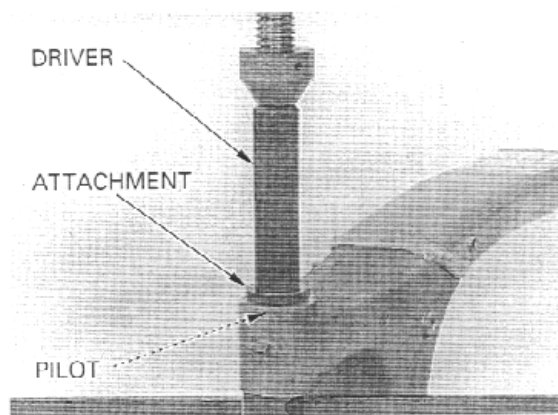


Press in the bearing with the marking side facing up.

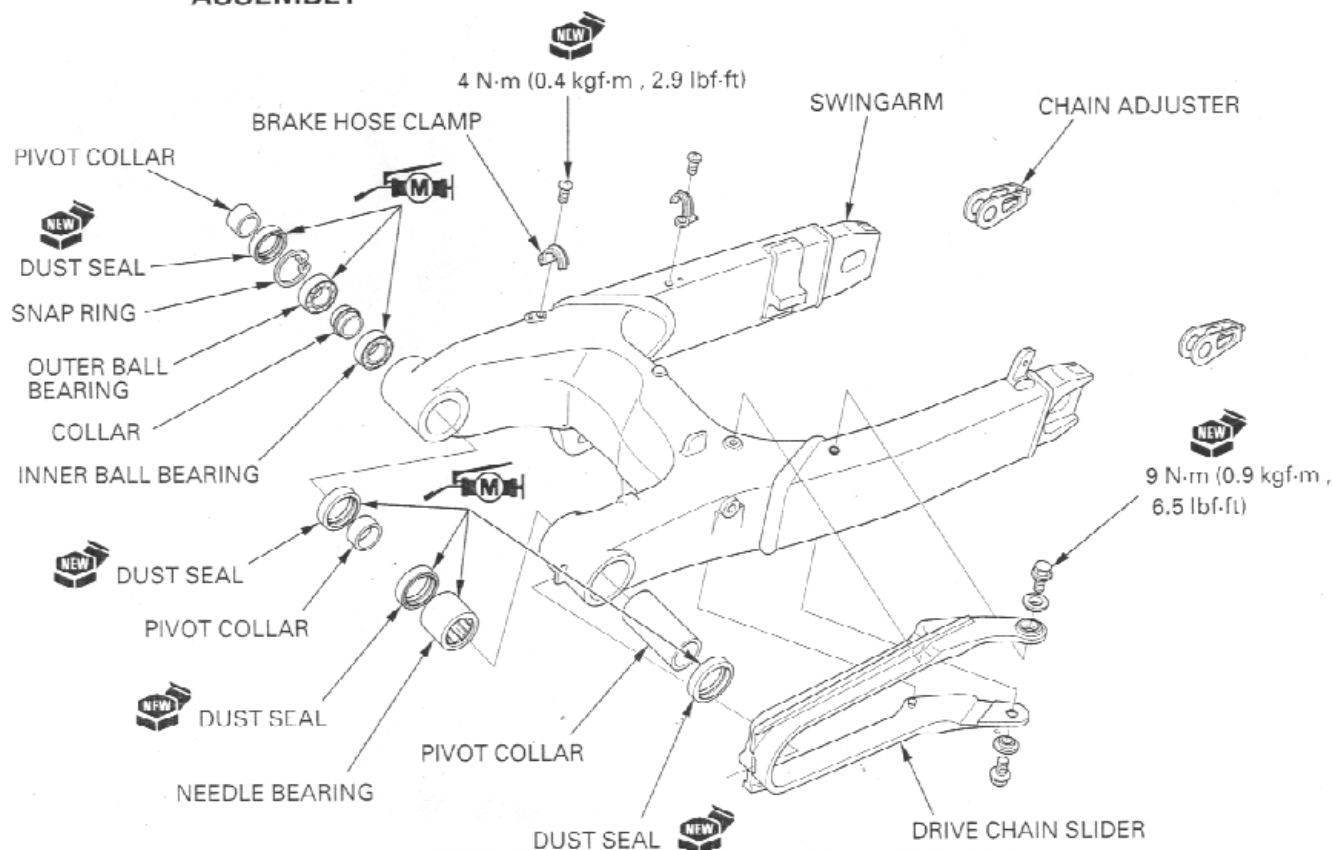
Apply molybdenum disulfide grease to the needle rollers of a new bearing.
Carefully press the needle bearing into pivot until the depth from the swingarm outer surface is 14–15 mm (0.55–0.59 in), using the special tool.

TOOLS:

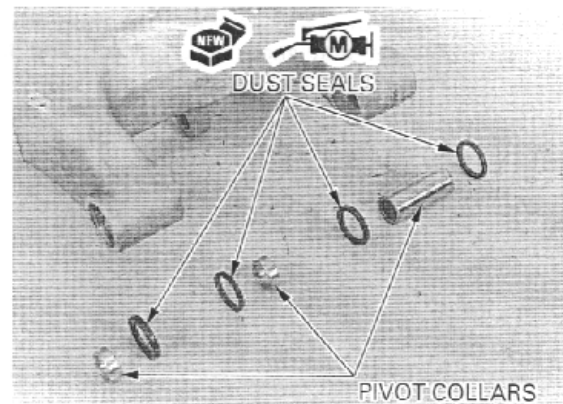
Driver	07749-0010000
Attachment, 37 × 40 mm	07746-0010200
Pilot, 28 mm	07746-0041100



ASSEMBLY

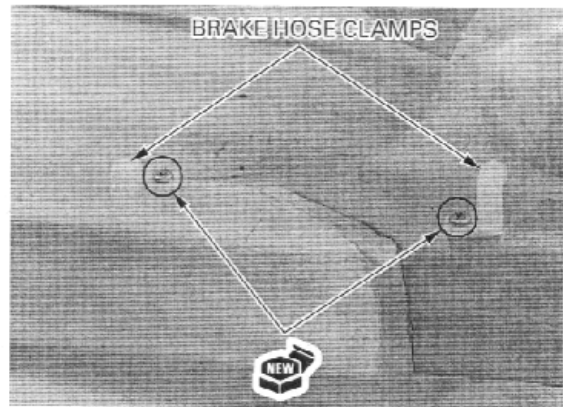


Apply molybdenum disulfide grease to new dust seal lips and install them into the swingarm pivots. Install the pivot collars.



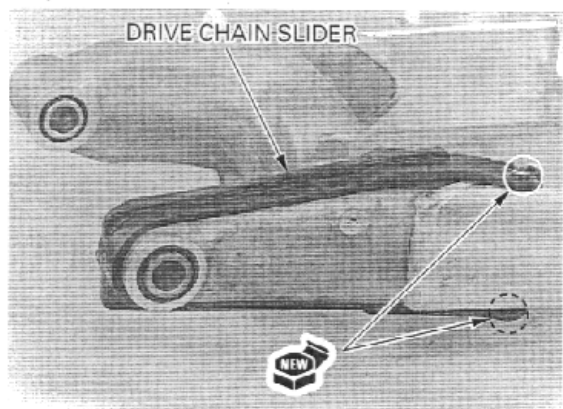
Install the brake hose clamps if removed, aligning the boss with the hole in the swingarm. Install and tighten new screws.

TORQUE: 4 N·m (0.4 kgf·m , 2.9 lbf·ft)



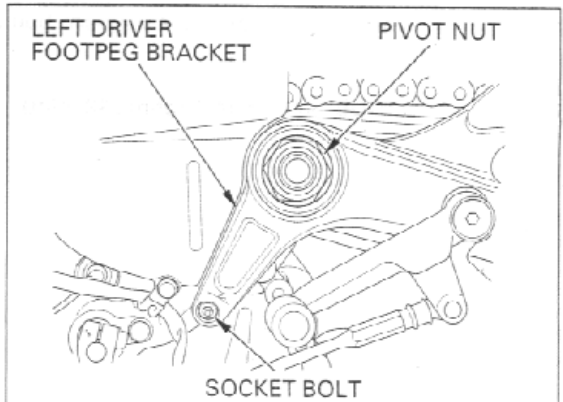
Install the drive chain slider if removed, aligning the hole with the boss of the swingarm. Install and tighten new bolts.

TORQUE: 9 N·m (0.9 kgf·m , 6.5 lbf·ft)



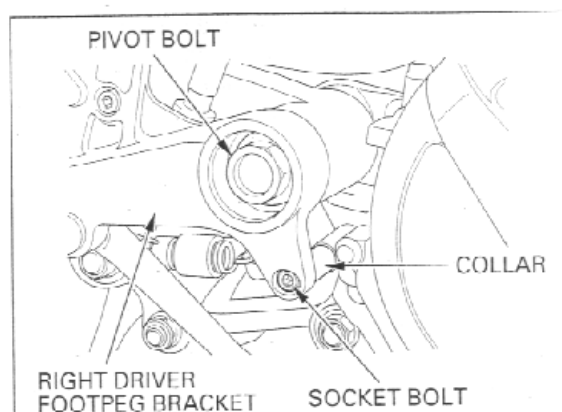
INSTALLATION

Install the swingarm onto the engine and insert the pivot bolt through the right driver footpeg bracket, swingarm, engine and left driver footpeg bracket. Install the swingarm pivot nut. Install the left driver footpeg bracket onto the shock link bracket and tighten the socket bolt.



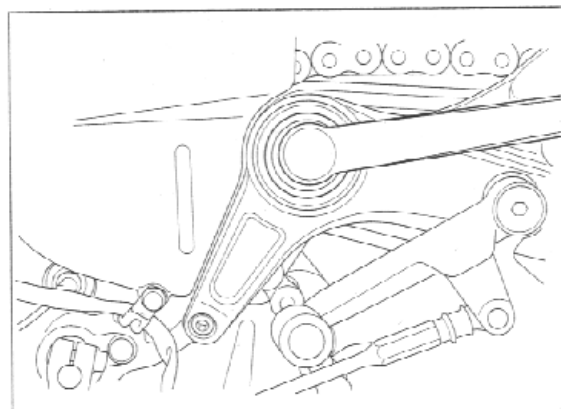
REAR WHEEL/SUSPENSION

Install the collar between the right driver footpeg bracket and shock link bracket, and tighten the socket bolt.

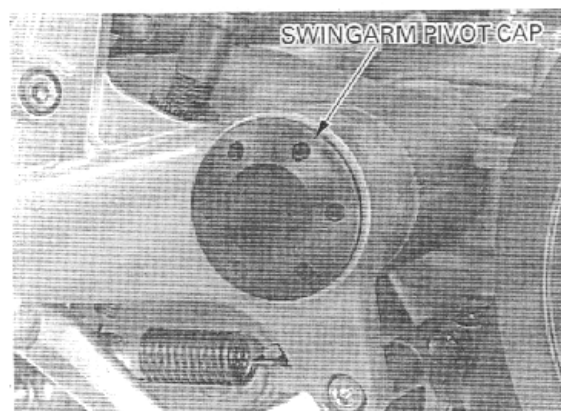


Tighten the swingarm pivot nut.

TORQUE: 93 N·m (9.5 kgf·m , 69 lbf·ft)

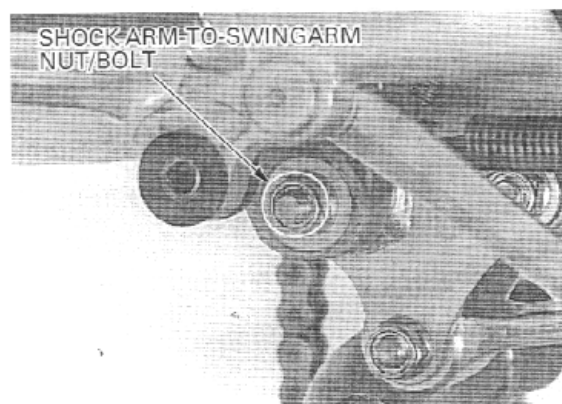


Install the left and right swingarm pivot caps.

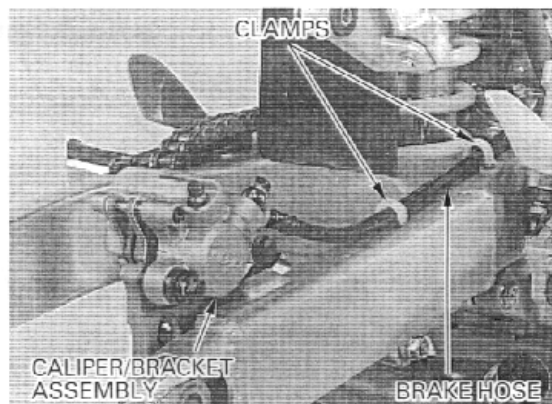


Install the shock arm-to-swingarm bolt and tighten the nut.

TORQUE: 44 N·m (4.5 kgf·m , 33 lbf·ft)



Install the rear brake caliper/bracket assembly onto the boss of the swingarm.
Install the rear brake hose in the clamps.



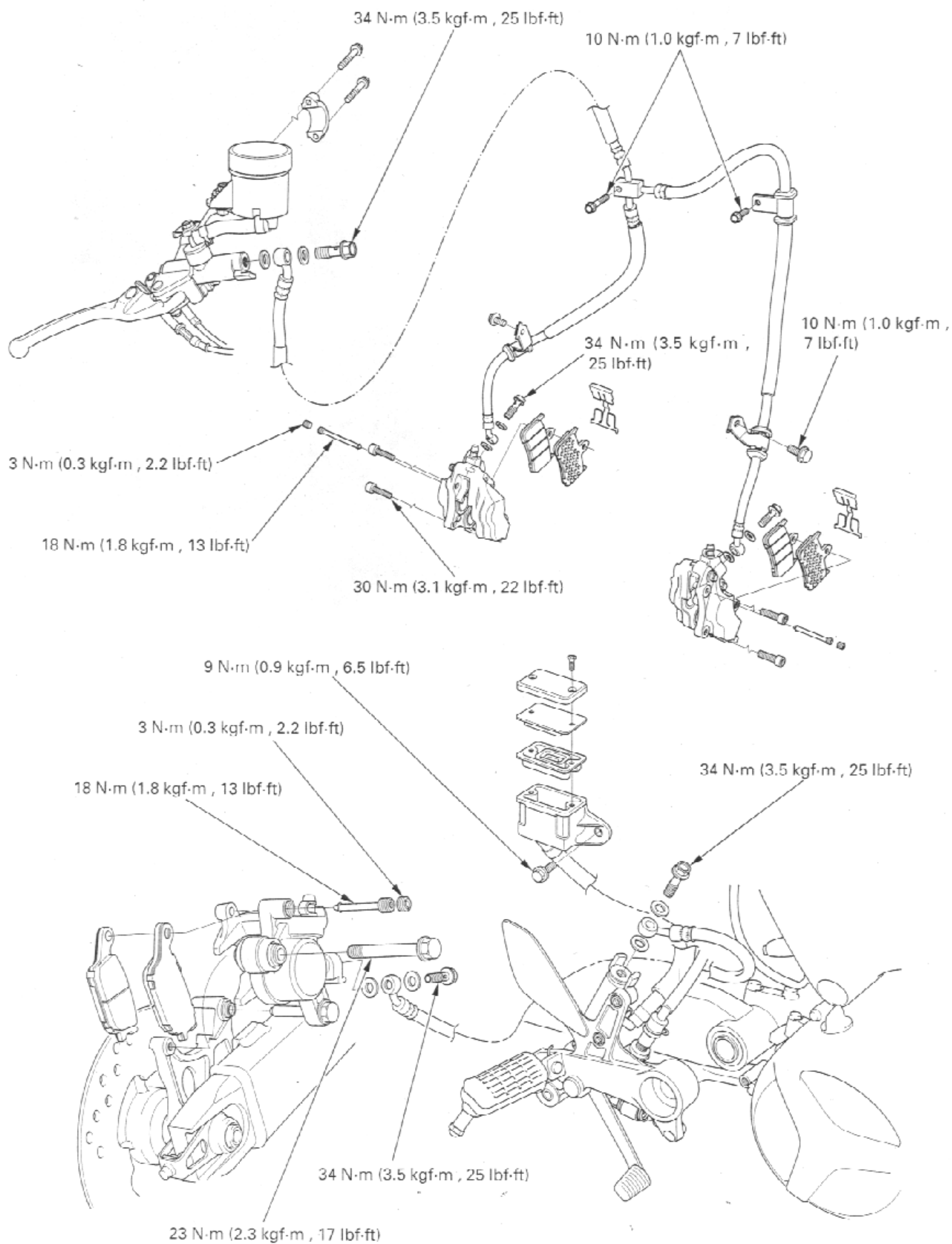
Install the drive chain cover aligning the slot with the boss of the swingarm, and tighten the two bolts.

Install the rear wheel (page 14-8).

Install the left and right mufflers (page 2-6).



HYDRAULIC BRAKE



15. HYDRAULIC BRAKE

SERVICE INFORMATION	15-1	FRONT MASTER CYLINDER	15-7
TROUBLESHOOTING	15-2	REAR MASTER CYLINDER/ BRAKE PEDAL	15-12
BRAKE FLUID REPLACEMENT/ AIR BLEEDING	15-3	FRONT BRAKE CALIPER	15-16
BRAKE PAD/DISC	15-5	REAR BRAKE CALIPER	15-19

SERVICE INFORMATION

GENERAL

▲WARNING

A contaminated brake disc or pad reduces stopping power. Discard contaminated pads and clean a contaminated disc with a high quality brake degreasing agent.

- Spilled brake fluid will severely damage the plastic parts and painted surfaces. It is also harmful to some rubber parts. Be careful whenever you remove the reservoir cap; make sure the reservoir is horizontal first.
- Never allow contaminants (dirt, water, etc.) to get into an open reservoir.
- Once the hydraulic system has been opened, or if the brake feels spongy, the system must be bled.
- Always use fresh DOT 4 brake fluid from a sealed container when servicing the system. Do not mix different types of fluid as they may not be compatible.
- Always check brake operation before riding the motorcycle.
- A hoist or equivalent is required to support the motorcycle when servicing the rear master cylinder.

SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Front	Specified brake fluid	DOT 4	
	Brake disc thickness	4.4 – 4.6 (0.17 – 0.18)	3.5 (0.14)
	Brake disc runout		0.30 (0.012)
	Master cylinder I. D.	14.000 – 14.043 (0.5512 – 0.5529)	14.055 (0.5533)
	Master piston O. D.	13.957 – 13.984 (0.5495 – 0.5506)	13.945 (0.5490)
	Caliper cylinder I. D.	A	30.23 – 30.28 (1.190 – 1.192)
		B	27.000 – 27.050 (1.0630 – 1.0650)
	Caliper piston O. D.	A	30.148 – 30.198 (1.1869 – 1.1889)
		B	26.918 – 26.968 (1.0598 – 1.0617)
Rear	Specified brake fluid	DOT 4	
	Brake disc thickness	4.8 – 5.2 (0.19 – 0.20)	4.0 (0.16)
	Brake disc runout		0.30 (0.012)
	Master cylinder I. D.	14.000 – 14.043 (0.5512 – 0.5529)	14.055 (0.5533)
	Master piston O. D.	13.957 – 13.984 (0.5495 – 0.5506)	13.945 (0.5490)
	Caliper cylinder I. D.	38.18 – 38.23 (1.503 – 1.505)	38.24 (1.506)
	Caliper piston O. D.	38.098 – 38.148 (1.4999 – 1.5019)	38.09 (1.500)

HYDRAULIC BRAKE

TORQUE VALUES

Brake caliper bleed valve	6 N·m (0.6 kgf·m , 4.3 lbf·ft)	
Pad pin plug	3 N·m (0.3 kgf·m , 2.2 lbf·ft)	
Pad pin	18 N·m (1.8 kgf·m , 13 lbf·ft)	
Brake hose oil bolt	34 N·m (3.5 kgf·m , 25 lbf·ft)	
Front brake lever pivot nut	6 N·m (0.6 kgf·m , 4.3 lbf·ft)	
Front brake fluid reservoir mounting nut	6 N·m (0.6 kgf·m , 4.3 lbf·ft)	U-nut
Front master cylinder holder bolt	12 N·m (1.2 kgf·m , 9 lbf·ft)	
Rear brake fluid reservoir mounting bolt	9 N·m (0.9 kgf·m , 6.5 lbf·ft)	
Rear master cylinder mounting bolt	10 N·m (1.0 kgf·m , 7 lbf·ft)	
Rear master cylinder joint nut	18 N·m (1.8 kgf·m , 13 lbf·ft)	
Swingarm pivot nut	93 N·m (9.5 kgf·m , 69 lbf·ft)	U-nut
Front brake caliper mounting bolt	30 N·m (3.1 kgf·m , 22 lbf·ft)	ALOC bolt
Front brake caliper assembly bolt	32 N·m (3.3 kgf·m , 24 lbf·ft)	Apply locking agent to the threads
Rear brake caliper bolt	23 N·m (2.3 kgf·m , 17 lbf·ft)	
Rear brake caliper pin bolt	27 N·m (2.8 kgf·m , 20 lbf·ft)	Apply locking agent to the threads

TOOL

Snap ring pliers	07914-3230001
------------------	---------------

TROUBLESHOOTING

Brake lever/pedal soft or spongy

- Air in hydraulic system
- Leaking hydraulic system
- Contaminated brake pad/disc
- Worn caliper piston seals
- Worn master cylinder piston cups
- Worn brake pad/disc
- Contaminated caliper
- Contaminated master cylinder
- Caliper not sliding properly
- Low brake fluid level
- Clogged fluid passage
- Warped/deformed brake disc
- Sticking/worn caliper piston
- Sticking/worn master piston
- Bent brake lever/pedal

Brake lever/pedal hard

- Clogged/restricted hydraulic system
- Sticking/worn caliper piston
- Sticking/worn master piston
- Caliper not sliding properly
- Bent brake lever/pedal

Brake drag

- Contaminated brake pad/disc
- Misaligned wheel
- Badly worn brake pad/disc
- Warped/deformed brake disc
- Caliper not sliding properly
- Clogged/restricted fluid passage
- Sticking caliper piston

BRAKE FLUID REPLACEMENT/AIR BLEEDING

▲WARNING

A contaminated brake disc or pad reduces stopping power. Discard contaminated pads and clean a contaminated disc with a high quality brake degreasing agent.

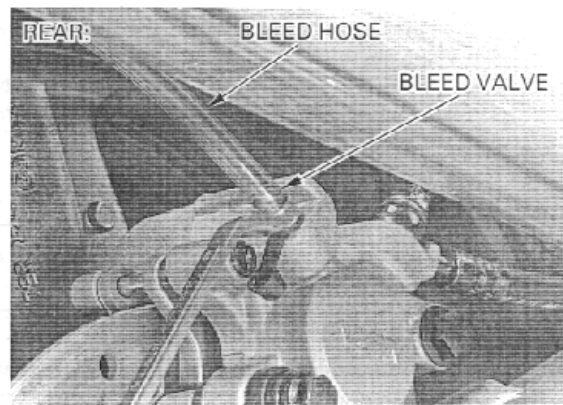
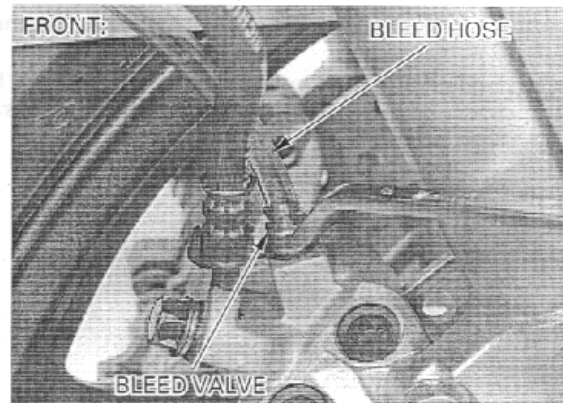
CAUTION:

- Do not allow foreign material to enter the system when filling the reservoir.
- Avoid spilling fluid on painted, plastic or rubber parts. Place a rag over these parts whenever the system is serviced.
- Use only DOT 4 brake fluid from a sealed container.
- Do not mix different types of fluid. They are not compatible.

BRAKE FLUID DRAINING

Remove the reservoir cap, set plate and diaphragm (page 3-19 for front, page 3-20 for rear).

Connect a bleed hose to the bleed valve. Loosen the bleed valve and pump the brake lever or pedal until no more fluid flows out of the bleed valve.



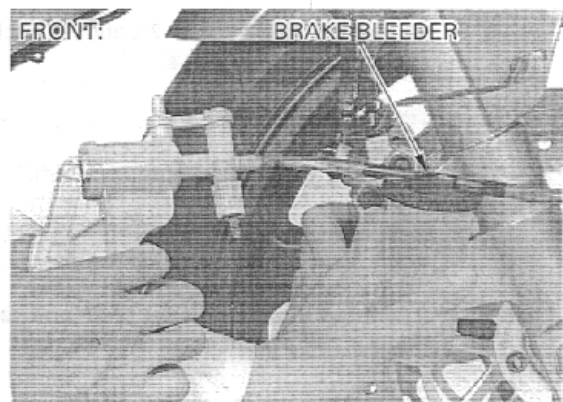
BRAKE FLUID FILLING/BLEEDING

Close the bleed valve. Fill the reservoir with DOT 4 brake fluid from a sealed container.

Connect a commercially available brake bleeder to the bleed valve. Pump the brake bleeder and loosen the bleed valve. Add brake fluid when the fluid level in the reservoir is low.

NOTE:

- Check the fluid level often while bleeding the brake to prevent air from being pumped into the system.
- When using a brake bleeding tool, follow the manufacturer's operating instructions.



HYDRAULIC BRAKE

Repeat the above procedures until air bubbles do not appear in the plastic hose.

NOTE:

If air is entering the bleeder from around the bleed valve threads, seal the threads with teflon tape.

Close the bleed valve and operate the brake lever or pedal. If it still feels spongy, bleed the system again.

If a brake bleeder is not available, use the following procedure:

Pump up the system pressure with the brake lever or pedal until lever or pedal resistance is felt.

Connect a bleed hose to the bleed valve and bleed the system as follows:

1. Squeeze the brake lever or depress the brake pedal, open the bleed valve 1/2 turn and then close it.

NOTE:

Do not release the brake lever until the bleed valve has been closed.

2. Release the brake lever or pedal slowly and wait several seconds after it reaches the end of its travel.

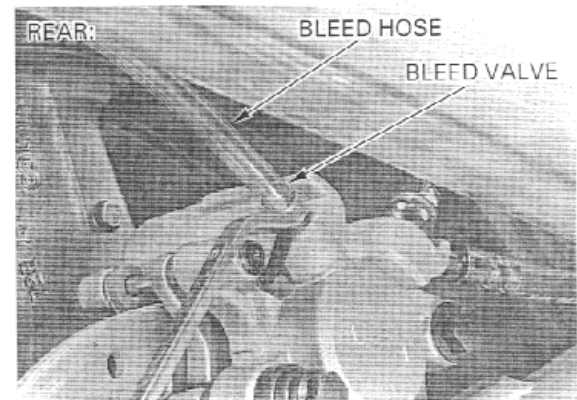
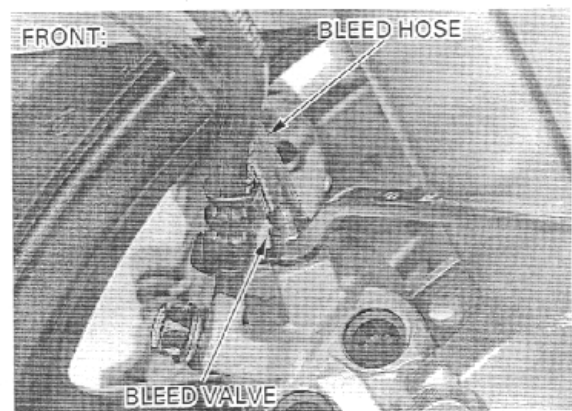
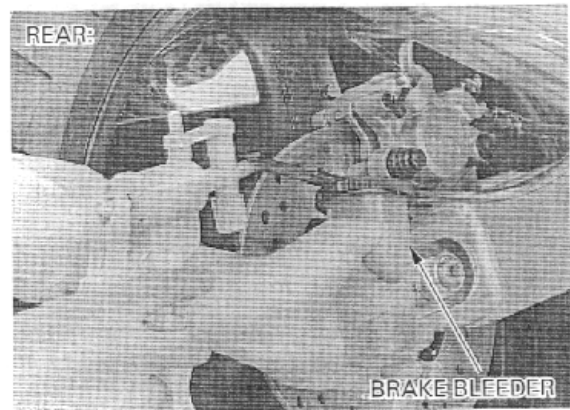
Repeat the steps 1 and 2 until air bubbles do not appear in the bleed hose.

Tighten the bleed valve.

TORQUE: 6 N·m (0.6 kgf·m, 4.3 lbf·ft)

Fill the reservoir to the upper level line with DOT 4 brake fluid from a sealed container.

Install the diaphragm, set plate and reservoir cap (page 3-18 for front, page 3-19 for rear).

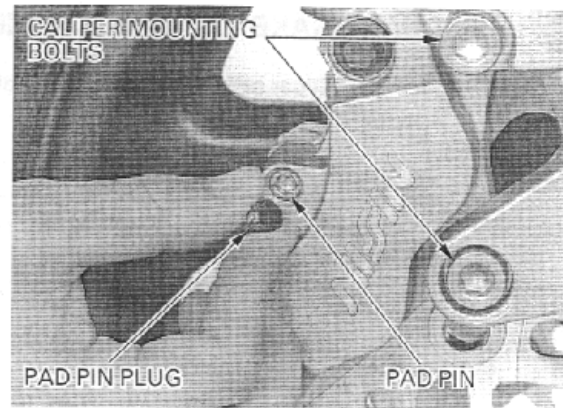


BRAKE PAD/DISC

FRONT BRAKE PAD REPLACEMENT

Always replace the brake pads in pairs to ensure even disc pressure.

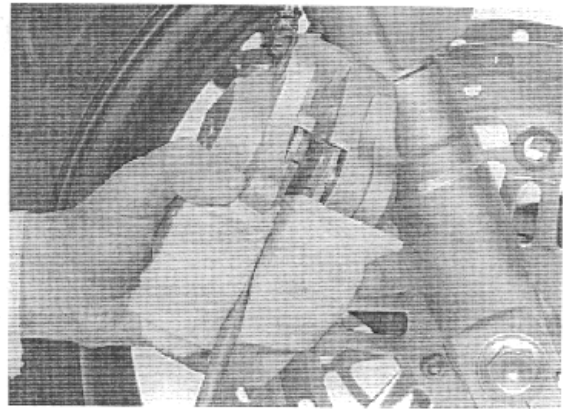
Remove the pad pin plug and loosen the pad pin.
Remove the mounting bolts and front brake caliper.



Push the caliper pistons all the way in to allow installation of new brake pads.

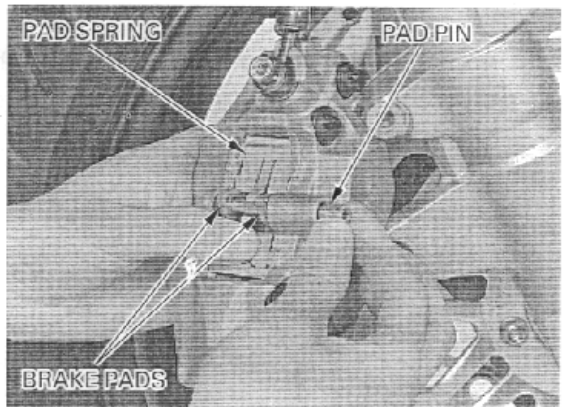
NOTE:

Check the brake fluid level in the brake reservoir as this operation causes the level to rise.



Remove the pad pin while pushing in the pad spring, then remove the pad spring and brake pads.

Install new brake pads and the pad spring by aligning its tabs with the slots in the caliper body.
Install the pad pin while pushing in the pad spring.



Install the front brake caliper so the disc is positioned between the pads, being careful not to damage the pads.

Install and tighten new mounting bolts.

TORQUE: 30 N·m (3.1 kgf·m, 22 lbf·ft)

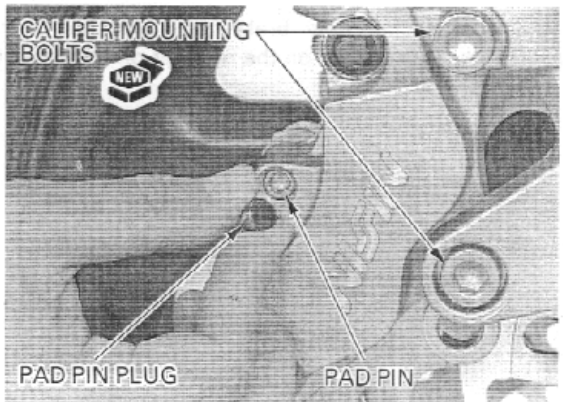
Tighten the pad pin.

TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)

Install and tighten the pad pin plug.

TORQUE: 3 N·m (0.3 kgf·m, 2.2 lbf·ft)

Operate the brake lever to seat the caliper pistons against the pads.



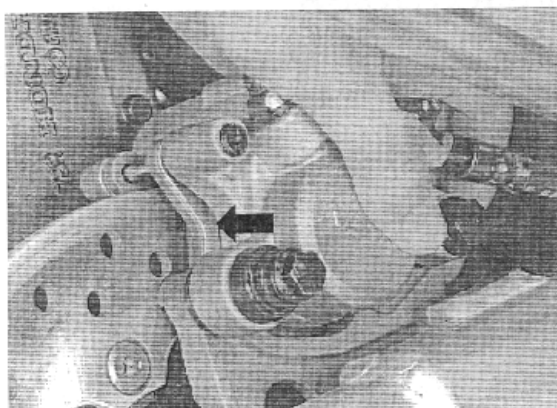
REAR BRAKE PAD REPLACEMENT

Always replace the brake pads in pairs to ensure even disc pressure.

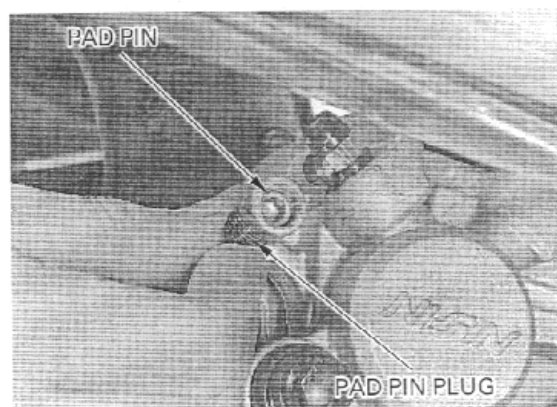
Push the caliper piston all the way in to allow installation of new brake pads.

NOTE:

Check the brake fluid level in the brake reservoir as this operation causes the level to rise.



Remove the pad pin plug and loosen the pad pin.

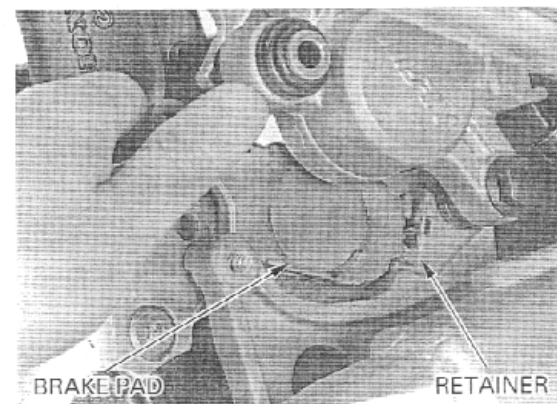


Remove the rear brake caliper bolt.
Pivot the caliper up, and remove the pad pin and brake pads.



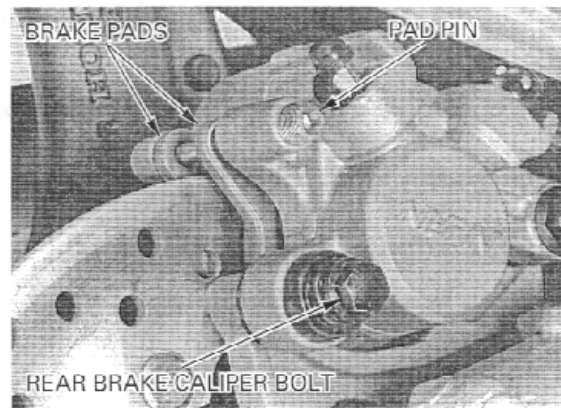
Be careful not to lose the pad spring.

Install new brake pads so that their ends are positioned on the retainer on the caliper bracket as shown.



Lower the caliper and install the pad pin.
Install and tighten the rear brake caliper bolt.

TORQUE: 23 N·m (2.3 kgf·m , 17 lbf·ft)



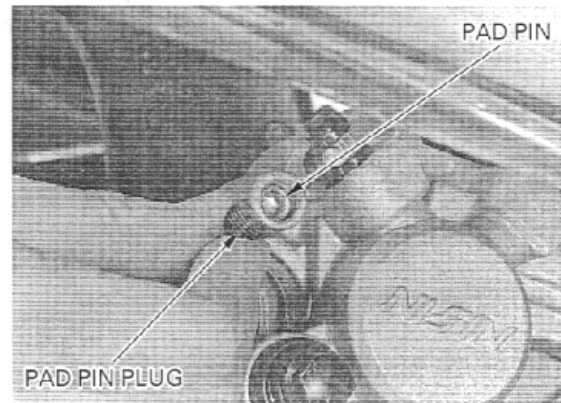
Tighten the pad pin.

TORQUE: 18 N·m (1.8 kgf·m , 13 lbf·ft)

Install and tighten the pad pin plug.

TORQUE: 3 N·m (0.3 kgf·m , 2.2 lbf·ft)

Operate the brake pedal to seat the caliper piston against the pads.



BRAKE DISC INSPECTION

Visually inspect the disc for damage or cracks.

Measure the brake disc thickness at several points.

SERVICE LIMITS: Front: 3.5 mm (0.14 in)
Rear: 4.0 mm (0.16 in)



FRONT MASTER CYLINDER

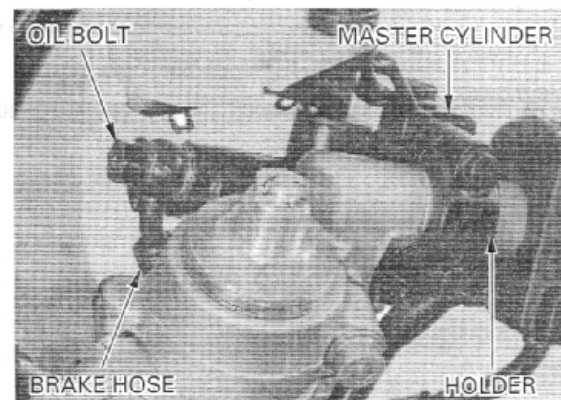
CAUTION:

- Avoid spilling fluid on painted, plastic or rubber parts. Place a rag over these parts whenever the system is serviced.
- When removing the oil bolt, cover the end of the hose to prevent contamination.

DISASSEMBLY

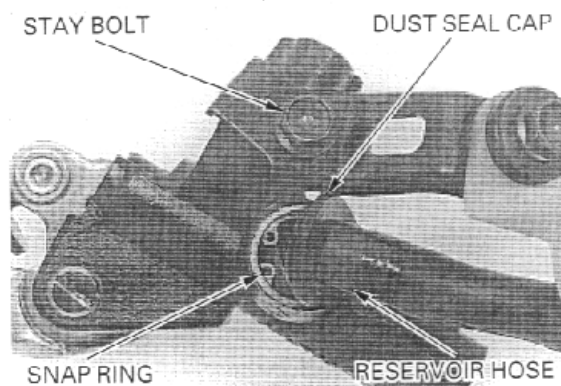
Drain the brake fluid from the front brake hydraulic system (page 15-3).

Disconnect the front brake light switch connectors. Disconnect the brake hose from the master cylinder by removing the oil bolt and sealing washers. Remove the master cylinder holder bolts, holder and the master cylinder.

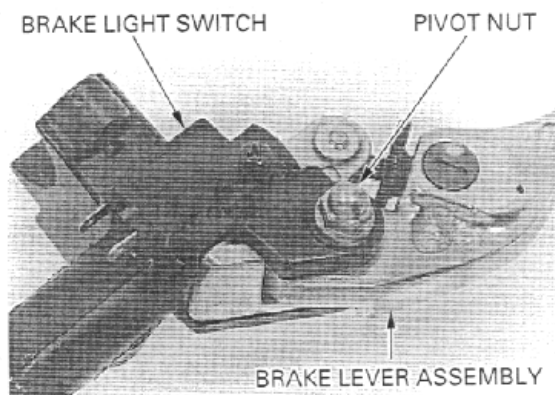


HYDRAULIC BRAKE

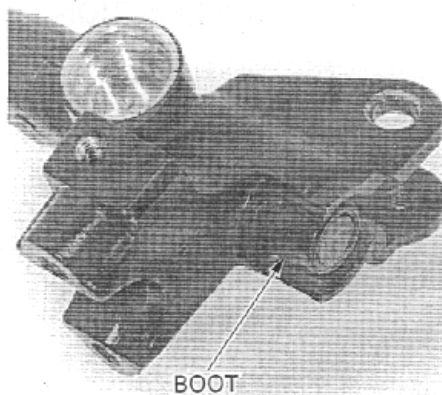
Remove the dust seal cap, snap ring and reservoir hose from the master cylinder.
Remove the O-ring.
Remove the stay bolt and fluid reservoir with the stay and hose.



Remove the pivot nut, bolt and brake lever assembly.
Remove screw and brake light switch.



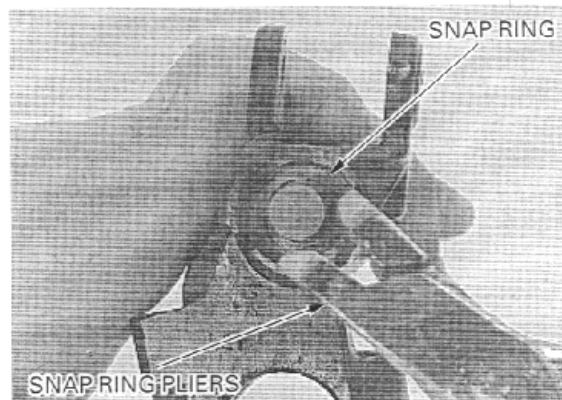
Remove the boot from the master cylinder and master piston.



Remove the snap ring using the special tool.

TOOL:
Snap ring pliers

07914-3230001



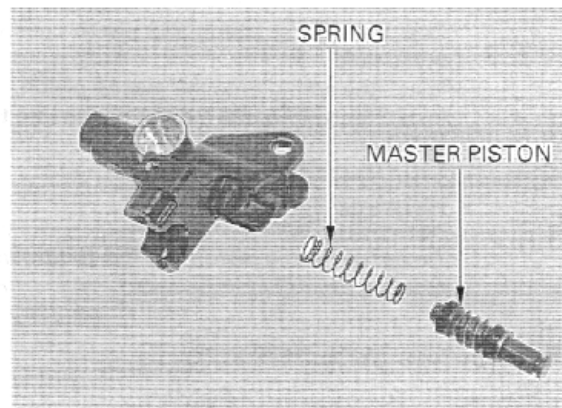
Remove the master piston and spring from the master cylinder.

Clean the master cylinder, reservoir and master piston in clean brake fluid.

INSPECTION

Check the piston cups for wear, deterioration or damage.

Check the spring for damage.



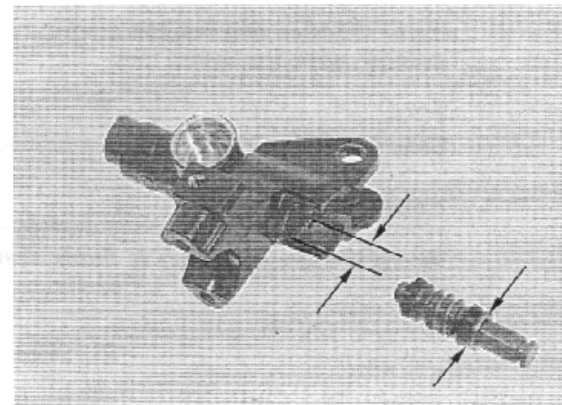
Check the master cylinder and piston for scoring, scratches or damage.

Measure the master cylinder I. D.

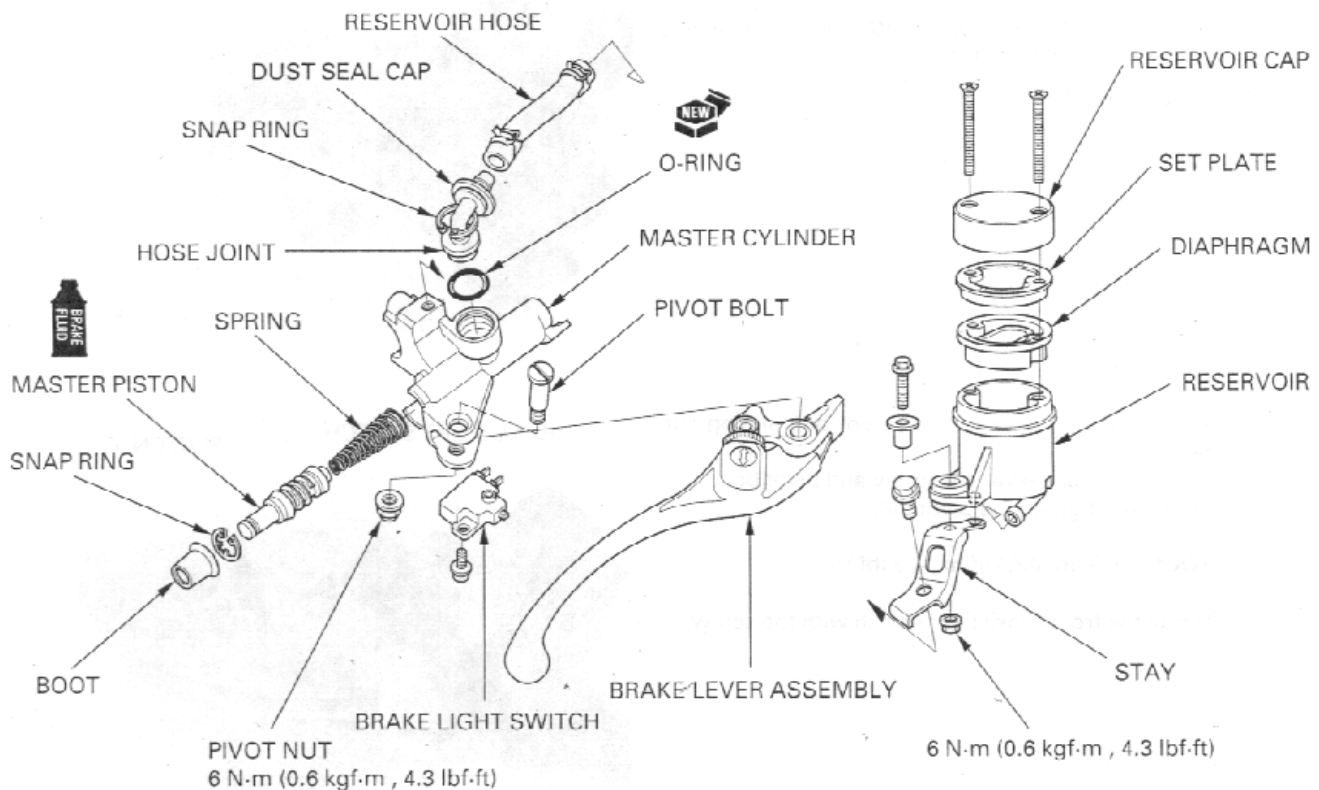
SERVICE LIMIT: 14.055 mm (0.5533 in)

Measure the master piston O. D.

SERVICE LIMIT: 13.945 mm (0.5490 in)



ASSEMBLY

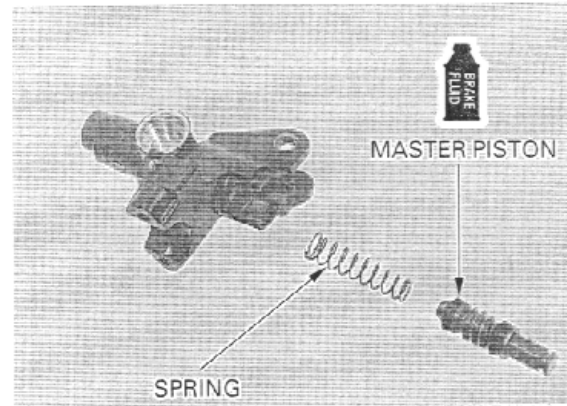


HYDRAULIC BRAKE

Coat the master piston and piston cups with clean brake fluid.
Install the spring onto the master piston.
Install the spring and master piston into the master cylinder.

CAUTION:

Do not allow the piston cup lips to turn inside out.



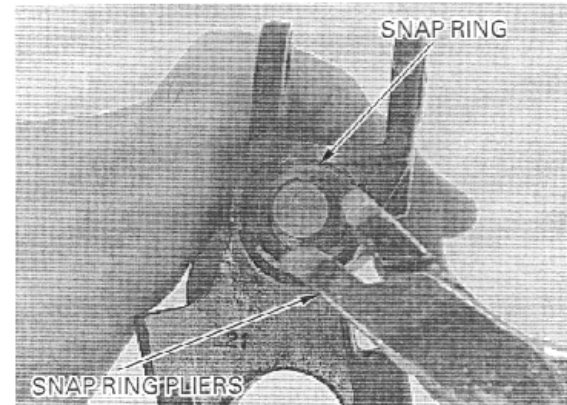
Install the snap ring into the groove in the master cylinder, using the special tool.

TOOL:

Snap ring pliers 07914-3230001

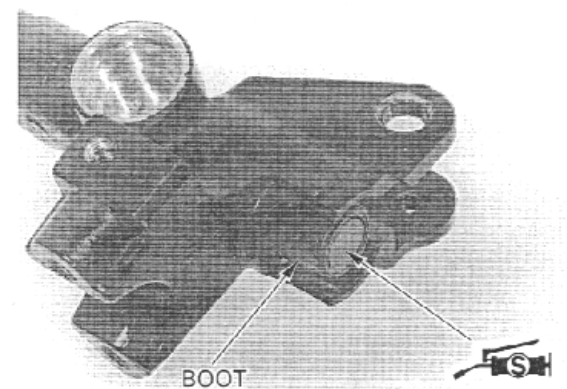
CAUTION:

Be certain the snap ring is firmly seated in the groove.



Install the boot onto the piston and into the master cylinder.

Apply silicone grease to the brake lever contacting area of the master piston.

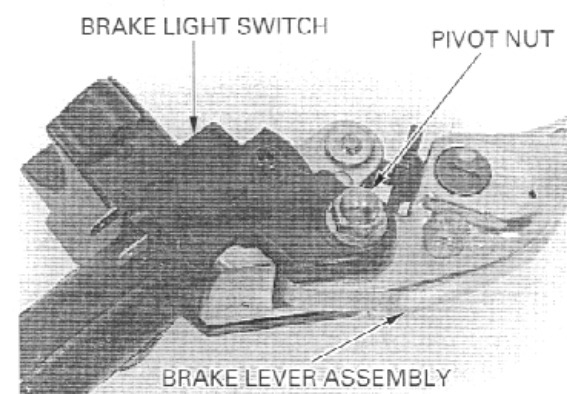


Apply silicone grease to the pivot bolt sliding surface.

Install the brake lever assembly and pivot bolt.
Install and tighten the pivot nut.

TOOL: 6 N·m (0.6 kgf·m, 4.3 lbf·ft)

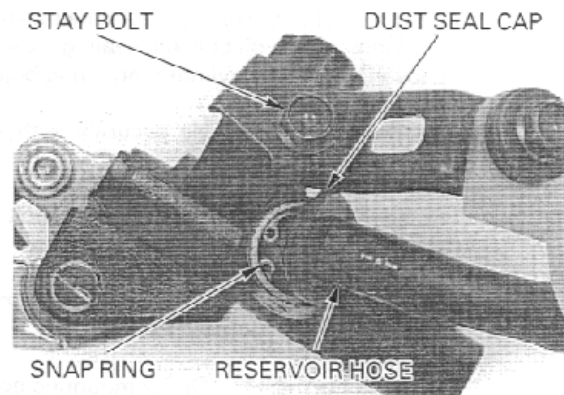
Install the front brake light switch with the screw.



Coat a new O-ring with brake fluid and install it into the master cylinder.

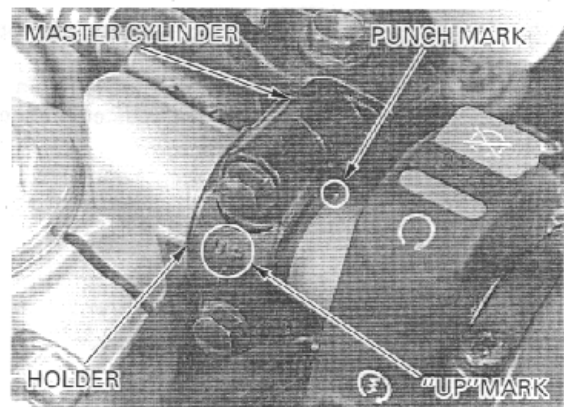


Install the fluid reservoir with the stay and hose, and tighten the stay bolt. Install the reservoir hose joint, secure it with the snap ring and install the dust seal cap.



Install the master cylinder and holder with the "UP" mark facing up. Align the end of the master cylinder with the punch mark on the handlebar, and tighten the upper bolt first, then tighten the lower bolt.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



Connect the brake hose to the master cylinder with the oil bolt and new sealing washers, and tighten the oil bolt.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

Connect the front brake light switch connectors.

Fill and bleed the front brake hydraulic system (page 14-3).



REAR MASTER CYLINDER/BRAKE PEDAL

CAUTION:

- Avoid spilling fluid on painted, plastic or rubber parts. Place a rag over these parts whenever the system is serviced.
- When removing the oil bolt, cover the end of the hose to prevent contamination.

DISASSEMBLY

Drain the brake fluid from the rear brake hydraulic system (page 15-3).

Disconnect the brake hose from the master cylinder by removing the oil bolt and sealing washers. Loosen the master cylinder mounting bolts.

Support the motorcycle securely with a hoist or equivalent.

Remove the swingarm pivot caps.

Remove the lower muffler mounting bolt and washer.

Remove the swingarm pivot nut.

Remove the socket bolt, collar, swingarm pivot bolt and right driver footpeg bracket.

Remove the master cylinder mounting bolts.

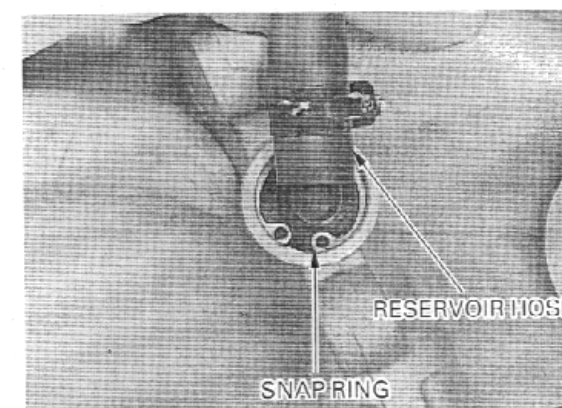
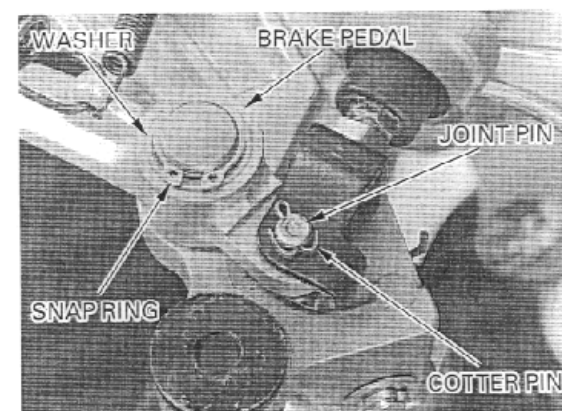
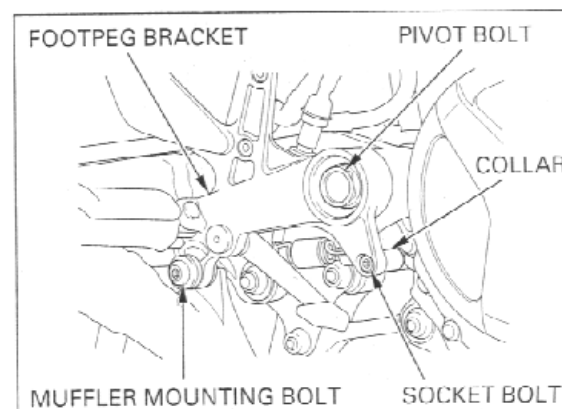
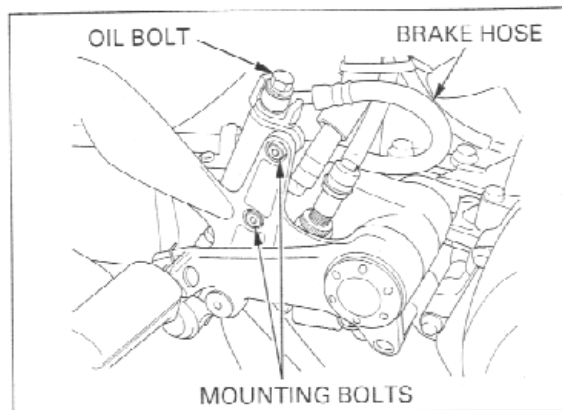
Remove the snap ring, washer and brake pedal from the pedal pivot shaft.

Remove the cotter pin from the joint pin.

Remove the joint pin and master cylinder from the brake pedal.

Remove the snap ring and reservoir hose joint from the master cylinder.

Remove the O-ring.

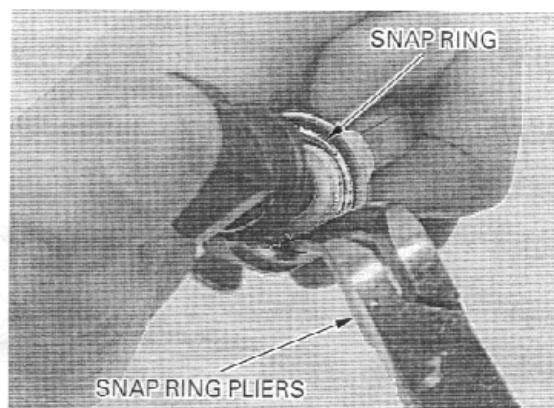


Remove the boot from the master cylinder.
Remove the snap ring using the special tool.

TOOL:

Snap ring pliers

07914-3230001



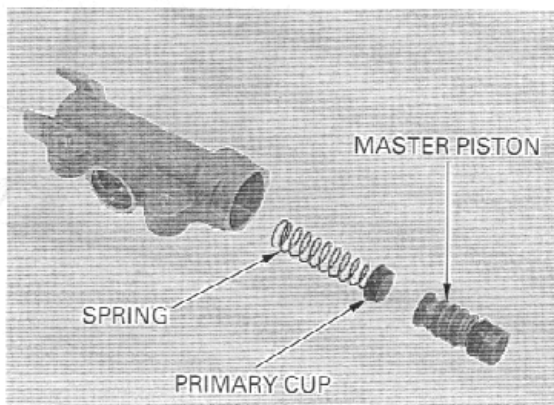
Remove the master piston, primary cup and spring.

Clean the master cylinder, reservoir and master piston in clean brake fluid.

INSPECTION

Check the piston cups for wear, deterioration or damage.

Check the spring for damage.



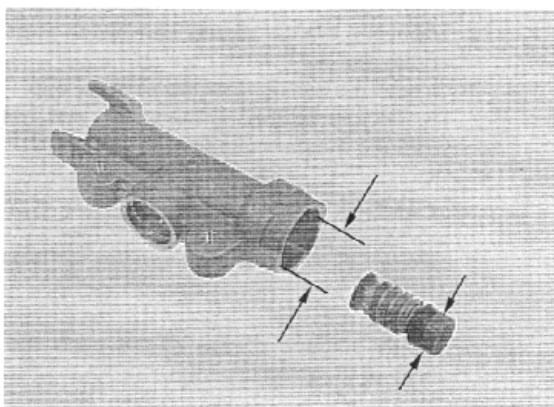
Check the master cylinder and piston for scoring or damage.

Measure the master cylinder I. D.

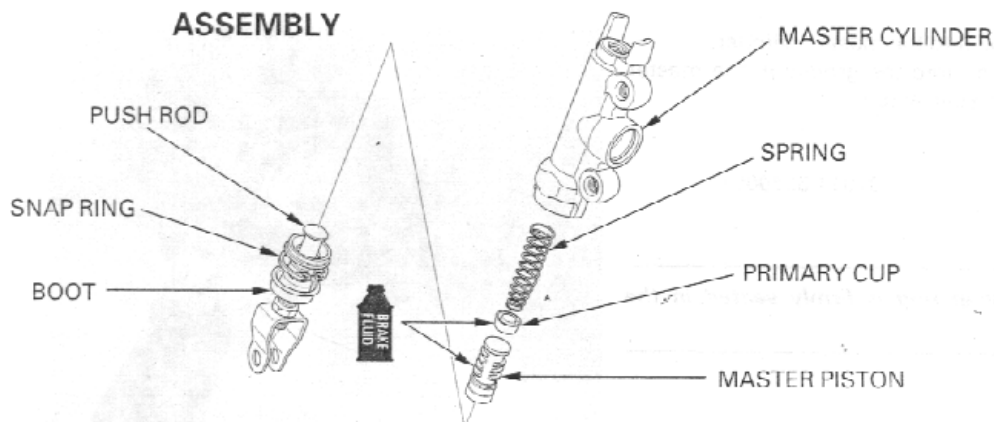
SERVICE LIMIT: 14.055 mm (0.5533 in)

Measure the master piston O. D.

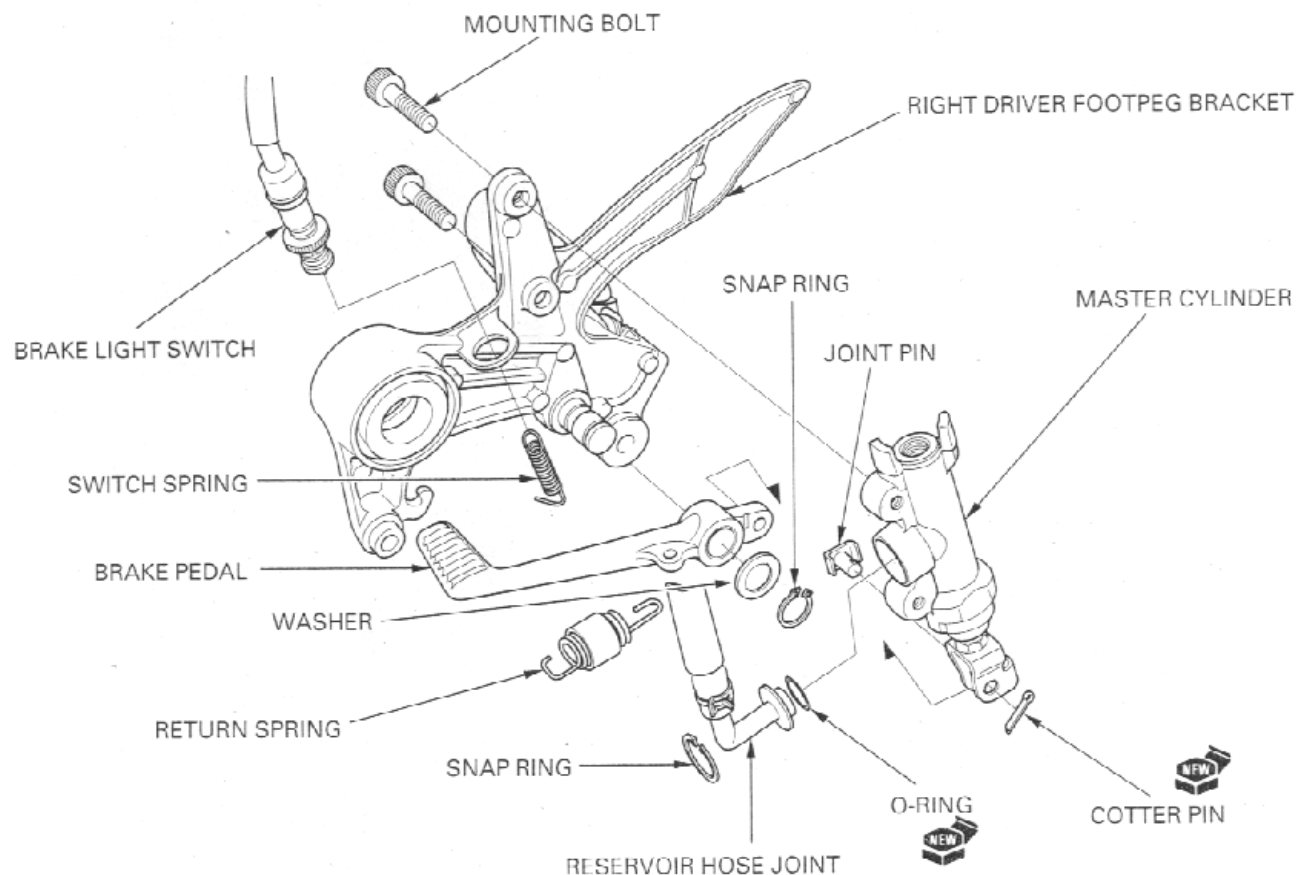
SERVICE LIMIT: 13.945 mm (0.5490 in)



ASSEMBLY



HYDRAULIC BRAKE

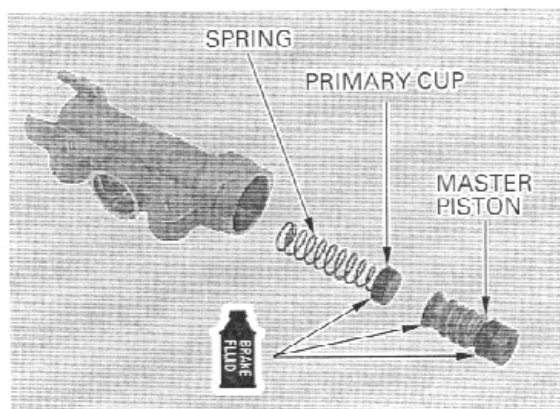


Coat the master piston and piston cups with clean brake fluid.
 Install the spring onto the primary cup.
 Install the spring, primary cup and master piston into the master cylinder.

CAUTION:

Do not allow the piston cup lips to turn inside out.

Apply silicone grease to the push rod contacting area of the master piston.



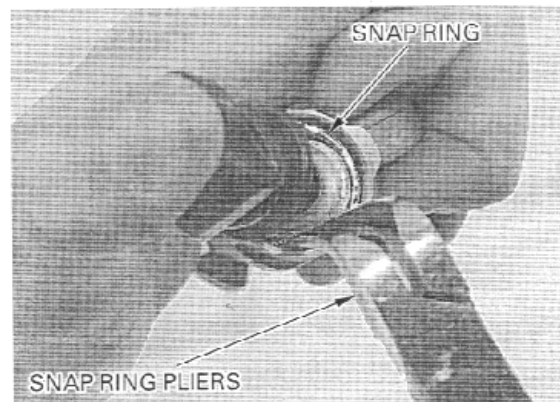
Install the push rod into the master cylinder.
 Install the snap ring into the groove in the master cylinder, using the special tool.

TOOL:

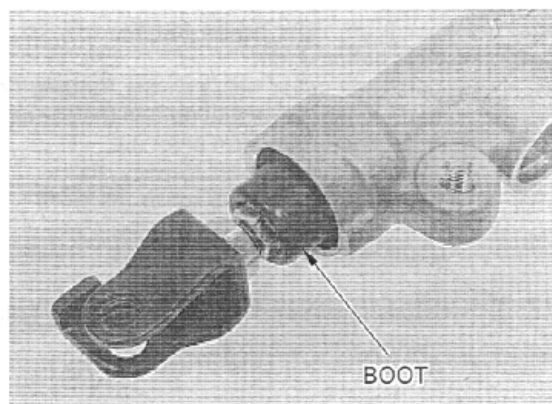
Snap ring pliers 07914-3230001

CAUTION:

Be certain the snap ring is firmly seated in the groove.



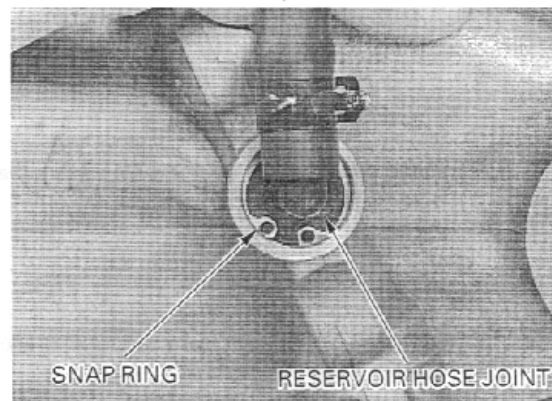
Install the boot into the master cylinder.



Coat a new O-ring with brake fluid and install it into the master cylinder.



Install the reservoir hose joint and secure it with the snap ring.



Connect the master cylinder push rod joint to the brake pedal with the joint pin and a new cotter pin.

Apply grease to the brake pedal pivot.

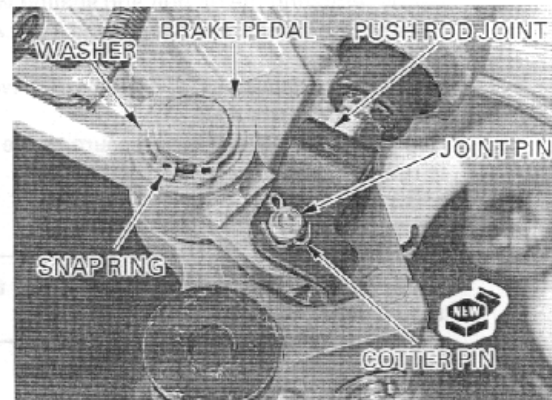
Connect the rear brake light switch spring to the brake pedal.

Install the brake pedal onto the pivot shaft.

Install the washer and snap ring onto the pivot shaft.

Connect the pedal return spring.

Install the master cylinder mounting bolts.



HYDRAULIC BRAKE

Install the right driver footpeg bracket, swingarm pivot bolt and nut.

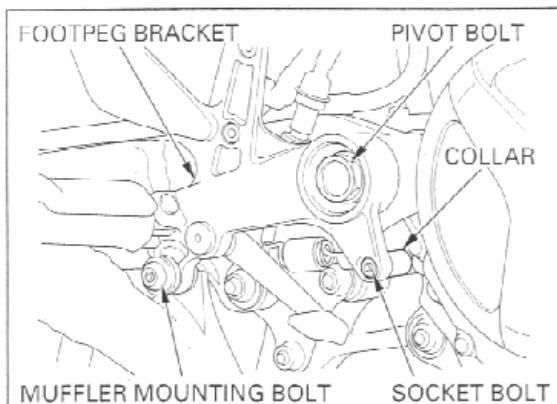
Install the collar between the footpeg bracket and shock link bracket, and tighten the socket bolt.

Tighten the swingarm pivot nut.

TORQUE: 93 N·m (9.5 kgf·m, 69 lbf·ft)

Install the swingarm pivot caps.

Install the lower muffler mounting bolt with the washer and tighten it.



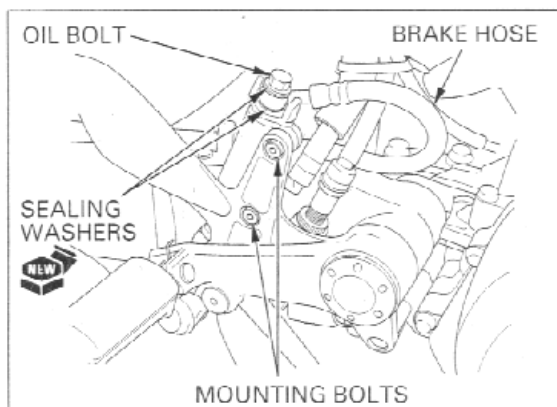
Tighten the master cylinder mounting bolts.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Connect the brake hose to the master cylinder with the oil bolt and new sealing washers, and tighten the oil bolt.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

Fill and bleed the rear brake hydraulic system (page 15-3).



FRONT BRAKE CALIPER

CAUTION:

Avoid spilling fluid on painted, plastic or rubber parts. Place a rag over these parts whenever the system is serviced.

DISASSEMBLY

Drain the brake fluid from the front brake hydraulic system (page 15-3).

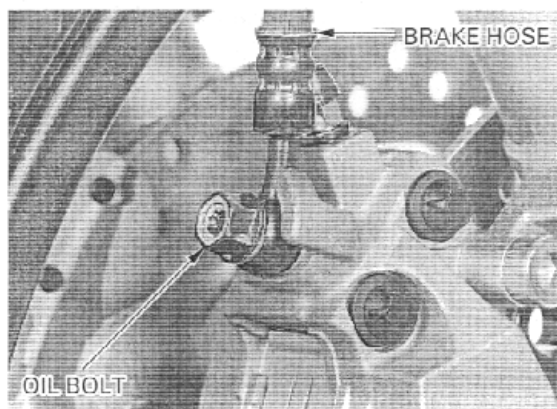
Disconnect the brake hose from the front brake caliper by removing the oil bolt and sealing washers. Remove the front brake pads (page 15-5).

Install a corrugated cardboard or soft wood sheet between the pistons.

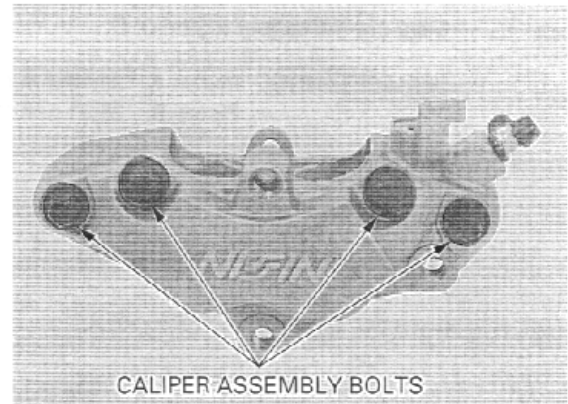
Apply small squirts of air pressure to the fluid inlet to remove the pistons.

⚠ WARNING

Do not use high pressure air or bring the nozzle too close to the inlet.

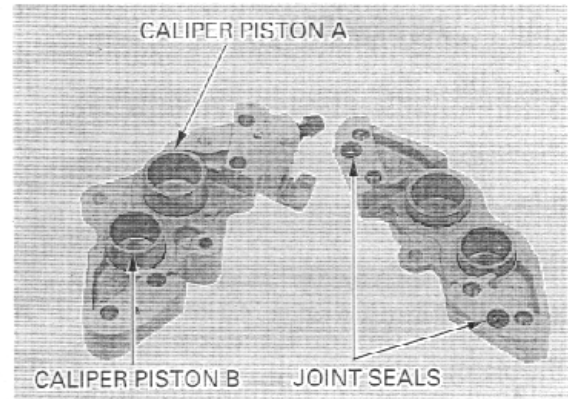


Remove the four caliper assembly bolts and separate the caliper body halves.



Remove the following:

- joint seals
- caliper piston A
- caliper piston B

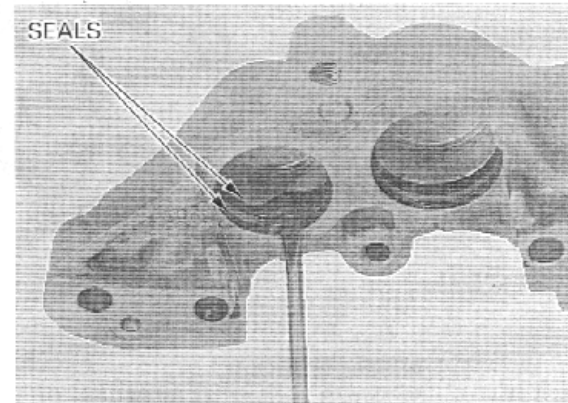


Push the dust seals and piston seals in and lift them out.

CAUTION:

Be careful not to damage the piston sliding surface.

Clean the seal grooves, caliper cylinders and piston with clean brake fluid.

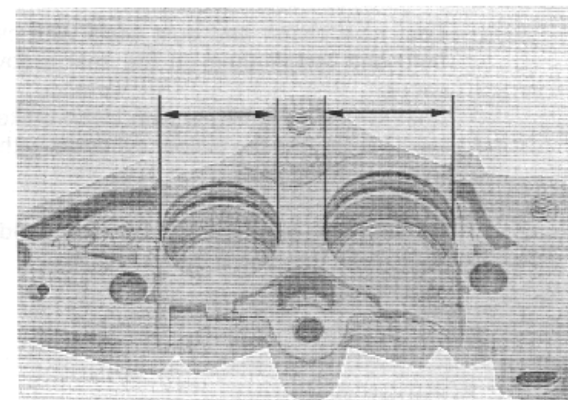


INSPECTION

Check the caliper cylinders and pistons for scoring, scratches or damage.

Measure the caliper cylinder I. D.

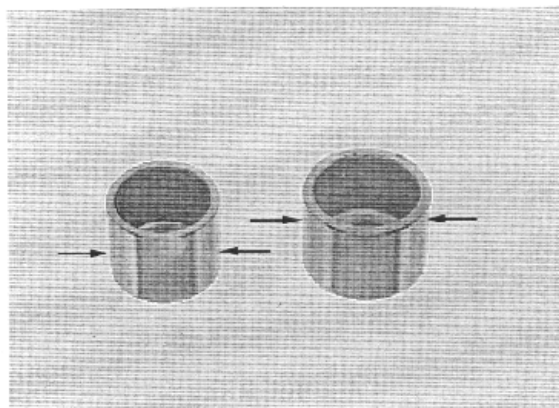
SERVICE LIMITS: **Cylinder A:**
30.29 mm (1.193 in)
Cylinder B:
27.060 mm (1.0654 in)



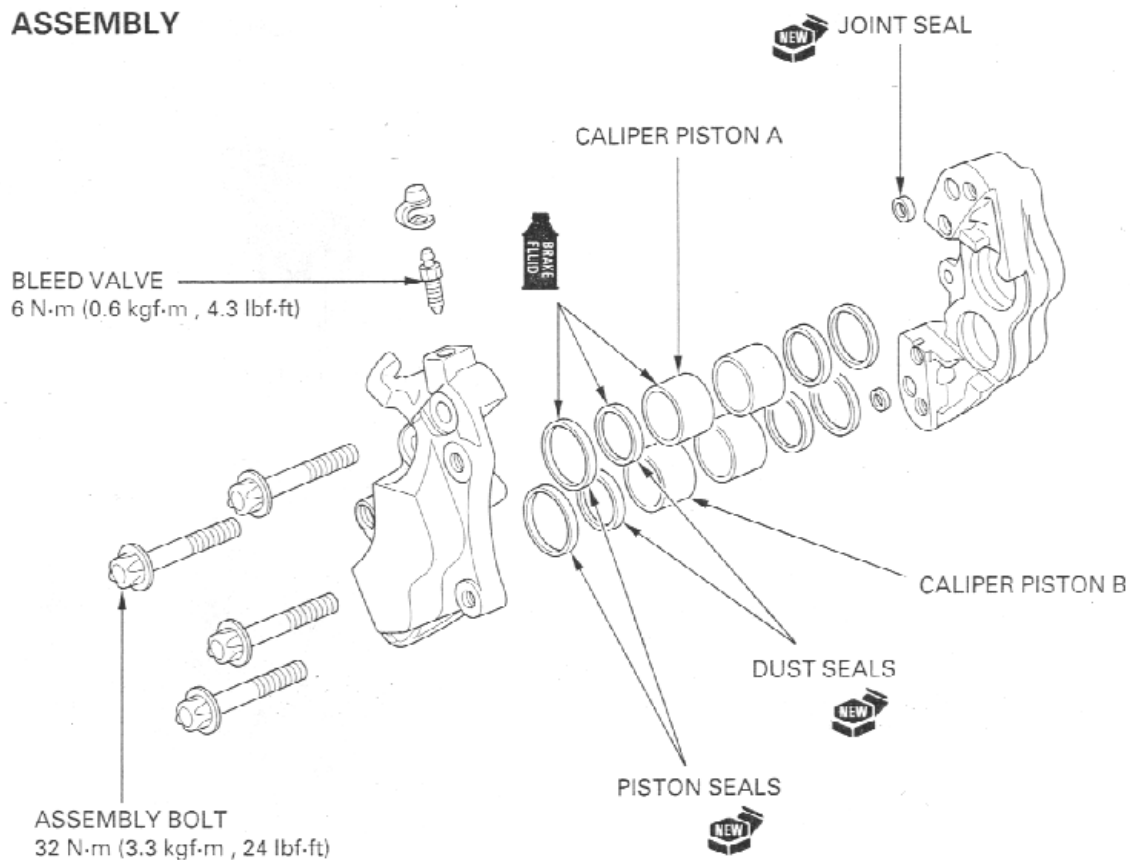
HYDRAULIC BRAKE

Measure the caliper piston O. D.

SERVICE LIMITS: Piston A: 30.14 mm (1.187 in)
Piston B: 26.91 mm (1.059 in)



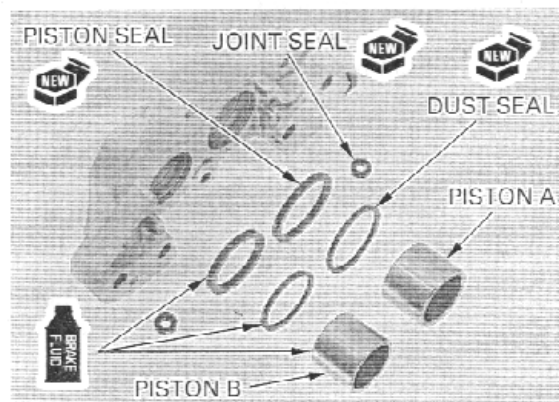
ASSEMBLY



Coat new piston and dust seals with clean brake fluid and install them in the seal grooves in the caliper.

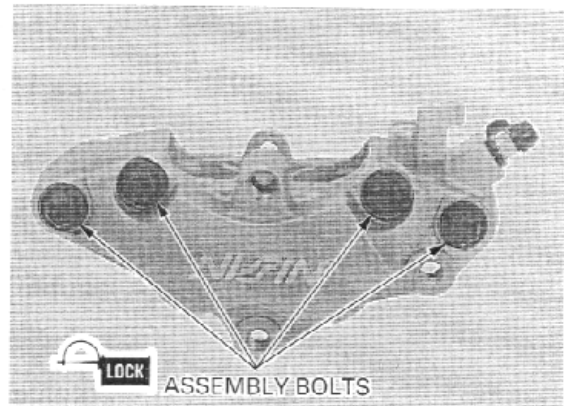
Coat the caliper pistons with clean brake fluid and install them into the caliper cylinders with the opening toward the pads.

Install new joint seals into the fluid passage grooves in the caliper body.



Assemble the caliper body halves.
Apply locking agent to the caliper assembly bolt threads.
Install and tighten the assembly bolts.

TORQUE: 32 N·m (3.3 kgf·m , 24 lbf·ft)

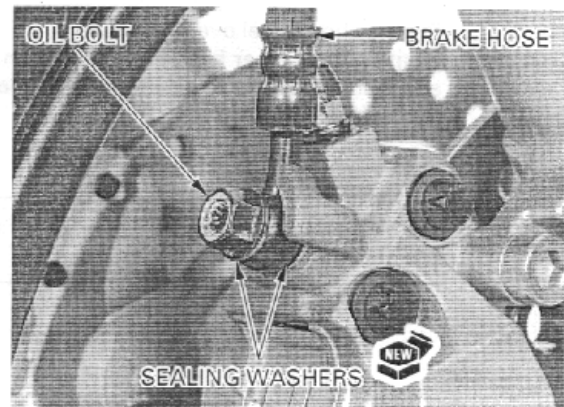


Install the brake pads (page 15-5).

Connect the brake hose to the brake caliper with the oil bolt and new sealing washers, and tighten the oil bolt.

TORQUE: 34 N·m (3.5 kgf·m , 25 lbf·ft)

Fill and bleed the front brake hydraulic system (page 14-3).



REAR BRAKE CALIPER

CAUTION:

Avoid spilling fluid on painted, plastic or rubber parts. Place a rag over these parts whenever the system is serviced.

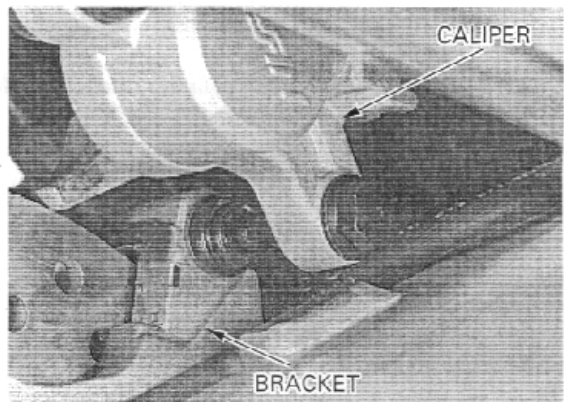
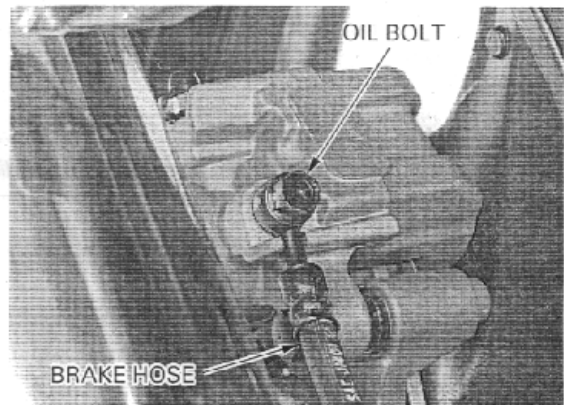
DISASSEMBLY

Drain the brake fluid from the rear brake hydraulic system (page 15-3).

Disconnect the brake hose from the rear brake caliper by removing the oil bolt and sealing washers.

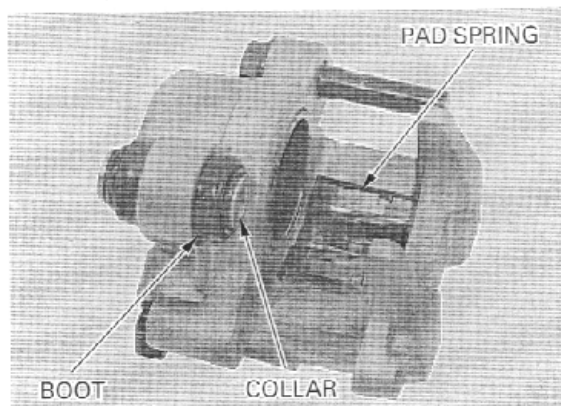
Remove the rear brake pads (page 15-6).

Remove the rear brake caliper from the bracket.



HYDRAULIC BRAKE

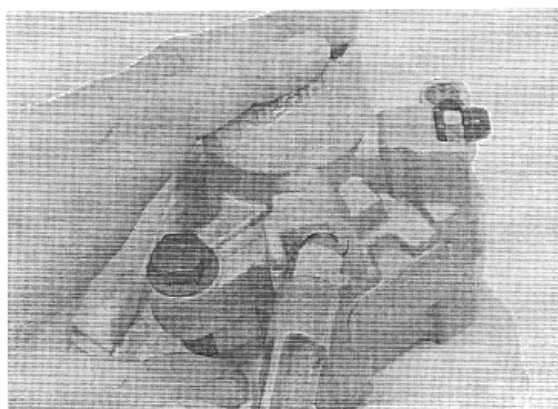
Remove the pad spring, collar and boot from the caliper body.



Place a shop towel over the piston.
Position the caliper body with the piston down and apply small squirts of air pressure to the fluid inlet to remove the piston.

⚠ WARNING

Do not use high pressure air or bring the nozzle too close to the inlet.

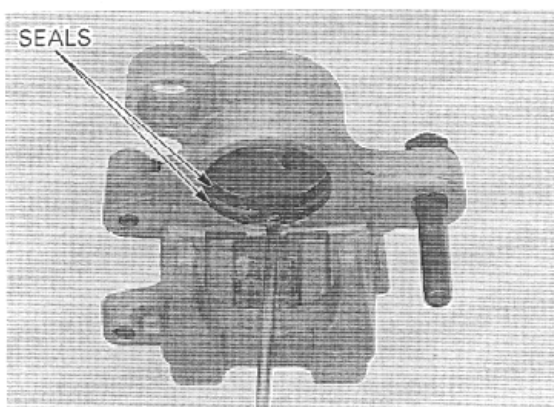


Push the dust seal and piston seal in and lift them out.

CAUTION:

Be careful not to damage the piston sliding surface.

Clean the seal grooves, caliper cylinder and piston with clean brake fluid.



INSPECTION

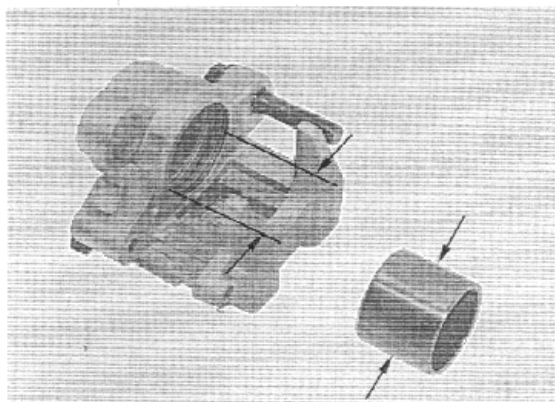
Check the caliper cylinder and piston for scoring, scratches or damage.

Measure the caliper cylinder I. D.

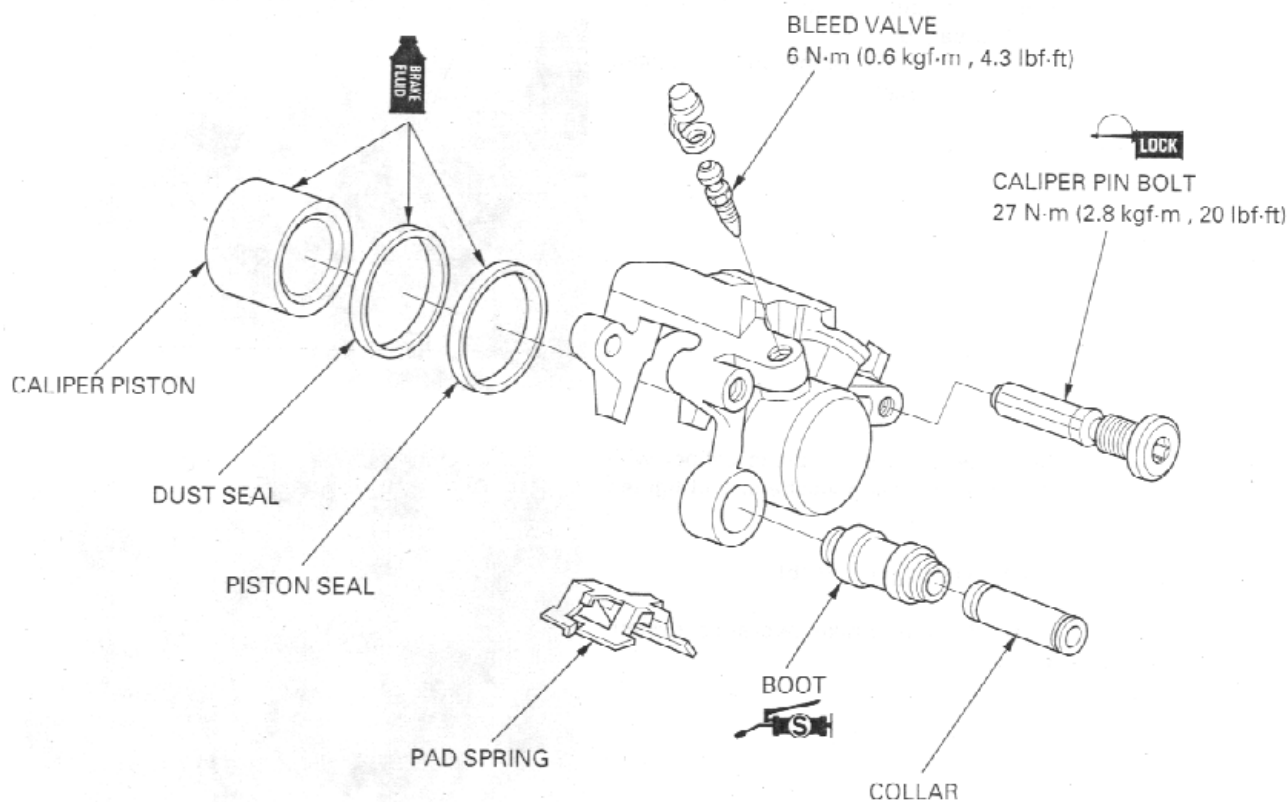
SERVICE LIMIT: 38.24 mm (1.506 in)

Measure the caliper piston O. D.

SERVICE LIMIT: 38.09 mm (1.500 in)

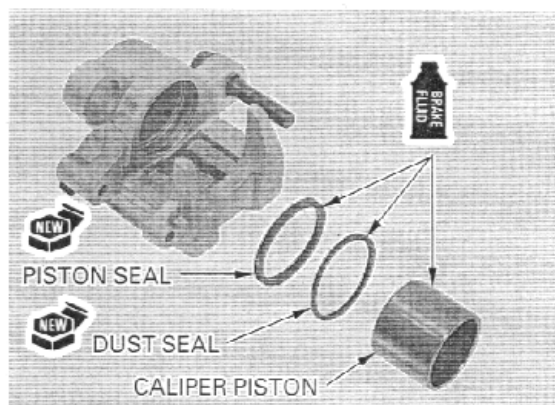


ASSEMBLY



Coat new piston and dust seals with clean brake fluid and install them in the seal grooves in the caliper.

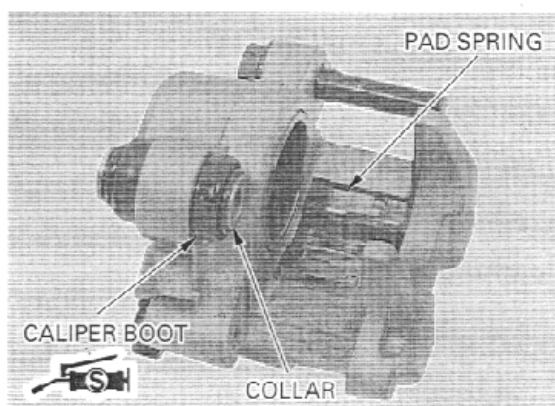
Coat the caliper piston with clean brake fluid and install it into the caliper cylinder with the opening toward the pads.



Install the pad spring onto the caliper body as shown.

Check the caliper boot and replace it if it is hard, deteriorated or damaged.

Apply silicone grease to the inside of the boot.
Install the boot and collar into the caliper.

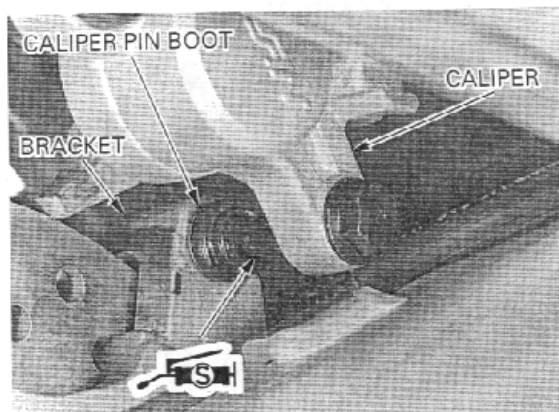


HYDRAULIC BRAKE

Check the caliper pin boot and replace it if it is hard, deteriorated or damaged.

Apply silicone grease to the caliper pin and install the caliper onto the bracket.

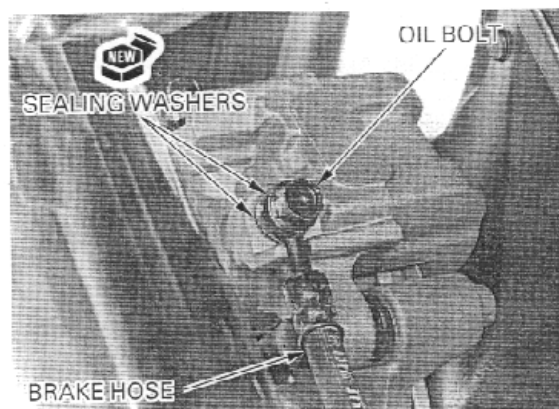
Install the rear brake pads (page 15-6).



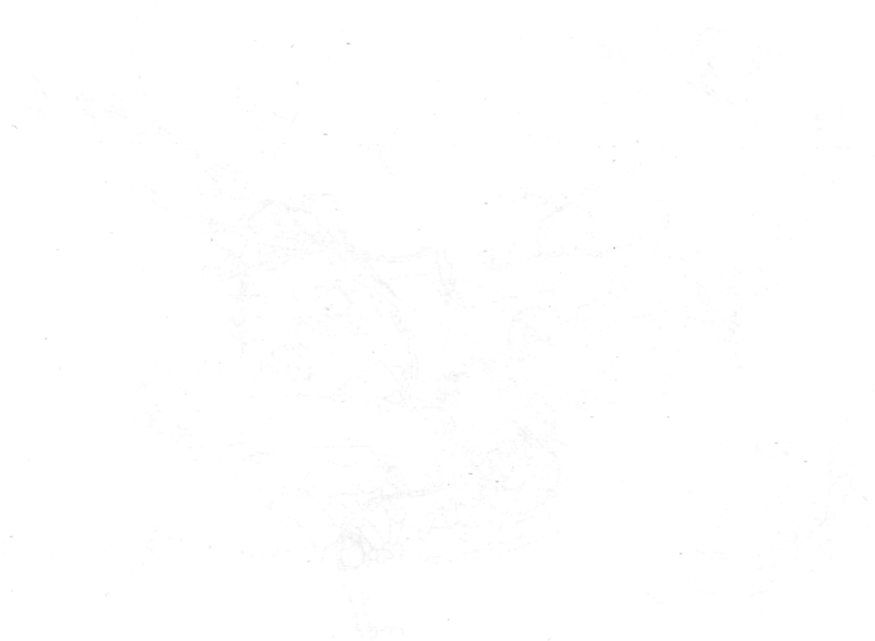
Connect the brake hose to the brake caliper with the oil bolt and new sealing washers, and tighten the oil bolt.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

Fill and bleed the rear brake hydraulic system (page 15-3).

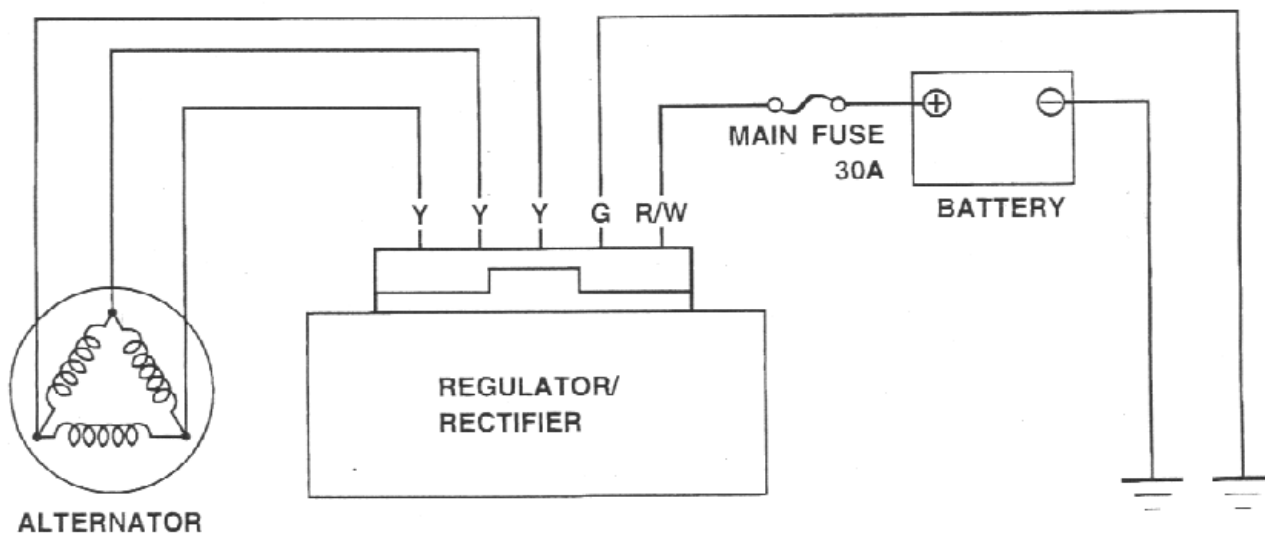
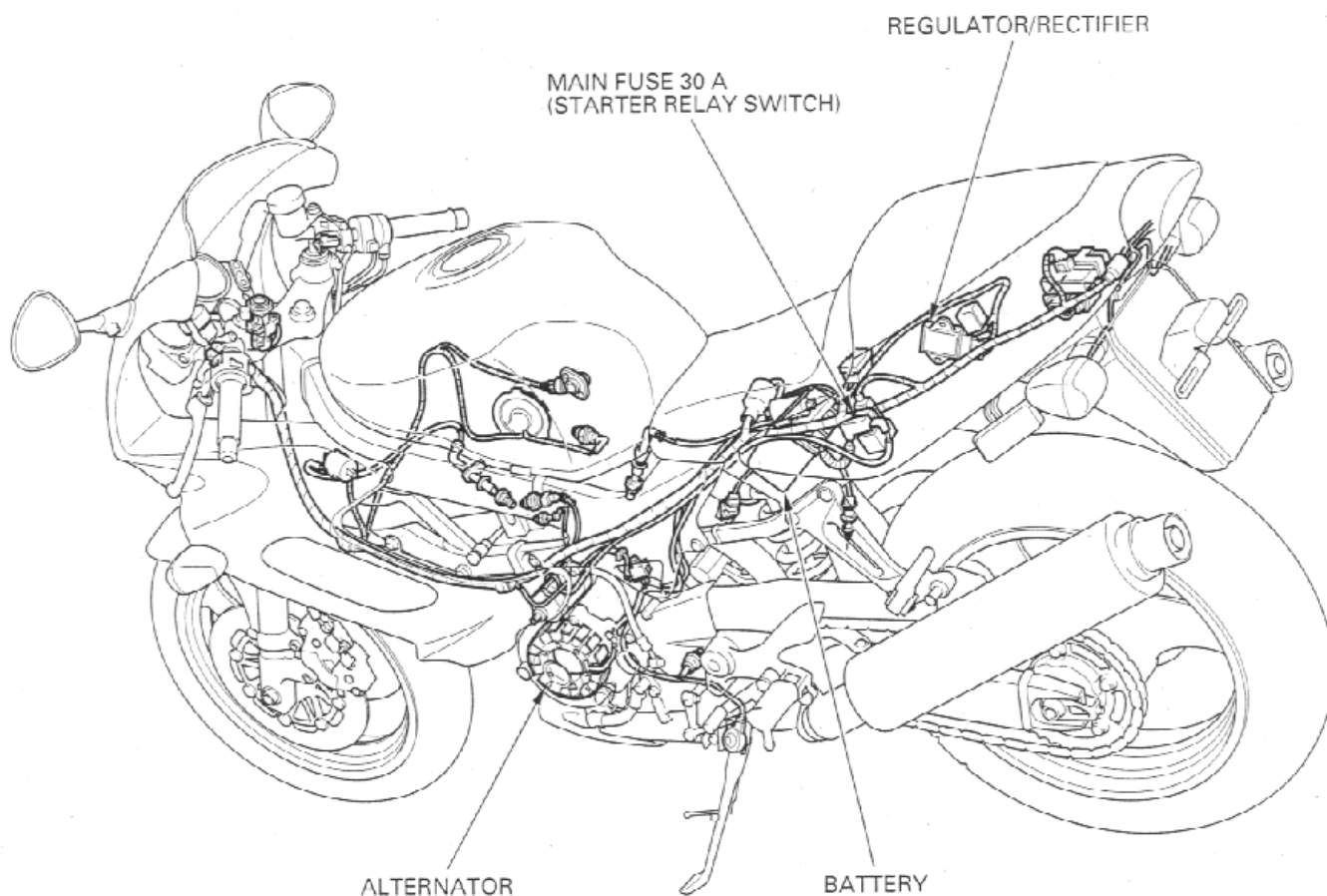


MEMO



10-0

BATTERY/CHARGING SYSTEM



Y: Yellow
G: Green
R: Red
W: White

16. BATTERY/CHARGING SYSTEM

SERVICE INFORMATION	16-1	CHARGING SYSTEM INSPECTION	16-6
TROUBLESHOOTING	16-3	ALTERNATOR CHARGING COIL	16-8
BATTERY	16-4	REGULATOR/RECTIFIER	16-8

SERVICE INFORMATION

GENERAL

▲WARNING

- The battery gives off explosive gases; keep sparks, flames and cigarettes away. Provide adequate ventilation when charging.
- The battery contains sulfuric acid (electrolyte). Contact with skin or eyes may cause severe burns. Wear protective clothing and a face shield.
 - If electrolyte gets on your skin, flush with water.
 - If electrolyte gets in your eyes, flush with water for at least 15 minutes and call a physician immediately.
- Electrolyte is poisonous.
If swallowed, drink large quantities of water or milk and follow with milk of magnesia or vegetable oil and call a physician. **KEEP OUT OF REACH OF CHILDREN.**

- Always turn off the ignition switch before disconnecting any electrical components.

CAUTION:

Some electrical components may be damaged if terminals or connectors are connected or disconnected while the ignition switch is ON and current is present.

- For extended storage, remove the battery, give it a full charge, and store it in a cool, dry place.
- For a battery remaining in a stored motorcycle, disconnect the negative battery cable from the battery.

NOTE:

The maintenance free battery must be replaced when it reaches the end of its service life.

CAUTION:

'98-'00 only: The battery caps should not be removed. Attempting to remove the sealing caps from the cells may damage the battery.

- The battery can be damaged if overcharged or undercharged, or if left to discharge for a long period of time. These same conditions contribute to shortening the "life span" of the battery. Even under normal use, the performance of the battery deteriorates after 2–3 years.
- Battery voltage may recover after battery charging, but under heavy load, the battery voltage will drop quickly and eventually die out. For this reason, the charging system is often suspected as the problem. Battery overcharge often results from problems in the battery itself, which may appear to be an overcharging symptom. If one of the battery cells is shorted and battery voltage does not increase, the regulator/rectifier supplies excess voltage to the battery. Under these conditions, the electrolyte level goes down quickly.
- Before troubleshooting the charging system, check for proper use and maintenance of the battery. Check if the battery is frequently under heavy load, such as having the headlight and taillight on for long periods of time without riding the motorcycle.
- The battery will self-discharge when the motorcycle is not in use. For this reason, charge the battery every 2 weeks to prevent sulfation from occurring.
- '98-'00 only: Filling a new battery with electrolyte will produce some voltage, but in order to achieve its maximum performance, always charge the battery. Also, the battery life is lengthened when it is initially charged.
- When checking the charging system, always follow the steps in the troubleshooting flow chart (page 16-3).
- For alternator service, refer to section 10.

BATTERY/CHARGING SYSTEM

- '98-'00 only: This model comes with a maintenance free (MF) battery. Remember the following about MF batteries.
 - Use only the electrolyte that comes with the battery.
 - Use all of the electrolyte.
 - Seal the battery properly.
 - Never open the seals again.

CAUTION:

For battery charging, do not exceed the charging current and time specified on the battery. Using excessive current or extending the charging time may damage the battery.

BATTERY TESTING

Refer to the battery tester's Operation Manual for the recommended battery testing procedure.

The recommended battery tester puts a "load" on the battery so that the actual battery condition of the load can be measured.

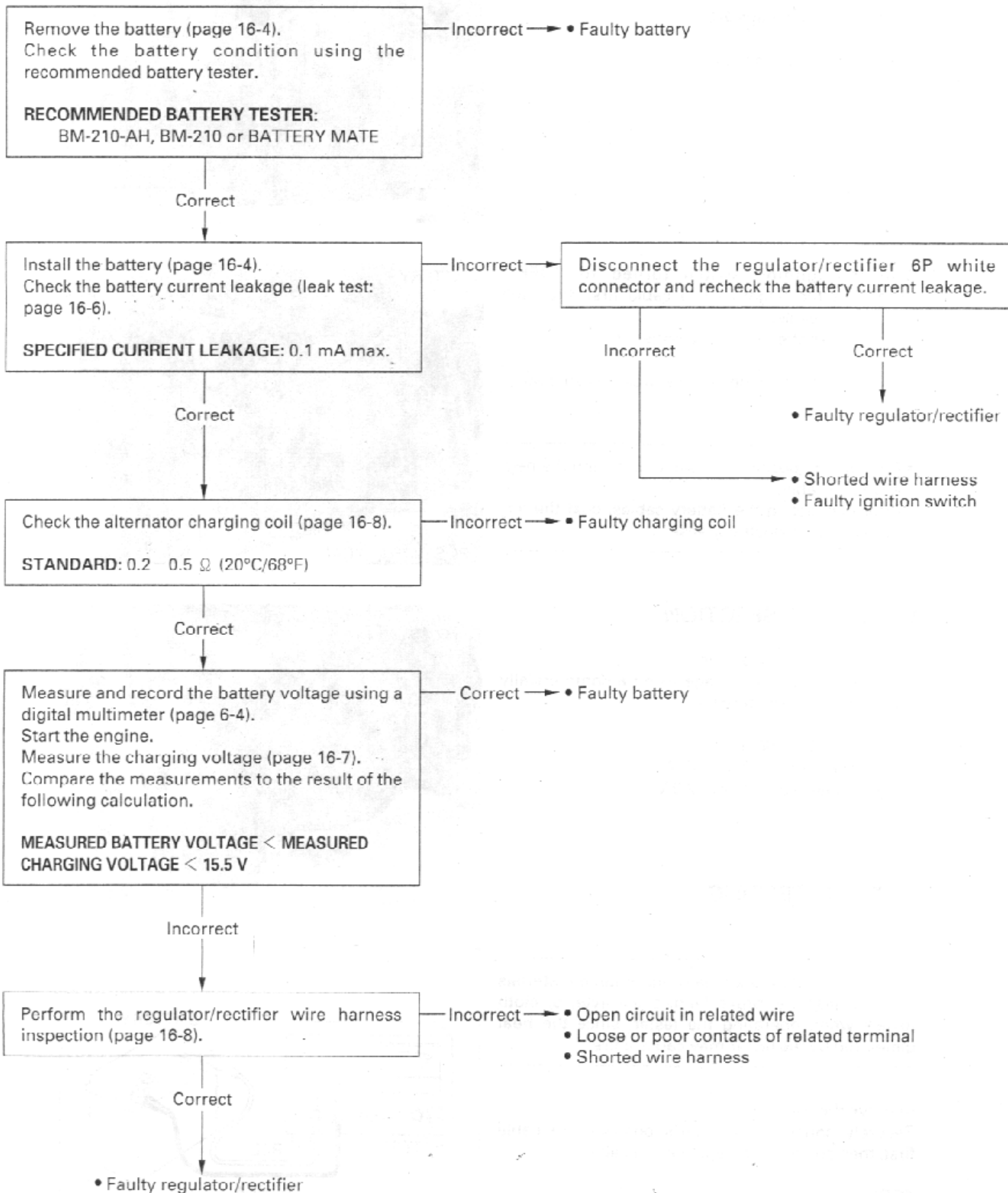
Recommended battery tester BM-210-AH, BM-210 or BATTERY MATE

SPECIFICATIONS

ITEM			SPECIFICATIONS
Battery	Capacity		12 V - 10 Ah
	Current leakage		0.1 mA max.
	Voltage (20 °C/68 °F)	Fully charged	13.0 - 13.2 V
		Needs charging	Below 12.3 V
	Charging current	Normal	1.2 A × 5 - 10 h
		Quick	5.0 A × 1.0 h
Alternator	Capacity		0.280 kW/5,000 rpm
	Charging coil resistance (20 °C/68 °F)		0.2 - 0.5 Ω

TROUBLESHOOTING

Battery is damaged or weak

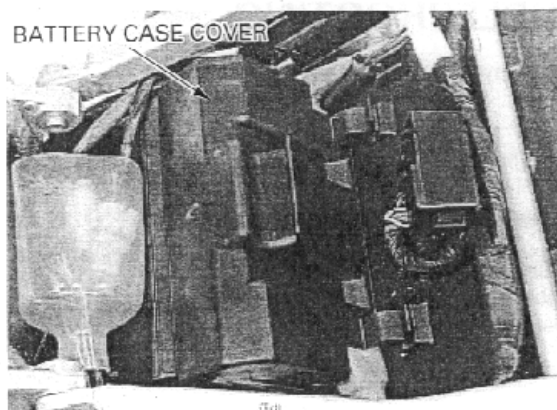


BATTERY

REMOVAL/INSTALLATION

Remove the seat (page 2-2).

Open the battery case cover.



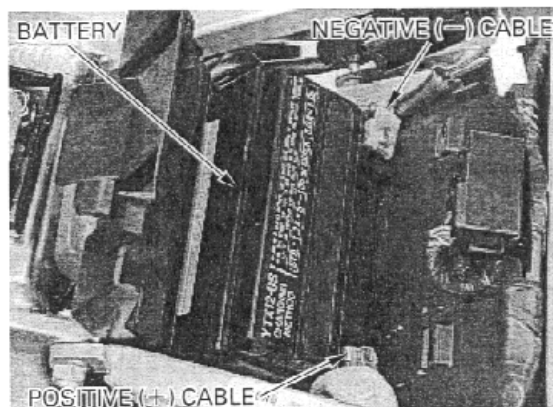
With the ignition switch turned to "OFF", disconnect the negative (-) cable first, then the positive (+) cable.

Remove the battery from the battery case.

Install the battery in the reverse order of removal.

NOTE:

- Connect the positive (+) cable first, then the negative (-) cable.
- After connecting the battery cables, coat the terminals with dielectric grease.



VOLTAGE INSPECTION

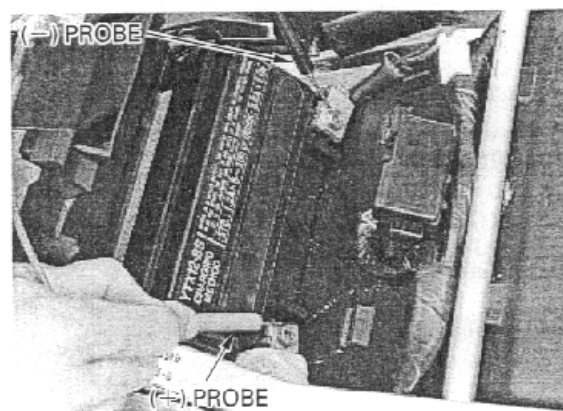
Open the battery case cover.

Measure the battery voltage using a commercially available digital multimeter.

VOLTAGE (20 °C/68 °F):

Fully charged: 13.0 – 13.2 V

Under charged: Below 12.3 V



BATTERY TESTING

NOTE:

Always clear the work area of flammable materials such as gasoline, brake fluid, electrolyte, or cloth towels when operating the tester, since the heat generated by the tester may cause a fire.

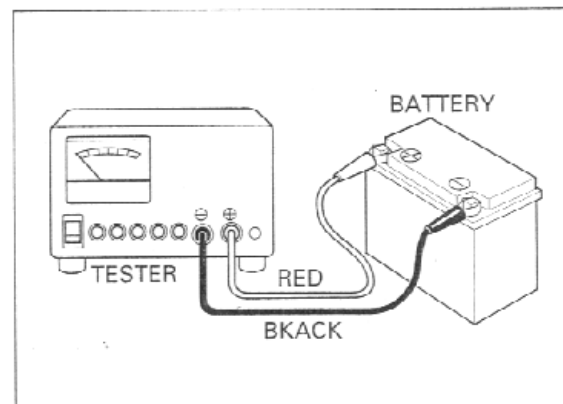
Remove the battery.

Securely connect the tester's positive (+) cable first, then connect the negative (-) cable.

TOOL:

Battery tester

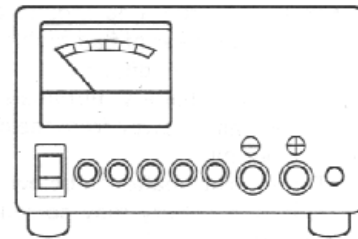
BM-210-AH or BM-210
(U.S.A. only)



NOTE:

For accurate test results, be sure the tester's cables and clamps are in good working condition and that a secure connection can be made at the battery.

Set the temperature switch to "HIGH" or "LOW" depending on the ambient temperature.



HIGH: 15°C (60°F) or higher
LOW: 15°C (60°F) or lower

Push in the appropriate test button for 3 seconds and read the condition of the battery on the meter.

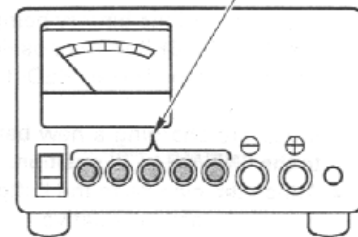
NOTE:

For the first check, DO NOT charge the battery before testing; test it in an "as is" condition.

NOTE:

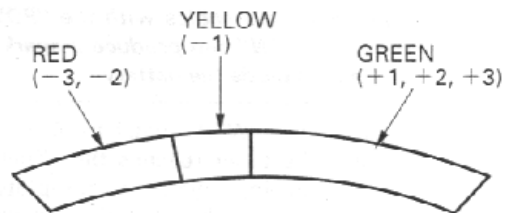
- To avoid damaging the tester, only test batteries with an amperage rating of less than 30 Ah.
- Tester damage can result from overheating when:
 - The test button is pushed in for more than 3 seconds.
 - The tester is used without being allowed to cool for at least 1 minute when testing more than one battery.
 - More than ten consecutive tests are performed without allowing at least a 30-minute cool-down period.

TEST BUTTONS



NOTE:

The result of a test on the meter scale is relative to the amp. hour rating of the battery. Any battery reading in the green zone is OK. Batteries should only be charged if they register in the YELLOW or RED zone.



BATTERY CHARGING

▲WARNING

- The battery gives off explosive gases; keep sparks, flames and cigarettes away. Provide adequate ventilation when charging.
- Turn the power ON/OFF at the charger, not at the battery terminals.

Remove the battery (page 16-4).

NOTE:

- Make sure the area around the charger is well ventilated, clear of flammable materials, and free from heat, humidity, water and dust.
- Clean the battery terminals and position the battery as far away from the charger as the leads will permit.
- Do not place batteries below the charger—gases from the battery may corrode and damage the charger.
- Do not place batteries on top of the charger. Be sure the air vents are not blocked.

TOOL:

Christie battery charger MC1012/2 (U. S. A. only)

1. Turn the "POWER" switch to "OFF".
2. Set the "BATTERY AMP. HR. SELECTOR" switch for the size of the battery being charged.
3. Set the "TIMER" to the position indicated by the Honda Battery Tester; RED-3, RED-2 or YELLOW 1.
If you are charging a new battery, set the switch to the "NEW BATT" position.
4. Attach the clamps to the battery terminals: red to positive, black to negative.

Connect the battery cables only when the "POWER" switch is turned to "OFF".

▲WARNING

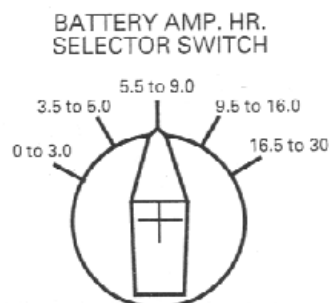
Connecting the cables with the "POWER" switch turned to "ON" can produce a spark which could ignite or explode the battery.

5. Turn the "POWER" switch to "ON".
6. When the timer reaches the "Trickle" position, the charging cycle is complete. Turn the "POWER" switch to "OFF" and disconnect the clamps.

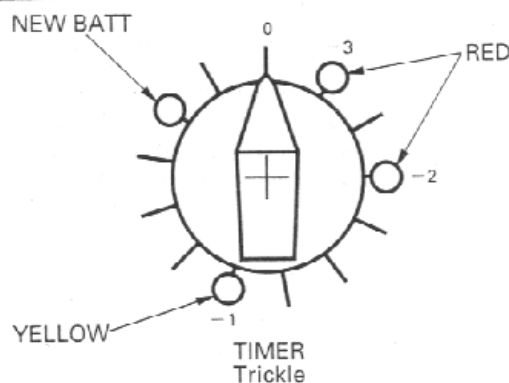
NOTE:

The charger will automatically switch to the "Trickle" mode after the set charging time has elapsed.

7. Let the battery cool for at least 10 minutes or until gassing subsides after charging.
8. Retest the battery using the Honda Battery Tester and recharge if necessary using the above steps.



Set the appropriate amp. hour rating.



CHARGING SYSTEM INSPECTION

Open the battery case cover (page 16-4).

CURRENT LEAKAGE TEST

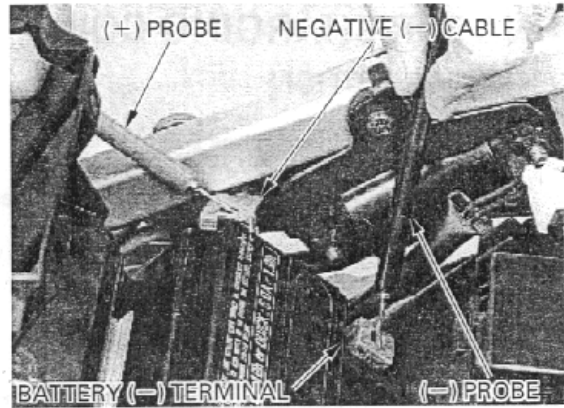
Turn the ignition switch OFF, and disconnect the negative (—) cable from the battery.

Connect the ammeter (+) probe to the negative (-) cable and the ammeter (-) probe to the battery (-) terminal.

With the ignition switch OFF, check for current leakage.

NOTE:

- When measuring current using a tester, set it to a high range, and then bring the range down to an appropriate level. Current flow higher than the range selected may blow out the fuse in the tester.
- While measuring current, do not turn the ignition switch on. A sudden surge of current may blow out the fuse in the tester.



SPECIFIED CURRENT LEAKAGE: 0.1 mA max.

If current leakage exceeds the specified value, a short circuit is likely.

Locate the short by disconnecting connections one by one and measuring the current.

CHARGING VOLTAGE INSPECTION

⚠ WARNING

When the engine must be running to do some work, make sure the area is well-ventilated. Never run the engine in an enclosed area. The exhaust contains poisonous carbon monoxide gas that may cause loss of consciousness and lead to death. Run the engine in an open area or with an exhaust evacuation system in an enclosed area.

NOTE:

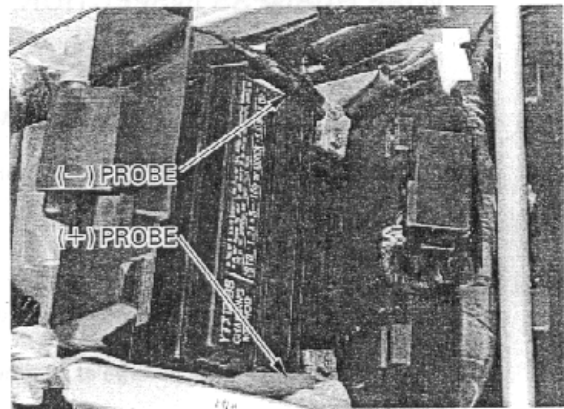
Make sure the battery is in good condition before performing this test.

Start the engine and warm it up to the operating temperature; stop the engine.

Connect the multimeter between the positive and negative terminals of the battery.

NOTE:

- To prevent a short, make absolutely certain which are the positive and negative terminals or cable.
- Do not disconnect the battery or any cable in the charging system without first switching off the ignition switch. Failure to follow this precaution can damage the tester or electrical components.



With the headlight on high beam, restart the engine. Measure the voltage on the multimeter when the engine runs at 5,000 rpm.

STANDARD:

Measured battery voltage (page 16-4) < Measured charging voltage (see above) < 15.5 V

ALTERNATOR CHARGING COIL

INSPECTION

Remove the seat (page 2-2).

Disconnect the alternator 3P (white) connector.

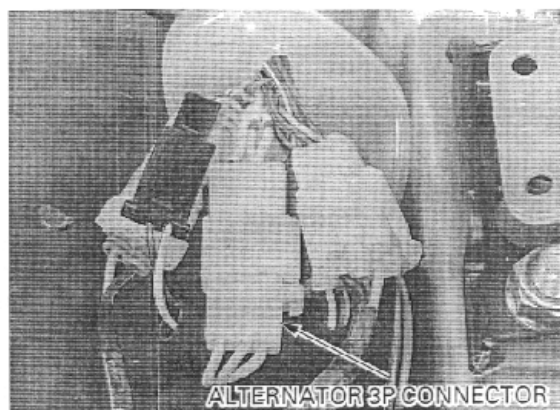
Measure the resistance between the wire terminals of the alternator side connector.

STANDARD: 0.2 — 0.5 Ω (20 °C/68 °F)

Check for continuity between each wire terminal of the alternator side connector and ground. There should not be continuity.

Replace the alternator stator if resistance is out of specification, or if any wire has continuity to ground.

Refer to section 10 for alternator stator replacement.



REGULATOR/RECTIFIER

WIRE HARNESS INSPECTION

Remove the seat cowl (page 2-2).

Disconnect the regulator/rectifier 6P (white) connector.

Check the connector for loose contact or corroded terminals.

BATTERY LINE

Measure the voltage between the red/white wire terminal and ground.

There should be battery voltage at all time.

GROUND LINE

Check the continuity between the green wire terminal and ground.

There should be continuity at all time.

CHARGING COIL LINE

Measure the resistance between the yellow wire terminals.

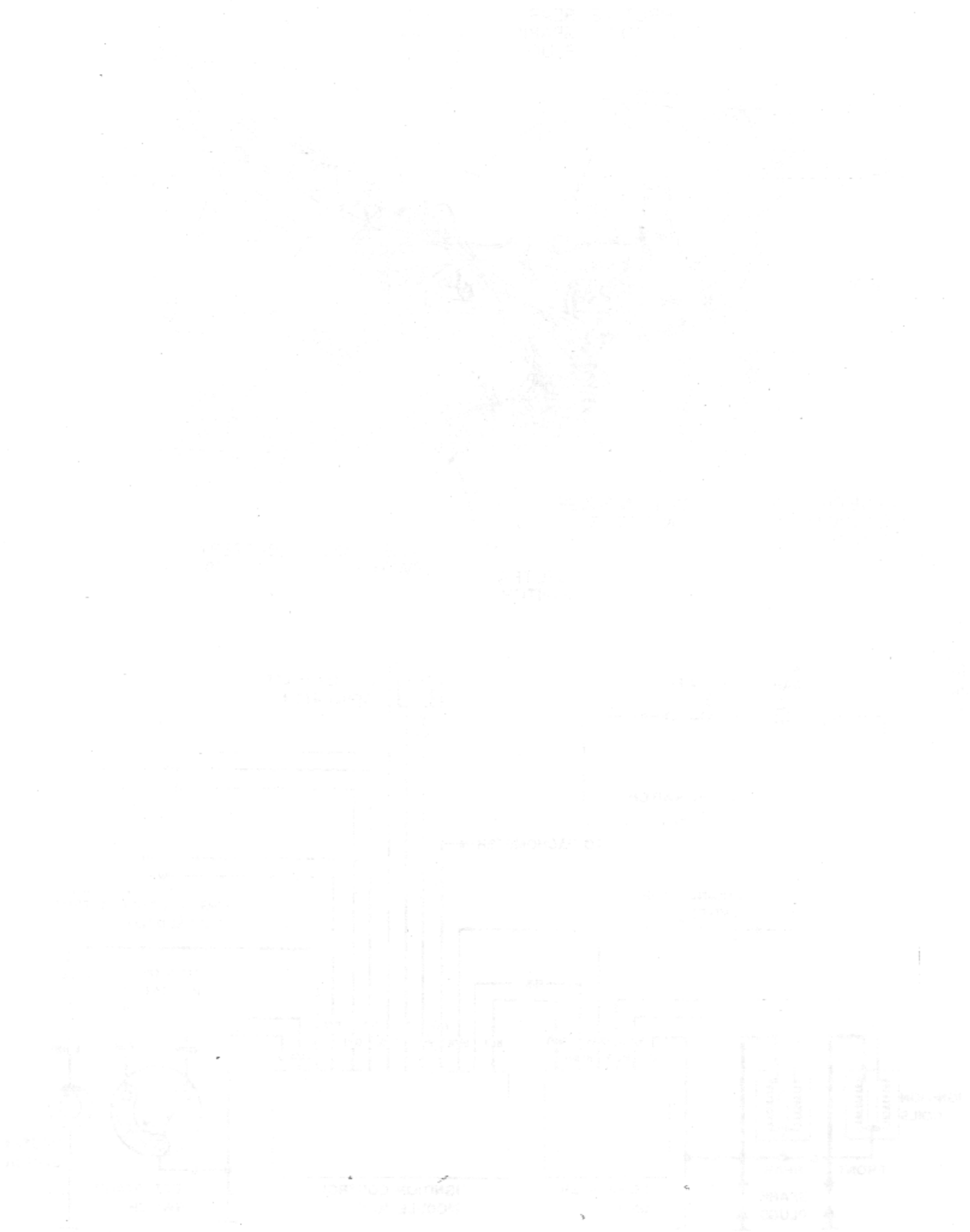
STANDARD: 0.2 — 0.5 Ω (20 °C/68 °F)

Check for continuity between each yellow wire terminal and ground.

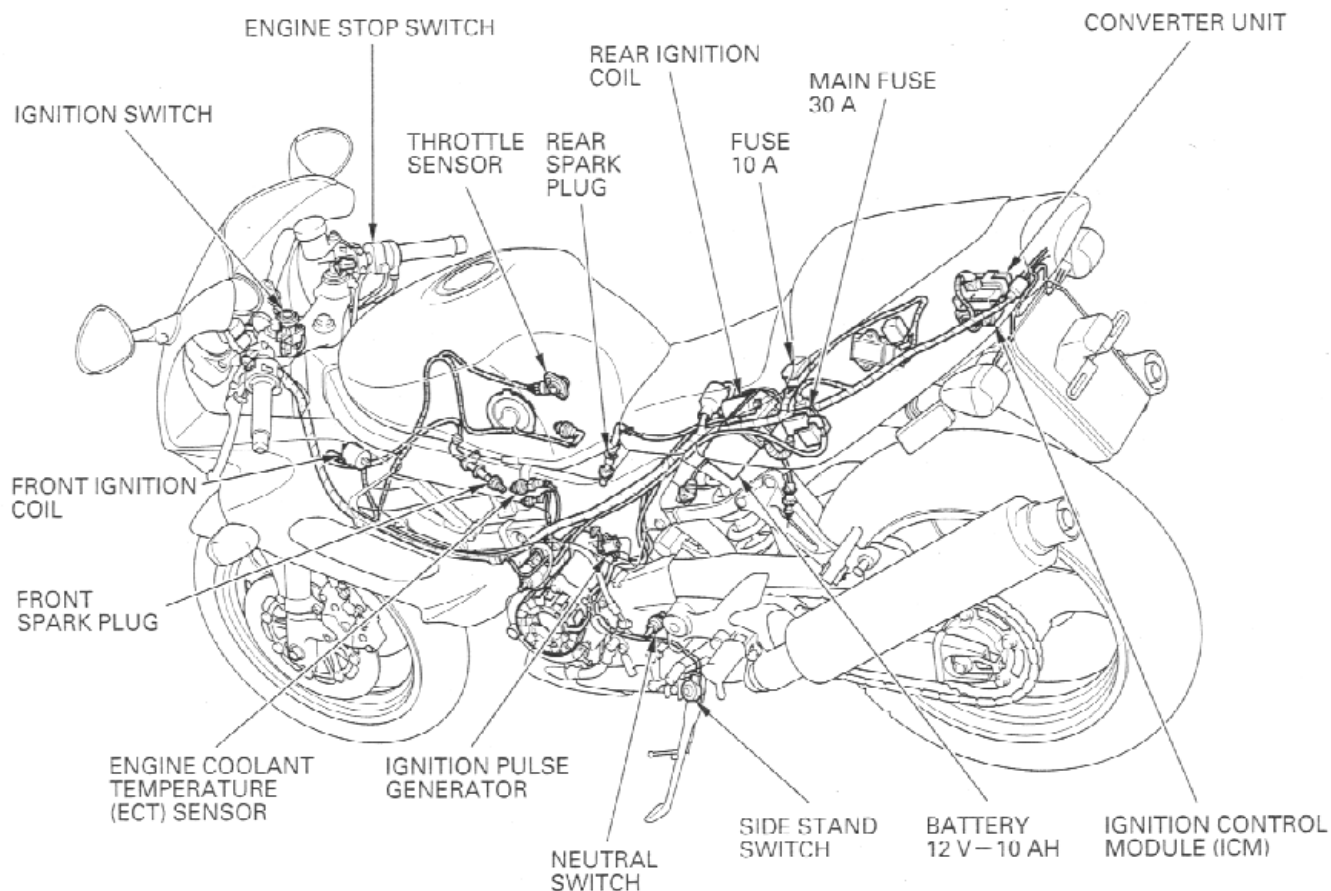
There should not be continuity.



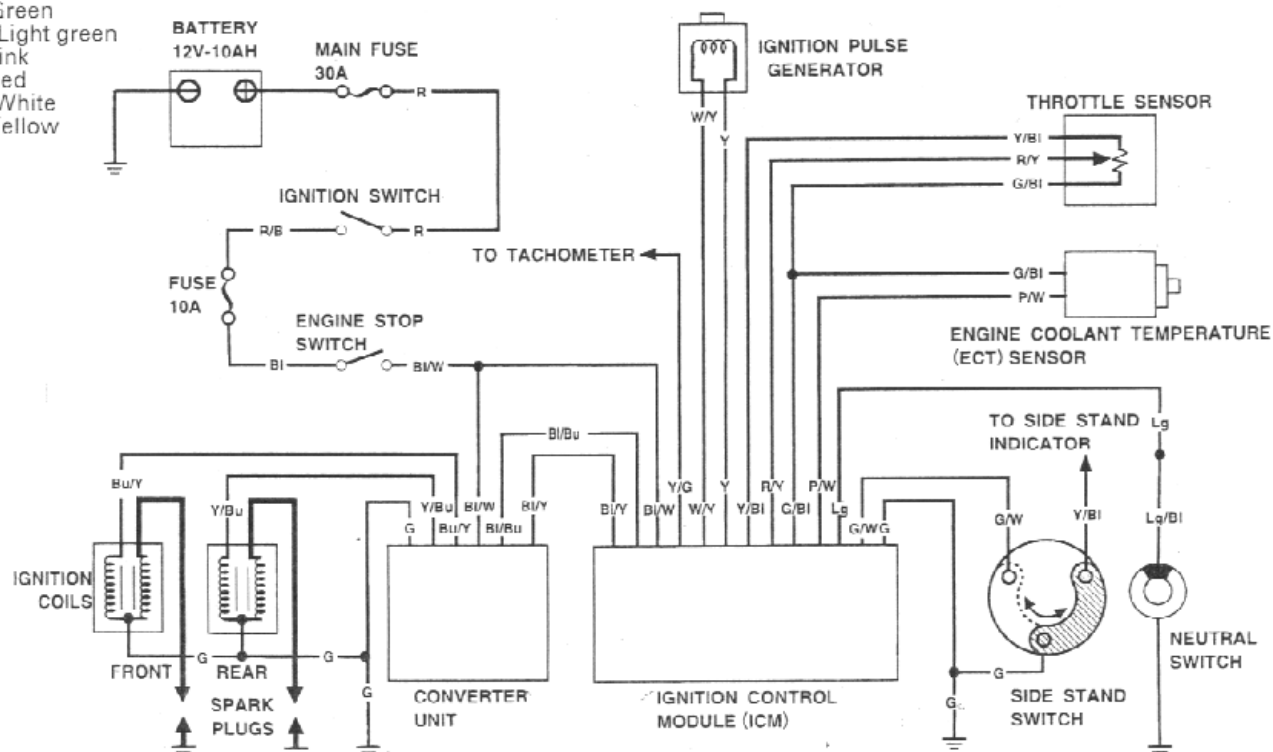
MEMO



IGNITION SYSTEM



Bl: Black
 Bu: Blue
 G: Green
 Lg: Light green
 P: Pink
 R: Red
 W: White
 Y: Yellow



17. IGNITION SYSTEM

SERVICE INFORMATION	17-1	IGNITION TIMING	17-7
TROUBLESHOOTING	17-3	THROTTLE SENSOR	17-8
IGNITION SYSTEM INSPECTION	17-4	ENGINE COOLANT TEMPERATURE (ECT) SENSOR	17-10
IGNITION COIL	17-6		
IGNITION PULSE GENERATOR	17-7		

SERVICE INFORMATION

GENERAL

▲WARNING

When the engine must be running to do some work, make sure the area is well ventilated. Never run the engine in an enclosed area. The exhaust contains poisonous carbon monoxide gas that may cause loss of consciousness and lead to death. Run the engine in an open area or with an exhaust evacuation system in an enclosed area.

CAUTION:

Some electrical components may be damaged if terminals or connectors are connected or disconnected while the ignition switch is ON and current is present.

- When servicing the ignition system, always follow the steps in the troubleshooting sequence on page 17-3.
- The transistorized ignition system uses an electrically controlled ignition timing system. No adjustments can be made to the ignition timing.
- The ignition control module (ICM) varies ignition timing according to the engine speed. The engine coolant temperature (ECT) sensor and throttle sensor signal the ICM to compensate the ignition timing according to the coolant temperature and throttle opening.
- The ICM may be damaged if dropped. Also, if the connector is disconnected when current is flowing, the excessive voltage may damage the ICM. Always turn off the ignition switch before servicing.
- A faulty ignition system is often related to poor connections. Check those connections before proceeding.
- Make sure the battery is adequately charged. Using the starter motor with a weak battery results in a slower engine cranking speed as well as no spark at the spark plugs.
- This motorcycle's spark plug is equipped with platinum type electrodes. Do not use spark plugs other than specified.
- For spark plug inspection, see section 3.
- See section 19 for following components:
 - Ignition switch
 - Engine stop switch
 - Neutral switch
 - Side stand switch
 - Clutch switch

IGNITION SYSTEM

SPECIFICATIONS

ITEM		SPECIFICATIONS
Spark plug		DPR9EVX-9 (NGK)
Spark plug gap		0.80 0.90 mm (0.031 – 0.035 in)
Ignition coil primary peak voltage		100 V minimum
Ignition pulse generator peak voltage		0.7 V minimum
Ignition timing ("F" mark)		15° BTDC at idle
Engine coolant temperature (ECT) sensor resistance	At 20 °C (68 °F)	2 – 3 k Ω
	At 80 °C (176 °F)	200 – 400 Ω
Throttle sensor	Resistance (20 °C/68 °F)	4 6 k Ω
	Input voltage	4.7 – 5.3 V

TORQUE VALUES

Ignition coil mounting bolt	10 N·m (1.0 kgf·m , 7 lbf·ft)
Ignition pulse generator bolt	12 N·m (1.2 kgf·m , 9 lbf·ft)
Engine coolant temperature (ECT) sensor	23 N·m (2.3 kgf·m , 17 lbf·ft)

TOOLS

Peak voltage tester (U. S. A. only) or Peak voltage adaptor	07HGJ-0020100 (not available in U.S.A.) with commercially available digital multimeter (impedance 10 M Ω /DCV minimum)
Inspection adaptor	07VMJ-0020100 or equivalent commercially available in U.S.A.

TROUBLESHOOTING

- Inspect the following before diagnosing the system.
 - Faulty spark plug
 - Loose spark plug cap or spark plug wire connections
 - Water got into the spark plug cap (Leaking the ignition coil secondary voltage)
- If there is no spark at any cylinder, temporarily exchange the ignition coil with the other good one and perform the spark test. If there is spark, the exchanged ignition coil is faulty.

NO SPARK AT SPARK PLUGS

UNUSUAL CONDITION		PROBABLE CAUSE (Check in numerical order)
Ignition coil primary voltage	Low peak voltage	1. Incorrect peak voltage adaptor connections. 2. The multimeter impedance is too low; below 10 M Ω /DCV. 3. Cranking speed is too low. (Battery is undercharged) 4. The sampling timing of the tester and measured pulse were not synchronized. (System is normal if measured voltage is over the standard voltage at least once.) 5. Poorly connected connectors or an open circuit in ignition system. 6. Faulty side stand switch or neutral switch. 7. An open circuit or loose connection in No. 6 related circuit wires. <ul style="list-style-type: none"> • Side stand switch line: green/white wire • Neutral switch line: light green and light green/black wires 8. Faulty ignition control module (ICM) and/or converter unit (in case when above No. 1 thru. 7 are normal).
	No peak voltage	1. Incorrect peak voltage adaptor connections. (System is normal if measured voltage is over the specifications with reverse connections.) 2. Battery is undercharged. (Voltage drops largely when the engine is started.) 3. Faulty ignition switch or engine stop switch. 4. Loose or poorly connected ICM or converter unit connectors. 5. No voltage at the black/white wire of the ICM or converter unit. 6. Open circuit or poor connection in green (ground) wire of the ICM or converter unit. 7. Faulty side stand switch or neutral switch. 8. An open circuit or loose connection in No. 7 related circuit wires. <ul style="list-style-type: none"> • Side stand switch line: green/white wire • Neutral switch line: light green and light green/black wires 9. Faulty peak voltage adaptor. 10. Faulty ignition pulse generator. (Measure peak voltage.) 11. Faulty ICM and/or converter unit (in case when above No. 1 thru. 10 are normal).
	Peak voltage is normal, but does not spark	1. Faulty spark plug or leaking ignition coil secondary current ampere. 2. Faulty ignition coils.
Ignition pulse generator	Low peak voltage	1. The multimeter impedance is too low; below 10 M Ω /DCV. 2. Cranking speed is too slow. (Battery is undercharged.) 3. The sampling timing of the tester and measured pulse were not synchronized. (System is normal if measured voltage is over the standard voltage at least once.) 4. Faulty ignition pulse generator (in case when above No. 1 thru. 3 are normal).
	No peak voltage	1. Faulty peak voltage adaptor. 2. Faulty ignition pulse generator.

IGNITION SYSTEM INSPECTION

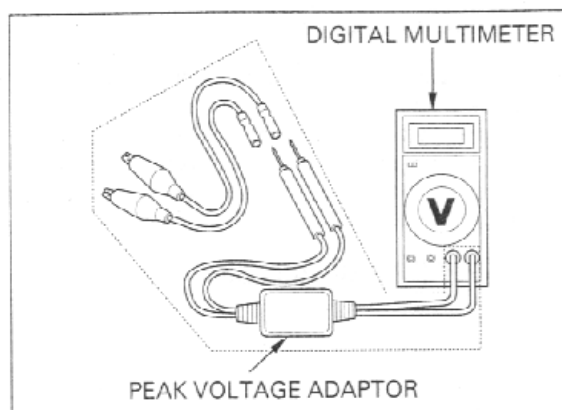
NOTE:

- If not spark jumps at the plugs, check that all connections for loose or poor contact before measuring each peak voltage.
- Use recommended digital multimeter or commercially available digital multimeter with an impedance $10\text{ M}\Omega/\text{DCV}$ minimum.
- The display value differs depending upon the internal impedance of the multimeter.

Connect the peak voltage adaptor to the digital multimeter, or use the peak voltage tester.

TOOLS:

Peak voltage tester (U.S.A. only) or
Peak voltage adaptor 07HGJ-0020100
with commercially available digital multimeter
(impedance $10\text{ M}\Omega/\text{DCV}$ minimum)



IGNITION PRIMARY PEAK VOLTAGE

NOTE:

- Check all system connections before the inspection. If the system is disconnected, incorrect peak voltage might be measured.
- Check cylinder compression at each cylinder and check that the spark plugs are installed correctly in the cylinders.

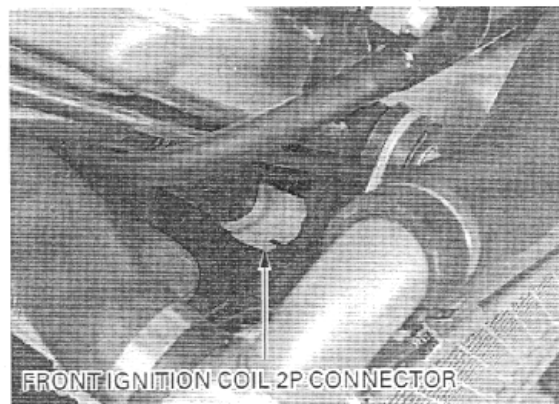
Disconnect the spark plug caps from the spark plugs.

Connect good known spark plugs to the spark plug caps and ground the spark plugs to the cylinder heads as done in a spark test.

Front: Remove the front fairing (page 2-3).

Rear: Remove the seat (page 2-2).

Disconnect the ignition coil 2P (white) connector.



Connect the inspection adaptor.

TOOL:

Inspection adaptor 07VMJ-0020100 or equivalent commercially available in U.S.A.

Connect the peak voltage adaptor or tester to the inspection adaptor.

CONNECTIONS:

Red clip (-) - Green clip (+)

Turn the ignition switch ON and engine stop switch to RUN.

Shift the transmission into neutral.

Crank the engine with the starter motor and measure the ignition coil primary peak voltage.

PEAK VOLTAGE: 100 V minimum

⚠ WARNING

Avoid touching the spark plugs and tester probes to prevent electric shock.

NOTE:

Although measured values are different for each ignition coil, they are normal as long as voltage is higher than the specified value.

If the peak voltage is lower than standard value, follow the checks described in the troubleshooting chart (page 17-3).

Install the removed parts in the reverse order of removal.

IGNITION PULSE GENERATOR PEAK VOLTAGE

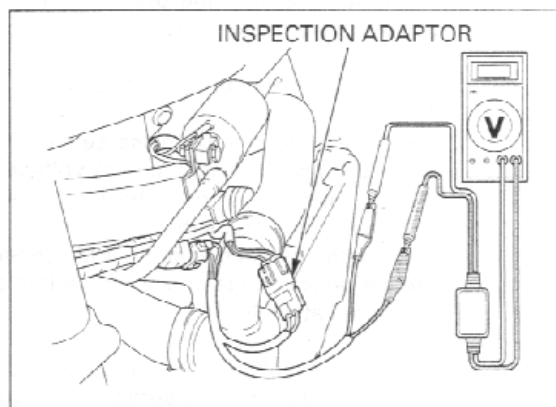
NOTE:

Check cylinder compression at each cylinder and check that the spark plugs are installed correctly in the cylinders.

Remove the seat (page 2-2).

Remove the converter unit from the stay.

Remove the ignition control module (ICM) from the stay and disconnect the ICM connector.



Connect the peak voltage adaptor or tester probes to the connector terminals of the wire harness side.

CONNECTION:

White/Yellow terminal — Yellow terminal

Turn the ignition switch ON and engine stop switch to RUN.

Shift the transmission into neutral.

Crank the engine with the starter motor and measure the ignition pulse generator peak voltage.

PEAK VOLTAGE: 0.7 V minimum

If the peak voltage measured at ICM connector is abnormal, measure the peak voltage at the pulse generator connector.

Remove the front fairing (page 2-3).

Disconnect the ignition pulse generator 2P (white) connector and connect the peak voltage adaptor or tester probes to the connector terminals of the ignition pulse generator side.

In the same manner as at the ICM connector, measure the peak voltage and compare it to the voltage measured at the ICM connector.

- If the peak voltage measured at the ICM is abnormal and the one measured at the ignition pulse generator is normal, the wire harness has an open or short circuit, or loose connection.
- If both peak voltage are lower than standard value, follow the checks described in the troubleshooting chart (page 17-3).

Install the removed parts in the reverse order of removal.

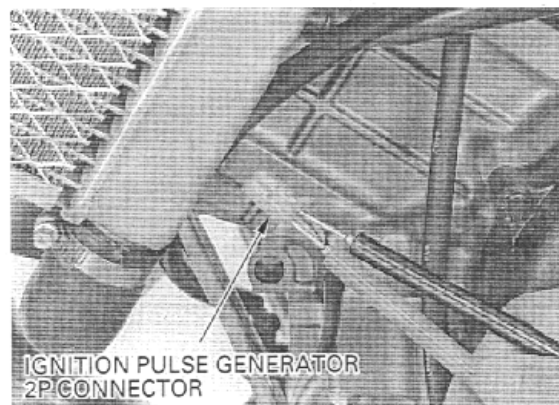
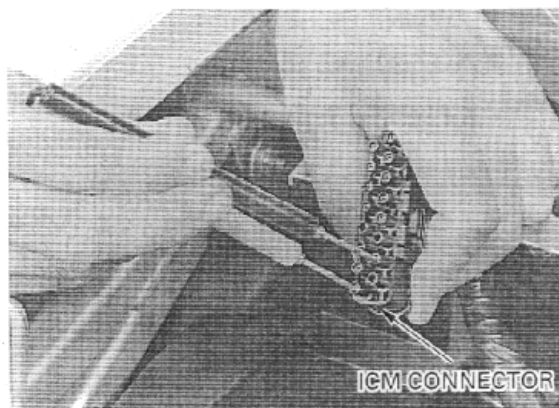
IGNITION COIL

REPLACEMENT

Front: Remove the front fairing (page 2-3).

Rear: Remove the seat cowl (page 2-2).

Disconnect the spark plug cap from the plug.
Disconnect the ignition coil connector.



Remove the two mounting bolts and the ignition coil.

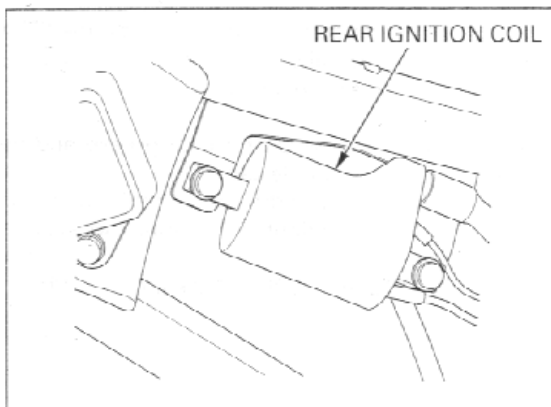
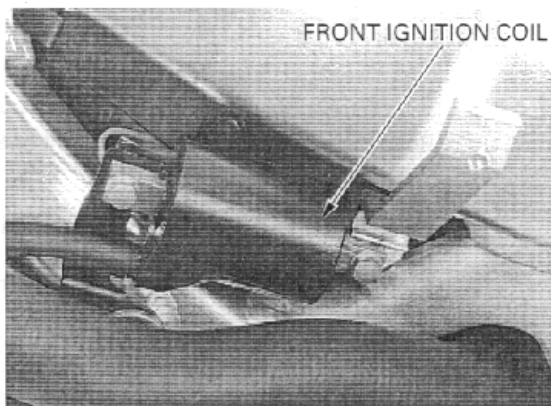
Install the ignition coil and tighten the mounting bolts.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Install the removed parts in the reverse order of removal.

NOTE:

Route the ignition coil wire and spark plug wire properly (page 1-18).



IGNITION PULSE GENERATOR

REPLACEMENT

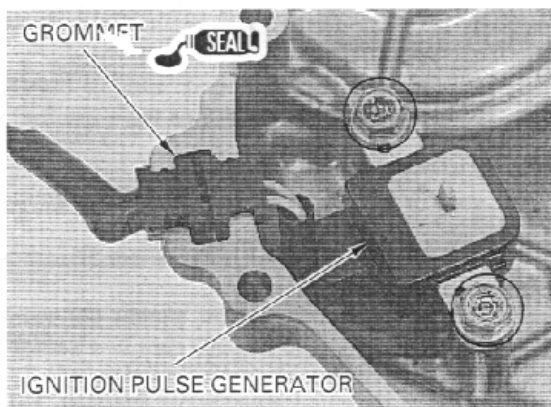
Remove the right crankcase cover (page 6-12).

Remove the two bolts and ignition pulse generator.

Apply sealant to the grommet seating surfaces. Install a new ignition pulse generator and the grommet into the cover groove properly. Tighten the bolts.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Install the right crankcase cover (page 6-14).



IGNITION TIMING

NOTE:

Read the instructions for timing light operation.

Start the engine and warm it up to operating temperature.

Stop the engine and remove the timing hole cap.

Connect the timing light to the spark plug wire.

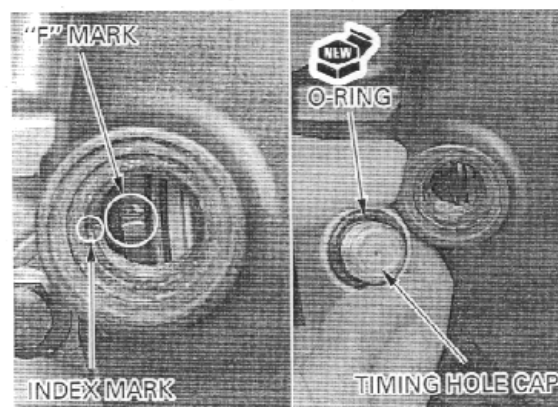
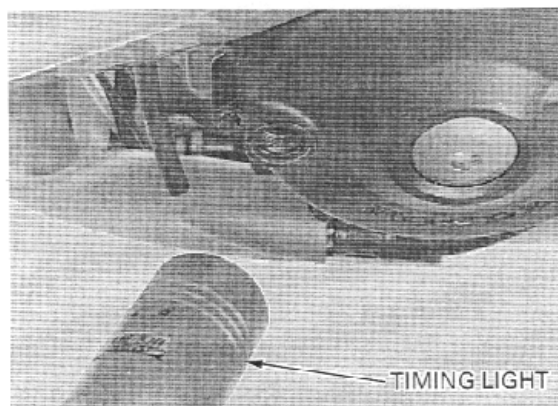
Start the engine, let it idle and check the ignition timing.

The ignition timing is correct if the "F" mark on the flywheel aligns with the index mark on the left crankcase cover at idle.

Coat a new O-ring with grease and install it onto the timing hole cap.

Apply grease the timing hole cap threads. Install and tighten the timing hole cap.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)



THROTTLE SENSOR

Remove the fuel tank without disconnecting the fuel and vacuum tubes from the fuel valve (page 2-4).

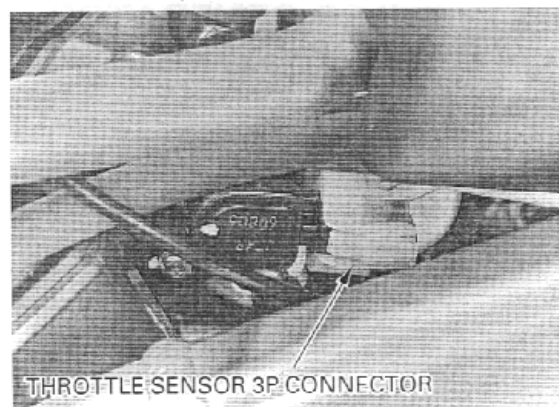
OPERATION INSPECTION

Disconnect the throttle sensor 3P connector.

Start the engine.

Connect the throttle sensor connector when the engine speed is 3,500 rpm or above (throttle angle is 4 – 12°).

The engine speed should increase.

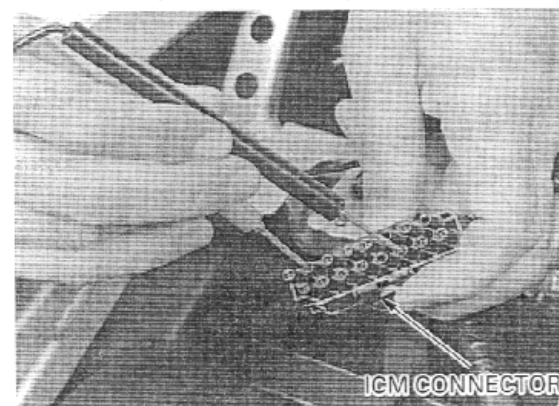


SYSTEM INSPECTION

Disconnect the ignition control module (ICM) connector (page 17-5).

Measure the resistance between the yellow/black and green/black wire terminals of the wire harness side connector.

STANDARD: 4 – 6 k Ω (20 °C/68 °F)



Check that the resistance between the red/yellow and green/black wire terminals varies with the throttle position while operating the throttle grip.

Fully open – Fully closed position: Resistance decreases

Fully closed – Fully open position: Resistance increases

If the correct measurements cannot be obtained, disconnect the throttle sensor 3P connector and perform the same inspections at the sensor terminals.

- If the measurement at the ICM is abnormal and the one at the throttle sensor is normal, check for open or short circuit, or loose or poor connections in the wire harness.
- If both measurements are abnormal, replace the throttle sensor.

Connect the ICM connector.

Turn the engine stop switch to RUN and the ignition switch ON.

Measure the input voltage between the yellow/black (+) and green/black (–) wire terminals of the wire harness side throttle sensor connector.

STANDARD: 4.7 – 5.3 V

If the input voltage is abnormal, or if there is no input voltage, check for open or short circuit in the wire harness, or loose or poor ICM connector contact.

REPLACEMENT

Remove the carburetors from the insulators (page 55).

Disconnect the throttle sensor connector.

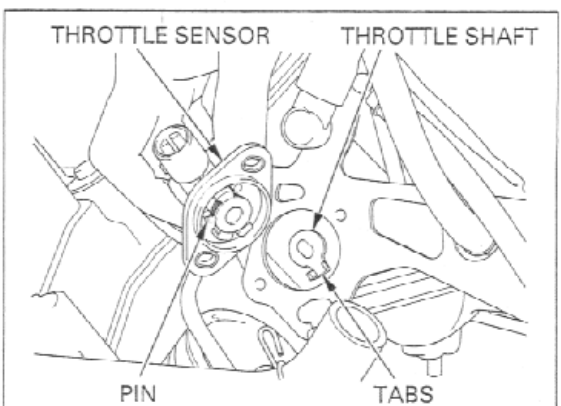
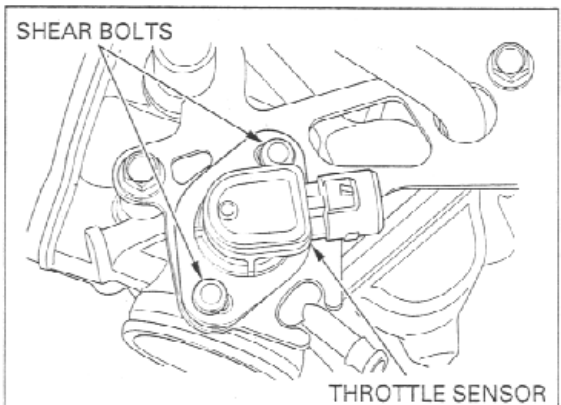
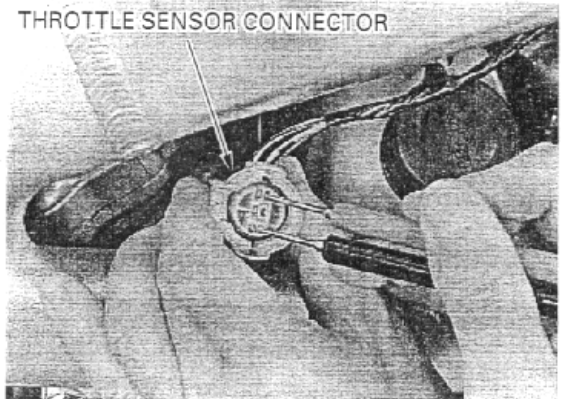
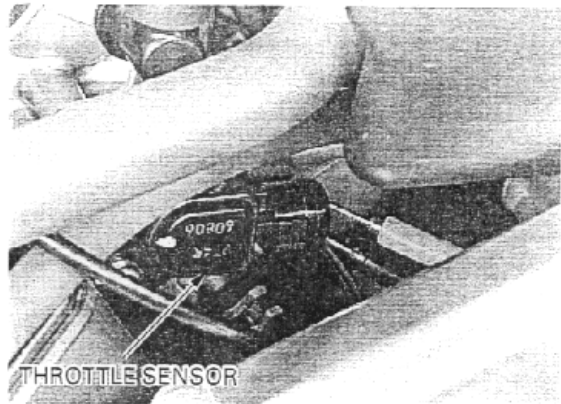
Remove the two shear bolts and the throttle sensor.

Install the throttle sensor so that the pin of the throttle sensor is positioned between the tabs of the throttle shaft.

Loosely install new shear bolts.

CAUTION:

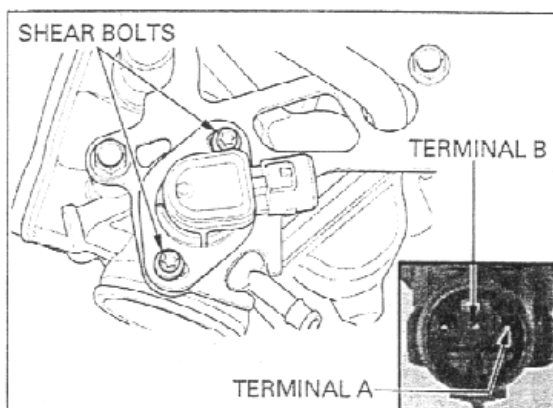
Install the throttle sensor properly. Improper installation can cause damage to the throttle sensor.



Adjust the throttle sensor position so that the resistance between terminals A and B is 490–510 Ω , and tighten the shear bolts until the bolt heads break off.

Connect the throttle sensor connector.

Install the removed parts in the reverse order of removal.



ENGINE COOLANT TEMPERATURE (ECT) SENSOR

INSPECTION

Remove the fuel tank (page 2-4).

Disconnect the ignition control module (ICM) connector (page 17-5).

Disconnect the ECT sensor connector.

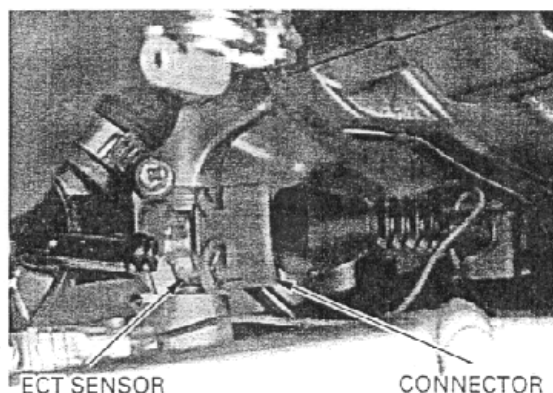
Check for continuity between the ECT sensor connector and ICM connector.

There should be continuity between the same color wires, and no continuity between different color wires.

Drain the coolant (page 6-5).

Remove the ECT sensor from the thermostat housing.

Suspend the sensor in cold water. Heat the water slowly, using an electric heating element.

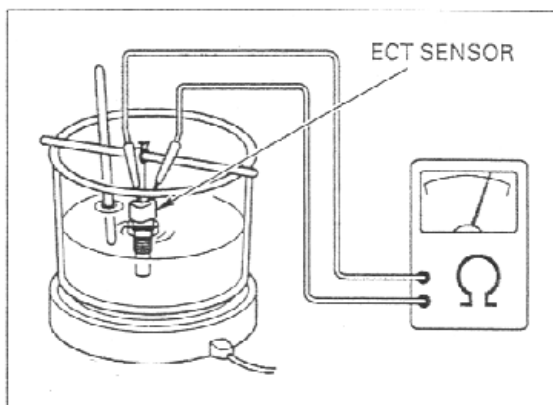


⚠ WARNING

Keep all flammable materials away from the electric heating element. Wear protective clothing, insulated gloves and eye protection.

Measure the resistance between the sensor terminals.

STANDARD: 2 – 3 k Ω at 20 °C (68 °F)
200 – 400 Ω at 80 °C (178 °F)



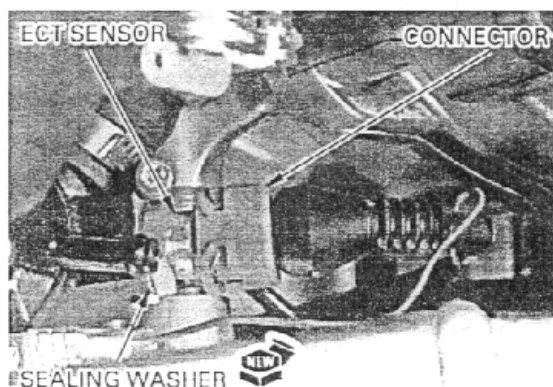
If the resistance is out of above ranges, replace the ECT sensor.

Install the ECT sensor with a new sealing washer and tighten it.

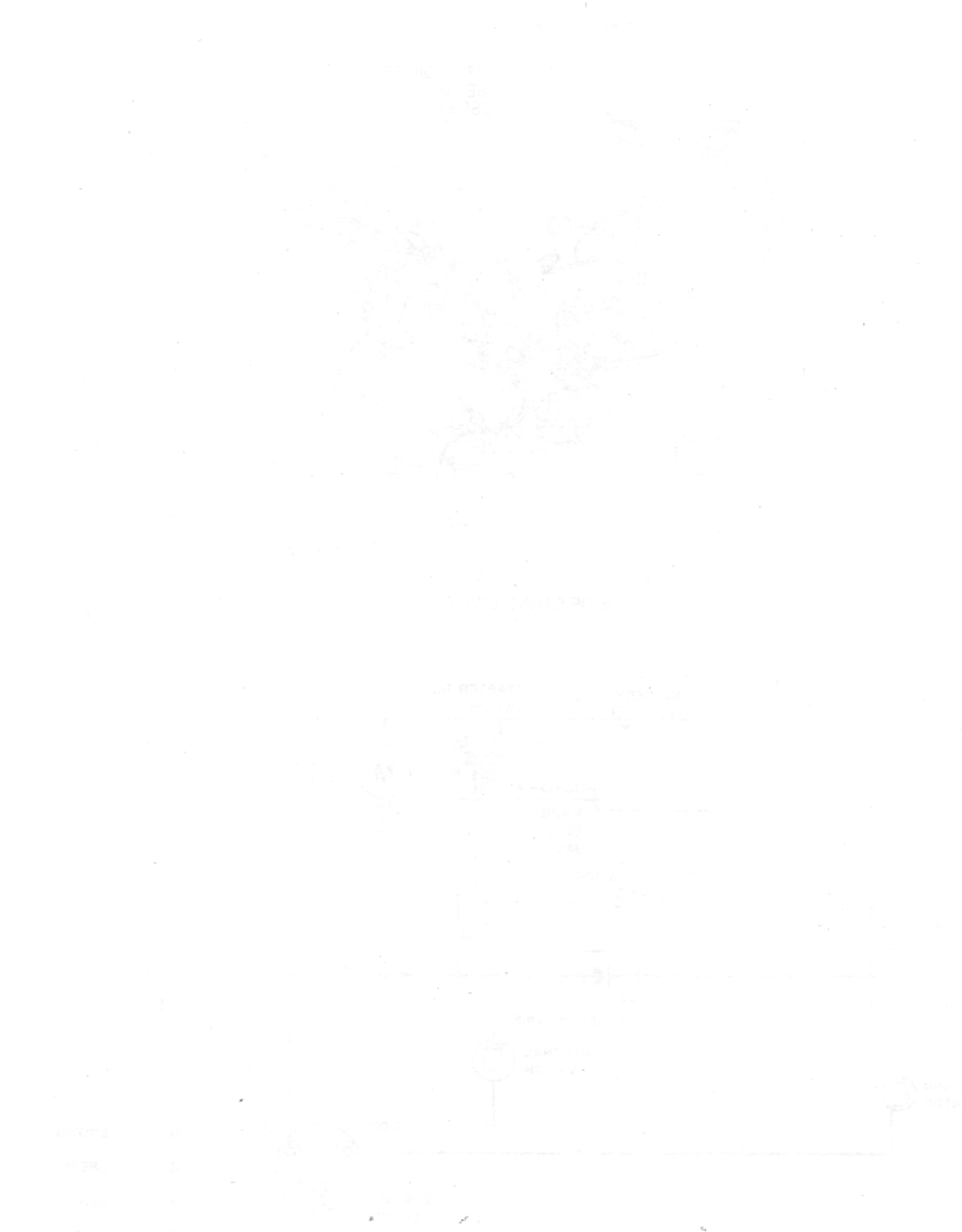
TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)

Install the removed parts in the reverse order of removal.

Fill and bleed the cooling system (page 6-5).

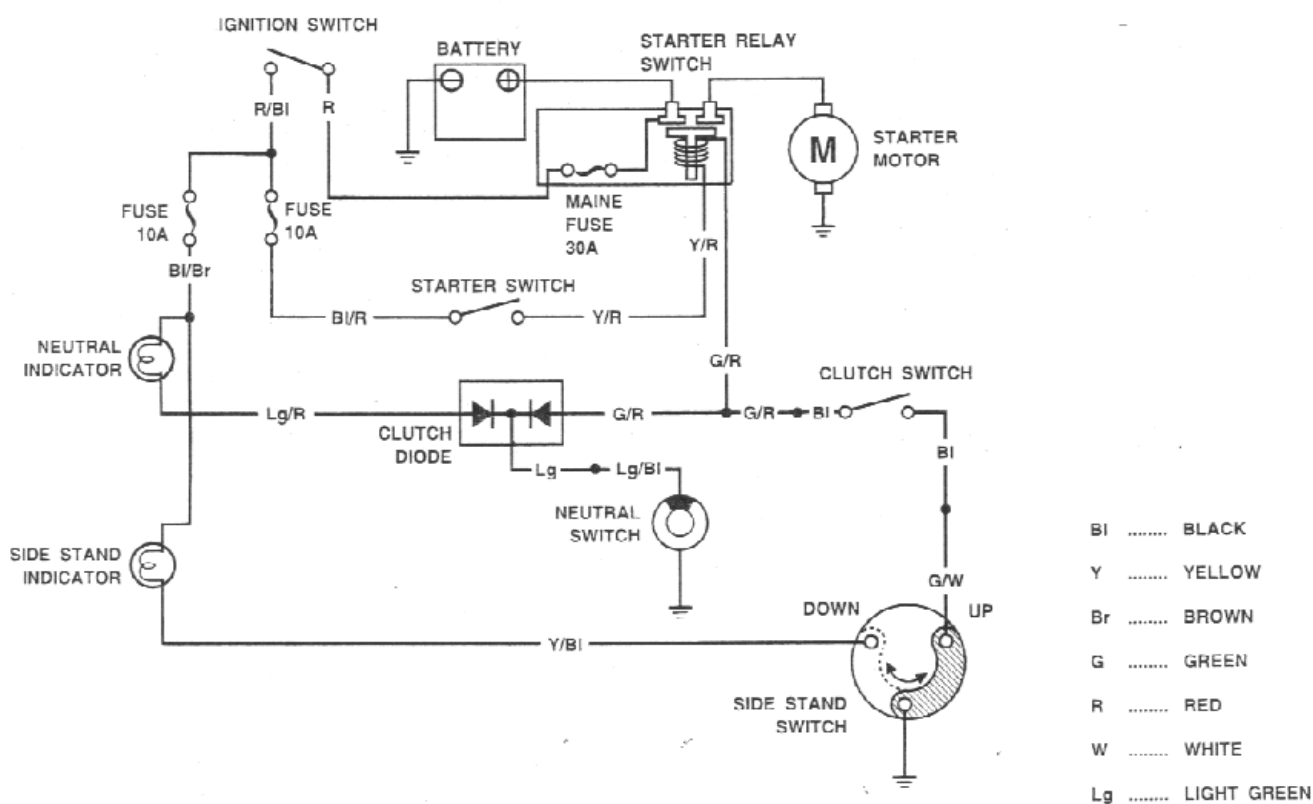
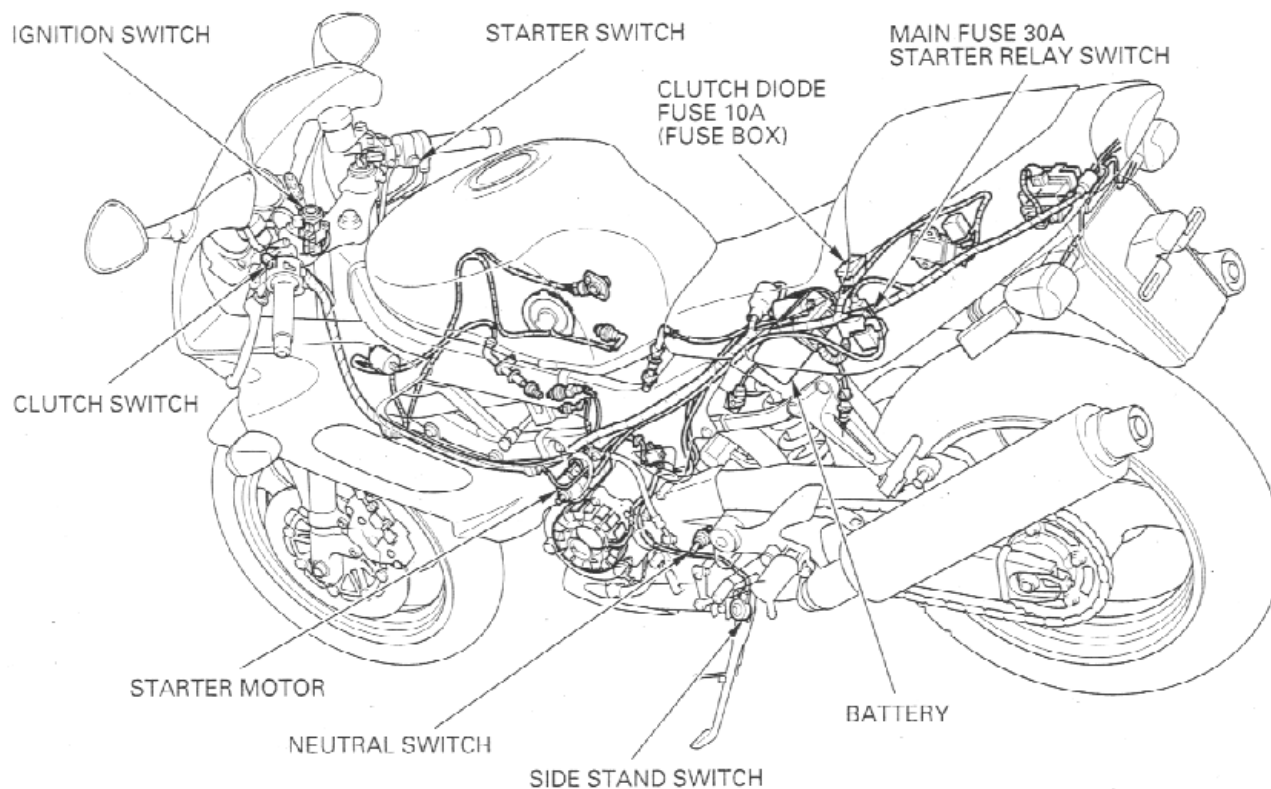


MEMO



1. 1000
2. 1000
3. 1000
4. 1000
5. 1000
6. 1000
7. 1000
8. 1000
9. 1000
10. 1000
11. 1000
12. 1000
13. 1000
14. 1000
15. 1000
16. 1000
17. 1000
18. 1000
19. 1000
20. 1000
21. 1000
22. 1000
23. 1000
24. 1000
25. 1000
26. 1000
27. 1000
28. 1000
29. 1000
30. 1000
31. 1000
32. 1000
33. 1000
34. 1000
35. 1000
36. 1000
37. 1000
38. 1000
39. 1000
40. 1000
41. 1000
42. 1000
43. 1000
44. 1000
45. 1000
46. 1000
47. 1000
48. 1000
49. 1000
50. 1000
51. 1000
52. 1000
53. 1000
54. 1000
55. 1000
56. 1000
57. 1000
58. 1000
59. 1000
60. 1000
61. 1000
62. 1000
63. 1000
64. 1000
65. 1000
66. 1000
67. 1000
68. 1000
69. 1000
70. 1000
71. 1000
72. 1000
73. 1000
74. 1000
75. 1000
76. 1000
77. 1000
78. 1000
79. 1000
80. 1000
81. 1000
82. 1000
83. 1000
84. 1000
85. 1000
86. 1000
87. 1000
88. 1000
89. 1000
90. 1000
91. 1000
92. 1000
93. 1000
94. 1000
95. 1000
96. 1000
97. 1000
98. 1000
99. 1000
100. 1000

ELECTRIC STARTER



18. ELECTRIC STARTER

SERVICE INFORMATION	18-1	STARTER RELAY SWITCH	18-10
TROUBLESHOOTING	18-2	CLUTCH DIODE	18-11
STARTER MOTOR	18-4		

SERVICE INFORMATION

GENERAL

⚠ WARNING

Always turn the ignition switch OFF before servicing the starter motor. The motor could suddenly start, causing serious injury.

- The starter motor can be serviced with the engine in the frame.
- When checking the starter system, always follow the steps in the troubleshooting flow chart (page 18-2).
- A weak battery may be unable to turn the starter motor quickly enough, or supply adequate ignition current.
- If the current is kept flowing through the starter motor to turn it while the engine is not cranking over, the starter motor may be damaged.
- See section 10 for starter clutch servicing.
- See section 19 for following components:
 - Ignition switch
 - Starter switch
 - Neutral switch
 - Side stand switch
 - Clutch switch

SPECIFICATIONS

Unit: mm (in)

ITEM	STANDARD	SERVICE LIMIT
Starter motor brush length	12.0 – 13.0 (0.47 – 0.51)	6.5 (0.26)

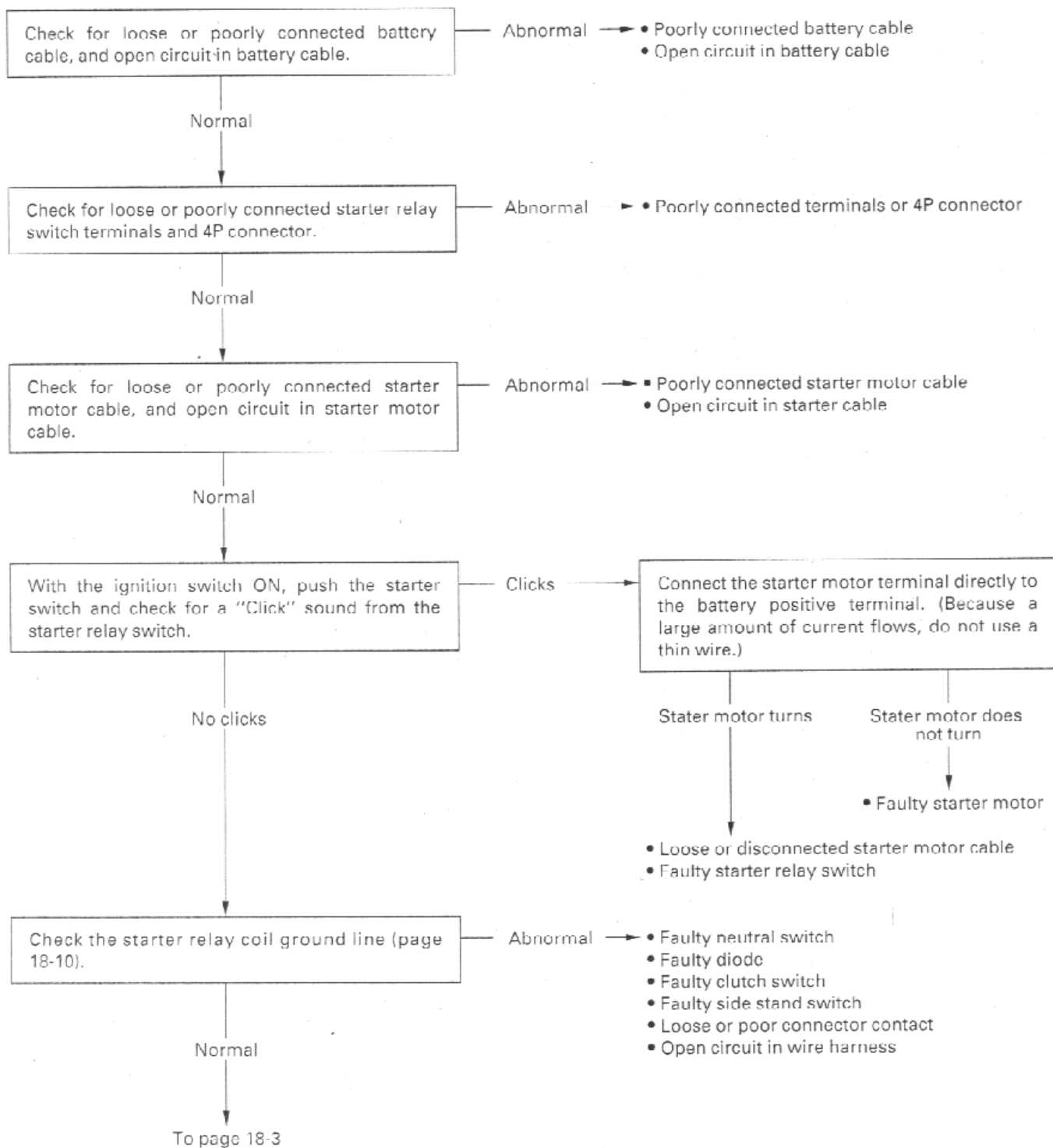
TORQUE VALUE

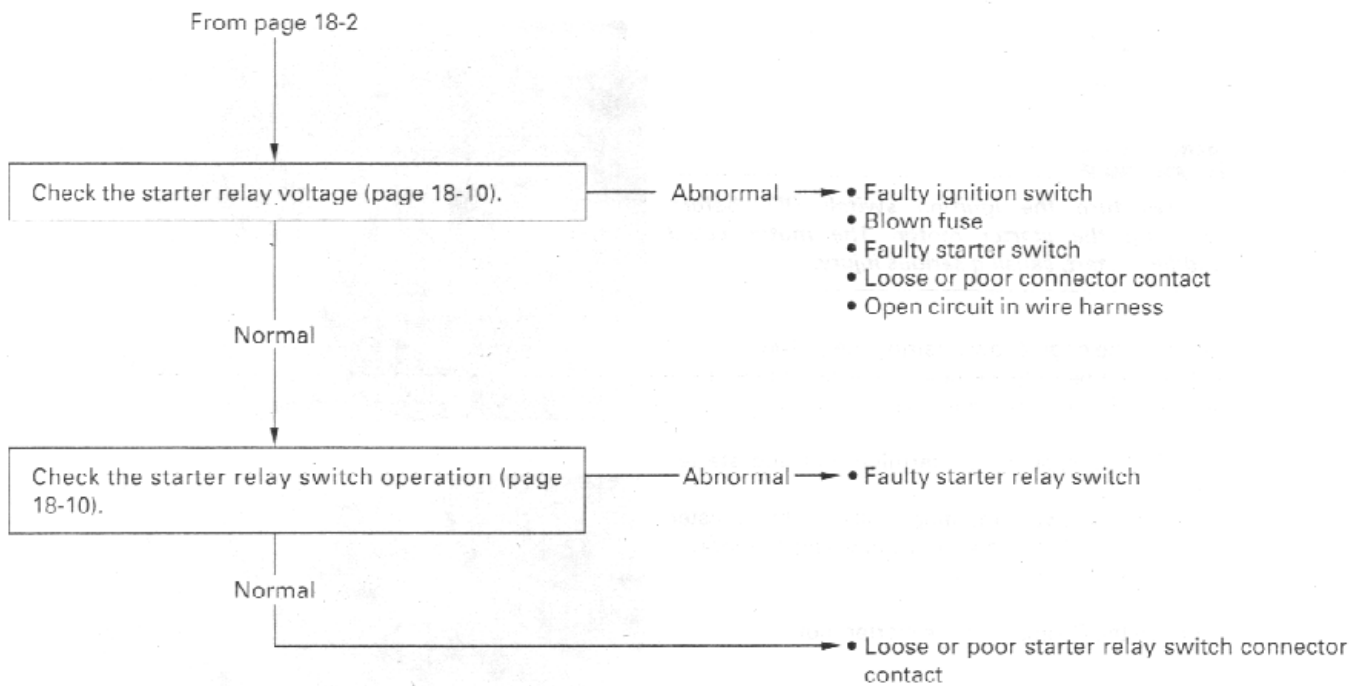
Starter motor terminal nut 10 N·m (1.0 kgf·m, 7 lbf·ft)

TROUBLESHOOTING

Starter motor will not turn

- Check for a blown main fuse (30 A) or sub-fuse (10 A)
- Check that the battery is fully charged and in good condition.



**Starter motor turns slowly**

- Weak battery
- Poorly connected battery cable
- Poorly connected starter motor cable
- Faulty starter motor

Starter motor turns, but engine does not turn

- Faulty starter clutch (section 10)

Starter relay switch "clicks", but engine does not turn over

- Crankshaft does not turn due to engine problem
- Faulty starter clutch (section 10)
- Faulty starter reduction gear (section 10)

STARTER MOTOR REMOVAL

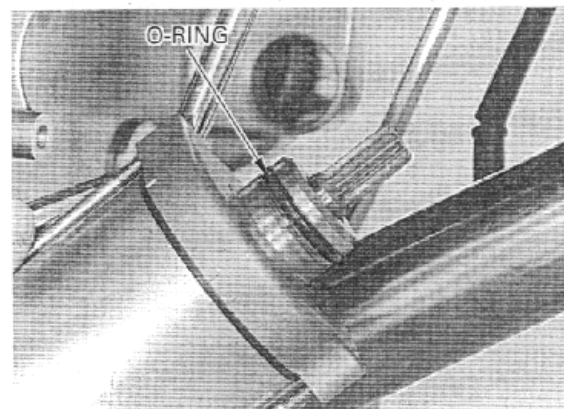
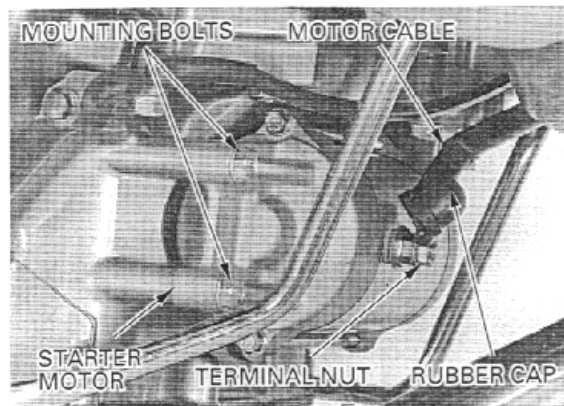
⚠WARNING

Always turn the ignition switch OFF before servicing the starter motor. The motor could suddenly start, causing serious injury.

Remove the engine lower fairing (page 2-4).
California type only: Remove the evaporative emission (EVAP) canister (page 5-25).

Remove the rubber cap, terminal nut and starter motor cable.
Remove the two mounting bolts, right canister bracket stay (California type only) and the starter motor from the crankcase.

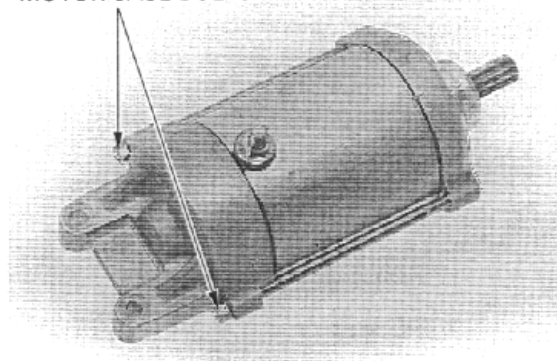
Remove the O-ring from the starter motor.



DISASSEMBLY

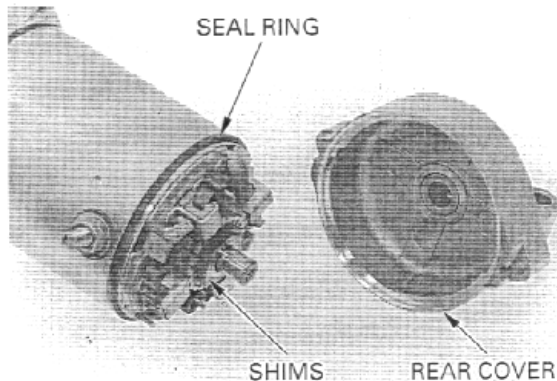
Remove the starter motor case bolts.

MOTOR CASE BOLTS



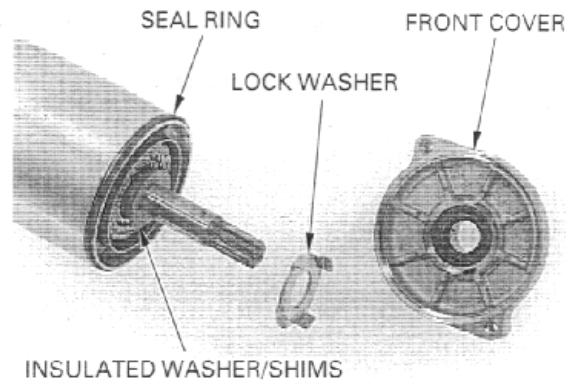
Record the location and number of shims.

Remove the rear cover, seal ring and shims.



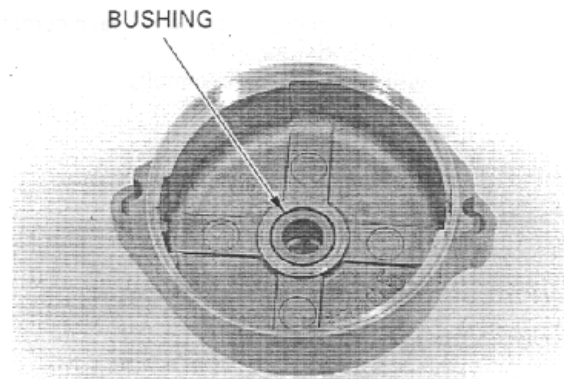
Remove the following:

- front cover
- seal ring
- lock washer
- insulated washer
- shims
- armature

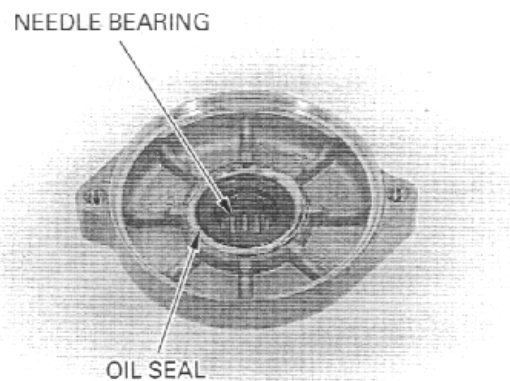


INSPECTION

Check the bushing in the rear cover for wear or damage.



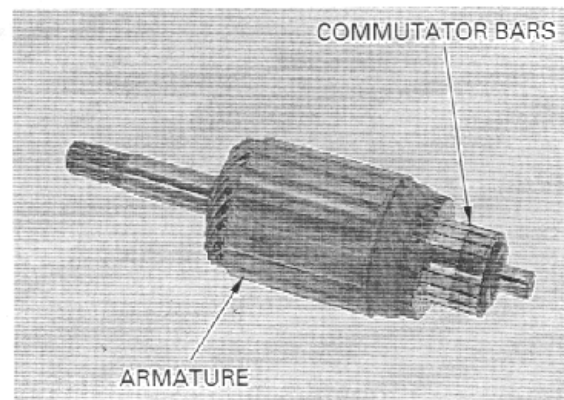
Check the oil seal and needle bearing in the front cover for deterioration, wear or damage.



Check the commutator bars of the armature for discoloration.

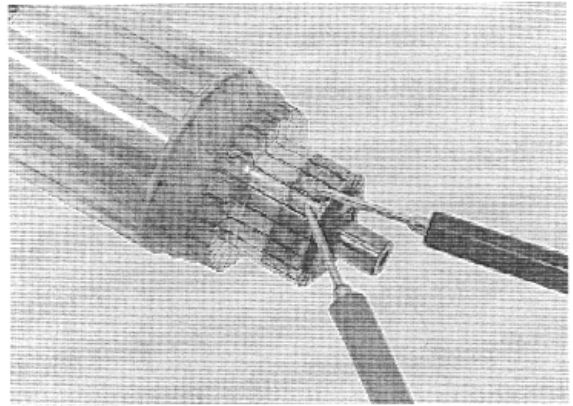
NOTE:

Do not use emery or sand paper on the commutator.

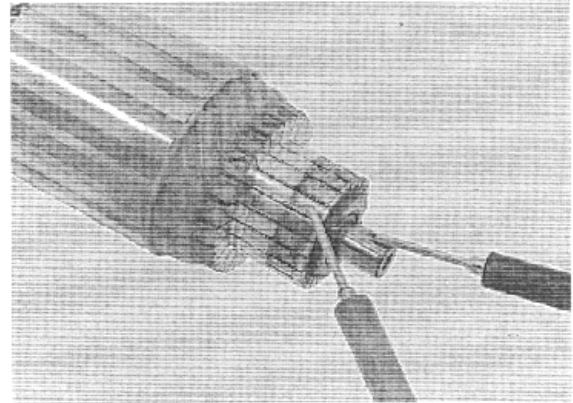


ELECTRIC STARTER

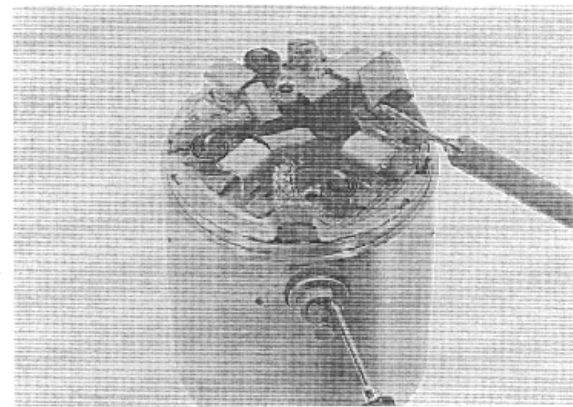
Check for continuity between pairs of commutator bars.
There should be continuity.



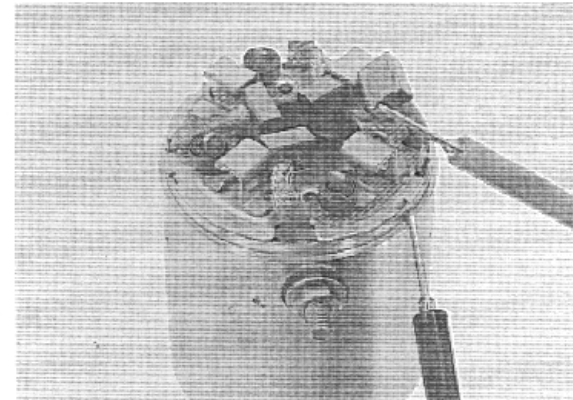
Check for continuity between each commutator bar and the armature shaft.
There should be no continuity.



Check for continuity between the insulated brush and cable terminal.
There should be continuity.



Check for continuity between the insulated brush and motor case.
There should be no continuity.

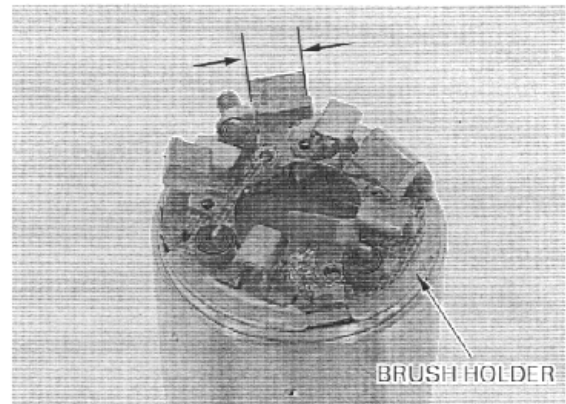


Measure the brush length.

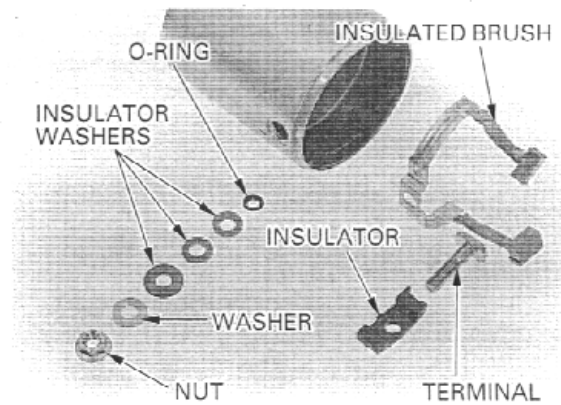
SERVICE LIMIT: 6.5 mm (0.26 in)

Remove the following if necessary:

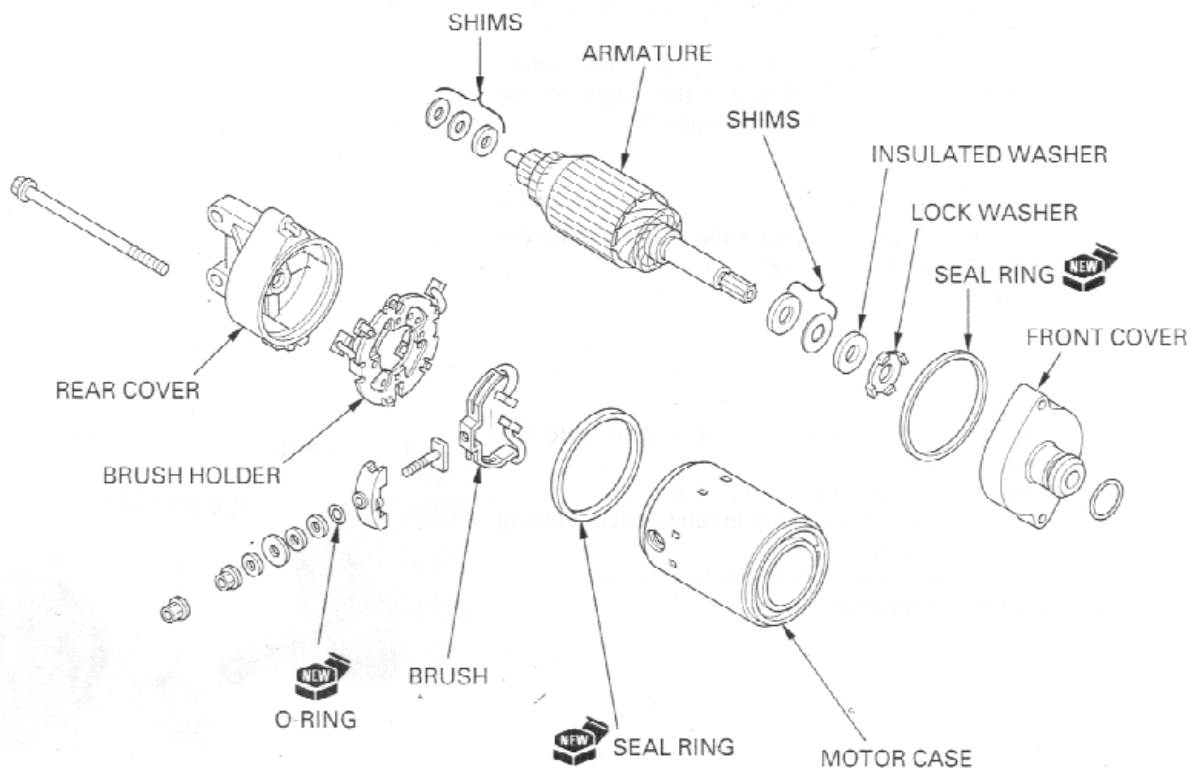
— brush holder



- nut
- washer
- insulator washers
- O-ring
- cable terminal
- insulated brush
- insulator



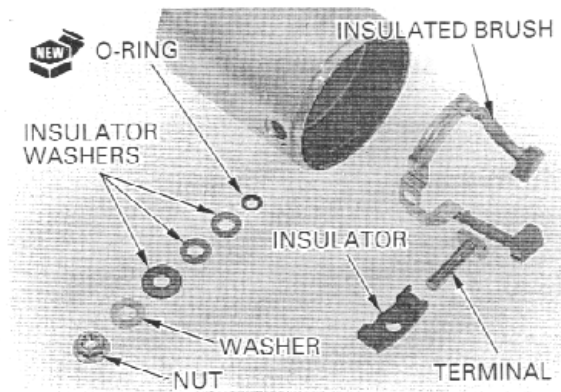
ASSEMBLY



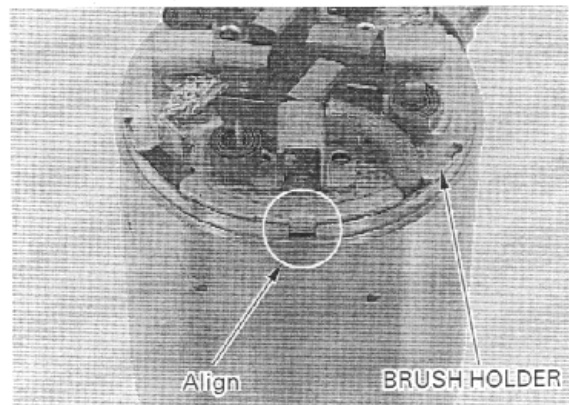
ELECTRIC STARTER

Install the following:

- insulator
- insulated brush
- cable terminal
- new O-ring
- insulator washers
- washer
- nut



Install the brush holder, aligning the holder tab with the case groove, and the holder grooves with the insulated brush wires.



Push and hold the brushes inside the brush holder, and install the armature through the motor case and brush holder.

When installing the armature into the motor case, hold the armature tightly to keep the magnet of the case from pulling the armature against it.

CAUTION:

The coil may be damaged if the magnet pulls the armature against the case.

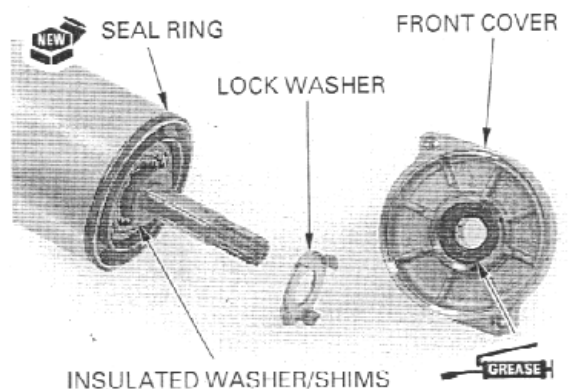
Install the shims and insulated washer onto the armature shaft.

Install a new seal ring onto the motor case.

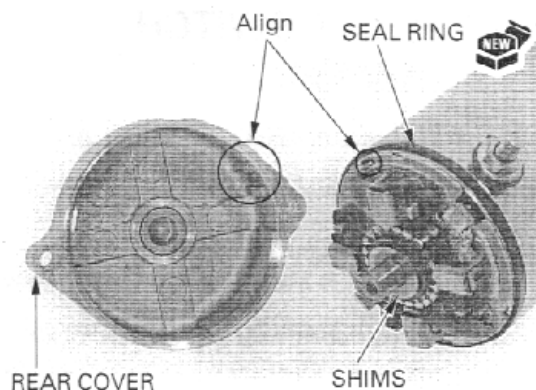
Apply grease to the oil seal lip and needle bearing in the front cover.

Install the lock washer onto the front cover.

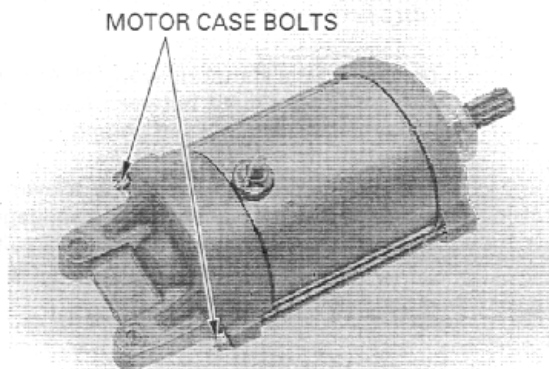
Install the front cover.



Install the same number of shims in the same locations as noted during disassembly.
 Install a new seal ring onto the motor case.
 Apply thin coat of grease to the armature shaft end.
 Install the rear cover aligning its groove with the brush holder tab.

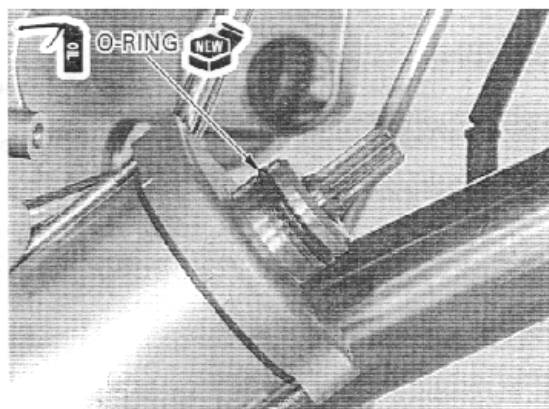


Install and tighten the motor case bolts.



INSTALLATION

Coat a new O-ring with oil and install it into the starter motor groove.

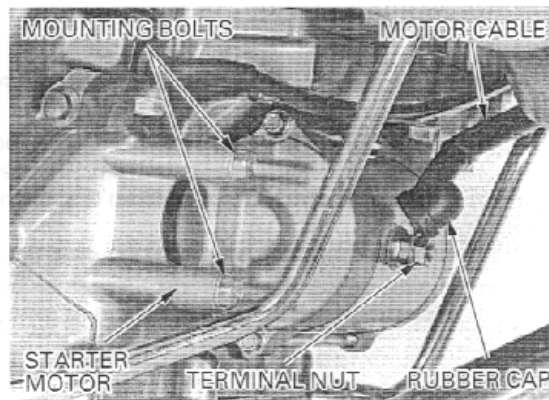


Install the starter motor into the crankcase.
 Install the right canister bracket stay (California type only) and mounting bolts, and tighten the bolts.
 Connect the starter motor cable.
 Install and tighten the terminal nut.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Install the rubber cap securely.

California type only: Install the evaporative emission (EVAP) canister (page 5-25).
 Install the engine under cover (page 2-4).



STARTER RELAY SWITCH

INSPECTION

Remove the seat cowl (page 2-2).

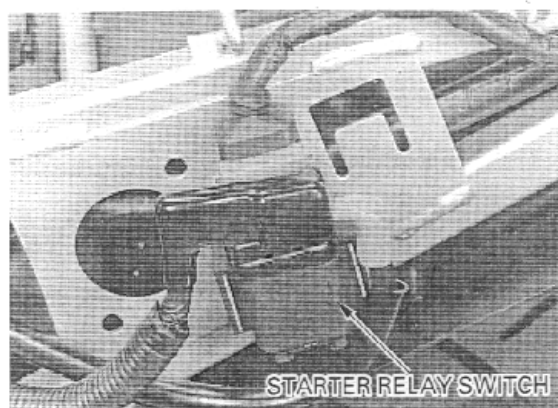
Shift the transmission into neutral.

Turn the ignition switch ON.

Push the starter switch.

The coil is normal if the starter relay switch clicks.

If you don't hear the switch "CLICK", inspect the relay switch using the procedure below.

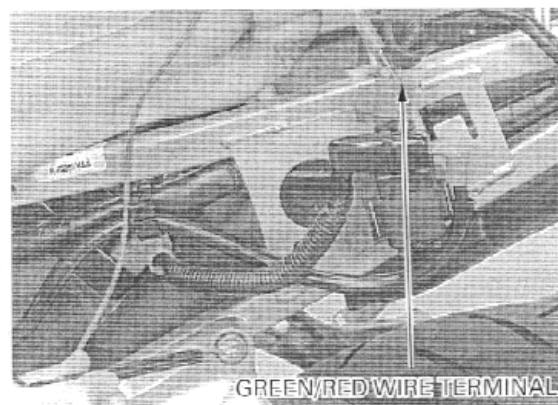


GROUND LINE

Disconnect the starter relay switch 4P connector.

Check for continuity between the green/red wire (ground line) terminal and ground.

If there is continuity when the transmission is in neutral or when the clutch is disengaged and the side stand is retracted, the ground circuit is normal. (In neutral, there is a slight resistance due to the diode.)



STARTER RELAY VOLTAGE

Connect the starter relay switch 4P connector.

Shift the transmission into neutral.

Measure the voltage between the yellow/red wire terminal (+) and ground (-).

If the battery voltage appears only when the starter switch is pushed with the ignition switch ON, it is normal.

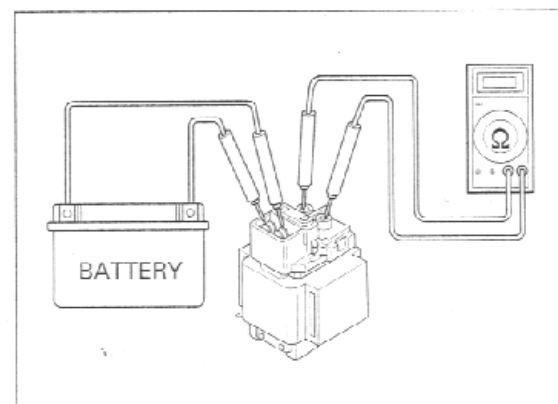


OPERATION CHECK

Disconnect the starter relay switch 4P connector and cables.

Connect a fully charged 12 V battery positive wire to the relay switch yellow/red wire terminal and negative wire to the green/red wire terminal.

There should be continuity between the large terminals while the battery is connected, and no continuity when the battery is disconnected.

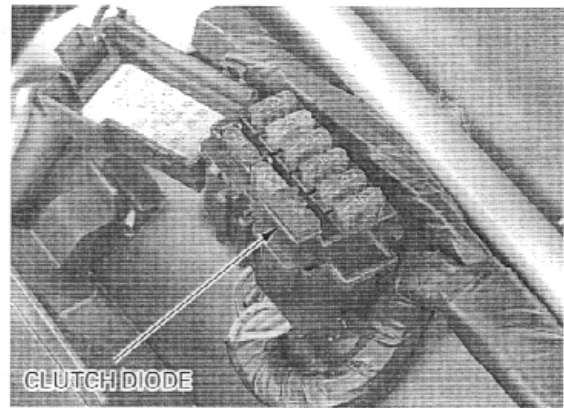


CLUTCH DIODE

INSPECTION

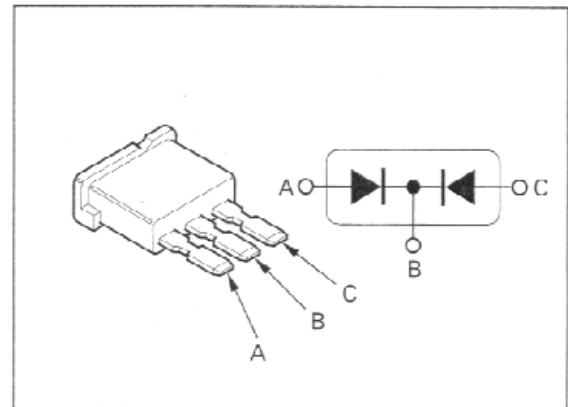
Remove the seat (page 2-2).

Remove the fuse box cover and clutch diode.



Check for continuity between the diode terminals. When there is continuity, a small resistance value will register.

If there is continuity in one direction, the diode is normal.



MEMO

19. LIGHTS/METERS/SWITCHES

SERVICE INFORMATION	19-1	COOLING FAN MOTOR SWITCH	19-18
HEADLIGHT	19-3	OIL PRESSURE INDICATOR	19-19
POSITION LIGHT	19-4	IGNITION SWITCH	19-19
TURN SIGNAL LIGHT	19-4	HANDLEBAR SWITCHES	19-20
BRAKE/TAILLIGHT	19-5	BRAKE LIGHT SWITCH	19-21
LICENSE LIGHT	19-6	CLUTCH SWITCH	19-22
COMBINATION METER ('98-'00)	19-7	NEUTRAL SWITCH	19-22
COMBINATION METER (After '00)	19-8	SIDE STAND SWITCH	19-23
SPEEDOMETER/VEHICLE SPEED SENSOR	19-10	LOW FUEL INDICATOR/FUEL RESERVE SENSOR ('98-'00 only)	19-24
TACHOMETER	19-12	HORN	19-24
COOLANT TEMPERATURE GAUGE/ THERMOSENSOR	19-14	TURN SIGNAL RELAY	19-25
FUEL GAUGE/FUEL LEVEL SENSOR (After '00 only)	19-17		

SERVICE INFORMATION

GENERAL

- Note the following when replacing the halogen headlight bulb.
 - Wear clean gloves while replacing the bulb. Do not put fingerprints on the headlight bulb, as they may create hot spots on the bulb and cause it to fail.
 - If you touch the bulb with your bare hands, clean it with a cloth moistened with alcohol to prevent its early failure.
 - Be sure to install the dust cover after replacing the bulb.
- Check the battery condition before performing any inspection that requires proper battery voltage.
- A continuity test can be made with the switches installed on the motorcycle.
- The following color codes used are indicated throughout this section.

Bu: Blue	G: Green	Lg: Light Green	R: Red
Bl: Black	Gr: Gray	O: Orange	W: White
Br: Brown	Lb: Light Blue	P: Pink	Y: Yellow

SPECIFICATIONS

ITEM		SPECIFICATIONS
Bulbs	Headlight (high/low beam)	12 V - 60/55 W
	Position light	12 V - 5 W
	Brake/taillight	12 V - 21/5 W × 2
	License light	12 V - 4 CP
	Front turn signal/running light	12 V - 32/3 CP × 2
	Rear turn signal light	12 V - 32 CP × 2
	Instrument light	'98 - '00: 12 V - 1.7 W × 3, After '98: 14 V - 1.4 W × 3
	Turn signal indicator	'98 - '00: 12 V - 1.7 W × 2, After '98: 14 V - 1.4 W × 2
	High beam indicator	'98 - '00: 12 V - 1.7 W, After '98: 14 V - 1.4 W
	Neutral indicator	'98 - '00: 12 V - 1.7 W, After '98: 14 V - 1.4 W
	Oil pressure indicator	'98 - '00: 12 V - 1.7 W, After '98: 14 V - 1.4 W
Fuse	Side stand indicator ('98 - '00 only)	12 V - 1.7 W
	Main fuse	30 A
	Sub-fuse	10 A, 20 A
Thermosensor resistance	At 80 °C (176 °F)	47 - 57 Ω
	At 120 °C (248 °F)	14 - 18 Ω
Fan motor switch	Starts to close (ON)	98 - 102 °C (208 - 216 °F)
	Stops to open (OFF)	93 - 97 °C (199 - 207 °F)

TORQUE VALUES

Thermosensor	10 N·m (1.0 kgf·m, 7 lbf·ft)	Apply sealant to the threads
Fan motor switch	18 N·m (1.8 kgf·m, 13 lbf·ft)	
Ignition switch mounting bolt	25 N·m (2.5 kgf·m, 18 lbf·ft)	
Neutral switch	12 N·m (1.2 kgf·m, 9 lbf·ft)	
Side stand switch bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	

HEADLIGHT

BULB REPLACEMENT

▲WARNING

A halogen headlight bulb becomes very hot while the headlight is ON, and remains hot for a while after it is turned OFF. Be sure to let it cool down before servicing.

Disconnect the headlight connector.
Remove the dust cover.

Unhook the bulb retainer and replace the headlight bulb.

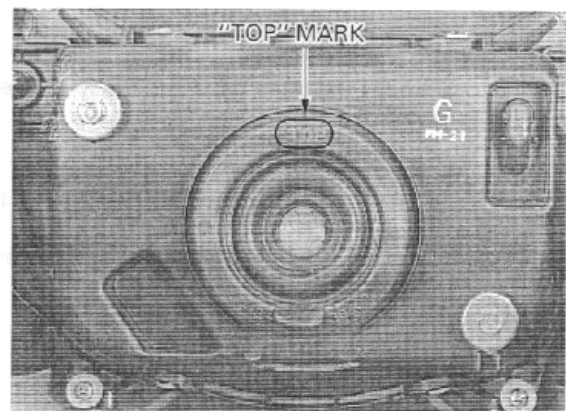
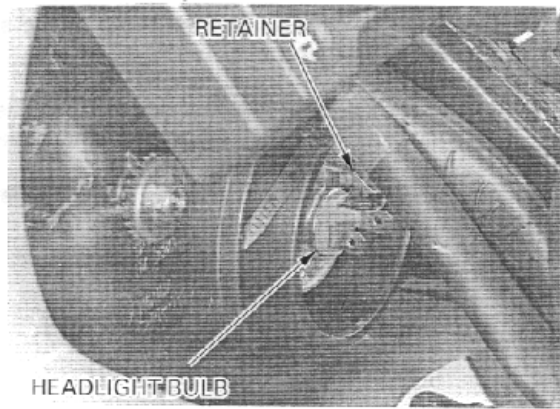
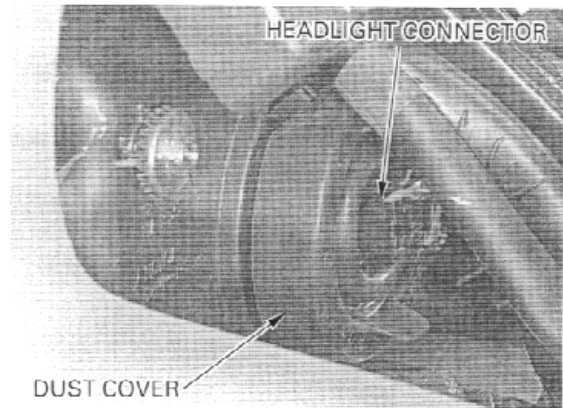
CAUTION:

Avoid touching halogen headlight bulb. Finger prints can create hot spots that cause a bulb to break.

If you touch the bulb with your bare hands, clean it with a cloth moistened with alcohol to prevent its early failure.

Hook the bulb retainer properly.

Install the dust cover properly onto the headlight with the "TOP" mark facing up.
Connect the headlight connector.

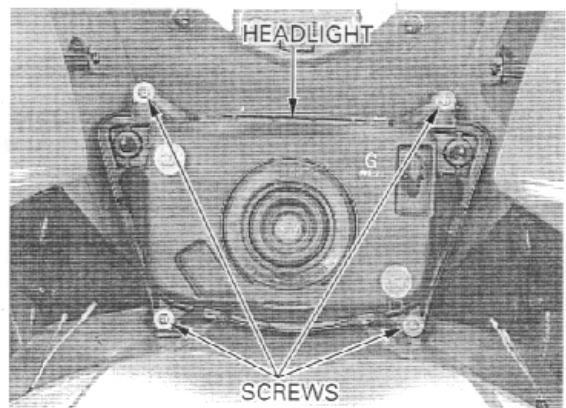


REMOVAL/INSTALLATION

Remove the front fairing (page 2-3).

Remove the four screws and the headlight unit.

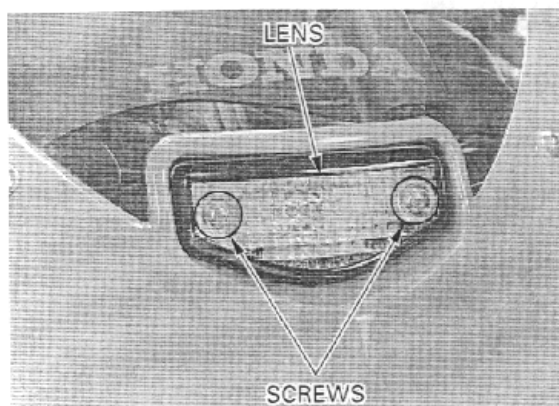
Install the headlight unit in the reverse order of removal.



POSITION LIGHT

BULB REPLACEMENT

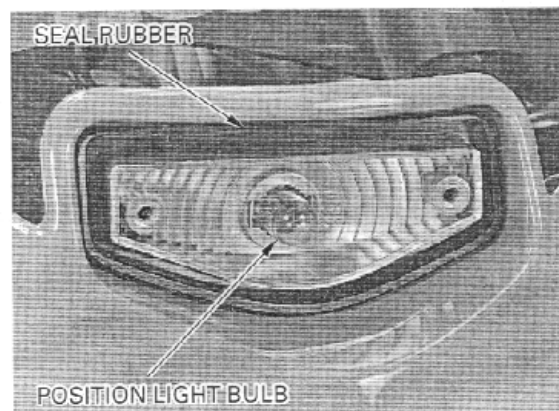
Remove the two screws and position light lens.



Pull the position light bulb out of the socket and replace it with a new one.

Make sure that the seal rubber is installed in position and is in good condition, and replace it with new one if necessary.

Install the position light lens and tighten the two screws.

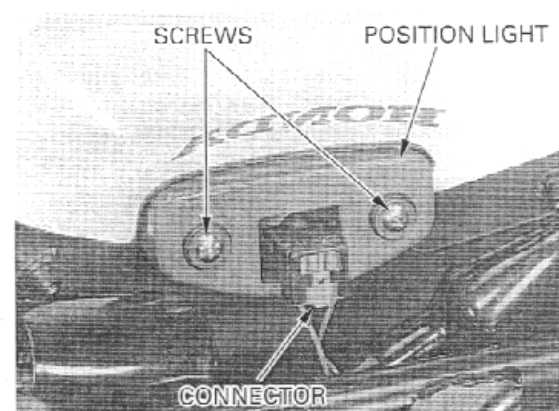


REPLACEMENT

Remove the three bolts and the instrument assembly from the stay (page 19-7).

Disconnect the position light connector. Remove the two screws and the position light.

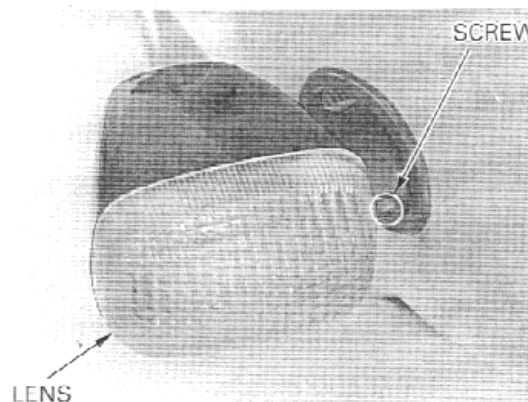
Install the position light in the reverse order of removal.



TURN SIGNAL LIGHT

BULB REPLACEMENT

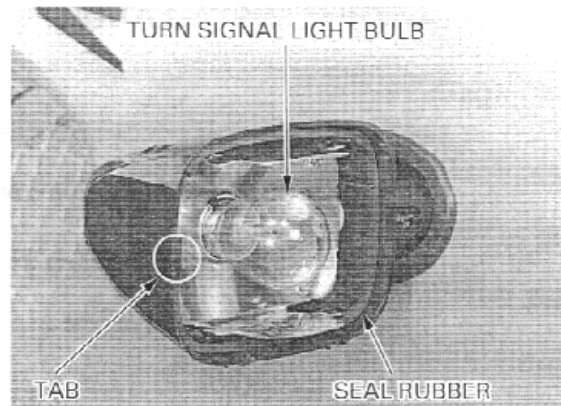
Remove the screw and turn signal light lens.



While pushing the bulb in, turn it counterclockwise to remove it, and replace it with a new one.

Make sure that the seal rubber is installed in position and is in good condition, and replace it with new one if necessary.

Install the lens, aligning the hook with the tab of the turn signal light, and tighten the screw.

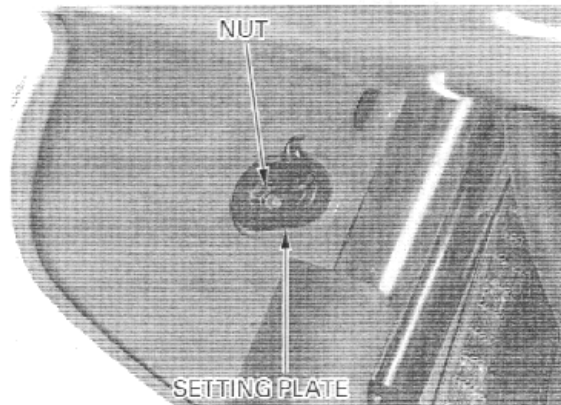


REMOVAL/INSTALLATION

Rear turn signal light: Remove the seat (page 2-2).

Disconnect the turn signal light connectors. Remove the nut, setting plate and the turn signal light.

Install the turn signal light in the reverse order of removal.

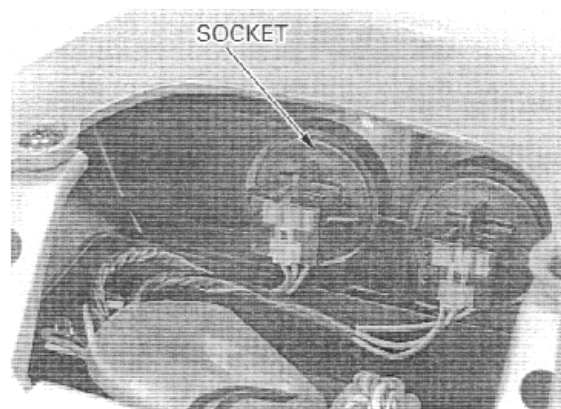


BRAKE/TAILLIGHT

BULB REPLACEMENT

Remove the seat (page 2-2).

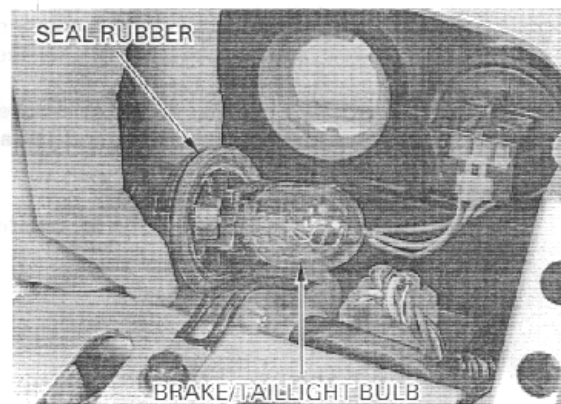
Turn the socket counterclockwise and remove it from the brake/taillight.



Pull the brake/taillight bulb out of the socket and replace it with a new one.

Make sure that the seal rubber is installed in position and is in good condition, and replace it with new one if necessary.

Install the socket by turning it clockwise. Install the seat (page 2-2).

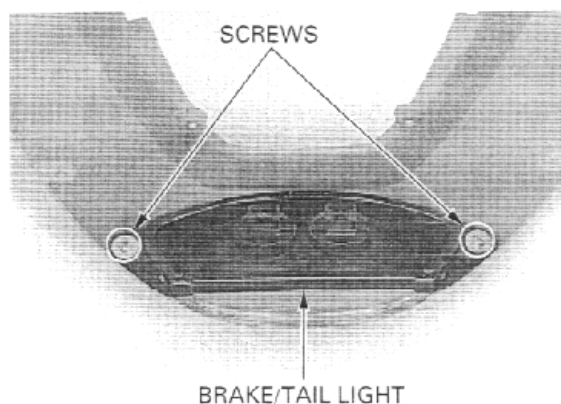


REMOVAL/INSTALLATION

Remove the seat cowl (page 2-2).

Remove the two screws and the brake/taillight.

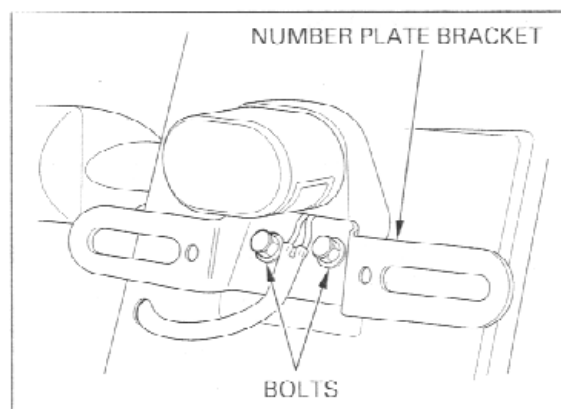
Install the brake/taillight in the reverse order of removal.



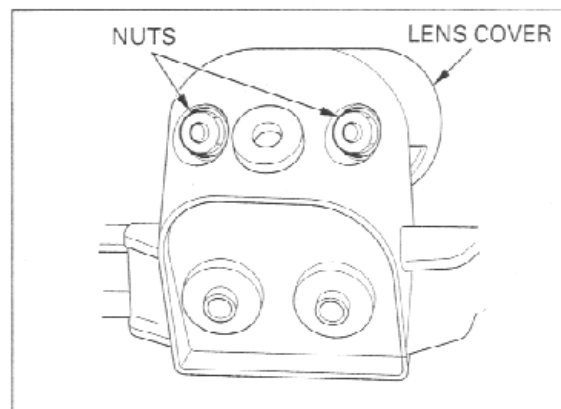
LICENSE LIGHT

BULB REPLACEMENT

Remove the two nuts, collar, bolts and the number plate bracket from the rear fender.



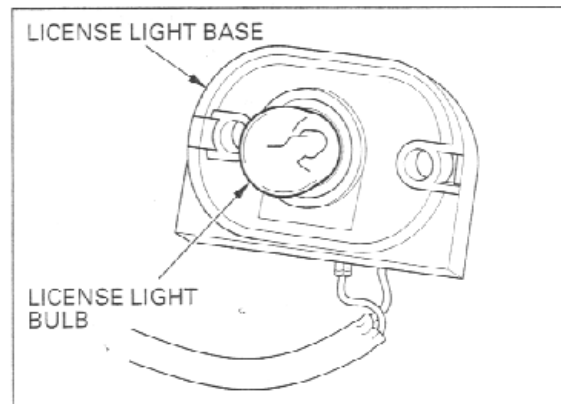
Remove the two attaching nuts, lens cover, lens and license light base from the number plate bracket.



While pushing the bulb in, turn it counterclockwise to remove it, and replace it with a new one.

Make sure that the seal rubber is installed in position and is in good condition, and replace it with new one if necessary.

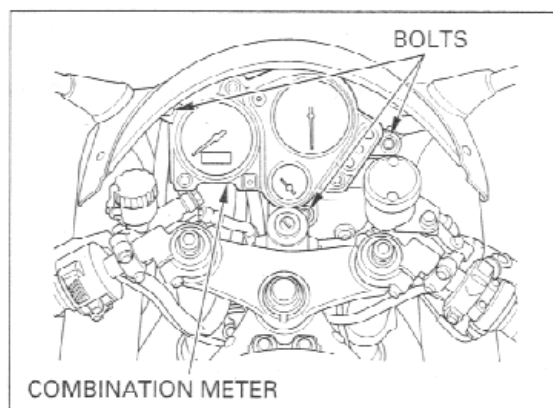
Install the removed parts in the reverse order of removal.



COMBINATION METER ('98 — '00)

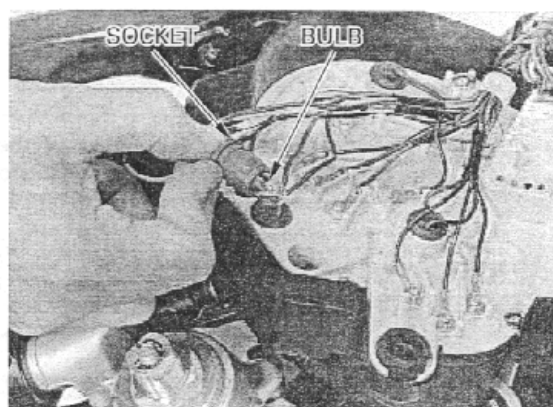
BULB REPLACEMENT

Remove the three bolts and the combination meter assembly from the stay.



Pull the socket out of the meter case.
Pull the bulb out of the socket and replace it with a new one.

Install the socket into the meter case.
Install the combination meter assembly onto the stay and tighten the three bolts.

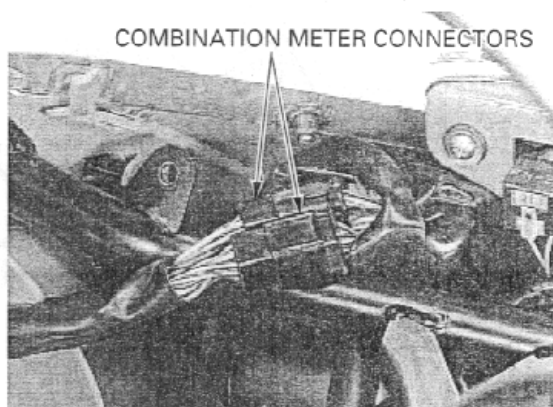


REMOVAL/INSTALLATION

Remove the three bolts and the combination meter assembly from the stay (see above).

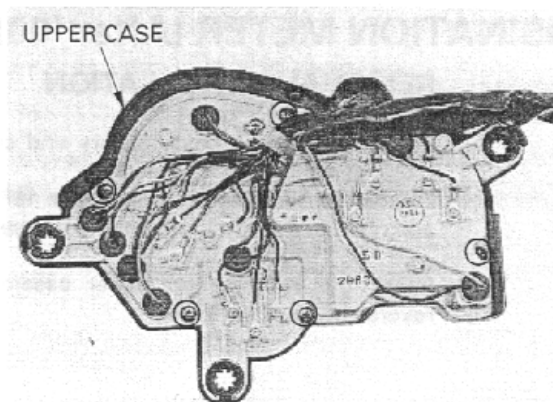
Disconnect the combination meter 6P black and 9P black connectors.

Install the combination meter assembly in the reverse order of removal.



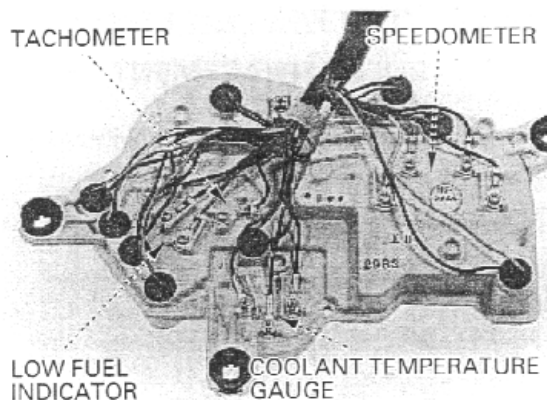
DISASSEMBLY

Remove the five screws and upper case.



LIGHTS/METERS/SWITCHES

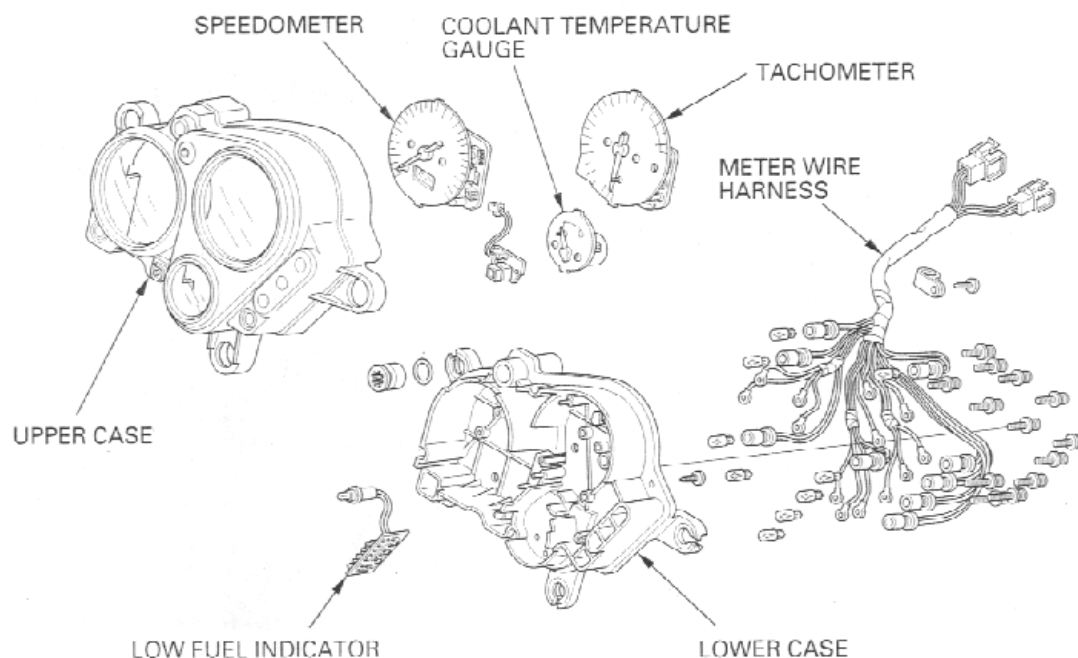
Remove the screws, speedometer, tachometer and coolant temperature gauge.
Remove the bulb sockets and combination meter wire harness.



ASSEMBLY

NOTE:

Connect the wire terminals and install the bulb sockets according to the color codes on the lower case.

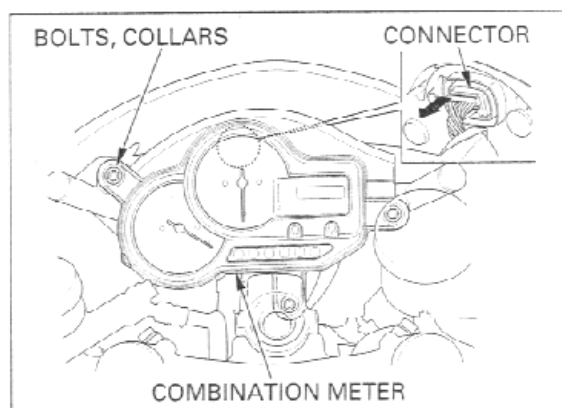


COMBINATION METER (After '00)

REMOVAL/INSTALLATION

Remove the three bolts, collars and combination meter assembly from the stay.
Disconnect the combination meter 16P connector and remove the combination meter assembly.

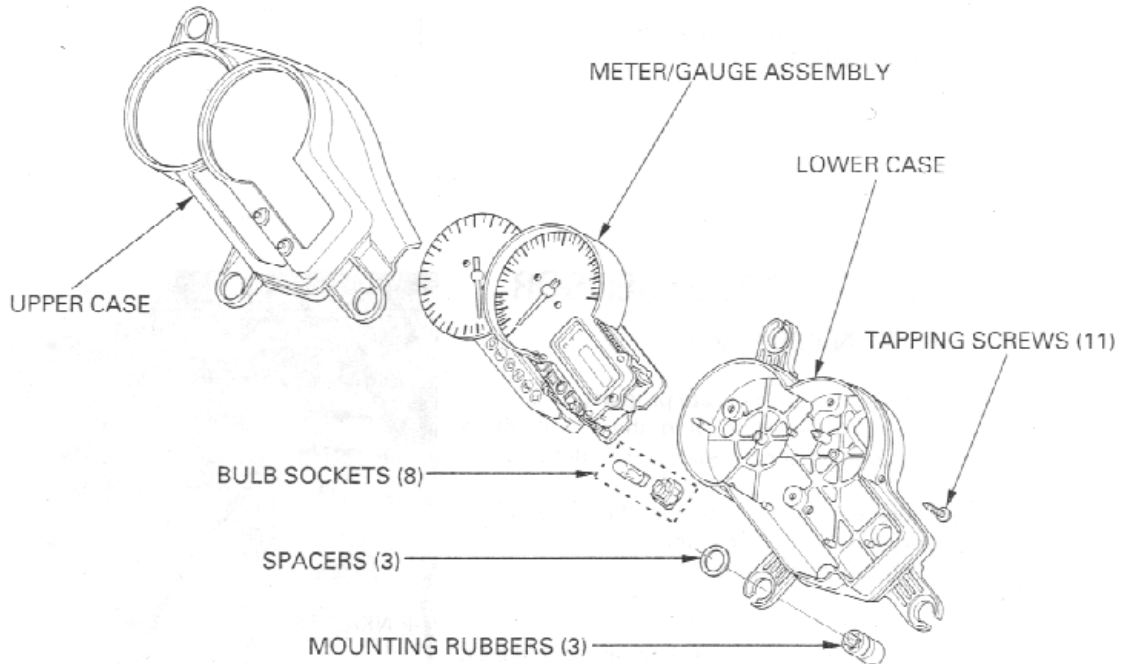
Install the combination meter assembly in the reverse order of removal.



DISASSEMBLY/ASSEMBLY

Remove the eleven screws and disassemble the combination meter assembly.

Assembly is in the reverse order of disassembly.

**POWER/GROUND LINE INSPECTION**

Remove the combination meter assembly.
Check the following at the combination meter connector terminals:

POWER SOURCE LINE

Measure the voltage between the black/brown wire terminal (+) and ground (-).

There should be battery voltage with the ignition switch ON.

If there is no voltage, check the following:

- open circuit in the black/brown wire
- blown sub-fuse (10 A) (meter/tail/illumination)

SENSOR GROUND LINE

Check for continuity between the green/black wire terminal and ground.

There should be continuity at all times.

If there is no continuity, check for an open circuit in the green/black wire.

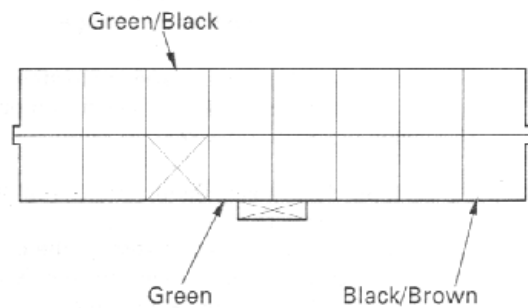
GROUND LINE

Check for continuity between the green wire terminal and ground.

There should be continuity at all times.

If there is no continuity, check for an open circuit in the green wire.

COMBINATION METER CONNECTOR
(Viewed from terminal side)



BACK-UP VOLTAGE LINE

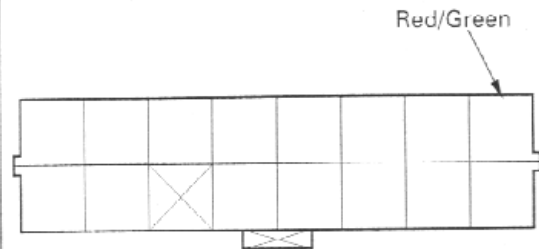
Measure the voltage between the red/green wire terminal (+) and ground (-).

There should be battery voltage at all times.

If there is no voltage, check the following:

- open circuit in the red/green wire
- blown sub-fuse (10 A) (odometer)
- open circuit in the Red wire

COMBINATION METER CONNECTOR
(viewed from terminal side)

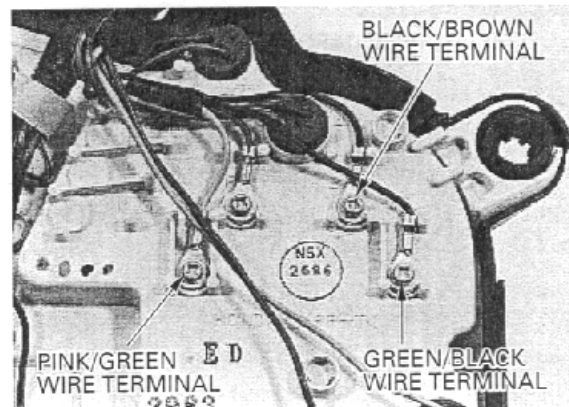


SPEEDOMETER/VEHICLE SPEED SENSOR

INSPECTION ('98-'00)

Speedometer does not operate properly

1. Remove the three bolts and the combination meter assembly from the stay (page 19-7).
2. Check the continuity between the green/black wire terminal and body ground.
There should be continuity.
 - If there is continuity, go to step 3.
 - If there is no continuity, check for an open circuit in the green/black wire.
3. Turn the ignition switch ON and measure the voltage between the black/brown (+) and green/black (-) wire terminals.
There should be battery voltage.
 - If there is battery voltage, go to step 4.
 - If there is no voltage, check for an open circuit in the black/brown wire.
4. Shift the transmission into neutral and turn the ignition switch ON.
Measure the voltage between the pink/green (+) and green/black (-) wire terminals while slowly turning the rear wheel by hand.
There should be 0 to 5 V pulse voltage.
 - If the pulse voltage appears, replace the speedometer (page 19-8).
 - If pulse voltage does not appear, check for an open or short circuit in the pink/green wire.
If the pink/green wire is OK, check the vehicle speed sensor (page 19-11).



INSPECTION (After '00)**Speedometer does not operate properly**

1. Check that the tachometer, coolant temperature gauge and fuel gauge function properly.

- If they do not function properly, check the power source line and sensor ground line.
- If they function properly, go to step 2.

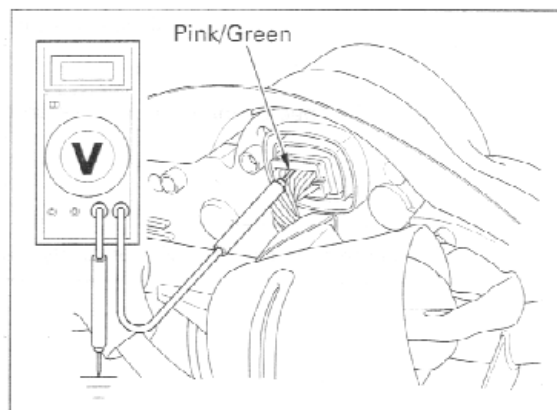
2. Remove the combination meter assembly from the stay (page 19-8), but do not disconnect the connector.

Shift the transmission into neutral and turn the ignition switch ON.

Measure the voltage between the pink/green (+) wire terminal of the combination meter connector and ground (-) with the connector connected.

There should be 0 V to 5 V pulse voltage while slowly turning the rear wheel by hand.

- If the pulse voltage appears, replace the meter/gauge assembly (page 19-9).
- If the pulse voltage does not appear, check for an open or short circuit in the pink/green wire. If the wire is OK, check the vehicle speed sensor.

**VEHICLE SPEED SENSOR INSPECTION**

Remove the seat (page 2-2).

Turn the ignition switch ON and measure the voltage between the black/brown (+) and green/black (-) wire terminals at the speed sensor 3P white connector.

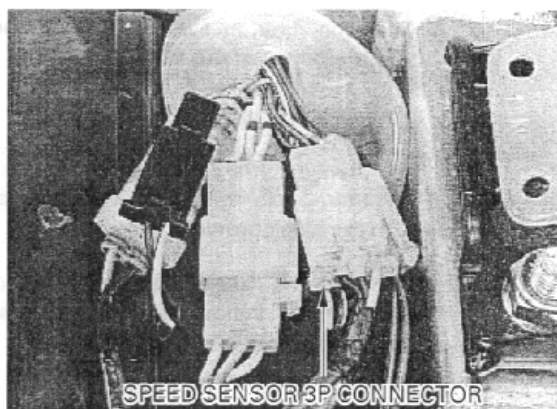
There should be battery voltage.

If there is no voltage, check for an open circuit in black/brown and green/black wires.

Shift the transmission into neutral and turn the ignition switch ON.

Measure the voltage between the pink/green (+) and green/black (-) wire terminals while slowly turning the rear wheel by hand.

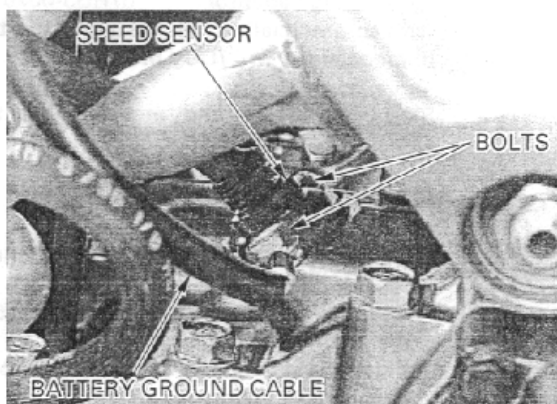
There should be 0 to 5 V pulse voltage.

**VEHICLE SPEED SENSOR REMOVAL/INSTALLATION**

Remove the seat (page 2-2).

Disconnect the speed sensor 3P white connector.

Remove the two bolts, battery ground cable and speed sensor.

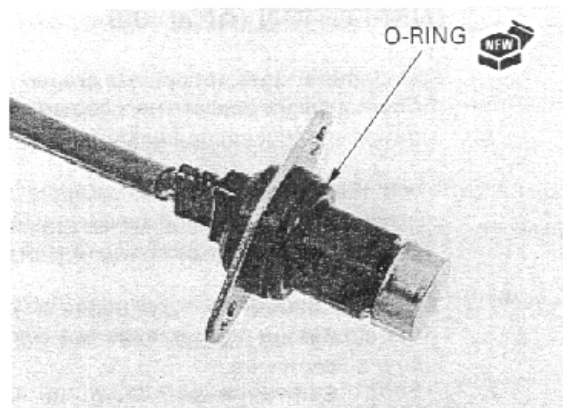


Coat a new O-ring with oil and install it onto the speed sensor.

Install the speed sensor in the reverse order of removal.

NOTE:

Route the speed sensor wire properly (page 1-18).



TACHOMETER

SYSTEM INSPECTION ('98 '00)

Tachometer does not operate properly

1. Remove the three bolts and the combination meter assembly from the stay (page 19-7).
2. Check the continuity between the green/black wire terminal and body ground. There should be continuity.
 - If there is continuity, go to step 3.
 - If there is no continuity, check for an open circuit in the green/black wire.
3. Turn the ignition switch ON and measure the voltage between the black/brown (+) and green/black (-) wire terminals. There should be battery voltage.
 - If there is battery voltage, go to step 4.
 - If there is no voltage, check for an open circuit in the black/brown wire.
4. Connect the peak voltage tester or adaptor probes to the yellow/green (+) wire terminal and ground (-).



TOOLS:

Peak voltage tester (U.S.A. only) or

Peak voltage adaptor 07HGJ-0020100

with commercially available digital multimeter
(impedance 10 M Ω /DCV minimum)

Start the engine and measure the tachometer signal peak voltage.

PEAK VOLTAGE: 10.5 V minimum

- If the measured value is more than 10.5 V, replace the tachometer (page 19-7).
- If the measured value is less than 10.5 V, replace the ignition control module (ICM).
- If there is no voltage, check for an open or short circuit in the yellow/green wire.

INSPECTION (After '00)**Tachometer does not operate properly**

1. Check that the speedometer, coolant temperature gauge and fuel gauge function properly.

- If they do not function properly, check the power source line and sensor ground line (page 19-9).
- If they function properly, go to step 2.

2. Remove the combination meter assembly (page 19-8).

Connect the peak voltage tester or adaptor probes to the yellow/green (+) wire terminal of the combination meter connector and ground (-).

TOOLS:

Peak voltage tester (U.S.A. only) or

Peak voltage adaptor 07HGJ-0020100

with commercially available digital multimeter (impedance 10 M Ω /DCV minimum)

Start the engine and measure the tachometer signal peak voltage.

PEAK VOLTAGE: 10.5 V minimum

- If the measured value is more than 10.5 V, replace the meter/gauge assembly (page 19-9).
- If the measured value is less than 10.5 V, replace the ignition control module (ICM).
- If there is no voltage, go to step 3.

3. Remove the seat cowl (page 2-2).

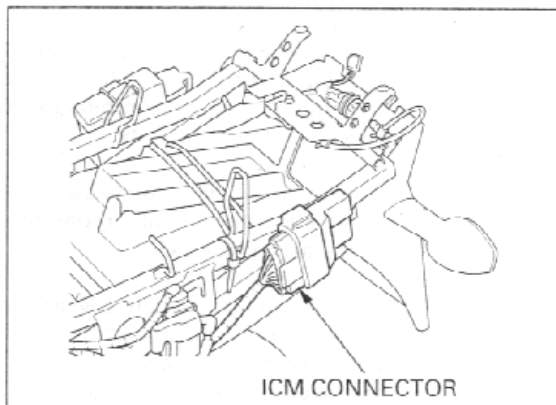
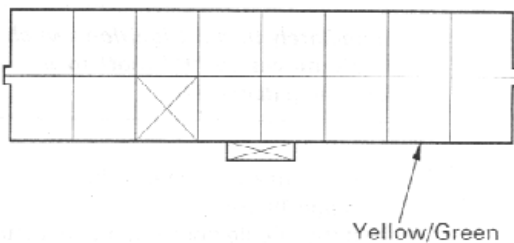
Disconnect the ICM connector.

Check the yellow/green wire for an open or short circuit as follows:

- Check for continuity between the combination meter and ICM connectors.
There should be continuity.
- Check for continuity to ground.
There should be no continuity.

- If the yellow/green wire is OK, replace the ICM.

COMBINATION METER CONNECTOR
(viewed from terminal side)

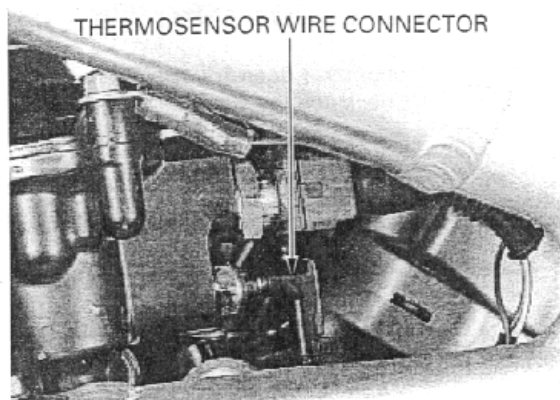


COOLANT TEMPERATURE GAUGE/ THERMOSENSOR

INSPECTION ('98 – '00)

Temperature gauge does not operate properly

1. Disconnect the thermosensor wire connector and ground it with a jumper wire.

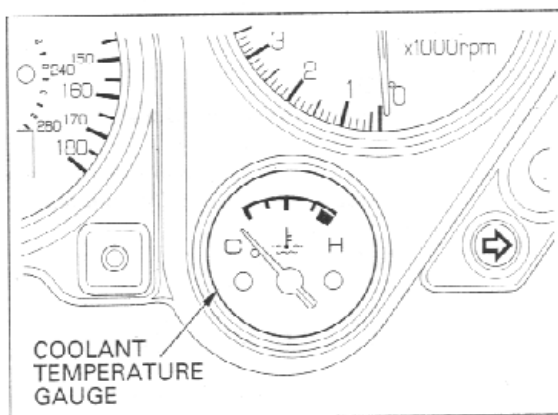


2. Turn the ignition switch ON and check the coolant temperature gauge needle. The needle should move to "H".

CAUTION:

Immediately turn the ignition switch OFF when the needle moves to "H" (hot) to prevent the gauge from being damaged.

- If the needle moves, check the thermosensor (page 19-16).
- If the needle does not move, go to step 3.

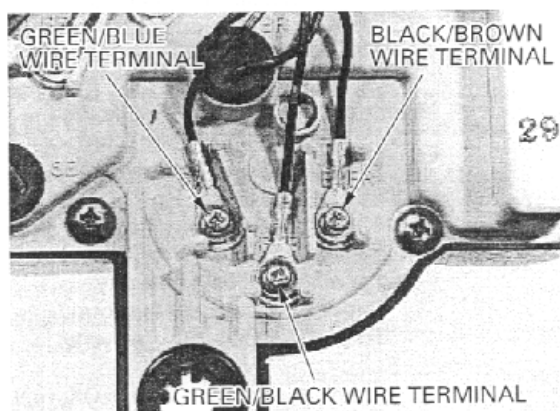


3. Remove the three bolts and the combination meter assembly from the stay (page 19-7). Check the green/blue wire for continuity between the thermosensor and combination meter. There should be continuity.

- If there is continuity, go to step 4.
- If there is no continuity, repair the open circuit in the green/blue wire.

4. Turn the ignition switch ON and measure the voltage between the black/brown (+) and green/black (-) wire terminals. There should be battery voltage.

- If there is battery voltage, replace the coolant temperature gauge (page 19-7).
- If there is no voltage, check for an open circuit in the black/brown and green/black wires.

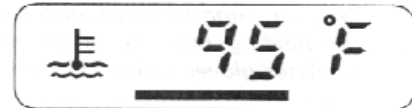


INSPECTION (After '00)

Temperature gauge does not operate properly

CAUTION:

The coolant temperature gauge displays "95°F" to "270°F". It displays "--°F" when the coolant temperature is below 95°F and the displayed figures blink when the coolant temperature is above 251°F.



COOLANT TEMPERATURE GAUGE

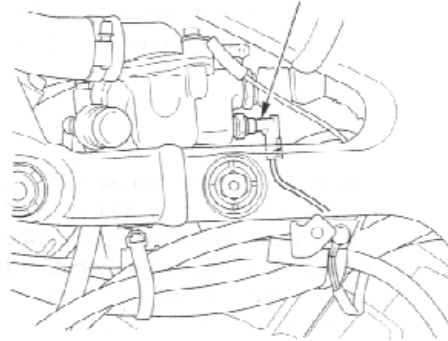
1. Check that the tachometer, speedometer and fuel gauge function properly.

- If they do not function properly, check the power source line and sensor ground line (page 19-9).
- If they function properly, go to step 2.

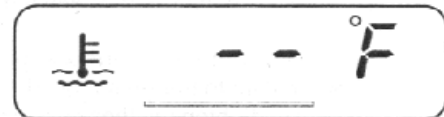
2. Turn the ignition switch OFF and disconnect the thermosensor connector.

Turn the ignition switch ON and check the coolant temperature gauge.

THERMOSENSOR CONNECTOR



- If the gauge displays "--°F", go to step 3.
- If the gauge displays "270°F" and the figures blink, check for a short circuit in the green/blue wire between the thermosensor and combination meter.
- If the gauge displays any figures other than "--°F", replace the meter/gauge assembly.



3. Turn the ignition switch OFF and ground the connector terminal with a jumper wire.

Turn the ignition switch ON and check the coolant temperature gauge.

- If the gauge displays "270°F" and the figures blink, check the thermosensor (page 19-16).
- If the gauge displays "--°F", check for an open circuit in the green/blue wire between the thermosensor and combination meter.
- If the gauge displays any figures other than "270°F", replace the meter/gauge assembly.



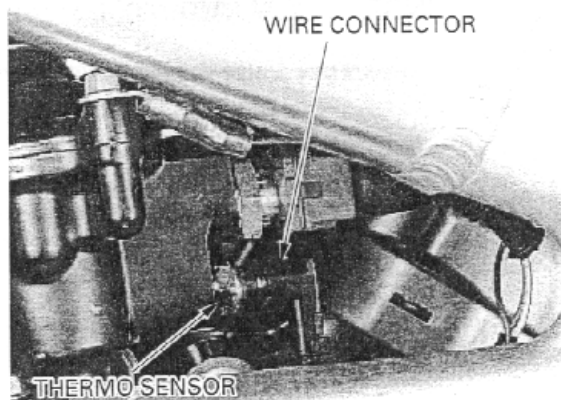
THERMOSENSOR INSPECTION

⚠ WARNING

Keep all flammable materials away from the electric heating element. Wear protective clothing, insulated gloves and eye protection.

Drain the coolant (page 6-5).

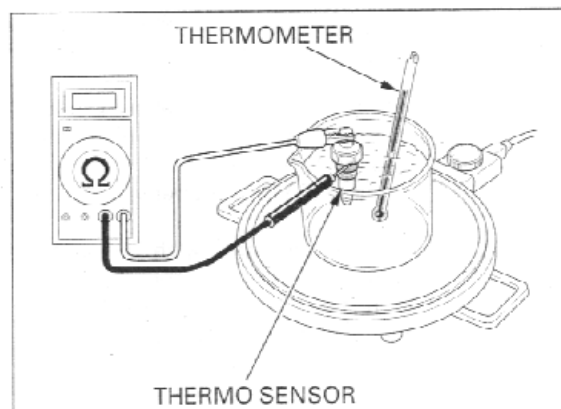
Disconnect the thermosensor connector and remove the thermosensor.



Suspend the thermosensor in a pan of coolant (1:1 mixture) on an electric heating element and measure the resistance through the sensor as the coolant heats up.

NOTE:

- Soak the thermosensor in coolant up to its threads with at least 40 mm (1.57 in) from the bottom of the pan to the bottom of the sensor.
- Keep the temperature constant for 3 minutes before testing. A sudden change of temperature will result in incorrect readings. Do not let the thermometer or thermosensor touch the pan.



Temperature	80 °C (176 °F)	120 °C (248 °F)
Resistance	47 – 57 Ω	14 – 18 Ω

Replace the thermosensor if it is out of specifications by more than 10 % at any temperature listed.

Apply sealant to the thermosensor threads. Do not apply sealant to the sensor head.
Install and tighten the thermosensor.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Connect the thermosensor connector.

Fill and bleed the cooling system (page 6-5).

FUEL GAUGE/FUEL LEVEL SENSOR (After '00 only)

Remove the seat (page 2-2).

SYSTEM INSPECTION

Gauge does not operate properly

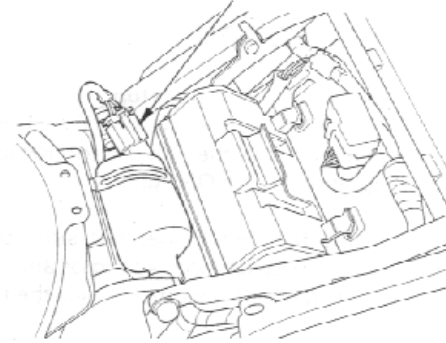
1. Check that the tachometer, speedometer and coolant temperature gauge function properly.

- If they do not function, check the power source line and sensor ground line (page 19-9).
- If they function properly, go to step 2.

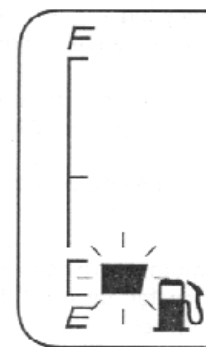
2. Turn the ignition switch OFF and disconnect the fuel level sensor connector.
Turn the ignition switch ON and check the fuel gauge.
Segment E should blink.

- If segment E blinks, go to step 3.
- If all segments up to segment F appear, check for a short circuit in the gray/black wire.
- If some segments appear, replace the meter/gauge assembly (page 19-9).

FUEL LEVEL SENSOR CONNECTOR

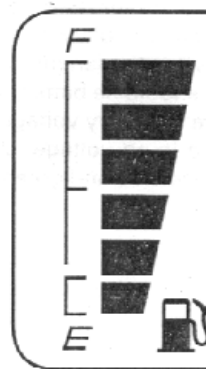


FUEL GAUGE



3. Turn the ignition switch OFF and short the wire harness side sensor connector terminals with a jumper wire.
Turn the ignition switch ON and check the fuel gauge display.
All segments up to segment F should appear.

- If all segments up to segment F appear, check the fuel level sensor.
- If segment E blinks, check for an open circuit in the gray/black and green/black wires.
- If some segments appear, replace the meter/gauge assembly (page 19-9).



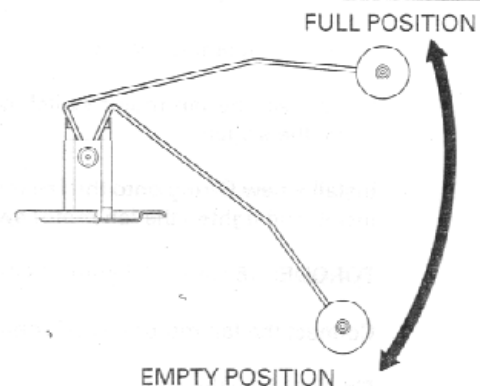
FUEL LEVEL SENSOR INSPECTION

Remove the fuel level sensor from the fuel tank.

Measure the resistance between the fuel level sensor connector terminals with the float at the upper (FULL) and lower (EMPTY) positions.

RESISTANCE (20°C/68°F):

- 4–10 Ω with the float at FULL position
- 81–91 Ω with the float at EMPTY position



COOLING FAN MOTOR SWITCH

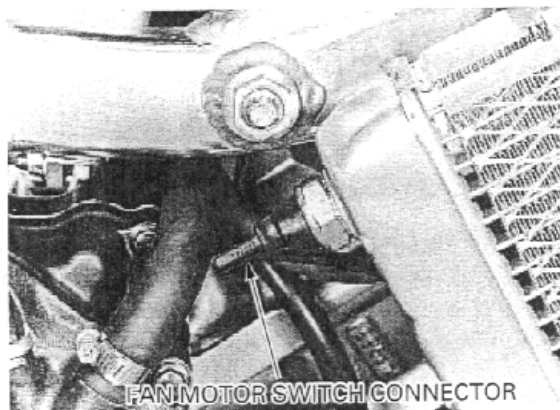
INSPECTION

Fan motor does not stop

Turn the ignition switch OFF, disconnect the connector from the fan motor switch and turn the ignition switch ON again.

If the fan motor does not stop, check for a short circuit between the fan motor and switch.

If the fan motor stops, replace the fan motor switch.



FAN MOTOR SWITCH CONNECTOR

Fan motor does not start

Before testing, check for a blown fan motor fuse.

Warm up the engine to operating temperature.

Disconnect the connector from the fan motor switch and ground the connector with a jumper wire.

Turn the ignition switch ON and check the fan motor.

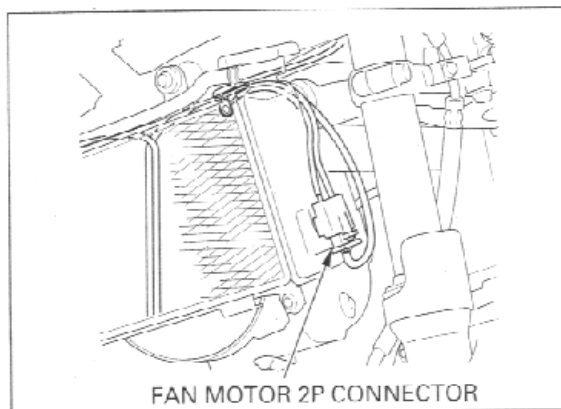
If the motor starts, check the connection at the fan motor switch terminal. If it is OK, replace the fan motor switch.

If the fan motor does not start, measure the voltage between the black/blue (+) and green (-) wire terminal at the fan motor 2P black connector.

There should be battery voltage.

If there is battery voltage, replace the fan motor.

If there is no voltage, check for an open circuit in the black/blue and green wires.



FAN MOTOR 2P CONNECTOR

REMOVAL/INSTALLATION

Drain the coolant (page 6-5).

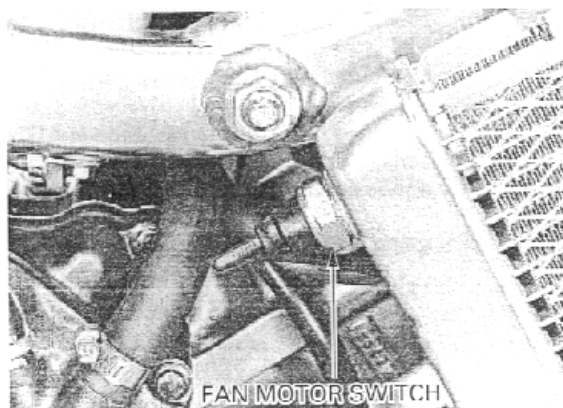
Disconnect the fan motor switch connector and remove the switch.

Install a new O-ring onto the fan motor switch. Install and tighten the fan motor switch.

TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)

Connect the fan motor switch connector.

Fill and bleed the cooling system (page 6-5).



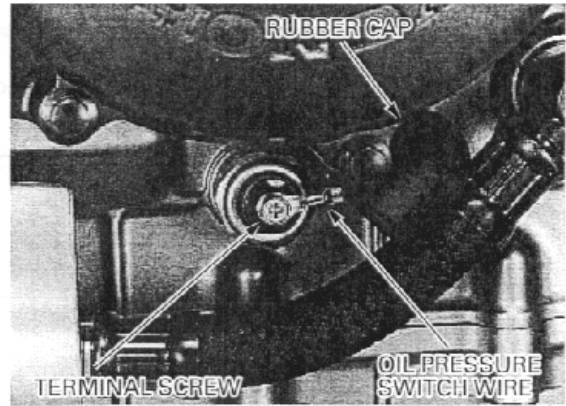
FAN MOTOR SWITCH

OIL PRESSURE INDICATOR

INSPECTION

Indicator does not come on with the ignition switch turned ON

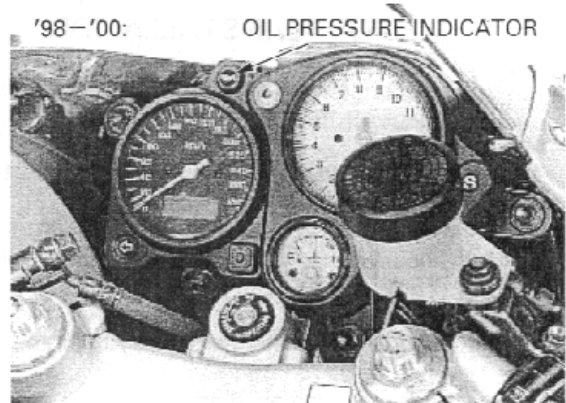
Remove the rubber cap, and disconnect the oil pressure switch wire by removing the terminal screw. Ground the wire terminal to the engine with a jumper wire.



Turn the ignition switch ON and check the oil pressure indicator.

If the indicator comes on, replace the oil pressure switch (page 4-4).

If the indicator does not come on, check for an open circuit in the blue/red wire.



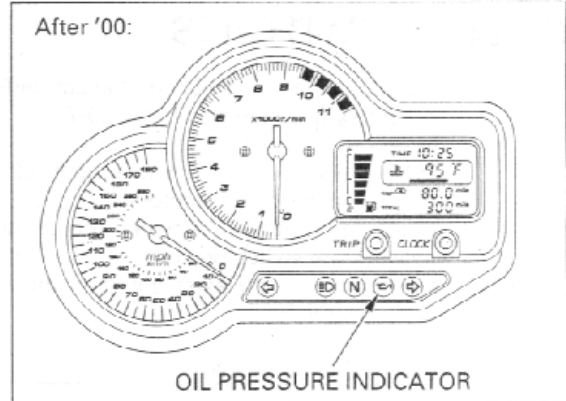
Indicator stays on while the engine is running

Remove the rubber cap, and disconnect the oil pressure switch wire by removing the terminal screw. Check for continuity between the wire terminal and ground.

If there is continuity, check for a short circuit in the blue/red wire.

If there is no continuity, check the oil pressure (page 4-4).

If the oil pressure is normal, replace the oil pressure switch (page 4-4).

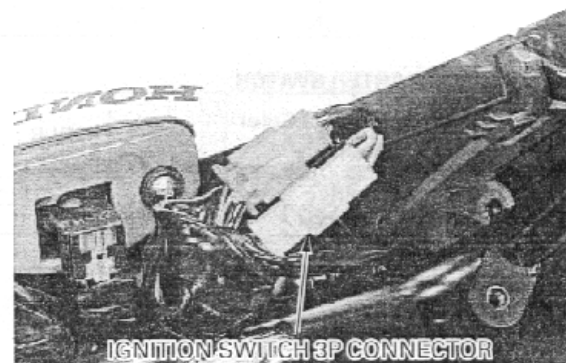


IGNITION SWITCH

INSPECTION

Remove the three bolts and the instrument assembly from the stay (page 19-7).

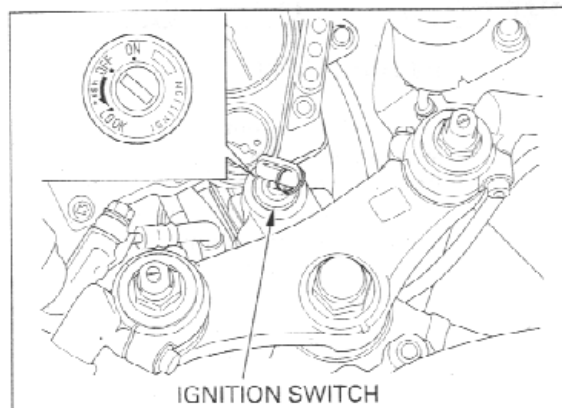
Disconnect the ignition switch 3P white connector.



LIGHTS/METERS/SWITCHES

Check for continuity between the connector terminals in each switch position. Continuity should exist between the color coded wires as follows:

Color \ Position	R	R/BI	Bu/O
ON			
OFF			
LOCK			



REMOVAL/INSTALLATION

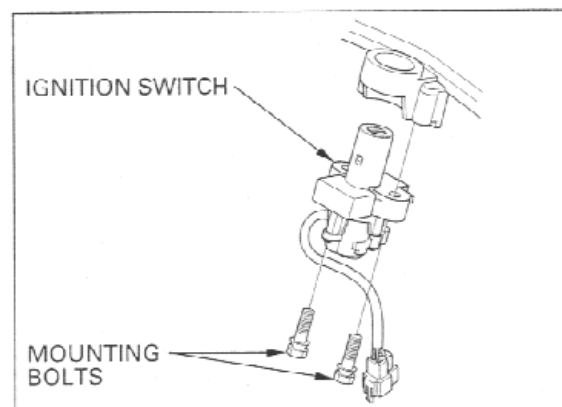
Disconnect the ignition switch 3P white connector (page 19-19).

Remove the two mounting bolts and the ignition switch.

Install the ignition switch and tighten the mounting bolts.

TORQUE: 25 N·m (2.5 kgf·m, 18 lbf·ft)

Install the removed parts.



HANDLEBAR SWITCHES

Remove the three bolts and the combination meter assembly from the stay (page 19-7).

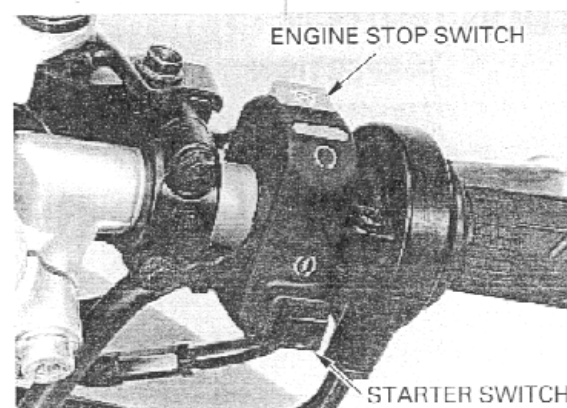
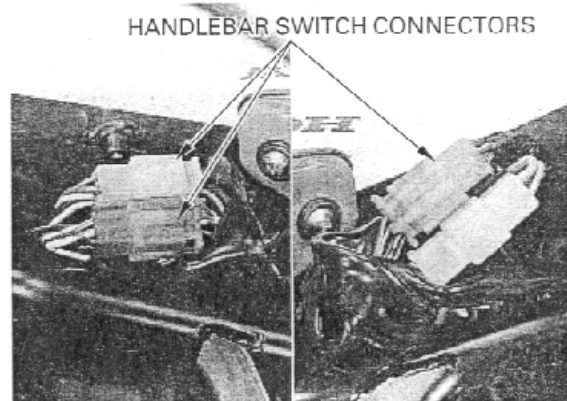
Disconnect the handlebar switch 6P green, 9P green and 9P red connectors. Check for continuity between the connector terminals in each switch position. Continuity should exist between the color coded wires as follows:

ENGINE STOP SWITCH

Color \ Position	BI	BI/W
OFF		
RUN		

STARTER SWITCH

Color \ Position	Y/R	BI/R	Bu/W
FREE			
PUSH			



HORN SWITCH

Color Position	W/G	Lg
FREE		
PUSH	○	○

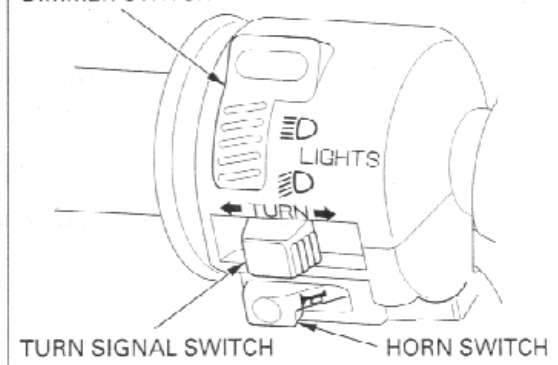
DIMMER SWITCH

Color Position	Bu	Bu/W	W
H	○	○	
(N)	○	○	○
L		○	○

TURN SIGNAL SWITCH

Color Position	O	Gr	Lb	O/W	Bl/Br	Lb/W
L	○	○			○	○
(N)				○	○	○
R		○	○	○	○	

DIMMER SWITCH

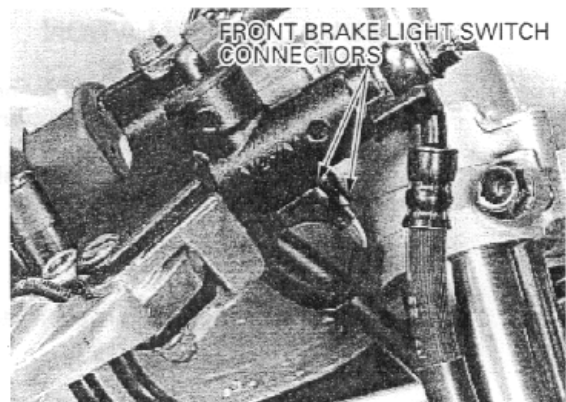


BRAKE LIGHT SWITCH

FRONT

Disconnect the front brake light switch wire connectors and check for continuity between the switch terminals.

There should be continuity with the front brake lever squeezed and no continuity with the lever released.



REAR

Remove the seat (page 2-2).

Disconnect the rear brake light switch 2P white connector and check for continuity between the connector terminals.

There should be continuity with the rear brake pedal depressed and no continuity with the pedal released.

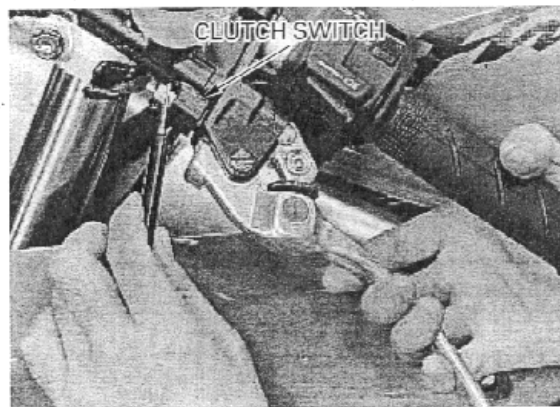


REAR BRAKE LIGHT SWITCH CONNECTOR

CLUTCH SWITCH

Disconnect the clutch switch wire connector and check for continuity between the switch terminals.

There should be continuity with the clutch lever squeezed and no continuity with the lever released.



CLUTCH SWITCH

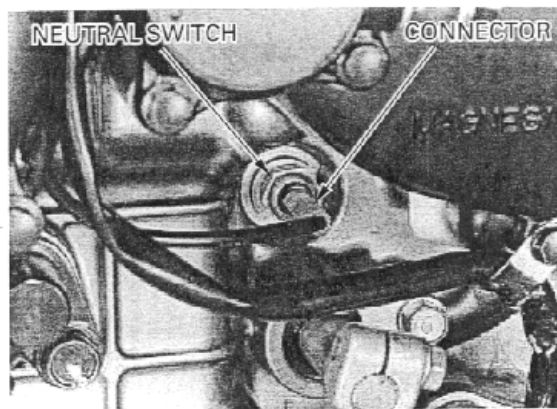
NEUTRAL SWITCH

INSPECTION

Disconnect the neutral switch wire connector.

Check for continuity between the switch terminal and engine ground.

There should be continuity with the transmission in neutral, and no continuity with the transmission in any gear except neutral.



NEUTRAL SWITCH

CONNECTOR

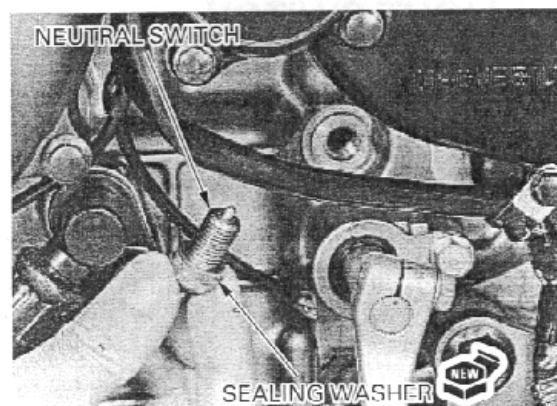
REMOVAL/INSTALLATION

Disconnect the neutral switch wire connector.
Remove the neutral switch from the crankcase.

Install the neutral switch with a new sealing washer and tighten it.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Connect the neutral switch wire connector.



NEUTRAL SWITCH

SEALING WASHER

SIDE STAND SWITCH

INSPECTION

Remove the seat (page 2-2).

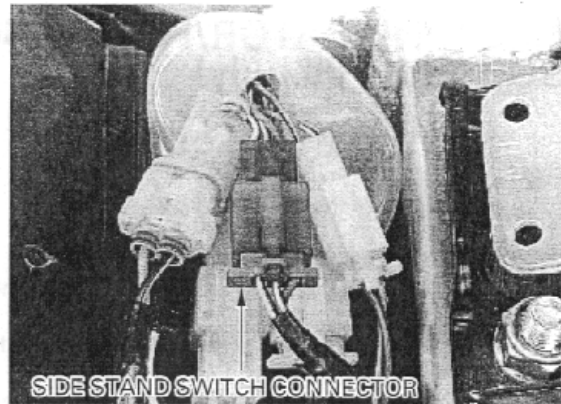
Disconnect the side stand switch connector.
Check for continuity between the connector terminals in each side stand position.
Continuity should exist between the color coded wires as follows:

'98-'00:

Color Position	G/W	Y/BI	G
Extended		○	○
Retracted	○		○

After '00:

Color Position	G/W	G
Extended		
Retracted	○	○

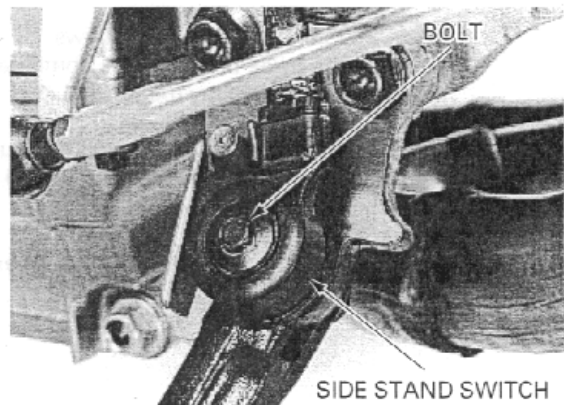


SIDE STAND SWITCH CONNECTOR

REMOVAL/INSTALLATION

Remove the seat (page 2-2).

Disconnect the side stand switch connector.
Remove the side stand switch bolt and switch.



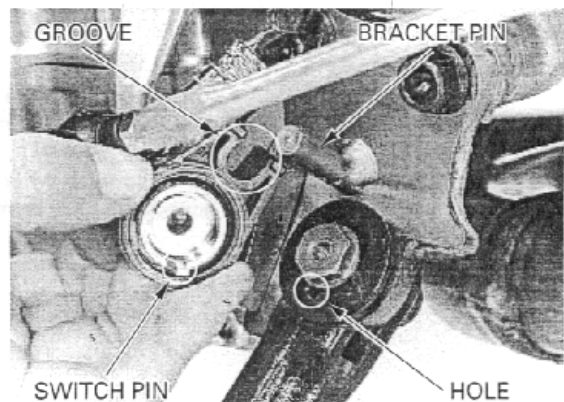
Install the side stand switch by aligning the switch pin with the side stand hole and the switch groove with the bracket pin.
Install the side stand switch bolt and tighten it.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Install the removed parts.

NOTE:

Route the side stand switch wire properly (page 1-18).



LOW FUEL INDICATOR/FUEL RESERVE SENSOR ('98-'00 only)

SYSTEM INSPECTION

Remove the seat (page 2-2).

Low fuel indicator does not go off

Disconnect the fuel reserve sensor 2P white connector.

Turn the ignition switch ON and check the low fuel indicator.

If the indicator does not come on, replace the fuel reserve sensor.

If the indicator comes on, check for a short circuit in the brown/black wire.

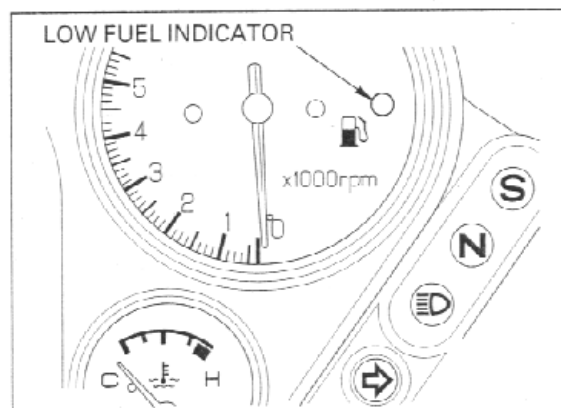
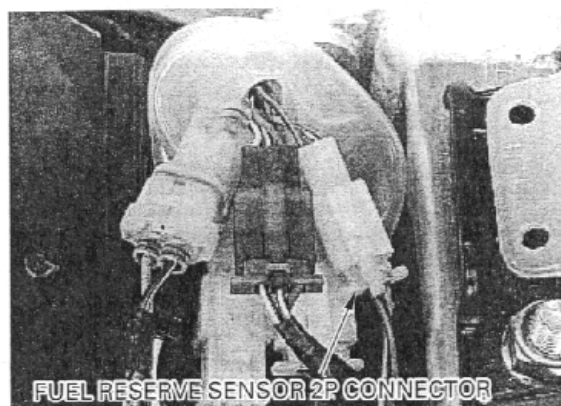
Low fuel indicator does not come on

Disconnect the fuel reserve sensor 2P white connector and short the connector terminals with a jumper wire.

Turn the ignition switch ON and check the low fuel indicator.

If the indicator comes on, replace the fuel reserve sensor.

If the indicator does not come on, check for an open circuit in the brown/black and green wires.



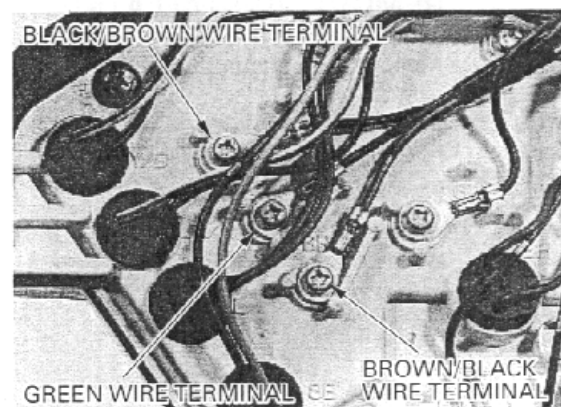
If the wires are OK, check as follows:

Remove the three bolts and the combination meter assembly from the stay (page 19-7).

Turn the ignition switch ON and measure the voltage between the black/brown (+) and green (-) wire terminals at the low fuel indicator.

There should be battery voltage.

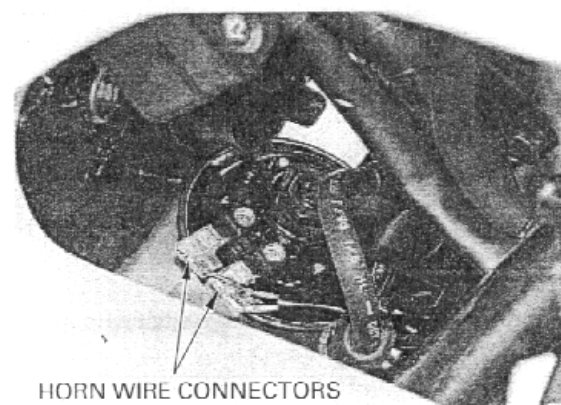
If there is no voltage, check for an open circuit in the black/brown and green wires.



HORN

Disconnect the wire connectors from the horn. Connect a 12 V battery to the horn terminals.

The horn is normal if it sounds when the 12 V battery is connected across the horn terminals.



TURN SIGNAL RELAY

Turn signal light does not blink
Remove the seat cowl (page 2-2).

Remove the turn signal relay from the stay and disconnect the relay connector.

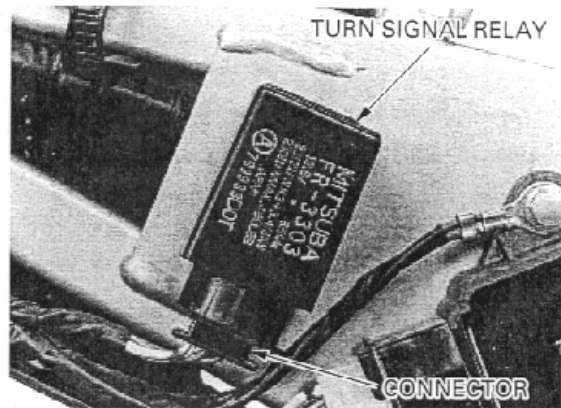
Short the white/green and gray wire terminals of the relay connector with a jumper wire.
Check the turn signal light with the ignition switch ON.

If the light does not come on, check for an open circuit in the white/green and gray wires.

If the light comes on, check for continuity between the green wire terminal and body ground.
If there is no continuity, check for an open circuit in the green wire.

If there is continuity, check the connector terminals for loose or poor contact.

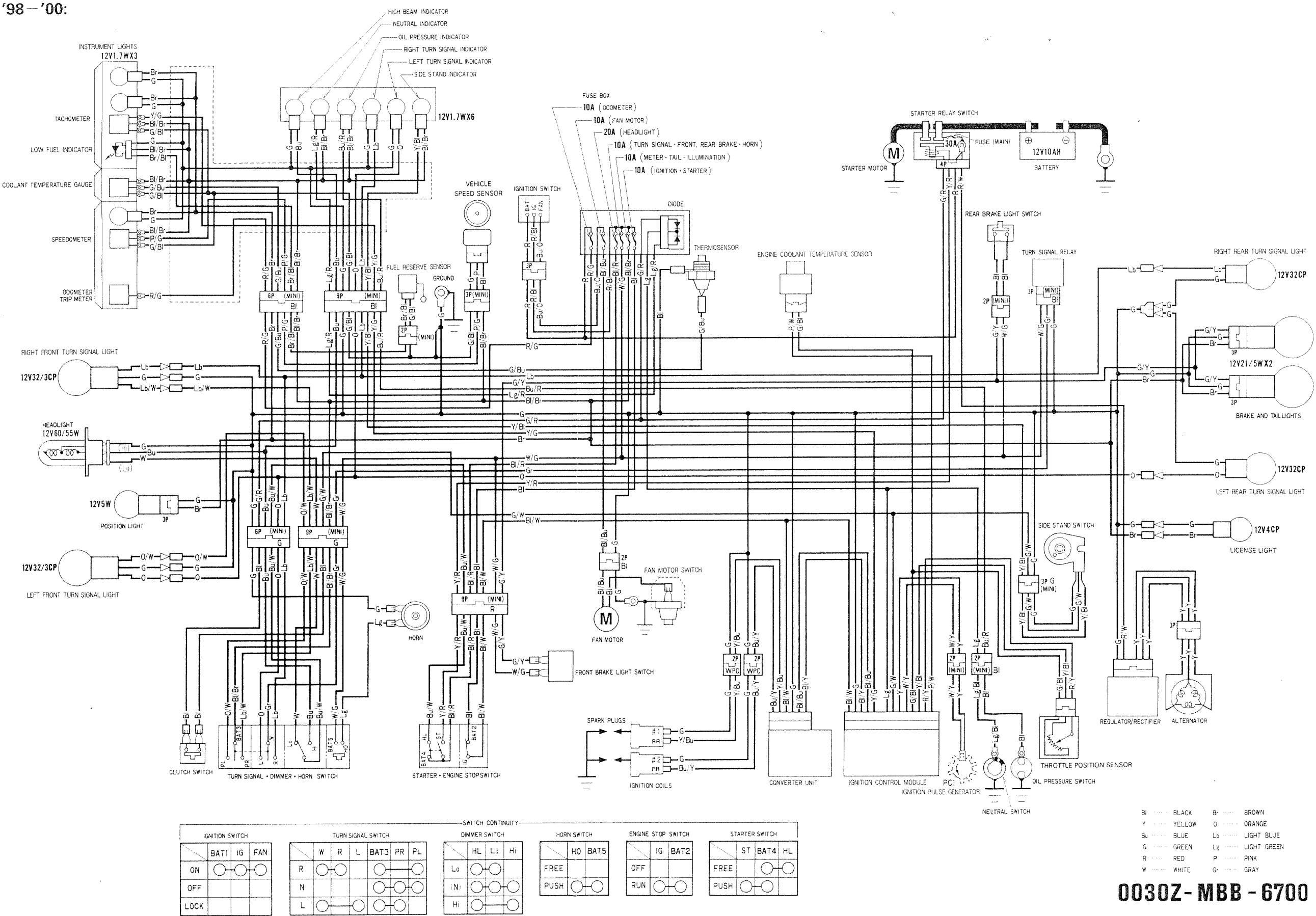
If the connector terminals are OK, replace the turn signal relay.



MEMO

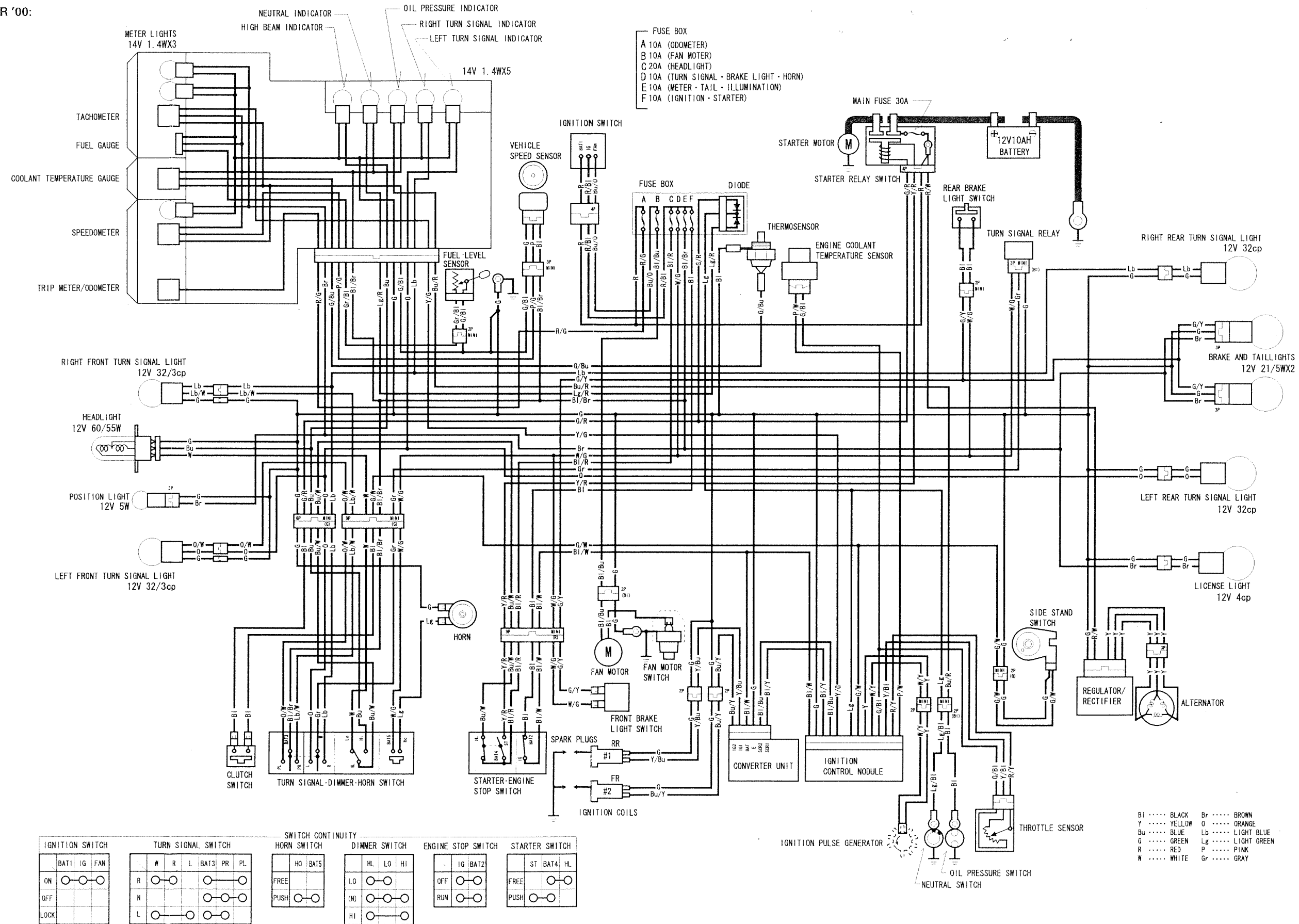
20. WIRING DIAGRAM

'98-'00:



WIRING DIAGRAM

AFTER '00:



0030Z-MBB-A200

21. TROUBLESHOOTING

ENGINE DOES NOT START OR IS
HARD TO START

21-1

POOR PERFORMANCE AT HIGH SPEED 21-4

ENGINE LACKS POWER

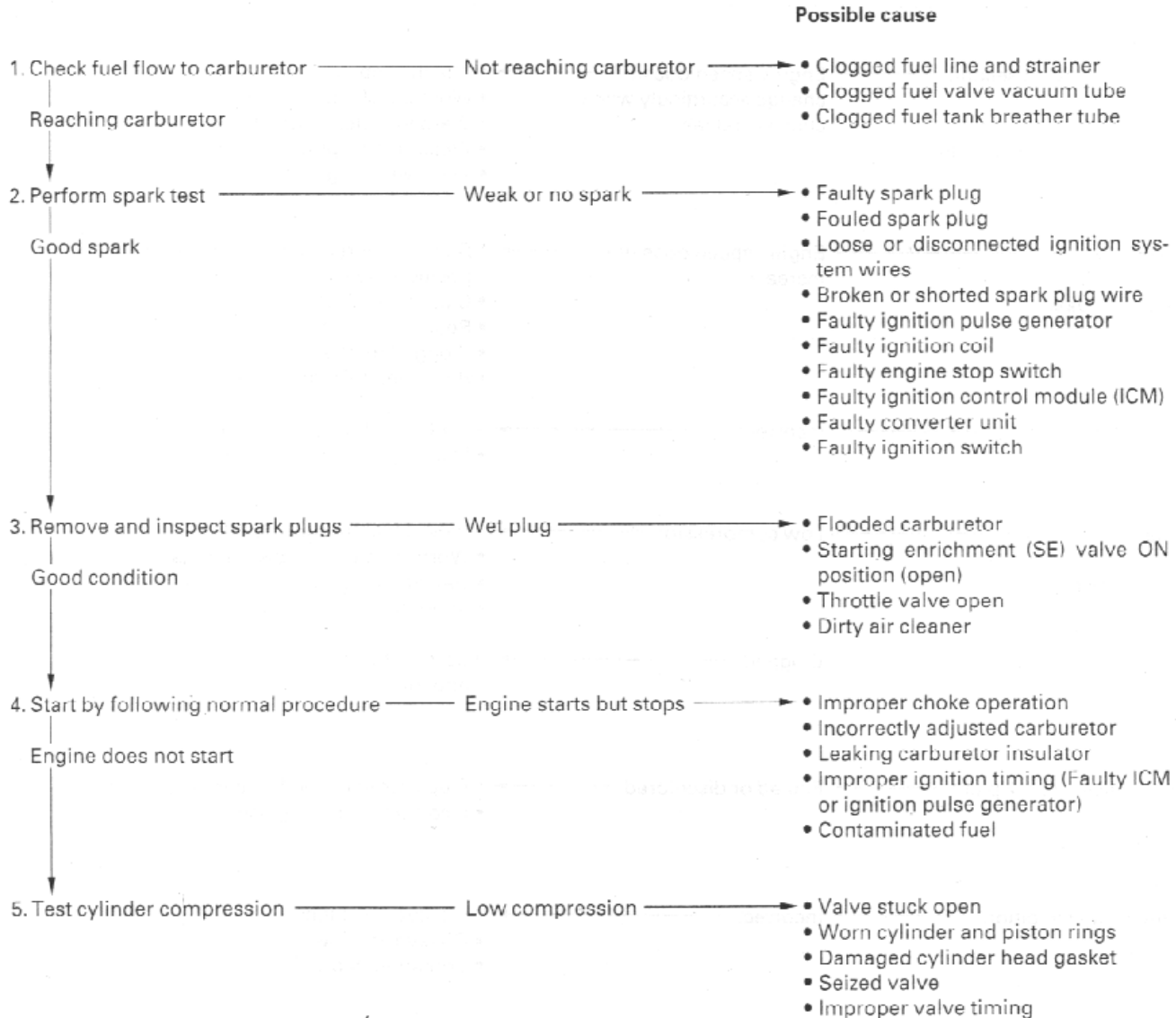
21-2

POOR HANDLING 21-4

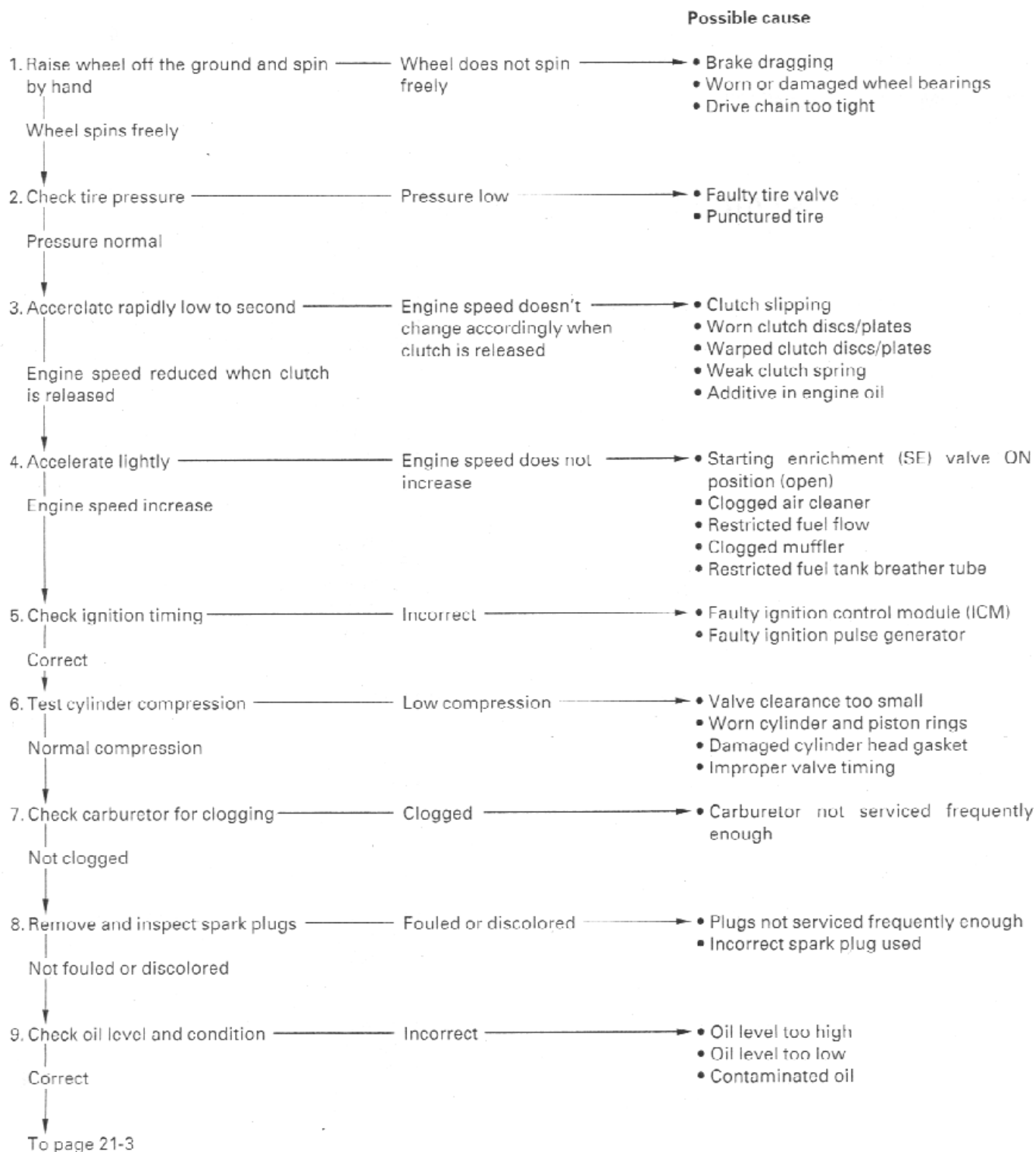
POOR PERFORMANCE AT LOW AND
IDLE SPEED

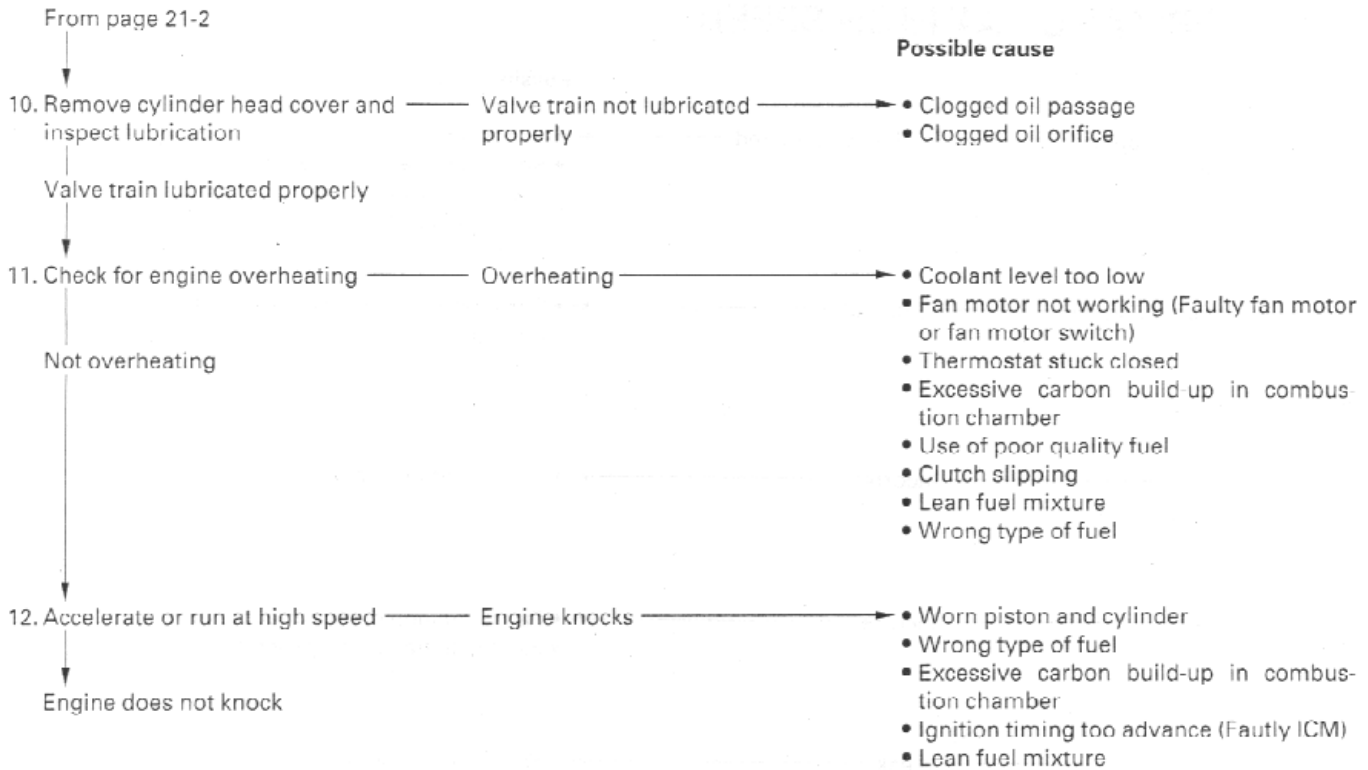
21-3

ENGINE DOES NOT START OR IS HARD TO START

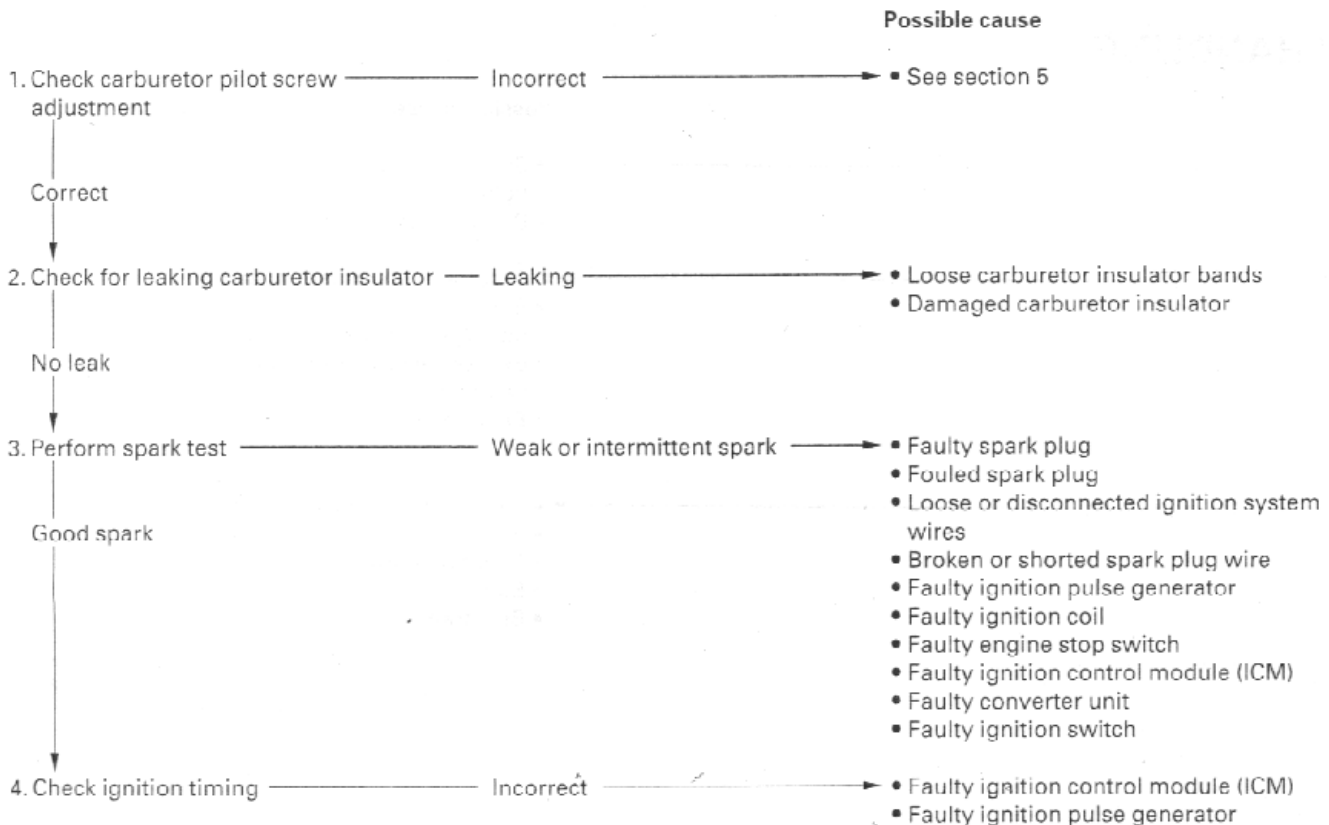


ENGINE LACKS POWER

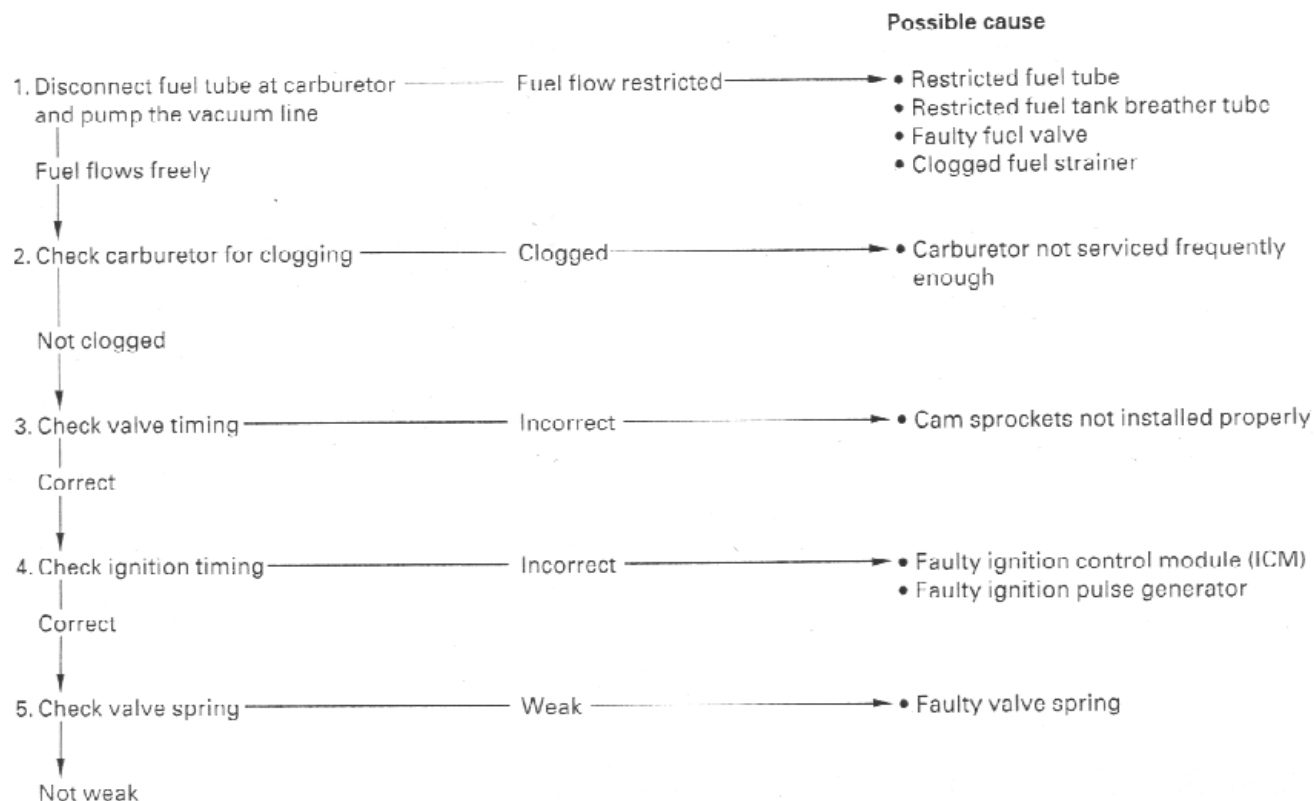




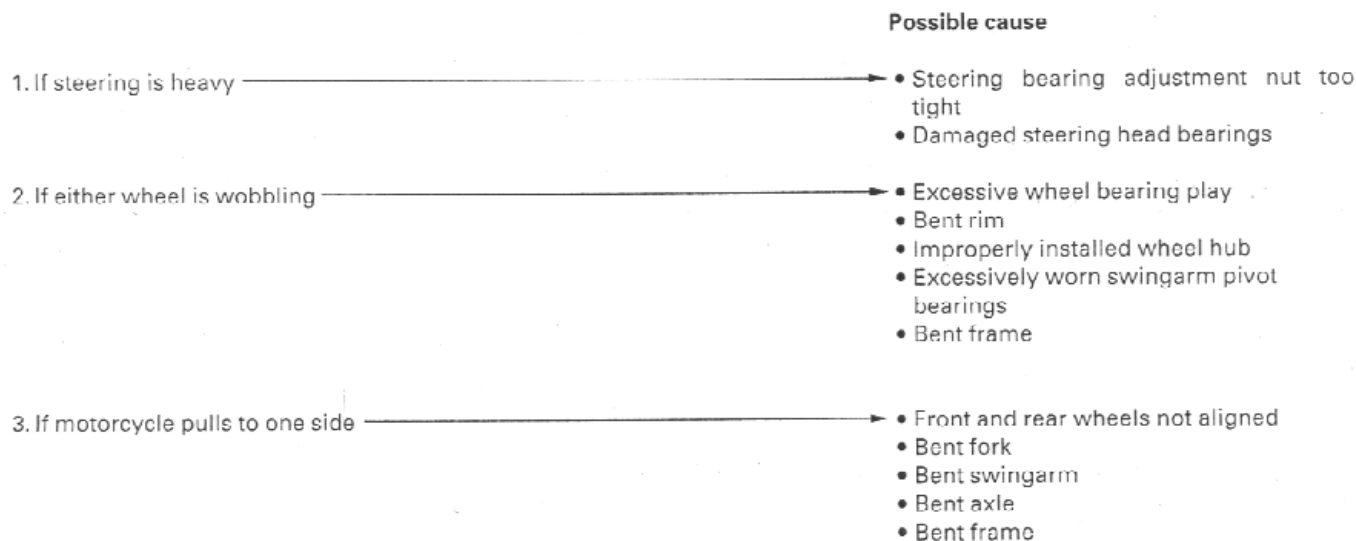
POOR PERFORMANCE AT LOW AND IDLE SPEED



POOR PERFORMANCE AT HIGH SPEED



POOR HANDLING



AIR CLEANER	3-5	ENGINE INSTALLATION	7-7
AIR CLEANER HOUSING (FUEL SYSTEM)	5-4	ENGINE LACKS POWER	21-2
ALTERNATOR CHARGING COIL	16-8	ENGINE LOWER FAIRING	2-4
ALTERNATOR STATOR	10-2	ENGINE OIL	3-10
BATTERY	16-4	ENGINE OIL FILTER	3-11
BRAKE FLUID	3-19	ENGINE REMOVAL	7-3
BRAKE FLUID REPLACEMENT/AIR BLEEDING	15-3	EVAPORATIVE EMISSION CONTROL SYSTEM (California type only)	3-15
BRAKE LIGHT SWITCH	3-21	EVAPORATIVE EMISSION CONTROL SYSTEM (California type only)	5-25
BRAKE LIGHT SWITCH	19-21	EXHAUST SYSTEM	2-5
BRAKE PAD WEAR	3-20	FLYWHEEL INSTALLATION	10-7
BRAKE PAD/DISC	15-5	FLYWHEEL REMOVAL	10-3
BRAKE SYSTEM	3-21	FORK	13-12
BRAKE/TAILLIGHT	19-5	FRONT BRAKE CALIPER	15-16
CABLE & HARNESS ROUTING	1-18	FRONT FAIRING	2-3
CAMSHAFT INSTALLATION	8-19	FRONT MASTER CYLINDER	15-7
CAMSHAFT REMOVAL	8-4	FRONT WHEEL	13-6
CARBURETOR ASSEMBLY	5-12	FUEL GAUGE/FUEL LEVEL SENSOR (After '00 only)	19-17
CARBURETOR CHOKE	3-5	FUEL LINE	3-4
CARBURETOR COMBINATION	5-15	FUEL TANK	2-4
CARBURETOR DISASSEMBLY/INSPECTION	5-9	GEARSHIFT LINKAGE	9-20
CARBURETOR INSTALLATION	5-18	GENERAL SAFETY	1-1
CARBURETOR REMOVAL	5-5	HANDLEBAR	13-3
CARBURETOR SEPARATION	5-8	HANDLEBAR SWITCHES	19-20
CARBURETOR SYNCHRONIZATION	3-12	HEADLIGHT	19-3
CHARGING SYSTEM INSPECTION	16-6	HEADLIGHT AIM	3-22
CHOKE SYSTEM	5-20	HIGH ALTITUDE ADJUSTMENT	5-22
CLUTCH	9-12	HORN	19-24
CLUTCH DIODE	18-11	IGNITION COIL	17-6
CLUTCH FLUID	3-23	IGNITION PULSE GENERATOR	17-7
CLUTCH FLUID REPLACEMENT/AIR BLEEDING	9-4	IGNITION SWITCH	19-19
CLUTCH MASTER CYLINDER	9-5	IGNITION SYSTEM INSPECTION	17-4
CLUTCH SLAVE CYLINDER	9-10	IGNITION TIMING	17-7
CLUTCH SWITCH	19-22	LICENSE LIGHT	19-6
CLUTCH SYSTEM	3-22	LOW FUEL INDICATOR/FUEL RESERVE SENSOR ('98 - '00 only)	19-24
COMBINATION METER ('98 - '00)	19-7	LUBRICATION & SEAL POINTS	1-16
COMBINATION METER (After '00)	19-8	MAIN JOURNAL BEARING	12-4
COOLANT REPLACEMENT	6-4	MAINTENANCE SCHEDULE	3-3
COOLANT TEMPERATURE GAUGE/ THERMOSENSOR	19-14	MODEL IDENTIFICATION	1-3
COOLING FAN MOTOR SWITCH	19-18	NEUTRAL SWITCH	19-22
COOLING SYSTEM	3-14	NUTS, BOLTS, FASTENERS	3-25
CRANKCASE ASSEMBLY	11-10	OIL COOLER	4-11
CRANKCASE SEPARATION	11-3	OIL PRESSURE CHECK	4-4
CRANKPIN BEARING	12-6	OIL PRESSURE INDICATOR	19-19
CRANKSHAFT	12-3	OIL PUMP	4-7
CYLINDER COMPRESSION	8-3	OIL STRAINER/PRESSURE RELIEF VALVE	4-5
CYLINDER HEAD ASSEMBLY	8-16	PILOT SCREW ADJUSTMENT	5-21
CYLINDER HEAD COVER INSTALLATION	8-23	PISTON/CYLINDER	12-8
CYLINDER HEAD COVER REMOVAL	8-3	POOR HANDLING	21-4
CYLINDER HEAD DISASSEMBLY	8-8	POOR PERFORMANCE AT HIGH SPEED	21-4
CYLINDER HEAD INSTALLATION	8-17	POOR PERFORMANCE AT LOW AND IDLE SPEED	21-3
CYLINDER HEAD REMOVAL	8-7	POSITION LIGHT	19-4
DRIVE CHAIN	3-15	PRIMARY DRIVE GEAR	9-22
DRIVE CHAIN SLIDER	3-19	RADIATOR COOLANT	3-13
EMISSION CONTROL INFORMATION LABEL	1-33	RADIATOR RESERVE TANK	6-9
EMISSION CONTROL SYSTEMS	1-30	RADIATOR/COOLING FAN	6-6
ENGINE COOLANT TEMPERATURE (ECT) SENSOR	17-10	REAR BRAKE CALIPER	15-19
ENGINE DOES NOT START OR IS HARD TO START	21-1	REAR FENDER/SEAT RAIL	2-7
ENGINE IDLE SPEED	3-13		

INDEX

REAR MASTER CYLINDER/BRAKE PEDAL	15-12
REAR WHEEL	14-3
REGULATOR/RECTIFIER	16-8
SEAT	2-2
SEAT COWL	2-2
SECONDARY AIR SUPPLY SYSTEM	3-14
SECONDARY AIR SUPPLY SYSTEM	5-24
SERVICE INFORMATION	
ALTERNATOR/STARTER CLUTCH	10-1
BATTERY/CHARGING SYSTEM	16-1
CLUTCH/GEARSHIFT LINKAGE	9-2
COOLING SYSTEM	6-1
CRANKCASE/TRANSMISSION	11-1
CRANKSHAFT/PISTON/CYLINDER	12-1
CYLINDER HEAD/VALVE	8-1
ELECTRIC STARTER	18-1
ENGINE REMOVAL/INSTALLATION	7-1
FRAME/BODY PANELS/EXHAUST SYSTEM	2-1
FRONT WHEEL/SUSPENSION/STEERING	13-1
FUEL SYSTEM	5-1
HYDRAULIC BRAKE	15-1
IGNITION SYSTEM	17-1
LIGHTS/METERS/SWITCHES	19-1
LUBRICATION SYSTEM	4-2
MAINTENANCE	3-1
REAR WHEEL/SUSPENSION	14-1
SERVICE RULES	1-2
SHIFT FORK/SHIFT DRUM	11-4
SHOCK ABSORBER	14-8
SIDE STAND	3-23
SIDE STAND SWITCH	19-23
SPARK PLUG	3-6
SPECIFICATIONS	1-4
SPEEDOMETER/VEHICLE SPEED SENSOR	19-10
STARTER CLUTCH	10-4
STARTER MOTOR	18-4
STARTER RELAY SWITCH	18-10
STEERING HEAD BEARINGS	3-26
STEERING STEM	13-21
SUSPENSION	3-24
SUSPENSION LINKAGE	14-11
SWINGARM	14-15
SYSTEM TESTING	6-3
TACHOMETER	19-12
THERMOSTAT	6-10
THROTTLE OPERATION	3-4
THROTTLE SENSOR	17-8
TOOLS	1-14
TORQUE VALUES	1-11
TRANSMISSION	11-6
TROUBLESHOOTING	
ALTERNATOR/STARTER CLUTCH	10-1
BATTERY/CHARGING SYSTEM	16-3
CLUTCH/GEARSHIFT LINKAGE	9-3
COOLING SYSTEM	6-2
CRANKCASE/TRANSMISSION	11-2
CRANKSHAFT/PISTON/CYLINDER	12-2
CYLINDER HEAD/VALVE	8-2
ELECTRIC STARTER	18-2
FUEL SYSTEM	5-3
FRAME/BODY PANELS/EXHAUST SYSTEM	2-1

TROUBLESHOOTING	
FRONT WHEEL/SUSPENSION/STEERING	13-2
HYDRAULIC BRAKE	15-2
IGNITION SYSTEM	17-3
LUBRICATION SYSTEM	4-3
REAR WHEEL/SUSPENSION	14-2
TURN SIGNAL LIGHT	19-4
TURN SIGNAL RELAY	19-25
VALVE CLEARANCE	3-7
VALVE GUIDE REPLACEMENT	8-12
VALVE SEAT INSPECTION/REFACING	8-13
WATER PUMP	6-11
WHEELS/TIRES	3-26
WIRING DIAGRAM	20-1