

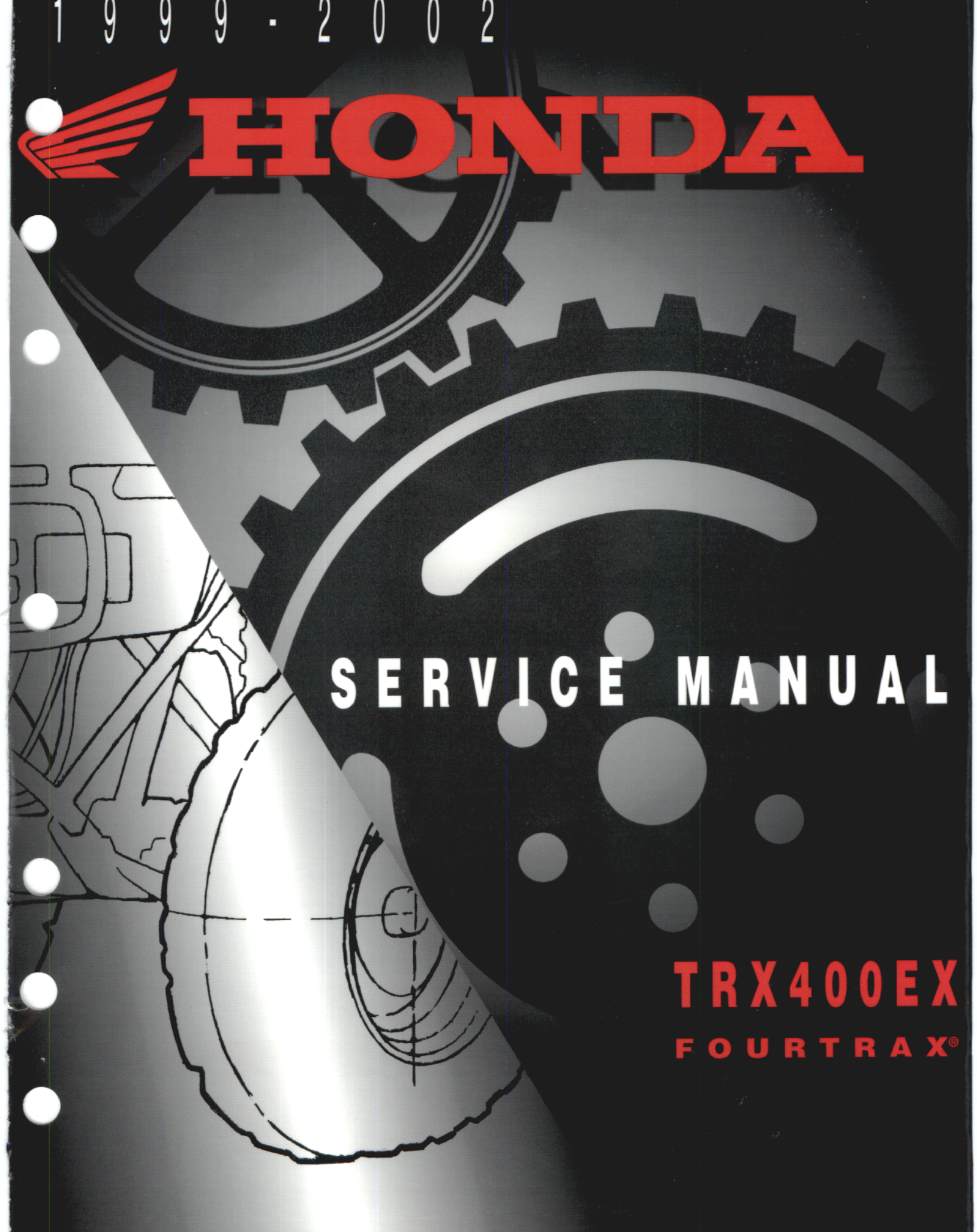
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# HONDA

## SERVICE MANUAL

**TRX400EX**  
**FOURTRAX®**



## IMPORTANT SAFETY NOTICE



**WARNING** *Indicates a strong possibility of severe personal injury or death if instructions are not followed.*

**CAUTION:** *Indicates a possibility of equipment damage if instructions are not followed.*

**NOTE:** Gives helpful information.

Detailed descriptions of standard workshop procedures, safety principles and service operations are not included. It is important to note that this manual contains some warnings and cautions against some specific service methods which could cause **PERSONAL INJURY** to service personnel or could damage a vehicle or render it unsafe. Please understand that those warnings could not cover all conceivable ways in which service, whether or not recommended by Honda might be done or of the possible hazardous consequences of each conceivable way, nor could Honda investigate all such ways. Anyone using service procedures or tools, whether or not recommended by Honda *must satisfy himself thoroughly* that neither personal safety nor vehicle safety will be jeopardized by the service method or tools selected.



## HOW TO USE THIS MANUAL

This service manual describes the service procedures for the TRX400EX.

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 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 describes procedures for removal/installation of components that may be required to perform service described in the following sections.

Sections 4 through 18 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 start with 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 20, Troubleshooting.

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HONDA MOTOR CO., LTD  
SERVICE PUBLICATIONS OFFICE

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## SYMBOLS

The symbols used throughout this manual show specific service procedures. If supplementary information is required pertaining to these symbols, it would be explained specifically in the text without the use of the symbols.

	<p>Replace the part(s) with new one(s) before assembly.</p>
	<p>Use recommended engine oil, unless otherwise specified.</p>
	<p>Use molybdenum oil solution (mixture of the engine oil and molybdenum grease in a ratio of 1 : 1).</p>
	<p>Use multi-purpose grease (Lithium based multi-purpose grease NLGI #2 or equivalent)</p>
	<p>Use molybdenum disulfide grease (containing more than 3% molybdenum disulfide, NLGI #2 or equivalent).          Example: Molykote® BR-2 plus manufactured by Dow Corning, U.S.A.          Multi-purpose M-2 manufactured by Mitsubishi Oil, Japan</p>
	<p>Use molybdenum disulfide paste (containing more than 40% molybdenum disulfide, NLGI #2 or equivalent).          Example: Molykote® G-n paste, manufactured by Dow Corning, U.S.A.          Honda Moly 60 (U.S.A. only)          Rocol ASP manufactured by Rocol Limited, U.K.          Rocol Paste manufactured by Sumico Lubricant, Japan</p>
	<p>Use silicone grease.</p>
	<p>Apply a locking agent. Use a middle strength locking agent unless otherwise specified.</p>
	<p>Apply sealant.</p>
	<p>Use DOT 4 brake fluid. Use the recommended brake fluid unless otherwise specified.</p>
	<p>Use Fork or Suspension Fluid.</p>



# 1. GENERAL INFORMATION

1

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## 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 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.

### 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 air borne 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

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### BATTERY HYDROGEN GAS & ELECTROLYTE

#### **▲ WARNING**

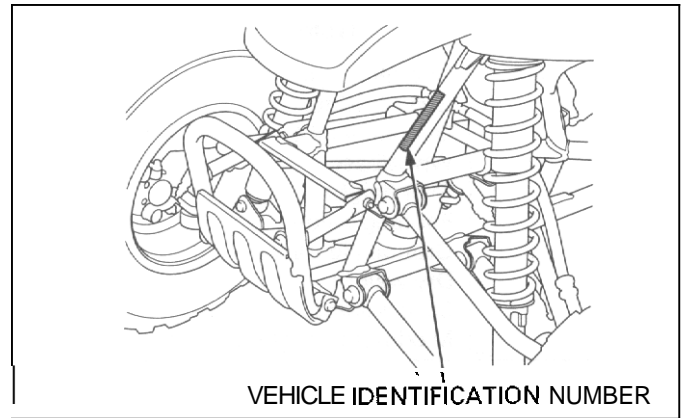
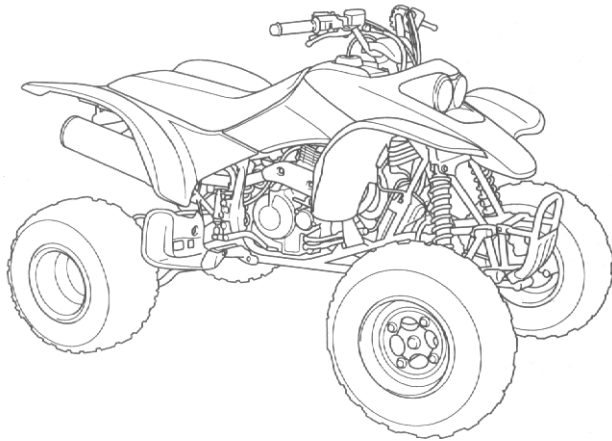
- *The battery gives off explosive gases; keep sparks, flames and cigarettes away. Provide adequate ventilation when charging or using the battery in an enclosed space.*
  - *The battery contains sulfuric acid (electrolyte). Contact with skin or eyes may cause severe burns. Wear protective clothing and 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 or magnesium or vegetable oil and call a physician. **KEEP OUT OF REACH OF CHILDREN.***
- 

## SERVICE RULES

1. Use genuine HONDA or HONDA-recommended parts and lubricants or their equivalents. Parts that don't 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 1-22, Cable & Harness routing.

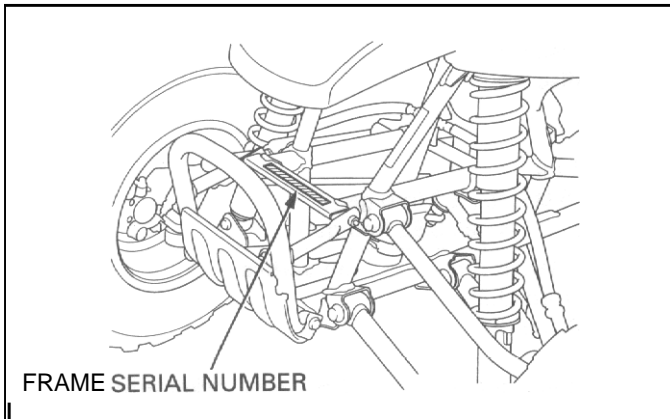


## MODEL IDENTIFICATION



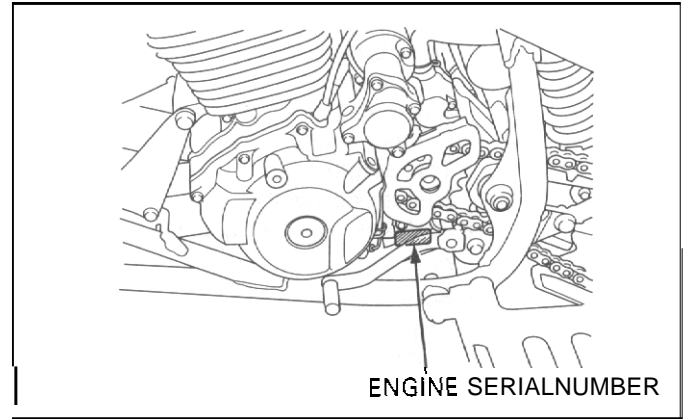
VEHICLE IDENTIFICATION NUMBER

The Vehicle Identification Number (VIN) is located on the left side frame down tube.



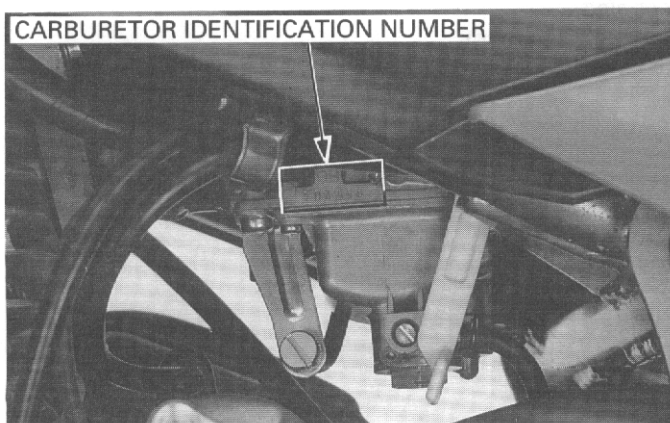
FRAME SERIAL NUMBER

The frame serial number is stamped on the front side of the frame.



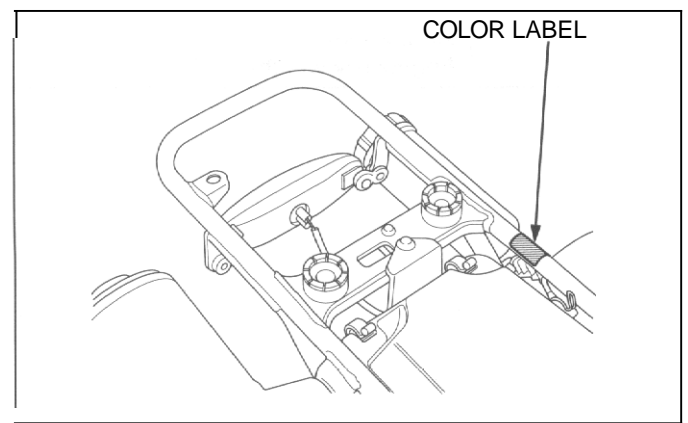
ENGINE SERIALNUMBER

The engine serial number is stamped on the lower left of the crankcase.



CARBURETOR IDENTIFICATION NUMBER

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



COLOR LABEL

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

## GENERAL INFORMATION

### SPECIFICATIONS

- GENERAL		
	ITEM	SPECIFICATIONS
DIMENSIONS	Overall length Overall width Overall height Wheelbase Seat height Footpeg height Ground clearance Dry weight Curb weight Maximum weight capacity	1,835 mm (72.2 in) 1,150 mm (45.3 in) 1,110 mm (43.7 in) 1,230 mm (48.4 in) 810 mm (31.9 in) 353 mm (13.9 in) 110 mm (4.3 in) 170 kg (375 lbs) 178 kg (392 lbs) 110 kg (243 lbs)
FRAME	Frame type Front suspension Front wheel travel Rear suspension Rear axle travel Front tire size Rear tire size Front tire brand Rear tire brand Front brake Rear brake Caster angle Camber angle Trail length Fuel tank capacity Fuel tank reserve capacity	Double cradle Double wish-bone 209 mm (8.2 in) Swingarm 230 mm (9.1 in) AT22 x 7-10 ★★ AT20 x 10-9 ★★ M/R 101 (Ohtsu) M/R 501 (Ohtsu) Hydraulic disc x 2 Hydraulic disc 6.5" -0.8" 28 mm (1.1 in) 10 liters (2.6 US gal, 2.2 Imp gal) 1.6 liters (0.42 US gal, 3.52 Imp gal)
ENGINE	Cylinder arrangement Bore and stroke Displacement Compression ratio Valve train Intake valve opens closes Exhaust valve opens closes Lubrication system Oil pump type Cooling system Air filtration Engine dry weight	Single cylinder, 15" inclined from vertical 85.0 x 70.0 mm (3.35 x 2.76 in) 397 cm <sup>3</sup> (24.2 cu-in) 9.1 : 1 Silent multi-link chain driven SOHC with rocker arms 5" BTDC (at 1 mm lift) 40" ABDC (at 1 mm lift) 40" BBDC (at 1 mm lift) 5" ATDC (at 1 mm lift) Forced pressure (dry sump) Trochoid Air cooled Oiled urethane foam 41.5 kg (91 lbs)



## GENERAL (Cont'd)

	ITEM	SPECIFICATIONS
CARBURETOR	Carburetor type Throttle bore	Piston valve 38 mm (1.5 in)
DRIVE TRAIN	Clutch system Clutch operation system Transmission Primary reduction Final reduction Gear ratio 1st 2nd 3rd 4th 5th Gearshift pattern	Multi-plate, wet Cable operating Constant mesh, 5-speeds 2.826 (23/65) 2.533 (15/38) 2.916 (12/35) 1.937 (16/31) 1.473 (19/28) 1.181 (22/26) 1.000 (26/26) Left foot operated return svstern. 1 - N - 2 - 3 - 4 - 5
ELECTRICAL	Ignition system Starting system Charging system <b>Regulator/rectifier</b> Lighting system	ICM (Capacitive Discharge Ignition) Electric starter motor Single phase output alternator Single phase full wave rectification Battery

## GENERAL INFORMATION

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Engine oil capacity	After draining	1.8 liters (1.9 US qt, 1.6 Imp qt)	—
	After draining/filter change	1.85 liters (1.95 US qt, 1.63 Imp qt)	—
	After disassembly	2.2 liters (2.3 US qt, 1.9 Imp qt)	—
Recommended engine oil		Honda GN4 or HP4 4-stroke oil or equivalent motor oil API service classification SF or SG Viscosity: SAE 10W-40 or 20W-50	—
Oil pump	Tip clearance	0.15 (0.006)	0.20 (0.008)
	Body clearance	0.15 – 0.22 (0.006 – 0.009)	0.25 (0.010)
	Side clearance	0.02 – 0.09 (0.001 – 0.004)	0.12 (0.005)

ITEM	SPECIFICATIONS
Main jet	#148
Jet needle clip position	3rd groove from top
Pilot screw opening	See page 5-13
Float level	18.5 mm (0.73 in)
Idle speed	1,400 ± 100 rpm
Throttle lever free play	3 – 8 mm (1/8 – 5/16 in)

ITEM		STANDARD	SERVICE LIMIT	
Cylinder compression		686 – 883 kPa (7.0 – 9.0 kgf/cm <sup>2</sup> , 100 – 128 psi)	—	
Valve clearance	IN	0.10 (0.004)	—	
	EX	0.12 (0.005)	—	
Camshaft	Cam lobe height	IN	30.673 – 30.773 (1.2076 – 1.2115)	
		EX	30.468 – 30.568 (1.1995 – 1.2035)	
	Runout	—	0.03 (0.001)	
Rocker arm	Arm I.D.	IN/EX 11.500 – 11.518 (0.4528 – 0.4535)	11.53 (0.454)	
	Shaft O.D.	IN/EX 11.466 – 11.484 (0.4514 – 0.4521)	11.41 (0.449)	
	Arm-to-shaft clearance	IN/EX 0.016 – 0.052 (0.0006 – 0.0020)	0.10 (0.004)	
Sub-rocker arm	Arm I.D.	IN/EX 7.000 – 7.015 (0.2756 – 0.2762)	7.05 (0.278)	
	Shaft O.D.	IN/EX 6.972 – 6.987 (0.2745 – 0.2751)	6.92 (0.272)	
	Arm-to-shaft clearance	IN/EX 0.013 – 0.043 (0.0005 – 0.0017)	0.10 (0.004)	
Valve, valve guide	Valve stem O.D.	IN	5.475 – 5.490 (0.2156 – 0.2161)	
		EX	5.455 – 5.470 (0.2148 – 0.2154)	
	Valve guide I.D.	IN/EX 5.500 – 5.512 (0.2165 – 0.2170)	5.52 (0.217)	
	Stem-to-guide clearance	IN	0.010 – 0.037 (0.0004 – 0.0015)	0.12 (0.005)
		EX	0.030 – 0.057 (0.0012 – 0.0022)	0.14 (0.006)
Valve seat width	IN/EX 1.0 – 1.1 (0.039 – 0.043)	2.0 (0.08)		
Valve spring	Free length	Inner	37.19 (1.464)	
		Outer	44.20 (1.740)	
Cylinder head warpage		—	0.10 (0.004)	



**GENERAL INFORMATION**

ITEM		STANDARD	SERVICE LIMIT
Cylinder	I.D.	85.000 - 85.010 (3.3465 - 3.3468)	85.10 (3.350)
	Out of round	—	0.05 (0.002)
	Taper	—	0.05 (0.002)
	Warpage	—	0.10 (0.004)
Piston,	Piston O.D. at 15 (0.6) from bottom		84.960 - 84.985 (3.3449 - 3.3459)
	Piston pin O.D.		19.994 - 20.000 (0.7872 - 0.7874)
	Piston-to-piston pin clearance		0.002 - 0.014 (0.0001 - 0.0006)
	Piston ring end gap	Top	0.20 - 0.35 (0.008 - 0.014)
		Second	0.35 - 0.50 (0.014 - 0.020)
		Oil (side rail)	0.20 - 0.70 (0.008 - 0.028)
	Piston ring-to-ring groove clearance	Top	0.030 - 0.065 (0.0012 - 0.0026)
		Second	0.015 - 0.050 (0.0006 - 0.0020)
	Cylinder-to-piston clearance		0.015 - 0.050 (0.0006 - 0.0020)
Connecting rod small end I.D.		20.020 - 20.041 (0.7882 - 0.7890)	
Connecting rod-to-Piston pin clearance		0.020 - 0.047 (0.0008 - 0.0019)	

ITEM		STANDARD	SERVICE LIMIT
Clutch	Lever free play		10 - 20 (3/8 - 3/4)
	Spring free length		52.64 (2.072)
	Disc thickness		2.92 - 3.08 (0.115 - 0.121)
	Plate warpage		—
	Outer I.D.		28.000 - 28.021 (1.1024 - 1.1032)
	Outer guide	I.D.	22.010 - 22.035 (0.8665 - 0.8675)
		O.D.	27.959 - 27.980 (1.1007 - 1.1016)
Mainshaft O.D. at clutch outer guide		21.959 - 21.980 (0.8645 - 0.8654)	

ITEM	STANDARD	SERVICE LIMIT
Starter driven gear boss O.D.	51.705 - 51.718 (2.0356 - 2.0361)	51.67 (2.034)

## GENERAL INFORMATION

ITEM		STANDARD	SERVICE LIMIT	
Transmission	I.D.	13.000 – 13.021 (0.5118 – 0.5126)	13.05 (0.514)	
	Claw thickness	5.93 – 6.00 (0.233 – 0.236)	5.5 (0.22)	
	Shaft O.D.	12.966 – 12.984 (0.5105 – 0.5112)	12.90 (0.508)	
	Gear I.D.	M4	25.020 – 25.041 (0.9850 – 0.9859)	25.08 (0.987)
		M5	25.000 – 25.021 (0.9843 – 0.9851)	25.06 (0.987)
		C1	23.000 – 23.021 (0.9055 – 0.9063)	23.07 (0.908)
		C2, C3	28.020 – 28.041 (1.1031 – 1.1040)	28.08 (1.106)
	Gear bushing O.D.	M4	24.979 – 25.000 (0.9834 – 0.9843)	24.90 (0.980)
		M5	24.959 – 24.980 (0.9826 – 0.9835)	24.90 (0.980)
		C1	22.959 – 22.980 (0.9039 – 0.9047)	22.90 (0.902)
		C2, C3	27.979 – 28.000 (1.1015 – 1.1024)	27.94 (1.100)
	Gear-to-bushing clearance		0.020 – 0.062 (0.0008 – 0.0022)	0.10 (0.004)
	Gear bushing I.D.	M4	22.000 – 22.021 (0.8661 – 0.8670)	22.10 (0.870)
		C1	20.020 – 20.041 (0.7882 – 0.7890)	20.08 (0.791)
		C2, C3	25.000 – 25.021 (0.9843 – 0.9851)	25.06 (0.987)
	Mainshaft O.D.	at M4	21.959 – 21.980 (0.7866 – 0.7874)	21.92 (0.863)
Countershaft O.D.	at C1	19.979 – 20.000 (1.1791 – 1.1801)	19.94 (0.785)	
	at C2, C3	24.959 – 24.980 (0.9826 – 0.9835)	24.92 (0.981)	
Bushing-to-shaft clearance		0.020 – 0.062 (0.0008 – 0.0022)	0.10 (0.004)	
Crankshaft	Runout	—	0.12 (0.005)	
	Big end side clearance	0.05 – 0.45 (0.002– 0.018)	0.6 (0.02)	
	Big end radial clearance	0.006– 0.018 (0.0002– 0.0007)	0.05(0.002)	

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		—	4.0 (0.16)
Cold tire pressure	Standard	27 kPa 10.275 kgf/cm <sup>2</sup> , 4.0 psi	—
	Minimum	23 kPa (0.235 kgf/cm <sup>2</sup> , 3.4 psi)	—
	Maximum	31 kPa (0.315 kgf/cm <sup>2</sup> , 4.6 psi)	—
Tie-rod distance between the ball joints		370.2 (14.57)	—
Toe		Toe-in: 17 ± 15 (0.7 ± 0.6)	—
Shock absorber spring adjuster standard position		4th from softest position	—

ITEM		STANDARD	SERVICE LIMIT
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	Minimum	23 kPa (0.235 kgf/cm <sup>2</sup> , 3.4 psi)	—
	Maximum	31 kPa 10.315 kgf/cm <sup>2</sup> , 4.6 psi	—
Axle runout		—	3.0 (0.12)
Drive chain slack		30 – 40 (1-1/4 – 1-5/8)	—
Shock absorber spring installed length		231.5 (9.11)	—

**- HYDRAULIC DISC BRAKE**

ITEM		STANDARD	SERVICE LIMIT
Recommended brake fluid		DOT 4 brake fluid	—
Brake disc thickness	Front	2.8 – 3.2 (0.11 – 0.13)	2.5 (0.10)
	Rear	3.8–4.2 (0.15–0.17)	3.5(0.14)
Brake disc runout		—	0.30 (0.012)
Master cylinder I.D.		12.700 – 12.743 (0.5000– 0.5017)	12.75(0.502)
Master piston O.D.		12.657– 12.684(0.4983– 0.4994)	12.65(0.498)
Caliper cylinder I.D.		33.960 – 34.010 (1.3370 – 1.3390)	34.02(1.340)
Caliper piston O.D.		33.895– 33.928 (1.3344– 1.3357)	33.87(1.333)





ITEM		SPECIFICATIONS	
Battery	Capacity	12 V - 8 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	0.9 A x 5 - 10 h
Quick		4.0 A x 1.0 h	
Alternator	Capacity	147 W/5,000 rpm	
	Charaina coil resistance (20°C/68°F)	0.1 - 1.0 Ω	

ITEM		SPECIFICATIONS
Spark plug	Standard	DPR8Z (NGK), X24GPR-U (DENSO)
	For extended high speed riding	DPR9Z (NGK), X27GPR-U (DENSO)
Spark plug gap		0.6 - 0.7 mm (0.024 - 0.028 in)
Ignition coil primary peak voltage		100 V minimum
Ignition pulse generator peak voltage		0.7 V minimum
Exciter coil peak voltage		100 V minimum
Ignition timing ("F" mark)		8° BTDC at idle

ITEM	STANDARD	SERVICE LIMIT
Starter motor brush length	12.5 (0.49)	8.5 (0.33)

ITEM		SPECIFICATIONS
Bulbs	Headlight (High/Low beam)	12 V - 30/30 W x 2
	Taillight	12 V - 5 W
	Neutral indicator	12 V - 3.4 W
Fuse (main fuse)		15 A

# 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)	9 (0.9, 6.5)
10 mm bolt and nut	34 (3.5, 25)		
12 mm bolt and nut	54 (5.5, 40)	6 mm flange bolt (8 mm head, large flange)	12 (1.2, 9)
			
		6 mm flange bolt (10 mm head) and nut	12 (1.2, 9)
		8 mm flange bolt and nut	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 locking agent to the threads.
  2. Apply oil to the threads and seating surface.
  3. Apply grease to the threads and seating surface.
  4. ALOC bolt. replace with a new one.
  5. Castle nut: tighten to the specified torque and further tighten until its grooves align with the cotter pin hole.
  6. Stake.

- ENGINE				
ITEM	QTY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
<b>MAINTENANCE:</b>				
Spark plug	1	12	18 (1.8, 13)	
Valve adjusting hole cap	4	36	15 (1.5, 11)	
Valve adjusting lock nut	4	7	24 (2.4, 17)	
Crankshaft hole cap	1	30	8 (0.8, 5.8)	
Timing hole cap	1	14	10 (1.0, 7)	
Engine oil drain bolt (crankcase)	1	12	25 (2.5, 18)	
Engine oil drain bolt (oil tank)	1	10	20 (2.0, 14)	
Engine oil strainer screen (at oil tank)	1	27	54 (5.5, 40)	
Oil pipe joint flare nut	2	16	20 (2.0, 14)	
<b>CYLINDER HEAD/VALVE:</b>				
Cylinder head cover bolt	1	8	23 (2.3, 17)	
Rocker arm shaft	2	14	27 (2.8, 20)	NOTE 1
Intake sub-rocker arm shaft	2	14	27 (2.8, 20)	VOTE 1
Exhaust sub-rocker arm shaft	2	12	27 (2.8, 20)	NOTE 1
Cam sprocket bolt	2	7	20 (2.0, 14)	NOTE 1
Cam tensioner plug	1	6	4 (0.4, 2.9)	
Cylinder head nut	4	10	44 (4.5, 33)	NOTE 2
<b>CYLINDER/PISTON:</b>				
Cylinder bolt	4	10	44 (4.5, 33)	NOTE 2
Cylinder stud bolt	4	10	20 (2.0, 33)	oage 8-6
<b>CLUTCH/GEARSHIFT LINKAGE:</b>				
Clutch center lock nut	1	18	108 (11.0, 80)	VOTE 2,6
Primary drive gear nut	1	18	88 (9.0, 65)	VOTE 2
Gearshift drum stopper arm pivot bolt	1	6	12 (1.2, 9)	
Gearshift spindle return spring pin	1	8	24 (2.4, 17)	
<b>ALTERNATOR/STARTER CLUTCH:</b>				
Flywheel bolt	1	12	127 (13.0, 94)	VOTE 2
Starter clutch bolt	6	8	30 (3.1, 22)	VOTE 1
Left crankcase cover stud bolt	1	6	10 (1.0, 7)	
Gearshift pedal Dinch bolt	1	6	20 (2.0, 14)	



**GENERAL INFORMATION**

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N-m (kgf-m, lbf-ft)	REMARKS
<b>HYDRAULIC BRAKE:</b>				
Caliper bleed valve	3	8	6 (0.6, 4.3)	
Front brake caliper pad pin plug	4	10	3 (0.3, 2.2)	
Front brake caliper pad pin	4	10	18 (1.8, 13)	
Rear brake caliper pad pin	2	8	18 (1.8, 13)	
Brake hose oil bolt	4	10	34 (3.5, 25)	
Brake pipe joint nut	2	10	17 (1.7, 12)	
Front brake lever pivot bolt	1	6	6 (0.6, 4.3)	
nut	1	6	6 (0.6, 4.3)	
Rear master cylinder mounting bolt	2	6	13 (1.3, 9)	NOTE 4
Rear master cylinder reservoir hose joint screw	1	4	2 (0.2, 1.4)	NOTE 1
Front brake caliper slide pin	2	8	23 (2.3, 17)	
Front brake caliper bracket pin	2	8	18 (1.8, 13)	
Front brake caliper mounting bolt	2	8	30 (3.1, 22)	NOTE 4
Rear brake caliper slide pin	1	8	23 (2.3, 17)	
Rear brake caliper bracket pin	1	8	18 (1.8, 13)	NOTE 1
Rear brake caliper mounting bolt	2	8	30 (3.1, 22)	NOTE 4
Rear brake caliper parking brake base bolt	2	8	23 (2.3, 17)	
<b>LIGHTS/SWITCHES:</b>				
Headlight mounting bolt	2	4	4 (0.4, 2.9)	
<b>OTHERS:</b>				
Sub-frame upper mounting bolt	2	8	42 (4.3, 31)	
Sub-frame lower mounting bolt	2	10	54 (5.5, 40)	

## GENERAL INFORMATION

### TOOLS

- NOTES: 1. Equivalent commercially available in U.S.A.  
 2. Not available in U.S.A.  
 3. Alternative tool

DESCRIPTION	TOOL NUMBER	REMARKS	REF. SECTION
Carburetor float level gauge	07401 - 0010000		3
Universal bearing puller	07631 - 0010000	NOTE 1	11
Gear holder	07724 - 0010100	NOTE 2	3
Clutch center holder	07724 - 0050002	NOTE 1	3
Flywheel holder	07725 - 0040000	NOTE 1	10
Motor puller	07733 - 0020001	NOTE 3	10
Remover weight	07741 - 0010201	07933 - 3950000 (U.S.A. only) NOTE 3: 07936 - 371020A or 07936 - 3710200	11
Valve guide driver, 5.5 mm	07742 - 0010100		7
Attachment, 32 x 35 mm	07746 - 0010100		11, 12
Attachment, 37 x 40 mm	07746 - 0010200		11, 12
Attachment, 42 x 47 mm	07746 - 0010300		11, 12
Attachment, 52 x 55 mm	07746 - 0010400		11
Attachment, 62 x 68 mm	07746 - 0010500		13
Attachment, 72 x 75 mm	07746 - 0010600		11
Attachment, 24 x 26 mm	07746 - 0010700		13
Attachment, 35 mm I.D.	07746 - 0030400		13
Pilot, 12 mm	07746 - 0040200		11
Pilot, 15 mm	07746 - 0040300		11, 12
Pilot, 17 mm	07746 - 0040400		3, 11, 12, 13
Pilot, 20 mm	07746 - 0040500		12
Pilot, 25 mm	07746 - 0040600		11
Pilot, 30 mm	07746 - 0040700		11
Pilot, 40 mm	07746 - 0040900		13
Pilot, 22 mm	07746 - 0041000		11
Bearing remover shaft	07746 - 0050100		12
Bearing remover head, 15 mm	07746 - 0050400		12
Attachment, 28 x 30 mm	07746 - 1870100		9
Driver	07749 - 0010000		9, 11, 12, 13
Valve spring compressor	07757 - 0010000		7
Valve seat cutter, 29 mm (EX 45°)	07780 - 0010300	NOTE 1	7
Valve seat cutter, 35 mm (IN 45°)	07780 - 0010400		7
Flat cutter, 30 mm (EX 32°)	07780 - 0012200		7
Flat cutter, 35 mm (IN 32°)	07780 - 0012300		7
Interior cutter, 30 mm (IN/EX 60°)	07780 - 0014000		7
Cutler holder, 55 mm	07781 - 0010101		7
Pilot screw wrench	07908 - 4220201		5
Compression gauge attachment	07908 - KK60000	NOTE 1	7
Snap ring pliers	07914 - SA50001		14
Lock nut wrench, 45 mm	07916 - 1870101	NOTE 1	13
Lock nut wrench, 56 mm	07916 - HA20000	NOTE 3: 07916 - HA2010A (U.S.A. only)	13
Remover handle	07936 - 3710100		11
Bearing remover, 17 mm	07936 - 3710300		11
Bearing remover set, 15 mm	07936 - KC10000	NOTE 2	11
— bearing remover, 15 mm	07936 - KC10500		
— remover shaft	07936 - KC10100	NOTE 2	
— remover head	07936 - KC10200	NOTE 2	
— sliding weight	07741 - 0010201	NOTE 3: 07936 - 371020A or 07936 - 3710200	
Needle bearing remover	07946 - KA50000		13



<b>DESCRIPTION</b>	<b>TOOL NUMBER</b>	<b>REMARKS</b>	<b>REF. SECTION</b>
Crankcase assembly tool — assembly collar — assembly shaft	07965 - VM00000 07965 - VM00100 07965 - VM00200	NOTE 2	11
— threaded adaptor	07965 - VM00300	NOTE 3: 07931 - ME4010B and 07931 - HB3020A NOTE 3: 07931 - KF00200	
Assembly collar	07965 - VM00100		12.13
Valve guide reamer, 5.5 mm	07984 - 2000001	NOTE 3 07984 - 200000D (U.S.A. only)	7
Spherical bearing driver	07HMF - HC00100	NOTE 2	12
Ball joint remover	07MAC - SL00200	NOTE 3: 07GAD - PH70100	12

## GENERAL INFORMATION

### LUBRICATION & SEAL POINTS

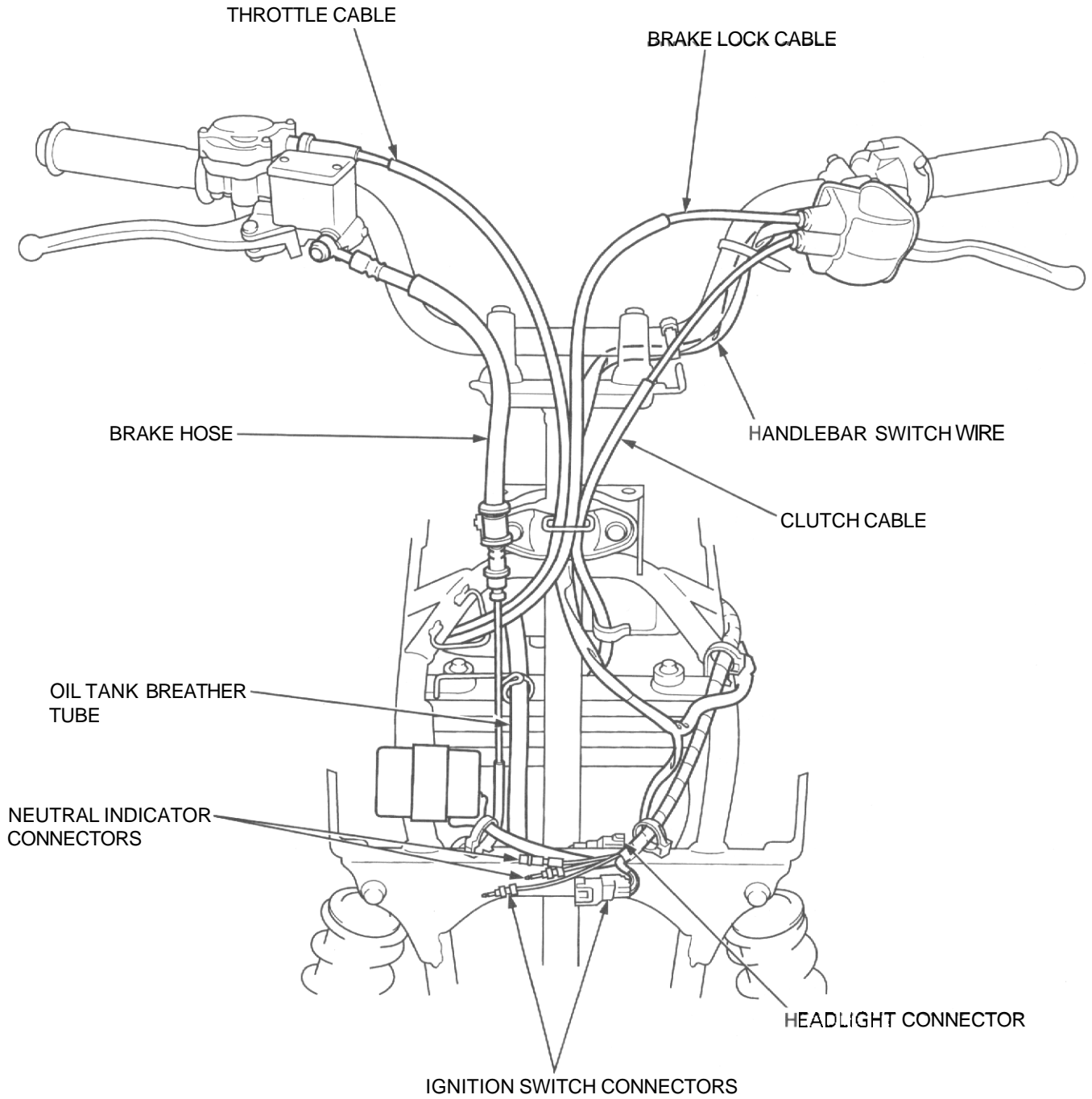
#### – ENGINE

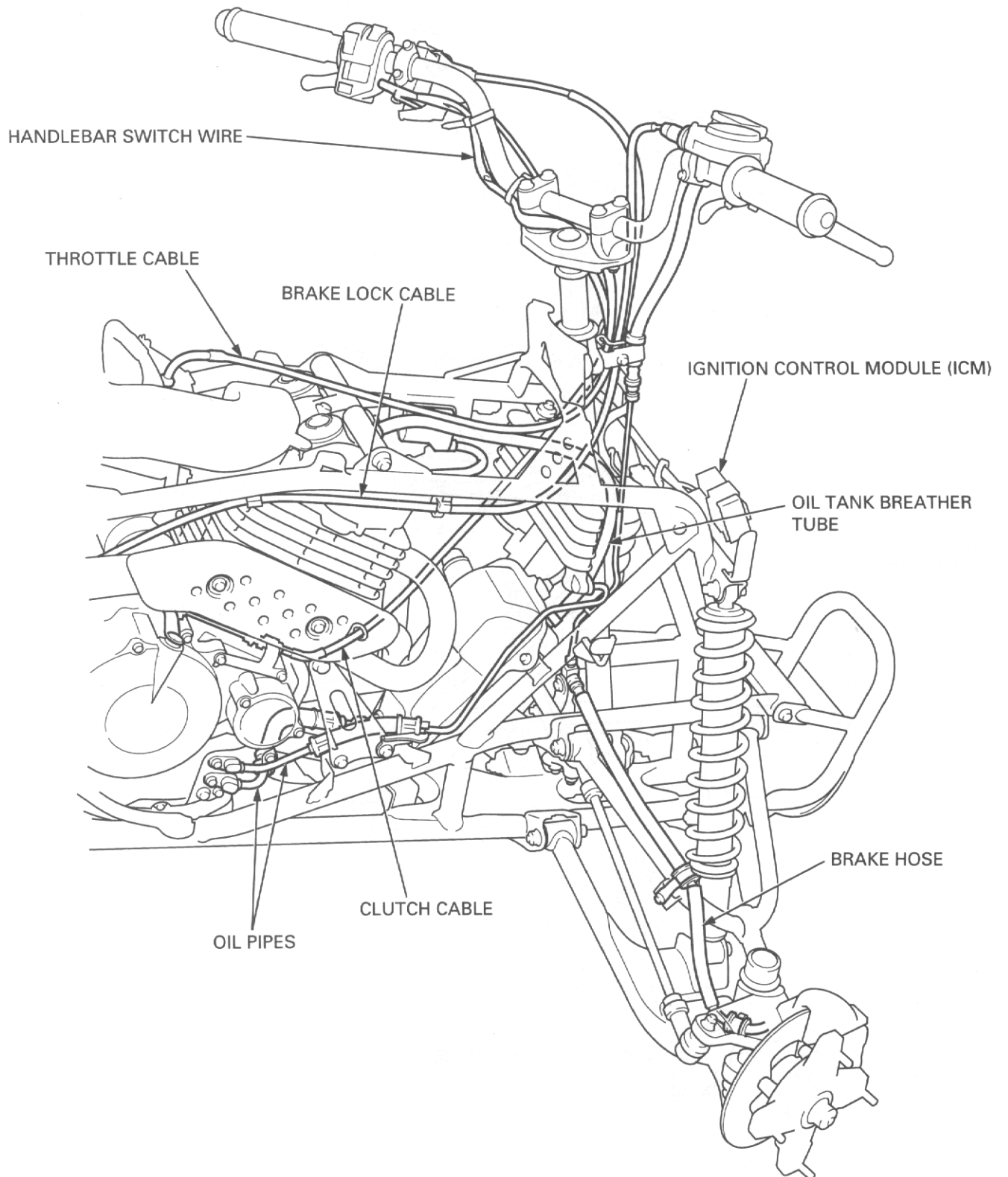
LOCATION	MATERIAL	REMARKS
Camshaft journals and cam lobes Rocker arm slipper surfaces Sub-rocker arm slipper surfaces Valve stem (valve guide sliding surface) Clutch outer guide inner and outer surfaces Piston pin outer surface Connecting rod small end inner surface Transmission gear rotating surfaces Transmission gear shift fork grooves Connecting rod big end bearing	Molybdenum oil solution (a mixture of 1/2 engine oil and 1/2 molybdenum disulfide grease)	
Rocker arm shaft sliding surfaces Sub-rocker arm shaft sliding surfaces Cam chain Cylinder head nut threads and seating surfaces Piston outer surface and piston pin hole Piston rings Cylinder bore Cylinder bolt threads and seating surfaces (10 mm only) Clutch arm spindle Clutch lifter piece Clutch disc lining Clutch center lock nut threads and seating surface Primary drive gear nut threads and seating surface Flywheel bolt threads and seating surface Transmission gear teeth Shift fork shaft Shift fork guide pins and inner surfaces Shift drum grooves Each bearing rotating area Each O-ring whole surface Each oil seal outer surface	Engine oil	
Each oil seal lip	Multi-purpose grease	
Rocker arm shaft threads Sub-rocker arm shaft threads Gearshift cam plate bolt threads Left crankcase cover stud bolt threads Alternator wire clamp bolt threads (inside left crankcase cover) Ignition pulse generator bolt threads Mainshaft bearing setting plate bolt threads Cam chain tensioner slider bolt threads Cam sprocket bolt threads Starter clutch bolt threads	Locking agent	Coating area (page 7-22) Coating area (page 7-22) Coating width: 6.5 mm (0.26 in) from tip       Coating width: 5 mm (0.2 in)
Alternator/ignition pulse generator wire grommet seating surface	Liquid sealant	

- FRAME

LOCATION	MATERIAL	REMARKS
Throttle cable end Throttle lever pivot and dust seal lip Brake lock cable end Brake lock arm pivot Front wheel hub dust seal lips Steering shaft bushing inner surface Steering shaft dust seal lips Upper and lower arm pivot bearings Upper and lower arm pivot dust seal lips Shock arm and link bearings Shock arm and link dust seal lips Swingarm pivot bearings Swingarm pivot dust seal lips Rear brake pedal pivot Rear brake pedal pivot dust seal lips Rear axle bearing holder outer surface Rear axle bearing holder dust seal lips Rear brake caliper stay inner surface Rear axle splines (brake disc and driven flange) Rear axle outer lock nut stopper ring Rear wheel hub nut threads and seating surfaces Rear shock absorber upper needle bearing Rear shock absorber dust seal lips	Multi-purpose grease	Apply 1 g per each dust seal  Fill up 3 g per each bearing  Apply 3 g per each bearing  Apply 1 g per each dust seal
Front shock absorber lower bushings Front shock absorber dust seal lips	Molybdenum disulfide paste	
Air cleaner intake duct-to-housing mating surface	Engine oil	
Throttle cable outer inside Clutch cable outer inside Brake lock cable outer inside	Cable lubricant	
Handlebar grip rubber inside	Honda Bond A or Honda Hand Grip Cement (U.S.A. only) or equivalent	
Front brake lever-to-masterpiston contacting area Front brake lever pivot Rear brake master piston-to-push rod contacting area and boot groove Brake caliper pin bolt boots inside Rear brake caliper parking brake shaft sliding surface	Silicone grease	
Brake master piston and cups Brake caliper piston and piston seals Rear brake master cylinder hose joint O-ring Rear brake caliper piston shaft O-ring	DOT 4 brakefluid	
Clutch switch retainer screw Rear axle outer and inner lock nut threads Rear brake master cylinder hose joint screw threads	Locking agent	

CABLE & HARNESS ROUTING

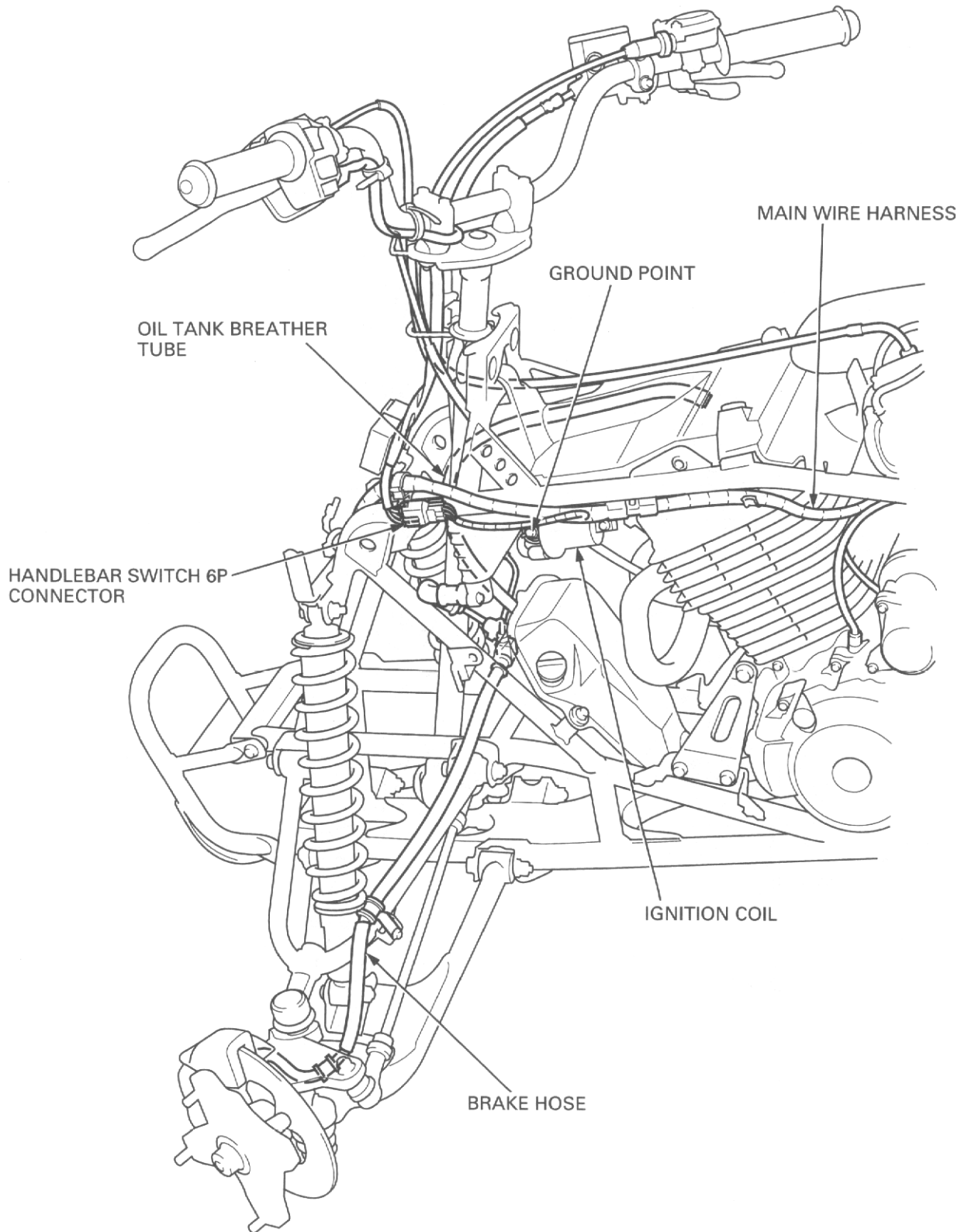


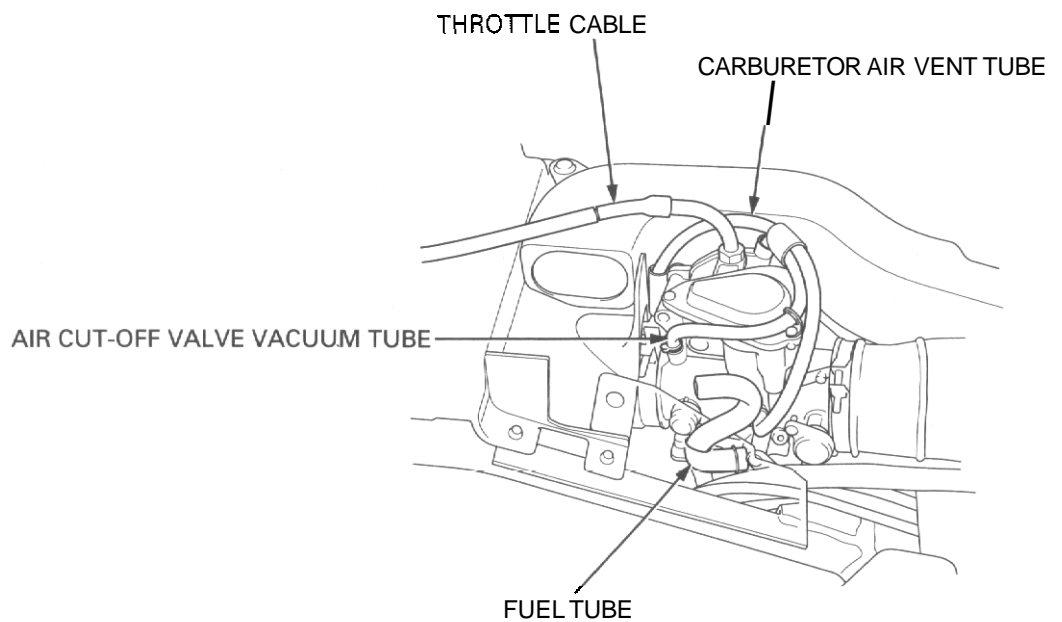
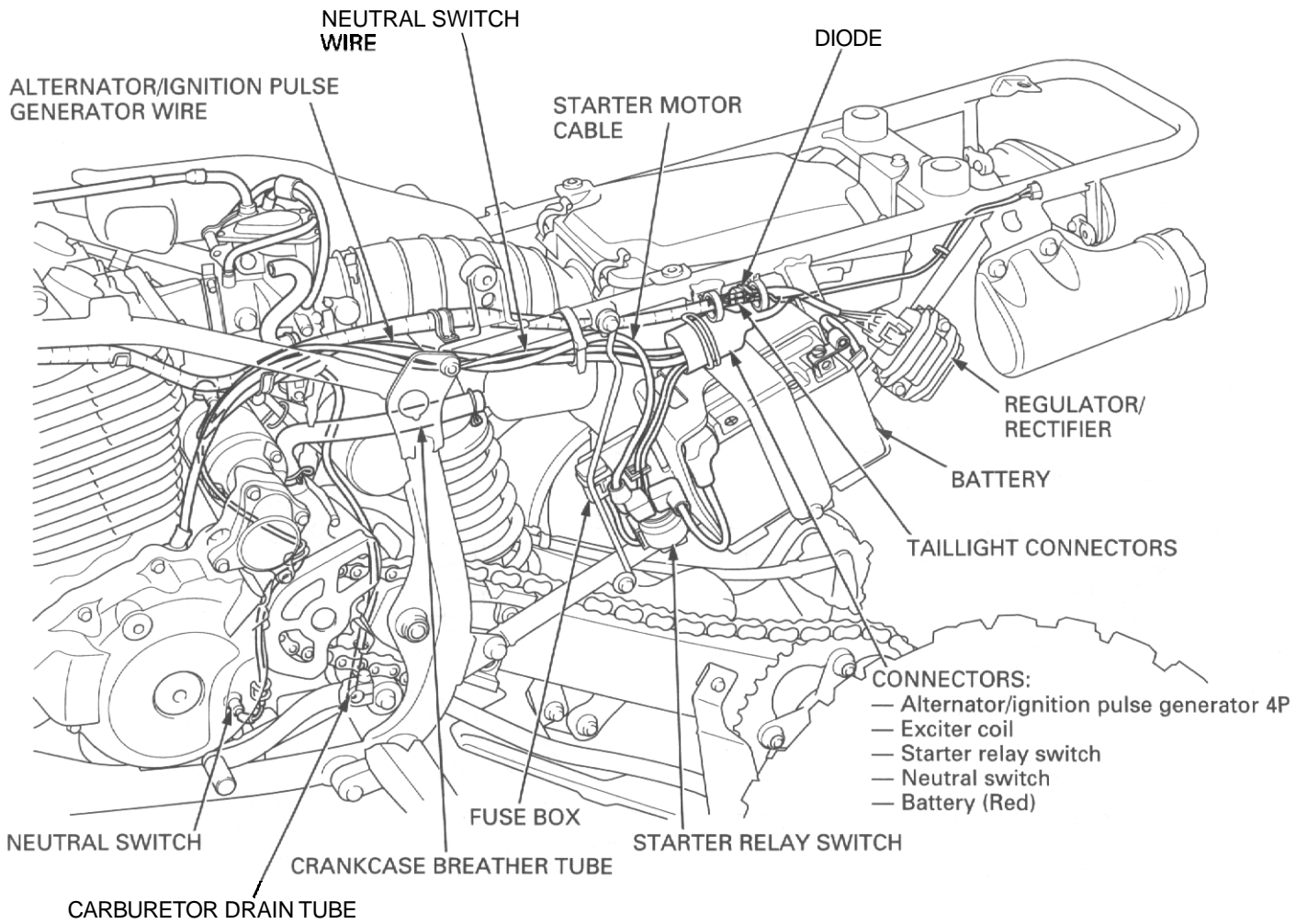


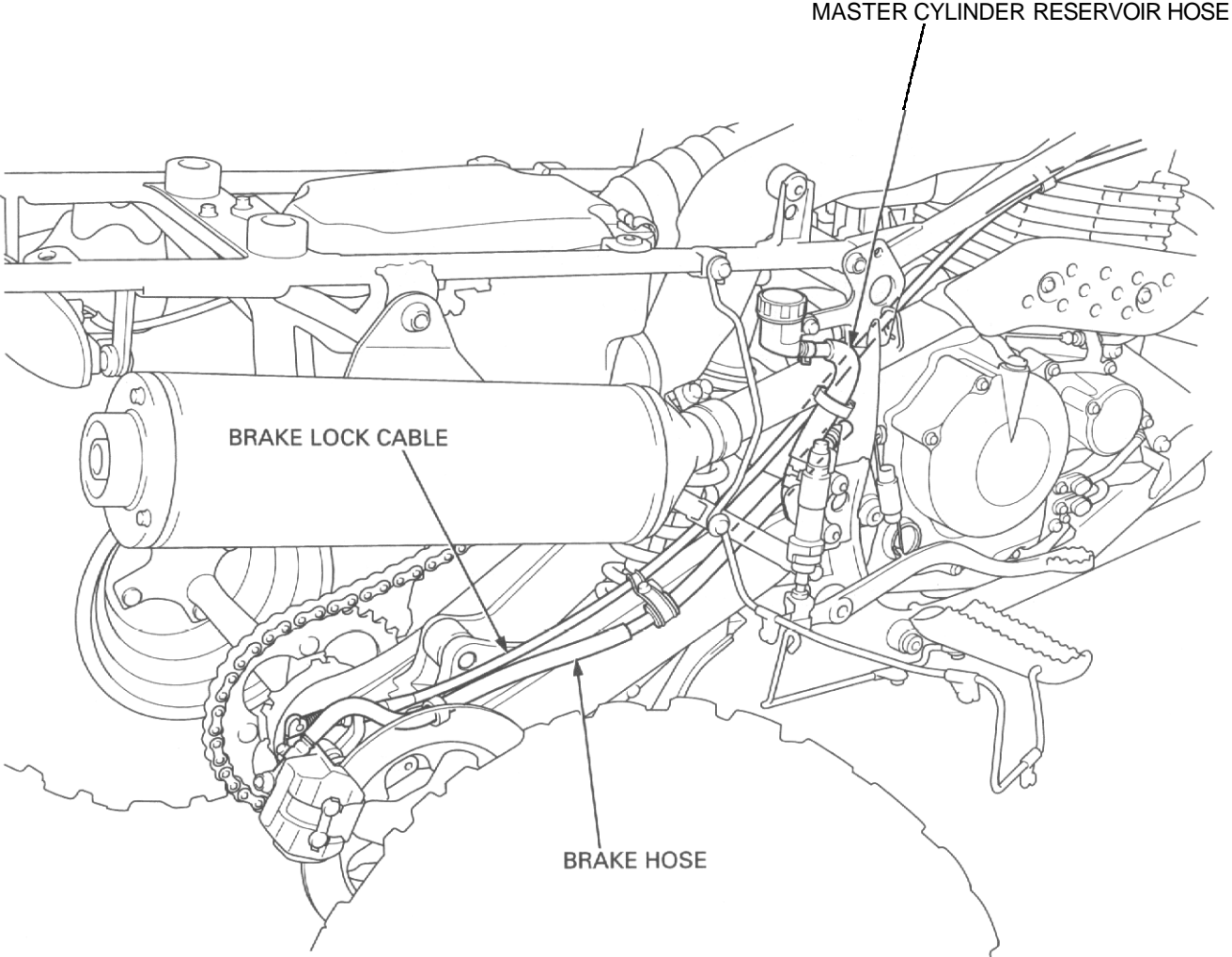


**GENERAL INFORMATION**

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## EMISSION CONTROL SYSTEMS

The California Air Resources Board (CARB) requires manufacturers to certify that their ATVs comply with applicable exhaust emissions standards during their useful life, when operated and maintained according to the instructions provided.

### 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.

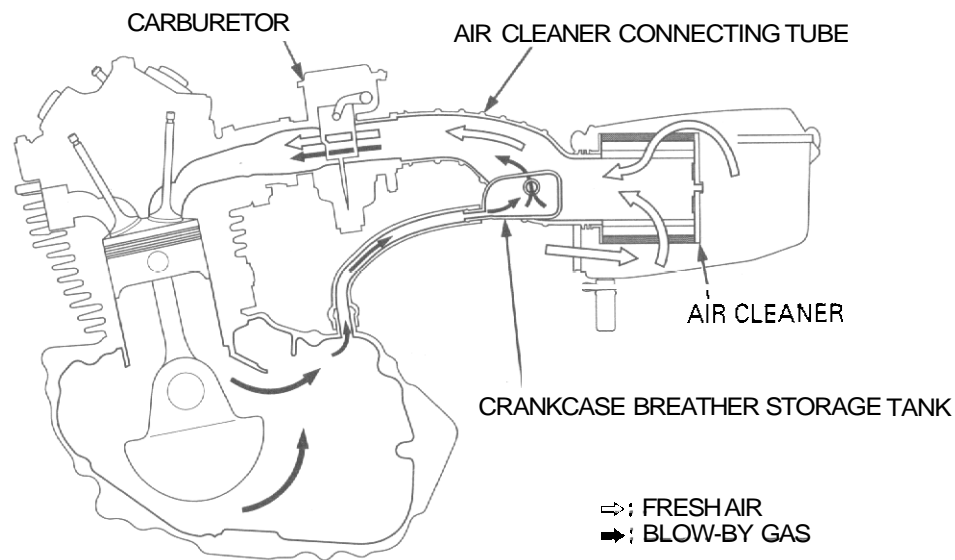
Honda Motor Co., Ltd. utilizes lean carburetor settings as well as other systems, to reduce carbon monoxide and hydrocarbons.

### EXHAUST EMISSION CONTROL SYSTEM

The exhaust emission control system is composed of a lean carburetor setting, and no adjustments should be made except idle speed adjustment with the throttle stop screw. The exhaust emission control system is separate from the crankcase emission control system.

### 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.



### NOISE EMISSION CONTROL SYSTEM

**TAMPERING WITH THE NOISE CONTROL SYSTEM IS PROHIBITED.** US. federal law prohibits, or Canadian provincial laws 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.

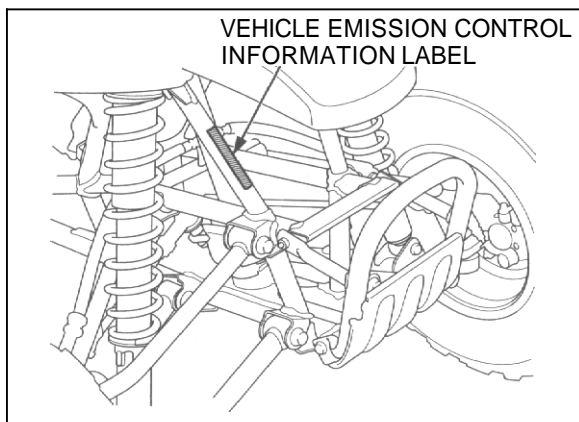
AMONG THOSE ACTS PRESUMED TO CONSTITUTE TAMPERING ARE THE ACTS LISTED BELOW

1. Removal of or puncturing of the muffler, baffles, header pipes or any other component which conducts 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.

## GENERAL INFORMATION

### EMISSION CONTROL INFORMATION LABEL

The Vehicle Emission Control Information Label is attached on the right side frame down tube.



# 2. FRAME/BODY PANELS/EXHAUST SYSTEM

SERVICE INFORMATION	2-1	FUEL TANK & HEAT PROTECTOR	2-4
TROUBLESHOOTING	2-1	FOOTPEG/MUD GUARD	2-5
SEAT/REAR FENDER	2-2	SKID PLATE	2-5
FRONT FENDER	2-2	EXHAUST SYSTEM	2-6
SIDE COVER	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 gaskets when removing the exhaust system.
- Always inspect the exhaust system for leaks after installation.
- Refer to section 18 for light and switch information.

### TORQUE VALUES

Footpeg bracket bolt	42 N·m (4.3 kgf·m, 31 lbf·ft)
Skid plate bolt (8 mm)	30 N·m (3.1 kgf·m, 22 lbf·ft)
Muffler mounting bolt	32 N·m (3.3 kgf·m, 24 lbf·ft)
Muffler band bolt	23 N·m (2.3 kgf·m, 17 lbf·ft)
Exhaust pipe protector bolt	20 N·m (2.0 kgf·m, 14 lbf·ft)

## TROUBLESHOOTING

#### **Excessive exhaust noise**

- Broken exhaust system
- Exhaust gas leaks

#### **Poor performance**

- Deformed exhaust system
- Exhaust gas leaks
- Clogged muffler



## SEAT/REAR FENDER

### CAUTION:

*The rear fender may be deformed if it contacts the muffler while the exhaust system is hot.*

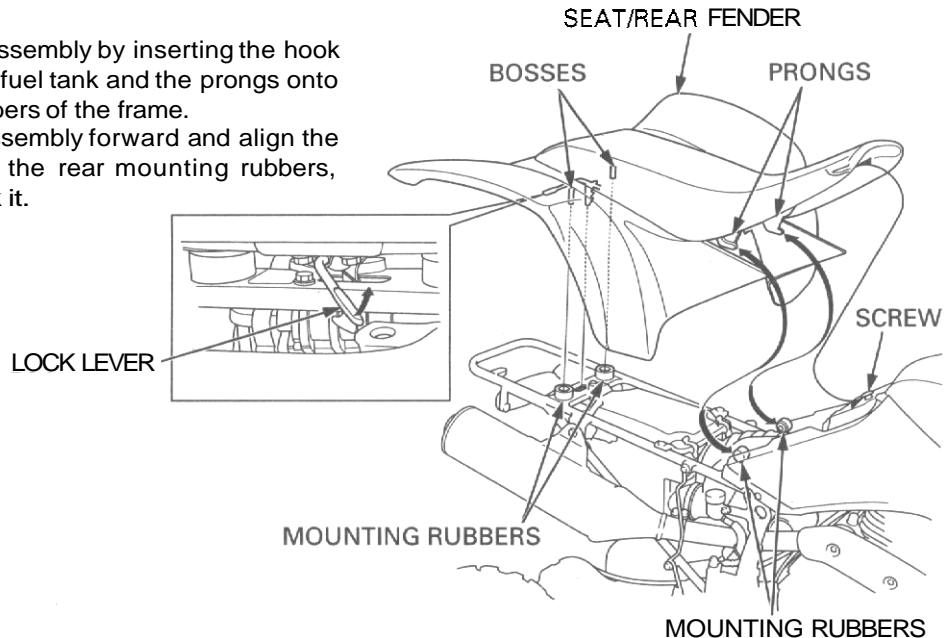
### REMOVAL

Unlock the seat by turning the lock lever upward.  
Raise the seat/fender assembly up and remove it.

*Do not allow the assembly to contact the muffler when the exhaust system is hot.*

### INSTALLATION

Install the seat/fender assembly by inserting the hook between the screw and fuel tank and the prongs onto the front mounting rubbers of the frame. Push the seat/fender assembly forward and align the mounting bosses with the rear mounting rubbers, then press down to lock it.



## FRONT FENDER

### ⚠ WARNING

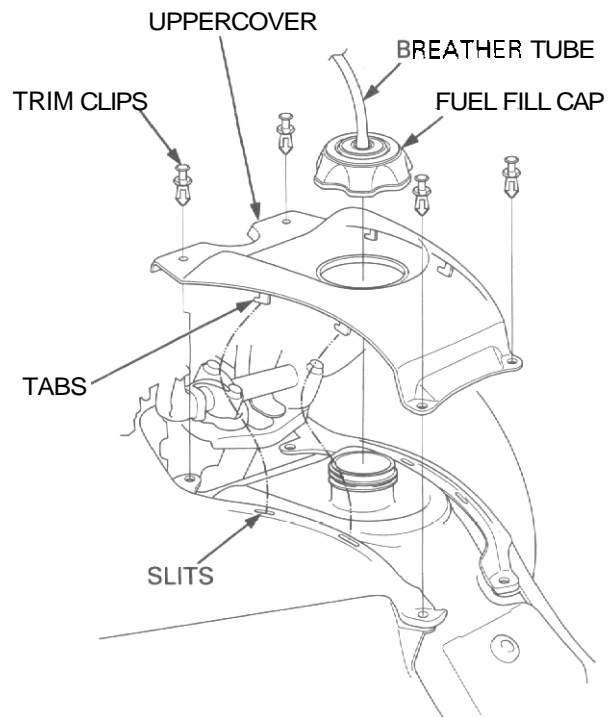
*Gasoline is extremely flammable and is explosive under certain conditions. KEEP OUT OF REACH OF CHILDREN.*

### REMOVAL/INSTALLATION

Remove the seat/rear fender assembly.

Release the four trim clips by raising the center pin and remove them.

Remove the breather tube and fuel fill cap.  
Release the four tabs from the slits in the fender while sliding the fuel tank upper cover rearward and remove it.  
Install the fuel fill cap.

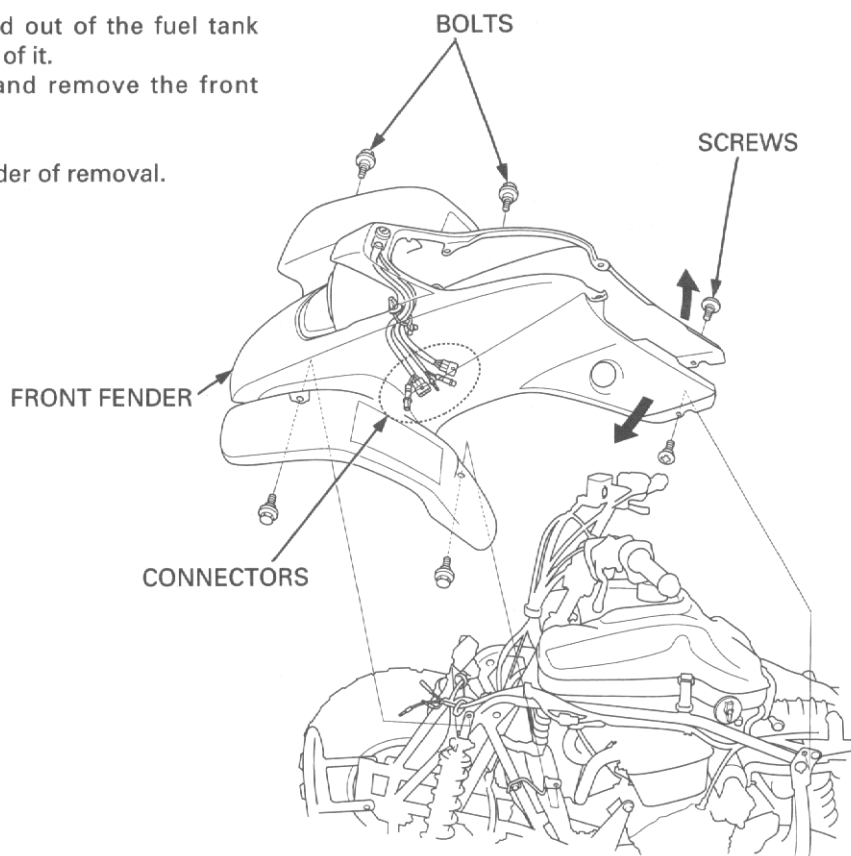


Remove the four bolts and two screws.

Slide the front fender forward out of the fuel tank while opening the rear portion of it. Disconnect the connectors and remove the front fender.

*When installing the trim clips, carefully align the clip holes to avoid damaging the clip.*

Installation is in the reverse order of removal.



## **SIDE COVER**

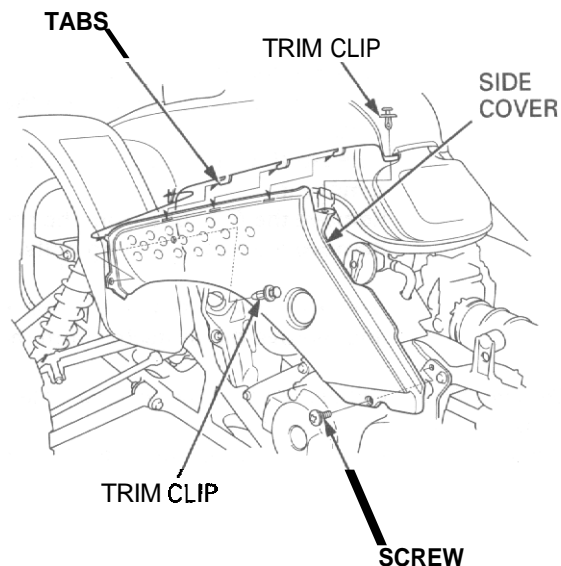
### **REMOVAL/INSTALLATION**

Remove the seat/rear fender (page 2-2).

Remove the screw and two trim clips. Release the side cover from the three tabs of the front fender by sliding it forward and remove the side cover.

*When installing the trim clips, carefully align the clip holes to avoid damaging the clip.*

Installation is in the reverse order of removal.



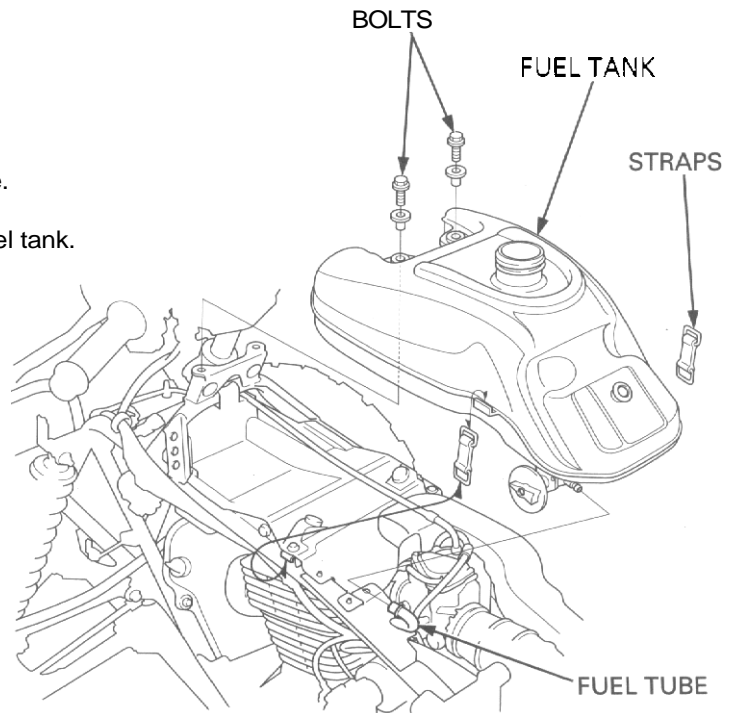
## FUEL TANK & HEAT PROTECTOR

### REMOVAL/INSTALLATION

Remove the front fender (page 2-2).

#### FUEL TANK

Turn the fuel valve OFF.  
Disconnect the fuel tube from the fuel valve.  
Unhook the mounting straps.  
Remove the two mounting bolts and the fuel tank.



#### TANK UNDER HEAT PROTECTOR

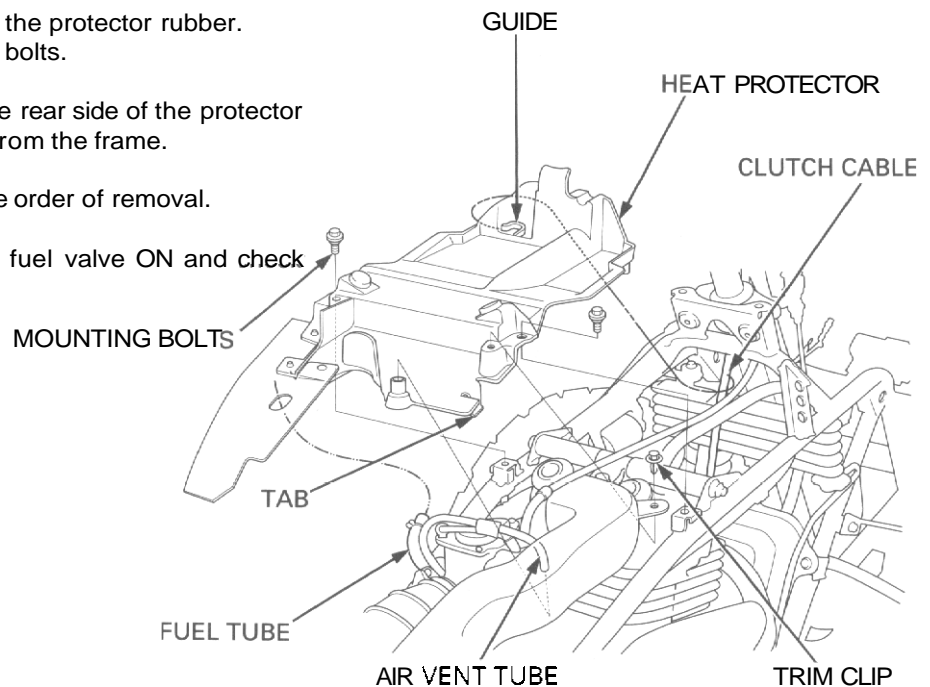
Remove the carburetor air vent tube from the tube holder in the heat protector.  
Remove the clutch cable from the cable guide on the protector.  
Release the trim clip by raising the center pin and remove it.  
Remove the fuel tube from the protector rubber.  
Remove the two mounting bolts.

Release the two tabs on the rear side of the protector and remove the protector from the frame.

Installation is in the reverse order of removal.

After installation, turn the fuel valve ON and check the fuel line for leakage.

*When installing the trim clip, carefully align the clip holes to avoid damaging the clip.*



## FOOTPEG/MUD GUARD

### REMOVAL/INSTALLATION

Remove the five screws, nut and the mud guard.

Remove the washer bolt from the footpeg bottom and the inner mud guard stay.

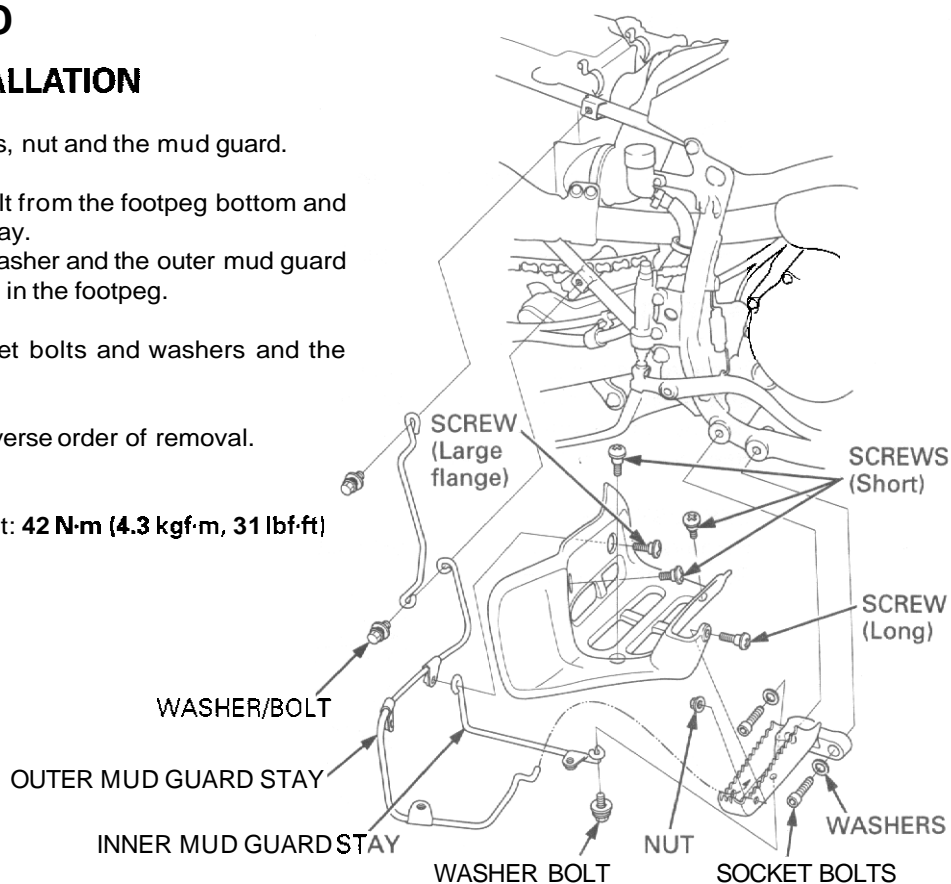
Remove the bolt and washer and the outer mud guard stay from the stay hole in the footpeg.

Remove the two socket bolts and washers and the footpeg.

Installation is in the reverse order of removal.

### TORQUE

Footpeg bracket bolt: **42 N·m (4.3 kgf·m, 31 lbf·ft)**



## SKID PLATE

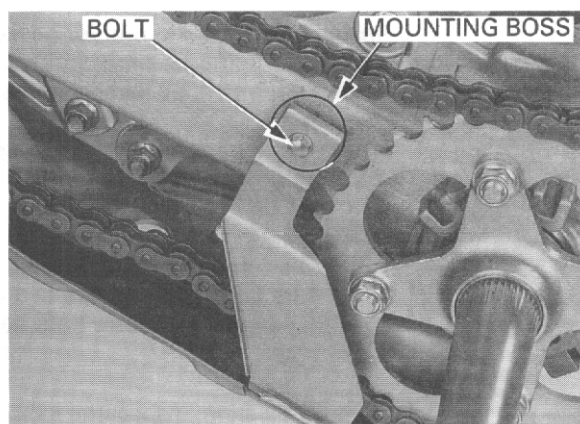
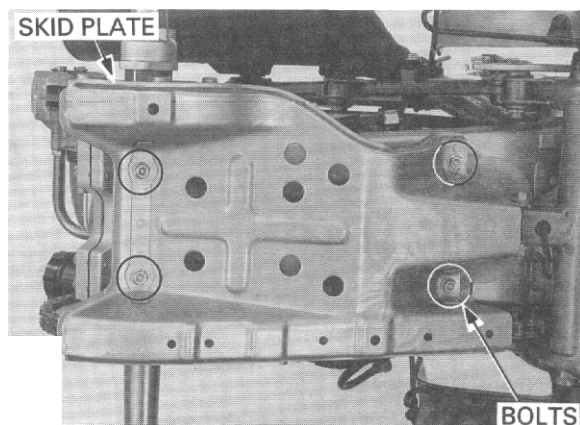
### REMOVAL

Remove the five bolts and the skid plate from the swingarm.

### INSTALLATION

Hook the chain guard of the skid plate onto the mounting boss on the swingarm, install the 6 mm bolt and new four 8 mm bolts and tighten them.

TORQUE 8 mm bolt: **30 N·m (3.1 kgf·m, 22 lbf·ft)**



## EXHAUST SYSTEM

### REMOVAL

**⚠ WARNING**

Do not service the exhaust system while it is hot.

Remove the seat/rear fender (page 2-2).

#### MUFFLER

Loosen the muffler band bolts.

Remove the upper and lower muffler mounting bolts and washers (between the muffler and frame).

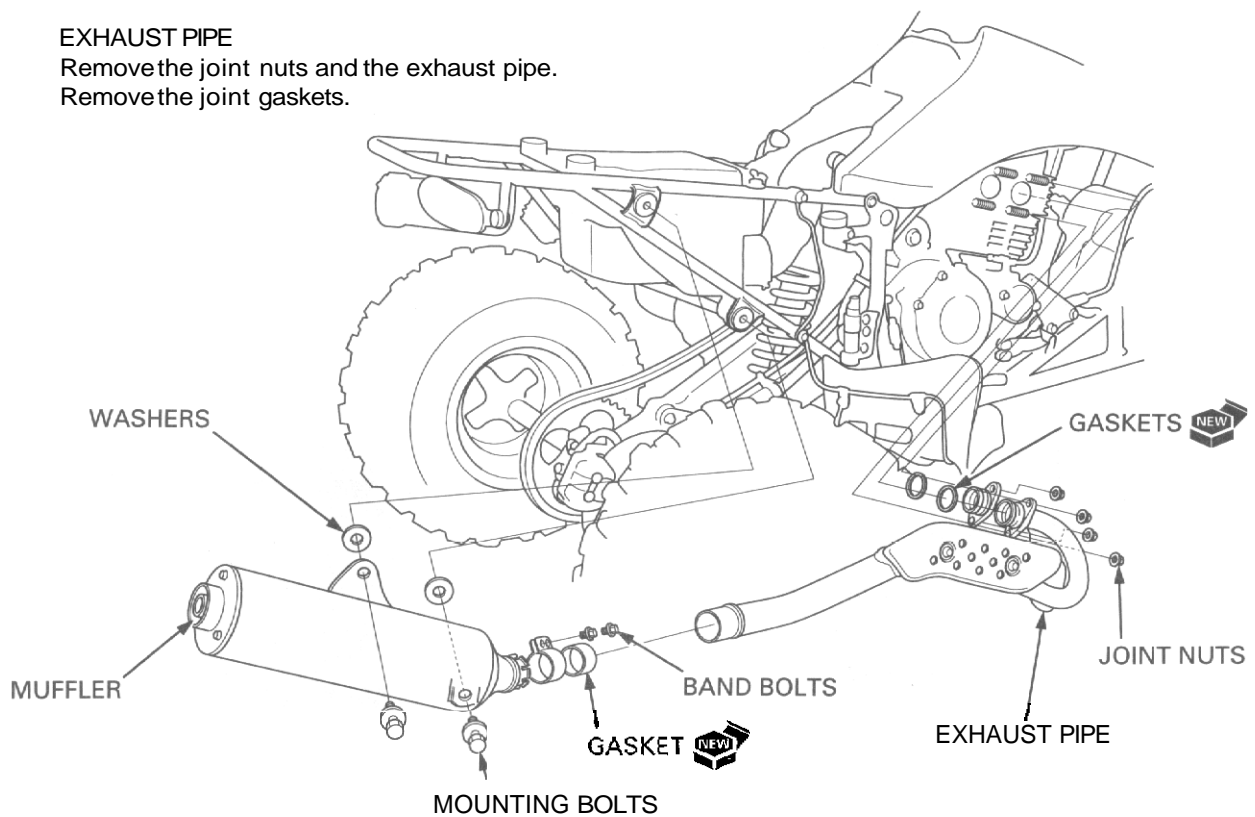
Remove the muffler.

Remove the muffler gasket.

#### EXHAUST PIPE

Remove the joint nuts and the exhaust pipe.

Remove the joint gaskets.



### INSTALLATION

*Set the exhaust pipe flange as shown.*

Install new joint and muffler gaskets. Install the exhaust pipe and muffler in the reverse order of removal by loosely tightening all fasteners.

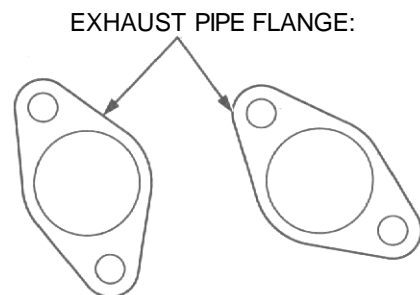
Tighten the joint nut first, then tighten the mounting bolts and the band bolts.

#### TORQUE:

Muffler mounting bolt: **32 N·m (3.3 kgf·m, 24 lbf·ft)**

Muffler band bolt: **23 N·m (2.3 kgf·m, 17 lbf·ft)**

Exhaust pipe protector bolt: **20 N·m (2.0 kgf·m, 14 lbf·ft)**



View from front side:

After installation, inspect the exhaust system for leaks.

# 3. MAINTENANCE

SERVICE INFORMATION	3-1	DRIVE CHAIN SLIDER	3-14
MAINTENANCE SCHEDULE	3-3	BRAKE FLUID	3-14
FUEL LINE	3-4	BRAKE PADS WEAR	3-15
THROTTLE OPERATION	3-4	BRAKE SYSTEM	3-15
AIR CLEANER	3-5	SKID PLATE AND ENGINE GUARD	3-17
AIR CLEANER HOUSING DRAIN TUBE	3-6	CLUTCH SYSTEM	3-17
SPARK PLUG	3-6	SUSPENSION	3-18
VALVE CLEARANCE	3-7	SPARK ARRESTER	3-19
ENGINE OIL	3-9	NUTS, BOLTS, FASTENERS	3-19
ENGINE OIL FILTER	3-11	WHEELS/TIRES	3-19
ENGINE OIL STRAINER SCREEN IN OIL TANK	3-12	STEERING SHAFT HOLDER BEARING	3-20
ENGINE IDLE SPEED	3-12	STEERING SYSTEM	3-20
DRIVE CHAIN	3-13		

## SERVICE INFORMATION

### GENERAL

**⚠ WARNING**

*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 lead to death. Run the engine in an open area or with an exhaust evacuation system in an enclosed area.*

### SPECIFICATIONS

ITEM		SPECIFICATIONS
Throttle lever free play		3 – 8 mm (1/8 – 5/16 in)
Spark plug	Standard	DPR8Z (NGK), X24GPR-U (DENSO)
	For extended high speed riding	DPR9Z (NGK), X27GPR-U (DENSO)
Spark plug gap		0.6 – 0.7 mm (0.024 – 0.028 in)
Valve clearance	Intake	0.10 mm (0.004 in)
	Exhaust	0.12 mm (0.005 in)
Recommended engine oil		Honda GN4 or HP4 4-stroke oil or equivalent motor oil  Viscosity: SAE <b>10W-40</b> or 20W-50
Engine oil capacity	After draining	1.8 liters (1.9 US qt, 1.6 Imp qt)
	After draining/filter change	1.85 liters (1.95 US qt, 1.63 Imp qt)
	After disassembly	2.2 liters (2.3 US qt, 1.9 Imp qt)
Engine idle speed		1,400 ± 100 rpm

Drive chain slack		30 – 40 mm (1-1/4 – 1-5/8 in)
Recommended brake fluid		DOT 4 brake fluid
Clutch lever free play		10 – 20 mm (3/8 – 3/4 in)
Cold tire pressure (Front/Rear)	Standard	27 kPa (0.275 kgf/cm <sup>2</sup> , 4.0 psi)
	Minimum	23 kPa (0.235 kgf/cm <sup>2</sup> , 3.4 psi)
	Maximum	31 kPa (0.315 kgf/cm <sup>2</sup> , 4.6 psi)
Tire size	Front	AT22 x 7-10 ★★
	Rear	AT20 x 10-9 ★★
Tire brand (Ohtsu)	Front	M/R 101
	Rear	M/R 501
Minimum tread depth (Front/Rear)		4.0 mm (0.16 in)
Toe		Toe-in: 17 ± 15mm (0.7 ± 0.6 in)

## TORQUE VALUES

Spark plug	18 N·m (1.8 kgf·m, 13 lbf·ft)
Valve adjusting hole cap	15 N·m (1.5 kgf·m, 11 lbf·ft)
Valve adjusting lock nut	24 N·m (2.4 kgf·m, 17 lbf·ft)
Crankshaft hole cap	8 N·m (0.8 kgf·m, 5.8 lbf·ft)
Timing hole cap	10 N·m (1.0 kgf·m, 7 lbf·ft)
Engine oil drain bolt (crankcase)	25 N·m (2.5 kgf·m, 18 lbf·ft)
Engine oil drain bolt (oil tank)	20 N·m (2.0 kgf·m, 14 lbf·ft)
Engine oil strainer screen (at oil tank)	54 N·m (5.5 kgf·m, 40 lbf·ft)
Oil pipe joint flare nut	20 N·m (2.0 kgf·m, 14 lbf·ft)
Axle bearing holder pinch bolt	21 N·m (2.1 kgf·m, 15 lbf·ft)
Front master cylinder reservoir cap screw	2 N·m (0.2 kgf·m, 1.4 lbf·ft)
Parking brake arm lock nut	18 N·m (1.8 kgf·m, 13 lbf·ft)
Rear master cylinder push rod lock nut	18 N·m (1.8 kgf·m, 13 lbf·ft)
Tie-rod lock nut	54 N·m (5.5 kgf·m, 40 lbf·ft)

# 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

ITEMS	FREQUENCY	WHICHEVER COMES FIRST ⇓	REGULAR MAINTENANCE INTERVAL			Refer to page	
			INITIAL MAINTENANCE	REGULAR MAINTENANCE INTERVAL			
			mi	600	1,200		
			km	1,000	2,000		
NOTE	HOURS	20	100	200			
EMISSION RELATED ITEMS	* FUEL LINE				I	3-4	
	* THROTTLE OPERATION				I	3-4	
	AIR CLEANER	NOTE 1			C	3-5	
	AIR CLEANER HOUSING DRAIN TUBE	NOTE 2			I	3-6	
	SPARK PLUG				I	3-6	
	* VALVE CLEARANCE				I	3-7	
	ENGINE OIL				R	3-9	
	ENGINE OIL FILTER				R	3-11	
	* ENGINE OIL STRAINER SCREEN IN OIL TANK				C	3-12	
	* ENGINE IDLE SPEED				I	3-12	
NON-EMISSION RELATED ITEMS	DRIVE CHAIN	NOTE 1, 2		I, L	I, L: Every 300 mi (500 km) or 50 operating hours		3-13
	DRIVE CHAIN SLIDER				I	I	3-14
	* BRAKE FLUID	NOTE 3			I	I	3-14
	* BRAKE PADS WEAR	NOTE 1,2				I	3-15
	BRAKE SYSTEM				I	I	3-15
	SKID PLATE, ENGINE GUARD				I	I	3-17
	* CLUTCH SYSTEM				I	I	3-17
	* SUSPENSION				I	I	3-18
	* SPARK ARRESTER				C	C	3-19
	* NUTS, BOLTS, FASTENERS				I	I	3-19
	** WHEELS/TIRES				I	I	3-19
	** STEERING SHAFT HOLDER BEARING					I	3-20
	** STEERING SYSTEM					I	3-20

\* ! Should be serviced by your 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 Honda dealer.

NOTES 1. Service more frequently if the ATV is ridden in dusty areas, sand or snow.

2. Service more frequently if the ATV is ridden in very wet or muddy conditions.

3. Replace every 2 years. Replacement requires mechanical skill.



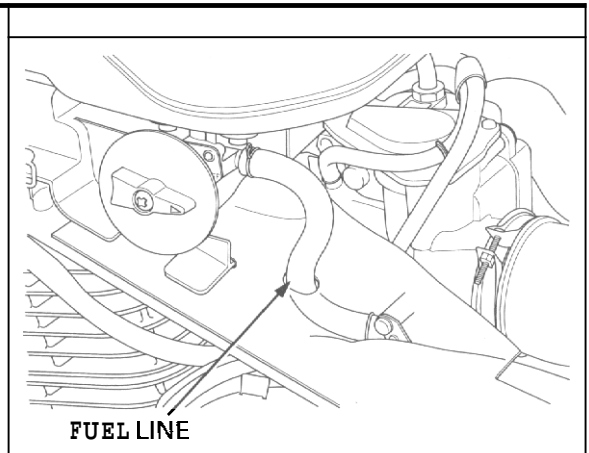
## MAINTENANCE

### FUEL LINE

Remove the front fender (page 2-2).

Check the fuel line for deterioration, damage or leakage.

Replace the fuel line if necessary.



### THROTTLE OPERATION

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

If the throttle lever does not return properly, lubricate the throttle cable and overhaul and lubricate the throttle housing.

For cable lubrication: Disconnect the throttle cable at its upper end. Thoroughly lubricate the cable and its pivot point with a commercially available cable lubricant or a light weight oil.

If the throttle lever still does not return properly, replace the throttle cable.

#### ⚠ 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 lever free play and the throttle cable connection.

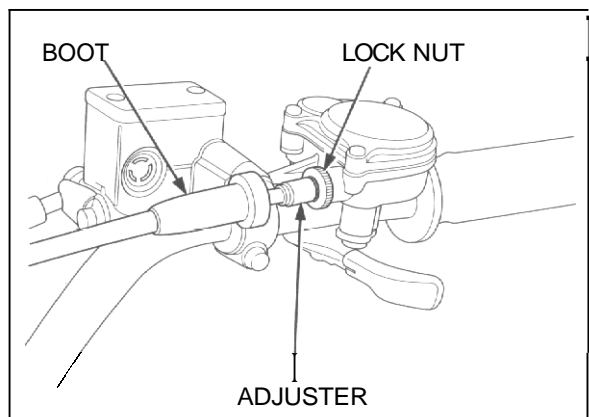
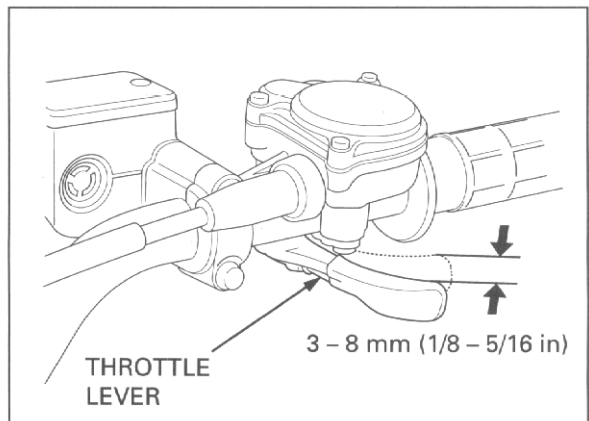
Measure the throttle lever free play at the tip of the throttle lever.

**THROTTLE LEVER FREE PLAY: 3 - 8 mm**  
118 - 5/16 in)

Throttle lever free play can be adjusted at upper end of the throttle cable.

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

Install the rubber boot securely.



# AIR CLEANER

**NOTE:**

If the vehicle is used in dusty areas, sand or snow, more frequent inspections are required.

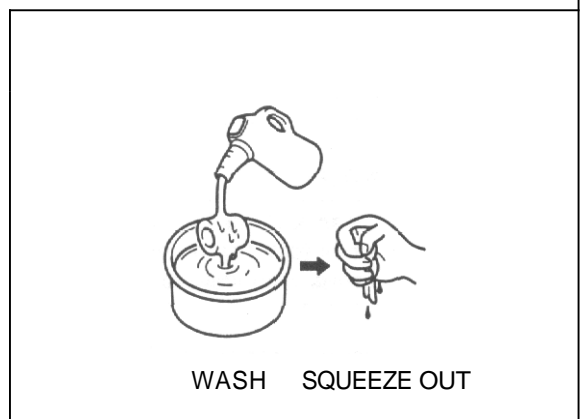
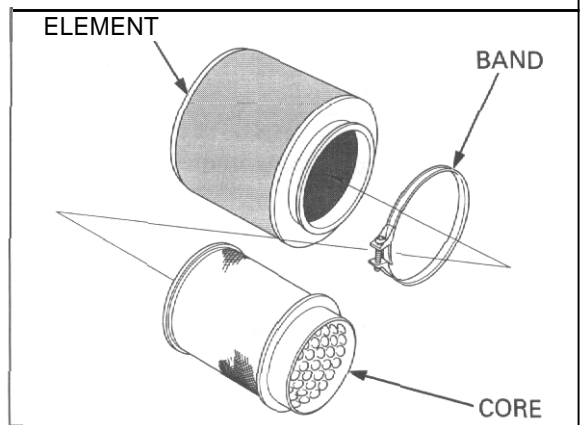
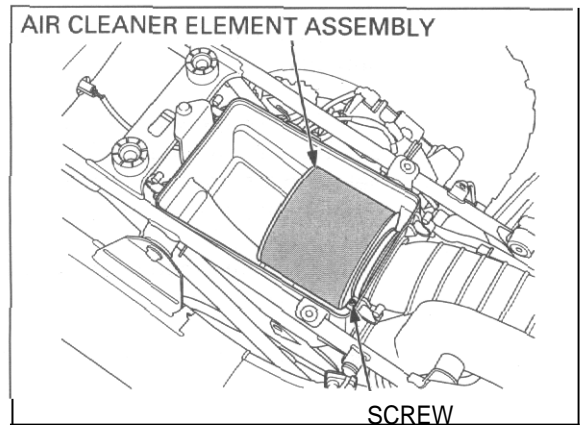
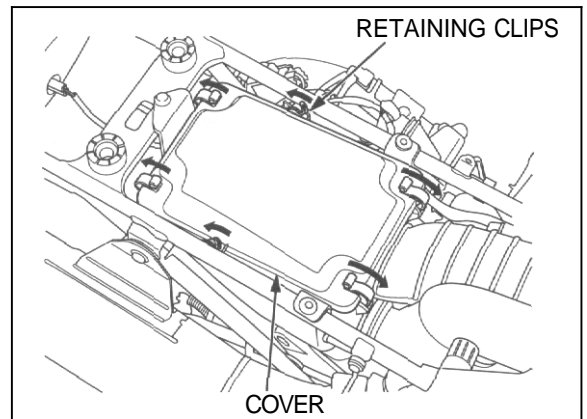
Remove the seat/rear fender assembly (page 2-2).

Release the six retaining clips from the air cleaner housing cover and remove the cover.

Loosen the air cleaner element band screw. Remove the air cleaner element assembly from the housing.

Remove the element band and the element core from the air cleaner element.

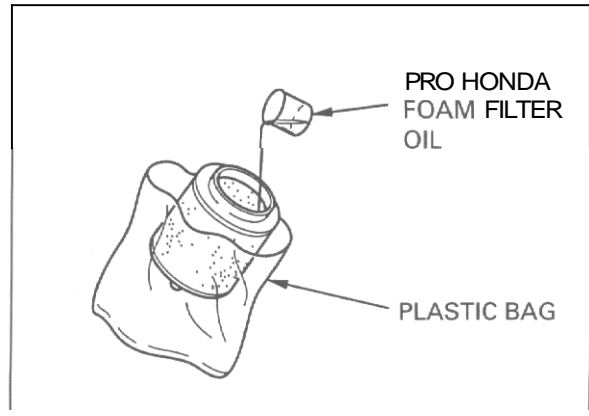
Wash the element in non-flammable or high flash point solvent such as kerosene. Squeeze out the solvent thoroughly, and allow the element to dry.



## MAINTENANCE

Apply approximately 20 g (0.7 oz) of Pro Honda Foam Filter Oil or equivalent oil from the inside of the element.

Place the element into a plastic bag and spread the oil evenly by hand.

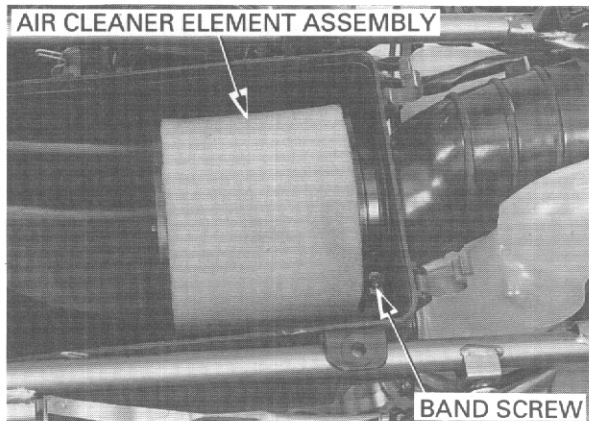


Install the element core into the air cleaner element properly.

Install the element band onto the air cleaner element and the element assembly over the connecting tube flange in the housing securely. Tighten the band screw.

Install the air cleaner housing cover and secure it with the retaining clips.

Install the **seat/rear** fender assembly (page 2-2).



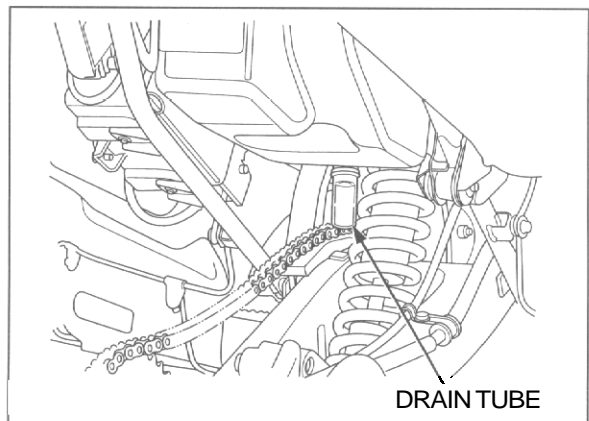
## AIR CLEANER HOUSING DRAIN TUBE

### NOTE:

If the vehicle is used in very wet or muddy conditions, more frequent inspections are required.

Remove the drain tube from bottom of the air cleaner housing to empty any deposits.

Install the drain tube securely.



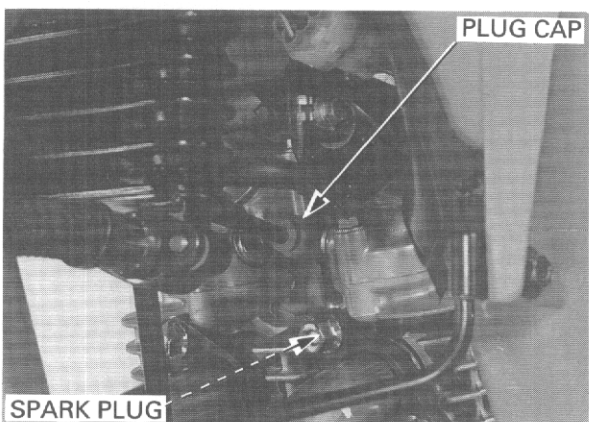
## SPARK PLUG

Disconnect the spark plug cap and clean around the spark plug base.

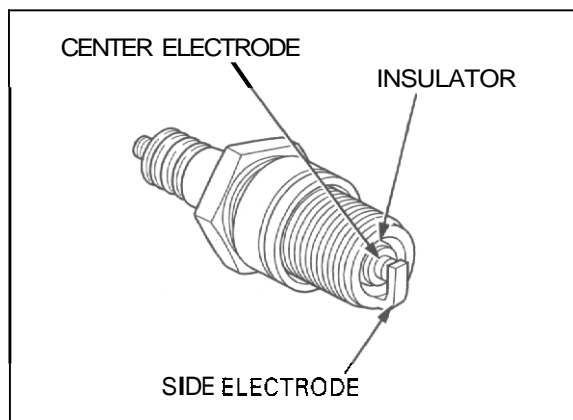
### NOTE:

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

Remove the spark plug.



Check the insulator for cracks or damage, and the electrodes for wear, fouling or discoloration. Replace the plug if necessary (recommended spark plug: page 3-1).



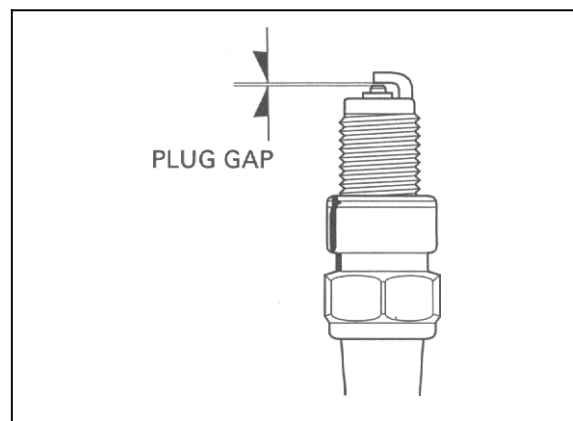
Clean the spark plug electrodes with a wire type brush or special plug cleaner.

Check the gap between the center and side electrodes with a wire-type feeler gauge. If necessary, adjust the gap by bending the side electrode carefully.

**SPARK PLUG GAP 0.6- 0.7 mm (0.024- 0.028in)**

**CAUTION:**

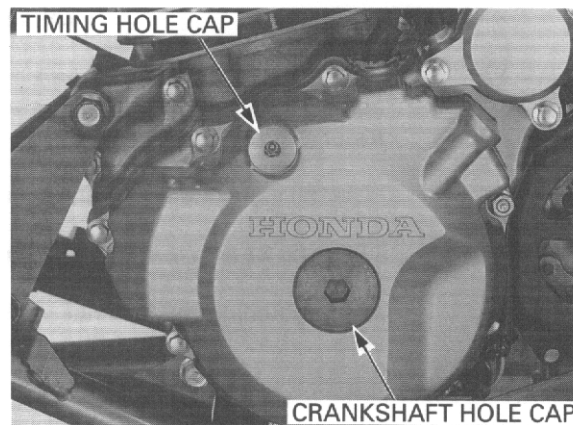
*To prevent damage to the cylinder head, hand-tighten the spark plug before using a wrench to tighten to the specified torque.*



Reinstall the spark plug in the cylinder head and hand tighten, then torque to specification.

**TORQUE 18N·m (1.8 kgf·m, 13 lbf·ft)**

Connect the spark plug cap.



## VALVE CLEARANCE

**NOTE:**

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

Remove the following:

- fuel tank and heat protector (page 2-4)
- timing hole cap and crankshaft hole cap
- valve adjusting hole caps.



Rotate the crankshaft only counterclockwise to align the T mark on the flywheel with the index notch in the left crankcase cover.

Make sure the piston is TDC (Top Dead Center) on the compression stroke.

This position can be obtained by confirming that there is slack in the sub-rocker arm. If there is no slack, it is because the piston is moving through the exhaust stroke to TDC. Rotate the crankshaft one full turn counterclockwise and match up the T mark again.

**CAUTION:**

*If the T mark is passed when trying to align it with the index notch, rotate the crankshaft counterclockwise again and align the T mark with the index notch. This must be done to prevent the one-way decompressor system from functioning and to obtain the correct valve clearance.*

Check the clearance of all valves by inserting a feeler gauge between the adjusting screw and sub-rocker arm.

**NOTE:**

When checking the clearance, slide the feeler gauge from the inside out in the direction of the arrow.

VALVE CLEARANCES IN: **0.10 mm (0.004 in)**  
EX **0.12 mm (0.005 in)**

Adjust by loosening the lock nut and turning the adjusting screw until there is a slight drag on the feeler gauge.

**Hold** the adjusting screw and tighten the lock nut.

**TORQUE 24 N·m (2.4 kgf·m, 17 lbf·ft)**

After tightening the lock nut, recheck the valve clearance.

Coat new O-rings and install them into the grooves in the adjusting hole caps.  
Install the adjusting hole caps and tighten them.

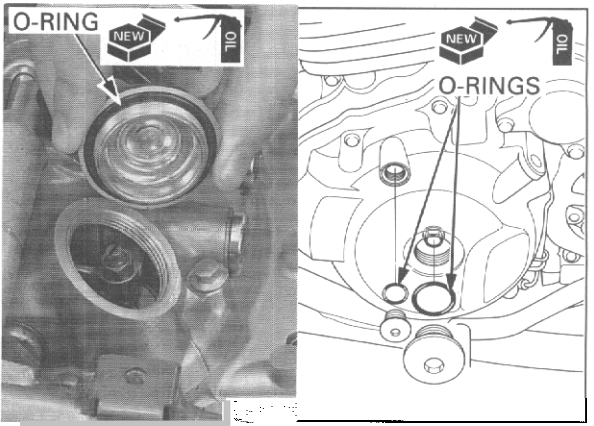
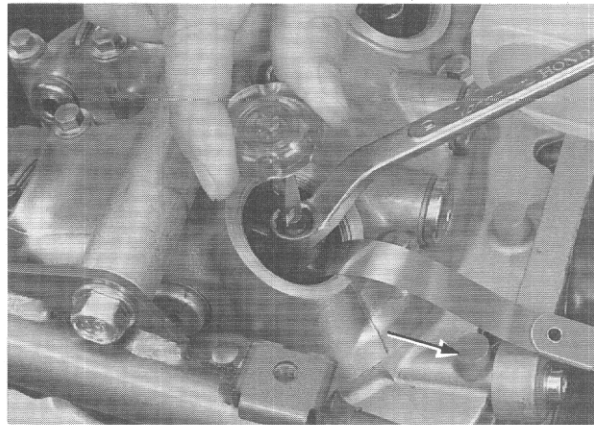
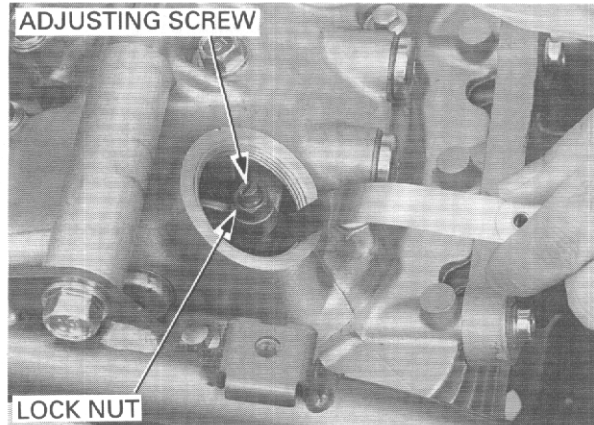
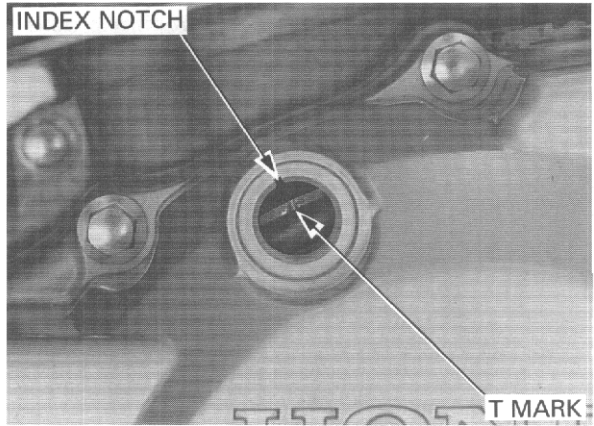
**TORQUE: 15 N·m (1.5 kgf·m, 11 lbf·ft)**

Coat new O-rings and install them onto the crankshaft hole cap and timing hole cap.  
Install the caps and tighten them.

**TORQUE:**

Crankshaft hole cap: **8 N·m (0.8 kgf·m, 5.8 lbf·ft)**  
Timing hole cap: **10 N·m (1.0 kgf·m, 7 lbf·ft)**

Install the heat protector and fuel tank (page 2-4).



## ENGINE OIL

**▲ WARNING**

Engine and exhaust system parts become very hot and remain hot for some time after the engine is run. Wear insulated gloves.

### LEVEL CHECK

NOTE:

- Check the oil level after starting the engine and allowing the oil to circulate through the engine thoroughly. It is especially important on dry sump engine, due to the comparatively large volume of oil.
- Do not snap the throttle while idling or the oil level reading will be inaccurate.

Place the vehicle on level ground.

Start the engine and let it idle for a 5 minutes. If the air temperature is below 10°C (50°F), let the engine idle for an additional 5 minutes (a total of 10 minutes). Stop the engine.

After a few minutes, remove the oil filler cap/dipstick from the oil tank and wipe it clean.

Check the oil level by inserting the oil filler/dipstick into the oil filler hole without screwing it in.

The engine contains a sufficient amount of oil if the oil level is between the upper and lower level marks on the dipstick.

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

#### RECOMMENDED ENGINE OIL

Honda GN4 or HP4 4-stroke oil or equivalent motor oil

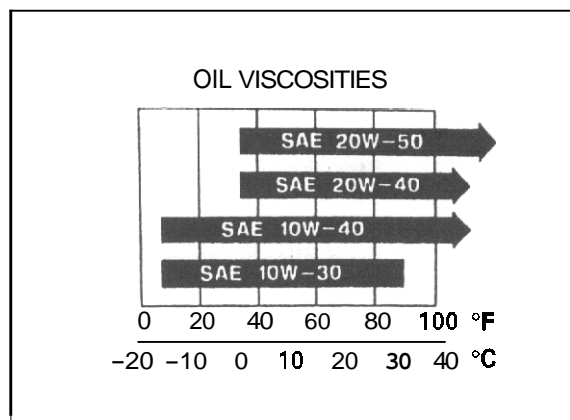
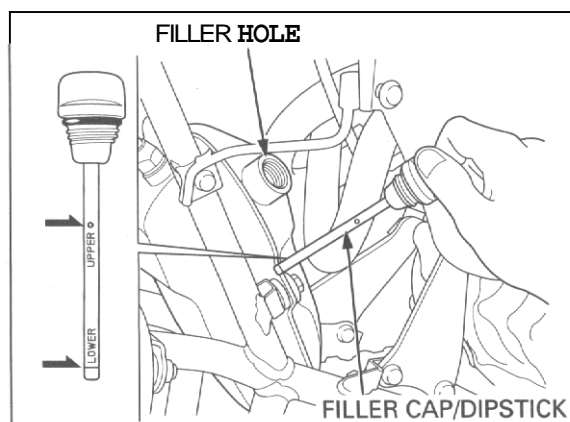
API service classification **SF** or **SG**

Viscosity: SAE **10W-40** or **20W-50**

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/dipstick.



## At **Crankcase** Oil Check Bolt

### NOTE

- The crankcase oil level check bolt is useful when checking the lubrication; the oil pump adjusts the oil level so that the crankcase is always kept at the proper level. If this check shows otherwise, some portion of the lubrication system is not working properly.
- Do not check the oil level immediately after the engine has been operated at high speeds. Make sure that vehicle is on firm level ground while idling. Allow the engine to idle for a few minutes to stabilize the oil levels.

The crankcase oil level is correct if the oil is flush with the bottom of the check bolt hole.

## OIL CHANGE

### 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.***

### NOTE:

Change the oil with the engine warm to assure complete and rapid drainino.

Start the engine and let it idle for few minutes.  
Stop the engine and remove the oil filler cap/dipstick.

Remove the oil tank and crankcase drain bolts with the sealing washers and drain the engine oil.

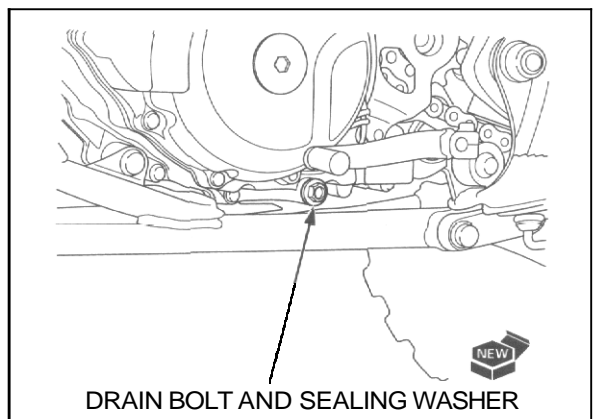
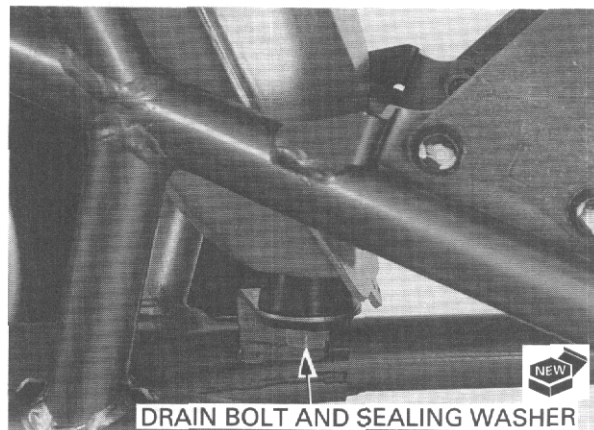
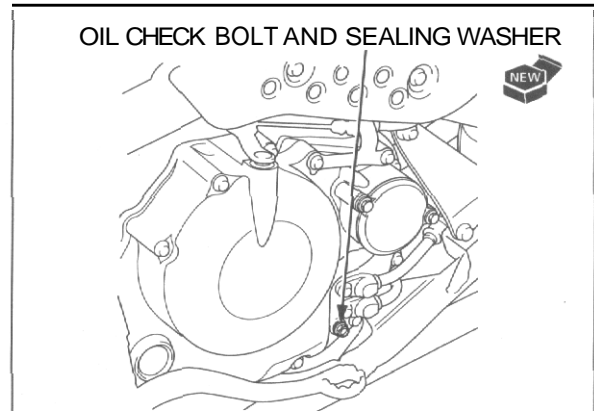
After the oil has drained, install the drain bolts with new sealing washers.

### TORQUE:

**Crankcase drain bolt 25 N·m (2.5 kgf·m, 18 lbf·ft)  
Oil tank drain bolt: 20 N·m (2.0 kgf·m, 14 lbf·ft)**

### NOTE:

- If maintenance is required for the oil tank oil strainer screen, perform the maintenance on the screen before filling the oil tank (page 3-12).
- Pour in the engine oil after replacing the oil filter (page 3-11).



Pour the recommended oil (page 3-9) into the oil tank up to the upper level mark on the dipstick.

**NOTE:**

The engine takes about **1.85 liters (1.95 US qt, 1.63 Imp qt)** at oil and filter change. Because only a portion of that oil is held in the oil tank, you cannot add the full amount initially.

**OIL CAPACITY:**

- 1.8 liters (1.9 US qt, 1.6 Imp qt) at draining
- 1.85 liters (1.95 US qt, 1.63 Imp qt) at draining/filter change
- 2.2 liters (2.3 US qt, 1.9 Imp qt) at disassembly

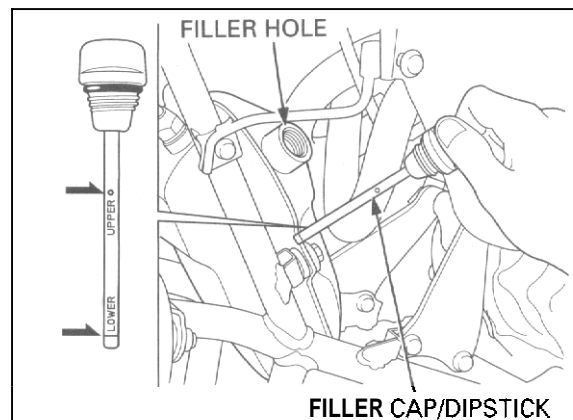
Install the oil filler cap/dipstick.

Place the vehicle on firm level ground.  
Start the engine and let it idle for a few minutes without snapping the throttle.

Stop the engine and add the recommended oil up to the upper level mark on the dipstick.

Install the filler cap/dipstick.  
Start the engine and recheck the oil level (page 3-91).

After replacing, make sure there are no oil leaks.



## ENGINE OIL FILTER

**▲ WARNING**

Engine and exhaust system parts become very hot and remain hot for some time after the engine is run. Wear insulated gloves.

Drain the engine oil (page 3-10).

Remove the following:

- cover bolts
- filter cover with O-ring
- oil filter
- spring.

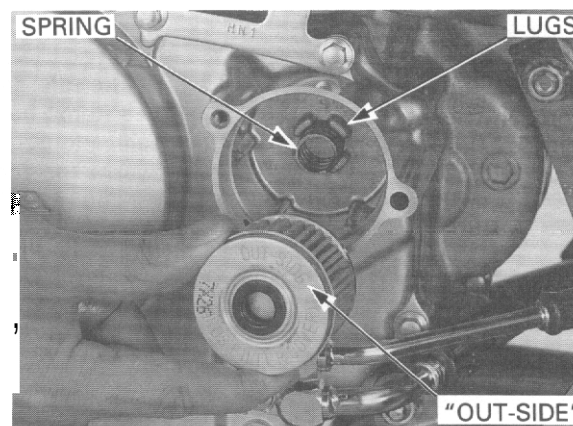
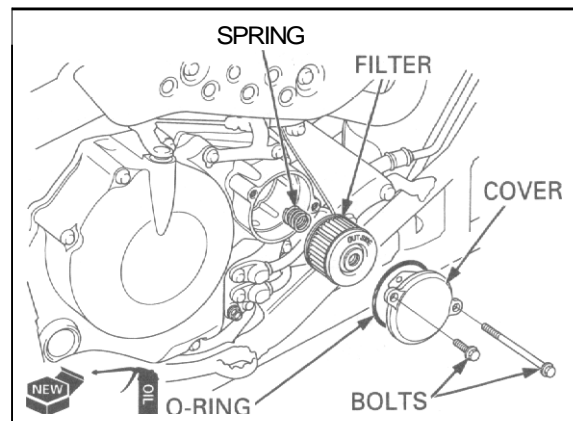
Coat a new O-ring with engine oil and install it in the cover groove.

Install the spring between the lugs and a new oil filter with the “OUT-SIDE” mark facing out, then set the filter cover onto the filter and tighten the bolts securely.

**CAUTION**

**Installing** the oil **filter** backwards **will result in** severe engine damage.

Fill the engine and oil tank with the engine oil.





## ENGINE OIL STRAINER SCREEN IN OIL TANK

**⚠ WARNING**

Engine and exhaust system parts become **very** hot and remain hot for some time after the engine is run. Wear insulated gloves.

Drain the engine oil (page 3-10).

Disconnect the oil pipe from the lower side of the oil tank by loosening the flare nut.

Remove the oil strainer screen.

Wash the strainer screen thoroughly in high flash point solvent until all accumulated dirt has been removed.

Blow the screen dry with compressed air, or leave it in a well ventilated place until the solvent has evaporated.

Before installing the strainer screen, it should be examined closely for damage.

Coat a new O-ring with engine oil and install it onto the oil strainer screen.

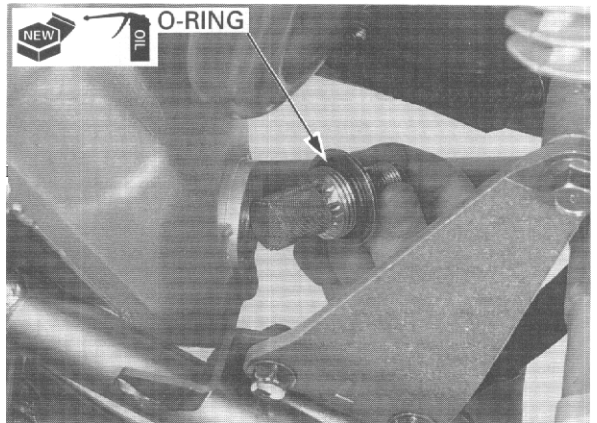
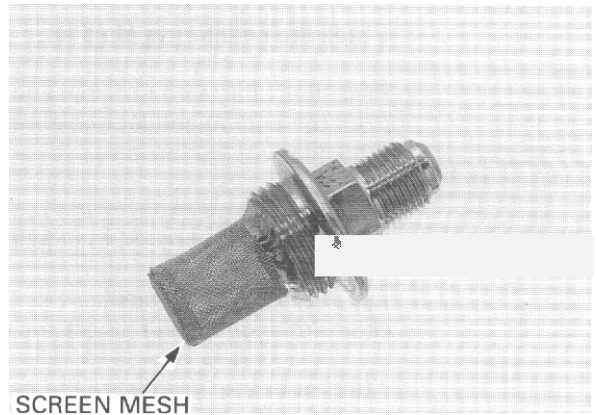
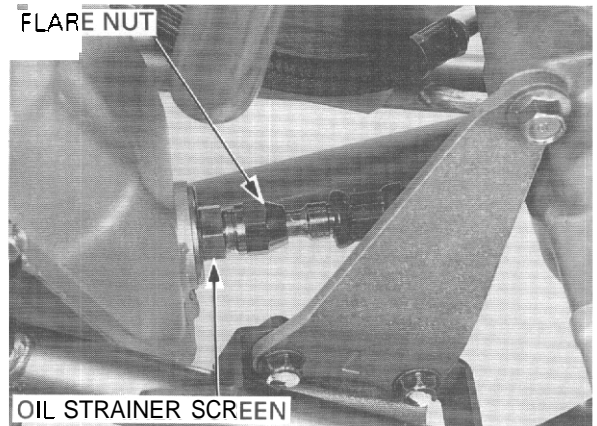
Install the strainer screen and tighten it.

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

Connect the oil pipe over the strainer by screwing the flare nut. Tighten the flare nut.

**TORQUE: 20 N·m (2.0 kgf·m, 14 lbf·ft)**

Fill the engine and oil tank with the engine oil (page 3-10).



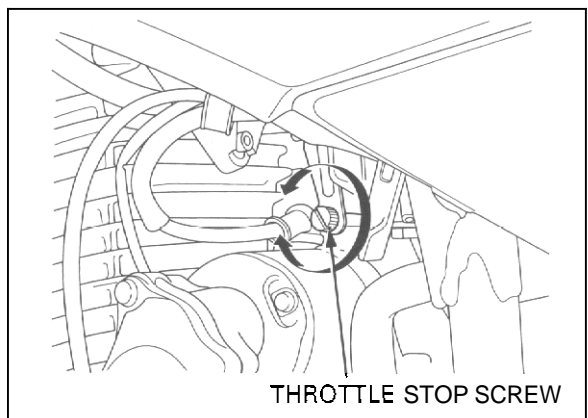
## ENGINE IDLE SPEED

**NOTE:**

- Inspect and adjust the idle speed after all other engine maintenance items have been performed and are within specifications.
- Engine must be warm for accurate adjustment. Ten minutes of stop-and-go riding is sufficient.

Warm up the engine, shift the transmission into neutral and place the vehicle on a level surface. Check the idle speed and adjust by turning the throttle stop screw as required.

**IDLE SPEED 1,400 ± 100 rpm**



## DRIVE CHAIN

### CHAIN SLACK INSPECTION

**⚠ WARNING**

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

Turn the ignition switch OFF, shift the transmission into neutral.

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

**CHAIN SLACK 30 – 40 mm (1-1/4 – 1-5/8 in)**

### ADJUSTMENT

Loosen the axle bearing holder pinch bolts. Turn the axle bearing holder until the correct drive chain slack is obtained, using the hex wrench in the tool kit as shown.

Tighten the holder pinch bolts.

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

Recheck the drive chain slack and free wheel rotation.

If the chain slack is excessive when the bearing holder is turned fully rearward (the correct slack cannot be obtained), replace the drive chain with a new one. To replace the drive chain, remove the drive sprocket cover (page 6-2) and swingarm (page 13-13).

### CLEANING AND INSPECTION

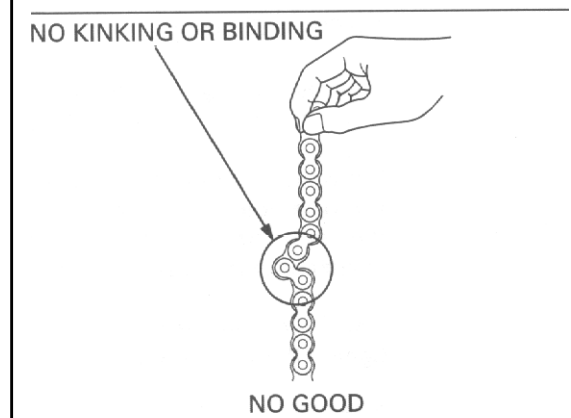
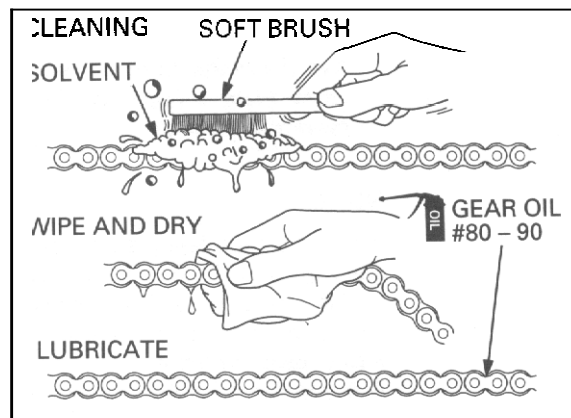
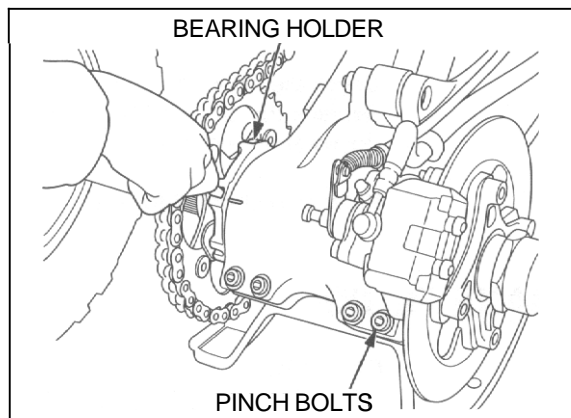
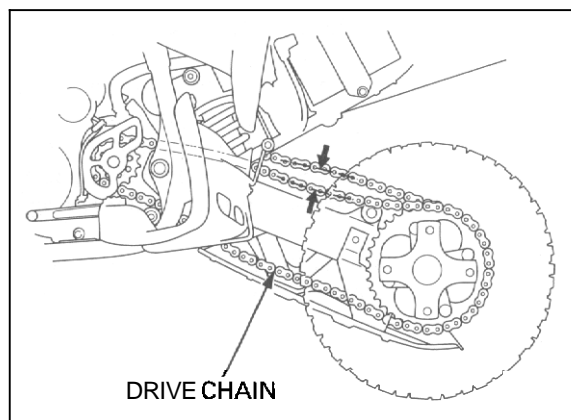
Clean the chain with a soft brush using a **non-flammable** or high flash point solvent and wipe it dry. Be sure the chain has dried completely before lubricating.

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 Pro Honda Chain Lube or equivalent chain lubricant designed for specifically for use on O-ring chains.

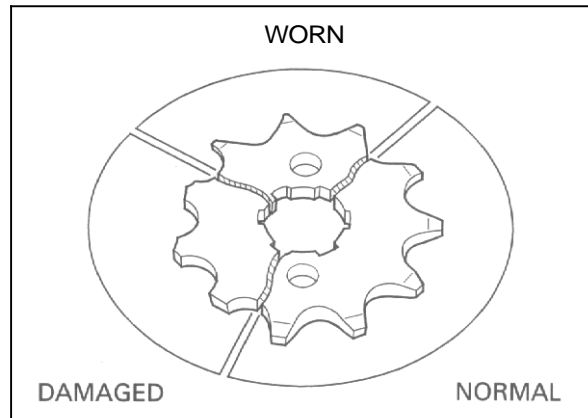
Some commercially available chain lubricants may contain solvents which could damage the O-rings. Wipe off the excess chain lube.



### 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.

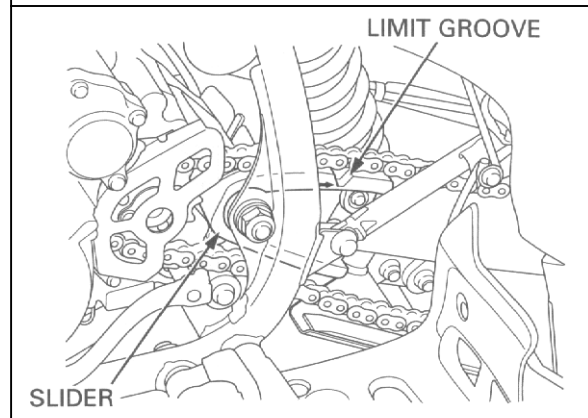
Check the attachment bolt and nuts on the drive and driven sprockets. If any are loose, torque them.



### DRIVE CHAIN SLIDER

Check the drive chain slider for wear. Replace the chain slider if it is worn to the bottom of the wear limit groove.

Refer to section 13 for drive chain slider replacement.



### BRAKE FLUID

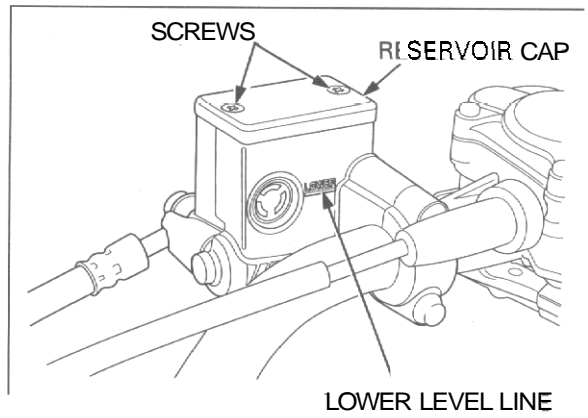
#### CAUTION

- *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 3-17). 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 3-17).



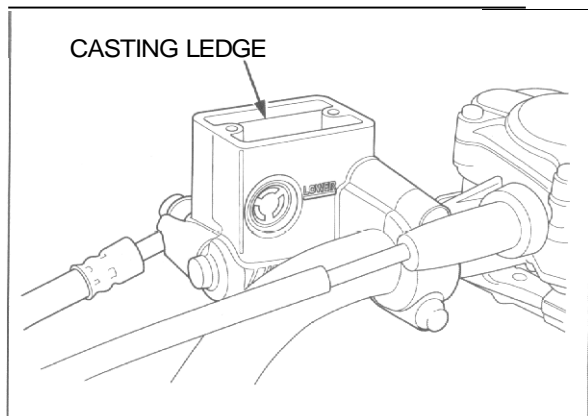
### FRONT BRAKE

Turn the handlebar to the left side so that the reservoir is level and check the front brake reservoir level through the sight glass.

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 casting ledge.

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

**TORQUE: 2 N·m (0.2 kgf·m, 1.4 lbf·ft)**

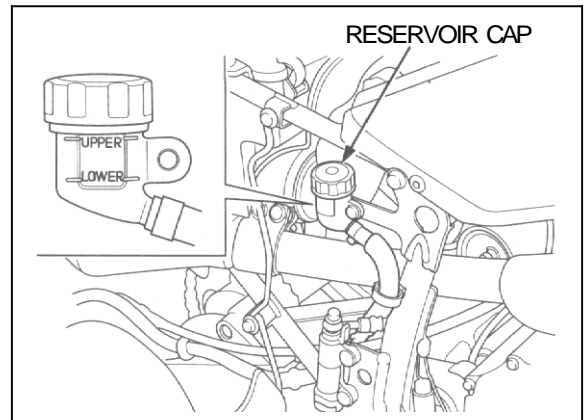


## REAR BRAKE

Place the vehicle on a level surface.  
Remove the seat/rear fender assembly (page 2-2).  
Check the fluid level in the rear 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.

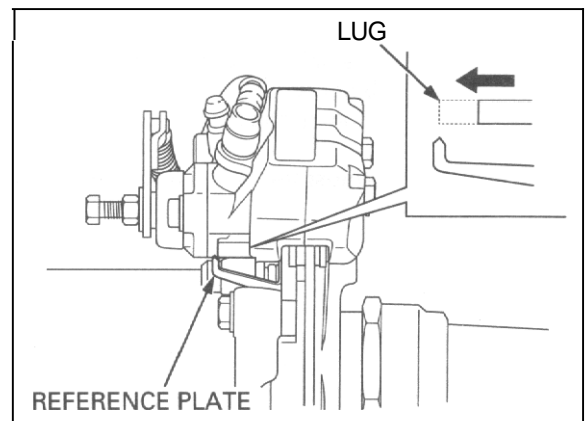
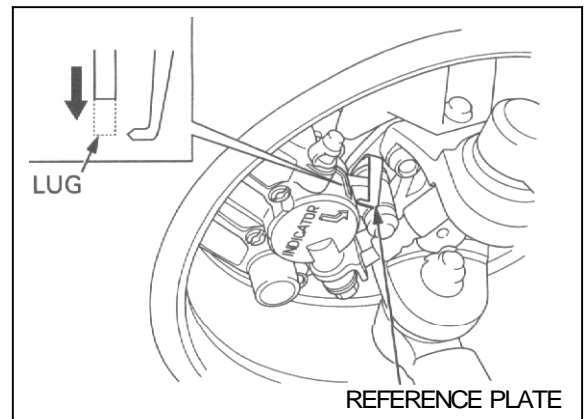
Install the diaphragm, set plate and reservoir cap.  
Install the seat/rear fender assembly (page 2-21).



## BRAKE PADS WEAR

Check the brake pad for wear.  
Replace the brake pads if the wear limit indicator (lug end) aligns with the reference plate.

Refer to page 14-5 for brake pad replacement.



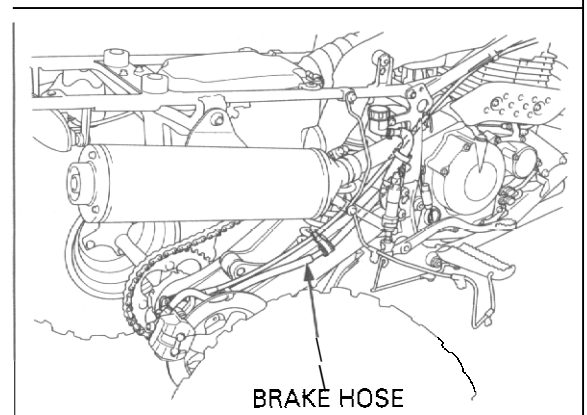
## BRAKE SYSTEM

### INSPECTION FOR AIR IN 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 14-3 for air bleeding procedures.

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



## BRAKE LOCK CABLE ADJUSTMENT

*A lock cable adjustment may be required if the parking brake does not hold the rear wheels securely.*

Slide the dust cover off the lever bracket. To adjust the clutch lever free play to more than 30 mm (1-1/8 in), loosen the lock nut at the clutch lever and turn the adjuster all the way in.

Loosen the lock nut at the brake arm on the caliper and turn the adjusting bolt clockwise until bolt resistance is felt. Then turn the adjusting bolt 1/8 turn counterclockwise and tighten the lock nut while holding the adjusting bolt.

**TORQUE 18N·m (1.8kgf·m, 13lbf·ft)**

Squeeze the clutch lever while pushing the brake lock pin down until firm resistance is felt and measure the brake lock cable free play at the end of the clutch lever.

**FREE PLAY 25 - 30 mm (1 - 1-1/8 in)**

To adjust the free play, loosen the lock nut and turn the adjuster at the brake lock arm on the clutch lever bracket.

Tighten the lock nut while holding the adjuster.

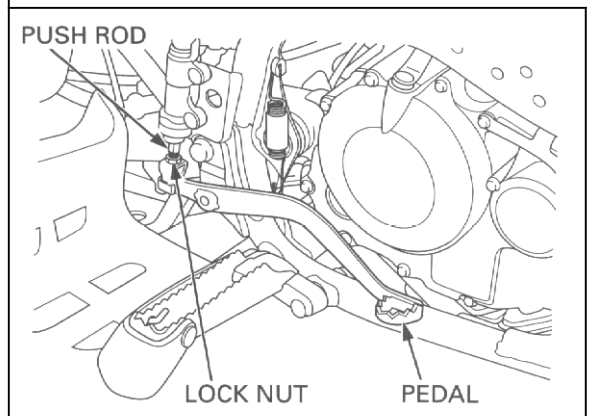
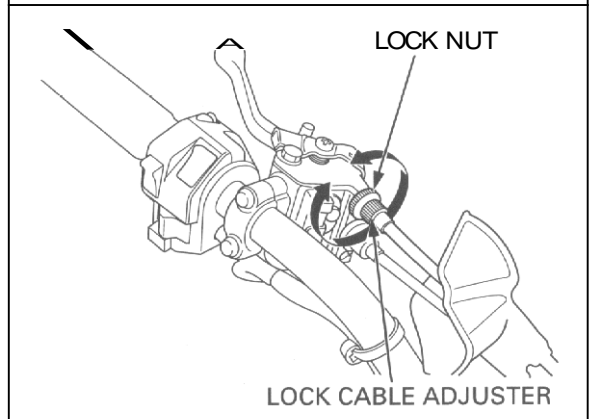
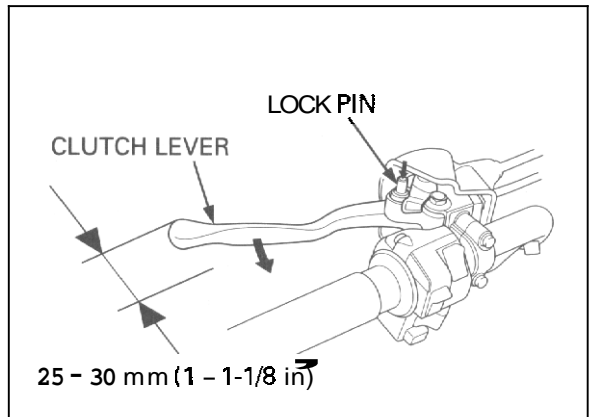
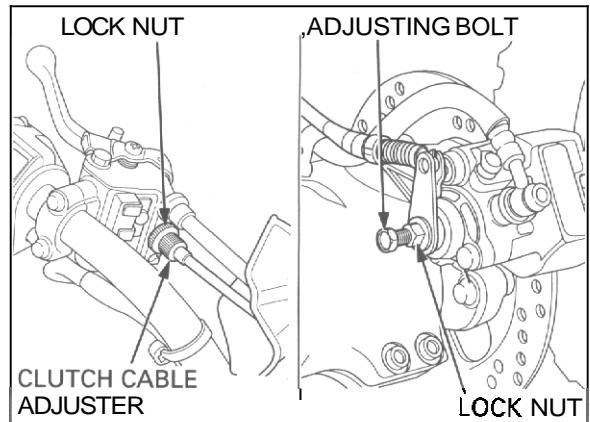
Adjust the clutch lever free play (page 3-19).

## BRAKE PEDAL HEIGHT

Adjust the brake pedal to the desired height. Loosen the lock nut and turn the push rod to obtain the pedal height.

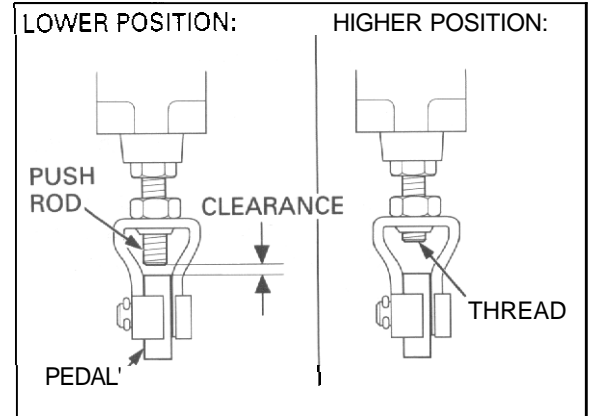
Tighten the lock nut after adjustment has been made.

**TORQUE: 18N·m (1.8kgf·m, 13lbf·ft)**



If adjusting the brake pedal to the lower position, make sure that the clearance between the lower end of the push rod and the brake pedal does not fall below 1 mm (0.04 in).

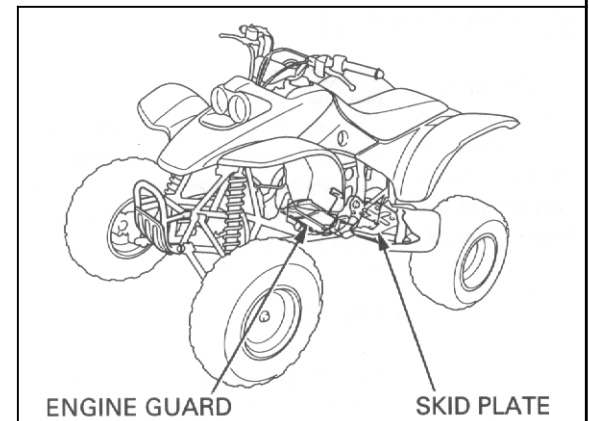
If adjusting to the higher position, make sure that a portion of the lower end of the push rod thread is visible inside the joint.



## SKID PLATE, ENGINE GUARD

Check the skid plate and engine guard for cracks, damage or looseness.

Tighten any loose fasteners. Replace the skid plate and engine guard as required (page 2-5 and 6-3).

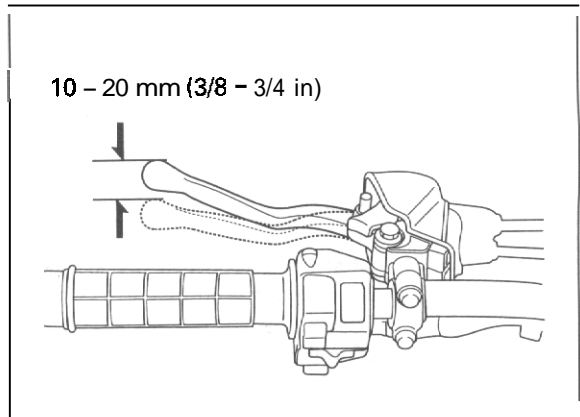


## CLUTCH SYSTEM

Inspect the clutch cable for kinks or damage, and lubricate the cable if necessary.

Measure the clutch lever free play at the end of the lever

**FREE PLAY 10 - 20 mm (3/8 - 3/4 in)**

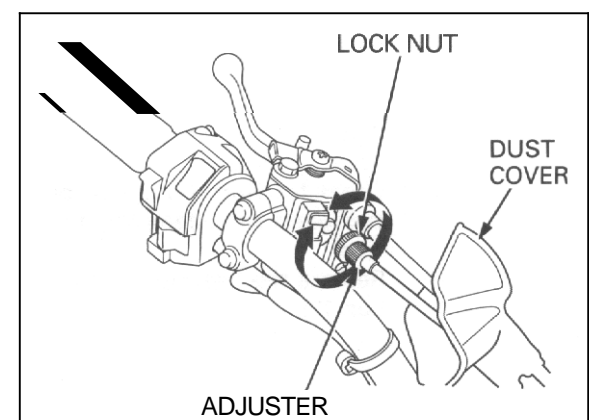


Minor adjustments are made at the clutch lever. Slide the dust cover off the lever bracket, loosen the lock nut and turn the adjuster. Tighten the lock nut securely.

### CAUTION

***The adjuster may be damaged if it is positioned too far out, leaving minimal thread engagement.***

If the adjuster is threaded out near its limit and the correct free play cannot be obtained, turn the adjuster all the way in and back out one turn. Tighten the lock nut and make a major adjustment as described following page.



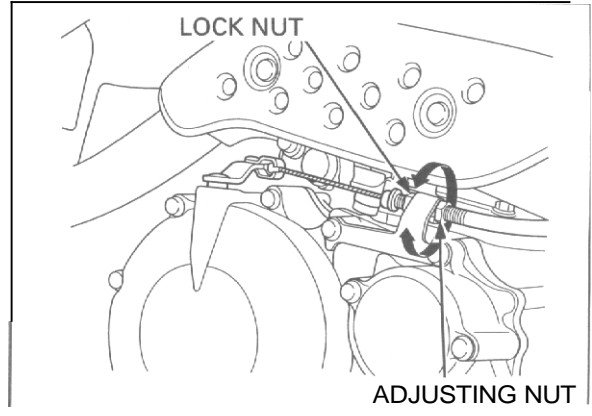
## MAINTENANCE

Major adjustments are made with the lower adjusting nut at the engine.

Loosen the lock nut and turn the adjusting nut. After adjustment is complete, tighten the lock nut securely while holding the adjusting nut.

Check the clutch operation.

If the free play cannot be obtained, or the clutch slips during test ride, disassemble and inspect the clutch (section 9).



## SUSPENSION

For detailed instructions on adjusting **pre-load** and **damping** setting, see *Owner's Manual*.

### WARNING

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

### FRONT

Check the action of the shock absorbers by compressing them 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 12 for shock absorber service.

### REAR

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.

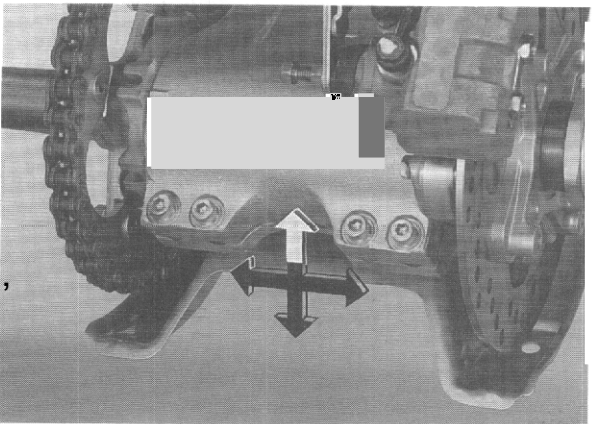
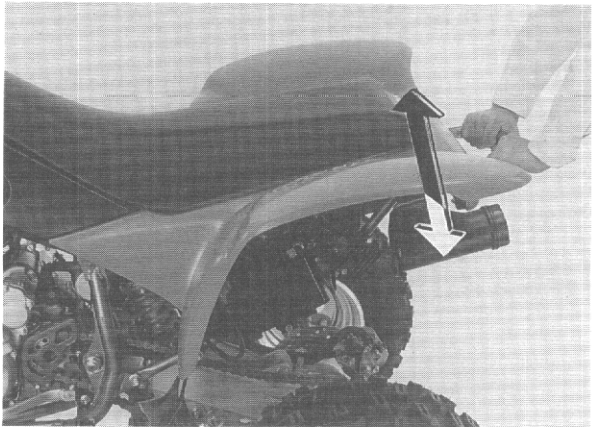
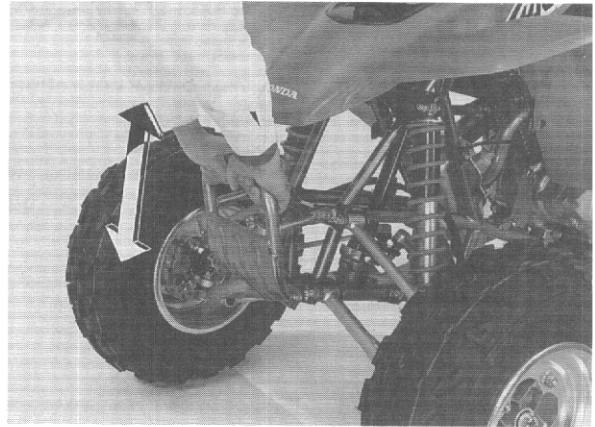
Tighten all nuts and bolts.

Refer to section 13 for shock absorber and linkage service.

Raise the rear wheel off the ground and support the vehicle securely.

Check for worn swingarm bearings by grabbing the swingarm and attempting to move the wheels side to side.

Replace the bearings if any looseness is noted (section 13).



## SPARK ARRESTER

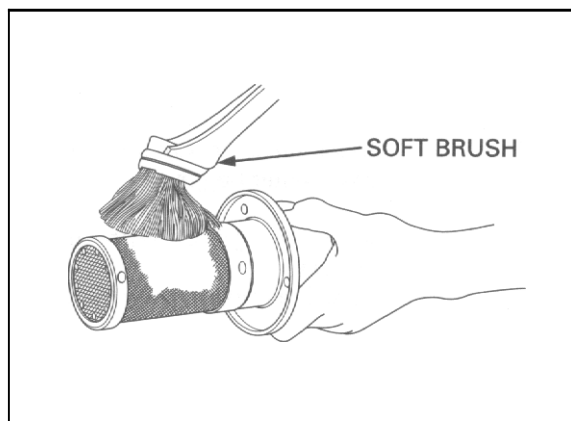
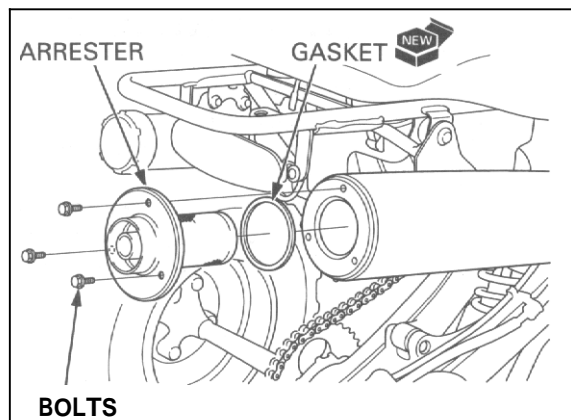
**⚠ WARNING**

Wait until the exhaust system has cooled before removing or installing the arrester. Touching the hot exhaust may result in severe burns.

Remove the three bolts and the spark arrester with the gasket.

Use a brush to remove carbon deposits from the screen mesh, being careful not to damage the screen mesh. The screen mesh must be free of breaks and holes. Replace the spark arrester if necessary.

Install the spark arrester with a new gasket and tighten the bolts securely.



## NUTS, BOLTS, FASTENERS

Check that all chassis nuts and bolts are tightened to their correct torque values (page 1-11). 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.

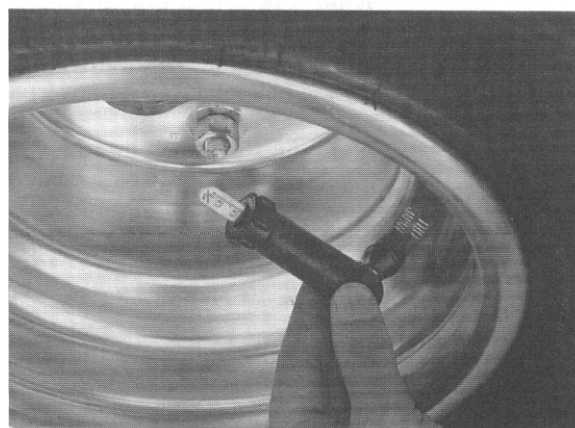
**RECOMMENDED TIRE PRESSURE (Front/Rear):**

- Standard:  
**27 kPa (0.275 kgf/cm<sup>2</sup>, 4.0 psi)**
- Minimum:  
**23 kPa (0.235 kgf/cm<sup>2</sup>, 3.4 psi)**
- Maximum:  
**31 kPa (0.315 kgf/cm<sup>2</sup>, 4.6 psi)**

Check the tires for cuts, embedded nails, or other damage. Check the front and rear wheels for trueness (refer to section 12 and 13).

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/Rear):**  
**4.0 mm (0.16 in)**





## STEERING SHAFT HOLDER BEARING

*Make sure the cables do not interfere with the rotation of the handlebar*

Raise the front wheels off the ground and support the vehicle securely.

Check that the handlebar moves freely from side to side.

If the handlebar moves unevenly, binds, or has horizontal movement, inspect the steering shaft holder bushing and bearings (section 12).



## STEERING SYSTEM

Place the vehicle on level ground with the front wheels facing straight ahead.

Mark the centers of the tires with chalk to indicate the axle center height.

Align the gauge with the marks on the tires as shown.

Check the readings on the gauge scales.

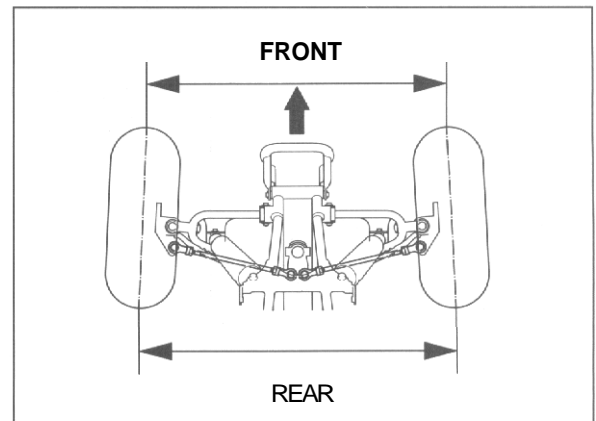
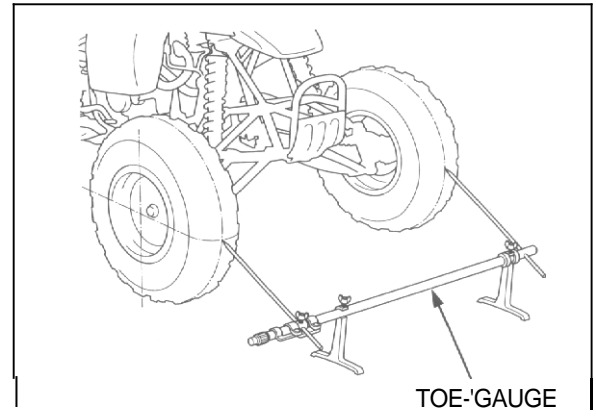
Slowly move the vehicle back until the wheels have turned 180° so the marks on the tires are aligned with the gauge height on the rear side.

Measure the toe on the rear pan of the tires at the same points with no load on the vehicle.

**TOE-IN: 17 ± 15 mm (0.7 ± 0.6 in)**

**NOTE:**

Toe-in means the rear measurement is greater than the front measurement.

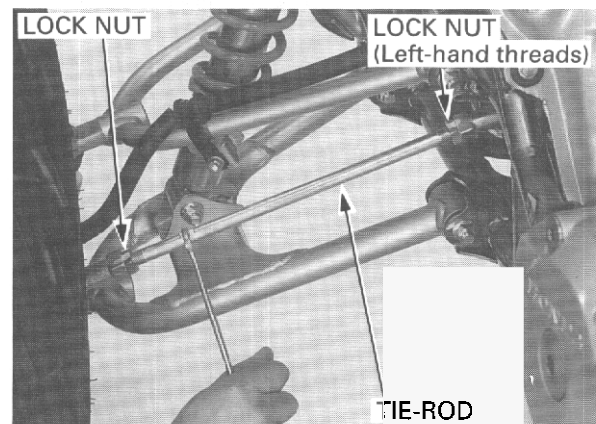


When the toe is out of specification, adjust it by changing the length of the tie-rods equally by loosening the lock nuts and turning the tie-rods while holding the ball joints.

After adjusting each tie-rod, rotate both ball joints in the same direction with the tie-rod axis until they stop against the ball joint stud. Hold them in that position and tighten the tie-rod lock nuts.

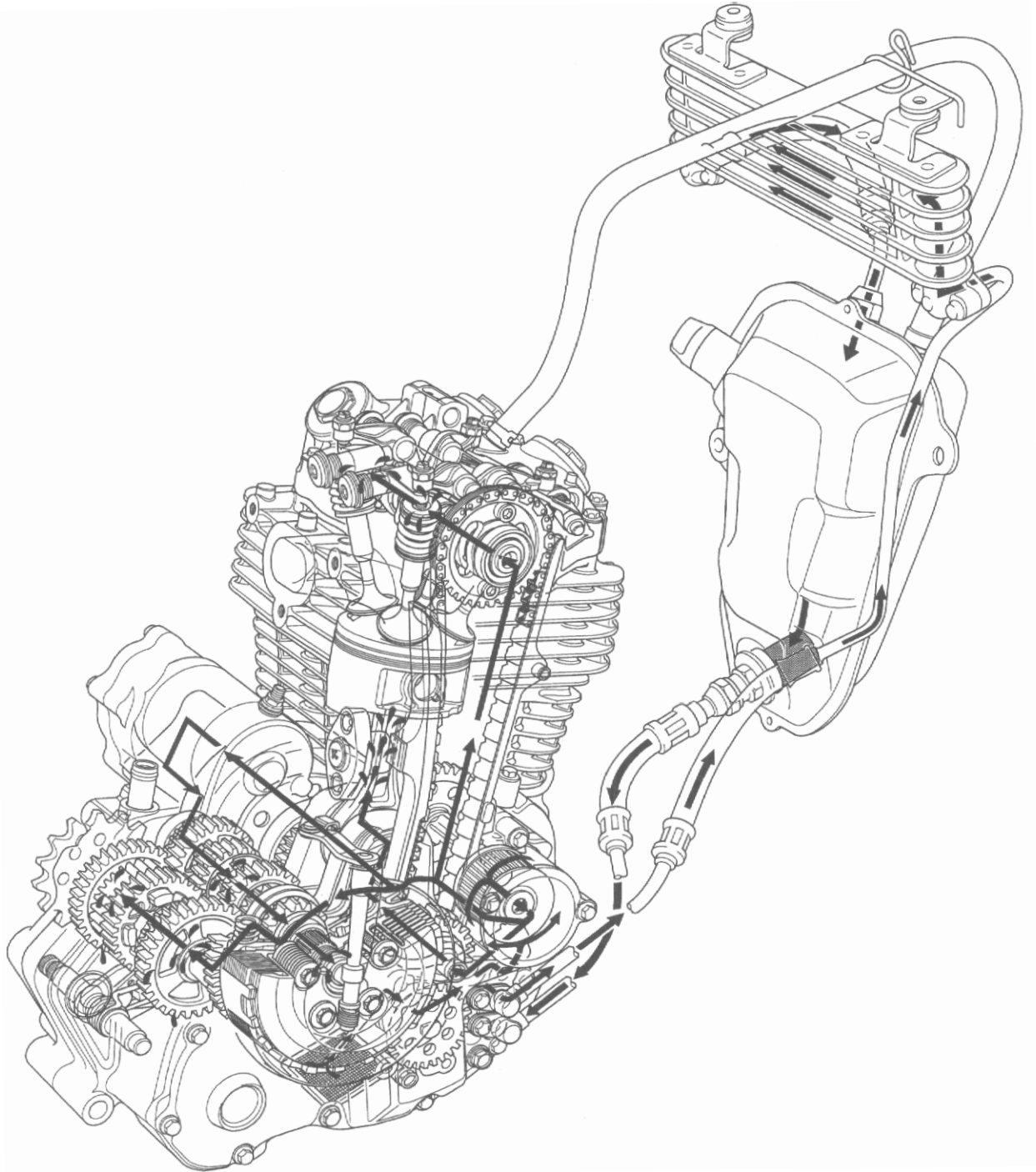
**TORQUE 54 N·m 155 kgf·m, 40 lbf·ft)**

After finally tightening the lock nuts, make sure the ball joints operate properly by rotating the tie-rods, to make sure both ball joints have equal play.



---

**MEMO**



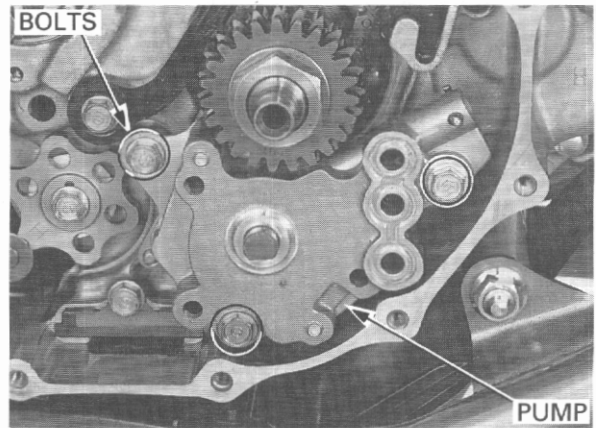


## OIL PUMP & STRAINER

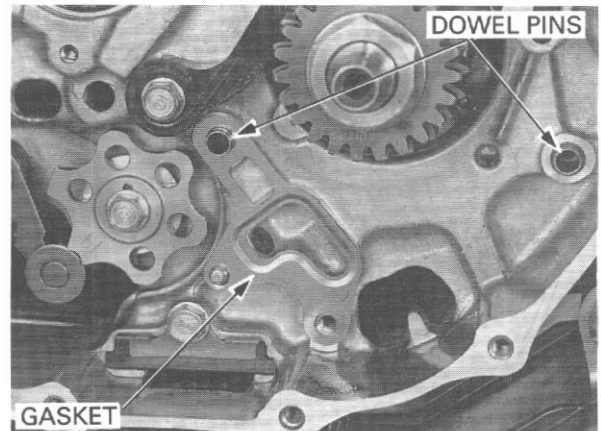
### REMOVAL

Remove the right crankcase cover (page9-2),  
Remove the clutch outer (page9-5).

Remove the three mounting bolts and the oil pump.



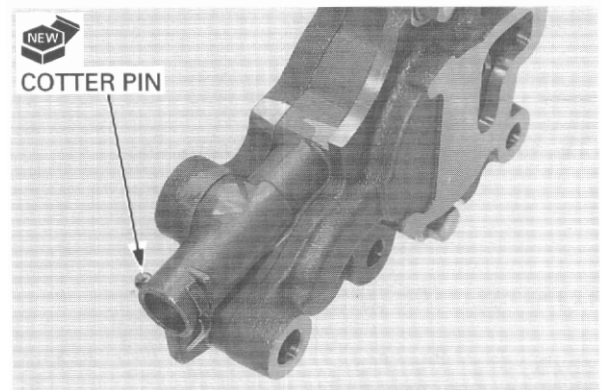
Remove the gasket and two dowel pins.



### RELIEF VALVE CHECK

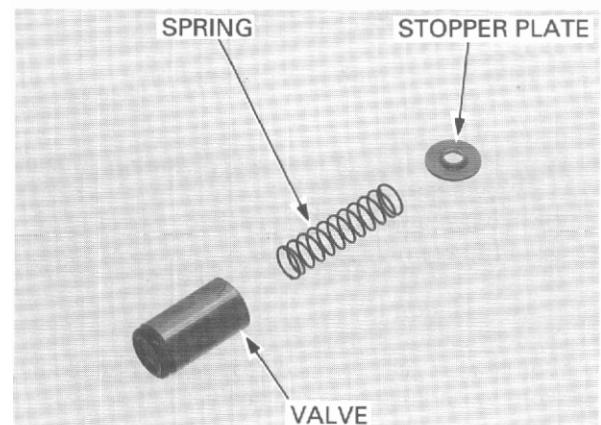
Remove the following:

- cotter pin
- stopper plate
- spring
- valve



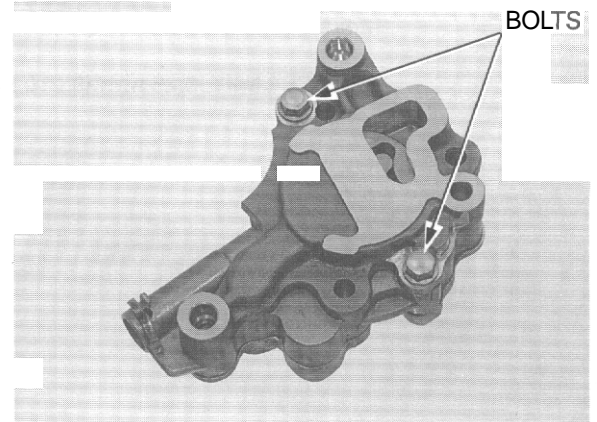
Check the spring and valve for wear or damage.

Install the valve, spring and stopper plate into the oil pump, then insert a new cotter pin from the pump body side and secure it.



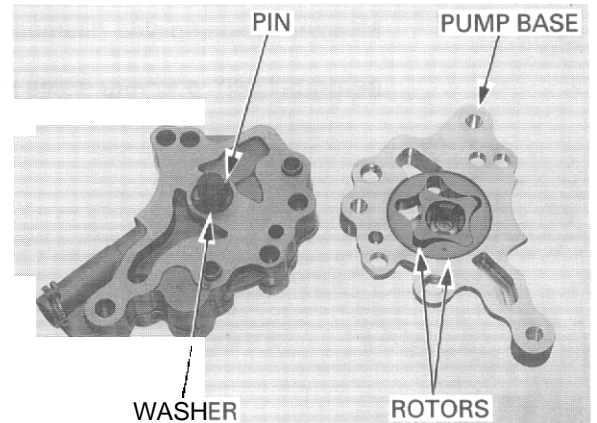
## DISASSEMBLY

Remove the two bolts and separate the pump base from the pump spacer.



Remove the following:

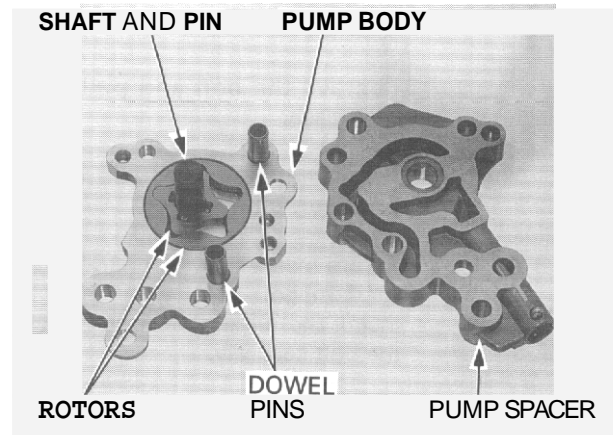
- drive pin
- thrust washer
- inner rotor
- outer rotor



Separate the pump body from the pump spacer.

Remove the following:

- pumpshaft
- drive pin
- dowelpins
- inner rotor
- outer rotor



## INSPECTION

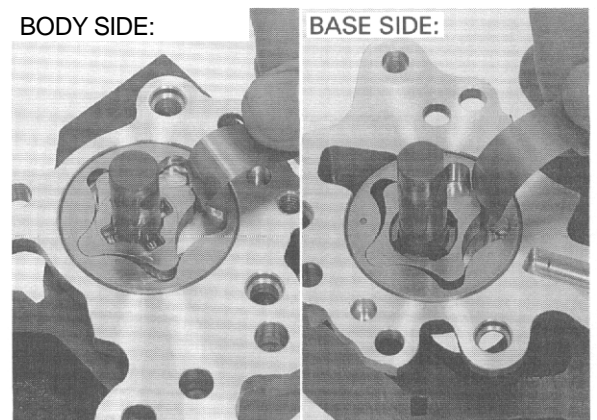
NOTE:

Measure at several places and use the largest reading to compare the service limit. If any portion of the oil pump is worn beyond the specified service limits, replace the oil pump as an assembly.

Install the inner and outer rotors into the pump base and pump body.

Install the pump shaft with the drive pin into the inner rotor and measure rotor tip clearance.

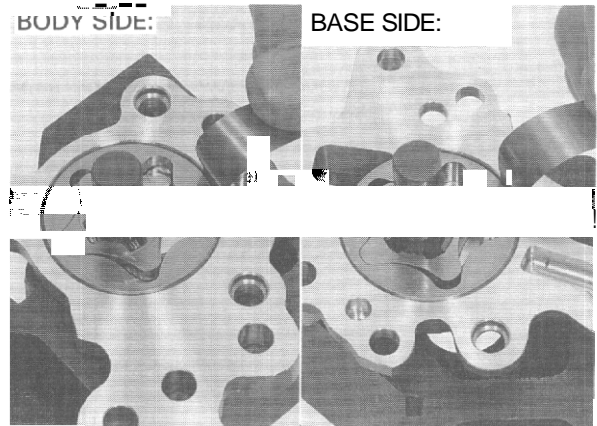
SERVICE LIMIT 0.20 mm 10.008 in)



## LUBRICATION SYSTEM

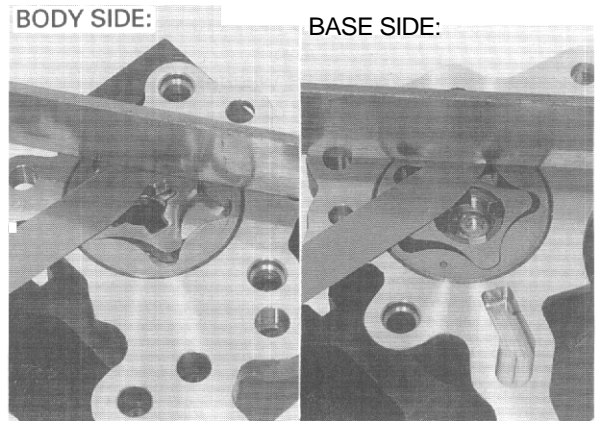
Measure the pump body clearance.

SERVICE **LIMIT 0.25 mm (0.010 in)**



Measure the pump side clearance.

SERVICE **LIMIT 0.12 mm (0.005 in)**

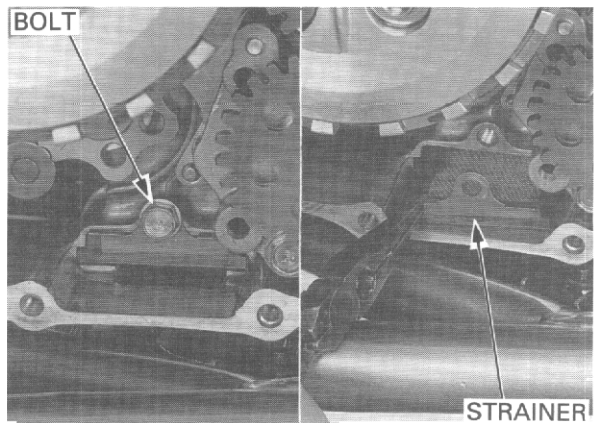


### OIL STRAINER CLEANING

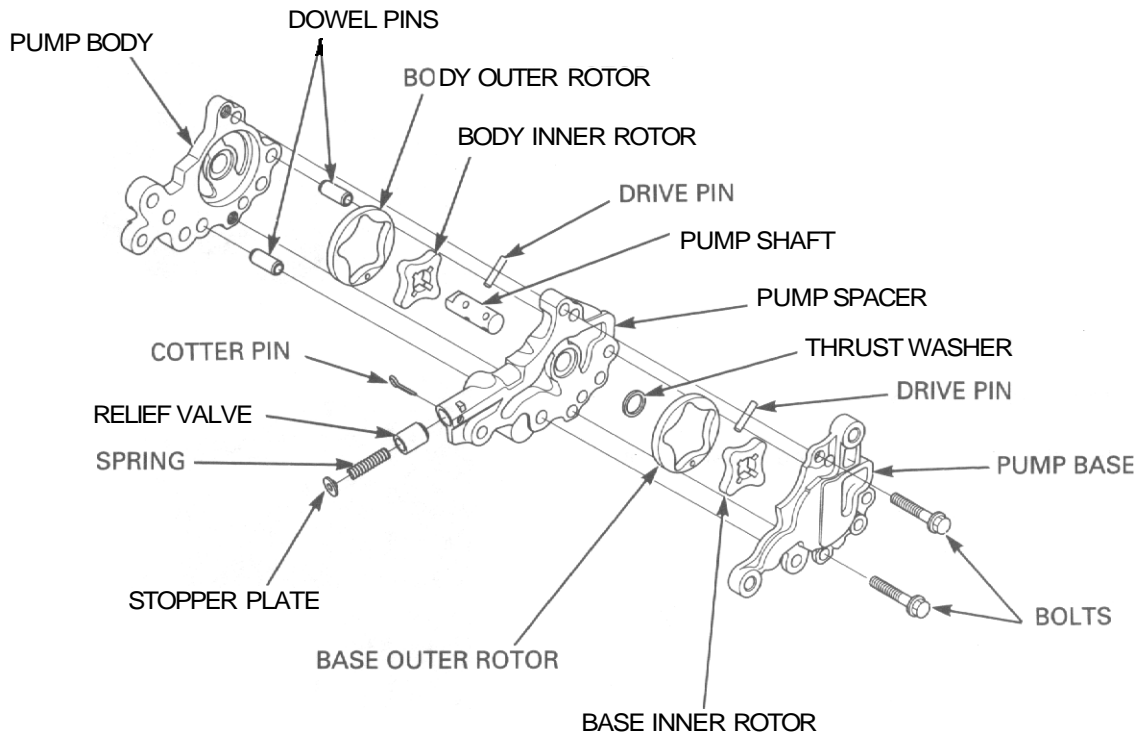
Remove the bolt and pull the strainer out of the crankcase.

Wash the strainer screen thoroughly in high flash point solvent.

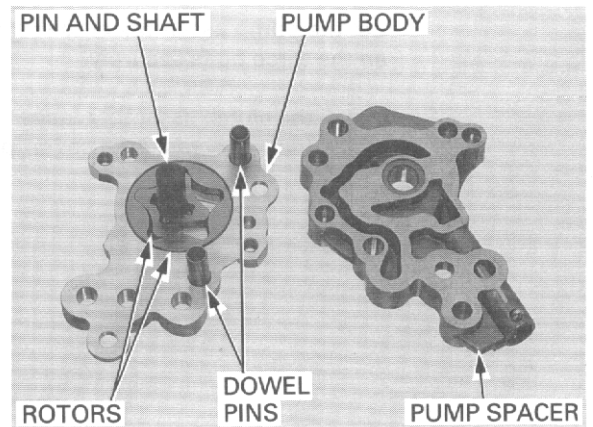
Before installing the oil strainer, it should be checked for damage.  
Install the oil strainer into the crankcase and tighten the bolt securely.



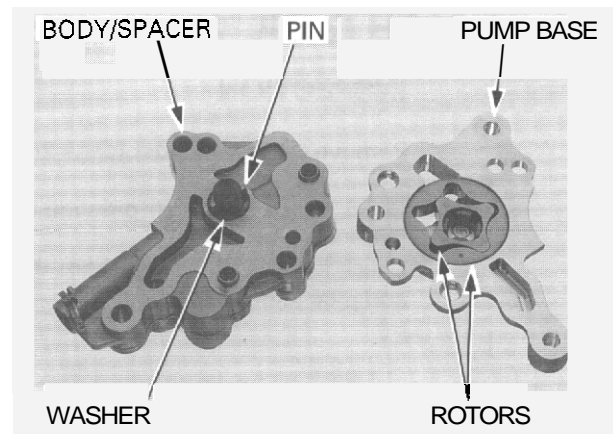
**ASSEMBLY**



- Install the following into the pump body:
- outer rotor with the punch mark facing the pump spacer
  - inner rotor
  - drive pin and shaft with the stepped end facing pump body
  - dowelpins
- Assemble the pump body and spacer.



- Install the following onto the pump shaft and into the pump base.
- thrustwasher
  - drive pin
  - outer rotor with the punch mark facing the pump base
  - inner rotor
- Assemble the pump body/spacer assembly and pump base by aligning the drive pin with the slots in the inner rotor.

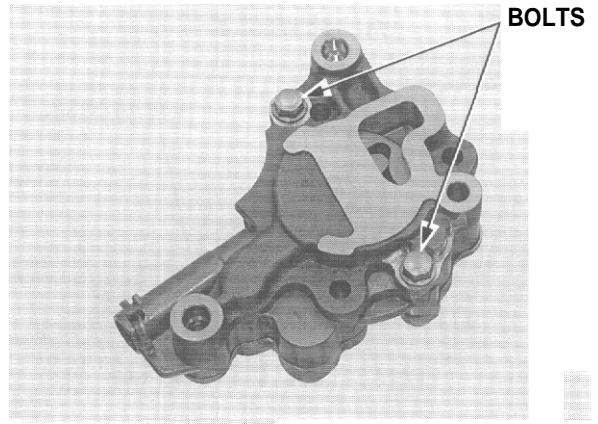




## LUBRICATION SYSTEM

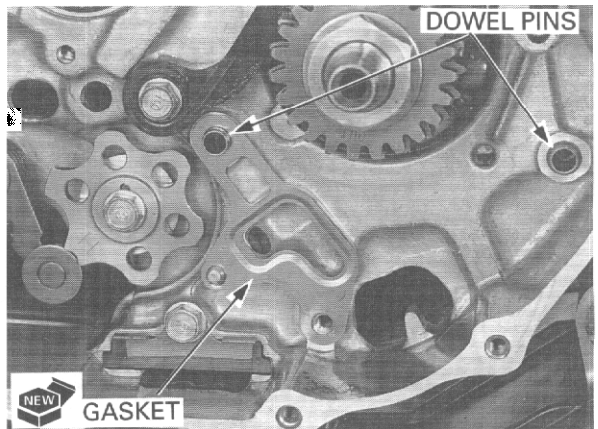
Be sure that there are no gap between the mating surfaces and tighten the two bolts.

TORQUE: 13 N·m (1.3 kgf·m, 9 lbf·ft)



### INSTALLATION

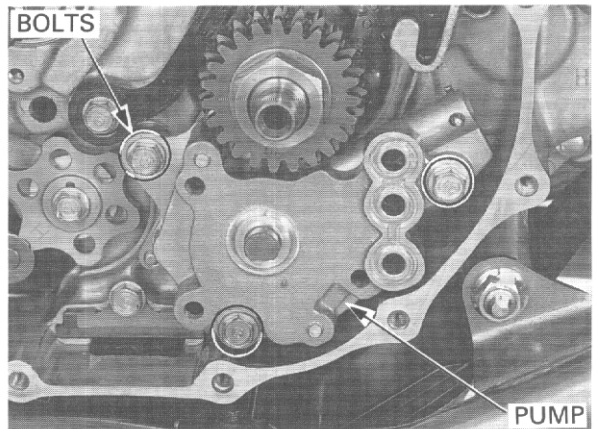
Install the two dowel pins and a new gasket.



Set the pump assembly onto the crankcase and tighten the three bolts securely.

Install the clutch assembly (page 9-8).

Install the right crankcase cover (page 9-12).



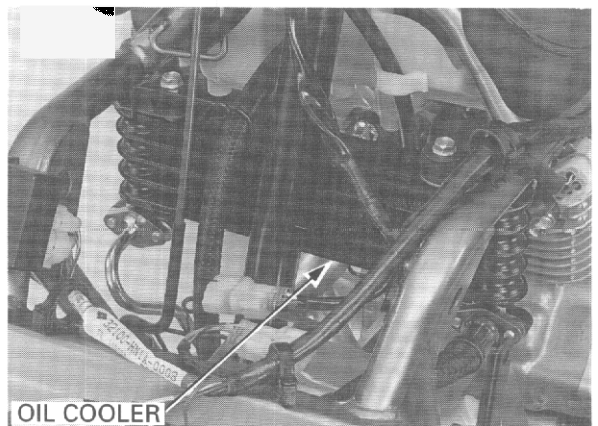
## OIL COOLER & OIL TANK

### INSPECTION

Remove the front fender (page 2-2).

Check the oil cooler air passage for clogging or damage.

Check for any oil leakage from the oil cooler, oil tank and pipe joints.

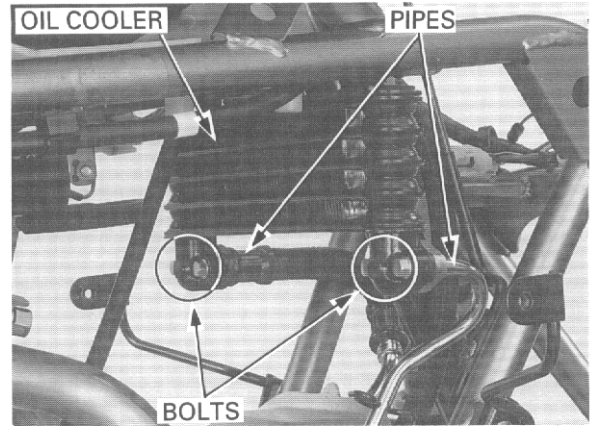


**REMOVAL/INSTALLATION**

Drain the engine oil (page 3-9).

**OIL COOLER**

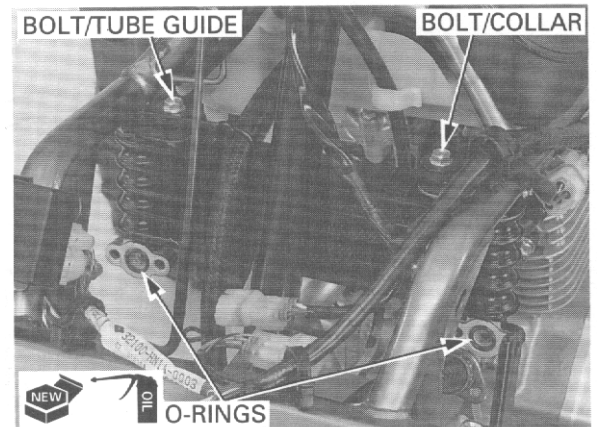
Disconnect the oil pipes from the oil cooler by removing the joint bolts and remove the O-rings.



Remove the two mounting bolts and the oil cooler.

*Replace the O-rings with new ones and coat them with engine oil.*

Installation is in the reverse order of removal

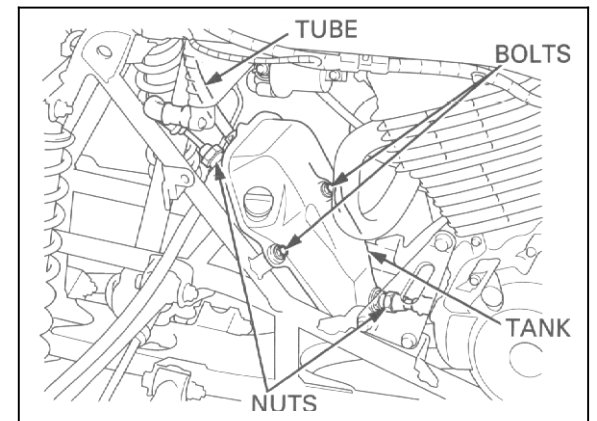


**OIL TANK**

Disconnect the oil tank breather tube.  
Disconnect the oil pipes by loosening the flare nuts.  
Remove the tank mounting bolts and the oil tank from the mounting rubber.

Installation is in the reverse order of removal.

**TORQUE:** Flare nuts: 20 N·m (2.0 kgf·m, 14 lbf·ft)



**OIL PIPES**

Disconnect the oil pipes from the oil cooler and oil tank (see above).

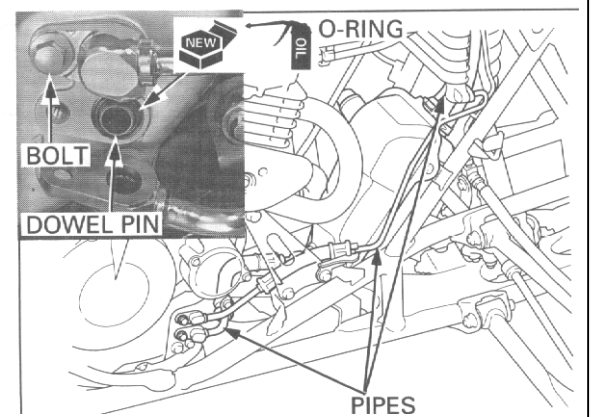
Disconnect the oil pipes from the engine by removing the bolts.

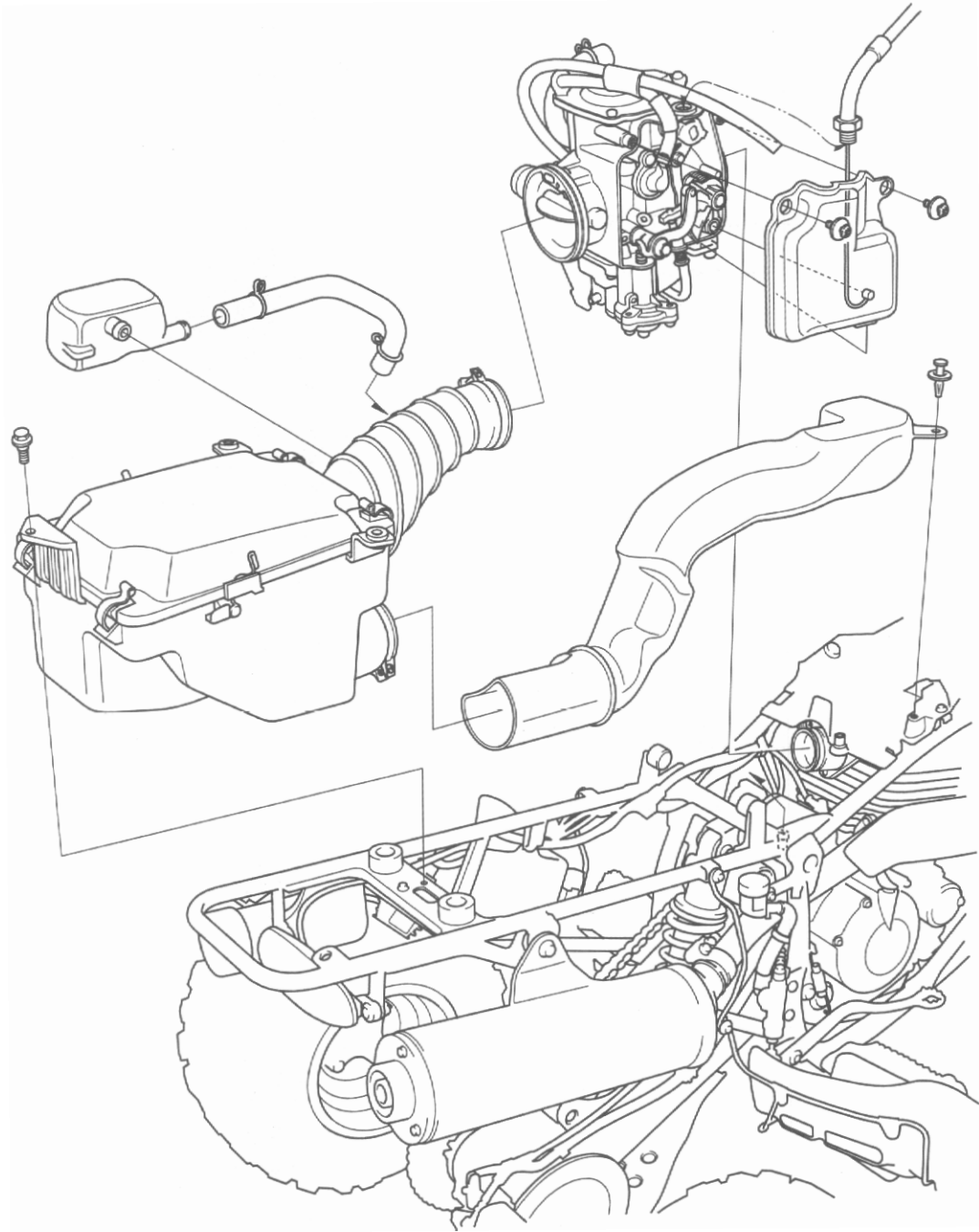
Remove the dowel pins and O-rings.

Check the oil pipes for clogging or damage.

*Replace the O-rings with new ones and coat them with engine oil.*

Installation is in the reverse order of removal.





# 5. FUEL SYSTEM

SERVICE INFORMATION	5-1	CARBURETOR INSTALLATION	5-12
TROUBLESHOOTING	5-2	PILOT SCREW ADJUSTMENT	5-13
CARBURETOR REMOVAL	5-3	HIGH ALTITUDE ADJUSTMENT	5-14
CARBURETOR DISASSEMBLY/ INSPECTION	5-3	AIR CLEANER HOUSING	5-15
CARBURETOR ASSEMBLY	5-7		

## SERVICE INFORMATION

5

### 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 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.

#### NOTE:

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

- For fuel tank removal and installation, see page 2-4.
- Before disassembling the carburetor, place an approved fuel container under the carburetor, loosen the drain screw and drain the carburetor.
- After removing the carburetor, cover the intake port of the cylinder head with shop towel 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.

# FUEL SYSTEM

## SPECIFICATIONS

ITEM	SPECIFICATIONS
Carburetor identification number	QB10A
Main jet	#148
Slow jet	#38
Jet needle clip position	3rd groove from top
Pilot screw opening	See page 5-13
Float level	18.5 mm (0.73in)
Idle speed	1,400 ± 100 rpm
Throttle lever free play	3 – 8 mm (1/8 – 5/16in)

## TOOL

Carburetor float level gauge	07401 – 0010000
Pilot screw wrench	07908–4220201

## TROUBLESHOOTING

Engine cranks but won't start

- No fuel in tank
- No fuel to carburetor
  - Clogged fuel stainer
  - Clogged fuel line
  - 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 16)

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 throttle valve

Rich mixture

- Starting enrichment valve close (ON)
- Clogged air jets
- Faulty float valve
- Float level too high
- Dirty air cleaner
- Worn jet needle or needle jet

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 close (ON)
- Faulty ignition system (section 16)

Afterburn when engine braking is used

- Lean mixture in slow circuit
- Faulty air cut-off valve
- Faulty ignition system (section 16)

Backfiring or misfiring during acceleration

- Lean mixture
- Faulty ignition system (section 16)

Poor performance (**driveability**) and poor fuel economy

- Clogged fuel system
- Faulty ignition system (section 16)

## CARBURETOR REMOVAL

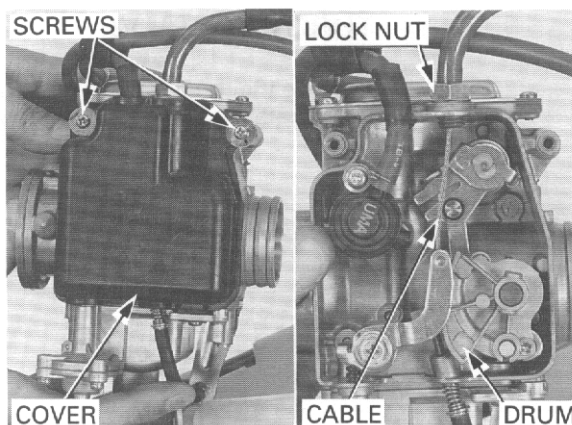
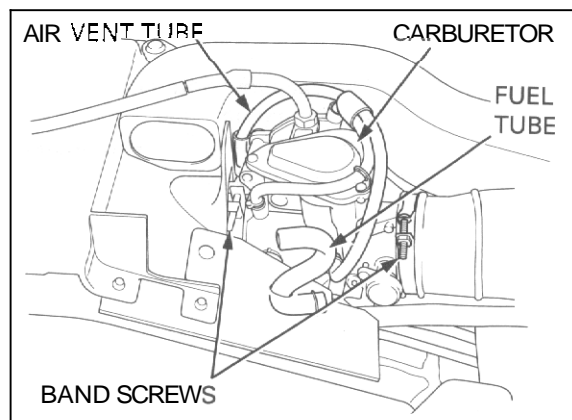
Remove the fuel tank (page 2-4). Place an approved fuel container under the drain tube. Loosen the drain screw and drain the carburetor.

Remove the air vent tube from the heat protector and the fuel tube from the heat protector rubber. Disconnect the drain tube from the carburetor.

Loosen the connecting tube band and insulator band screws. Release the carburetor from the connecting tube and

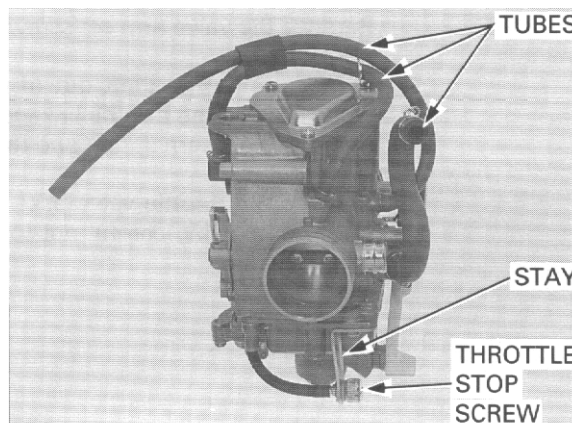
Remove the two screws and the throttle linkage cover.

Disconnect the throttle cable from the throttle drum. Loosen the cable lock nut and remove the carburetor from the cable outer.



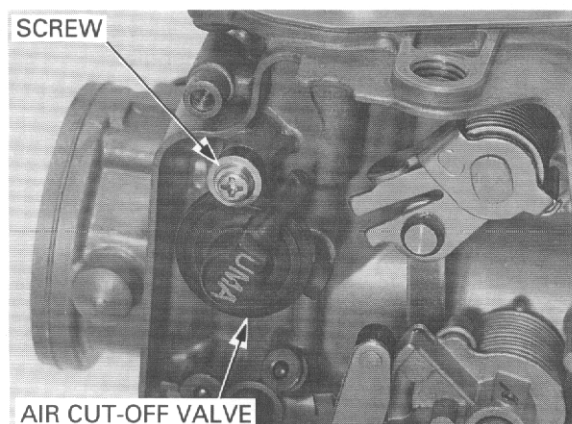
## CARBURETOR DISASSEMBLY/INSPECTION

Disconnect the tubes from the carburetor body. Remove the throttle stop screw stay attaching screw and the throttle stop screw by turning counterclockwise.



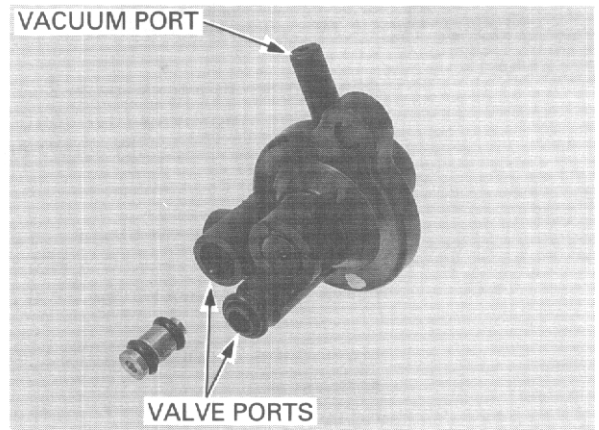
## AIR CUT-OFF VALVE

Remove the attaching screw and the air cut-off valve. Remove the O-rings and joint pipe.



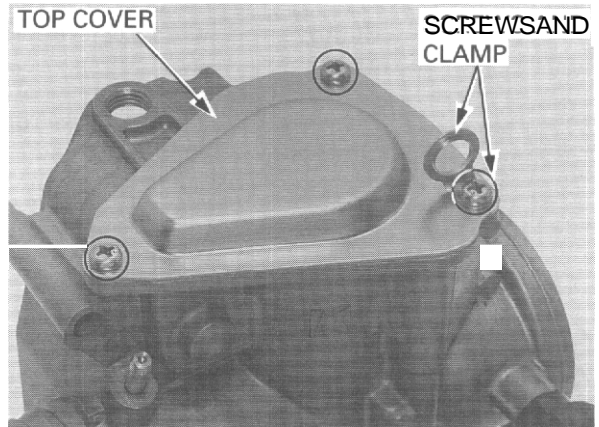
Apply vacuum to the vacuum port.

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



### THROTTLE VALVE

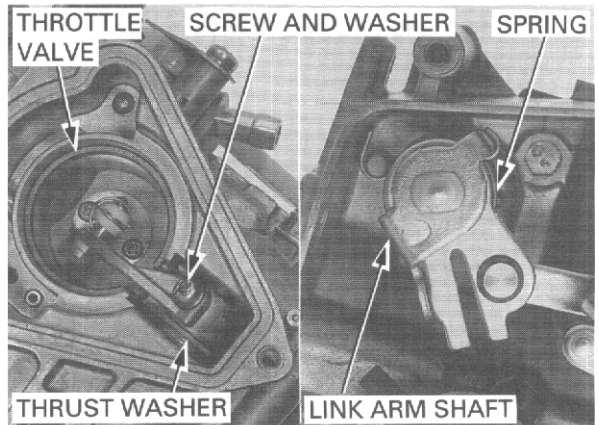
Remove the three screws, clamp and top cover.  
Remove the O-ring from the body groove.



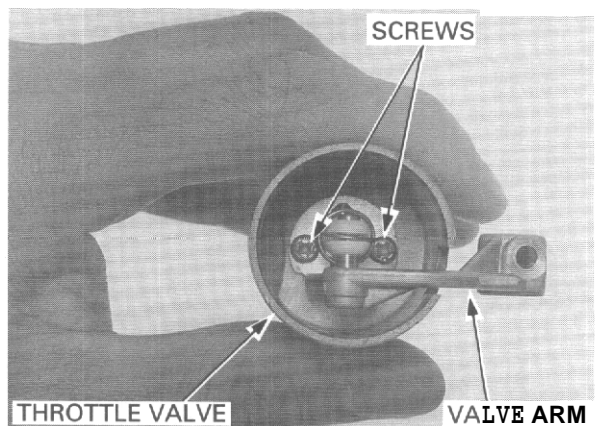
Remove the valve arm set screw and washer.

Pull the link arm shaft out of the carburetor body while holding the throttle linkage.  
Remove the return spring and the thrust washer.

Remove the throttle valve assembly from the carburetor body, being careful not to damage the jet needle.

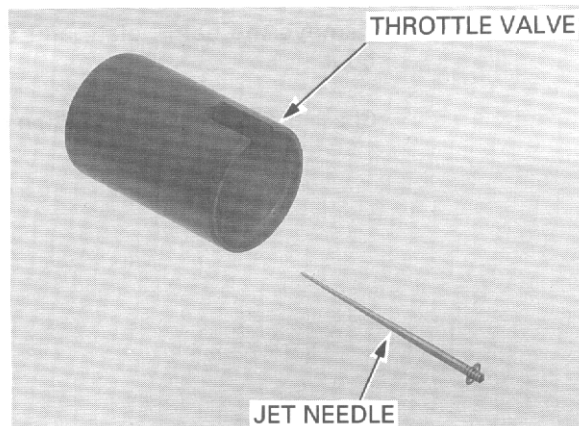


Remove the two screws and valve arm.  
Remove the jet needle.



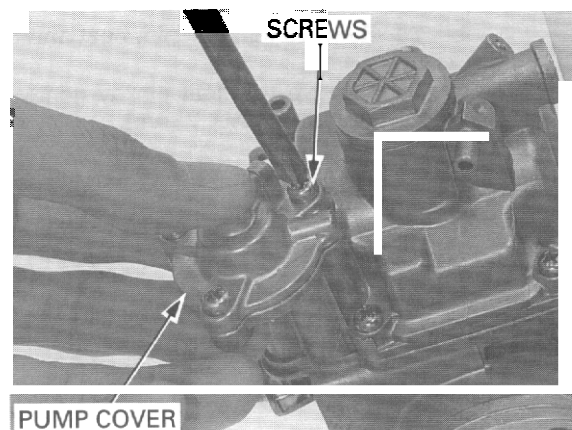


Check the jet needle for stepped wear or damage.  
Check the throttle valve for scoring, scratches or damage.



### ACCELERATOR PUMP

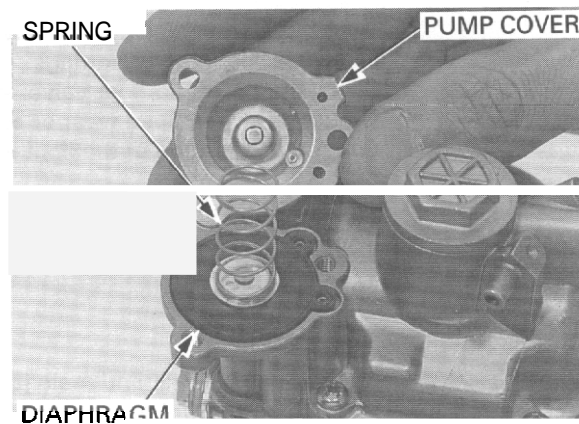
Remove the three screws while holding the accelerator pump cover.



Remove the pump cover, spring and the diaphragm, being careful not to damage it.

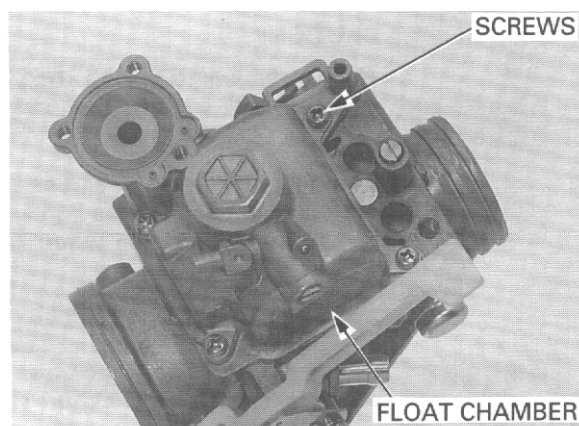
Visually check the following:

- diaphragm for deterioration or pin holes
- spring for deterioration
- diaphragm shaft for excessive wear or damage
- orifice in cover for clogging or restriction



### FLOAT AND JETS

Remove the four screws and the float chamber.

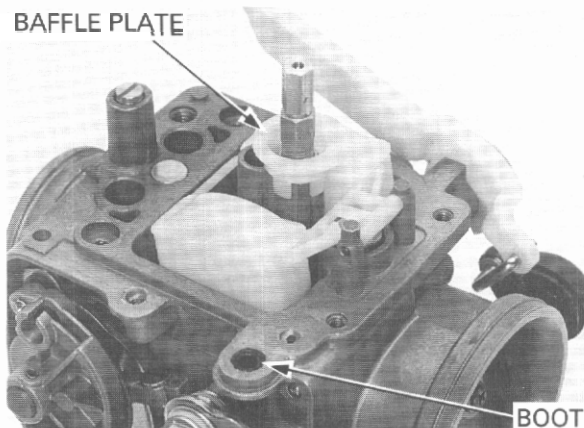




## FUEL SYSTEM

Remove the baffle plate and the diaphragm shaft boot.

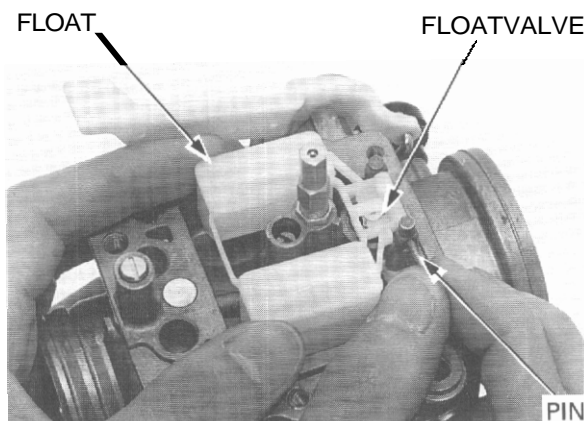
Check the boot for deterioration or damage.



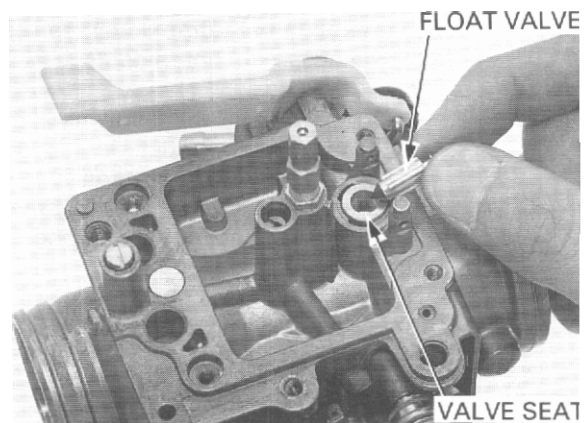
'99 - '00 Remove the float pin, float and float valve.

After '00 Remove the float pin by gently tapping with a suitable pin driver (O.D. 2 mm).

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 slow jet and main jet. Loosen the lock nut and remove the needle jet holder and needle jet.

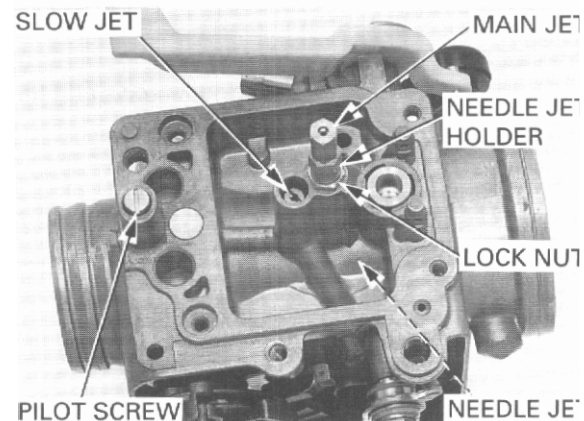
### CAUTION:

*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

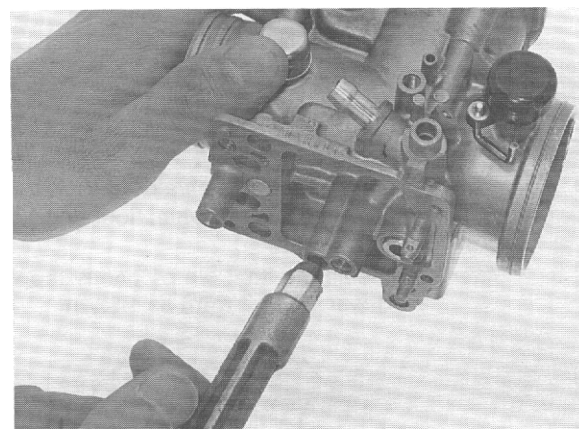
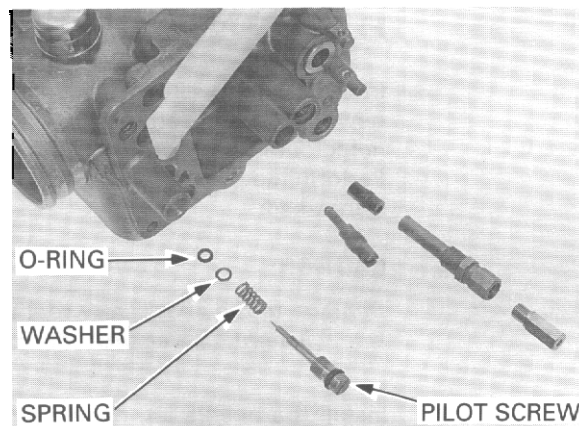
Remove the following:

- air cut-off valve
- throttle valve
- accelerator pump
- main jet, needle jet holder, needle jet and slow jet
- pilot screw.

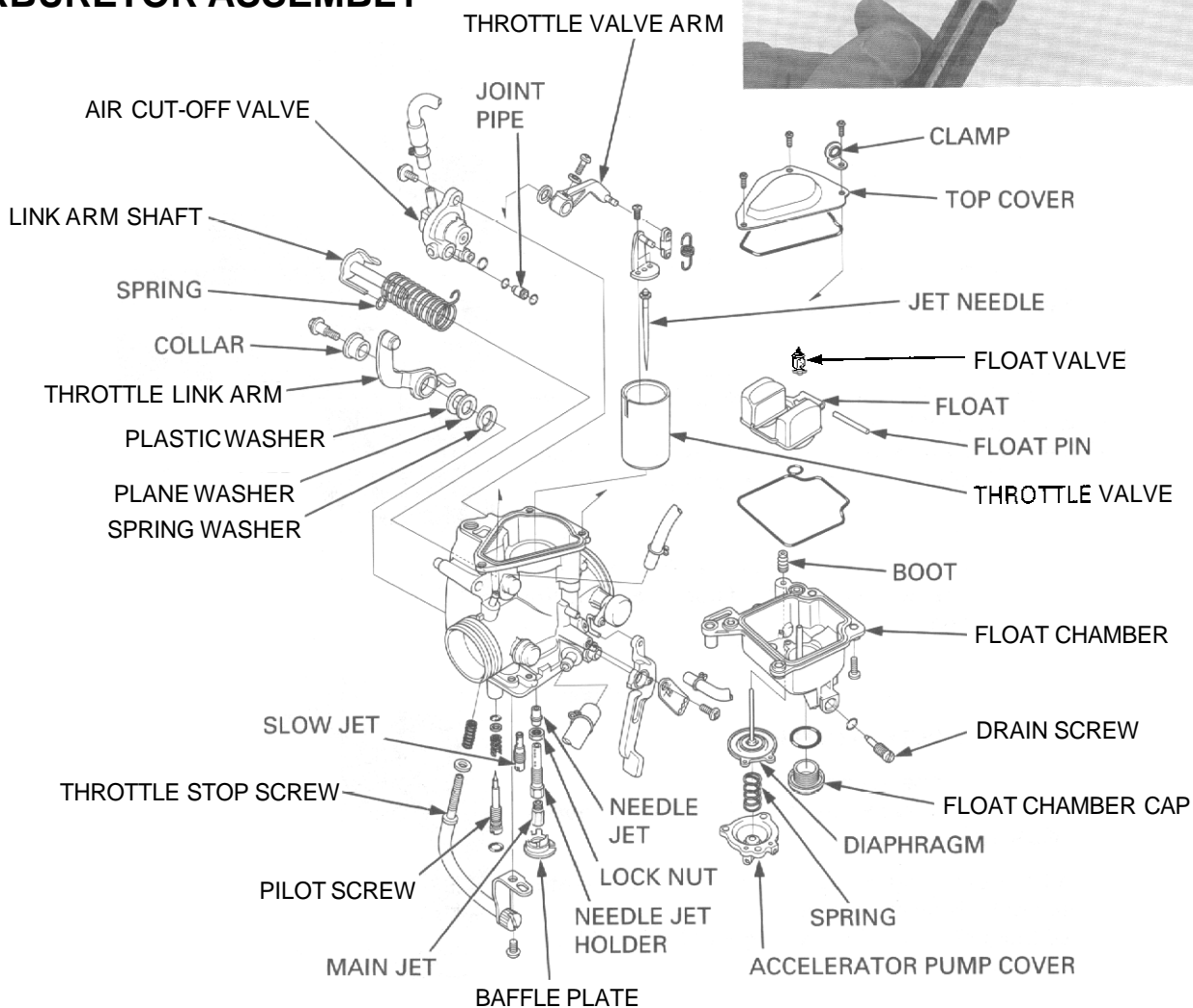
CAUTION:

*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 AND JETS**

Install the pilot screw with the spring, washer and a new O-ring and return it to its 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

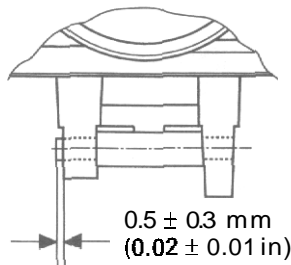
Install the needle jet, needle jet holder and tighten the lock nut. Install the main jet and slow jet.

**CAUTION:**

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

'99 - '00 Hang the float valve onto the float arm lip. Install the float valve, float and float pin.

After '00 Install the float pin by gently tapping with a suitable pin driver (O.D. 2 mm) as shown.



<VIEW FROM AIR CLEANER HOUSING SIDE>

**FLOAT LEVEL INSPECTION**

**NOTE:**

- Check the float level after checking the float valve, valve seat and float.
- Set the float level gauge so that it is perpendicular to the float chamber face at the highest point of the float.

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

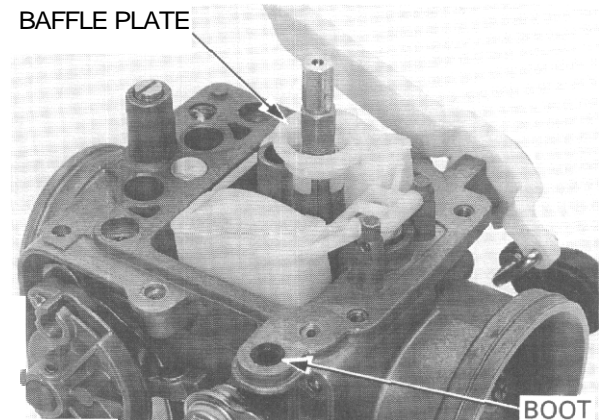
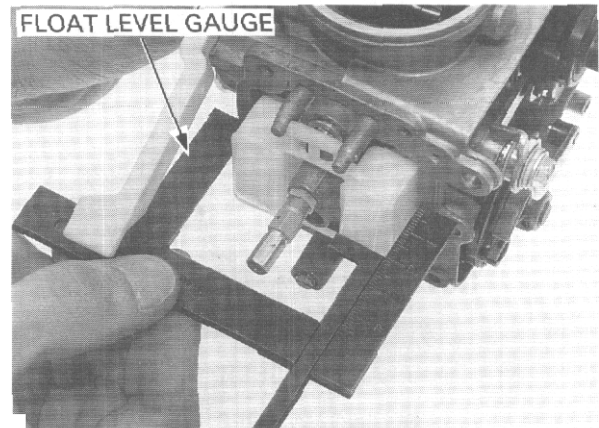
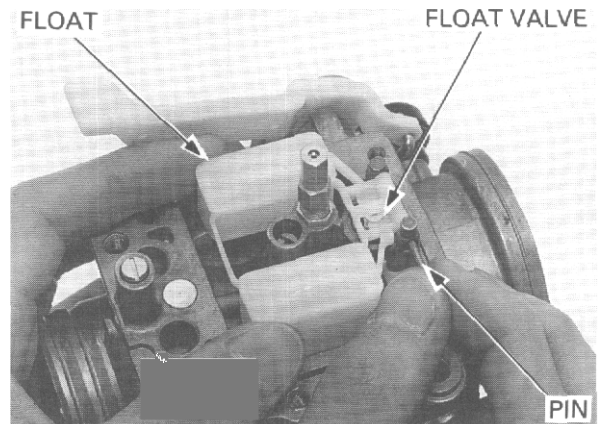
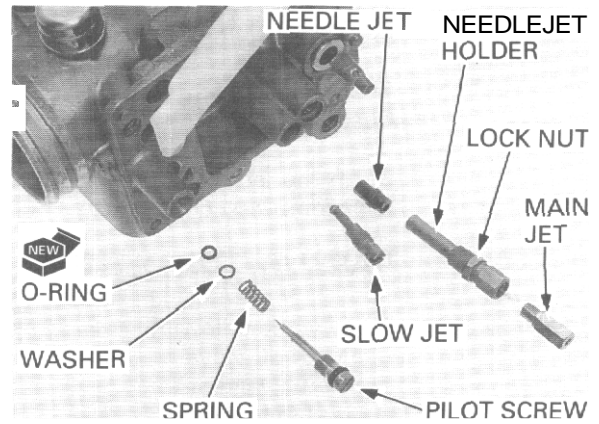
**TOOL**

Carburetor float level gauge **07401 - 0010000**

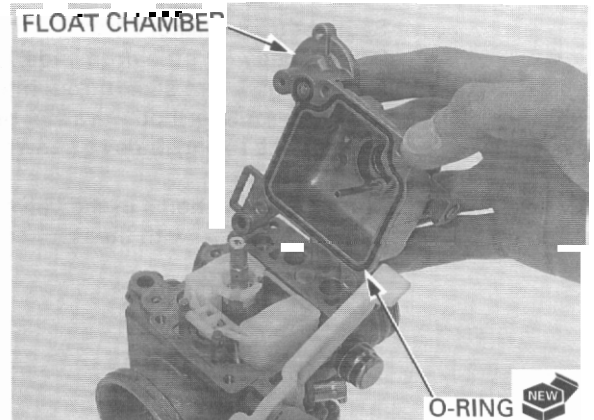
FLOAT LEVEL 18.5 mm (0.73 in)

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

Install the diaphragm shaft boot of the accelerator pump until it is flush with the carburetor body. Install the baffle plate by aligning its groove with the lug on the carburetor body as shown.



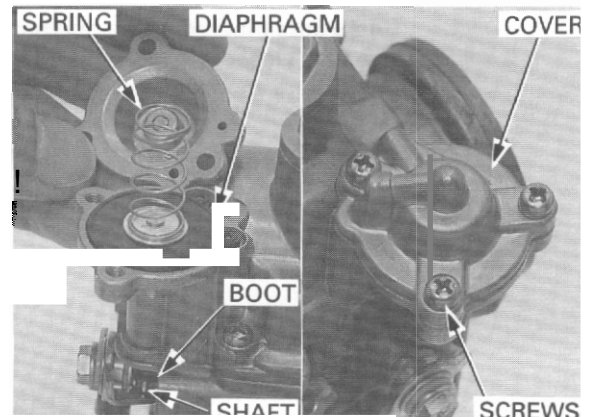
Install a new O-ring into the float chamber groove securely.  
 Install the float chamber, being careful not to pinch the boot and tighten the four screws.



### ACCELERATOR PUMP

Insert the diaphragm shaft into the float chamber through the boot and set the diaphragm rib into the groove properly. To avoid damage to the boot, turn the shaft slowly when inserting.

Place the spring onto diaphragm. Install and hold the pump cover, being careful not to pinch the diaphragm and tighten the three screws.

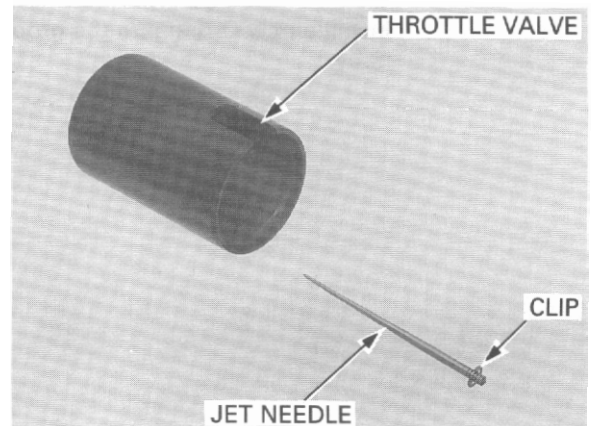


### THROTTLE VALVE

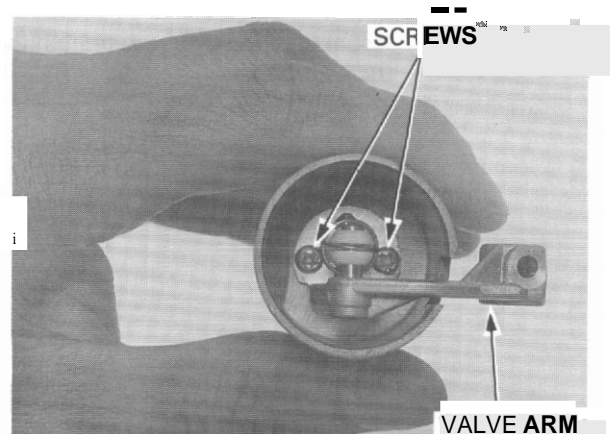
Install the needle clip onto the jet needle.

**STANDARD CLIP POSITION: 3rd groove from top**

Insert the jet needle into the throttle valve.



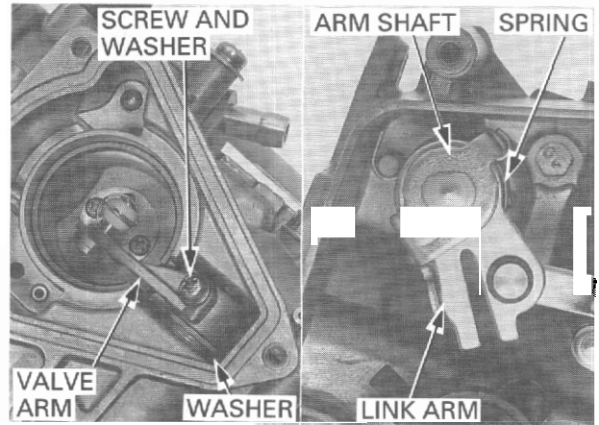
Assemble the throttle valve and valve arm with the two screws.  
 Install the throttle valve assembly into the carburetor body, being careful not to damage the jet needle.



## FUEL SYSTEM

Set the thrust washer between the valve arm and carburetor body (throttle drum side). Insert the link arm shaft through the throttle link arm, spring, carburetor body, washer and valve arm while hanging the spring ends as shown.

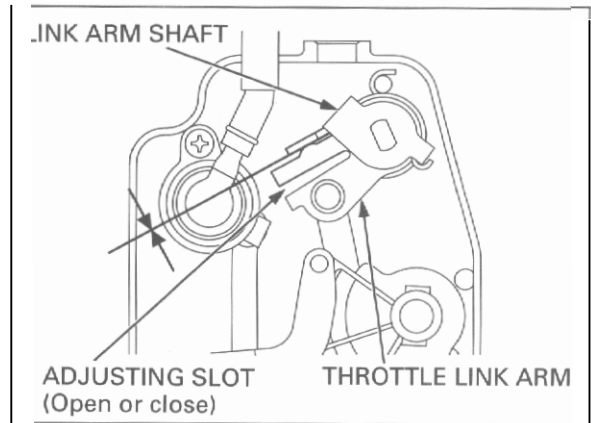
Align the screw holes in the valve arm and shaft and tighten the screw with the washer.



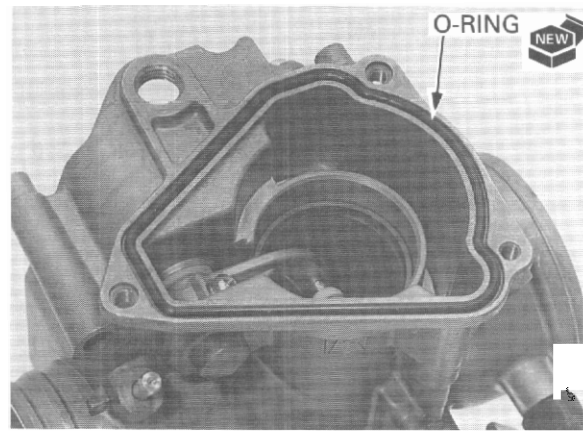
Make sure that the piston and butterfly throttle valves are fully closed.

Make sure the clearance between the link arm shaft and throttle link arm is 0.1 - 0.3 mm (0.004 - 0.012 in).

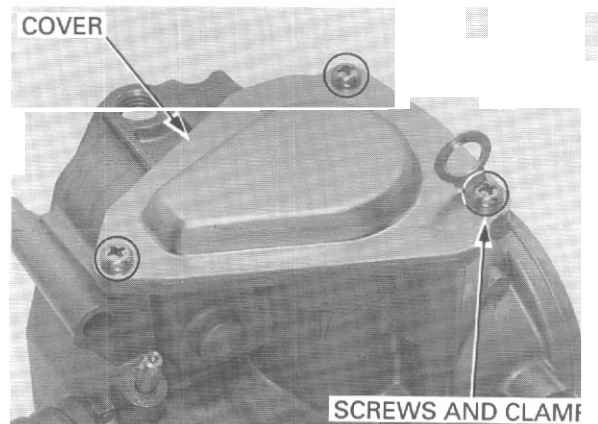
Adjust synchronization by opening or closing the slot in the throttle link arm.



Install a new O-ring into the groove in the carburetor body.

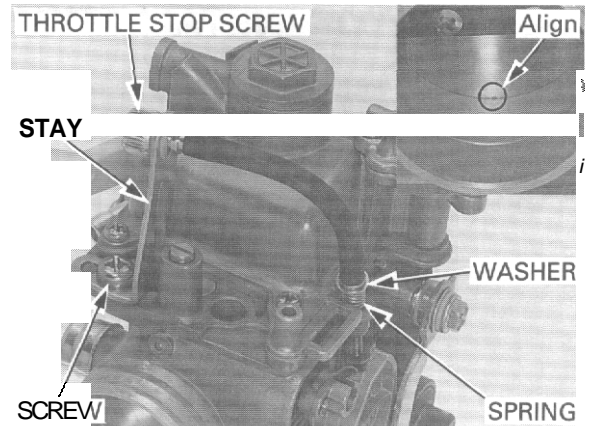


Install the top cover and tighten the three screws with the clamp.



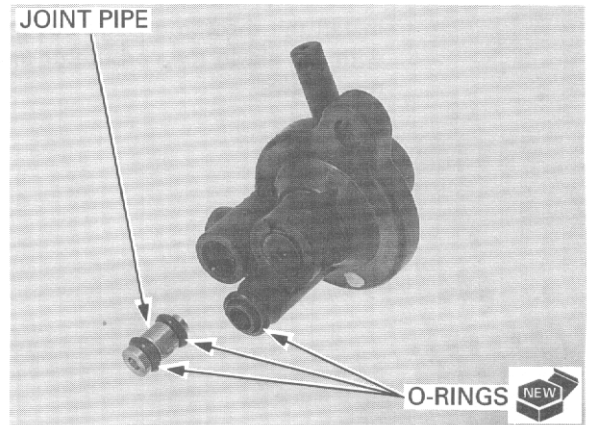
Install the throttle stop screw with the washer and spring by screwing it clockwise. Secure the stay with the screw by aligning its hole and boss.

Turn the throttle stop screw to align the butterfly throttle valve with the edge of the outside by-pass hole in the carburetor.

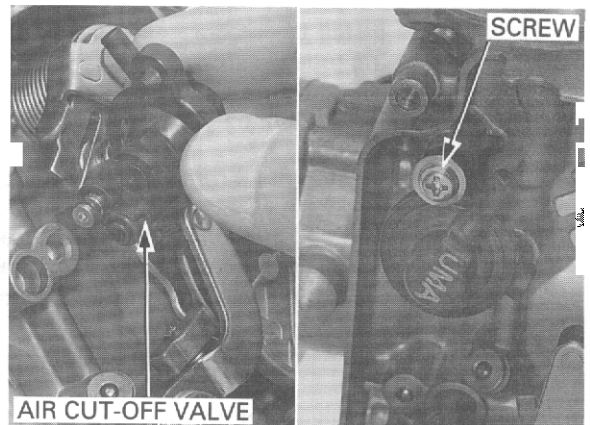


### AIR CUT-OFF VALVE

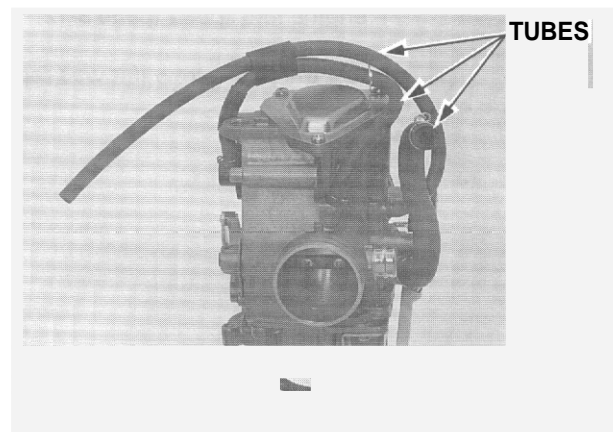
Install new O-rings onto the air cut-off valve into the joint pipe. Install the joint pipe into the air cut-off valve with the stepped side facing out (valve side).



Install the air cut-off valve and secure it with the screw.



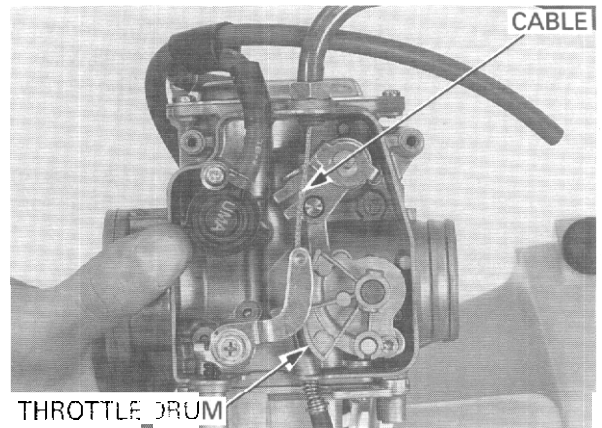
Connect the vacuum, air vent and fuel tubes as shown.



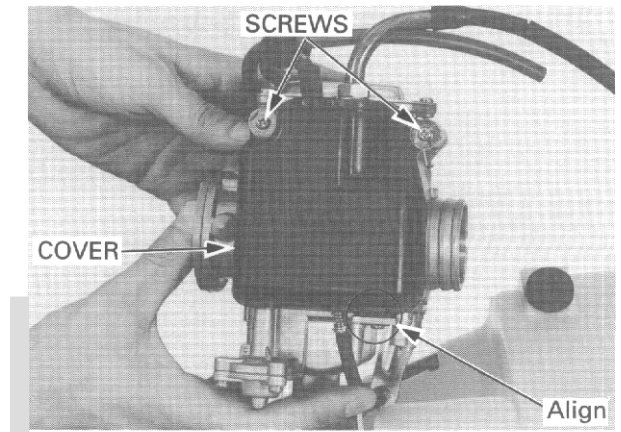


## CARBURETOR INSTALLATION

Install the throttle cable outer to the carburetor body and connect the cable inner to the throttle drum.



Install the throttle linkage cover by aligning the tab with the slit in the carburetor and secure it with the two screws.



Install the carburetor into the insulator and connecting tube securely.  
Align the lug on the carburetor with the groove in the insulator and tighten the band screws.

Tighten the throttle cable lock nut.

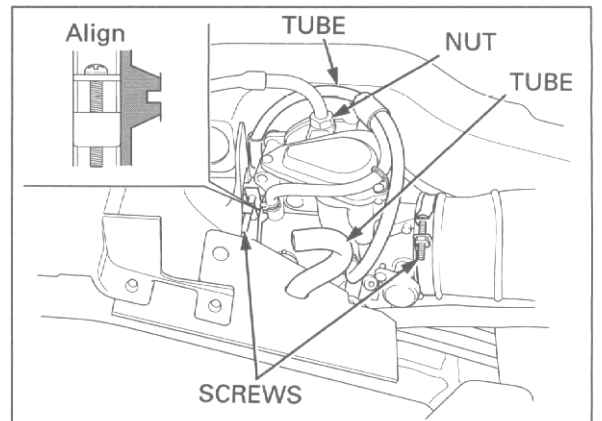
Connect the drain tube to the carburetor.  
Install the air vent tube into the heat protector.  
Insert the fuel tube through the protector rubber.

Install the fuel tank (page 2-4).

Check the following:

- throttle operation (page 3-4)
- engine idle speed (page 3-12)

Adjust the pilot screw if it was replaced (page 5-13).



## PILOT SCREW ADJUSTMENT

### IDLE DROP PROCEDURE

#### NOTE:

- The pilot screw is factory pre-set and no adjustment is necessary unless the pilot screw is replaced.
- Use a tachometer with graduations of 50 rpm or smaller that will accurately indicate a 50 rpm change.

1. Turn the 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**                      **07908-4220201**

INITIAL OPENING: **2-1/4** turns out

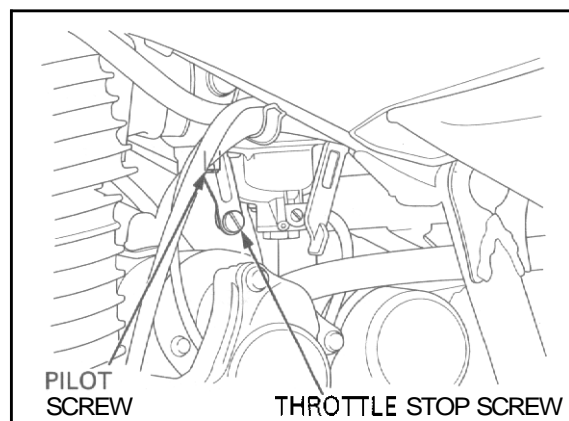
2. Warm up the engine to operating temperature. Stop and go riding for 10 minutes is sufficient.
3. Stop the engine and connect a tachometer according to the tachometer manufacturer's instructions.
4. Start the engine and adjust the idle speed with the throttle stop screw.

IDLE SPEED: **1,400 ± 100 rpm**

5. Turn the pilot screw in or out slowly to obtain the highest engine speed.
6. Lightly open the throttle 2 - 3 times, then adjust the idle speed with the throttle stop screw.
7. Turn the pilot screw in gradually until the engine speed drops by 50 rpm.
8. Turn the pilot screw out to the final opening.

FINAL OPENING: **1** turn out

9. Readjust the idle speed with the throttle stop screw.





## HIGH ALTITUDE ADJUSTMENT

	Below 5,000 ft (1,500 m)	Between 3,000 - 8,000 ft (1,000 - 2,500 m)
Main jet	#148	#142
Pilot screw opening	Factory preset	1 turns in from factory preset

The carburetor must be adjusted for high altitude riding (between 3,000 - 8,000 ft/1,000 - 2,500 m).

**STANDARD SETTING:** *Below 5,000 ft (1,500 m)*  
**HIGH ALTITUDE SETTING:** *Between 3,000 - 8,000 ft  
(1,000 - 2,500 m)*

The high altitude carburetor adjustment is performed as follows:  
 Remove the carburetor (page 5-3) and the float chamber cap.  
 Replace the standard main jet with the high altitude type.

### HIGH ALTITUDE MAIN JET #142

Check that the O-ring on the chamber cap is in good condition and replace it with a new one if necessary. Install the chamber cap and the carburetor.  
 Turn-in the pilot screw the specified number of turns from the initial setting.

### TOOL

Pilot screw wrench 07908-4220201

### HIGH ALTITUDE PILOT SCREW OPENING:

*1 turn in from initial opening*

Start the engine and adjust the idle speed at high altitude to ensure proper high altitude operation.

### ▲ WARNING

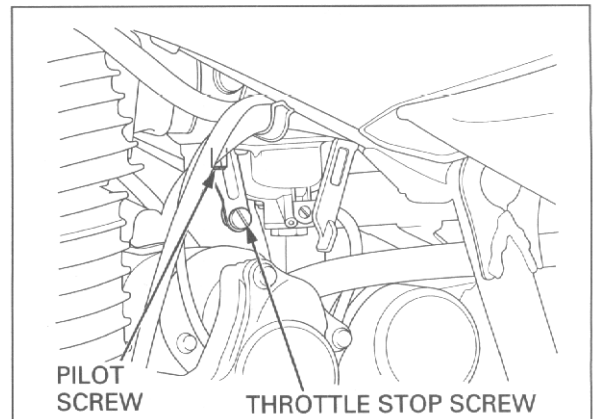
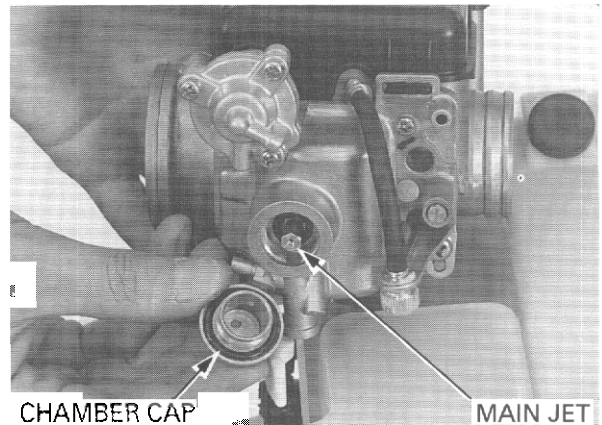
*If the engine must be running to do some work, make sure the area is well-ventilated. Never run the engine in an enclosed area. The exhaust contains poisonous carbon monoxide gas that may cause loss of consciousness and lead to death. Run the engine in an open area or with an exhaust evacuation system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

### CAUTION:

*Sustained operation below 5,000 ft (1,500 m) with the high altitude settings may cause engine overheating and engine damage. Install the standard main jet and screw out the pilot screw the specified number of turns, when riding below 5,000 ft (1,500 m).*

### STANDARD MAIN JET # 148

*Pilot screw change for low altitude: 1 turn out*



## AIR CLEANER HOUSING

### REMOVAL/INSTALLATION

Remove the seat/rear fender assembly (page 2-2).

Disconnect the crankcase breather tube and remove the crankcase breather storage tank from the air cleaner connecting tube.

Remove the mounting bolt.

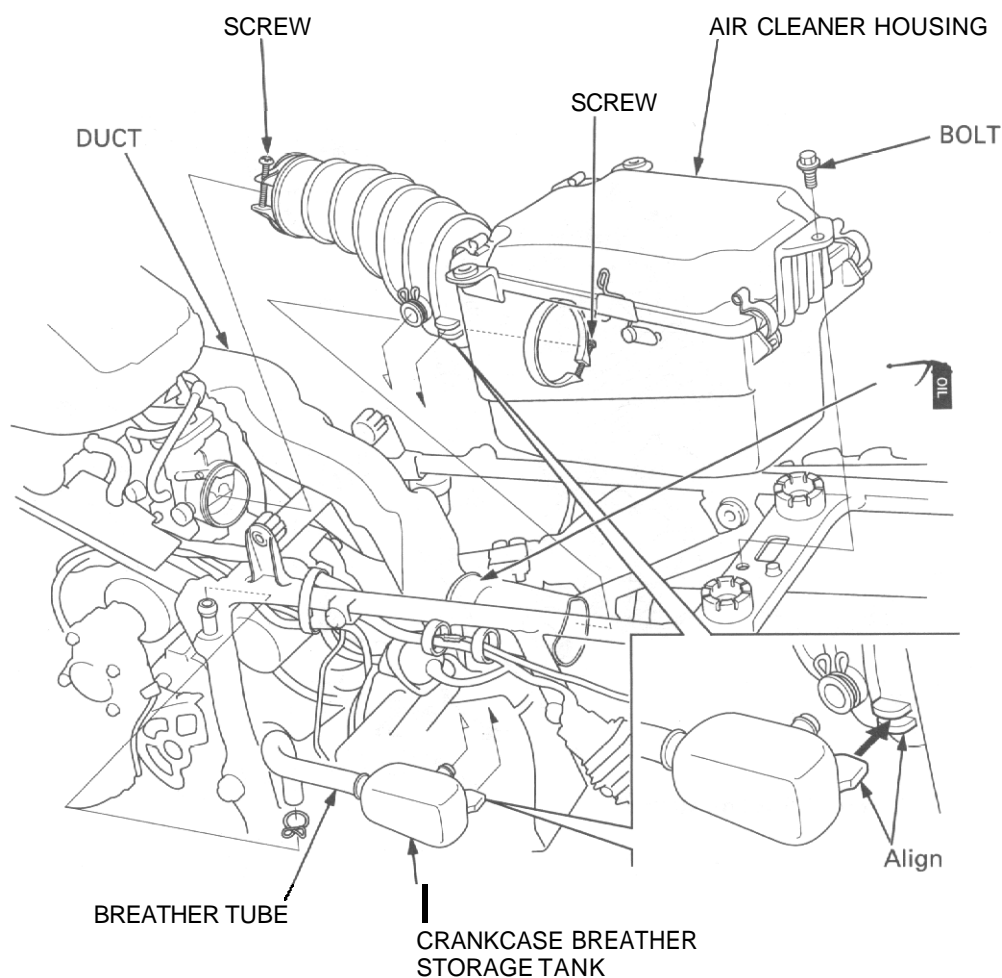
Loosen the connecting tube band and intake duct band screws.

Remove the air cleaner housing from the carburetor and inlet duct.

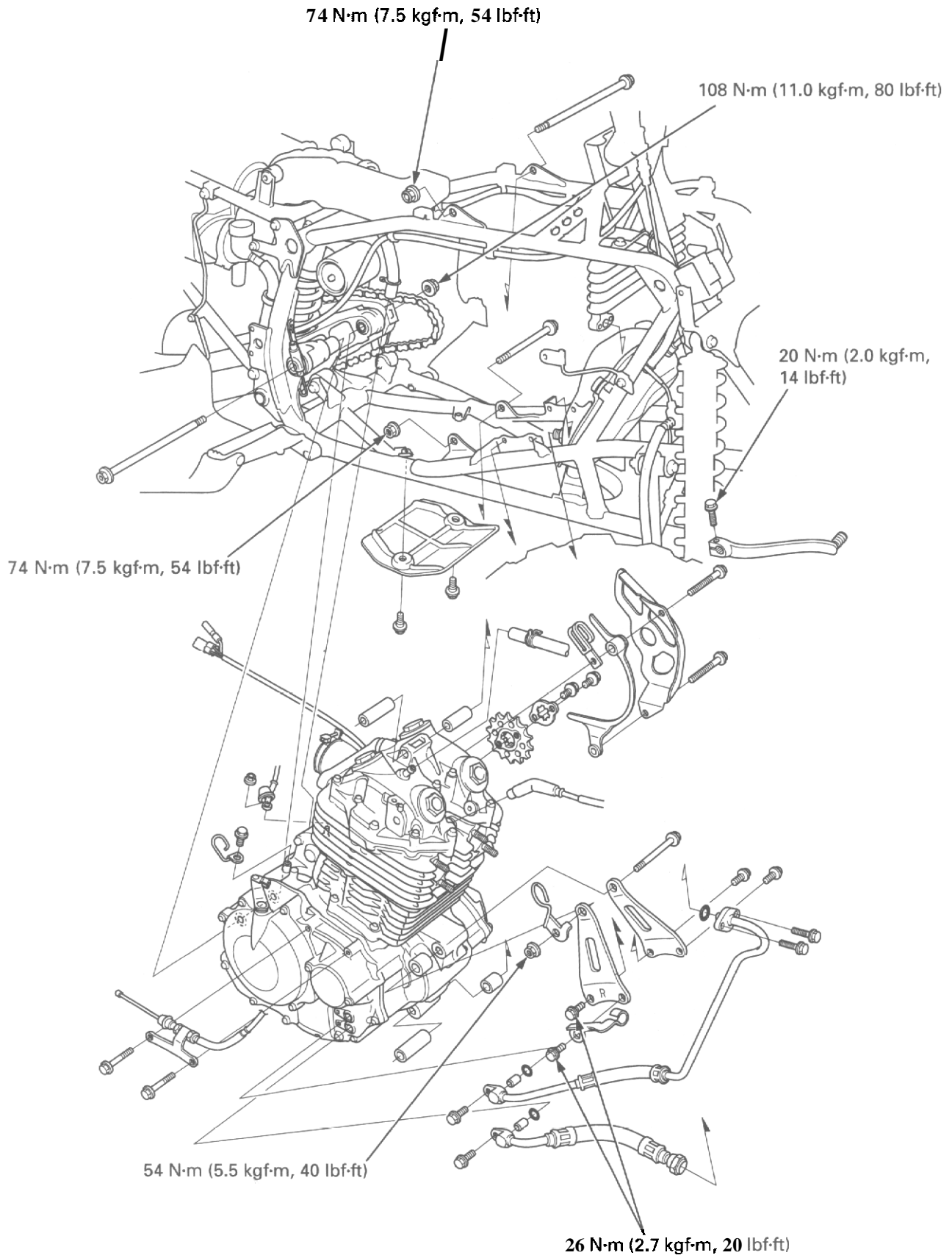
Installation is in the reverse order of removal.

#### NOTE:

- Apply oil to the mating surface of the intake duct and housing.
- When installing the crankcase breather storage tank, align its tab with the connecting tube slit.



# ENGINE REMOVAL/INSTALLATION





### ENGINE REMOVAL

Drain the engine oil (page 3-91)

Remove the following:

- fuel tank and heat protector (page 2-4)
- carburetor assembly (page 5-3)
- exhaust system (page 2-6).

Loosen the rear axle for maximum drive chain slack (page 3-13).

Remove the two bolts, sprocket cover, sprocket protector and clamp.

Remove the fixing plate bolts.

Remove the fixing plate by aligning the splines of the plate and countershaft.

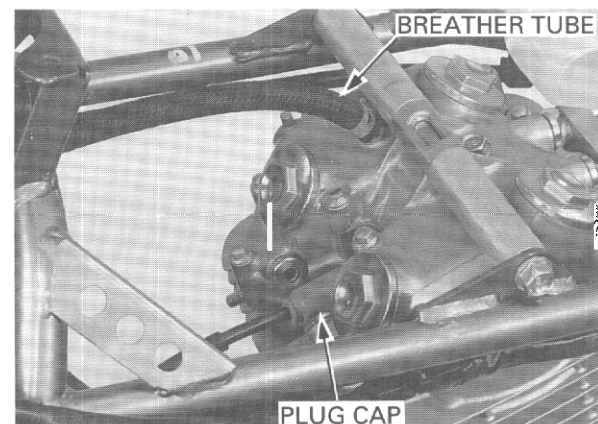
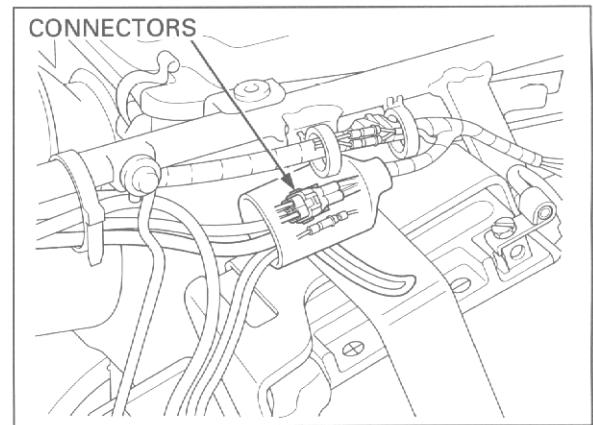
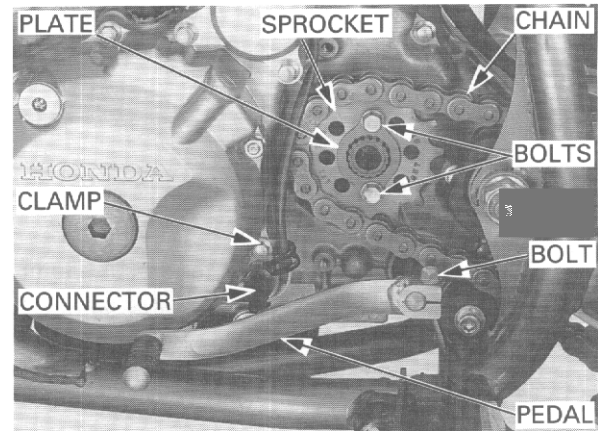
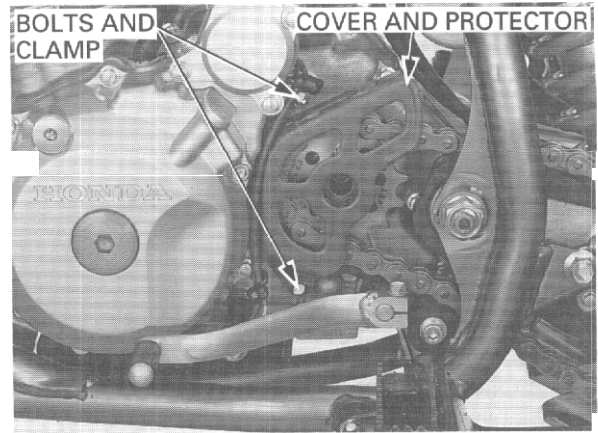
Pull the drive sprocket off the countershaft and remove the sprocket from the chain.

Remove the pinch bolt and the gearshift pedal.

Release the neutral switch wire from the clamp and disconnect the connector.

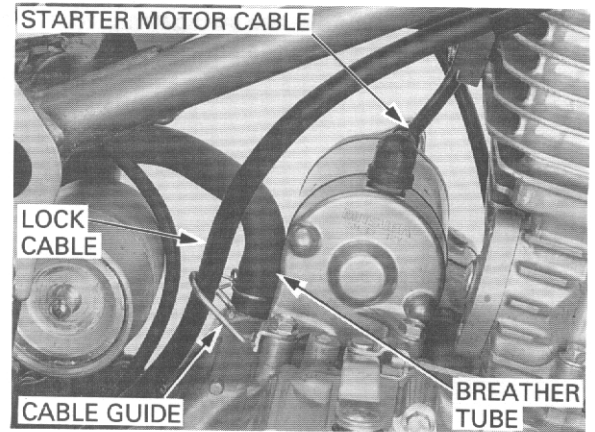
Disconnect the alternator connectors and release the wire from the wire band and clamp.

Disconnect the spark plug cap.  
Disconnect the cylinder head breather tube.

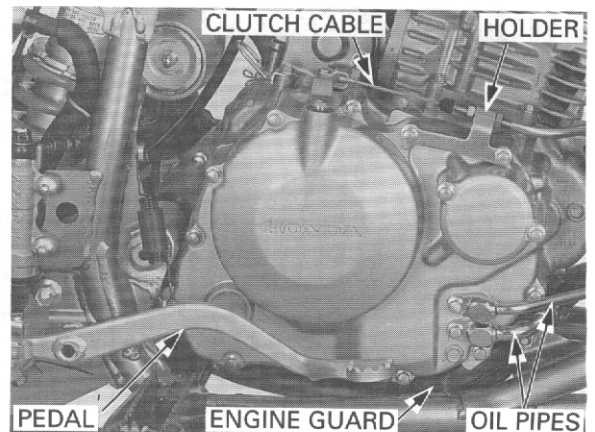


## ENGINE REMOVAL/INSTALLATION

Disconnect the starter motor cable by removing the terminal nut.  
Disconnect the crankcase breather tube from the engine.  
Release the brake lock cable from the cable guide by removing the mounting bolt.



Loosen the clutch cable lock nut. Remove the holder bolts and cable holder and disconnect the clutch cable from the clutch arm.



Disconnect the oil pipes from the engine by removing the bolts. Remove the dowel pins and O-rings.

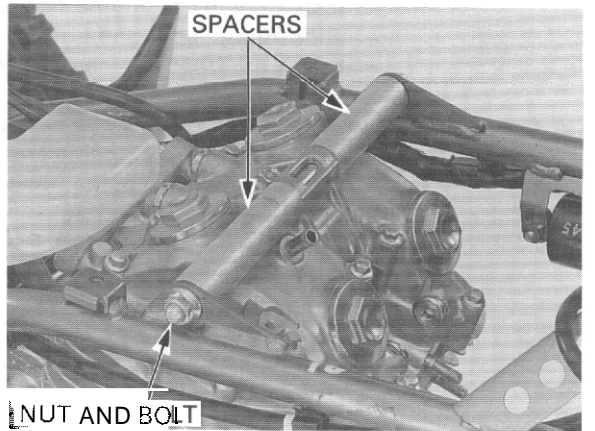
Remove the brake pedal (page 14-20).

Remove the two bolts and engine guard.

Support the engine with a floor jack or other adjustable support.

### NOTE:

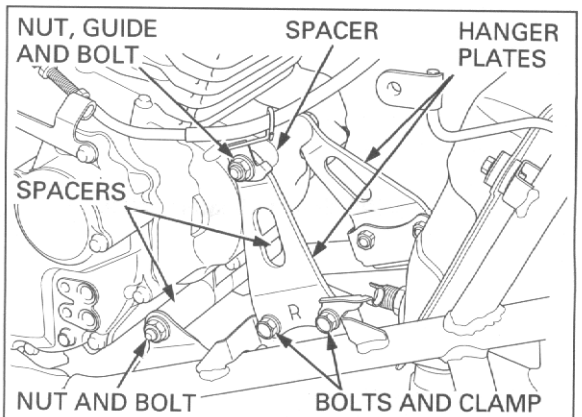
The jack height must be continually adjusted to relieve stress for ease of bolt removal.



Remove the upper engine hanger nut, spacers and bolt.

Remove the front engine hanger nut, cable guide, spacer and bolt.

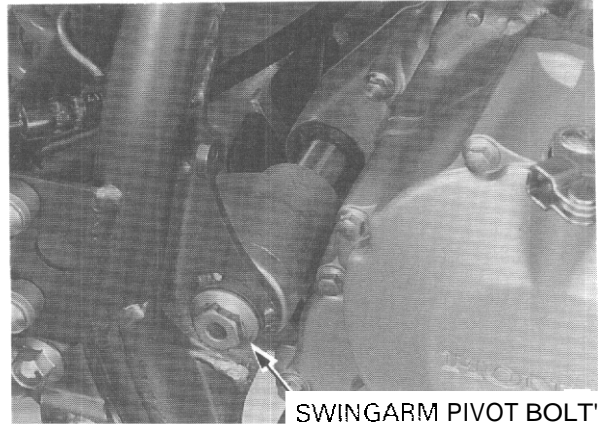
Remove the front engine hanger bolts, pipe clamp and hanger plates.



Remove the lower engine hanger nut, spacers and bolt.

## ENGINE REMOVAL/INSTALLATION

Remove the swingarm pivot nut and bolt.  
Remove the engine out of the frame to the right.



## ENGINE INSTALLATION

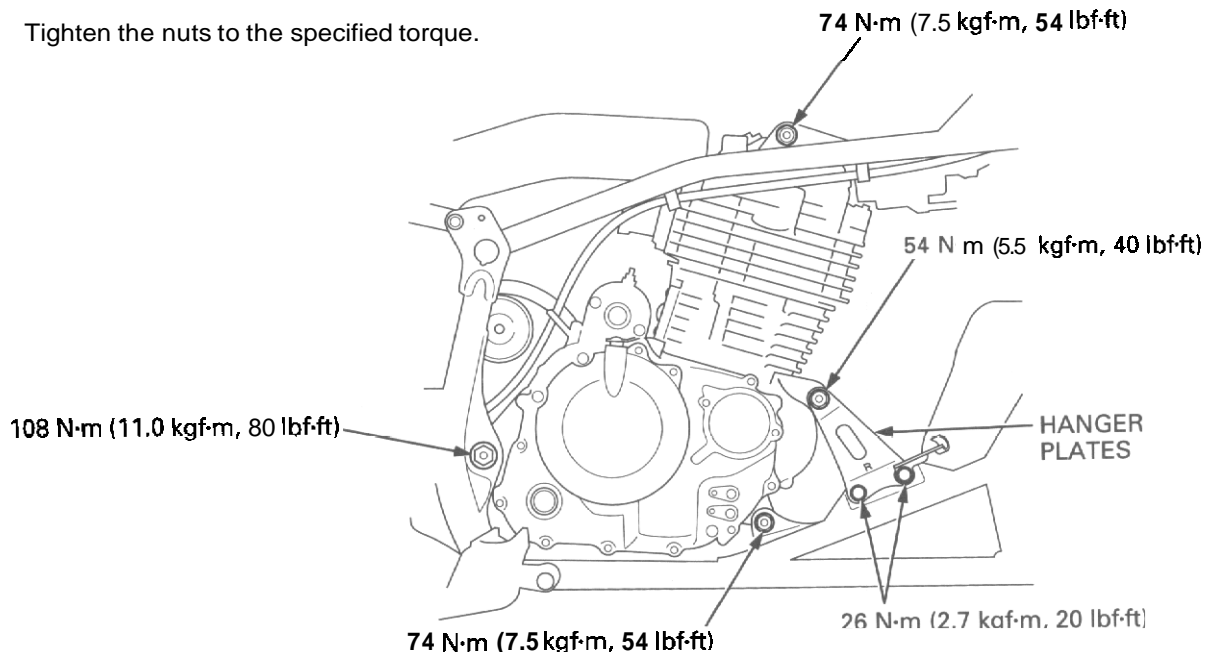
Install the engine into the frame from the right side in the reverse order of removal.

### NOTE:

- Before installing, make sure that the pivot collars are installed into the swingarm pivots.
- Note the installation direction of the mounting bolts and the position of the spacers.
- The front hanger plates are identified by marks them (R: right/L: left).

- Install the swingarm pivot bolt and nut.
- Install the lower engine hanger bolt, spacers (Left: short/Right: long) and nut.
- Install the front engine hanger plate with the bolts and clamp.  
Install the front engine hanger bolt, spacer (right side of the engine), guide and nut.
- Install the upper engine hanger bolt, spacers (Left short/Right: long) and nut.

Tighten the nuts to the specified torque.

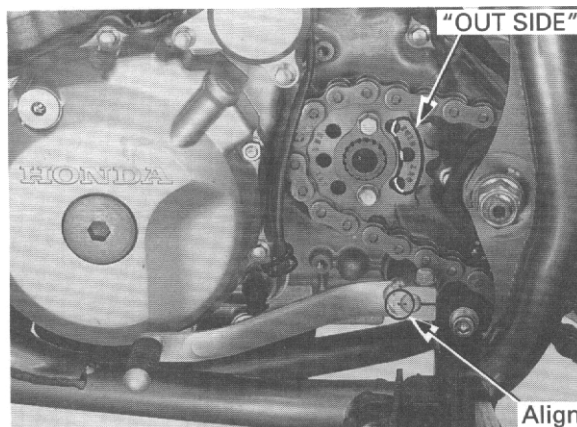


Install the removed parts from engine removal procedure (page 6-2 to 6-3) in the reverse order of removal.

TORQUE: Gearshift pedal pinch bolt:  
20 N·m (2.0 kgf·m, 14 lbf·ft)

**NOTE:**

- Route the wires, cables and tubes properly (page 1-18).
- When installing the gearshift pedal, align the punch marks on the pedal and spindle.
- When installing the drive sprocket, install with the "OUT SIDE" mark facing out. Set the fixing plate into the countershaft groove and move it to align the bolt holes in the plate and sprocket then tighten the bolts.



Install the following:

- oil pipes (page 4-7)
- brake pedal (page 14-20)
- exhaust system (page 2-6)
- carburetor assembly (page 5-12)
- fuel tank and heat protector (page 2-4)

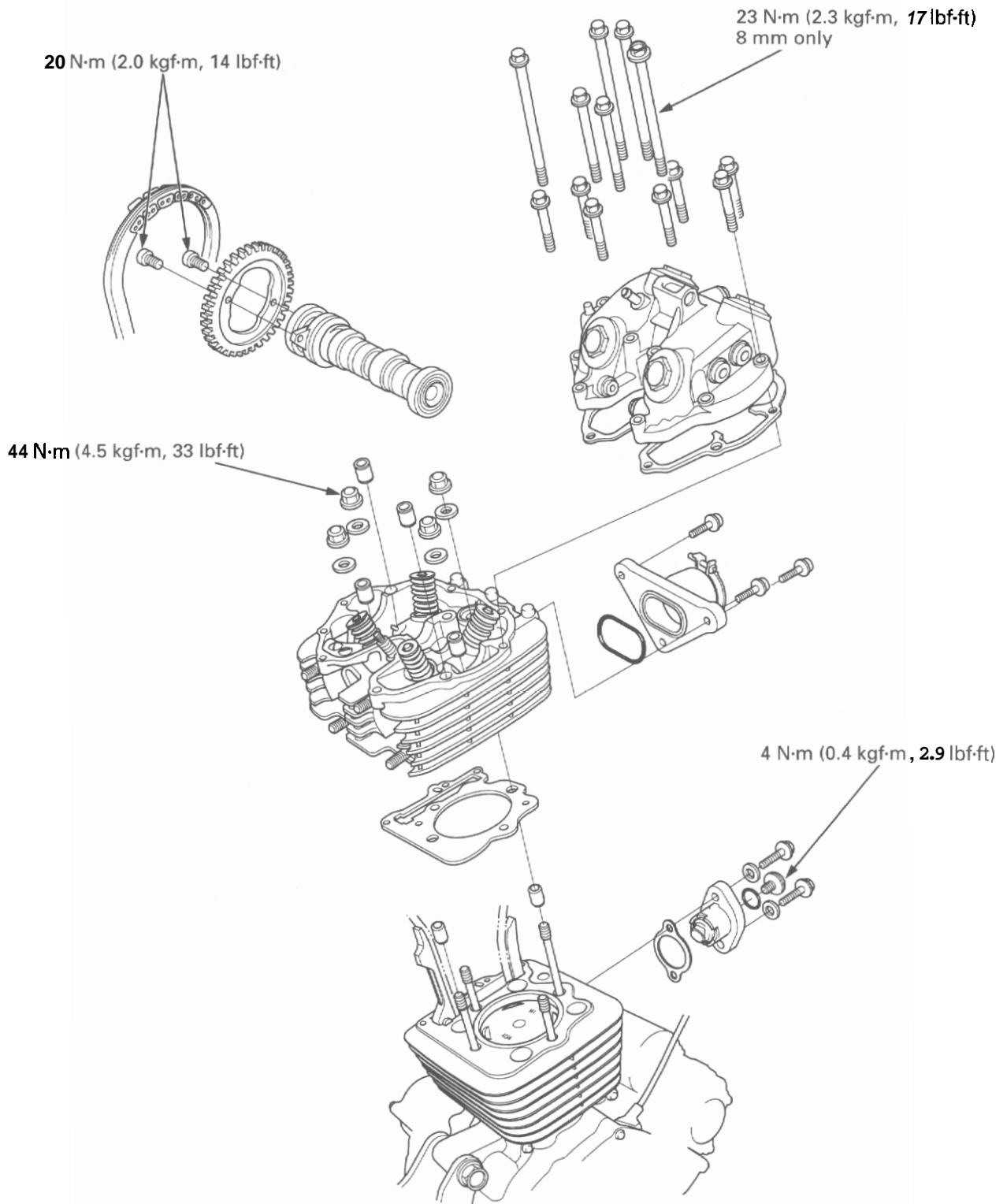
Perform the following adjustments:

- drive chain (page 3-13)
- clutch cable (page 3-17)
- throttle cable (page 3-4)

Fill with engine oil (page 3-9).



# CYLINDER HEAD/VALVE



# 7. CYLINDER HEAD/VALVE

<b>SERVICE INFORMATION</b>	<b>7-1</b>	<b>VALVE GUIDE REPLACEMENT</b>	<b>7-12</b>
<b>TROUBLESHOOTING</b>	<b>7-3</b>	<b>VALVE SEAT INSPECTION/REFACING</b>	<b>7-13</b>
<b>CYLINDER COMPRESSION</b>	<b>7-4</b>	<b>CYLINDER HEAD ASSEMBLY/ INSTALLATION</b>	<b>7-16</b>
<b>CYLINDER HEAD COVER/CAMSHAFT REMOVAL</b>	<b>7-4</b>	<b>CAMSHAFT/CYLINDER HEAD COVER INSTALLATION</b>	<b>7-18</b>
<b>CYLINDER HEAD REMOVAL/ DISASSEMBLY</b>	<b>7-9</b>		

## SERVICE INFORMATION

### GENERAL

- This section covers service of the camshaft, rocker arms, cylinder head and valves. These parts 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 and lubricating oil is fed through oil passages in the cylinder head. Clean the oil passages before assembling cylinder head.
- Pour clean engine oil into the oil pocket in the cylinder head during assembly to lubricate the camshaft.
- Be careful not to damage the mating surfaces when removing the cylinder head cover and cylinder head. **Do** not strike the head cover and cylinder head too hard during removal.

### SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Cylinder compression at rpm			686 – 883 kPa (7.0 – 9.0 kgf/cm <sup>2</sup> , 100 – 128 psi)	—
Valve clearance		IN	0.10 (0.004)	—
		EX	0.12 (0.005)	—
Camshaft	Cam lobe height	IN	30.673 – 30.773 (1.2076 – 1.2115)	30.57 (1.204)
		EX	30.468 – 30.568 (1.1995 – 1.2035)	30.37 (1.196)
	Runout		—	0.03 (0.001)
Rocker arm	Arm I.D.	IN/EX	11.500 – 11.518 (0.4528 – 0.4535)	11.53 (0.454)
	Shaft O.D.	IN/EX	11.466 – 11.484 (0.4514 – 0.4521)	11.41 (0.449)
	Arm-to-shaft clearance	IN/EX	0.016 – 0.052 (0.0006 – 0.0020)	0.10 (0.004)
Sub-rocker arm	Arm I.D.	IN/EX	7.000 – 7.015 (0.2756 – 0.2762)	7.05 (0.278)
	Shaft O.D.	IN/EX	6.972 – 6.987 (0.2745 – 0.2751)	6.92 (0.272)
	Arm-to-shaft clearance	IN/EX	0.013 – 0.043 (0.0005 – 0.0017)	0.10 (0.004)
Valve, valve guide	Valve stem O.D.	IN	5.475 – 5.490 (0.2156 – 0.2161)	5.46 (0.215)
		EX	5.455 – 5.470 (0.2148 – 0.2154)	5.44 (0.214)
	Valve guide I.D.	IN/EX	5.500 – 5.512 (0.2165 – 0.2170)	5.52 (0.217)
	Stem-to-guide clearance	IN	0.010 – 0.037 (0.0004 – 0.0015)	0.12 (0.005)
		EX	0.030 – 0.057 (0.0012 – 0.0022)	0.14 (0.006)
	Valve seat width	IN/EX	1.0 – 1.1 (0.039 – 0.043)	2.0 (0.08)
Valve spring	Free length	Inner	37.19 (1.464)	36.3 (1.43)
		Outer	44.20 (1.740)	43.1 (1.70)

## CYLINDER HEAD/VALVE

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### TORQUE VALUES

Upper engine hanger nut	54 N·m (5.5 kgfm, 40 lbf·ft)
Cylinder head nut	44 N·m (4.5 kgfm, 33 lbf·ft) Apply oil to the threads and seating surface
Cam sprocket bolt	20 N·m (2.0 kgf·m, 14 lbf·ft) Apply locking agent to the threads
Cam chain tensioner plug	4 N·m (0.4 kgfm, 2.9 lbf·ft)
Rocker arm shaft	27 N·m (2.8 kgfm, 20 lbf·ft) Apply locking agent to the threads
Sub-rocker arm shaft	27 N·m (2.8 kgfm, 20 lbf·ft) Apply locking agent to the threads
Cylinder head cover bolt (8 mm)	26 N·m (2.7 kgfm, 20 lbf·ft)
Spark plug	18 N·m (1.8 kgfm, 13 lbf·ft)

### TOOLS

Valve spring compressor	07757 - 0010000
Valve guide driver, 5.5 mm	07742 - 0010100
Valve guide reamer, 5.5 mm	07984 - 2000001 or 07984 - 200000D (U.S.A. only)
Valve seat cutter, 35 mm (IN 45°)	07780 - 0010400 — or equivalent commercially available in U.S.A.
Valve seat cutter, 29 mm (EX 45°)	07780 - 0010300 —
Flat cutter, 35 mm (IN 32°)	07780 - 0012300 —
Flat cutter, 30 mm (EX 32°)	07780 - 0012200 —
Interior cutter, 30 mm (IN/EX 60°)	07780 - 0014000 —
Compression gauge attachment	07908 - KK60000 —
Cutter holder, 5.5 mm	07781 - 0010101 —

### 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.
- If the performance is poor at low speeds, check for a white smoke in the crankcase breather tube. If the tube is smoky, check for sized piston ring (section 8).

#### 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
  - Valve stuck open
- Cylinder head
  - Leaking or damaged cylinder head gasket
  - Warped or cracked cylinder head
  - Loose spark plug
- Cylinder/piston (section 8)

#### Compression too high

- Excessive carbon build-up on piston head or combustion chamber
- Worn or damaged decompressor system

#### Excessive smoke

- Worn valve stem or valve guide
- Damaged stem seal
- Cylinder/piston problem (section 8)

#### Excessive noise

- Incorrect valve clearance
- Sticking valve or broken valve spring
- Excessive worn valve seat
- Worn or damaged camshaft
- Worn or damaged rocker arm and/or shaft
- Worn rocker arm follower or valve stem end
- Worn cam chain
- Worn or damaged cam chain tensioner
- Worn cam sprocket teeth
- Cylinder/piston problem (section 8)

#### Rough idle

- Low cylinder compression

## CYLINDER COMPRESSION

Warm up the engine to normal operating temperature. Stop the engine, disconnect the spark plug cap and remove the spark plug.

Install the compression gauge with the gauge attachment into the spark plug hole.

### TOOL

Compression gauge attachment 07908 - **KK60000** or equivalent commercially available in U.S.A.

Shift the transmission in neutral and open the choke lever (OFF).

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

**686 - 883 kPa (7.0 - 9.0 kgf/cm<sup>2</sup>, 100 - 128 psi)**

### NOTE:

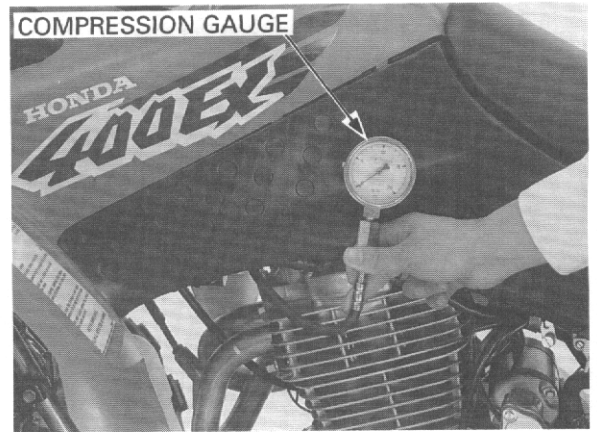
Check that there is no leakage at the gauge connection,

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:

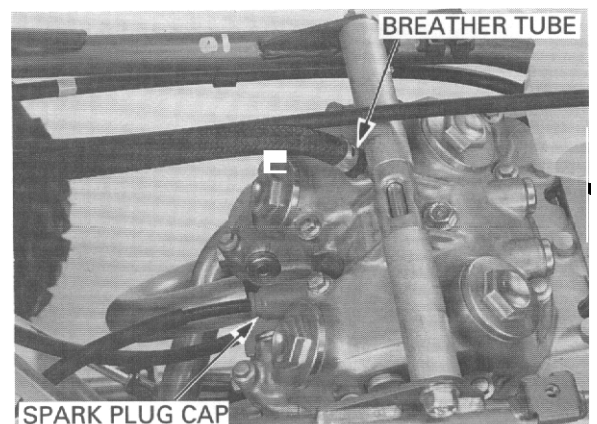
- carbon deposits in combustion chamber or on piston head



## CYLINDER HEAD COVER/CAMSHAFT REMOVAL

Remove the fuel tank under heat protector (page 2-4).

Remove the spark plug cap. Disconnect the crankcase breather tube from the head cover.



## CYLINDER HEAD/VALVE

Remove the upper engine hanger nut, bolt and spacers.



Remove the timing hole cap, crankshaft hole cap and valve adjusting hole caps (page 3-7).

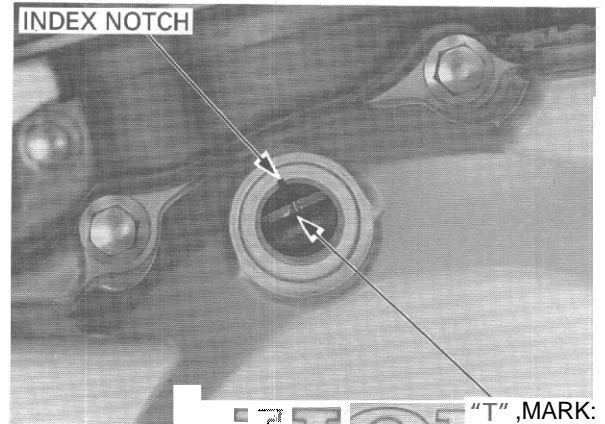
***The crankshaft should be turned only counterclockwise. This must be done to prevent the one-way decompressor system functioning***

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

Make sure that the piston is at TDC (Top Dead Center) on the compression stroke.

The rocker arms should be loose.

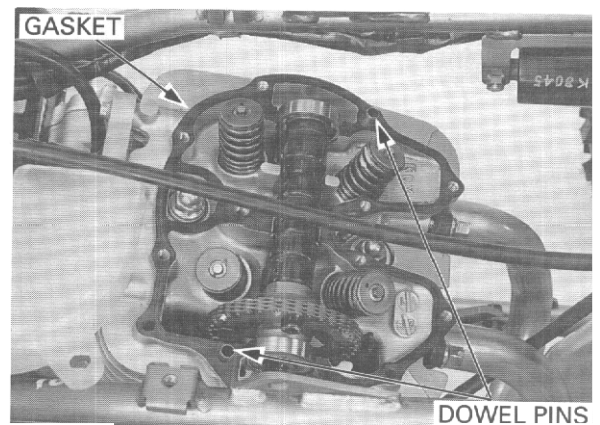
If the rocker arms are tight, rotate the crankshaft counterclockwise one full turn and realign the "T" mark with the index notch.



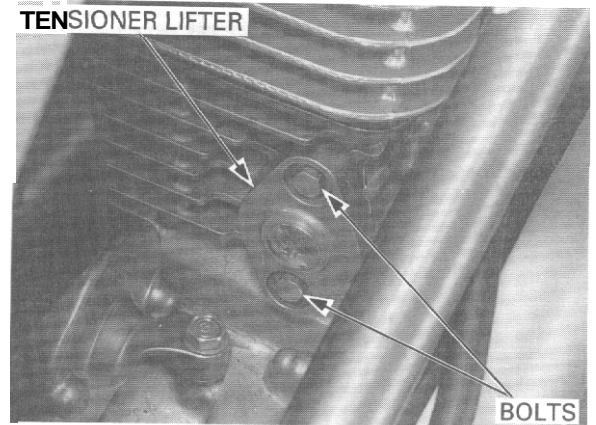
Loosen the twelve 6 mm bolts and 8 mm bolt in a crisscross pattern in 2 or 3 steps. Remove the bolts and the cylinder head cover.



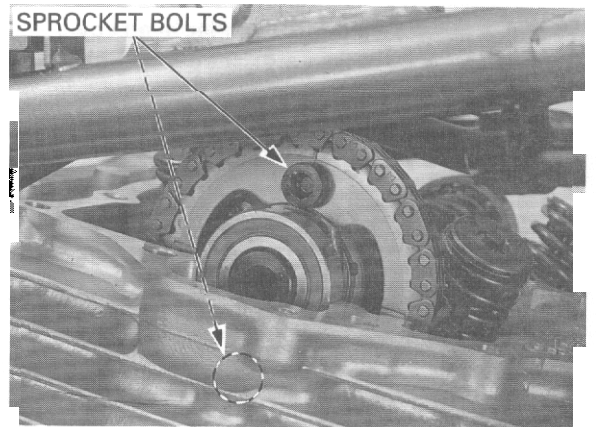
Remove the gasket and dowel pins.



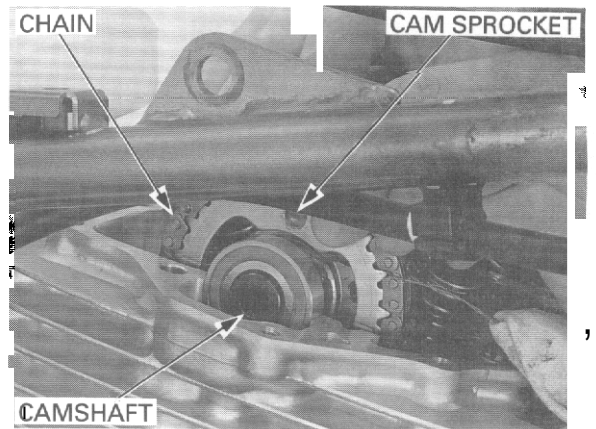
Loosen the cam chain tensioner lifter plug.  
Remove the two bolts, cam chain tensioner lifter and gasket.



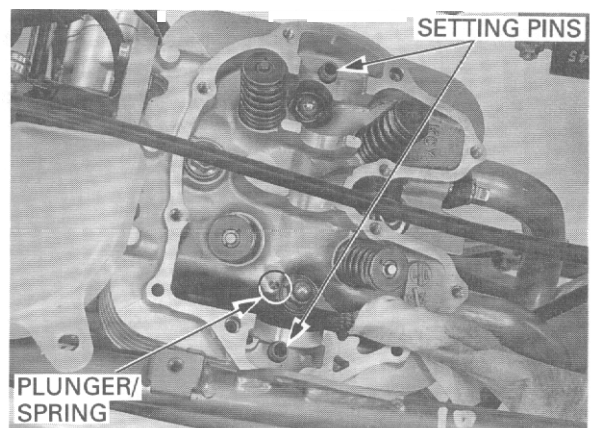
**Becarefulnotto** Remove the cam sprocket bolt.  
**let the sprocket** Rotate the crankshaft counterclockwise one turn and  
**bolts fall into the** remove the other cam sprocket bolt.  
**crankcase,**



Remove the cam sprocket from the camshaft flange.  
Attach a piece of wire to the cam chain to prevent it from falling into the crankcase.  
Lift the camshaft and remove it.  
Remove the cam sprocket from the cam chain.



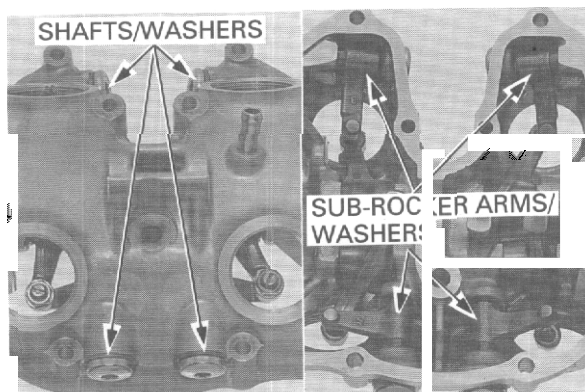
Remove the plunger, spring and bearing setting pins, being careful not to drop them into the crankcase.



### CYLINDER HEAD COVER DISASSEMBLY

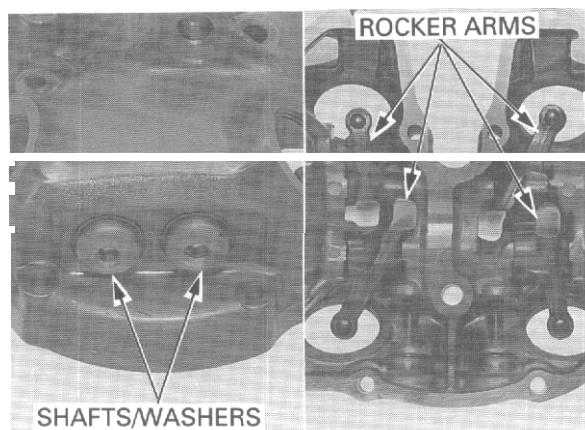
Hold the cylinder head cover securely and loosen the sub-rocker arm shafts, being careful not to damage the mating surface of the cylinder head cover.

Remove the shafts, sealing washers, sub-rocker arms and wave washers.



Hold the cylinder head cover securely and loosen the rocker arm shafts, being careful not to damage the mating surface of the cylinder head cover.

Remove the shafts, sealing washers and rocker arms.



### INSPECTION

#### CAMSHAFT

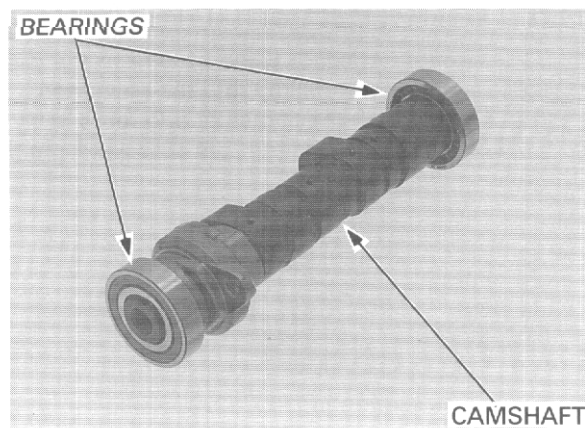
Check the cam and journal surfaces of the camshaft for scoring, scratches or evidence of insufficient lubrication.

Check the oil holes in the camshaft for clogging.

Turn the outer race of each bearing with your finger.

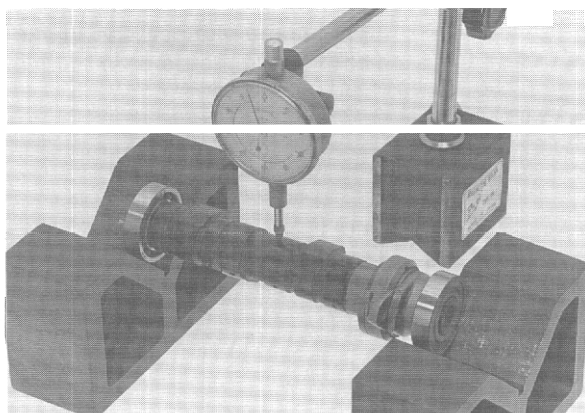
The bearings should turn smoothly and quietly.

Replace the bearing if the outer race does not turn smoothly and quietly.



Measure the camshaft runout using a dial indicator.

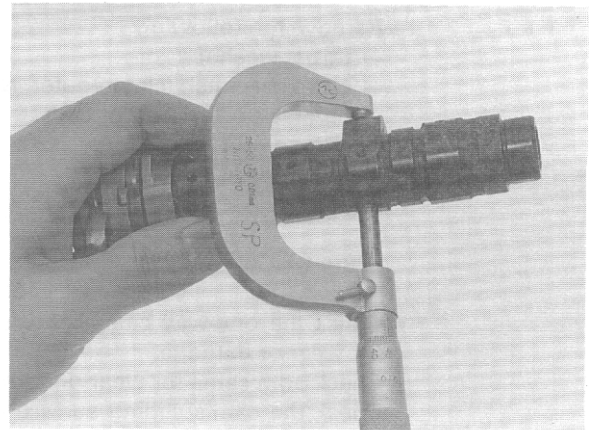
**SERVICE LIMIT: 0.03 mm (0.001 in)**





Measure each cam lobe height,

SERVICE LIMIT I N **30.57 mm (1.204 in)**  
 E X **30.37 mm (1.196 in)**



### ROCKER ARM/SHAFT

Check the rocker arms and shafts for wear or damage. If the rocker arm slipper surface is worn or damaged, check the camshaft cam lobe and oil passages.

Measure each rocker arm shaft O.D.

SERVICE LIMITS

**Rocker arm shaft: 11.41 mm (0.449 in)**  
**Sub-rocker arm shaft: 6.92 mm (0.272 in)**

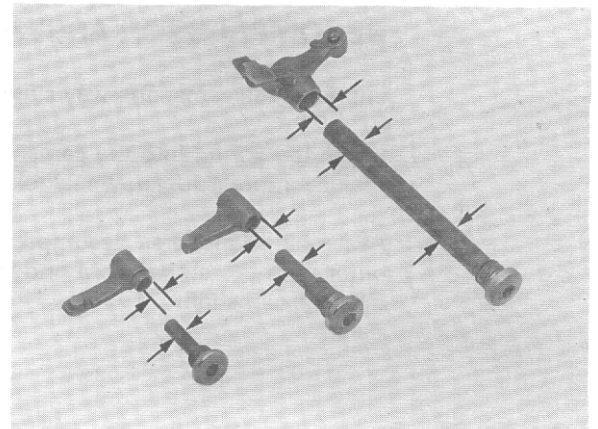
Measure each rocker arm I.D.

SERVICE LIMITS:

**Rocker arm: 11.53 mm (0.454 in)**  
**Sub-rocker arm: 7.05 mm (0.278 in)**

Subtract each rocker arm shaft O.D. from the corresponding rocker arm I.D. to obtain the rocker arm-to-shaft clearance.

SERVICE LIMIT **0.10 mm (0.004 in)**



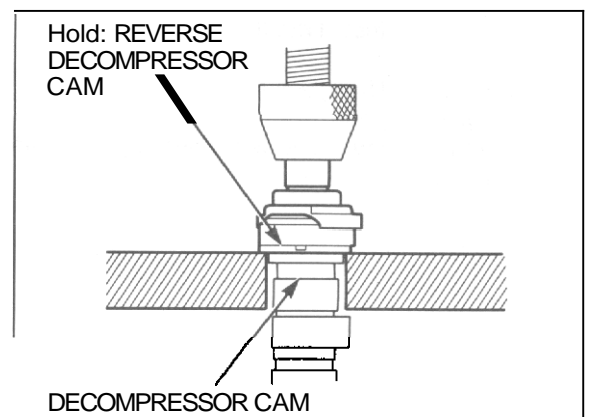
### DECOMPRESSOR DISASSEMBLY

Set the camshaft assembly onto the hydraulic press by supporting the reverse decompressor cam flange.

#### CAUTION

- **Do not support the assembly by the sprocket flange. It will break or crack its flange.**
- **When setting the camshaft assembly, take care not to contact the support blocks against the cam lobe or decompressor cam to avoid damaging them when pressing.**

Press the camshaft out of the sprocket flange.





## CYLINDER HEAD/VALVE

Remove the following:

- thrust washer
- one-way clutch (clutch outer, rollers and springs)
- reverse decompressor cam
- stopper pin
- decompressor cam
- spring

### INSPECTION

Check the one-way clutch outer, rollers and springs for wear or damage.

Check both cams for wear or damage.

Check the cam's sliding surface on the camshaft for scoring or wear.

### DECOMPRESSOR ASSEMBLY

Lubricate the cams, one-way clutch and washer,

Install the spring into the camshaft hole, then install the decompressor cam while holding the spring.

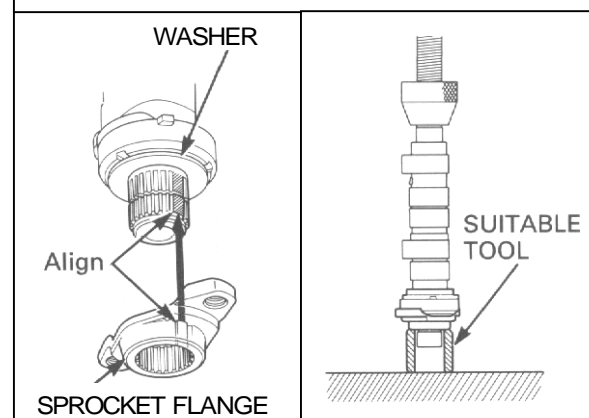
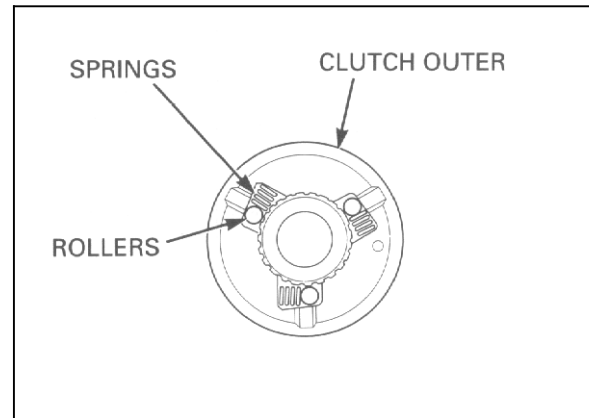
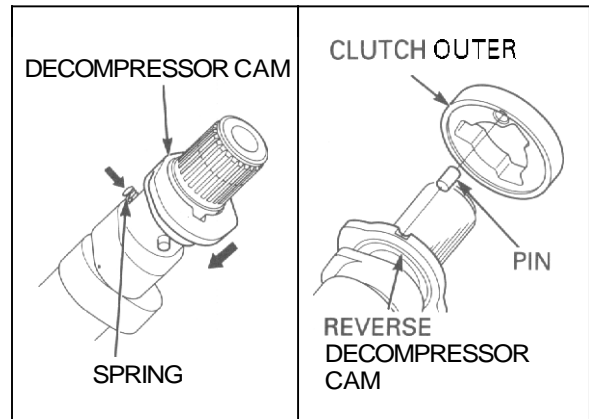
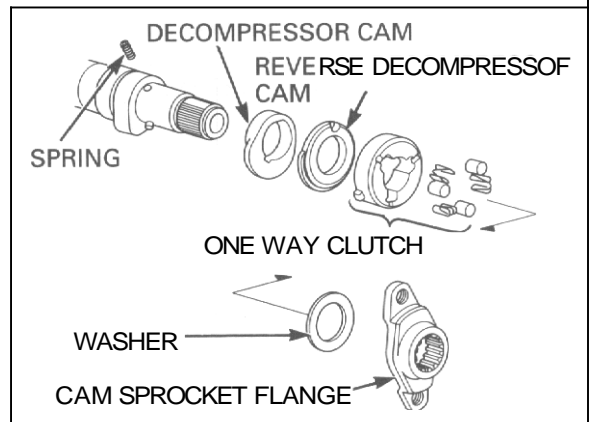
Assemble the reverse decompressor cam and clutch outer with the stopper pin and install the assembly onto the camshaft.

Install the springs and rollers into the clutch outer grooves as shown.

Install the thrust washer onto the clutch outer.

*Do not press on the flange portion. It will break or crack.*

Using a suitable tool (collar with 19 mm or more I.D.), press the sprocket flange onto the camshaft by aligning the wide groove with the wide tooth.



## CYLINDER HEAD REMOVAL/ DISASSEMBLY

Remove the following:

- exhaust system (page 2-6)
- carburetor (page 5-3)
- cylinder head cover and camshaft (page 7-3)
- sparkplug

Remove the four cap nuts and washers, being careful not to drop them into the crankcase.

*Do not strike the cylinder head too hard.*

Remove the cylinder head.

Remove the gasket and dowel pins.

Remove the three bolts and the carburetor insulator from the cylinder head.  
Remove the O-ring from the carburetor insulator.

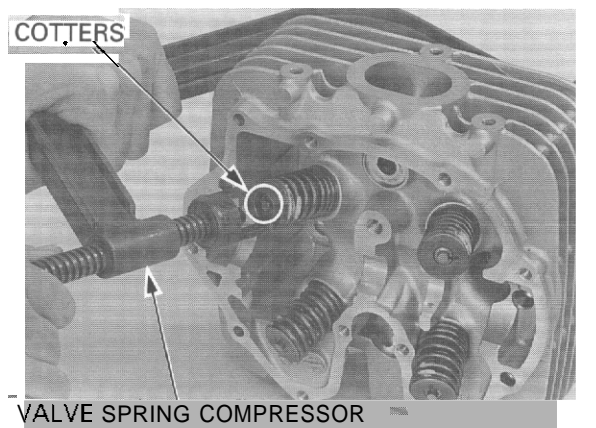
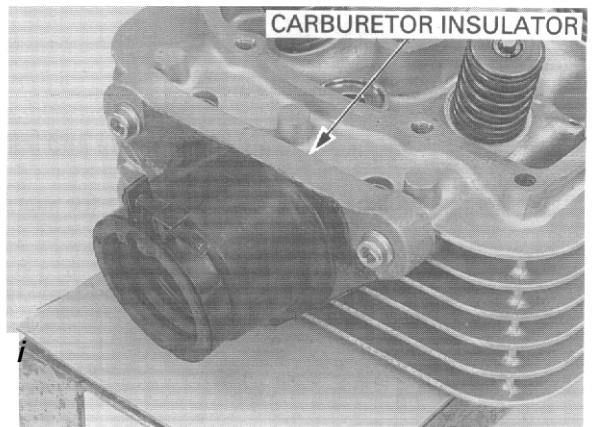
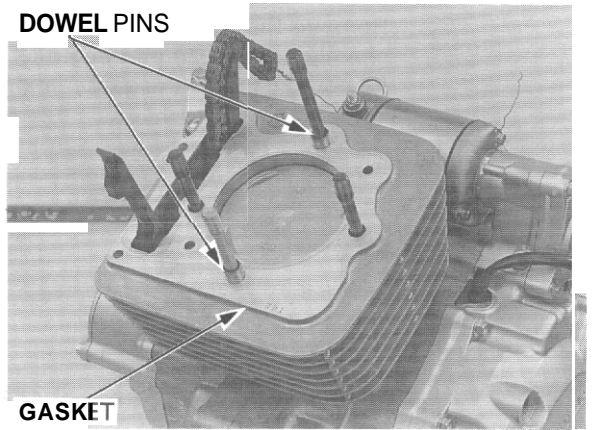
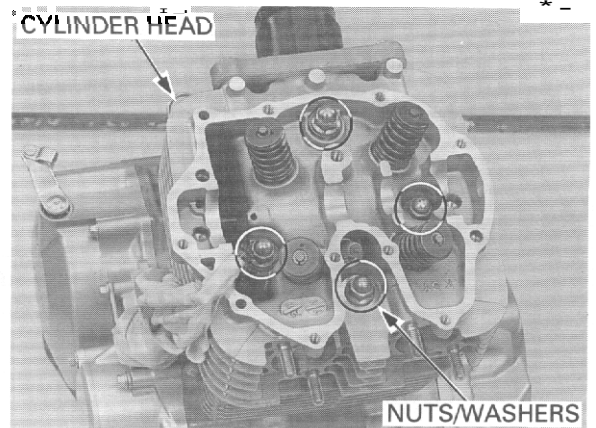
Remove the valve spring cotters using the valve spring compressor.

### TOOL

**Valve spring compressor**      07757-001000

### CAUTION

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



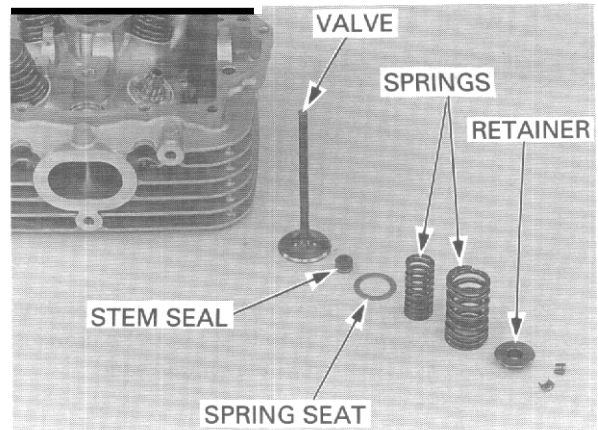
## CYLINDER HEAD/VALVE

Remove the following:

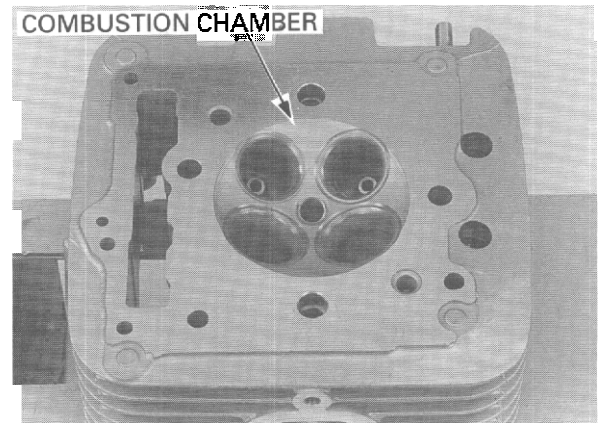
- spring retainer
- inner and outer valve springs
- valve
- stem seal
- valvespring seat

### NOTE:

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



Remove the carbon deposits from the combustion chamber and clean off the gasket surface, being careful not to damage the gasket and valve seat surfaces.



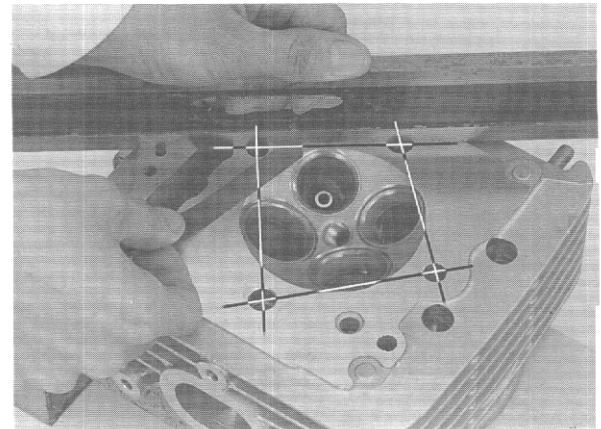
## INSPECTION

### CYLINDER HEAD

Check the spark plug hole and valve areas for cracks.

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

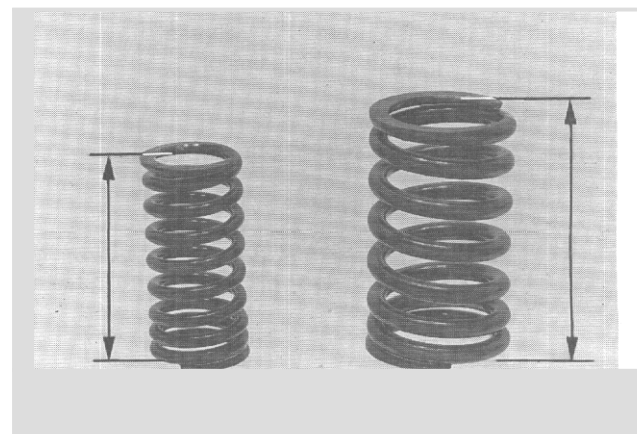
**SERVICE LIMIT 0.10 mm (0.004 in)**



### VALVE SPRING

Measure the valve spring free length.

**SERVICE LIMITS** Inner: 36.3 mm (1.43 in)  
Outer: 43.1 mm (1.70 in)





## 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. **Do not** heat the cylinder head beyond 150° (300°F). Use temperature indicator sticks, available from welding supply stores, to be sure the cylinder head is heated to the proper temperature.

**⚠ WARNING**

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

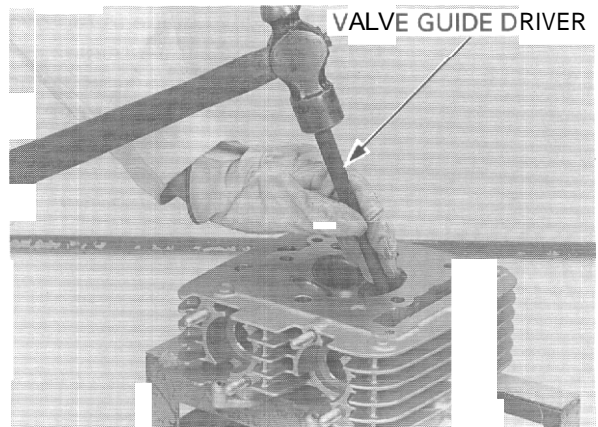
**CAUTION:**

***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**

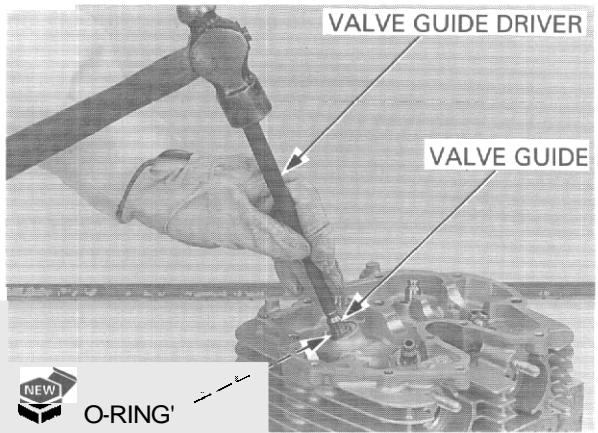
***Valve guide driver, 5.5 mm***      **07742– 0010100**



Install new O-rings onto the new valve guides. Drive the new valve guides in the cylinder head from the camshaft side while the cylinder head is still heated.

**TOOL**

***Valve guide driver, 5.5 mm***      **07742–0010100**



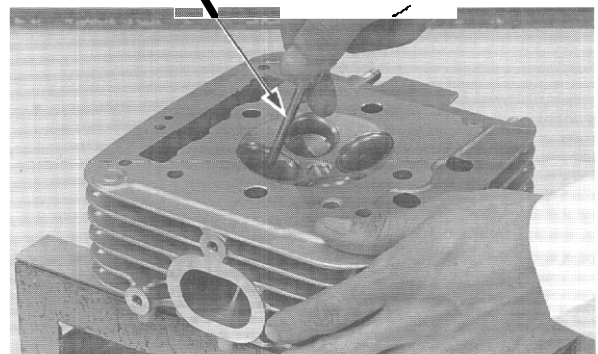
Let the cylinder head cool to room temperature.

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, 5.5 mm***      **07984 – 2000001 or  
07984 – 200000D  
(U.S.A. only)**

VALVE GUIDE REAMER'



**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 7-14).

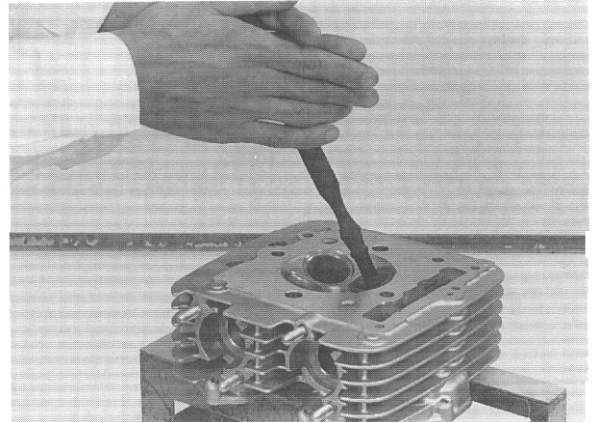
## VALVE SEAT INSPECTION/REFACING

### INSPECTION

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

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

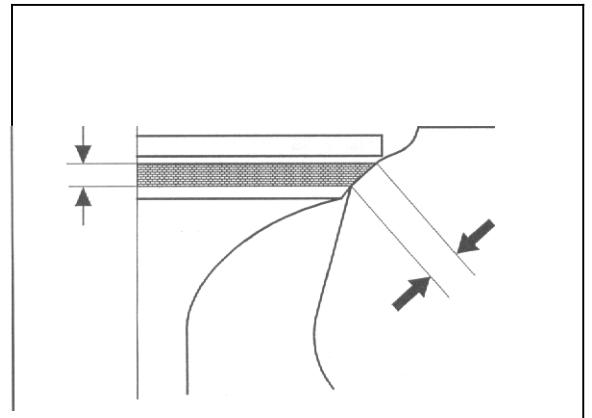
Tap the valve against the valve seat several times without rotating the valve, to check for proper valve seat contact.



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.

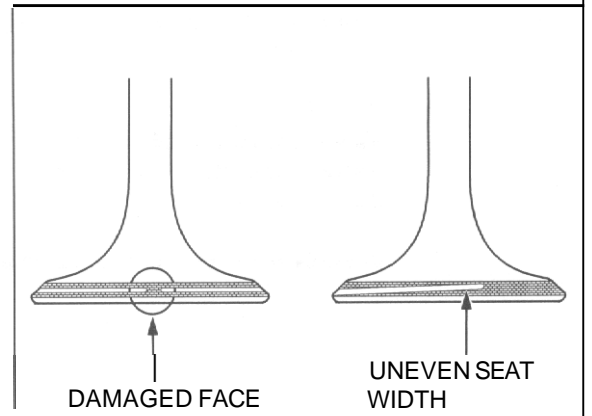
**STANDARD: 1.0 - 1.1 mm (0.039 - 0.043 in)**  
**SERVICE LIMIT 2.0 mm (0.08 in)**

If the valve seat width is not within specification, reface the valve seat (page 7-14).



Inspect the valve seat face for:

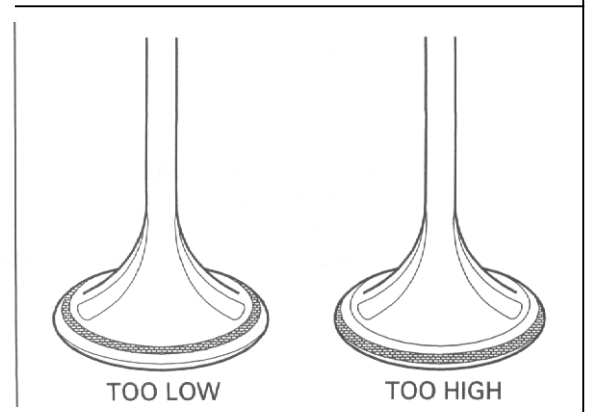
- Uneven seat width:
  - Replace the valve and reface the valve seat.
- Damaged face:
  - Replace the valve and reface the valve seat.



- 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**

- |                               |                      |
|-------------------------------|----------------------|
| Valve seat cutter, 35 mm (IN) | <b>07780-0010400</b> |
| Valve seat cutter, 29 mm (EX) | <b>07780-0010300</b> |
| Cutter holder, 5.5 mm         | <b>07781-0010101</b> |

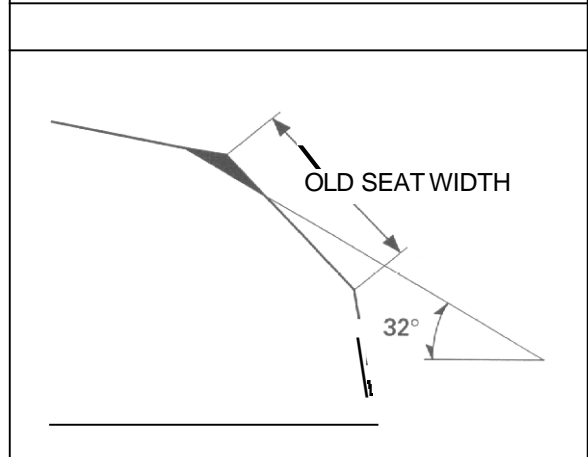
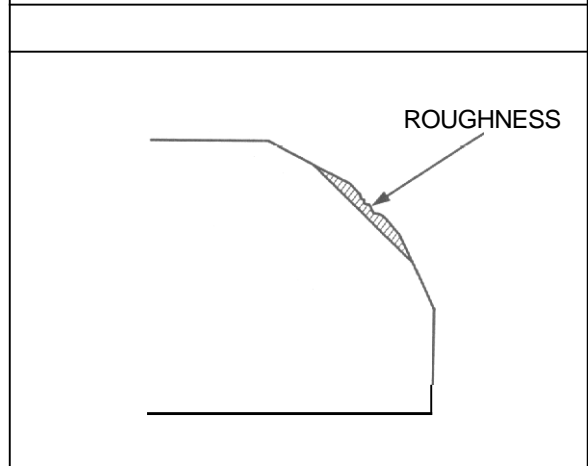
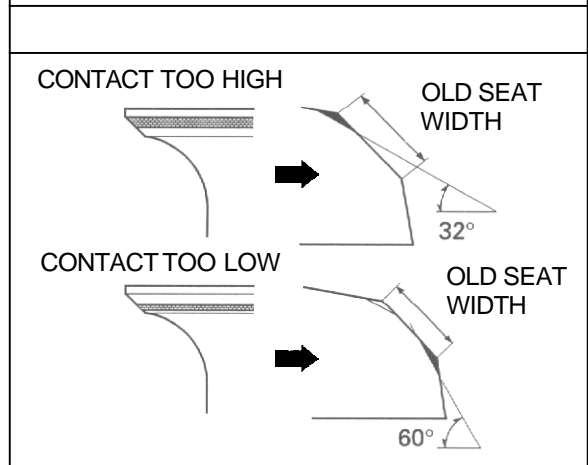
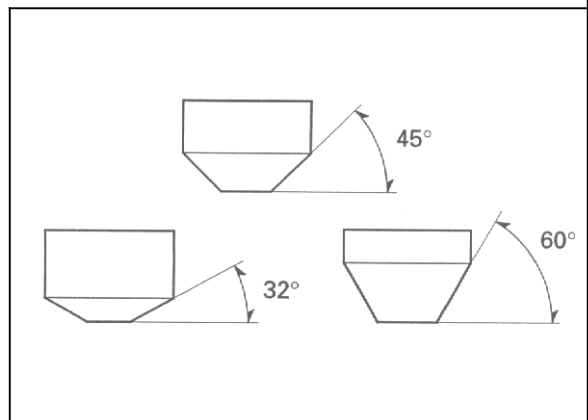
or equivalent commercially available in U.S.A.

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

**TOOLS:**

- |                         |                      |
|-------------------------|----------------------|
| Flat cutter, 35 mm (IN) | <b>07780-0012300</b> |
| Flat cutter, 30 mm (EX) | <b>07780-0012200</b> |
| Cutter holder, 5.5 mm   | <b>07781-0010101</b> |

or equivalent commercially available in U.S.A.



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

**TOOLS:**

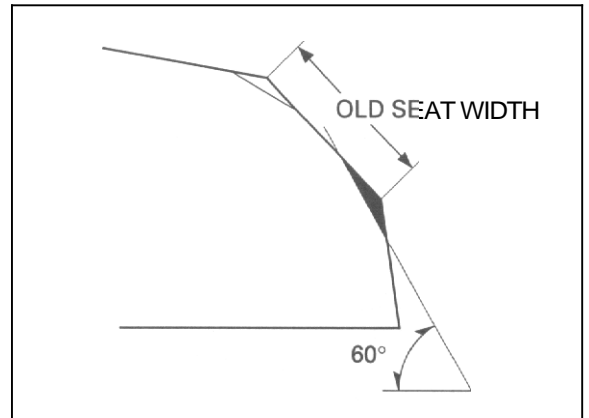
Interior cutter, **30 mm**

**07780-0014000**

Cutter holder, **5.5 mm**

**07781-0010101**

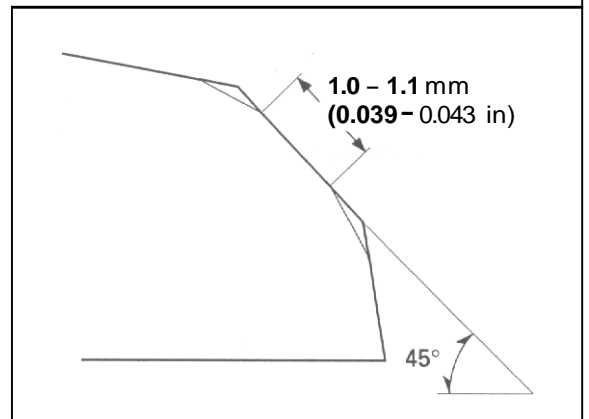
or equivalent commercially available in U.S.A.



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

**VALVE SEAT WIDTH: 1.0 - 1.1 mm (0.039 - 0.043 in)**

Make sure that all pitting and irregularities are removed.

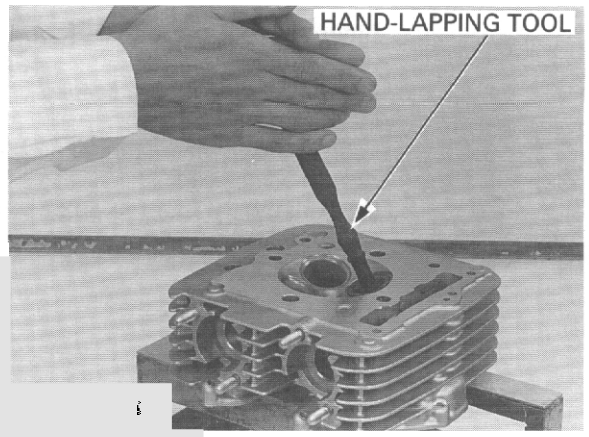


After cutting the seat, apply lapping compound to the valve face, and lap the valve using light pressure.

**CAUTION**

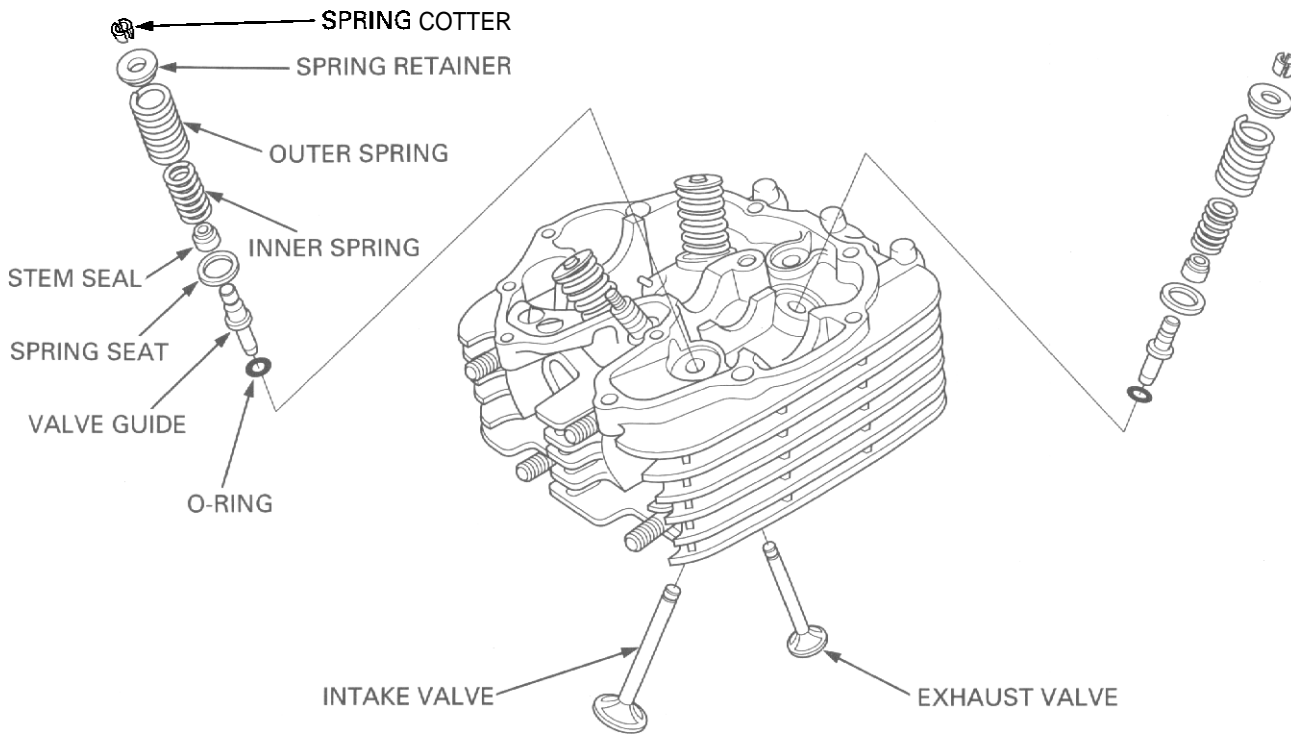
- Excessive lapping pressure may deform or damage the seat.
- Change the angle of lapping tool frequently to prevent uneven seat wear.
- Do not allow lapping compound to enter the guides.

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

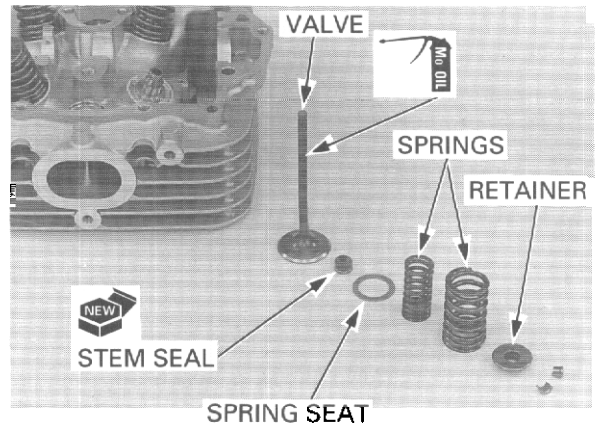




# CYLINDER HEAD ASSEMBLY/ INSTALLATION

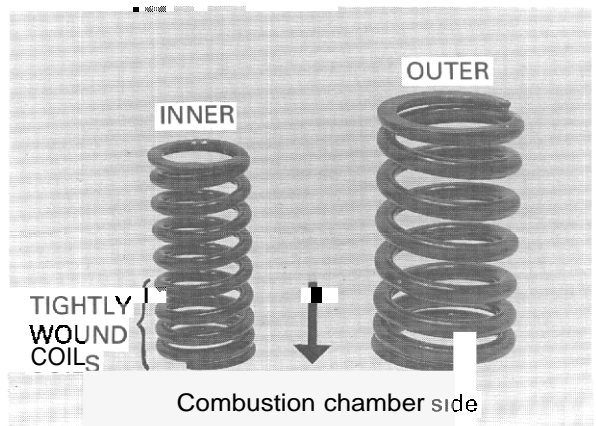


Blow through the oil passage in the cylinder head with compressed air.  
Install the valve spring seats.  
Install new stem seals.  
Lubricate the valve stem sliding surface with molybdenum oil solution.  
**Insert** the valve into the guide while turning it slowly to avoid damage to the stem seal.



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

Install the spring retainer.

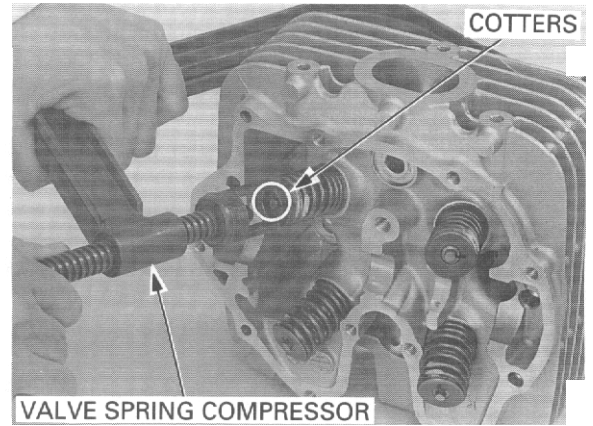


Grease the cotteners to ease installation.

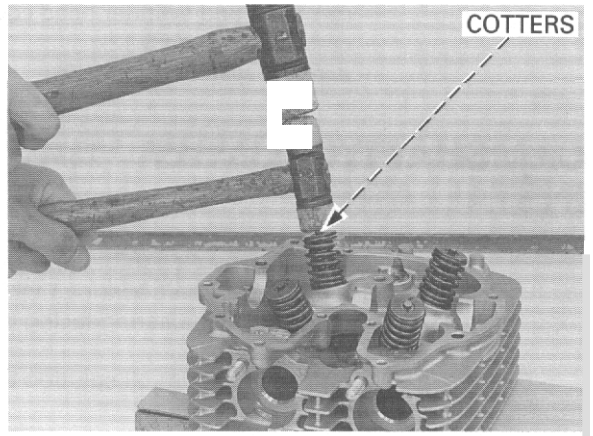
Install the valve spring cotteners using the valve spring compressor.

TOOL  
Valve spring compressor                    07757 - 0010000

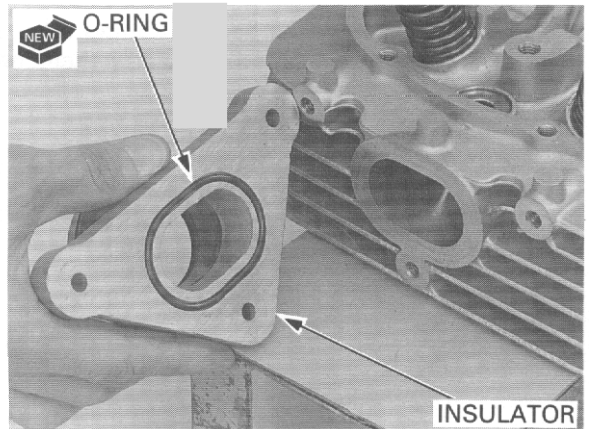
CAUTION:  
To prevent loss of tension, do not compress the valve springs more than necessary to install the cotteners.



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 cotteners firmly.

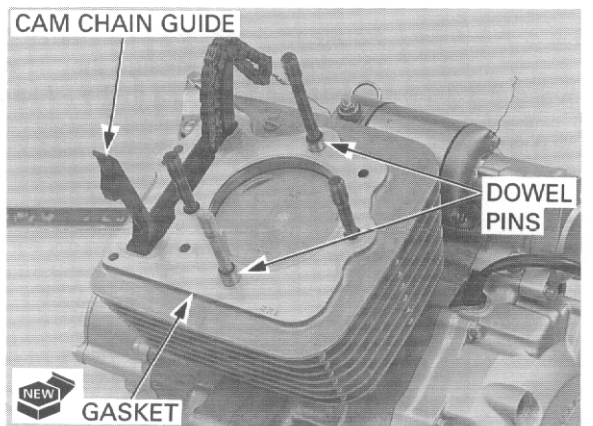


Coat a new O-ring with oil and install it into the groove in the carburetor insulator. Install the carburetor insulator onto the cylinder head and tighten the three bolts securely.



Clean the cylinder mating surface. Make sure that the cam chain guide bosses are positioned in the cylinder grooves.

Install the dowel pins and a new gasket.



## CYLINDER HEAD/VALVE

Route the cam chain through the cylinder head and install the cylinder head onto the cylinder. Apply oil to the cylinder head nut threads and seating surfaces.

Install the cylinder head nuts with the washers and tighten them in a crisscross pattern in 2 or 3 steps. Note the position of the large washer.

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

Install and tighten the spark plug.

**TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)**

Install the following:

- camshaft and cylinder head cover
- carburetor (page 5-12)
- exhaust system (page 2-6)

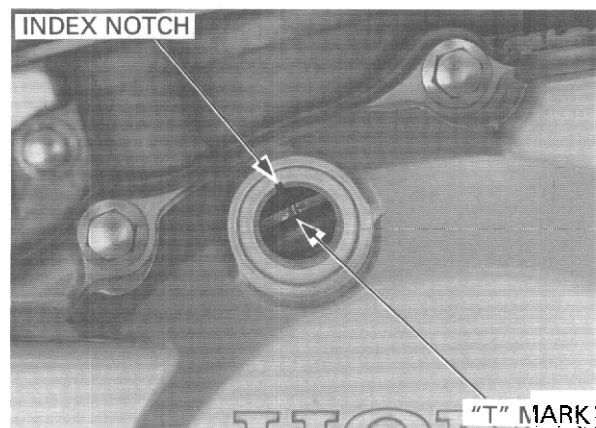
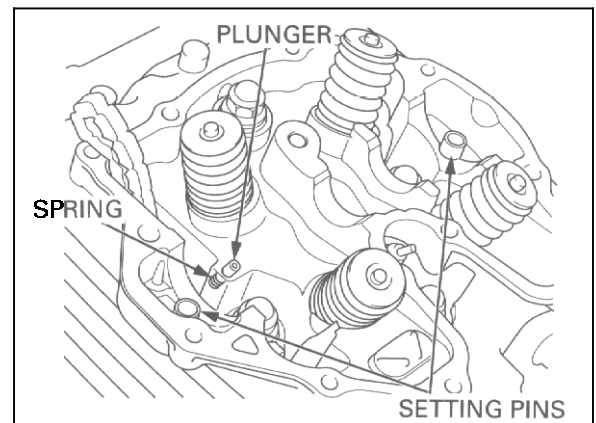
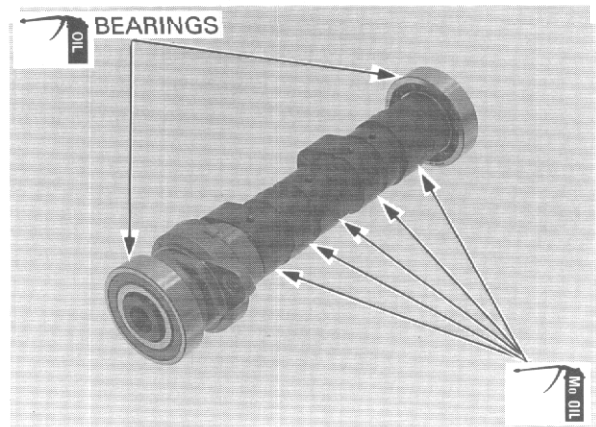
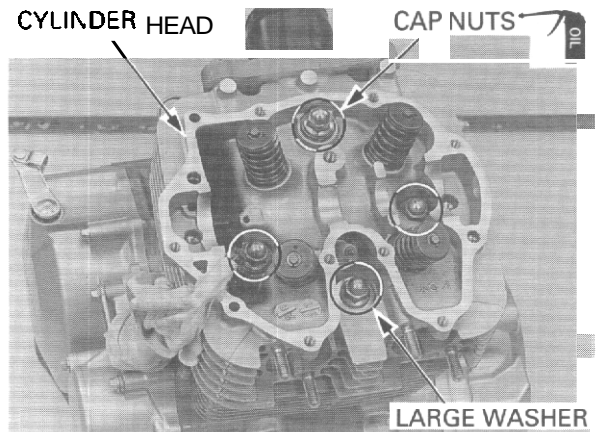
## CAMSHAFT/CYLINDER HEAD COVER INSTALLATION

Lubricate the camshaft bearing with oil.

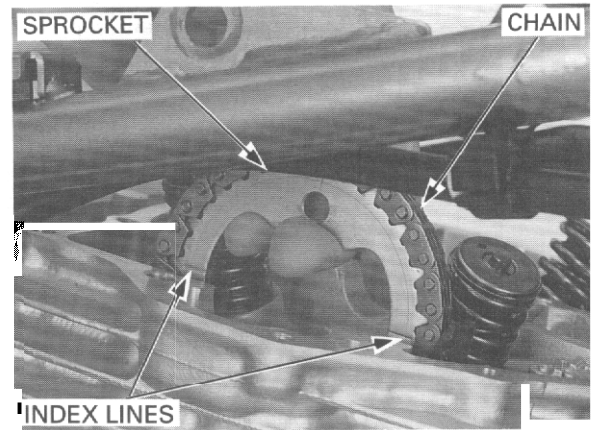
Install the camshaft bearings with the sealed side of the sprocket side bearing facing out.

Apply molybdenum oil solution to the cam lobes and journal.

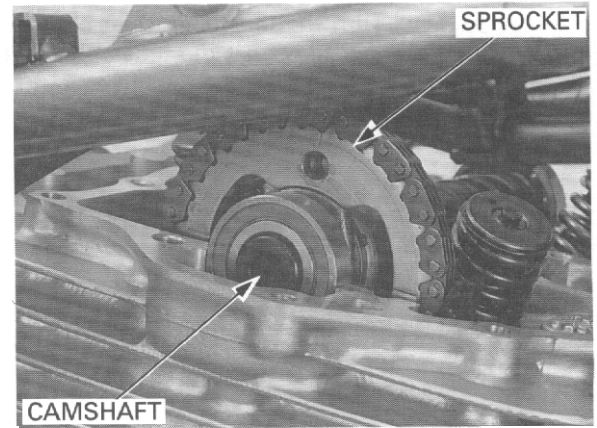
Install the bearing setting pins, spring and plunger, being careful not to drop them into the crankcase.



Install the cam sprocket onto the cam chain so that the index lines on the sprocket with the upper surface of the cylinder head.

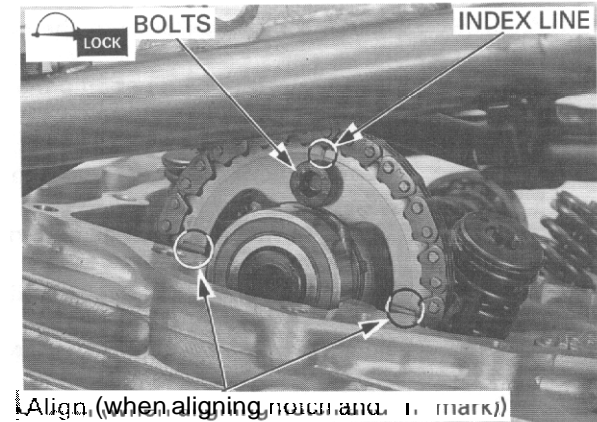


Install the camshaft onto the cylinder head through cam sprocket.  
Install the cam sprocket onto the camshaft flange securely.



Make sure that the index lines on the cam sprocket with the upper surface of the cylinder head when the "T" mark on the flywheel is aligned with the index notch in the left crankcase cover.

Apply locking agent to the cam sprocket bolt threads. Align the bolt holes in the cam sprocket and camshaft flange and install the cam sprocket bolt.



*The crankshaft should be turned only counterclockwise. This must be done to prevent the one-way decompressor system functioning.*

Turn the crankshaft counterclockwise one turn and install the remaining cam sprocket bolt.

Tighten the INDEX LINE side bolt first.

**TORQUE: 20 N·m (2.0 kgf·m, 14 lbf·ft)**

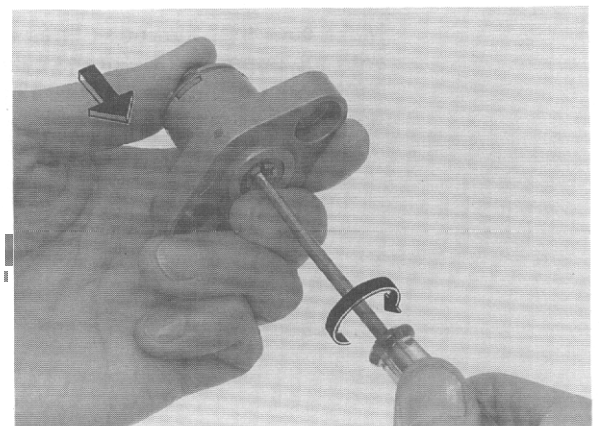
Turn the crankshaft counterclockwise one turn and tighten the other cam sprocket bolt to the same torque.

### CAM CHAIN TENSIONER LIFTER INSTALLATION

Remove the cam chain tensioner lifter plug and O-ring.

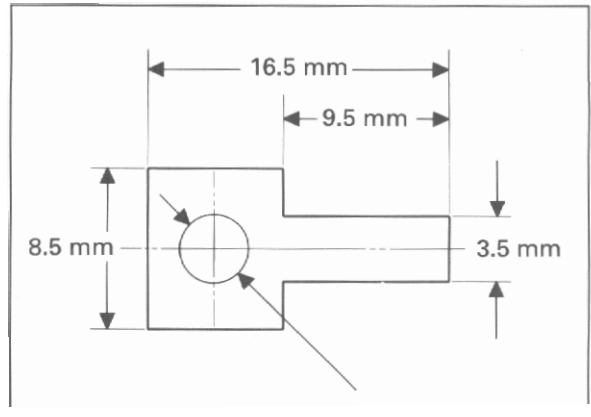
Check the lifter operation:

- The tensioner shaft should not go into the body when it is pushed.
- When it is turned **clockwise** with a screwdriver, the tensioner shaft should be pulled into the body. The shaft springs out of the body as soon as the screwdriver is released.

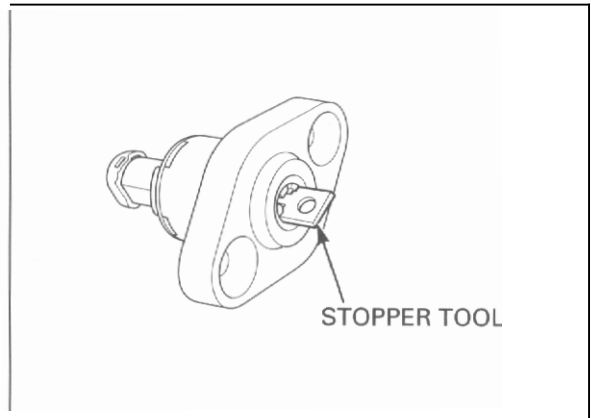


## CYLINDER HEAD/VALVE

Make a tensioner shaft stopper tool of a thin piece of steel (0.8 mm thick) using the diagram.



Turn the tensioner shaft clockwise with the stopper tool to retract the tensioner, then insert the stopper fully to hold the tensioner in the fully retracted position.



Install a new gasket onto the cam chain tensioner lifter.

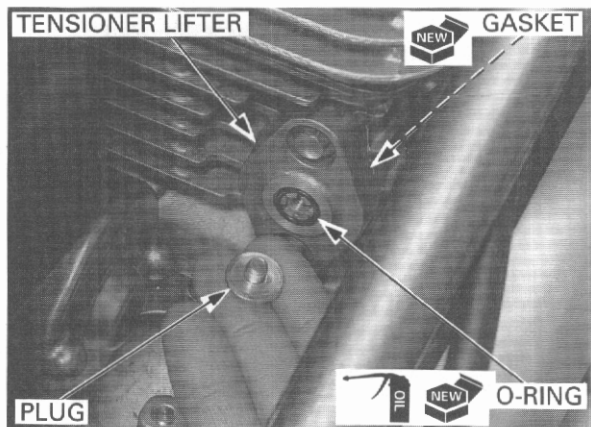
Install the tensioner lifter onto the cylinder and tighten the two mounting bolts securely.

Remove the stopper tool from the tensioner lifter.

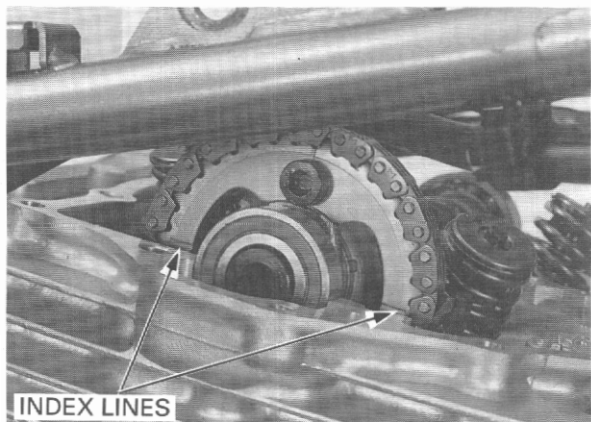
Coat a new O-ring with oil and install it into the tensioner lifter groove.

Install and tighten the tensioner lifter plug.

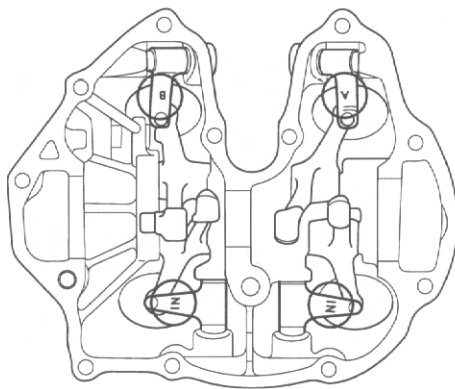
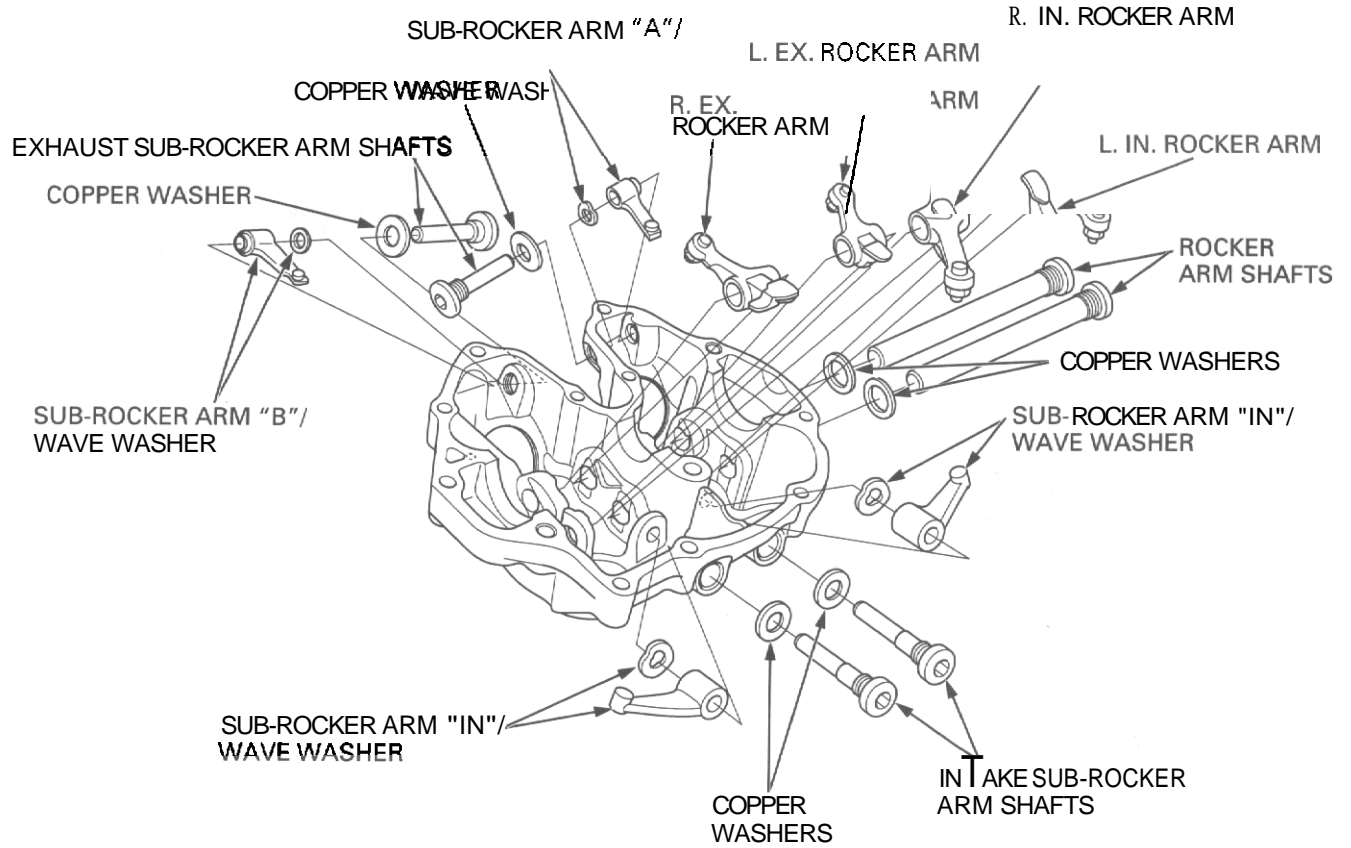
**TORQUE: 4 N·m (0.4 kgf·m, 2.9 lbf·ft)**



Make sure that the index lines on the cam sprocket with the upper surface of the cylinder head when the "T" mark on the flywheel is aligned with the index notch in the left crankcase cover.

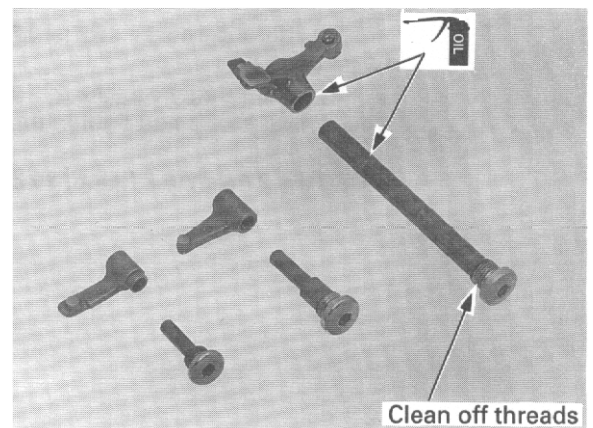


CYLINDER HEAD COVER ASSEMBLY



Clean the threads of each rocker arm shaft thoroughly.

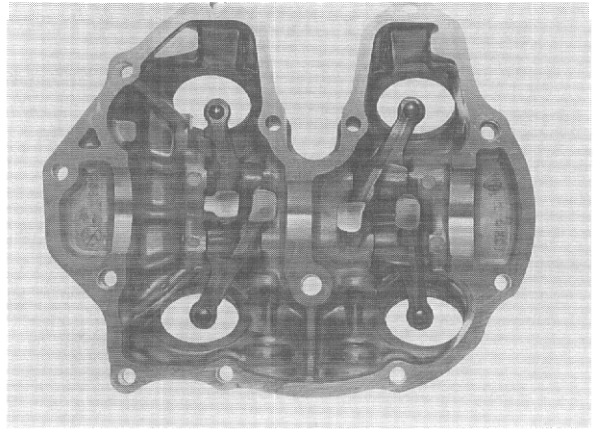
Apply engine oil to the rocker arm and shaft sliding surfaces.





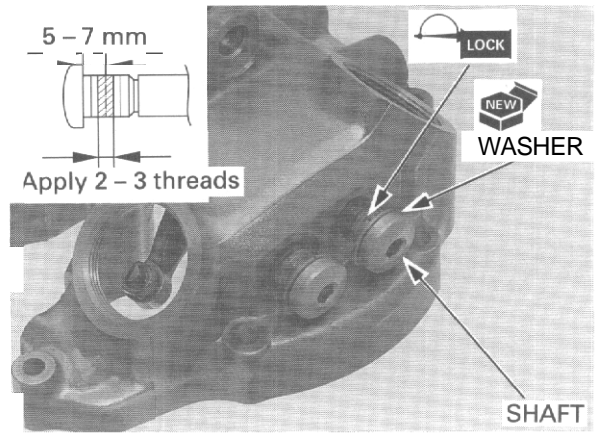
## CYLINDER HEAD/VALVE

Install the rocker arms in the cylinder head cover as shown.

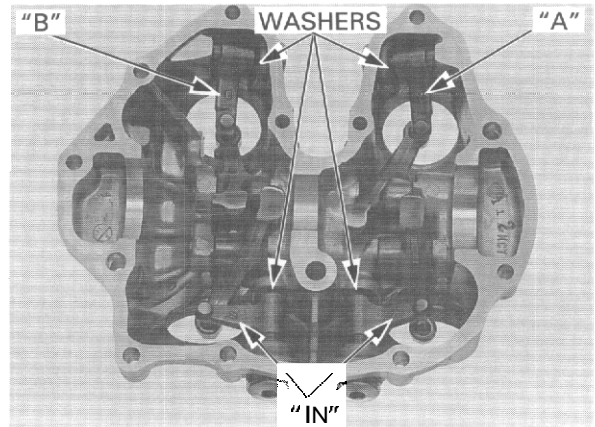


Install the rocker arm shafts with new sealing washers. **Apply** locking agent to the 2 - 3 threads of the rocker arm shafts and tighten the shafts.

**TORQUE: 27 N·m 128 kgf·m, 20 lbf·ft)**



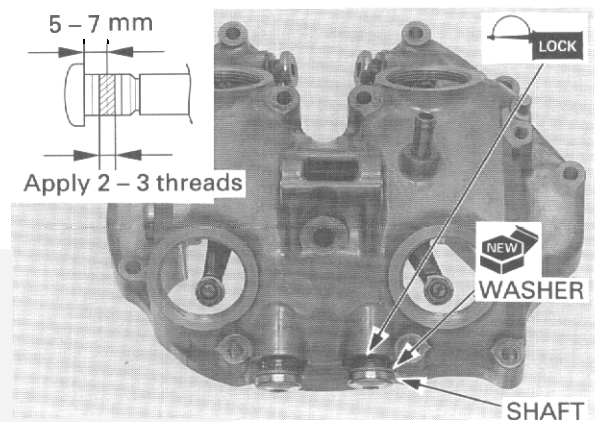
Install the sub-rocker arms and wave washers in the cylinder head cover as shown, noting each identification mark as shown.



Install the sub-rocker arm shafts with new **sealing** washers.

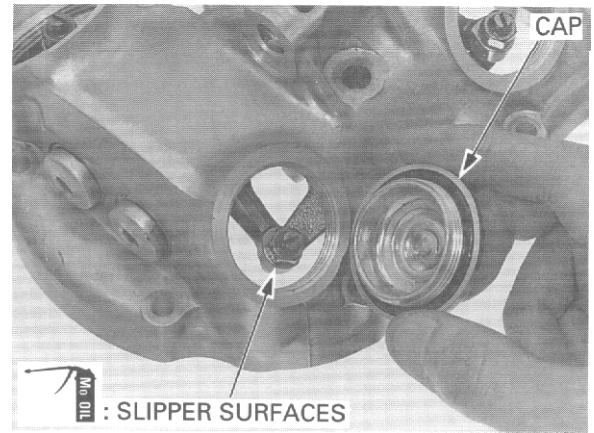
**Apply** locking agent to the 2 - 3 threads of the sub-rocker arm shafts and tighten the shafts.

**TORQUE: 27 N·m (2.8 kgfm, 20 lbf·ft)**



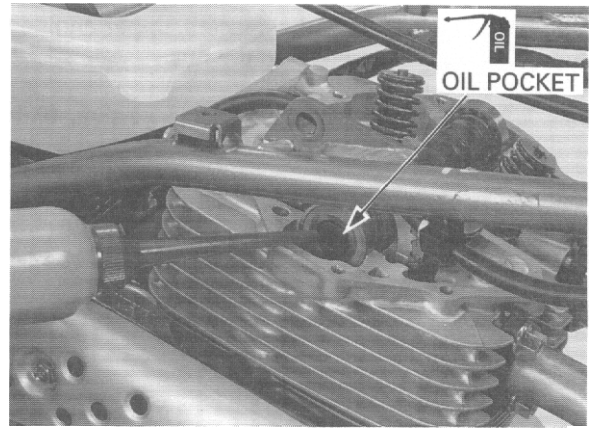
**CYLINDER HEAD COVER INSTALLATION**

Apply molybdenum oil solution to the slipper surfaces of the rocker arms and sub-rocker arms.



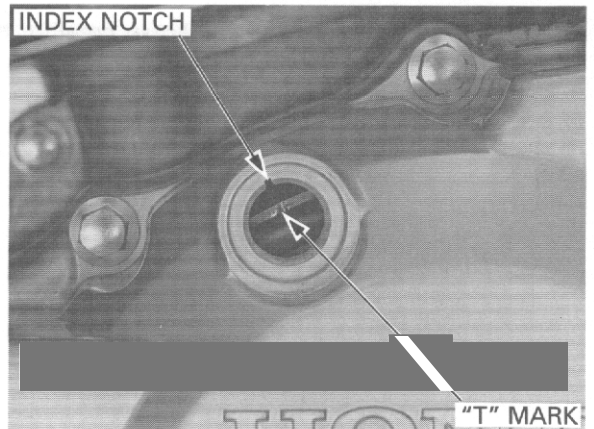
Clean the mating surfaces of the cylinder head and head cover.

Pour engine oil into the oil pocket in the cylinder head.

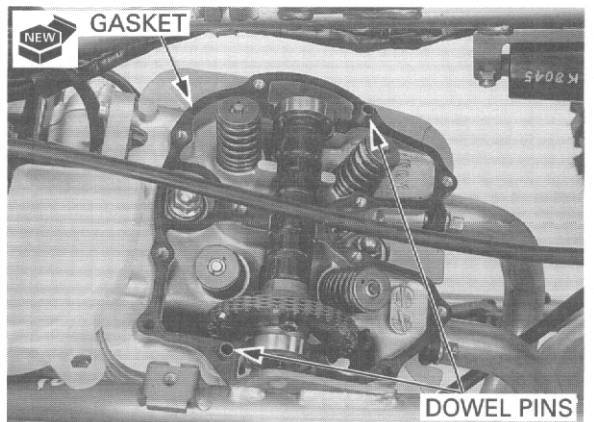


***The crankshaft should be turned only counterclockwise. This must be done to prevent the one-way decompressor system functioning.***

Rotate the crankshaft counterclockwise and align the "T" mark on the flywheel with the index notch in the left crankcase cover so that the cam lobes are facing down.



Install the dowel pins and a new gasket



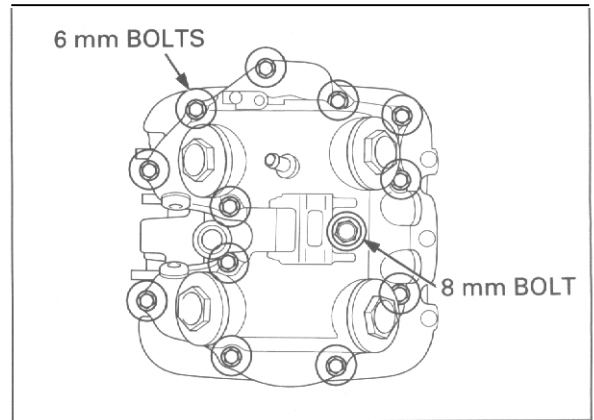


## CYLINDER HEAD/VALVE

Install the valve adjusting hole caps.

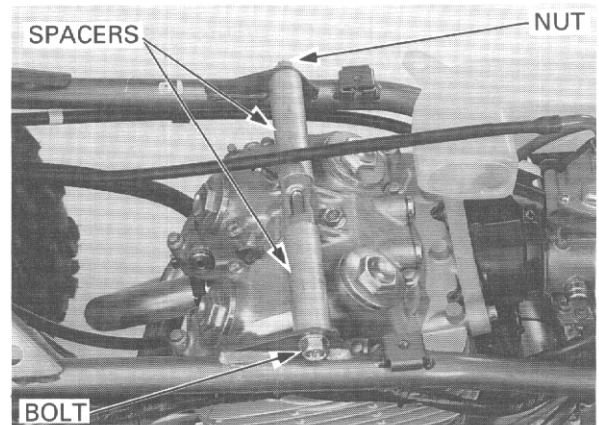
Install the cylinder head cover onto the cylinder head. Install the 8 mm and 6 mm cylinder head cover bolts and tighten them in a crisscross pattern in 2 or 3 steps.

**TORQUE: 8 mm bolt: 23 N·m (2.3 kgf·m, 17 lbf·ft)**



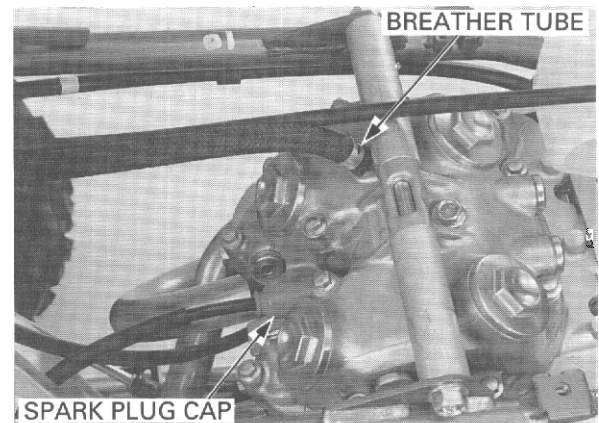
Install the spacers, upper engine hanger bolt and nut, and tighten the nut.

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



Connect the crankcase breather tube to the cylinder head cover. Install the spark plug cap.

Check the valve clearances and adjust **if** necessary (page 3-7).



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**MEMO**

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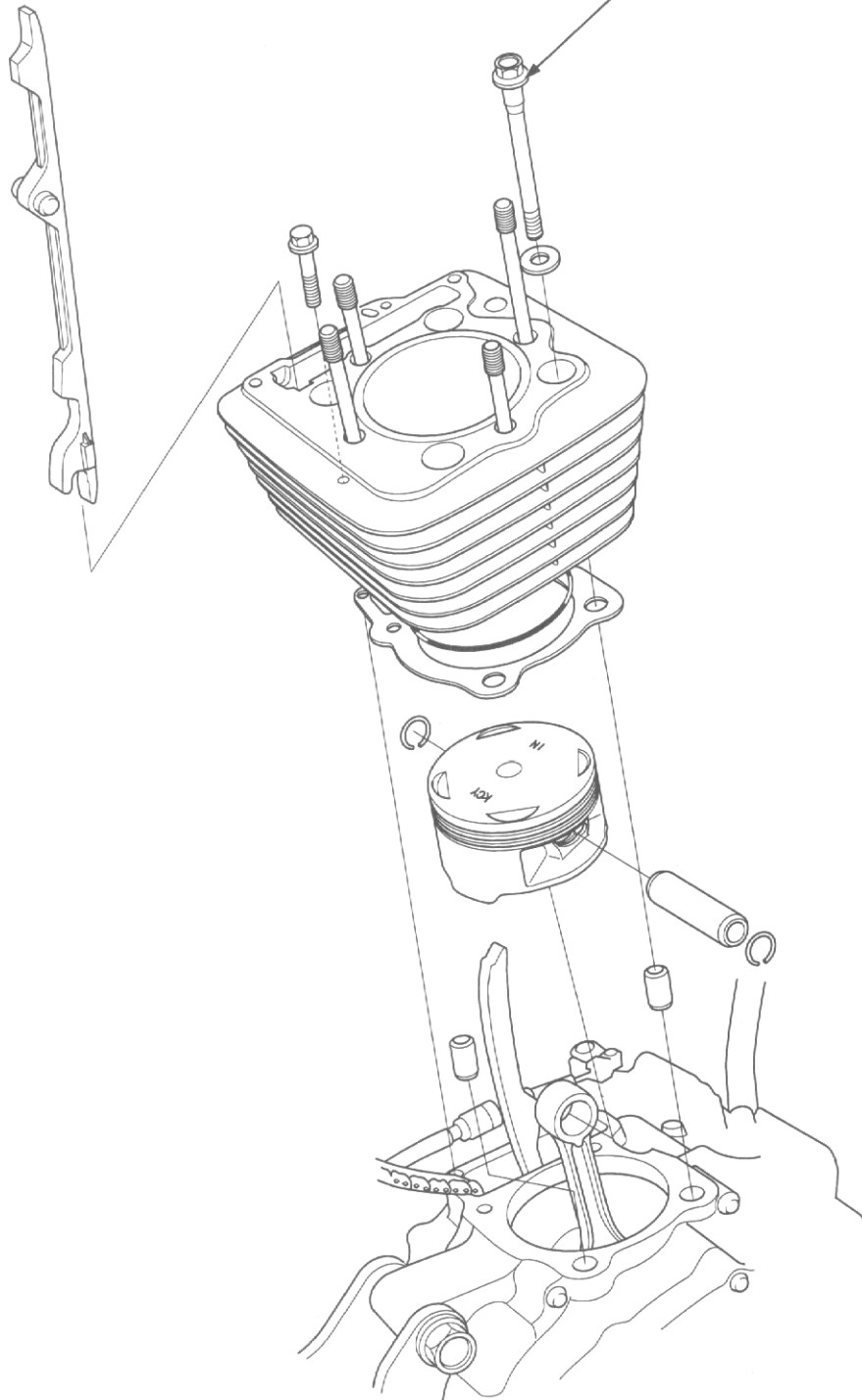
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44 N·m (4.5 kgf·m, 33 lbf·ft)



# 8. CYLINDER/PISTON

<b>SERVICE INFORMATION</b>	<b>8-1</b>	<b>CYLINDER/PISTON REMOVAL</b>	<b>8-3</b>
<b>TROUBLESHOOTING</b>	<b>8-2</b>	<b>PISTON/CYLINDER INSTALLATION</b>	<b>a-7</b>

## SERVICE INFORMATION

### GENERAL

- The cylinder and piston can be serviced with the engine installed in the frame.
- Take care not to damage the cylinder wall and piston.
- Do not damage mating surfaces by using a screwdriver when removing the cylinder.
- Camshaft lubricating oil is fed through the oil passage in the cylinder. Clean the oil passage before installing the cylinder.

### SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT	
Cylinder	I.D.	85.000 – 85.010 (3.3465– 3.3468)	85.10(3.350)	
	Out of round	—	0.05 (0.002)	
	Taper	—	0.05 (0.002)	
	Warpage	—	0.10 (0.004)	
Piston, piston pin, pis- ton ring	Piston O.D. at 15 (0.6) from bottom	84.960 – 84.985 (3.3449 – 3.3459)	84.880 (3.3417)	
	Piston pin hole I.D.	20.002 – 20.008 (0.7875 – 0.7877)	20.060 (0.7898)	
	Piston pin O.D.	19.994 – 20.000 (0.7872 – 0.7874)	19.964 (0.7860)	
	Piston-to-piston pin clearance	0.002 – 0.014 (0.0001 – 0.0006)	0.096 (0.0038)	
	Piston ring end gap	Top	0.20 – 0.35 (0.008 – 0.014)	0.50 (0.020)
		Second	0.35 – 0.50 (0.014 – 0.020)	0.65 (0.026)
		Oil (side rail)	0.20 – 0.70 (0.008 – 0.028)	0.90 (0.035)
	Piston ring-to-ring groove clearance	Top	0.030 – 0.065 (0.0012 – 0.0026)	0.14 (0.006)
		Second	0.015 – 0.050 (0.0006 – 0.0020)	0.12 (0.005)
Cylinder-to-piston clearance		0.015 – 0.050 (0.0006– 0.0020)	0.10(0.004)	
Connecting rod small end I.D.		20.020 – 20.041 (0.7882– 0.7890)	20.067 (0.7900)	
Connecting rod-to-piston pin clearance		0.020– 0.047(0.0008 – 0.0019)	0.103(0.0041)	

8

### TORQUE VALUES

Cylinder bolt (10 mm)  
Cylinder stud bolt

44 N·m (4.5 kgf·m, 33 lbf·ft)  
20 N·m (2.0 kgf·m, 14 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

## CYLINDER/PISTON REMOVAL

### CYLINDER REMOVAL

Remove the cylinder head (section 7).

Remove the two 6 mm cylinder bolts.

Remove the cam chain guide (front).  
Remove the four 10 mm cylinder bolts and washers.  
Remove the cylinder.

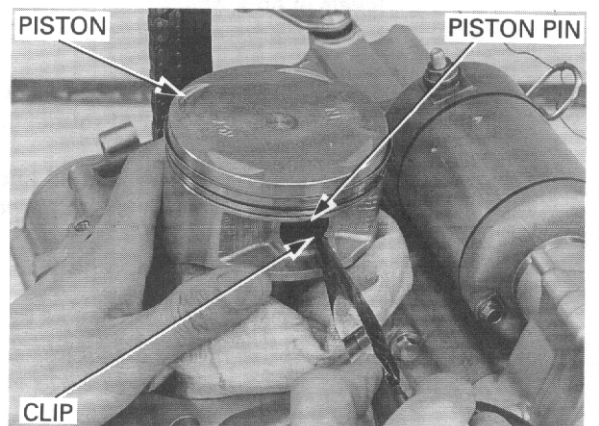
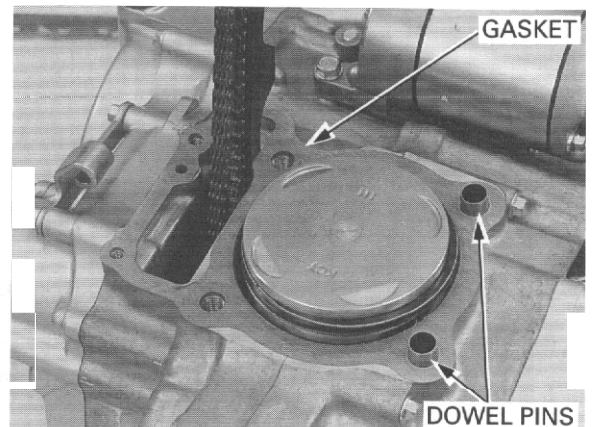
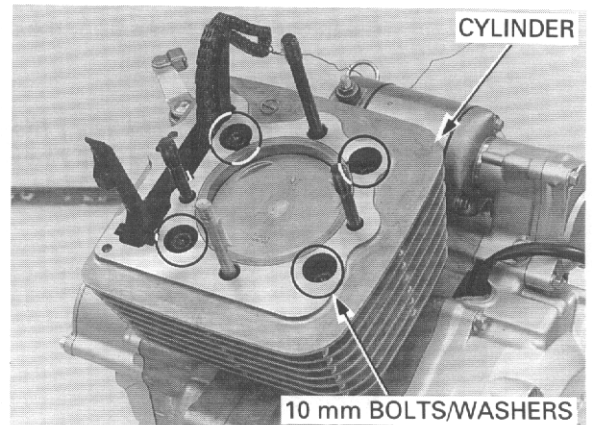
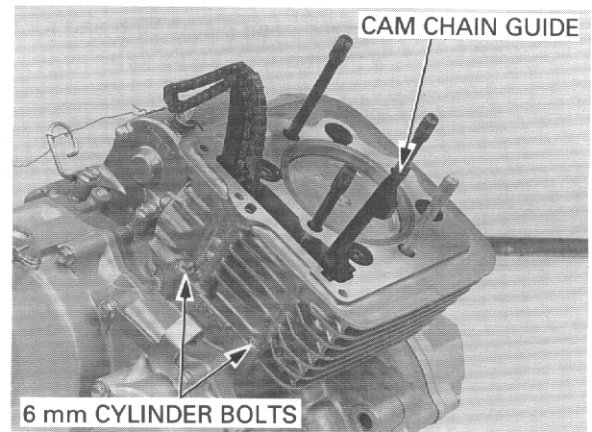
*Do not strike the cylinder too hard and do not damage the mating surface with a screwdriver.*

Remove the gasket and dowel pins.

### PISTON REMOVAL

Place a clean shop towel over the crankcase to prevent the clip from falling into the crankcase.

Remove the piston pin clips with the pliers.  
Push the piston pin out of the piston and connecting rod, and remove the piston.

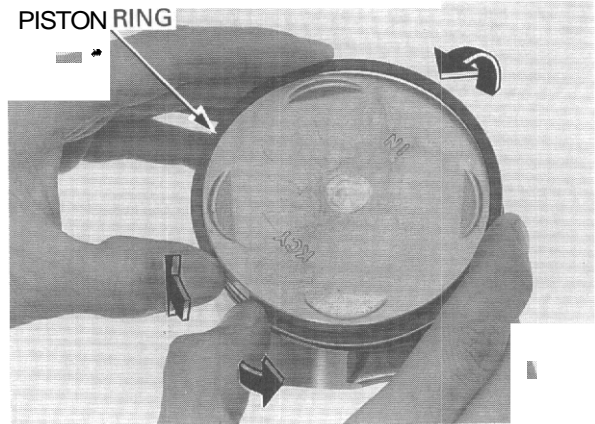


## CYLINDER/PISTON

Spread each piston ring and remove it by lifting up at a point opposite the gap.

### CAUTION:

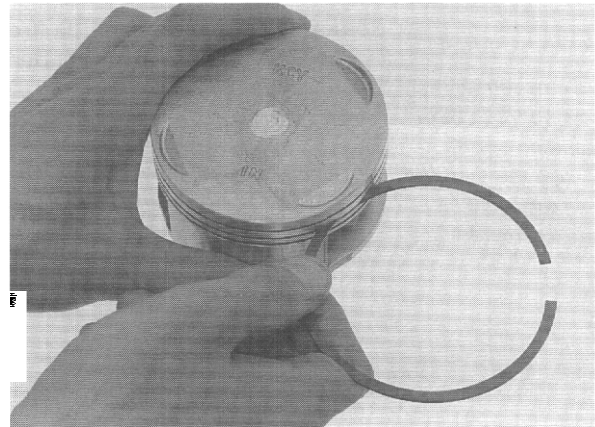
**Do not damage the piston ring by spreading the ends too far.**



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.**



## INSPECTION

### CYLINDER

Inspect the cylinder bore 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 85.10 mm (3.350 in)**

Calculate the cylinder-to-piston clearance. Refer to page 8-5 for measurement of the piston O.D.

**SERVICE LIMIT 0.10 mm (0.004 in)**

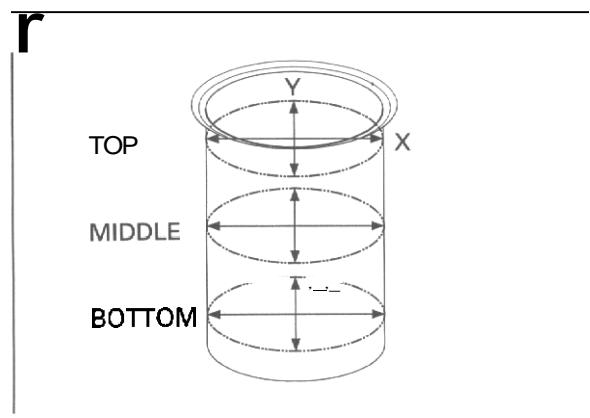
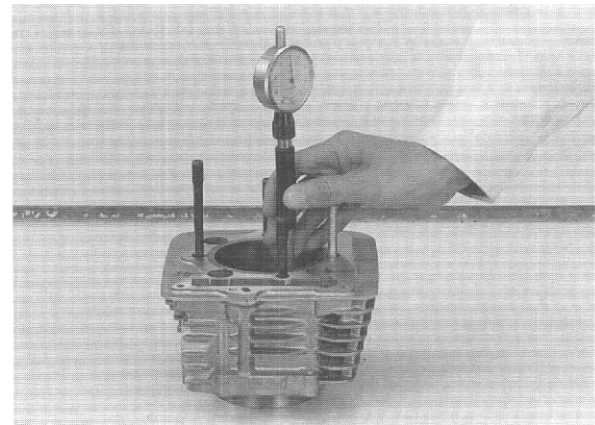
Calculate the cylinder taper and out-of-round at three levels in an X and Y axis. Take the maximum reading to determine the taper and out-of-round.

**SERVICE LIMITS Taper: 0.05 mm (0.002 in)  
Out-of-round: 0.05 mm (0.002 in)**

The cylinder must be rebored and an oversize piston fitted if the service limits are exceeded.

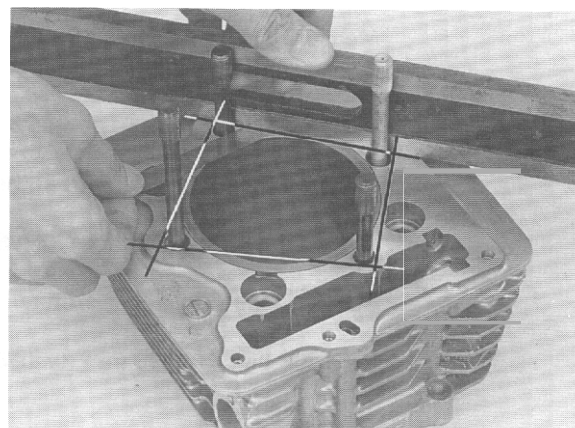
The 0.25 mm (0.010 in) and 0.50 mm (0.020 in) oversize pistons are available.

The cylinder must be rebored so that the clearance for an oversize piston is 0.015 - 0.050 mm (0.0006 - 0.0020 in).



Check the top of the cylinder for warpage with a straight edge and feeler gauge across the studs and bolt holes as shown.

**SERVICE LIMIT 0.10 mm (0.004 in)**

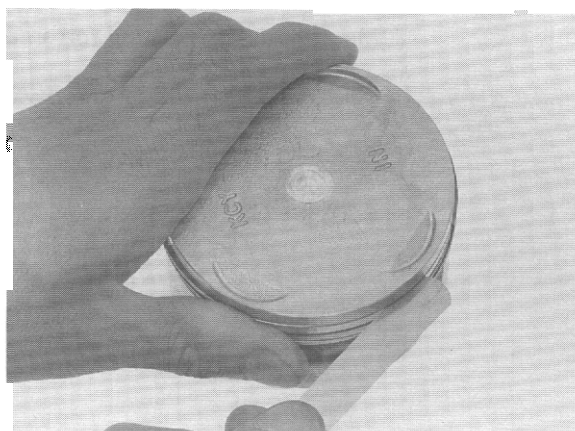


**PISTON/PISTON RING**

Inspect the piston rings for movement by rotating the rings. The rings should be able to move in their grooves without catching.

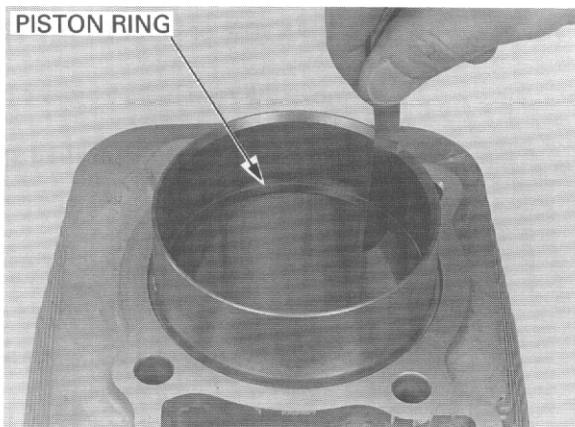
Push the ring until the outer surface of the piston ring is nearly flush with the piston and measure the ring-to-ring groove clearance.

**SERVICE LIMITS: Top: 0.14 mm (0.006 in)**  
 Second: 0.12 mm (0.005 in)



Insert each piston ring into the bottom of the cylinder squarely using the piston. Measure the ring end gap.

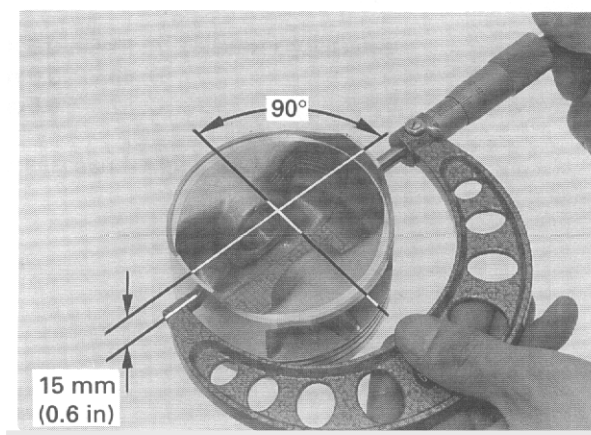
**SERVICE LIMITS Top: 0.50 mm (0.020 in)**  
 Second: 0.65 mm (0.026 in)  
 Oil (side rail): 0.9 mm (0.04 in)



Measure the piston pin O.D. 90° to the piston pin hole and at point 15 mm (0.6 in) from bottom of the piston skirt.

**SERVICE LIMIT 84.880 mm (3.3417 in)**

Compare this measurement against the maximum cylinder I.D. measurement and calculate the piston-to-cylinder clearance (page 8-4).





## CYLINDER/PISTON

Measure piston pin hole I.D. in an X and Y axis. Take the maximum reading to determine the I.D.

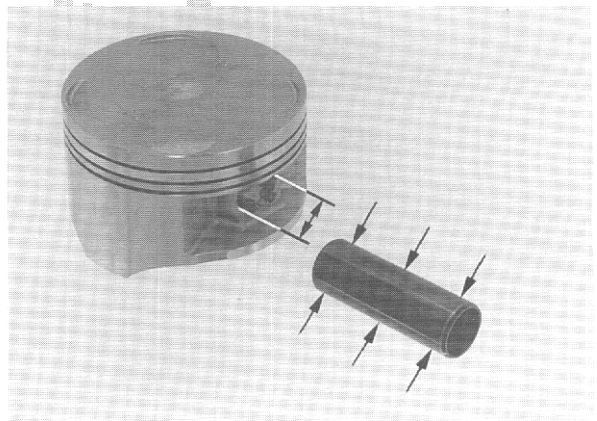
**SERVICE LIMIT 20.060 mm (0.7898 in)**

Measure the piston pin O.D. at three points.

**SERVICE LIMIT: 19.964 mm (0.7860 in)**

Calculate the piston-to-piston pin clearance.

**SERVICE LIMIT 0.096 mm (0.0038 in)**

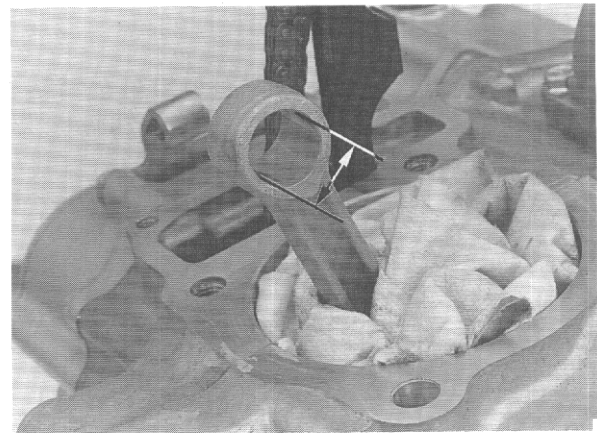


Measure the connecting rod small end I.D.

**SERVICE LIMIT: 20.067 mm (0.7900 in)**

Calculate the connecting rod-to-piston pin clearance.

**SERVICE LIMIT: 0.103 mm (0.0041 in)**



## CYLINDER STUD BOLT REPLACEMENT

Remove the stud bolts from the cylinder

Install new stud bolts in their proper positions and tighten them.

**A: 10 x 92 mm stud bolt**

**B: 10 x 60 mm stud bolt**

**C: 10 x 73 mm stud bolt**

**TORQUE 20 N·m 120 kgf·m, 14 lbf·ft)**

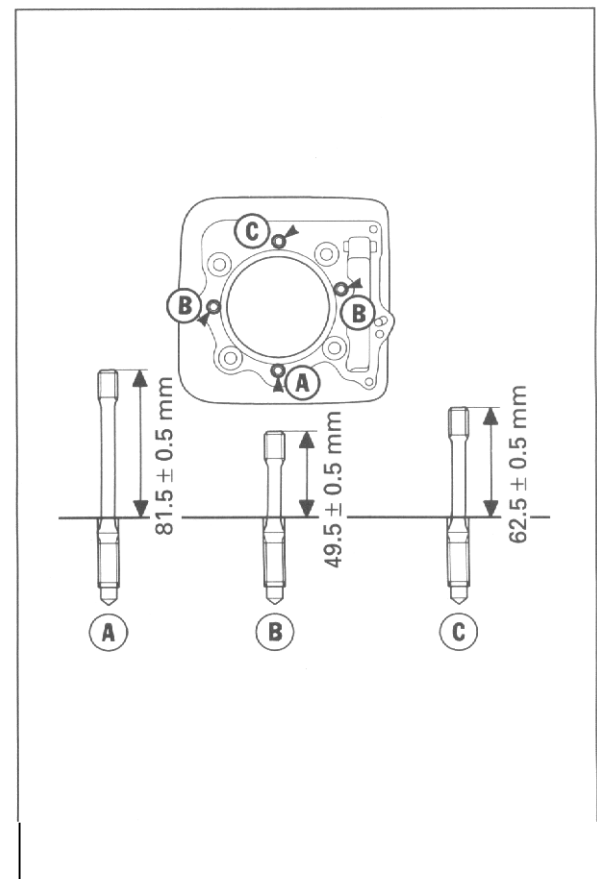
After installation, measure the stud height from the cylinder surface.

**SPECIFIED HEIGHT: A 81.5 ± 0.5 mm (3.21 ± 0.02 in)**

**B 49.5 ± 0.5 mm (1.95 ± 0.02 in)**

**C 62.5 ± 0.5 mm (2.46 ± 0.02 in)**

Adjust the stud height if necessary.



## PISTON/CYLINDER INSTALLATION

### PISTON RING INSTALLATION

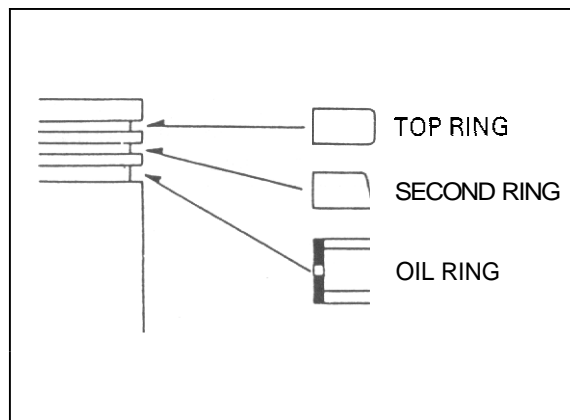
Carefully install the piston rings into the piston ring grooves with the markings facing up.

**CAUTION:**

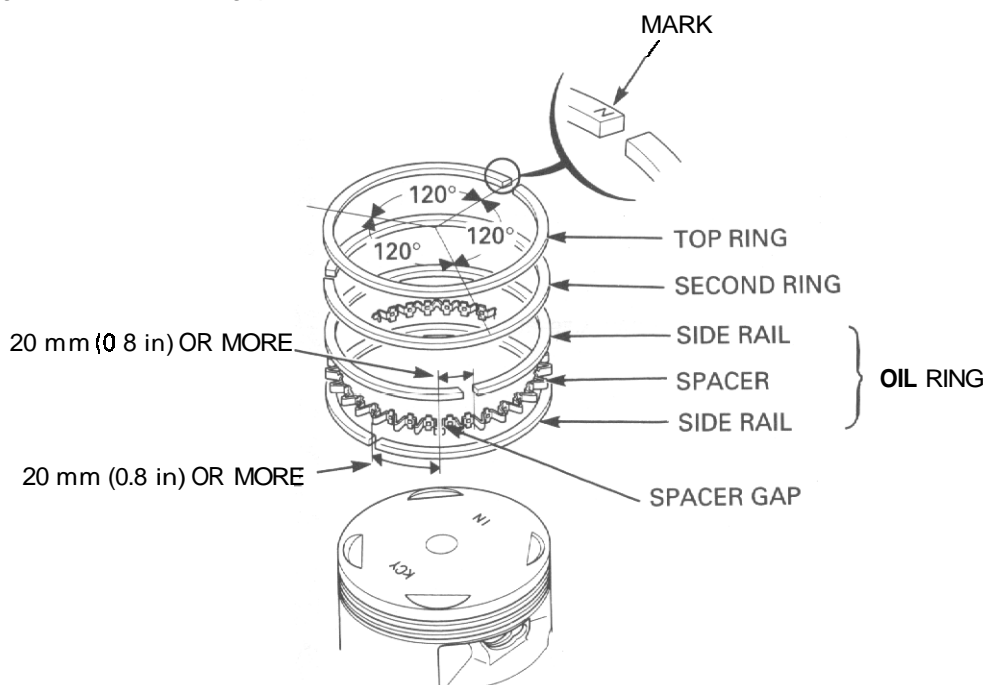
***Be careful not to damage the piston and rings during installation.***

**NOTE:**

- Do not confuse the top and second rings.
- 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.



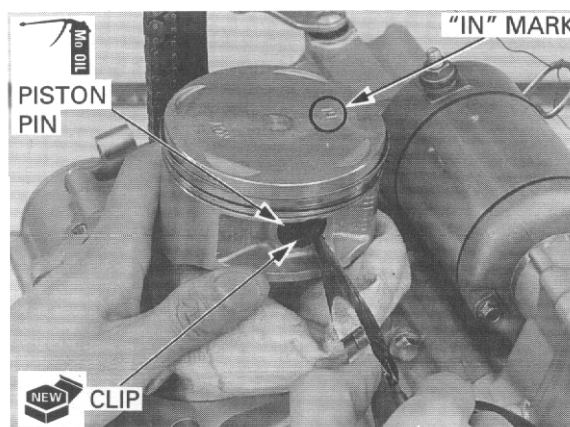
### PISTON INSTALLATION

Place a clean shop towel over the crankcase to prevent the clip from falling into the crankcase.

Apply molybdenum oil solution to the piston pin outer surface and connecting rod inner surface.

Install the piston with the "IN" mark toward the intake side and insert the piston pin through the piston and connecting rod.

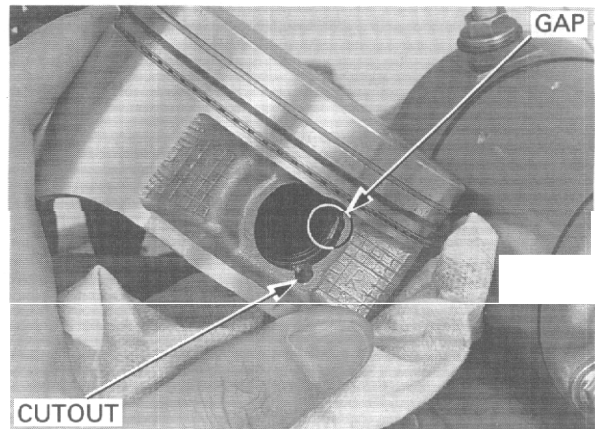
Install new piston pin clips into the grooves of the piston pin hole.



## CYLINDER/PISTON

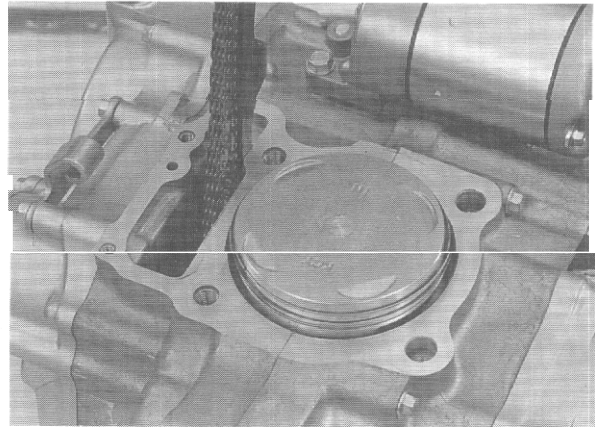
### NOTE:

- Make sure that the piston pin clips are seated securely.
- Do not align the piston pin clip end gap with the piston cutout.

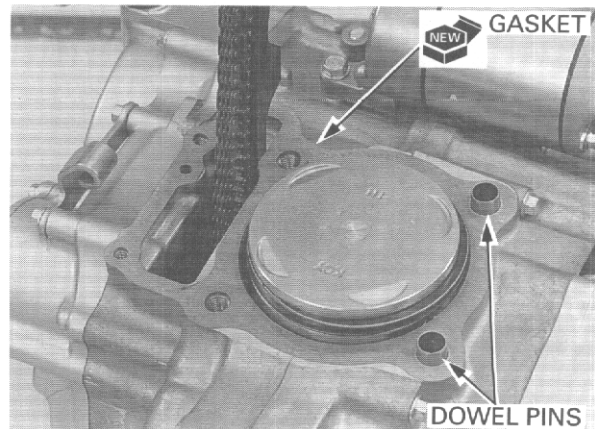


## CYLINDER INSTALLATION

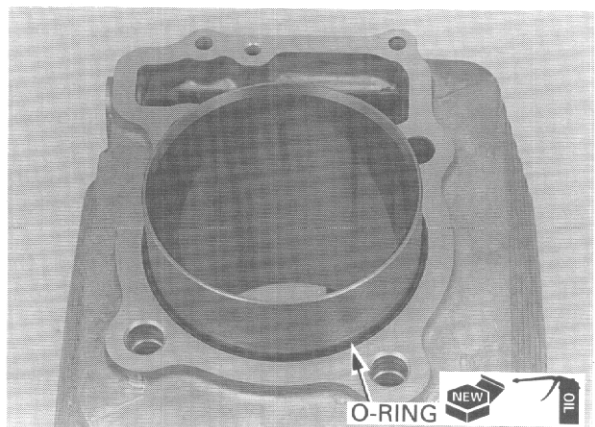
Clean the gasket surfaces of the cylinder and crankcase thoroughly, being careful not to damage it, and careful not to allow gasket material into the crankcase.



Install the dowel pins and a new gasket



Coat a new O-ring with oil and install it into the groove in the cylinder bottom.

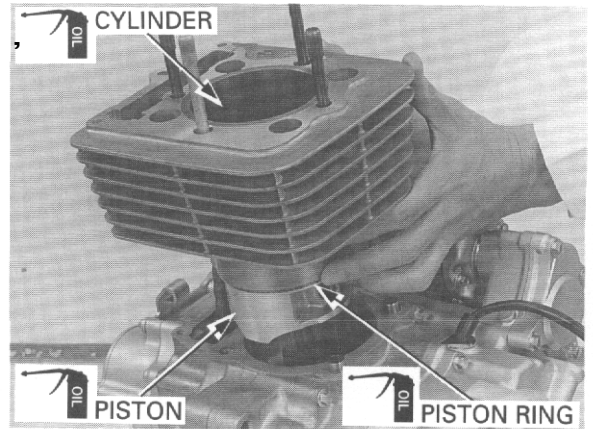


Apply oil to the cylinder wall, piston and piston ring outer surfaces.

Route the cam chain through the cylinder and install the cylinder over the piston while compressing the piston rings with your fingers.

**CAUTION:**

***Be careful not to damage the piston rings and cylinder wall.***



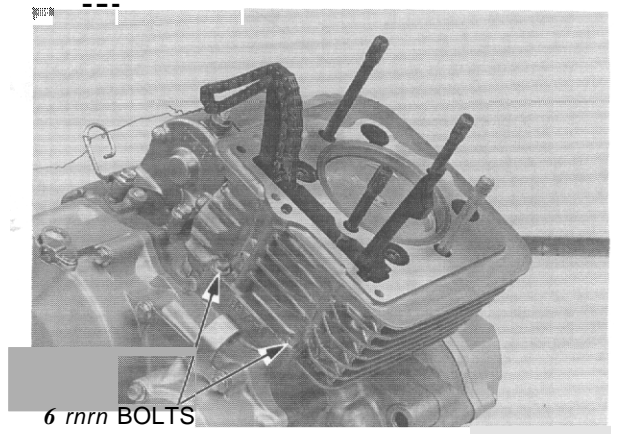
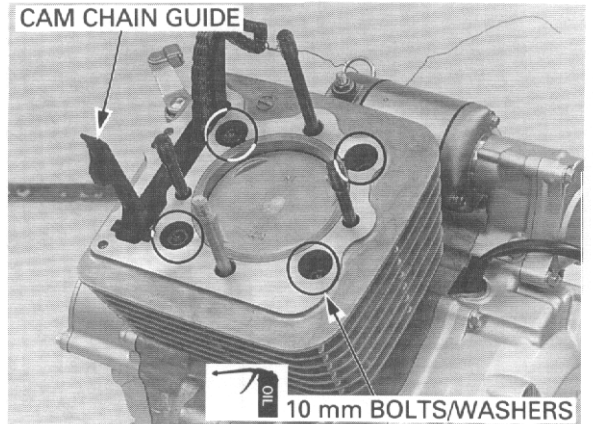
Apply oil to the 10 mm cylinder bolt threads and seating surfaces and install them with the washers. Tighten the bolts in a crisscross pattern in 2 or 3 steps.

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

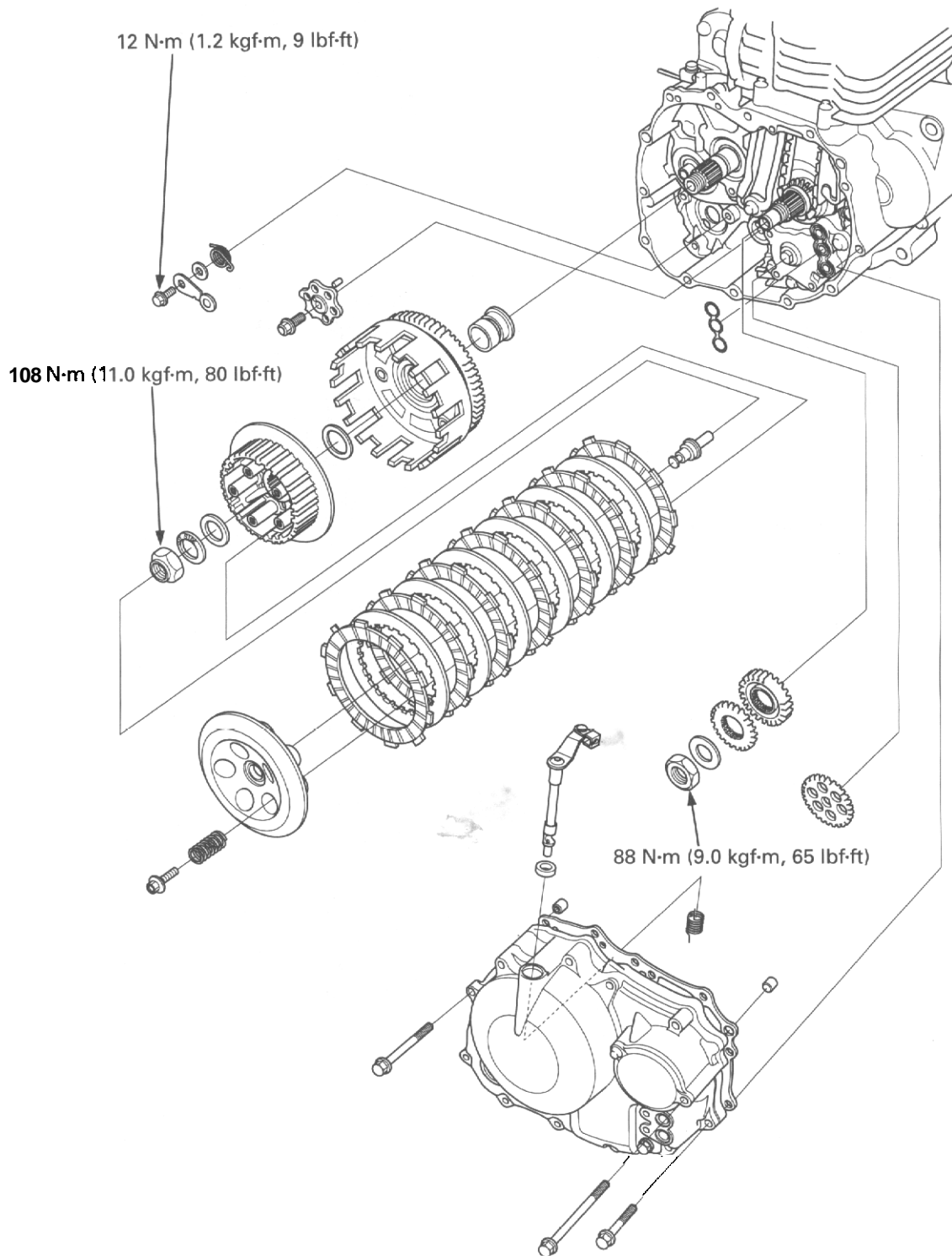
Install the 6 mm cylinder bolts and tighten them securely.

Install the cam chain guide into the cylinder and crankcase, aligning the bosses with the grooves in the cylinder.

Install the cylinder head (section 7).



# CLUTCH/GEARSHIFT LINKAGE



# 9. CLUTCH/GEARSHIFT LINKAGE

<b>SERVICE INFORMATION</b>	<b>9-1</b>	<b>PRIMARY DRIVE GEAR</b>	<b>9-10</b>
<b>TROUBLESHOOTING</b>	<b>9-2</b>	<b>GEARSHIFT LINKAGE</b>	<b>9-11</b>
<b>RIGHT CRANKCASE COVER REMOVAL</b>	<b>9-3</b>	<b>RIGHT CRANKCASE COVER</b>	
<b>CLUTCH</b>	<b>9-5</b>	<b>INSTALLATION</b>	<b>9-12</b>

## SERVICE INFORMATION

### GENERAL

- The clutch and gearshift linkage can be serviced with the engine installed in the frame.
- Engine oil viscosity and level and the use of oil additives have an effect on clutch operation. 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 and oil level before servicing the clutch system.
- The crankcase must be separated when the transmission, shift drum and shift forks require service (section 11).

### SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Clutch	Lever free play	10 – 20 (3/8 – 3/4)	—
	Spring free length	52.64 (2.072)	50.0 (1.97)
	Disc thickness	2.92 – 3.08 (0.115 – 0.121)	2.69 (0.106)
	Plate warpage	—	0.15 (0.006)
	Outer I.D.	28.000 – 28.021 (1.1024 – 1.1032)	28.04 (1.104)
	Outer guide	I.D.	22.010 – 22.035 (0.8665 – 0.8675)
O.D.		27.959 – 27.980 (1.1007 – 1.1016)	27.90 (1.098)
Mainshaft O.D. at clutch outer guide		21.959 – 21.980 (0.8645 – 0.8654)	21.91 (0.863)

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### TORQUE VALUES

Clutch center lock nut	<b>108 N·m (11.0 kgfm, 80 lbf·ft)</b>	Apply oil to the threads and seating surface. Stake.
Primary drive gear nut	<b>88 N·m (9.0 kgfm, 65 lbf·ft)</b>	Apply oil to the threads and seating surface.
Gearshift drum stopper arm bolt	<b>12 N·m (1.2 kgfm, 9 lbf·ft)</b>	

### TOOLS

Driver	07749-0010000
Attachment, 28 x 30 mm	07746- 1870100
Pilot, 17 mm	07746-0040400
Clutch center holder	07724 - 0050002 or equivalent commercially available in U.S.A.
Gear holder	07724- 0010100 not available in U.S.A.

### TROUBLESHOOTING

#### Clutch lever too hard

- Damaged, kinked or dirty clutch cable
- Improperly routed clutch cable
- Damaged clutch lifter mechanism
- Faulty clutch lifter plate bearing

#### Clutch will not disengage or motorcycle creeps with clutch disengaged

- Too much clutch lever free play
- Warped clutch plates
- Faulty clutch lifter
- Improper oil viscosity or oil additive used

#### Clutch slips

- No clutch lever free play
- Clutch lifter sticking
- Worn clutch discs
- Weak clutch springs
- Oil additive used

#### Hard to shift

- Improper clutch operation
- Incorrect engine oil viscosity
- Incorrect clutch adjustment
- Bent or damaged gearshift spindle
- Damaged gearshift cam
- Bent fork shaft or damaged shift forks and shift drum (section 11)

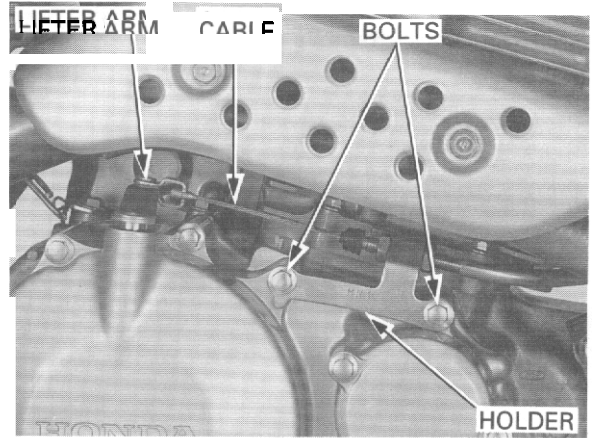
#### Transmission jumps out of gear

- Broken shift drum stopper arm
- Weak or broken shift linkage return springs
- Worn or damaged gearshift cam
- Bent fork shaft or worn shift forks and shift drum (section 11)
- Worn gear dogs or slots (section 11)

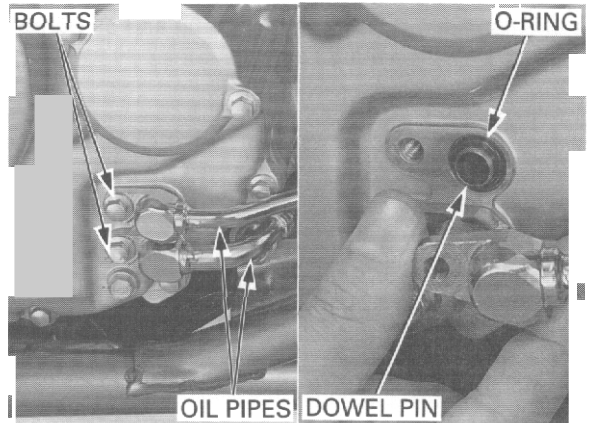
## RIGHT CRANKCASE COVER REMOVAL

Drain the engine oil (page 3-10).  
Remove the rear brake pedal (page 14-20).

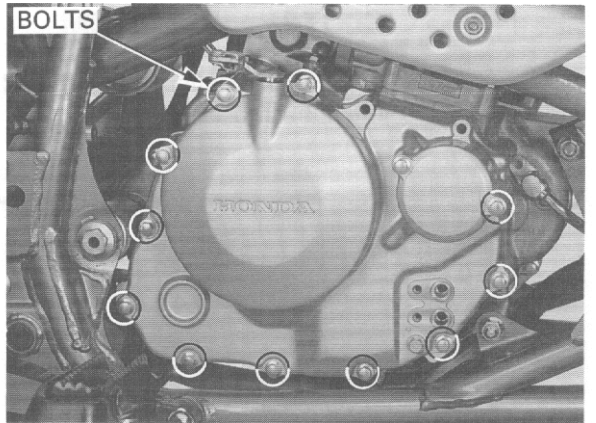
Remove the two bolts and clutch cable holder, and disconnect the clutch cable from the clutch lifter arm.



Remove the bolts, oil pipes O-rings and dowel pins from the right crankcase cover.

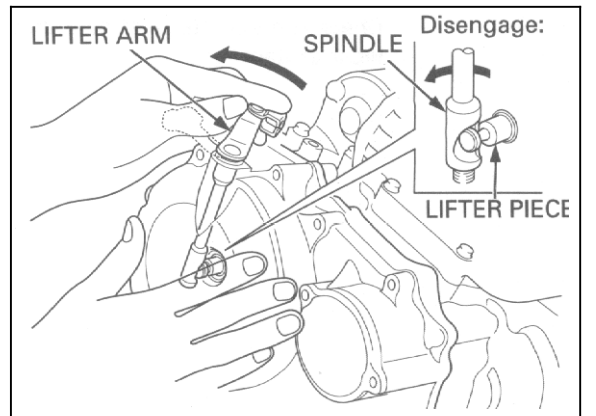


Remove the right crankcase cover bolts.



*The clutch lifter spindle is engaged with the clutch lifter piece inside the right crankcase cover.*

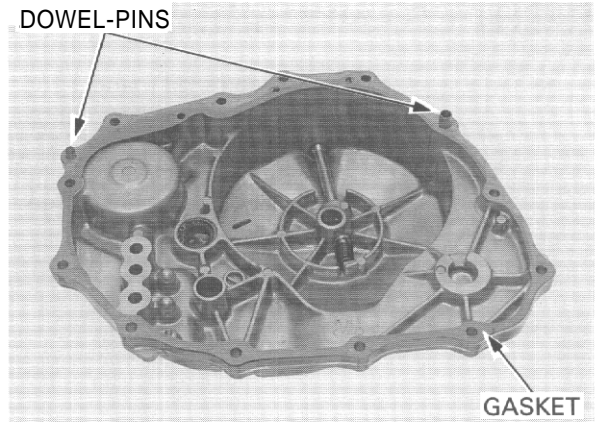
Remove the right crankcase cover while turning the clutch lifter arm counterclockwise to disengage the lifter arm spindle from the lifter piece.



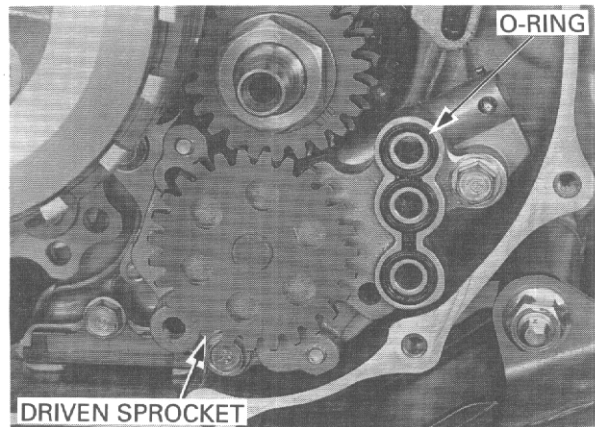


## CLUTCH/GEARSHIFT LINKAGE

Remove the gasket and dowel pins.



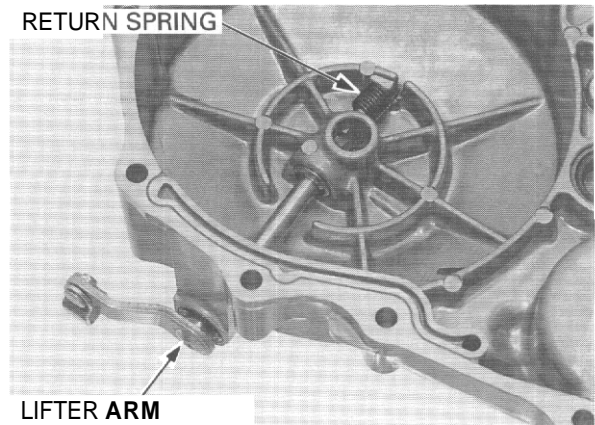
Remove the O-ring and oil pump driven sprocket from the oil pump.



### CLUTCH LIFTER ARM

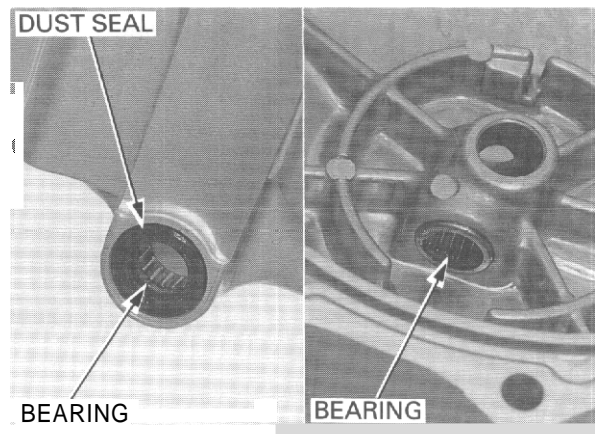
Remove the clutch lifter arm and return spring from the right crankcase cover.

Check the lifter arm spindle for wear or damage.  
Check the return spring for fatigue or damage.



Check the spindle dust seal and needle bearings for wear or damage.

Replace any faulty parts.



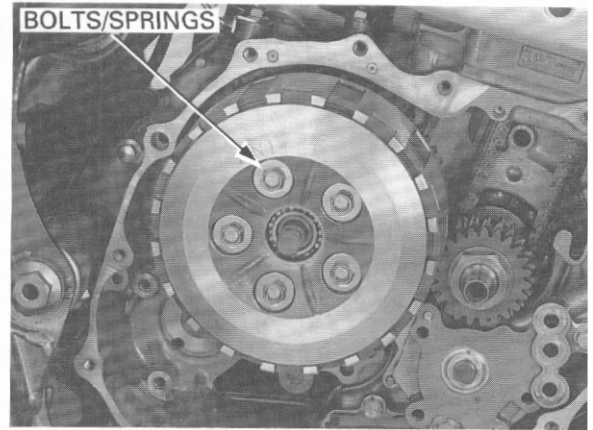
# CLUTCH

## DISASSEMBLY

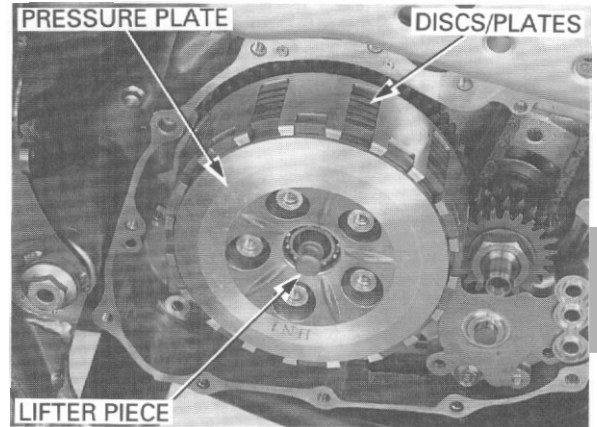
Remove the right crankcase cover (page 9-3).

Loosen the clutch spring bolts in a crisscross pattern in several steps.

Remove the bolts and springs.

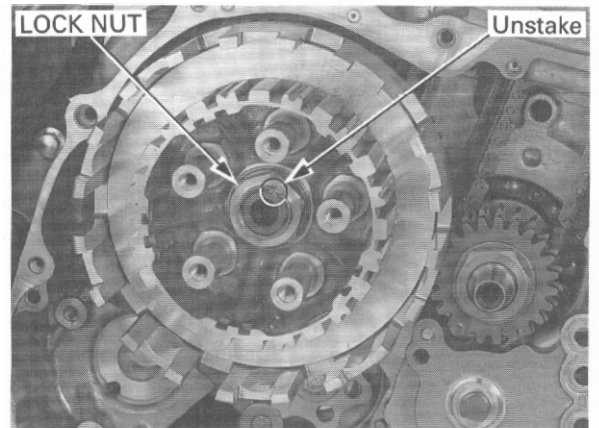


Remove the pressure plate and lifter piece.  
Remove the clutch discs and plates.



*Be careful not to damage the mainshaft threads.*

Unstake the clutch center lock nut.

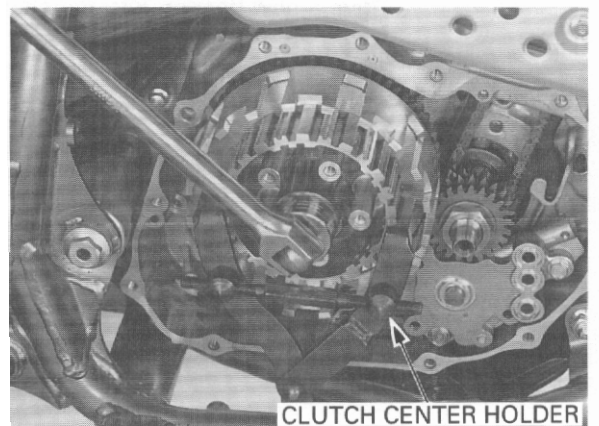


Hold the clutch center with the special tool and remove the clutch center lock nut.

**TOOL:**

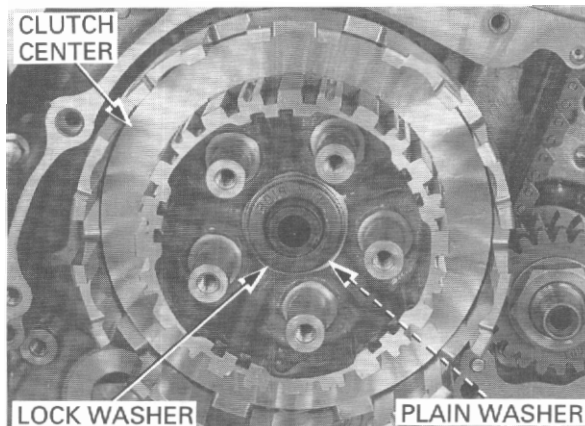
Clutch center holder

**07724 - 0050002** or equivalent commercially available in U.S.A.

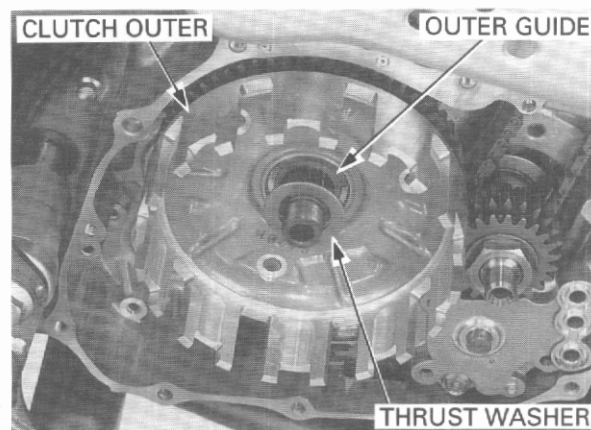


## CLUTCH/GEARSHIFT LINKAGE

Remove the lock washer, plain washer and clutch center.



Remove the thrust washer, clutch outer and 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 fits 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 up.

### TOOLS

Driver

07749-0010000

Attachment, 28 x 30 mm

07746-1870100

Pilot, 17 mm

07746-0040400

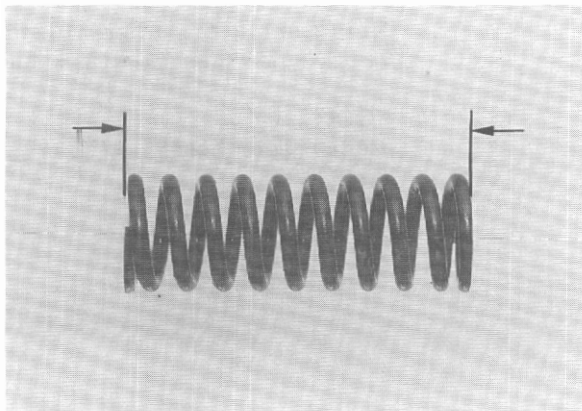
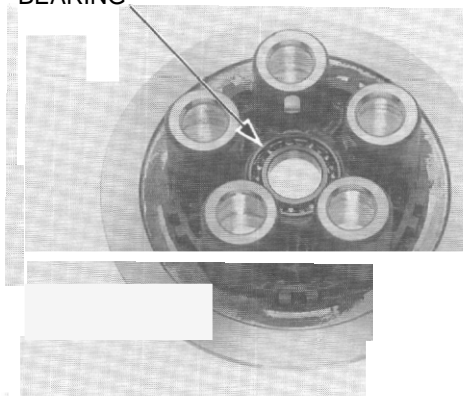
### CLUTCH SPRING

Replace the clutch springs as a set.

Measure the clutch spring free length.

**SERVICE LIMIT** 50.0 mm 11.97 in)

### BEARING

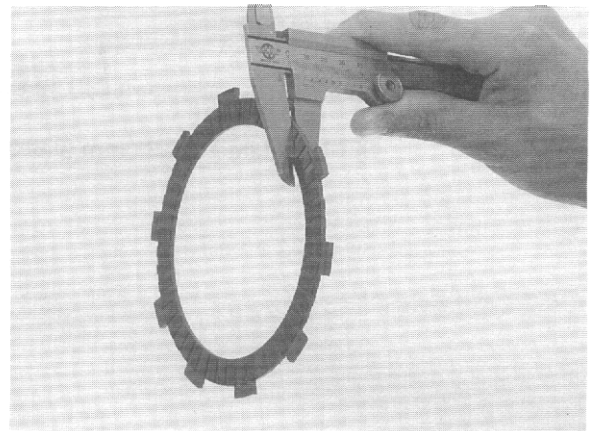


**CLUTCH DISC**

**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 2.69 mm 0.106 in)**

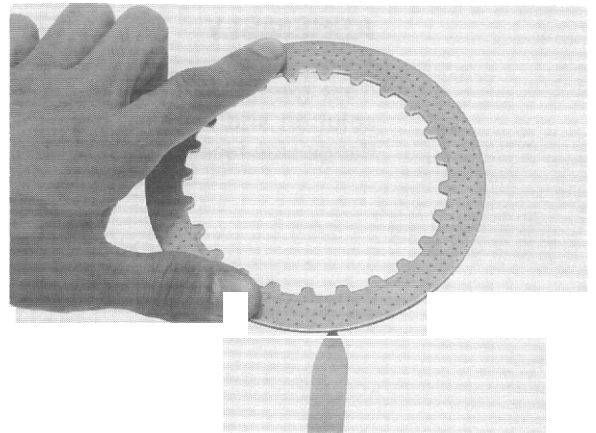


**CLUTCH PLATE**

**Replace the clutch discs and plates as a set**

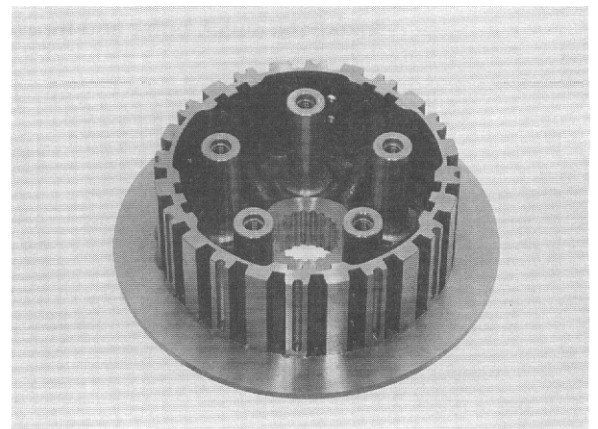
Check the plates for discoloration.  
Check the plate warpage on a surface plate using a feeler gauge.

**SERVICE LIMIT 0.15 mm 0.006 in)**



**CLUTCH CENTER**

Check the clutch center and pressure plate for nicks, indentations or abnormal wear made by the plates.



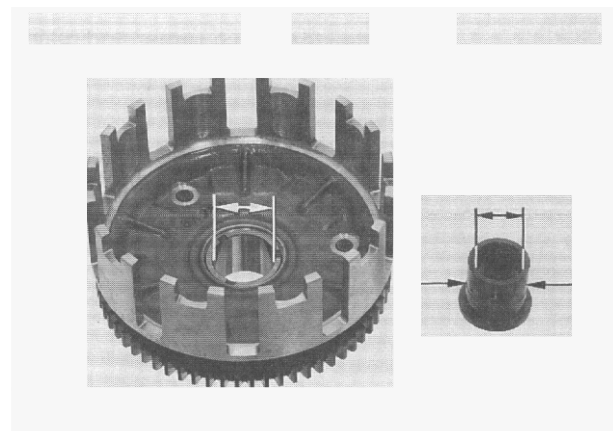
**CLUTCH OUTER/OUTER GUIDE**

Check the primary driven gear teeth for wear or damage.  
Check the slots in the clutch outer for nicks, indentation or abnormal wear made by the clutch discs.  
Measure the clutch outer I.D.

**SERVICE LIMIT: 28.04 mm (1.104 in)**

Measure the clutch outer guide I.D. and O.D.

**SERVICE LIMITS: I.D.: 22.05 mm 0.868 in)  
O.D.: 27.90 mm (1.098 in)**

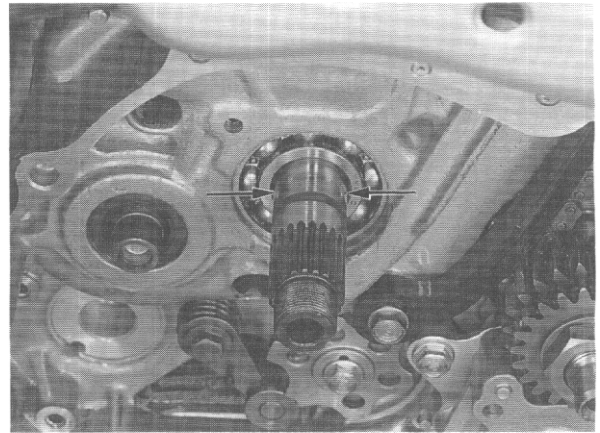


## CLUTCH/GEARSHIFT LINKAGE

### MAINSHAFT

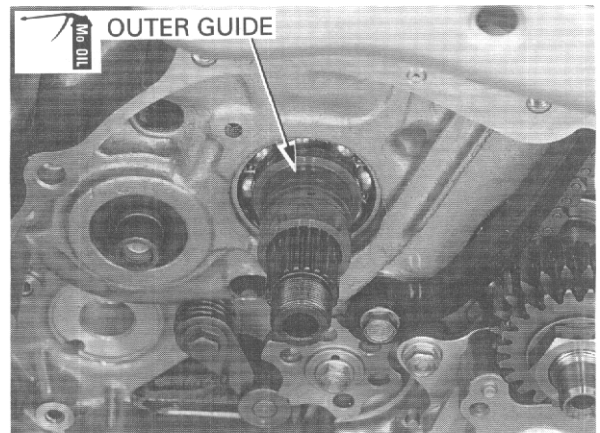
Measure the mainshaft O.D. at the clutch outer guide.

SERVICE LIMIT 21.91 mm (0.863 in)

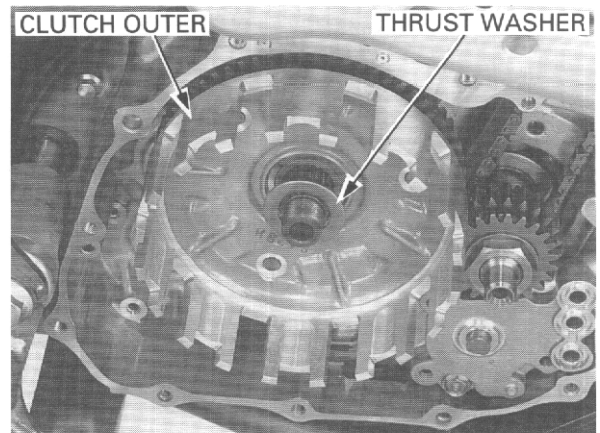


### ASSEMBLY

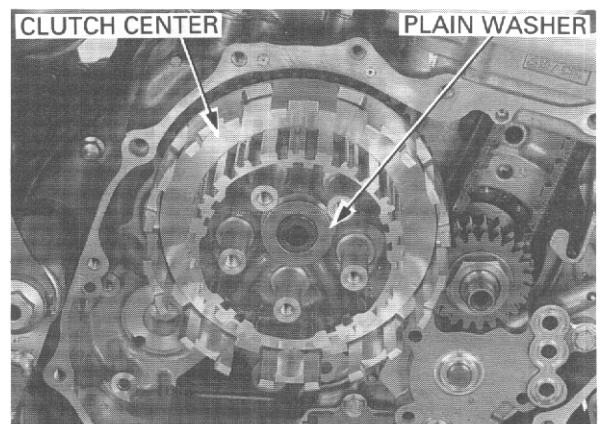
Coat the clutch outer guide with molybdenum oil solution and install it onto the mainshaft with the flange side facing the crankcase.



Install the clutch outer and thrust washer.

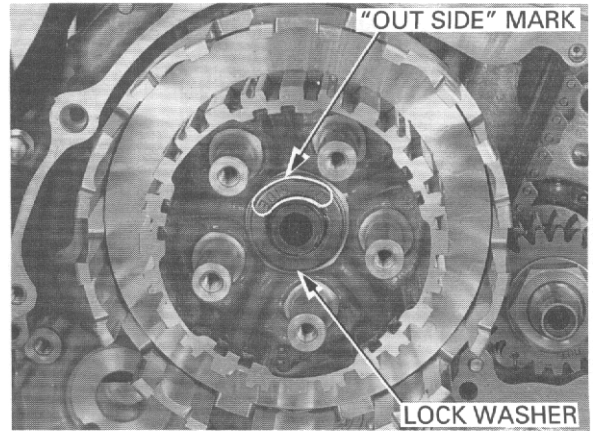


Install the clutch center and plain washer.





Install the lock washer with the "OUTSIDE" mark facing out.

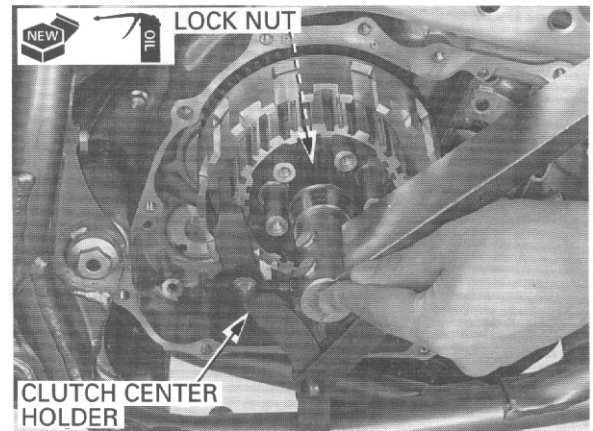


Apply oil to the threads and seating surface of a new clutch center lock nut and install it onto the mainshaft. Hold the clutch center with the special tool and tighten the lock nut.

**TOOL**  
Clutch center holder

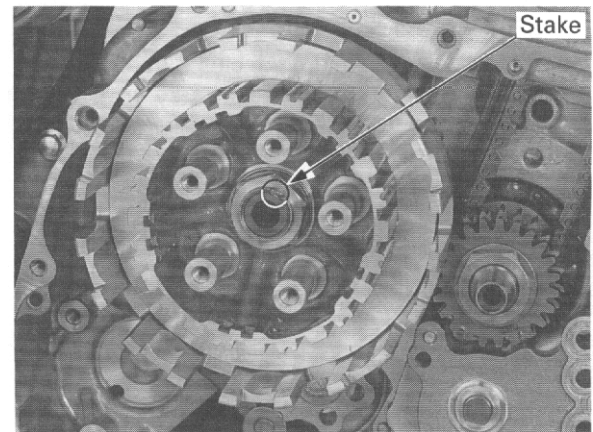
**07724 - 0050002 or equivalent commercially available in U.S.A.**

**TORQUE: 108 N-m (11.0 kgf-m, 80 lbf-ft)**



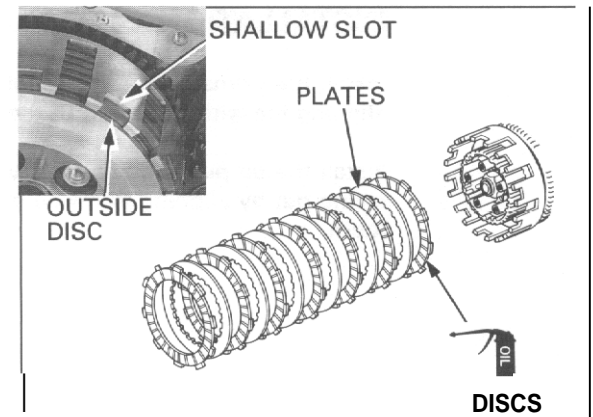
*Be careful not to damage the mainshaft threads.*

Stake the clutch center lock nut into the mainshaft groove.



*Install the out-side clutch disc tabs into the shallow slots in the clutch outer.*

Coat the clutch discs with clean engine oil. Install the seven clutch discs and six plates alternately, starting with the disc.



## CLUTCH/GEARSHIFT LINKAGE

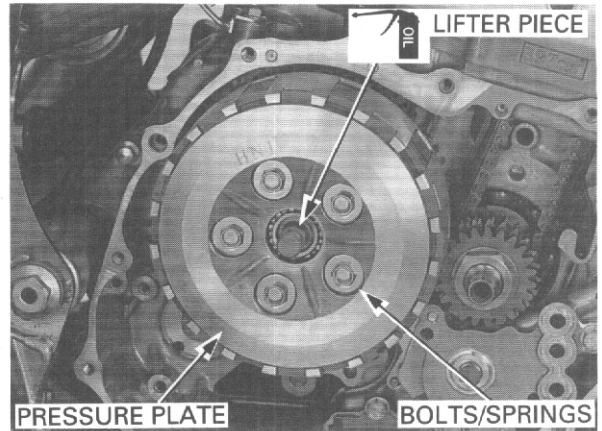
Apply oil to the clutch lifter piece whole surface and lifter bearing.

Install the clutch lifter piece and pressure plate.

Install the clutch springs and bolts.

Tighten the bolts in a crisscross pattern in several steps.

Install the right crankcase cover (page 9-12).



## PRIMARY DRIVE GEAR

### REMOVAL

Remove the right crankcase cover (page 9-3).  
Disassemble the clutch to the clutch center thrust washer (page 9-5).

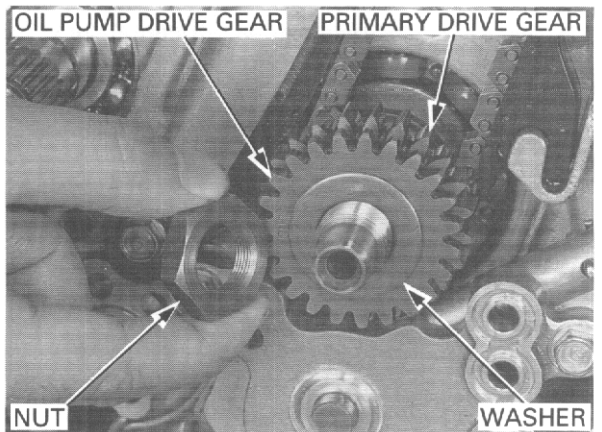
Install the special tool between the primary drive and driven gear as shown, loosen the primary drive gear nut.

**TOOL**  
Gear holder

**07724- 0010100**  
not available in  
U.S.A.



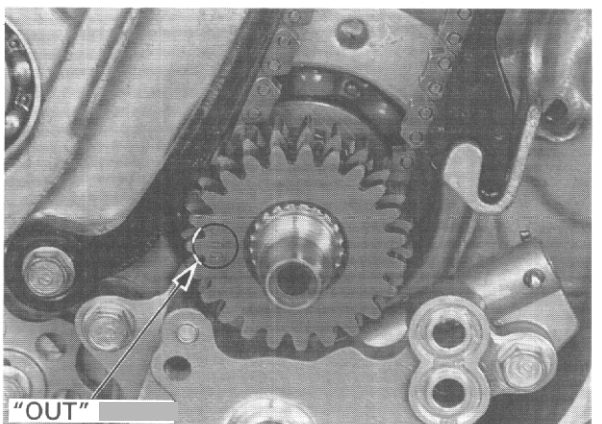
Remove the clutch outer.  
Remove the primary drive gear nut, washer, oil pump drive gear and primary drive gear from the crankshaft.



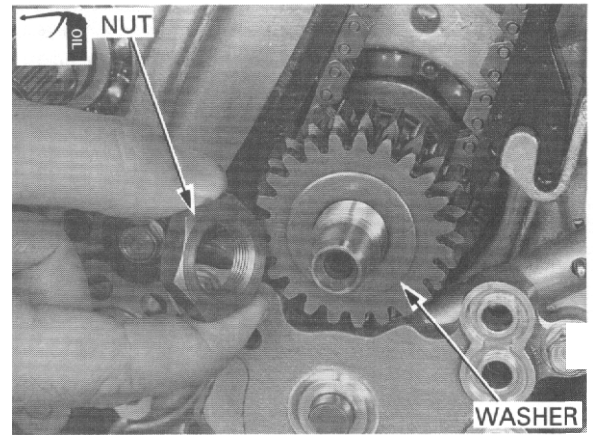
### INSTALLATION

Install the primary drive gear onto the crankshaft by aligning the wide groove with the wide tooth.

Install the oil pump drive gear with the "OUT" mark facing out by aligning the wide groove with the wide tooth.



Apply oil to the primary drive gear nut threads and seating surface.  
Install the washer and primary drive gear nut.



Remove the oil pump (page 4-21).  
Install the clutch outer onto the mainshaft.

Install the special tool between the primary drive and driven gears as shown and tighten the primary drive gear nut.

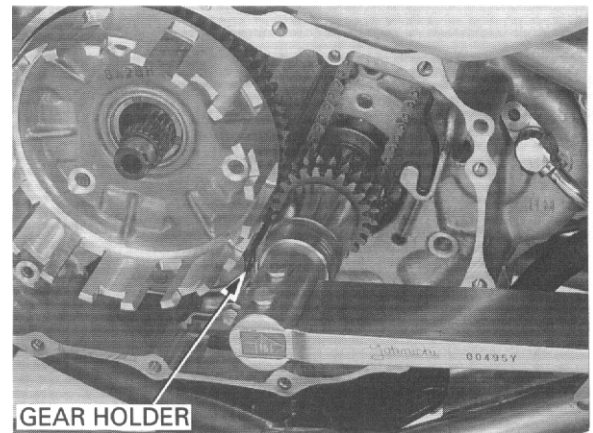
**TOOL**

Gear holder

**07724-0010100**  
not available in  
**U.S.A.**

**TORQUE 88 N·m (9.0kgf·m, 65 lbf·ft)**

Assemble the clutch (page 9-81).  
Install the oil pump (page 4-61).  
Install the right crankcase cover (page 9-12).



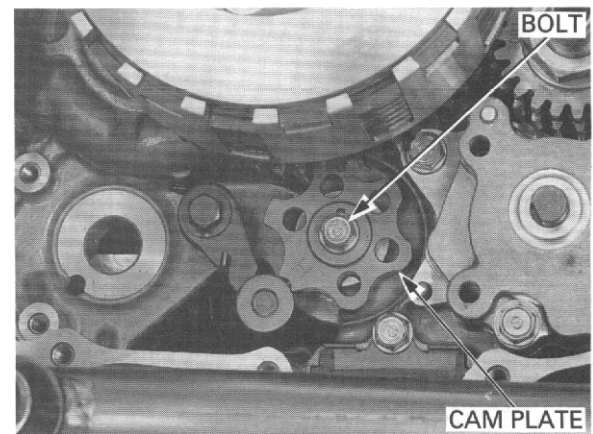
**GEARSHIFT LINKAGE**

**NOTE:**

For gearshift spindle service, refer to section 11

**REMOVAL**

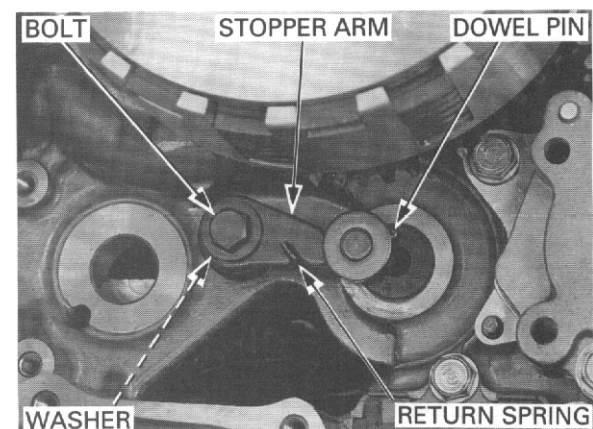
Remove the right crankcase cover (page 9-3).  
Remove the bolt and gearshift cam plate,  
Remove the bolt, stopper arm, washer and return spring.  
Remove the dowel pin from the shift drum.



Check the gearshift cam and stopper arm for wear or damage.  
Check the stopper arm return spring for fatigue or damage.

**INSTALLATION**

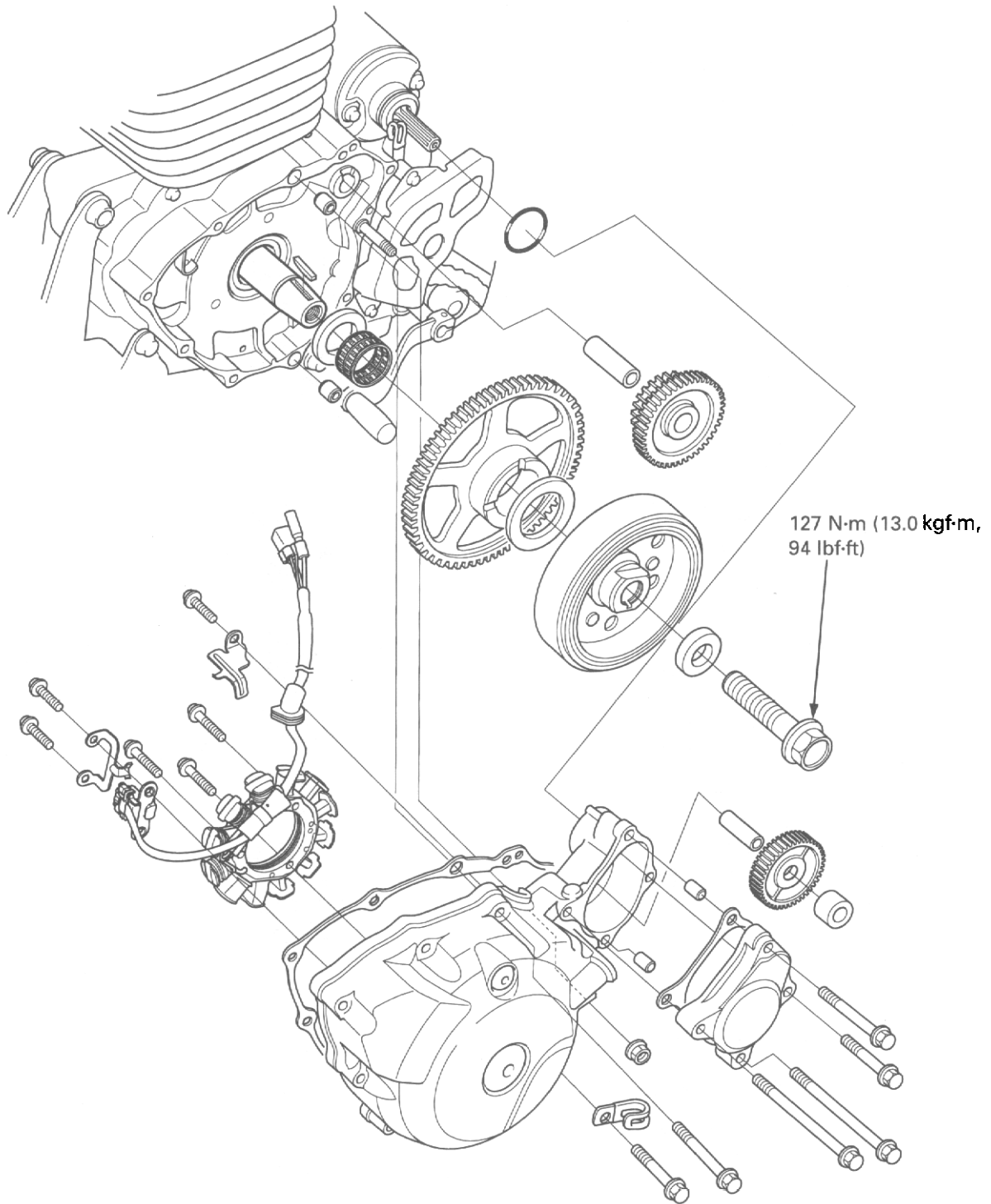
Install the dowel pin into the shift drum.  
Install the return spring, washer (between the arm and spring), stopper arm and bolt, and tighten the bolt.



**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**



# ALTERNATOR/STARTER CLUTCH



# 10. ALTERNATOR/STARTER CLUTCH

SERVICE INFORMATION	10-1	FLYWHEEL REMOVAL	10-5
TROUBLESHOOTING	10-1	STARTER CLUTCH	10-6
ALTERNATOR STATOR	10-2	FLYWHEEL INSTALLATION	10-8

ITEM	STANDARD	SERVICE LIMIT

## TORQUE VALUES

Flywheel bolt	127 N·m (13.0 kgf·m, 94 lbf·ft)	Apply oil to the threads and seating surface.
Starter clutch bolt	30 N·m (3.1 kgf·m, 22 lbf·ft)	Apply locking agent to the threads.
Left crankcase stud bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	

10

## TOOLS

Flywheel holder	07725 - 0040000 or equivalent commercially available in U.S.A.
Rotor puller	07733 - 0020001 or 07933 - 3950000 (U.S.A. only)

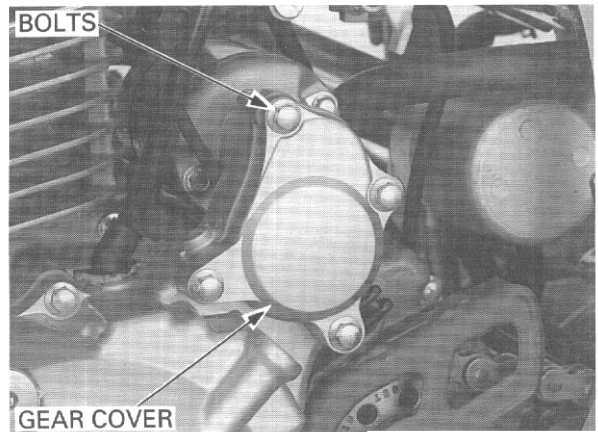
## TROUBLESHOOTING

- Starter motor turns, but engine does not turn
- Faulty starter clutch
  - Damaged starter idle and reduction gears

**ALTERNATOR STATOR**

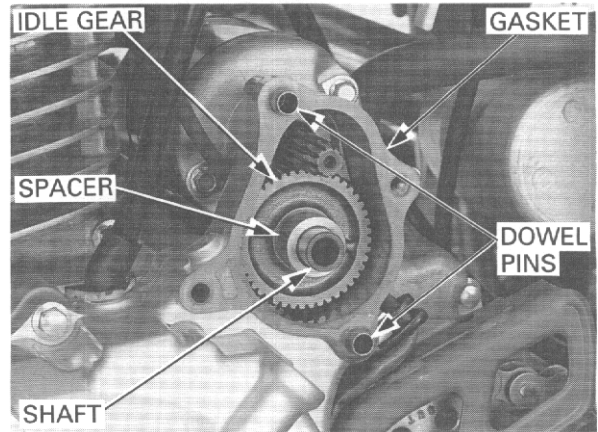
**LEFT CRANKCASE COVER REMOVAL**

Remove the four bolts and the starter idle gear cover.



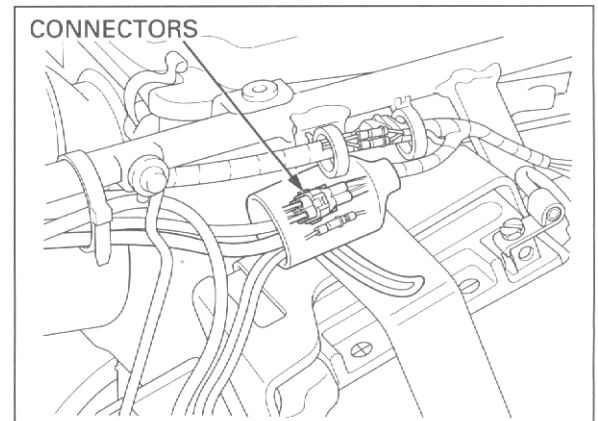
Remove the gasket and dowel pins.

Remove the spacer, starter idle gear and shaft from the left crankcase cover.

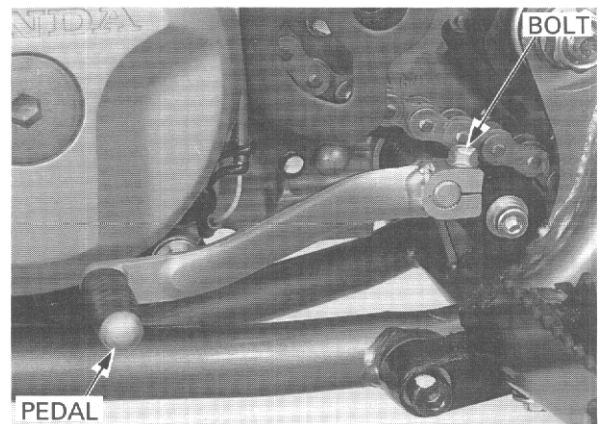


Remove the seat/rear fender (page 2-2).

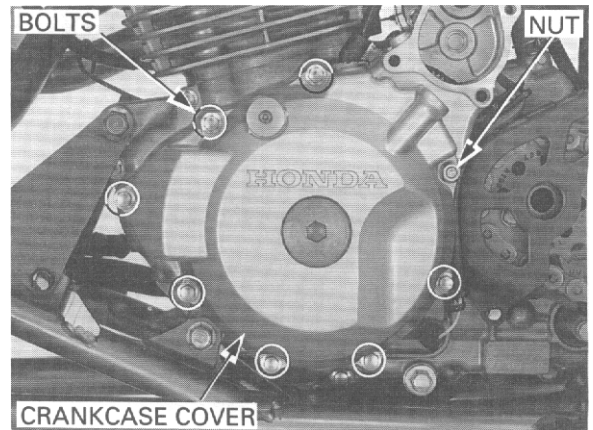
Disconnect the alternator connectors.



Remove the pinch bolt and gearshift pedal from the gearshift spindle.

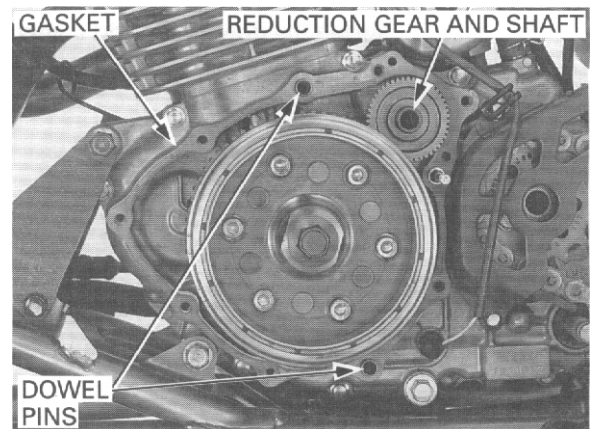


Remove the nut, seven bolts and the left crankcase cover.



Remove the gasket and dowel pins.

Remove the starter reduction gear shaft and gear.

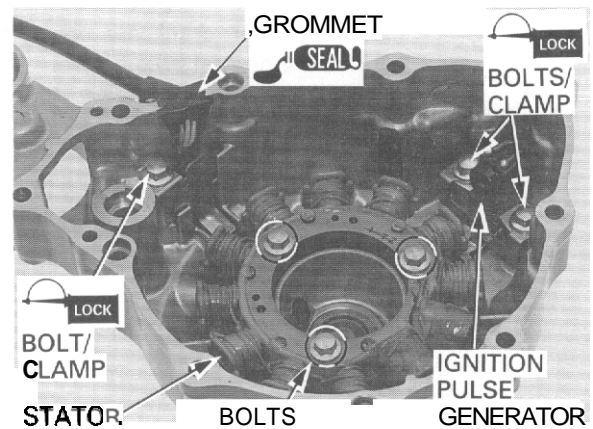


## STATOR REMOVAL/INSTALLATION

Remove the bolt and wire clamp.  
Remove the two ignition pulse generator bolts and wire clamp.  
Remove the three stator bolts.  
Remove the wire grommet and stator/ignition pulse generator assembly from the left crankcase cover.

Install the **stator/ignition** pulse generator assembly onto the left crankcase cover.  
Apply sealant to the wire grommet seating surface and install it into the cover groove properly.

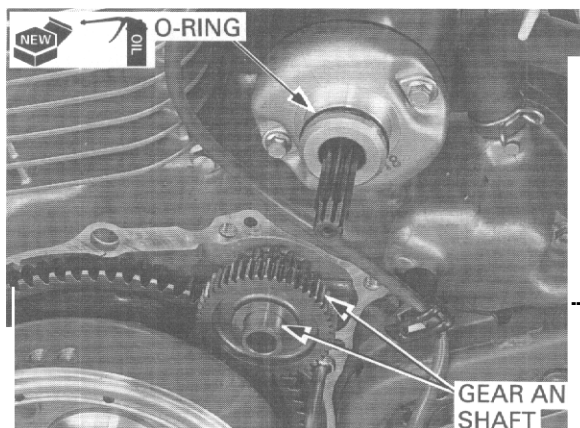
Install the stator bolts and tighten them securely.  
Apply locking agent to the ignition pulse generator bolt threads.  
Install the wire clamp onto the ignition pulse generator and tighten the two bolts securely.  
Apply locking agent to the wire clamp bolt threads.  
Install the wire clamp and tighten the bolt securely.



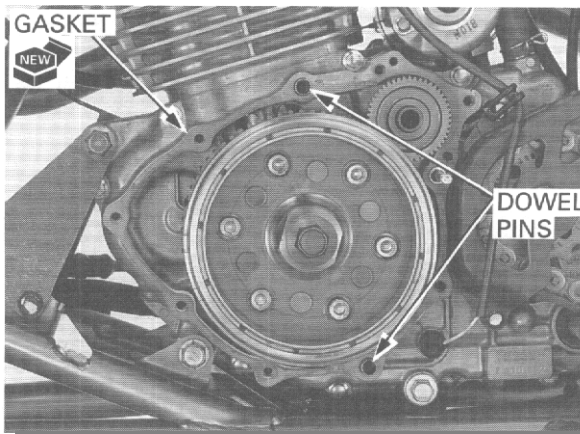
### LEFT CRANKCASE COVER INSTALLATION

Install the starter reduction gear and shaft.

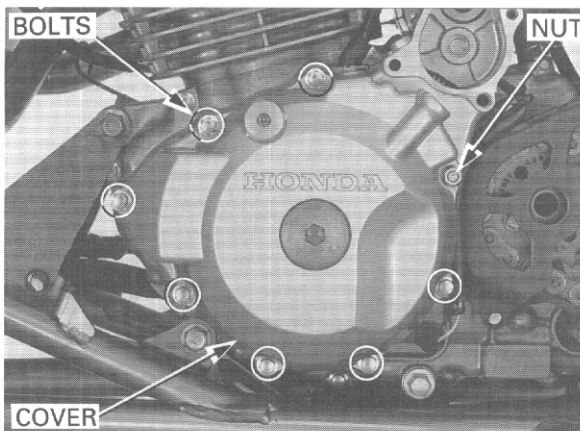
Coat a new O-ring with oil and install it into the starter motor groove.



Install the dowel pins and a new gasket

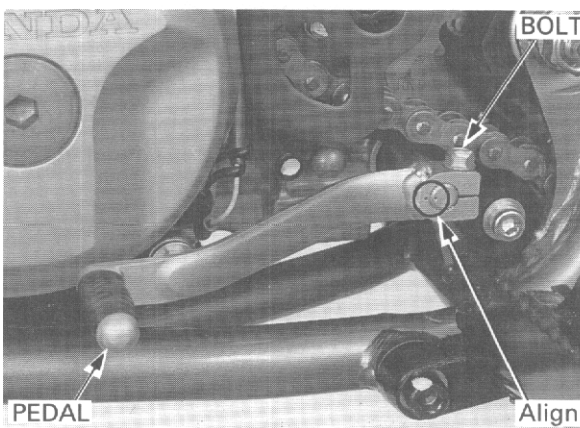


Install the left crankcase cover, being careful not to pinch the neutral switch wire.  
Install the nut and seven bolts, and tighten them securely.



Install the gearshift pedal onto the gearshift spindle, aligning the punch marks on the pedal and spindle.  
Install the gearshift pedal pinch bolt and tighten it.

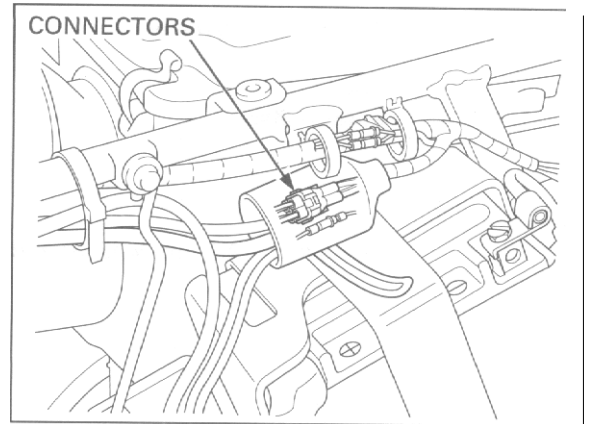
**TORQUE: 20 N·m (2.0 kgf·m, 14 lbf·ft)**



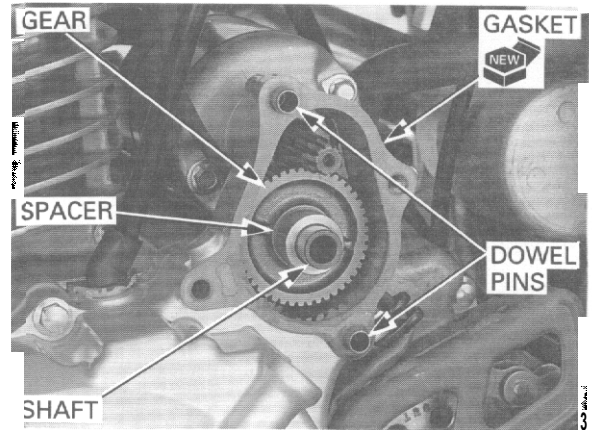
Route the alternator wire properly (page 1-18).

Connect the alternator connectors.

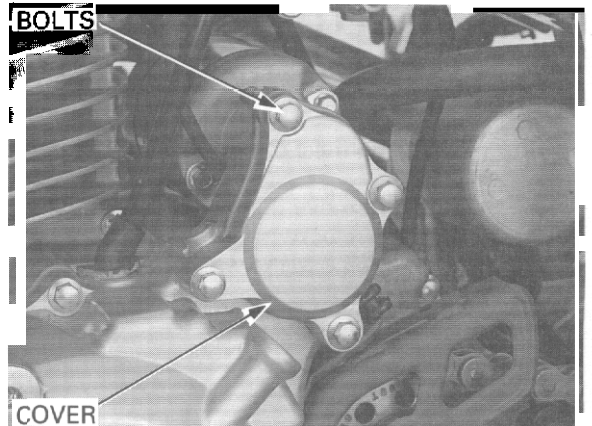
Install the **seat/rear** fender (page 2-21).



Install the starter idle gear shaft, gear and spacer in the left crankcase cover.  
Install the dowel pins and a new gasket.



Install the **starter** idle gear cover and tighten the four bolts securely.



## FLYWHEEL REMOVAL

Remove the **left** crankcase cover (page 10-2).

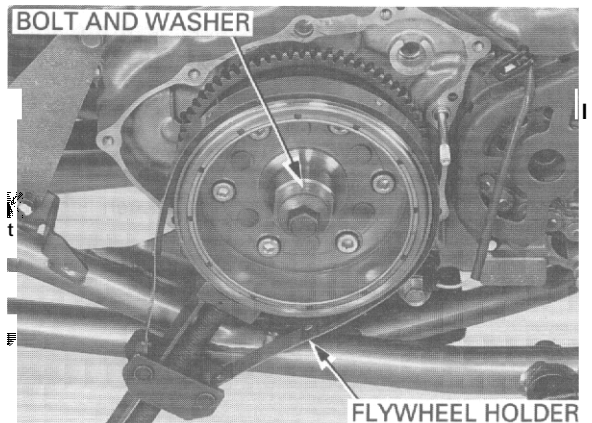
Hold the flywheel with the special tool and loosen the flywheel bolt.

### TOOL

**Flywheel holder**

**07725 - 0040000 or equivalent commercially available in U.S.A.**

Remove the flywheel bolt and special washer.



## ALTERNATOR/STARTER CLUTCH

Remove the flywheel using the special tool.

### TOOL

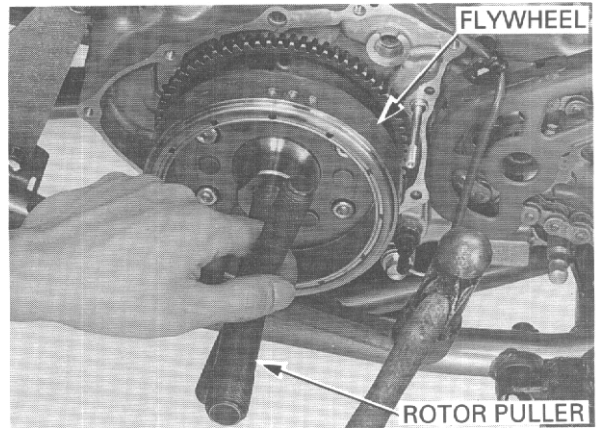
Rotor puller

07733-0020001 or

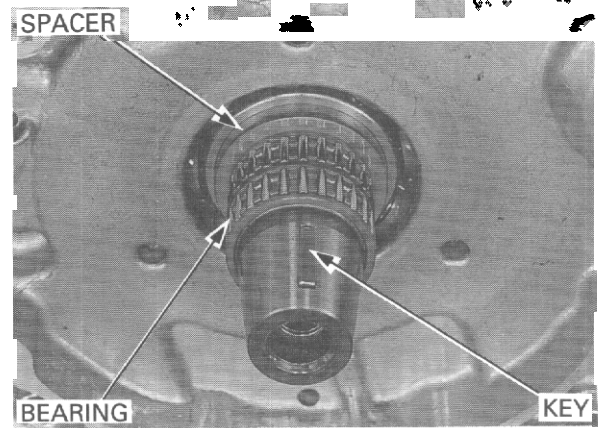
07933-3950000

(U.S.A. only)

Remove the 3.7 mm washer and starter drive gear.



Remove the needle bearing, spacer and woodruff key.



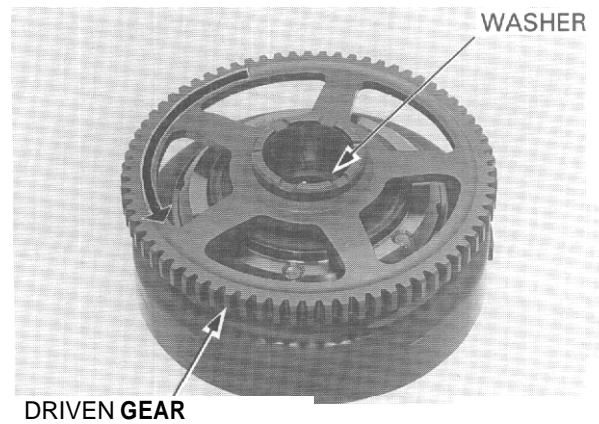
## STARTER CLUTCH

### REMOVAL

Remove the flywheel (page 10-5).

Remove the starter driven gear while turning it counterclockwise.

Remove the washer.



Hold the flywheel with the special tool and remove the starter clutch bolts.

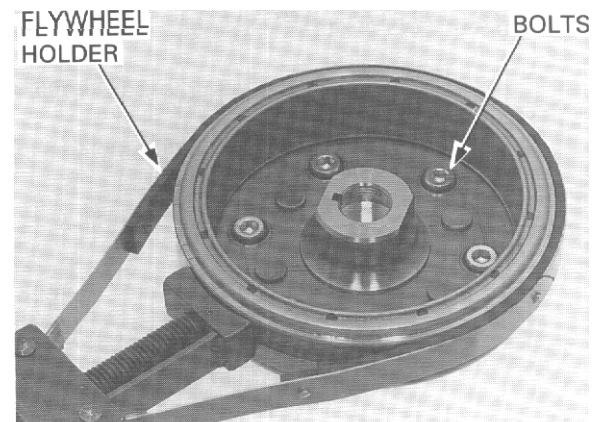
### TOOL

Flywheel holder

07725-0040000

Remove the starter clutch assembly from the flywheel.

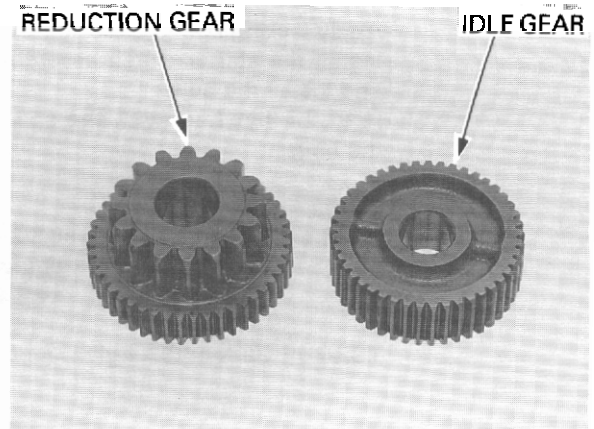
Remove the sprag clutch from the starter clutch outer.



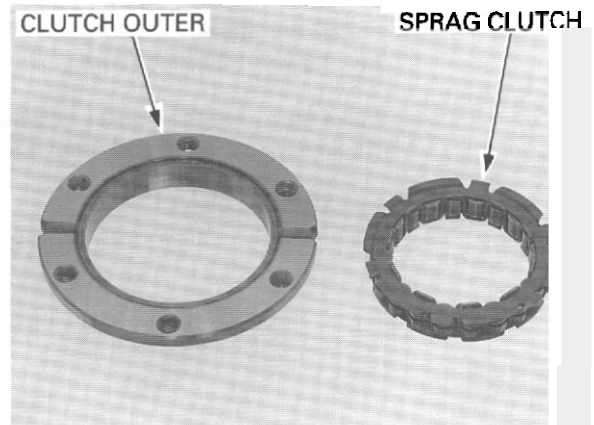


### INSPECTION

Check the starter idle gear and reduction gear for wear or damage.



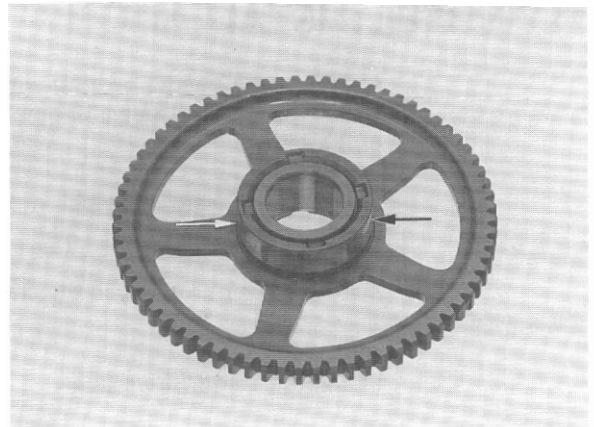
Check the starter clutch outer and sprag clutch for abnormal wear or damage.



Check the starter driven gear teeth for wear or damage.

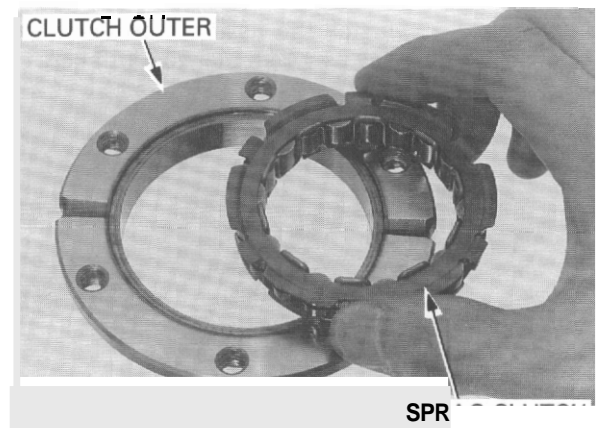
Measure the starter driven gear boss O.D.

SERVICE LIMIT 51.67 mm (2.034 in)



### INSTALLATION

Install the sprag clutch into the starter clutch outer with the flange side facing the flywheel side.





## ALTERNATOR/STARTER CLUTCH

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

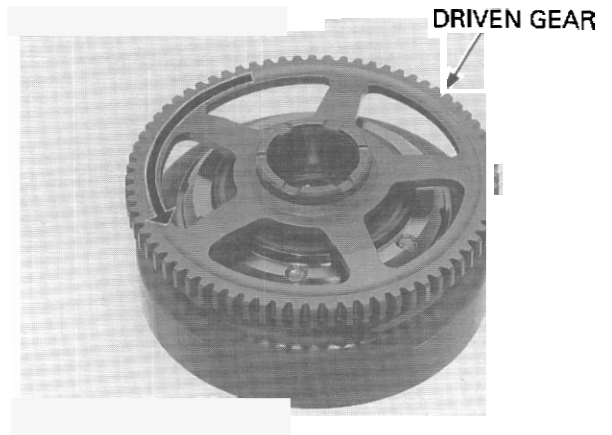
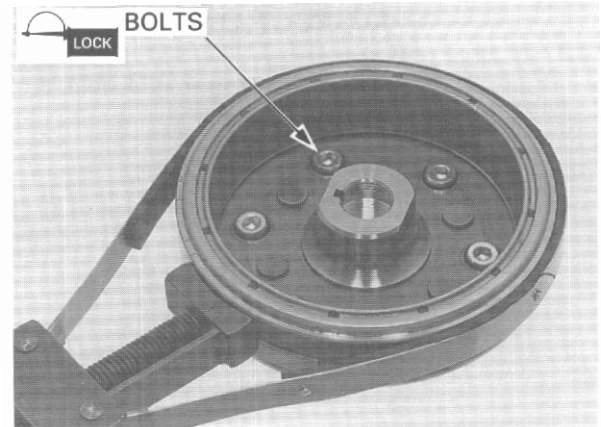
**07725 - 0040000** or equivalent commercially available in U.S.A.

**TORQUE: 30 N·m (3.1 kgf·m, 22 lbf·ft)**

Install the starter driven gear with the washer while turning it counterclockwise.

Make sure that the starter driven gear turns counterclockwise smoothly and does not turn clockwise.

Install the flywheel.



## FLYWHEEL INSTALLATION

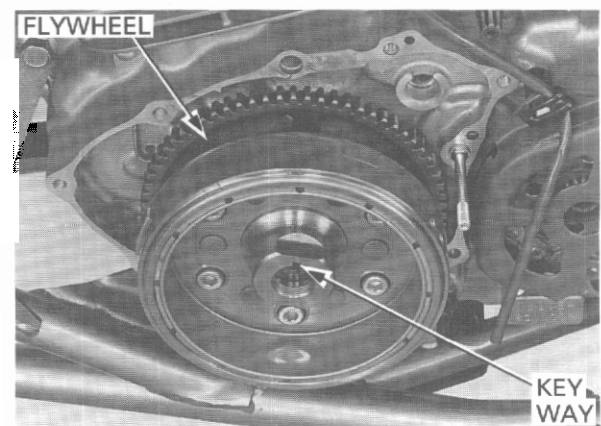
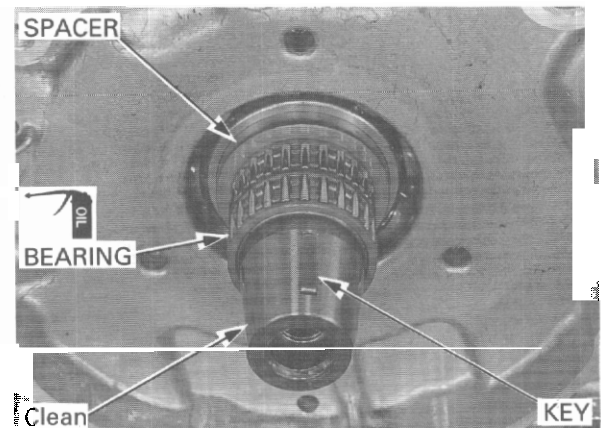
Lubricate the needle bearing with oil. Install the 5.6 mm spacer and needle bearing onto the crankshaft.

Clean any oil from the tapered portions of the crankshaft and flywheel.

Install the woodruff key in the crankshaft key groove.

Install the starter drive gear.

Install the flywheel on the crankshaft, aligning the key way with the woodruff key.



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.

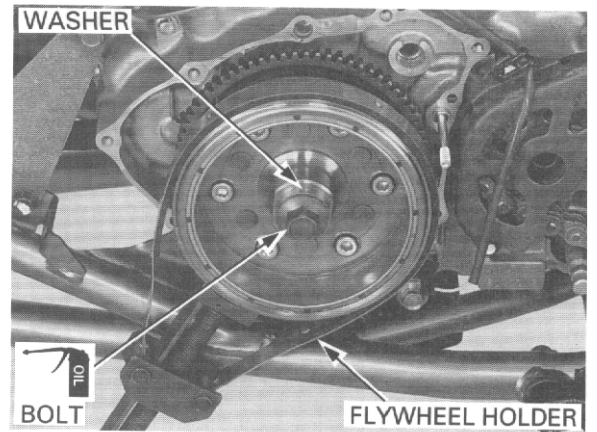
### TOOL

Flywheel holder

07725 – 0040000 or  
equivalent commercially  
available in U.S.A.

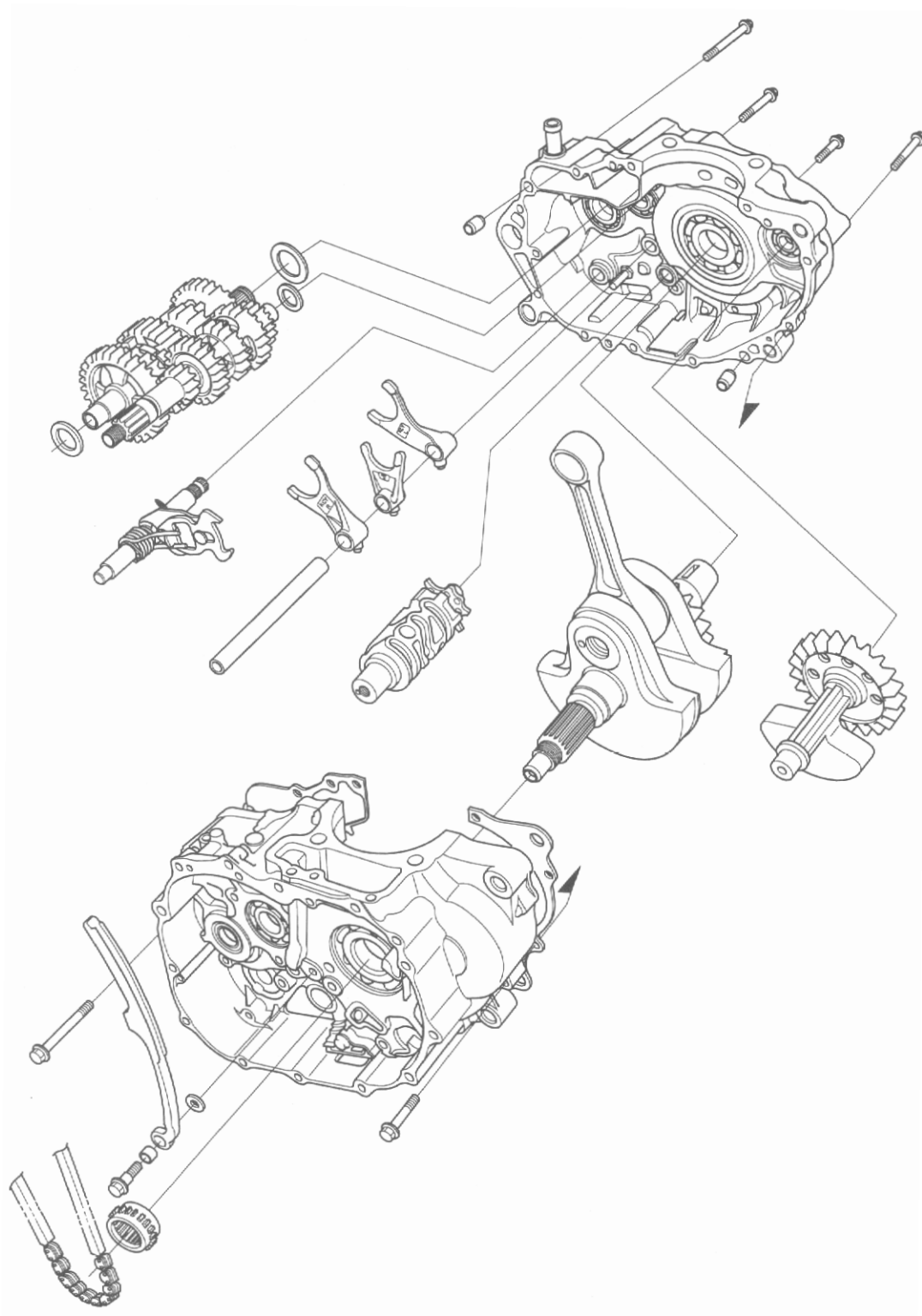
**TORQUE:** 127 N·m 113.0 kgf·m, 94 lbf·ft)

Install the left crankcase cover (page 10-4).



**CRANKCASE/TRANSMISSION/CRANKSHAFT**

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# 11. CRANKCASE/TRANSMISSION/CRANKSHAFT

SERVICE-INFORMATION	11-1	CRANKSHAFT/BALANCER	11-9
TROUBLESHOOTING	11-2	CRANKCASE BEARING REPLACEMENT	11-12
CRANKCASE SEPARATION	11-3	CRANKCASE ASSEMBLY	11-15
TRANSMISSION	11-4		

## SERVICE INFORMATION

### GENERAL

- The crankcase halves must be separated to service the transmission and crankshaft. To service these parts, the engine must be removed from the frame (section 6).
- Be careful not to damage the crankcase mating surfaces when servicing.

### SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT	
Shift fork	I.D.	13.000– 13.021 (0.5118–0.5126)	13.05 (0.514)	
	Claw thickness	5.93 – 6.00 (0.233 – 0.236)	5.5 (0.22)	
	Shaft O.D.	12.966– 12.984 (0.5105–0.5112)	12.90 (0.508)	
Transmission	Gear I.D.	M4	25.020 – 25.041 (0.9850 – 0.9859)	25.08 (0.987)
		M5	25.000 – 25.021 (0.9843 – 0.9851)	25.06 (0.987)
		C1	23.000 – 23.021 (0.9055 – 0.9063)	23.07 (0.908)
		C2, C3	28.020 – 28.041 (1.1031 – 1.1040)	28.08 (1.106)
	Gear bushing O.D.	M4	24.979 – 25.000 (0.9834 – 0.9843)	24.90 (0.980)
		M5	24.959 – 24.980 (0.9826 – 0.9835)	24.90 (0.980)
		C1	22.959 – 22.980 (0.9039 – 0.9047)	22.90 (0.902)
		C2, C3	27.979 – 28.000 (1.1015 – 1.1024)	27.94 (1.100)
	Gear-to-bushing clearance		0.020 – 0.062 (0.0008 – 0.0022)	0.10 (0.004)
	Gear bushing I.D.	M4	22.000 – 22.021 (0.8661 – 0.8670)	22.10 (0.870)
		C1	20.020 – 20.041 (0.7882 – 0.7890)	20.08 (0.791)
		C2, C3	25.000 – 25.021 (0.9843 – 0.9851)	25.06 (0.987)
	Mainshaft O.D.	at M4	21.959 – 21.980 (0.7866 – 0.7874)	21.92 (0.863)
	Countershaft O.D.	at C1	19.979 – 20.000 (1.1791 – 1.1801)	19.94 (0.785)
at C2, C3		24.959 – 24.980 (0.9826 – 0.9835)	24.92 (0.981)	
Bushing-to-shaft clearance		0.020 – 0.062 (0.0008 – 0.0022)	0.10 (0.004)	
Crankshaft	Runout	—	0.12 (0.005)	
	Big end side clearance	0.05 – 0.45 (0.002 – 0.018)	0.6 (0.02)	
	Big end radial clearance	0.006 – 0.018 (0.0002 – 0.0007)	0.05 (0.002)	

11

### TORQUE VALUES

- |  |                               |                                    |
|--|-------------------------------|------------------------------------|
| Mainshaft bearing setting plate bolt     | 12 N·m (1.2 kgf·m, 9 lbf·ft)  | Apply locking agent to the threads |
| Gearshift spindle return spring pin bolt | 24 N·m (2.4 kgf·m, 17 lbf·ft) |                                    |

## CRANKCASE/TRANSMISSION/CRANKSHAFT

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### TOOLS

Bearing remover set, 15 mm	07936-KC10000 not available in U.S.A.
— bearing remover, 15 mm	07936-KC10500
— remover shaft	07936-KC10100 not available in U.S.A.
— remover head	07936-KC10200 not available in U.S.A.
— sliding weight	07741-0010201 or 07936-371020A or 07936-3710200
Bearing remover, 17 mm	07936-3710300
Remover handle	07936-3710100
Remover weight	<b>07741-0010201 or 07936-371020A or 07936-3710200</b>
Driver	07749-0010000
Attachment, 32 x 35 mm	07746-0010100
Attachment, 37 x 40 mm	07746-0010200
Attachment, 42 x 47 mm	07746-0010300
Attachment, 52 x 55 mm	07746-0010400
Attachment, 72 x 75 mm	07746-0010600
Pilot, 12 mm	07746-0040200
Pilot, 15 mm	07746-0040300
Pilot, 17 mm	07746-0040400
Pilot, 22 mm	07746-0041000
Pilot, 25 mm	07746-0040600
Pilot, 30 mm	07746-0040700
Universal bearing puller	07631-0010000 or equivalent commercially available in U.S.A.
Crankcase assembly tool	07965-VM00000 not available in U.S.A.
— assembly collar	07965-VM00100
— assembly shaft	07965-VM00200 or 07931-ME4010B and 07931-HB3020A
— threaded adaptor	07965-VM00300 or 07931-KF00200

### TROUBLESHOOTING

#### Excessive engine noise

- Worn, seized or chipped transmission gears
- Worn transmission bearing
- Worn or damaged connecting rod bearings
- Worn crankshaft main journal bearing
- Worn connecting rod small end
- Worn balancer bearing
- Improper balancer installation

#### Transmission jumps out of gear

- Worn gear dogs or dog holes
- Worn shift drum guide groove
- Worn shift fork guide pin
- Worn gear shifter groove
- Worn shift fork
- Bent shift fork shaft

#### Hard to shift

- Damaged shift fork
- Bent shift fork shaft
- Damaged shift fork guide pin
- Damaged shift drum guide groove

#### Abnormal vibration

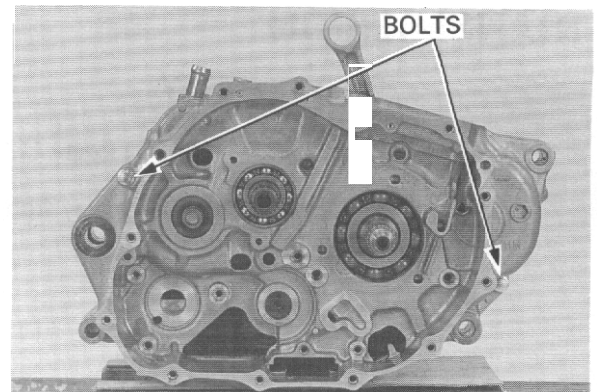
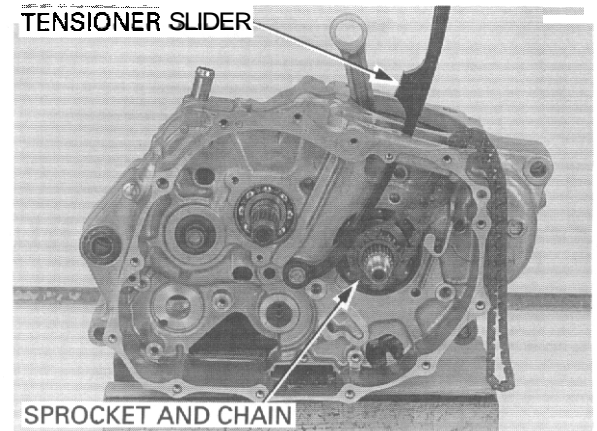
- Improper balancer timing

## CRANKCASE SEPARATION

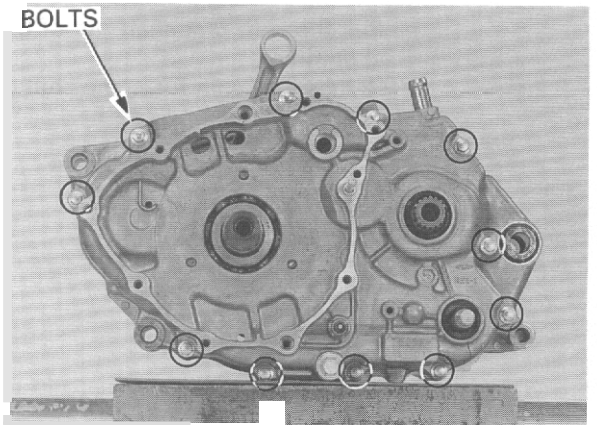
Remove the following:

- engine (section 6)
- cylinder head (section 7)
- cylinder and piston (section 8)
- clutch, gearshift linkage, primary drive gear (section 9)
- oil pump (section 4)
- flywheel (section 10)
- starter motor (section 18)
- bolt, tensioner slider/collar and washer
- cam chain
- cam chain drive sprocket

- two right crankcase bolts



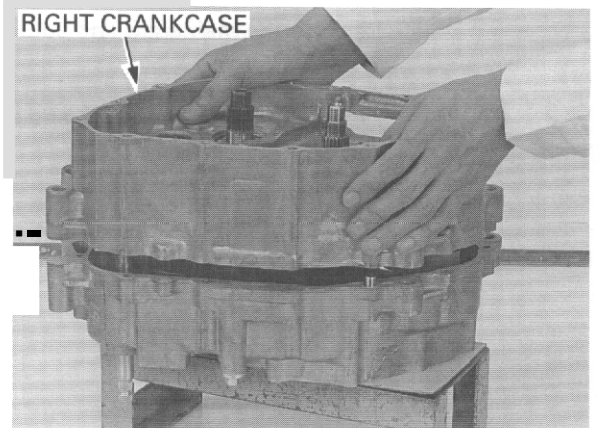
Loosen the eleven left crankcase bolts in a crisscross pattern in 2 or 3 steps and remove them.



Place the crankcase assembly with the left side down. Remove the right crankcase from the left crankcase while tapping them at several locations with a soft hammer.

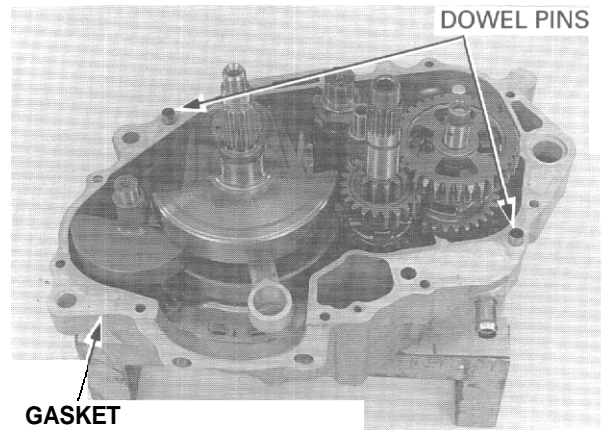
**CAUTION:**

*Do not pry the crankcase apart with a screwdriver.*



## CRANKCASE/TRANSMISSION/CRANKSHAFT

Remove the gasket and dowel pins.

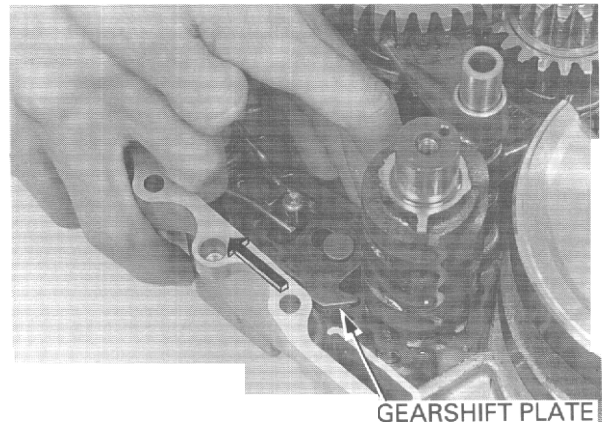


## TRANSMISSION

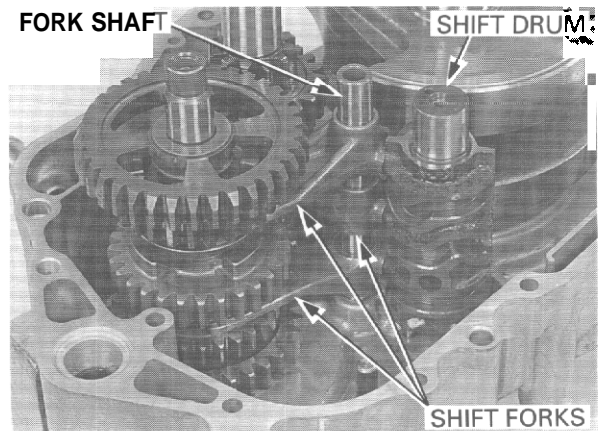
### DISASSEMBLY

Separate the crankcase (page 11-3).

Pull the gearshift plate away from the shift drum and remove the gearshift spindle.

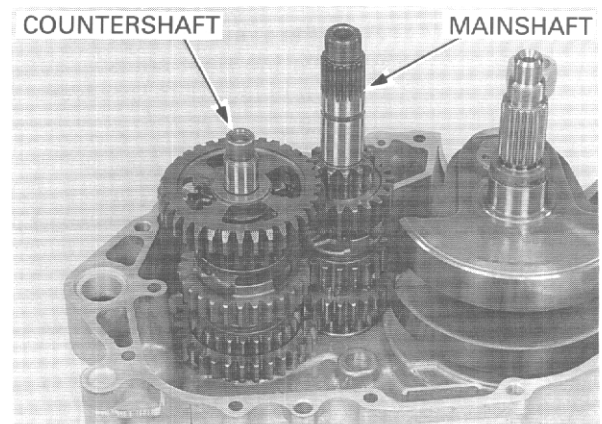


Pull the shift fork shaft out of the left crankcase and shift forks.  
Remove the shift forks and shift drum.



Remove the mainshaft and countershaft assembly as a set.

Disassemble the mainshaft and countershaft.



## INSPECTION

### GEAR/BUSHING/SHAFT

Check the gear dogs and teeth for abnormal wear or damage.

Measure the gear I.D.

SERVICE LIMITS: M 4 25.08 **mm (0.987 in)**  
 M5: 25.06 **mm (0.987 in)**  
 C1: 23.07 **mm (0.908 in)**  
 C2, C3: 28.08 **mm (1.106 in)**

Measure the gear bushing O.D.

SERVICE LIMITS: M4, M5: 24.90 **mm (0.980 in)**  
 C1: 22.90 **mm (0.902 in)**  
 C2, C3: 27.94 **mm (1.100 in)**

Calculate the gear-to-bushing clearance.

SERVICE LIMIT 0.10 **mm (0.004 in)**

Measure the gear bushing I.D.

SERVICE LIMITS: M 4 22.10 **mm (0.870 in)**  
 C1: 20.80 **mm (0.791 in)**  
 C2, C3: 25.06 **mm (0.987 in)**

Check the mainshaft and countershaft for abnormal wear or damage.

Measure the mainshaft O.D. at the M4 gear.

SERVICE LIMIT 21.92 **mm (0.863 in)**

Measure the countershaft O.D. at the C1, C2 and C3 gears.

SERVICE LIMITS At C1: 19.94 **mm (0.785 in)**  
 At C2, C3 24.92 **mm (0.981 in)**

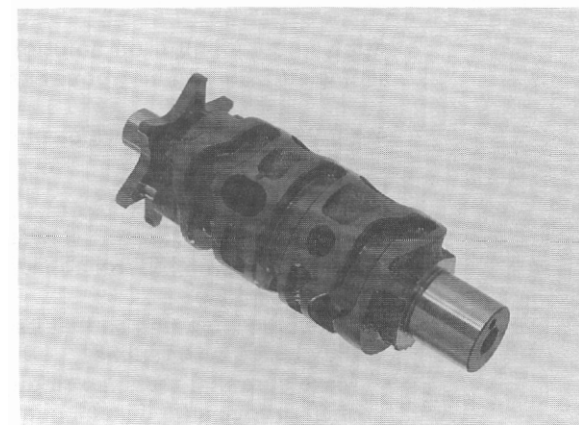
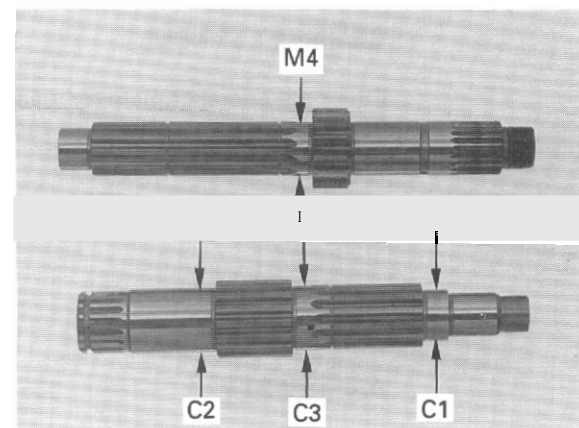
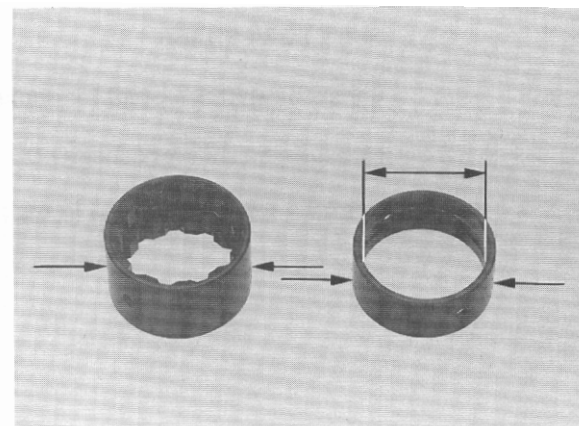
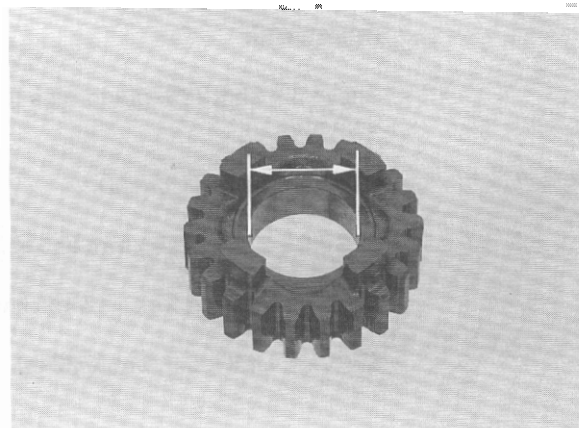
Calculate the gear bushing-to-shaft clearance.

SERVICE LIMIT 0.10 **mm 10.004 in)**

### SHIFT DRUM

Check the shift drum guide grooves for abnormal wear or damage.

Check the shift drum journals for scoring, scratches or evidence of insufficient lubrication.





## CRANKCASE/TRANSMISSION/CRANKSHAFT

### SHIFT FORK

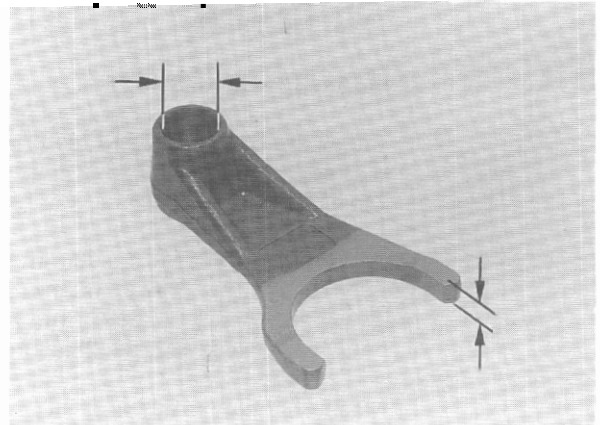
Check the shift fork guide pins for abnormal wear or damage.

Measure the shift fork I.D

**SERVICE LIMIT 13.05 mm (0.514 in)**

Measure the shift fork claw thickness.

**SERVICE LIMIT 5.5 mm (0.22 in)**

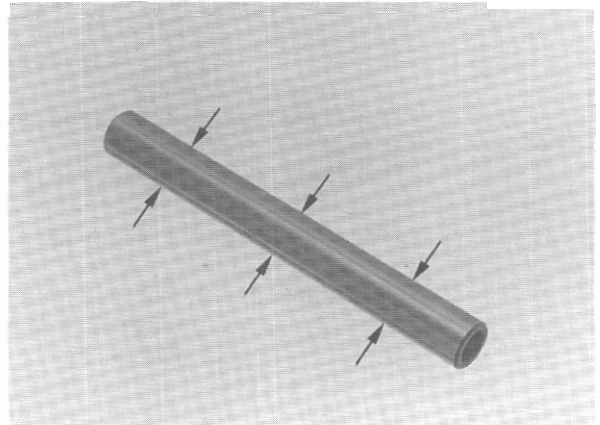


### SHIFT FORK SHAFT

Check the shift fork shaft for damage or bending

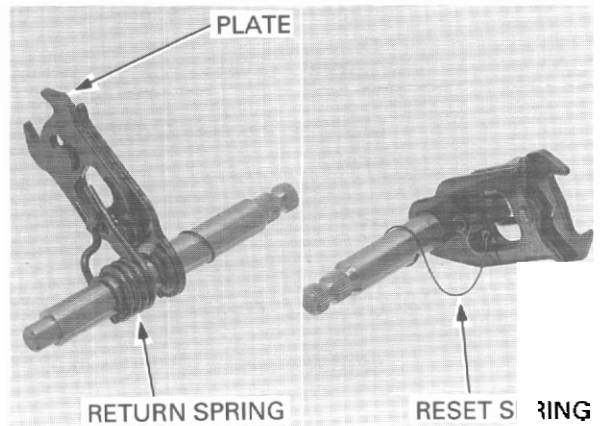
Measure the shift fork shaft O.D.

**SERVICE LIMIT 12.90 mm (0.508 in)**



### GEARSHIFT SPINDLE

Check the gearshift plate for wear or damage.  
Check the return spring and reset spring for fatigue or damage.



### ASSEMBLY

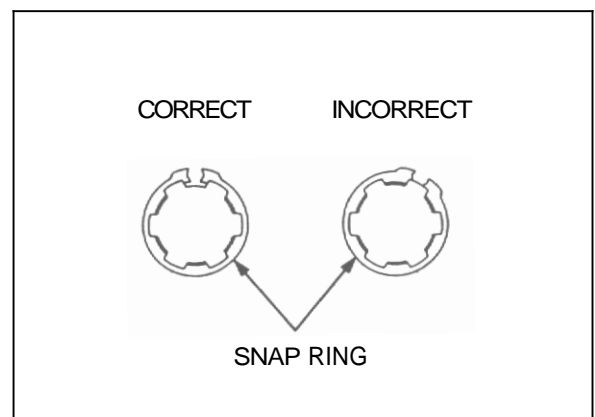
Clean all parts in solvent and dry them thoroughly.

Apply molybdenum oil solution to the gear teeth, sliding surface, shifter grooves and bushings.

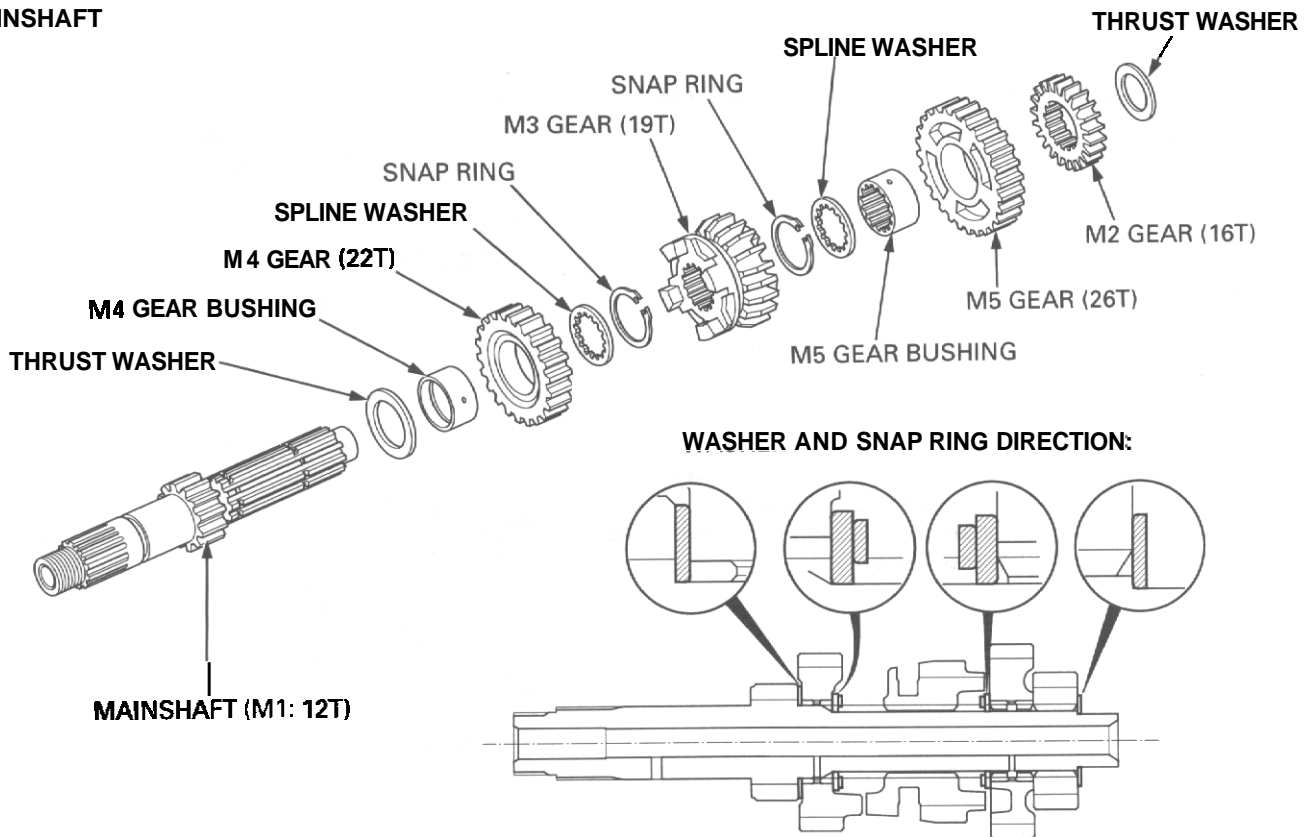
Assemble the mainshaft and countershaft.

#### NOTE:

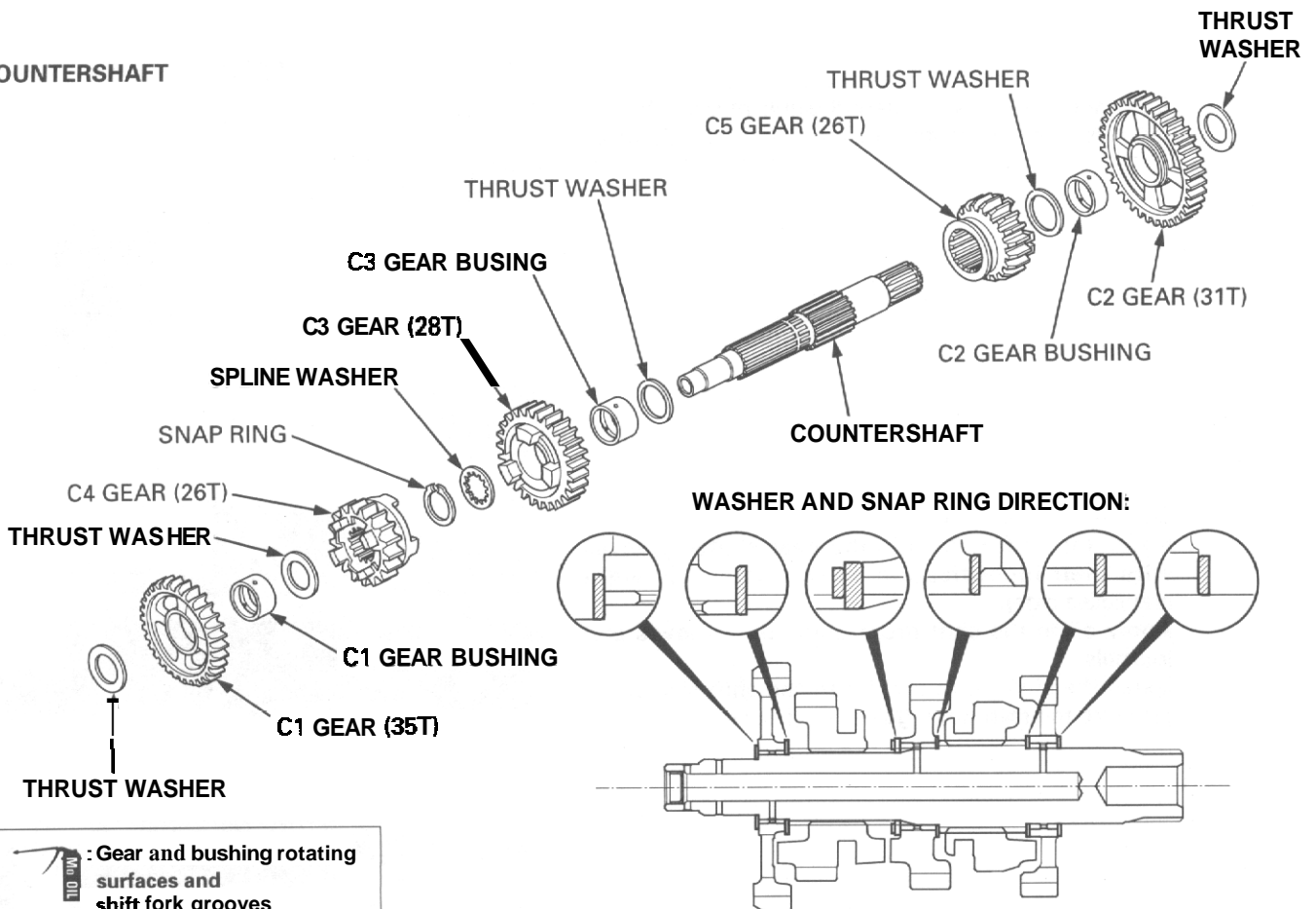
- Always install the thrust washer and snap ring with the chamfered (rolled) edge facing away from the thrust load.
- Install the snap ring so that its end gap aligns with the groove in the splines.
- Make sure that the snap ring is fully seated in the shaft groove after installing it.




**MAINSHAFT**



**COUNTERSHAFT**

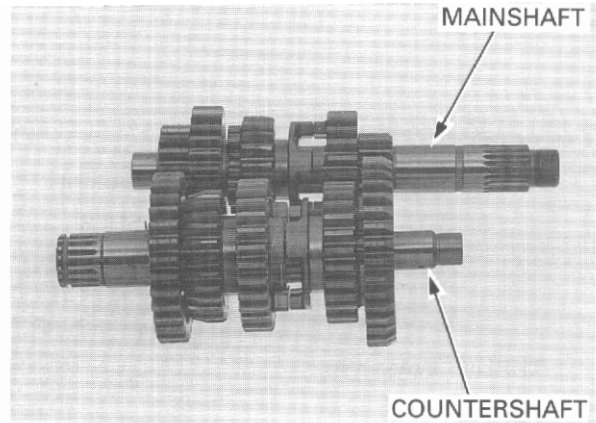


 : Gear and bushing rotating surfaces and shift fork grooves

## CRANKCASE/TRANSMISSION/CRANKSHAFT

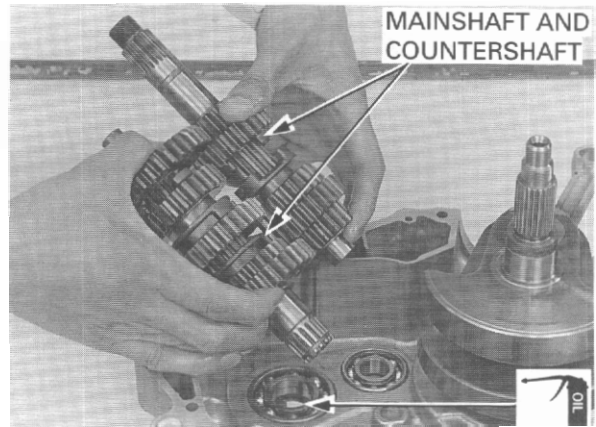
Check the gears for freedom of movement or rotation on the shaft.

Engage the mainshaft and countershaft gears.



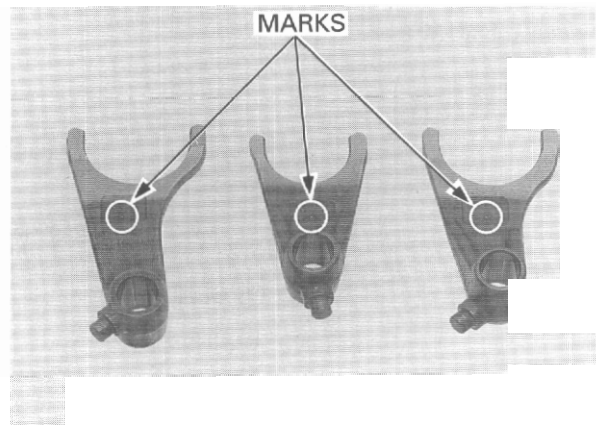
**Be sure to install the thrust washers.**

If removed, install the crankshaft/balancer (page 11-11).  
Apply oil to the countershaft oil seal lip.  
Install the mainshaft and countershaft assemblies as a set into the left crankcase.

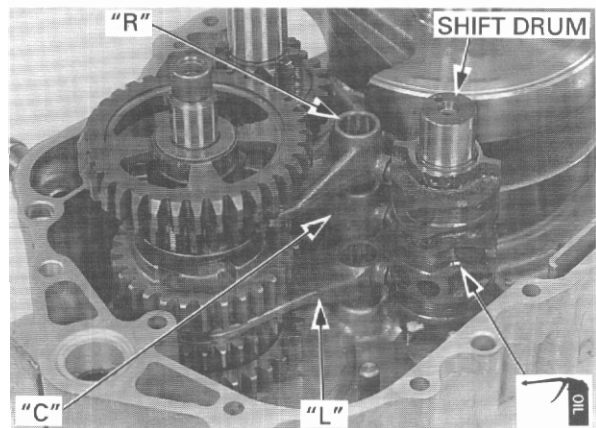


### NOTE:

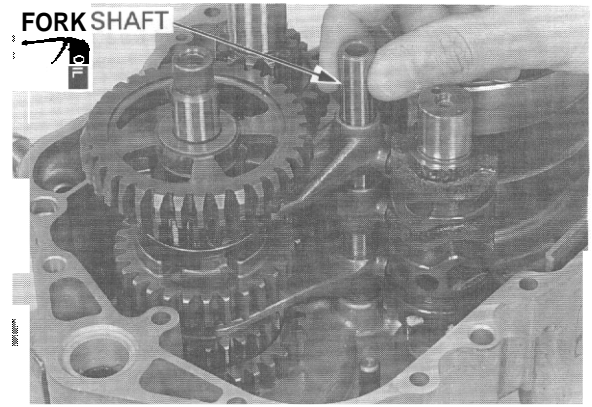
Each shift fork has an identification mark; L for the left fork, C for the centerfork and R for the right fork.



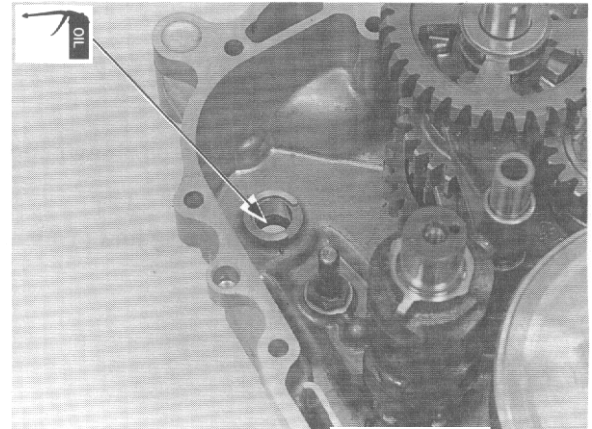
Coat the shift forks with oil.  
Install the shift forks into the gear shifter grooves with their identification marks facing up (right crankcase side).  
Apply oil to the shift drum guide pin grooves and journals.  
Install the shift drum and insert the shift fork guide pins into the shift drum guide pin grooves.



Coat the shift fork shaft with oil.  
Install the shift fork shaft through the shift forks and into the left crankcase.

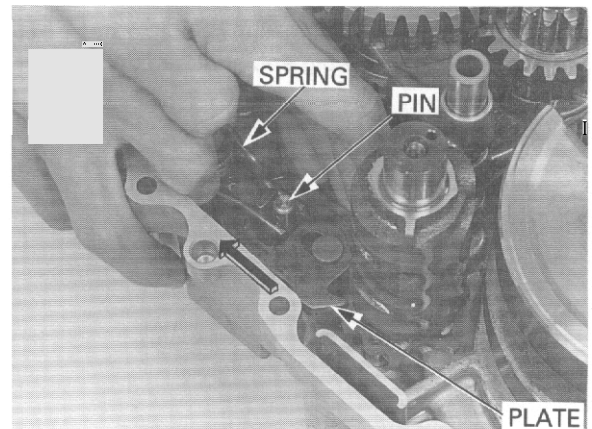


Apply oil to the gearshift spindle oil seal lip



Install the gearshift spindle by aligning the return spring ends with the spring pin bolt while pulling the gearshift plate.  
Engage the gearshift plate with the shift drum.

Assemble the crankcase halves (page 11-14).



## **CRANKSHAFT/BALANCER**

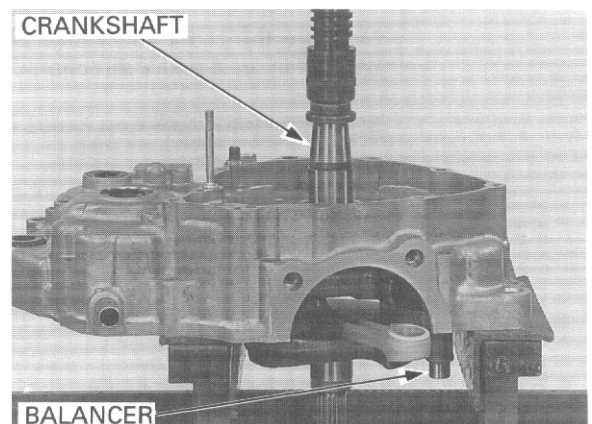
### **REMOVAL**

Separate the crankcase (page 11-3).  
Remove the transmission (page 11-4)

Remove the crankshaft and balancer from the left crankcase using a hydraulic press while holding them.

### **CAUTION**

*Be careful not to damage the crankcase mating surface and crankshaft assembly.*



## CRANKCASE/TRANSMISSION/CRANKSHAFT

If the left crankshaft bearing is left on the crankshaft, remove it using the bearing puller with a suitable protector.

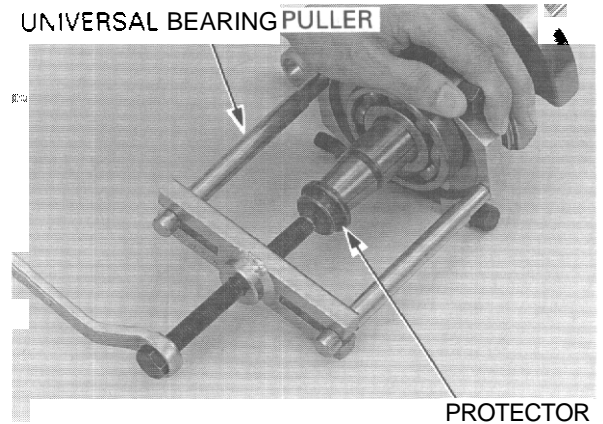
### TOOL

Universal bearing puller **07631 - 0010000** or equivalent commercially available in U.S.A.

### NOTE:

Always replace the left crankshaft bearing with a new one when the crankshaft is removed.

### UNIVERSAL BEARING PULLER

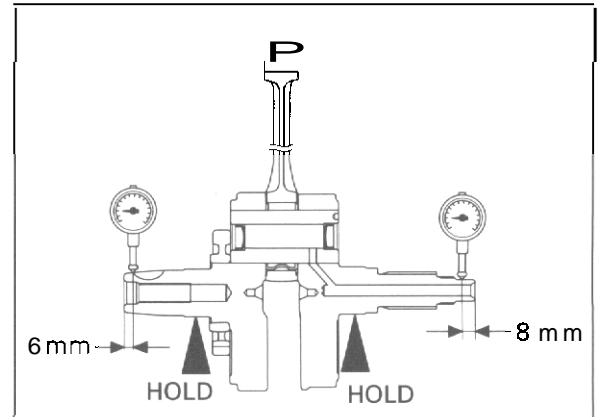


## INSPECTION

### CRANKSHAFT

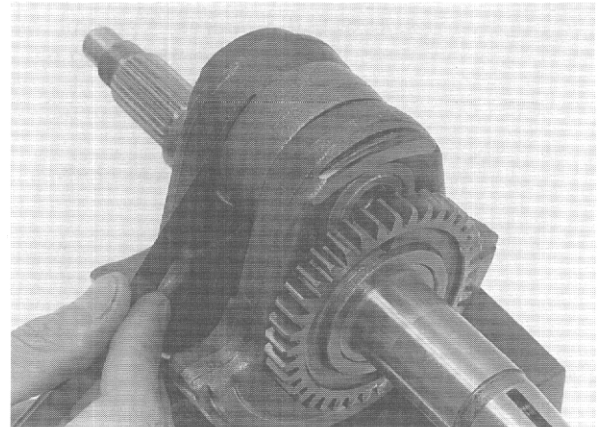
Set the crankshaft as shown and measure the runout using a dial indicator.

SERVICE LIMIT 0.12 mm **10.005 in**



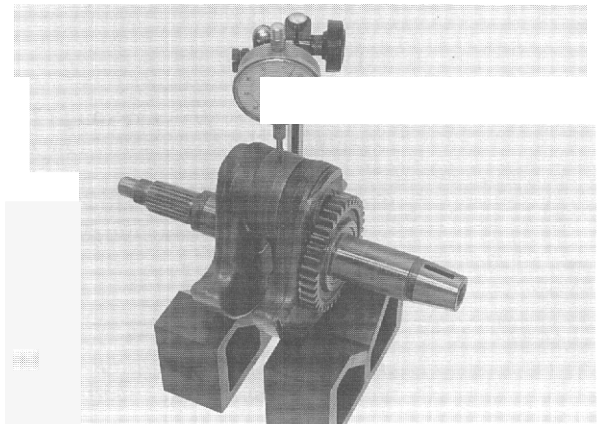
Measure the side clearance between the connecting rod big end and crank weight with a feeler gauge.

SERVICE LIMIT **0.6 mm 10.02 in**



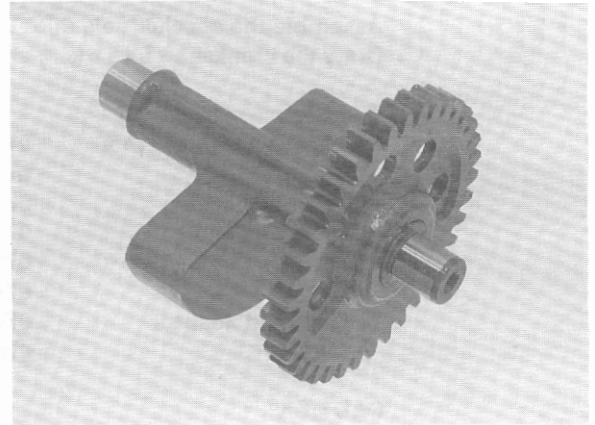
Measure the radial clearance at the connecting rod big end in an X and Y directions.

SERVICE LIMIT: 0.05 mm (**0.002 in**)



**BALANCER**

Check the balancer gear for wear or damage.

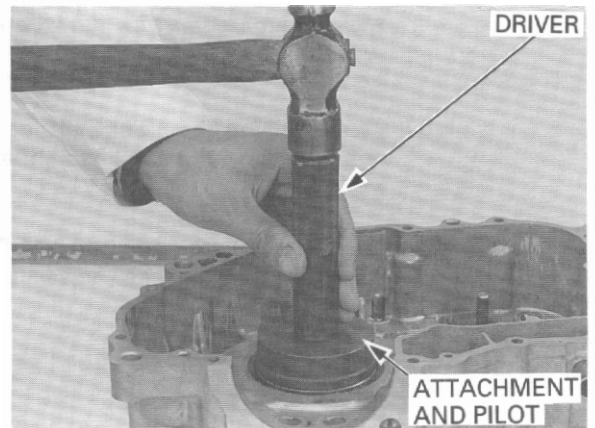


**INSTALLATION**

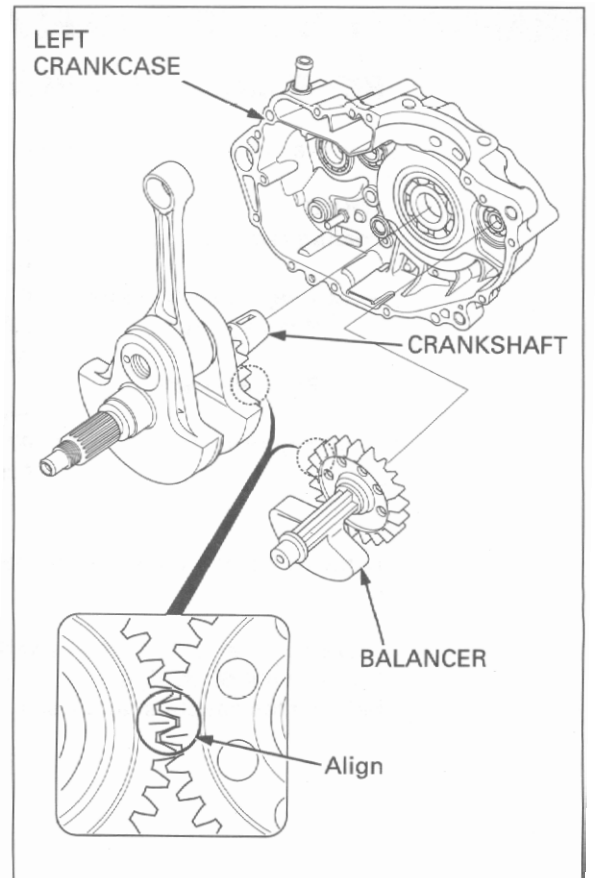
Apply oil to a new crankshaft bearing.  
Drive the crankshaft bearing into the left crankcase with the marking side facing up.

**TOOLS**

Driver	07749-001000
Attachment, 72 x 75 mm	07746 - 0010600
Pilot, 30 mm	07746-0040700



Engage the balancer and crankshaft by aligning the index lines on the balancer drive and driven gears as shown, and install the crankshaft and balancer together into the left crankcase.





## CRANKCASE/TRANSMISSION/CRANKSHAFT

Assemble the special tool onto the crankshaft.  
Draw the crankshaft into the bearing inner race.

### TOOLS:

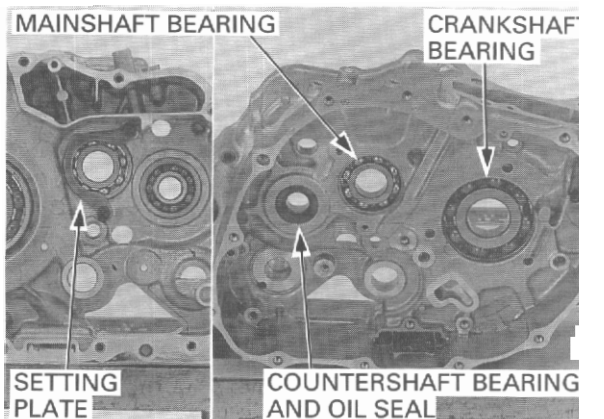
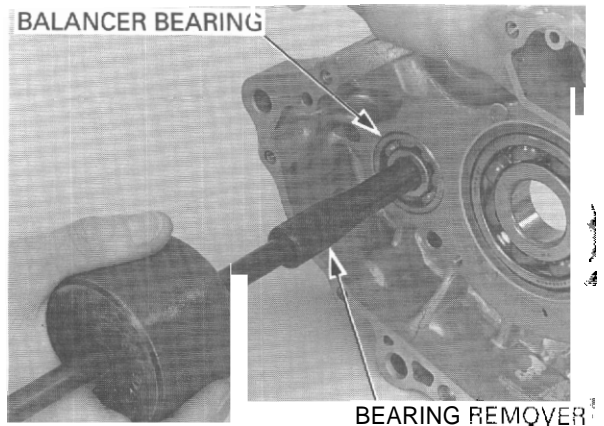
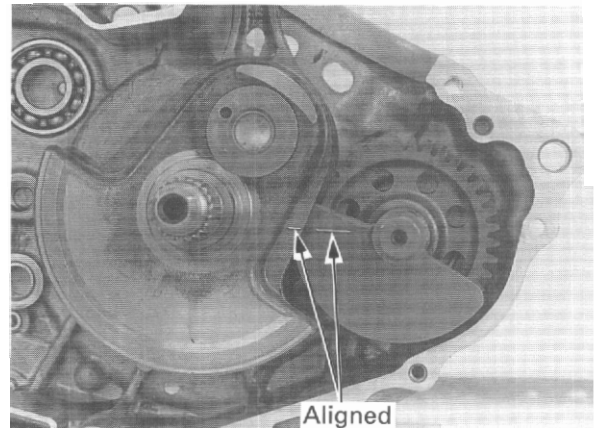
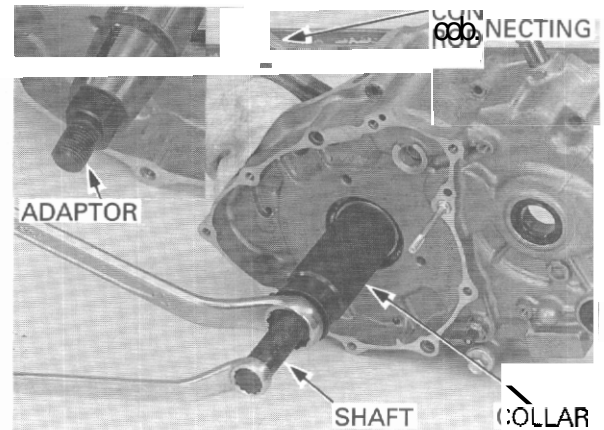
Crankcase assembly tool	07965 - VM00000 not available in U.S.A.
— Assembly collar	07965 - VM00100
— Assembly shaft	07965 - VM00200 or 07931 - ME4010B and 07931 - HB3020A
— Threaded adaptor	07965 - VM00300 or 07931 - KF00200

### CAUTION:

Be careful not to let the connecting rod press against the crankcase mating surface while drawing the crankshaft.

After drawing the crankshaft in, make sure that the index lines on the crank weight and balancer weight are aligned.

Install the transmission (page 11-7).  
Assemble the crankcase halves (page 11-14).



## CRANKCASE BEARING REPLACEMENT

### RIGHT CRANKCASE BEARING

Remove the balancer bearing with the special tools.

### TOOLS:

Bearing remover set, 15 mm	07936 - KC10000 not available in U.S.A.
— Bearing remover, 15 mm	07936 - KC10500
— Remover, 15 mm	07936 - KC10200
— Remover shaft	not available in U.S.A. 07936 - KC10100
— Sliding weight	not available in U.S.A. 07741 - 0010201 or 07936 - 371020A or 07936 - 3710200

Remove the two bolts and mainshaft bearing setting plate.

Drive the crankshaft, mainshaft and countershaft bearings out of the right crankcase.  
Remove the countershaft oil seal.

Apply oil to new bearings.  
Drive the mainshaft, crankshaft and balancer bearings in with the marking side facing up using the special tools.

**TOOLS:**

Mainshaft bearing:

Driver	<b>07749 - 0010000</b>
Attachment, 42 x 47 mm	<b>07746-0010300</b>
Pilot, 22 mm	<b>07746 - 0041000</b>

Crankshaft bearing:

Driver	<b>07749 - 0010000</b>
Attachment, 72 x 75 mm	<b>07746-0010600</b>
Pilot, 30 mm	<b>07746-0040700</b>

Balancer bearing:

Driver	<b>07749 - 0010000</b>
Attachment, 37 x 40 mm	<b>07746-0010200</b>
Pilot, 15 mm	<b>07746-0040300</b>

Drive a new countershaft oil seal in using a suitable 24 mm socket.

Drive the countershaft bearing in with the sealed side facing down using the special tools.

**TOOLS:**

Driver	<b>07749-0010000</b>
Attachment, 42 x 47 mm	<b>07746-0010300</b>
Pilot, 17 mm	<b>07746-0040400</b>

Apply locking agent to the mainshaft bearing setting plate bolt threads.  
Install the setting plate and tighten the bolts.

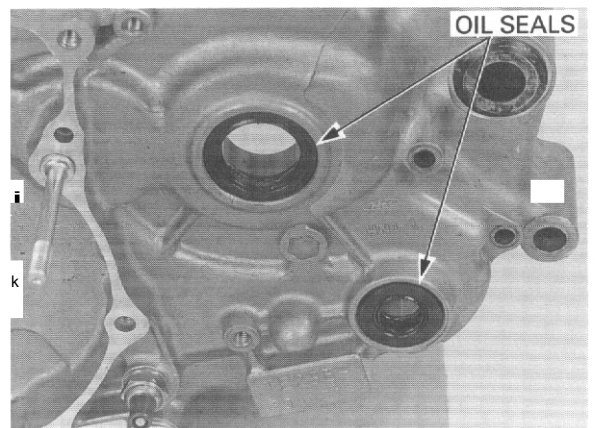
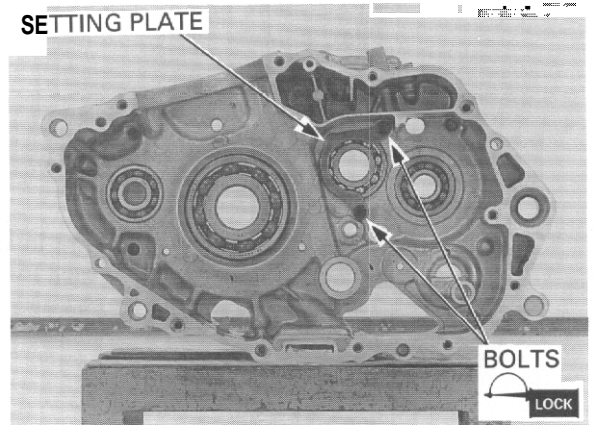
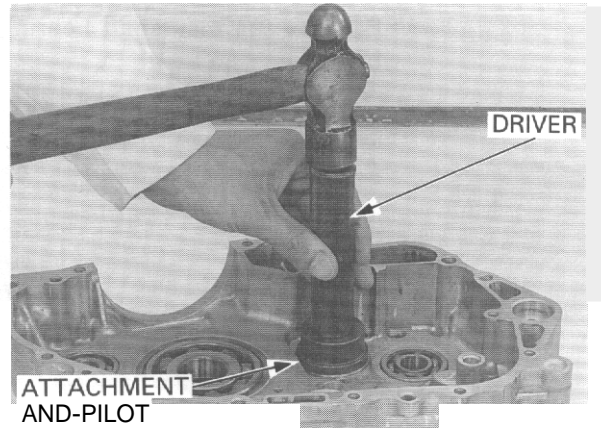
**TORQUE: 12N·m (1.2 kgf·m, 9 lbf·ft)**

*Be sure to align the notch in the countershaft oil seal with the crankcase passage.*

**LEFT CRANKCASE**

Remove the countershaft and gearshift spindle oil seals.

Use 24 mm socket or suitable tool.





## CRANKCASE/TRANSMISSION/CRANKSHAFT

Remove the mainshaft bearing using the special tools.

### TOOLS:

Mainshaft bearing:  
Bearing remover, 17 mm      07936-3710300  
Remover handle                07936-3710100  
Sliding weight                 07741 - 0010201 or  
   07936 - 371020A or  
   07936-3710200

Heat the crankcase 80°C (176°F) evenly using a heat gun and remove the balancer bearing.

### ⚠ WARNING

Always wear insulated gloves when handling the crankcase after it has been heated.

### CAUTION:

***Do*** not use a torch to heat the case; it may cause ***warping***.

Apply oil to new bearings.  
Drive the countershaft and balancer bearings in with the marking side facing up using the special tools.

### TOOLS

Countershaft bearing:  
Driver                                07749 - 0010000  
Attachment, 52 x 55 mm        07746 - 0010400  
Pilot, 25 mm                      07746 - 0040600

Balancer bearing:  
Driver                                07749-0010000  
Attachment, 32 x 35 mm        07746-0010100  
Pilot, 12 mm                      07746-0040200

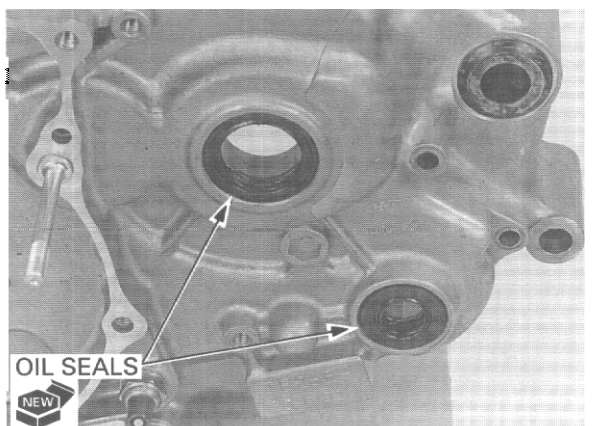
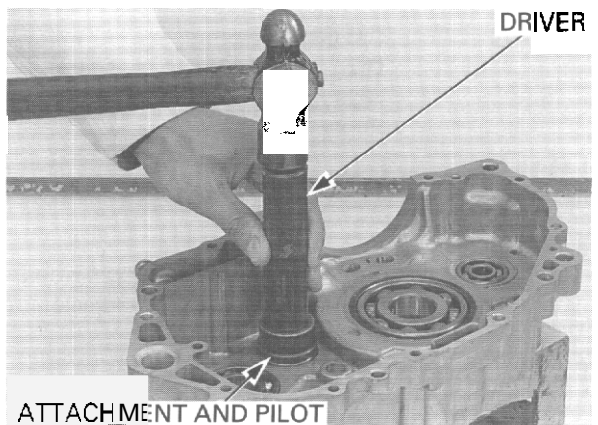
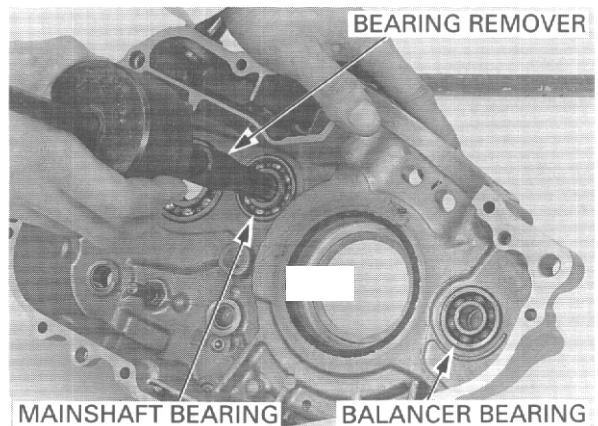
Drive the mainshaft bearing in with the sealed side facing down using the special tools.

### TOOLS:

Driver                                07749-0010000  
Attachment, 37 x 40 mm        07746-0010200  
Pilot, 17 mm                      07746 - 0040400

Install new countershaft and gearshift spindle oil seals.

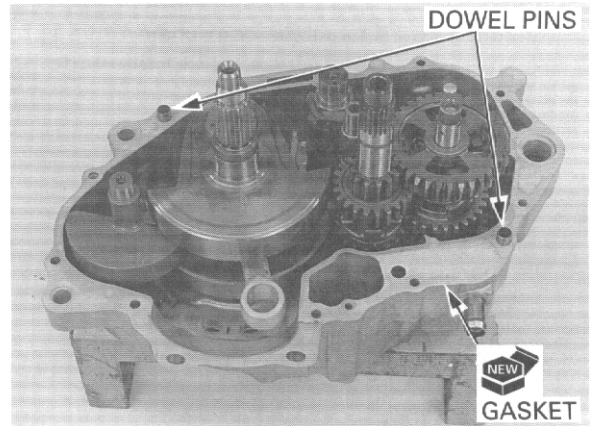
Install the crankshaft (page 11-10).  
Install the transmission (page 11-7).  
Assemble the crankcase halves (page 11-14).



## **CRANKCASE ASSEMBLY**

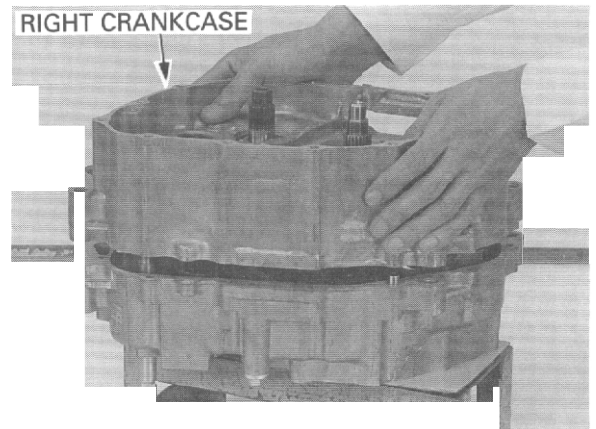
Clean the left and right crankcase mating surfaces thoroughly, being careful not to damage them.

Install the dowel pins and a new gasket.

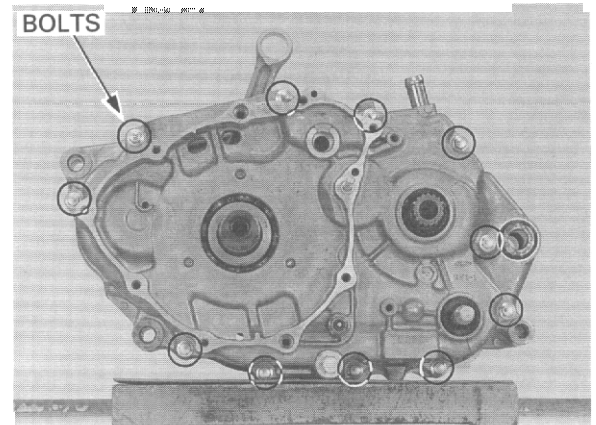


Make sure all the parts are installed in the left crankcase.

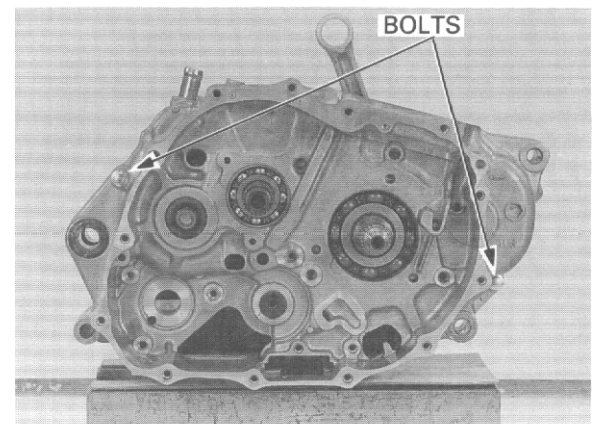
Install the right crankcase over the left crankcase.



Install the left crankcase bolts and tighten them in a crisscross pattern in 2 or 3 steps.

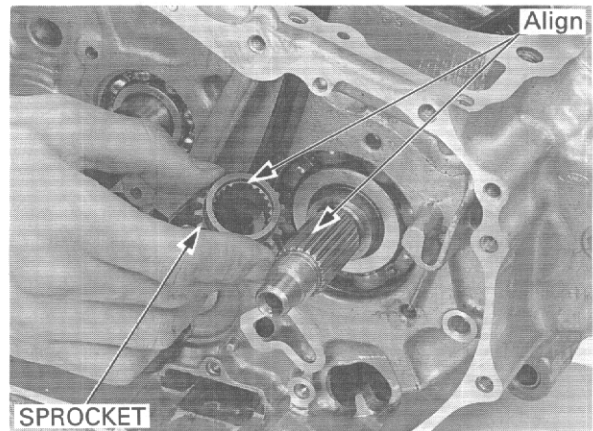


Install and tighten the right crankcase bolts.



## CRANKCASE/TRANSMISSION/CRANKSHAFT

Install the cam chain drive sprocket onto the crankshaft, by aligning the wide groove with the wide tooth.



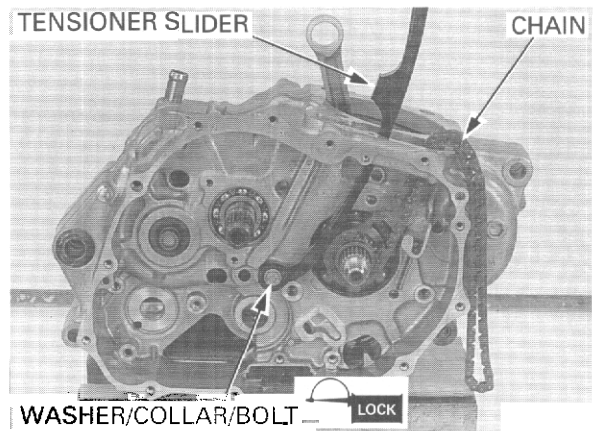
Install the cam chain onto the drive sprocket and through the crankcase.

Apply locking agent to the cam chain tensioner bolt threads.

Install the washer (between the crankcase and slider), tensioner slider/collar and bolt, and tighten the bolt securely.

Install the following:

- primary drive gear, clutch, gearshift linkage (section 9)
- piston and cylinder (section 8)
- cylinder head (section 7)
- oil pump (section 4)
- flywheel (section 10)
- starter motor (section 18)
- engine (section 6)



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**MEMO**

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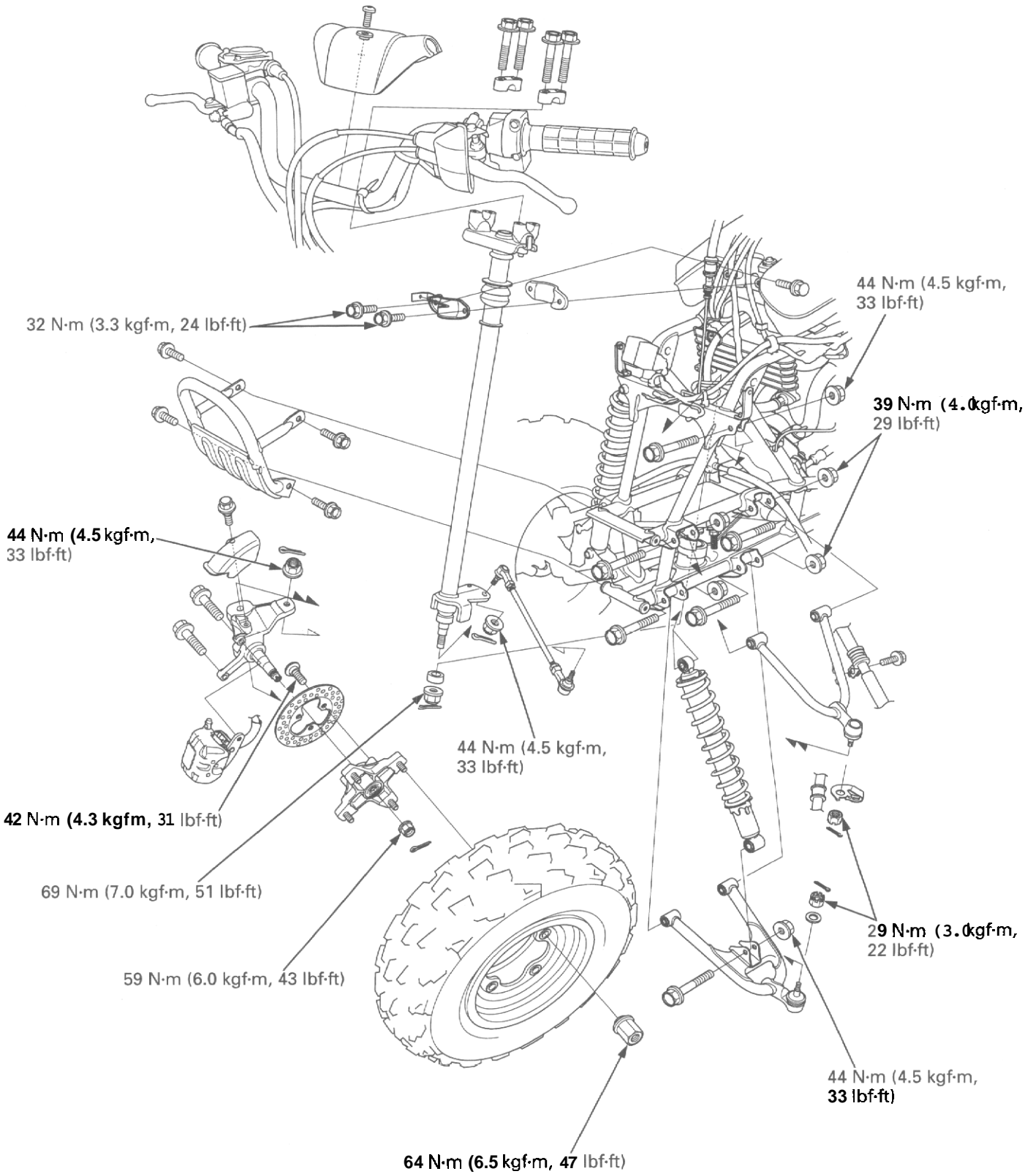
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# FRONT WHEEL/SUSPENSION/STEERING



# 12. FRONT WHEEL/SUSPENSION/STEERING

SERVICE INFORMATION	12-1	TIRES	12-9
TROUBLESHOOTING	12-2	SUSPENSION ARM	12-12
HANDLEBAR	12-3	FRONT SHOCK ABSORBER	12-16
THROTTLE HOUSING	12-5	STEERING SHAFT AND TIE-ROD	12-17
FRONT WHEEL AND HUB	12-6		

## 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*

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		—	4.0 (0.16)
Cold tire pressure	Standard	27 kPa (0.275 kgf/cm <sup>2</sup> , 4.0 psi)	—
	Minimum	23 kPa (0.235 kgf/cm <sup>2</sup> , 3.4 psi)	—
	Maximum	31 kPa (0.315 kgf/cm <sup>2</sup> , 4.6 psi)	—
Tie-rod distance between the ball joints		370.2 (14.57)	—
Toe		17 ± 15 (0.7 ± 0.6)	—
Shock absorber spring adjuster standard position		4th from softest position	—

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### TORQUE VALUES

Handlebar lower holder nut	39 N·m (4.0 kgf·m, 29 lbf·ft)	
Throttle housing cover screw	4 N·m (0.4 kgf·m, 2.9 lbf·ft)	
Left handlebar switch housing screw	2 N·m (0.2 kgf·m, 1.4 lbf·ft)	
Front wheel nut	64 N·m (6.5 kgf·m, 47 lbf·ft)	
Front wheel hub nut	59 N·m (6.0 kgf·m, 43 lbf·ft)	Castle nut
Front brake disc bolt	42 N·m (4.3 kgf·m, 31 lbf·ft)	ALOC bolt
Shock absorber mounting nut	44 N·m (4.5 kgf·m, 33 lbf·ft)	
Upper and lower arm pivot nut	39 N·m (4.0 kgf·m, 29 lbf·ft)	
Upper and lower arm ball joint nut	29 N·m (3.0 kgf·m, 22 lbf·ft)	Castle nut
Tie-rod ball joint lock nut	54 N·m (5.5 kgf·m, 40 lbf·ft)	
Tie-rod stud joint nut	44 N·m (4.5 kgf·m, 33 lbf·ft)	
Steering shaft end nut	69 N·m (7.0 kgf·m, 51 lbf·ft)	
Steering shaft holder bolt	32 N·m (3.3 kgf·m, 24 lbf·ft)	

## FRONT WHEEL/SUSPENSION/STEERING

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### TOOLS

Driver	07749-0010000
Attachment, 32 x 35 mm	07746 - 0010100
Attachment, 37 x 40 mm	07746 - 0010200
Attachment, 42 x 47 mm	07746-0010300
Pilot, 15 mm	07746 - 0040300
Pilot, 17 mm	07746 - 0040400
Pilot, 20 mm	07746 - 0040500
Bearing remover shaft	07746 - 0050100
Bearing remover head, 15 mm	07746 - 0050400
Assembly collar	07965 - VM00100
Ball joint remover	07MAC - SL00200
Spherical bearing driver	07HMF - HC00100 not available in U.S.A. or 07GAD -.PH70100

### TROUBLESHOOTING

#### Hard steering

- Steering shaft holder too tight
  - Damaged steering shaft bearing/bushing
- Insufficient tire pressure

#### Steers one side or does not track straight

- Incorrect wheel alignment
- Unequal tire pressure
- Bent tie-rod, suspension arm or frame
  - Worn or damaged wheel hub bearings
- Weak shock absorber

#### Front wheel wobbling

- Bent rim
- Worn or damaged wheel hub bearings
- Faulty tire
- Wheel hub not tightened properly

#### Soft suspension

- Weak shock absorber spring
- Faulty shock absorber damper
- Loose front suspension fasteners

#### Hard suspension

- Bent shock absorber damper rod
- Improperly installed suspension arms
- Faulty suspension arm spherical bearings

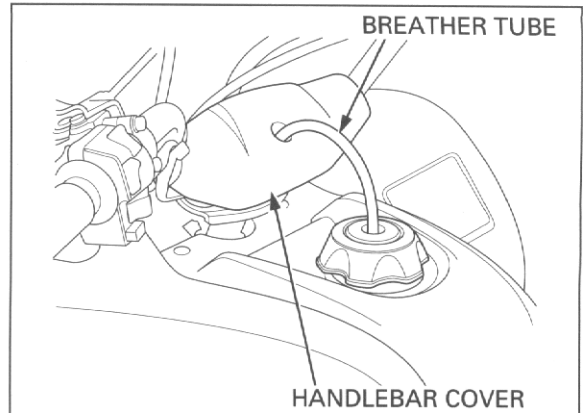
#### Front suspension noise

- Binding suspension link
- Loose front suspension fasteners

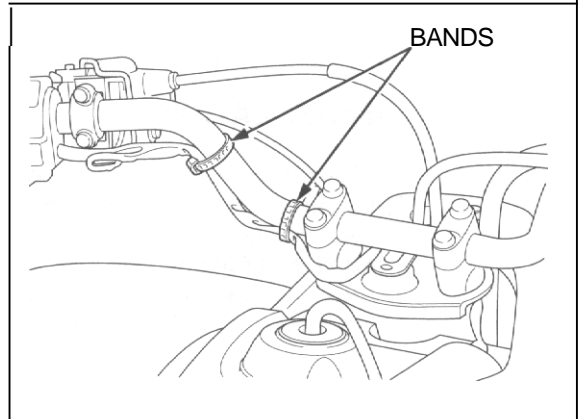
**HANDLEBAR**

**REMOVAL**

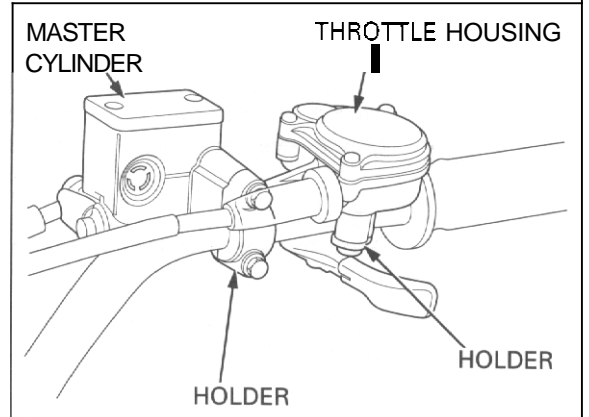
Remove the fuel tank breather tube from the handlebar cover.  
 Remove the handlebar cover attaching bolt, being careful not to let the bolt fall into the steering shaft.  
 Remove the cover by releasing its ends off the handlebar carefully.



Remove the wire bands.



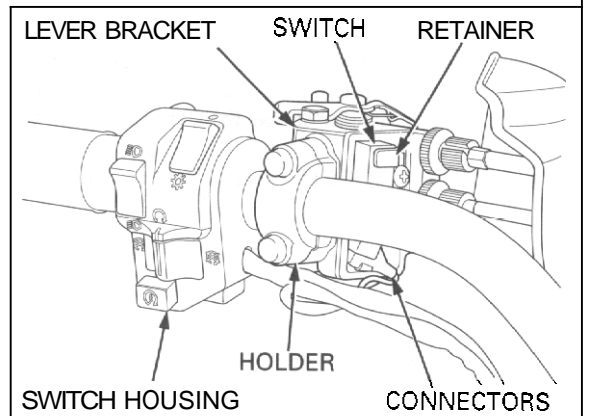
Remove the two screws, holder and throttle housing.  
 Remove the two bolts, holder and master cylinder.



Slide the boot off the clutch lever bracket.

Remove the screw and clutch switch retainer.  
 Remove the clutch switch out of the clutch lever bracket and disconnect the connectors,  
 Remove the two bolts, holder and clutch lever bracket.

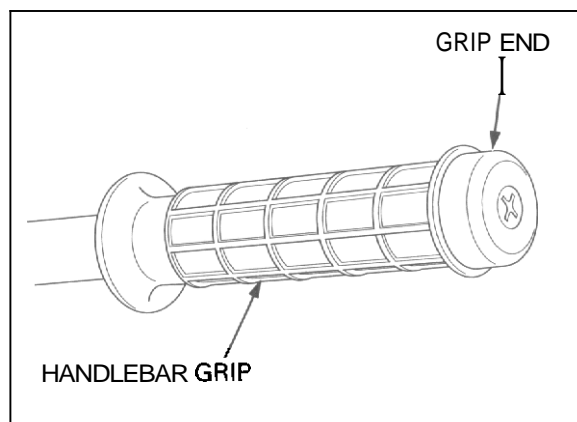
Remove the two screws and handlebar switch housing.





## FRONT WHEEL/SUSPENSION/STEERING

Remove the screw and grip end.  
Remove the handlebar grip.

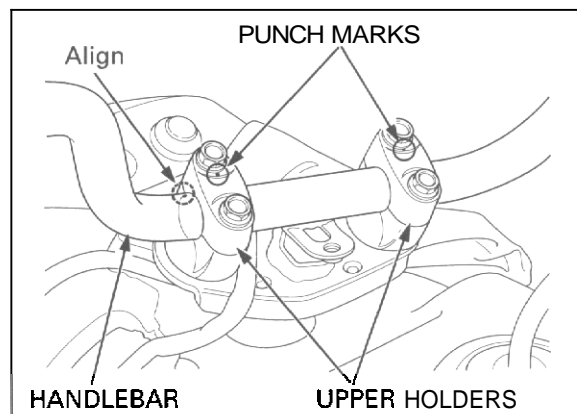


Remove the four bolts and the upper holders:  
Remove the handlebar from the lower holders.

### INSTALLATION

Place the handlebar onto the lower holders and align the punch mark on the handlebar with the top of the lower holder.

Install the upper holders with the punch marks facing forward. Install the four bolts and tighten the forward bolts first, then tighten the rear bolts.

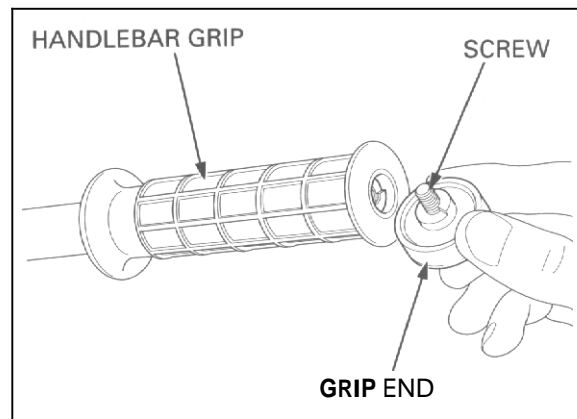


Apply Honda Bond A or Honda Hand Grip Cement (U.S.A. only) to the inside surface of the handlebar grip and to the clean surface of the handlebar. Wait 3 - 5 minutes and install the grip. Rotate the grip for even application of the adhesive.

#### NOTE:

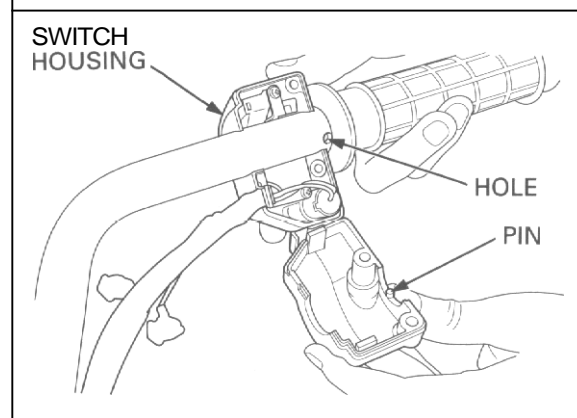
Allow the adhesive to dry for an hour before using.

Install the grip end with the screw securely by aligning the flats.



Install the handlebar switch housing by aligning its locating pin with the hole in the handlebar. Install the two attaching screws and tighten the upper screw first, then tighten the lower screw.

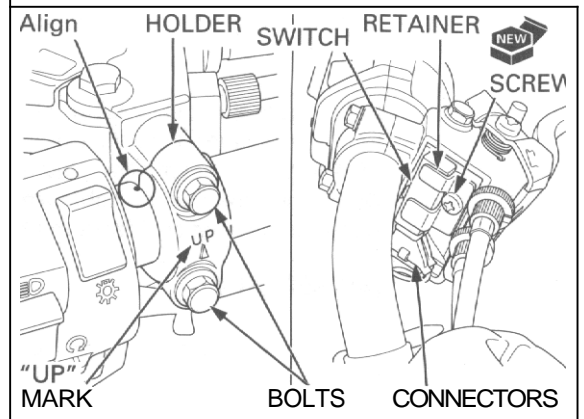
**TORQUE: 2 N·m (0.2 kgf·m, 1.4 lbf·ft)**



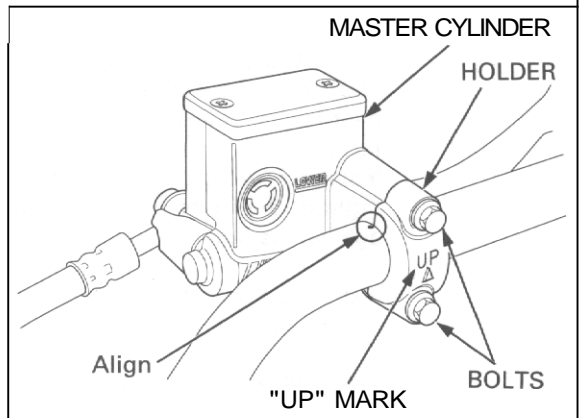
Install the clutch lever bracket and holder with the "UP" mark facing up.  
Align the slit of the lever bracket with the punch mark on the handlebar, and tighten the upper bolt first, then the lower bolt.

Connect the clutch switch to the connectors and install it into the clutch lever bracket.  
Secure the switch with the retainer and a new screw.

Cover the bracket with the boot securely.



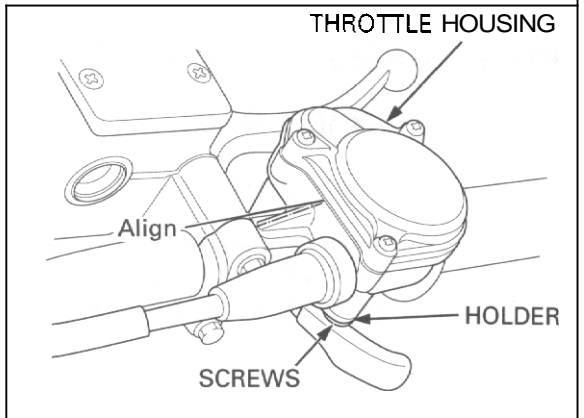
Install the master cylinder and holder with the "UP" mark facing up.  
Align the slit of the master cylinder with the punch mark on the handlebar, and tighten the upper bolt first, then the lower bolt.



Install the throttle housing and holder against the master cylinder.  
Align the lug on the throttle housing with the slit of the master cylinder, and tighten the forward screw first, then the rear screw.

Secure the handlebar switch wire with the wire bands (page 1-18).

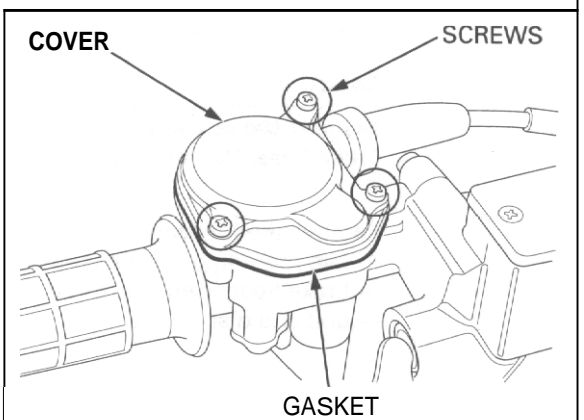
Install the handlebar cover and breather tube in the reverse order of removal.



## **THROTTLE HOUSING**

### **DISASSEMBLY**

Remove the three attaching screws and the throttle housing cover.  
Remove the gasket.



## FRONT WHEEL/SUSPENSION/STEERING

Slide the boot off the throttle cable adjuster  
Loosen the cable adjuster.

Bend down the lock washer tab and remove the pivot nut, lock washer, throttle arm and return spring, then the throttle lever with the plastic washer.  
Disconnect the throttle cable from the throttle arm.  
Remove the dust seal from the housing bottom.

### ASSEMBLY

Apply grease to the **throttle** lever pivot in the housing.  
Coat a new dust seal lip with grease and install it into the housing until it is fully seated.

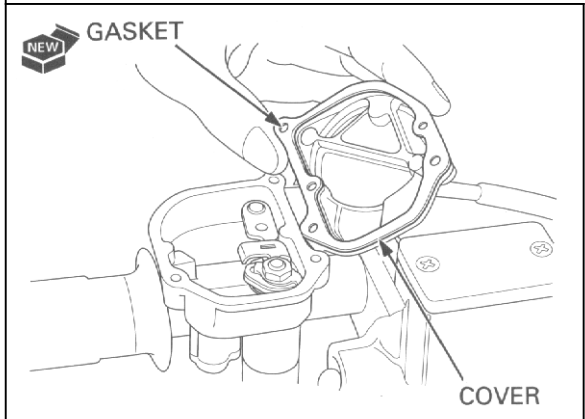
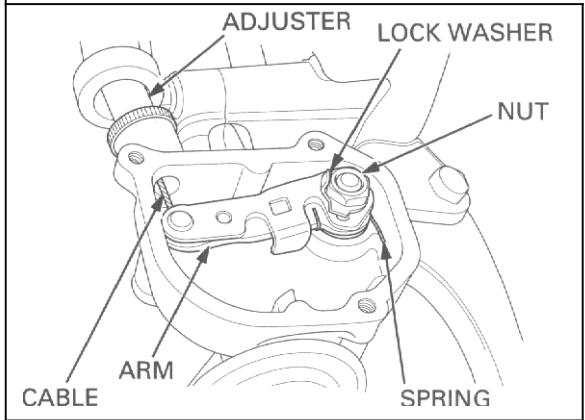
Connect the cable to the throttle arm.  
Insert the throttle lever with the washer into the housing and install the throttle arm with the spring over the throttle lever pivot by aligning the flat surfaces.

Install a new lock washer and the pivot nut.  
Tighten the pivot nut and bend up the washer tab against the nut.

Install the housing cover with a new gasket and tighten the three screws.

**TORQUE: 4 N·m 10.4 kgf·m, 2.9 lbf·ft)**

Adjust the throttle lever free play (page 3-4).

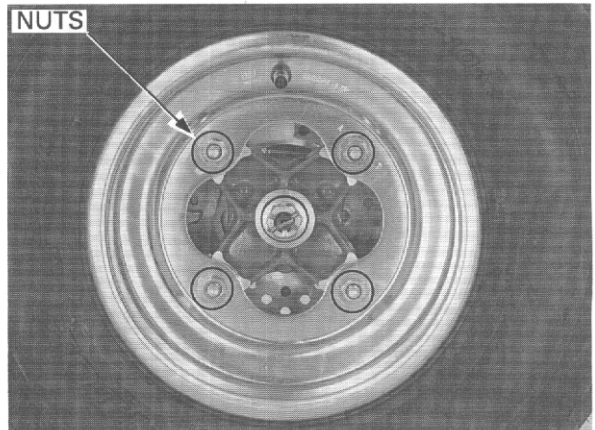


## FRONT WHEEL AND HUB

### WHEEL REMOVAL

Loosen the wheel nuts

Place the support block under the frame to raise the front wheel off the ground.  
Remove the nuts and wheel.



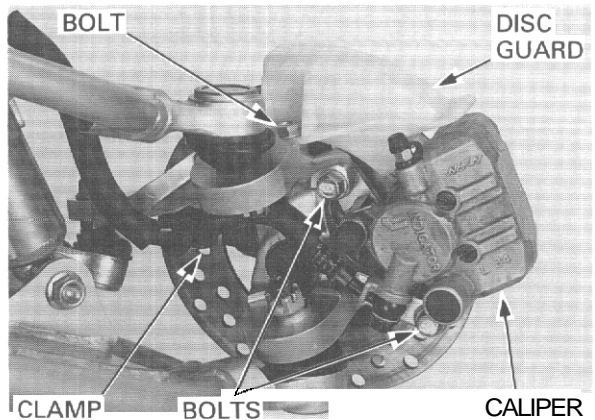
### HUB DISASSEMBLY

#### CAUTION:

**Support the caliper so that it does not hang from the brake hose. Do not twist or bend the brake hose.**

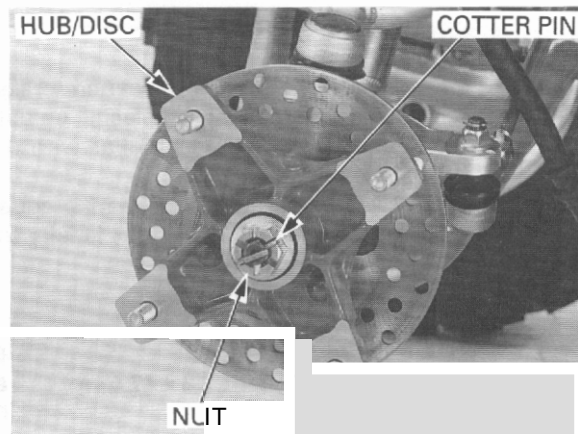
Remove the following:

- two mounting bolts and brake caliper
- brake hose from the clamp
- bolt and disc guard

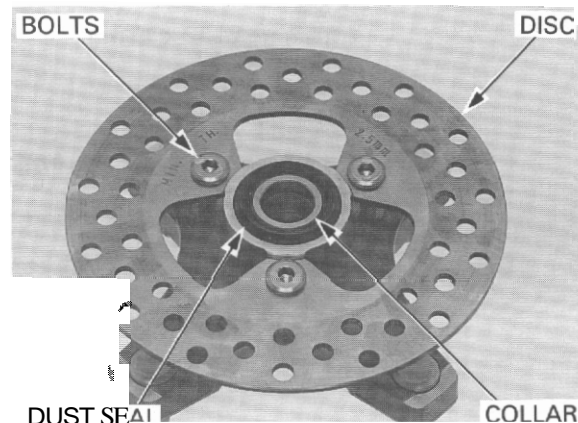


## FRONT WHEEL/SUSPENSION/STEERING

- cotter pin
- hub nut
- wheelhub/disc



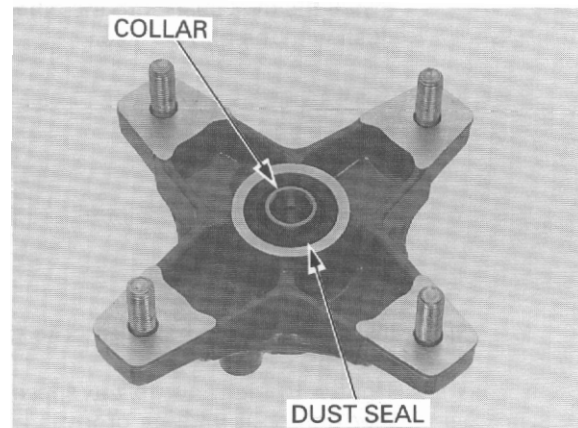
- three bolts and brake disc
- side collars
- dustseals.



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 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.



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.

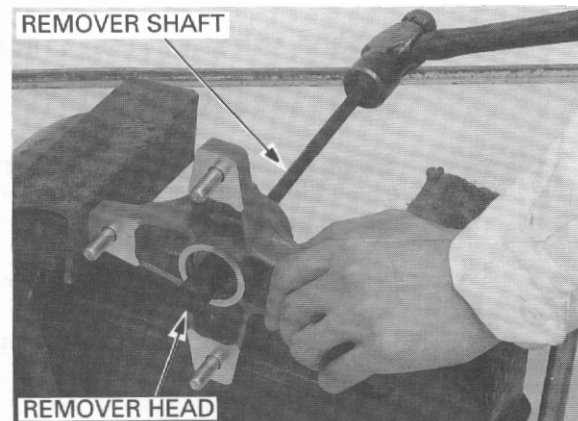
### TOOLS

Bearing remover shaft                    **07746 -0050100**

Bearing remover head, 15 mm        **07746 - 0050400**

### NOTE

Replace the wheel bearings in pairs. Do not reuse old bearings.



**HUB ASSEMBLY**

Drive in a new inner bearing (brake disc side) squarely with the marking side facing up until it is fully seated. Install the distance collar with the large dia. facing the inner bearing.

Drive in a new outer bearing squarely with the marking side facing up until it is fully seated.

**TOOLS**

Inner bearing (disc side):

Driver **07749 - 0010000**  
Attachment, **42 x 47 mm** **07746 - 0010300**

Pilot, **20 mm** **07746-0040500**  
Outer bearing (wheel side):

Driver **07749-0010000**  
Attachment, **32 x 35 mm** **07746 - 0010100**  
Pilot, **15 mm** **07746-0040300**

**⚠ WARNING**

**Do not get grease on the brake disc or stopping power will be reduced.**

Install the brake disc with the stamp facing up (away from the hub).

Install new disc bolts and tighten them in 2 - 3 steps.

**TORQUE: 42 N·m (4.3 kgf·m, 31 lbf·ft)**

Apply grease to new dust seal lips. Install the dust seals into the wheel hub until they are flush with the hub surface.

**TOOLS:**

Disc side:

Assembly collar **07965 - VM00100**

Wheel side:

Attachment, **32 x 35 mm** **07746 - 0010100**

Install the side collars.

Install the wheel hub/disc onto the knuckle and the hub nut.

Tighten the hub nut to the specified torque and further tighten it until its grooves align with the cotter pin hole.

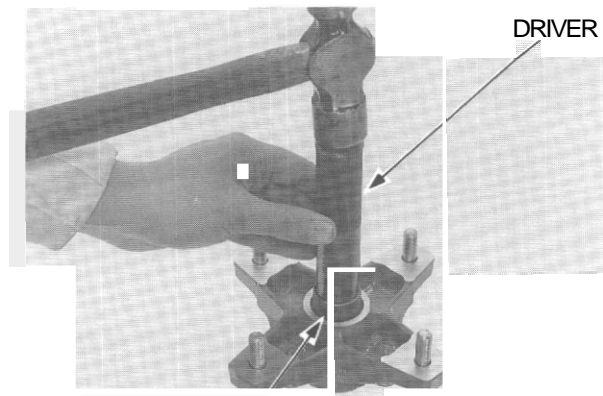
**TORQUE: 59 N·m (6.0 kgf·m, 43 lbf·ft)**

Install a new cotter pin.

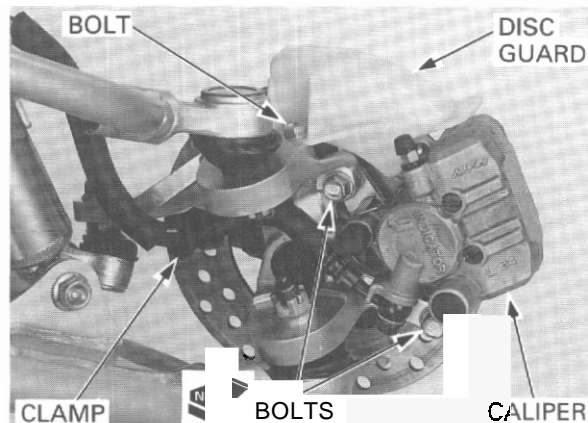
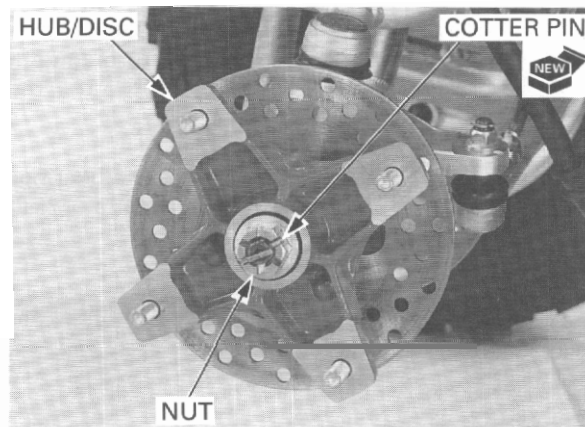
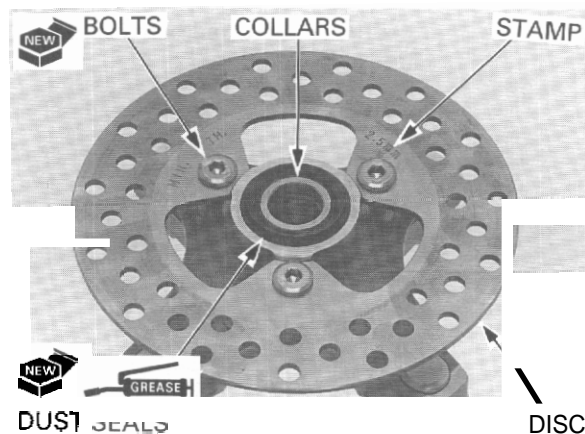
Secure the brake hose with the clamp on the knuckle. Install the brake caliper with new mounting bolts and tighten them.

**TORQUE: 30 N·m (3.1 kgf·m, 22 lbf·ft)**

Install the disc guard and tighten the bolt.



ATTACHMENT AND PILOT



**WHEEL INSTALLATION**

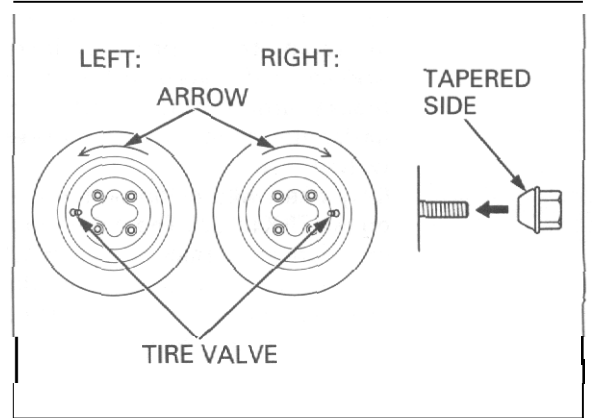
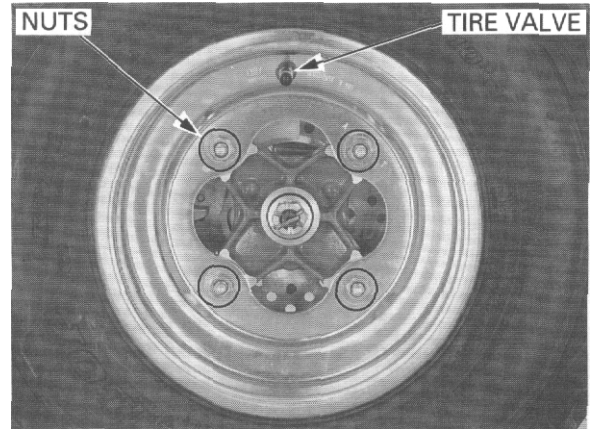
Install the wheel onto the hub with the tire valve facing out and the arrow mark facing in the normal rotating direction.

**NOTE:**

Do not interchange the left and right tires.

Install the wheel nuts with the tapered side facing inward and tighten them.

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



**TIRES**

**REMOVAL**

**NOTE:**

- This service requires the Universal Bead Breaker (GN-AH-958-BB1).
- Remove and install the tire from the rim side opposite the valve stem.

Remove the core from the valve stem.

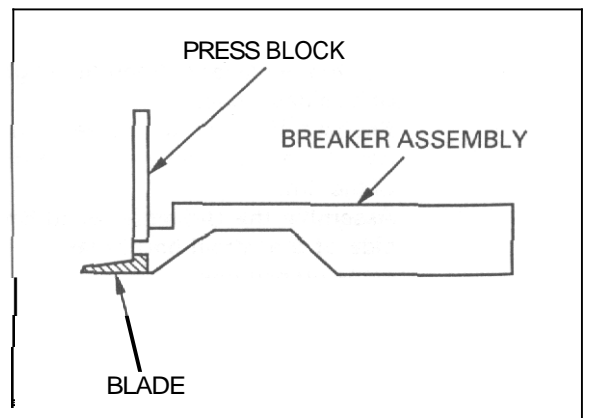
**CAUTION**

- Use of the bead breaker tool is required for tire removal.
- Do not damage the bead seating area of the rim.
- Use Coats 220 Tire Changer or equivalent to remove the tire from the rim. If a tire changer is not available, tire irons may be used, but take care not to scratch the wheel.

Install the blade for 9/11" rims onto the breaker arm assembly.

**CAUTION:**

Use of an improper size blade may result in damage to the rim, tire or blade.



## FRONT WHEEL/SUSPENSION/STEERING

Place the proper size adaptor onto the threaded shaft and then put the wheel over the threaded shaft and adaptor.

Lube the bead area with water, pressing down on the tire sidewall/bead area in several places to allow the water to run into and around the bead. Also lube area where the breaker arm will contact the sidewall of the tire.

### ⚠ WARNING

**Use only water as a lubricant removing or mounting tires. Soap or some mounting lubricants may leave a slippery residue which can cause the tire to shift on the rim and lose air pressure during riding.**

While holding the breaker arm assembly at an approximate 45° position, insert the blade of the breaker arm between the tire and rim. Push the breaker arm inward and downward until it is in the horizontal position with its press block in contact with the rim.

Only one white nylon button is used for the wheels on the TRX400EX. The button must be ground across the rounded surface to within 1.5 mm of the center hole. Install the button on the right side of the press head (as viewed when installed on tire).

With the breaker arm in the horizontal position, place the breaker press head assembly over the breaker arm press block. Make sure the press head bolt is backed out all the way and then position the nylon button on the press head against the inside edge of the rim.

Insert the threaded shaft through the appropriate hole in the breaker press head assembly. When installing the press head block onto the breaker arm, you may have to rotate the press head assembly to draw the blade fully under the wheel rim. Then, straighten the press head/breaker arm assembly and tighten the lever nut until both ends of the breaker press head assembly are in firm contact with the rim.

Tighten the press head bolt until the reference mark on the press block is aligned with the top edge of the press head. Do not tighten past this reference mark.

If the rest of the bead cannot be pushed down into the center of the rim by hand, loosen the press head bolt and the lever nut.

Rotate the breaker arm assembly and breaker press head assembly  $\frac{1}{8}$  to  $\frac{1}{4}$  the circumference of the rim.

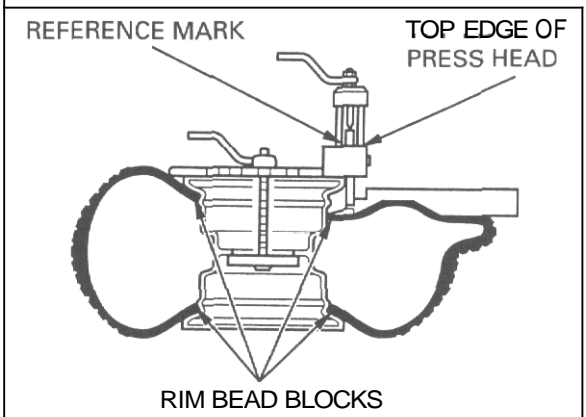
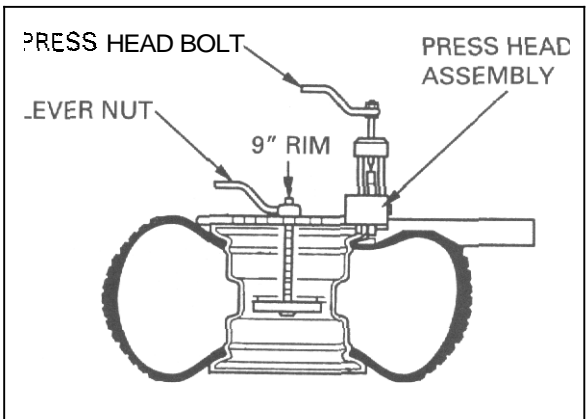
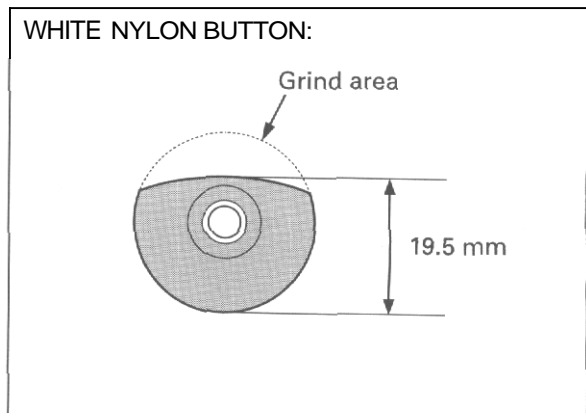
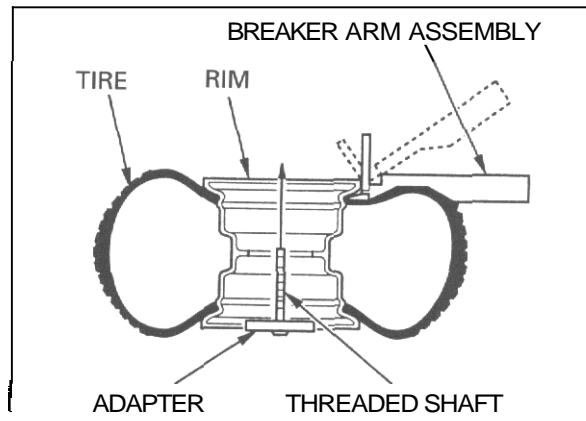
Tighten the lever nut and then tighten the press head bolt as described.

Repeat this procedure as necessary until the remainder of the bead can be pushed down into the center of the rim.

Assemble the Universal Bead Breaker on the other side of the wheel and break the bead following the same procedures.

Remove the tire from the rim using a tire changer machine or tire irons and rim protectors.

Remove tire from rim that has the smallest shoulder area to simplify removal.



## TIRE REPAIR

### NOTE:

Use the manufacturer's instructions for the tire repair kit you are using. If your kit does not have instructions, use the procedures provided here.

Check the tire for puncturing objects.  
Chalk mark the punctured area and remove the puncturing object.  
Inspect and measure the injury.  
Tire repairs for injuries larger than 15 mm (5/8 in) should be a section repair.  
Section repairs should be done by a professional tire repair shop.  
If the injury is smaller than 15 mm (5/8 in), proceed with the repair as described here.

Install a rubber plug into the injury as follows:  
Apply a cement to a plug inserting needle and work the needle into the injury to clean and lubricate it.  
Do this three times.  
Do not let the cement dry.

Insert and center a rubber plug through the eye of the inserting needle.

Apply cement to the rubber plug.  
Push the inserting needle with plug into the injury until the plug is slightly above the tire.  
Twist the needle and remove it from the tire; the plug will stay in the tire.

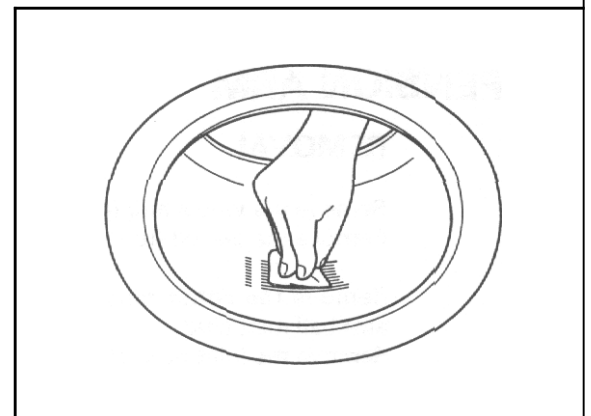
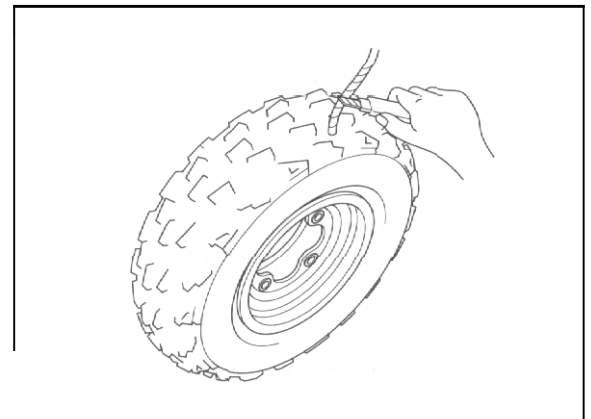
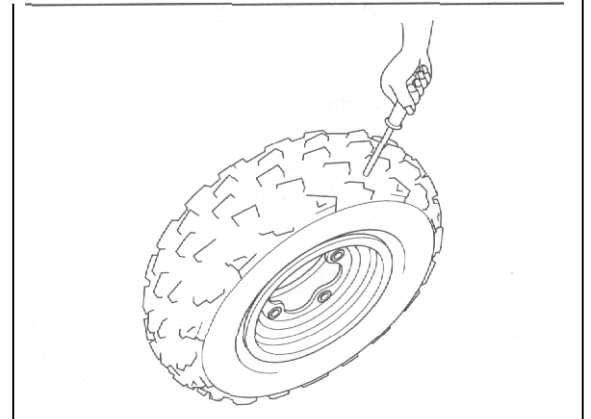
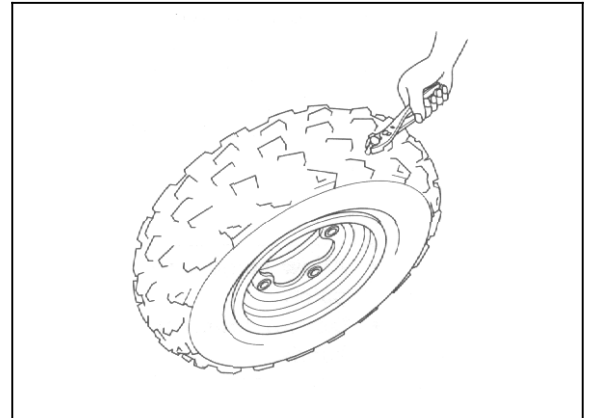
Trim the plug 6 mm (1/4 in) above the tire surface.  
Repeat the above procedure if the puncture is large.  
Do not use more than two plugs per injury.

Allow the repair to dry. Drying time will vary with air temperature. Refer to the tire repair kit manufacturer's recommendations.

Inflate the tire and test the seal by dabbing a small amount of cement around the plug. Escaping air will cause a bubble in the cement. If there is leakage, remove the tire (page 12-7) and apply a cold patch to the inside of the tire as described.

If a plug has been inserted, trim it even with the inner tire surface.

Temporarily place a rubber patch that is at least twice the size of the puncture over the injury. Make a mark around the patch, slightly larger than the patch itself. Rough the area marked inside the tire with a tire buffer or a wire brush. Clean the rubber dust from the buffed area.



***Becarefulnotto push the plug all the way into the tire to prevent it from falling inside.***



## FRONT WHEEL/SUSPENSION/STEERING

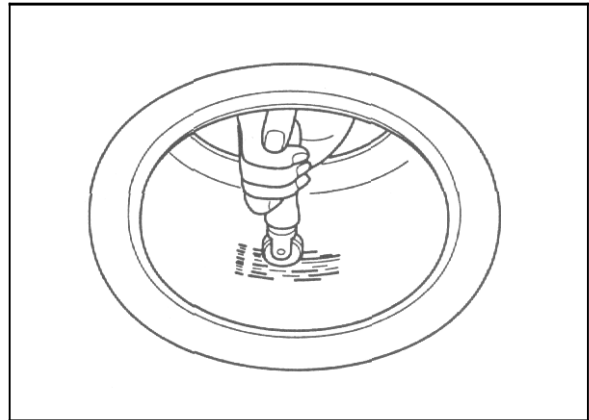
Apply cement over the area marked and allow it to dry.

Remove the lining from the patch and center it over the injury.

Press the patch against the injury using a special roller.

### NOTE:

- Allow cement to dry until tacky before applying patch.
- Do not touch the cement with dirty or greasy hands.



## ASSEMBLY

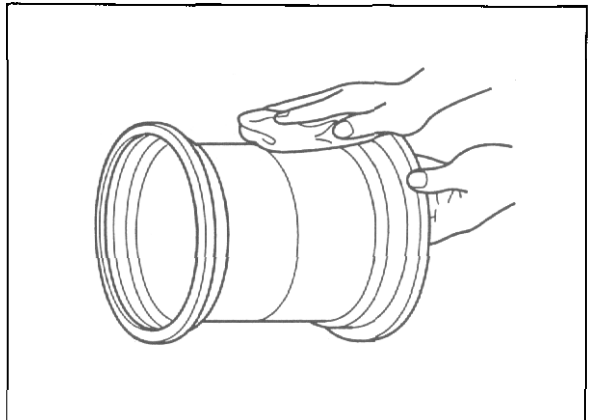
Install the tire onto the rim, where the rim shoulder width is the narrowest, to simplify installation.

Clean the rim bead seat and flanges.

Apply clean water to the rim flanges, bead seat and base.

### ⚠ WARNING

**Use only water as a lubricant removing or mounting tires. Soap or some mounting lubricants may leave a slippery residue which can cause the tire to shift on the rim and lose air pressure during riding.**



**Front tire:** Install the front tire with the arrow mark facing in the normal rotating direction.

**Rear tire:** Install the rear tire with the "OUT SIDE" facing the tire valve.

Inflate the tire to seat the tire bead.

Deflate the tire. Wait 1 hour and inflate the tire to the specified pressure.

Check for air leaks and install the valve cap.

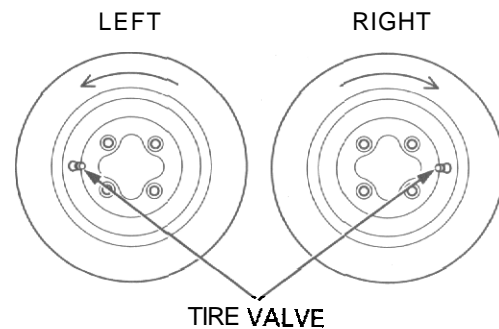
### COLD TIRE PRESSURE (Front/Rear):

Standard: 27 kPa (0.275 kgf/cm<sup>2</sup>, 4.0 psi)

Minimum: 23 kPa 10.235 kgf/cm<sup>2</sup>, 3.4 psi

Maximum: 31 kPa (0.315 kgf/cm<sup>2</sup>, 4.6 psi)

### FRONT TIRE:



## SUSPENSION ARM

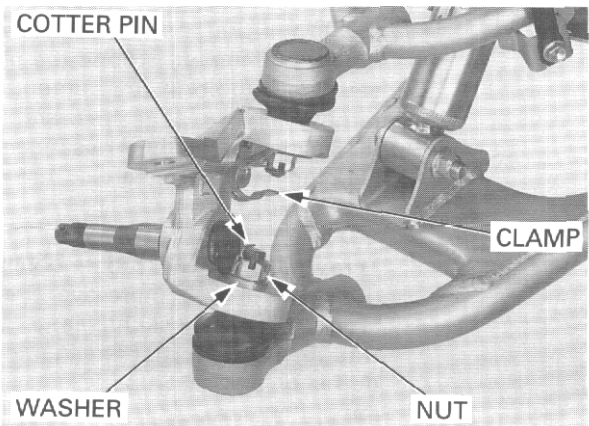
### REMOVAL

Remove the wheel hub (page 12-6).

Remove the tie-rod from the knuckle (page 12-17).

Remove the cotter pins from the upper and lower arm ball joint studs.

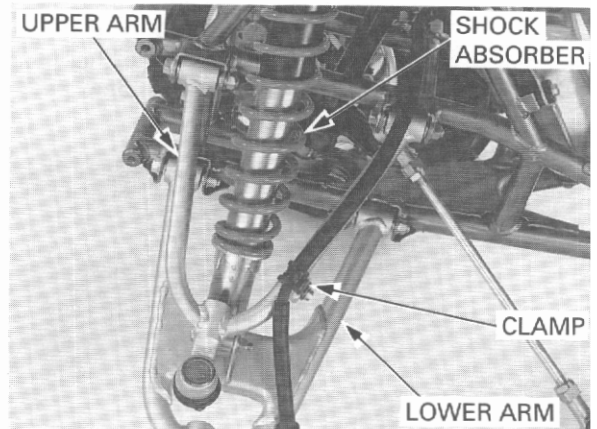
Remove the joint nuts, clamp and washer,





## FRONT WHEEL/SUSPENSION/STEERING

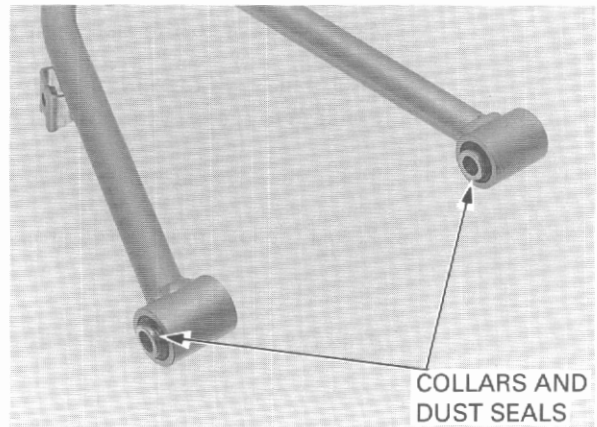
- bolt and brake hose clamp from the upper arm
- upper arm pivot nuts, bolts and upper arm
- shock absorber lower mounting nut and bolt
- lower arm pivot nuts, bolts and lower arm



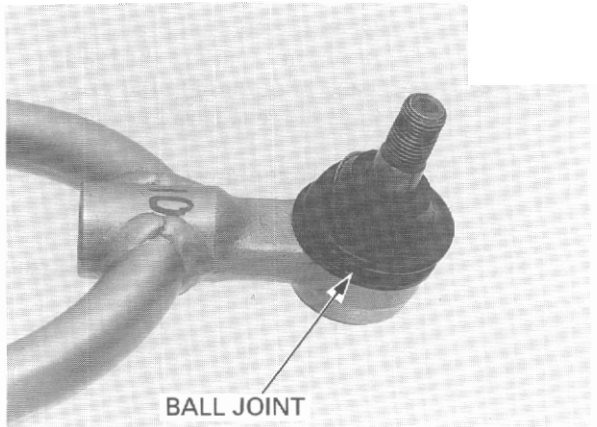
Remove the pivot collars and dust seals.

### INSPECTION

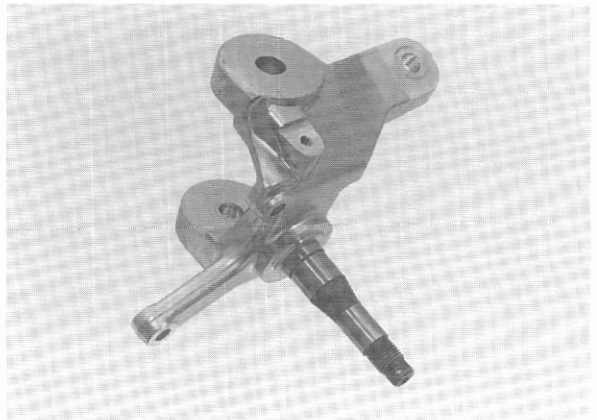
Check the pivot collars, dust seals and spherical bearings for wear or damage.



Inspect the ball joint rubber for tears or other damage by moving the ball joint studs. It should move freely and smoothly.



Inspect the knuckle for damage or cracks.



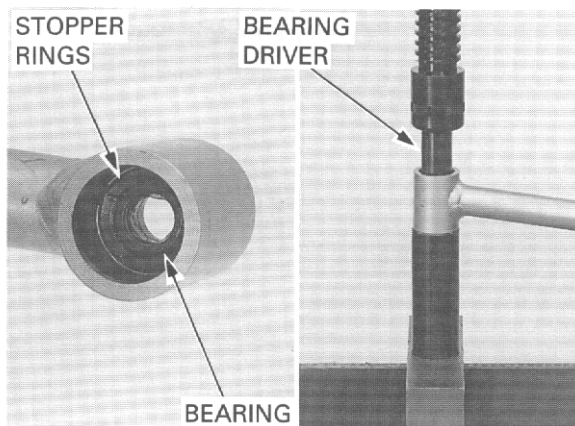
## PIVOT BEARING REPLACEMENT

Remove the stopper rings.  
Press the spherical bearing out of the arm pivot.

### TOOL

Spherical bearing driver

**07HMF - HC00100**  
not available in  
U.S.A. or  
**07GAD - PH70100**

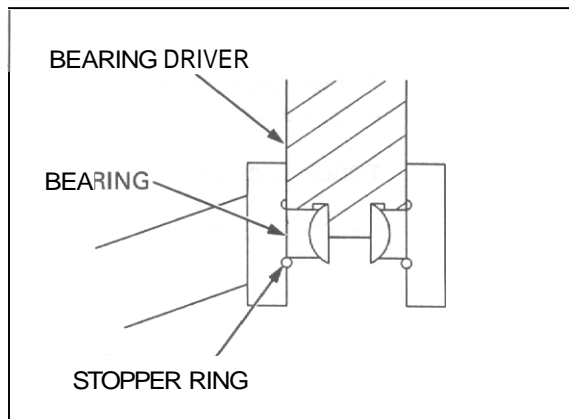


Install a new stopper ring into the groove in the arm pivot properly.  
Press a new bearing into the arm pivot until it contacts the stopper ring, using the same tool.

Install a new stopper ring into the opposite side groove.

### NOTE:

Spherical bearing case is split as part of manufacturing process.

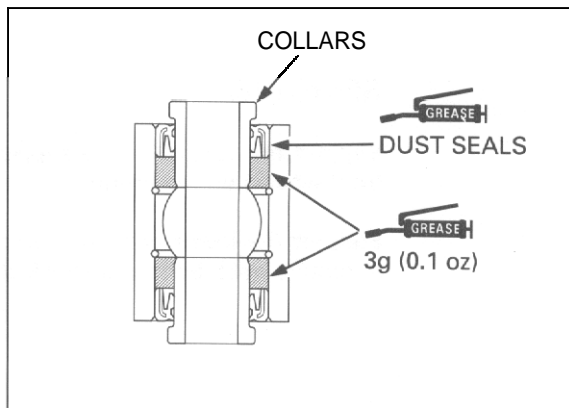


## INSTALLATION

Pack 3 g (0.1 oz) of grease into each arm pivot as shown.

Coat new dust seal lips with grease and install them into the arm pivots until they are flush with the pivot ends.

Install the pivot collars into the dust seals.

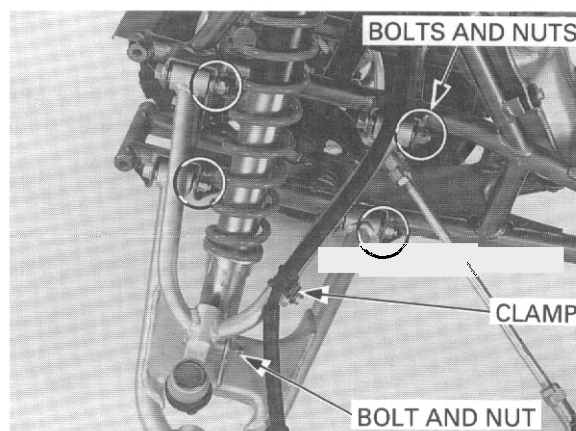


Install the following:

- upper and lower arm with pivot bolts from front side
- pivot nuts
- shock absorber lower mounting bolt and nut
- brake hose clamp with bolt

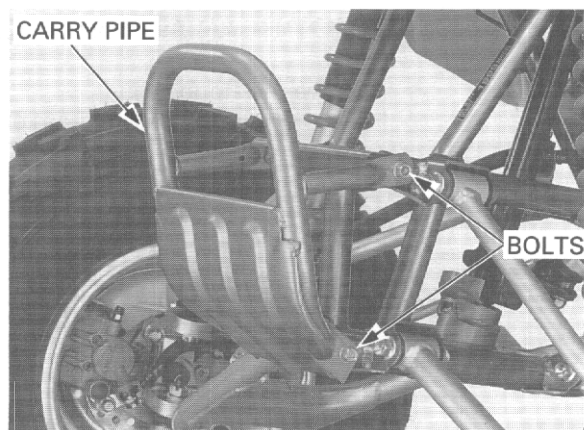
### TORQUE:

Upper/lower arm: 39 N·m (4.0 kgf·m, 29 lbf·ft)  
Shock absorber: 44 N·m (4.5 kgf·m, 33 lbf·ft)



## FRONT WHEEL/SUSPENSION/STEERING

— carry pipe with four bolts



Install the knuckle onto the upper and lower arms with the joint nuts, washer and clamp. Tighten each nut to the specified torque and further tighten until its grooves align with the cotter pin hole.

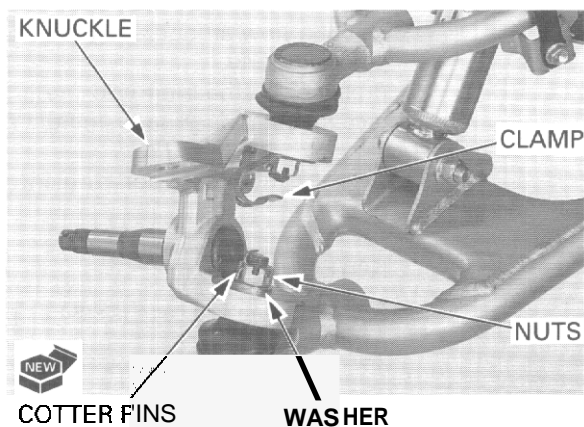
**TORQUE: 29 N·m (3.0kgf·m, 22 lbf·ft)**

Install new cotter pins.

Install the following:

- tie-rod into knuckle (page 12-7)
- wheel hub and front wheel (page 12-8).

Adjust the toe (page 3-22).

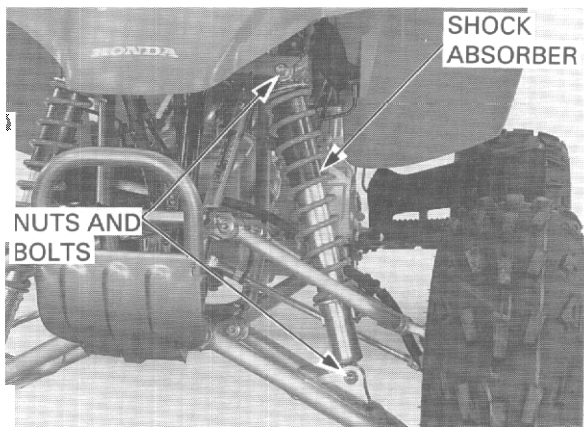


## FRONT SHOCK ABSORBER

### REMOVAL

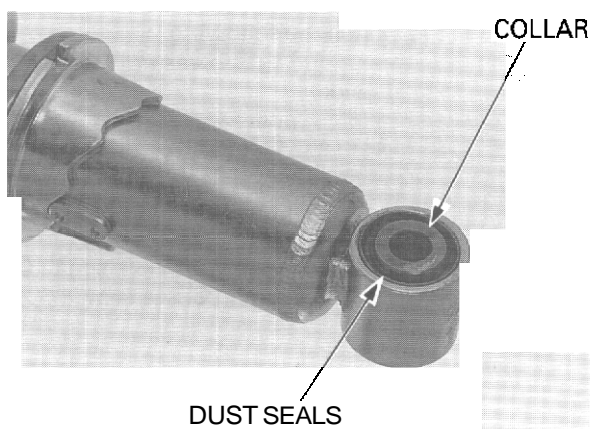
Support the vehicle with a support block to raise the front wheels off the ground.

Support the lower arm and remove the upper/lower mounting nuts, bolts and shock absorber.



### INSPECTION

Remove the lower pivot collar and dust seals. Check the pivot collar and dust seals for wear or damage.



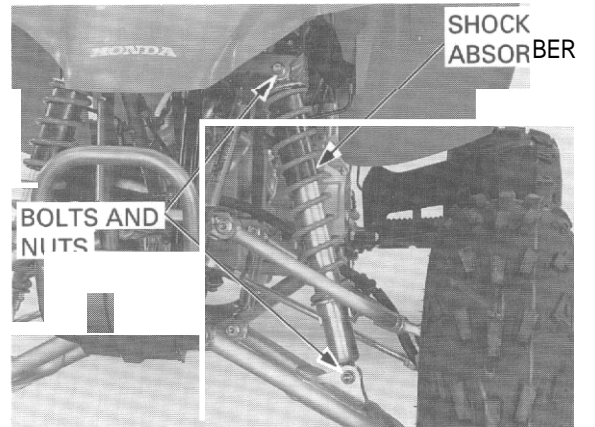
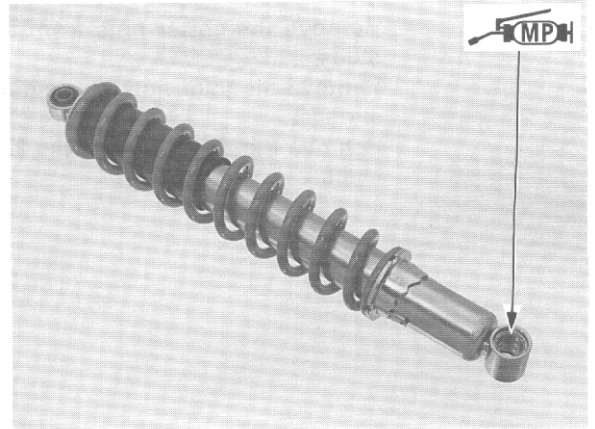
Check the bushings for wear or damage.  
 Check the damper unit for leakage or other damage.  
 Replace the shock absorber assembly if necessary.

**INSTALLATION**

Apply molybdenum disulfide paste to the lower bushing of the shock absorber.  
 Coat new dust seal lips with molybdenum disulfide paste and install them into the lower pivot.  
 Install the lower pivot collar.

Install the shock absorber with the mounting bolts from front side.  
 install the mounting nuts and tighten them.

**TORQUE: Upper/Lower: 44 N·m (4.5 kgf·m, 33 lbf·ft)**



**STEERING SHAFT AND TIE-ROD**

**REMOVAL**

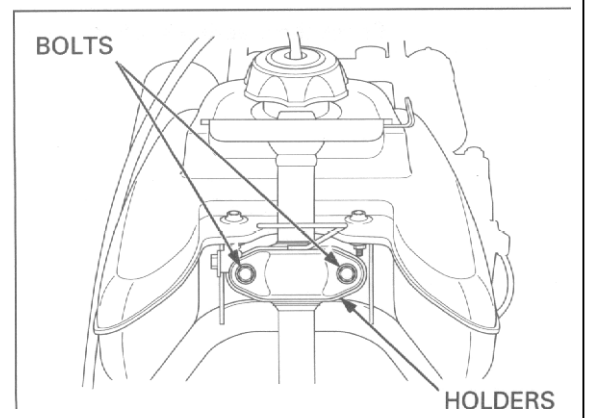
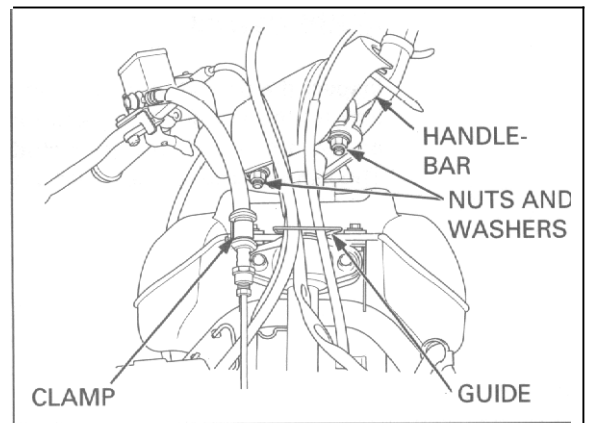
*When removing the tie-rod only, it can be removed without removing the front fender.*

Remove the front fender (page 2-2).  
 Release the cables and wire harness from the cable guide.  
 Remove the bolt and brake hose clamp from the steering shaft holder.  
 Remove the handlebar lower holder nuts, washers and the handlebar assembly from the steering shaft.

**CAUTION:**

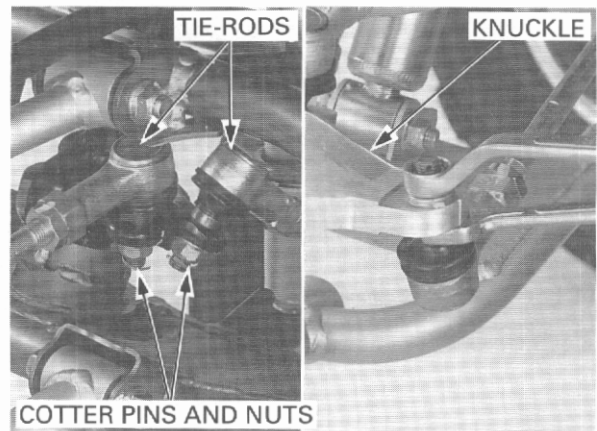
***Do not twist or bend the brake hose and pipe.***

Remove the two bolts and the steering shaft holders.

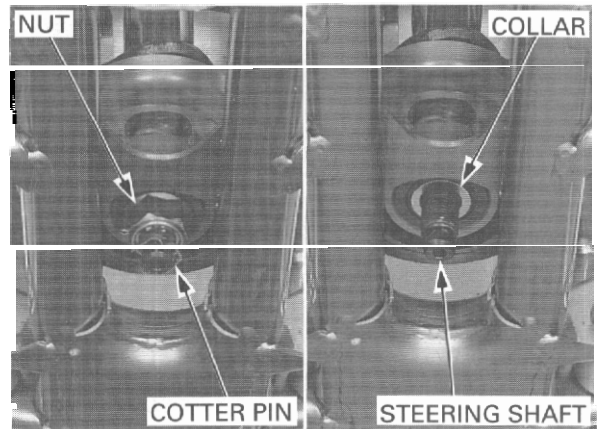


## FRONT WHEEL/SUSPENSION/STEERING

Remove the cotter pins from the tie-rod ball joint studs.  
Remove the joint nuts by holding the joint stud flat surfaces.  
Remove the tie-rods from the knuckles and steering shaft.



Remove the cotter pin and the steering shaft end nut.  
Remove the steering shaft and shaft collar from the frame.

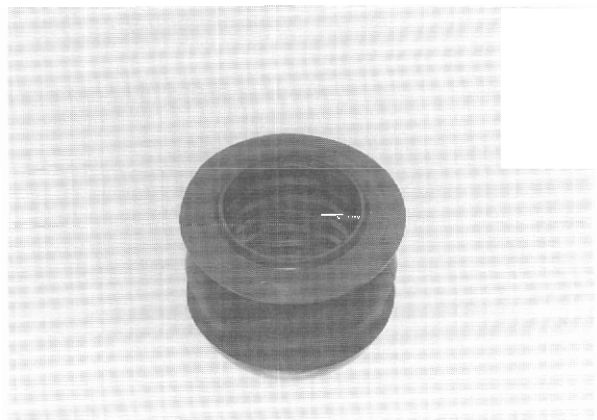


## INSPECTION

Inspect the tie-rod for distortion or damage.  
Inspect the ball joint rubbers for tears or other damage by moving the ball joint studs.  
They should move freely and smoothly.

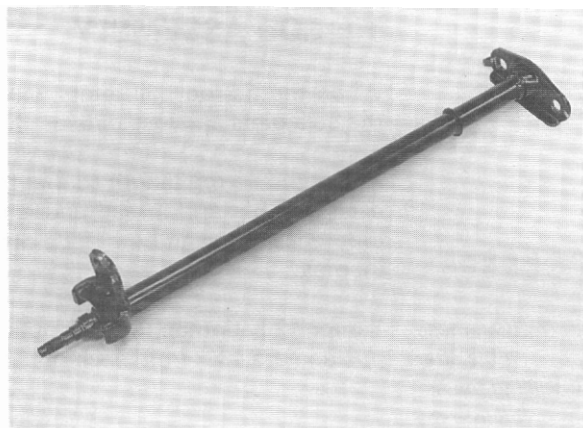


Check the steering shaft bushing for wear or damage.



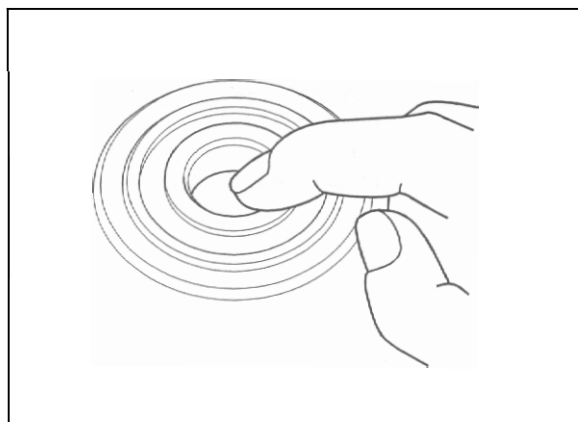


Check the steering shaft for distortion or damage.



Turn the inner race of each bearing with your finger. The bearing should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the frame.

Remove and discard the bearing if the race do not turn smoothly and quietly, if it fits loosely in the frame.



## BEARING REPLACEMENT

Remove the dust seals  
Remove the snap ring.

Drive the steering shaft bearing out of the frame.

**TOOLS:**

Driver **07749 - 0010000**  
Attachment, **32 x 35 mm** **07746 - 0010100**

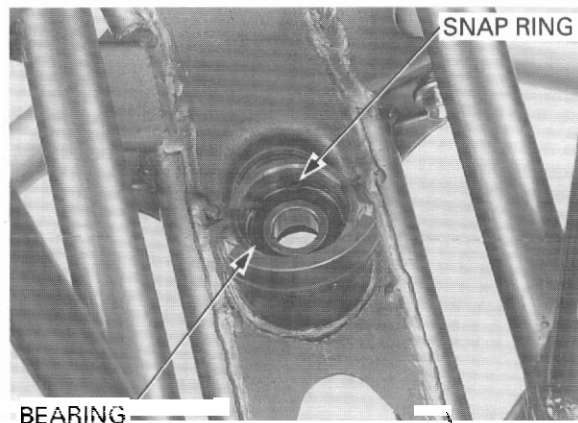
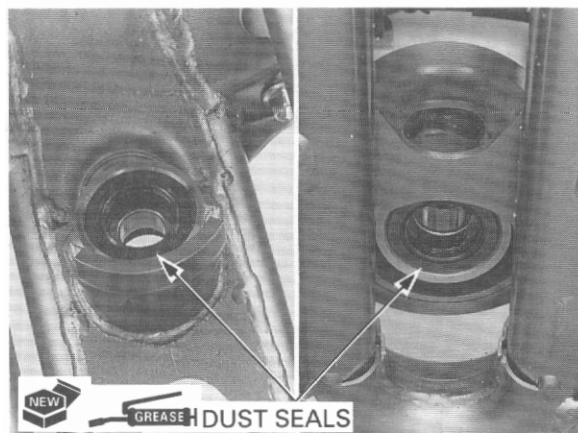
Drive in a new bearing squarely with the marking side facing up until it is fully seated.

**TOOLS:**

Driver **07749 - 0010000**  
Attachment, **37 x 40 mm** **07746-0010200**  
Pilot, **17 mm** **07746 - 0040400**

Install the snap ring into the groove properly.

Coat new dust seals with grease and install them until they are flush with the frame edge.



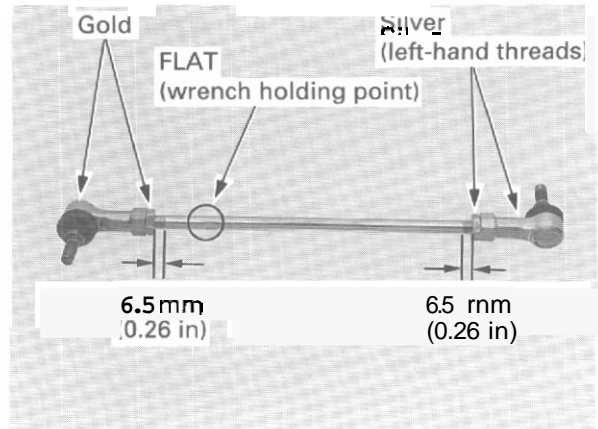


## FRONT WHEEL/SUSPENSION/STEERING

### TIE-ROD ASSEMBLY

When the tie-rod ball joints will be replaced, install the ball joints and lock nuts as shown.

Adjust the tie-rod length so that the distance between each lock nut and thread end is 6.5 mm (0.26 in). (A difference between both ends distances is 3 mm (0.1 in) max.)

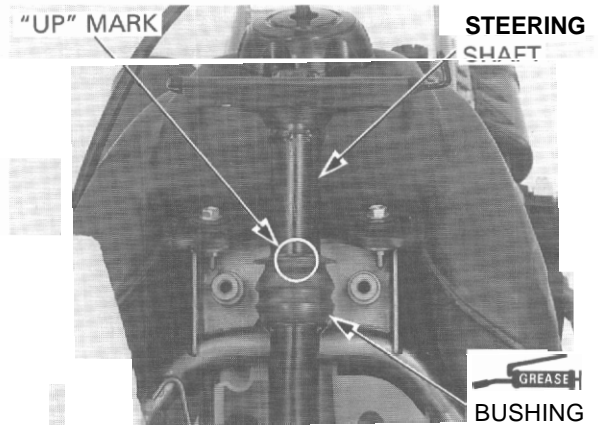


**Tighten these nuts after installing the tie-rod into the knuckle and steering shaft.**

Temporarily tighten the lock nuts while the ball joints position are 180° from each other.

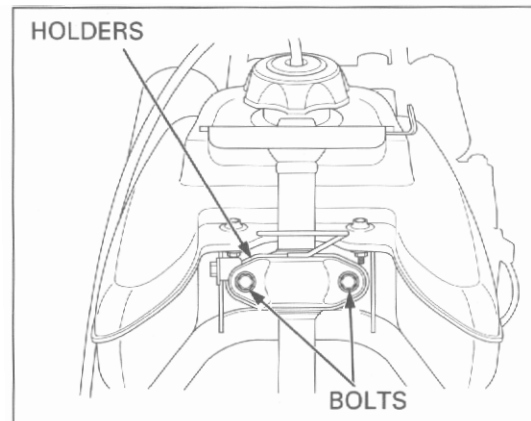
### INSTALLATION

Apply grease to the shaft bushing inner surface. Install the shaft bushing onto the steering shaft with the "UP" mark facing up. Install the steering shaft into the shaft bearing.



Install the shaft holders with the two bolts as shown. Tighten the holder bolts.

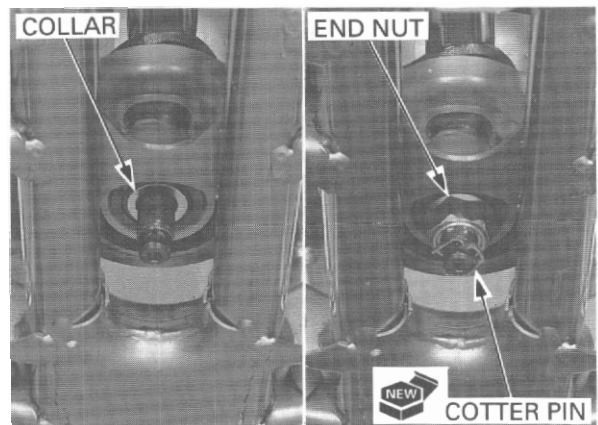
**TORQUE: 32 N·m 133 kgf·m, 24 lbf·ft)**



Install the shaft collar into the dust seal. Install the end nut and tighten it.

**TORQUE: 69 N·m 17.0kgf·m, 51 lbf·ft)**

Install a new cotter pin.



Install the tie-rod into the steering shaft and knuckles with the flat (wrench holding point) side facing the knuckle.

Install the joint nuts and tighten them by holding the joint stud flat surfaces.

**TORQUE 44 N·m 14.5 kgf·m, 33 lbf·ft)**

If the ball joints were replaced, tighten the lock nuts following procedure:

Rotate both ball joints with the tie-rod axis until they stop against the ball joint studs. Hold them in that position and tighten the ball joint lock nuts.

**TORQUE: 54 N·m 15.5 kgf·m, 40 lbf·ft)**

Install new cotter pins into the tie-rod ball joint studs.

**CAUTION:**

***Do not twist or bend the brake hose and pipe.***

*Route the wire and cable properly (page 1-18).*

Install the handlebar assembly onto the steering shaft with the lower holder nuts and washers. Tighten the nuts.

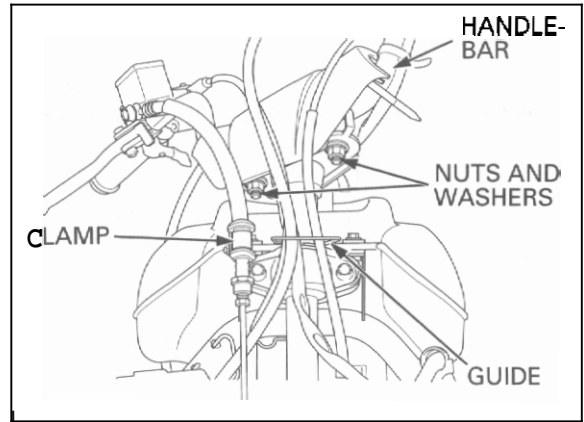
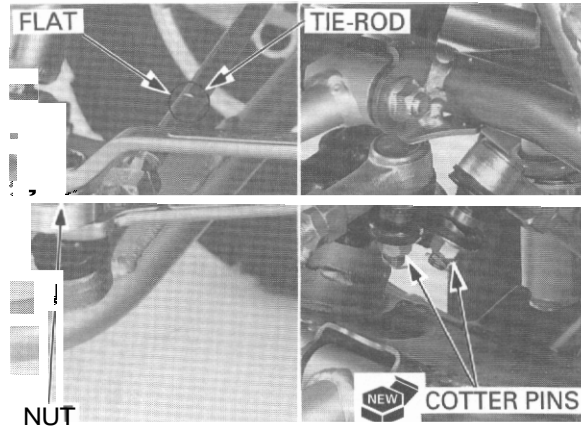
**TORQUE: 39 N·m 14.0 kgf·m, 29 lbf·ft)**

Install the cables and wire harness into the guide on the shaft holder.

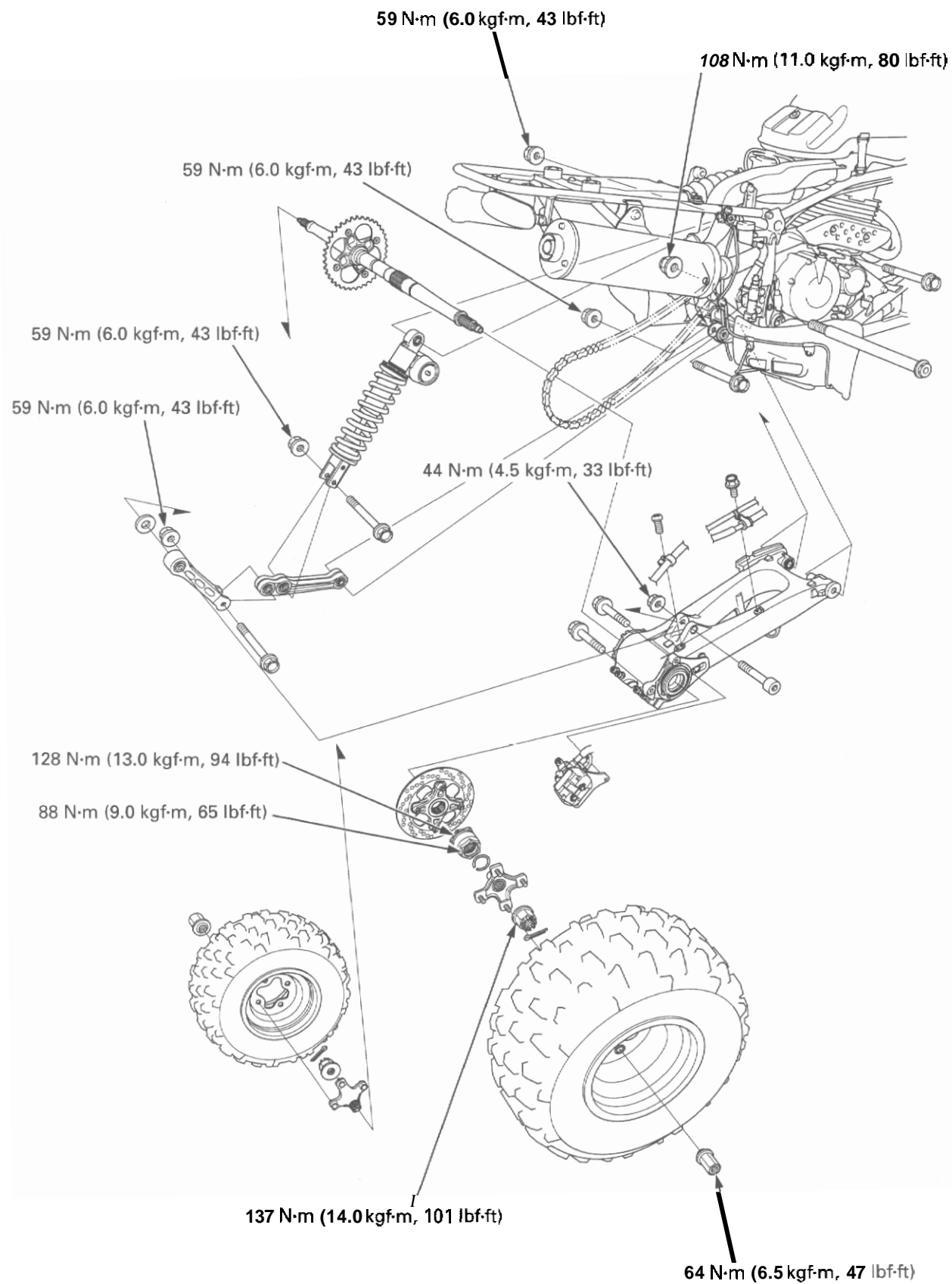
Install the brake hose onto steering shaft holder with the clamp bolt.

Adjust the toe (page 3-20).

Install the front fender (page 2-2).



## REAR WHEEL/SUSPENSION



# 13. REAR WHEEL/SUSPENSION

SERVICE INFORMATION	13-1	REAR SHOCK ABSORBER	13-9
TROUBLESHOOTING	13-2	SHOCK LINKAGE	13-11
REAR WHEEL	13-3	SWINGARM	13-13
REAR AXLE	13-3		

## 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.
  - **The** shock absorber contains nitrogen under high pressure. Do not allow fire or heat near the shock absorber.
  - Before disposal of the shock absorber, release the nitrogen by pressing the valve core. Then remove the valve from the shock absorber reservoir.
- 
- A jack or other support is required to support the vehicle.
  - When using the lock nut wrench for the axle lock nuts, 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.
  - Refer to section 12 for tire information.
  - Refer to section 3 for drive chain information.
  - Refer to section 14 for brake system information.

### SPECIFICATIONS

Unit: mm (in)

13

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		—	4.0 (0.16)
Cold tire pressure	Standard	27 kPa (0.275 kgf/cm <sup>2</sup> , 4.0 psi)	—
	Minimum	23 kPa (0.235 kgf/cm <sup>2</sup> , 3.4 psi)	—
	Maximum	31 kPa (0.315 kgf/cm <sup>2</sup> , 4.6 psi)	—
Axle runout		—	30 (0.12)
Drive chain slack		30 – 40 (1-1/4 – 1-5/8)	—
Shock absorber spring installed length		231.5 (9.11)	—

### TORQUE VALUES

Rear wheel nut	64 N·m (6.5 kgfm, 47 lbf·ft)	
Rear wheel hub nut	137 N·m (14.0 kgfm, 101 lbf·ft)	
	Apply grease to the threads and seating surface/Castle nut	
Shock absorber mounting nut	59 N·m (6.0 kgfm, 43 lbf·ft)	
Shock link-to-swingarm nut	44 N·m (4.5 kgfm, 33 lbf·ft)	
Shock arm-to-frame nut	59 N·m (6.0 kgfm, 43 lbf·ft)	
Shock arm-to-shock link nut	59 N·m (6.0 kgfm, 43 lbf·ft)	
Final driven sprocket nut	59 N·m (6.0 kgfm, 43 lbf·ft)	
Axle lock nut (outer)	88 N·m (9.0 kgfm, 65 lbf·ft)	Apply locking agent to the threads
(inner)	128 N·m (13.0 kgfm, 94 lbf·ft)	Apply locking agent to the threads
Swingarm pivot nut	108 N·m (11.0 kgfm, 80 lbf·ft)	
Caliper stopper pin	59 N·m (6.0 kgfm, 43 lbf·ft)	Apply locking agent to the threads

## REAR WHEEL/SUSPENSION

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### TOOLS

Driver	07749 - 0010000
Attachment, 24 x 26 mm	07746 - 0010700
Attachment, 62 x 66 mm	07746 - 0010500
Attachment, 35 mm I.D.	07746 - 0030400
Pilot, 17 mm	07746 - 0040400
Pilot, 40 mm	07746 - 0040900
Lock nut wrench, 56 mm	07916 - HA20000 or 07916 - HA2010A (U.S.A. only)
Lock nut wrench, 45 mm	07916 - 1870101 or equivalent commercially available in U.S.A.
Needle bearing remover	07946 - KA50000
Assembly collar	07965 - VM00100

### TROUBLESHOOTING

#### Rear wheel wobbling

- Bent rim
- Worn or damaged rear axle bearings
- Faulty rear tire
- Axle fastener not tightened properly
- Faulty swingarm pivot bearings

#### Rear wheel turns hard

- Faulty rear axle bearings
- Bent rear axle
- Rear brake drag
- Drive chain too tight

#### Soft suspension

- Weak shock absorber spring
- Incorrect suspension adjustment
- Oil leakage from damper unit

#### Hard suspension

- Incorrect suspension adjustment
- Damaged rear suspension pivot bearings
- Bent damper rod

#### Rear suspension noise

- Faulty rear shock absorber
- Loose rear suspension fasteners
- Worn rear suspension pivot bearings

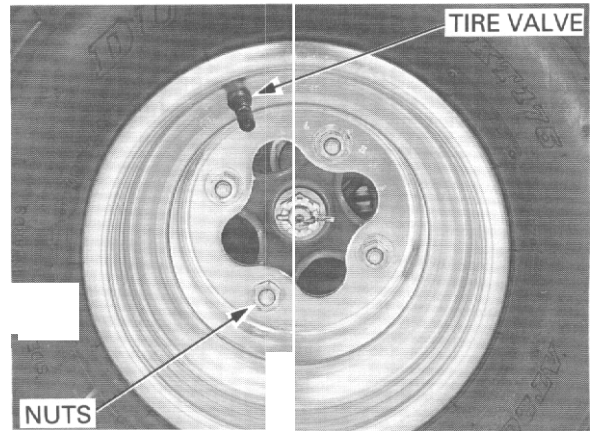
## REAR WHEEL

### REMOVAL

Loosen the wheel nuts.

Support the vehicle with a support block to raise the rear wheels off the ground.  
Remove the nuts and wheel.

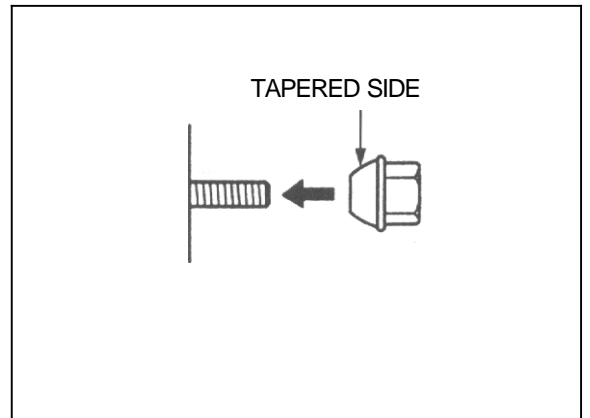
For tire removal/installation and repair, refer to section 12.



### INSTALLATION

Install the tire onto the hub with the tire valve facing out.  
Install the wheel nuts with the tapered side facing inward and tighten them.

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



## REAR AXLE

### REMOVAL

#### CAUTION:

**Support** the caliper so that it does not hang from the brake hose. **Do** not twist or bend the brake hose.

Remove the rear brake caliper (page 14-6).

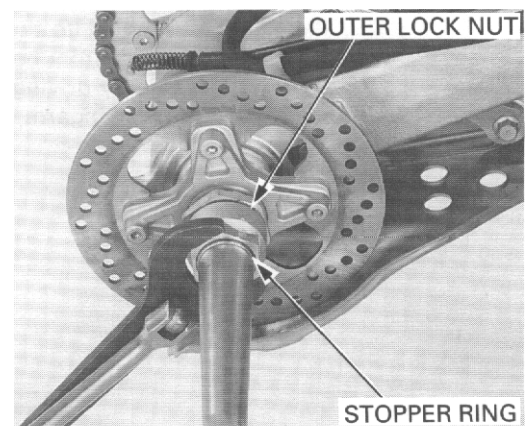
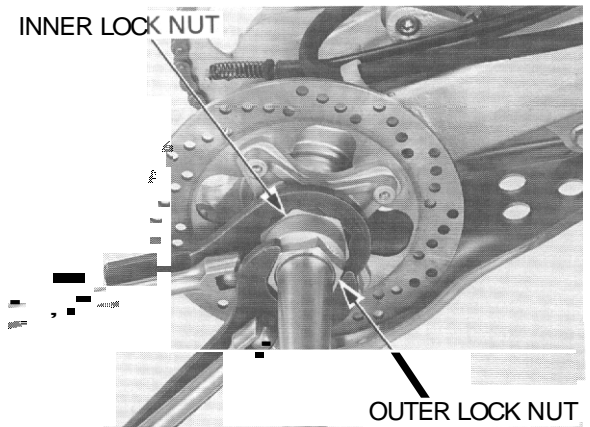
*The locknuts has left hand threads* Loosen the axle inner lock nut while holding the outer lock nut, using the special tools.

#### TOOLS

- Lock nut wrench, 56 mm **07916 - HA20000** or **07916 - HA2010A** (U.S.A. only)
- Lock nut wrench, 45 mm **07916 - 1870101** or equivalent commercially available in **U.S.A.**

Loosen the outer lock nut until the stopper ring can be removed, using same tool.

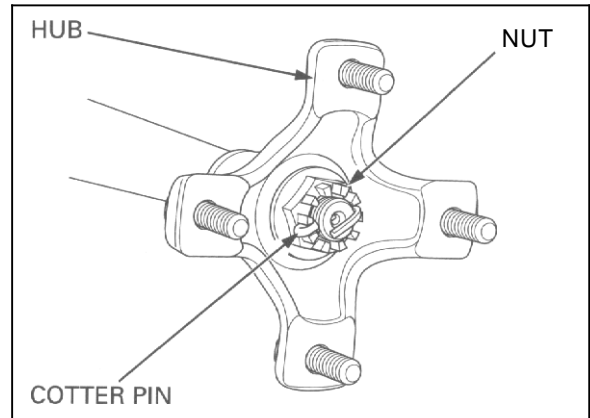
Remove the stopper ring from the axle groove.



## REAR WHEEL/SUSPENSION

Remove the wheels (page 13-3).

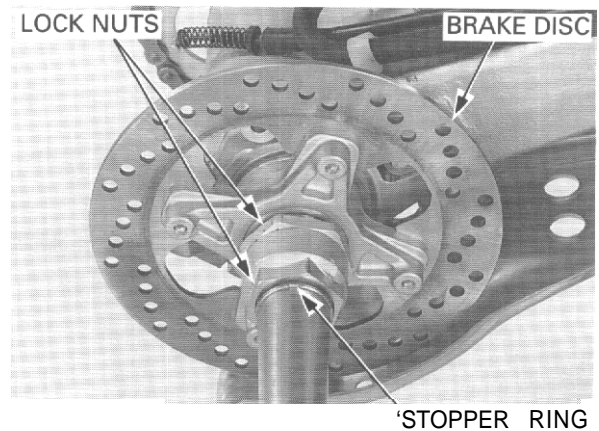
Remove the cotter pin and the hub nut.  
Remove the right wheel hub.



Remove the stopper ring, outer and inner lock nuts from the axle.

Remove the skid plate (page 2-5).

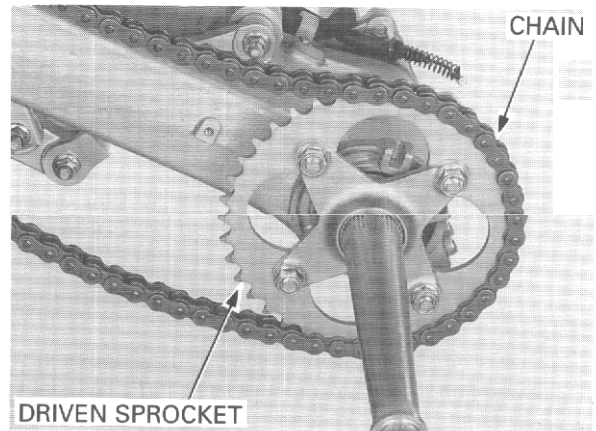
Remove the brake disc/hub by sliding it outward.  
Remove the O-ring from the inside of the disc hub.



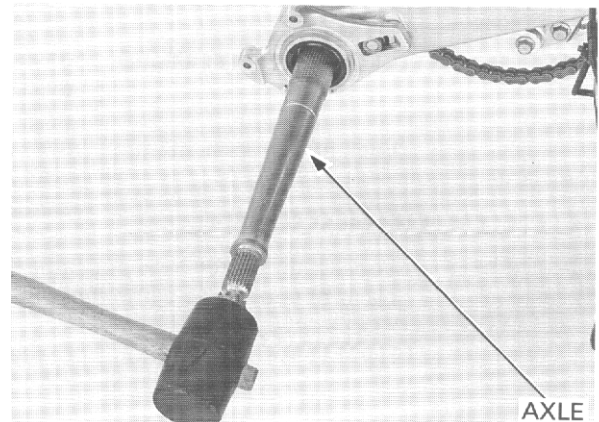
Loosen the rear axle for maximum drive chain slack (page 3-13).

Remove the drive chain from the driven sprocket.

If the sprocket must be replaced, remove the four nuts, bolts and the driven sprocket.

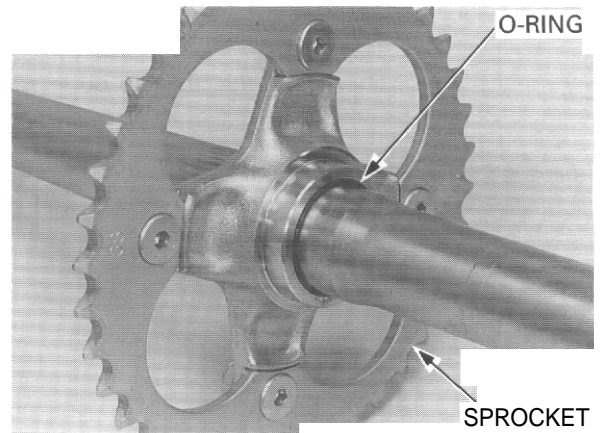


Install the hub nut onto the right end of the axle to prevent the threads from being damaged.  
Remove the axle by driving the axle out of the bearing holder in the swingarm, using a rubber mallet.

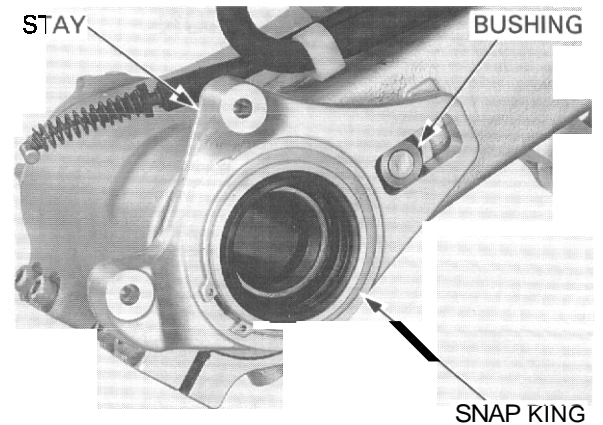


Remove the O-ring.

Remove the nuts, bolts and driven sprocket.

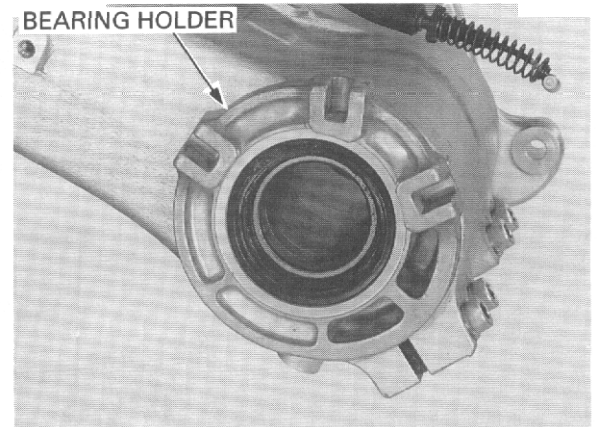


Remove the snap ring from the bearing holder.  
Remove the caliper stay and stopper bushing.  
Remove the O-rings from the bearing holder and stay groove.



Remove the axle bearing holder to the left by tapping it lightly from the right side.

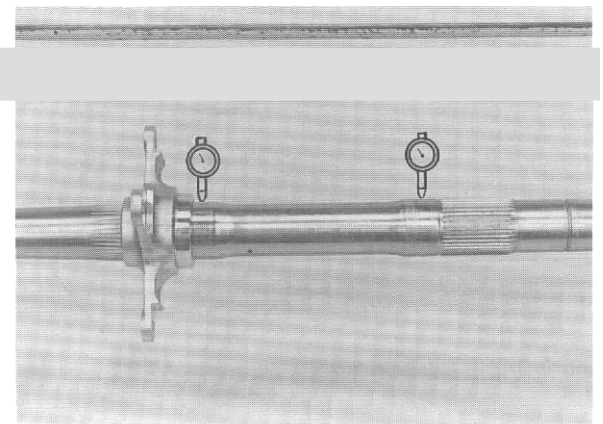
Remove the O-rings from the holder grooves.  
Remove the dust seals.



**INSPECTION**

Set the axle in V-blocks and measure the axle runout with a dial indicator.  
Actual runout is 1/2 the total indicator reading.

**SERVICE LIMIT 3.0 mm (0.12in)**



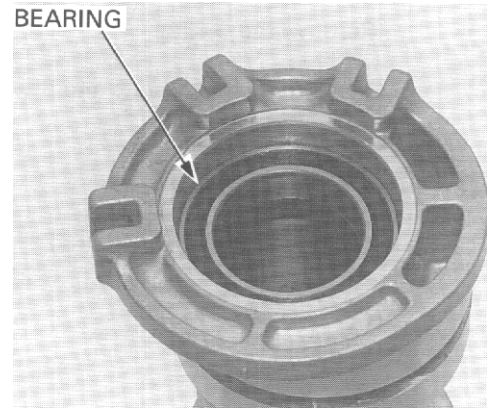


## REAR WHEEL/SUSPENSION

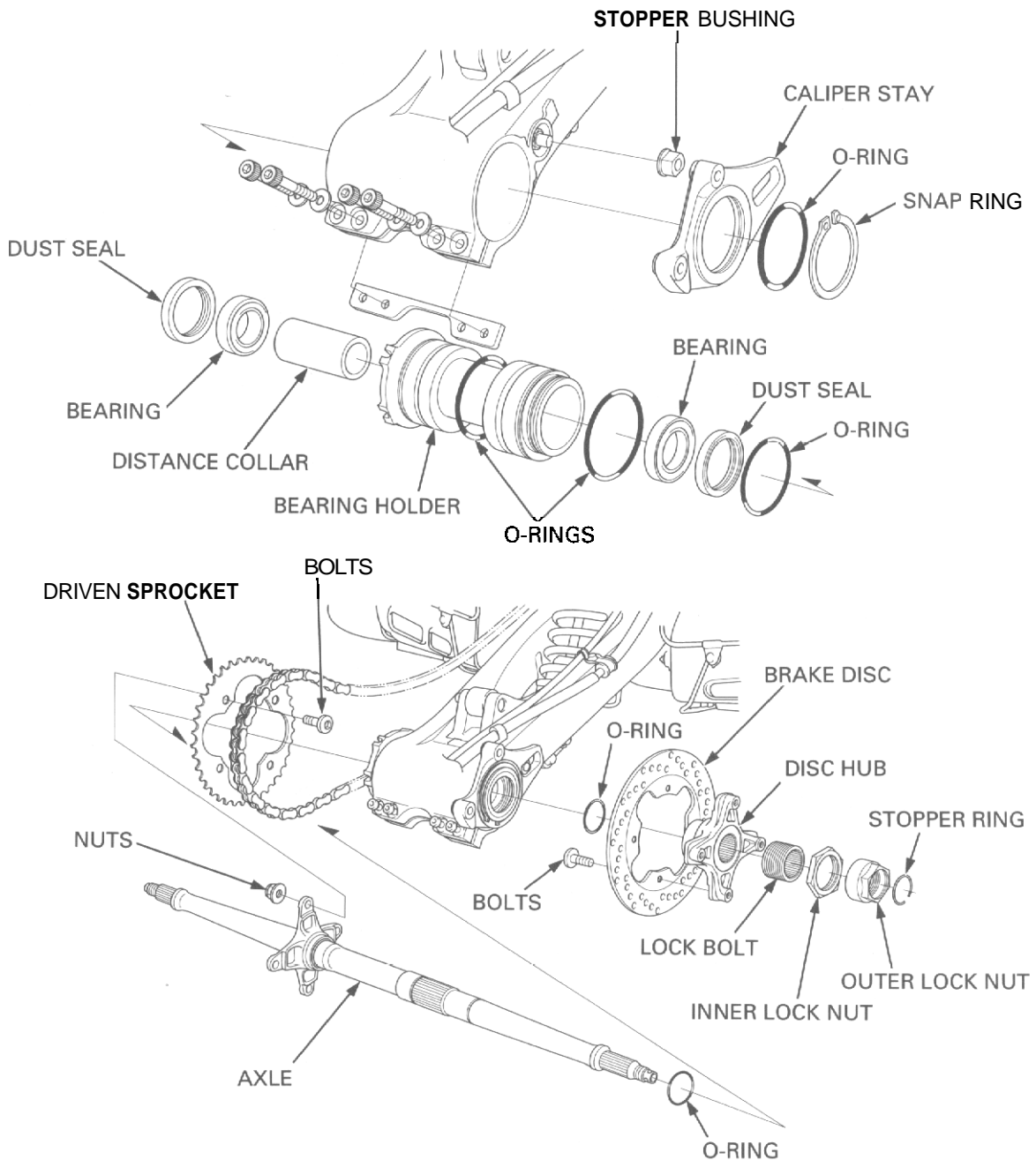
Turn the inner race of each bearing with your finger. The bearings should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the holder.

*Replace the axle bearings in pairs.*

Remove and discard the bearings if the races do not turn smoothly and quietly or if they fit loosely in the holder.



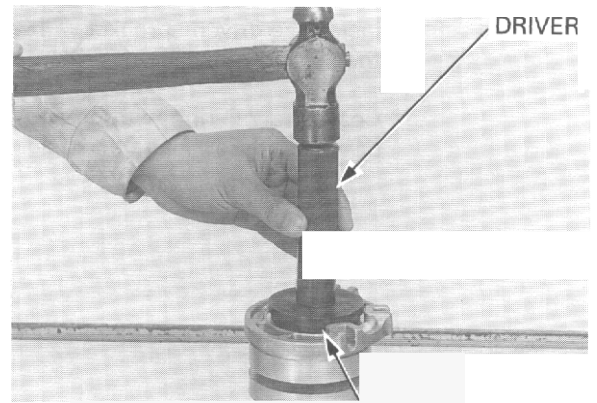
## INSTALLATION



Drive in a new right bearing (brake disc side) squarely with the marking side facing up until it is fully seated.  
 Install the distance collar.  
 Drive in a new left bearing squarely with the marking side facing up until it is fully seated.

**TOOLS**

Driver	<b>07749-0010000</b>
Attachment, 62 x 68 mm	<b>07746-0010500</b>
Pilot, 40 mm	<b>07746-0040900</b>

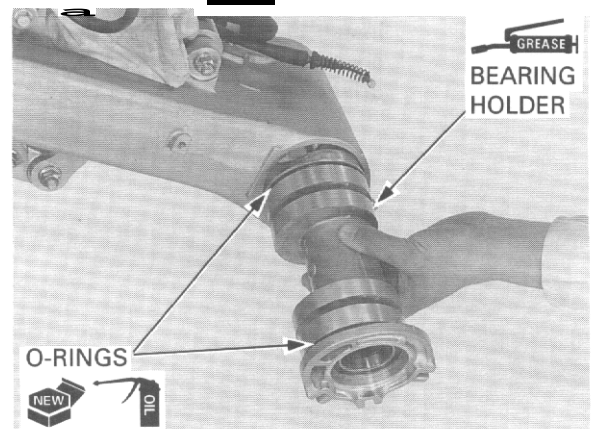


ATTACHMENT AND PILOT

Clean the bearing holder outer surface and the swingarm inner surface.

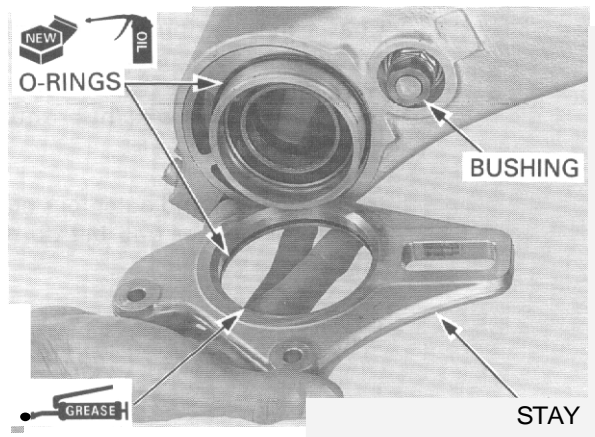
Coat new O-rings with oil and install them into the grooves in the bearing holder.

Apply grease to the bearing holder outer surface. Install the bearing holder into the swingarm until it is fully seated, being careful not to damage the O-rings.

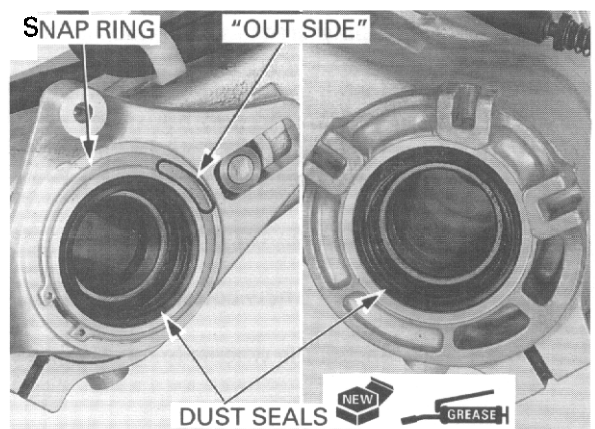


Coat new O-rings with oil and install them into the caliper stay groove and onto the bearing holder.

Install the bushing onto the stopper bolt.  
 Apply grease to the inner surface of the caliper stay and install the stay onto the bearing holder and bushing.  
 Install the snap ring into the bearing holder groove with the "OUT SIDE" facing out to secure the caliper stay.



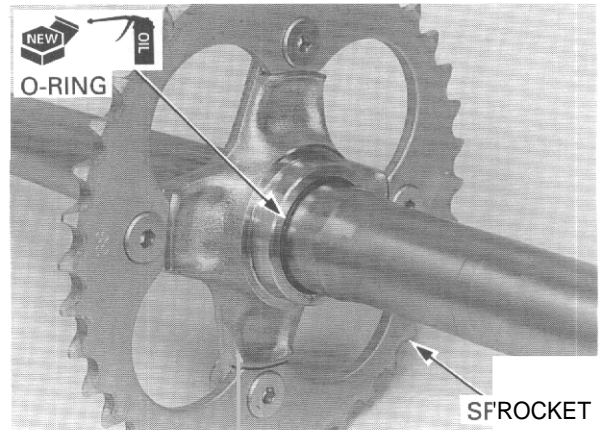
Pack 1 g (0.04 oz) of grease into each new dust seal lip cavity.  
 Install the dust seals until they are flush with the bearing holder



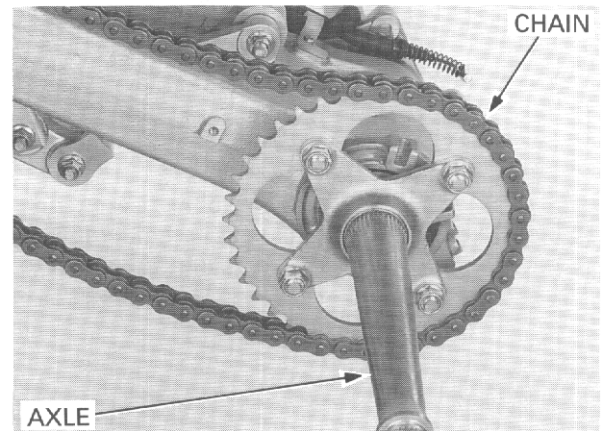
## REAR WHEEL/SUSPENSION

Install the driven sprocket with the chamfered side of the bolt holes facing in.

Coat a new O-ring with oil and install it between the driven sprocket flange and axle.

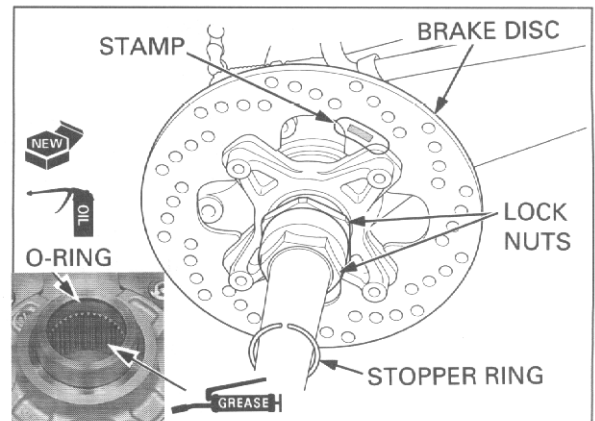


Install the axle into the swingarm through the drive chain until it is fully seated. Install the chain over the driven sprocket.



Coat a new O-ring with oil and install it into the groove in the disc hub.  
Apply grease to the disc hub splines.  
Install the brake disc/hub onto the axle with the stamp facing out.

Install the inner and outer lock nuts onto the axle.  
Install the stopper ring but do not install it into the ring groove yet.



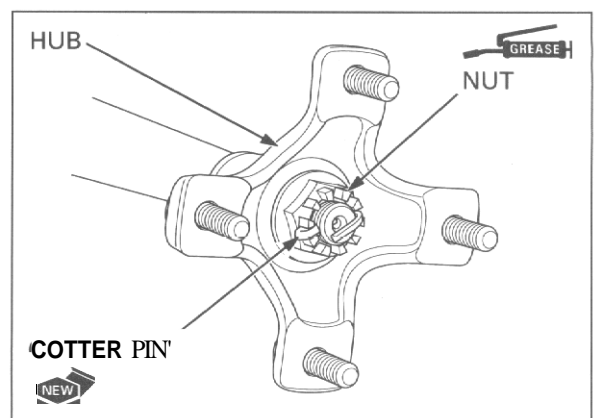
Apply grease to the hub nut threads and seating surface.

Install the wheel hub and hub nut onto the axle.  
Tighten the hub nut to the specified torque and further tighten it until its grooves align with the cotter pin hole.

**TORQUE: 137 N·m (14.0 kgf·m, 101 lbf·ft)**

Install a new cotter pin.

Install the wheels (page 13-3).



*The lock nuts has left-hand threads.*

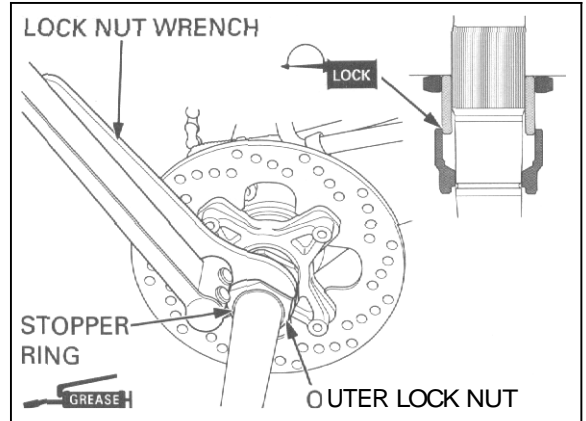
Turn the outer lock nut clockwise until the stopper ring groove is covered with the outer lock nut and apply locking agent to the lock bolt threads as shown. Turn the outer lock nut counterclockwise until the ring groove is visible and install the stopper ring into the groove.

Apply grease to the stopper ring (outer lock nut seating surface) and turn the outer lock nut to seat it against the stopper ring.

Tighten the outer lock nut.

**TOOL**

Lock nut wrench, 45 mm 07916 - 1870101 or equivalent commercially available in U.S.A.



*Refer to torque wrench reading information on page 13-1 "SERVICE INFORMATION".*

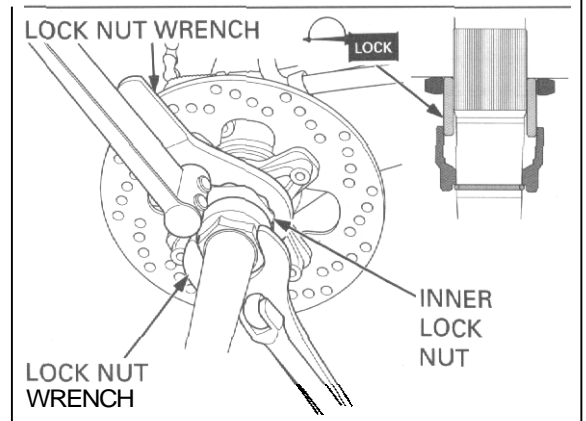
**TORQUE:** Actual: 88 N·m (9.0 kgf·m, 65 lbf·ft)  
Indicated: 79 N·m (8.1 kgf·m, 59 lbf·ft)

Apply locking agent to the inner lock nut area of the lock bolt threads.

Tighten the inner lock nut while holding the outer lock nut.

**TOOLS**

Lock nut wrench, 56 mm 07916 - HA20000 or 07916 - HA2010A (U.S.A. only)  
Lock nut wrench, 45 mm 07916 - 1870101 or equivalent commercially available in U.S.A.

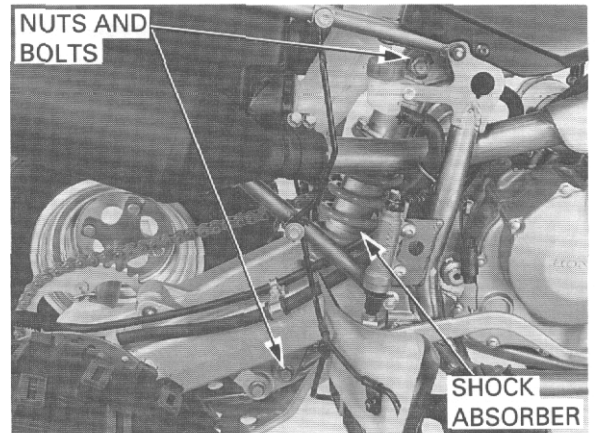


**TORQUE:** Actual: 128 N·m (13.0 kgf·m, 94 lbf·ft)  
Indicated: 115 N·m (11.7 kgf·m, 85 lbf·ft)

Tighten the driven sprocket nuts if the sprocket was removed.

**TORQUE** 59 N·m (6.0 kgf·m, 43 lbf·ft)

Install the brake caliper (page 14-6).  
Install the skid plate (page 2-5).  
Adjust the drive chain slack (page 3-13)



**REAR SHOCK ABSORBER**

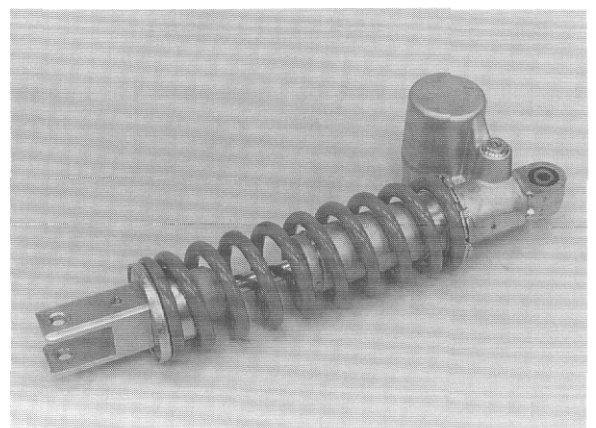
**REMOVAL**

Remove the seat/rear fender (page 2-2).  
Support the vehicle with a support block to raise the rear wheels off the ground.  
Support the swingarm and remove the mounting nuts, bolts and the shock absorber.

**INSPECTION**

*Be careful not to lose the needle rollers of the bearing.*

Remove the upper pivot collar and check the needle bearing, pivot collar and dust seals for wear or damage.  
Check the damper unit for leakage or other damage.  
Replace the shock absorber assembly if necessary.

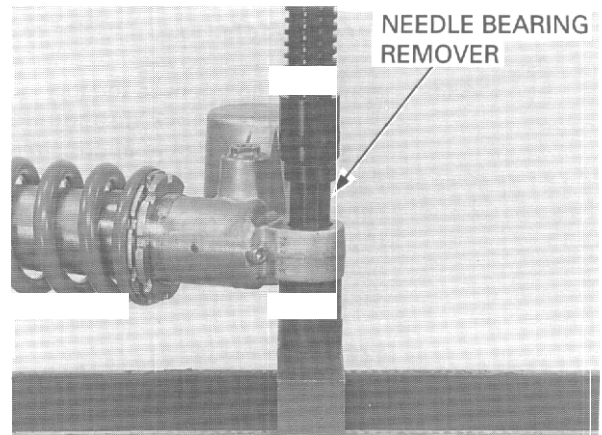


## BEARING REPLACEMENT

Remove the dust seals.  
Press the needle bearing out of the shock absorber.

### TOOL

Needle bearing remover                      07946 - KA50000

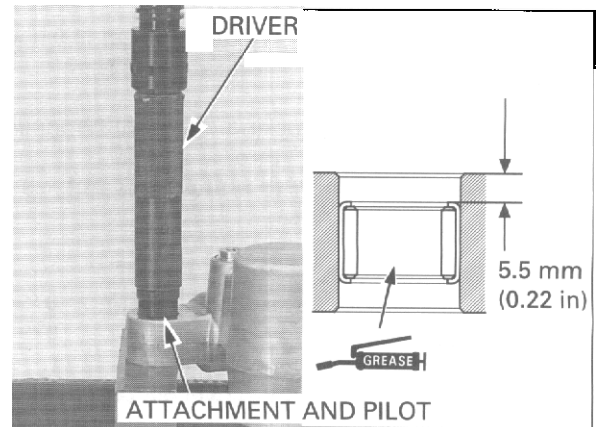


*Press the marking side of the bearing.*

Apply grease to new needle bearing rollers.  
Carefully press the needle bearing into the shock absorber until the depth from the outer surface is 5.5 mm (0.22 in).

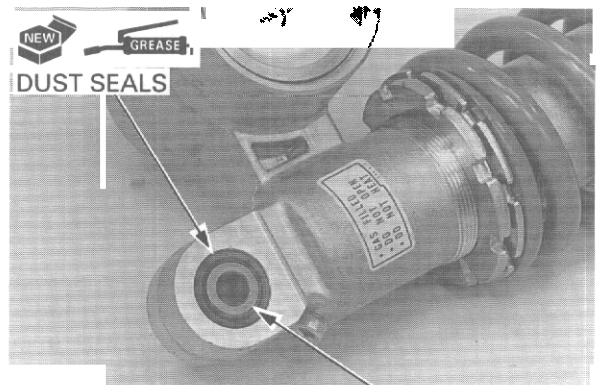
### TOOLS:

Driver    07749 - 0010000  
Attachment, 24 x 26 mm                      07746 - 0010700  
Pilot, 17 mm                                      07746 - 0040400



Make sure that the needle rollers are in position.

Apply grease to new dust seal lips and install them into the upper pivot until they are seated against the needle bearing.  
Install the pivot collar.



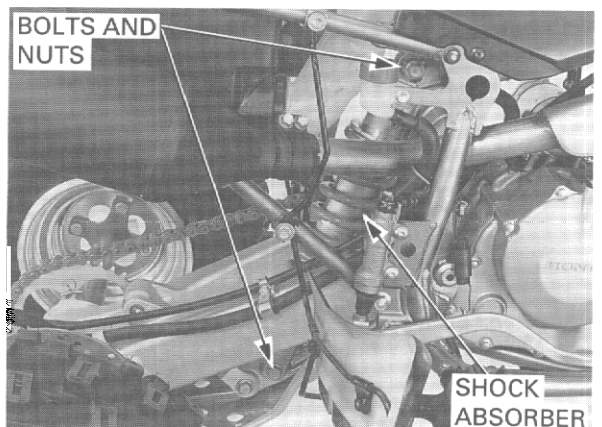
PIVOT COLLAR

## INSTALLATION

Set the shock absorber onto the shock link and into the frame and install the mounting bolts from the right side.  
Install the mounting nuts and tighten them.

**TORQUE: Upper/Lower: 59 N·m (6.0 kgf·m, 43 lbf·ft)**

Install the seat/rear fender (page 2-2).



## SHOCK LINKAGE

### REMOVAL

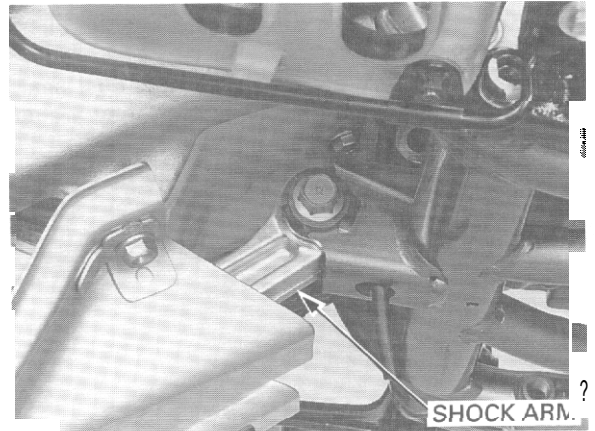
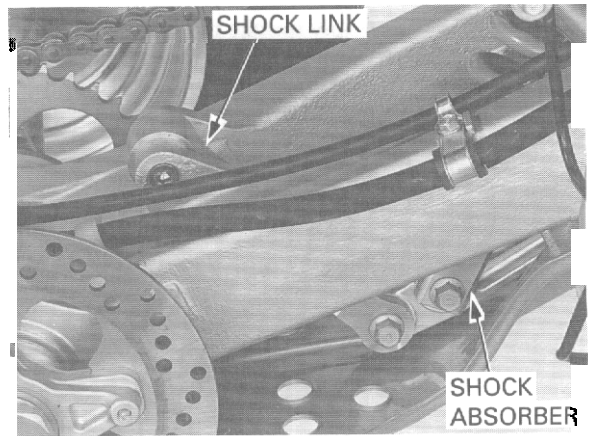
**NOTE:**

The linkage can be serviced with the skid plate installed, although it is easier to service if the skid plate is removed (page 2-5).

Support the vehicle with a support block to raise the rear wheels off the ground.

Support the swingarm and remove the following:

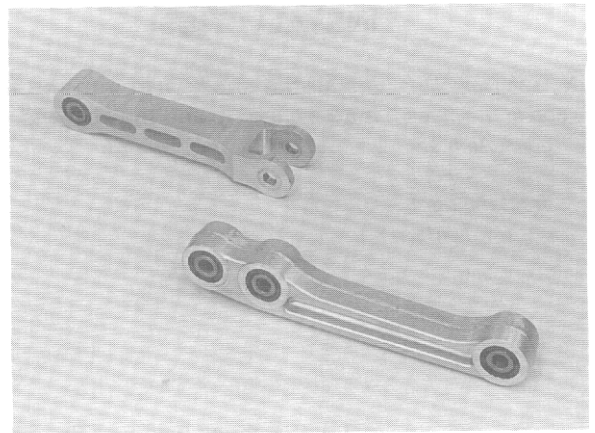
- shock absorber lower mounting nut and bolt
- shock arm-to-shock link nut and bolt
- shock link-to-swingarm nut and bolt
- shock link and washer
- shock arm-to-frame nut and bolt
- shock arm



### INSPECTION

*Be careful not to lose the needle rollers of the bearing.*

Remove the pivot collars and check the needle bearings, pivot collars and dust seals for wear or damage.



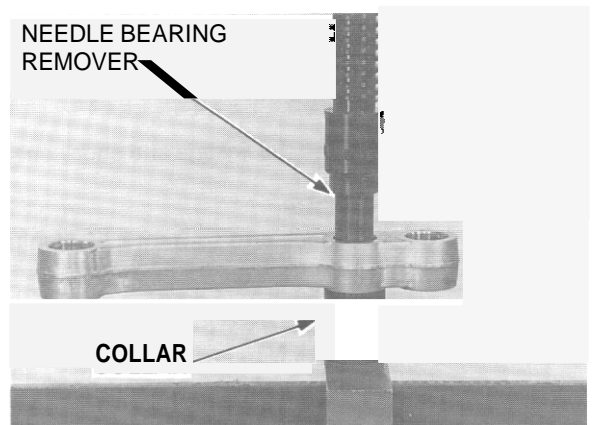
### BEARING REPLACEMENT

Remove the dust seals.  
Press the needle bearing out of the shock arm and shock link.

**TOOLS:**

Needle bearing remover  
Assembly collar

07946 - KA50000  
07965 - VM00100





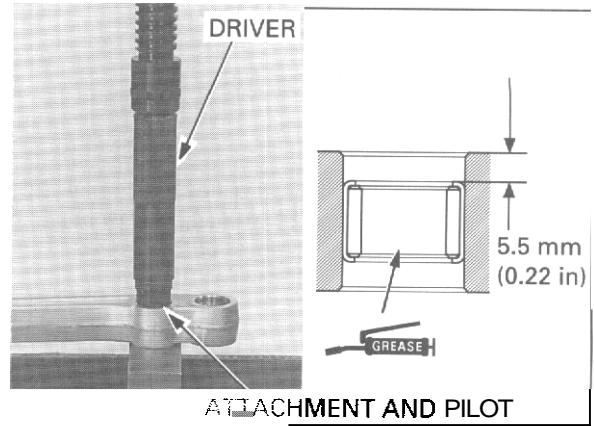
## REAR WHEEL/SUSPENSION

*Press the marking side of the bearing*

Apply grease to new needle bearing rollers. Carefully press the needle bearing into the shock arm and shock link until the depth from the outer surface is 5.5 mm (0.22 in).

### TOOLS:

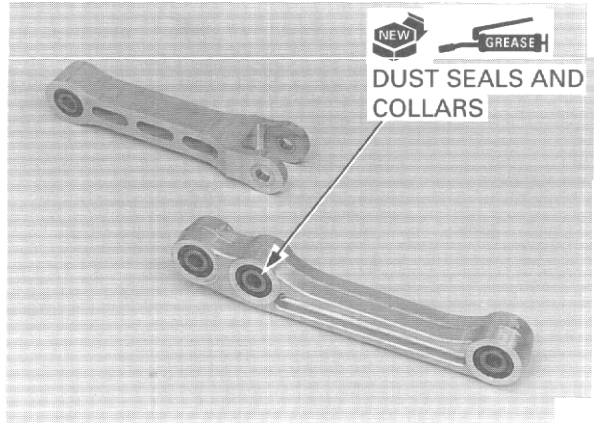
Driver	<b>07749 - 0010000</b>
Attachment, 24 x 26 mm	<b>07746-0010700</b>
Pilot, 17 mm	<b>07746-0040400</b>



Make sure that the needle rollers are in position.

Apply grease to new dust seal lips and install them into the pivots until they are seated against the needle bearings.

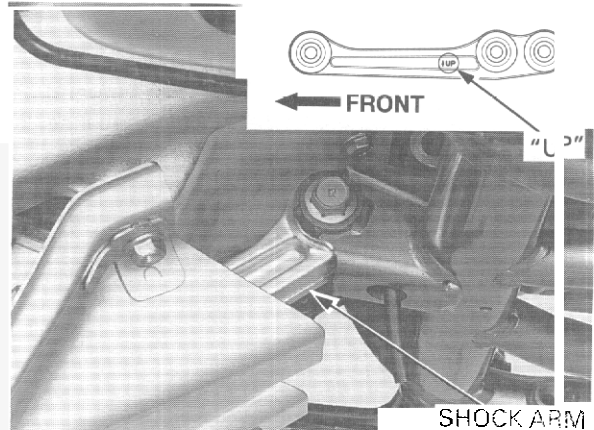
Install the pivot collars.



## INSTALLATION

*Note the installation of the pivot bolts. All bolts are installed from the right side.*

Install the shock arm into the frame with the "UP" mark facing up and the bolt and nut.



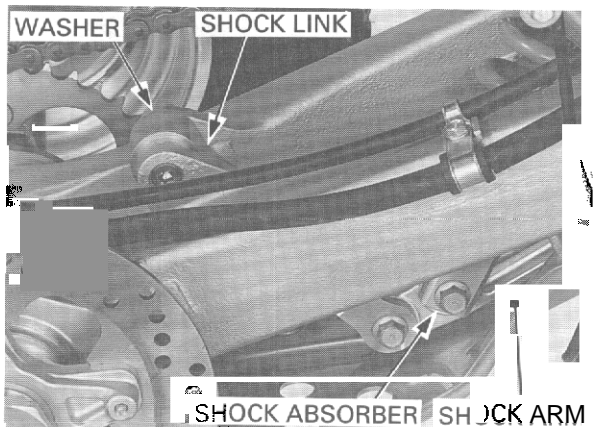
install the shock link over the shock arm and into the swingarm with the washer (left side of the shock link), bolts and nuts.

Connect the shock absorber to the shock link with the bolt and nut.

Tighten the linkage and shock absorber mounting nuts.

### TORQUE:

Shock arm-to-frame: **59 N·m (6.0 kgf·m, 43 lbf·ft)**  
 Shock arm-to-shock link  
**59 N·m (6.0 kgf·m, 43 lbf·ft)**  
 Shock link-to-swingarm:  
**44 N·m 14.5 kgf·m, 33 lbf·ft)**  
 Shock absorber mounting:  
**59 N·m (6.0 kgf·m, 43 lbf·ft)**



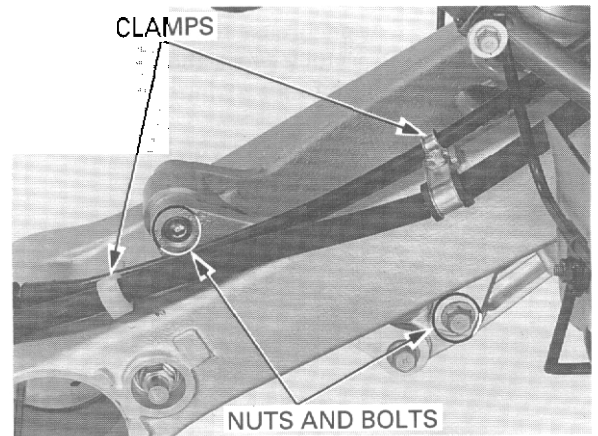
# SWINGARM

## REMOVAL

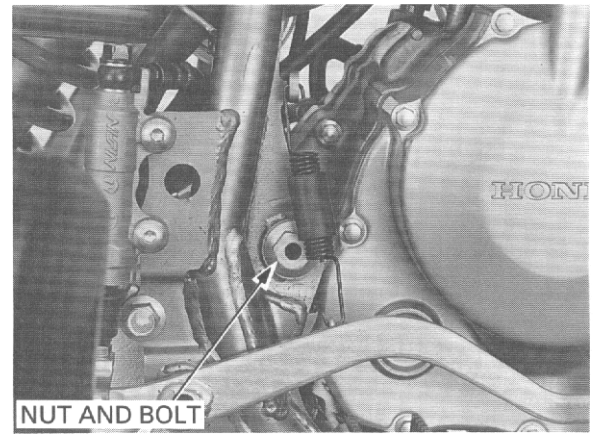
Remove the rear axle (page 13-3).

Support the swingarm and remove the following:

- screw and brake hose clamp
- bolt and brake hose lock cable clamp
- shock absorber lower mounting nut and bolt
- shock link-to-swingarm nut and bolt



- swingarm pivot nut and bolt
- swingarm from the frame

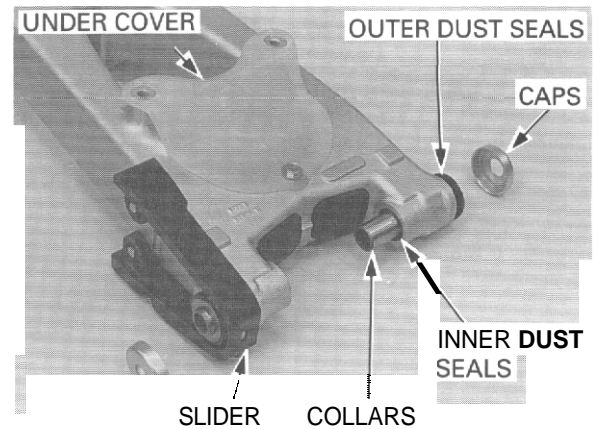


- dust seal caps and outer dust seals
- under cover and chain slider if necessary.

## INSPECTION

*Be careful not to lose the needle rollers of the bearing.*

Remove the pivot collars and check the needle bearings, pivot collars and dust seals for wear or damage.



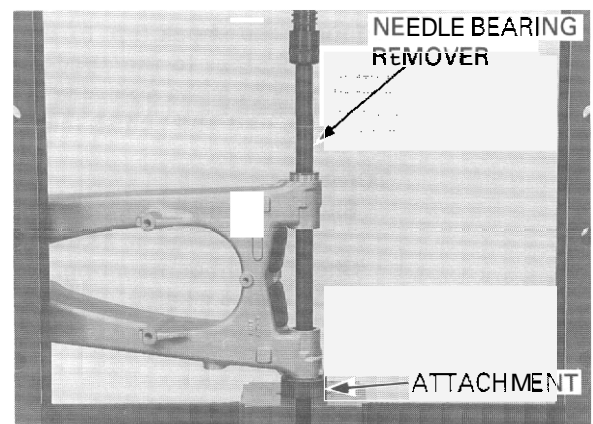
## BEARING REPLACEMENT

Remove the inner dust seals.  
Press the needle bearing and thrust bushing out of the swingarm.

### TOOLS:

Needle bearing remover  
Attachment, 35 mm I.D.

07946 - KA50000  
07746-0030400





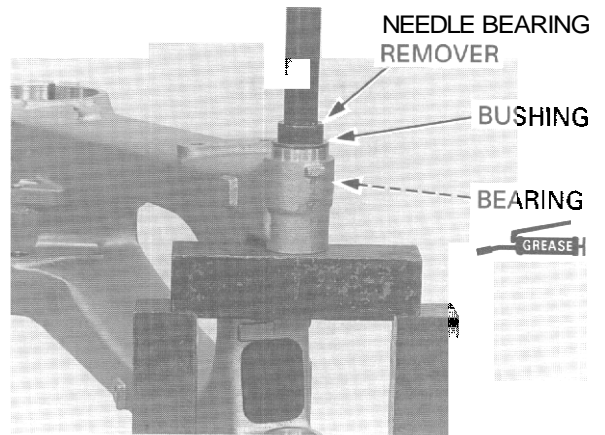
## REAR WHEEL/SUSPENSION

*Press the marking side of the bearing.*

Apply grease to new needle bearing rollers. Carefully press the needle bearing and thrust bushing into the swingarm pivot until the bushing is fully seated.

### TOOL

Needle bearing remover                      07946 - KA50000



Pack grease into new inner dust seal lip cavities. Install the inner dust seals until they are flush with the pivot surfaces. Install the pivot collars.

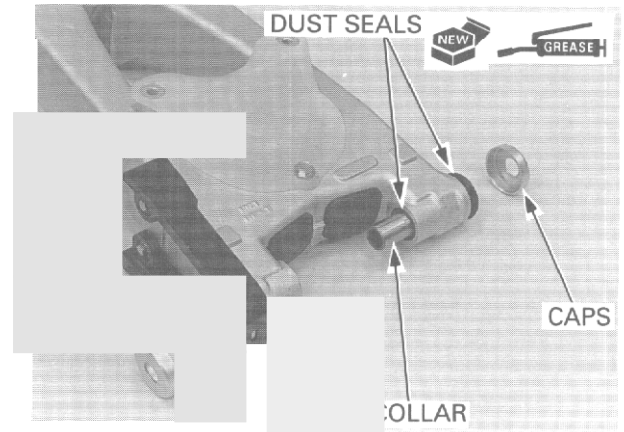
### INSTALLATION

Install the following if they are removed:

- under cover with the bolt
- chain slider with the bolts and collars

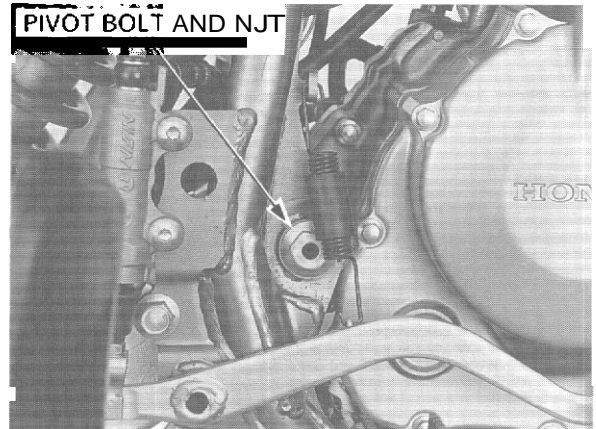
*Install the slider with the wear limit groove facing up, aligning its slit with the lug.*

Pack grease into new outer dust seal lip cavities. Install the outer dust seals onto the swingarm pivots and the seal caps over the dust seal securely.



Set the swingarm into the frame, take care to prevent removing the dust seal caps, and install the pivot bolt from the right side. Install the pivot nut and tighten it.

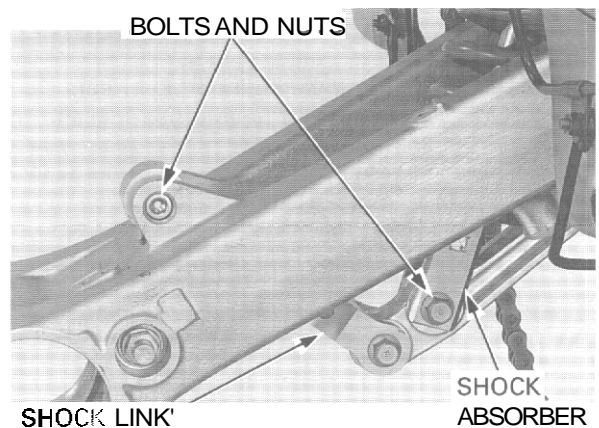
**TORQUE: 108N·m (11.0 kgf·m, 80 lbf·ft)**



Connect the shock link to the swingarm and the shock absorber to the shock arm by inserting the pivot bolts from the right side. Install the nuts and tighten them.

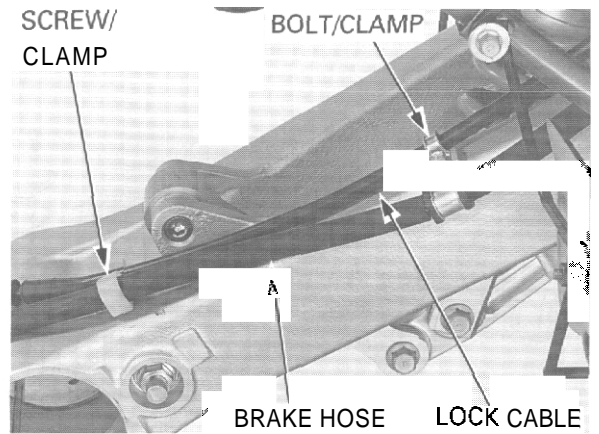
### TORQUE:

- Shock link-to-swingarm:  
**44 N·m (4.5kgf·m, 33 lbf·ft)**
- Shock absorber mounting:  
**59 N·m (6.0 kgf·m, 43 lbf·ft)**

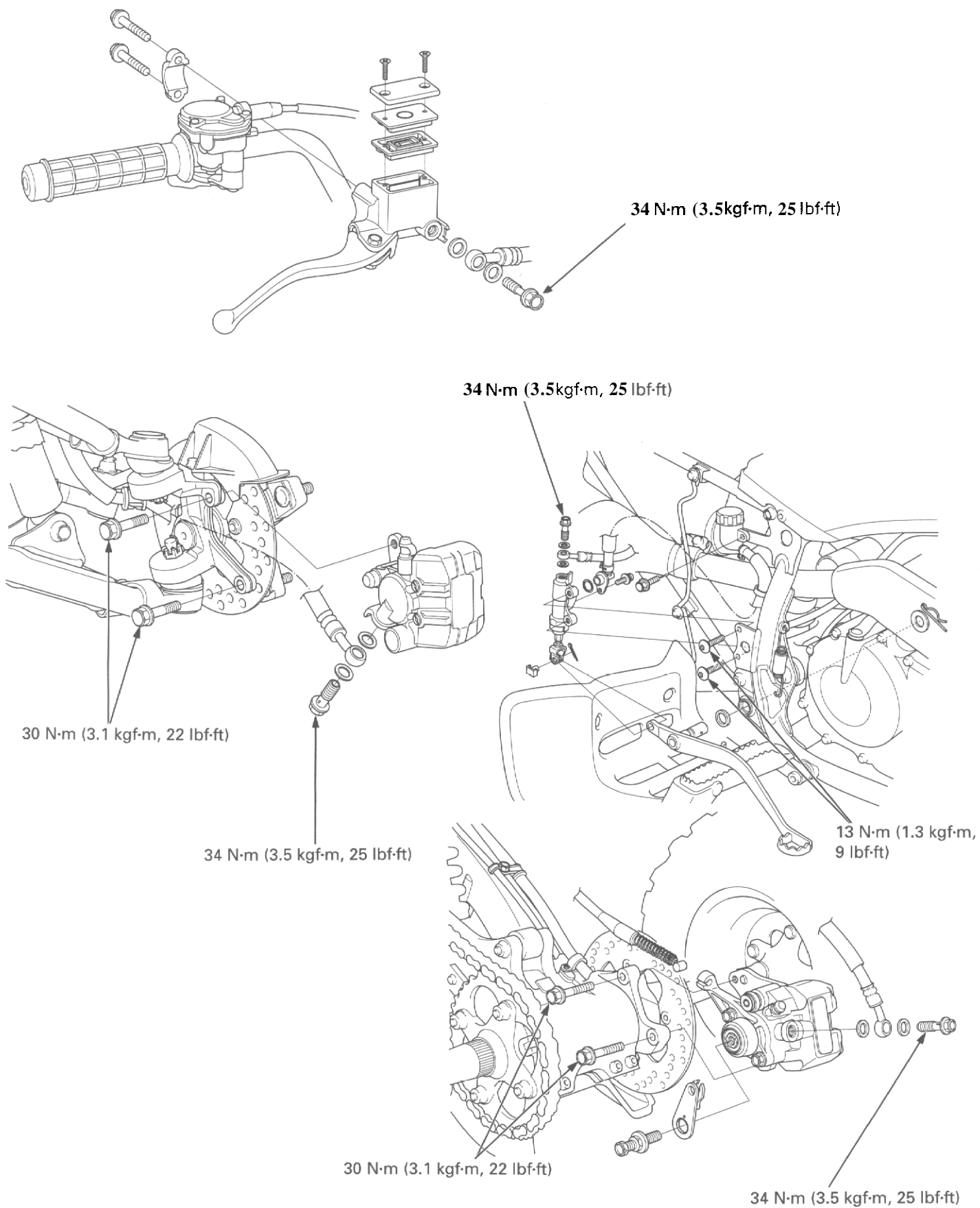


Install the brake hose/cable clamp with the bolt to secure the brake lock cable.  
Install the brake hose clamp with the screw.

Install the rear axle (page 13-6).



# HYDRAULIC DISC BRAKE



# 14. HYDRAULIC DISC BRAKE

SERVICE INFORMATION	14-1	FRONT BRAKE CALIPER	14-10
TROUBLESHOOTING	14-2	REAR MASTER CYLINDER	14-13
BRAKE FLUID REPLACEMENT/ AIR BLEEDING	14-3	REAR BRAKE CALIPER	14-16
BRAKE PAD/DISC	14-5	BRAKE PEDAL	14-20
FRONT MASTER CYLINDER	14-7		

## 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.

ITEM	STANDARD	SERVICE LIMIT
Recommended brake fluid	DOT 4 brake fluid	—
Brake disc thickness	Front	2.8 – 3.2 (0.11 – 0.13)
	Rear	3.8 – 4.2 (0.15 – 0.17)
Brake disc runout	—	0.30 (0.012)
Master cylinder I.D.	12.700–12.743 (0.5000 – 0.5017)	12.75(0.502)
Master piston O.D.	12.657– 12.684 (0.4983– 0.4994)	12.65(0.498)
Caliper cylinder I.D.	33.960–34.010 (1.3370 – 1.3390)	34.02(1.340)
Caliper piston O.D.	33.895– 33.928 (1.3344–1.3357)	33.87(1.333)

14

Caliper bleed valve	6 N·m (0.6 kgf·m, 4.3 lbf·ft)	
Front brake caliper pad pin plug	3 N·m (0.3 kgf·m, 2.2 lbf·ft)	
Front brake caliper pad pin	18 N·m (1.8 kgf·m, 13 lbf·ft)	
Rear brake caliper 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)	
Brake pipe joint nut	17 N·m (1.7 kgf·m, 12 lbf·ft)	
Front brake lever pivot bolt	6 N·m (0.6 kgf·m, 4.3 lbf·ft)	
nut	6 N·m (0.6 kgf·m, 4.3 lbf·ft)	
Rear master cylinder mounting bolt	13 N·m (1.3 kgf·m, 9 lbf·ft)	ALOC bolt
Rear master cylinder reservoir hose joint screw	2 N·m (0.2 kgf·m, 1.4 lbf·ft)	Apply locking agent to the threads
Front brake caliper slide pin	23 N·m (2.3 kgf·m, 17 lbf·ft)	
Front brake caliper bracket pin	18 N·m (1.8 kgf·m, 13 lbf·ft)	
Front brake caliper mounting bolt	30 N·m (3.1 kgf·m, 22 lbf·ft)	ALOC bolt
Rear brake caliper slide pin	23 N·m (2.3 kgf·m, 17 lbf·ft)	
Rear brake caliper bracket pin	18 N·m (1.8 kgf·m, 13 lbf·ft)	Apply locking agent to the threads
Rear brake caliper mounting bolt	30 N·m (3.1 kgf·m, 22 lbf·ft)	ALOC bolt
Rear brake caliper parking brake base bolt	23 N·m (2.3 kgf·m, 17 lbf·ft)	Apply locking agent to the threads

## HYDRAULIC DISC BRAKE

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### TOOL

Snap ring pliers

07914– SA50001

### 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 grab or pull one side

- Misaligned disc or wheel
- Contaminated brake pad/disc
- Warped/deformed brake disc
- Caliper not sliding properly

Brake drag

- Contaminated brake pad/disc
- Badly worn brake pad/disc
- Warped/deformed brake disc
- Caliper not sliding properly
- Clogged/restricted fluid passage
- Sticking caliper piston
- Misaligned disc

## 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.

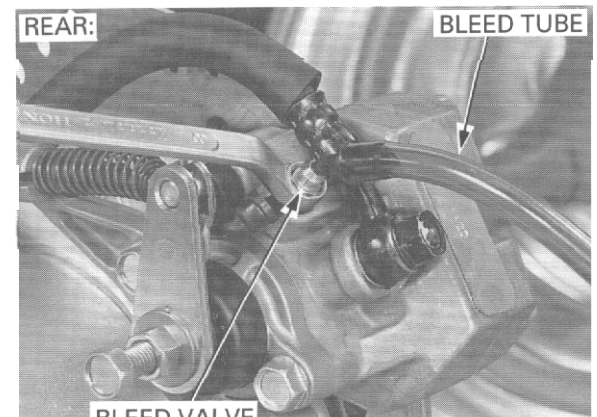
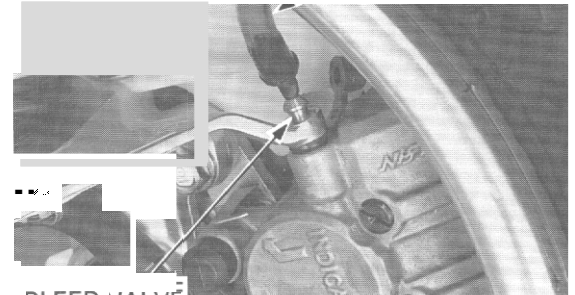
### CAUTION

- 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 3-14 for front, page 3-15 for rear).

Connect the bleed tube 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.



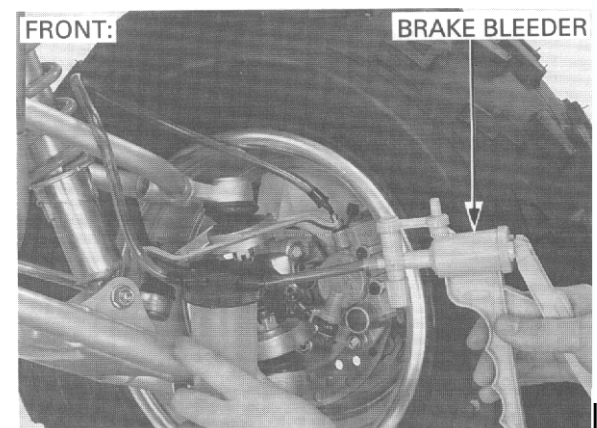
### BRAKE FLUID FILLING/BLEEDING

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.



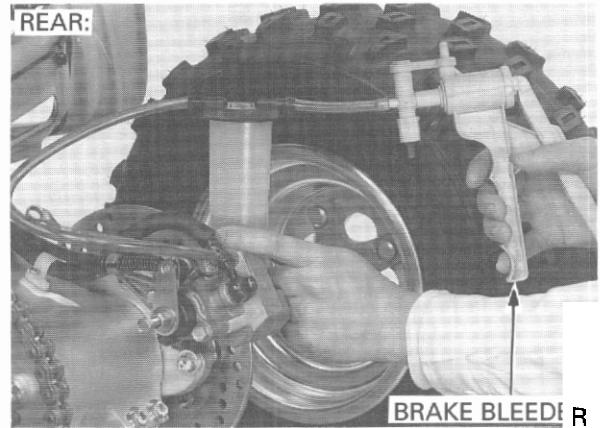
## HYDRAULIC DISC BRAKE

Repeat the previous procedures until air bubbles do not appear in the bleed tube.

### NOTE:

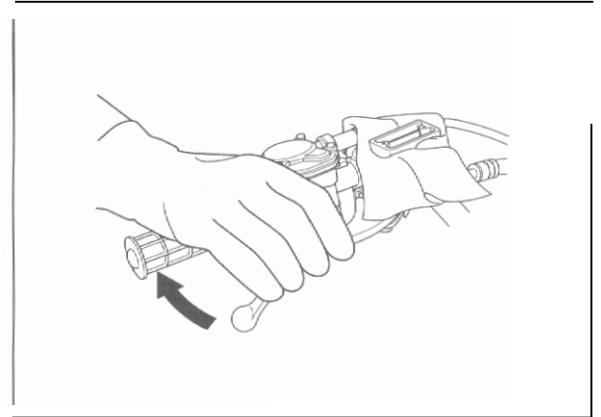
If air is entering the bleeder from around the bleed valve threads, seal the threads with teflon tape.

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 tube to the bleed valve and bleed the system as follows:

1. Squeeze the brake lever or depress the brake pedal, open the bleed valve 1/4 turn and then close it.

### NOTE:

Do not release the brake lever or pedal 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.

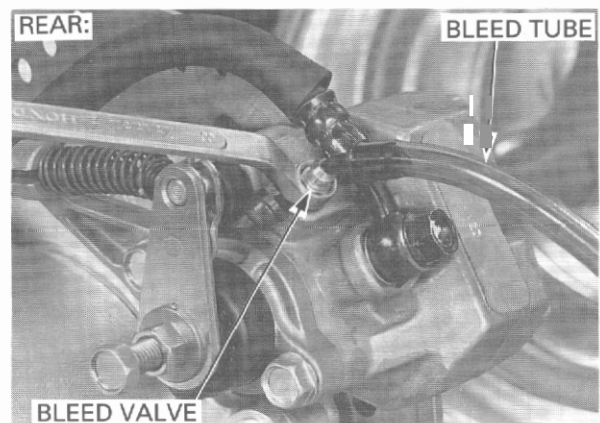
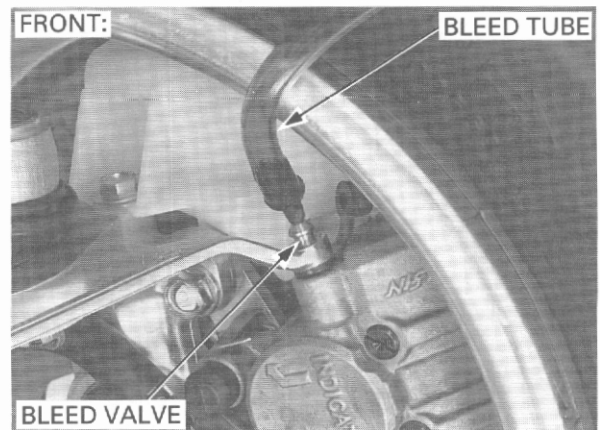
Repeat the steps 1 and 2 until air bubbles do not appear in the bleed tube.

Tighten the bleed valve.

**TORQUE: 6 N·m 10.6kgf·m, 43 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 3-14 for front, page 3-15 for rear).



## BRAKE PAD/DISC

### FRONT BRAKE PAD REPLACEMENT

*Always replace the brake pads in pairs to ensure even disc pressure.*

Remove the front wheel (page 12-6).

Remove the pad pin plugs and loosen the pad pins. Release the brake hose from the clamp. Remove the mounting bolts and front brake caliper.

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.

Pull the pad pins out of the caliper body while pushing in the pads against the pad spring. Remove the brake pads.

Make sure that the pad spring is in position as shown. Install new brake pads into the caliper body with the shim facing toward the piston. Install the pad pins by pushing in the pads against the pad spring to align the pad pin holes in the pads and caliper body.

Install the front brake caliper so the disc is positioned between the pads, being careful not to damage the pads. Install new mounting bolts and tighten them.

**TORQUE: 30 N·m (3.1 kgf·m, 22 lbf·ft)**

Secure the brake hose with the clamp.

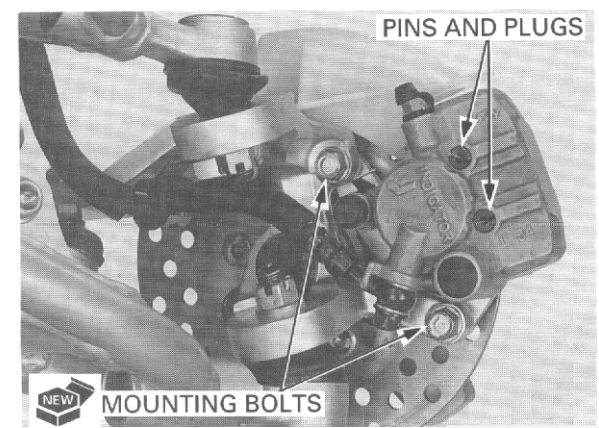
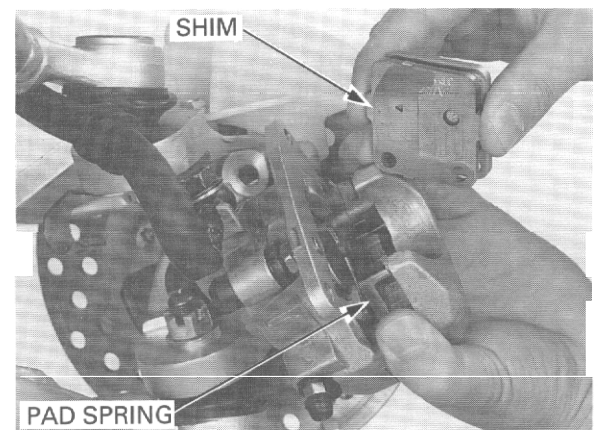
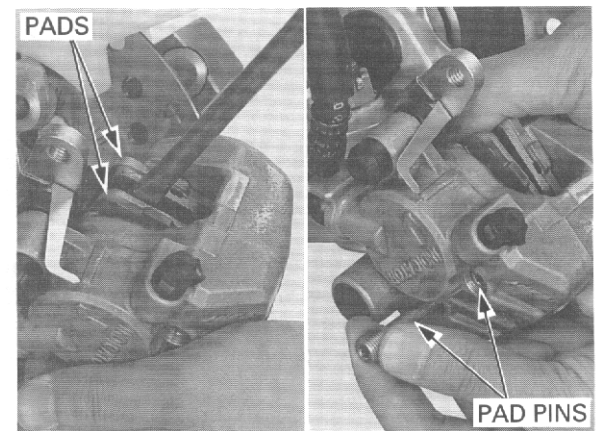
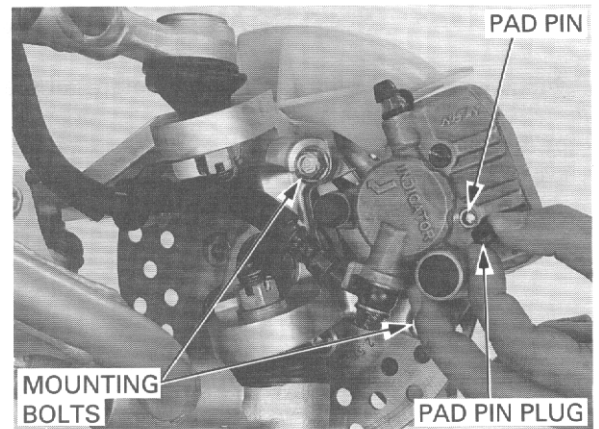
Tighten the pad pins.

**TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)**

Install the pad pin plugs and tighten them.

**TORQUE 3 N·m 10.3 kgf·m, 2.2 lbf·ft)**

Operate the brake lever to seat the caliper piston against the pads.





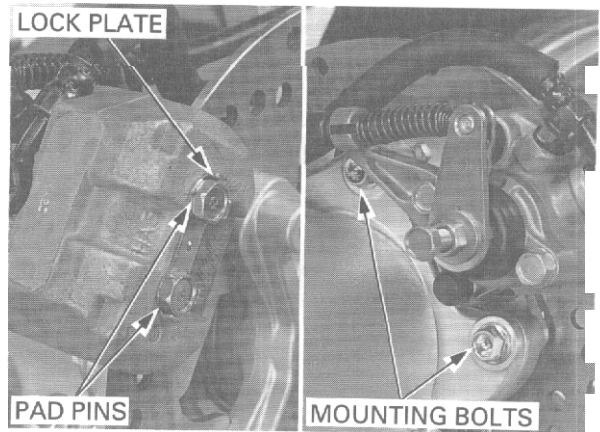
## HYDRAULIC DISC BRAKE

### REAR BRAKE PAD REPLACEMENT

*Always replace the brake pads in pairs to ensure even disc pressure.*

Straighten the lock plate tabs and loosen the pad pins.

Remove the mounting bolts and rear brake caliper.



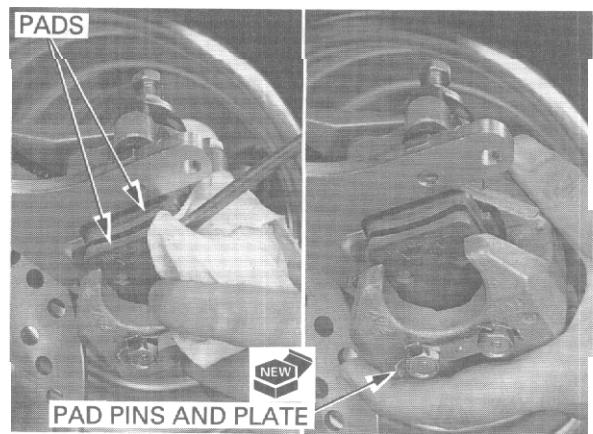
Push the caliper piston all the way in to allow installation of new brake pads.

#### NOTE:

Check the brake fluid level in the brake reservoir as this operation causes the level to rise.

Pull the pad pins out of the caliper body with the lock plate while pushing in the pads against the pad spring.

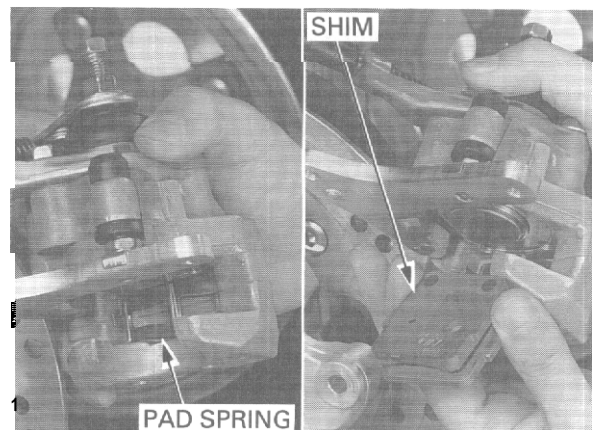
Remove the brake pads.



Make sure that the pad spring is in position as shown.

Install new brake pads into the caliper body with the shim facing toward the piston.

Install the pad pins with a new lock plate by pushing in the pads against the pad spring to align the pad pin holes in the pads and caliper body.



Install the rear brake caliper so the disc is positioned between the pads, being careful not to damage the pads.

Install new mounting bolts and tighten them.

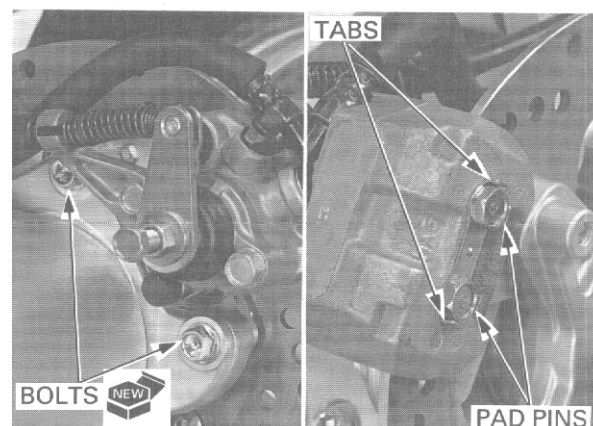
**TORQUE: 30 N·m (3.1 kgf·m, 22 lbf·ft)**

Tighten the pad pins.

**TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)**

Bend up the lock plate tabs against the pad pins.

Operate the brake pedal to seat the caliper piston against the pads.

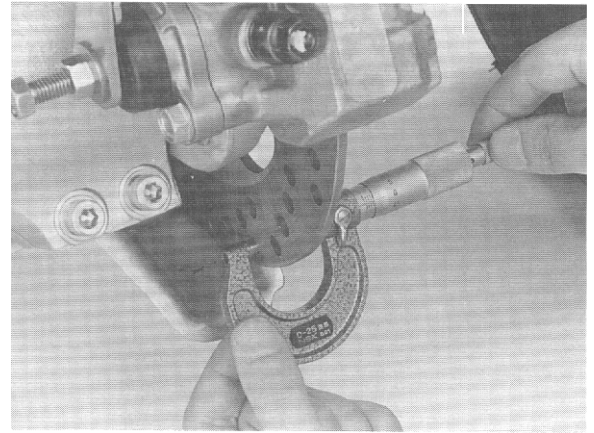


## BRAKE DISC INSPECTION

Visually inspect the disc for damage or cracks.  
Measure the brake disc thickness at several points.

**SERVICE LIMIT** *Front: 2.5 mm (0.10 in)*  
*Rear: 3.5 mm (0.14 in)*

Replace the brake disc if the smallest measurement is less than service limit.

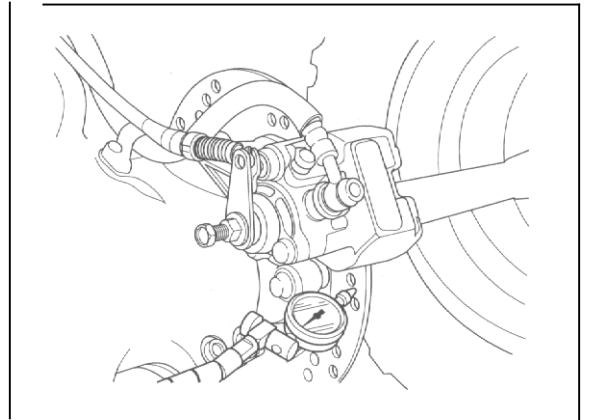


Check the brake disc for warpage.

**SERVICE LIMIT** *0.30 mm (0.012 in)*

Check the bearing for excessive play, if the warpage exceeds the service limit.

Replace the brake disc if the bearings are normal.



## FRONT MASTER CYLINDER

### CAUTION:

- *Avoid spilling fluid on painted, plastic or rubber park. 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

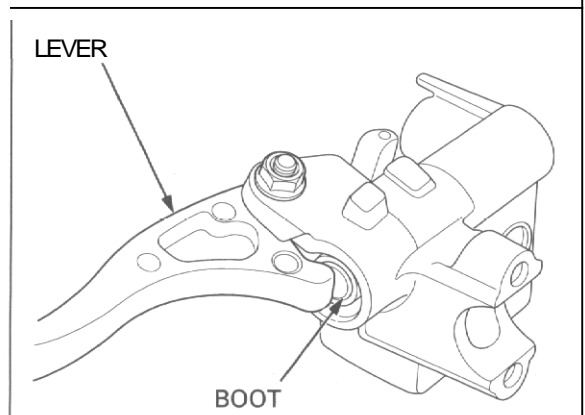
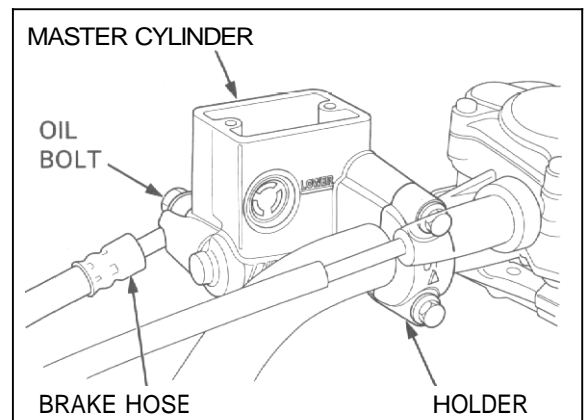
Drain the brake fluid from the front brake hydraulic system (page 14-3).

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.

Remove the following:

- pivot nut, bolt and brake lever
- piston boot



## HYDRAULIC DISC BRAKE

— snap ring

### TOOL

**Snap ring pliers**

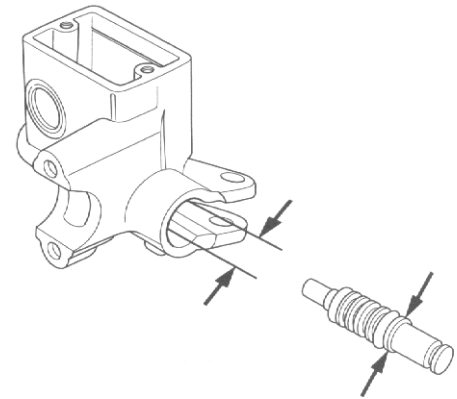
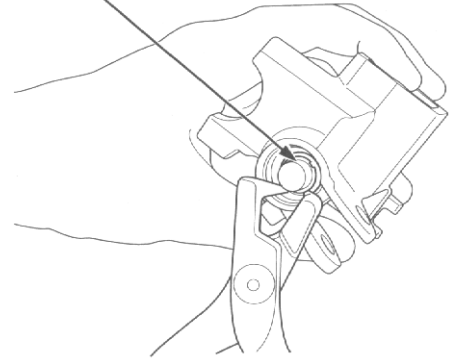
**07914 - SA50001**

— master piston

— spring

Clean the master cylinder, reservoir and master piston in clean brake fluid.

SNAP RING



## 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.

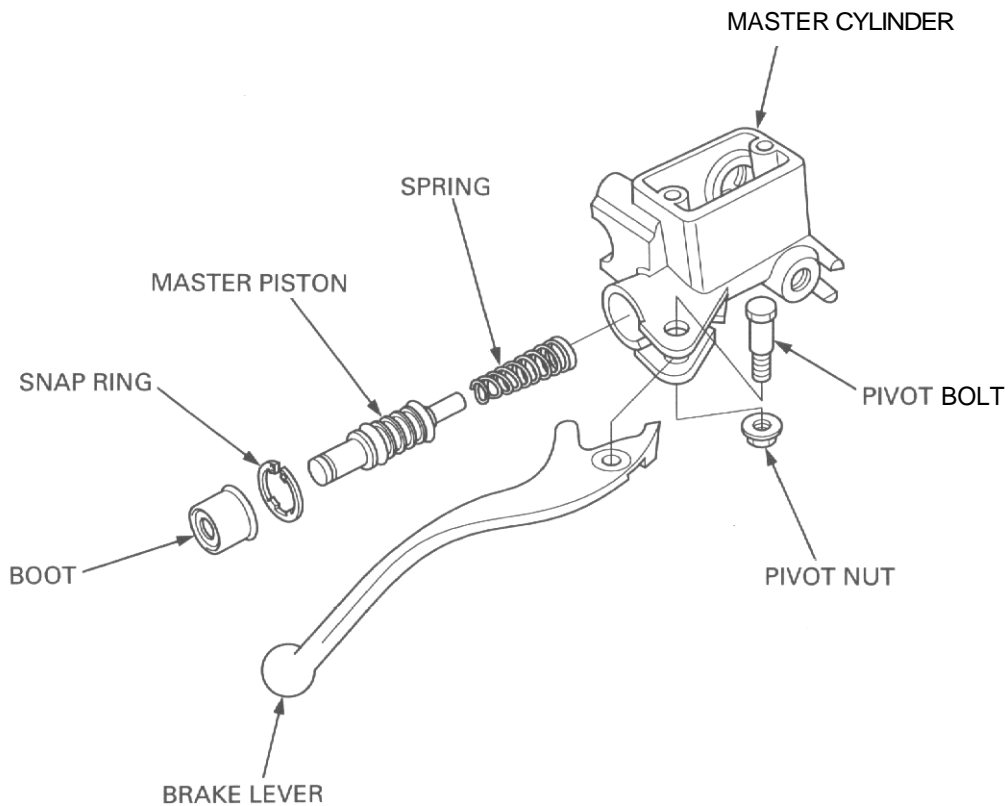
Measure the master cylinder I.D.

**SERVICE LIMIT 12.75 mm (0.502 in)**

Measure the master piston O.D.

**SERVICE LIMIT: 12.65 mm (0.498 in)**

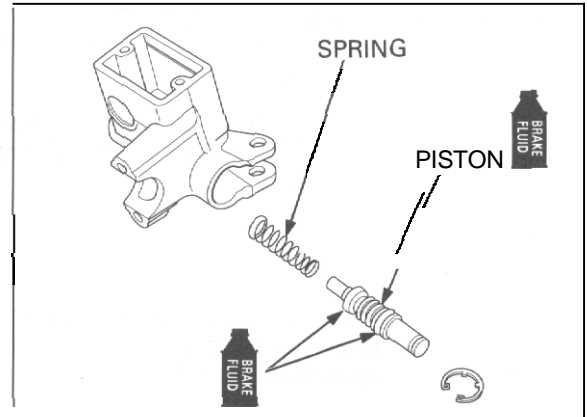
## ASSEMBLY



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.*



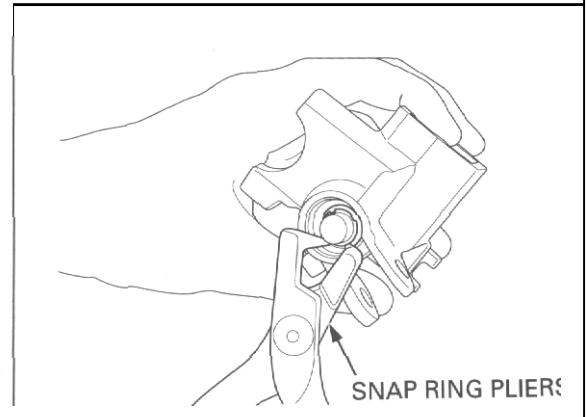
Install the snap ring into the groove in the master cylinder, using the special tool.

**TOOL**

**Snap ring pliers** **07914 - SA50001**

**CAUTION:**

*Be certain the snap ring is firmly seated in the groove.*



Install the boot into the master cylinder and the groove in the piston.

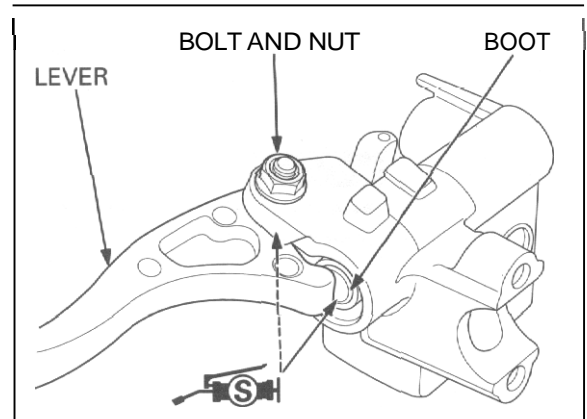
Apply silicone grease to the brake lever contacting surface of the piston.

Apply silicone grease to the brake lever pivot.  
 Install the brake lever and pivot bolt, and tighten it.

**TORQUE: 6 N·m (0.6 kgf·m, 4.3 lbf·ft)**

Install the pivot nut and tighten it.

**TORQUE: 6 N·m (0.6 kgf·m, 4.3 lbf·ft)**



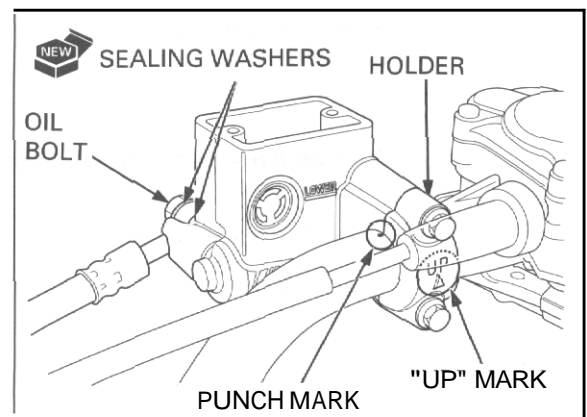
Install the master cylinder and holder with the "UP" mark facing up.

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 brake hose to the master cylinder with the oil bolt and new sealing washers by aligning the hose joint with the stopper groove.  
 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).



## 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

Remove the front wheel (page 12-6).  
Drain the brake fluid from the front brake hydraulic system (page 14-3).

Disconnect the brake hose from the front brake caliper by removing the oil bolt and sealing washers. Remove the dust plug and loosen the caliper slide pin.

Remove the brake pads (page 14-5).

Loosen the slide pin and remove the following:

- caliper bracket and washer
- pad spring
- slide pin and boots

Place the 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

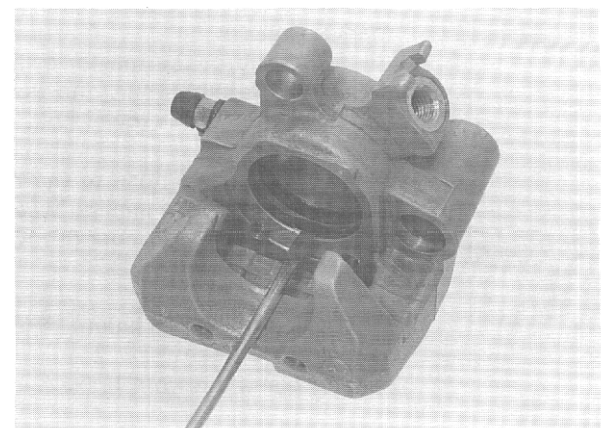
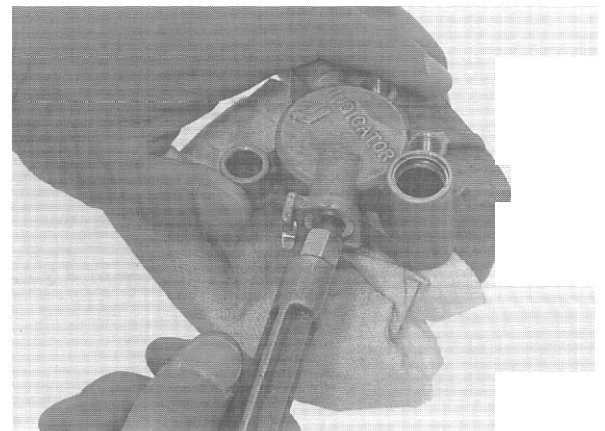
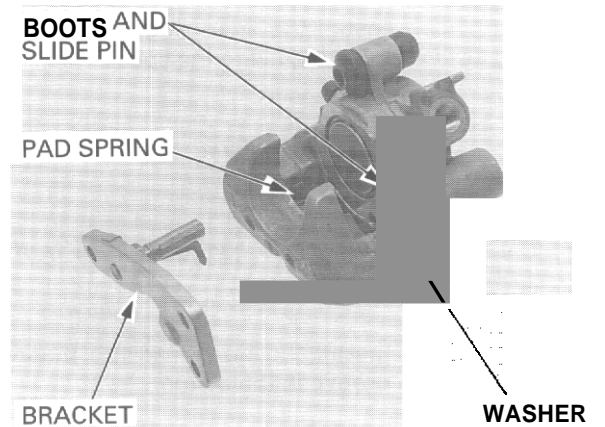
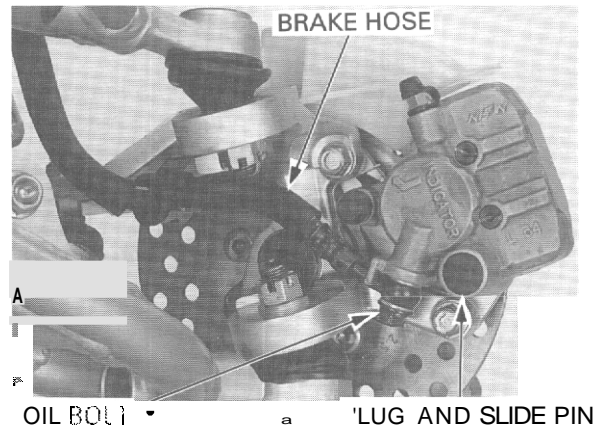
*Do not use high pressure air or bring the nozzle too close to the inlet.*

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**

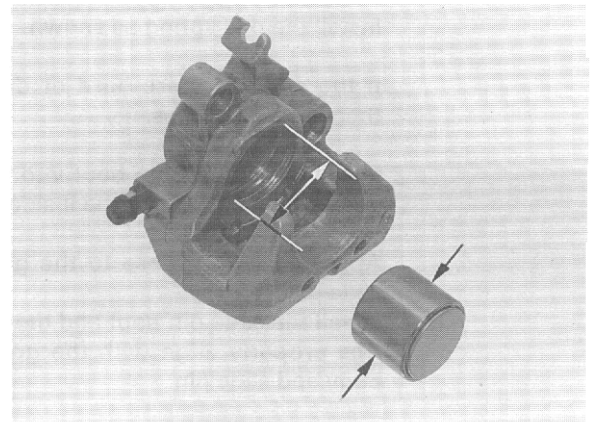
Check the caliper cylinder and piston for scoring, scratches or damage.

Measure the caliper cylinder I.D.

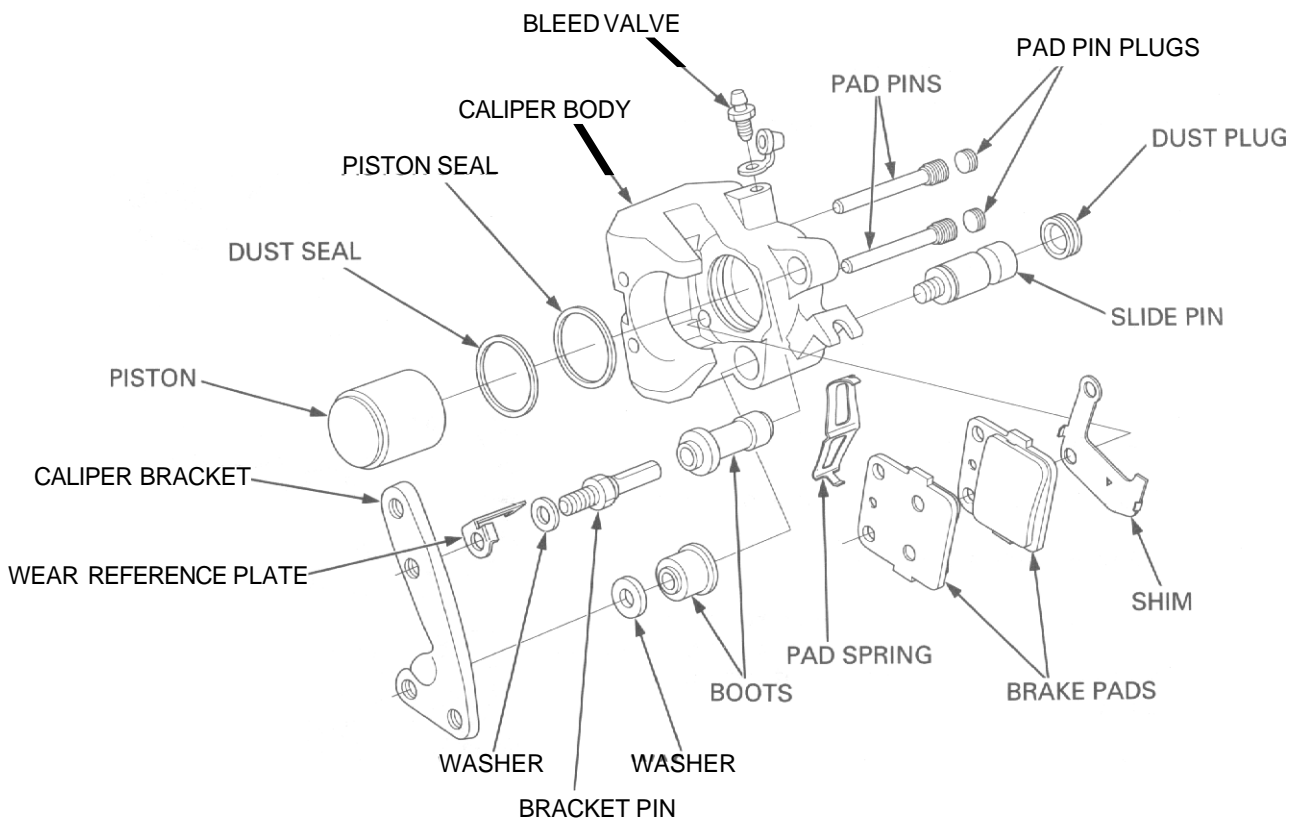
**SERVICE LIMIT: 34.02 mm (1.340 in)**

Measure the caliper piston O.D.

**SERVICE LIMIT 33.87 mm (1.333 in)**

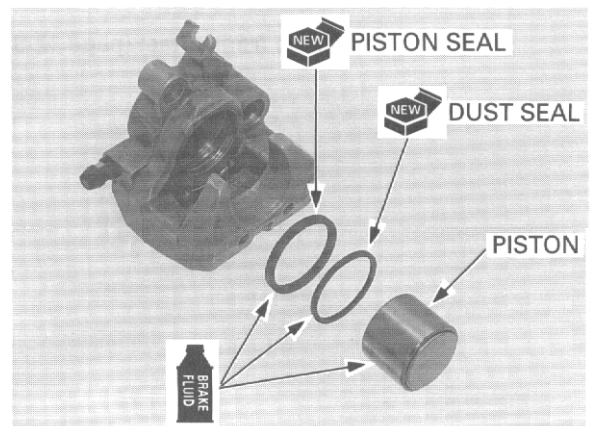


**ASSEMBLY**



Coat new piston seal and dust seal with clean brake fluid and install them into 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 caliper body.



## HYDRAULIC DISC BRAKE

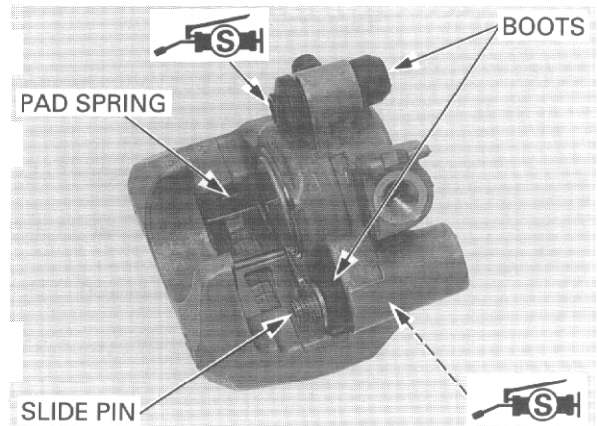
Install the pad spring as shown.

If the pin boots are hard or deteriorated, replace them with new ones.

Install the bracket pin boot into the caliper body and pack silicone grease to the inside of the boot.

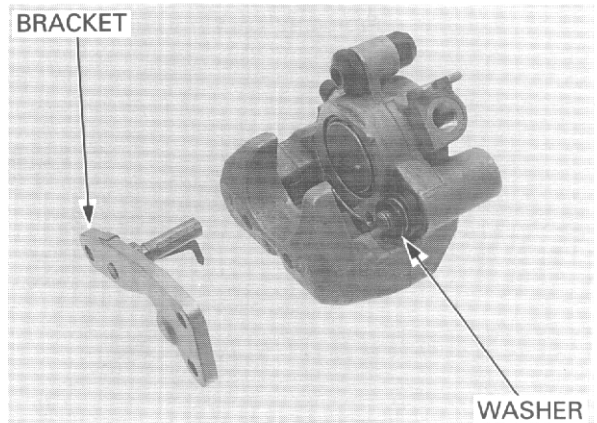
Apply silicone grease to the grease groove in the slide pin.

Install the slide pin boot and the slide pin so the boot ribs properly align with the grooves in the caliper body and slide pin.



Install the caliper bracket over the caliper body with the spring washer (between the slide pin and bracket) and thread the slide pin into the bracket, being careful not to damage the pin boot.

Make sure that the boots are seated securely into the pin grooves.



Install the brake pads (page 14-5).

Tighten the slide pin and install the dust plug.

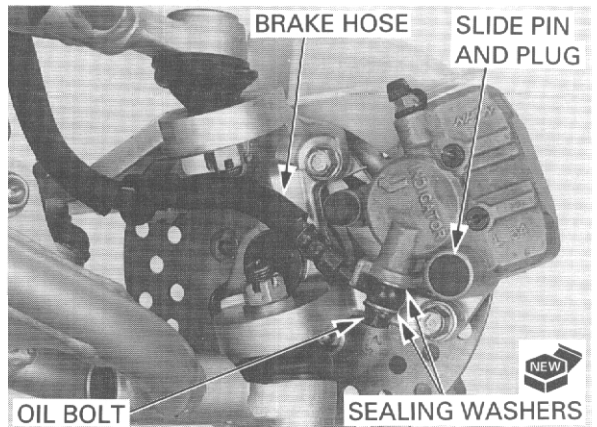
**TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)**

Connect the brake hose to the brake caliper with the oil bolt and new sealing washers, and tighten the oil bolt by aligning the hose joint with the stopper groove.

**TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)**

Fill and bleed the front brake hydraulic system (page 14-3).

Install the front wheel (page 12-9).





## REAR 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 rear brake hydraulic system (page 14-3).

Disconnect the push rod from the brake pedal by removing the cotter pin and joint pin.

Disconnect the brake hose from the master cylinder by removing the oil bolt and sealing washers.

Remove the master cylinder mounting bolts.

Disconnect the reservoir hose joint from the master cylinder by removing the joint screw.  
Remove the O-ring.

Remove the boot from the master cylinder.  
Remove the snap ring and push rod using the special tool.

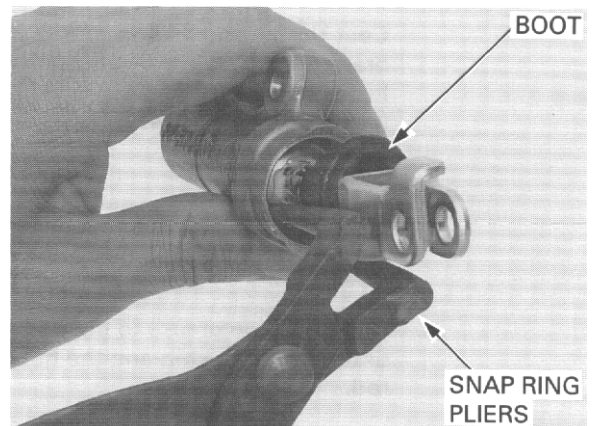
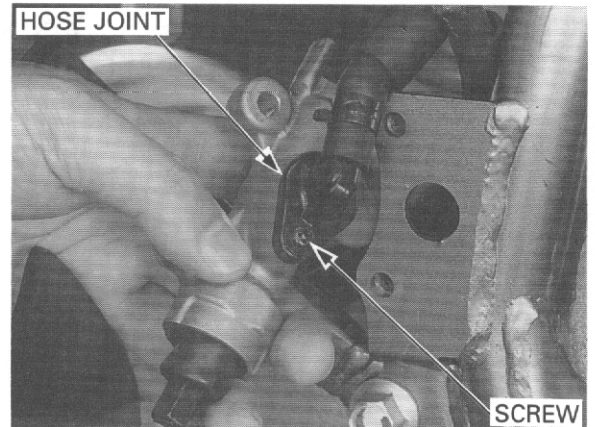
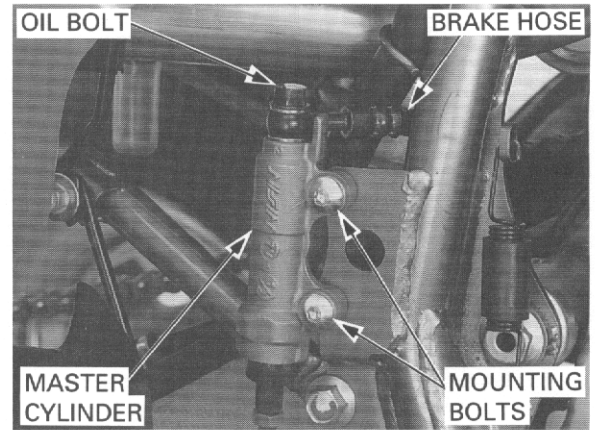
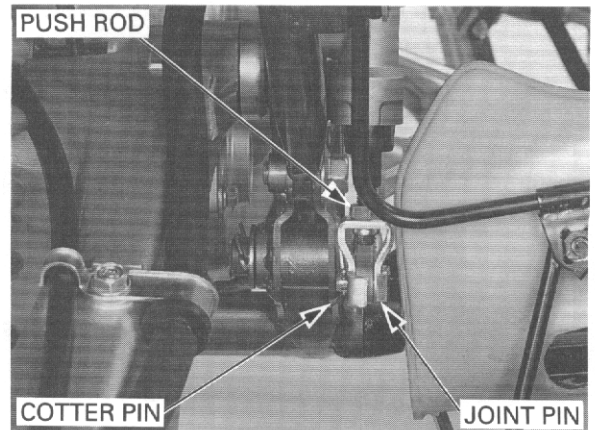
**TOOL**

**Snap ring pliers**

**07914 - SA50001**

Remove the master piston and spring.

Clean the master cylinder and master piston in clean brake fluid.





# HYDRAULIC DISC BRAKE

## 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.

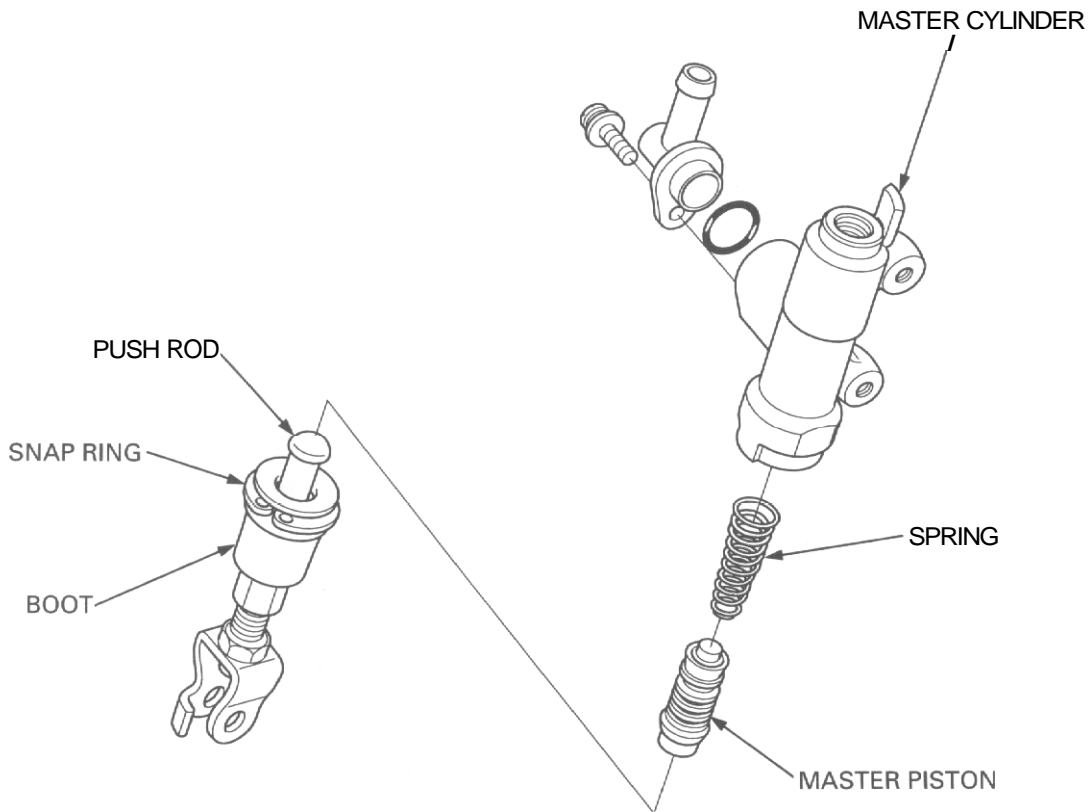
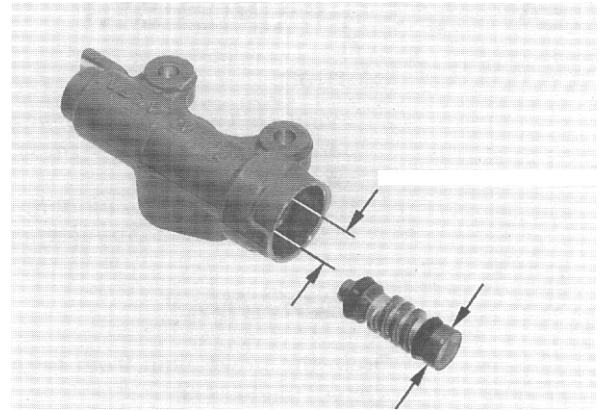
Measure the master cylinder I.D.

**SERVICE LIMIT 12.75 mm 10.502 in)**

Measure the master piston O.D.

**SERVICE LIMIT 12.65 mm 10.498 in)**

## ASSEMBLY



Coat the master piston and piston cups with clean brake fluid

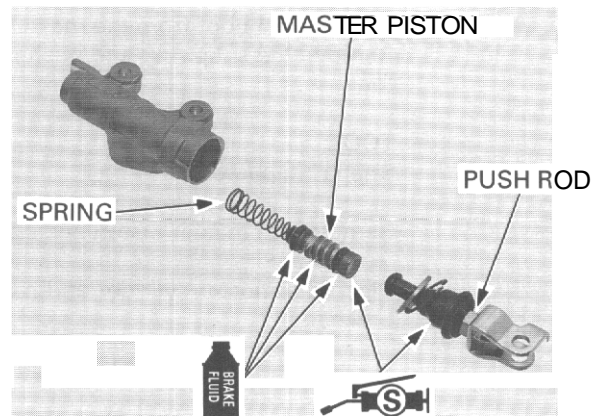
Install the spring onto the master piston.

Install the spring and master piston into the master cylinder.

### CAUTION:

***Do not allow the piston cup lips to turn inside out.***

Apply silicone grease to the push rod contacting area of the master piston and the boot groove in the push rod.



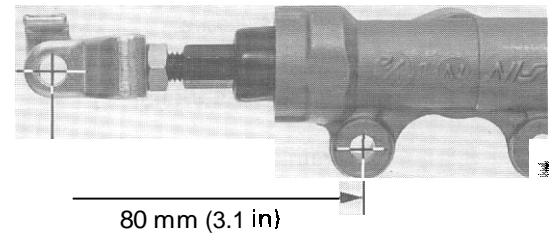
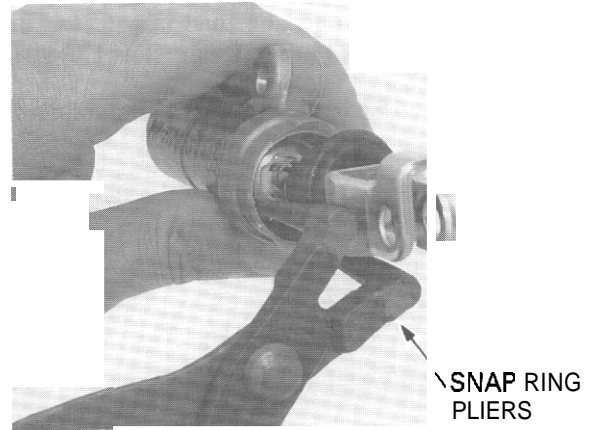
Install the push rod into the master cylinder and the snap ring into the groove in the master cylinder, using the special tool.

TOOL  
Snap ring *pliers* **07914 - SA50001**

**CAUTION:**  
*Be certain the snap ring is firmly seated in the groove.*

Install the piston boot into the master cylinder and the groove in the push rod.

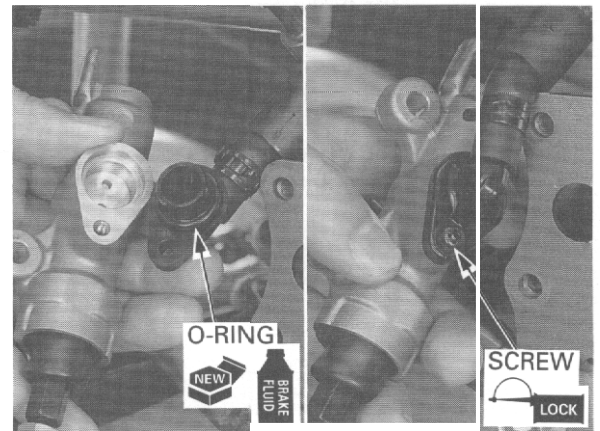
If the push rod joint is reinstalled, adjust the push rod length so that the distance from the center of the master cylinder lower mounting hole to the center of the joint pin hole is 80 mm (3.1 in).  
Tighten the lock nut.  
Adjust the brake pedal height if necessary (page 3-16).



Coat a new O-ring with brake fluid and install it onto the hose joint

Apply locking agent to the joint screw threads.  
Connect the reservoir hose joint to the master cylinder and secure it with the joint screw.

**TORQUE: 2 N·m (0.2 kgf·m, 1.4 lbf·ft)**

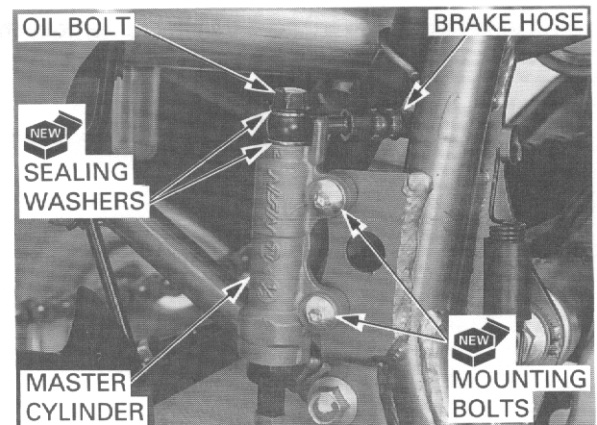


Install the master cylinder with new mounting bolts and tighten them.

**TORQUE 13 N·m 11.3 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.

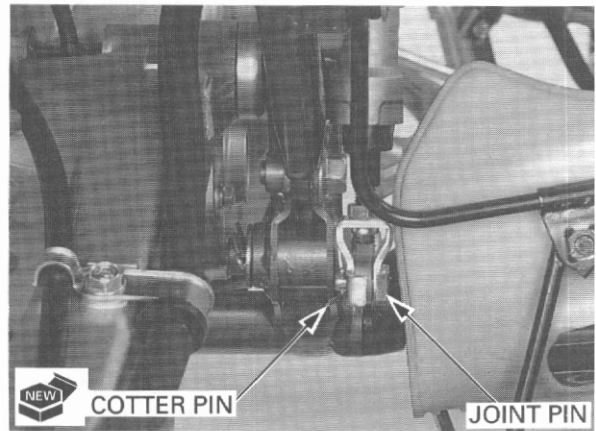
**TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)**



## HYDRAULIC DISC BRAKE

Connect the push rod to the brake pedal with the joint pin and secure it with a new cotter pin.

Fill and bleed the rear hydraulic system (page 14-3).



## REAR BRAKE CALIPER

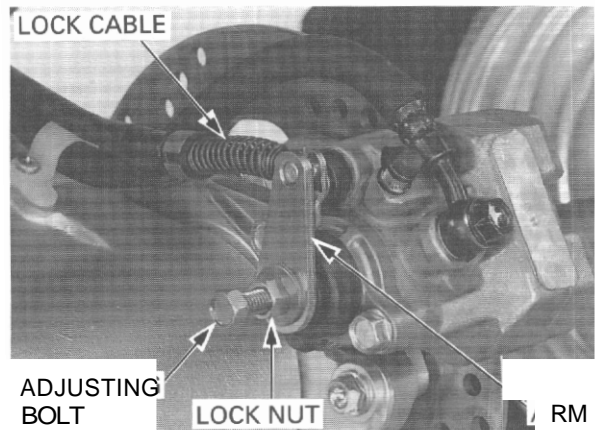
### CAUTION:

*Avoid spilling fluid on painted, plastic or rubber parts. Place a rag over these parts whenever the system is serviced.*

### DISASSEMBLY

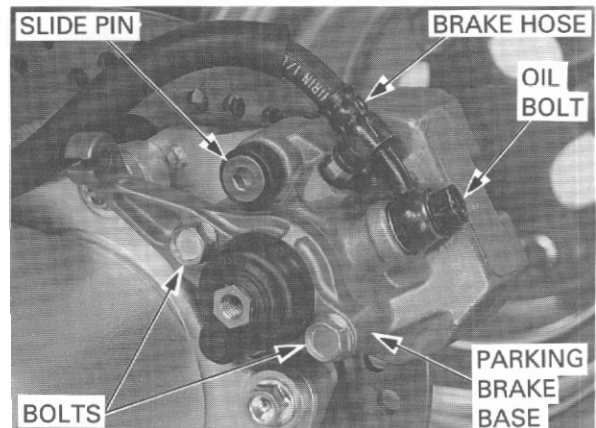
Drain the brake fluid from the rear brake hydraulic system (page 14-3).

Loosen the lock nut and remove the adjusting bolt and brake arm. Disconnect the brake lock cable from the brake arm and remove it from the cable stay.



Remove the two bolts and parking brake base. Remove the O-ring.

Disconnect the brake hose from the rear brake caliper by removing the oil bolt and sealing washers.

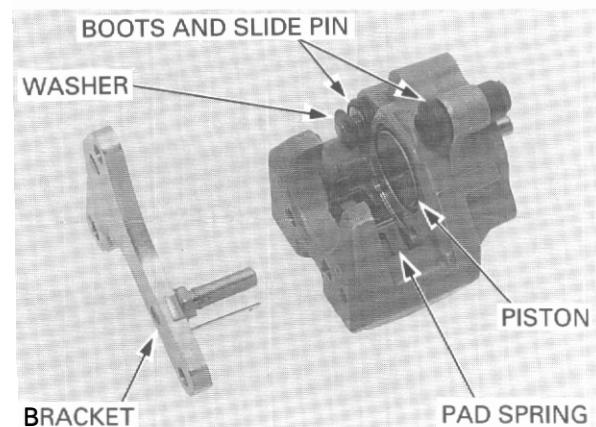


Loosen the caliper slide pin,

Remove the brake pads (page 14-6).

Loosen the slide pin and remove the following:

- caliper bracket and washer
- pad spring
- slide pin and boots
- caliper piston



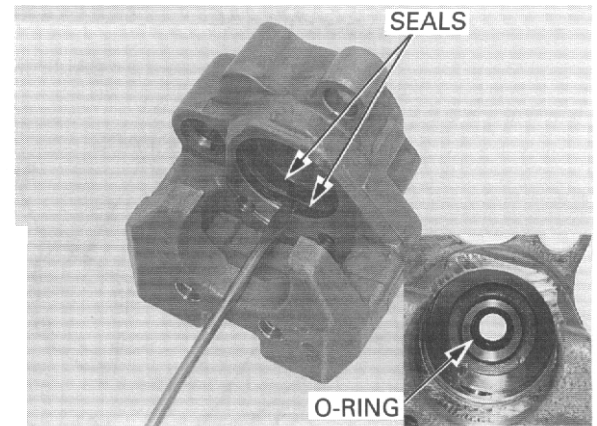
**CAUTION:**

***Be careful not to damage the piston sliding surface.***

Push the dust seal and piston seal in and lift them out.

Remove the O-ring.

Clean the seal grooves, caliper cylinder and piston with clean brake fluid.

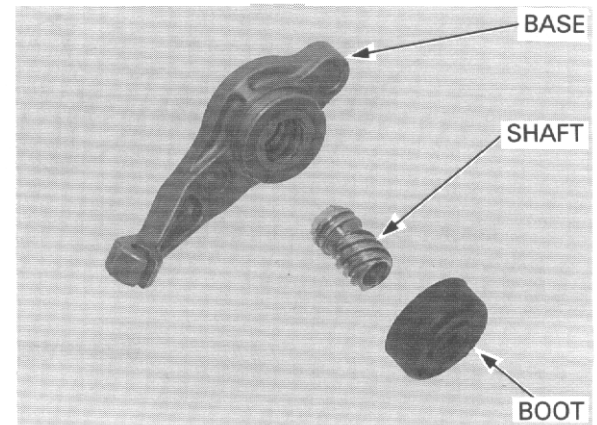


**INSPECTION**

**CABLE LOCK BRAKE**

Remove the shaft boot and the brake shaft.

Check the shaft and base threads for wear or damage.



**HYDRAULIC BRAKE**

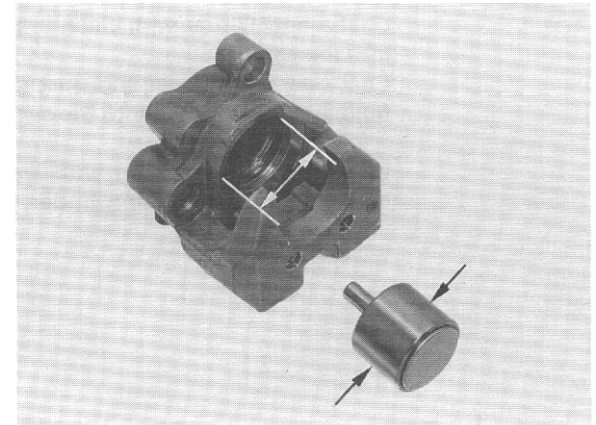
Check the caliper cylinder and piston for scoring, scratches or damage.

Measure the caliper cylinder I.D.

**SERVICE LIMIT 34.02 mm (1.340 in)**

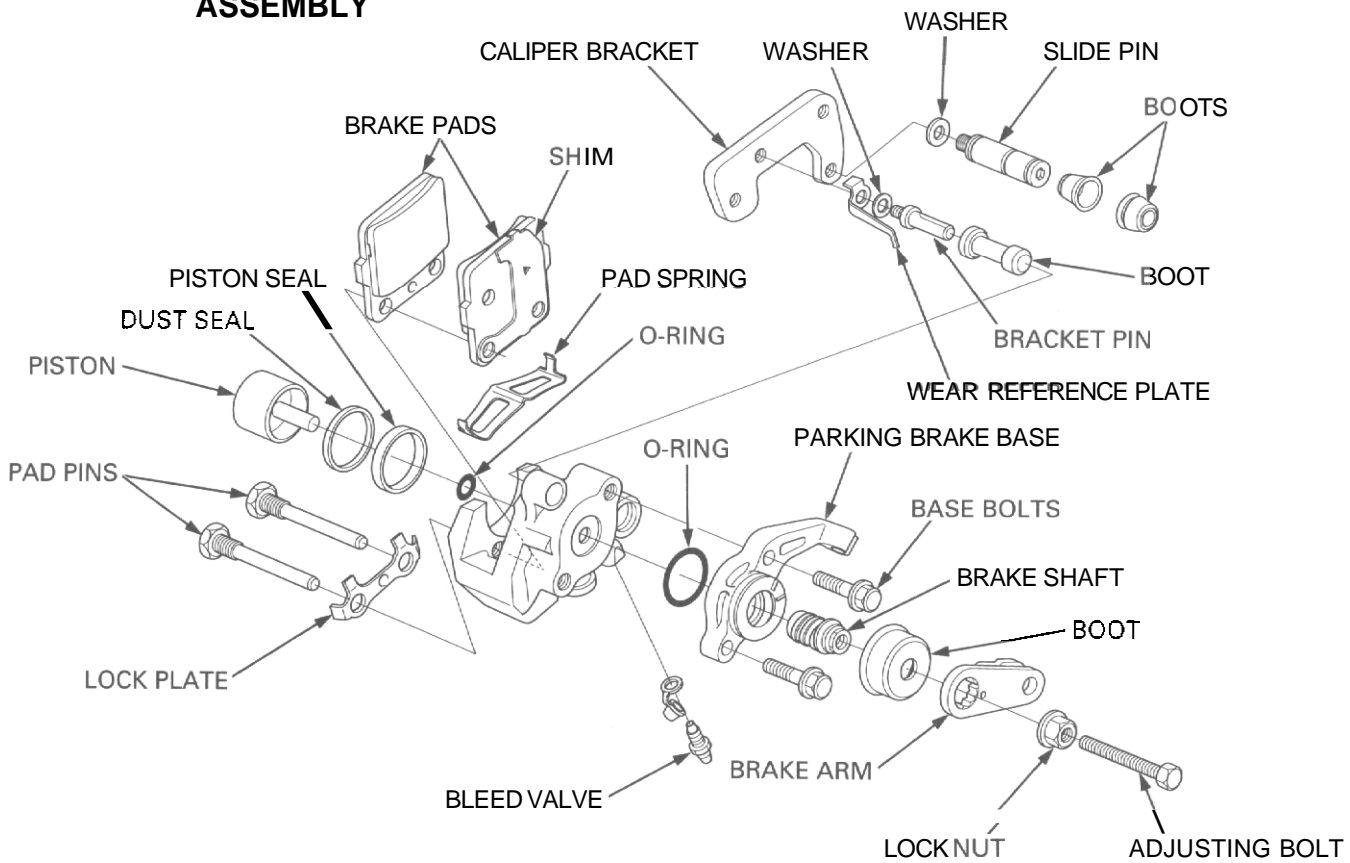
Measure the caliper piston O.D.

**SERVICE LIMIT 33.87 mm (1.333 in)**



# HYDRAULIC DISC BRAKE

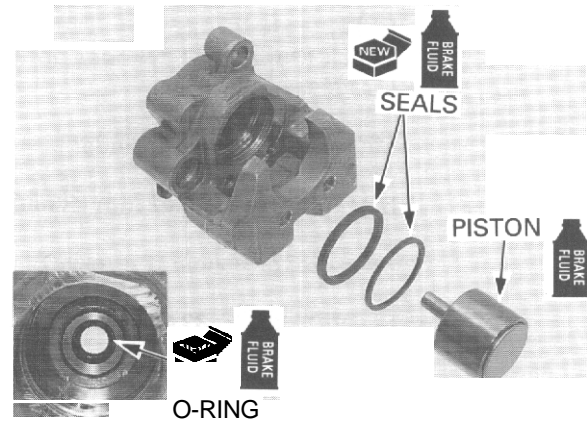
## ASSEMBLY



Coat a new O-ring with clean brake fluid and install it into the caliper.

Coat new piston seal and dust seal with clean brake fluid and install them into the seal grooves.

Coat the caliper piston with clean brake fluid and install it into the caliper cylinder.



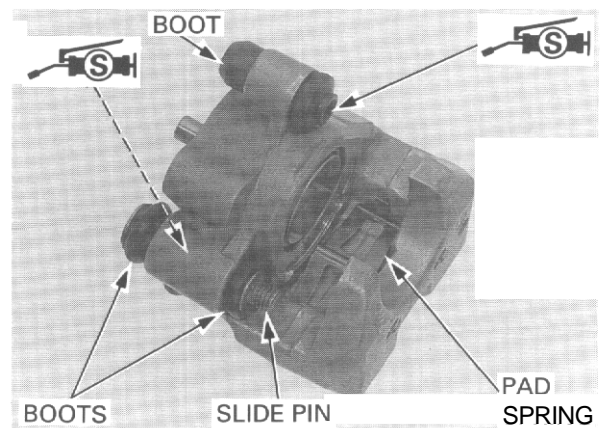
Install the pad spring as shown.

If the pin boots are hard or deteriorated, replace them with new ones.

Install the bracket pin boot into the caliper body and pack silicone grease to the inside of the boot.

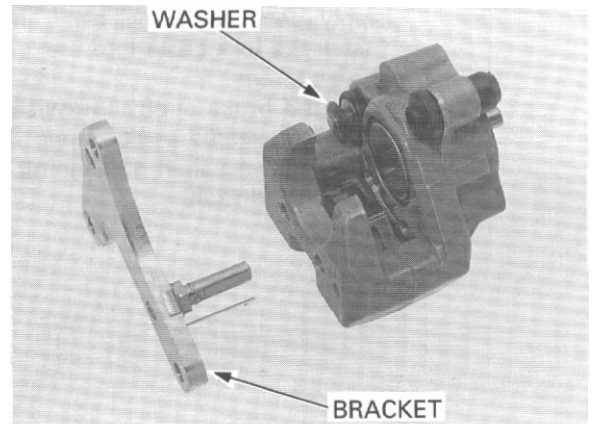
Apply silicone grease to the grease groove in the slide pin.

Install the slide pin boots and the slide pin so the boot ribs properly align with the grooves in the caliper body and slide pin.



Install the caliper bracket over the caliper body with the spring washer (between the slide pin and bracket) and thread the slide pin into the bracket, being careful not to damage the pin boot.

Make sure that the boots are seated securely into the pin grooves.



Install the brake pads (page 14-6).

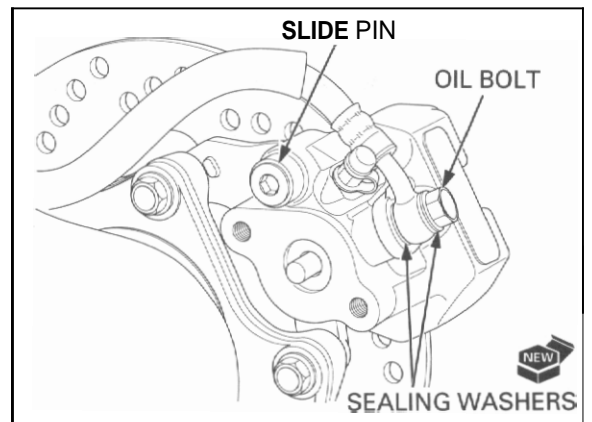
Tighten the slide pin.

**TORQUE 23 N·m (2.3 kgf·m, 17 lbf·ft)**

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 14-3).



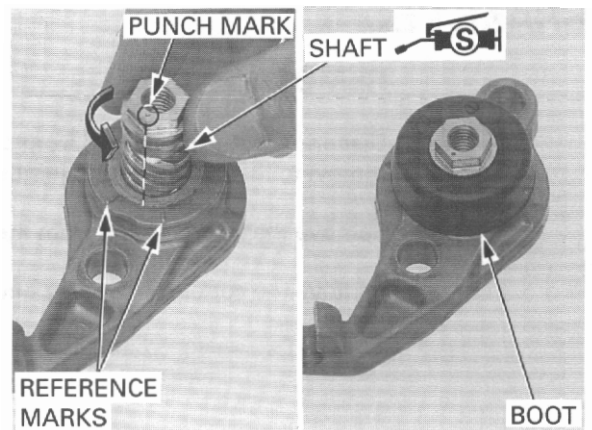
Apply silicone grease to the brake shaft outer surface.

Position the shaft so that its punch mark is within the reference marks on the base and thread it.

Screw the shaft in fully and make sure that the punch mark is within the reference marks.

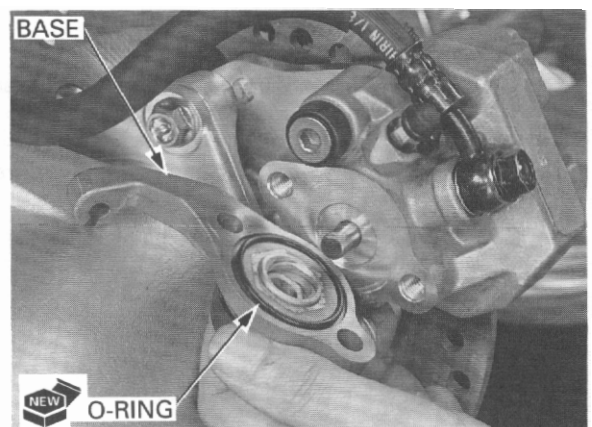
If the shaft boot is hard or deteriorated, replace it with new one. Install the boot over the brake base and into the shaft groove properly.

*The brake shaft has left-hand threads.*



Instal. a new O-ring into the base groove and the brake base onto the caliper body with the two bolts.

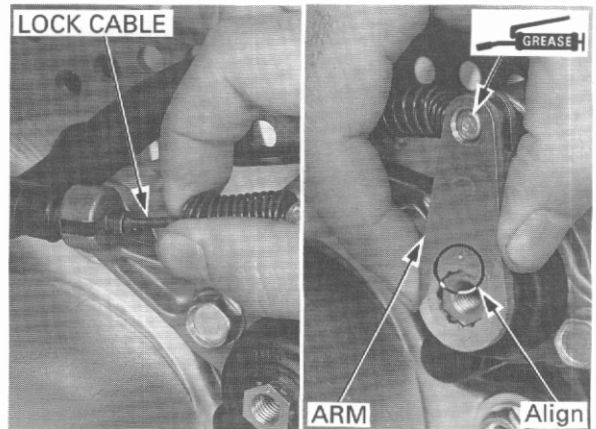
**TORQUE: 23 N·m 123 kgf·m, 17 lbf·ft)**



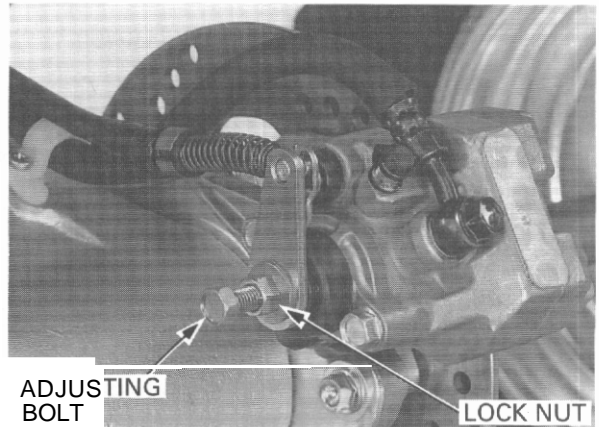


## HYDRAULIC DISC BRAKE

Apply grease to the lock cable end.  
Install the lock cable into the stay and connect it to the brake arm.  
Turn the brake shaft clockwise approximately 90° from fully seated position and install the brake arm onto the brake shaft by aligning the punch marks on the arm and shaft.



Loosely install the lock nut and adjusting bolt.  
Adjust the lock cable free play (page 3-16).



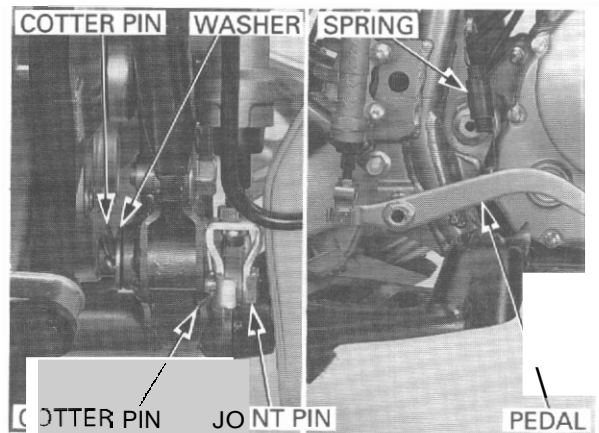
## BRAKE PEDAL

### REMOVAL

Disconnect the push rod from the brake pedal by removing the cotter pin and joint pin.

Remove the return spring from the pedal.

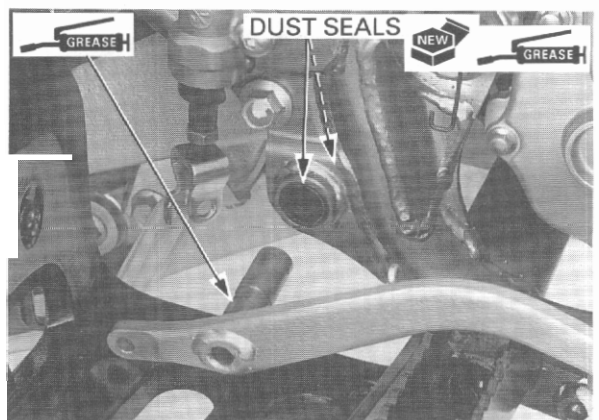
Remove the cotter pin, washer and the brake pedal.



### INSTALLATION

Coat new dust seal lips with grease and install them into the pedal pivot in the frame.

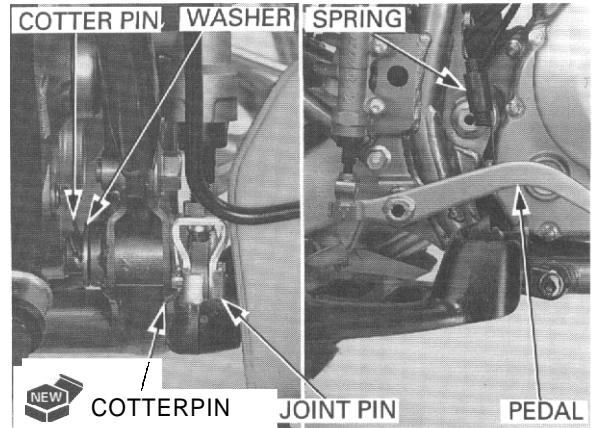
Apply grease to the pedal pivot groove and install the pedal.



Secure the pedal with the washer and cotter pin.

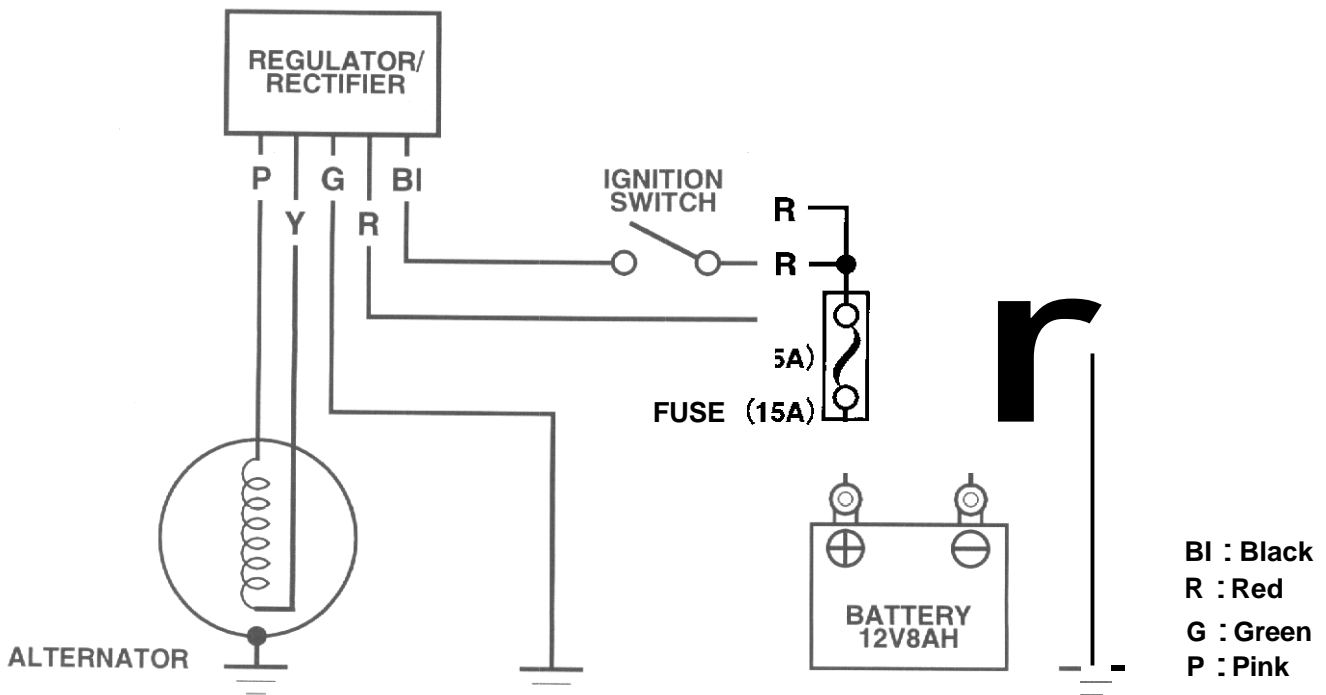
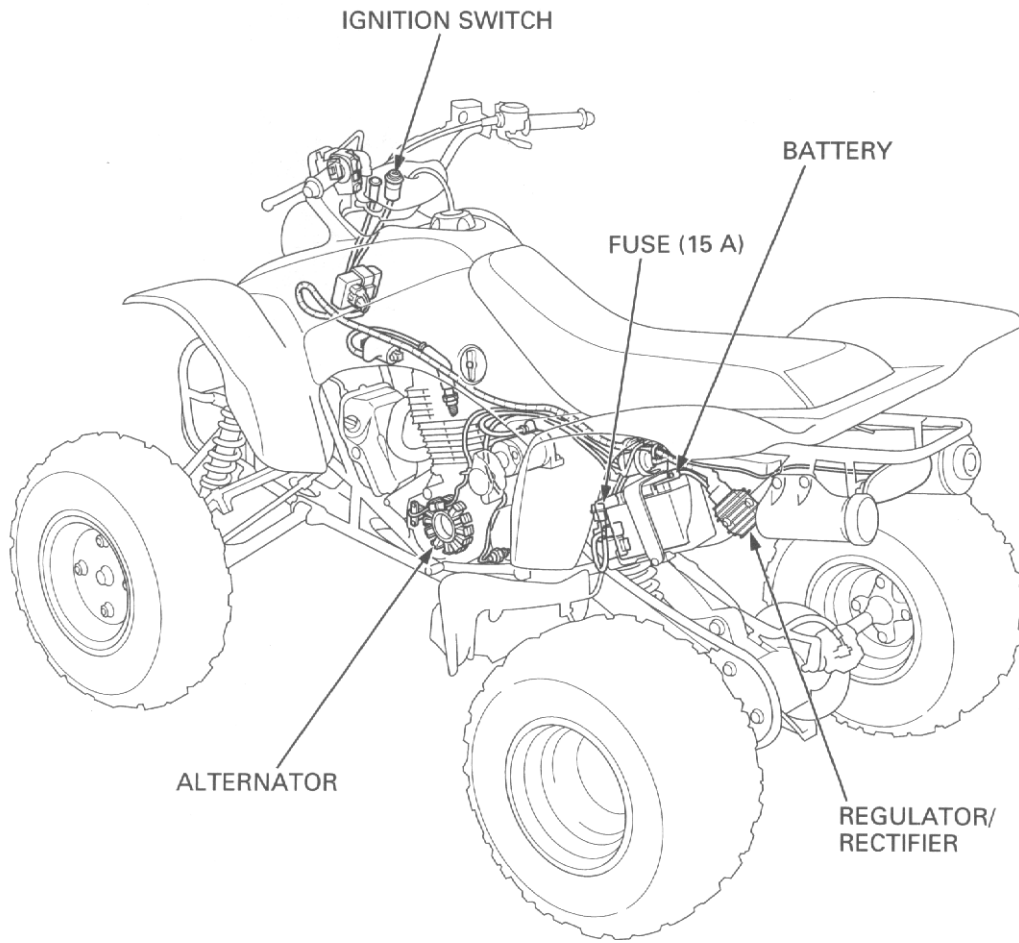
Hook the return spring to the pedal.

Connect the push rod to the pedal with the joint pin and secure the joint pin with a new cotter pin.





# BATTERY/CHARGING SYSTEM



# 15. BATTERY/CHARGING SYSTEM

SERVICE INFORMATION	15-1	CHARGING SYSTEM INSPECTION	15-5
TROUBLESHOOTING	15-3	REGULATOR/RECTIFIER	15-6
BATTERY	15-4	ALTERNATOR CHARGING COIL	15-7

## 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 component.

#### 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 vehicle, disconnect the negative battery cable from the battery.

#### NOTE:

The maintenancefree battery must be replaced when it reaches the end of its service life.

#### CAUTION:

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 long periods. 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 vehicle.
- The battery will self-discharge when the vehicle is not in use. For this reason, charge the battery every two weeks to prevent sulfation from occurring.
- 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 15-3).
- For alternator service, refer to section 10.

## BATTERY/CHARGING SYSTEM

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### **Battery charging**

- **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.**

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### BATTERY TESTING

Refer to the instructions in the Operation Manual for the recommended battery tester for details about battery testing. The recommended battery tester puts a "load" on the battery so that the actual battery condition can be measured.

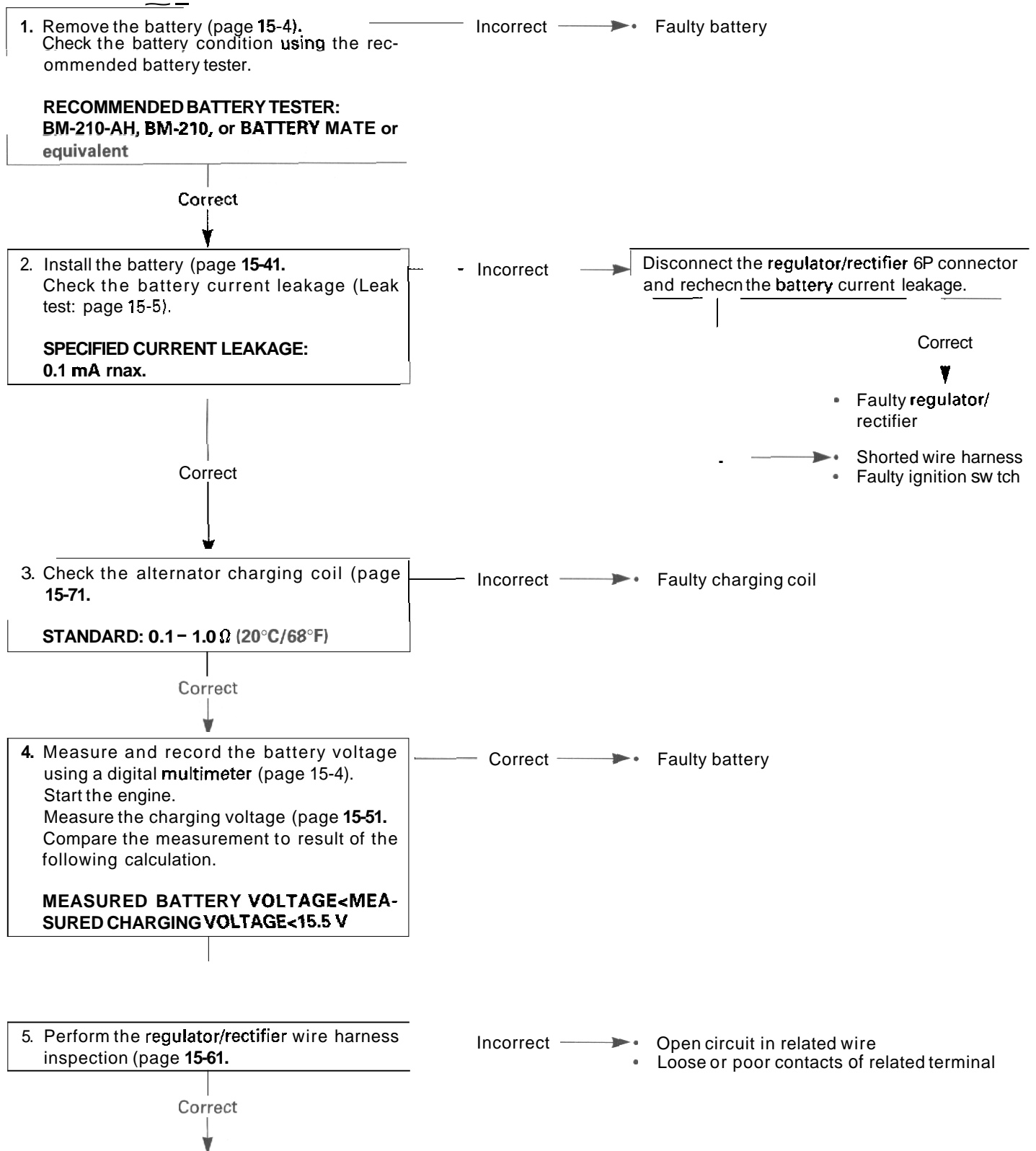
**Recommended battery tester** BM-210-AH, BM-210, or BATTERY MATE or **equivalent**

### SPECIFICATIONS

ITEM		SPECIFICATIONS	
Battery	Capacity	12 V - 8 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	0.9 A x 5 - 10 h
Quick		4.0 A x 10 h	
Alternator	Capacity	147 W/5,000 rpm	
	Charging coil resistance (20°C/68°F)	0.1 - 1.0 Ω	

# TROUBLESHOOTING

## Battery is damaged or weak



# BATTERY

### REMOVAL/INSTALLATION

With the ignition switch OFF, disconnect the negative (-) cable first, then the positive (+) cable. Remove the two bolts, battery holder and battery from the battery box.

Install the battery in the reverse order of removal.

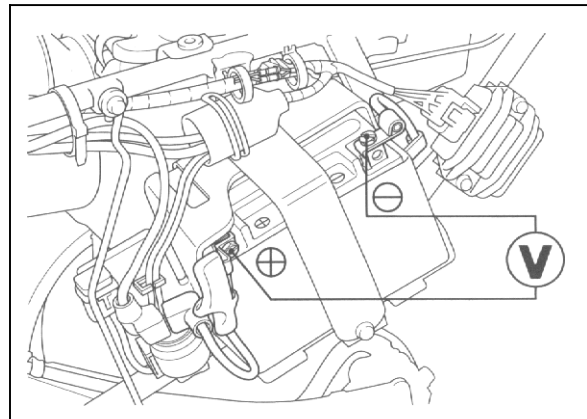
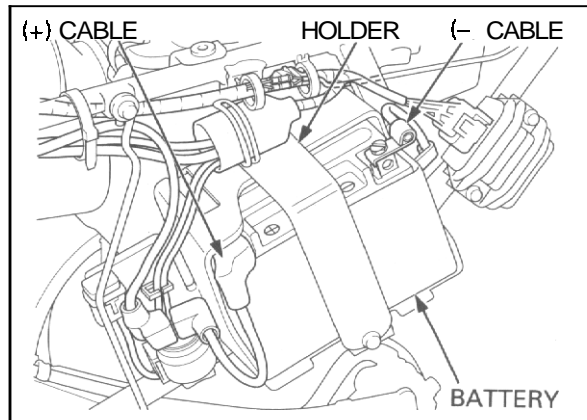
#### NOTE:

- Connect the positive (+) cable first, then the negative (-) cable.
- After connecting the battery cables, coat the terminals with grease.

### VOLTAGE INSPECTION

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 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.

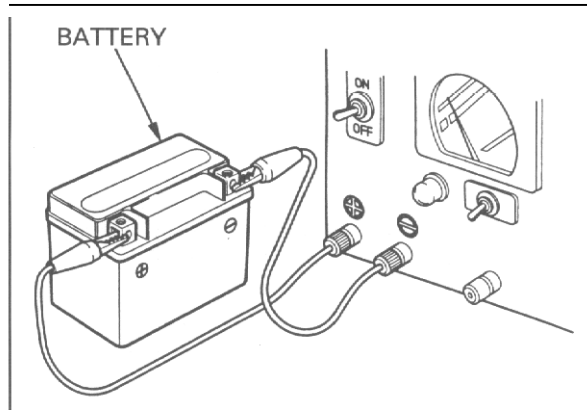
Connect the charger positive (+) cable to the battery positive (+) terminal.  
Connect the charger negative (-) cable to the battery negative (-) terminal.

#### CHARGING CURRENT/TIME:

*Standard 0.9 A/5 - 10 h*  
*Quick 4.0 A/1.0 h*

#### CAUTION:

- *Quick charging should only be done in an emergency; slow charging is preferred.*
- *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.*



## CHARGING SYSTEM INSPECTION

### CURRENT LEAKAGE TEST

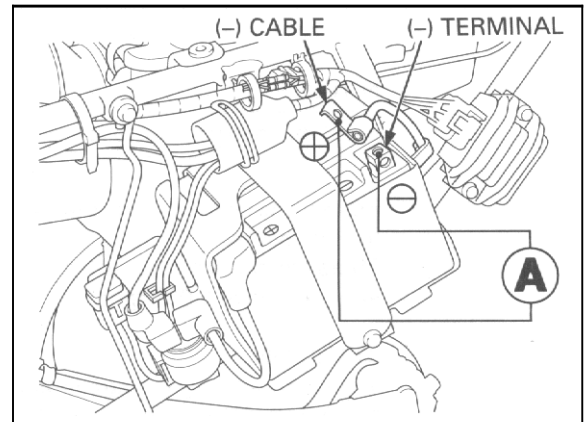
Turn the ignition switch OFF, and disconnect the negative (-) cable from the battery.

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 shorted circuit is likely.

Locate the short by disconnecting connections one by one and measuring the current.

### CHARGING VOLTAGE INSPECTION

**⚠ WARNING**

*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.*

NOTE:

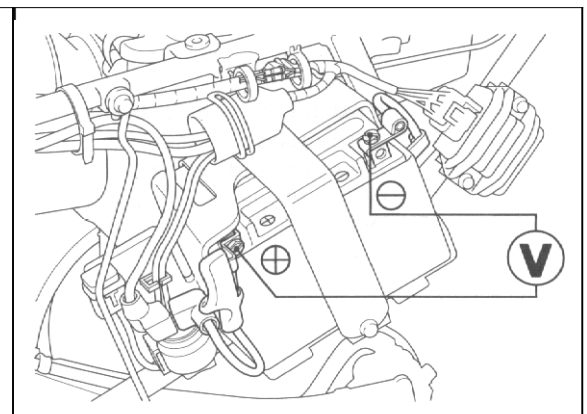
Be sure that the battery is in good condition before performing this test.

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.

**CAUTION**

- To prevent 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.



## BATTERY/CHARGING SYSTEM

---

Connect the tachometer

**NOTE:**

Read the instructions for tachometer operation.

Restart the engine, turn the headlight on and shift it to High beam.

Measure the voltage on the multimeter when the engine runs at 5,000 rpm.

**STANDARD:**

Measured battery voltage (page 15-4) <

Measured charging voltage < 15.5 V at 5,000 rpm

## REGULATOR/RECTIFIER

### WIRE HARNESS INSPECTION

Disconnect the regulator/rectifier 6P connector.  
Check the connector for loose contact or corroded terminals.

### BATTERY LINE

Measure the voltage between the red wire terminal and ground.  
There should be battery voltage at all times.

### GROUND LINE

Check the continuity between the green wire terminal and ground.  
There should be continuity at all times.

### CHARGING COIL LINE

Measure the resistance between the yellow and pink wire terminals.

**STANDARD:** 0.1 – 1.0  $\Omega$  (20°C/68°F)

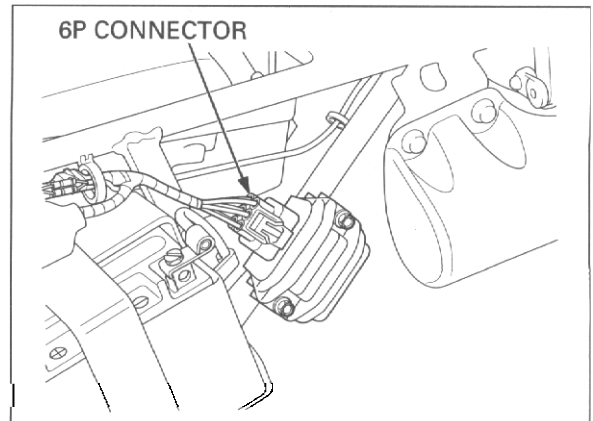
Check for continuity between the yellow wire terminal and ground, and the pink wire terminal and ground.

There should not be continuity.

### VOLTAGE FEEDBACK LINE

Measure the voltage between the black wire terminal and ground.

There should be battery voltage with the ignition switch ON, and no voltage with the ignition switch OFF.

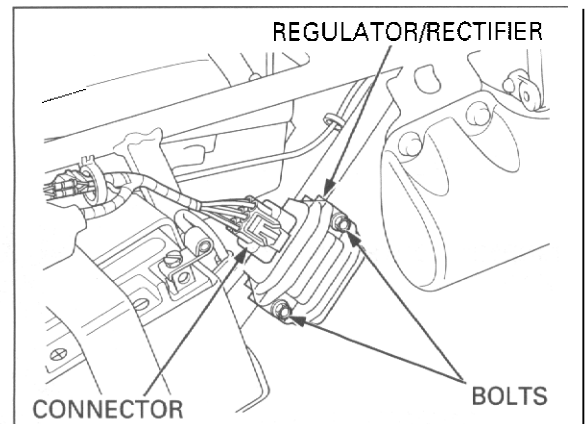


**REMOVAL/INSTALLATION**

Remove the two bolts and regulator/rectifier from the frame.

Disconnect the 6P connector and remove the regulator/rectifier.

Install the regulator/rectifier in the reverse order of removal.

**- ALTERNATOR CHARGING COIL****INSPECTION**

Remove the seat/rear fender (page 2-2).

Disconnect the alternator 4P connector.

Measure the resistance between the yellow and pink wire terminals of the alternator side connector.

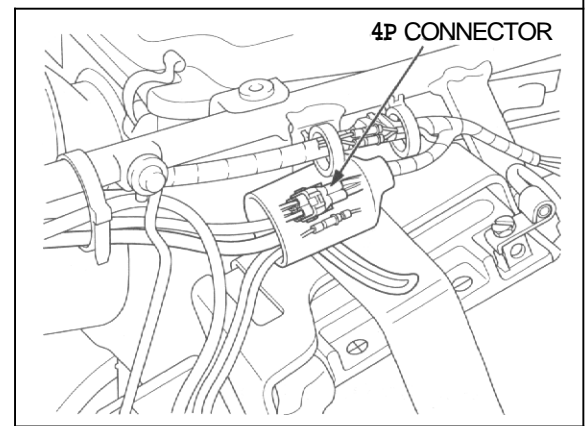
**STANDARD: 0.1 - 1.0  $\Omega$  (20°C/68°F)**

Check for continuity between the yellow wire terminal and ground, and the pink wire terminal and ground.

There should not be continuity.

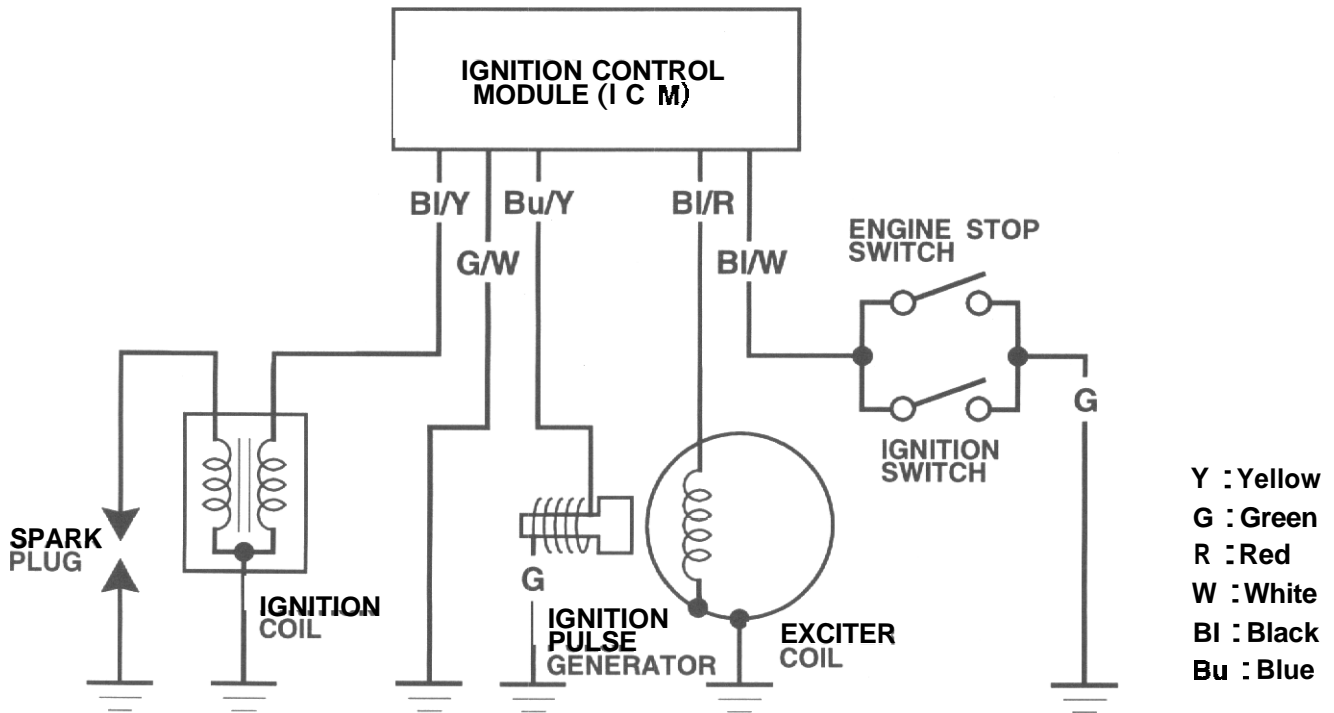
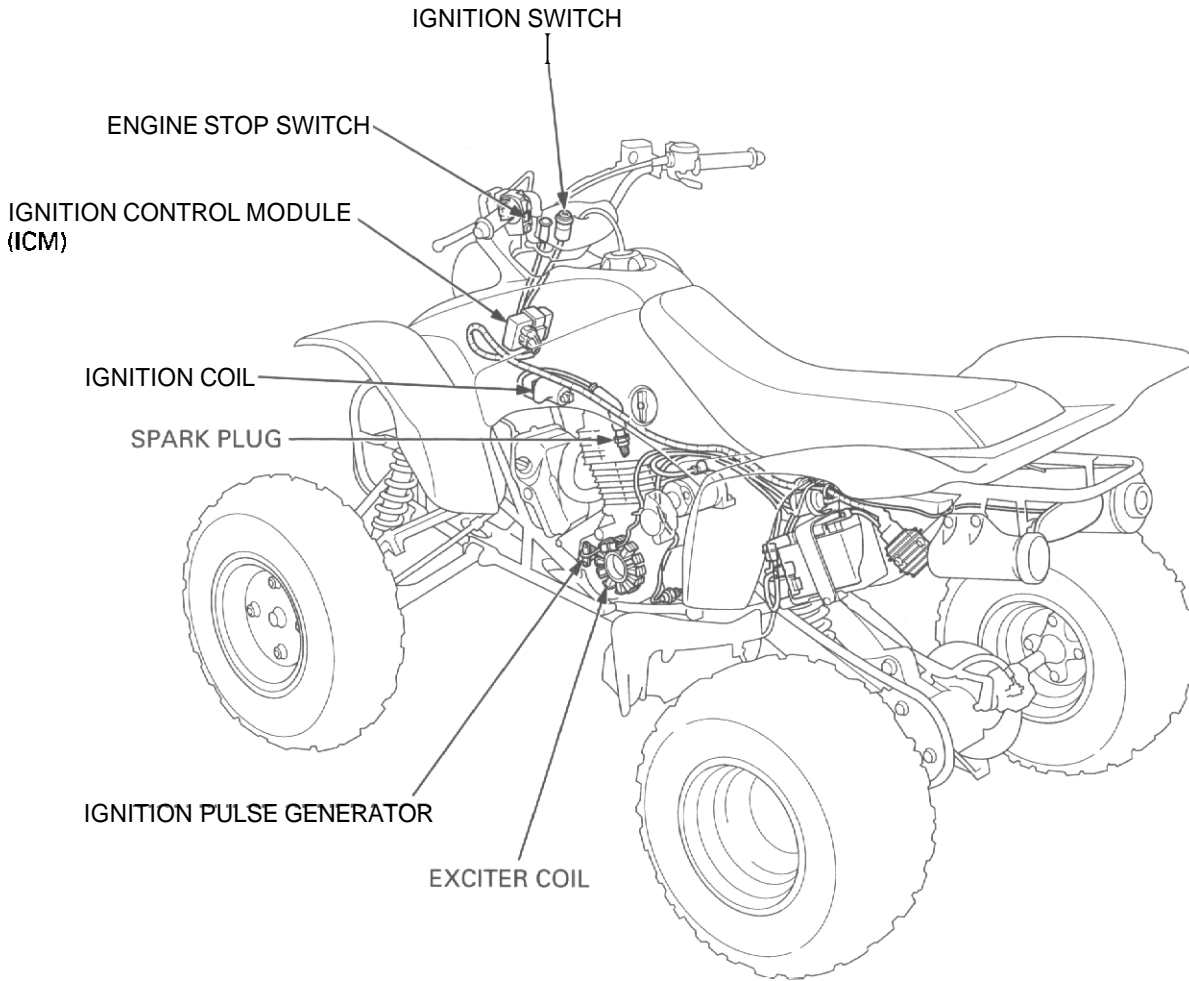
Replace the alternator stator if resistance is out of specification, or if any wire has continuity to ground.

Refer to section 10 for alternator stator replacement.





# IGNITION SYSTEM



# 16. IGNITION SYSTEM

<b>SERVICE INFORMATION</b>	<b>16-1</b>	<b>IGNITION COIL</b>	<b>16-6</b>
<b>TROUBLESHOOTING</b>	<b>16-2</b>	<b>IGNITION CONTROL MODULE (ICM)</b>	<b>16-6</b>
<b>IGNITION SYSTEM INSPECTION</b>	<b>16-3</b>	<b>IGNITION TIMING</b>	<b>16-7</b>

## SERVICE INFORMATION

### GENERAL

#### 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 on page 16-2.
- The ignition timing cannot be adjusted since the ignition control module (ICM) is factory preset.
- 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.
- Use a spark plug of the correct heat range. Using spark plug with an incorrect heat range can damage the engine.
- For ignition switch and engine stop switch inspection, see section 18.
- For exciter coil and ignition pulse generator (alternator stator) removal/installation, see section 10.

### SPECIFICATIONS

ITEM		SPECIFICATIONS
Spark plug	Standard	DPR8Z (NGK), X24GPR-U (DENSO)
Spark plug gap		0.6 - 0.7 mm (0.024 - 0.028 in)
Ignition coil primary peak voltage		100 V minimum
Ignition pulse generator peak voltage		0.7 V minimum
Exciter coil peak voltage		100 V minimum
Ignition timing ("F" mark)		8° BTDC at idle

16

### TOOL

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 $\Omega$ /DCV minimum)

## IGNITION SYSTEM

### 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 cylinder, temporarily exchange the ignition coil with a good one and perform the spark test. If there is spark, the exchanged ignition coil is faulty.

No spark at spark plug

UNUSUAL CONDITION		PROBABLE CAUSE (Check in numerical order)
Ignition coil primary voltage	Low peak voltage	<ol style="list-style-type: none"> <li>1. Incorrect peak voltage adaptor connections. (System is normal if measured voltage is over the specifications with reverse connections.)</li> <li>2. The multimeter impedance is too low; 10 MΩ/DCV.</li> <li>3. Cranking speed is too low.                             <ul style="list-style-type: none"> <li>• Battery is undercharged.</li> </ul> </li> <li>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.)</li> <li>5. Poorly connected connectors or an open circuit in ignition system.</li> <li>6. Faulty exciter coil. (Measure peak voltage.)</li> <li>7. Faulty ignition coil.</li> <li>8. Faulty ignition control module (ICM) (when above No. 1 through 7 are normal.)</li> </ol>
	No peak voltage	<ol style="list-style-type: none"> <li>1. Incorrect peak voltage adaptor connections. (System is normal if measured voltage is over the specifications with reverse connections.)</li> <li>2. Short circuit in engine stop switch (black/white) wire.</li> <li>3. Faulty ignition switch or engine stop switch.</li> <li>4. Loose or poorly connected ICM connectors.</li> <li>5. Open circuit or poor connection in ground (green/white) wire of the ICM.</li> <li>6. Faulty peak voltage adaptor.</li> <li>7. faulty exciter coil. (Measure peak voltage.)</li> <li>8. Faulty ignition pulse generator. (Measure peak voltage.)</li> <li>9. Faulty ICM (when above No. 1 through 8 are normal.)</li> </ol>
	Peak voltage is normal, but no spark jumps at plug	<ol style="list-style-type: none"> <li>1. Faulty spark plug or leaking ignition coil secondary current ampere.</li> <li>2. Faulty ignition coil.</li> </ol>
Exciter coil	Low peak voltage	<ol style="list-style-type: none"> <li>1. The multimeter impedance is too low; 10 MΩ/DCV.</li> <li>2. Cranking speed is too slow.                             <ul style="list-style-type: none"> <li>• Battery is undercharged.</li> </ul> </li> <li>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.)</li> <li>4. Faulty exciter coil (when above No. 1 through 3 are normal).</li> </ol>
	No peak voltage	<ol style="list-style-type: none"> <li>1. Faulty peak voltage adaptor.</li> <li>2. Faulty exciter coil.</li> </ol>
Ignition pulse generator	Low peak voltage	<ol style="list-style-type: none"> <li>1. The multimeter impedance is too low; 10 MΩ/DCV.</li> <li>2. Cranking speed is too slow.                             <ul style="list-style-type: none"> <li>• Battery is undercharged.</li> </ul> </li> <li>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.)</li> <li>4. Faulty ignition pulse generator (when above No. 1 through 3 are normal).</li> </ol>
	No peak voltage.	<ol style="list-style-type: none"> <li>1. Faulty peak voltage adaptor.</li> <li>2. Faulty ignition pulse generator.</li> </ol>

## IGNITION SYSTEM INSPECTION

**NOTE:**

- If no spark jumps at the plugs, check all connections for loose or poor contact before measuring each peak voltage.
- Use a commercially available digital multimeter (impedance 10MΩ/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** (not available in U.S.A.)  
 with commercially available digital multimeter [impedance 10MΩ/ DCV minimum]

### IGNITION PRIMARY PEAK VOLTAGE

**NOTE:**

- Check all system connections before this inspection. Poor connections can cause incorrect readings.
- Check the cylinder compression and check that the spark plug is installed correctly in the cylinder.

Disconnect the spark plug cap from the spark plug. Connect good known spark plug to the spark plug cap and ground the spark plug to the cylinder head as done in a spark test.

Remove the left side cover [page 2-3].

With the connector connected, connect the peak voltage tester or adaptor probes to the ignition coil primary terminal and body ground.

**CONNECTION:**

**Black/yellow I+)** – Body ground **I-)**

Turn the ignition switch ON.  
 Crank the engine with the starter motor and read the ignition coil primary voltage.

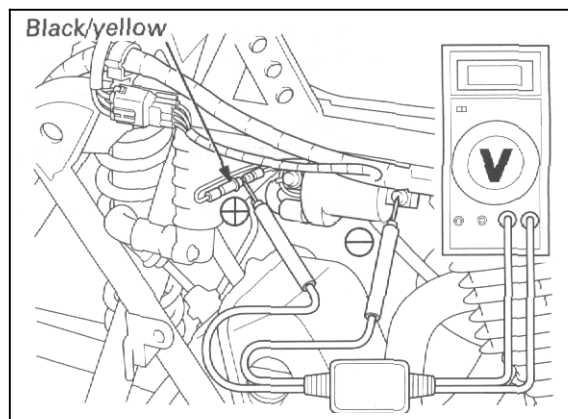
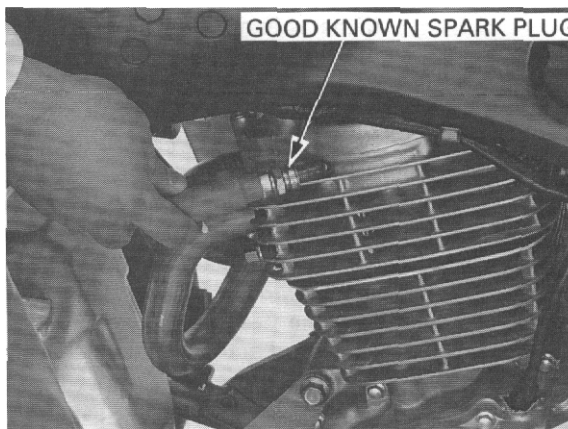
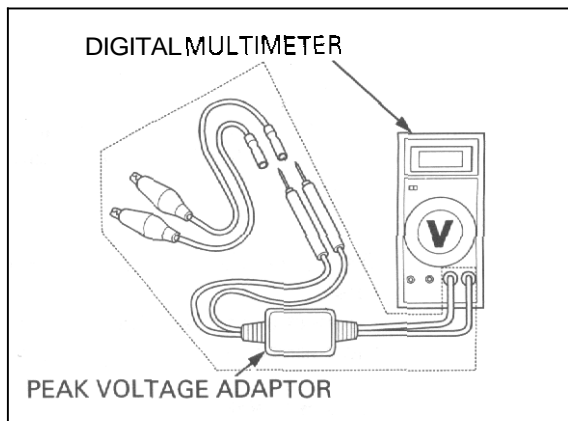
**PEAK VOLTAGE: 100V** minimum

**⚠ WARNING**

Avoid touching the spark plug and tester probes to **prevent** electric shock.

If the peak voltage is lower than the standard value, follow the checks described in the troubleshooting on page 16-2.

Install the side cover [page 2-3].



### EXCITER COIL PEAK VOLTAGE

#### NOTE:

Check that the cylinder compression is normal and the spark plug is installed correctly in the cylinder head.

Disconnect the ignition control module (ICM) connectors.

Connect the peak voltage tester or adaptor probes to the connector terminals of the wire harness side.

#### CONNECTION:

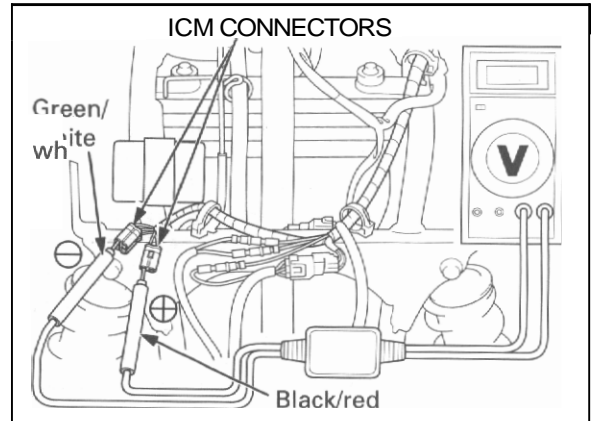
Turn the ignition switch ON.

Crank the engine with the starter motor and read the peak voltage.

**PEAK VOLTAGE: 100 V** minimum

#### ⚠ WARNING

**Avoid touching the spark plug and tester probes to prevent electric shock.**



If the voltage measured at ICM connector is abnormal, measure the peak voltage at the exciter coil connector.

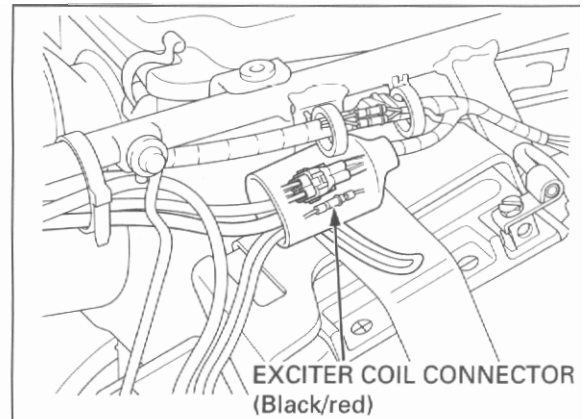
Remove the seat/rear fender (page 2-2).

Disconnect the exciter coil connector and connect the peak voltage tester or adaptor probes to the alternator side connector terminal and ground.

In the same manner as at the ICM connectors, measure the peak voltage and compare it to the voltage measured at the ICM connectors.

- If the peak voltage measured at the ICM connectors is abnormal and the one measured at the exciter coil connector is normal, the **black/red** wire has an open or short circuit, or loose connections.
- If both peak voltages are abnormal, follow the checks described in the troubleshooting on page 16-2.  
See section 10 for alternator stator replacement.

Install the seat/rear fender (page 2-2)



## IGNITION PULSE GENERATOR PEAK VOLTAGE

### NOTE

Check that the cylinder compression is normal and the spark plug is installed correctly in the cylinder head.

Disconnect the ignition control module (ICM) 4P connector.

Connect the peak voltage tester or adaptor probes to the connector terminals of the wire harness side.

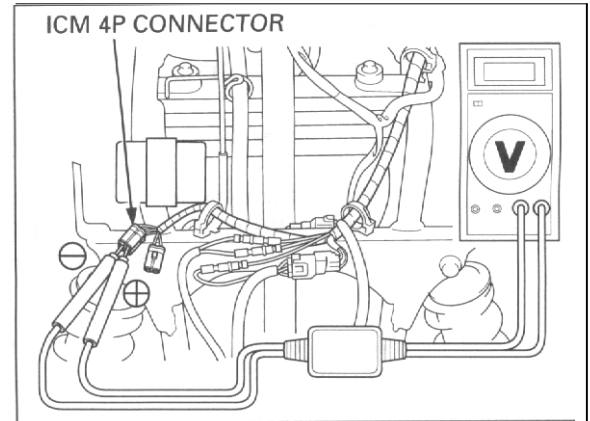
### CONNECTION:

**Blue/yellow (+) — Green/white (-)**

Turn the ignition switch ON.

Crank the engine with the starter motor and read the peak voltage.

**PEAK VOLTAGE 0.7 V** minimum



If the voltage measured at ICM connector is abnormal, measure the peak voltage at the alternator connector.

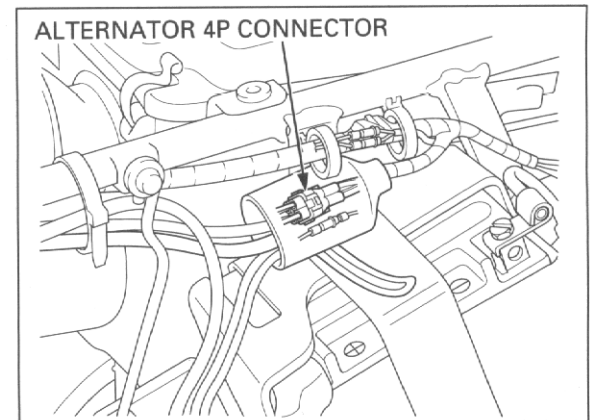
Remove the seat/rear fender (page 2-2).

Disconnect the alternator 4P connector and connect the peak voltage tester or adaptor probes to the **blue/yellow** and green wire terminals of the alternator side connector.

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 connector is abnormal and the one measured at the alternator connector is normal, the **blue/yellow** wire has an open or short circuit, or loose connections.
- If both peak voltages are abnormal, follow the checks described in the troubleshooting on page 16-2.  
See section 10 for alternator stator replacement.

Install the seat/rear fender (page 2-2).



## IGNITION SYSTEM

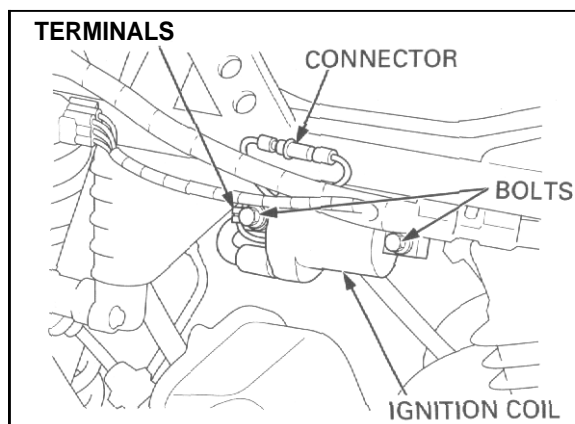
### IGNITION COIL

#### REPLACEMENT

Remove the left side cover (page 2-3).

Disconnect the primary coil connector.  
Remove the spark plug cap from the plug.  
Remove the two bolts, ground wire terminals and the ignition coil from the frame.

Install a new ignition coil in the reverse order of removal.



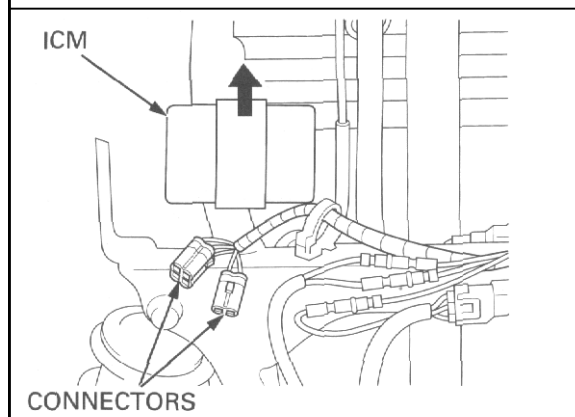
### IGNITION CONTROL MODULE (ICM)

#### REPLACEMENT

Remove the ICM with the rubber suspension from the stay.

Disconnect the connectors and remove the ICM.  
Remove the ICM from the rubber suspension.

Install a new ICM in the reverse order of removal.



## IGNITION TIMING

### ⚠ WARNING

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

Start the engine and warm it up operating temperature.

Stop the engine and remove the timing hole cap.

Connect the timing light and tachometer.

### NOTE:

Read the instructions for timing light *and* tachometer operation.

Start the engine, let it idle and check the ignition timing.

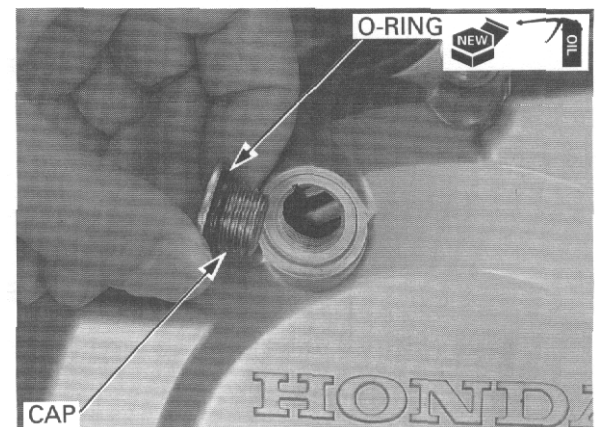
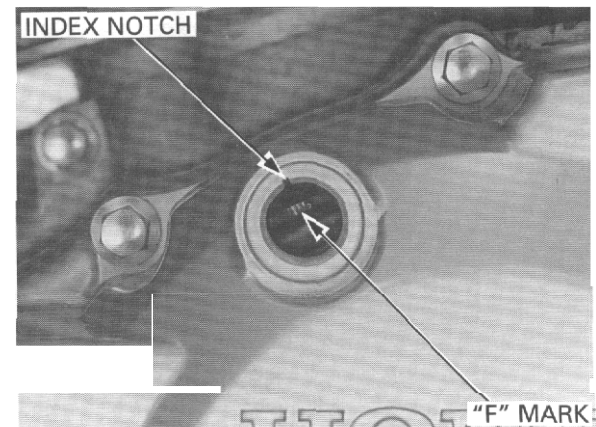
The ignition timing is correct if the "F" mark on the flywheel aligns with the index notch in the left crankcase cover at idle.

Increase the engine speed and make sure the "F" mark begins to move counterclockwise.

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

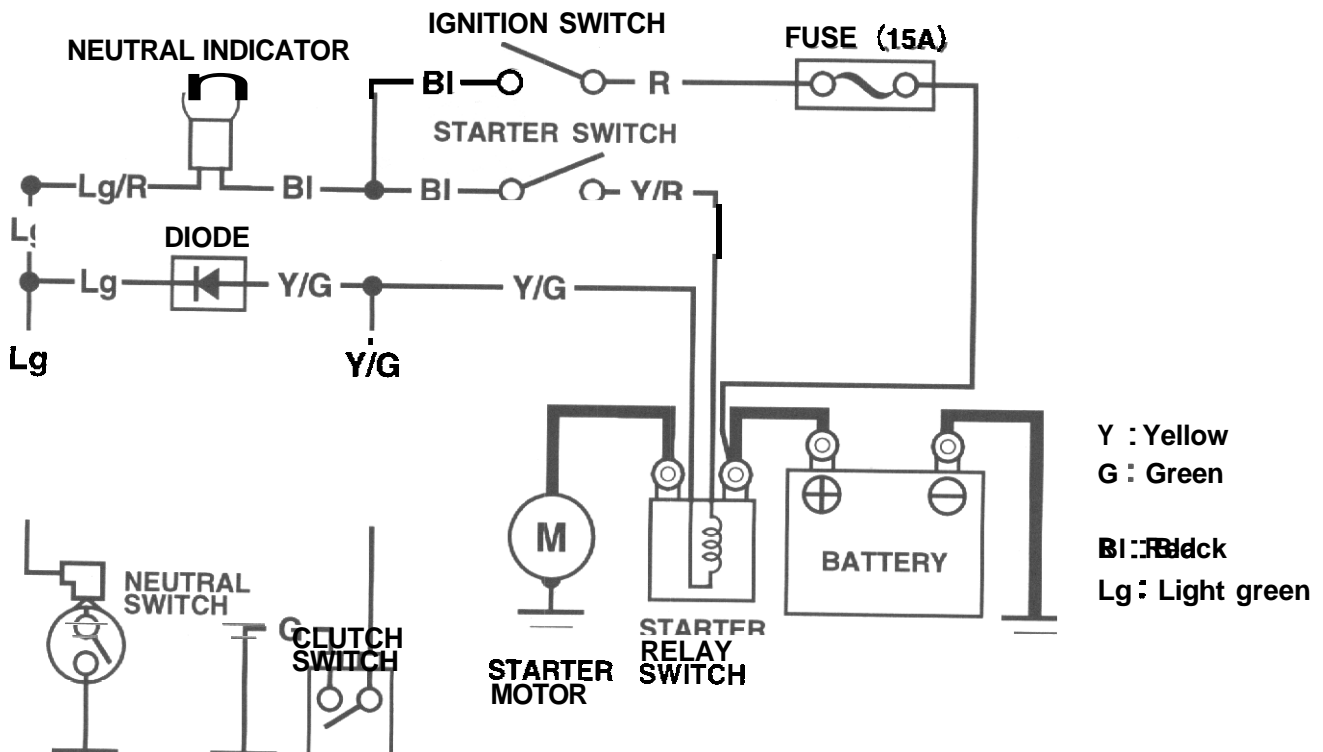
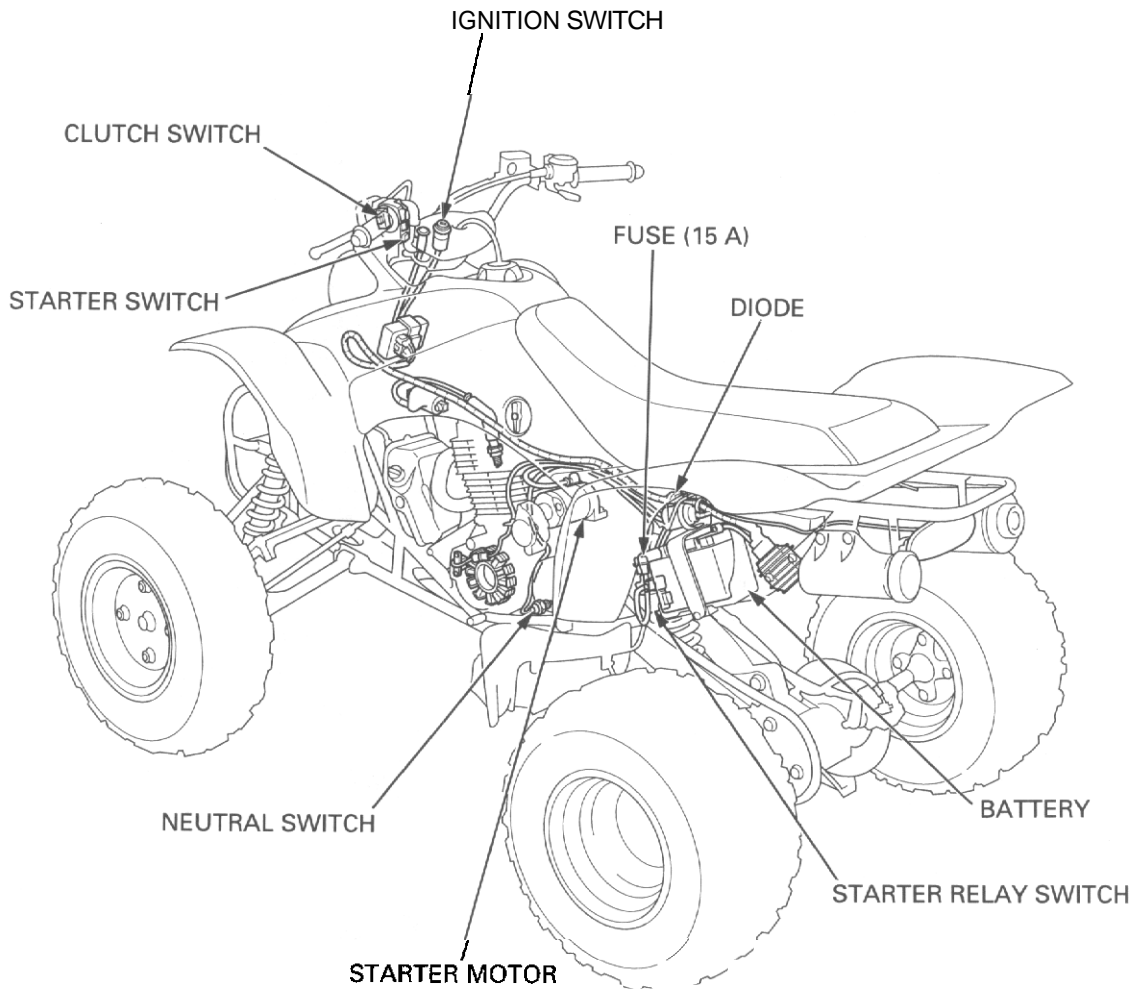
Install and tighten the timing hole cap.

**TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)**





# ELECTRIC STARTER



# 17. ELECTRIC STARTER

SERVICE INFORMATION	17-1	STARTER RELAY SWITCH	17-9
TROUBLESHOOTING	17-2	CLUTCH DIODE	17-10
STARTER MOTOR	17-4		

## SERVICE INFORMATION

### GENERAL

**⚠ WARNING**

Always *turn the ignition switch OFF* before servicing the starter motor. The motor could suddenly start, causing *serious injury*.

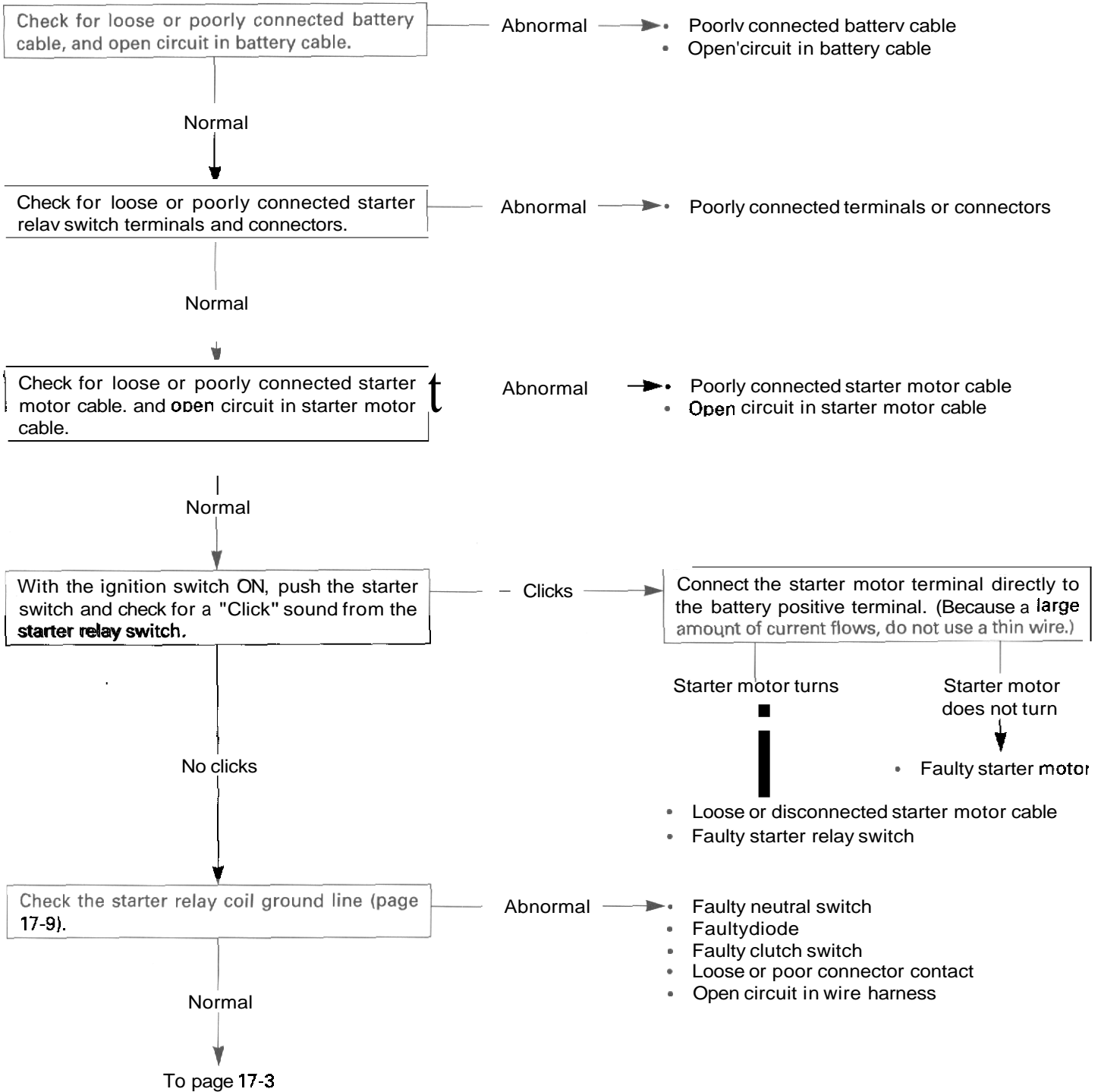
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•

ITEM	STANDARD	SERVICE LIMIT

TROUBLESHOOTING

Starter motor will not turn

- Check for a blown fuse (15 A).
- Check that the battery is fully charged and in good condition



From page 17-2



Check the starter relay voltage (page 17-10).

Abnormal

- • Faulty ignition switch
- Blown fuse
- Faulty engine stop switch
- Faulty starter switch
- Loose or poor connector contact
- Open circuit in wire harness

Normal



Check the starter relay switch operation (page 17-10).

Abnormal

- • Faulty starter relay switch

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 reduction gear (section 10)
- Faulty starter idle gear (section 10)

## STARTER MOTOR

### REMOVAL

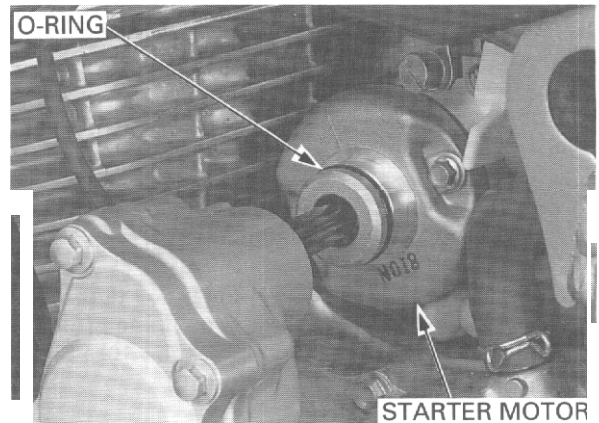
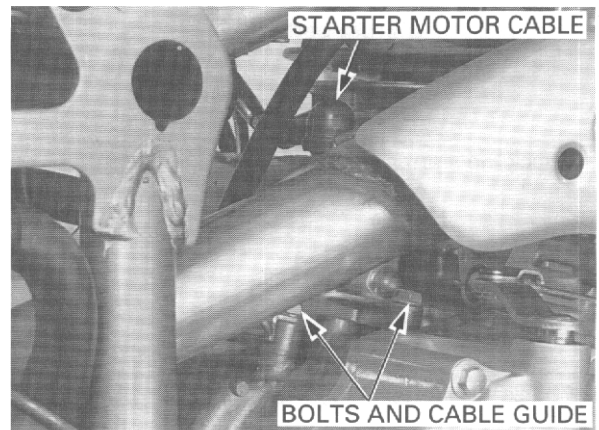
**⚠ WARNING**

Always turn the ignition switch OFF before servicing the starter motor. The motor could suddenly start, causing serious injury.

Remove the rubber cap, terminal nut and starter motor cable.

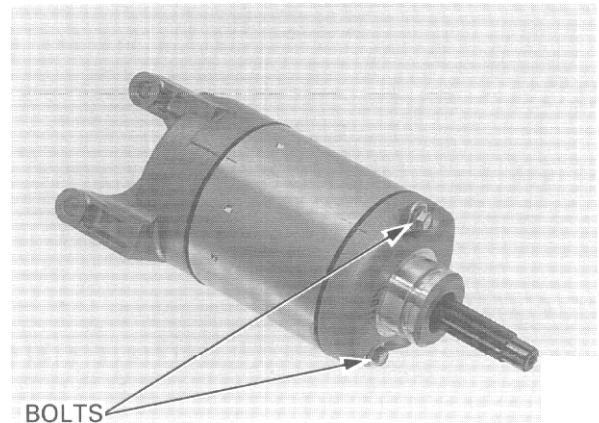
Remove the two mounting bolts, cable guide and the starter motor from the crankcase and left crankcase cover.

Remove the O-ring from the starter motor.

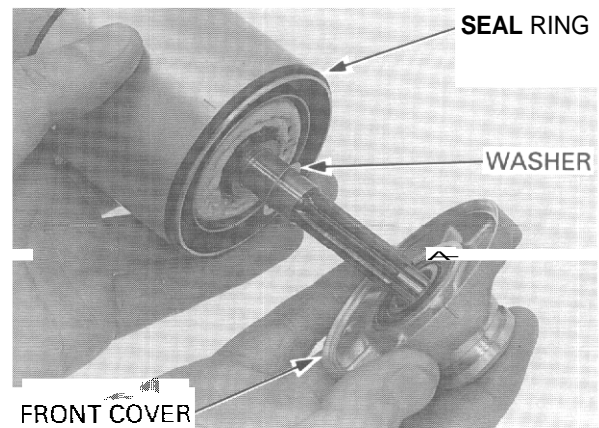


### DISASSEMBLY/INSPECTION

Remove the starter motor case bolts.

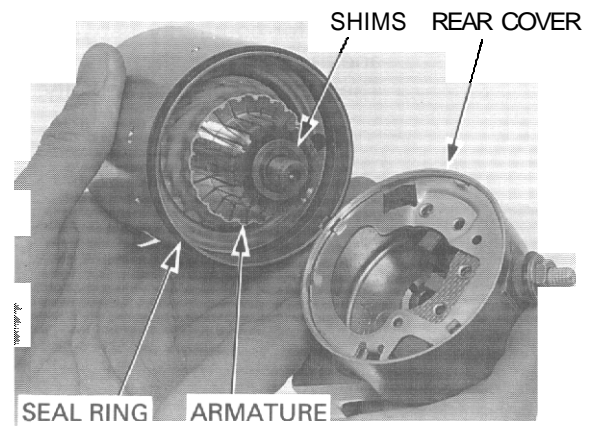


Remove the front cover, thrust washer and seal ring.

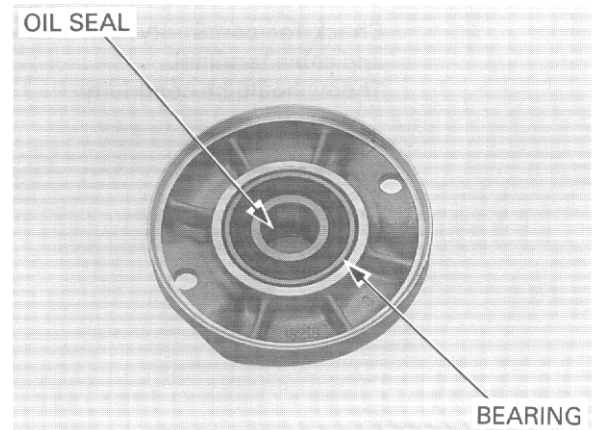


**Record the location and number of shims.**

Remove the rear cover, shims and seal ring.  
Remove the armature from the motor case.



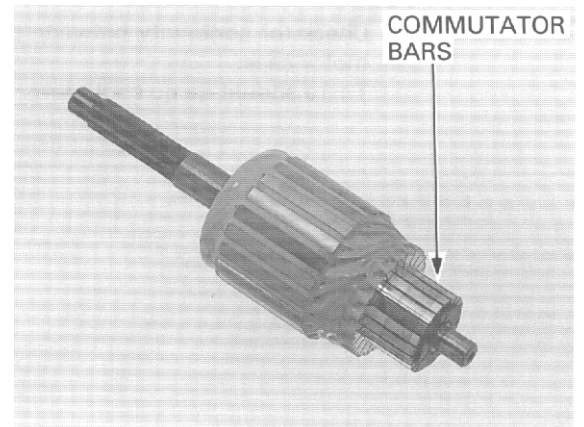
Check the bearing and oil seal in the front cover for wear or damage.



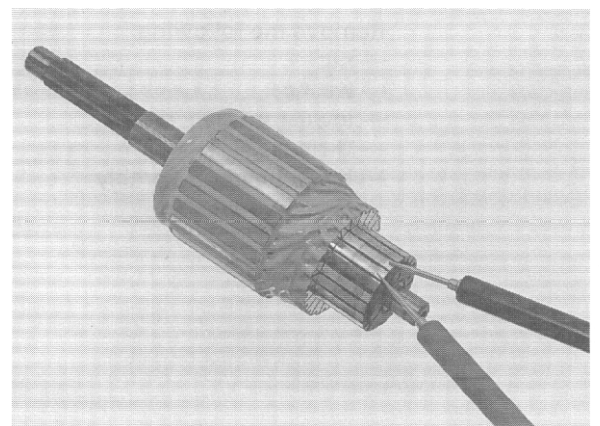
Check the commutator bars of the armature for discoloration.

**NOTE:**

Do not use emery or sand paper on the commutator.

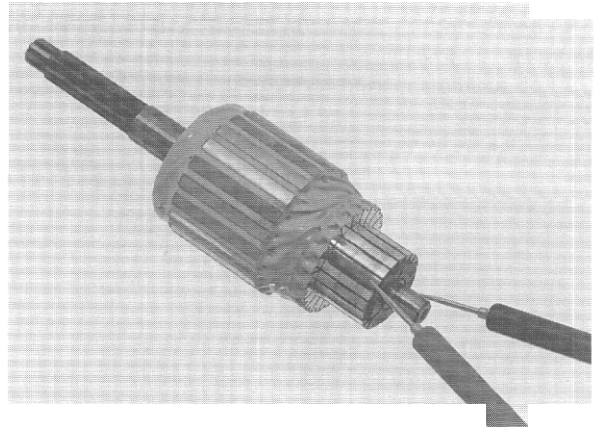


Check for continuity between pairs of commutator bars.  
There should be continuity.

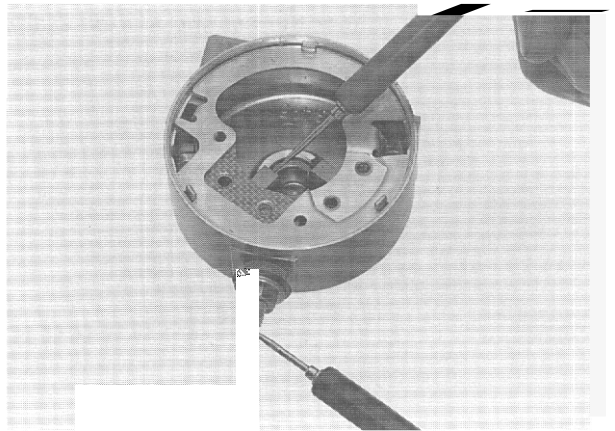


## ELECTRIC STARTER

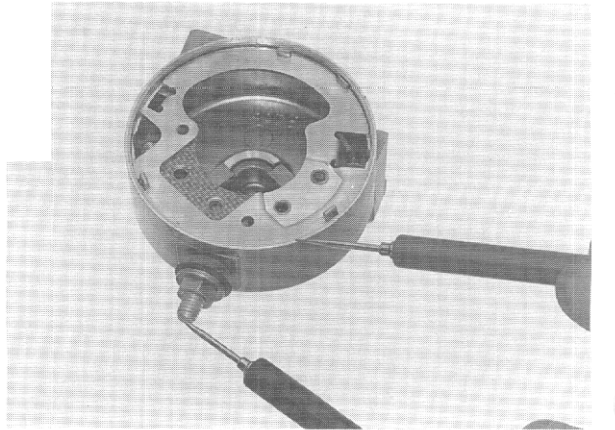
Check for continuity between each commutator bar and the armature shaft.  
There should be no continuity.



Check for continuity between the insulated brush and cable terminal.  
There should be continuity.

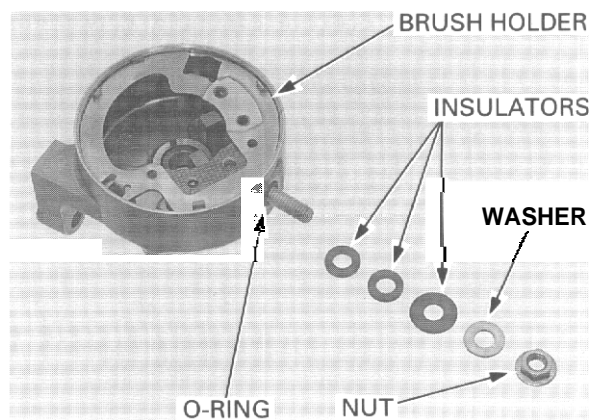


Check for continuity between the cable terminal and motor case.  
There should be no continuity.



Remove the following:

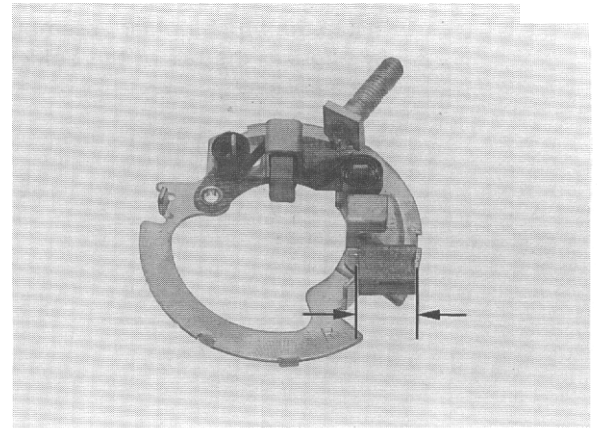
- nut
- washer
- insulator washers
- O-ring
- brush holder assembly



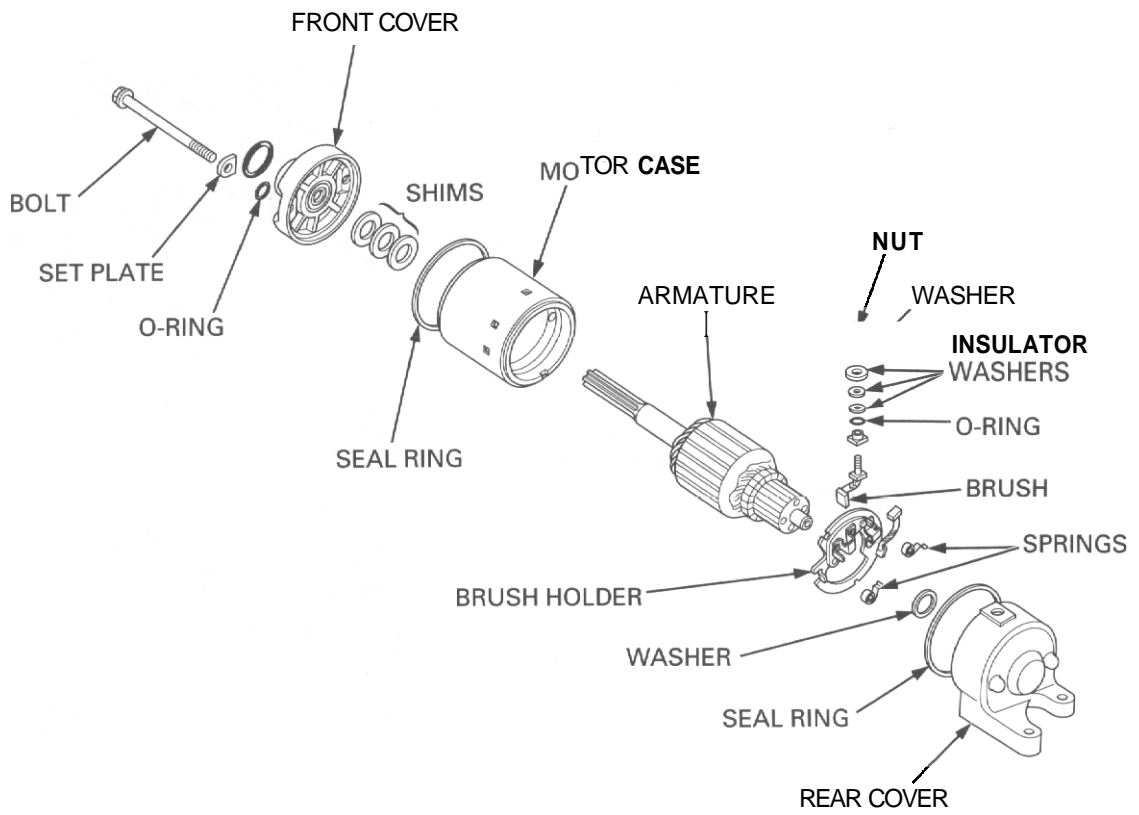
Remove the brushes from the brush holder.

Measure the brush length.

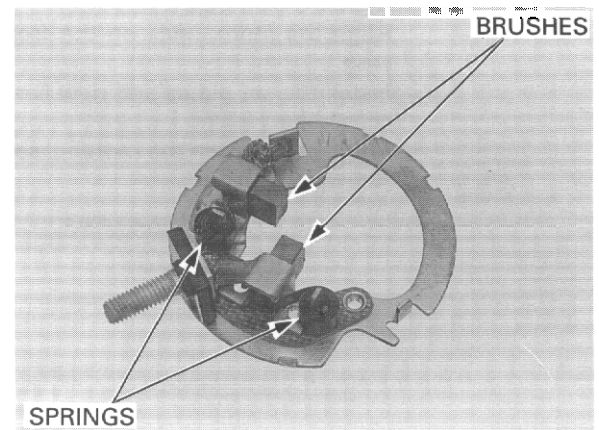
SERVICE LIMIT 8.5 mm 10.33 in)



**ASSEMBLY**



Install the brushes into the brush holder.





## ELECTRIC STARTER

Install the brush holder assembly into the rear cover by aligning the tab of the holder with the groove in the rear cover.

Install the following:

- new O-ring
- insulator washers
- washer
- nut

Install the armature into the motor case while holding 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 same number of shims in the same locations as noted during disassembly.

Install a new seal ring.

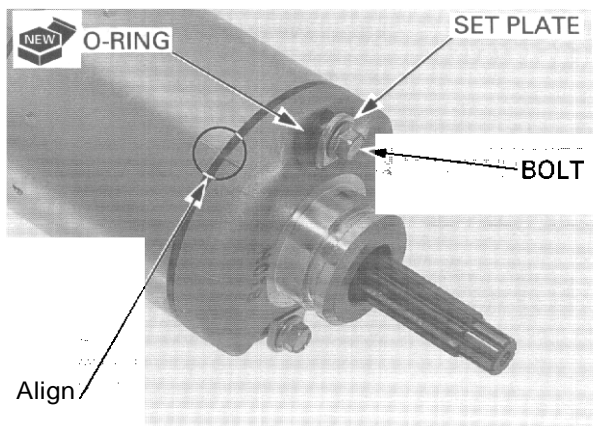
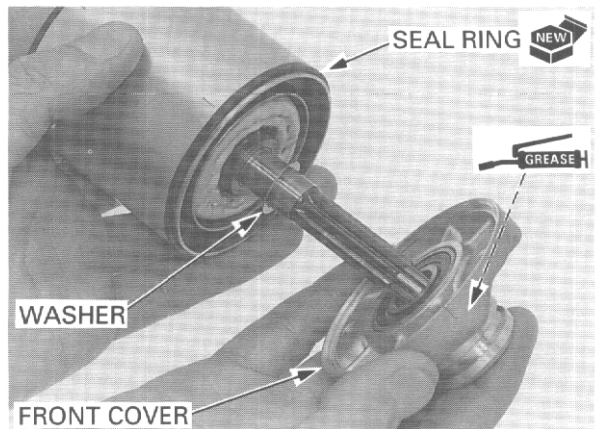
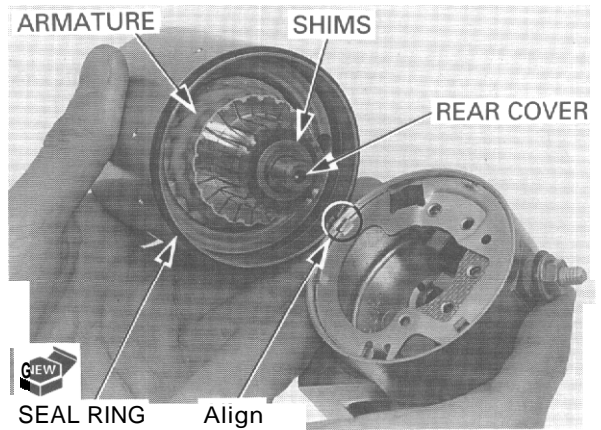
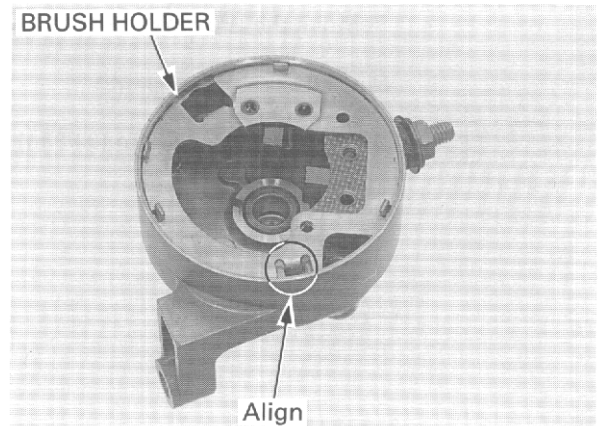
Install the rear cover by aligning the brush holder tab with the motor case groove.

Install the thrust washer and a new seal ring.  
Apply grease to the oil seal lip in the front cover.  
Install the front cover.

Align the index lines on the front cover and motor case.

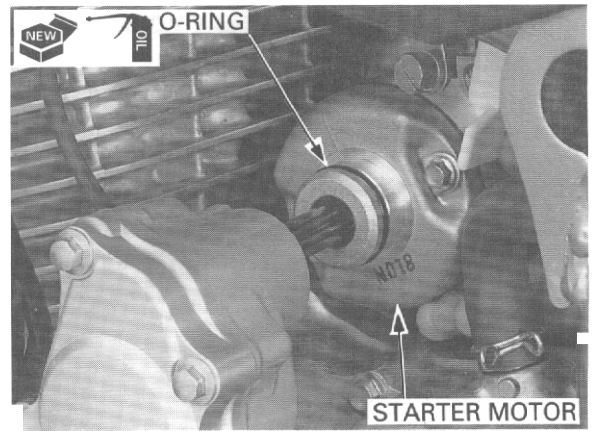
Install the set plates and new O-rings onto the motor case bolts.

Install and tighten the motor case bolts.

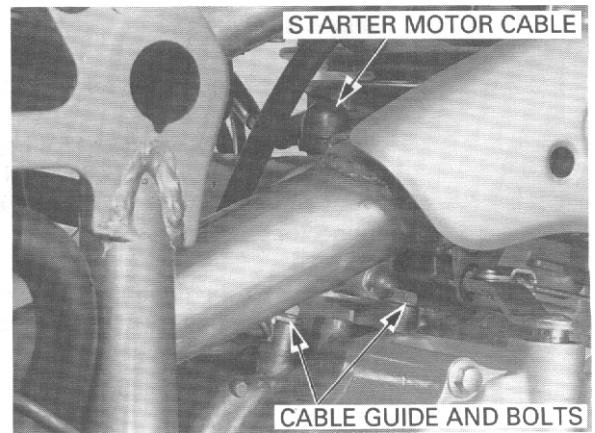


**INSTALLATION**

Coat a new O-ring with oil and install it into the starter motor groove.



Install the starter motor into the left crankcase cover and onto the crankcase.  
 Install the cable guide and mounting bolts, and tighten the bolts securely.  
 Install the starter motor cable and terminal nut onto the motor terminal and tighten the nut securely.  
 Install the rubber cap over the motor terminal securely.



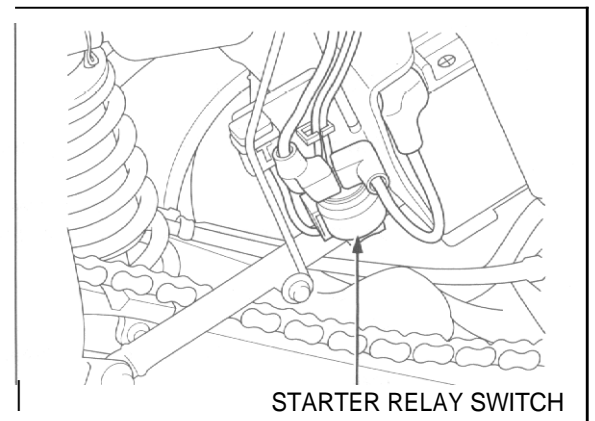
**STARTER RELAY SWITCH**

**INSPECTION**

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.

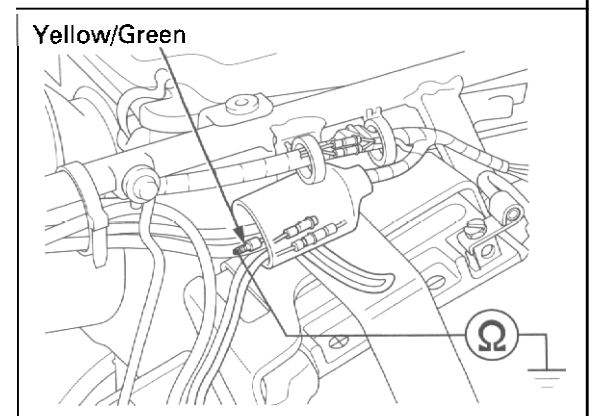
Remove the seat/rear fender (page 2-2).



**GROUND LINE**

Disconnect the yellow/green wire connector of the starter relay switch.  
 Check for continuity between the wire harness side connector terminal and ground.

If there is continuity when the transmission is in neutral or when the clutch is disengaged, the ground circuit is normal. (In neutral, there is a slight resistance due to the diode.)



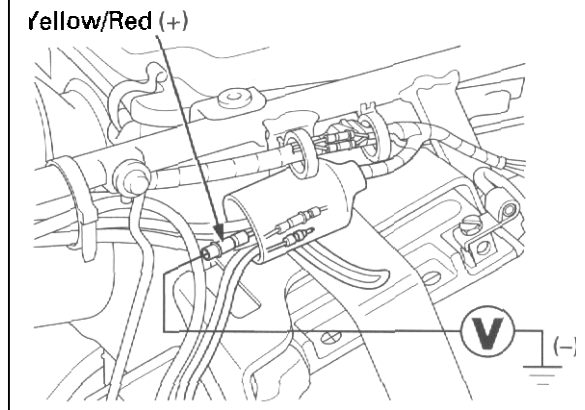
## ELECTRIC STARTER

### STARTER RELAY VOLTAGE

Disconnect the **yellow/red** wire connector of the starter relay switch.

Measure the voltage between the wire harness side connector terminal (+) and ground (-).

If the battery voltage appears only when the starter switch is pushed with the ignition switch ON, the circuit is normal.

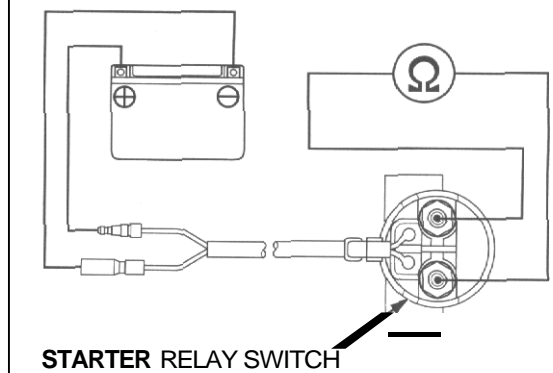


### OPERATION CHECK

Disconnect the starter relay switch connectors and cables.

Connect the fully charged 12V battery positive terminal to the relay switch **yellow/red** wire connector terminal and negative terminal to the **yellow/green** wire connector 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

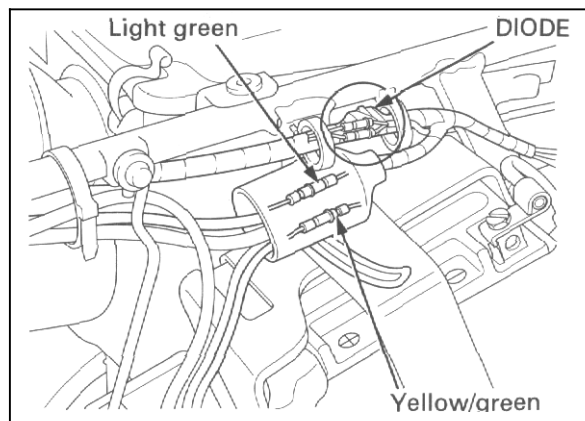
Remove the **seat/rear** fender (page 2-2).

Disconnect the starter relay switch (**Yellow/green**) and neutral switch (**Lightgreen**) connectors.

Check for continuity between the wire harness side connector terminals.

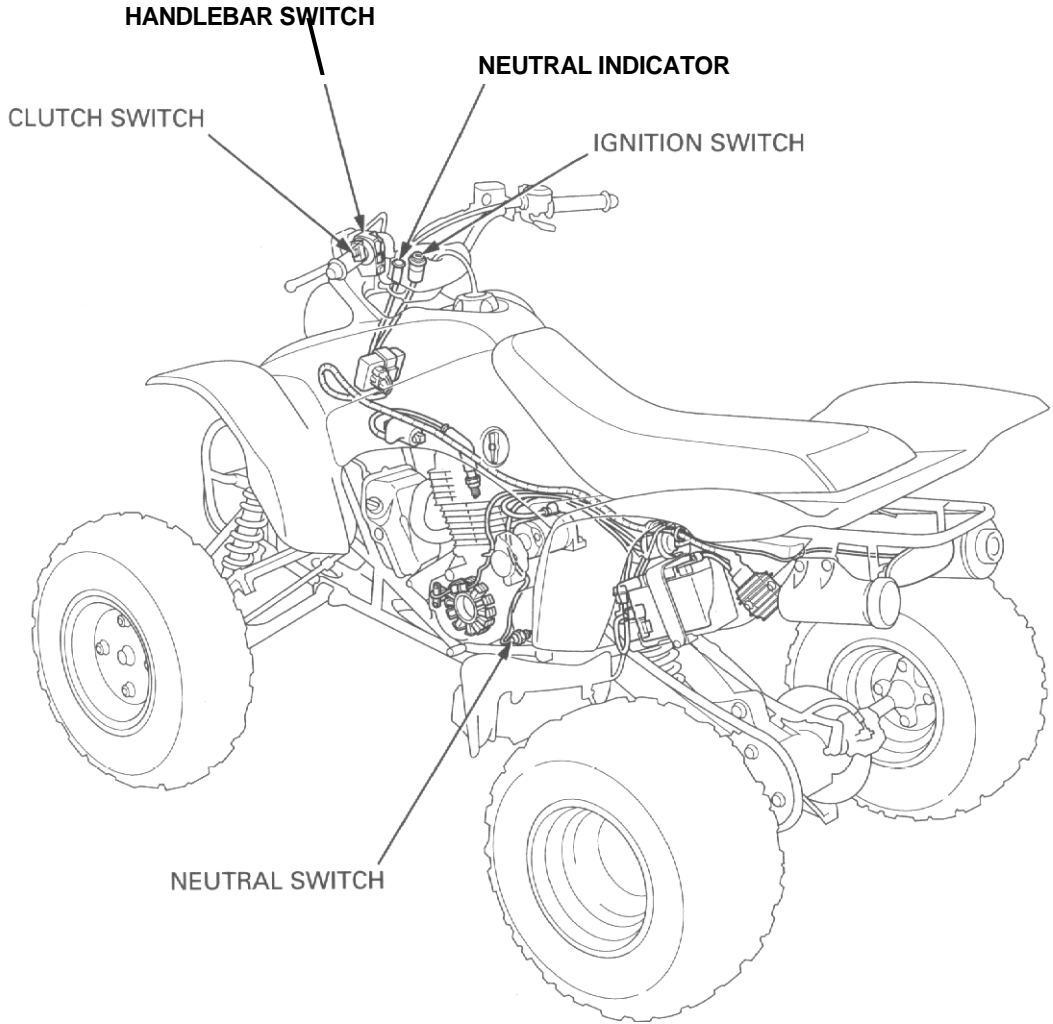
If there is continuity in one direction, the diode is normal.

When there is continuity, a small resistance value will register.



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**MEMO**



# 18. LIGHTS/SWITCHES

SERVICE INFORMATION	18-1	HANDLEBAR SWITCH	18-4
BULB REPLACEMENT	18-2	CLUTCH SWITCH	18-4
IGNITION SWITCH	18-3	NEUTRAL SWITCH	18-5

## SERVICE INFORMATION

### GENERAL

- A continuity test can be made with the switches installed on the vehicle.
- All plastic connectors have locking tabs that must be released before disconnecting, and must be aligned when reconnecting.
- To isolate an electrical failure, check the continuity of the electrical path through the part. A continuity check can usually be made without removing the part from the vehicle. Simply disconnect the connectors and connect a continuity tester to the terminals or connections.

### SPECIFICATIONS

ITEM		SPECIFICATIONS
Bulbs	Headlight (High/low beam)	12 V - 30/30 W x 2
	Taillight	12 V - 5 W
	Neutral indicator	12 V - 3.4 W
Fuse (main fuse)		15 A

### TORQUE VALUES

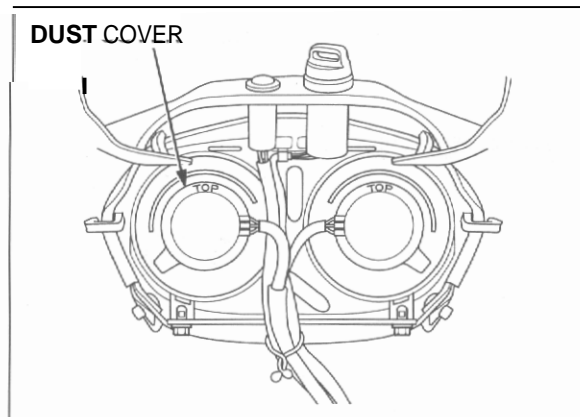
Headlight mounting bolt	4 N·m (0.4 kgf·m, 2.9 lbf·ft)
Neutral switch	13 N·m (1.3 kgf·m, 9 lbf·ft)

## BULB REPLACEMENT

### HEADLIGHT

Remove the front fender (page 2-2).

Remove the dust cover from the headlight.



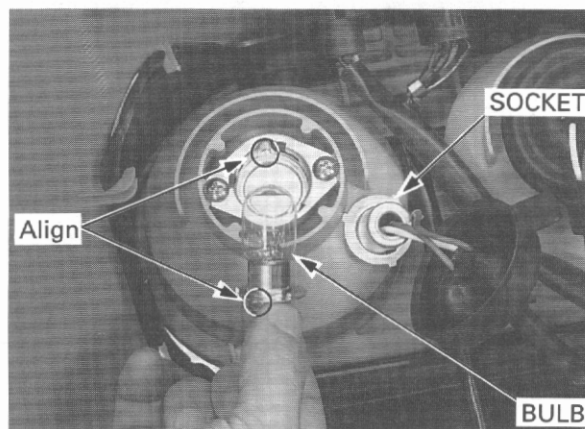
Remove the bulb socket by turning it counterclockwise while pushing it in.

Replace the headlight bulb with a new one.

Installation is in the reverse order of removal.

**NOTE:**

Align the bulb tab with the headlight groove.



### HEADLIGHT REPLACEMENT

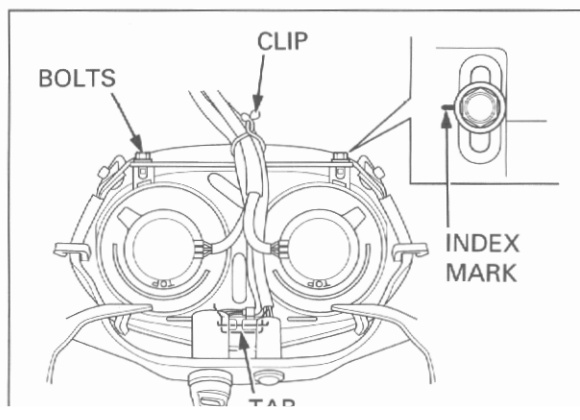
Release the wires from the clip.

Remove the two mounting bolts and headlight from the front fender.

Install the headlight by aligning the tab with the slit in the fender. Install the bolts, align the bolt centers with the index marks, and tighten them.

**TORQUE: 4 N·m 10.4 kgf·m, 2.9 lbf·ft)**

Secure the wires with the clip.



### TAILLIGHT

Remove the bulb socket from the taillight by turning it counterclockwise while pushing it in.



Pull the taillight bulb out of the socket.

Install a new bulb and the socket in the reverse order of removal.

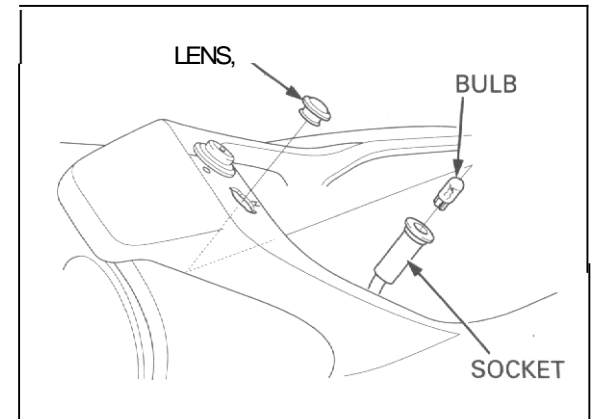


**NEUTRAL INDICATOR**

Remove the indicator lens from the bulb socket.  
Remove the neutral indicator from the front fender.

Pull the indicator bulb out of the socket,

Install a new bulb, the lens and socket in the reverse order of removal.



**IGNITION SWITCH**

**INSPECTION**

Disconnect the ignition switch connectors.

Check for continuity between the connector terminals in each switch position.  
Continuity should exist between the color coded wires as follows:

Color Position	Black/white	Green	Red	Black
OFF	○ — ○			
ON			○ — ○	

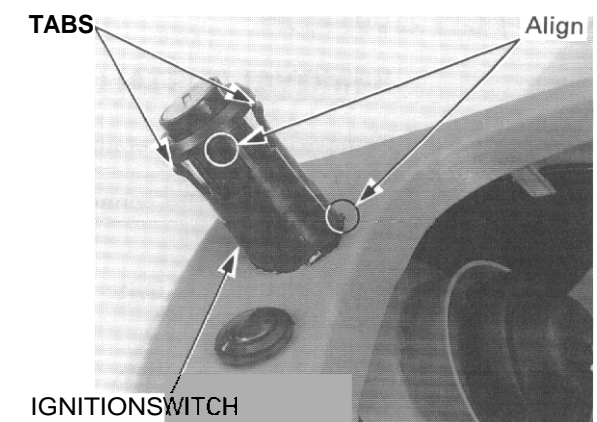
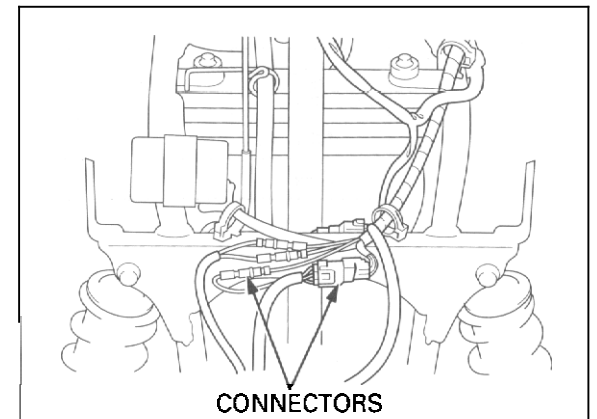
**REPLACEMENT**

Disconnect the ignition switch connectors.

Remove the ignition switch from the front fender while pushing in the two stopper tabs.

Install new ignition switch by aligning the lug with the groove in the front fender.

Connect the ignition switch connectors.



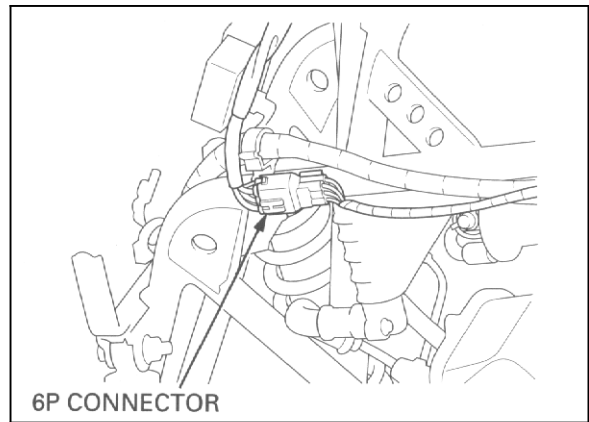


# HANDLEBAR SWITCH

## INSPECTION

Disconnect the handlebar switch **6P** connector.

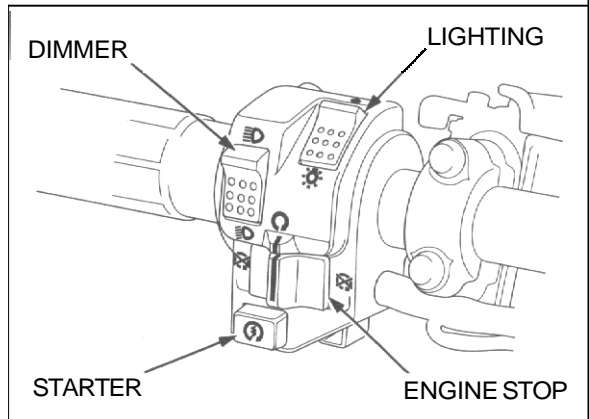
Check for continuity between the connector terminals in each switch position. Continuity should exist between the color coded wires as follows:



## ENGINE STOP SWITCH

Color Position	Black/white	Green
OFF		
RUN		
OFF		

Color Position	Black	I
FREE		



## LIGHTING SWITCH

Color Position	Black	Brown
OFF		
ON		

## DIMMER SWITCH

Color Position	Blue	I	White
HI			
{N}			
LO			

# CLUTCH SWITCH

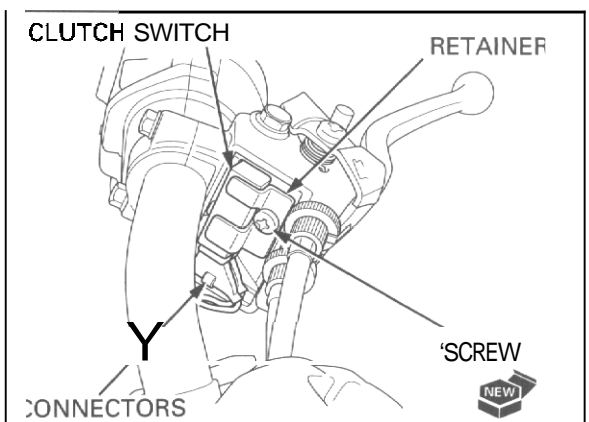
## REMOVAL/INSTALLATION

Remove the screw, retainer and clutch switch from the lever bracket.

Disconnect the wire connectors from the switch and remove the switch.

*Replace the screw with a new one.*

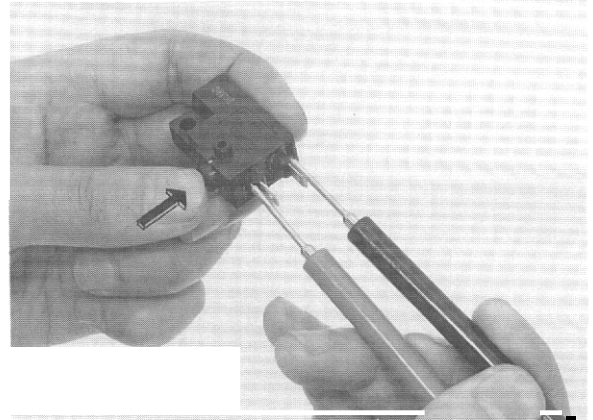
Install the clutch switch in the reverse order of removal.



## INSPECTION

Remove the clutch switch and check for continuity between the switch terminals.

There should be no continuity with the switch plunger pushed in, and continuity with the switch plunger released.



## 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.

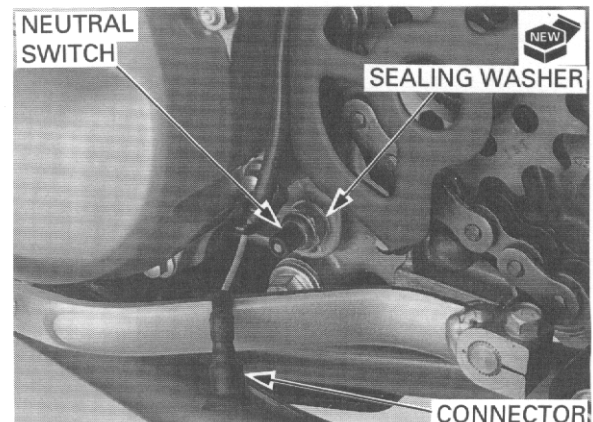
### REMOVAL/INSTALLATION

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: 13 N·m (1.3 kgf·m, 9 lbf·ft)**

Connect the neutral switch wire connector.



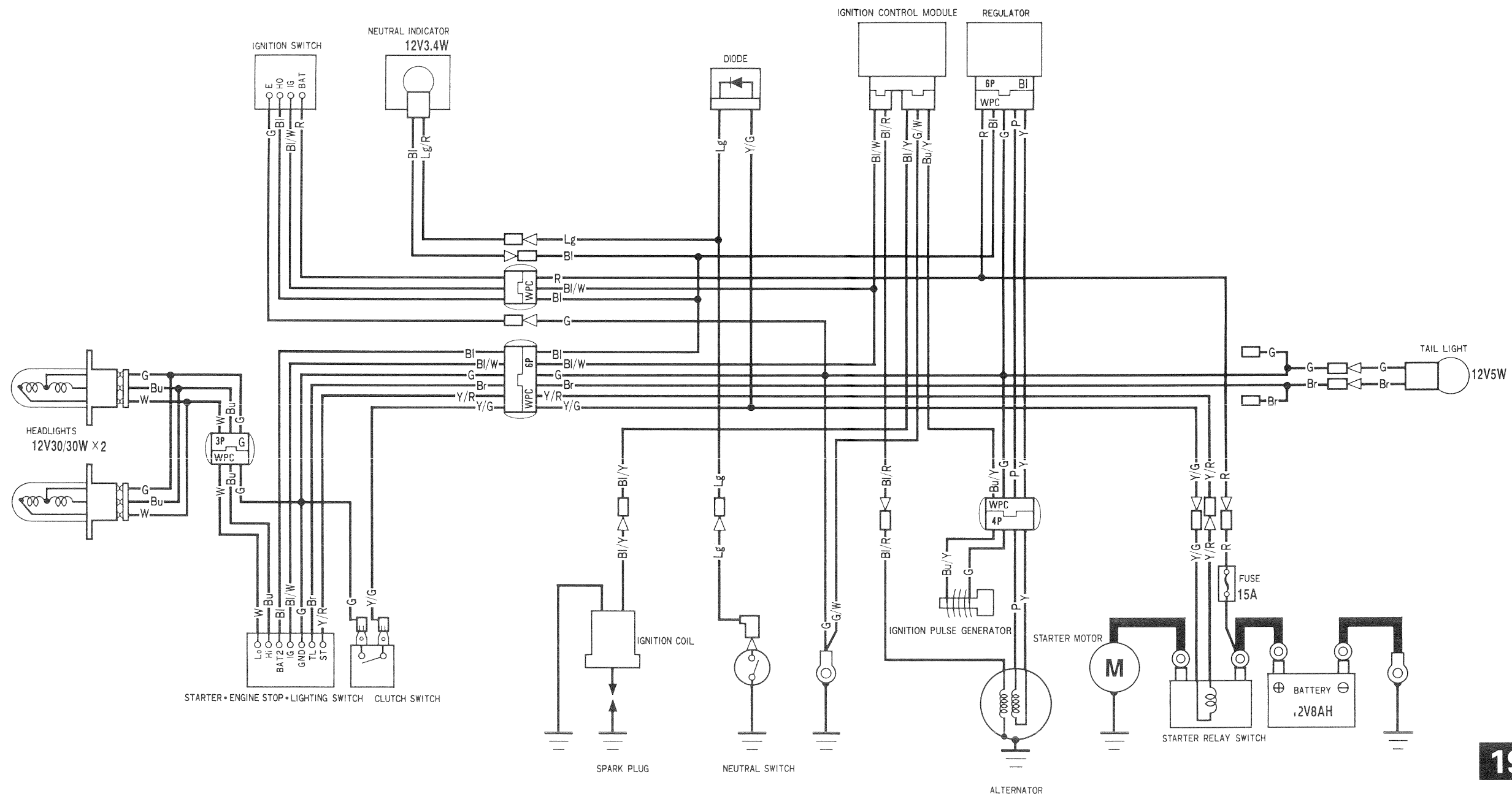
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**MEMO**

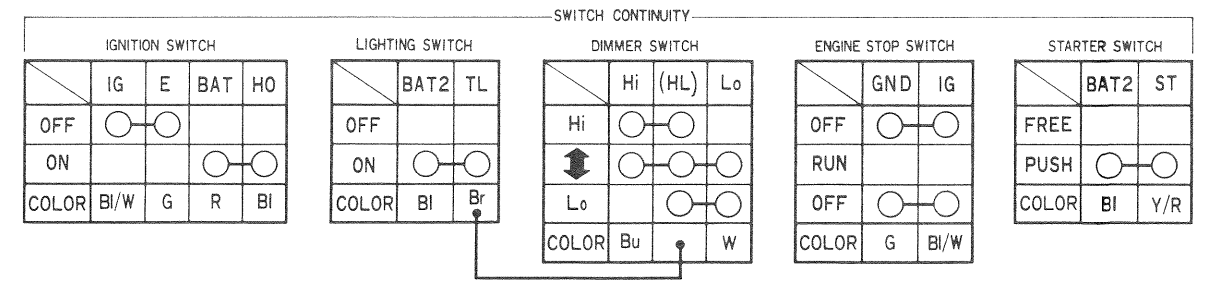


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# 19. WIRING DIAGRAM



19



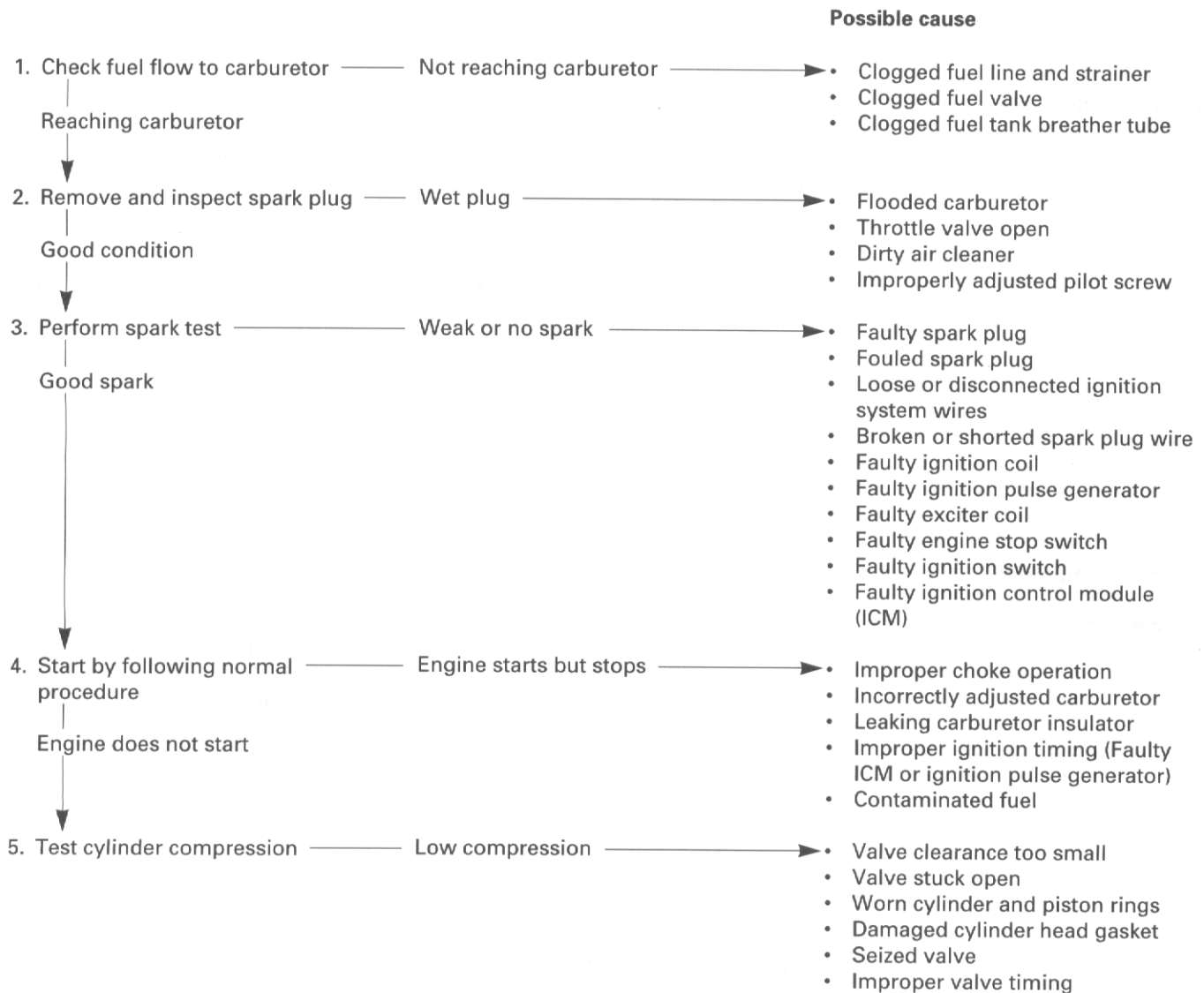
- BI ..... BLACK
- Y ..... YELLOW
- Bu ..... BLUE
- G ..... GREEN
- R ..... RED
- W ..... WHITE
- Br ..... BROWN
- O ..... ORANGE
- Lb ..... LIGHT BLUE
- Lg ..... LIGHT GREEN
- P ..... PINK
- Gr ..... GRAY

0030Z- HN1 -0000

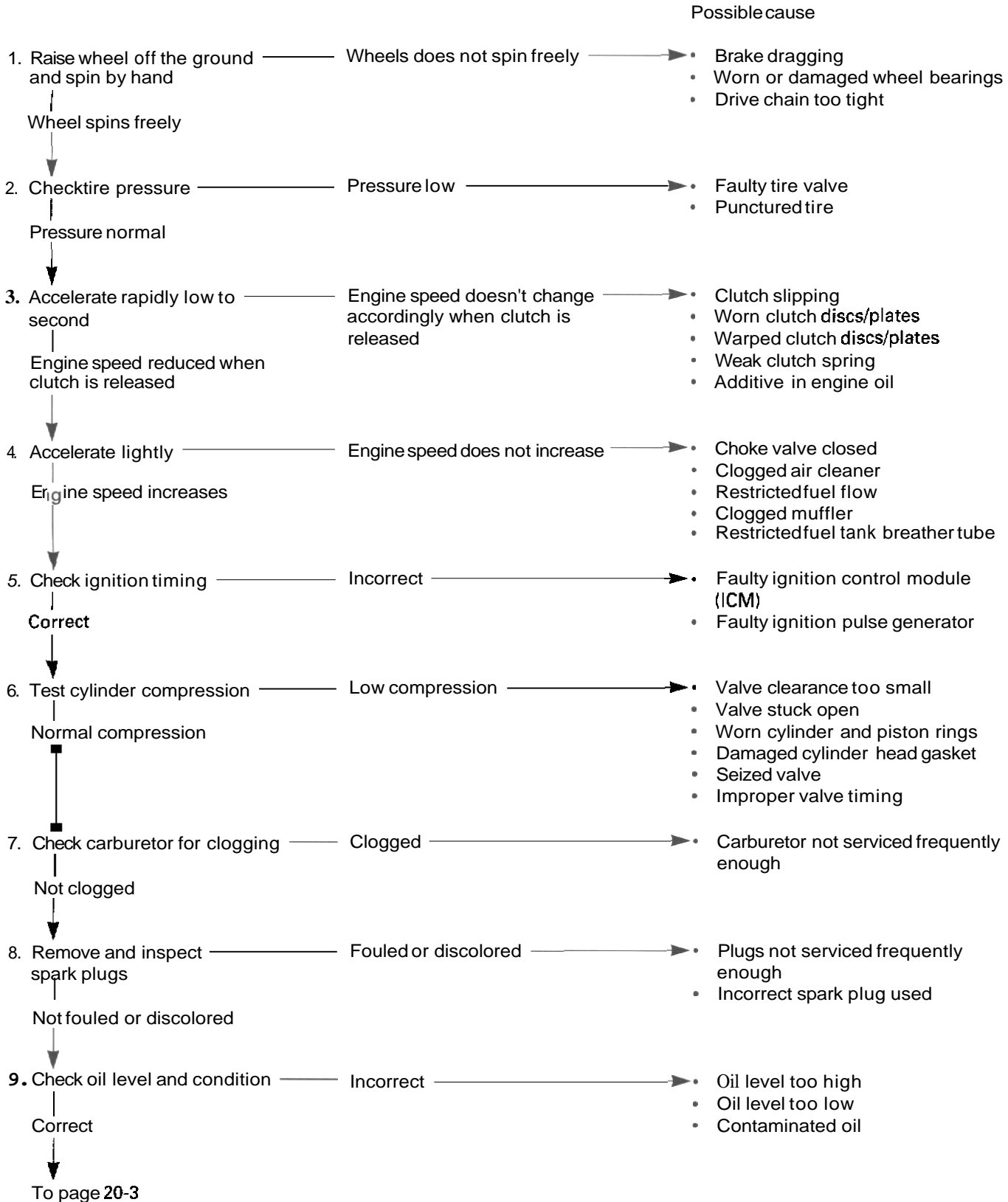
# 20. TROUBLESHOOTING

<b>ENGINE DOES NOT START OR IS HARD TO START</b>	<b>20-1</b>	<b>POOR PERFORMANCE AT HIGH SPEED</b>	<b>20-4</b>
<b>ENGINE LACKS POWER</b>	<b>20-2</b>	<b>POOR HANDLING</b>	<b>20-4</b>
<b>POOR PERFORMANCE AT LOW AND IDLE SPEED</b>	<b>20-3</b>		

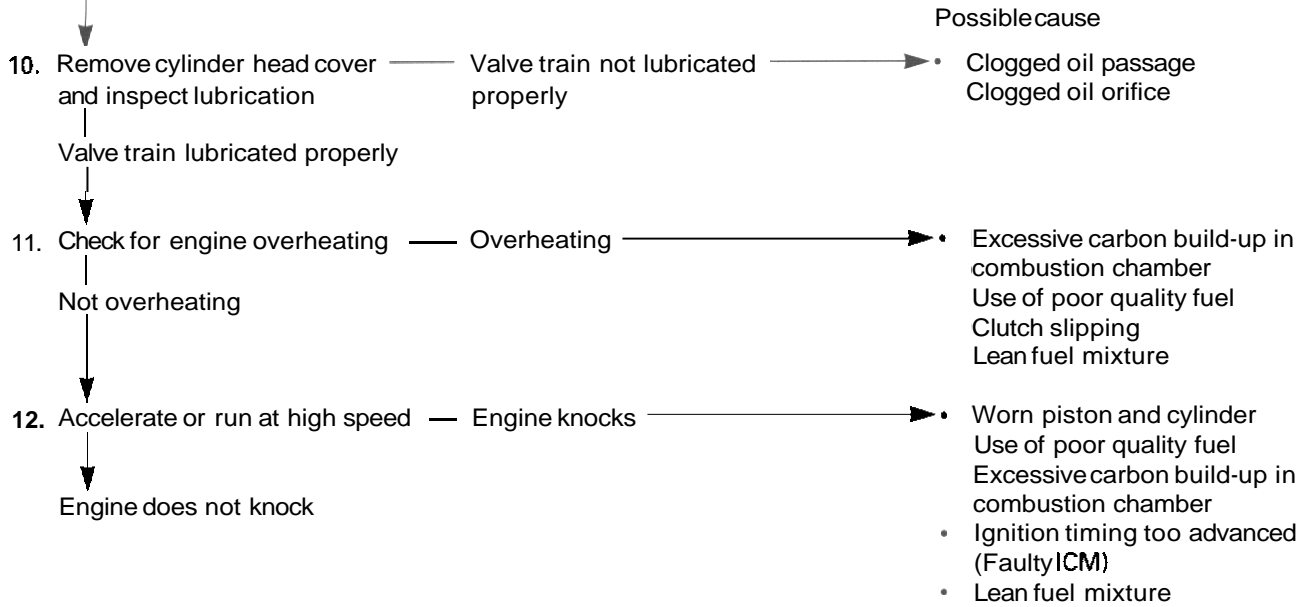
## ENGINE DOES NOT START OR IS HARD TO START



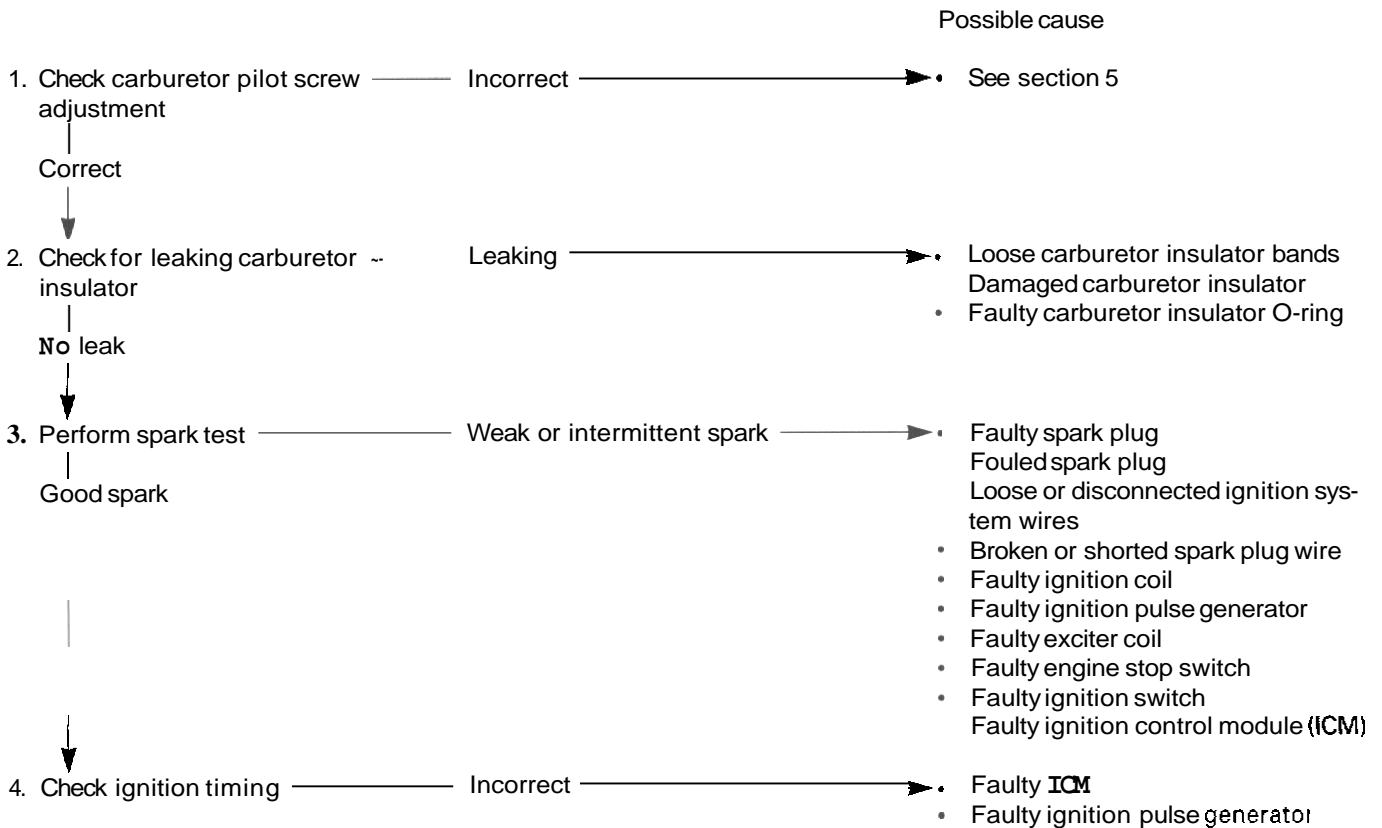
**ENGINE LACKS POWER**



From page 20-2



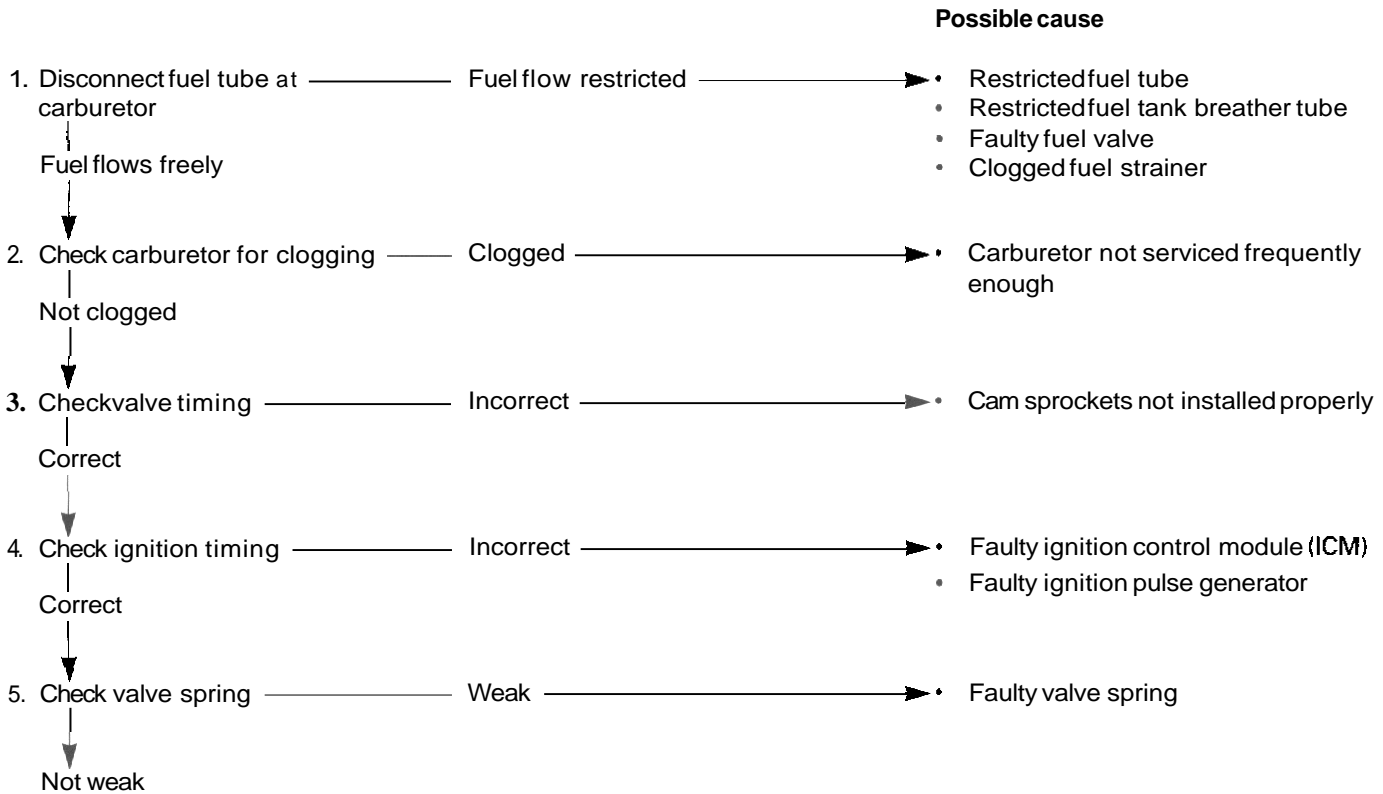
## POOR PERFORMANCE AT LOW AND IDLE SPEED



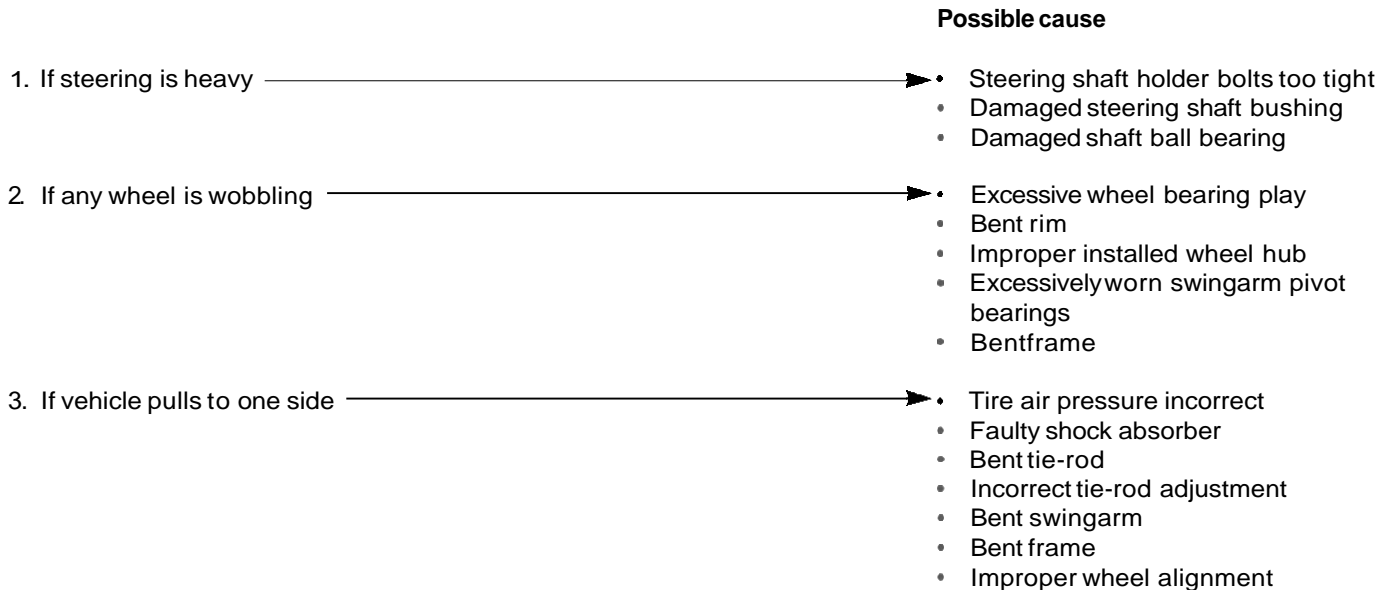
## TROUBLESHOOTING

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### POOR PERFORMANCE AT HIGH SPEED



### POOR HANDLING





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