NTV 600 / 650
REVERE

Workshop
Manual

HOW TO USE THIS MANUAL

This shop manual describes the servicing procedures for the NTV600, 650.
Throughout the manual, the following abbreviations are used to identify individual models.

CODE	AREA (TYPE)	CODE	AREA (TYPE)
E	U.K.	SW	Switzerland
F	France	NR	Norway
G	Germany: Full power	IT	Italy
G II	Germany: 50 PS limited	FI	Finland
G III	Germany: 27 PS limited	AR	Austria
ED	Europe Direct	SP	Spain
SA	South Africa	SD	Sweden
H	Netherland	B	Belgium
U	Australia	ND	Northern Europe

Follow the Maintenance Schedule (Section 3) recommendations to ensure that the motorcycle is in peak operating condition.
Performing the first scheduled maintenance is very important. It compensates for the initial wear that occurs during the break-in period.
Sections 1 through 3 apply to the whole motorcycle, while sections 4 through 20 describe parts of the motorcycle, grouped according to locations.
Find the section you want on this page, then turn to the table of contents on the first page of that 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 22 TROUBLESHOOTING.

CONTENTS

1 GENERAL INFORMATION

GENERAL SAFETY

⚠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.

⚠WARNING

The battery generates hydrogen gas which can be highly explosive. Do not smoke or allow flames or sparks near the battery, especially while charging it.

⚠WARNING

Inhaled asbestos fibers have been found to cause respiratory disease and cancer. Never use an air hose or dry brush to clean brake assemblies.

⚠WARNING

- *The rear 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.*

⚠WARNING

Gasoline is extremely flammable and is explosive under cetain conditions work in a well ventilated area with the engine stopped. Do not smoke or allow flames or sparks in the work area or where gasoline is stored.

⚠WARNING

The battery electrolyte contains sulfuric acid. Protect your eyes, skin and clothing. In case of contact, flush thoroughly with water and call a doctor if electrolyte gets in your eyes.

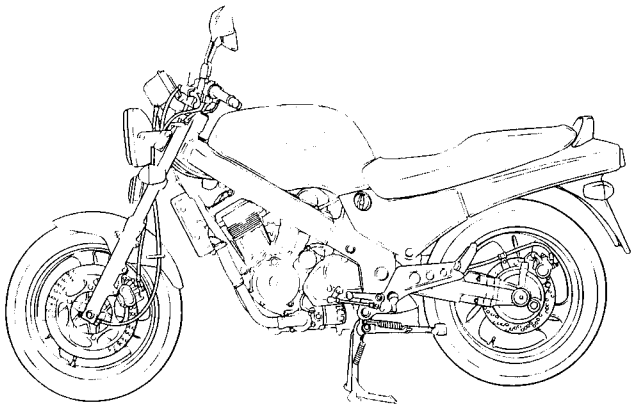
CAUTION:

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 adviseable to thoroughly wash your hands with soap and water as soon as possible after handling used oil.

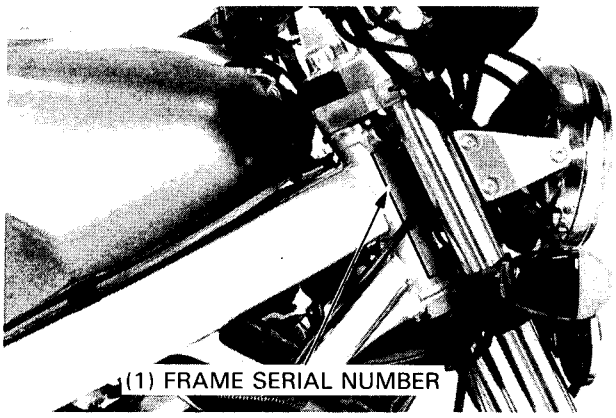
SERVICE RULES

1. Use genuine HONDA or HONDA-recommended parts and lubricants or their equivalents. Parts that don't meet HONDA's design specifications may damage to the vehicle.
2. Use the special tools designed for this product to avoid damage and incorrect assembly.
3. Use only metric tools when servicing the vehicle. 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 bolts first. Then tighten to the specified torque diagonally in 1-5 steps, unless a particular sequence is specified.
6. Clean parts in non-flammable or high flash point solvent upon disassembly. Lubricate any sliding surfaces before reassembly.
7. After reassembly, check all parts for proper installation and operation.
8. Route all wires as shown on pages 1-10 through 1-14, Cable and Harness Routing.

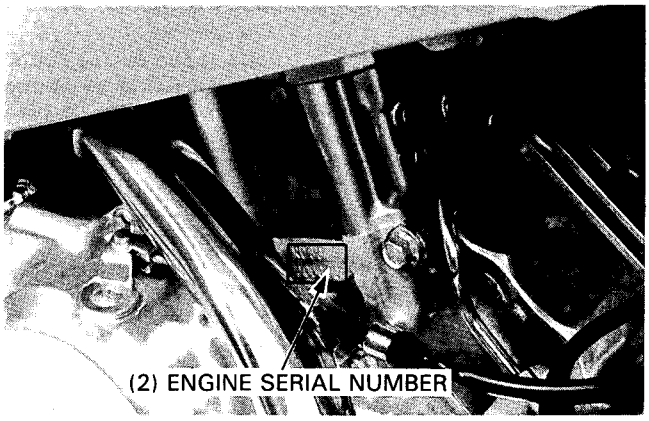
MODEL IDENTIFICATION



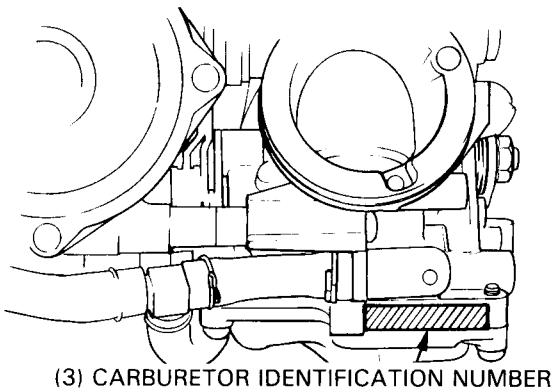
CODE	Engine Serial number	Frame Serial number
G, F, B, H, SW, AR, SP ED, IT, FI	RC33E-2000001~	RC33-2000001~
G II	RC33E-3000001~	RC33-3000001~
G III	RC33E-4000001~	RC33-4000001~
NTV600	PC22E-2000001~	PC22-2000001~



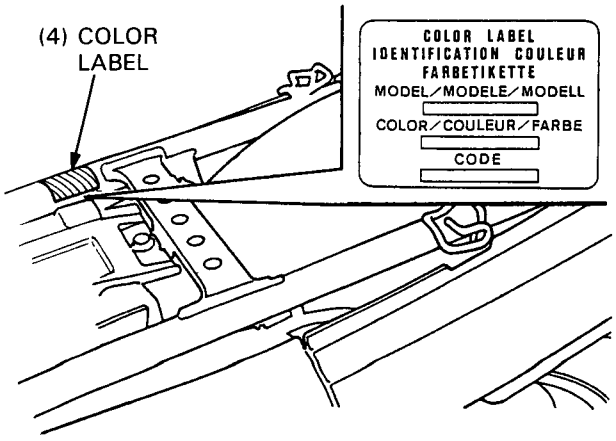
The frame serial number is stamped on the right side of the steering head.



The engine serial number is stamped on the right crankcase below the rear cylinder.



The carburetor identification numbers are on the carburetor body intake side.



The color label is attached to the rear upper pipe (right side) under the seat.
When ordering a color coded part, always specify its designated color code.

SPECIFICATIONS

ITEM				SPECIFICATIONS
DIMENSIONS	Overall length			[G, SW] 2,190 mm (86.22 in) [F, AR]: 2,150 mm (84.65 in) [FI] 2,235 mm (87.99 in)
	Overall width			710 mm (27.95 in)
	Overall height			1,080 mm (42.52 in)
	Wheelbase			1,465 mm (57.68 in)
	Seat height			780 mm (30.71 in)
	Foot peg height			335 mm (13.18 in)
	Ground clearance			150 mm (5.91 in)
	Dry weight			188 kg (414.5 lb) [SW] 189 kg (416.6 lb)
	Curb weight	Front axle		98 kg (216.0 lb) [SW] 99 kg (218.2 lb)
		Rear axle		110 kg (242.5 lb)
		Total		208 kg (458.6 lb) [SW] 209 kg (460.1 lb)
FRAME	Type			Twin hexagonal-section tube
	Front suspension/travel			Telescopic fork/130 mm (5.12 in)
		Tube diameter		41 mm (1.61 in)
	Caster angle			28°
	Trail length			119 mm (4.69 in)
	Fork oil capacity/level			405 cm³ (13.7 US oz, 14.2 Imp oz)/182 mm (7.17 in)
	Rear suspension/travel			Pro-Arm with mono-strut swingarm/120 mm (4.72 in)
	Vehicle capacity load			192 kg (423 lb)
	Front tire size			110/80-17 57H Tubeless type
	Rear tire size			150/70-17 69H Tubeless type
	Cold tire pressure	Rider only	Front	225 kPa (2.25 kg/cm², 33 psi)
			Rear	225 kPa (2.25 kg/cm², 33 psi)
		Rider and passenger	Front	225 kPa (2.25 kg/cm², 33 psi)
			Rear	280 kPa (2.80 kg/cm², 41 psi)
	Front brake, lining swept area			Hydraulic single disc, 262 x 2 cm² (40.6 x 2 sq in)
	Rear brake, lining swept area			Hydraulic single disc, 236 x 2 cm² (36.6 x 2 sq in)
	Fuel capacity			19.0 lit (5.02 US gal. 4.18 Imp gal)
	Fuel reserve capacity			2.5 lit (2.63 qt. 2.20 Imp qt)
ENGINE	Type			Liquid cooled twin, 4-stroke 6 valve SOHC (Single Over Head Camshaft) engine
	Cylinder arrangement			2 Cylinders 52°V
	Bore and stroke			NTV650: 79.0 x 66.0 mm (3.11 x 2.60 in) NTV600: 75.0 x 66.0 mm (2.95 x 2.60 in)
	Displacement			NTV650: 647 cm³ (39.5 cu-in) NTV600: 583 cm³ (35.6 cu-in)
	Compression ratio			NTV650: 9.2 : 1 NTV600: 9.2 : 1
	Valve train			Silent, multi-link chain drive and OHC with rocker arms
	Oil capacity	After disassembly		3.0 lit (3.15 US qt, 2.64 Imp qt)
		With oil filter		2.6 lit (2.73 US qt, 2.29 Imp qt)
		After draning		2.4 lit (2.52 US qt, 2.11 Imp qt)
	Coolant capacity	Total system		2.2 lit (2.31 US qt, 1.94 Imp qt)
		After draining		1.6 lit (1.68 US qt, 1.41 Imp qt)
	Lubrication system			Forced pressure and wet sump
	Air filtration			Paper filter, Cartridge type
	Cylinder compression/min⁻¹ (rpm)			1,275 ± 196 kPa (13 ± 2 kg/cm², 185 ± 28 psi)/400
	Intake valve	: Opens		10° BTDC — at 1 mm lift
		: Closes		40° ABDC — at 1 mm lift
	Exhaust valve	: Opens		40° BBDC — at 1 mm lift
		: Closes		10° ATDC — at 1 mm lift
	Valve clearance (cold)	Intake:		0.15 ± 0.02 mm
		Exhaust:		0.20 ± 0.02 mm
	Engine weight			80 kg (176 lb)
	Idle speed			NTV650: 1,100 ± 100 min⁻¹ (rpm) NTV650 [SW]: 1,200 ± 50 min⁻¹ (rpm) NTV600: 1,200 ± 100 min⁻¹ (rpm)

ITEM		SPECIFICATIONS
CARBURETION	Carburetor type	Slant type Constant Velocity dual carburetor
	Identification number	NTV650: VDG4A, [SW]: VDGPA, NTV600: VDF5A
	Float level	NTV650: 9.2 mm (0.36 in) NTV600: 7.0 mm (0.27 in)
DRIVE TRAIN	Clutch	Cable operating, multi-plate, wet
	Transmission	5-speed
	Primary reduction	NTV650: 1.763 (67/38) NTV600: 1.888 (68/36)
	Secondary reduction	0.882 (30/34)
	Third reduction	1.058 (18/17)
	Final reduction	2.909 (32/11)
	Gear ratio I	2.571 (36/14)
	Gear ratio II	1.882 (32/17)
	Gear ratio III	1.500 (30/20)
	Gear ratio IV	1.240 (31/25)
	Gear ratio V	1.074 (29/27)
	Gear shift pattern	Left foot operated return system, 1-N-2-3-4-5
	Final drive gear oil	Hypoid gear oil SAE #80
	—Oil capacity after disseembly	120 cm^3 (4.1 US oz, 4.2 Imp oz)
	—Oil capacity after draining	110 cm^3 (3.7 US oz, 3.9 Imp oz)
ELECTRICAL	Ignition	Digitalized full transistor ignition
	Ignition timing "F" mark	10° BTDC at idle
	Full advance	31° BTDC at 7,000 ± 200 min^{-1} (rpm)
	Starting system	Starter motor
	Alternator	345 W/5,000 min^{-1} (rpm)
	Battery capacity	12 V—8 Ah MF Battery
	Spark plug	

	NGK	ND
Standard	DPR8EA-9	X24EPR-U9
For cold climate (Below 5°C, 41°F)	DPR7EA-9	X22EPR-U9
For extended high speed riding	DPR9EA-9	X27EPR-U9

	Spark plug gap	0.80—0.90 mm (0.031—0.035 in)
	Firing order	Front—232° —Rear—488° —Front
	Fuse/Main fuse	10 A x 6, 15 A x 1/30 A
LIGHTS	Headlight (high/low beam)	12 V—60/55 W
	Tail/brakelight	12 V—5/21 W x 2
	Front turn signal light	12 V—21 W
	Rear turn signal light	12 V—21 W
	Position light	12 V—4 W
	Instrument light	12 V—3.4 W x 1, 1.7 W x 2
	High beam indicator	12 V—3.0 W
	Turn signal indicator	12 V—3.0 W x 2
	Neutral indicator	12 V—3.0 W
	Oil pressure warning indicator	LED
	Side stand switch indicator	LED

TORQUE VALUES

The torque specifications listed under "Engine" and "Frame" are for specific tightening points. If a specification is not listed, follow the standard torque values below.

STANDARD TORQUE VALUES

TYPE	TORQUE N·m (kg-m, ft-lb)	TYPE	TORQUE N·m (kg-m, ft-lb)
5 mm bolt, nut	5 (0.50, 3.6)	5 mm screw	4 (0.40, 2.9)
6 mm bolt, nut	10 (1.0, 7.2)	6 mm screw, 6 mm	
8 mm bolt, nut	22 (2.2, 16)	bolt with 8 mm head	9 (0.9, 6.5)
10 mm bolt, nut	35 (3.5, 25)	6 mm flange bolt, nut	12 (1.2, 9)
12 mm bolt, nut	55 (5.5, 40)	8 mm flange bolt, nut	27 (2.7, 20)
		10 mm flange bolt, nut	40 (4.0, 29)

ENGINE

Item	Q'ty	Thread dia. (mm)	Torque N·m (kg-m, ft-lb)	Remarks
Spark plug	4	12	14 (1.4, 10)	
Cylinder head cover bolt	4	6	10 (1.0, 7.2)	Special bolt
Camshaft holder bolt	6	8	23 (2.3, 17)	
nut	2	8	23 (2.3, 17)	
6 mm bolt	4	6	10 (1.0, 7.2)	
Cylinder head nut	8	10	48 (4.8, 35)	
bolt	2	8	23 (2.3, 17)	
8 mm nut	4	8	23 (2.3, 17)	
6 mm bolt	4	6	10 (1.0, 7.2)	Socket bolt
Camshaft sprocket bolt	4	7	23 (2.3, 17)	NOTE 1
Clutch lock nut	1	18	130 (13.0, 94)	Staked nut.
Right crankcase cover bolt	15	6	10 (1.0, 7.2)	
Left crankcase cover bolt	9	6	10 (1.0, 7.2)	
Oil filter cartridge	1	20	10 (1.0, 7.2)	Apply clean engine oil to the O-ring
Oil drain bolt	1	14	35 (3.5, 25)	
Neutral switch	1	10	12 (1.2, 9)	
Oil pressure switch	1	—	12 (1.2, 9)	NOTE 4
Primary drive gear bolt	1	12	90 (9.0, 65)	UBS bolt, NOTE 2
Flywheel bolt	1	12	130 (13.0, 94)	Left hand threads, NOTE 2
Starter one way clutch	6	8	30 (3.0, 22)	Torx bolt, NOTE 1
Oil control bolt	1	10	23 (2.3, 17)	
Oil pipe bolt	2	7	10 (1.0, 7.2)	Special bolt
Connecting rod cap nut	4	8	34 (3.4, 25)	
Mainshaft bearing set plate bolt	1	6	10 (1.0, 7,2)	NOTE 1
Countershaft bearing set plate bolt	3	6	10 (1.0, 7.2)	
Crankcase bolt	14	8	23 (2.3, 17)	NOTE 2
	6	6	12 (1.2, 9)	NOTE 2
Shift drum stopper plate bolt	1	6	26 (2.6, 19)	NOTE 1
Insulator band screw	4	5	4 (0.4, 2.9)	NOTE 2
Timing hole cap	1	14	10 (1.0, 7.2)	NOTE 3
Crankshaft hole cap	1	30	15 (1.5, 11)	NOTE 3
Oil pump driven sprocket bolt	1	6	15 (1.5, 11)	NOTE 1
Valve adjusting screw lock nut	6	7	23 (2.3, 17)	
Cylinder stud bolt 8 mm	2	8	20—30 (2.0—3.0, 14—22)	NOTE 1, Refer section 10.
10 mm	8	10	30—50 (3.0—5.0, 22—36)	NOTE 1, Refer section 10.

NOTE 1: Apply a locking agent to the threads.
NOTE 2: Apply clean engine oil to the threads.
NOTE 3: Apply molybdenum disulfide grease to the threads.
NOTE 4: Apply sealant to the threads.

ENGINE

Item	Q'ty	Thread dia. (mm)	Torque N·m (kg-m, ft-lb)	Remarks
Output drive shaft bolt	1	10	50 (5.0, 36)	Special bolt NOTE 2
Output gear case bolt	5	8	32 (3.2, 23)	UBS BOLT
Output drive shaft bearing lock nut				
: Inner	1	30	75 (7.5, 54)	Staked nut
: Outer	1	64	100 (10.0, 72)	Staked nut
Output driven gear bearing lock nut				
: Inner	1	30	75 (7.5, 54)	Staked nut
: Outer	1	64	100 (10.0, 72)	Staked nut
Output driven gear bearing holder bolt	4	8	32 (3.2, 23)	Socket bolt

NOTE 1: Apply a locking agent to the threads.
NOTE 2: Apply clean engine oil to the threads.
NOTE 3: Apply molybdenum disulfide grease to the threads.
NOTE 4: Apply sealant to the threads.

FRAME

Item	Q'ty	Thread dia. (mm)	Torque N·m (kg-m, ft-lb)	Remarks
Front engine bracket bolt	2	8	25 (2.5, 18)	
Front engine lower mounting bolt	1	10	40 (4.0, 29)	
Rear upper engine mounting bolt	1	10	40 (4.0, 29)	NOTE 2
Rear lower engine mounting bolt	1	10	40 (4.0, 29)	
—mounting bracket bolt	2	8	22 (2.2, 16)	
Gearshift arm bolt	1	6	12 (1.2, 9)	
Thermostatic switch	1	16	18 (1.8, 13)	
Exhaust pipe joint nut	4	8	27 (2.7, 20)	
Muffler band bolt	2	8	27 (2.7, 20)	
Muffler mounting bolt	2	8	27 (2.7, 20)	
Fuel tank mounting bolt: Front	1	6	12 (1.2, 9)	
: Rear	1	8	22 (2.2, 16)	
Front brake master cylinder holder	2	6	12 (1.2, 9)	
Brake oil bolt	4	10	30 (3.0, 22)	
Brake reservoir screw	4	4	1.5 (0.2, 1.4)	
Bleed valve	2	7	6 (0.6, 4.3)	
Front caliper mounting bolt	2	8	27 (2.7, 20)	Flange bolt
—caliper bracket pin bolt	1	8	13 (1.3, 10)	NOTE 1
—caliper pin bolt	1	8	23 (2.3, 17)	NOTE 1
Pad pin	2	10	17 (1.7, 12)	
Pad pin plug	2	10	2.5 (0.25, 1.8)	
Front brake disc retaining bolt	6	8	40 (4.0, 29)	NOTE 1
Rear brake disc retaining bolt	6	8	27 (2.7, 20)	NOTE 1
—master cylinder mounting bolt	2	6	12 (1.2, 9)	
—master cylinder joint pin nut	1	8	18 (1.8, 13)	
—brake reservoir hose joint screw	1	4	1.5 (0.2, 1.4)	
—caliper mounting bolt	2	8	27 (2.7, 20)	
—caliper pivot bolt	1	8	22 (2.2, 16)	
—caliper bracket pin bolt	1	8	23 (2.3, 17)	NOTE 1
Handlebar mounting bolt	6	8	30 (3.0, 22)	
Ignition switch mounting bolt	2	8	25 (2.5, 18)	
Fork pinch bolt (upper)	2	8	23 (2.3, 17)	
Fork pinch bolt (lower)	2	10	50 (5.0, 36)	NOTE 2

NOTE 1: Apply a locking agent to the threads.
NOTE 2: Apply clean engine oil to the threads.

FRAME

Item	Q'ty	Thread dia. (mm)	Torque N·m (kg-m, ft-lb)	Remarks
Fork cap bolt	2	39	23 (2.3, 17)	
Fork socket bolt	2	8	20 (2.0, 14)	NOTE 1
Steering bearing adjustment nut	1	26	22 (2.2, 16)	NOTE 2
Steering stem nut	1	24	105 (10.5, 76)	Flange nut
Front axle bolt	1	14	60 (6.0, 43)	
Front axle holder bolt	4	8	22 (2.2, 16)	
Rear wheel nut	1	18	120 (12.0, 87)	Apply clean grease to the axle threads
Rear wheel drive pin bolt	6	8	22 (2.2, 16)	NOTE 1
Shock absorber upper mounting bolt	1	12	95 (9.5, 69)	Flange bolt, NOTE 2
Shock absorber lower mounting bolt	1	10	45 (4.5, 33)	
Shock absorber damper rod lock nut	1	14	68 (6.8, 49)	NOTE 1
Swingarm left pivot bolt	1	23	100 (10.0, 72)	
Swingarm right pivot bolt	1	23	10 (1.0, 7.2)	
Swingarm right pivot lock nut	1	23	100 (10.0, 72)	
Final gear case nut	4	10	65 (6.5, 47)	
Final gear case oil filler cap	1	30	12 (1.2, 9)	Apply clean oil to the O-ring
Final gear case drain bolt	1	14	20 (2.0, 14)	
Pinion bearing retainer	1	64	110 (11.0, 80)	
Pinion nut	1	16	110 (11.0, 80)	NOTE 1
Final gear case cover bolt: 10 mm	2	10	48 (4.8, 35)	NOTE 1
: 8 mm	6	8	26 (2.6, 19)	NOTE 1
Foot peg bracket bolt	3	8	27 (2.7, 20)	
Rear brake pedal pivot bolt	1	8	27 (2.7, 20)	
Side stand pivot bolt	1	10	38 (3.8, 27)	
Center stand mounting bolt	2	8	30 (3.0, 22)	NOTE 1

NOTE 1: Apply a locking agent to the threads.

NOTE 2: Apply clean engine oil to the threads.

TOOLS

SPECIAL

Description	Tool number	Service items	NOTE	Refer to section(s)
Oil pressure gauge	07506—3000000		NOTE 1	2
Oil pressure gauge attachment	07510—4220100		NOTE 1	2
Oil filter wrench	07HAA—PJ70100		NOTE 1	2
Snap ring pliers	07914—3230001	Brake master cylinder	NOTE 1	16
Vacuum gauge	07404—0030000	Carburetor synchronize	NOTE 1	3
Valve adjusting wrench	07908—KE90000	Valve clearance		3
Valve guide driver attachment (IN)	07943—MF50100	Cylinder head		9
Valve guide driver attachment (EX)	07943—MF50200			
Valve guide reamer, 5.5 mm (IN)	07984—2000001			
Valve guide reamer, 6.6 mm (EX)	07984—ZE20001			
Clutch center holder	07923—KE10000	Clutch		7
Bearing remover set	07936—3710001	Mainshaft bearing: L		11
—remover handle	07936—3710100	Countershaft bearing: L		11
—bearing remover set	07936—3710600			
—remover weight	07741—0010201			
Main bearing driver attachment	07HMF—MM90400	Main bearing		12
Damper spring compressor	07964—ME90000	Output gear		12
Lock nut wrench 30/64 mm	07916—MB00001			
Main shaft holder	07923—6890101			
Bearing remover	07936—3710300			
Remover handle	07936—3710100			
Remover sliding weight	07741—0010000			
Bearing race insert attachment	07931—4630300			
Puller shaft	07931—ME40000	Final drive		13
Universal bearing puller	07631—0010000			
Retainer wrench	07910—MA10000			
Pinion joint holder	07924—ME40001	or modified		
Adjustable bearing remover set	07JAC—PH80000	07924—ME40000		
—adjustable bearing remover attachment	07JAC—PH80100			
—adjustable bearing remover shaft	07JAC—PH80200			
Remover sliding weight	07741—0010201			
Front hub base	07GAF—SE00401			
Steering stem socket	07916—3710100	Steering stem nut		14
Bearing race remover	07946—3710500	Steering inner race: Lower		14
Steering stem driver	07946—MB00000	Steering outer race: Lower		14
Ball race remover	07953—MJ10000	Steering upper race		14
—driver handle	07953—MJ10200			
—driver attachement	07953—MJ10100			
Fork seal driver	07947—KA50100	Fork		14
—driver attachment	07947—KF00100			
Shock absorber compressor	07967—KE10000	Shock absorber		15
Lock nut wrench	07908—KE90000	Swingarm pivot: R, lock nut		15
Pivot bearing outer remover	07936—4150000	Swingarm pivot bearing: L		15

NOTE 1: Equivalent commercially available.

COMMON

Description	Tool number	Service items	NOTE	Refer to section(s)
Float level gauge	07401—0010000	Carburetor	NOTE 1	4
Lock nut wrench 17 x 27 mm	07716—0020300	Clutch	NOTE 1	7
Extension bar	07716—0020500	Clutch, Steering stem		7, 14
Gear holder	07724—0010100	Primary drive gear	NOTE 1	7
Flywheel holder	07725—0040000	Flywheel	NOTE 1	8
Rotor puller	07733—0020001	Flywheel	NOTE 1	8
Valve spring compressor	07757—0010000	Valve spring	NOTE 1	9
Valve guide remover 5.5 mm	07742—0010100	Valve guide (IN)		9
Valve guide remover 6.6 mm	07742—0010200	Valve guide (EX)		9
Attachment 32 x 35 mm	07746—0010100	Swingarm pivot, Final gear		13, 15
Attachment 42 x 47 mm	07746—0010300	┬ Mainshaft bearing: L,		11
		├ Countershaft bearing: L, R		11
		└ F. wheel, Upper race		14
Attachment 52 x 55 mm	07746—0010400	┬ Mainshaft bearing: R,		11
		├ Lower race, Final gear		13, 14
		└ Output gear		12
Attachment 62 x 68 mm	07746—0010500	┬ Output gear		12
Inner driver 30 mm	07746—0030300	├		
Inner driver handle (C)	07746—0030100	├		
Inner driver 25 mm	07746—0030200	├		
Pilot 17 mm	07746—0040400	┘		
Pilot 20 mm	07746—0040500	┬ Output gear, F. wheel		12, 14
		└ Countershaft bearing: R		11
Pilot 22 mm	07746—0041000	Mainshaft bearing: R		11
Pilot 30 mm	07746—0040700	Output gear, Final gear		12, 13
Driver handle A	07749—0010000	Bearing outer		11, 12, 13, 14
Bearing remover shaft	07746—0050100	┬ F. wheel bearing		14
Bearing remover head 20 mm	07746—0050600	┘		

NOTE 1: Equivalent commercially available.

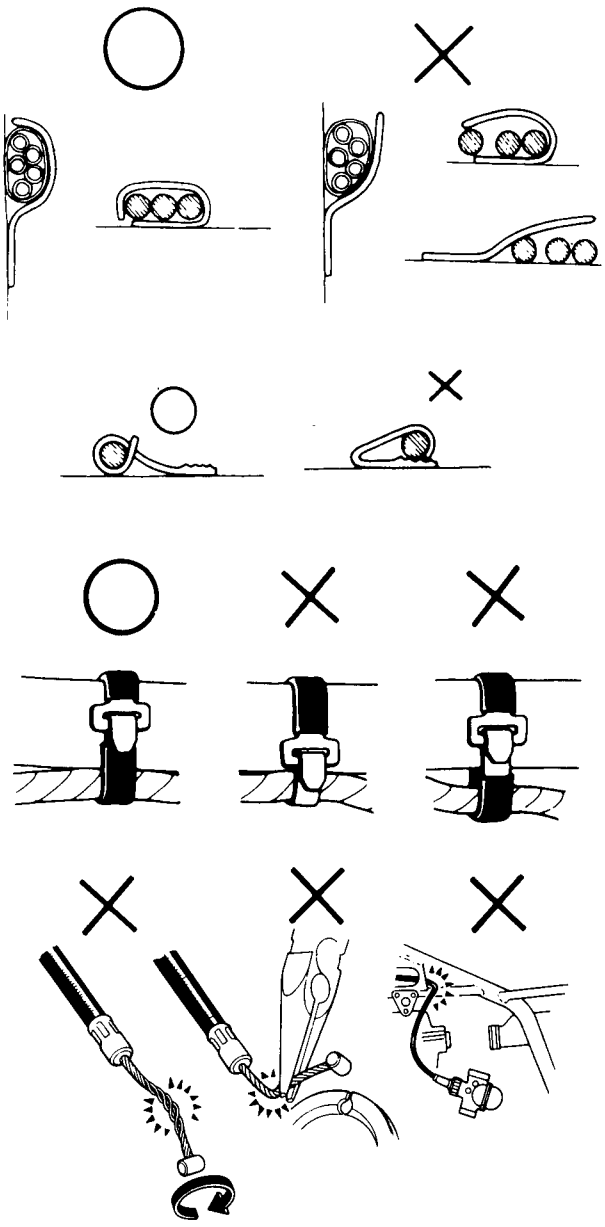
VALVE SEAT CUTTERS

Description	Tool number	Remarks
Valve seat cutter, 27.5 mm	07780—0010200	45° IN
Valve seat cutter, 35 mm	07780—0010400	45° EX
Valve seat cutter, 28 mm	07780—0012100	32° IN
Valve seat cutter, 35 mm	07780—0012300	32° EX
Valve seat cutter, 30 mm	07780—0014000	60° IN
Valve seat cutter, 37.5 mm	07780—0014100	60° EX
Cutter holder, 5.5 mm	07781—0010101	Valve guide IN
Cutter holder, 6.6 mm	07781—0010201	Valve guide EX

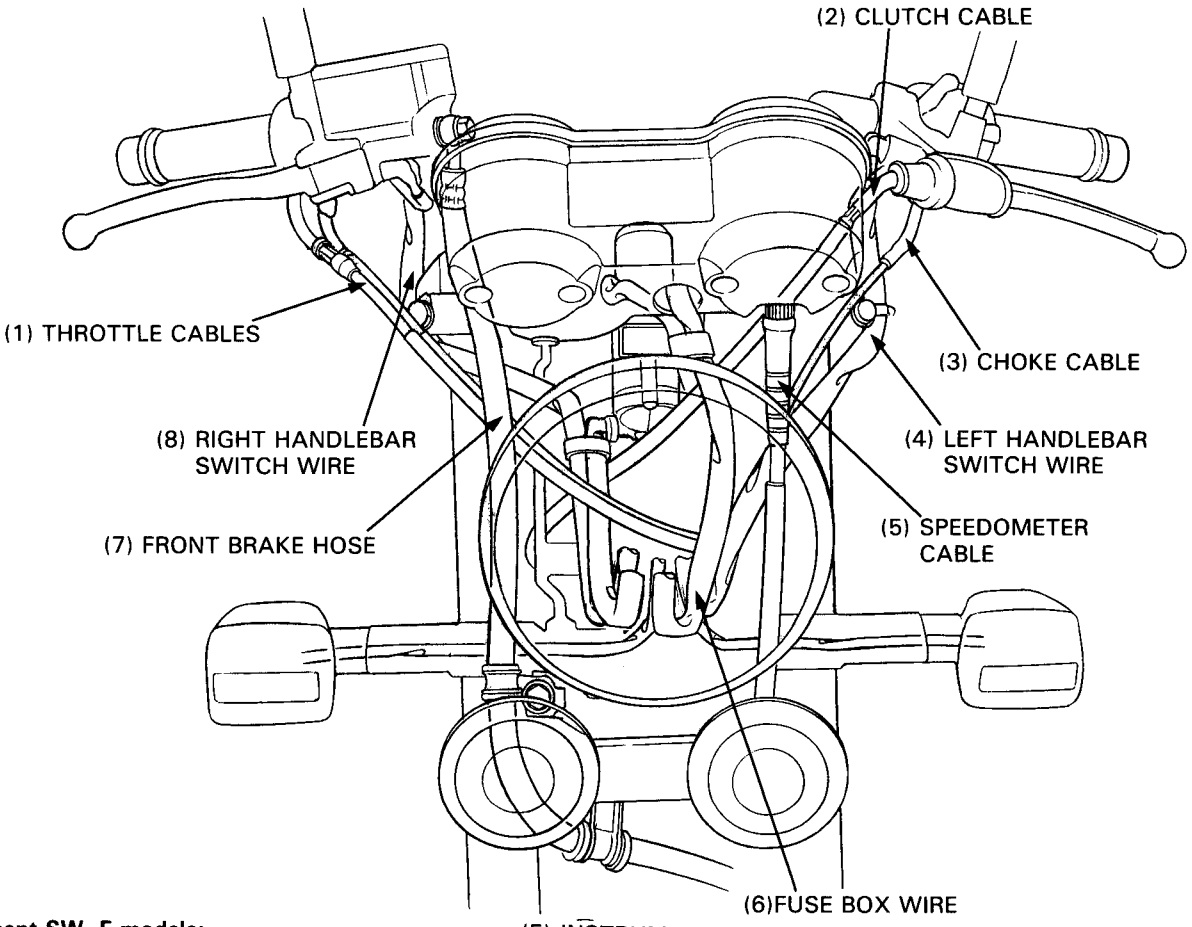
CABLE & HARNESS ROUTING

Note the following when routing cables and wire harnesses:

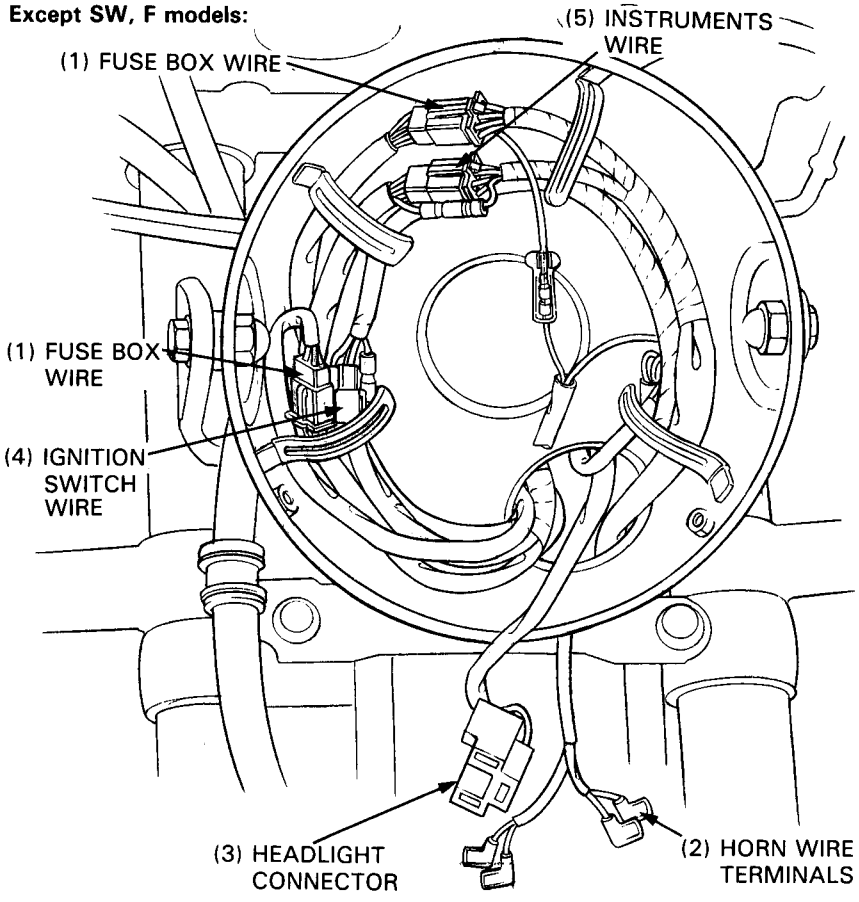
- A loose wire, harness or cable can be a safety hazard. After clamping, check each wire to be sure it is secure.
- Do not squeeze wires against welds or clamps.
- Secure wires and wire harnesses to the frame with their respective wire bands at the designated locations. Tighten the bands so that only the insulated surfaces contact the wires or wire harnesses.
- Route harnesses so they are neither pulled taut nor have excessive slack.
- Protect wires and harnesses with electrical tape or a tubing if they contact a sharp edge or corner. Clean the attaching surface thoroughly before applying tape.
- Do not use a wire or harness with broken insulation. Repair by wrapping them with protective tape or replace them.
- Route wire harnesses to avoid sharp edges or corners. Also avoid the projected ends of bolts and screws.
- Keep wire harnesses away from the exhaust pipes and other hot parts.
- Be sure grommets are seated in their grooves properly.
- After clamping, check each harness to be certain that it does not interfere with any moving or sliding parts.
- After routing, check that the wire harnesses are not twisted or kinked.
- Wire harnesses routed along the handlebars should not be pulled taut, have excessive slack, be pinched by or interfere with adjacent or surrounding parts in all steering positions.
- Do not bend or twist the control cables.
  Damaged control cables will not operate smoothly and may stick or bind.

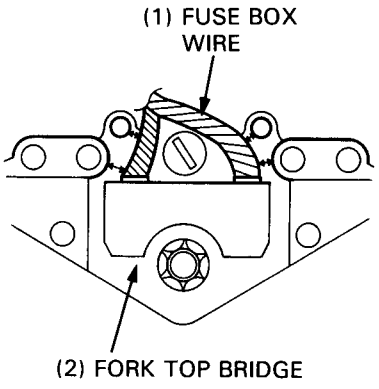


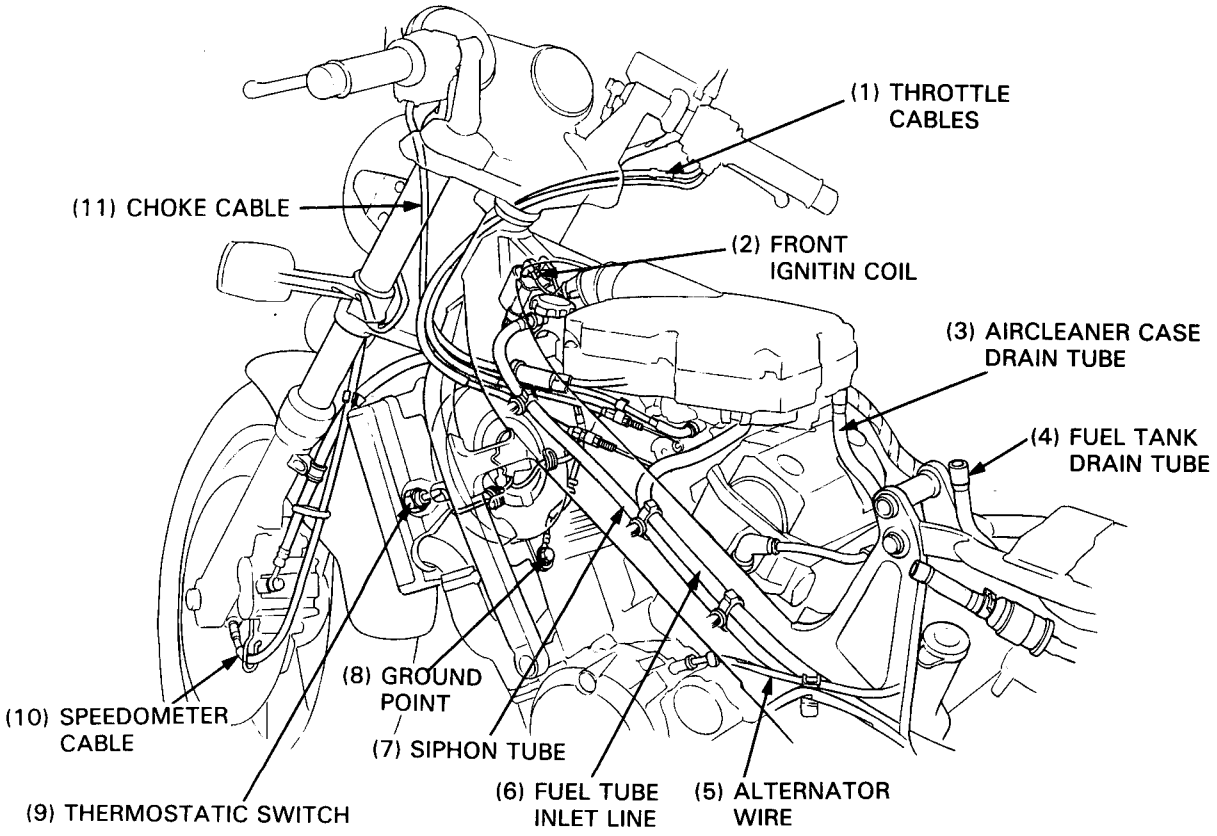
O: CORRECT
×: INCORRECT

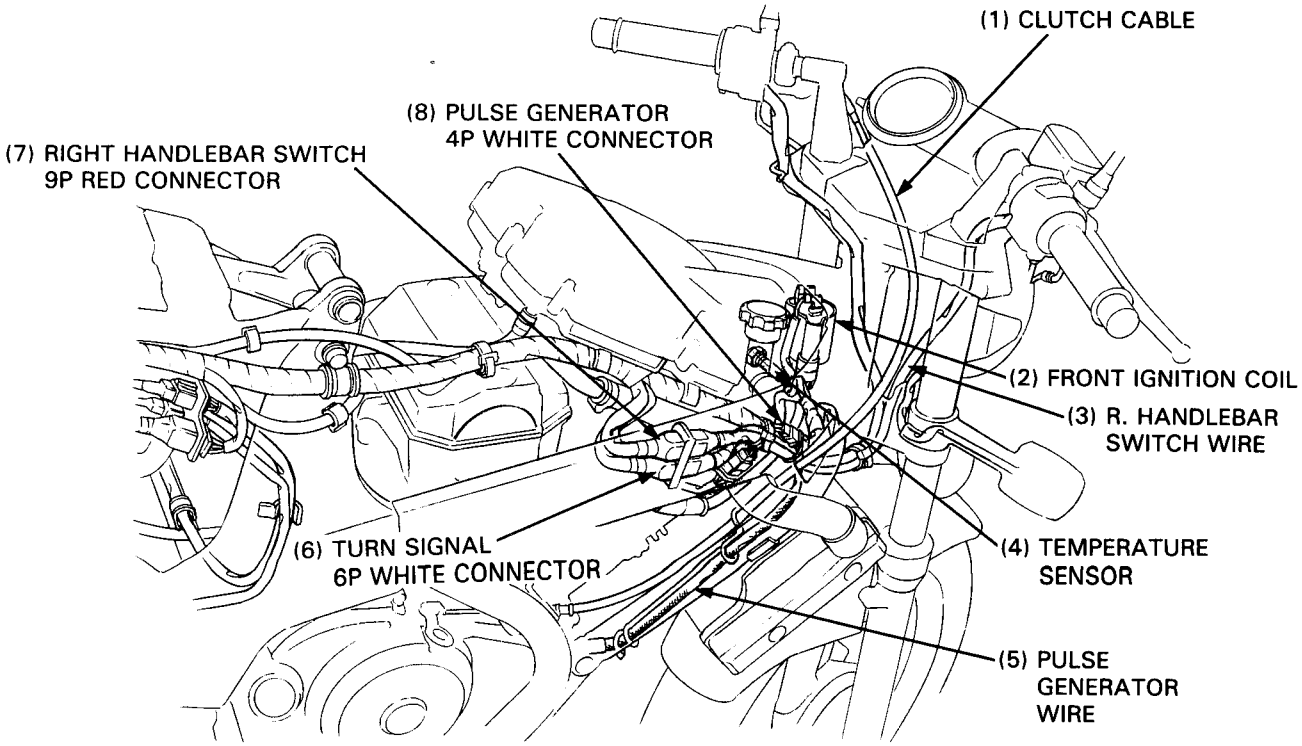


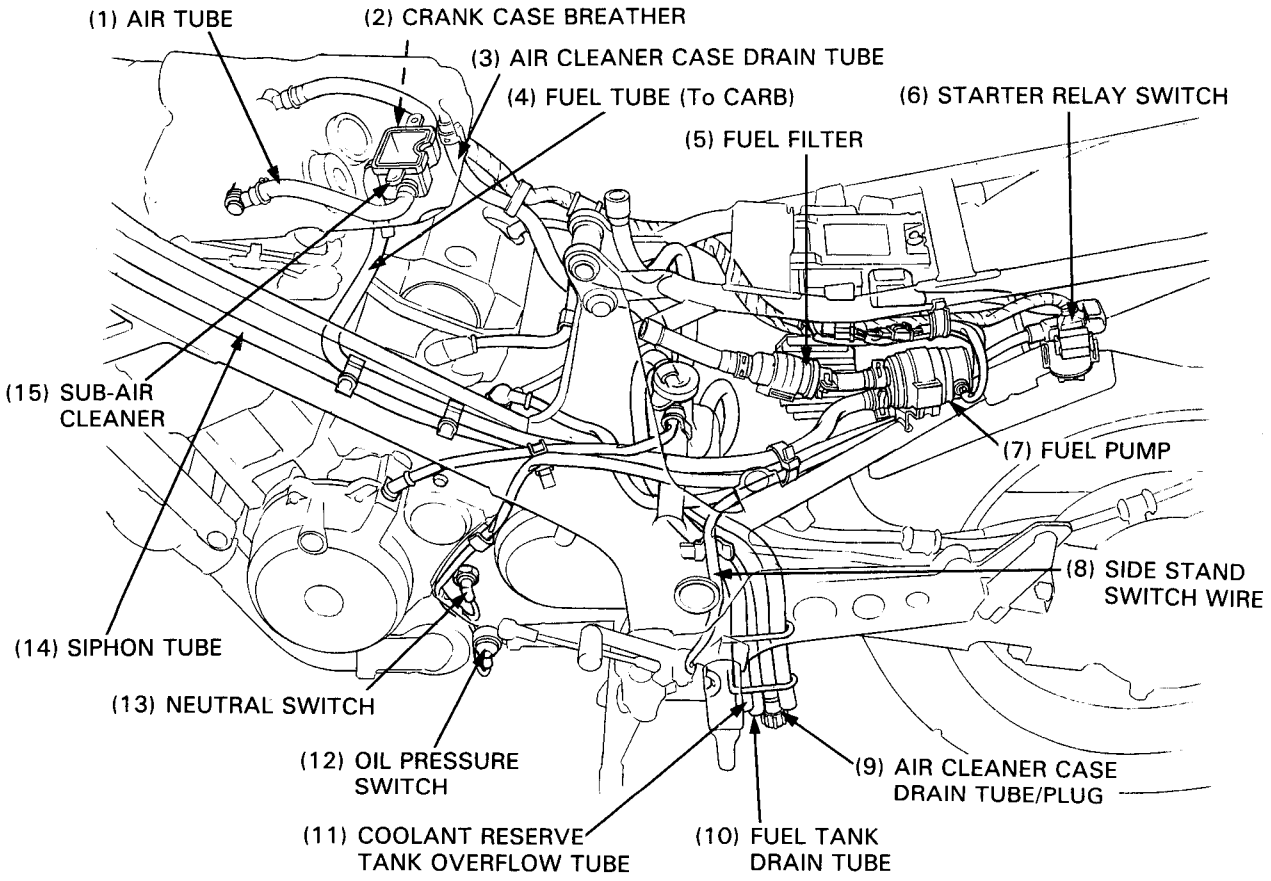
Except SW, F models:

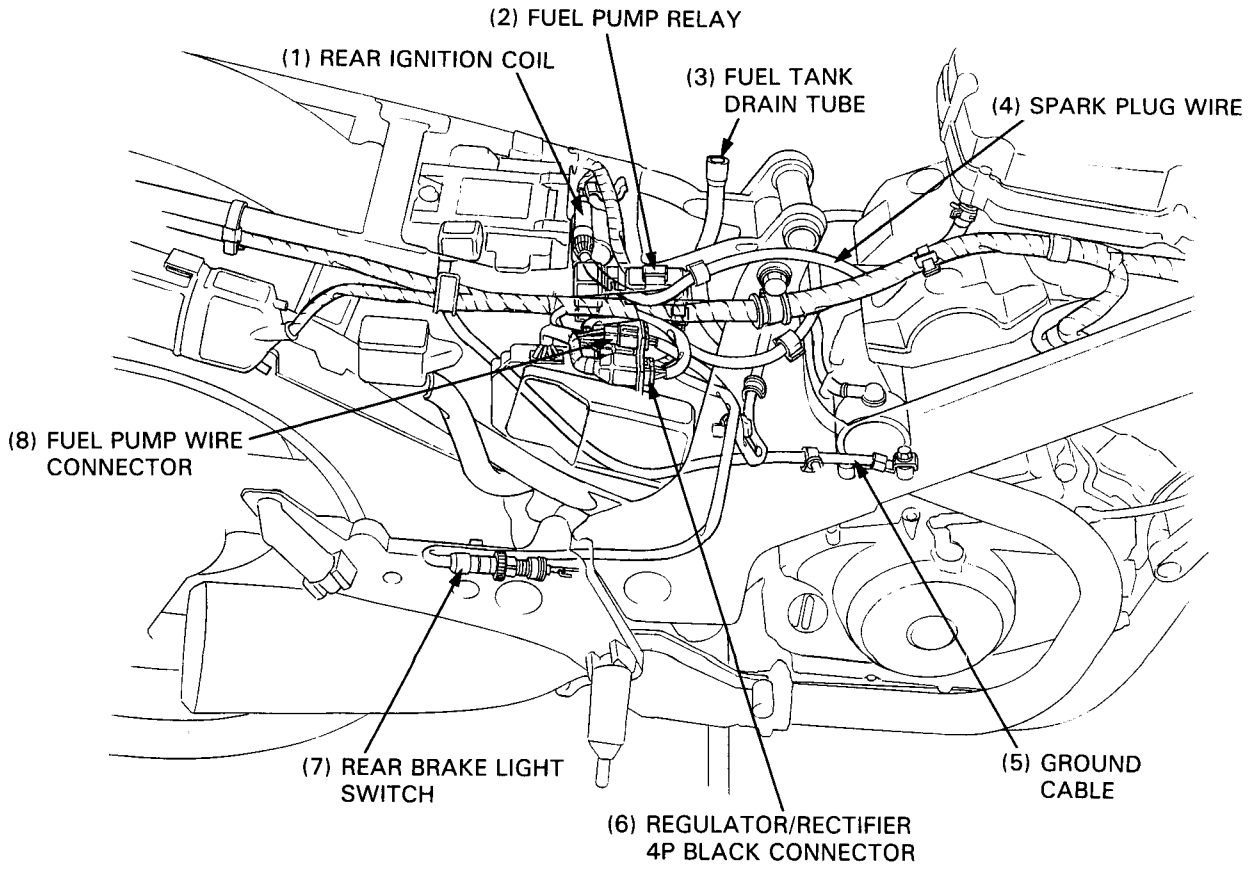


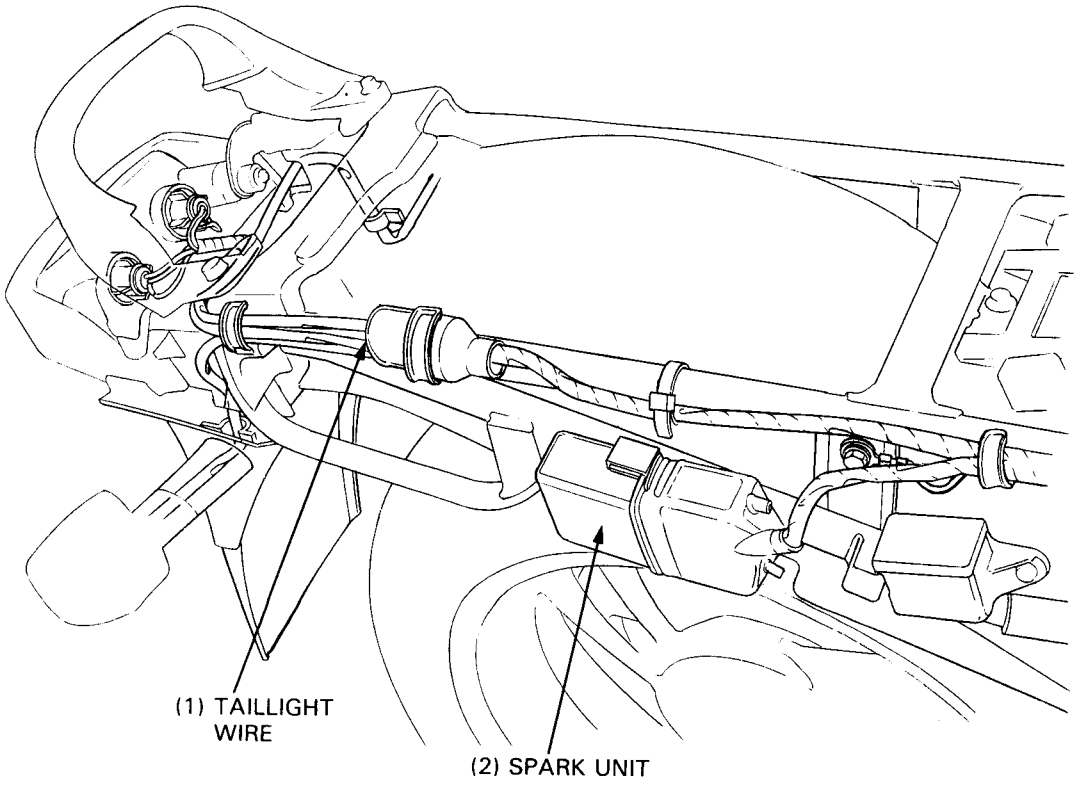



(1) THROTTLE CABLES
(11) CHOKE CABLE
(2) FRONT IGNITIN COIL
(3) AIRCLEANER CASE DRAIN TUBE
(4) FUEL TANK DRAIN TUBE
(10) SPEEDOMETER CABLE
(8) GROUND POINT
(7) SIPHON TUBE
(9) THERMOSTATIC SWITCH
(6) FUEL TUBE INLET LINE
(5) ALTERNATOR WIRE


(1) CLUTCH CABLE
(8) PULSE GENERATOR 4P WHITE CONNECTOR
(7) RIGHT HANDLEBAR SWITCH 9P RED CONNECTOR
(2) FRONT IGNITION COIL
(3) R. HANDLEBAR SWITCH WIRE
(6) TURN SIGNAL 6P WHITE CONNECTOR
(4) TEMPERATURE SENSOR
(5) PULSE GENERATOR WIRE


(1) AIR TUBE
(2) CRANK CASE BREATHER
(3) AIR CLEANER CASE DRAIN TUBE
(4) FUEL TUBE (To CARB)
(5) FUEL FILTER
(6) STARTER RELAY SWITCH
(15) SUB-AIR CLEANER
(7) FUEL PUMP
(8) SIDE STAND SWITCH WIRE
(14) SIPHON TUBE
(13) NEUTRAL SWITCH
(12) OIL PRESSURE SWITCH
(9) AIR CLEANER CASE DRAIN TUBE/PLUG
(11) COOLANT RESERVE TANK OVERFLOW TUBE
(10) FUEL TANK DRAIN TUBE


(2) FUEL PUMP RELAY
(1) REAR IGNITION COIL
(3) FUEL TANK DRAIN TUBE
(4) SPARK PLUG WIRE
(8) FUEL PUMP WIRE CONNECTOR
(7) REAR BRAKE LIGHT SWITCH
(5) GROUND CABLE
(6) REGULATOR/RECTIFIER 4P BLACK CONNECTOR


(1) TAILLIGHT WIRE
(2) SPARK UNIT

EMISSION CONTROL SYSTEMS

SOURCE OF EMISSIONS

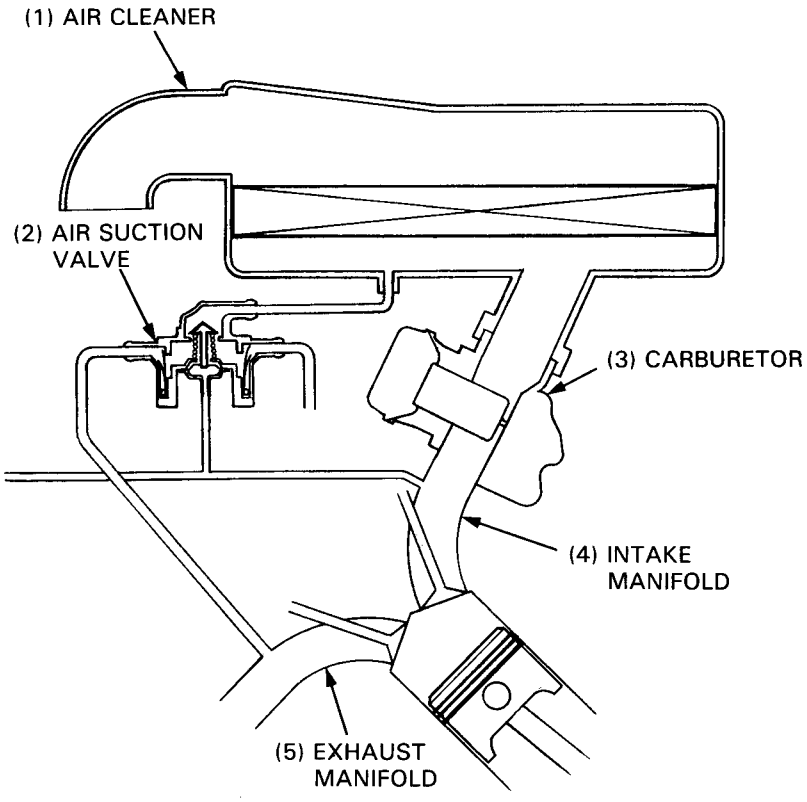
The combustion process produces carbon monoxide and hydrocarbons. Control of hydrocarbons is very important because, under certain conditions, they react to form photochemical smog when subjected to sunlight. Carbon monoxide does not react in the same way, but it is toxic.

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

EXHAUST EMISSION CONTROL SYSTEM (SW model only)

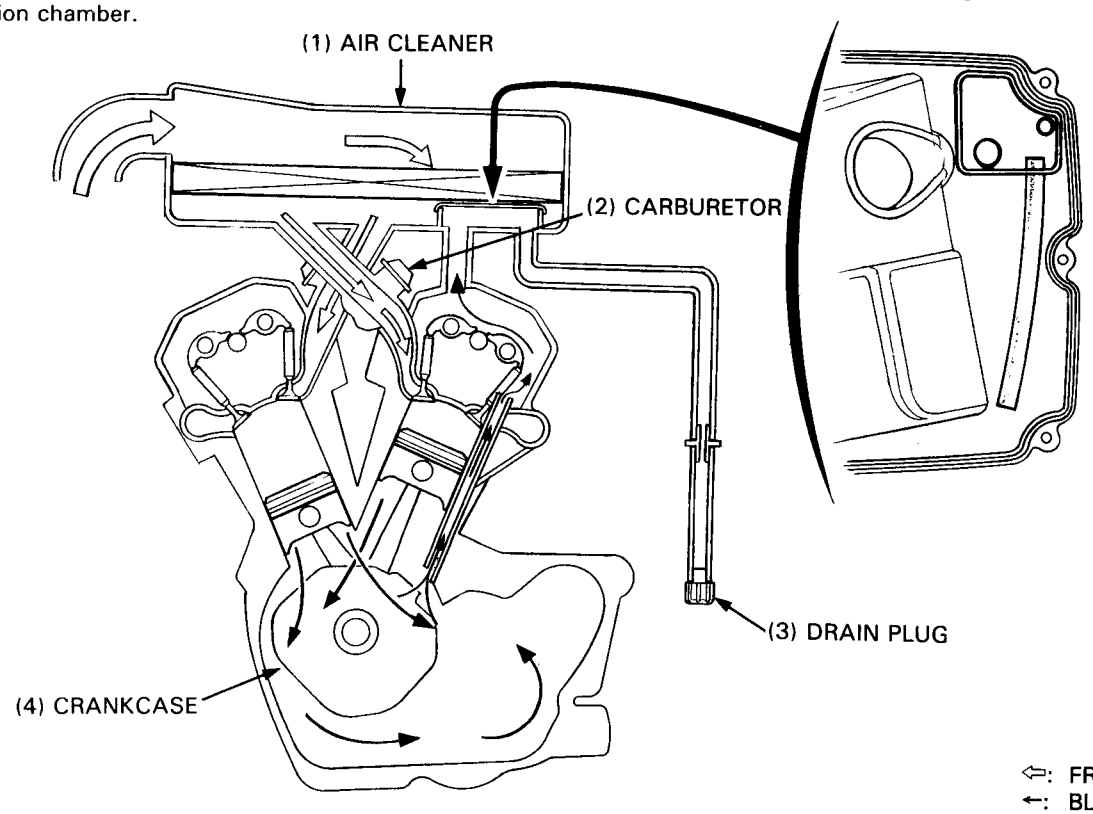
Lean setting carburetor by factory preset:
The exhaust emission control system is composed of a lean carburetor setting, and no adjustments should be made except idle speed adjustment with the throttle stop screw. The exhaust emission control system is separate from the crankcase emission control system.

Secondary air supply system:
The exhaust emission control system consists of a secondary air supply system which introduces filtered air into the exhaust gases in the exhaust port. No adjustments to this system should be made, although periodic inspection of the components is recommended. The secondary air supply system helps improve emission performance.



CRANKCASE EMISSION CONTROL SYSTEM (All models:)

The engine is equipped with a closed crankcase system which routes crankcase emissions through the air cleaner into the combustion chamber.



NOISE EMISSION CONTROL SYSTEM (AR only:)

TAMPERING WITH THE NOISE CONTROL SYSTEM IS PROHIBITED: Federal law prohibits 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; or (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 motorcycle, or parts of the exhaust or intake system, with parts other than those specified by the manufacturer.

LUBRICATION

SERVICE INFORMATION

⚠ 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.*

CAUTION

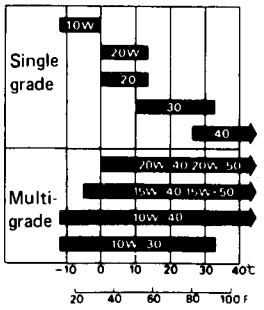
- *Used engine oil may cause skin cancer if repeatedly left in contact with the skin for prolonged periods. Although this is unlikely unless you handle used oil on a daily basis, it is still advisable to thoroughly wash your hands with soap and water as soon as possible after handling used oil.*

GENERAL

- The oil pump can be serviced after removing the engine from the frame.

SPECIFICATIONS

Engine oil

Oil capacity	3.0 lit (3.15 US qt, 2.64 Imp qt) after disassembly. 2.6 lit (2.73 US qt, 2.29 Imp qt) at oil filter and oil change. 2.4 lit (2.52 US qt, 2.11 Imp qt) after draining.
Oil recommendation	HONDA 4 stroke oil or equivalent API service classification: SE or SF VISCOSITY: SAE 10W–40 Other viscosities shown in the chart may be used when the average temperature in your riding area is within the indicated range. Oil recommendation 

Oil pump

ITEM	STANDARD	SERVICE LIMIT
Rotor tip clearance	0.15 mm (0.006 in)	0.20 mm (0.008 in)
Pump body clearance	0.15–0.22 mm (0.006–0.009 in)	0.35 mm (0.014 in)
Pump end clearance	0.02–0.07 mm (0.001–0.003 in)	0.10 mm (0.004 in)
Oil pressure (80°C/176°F)	441 kPa (4.5 kg/cm², 64 psi) at 6,000 min⁻¹ (rpm)	—

Final drive gear oil

Oil capacity	120 cm³ (4.1 US oz, 4.2 Imp oz) after disassembly 110 cm³ (3.7 US oz, 3.9 Imp oz) after draining
Recommended oil	Hypoid gear oil: SAE #80

TORQUE VALUES

Engine oil drain plug	35 N·m (3.5 kg-m, 25 ft-lb)
Engine oil filter	10 N·m (1.0 kg-m, 7.2 ft-lb)
Oil pressure switch	12 N·m (1.2 kg-m, 9 ft-lb) — Apply 3-BOND® No. 1211 or its equivalent to the
Oil pump driven sprocket bolt	18 N·m (1.8 kg-m, 13 ft-lb) bolt threads.
Final drive gear case oil filler cap	12 N·m (1.2 kg-m, 9 ft-lb)
— Oil drain bolt	20 N·m (2.0 kg-m, 14 ft-lb)

TOOLS

Special

Oil pressure gauge	07506—3000000
Oil pressure gauge attachment	07510—4220100 or equivalent commercially available
Oil filter wrench	07HAA—PJ70100

TROUBLESHOOTING

Oil level too low—high oil consumption
- External oil leaks
- Worn piston rings
- Worn valve guide or seal

Oil contamination
- Oil or filter not changed often enough
- Head gasket faulty
- Worn piston rings

Low oil pressure
- Oil level low
- Pressure relief valve stuck open
- Plugged oil pick-up screen
- Oil pump worn
- External oil leaks

High oil pressure
- Pressure relief valve stuck open
- Plugged oil filter, gallery, or metering orifice
- Incorrect oil being used

No oil pressure
- Oil level low
- Oil pump drive chain broken
- Oil pump faulty
- Internal oil leakage

ENGINE OIL LEVEL

Place the motorcycle on its center stand and shift into neutral.

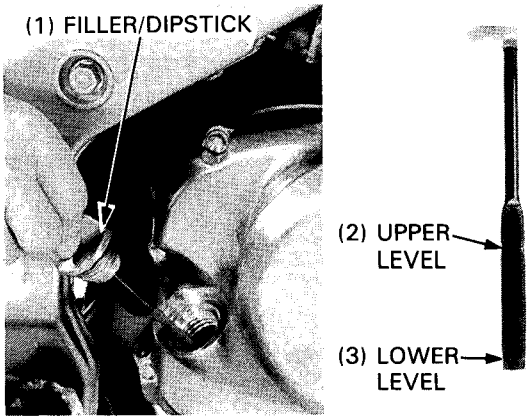
Start the engine and let it idle for a few minutes.

Stop the engine, remove the oil filler cap/dipstick and wipe it clean.
Check the oil level with the oil filler cap/dipstick by inserting it without screwing it in.

NOTE

- Do not screw the cap in when making this check.

If the oil level is below the lower level mark on the dipstick, fill to the upper level mark with the recommended oil.
Check the O-ring for damage.

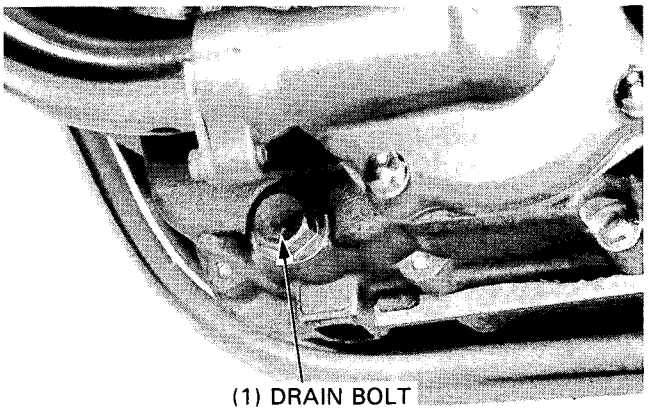


ENGINE OIL CHANGE

NOTE

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

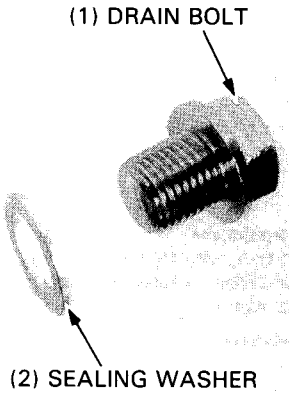
Remove the oil filler cap/dipstick and drain bolt.
With the engine stop switch OFF, start the starter motor for few seconds to drain any oil which may be left in the engine.



NOTE

- Do not operate the motor for more than few seconds.

After the oil has drained, check that the drain bolt sealing washer is in good condition, and install the bolt.



TORQUE: 35 N·m (3.5 kg-m, 25 ft-lb)

Fill the crankcase with the correct quantity of the recommended oil.

OIL CAPACITY:
3.0 lit (3.15, US qt, 2.64 Imp qt) after disassembly)
2.6 lit (2.73 US qt, 2.29 Imp qt) at oil filter and oil change
2.4 lit (2.52 US qt, 2.11 Imp qt) after draining

RECOMMENDED OIL: Honda 4-stroke oil or qeuivalent
API service classification: SE or SF
VISCOSITY: SAE 10W–40

Install the oil filler cap/dipstick.
Start the engine and let it idle for 2–3 minutes.

Stop the engine and wait a few minutes, then check that the oil level is at the upper level mark.

Check that there are no oil leaks.

OIL FILTER CHANGE

Drain the engine oil (page 2-3).

CAUTION

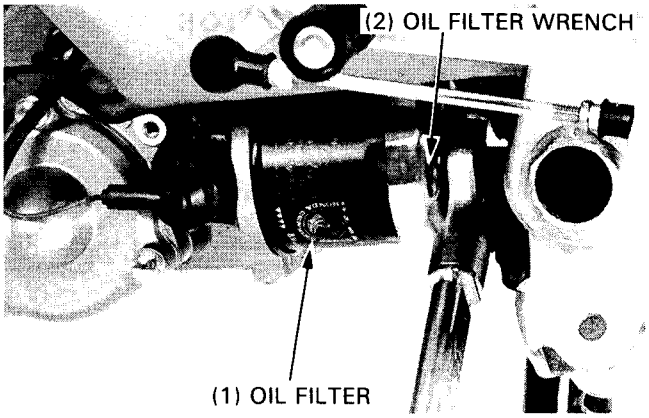
- *Do not replace the oil filter when the exhaust system is hot.*

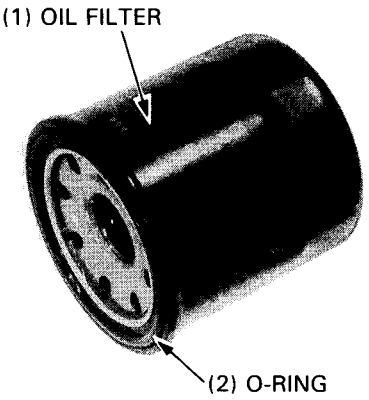
Remove the left crankcase rear cover (page 8-2).
Remove the oil filter with a filter wrench.
TOOL:
Oil filter wrench **07HAA—PJ70100**

Apply oil to the new oil filter O-ring and install the new oil filter.
Tighten the oil filter with a filter wrench.

TORQUE: 10 N·m (1.0 kg-m, 7.2 ft-lb)

Fill the engine with recommended oil (page 2-3).





OIL PRESSURE CHECK

Warm the engine up to normal operating temperature (approximately 80°C/176°F).
Stop the engine.

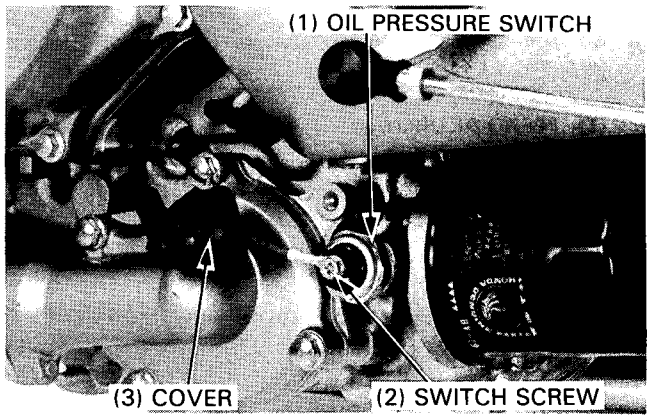
⚠WARNING

- ***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.***

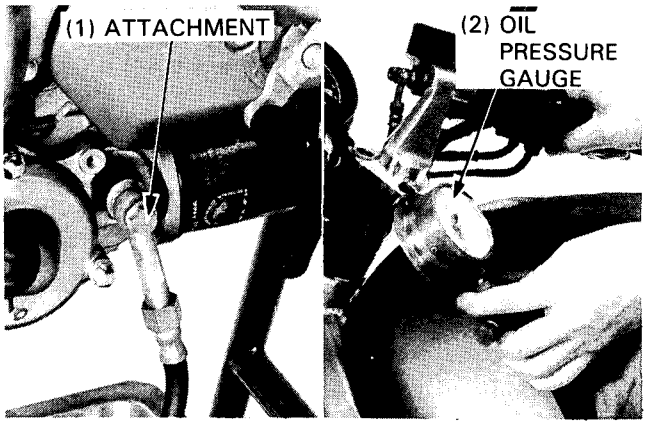
Remove the oil pressure switch cover and disconnect the switch wire.

Remove the oil pressure switch and connect an oil pressure gauge attachment and gauge to the pressure switch hole.
Check the oil level.
TOOLS:

Oil pressure gauge attachment	**07510—4220100 or equivalent commercially available**
Oil pressure gauge	**07506—3000000 or equivalent commercially available**



Start the engine and check the oil pressure at 6,000 min^{-1} (rpm).
OIL PRESSURE:
441 kPa (4.5 kg/cm², 64 psi) at 6,000 min^{-1} (rpm) (80°C/176°F)



Stop the engine.
Apply 3-BOND® sealant or equivalent to the pressure switch threads and install.
TORQUE: 12 N·m (1.2 kg-m, 9 ft-lb)

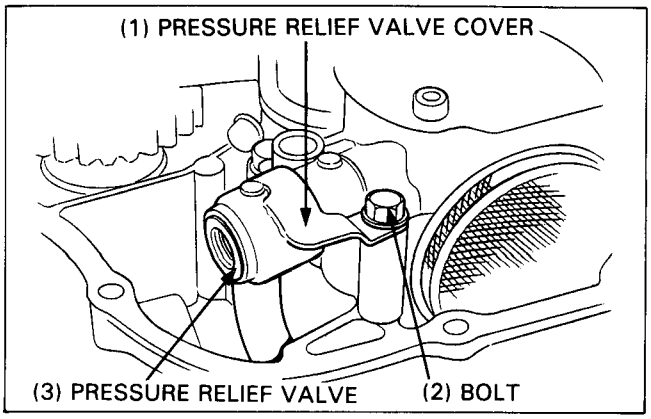
Connect the oil pressure switch wire and start the engine.
Check that the oil pressure warning indicator goes out after one or two seconds. If the oil pressure warning indicator stays on, stop the engine immediately and determine the cause.

OIL PUMP/RELIEF VALVE

REMOVAL

Separate the crankcase (Section 11).

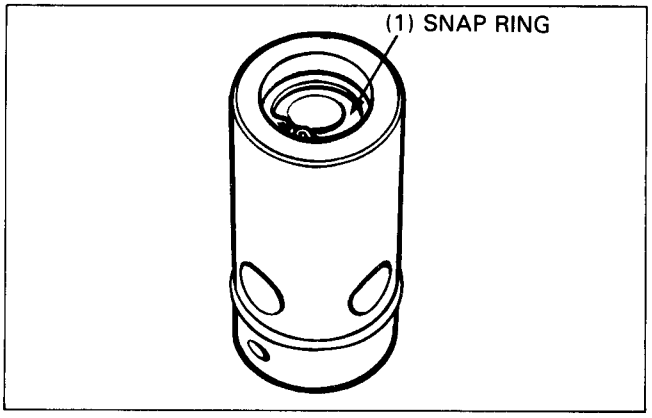
Remove the bolt and pressure relief valve cover.
Remove the pressure relief valve from the oil pump.



DISASSEMBLY

Remove the snap ring and disassemble the relief valve.

TOOL:
Snap ring pliers **07914–3230001**

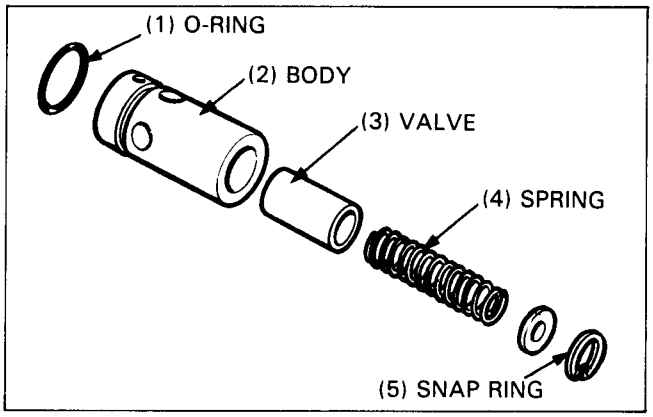


INSPECTION

Check the spring, O-ring and valve for fatigue, wear or damage.
Check the body for clogging or damage.

Clean all the parts and assemble them in the reverse order of disassembly.

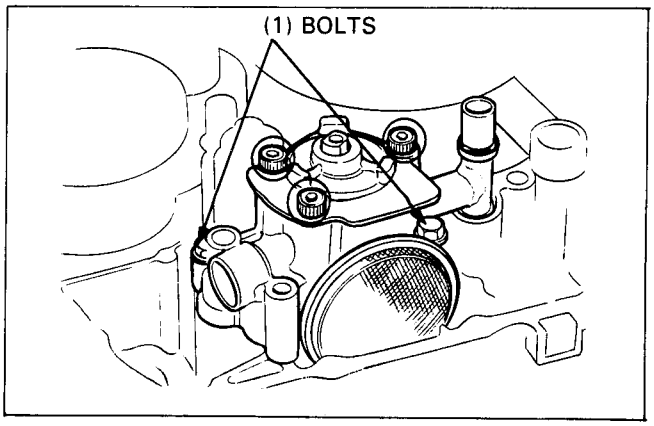
Replace the relief valve, if necessary, as an assembly.



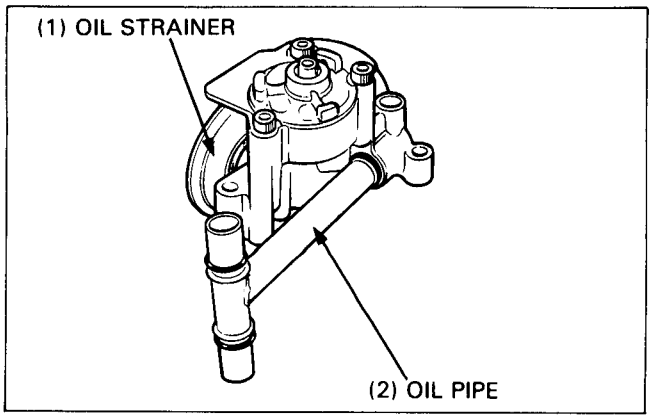
OIL PUMP REMOVAL/DISASSEMBLY

Remove the oil pump by removing two mounting bolts.

Remove the dowel pins and O-rings.

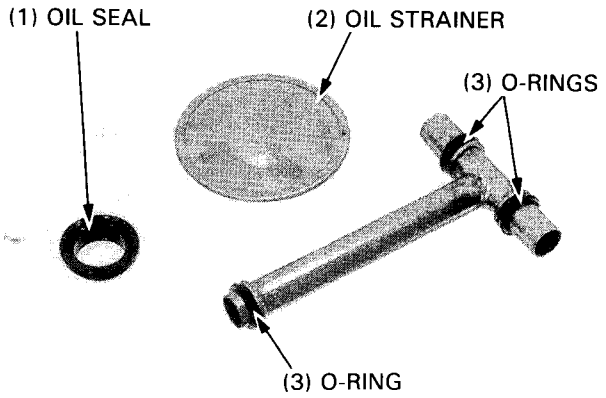


Remove the oil strainer and oil pipe from the oil pump.

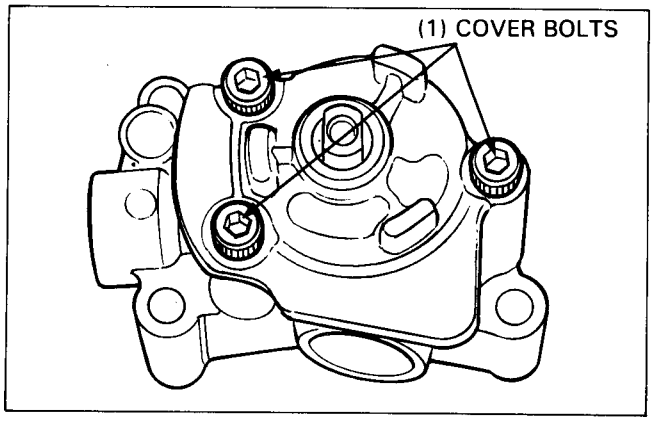


Check the O-rings and oil seal for fatigue or damage.

Clean the oil strainer and oil pipe with non-flammable or high flash point solvent.



Remove the three cover bolts.
Disassemble the parts and clean them with non-flammable or high flash point solvent.

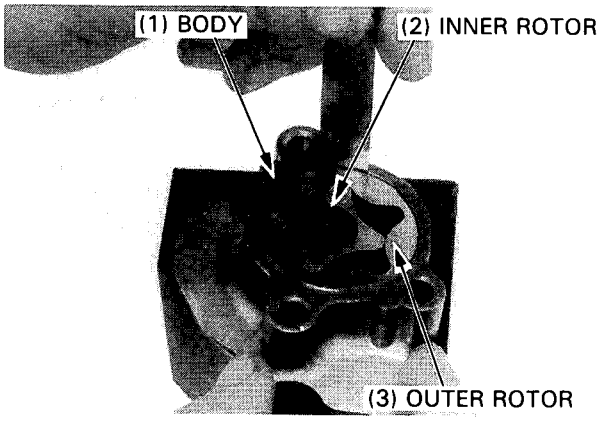


INSPECTION

Install the outer and inner rotors to the pump body.

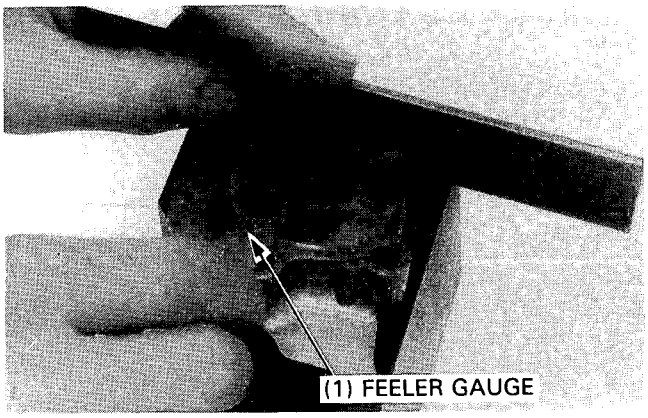
Measure the outer rotor-to-pump body clearance.

SERVICE LIMIT: 0.35 mm (0.014 in)



Remove the oil pump shaft from the oil pump and measure the pump end clearance.

SERVICE LIMIT: 0.10 mm (0.004 in)

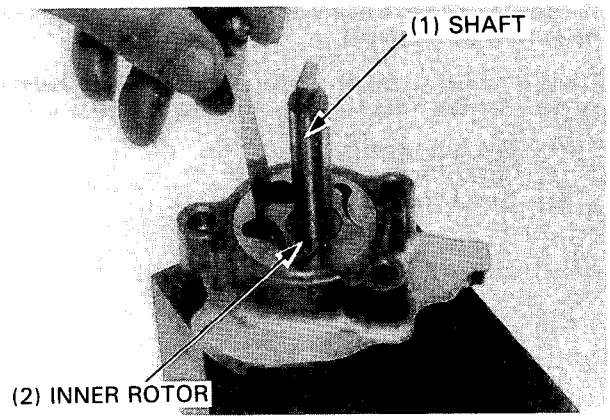


Temporarily install the shaft in the pump body.

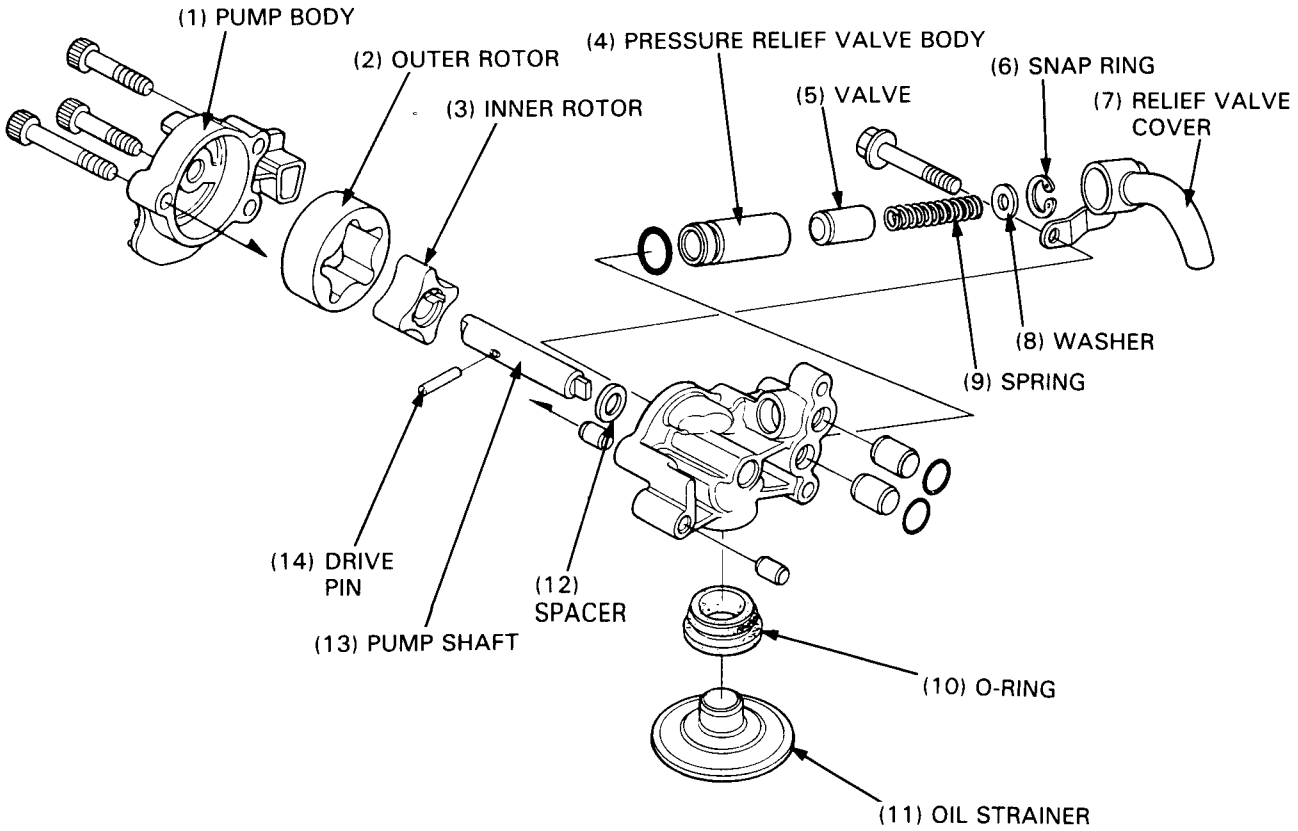
Measure the inner rotor tip clearance.

SERVICE LIMIT: 0.20 mm (0.008 in)

Replace the oil pump, if necessary as an assembly.

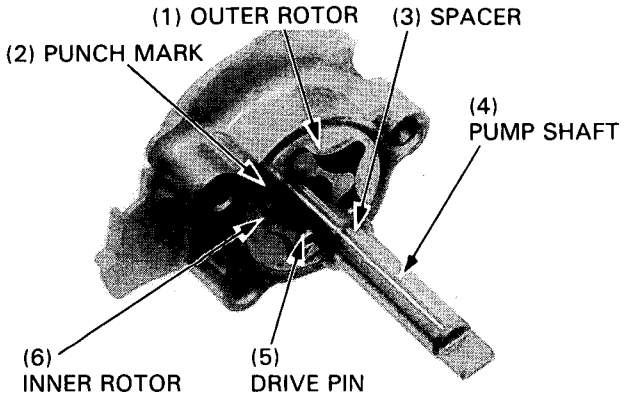


ASSEMBLY

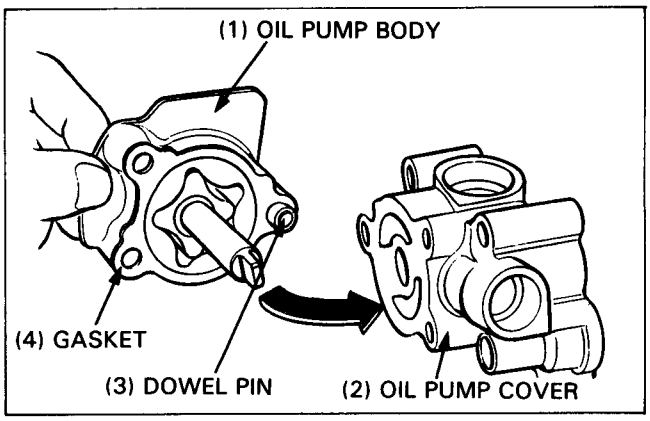


Install the outer rotor in the pump body with the punch mark facing the cover, then install the inner rotor.
Install the drive pin and spacer on the shaft.

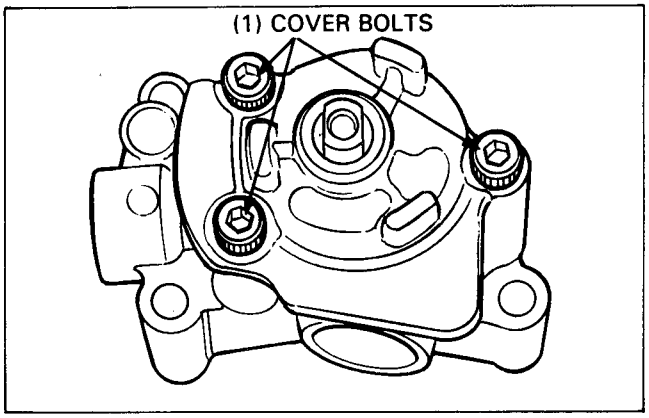
Install the shaft in the body, aligning the drive pin with the inner rotor groove.



Install the dowel pin and a new gasket on the pump body, then install the cover.



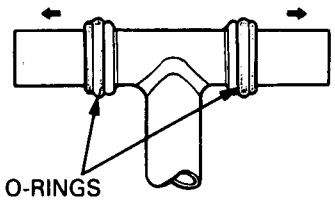
Tighten the cover bolts securely.

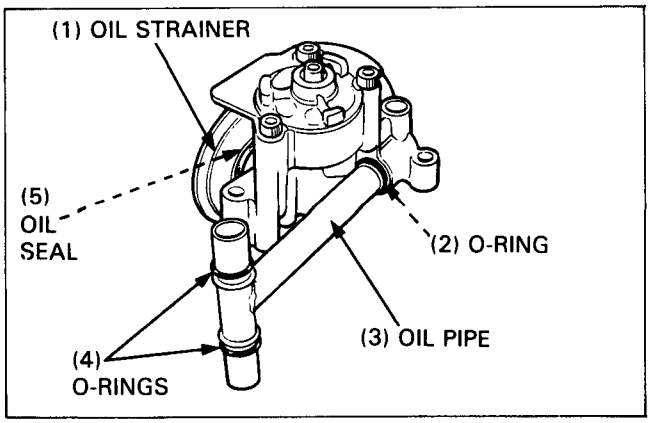


Install the O-rings, oil seal, oil strainer and oil pipe on the oil pump.

CAUTION

- *Install the O-rings on the oil pipe with the tapered side facing out as shown, or the engine will be damaged.*

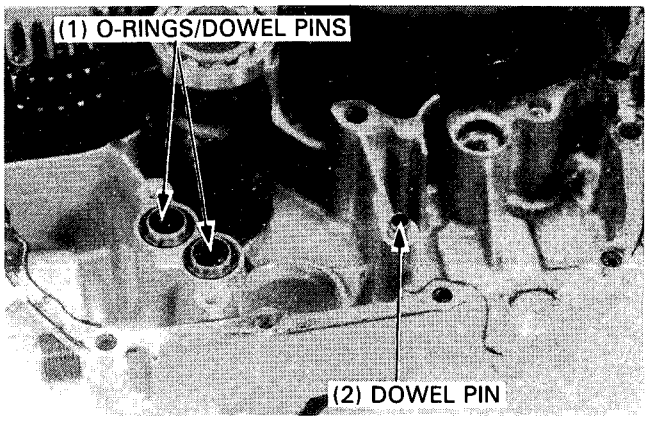




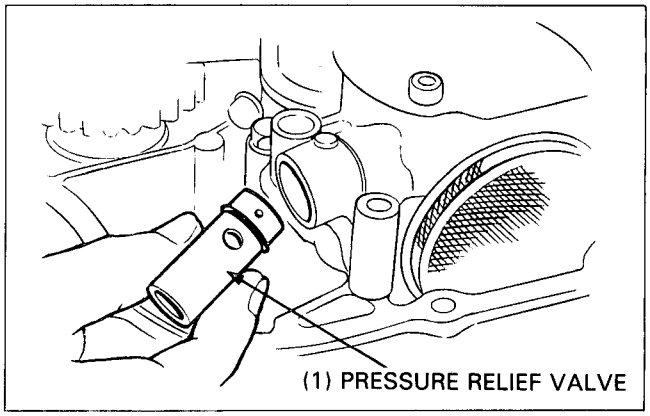
INSTALLATION

Install the dowel pins and new O-rings.

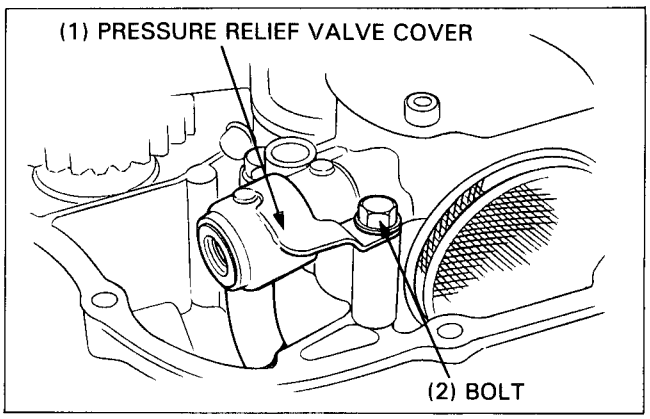
Install the oil pump as an assembly.



Assemble the pressure relief valve and install it in the oil pump.



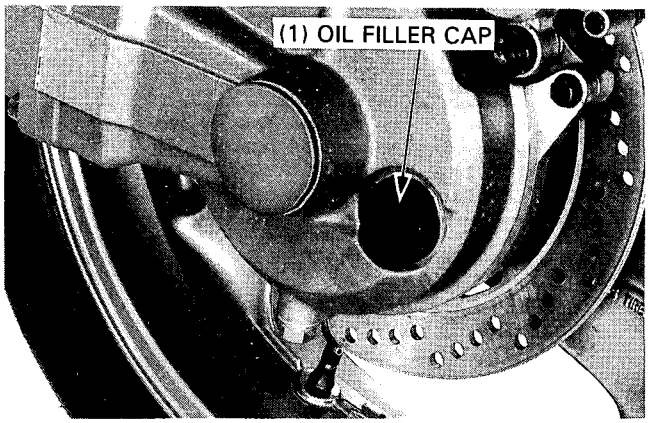
Install the pressure relief valve cover with the bolt.
Assemble the crankcase (Section 11).



FINAL DRIVE OIL

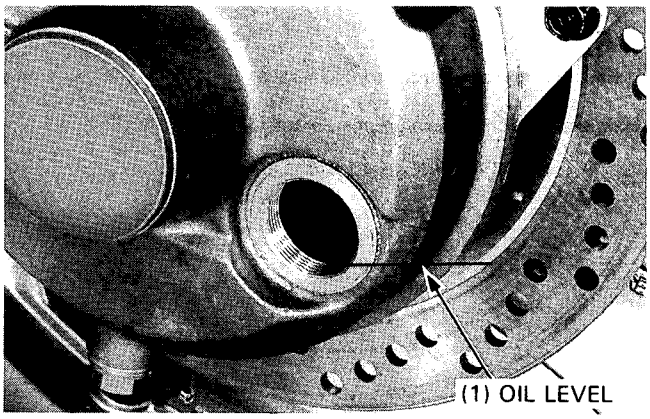
CHECK

Place the motorcycle on its center stand on level ground.
Remove the oil filler cap.



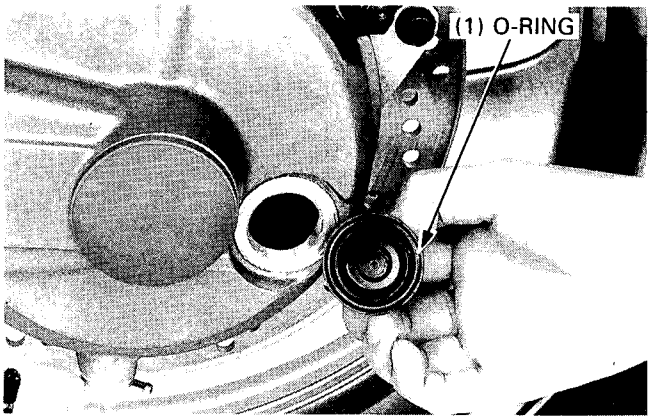
Check that the oil level reaches the lower edge of the oil filler cap hole.

Check for leaks if the level is low. Pour fresh oil through the oil filler hole until it reaches the lower edge.



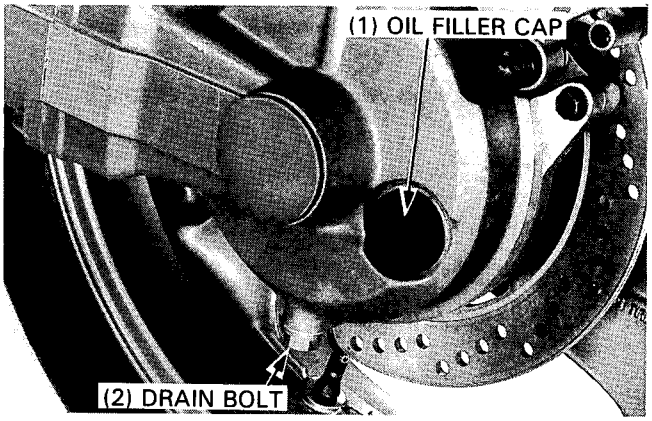
Install a new O-ring on the filler cap, and install and tighten the cap.

TORQUE: 12 N·m (1.2 kg-m, 9 ft-lb)



CHANGE

Remove the oil filler cap and drain bolt to drain all oil from the final gear case.



Check that the magnetic surface with ferrous burrs on the drain bolt and clean them.

Check that the sealing washer on the drain bolt in good condition, replace the washer if desired.

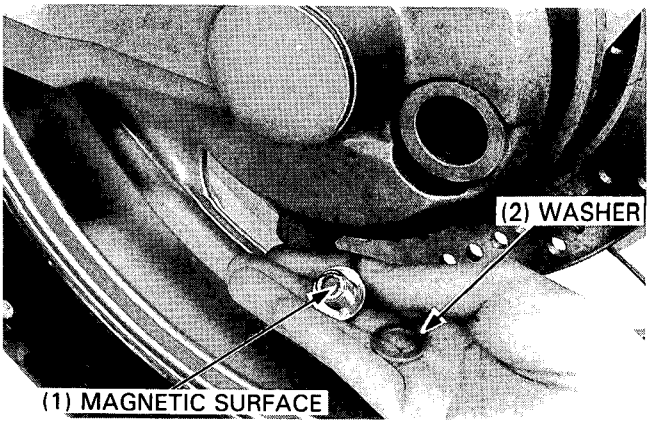
Reinstall the drain bolt with the washer.

TORQUE: 12 N·m (1.2 kg-m, 9 ft-lb)

Fill the gear case with the recommended oil up to the correct level.

OIL CAPACITY: 110 cm³ (3.7 US oz, 3.9 Imp. oz) after draining

RECOMMENDED OIL: HYPOID GEAR OIL SAE #80

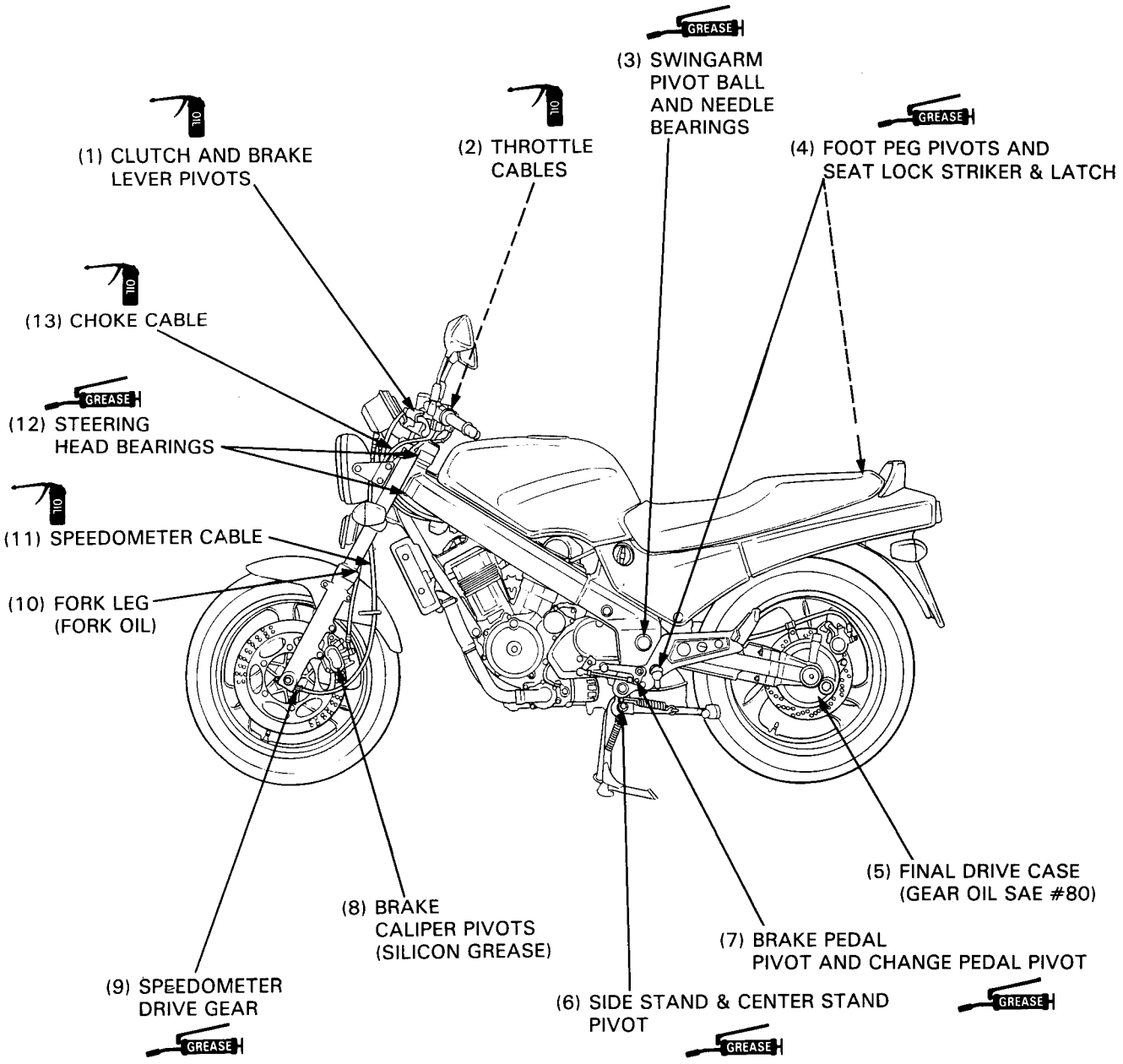


CONTROL CABLE LUBRICATION

Periodically disconnect the throttle and choke cable at their upper ends. Thoroughly lubricate the cables and their pivot points with a commercially available cable lubricant or a light weight oil.

LUBRICATION POINTS

Use general purpose grease when not otherwise specified here.
Apply oil or grease to the other sliding surfaces and cables not shown here.



MAINTENANCE

SERVICE INFORMATION

⚠ WARNING

- *Support the motorcycle on the center stand on a level surface before starting any work.*
- *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.*
- *Gasoline is extremely flammable and is explosive under certain conditions. Work in a well ventilated area with the engine stopped. Do not smoke or allow flames or sparks in the work area or where gasoline is stored.*

GENERAL

- Engine oil — See page 2-3
- Engine oil filter change — See page 2-4

SPECIFICATIONS

≪ENGINE≫

Ignition timing	Initial		10° BTDC at idle
	Full advance		31° BTDC at 7,000 min^{-1} (rpm) ± 200 min^{-1} (rpm)
Spark plug			

	NGK	ND
Standard	DPR8EA-9	X24EPR-U9
For cold climate (below 5°C/41°F)	DPR7EA-9	X22EPR-U9
For extended high speed riding	DPR9EA-9	X27EPR-U9

Spark plug gap			0.8—0.9 mm (0.031—0.035 in)
Valve clearance (COLD)	IN		0.15 ± 0.02 mm (0.006 ± 0.0008 in)
	EX		0.20 ± 0.02 mm (0.008 ± 0.0008 in)
Idle speed		NTV650:	1,100 ± 100 min^{-1} (rpm)
		SW model only:	1,200 ± 50 min^{-1} (rpm)
		NTV600:	1,200 ± 100 min^{-1} (rpm)
Cylinder compression			1,324 ± 196 kPa (13.5 ± 2.0 kg/cm^2, 192 ± 28 psi)
Throttle grip free play			2—6 mm (1/16—1/4 in)

≪CHASSIS≫

Clutch lever free play: 10—20 mm (3/8—3/4 in)

Tires

Item		Front	Rear
Tire size		110/80-17 57H Tubeless type	150/70-17 69H Tubeless type
Wheel balance weight		60 g MAX.	60 g MAX.
Tire pattern code	DUNLOP	K505G	K505
	BRIDGESTONE	G547G	G548
Tire pressure (COLD)	Rider only	225 kPa (2.25 kg/cm², 33 psi)	225 kPa (2.25 kg/cm², 33 psi)
	Rider and passenger	225 kPa (2.25 kg/cm², 33 psi)	280 kPa (2.80 kg/cm², 41 psi)
Minimum thread depth		1.5 mm (0.06 in)	2.0 mm (0.08 in)

TORQUE VALUES

Valve adjusting screw lock nut	23 N·m (2.3 kg-m, 17 ft-lb)
Timing hole cap	10 N·m (1.0 kg-m, 7.2 ft-lb) ┐ Apply molybdenum disulfide grease to the threads
Crankshaft hole cap	15 N·m (1.5 kg-m, 11 ft-lb) ┘
Spark plug	14 N·m (1.4 kg-m, 10 ft-lb)

TOOLS

Special

Valve adjusting wrench	07908—KE90000
Vacuum gauge	07404—0030000 or M937B—021—XXXXX Vacuum gauge set

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 L: LUBRICATE

		ITEM \ FREQUENCY	WHICHEVER COMES FIRST →	x 1,000 km	ODOMETER READING (NOTE 1) 1	6	12	18	24	30	36	Refer to page(s)
			EVERY	x 1,000 mi	0.6	4	8	12	16	20	24	
			MONTHS			6	12	18	24	30	36	
EMISSION RELATED ITEMS	*	FUEL LINE					I		I		I	3-4
	*	THROTTLE OPERATION					I		I		I	3-4
	*	CARBURETOR CHOKE					I		I		I	3-5
		AIR CLEANER	(NOTE 2)					R			R	3-5
		CRANKCASE BREATHER	(NOTE 3)			C	C	C	C	C	C	3-6
		SPARK PLUG				I	R	I	R	I	R	3-6
	*	VALVE CLEARANCE			I		I		I		I	3-6
		ENGINE OIL			R		R		R		R	2-3
		ENGINE OIL FILTER			R		R		R		R	2-4
	*	CARBURETOR-SYNCHRONIZATION			I		I		I		I	3-8
	*	CARBURETOR-IDLE SPEED			I	I	I	I	I	I	I	3-9
		RADIATOR COOLANT	2 YEARS *R				I		I		*R	3-9
	*	COOLING SYSTEM					I		I		I	3-10
	*	SECONDARY AIR SUPPLY SYSTEM	(NOTE 4)				I		I		I	3-11
NON-EMISSION RELATED ITEMS		FINAL DRIVE OIL					I		I		R	2-9
		BRAKE FLUID	2 YEARS *R			I	I	*R	I	I	*R	3-11
		BRAKE PAD WEAR				I	I	I	I	I	I	3-12
		BRAKE SYSTEM			I		I		I		I	3-12
	*	BRAKE LIGHT SWITCH					I		I		I	3-12
	*	HEADLIGHT AIM					I		I		I	3-13
		CLUTCH SYSTEM			I	I	I	I	I	I	I	3-13
		SIDE STAND					I		I		I	3-14
	*	SUSPENSION					I		I		I	3-14
	*	NUTS, BOLTS, FASTENERS			I		I		I		I	3-15
	**	WHEELS/TIRES			I	I	I	I	I	I	I	3-15
	**	STEERING HEAD BEARINGS			I		I		I		I	3-16

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

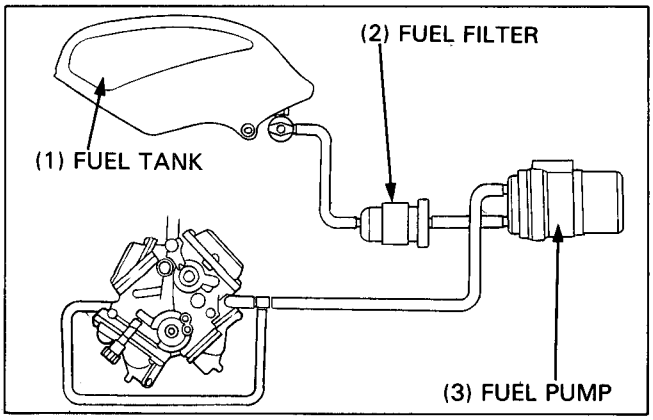
** In the interest of safety, we recommend these items be serviced only by an authorized Honda dealer.

NOTES: 1. At higher odometer readings, repeat at the frequency interval established here.
2. Service more frequently when riding in unusually wet or dusty areas.
3. Service more frequently when riding in rain or at full throttle.
4. SW model only.

FUEL LINE

Remove the seat (page 15-14).

Check the fuel lines for deterioration, damage or leakage. Replace the fuel lines if necessary.



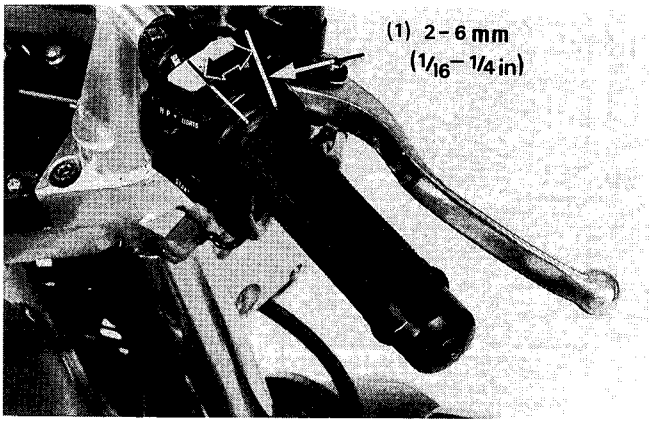
THROTTLE OPERATION

Check for smooth throttle grip full opening and automatic full closing in all steering positions.
Check the throttle cables and replace them if they are deteriorated, kinked or damaged.

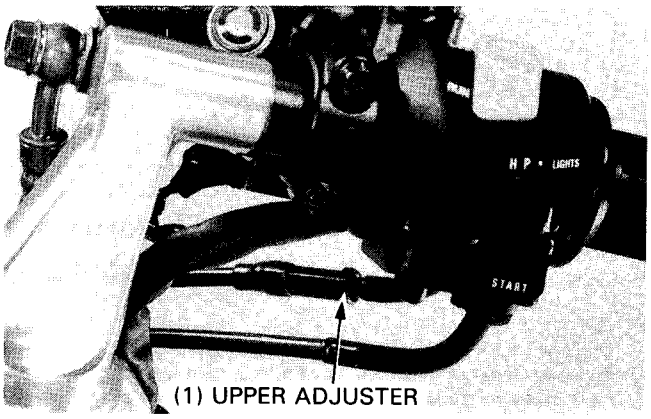
Lubricate the throttle cables, if throttle operation is not smooth.

Measure the free play at the throttle grip flange.

FREE PLAY: 2—6 mm (1/16—1/4 in)



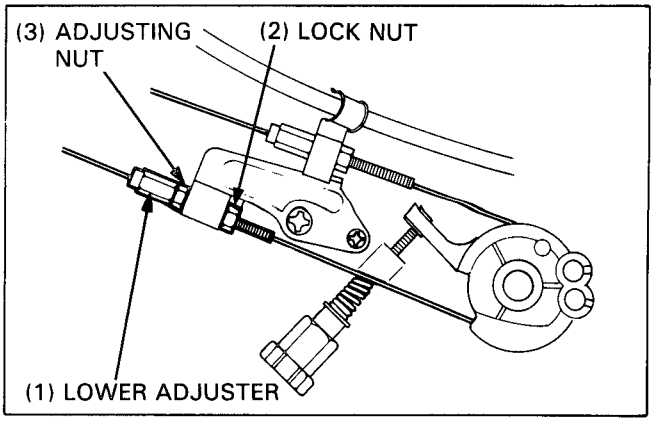
Throttle grip free play can be adjusted at either end of the throttle cable. Minor adjustments are made with the upper adjuster.



Major adjustments are made with the lower adjuster.

Adjust the free play by loosening the lock nut and turning the adjusting nut. Tighten the lock nut.

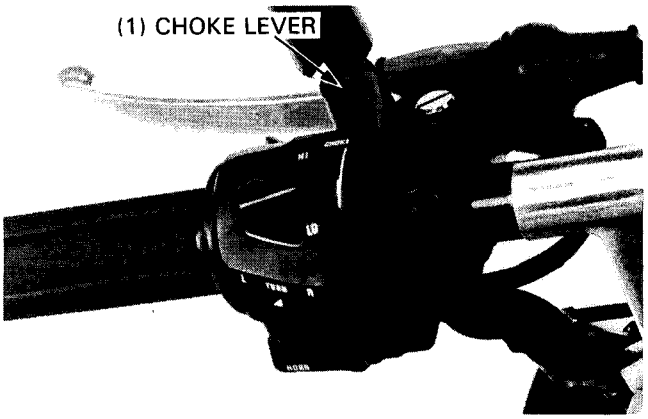
Recheck throttle operation. Replace any damaged parts, if necessary.



CARBURETOR CHOKE

This model's choke system uses a fuel enrichening circuit controlled by a choke valve. The choke valve opens the enrichening circuit via a cable when the choke lever on the handlebar is pulled back.

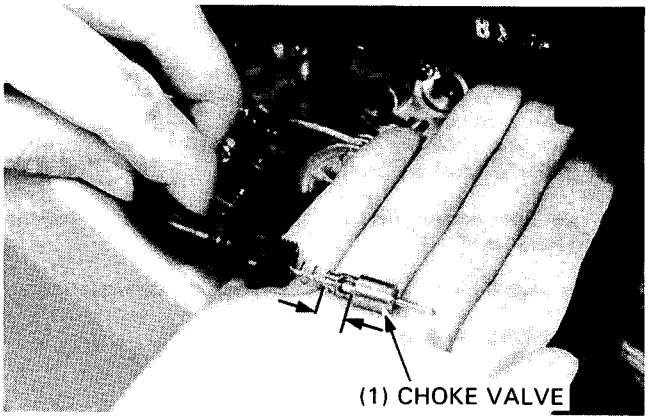
Check for smooth upper choke lever operation. Lubricate the choke cable if the operation is not smooth.



Remove the left and right choke cable boots from the choke valve nuts.

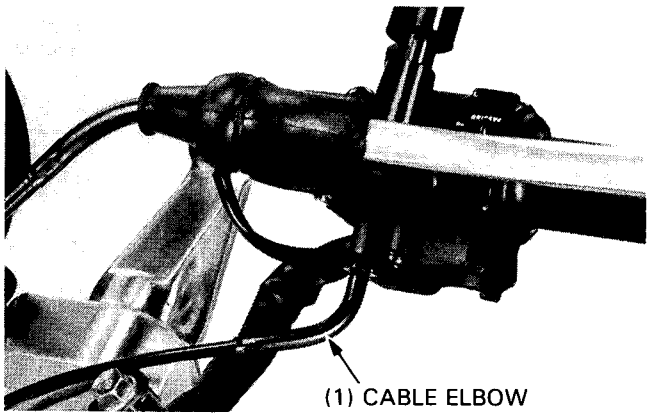
Loosen each choke valve nut and remove the choke valve from the carburetor.

Push the choke lever on the handlebar all the way up to fully closed and measure the distance between the ends of the choke valve and nut.
It should be 10—11 mm (0.39—0.43 in).



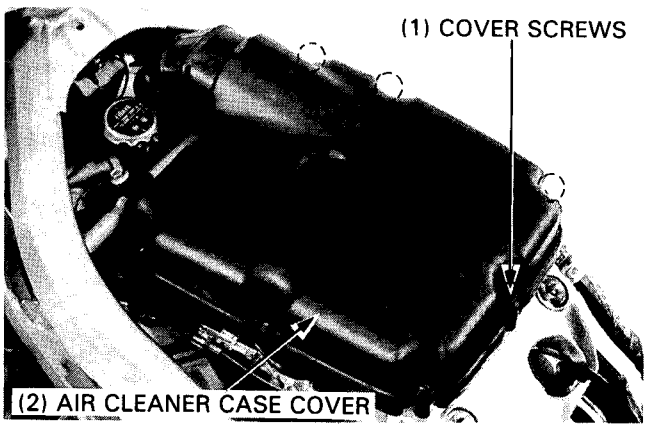
Adjust the distance to within specifications by loosening the lock nut and turning the cable's elbow at the left handlebar switch housing.
Tighten the lock nut securely and recheck the distance.

Thread the choke valve in by hand and then tighten the choke valve nut 1/4 turn with a 14 mm wrench.

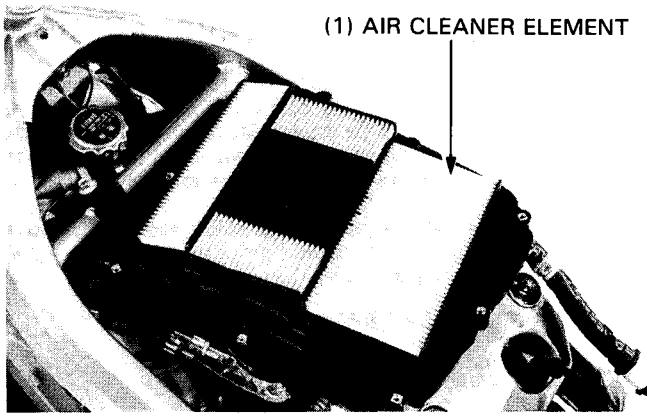


AIR CLEANER

Remove the fuel tank (page 4-3).
Remove the air cleaner case cover screws and cover.



Remove the air cleaner element.
Replace the element in accordance with the maintenance schedule.
Also, replace the element any time it is excessively dirty or damaged.



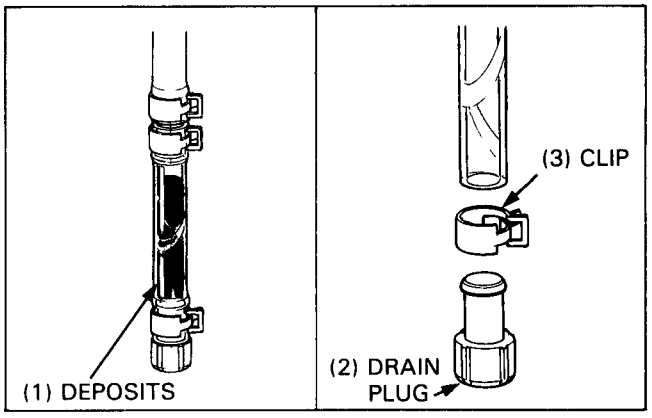
CRANKCASE BREATHER

The crankcase breather drain; air cleaner case drain tube is behind the side stand.

Remove the drain plug from the tube to empty any deposits.
Reinstall the plug securely.

NOTE

- Service more frequently when the motorcycle has been ridden in rain, at full throttle, or after it is washed or overturned. Service if the deposit level can be seen in the transparent section of the drain tube.

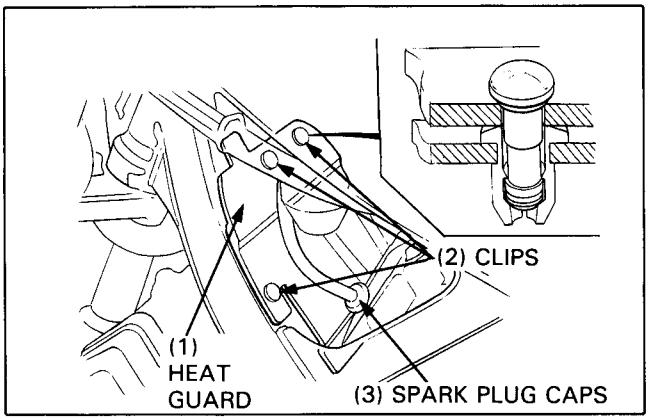


SPARK PLUGS

Remove the heat guard by removing the clips.
Disconnect the spark plug caps and remove the spark plugs.

RECOMMENDED SPARK PLUG:

	NGK	ND
Standard	DPR8EA-9	X24EPR-U9
For cold climate (below 5°C/41°F)	DPR7EA-9	X22EPR-U9
For extended high speed riding	DPR9EA-9	X27EPR-U9



Measure the new spark plug gap with a wire-type feeler gauge.

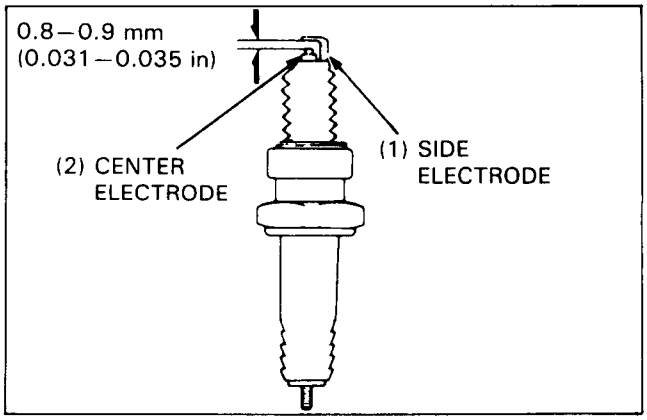
SPARK PLUG GAP: 0.8–0.9 mm (0.031–0.035 in)

Adjust the gap if necessary, by bending the side electrode carefully. With the plug washer attached, thread each spark plug in by hand to prevent crossthreading. Continue tightening by hand until the spark plug bottoms.
Then, tighten the spark plugs another 1/2 turn with a spark plug wrench to compress the plug washer.

TORQUE: 14 N·m (1.4 kg-m, 10 ft-lb)

Connect the spark plug caps.

Install the removed parts in the reverse order of removal.

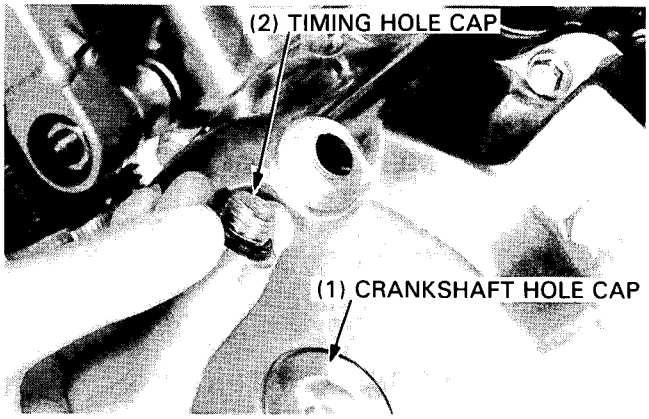


VALVE CLEARANCE

NOTE

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

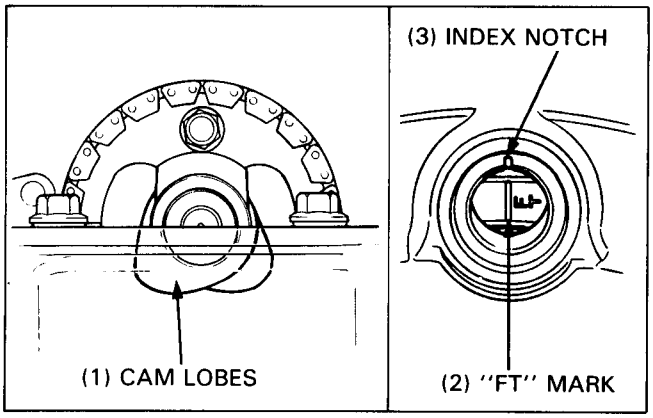
Remove the following parts:
- fuel tank (page 4-3)
- air cleaner case (page 4-3)
- carburetors (page 4-5)
- thermostat housing mounting bolt and radiator mounting bolts to releasing tension of water hoses.
- crankshaft and timing hole caps.



Remove the cylinder head covers.

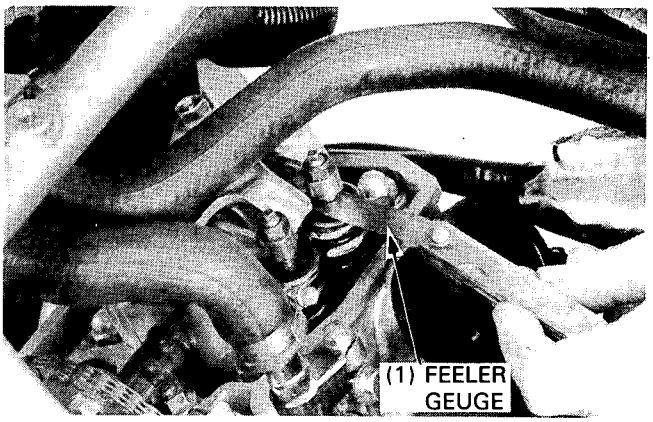
FRONT CYLINDER

Rotate the flywheel counterclockwise to align the "FT" mark with the index notch on the left crankcase cover. Make sure the piston is at TDC (Top Dead Center) on the compression stroke and the cam lobes are all facing down as shown.



Inspect the clearance of all three valves by inserting a feeler gauge between the adjusting screw and the valve.

VALVE CLEARANCES: (COLD)
Intake: 0.15 ± 0.02 mm (0.006 ± 0.0008 in)
Exhaust: 0.20 ± 0.02 mm (0.008 ± 0.0008 in)



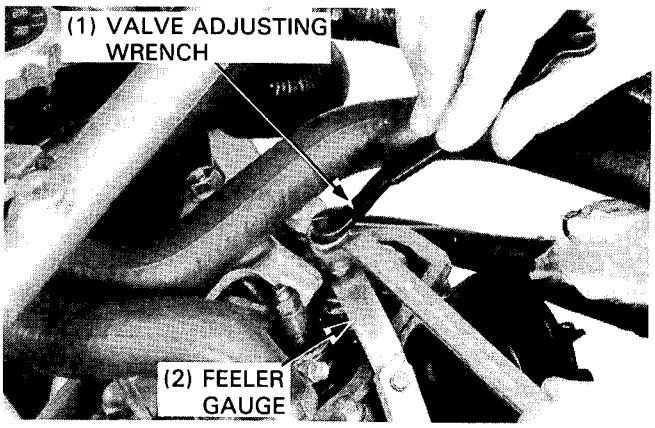
Adjust by loosening the lock nut and turning the adjusting screw until there is a slight drag on the feeler gauge.

Apply oil to the nut and screw threads.

Hold the adjusting screw and tighten the lock nut.

TOOL:
Valve adjusting wrench 07908—KE90000

TORQUE: 23 N·m (2.3 kg-m, 17 ft-lb)

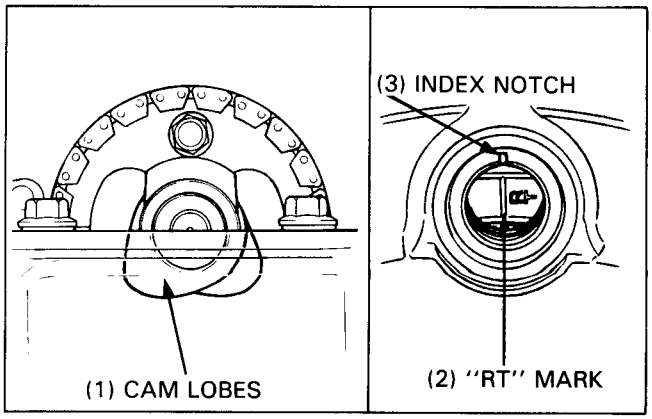


REAR CYLINDER

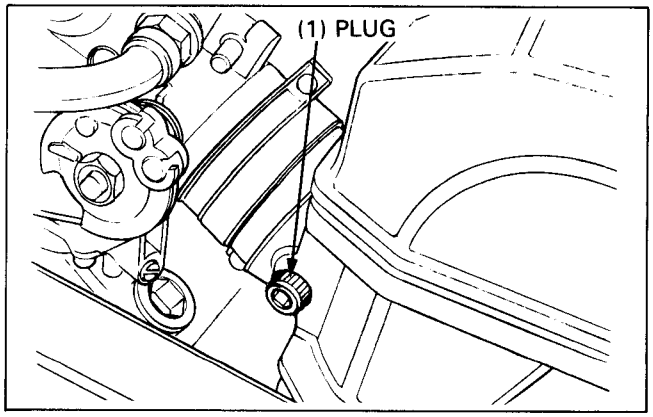
Rotate the flywheel counterclockwise to align the "RT" mark with the index notch on the left crankcase cover. Make sure the piston is at TDC on the compression stroke and the cam lobes are all facing down.

Inspect and adjust the valve clearance using the same method as for the front cylinder.
Install the removed parts in the reverse order of removal.

Apply molybdenum disulfide grease to the threads of the timing and crankcase hole caps, then install and tighten them.



TORQUE:
Timing hole cap:
10 N·m (1.0 kg-m, 7.2 ft-lb)
Crankshaft hole cap:
15 N·m (1.5 kg-m, 11 ft-lb)



CARBURETOR SYNCHRONIZATION

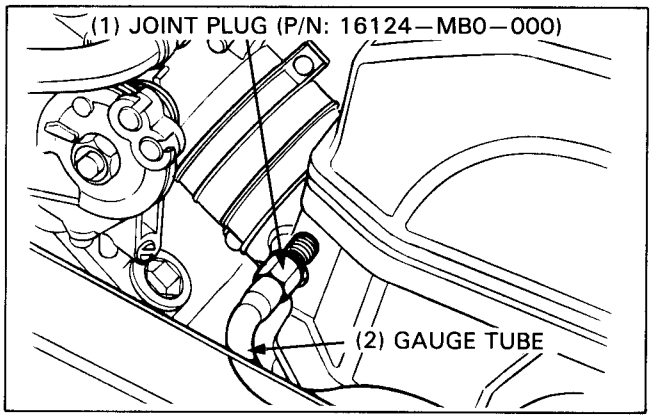
NOTE

- Perform this maintenance with the engine at normal operating temperature, the transmission in neutral, and the motorcycle on its center stand.

Remove the rear fuel tank mounting bolt first, then remove the front side (page 4-3). Carefully raise the tank and support it in the frame using a suitable base.

FRONT CYLINDER:
Remove the plug from the front cylinder intake port and install the vacuum gauge adaptor.

REAR CYLINDER:
Remove the plug from the rear cylinder intake port and install the joint plug (P/N: 16124—MB0—000).

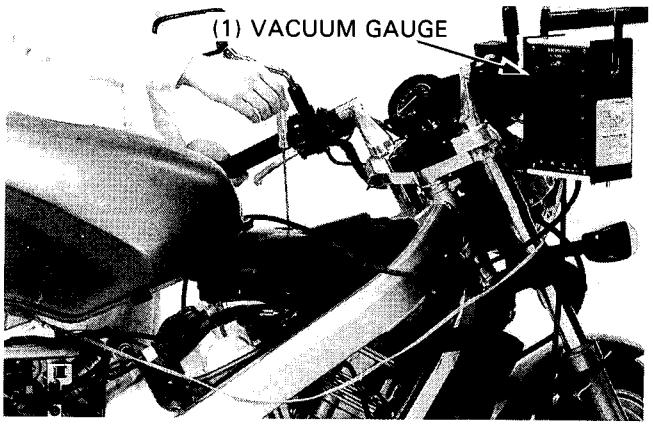


Connect the vacuum gauge tube and vacuum gauge.

TOOL:

Vacuum gauge	**07404—0030000 or**
Vacuum gauge set	**M937B—021—XXXXX**

Warm up the engine and adjust the idle speed with the throttle stop screw.



⚠ 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.***

IDLE SPEED: NTV650: 1,100 ± 100 min^{-1} (rpm)
SW model only: 1,200 ± 50 min^{-1} (rpm)
NTV600: 1,200 ± 100 min^{-1} (rpm)

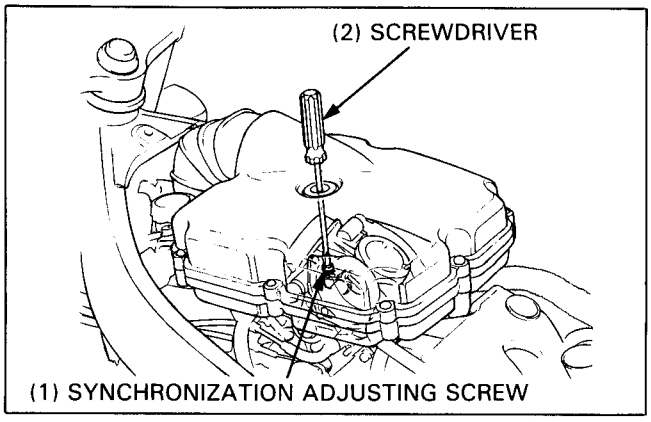
Check that the difference in vacuum readings is 40 mm (1.6 in) Hg or less.

NOTE

- The rear cylinder carburetor is the base carburetor.

If necessary, synchronize to the specification by turning the synchronization adjusting screw.

Recheck the idle speed and synchronization.
Disconnect the gauge and adaptors and install the removed parts.



CARBURETOR IDLE SPEED

NOTE

- Inspect and adjust idle speed after all other engine adjustments are within specifications.
- The engine must be warm for accurate adjustment. Ten minutes of stop-and-go riding is sufficient.

Warm up the engine, shift to NEUTRAL, and place the motorcycle on its center stand.

⚠ 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.***

Turn the throttle stop screw as required to obtain the specified idle speed.

IDLE SPEED: NTV650: 1,100 ± 100 min^{-1} (rpm)
SW model only: 1,200 ± 50 min^{-1} (rpm)
NTV600: 1,200 ± 100 min^{-1} (rpm)

RADIATOR COOLANT

Check the coolant level of the reserve tank with the engine running at normal operating temperature.

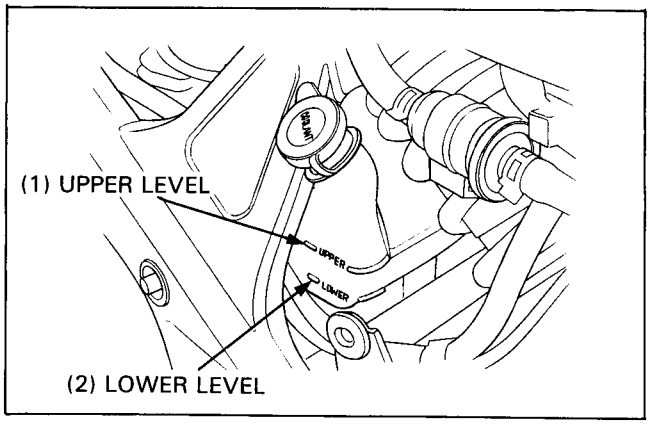
⚠ WARNING

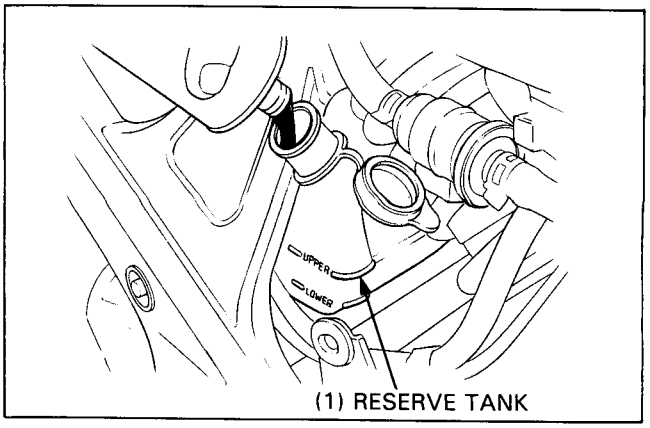
- ***If the engine must be running to do some work, make sure the area is well-ventilated. Never run the engine in an enclosed area.***
- ***The exhaust contains poisonous carbon monoxide gas that may cause loss of consciousness and lead to death.***

The level should be between the "UPPER" and "LOWER" level lines.

If necessary, remove the reserve tank cap.
Fill up to the upper level line with 50/50 mixture of distilled water and antifreeze.

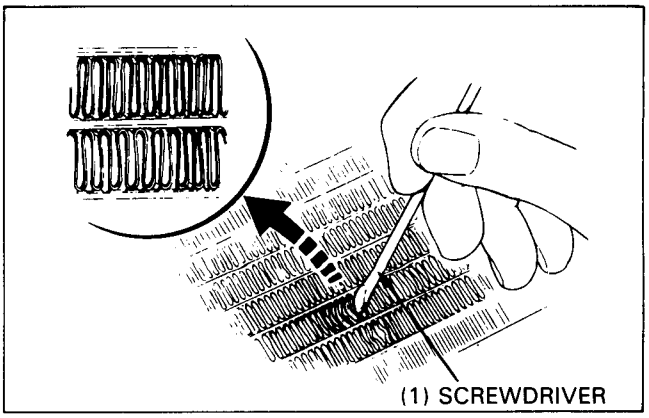
Reinstall the reserve tank cap.



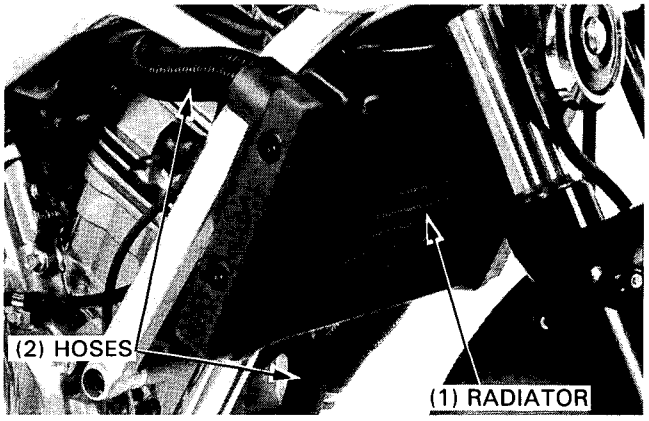


COOLING SYSTEM

Remove the radiator shroud and check the radiator air passages for clogging or damage.
Straighten bent fins or collapsed core tubes with a small flat blade screwdriver as shown and remove insects, mud or any obstructions with compressed air or low pressure water.
Replace the radiator if the air flow is restricted over more than 30% of the radiator's surface.
For radiator replacement, refer to page 5-5.



Make sure the hoses are in good condition.
Replace any hose that shows any sign of deterioration.
Check that all hose clamps are tight.



CYLINDER COMPRESSION

Warm up the engine to normal operating temperature.

⚠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.***

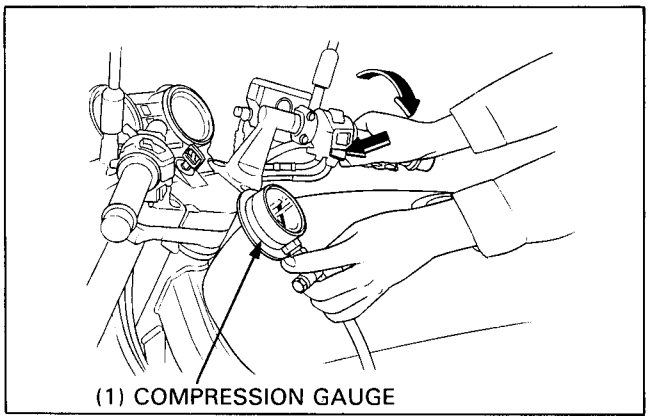
Stop the engine, disconnect both spark plug caps and remove one spark plug.

NOTE

- To measure the cylinder compression of each individual cylinder and remove only one plug at a time.

Turn the engine stop switch OFF.

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



COMPRESSION PRESSURE:
1,324 ± 196 kPa (13.5 ± 2.0 kg/cm², 192 ± 28 psi)

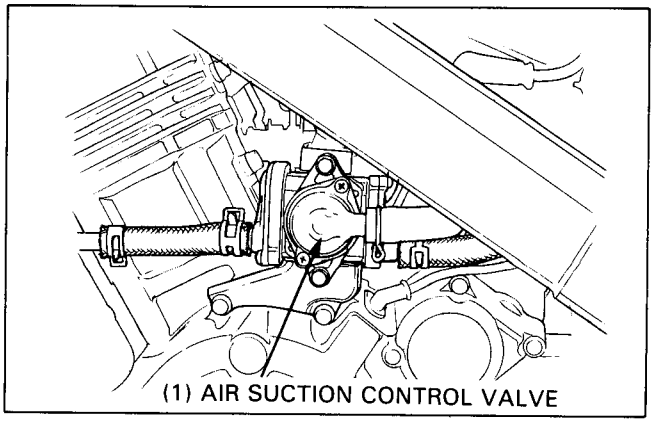
If compression is high, it indicates that carbon deposits have accumulated on the combustion chamber and/or the piston crown.

If compression is low, pour 3—5 cm³ (0.1—0.2 US. oz) of clean engine oil into the cylinder through the spark plug hole and recheck the compression.
If the compression increases from the previous value, check the cylinder, piston and piston rings.
If the compression is the same as the previous value, check the valves for leakage.

SECONDARY AIR SUPPLY SYSTEM (SW model only)

Check the air and vacuum hoses and tubes for bending or twisting and straighten if necessary.

Check the system hoses and tubes for damage, deterioration, clogging or loose connections.
Check the air suction valve for damage (page 4-15).
Refer to the vacuum hose routing diagram label for hose connections.



BRAKE FLUID

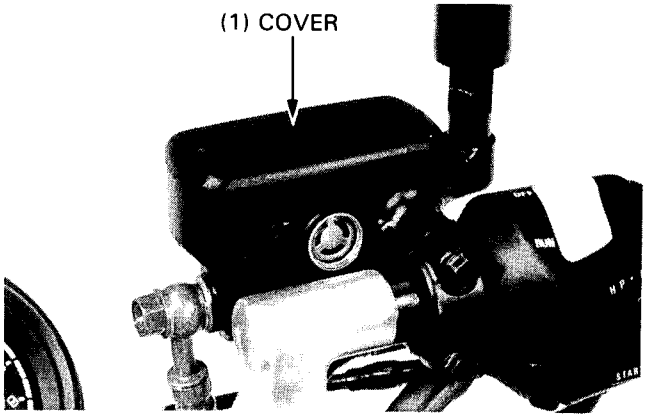
FRONT

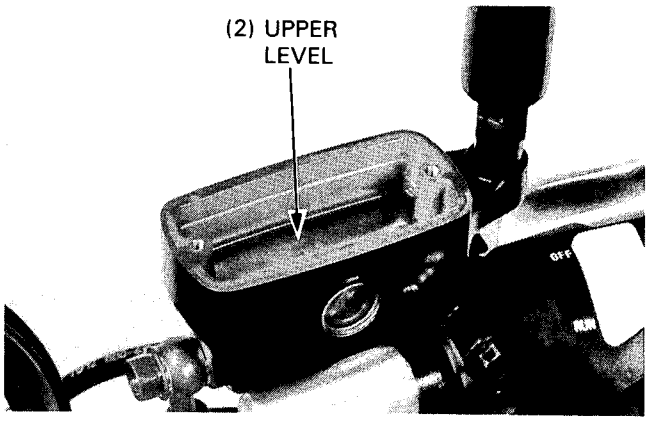
Check the front brake fluid level with the handlebar turned so that the reservoir is level.
Check the front brake fluid through the sight glass. If the level is visible, check pad wear first; replace the pads if necessary. Then remove the cover, set plate and diaphragm. Fill the reservoir to the upper level with DOT 4 fluid from a sealed container. Check the system for leaks.

CAUTION

- *Do not remove the reservoir cover until the handlebar has been turned so that the reservoir is level.*
- *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 the fluid on painted, plastic or rubber parts. Place a rag over these parts whenever the system is serviced.*

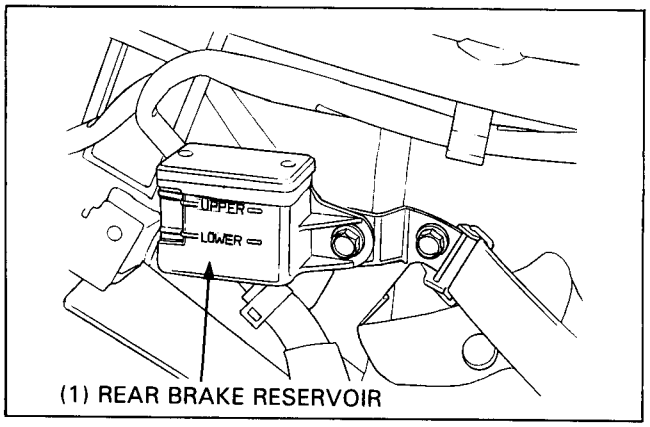
Refer to section 16 for brake bleeding procedures.





REAR

Check the rear brake fluid level after supporting the motorcycle upright on level ground.
Check the rear brake fluid level; if it is near the lower line, check pad wear first; replace the pads if necessary. Then remove the cover, set plate and diaphragm. Fill the reservoir to the upper level with DOT 4 fluid from a sealed container. Check the system for leaks.



BRAKE PAD WEAR

FRONT

Check the front brake pads for wear, through from the lower end of the caliper.

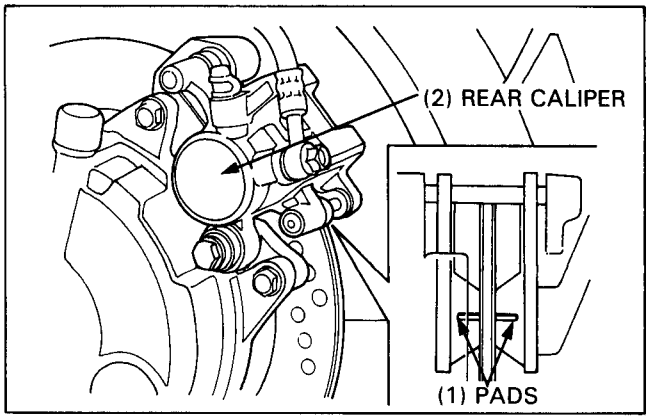
REAR

Check the rear brake pads for wear, through from the rear of the caliper.

CAUTION

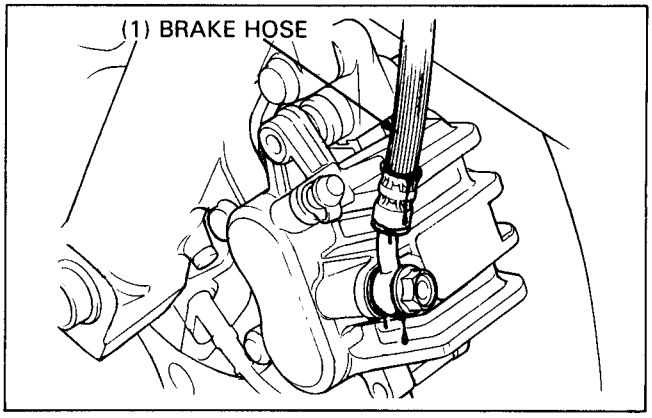
- *Always replace the brake pads as a set to assure even disc pressure.*

See section 16 for brake pad replacement.



BRAKE SYSTEM

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

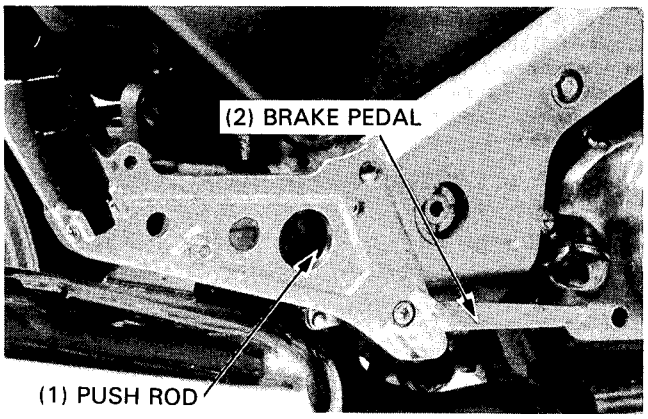


REAR BRAKE PEDAL

Check the rear brake pedal height.
To adjust the brake pedal height, loosen the lock nut and turn the master cylinder push rod. Tighten the lock nut.

NOTE

- Adjust the brake light switch after adjusting the brake pedal height.



BRAKE LIGHT SWITCH

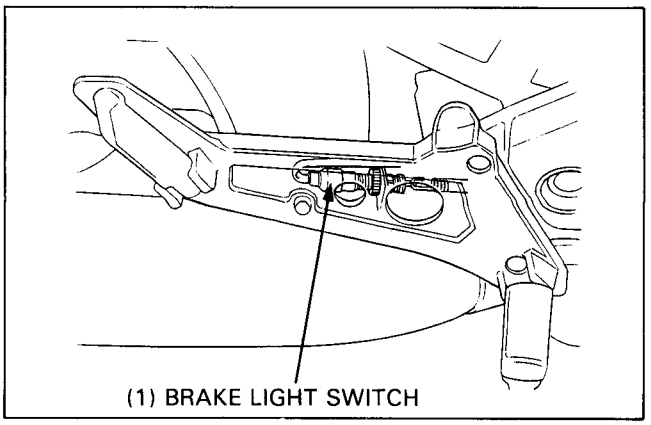
NOTE

- Perform the rear brake light switch adjustment after adjusting the brake height.
- The front brake light switch does not require adjustment.

Adjust the brake light switch so that the brake light will come on when brake engagement begins.
Adjust by turning the adjuster while holding the switch body. Tighten the adjuster lock nut and recheck the brake light switch operation.

NOTE

- Do not turn the switch body.



HEADLIGHT AIM

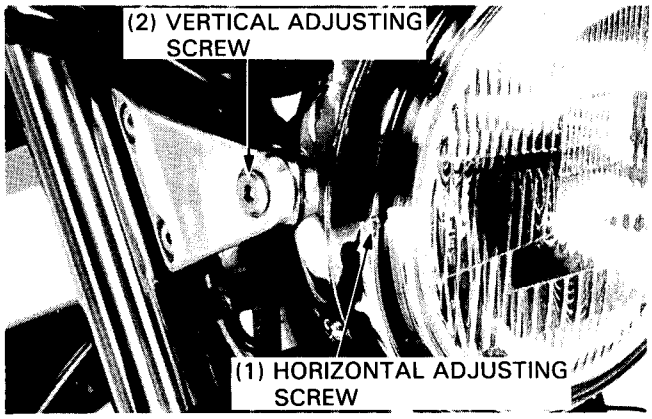
Adjust vertically by loosing the headlight mounting bolts.
Adjust horizontally by turning the horizontal adjusting screw.

NOTE

- Adjust the headlight beam as specified by local laws and regulations.

⚠ WARNING

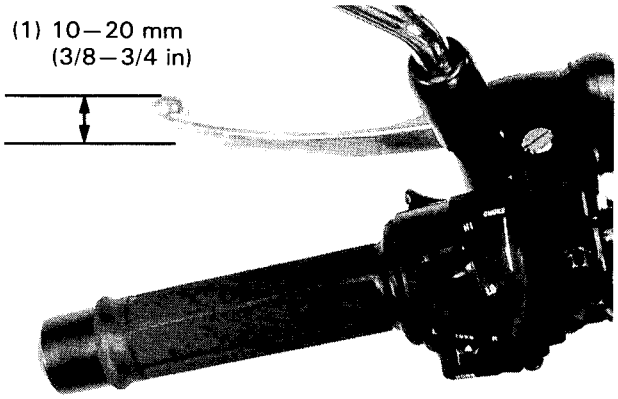
- ***An improperly adjusted headlight may blind oncoming drivers, or it may fail to light the road for a safe distance.***



CLUTCH SYSTEM

Measure the clutch lever free play at the lever end.

FREE PLAY: 10—20 mm (3/8—3/4 in)

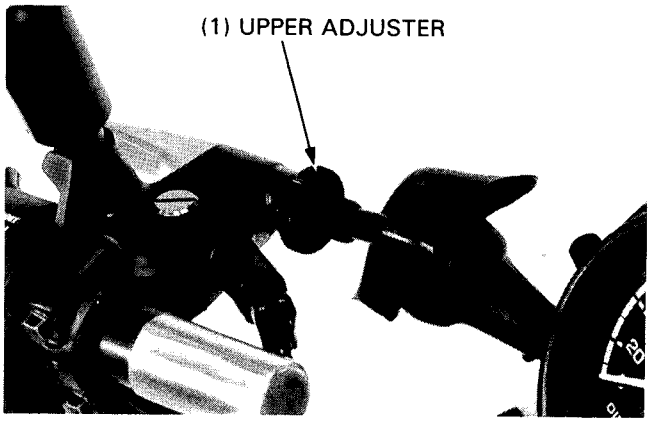


Minor adjustments are made with the upper adjuster.

Pull the lever cover back, loosen the lock nut and turn the adjuster to obtain the specified free play.

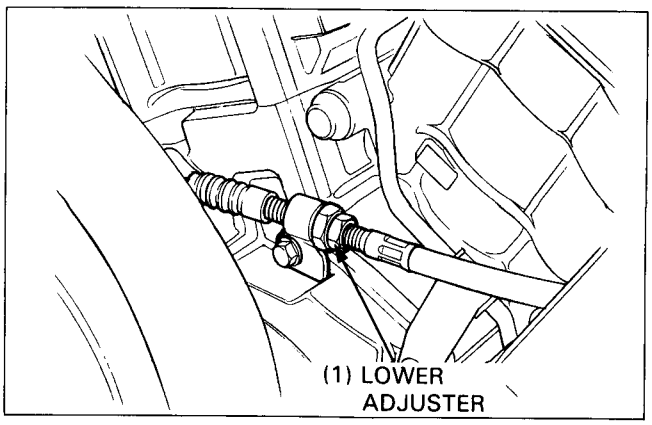
Tighten the lock nut and install the cover.

Check clutch operation.



Major adjustments are made with the lower adjuster.
Loosen the lock nut and turn the adjusting nut to obtain the specified free play.

Tighten the lock nut and check the clutch operation.



SIDE STAND

Check the spring for damage or loss of tension.
Check the side stand assembly for freedom of movement.
Lubricate the pivot bolt and the side stand pivot area if necessary.

Tighten the pivot bolt.

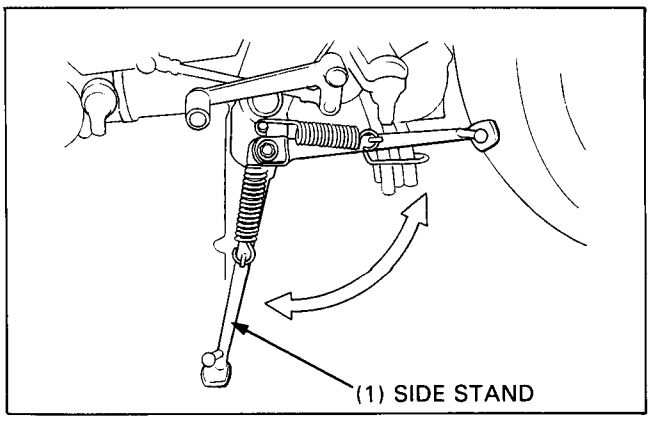
TORQUE: BOLT: 38 N·m (3.8 kg-m, 27 ft-lb)

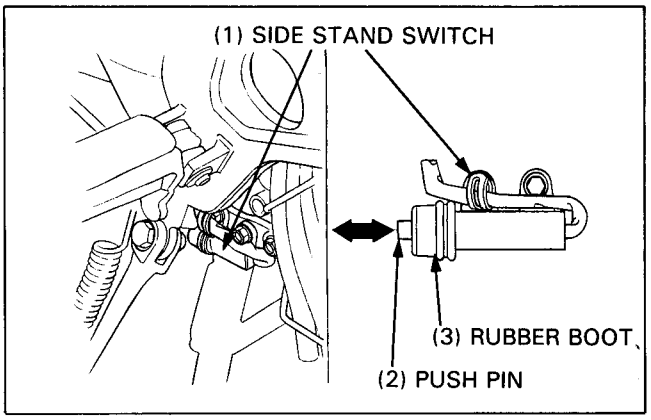
Check the side stand ignition cut-off system:
- Place the motorcycle on its center stand and raise the side stand.
- Start the engine with the transmission in neutral, then shift the transmission into gear with the clutch lever squeezed.
- Lower the side stand.
- The engine should stop as the side stand is lowered.

If there is a problem with the system, check the side stand switch (see section 20).

Check the side stand switch mounting bolts for looseness.

Check the side stand switch push pin and rubber boot for damage.





SUSPENSION

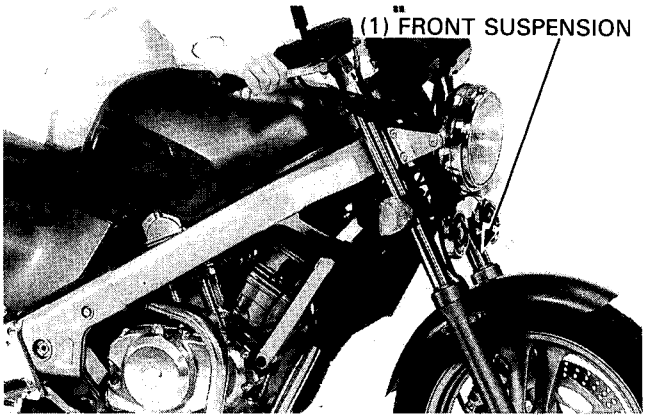
FRONT

Check the suspension action by compressing it several times.

Check the entire fork leg assembly for signs of leaks or damage.
Replace any components which are unrepairable.
Tighten all nuts and bolts to the specified torque value.

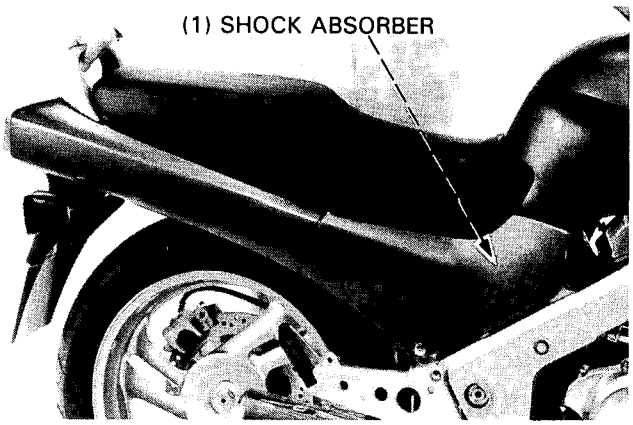
⚠ WARNING

- ***Do not ride a vehicle with faulty suspension. Loose, worn, or damaged suspension parts may affect stability and rider control.***



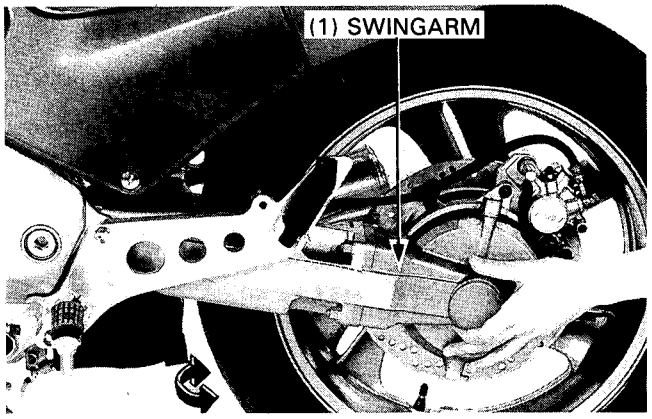
REAR

Check the action of the rear suspension components by compressing the suspension several times.
Check the entire suspension assembly, being sure it is securely mounted and not damaged or distored.

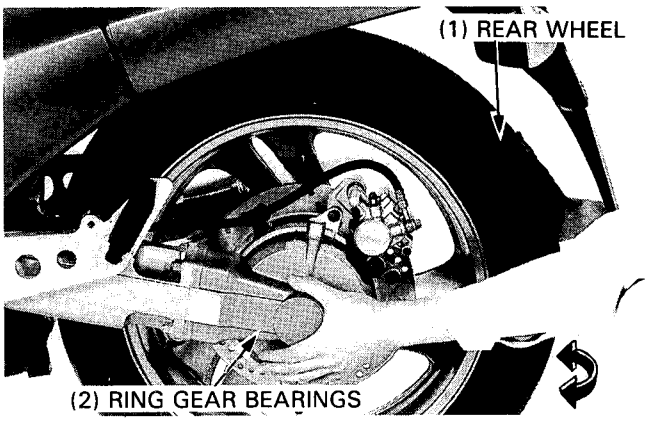


Place the motorcycle on its center stand.
Check for worn swingarm bearings by grabbing the swingarm, and attempting to move the swingarm side to side. Replace the bearings if any looseness is noted (page 15-10).

Tighten all nuts and bolts.



Check for worn ring gear bearings by grabbing the rear wheel as shown, and attempting to move the wheel side to side. Replace the bearings if any looseness is noted (Section 13).



NUTS, BOLTS, FASTENERS

Tighten the bolts, nuts and fasteners at the intervals shown in the Maintenance Schedule (page 3-3).
Check that all chassis nuts and bolts are tightened to their correct torque values (page 1-5, 6 and 7).
Check all cotter pins and safety clips.

WHEELS/TIRES

TIRE PRESSURE

NOTE

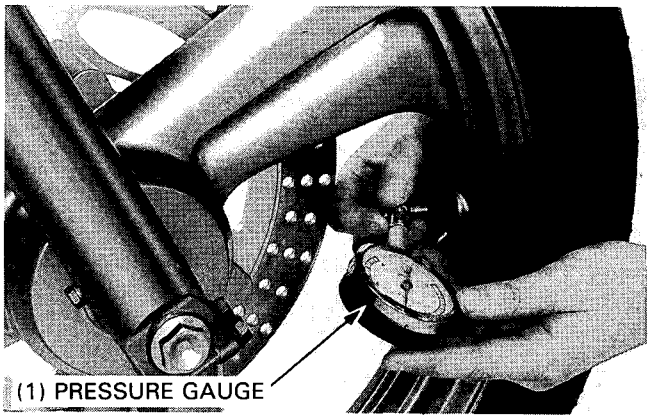
- Tire pressure should be checked when the tires are COLD.

Item		Front	Rear
Tire size		110/80-17 57H Tubeless type	150/70-17 69H Tubeless type
Wheel balance weight		60 g MAX.	60 g MAX.
Tire pattern code	DUNLOP	K505G	K505
	BRIDGESTONE	G547G	G548
Tire pressure (COLD)	Rider only	225 kPa (2.25 kg/cm^2, 33 psi)	225 kPa (2.25 kg/cm^2, 33 psi)
	Rider and passenger	225 kPa (2.25 kg/cm^2, 33 psi)	280 kPa (2.80 kg/cm^2, 41 psi)

Check the tires for cuts, imbedded nails, or other sharp objects.

Check the front and rear wheels for trueness (Section 14 and 15).
Measure the tread depth at the center of the tires.
Replace the tires if the tread depth reaches the following limit:

MINIMUM TREAD DEPTH:
Front: 1.5 mm (0.06 in)
Rear: 2.0 mm (0.08 in)

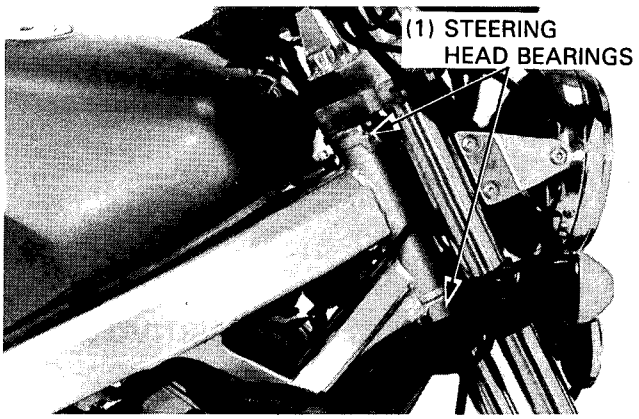


STEERING HEAD BEARINGS

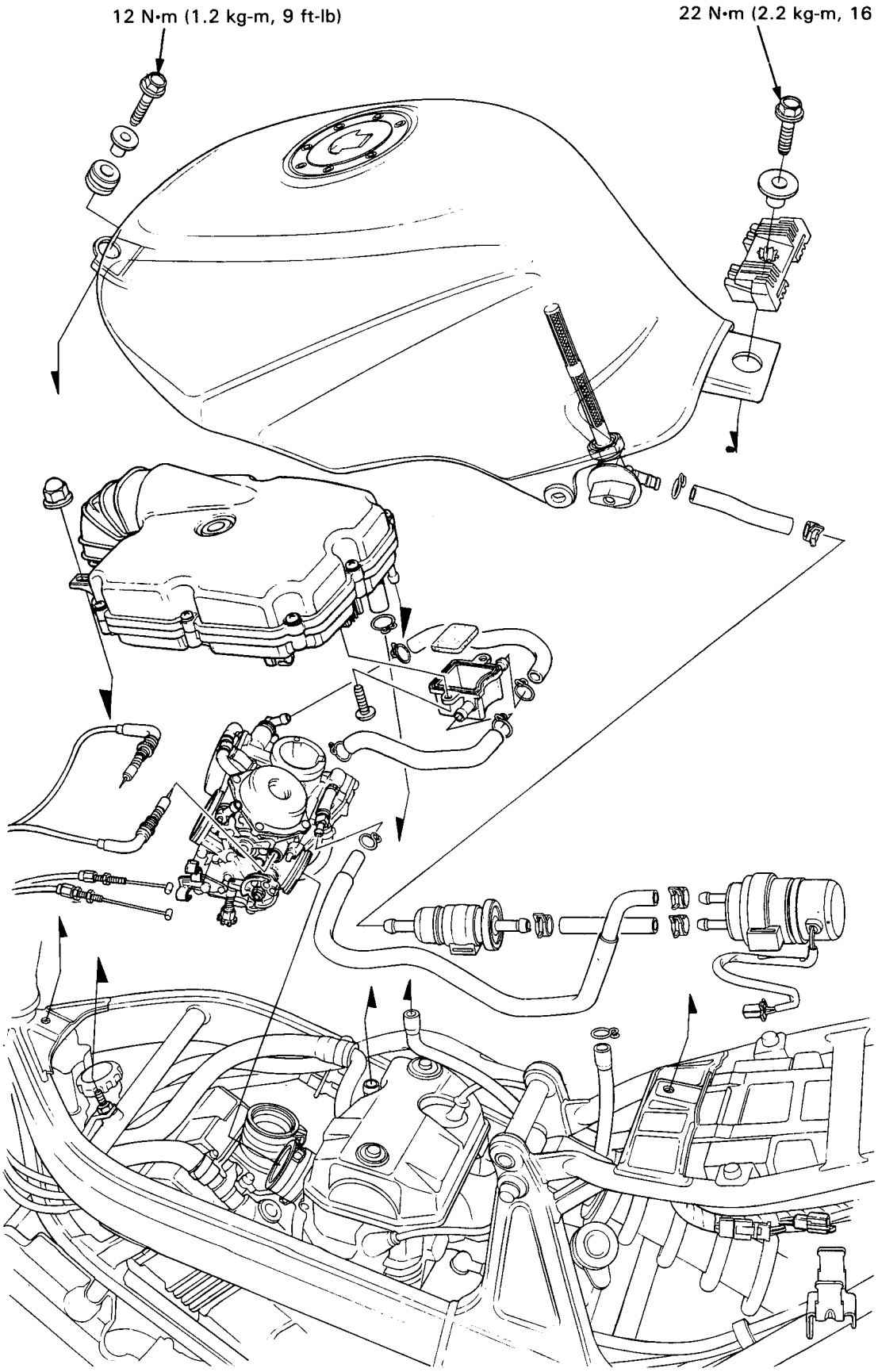
NOTE

- Check that the control cables do not interfere with handlebars rotation.

Raise the front wheel off the ground.
Check that the fork pivots freely from side to side. If the fork pivots unevenly, binds, or has vertical movement, inspect the steering head bearings (Section 14).



FUEL SYSTEM


12 N•m (1.2 kg-m, 9 ft-lb)
22 N•m (2.2 kg-m, 16 ft-lb)

SERVICE INFORMATION

⚠ WARNING

- *Gasoline is extremely flammable and is explosive under certain conditions work in a well ventilated area with the engine stopped. Do not smoke or allow flames or sparks in the work area or where gasoline is stored.*
- *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.*

GENERAL

- Refer to Section 3 for carburetor synchronization, throttle cable and choke cable adjustments.
- When disassembling fuel system parts, note the locations of the O-rings; replace them with new ones on reassembly.
- The carburetor float chambers have drain screws that can be loosened to drain residual gasoline.
- For fuel pump inspection refer to section 20.

CAUTION

- *Do not bend or twist control cables. Damaged control cables will not operate smoothly and may stick or bind.*

NOTE

- If vehicle is to be stored for more that one month, drain the float chambers. Fuel left in the float chambers may cause clogged jets resulting in hard starting or poor, drivability.

SPECIFICATIONS

ITEM	NTV650 [Except SW model]	NTV650 [SW model only]	NTV600
Type	Slant type constant velocity dual carburetor		
Throttle bore	36.5 mm (1.43 in)	36.5 mm (1.43 in)	34.0 mm (1.39 in)
Identification number	VDG4A	VDGPA	VDF5A
Float level	9.2 mm (0.36 in)	9.2 mm (0.36 in)	7.0 mm (0.27 in)
Main jet	Front #140, Rear #135	Front #140, Rear #135	Front #135, Rear #130
Slow jet	#42	#42	#38
Idle speed	1,100 ± 100 min^{-1} (rpm)	1,200 ± 50 min^{-1} (rpm)	1,200 ± 100 min^{-1} (rpm)
Throttle grip free play	2 ~ 6 mm (1/8 ~ 1/4 in)		
Pilot screw initial setting	2 turns out	1-3/4 turns out	1-3/4 turns out

TORQUE VALUES

Fuel tank mounting bolt	: Front	12 N·m (1.2 kg-m, 9 ft-lb)
	: Rear	22 N·m (2.2 kg-m, 16 ft-lb)

TOOLS

Special

Vacuum/Pressure pump	A937X—041—XXXXX

Common

Float level gauge	07401—0010000

TROUBLESHOOTING

Engine cranks but won't start
- No fuel to carburetor
- Engine flooded with fuel
- No spark at plug (ignition system faulty)
- Clogged air cleaner
- Intake air leak
- Improper choke operation
- Improper throttle operation

Hard starting or stalling after starting
- Improper choke operation
- Ignition malfunction
- Faulty carburetor
- Fuel contaminated
- Intake air leak
- Incorrect idle speed
- Incorrect valve clearance (Section 3)
- Incorrect carburetor synchronization (Section 3)
- Improper choke valve operation.

Rough idle
- Faulty ignition system
- Incorrect idle speed
- Incorrect valve clearance (Section 3)
- Incorrect carburetor synchronization
- Faulty carburetor
- Fuel contaminated
- Faulty air cut off valve

  (SW model only:)

  : Worn/damaged emission system hoses

Afterburning during deceleration
- Faulty ignition system
- Faulty air cut off valve
- Lean mixture

  (SW model only:)

  : Worn/damaged emission system hoses

Misfiring during acceleration
- Faulty ignition system

Backfiring
- Faulty ignition system
- Faulty carburetor

Poor performance (driveability) and poor fuel economy
- Clogged fuel system
- Faulty ignition system
- Dirty air cleaner

  (SW model only:)

  : Worn/damaged emission system hoses

Lean mixture
- Clogged fuel jets
- Stuck vacuum piston
- Faulty float valve
- Low float level
- Clogged fuel tank breather
- Clogged fuel strainer
- Restricted fuel line
- Intake air leak
- Restricted or faulty fuel pump

Rich mixture
- Clogged air jets
- Faulty float valve
- Float level too high
- Dirty air cleaner

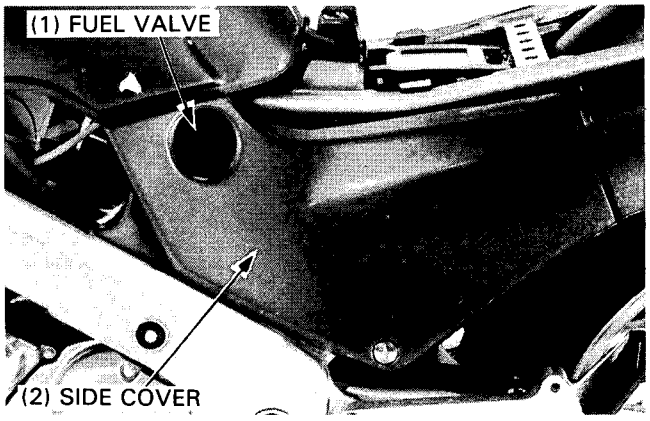
FUEL TANK

REMOVAL

⚠WARNING

- ***Gasoline is extremely flammable and is explosive under certain conditions. Work in a well ventilated area with the engine stopped. Do not smoke or allow flames or sparks in the work area or where gasoline is stored.***

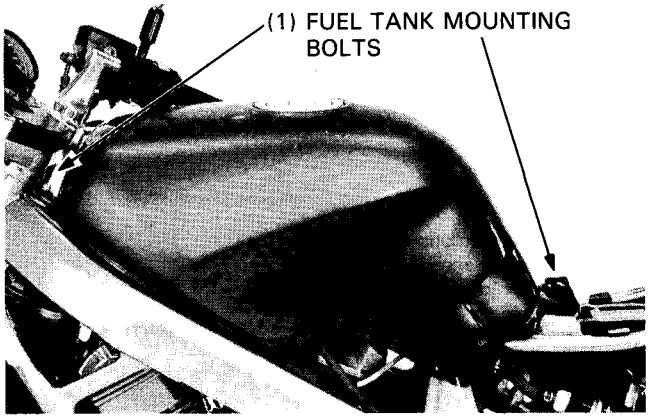
Remove the seat (page 15-14) and turn the fuel valve OFF.
Remove the left side cover.
Disconnect the fuel tube from the fuel tank.



Remove the rear fuel tank mounting bolt first, then the front bolt and remove the tank from the frame.

CAUTION

- *If you remove the front mounting bolt first, it may damage the front mounting collar.*



Check that fuel flows out of the fuel valve freely.
If flow is restricted, clean the fuel startiner.

INSTALLATION

Install the fuel tank in the frame.
Install the front fuel tank mounting bolt first, then the rear bolt.

TORQUE:
Front: 12 N·m (1.2 kg-m, 9 ft-lb)
Rear: 22 N·m (2.2 kg-m, 16 ft-lb)

Connect the removed tubes securely.

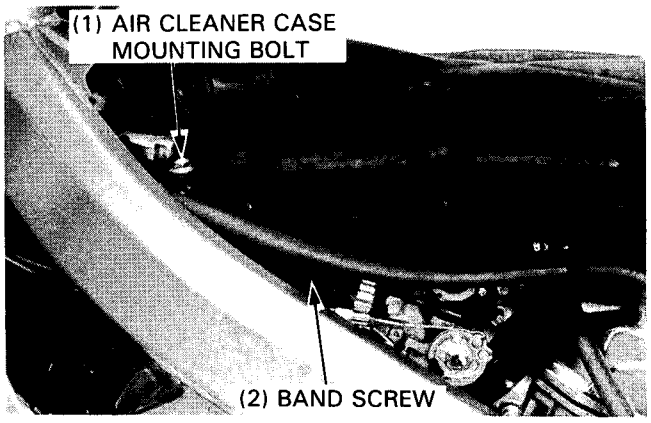
AIR CLEANER CASE

REMOVAL

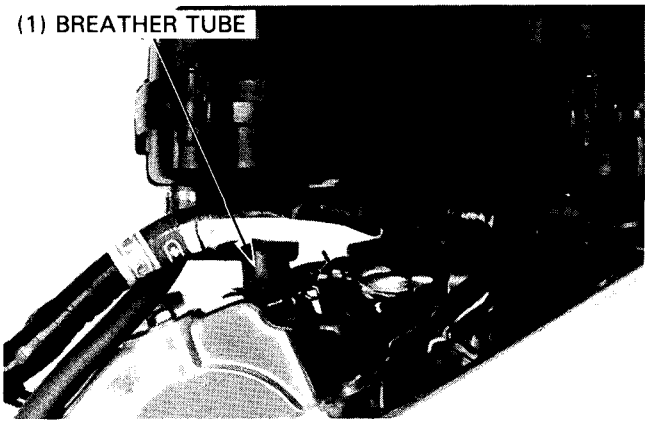
NOTE

- The air cleaner case removal is can be done without the case cover removal.

Remove the seat and fuel tank.
Remove the air cleaner case mounting bolt.

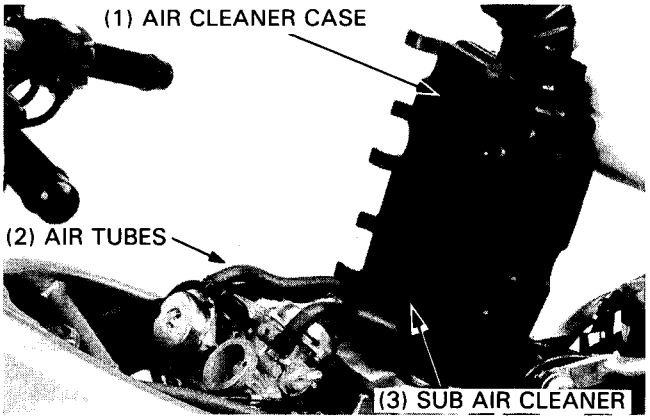


Loosen the air cleaner connecting tube band screws and disconnect the crankcase breather and air cleaner case drain tube.



Raise the air cleaner case and disconnect the air tubes (: to sub air cleaner) at the carburetors.

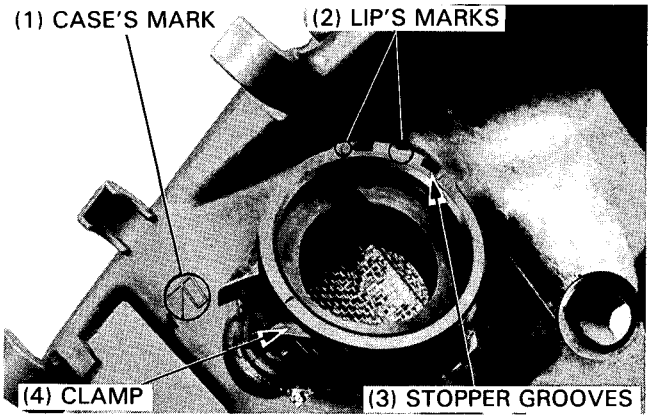
Remove the air cleaner case.



INSTALLATION

Install the air cleaner case in the reverse order of removal.

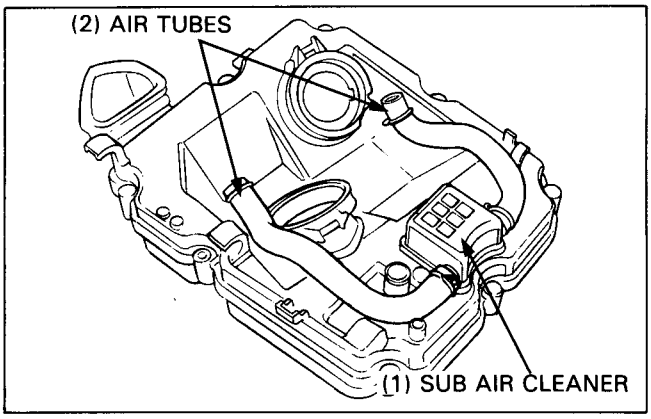
If connecting tube clamps are removed, align the clamp stopper groove with location marks which are on the case and the tube lip.



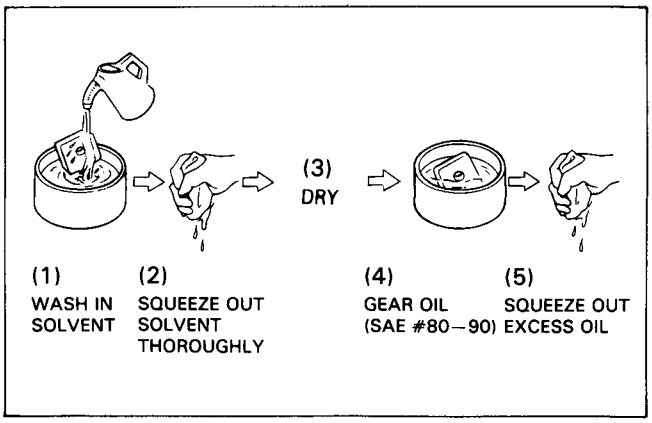
SUB-AIR CLEANER ELEMENT

Remove the following:
— seat (page 15-13) and fuel tank (page 4-3)
— air cleaner case

Disconnect the air tubes (carburetors-to-sub-air cleaner cover).
Remove the sub-air cleaner mounting bolt and cover and remove the element.



Wash the element in non-flammable or high flash point solvent, squeeze out the solvent thoroughly, and allow the element to dry.
Soak the element in gear oil (SAE #80—90) and squeeze out the excess.
Reinstall the element and cover, and tighten the bolt.
Reconnect the air tubes from the carburetors.



CARBURETOR REMOVAL

⚠WARNING

- ***Gasoline is extremely flammable and is explosive under certain conditions. Work in a well ventilated area with the engine stopped. Do not smoke or allow flames or sparks in the work area or where gasoline is stored.***

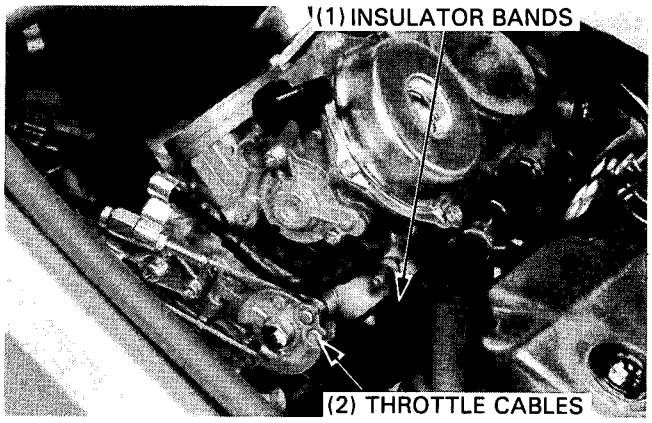
Loosen the drain screws and drain the fuel into a container.
Remove the air cleaner case.
Disconnect the throttle cables from the carburetor.

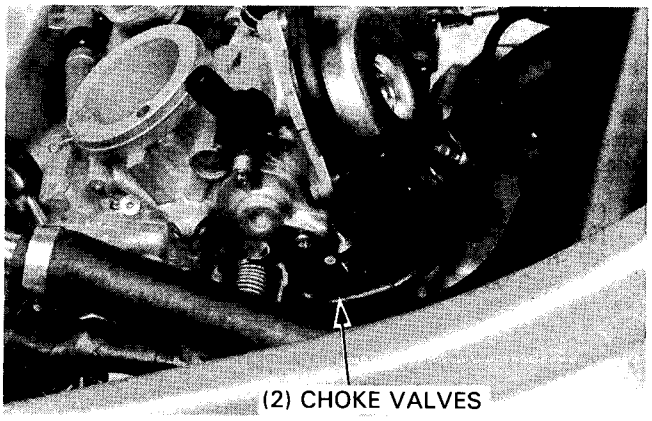
NOTE

- Turn the choke lever fully in to avoid losing the choke valves.

Remove the choke valves from the carburetor and loosen the carburetor insulator bands.

Pull the carburetors upward and away from the engine.



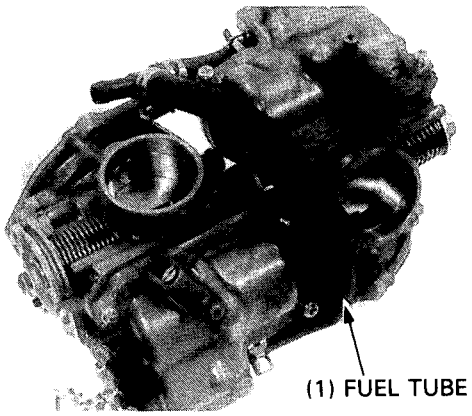


CARBURETOR DISASSEMBLY

NOTE

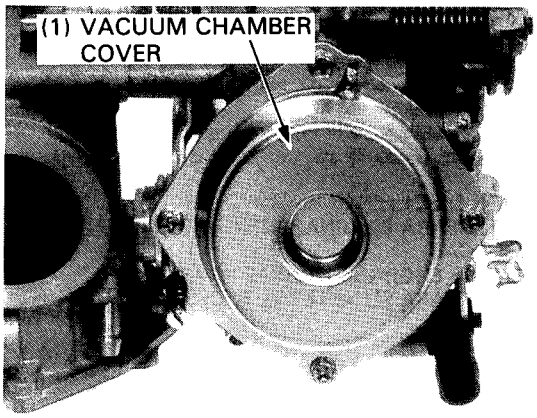
- The carburetors can be disassembled without being separated.

Remove the fuel and air vent tubes from the carburetor.



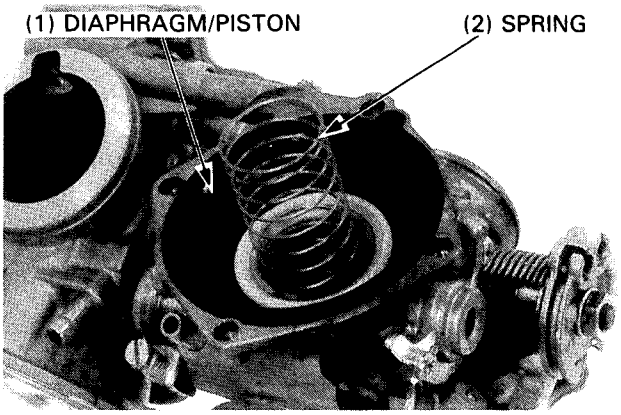
VACUUM CHAMBER

Remove the four screws and vacuum chamber cover.

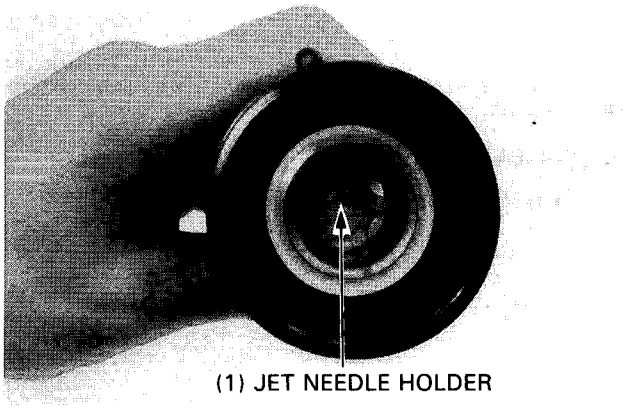


Remove the spring, piston/diaphragm.
Inspect the vacuum piston for wear, nicks, scratches or other damage.

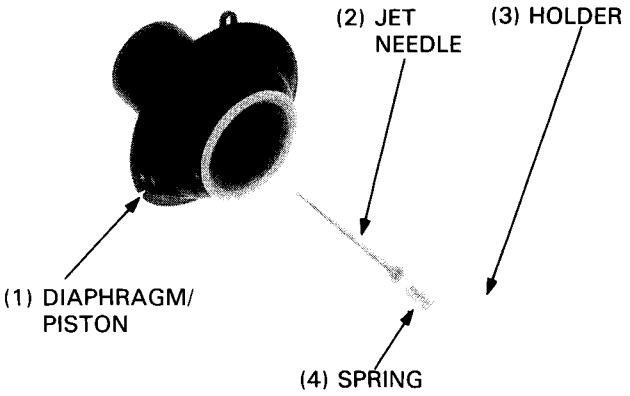
Make sure the piston moves up and down freely in the chamber.



Push the jet needle holder in and turn it in 90 degrees counterclockwise.

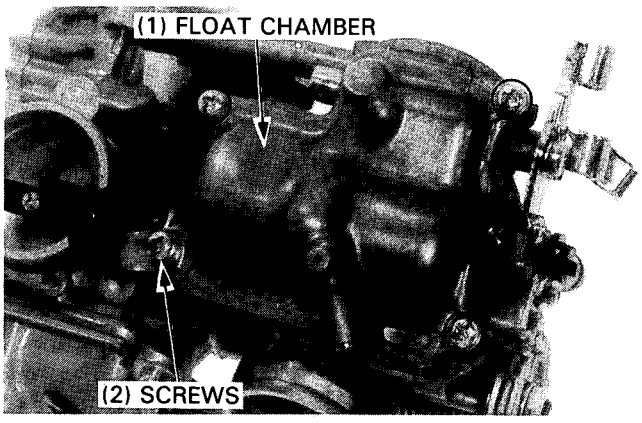


Then remove the needle holder, spring, and jet needle from the piston.
Inspect the needle for excessive wear at the tip, bending or other damge.
Inspect the diaphragm for damage, fatigue or pin holes.
Inspect the vacuum piston for wear or damage.

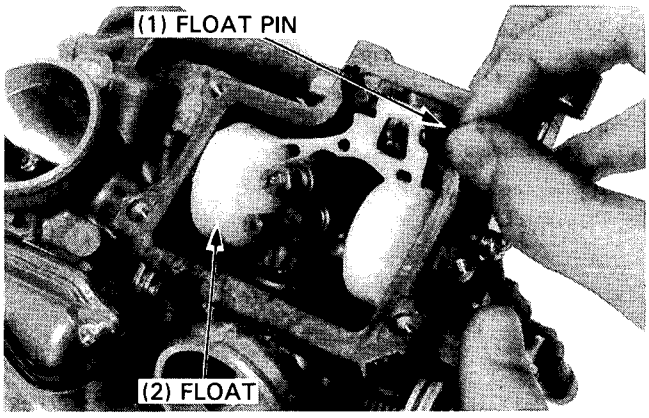


FLOAT CHAMBER, FLOAT AND JETS

Remove the four screws and float chamber.

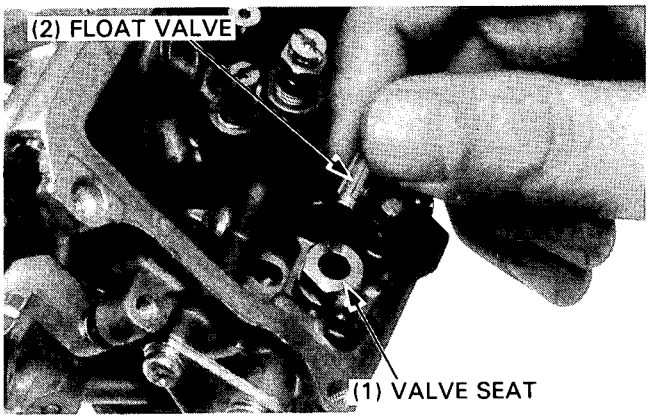


Remove the float pin, float and float valves.



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

Inspect the operation of the float valve.



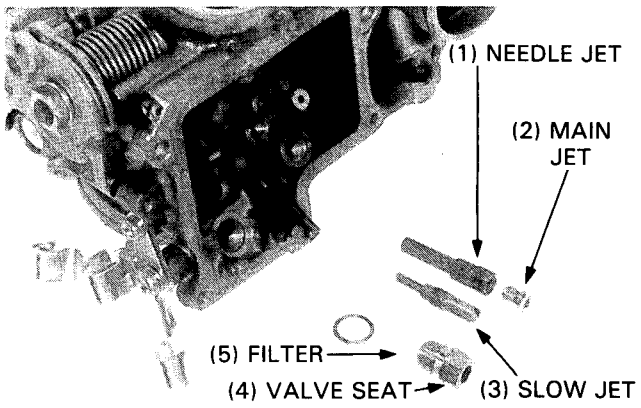
Remove the main jet, needle jet, slow jet and valve seat/filter.

Check each part for wear or damage.
Blow open all jets with compressed air.

Clean each jet with non-flammable or high flash point solvent.

Inspect the float valve seat and filter for grooves, nicks or deposits.

Clean the filter with low-pressure compressed air.

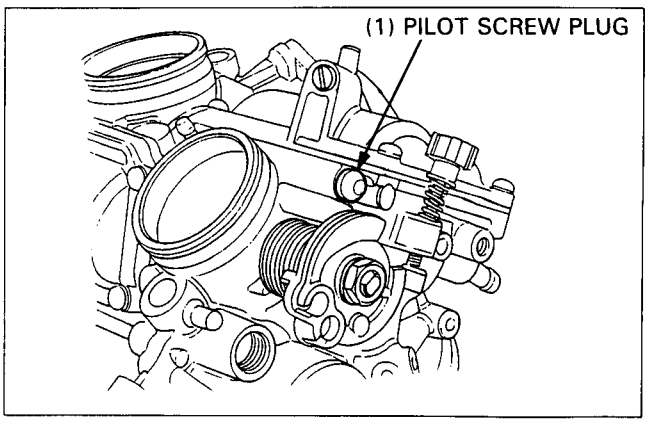


PILOT SCREW REMOVAL

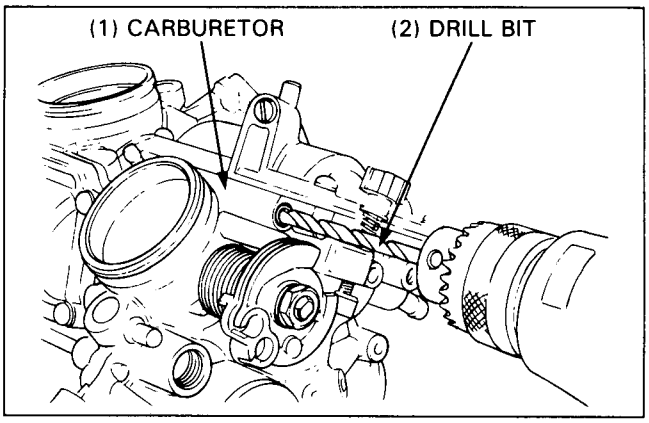
SW model only:

NOTE

- The pilot screws are factory pre-set and should not be removed unless the carburetors are overhauled.
- The pilot screw plugs are factory installed to prevent pilot screw misadjustment. Do not remove the plugs unless the pilot screws are being removed.
- Cover all openings with tape to keep metal particles out when the plugs are drilled.



Center punch the pilot screw plug to center the drill point. Drill through the plug with a 4 mm (5/32 in) drill bit. Attach a drill stop to the bit 3 mm (1/8 in) from the end to prevent drilling into the pilot screw.



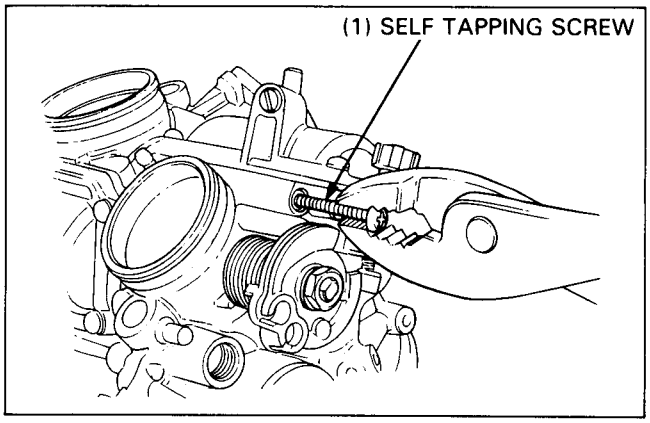
CAUTION

- *Be careful not to drill into the pilot screw.*
- *Both pilot screws must be replaced even if only one requires it, for proper pilot screw adjustment (page 4-14).*

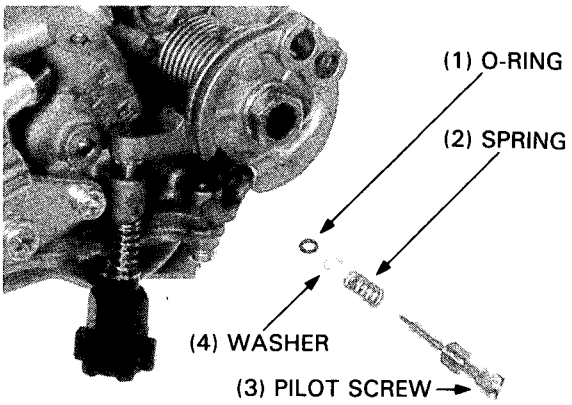
Force a self-tapping 4 mm screw, P/N 93903—35410) into the drilled plug and continue turning the screwdriver until the plug rotates with the screw.

Pull on the screw head with pliers to remove the plug.

Use compressed air to clean the pilot screw area and remove metal shavings.



All models:
Turn each 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 screws.



CAUTION

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

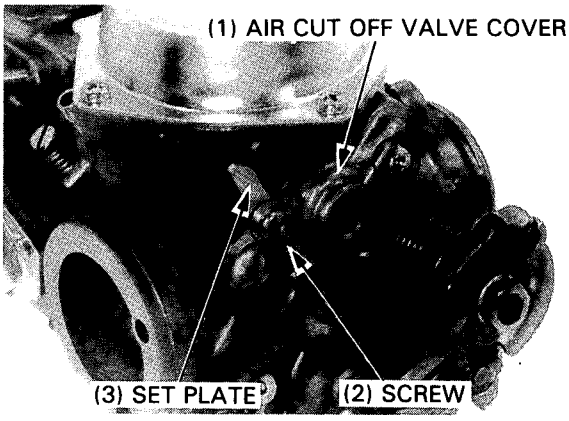
Remove the pilot screws and inspect them. Replace them if they are worn or damaged.

AIR CUT OFF VALVE

Remove the two screws, the set plate and the air cut off valve cover.

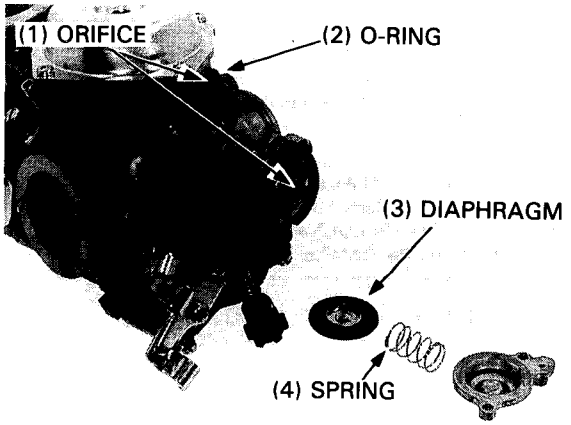
NOTE

- The air cut off valve cover is under spring pressure. Do not loose the spring and screws.



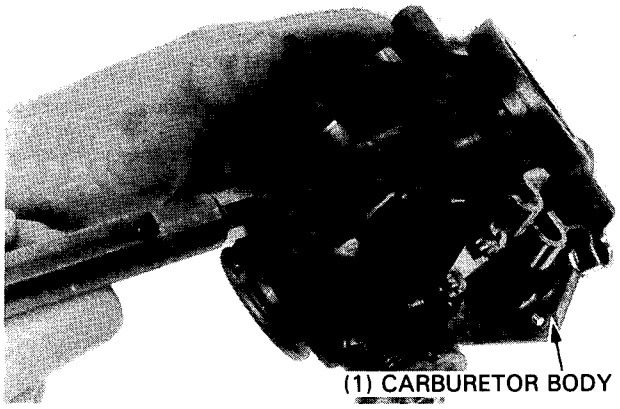
Visually check the following:
- diaphragm for deterioration, pin hole or other damage.
- spring for deterioration or other damage.
- diaphragm needle for excessive wear at the tip or other damage.
- orifice of air vent for clogging.
- O-ring for damage.

Replace the air cut off valve as an assembly, if necessary.



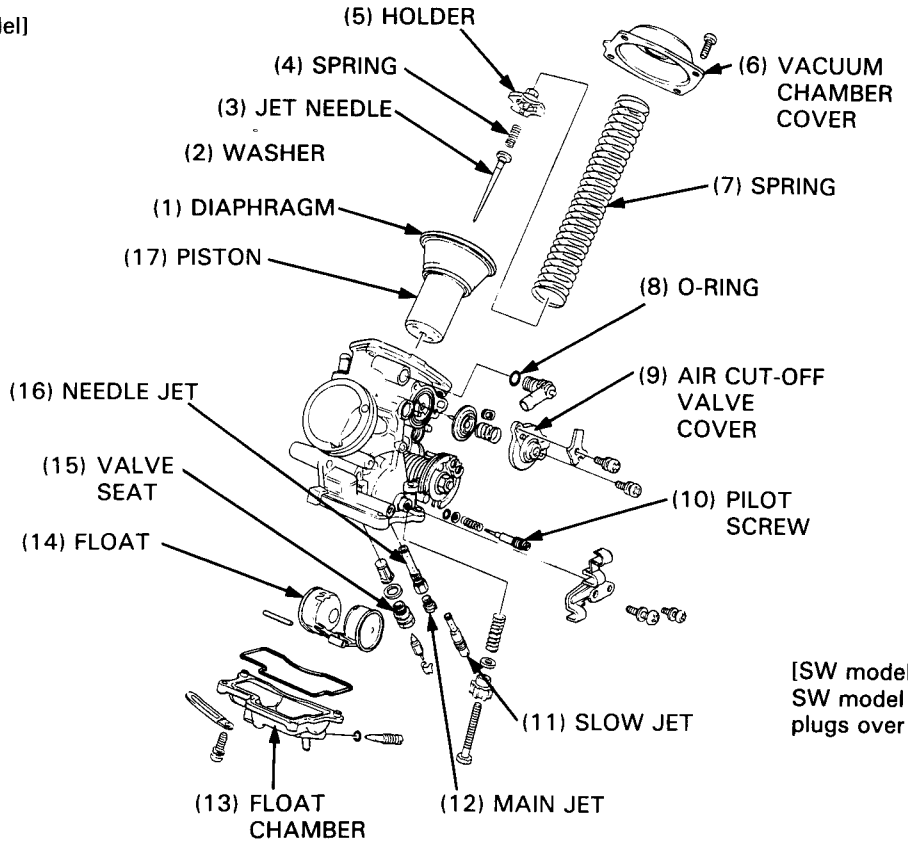
CARBURETOR CLEANING

Separate the carburetors (page 4-12).
Remove the float valve, all jets, and the pilot screws.
Blow open all carburetor body openings with compressed air.



CARBURETOR ASSEMBLY

[Except SW model]

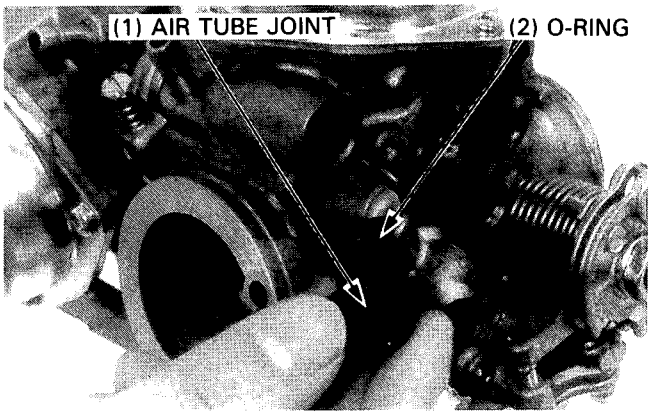


[SW model]:
SW model has pilot screw plugs over the pilot screws.

INSTALLATION

If the air tube joint was removed, install a new O-ring onto the air tube joint.

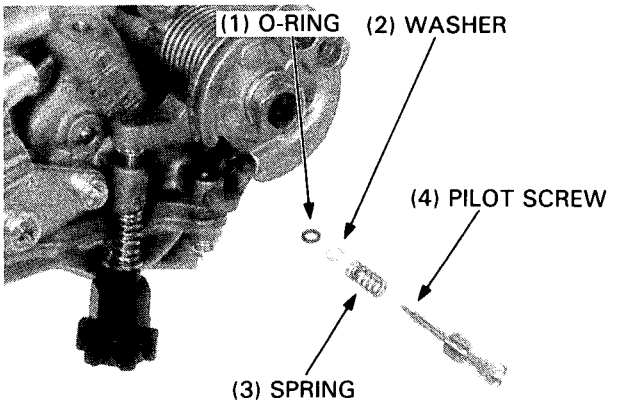
Install the air cut off valve cover with the joint set plate and tighten the screws securely.
Be sure the diaphragm and spring are properly seated.



Install the pilot screws and return them to their original position as noted during removal.
Perform pilot screw adjustment if new pilot screws are installed (page 4-14).

NOTE

- Do not install new plugs on new pilot screw holes until after adjustment has been made.
- If you replace the pilot screw in one carburetor, you must replace the pilot screw in the other carburetor for proper pilot screw adjustment.



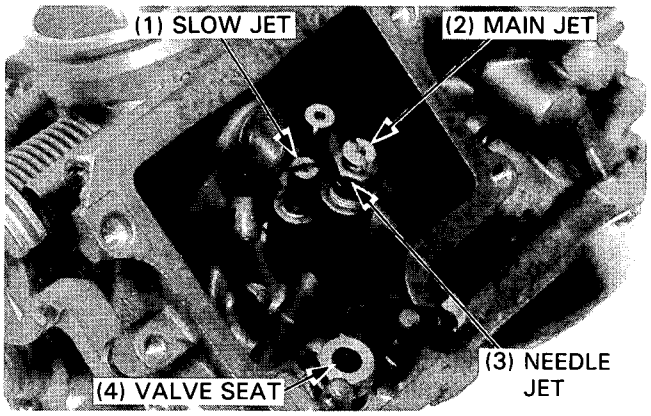
FLOAT CHAMBER, FLOAT AND JETS

Install the pilot screw and turn it in until it seats lightly.
Turn the pilot screw out the number of turns recorded during removal.

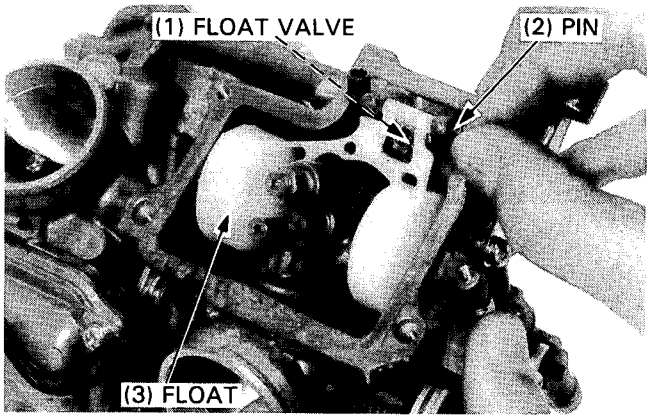
CAUTION

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

Install the valve seat, slow jet, needle jet and main jet.



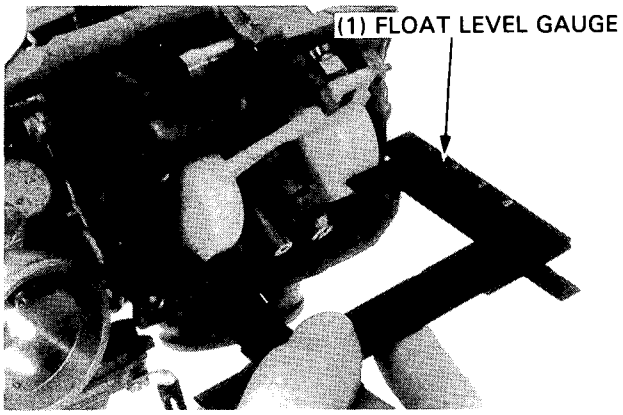
Install the float with float valve in the carburetor body, then install the float arm pin through the body and the float.



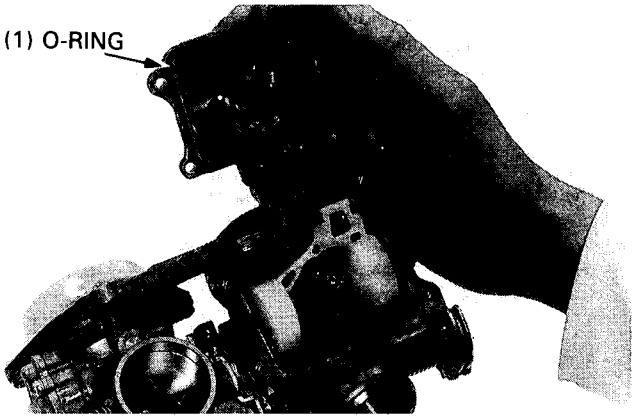
FLOAT LEVEL

Measure the float level with the float tang just contacting the float valve.

FLOAT LEVEL: NTV 650: 9.2 mm (0.36 in)
NTV 600: 7.0 mm (0.27 in)
Adjust the float level by carefully bending the tang.



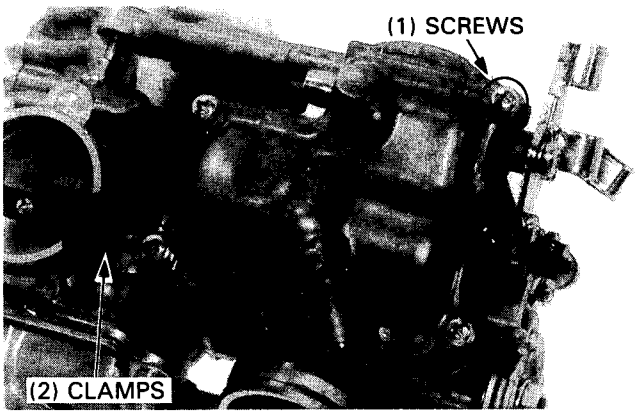
Install the new O-ring in the float chamber groove.



Install the float chamber and tighten the screws securely.

NOTE

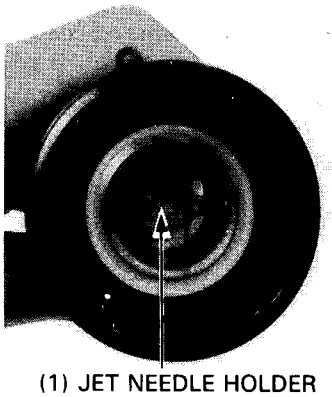
- Install the fuel tube clamps.

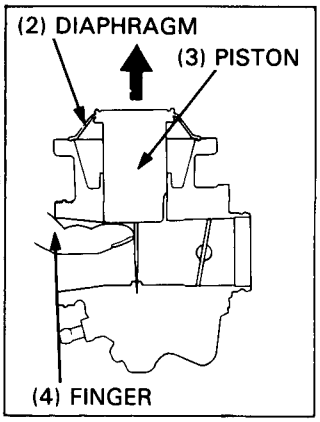


VACUUM CHAMBER

Install the washer, jet needle, spring and jet needle holder in the vacuum piston.
Push the jet needle holder in and turn it in 90 degrees clockwise.

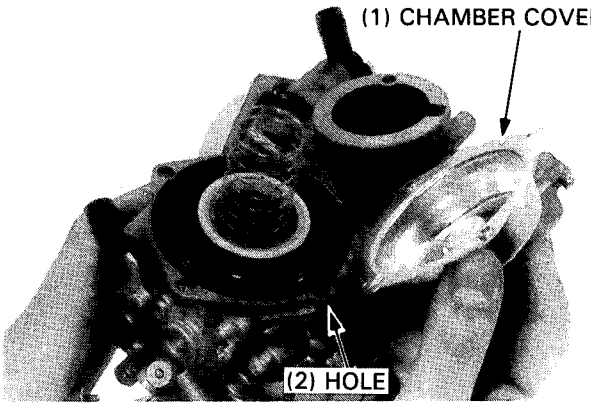
Hold the vacuum piston up to almost full open to avoid pinching the diaphragm with the chamber cover.



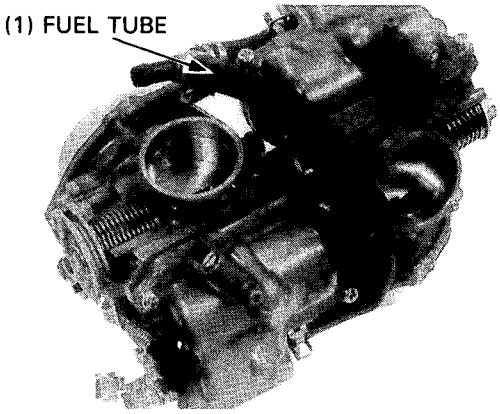


Install the vacuum piston, aligning the tab of the diaphragm with the groove of the carburetor.

Install the chamber cover with the spring, aligning the cover with the hole in the carburetor, and secure with at least two screws before releasing the vacuum piston.



Install the fuel and air vent tubes as shown.



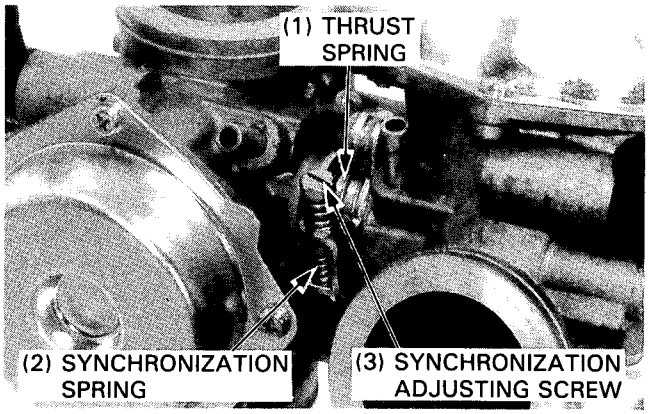
CARBURETOR SEPARATION/COMBINATION

SEPARATION

Loosen the synchronization adjusting screw.

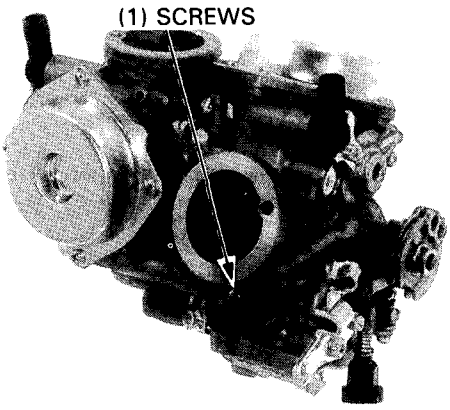
NOTE

- When separating the carburetors, be careful not to lose the thrust spring and synchronization adjusting spring.



Separate the carburetors by removing the two attaching screws.

Remove the synchronization spring.

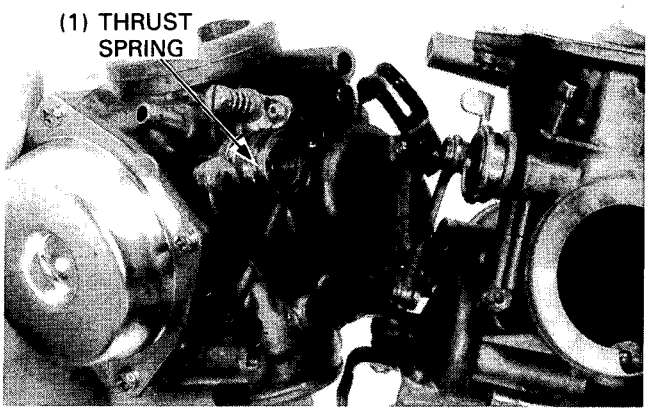


COMBINATION

Loosen the synchronization adjusting screw until there is no spring tension.

Install the thrust spring between the throttle links.

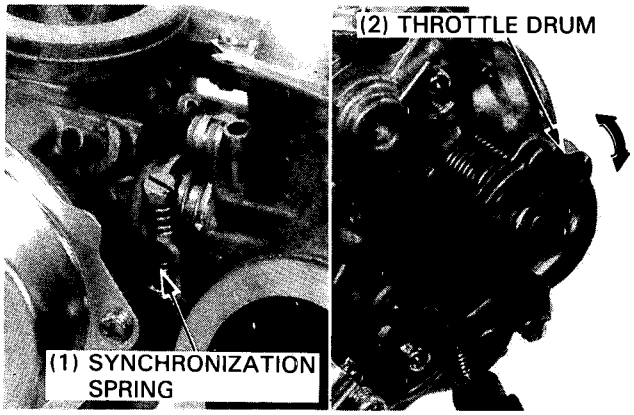
Secure the carburetors together with the two screws.



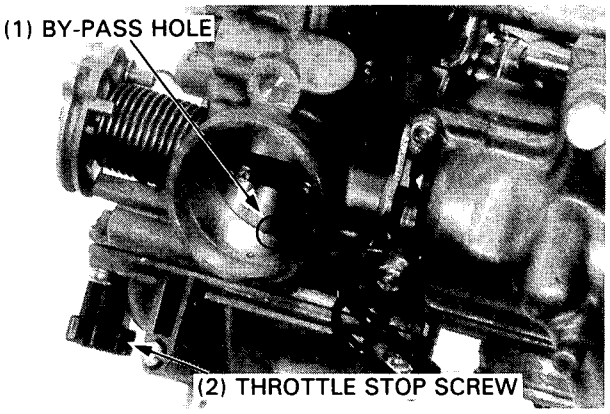
Install the synchronization spring and synchronization adjusting screw.

Inspect throttle operation as described below:

- Open the throttle slightly by rotating the throttle drum, then release the throttle. Make sure that there is no drag when opening and closing the throttle.

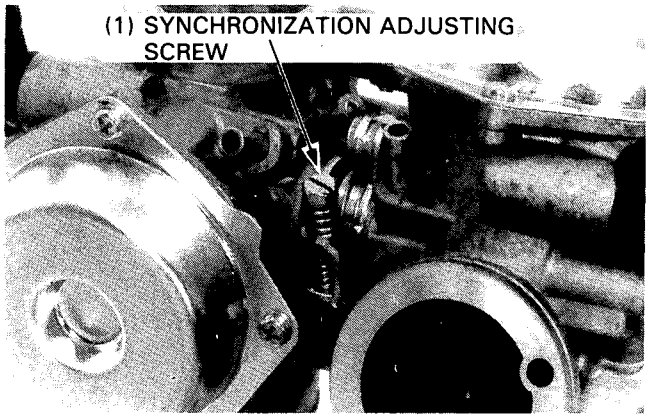


Turn the throttle stop screw to align the rear cylinder carburetor throttle valve with the edge of the by-pass hole.



Align the front cylinder carburetor throttle valve with the by-pass hole edge by turning the synchronization adjusting screw.

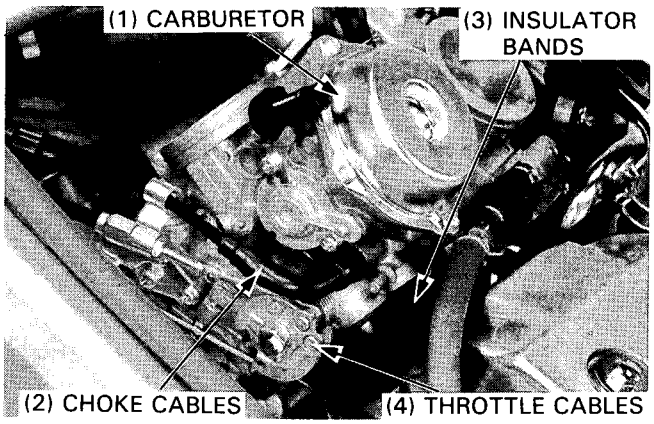
Make sure the throttle returns smoothly to the fully closed position.



CARBURETOR INSTALLATION

Install the carburetors onto the cylinder heads and tighten the insulator bands securely.

Install the following parts
– throttle cables
– choke cables
– air cleaner case
– fuel tank
Adjust as follows:
– pilot screw (page 4-14)
– carburetor synchronization (page 3-8)
– throttle grip free play (page 3-4)
– carburetor idle speed (page 3-9)
– carburetor choke (page 3-5)



PILOT SCREW ADJUSTMENT (Except SW)

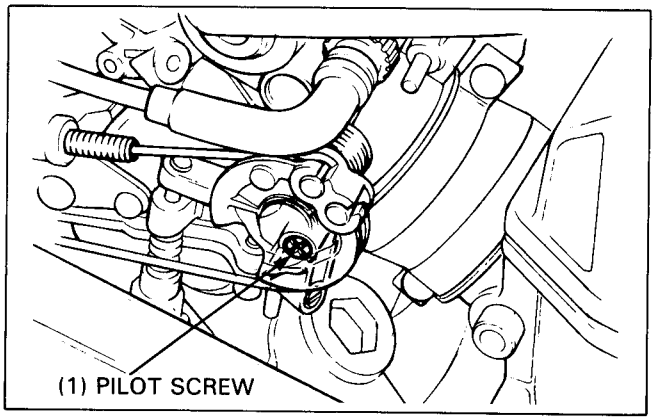
NOTE

- The pilot screws are factory pre-set. Adjustment is not necessary unless the carburetor is overhauled or a new pilot screw is installed.

CAUTION

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

Turn the pilot screw clockwise until it seats lightly and back it out 2; NTV650, 1-3/4; NTV600 turns.
This is an initial setting prior to the final pilot screw adjustment.
Warm the engine up to operating temperature.
Stop the engine and connect a tachometer.



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

IDLE SPEED: NTV650: 1,100 ± 100 min^{-1} (rpm)
NTV600: 1,200 ± 100 min^{-1} (rpm)

Turn the pilot screw clockwise until you hear the engine miss or decrease in speed, then turn counterclockwise until the engine again misses or decreases in speed.
Center the pilot screw exactly between these two extreme positions.
If idle speed changes after adjusting the pilot screw, readjust the throttle stop screw.

IDLE DROP PROCEDURE (SW ONLY)

NOTE

- The pilot screws are factory pre-set and no adjustment is necessary unless the pilot screws are replaced.
- Use a tachometer with graduations of 50 min^{-1} (rpm) or smaller that will accurately indicate a 50 min^{-1} (rpm) change.

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

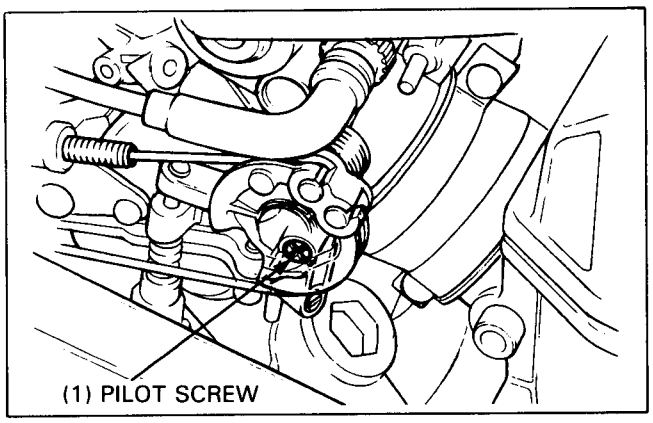
INITIAL OPENING: 1-3/4 turns out

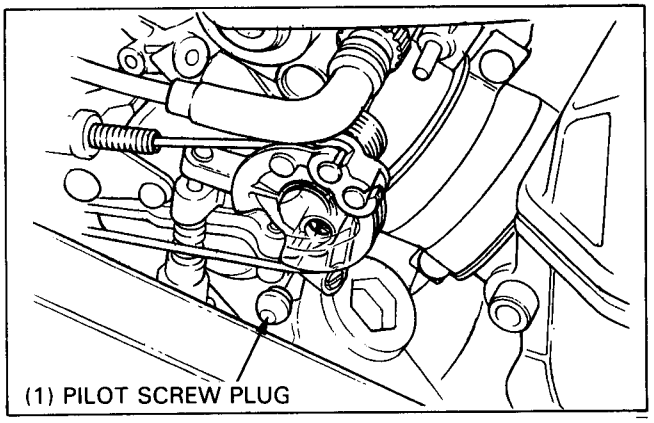
CAUTION

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

2. Warm up the engine to operating temperature.
   Stop and go riding for 10 minutes is sufficient.
3. Attach a tachometer according to the manufacturer's instructions.
4. Adjust the idle speed with the throttle stop screw.
5. Turn each pilot screw 1/2 turn out from the initial setting.
6. If the engine speed increases by 50 min^{-1} (rpm) or more, turn each pilot screw out by an additional 1/2 turn until engine speed drops by 50 min^{-1} (rpm) or less.
7. Adjust the idle speed with the throttle stop screw.
8. Turn the rear cylinder carburetor pilot screw in until the engine speed drops 50 min^{-1} (rpm).
9. Turn the rear cylinder carburetor pilot screw 1 turn out from the position obtained in step 8.
10. Adjust the idle speed with the throttle stop screw.
11. Perform steps 8, 9 and 10 for the front cylinder carburetor pilot screw.
12. Drive new pilot screw plugs into the pilot screw bores with a 7 mm valve guide driver (P/N 07942—8230000). When fully seated the plug surfaces will be recessed 1 mm.

IDLE SPEED: 1,200 ± 50 min^{-1} (rpm)





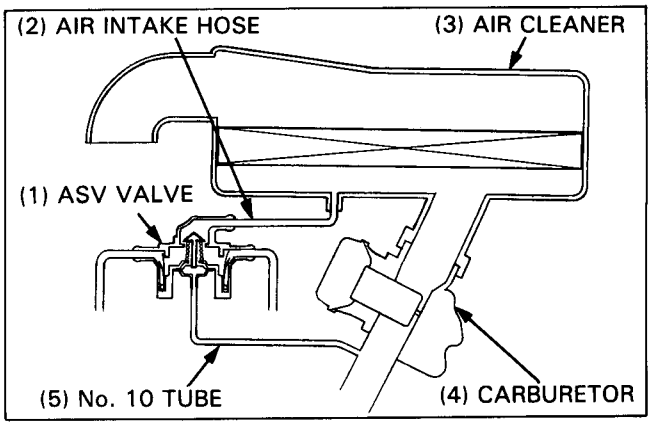
SECONDARY AIR SUPPLY SYSTEM (SW only)

SYSTEM INSPECTION

Start the engine and warm it up to normal operating temperature.
Disconnect the secondary air intake hose from the air cleaner case.

NOTE

- Do not disconnect the fuel tubes from the tank.



Check that the secondary air intake ports are clean and free of carbon deposits.

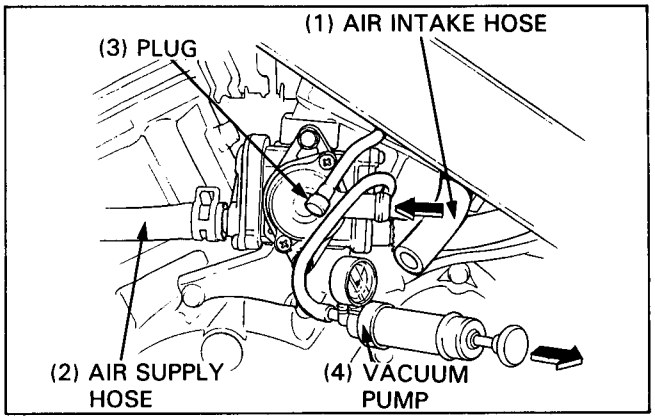
Check the secondary air intake hose for clogging, deterioration or damage and replace if necessary.
Check the reed valves in the air suction valve (ASV) if the intake hose or supply hose is damaged by exhaust gas.
Disconnect the vacuum tube (No. 10) from the ASV and install a plug in the vacuum tube to keep air from entering.
Connect the vacuum pump to the ASV.

TOOL:
Vacuum/Pressure pump A937X–041–XXXXX

Start the engine and open the throttle slightly to be certain that air is sucked in through the intake hose.
If air is not drawn in, check the air supply hoses and vacuum tube for clogging.
With the engine running, gradually apply vacuum to the ASV.
Check that the air intake hose stops drawing air, and that the vacuum does not bleed off.

SPECIFIED VACUUM:
285–360 mm (11.2–14.2 in) Hg

If air is still drawn in, or if the specified vacuum is not maintained, install a new ASV.
If afterburn occurs on deceleration, even when the secondary air supply system is normal, check the air cut-off valve for correct vacuum operation.



REED VALVE INSPECTION

Disconnect the air supply hoses from the reed valve covers of the ASV.
Disconnect the vacuum tube and air intake hose from the ASV.
Remove the ASV mounting bolts and ASV.

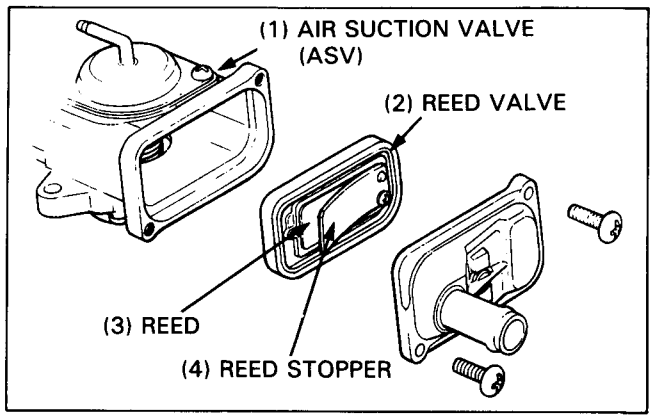
Remove the two screws, the reed valve cover and the reed valve from the ASV.

Check the reed valve for damage or fatigue, and replace if necessary.

Install a new reed valve if the seat rubber is cracked or damaged, or if there is clearance between the reed valve and seat.

CAUTION

- *Do not disassemble the reed valve assembly or bend the reed stopper.*
- *If the stopper, reed or seat is faulty, replace the valve as an assembly.*



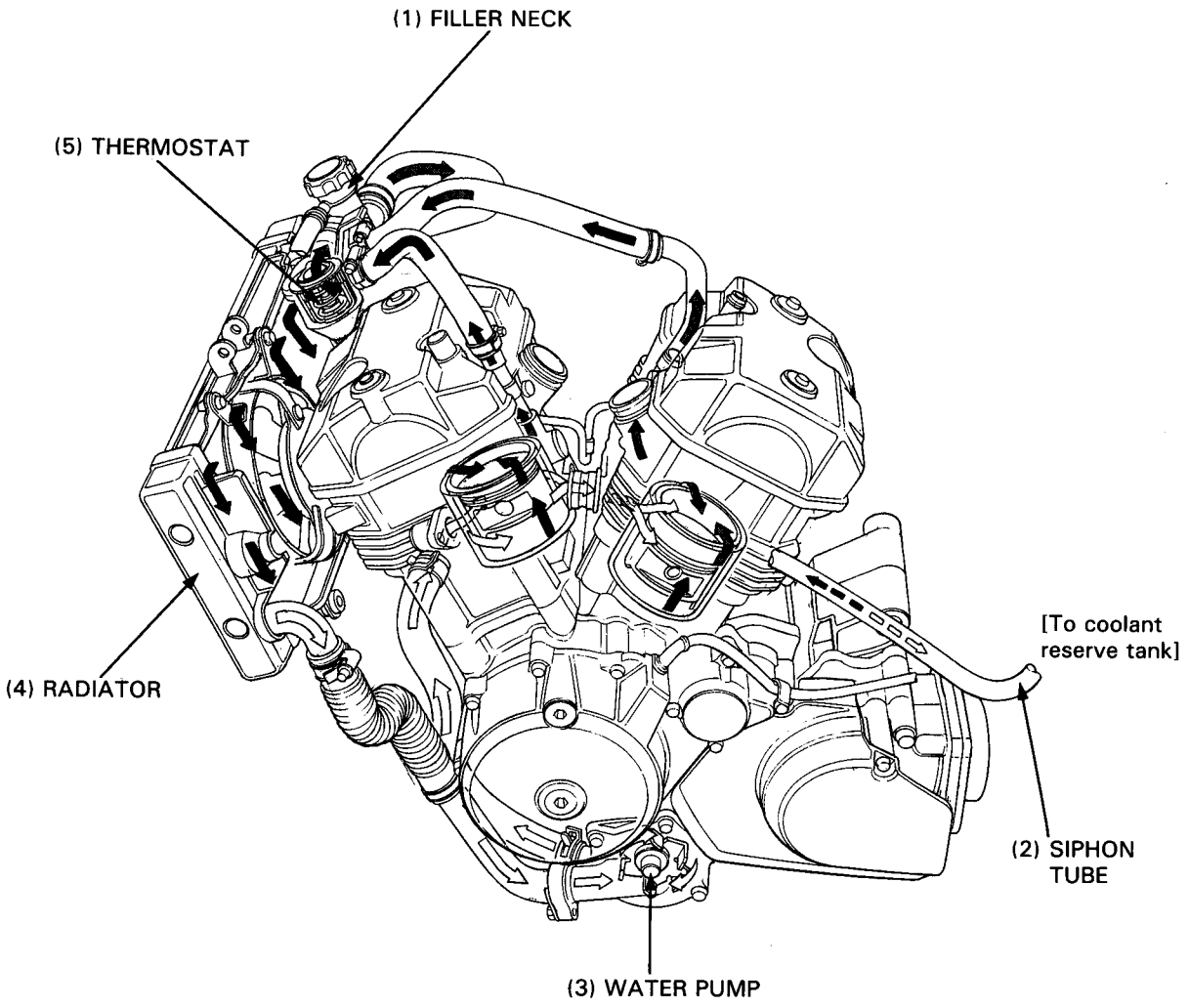
Assemble and install the ASV in the reverse order of disassembly/removal.

NOTE

- After installing, make sure the air and vacuum tubes are correctly connected (page 1-10 to 14).

5

COOLING SYSTEM


(1) FILLER NECK
(5) THERMOSTAT
(4) RADIATOR
[To coolant reserve tank]
(2) SIPHON TUBE
(3) WATER PUMP

SERVICE INFORMATION

GENERAL

⚠ WARNING

- ***Do not remove the radiator cap when the engine is hot. The coolant is under pressure and severe scalding could result. The engine must be cool before servicing the cooling system.***
- ***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.***

- Use only distilled water and ethylene glycol in the cooling system. A 50—50 mixture is recommended for maximum corrosion protection. Do not use alcohol-based antifreeze.
- Add coolant at the reserve tank. Do not remove the radiator cap except to refill, or drain the system, or to test the coolant mixture.
- Avoid spilling coolant on painted surfaces.
- After servicing the system, check for leaks with a cooling system tester.
- For temperature sensor and thermostatic switch inspection, refer to section 20.

SPECIFICATIONS

ITEM	SPECIFICATIONS
Radiator cap relief pressure	88—127 kPa (0.9—1.3 kg/cm², 13—18 psi)
Freezing point (Hydrometer test):	55% Distilled water + 45% ethylene glycol: −32°C (−25°F) 50% Distilled water + 50% ethylene glycol: −37°C (−34°F) 45% Distilled water + 55% ethylene glycol: −44.5°C (−48°F)
Coolant capacity: Coolant change: Total system:	1.60 lit (1.51 US qt, 1.28 Imp qt) 2.20 lit (2.32 US qt, 1.94 Imp qt)
Thermostat	Begins to open: 80° to 84°C (176° to 183°F) Valve lift: Minimum of 8 mm at 95°C (0.3 in at 203°F)
Boiling point (with 50—50 mixture):	Unpressurized: 107.7°C (226°F) Cap on, pressurized: 125.6°C (258°F)

TROUBLESHOOTING

Engine temperature too high
- Faulty temperature gauge or sensor
- Thermostat stuck closed
- Faulty radiator cap
- Insufficient coolant or coolant level too low
- Passages blocked in radiator, hoses or water jacket
- Cooling fan motor does not turn
  - — Burned or loose sub-fuse
  - — Faulty fan motor
  - — Faulty thermostatic switch
  - — Poor connector contact or open circuit in harness
- Faulty water pump

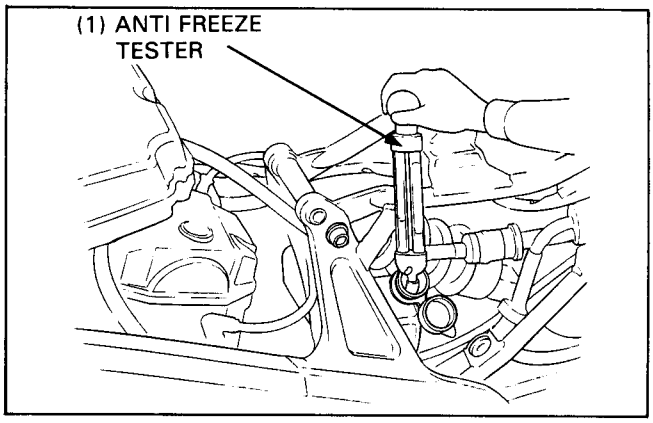
Engine temperature too low
- Faulty temperature gauge or sensor
- Thermostat stuck open

Coolant leaks
- Faulty pump mechanical seal
- Deteriorated O-rings

SYSTEM TESTING

COOLANT MIXTURE

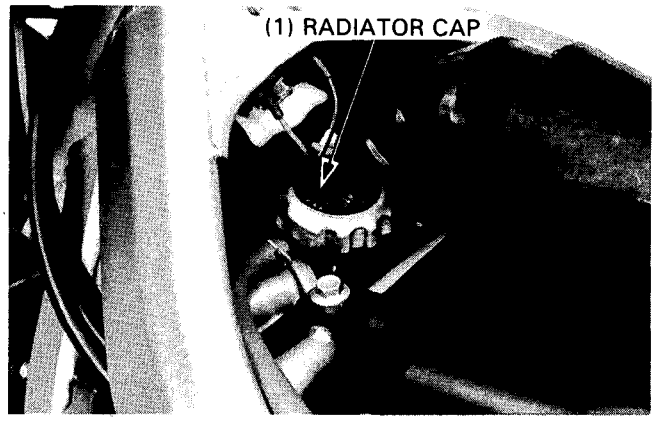
Remove the reserve tank cap.
Test the coolant mixture with an antifreeze tester.
For maximum corrosion protection, a 50—50% solution of ethylene glycol and distilled water is recommended.



Remove the fuel tank (page 4-3).
Remove the radiator cap.

⚠ WARNING

- ***Be sure the engine is cool before removing the cap or you may be severely scalded.***

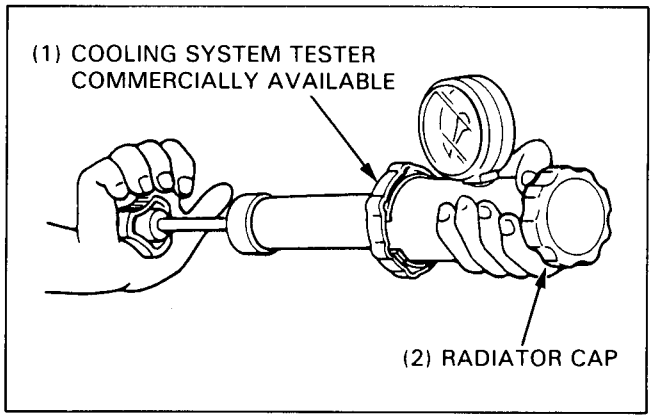


RADIATOR CAP

Wet the radiator cap sealing surface, install the cap on the tester, and apply pressure.

Replace the radiator cap if it does not hold pressure, or if it's relief pressure is too high or too low. It must hold specified pressure for at least six seconds.

RADIATOR CAP RELIEF PRESSURE:
88—127 kPa (0.9—1.3 kg/cm², 13—18 psi)



SYSTEM PRESSURE TEST

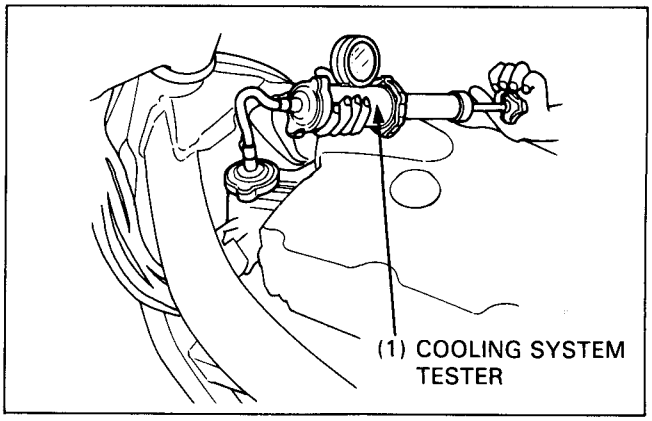
Remove the fuel tank and radiator cap.

Attach the tester to the radiator and apply enough pressure to test the radiator, engine and hoses, check for leaks.

CAUTION

- *Excessive pressure can damage the radiator. Do not exceed 125 kPa (1.25 kg/cm², 18 psi)*

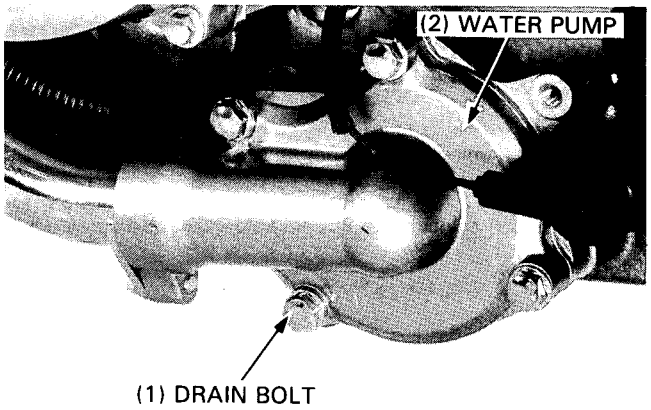
Repair or replace components if the system will not hold specified pressure for at least six seconds.



COOLANT REPLACEMENT

⚠ WARNING

- ***The engine must be cool before replacing the coolant or severe scalding may result.***
- ***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.***

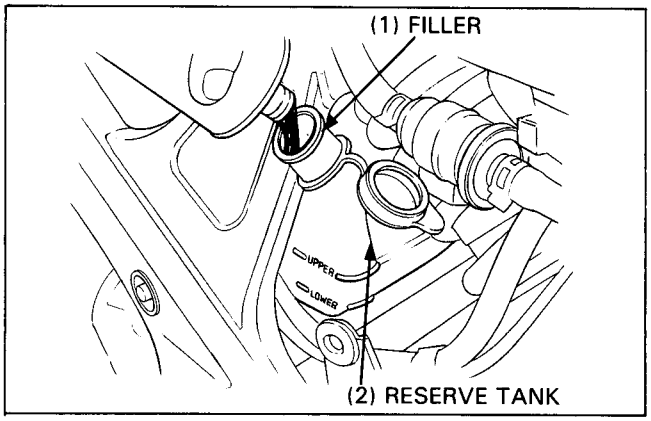


Remove the radiator cap (page 5-2).

Drain the coolant from the system by removing the drain bolt on the water pump cover.
Reinstall the drain bolt.

Fill the system with 50—50 mixture of distilled water and ethylene glycol.
Bleed air from the cooling system.

- Support the motorcycle on its center stand and shift the transmission into neutral.
- Start the engine and snap the throttle grip, 3—4 times at 4,000—5,000 min^{-1} (rpm). Then add coolant up to the radiator filler neck.
- Reinstall the radiator cap.
- Check the level of coolant in the reserve tank and fill to the correct level if the level is low.

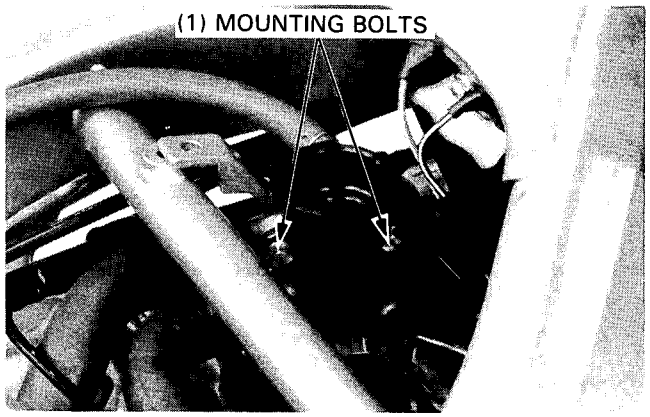


THERMOSTAT

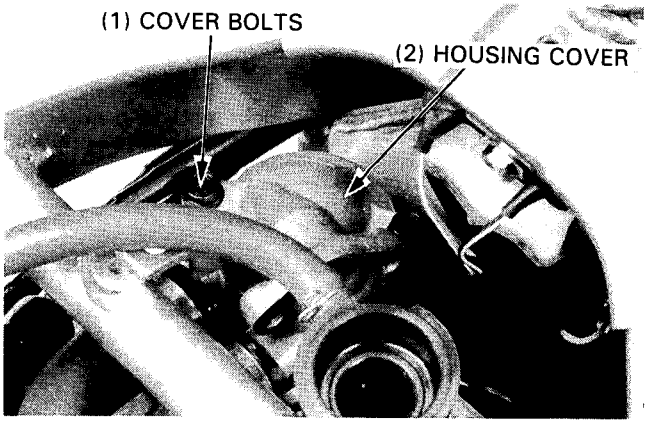
REMOVAL

Remove the following:
— fuel tank (page 4-3)
— air cleaner case (page 4-3)

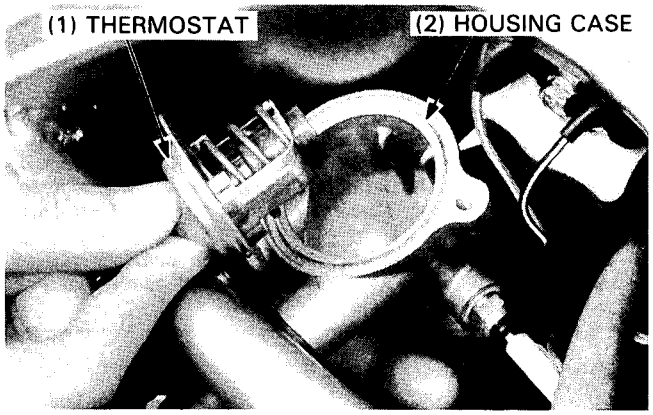
Remove the filler neck mounting bolts.



Remove the housing cover attaching bolts and separate the case from the cover.



Remove the thermostat from the housing case.

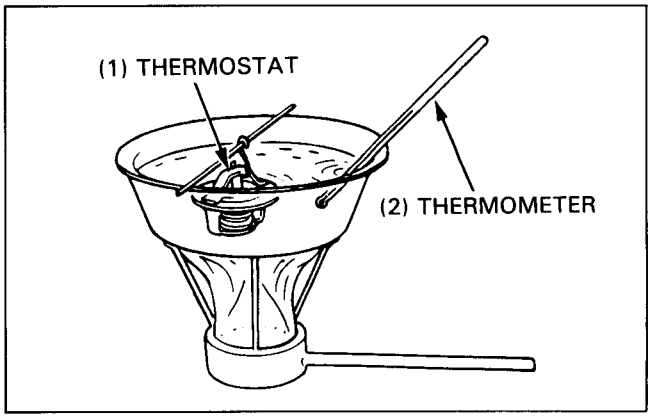


INSPECTION

Inspect the thermostat visually for damage.
Suspend the thermostat in heated water to check its operation.

NOTE

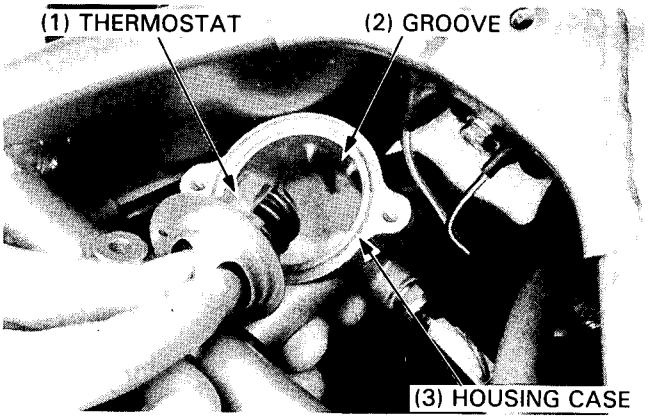
- If the thermostat or thermometer touches the pan, you'll get a false reading.



Replace thermostat if valve stays open at room temperature, or if it responds at temperatures other than those specified.

Data:

Start to open	80° to 84°C (176—183°F)
Valve lift	8 mm (0.3 in) minimum when heated to 95°C (203°F) for five minutes.



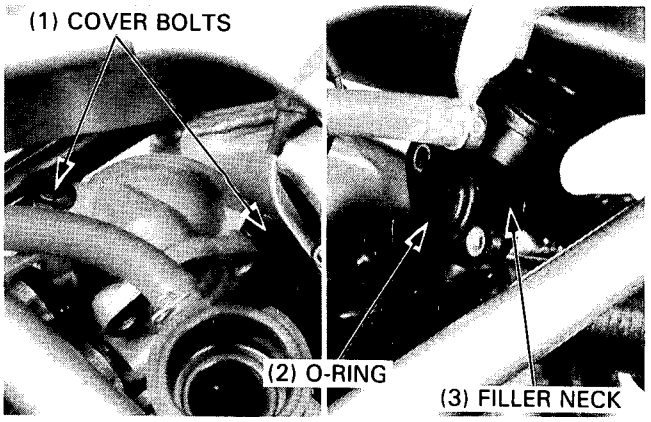
INSTALLATION

Install the thermostat into the housing case align the thermostat with the groove on the case.

Install the new O-ring into the case cover groove and the cover onto the case by attaching bolts.

Assemble the case and filler neck with the new O-ring.
Tighten the bolts.

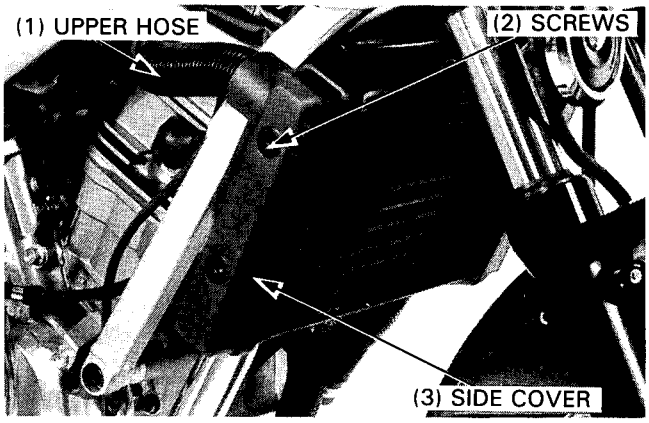
Fill the system with coolant and air bleed it.



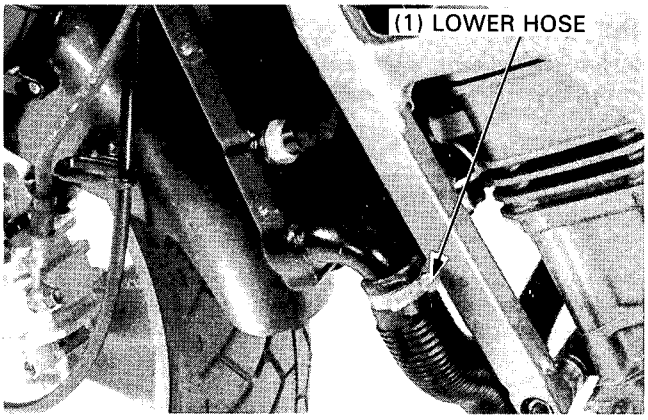
RADIATOR/COOLING FAN

REMOVAL

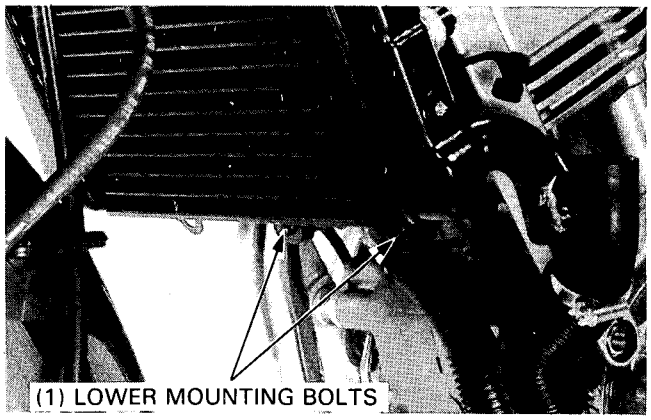
Drain the coolant (page 5-3).
Disconnect the cooling fan motor connector.
Remove the radiator side covers by removing mounting screws.
Disconnect the upper radiator hose at the radiator.



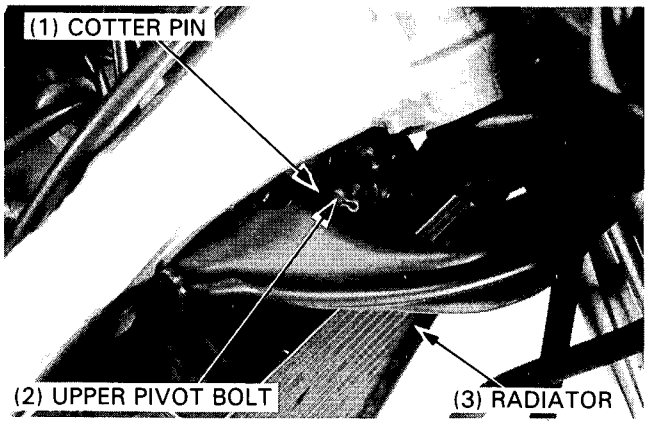
Disconnect the lower radiator hose at the radiator.



Remove the radiator lower mounting bolts.

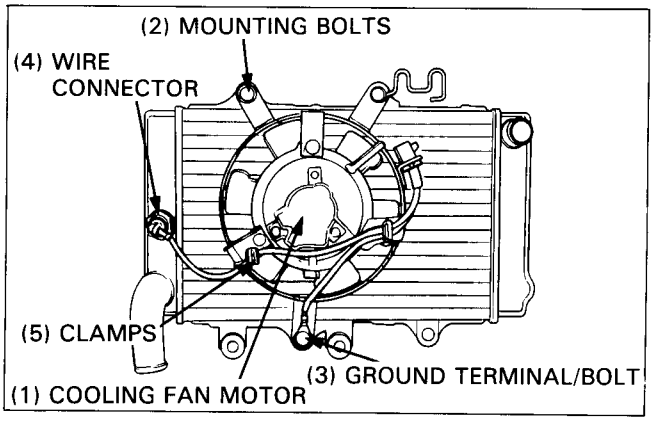


Remove the cotter pin.
Remove the radiator upper pivot bolt and radiator from the frame.

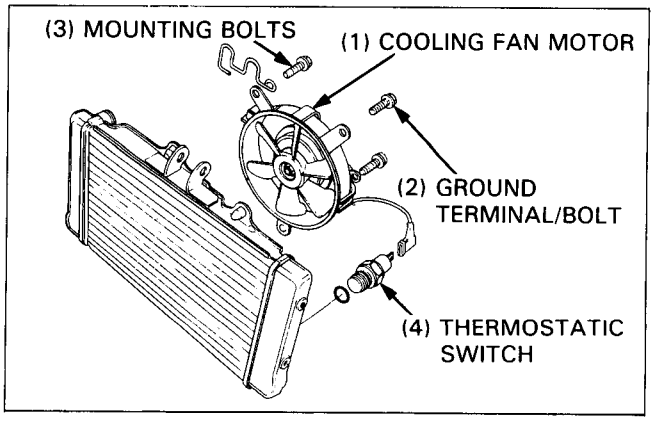


DISASSEMBLY

Disconnect the cooling fan motor wire connector from the thermostatic switch and remove the wire from the clamp. Remove the ground wire terminal bolt.



Remove the cooling fan motor mounting bolts and cooling fan motor.



RADIATOR INSPECTION

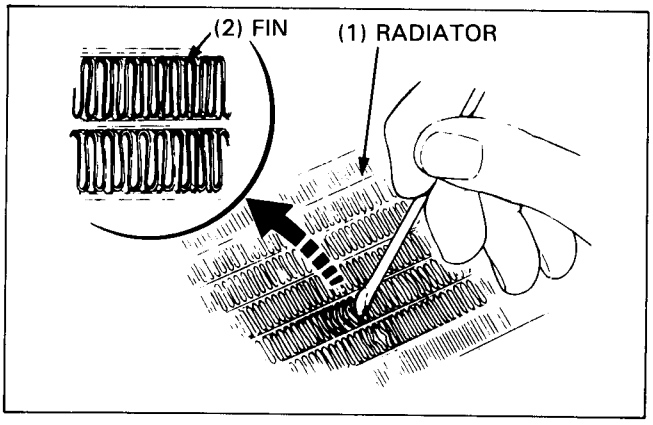
NOTE

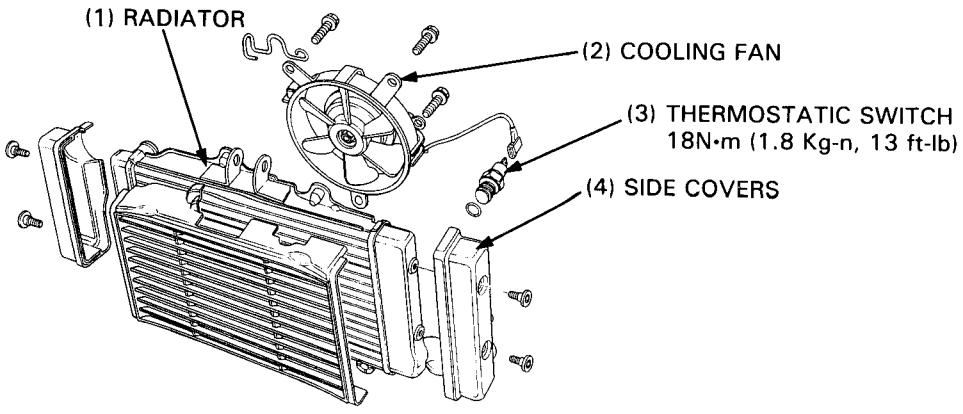
- See section 20 for thermostatic switch inspection.

Inspect the radiator soldered joints and seams for leaks.

Blow dirt out from between core fins with compressed air. If insects, etc., are clogging the radiator, wash them off with low pressure water.

Carefully straighten any bent fins.

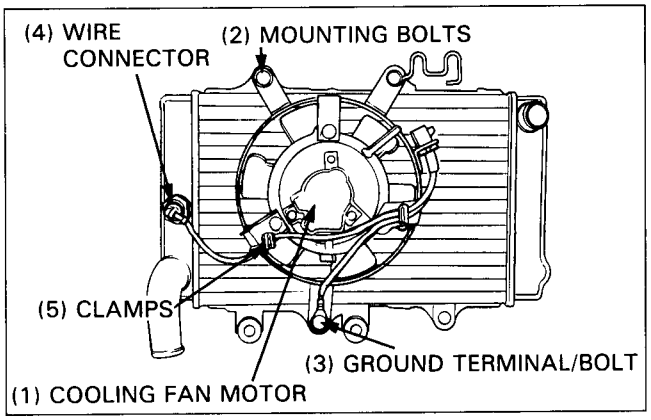




ASSEMBLY/INSTALLATION

Install the cooling fan motor.

Connect the ground terminal and thermostatic switch wire connector.

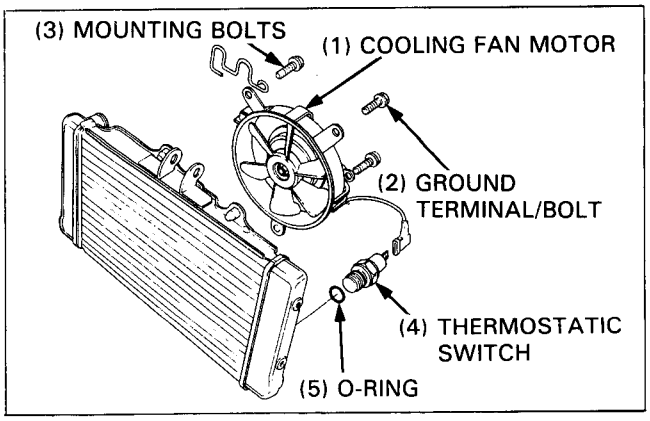


Install the mounting bolts.

If the thermostatic switch was removed, install a new O-ring and tighten to the specified torque.

THERMOSTATIC SWITCH:
TORQUE: 18 N·m (1.8 kg-m, 13 ft-lb)

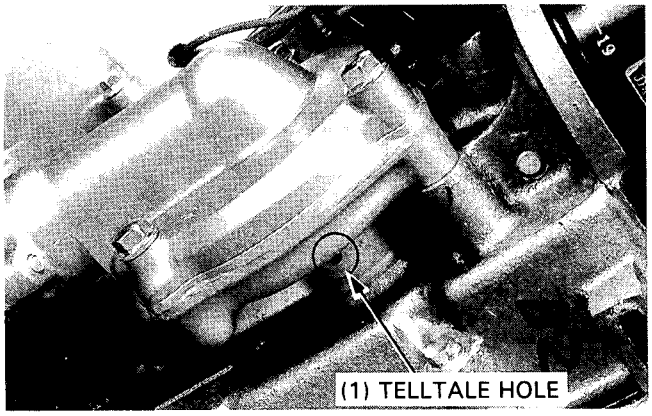
Install the radiator in the reverse order of removal.



WATER PUMP

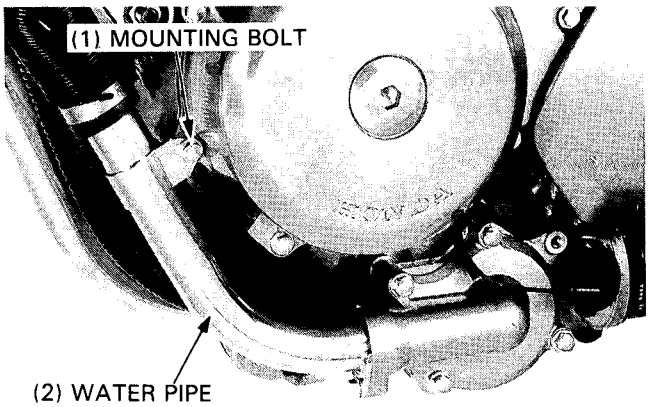
MECHANICAL SEAL INSPECTION

Inspect the telltale hole for signs of mechanical seal coolant leakage.
Replace the water pump as an assembly if the mechanical seal is leaking.



REMOVAL

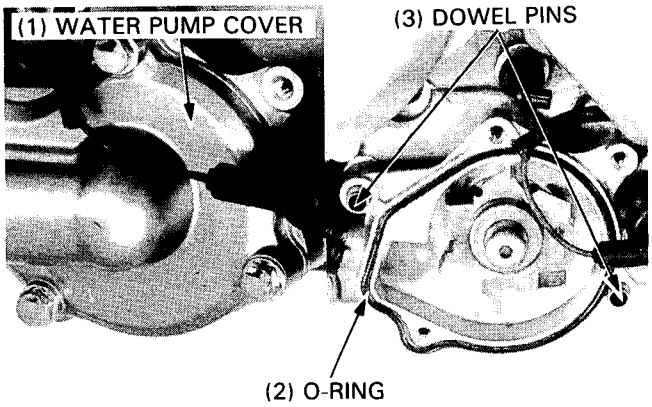
Drain the engine oil (page 2-3).
Remove the water pipe mounting bolt.



Remove the water pump cover mounting bolts and cover.

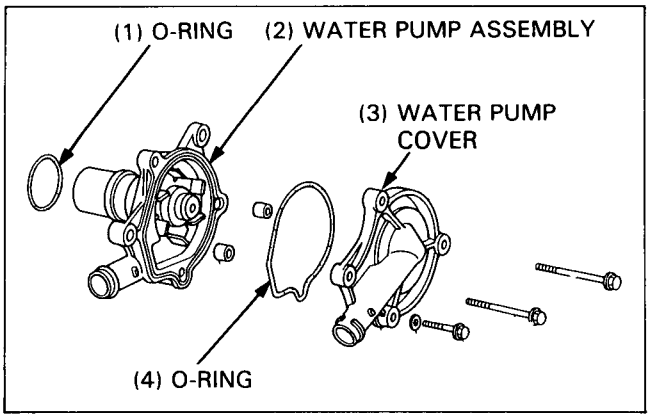
Remove the O-ring and dowel pins from the water pump assembly and disconnect the water hose.

Remove the water pump from the crankcase.



INSPECTION

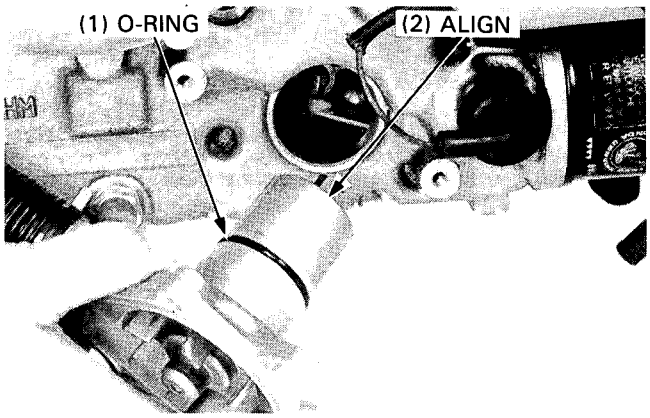
Check the water pump for mechanical seal leakage and bearing deterioration. Replace the water pump as an assembly if necessary.



INSTALLATION

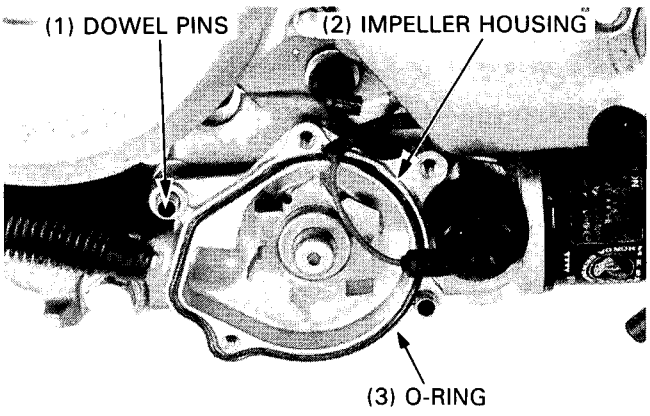
Connect the water hose with the clamp.
Apply a coat of clean engine oil to a new O-ring and install it in the water pump shaft housing groove.

Align the water pump shaft groove with the oil pump shaft and insert the water pump into the crankcase.



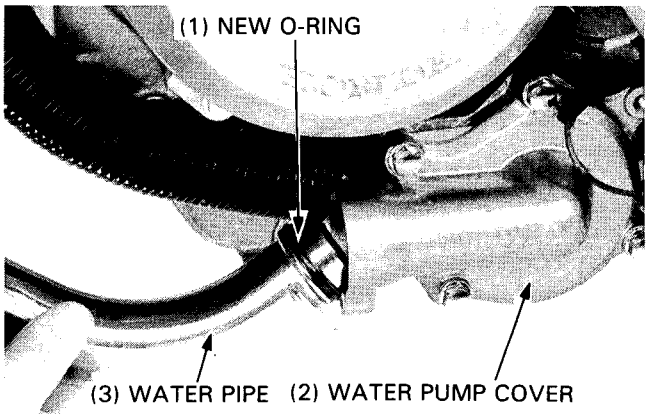
Apply a coat of engine oil to a new O-ring and install it around the impeller housing.

Install the two dowel pins.



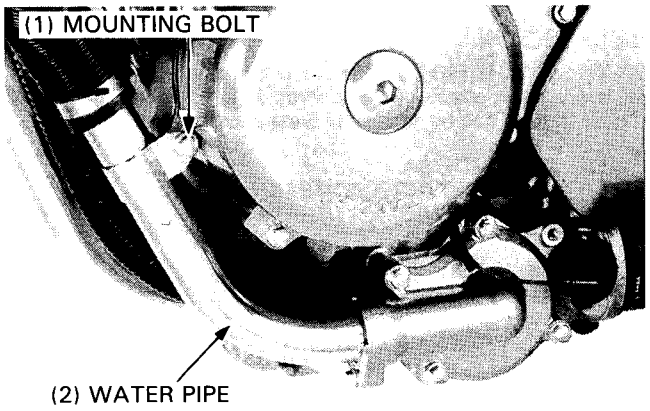
Install the water pump cover and tighten the cover mounting bolts.

If the water pipe was removed from the water pump cover, apply the clean coolant fluid to the new O-ring and install the water pipe onto the cover.

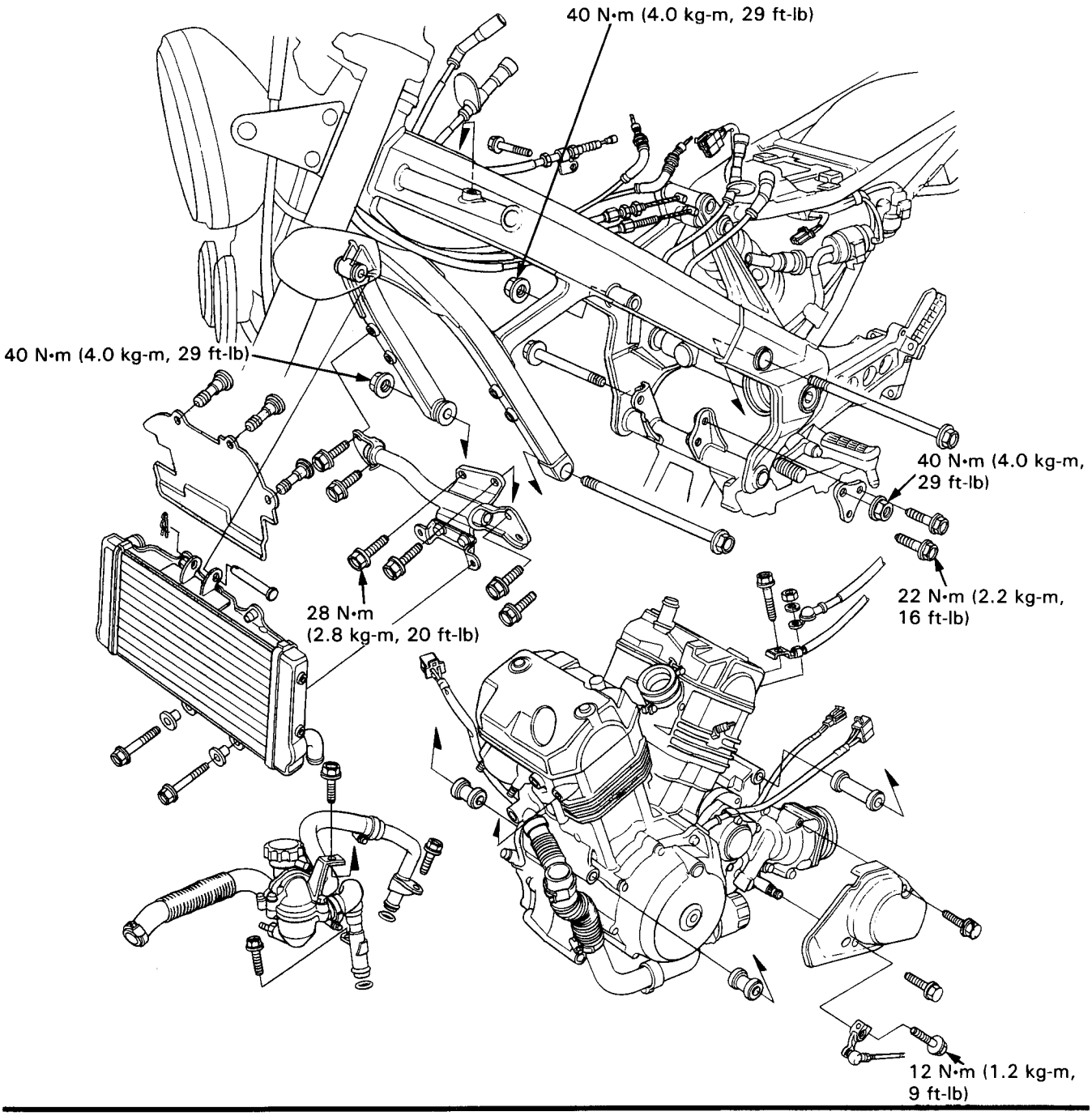


Install the water pipe mounting bolt.

Fill the system with coolant (page 5-3).
Fill the engine with the recommended engine oil (page 2-3).
Check the cooling system for leakage.



ENGINE REMOVAL/INSTALLATION



SERVICE INFORMATION

GENERAL

- Support the motorcycle using a hoist, a floor jack or other adjustable support.
- The following parts can be serviced with the engine installed in the frame:
  - Clutch
  - Gearshift linkage
  - Camshafts
  - Cylinder head
  - Alternator
  - Starter motor
  - Carburetors
  - Water pump
  - Cylinder/piston
- To service the crankshaft/transmission and oil pump, the engine must be removed from the frame.

SPECIFICATIONS

Engine dry weight	80 kg (176 lb)
Oil capacity	3.0 lit (3.15 US qt, 2.64 Imp qt) at disassembly
Coolant capacity	2.2 lit (2.32 US qt, 1.94 Imp qt) total

TORQUE VALUES

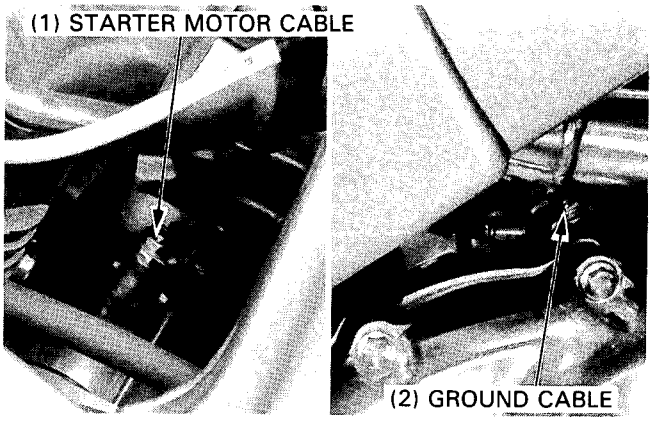
Muffler mounting bolt	27 N·m (2.7 kg-m, 20 ft-lb)	
Exhaust pipe joint nut	27 N·m (2.7 kg-m, 20 ft-lb)	
Gearshift arm bolt	12 N·m (1.2 kg-m, 9 ft-lb)	
Front engine bracket bolt	25 N·m (2.5 kg-m, 18 ft-lb)	
Front engine lower mounting bolt	40 N·m (4.0 kg-m, 29 ft-lb)	
Rear upper engine mounting bolt	40 N·m (4.0 kg-m, 29 ft-lb)	
Rear lower engine mounting bolt	40 N·m (4.0 kg-m, 29 ft-lb)	
— mounting bracket bolt	22 N·m (2.2 kg-m, 16 ft-lb)	
Fuel tank mounting bolt: Front	12 N·m (1.2 kg-m, 9 ft-lb)	
: Rear	22 N·m (2.2 kg-m, 16 ft-lb)	
Final gear case nut	65 N·m (6.5 kg-m, 47 ft-lb)	
Rear wheel nut	120 N·m (12.0 kg-m, 87 ft-lb)	Apply clean grease to the axle threads

ENGINE REMOVAL

Place the motorcycle on its center stand.
Drain the engine oil (page 2-3).
Drain the coolant (page 5-3).
Disconnect the battery negative cable from the battery terminal.

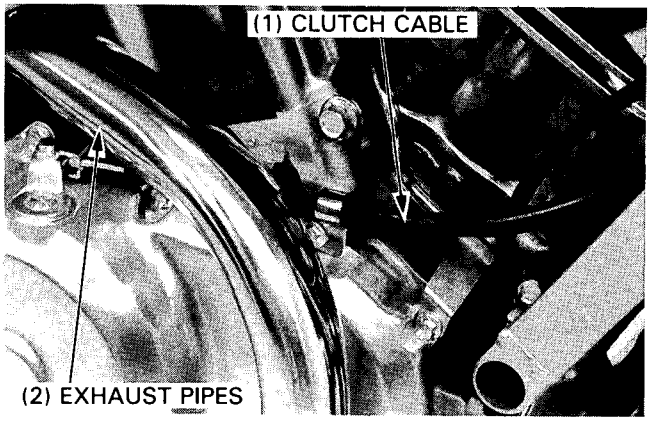
Remove the following:
— fuel tank (page 4-3).
— air cleaner case (page 4-3).
— carburetor (page 4-5).
— radiator (page 5-5).

Disconnect the starter motor cable and ground cable.



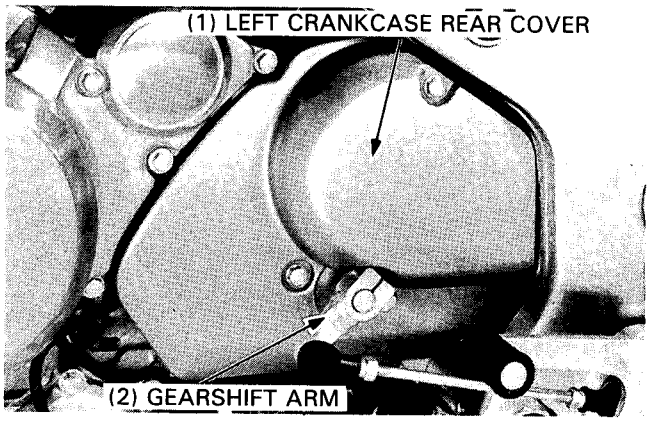
Disconnect the clutch cable from the clutch lifter arm by removing the holder bolt.

Disconnect the pulse generator wire at the 4P connector.
Loosen the muffler mounting bolts and remove the exhaust pipes (page 15-15).

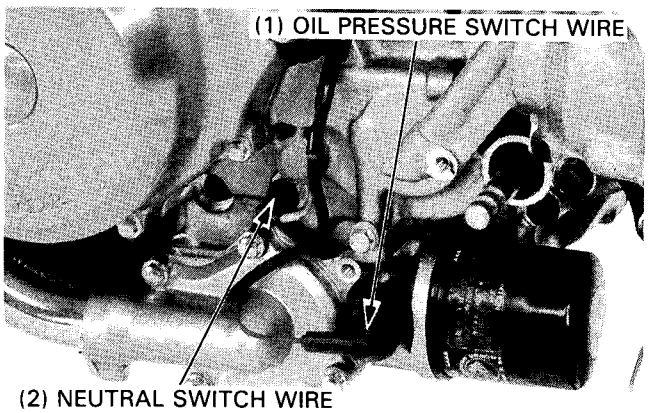


Remove the gearshift arm from the gearshift spindle.

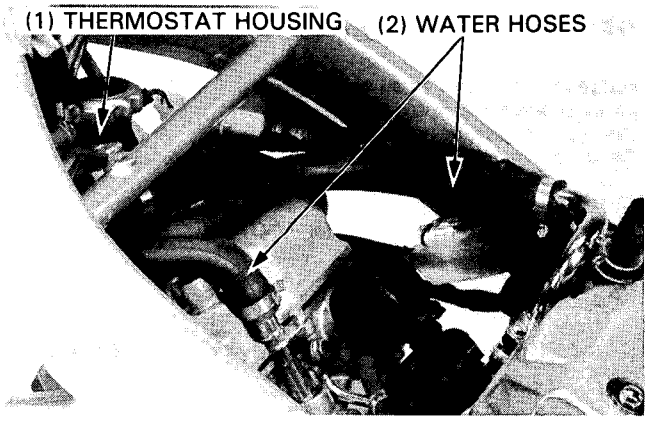
Remove the left crankcase rear cover bolts and cover.



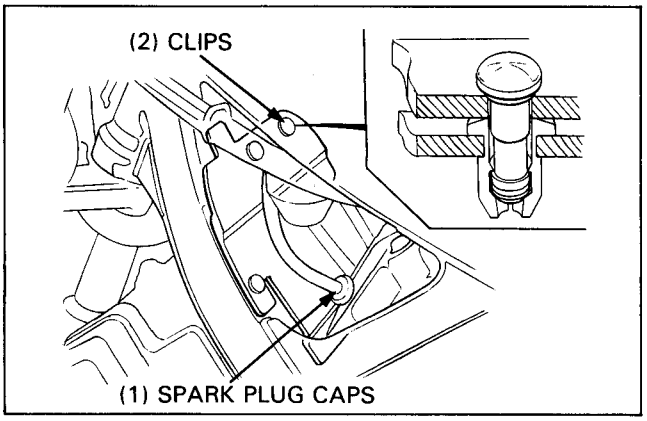
Disconnect the following electrical connections:
— oil pressure switch wire
— neutral switch wire
— alternator wire



Disconnect the following cooling system connections:
— water hoses to thermostat housing at the engine.
— siphon tube at the filler neck.



Remove the heat guard by removing the clips
Disconnect the spark plug caps at the engine.

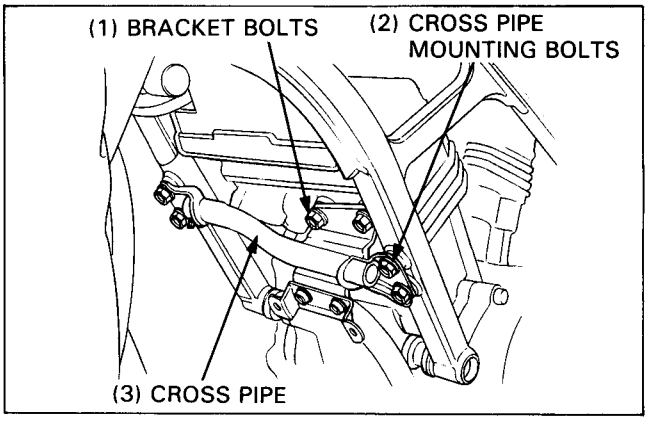


Place a floor jack or other adjustable support under the engine.

CAUTION

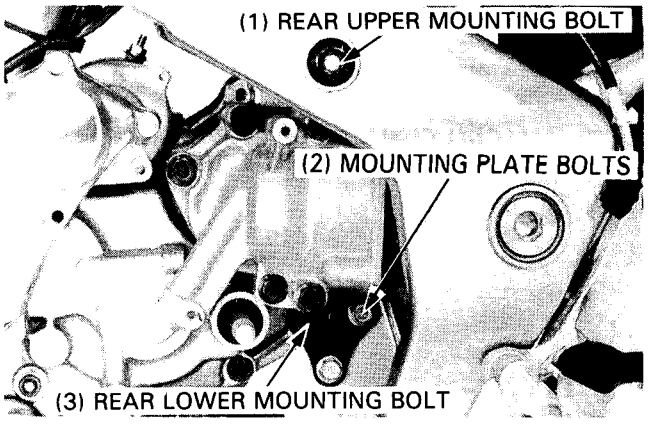
- *The jack height must be continually adjusted to relieve stress for ease of bolt removal.*
- *Do not jack up the engine at the oil filter.*

Remove the following:
— front engine bracket bolts.
— cross pipe mounting bolts and cross pipe from the frame.
— front lower mounting bolt



Remove the rear wheel (page 15-3) and final drive gear case with universal joint as an assembly to release the universal joint connection (page 13-3).

Remove the following rear mounting:
— upper mounting bolt
— lower engine mounting bolt and nut
— lower engine mounting plate bolts and plate



ENGINE INSTALLATION

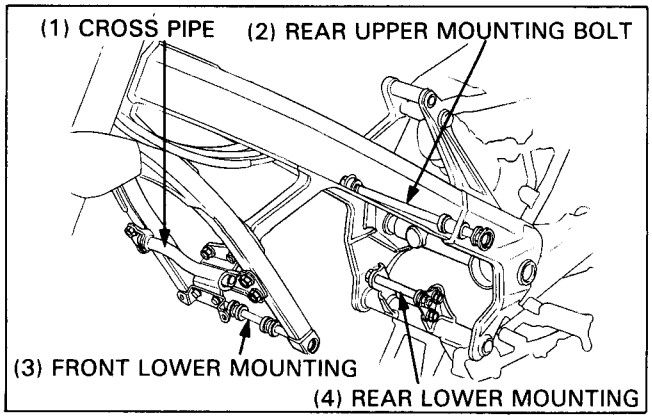
Engine installation is essentially the reverse order of removal. Use a floor jack or other adjustable support to carefully manuever the engine into place.

Install the engine into the frame correctly.

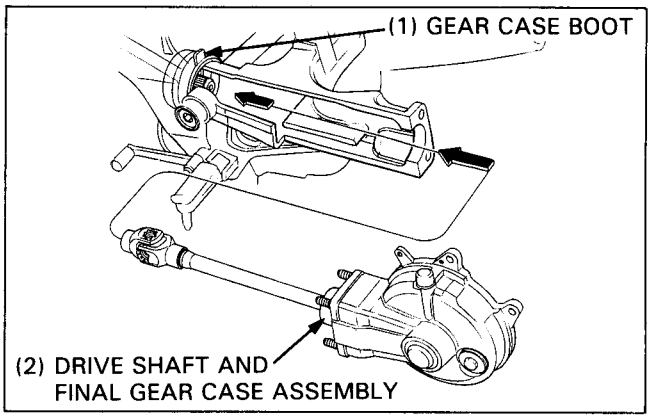
Install the swingarm-to-output gear case boot onto the output gear case with "UP" mark facing up securely.

CAUTION

- *Carefully align the mounting points with the jack to prevent damage to mounting bolt threads and wire harness and cables.*



Install the universal joint, drive shaft and final gear case as an assembly into the engine, align the universal joint to the output drive shaft connection (page 13-16).



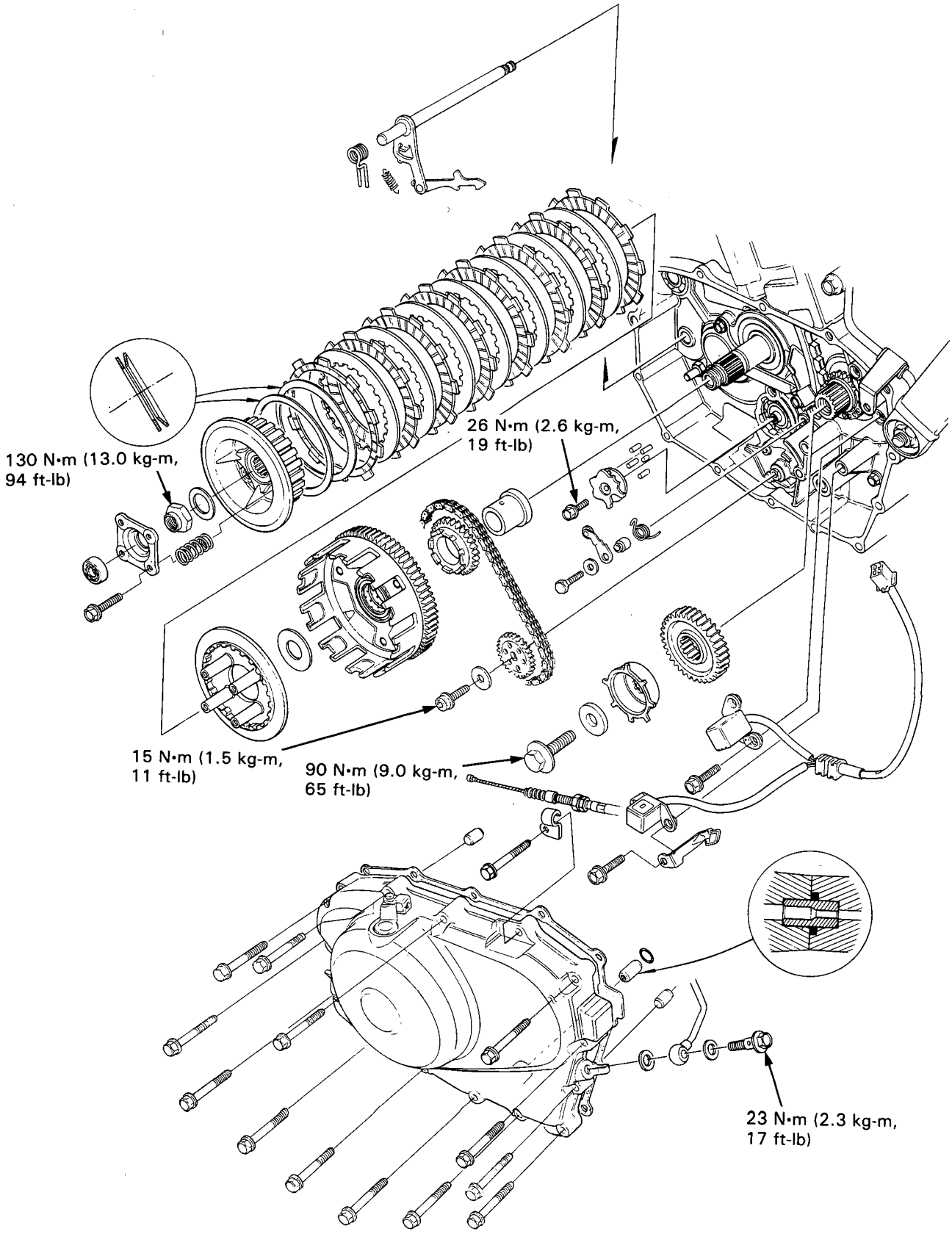
Tighten all the fasteners to the torques given on page 6-1 and 2.

NOTE

- Route the wires and cables properly (Section 1).
- Fill the crankcase to the proper level with the recommended oil (page 2-1).
- Fill the cooling system (page 5-3).
- Perform the following inspection and adjustments:
  Throttle operation (page 3-4).
  Clutch system (page 3-13).

7

CLUTCH/GEARSHIFT LINKAGE


130 N•m (13.0 kg-m, 94 ft-lb)
26 N•m (2.6 kg-m, 19 ft-lb)
15 N•m (1.5 kg-m, 11 ft-lb)
90 N•m (9.0 kg-m, 65 ft-lb)
23 N•m (2.3 kg-m, 17 ft-lb)

SERVICE INFORMATION

GENERAL

- This section covers the removal and installation of the clutch, oil pump drive chain, gearshift linkage and primary drive gear. All these operations can be done with the engine installed in the frame.
- If the shift fork, drum and transmission require servicing, remove the engine and separate the crankcase (section 11).
- Coat the new clutch discs with clean engine oil before reassembly.

SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Clutch	Spring free length		44.4 (1.75)	42.8 (1.69)
	Spring preload/length		22.75/26.2 kg/mm (50.15/1.031 lb/in)	—
	Disc thickness	Disc A	2.92–3.08 (0.115–0.121)	2.60 (0.102)
		Disc B	2.62–2.78 (0.103–0.109)	2.30 (0.091)
	Plate warpage		—	0.30 (0.012)
	Outer guide	I.D.	21.991–22.016 (0.8658–0.8668)	22.09 (0.870)
		O.D.	31.959–31.975 (1.2582–1.2589)	31.92 (1.257)
	Outer I.D.		32.000–32.025 (1.2598–1.2608)	32.10 (1.264)
Oil pump drive sprocket I.D.			32.000–32.025 (1.2598–1.2608)	32.10 (1.264)
Mainshaft O.D. at clutch outer guide			21.967–21.980 (0.8648–0.8654)	21.92 (0.863)

TORQUE VALUES

Shift drum stopper plate bolt	26 N·m (2.6 kg-m, 19 ft-lb) Apply locking agent
Primary drive gear bolt	90 N·m (9.0 kg-m, 65 ft-lb)
Oil pump driven sprocket bolt	15 N·m (1.5 kg-m, 11 ft-lb) Apply locking agent
Clutch lock nut	130 N·m (13.0 kg-m, 94 ft-lb) Staked nut
Oil pass pipe bolt (8 mm)	23 N·m (2.3 kg-m, 17 ft-lb)
(7 mm)	10 N·m (1.0 kg-m, 7.2 ft-lb)

TOOLS

Special

Clutch center holder	07923–KE10000
Gear holder	07724–0010100

Common

Lock nut wrench, 17 x 27 mm	07716–0020300

TROUBLESHOOTING

Faulty clutch operation can usually be corrected by adjusting the clutch lever free play.

Clutch slips when accelerating
- No free play
- Discs worn
- Springs weak

Clutch will not disengage
- Too much free play
- Plates warped
- Dirty engine oil

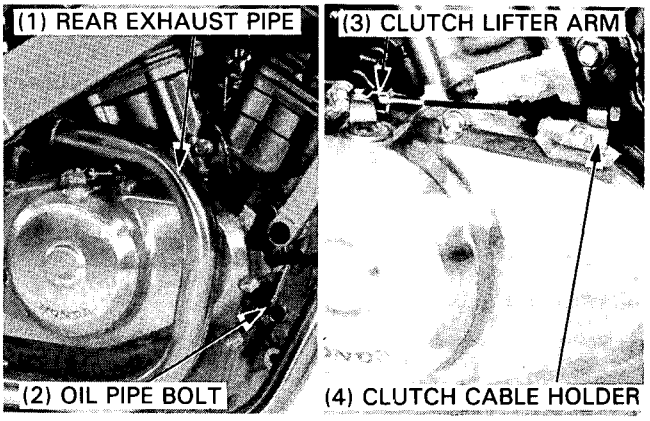
Motorcycle creeps with clutch disengaged
- Too much free play
- Plates warped
- Dirty engine oil

Excessive lever pressure
- Clutch cable kinked, damaged or dirty
- Lifter mechanism damaged

Clutch operation feels rough
- Clutch outer slots rough
- Dirty clutch cable

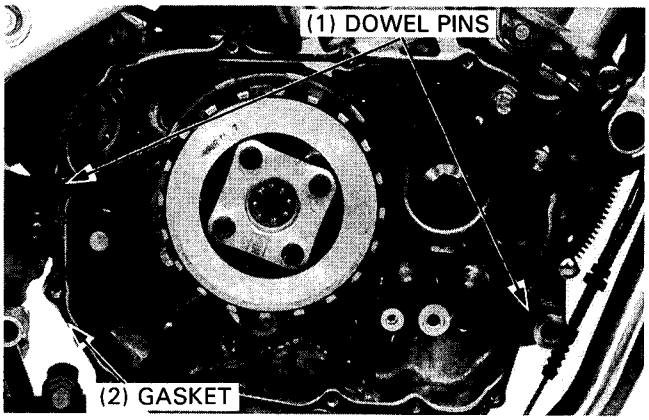
RIGHT CRANKCASE COVER REMOVAL

Drain the engine oil (page 2-3).
Remove the rear exhaust pipe. (page 15-15).
Remove the clutch cable holder and disconnect the clutch cable from the clutch lifter arm.
Loosen the oil pipe holder and remove the oil pipe bolt and sealing washers from the right crankcase cover.

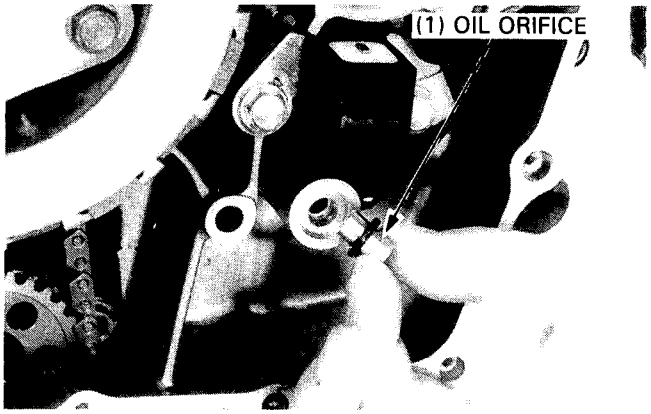


Remove the right crankcase cover bolts and cover.

Remove the dowel pins and gasket.



Remove the oil orifice.

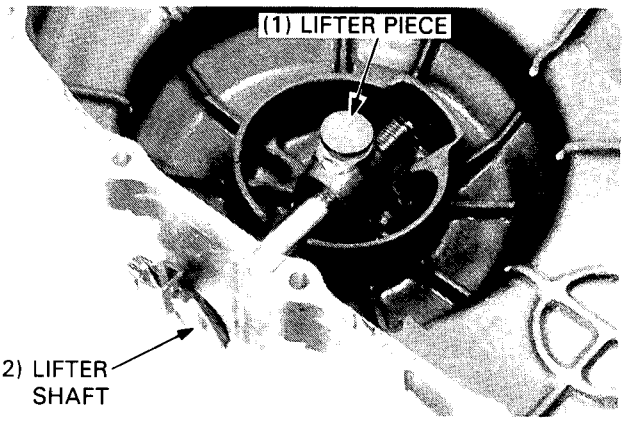


CLUTCH LIFTER

Remove the clutch lifter piece, and remove the snap ring and return spring from the right crankcase cover.

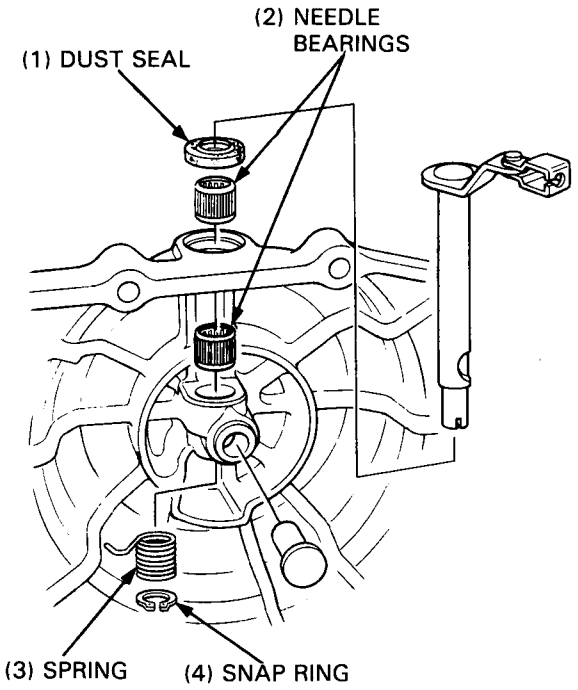
Remove the clutch lifter shaft.

Check the clutch lifter piece and shaft for damage or excessive scratching.
Check the return spring for fatigue or damage.



Check the needle bearings for wear or damage or a loose fit in the cover.
Check the dust seal for fatigue or damage.

Apply grease to the dust seal and needle bearing.



Install the clutch lifter shaft, snap ring and return spring.
Hook the spring end in the cover tab securely, and turn the shaft.

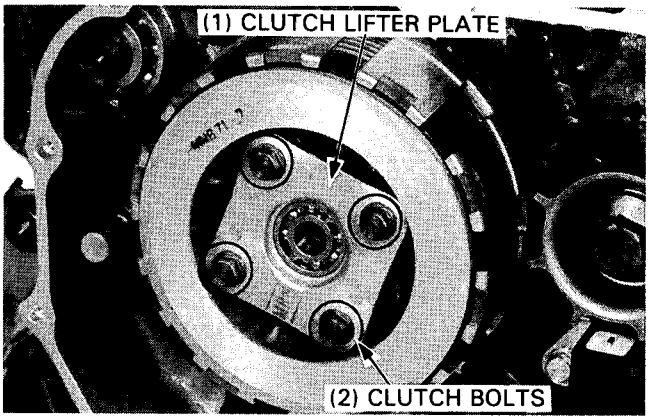
Install the clutch lifter piece, aligning the piece end with the groove in the clutch lifter shaft.

CLUTCH REMOVAL

Remove the following:
– clutch bolts
– clutch lifter plate
– springs

NOTE

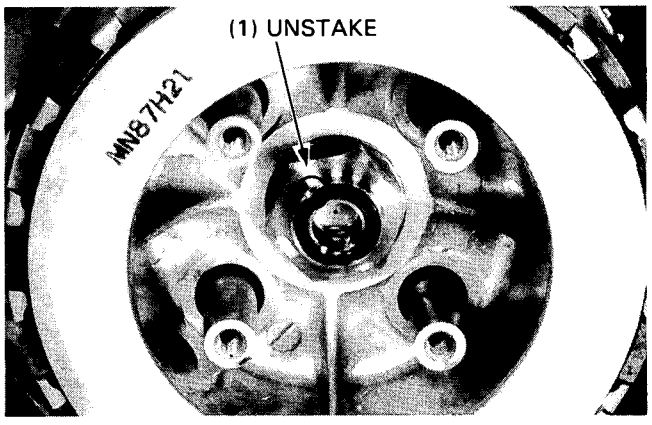
- Remove the bolts in a crisscross pattern in 2 or 3 steps.



Unstake the clutch lock nut with a drill or grinder.

NOTE

- Be careful not to damage the shaft threads.



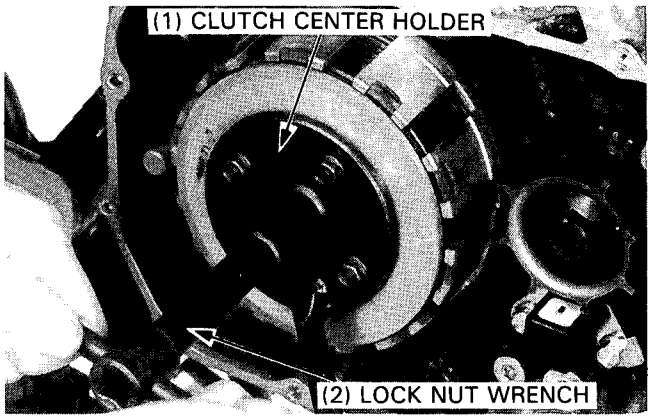
Hold the clutch center with the special tool and loosen the clutch lock nut. Remove the tools and the lock nut.

TOOLS:

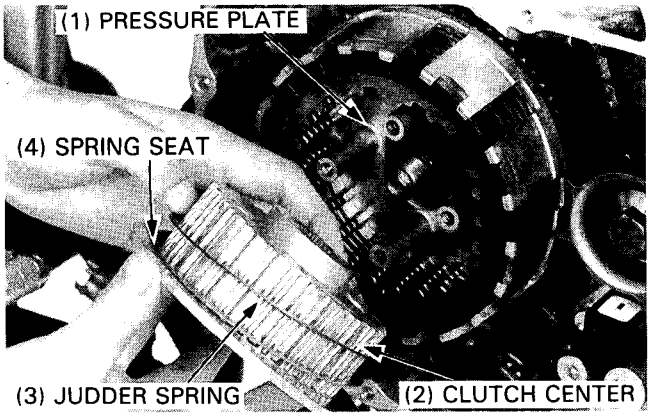
Clutch center holder	**07923–KE10000**
Lock nut wrench, 17 x 27 mm	**07716–0020300**

NOTE

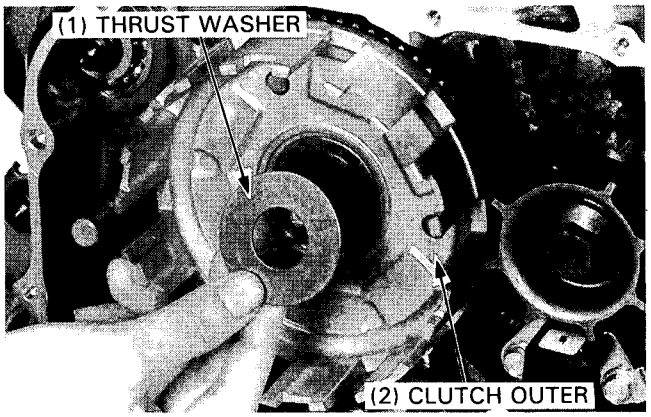
- If you will remove the oil pump driven sprocket, loosen the driven sprocket mounting bolt at this time.



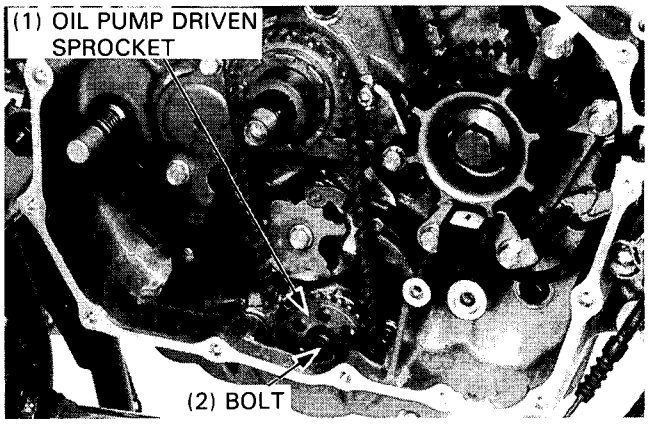
Remove the following:
- washer
- clutch center, judder spring and spring seat
- discs and plates
- pressure plate



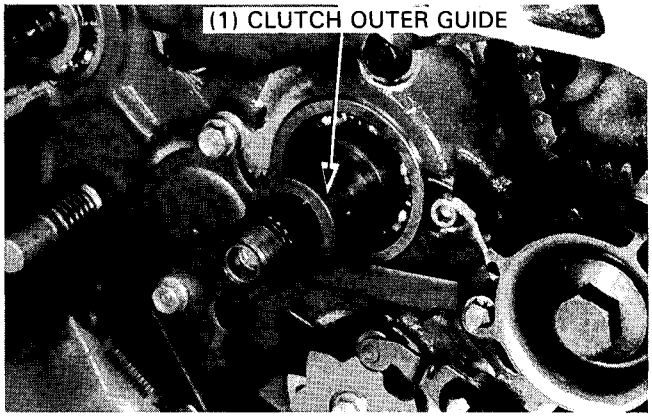
Remove the thrust washer and clutch outer.



Remove the oil pump driven sprocket mounting bolt, driven sprocket and oil pump drive chain.

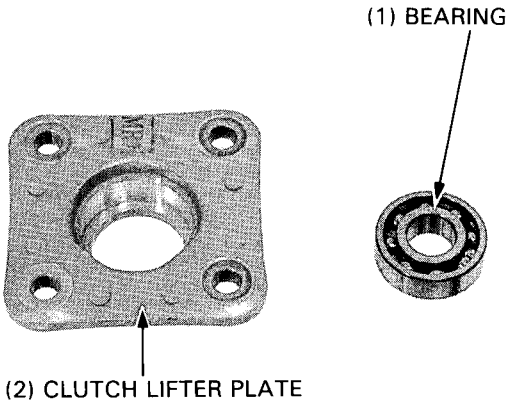


Remove the drive sprocket and clutch outer guide from the mainshaft.



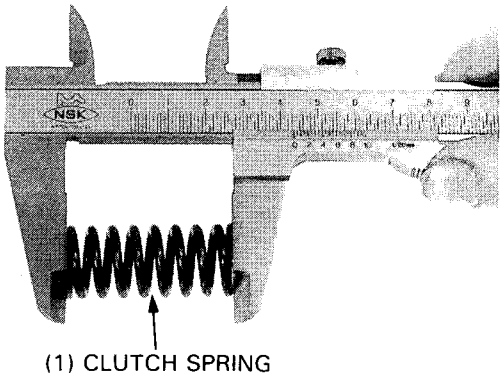
INSPECTION

Check the lifter plate bearing for damage.
Turn the bearing inner race with your finger.
The bearing should turn smoothly and quietly.
Also check that the bearing outer race fits tightly in the clutch lifter plate.
Replace the bearing if necessary.



Measure the spring free length.

SERVICE LIMIT: 42.8 mm (1.69 in)



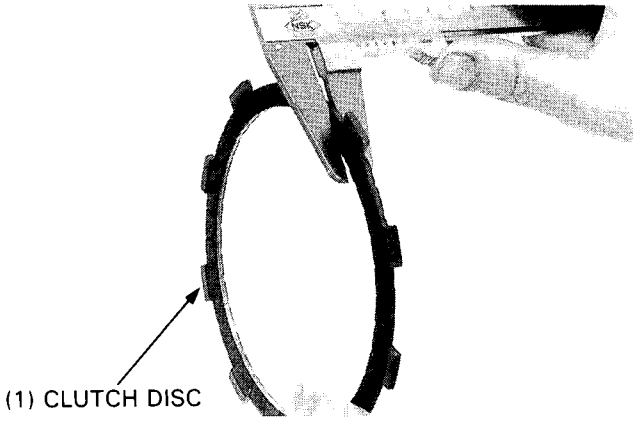
Replace the clutch discs if they show signs of scoring or discoloration.

Measure the thickness of discs A and B.

SERVICE LIMITS:
Disc A: 2.60 mm (0.102 in)
Disc B: 2.30 mm (0.091 in)

NOTE

- Replace the discs and plates as a set if any one is beyond the service limit.

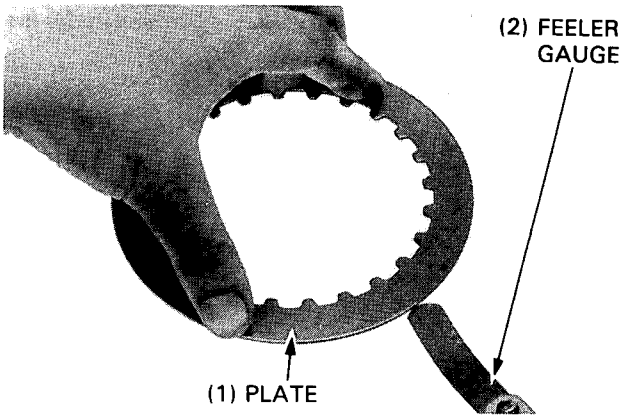


Check the plate warpage on a surface plate using a thickness gauge.

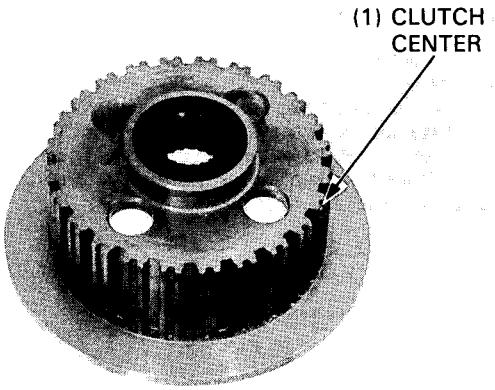
SERVICE LIMIT: 0.30 mm (0.012 in)

NOTE

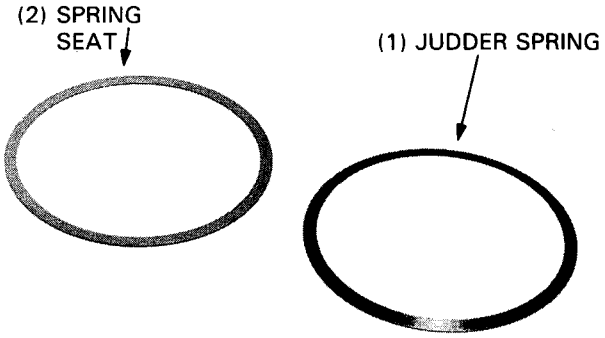
- Replace the discs and plates as a set if any one is beyond the service limit.



Check the clutch center for nicks or indentations made by the clutch plates.



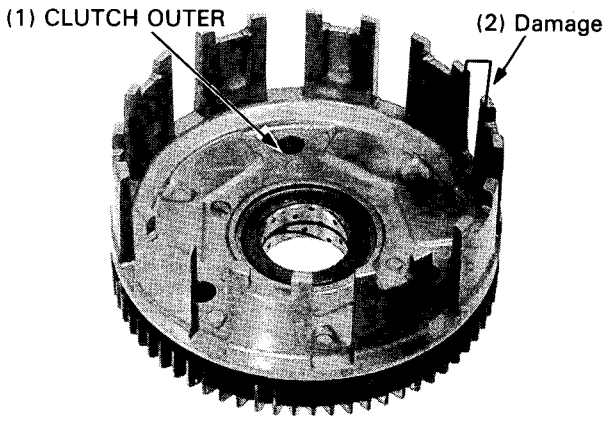
Check the spring seat and judder spring for distortion, wear or damage.
Replace them if necessary.



Check the slots in the clutch outer for nicks or indentations made by the clutch discs.

Measure the I.D. of the clutch outer.

SERVICE LIMIT:
Clutch outer I.D. 32.10 mm (1.264 in)

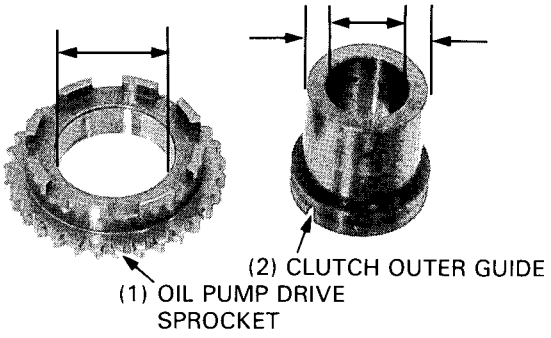


Check the oil pump drive sprocket for damage.

Measure I.D of the drive sprocket and the O.D. and I.D. of the outer guide.

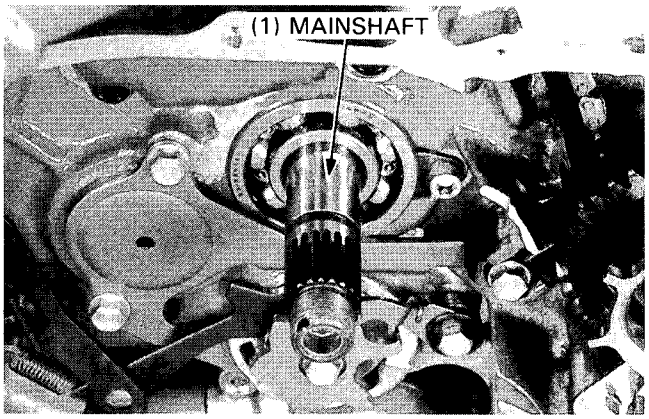
SERVICE LIMITS:

Oil pump drive sprocket I.D.	**32.10 mm (1.264 in)**
Clutch outer guide O.D.	**31.92 mm (1.257 in)**
I.D.	**22.09 mm (0.870 in)**



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

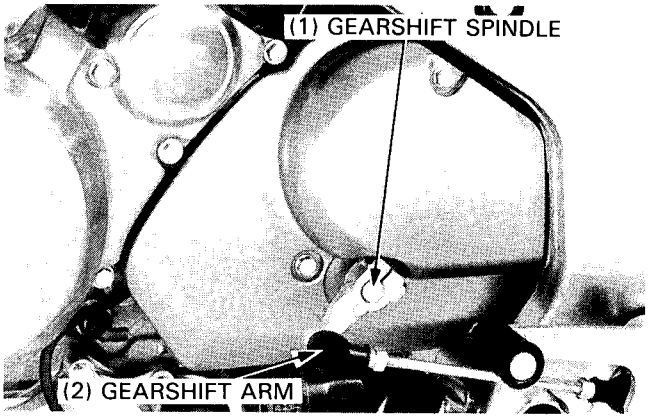
SERVICE LIMIT: 21.92 mm (0.863 in)



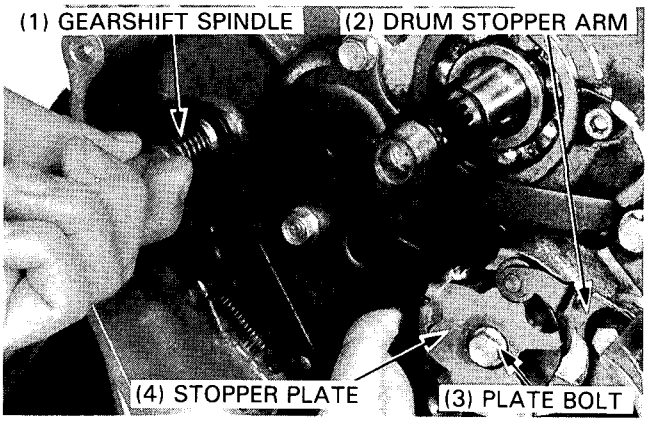
GEARSHIFT LINKAGE

REMOVAL

Remove the following:
- gearshift pedal arm from the gearshift spindle
- right crankcase cover (page 7-3)
- clutch assembly (page 7-4)
- oil pump drive chain (page 7-5)

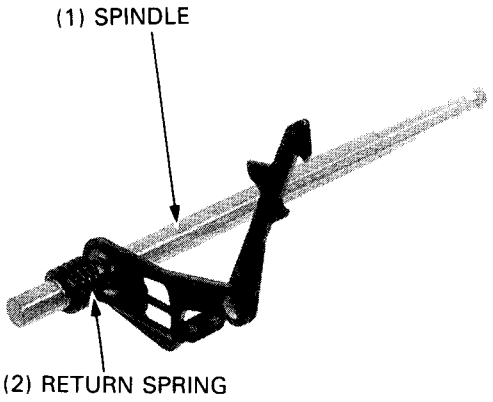


Remove the following:
- gearshift spindle
- drum stopper arm bolt, stopper arm, collar and spring
- drum stopper plate bolt and stopper plate/drum



INSPECTION

Check the gearshift spindle for bending or damage.
Check the return spring for fatigue or damage.

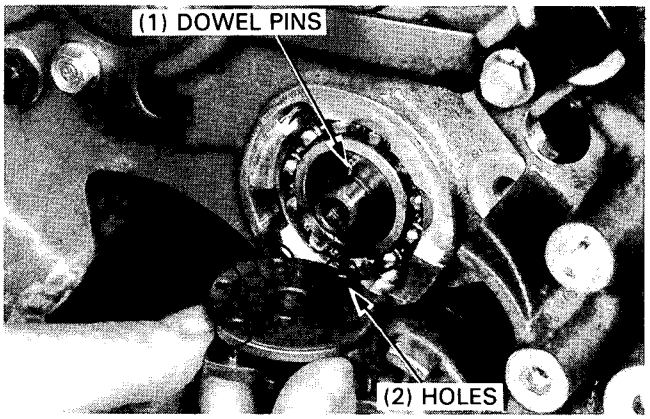


INSTALLATION

Install the dowel pins into the holes of the gearshift drum and stopper plate.

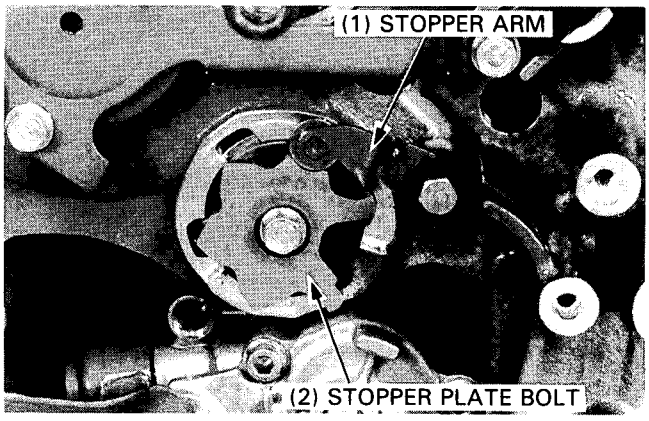
Apply locking agent to the threads of the stopper plate bolt and tighten the bolt.

TORQUE: 26 N·m (2.6 kg-m, 19 ft-lb)



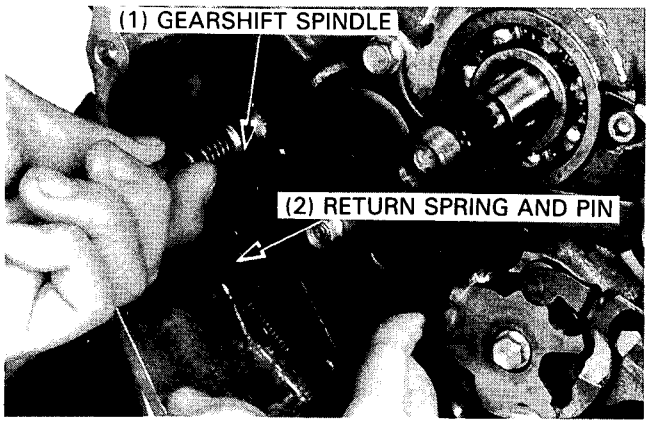
Install the collar, spring, stopper arm, washer and stopper arm bolt and tighten the bolt.

Lift up the drum stopper arm and install the the arm onto the shift drum.



Install the gearshift spindle, aligning the return spring ends with the pin in the case.

Install the removed parts in the reverse order of removal.

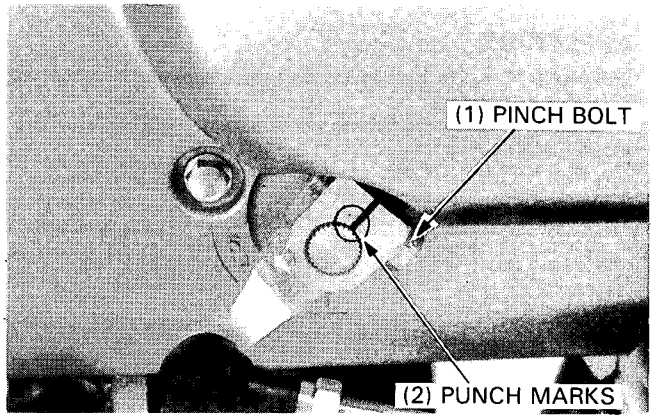


Install the gearshift arm to the gearshift spindle.

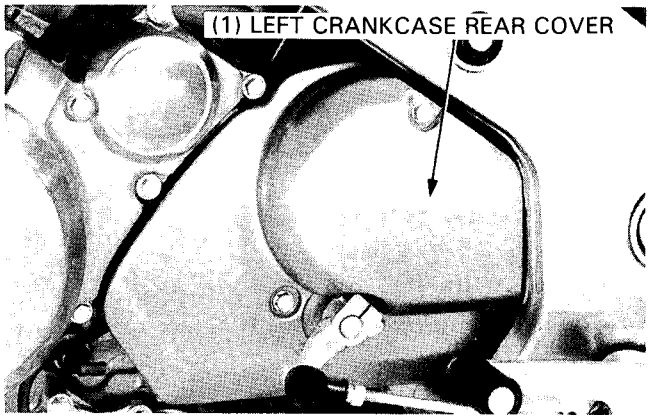
Align the punch mark on the arm with the punch mark on the spindle.

Tighten the gearshift arm pinch bolt.

TORQUE: 12 N·m (1.2 kg-m, 9 ft-lb)



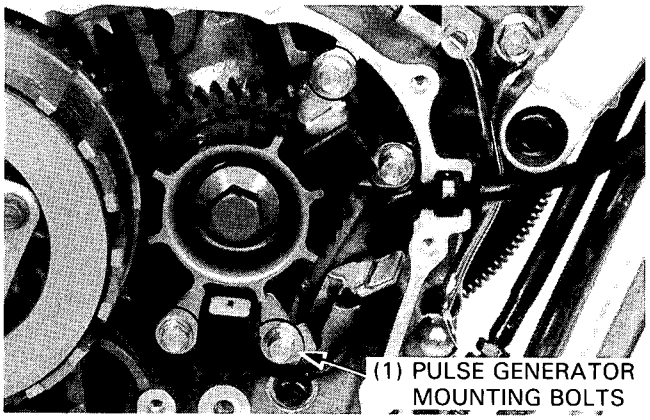
Install the left crankcase rear cover.



PRIMARY DRIVE GEAR

REMOVAL

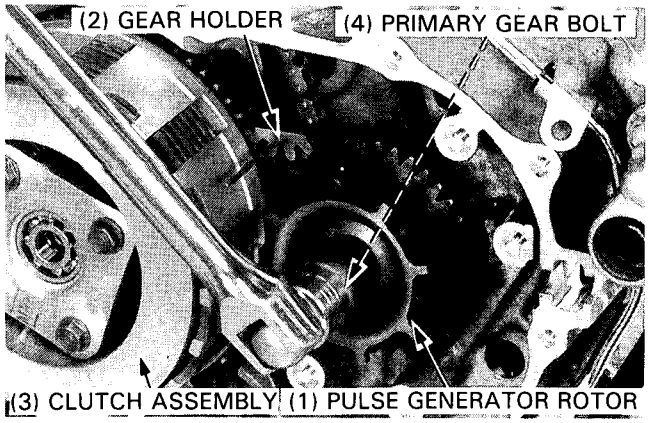
Remove the following:
- right crankcase cover (page 7-3)
- pulse generator mounting bolts and pulse generators



Install the gear holder as shown.

TOOL:
Gear holder **07724—0010100**

Remove the following:
- primary drive gear bolt and pulse generator rotor
- clutch assembly (page 7-4) and gear holder
- primary drive gear

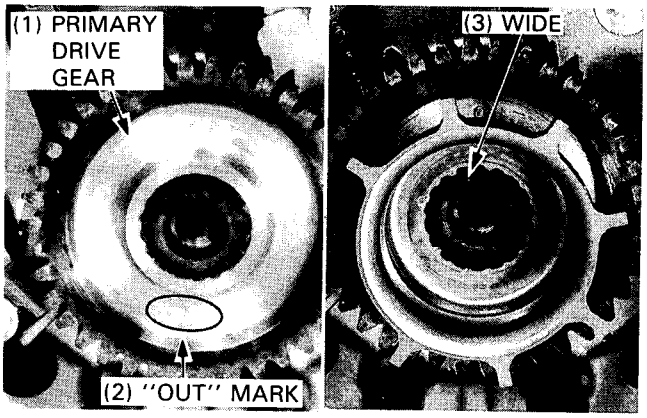


INSTALLATION

Install the primary drive gear with the "OUT" mark facing out.

NOTE

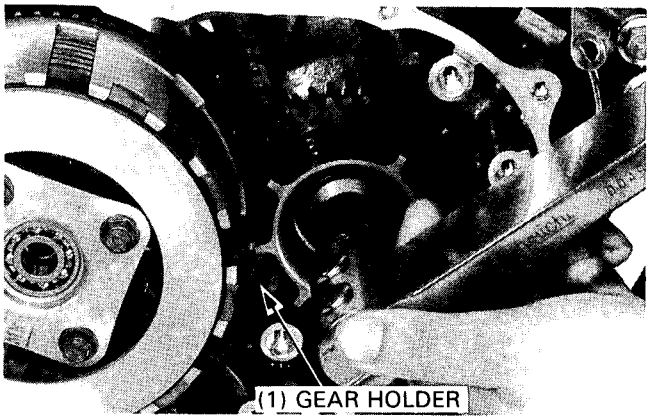
- The primary drive gear and pulse generator rotor will only go on in one position because of the extra wide aligning spline.



Install the pulse generator rotor.

Install the clutch assembly and install the gear holder as shown.

TOOL:
Gear holder **07724–0010100**



Install the washer and bolt and tighten the bolt.

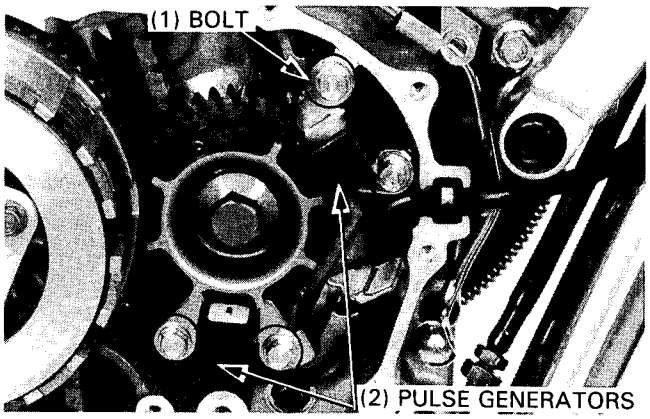
TORQUE: 90 N·m (9.0 kg-m, 65 ft-lb)

Remove the gear holder.

Install the following:
– pulse generators
– right crankcase cover (page 8-6).

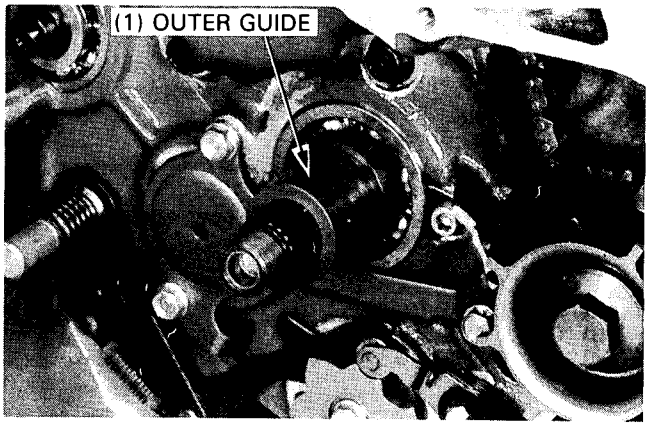
NOTE

- If the pulse generator wire grommets were removed from the case groove, reinstall them securely.



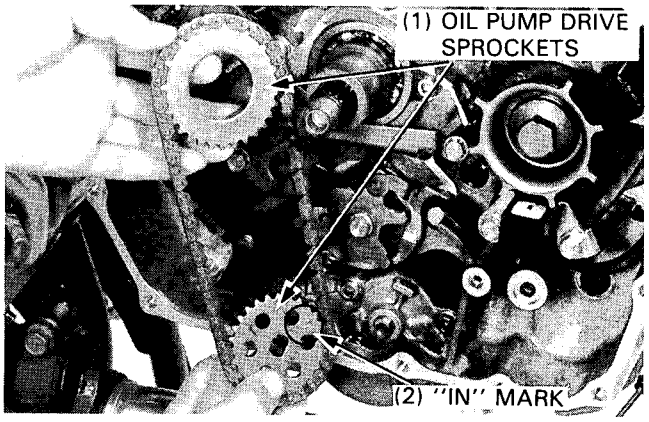
CLUTCH INSTALLATION

Apply molybdenum disulfide addtive paste grease to the outside of the clutch outer guide.



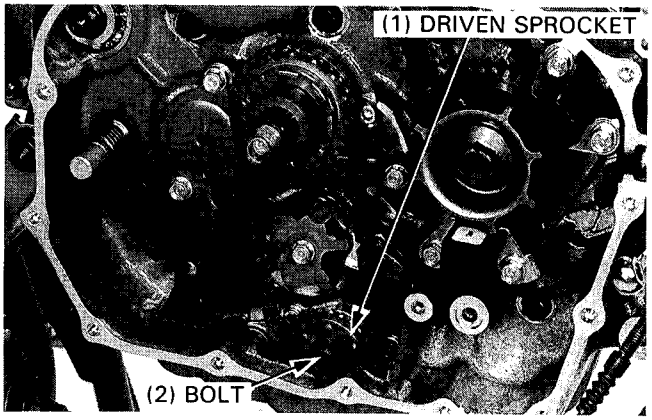
Install the oil pump drive chain on the sprockets, aligning with the "IN" mark on the driven sprocket facing inside.

Install the drive sprocket over the outer guide as an assembly.

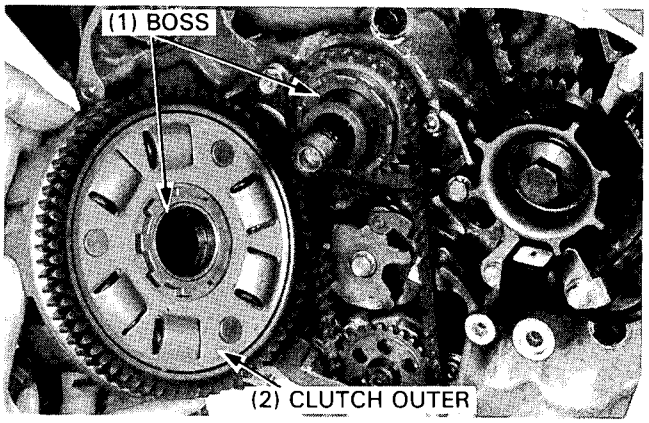


Apply locking agent to the threads of the driven sprocket mounting bolt and tighten it with the washer to the specified torque.

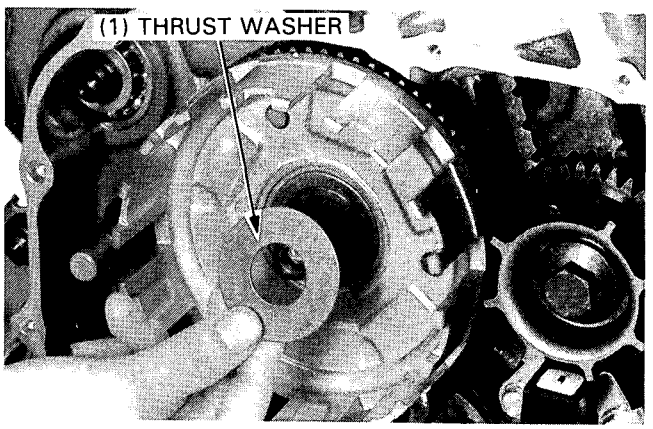
TORQUE: 15 N·m (1.5 kg-m, 11 ft-lb)



Align the grooves in the clutch outer with the bosses on the oil pump drive sprocket while turning the sprocket with the chain and pushing the clutch outer onto the shaft.



Install the thrust washer onto the mainshaft.

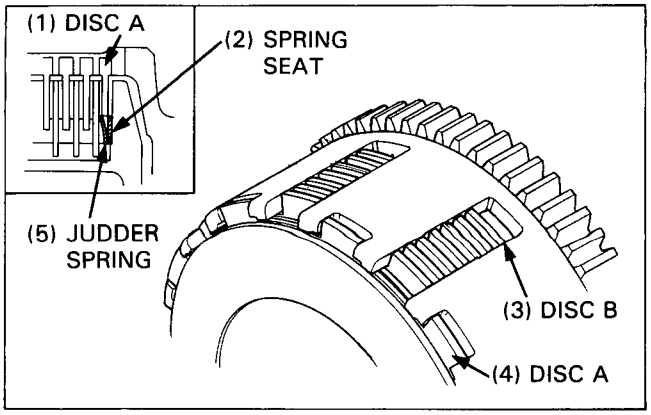


Install the pressure plate, clutch discs B, plates and disc A in the clutch outer.

NOTE

- Stack the discs and plates alternately.
- Coat the new clutch discs with clean engine oil.

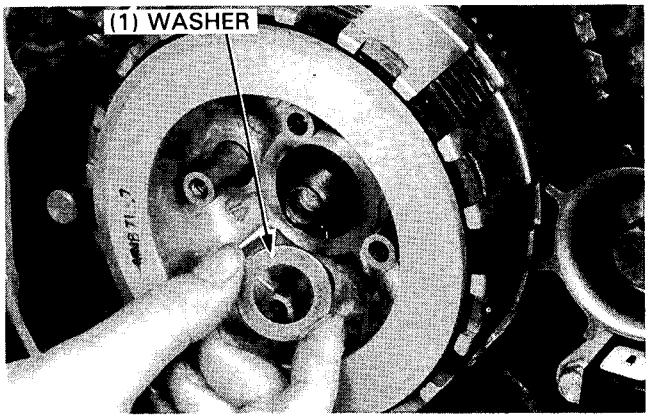
Install the spring seat and judder spring on the clutch center as shown.
Install them in the clutch outer.



NOTE

- Note the positions of the seat and disc A.

Install the washer on the mainshaft.

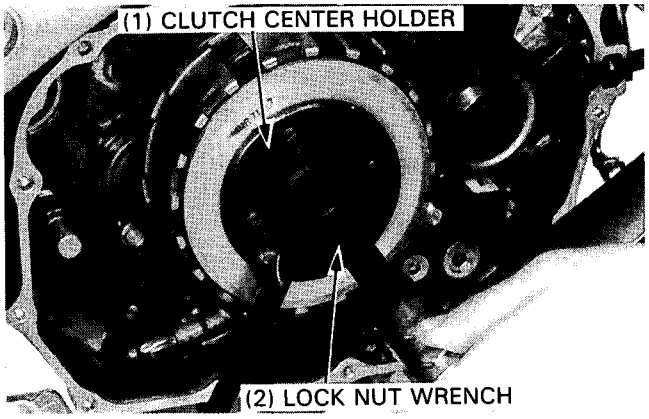


Hold the clutch center with the clutch center holder, and tighten the lock nut to the specified torque.

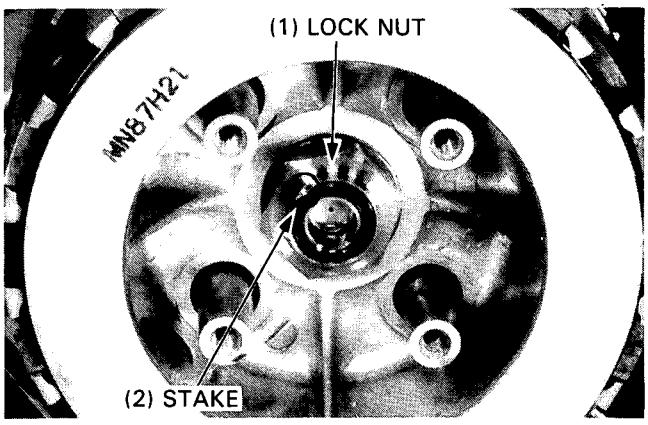
TORQUE: 130 N·m (13.0 kg-m, 94 ft-lb)

TOOLS:

Clutch center holder	**07923—KE10000**
Lock nut wrench, 17 x 27 mm	**07716—0020300 Equivalent commercially available**



Stake the lock nut with a center punch.

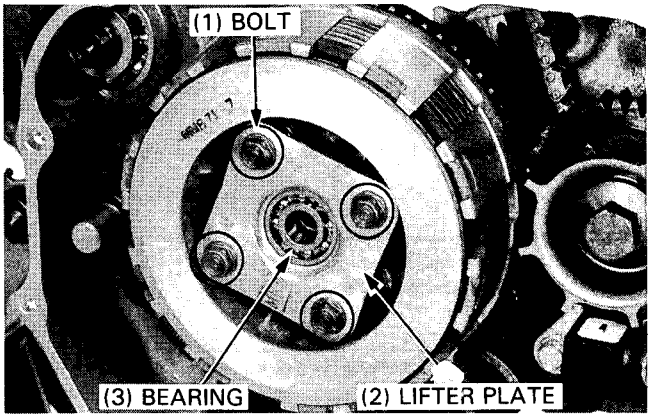


Install the clutch springs, lifter plate and bolts.
Tighten the bolts in a crisscross pattern in 2 or 3 steps.

NOTE

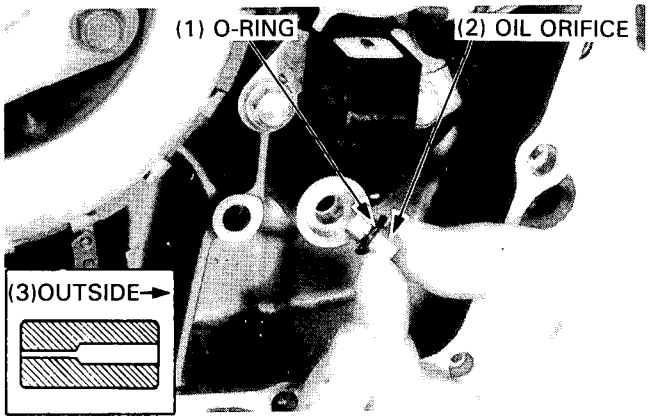
- Make sure the pressure plate firmly pushes the discs and plates.

Install the bearing into the lifter plate.

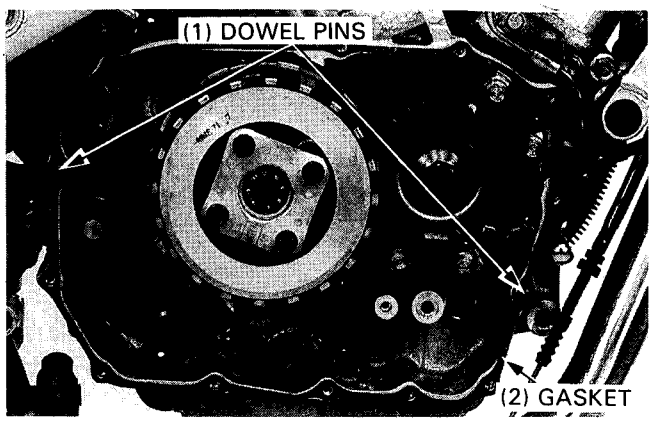


RIGHT CRANKCASE COVER INSTALLATION

Check the oil orifice for clogging.
Install a new O-ring on the oil orifice.
Install the oil orifice with its larger hole facing out.



Install the dowel pins and new gasket.



Tighten the right crankcase cover mounting bolts in a crisscross pattern in 2 or 3 steps and install the clutch cable holder and oil pipe holder at the same time.
Connect the clutch cable to the clutch lifter arm.

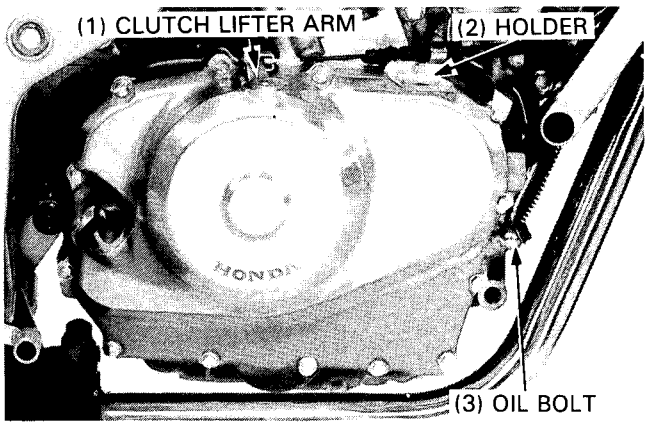
Tighten the oil pipe bolt with the new sealing washers.

TORQUE: 23 N·m (2.3 kg-m, 17 ft-lb)

Install the rear exhaust pipe (page 15-15).

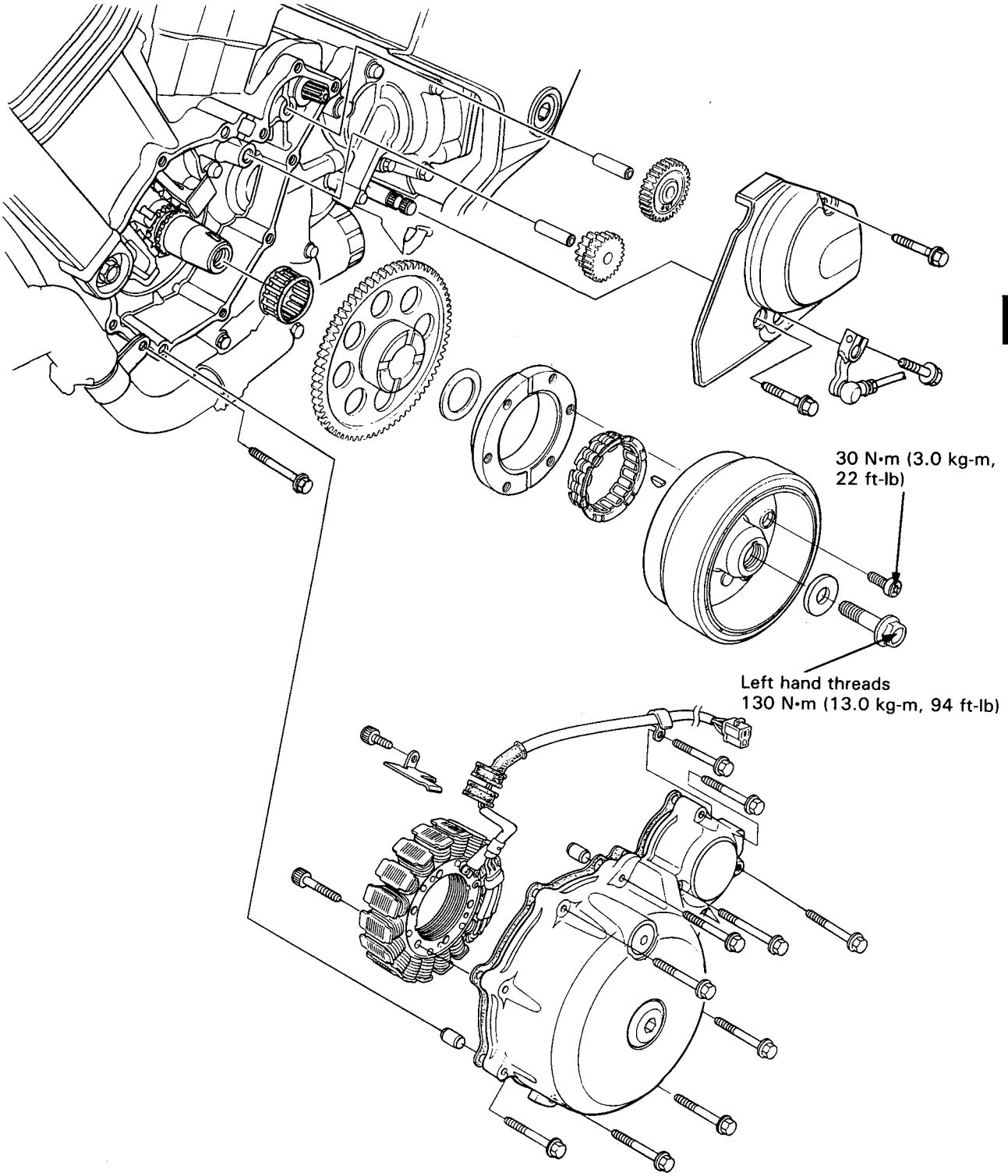
TORQUE:
Exhaust pipe joint nut: 27 N·m (2.7 kg-m, 20 ft-lb)
Muffler band bolt: 27 N·m (2.7 kg-m, 20 ft-lb)

Fill the crankcase with engine oil (page 2-3).
Adjust the clutch lever free play (page 3-13).



8

ALTERNATOR/STARTER CLUTCH


30 N·m (3.0 kg-m, 22 ft-lb)
Left hand threads
130 N·m (13.0 kg-m, 94 ft-lb)

SERVICE INFORMATION

GENERAL

- This section covers the removal and installation of the alternator, starter clutch and starter gears.
- Refer to section 17 for troubleshooting and inspection of the alternator.

SPECIFICATIONS

Unit: mm (in)

ITEM	STANDARD	SERVICE LIMIT
Starter driven gear O.D.	57.749—57.768 (2.2736—2.2743)	57.60 (2.268)

TORQUE VALUES

Flywheel bolt	130 N·m (13.0 kg-m, 94 ft-lb)	Left-hand thread
Starter clutch torx bolts	30 N·m (3.0 kg-m, 22 ft-lb)	Apply locking agent to the threads.

TOOLS

Common

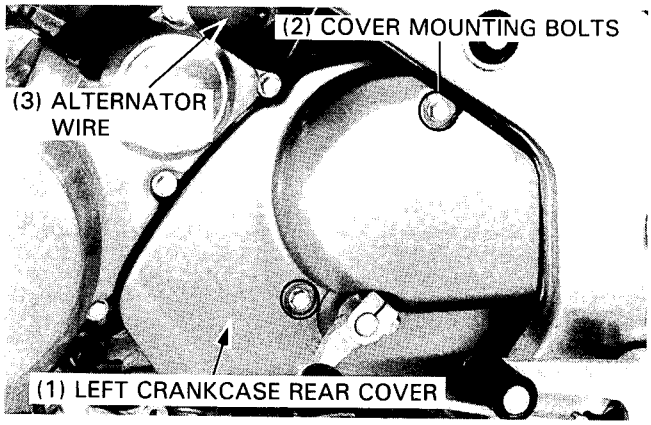
Rotor puller	07733—0020001 or 07933—3290001
Flywheel holder	07725—0040000 ┐ Equivalent commercially available.
Torx bit	07703—0010100 ┘

LEFT CRANKCASE COVER REMOVAL

Disconnect the alternator wire 3P connector (Black).

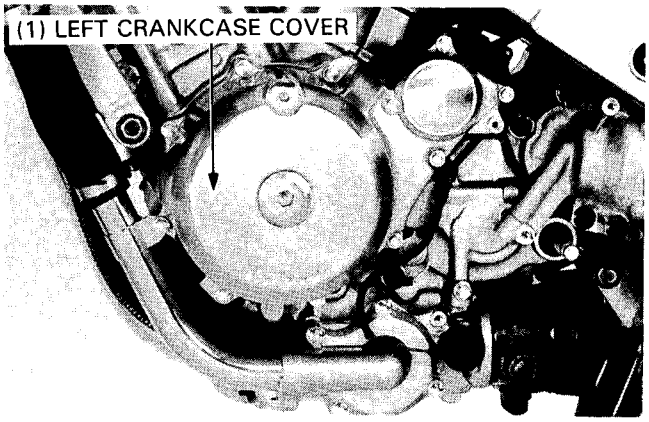
Remove the gearshift arm pinch bolt and shiftarm from the spindle.

Remove the left crankcase rear cover.

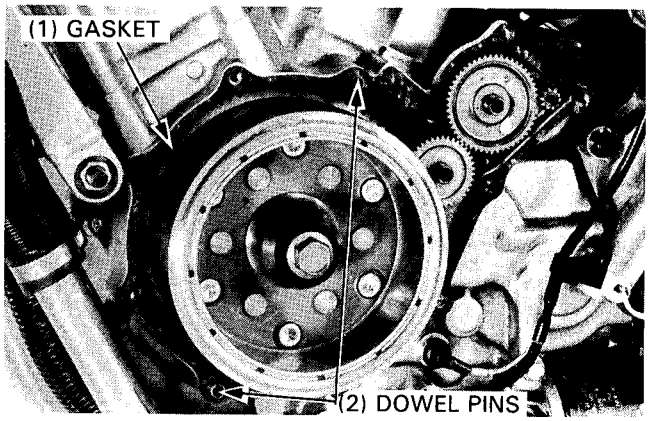


Place a container under the left crankcase cover to catch the engine oil.

Remove the eleven left crankcase cover bolts and the cover.



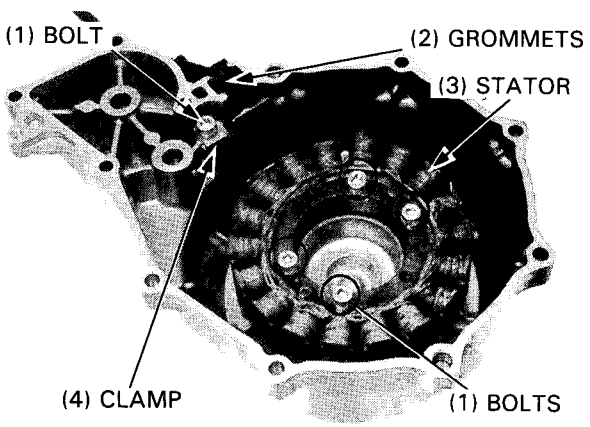
Remove the dowel pins and gasket.



STATOR REPLACEMENT

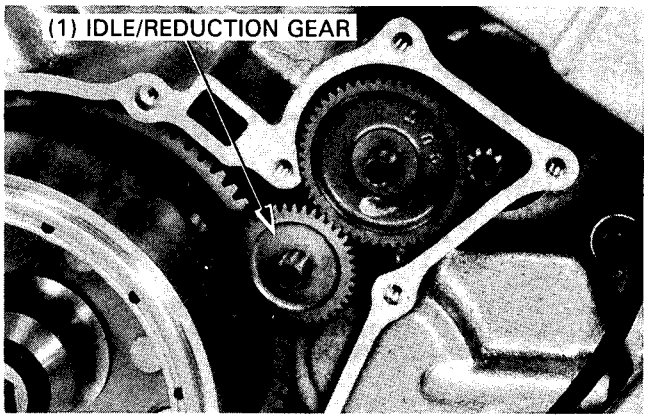
Remove the wire clamp bolt and the clamp.
Remove the stator mounting bolts and stator.

Position the new stator and the grommets in the cover.
Apply a locking agent to the threads of the stator mounting bolts.
Tighten the stator mounting bolts and the clamp bolts.



FLYWHEEL REMOVAL

Remove the starter idle/reduction gear by removing the shaft.

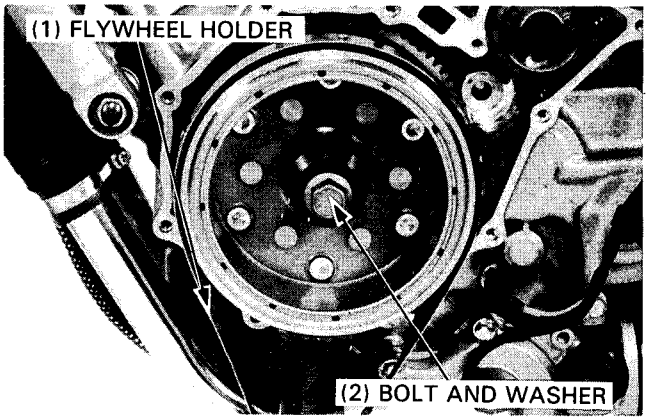


Hold the flywheel with the flywheel holder and remove the flywheel bolt and washer.

TOOL:
Flywheel holder **07725–0040000**

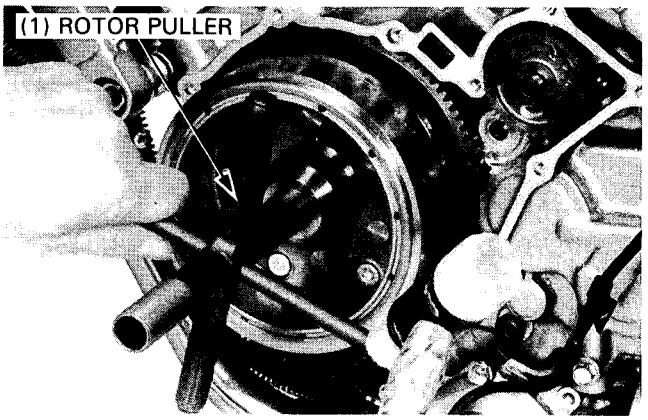
NOTE

- The flywheel bolt has left-hand threads.



Remove the flywheel with the rotor puller.

TOOL:
Rotor puller **07733–0020001**



Remove the needle bearing from the crankshaft, then remove the woodruff key.

NOTE

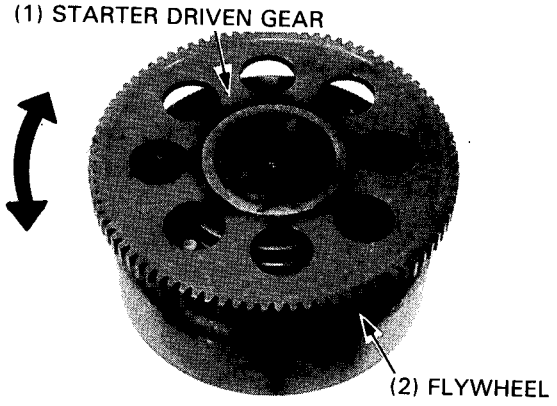
- Do not lose the woodruff key.

STARTER CLUTCH

DISASSEMBLY

Reinstall the starter driven gear into the flywheel.

Inspect the starter clutch by turning the starter driven gear. The gear should turn counterclockwise freely and should not turn clockwise: if it turns incorrectly, replace the starter clutch.

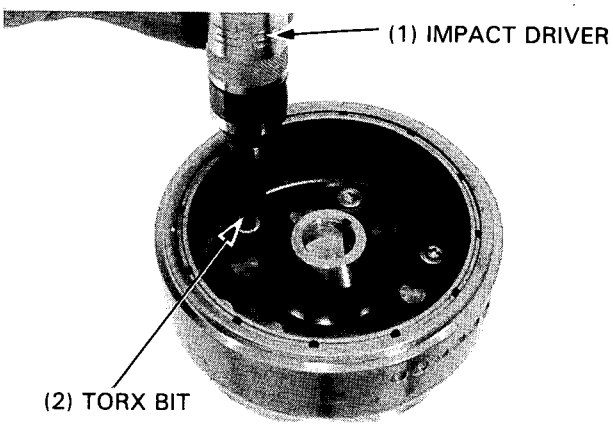


Remove the torx bolts using a torx bit with impact driver.

Remove the starter clutch outer and oneway clutch.

TOOL:

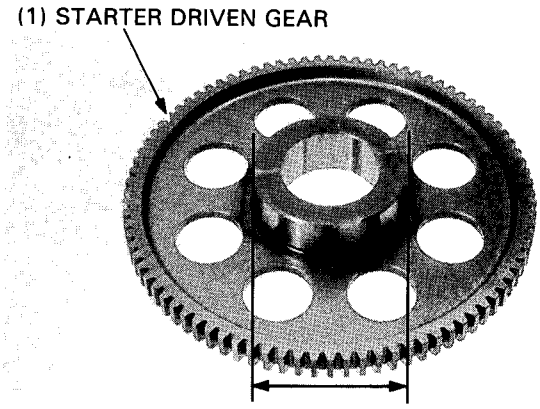
Torx bit	**07703—0010100**



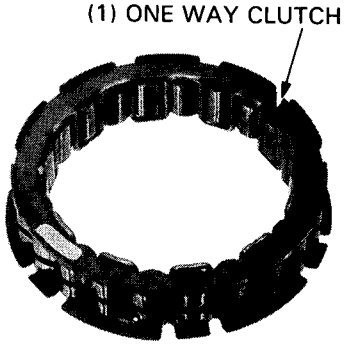
INSPECTION

Measure the O.D. of the starter driven gear.

SERVICE LIMIT: 57.60 mm (2.268 in)

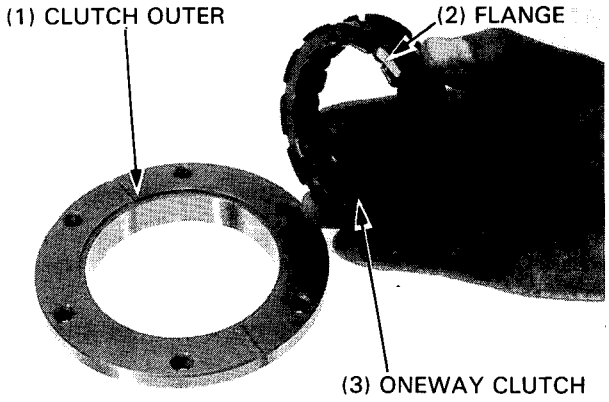


Inspect the oneway clutch for wear or damage and replace if necessary.



ASSEMBLY

Install the oneway clutch into the clutch outer with the flange side facing inside.

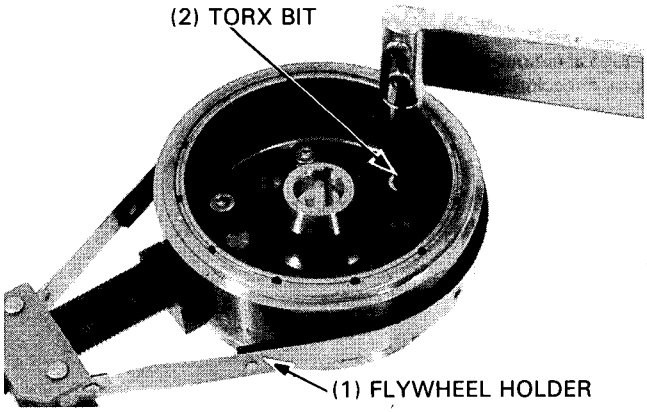


Hold the flywheel with the flywheel holder. Apply locking agent to the torx bolt threads and tighten the bolts.

TORQUE: 30 N·m (3.0 kg-m, 22 ft-lb)

TOOLS:

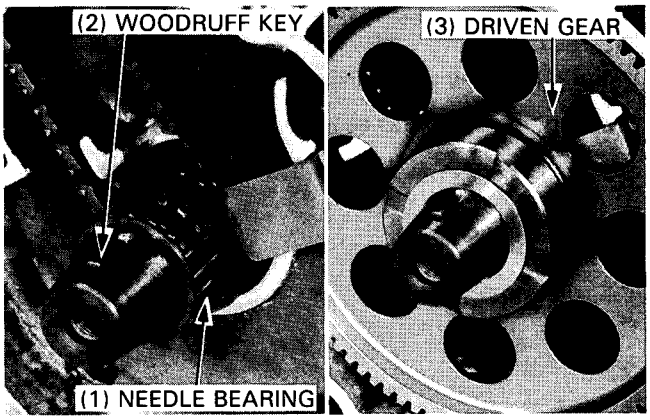
Flywheel holder	**07725–0040000**
Torx bit	**07703–0010100**



FLYWHEEL INSTALLATION

Clean the crankshaft and install the woodruff key.

Install the needle bearing onto the crankshaft and driven gear over the bearing.



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

Hold the flywheel with the flywheel holder, install the washer and flywheel bolt and tighten the bolt.

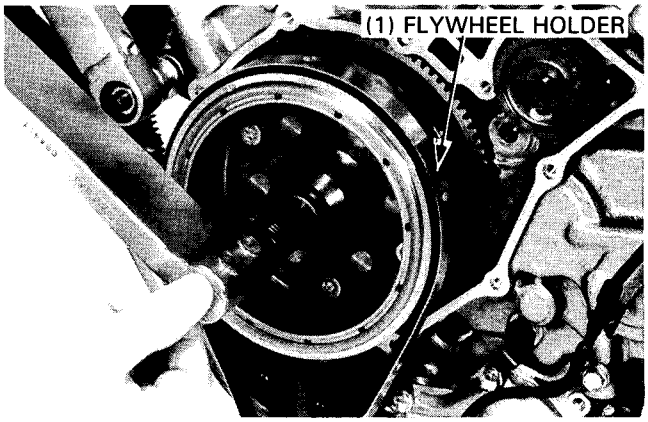
TORQUE: 130 N·m (13.0 kg-m, 94 ft-lb)

TOOL:

Flywheel holder	**07725–0040000**

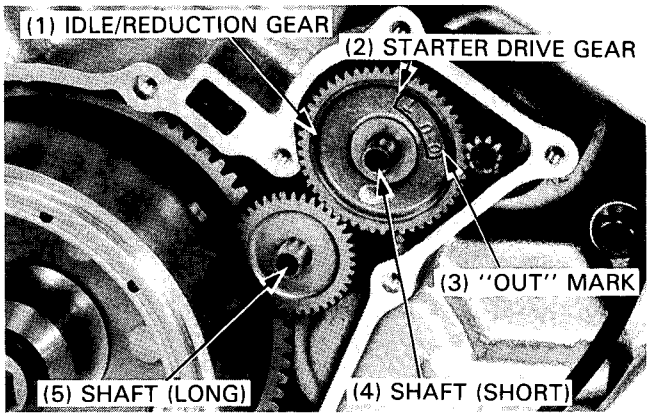
NOTE

- The flywheel bolt has left hand threads.

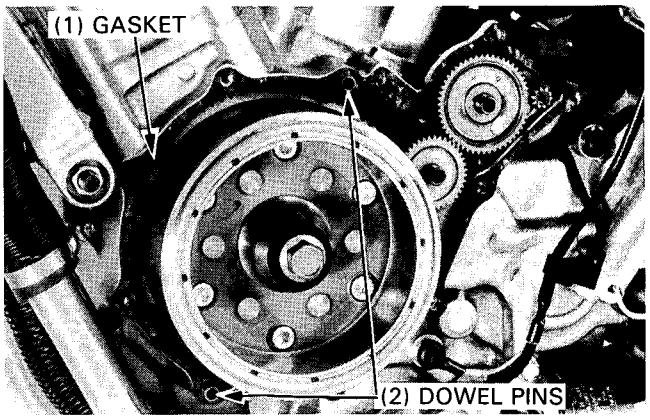


Install the starter idle/reduction gear with the longer shaft.

Install the starter drive gear with the "OUT" mark facing out and the shorter shaft, if the gear is removed.



Install the dowel pins and new gasket.

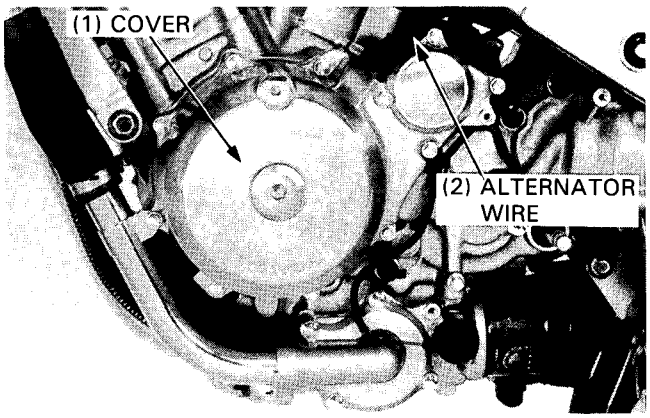


LEFT CRANKCASE COVER INSTALLATION

Install the left crankcase cover and tighten the cover bolts with the neutral and oil pressure switch wire harness clamps as shown.

Route the alternator wire and connect the alternator 3P (Black) connector.

Install the left crankcase rear cover.

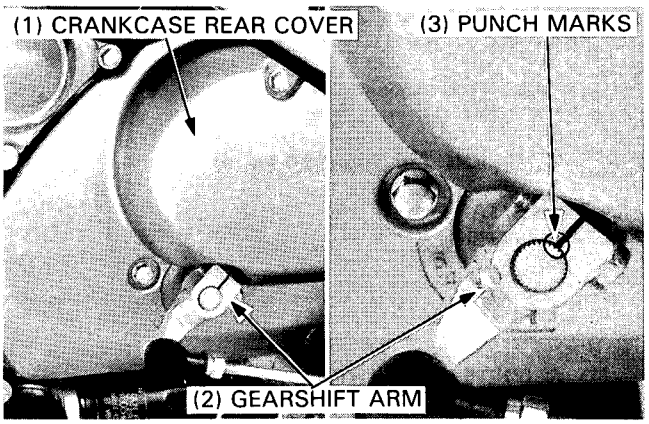


Install the gearshift arm onto the spindle by aligning the punch mark on the arm with the punch mark on the spindle.

Tighten the gearshift arm pinch bolt.

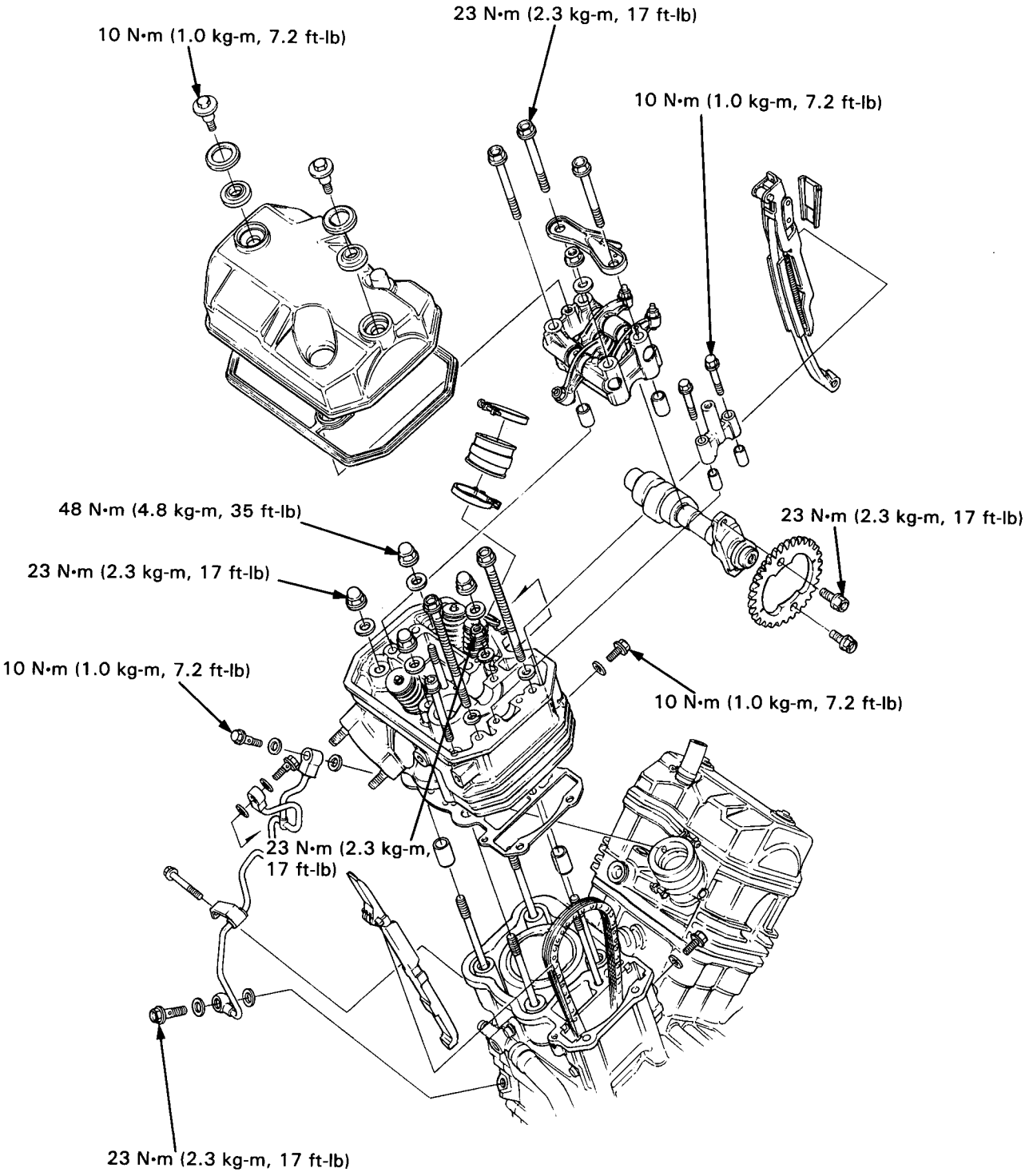
TORQUE: 12 N·m (1.2 kg-m, 9 ft-lb)

Check the engine oil level and add the oil if necessary.



9

CYLINDER HEAD/VALVES


10 N•m (1.0 kg-m, 7.2 ft-lb)
23 N•m (2.3 kg-m, 17 ft-lb)
10 N•m (1.0 kg-m, 7.2 ft-lb)
48 N•m (4.8 kg-m, 35 ft-lb)
23 N•m (2.3 kg-m, 17 ft-lb)
23 N•m (2.3 kg-m, 17 ft-lb)
10 N•m (1.0 kg-m, 7.2 ft-lb)
10 N•m (1.0 kg-m, 7.2 ft-lb)
23 N•m (2.3 kg-m, 17 ft-lb)
23 N•m (2.3 kg-m, 17 ft-lb)

SERVICE INFORMATION

GENERAL

- The cylinder heads can be removed without removing the engine.
- Camshaft lubricating oil is fed through an oil pass pipe. Be sure the holes in the oil pass bolts are not clogged.
- During assembly apply molybdenum disulfide (MoS_2) grease to the camshaft holders, camshaft journals of the cylinder head, rocker arm shafts, rocker arm slipper faces and valve stems to provide initial lubrication.

SPECIFICATIONS

Unit: mm (in)

ITEM				STANDARD	SERVICE LIMIT
Compression pressure				1,324 kPa (13.5 ± 2.0 kg/cm², 192 ± 28 psi)	—
Camshaft	Cam lobe height	IN		38.189 (1.5035)	38.17 (1.503)
		EX		38.213 (1.5044)	38.19 (1.504)
	Journal O.D.			21.959–21.980 (0.8645–0.8654)	21.95 (0.864)
	Runout			0.030 (0.0012)	0.05 (0.002)
	Oil clearance			0.040–0.093 (0.0015–0.0037)	0.11 (0.004)
Rocker arm	Rocker arm I.D.	IN/EX		12.000–12.018 (0.4724–0.4731)	12.03 (0.474)
	Rocker arm shaft O.D.	IN/EX		11.966–11.984 (0.4711–0.4718)	11.96 (0.471)
Valve and valve guide	Valve stem O.D.	IN		5.475–5.490 (0.2156–0.2161)	5.47 (0.215)
		EX		6.555–6.570 (0.2580–0.2587)	6.55 (0.258)
	Valve guide I.D.	IN		5.500–5.512 (0.2165–0.2170)	5.53 (0.218)
		EX		6.600–6.615 (0.2598–0.2604)	6.66 (0.262)
	Stem-to-guide clearance	IN		0.010–0.037 (0.0004–0.0015)	0.07 (0.003)
		EX		0.030–0.060 (0.0014–0.0024)	0.11 (0.004)
	Valve seat width			0.9–1.1 (0.035–0.043)	1.5 (0.06)
	Valve guide projection height	IN		19.4–19.6 (0.76–0.77)	—
		EX		17.9–18.1 (0.70–0.71)	—
Valve spring	Free length	OUTER	IN	42.14 (1.659)	40.58 (1.598)
			EX	42.83 (1.686)	41.25 (1.624)
		INNER	IN	38.11 (1.500)	36.47 (1.436)
			EX	38.81 (1.765)	37.51 (1.477)
Cylinder head warpage				—	0.10 (0.004)

TORQUE VALUES

Cylinder head cover bolt		10 N·m (1.0 kg-m, 7.2 ft-lb)
Camshaft holder	8 mm bolt	23 N·m (2.3 kg-m, 17 ft-lb)
	8 mm nut	23 N·m (2.3 kg-m, 17 ft-lb)
	6 mm bolt	10 N·m (1.0 kg-m, 7.2 ft-lb)
Cylinder head	10 mm nut	48 N·m (4.8 kg-m, 35 ft-lb)
	8 mm bolt	23 N·m (2.3 kg-m, 17 ft-lb)
	8 mm nut	23 N·m (2.3 kg-m, 17 ft-lb)
	6 mm bolt	10 N·m (1.0 kg-m, 7.2 ft-lb)
Camshaft sprocket bolt		23 N·m (2.3 kg-m, 17 ft-lb)
Cam chain tensioner bolt		10 N·m (1.0 kg-m, 7.2 ft-lb)
Oil pass pipe	7 mm bolt	10 N·m (1.0 kg-m, 7.2 ft-lb)
	8 mm bolt	23 N·m (2.3 kg-m, 17 ft-lb)

TOOLS

Special

Valve guide reamer (IN)	07984—2000001
Valve guide reamer (EX)	07984—ZE20001
Valve guide driver attachment (IN)	07943—MF50100
Valve guide driver attachment (EX)	07943—MF50200

Common

Valve guide driver, 5.5 mm (IN)	07742—0010100
Valve guide driver, 6.6 mm (EX)	07742—0010200
Valve spring compressor	07757—0010000 or 07957—3290001

Valve seat cutter

Cutter holder	IN 5.5 mm	07781—0010101
	EX 6.6 mm	07781—0010201
Flat cutter	IN 28 mm (32°)	07780—0012100
	EX 35 mm (32°)	07780—0012300
Interior cutter	IN 30 mm (60°)	07780—0014000
	EX 37.5 mm (60°)	07780—0014100
Seat cutter	IN 27.5 mm (45°)	07780—0010200
	EX 35 mm (45°)	07780—0010400

TROUBLESHOOTING

- Engine top-end problems are usually performance-related and can usually be diagonosed by a compressio test.
- Engine noises can usually be traced to the top-end with a sounding rod or stethoscope.

Uneven or low compression
- Valves
  - — Incorrect valve adjustment
  - — Burned or bent valves
  - — Incorrect valve timing
  - — Broken valve spring
- Cylinder head
  - — Leaking or damaged head gasket
  - — Warped or cracked cylinder head
- Cylinder and piston (Refer to Section 10)

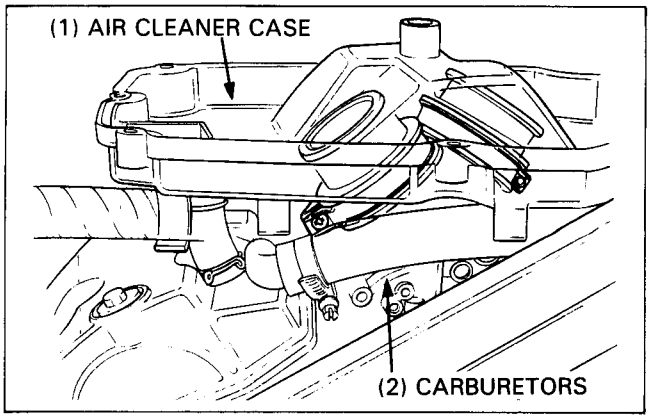
High compression
- Excessive carbon build-up on piston crown or combustion chamber

Excessive noise
- Incorrect valve adjustment
- Sticking valve or broken valve spring
- Damaged or worn rocker arm or camshaft
- Loose or worn cam chain
- Worn or damaged cam chain tensioner
- Worn cam sprocket teeth

Poor idling
- Compression too low

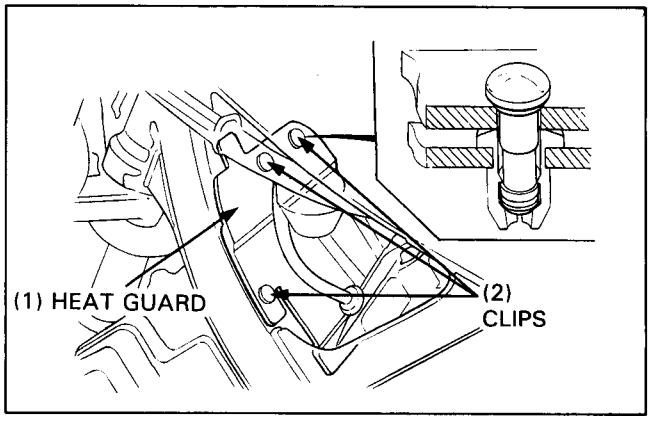
CYLINDER HEAD COVER REMOVAL

Remove the following parts:
– seat (page 15-13)
– fuel tank (page 4-3)
– air cleaner case (page 4-3)
– carburetors (page 4-5)



FRONT:

Remove the heat guard mounting clips and heat guard from the frame.



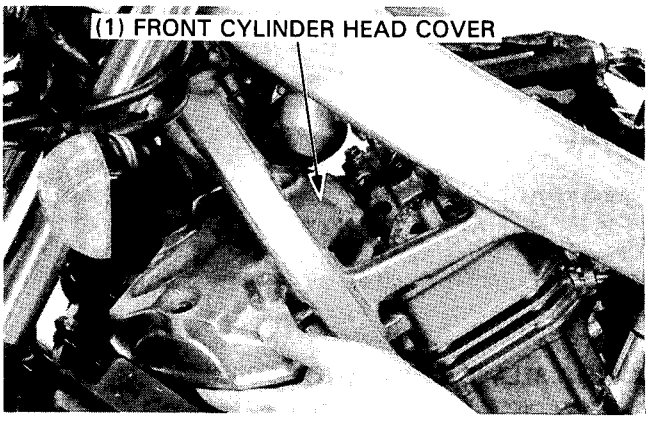
Disconnect the spark plug caps.

Remove the radiator mounting bolts and pivot bolt (page 5-5). Release the radiator from the frame grommets suspend it with a piece of rope or something suitable.

Remove the front cylinder head cover bolts and remove the cover through the front down tubes as shown.

NOTE

- Be careful not to damage the cover surfaces.

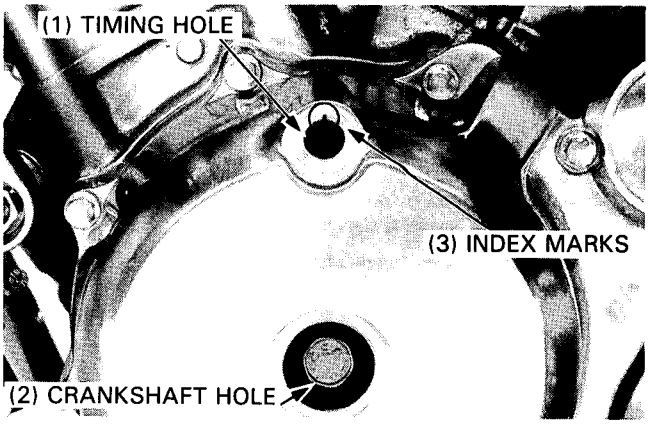


REAR:

Disconnect the spark plug caps.
Remove the cylinder head cover bolts and cover.

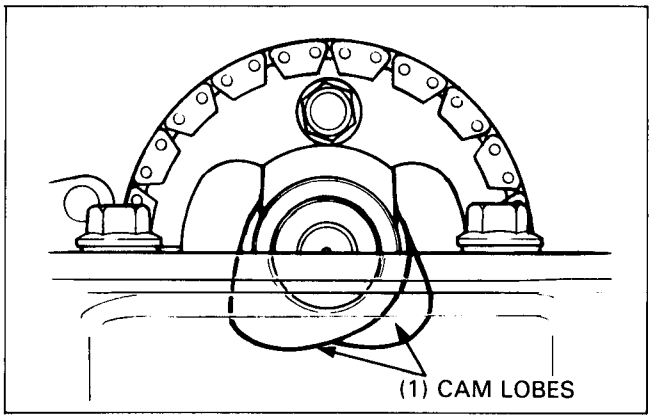
CAMSHAFT REMOVAL

Remove the cylinder head cover.
Remove the timing hole cap and crankshaft hole cap from the left crankcase cover.
Align the FT mark (rear: RT mark) on the flywheel with the index mark on the left crankcase cover timing hole by turning the crankshaft counterclockwise.



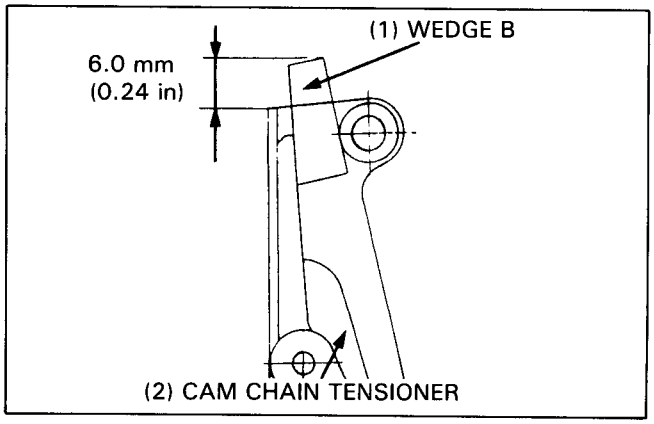
Make sure the piston is at TDC (TOP DEAD CENTER) on the compression stroke with cam lobes are all facing down.

If the cam lobe is facing up at TDC, turn the crankshaft 360° couterclockwise, and re-align the mark and notch.



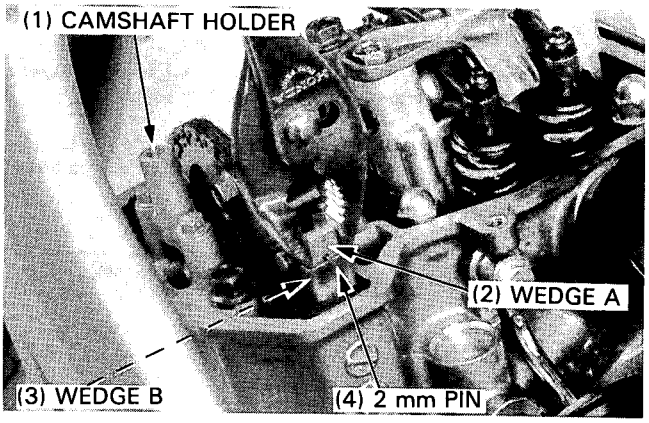
Measure the amount of the cam chain tensioner projection as shown. Replace the cam chain with the new one if the projection exceeds 6.0 mm (0.24 in).
To replace the cam chain, drain the oil from the engine and remove the following parts:

FRONT CYLINDER HEAD	REAR CYLINDER HEAD
Left crankcase cover	Right crankcase cover
Front camshaft	Rear camshaft
Flywheel	Primary drive gear



Pull wedge A straight up while holding wedge B down.
Secure wedge A with a 2 mm pin as shown.

Remove the camshaft holder on the cam sprocket side by removing the two mounting bolts.

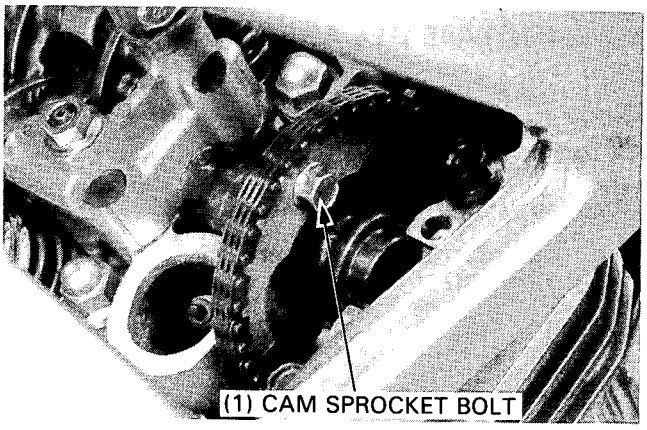


Remove the cam sprocket bolt, rotate the crankshaft counterclockwise one turn (360°) and remove the other cam sprocket bolt.

NOTE

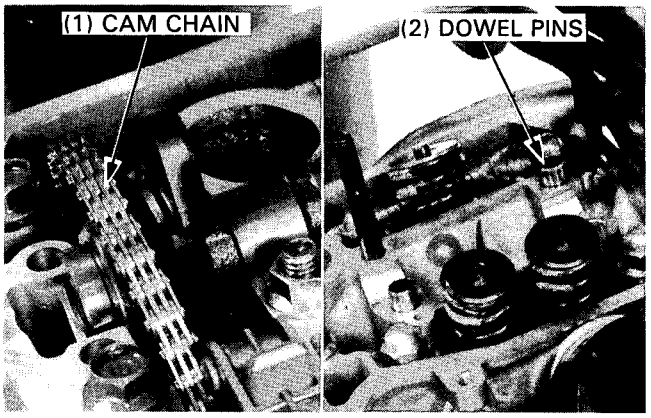
- Be careful not to let the cam sprocket bolts fall into the crankcase.

Remove the three camshaft holder mounting bolts and the nut, the oil plate and the holder.



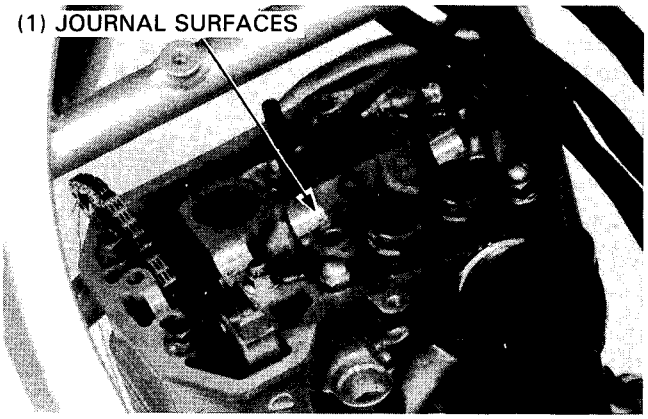
Remove the dowel pins.
Hang the cam chain on the camshaft behind the camshaft flange and remove the cam sprocket while lifting the camshaft out.

Attach a piece of wire to the cam chain to prevent it from being dropped into the crankcase.



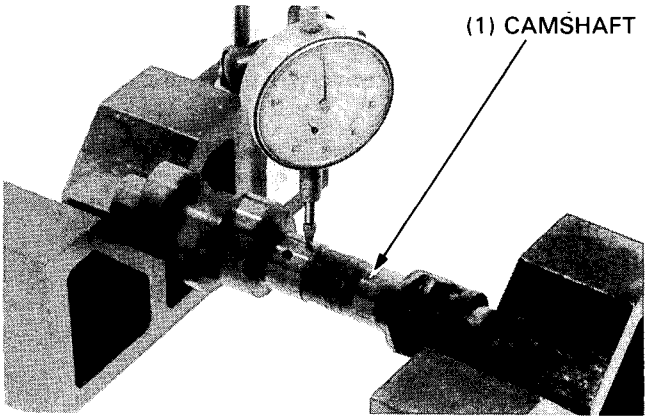
INSPECTION

Cylinder head
Inspect the camshaft holder and cylinder head journal surfaces for scoring or evidence of insufficient lubrication.



Camshaft runout
Support both ends of the camshaft with V-blocks and check the camshaft runout with a dial indicator.

SERVICE LIMIT: 0.05 mm (0.002 in)

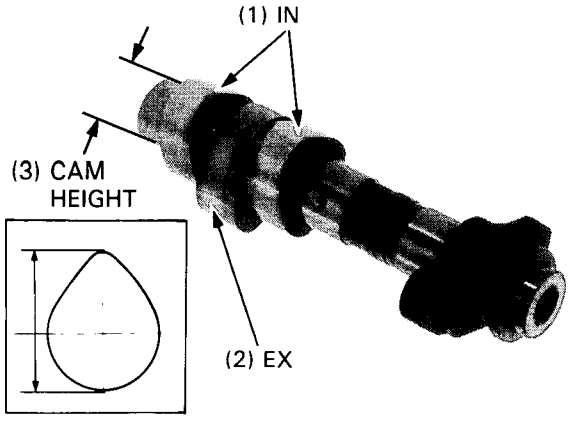


Using a micrometer, measure the height of each cam lobe.

SERVICE LIMIT:
IN: 38.17 mm (1.503 in)
EX: 38.19 mm (1.504 in)

Check the camshaft journals for wear or damage.
Measure the O.D. of each journal.

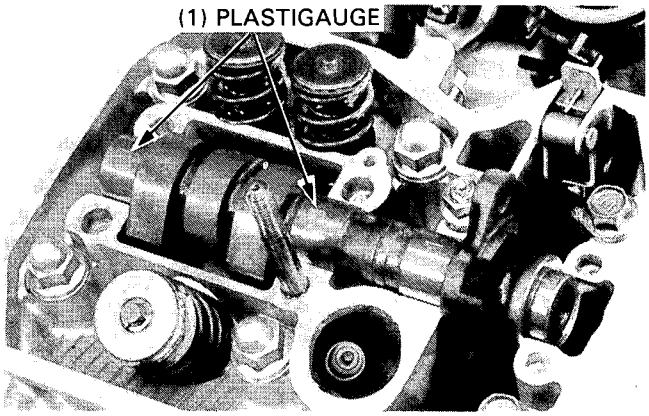
SERVICE LIMIT: 21.95 mm (0.864 in)



Camshaft bearing oil clearance
Wipe any oil from the journals. Lay a strip of plastigauge lengthwise on top of each camshaft journal.

NOTE

- Avoid placing plastigauge over the oil hole.

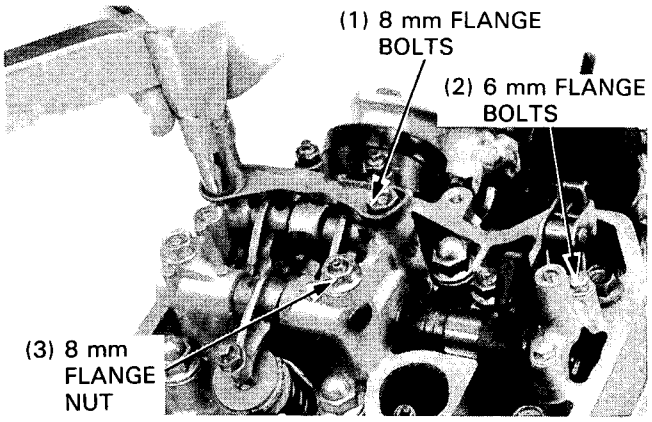


Install the camshaft holders and tighten the mounting bolts in a crisscross pattern in 2 or 3 steps.

NOTE

- Do not rotate the camshaft when using plastigauge.

TORQUE:
6 mm flange bolt: 12 N·m (1.2 kg-m, 9 ft-lb)
8 mm flange bolt: 23 N·m (2.3 kg-m, 17 ft-lb)
8 mm flange nut: 23 N·m (2.3 kg-m, 17 ft-lb)

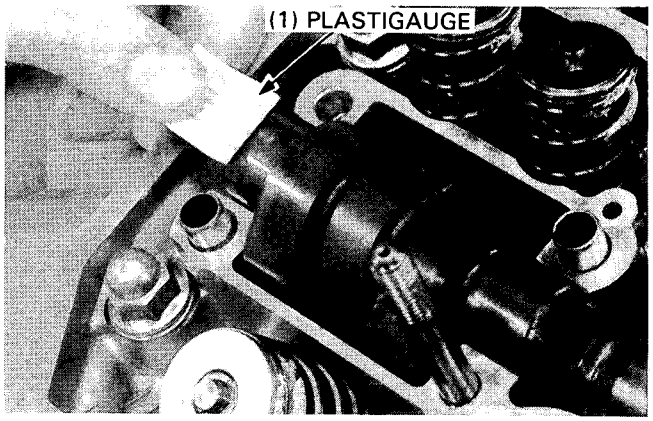


Remove the camshaft holder and measure the width of each plastigauge. The widest thickness determines the oil clearance.

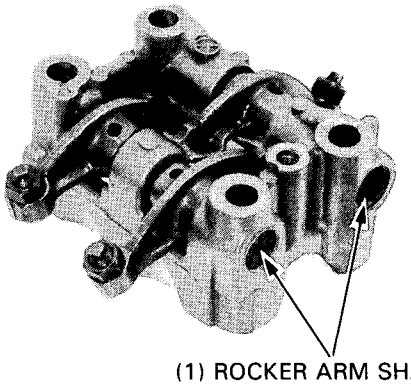
SERVICE LIMIT: 0.11 mm (0.004 in)

When the service limit is exceeded, replace the camshaft and recheck the oil clearance.

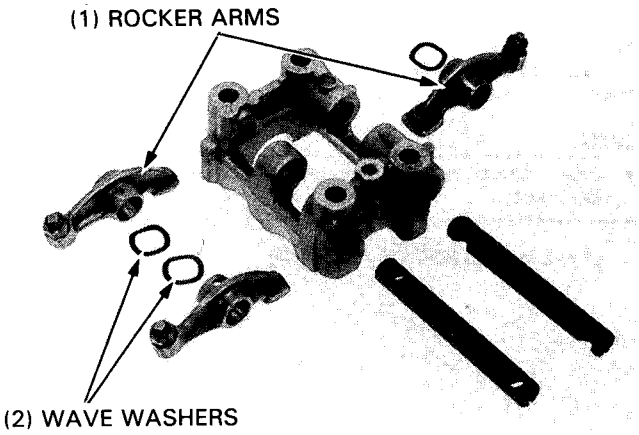
Replace the cylinder head and camshaft holder if the clearance still exceeds the service limit.



Camshaft holder/Rocker arm shaft/Rocker arm
Remove the rocker arm shafts by tapping the holder with a soft hammer.



Remove the rocker arms and wave washers from the shafts.



Inspect the rocker arm shafts and rocker arms for wear or damage.

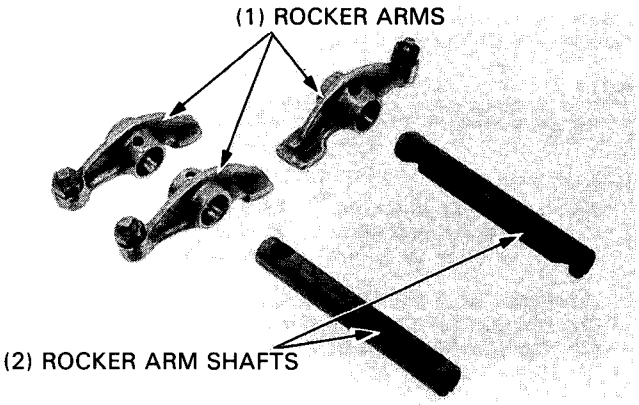
Check the rocker arms for clogged oil holes.

Measure the O.D. of each rocker arm shaft.

SERVICE LIMIT:
IN/EX: 11.96 mm (0.471 in)

Measure the I.D. of each rocker arm.

SERVICE LIMIT: 12.03 mm (0.474 in)



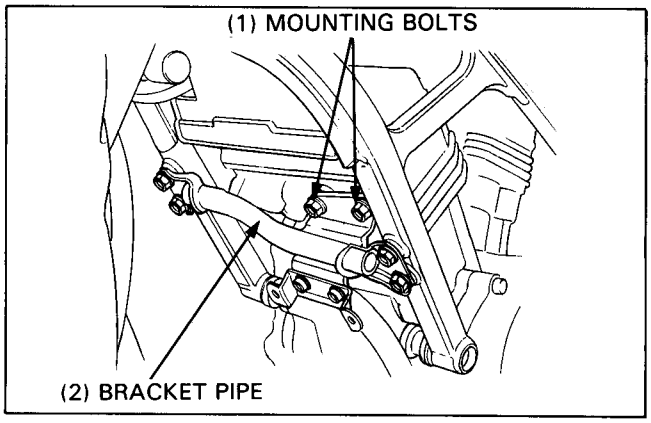
CYLINDER HEAD

REMOVAL

NOTE

- Front cylinder head service has described in this section, rear cylinder head service using the same procedure as for the front.

Drain the coolant (page 5-3) and remove the following:
— cylinder head cover (page 9-3)
— camshaft (page 9-3)
— front exhaust pipe (page 15-15)
— engine mounting bolts and bracket pipe

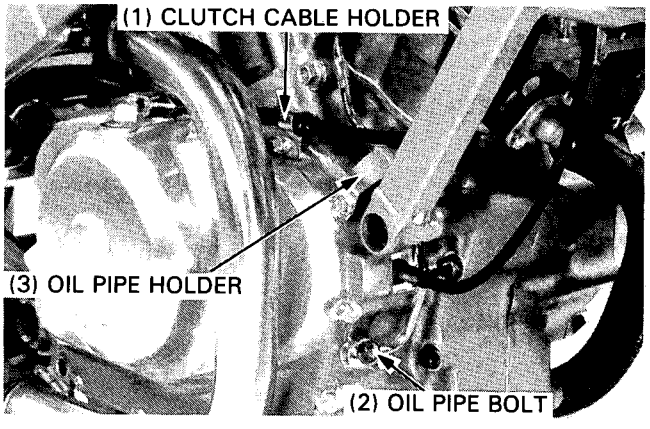


SW model only:
Remove the ASV pipes from the cylinder head.
All models:
Disconnect the clutch cable from the clutch lifter arm by removing the clutch cable holder bolt.

Remove the oil pipe bolt and the pipe holder bolt.

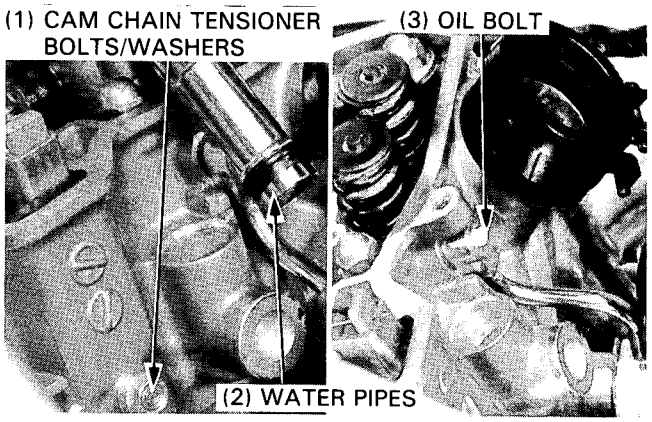
NOTE

- Do not bend the oil pipe during removal.



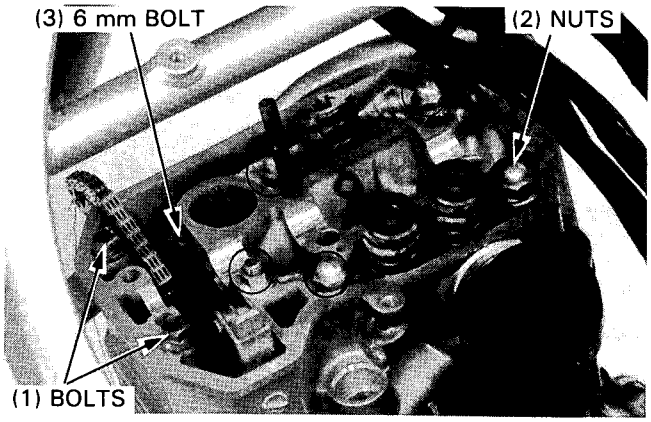
Remove the following:
– cam chain tensioner upper bolt
– water pipe
– cylinder head oil pipe bolts and oil pipe

Loosen the cam chain tensioner lower bolt.



Loosen the 6 mm bolt, 8 mm bolts, 8 mm nut and 10 mm nuts/washers in a criss-cross pattern in 2 or 3 steps.

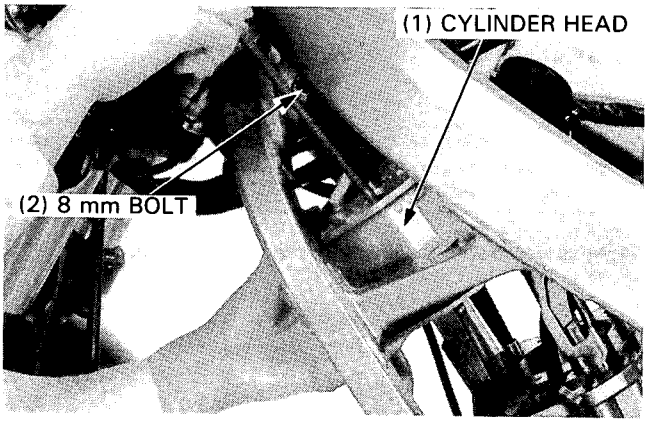
Remove the 6 mm socket bolt and 8 mm nuts.



Remove the 8 mm rear bolt while holding the cylinder head as shown.

NOTE

- Be careful not to damage the cylinder studs.



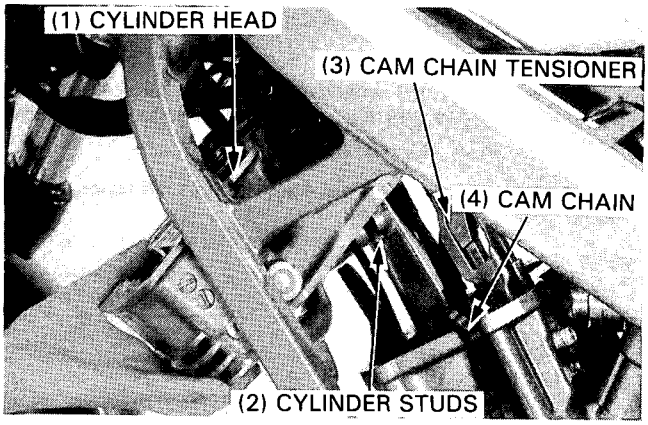
Remove the cylinder head through the front down tubes.

NOTE

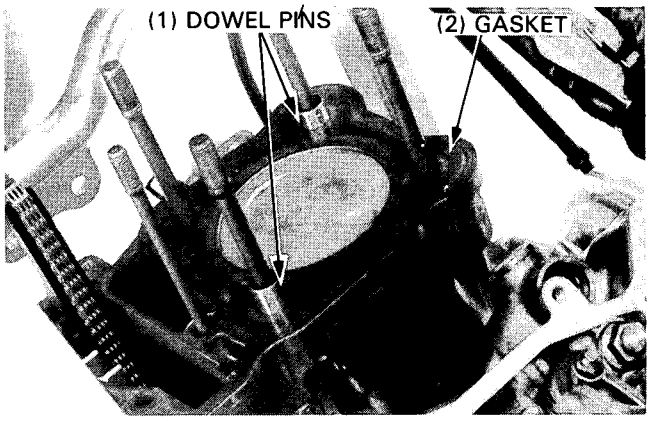
- Be careful not to damage the cylinder head and studs.

Remove the cam chain tensioner lower bolt and the tensioner.

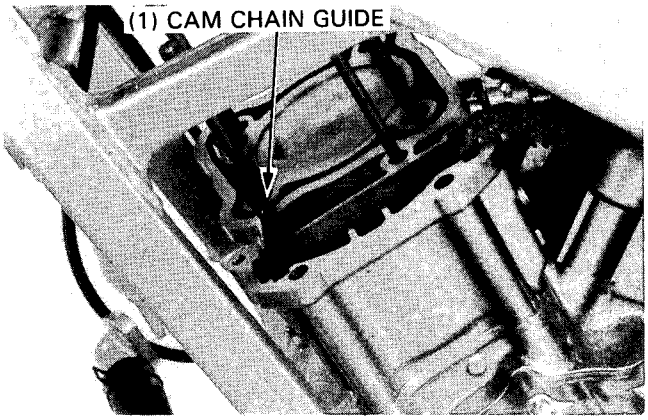
Attach a piece of wire to the cam chain to prevent it from being dropped into the crankcase.



Remove the gasket and dowel pins from the cylinder.



Remove the cam chain guide from the cylinder.



DISASSEMBLY/INSPECTION

Cylinder head

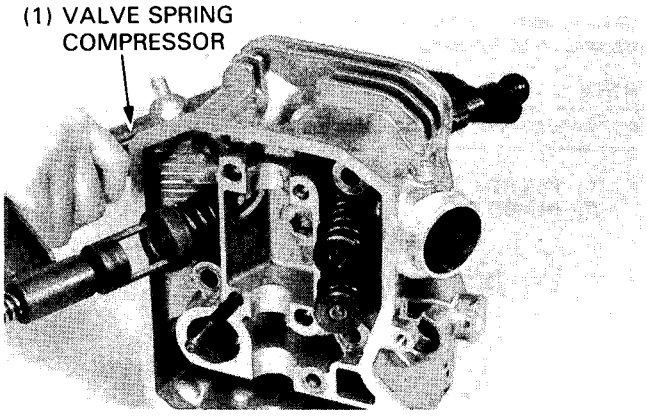
Remove the valve spring cotters, retainers, springs, and valves using a Valve Spring Compressor.

TOOL:

Valve spring compressor	**07757–0010000 or 07957–3290001**

CAUTION

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



NOTE

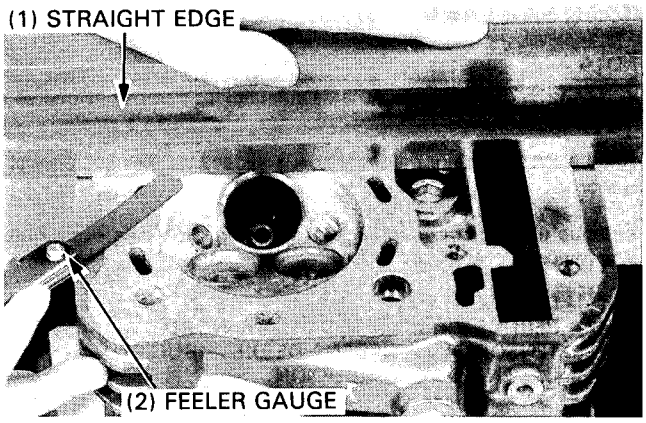
- Mark all parts during disassembly so they can be placed back in their original locations.

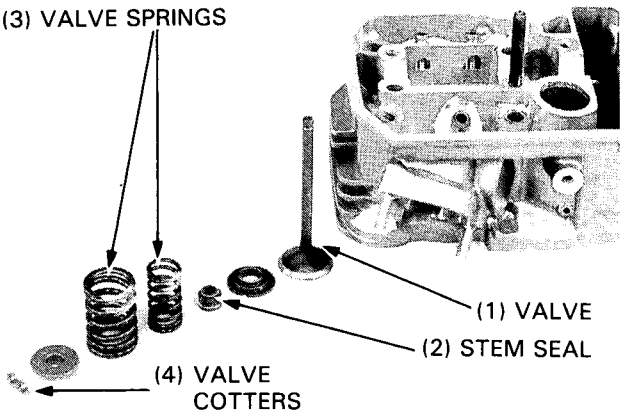
CAUTION

- *Avoid damaging the gasket surfaces.*

Check the spark plug hole and valve areas for cracks.
Check the cylinder head for warpage with the straight edge and feeler gauge.

SERVICE LIMIT: 0.10 mm (0.004 in)



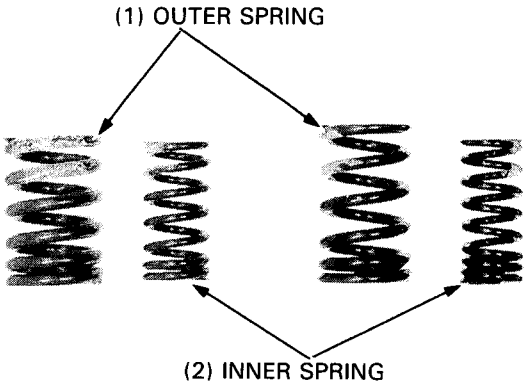


Remove the valve stem seals and valve spring seats.

Remove carbon deposits from the combustion chamber.

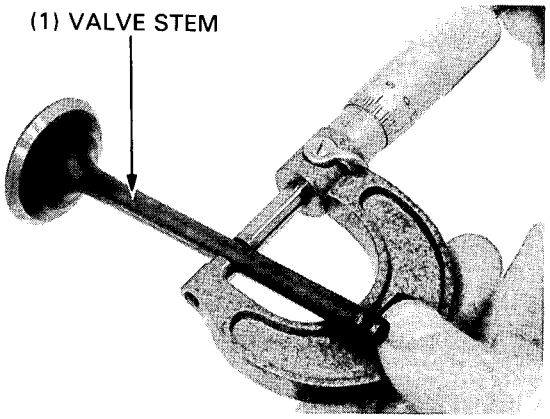
Valve springs
Measure the free length of the inner and outer valve springs.

SERVICE LIMITS:
INNER (IN): 36.47 mm (1.436 in)
(EX): 37.51 mm (1.477 in)
OUTER (IN): 40.58 mm (1.598 in)
(EX): 41.25 mm (1.624 in)



Replace the springs as a set if they are shorter than the service limits.

Valve stem-to-guide clearance
Inspect each valve for bending, burning, scratches or abnormal stem wear.



Check valve movement in the guide and measure and record each valve stem O.D.

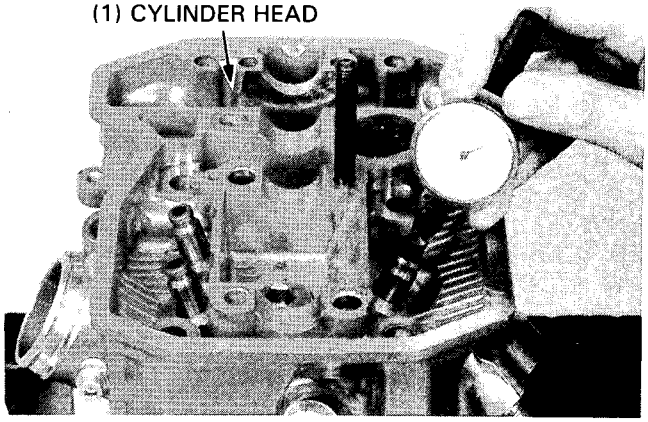
SERVICE LIMITS: IN: 5.47 mm (0.215 in)
EX: 6.55 mm (0.258 in)

Measure and record each valve guide I.D.

NOTE

- Ream the guides to remove any carbon deposits before checking clearances.

SERVICE LIMITS: IN: 5.53 mm (0.218 in)
EX: 6.66 mm (0.262 in)



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

SERVICE LIMITS: IN: 0.07 mm (0.003 in)
EX: 0.11 mm (0.004 in)

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

TOOLS:

Valve guide reamer IN:	**07984—2000001**
EX:	**07984—ZE20001**

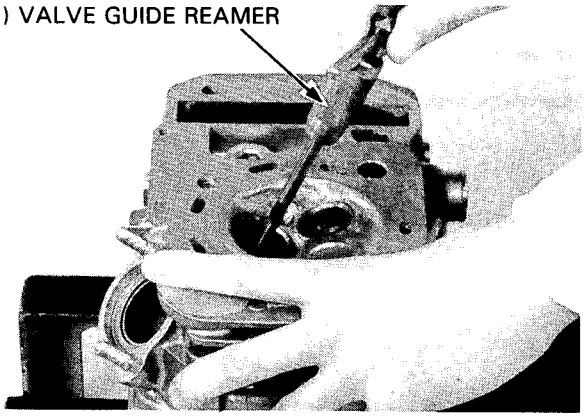
NOTE

- It is important that the reamer always be rotated in the same direction when it is inserted or removed.

If the stem-to-guide clearance exceeds the service limits with new guides, also, replace the valves.

NOTE

- Reface the valve seats whenever the valve guides are replaced.



VALVE GUIDE REPLACEMENT

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

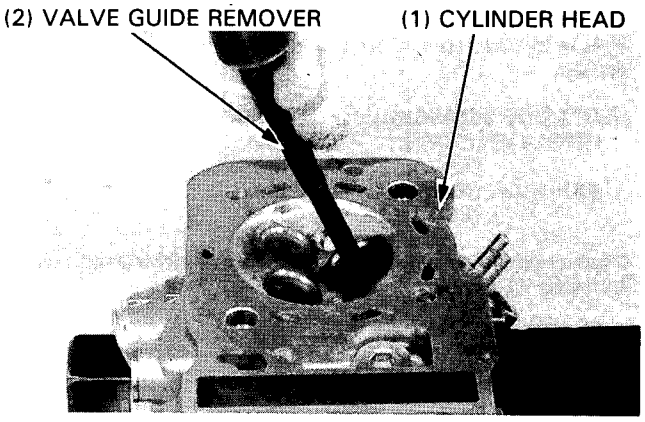
Heat the cylinder head to 212°F (100°C) with a hot plate or oven. Maximum allowable temperature is 300°F (150°C).

⚠WARNING

- ***To avoid burns, wear heavy gloves when handling the heated cylinder head.***

CAUTION

- *Do not use a torch to heat the cylinder head; it may cause warping.*



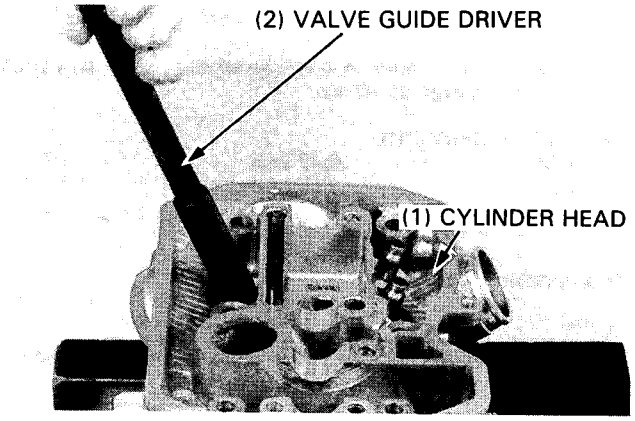
Support the cylinder head and drive out the old guides from the combustion chamber side of the cylinder head.

TOOLS:

Valve guide driver (IN):	**07742—0010100**
(EX):	**07742—0010200**

NOTE

- Avoid damaging the cylinder head.



Make note of the valve guide projection specifications (following), then drive in new guides from camshaft side of the cylinder head.

TOOLS:

Valve guide driver

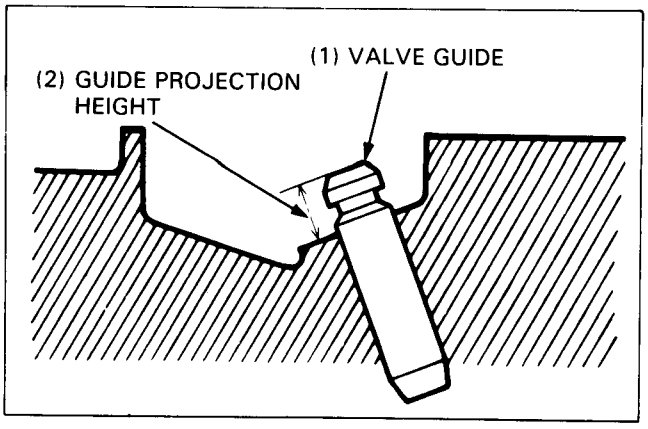
5.5 mm (IN): 07742—0010100
6.6 mm (EX): 07742—0010200

Attachment

5.5 mm (IN): 07943—MF50100
6.6 mm (EX): 07943—MF50200

VALVE GUIDE PROJECTION HEIGHT:

IN: 19.4—19.6 mm (0.76—0.77 in)
EX: 17.9—18.1 mm (0.70—0.71 in)



Ream the new valve guides after installation.

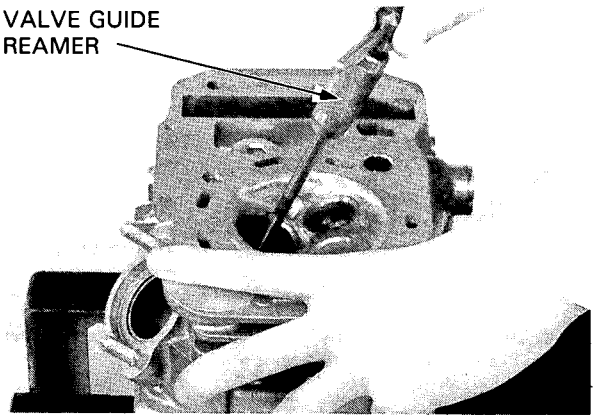
NOTE

- Use cutting oil on the reamer during this operation.
- It is important that the reamer always be rotated in the same direction when it is inserted or removed.

Clean the head thoroughly after reaming the valve guides.

TOOLS:

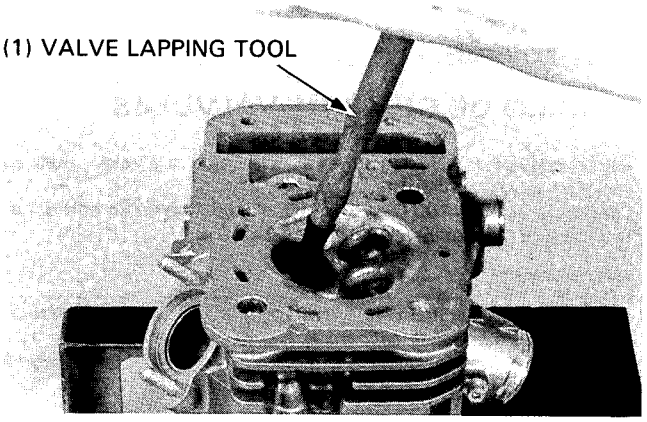
Valve guide reamer	**IN:**	**07984–2000001**
	EX:	**07984–ZE20001**



VALVE SEAT INSPECTION/REFACING

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

Apply a light coating of Prussian Blue to each valve seat. Lap each valve and seat using a rubber hose or other hand-lapping tool.



Remove and inspect each valve.

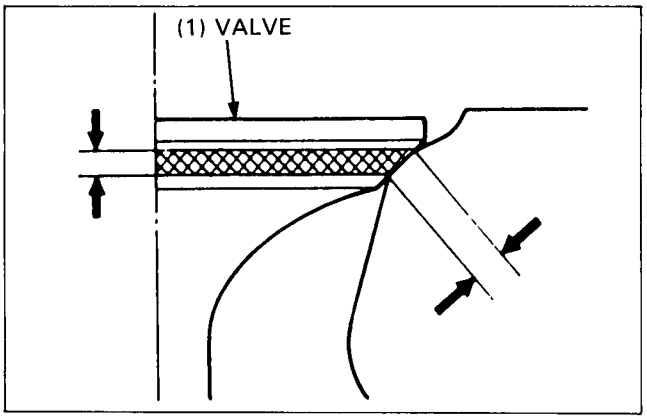
CAUTION

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

Inspect the width of each valve seat.

STANDARD: 0.9–1.1 mm (0.035–0.043 in)
SERVICE LIMIT: 1.5 mm (0.06 in)

If the seat is too wide, too narrow or has low spots, the seat must be ground.

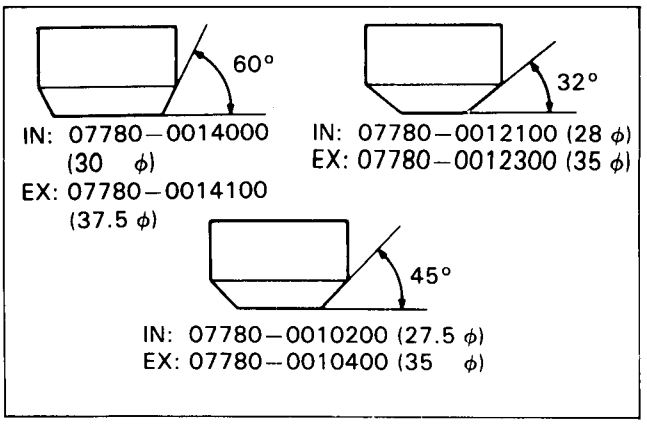


VALVE SEAT CUTTERS

Honda Valve Seat Cutters, grinder or equivalent valve seat refacing equipment are recommended to correct a worn valve seat.

NOTE

- Follow the refacer manufacturer's operating instructions.



VALVE SEAT REFACING

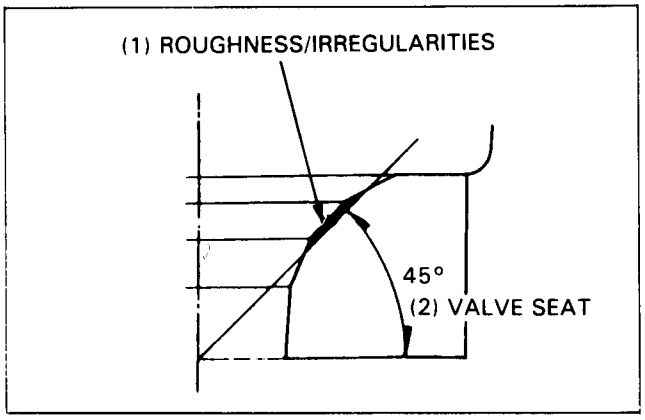
Use a 45 degree cutter to remove any roughness or irregularities from the seat.

NOTE

- Reface the seat with a 45 degree cutter when a valve guide is replaced.

TOOLS: (OP)

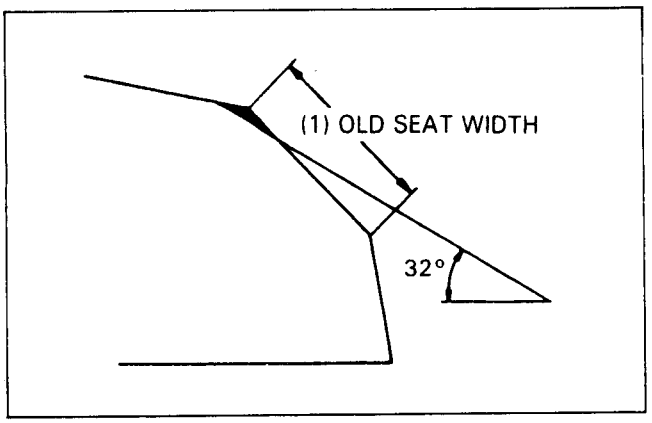
45° Seat cutter 27.5 mm: IN	**07780–0010200**
Cutter holder 5.5 mm: IN	**07781–0010101**
45° Seat cutter 35 mm: EX	**07780–0010400**
Cutter holder 6.6 mm: EX	**07781–0010201**



Use a 32 degree cutter to remove the top 1/4 of the existing valve seat material.

TOOLS: (OP)

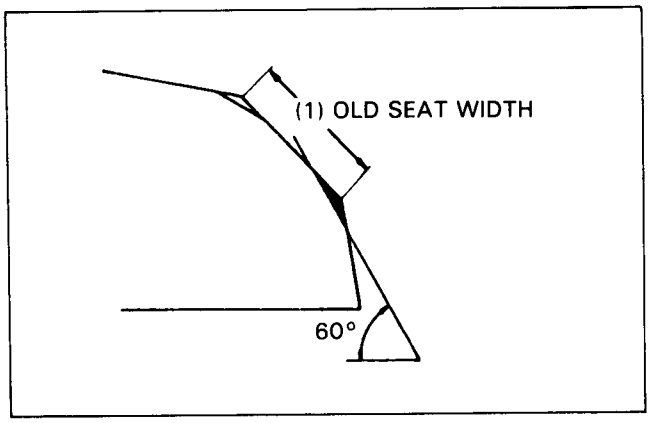
32° Flat cutter 28 mm: IN	**07780–0012100**
Cutter holder 5.5 mm: IN	**07781–0010101**
32° Flat cutter 35 mm: EX	**07780–0012300**
Cutter holder 6.6 mm: EX	**07781–0010201**



Use a 60 degree cutter to remove the bottom 1/4 of the old seat. Remove the cutter and inspect the area you have refaced.

TOOLS: (OP)

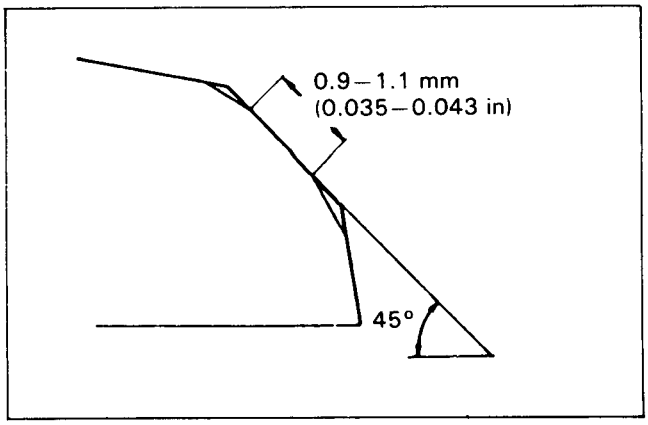
60° Interior cutter 30 mm: IN	**07780–0014000**
Cutter holder 5.5 mm: IN	**07781–0010101**
60° Interior cutter 37.5 mm: EX	**07780–0014100**
Cutter holder 6.6 mm: EX	**07781–0010201**



Install a 45 degree finish cutter and cut the seat to the proper width. Make sure that all pitting and irregularities are removed. Refinish if necessary.

TOOLS: (OP)

45° Seat cutter 27.5 mm: IN	**07780–0010200**
Cutter holder 5.5 mm: IN	**07781–0010101**
45° Seat cutter 35 mm: EX	**07780–0010400**
Cutter holder 6.6 mm: EX	**07781–0010201**



Apply a thin coating of Prussian Blue to the valve seat. Press the valve through the valve guide and onto the seat to make a clear pattern.

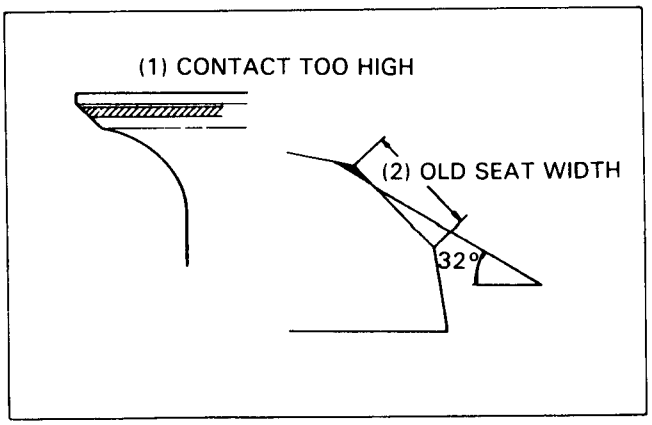
NOTE

- The location of the valve seat in relation to the valve face is very important for good sealing.

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

TOOLS: (OP)

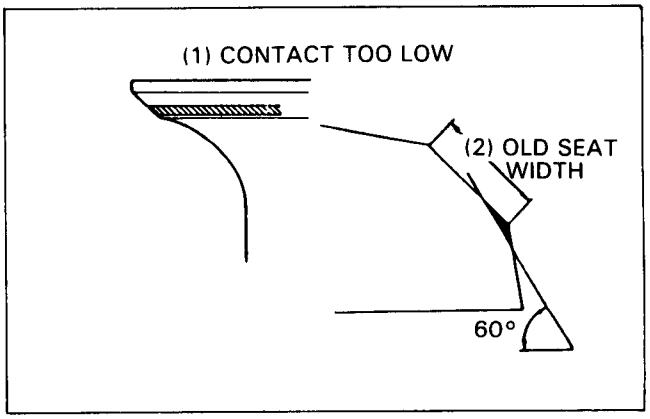
32° Flat cutter 28 mm: IN	**07780–0012100**
Cutter holder 5.5 mm: IN	**07781–0010101**
32° Flat cutter 35 mm: EX	**07780–0012300**
Cutter holder 6.6 mm: EX	**07781–0010201**



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

TOOLS: (OP)

60° Interior cutter 30 mm: IN	**07780–0014000**
Cutter holder 5.5 mm: IN	**07781–0010101**
60° Interior cutter 37.5 mm: EX	**07780–0014100**
Cutter holder 6.6 mm: EX	**07781–0010201**



Refinish the seat to specifications, using a 45 degree finish cutter.

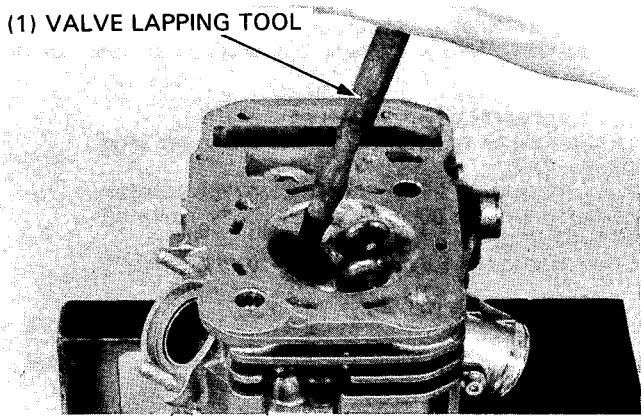
After cutting the seat, apply lapping compound to the valve face, and lap the valve using light pressure.
After lapping, wash all residual compound off the cylinder head and valve.

NOTE

- Do not allow lapping compound to enter the guides.

TOOLS: (OP)

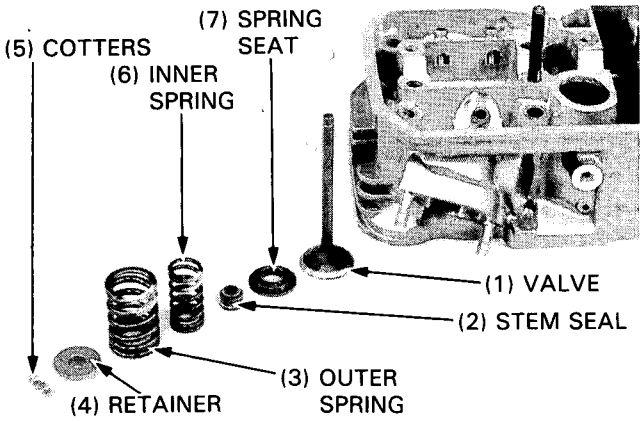
45° Seat cutter 27.5 mm: IN	**07780–0010200**
Cutter holder 5.5 mm: IN	**07781–0010101**
45° Seat cutter 35 mm: EX	**07780–0010400**
Cutter holder 6.6 mm: EX	**07781–0010201**



CYLINDER HEAD ASSEMBLY

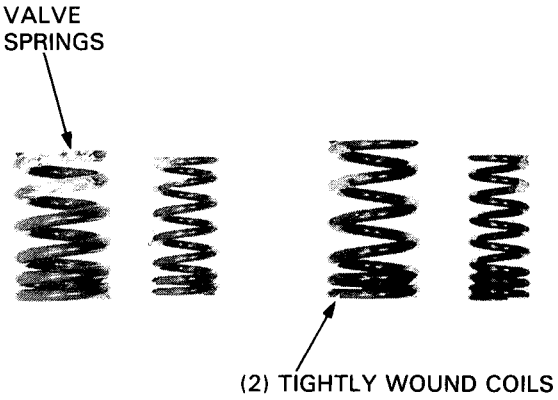
Install the valve spring seats and new stem seals.
Lubricate each valve stem with molybdenum disulfide grease and insert the valve into the valve guide. Turn the valve slowly while inserting to avoid damaging the seals.

Move the valves up and down to check for smooth operation.



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

Install the spring retainers.



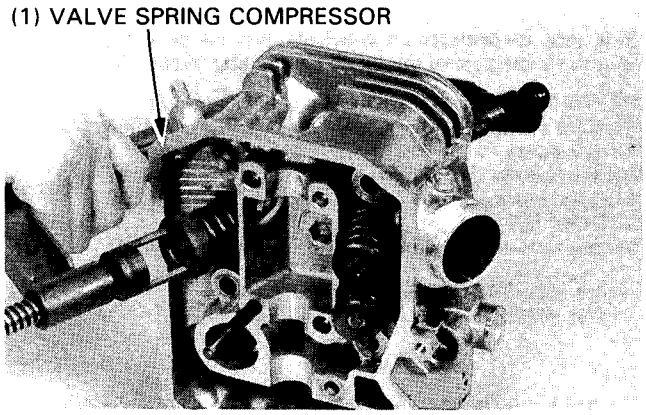
Compress the springs and install the valve cotters.

CAUTION

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

TOOL:

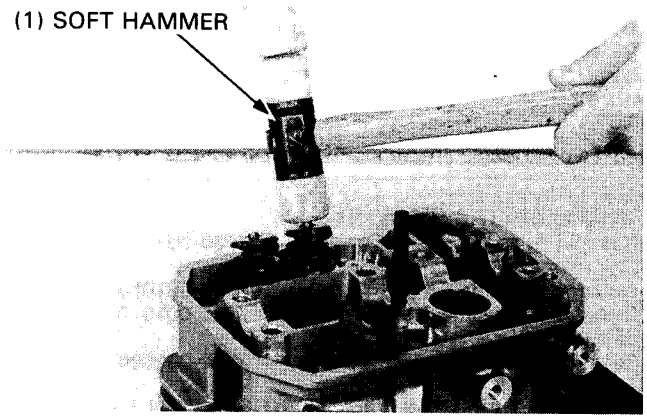
Valve spring compressor	**07757—0010000 or 07957—3290001**



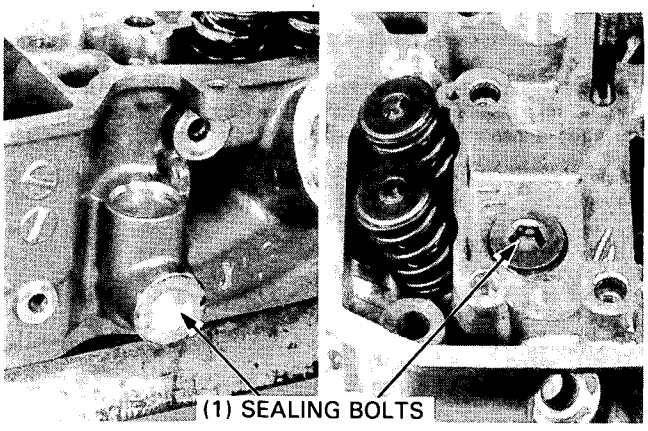
Tap the valve stems gently with a soft hammer to firmly seat the cotters.

NOTE

- Support the cylinder head above the work bench surface to prevent possible valve damage.

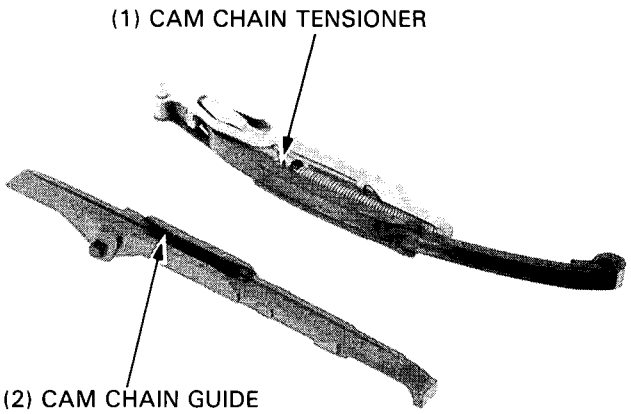


Clean and apply locking agent to the threads of the sealing bolts and tighten them, if removed.



Check the sliding surface of the cam chain tensioner and cam chain guide for wear or damage.

Check the cam chain tensioner spring for wear or loss of tension.



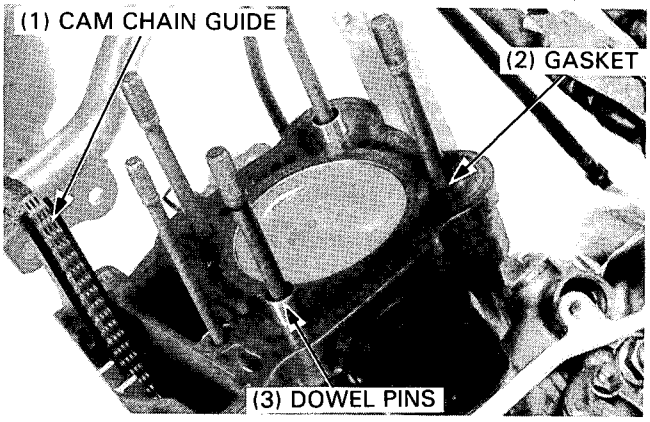
CYLINDER HEAD INSTALLATION

Install the cam chain guide into the cylinder.

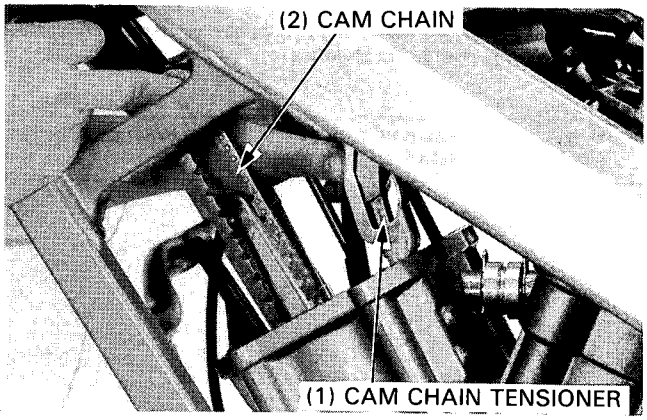
Make sure that the cam chain guide bosses are in the grooves of cylinder.

Clean the cylinder head surface of any gasket material.

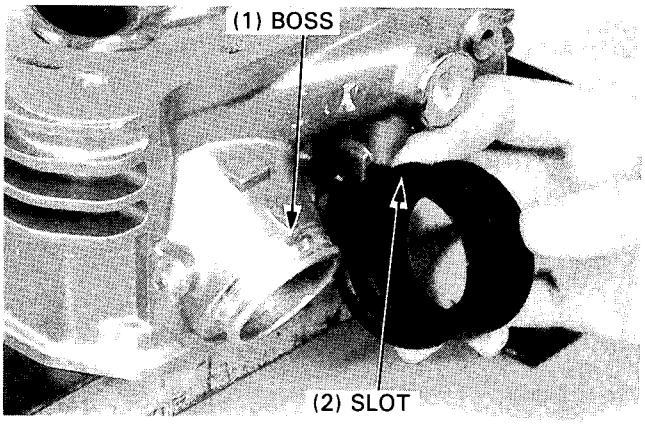
Install the dowel pins and a new head gasket.



Insert the cam chain tensioner end onto the crankcase slot while holding the cam chain tensioned fully.
Loosely install the tensioner lower bolt.



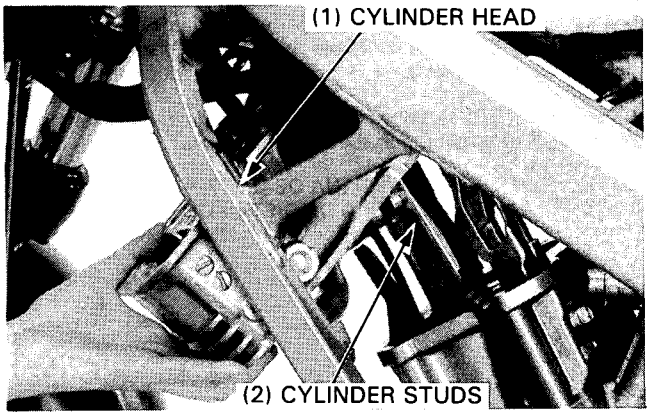
Install the carburetor insulator on the cylinder head, aligning the boss on the cylinder head with the slot in the insulator.
Tighten the screw securely.



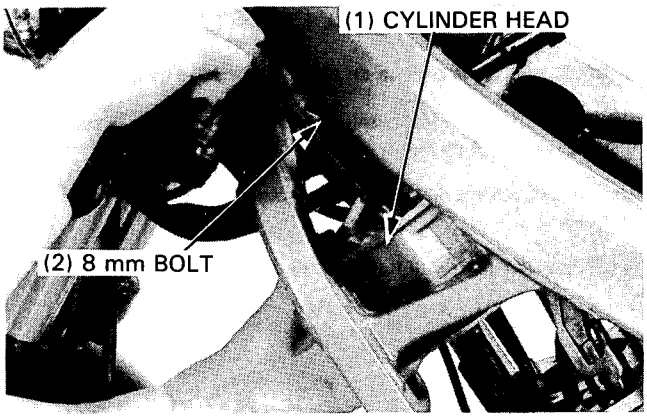
Insert the cylinder head through the front down tubes as shown.

NOTE

- Be careful not to damage the cylinder head and studs.

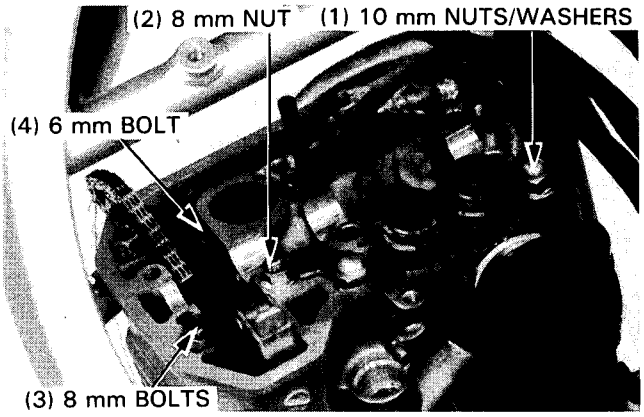


Insert the 8 mm rear bolt through the cylinder head while holding the head as shown.



Install the cylinder head.
Install the 10 mm nut/washer, 8 mm nut/washer, 8 mm bolt/washer and 6 mm bolt and tighten them in a crisscross pattern in 2 or 3 steps.

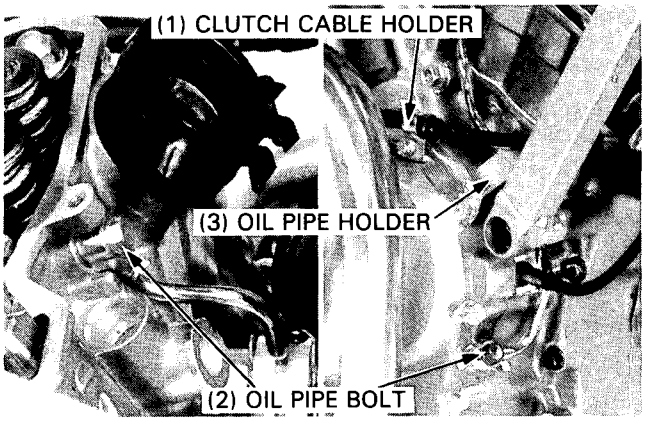
TORQUE:
10 mm nut: 48 N·m (4.8 kg-m, 35 ft-lb)
8 mm bolt: 23 N·m (2.3 kg-m, 17 ft-lb)
8 mm nut: 23 N·m (2.3 kg-m, 17 ft-lb)
6 mm bolt: 10 N·m (1.0 kg-m, 7.2 ft-lb)



Check the oil pass pipe bolts and oil pass pipe for clogging or bending.

Install the oil pass pipe, new sealing washers, oil pass pipe bolts and the pipe holder bolt.
Tighten the bolts.

TORQUE:
Oil pass pipe bolt:
7 mm: 10 N·m (1.0 kg-m, 7.2 ft-lb)
8 mm: 23 N·m (2.3 kg-m, 17 ft-lb)



Connect the clutch cable to the lifter and install the clutch cable holder.
Adjust the clutch free play (page 3-13).

Install the following:
— camshaft (page 9-18)

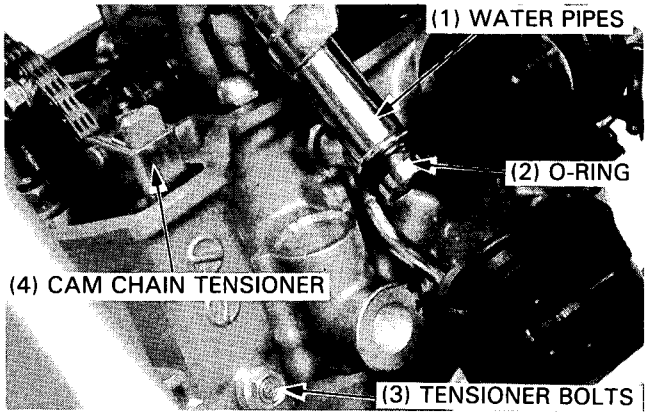
Install the new O-ring into the water pipes and install and mounting bolt.

Install the cam chain tensioner upper bolt and tighten the lower and upper bolt.

TORQUE: 10 N·m (1.0 kg-m, 7.2 ft-lb)

SW model only:
Install the ASV pipes onto the cylinder.

All models:
Install the cylinder head cover (page 9-21).
Reinstall the radiator, and exhaust pipes.

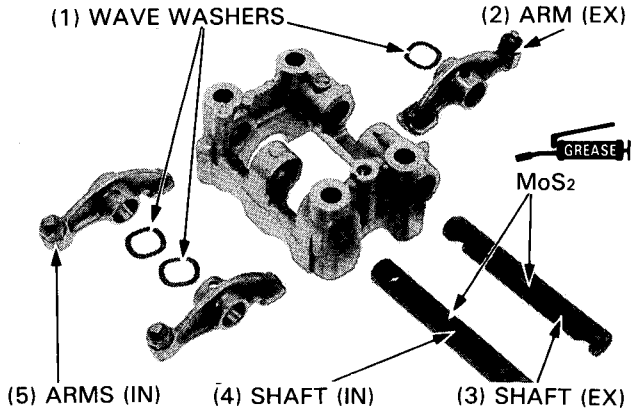


CAMSHAFT INSTALLATION

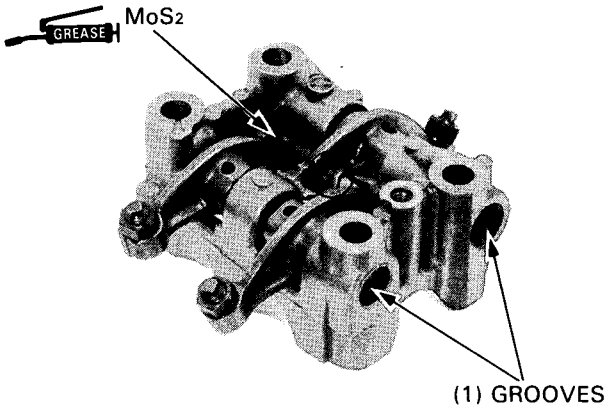
Apply molybdenum disulfide (MoS_2) paste grease to the rocker arm shafts.
Install the rocker arms, rocker arm shafts and wave washers in the camshaft holders.

NOTE

- Install the wave washers in the proper position as shown.



Position the grooves in the rocker arm shafts vertically, aligning the bolt holes of the holder with the holes of the shafts.
Apply molybdenum disulfide (MoS_2) grease to the rocker arm slipper faces.

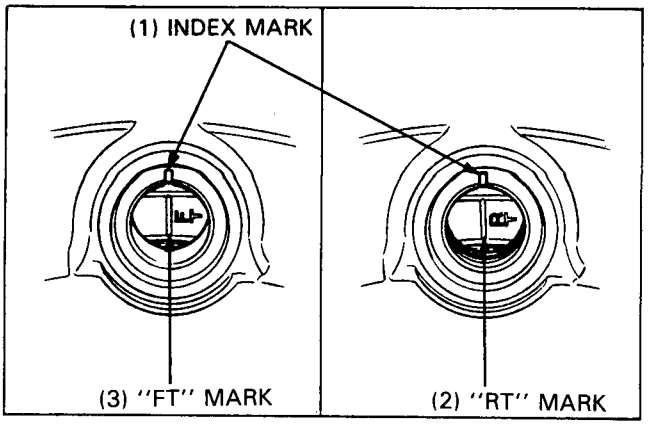


FRONT CYLINDER

NOTE

- If the rear cylinder head was not serviced, remove the rear cylinder head cover and check the camshaft position as follows:
  Turn the crankshaft counterclockwise and align the "RT" mark on the flywheel with the index mark on the timing hole, then check that the cam lobes are all facing down.
  If the cam lobes are facing down, turn the crankshaft counterclockwise 488° and begin installation of the front camshaft.
  If the cam lobes are all facing up, turn the crankshaft counterclockwise to make all cam lobes are facing down.

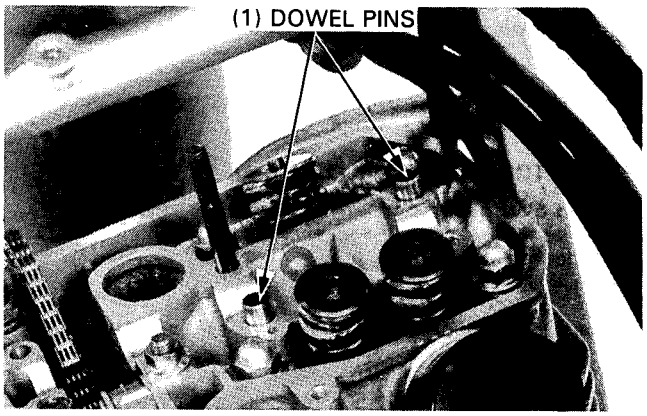
Align the "FT" mark on the flywheel with the index mark on the timing hole with cam lobes are all facing down.



NOTE

- If the front and rear cylinder camshafts were removed, do not confuse them. Check the identification mark on the end of the shaft.

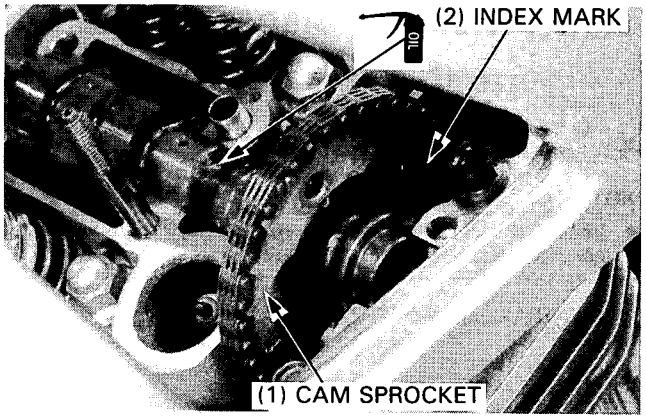
Install the dowel pins into the cylinder head.



Install the camshaft in the cylinder head through the cam chain and install the cam sprocket on the camshaft.

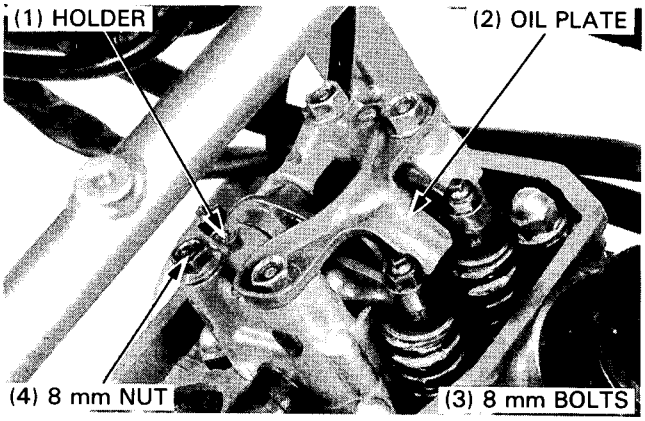
With the cam lobes are all facing down, align the timing marks (index lines) on the cam sprocket with the top of the cylinder head.

Install the cam sprocket on the camshaft flange and recheck that the timing marks (index lines) align with the top of the cylinder head.



Install the holder, oil plate, 8 mm bolt and 8 mm nut.

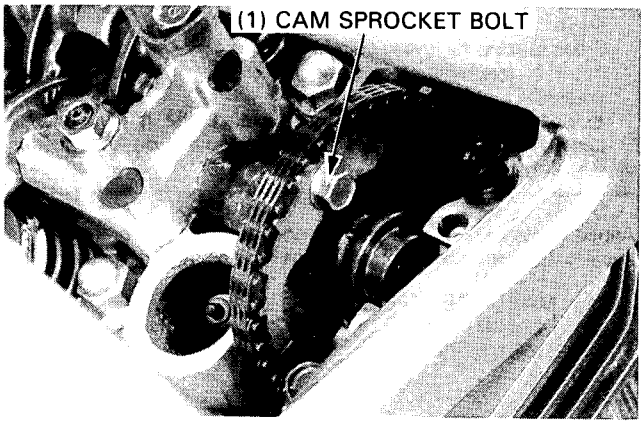
TORQUE:
8 mm bolt: 23 N·m (2.3 kg-m, 17 ft-lb)
8 mm nut: 23 N·m (2.3 kg-m, 17 ft-lb)



Align the cam sprocket bolt holes in the cam sprocket and camshaft, install and tighten the cam sprocket bolt.

TORQUE: 23 N·m (2.3 kg-m, 17 ft-lb)

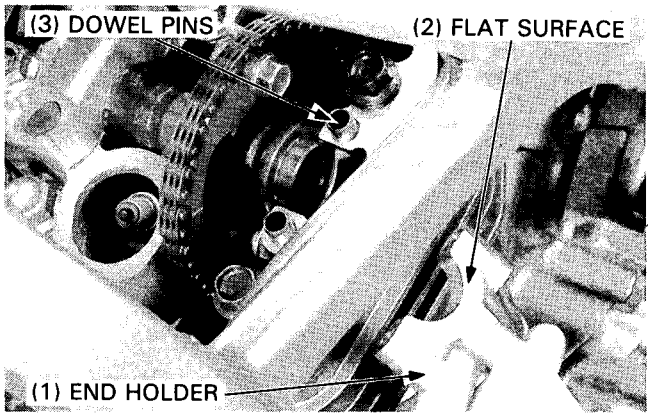
Turn the crankshaft counterclockwise 360° and install the other sprocket bolt.



Install the dowel pins.
Install the camshaft end holder with flat surface facing in.

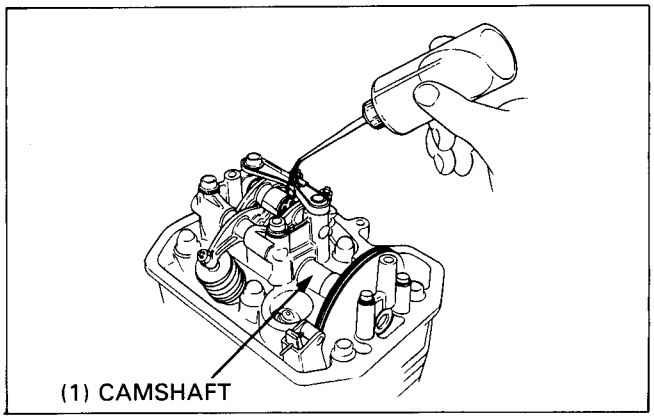
TORQUE: 10 N·m (1.0 kg-m, 7.2 ft-lb)

After installing the front cylinder camshaft, turn the crankshaft counterclockwise 232° and align the RT mark with the index on the timing hole, then install the rear cylinder camshaft using the same procedure as for the front cylinder.



Lubricate the cam lobes with fresh engine oil with molybdenum disulfide grease mixed.

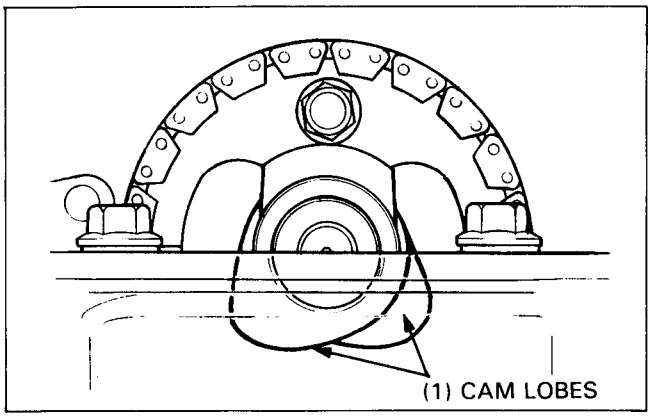
Install the following:
— radiator
— exhaust pipe (page 15-15)



REAR CYLINDER

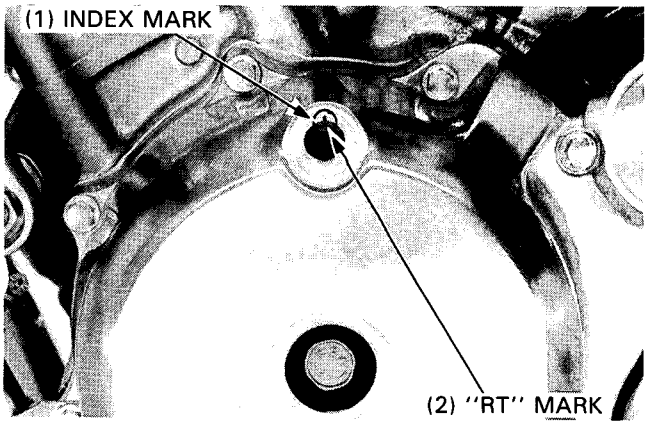
NOTE

- If the front cylinder head was not serviced, remove the front cylinder head cover and check the camshaft position as follows:
  Turn the crankshaft counterclockwise and align the "FT" mark on the flywheel with the index mark on the timing hole, then check that the cam lobes are all facing down. If the cam lobes are all facing down, turn the crankshaft counterclockwise 232° and begin installation of the rear camshaft.
  If the cam lobes are all facing up, turn the crankshaft counterclockwise to make all cam lobes are facing down.



Make sure that the "RT" mark on the flywheel aligns with the index mark on the timing hole.

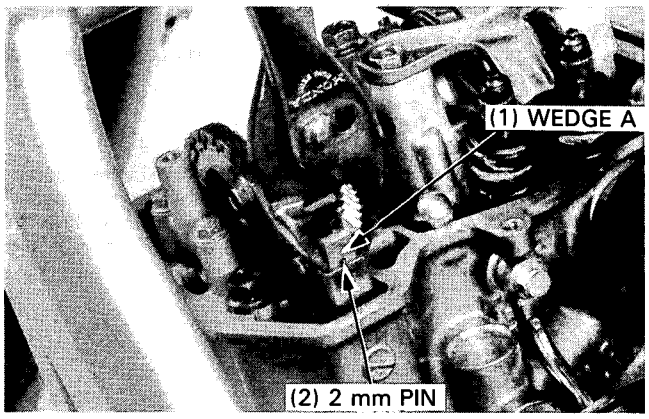
Place the camshaft into correct position with the cam lobes are all facing down.
Install the cam sprocket and camshaft holders using the same procedure as for the front cylinder (page 9-18).



Remove the 2 mm pin holding cam chain tensioner wedge A.

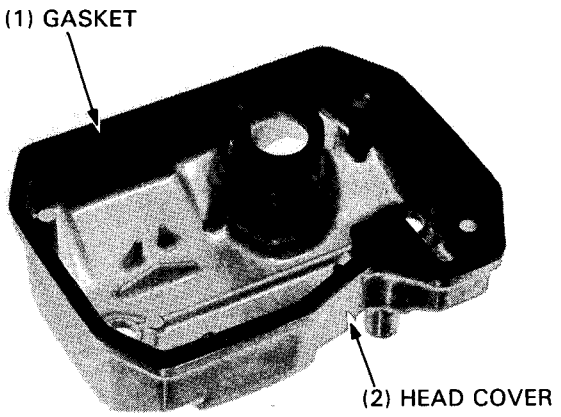
NOTE

- Be careful not to let the 2 mm pin fall into the crankcase.
- Do not forget to remove the 2 mm pin before installing the cylinder head cover.



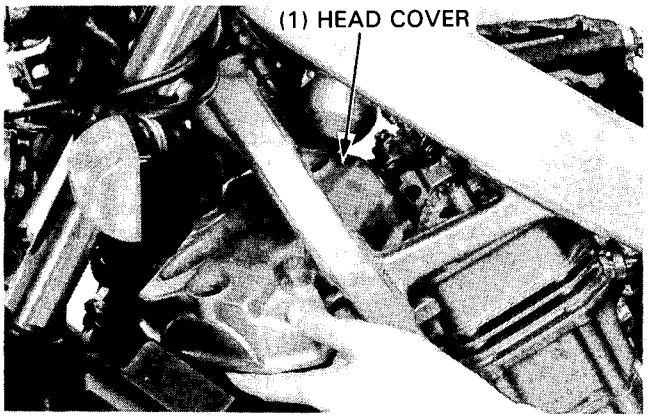
CYLINDER HEAD COVER INSTALLATION

Clean and apply contact cement to the gasket groove.
Install the new gasket onto the groove properly.



Install the cylinder head cover, rubber washer, washer cover and cylinder head cover bolts.
Tighten the cover bolts.

TORQUE: 10 N·m (1.0 kg-m, 7.2 ft-lb)

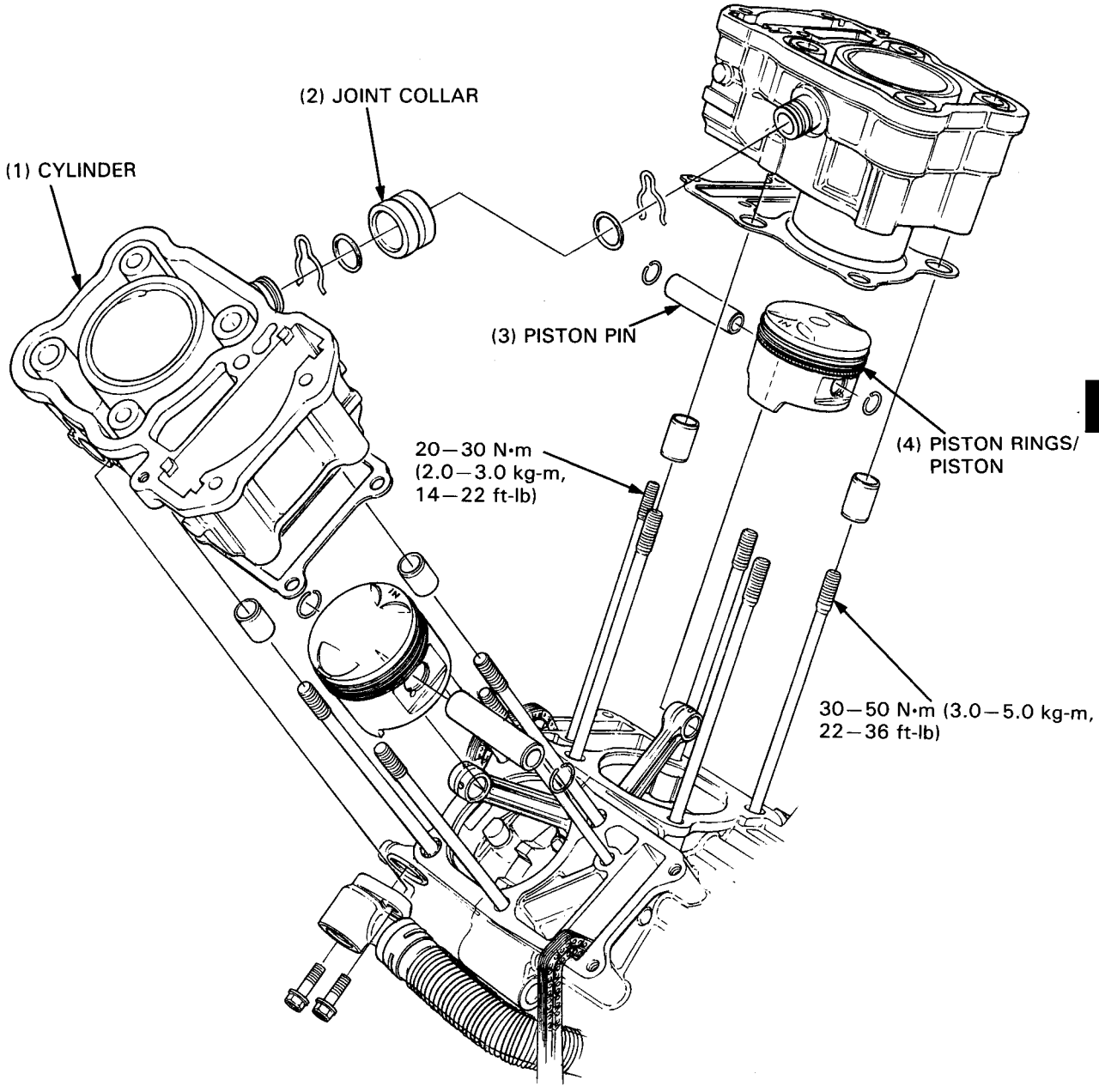


Connect the water hose to the water pipe and install the spark plug caps.
Install the following parts:
— heat guard
— carburetors (page 4-19)
— air cleaner case (page 4-4)
— fuel tank (page 4-3)

Fill the cooling system (page 5-3).

10

CYLINDER/PISTON


(2) JOINT COLLAR
(1) CYLINDER
(3) PISTON PIN
(4) PISTON RINGS/
PISTON
20—30 N·m
(2.0—3.0 kg-m,
14—22 ft-lb)
30—50 N·m (3.0—5.0 kg-m,
22—36 ft-lb)

SERVICE INFORMATION

GENERAL

- This section covers service of the cylinder and piston.

SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Cylinder	I.D.	NTV650	79.000–79.015 (3.1102–3.1108)	79.05 (3.112)
		NTV600	75.000–75.015 (2.9528–2.9533)	75.10 (2.957)
	Warpage across top		—	0.10 (0.004)
	Taper		—	0.06 (0.002)
	Out-of-round		—	0.06 (0.002)
Piston, piston rings and piston pin	Piston ring-to-ring groove clearance	TOP	0.025–0.055 (0.001–0.002)	0.11 (0.004)
		SECOND	0.015–0.045 (0.0006–0.0018)	0.10 (0.004)
	Ring end gap	TOP	0.20–0.35 (0.008–0.014)	0.65 (0.026)
		SECOND	0.35–0.50 (0.014–0.020)	0.65 (0.026)
		OIL	0.20–0.80 (0.008–0.031)	0.95 (0.037)
	Piston O.D.	NTV650	78.970–78.990 (3.1086–3.1098)	78.92 (3.107)
		NTV600	74.965–74.990 (2.9514–2.9524)	74.90 (2.949)
	Piston pin bore	NTV650	20.002–20.008 (0.7874–0.7877)	20.02 (0.788)
		NTV600	18.002–18.008 (0.7087–0.7090)	18.05 (0.711)
	Connecting rod small end I.D.	NTV650	20.016–20.034 (0.7880–0.7887)	20.04 (0.789)
		NTV600	18.016–18.034 (0.7093–0.7100)	18.07 (0.711)
	Piston pin O.D.	NTV650	19.994–20.000 (0.7871–0.7874)	19.98 (0.787)
		NTV600	17.994–18.000 (0.7084–0.7087)	17.98 (0.708)
	Piston-to-piston pin clearance		0.002–0.014 (0.0001–0.0006)	0.034 (0.0013)
	Cylinder-to-piston clearance		0.010–0.035 (0.0004–0.0014)	0.13 (0.005)
	Piston pin-to-connecting rod small end clearance		0.016–0.040 (0.0006–0.0016)	0.060 (0.0024)

TROUBLESHOOTING

Low or uneven compression
- Worn cylinder or piston rings.
- Leaking head gasket.
- Incorrect valve timing.

Excessive smoke
- Worn cylinder and piston rings.
- Improperly installed piston rings.
- Damaged piston or cylinder.

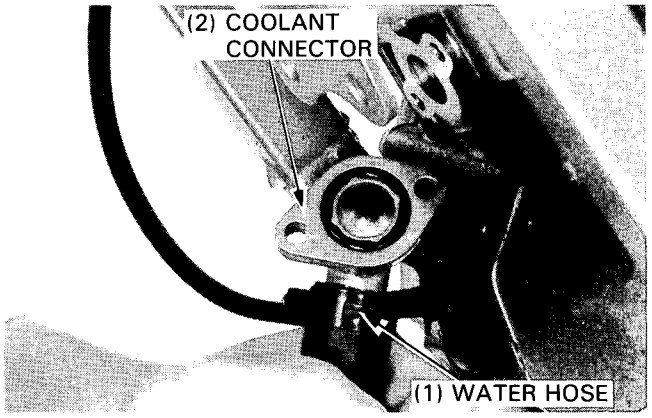
Piston noise
- Worn cylinder and piston.
- Excessive carbon deposits.

Overheating
- Excessive carbon deposits on piston or combustion chamber.
- Faulty water pump.

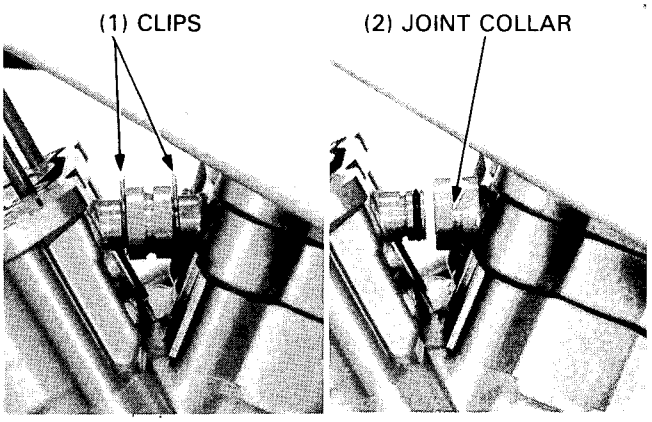
CYLINDER

REMOVAL

Remove the following:
— cylinder head cover (page 9-3)
— cylinder head (page 9-7)
— gaskets, dowel pins, and cam chain guides.
Disconnect the water hose from the coolant connector.



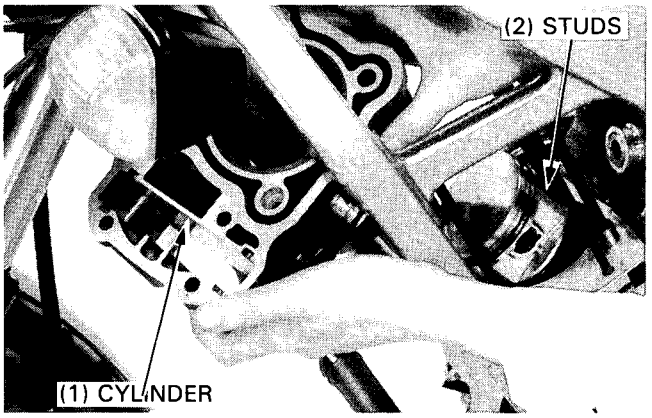
Remove the clip and slide the cylinder joint collar toward either the front or rear cylinder.



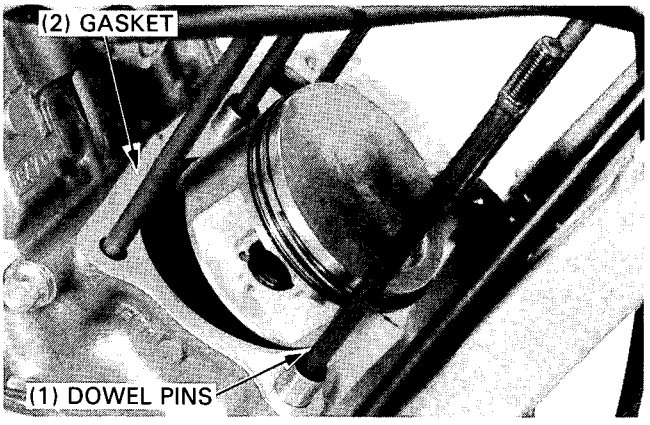
Remove the cylinder through the down tubes as shown.

NOTE

- Be careful not to damage the cylinder and studs.



Remove the cylinder gasket and dowel pins from the crankcase.



INSPECTION

Clean the top of each cylinder thoroughly.

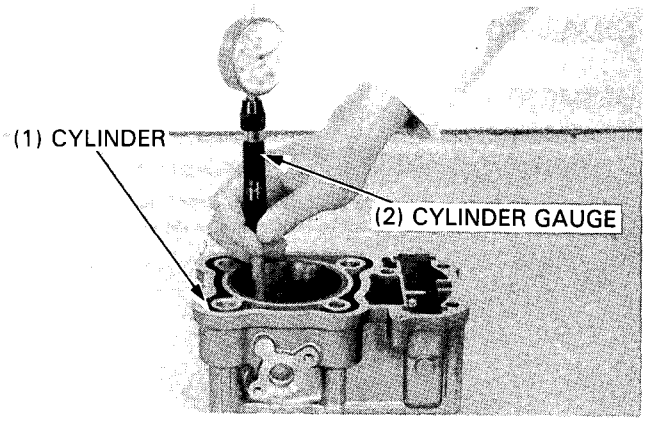
Inspect the cylinder walls for scratches and wear.

Measure and record the cylinder I.D. at three levels in both an X and Y axis. Take the maximum reading to determine the cylinder wear.

SERVICE LIMITS: NTV650: 79.05 mm (3.112 in)
NTV600: 75.10 mm (2.957 in)

Calculate the piston-to-cylinder clearance. Take the maximum reading to determine the clearance.

SERVICE LIMIT: 0.13 mm (0.005 in)

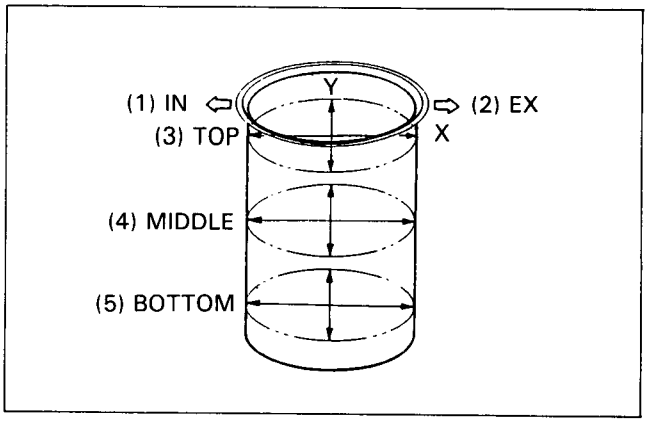


Calculate the cylinder for taper at three levels in an X and Y axis. Take the maximum reading to determine the taper.

SERVICE LIMIT: 0.06 mm (0.002 in)

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

SERVICE LIMIT: 0.06 mm (0.002 in)



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

NTV650:
The following oversize pistons are available:
0.25 mm (0.010 in) and 0.50 mm (0.020 in)

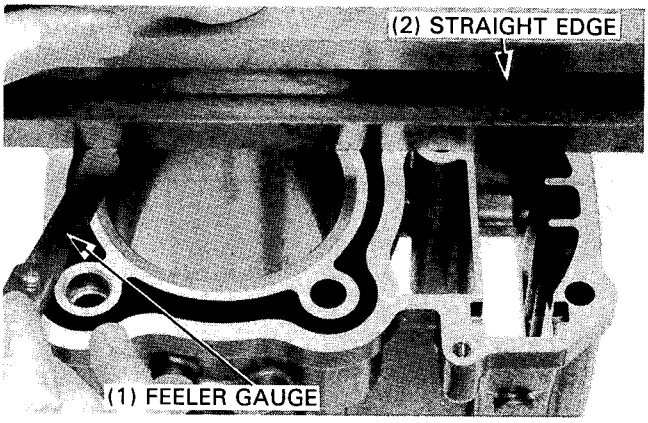
The cylinder must be rebored so that the clearance to an oversize piston is 0.010—0.050 mm (0.0004—0.0020 in).

All models:
Inspect the cylinders for transverse warpage across the top.

NOTE

- Measure warpage using a straight edge and feeler gauge as shown.

SERVICE LIMIT: 0.10 mm (0.004 in)



PISTON

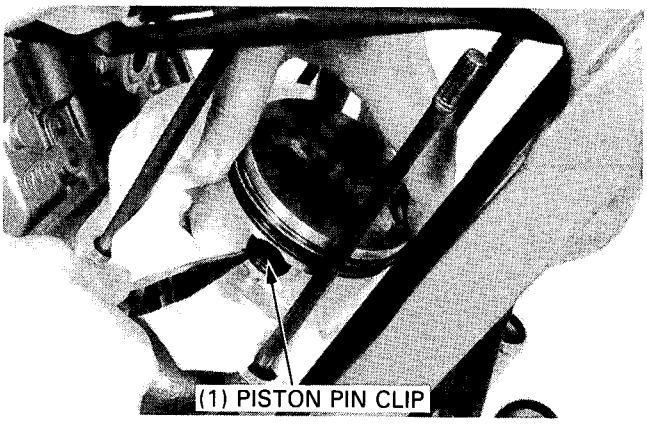
REMOVAL

Place a shop towel into the crankcase and remove the piston pin clips.

NOTE

- Do not let the clips fall into the crankcase.

Push the piston pin out and remove the piston.



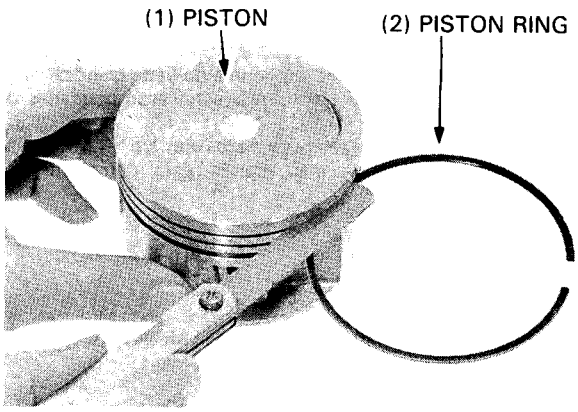
INSPECTION

Clean the piston domes, ring lands and skirts.

Measure the piston ring-to-groove clearance.

SERVICE LIMITS:
Top: 0.11 mm (0.004 in)
Second: 0.10 mm (0.004 in)

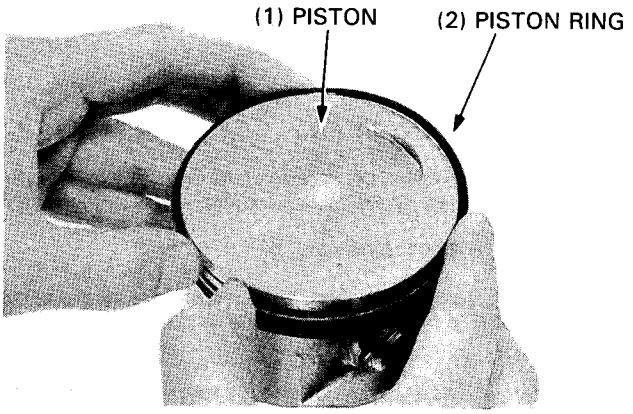
If clearance is excessive, replace the piston ring.



Remove the piston rings and mark them to indicate the correct cylinder and piston position for reassembly.

NOTE

- Do not damage the piston rings when removing them.



Measure the piston O.D.

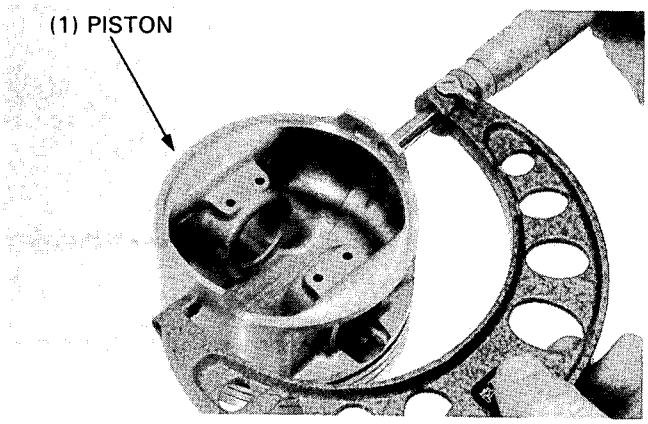
NOTE

- Take measurements 10 mm (0.4 in) from the bottom, and 90° to the piston pin hole.

SERVICE LIMITS: NTV650: 78.92 mm (3.107 in)
NTV600: 74.90 mm (2.949 in)

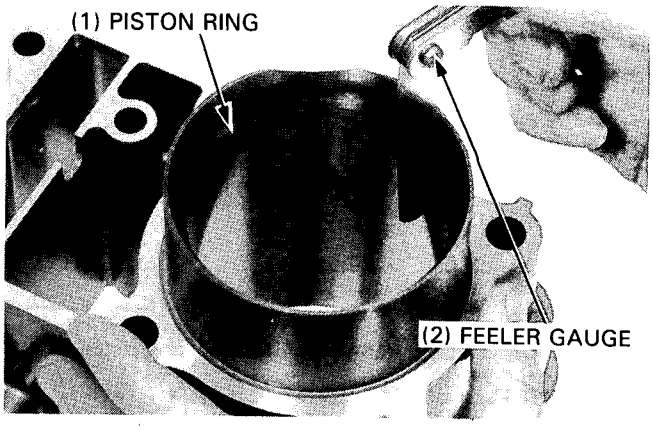
Calculate the piston-to-cylinder clearance by subtracting the piston O.D. from the cylinder I.D. (page 10-2).

SERVICE LIMIT: 0.13 mm (0.005 in)



Measure the top and second piston ring end gaps: using a piston, push the ring into the cylinder squarely and make the measurement.

SERVICE LIMITS:
Top: 0.65 mm (0.026 in)
Second: 0.65 mm (0.026 in)
Oil: 0.95 mm (0.037 in)



Measure each piston pin bore.

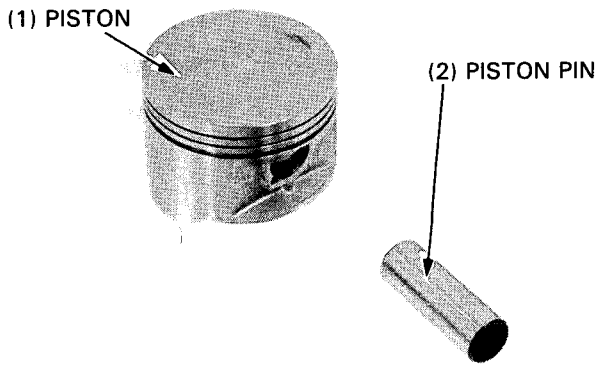
SERVICE LIMITS: NTV650: 20.02 mm (0.788 in)
NTV600: 18.05 mm (0.711 in)

Measure each piston pin O.D.

SERVICE LIMITS: NTV650: 19.98 mm (0.787 in)
NTV600: 17.98 mm (0.708 in)

Calculate the piston pin-to-piston clearance.

SERVICE LIMIT: 0.034 mm (0.0013 in)



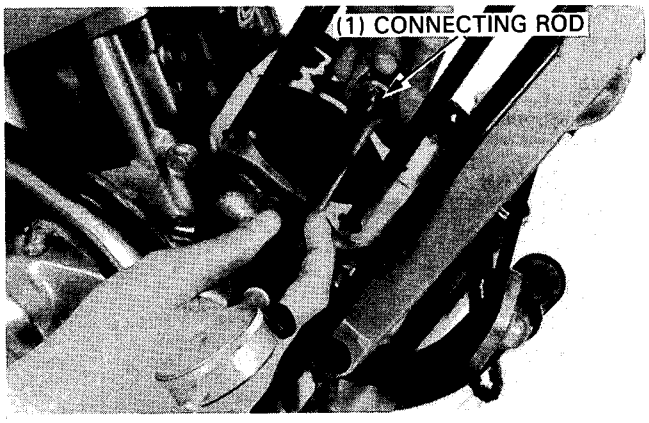
Measure the I.D. of the connecting rod small end.

SERVICE LIMITS: NTV650: 20.04 mm (0.789 in)
NTV600: 18.07 mm (0.711 in)

Calculate the piston pin-to-connecting rod clearance.

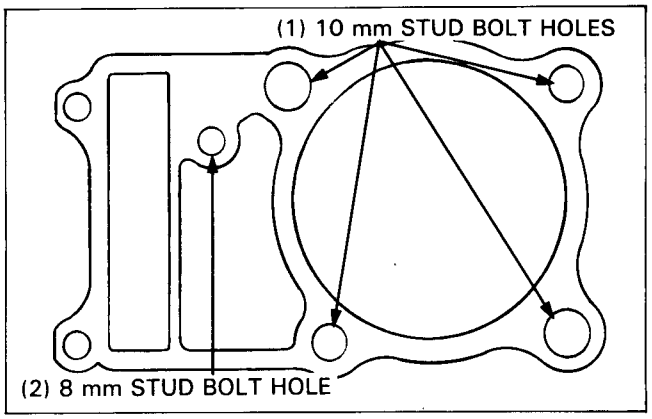
SERVICE LIMIT: 0.060 mm (0.0024 in)

Refer to section 12 for connecting rod replacement.



STUD BOLT INSPECTION

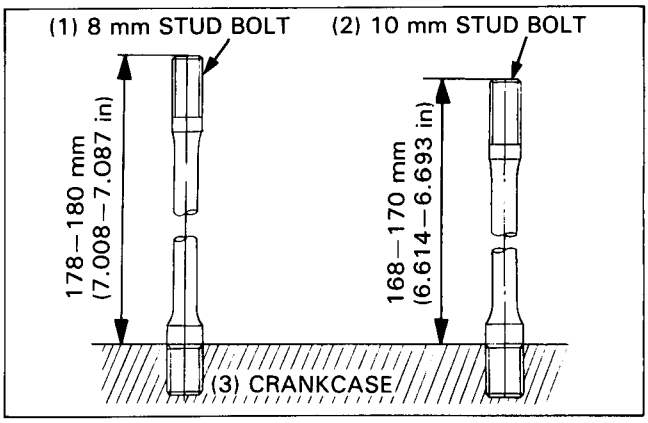
Check that the studs are tight. If any are loose, remove them, clean their threads with contact cleaner, then reinstall them using Honda Anaerobic Thread Lock, or equivalent.



After installing, be sure to measure the distance from the top of each stud to the crankcase surface.

Tighten the stud bolts to the specified torque.

TORQUE: 8 mm stud bolt:
20–30 N·m (2.0–3.0 kg-m, 14–22 ft-lb)
10 mm stud bolt:
30–50 N·m (3.0–5.0 kg-m, 22–36 ft-lb)



PISTON RING INSTALLATION

NOTE

- Insert the outside surface of the ring into the proper ring groove and roll the ring around in the groove to make sure that the ring has a free fit around the piston's circumference.

Carefully install the piston rings onto the piston with the markings facing up.

NOTE

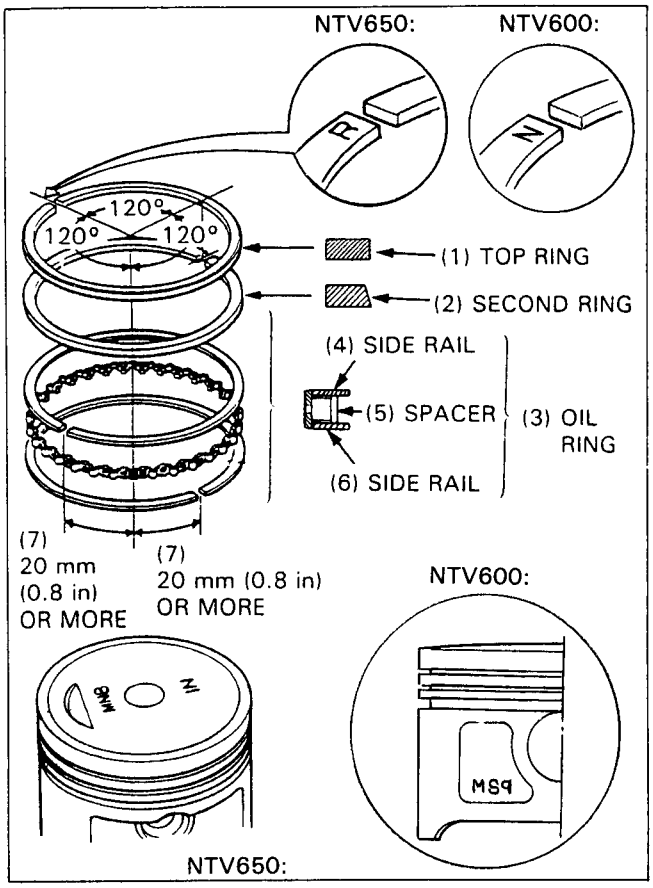
- Be careful not to damage the piston and piston rings during assembly.

Stagger the ring end gaps 120° apart from each other as shown.

NOTE

- To install the oil ring, install the spacer first, then install the side rails.

After installing the rings, check that they rotate freely without sticking.

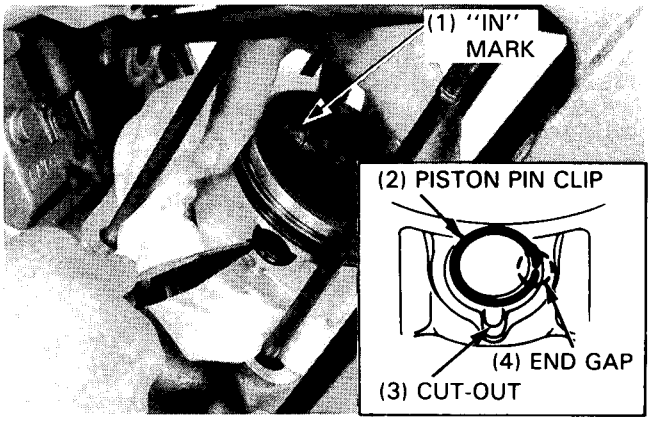


PISTON INSTALLATION

Place a shop towel into the crankcase.
Coat the rod small end with molybdenum disulfide grease. Assemble the piston and connecting rod with the piston and piston pin clips as shown.

NOTE

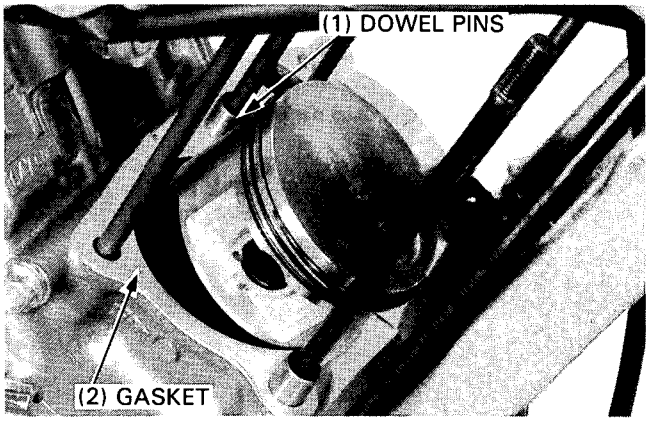
- Install the pistons with the mark "IN" facing towards the intake side.
- After installing the piston pin clips, make sure that they are seated properly and the end gaps are not aligned with the cut-out in the piston.
- Do not let the piston pin clips fall into the crankcase.



CYLINDER INSTALLATION

Clean the cylinder gasket surface.

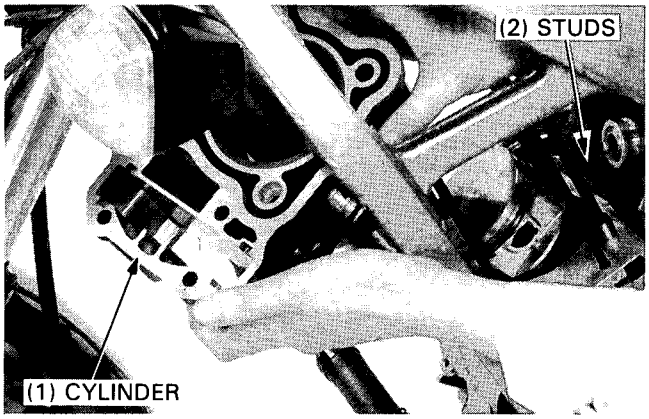
Install the dowel pins and new gasket.



Insert the cylinder through the down tubes as shown.

NOTE

- Be careful not to damage the cylinder and studs.

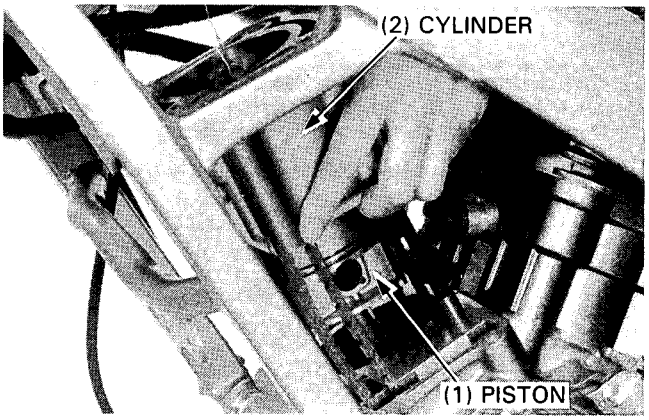


Coat the cylinder, piston rings/grooves and piston with clean engine oil.

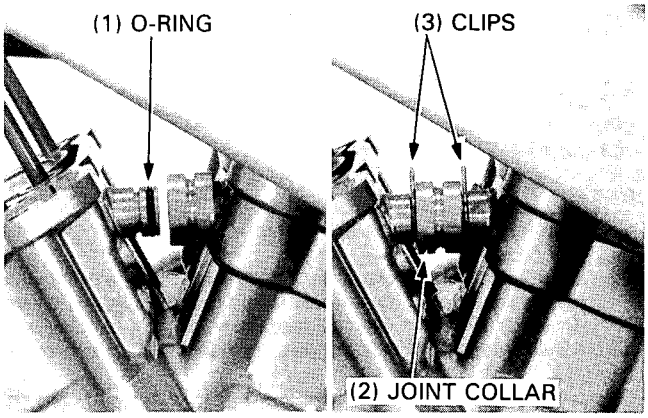
Install the piston assembly into the cylinder from the top of the crankcase while compressing the piston rings with your fingers.
Be sure each assembly is returned to its original position as noted during removal.

NOTE

- Be careful not to damage the piston rings during assembly.
- When the cylinder is halfway over the piston, route the cam chain through the cylinder.

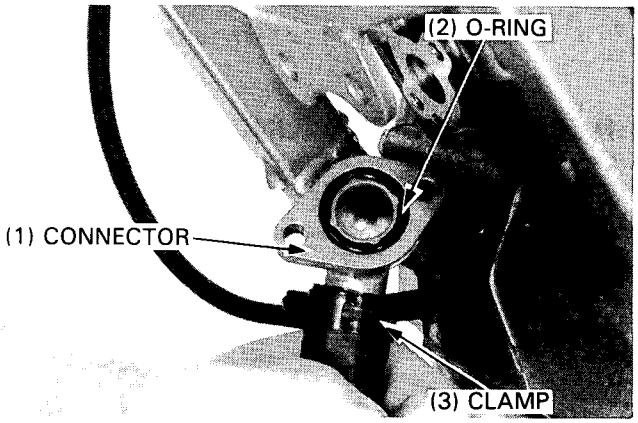


Install a new O-ring onto the cylinder joint and install the cylinder joint collar by sliding the collar toward either cylinder.
Install the clips securely.



Install a new O-ring into the connector and install and tighten the connector mounting bolts, if the connector was removed.

If only the water hose was removed, connect the hose with the clamp.



Clean the cylinder gasket surface.

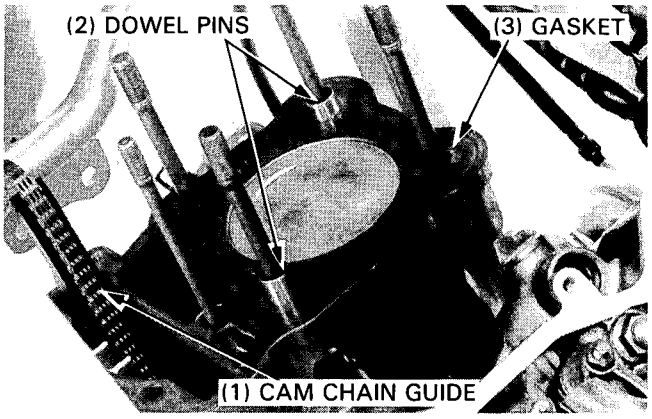
NOTE

- Avoid damaging the gasket surface.

Install the cam chain guide.

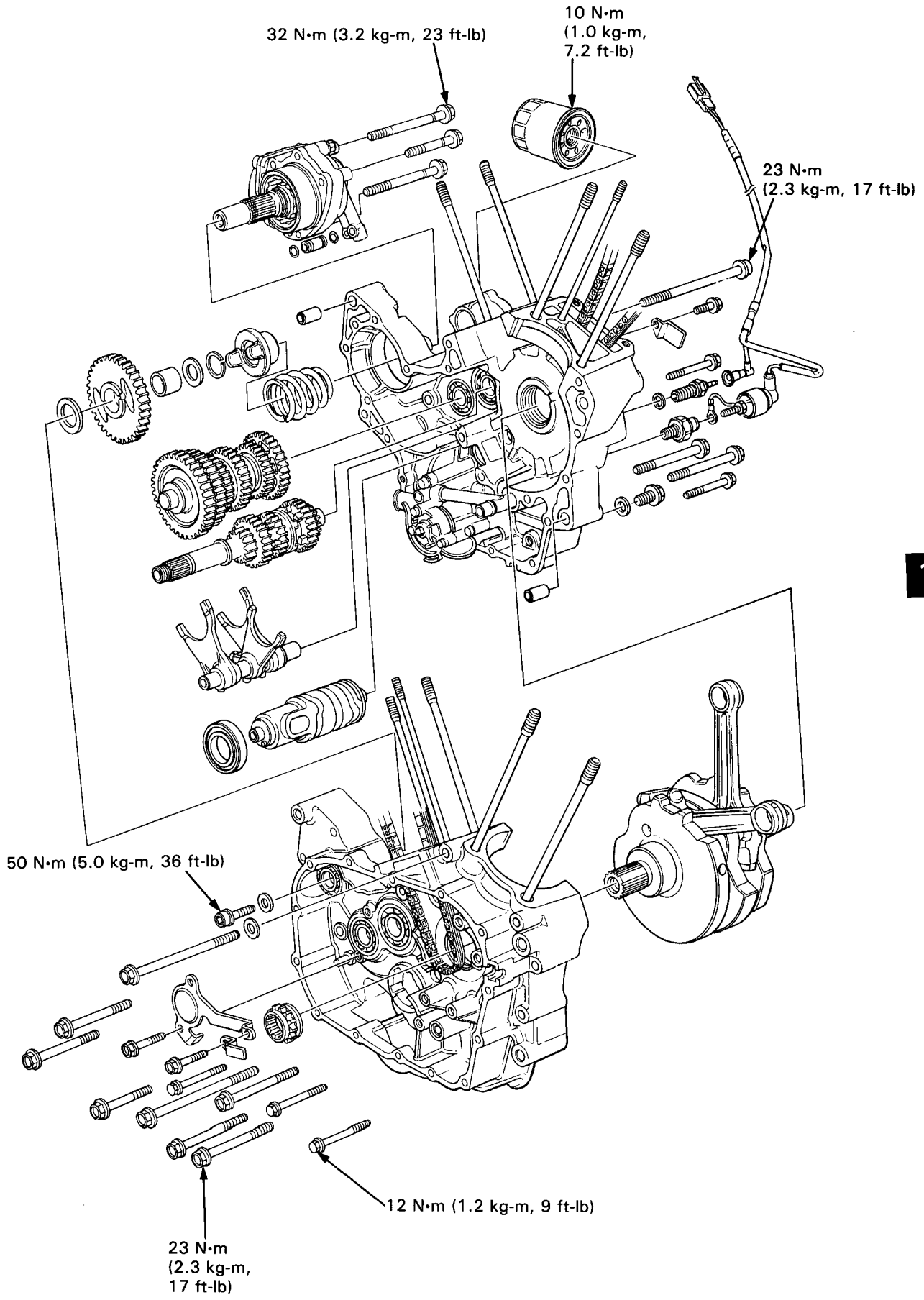
NOTE

- Align the guide boss with the groove in the cylinder.
- Make sure that the end of the guide is inserted into place in the crankcase.



Install the dowel pins and a new gasket.
Install the cylinder heads and covers (Section 9).

CRANKCASE


32 N•m (3.2 kg-m, 23 ft-lb)
10 N•m
(1.0 kg-m,
7.2 ft-lb)
23 N•m
(2.3 kg-m, 17 ft-lb)
50 N•m (5.0 kg-m, 36 ft-lb)
12 N•m (1.2 kg-m, 9 ft-lb)
23 N•m
(2.3 kg-m,
17 ft-lb)

SERVICE INFORMATION

- To service the oil pump, connecting rods, crankshaft, transmission and output gear, the crankcase must be separated.
- The following parts must be removed before disassembling the crankcase:
  - Water pump (section 6)
  - Clutch and primary drive gear (section 7)
  - Flywheel and starter clutch (section 8)
  - Gearshift linkage (section 7)
  - Cylinder heads (section 9)
  - Cylinder and piston (section 10)
  - Starter motor (section 19)

TORQUE VALUES

Crankcase bolt	8 mm	23 N·m (2.3 kg-m, 17 ft-lb)
	6 mm	12 N·m (1.2 kg-m, 9 ft-lb)
Output drive shaft bolt		50 N·m (5.0 kg-m, 36 ft-lb) Apply a locking agent

TOOL

Special

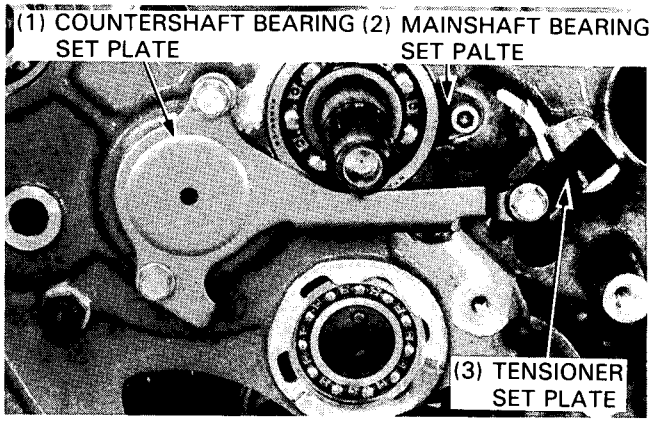
Shaft holder	07923—6890101

CRANKCASE SEPARATION

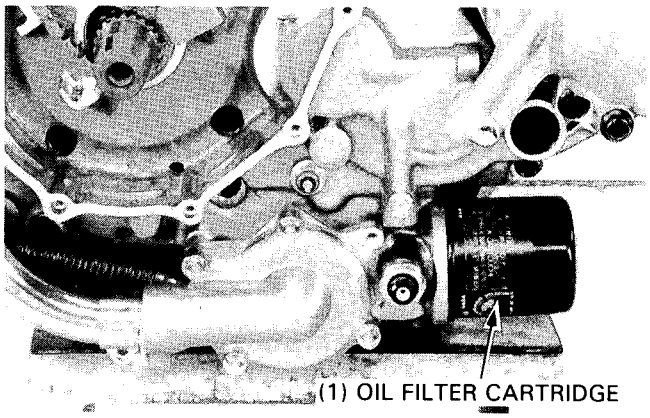
Remove the engine from the frame (section 6).

Refer to service information (page 11-1) for the parts that must be removed before the separating the crankcase.

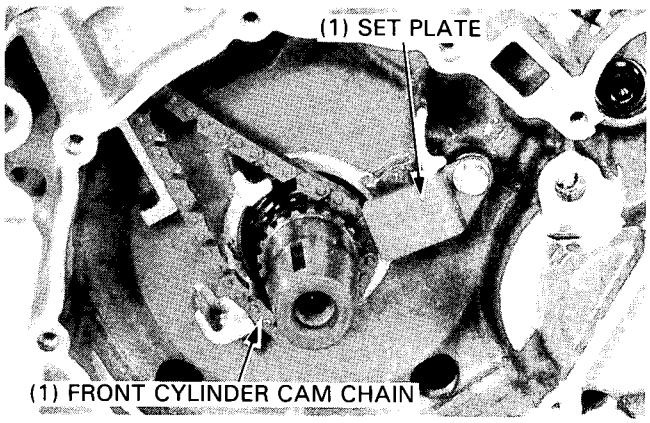
Remove the following:
— rear cylinder cam chain and drive sprocket
— cam chain tensioner set plate
— mainshaft bearing set plate
— countershaft bearing set plate



Remove the oil filter cartridge from the left crankcase.



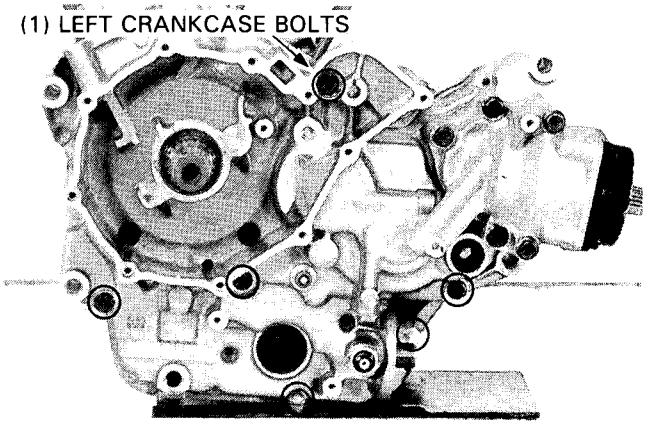
Remove the bolt and cam chain tensioner set plate.
Remove the front cylinder cam chain from the crankshaft.



Remove the 8 mm bolts (4 pcs.) and 6 mm bolts (2 pcs.) from the left crankcase.

NOTE

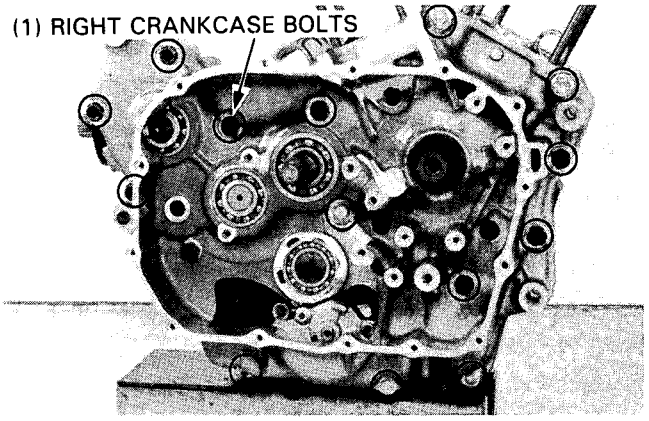
- Remove the bolts in a crisscross pattern in 2 or 3 steps.
- Loosen the 6 mm bolts first, then loosen the 8 mm bolts.



Remove the 8 mm bolts (11 pcs.) and 6 mm bolt (3 pcs.) from the right crankcase.

NOTE

- Remove the bolts in a crisscross pattern in 2 or 3 steps.
- Loosen the 6 mm bolts first, then loosen the 8 mm bolts.

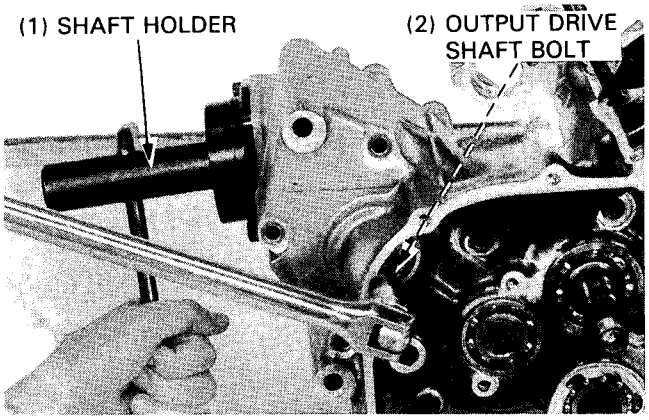


Hold the final driven shaft with a shaft holder and remove the output drive shaft bolt and washer.

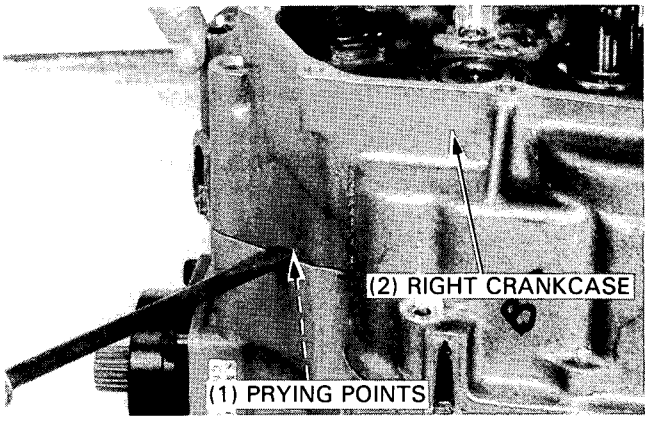
TOOL:
Shaft holder **07923–6890101**

NOTE

- Be careful to remove the bolt which is applied threads locking agent.

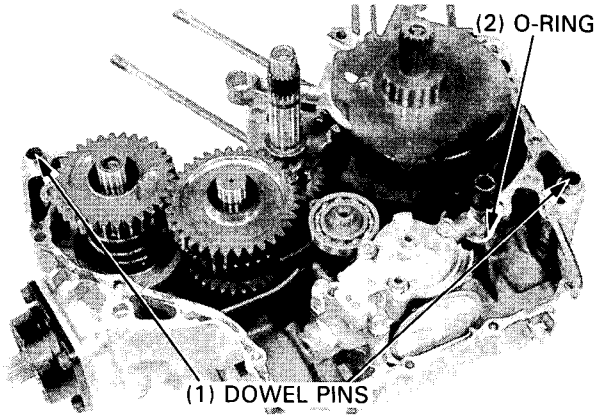


Place the left crankcase side down and separate the right crankcase from the left crankcase while prying where indicated at the points shown and tapping the cases at several locations with a soft hammer.



Remove the dowel pins and clean the crankcsae halves of any sealant material.

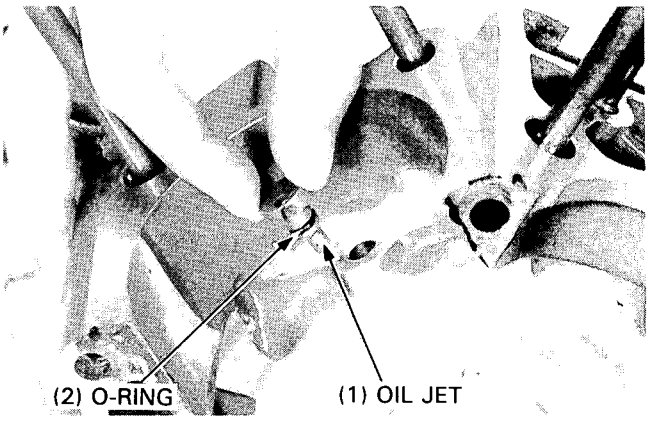
Remove the following parts, if desired:
Crankshaft/connecting rod (section 12).
Shift forks/shift drum (section 12).
Transmission (section 12).
Output gear assembly (section 12).
Oil pump assembly (section 2).



Remove the oil jets from the front cylinder bores of the right and left crankcase.

Check the O-ring for fatigue and damge.

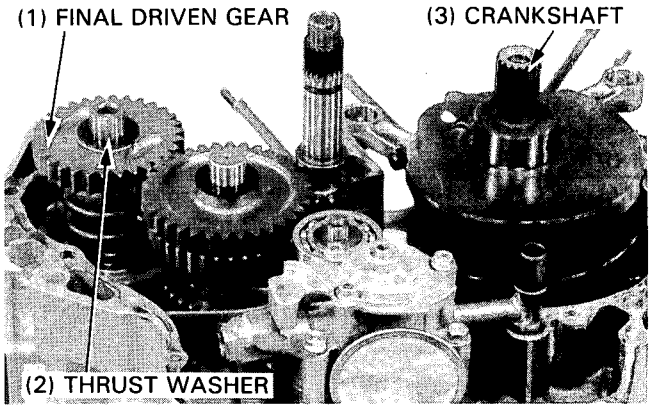
Apply clean engine oil to the O-ring of the oil jets.
Install the them securely.



CRANKCASE ASSEMBLY

Clean the left and right crankcase mating surface throughly, being careful not to damage them.

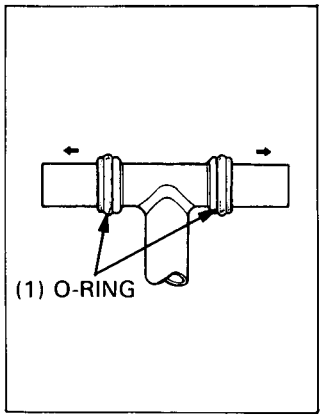
Install the following:
– output gear assembly to the left crankcase (section 12).
– crankshaft, transmission assembly (section 12).
– oil pump assembly (section 2).
– final driven gear and thrust washer onto the countershaft.

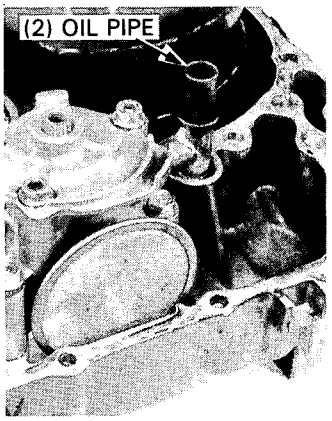


Install the new O-ring onto the oil pipe.

CAUTION

- *Install the O-rings on the oil pipe with the tapered side facing out as shown, or the engine will be damaged.*





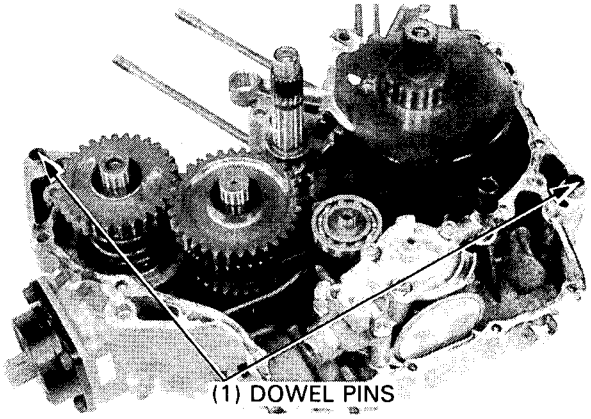
Install the dowel pins.

Apply liquid sealant to the crankcase mating surfaces.
Install the right crankcase over the left crankcase.

Assemble the right and left crankcase being careful to align the dowel pins and shafts.

CAUTION

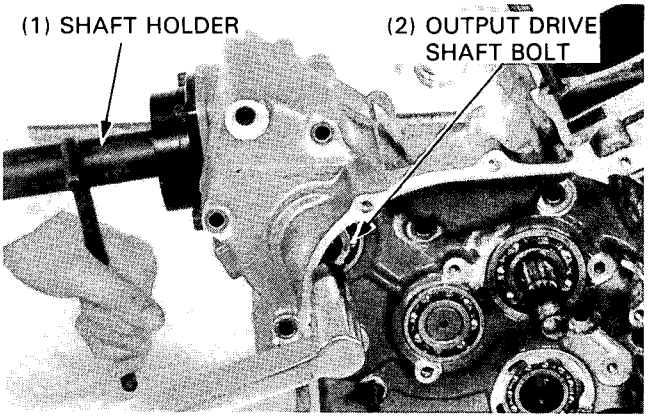
- *Do not force the crankcase halves together; if there is exessive force required, something is wrong. Remove the right crankcase and check for misaligned parts.*



Clean and apply locking agent to the drive shaft bolt threads. Hold the final driven shaft with the shaft holder, install the washer and output drive shaft bolt and tighten the bolt.

TORQUE: 50 N·m (5.0 kg-m, 36 ft-lb)

TOOL:
Shaft Holder **07923–6890101**

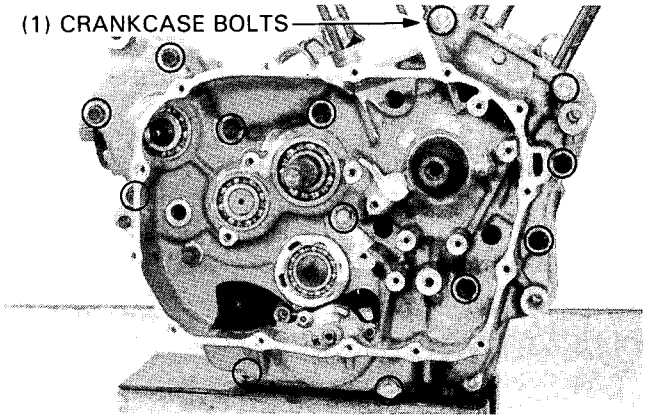


Apply oil to all crankcase bolts.
Install and tighten the right crankcase bolts in a crisscross pattern in 2 or 3 steps.

NOTE

- Tighten the 8 mm bolts (11 pcs.) first, then tighten the 6 mm bolts (3 pcs.).

TORQUE:
8 mm bolts: 23 N·m (2.3 kg-m, 17 ft-lb)
6 mm bolts: 12 N·m (1.2 kg-m, 9 ft-lb)

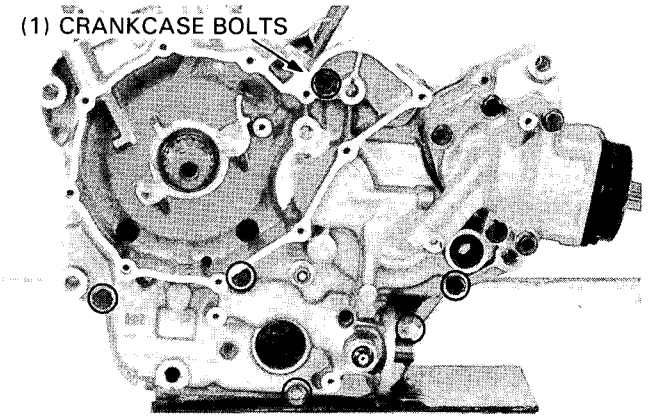


Install and tighten the left crankcase bolts in a crisscross pattern in 2 or 3 steps.

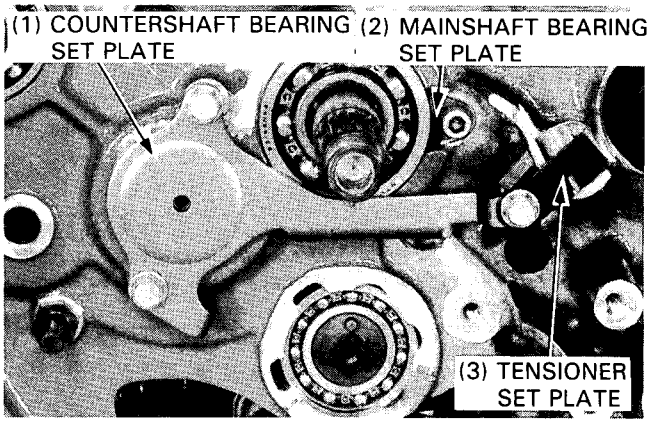
NOTE

- Tighten the 8 mm bolts (4 pcs) first, then tighten the 6 mm bolts (2 pcs).

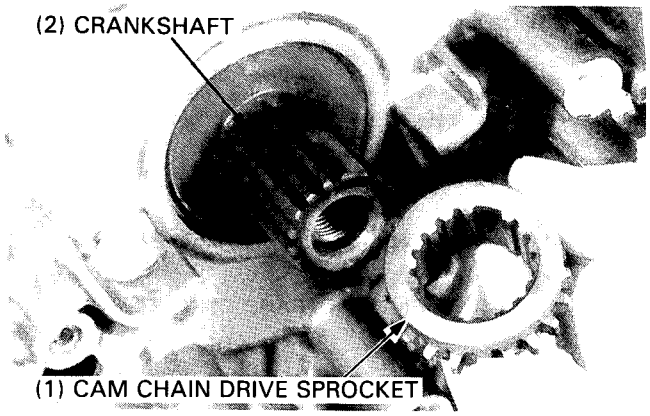
TORQUE:
8 mm bolts: 23 N·m (2.3 kg-m, 17 ft-lb)
6 mm bolts: 12 N·m (1.2 kg-m, 9 ft-lb)



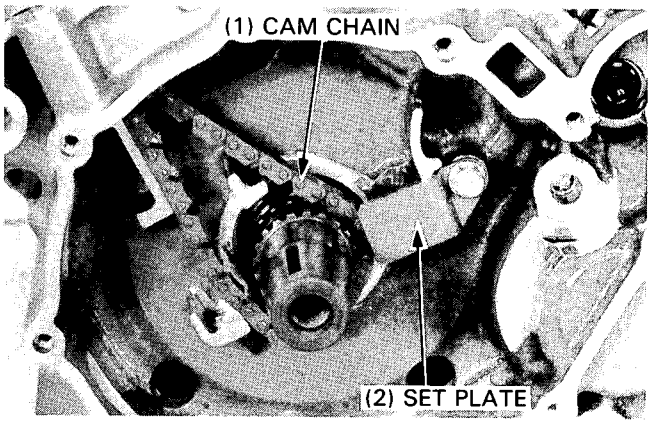
Install the following: on the right crankcase.
– countershaft bearing set plate
– cam chain tensioner set plate
– the mainshaft bearing set plate aligning the edge of the set plate with the slot on the bearing outer and tighten the bolt securely.



Install the rear cam chain drive sprocket over the crankshaft, aligning the extra-wide splines in the sprocket and crankshaft.
Install the rear cam chain over the drive sprocket.

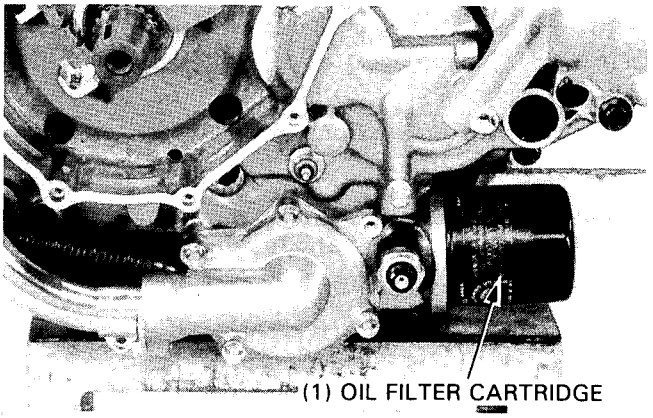


Install the front cam chain over the front cam chain drive sprocket.
Install the cam chain tensioner set plate and tighten the bolt securely.



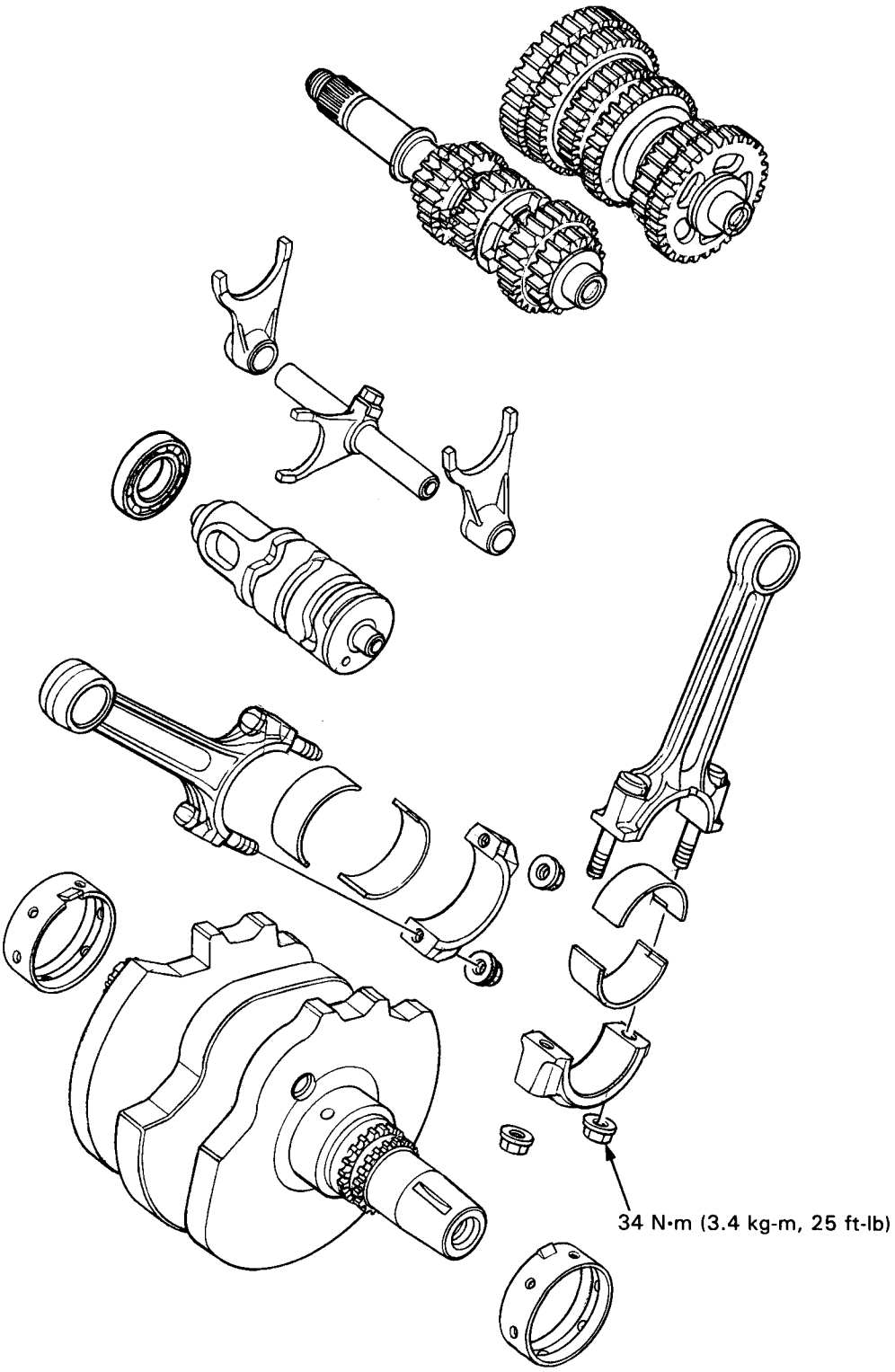
Apply clean engine oil to the O-ring and install the oil filter cartridge.

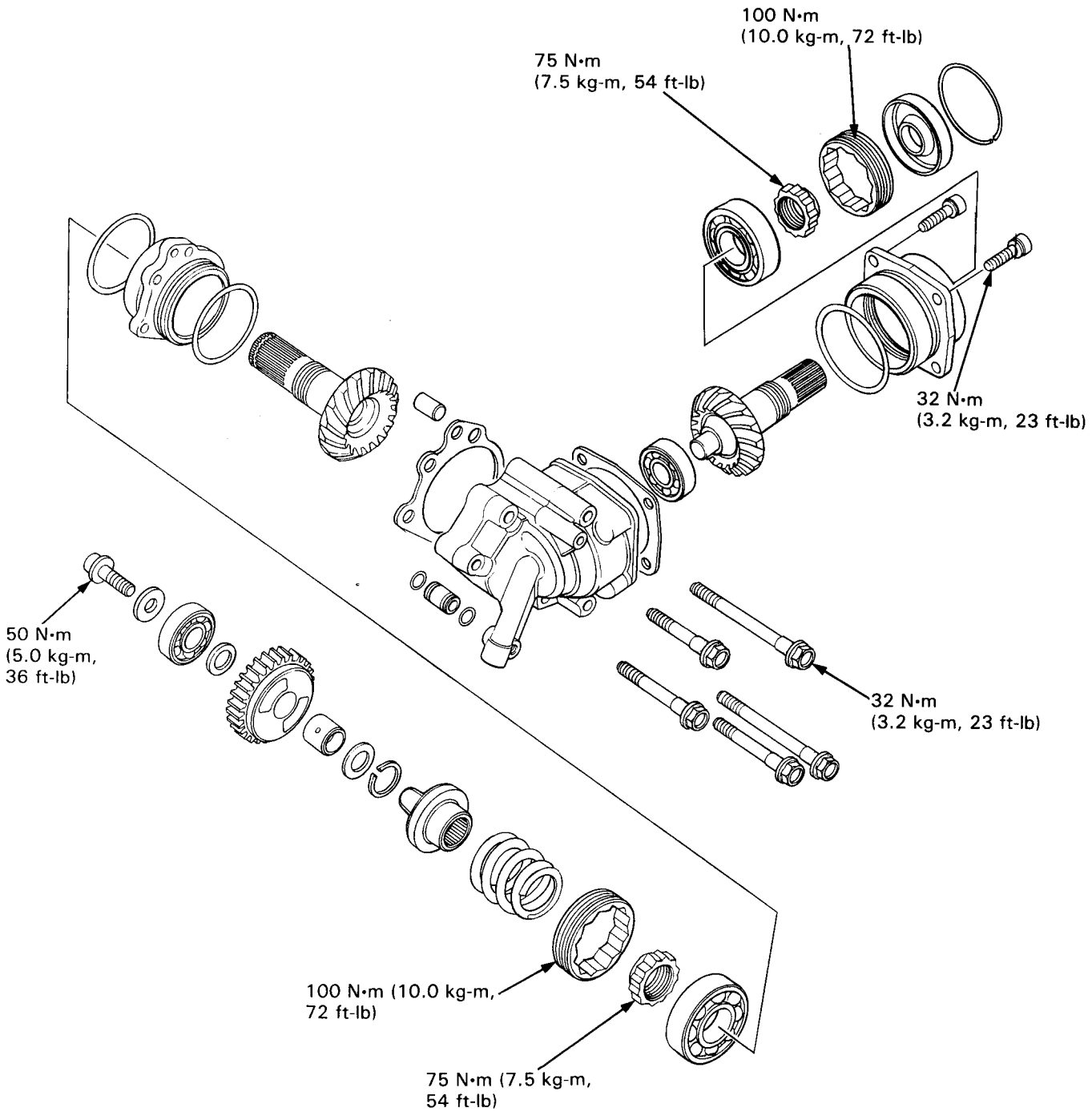
Install the remaining parts in the reverse order of removal (page 11-1).



12

CRANKSHAFT/TRANSMISSION


34 N·m (3.4 kg-m, 25 ft-lb)



SERVICE INFORMATION

GENERAL

- To service the connecting rods, crankshaft, transmission, output gear, and oil pump, the engine must be removed from the frame (Section 6).
- All bearing inserts are select fitted and are identified by color code or code letter. Seclect replacement bearings from the code tables.
  After installing new bearings, recheck them with plastigauge to verify clearance.
- Apply molybdenum disulfide grease to the main journals and crankpins during assembly.
- Before separating the crankcase, the following parts must be removed.
  - Cylinder head (Section 9)
  - Cylinder/piston (Section 10)
  - Clutch/gearshift linkage (Section 7)
  - Flywheel (Section 8)
  - Starter motor (Section 19)
  - Water pump (Section 5)
- When replacing the following output gear components, a new adjustment shim must be selected.
  - Output gear case.
  - Output gear assembly.
  - Output gear bearing.
  - Output gear bearing holder.
- Replace the final drive and output drive shafts as a set.
- When using the lock nut wrench, 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 specificaiton given on the next page is the actual torque applied to the lock nut, not the reading on the torque wrench when used with the lock nut wrench. The procedure later in the text gives both actual and indicated.

SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Crankshaft/ connecting rod	Connecting rod big end side clearance		0.05–0.20 (0.002–0.008)	0.3 (0.012)
	Crankpin oil clearance		0.028–0.052 (0.0011–0.0020)	0.08 (0.003)
	Main journal oil clearance		0.025–0.041 (0.0010–0.0016)	0.05 (0.002)
	Crankshaft runout		—	0.05 (0.002)
Transmission	Gear I.D.	C1	24.000–24.021 (0.9449–0.9457)	24.03 (0.946)
		M4, M5, C2, C3	28.000–28.021 (1.1024–1.1032)	28.03 (1.103)
	Gear bushing O.D.	C1	23.959–23.980 (0.9433–0.9441)	24.95 (0.982)
		M4, M5, C2, C3	27.959–27.980 (1.1007–1.1016)	27.95 (1.100)
	Gear bushing I.D.	C1	20.016–20.037 (0.7880–0.7889)	20.05 (0.789)
		M4, C2, C3	25.000–25.021 (0.9843–0.9851)	25.03 (0.985)
	Bushing-to-shaft clearance	M4, C3	0.020–0.062 (0.0008–0.0024)	0.08 (0.003)
		C2	0.010–0.049 (0.0004–0.0019)	0.07 (0.003)
	Gear-to-bushing clearance	M4, M5, C1, C2, C3	0.020–0.062 (0.0008–0.0024)	0.08 (0.003)
	Mainshaft O.D.	M4 bushing	24.959–24.980 (0.9826–0.9835)	24.95 (0.982)
	Countershaft O.D.	C1 bushing	19.980–19.993 (0.7866–0.7871)	19.97 (0.786)
		C2 bushing	24.972–24.990 (0.9831–0.9839)	24.96 (0.983)
		C3 bushing	24.959–24.980 (0.9826–0.9835)	24.95 (0.982)
Shift fork/ fork-shaft	Claw thickness		5.93–6.00 (0.233–0.236)	5.83 (0.230)
	Right and left shift fork I.D.		13.000–13.018 (0.5118–0.5125)	13.03 (0.513)
	Shaft O.D.		12.966–12.984 (0.5105–0.5112)	12.96 (0.510)
Shift drum O.D. (at the left side journal)			11.966–11.984 (0.4711–0.4718)	11.96 (0.471)

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Output gear	Final driven gear	Gear I.D.	24.000–24.021 (0.9449–0.9457)	24.10 (0.949)
		Bushing O.D.	23.959–23.980 (0.9433–0.9441)	23.70 (0.933)
		Bushing I.D.	20.020–20.041 (0.7882–0.7890)	20.10 (0.791)
	Final driven shaft O.D.		19.979–20.000 (0.7866–0.7874)	19.97 (0.786)
	Damper spring free length		58.40 (2.299)	56.0 (2.20)

TORQUE VALUES

Connecting rod bearing cap nut	34 N·m (3.4 kg-m, 25 ft-lb)
Output drive shaft bolt	50 N·m (5.0 kg-m, 36 ft-lb) Apply locking agent to the threads
Output gear case bolt	32 N·m (3.2 kg-m, 23 ft-lb)
Output drive shaft bearing lock nut (Inner)	75 N·m (7.5 kg-m, 54 ft-lb)
(Outer)	100 N·m (10.0 kg-m, 72 ft-lb)
Output driven gear bearing lock nut (Inner)	75 N·m (7.5 kg-m, 54 ft-lb)
(Outer)	100 N·m (10.0 kg-m, 72 ft-lb)
Output driven gear holder bolt	32 N·m (3.2 kg-m, 23 ft-lb)

TOOLS

Special

Main bearing driver attachment	07HMF–MM90400
Damper spring compressor	07964–ME90000
Snap ring pliers	07914–S670100 or equivalent commercially available
Lock nut wrench, 30 x 64 mm	07916–MB00001
Dis/Assembly tool	07965–3710101
Shaft holder	07923–6890101
Bearing remover, 17 mm	07936–3710300
Remover handle	07936–3710100
Remover weight	07741–0010201 or 07936–3710200
Bearing remover set, 20 mm	07936–3710001
– bearing remover, 20 mm	07936–3710600
– remover handle	07936–3710100
– remover weight	07741–0010201 or 07936–3710200

Common

Driver	07749–0010000
Attachment, 42 x 47 mm	07746–0010300
Pilot, 20 mm	07746–0040500
Attachment, 52 x 55 mm	07746–0010400
Pilot, 22 mm	07746–0041000
Pilot, 25 mm	07746–0040600

TROUBLESHOOTING

Excessive noise
- Crankshaft
- — Worn main bearing
- — Worn crankpin bearing
- Connecting rod
- — Worn rod small end
- — Worn crankpin bearing

Hard to shift
- Shift fork bent
- Shift fork shaft bent
- Shift spindle claw bent
- Shift drum cam grooves damaged
- Shift fork guide pin damaged

Transmission jumps out of gear
- Gear dogs worn
- Shift shaft bent
- Shift fork bent

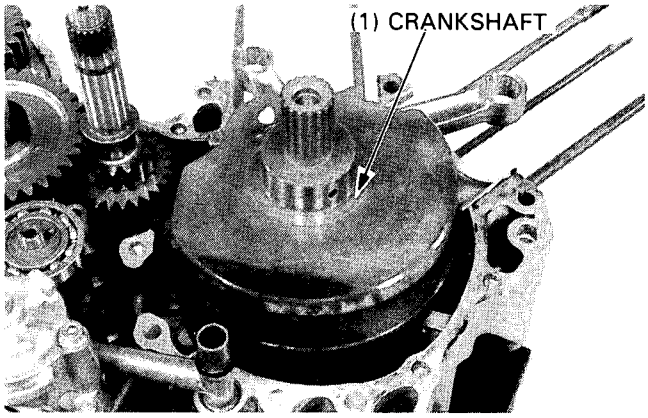
Excessive output gear noise
- Output drive and driven gears worn or damaged
- Bearings worn or damaged
- Excessive backlash between output drive and driven gears
- Improper shim thickness

CRANKSHAFT/CONNECTING ROD

CRANKSHAFT REMOVAL

Separate the crankcase (page 11-2) and remove the dowel pins and O-ring.

Remove the crankshaft.

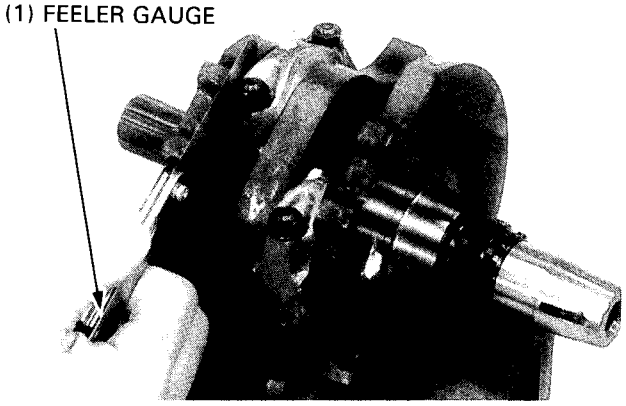


CRANKSHAFT SIDE CLEARANCE INSPECTION

Remove the crankshaft from the left crankcase.
Check the connecting rod side clearance with feeler gauge.

SERVICE LIMIT: 0.30 mm (0.0012 in)

If either side clearance exceeds the service limit, replace the connecting rod and recheck.
If still beyond the limit, replace the crankshaft.
Inspect the crankshaft for rough spots or damage.



CONNECTING ROD DISASSEMBLY

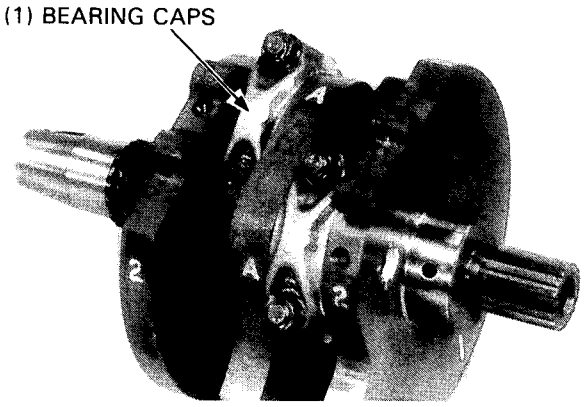
Remove the connecting rod bearing caps noting their locations.

NOTE

- Tap the side of the cap lightly if it is hard to remove.

CAUTION

- *Do not interchange the crankpin bearings. They must be installed in their original positions or the correct bearing oil clearance may not be obtained resulting in engine damage.*



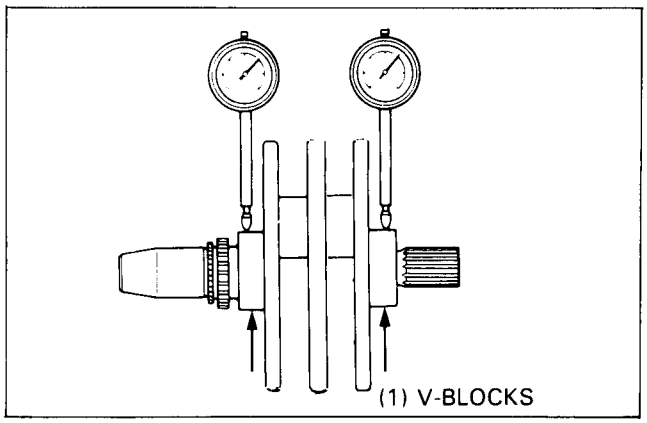
CRANKSHAFT RUNOUT INSPECTION

Place the crankshaft on a stand or V blocks.
Set a dial indicator on the main journals. Rotate the crankshaft two revolutions and read the runout.

SERVICE LIMIT: 0.05 mm (0.002 in)

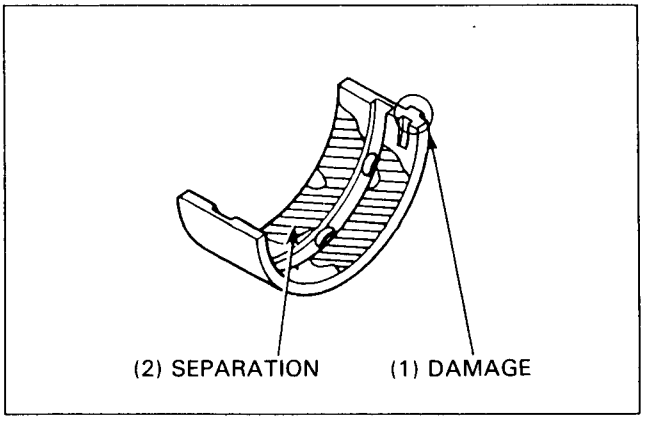
NOTE

- The crankshaft connot be repaired. Replace it if the journals or crankpins are burnt, cracked, or if the runout is beyond limits.



CONNECTING ROD BEARING INSPECTION

Inspect the bearing inserts for damage or separation.
Clean all oil from the bearing inserts and crankpins.



OIL CLEARANCE INSPECTION

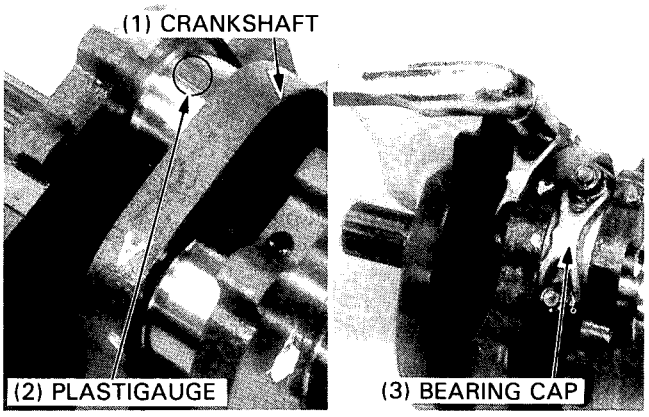
Put a piece of plastigauge on each crankpin avoiding the oil hole.

Install the bearing caps and rods on the correct crankpins, and tighten them evenly.

TORQUE: 34 N·m (3.4 kg-m, 25 ft-lb)

NOTE

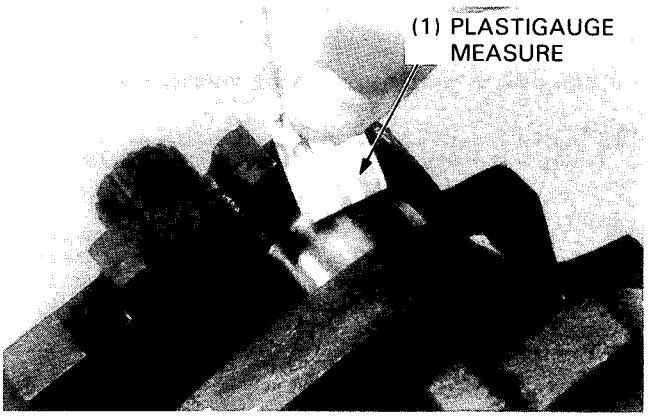
- Do not rotate the crankshaft during inspection.



Remove the caps and measure the compressed plastigauge at its widest point on each crankpin to determine the oil clearance.

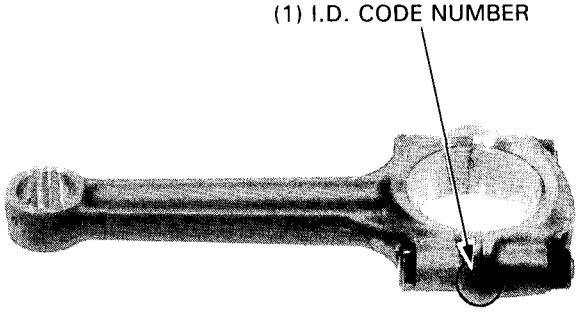
SERVICE LIMIT: 0.08 mm (0.003 in)

If the rod bearing clearance is beyond tolerance, select replacement bearings.

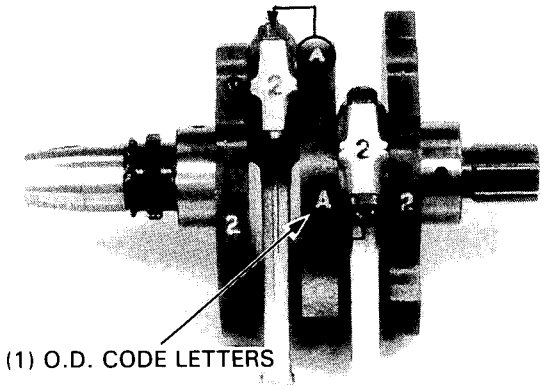


CONNECTING ROD BEARING SELECTION

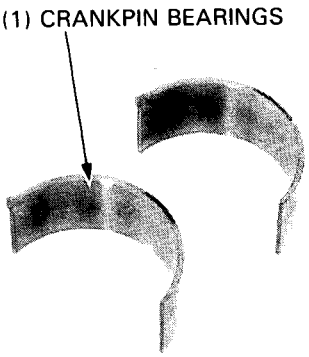
Determine the connecting rod I.D. code number.
The code will be either a number 1 or 2 located on the rod in the area shown.



Determine the corresponding crankpin O.D. code (or measure the crankpin O.D.). The code will be either a letter A or B on the crank weight.

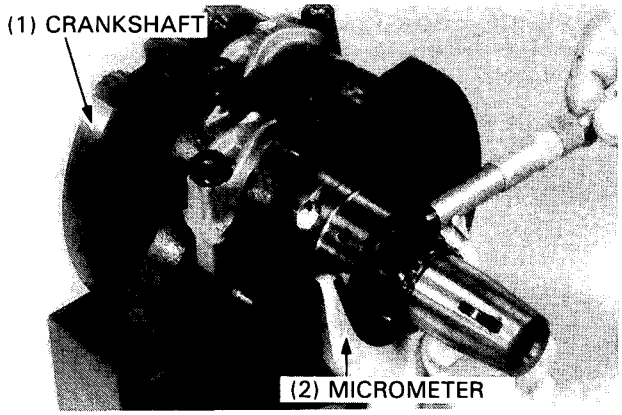


Cross reference the crankpin and connecting rod codes to determine the replacement bearing color.



CRANKPIN O.D. CODE / CONNECTING ROD I.D. CODE		A	B
		39.982–39.990 mm (1.5741–1.5744 in)	39.974–39.983 mm (1.5738–1.5741 in)
1	43.000–43.008 mm (1.6929–1.6932 in)	C (BROWN)	B (BLACK)
2	43.008–43.016 mm (1.6932–1.6935 in)	B (BLACK)	A (BLUE)

BEARING INSERT THICKNESS
A (BLUE): 1.495–1.499 mm (0.0589–0.0590 in)
B (BLACK): 1.491–1.495 mm (0.0587–0.0589 in)
C (BROWN): 1.487–1.491 mm (0.0585–0.0587 in)



MAIN BEARING INSPECTION

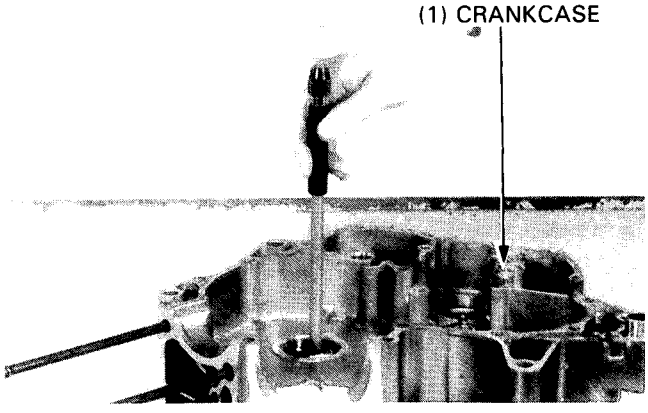
Measure the main journal O.D. and record it.

Measure the main journal bearing I.D. and record it.

Calculate the clearance between the main journal and the main bearing.

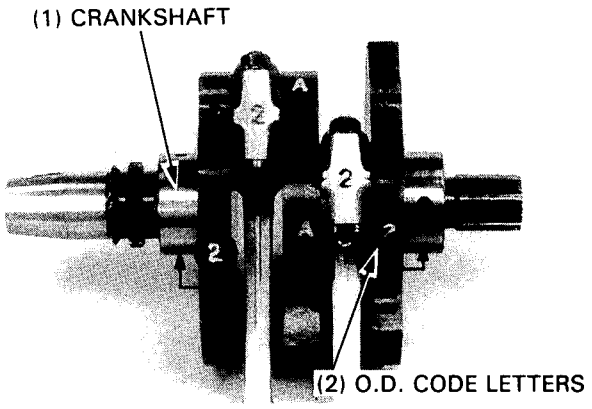
SERVICE LIMIT: 0.06 mm (0.002 in)

If the oil clearance is beyond the service limit, select a replacement bearings as follows:

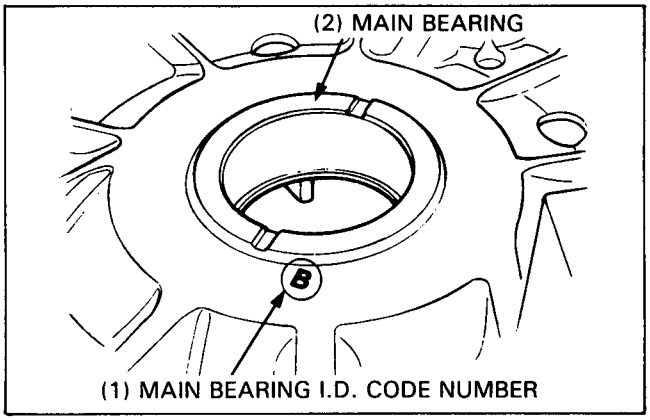


MAIN BEARING SELECTION

Determine the crankshaft main journal O.D. code. The code will be either a number 1 or 2 on the crank weight.



Determine the corresponding main bearing I.D. code. The code will be either a letter A or B on the crankcase.



Choose replacement main bearings in accordance with the table below.

			MAIN JOURNAL O.D. CODE [on crank weight]	
			1	2
			44.992–45.000 mm (1.7713–1.7717 in)	44.984–44.991 mm (1.7710–1.7713 in)
MAIN BEARING I.D. CODE [on crankcase]	A	48.990–49.000 mm (1.9287–1.9291 in)	C (BROWN)	B (BLACK)
	B	49.000–49.010 mm (1.9291–1.9295 in)	B (BLACK)	A (BLUE)

BEARING INSERT THICKNESS
A (BLUE): 2.003–2.013 mm (0.0789–0.0793 in)
B (BLACK): 1.998–2.008 mm (0.0787–0.0791 in)
C (BROWN): 1.993–2.003 mm (0.0785–0.0789 in)

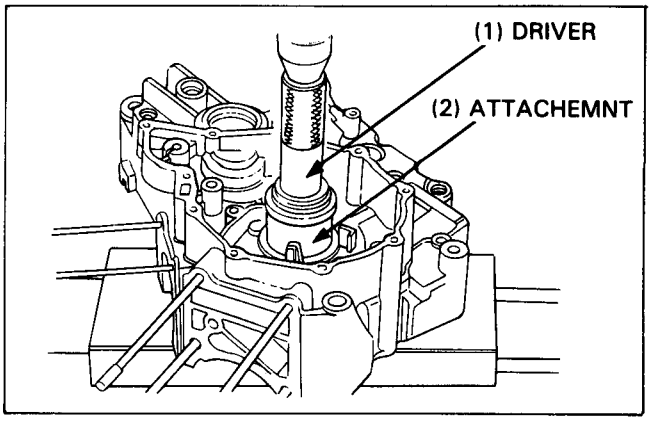
MAIN BEARING REPLACEMENT

Press the main bearing out of the crankcase using a hydraulic press and special tools.

NOTE

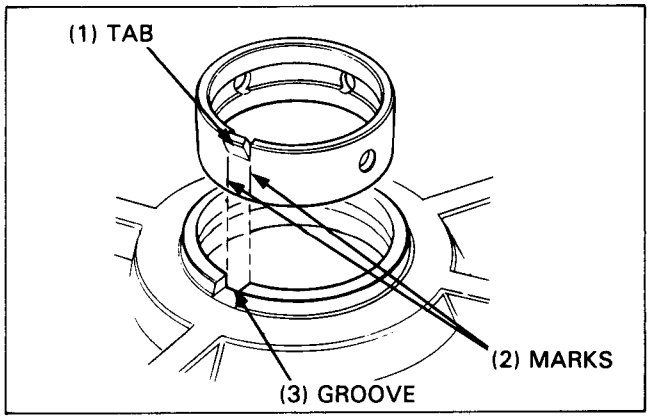
- Always use a press to remove the main bearing.

TOOLS:
Driver 07749–0010000
Main bearing remover attachment 07HMF–MM90400



Mark a vertical line below each side of the bearing tab.

Apply molybdenum disulfide grease to the outer surface of the main bearing.



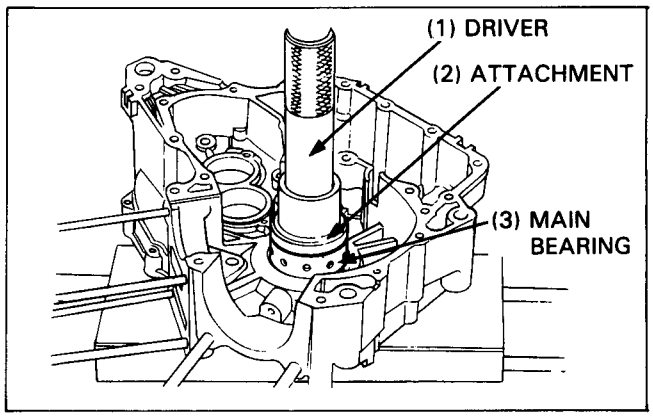
Align the marks on the bearing with the groove in the bearing hole, and press the main bearing into the crankcase.

CAUTION

- *Be careful not to damage the bearings.*

TOOLS:

Driver	**07749—0010000**
Main bearing driver attachment	**07HMF—MM90400**



CONNECTING ROD SELECTION

A letter stamped on the connecting rod is the code for the rod's weight.

When replacing the connectring rod, select the new rod by cross-matching the front and rear cylinder connecting rod weights using the selection table below.

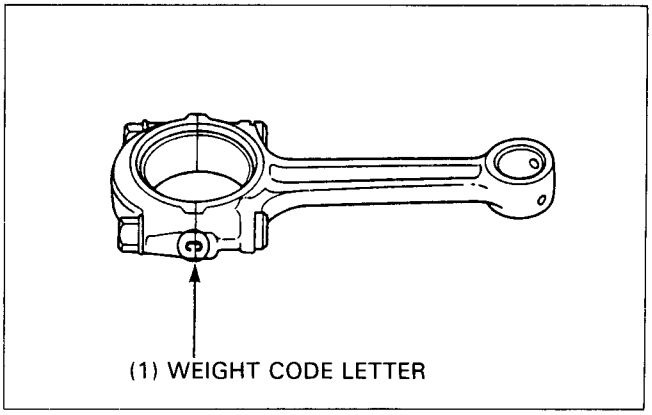
NOTE

- The "O" mark in the table indicates that the matching is possible in the crossed codes.

SELECTION TABLE

Front rod code / Rear rod code	A	B	C	D*
A	O	O		
B	O	O	O	
C		O	O	O
D*			O	O

*: Applicable for NTV650 only.

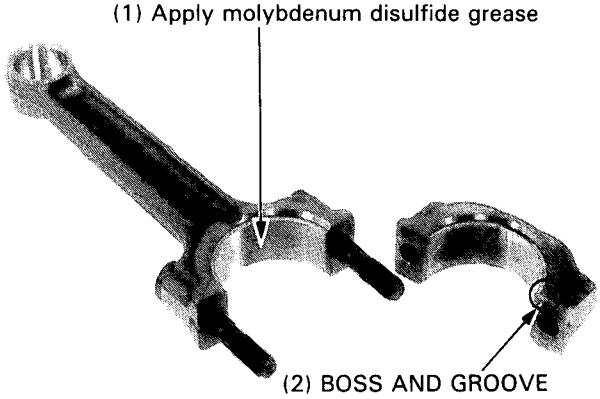


CONNECTING ROD ASSEMBLY

Install the bearing inserts on the rods and caps.

NOTE

- Align the boss on the bearing with the groove in the rod or cap.
- Apply molybdenum disulfide grease to the bearing.



Install the connecting rods and caps on the crankpin. Be sure each part is installed in its original position, as noted during removal.

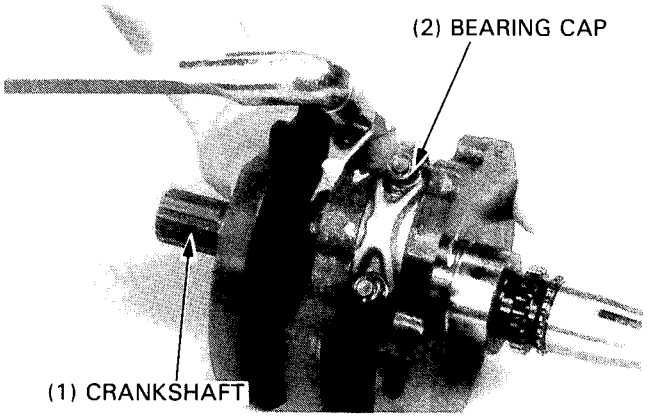
Tighten the bearing cap nuts.

NOTE

- Align the I.D. code on the cap and rod.
- Tighten the nuts in two or more steps. After tightening, check that the rods move freely without binding.

TORQUE: 34 N·m (3.4 kg-m, 25 ft-lb)

Install the crankshaft in the left crankcase.
Install the dowel pins and assemble the crankcase (page 11-4).



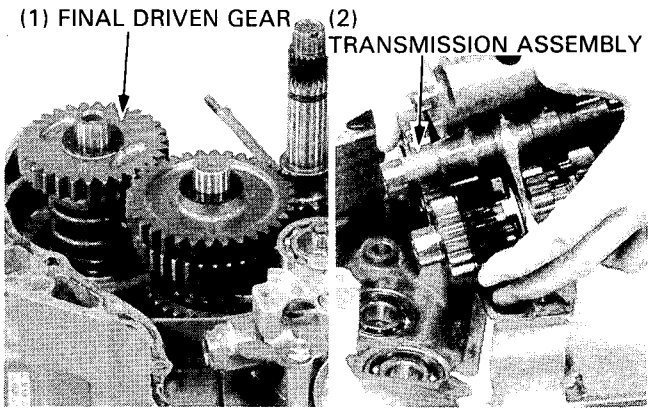
TRANSMISSION

REMOVAL

Remove the final dirven gear from the output drive shaft.

Remove the mainshaft, countershaft, shift fork shaft and shift drum as an assembly.

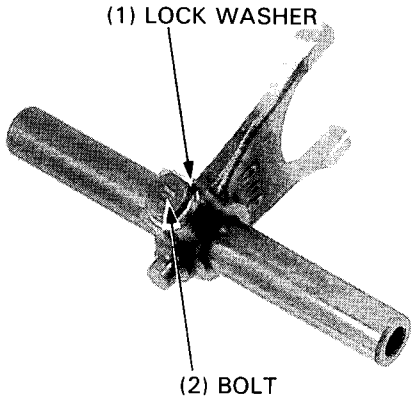
Separate the shift forks/shaft, mainshaft and countershaft assemblies from each other.



DISASSEMBLY/INSPECTION

Bend down the lock washer tabs and remove the bolt and lock washer from the center shift fork.
Remove the shift fork shaft.

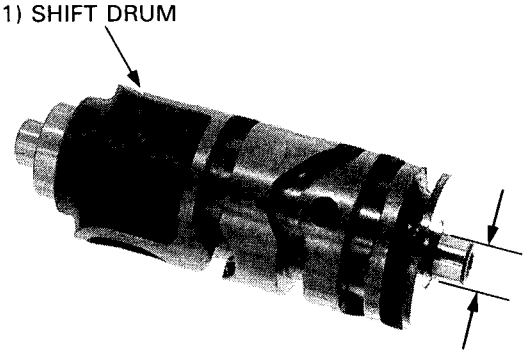
Disassemble the mainshaft and countershaft.



Inspect the shift drum end for scoring, scratches, or evidence of insufficient lubrication. Check the shift drum grooves for damage.
Measure the shift drum shaft O.D. at the left side journal.

SERVICE LIMIT: 11.96 mm (0.471 in)

Check the bearing inner and outer races for damage.
The bearing should turn smoothly and quietly.

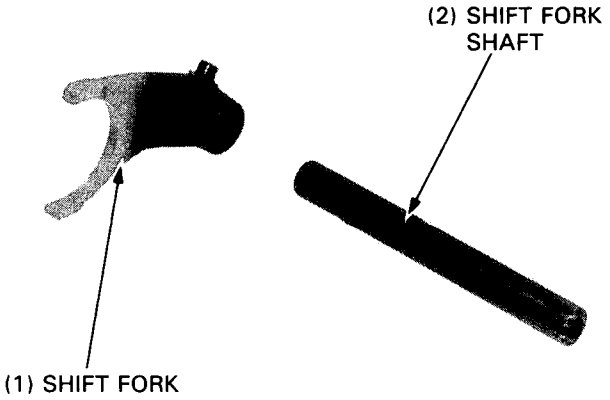


Check the shift fork shaft for scratches, scoring or evidence of insufficient lubrication.
Measure the shift fork shaft O.D.

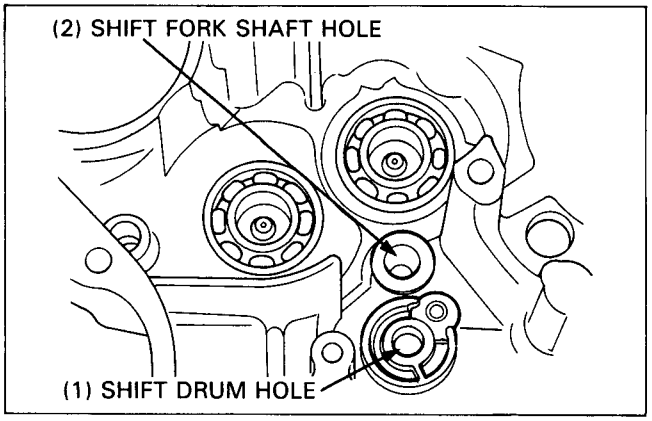
SERVICE LIMIT: 12.96 mm (0.510 in)

Measure the I.D. of each shift fork and the fork claw thickness.

SERVICE LIMITS:
I.D.: 13.03 mm (0.513 in)
CLAW THICKNESS: 5.83 mm (0.230 in)

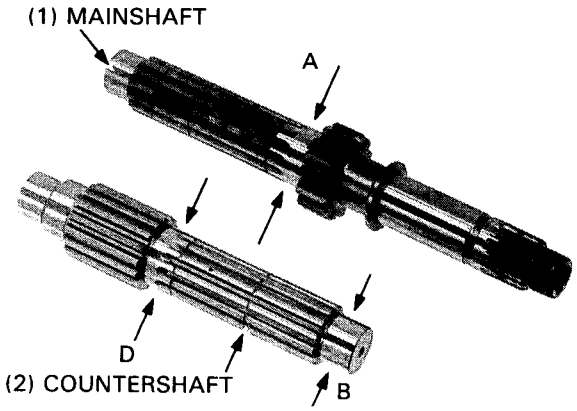


Inspect the shift drum and shift fork shaft hole journals for excessive wear or damage.



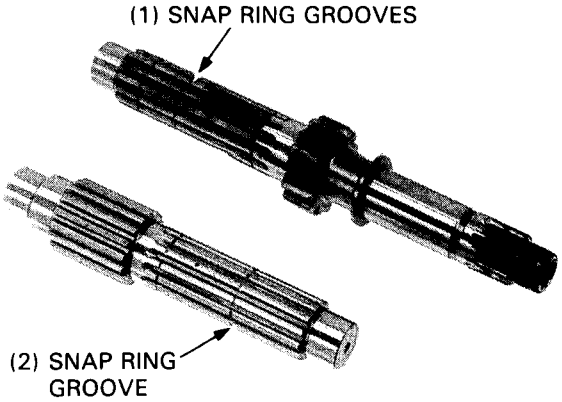
Measure the O.D. of mainshaft and countershaft.

SERVICE LIMITS:
A: M4 bushing 24.95 mm (0.982 in)
B: C1 bushing 19.97 mm (0.786 in)
C: C2 bushing 24.96 mm (0.983 in)
D: C3 bushing 24.95 mm (0.982 in)



Check each shaft's grooves for damage.

Replace if necessary.



Check the gear dogs, holes and teeth for excessive or abnormal wear, or evidence of insufficient lubrication.
Measure the I.D. of each gear.

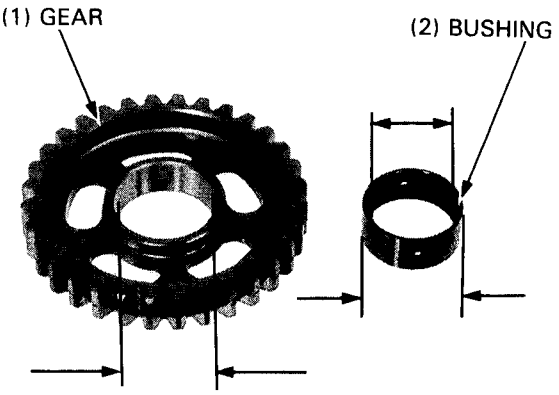
SERVICE LIMITS:
M4, M5, C2, C3 gears: 28.03 mm (1.103 in)
C1 gear: 24.03 mm (0.946 in)

Measure the I.D. and O.D. of each gear bushing.

SERVICE LIMITS:
M4, M5, C2, C3 bushings O.D.: 27.95 mm (1.100 in)
C1 bushing O.D.: 24.95 mm (0.982 in)
M4, C2, C3 bushing I.D.: 25.03 mm (0.985 in)
C1 bushing I.D.: 20.05 mm (0.789 in)

Calculate the bushing to shaft clearances and gear to bushing clearance.

SERVICE LIMITS:
bushing-to-shaft (M4, C3):
0.08 mm (0.003 in)
(C2):
0.07 mm (0.03 in)
gear-to-bushing (M4, M5, C1, C2, C3):
0.08 mm (0.003 in)



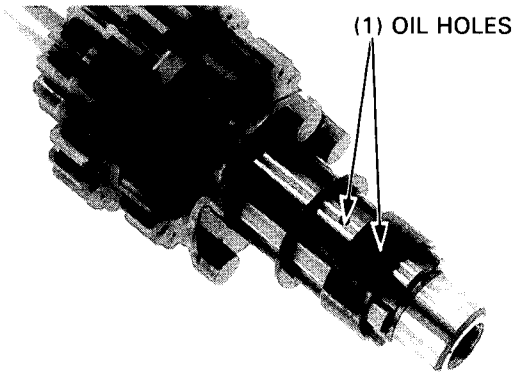
TRANSMISSION ASSEMBLY/ INSTALLATION

Apply molybdenum disulfide (MoS_2) grease to the shift fork journals of M3, C4 and C5 gears.

Clean all parts in solvent and dip them in clean engine oil.

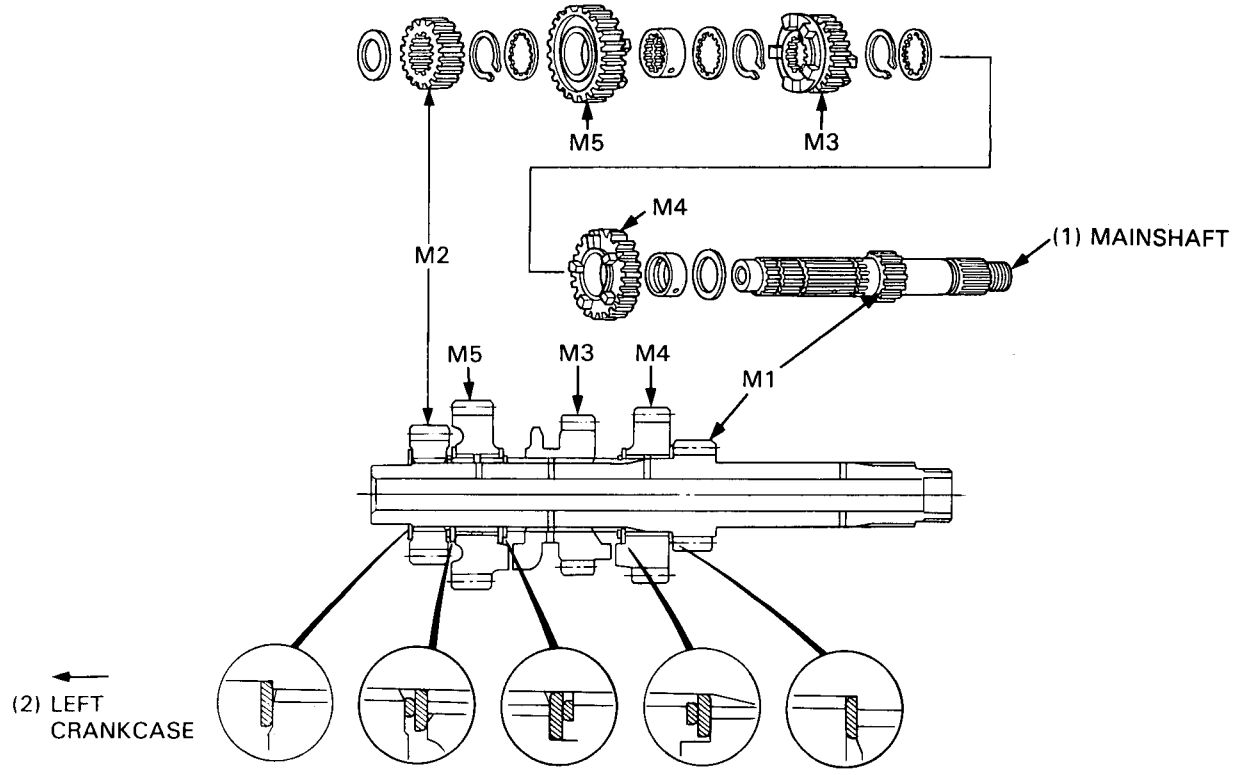
CAUTION

- *Align the oil holes in the bushings and gears with the oil holes in the shaft.*

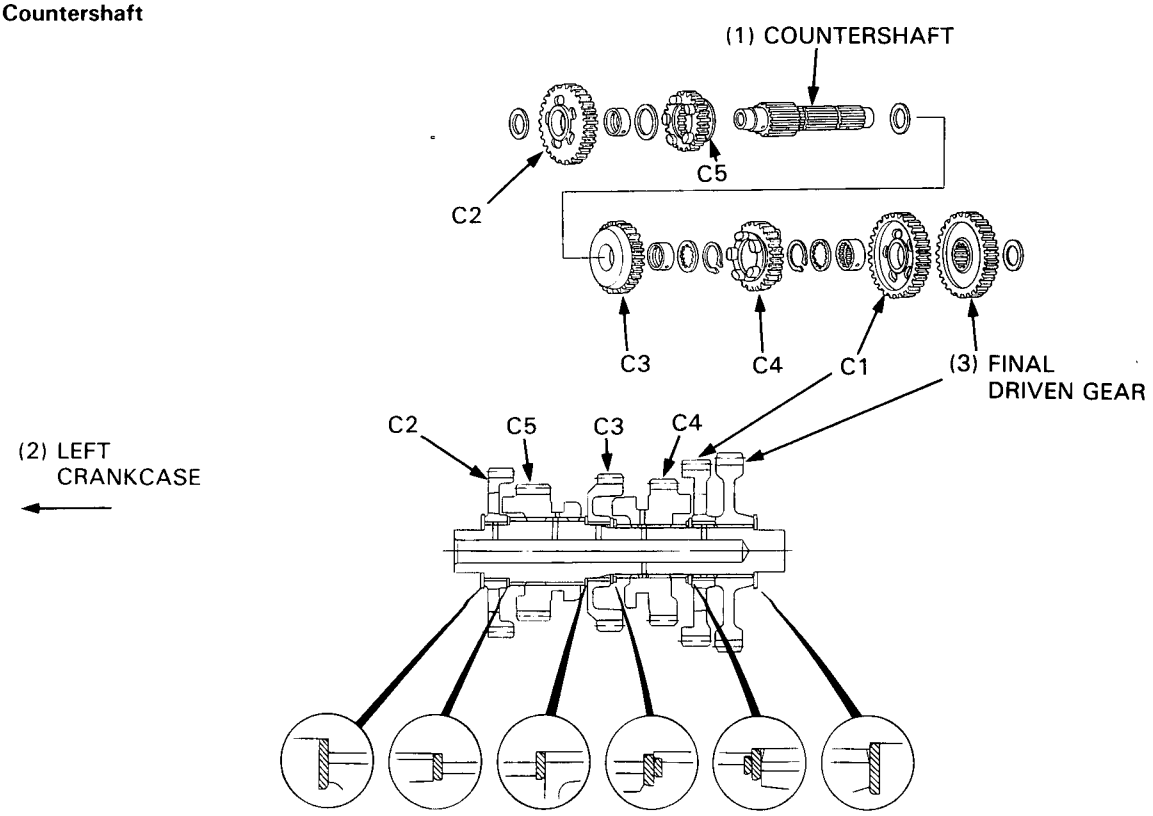


Mainshaft

Apply molybdenum disulfide grease to the following.
- shift fork grooves
- inside and outside of the bushings
- outside of the spline bushings



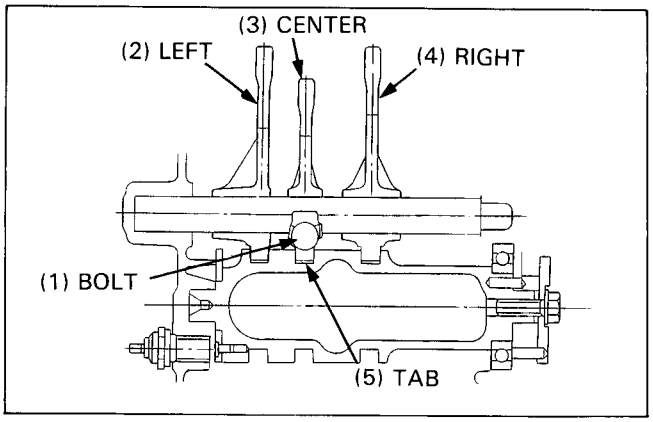
Countershaft



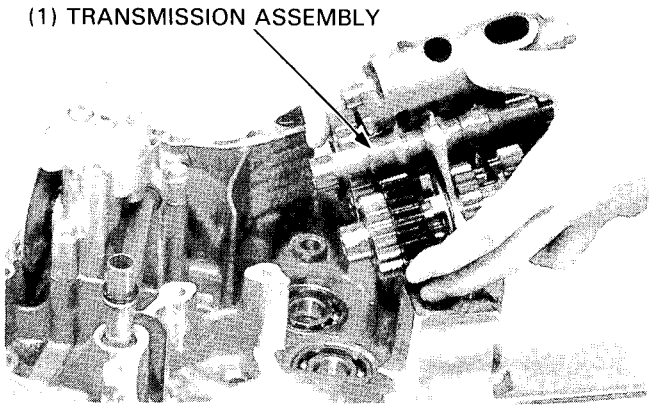
Install the shift forks onto the shaft as follows.

Left side: "L" mark facing R. crankcase.
Center: "C" mark facing L. crankcase.
Right side: "R" mark facing R. crankcase.

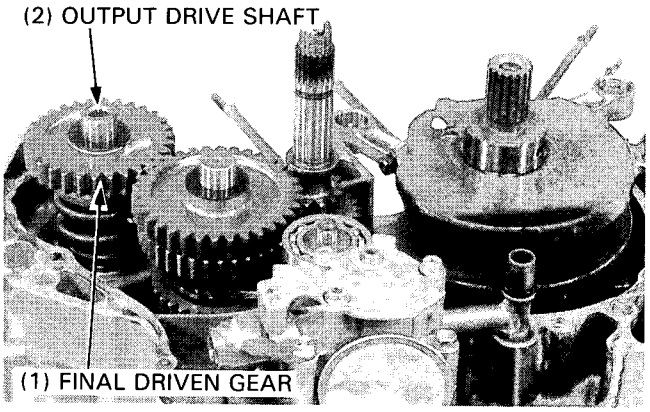
Tighten the bolt with the lock washer and bend up the tab of the lock washer.



Assemble the mainshaft, countershaft, shift fork shaft and shift drum.
Install them into the left crankcase as an assembly.

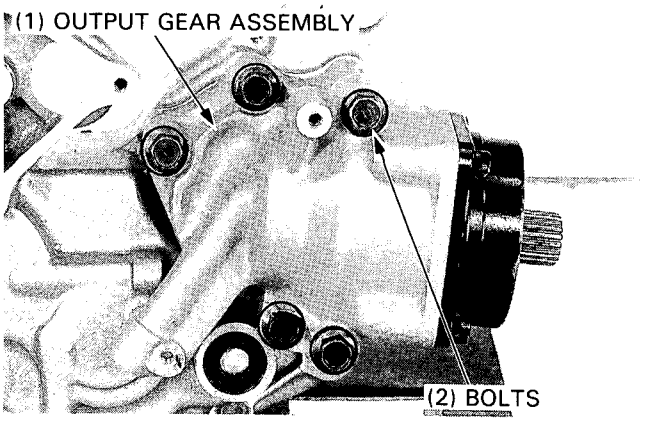


Install the final driven gear onto the output drive shaft.



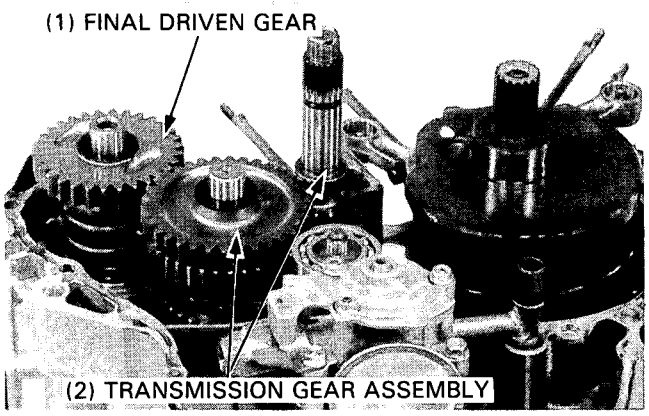
OUTPUT GEAR

Loosen the output gear assembly mounting bolts from the left crankcase.



Separate the crankcase (page 11-2).

Remove the final driven gear from the output drive shaft.
Remove the shift drum, shift fork and transmission gear assembly from the left crankcase.



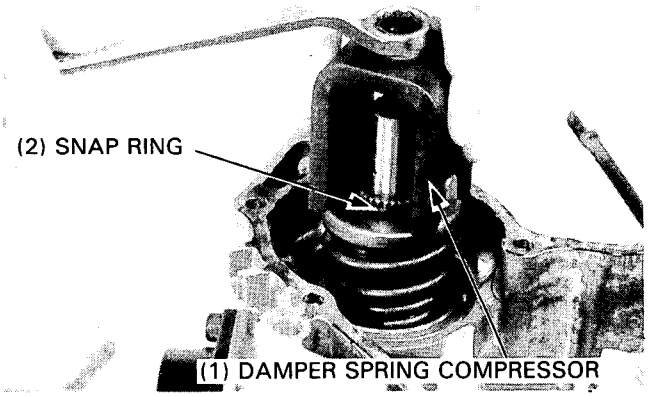
Install an attachment or equivalent spacer between the compressor bolt and body.
Place the damper spring compressor onto the damper cam and output drive shaft.

Compress the damper spring by turning the compresser bolt clockwise and remove the snap ring.

Loosen and remove the compressor.

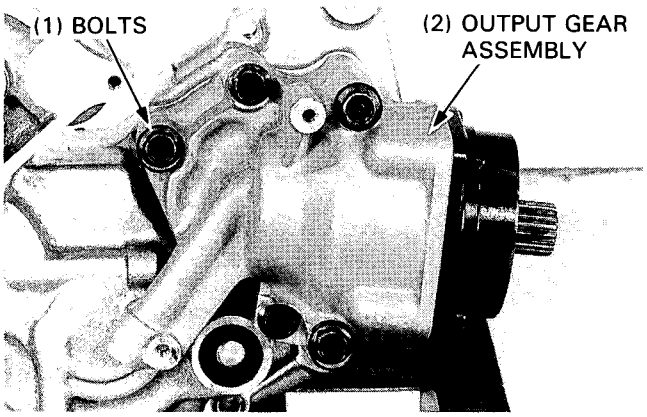
TOOLS:

Damper spring compressor	**07964—ME90000**
Snap ring pliers	**07914—5670100 or equivalent commercially available**

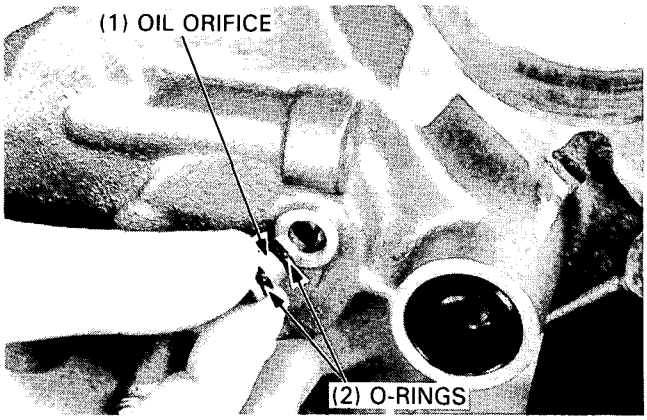


Remove the damper cam and spring.

Remove the three output gear assembly attaching bolts and the gear assembly.



Remove the oil orifice and O-rings.

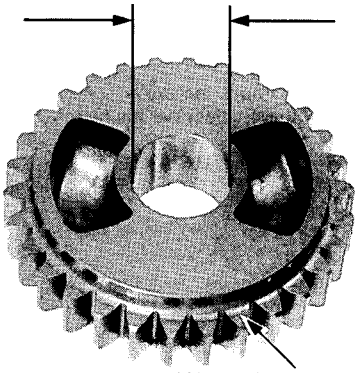


INSPECTION

Check the gear grooves and teeth for excessive or abnormal wear, or evidence of insufficient lubrication.

Measure the final driven gear I.D.

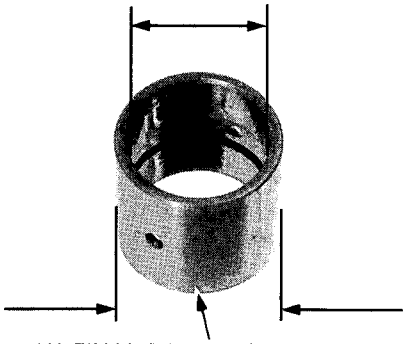
SERVICE LIMIT: 24.10 mm (0.949 in)



(1) FINAL DRIVEN GEAR

Measure the final driven gear bushing I.D. and O.D.

SERVICE LIMITS:
I.D.: 20.10 mm (0.791 in)
O.D.: 23.70 mm (0.933 in)

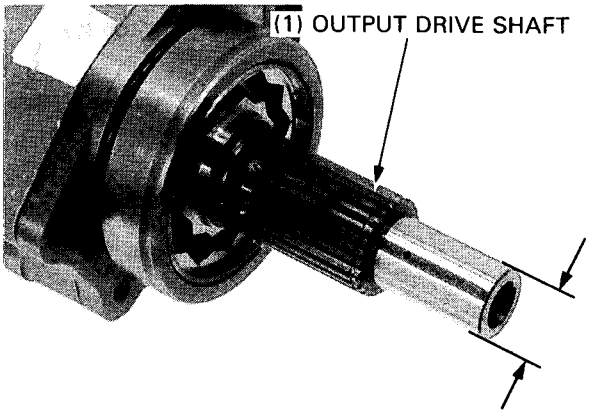


(1) FINAL DRIVEN GEAR BUSHING

Measure the output drive shaft O.D.

SERVICE LIMIT: 19.97 mm (0.786 in)

Check the spline of the shaft for wear or damage.



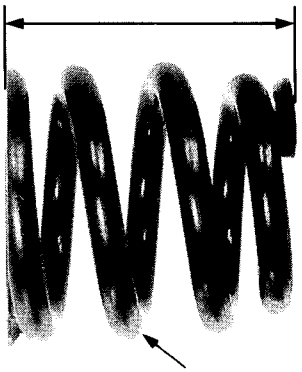
(1) OUTPUT DRIVE SHAFT

DAMPER SPRING

Measure the damper spring free length.

SERVICE LIMIT: 56.0 mm (2.20 in)

Replace the spring if it is shorter than the service limit.



(1) DAMPER SPRING

BACKLASH INSPECTION

Place the output gear case in a vise with soft jaws or use a shop towel.

Set a horizontal type dial indicator on the final drive shaft as shown.

Hold the driven gear with the shaft holder and rotate the drive shaft until gear slack is taken up.

TOOL:
Shaft holder **07923–6890101**

Turn the drive shaft back and force to read backlash.

SERVICE LIMIT: 0.4 mm (0.0157 in)

Remove the dial indicator. Turn the output drive shaft 120 degrees and measure the backlash as part of the same procedure.

Repeat this procedure once more, at another 120 degrees.

Compare the difference of the three measurements.

Difference of measurements
SERVICE LIMIT: 0.10 mm (0.004 in)

If the difference of the measurements exceeds the service limit, it indicates that the bearings are not installed squarely. Inspect the bearings and reinstall if necessary.

If backlash is excessive, replace the drive shaft adjustment shim with a thinner one.
If backlash is too small, replace the drive shaft adjustment shim with a thicker one.

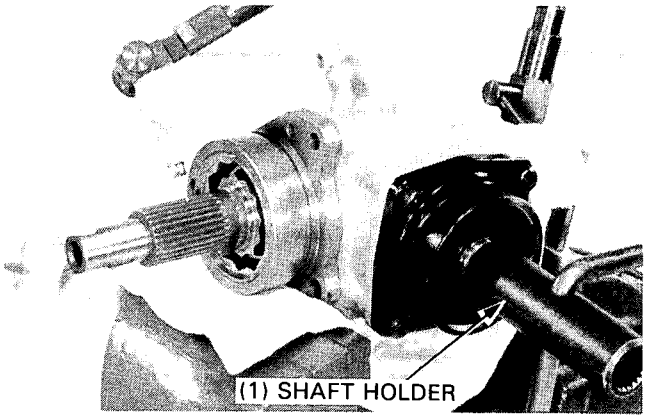
Backlash is changed by approximately 0.015 mm (0.0006 in) when thickness of the shim is changed by 0.05 mm (0.002 in).

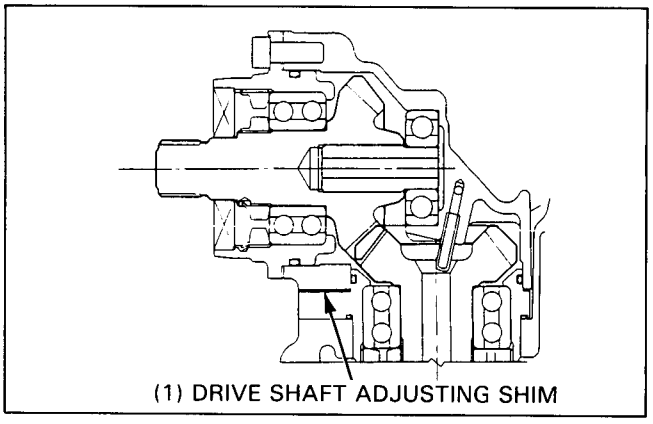
OUTPUT DRIVE SHAFT ADJUSTMENT SHIMS:
- **A : 0.20 mm (0.008 in)**
- **B : 0.25 mm (0.010 in)**
- **C : 0.30 mm (0.012 in)**
- **D : 0.35 mm (0.014 in)**
- **E : 0.40 mm (0.016 in)**
- **F : 0.45 mm (0.018 in)**
- **G : 0.50 mm (0.020 in) Standard**
- **H : 0.55 mm (0.022 in)**
- **I : 0.60 mm (0.024 in)**

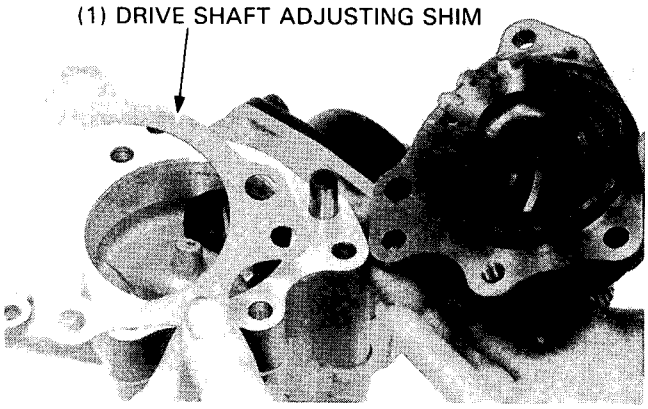
To replace the output drive shaft adjustment shim, remove the output gear case from the bearing holder.

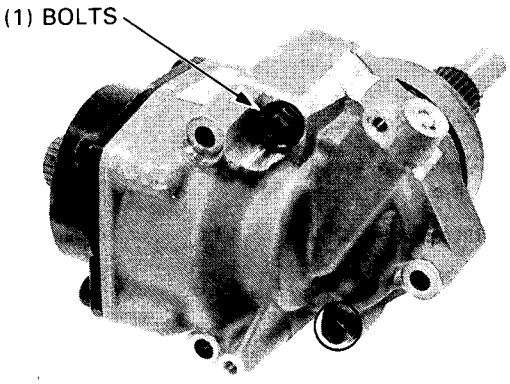
After replacing the shim, install the gear case and tighten the bolts.

TORQUE: 32 N·m (3.2 kg-m, 23 ft-lb)







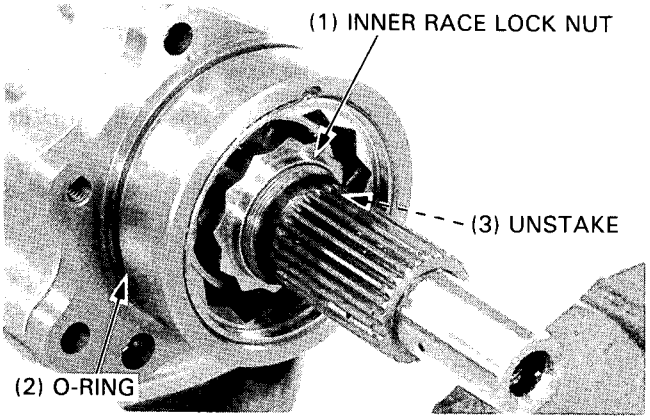


OUTPUT DRIVE SHAFT BEARING REPLACEMENT

Remove the O-ring.

Place the output gear case in a vise with soft jaws, being careful not to distort it.

Unstake the bearing inner race lock nut with a drill or grinder. Be careful that metal particles do not enter the bearing and the threads on the shaft are not damaged.



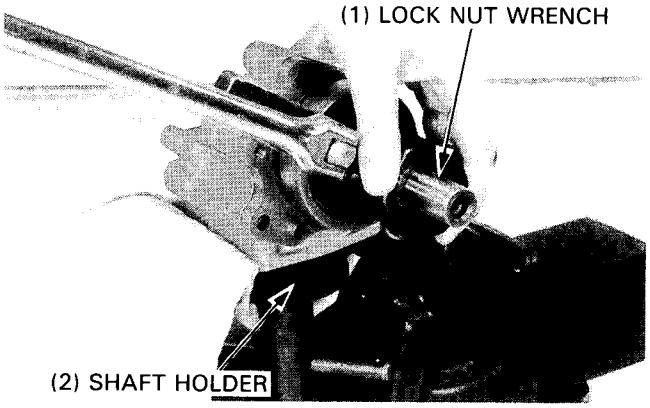
Place the shaft holder on the driven gear shaft, wedging it against the vise to lock the shaft.

Remove the bearing inner lock nut and discard it.

TOOLS:

Shaft holder	**07923—6890101**
Lock nut wrench, 30 x 64 mm	**07916—MB00001**

Remove the shaft holder.

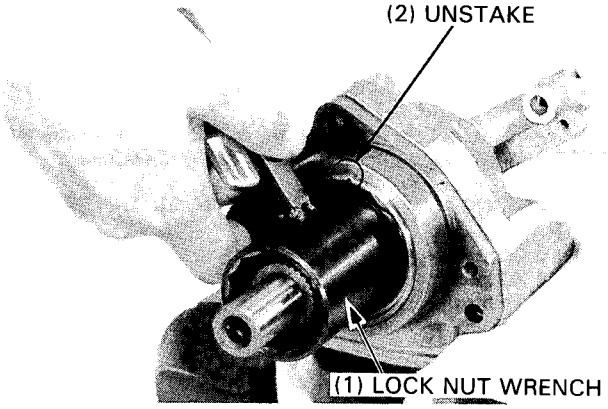


Unstake the bearing outer lock nut with a punch.

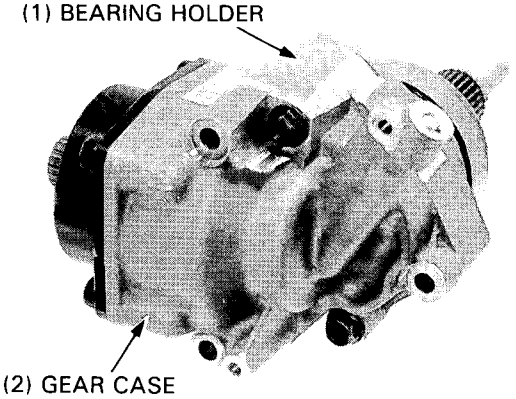
Remove the bearing outer lock nut and discard it.

TOOL:

Lock nut wrench, 30 x 64 mm	**07916—MB00001**

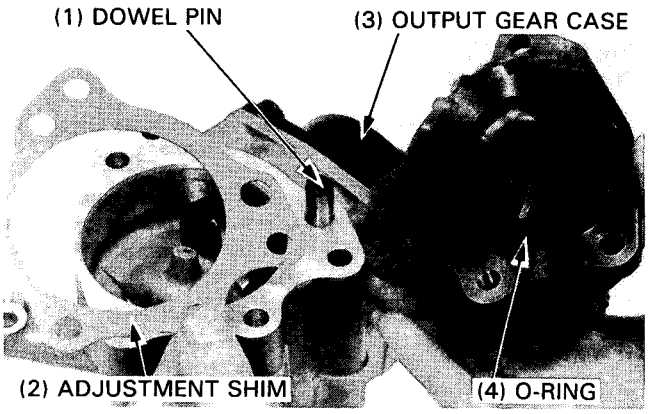


Remove the output drive shaft bearing holder from the output gear case.



Remove the O-ring from the bearing holder.

Remove the adjustment shim and dowel pin from the output gear case.



Place the output drive shaft and a dis/assembly tool in a hydraulic press.

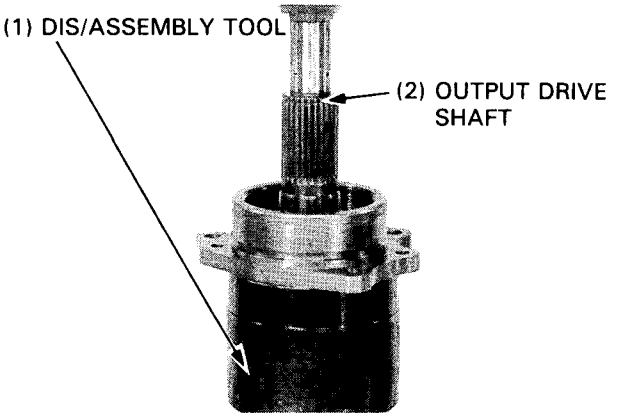
NOTE

- Remove the center guide from the dis/assembly tool before using it.

Press the output drive shaft out of the bearing holder.

TOOL:

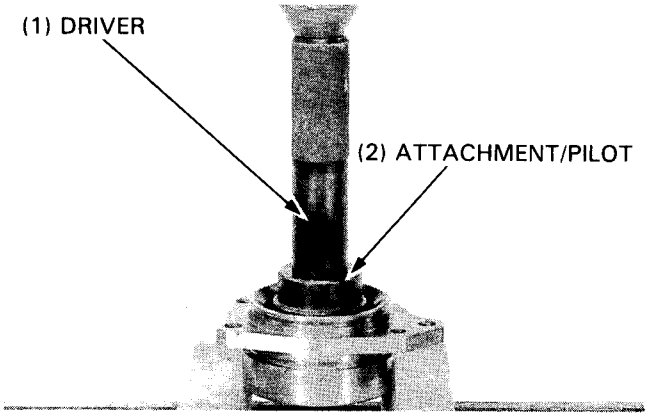
Dis/assembly tool	**07965–3710101**



Place the bearing holder in a press and remove the bearing.

TOOLS:

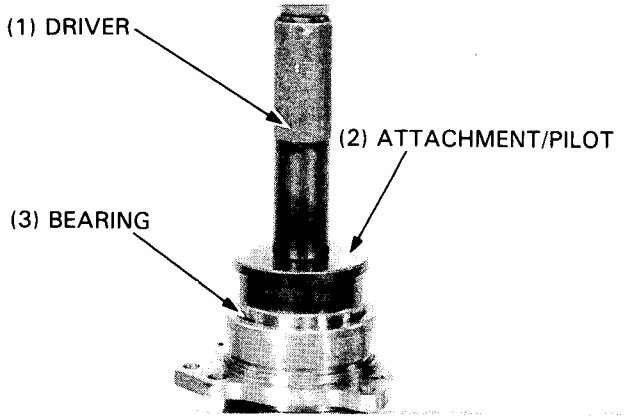
Driver	**07749–0010000**
Attachment, 42 x 47 mm	**07746–0010300**
Pilot, 30 mm	**07746–0040700**



Press a new bearing in the bearing holder.

TOOLS:

Driver	**07749–0010000**
Attachment, 62 x 68 mm	**07746–0010500**
Pilot, 30 mm	**07746–0040700**



NOTE

- If the output drive shaft requires replacement, the drive and driven shafts must be replaced as a set.

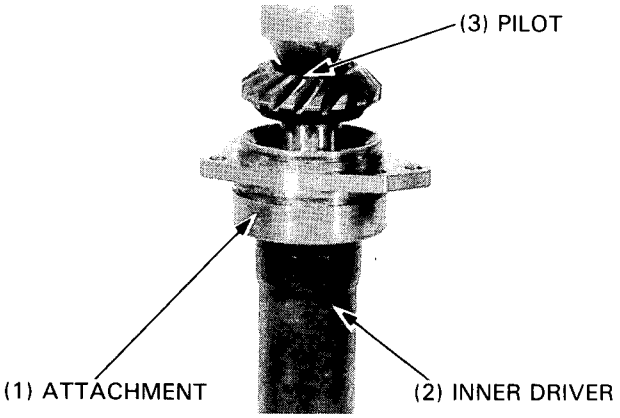
Support the bearing inner race and press the output drive shaft in with a pilot.

NOTE

- Place the pilot's threaded end into the output drive shaft.

TOOLS:

Inner driver	**07746—0030100**
Attachment, 30 mm I.D.	**07746—0030300**
Pilot, 20 mm	**07746—0040500**

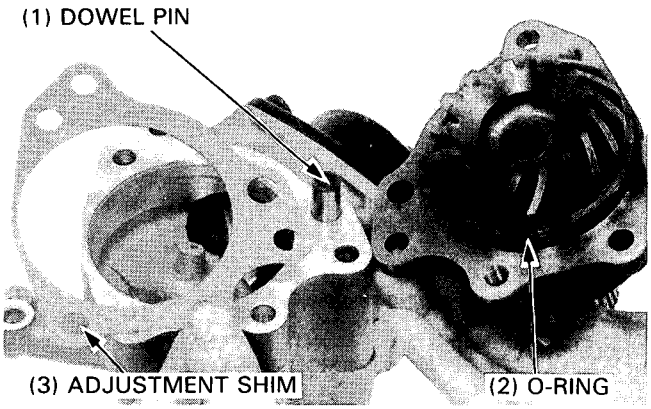


Install the dowl pin.
Place the adjustment shim on the gear case.

NOTE

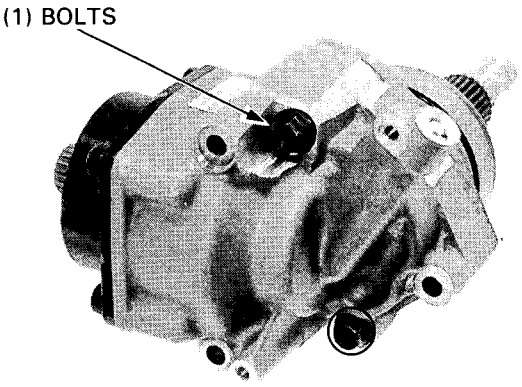
- If the bearing holder and/or gear case is replaced, a new adjustment shim must be selected (page 12-17, Backlash inspection).

Install a new O-ring.



Install the bearing holder onto the gear case and tighten the bolts.

TORQUE: 32 N·m (3.2 kg-m, 23 ft-lb)

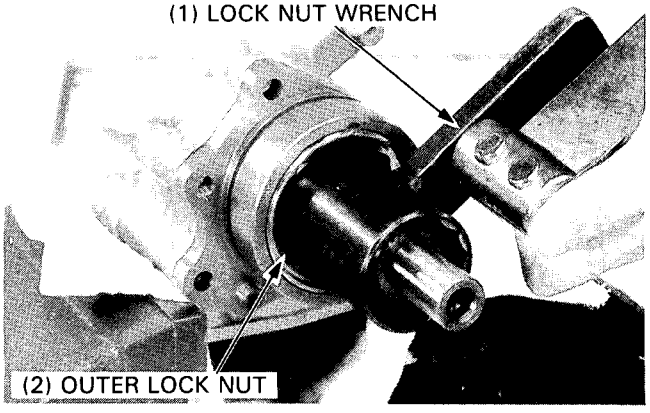


Place the gear case in a vise with soft jaws and install and tighten a new bearing outer lock nut.

TORQUE:
Actual: 100 N·m (10.0 kg-m, 72 ft-lb)
Indicated: 91 N·m (9.1 kg-m, 65 ft-lb)

TOOL:

Lock nut wrench, 30 x 64 mm	**07916—MB00001**



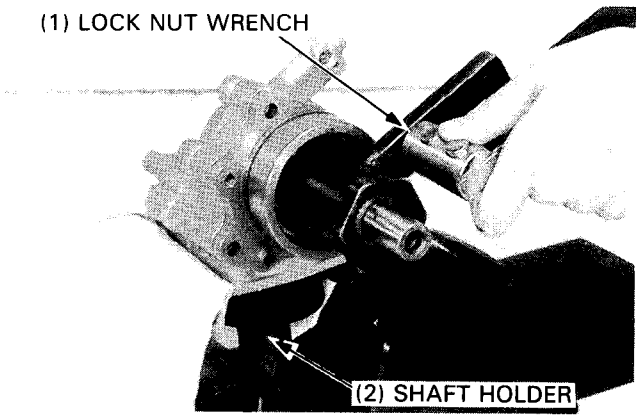
Hold the shaft and install and tighten a new bearing inner race lock nut.

TORQUE:
Actual: 75 N·m (7.5 kg-m, 54 ft-lb)
Indicated: 69 N·m (6.9 kg-m, 50 ft-lb)

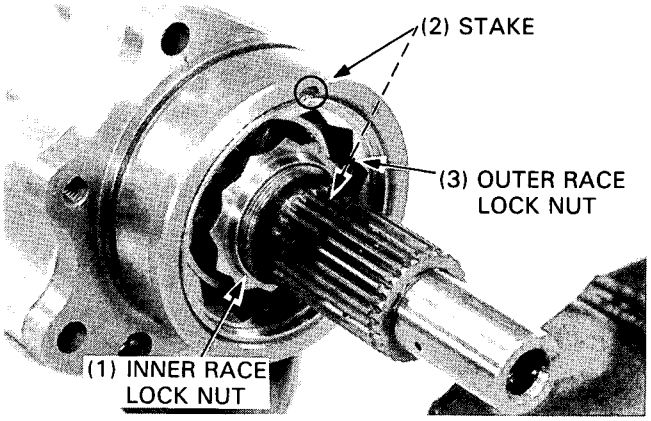
TOOLS:

Lock nut wrench, 30 x 64 mm	**07916—MB00001**
Shaft holder	**07923—6890101**

Remove the shaft holder.

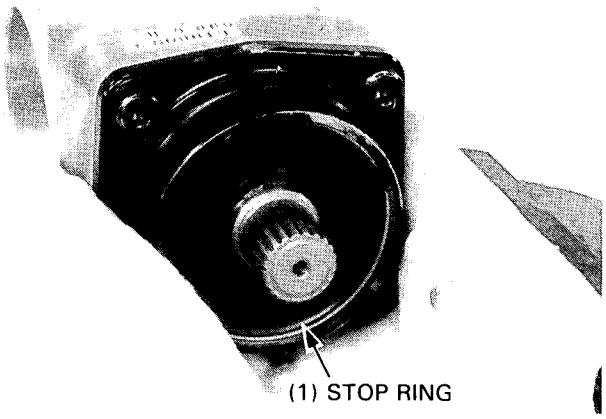


Stake the inner and outer race lock nuts.

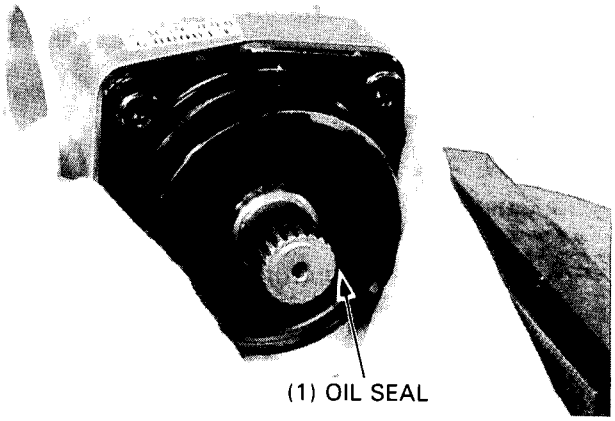


OUTPUT DRIVEN GEAR BEARING REPLACEMENT

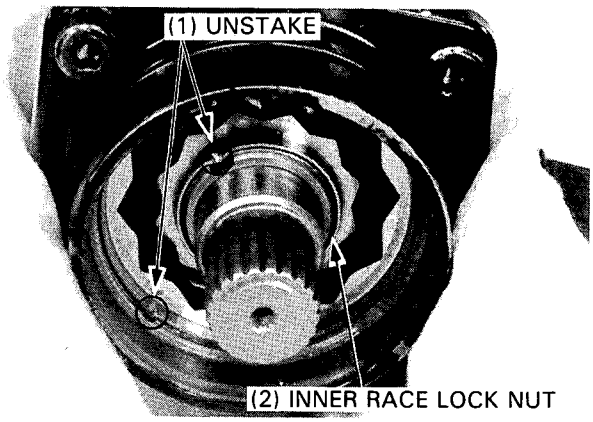
Remove the oil seal stop ring.



Remove the output driven gear oil seal from the driven gear bearing holder.



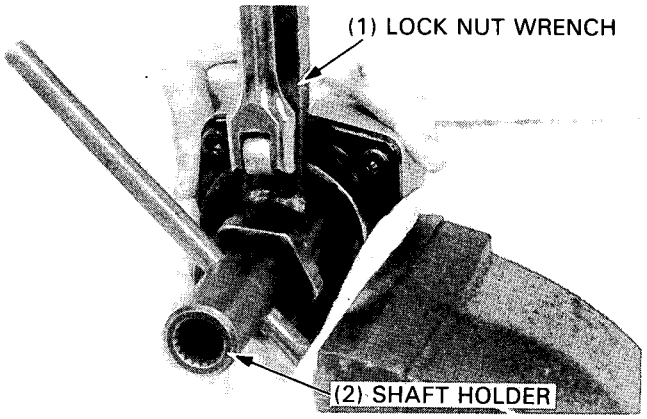
Pry or drill the staked dege of the bearing inner and outer race lock nut.



Hold the output driven gear with the shaft holder and remove the inner race lock nut.

TOOLS:

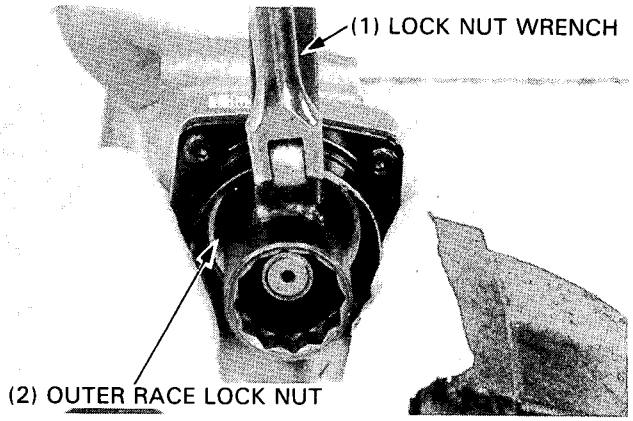
Shaft holder	**07923–6890101**
Lock nut wrench, 30 x 64 mm	**07916–MB00001**



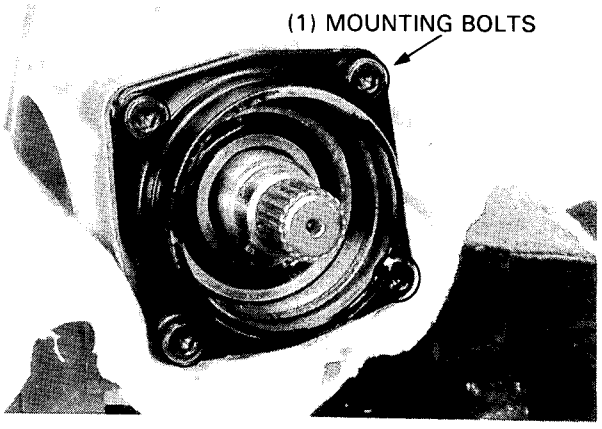
Remove the bearing outer race lock nut.

TOOL:

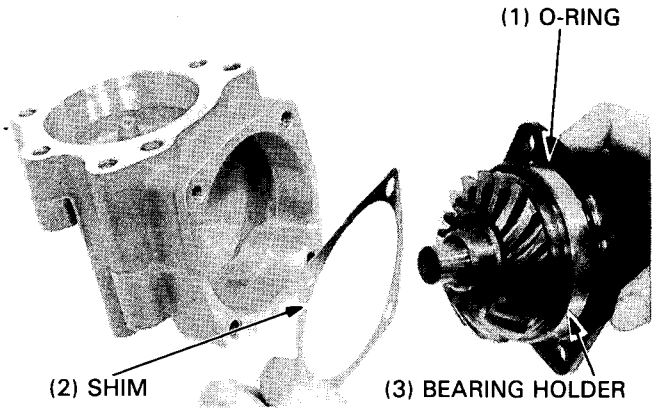
Lock nut wrench, 30 x 64 mm	**07916–MB00001**



Remove the bearing holder mounting bolts and the holder from the output gear case.



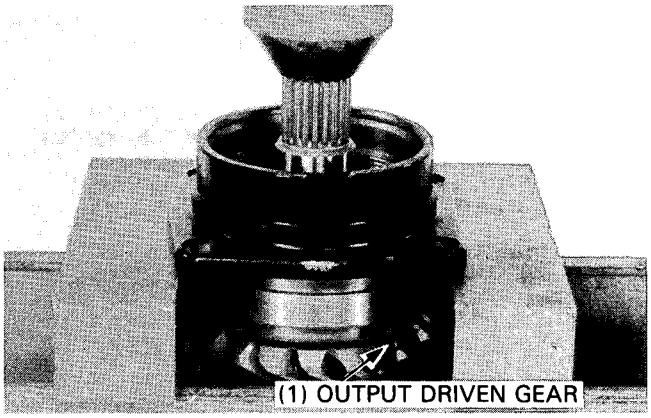
Remove the O-ring and shim from the bearing holder.



Press the output driven gear out of the bearing holder using a hydraulic press.

NOTE

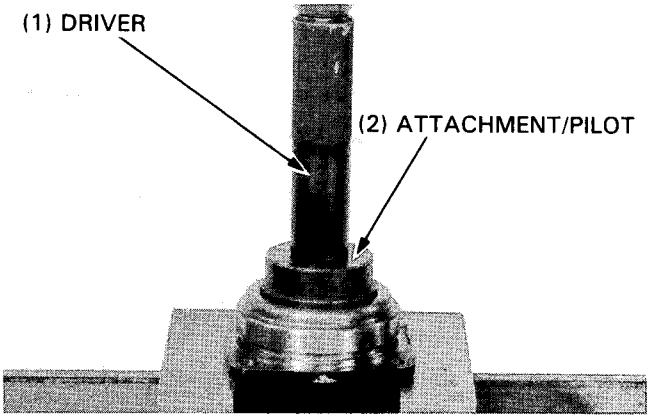
- Be careful not to damage the bearing holder gear case mating surface.



Press the output driven gear bearing out of the bearing holder using a hydraulic press.

TOOLS:

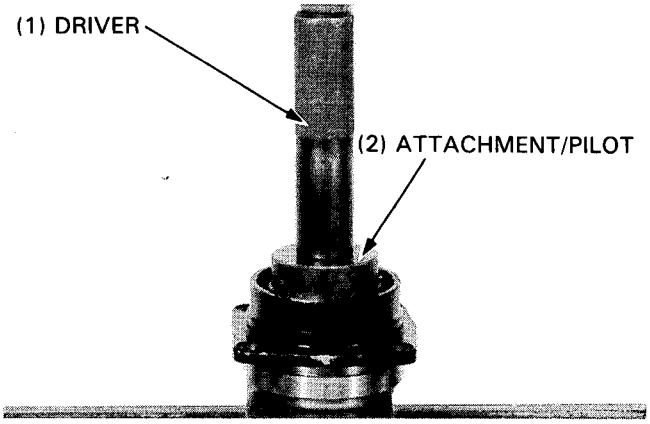
Driver	**07749–0010000**
Attachment, 52 x 55 mm	**07746–0010400**
Pilot, 30 mm	**07746–0040700**



Press a new bearing into the bearing holder using a hydraulic press.
Make sure the bearing rotates freely after installation.

TOOLS:

Driver	**07749–0010000**
Attachment, 52 x 55 mm	**07746–0010400**
Pilot, 30 mm	**07746–0040700**



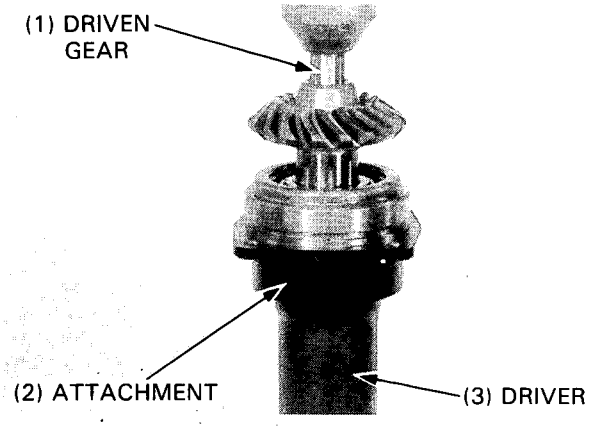
NOTE

- If the output driven gear requires replacement, the driven gear and drive shaft must be replaced as a set.

Support the bearing inner race and press the output driven gear in the bearing holder using a hydraulic press.

TOOLS:

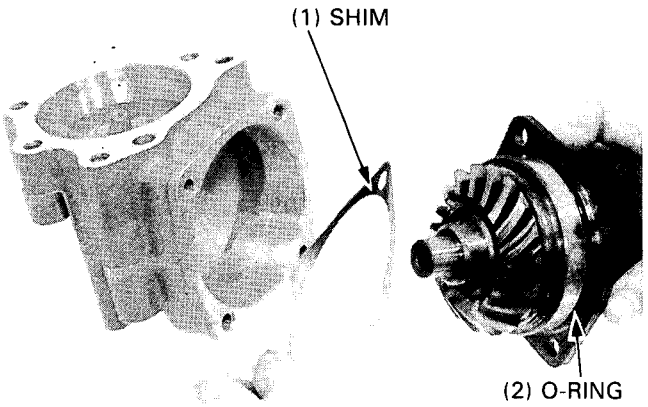
Inner driver	**07746–0030100**
Attachment, 30 mm I.D.	**07746–0030300**



Install the corret shim and a new O-ring.

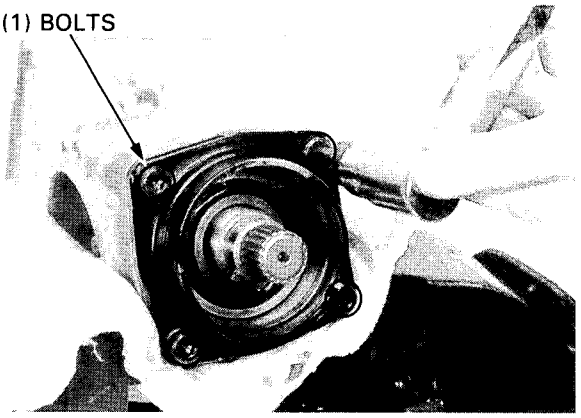
NOTE

- When the gear set, driven gear bearing and/or gear case has been replaced, use the 0.50 mm (0.020 in) shim for initial reference.



Install the driven gear bearing holder onto the gear case.
Coat the bolt threads with clean engine oil and install them.

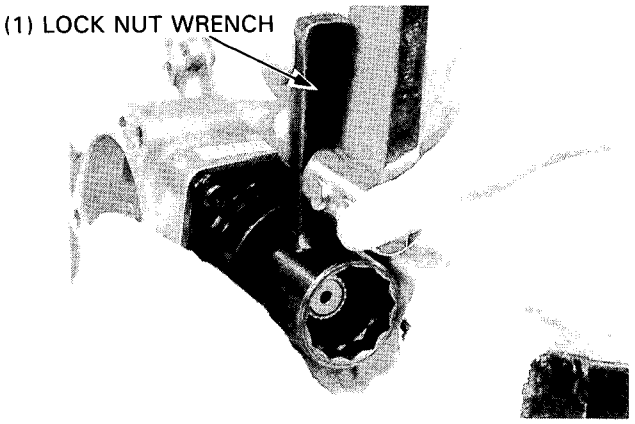
TORQUE: 32 N·m (3.2 kg-m, 23 ft-lb)



Place the bearing holder into a vise with soft jaws.
Install and tighten a new bearing outer race lock nut to the specified torque value.

TORQUE:
Actual: 100 N·m (10.0 kg-m, 72 ft-lb)
Indicated: 91 N·m (9.1 kg-m, 65 ft-lb)

TOOL:
Lock nut wrench, 30 x 64 mm 07916–MB00001

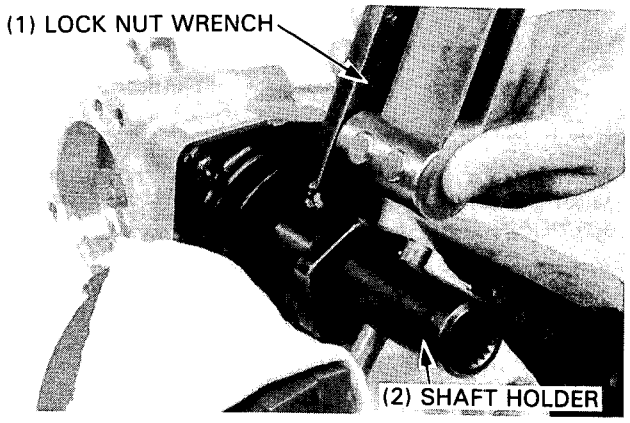


Hold the output driven gear with the shaft holder.
Install a new bearing inner race lock nut and tighten it to the specified torque.

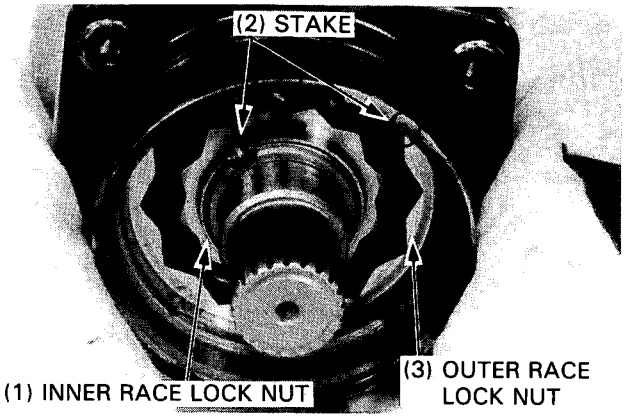
TORQUE:
Actual: 75 N·m (7.5 kg-m, 54 ft-lb)
Indicated: 69 N·m (6.9 kg-m, 50 ft-lb)

TOOLS:

Shaft holder	**07923—6890101**
Lock nut wrench, 30 x 64 mm	**07916—MB00001**

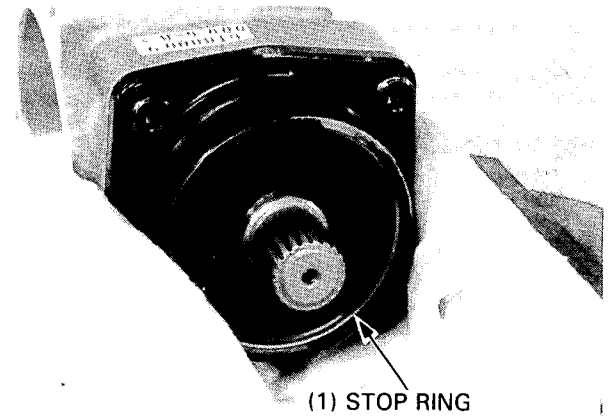


Stake the inner and outer race lock nuts.



Install a new oil seal on the bearing holder.

Install the stop ring securely into the groove in the bearing holder firmly.

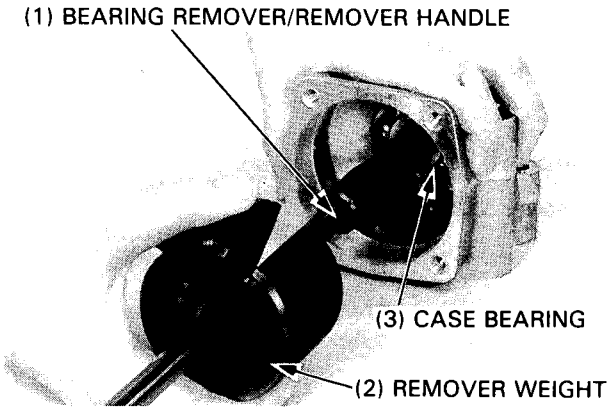


OUTPUT DRIVEN GEAR CASE BEARING REPLACEMENT

Remove the driven gear bearing holder (page 12-21).
Remove the gear case bearing with the bearing puller.

TOOLS:

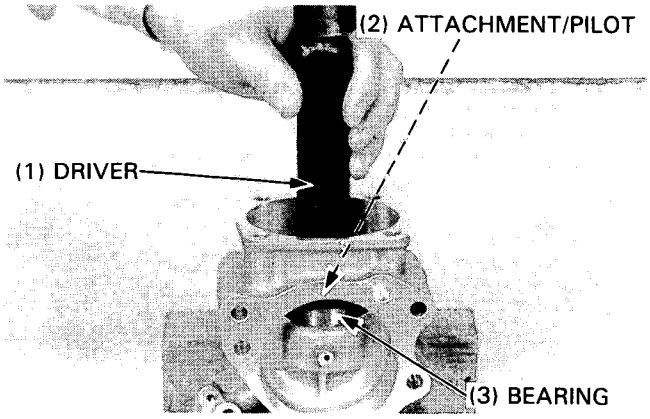
Bearing remover, 17 mm	**07936–3710300**
Remover handle	**07936–3710100**
Remover weight	**07741–0010201 or 07936–3710200**



Drive a new bearing into the gear case.

TOOLS:

Driver	**07749–0010000**
Attachment, 42 x 47 mm	**07746–0010300**
Pilot, 17 mm	**07746–0040400**



Install the driven gear bearing holder and tighten the bolts (page 12-24).
Install the drive shaft bearing holder and tighten the bolts (page 12-20).

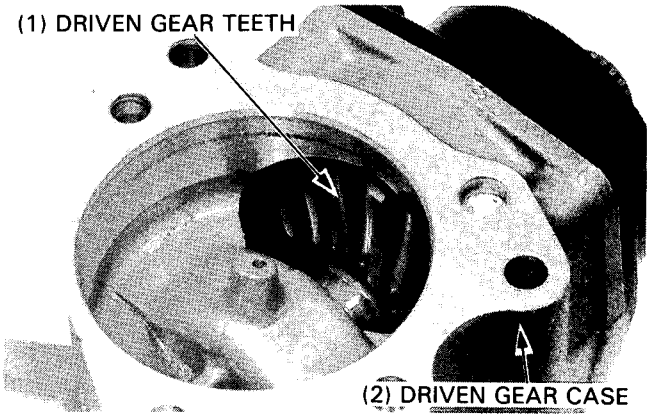
GEAR TOOTH CONTACT PATTERN CHECK

Remove the drive shaft (page 12-18) and driven gear bearing holders (page 12-21).

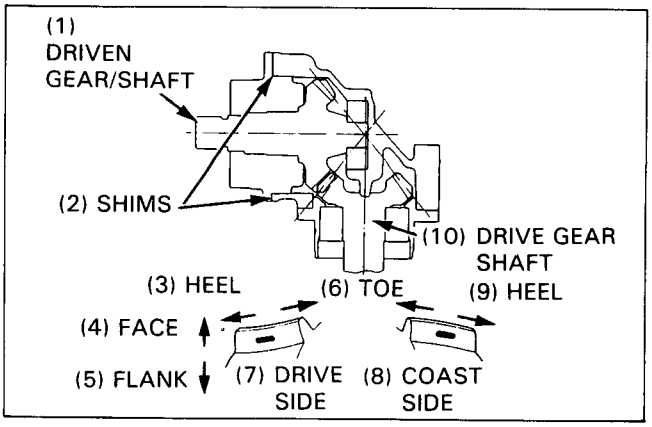
Apply Prussian Blue to the driven gear teeth.

Install the drive shaft and driven gear bearing holders with the standard shims.

Rotate the drive gear several times in the normal direction of rotation.
Check the gear tooth contact pattern after removing the drive gear.

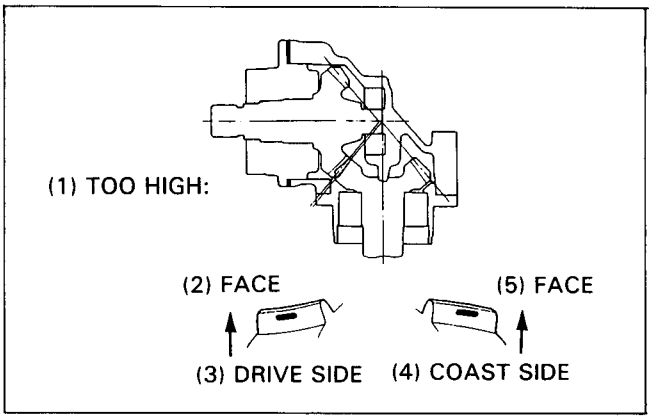


Contact is normal if Prussian Blue is transfered to the approximate center of each tooth and slightly to the toe.



If the pattern is not correct, remove and replace the driven gear adjustment shim.

Replace the shim with a thinner one if the contact pattern is too high.



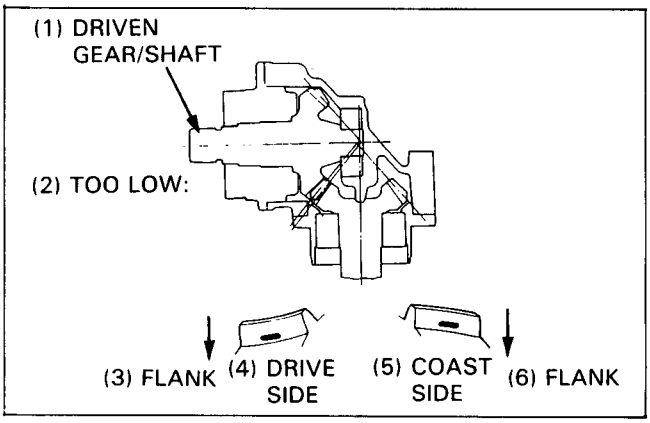
Replace the driven gear adjustment shim with a thicker one if the contact pattern is too low.

The pattern will shift about 1.5—2.0 mm (0.06—0.08 in) when the thickness of the shim is changed by 0.10 mm (0.04 in).

OUTPUT DRIVEN GEAR ADJUSTMENT SHIM:

- **A: 0.40 mm (0.016 in)**
- **B: 0.45 mm (0.018 in)**
- **C: 0.50 mm (0.020 in) Standard**
- **D: 0.55 mm (0.022 in)**
- **E: 0.60 mm (0.024 in)**

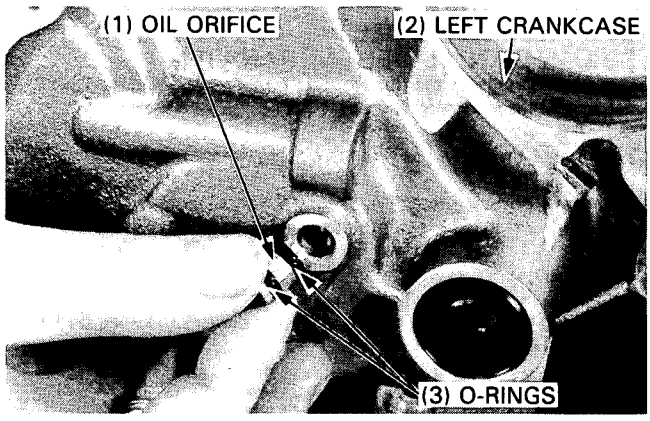
Check the backlash (See page 12-17).



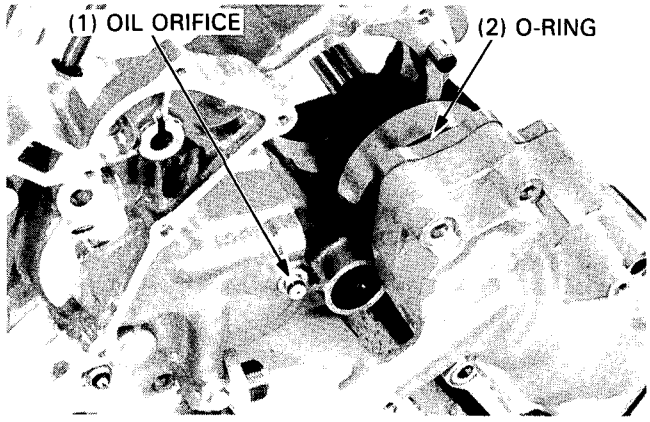
OUTPUT GEAR INSTALLATION

Clean the oil orifice with compressed air.

Install new O-rings onto the oil orifice and install the orifice into the left crankcase.



Install a new O-ring onto the drive shaft bearing holder and loosely install the output gear assembly onto the left crankcase with three bolts.

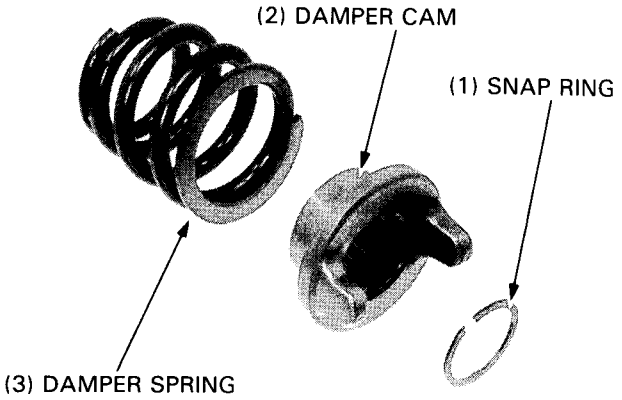


Install the damper spring over the output drive shaft with the closely wound coil facing the crankcase.
Install the damper cam onto the output drive shaft.

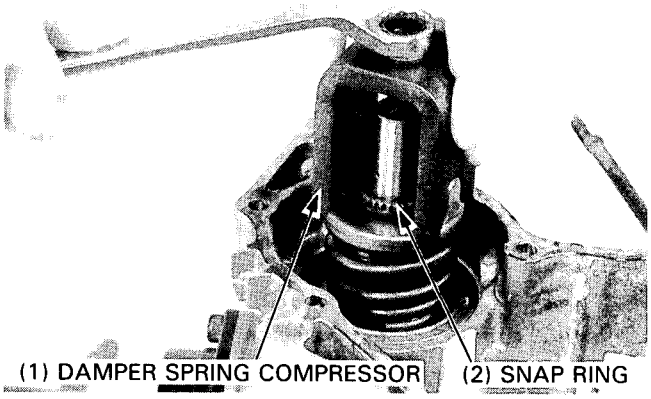
Install a attachment or equivalent spacer between the compressor bolt and body.
Set the damper spring compressor onto the damper cam and output drive shaft.
Compress the damper spring by turning the compressor bolt clockwise and install the snap ring.
Remove the compressor.

TOOLS:

Damper spring compressor	**07964—ME90000**
Snap ring pliers	**07914—5670100**
	or equivalent commercially available

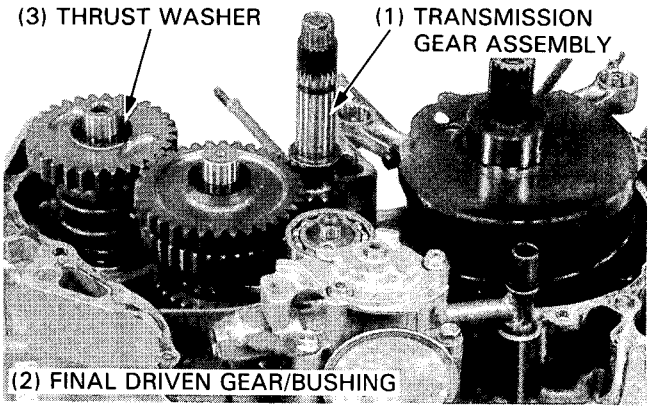


Install the transmission, final driven gear, bushing and thrust washer.



Install the following onto the left crankcase:
— transmission gear assembly
— shift fork/shift drum
— final driven gear/bushing
— thrust washer

Assemble the crankcase (page 11-4).

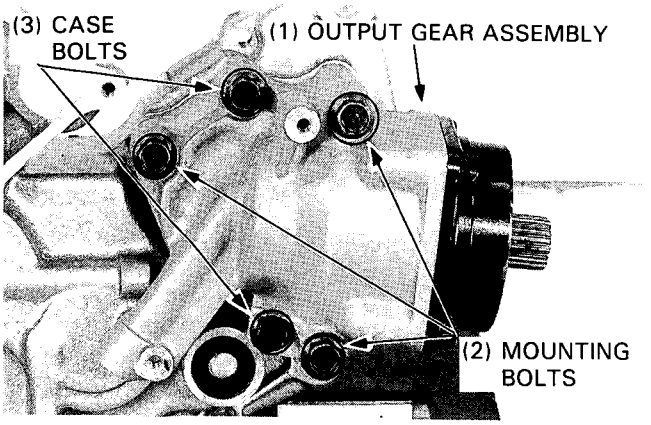


Tighten the three output gear case mounting bolts.

TORQUE: 32 N·m (3.2 kg-m, 23 ft-lb)

Install and tighten the two output gear case bolts.

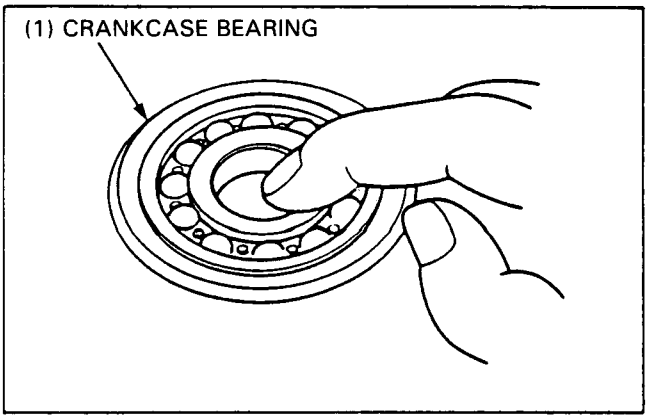
TORQUE: 32 N·m (3.2 kg-m, 23 ft-lb)



CRANKCASE BEARINGS REPLACEMENT

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 crankcase.

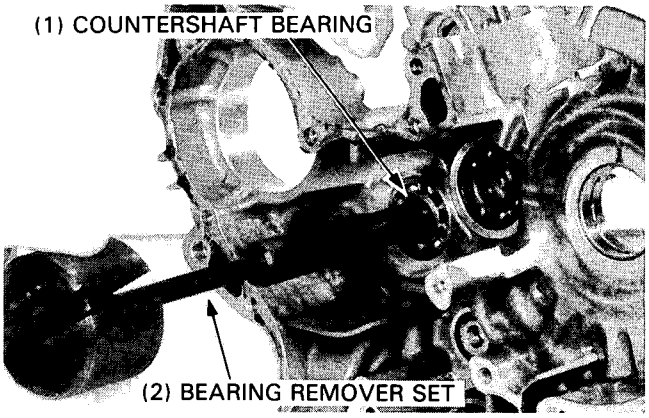
Remove and discard the bearings if the races do not turn smoothly, quietly, or if they fit loosely in the crankcase.



Left cankcase
Remove the left countershaft bearing using the special tools.

TOOLS:

Bearing remover set	**07936—3710001**
— remover handle	**07936—3710100**
— bearing remover set	**07936—3710600**
— remover weight	**07741—0010201**

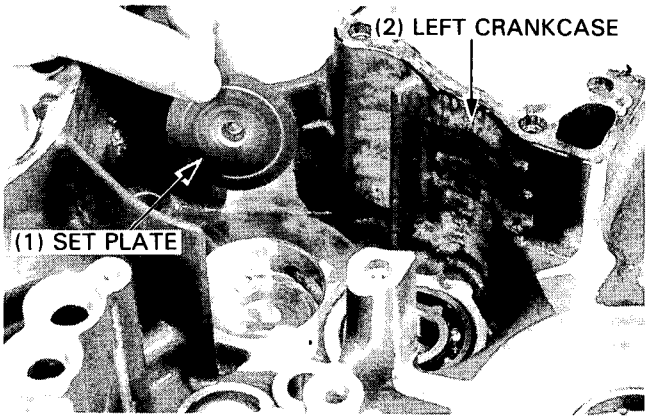


Remove the countershaft bearing set plate and discard it.

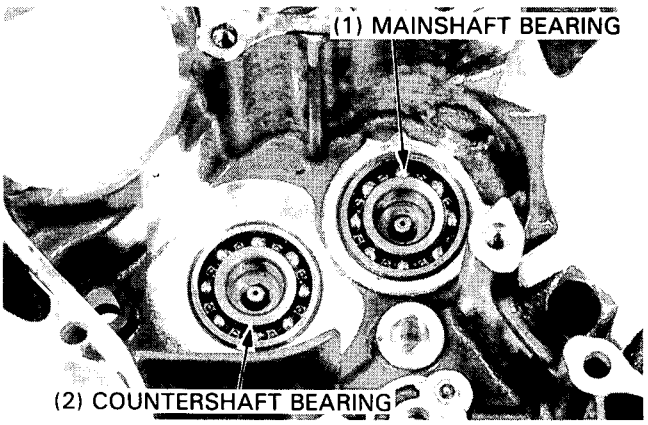
NOTE

- Do not use the removed set plate.

Install the countershaft bearing set plate on the left crankcase.



The mainshaft bearing service is using the same procedure as for countershaft bearing service.



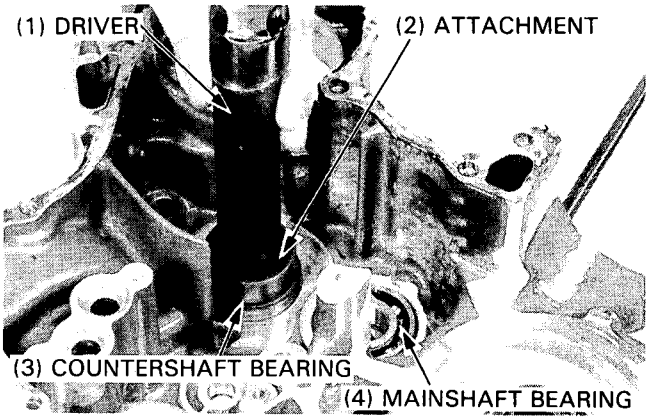
NOTE

- Apply fresh engine oil to the new crankcase bearings before installation.

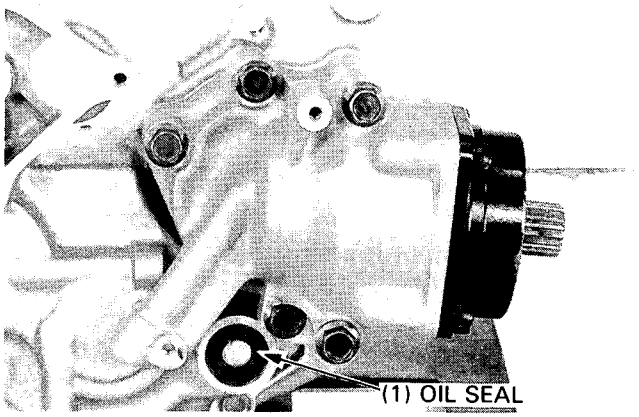
Install the new countershaft and mainshaft bearings with the following tools.

TOOLS:

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



Check the gearshift spindle oil seal for wear or damage, replace if necessary.



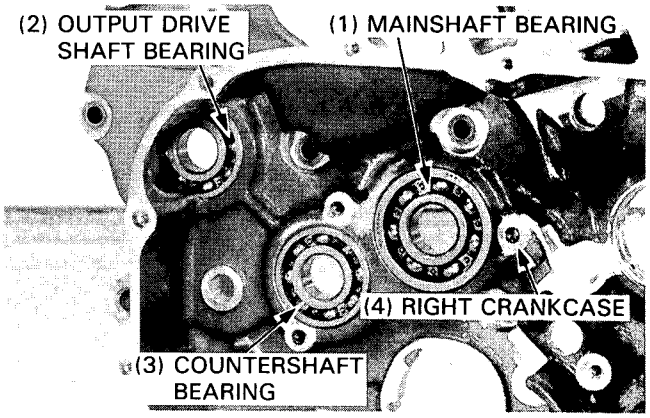
Right crankcase
Separate the crankcase (page 11-2).

Heat the right crankcase around the output drive shaft, mainshaft and countershaft bearings to 80°C (176°F).

⚠WARNING

- ***Always wear gloves when handling a heated crankcase.***

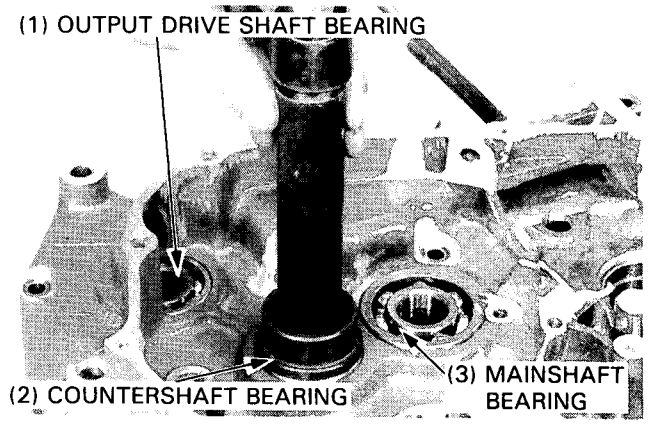
Drive the output drive shaft, mainshaft and countershaft bearings out of the right crankcase.



Drive the new bearings into the right crankcase with their lettered sides facing out using the following tools.

TOOLS:

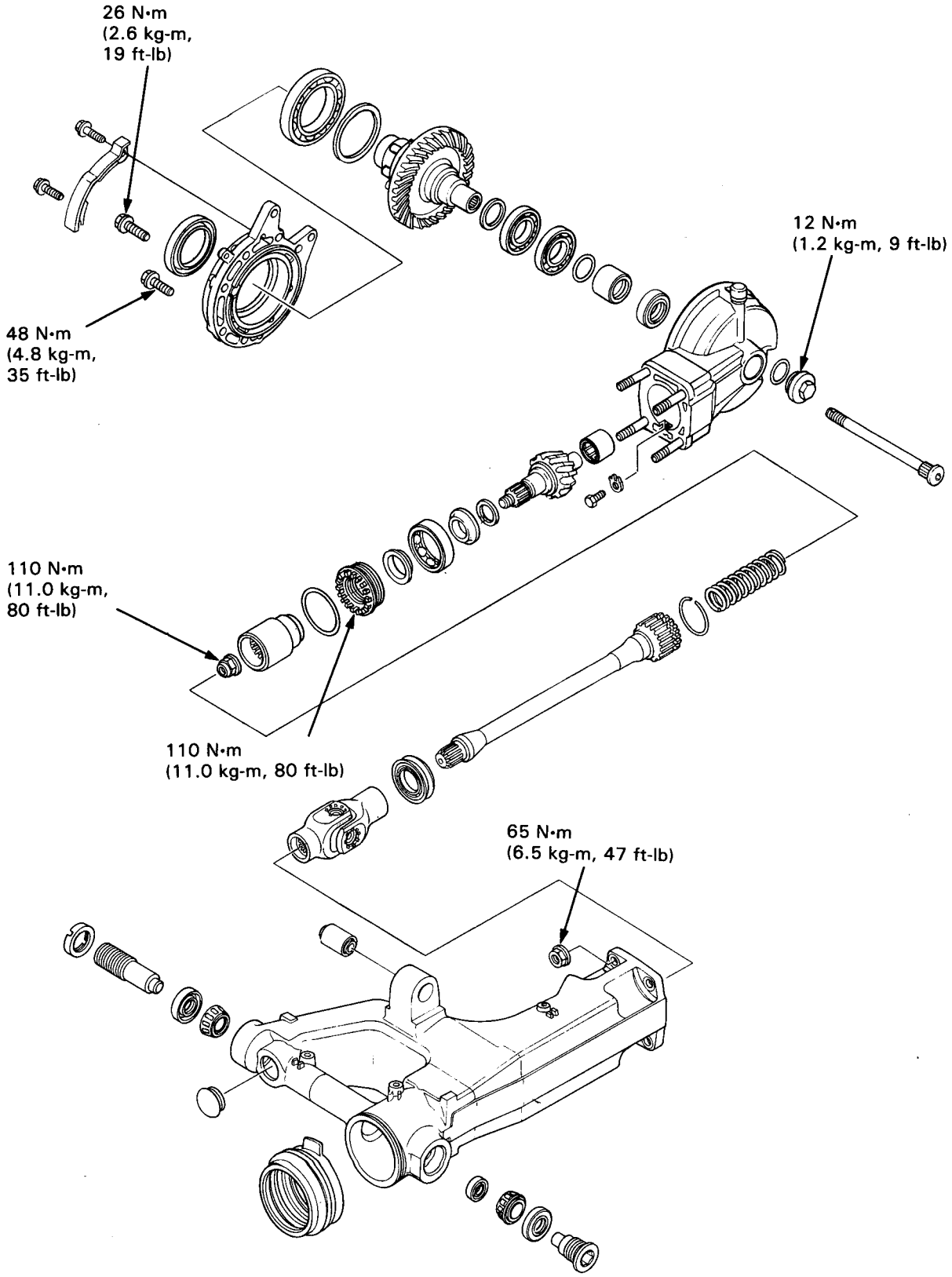
Mainshaft bearing:	
Driver	**07749–0010000**
Attachment, 52 x 55 mm	**07746–0010400**
Pilot, 22 mm	**07746–0041000**
Countershaft bearing and output drive shasft bearing:	
Driver	**07749–0010000**
Attachment, 42 x 47 mm	**07746–0010300**
Pilot, 20 mm	**07746–0040500**



Install the transmission, output drive gear and crankshaft.

Assemble the crankcase (page 11-4).

FINAL DRIVE


26 N·m
(2.6 kg-m,
19 ft-lb)
48 N·m
(4.8 kg-m,
35 ft-lb)
12 N·m
(1.2 kg-m, 9 ft-lb)
110 N·m
(11.0 kg-m,
80 ft-lb)
110 N·m
(11.0 kg-m, 80 ft-lb)
65 N·m
(6.5 kg-m, 47 ft-lb)

SERVICE INFORMATION

GENERAL

- The final drive gear assembly and drive shaft must be removed together.
- Replace all oil seals and O-rings whenever the final drive gear assembly is disassembled.
- Check the tooth contact pattern and gear backlash when the bearing, gear set and/or gear case have been replaced.

SPECIFICATIONS

ITEM		STANDARD	SERVICE LIMIT
Final gear oil	Capacity	120 cm^3 (4.1 US. oz. 4.2 Imp. oz)	——
	Recommended oil	Hypoid-gear oil: SAE #80	——
Gear backlash		0.05—0.15 mm (0.002—0.006 in)	0.15 mm (0.006 in)

TORQUE VALUES

Pinion bearing retainer	110N·m (11.0 kg-m, 80 ft-lb)
Pinion nut	110N·m (11.0 kg-m, 80 ft-lb)
Gear case cover bolt 10 mm	48N·m (4.8 kg-m, 35 ft-lb)
8 mm	26N·m (2.6 kg-m, 19 ft-lb)
Final gear case attaching nut	65N·m (6.5 kg-m, 47 ft-lb)
Rear wheel nut	120N·m (12.0 kg-m, 87 ft-lb) Apply clean grease to the axle threads
Rear brake disc retaining bolt	27N·m (2.7 kg-m, 20 ft-lb) Apply a locking agent to the threads

TOOLS

Special

Pinion holder	07924—ME40001 or modified 07924—ME40000 see page 13-13.
Puller shaft	07931—ME40000
Pinion retainer wrench	07910—MA10000
Adjustable bearing remover set	07JAC—PH80000
— Adjustable bearing remover attachment	07JAC—PH80100
— Adjustable bearing remover shaft	07JAC—PH80200
— Bearing remover weight	07741—0010201
Attachment	07945—3330300
Bearing race insert attachment	07931—4630300
Front hub base	07GAF—SE00401

Common

Driver	07749—0010000
Attachment, 52 x 55 mm	07746—0010400
Inner driver (C)	07746—0030100
Attachment, 25 mm I.D.	07746—0030200
Pilot, 30 mm	07746—0040700

TROUBLESHOOTING

Excessive noise

- Worn or scored ring gear shaft and driven flange
- Scored driven flange and wheel hub
- Worn or scored drive pinion and splines
- Worn pinion and ring gears
- Excessive backlash between pinion and ring gear
- Oil level too low

Oil leak

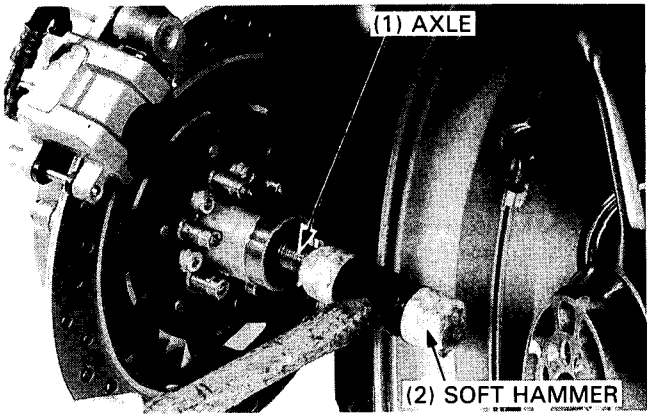
- Clogged breather
- Oil level too high
- Seals damaged

FINAL DRIVE REMOVAL

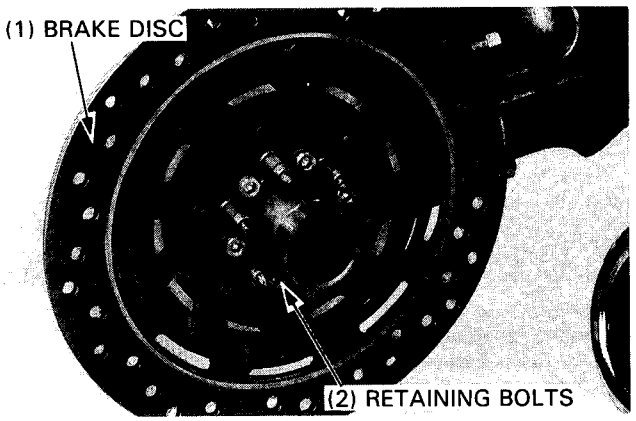
Place the motorcycle on its center stand.

Remove the rear wheel (page 15-3).

Tap the axle with soft a hammer and push the axle in until it clears the engagement.

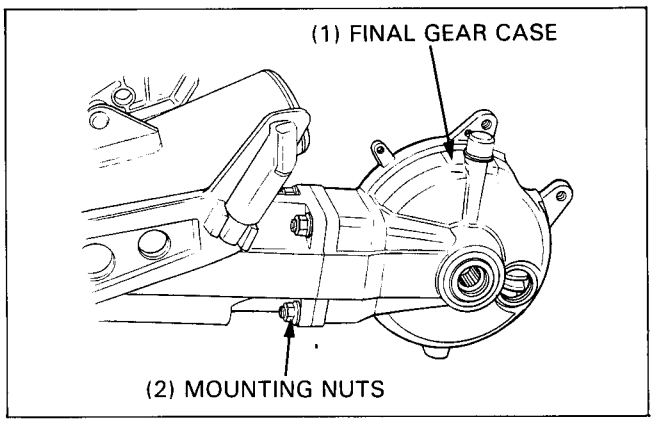


Remove the rear brake disc by removing the retaining bolts.

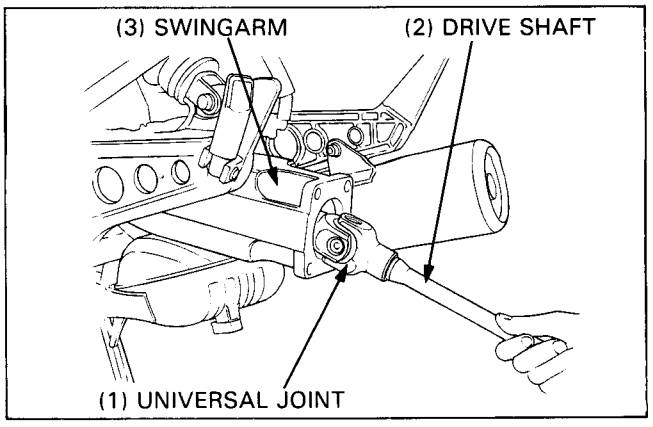


Remove the mounting nuts and the final gear case with drive shaft and universal joint as an assembly.

Drain the final gear oil (page 2-10).



If the drive shaft stay in the swingarm, remove the drive shaft and universal joint as assembly.



UNIVERSAL JOINT

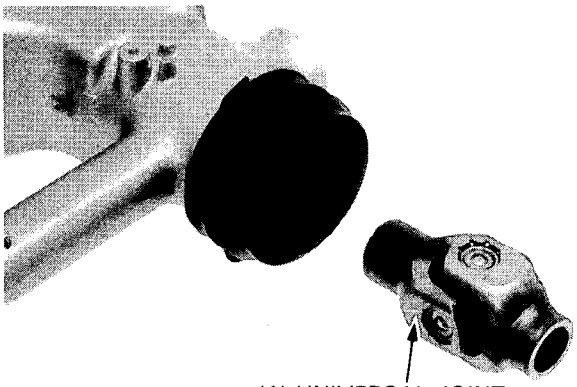
Inspect the universal joint. There should be no play in the bearings.

Rotate the shaft and joint in opposite directions. If there is any evidence of side play, the universal joint must be replaced.

Apply molybedenum disulfide addtive grease to the splines.

NOTE

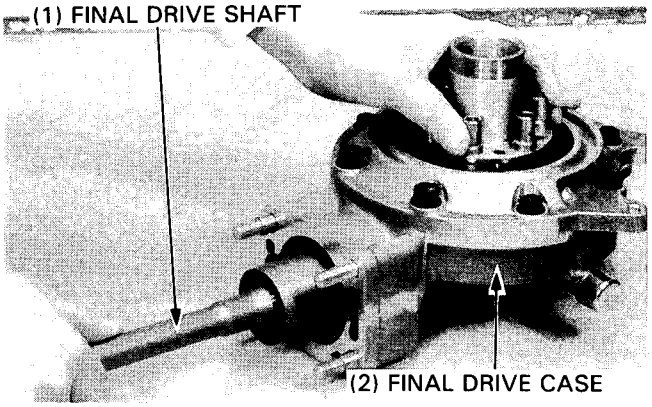
- Install the joint into the swingarm, with the long splines side to the rear.



DRIVE SHAFT

REMOVAL

Separate the drive shaft from the gear case by gently pulling on the drive shaft while moving it in a circular pattern.



DISASSEMBLY/ASSEMBLY

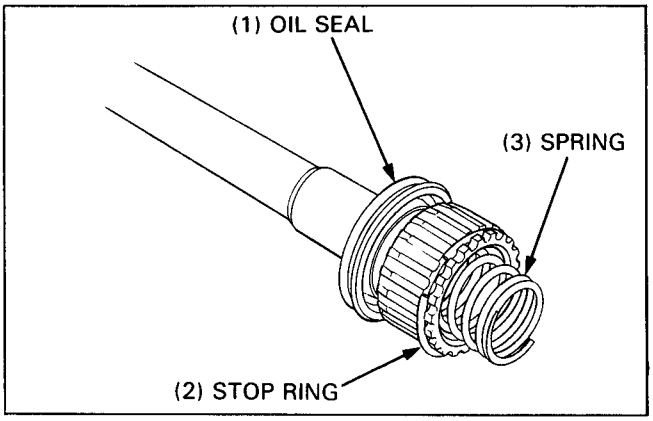
Remove the spring, oil seal and stop ring from the drive shaft.

NOTE

- Replace the oil seal whenever it is removed.

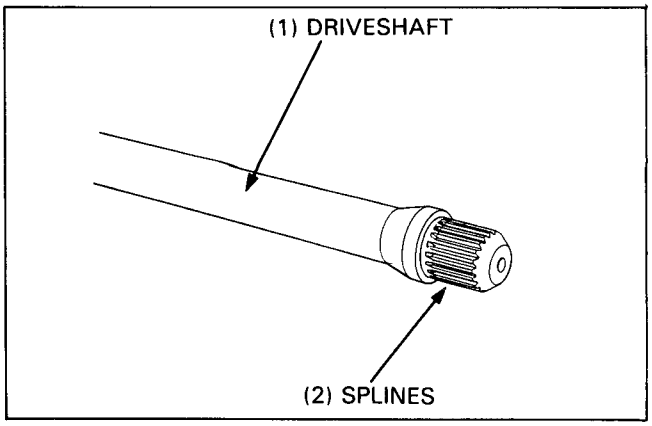
Discard the oil seal and stop ring.

Place a new oil seal over the drive shaft.
Install the spring and a new stop ring.



Inspect the drive shaft splines for wear or damage.

Clean and apply molybdenum disulfide grease to the both ends splines.
See page 13-16 for gear case installation.



GEAR CASE DISASSEMBLY

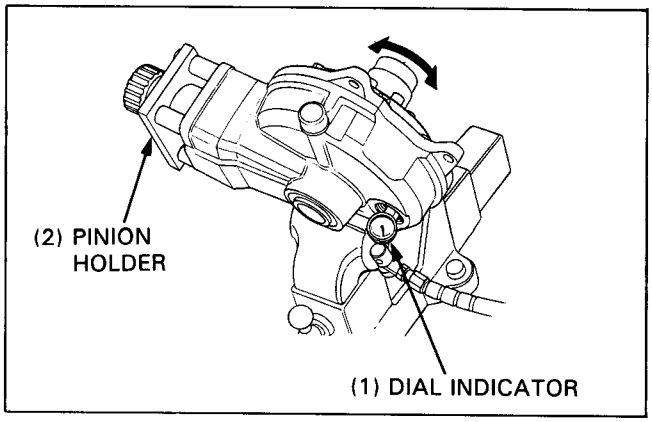
BACKLASH INSPECTION

Remove the oil filler cap.

Set the final gear assembly into a jig or stand to hold it steady.

Set a horizontal type dial indicator on the ring gear, through the oil filler hole.

Hold the pinion gear spline with the pinion holder. Rotate the ring gear by hand until gear slack is taken up.



TOOL:

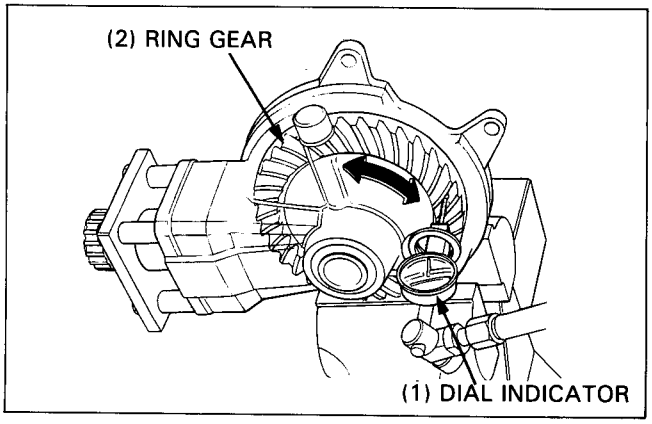
Pinion holder	**07924—ME40001**
or Modified Pinion holder	**07924—ME40000**

NOTE

- Modification to the pinion holder 07924—ME40000, indicated page 13-13.

Turn the ring gear back and forth to read backlash.

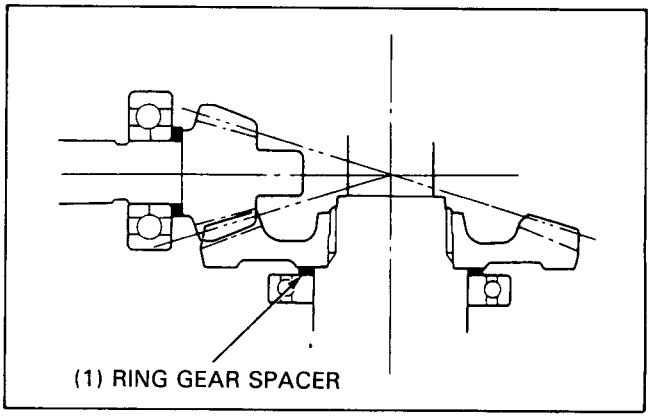
STANDARD: 0.05—0.15 mm (0.002—0.006 in)
SERVICE LIMIT: 0.15 mm (0.006 in)



Remove the dial indicator. Turn the ring gear 120° and measure backlash. Repeat this procedure once more.

Compare the difference between the three measurements.

DIFFERENCE BETWEEN MEASUREMENTS
SERVICE LIMIT: 0.10 mm (0.004 in)



If the difference in measurements exceeds the limit, it indicates that the bearing is not installed squarely.
Inspect the bearings and reinstall if necessary.

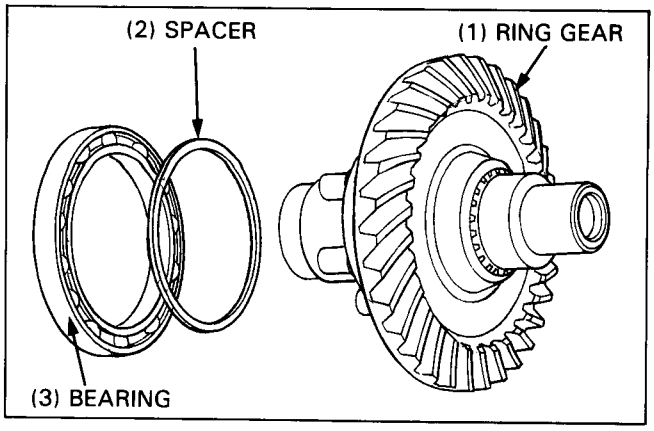
If backlash is excessive, replace the ring gear spacer with a thicker one.

If the backlash is too small, replace the ring gear spacer with a thinner one.

Backlash is changed by about 0.06—0.07 mm (0.002—0.003 in) when the thickness of the spacer is changed by 0.10 mm (0.004 in).

RING GEAR SPACER: *:Standard

	A: 1.58 mm (0.062 in)	**L: 2.24 mm (0.088 in)**
	B: 1.64 mm (0.065 in)	**M: 2.30 mm (0.091 in)**
	C: 1.70 mm (0.067 in)	**N: 2.36 mm (0.093 in)**
	D: 1.76 mm (0.069 in)	**O: 2.42 mm (0.095 in)**
	E: 1.82 mm (0.072 in)	**P: 2.48 mm (0.098 in)**
	F: 1.88 mm (0.074 in)	**Q: 2.54 mm (0.100 in)**
	G: 1.94 mm (0.076 in)	**R: 2.60 mm (0.102 in)**
*	**H: 2.00 mm (0.079 in)**	**S: 2.66 mm (0.105 in)**
	I: 2.06 mm (0.081 in)	**T: 2.72 mm (0.107 in)**
	J: 2.12 mm (0.083 in)	**U: 2.78 mm (0.109 in)**
	K: 2.18 mm (0.086 in)	**V: 2.84 mm (0.112 in)**



GEARCASE SEPARATION

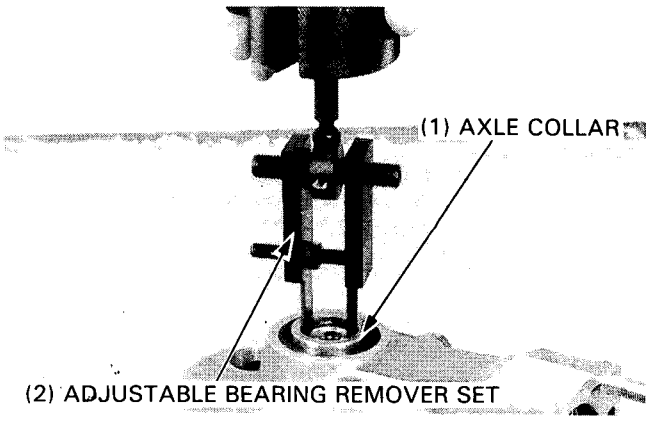
Install the special tool into the axle collar.

TOOLS:

Adjustable bearing remover set 07JAC—PH80000
— Adjustable bearing remover attachment 07JAC—PH80100
— Adjustable bearing remover shaft 07JAC—PH80200
— Bearing remover weight 07741—0010201

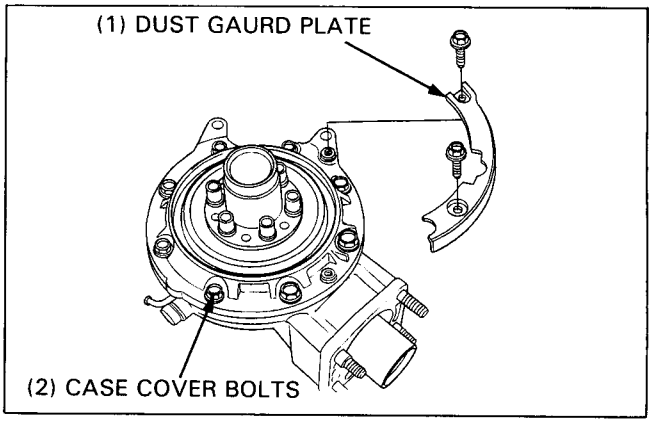
Using the special tools, pull out the axle collar.

Remove the O-ring from the axle collar and discard it.



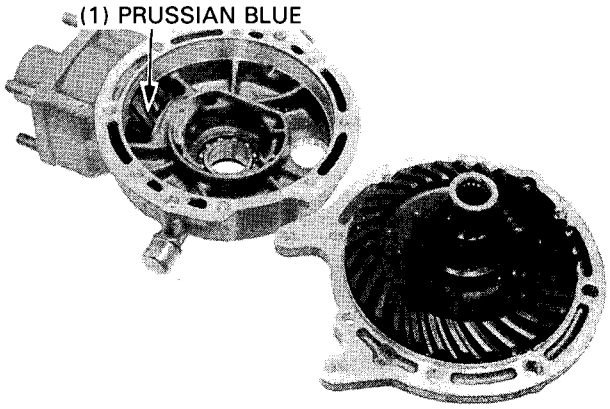
Remove the dust guard plate bolts and the plate.

Remove the eight case cover bolts and cover.



GEAR TOOTH CONTACT PATTERN CHECK

Separate the gear case and cover indicated in the previous steps.
Apply a thin coat of Prussian Blue to the pinion gear teeth for a contact pattern check.

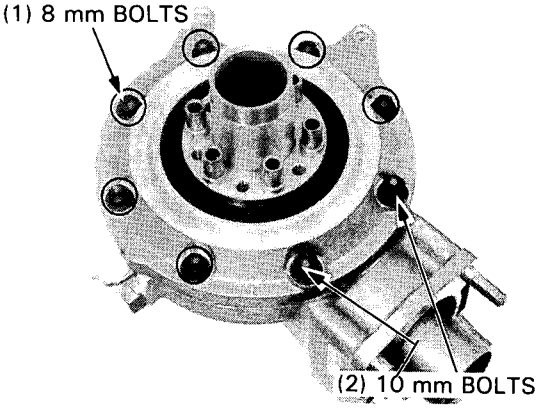


Tighten the cover bolts in 2 or 3 steps until the cover evenly touches the gear case, then tighten the 8 mm bolts to the specified torque in a crisscross pattern in two or more steps.

TORQUE: 26 N·m (2.6 kg-m, 19 ft-lb)

Then tighten the 10 mm bolts.

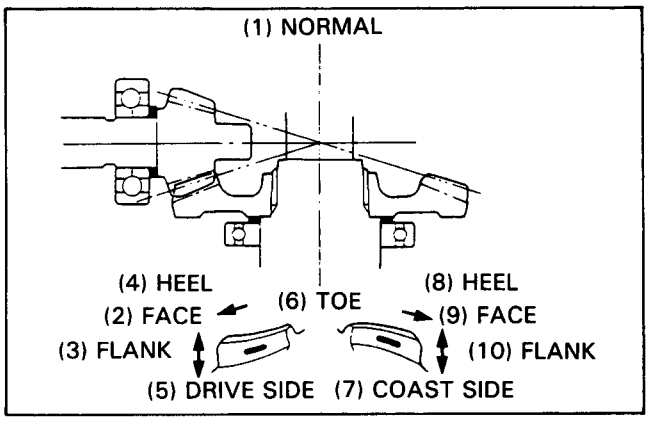
TORQUE: 48 N·m (4.8 kg-m, 35 ft-lb)



Remove the oil filler cap from the final gear case.

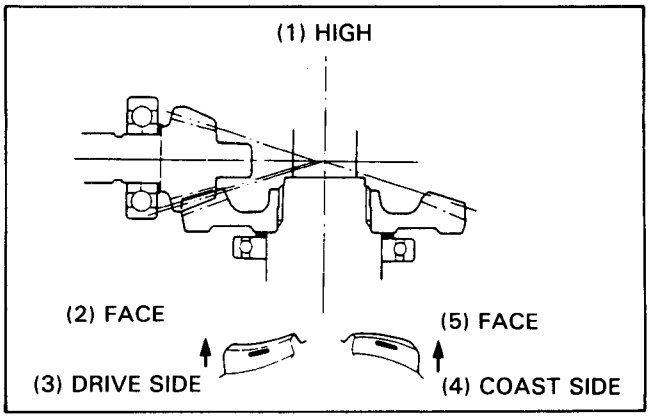
Rotate the ring gear several times in both direction of rotation.

Check the gear wooth contact pattern through the oil filler hole.
The pattern will be indicated by the Prussian Blue applied to the pinion before assembly.
Contact is normal if Prussian Blue is transferred to the approximate center of each tooth and slightly towards the face.



If the patterns are not correct, remove and change the pinion spacer (page 13-13).

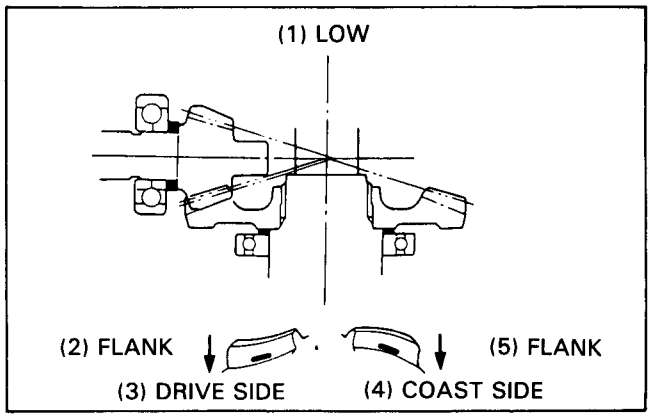
Replace the pinion spacer with a thicker one if the contact patterns are too high.



Replace the pinion spacer with a thinner one if the contact patterns are too low.

The patterns will shift about 1.5—2.0 mm (0.06—0.08 in) when the thickness of the spacer is changed by 0.1 mm (0.004 in).

PINION SPACER:
- **A: 1.82 mm (0.072 in)**
- **B: 1.88 mm (0.074 in)**
- **C: 1.94 mm (0.076 in)**
- **D: 2.00 mm (0.079 in) standard**
- **E: 2.06 mm (0.081 in)**
- **F: 2.12 mm (0.083 in)**
- **G: 2.18 mm (0.086 in)**



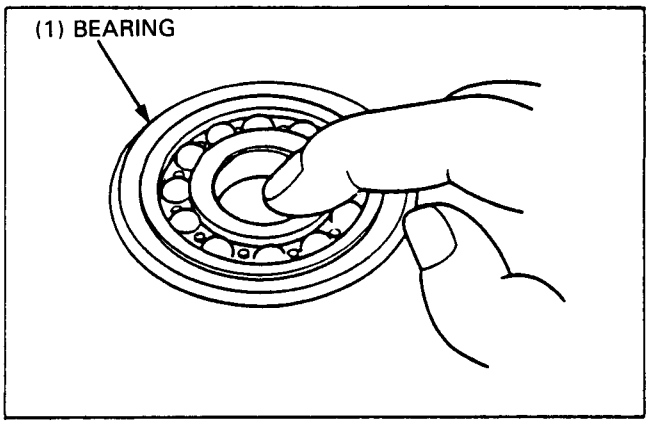
BEARING INSPECTION

Separate the gear case and cover (page 13-6).
Turn the inner or outer race of the ring gear bearings with your finger. The bearings should turn smoothly and quietly.

Also check that the outer or inner races fit tightly in the case or gear.

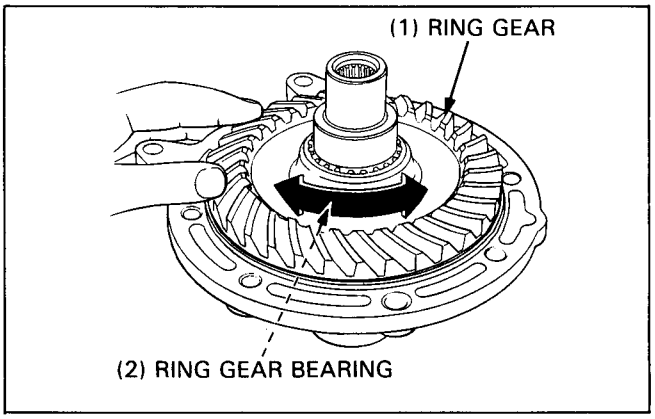
Remove and discard the bearings if the races do not turn smoothly and quietly, or if they loosely fit in the case or gear.

For drive pinion removal and disassembly, see page 13-13.



Hold the gear case and ring gear as an assembly.
Turn the ring gear with your finger. The gear should turn smoothly and quietly.
Also check that the ring gear and ring gear bearing race fit tightly in the ring gear and gear case.

Remove the discard the bearing if the races of not turn smoothly and quietly, or if they loosely fit in the gear or case.

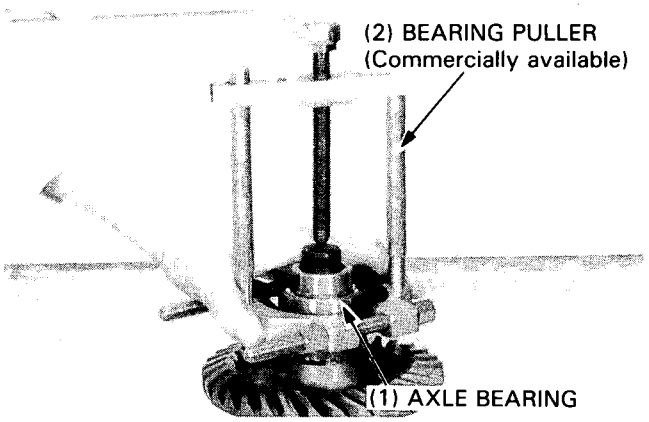


RING GEAR BEARING REPLACEMENT

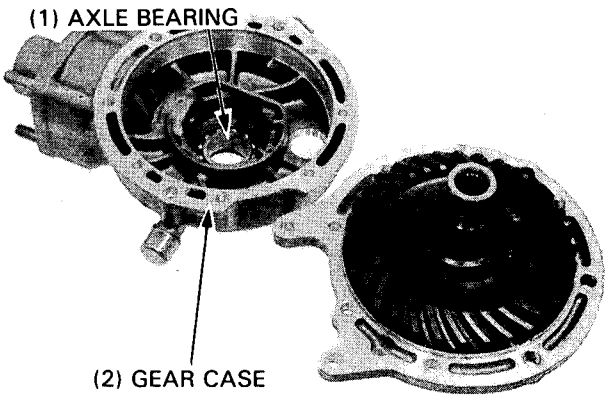
Remove the axle bearing from the ring gear.
Pull the bearing off the ring gear with the universal bearing puller.

TOOL:

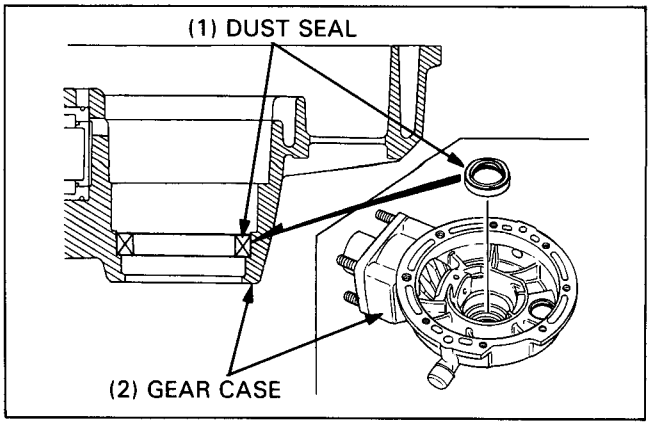
Universal bearing puller	**07631—0010000 or Commercially available**



If the axle bearing stay in the gear case, remove the bearing from the case.



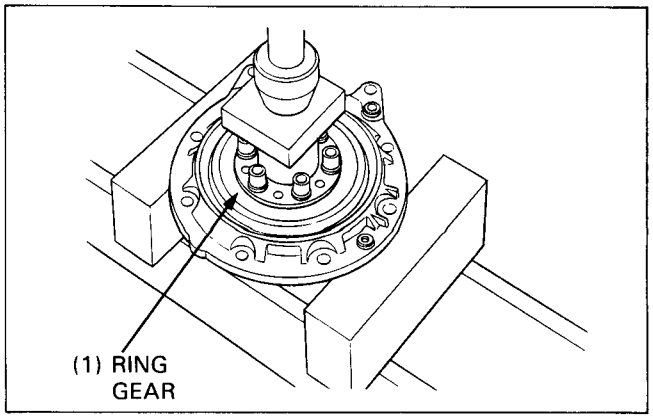
Remove the dust seal from the gear case.



Press the ring gear and bearing out of cover.

CAUTION

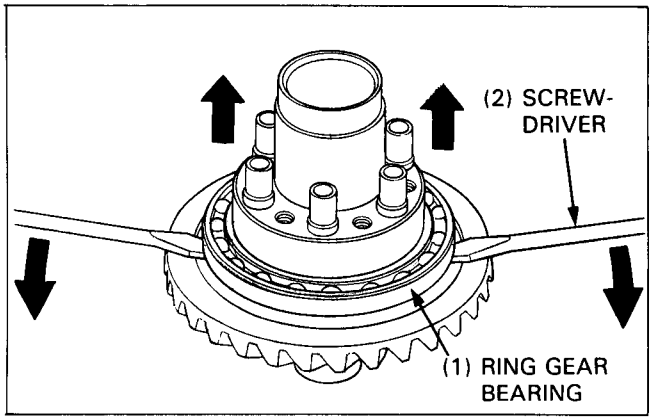
- *Do not damage the ring gear.*



Pry out the ring gear bearing.

CAUTION

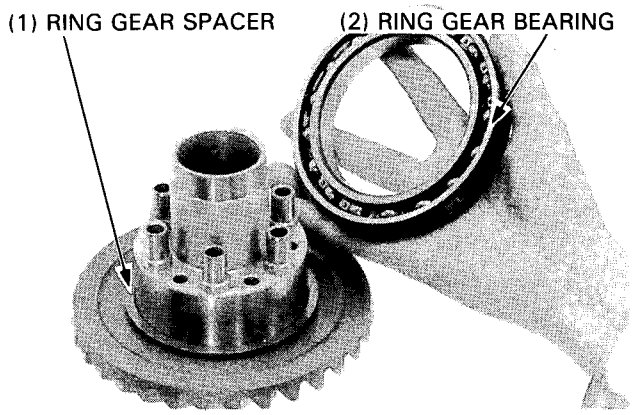
- *Do not damage the ring gear spacer.*



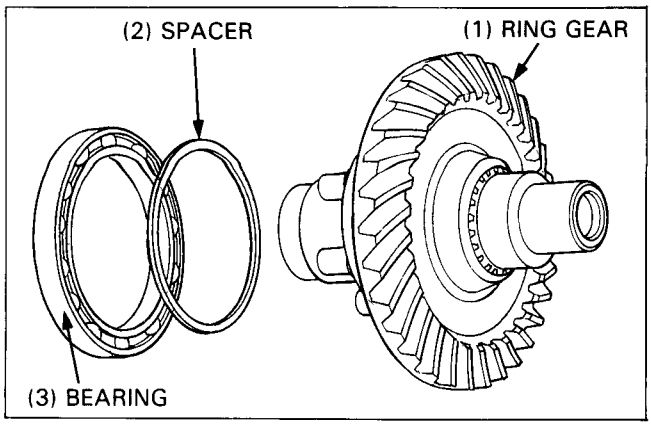
Remove the ring gear spacer.

NOTE

- If the gear set, pinion bearing, ring gear bearing, and/or gear case is replaced, install a 2.0 mm (0.08 in) thick spacer (standard).

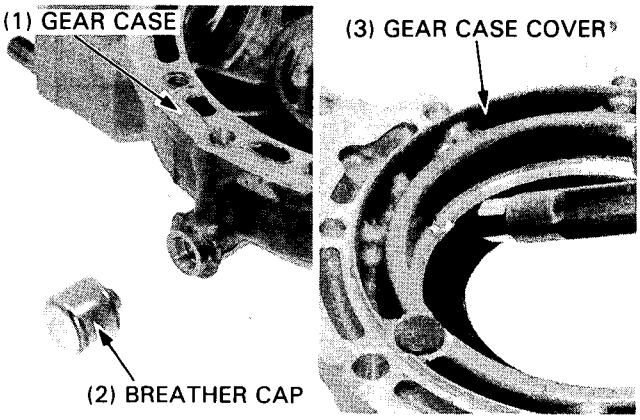


Place the suitable ring gear spacer onto the ring gear.

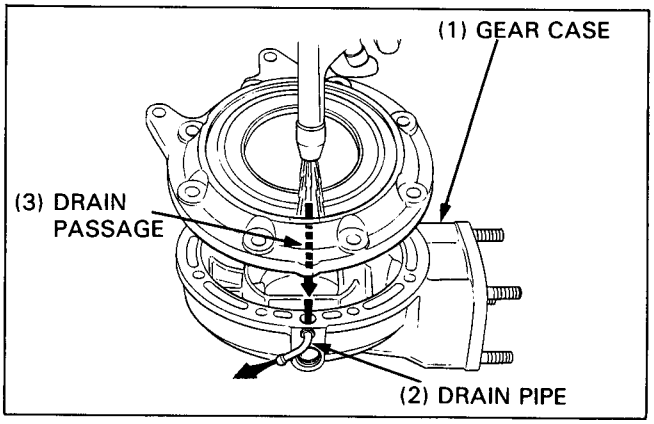


BREATHER HOLE CLEANING

Remove the breather hole cap and blow compressed air through the breather hole.
Blow compressed air through the breather hole in the gear case cover.

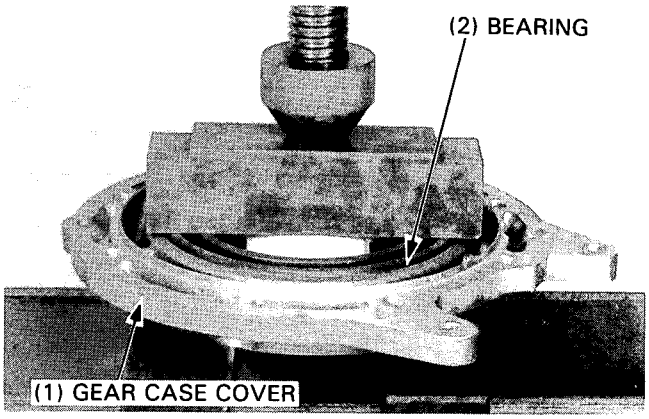


Blow the compressed air through the gearcase drain pipe and the passage.



GEAR CASE ASSEMBLY

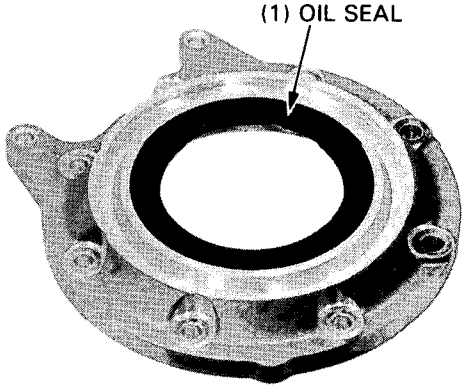
Use a hydraulic press to seat the ring gear bearing on the gear case cover.



Check the oil seal lip for wear ordamage and replace the new one if necessary.

Apply gear oil to the case cover oil seal lip.

Gently seat the oil seal on the cover, if removed.

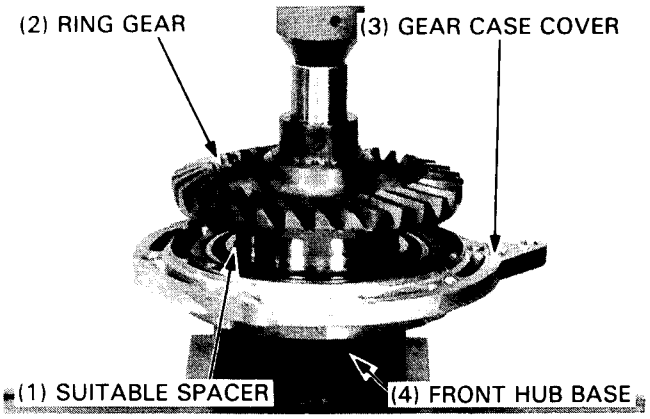


Choose suitable thick of the ring gear spacer (page 13-5).

Install the suitable spacer on the ring gear.

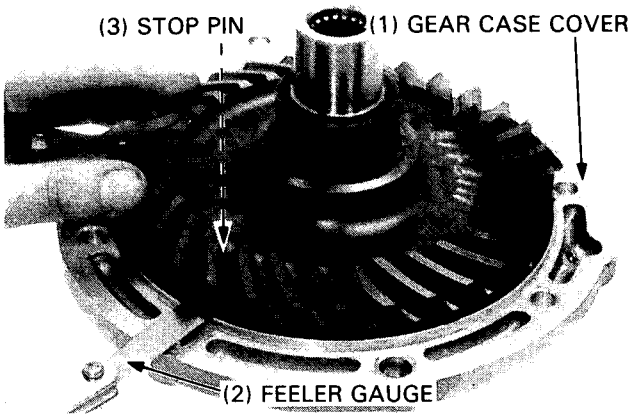
Use a hydraulic press to seat the ring gear with the spacer on the gear case cover.

TOOL:
Front hub base **07GAF–SE00401**



Measure the clearance between the ring gear and the ring gear stop pin with a feeler gauge.

CLEARANCE: 0.30–0.60 mm (0.012–0.024 in)



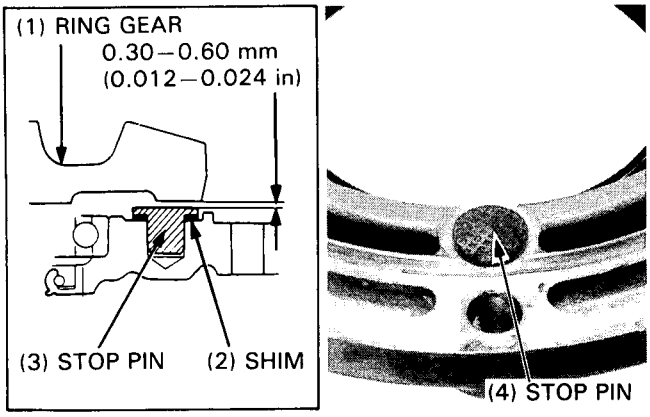
Remove the ring gear. If the clearance exceeds the service limit, heat the gear case cover to approximately 80°C (176°F) and remove the stop pin by tapping the cover.

⚠ WARNING

- ***Always wear gloves when handling the gear case after it has been heated.***

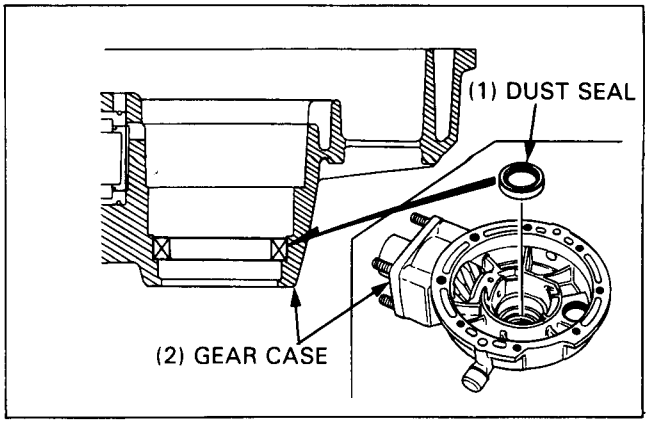
Install a stop pin shim to obtain the correct clearance.

SHIM THICKNESS: A: 0.10 mm (0.004 in)
B: 0.15 mm (0.006 in)



Install the shim and drive the stop pin into the case cover.

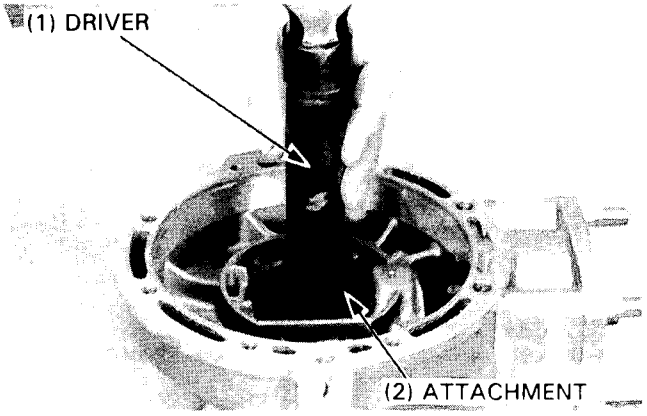
Apply clean gear oil to the dust seal lips.
Install the dust seal into the gear case securely.



Drive the new axle bearing into the case.

TOOLS:

Driver	**07749–0010000**
Attachment, 52 x 55 mm	**07746–0010400**
Pilot, 30 mm	**07746–0040700**

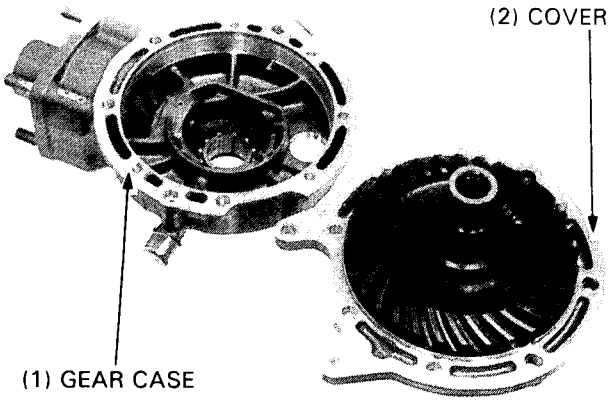


Clean all sealing material off the mating surfaces of the gear case and cover.

NOTE

- Keep dust and dirt out of the gear case.
- Be careful not to damage the mating surfaces.

Apply liquid sealant to the mating surface of the gear case cover.



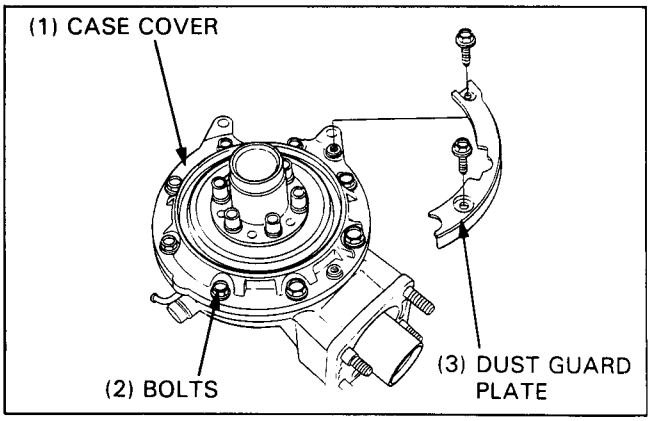
Clean and apply locking agent to the threads of the all bolts. Tighten the cover bolts in 2 or 3 steps until the cover evenly touches the gear case, then tighten the 8 mm bolts to the specified torque in a crisscross pattern in two or more steps.

TORQUE: 26 N·m (2.6 kg-m, 19 ft-lb)

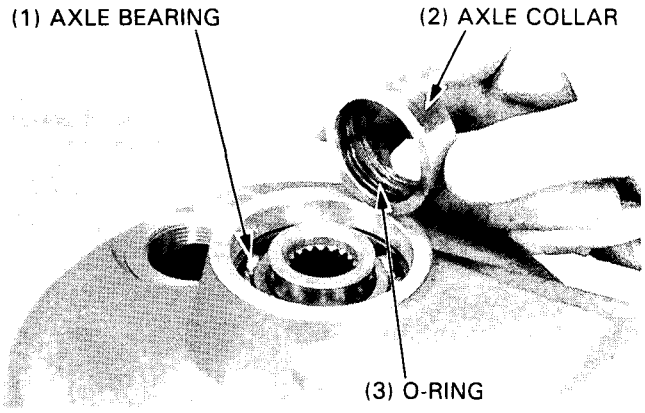
Then tighten the 10 mm bolts.

TORQUE: 48 N·m (4.8 kg-m, 35 ft-lb)

Install the dust guard plate.



Place the new O-ring onto the axle collar and apply clean gear oil to the O-ring.
Install the axle collar on the ring gear to seat the axle bearing outer.



PINION SPACER REPLACEMENT

PINION GEAR REMOVAL

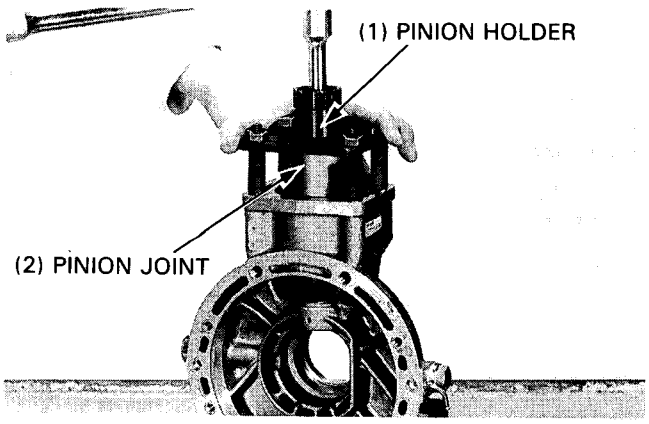
Install the pinion holder and remove the pinion shaft nut.

TOOL:

Pinion holder	**07924—ME40001**
or Modified Pinion holder	**07924—ME40000**

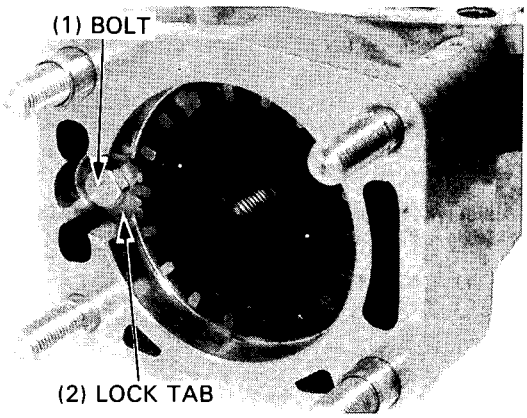
NOTE

- Modification to the pinion holder 07924—ME40000, indicated below.



Remove the tool and pinion joint.

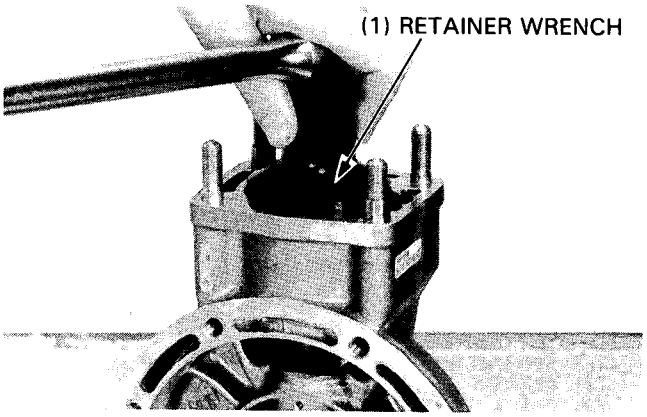
Remove the retainer lock tab.



Remove the pinion retainer with the pinion retainer wrench.

TOOL:

Pinion retainer wrench	**07910—MA10000**



Pull the pinion assembly off with the special tools.

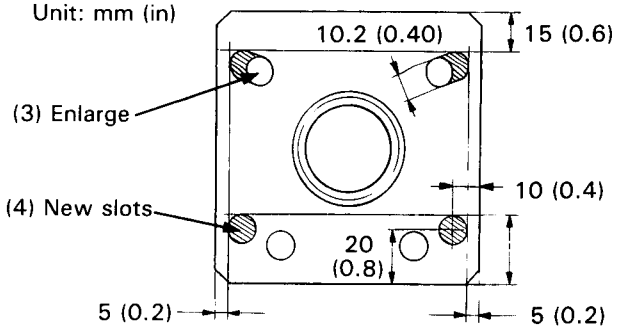
TOOLS:

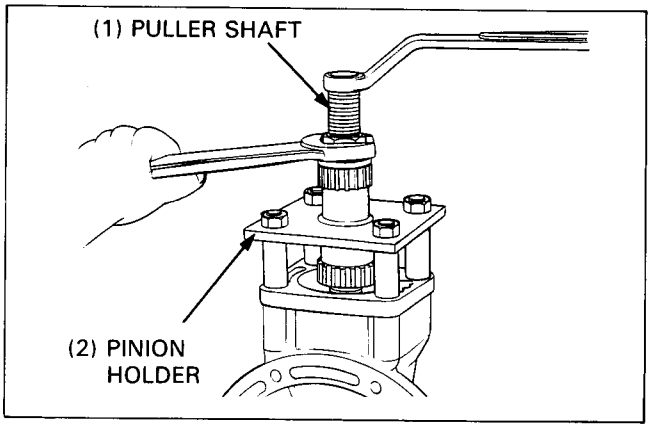
Pinion holder	**07924—ME40001**
or Modified Pinion holder	**07924—ME40000**
Puller shaft	**07931—ME40000**

NOTE

- Modify the Pinion Holder: 07924—ME40000 as shown, if the Pinion Holder: 07924—ME40001 is unavailable.

Slot two holes 10.2 mm (0.40 in) diameter addition, and enlarge the previous two holes as shown.

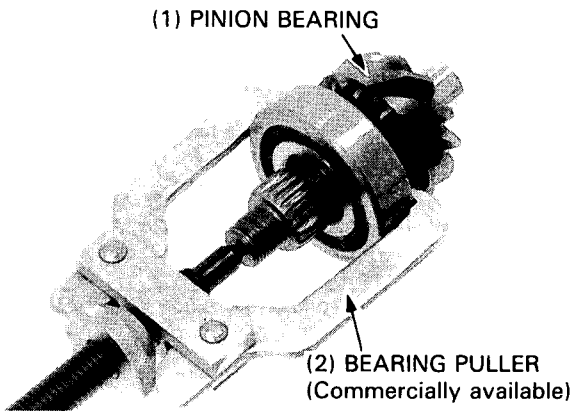




Pull the bearing outer and inner races off the shaft with the bearing puller.

Pull the other inner race off with the same tool.

Remove the pinion adjustment spacer.

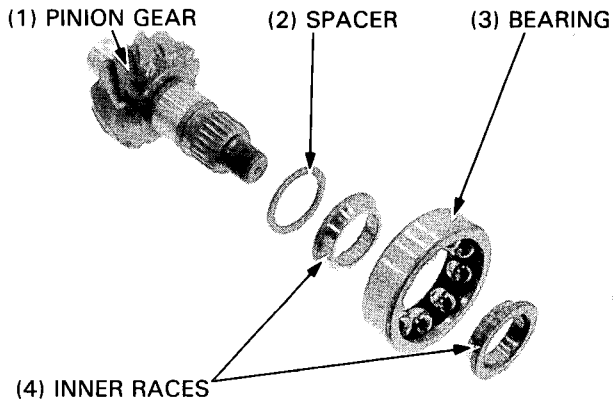


To reassemble, first install the suitable pinion spacer.

Apply clean gear oil to the inner races and the bearing.

NOTE

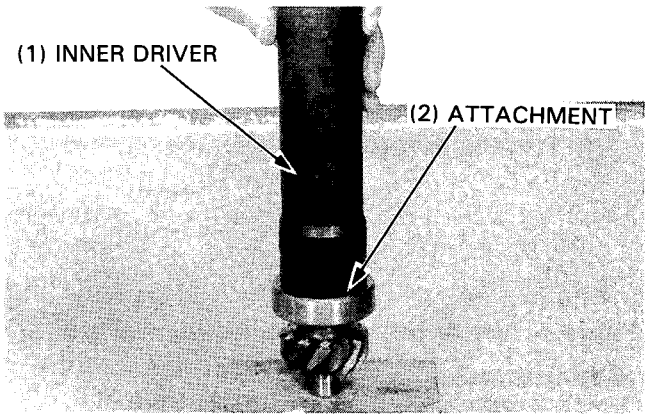
- When the gear set, pinion bearing and/or gear case are replaced, use a 2.0 mm (0.08 in) thick spacer.



Press the pinion bearing onto the shaft until it seats. Press only on the inner race.

TOOLS:

Inner driver (C)	**07746—0030100**
Attachment, 25 mm I.D.	**07746—0030200**



PINION RETAINER OIL SEAL REPLACEMENT

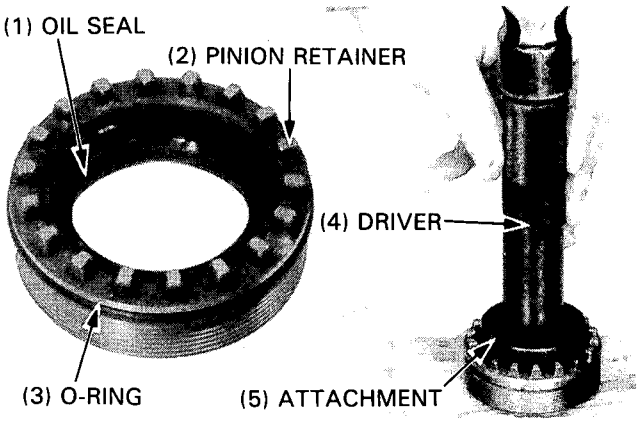
Remove the O-ring and oil seal from the pinion retainer.

Drive a new oil seal into the retainer.

TOOLS:

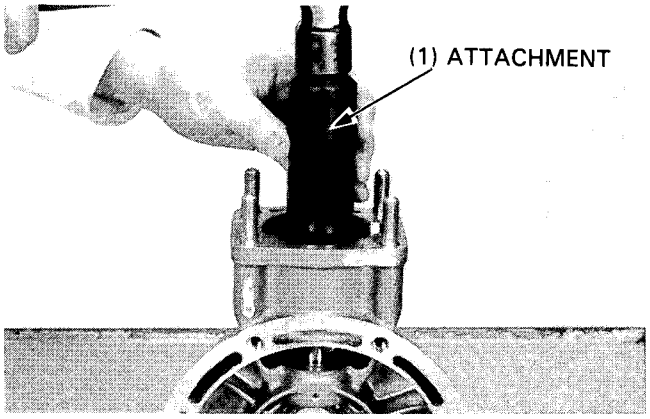
Driver	**07749—0010000**
Attachement	**07945—3330300**

Coat a new O-ring with oil and install it on the retainer.



Place the pinion assembly into the gear case and drive it until enough threads are visible to engage the pinion retainer.

TOOL:
Bearing race insert attachement 07931—4630300

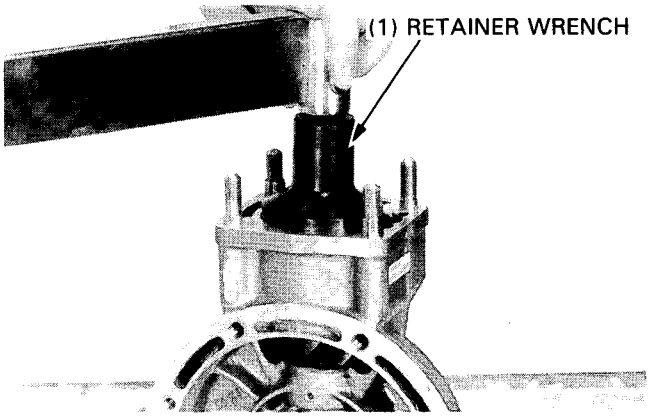


Coat the O-ring and threads on the pinion retainer with gear oil.

Screw the pinion retainer in, pressing the pinion bearing in place, then tighten to the specified torque.

TORQUE: 110 N·m (11.0 kg-m, 80 ft-lb)

TOOL:
Pinion retainer wrench 07910—MA10000

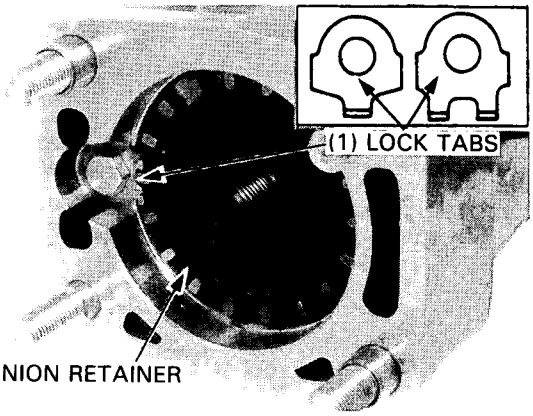


PINION JOINT INSTALLATION

Install the appropriate pinion lock tab.

NOTE

- There are two types of lock tabs as shown.



Coat the oil seal lip contact surface of the pinion joint with oil and install the pinion joint.

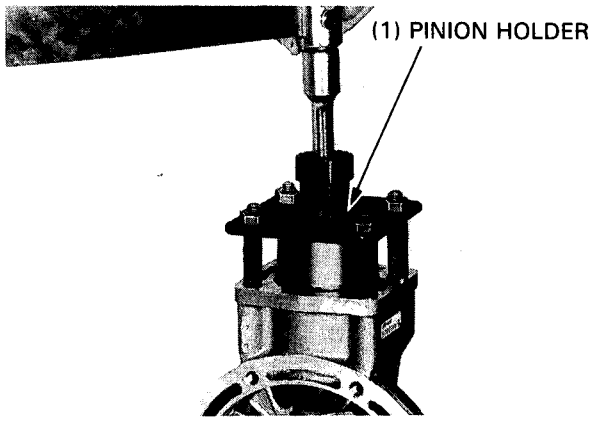
Install the pinion holder tool and tighten the pinion nut.

TORQUE: 110 N·m (11.0 kg-m, 80 ft-lb)

TOOL:
Pinion holder 07924—ME40001
or Modified Pinion holder 07924—ME40000

NOTE

- Modification to the pinion holder 07924—ME40000, indicated page 13-13.



Remove the pinion holder tool.

FINAL DRIVE INSTALLATION

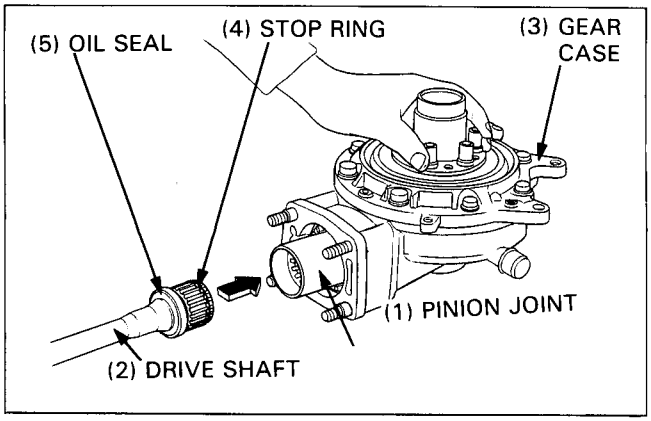
Assemble the gear case (page 13-10).

Coat the pinion joint splines and drive shaft oil seal lip with molybdenum disulfide grease.

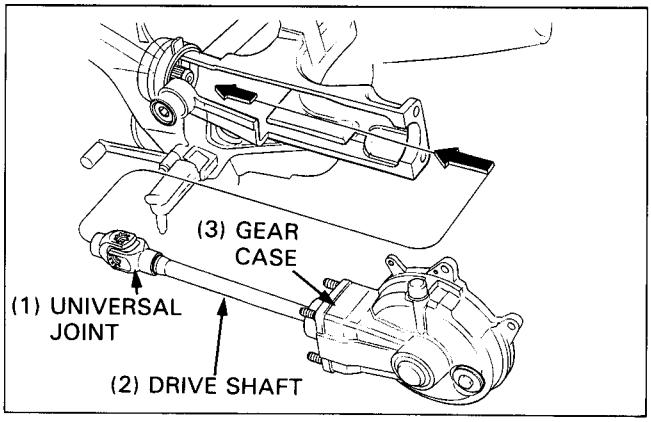
Insert the drive shaft into the pinion joint until the stop ring seats in the pinion joint spline grooves.

NOTE

- Make sure that the stop ring is seated properly by pulling on the drive shaft lightly.
- Be careful not to damage the drive shaft oil seal.

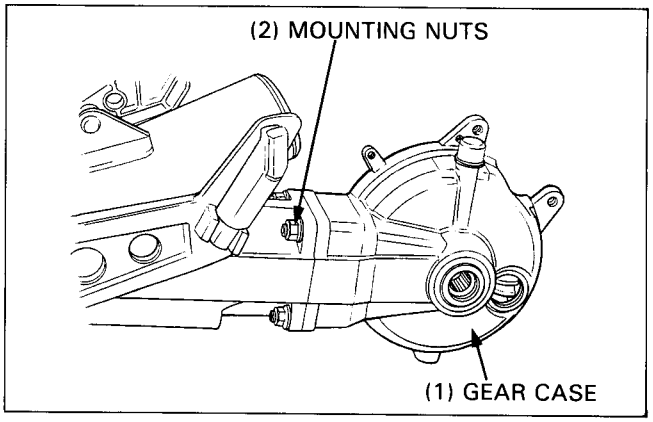


Install the universal joint, drive shaft and gear case as an assembly into the swingarm and align the splines with the output drive shaft.



Install the final drive gear case into the swingarm and loosely install the mounting nuts.
Tighten the nuts in 2 or 3 steps until the case evenly touches the swingarm, then tighten the nuts to the specified torque in a crisscross pattern in two or more steps.

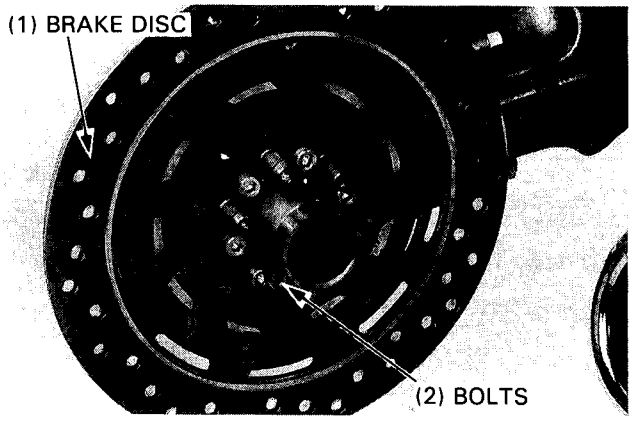
TORQUE: 65 N·m (6.5 kg-m, 47 ft-lb)



Install the rear brake disc with the mark: wheel direction arrow is facing to the right side.

Clean and apply locking agent to the threads of the bolts.
Tighten the retaining bolts to the specified torque.

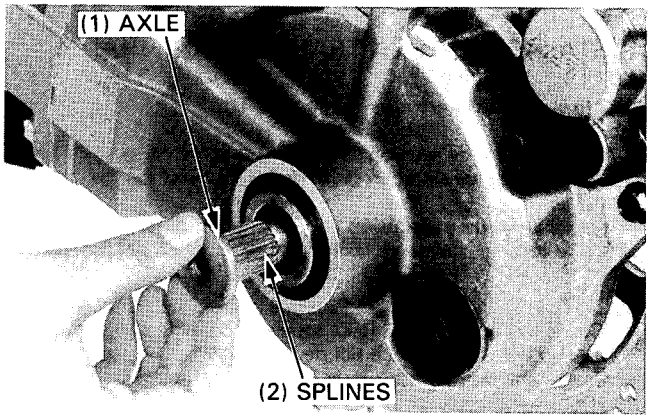
TORQUE: 27 N·m (2.7 kg-m, 20 ft-lb)



Insert the axle in the gear case, making sure the splines are correctly aligned.

Tap the axle with soft hammer to seat the axle securely.

Install the rear wheel (page 15-5).



Remove the oil filler cap and drain bolt.

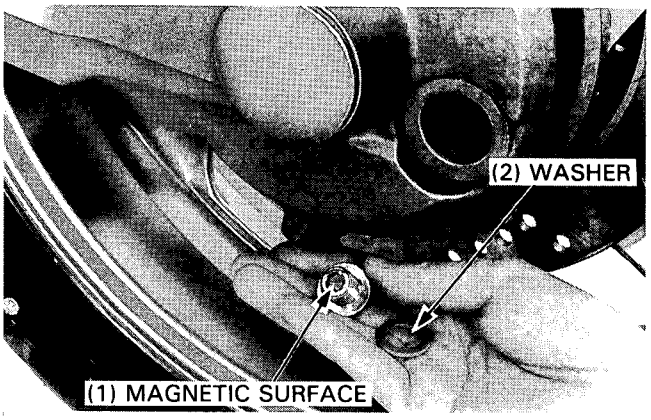
Check that the magnetic surface with ferrous burrs on the drain bolt and clean them.

Check the sealing washer on the drain bolt in good condition, replace the washer if desired.
Reinstall the drain bolt with the washer.

TORQUE: 12 N·m (1.2 kg-m, 9 ft-lb)

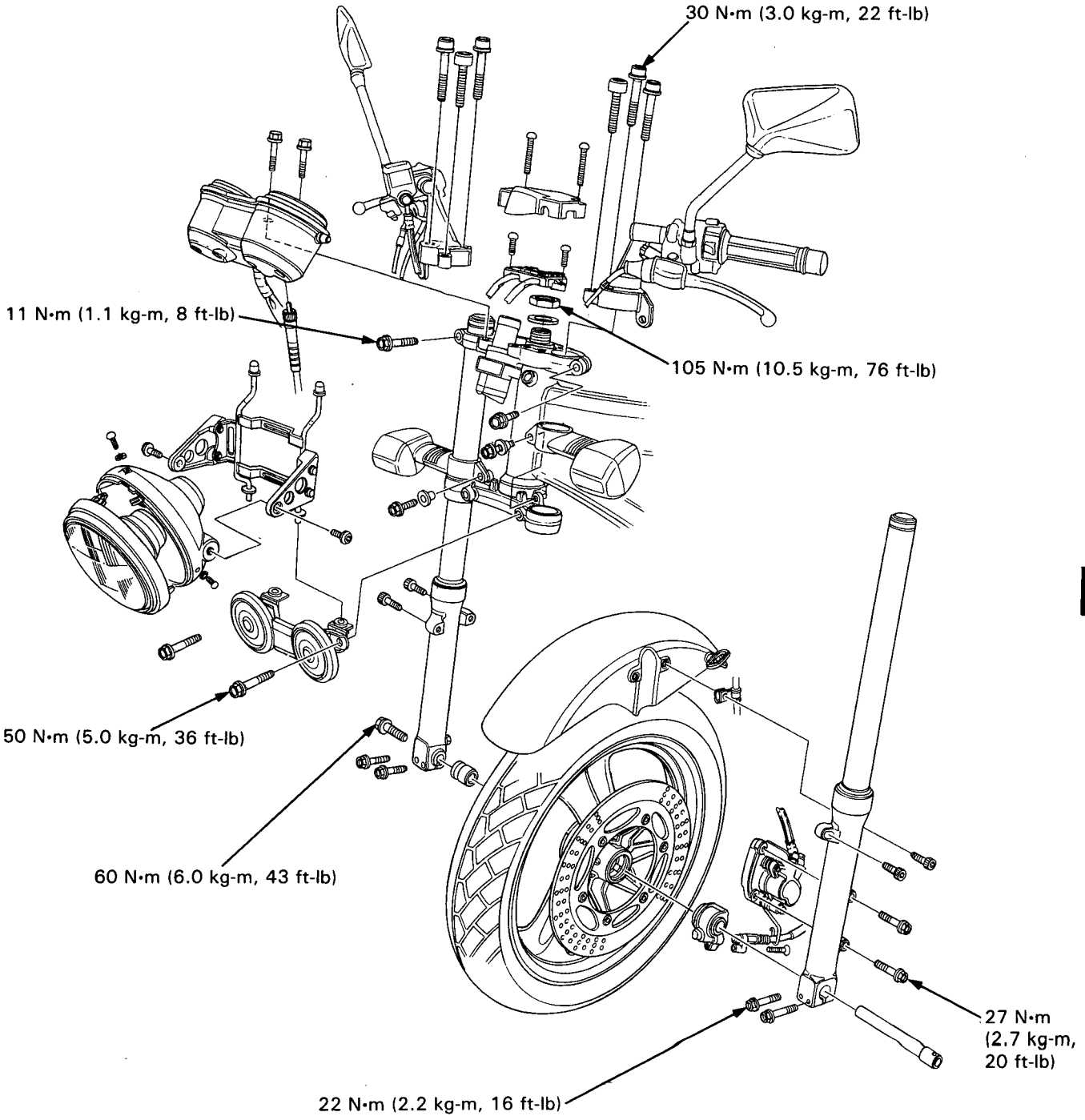
Fill the gear case with the recommended oil up to the correct level.

OIL CAPACITY: 120 cm³ (4.1, US oz, 4.2 Imp oz)
after disassembly
RECOMMENDED OIL: HYPOID GEAR OIL SAE #80



14

FRONT WHEEL/SUSPENSION/ STEERING


30 N·m (3.0 kg-m, 22 ft-lb)
11 N·m (1.1 kg-m, 8 ft-lb)
105 N·m (10.5 kg-m, 76 ft-lb)
50 N·m (5.0 kg-m, 36 ft-lb)
60 N·m (6.0 kg-m, 43 ft-lb)
27 N·m
(2.7 kg-m,
20 ft-lb)
22 N·m (2.2 kg-m, 16 ft-lb)

SERVICE INFROMATION

⚠ WARNING

- ***Inhaled asbestos fibers have been found to cause respiratory disease and cancer. Never use an air hose or dry brush to clean brake assemblies.***

GENERAL

- A jack or other support is required to support the motorcycle during front end service.
- For front brake service, refer to section 16.
- For headlight, instrument and ignition switch services and inspections, refer to section 20.

SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Axle runout		—	0.2 (0.01)
Front wheel rim runout	Radial	—	2.0 (0.08)
	Axial	—	2.0 (0.08)
Fork spring free length		—	321.3 (12.6)
Fork tube runout		—	0.2 (0.01)
Fork oil capacity		405 cm^3 (13.7 US oz, 14.2 Imp oz)	—
Fork oil level		182 (7.17)	—
Steering bearing preload		1.0–1.5 kg (2.2–3.3 lb)	—

TORQUE VALUES

Master cylinder holder bolt	12 N·m (1.2 kg-m, 9 ft-lb)
Front axle bolt	60 N·m (6.0 kg-m, 43 ft-lb)
Front axle pinch bolt	22 N·m (2.2 kg-m, 16 ft-lb)
Fork top pinch bolt	11 N·m (1.1 kg-m, 8 ft-lb)
Fork bottom pinch bolt	50 N·m (5.0 kg-m, 36 ft-lb) Apply clean engine oil to the threads
Fork cap bolt	23 N·m (2.3 kg-m, 17 ft-lb)
Fork socket bolt	20 N·m (2.0 kg-m, 14 ft-lb) Apply locking agent to the threads
Brake disc retaining bolt	40 N·m (4.0 kg-m, 29 ft-lb) Apply locking agent to the threads
Brake caliper mounting bolt	27 N·m (2.7 kg-m, 20 ft-lb)
Steering bearing adjustment nut	22 N·m (2.2 kg-m, 16 ft-lb)
Steering stem nut	105 N·m (10.5 kg-m, 76 ft-lb)
Handlebar pinch bolt	27 N·m (2.7 kg-m, 20 ft-lb)
Handlebar mounting bolt	30 N·m (3.0 kg-m, 22 ft-lb)
Ignition switch mounting bolt	25 N·m (2.5 kg-m, 18 ft-lb)

TOOLS

Special

Steering stem socket	07916—3710100
Ball rece remover	07953—MJ10000
Ball rece remover	07953—4250002
Ball race remover attachment	07946—3710500
Steering stem socket	07916—3710100
Snap ring pliers	07914—3230001—Equivalent commercially available
Steering stem driver	07946—MB00000

Common

Lock nut wrench, 30 x 32 mm	07716—0020400—Equivalent commercially available
Extension bar	07716—0020500
Driver	07749—0010000
Attachment, 42 x 47 mm	07746—0010300
Attachment, 52 x 55 mm	07746—0010400
Pilot, 20 mm	07746—0040500
Fork seal driver	07947—KA50100
— Driver attachment	07947—KF00100
Bearing remover shaft	07746—0050100—Equivalent commercially available
Bearing remover head, 20 mm	07746—0050600

TROUBLESHOOTING

Hard Steering
- Steering bearing adjustment nut too tight
- Faulty steering stem bearings
- Insufficient air in front tire

Steers to One Side or Does Not Track Straight
- Bent fork legs
- Bent front axle, wheel installed incorrectly
- Unequal oil quantity in each fork tube

Front Wheel Wobbling
- Distorted rim
- Worn front wheel bearings
- Faulty tire
- Axle or axle holder not tightened properly

Soft Suspension
- Weak fork springs
- Insufficient fluid in fork legs

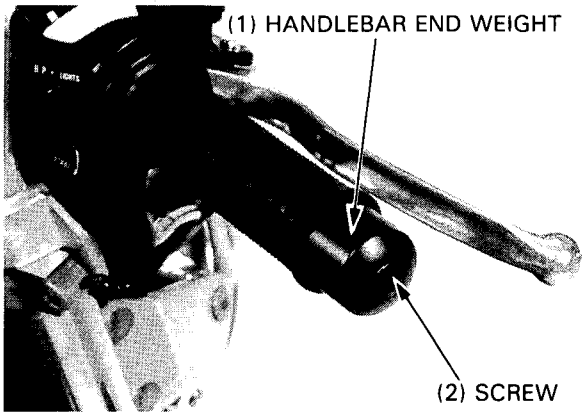
Hard Suspension
- Fork oil level too high
- Fork tube(s) bent or fork slider(s) damaged

Front Suspension Noise
- Slider binding
- Insufficient fluid in fork legs
- Loose fork leg fasteners

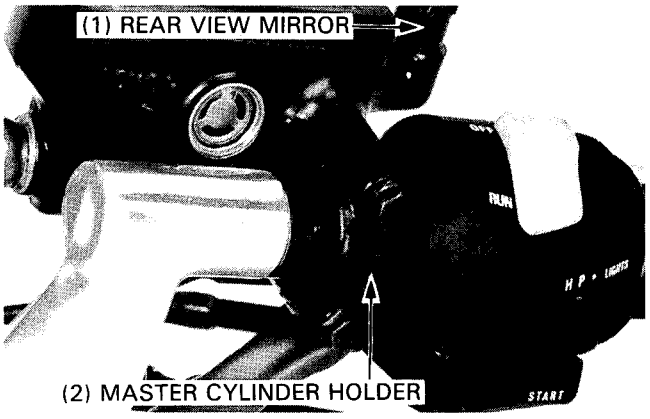
HANDLEBARS

REMOVAL

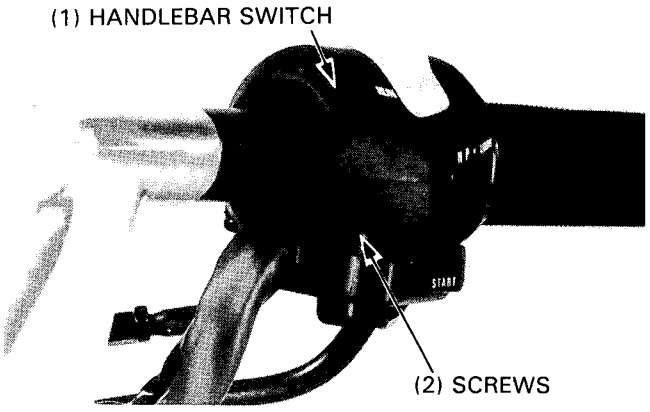
Remove both handlebar end weights by removing the screws.



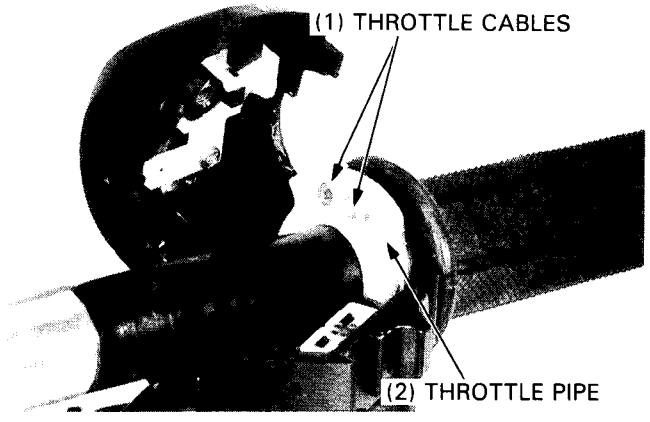
Disconnect the front brake light switch wires from the switch.
Remove the following:
– rear view mirror from the master cylinder
– master cylinder holder mounting bolts and holder



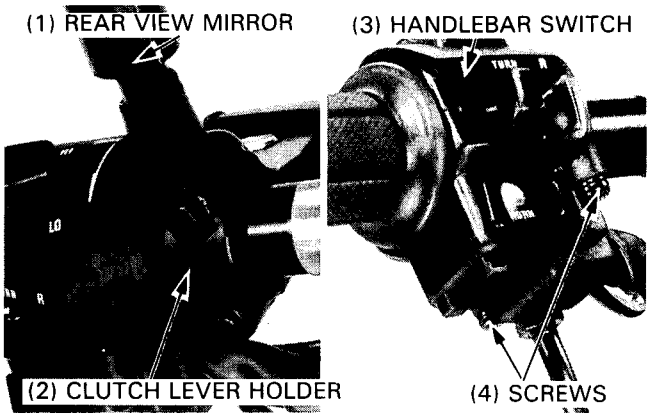
– right handlebar switch screws and switch



Loosen the throttle cable lower adjusting nuts at the carburetor and disconnect the throttle cables from the throttle pipe.
Remove the throttle pipe from the right handlebar.

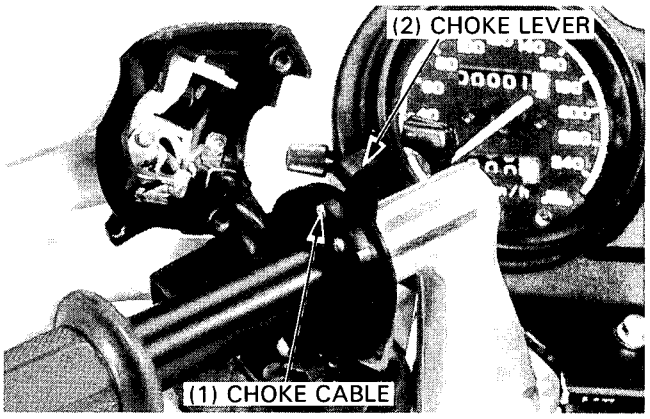


Disconnect clutch switch wires from the switch terminals.
Remove the following:
– rear view mirror from the clutch lever holder
– clutch lever holder mounting bolts and holder
– left handlebar switch screws and switch

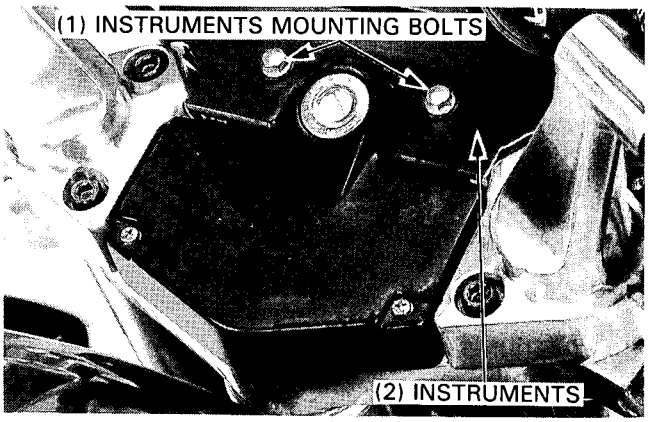


Disconnect the choke cable at the choke lever.

Remove the left grip from the handlebar.

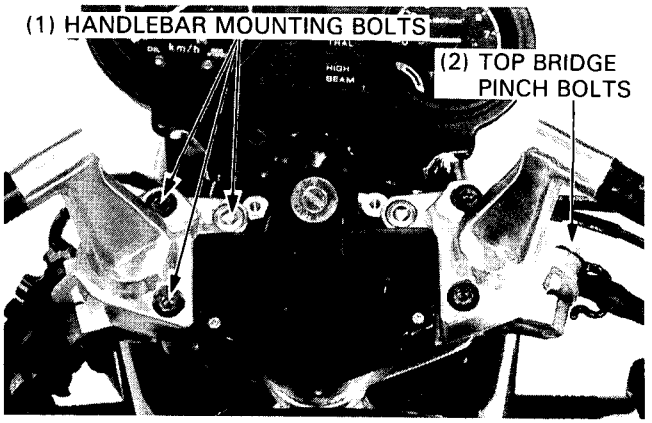


Remove the instruments mounting bolts and instruments.



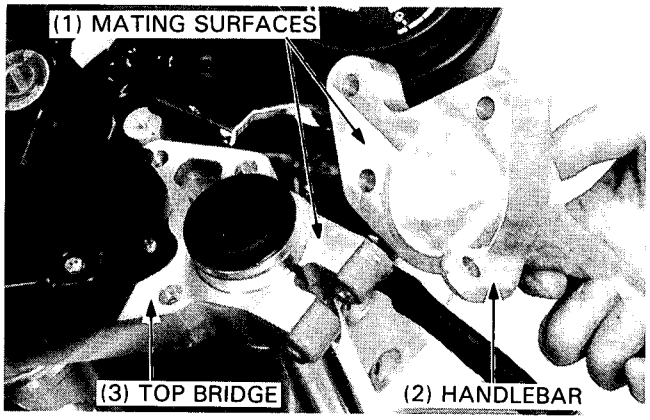
Remove the fork top bridge pinch bolts and handlebar switch wire clamps.

Remove the handlebar mounting bolts and handlebars.



INSTALLATION

Clean the handlebar and fork top bridge mating surfaces.

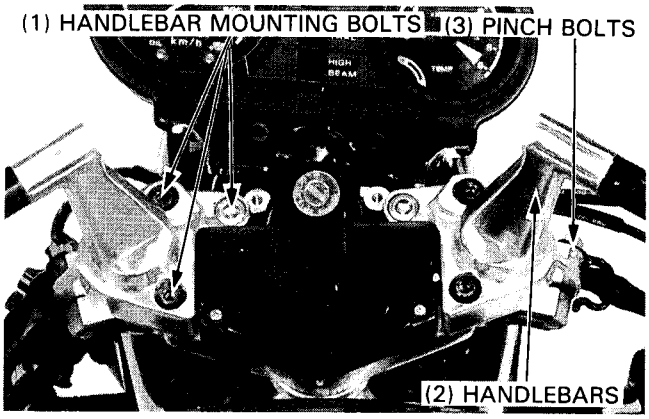


Install the handlebars onto the fork top bridge attaching by mounting bolts.

TORQUE: 30 N·m (3.0 kg-m, 22 ft-lb)

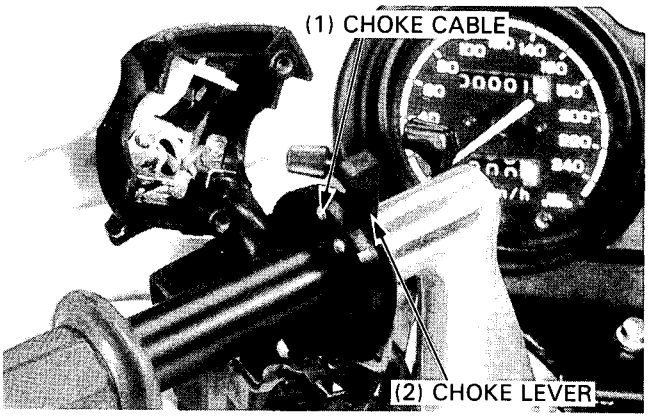
Install the fork top bridge pinch bolts with the switch wire clamps.

TORQUE: 11 N·m (1.1 kg-m, 8 ft-lb)

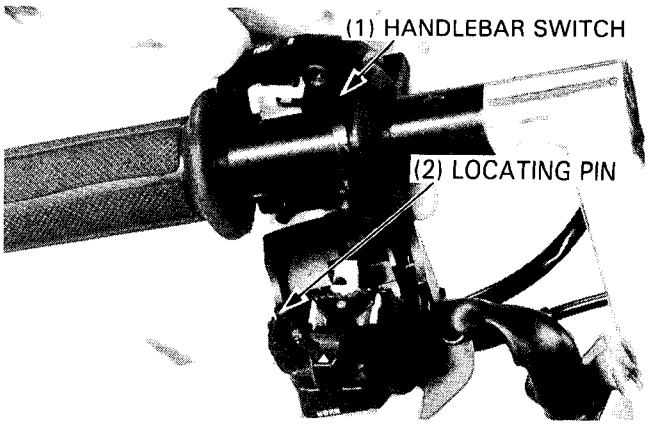


Install the left grip onto the handlebar.

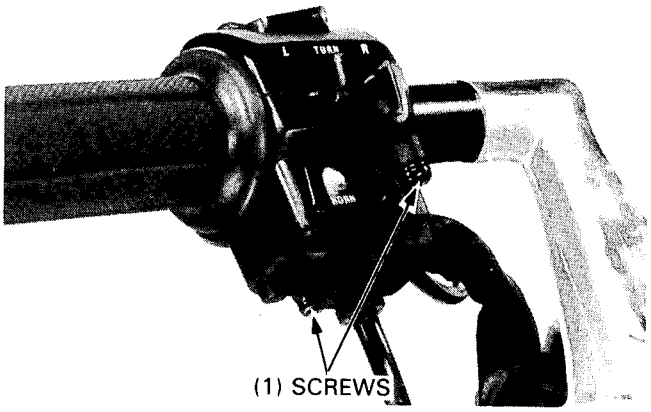
Apply clean grease to the choke cable end and connect the choke cable to the choke lever.



Install the left handlebar switch onto the handlebar, aligning the locating pin with the hole in the handlebar.



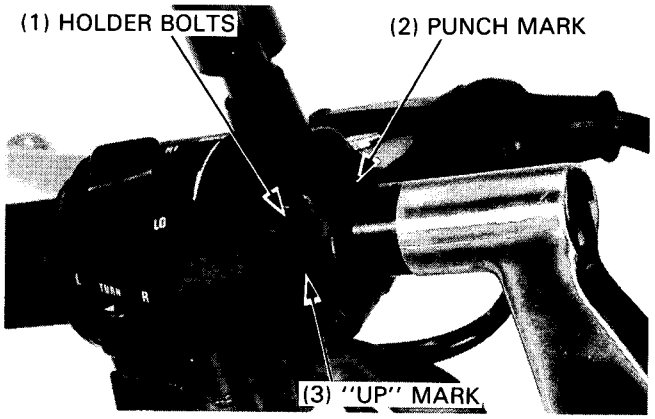
Install the left handlebar switch, and tighten the forward screw first, then tighten the rear screw.



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

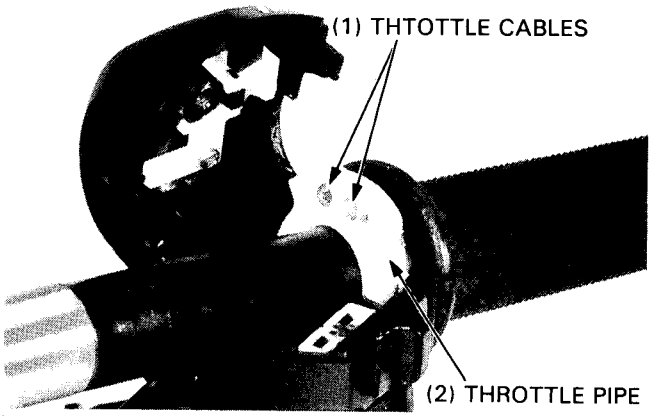
TORQUE: 12 N·m (1.2 kg-m, 9 ft-lb)

Connect the clutch switch wires to the switch terminals.

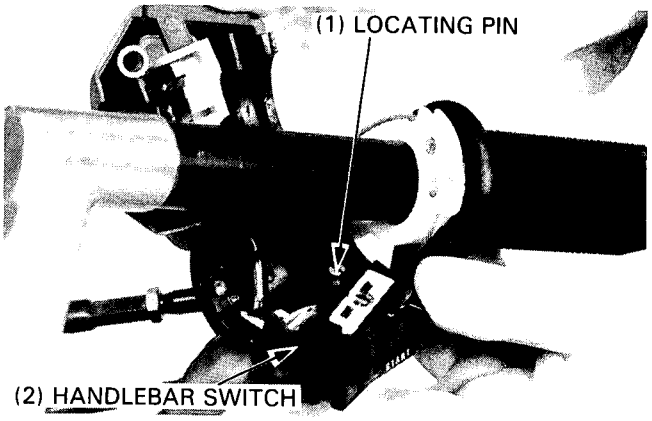


Connect the throttle cables to the throttle grip, clean the throttle grip sliding surface and slide it over the right handlebar.

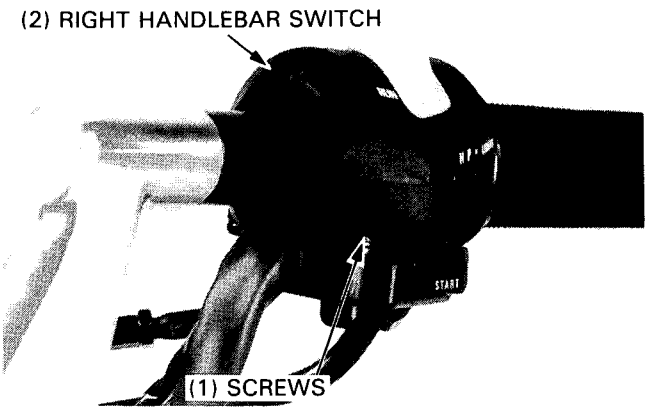
Apply clean grease to the throttle cable ends.



Install the right handlebar switch onto the handlebar, aligning the locating pin with the hole in the hadlebar.



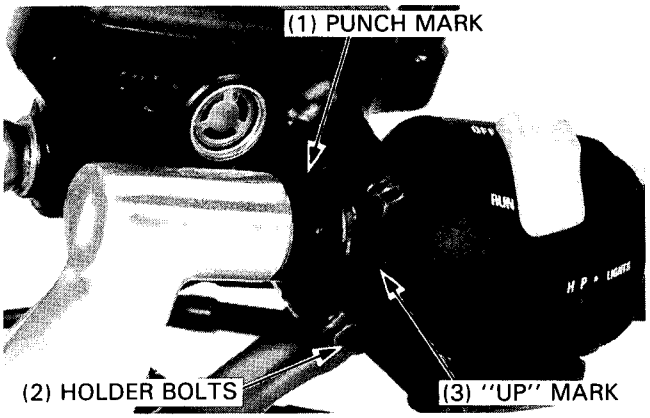
Install the right handlebar switch screws, and tighten the forward screw first, then tighten the rear screw.



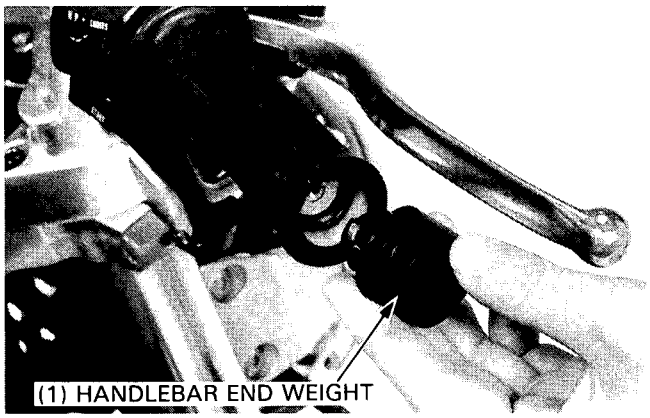
Install the front brake master cylinder and the holder with the "UP" mark facing up.
Align the end of the holder with the punch mark on the handlebar and tighten the upper bolt first, then tighten the lower bolt.

TORQUE: 12 N·m (1.2 kg-m, 9 ft-lb)

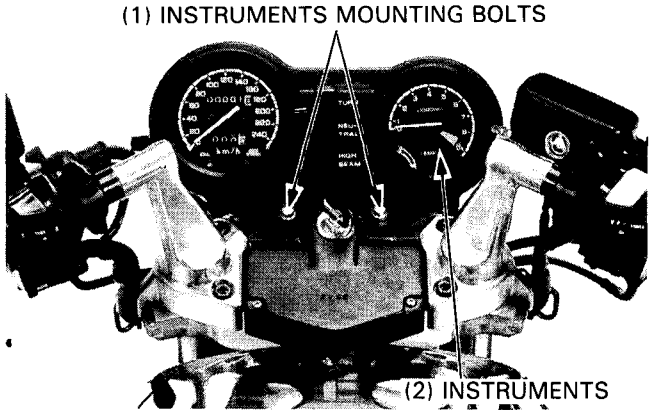
Connect the front brake light switch wires.



Install both handlebar end weights, aligning the boss with the slot in the handlebar weight.



Install the instruments by attaching the mounting bolts.



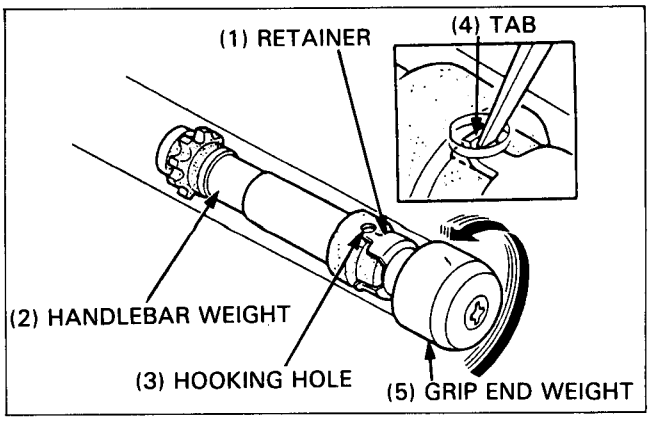
HANDLEBAR WEIGHT REPLACEMENT

Remove the grip from the handlebar.
Straighten the weight retainer tab by the screwdriver or center punch.

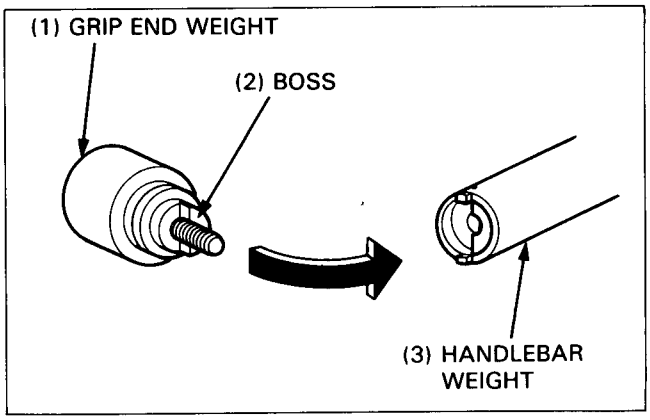
Remove the handlebar weight by turning the grip end weight.

NOTE

- Apply lubricant spray (CRC 5-56 or equivalent) through the tab hooking hole to the rubber suspension in order to easy removal.



Remove the grip end weight by removing the mounting screw from the handlebar weight.
Discard the used retainer.

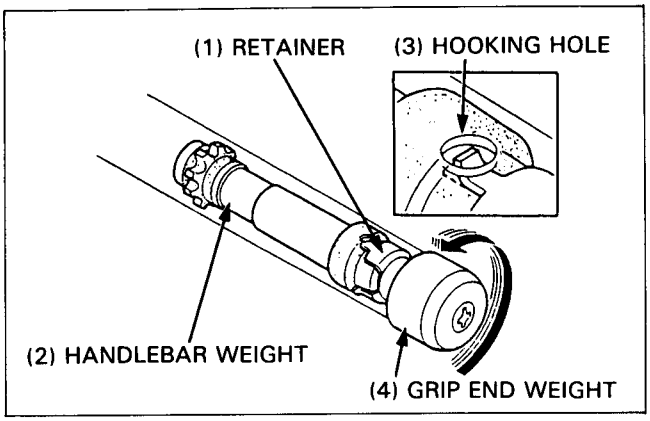


Install the new retainer onto the handlebar weight.
Install the grip end weight onto the handlebar weight aligning the boss with slot.
Clean and apply a locking agent to the mounting screw threads and tighten it securely.

Insert the handlebar weight assembly onto the handlebar.

Hooking the retainer tab to the hooking hole securely.

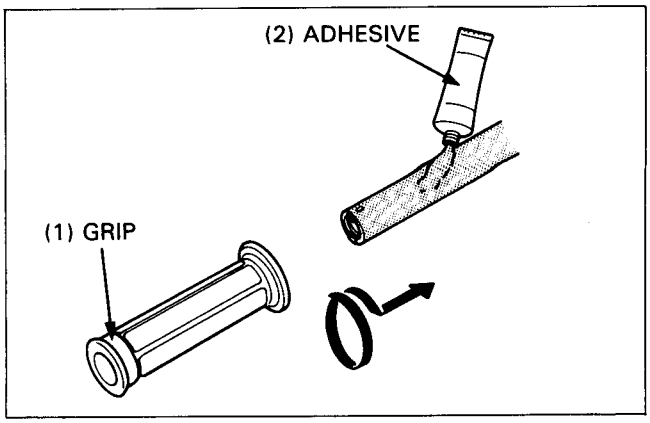
Install the grip onto the handlebar.



Apply Honda bond A to the inside surface of the grips and to the clean surface of the left handlebar and throttle pipe. Wait 3—5 minutes and install the grips.
Rotate the grips for even application of the adhesive.

NOTE

- Allow the adhesive to dry for an hour before using.

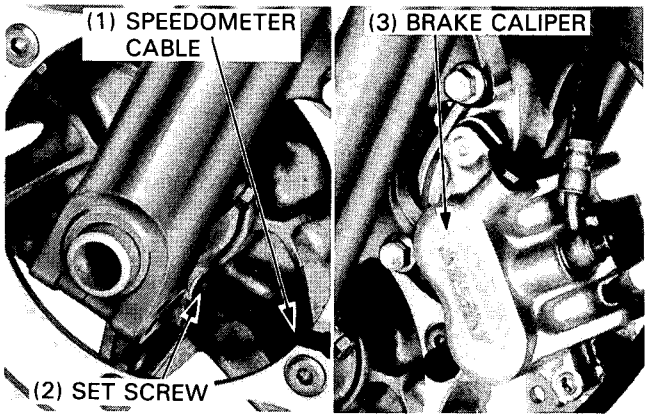


FRONT WHEEL

REMOVAL

Raise the front wheel off the ground.

Disconnect the speedometer cable from the speedometer gear box by removing the cable set screw.
Remove the brake caliper mounting bolts and brake caliper.



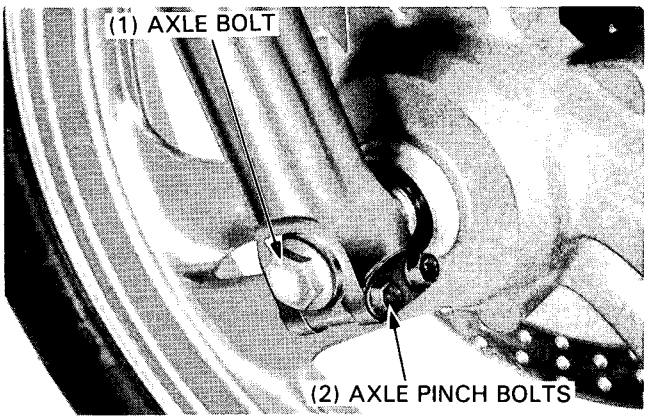
CAUTION

- *Support the caliper assembly so that it does not hang on the brake hose. Do not twist the brake hose.*

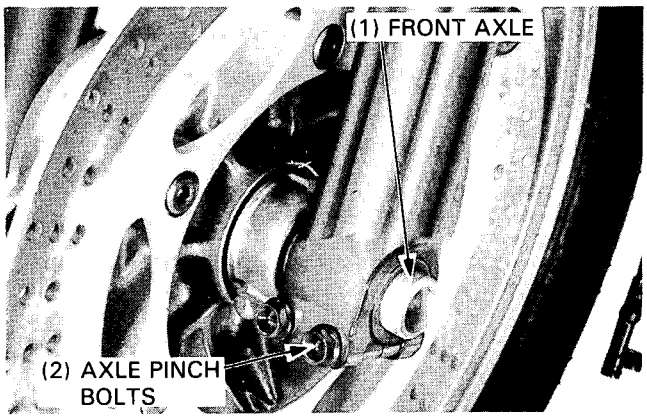
NOTE

- If you squeeze the front brake lever after the caliper is removed, the caliper piston will move out and make assembly difficult.

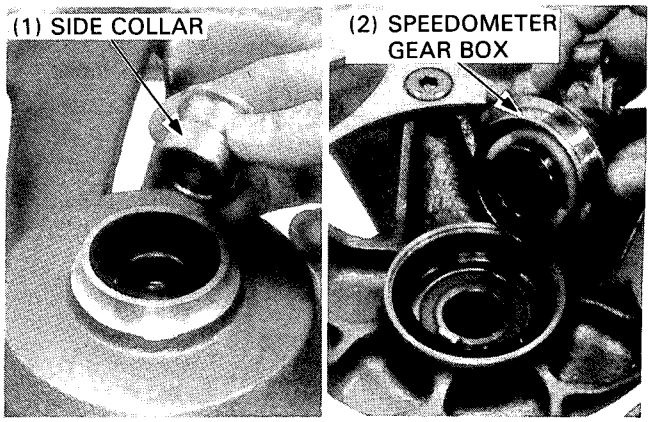
Loosen the right and left front axle pinch bolts, and remove the axle bolt.



Remove the axle and the front wheel.



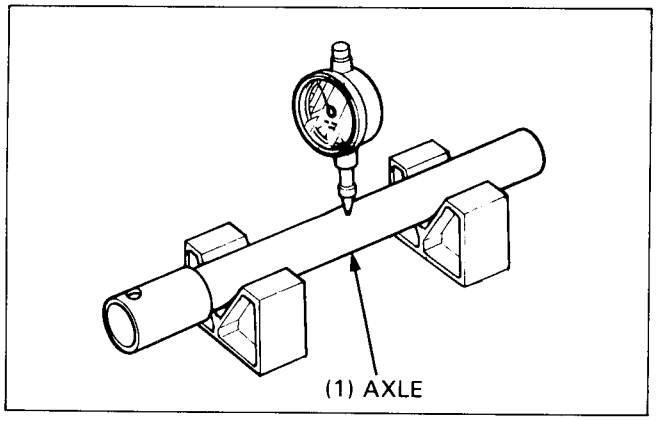
Remove the side collar from the right side and remove the speedometer gear box from the left side.



INSPECTION

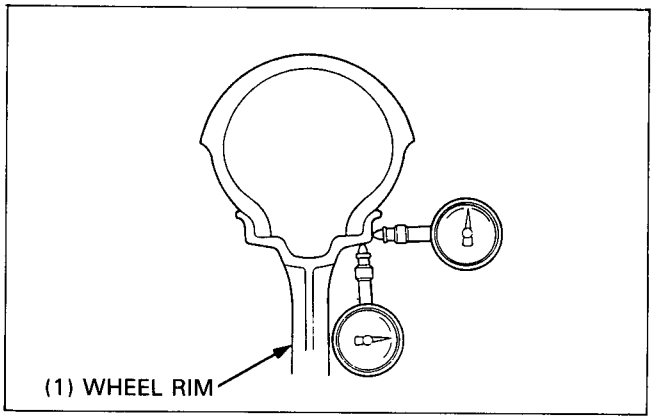
Axle
Set the axle in V blocks and measure the runout.

SERVICE LIMIT: 0.2 mm (0.01 in)



Wheel rim runout
Check the rim runout by placing the wheel in a truing stand. Spin the wheel slowly and read the runout using a dial indicator.

SERVICE LIMITS:
RADIAL RUNOUT: 2.0 mm (0.08 in)
AXIAL RUNOUT: 2.0 mm (0.08 in)



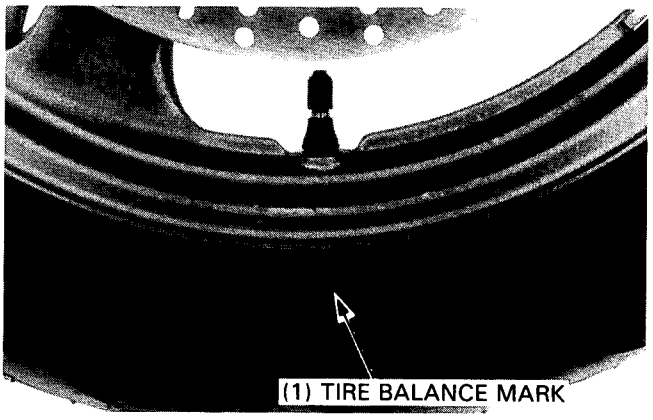
Wheel Balance

CAUTION

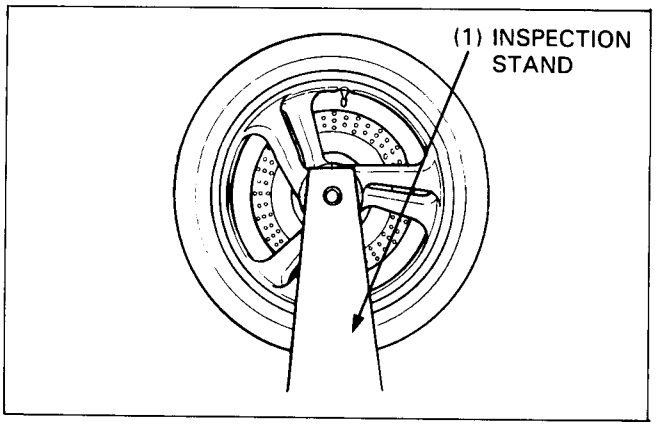
- *Wheel balance directly affects the stability, handling and overall safety of the motorcycle. Always check balance when the tire has been removed from the rim.*

NOTE

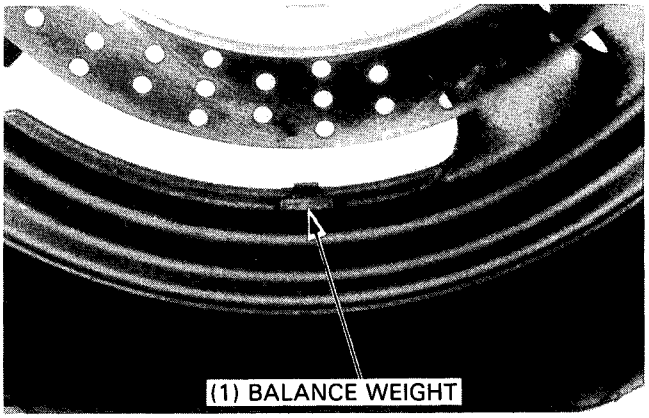
- For optimum balance, the tire balance mark (a paint dot on the side wall) must be located next to the valve stem. Remount the tire if necessary.



Mount the wheel, tire and brake disc assembly in an inspection stand.
Spin the wheel, allow it to stop, and mark the lowest (heaviest) part of the wheel with chalk.
Do this two or three times to verify the heaviest area. If the wheel is balanced, it will not stop consistently in the same position.



To balance the wheel, install wheel weights on the highest side of the rim, the side opposite the chalk marks. Add just enough weight so the wheel will no longer stop in the same position when it's spun.
Do not add more than 60 grams to the front wheel.

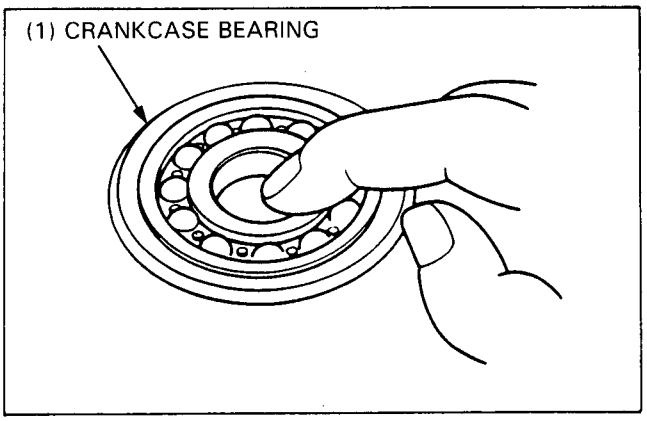


Wheel bearing
Turn the inner race of each bearing with your finger. The bearings should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the hub.

Remove and discard the bearings if the races do not turn smoothly, quietly, or if they fit loosely in the hub.

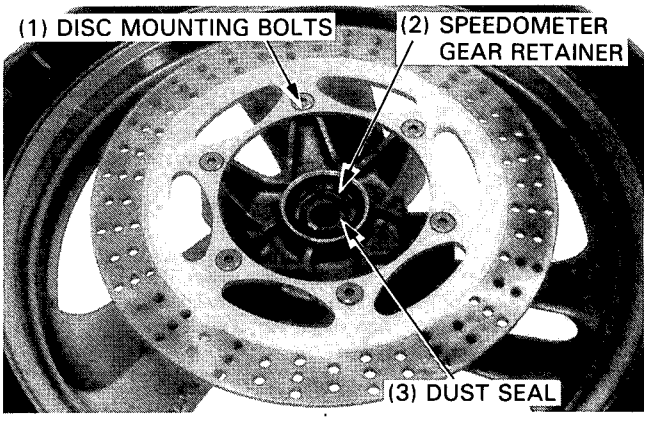
NOTE

- Replace hub bearings in pairs.



BEARING REPLACEMENT

Remove the brake disc mounting bolts and discs.
Remove the dust seal from both sides.
Remove the speedometer gear retainer.



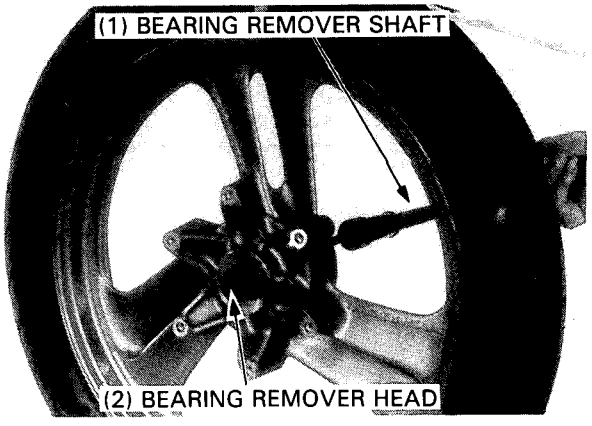
Install the bearing remover head into the bearing.
From the opposite side install the bearing remover shaft and drive the bearing out of the wheel.

NOTE

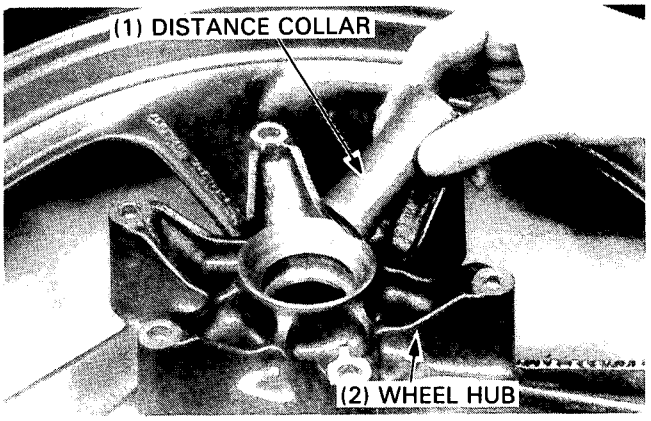
- If the bearings are removed, they must be replaced with new ones.

TOOLS:

Bearing remover shaft	**07746–0050100**
Bearing remover head, 20 mm	**07746–0050600**



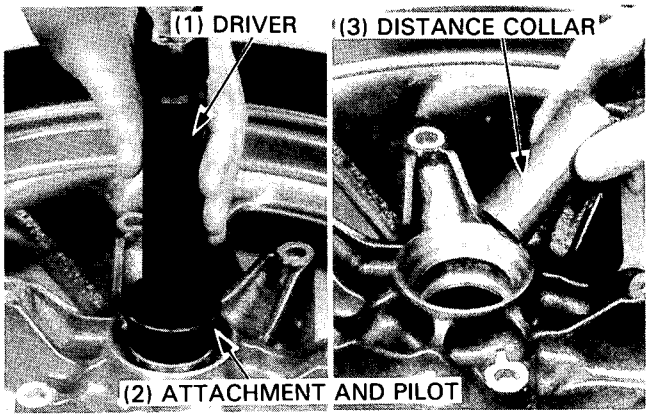
Remove the distance collar from the wheel hub.
Remove the other bearing from the hub using the same tools.



Drive a new right bearing into the wheel until it is fully seated first.

TOOLS:

Driver	**07749–0010000**
Attachment, 42 x 47 mm	**07746–0010300**
Pilot, 20 mm	**07746–0040500**



NOTE

- Do not allow the bearings to tilt while driving them in.
- Never install an old bearing, once a bearing is removed, it must be replaced with a new one.

Install the distance collar into the wheel hub.
Drive a new left bearing into the wheel until it is fully seated.

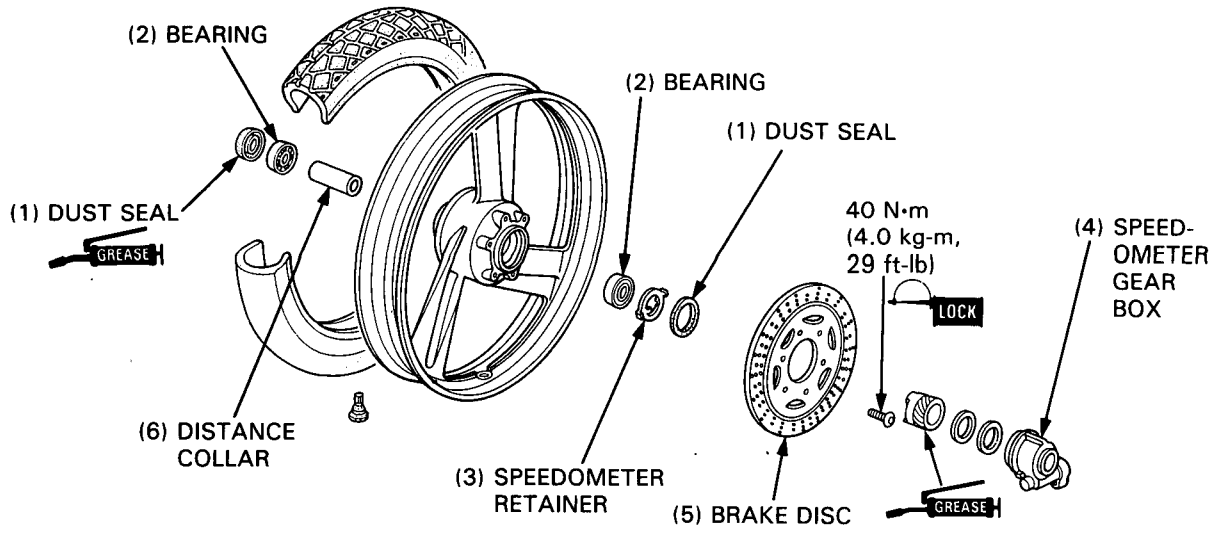
ASSEMBLY

NOTE

- The front wheel has no rim band.

⚠ WARNING

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

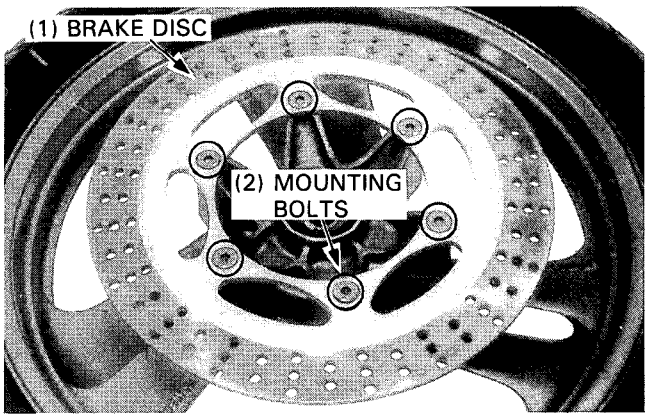


Install the brake disc onto the wheel hub with the minimum thickness marking (MIN TH 4.0 mm) facing out.
Clean and apply locking agent to the mounting bolt threads.
Tighten the bolts to the specified torque in a crisscross pattern in 2 or 3 steps.

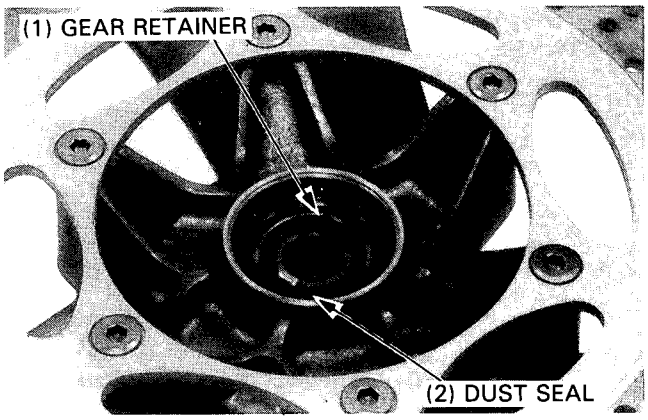
TORQUE: 40 N·m (4.0 kg-m, 29 ft-lb)

⚠WARNING

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

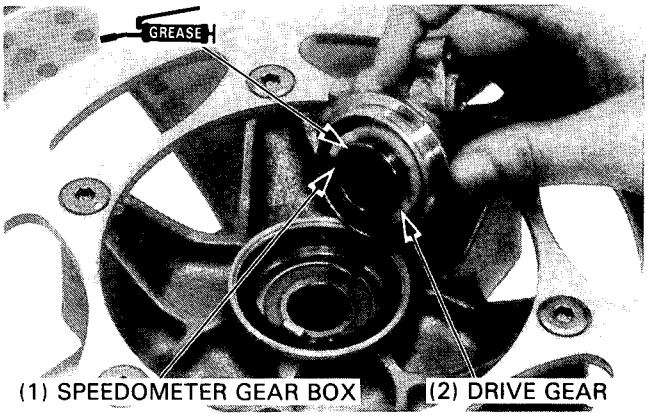


Coat the speedometer gear retainer with clean grease and install the retainer into the wheel hub, aligning the tangs with the slots in the hub.
Apply clean grease to the dust seal lip and install the dust seal over the gear retainer.

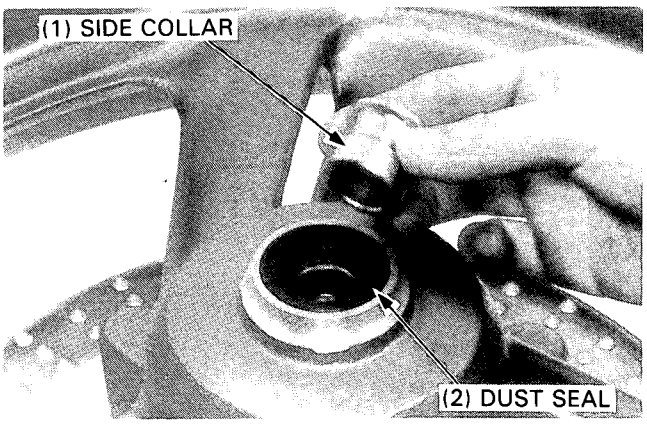


Fill the speedometer gear box with clean grease and install the drive gear.

Install the speedometer gear box into the wheel hub.



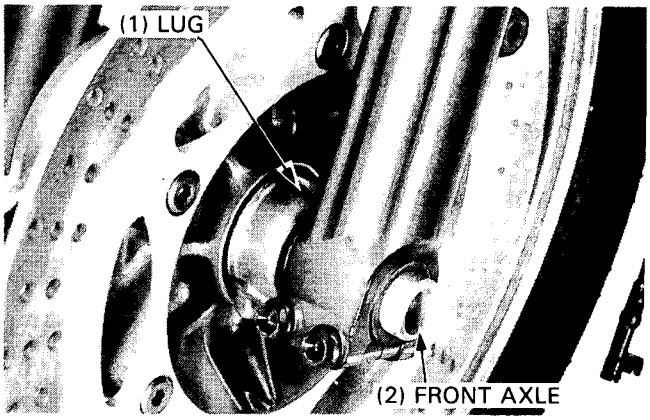
Apply clean grease to the right dust seal lip and install the seal into the wheel.
Install the side collar.



INSTALLATION

Position the wheel between the fork legs.
Insert the axle from the leftside, through the left fork leg and wheel hub.

Position the tang on the speedometer gear box against the back of the lug on the left fork leg.

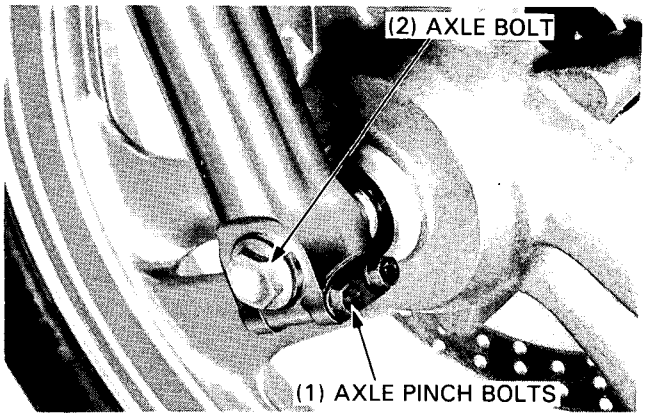


Insert and tighten the axle bolt.

TORQUE: 60 N·m (6.0 kg-m, 43 ft-lb)

Tighten the axle pinch bolts.

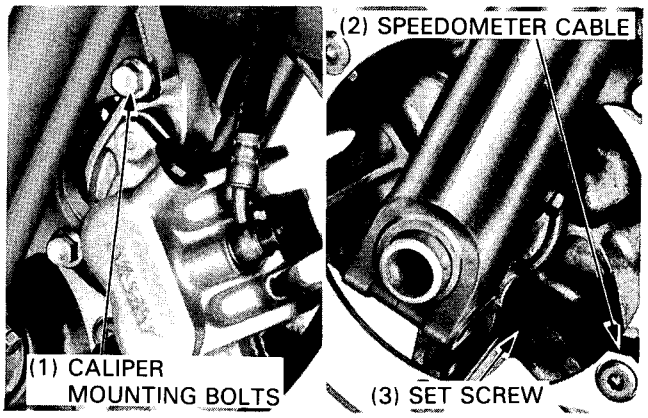
TORQUE: 22 N·m (2.2 kg-m, 16 ft-lb)



Install the brake caliper with the caliper bracket.
Install the caliper mounting bolts and tighten the bolts.

TORQUE: 27 N·m (2.7 kg-m, 20 ft-lb)

Connect the speedomater cable with the set screw.

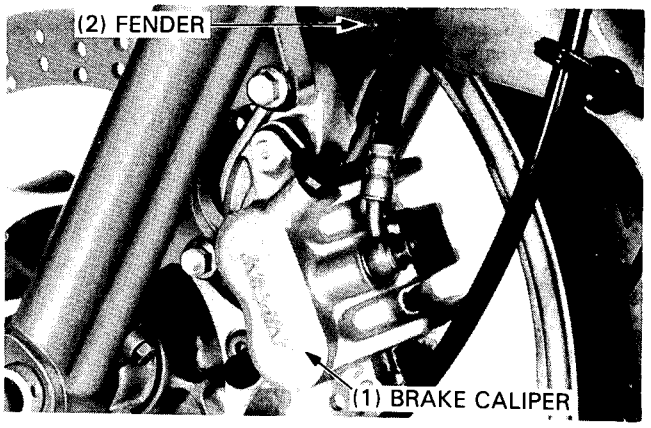


FORK

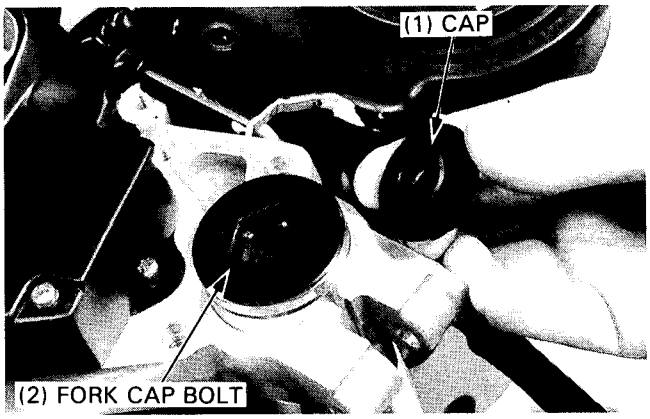
REMOVAL

Remove the following:
- handlebars (page 14-3)
- front wheel (page 14-9)
- brake caliper
- mounting bolts and fender.

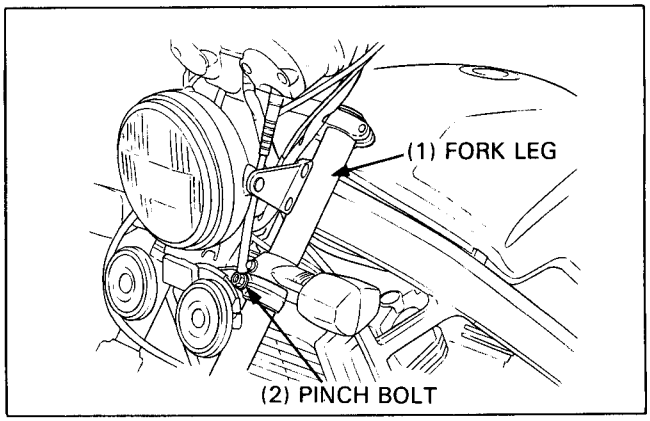
Tie the caliper to the handlebar so its weight does not pull on the brake hose.



If the fork tubes will be disassembled, remove the cap and loosen the fork cap bolts but do not remove them yet.



Loosen the fork bottom pinch bolts and remove the fork legs from the fork top bridge and steering stem.



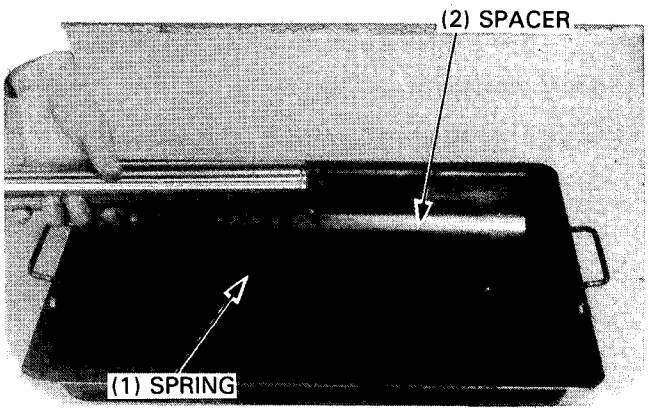
DISASSEMBLY

Remove the fork cap bolt and the spring.

⚠WARNING

- ***The cap bolt is under spring pressure. Use care when removing it and wear eye and face protection.***

Drain the oil by pumping the tube up and down several times.

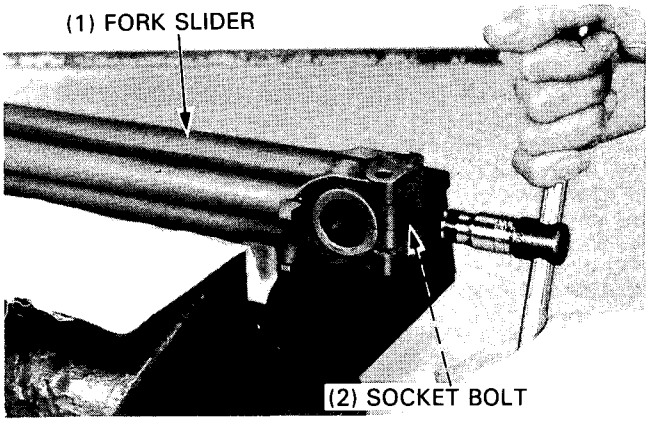


Hold the fork slider in a vise with soft jaws or use a shop towel.

Remove the socket bolt with a hex wrench.

NOTE

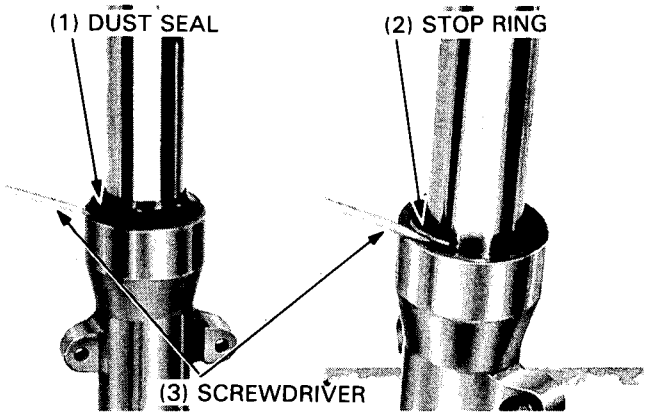
- Temporarily reinstall the spring and cap bolt if the bolt is difficult to remove.



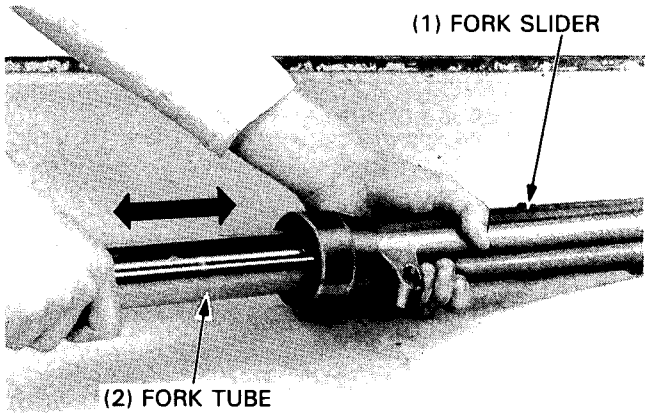
Remove the dust seal and the stop ring with a screwdriver.

CAUTION

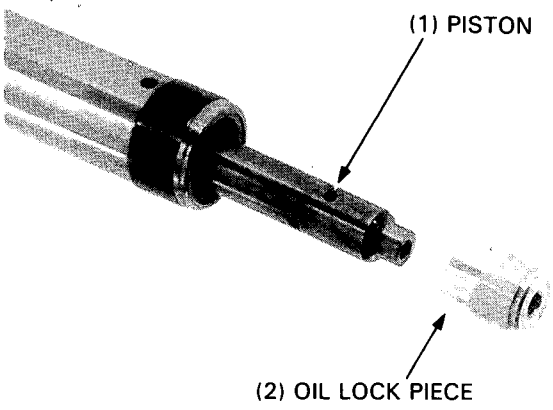
- *Do not scratch the fork tube sliding surface.*



Pull the fork tube out until resistance from the slider bushing is felt. Then move it in and out, tapping the bushing lightly until the fork tube separates from the slider. The slider bushing will be forced out by the fork tube bushing.



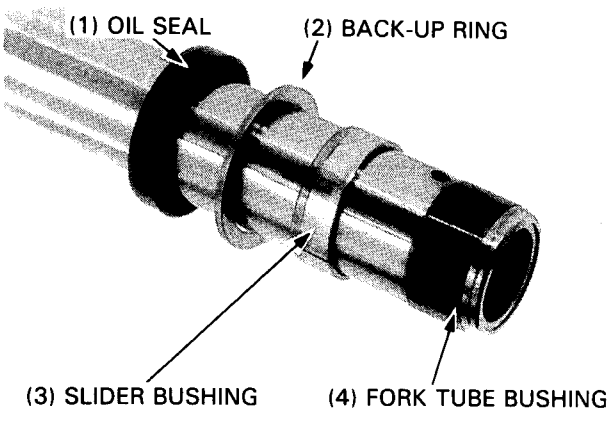
Remove the oil lock piece from the piston.
Remove the piston and rebound spring from the fork tube.



Remove the oil seal, back-up ring and slider bushing from the fork tube.

NOTE

- Do not remove the fork tube bushing unless it is necessary to replace it with a new one. See bushing inspection, page 14-17.

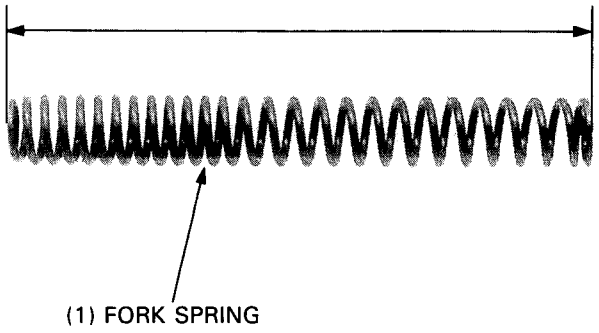


INSPECTION

Fork spring
Measure the fork spring free length.

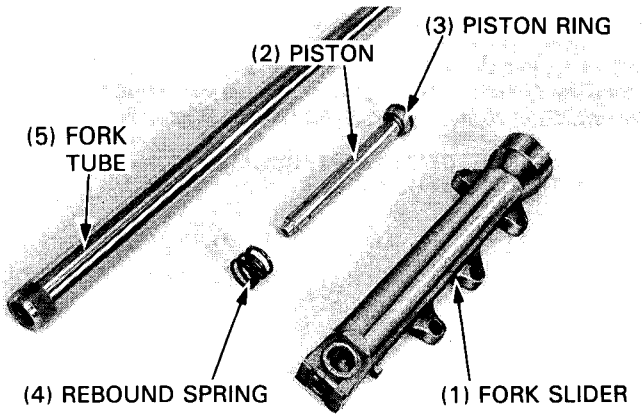
SERVICE LIMIT: 321.3 mm (12.6 in)

Replace the spring if it is shorter than the service limit.



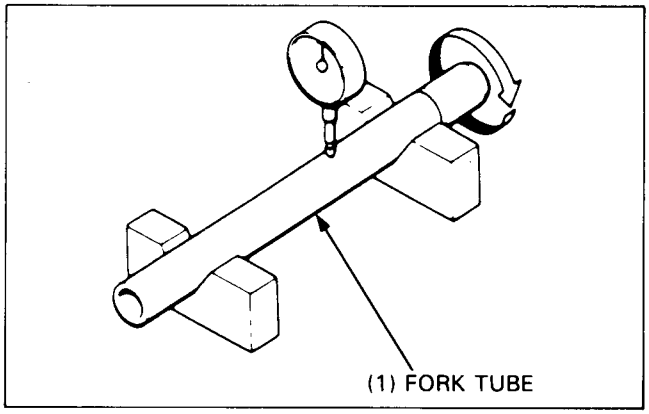
Fork tube/slider/piston
Check the fork tube, fork slider and piston for score marks and excessive or abnormal wear.
Replace any components which are worn or damaged.

Check the fork piston ring for wear or damage.
Check the rebound spring for fatigue or damage.



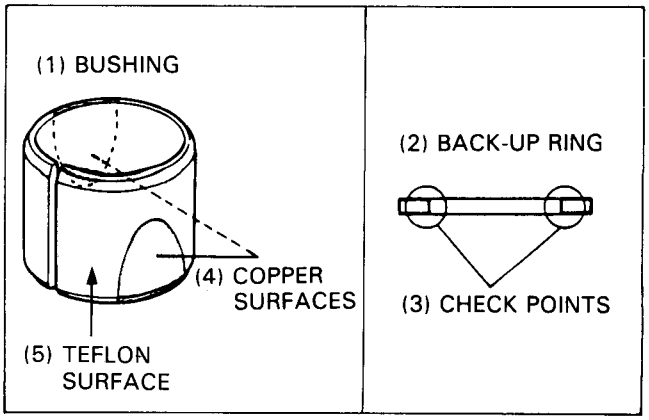
Set the fork tube in V blocks and read the runout.
Use 1/2 the total indicator reading to determine the actual run-out.

SERVICE LIMIT: 0.20 mm (0.008 in)



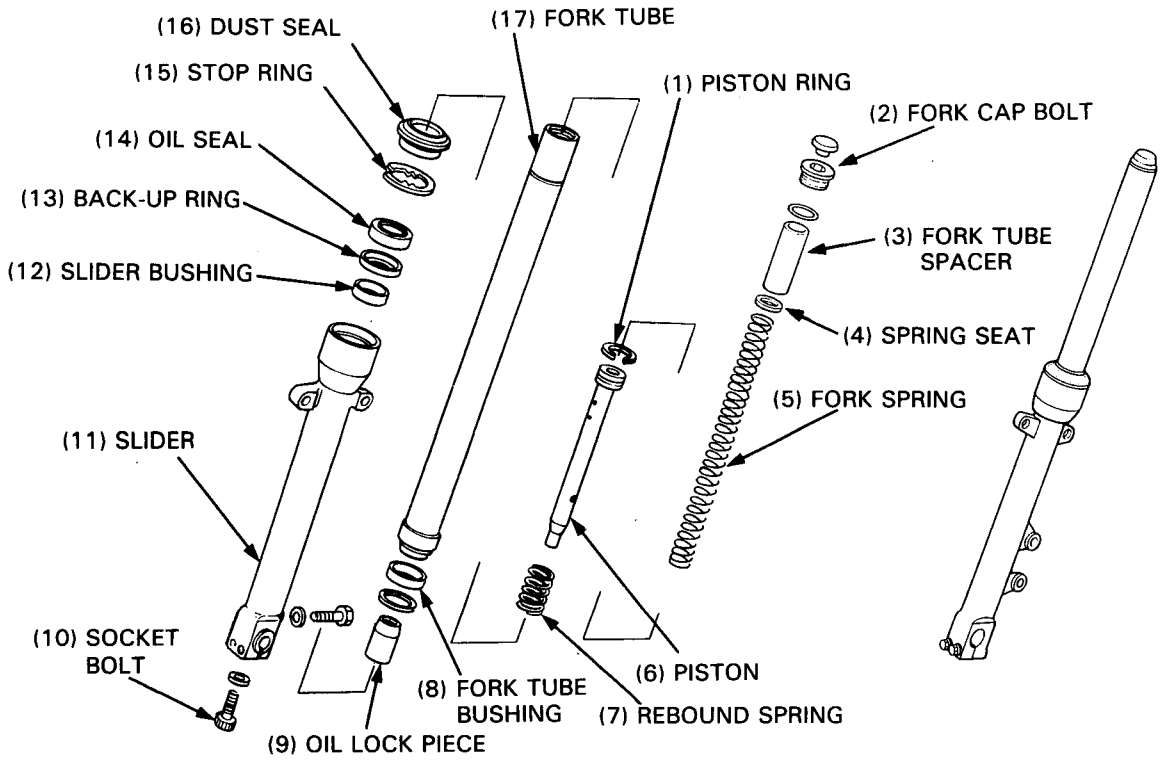
Bushings
Visually inspect the slider and fork tube bushings.
Replace the bushings if there is excessive scoring or scratching, or if the teflon is worn so that the copper surface appears on more than 3/4 of the entire surface.

Check the back-up ring; replace it if there is any distortion at the points shown.

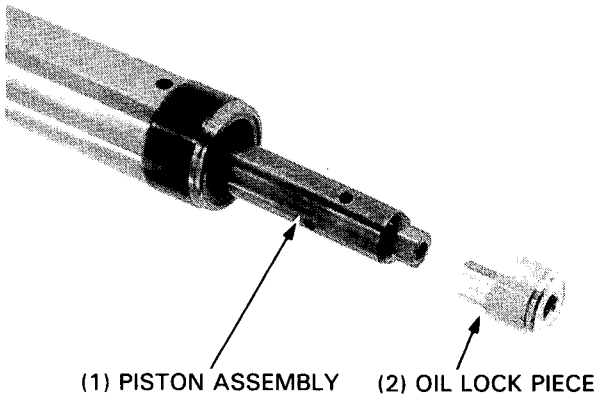


ASSEMBLY

Before assembly, wash all parts with a high flash point or non-flammable solvent and wipe them off completely.

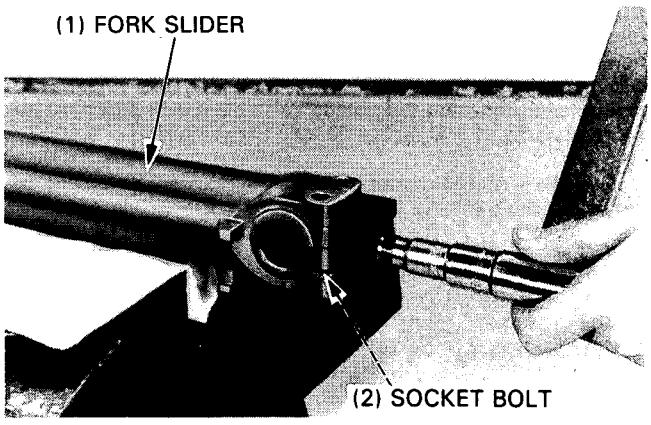


Assemble the rebound spring onto the piston.
Insert the piston assembly into the fork tube.
Place the oil lock piece on the end of the piston and insert the fork tube assembly into the slider.



Place the fork slider in a vise with soft jaws or use a shop towel to avoid damaging the slider.
Clean and apply a locking agent to the socket bolt threads and screw the bolt into the piston.
Temporarily install the fork spring and cap to tighten the socket bolt.
Tighten the bolt with a 6 mm hex wrench.

TORQUE: 20 N·m (2.0 kg-m, 14 ft-lb)



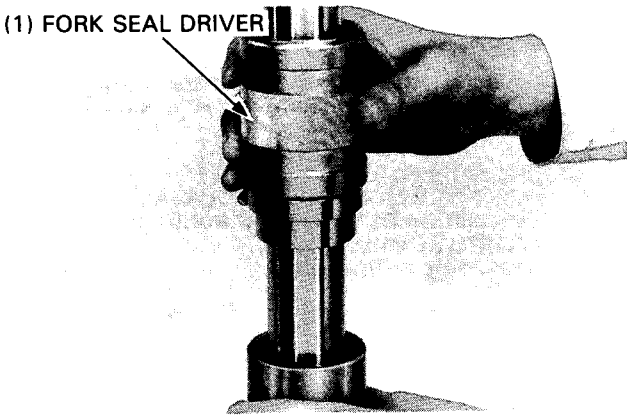
Place the slider bushing over the fork tube and rest it on the slider.

Drive the bushing into place with the seal driver.

Coat a new oil seal with ATF or equivalent and install it with the seal markings facing up. Drive the seal in with the seal driver.

TOOLS:

Fork seal driver	**07947–KA50100**
– driver attachment	**07947–KF00100**

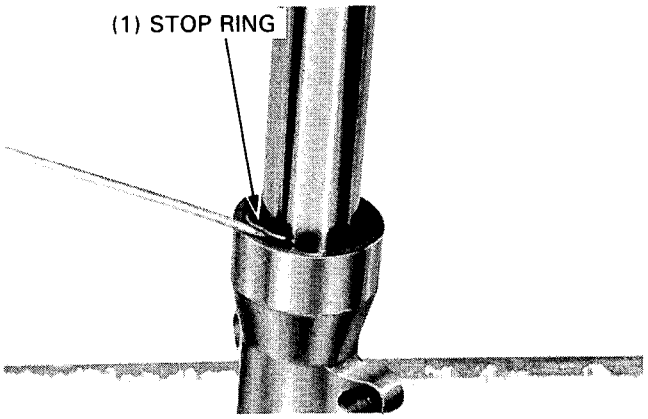


Install the stop ring securely into the groove in the fork slider.

CAUTION

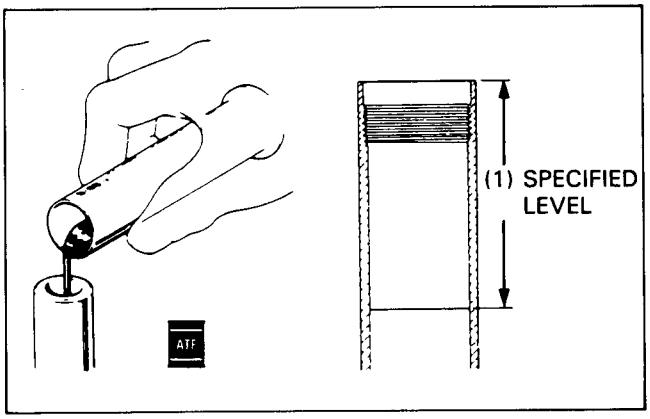
- *Do not scratch the fork tube sliding surface.*

Install the new dust seal onto the fork slider.



Compress the fork tube and pour in the recommended fork oil to the specified level.

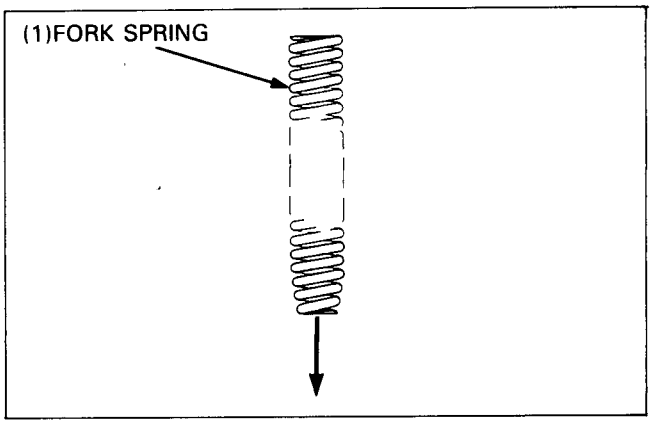
RECOMMENDED FORK OIL: ATF or EQUIVALENT
SPECIFIED LEVEL: 182 mm (7.17 in)
CAPACITY: 405 cm³ (13.7 US oz, 14.2 Imp oz)



Gently install the fork spring in the fork tube then install the spring seat and spacer.

NOTE

- Note the spring direction; the tapered end must face toward the bottom.



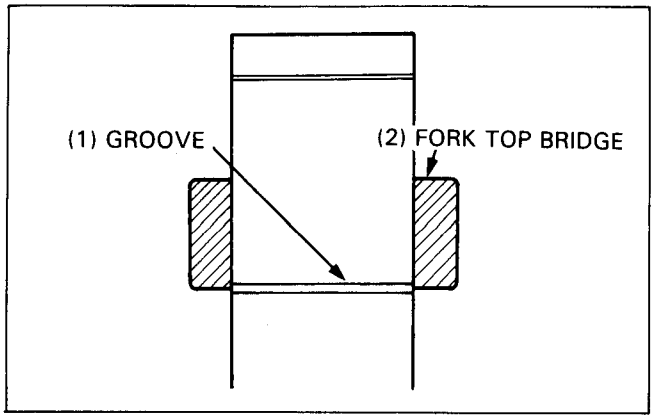
Loosely install the fork cap bolt with a new O-ring.

CAUTION

- *Do not damage the fork tube sliding surface.*

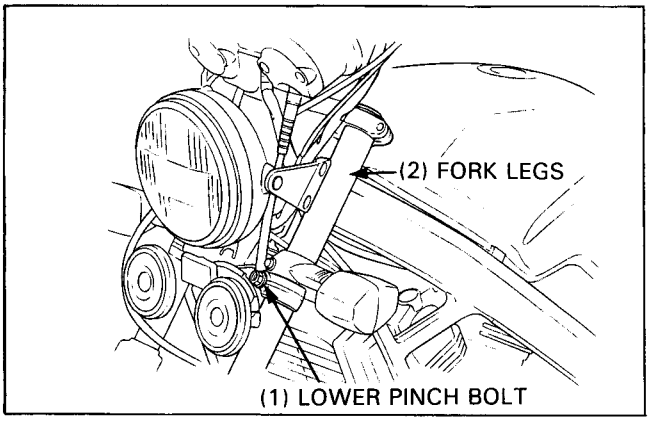
INSTALLATION

Install the fork legs into the steering stem and fork top bridge and align the groove of the fork tube with the top of the bridge.



Apply oil to the lower pinch bolt thread and tighten the bolt.

TORQUE: 50 N·m (5.0 kg-m, 36 ft-lb)



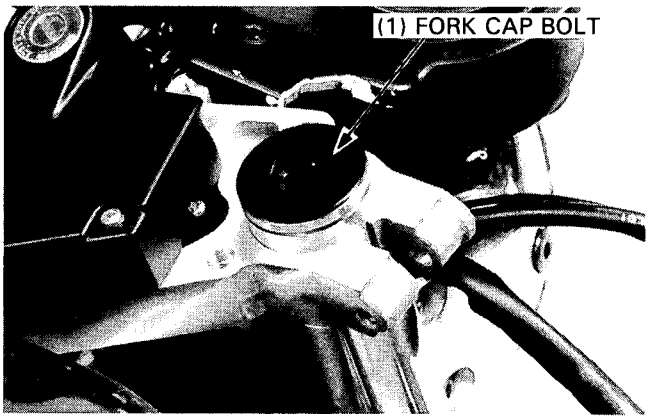
Tighten the fork cap bolt.

TORQUE: 23 N·m (2.3 kg-m, 17 ft-lb)

Install the handlebars (page 14-5).

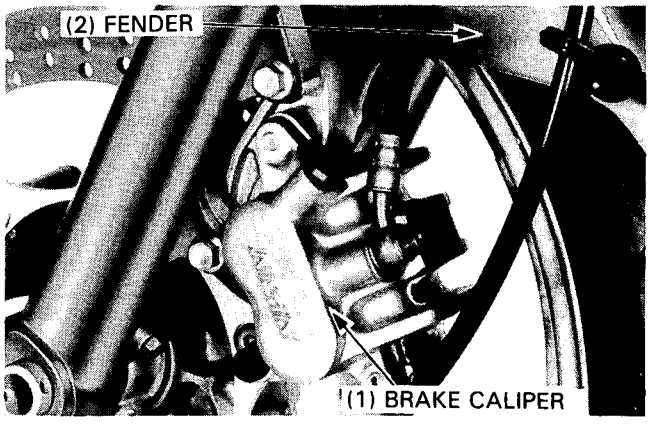
Tighten the top pinch bolt.

TORQUE: 11 N·m (1.1 kg-m, 8 ft-lb)



Inatll the following:
— fender and brake caliper.
— front wheel (page 14-14).

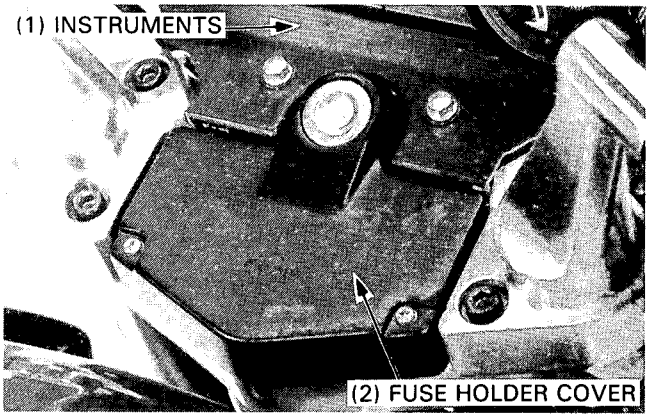
With the front brake applied, compress the fork up and down several times to check for proper fork and wheel assembly.



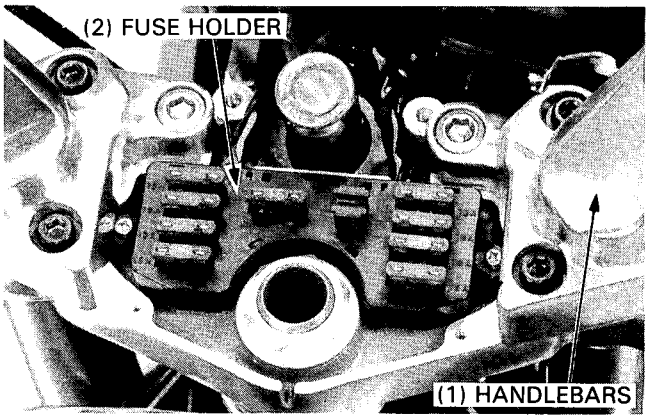
STEERING STEM

REMOVAL

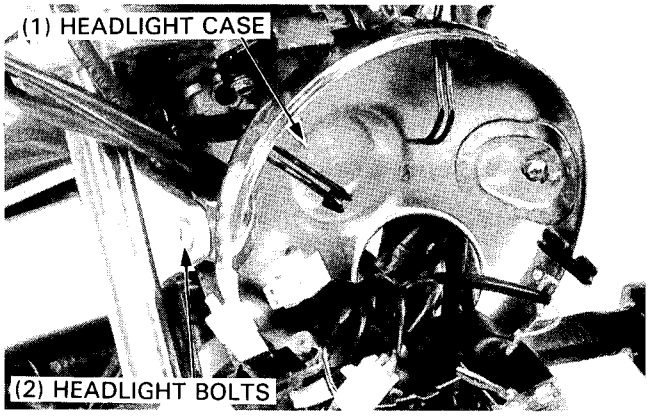
Remove the following:
- instaruments
- fuse holder cover
- front wheel (page 14-9)



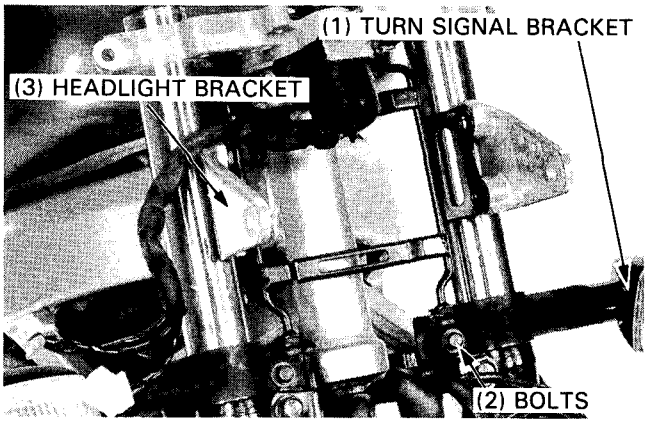
Remove the fuse holder removing the two screws.
Remove the handlebars (page 14-3).



Remove the headlight and headlight case (page 20-3).



Remove the turn signal bracket bolts and the headlight bracket.

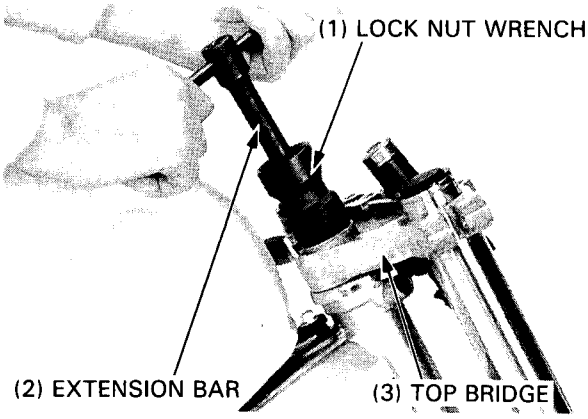


Remove the steering stem nut.

TOOLS:

Lock nut wrench, 30 x 32 mm	**07716—0020400 or equivalents commercially available**
Extension bar	**07716—0020500 or equivalents commercially available**

Remove the fork tube and top bridge.

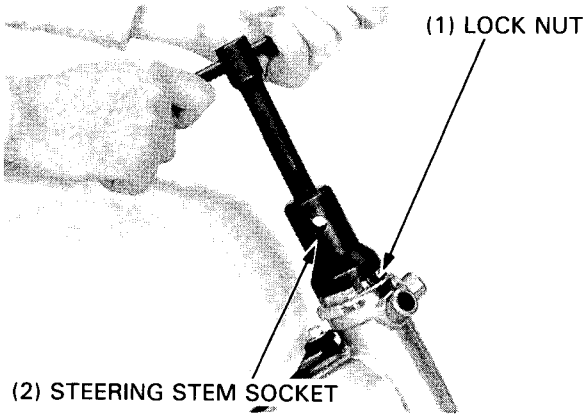


Straighten the lock washer tabs and remove the lock nut and lock washer.

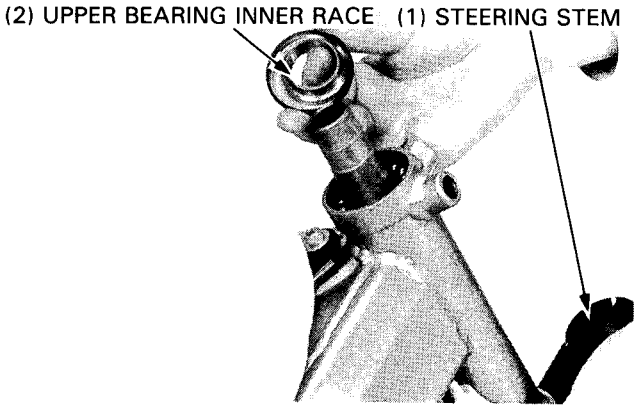
Remove the bearing adjustment nut.

TOOL:

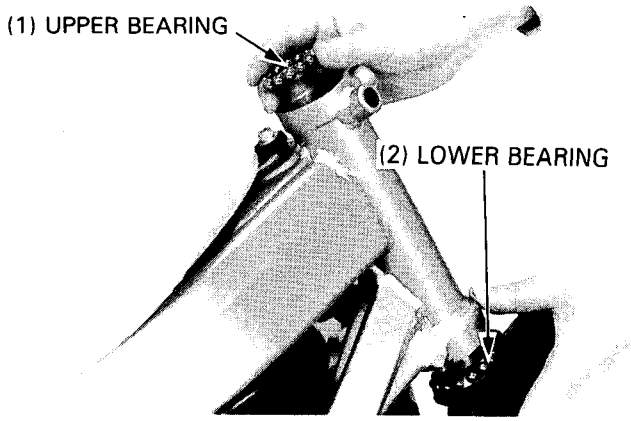
Steering stem socket	**07916—3710100**



Remove the dust cap, upper bearing inner race and bearing, then remove the steering stem.



Remove the upper bearing and steering stem from the frame. Remove the lower bearing from the stem.



BEARING RACE REPLACEMENT

NOTE

- Always replace the bearing and races as a set.

Remove the upper bearing outer race with the A side of the ball race remover.

TOOL:

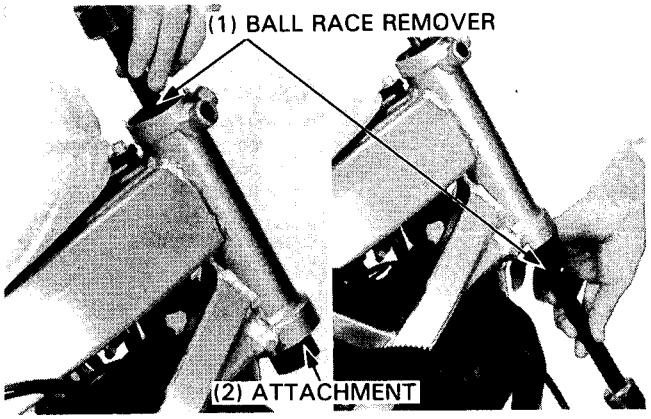
Ball race remover	**07953–MJ10000**

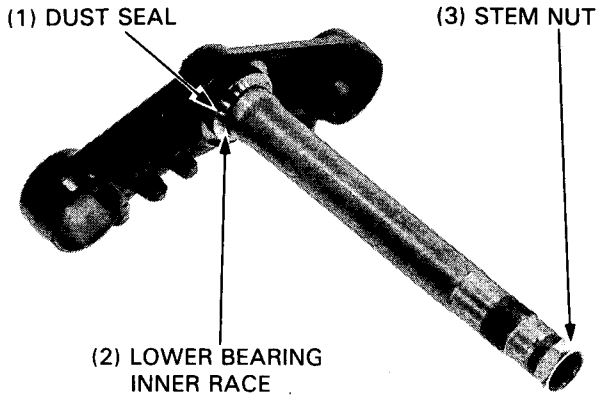
Remove the lower bearing outer race with the ball race remover and attachment.

TOOLS:

Ball race remover	**07953–4250002**
Ball race remover attachement	**07946–3710500**

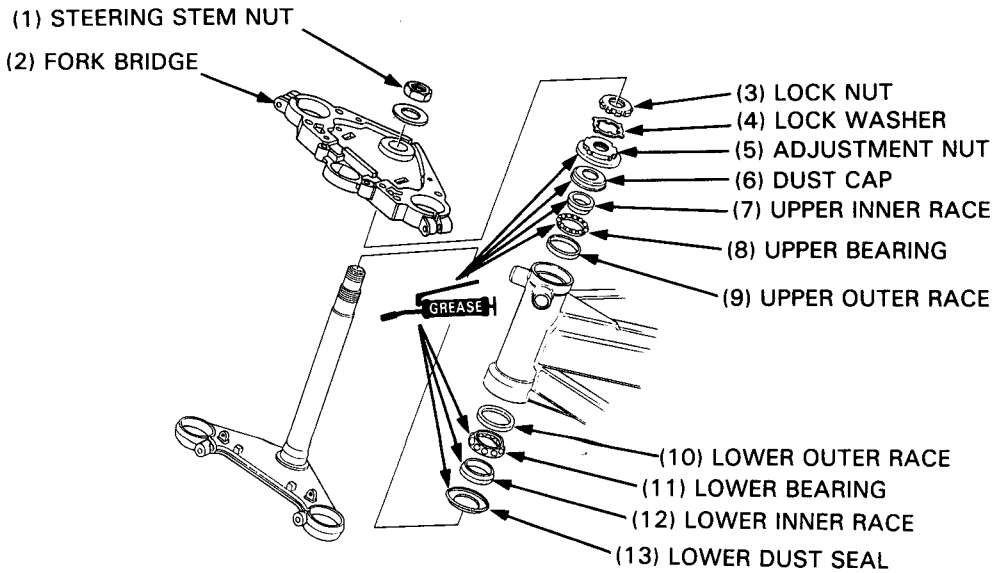
Install the stem nut onto the stem to prevent the threads from being damaged when removing the lower bearing inner race from the stem.
Remove the lower bearing inner race with a chisel or equivalent tool, being careful not to damage the stem.
Remove the dust seal.





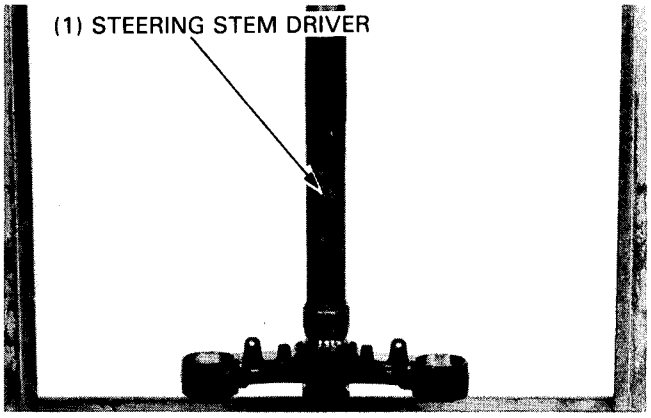
NOTE

- If the motorcycle has been involved in accident, examine the area around the steering head cracks.



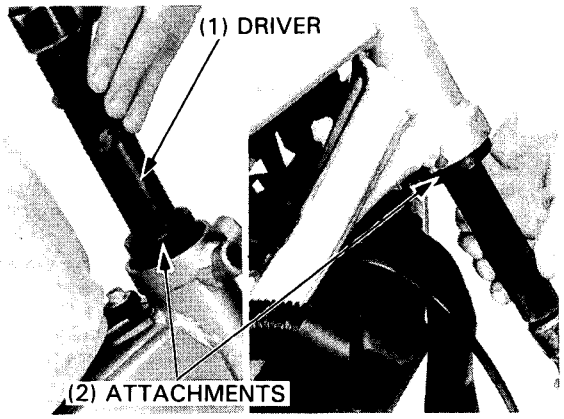
Install a new dust seal over the steering stem.
Press a new lower bearing inner race onto the stem.

TOOL:
Steering stem driver **07946—MB00000**



Drive new upper and lower bearing outer races into the steering stem.

TOOLS:
Upper bearing outer race:
Driver **07749—0010000**
Attachment, 42 x 47 mm **07746—0010300**
Lower bearing outer race:
Driver **07749—0010000**
Attachment, 52 x 55 mm **07746—0010400**

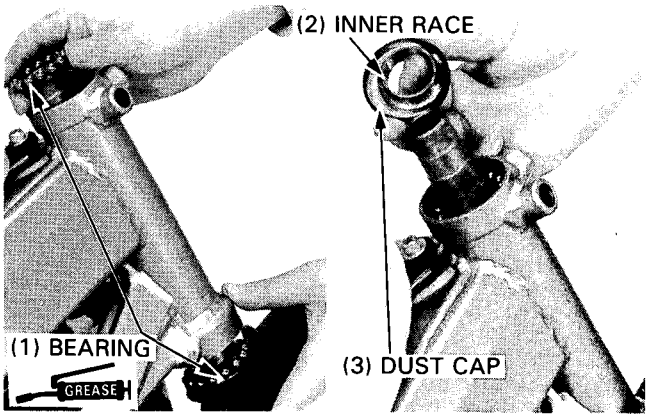


INSTALLATION

Pack the bearing cavities with clean grease.

Install the lower bearing onto the steering stem, then insert the steering stem into the steering head.

Install the upper bearing, upper bearing inner race and dust cap.

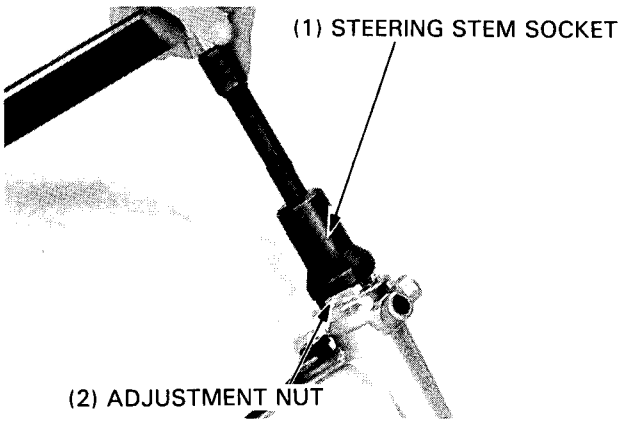


Install and tighten the adjustment nut to the specified torque.

TORQUE: 22 N·m (2.2 kg-m, 16 ft-lb)

TOOL:
Steering stem socket **07916—3710100**

Turn the steering stem lock-to-lock 4 or 5 times to seat the bearings, then tighten the nut to the same torque.

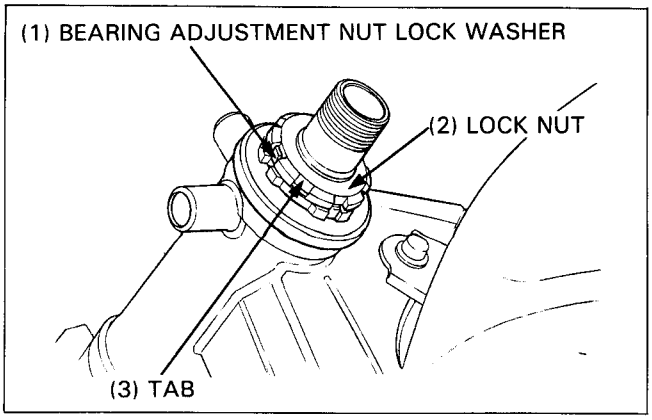


Install a new bearing adjustment nut lock washer aligning the tabs with the grooves in the nut. Bend two opposite tabs down into the grooves.

NOTE

- Do not install a used lock washer.

Finger tighten the lock nut all the way.
Hold the adjustment nut and further tighten the lock nut (within 90 degrees) enough to align its grooves with the lock washer tabs.
Bend the lock washer tabs up into the lock nut grooves.

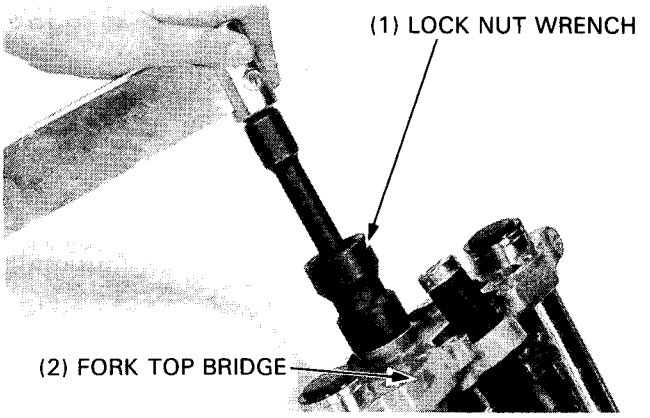


Install the fork top bridge and install the steering stem nut.
Temporarily install the fork legs.
Tighten the steering stem nut.

TORQUE: 105 N·m (10.5 kg-m, 76 ft-lb)

TOOL:

Lock nut wrench, 30 x 32 mm	**07716—0020400 or Equivalent commercially available**

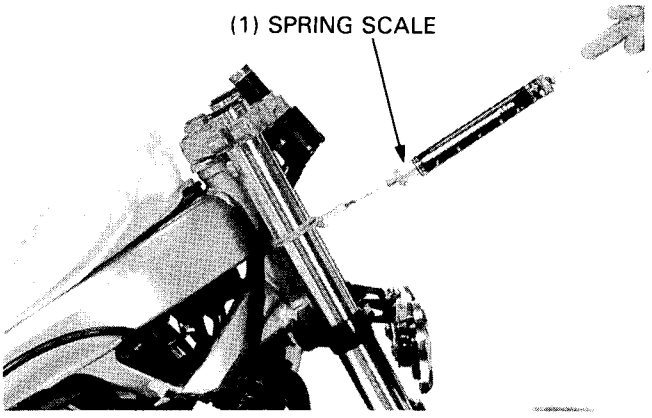


STEERING HEAD BEARING PRELOAD

Install the front wheel (page 14-14).
Place a stand under the engien and raise the front wheel off the ground.
Postion the steering stem in the straight ahead position.
Hook a spring scale to the fork tube and measure the steering head bearing preload.

NOTE

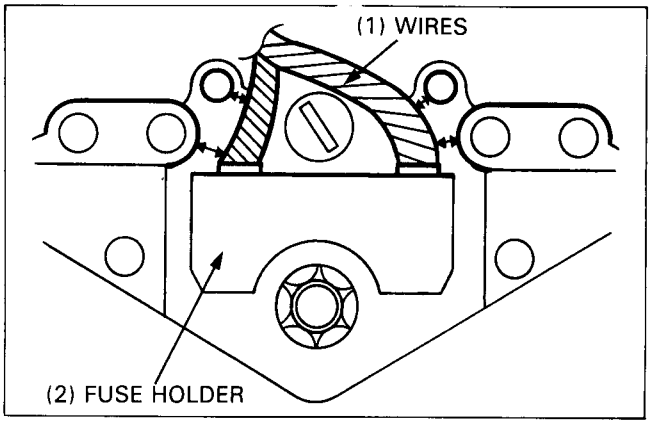
- Make sure that there is no cable or wire harness interference.



The preload should be within 1.0—1.5 kg (2.2—3.3 lb) for right and left turns.
If the readings do not fall within the range, lower the front wheel and adjust the bearing adjustment nut.
After making sure the bearing preload is acceptable, install the removed parts in the reverse order of removal.

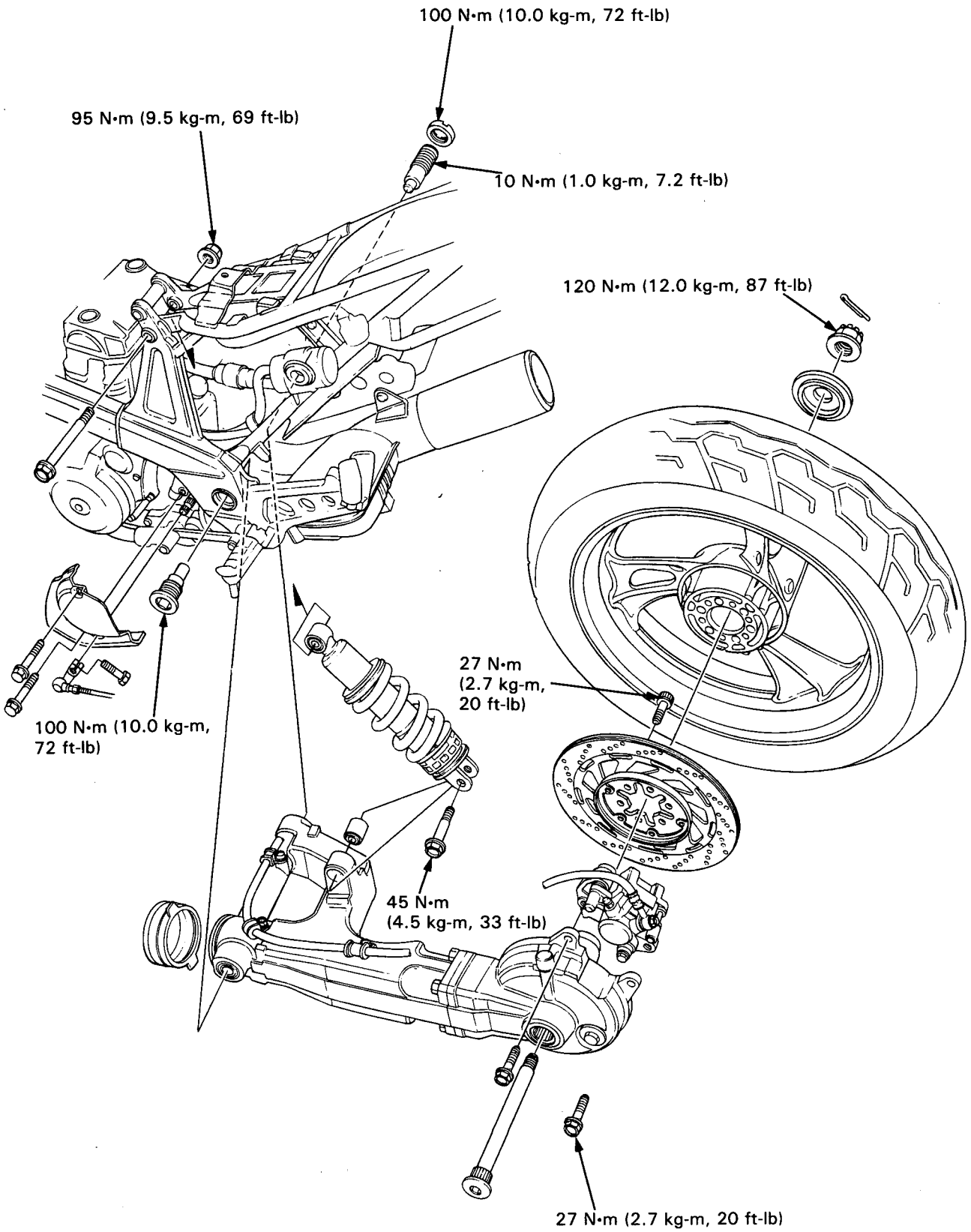
NOTE

- Route the fuse holder wires correctly.



15

REAR WHEEL/BRAKE/ SUSPENSION


100 N•m (10.0 kg-m, 72 ft-lb)
95 N•m (9.5 kg-m, 69 ft-lb)
10 N•m (1.0 kg-m, 7.2 ft-lb)
120 N•m (12.0 kg-m, 87 ft-lb)
27 N•m
(2.7 kg-m,
20 ft-lb)
100 N•m (10.0 kg-m,
72 ft-lb)
45 N•m
(4.5 kg-m, 33 ft-lb)
27 N•m (2.7 kg-m, 20 ft-lb)

SERVICE INFORMATION

GENERAL

- Never ride on the rim.
- When using a lock nut wrench, use a 500 mm (20 in) long deflecting beam type torque wrench. 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.

⚠ 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.*
- *Inhaled asbestos fibers have been found to cause respiratory disease and cancer. Never use an air hose or dry brush to clean brake assemblies.*
- *The shock absorber contains nitrogen gas under high pressure. Do not allow fire or heat near the shock absorber.*
- *Before disposal of the shock absorber, release the nitrogen. (see page 15-7).*

SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Rear wheel rim runout	Radial	—	2.0 (0.08)
	Axial	—	2.0 (0.08)
Shock absorber spring free length		151.3 (5.96)	148.3 (5.84)
Shock absorber spring preload adjuster position		4	—
Compression force at 10 mm (0.4 in) compressed		15—20 kg (33.1—44.1 lb)	14.9 kg (32.8 lb)

TORQUE VALUES

Brake disc retaining bolt	27 N·m (2.7 kg-m, 20 ft-lb) Apply a locking agent to the threads
Rear wheel nut	120 N·m (12.0 kg-m, 87 ft-lb) Apply clean grease to the axle threads
Rear wheel drive pin bolt	22 N·m (2.2 kg-m, 16 ft-lb) Apply a locking agent to the threads
Swingarm left pivot bolt	100 N·m (10.0 kg-m, 72 ft-lb)
Swingarm right pivot bolt	10 N·m (1.0 kg-m, 7.2 ft-lb)
Swingarm right pivot bolt lock nut	100 N·m (10.0 kg-m, 72 ft-lb)
Shock absorber mounting bolt: upper side	95 N·m (9.5 kg-m, 69 ft-lb) Apply engine oil to the threads
Shock absorber mounting bolt: lower side	45 N·m (4.5 kg-m, 33 ft-lb)
Damper rod lock nut	68 N·m (6.8 kg-m, 49 ft-lb) Apply a locking to the threads

TOOLS

Special

Socket bit, 10 mm	07703—0020200 ┐ or equivalent commercially available
Socket bit, 14 mm	07703—0020400 ┘
Shock absorber compressor attachment	07967—KE10000
Pivot bearing outer remover	07936—4150000
Lock nut wrench	07908—ME90000

Common

Driver	07749—0010000
Attachment, 32 x 35 mm	07746—0010100

TROUBLESHOOTING

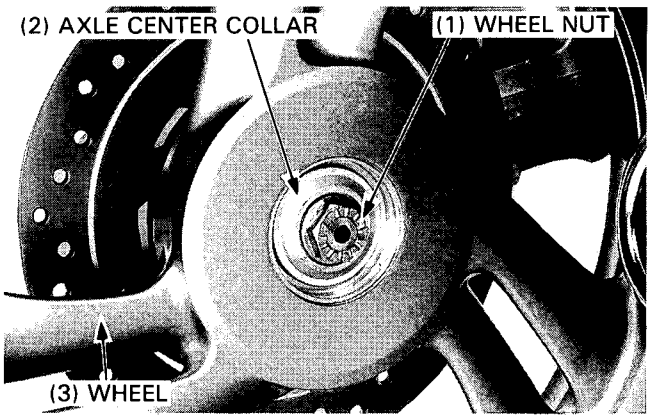
Wobble or vibration in motorcycle
- Bent rim
- Loose ring gear bearing(s)
- Damaged tire
- Wheel nut not tightened properly
- Swingarm pivot bearing worn
- Bent frame or swingarm
- Damaged drive pin(s) and pin hole(s)

Soft suspension
- Weak spring
- Improper shock absorber spring preload
- Leaking damper

Hard suspension
- Improper shock absorber spring preload
- Bent shock absorber rod
- Swingarm pivot bearings damaged
- Bent frame or swingarm

Suspension noise
- Faulty rear damper
- Loose fasteners

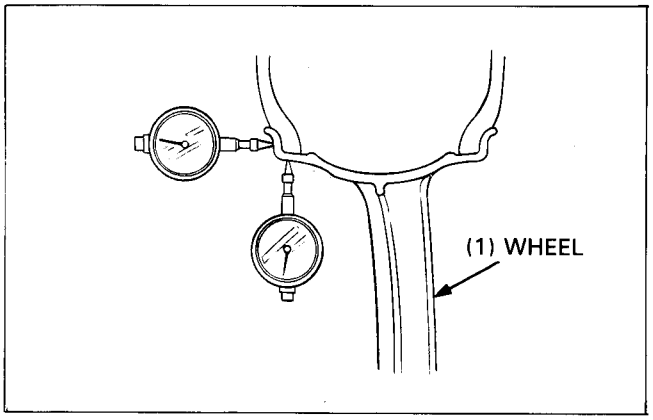
REAR WHEEL



REMOVAL

Place the motorcycle on its center stand.
Remove the following:
- center cap
- cotter pin
- wheel nut
- axle center collar

INSPECTION

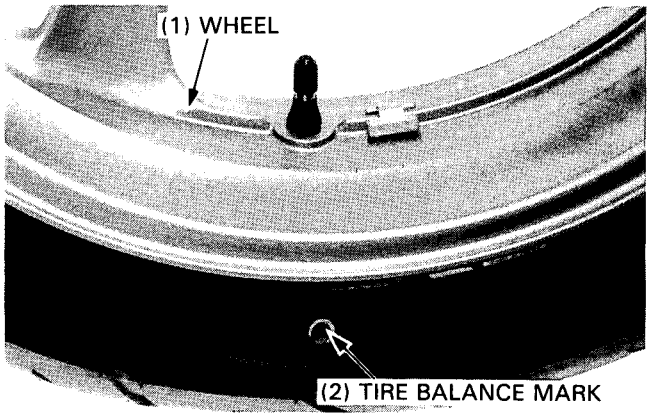


Wheel rim runout
Check the rim runout by placing the wheel in a truing stand. Spin the wheel slowly and read the runout using a dial indicator.

SERVICE LIMITS:
RADIAL RUNOUT: 2.0 mm (0.08 in)
AXIAL RUNOUT: 2.0 mm (0.08 in)

NOTE

- The wheel cannot be repaired and must be replaced with a new one if the service limits are exceeded.



Wheel Balance

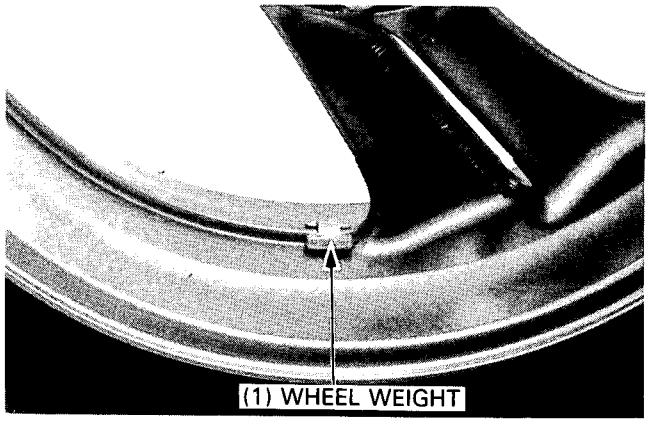
CAUTION

- *Wheel balance directly affects the stability, handling and overall safety of the motorcycle. Always check balance when the tire has been removed from the rim.*

NOTE

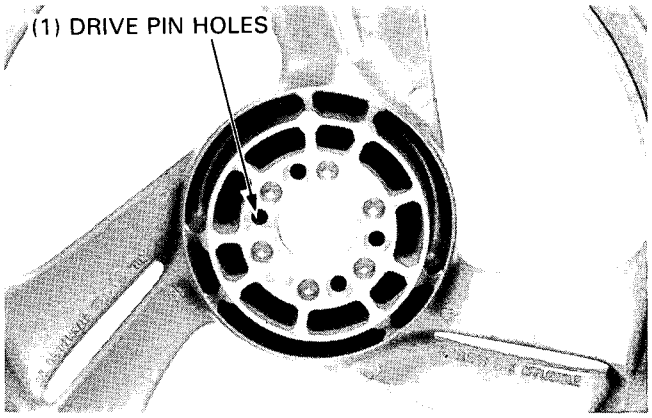
- For optimum balance, the tire balance mark (a paint dot on the side wall) must be located next to the valve stem. Remount the tire if necessary.

Remove the dust seal from the wheel.
Mount the wheel and tire assembly in an inspection stand.
Spin the wheel, allow it to stop, and mark the lowest (heaviest) part of the wheel with chalk.
Do this two or three times to verify the heaviest area. If the wheel is balanced, it will not stop consistently in the same position.



To balance the wheel, install wheel weights on the highest side of the rim, the side opposite the chalk marks. Add just enough weight so the wheel will no longer stop in the same position when it's spun.
Do not add more than 60 grams to the rear wheel.

Drive pin hole
Check the drive pin holes for the damage.

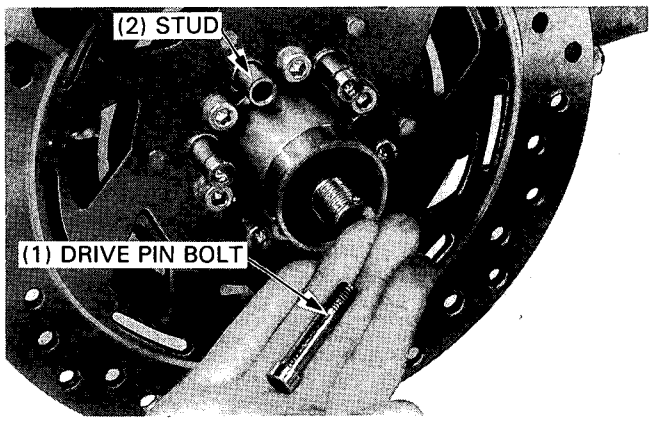


Drive pin bolt
Check the drive pin for damage.

Remove the drive pin bolt, replace it if desired.

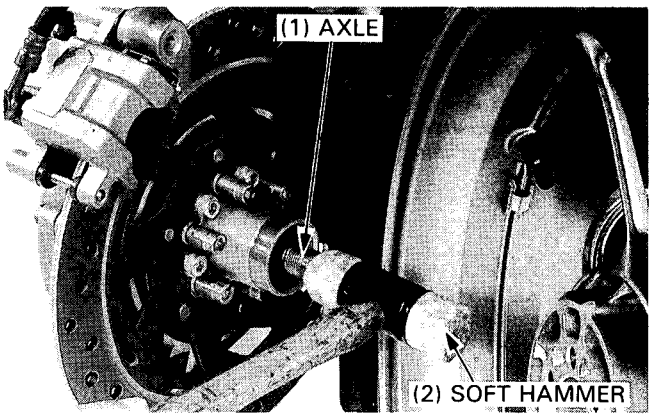
Clean and apply locking agent to the threads and install it onto the ring gear stud.

TORQUE: 22 N·m (2.2 kg-m, 16 ft-lb)

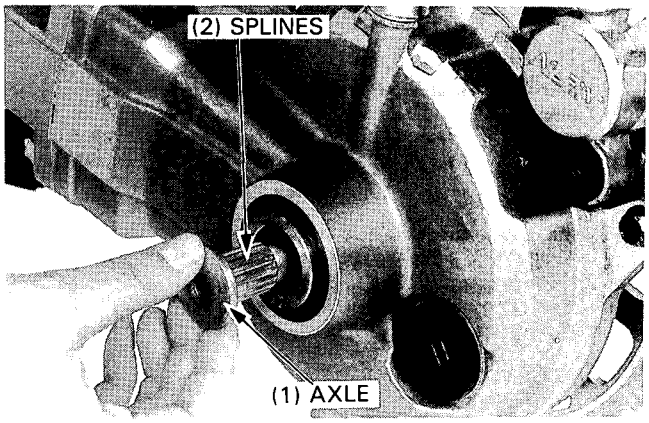


Axle
Tap the axle with a soft hammer and push the axle in until it clears the engagement.

Check the axle splines and threads for wear or damage.

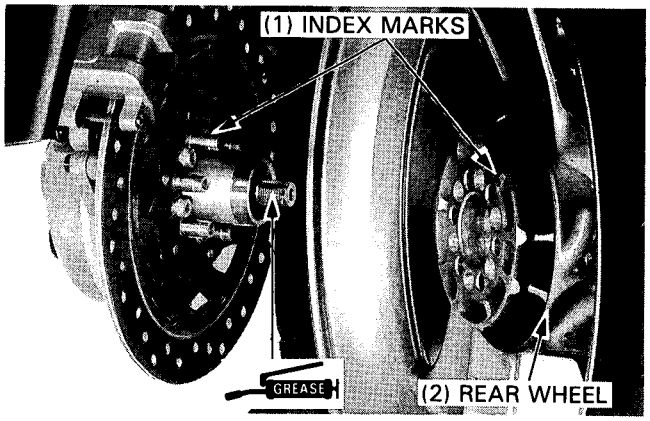


Clean and apply clean grease to the splines of axle.
Insert the axle in the gear case, making sure the splines are correctly aligned.
Tap the axle with a soft hammer to seat the axle securely.



INSTALLATION

Clean the wheel and spindle mating surface.
Align the index marks and install the wheel hub over the drive pins.



Clean and apply clean grease to the axle threads.

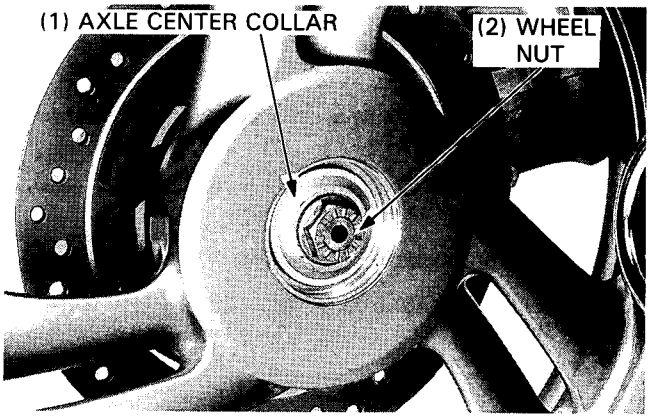
CAUTION

- *Make sure that the axle threads are applied clean grease to obtain the specified torque.*

Install the axle center collar and wheel nut.
Tighten the wheel nut to the specified torque.

TORQUE: 120 N·m (12.0 kg-m, 87 ft-lb)

Install a new cotter pin and install the center cap securely.



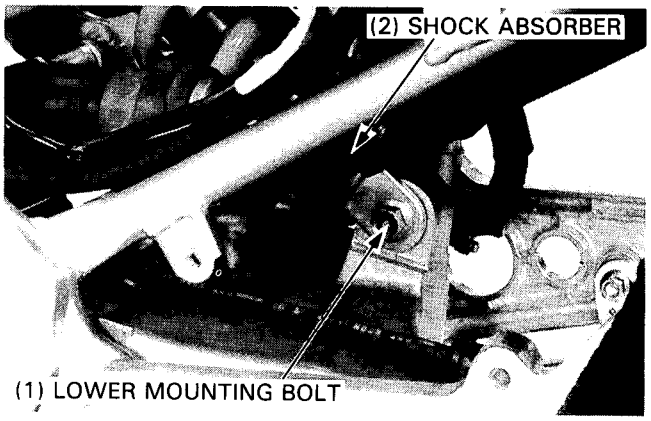
SHOCK ABSORBER

⚠ WARNING

- ***The rear 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.***

NOTE

- If you plan to disassemble the shock absorber, set the spring adjuster to the softest position at this time.



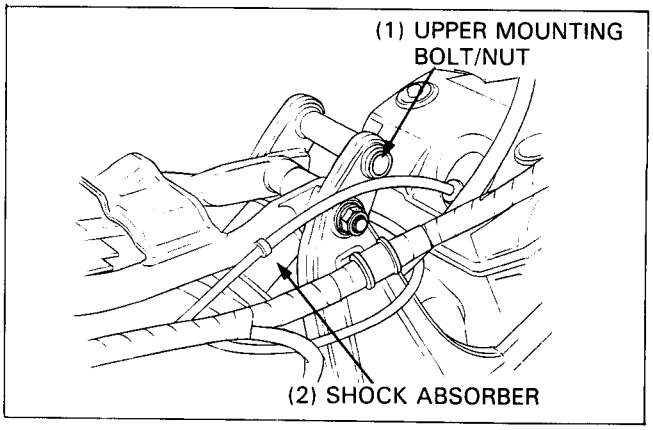
REMOVAL

Raise the rear wheel off the ground by placing the motorcycle on its center stand.

Remove the seat (page 15-14).
Remove the shock absorber lower mounting bolt while supporting the wheel.

Remove the shock absorber upper mounting bolt and nut.

Pull the shock absorber out from the frame.

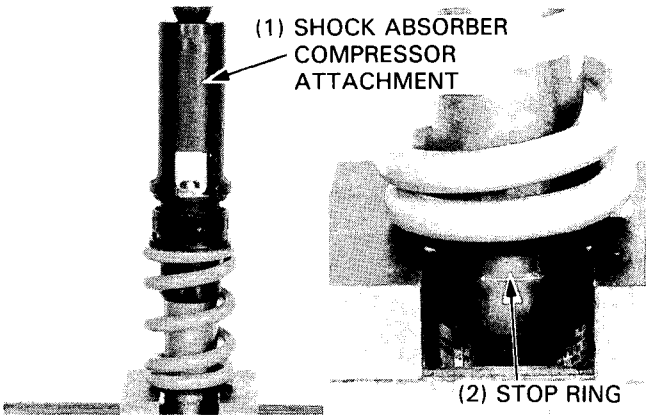


DISASSEMBLY

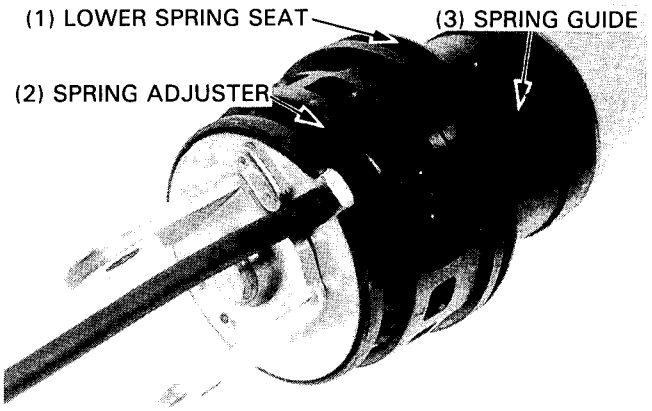
Make sure the spring adjuster is set to the softest position before disassembly.
Set the shock absorber in the hydraulic press with the special tool.

TOOL:
Shock absorber compressor attachement 07967—KE10000

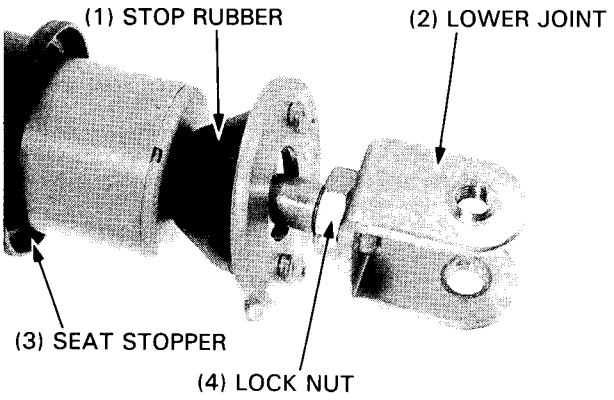
Compress the spring until the stop ring can be removed, and remove the stop ring from the shock absorber.



Remove the following:
— upper spring seat
— spring
— lower spring seat
— spring adjuster
— dust seal

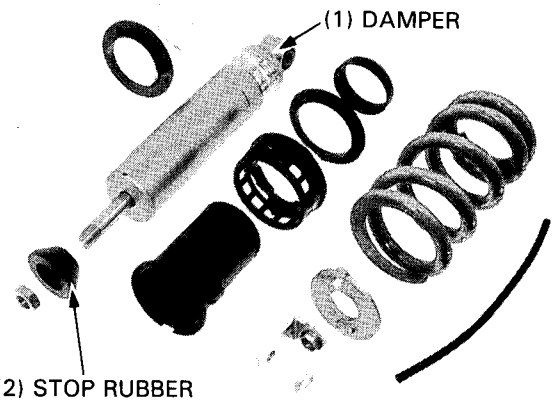


— lock nut and lower joint
— stop rubber
— seat stopper



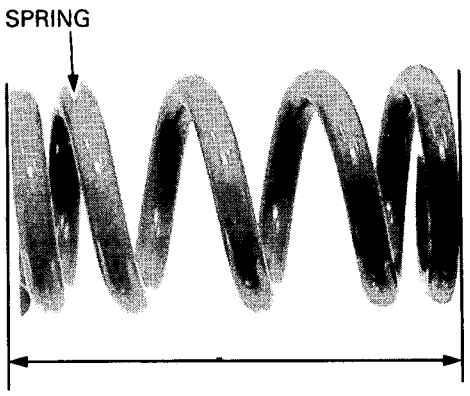
INSPECTION

Inspect the following parts:
— damper unit for oil leaks
— damper rod for bends or damage
— stop rubber for wear or damage
Inspect all the other parts for wear or damage.



Measure the spring free length.

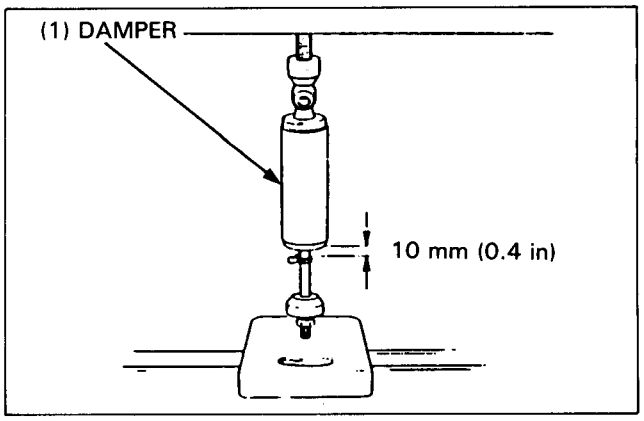
SERVICE LIMIT: 148.3 mm (5.84 in)



Mark the 10 mm position as shown of the damper rod.
Place the damper rod on a scale and measure the force required to compress the damper to the 10 mm (0.4 in) mark.

COMPRESSION FORCE: 15—20 kg (33.1—44.1 lb)

If the force required is less than 14.9 kg (32.8 lb), gas is leaking.
Examine the damper rod and replace the damper unit if it is bent or scored.



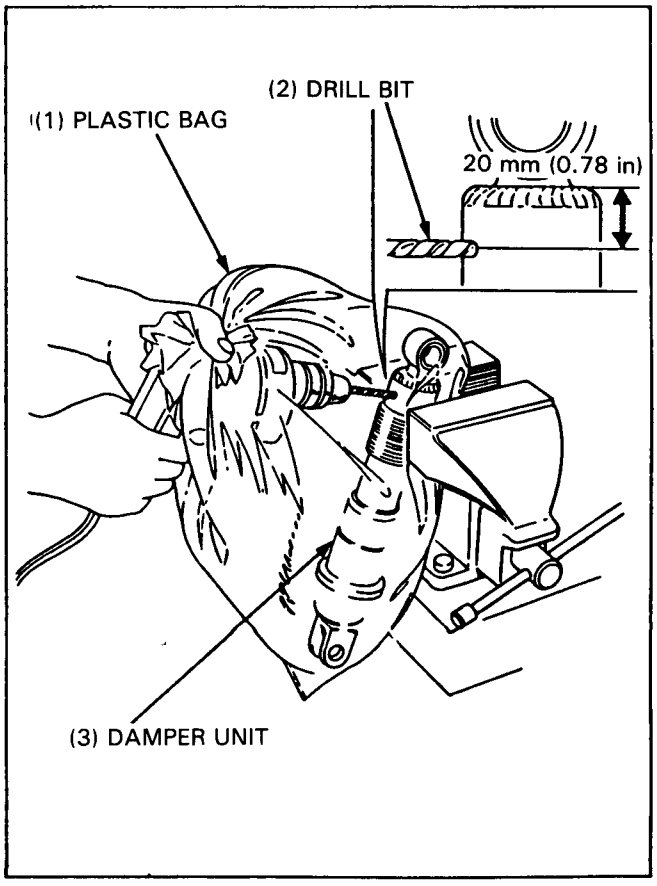
SHOCK ABSORBER DISPOSAL PROCEDURE

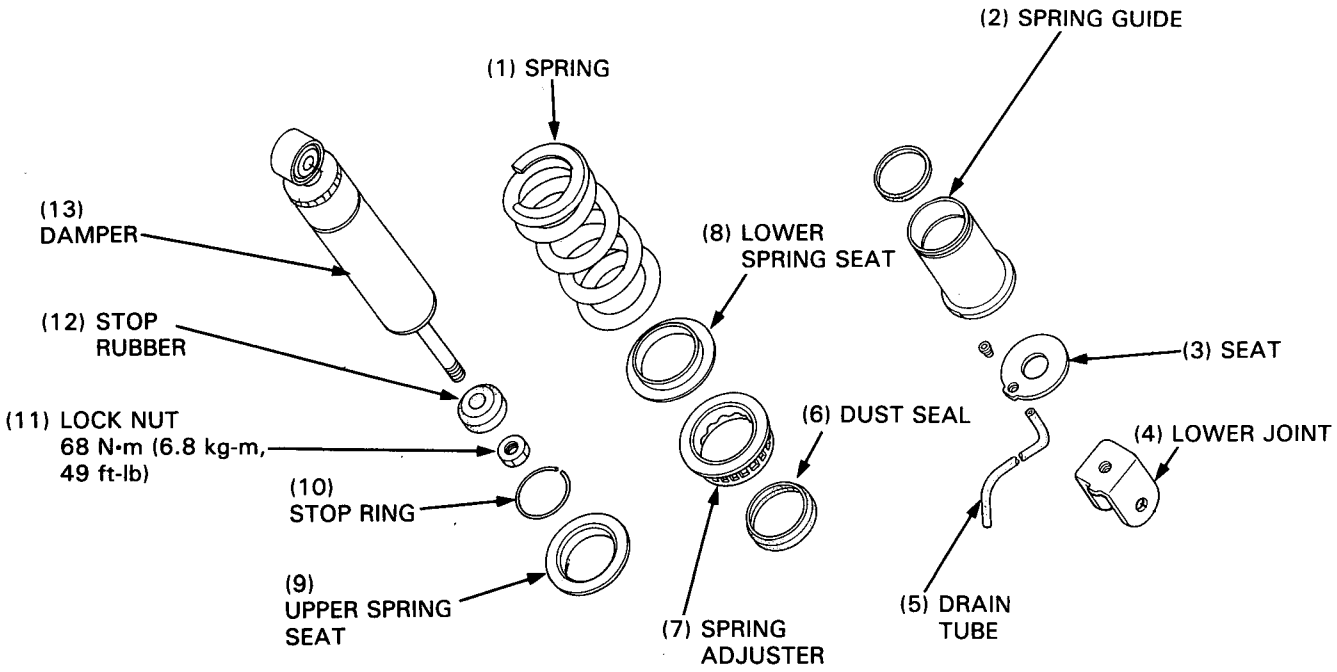
Center punch the damper case to mark the drilling point, approximately 20 mm (0.78 in) from the top surface.
Wrap the damper unit inside a plastic bag.
Support the damper unit upright in a vise as shown.
Through the open end of the bag, insert a drill motor with a sharp 2—3 mm (5/64—1/8 in) drill bit.

⚠WARNING

- ***Do not use a dull drill bit which could cause a build-up of excessive heat and pressure inside the damper, leading to explosion and severe personal injury.***
- ***The shock absorber contains nitrogen gas and oil under high pressure. Do not drill any farther down the damper case than the measurement given above, or you may drill into the oil chamber; oil escaping under high pressure may cause serious personal injury.***
- ***Always wear eye protection to avoid getting metal shavings in your eyes when the gas pressure is released.***
  The plastic bag is only intended to shield you from the escaping gas.

Hold the bag around the drill motor and briefly run the drill motor inside the bag; this will inflate the bag with air from the motor and help keep the bag from getting caught in the bit when you start.





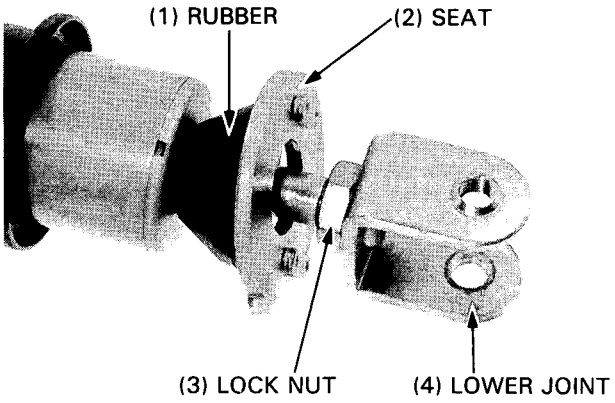
ASSEMBLY

Install the stop rubber and seat.
Apply locking agent to the threads and install the lock nut.
Screw in the lock nut fully.
Screw the lower joint onto the damper rod fully, hold it and tighten the lock nut.

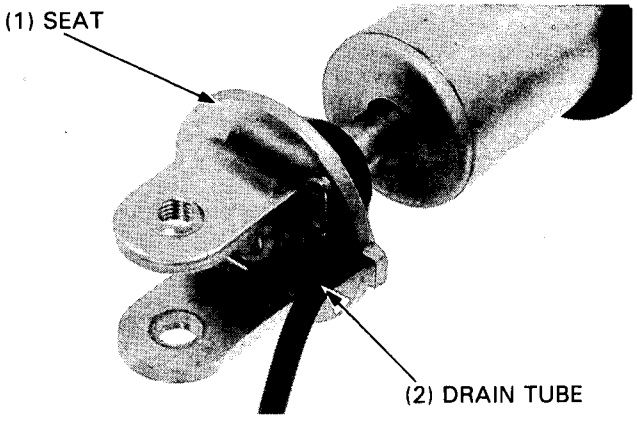
TORQUE: 68 N·m (6.8 kg-m, 49 ft-lb)

NOTE

- Align the tabs of the seat with the lower joint.

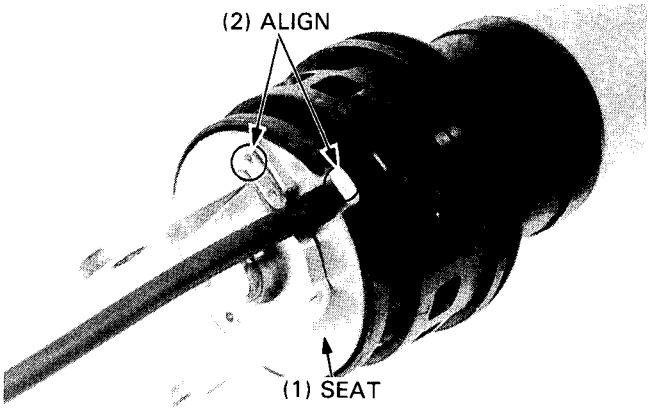


Install the shock absorber drain tube on the seat.



Install the following:
– spring guide
– dust seal
– spring adjuster
– lower spring seat
– spring and upper spring seat

Make sure the tab of the seat is aligned with the groove of the spring guide.

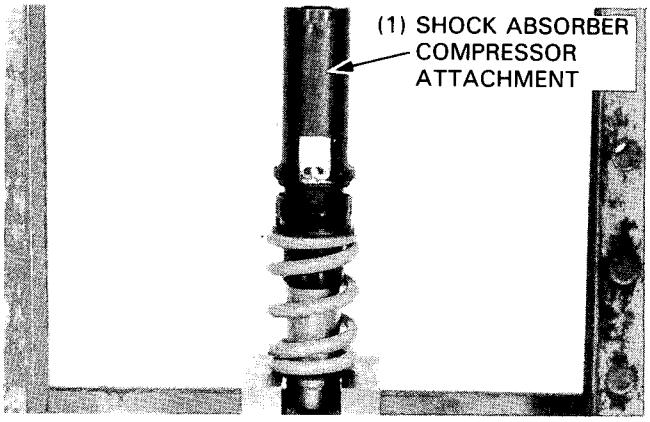


NOTE

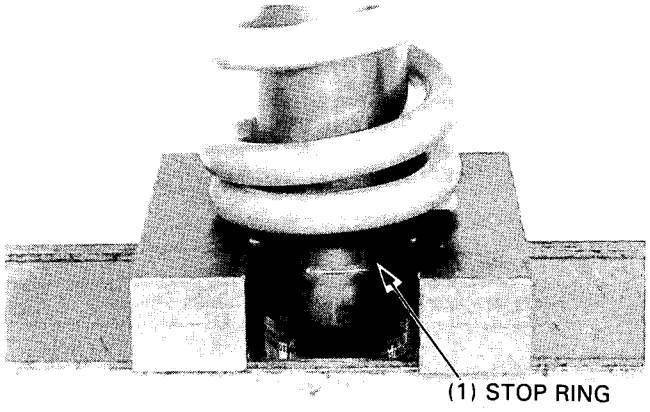
- Make sure the spring adjuster is set to the softest position.

Set the shock absorber in the hydraulic press with the special tool.

TOOL:
Shock absorber compressor attachment 07967–KE10000



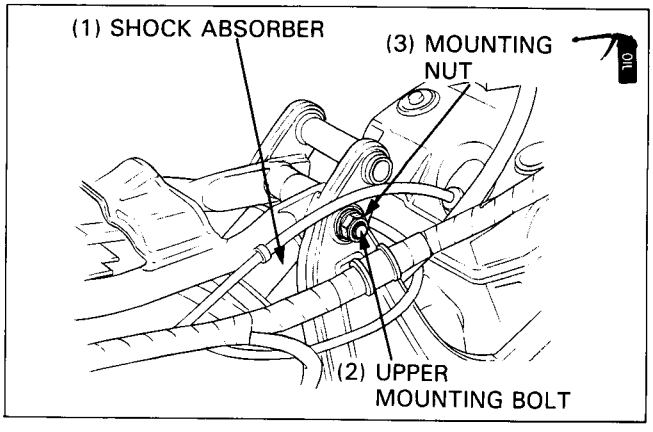
Compress the spring until the stop ring can be installed, and install the stop ring.



INSTALLATION

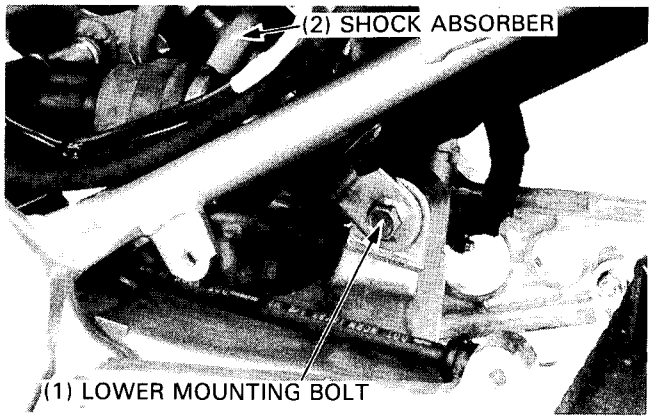
Install the shock absorber in the frame with the drain tube facing forward.
Install the shock absorber upper mounting bolt.
Apply engine oil to the threads and seating face of the nut.
Tighten the shockabsorber upper mounting nut.

TORQUE: 95 N·m (9.5 kg-m, 69 ft-lb)



Route and clamp the shock absorber drain tube.
Install the shock absorber lower mounting bolt.

TORQUE: 45 N·m (4.5 kg-m, 33 ft-lb)



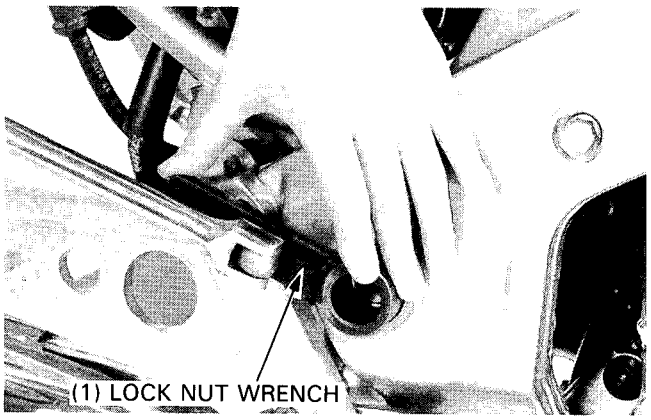
SWINGARM

REMOVAL

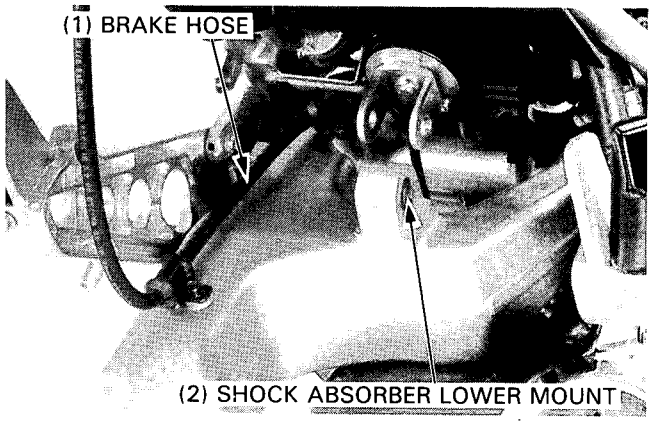
Raise the rear wheel off the ground by placing the motorcycle on its center stand.
Remove the rear wheel (page 15-3) and final drive (page 13-3).

Remove the swingarm right pivot lock nut using a special tool.

TOOL:
Lock nut wrench **07908—ME90000**

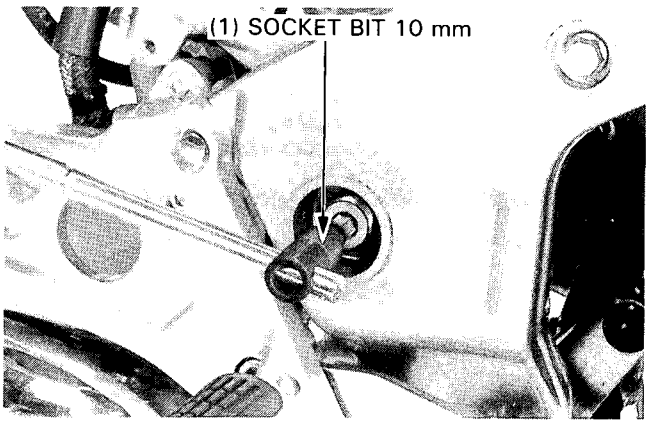


Remove the shock absorber lower mounting bolt.
Unhook the rear brake hose and remove the brake caliper (page 16-16).



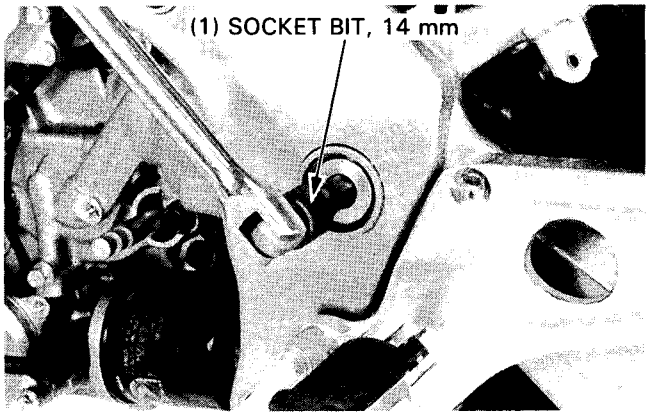
Remove the right pivot bolt.

TOOL:
Socket bit, 10 mm **07703—0020200 or equivalent commercially available**

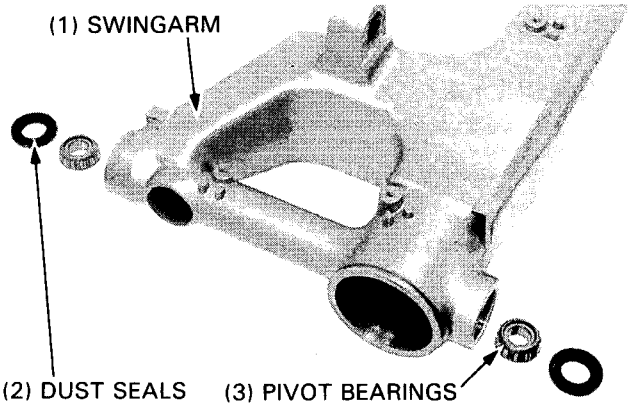


Remove the left pivot bolt and remove the swingarm.

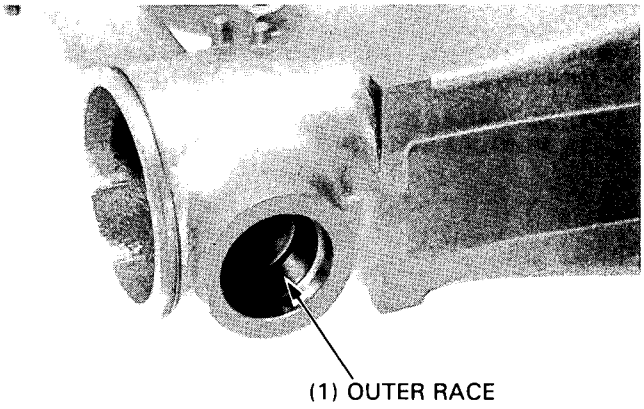
TOOL:
Socket bit, 14 mm **07703—0020400 or equivalent commercially available**



Remove the dust seals and pivot bearings from the swingarm.



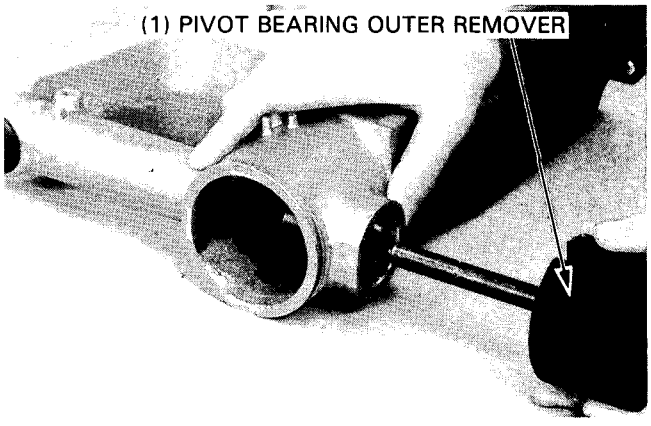
Inspect the pivot bearing outer races for wear or damage and replace if necessary.



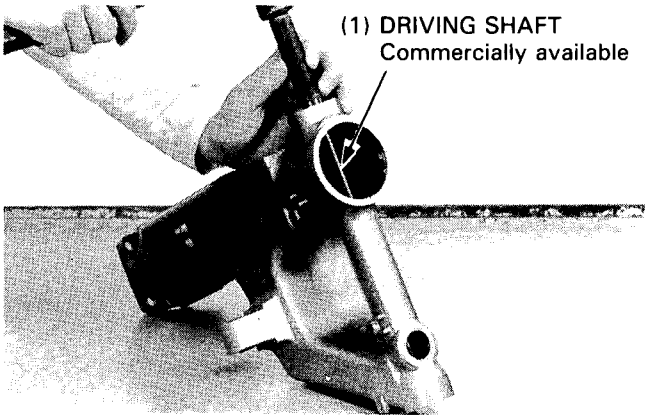
PIVOT BEARING/RACE REPLACEMENT

Remove the left pivot outer race using special tools.

TOOL:
Pivot bearing outer remover **07936—4150000**



Remove the right pivot outer race with grease retainer plate using the suitable driving shaft.



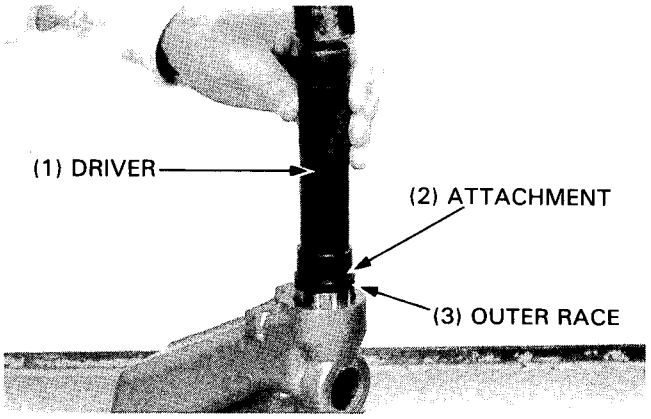
NOTE

- Replace the bearing inner and outer races as a set. Replace the grease retainer plate whenever it is removed.

Install new grease retainer plate and drive new bearing outer races into the swingarm pivot.

TOOLS:

Driver	**07749–0010000**
Attachment, 32 x 35 mm	**07746–0010100**

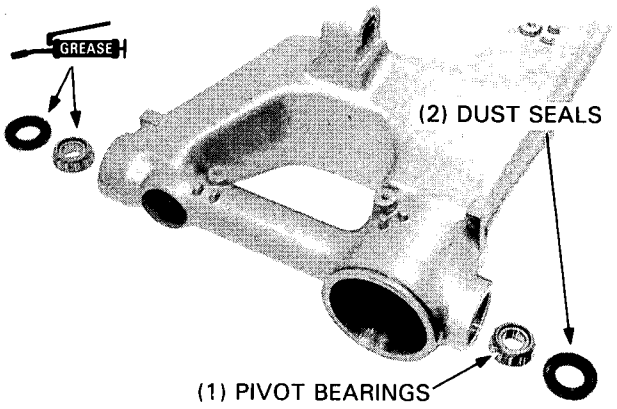


Apply clean grease to the pivot bearings and dust seals lips.

NOTE

- The pivot bearings has a built-in dust seal.

Install the bearings into the swingarm pivots.



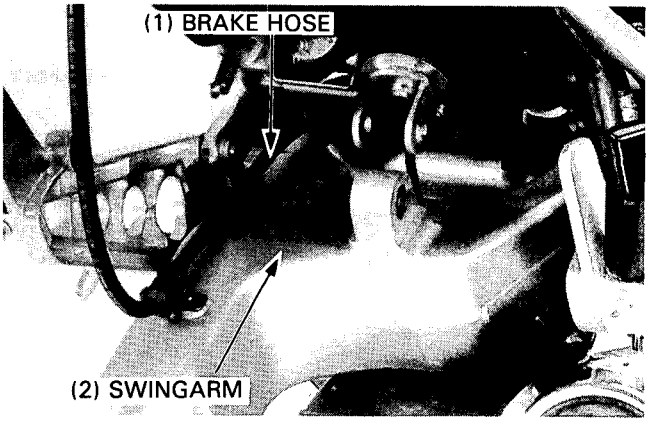
INSTALLATION

Install the boot onto the output gear case with the "UP" mark facing up.

Install the swingarm in the frame.

Coat the pivot bearings and pivot bolt tips with clean grease, and install the swingarm and pivot bolts.

Install the brake hose with clamps.



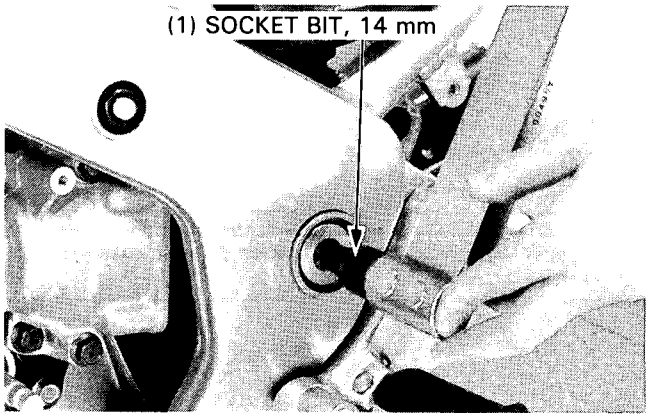
Tighten the left pivot bolt.

TORQUE: 100 N·m (10.0 kg-m, 72 ft-lb)

TOOL:

Socket bit, 14 mm	**07703—0020400 or equivalent commercially available**

Install the left pivot cap.



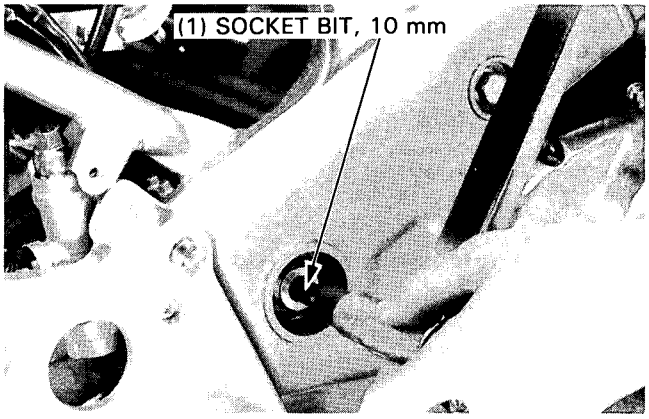
Tighten the right pivot bolt to 12 N·m (1.2 kg-m, 9 ft-lb), loosen it and retighten to the specified torque.

TORQUE: 10 N·m (1.0 kg-m, 7.2 ft-lb)

Move the swingarm up and down several times.
Retighten the right pivot bolt to the specified torque.

TOOL:

Socket bit, 10 mm	**07703—0020200 or equivalent commercially available**

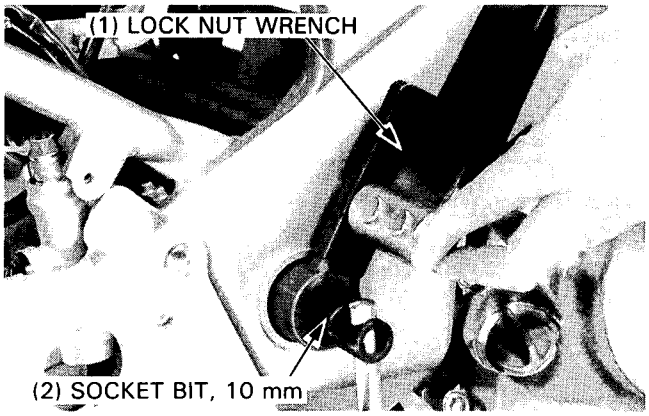


Tighten the right pivot bolt lock nut while holding the pivot bolt.

TORQUE:
Actual: 100 N·m (10.0 kg-m, 72 ft-lb)
Indicated: 90 N·m (9.0 kg-m, 65 ft-lb)

TOOLS:

Lock nut wrench	**07908—ME90000**
Socket bit, 10 mm	**07703—0020200 or equivalent commercially available**



Install the folllowing:
— final drive case (page 13-16)
— rear shock absorber lower mounting bolt (page 15-9)
— rear wheel (page 15-5)

SEAT

REMOVAL/INSTALLATION

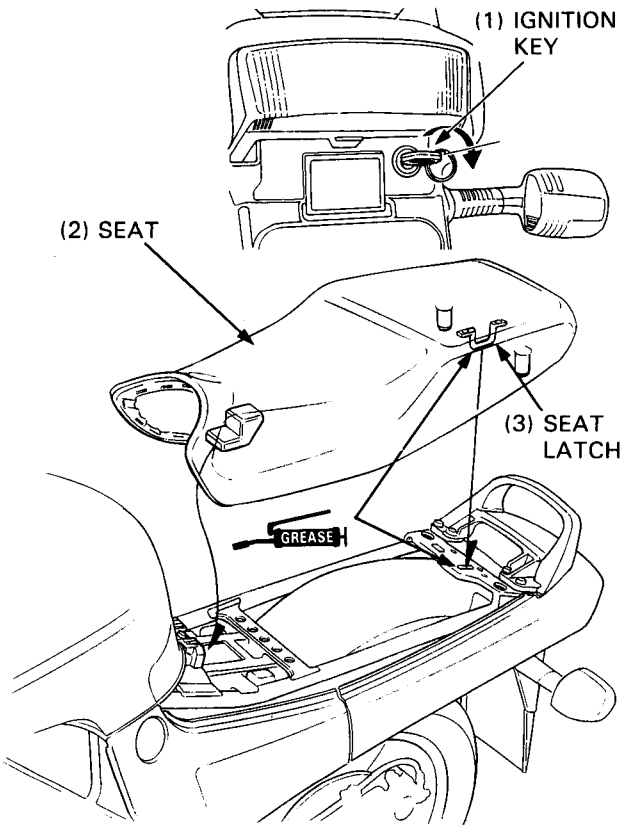
Insert the ignition key into the seat lock key slot and turn it clockwise to release the seat locking.

Remove the seat from the frame.

Installation is the reverse order of removal.

NOTE

- Apply clean grease to the seat lock striker and latch.

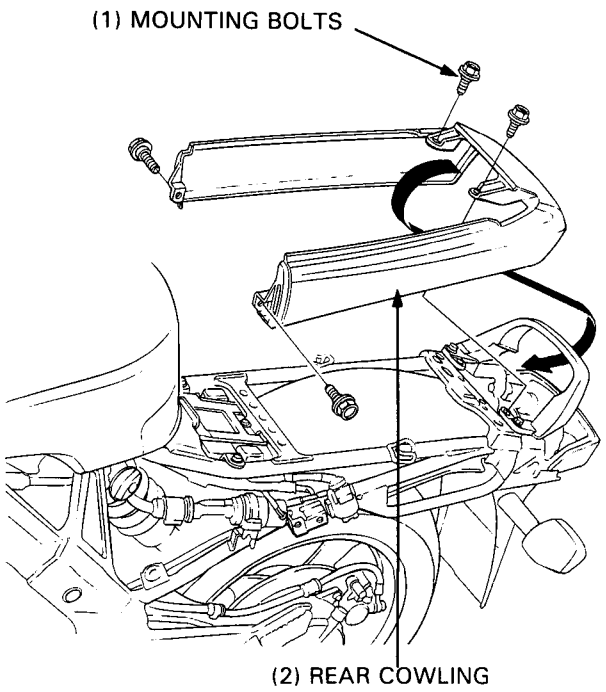


REAR COWLING

REMOVAL/INSTALLATION

Remove the seat.
Remove the four rear cowling mounting bolts and the cowling.

Installation is the reverse order of removal.



MUFFLER/EXHAUST PIPE

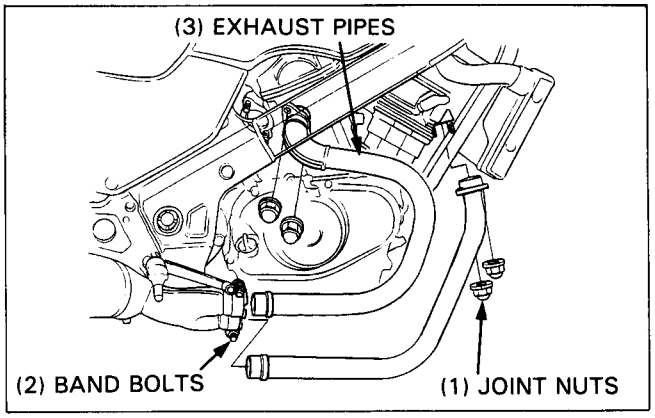
REMOVAL

⚠ WARNING

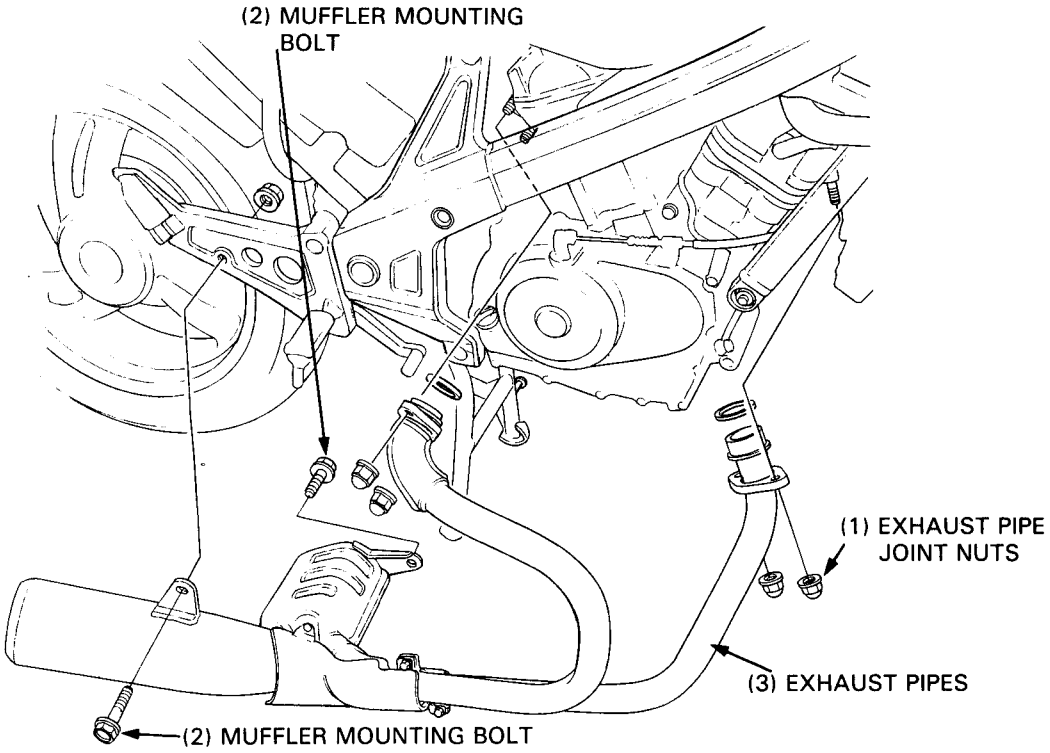
- *Do not service the exhaust system while it is hot.*

EXHAUST PIPE ONLY:
Loosen the muffler mounting bolts and muffler band bolts.

Remove the exhaust pipe joint nuts and pipes.



AS AN ASSEMBLY:
Remove the following:
- muffler mounting bolts
- exhaust pipe joint nuts
- muffler and exhaust pipes as an assembly



INSTALLATION

Installation is the reverse order of removal.

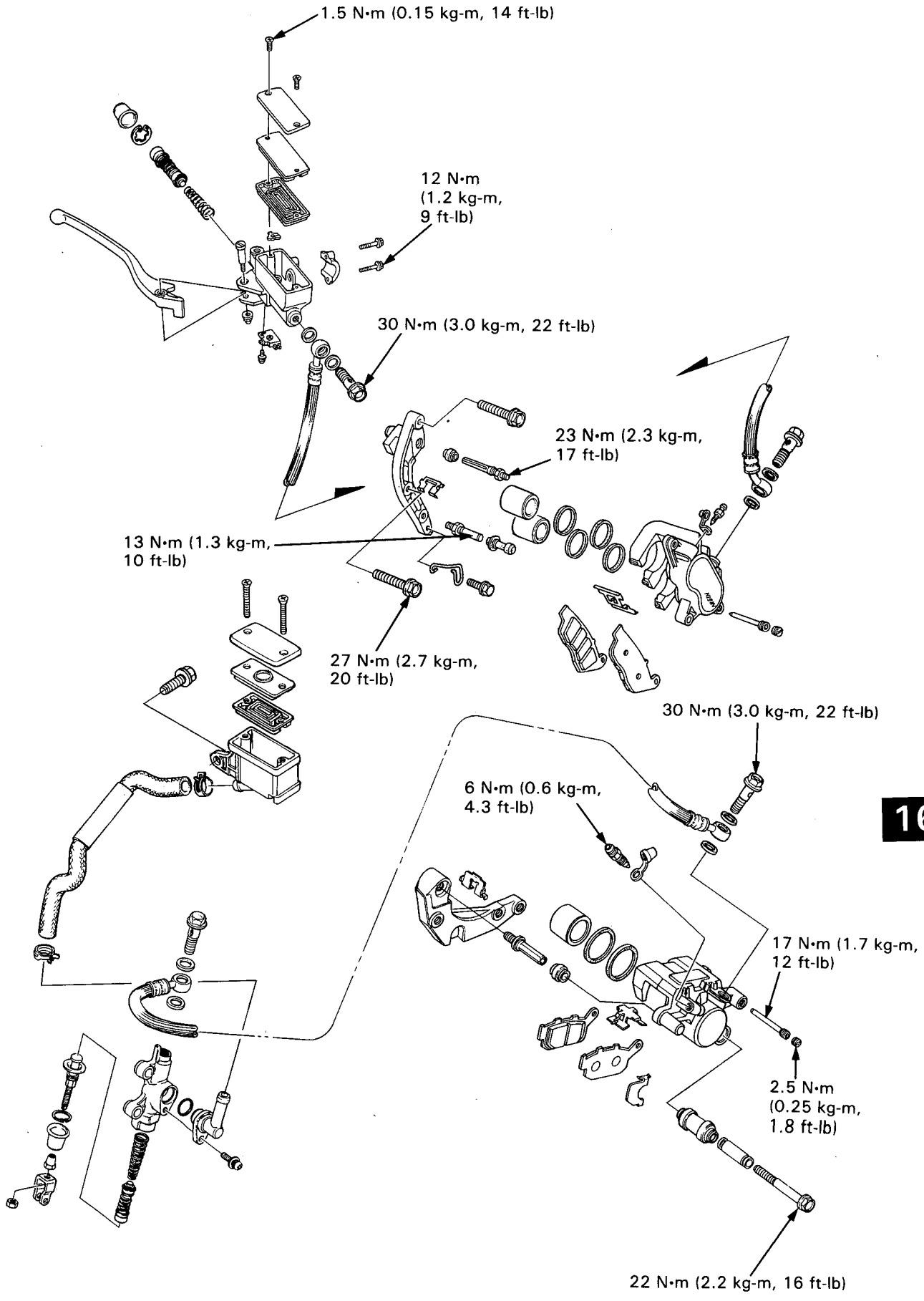
TORQUE:
Exhaust pipe joint nut: 27 N·m (2.7 kg-m, 20 ft-lb)
Muffler mounting bolt: 27 N·m (2.7 kg-m, 20 ft-lb)
Muffler band bolt: 27 N·m (2.7 kg-m, 20 ft-lb)

CAUTION

- *Be sure the new exhaust pipe gaskets are correctly seated on the pipe flange before installing the pipes.*

16

HYDRAULIC BRAKE


1.5 N·m (0.15 kg-m, 14 ft-lb)
12 N·m
(1.2 kg-m,
9 ft-lb)
30 N·m (3.0 kg-m, 22 ft-lb)
23 N·m (2.3 kg-m,
17 ft-lb)
13 N·m (1.3 kg-m,
10 ft-lb)
27 N·m (2.7 kg-m,
20 ft-lb)
30 N·m (3.0 kg-m, 22 ft-lb)
6 N·m (0.6 kg-m,
4.3 ft-lb)
17 N·m (1.7 kg-m,
12 ft-lb)
2.5 N·m
(0.25 kg-m,
1.8 ft-lb)
22 N·m (2.2 kg-m, 16 ft-lb)

16

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.*
- *Use only DOT 4 brake fluid.*
- *The brake caliper and brake pads can be removed without disconnecting the hydraulic system.*
- *Once the hydraulic system has been disassembled, or if the brakes feel spongy, the system must be bled.*
- *Do not allow foreign material to enter the system when filling the reservoir.*
- *Brake fluid will damage painted, plastic, and rubber parts. Whenever handling brake fluid, protect the painted, plastic and rubber parts by covering them with a shop towel. If fluid does get on these parts, wipe it off immediately with a clean cloth.*
- *Always check brake operation before riding the motorcycle.*
- *Inhaled asbestos fibers have been found to cause respiratory disease and cancer. Never use an air hose or dry brush to clean brake assemblies.*

SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Brake disc	Thickness	5.0 (0.19)	4.0 (0.16)
	Warpage	—	0.3 (0.01)
Master cylinder I.D.	Front	12.700–12.743 (0.5000–0.5016)	12.76 (0.502)
	Rear	12.700–12.743 (0.5000–0.5016)	12.76 (0.502)
Master piston O.D.	Front	12.657–12.684 (0.4983–0.4993)	12.65 (0.498)
	Rear	12.657–12.684 (0.4983–0.4993)	12.65 (0.498)
Caliper cylinder I.D.	Front	30.230–30.280 (1.1902–1.1921)	30.29 (1.193)
	Rear	38.180–38.230 (1.5031–1.5051)	38.24 (1.505)
Caliper piston O.D.	Front	30.148–30.198 (1.1870–1.1889)	30.14 (1.187)
	Rear	38.115–38.148 (1.5005–1.5018)	38.11 (1.500)
Brake fluid		DOT 4 only	—

TORQUE VALUES

Front master cylinder holder bolt	12 N·m (1.2 kg-m, 9 ft-lb)
Rear master cylinder mounting bolt	12 N·m (1.2 kg-m, 9 ft-lb)
Brake oil bolt	30 N·m (3.0 kg-m, 22 ft-lb)
Brake reservoir screw	1.5 N·m (0.15 kg-m, 1.4 ft-lb)
Caliper bleed valve	6 N·m (0.6 kg-m, 4.3 ft-lb)
Front caliper mounting bolt	27 N·m (2.7 kg-m, 20 ft-lb)
Front caliper pin bolt	28 N·m (2.8 kg-m, 20 ft-lb)
Rear caliper mounting bolt	27 N·m (2.7 kg-m, 20 ft-lb)
Rear caliper pivot bolt	22 N·m (2.2 kg-m, 16 ft-lb)
Caliper pad pin	17 N·m (1.7 kg-m, 12 ft-lb)
Caliper pad pin plug	2.5 N·m (0.25 kg-m, 1.8 ft-lb)
Front disc retaining bolt	40 N·m (4.0 kg-m, 29 ft-lb) Apply a locking agent to the threads
Rear disc retaining bolt	27 N·m (2.7 kg-m, 20 ft-lb) Apply a locking agent to the threads
Brake pedal pivot bolt	27 N·m (2.7 kg-m, 20 ft-lb)
Foot peg bracket mounting bolt	22 N·m (2.2 kg-m, 16 ft-lb)
Muffler mounting bolt	27 N·m (2.7 kg-m, 20 ft-lb)

TOOL

Special

Snap ring pliers	07914—3230001

TROUBLESHOOTING

Brake lever/pedal soft or spongy
- Air in hydraulic system
- Low fluid level
- Hydraulic system leaking

Brake lever/pedal too hard
- Sticking piston(s)
- Clogged hydraulic system
- Pads glazed or worn excessively

Brake drag
- Hydraulic system sticking
- Sticking piston(s)
- Clogged hydraulic system
- Incorrect pedal adjustment
- Caliper slide pins sticking
- Disc or wheel misaligned

Brakes grab
- Pads contaminated
- Disc or wheel misaligned

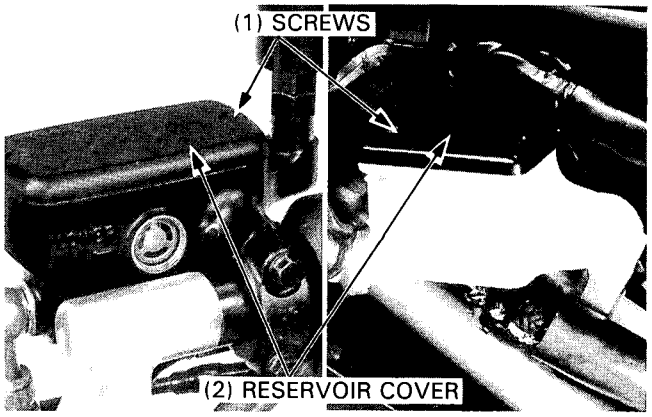
Brake chatter or squeal
- Pads contaminated
- Excessive disc runout
- Caliper installed incorrectly

BRAKE FLUID REPLACEMENT/ AIR BLEEDING

CAUTION

- *Be careful not to allow dust or water to enter the brake system when filling the reservoir.*
- *USE ONLY DOT 4 BRAKE FLUID*
- *Do not mix different types of fluid since they are not compatible.*
- *Avoid spilling fluid on painted surfaces. Place a rag over the fuel tank whenever the system is serviced.*

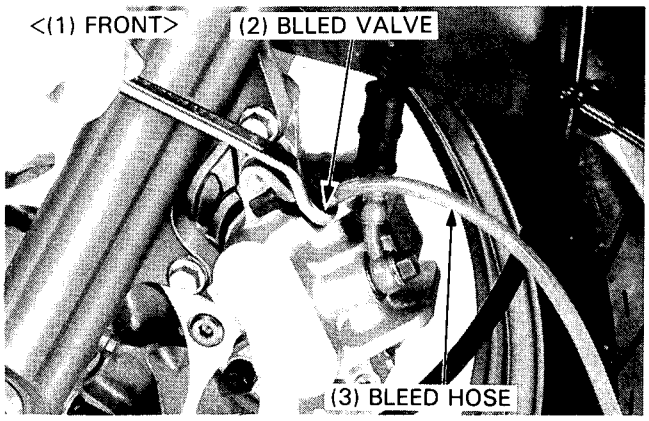
Check the fluid level with the reservoir parallel to the ground. Remove the reservoir cover, set plate and diaphragm.

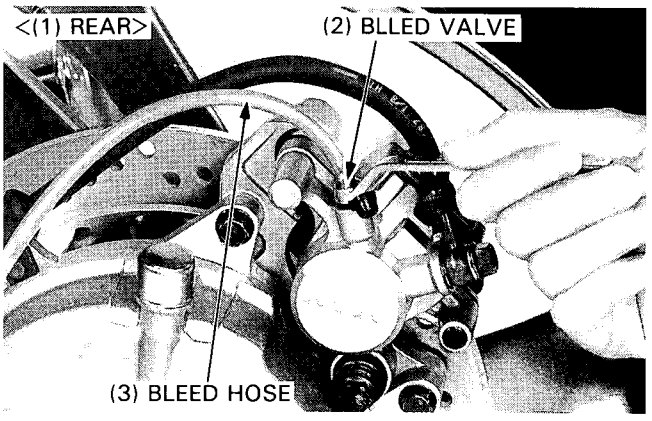


BRAKE FLUID DRAINING

Connect a bleed hose to the bleed valve.

Loosen the caliper bleed valve and pump the brake lever. Stop operating the lever when fluid stops flowing out of the bleed valve.



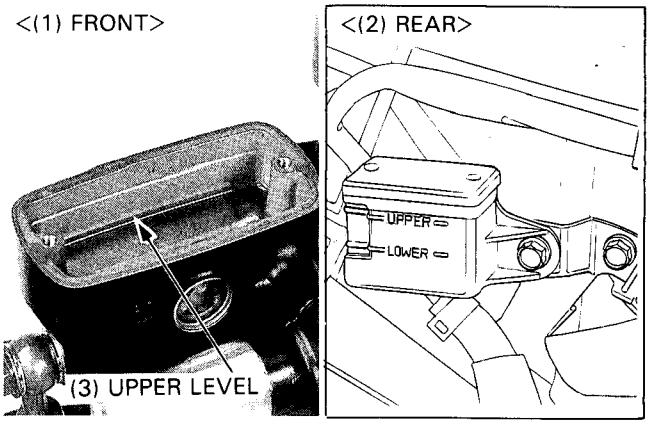


BRAKE FLUID FILLING

NOTE

- Check the fluid level often while bleeding the brakes to prevent air from being pumped into the system.
- When using the Brake Bleeder, follow the manufacturer's instructions.
- Do not mix brake fluid types and never reuse the fluid which has been bled out of the system; it may impair the efficiency of the brake system.

Close the bleed valve, fill the reservoir with DOT 4 brake fluid to the upper level.
Install the diaphragm and reservoir cover.

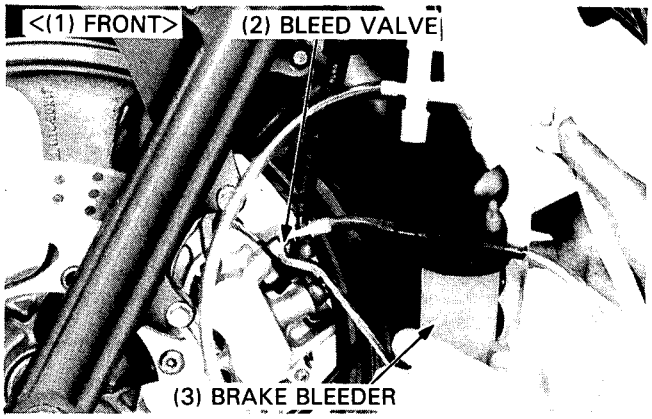


Connect a Brake Bleeder or equivalent to the bleed valve.

Pump the brake bleeder and loosen the bleed valve. Add fluid when the fluid level in the master cylinder reservoir is low. Repeat above procedures until no air bubbles appear in the plastic hose.

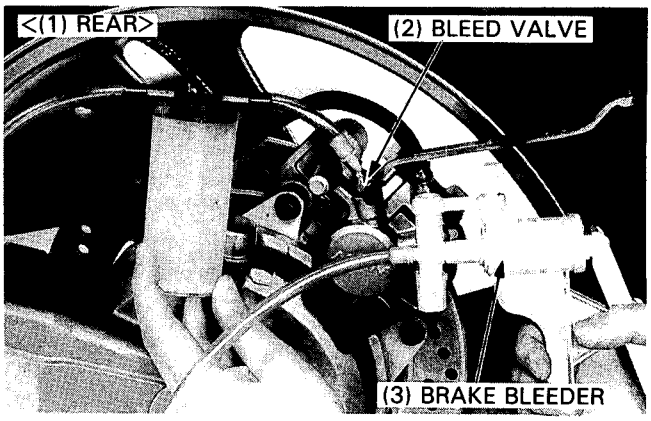
NOTE

- If air is entering the system from around the bleed valve threads, seal the threads with teflon tape.



If a brake bleeder is not available, fill the system as follows:

Pump up the system pressure with the lever or pedal until there are no air bubbles in the fluid flowing out of the reservoir hole and lever or pedal resistance is felt.



AIR BLEEDING

Bleed the system as follows:
1) Connect a bleed hose to the bleed valve.
2) Squeeze the brake lever (or depress the brake pedal), then open lthe bleed valve 1/4 turn and close the valve.

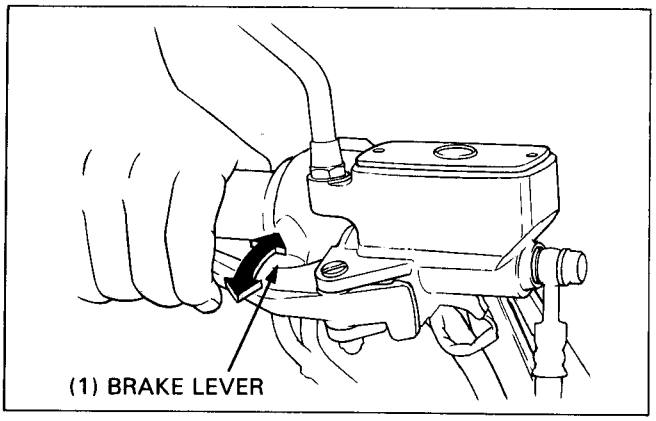
NOTE

- Do not release the brake lever (or pedal) until the bleed valve has been closed.

3) Release the brake lever (or pedal) slowly and wait several seconds after it reaches the end of its travel.

Repeat steps 2 and 3 until bubbles cease to appear in the fluid at the end of the hose.
Tighten the bleed valve.

TORQUE: 6 N·m (0.6 kg-m, 4.3 ft-lb)

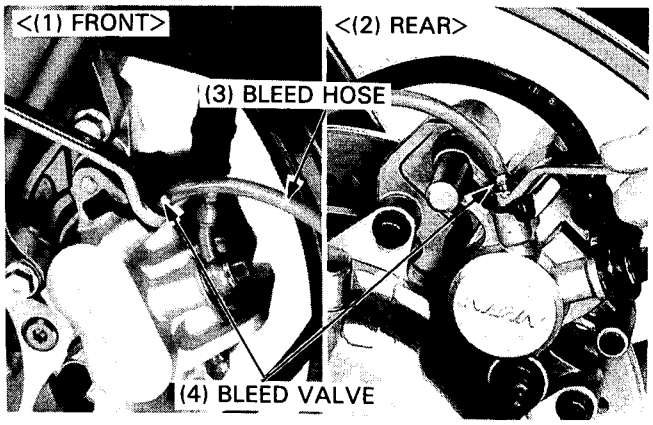


Close the bleed valve, fill the reservoir with DOT 4 brake fluid to the upper level.

Reinstall the diaphragm and reservoir cover.

⚠ 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.***



BRAKE PADS/DISCS

FRONT BRAKE PAD REPLACEMENT

⚠ WARNING

- ***Inhaled asbestos fibers have been found to cause respiratory disease and cancer. Never use an air hose or dry brush to clean brake assemblies.***

NOTE

- Always replace the brake pads in pairs to assure even disc pressure.

Remove the pad pin plug and loosen the pad pin.

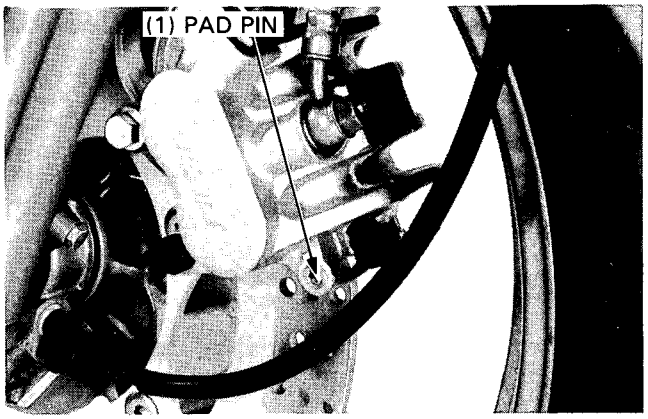
Push the pistons all the way in to allow installation of new brake pads.

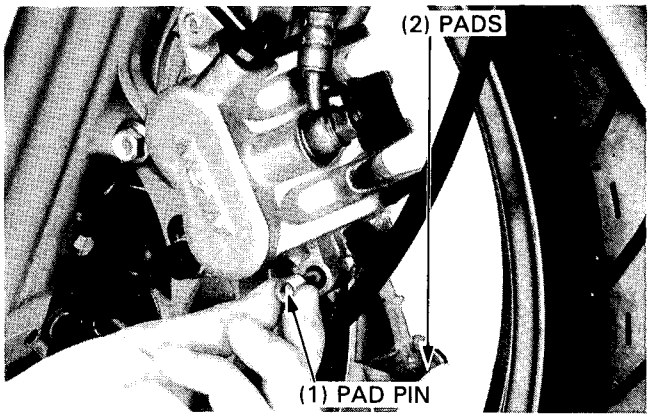
NOTE

- Check the brake fluid level in the reservoir as this operation causes the level to rise.

Pull the pad pin out of the caliper and remove the brake pads.

Insert the new brake pads.
Install the pad pin by pushing the pads against the caliper to depress the pad spring.





Tighten the pad pin.

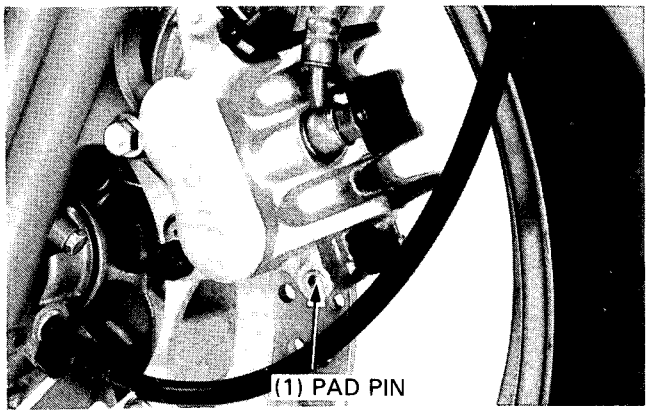
TORQUE: 17 N·m (1.7 kg-m, 12 ft-lb)

Install the pad pin plug.

TORQUE: 2.5 N·m (0.25 kg-m, 1.8 ft-lb)

NOTE

- Operate the brake lever to seat the caliper pistons against the pads.

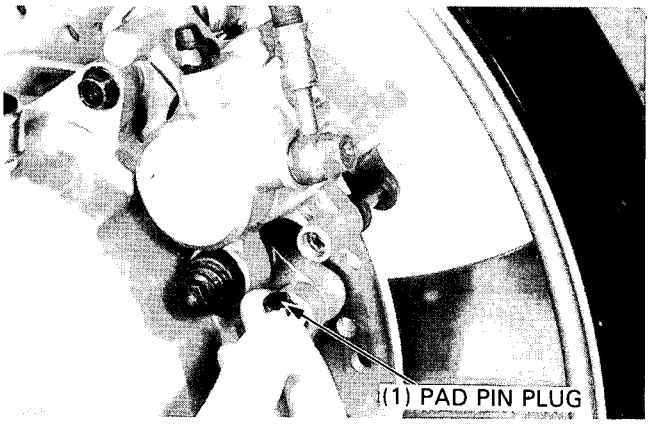


REAR BRAKE PAD REPLACEMENT

NOTE

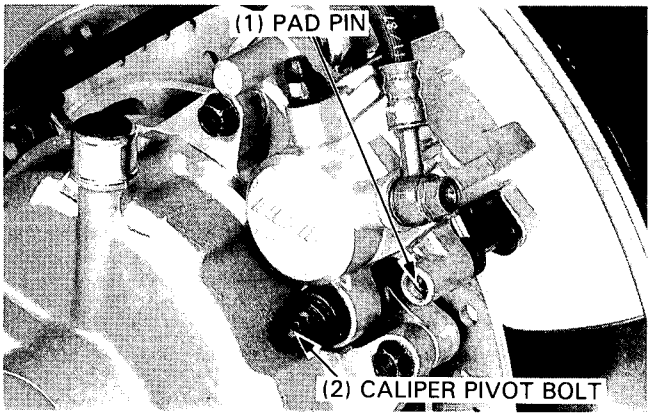
- Always replace the brake pads in pairs to assure even disc pressure.

Remove the pad pin plug.

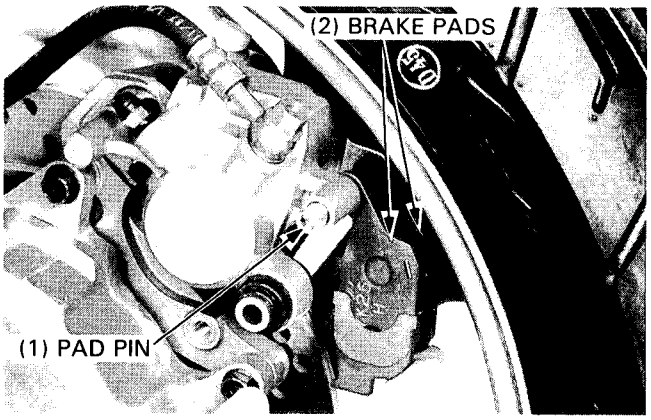


Loosen the pad pin.

Remove the caliper pivot bolt.



Swing the brake caliper from the brake disc.
Pull the pad pin out of the caliper.
Remove the brake pads.

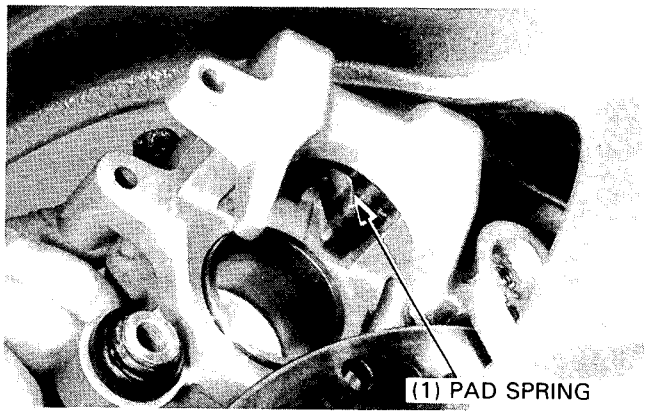


Position the pad spring in the caliper as shown.

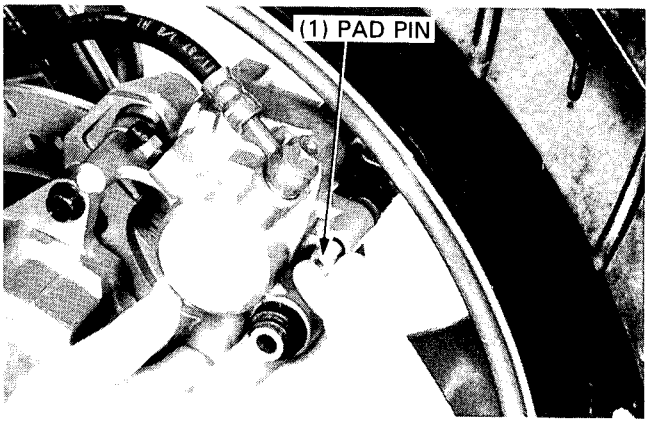
Push the piston all the way in to allow installation of new brake pads.

NOTE

- Check the brake fluid level in the reservoir as this operation causes the level to rise.



Insert the new brake pads.
Install the pad pin by pushing the pads against the caliper to depress the pad spring.



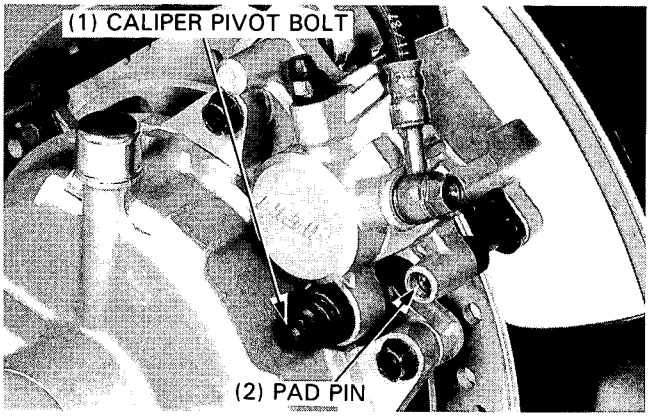
Install the caliper onto the brake disc so the disc is positioned between the pads, being careful not to damage the pads.

Install the caliper pivot bolt and tighten it.

TORQUE: 22 N·m (2.2 kg-m, 16 ft-lb)

Tighten the pad pin.

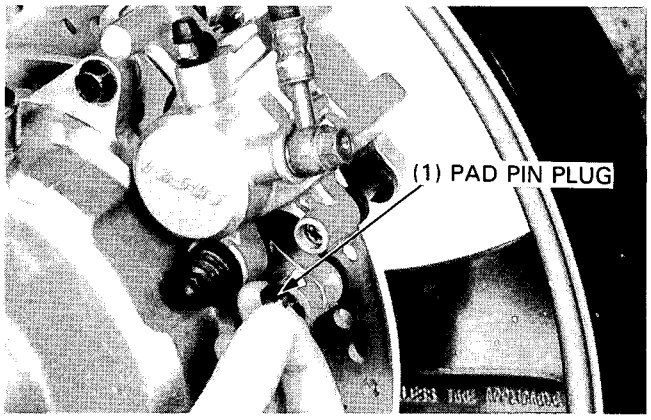
TORQUE: 17 N·m (1.7 kg-m, 12 ft-lb)



Install the pad pin plug.

TORQUE: 2.5 N·m (0.25 kg-m, 1.8 ft-lb)

Operate the brake pedal to seat the caliper piston against the pads.

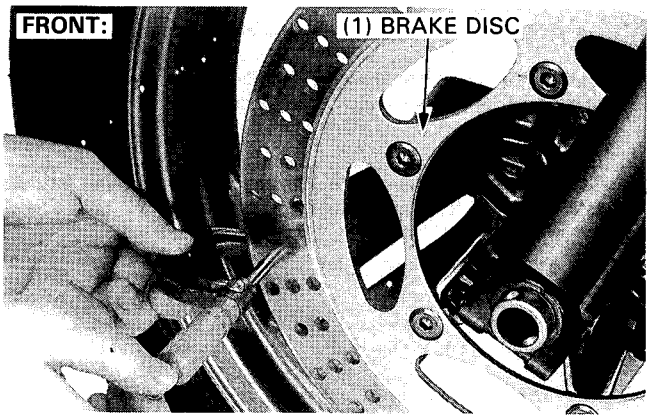


DISC THICKNESS

Measure the thickness of each disc.

SERVICE LIMITS: Front: 4.0 mm (0.16 in)
Rear: 4.0 mm (0.16 in)

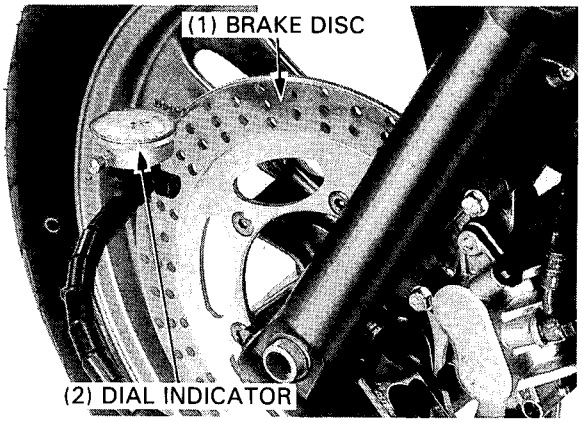
Brake disc removal is refer to:
Front: page 14-11.
Rear: page 13-3.



BRAKE DISC WARPAGE

Measure the brake discs for warpage with a dial indicator as shown.

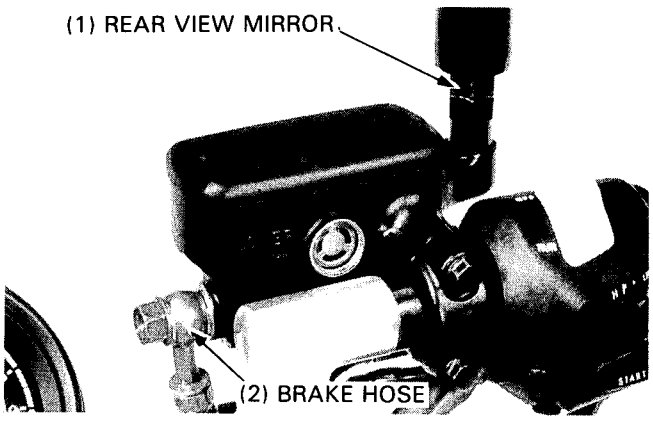
SERVICE LIMIT: Front/Rear: 0.30 mm (0.012 in)



FRONT BRAKE MASTER CYLINDER

REMOVAL

Drain brake fluid from the hydraulic system.
Remove the rear view mirror from the master cylinder and disconnect the brake light switch wires.
Disconnect the brake hose by removing the oil bolt and sealing washers.



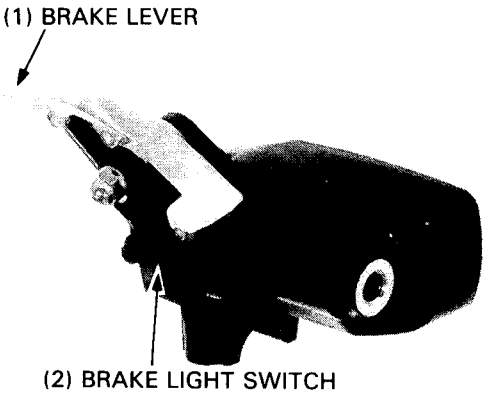
CAUTION

- *Avoid spilling brake fluid on painted surfaces. Place a rag over the fuel tank whenever the brake system is serviced.*

NOTE

- When removing the oil hose bolt, cover the end of the hose to prevent contamination. Secure the hose to prevent fluid from leaking out.

Remove the master cylinder holder bolts and holder, then remove the master cylinder from the handlebar.



DISASSEMBLY

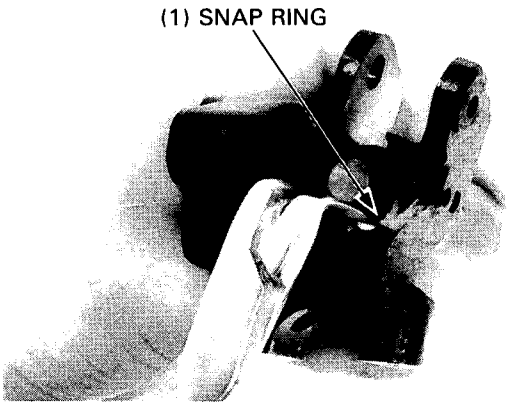
Remove the brake lever and brake light switch.

Remove the boot.

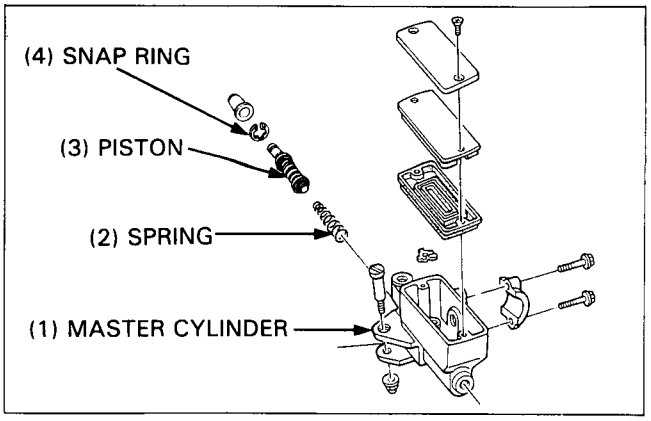
Remove the piston and spring by removing the snap ring.

TOOL:

Snap ring pliers	**07914—3230001 or equivalent commercially available**



Clean the inside of the master cylinder, reservoir, spring and piston with clean brake fluid.



INSPECTION

Measure the master cylinder I.D.

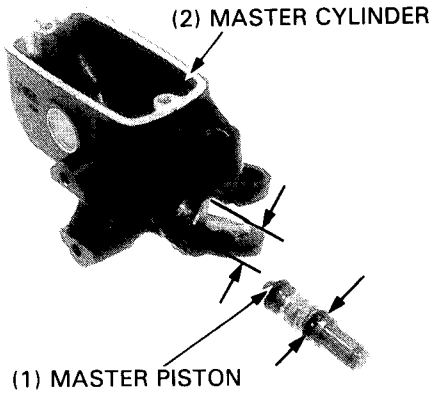
SERVICE LIMIT: 12.76 mm (0.502 in)

Check the master cylinder for scores, scratches or nicks.

Measure the master piston O.D. at the location shown.

SERVICE LIMIT: 12.65 mm (0.498 in)

Check the primary and secondary cups for damage before assembly.



ASSEMBLY

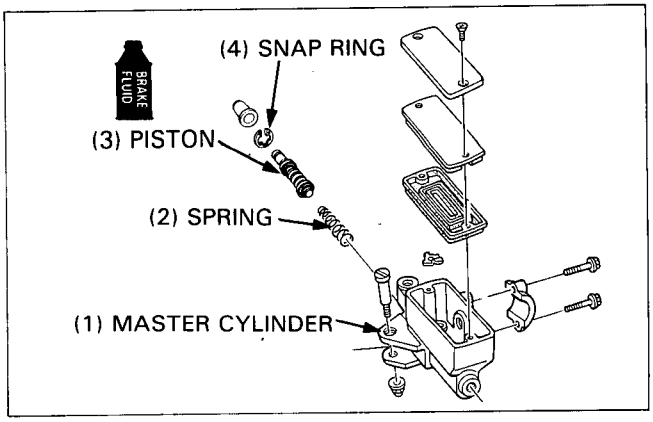
CAUTION

- *Handle the master cylinder piston, cylinder and spring as a set.*

Coat all parts with clean brake fluid before assembly.
Install the spring in the master cylinder with its large diameter facing inside.
Install the piston.

CAUTION

- *When installing the piston, do not allow the cup lips to turn inside out.*



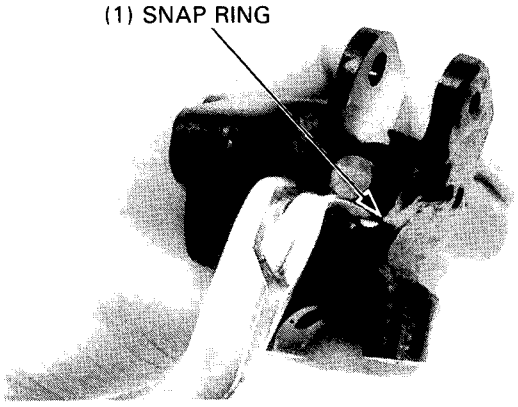
Install the snap ring using a snap ring pliers.
Install the boot.

CAUTION

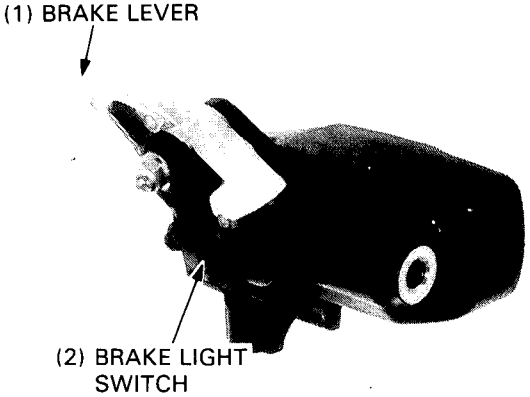
- *Be certain that the snap ring is seated firmly in the groove.*

TOOL:

Snap ring pliers	**07914—3230001 or equivalent commercially available**



Install the brake lever and brake light switch.

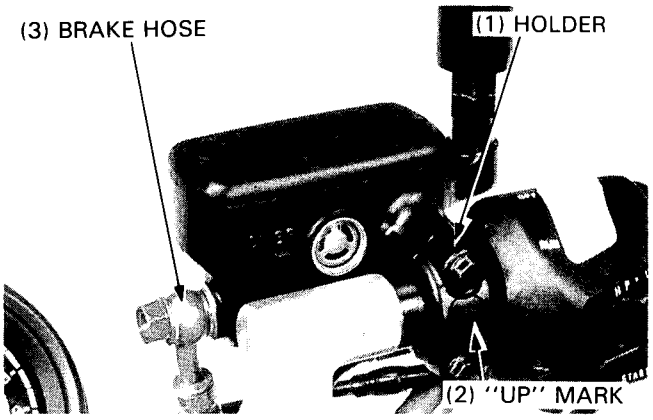


INSTALLATION

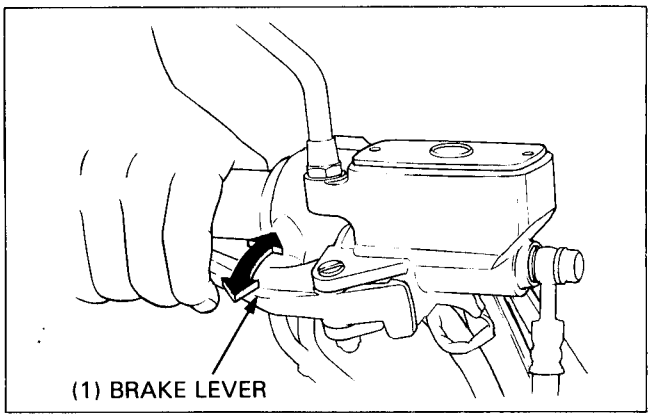
Set the master cylinder onto the handlebar with the holder "UP" mark facing up.
Temporarily install the holder bolts. Align the slit of the master cylinder with the punch mark on the handlebar.
Tighten the upper bolt first, then the lower bolt.
Connect the brake light switch wires to the switch terminals.
Install the rear view mirror.
Connect the brake hose with the oil bolt and two sealing washers and tighten the oil bolt.

TORQUE: 30 N·m (3.0 kg-m, 22 ft-lb)

Fill the reservoir with DOT 4 brake fluid to the casting ledge and bleed the brake system (page 16-3).



Operate the brake lever to seat the caliper pistons against the pads.



FRONT BRAKE CALIPER

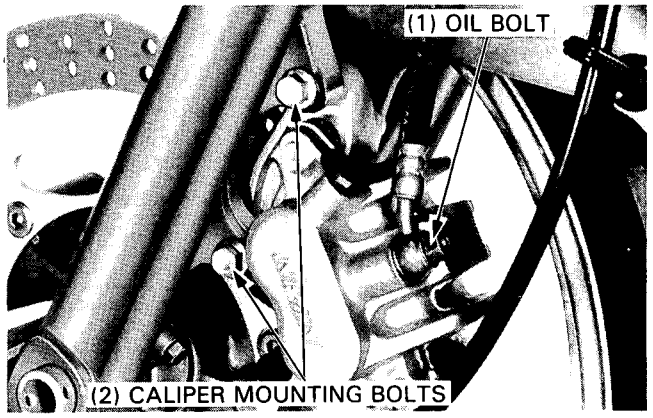
REMOVAL

Place a clean container under the caliper and disconnect the brake hose from the caliper by removing the oil bolt and sealing washers.

CAUTION

- *Avoid spilling brake fluid on painted surfaces.*

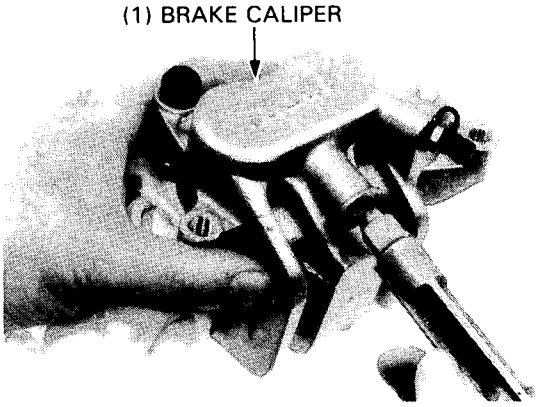
Remove the brake pads (page 16-5).
Remove the caliper mounting bolts and caliper.



DISASSEMBLY

Remove the following:
— pad spring and pin bolt boot from the caliper
— pin bolt boot from the bracket

If necessary, apply compressed air to the caliper fluid inlet to get the pistons out. Place a shop rag under the caliper to cushion the pistons when they are expelled. Use the air in short spurts.



⚠ WARNING

- ***Do not use high pressure air or bring the nozzle too close to the inlet.***

Push the dust seals and piston seals in, lift them out and discard them.

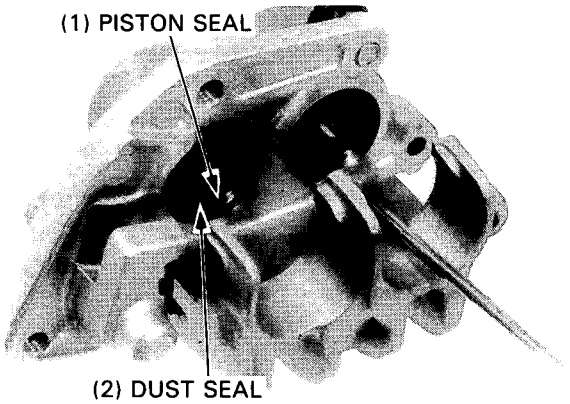
NOTE

- The seals must be replaced whenever they are removed.

Clean the seal grooves with clean brake fluid.

CAUTION

- *Be careful not to damage the piston sliding surfaces.*



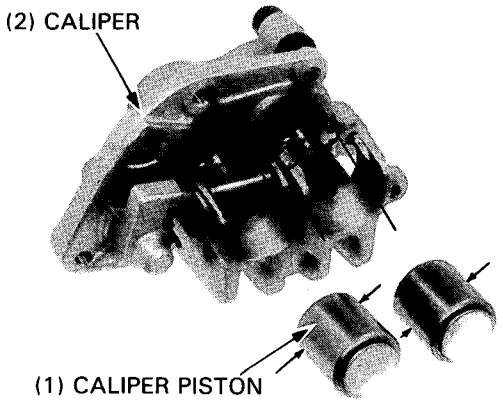
INSPECTION

Check the pistons for scoring, scratches or other faults.
Measure the piston O.D.

SERVICE LIMIT: 30.14 mm (1.187 in)

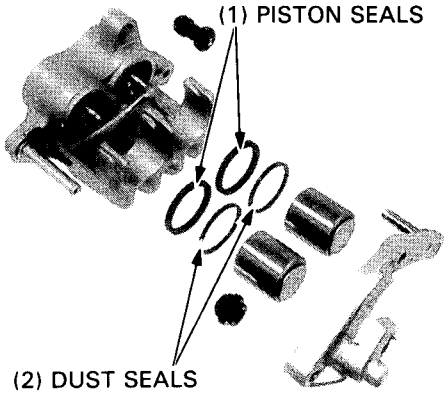
Check the caliper cylinder for scoring, scratches or other faults.
Measure the caliper cylinder I.D.

SERVICE LIMIT: 30.29 mm (1.193 in)

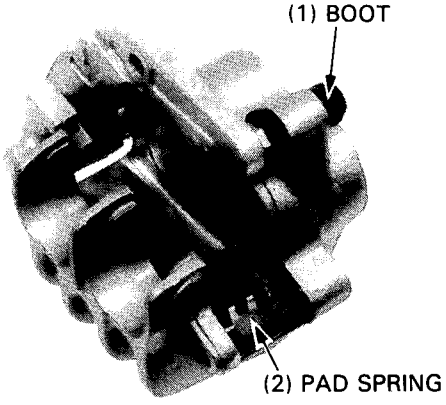


ASSEMBLY

Coat new piston seals and dust seals with clean brake fluid and install them in the caliper.
Install the pistons with the dished ends toward the pads.



Install the pad spring on the caliper as shown.
Apply silicone grease to the inside of the boot, and install it.

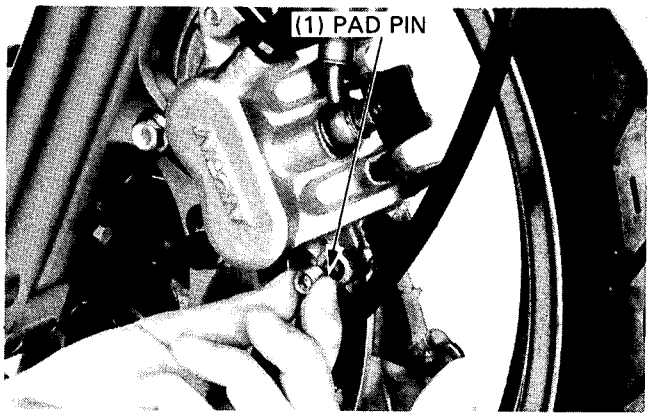


Install the pads and pad pins in the caliper.

Install the caliper assembly over the brake disc so that the disc is positioned between the pads.

CAUTION

- *Be careful not to damage the pads.*



Install and tighten the caliper mounting bolts.

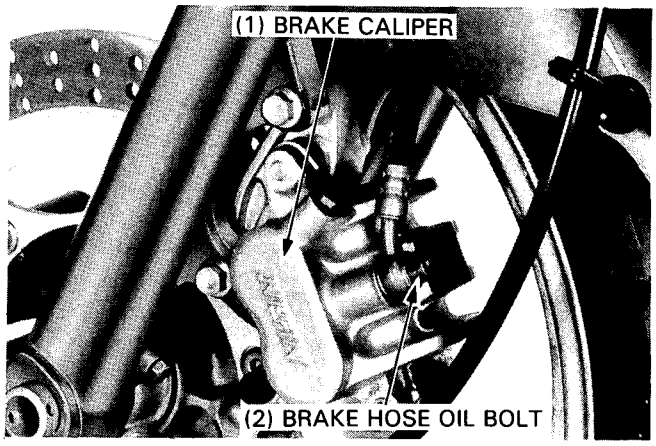
TORQUE: 27 N·m (2.7 kg-m, 20 ft-lb)

Tighten the pad pins and install and tighten the pad pin plug (page 14-5).

Connect the brake hose to the caliper with the oil bolt and two new sealing washers.

TORQUE: 30 N·m (3.0 kg-m, 22 ft-lb)

Bleed the air from the brake system (page 16-3).



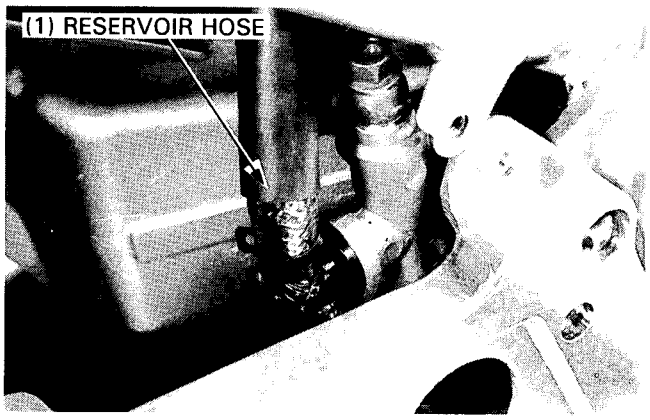
REAR BRAKE MASTER CYLINDER

REMOVAL

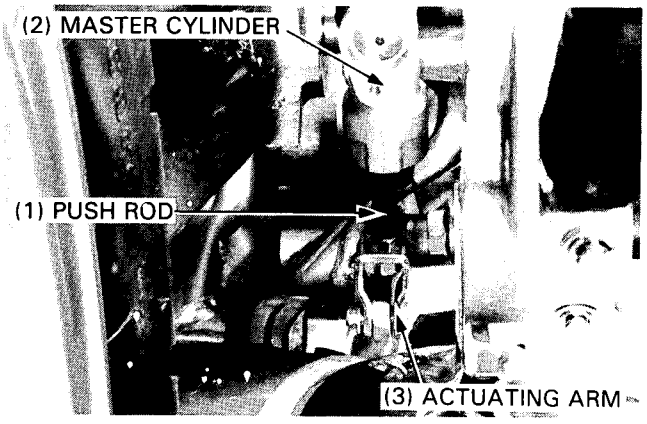
Drain the rear brake hydraulic system (page 16-3).

Remove the right side cover.

Remove the connector screw and disconnect the reservoir hose from the master cylinder.

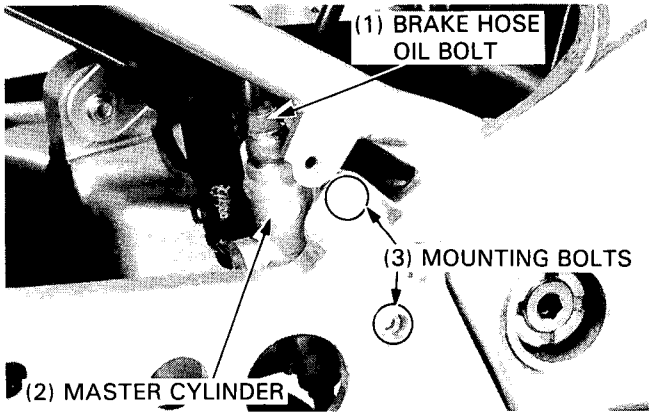


Loosen the push rod lock nut and remove the adjsuter nut, and disconnect the brake actuating arm from the master cylinder push rod.



Remove the brake oil bolt and disconnect the brake hose.

Remove the rear master cylinder from the foot peg bracket.



DISASSEMBLY

Remove the rubber boot.

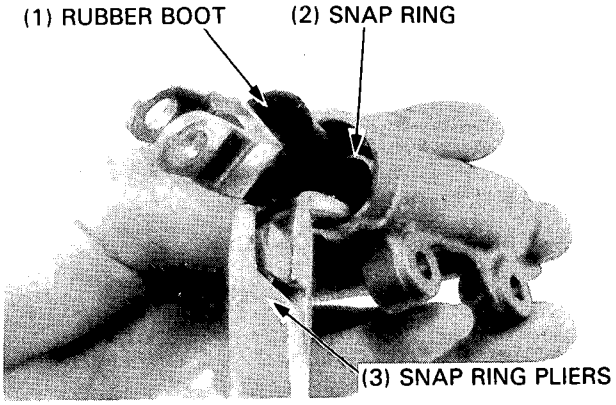
Remove the snap ring and push rod from the master cylinder body.

CAUTION

- *The push rod will pop out when the snap ring is removed.*

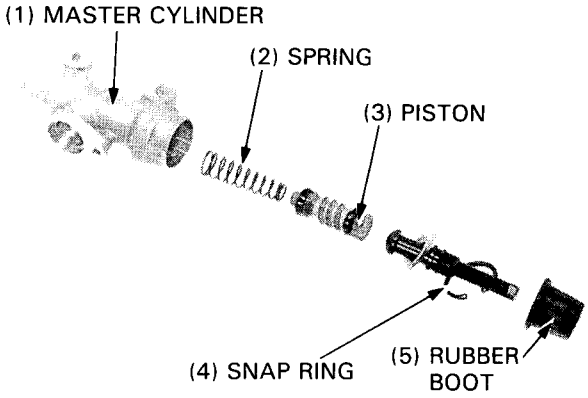
TOOL:

Snap ring pliers	**07914—3230001** **Equivalent commercially available**



Remove the master piston and spring.

It may be necessary to apply a small amount of air pressure to the fluid outlet to remove the master piston and spring.



INSPECTION

Check the inside of the master cylinder for scores, scratches or nicks.

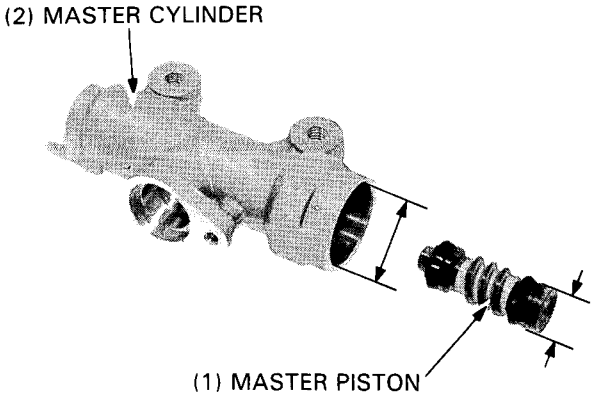
Measure the inside diameter of the master cylinder bore.

SERVICE LIMIT: 12.76 mm (0.502 in)

Check the piston and piston cups for damage, wear or deterioration.

Measure the master piston O.D.

SERVICE LIMIT: 12.65 mm (0.498 in)



ASSEMBLY

Clean the master cylinder with compressed air.

Dip the piston cups in clean brake fluid before assembly.

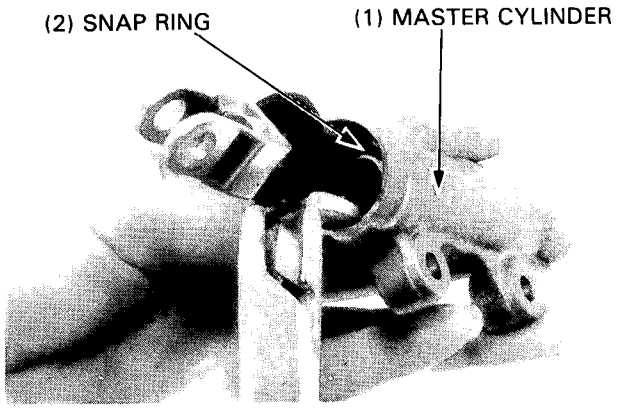
Install the spring and master piston together.

NOTE

- The master cylinder piston, cups and spring must be installed as a set.

CAUTION

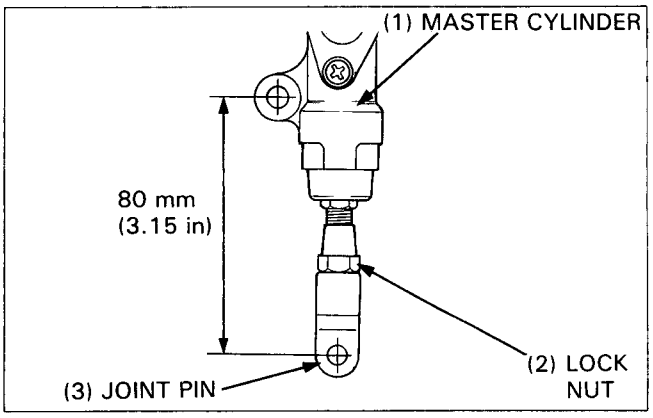
- *When installing the cups, do not allow the lips to turn inside out and be certain the snap ring is seated firmly in the groove.*



Install the push rod into the master cylinder.
Install the washer, snap ring and rubber boot.

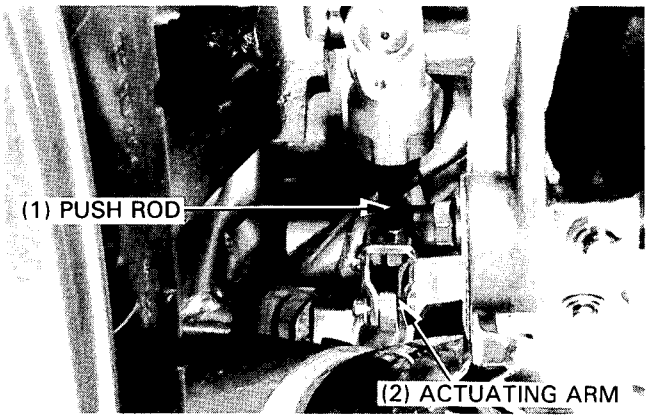
TOOL:
Snap ring pliers **07914–3230001**

Adjust the push rod standard length so that the distance from the center of the master cylinder lower mount hole to the center of the joint pin hole is 80 mm (3.15 in).
Tighten the lock nut.



Install the actuating arm onto the push rod using the lock nut and adjuster nut.

Adjust the push rod standard installed length indicated above.

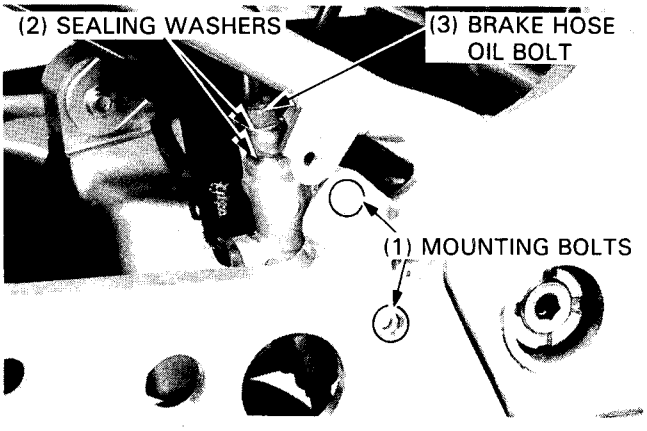


Install the master cylinder into the right foot peg bracket using the mounting bolts.

TORQUE: 12 N·m (1.2 kg-m, 9 ft-lb)

Connect the rear brake hose with the oil bolt and two new sealing washers.

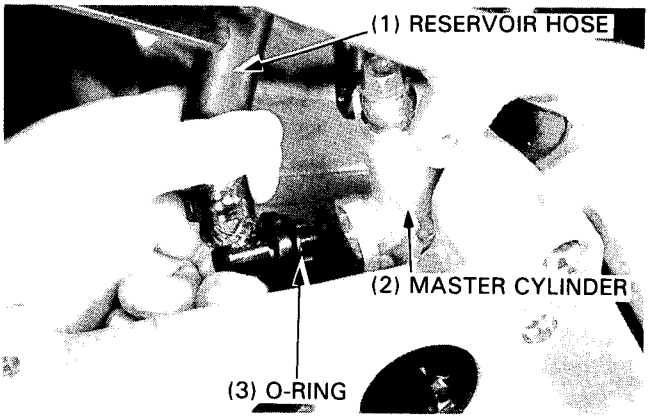
TORQUE: 30 N·m (3.0 kg-m, 22 ft-lb)



Connect the reservoir hose to the master cylinder with a new O-ring and screw.

Fill and bleed the rear brake system (page 16-3).
Check the brake light switch operation.

Operate the brake pedal to seat the caliper piston against the pads.



REAR BRAKE CALIPER

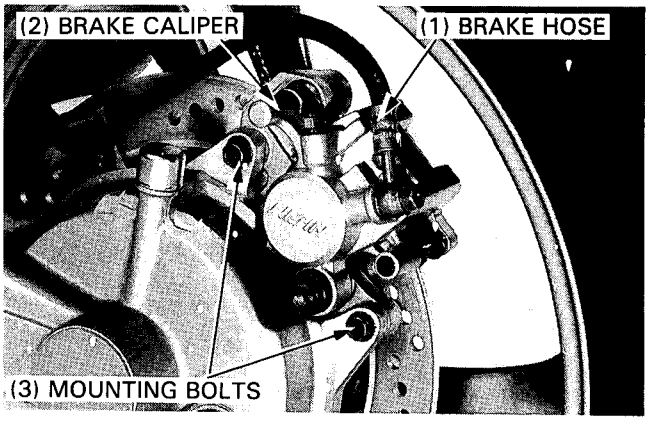
REMOVAL

Drain the brake fluid from the hydraulic system.

Disconnect the brake hose from the caliper.

Remove the rear brake pads (page 16-5).
Remove the caliper mounting bolts and caliper.

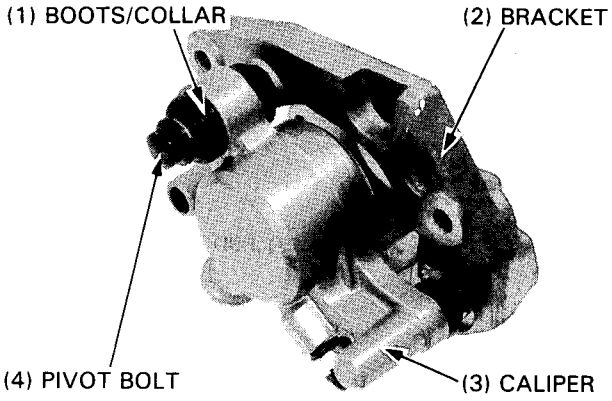
If you will disassemble the caliper, loosen the caliper pivot bolt at this time.



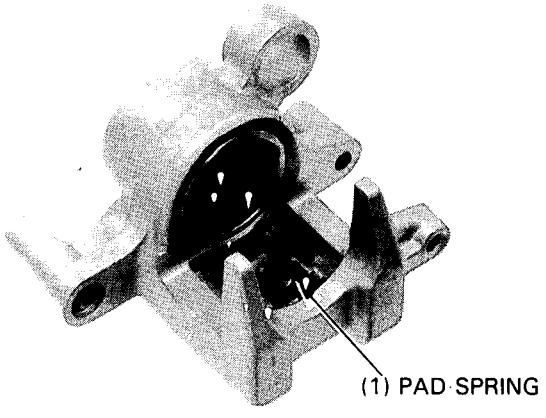
DISASSEMBLY

Remove the pivot bolt and separate the caliper and bracket.

Remove the pivot collar and the boot from the caliper.
Remove the bracket pin boot from the bracket.



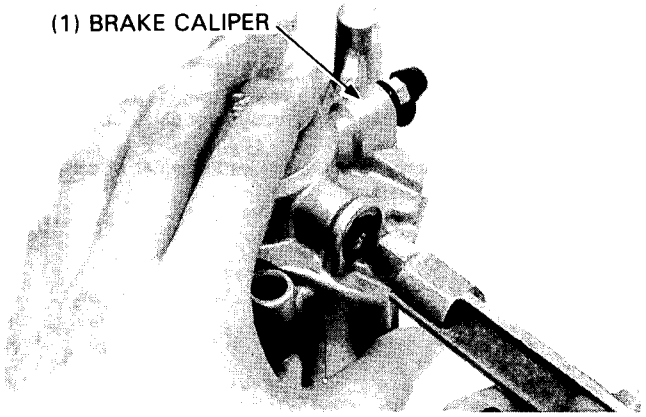
Remove the pad spring from the caliper.



Place a shop towel over the piston, position the caliper 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.***

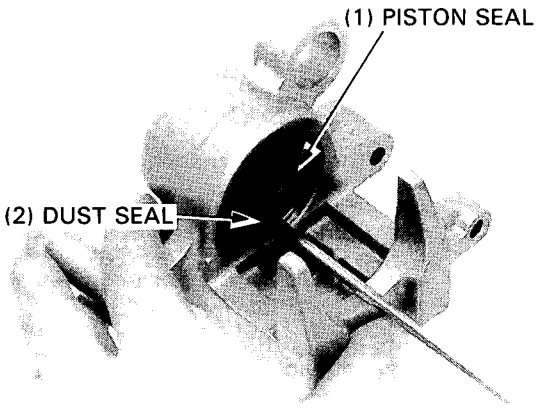


Push the dust and piston seals in and lift them out.

Wash the caliper cylinder, seal gooves and caliper piston with clean brake fluid.

CAUTION

- *Be careful not to damage the piston sliding surface.*



INSPECTION

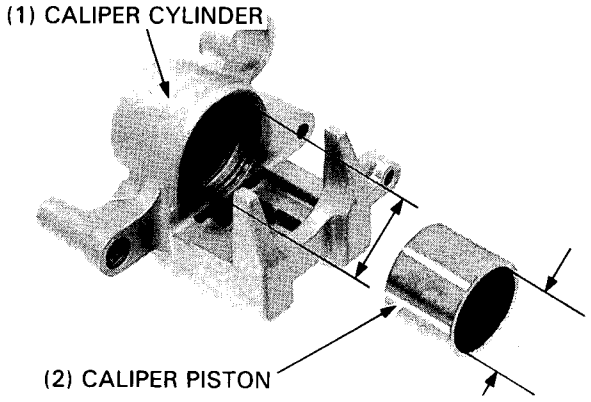
Check the caliper piston for scratches, scoring or other damage.

Measure the caliper cylinder I.D.

SERVICE LIMIT: 38.24 mm (1.505 in)

Measure the caliper piston O.D.

SERVICE LIMIT: 38.11 mm (1.500 in)



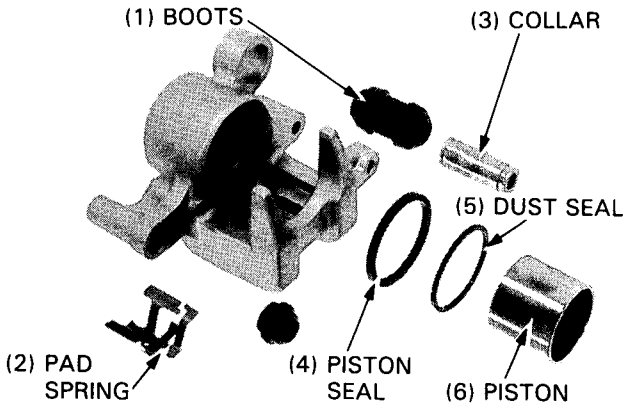
ASSEMBLY

The piston and dust seals must be replaced whenever they are removed.

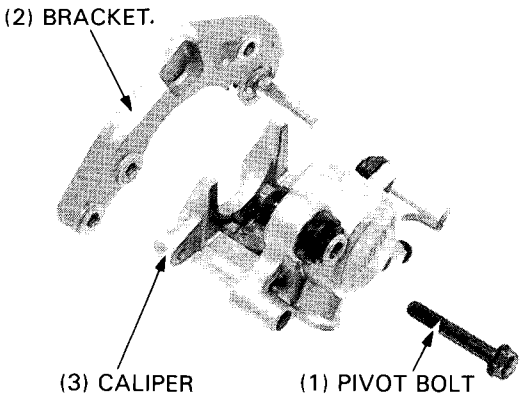
Check the boots and replace it if it is hardened or deteriorated.

Coat the piston and dust seals with clean brake fluid and install them with the small diameter facing in.
Lubricate the caliper cylinder and piston with clean brake fluid and install the piston into the caliper cylinder with the piston dished end facing toward the pads.

Apply silicone grease to the collar and the insides of the boots and install them into the caliper and bracket pin.
Make sure that the boot is seated in the collar and caliper grooves properly.
Install the pad spring.



Assemble the caliper and bracket, and loosely install the pivot bolt.



Install the pads (page 16-5).
Install the caliper onto the brake disc so the disc is positioned between the pads, being careful not to damage the pads.

Install the brake hose with the oil bolt and the new sealing washers. Tighten the oil bolt.

TORQUE: 30 N·m (3.0 kg-m, 22 ft-lb)

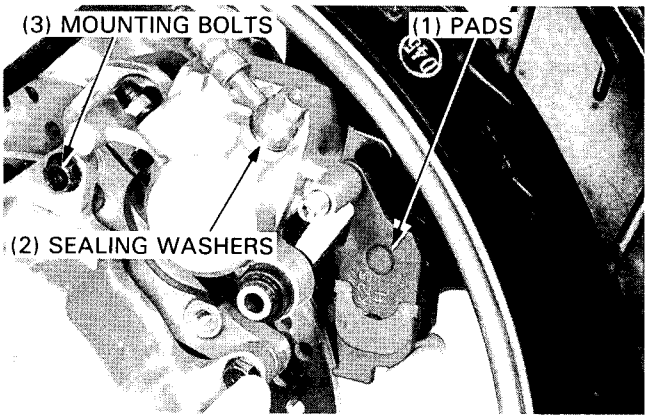
Install the caliper mounting bolts and tighten them.

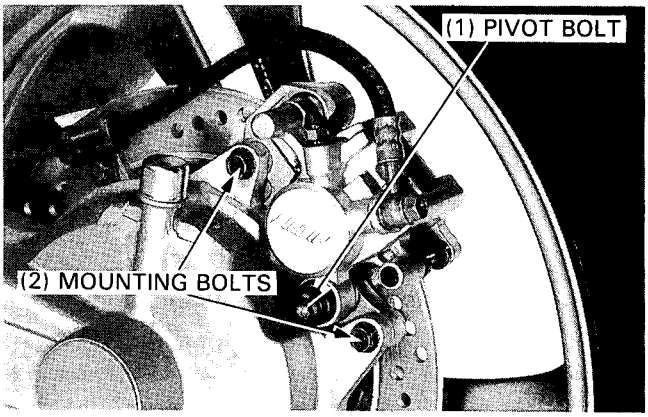
TORQUE: 27 N·m (2.7 kg-m, 20 ft-lb)

Install the caliper pivot bolt and tighten it.

TORQUE: 22 N·m (2.2 kg-m, 16 ft-lb)

Fill and bleed the rear brake system (page 16-3).
Operate the brake pedal to seat the caliper piston against the pads.





BRAKE PEDAL

REMOVAL/INSTALLATION

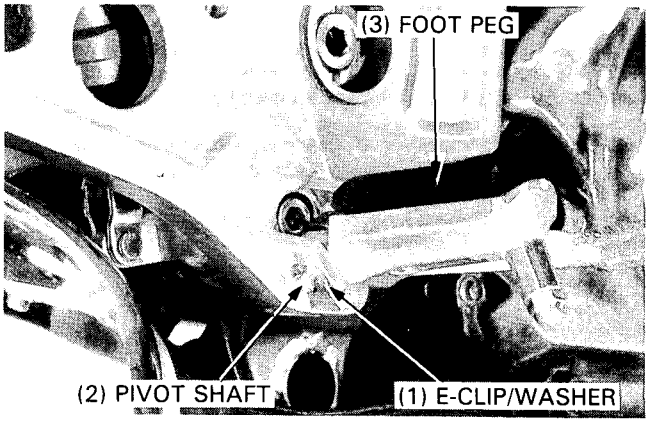
NOTE

- Brake pedal removal can be service without disconnecting the brake hydraulic system.

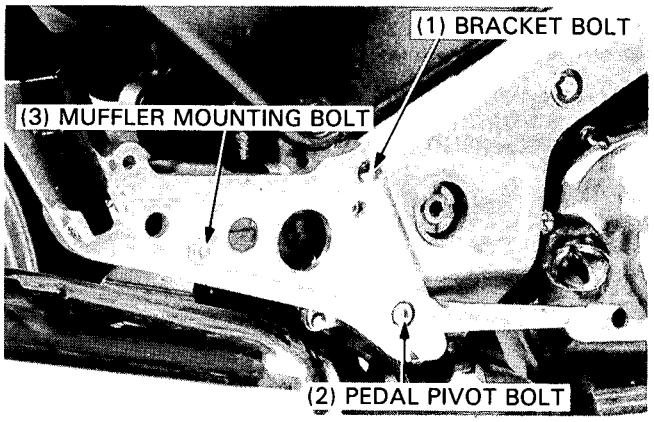
Remove the E-clip and washer from the foot peg pivot shaft.
Remove the pivot shaft and right foot peg.

NOTE

- Do not lose the pivot shaft spring.



Remove the following:
— foot peg bracket bolt
— muffler mounting bolt and nut



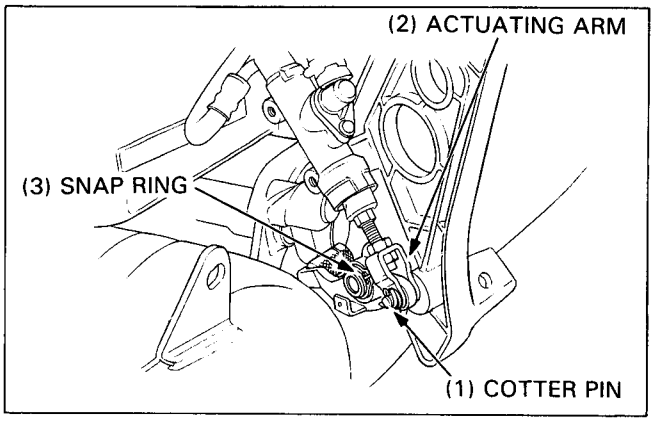
Remove the cotter pin and actuating arm shaft, and separate the brake pedal from the actuating arm.

CAUTION

- *Do not twist the brake hoses.*

Unhook the brake pedal return spring and the light switch spring.

Remove the snap ring and brake pedal.

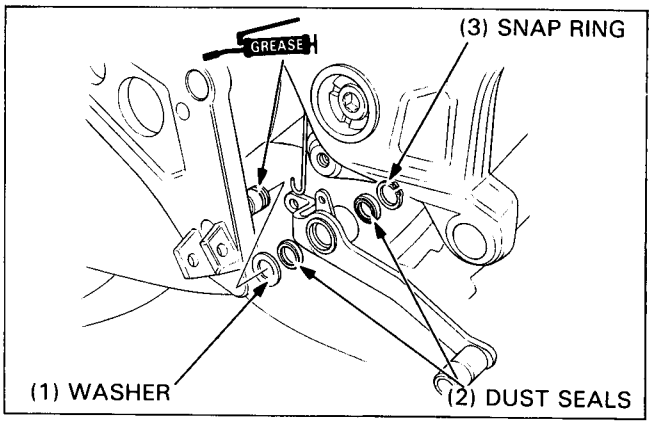


Remove the washer and dust seals.

INSTALLATION

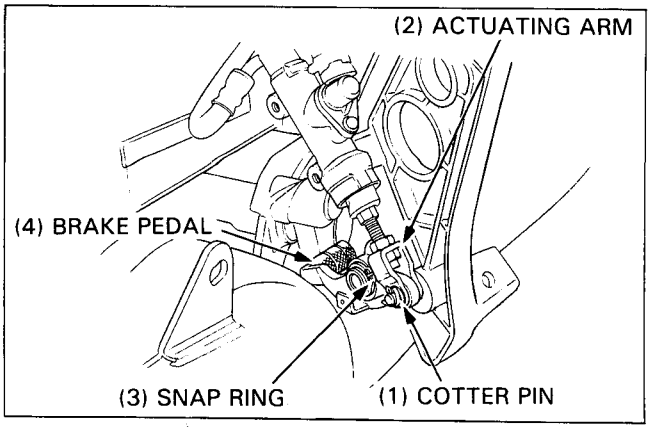
Apply clean grease to the pivot sliding surface, and dust seal lips.

Assemble the washer and dust seals onto the pedal.



Hook the springs into the pedal.
Install the brake pedal onto the foot peg and connect the actuating arm using the shaft with the new cotter pin.

Install the snap ring onto the brake pedal.



Install the following:
– the right foot peg bracket
– brake pedal pivot bolt

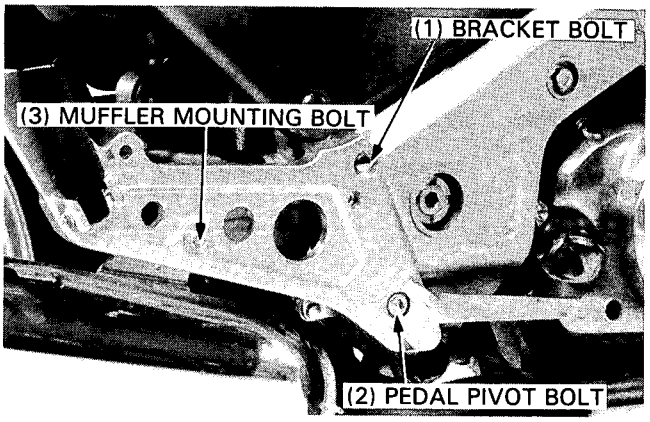
TORQUE: 27 N·m (2.7 kg-m, 20 ft-lb)

– bracket bolt

TORQUE: 22 N·m (2.2 kg-m, 16 ft-lb)

– muffler bolt and nut

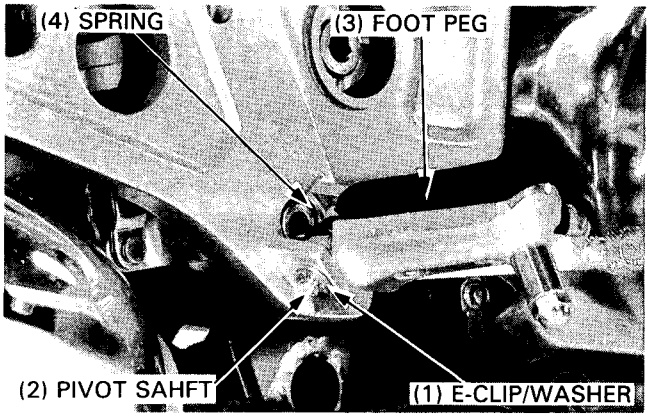
TORQUE: 27 N·m (2.7 kg-m, 20 ft-lb)



Install the foot peg into the bracket using the pivot shaft with hooking the spring onto the brake pedal pivot bolt hole securely.

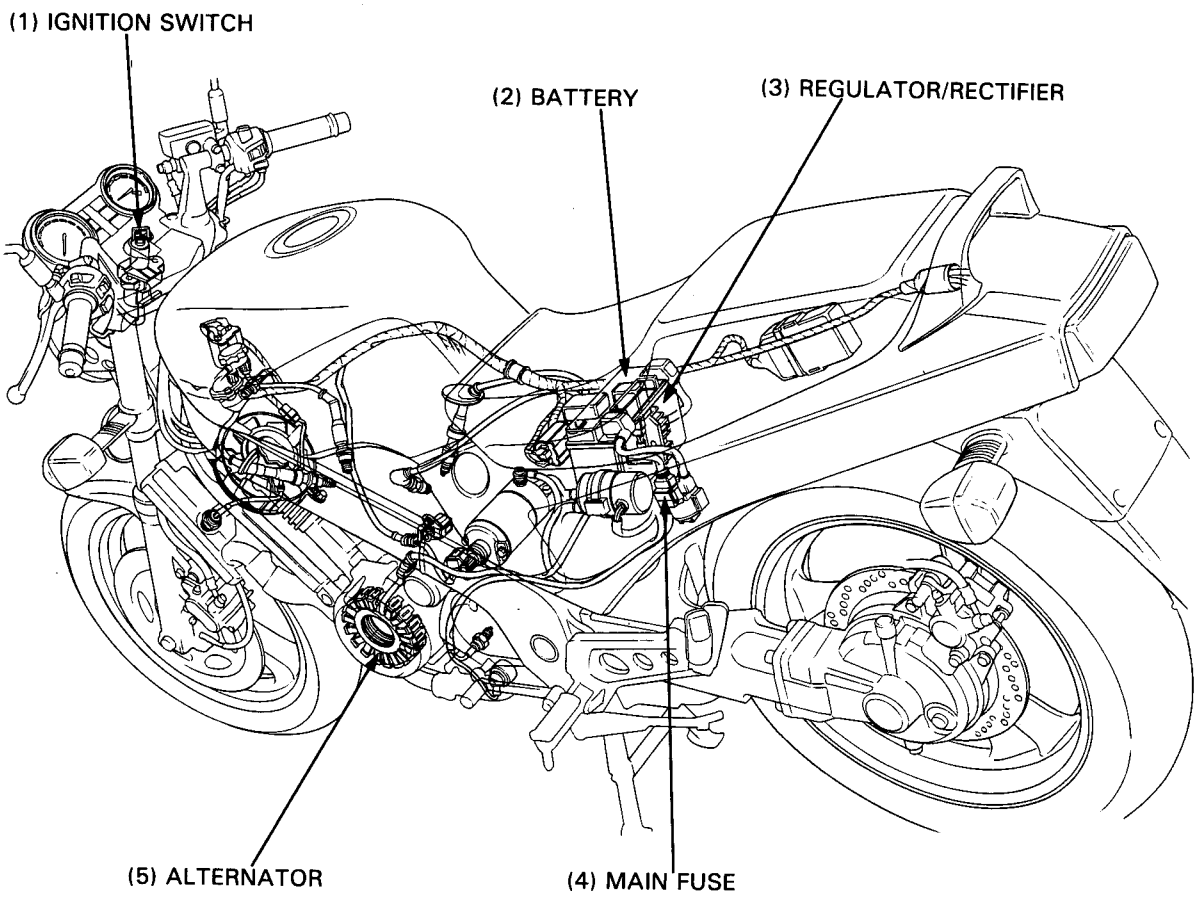
Install the washer and E-clip onto the pivot shaft securely.

Check the brake pedal light switch operation.

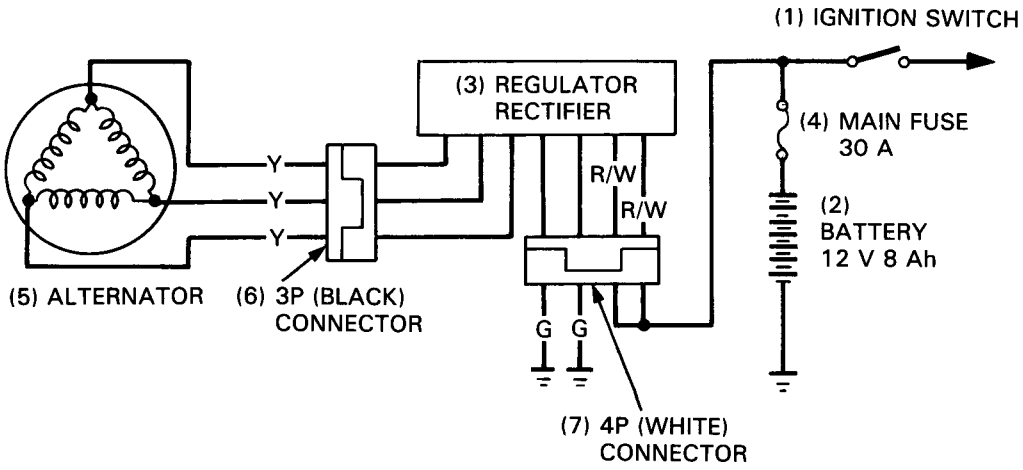


17

BATTERY/CHARGING SYSTEM



R: Red
W: White
G: Green
Y: Yellow



SERVICE INFORMATION

GENERAL

- After activation, the maintenance-free battery must be charged at the appropriate ampere-hour rating for the proper length of time.
- Quick charge a battery only in an emergency. Slow-charging is preferred.
- Remove the battery from the motorcycle when charging. If the battery must be charged on the motorcycle, disconnect the battery cables.
- When inspecting the charging system, check the system components and lines step-by-step according to the trouble shooting on page 17-2.
- The battery on this motorcycle is a sealed type. Do not try to remove the filler hole caps even during charging. Do not use a non-sealed battery as a replacement.

⚠ WARNING

- ***The battery generates hydorogen gas which can be highly explosive. Do not smoke or allow flames or sparks near the battery, expecially while charging it.***
- ***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 posisonous carbon monoxide gas that may cause loss of consciousness and, lead to death.***

SPECIFICATIONS

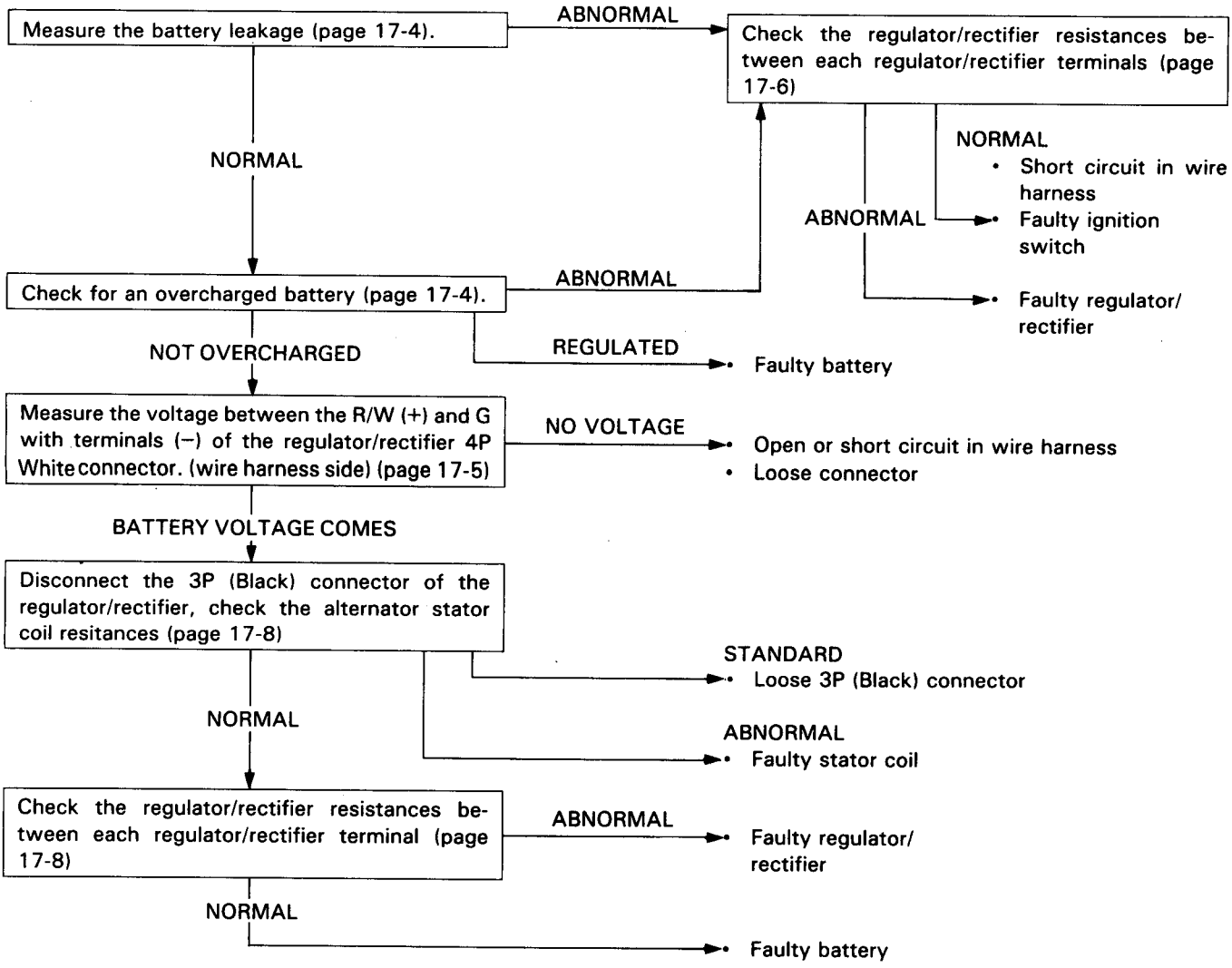
ITEM			STANDARD
Battery	Capacity		12 V—8 Ah
	Voltage at 20°C (68°F)	Fully cahrged	13.0—13.2 V
		Needs charging	12.3 V
	Leakage ampere at 20°C (68°F)		0.1 A max.
	Charging current		0.9 amperes
	Charging time		5 Hr
Regulator/rectifier	Type		Three-phase/full-wave
	Regulated voltage/Amperage		13.5—15.5 V/0.5 A (3,000 min^{-1}(rpm))
Alternator	Charging coil resistance at 20°C (68°F)		0.1—1.0 Ω
	Output		345 W/5,000 min^{-1} (rpm)
	Charging start rpm		1,200 ± 100 min^{-1} (rpm)

TOOLS

MULTITESTER:

07411—0020000	(KOWA Digital type)
07308—0020001	(SANWA Analogue type)
TH—5H	(KOWA Analogue type)

TROUBLESHOOTING

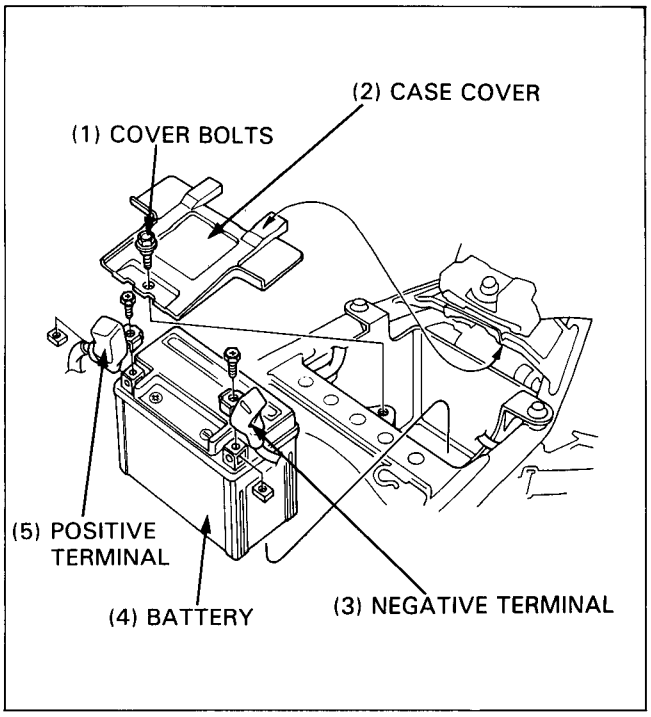


BATTERY

REMOVAL

Remove the seat (page 15-14) and turn OFF the ignition switch.
Remove the battery case cover bolts and cover.
Disconnect the negative (−) terminal cable first, then positive (+) terminal cable at the battery.

Pull the battery out of the battery holder.



INSTALLATION

Install the battery in the reverse order of the removal.

After installing the battery, coat the terminals with clean grease.

VOLTAGE INSPECTION

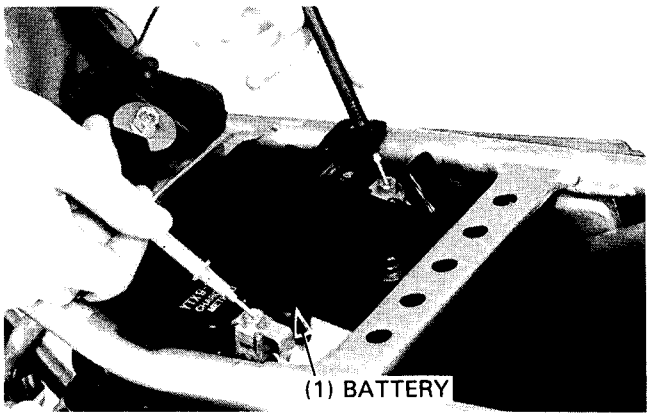
Remove the seat (page 15-14).
Remove the battery case cover.

Measure the battery voltage.

VOLTAGE (20°C/68°F): Fully charged: 13.0—13.2 V
Under charged: Below 12.3 V

TOOLS:

Digital multimeter	**07411—0020000 (KOWA)**
Circuit tester	**TH—5H (KOWA) 07308—0020001 (SANWA)**



CHARGING

Remove the battery.
Connect the charger positive (+) cable to the battery positive (+) terminal.
Connect the charger negative (−) cable to the battery negative (−) terminal.

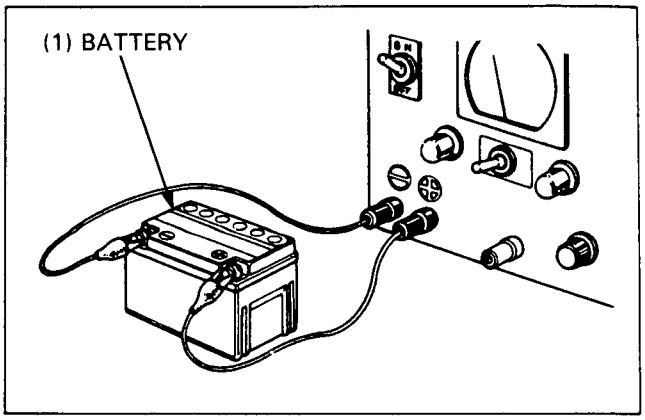
	Standard	Quick
Charging current	0.9 A	4.0 A
Charging time	5 hours	1 hour
Specified voltage	12 V min.	

⚠ WARNING

- ***Keep flames and sparks away from a charging battery.***
- ***Turn power ON/OFF at the charger, not at the battery terminals.***

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

NOTE

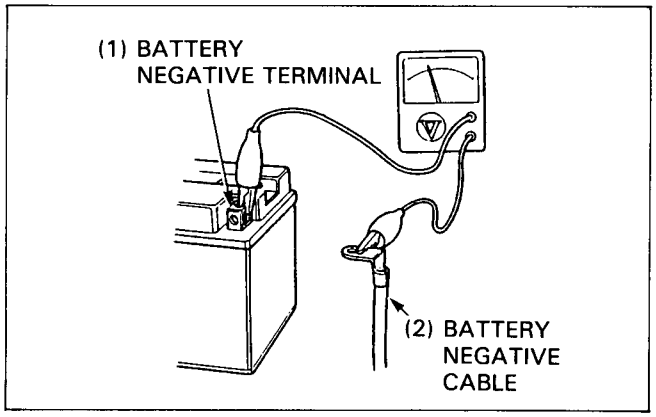
- When inspecting the charging system, check the system components and lines step-by-step according to the troubleshooting on page 17-2.
- With large capacity circuits that exceed the ratings of the fuse contained in the tester, measuring errors can cause damage to testing equipment.
  Before starting each test, set the tester at the high capacity range first, then adjust it to the small capacity circuits range in order that you have the correct range.

LEAKAGE INSPECTION

CAUTION

- *When measuring small capacity circuits, keep the ignition switch off. If the switch is suddenly turned on during a test, the tester fuse may blow.*

Check the battery ampere leakage before making the regulated ampere inspection.
Turn the ignition switch off and disconnect the battery negative cable from the battery.
Connect the tester between the negative cable and the negative battery terminal.



The tester should indicate within 0.1 A with the ignition switch OFF.

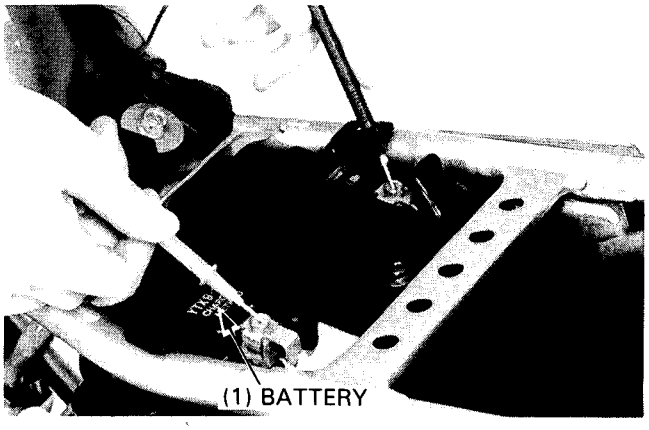
LEAKAGE AMPERE: 0.1 A max (20°C/68°F)

REGULATED VOLTAGE/AMPERE INSPECTION

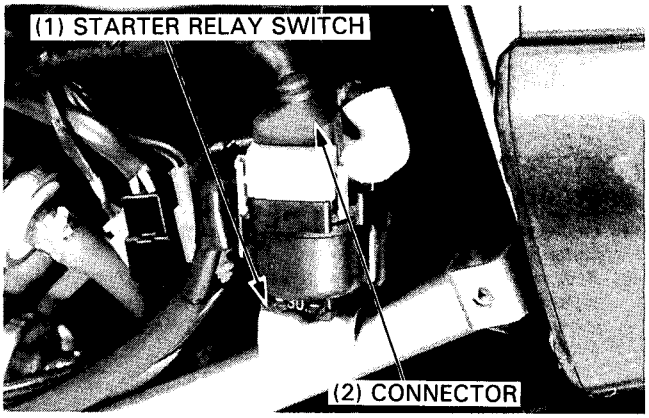
Warm up the engine to normal operating temperature.
Stop the engine, and connect the voltmeter as shown.

⚠ 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.***



Remove the seat and rear cowling (page 15-14).
Disconnect the main fuse connector and remove the main fuse.
Reconnect the connector securely.



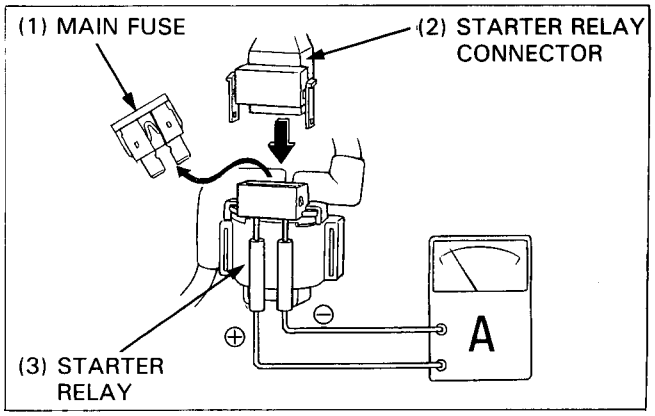
Connect the tester as shown.

CAUTION

- *Be careful not to let the battery positive cable contact the frame while testing.*

Restart the engine and allow it to idle, then increase the engine speed gradually.
The voltage and amperage should be controlled as specified below:

STANDARD: 13.5–15.5 V/0.5 A (3,000 min^{-1} (rpm)) (20°C/68°F)



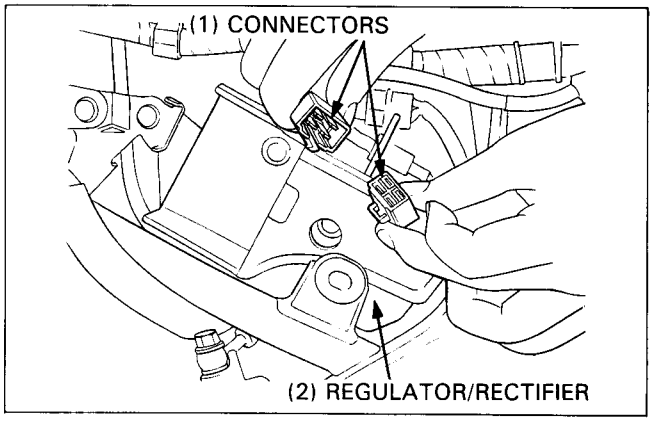
REGULATOR/RECTIFIER

SYSTEM INSPECTION

Remove the seat and rear cowling (page 15-14).
Disconnect the 3P (BLACK) and 4P (WHITE) regulator/rectifier connectors.

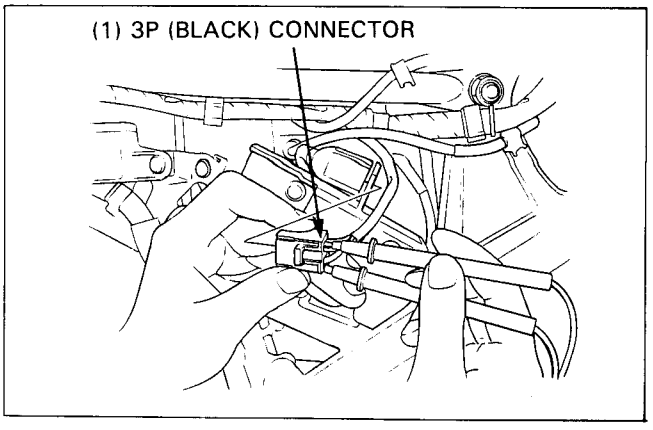
Check the connectors for loose or corroded terminals.

If the regulated voltage reading was out of specification, check the circuits between the connector terminals (wire harness side and alternator side) following the chart on next page.



NOTE

- The regulator/rectifier is semiconductorized unit; use the specified tester, if a different tester is used the test results will be out of specification.
- You'll get a false reading if your finger touches the tester probes.
- If the pointer of the tester fails to swing to zero when the adjusting knob is turned fully clockwise or counter-clockwise, replace the tester dry battery.

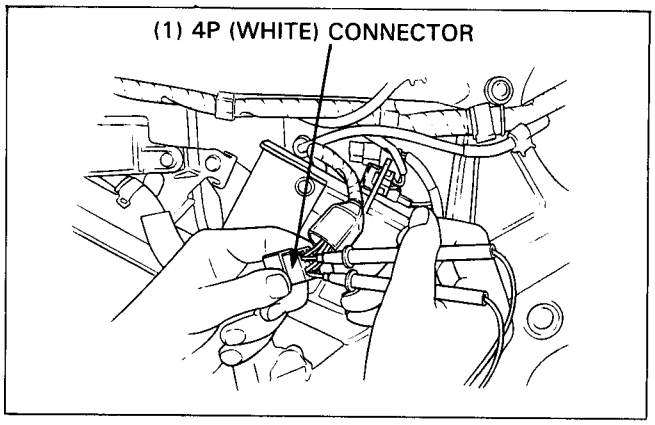


Tester:
07411–0020000 (KOWA Digital type)
07308–0020001 (SANWA Analogue type)
TH–5H (KOWA Analogue type)

Tester	Range
SANWA	kΩ
KOWA	RX100

ITEM	TERMINALS	STANDARDS
Battery charging line	Red/White (+) and Green (–)	Battery voltage should come
Alternator coil line	Yellow and Yellow	0.1–1.0 Ω (20°C/68°F)

Check the resistances between the leads with an ohmmeter. If the resistance is out of the specifications, make a UNIT INSPECTION indicated below.



UNIT INSPECTION

Provided the circuit on the wire harness side are normal and there are no loose connections at the connector, inspect the regulator/rectifier unit by measuring the resistance between the terminals.

NOTE

- You'll get false readings if the probes touch your fingers.
- Use the specified multitesters. Using other equipment may not allow you to obtain the correct results.
  This is due to the characteristic of semiconductors, which have different resistance values depending on the applied voltage.

SPECIFIC MULTITESTER:
– 07411–0020000 (KOWA Digital type)
– 07308–0020001 (SANWA Analogue type)
– TH–5H (KOWA Analogue type)

- Select the following range:
  SANWA: kΩ
  KOWA: X100
- An old dry battery stored in the multitester could cause inaccurate readings. Check the battery if the multitester resistance incorrectly.
- When using the KOWA multitester, remember that all readings should be multiplied by 100.

Replace the regulator/rectifier unit if the resistance value between the terminals is abnormal.

(20°C/68°F) Unit: kΩ

⊕ Probe / ⊖ Probe	Red/White	Green	Yellow 1	Yellow 2	Yellow 3
Red/White		∞	∞	∞	∞
Green	5~30		1~20	1~20	1~20
Yellow 1	1~20	∞		∞	∞
Yellow 2	1~20	∞	∞		∞
Yellow 3	1~20	∞	∞	∞	

Manufacture	Range
SANWA	kΩ
KOWA	RX100

ALTERNATOR

INSPECTION

NOTE

- It is not necessary to remove the stator coil to make this test.

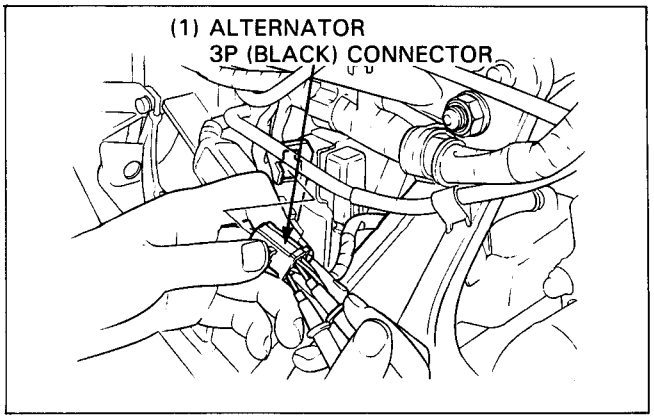
Remove the seat and rear cowling (page 15-14).

Disconnect the alternator 3P (BLACK) connector.

Measure the resistance between the yellow wire terminals and check for no continuity between each terminal and ground.

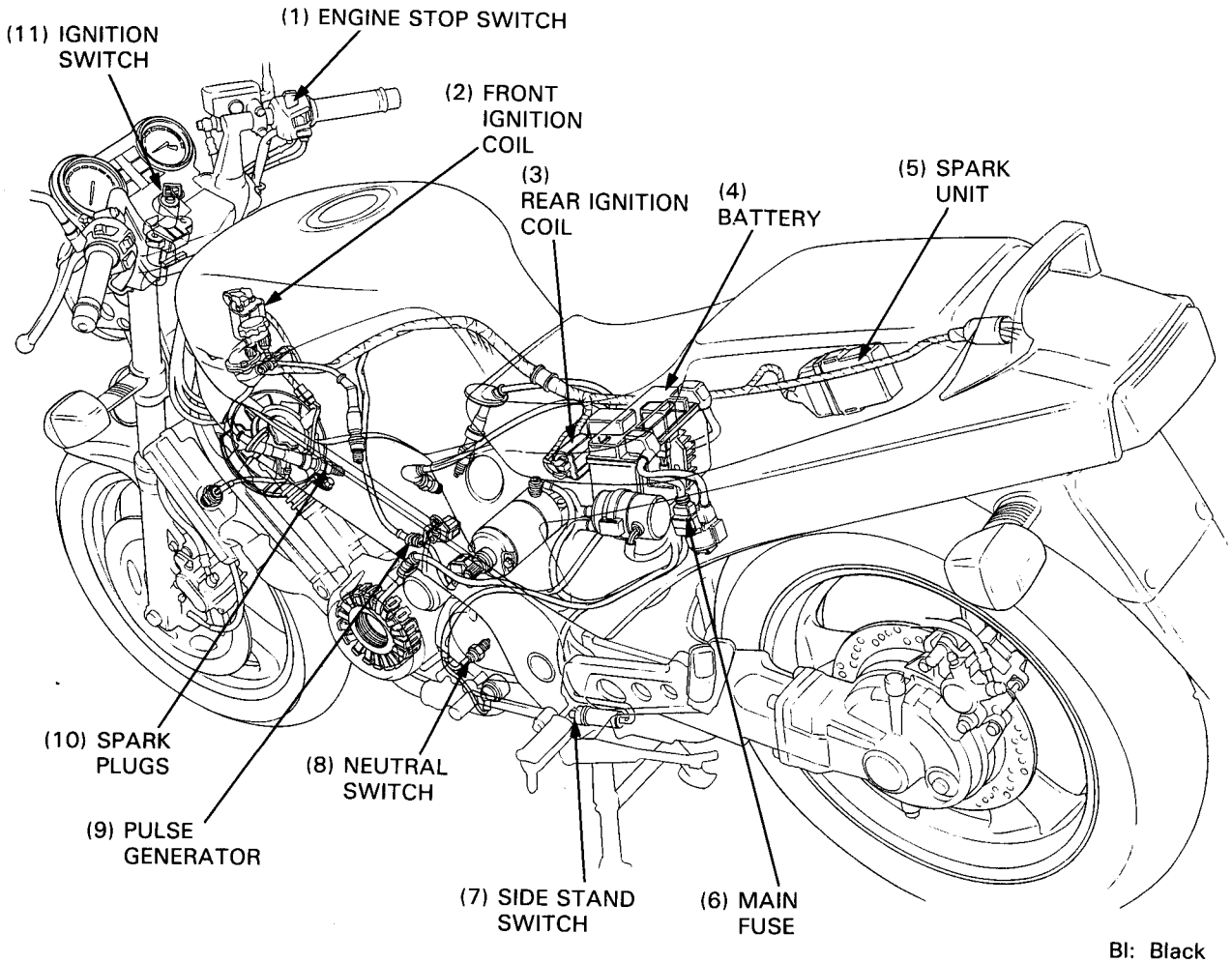
STANDARD: 0.1—1.0 Ω (20°C/68°F)

Replace the stator if the resistance is out of specification or if there is continuity between any yellow wire terminal and ground.

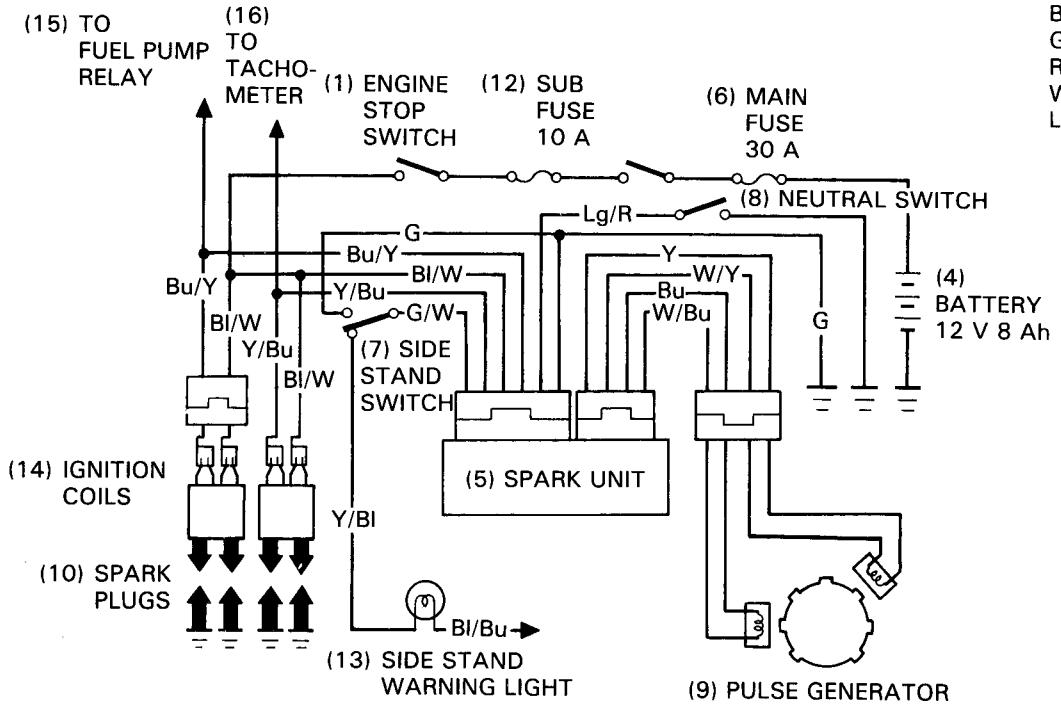


18

IGNITION SYSTEM



Bl: Black
Y: Yellow
Bu: Blue
G: Green
R: Red
W: White
Lg: Light green



18

SERVICE INFORMATION

⚠ WARNING

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

GENERAL

- Ignition timing cannot be adjusted since the spark unit is non-adjustable. If ignition timing is incorrect, check the system components and replace any faulty parts.
- For spark plug gap inspection and adjustment procedure, see page 3-6.
- For alternator removal and installation, see section 8.
- For pulse generator removal and installation, see section 7.
- When inspecting the ignition system, check the system components and lines step-by-step according to the troubleshooting on next page.
- Each pair of the spark plugs (Front and Rear) have its own ignition circuit.
- To test the neutral switch, refer to section 20.

SPECIFICATIONS

Spark plug

Spark plug/ Spark plug gap	For cold climate (Below 5°C, 41°F)	NGK	DPR7EA-9	0.8–0.9 mm (0.031–0.035 in)
		ND	X22EPR-U9	
	Standard	NGK	DPR8EA-9	
		ND	X24EPR-U9	
	For extended high speed riding	NGK	DPR9EA-9	
		ND	X27EPR-U9	

Ignition system

ITEM			STANDARDS
Ignition timing	Initial (F mark)		10° BTDC/idle
Ignition coil resistance (20°C/68°F)	Primary circuit		2.2–2.6 Ω
	Secondary circuit	With plug wire	30–36 kΩ
		Without plug wire	20–25 kΩ
Pulse generator coil resistance (20°C/68°F)			450–550 Ω
Firing order			Front–(232°)–Rear–(488°)–Front

TOOLS

Tester

07411–0020000 (KOWA Digital type)
07308–0020001 (SANWA Analogue type)
TH-5H (KOWA Analogue type)

TROUBLESHOOTING

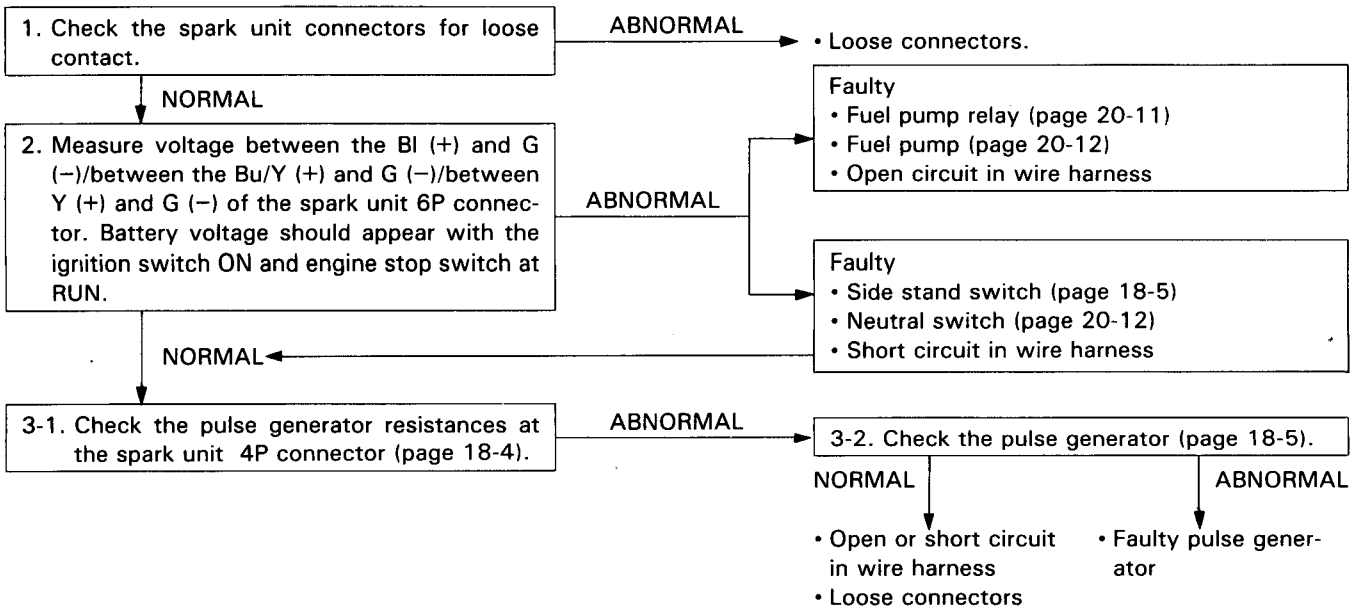
⚠ WARNING

- *When performing a spark test, keep open flames or sparks away from the work area.*

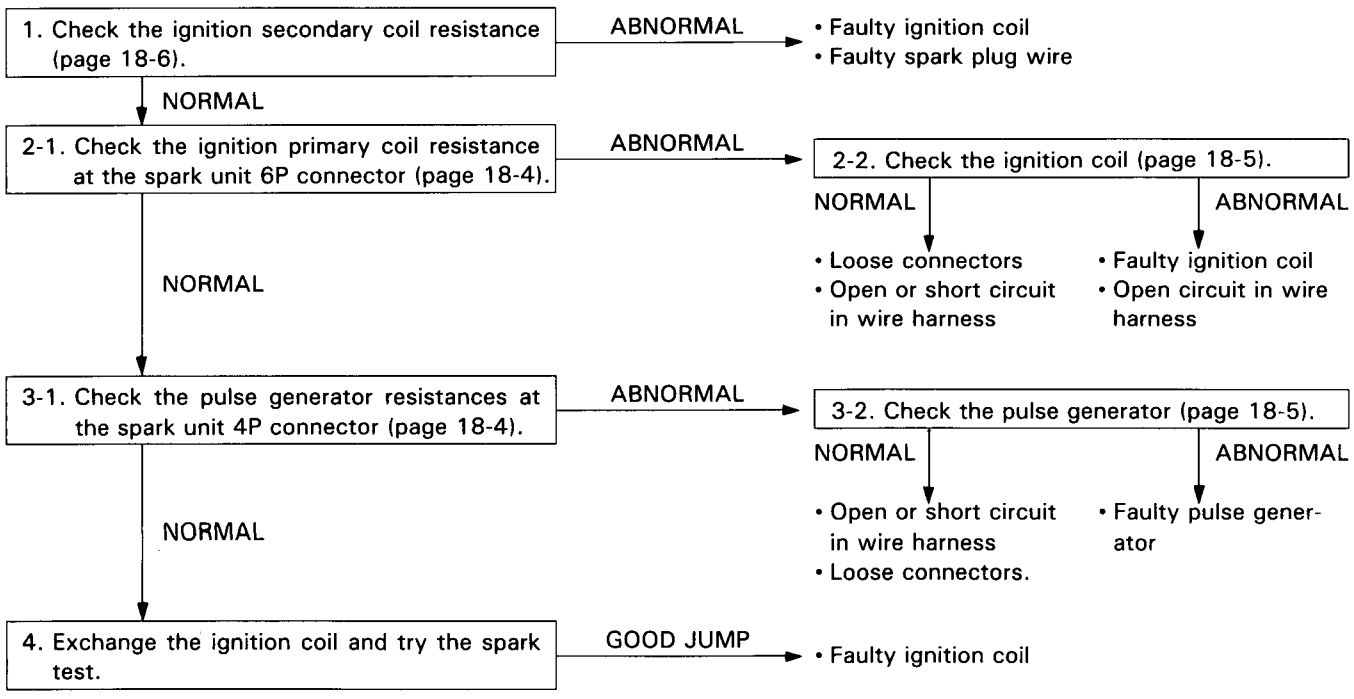
No spark at one spark plug

- Faulty spark plug
- Faulty spark plug wire

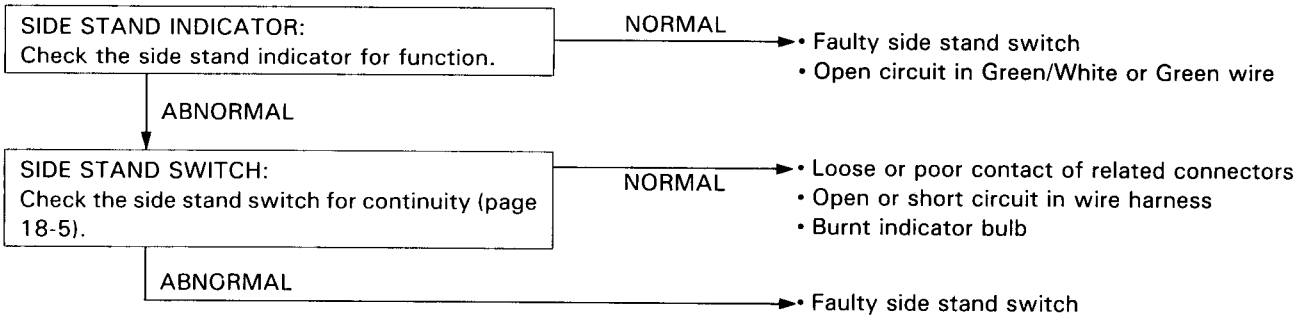
No spark at all plugs



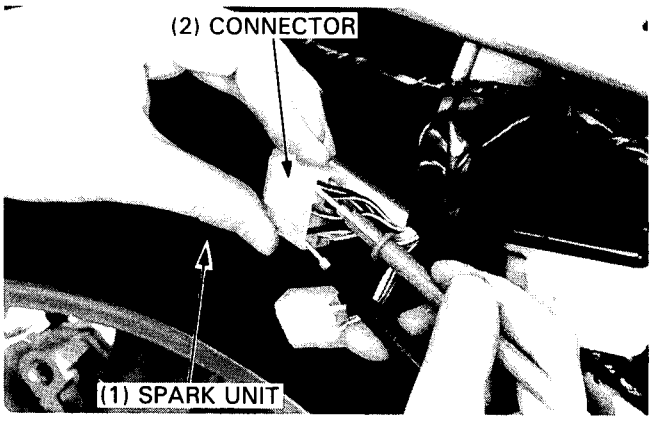
No spark at either spark group (Front or Rear)—(CHECK WRONG SPARK GROUP)



Engine starts, but side stand switch does not function at all.



IGNITION SYSTEM INSPECTION



Remove the seat and rear cowling (page 15-14).

NOTE

- Check the system components and lines step-by-step according to the troubleshooting chart on pages 18-2, 3.

Disconnect the spark unit connectors and check them for loose or corroded terminals.

Measure the data between connector terminals using the following chart.

<6P CONNECTOR>

ITEM		TERMINALS		STANDARDS (20°C/68°F)
Ignition primary coil	Front	Bu/Y and Bl/W		2.2–2.6 Ω
	Rear	Y/Bu and Bl/W		
DC power supply circuit line		Bl/W (+) and G (–), Bu/Y (+) and G (–), Y/Bu (+) and G (–), Ignition switch "ON" and engine stop switch "RUN"		Battery voltage should come
Side stand switch line		Stand retructed (Switch pushed)	G/W (+) and G (–)	No continuity
			Y/Bl (+) and G (–)	Continuity
		Stand down (Switch released)	G/W (+) and G (–)	Continuity
			Y/Bl (+) and G (–)	No continuity
Neutral switch line		In neutral	Lg/R (+) and G (–)	Continuity
		In any gear	Lg/R (+) and G (–)	No Continuity

<4P CONNECTOR>

ITEM	TERMINALS	STANDARDS (20°C/68°F)
Pulse generator coil	W/Y and Y (Front) W/Bu and Bu (Rear)	450–550 Ω
	Each terminal and body ground	NO CONTINUITY

SPARK UNIT

INSPECTION WITH TESTER

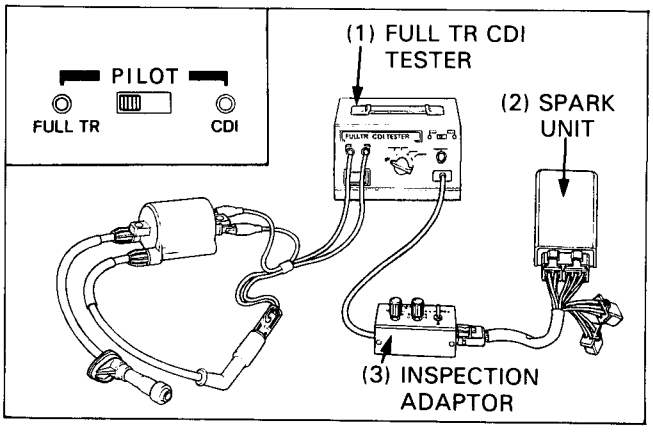
Remove the seat and rear cowling (page 15-14).
Remove the cover boot and disconnect the spark unit connectors at the spark unit.
Remove the spark unit.

NOTE

- Follow the tester manufacture's instruction.
- Choose the "CDI-FULL TR" switch is to be "FULL-TR".

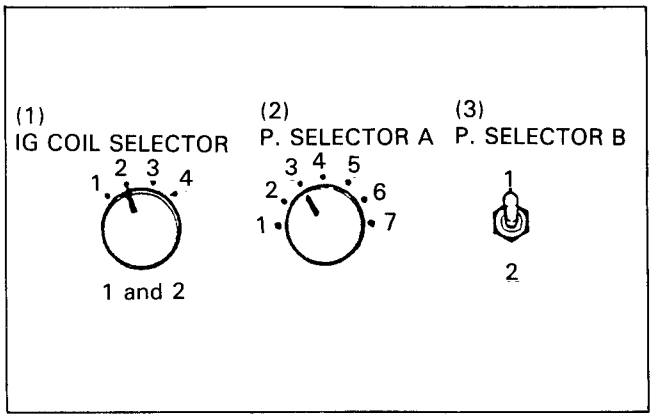
Connect the inspection adaptor to spark unit connector, and connect the tester as shown.

TOOL:
Inspection adaptor **07508–0013600**



Turn the selectors of the inspection adaptor as follows:

IG COIL SELECTOR: 2
P. SELECTOR A: 3
P. SELECTOR B: 1



Inspect the spark unit as following table:

	Good condition	No good condition
OFF	No Fire	——
P	↑	——
EXT	↑	Fire
ON1	Fire	No Fire
ON2	↑	↑

Replace the spark unit if it is not in good condition.

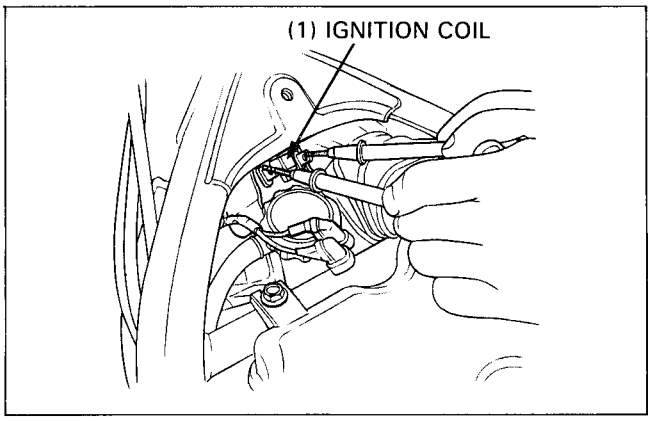
IGNITION COIL

INSPECTION

Remove the seat and fuel tank (page 4-3).
Measure the primary coil resistance of the front and rear ignition coils.

NOTE

- The rear ignition coil is behind the shock absorber upper mount.



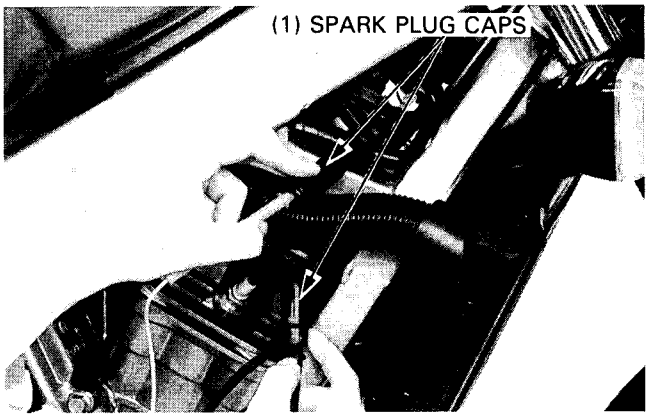
PRIMARY COIL RESISTANCE:
STANDARD: 2.2—2.6 Ω (20°C/68°F)

Disconnect the spark plug caps from the plugs and measure the secondary coil resistance with the spark plug caps in place.

STANDARD: 30—36 kΩ (20°C/68°F)

If the resistance is out of range, remove the spark plug wires and measure the resistance between the secondary coil terminals.

STANDARD: 20—25 kΩ (20°C/68°F)

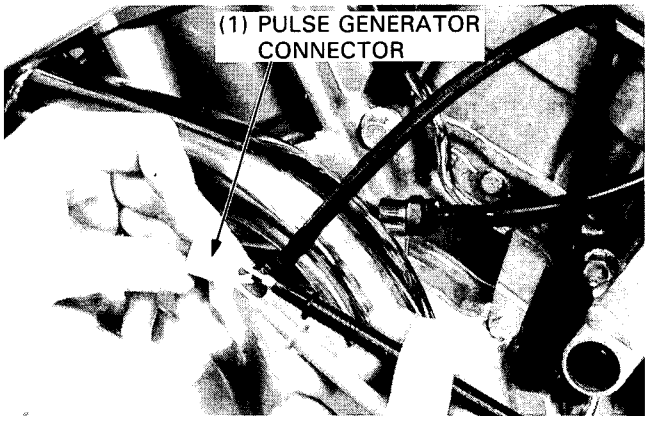


PULSE GENERATOR

INSPECTION

NOTE

- It is not necessary to remove the pulse generator to make this inspection.



Disconnect the pulse generator 4P connector (WHITE).
Measure the resistances between the White/Yellow and Yellow wires (front pulse generator) and White/Blue and Blue wires (rear pulse generator)

STANDARD: 450—550 Ω (20°C/68°F)

For pulse generator replacement, refer to section 8.

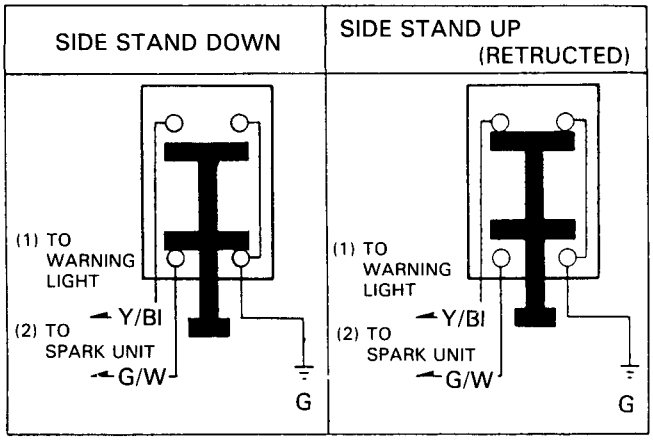
SIDE STAND SWITCH

INSPECTION

Remove the left side cover.
Disconnect the side stand switch connector.

Check for continuity between each terminals as below.

Item	Terminals	Results
The switch pin is pushed in. (Retructed)	Green/White—Green	NO CONTINUITY
	Yellow/Black—Green	CONTINUITY
The switch pin is released (DOWN).	Green/White—Green	CONTINUITY
	Yellow/Black—Green	NO CONTINUITY



IGNITION TIMING

NOTE

- The spark unit system is factory pre-set and cannot be adjusted. Ignition timing inspection procedures are given to inspect the function of the spark unit components.
- Connect the timing light to the other spark plug wire if you see that the ignition timing is incorrect, and you might be able to see the timing is correct.

Warm up the engine to operating temperature.

⚠WARNING

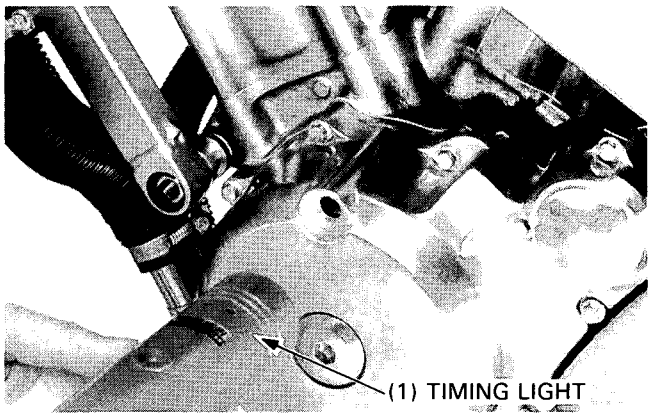
- ***If the engine must be running to do some work, make sure the area is well-ventilated. Never run the engine in an enclosed area.***
- ***The exhaust contains poisonous carbon monoxide gas that may cause loss of consciousness and lead to death.***

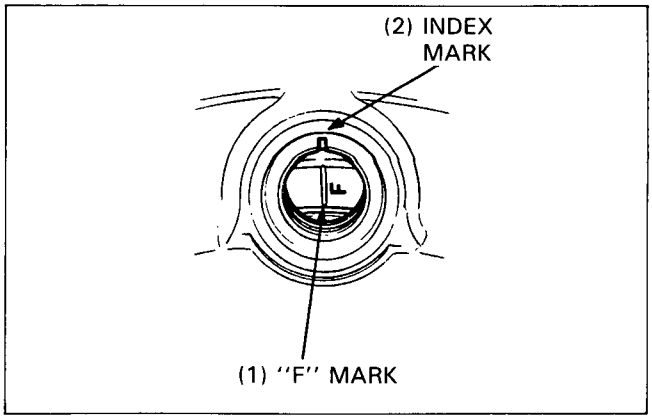
Remove the timing inspection hole cap on the left crankcase cover.

Connect the timing light to the front spark plug wire.

The timing is correct if the "F" mark aligns with the index mark on the right crankcase cover at idle for each cylinder.

Raise the engine rpm and the "F" mark should begin to rotate counterclockwise for each cylinder.



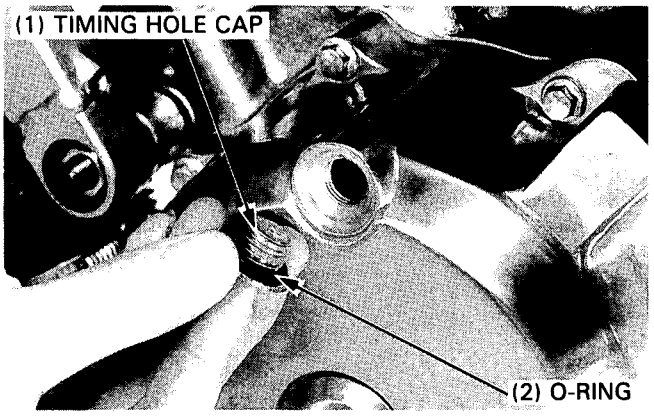


If the ignition timing is incorrect, make a ignition system inspection (pages 18-4) and replace any faulty parts.

Check the timing hole cap's O-ring for damage, replace the new one if desired.

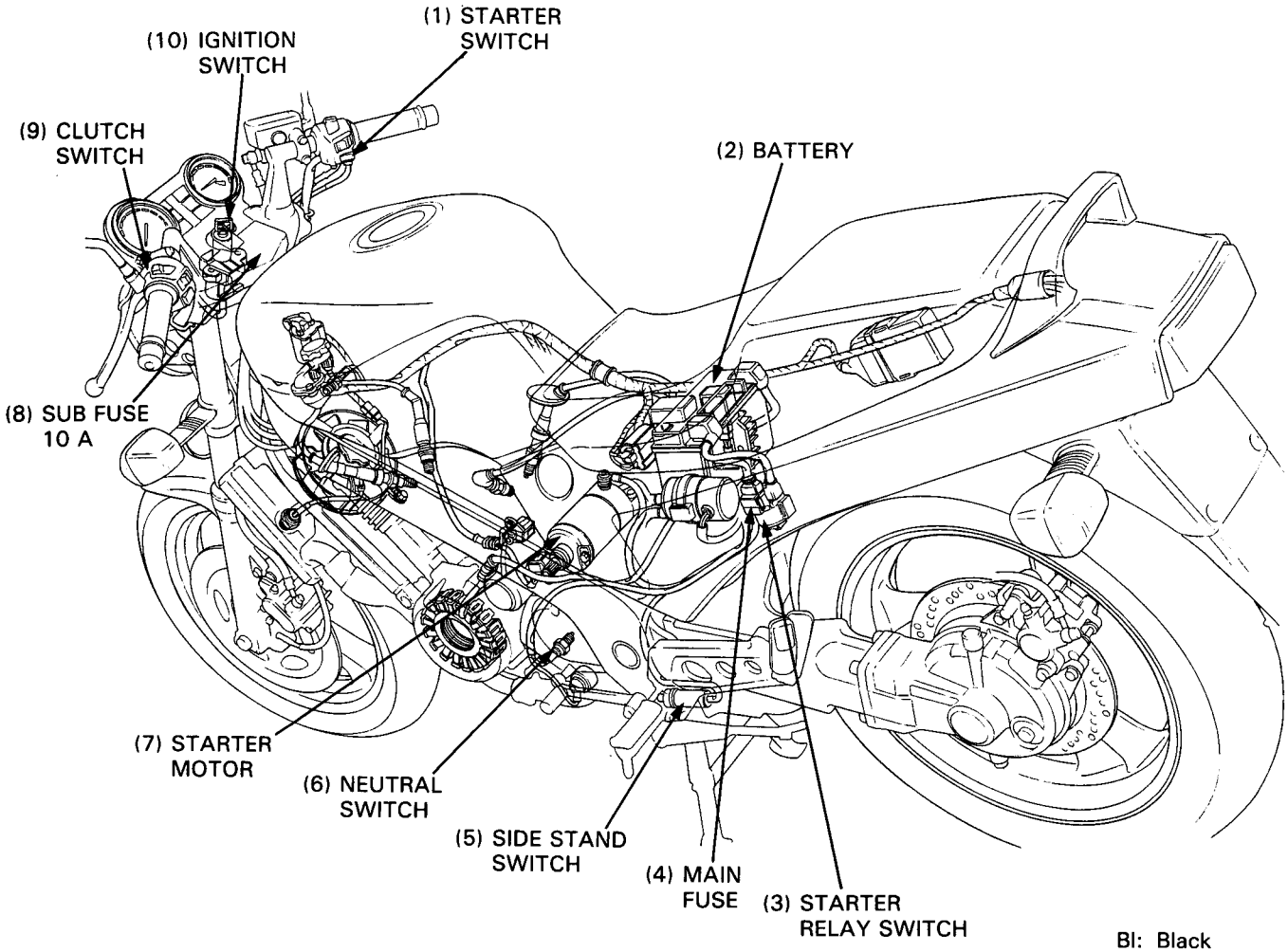
Apply molibdenum disulfide grease to the threads, and install the timing inspection hole cap.

TORQUE: 10 N·m (1.0 kg-m, 7.2 ft-lb)

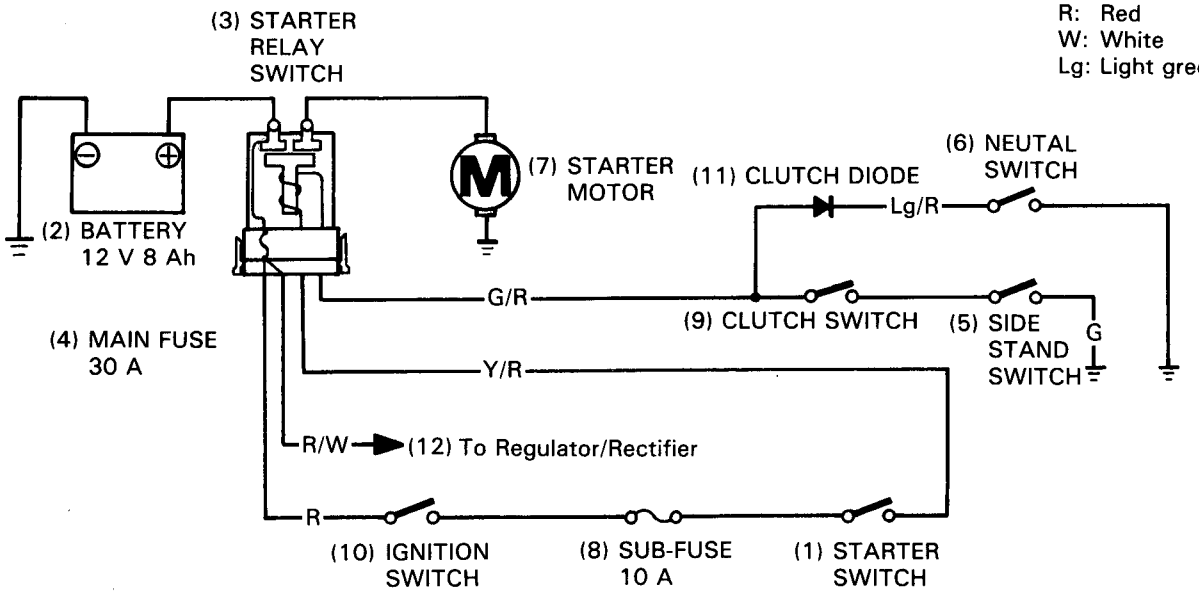


19

ELECTRIC STARTER



Bl: Black
Y: Yellow
G: Green
R: Red
W: White
Lg: Light green



19

SERVICE INFORMTION

GENERAL

- The starter motor and pulse generator can be removed with the engine in the frame.
- To inspect the pulse generator, refer to section 18.
- Refer to section 8 for starter clutch removal and installation.

SPECIFICATION

Unit: mm (in)

ITEM	STANDARD	SERVICE LIMIT
Starter motor brush length	12.5 (0.49)	6.5 (0.26)

TROUBLESHOOTING

NOTE

- Check for the following before troubleshooting the system.
  - Blown main (30 A) or sub (10 A) fuse.
  - Loose battery and starter motor cables.
  - Discharged battery.

- The starter motor should turn when the transmission is in neutral.
- The starter motor should turn when the transmission is in any gear with relative circuit satisfied, indicated below chart.

	SIDE STAND	CLUTCH LEVER	STARTER MOTOR
GEAR POSITION: ANY GEAR	UP	SQUEEZED	TURN
		FREE	DOES NOT TURN
	DOWN	SQUEEZED	DOES NOT TURN
		FREE	DOES NOT TURN

Starter motor does not turn

Measure the Voltage between the Green/White (+) and Green (−) terminals of the side stand connector (wire harness side):
There should be battery voltage.

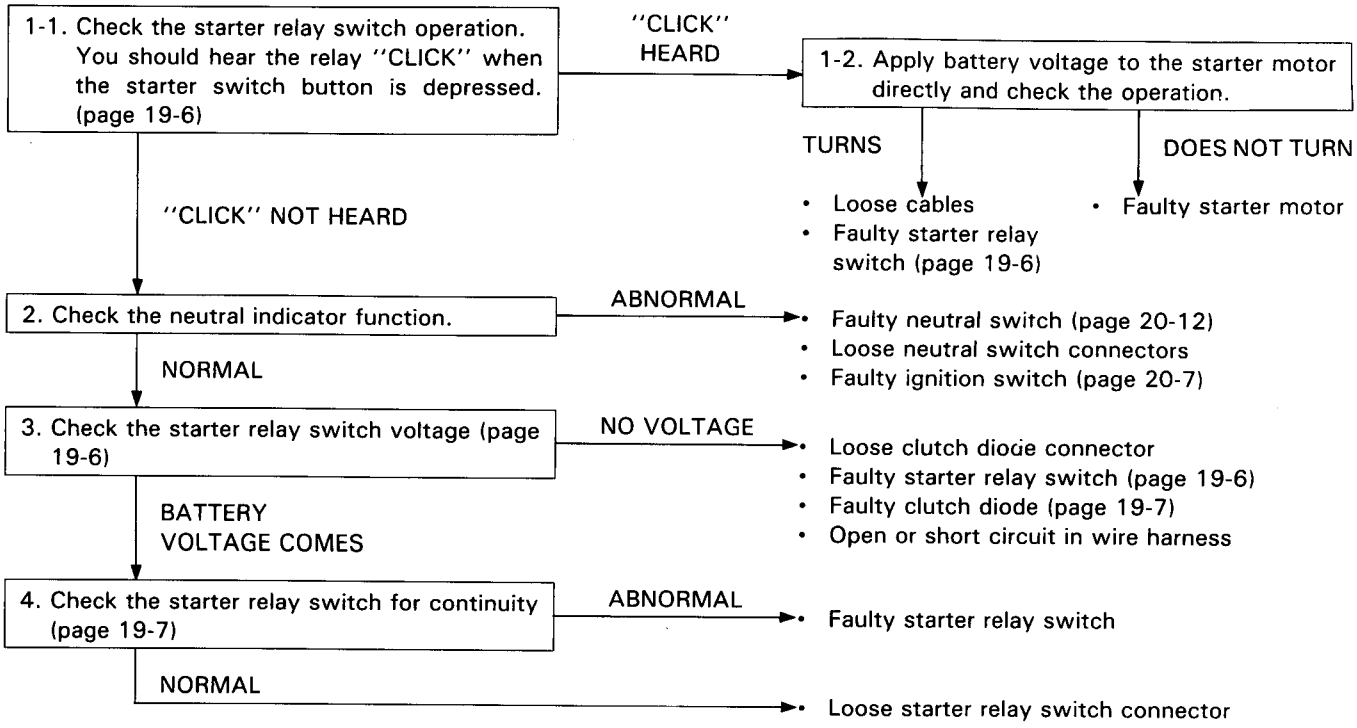
BATTERY VOLTAGE MEASURED → Check the clutch switch (page 20-13).

NO VOLTAGE
(or too little voltage)

↓

Check the side stand switch (page 18-5).

Starter motor does not turn with the side stand switch is Normal



Starter motor turns engine slowly
- Weak battery
- Excessive resistance in circuit
- Binding in starter motor

Starter motor turns, but engine does not turn
- Faulty starter clutch
- Faulty starter motor gears

Starter motor and engine turns, but engine does not start
- Faulty ignition system
- Engine problems
  - Low compression
  - Fouled spark plugs

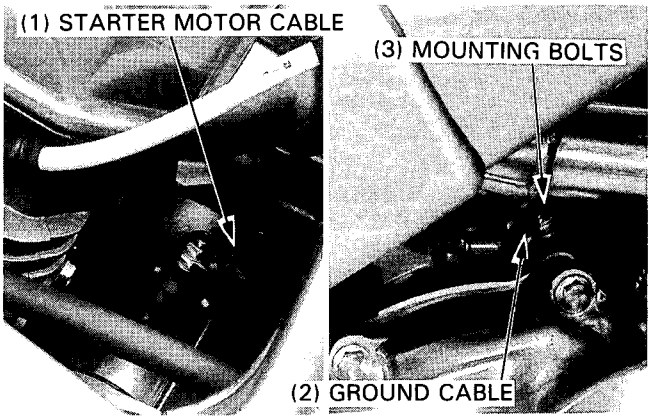
STARTER MOTOR

REMOVAL

⚠ WARNING

- ***With the ignition switch OFF, remove the negative cable at the battery before servicing the starter motor.***

Remove the rubber cap and disconnect the starter motor cable.
Remove the motor mounting bolts and ground cable.
Remove the motor from the left side.

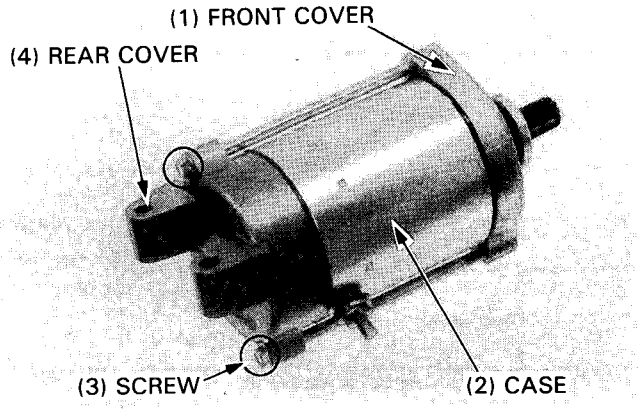


DISASSEMBLY

Remove the following components:
— motor case screws.
— front and rear covers.
— armature.

NOTE

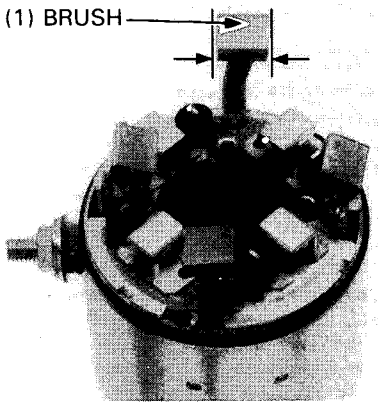
- Record the location and number of shims.



INSPECTION

Measure each brush length.

SERVICE LIMIT: 6.5 mm (0.26 in)

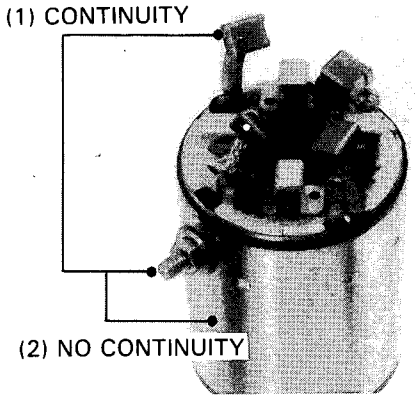


Check for continuity from the cable terminal to the motor case and from the cable terminal to the brush wire (black).

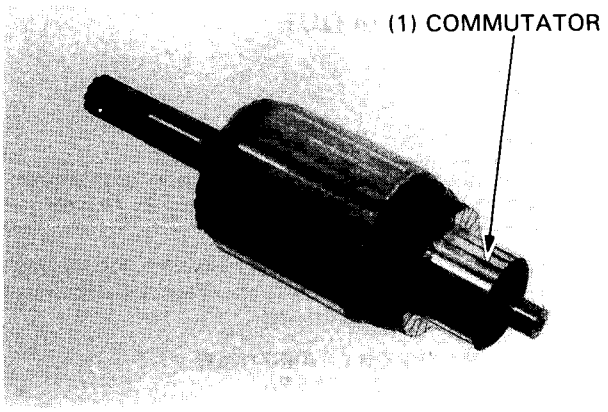
CABLE TERMINAL-MOTOR CASE
NO CONTINUITY: NORMAL

CABLE TERMINAL-BRUSH (BLACK WIRE)
CONTINUITY: NORMAL

Disassemble the brush holder if necessary.

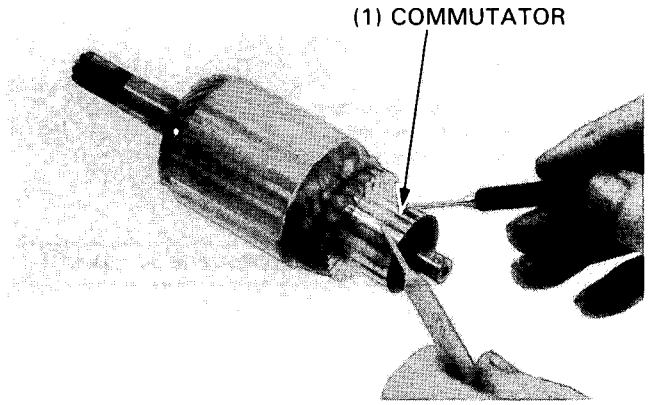


Inspect the commutator bars for discoloration.
Bars discolored in pairs indicate grounded armature coils.



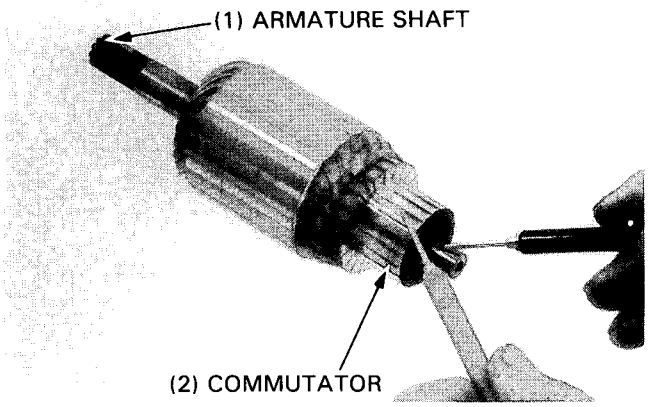
Check for continuity between pairs of commutator bars.

There should be continuity.

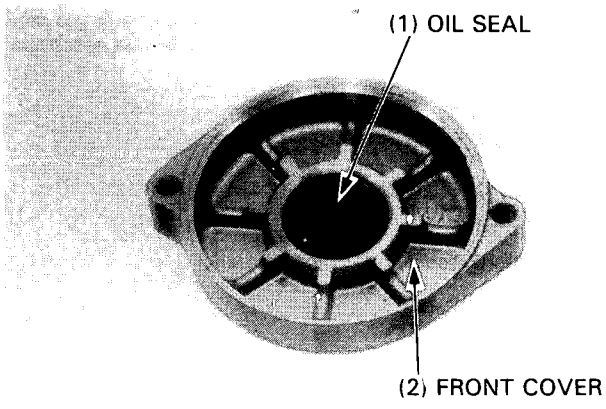


Check for continuity between individual commutator bars and the armature shaft.

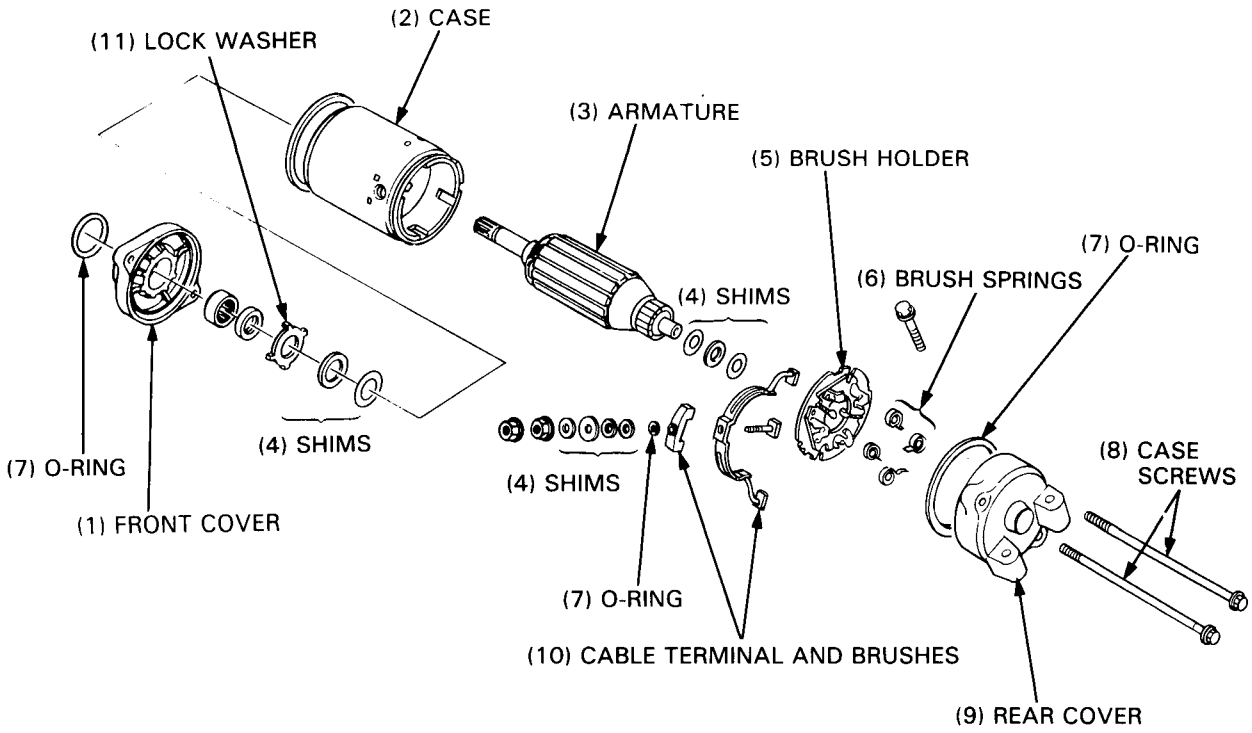
There should be no continuity.



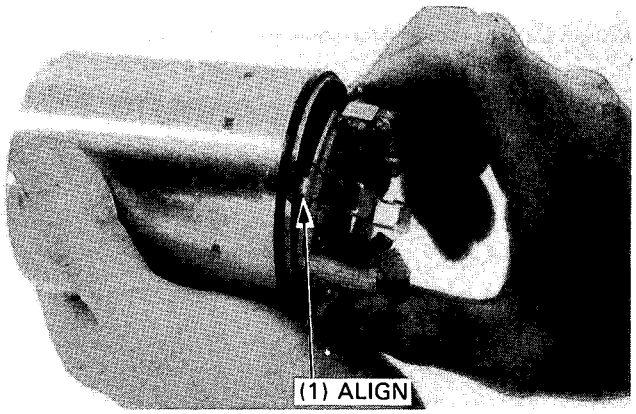
Check the front cover oil seal for wear or fatigue.



ASSEMBLY

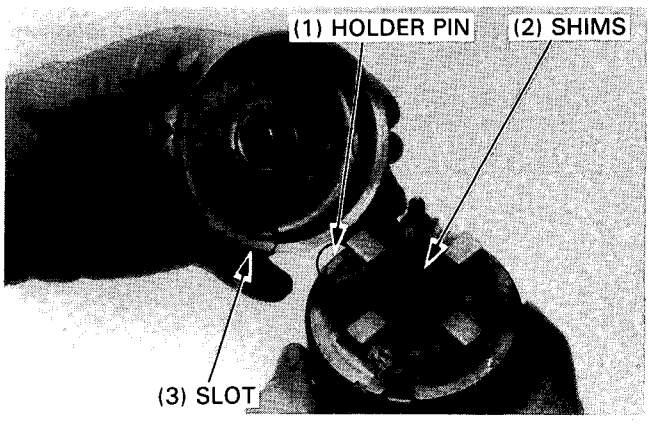


Set the brushes on the brush holder.
Align the starter motor case notch with the brush holder tab.



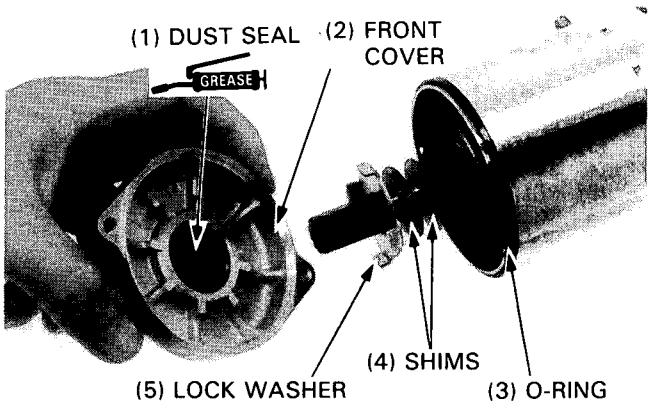
Install the armature in the case.
Set the brush springs.

Install the rear shims in the same location and number as before disassembly.
Install the O-ring on the case.
Install the rear cover, aligning its slot with the brush holder pin.



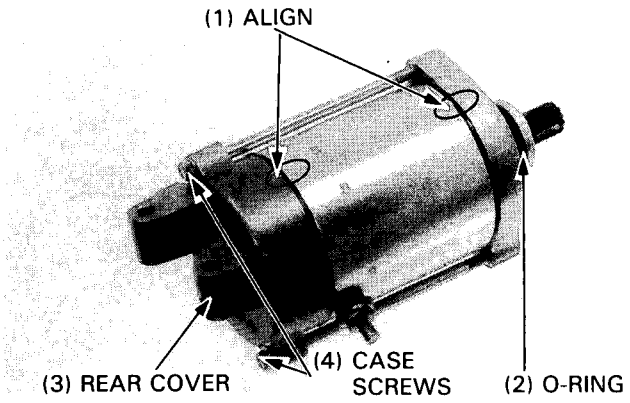
Install the front shims in the same location and number as before disassembly.

Install the O-ring on the case.
Install the lock washer, aligning its tabs with the slots of the front cover.
Apply grease to the dust seal and install the front cover.



Align index marks of the front cover, case and rear cover as shown.

Install and tighten the starter motor case screws and apply oil to the O-ring and install it on the front cover.



INSTALLATION

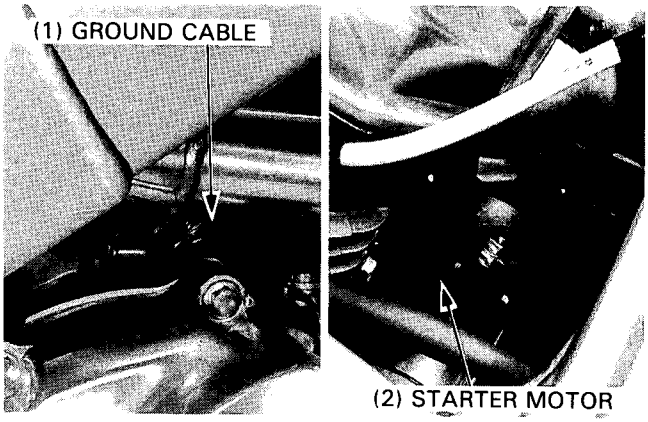
Install the starter motor in the engine.
Install and tighten the motor mounting bolts securely.

NOTE

- Install the ground cable with one mounting bolt as shown.

Connect the motor cable to the motor terminal and install the rubber cap over the terminal.

Connect the battery negative cable.



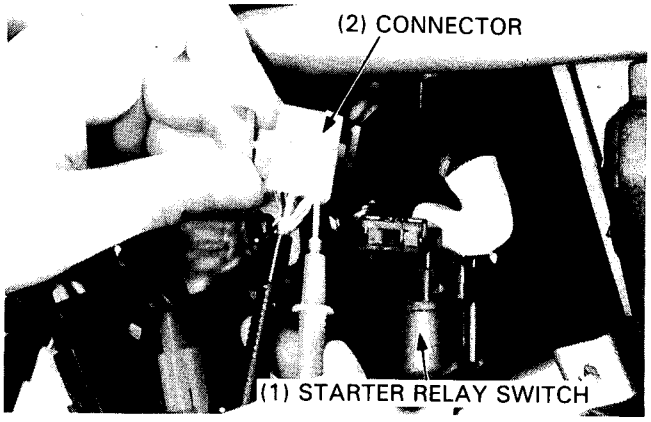
STARTER RELAY SWITCH

OPERATION INSPECTION

Depress the starter switch button with the ignition switch ON. The coil is normal if the starter relay switch clicks.

VOLTAGE INSPECTION

If you don't hear the switch "CLICK", disconnect the switch connector.
Shift the transmission into neutral and turn the ignition switch ON.
Measure the voltage between the Yellow/Red (+) and Green/Red (−) wires of the relay connector as you press the starter. The tester should show battery voltage. If it does not, make the following continuity inspection.

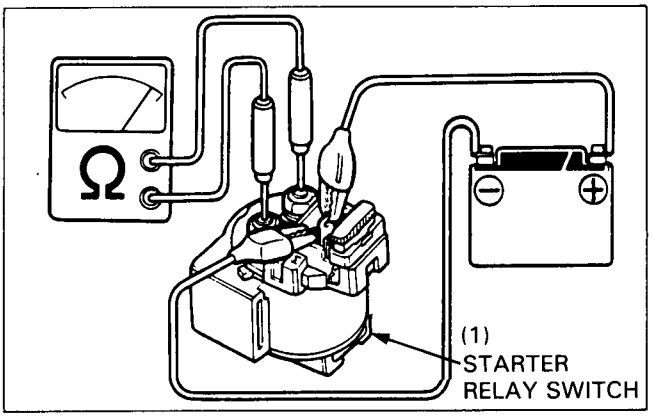


CONTINUITY INSPECTION

Remove the starter relay switch.
Connect an ohmmeter to the switch large terminals.

Connect a fully charged 12 V battery positive wire to the starter relay switch Yellow/Red wire terminal, and the battery negative wire to the Green/Red wire terminal.

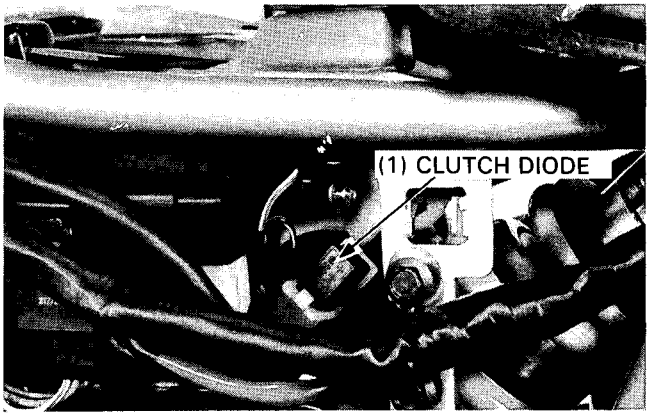
There should be continuity while the battery is connected to the terminals, and no continuity when the battery is disconnected.



CLUTCH DIODE

REMOVAL

Remove the rear cowling (page 15-14).
Remove the clutch diode from the wire harness.



INSPECTION

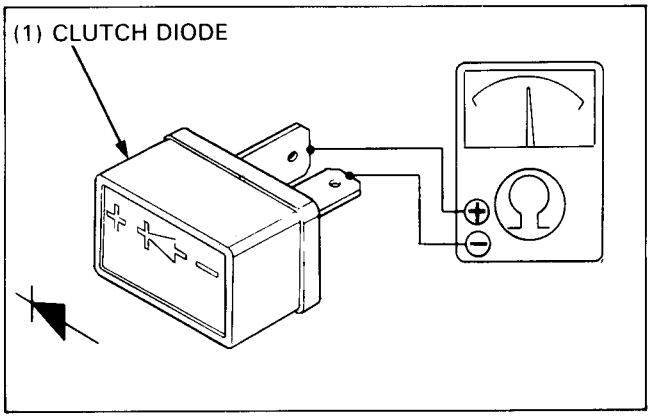
Check for continuity with an ohmmeter.

Connect the positive probe to the (+) terminal and the negative probe to the (−) terminal of the diode.

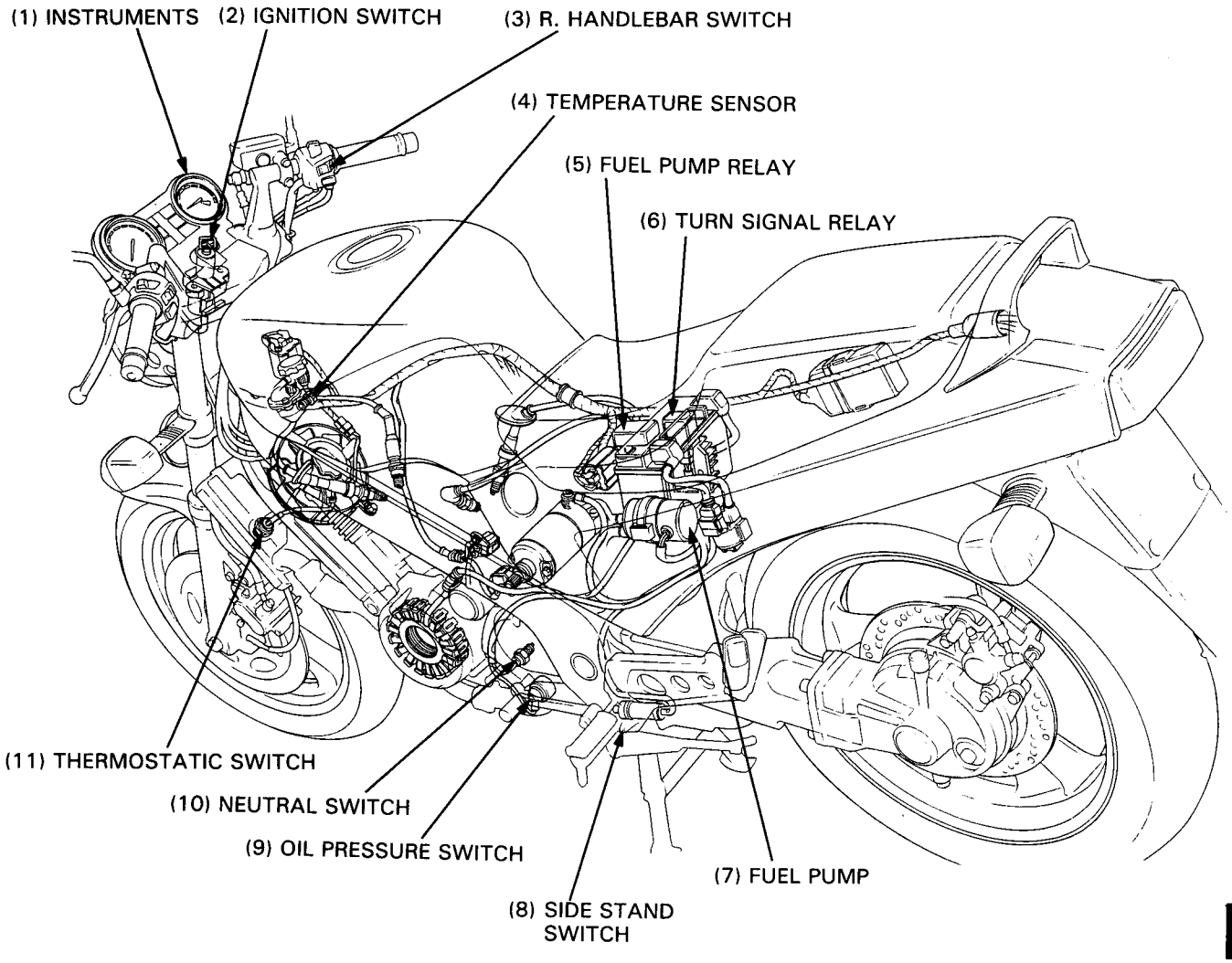
There should be continuity, then reverse the probes, there should be no continuity.

NOTE

- The test results shown above are for a positive ground ohmmeter and the opposite results will be obtained when a negative ground ohmmeter is used.



LIGHTS/INSTRUMENTS/ SWITCHES


(1) INSTRUMENTS
(2) IGNITION SWITCH
(3) R. HANDLEBAR SWITCH
(4) TEMPERATURE SENSOR
(5) FUEL PUMP RELAY
(6) TURN SIGNAL RELAY
(11) THERMOSTATIC SWITCH
(10) NEUTRAL SWITCH
(9) OIL PRESSURE SWITCH
(8) SIDE STAND SWITCH
(7) FUEL PUMP

SERVICE INFORMATION

⚠ 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.*
- *Gasoline is extremely flammable and is explosive under certain conditions. Work in a well ventilated area with the engine stopped. Do not smoke or allow flames or sparks in the work area or where gasoline is stored.*

GENERAL

- Some wires have different colored bands around them near the connector. These are connected to other wires which correspond to the band color.
- 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 motorcycle. Simply disconnect the wires and connect a continuity tester or volt-ohmmeter to the terminals or connections.
- A continuity tester is useful when checking to find out whether or not there is an electrical connection between the two points. An ohmmeter is needed to measure the resistance of a circuit, such as when there is a specific coil resistance involved, or when checking for high resistance caused by corroded connections.

SPECIFICATIONS

Headlight		12 V 60 W/55 W
Brake/taillight		12 V 21/5 W x 2
Turn signal lights	Front	12 V 21/5 W x 2
	Rear	12 V 21 W x 2
Oil pressure warning/Side stand indicator		LED (Light Emitting Diode) x 2
Indicator lights	Turn signal	12 V 3 W
	Neutral	12 V 3 W
	High beam	12 V 3 W
Meter light		12 V 3.4 W x 1, 1.7 W x 2
Main fuse		30 A
Sub-fuse (fan, ignition, headlight, oil/neutral, brake/turn/horn, parking)		10 A x 6, 15A x 1 (brake/turn/horn)
Fuel pump flow capacity/min at 10 V		600 cm^3 (0.630 US qt, 0.528 Imp qt)

TORQUE VALUES

Radiator thermostatic switch	18 N·m (1.8 kg-m, 13 ft-lb) — Apply sealant to the threads
Oil pressure switch	12 N·m (1.2 kg-m, 9 ft-lb) — Apply sealant to the threads
Ignition switch mounting bolt	25 N·m (2.5 kg-m, 18 ft-lb)

TROUBLESHOOTING

No Lights Come On When Ignition Switch Is Turned ON:
- Bulb at fault or burned out
- Faulty switch
- Wiring to that component has open circuit
- Fuse blown
- Wiring loose, broken, or at fault
- Battery dead or disconnected

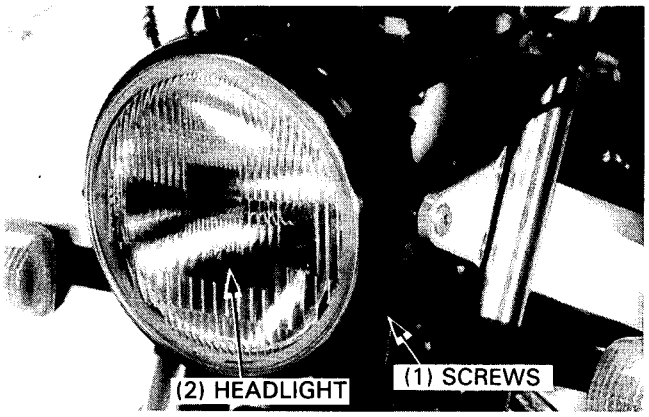
All Lights Come On, but Dimly, when Ignition Switch Is Turned ON:
- Battery voltage low
- Faulty bulb

Headlight Beam Does Not Shift When HI-LO Switch Is Operated:
- Faulty dimmer switch
- Wiring loose, broken, or at fault

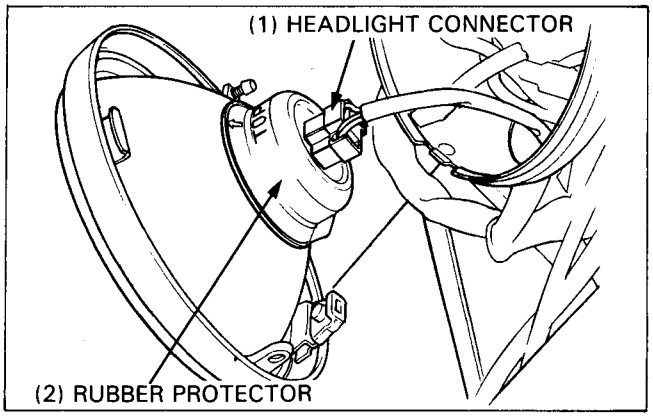
HEADLIGHT

REMOVAL/INSTALLATION

Remove the two screws and headlight.



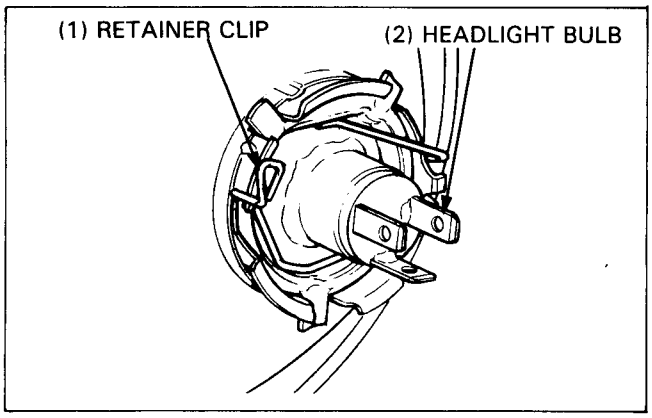
Disconnect the headlight connector and remove the rubber protector.



Remove the headlight retainer clip and replace the headlight bulb.

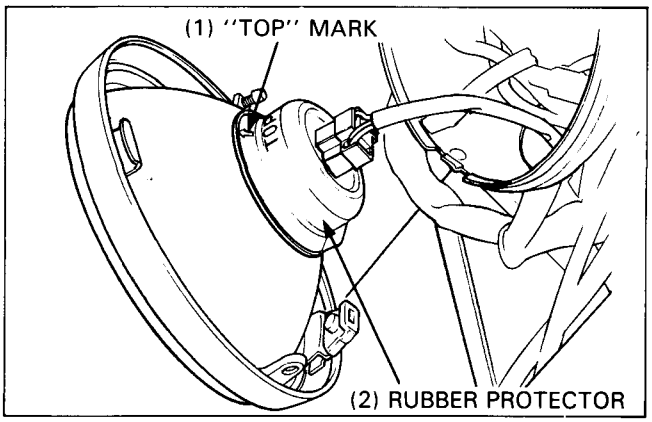
CAUTION

- *This motorcycle is equipped with a halogen headlight bulb.*
- *Do not put finger prints on the headlight bulb, they may create hot spots on the hulb.*
- *If you touch the bulb with your bare hands, clean it with a cloth moistened with alcohol to prevent its early failure.*
- *Do not try to replace the bulb or clean the headlight with the light ON.*
- *After replacing the bulb, install the rubber boot tightly against the unit.*



NOTE

- Install the rubber protector with the top mark facing up.



Install the headlight in the reverse order of removal.

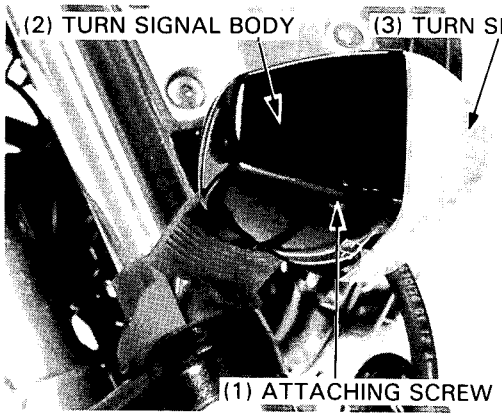
BULB REPLACEMENT

NOTE

- See page 20-6 for speedometer bulb replacement.

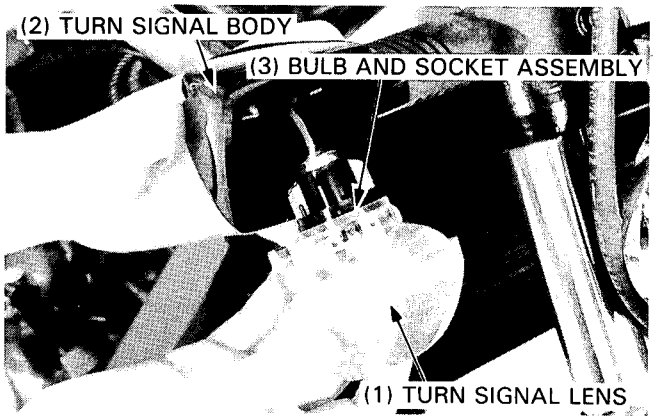
TURN SIGNAL LIGHT

Remove the turn signal lens attaching screw.



Remove the turn signal lens from the body.

Turn the bulb socket counterclockwise to remove the socket and bulb as an assembly.

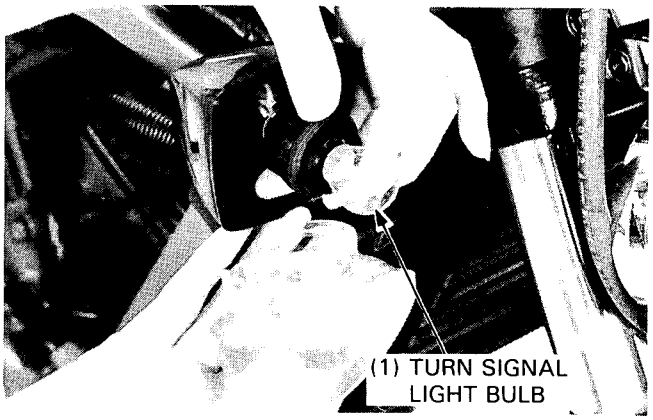


While pushing in, turn the bulb counterclockwise to remove. Replace the bulb, if desired.

Install in the reverse order of removal.

NOTE

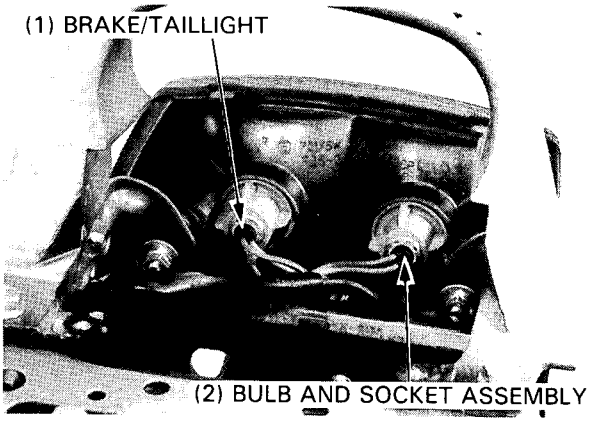
- Seat the rubber packing properly.



BRAKE/TAILLIGHT

Remove the seat and rear cowling (page 15-14).

Turn the bulb socket counterclockwise to remove the socket and bulb as an assembly.

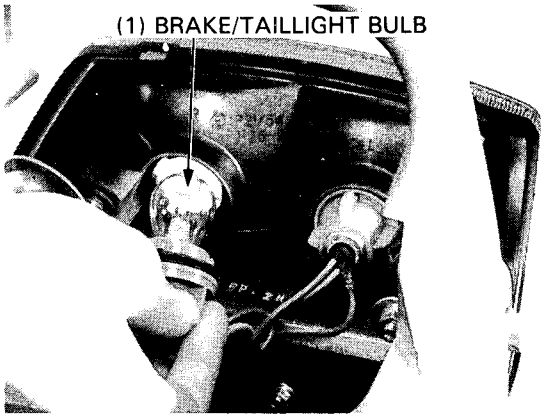


While pushing in, turn the bulb counterclockwise to remove. Replace the bulb, if desired.

Install in the reverse order of removal.

NOTE

- Seat the rubber packing properly

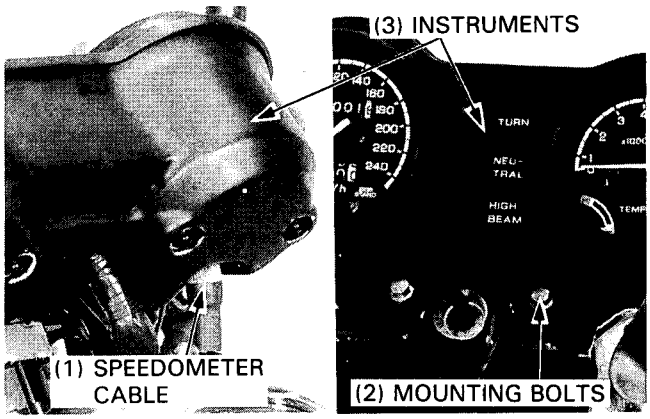


INSTRUMENTS

REMOVAL

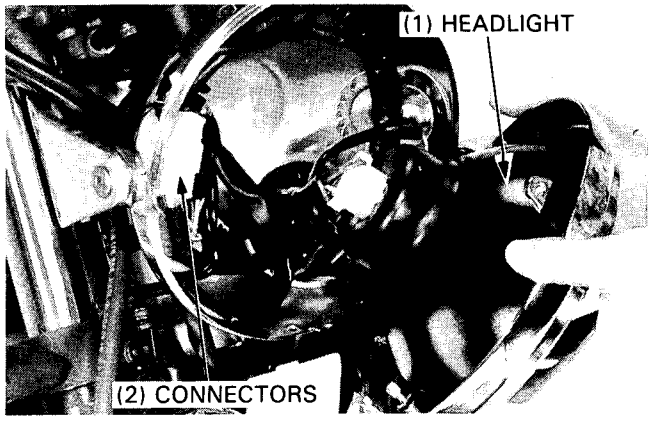
Disconnect the speedometer cable from the meter.

Remove the instruments mounting bolts and it.



Remove the following:
- 4 mounting nuts, washers and rubber suspensions
- 3 mounting screws
- lower cover

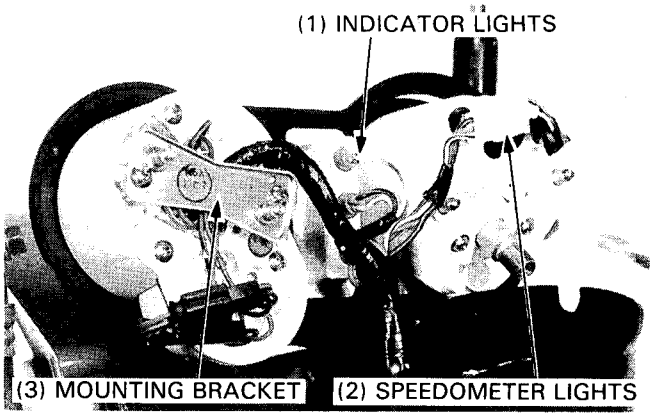
Remove the headlight and disconnect the instruments wire harness connectors.



BULB REPLACEMENT

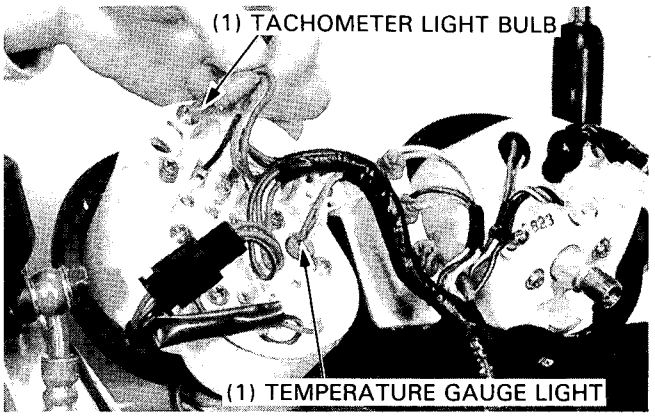
INDICATOR LIGHT, SPEEDOMETER LIGHT BULBES:
Pull the socket and bulb as an assembly out.
Turn the bulb counterclockwise to remove.
Replace the burned bulb(s) as required.

TACHOMETER, TEMPERATURE GAUGE LIGHT BULBES:
Remove the mounting bracket by removing two screws.



Pull the socket and bulb as an assembly out.
Turn the bulb counterclockwise to remove.
Replace the burned bulb(s) as required.

Assemble the meters in the reverse order of disassembly.

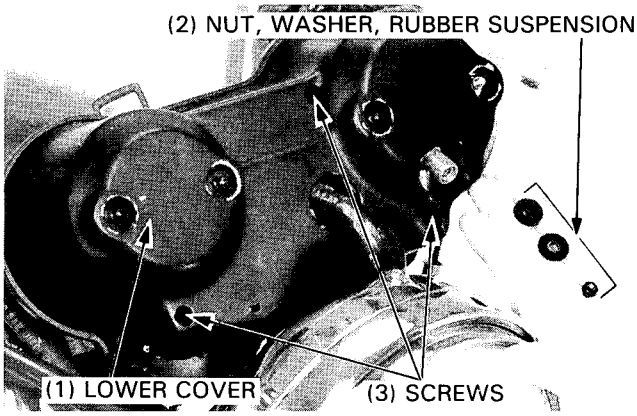


INSTALLATION

Install the instruments in the reverse order of removal.

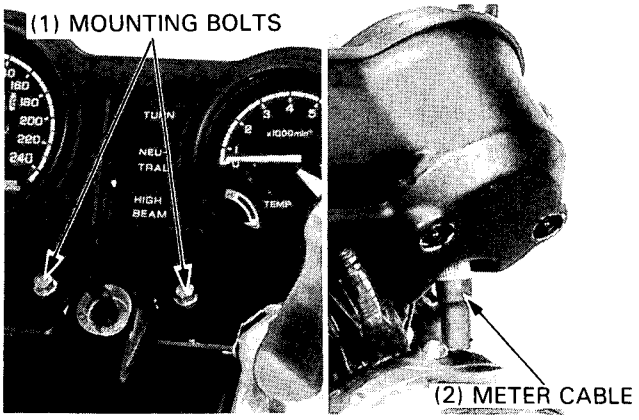
Connect the instruments wire harness connectors in the headlight case and install the headlight (page 20-3).

Assemble the lower cover and upper cover.
Install the following:
— 3 mounting screws
— rubber suspensions, washers and nuts



Install the instruments by mounting bolts.

Connect the speedometer cable to the meter.



IGNITION SWITCH

INSPECTION

Remove the headlight (page 20-3).

Disconnect the ignition switch wire connectors.

Check for continuity between the ignition switch connector terminals in each switch position.

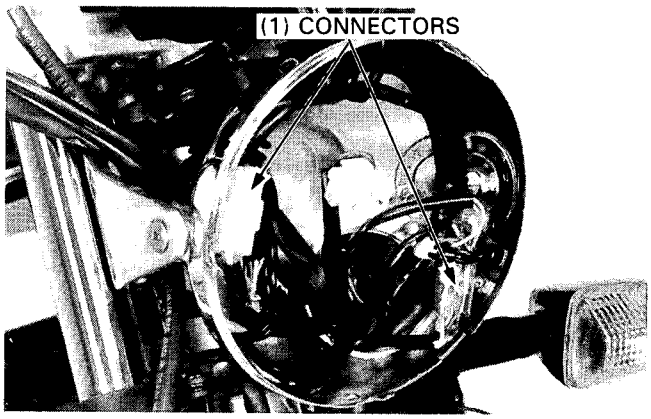
Continuity should exist between the terminals as illustrated by the connected circles (O—O) in the chart below.

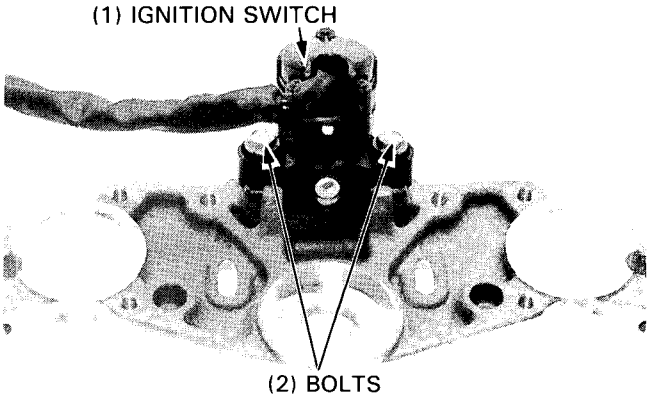
	BAT	IG	FAN	TL_1	TL_2	P
ON	O	O	O	O	O	
OFF						
P	O					O
COLOR	R	R/Bl	Bu/O	Br/W	Br	Y/Bl

If the continuity does not meet the specification in any one switch position, replace the ignition switch.

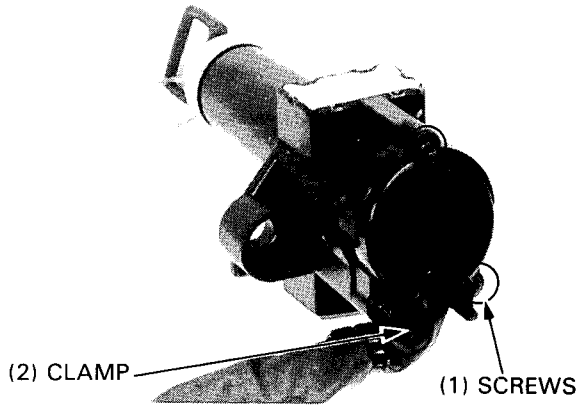
REPLACEMENT

Remove the fork top bridge (page 14-21).
Remove the two ignition switch mounting bolts and the ignition switch from the bridge.





Remove the wire clamp and the three screws.
Pull the contact base out the switch.



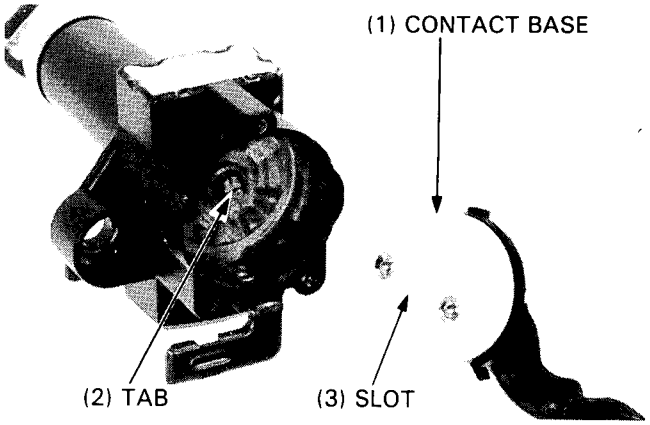
Assemble the new ignition switch contact base by aligning the tab and slot.

Install the ignition switch and other removed parts in the reverse order of removal.

INSTALLATION

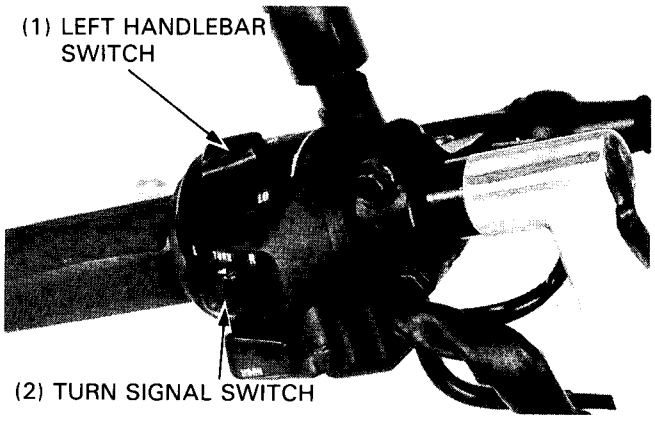
Install the meter and ignition switch in the reverse order of removal.

TORQUE: Ignition switch mounting bolt
25 N·m (2.5 kg-m, 18 ft-lb)



HANDLEBAR SWITCHES

The handlebar switches (dimmer, turn signals, horn, starter, engine stop, etc.) must be replaced as assemblies.
Remove the headlight.



LEFT HANDLEBAR SWITCH

Disconnect the left handlebar switch connector (9P White). And check for continuity between the terminals.
Continuity should exsit between the color coded wires in each chart.

Dimmer Switch

	HL_2	Hi	Lo
Lo	○		○
(N)	○	○	○
Hi	○	○	
Color code	Bu/W	Bu	W

Turn Signal Switch

	W	R	L	TL_2	PR	PL
RIGHT	○	○		○		○
N				○	○	○
LEFT	○		○	○	○	
Color code	Gr	Lb	O	Br/B	Lb/W	O/W

Horn Button

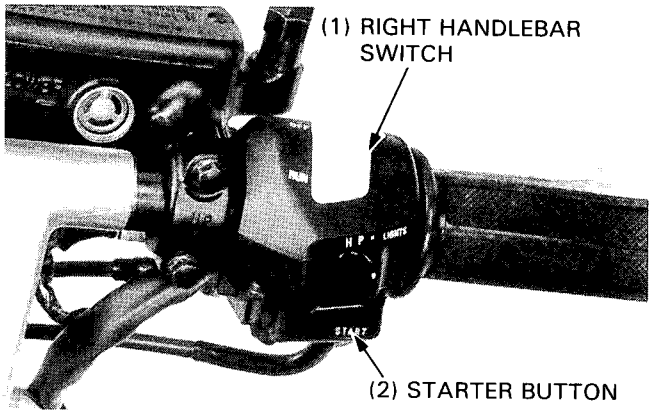
	Ho_1	Ho_2
Released		
Depressed	○	○
Color code	W/G	Lg

Passing Switch

	Ho_1	Hi
Released		
Depressed	○	○
Color code	W/G	Bu

RIGHT HANDLEBAR SWITCH

Disconnect the right handlebar switch connector (9P Red) and check for continuity between the terminals.
Continuity should exist between the color coded wires as indicated in each chart.



Starter Switch

	IG_1	ST
Released		
Pushed	○	○
Color code	Bl	Y/R

Engine Stop Switch

	IG_1	IG_2
RUN	○	○
OFF		
Color code	Bl	Bl/W

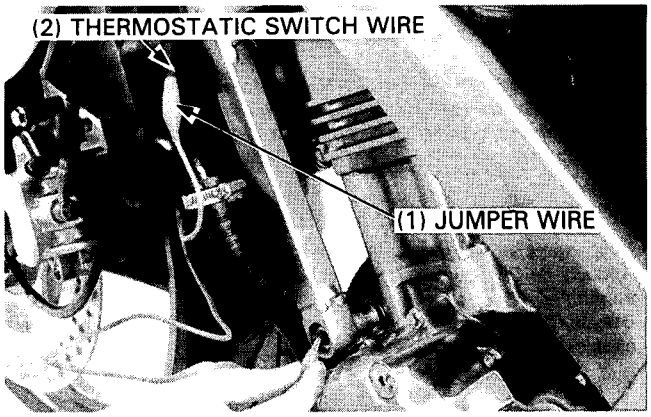
Lighting Switch

	TL_1	TL_2	HL	HL_1
●				
P	○	○		
H	○	○	○	○
Color code	Br/Bu	Br/W	Bl/R	Bu/W

THERMOSTATIC SWITCH

The cooling fan motor is actuated by the thermostatic switch located in the bottom of the radiator.

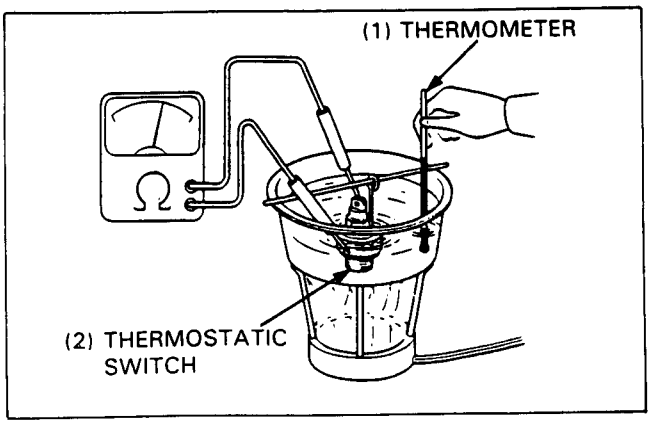
If the fan motor does not start, disconnect the Black/Blue lead from the thermostatic switch and ground it with a jumper wire as shown.
Turn the ignition switch ON. The cooling fan motor should start running. If it does not start, check for battery voltage from the Black/Blue lead of the fan motor connector and ground with ignition switch ON.
If there is no voltage, check for a blown fuse, loose terminals or connectors, or an open circuit.
If there is voltage, inspect the thermostatic switch as follows:
Remove the switch.
Connect one lead of an ohmmeter to the connector of the thermostatic switch and the other to the body.



Suspend the thermostatic switch in a pan of coolant (50—50 mixture) and check the temperatures at which the switch opens and closes.
Make sure that there is no continuity at room temperature and then gradually raise the coolant temperature. The switch should show continuity (close) at 93°—97°C (199°—207°F).

NOTE

- Keep the temperature constant for 3 minutes to confirm continuity.
  A sudden change of temperature will cause error temperature reading between the thermometer and switch.
- Do not let the switch or thermometer touch the pan as it will give a false reading.
- Immerse the switch in coolant up to its threads.

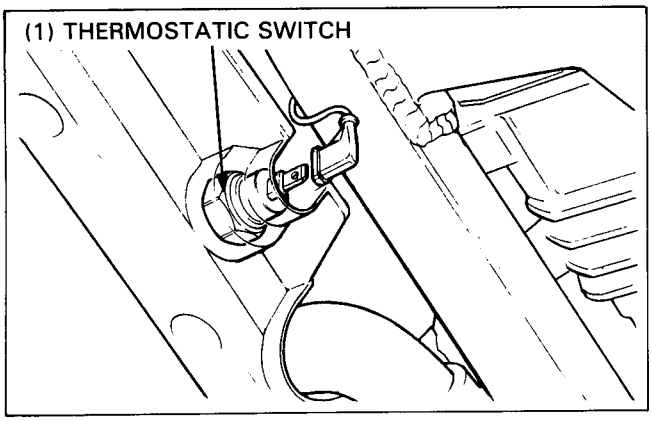


Install a new O-ring on the switch.
Apply sealant to the switch threads and install it.
Tighten the switch to the specified torque.

TORQUE: 18 N·m (1.8 kg-m, 13 ft-lb)

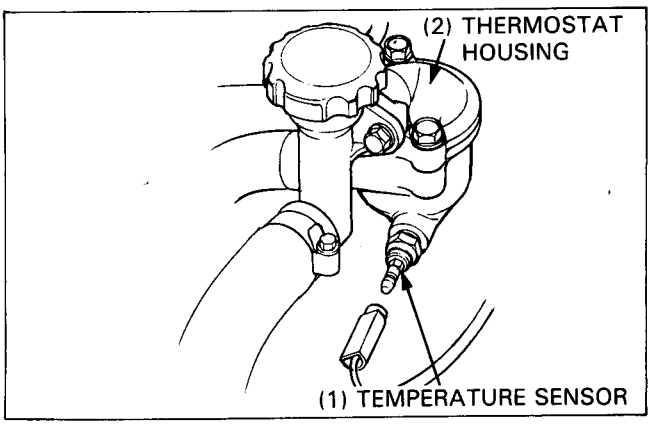
NOTE

- Do not over tighten the switch.



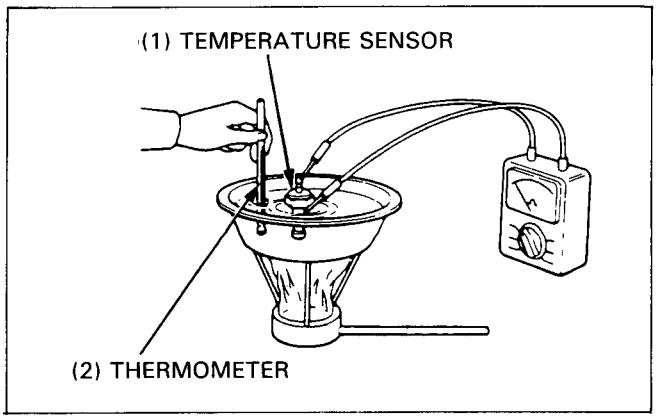
TEMPERATURE SENSOR

Remove the seat and fuel tank.
Disconnect the Green/Blue wire from the temperature sensor.
Check for continuity between the sensor body and ground.
There should be continuity.
If there is no continuity, check the thermostat housing for looseness and recheck. If there is still no continuity, remove.
The temperature sensor from the thermostat housing.



Suspend the temperature sensor in a pan of coolant over a heater and measure the resistance through the sensor as the coolant heats up.

Temperature	50°C (122°F)	100°C (212°F)
Resistance	130–180 Ω	25–30 Ω



⚠ WARNING

- *Wear gloves and eye protection.*

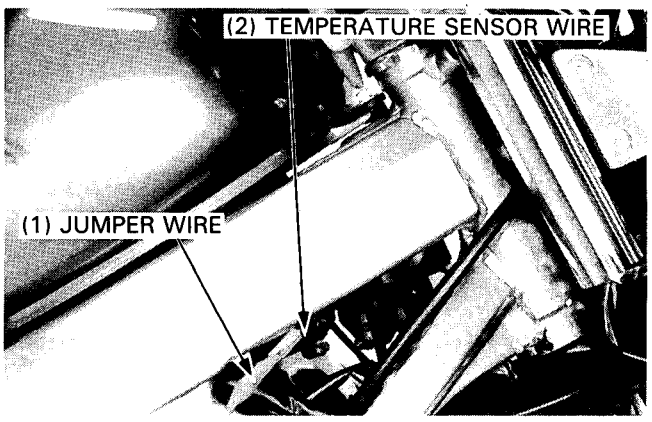
NOTE

- Coolant must be used as the heated liquid to check the function above 100°C (212°F).
- You will get false readings if either the sensor or thermometer touches the pan.

Replace the sensor if it is out of specification by more than 10% at either temperature.

TEMPERATURE GAUGE

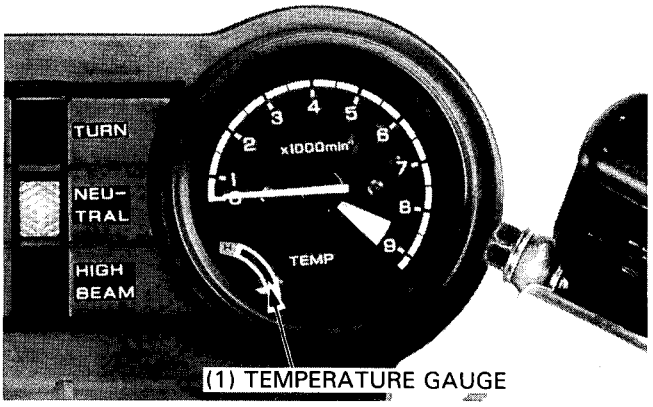
Disconnect the wire from the temperature sensor and short it to ground.



Turn the ignition switch ON. The temperature gauge needle should move all the way to (H).

CAUTION

- *Do not leave the temperature sensor wire grounded for longer than a few seconds or the temperature gauge will be damaged.*



FUEL PUMP RELAY

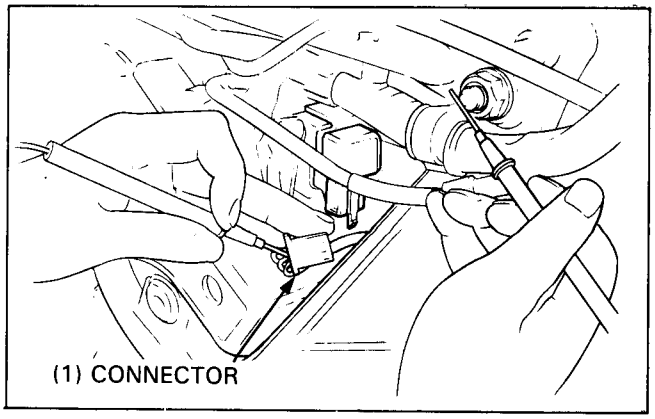
⚠ WARNING

- *Gasoline is extremely flammable and is explosive under certain conditions. Work in a well ventilated area. Do not smoke or allow flames or sparks in the your work area or where gasoline is stored.*

Check the sub-fuse (10 A).
Remove the relay from the rubber bracket and check the relay connector terminals for looseness and corrosion.

Inspect as follows:
Disconnect the connector and test the wires on the main harness side.

ITEM	STANDARD
Between Bl (+) and body ground (−) with the ignition switch "ON"	Battery voltage should come.
Bu/Y wire betwen the pump relay and spark unit	CONTINUITY
Bl/Bu wire between the pump relay and fuel pump	CONTINUITY



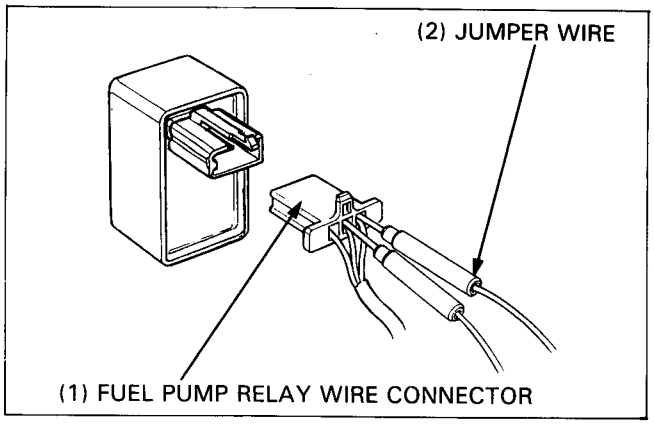
FUEL PUMP

SYSTEM INSPECTION

Turn the ignition switch OFF. Remove the seat and disconnect the fuel pump relay wire connectors. Short the Black and Black/Blue wire terminals with a jumper wire.
Disconnect the fuel tube from the T-joint near the carburetor and hold a graduated beaker under the fuel tube.

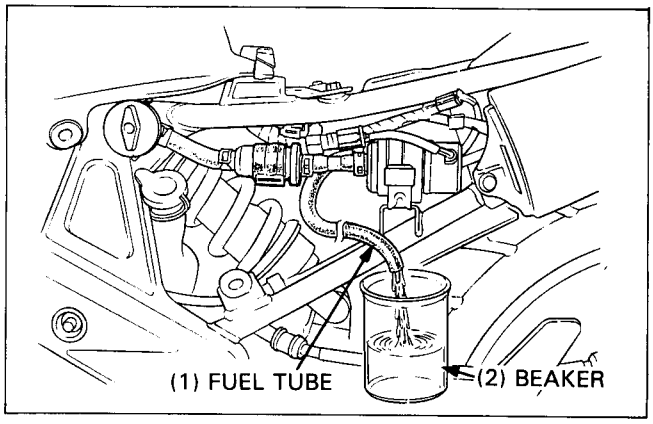
⚠WARNING

- ***Gasoline is extremely flammable and is explosive under certain conditions. Work in a well ventilated area with the engine stopped. Do not smoke or allow flames or sparks in the work area or where gasoline is stored.***



Turn the ignition switch ON and let fuel flow into the beaker for 5 seconds, then turn the ignition switch OFF.
Multiply the amount in the beaker by 12 to determine the fuel pump flow capacity per minute.

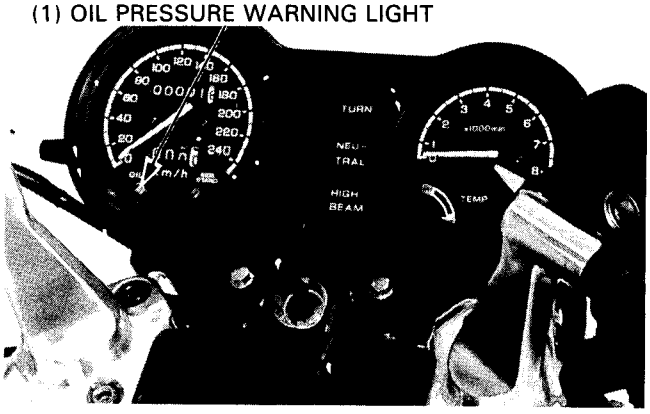
FUEL PUMP FLOW CAPACITY:
600 cm³ (0.630 US qt 0.528 Imp qt)/minute at 10 V



OIL PRESSURE SWITCH

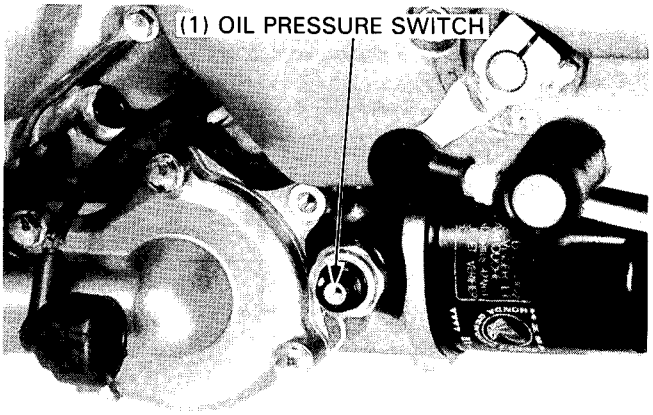
Make sure that the oil pressure warning light comes on with the ignition switch "ON".
If the light does not come on, inspect as follows:

(1) OIL PRESSURE WARNING LIGHT



Disconnect the oil pressure switch wire from the switch by removing the terminal screw. Short it to ground using a jumper wire.
Turn the ignition switch "ON".

The oil pressure warning light should come on.
If the light does not come on, check the sub-fuse (10 A) and wires for a loose connection or an ope circuit.
Start the engine and make sure that the light goes out. If the light does not go out, check the oil pressure (page 2-4).
If the oil pressure is normal, replace the oil pressure switch. (page 2-4)

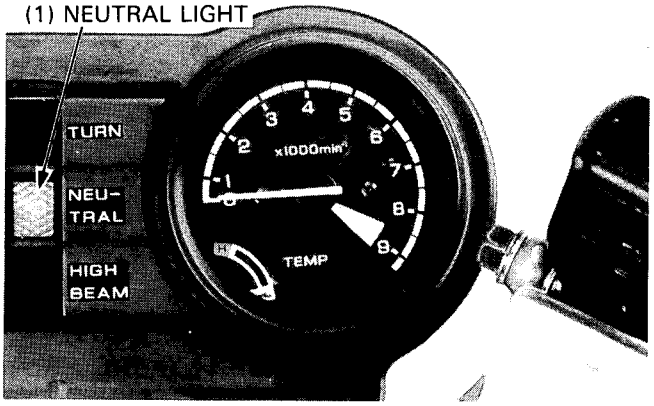


NEUTRAL SWITCH

INSPECTION

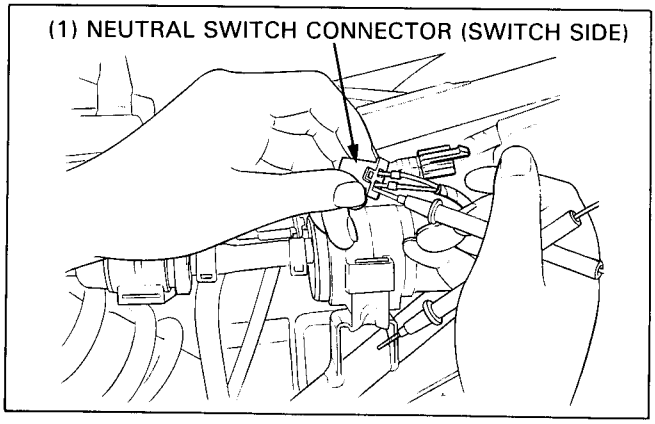
Harness check:
Remove the left side cover.
Disconnect the neutral/oil pressure switch connector (2P: White) and short it (Light green/Red: Main harness side) to the ground using suitable jumper wire.
Turn the ignition switch ON.

The neutral light should come on.
If the light does not come on, check the bulb, sub-fuse (10 A) and wires for a loose connection or an open circuit.



Switch check:
Disconnect the neutral/oil pressure swich connector (2P: White) and check it (Light green/Red: Switch side) and body ground.

There should be continuity between the light green/red connector and body ground.
There should be continuity with the transmission in neutral and no continuity with the transmission in any gear.
If there is no continuity in neutral, replace the new one.



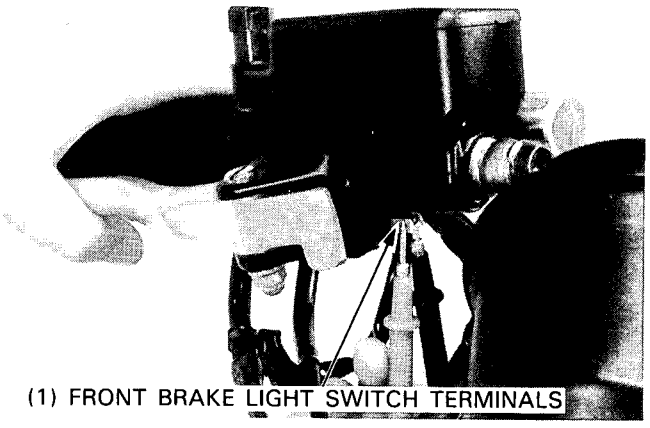
BRAKE LIGHT SWITCH

FRONT

Disconnect the front brake light switch connectors and check for continuity between the switch terminals.

There should be continuity with the front brake applied, and no continuity with the brake released.

Replace the switch if necessary.

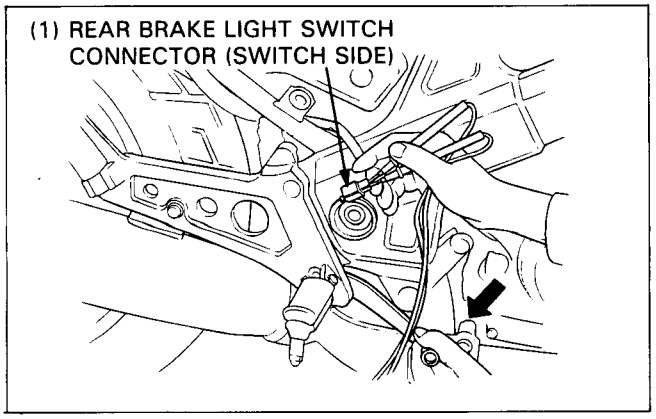


REAR

Disonnect the rear brake light switch connector and check for continuity between the terminals.

There should be continuity with the rear brake applied and no continuity with the rear brake released.

Replace the rear brake light switch, if necessary.



CLUTCH (SAFETY) SWITCH

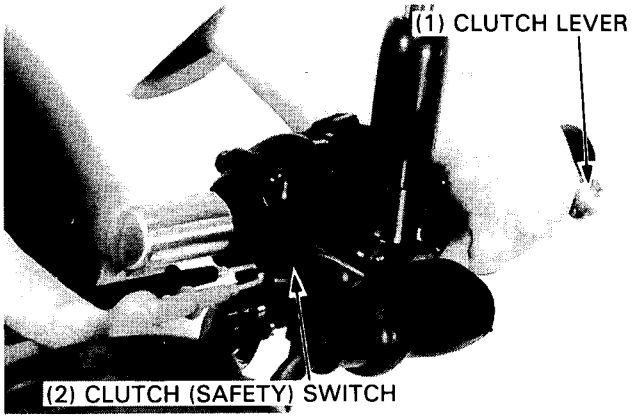
INSPECTION

Disconnect the clutch switch wire connectors.

Check for continuity between the switch terminals.

There should be continuity with the clutch applied and no continuity with the clutch released.

Replace the clutch switch if necessary.



TURN SIGNAL RELAY

Remove the seat and fuel tank.
Remove the turn signal relay from the rubber bracket.

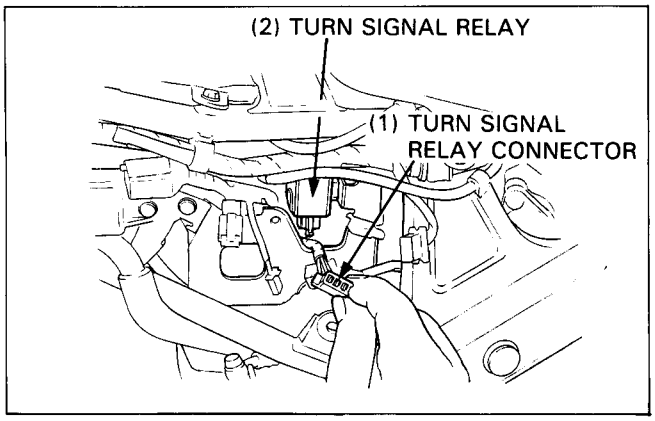
Check the turn signal circuit for proper connections before making this test.

Connect each terminal as indicated below:

White/Green:	D.C. 12 V positive (+)
Green:	D.C. 12 V Negative (−)
Gray:	Turn signal wire of one side; connect the other side to ground (frame).

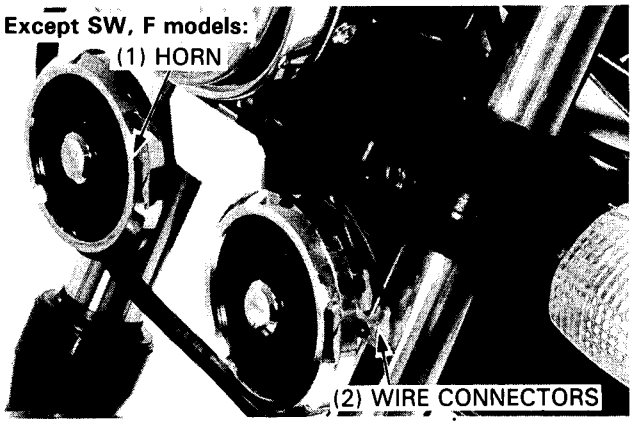
Check the left and right turn signal operation.

If the turn signal relay fails this test, replace it.

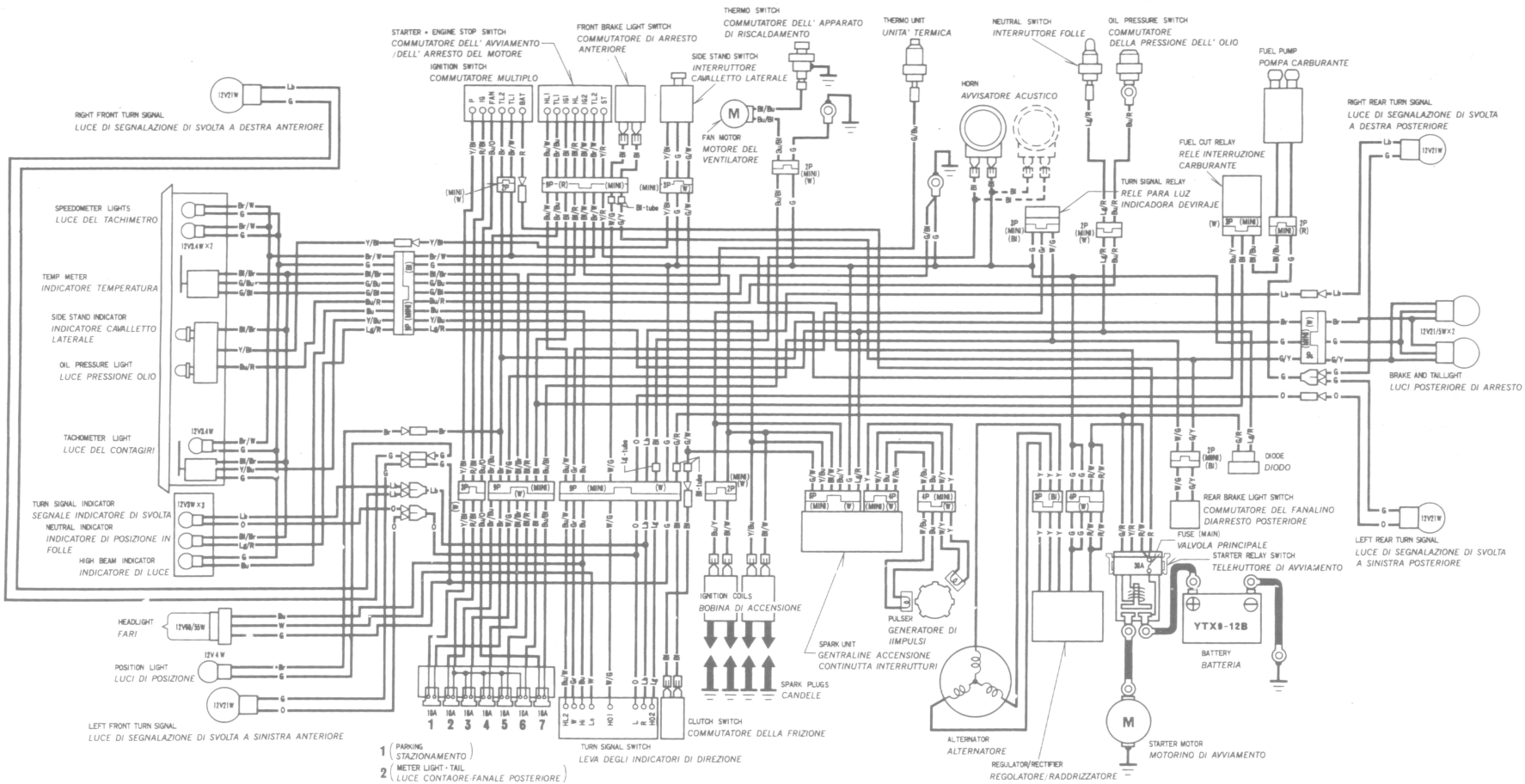


HORN

Disconnect the wire connectors from the horn and connect 12 V battery to the horn wire terminals.
The horn is normal if it sounds when the 12 V battery is connected across the horn terminals.



WIRING DIAGRAM



SWITCH CONTINUITY
CONTINUITA' DI COMMUTAZIONE

IGNITION SWITCH
COMMUTATORE MULTIPLO

	BAT	IG	FAN	TL1	TL2	P
ON	○	○	○	○	○	
OFF						
P	○					○
LOCK						

LIGHTING SWITCH
LEVA DI ACCENSIONE DELLE LUCI

	TL1	TL2	HL	HL1
•				
P	○			
H	○	○	○	

ENGINE STOP SWITCH
COMMUTATORE DI ARRESTO DEL MOTORE

	IG1	IG2
RUN	○	○
OFF		

STARTER SWITCH
COMMUTATORE DI AVVIAMENTO

	IG1	ST
FREE		
PUSH	○	○

TURN SIGNAL SWITCH
LEVA DEGLI INDICATORI DI DIREZIONE

	W	R	L
R	○	○	
N			
L	○		○

DIMMER SWITCH
COMMUTATORE ANABBAGLIANTE

	HL2	Hi	Lo
Lo	○		○
IN			
Hi	○	○	

HORN SWITCH
COMANDO DELL' AVVISATORE ACUSTICO

	HO1	HO2
FREE		
PUSH	○	○

PASSING SWITCH
COMMUTATORE DI SORPASSO

	HO1	Hi
ON	○	○
OFF		

Bl	BLACK	Br	BROWN
Y	YELLOW	O	ORANGE
Bu	BLUE	Lb	LIGHT BLUE
G	GREEN	Lg	LIGHT GREEN
R	RED	P	PINK
W	WHITE	Gr	GRAY

Bl	NERO	Br	MARRONE
Y	GIALLO	O	ARANCIONE
Bu	BLU	Lb	AZZURRO
G	VERDE	Lg	VERDE CHIARO
R	ROSSO	P	ROSA
W	BIANCO	Gr	GRIGIO

WIRING DIAGRAM

0030Z—MS9—6100
6200

21-1

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TROUBLESHOOTING

ENGINE DOES NOT START OR IS HARD TO START

		POSSIBLE CAUSE
1. Check fuel flow to carburetor	NOT REACHING CARBURETOR →	• Clogged fuel line or fuel filter • Sticking float valve • Faulty fuel pump • Faulty fuel pump relay • Clogged fuel tank vent hole • Loose or disconnected fuel pump relay wire
REACHING CARBURETOR ↓		
2. Perform spark test	WEAK OR NO SPARK →	• GO TO PAGE 18-2
	WET PLUG →	• Mixture too rich • Carburetor flooded • Carburetor choke on, or partially closed • Cylinder flooded • Air cleaner dirty
SPARK ↓		
3. Test cylinder compression	LOW COMPRESSION →	• Improper valve clearance (too small) • Valve stuck open • Worn cylinder and piston rings • Damaged cylinder head gasket • Seized valve • Improper valve timing • Improper valve and seat contact
COMPRESSION NORMAL ↓		
4. Start by following normal procedure	ENGINE STARTS BUT STOPS →	• Improper choke operation • Carburetor incorrectly adjusted • Intake pipe leaking • Improper ignition timing (Faulty spark unit or pulse generator) • Fuel contaminated
ENGINE DOES NOT FIRE ↓		
5. Start with choke applied		

ENGINE LACKS POWER

		POSSIBLE CAUSE
1. Raise wheels off ground and spin by hand WHEELS SPIN FREELY	WHEELS DO NOT SPIN FREELY →	• Brake dragging • Worn or damaged wheel bearings • Wheel bearing needs lubrication
2. Check tire pressure PRESSURE NORMAL	PRESSURE LOW →	• Faulty tire valve
3. Check for clutch slippage CLUTCH ENGAGED PROPERLY	CLUTCH SLIPS →	• Faulty clutch lifter system • Worn clutch disc/plate • Warped clutch disc/plate • Weak clutch spring
4. Accelerate lightly ENGINE SPEED INCREASES	ENGINE SPEED DOES NOT INCREASE →	• Carburetor choke closed • Clogged air cleaner • Restricted fuel flow • Clogged muffler • Clogged fuel cap vent hole • Faulty fuel pump • Faulty fuel pump relay • Loose, broken or shorted, wire or connection of pump relay
5. Check ignition timing CORRECT	INCORRECT →	• Faulty spark unit • Faulty pulse generator
6. Check valve clearance CORRECT	INCORRECT →	• Improper valve adjustment • Worn valve seat
7. Test cylinder compression NORMAL	TOO LOW →	• Valve stuck open • Worn cylinder and piston rings • Leaking head gasket • Improper valve timing • Seized valve • Improper valve and seat contact
8. Clean with compressed air and re-check performance NOT CLOGGED	CLOGGED →	• Dirty fuel or improper pre-storage procedure
9. Check spark plug condition NOT FOULED OR DISCOLORED	FOULED OR DISCOLORED →	• Wrong heat range
10. Check oil level and condition CORRECT	INCORRECT →	• Oil level too high • Contaminated oil

		POSSIBLE CAUSE
11. Remove cylinder head cover and inspect lubrication	VALVE TRAIN NOT LUBRICATED PROPERLY →	• Clogged oil passage • Clogged oil control orifice • Contaminated oil • Faulty oil pump • Oil level too low
VALVE TRAIN LUBRICATED PROPERLY ↓		
12. Check for engine overheating	OVERHEATING →	• Coolant level low • Fan motor not working (thermostatic switch) • Thermostat stuck closed • Excessive carbon build-up in combustion chamber • Use of poor quality fuel • Clutch slipping • Lean fuel mixture
NOT OVERHEATING ↓		
13. Accelerate or run at high speed	ENGINE KNOCKS →	• Worn piston and cylinder • Wrong type of fuel • Excessive carbon build-up in combustion chamber • Lean fuel mixture • Ignition timing too advanced (Faulty spark unit)

POOR PERFORMANCE AT LOW AND IDLE SPEEDS

		POSSIBLE CAUSE
1. Check ignition timing and valve clearance	INCORRECT →	• Improper valve clearance • Improper ignition timing — Faulty spark unit — Faulty pulse generator
CORRECT ↓		
2. Check carburetor pilot screw adjustment	INCORRECT →	• See Fuel System, Section 4
CORRECT ↓		
3. Check for leaking intake pipe	LEAKING →	• Loose carburetor insulator • Damaged insulator
NO LEAKAGE ↓		
4. Perform the spark test	WEAK OR INTERMITTENT SPARK →	• Faulty, carbon or wet fouled spark plug • GO TO PAGE 18-2

POOR PERFORMANCE AT HIGH SPEED

		POSSIBLE CAUSE
1. Check ignition timing and valve clearance	INCORRECT →	• Improper valve clearance • Improper ignition timing — Faulty spark unit — Faulty pulse generator
CORRECT ↓		
2. Disconnect fuel line at carburetor	FUEL FLOW RESTRICTED →	• Clogged fuel line • Clogged fuel cap vent hole • Clogged fuel valve • Faulty fuel pump or relay • Clogged fuel filter
FUEL FLOWS FREELY ↓		
3. Remove carburetors and check for clogged jets and air passages	CLOGGED →	• Clogged jets or air passages
NO CLOGGED JETS ↓		
4. Check valve timing	INCORRECT →	• Camshaft not installed properly
CORRECT ↓		
5. Check valve spring tension	WEAK →	• Faulty valve spring

POOR HANDLING → Check tire pressure

	POSSIBLE CAUSE
1. If steering is heavy →	• Bearing adjustment nut too tight • Damaged steering head bearings • Bent steering stem
2. If either wheel is wobbling →	• Excessive wheel bearing play • Bent rim(s) • Improper wheel balance • Improperly installed wheel hub(s) • Swingarm pivot bearings excessively worn • Bent frame or swingarm • Loose swingarm pivot bolt
3. If the motorcycle pulls to one side →	• Front and rear wheels not aligned • Bent fork legs • Bent swingarm • Bent frame