HONDA SERVICE DIVISION

MOTOR CYCLE SERVICE INFORMATION MANUAL

VOLUME XXII

VF1000F

vf1000.com

IMPORTANT SAFETY NOTICE

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

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

NOTE: Give helpful information.

Detalied descriptions of standard workshop procedures, safety principles and service operations are not included. It is important to note that this manual contains *some* warnings and cautions against some specific service methods which could cause **PERSONAL INJURY** to service personnal or could damage a vehicle or render it unsafe. Please understand that those warnings could not cover all conceivable ways in which service, whether or not recommended by Honda might be done or of the possible hazardous consequences of each conceivable way, nor could Honda investigate all such ways. Anyone using service procedures or tools, whether or not recommended by Honda *must satisfy himself thoroughly* that neigher personal safety nor vehicle safety will be jeopardized by the service method or tools selected.

HOW TO USE THIS MANUAL

This shop manual describes the technical features and servicing procedures for the VF1000F.

Throughout the manual, the following abbreviations are used to identify individual modules.

CODE	AREA (TYPE)
ED	Europe
E	U.K.
F	France
G	Germany
U	Australia
SA	South Africa
ND	Northern Europe
SW	Switzerland
AR	Austria

Follow the Maintenance Schedule (Section 3) recommendations to ensure that the vehicle 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 21 describe parts of the motorcycle, grouped according to location.

Find the section you want on this page, then turn to the table of contents on page 1 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 23, TROUBLESHOOTING.

ALL INFORMATION, ILLUSTRATIONS, DIRECTIONS AND SPECIFICATIONS INCLUDED IN THIS PUBLICATION ARE BASED ON THE LATEST PRODUCT INFORMATION AVAILABLE AT THE TIME OF APPROVAL FOR PRINTING. HONDA MOTOR CO., LTD. RESERVES THE RIGHT TO MAKE CHANGES AT ANY TIME WITHOUT NOTICE AND WITHOUT INCURRING ANY OBLIGATION WHATEVER.
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1 GENERAL INFORMATION

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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 a closed area. The exhaust contains poisonous carbon monoxide gas.

WARNING

Gasoline is extremely flammable and is explosive under certain conditions. Do not smoke or allow flames or sparks in your working area.

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.

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.

SERVICE RULES

1. Use genuine HONDA or HONDA-recommended parts and lubricants or their equivalent. Parts that do not meet HONDA's design specifications may damage the motorcycle.
2. Use the special tools designed for this product.
3. Use only metric tools when servicing this motorcycle. Metric bolts, nuts, and screws are not interchangeable with English fasteners. The use of incorrect tools and fasteners may damage the motorcycle.
4. Install new gaskets, O-rings, cotter pins, lock plates, etc. when reassembling.
5. When tightening bolts or nuts, begin with larger-diameter or inner bolts first, and tighten to the specified torque diagonally, unless a particular sequence is specified.
6. Clean parts in cleaning solvent upon disassembly. Lubricate any sliding surfaces before reassembly.
7. After reassembly, check all parts for proper installation and operation.

SPECIFICATIONS

ITEM				SPECIFICATIONS
DIMENSIONS	Overall length			2210 mm (87.0 in) 2160 mm (85.0 in) SA 2270 mm (89.3 in) SW, SD, FI
	Overall width			765 mm (30.0 in)
	Overall height			1.240 mm (48.8 in)
	Wheelbase			1.505 mm (59.3 in)
	Seat height			820 mm (32.3 in)
	Ground clearance			135 mm (5.3 in)
	Dry weight			233 kg (514 lb)
	Curb weight			258 kg (570 lb)
FRAME	Type			Double cradle rectangler pipe
	Front suspension, travel			Telescopic fork 155 mm (6.1 in)
	Rear suspension, travel			Swingarm/Shock absorbver, 120 mm (4.7 in)
	Front suspension air pressure			0–40 kPa (0–0.4 kg/cm², 0–6 psi)
	Rear suspension air pressure			0–300 kPa (0–3.0 kg/cm², 0–43 psi)
	Front tire size			120/80V16–V250
	Rear tire size			140/80V17–V250
	Cold tire pressures	Driver only	Front	250 kPa (2.50 kg/cm², 36 psi)
			Rear	290 kPa (2.90 kg/cm², 41 psi)
		Driver and one Passenger	Front	250 kPa (2.50 kg/cm², 36 psi)
			Rear	290 kPa (2.90 kg/cm², 41 psi)
	Front brake, lining swept area			Double disc 904 cm² (140 sq in)
	Rear brake, lining swept area			Single disc 452 cm² (70 sq in)
	Fuel capacity			23 liters (6.1 US gal, 5.0 Imp gal)
	Fuel reserve capacity			3.5 liters (0.9 US gal, 0.8 Imp gal)
	Caster angle			28°
	Trail			98 mm (3.9 in)
	Front fork oil capacity			Right: 380 cm³ (12.9 US oz, 13.4 Imp oz), Left: 400 cm³ (13.5 US oz, 14.1 Imp oz)
ENGINE	Type			Water cooled 4-stroke, DOHC engine
	Cylinder arrangement			4 cylinders 90°V
	Bore and stroke			77 x 53.6 mm (3.03 x 2.11 in)
	Displacement			998 cm³(60.5 cu in)
	Compression ratio			10.5: 1
	Valve train			Silent, multi-link chain drive and DOHC with rocker arms
	Maximum horsepower			(DIN) 86 kw (116 ps)/10.000 min⁻¹ (DIN) 74 kw (100 ps)/10.000 min⁻¹ : G, SD, AR (DIN) 68 kw (92 ps)/7.500 min⁻¹ : SW
	Maximum torque			88 N·m (9.0 kg-m)/7.500 min⁻¹ 79 N·m (8.5 kg-m)/7.500 min⁻¹ : G, SD, AR 88 N·m (9.0 kg-m)/7.000 min⁻¹ : SW
	Oil capacity			3.5 liters (3.7 US qt, 3.1 Imp qt) after disassembly 2.9 liters (3.1 US qt, 2.5 Imp qt) after draining
	Coolant capacity			3 liters (3.2 US qt, 2.6 Imp qt)
	Lubrication system			Forced pressure and wet sump
	Air filtration			Paper filter
	Cylinder compression			1300 ± 200 kPa (13 ± 2 kg/cm², 185 ± 28 psi)
	Intake valve	Opens		10° (BTDC) } at 1 mm lift
		Closes		40° (ABDC) }
	Exhaust valve	Opens		40° (BBDC) }
		Closes		10° (ATDC) }
	Valve clearance	(Cold)		IN: 0.12 mm (0.005 in) EX:

*:G **SW

	ITEM	SPECIFICATION
ENGINE	Engine weight (Dry)	92.5 kg (203.92 lb)
	Idle speed	1,000 ± 100 rpm
	Cylinder numbering	No.1—Left reak No.2—Left front No.3—Right rear No.4—Right front
CARBURETION	type/throttle bore	KEIHIN VD/36 mm (1.44 in)
	Identification number	VD82A *VD82D **VD82B
	Pilot screw initial setting	2-1/2 Turn counterclockwise
	Float level	75 mm (0.30 in)
DRIVE TRAIN	Clutch	Wet, nulti-plate
	Transmission	5-speed with over drive
	Primary reduction	1.971
	Final reduction	2.529
	Gear ratio I	2.733
	Gear ratio II	1.894
	Gear ratio III	1.500
	Gear ratio IV	1.240
	Gear ratio V	1.037
	Gear shift pattern	Left foot operated return system, 1—N—2—3—4—5
ELECTRICAL	Ignition	Full transistor ignition
	Ignition timing "F" mark	10° BTDC at idle
	Full advance	37° BTDC at 3,800 rpm
	Starting system	Starting motor
	Alternator	350W/5,000 rpm
	Battery capacity	12V—16AH
	Spark plug	< >:U

Spark plug	NGK	ND
Standard	DPR8EA-9 <DP8EA-9>	X24EPR-U9 <X24EP-U9>
For cold climate (Below 5°, 41°F)	DPR7EA-9 <DP7EA-9>	X22EPR-U9 <X22EP-U9>
For extended high speed riding	DPR9EA-9 <DP9EA-9>	X27EPR-U9 <X27EP-U9>

ELECTRICAL	Spark plug gap	0.8—0.9 mm (0.031—0.035 in)
	Firing order	1—4—3—2
	Fuse/Main fuse	10A, 15A/30A
LIGHTS	Headlight (high/low beam)	60/55 W
	Tail/stoplight	5/21 W
	Front turn signal/running light	21 W
	Rear turn signal	21 W
	Instrument lights	3.4 W X 2
	Neutral indicator	3 W
	Turn signal indicator	3 W
	High beam indicator	3 W
	Position light	4 W

TORQUE VALUES

ENGINE

Item	Q'ty	Thread Dia. (mm)	Torque N·m (kg-m, ft-lb)	Remarks
Cylinder head cover	8	6	8–12 (0.8–1.2, 6–9)	
Cam holder	16	6	10–14 (1.0–1.4, 7–10)	
Cylinder head	8	8	21–25 (2.1–2.5, 15–18)	
	16	9	43–47 (4.3–4.7, 31–34)	
Alternator	1	12	85–105 (8.5–10.5, 61–76)	
Primary drive gear	1	12	85–105 (8.5–10.5, 61–76)	
Clutch lock nut	1	22	80–90 (8.0–9.0, 58–65)	
Crankcase	14	9	38–42 (3.8–4.2, 27–30)	
	2	8	21–25 (2.0–2.5, 14–18)	
	15	6	10–14 (1.0–1.4, 7–10)	
Rocker arm shaft	8	22	45–50 (4.5–5.0, 32–36)	Apply LOCTITE 271 to the threads.
Cam sprocket	8	7	18–20 (1.8–2.0, 13–14)	
Starter clutch	3	8	26–30 (2.6–3.0, 19–22)	
Shift fork center	1	7	16–20 (1.6–2.0, 12–14)	
Cam chain guide bolt	1	12	21–25 (2.1–2.5, 15–18)	
Oil filter	1	20	15–20 (1.5–2.0, 11–14)	
Countershaft bearing holder	3	8	21–25 (2.0–2.5, 14–18)	
Drive sprocket	1	10	50–54 (5.0–5.4, 36–39)	
Valve adjustment nuts	16	7	21–25 (2.1–2.5, 15–18)	
Drain plug	1	12	35–40 (3.5–4.0, 25–29)	
Connecting rod nuts	8	8	30–34 (3.0–3.4, 22–25)	
Drum stopper pivot shaft	1	6	8–12 (0.8–1.2, 6–9)	Apply 3-Bond Sealant, or its equivalent, to the threads.
Oil pressure switch	1	–	10–14 (1.0–1.4, 7–10)	
Spark plugs	4	12	12–16 (1.2–1.6, 9–12)	

CHASSIS

Item	Q'ty	Thread Dia. (mm)	Torque N·m (kg-m, ft-lb)	Remarks
Steering stem nut	1	24	90–120 (9.0–12.0, 65–87)	
Steering bearing adjustment nut	1	26	23–27 (2.3–2.7, 17–20)	
Top bridge pinch bolt	1	8	20–30 (2.0–3.0, 14–22)	
Front axle holder	4	8	18–25 (1.8–2.5, 13–18)	
Front axle nut	1	14	55–65 (5.5–6.5, 40–47)	
Front fork top pinch bolts	2	7	20–30 (2.0–3.0, 14–22)	
Front fork bottom pinch bolts	2	10	45–55 (4.5–5.5, 33–40)	

Item	Q'ty	Thread Dia. (mm)	Torque N·m (kg-m, ft-lb)	Remarks
Brake caliper bracket mount bolts (Right)	2	10	30–40 (3.0–4.0, 22–29)	Front brake calipers
(Left-upper)	1	10	30–40 (3.0–4.0, 22–29)	
Anti-dive piston pin bolt	1	6	10–15 (1.0–1.5, 7–11)	
Brake caliper mount bolts	3	8	20–25 (2.0–2.5, 14–18)	Front and rear brake calipers
Brake caliper pivot bolts	3	12	25–30 (2.5–3.0, 18–22)	
Front brake discs	12	8	35–40 (3.5–4.0, 25–29)	
Shock arm to frame bolts	2	10	40–50 (4.0–5.0, 29–36)	
Shock link to shock arm bolt	1	10	40–50 (4.0–5.0, 29–36)	
Shock absorber mount bolts	2	10	40–50 (4.0–5.0, 29–36)	
Swing arm pinch bolt	1	8	20–30 (2.0–3.0, 14–22))	
Swing arm left pivot bolt	1	25	85–105 (8.5–10.5, 61–76)	
Swing arm right pivot bolt	1	16	85–105 (8.5–10.5, 61–76)	
Rear brake torque rod				
8 mm	1	8	18–25 (1.8–2.5, 13–18)	
10 mm	1	10	30–40 (3.0–4.0, 22–29)	
Final driven sprocket	5	12	80–100 (8.0–10.0, 58–72)	
Rear brake disc	6	8	35–40 (3.5–4.0, 25–29)	
Rear axle nut	1	18	85–105 (8.5–10.5, 61–76)	
Sub-frame bolts (upper and lower)	4	10	35–45 (3.5–4.5, 25–33)	Apply oil to lower bolts
Handlebar pinch bolts	2	8	30–40 (3.0–4.0, 22–29)	
Rear brake Pedal	1	8	30–40 (3.0–4.0, 22–29)	
Side stand	1	10	35–45 (3.5–4.5, 25–33)	
Engine rear hanger bolts (upper)	1	10	60–70 (6.0–7.0, 44–50)	
(lower)	1	10	35–45 (3.5–4.5, 25–33)	
Engine center hanger bolts	6	8	24–30 (2.4–3.0, 17–22)	
Engine front hanger bolts	2	10	35–45 (3.5–4.5, 25–33)	
Gearshift pedal pivot bolt	1	6	35–45 (3.5–4.5, 25–33)	

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

STANDARD TORQUE VALUES

Item	Torque Values N·m (kg-m, ft-lb)	Item	Torque Values N·m (kg-m, ft-lb)
5 mm bolt and nut	4–6 (0.4–0.6, 3–4)	5 mm screw	3–5 (0.3–0.5, 2–4)
6 mm bolt and nut	8–12 (0.8–1.2, 6–9)	6 mm screw	7–11 (0.7–1.1, 5–8)
8 mm bolt and nut	18–25 (1.8–2.5, 13–18)	6 mm flange bolt and nut	10–14 (1.0–1.4, 7–10)
10 mm bolt and nut	30–40 (3.0–4.0, 22–29)	8 mm flange bolt and nut	24–30 (2.4–3.0, 17–22)
12 mm bolt and nut	50–60 (5.0–6.0, 36–43)	10 mm flange bolt and nut	35–45 (3.5–4.5, 25–33)

TOOLS

SPECIAL

TOOL NAME	TOOL NUMBER	APPLICATION	REF. SECTION
Primary gear holder	07924-ME90000	Primary gear	7
4ch Vacuum tester set	07404-0030100	Vacuum	3
Oil pressure gauge attachment	07510-4220100	Oil pressure	2
Compression gauge attachment	07510-MB00101	Compression	3
Pilot screw wrench	07908-4220201	Carburetor	4
Tappet lock wrench	07908-MB00100	Tappet lock nut	3
Snap ring pliers	07914-3230001	Master cylinder	17
Steering stem socket	07916-3710100	Steering stem	15
Lock nut wrench	07916-4220000	Clutch	7
Hollow set wrench 6 mm	07917-3230000	Front fork	15
Needle bearing remover	07931-MA70000	Swing arm	16
Bearing race remover	07946-3710500	Lower ball race	15
Steering stem driver	07946-MB00000	Steering stem	15
Slider weight	07947-KA50000	Front fork seal	15
Seal driver attachment	07947-KF00100	Front fork seal	15
Ball race remover	07953-4250002	Steering ball race	15
Oil seal driver attachment	07965-MB00100	Rear shock absorber	16
Oil seal driver	07965-MC70100		
Driver ring attachment	07965-ME70100		
Oil seal driver attachment	07965-MA60100		
Valve guide reamer	07984-2000000	Valve guide	10
Fly wheel cover	07998-MB40000	Timing cover	3

COMMON TOOL

TOOL NAME	TOOL NUMBER	APPLICATION	REF. SECTION
Float level gauge	07401-0010000	Carburetor	4
Lock nut wrench 30 x 32 mm	07716-0020400	Steering lock nut	15
Extension bar	07716-0020500		
Flywheel holder	07725-0040000	Fly wheel	9
Rotor puller	07733-0020100		
Valve guide remover 5,5 mm	07742-0010100	Valve guide	10
Valve guide driver	07743-0020000		
Attachment 37 x 40 mm	07746-0010200	Swing arm	16
Pilot 17 mm	07746-0040400		
Pilot 20 mm	07746-0040500	Swing arm	16
Attachment 32 x 35 mm	07746-0010100	Rear wheel	16
Attachment 52 x 55 mm	07746-0010400	Counter shaft	13
Attachment 42 x 47 mm	07746-0010300		
Pilot 15 mm	07746-0040300	Front wheel	15
Pilot 25 mm	07746-0040600	Rear wheel	16
Attachment 62 x 68 mm	07746-0010500		
Driver A	07749-0010000		
Driver C	07746-0030100	Main shaft	13
Inner driver 30 mm	07746-0030300		

TOOL NAME	TOOL NUMBER	APPLICATION	REF. SECTION
Bearing remover shaft	07746-0050100	Front wheel	15
Bearing remover head 15 mm	07746-0050400	Rear wheel	16
Bearing remover head 20 mm	07746-0050600		
Valve spring compressor	07757-0010000	Valve	10

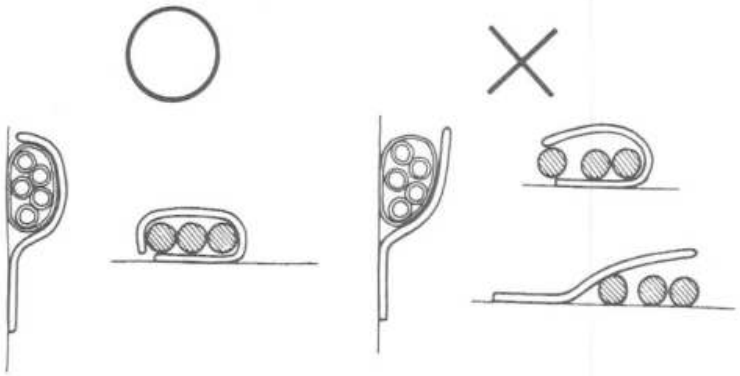
OPTIONAL TOOL

TOOL NAME	TOOL NUMBER	APPLICATION	REF. SECTION
Compression gauge	07305-0010000	Compression	3
Oil pressure gauge	07506-3000000	Oil pressure	3
Seat cutter 29 mm 45°(EX)	07780-0010300	Valve seat	10
Seat cutter 33 mm 45°(IN)	07780-0010800	Valve seat	10
Flat cutter 30 mm 32°(IN, EX)	07780-0012200	Valve seat	10
Interior cutter 30 mm 60°(IN, EX)	07780-0014000	Valve seat	10
Cutter holder 5.5 mm	07781-0010101	Valve seat	10

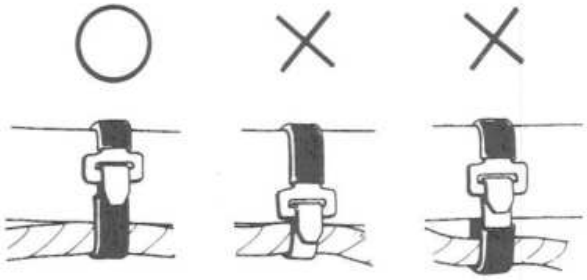
CABLE & HARNESS ROUTING

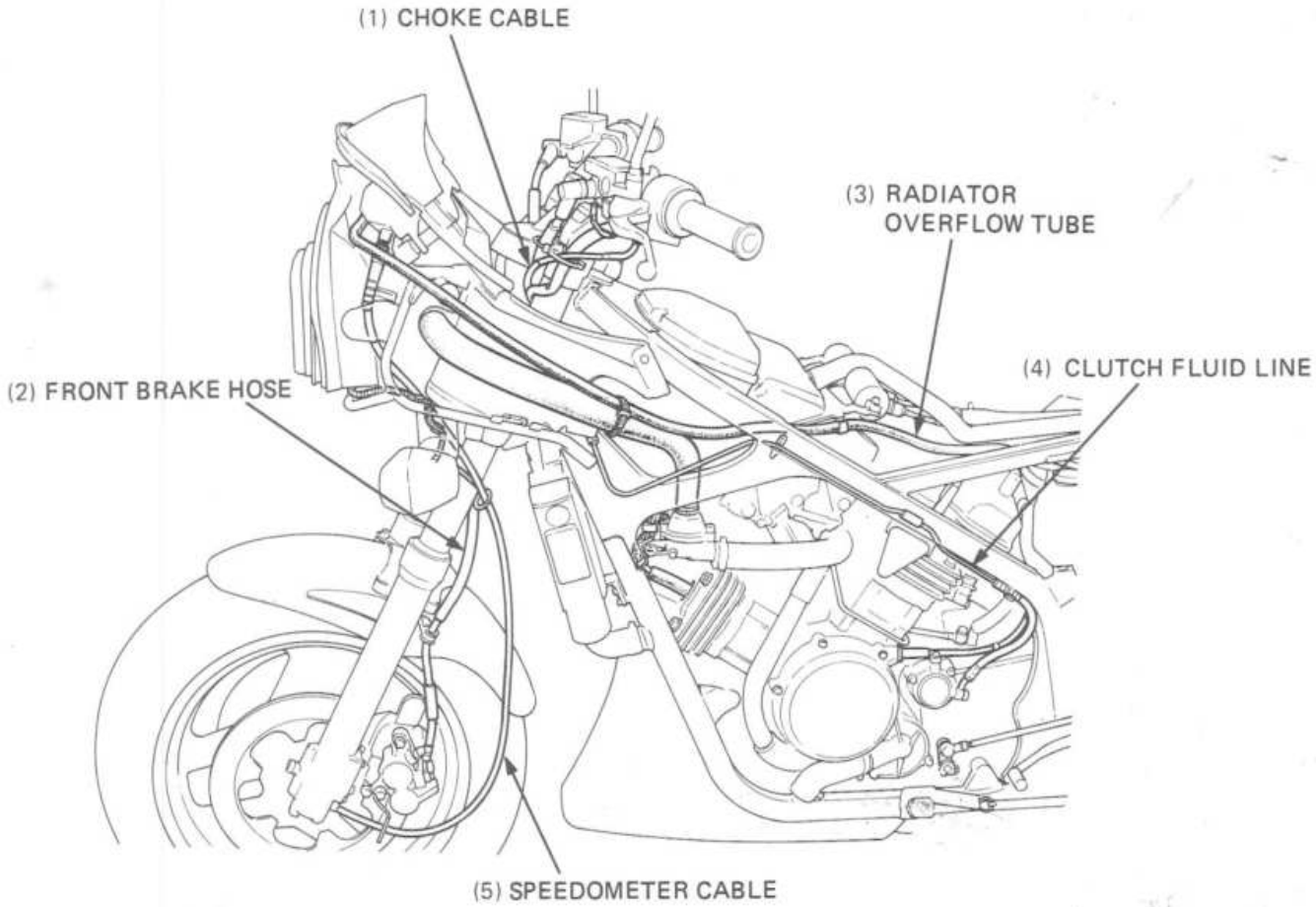
Note the following when routing cables and wire harnesses.

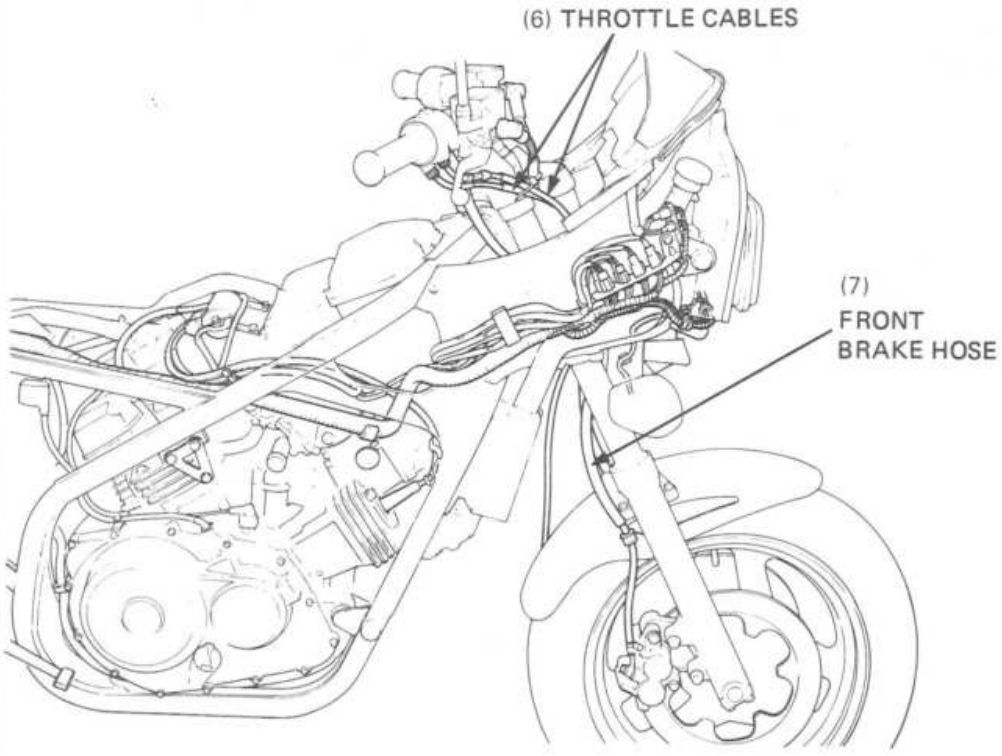
- A loose wire, harness or cable can be a safety hazard. After clamping, check each wire to be sure it is secure.
- Do not squeeze wires against the weld or end of its clamp when a weld-on clamp is used.
- Secure wires and wire harnesses to the frame with their respective wire bands at the designated locations. Tighten the bands so that only the insulated surfaces contact the wires or wire harnesses.
- Route harnesses so they are neither pulled tight nor have excessive slack.
- Protect wires and harnesses with electrical tape or tube if they contact a sharp edge or corner. Clean the attaching surface thoroughly before applying tape.
- Do not use a wire or harness with a broken insulator. 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 parts that get hot.
- Be sure grommets are seated in their grooves properly.
- After clamping, check each harness to be certain that it is not interferring 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.

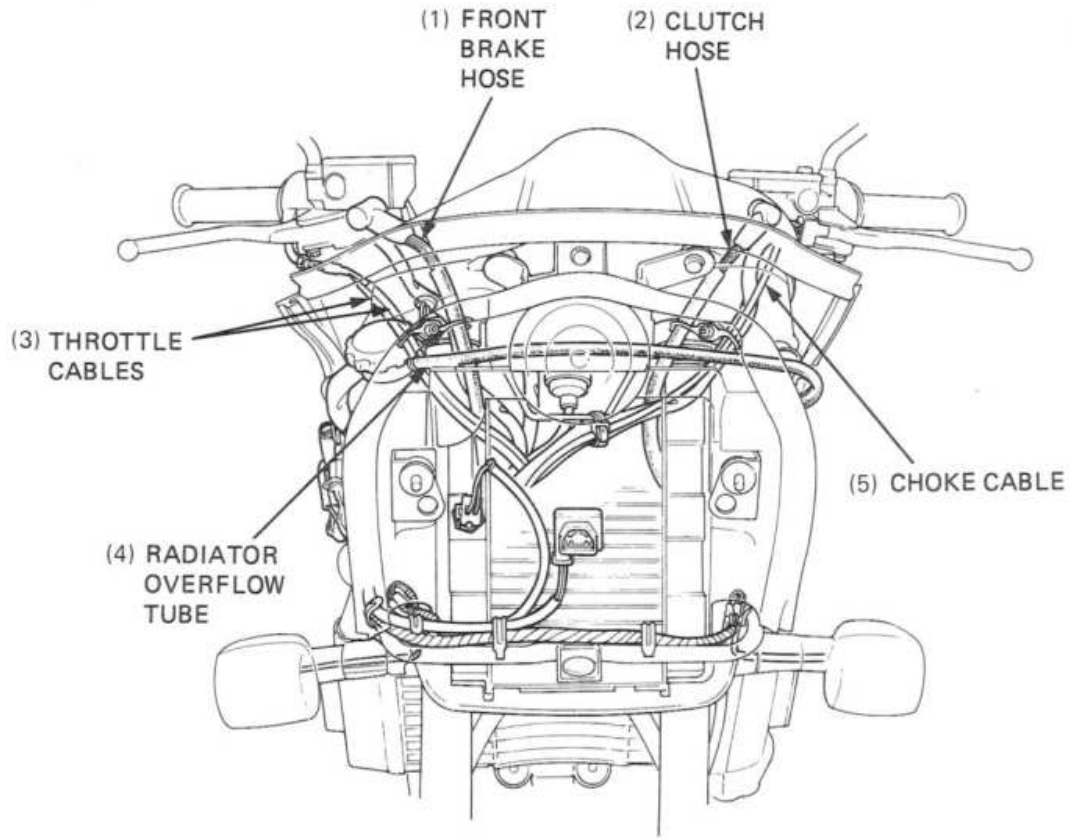


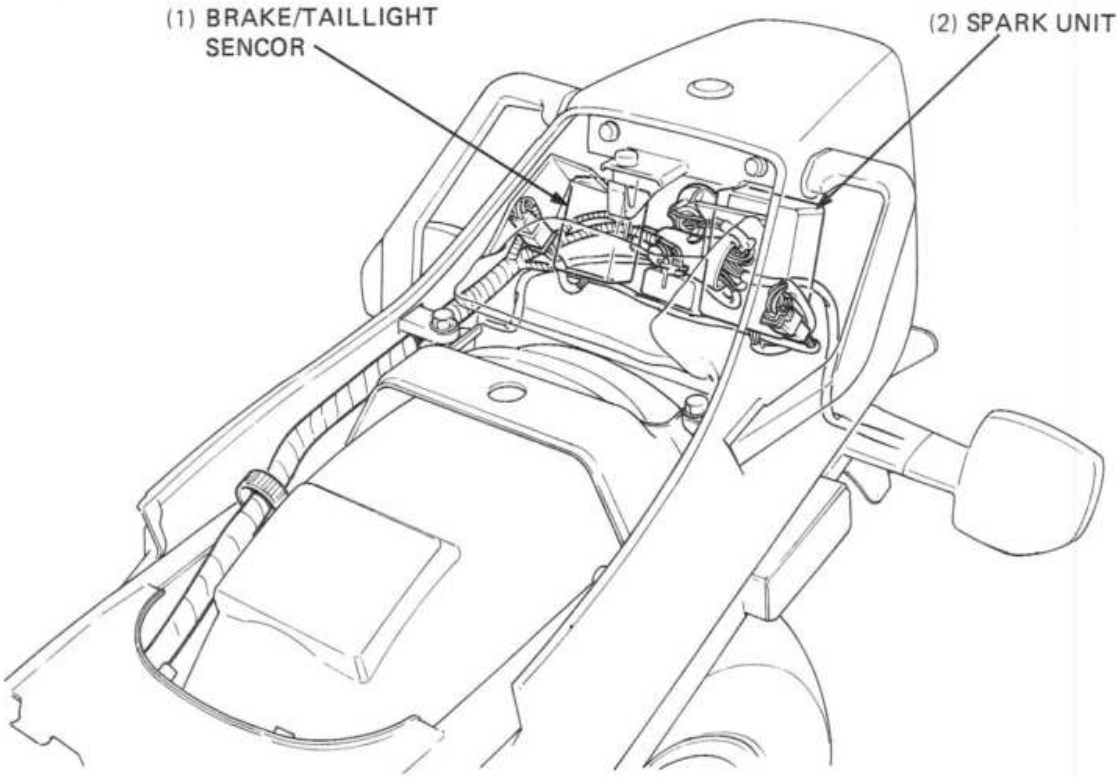


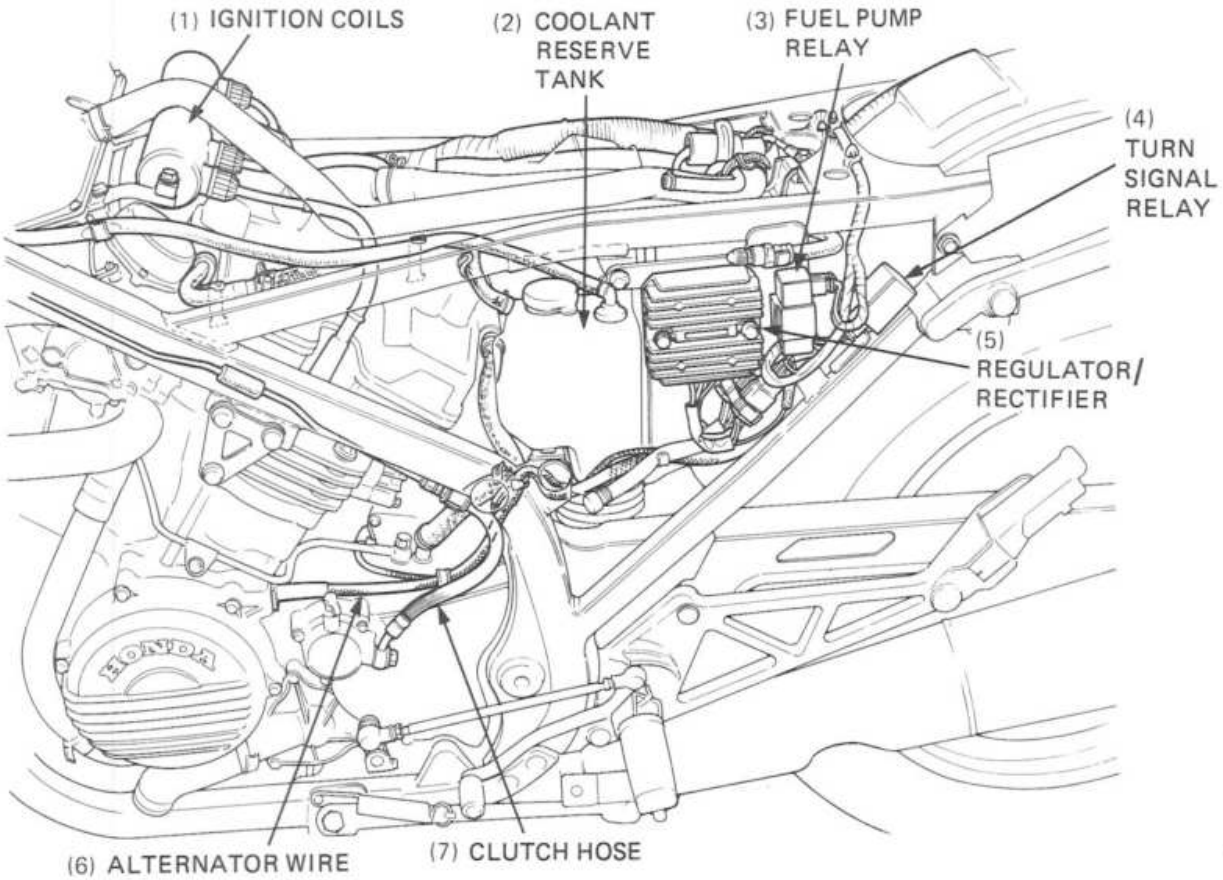


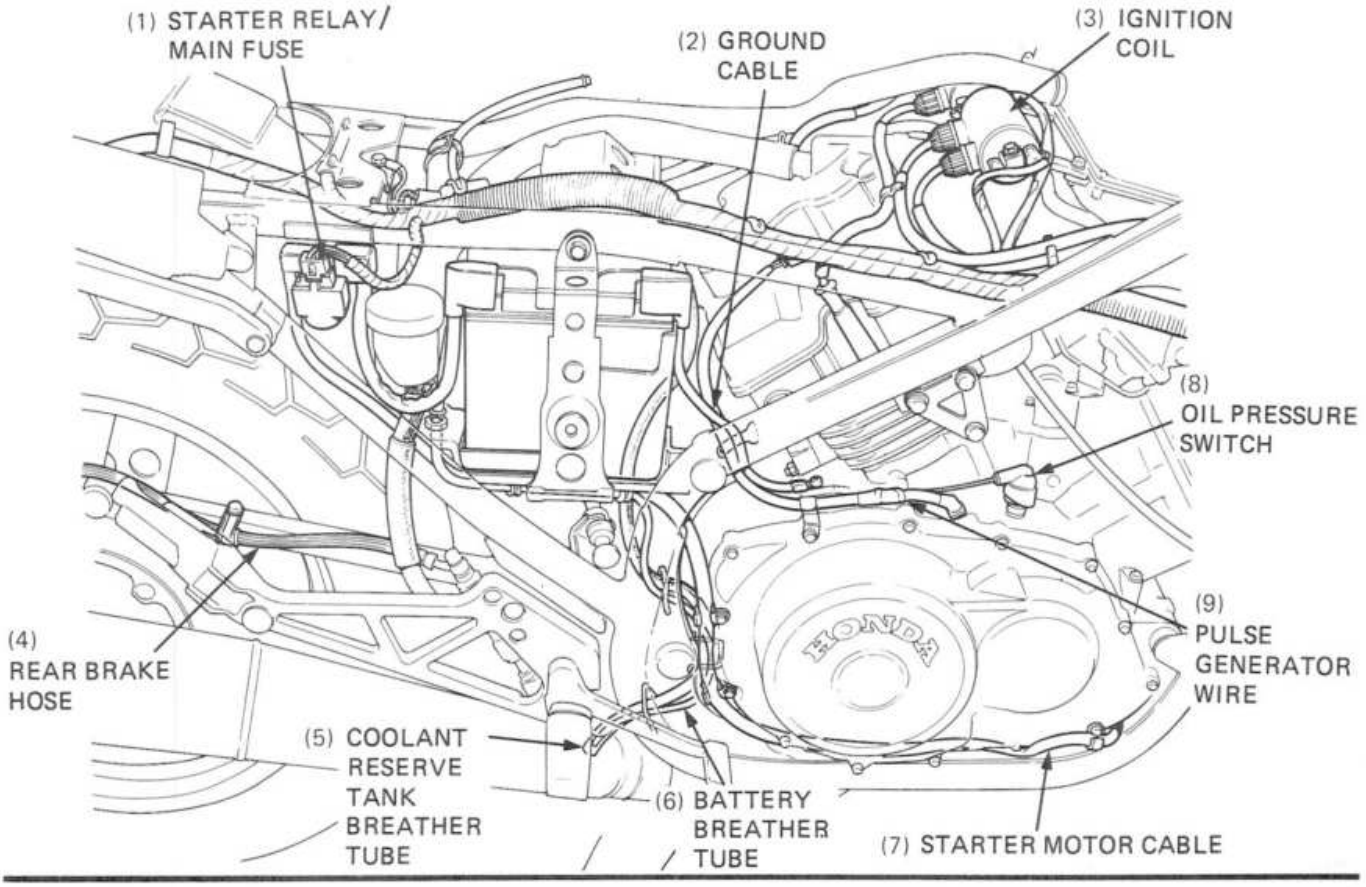

(1) CHOKE CABLE
(3) RADIATOR OVERFLOW TUBE
(4) CLUTCH FLUID LINE
(2) FRONT BRAKE HOSE
(5) SPEEDOMETER CABLE


(6) THROTTLE CABLES
(7) FRONT BRAKE HOSE

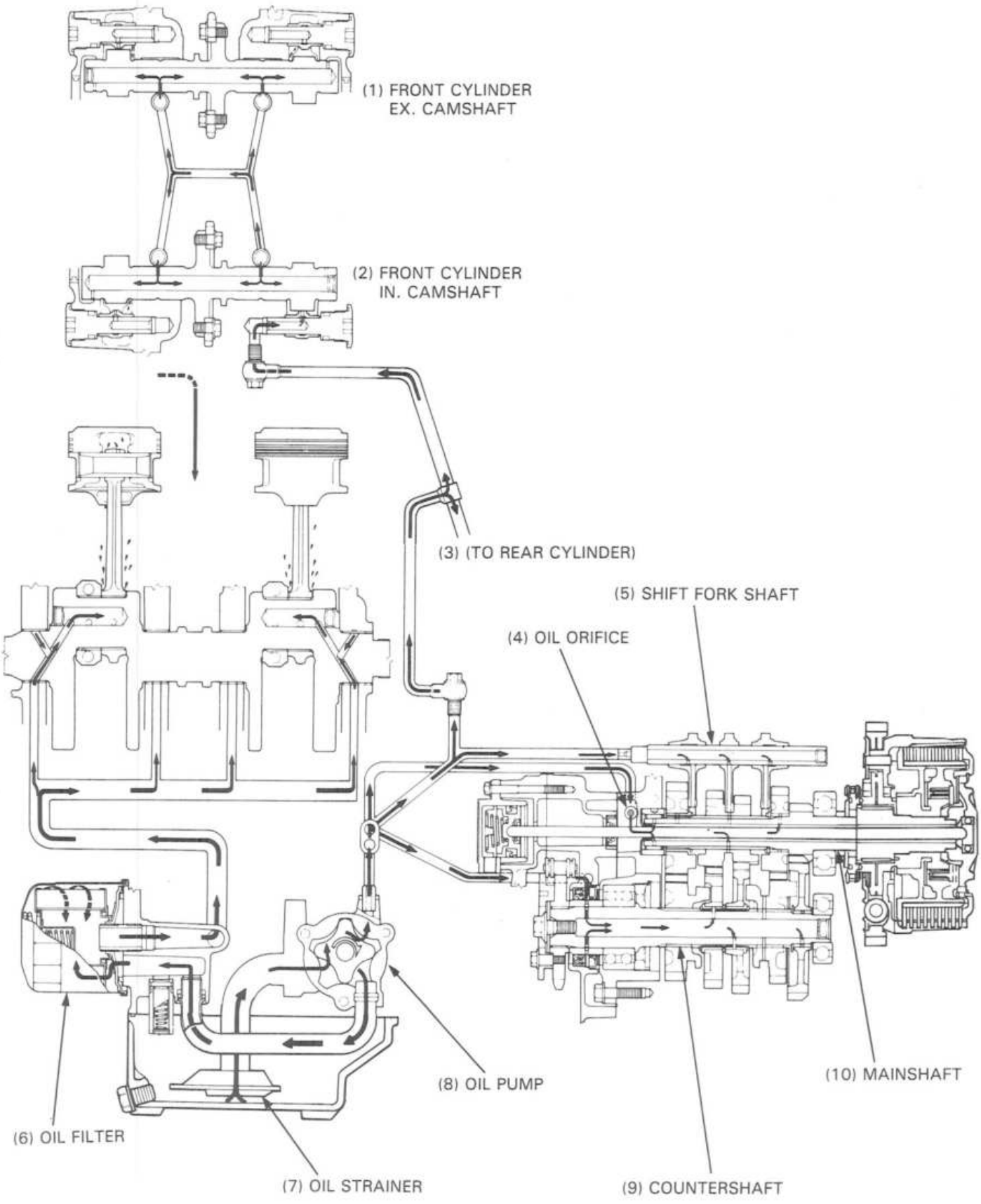

(1) FRONT BRAKE HOSE
(2) CLUTCH HOSE
(3) THROTTLE CABLES
(4) RADIATOR OVERFLOW TUBE
(5) CHOKE CABLE


(1) BRAKE/TAILLIGHT SENCOR
(2) SPARK UNIT


(1) IGNITION COILS
(2) COOLANT RESERVE TANK
(3) FUEL PUMP RELAY
(4) TURN SIGNAL RELAY
(5) REGULATOR/ RECTIFIER
(6) ALTERNATOR WIRE
(7) CLUTCH HOSE


(1) STARTER RELAY/ MAIN FUSE
(2) GROUND CABLE
(3) IGNITION COIL
(4) REAR BRAKE HOSE
(5) COOLANT RESERVE TANK BREATHER TUBE
(6) BATTERY BREATHER TUBE
(7) STARTER MOTOR CABLE
(8) OIL PRESSURE SWITCH
(9) PULSE GENERATOR WIRE

LUBRICATION

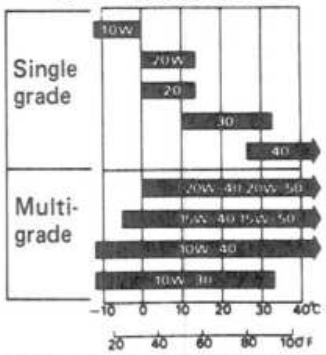

(1) FRONT CYLINDER EX. CAMSHAFT
(2) FRONT CYLINDER IN. CAMSHAFT
(3) (TO REAR CYLINDER)
(4) OIL ORIFICE
(5) SHIFT FORK SHAFT
(6) OIL FILTER
(7) OIL STRAINER
(8) OIL PUMP
(9) COUNTERSHAFT
(10) MAINSHAFT

SERVICE INFORMATION	2–1	OIL PRESSURE CHECK	2–6
TROUBLESHOOTING	2–2	OIL PUMP	2–7
ENGINE OIL LEVEL	2–3	CONTROL CABLE LUBRICATION	2–11
ENGIE OIL & FILTER CHANGE	2–3	LUBRICATION POINTS	2–12
OIL STRAINER/PRESSURE RELIEF VALVE	2–4		

SERVICE INFORMATION

SPECIFICATIONS

Engine oil

Oil capacity	2.9 liter (3.1 US qt, 2.5 Imp qt) after draining 3.5 liter (3.7 US qt, 3.1 Imp qt) after disassembly
Oil recommendation	Use 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 VISCOSITIES 
Oil pressure (at oil pressure switch)	540 ± 70 kPa (5.4 ± 0.7 kg/cm², 77 ± 10 psi) at 5,000 min⁻¹ (rpm) (80°C/176°F)
Oil pump delivery	56.3 liter (59.6 US qt, 49.6 Imp qt)/min. at 5,600 min⁻¹ (rpm)

Oil pump service data

	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)

TORQUE VALUES

Engine oil drain plug	35–40 N·m (3.5–4.0 kg-m, 25–29 ft-lb)
Engine oil filter	15–20 N·m (1.5–2.0 kg-m, 11–14 ft-lb)
Oil pressure switch	10–14 N·m (1.0–1.4 kg-m, 7–10 ft-lb)

TOOLS

Special

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

TROUBLESHOOTING

Oil level too low
1. External oil leaks
2. Worn piston rings
3. Worn valve guide or seal

Oil contamination
1. Oil or filter not changed often enough
2. Head gasket faulty
3. Worn piston rings

Low oil pressure
1. Oil level low
2. Pressure relief valve stuck open
3. Plugged oil pick-up screen
4. Oil pump worn
5. External oil leaks

High oil pressure
1. Pressure relief valve stuck closed
2. Plugged oil filter, gallery, or metering orifice
3. Incorrect oil being used

No oil pressure
1. Oil level low
2. Oil pump drive chain broken
3. Oil pump faulty
4. Internal oil leakage

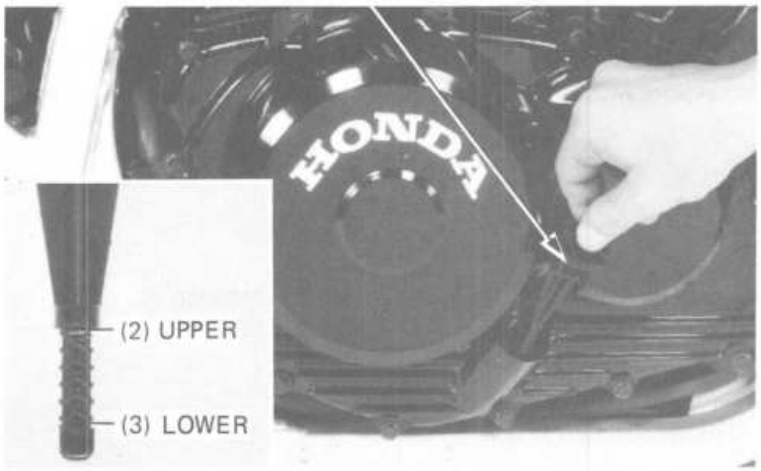
ENGINE OIL LEVEL

Put the motorcycle on its center stand on level ground. Start the engine and let it idle for 2–3 minutes. Turn off the engine. Remove the filler cap/dipstick, wipe it clean and insert it without screwing it in. Remove the filler cap/dipstick and check the oil level.

If the level is below the lower level mark on the dipstick, fill to the upper level mark with recommended oil.

Check the oil pressure with the oil pressure warning light after the engine starts. The light should go off after one or two seconds.
If it does not, stop the engine and check the oil pump output and/or oil circuit.

(1) OIL FILLER CAP/DIPSTICK

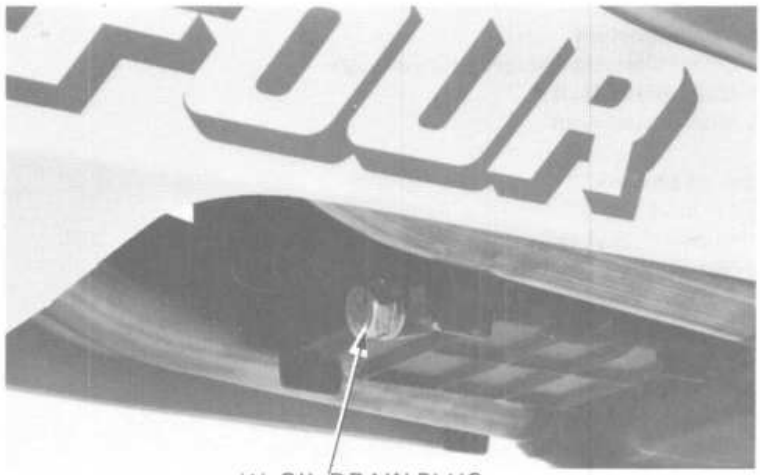


ENGINE OIL & FILTER CHANGE

NOTE

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

Stop the engine.
Remove the oil filler cap/dipstick, oil drain plug and drain the oil.



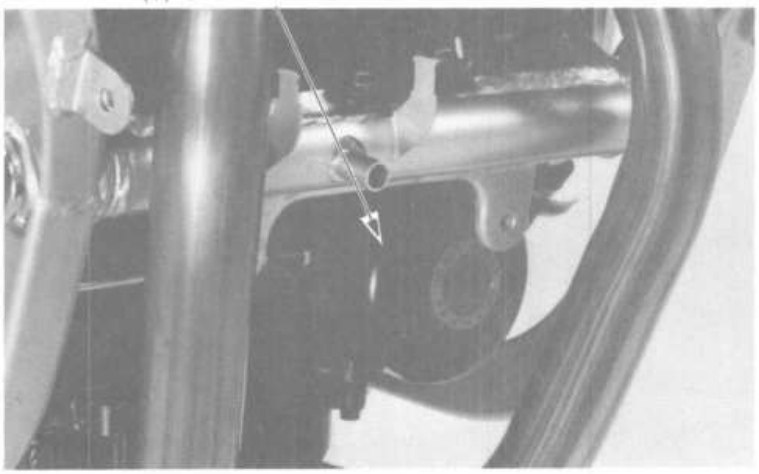
Remove the lower cowl.

Remove the oil filter with a filter wrench (07912–6110001) and let the remaining oil drain out. Discard the oil filter.

Check that the sealing washer on the drain plug is in good condition and install the plug. Replace the oil filter with a new one. Check that the oil filter O-ring is in good condition, and coat it with oil before installing it.
Install and tighten the oil filter.

TORQUE: 15–20 N·m (1.5–2.0 kg-m, 11–14 ft-lb)

(1) OIL FILTER



Fill the crankcase with 2.9 liters (3.1 US qt, 2.5 Imp qt) of the recommended oil (page 2-1). Reinstall the oil filler cap/dipstick.
Start the engine and let it idle for 2-3 minutes, then stop the engine.
Make sure that the oil level is at the upper level mark on the dipstick.
Make sure that there are no oil leaks.

Install the lower cowl.

OIL STRAINER/PRESSURE RELIEF VALVE

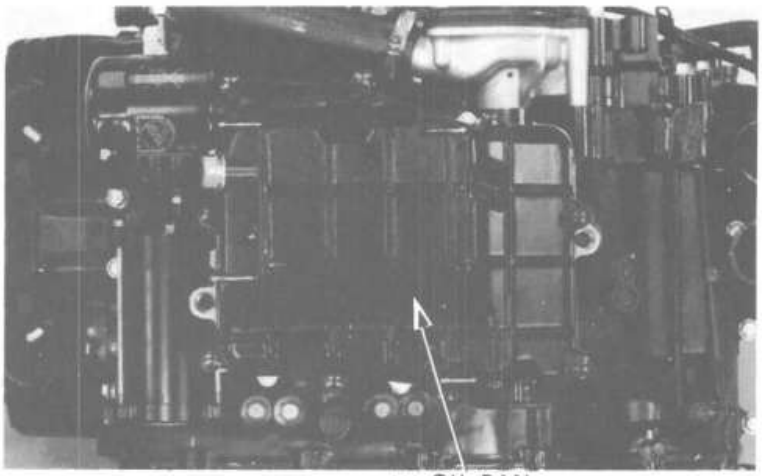
NOTE

> The oil strainer can be removed with the engine mounted in the frame.

Remove the lower cowl.
Remove the exhaust chamber.

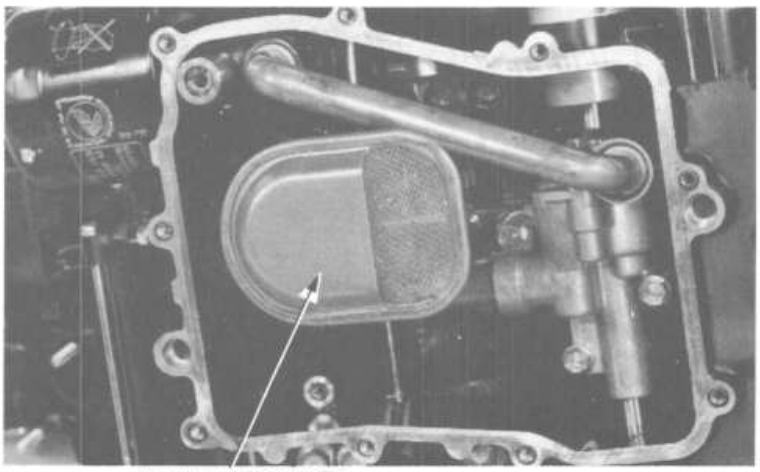
Drain the engine oil (page 2–3).

Remove the oil pan bolts and oil pan.



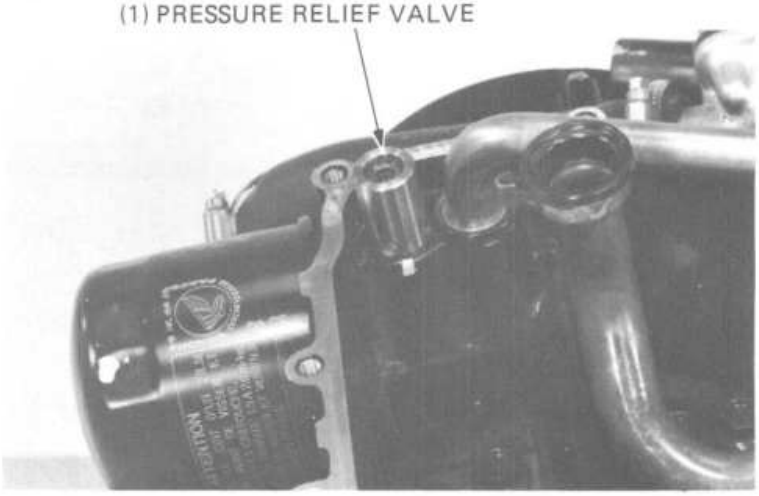
(1) OIL PAN

Remove and clean the oil strainer



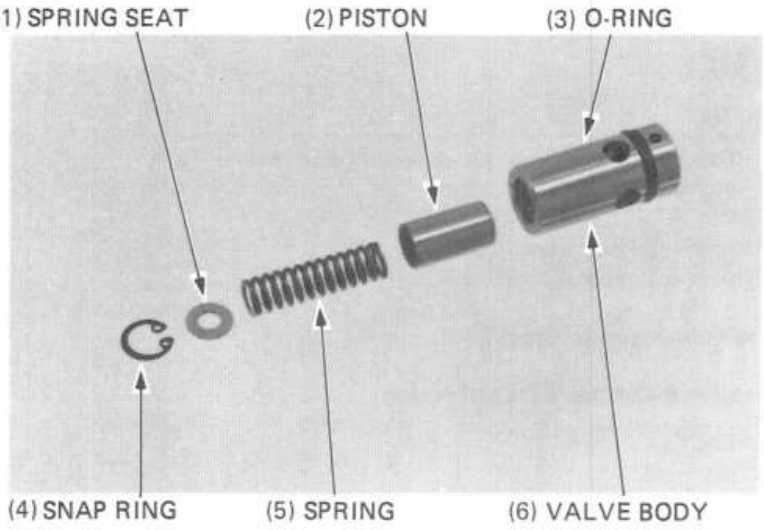
(1) OIL STRAINER

Check the operation of the pressure relief valve.

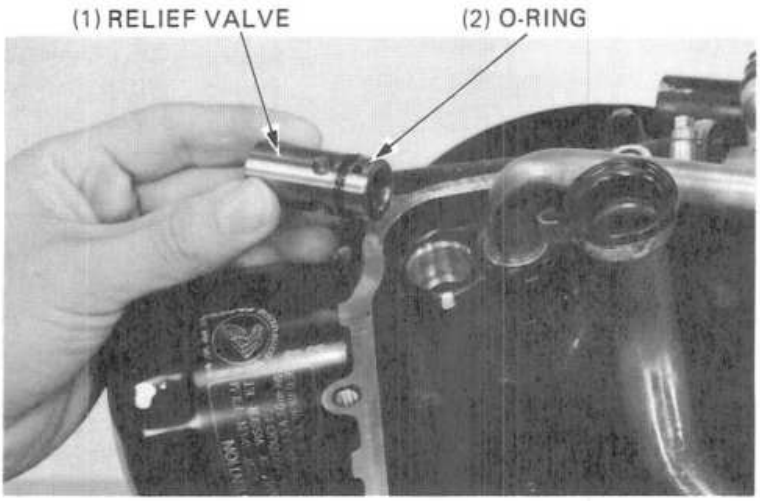


(1) PRESSURE RELIEF VALVE

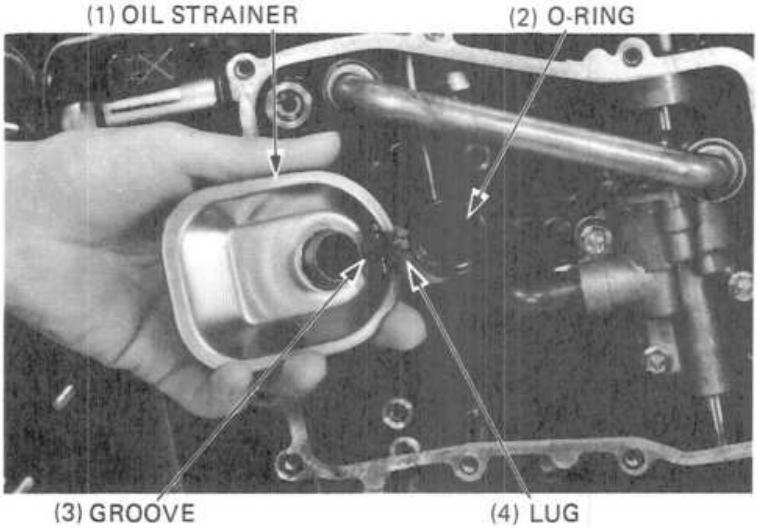
Disassemble the relief valve by removing the snap ring.
Inspect the piston for wear, sticking or damage.
Inspect the spring for weak or damage.
Assemble the relief valve in the reverse order of disassembly.



Make sure that the O-ring is in good condition and install the relief valve.

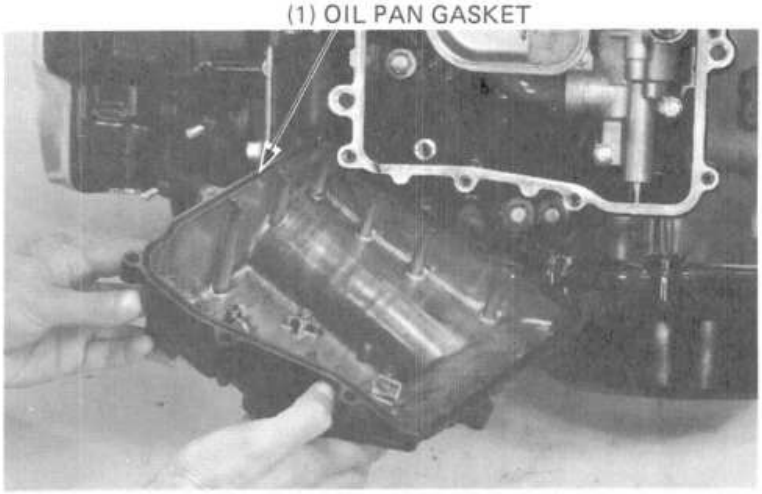


Make sure the O-ring is in good condition and install the oil strainer aligning its groove with the lug on the oil strainer tube pipe.



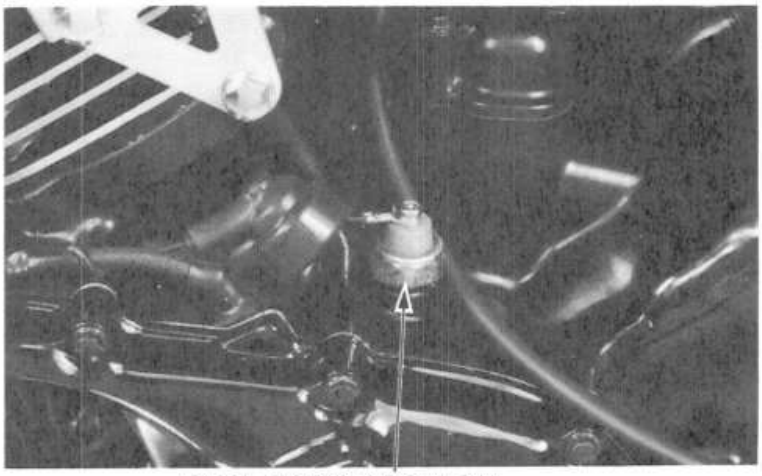
Install the oil pan with a new gasket.
Tighten the oil pan bolts in 2-3 steps in a criss cross pattern.
Install the exhaust pipes.
Fill the crankcase with the recommended oil (page2-1).
Install the lower cowl.

(1) OIL PAN GASKET



OIL PRESSURE CHECK

Warm the engine up to normal operating temperature (approximately 80°C/176°F).
Stop the engine and disconnect the oil pressure switch wire.
Remove the oil pressure switch and connect an oil pressure gauge to the pressure switch hole (page 2-5).
Check the oil level.



(1) OIL PRESSURE SWITCH

Start the engine and check the oil pressure at 5,000 rpm.

OIL PRESSURE:
540 ± 70 kPa (5.4 ± 0.7 kg/cm², 77 ± 10 psi) at 5,000 min⁻¹ (rpm) (80°C/176°F)

Stop the engine.
Apply 3-BOND® sealant or equivalent to the pressure switch threads and install.

TORQUE: 10–14 N·m (1.0–1.4 kg-m, 7–10 ft-lb)

Connect the oil pressure switch wire.
Start the engine.
Operate the warning indicator switch.
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.

(1) OIL PRESSURE GAUGE
07506–3000000



(2) OIL PRESSURE GAUGE ATTACHMENT
07510–4220100

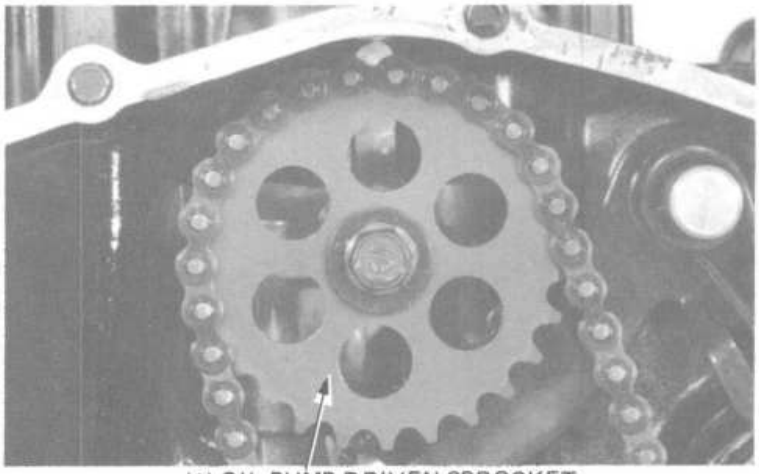
OIL PUMP

REMOVAL

NOTE

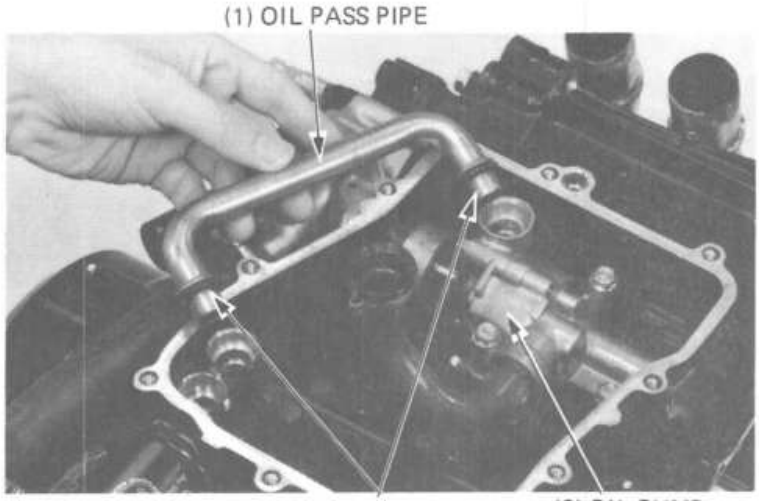
> The oil pump can be removed with the engine mounted in the frame.

Drain the engine oil.
Remove the right crankcase cover.
Remove the oil pump driven sprocket by removing the bolt and washer.

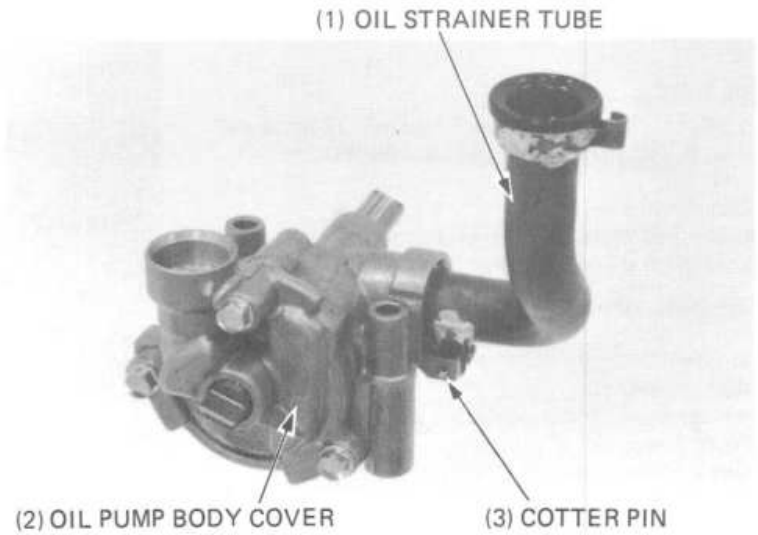


(1) OIL PUMP DRIVEN SPROCKET

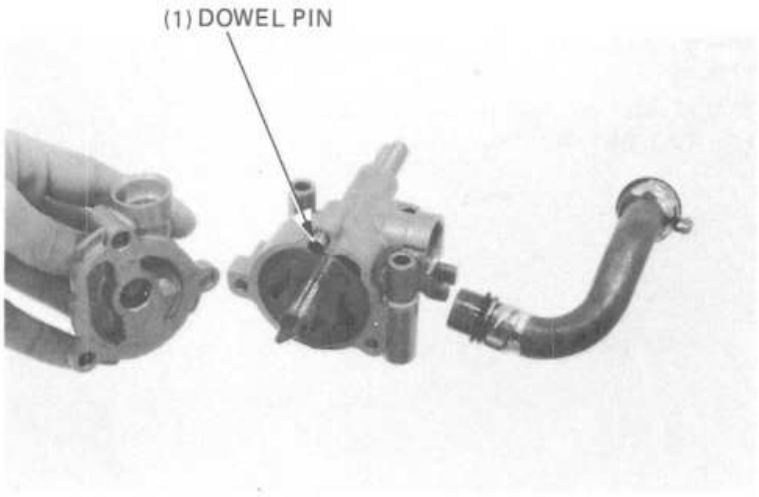
Remove the oil strainer (page 2-4) and the oil pass pipe.
Make sure the O-rings are in good condition.
Remove the oil pump by removing the mounting bolts.



Straighten and remove the cotter pin holding the oil strainer tube.
Remove the oil strainer tube.
Remove the oil pump body cover.

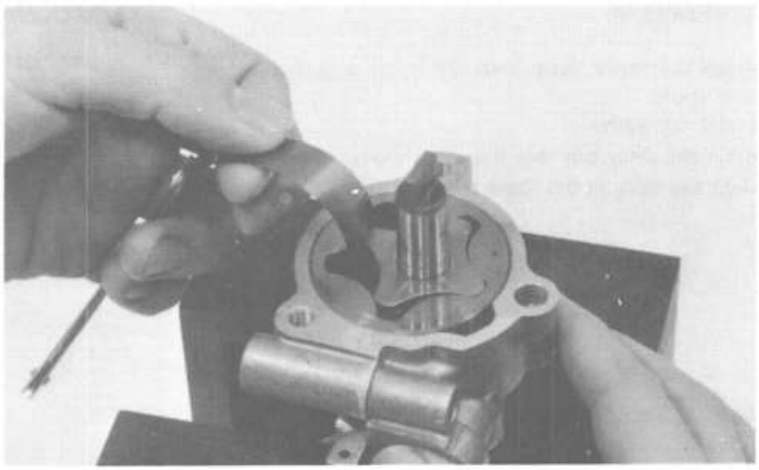


Remove the dowel pin.



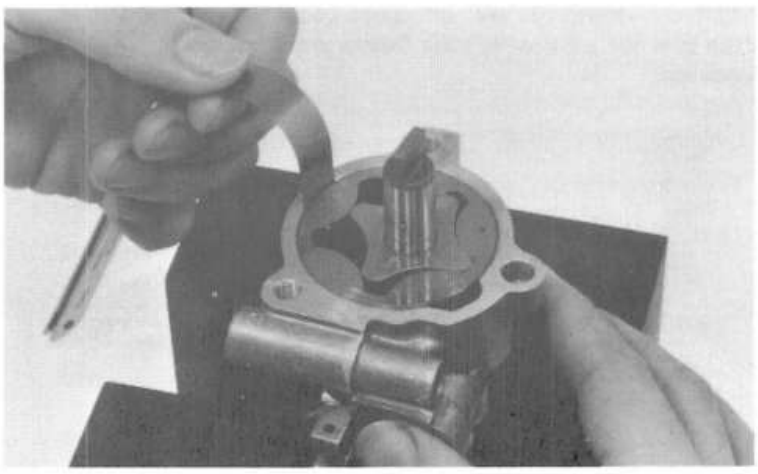
Measure the rotor tip clearance.

STANDARD: 0.15 mm (0.006 in)
SERVICE LIMIT: 0.20 mm (0.008 in)



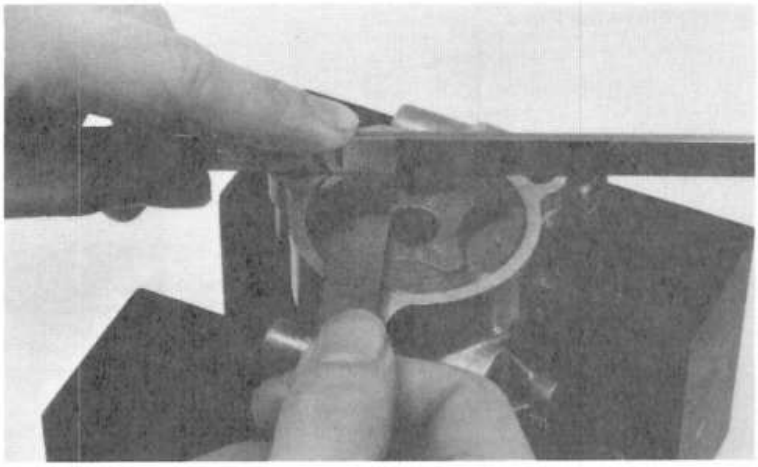
Measure the pump body clearance.

STANDARD: 0.15–0.22 mm (0.006–0.009 in)
SERVICE LIMIT: 0.35 mm (0.014 in)



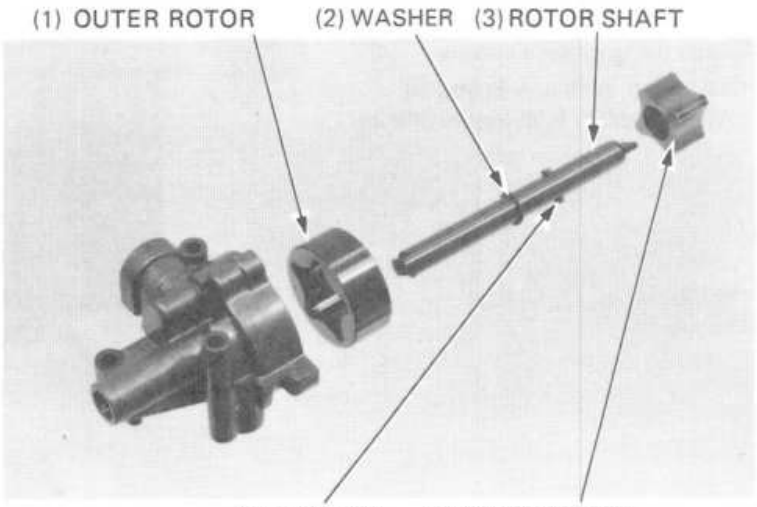
Remove the rotor shaft and measure the pump end clearance.

STANDARD: 0.02–0.07 mm (0.001–0.003 in)
SERVICE LIMIT: 0.10 mm (0.004 in)

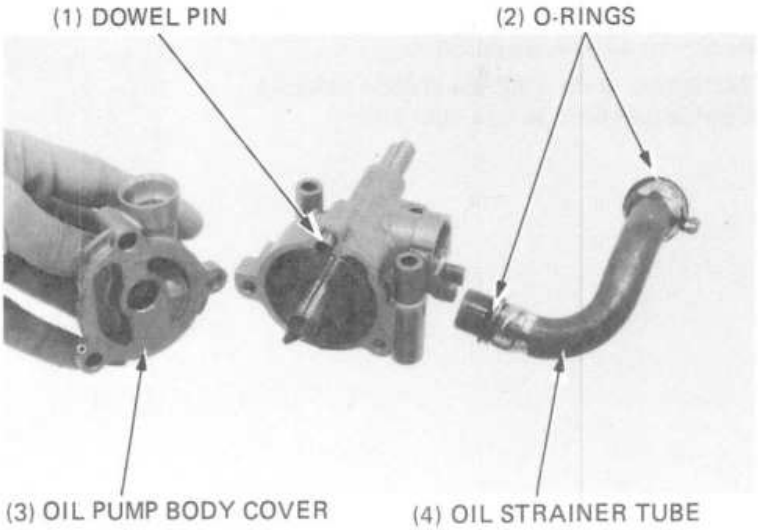


ASSEMBLY

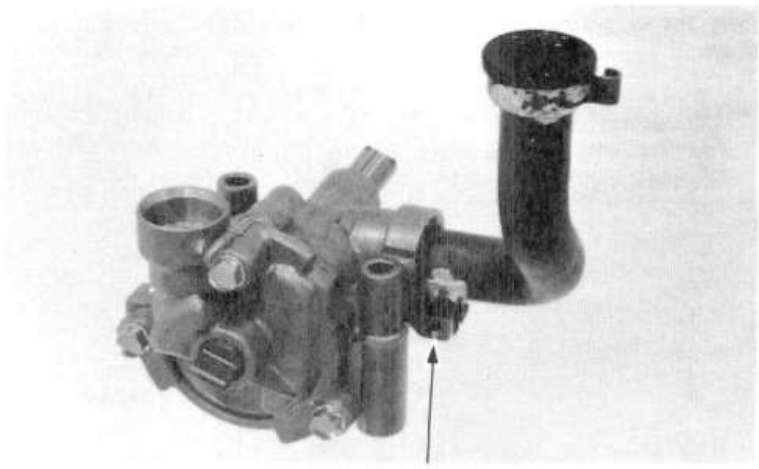
Install the outer rotor into the body and insert the rotor shaft.
Install the washer.
Insert the drive pin into the rotor shaft.
Align the slots in the inner rotor with the drive pin.



Install the dowel pin and oil pump body cover. Make sure the oil strainer tube O-rings are in good condition.



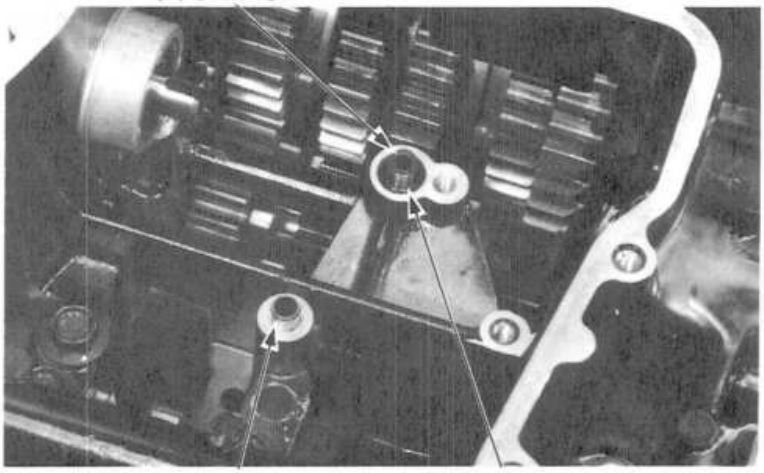
Install the oil strainer tube with a new cotter pin.



(1) COTTER PIN

INSTALLATION

Install the orifice, O-ring and dowel pin.

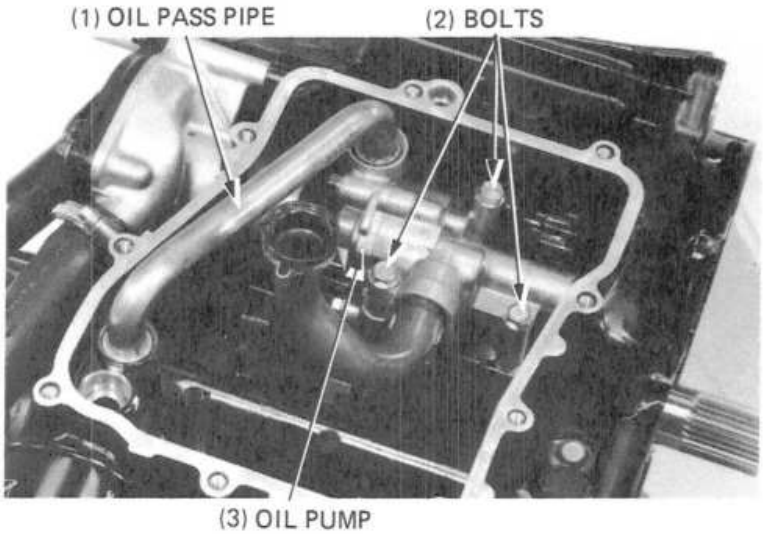


Install the oil pump and tighten the three bolts.

NOTE

> Make sure that the oil pump shaft rotates freely after tightening the bolts.

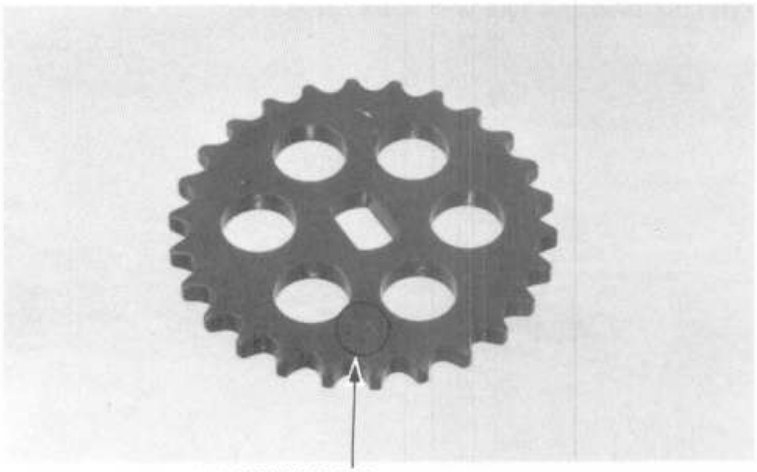
Make sure the O-rings on the oil pass pipe are in good condition and install the oil pass pipe.
Install the oil strainer and oil pan (page 2-5).



Place the oil pump driven sprocket into the drive chain.

NOTE

The "IN" mark on the driven sprocket should face the crankcase.



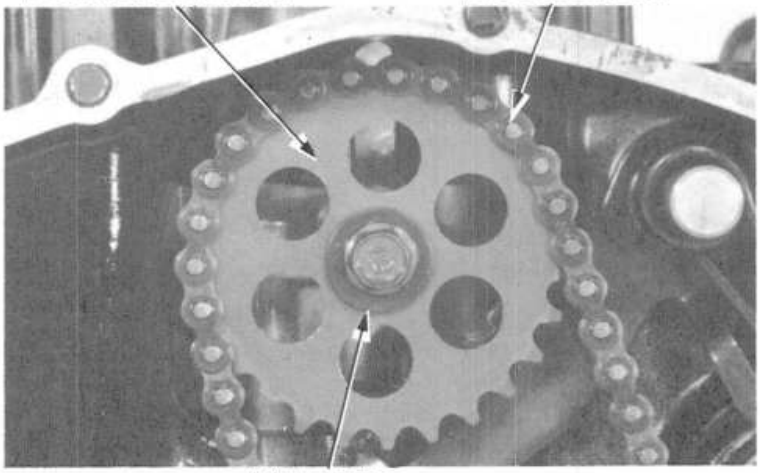
(1) "IN" MARK

Install the washer and tighten the bolt.

Install the dowel pins and a new gasket.
Install the right crankcase cover.

Install the exhaust system.
Fill the engine with the recommended oil (page 2-1).

(1) DRIVEN SPROCKET (2) DRIVE CHAIN

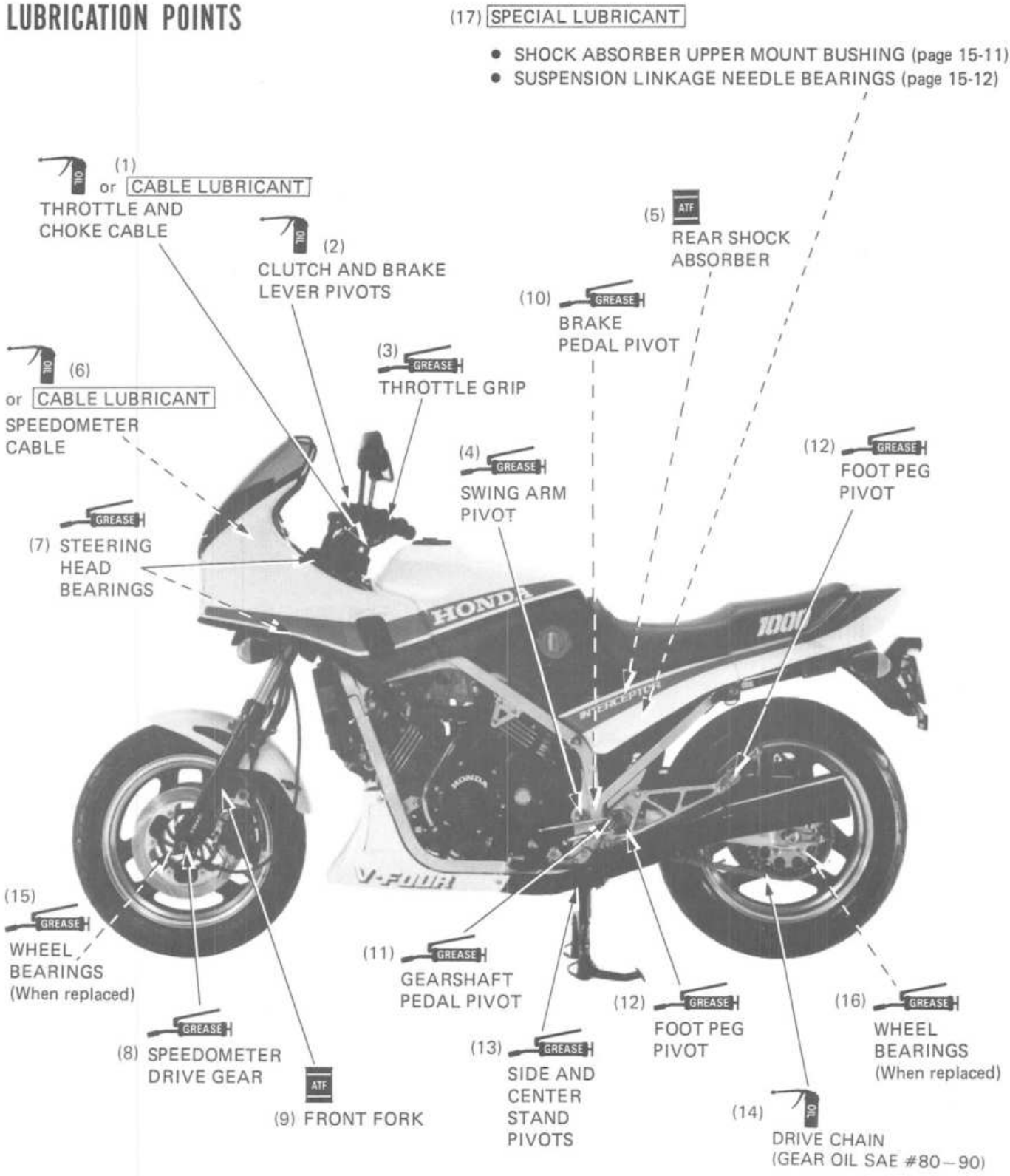


(3) WASHER

CONTROL CABLE LUBRICATION

Periodically, disconnect the throttle cables 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



3 MAINTENANCE

HONDA VF1000F

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CARBURETOR CHOKE	3–6	BRAKE SYSTEM	3–16
AIR CLEANER	3–6	BRAKE LIGHT SWITCH	3–17
CRANKCASE BREATHER	3–7	HEADLIGHT AIM	3–17
SPARK PLUGS	3–7	CLUTCH	3–17
VALVE CLEARANCE	3–8	SIDE STAND	3–18
CARBURETOR SYNCHRONIZATION	3–11	SUSPENSION	3–18
CARBURETOR IDLE SPEED	3–12	NUTS, BOLTS, FASTENERS	3–20
RADIATOR COOLANT	3–12	WHEELS	3–20
RADIATOR CORE	3–13	STEERING HEAD BEARINGS	3–20
COOLING SYSTEM HOSES & CONNECTIONS	3–13		

SERVICE INFORMATION

GENERAL

- Engine oil See page 2-3
- Engine oil filter See page 2-3

SPECIFICATIONS

< Engine >

Spark plugs:

Standard		For cold climate (below 5°C, 41°F)		For extended high speed riding	
NGK	ND	NGK	ND	NGK	ND
DPR8EA-9 <DP8EA-9>	X24EPR-U9 <X24EP-U9>	DPR7EA-9 <DP7EA-9>	X22EPR-U9 <X22EP-U9>	DPR9EA-9 <DP9EA-9>	X27EPR-U9 <X27EP-U9>

< >: U

Spark plug gap: 0.8–0.9 mm (0.031–0.035 in)

Valve clearance
Cold (Below 35°C, 95°F): Intake/Exhaust: 0.12 mm (0.005 in)

Idle speed: 1,000 ± 100 min^{-1} (rpm)
Carburetor synchronization: All carburetors within 60 mm (2.4 in) Hg
Cylinder compression: 1,300 ± 200 kPa (13.0 ± 2.0 kg/cm^2, 185 ± 28 psi)
Throttle grip free play: 2–6 mm (1/8–1/4 in)

< CHASSIS >

Drive chain slack: 15–25 mm (5/8–1 in)

Tire:

Tire size		Front	Rear
		120/80V16–V250	140/80V17–V250
Cold tire pressure, kpa (kg/cm^2, psi)	Driver only	250 (2.50, 36)	290 (2.90, 42)
	Driver and one passenger	250 (2.50, 36)	290 (2.90, 42)
Tire brand	Bridgestone	G511	G520
	Dunlop	K500	K500

Suspension air pressure: Front, 0–40 kPa (0–0.4 kg/cm^2, 0–6 psi)
Rear, 0–300 kPa (0–3.0 kg/cm^2, 0–43 psi)

TOOLS

Special

Vacuum gauge	07404–0020000
Carburetor pilot screw wrench	07908–4220201
Valve adjusting wrench	07908–MB00100
Compression gauge attachment	07510–MB00101

Common

Valve adjsuting wrench	07708–0030300

MAINTENANCE SCHEDULES

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

I: INSPECT AND CLEAN, ADJUST, LUBRICATE, OR REPLACE IF NECESSARY.
C: CLEAN, R: REPLACE, A: ADJUST, L: LUBRICATE

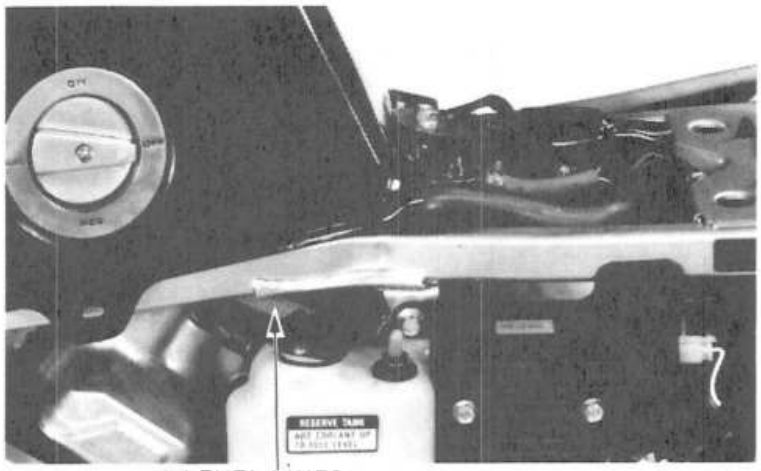
	ITEM / FREQUENCY	WHICHEVER COMES FIRST → EVERY	ODOMETER READING (NOTE 3) 1,000 km (600 mi)	6,400 km (4,000 mi)	12,800 km (8,000 mi)	19,200 km (12,800 mi)	25,600 km (16,000 mi)	32,000 km (20,000 mi)	38,400 km (24,000 mi)	Refer to page
*	FUEL LINES				I		I		I	3-4
*	FUEL FILTER								R	3-4
*	THROTTLE OPERATION		I		I		I		I	3-5
*	CARBURETOR-CHOKE				I		I		I	3-6
*	AIR CLEANER	NOTE 1			R		R		R	3-6
	CRANKCASE BREAHTER	NOTE 2		C	C	C	C	C	C	3-7
	SPARK PLUGS			I	R	I	R	I	R	3-7
*	VALVE CLEARANCE		I		I		I		I	3-8
	ENGINE OIL	YEAR	R		R		R		R	2-3
	ENGINE OIL FILTER	YEAR	R		R		R		R	2-3
*	CARBURETOR-SYNCHRONIZATION		I		I		I		I	3-11
*	CARBURETOR-IDLE SPEED		I	I	I	I	I	I	I	3-12
	RADIATOR COOLANT				I		I		*R	3-12
*	RADIATOR CORE				I		I		I	3-13
*	COOLING SYSTEM HOSES & CONNECTIONS		I		I		I		I	3-13
	DRIVE CHAIN		I, L EVERY 1,000 km (600 mi)							3-14
	BATTERY	MONTH	I	I	I	I	I	I	I	3-15
	BRAKE FLUID	MONTH I 2 YEARS* R	I	I	I	*R	I	I	*R	3-16
	BRAKE PAD WEAR			I	I	I	I	I	I	3-16
	BRAKE SYSTEM		I		I		I		I	3-16
*	BRAKE LIGHT SWITCH		I		I		I		I	3-17
*	HEADLIGHT AIM		I		I		I		I	3-17
	CLUTCH FLUID	MONTH I 2 YEARS *R	I	I	I	*R	i	I	*R	3-17
	CLUTCH SYSTEM		I		I		I		I	3-17
	SIDE STAND				I		I		I	3-18
*	SUSPENSION		I		I		I		I	3-18
*	NUTS, BOLTS, FASTENERS		I		I		I		I	3-20
**	WHEELS		I		I		I		I	3-20
**	STEERING HEAD BEARINGS		I		I		I		I	3-20

* 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 THAT THESE ITEMS BE SERVICED ONLY BY AN AUTHORIZED HONDA DEALER.

NOTES: 1. SERVICE MORE FREQUENTLY WHEN RIDING IN DUSTY AREAS.
2. SERVICE MORE FREQUENTLY WHEN RIDING IN RAIN OR AT FULL THROTTLE.
3. FOR HIGHER ODOMETER READINGS, REPEAT AT THE FREQUENCY INTERVAL ESTABLISHED HERE.

FUEL LINES

Remove the seat and left side cover.
Check the fuel lines and replace any parts which show deterioration, damage or leakage.


(1) FUEL LINES

FUEL FILTER

WARNING

Gasoline is flammable and is explosive under certain conditions. Do not smoke or allow flames or sparks in your working area.

Replace the fuel filter with a new one when indicated by the maintenance schedule (page 3-3).

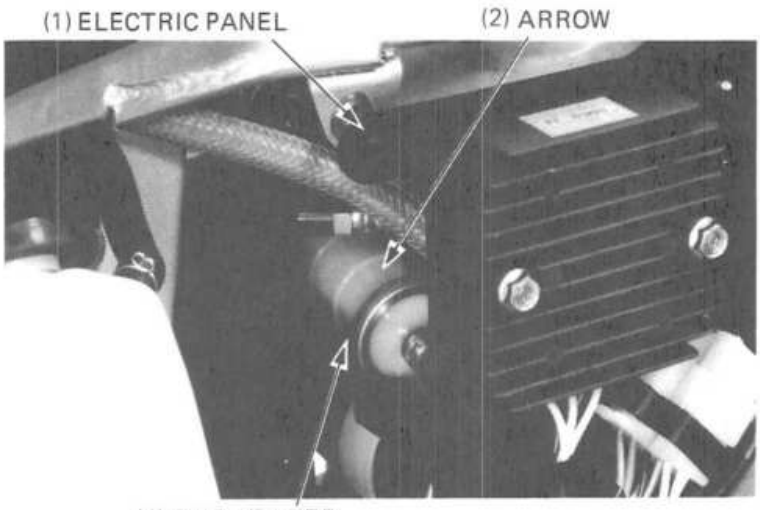
Remove the left side cover.
Remove the electric panel mounting bolts and remove the coolant reserve tank.

Unclip the fuel filter holder from the bottom of the electric panel.

Disconnect the fuel outlet line from the fuel filter.
Pull the fuel filter out then clip the inlet line closed.
Disconnect the fuel inlet line.

Install the fuel filter with its arrow pointing outlet side.

After installing, turn the fuel valve on and check that there are no fuel leaks.



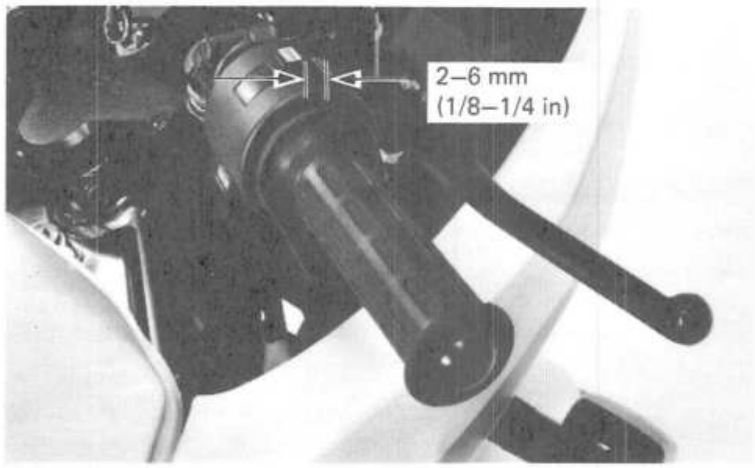
THROTTLE OPERATION

Check that the throttle grip opens smoothly to full throttle and fully closes automatically, in all steering positions.
Check the throttle cables and replace them if they are deteriorated, kinked or damaged.

Lubricate the throttle cables (page 2-11), if throttle operation is not smooth.

Measure throttle grip free play at the throttle grip flange.

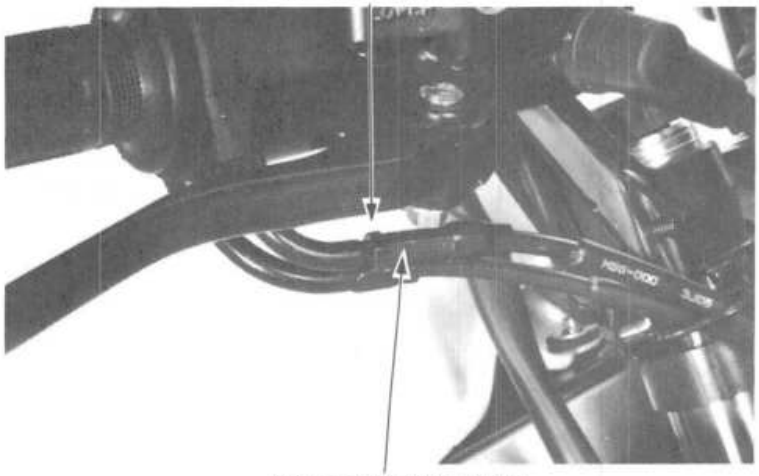
FREE PLAY: 2–6 mm (1/8–1/4 in)



Adjustment can be made at either end of the throttle cable. Minor adjustments are made with the upper adjuster and major adjustments are made with the lower adjuster after removing the fuel tank and air cleaner case.
Adjust the loosening the lock nut and turning the adjuster.
Tighten the lock nut and recheck throttle operation.

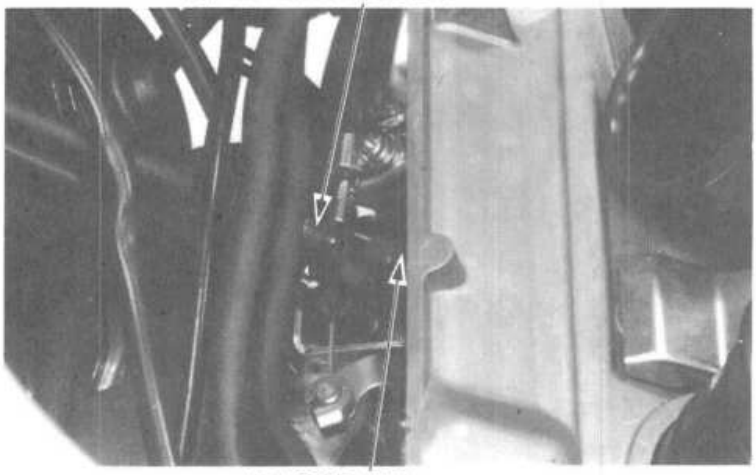
Install the air cleaner case and fuel tank, and check throttle free play once more. Also check for fuel leaks.

(1) LOCK NUT



(2) UPPER ADJUSTER

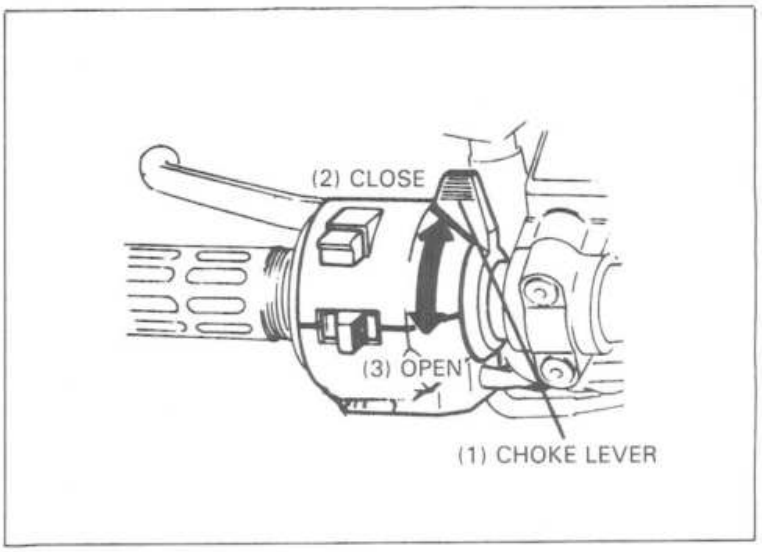
(3) LOWER ADJUSTER



(4) LOCK NUT

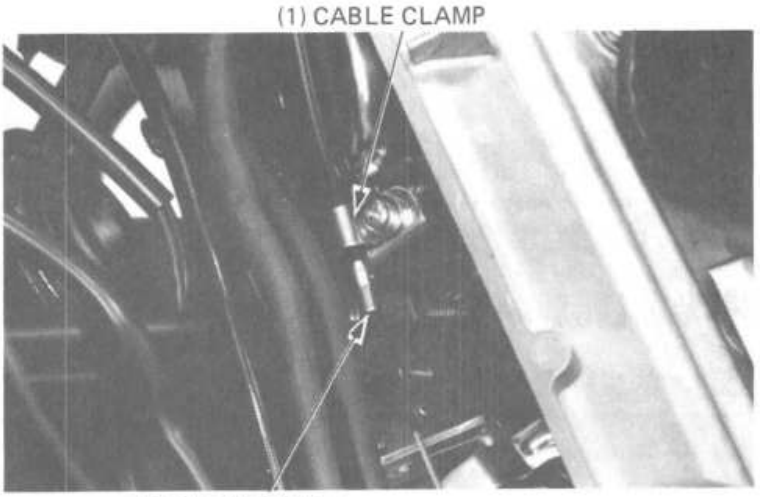
CARBURETOR CHOKE

The choke system uses a fuel enrichening circuit controlled by a bystarter valve. The bystarter valve opens the enrichening circuit via cable when the choke lever on the handlebar is pulled back.
Check for smooth operation of the choke lever. Lubricate the choke cable, if the operation is not smooth.
Pull the choke lever on the handlebar all the way back to the fully open. Make sure the choke valve is open by trying to move the choke lever on the carburetor, after removing the fuel tank and air cleaner case.
There should be no free play.



Adjust if necessary, by loosening the choke cable clamp on the carburetor and moving the choke cable casing so the choke lever is fully open.
Tighten the clamp.

Push the choke lever up all the way to fully closed. Make sure the choke valve is fully closed by checking for free play in the cable between the lever on the carburetor and cable casing.
Reinstall the removed parts in the reverse order of disassembly.



AIR CLEANER

Remove the fuel tank.
Remove the air cleaner case cover screws and the cover.

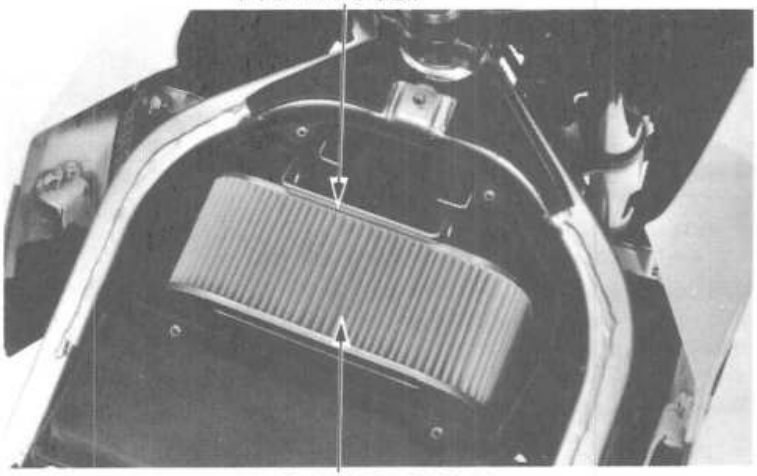


Remove the spring clip and the air cleaner element. Discard the element in accordance with the maintenance schedule.

Also, replace the element any time it is excessively dirty or damaged.

Install a new element and secure it with the spring clip.
Install the air cleaner cover and fuel tank.

(1) SPRING CLIP



(2) AIR CLEANER ELEMENT

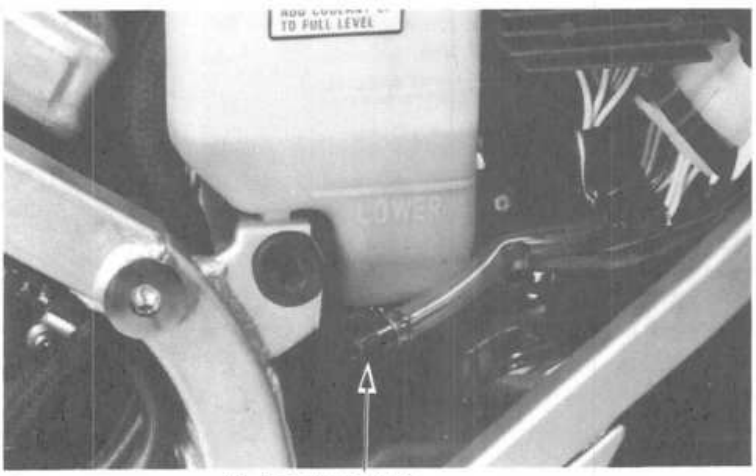
CRANKCASE BREATHER

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

Install the drain plug.

NOTE

> Service more frequently when riding in rain or at full throttle, or if the deposit level can be seen in the transparent section of the drain tube.



(1) DRAIN PLUG

SPARK PLUGS

RECOMMENDED SPARK PLUGS

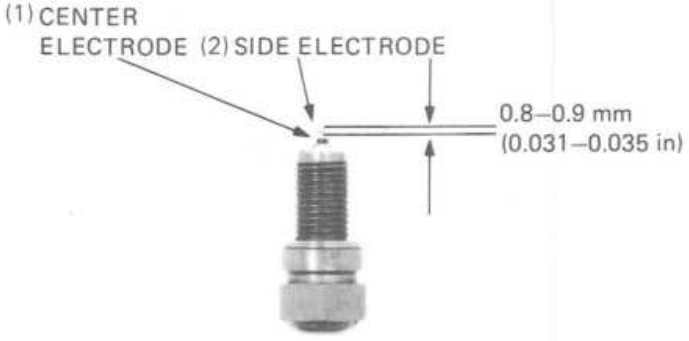
< >: U

	NGK	ND
Standard	DPR8EA-9 <DP8EA-9>	X24EPR-U9 <X24EP-U9>
For cold Climate (Below 5°C, 41°F)	DPR7EA-9 <DP7EA-9>	X22EPR-U9 <X22EP-U9>
For extended high speed riding	DPR9EA-9 <DP9EA-9>	X27EPR-U9 <X27EP-U9>

Disconnect the spark plug caps.
Clean any dirt from around the spark plug bases.
Remove the spark plug.
Visually inspect the spark plug.
Discard the spark plug if the insulator is cracked or chipped.
Measure the spark plug gap with a wire-type feeler gauge.

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

Adjust 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.
Connect the spark plug caps.



T

VALVE CLEARANCE

MAINTENANCE

NOTE

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

Remove the lower cowl.
Drain coolant from engine (page 6-3).

NOTE

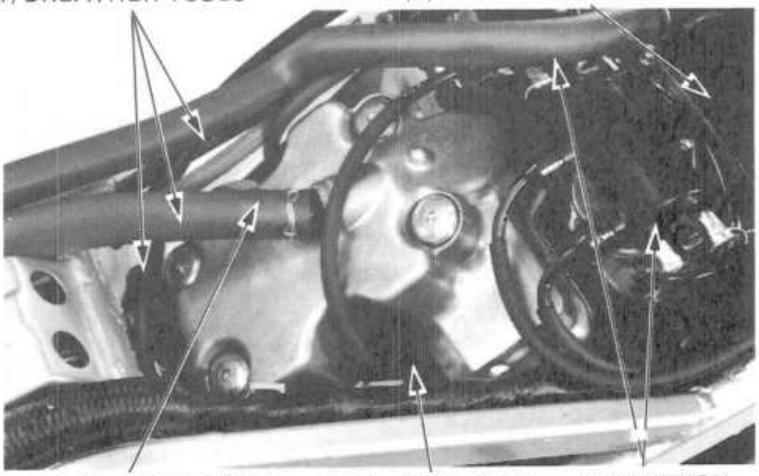
> Drain the coolant into a clean container for reuse. Scheduled coolant replacement is every 24,000 miles (38,400 km).

Remove the seat and remove the left and right side covers.
Turn the fuel valve off and remove the fuel tank.
Remove the lower radiator (page 6-5).
Remove the spark plug caps.

Disconnect the breather tubes from the rear cylinder head cover and air cleaner case.
Remove the air cleaner case (page 4-3).
Remove the ignition coils (page 19-4).

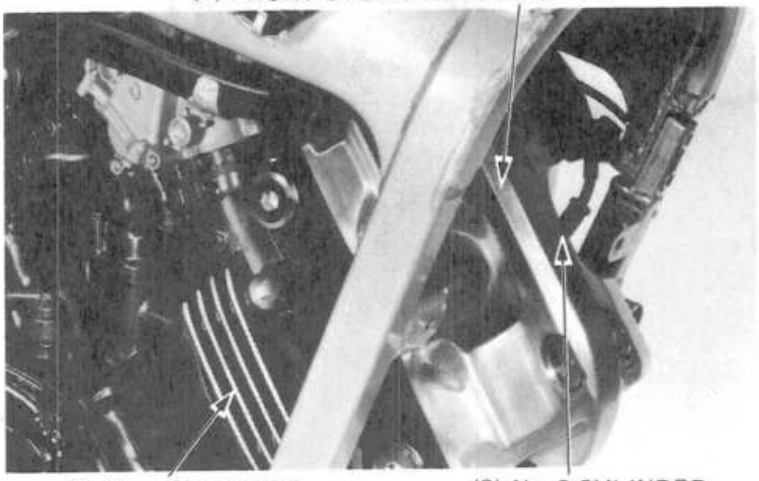
Remove the front and rear cylinder head cover bolts and both cylinder head covers.
Remove the alternator cover.

(1) BREATHER TUBES (2) AIR CLEANER CASE



(3) No. 1 CYLINDER (4) No. 3 CYLINDER (5) IGNITION COILS

(1) FRONT CYLINDER HEAD COVER



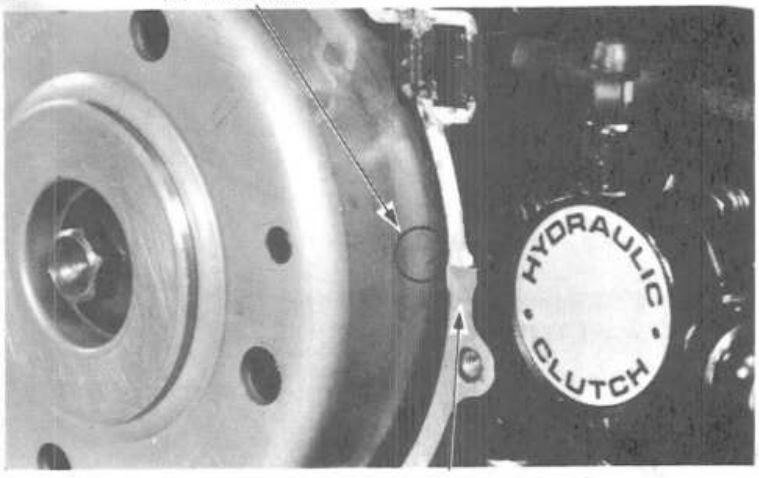
(2) No. 4 CYLINDER (3) No. 2 CYLINDER

INSPECTION

Measure and adjust the intake and exhaust valve clearances as described below.

Rotate the crankshaft clockwise to align the T1.3 mark with the crankcase mating surfaces.
Make sure the No. 1 piston is at TDC (Top Dead Center) on the compression stroke.

(1) T1.3 MARK

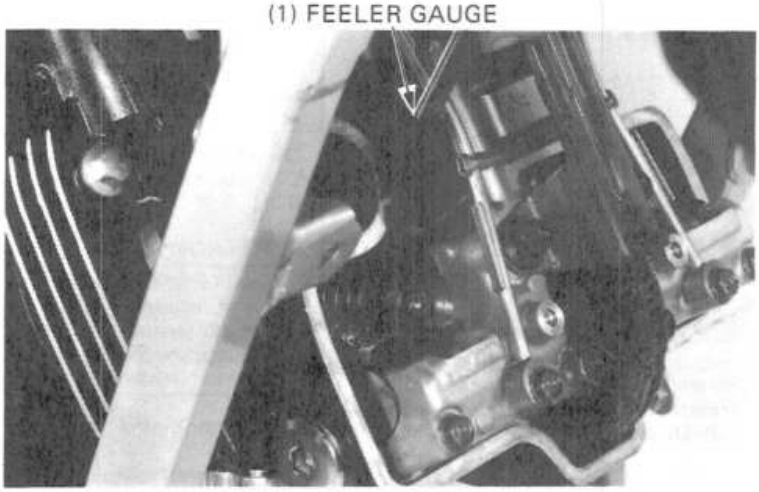


(2) REAR CRANKCASE MATING SURFACE

Check the valve clearances for the No. 1 cylinder using two feeler gauges for each pair of valves; one for each valve that shares a common rocker arm.

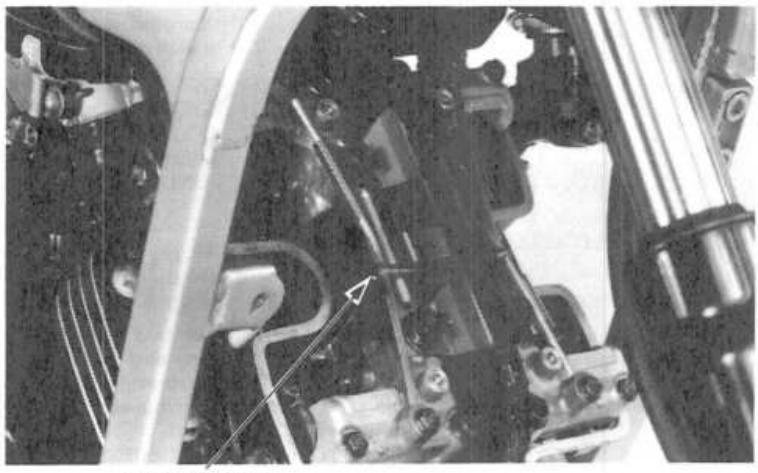
VALVE CLEARANCE (IN, EX):
0.12 mm (0.005 in)

(1) FEELER GAUGE



ADJUSTMENT

If adjustment is necessary, remove the eight oil pipe bolt and the oil pipe.



(1) OIL PIPE

(1) VALVE ADJUSTING WRENCH
07908–MB00100

Loosen the lock nuts and turn the adjusting screws until there is a slight drag on both feeler gauges. Both feeler gauges should remain inserted during adjustment.

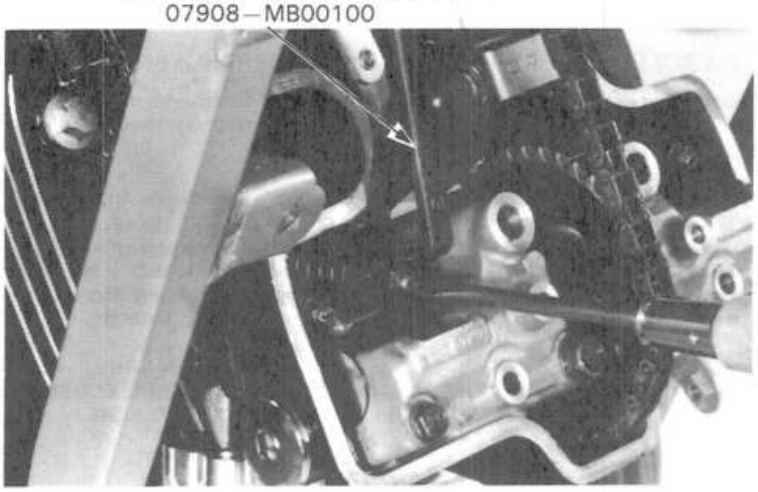
Hold the adjusting screws and tighten the lock nuts.

TORQUE: 21–25 N·m (2.1–2.5 kg-m, 15–18 ft-lb)

CAUTION

The lock nuts will come loose if not tightened to the correct torque value.

Recheck the valve clearance.



Rotate the crankshaft 90° counterclockwise to align the T2.4 mark with the crankcase mating surfaces and check the valve clearances for the No. 4 cylinder.

Adjust using the procedures for the No. 1 cylinder.

Rotate the crankshaft 270° counterclockwise to align the T1.3 mark with the crankcase mating surfaces and check the valve clearances for the No. 3 cylinder.

Adjust using the procedures for the No. 1 cylinder.

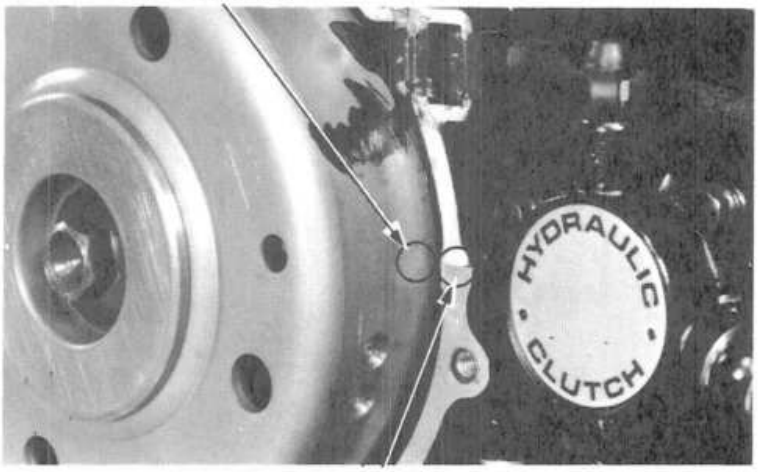
Rotate the crankshaft 90° counterclockwise to align the T2.4 mark with the crankcase mating surfaces and check the valve clearances for the No. 2 cylinder.

Adjust using the same procedures as for the No. 1 cylinder.

Install the oil pipes with their shorter pipe ends toward the exhaust sides.
Install the 9 mm and 6 mm bolts and tighten the 9 mm bolts first, then the 6 mm bolts.

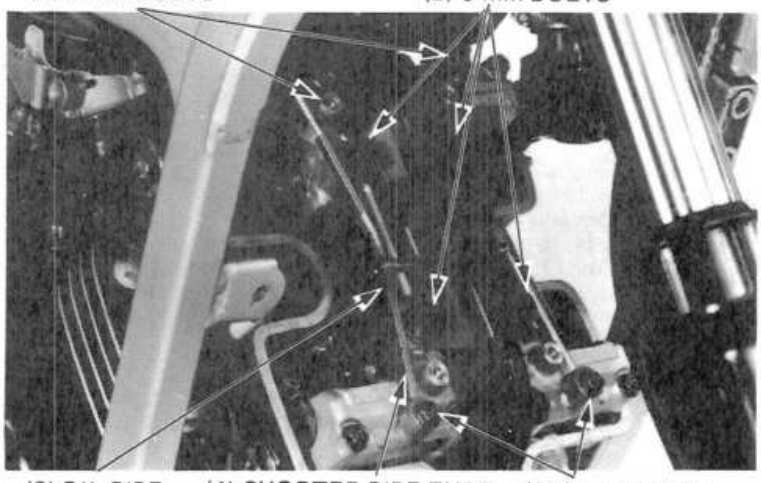
TORQUE:
9 mm – 43–47 N·m (4.3–4.7 kg-m, 31–34 ft-lb)
6 mm – 10–14 N·m (1.0–1.4 kg-m, 7–10 ft-lb)

(1) T2.4 MARK



(2) CRANKCASE MATING SURFACE

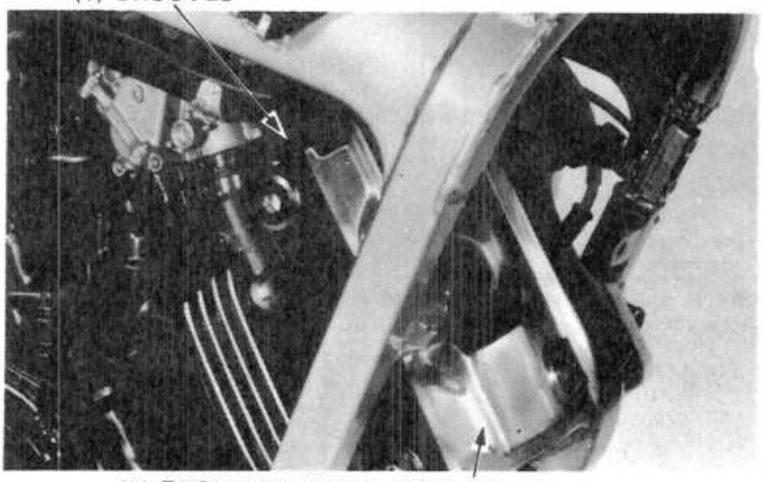
(1) 6 mm BOLTS (2) 9 mm BOLTS



(3) OIL PIPE (4) SHORTER PIPE ENDS (2) 6 mm BOLTS

Install the front cylinder head cover with its insulator grooves facing up and tighten the cover bolts.

(1) GROOVES

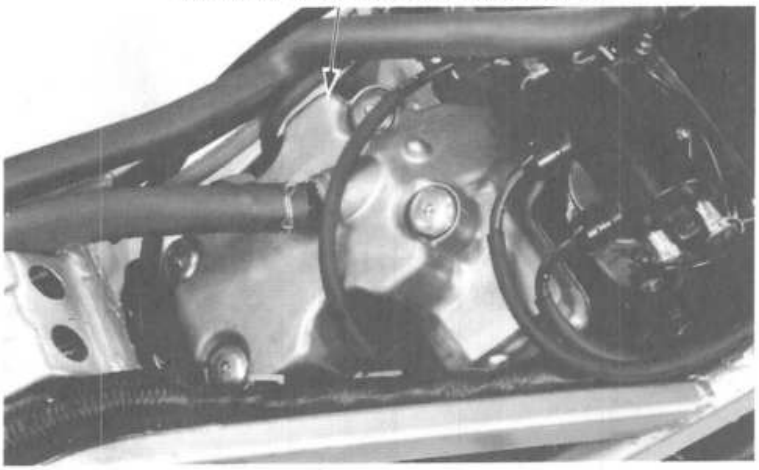


(2) FRONT CYLINDER HEAD COVER

Install the rear cylinder head cover and tighten the cover bolts.
Install the removed parts in the reverse order of removal.

Fill the cooling system (page 6-3).

(1) REAR CYLINDER HEAD COVER



CARBURETOR SYNCHRONIZATION

NOTE

> Synchronize the carburetors with the engine at normal operating temperature, transmission in neutral and motorcycle on the centerstand.

Remove the plugs from the No. 1, 2, 3 and 4 cylinder head ports and install the vacuum gauge adapters.

Connect the vacuum gauges.

(1) NO. 2 CYLINDER HEAD PORT

(2) NO. 1 CYLINDER HEAD PORT



Start the engine and adjust the idle speed.

IDLE SPEED: 1,000 ± 100 min^{-1} (rpm)

Check that all carburetors are within 60 mm (2.4 in) Hg.

(1) VACUUM GAUGE 07404–0020000

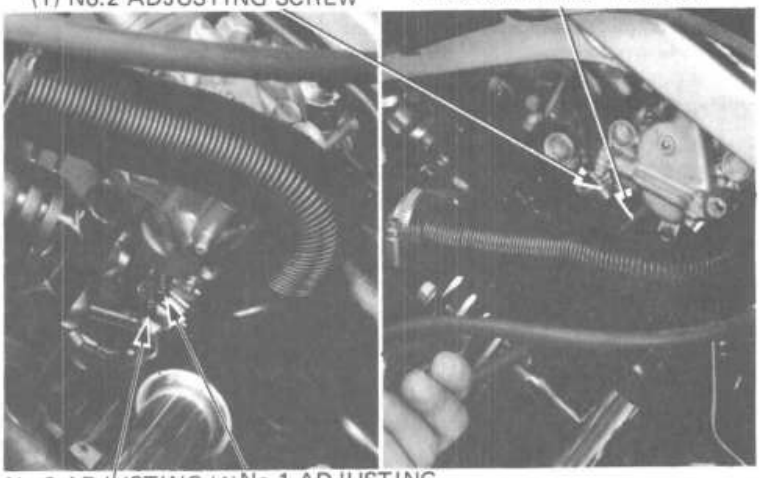


(2) ADAPTERS

Synchronize to specification by turning the adjusting screws with a carburetor pilot screw wrench (07908–4220201).

NOTE

The No. 4 carburetor cannot be adjusted; It is the base carburetor.



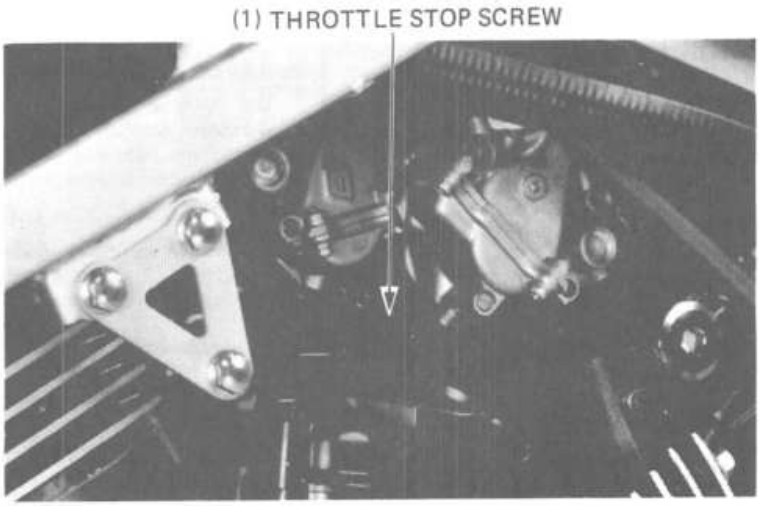
CARBURETOR IDLE SPEED

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

IDLE SPEED: 1,000 ± 100 rpm



RADIATOR COOLANT

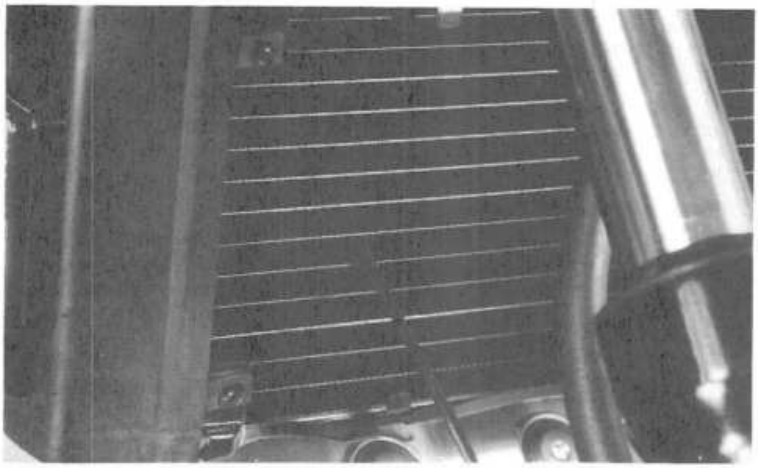
Remove the frame left side cover.

Check the coolant level of the reserve tank with the engine running at normal operating temperature.
The level should be between the "UPPER" and "LOWER" level lines.
If necessary, remove the reserve tank cap and fill to the "UPPER" level line with a 50/50 mixture of distilled water and anti-freeze.
Reinstall the cap and frame side cover.



RADIATOR CORE

Check the air passages for clogging or damage.
Straighten bent fins and collapsed core tubes.
Remove insects, mud or any obstruction with compressed air or low water pressure.
Replace the radiator if the air flow is restricted over more than 20% of the radiating surface.



COOLING SYSTEM HOSES & CONNECTIONS

Inspect the hoses for cracks or deterioration, and replace if necessary.
Check the tightness of all hose clamps.



CYLINDER COMPRESSION

Warm up the engine.
Stop the engine, then disconnect the spark plug caps and remove the spark plugs.
Insert the compression gauge.
Open the throttle all the way and crank the engine with the starter motor.

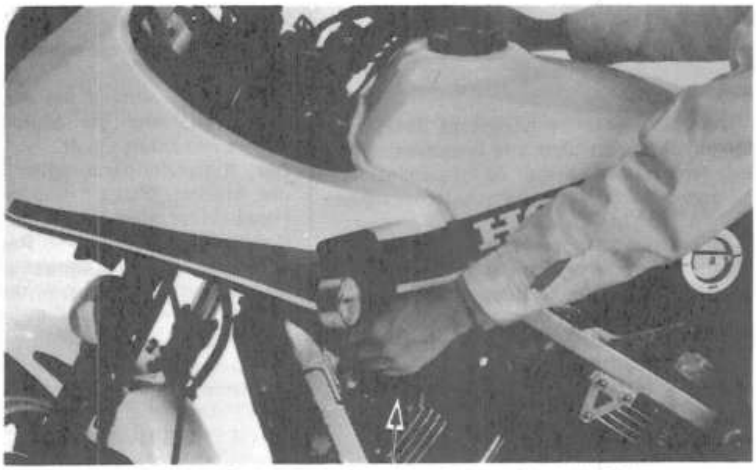
NOTE

> Crank the engine until the gauge reading stops rising. The maximum reading is usually reached within 4-7 seconds.

COMPRESSION PRESSURE:
1,300 ± 200 kPa (13.0 ± 2.0 kg/cm², 185 ± 28 psi)

If compression is low, check for the following:
- Improper valve clearance
- Leaky valves
- Leaking cylinder head gasket
- Worn piston/ring/cylinder

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



(1) COMPRESSION GAUGE ATTACHMENT
07510–MB00101

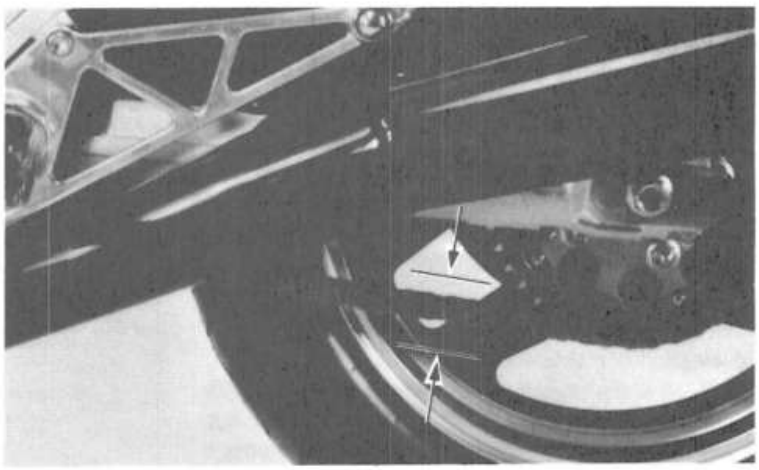
DRIVE CHAIN

Turn the engine off, place the motorcycle on its center stand and shift the transmission into neutral. Check slack in the drive chain lower run midway between the sprockets.

SLACK: 15–25 mm (5/8–1 in)

CAUTION

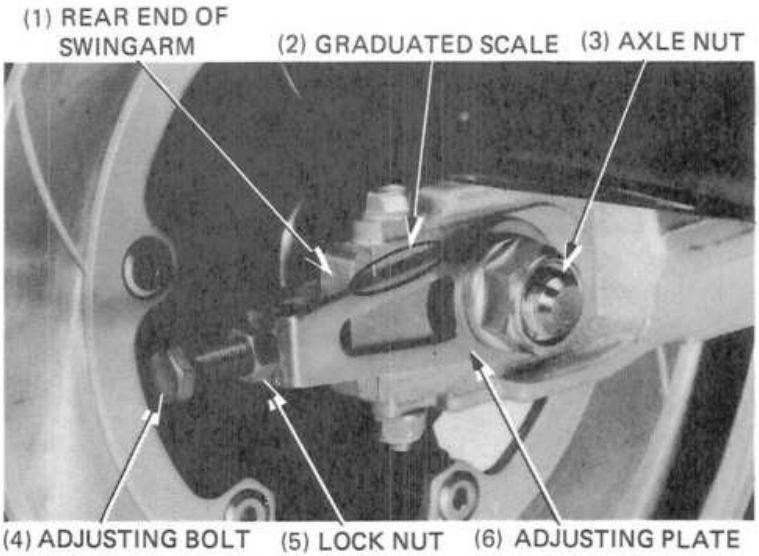
Excessive chain slack, 50 mm (2 in) or more, may damage the frame.



Adjust as follows:
Loosen the axle nut.
Loosen the adjusting bolt lock nuts.
Turn both adjusting bolts an equal number of turns until the correct drive chain slack is obtained.

CAUTION

Make sure that the same alignment marks on both adjusting plates align with the ends of the swingarm.



Tighten the adjusting bolt lock nuts.

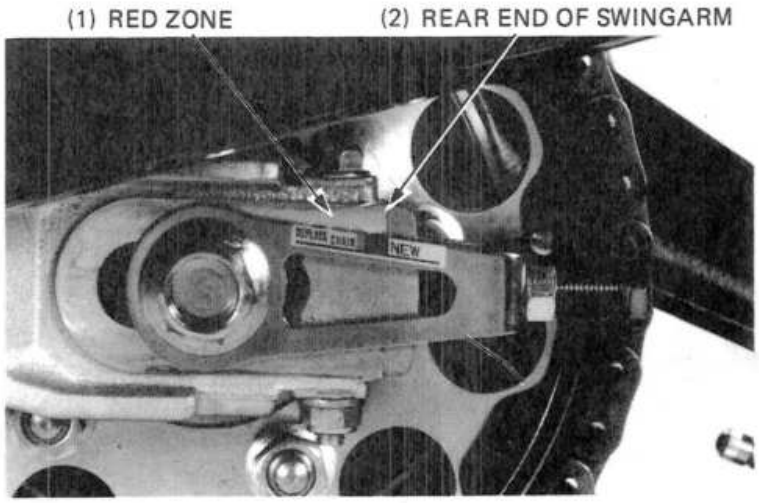
Tighten the rear axle nut.

TORQUE: 85–105 N·m (8.5–10.5 kg-m, 61–76 ft-lb)

Recheck chain slack and free wheel rotation.
Lubricate the drive chain with SAE 80 or 90 gear oil.

Check the chain wear label. If the red zone on the label align, or is beyond, the rear end of the swingarm after the chain has been adjusted, the chain must be replaced.

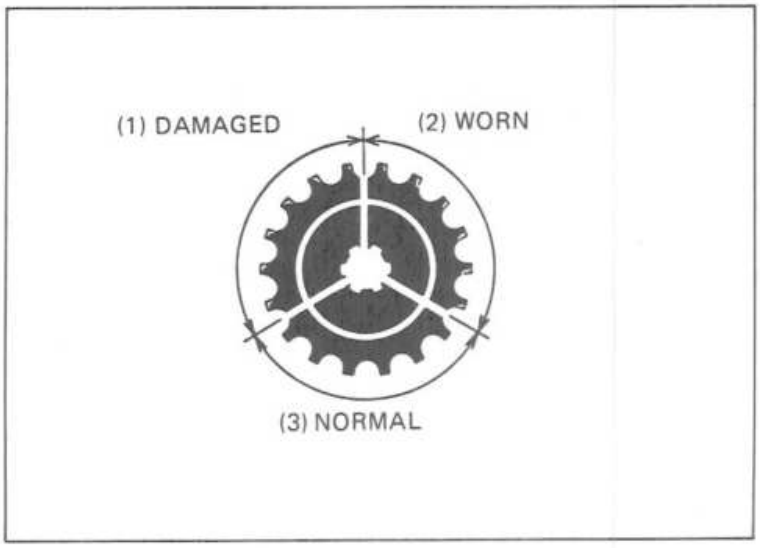
REPLACEMENT CHAIN: D.I.D. 50V or RK50MO



Inspect the drive chain and sprockets for damage or wear. A drive chain with damaged rollers, loose pins, or missing O-rings must be replaced. Replace any sprocket which is damaged or excessively worn.

NOTE

Never install a new drive chain on worn sprochets or a worn drive chain on new sprockets. Both chain and sprockets must be in good condition or the replacement chain or sprockets will wear rapidly.

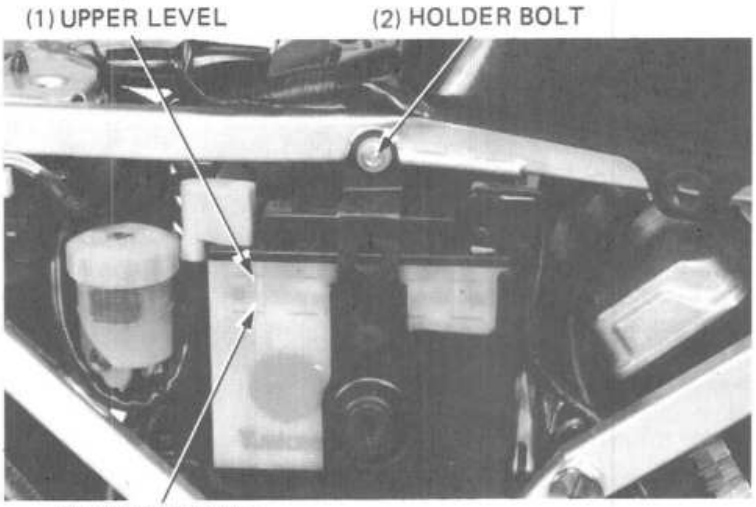


Lubrication and cleaning:
The drive chain on this motorcycle is equipped with small O-rings between the link plates. The O-rings can be damaged by steam cleaner, high pressure washers, and certain solvents.
Clean the chain with kerosene. Wipe dry and lubricate only with SAE 80 or 90 gear oil. Commercial chain lubricants may contain solvents which could damage the rubber O-rings.

BATTERY

Remove the right frame side cover and inspect the battery fluid level.
When the fluid level nears the lower level, remove the battery and add distilled water to the upper level line as follows:

Remove the battery holder bolt, then swing the holder out of the way.



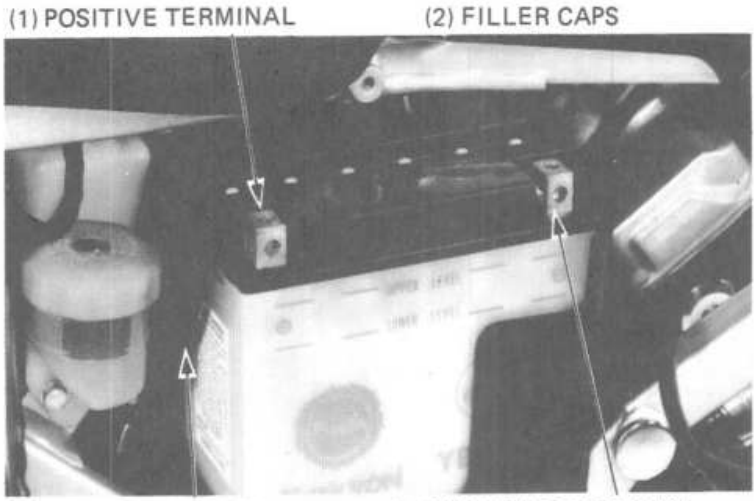
Disconnect the negative cable at the battery, then disconnect the positive cable.
Disconnect the battery breather hose from the battery.
Pull the battery out, remove the filler caps and add distilled water to the upper level line.
Reinstall the filler caps and the battery.

NOTE

Add only distilled water. Tap water will shorten the service life of the battery.

WARNING

The battery electrolyte contains sulphuric acid. Protect your eyes, skin, and clothing. If electrolyte gets in your eyes, flush them thoroughly with water and get prompt medical attention.



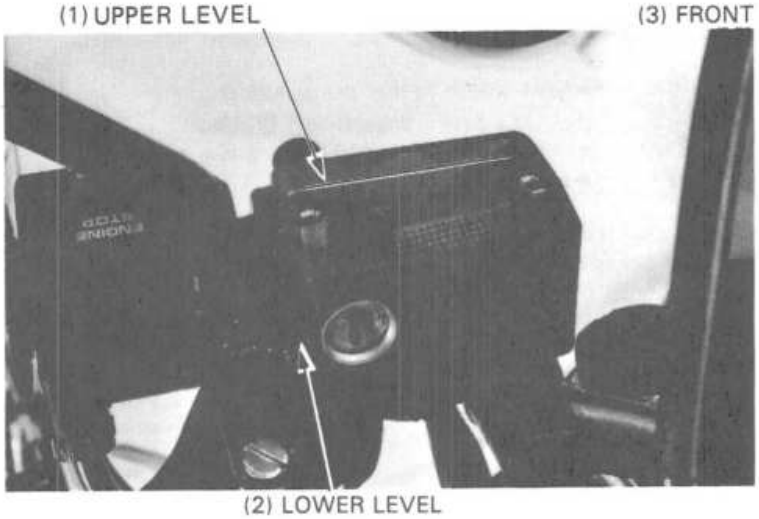
BRAKE FLUID

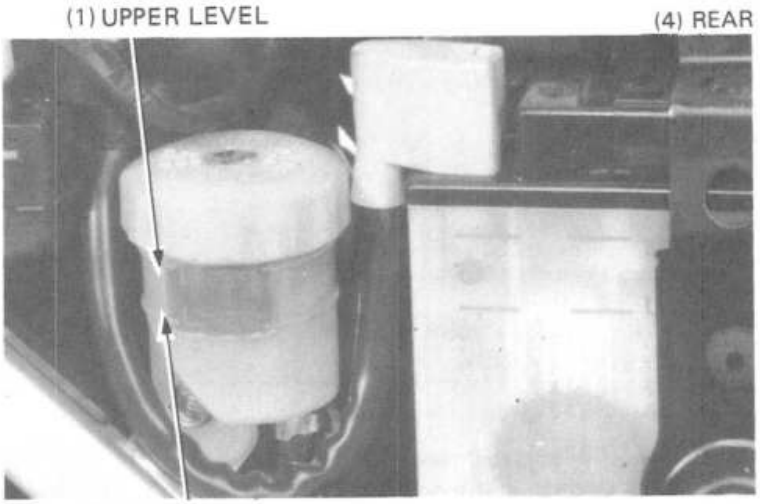
Check the front brake fluid reservoir level.
If the level nears the lower level mark, fill the reservoir with **DOT 4 BRAKE FLUID** to the upper level mark.
Check the entire system for leaks, if the level is low.

CAUTION

- *Do not remove the cover until the handlebar has been turned so that the reservoir is level.*
- *Avoid operating the brake lever with the cap removed. Brake fluid will squirt out if the lever is pulled.*
- *Do not mix different types of fluid, as they are not compatible.*

Refer to section 17 for brake bleeding procedures.





BRAKE PAD WEAR

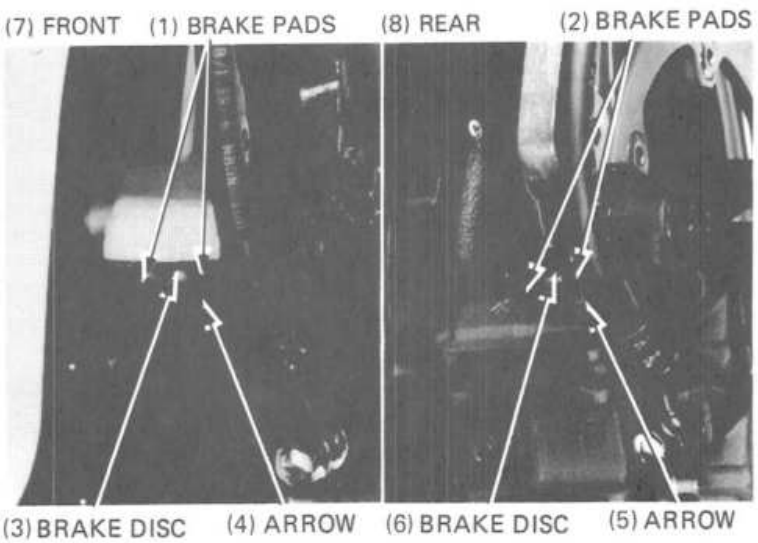
Check the brake pads for wear by looking through the slot indicated by the arrow cast on the caliper assembly.
Replace the brake pads if the wear line on the pads reaches the edge of the brake disc (page 17-5).

CAUTION

Always replace the brake pads in pairs to assure even disc pressure.

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.

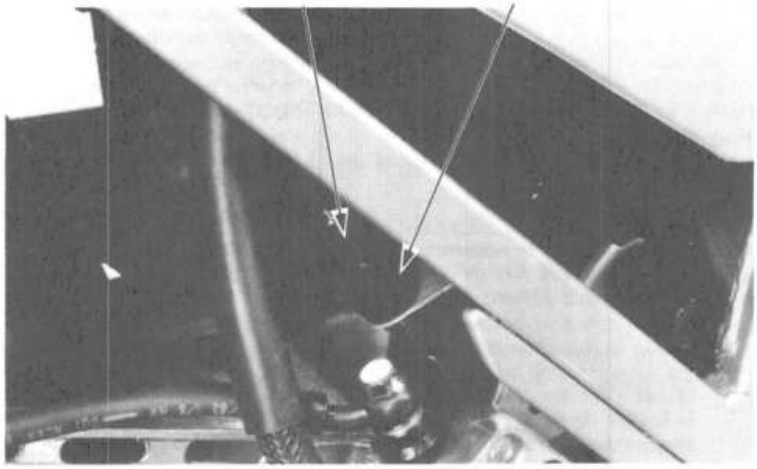


BRAKE LIGHT SWITCH

Adjust the brake light switch so that the brake light will come on when the brake engagement begins. Adjust by holding the switch body and turning the adjusting nut. Do not turn the switch body.

Turn the adjusting nut clockwise if the brake light comes on too late.

(1) BRAKE LIGHT SWITCH (2) ADJUSTING NUT



HEADLIGHT AIM

Adjust vertically by turning the vertical adjusting screw. Turn the adjusting screw clockwise to direct the beam down.

Adjust horizontally by turning the horizontal adjusting screw. Turn the adjusting screw clockwise to direct the beam toward the right side of the rider.

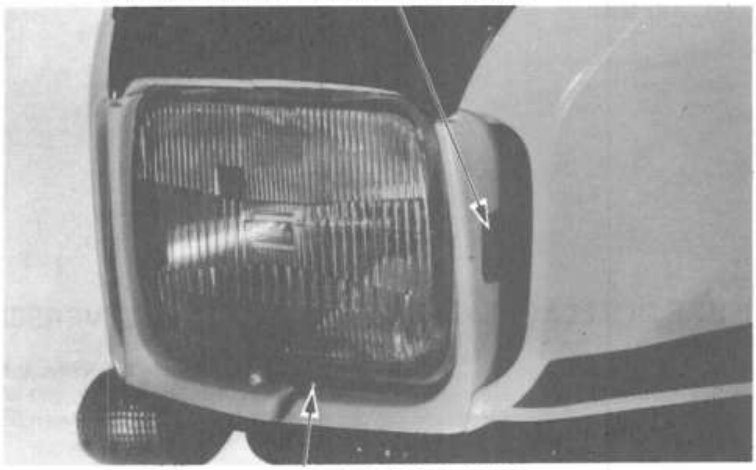
NOTE

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.

(1) HORIZONTAL ADJUSTING SCREW



(2) VERTICAL ADJUSTING SCREW

CLUTCH

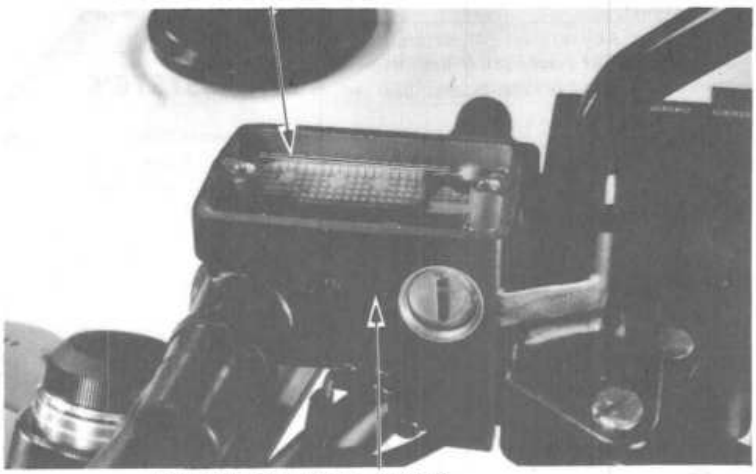
Check the clutch fluid reservoir level.

If the level nears the lower level mark, fill the reservoir with **DOT 4 BRAKE FLUID** until the level is between the upper and lower level mark.
Check the entire system for leaks, if the level is low.

CAUTION

- *Do not remove the cover until the handlebar has been turned so that the reservoir is level.*
- *Avoid operating the clutch lever with the cap removed. Fluid will squirt out if the lever is pulled.*
- *Do not mix different types of fluid, as they are not compatible.*

(1) UPPER LEVEL MARK



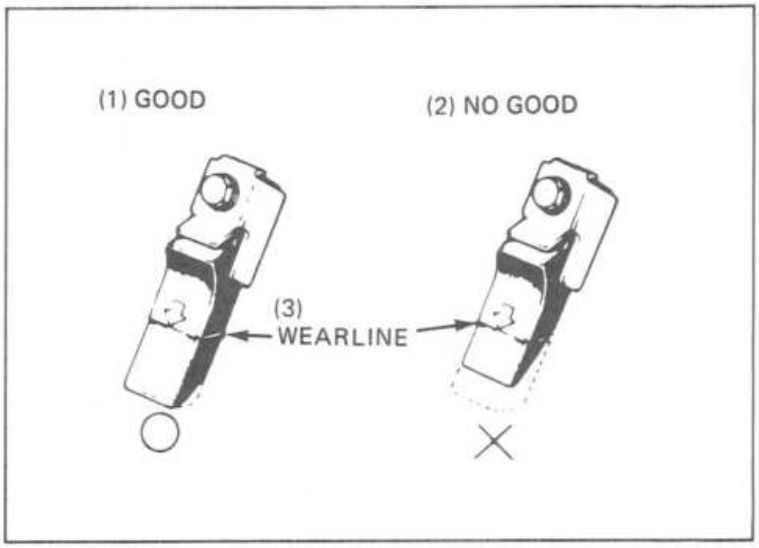
(2) LOWER LEVEL MARK

SIDE STAND

Check the rubber pad for deterioration or wear. Replace if any wear extends to wear line as shown. Check the side stand spring for damage and loss of tension, and the side stand assembly for freedom of movement. Make sure the side stand is not bent.

NOTE

- When replacing, use a rubber pad with the mark "Over 260 lbs ONLY".
- Spring tension is correct if the measurements fall within 2–3 kg (4.4–6.6 lb), when pulling the side stand lower end with a spring scale.



SUSPENSION

WARNING

Do not ride a vehicle with faulty suspension. Loose, worn or damaged suspension parts impair vehicle stability and control.

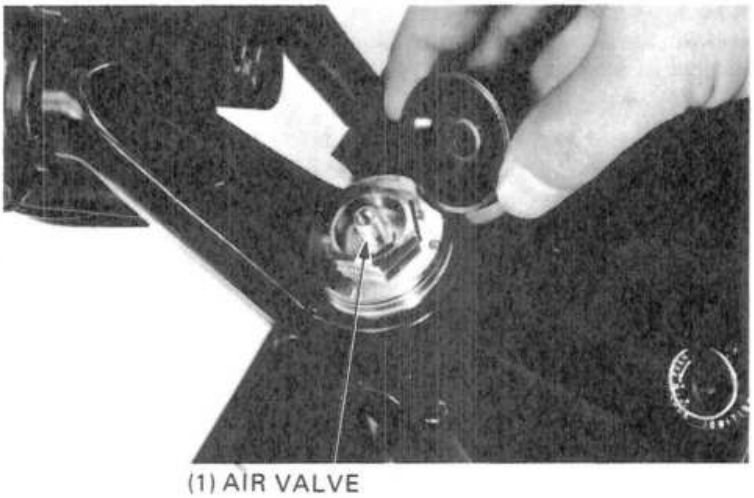


FRONT

Check the action of the front forks by compressing them several times.
Check the entire fork assembly for leaks or damage. Replace damaged components which cannot be repaired.
Tighten all nuts and bolts.

Check the front fork air pressure when the forks are cold.
Place the vehicle on its center stand.
Remove the air valve cap and measure the air pressure.

AIR PRESSURE:
0–40 kPa (0–0.4 kg/cm^2, 0–6 psi)



(1) AIR VALVE

ANTI-DIVE SYSTEM INSPECTION

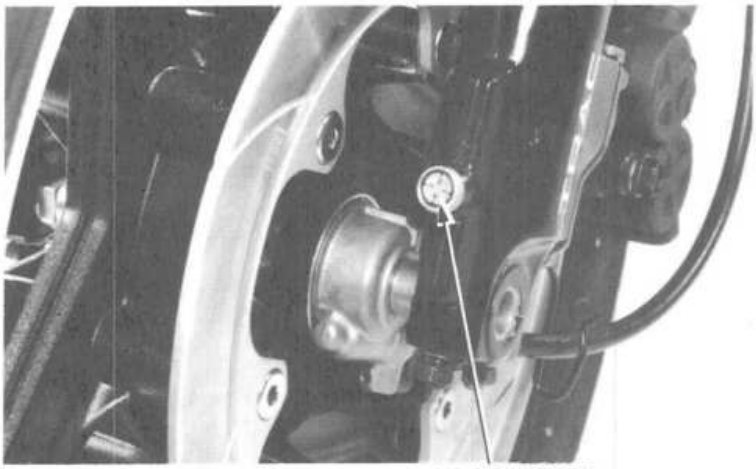
WARNING

Select a safe place away from traffic to perform this inspection.

Check the operation of the anti-dive system by riding the motorcycle and firmly applying the brakes.

Position	Anti-dive damper force
1	LIGHT ANTI-DIVE
2	MEDIUM
3	HARD
4	MAXIMUM ANTI-DIVE

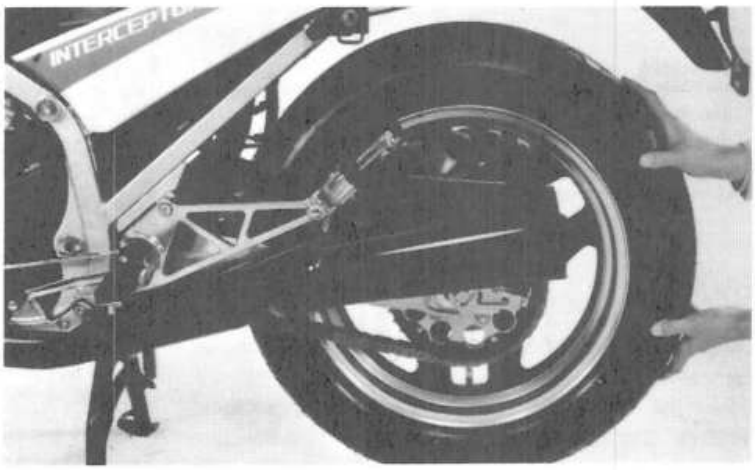
Inspect and if necessary, repair the system (Refer to section 15).



(1) ADJUSTER

REAR

Place the motorcycle on its center stand.
Move the rear wheel sideways with force to see if the swingarm bearings are worn.
Replace the bearings if there is any looseness (page 16-14).
Check the shock absorber for leaks or damage.
Tighten all rear suspension nuts and bolts.

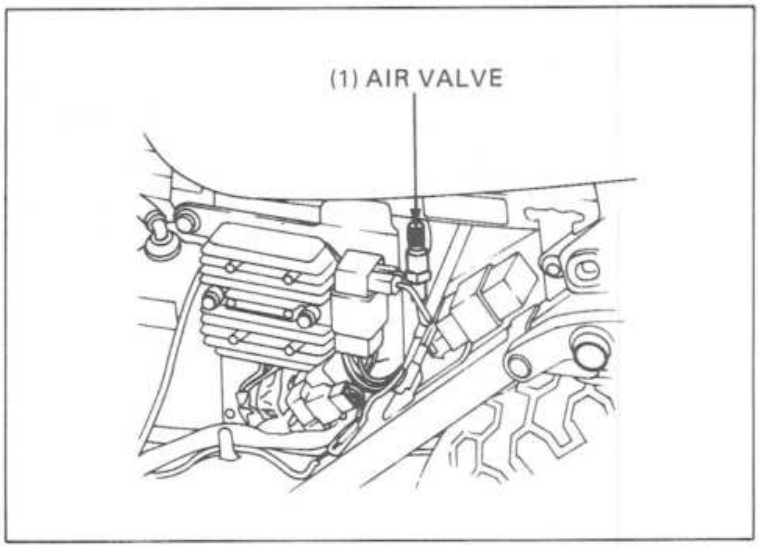


Remove the frame left side cover.
Remove the valve cap and measure the shock absorber air pressure.

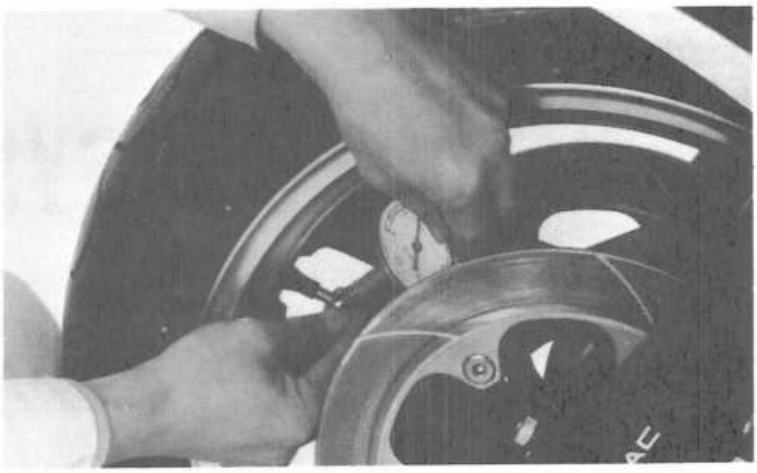
REAR SHOCK ABSORBER AIR PRESSURE:
0–300 kPa (0–3.0 kg/cm², 0–43 psi)

NOTE

Check the air pressure when the shock absorber is cold.



NUTS, BOLTS, FASTENERS



Check that all chassis nuts and bolts are tightened to their correct torque values (Section 1) at the intervals shown in the Maintenance Schedule (Page 3-3).
Check all cotter pins, safety clips, hose clamps and cable stays.

WHEELS

NOTE

> Tire pressure should be checked when tires are COLD.

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

RECOMMENDED TIRES AND PRESSURES:

		Front	Rear
Tire size		120/80V16–V250	140/80V17–V250
Cold tire pressure psi kPa, (kg/cm², psi)	Up to 90 kg (200 lbs) load	250 (2.5, 36)	290 (2.9, 42)
	90 kg (200 lbs) load to vehicle capacity load	250 (2.5, 36)	290 (2.9, 42)
Tire brand	BRIDGESTONE	G511	G510
	DUNLOP	K500	K500

Check the front and rear wheels for trueness (Section 15 and 16).
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 (1/16 in)
Rear: 2.0 mm (3/32 in)



STEERING HEAD BEARINGS

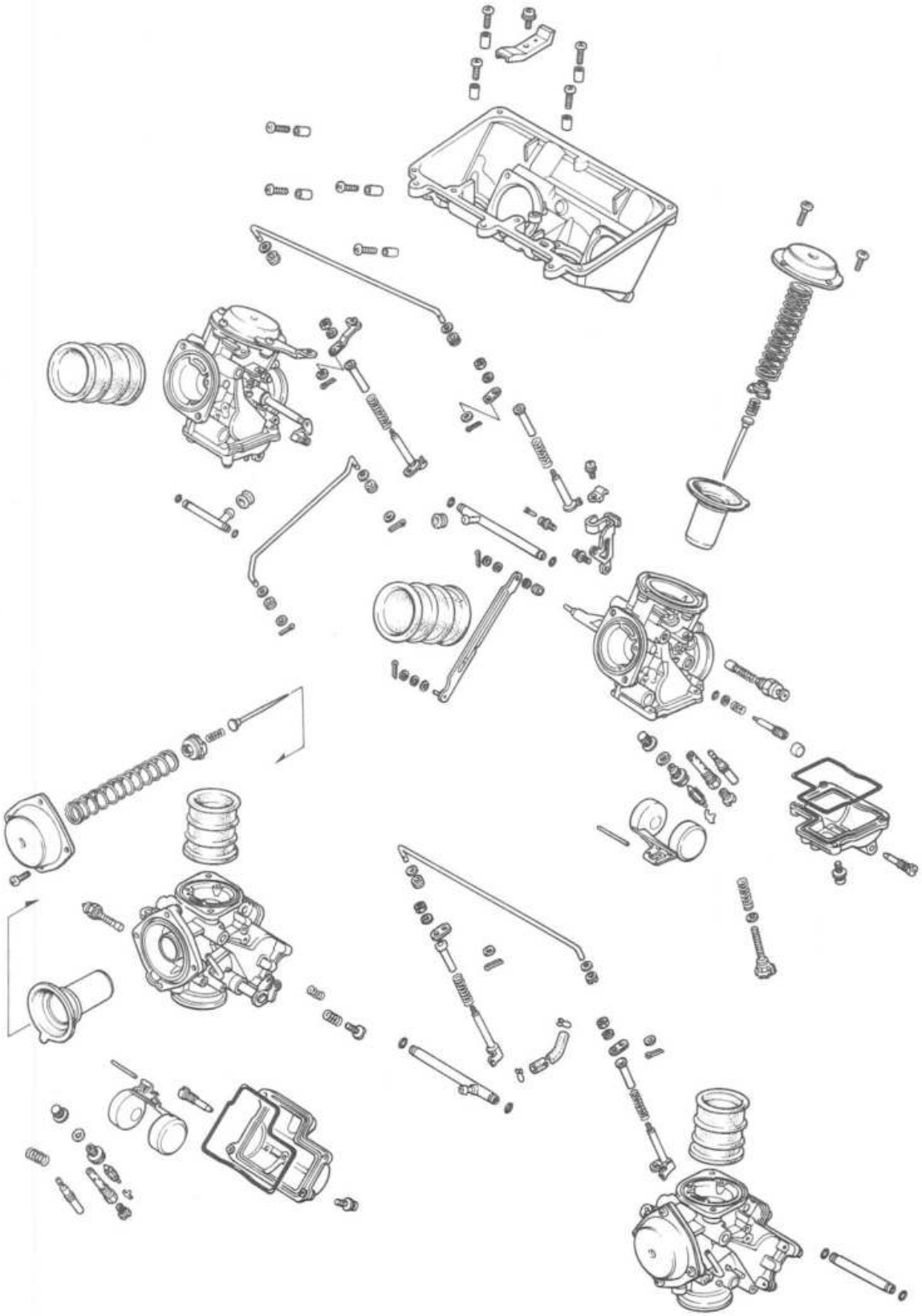
NOTE

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

Raise the front wheel off the ground and check that the handlebar rotates freely.

If the handlebar moves unevenly, binds, or has vertical movement, adjust the steering head bearing by turning the steering head adjusting nut (page 15-33).

FUEL SYSTEM



SERVICE INFORMATION	4–1	CARBURETOR ASSEMBLY	4–11
TROUBLESHOOTING	4–2	CARBURETOR INSTALLATION	4–14
CARBURETOR REMOVAL	4–3	PILOT SCREW ADJUSTMENT	4–15
VACUUM CHAMBER	4–4	FUEL TANK	4–16
FLOAT CHAMBER	4–6	AIR CLEANER	4–17
PILOT SCREW	4–8	FUEL PUMP	4–18
CARBURETOR SEPARATION	4–9		

SERVICE INFORMATION

GENERAL

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 work area.

- The front cylinders use down draft carburetors.
- When disassembling fuel system parts, note the locations of the O-rings. Replace them with new ones on reassembly.
- The float bowls have drain screws that can be loosened to drain residual gasoline.
- Fuel pump inspection is in section 20.
- The No. 1 and No. 3 carburetors use different jet needles (thinner) and shorter springs than the No. 2 and No. 4 carburetors Do not interchange these parts.

TOOLS

Common

Float level gauge	07401–0010000

SPECIFICATIONS

[ ]: SW ( ): G

Item		Specifications
Carburetor type		KEIHIN VD
Throttle bore		36 mm (1.42 in)
Venturi bore	Primary	12.2 mm (0.48 in)
	Secondary	34 mm (1.34 in) [28.8 mm (1.13 in)] (31.5 mm (1.24 in))
Identification No.		VD82A [VD82B] (VD82D)
Float level		7.5 mm (0.30 in)
Main jet		Front: #150, Rear: #145 [Front: #138, Rear: #135]
Idle speed		1,000 ± 100 rpm
Throttle grip free play		2–6 mm (0.08–0.24 in)
Pilot screw initial opening		See page 4-15

TROUBLESHOOTING

Engine cranks but won't start
1. No fuel in tank
2. No fuel to carburetors
3. Engine flooded with fuel
4. No spark at plug (ignition system faulty)
5. Air cleaner clogged
6. Intake air leak
7. Improper choke operation
8. Improper throttle operation

Hard starting or stalling after starting
1. Improper choke operation
2. Ignition malfunction
3. Carburetor faulty
4. Fuel contaminated
5. Intake air leak
6. Idle speed incorrect

Rough idle
1. Ignition system faulty
2. Idle speed incorrect
3. Incorrect carburetor synchronization
4. Carburetor faulty
5. Fuel contaminated

Misfiring during acceleration
1. Ignition system faulty

Backfiring
1. Ignition system faulty
2. Carburetor faulty

Poor performance (driveability) and poor fuel economy
1. Fuel system clogged
2. Ignition system faulty

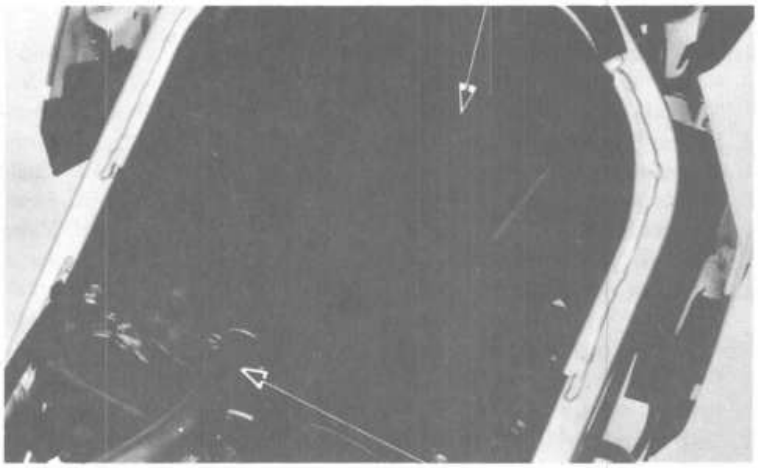
Lean mixture
1. Clogged fuel jets
2. Faulty float valve
3. Float level low
4. Fuel cap vent blocked
5. Fuel strainer screen clogged
6. Restricted fuel line
7. Air vent tube clogged
8. Intake air leak
9. Restricted or faulty fuel pump

Rich mixture
1. Clogged air jets
2. Vacuum piston stuck closed
3. Faulty float valve
4. Float level too high
5. Choke stuck or clogged
6. Dirty air cleaner

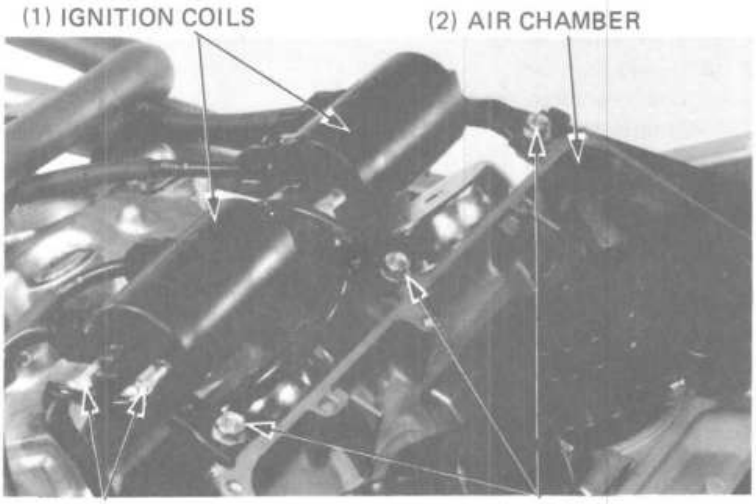
CARBURATOR REMOVAL

Turn the fuel valve off.
Remove the left and right side covers.
Remove the seat and fuel tank.
Remove the fairing.
Disconnect the breather hose and remove the air cleaner case by removing five screws.

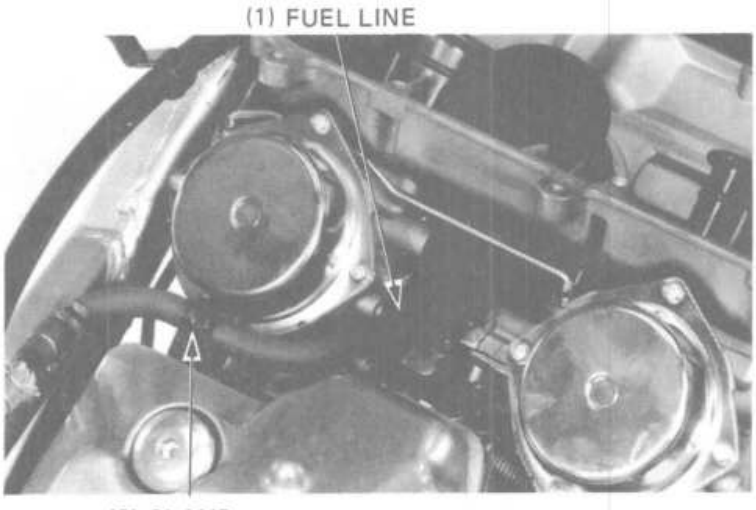
Remove the heat insulator plate.



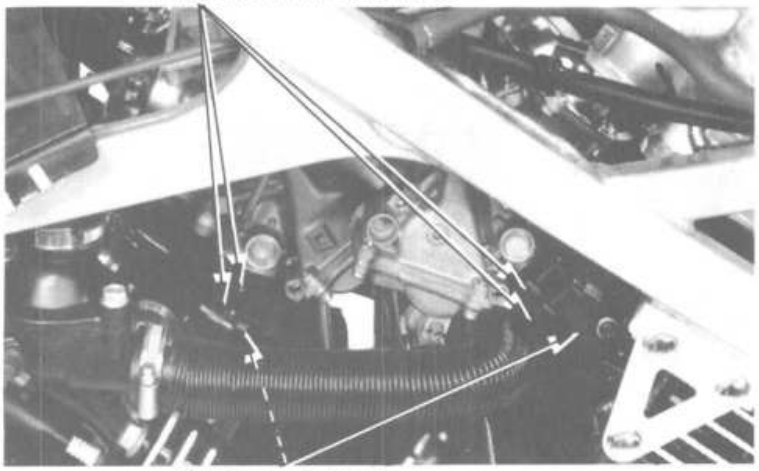
Remove the spark plug caps from the plugs.
Disconnect the ignition coil primary wires from the coils.
Remove the three ignition coil bracket bolts and the coils/brackets from the air chamber.



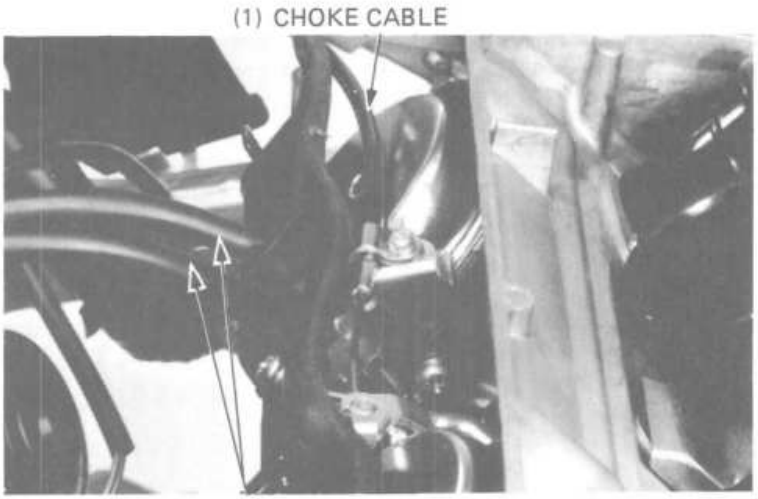
Disconnect the fuel line from the carburetor and remove it from the clamp on the carburetor.



Loosen all carburetor bands and remove the carburetor assembly from the intake pipes.



Lift the carburetors out of the frame and disconnect the choke and throttle cables from the carburetor.



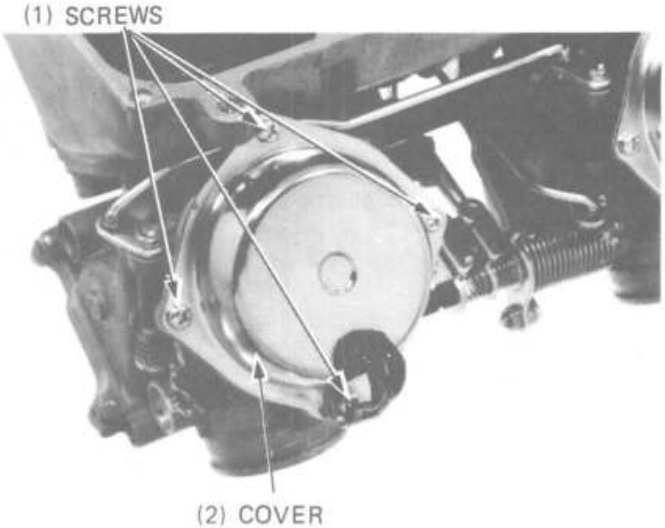
VACUUM CHAMBER

REMOVAL

Remove the four vacuum chamber cover screws and cover.

CAUTION:

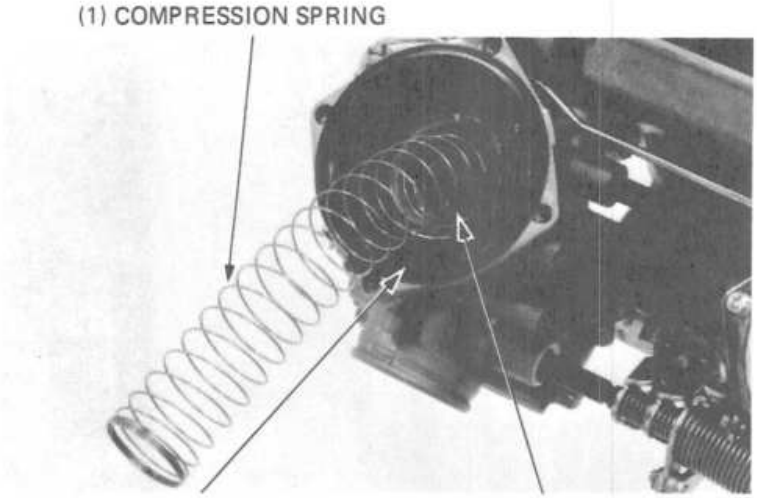
Do not interchange vacuum chamber covers, springs, pistons or jet needles between carburetors.



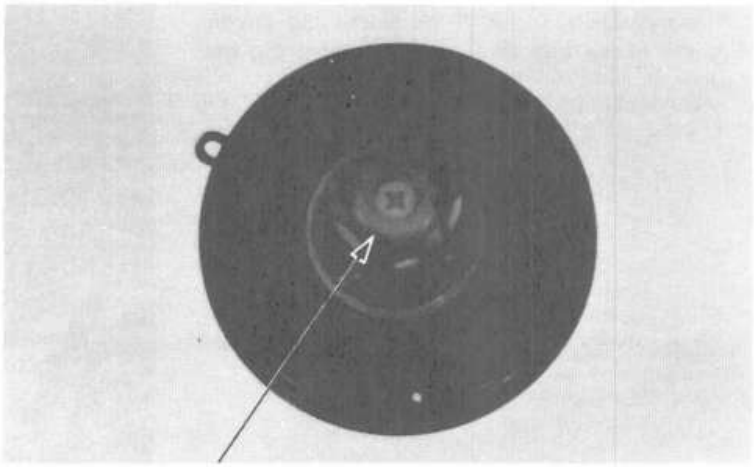
Remove the compression spring, diaphragm and vacuum piston.
Inspect the vacuum piston for wear, nicks, scratches or other damage.
Make sure the piston moves up and down freely in the chamber.

NOTE

No. 1 and No. 3 carburetors use thinner jet needles and shorter springs than the No. 2 and No. 4 carburetors.

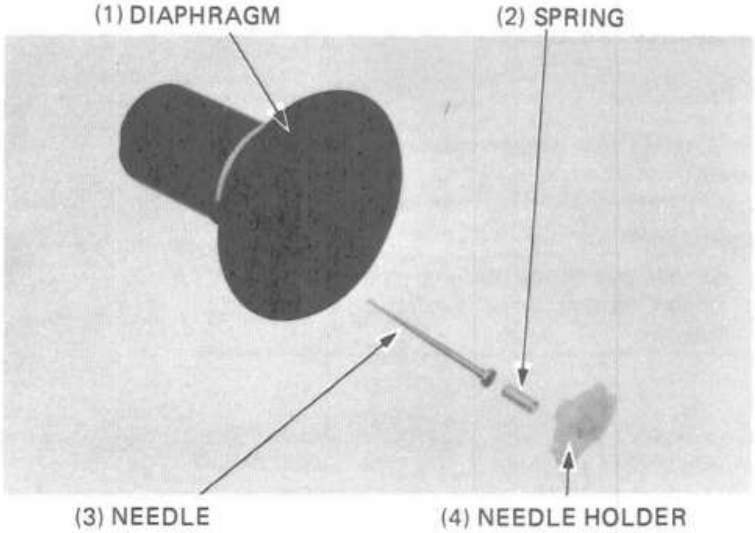


Push the needle holder in and turn it 60 degrees with an 8 mm socket. Then remove the needle holder, spring and needle from the piston.



Inspect the needle for excessive wear at the tip and for bending, or other damage.

Check for a torn diaphragm or other deterioration.

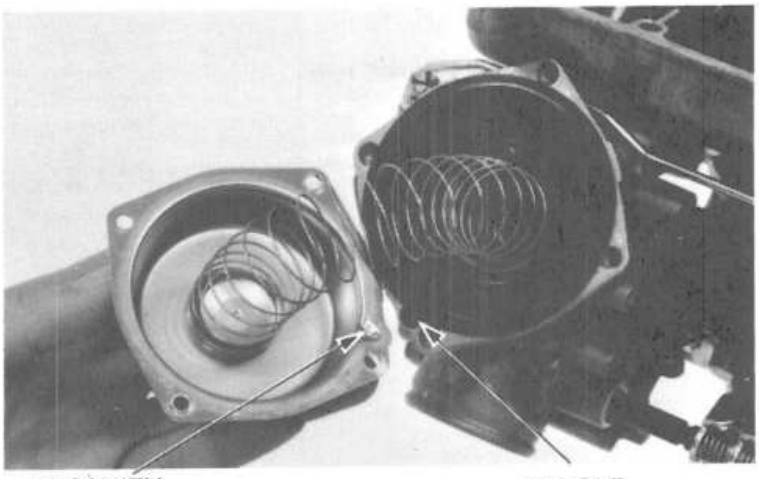


INSTALLATION

Installation is essentially the reverse of removal but to keep from distorting the diaphragm, install the vacuum piston/diaphragm as follows:
Insert the vacuum piston into the carburetor. Stick your finger into the carburetor bore and hold the vacuum piston in the full throttle position, then turn down the diaphragm so its lip fits into the carburetor groove.
Install the chamber cover, aligning its cavity with the hole in the carburetor, and secure with at least two screws before releasing the vacuum piston.

NOTE

> Be sure the thinner jet needles and shorter springs are installed in the No. 1 and No. 3 carburetors.

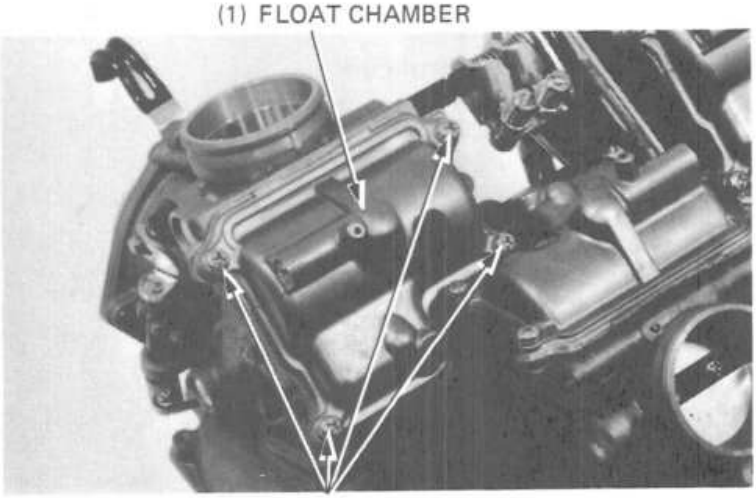


(1) CAVITY (2) HOLE

FLOAT CHAMBER

REMOVAL

Remove the four float chamber screws and the float chamber.



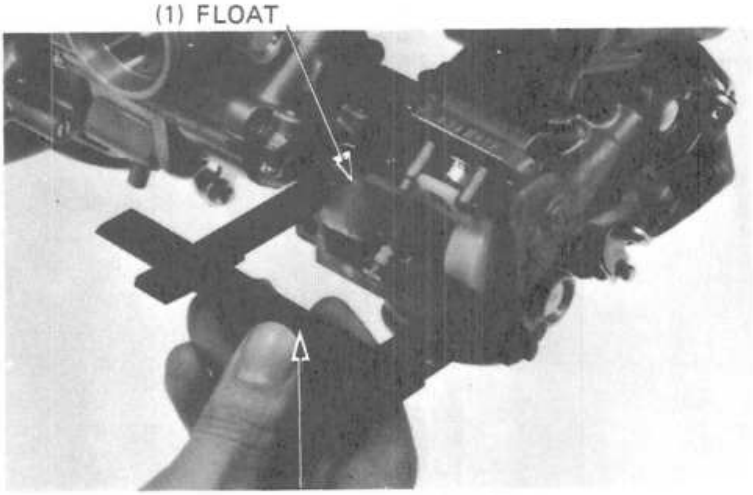
(1) FLOAT CHAMBER
(2) SCREWS

FLOAT LEVEL

Measure the float level with the carburetor inclined 15°–45° from vertical and the float tang just contacting the float valve.

FLOAT LEVEL: 7.5 mm (0.30 in)

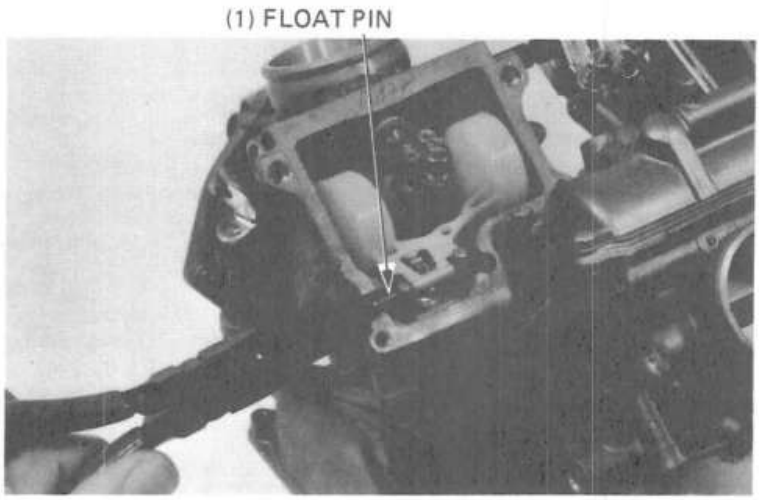
Adjust the float level by carefully bending the float tang.



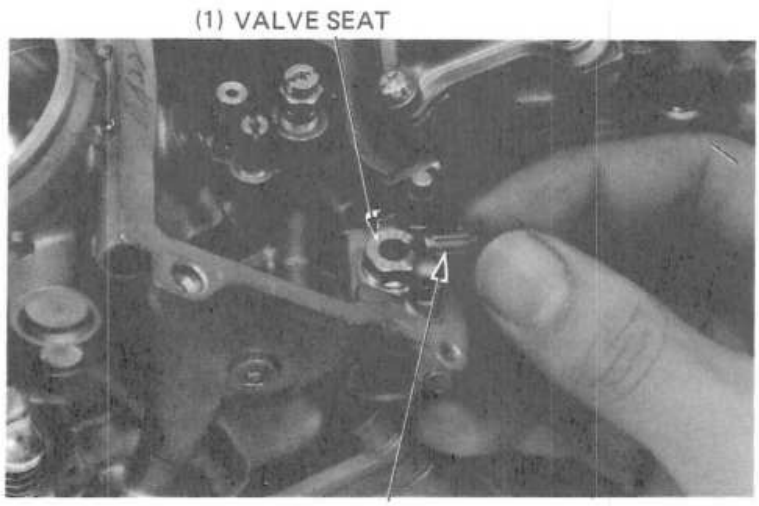
(1) FLOAT
(2) FLOAT LEVEL GAUGE
07401–0010000

FLOAT AND JETS

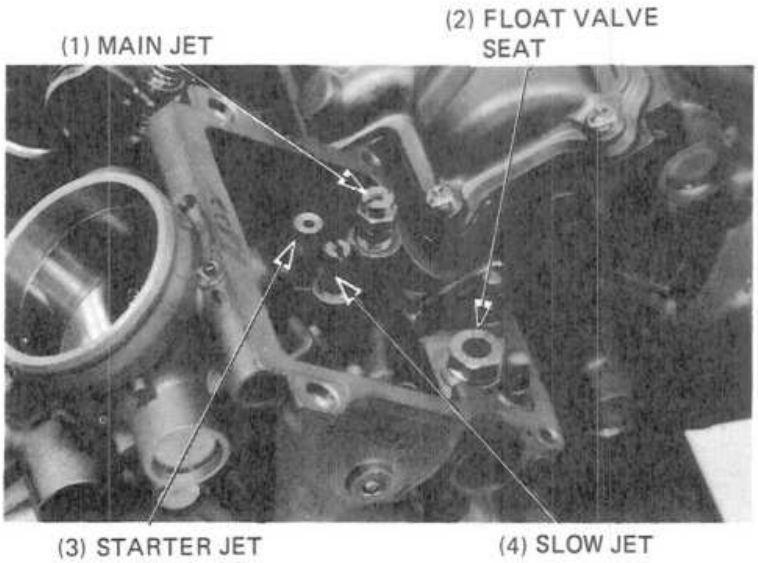
Remove the float pin, float and float valve.



Inspect the float valve for grooves and nicks.
Inspect the operation of the float valve.



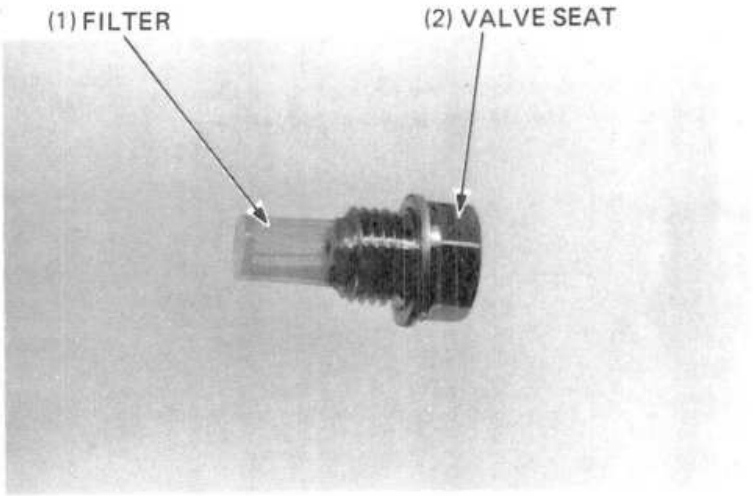
Remove the starter jet, main jet and slow jet.
Remove the float valve seat and filter.



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

ASSEMBLY

Assemble the float chamber components in the reverse order of disassembly.



PILOT SCREW

REMOVAL

NOTE

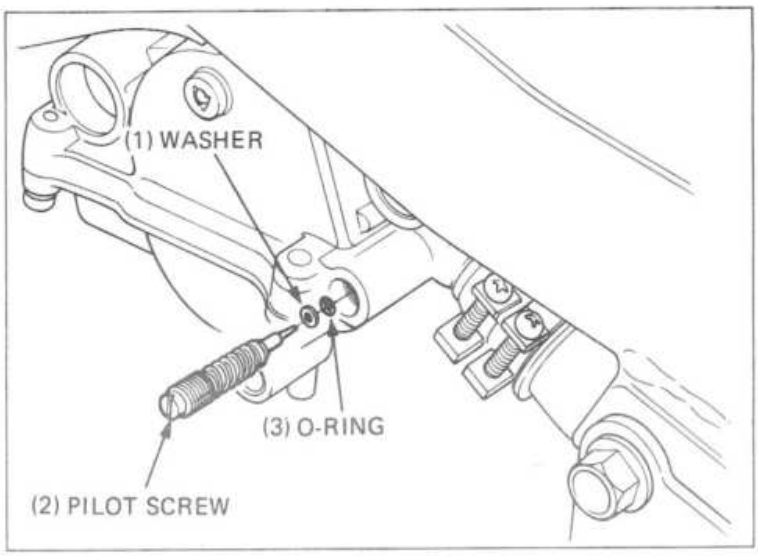
> The pilot screws are factory pre-set and should not be removed unless the carburetors are overhauled.

Turn each pilot screw in and carefully count the number of turns before 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 tigntened against the seat.*

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



INSTALLATION

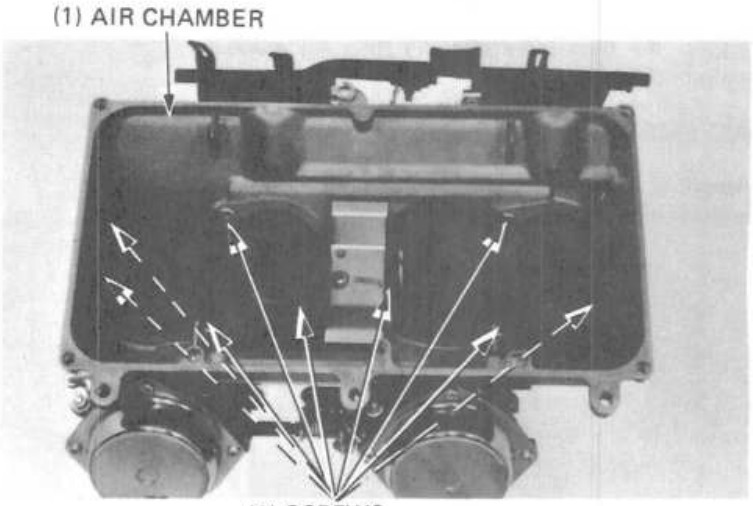
Install the pilot screws and return them to their original position as noted during removal.
Perform pilot screw adjustment if a new pilot screw is installed (page 4-15).

NOTE

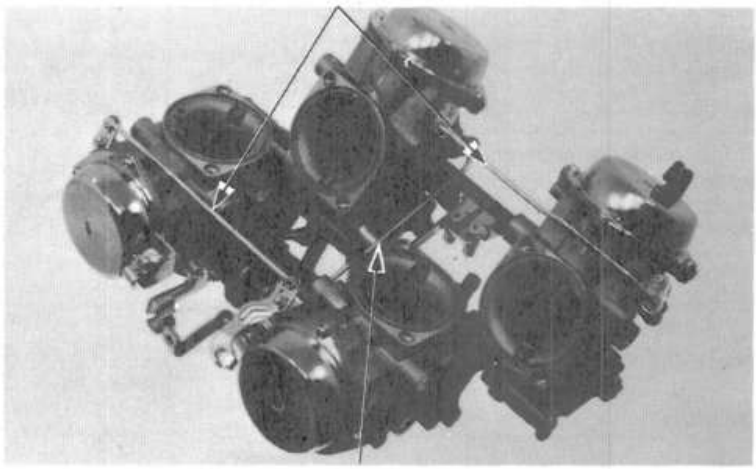
> If you replace the pilot screw in one carburetor, you must replace the pilot screws in the other carburetors for proper pilot screw adjustment.

CARBURETOR SEPARATION

Remove the screws attaching the air chamber to the carburetors and separate the chamber and carburetors.



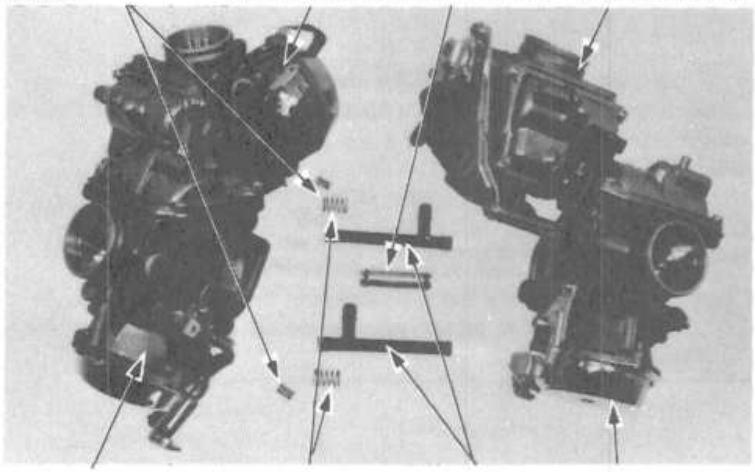
Remove the nuts, and remove the choke levers and rods.
Remove the cotter pins and washers, and remove the choke rod.



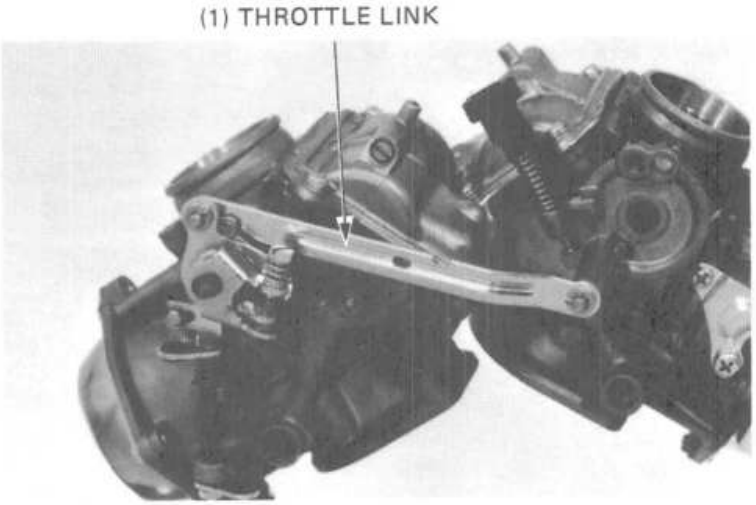
Carefully separate the No. 1 carburetor from the assembly. Then separate the No. 2 carburetor.

CAUTION

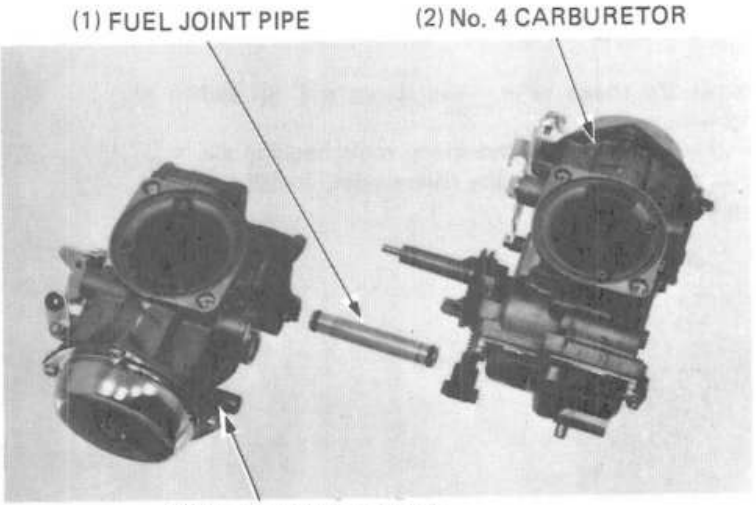
Separate the carburetors horizontally to prevent damage to the joint pipes.



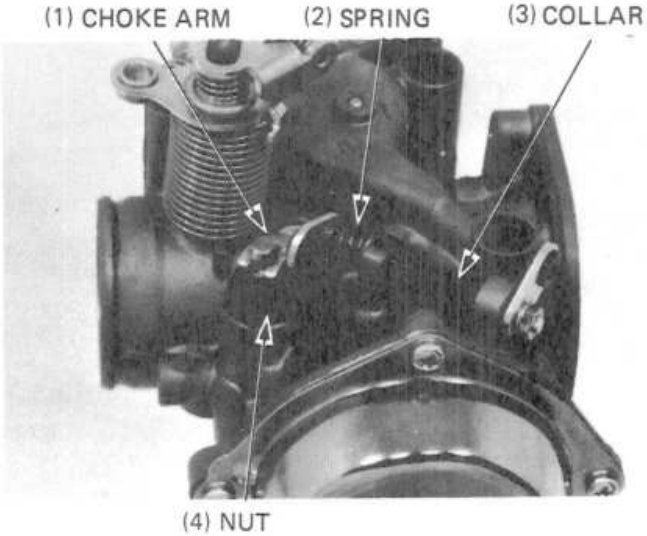
Disconnect the throttle link from the No. 3 and 4 caburetors by removing the cotter pins.



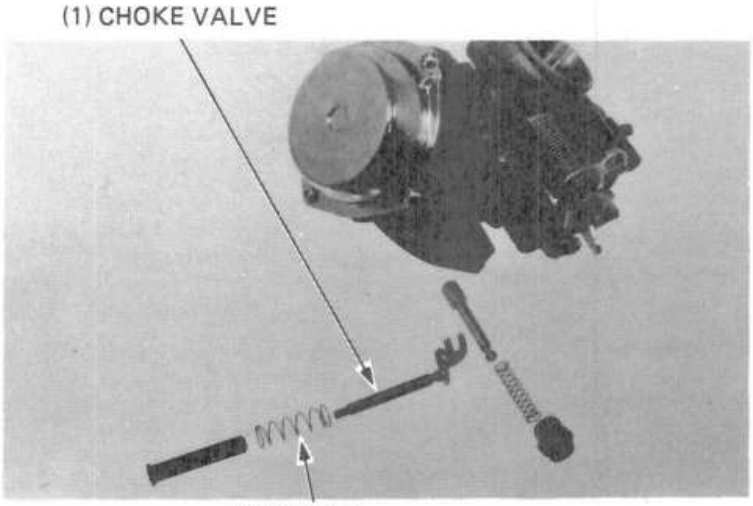
Carefully separate the No. 3 and No. 4 carburetors.



Remove the choke arm collar and remove the choke arm and spring.
Remove the choke valve nut, spring and valve.

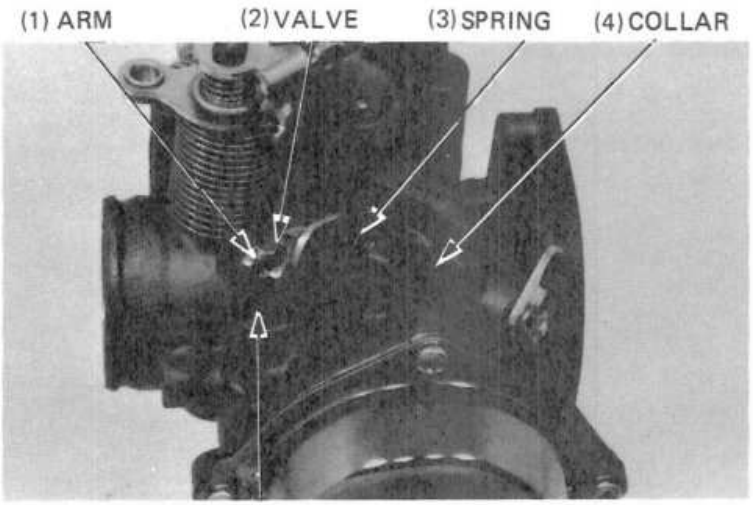


Check the choke valve and spring for nicks, grooves, or other damage.

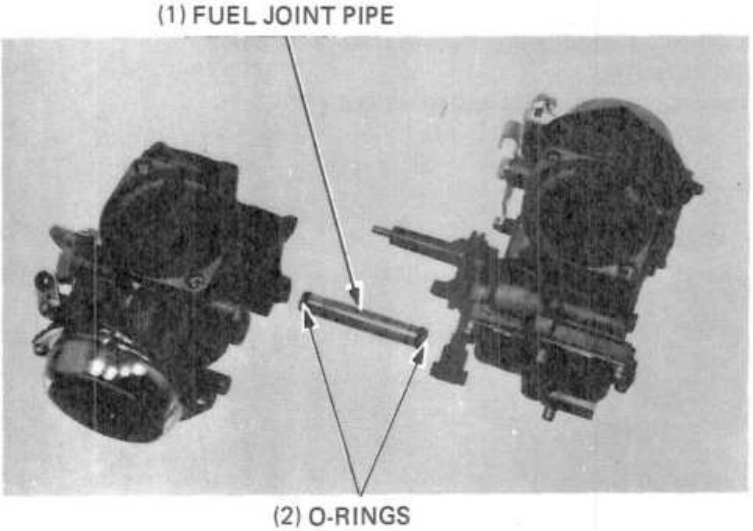


CARBURETOR ASSEMBLY

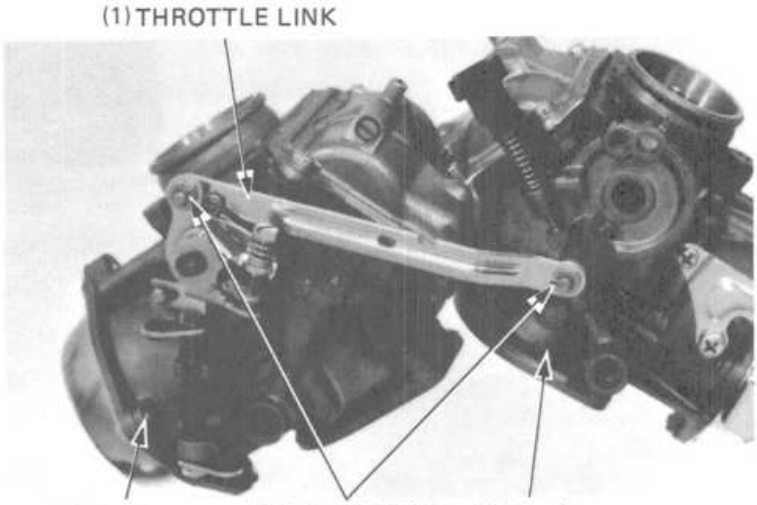
Install the choke valve, valve spring and nut and tighten the nut.
Install the choke arm and spring while hooking the arm to the groove in the choke valve. Install the choke arm collar.



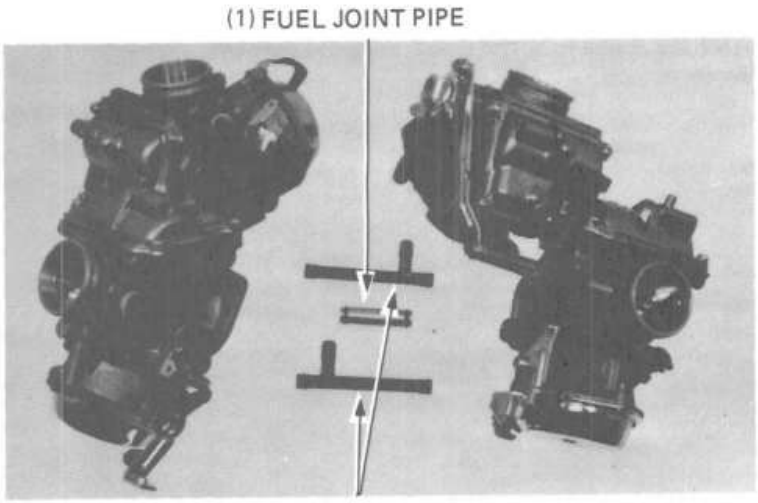
Coat the new O-rings with oil and install them on the fuel joint pipe for No. 3 and No. 4 carburetors.
Install the fuel joint pipe to the No. 3 and No. 4 carburetors.



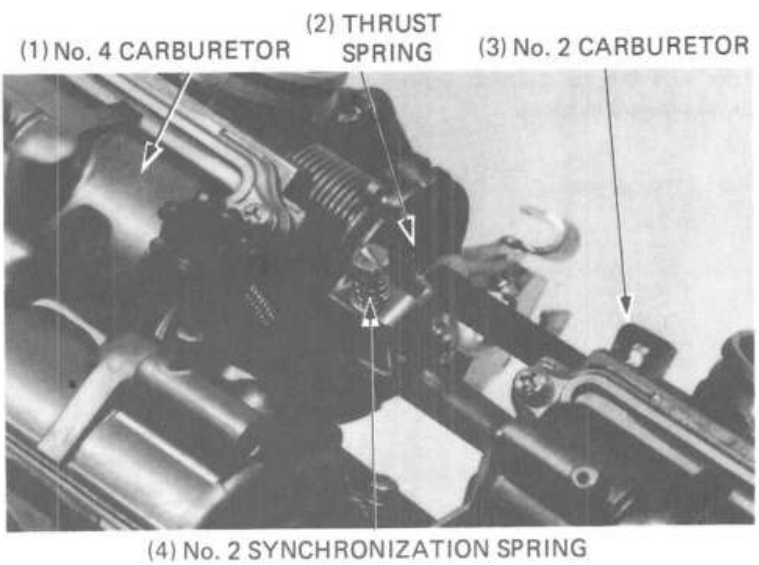
Reconnect the throttle linkage between the No. 3 and No. 4 carburetors, using new cotter pins.



Coat new O-rings with oil and install them on the fuel and air joint pipes.
Put the No. 1 and No. 2 carburetors together with the joint pipes.

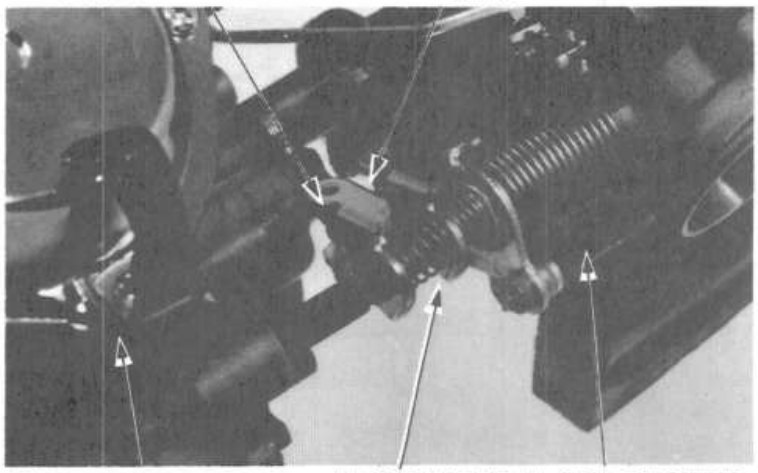


Loosen the synchronization adjusting screws until there is no tension.
Install the synchronization springs.
Install the thrust springs between the throttle valve shafts.



Make sure the fuel joint and air joint pipes are securely installed.

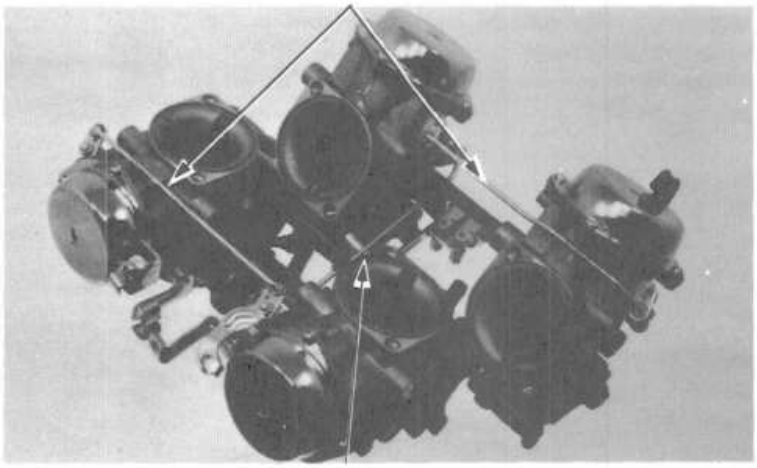
(1) No. 1 SYNCHRONIZATION SPRING (2) No. 3 SYNCHRONIZATION SPRING



(3) No. 1 CARBURETOR (4) THRUST SPRING (5) No.3 CARBURETOR

Install the choke rods and levers, using the nuts and new cotter pins.

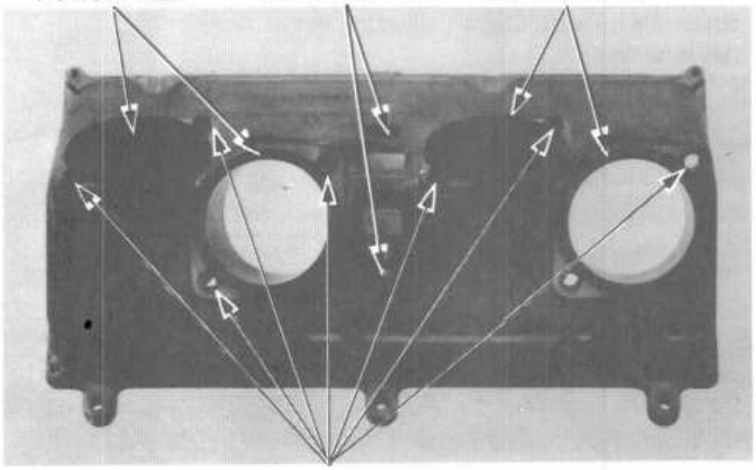
(1) CHOKE RODS AND LEVERS



(2) CHOKE ROD

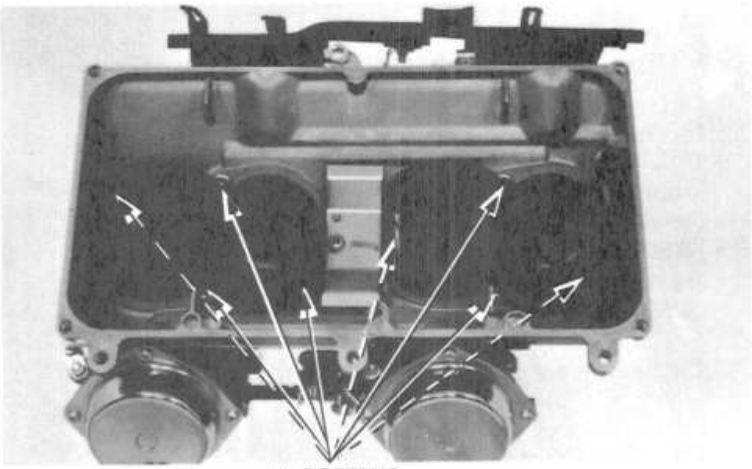
Make sure the air chamber funnels, grommets and dowel pins are in place.

(1) FUNNELS (2) GROMMETS (3) FUNNELS



(4) DOWEL PINS

Place the air chamber over the carburetors aligning the dowel pins with the carburetor holes.
Attach the air chamber to the carburetors with the eight screws.



(1) SCREWS

Turn the throttle stop screw to align the No. 4 throttle valve with the edge of the by-pass hole.

Align each throttle valve with the by-pass hole edge by turning the synchronization adjusting screws.

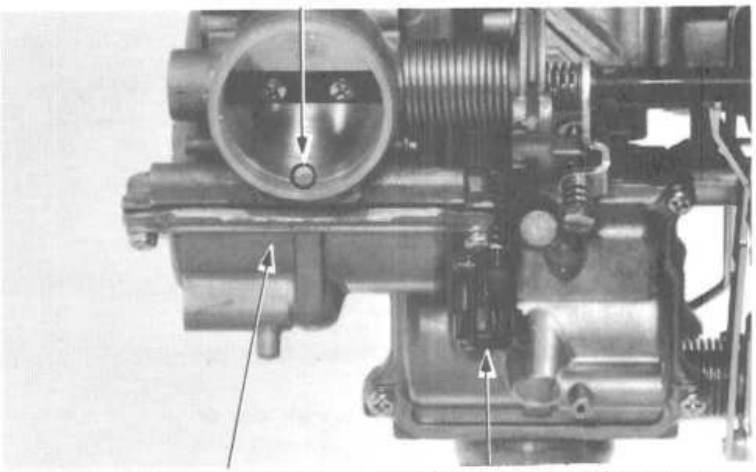
Inspect throttle operation as described below:

- Open the throttle slightly by pressing the throttle linkage. Then release the throttle.
- Make sure that it returns smoothly.
- Make sure that there is no drag when opening and closing the throttle.

Make sure that choke valve operation is smooth by moving the choke linkage.

Close the choke valve by turning the choke linkage. Release the choke linkage and make sure that it returns smoothly.

(1) BY-PASS HOLE



(2) No. 4 CARBURETOR (3) THROTTLE STOP SCREW

CARBURETOR INSTALLATION

Installation is essentially the reverse of removal.

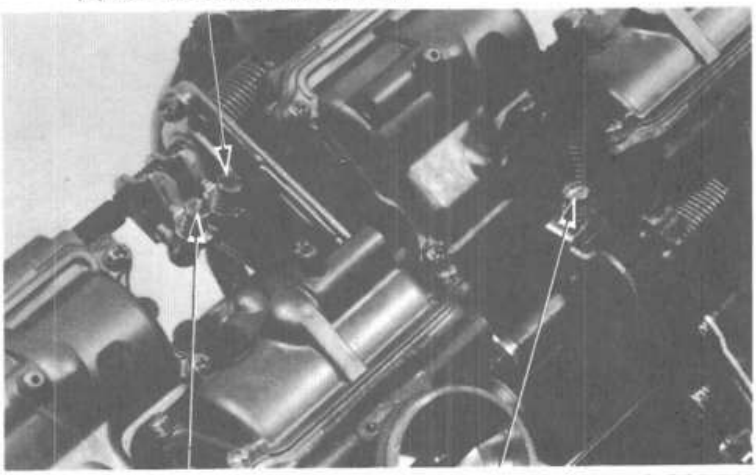
NOTE

Route the throttle and choke cables properly (page 1—9 to 1—11)

Perform the following inspections and adjustments.

- Throttle operation (page 3-5).
- Carburetor choke (page 3-6).
- Carburetor idle speed (page 3-12).
- Carburetor synchronization (page 3-11).

(2) No. 3 ADJUSTING SCREW



(3) No. 1 ADJUSTING SCREW (1) No. 2 ADJUSTING SCREW

PILOT SCREW ADJUSTMENT

IDLE DROP PROCEDURE

NOTE

- The pilot screws are factory pre-set and no adjustment is necessary unless the pilot screws are replaced (page 4-8).
- Use a tachometer with graduations of 50 rpm or smaller that will accurately indicate a 50 rpm change.

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

   INITIAL OPENING: 2-1/2 turns out

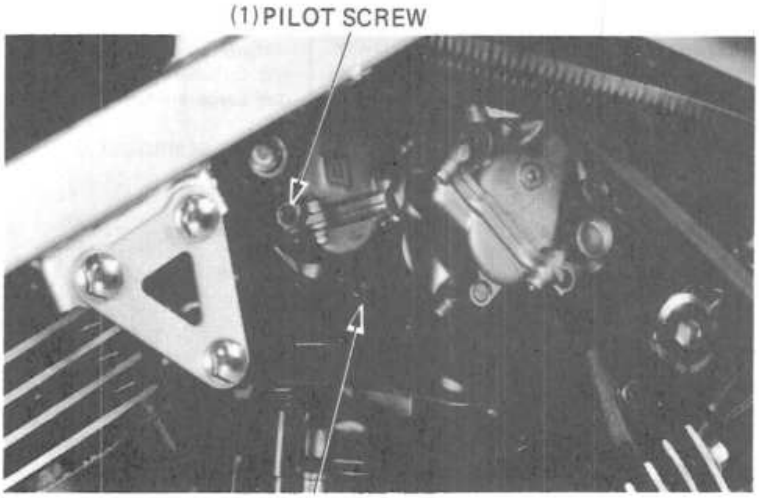
   CAUTION

   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 driving for 10 minutes is sufficient.
3. Attach a tachometer according to its manufacturer's instructions.
4. Adjust the idle speed with the throttle stop screw.

   IDLE SPEED: 1,000 ± 100 rpm

5. Turn each pilot screw 1/2 turn out from the initial setting.
6. If the engine speed increases by 50 rpm or more, turn each pilot screw out by successive 1/2 turn until engine speed drops by 50 rpm or less.
7. Adjust the idle speed with the throttle stop screw.
8. Turn the No. 1 carburetor pilot screw in until the engine speed drops 50 rpm.
9. Turn the No. 1 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 No. 2, 3 and 4 carburetor pilot screws.



FUEL TANK

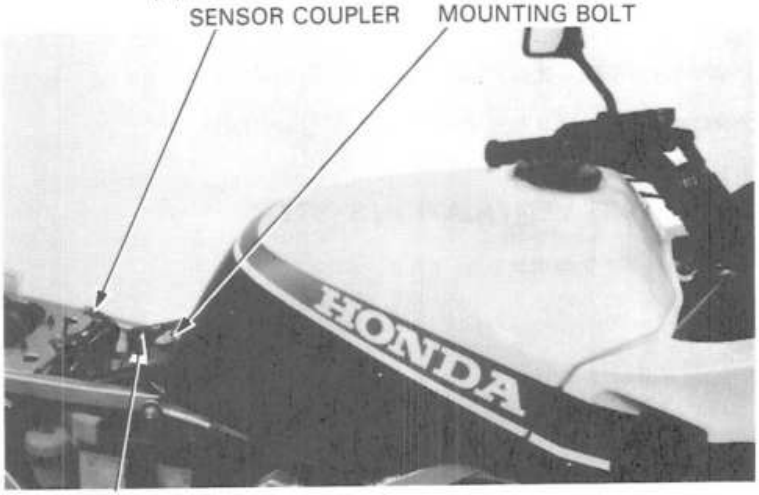
WARNING

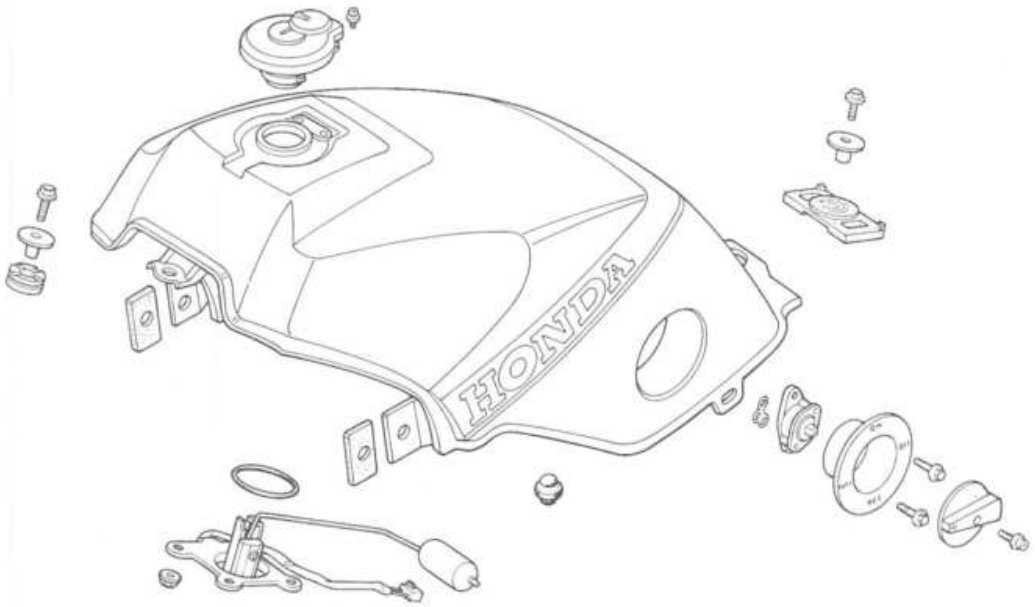
Do not allow flames or sparks near gasoline.
Wipe up spilled gasoline at once.

Remove the both frame side covers and seat.
Turn the fuel valve OFF and disconnect the fuel line at the fuel tank outlet tube.
Disconnect the fuel level sensor wire coupler.
Remove the two fuel tank mounting bolts and fuel tank.
Turn the fuel valve ON and drain the fuel into a clean container.

Check the vent hole of the filler cap for blockage.
Check that fuel is flowing out of the fuel valve freely.

Make sure that there are no fuel leaks.





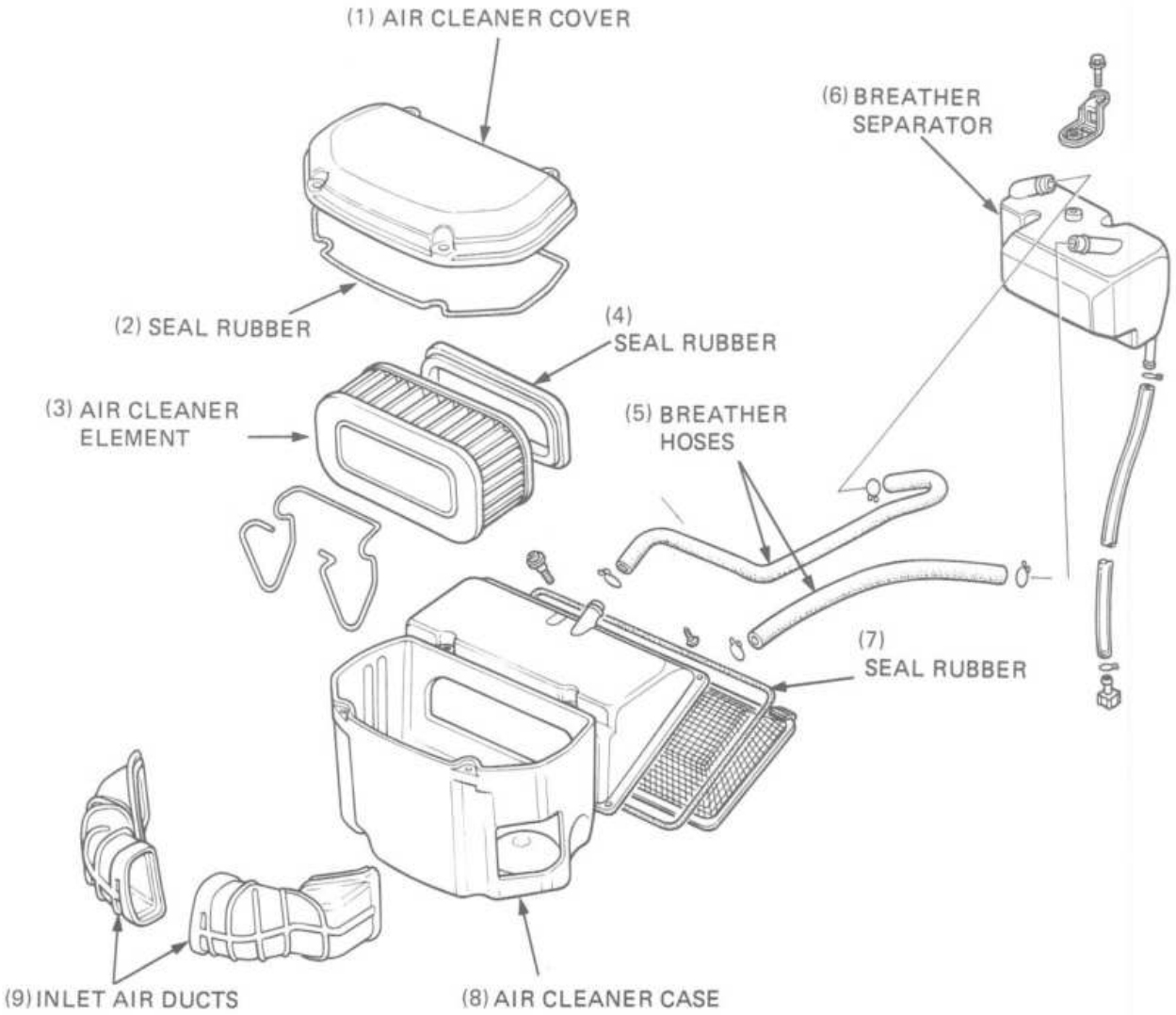
AIR CLEANER

CASE/CHAMBER

Check the air cleaner case seal rubbers for deterioration.

CRANKCASE VENTILATION SYSTEM

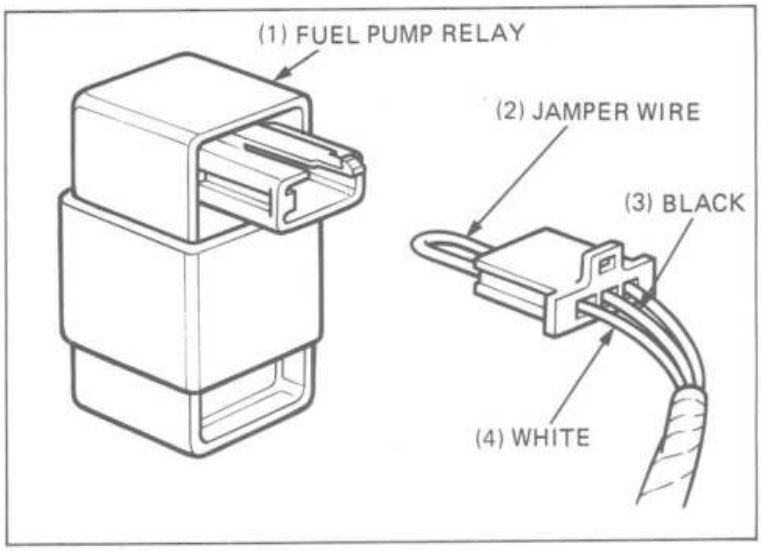
Check that the breather tube is not restricted.



FUEL PUMP

INSPECTION

Remove the left frame side cover.
Turn the fuel valve and ignition switch off.
Disconnect the fuel pump relay coupler and short the white and black wire terminals with a jamper wire.



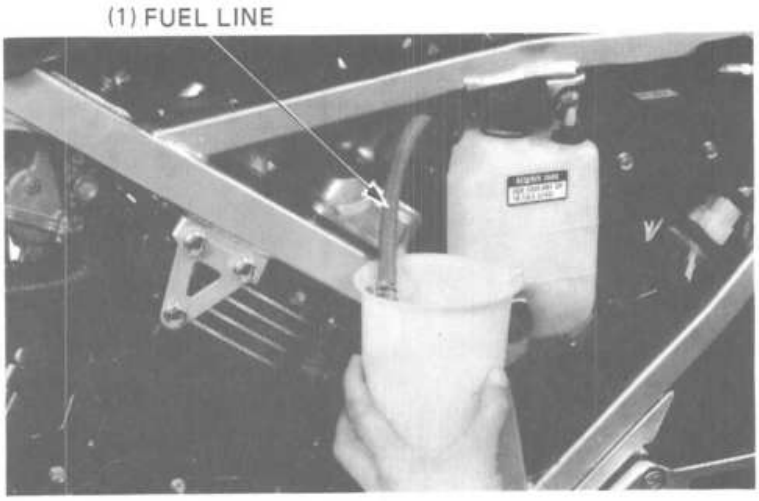
Disconnect the fuel line at the fuel line joint and hold a graduated beaker under the tube.

WARNING

Do not allow flames or sparks near gasoline.

Turn the ignition switch on and let fuel flows 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:
900 cc (30 US oz, 32 Imp oz) ± 10%/minute

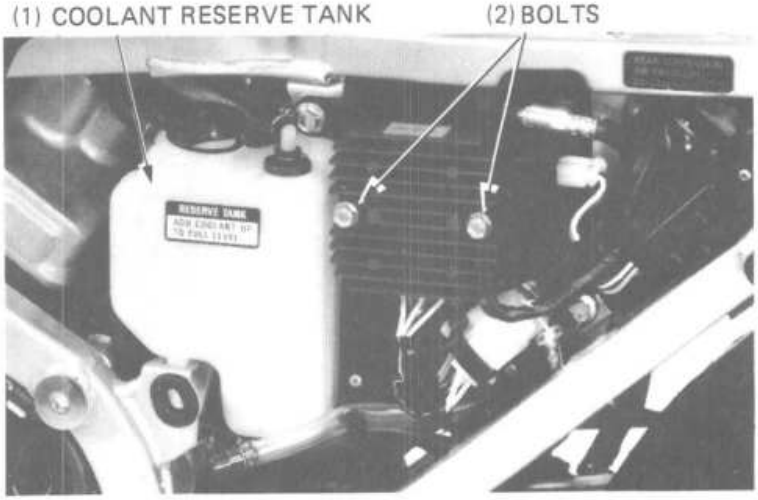


REMOVAL/INSTALLATION

WARNING

Do not allow flames or sparks near gasoline.
Wipe up spilled gasoline at once.

Remove the seat and left frame side cover.
Remove the coolant reserve tank and electric panel from the frame by removing the two mount bolts.

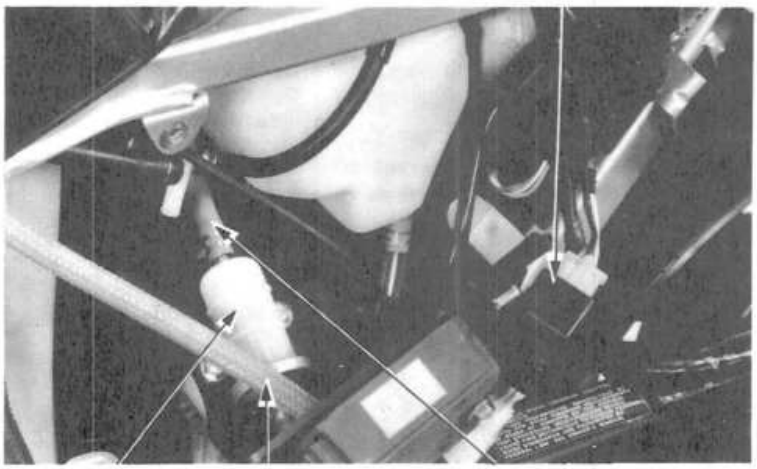


Disconnect the fuel pump wire coupler.

Disconnect the fuel inlet and outlet tubes from the fuel pump.

Remove the two fuel pump mounting bolts and the pump.

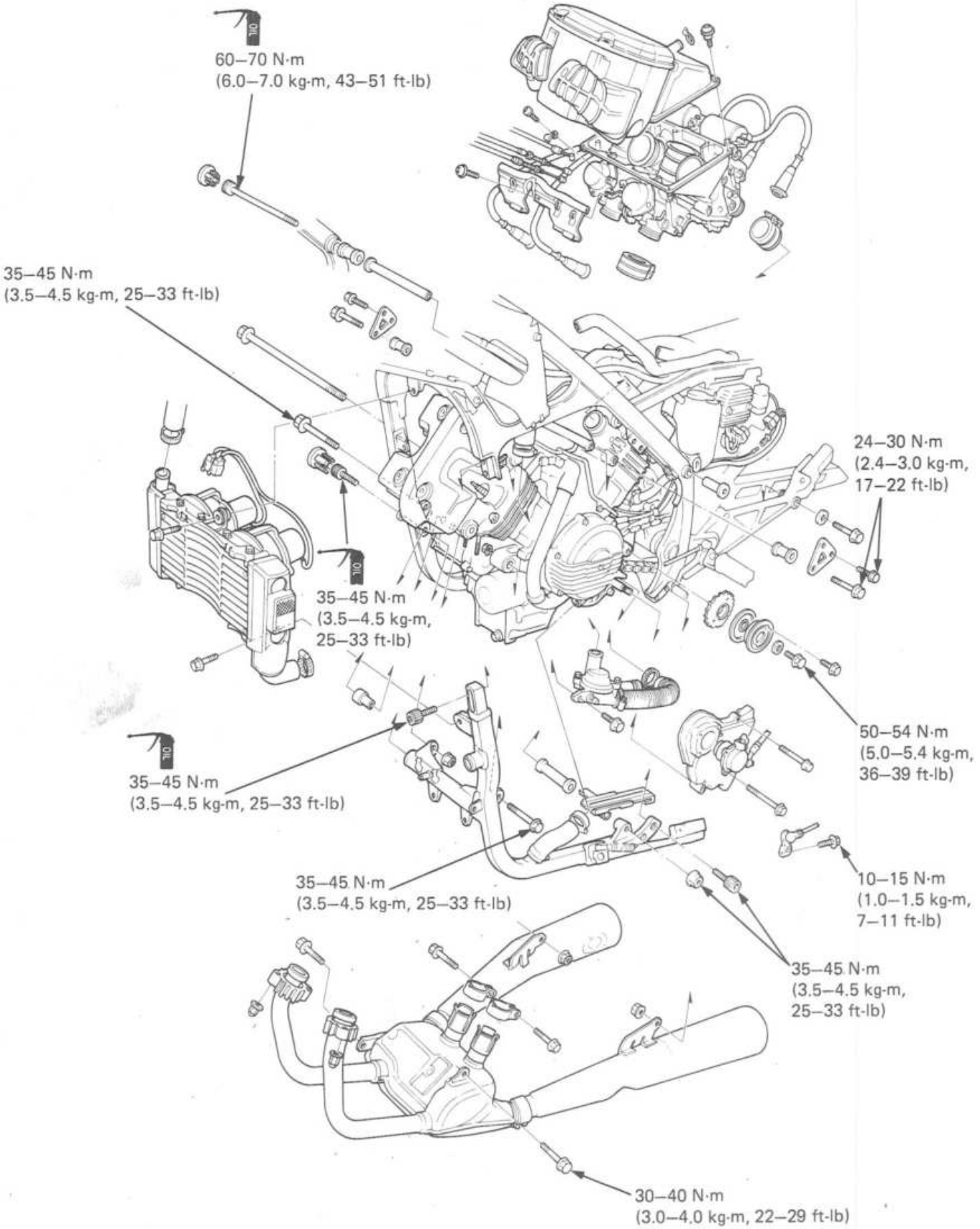
(1) COUPLER



(2) FUEL PUMP (3) OUTLET TUBE (4) INLET TUBE

Install the fuel pump in the reverse order of removal.

ENGINE REMOVAL/ INSTALLATION


OIL
60–70 N·m
(6.0–7.0 kg-m, 43–51 ft-lb)
35–45 N·m
(3.5–4.5 kg-m, 25–33 ft-lb)
24–30 N·m
(2.4–3.0 kg-m,
17–22 ft-lb)
OIL
35–45 N·m
(3.5–4.5 kg-m,
25–33 ft-lb)
50–54 N·m
(5.0–5.4 kg-m,
36–39 ft-lb)
OIL
35–45 N·m
(3.5–4.5 kg-m, 25–33 ft-lb)
35–45 N·m
(3.5–4.5 kg-m, 25–33 ft-lb)
10–15 N·m
(1.0–1.5 kg-m,
7–11 ft-lb)
35–45 N·m
(3.5–4.5 kg-m,
25–33 ft-lb)
30–40 N·m
(3.0–4.0 kg-m, 22–29 ft-lb)

SERVICE INFORMATION	5–1
ENGINE REMOVAL	5–2
ENGINE INSTALLATION	5–6

SERVICE INFORMATION

GENERAL

- A floor jack or other adjustable support is required to support and maneuver the engine.
- The following parts or components can be serviced with the engine installed in the frame:
  - Clutch
  - Alternator
  - Cooling system
  - Gearshift linkage
  - Starter motor
  - Front cylinder head
  - Carburetors
- The muffler of the VF1000F is black chromeplated. To clean the muffler, use a soft sponge and flush with sufficient water. After washing, let it dry and coat with non-compounded silicon wax.
  Apply a heat-resist and black paint if the black chrome plating is scratched or scored.

SPECIFICATIONS

Engine dry weight	92.5 kg (204 lb)
Oil capacity	3.5 liters (3.7 U.S. qt)

TORQUE VALUES

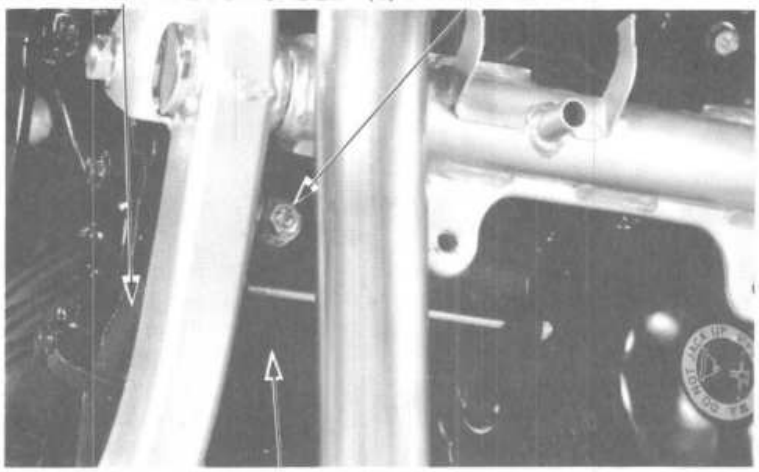
Drive sprocket bolt	50–54 N·m (5.0–5.4 kg-m, 36–39 ft-lb)
Engine rear upper hanger bolt	60–70 N·m (6.0–7.0 kg-m, 43–51 ft-lb)
Engine rear lower hanger bolt	35–45 N·m (3.5–4.5 kg-m, 25–33 ft-lb)
Engine center hanger bolts	24–30 N·m (2.4–3.0 kg-m, 17–22 ft-lb)
Engine front hanger bolts	35–45 N·m (3.5–4.5 kg-m, 25–33 ft-lb)
Sub-frame bolts	35–45 N·m (3.5–4.5 kg-m, 25–33 ft-lb)
Exhaust chamber mount bolts	30–40 N·m (3.0–4.0 kg-m, 22–29 ft-lb)
Gearshift arm bolt	10–15 N·m (1.0–1.5 kg-m, 7–11 ft-lb)

ENGINE REMOVAL

Place the motorcycle on its center stand.
Remove the seat, right and left frame side covers.
Remove the fairing and fuel tank.
Drain the engine oil (page 2-3) and coolant (page 6-3).
Remove the following components:
– lower radiator (page 6-5).
– carburetors (page 4-3).

Disconnect the starter motor cable at the starter motor by removing the terminal nut.

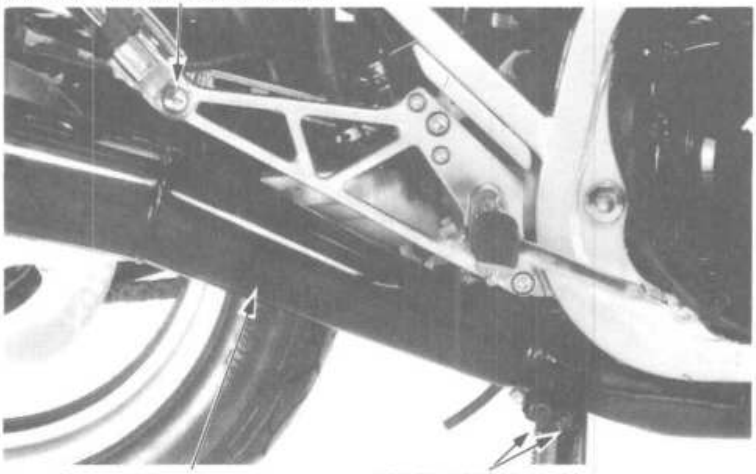
(1) STARTER MOTOR CABLE (2) TERMINAL NUT



(3) STARTER MOTOR

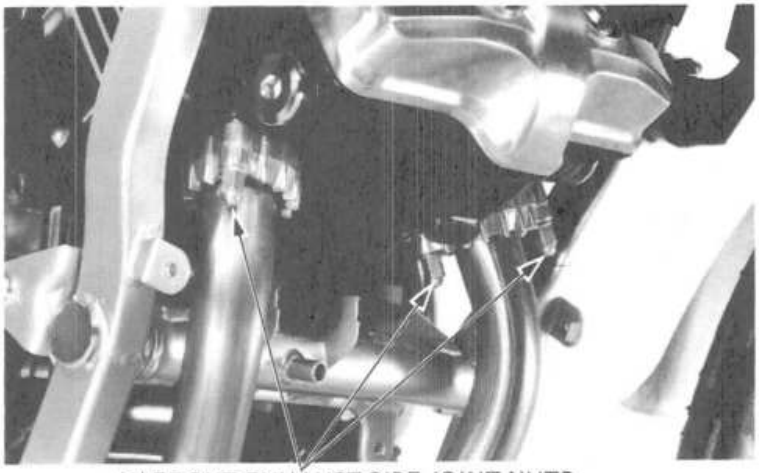
Loosen the muffler clamp bolts and remove the muffler mount bolts and right and left mufflers.

(1) MUFFLER MOUNT BOLT



(2) MUFFLER (3) CLAMP BOLTS

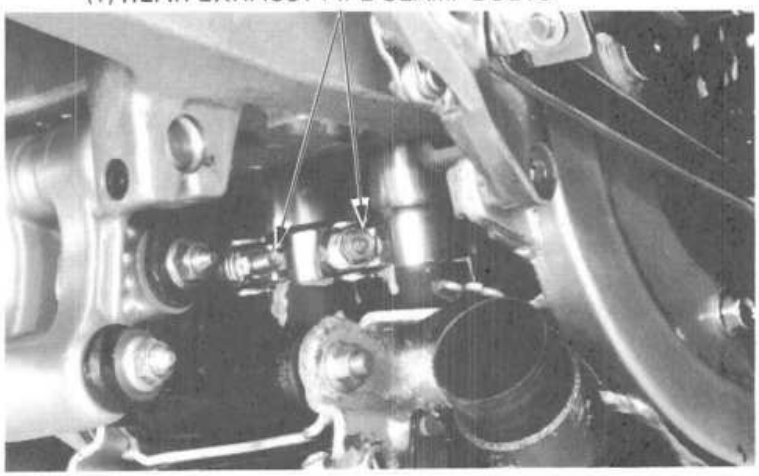
Remove the front exhaust pipe joint nuts.



(1) FRONT EXHAUST PIPE JOINT NUTS

Loosen the rear exhaust pipe clamp bolts.

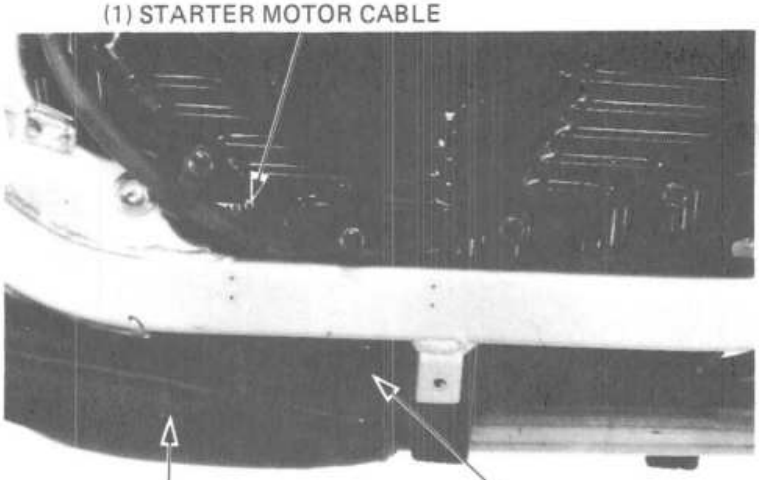
(1) REAR EXHAUST PIPE CLAMP BOLTS



Remove the exhaust chamber mount bolts and exhaust chamber/pipes from the engine.

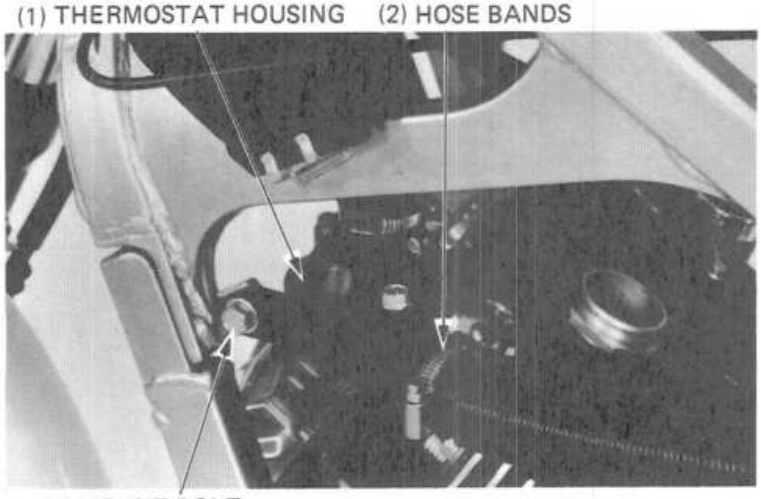
Remove the starter motor cable from the clamps on the right crankcase cover.

(1) STARTER MOTOR CABLE



(2) EXHAUST CHAMBER (3) MOUNT BOLT

Remove the thermostat housing by loosening water hose bands and removing the mount bolt.



Remove the clutch slave cylinder by removing three mount bolts.

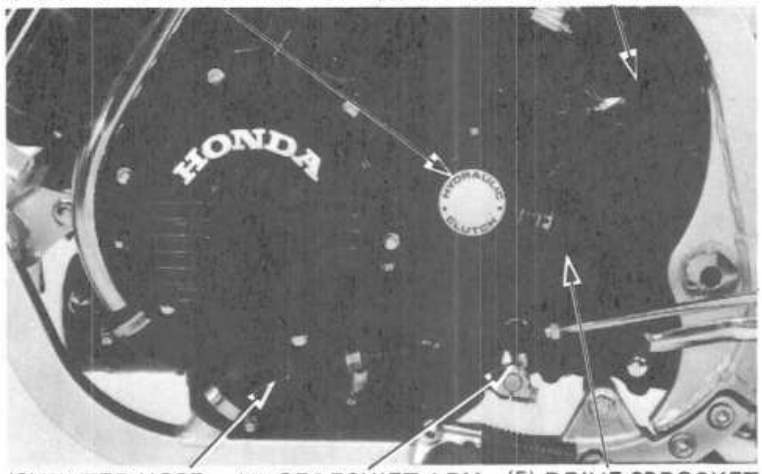
NOTE

> Do not operate the clutch lever after removing the clutch slave cylinder; It will cause difficulty when reinstalling the slave cylinder.

Remove the gearshift arm from the shift spindle.

Remove the drive sprocket cover by removing two bolts.

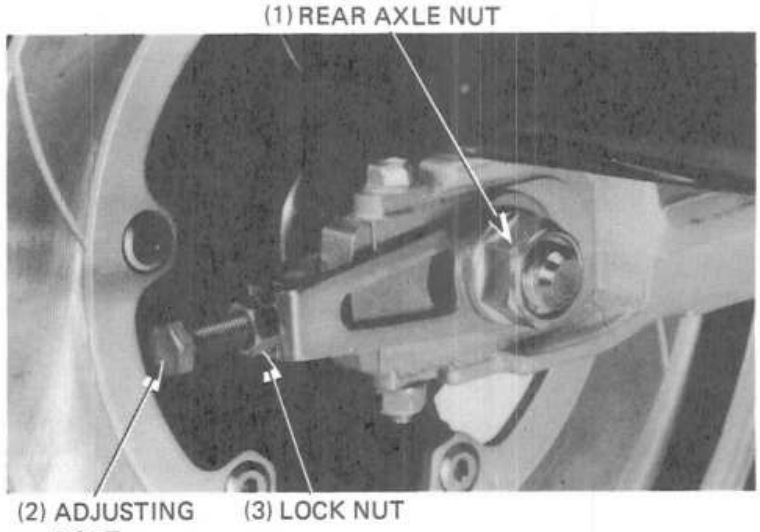
Loosen the two water hose bands and remove the hose.



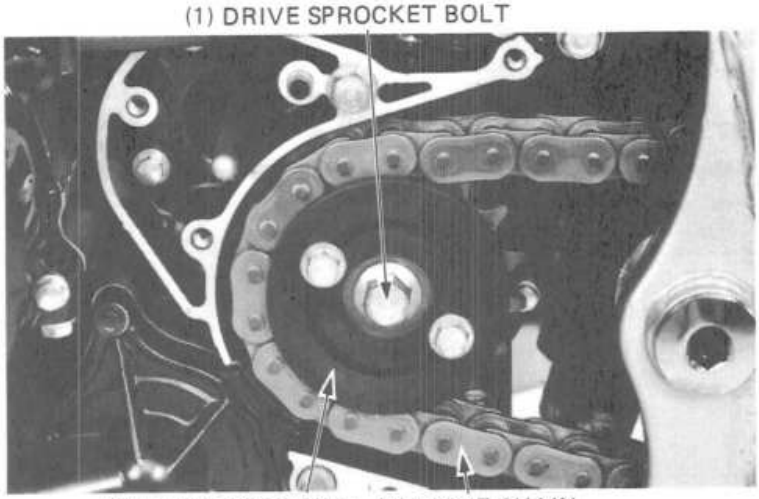
Loosen the tube bands and remove the crankcase breather tube.

Loosen the drive chain adjusting lock nuts and bolts.

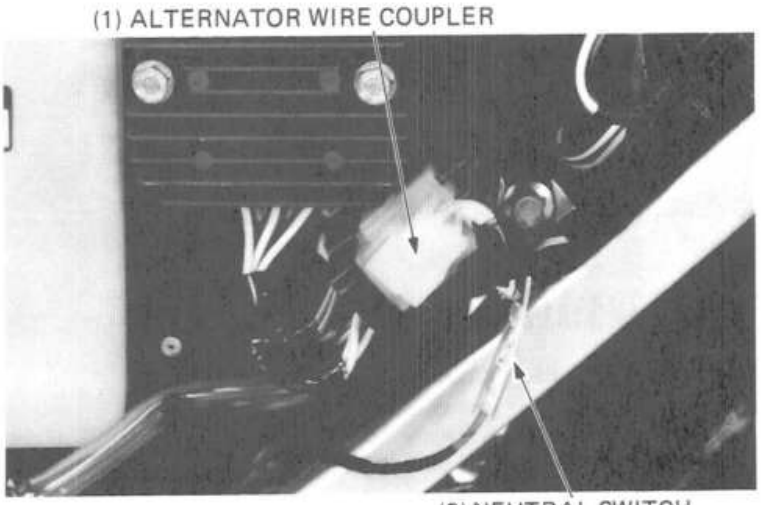
Loosen the rear axle nut and push the rear wheel forward.



Remove the drive sprocket bolt and sprocket from the countershaft and drive chain.



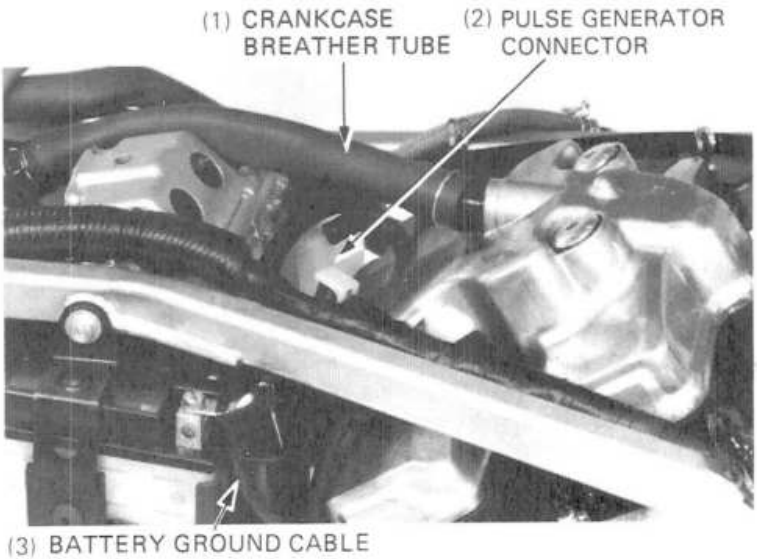
Disconnect the alternator wire coupler and neutral switch wire connector.



Disconnect the pulse generator wire coupler.

Disconnect the battery ground cable at the battery negative (–) terminal.

Disconnect the crankcase breather tube from the rear cylinder head cover.



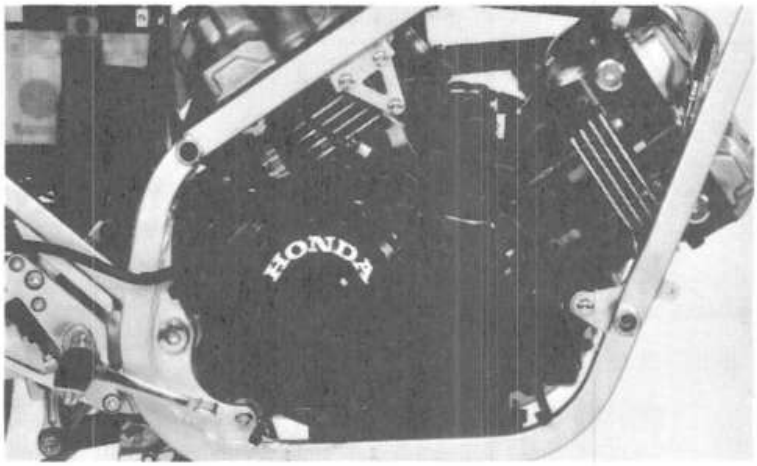
Place the floor jack or other adjustable support under the engine.

NOTE

> The jack height must be continuously adjusted to relieve stress from bolts that are being removed.

Remove the engine hanger bolts from the right side.

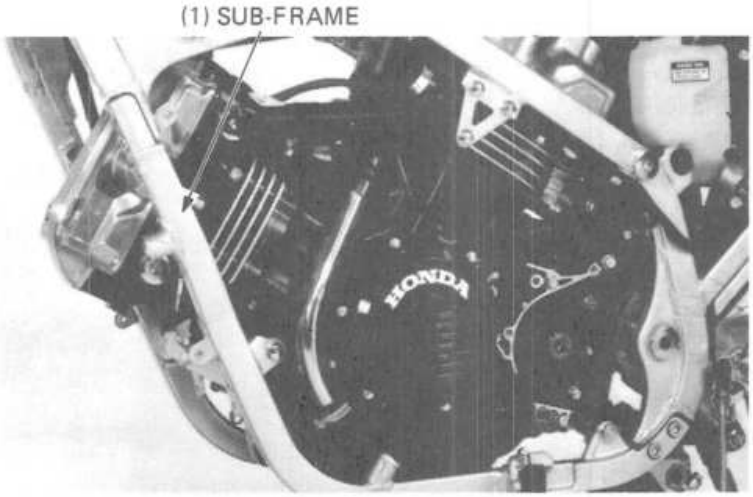
Remove the frame-to-sub-frame bolt.



Disconnect the crankcase breather hose.
Remove the engine hanger bolts and nuts from the left side.

Remove the sub-frame bolts.

Carefully lower the engine and remove it from the left side.



ENGINE INSTALLATION

Check the engine mount rubbers for damage and replace if necessary.
Install the engine mount rubbers.
Engine installation is essentially the reverse of removal.
Use a floor jack or other adjustable support to carefully manuever the engine into place.

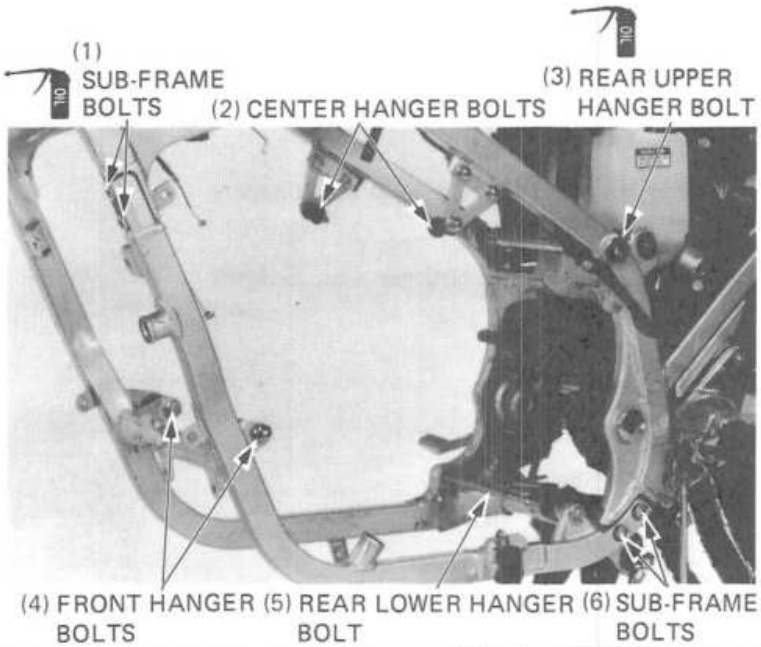
CAUTION

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

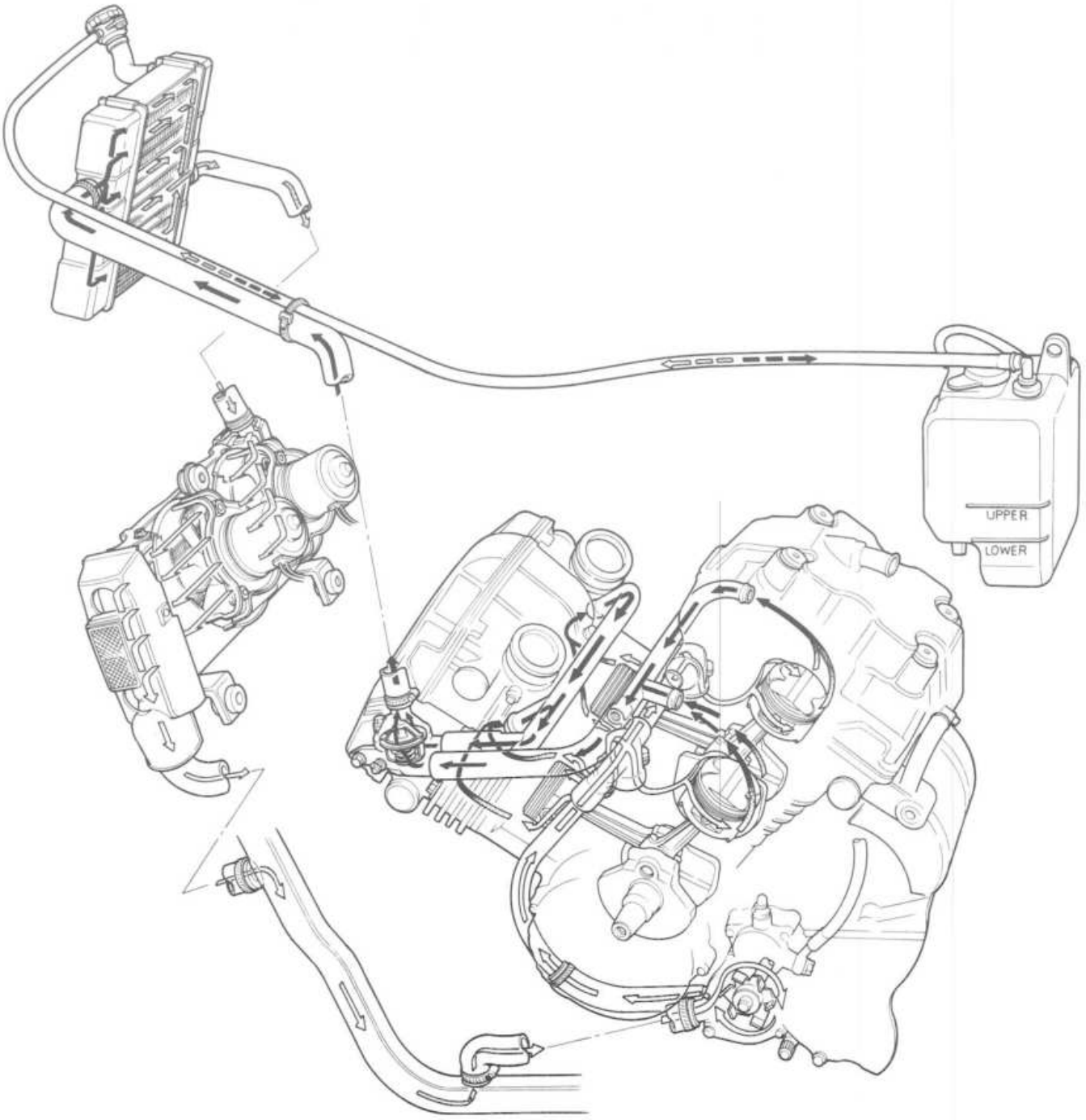
Tighten all fasteners to the torque values given on page 5-1.

NOTE

- Route the wires and cables properly (pages 1-9 thru 1-11).
- Fill the crankcase to the proper level with the recommended oil (page 2-1).
- Fill the cooling system (page 6-3).
- Perform the following inspection and adjustments:
  Throttle operation (page 3-5).
  Clutch (page 3-17).



COOLING SYSTEM


UPPER
LOWER

SERVICE INFORMATION	6–1	THERMOSTAT	6–4
TROUBLESHOOTING	6–1	RADIATOR/COOLING FAN	6–5
SYSTEM TESTING	6–2	WATER PUMP	6–10
COOLANT REPLACEMENT	6–3		

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.

- 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.
- All cooling system service can be done with the engine in the frame.
- Avoid spilling coolant on painted surfaces.
- After servicing the system, check for leaks with a cooling system tester.
- Refer to Section 20 for fan motor thermostatic switch and temperature sensor inspections.

SPECIFICATIONS

Radiator cap relief pressure	75–105 kPa (0.75–1.05 kg/cm^2, 10.7–14.9 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: Radiator and engine Reserve tank Total system	 3.0 liters (3.18 US qt, 2.64 imp qt) 0.4 liters (0.42 US qt, 0.35 imp qt) 3.4 liters (3.6 US qt, 2.99 imp qt)
Thermostat	Begins to open: 80° to 84°C (176° to 183°F) Valve lift: Minimum of 8 mm at 95°C (0.315 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
1. Faulty temperature gauge or gauge sensor
2. Thermostat stuck closed
3. Faulty radiator cap
4. Insufficient coolant
5. Passages blocked in radiator, hoses, or water jacket
6. Fan blades bent
7. Faulty fan motor

Engine temperature too low
1. Faulty temperature gauge or gauge sensor
2. Thermostat stuck open

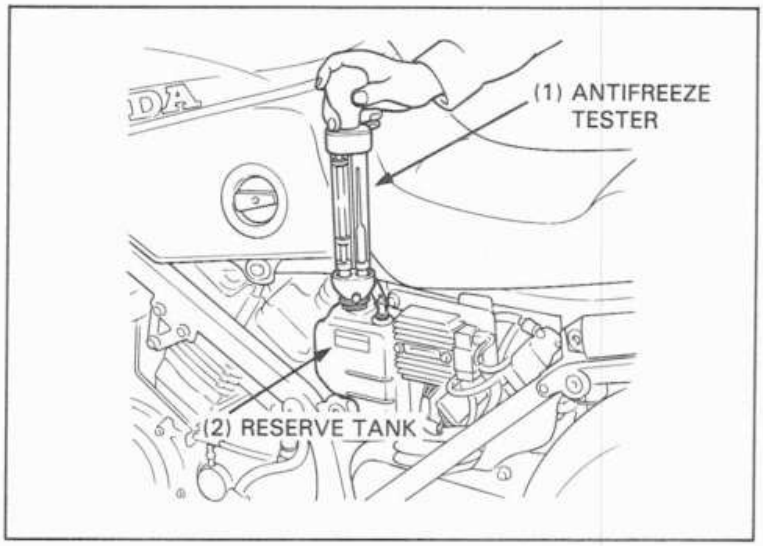
Coolant leaks
1. Faulty pump mechanical seal
2. Deteriorated O-rings

SYSTEM TESTING

COOLANT

Remove the frame left side cover and 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.



RADIATOR CAP INSPECTION

Remove the fairing and radiator cap.

WARNING

The engine must be cool before removing the cap.

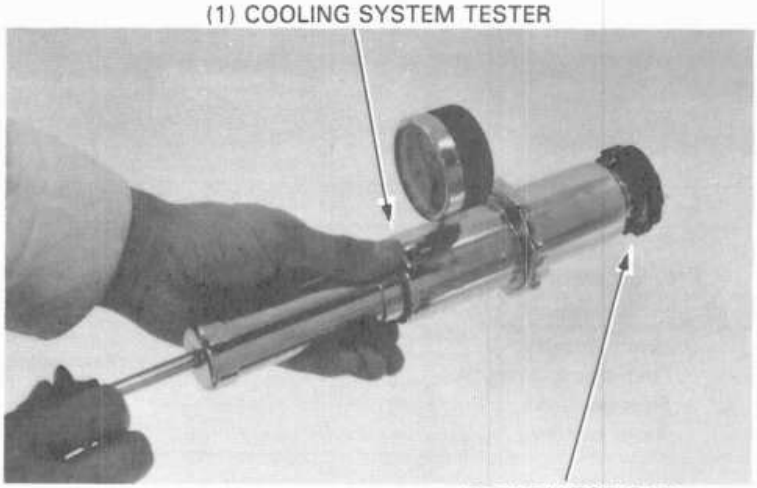
Pressure test the radiator cap. Replace the radiator cap if it does not hold pressure, or if relief pressure is too high or too low. It must hold specified pressure for at least six seconds.

NOTE

Before installing the cap on the tester, apply water to sealing surfaces.

RADIATOR CAP RELIEF PRESSURE:
75–105 kPa (0.75–1.05 kg/cm², 10.7–14.9 psi)

(1) COOLING SYSTEM TESTER



(2) RADIATOR CAP

SYSTEM PRESSURE TEST

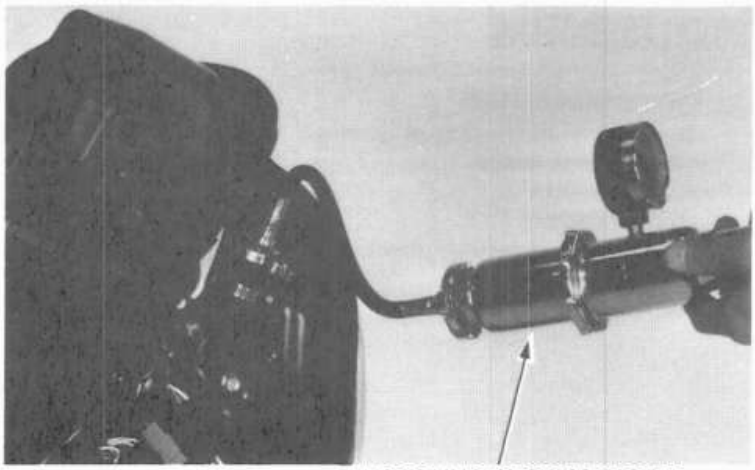
Remove the fairing and radiator cap.

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

CAUTION

Excessive pressure can damage the radiator. Do not exceed 1.05 kg/cm² (14.9 Psi)

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



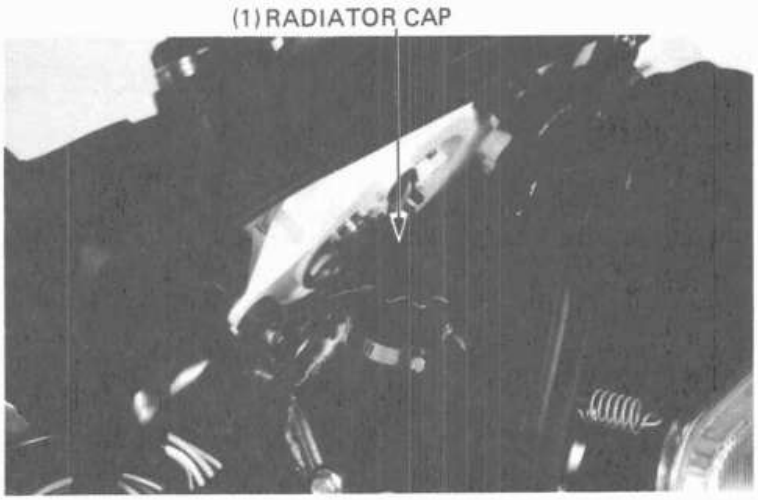
(1) COOLING SYSTEM TESTER

COOLANT REPLACEMENT

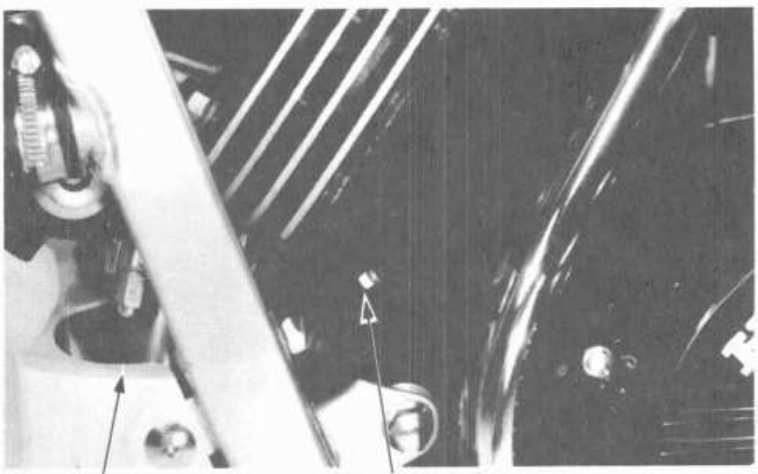
WARNING

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

Remove the fairing.
Remove the radiator cap.



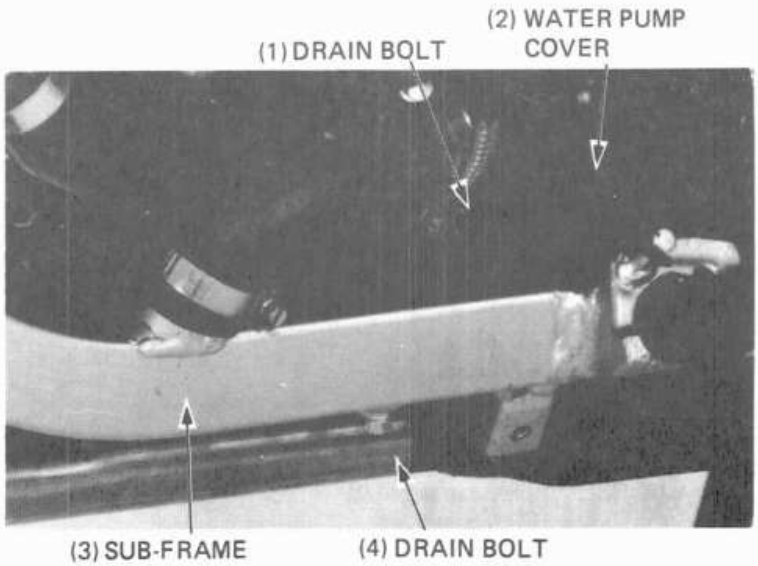
Remove the lower cowl.
Drain the coolant from the front cylinders by removing the drain bolts.



Drain the coolant from the rear cylinders and water pump by removing the drain bolt at the water pump cover.
Drain the coolant from the radiators by removing the drain bolt on the sub-frame.

Replace the drain bolts after making sure their sealing washers are in good condition.
Fill the system with a 50–50 mixture of distilled water and ethylene glycol.
Bleed air from the cooling system.

- Start the engine and run until there are no air bubbles in the coolant, and the level stabilizes.
- Stop the engine and add coolant up to the proper level if necessary.
- Reinstall the radiator cap.
- Check the level of coolant in the reserve tank and fill to the correct level if the level is low.
- Install the lower cowl.

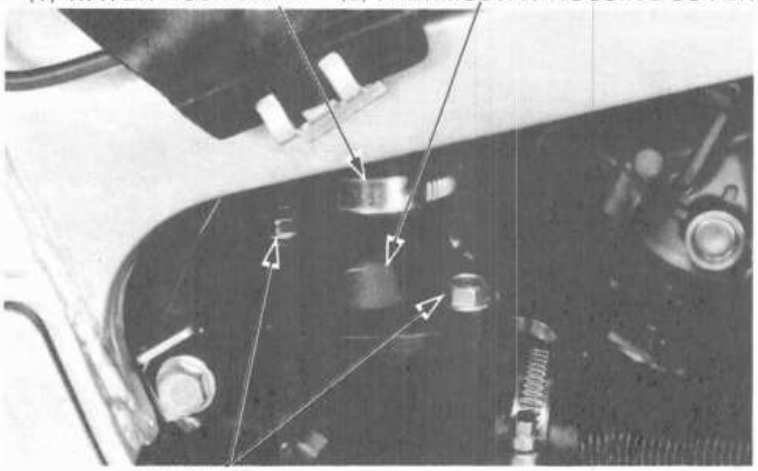


THERMOSTAT

REMOVAL

Remove the fairing.
Drain the coolant (page 6-3).

Remove the thermostat housing cover by loosening the water hose band and removing the two cover bolts.



Remove the thermostat from the housing.



INSPECTION

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

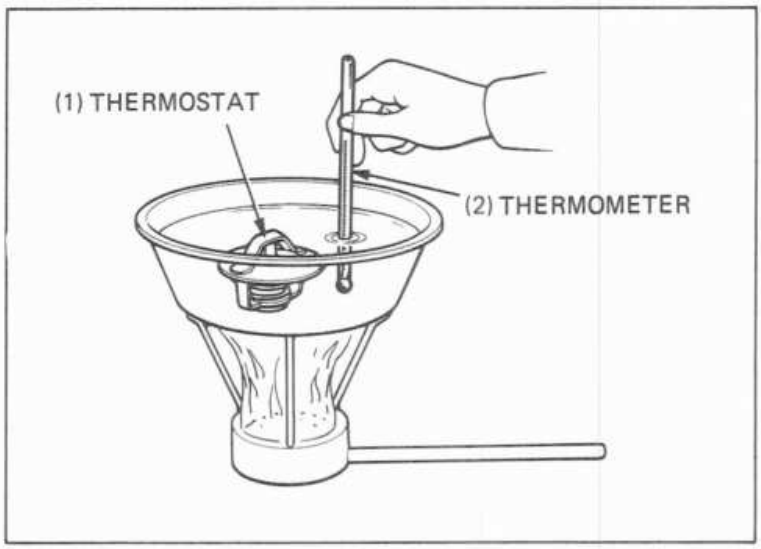
NOTE

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.

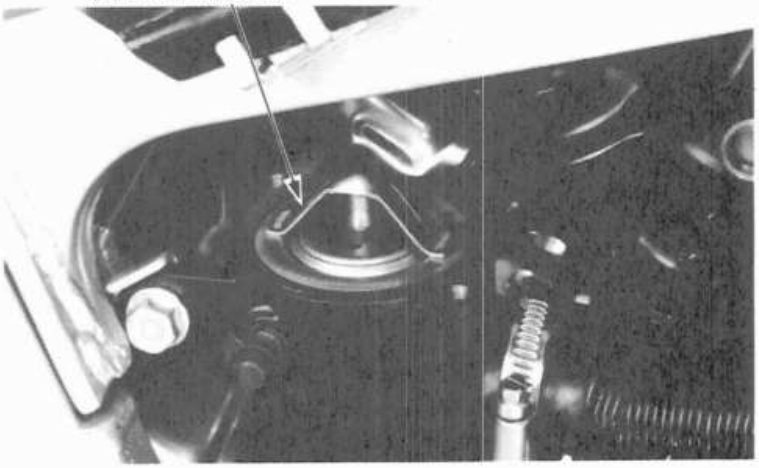
Technical Data

Start to open	80° to 84°C (176° – 183°F)
Valve lift	8 mm minimum (0.31 in) when heated to 95°C (203°F) for five minutes.



INSTALLATION

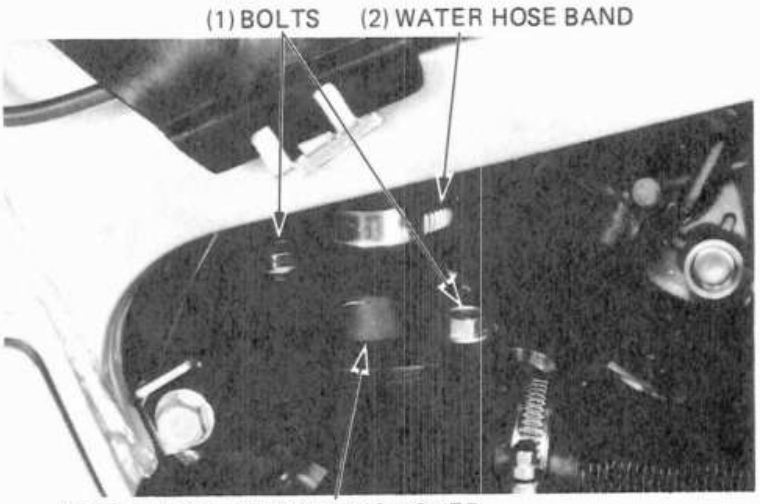
Install the thermostat into the housing.



Install the thermostat housing cover into the water hose.

Install a new O-ring onto the cover and the cover onto the housing and tighten the two cover bolts and water hose band.

Fill the cooling system (page 6-3).
Install the fairing.



RADIATORS/COOLING FANS

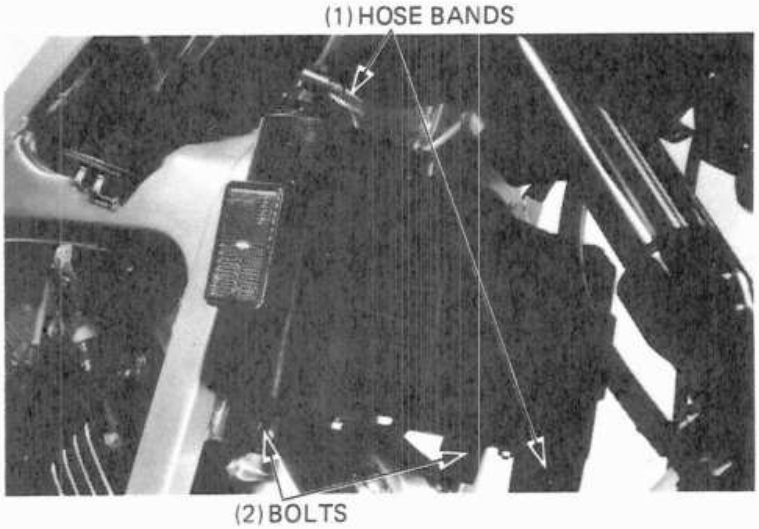
LOWER RADIATOR REMOVAL

Turn the ignition switch off and disconnect the battery negative cable from the battery.
Remove the fairing and lower cowl.

Drain the coolant (page 6-3).

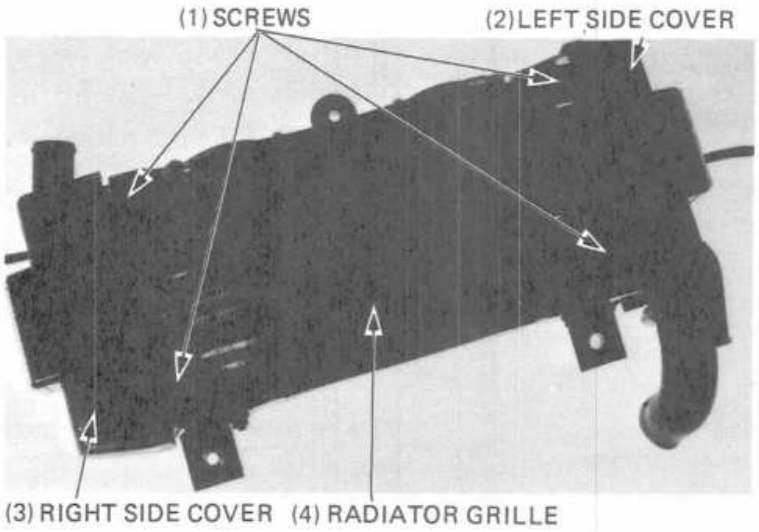
Disconnect the fan motor wire couplers.

Loosen the water hose bands and disconnect the water hoses from the lower radiator.
Remove the three radiator mount bolts and the lower radiator.

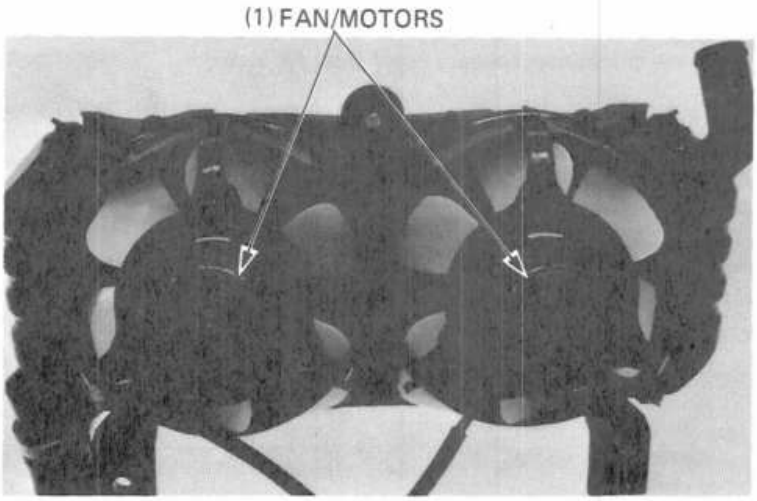


LOWER RADIATOR/COOLING FAN DISASSEMBLY

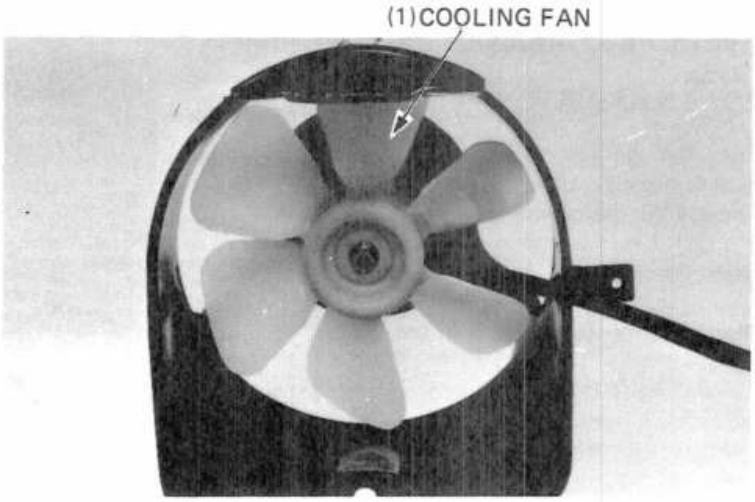
Remove the radiator grille and side covers by removing the screws.



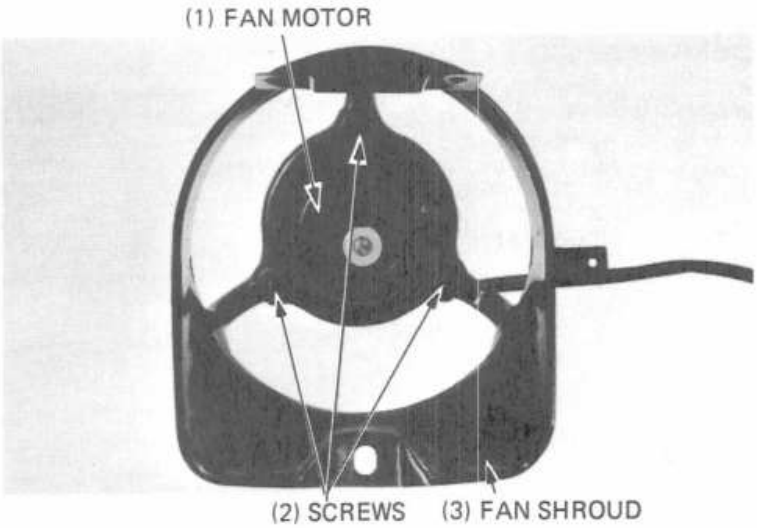
Remove the cooling fan/motors by removing the mount nuts.



Remove the fan from the motor by removing the nut.

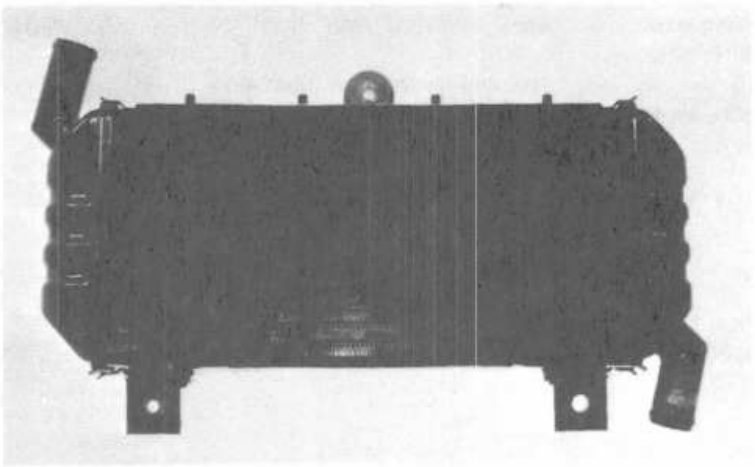


Remove the washer from the motor shaft.
Remove the fan motor from the fan shroud by removing the three screws.



LOWER RADIATOR 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.



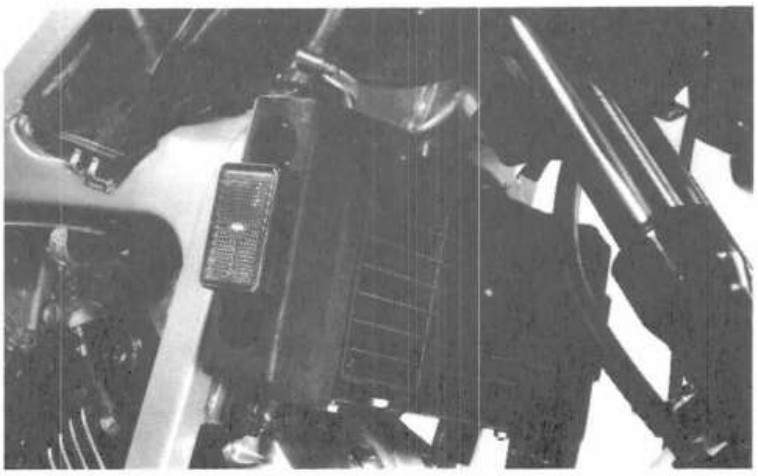
LOWER RADIATOR ASSEMBLY/ INSTALLATION

Assemble and install the lower radiator in the reverse order of disassembly and removal.

NOTE

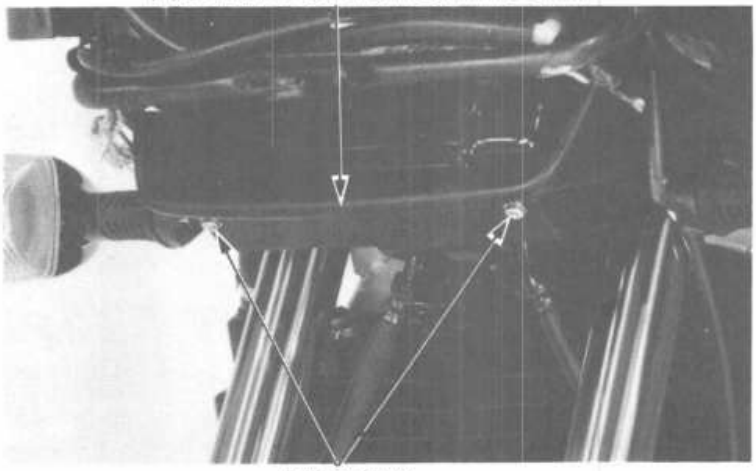
- Apply a locking agent to the fan motor shaft threads before installing the fan mount nut.
- Install the fan motor with longer wire onto the left side of the radiator.

After installation, fill the cooling system (page 6-3).

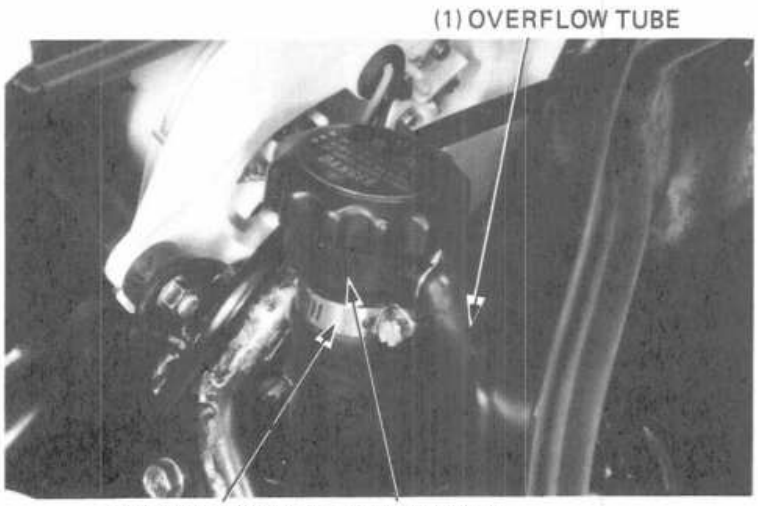


UPPER RADIATOR REMOVAL

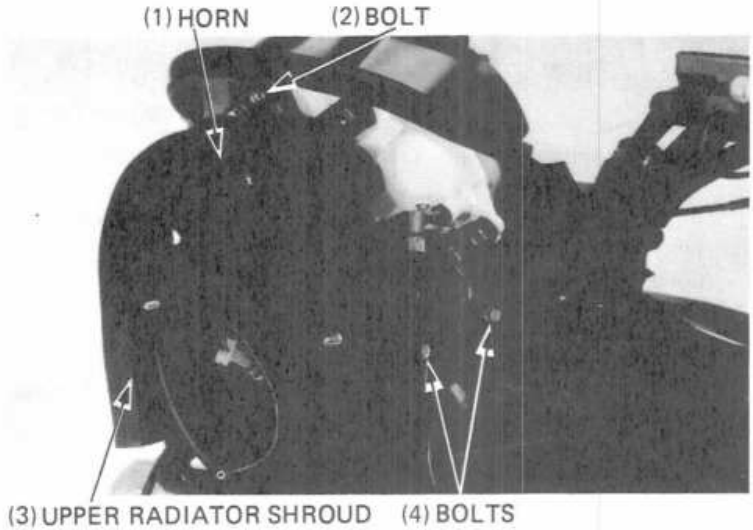
Remove the fairing and lower cowl.
Drain the coolant (page 6-3).
Remove the radiator lower cover by removing the two screws.



Disconnect the coolant overflow tube from the filler neck.
Loosen the hose band and remove the filler neck from the upper radiator.



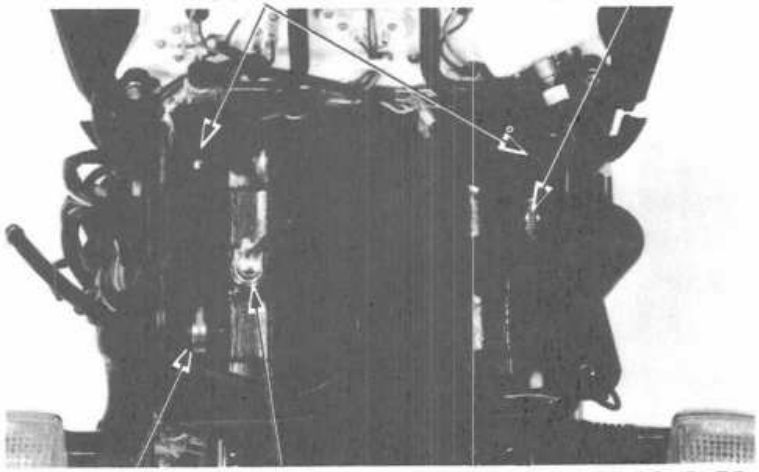
Remove the horn mount bolt and horn.
Remove the upper radiator shroud by removing two bolts.



Disconnect the wire coupler from the thermostatic switch on the upper radiator.

Loosen the hose bands and disconnect the water hoses from the radiator.

Remove the two upper radiator mount bolts and the radiator from the frame.

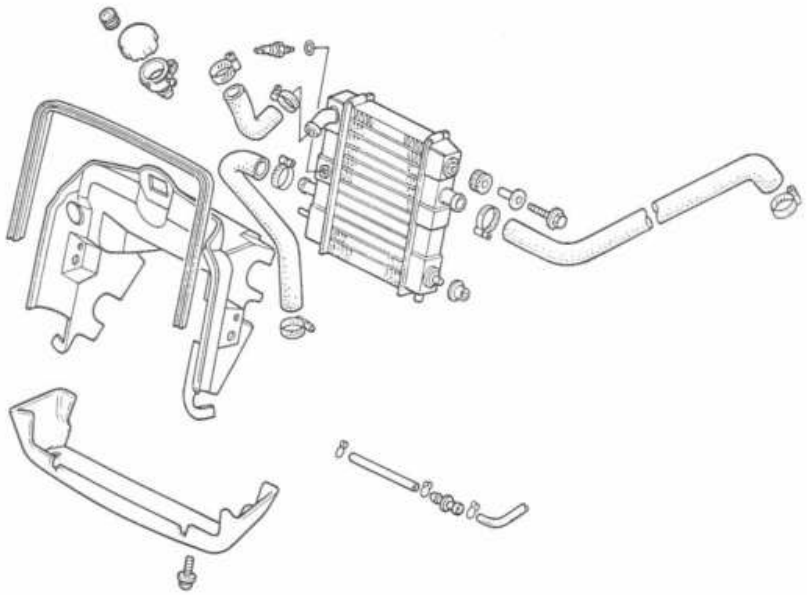


UPPER RADIATOR INSPECTION

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.

UPPER RADIATOR INSTALLATION

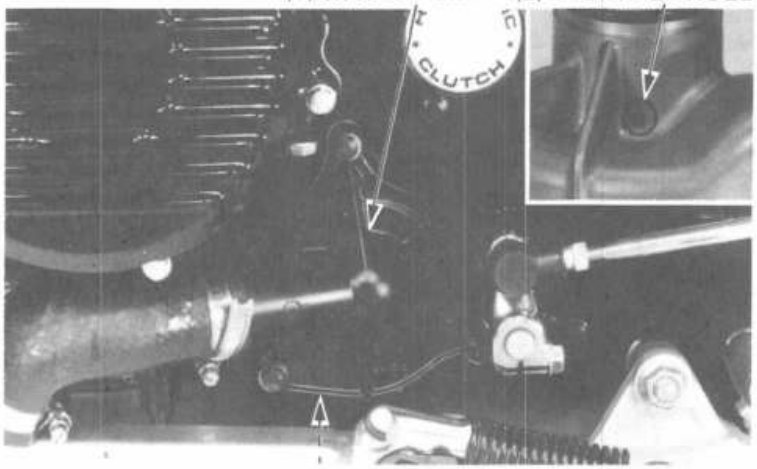
Install the upper radiator in the reverse order of removal.



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.



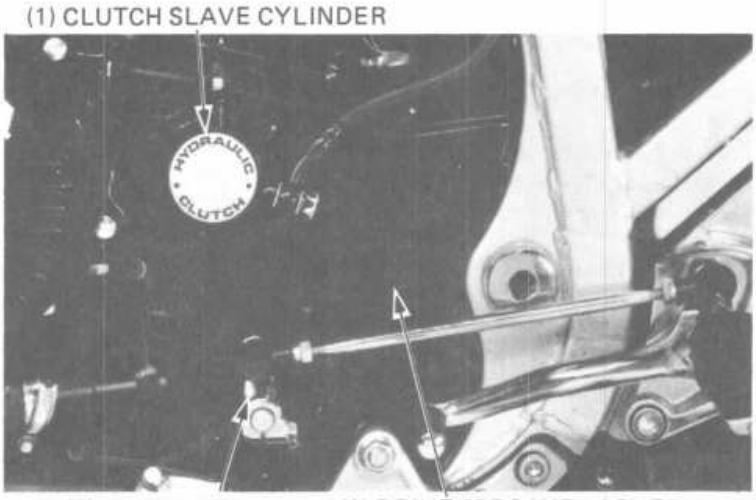
REMOVAL

Drain the coolant (page 6-3).
Remove the clutch slave cylinder.

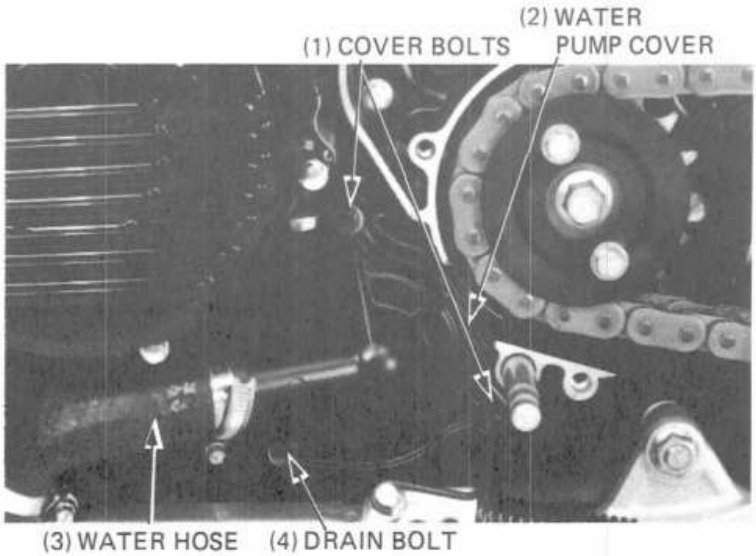
NOTE

> Do not operate the clutch lever after removing the clutch slave cylinder. To do so will cause difficulty in reinstalling the slave cylinder.

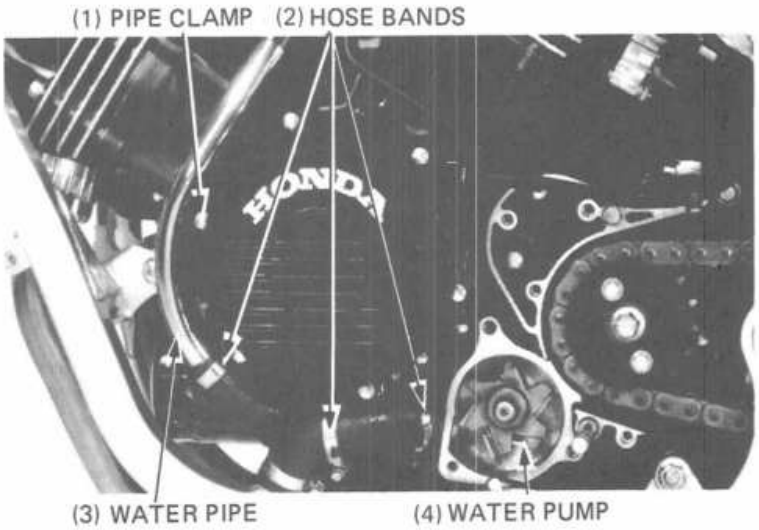
Remove the gearshift arm from the shift shaft.
Remove the drive sprocket cover.



Disconnect the water hose from the water pump cover.
Remove the water pump cover bolts and cover.

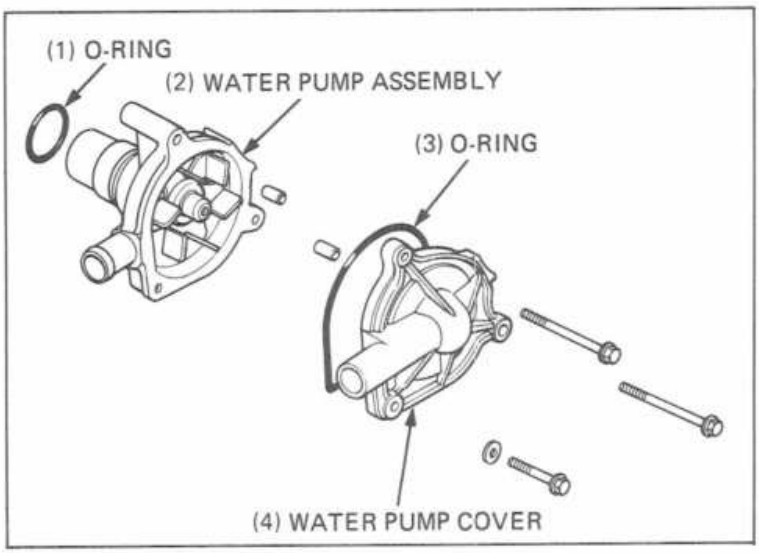


Remove the water pipe clamp bolt.
Loosen the water hose bands.
Pull off the water pump from the crankcase.
Remove the water pipe from the water pump.



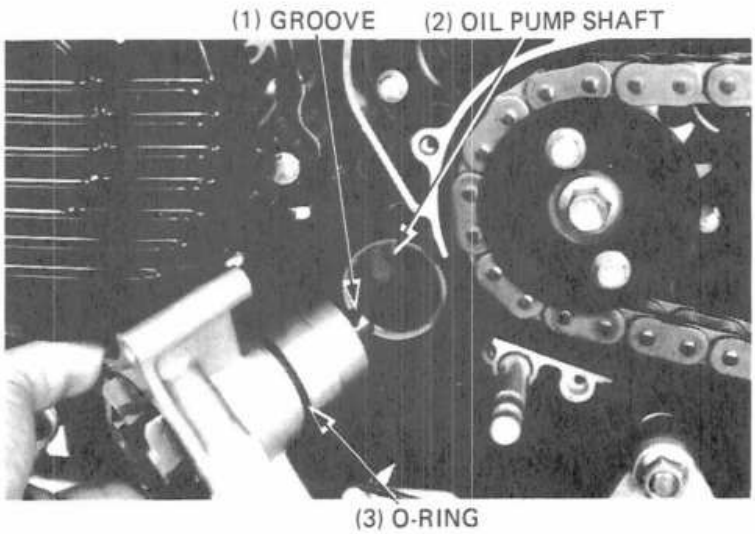
INSPECTION

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

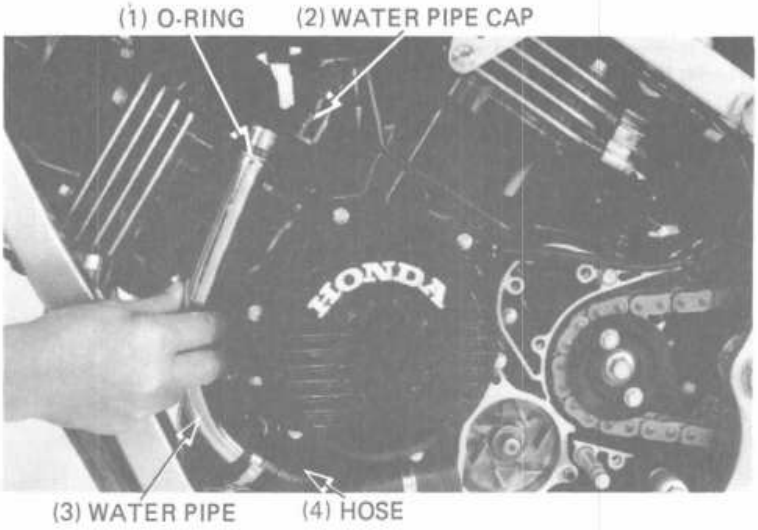


INSTALLATION

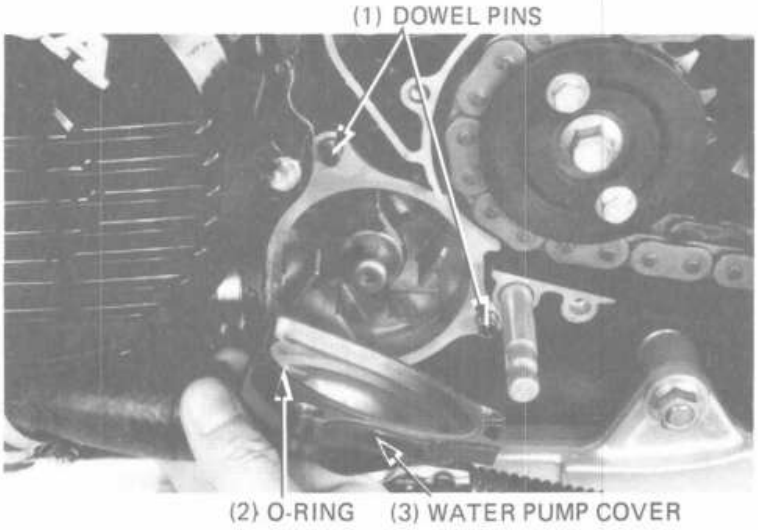
Apply a coat of clean engine oil to a new O-ring and install it in the water pump groove.
Align the water pump shaft groove with the oil pump shaft and insert the water pump in the crankcase.



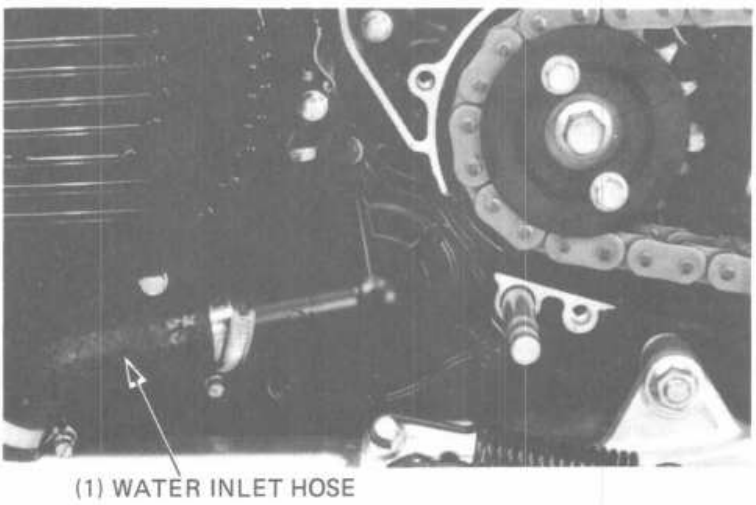
Insert a new O-ring over the end of the water pipe. Connect the water pipe to the pump hose and water pipe cap.



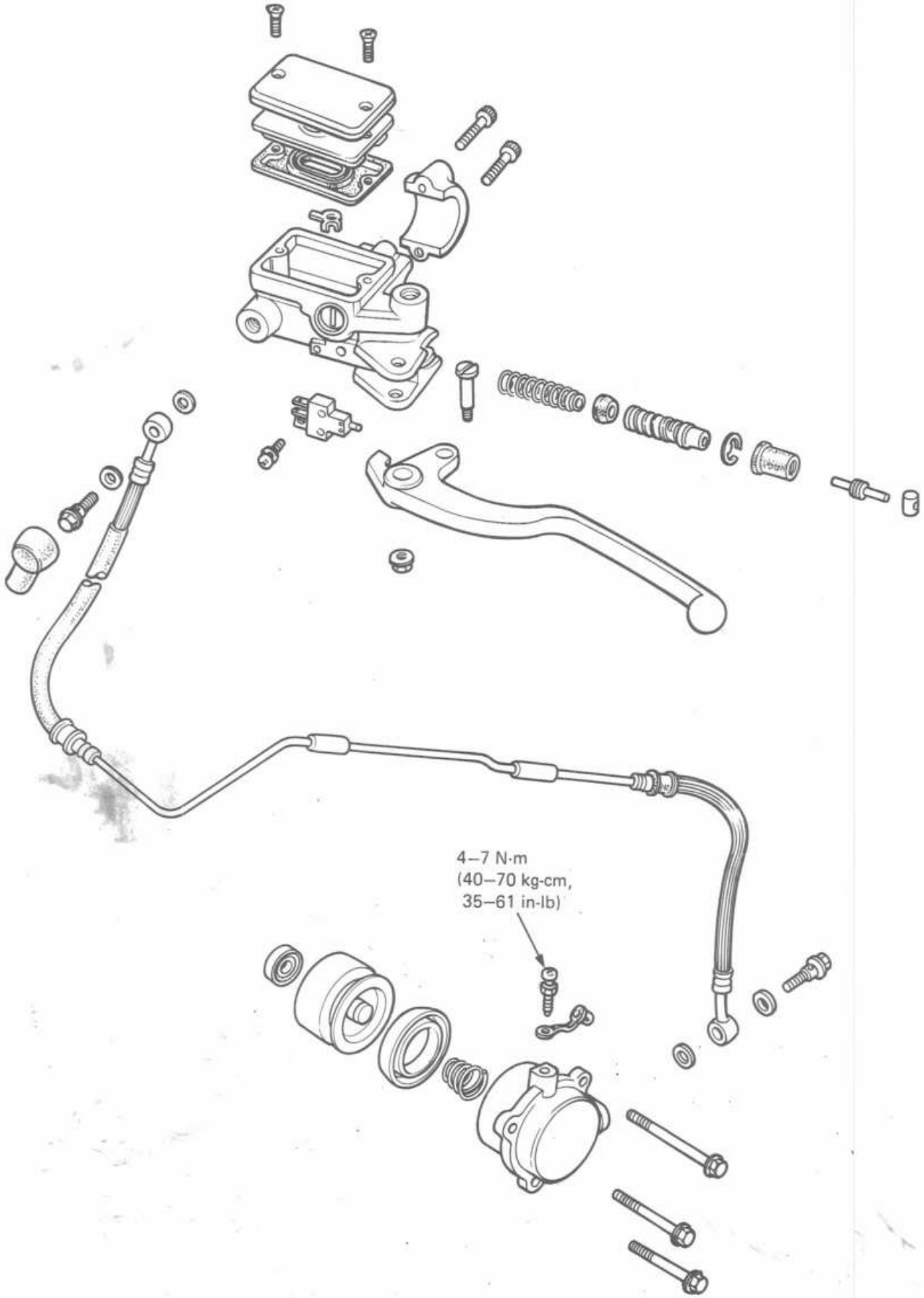
Install the dowel pins and install a new O-ring in the groove of the water pump cover.
Install the water pump cover and torque the bolts.



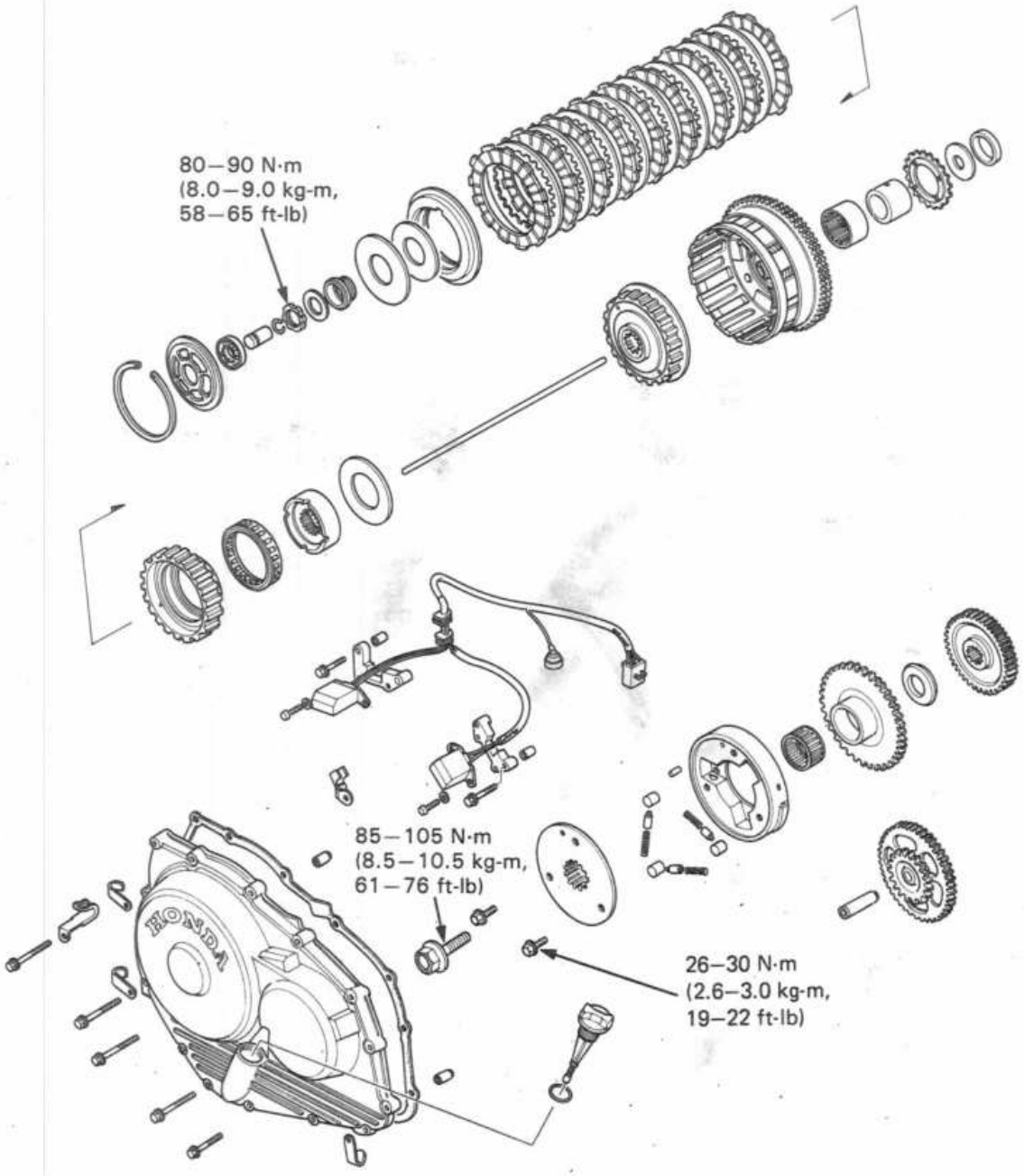
Connect the water inlet hose.
Install the drive sprocket cover, gearshift arm and clutch slave cylinder.
Fill the cooling system (page 6-3).



CLUTCH SYSTEM


4–7 N·m
(40–70 kg-cm,
35–61 in-lb)

SERVICE INFORMATION	7–2	CLUTCH COVER REMOVAL	7–10
TROUBLESHOOTING	7–3	STARTER CLUTCH DISASSEMBLY	7–10
CLUTCH FLUID REPLACEMENT/ AIR BLEEDING	7–4	CLUTCH DISASSEMBLY	7–12
CLUTCH MASTER CYLINDER	7–5	CLUTCH ASSEMBLY	7–17
CLUTCH SLAVE CYLINDER	7–8	STARTER CLUTCH ASSEMBLY	7–20
		CLUTCH COVER INSTALLATION	7–22



SERVICE INFORMATION

GENERAL

- This section covers removal and installation of the clutch hydraulic system, clutch and starter clutch.
- DOT-4 brake fluid is used for the hydraulic clutch and is referred to as clutch fluid in the section. Do not use other types of fluid as they are not compatible.
- Clutch maintenance can be done with the engine in the frame.

SPECIFICATIONS

		STANDARD	SERVICE LIMIT
Clutch master cylinder	Cylinder I.D.	14.000–14.043 mm (0.5512–0.5524 in)	14.06 mm (0.553 in)
	Piston O.D.	13.957–13.984 mm (0.5495–0.5506 in)	13.94 mm (0.549 in)
Clutch slave cylinder	Cylinder I.D.	33.600–33.622 mm (1.3228–1.3253 in)	33.68 mm (1.326 in)
	Piston O.D.	33.550–33.575 mm (1.3209–1.3218 in)	33.53 mm (1.320 in)
Clutch	Outer guide I.D.	29.995–30.012 mm (1.1809–1.1816 in)	30.08 mm (1.184 in)
	Spring free height	4.4 mm (0.17 in)	4.2 mm (0.165 in)
	Clutch center B I.D.	74.414–74.440 mm (2.9297–2.9307 in)	74.47 mm (2.932 in)
	One way clutch inner O.D.	57.755–57.768 mm (2.2738–2.2743 in)	57.72 mm (2.272 in)
	Disc thickness	3.72–3.88 mm (0.147–0.153 in)	3.1 mm (0.12 in)
	Plate warpage	–	0.30 mm (0.012 in)
Starter clutch	Driven gear O.D.	47.175–47.200 mm (1.8573–1.8583 in)	47.16 mm (1.857 in)

TORQUE VALUES

Primary drive gear	85–105 N·m (8.5–10.5 kg-m, 61–76 ft-lb)
Clutch lock nut	80–90 N·m (8.0–9.0 kg-m, 58–65 ft-lb)
Starter clutch	26–30 N·m (2.6–3.0 kg-m, 19–22 ft-lb)

TOOLS

Special

Snap ring pliers	07914–3230001
Gear holder	07924–ME90000
Lock nut wrench	07916–4220000

Common

Extension	07716–0020500
Driver	07749–0010000
Attachment, 37 x 40 mm	07746–0010200
Pilot, 40 mm	07746–0040900
Universal holder	07725–0030000

TROUBLESHOOTING

Clutch lever soft or spongy
1. Air bubbles in hydraulic system
2. Low fluid level
3. Hydraulic system leaking

Clutch lever too hard
1. Sticking piston(s)
2. Clogged hydraulic system

Clutch slips
1. Hydraulic system sticking
2. Discs worn
3. Springs weak

Clutch will not disengage
1. Air bubbles in hydraulic system
2. Low fluid level
3. Hydraulic system leaking
4. Hydraulic system sticking
5. Plates warped

Motocycle creeps with clutch disengaged
1. Air bubbles in hydraulic system
2. Low fluid level
3. Hydraulic system leaking
4. Hydraulic system sticking
5. Plates warped

Excessive lever pressure
1. Hydraulic system sticking
2. Lifter mechanism damaged

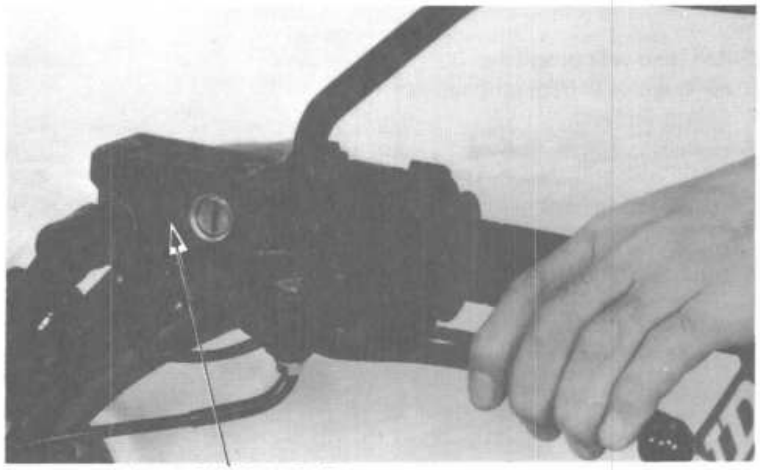
Clutch operation feels rough
1. Outer drum slots rough
2. Sticking piston(s)

CLUTCH FLUID REPLACEMENT/ AIR BLEEDING

Check the fluid level with the fluid reservoir parallel to the ground.

CAUTION

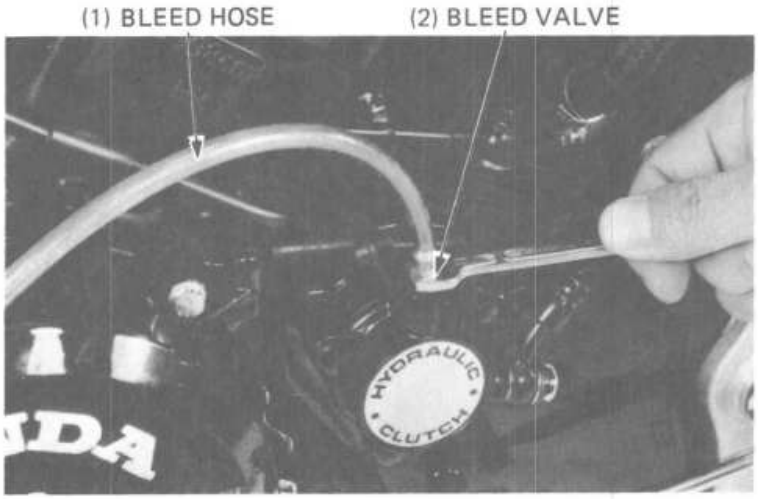
- *Install the diaphragm on the reservoir when operating the clutch lever. Failure to do so will allow clutch fluid to squirt out of the reservoir during clutch operation.*
- *Avoid spilling fluid on painted surfaces. Place a rag over the fuel tank whenever the system is serviced.*



(1) LOWER LEVEL

CLUTCH FLUID DRAINING

Connect a bleed hose to the bleed valve.
Loosen the slave cylinder bleed valve and pump the clutch lever.
Stop operating the lever when no fluid flows out of the bleed valve.



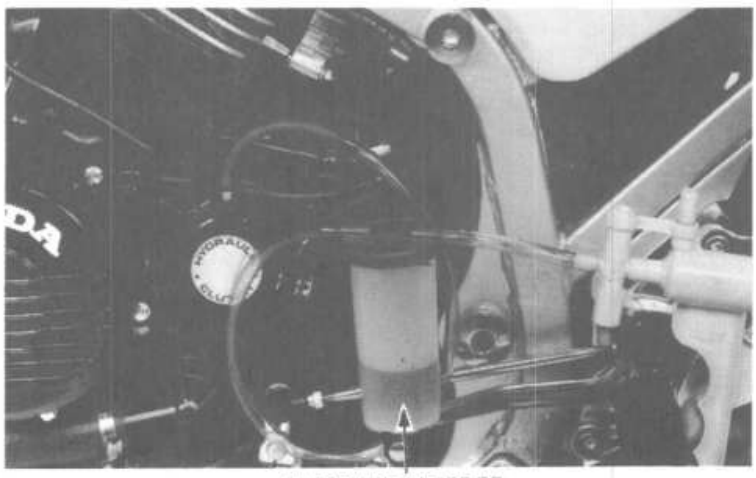
CLUTCH FLUID FILLING

Connect the Brake Bleeder to the bleed valve.
Pump the brake bleeder and loosen the bleed valve.
Add the clutch fluid when the fluid level in the master cylinder reservoir is low.
Repeat above procedure until air bubbles do not appear in the brake hose.

NOTE

If air is entering the bleeder from around the bleed valve threads, seal the threads with tefron tape.

If the brake bleeder not available, fill the system as follow:
Close the bleed valve, fill the reservoir, and install the diaphragm.
Pump up the system pressure with the lever until there are no air bubbles in the fluid flowing out of the reservoir small hole and lever resistance is felt.
Then bleed the system.



(1) BRAKE BLEEDER

AIR BLEEDING

NOTE

> Check the clutch fluid level often while bleeding clutch to prevent air from being pumped into the system.

1) Squeeze the clutch lever, open the bleed valve 1/2 turn then close the bleed valve.

NOTE

> Do not release the clutch lever until the bleed valve has been closed again.

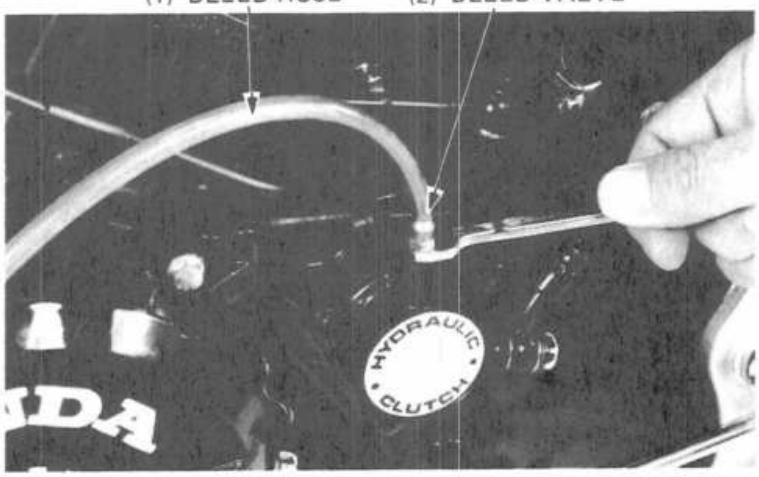
2) Release the clutch lever slowly and wait several seconds after it reachs the end of its travel.

Repeat the above until bubbles cease to appear in the fluid at the end of the hose.
Tighten the bleed valve.

TORQUE: 4–7 N·m (40–70 kg-cm, 35–61 in-lb)

Fill the clutch fluid reservoir to the upper level.

(1) BLEED HOSE (2) BLEED VALVE



CLUTCH MASTER CYLINDER

DISASSEMBLY

Drain clutch fluid from the hydraulic system.
Remove the rear view mirror and clutch lever.
Disconnect the clutch switch wires and remove the clutch hose.

CAUTION

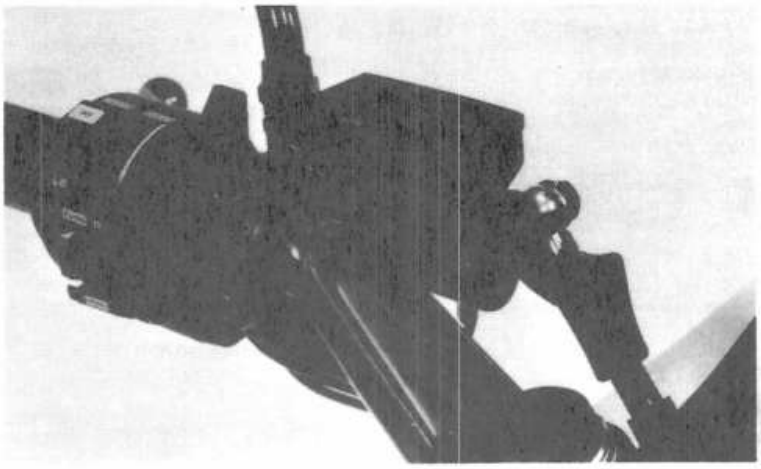
> *Avoid spilling clutch fluid on painted surfaces. place a rag over the fuel tank whenever the clutch system is serviced.*

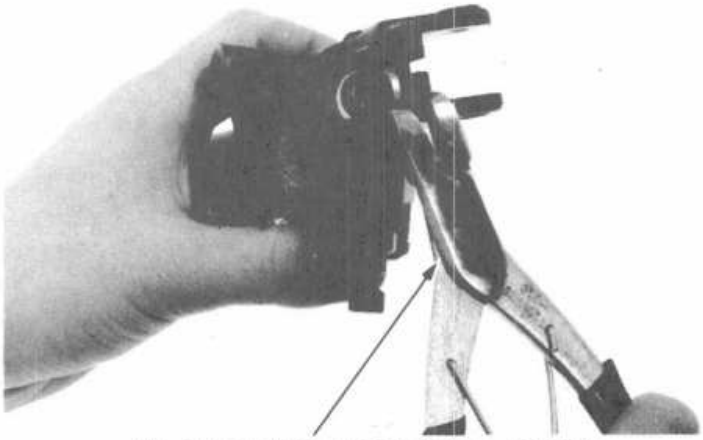
NOTE

> When removing the oil bolt, cover the end of the hose to prevent contamination and secure the hose.

Remove the master cylinder.

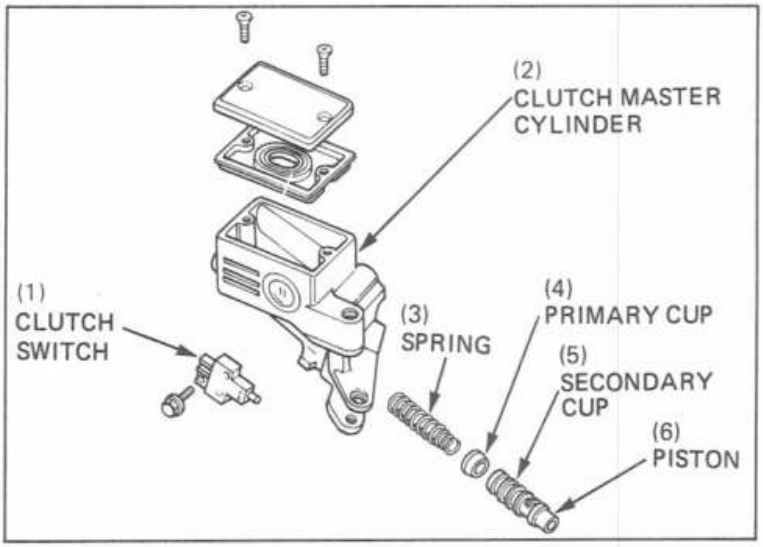
Remove the push rod, boot and snap ring from the master cylinder body.





(1) SNAP RING PLIERS 07914–3230001

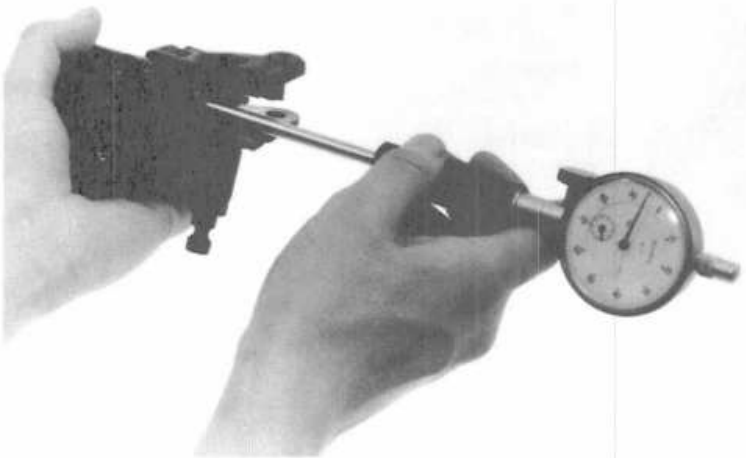
Remove the following:
- piston and secondary cup.
- primary cup and spring.
- clutch switch, if necessary.



MASTER CYLINDER I.D. INSPECTION

Measure the master cylinder I.D.
Check the master cylinder for scores, scratches or nicks.

SERVICE LIMIT: 14.06 mm (0.553 in)



MASTER PISTON O.D. INSPECTION

Measure the master piston O.D.

SERVICE LIMIT: 13.94 mm (0.549 in)

Check the primary and secondary cups for damage before assembly.



ASSEMBLY

CAUTION

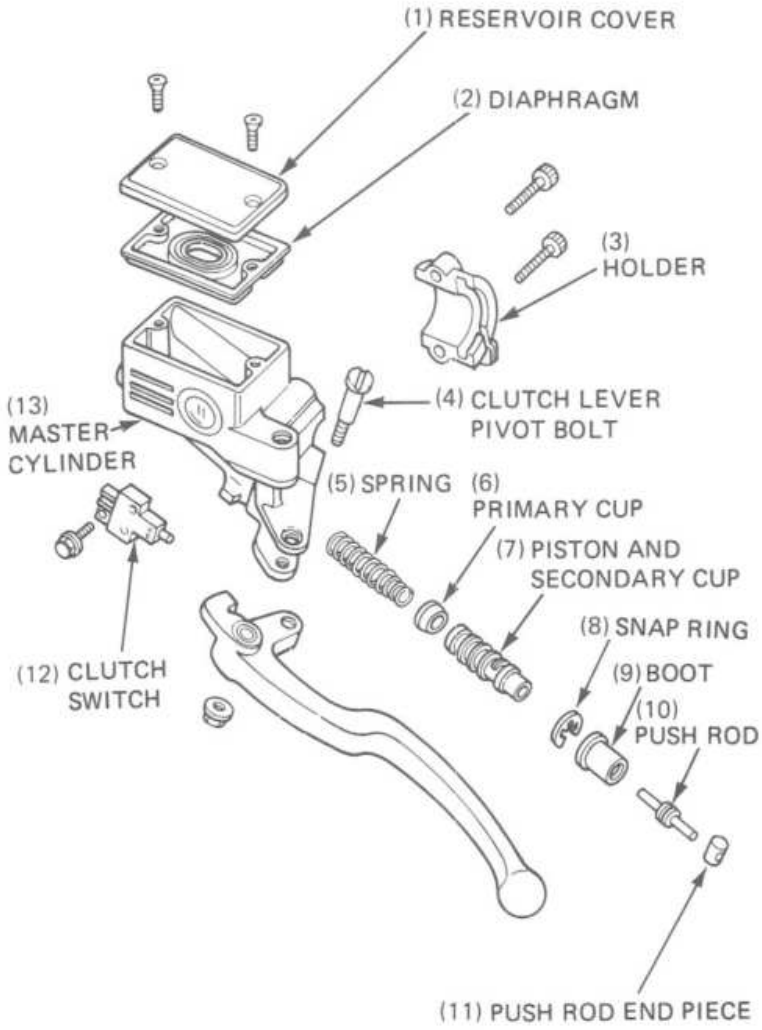
Handle the master piston, spring, primary cup and secondary cup as a set.

Coat all parts with clean brake fluid before assembly.
Install the spring, primary cup and piston.

CAUTION

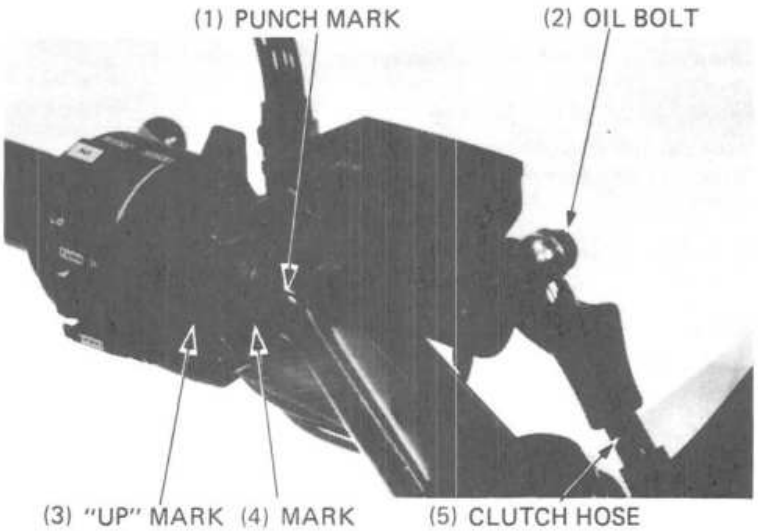
When installing the cups, do not allow the lips to turn inside out.

Install the snap ring making sure it is seated firmly in the groove. Then install the boot and push rod.
Install the clutch switch, if it was removed.



Place the master cylinder on the handlebar and install the holder with the "UP" mark facing up and the two mounting bolts.
Align the mark of the holder with the handlebar punch mark.
Tighten the top bolt first, then the bottom bolt.

Install the oil hose with the bolt and its two sealing washers.
Install the push rod end piece into the clutch lever hole and install the clutch lever.
Connect the clutch switch wires to the switch terminals.
Fill the reservoir and bleed the clutch system (page 7-4).



CLUTCH SLAVE CYLINDER

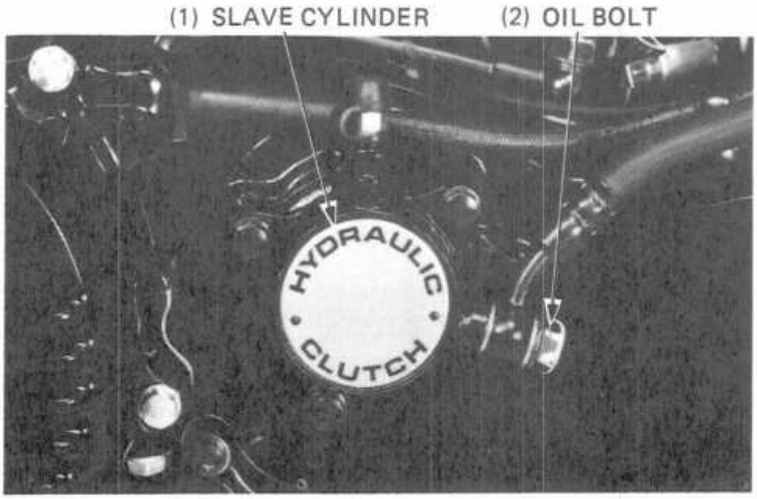
DISASSEMBLY

Place a container under the slave cylinder, remove the oil bolt and disconnect the clutch hose.

NOTE

Avoid spilling clutch fluid on painted surfaces.

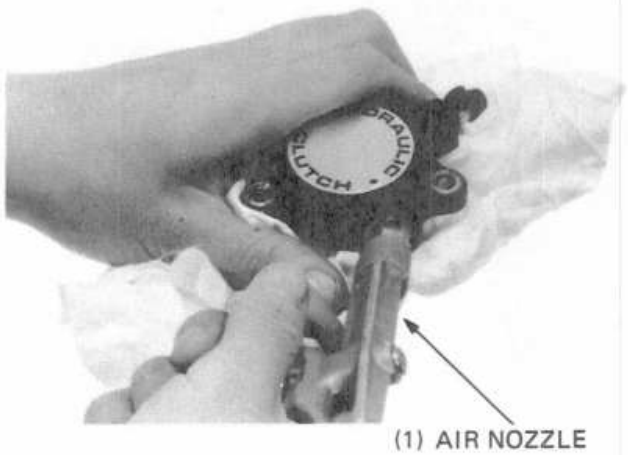
Remove the slave cylinder.



Remove the piston from the cylinder.

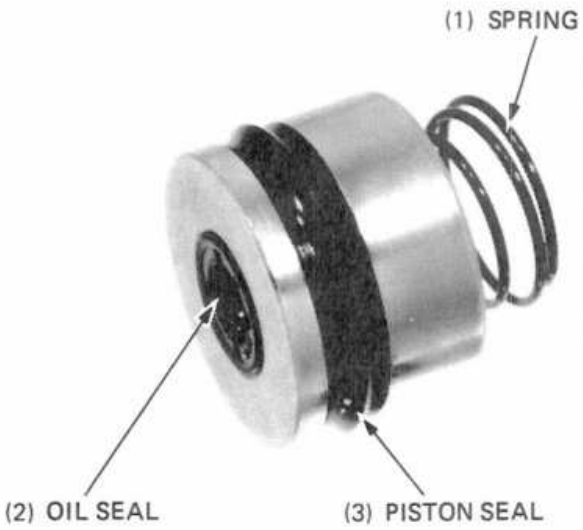
If piston removal is hard, place a shop towel over the piston to cushion the piston when it is expelled, and position the cylinder with the piston down.

Apply compressed air to the fluid inlet to remove the piston. Use the air in short spurts.



Remove the spring from the slave cylinder.

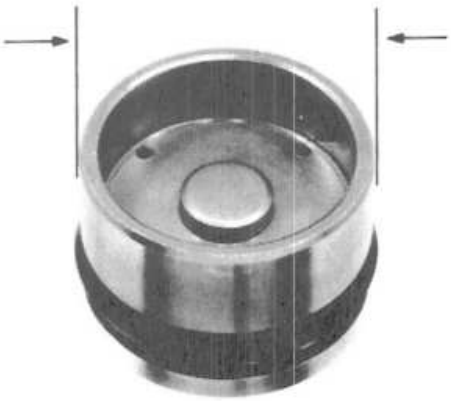
Remove the oil and piston seals.
Clean the piston groove with clutch fluid.
Check the piston spring for weakness or damage.



PISTON O.D. INSPECTION

Check the piston for scoring or scratches.
Measure the outside diameter of the piston with a micrometer.

SERVICE LIMIT: 33.53 mm (1.320 in)



CYLINDER I.D. INSPECTION

Check the slave cylinder for scoring or scratches.
Measure the inside diameter of the cylinder bore.

SERVICE LIMIT: 33.68 mm (1.326 in)

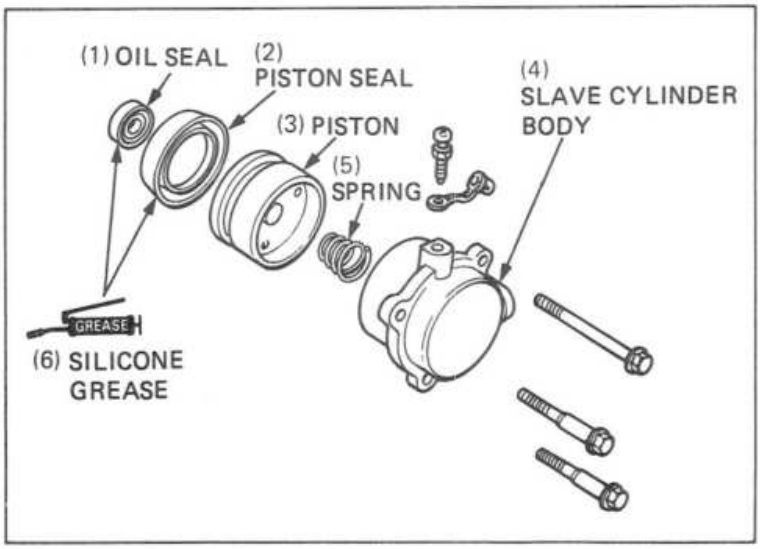


ASSEMBLY

Assemble the slave cylinder in the reverse order of disassembly. The oil seals must be replaced with new ones whenever they have been removed.

Lubricate the piston and piston seal with a medium grade of Hi-Temperature silicone grease or brake fluid before assembly.

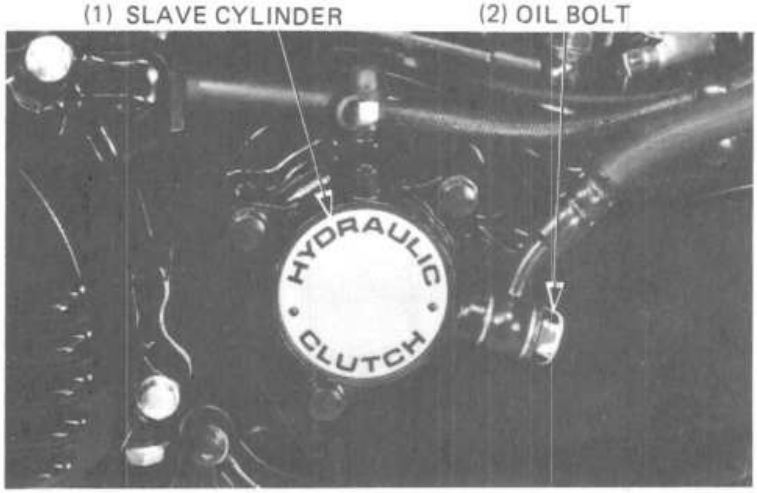
Be certain the piston seal is seated in the piston groove. Place the piston in the cylinder with the seal end facing out.



Install the insulator and slave cylinder.
Connect the clutch hose with the oil bolt and the two sealing washers.

Fill the clutch fluid reservoir and bleed the clutch system (page 7-4).

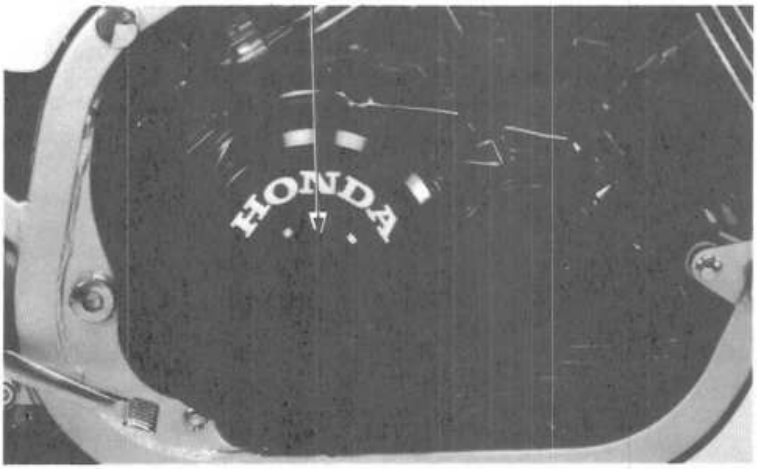
(1) SLAVE CYLINDER (2) OIL BOLT



CLUTCH COVER REMOVAL

Drain the engine oil.
Remove the clutch cover, gasket and dowel pins.

(1) CLUTCH COVER

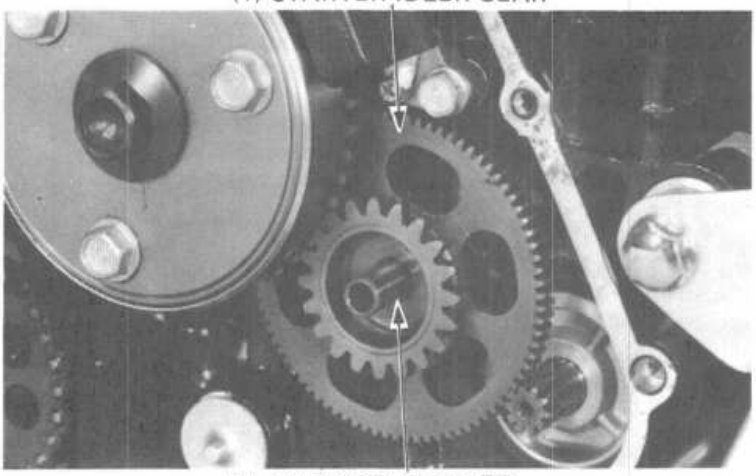


STARTER CLUTCH DISASSEMBLY

Remove the pulse generator (page 19-4).
Remove the starter idle gear shaft and gear.

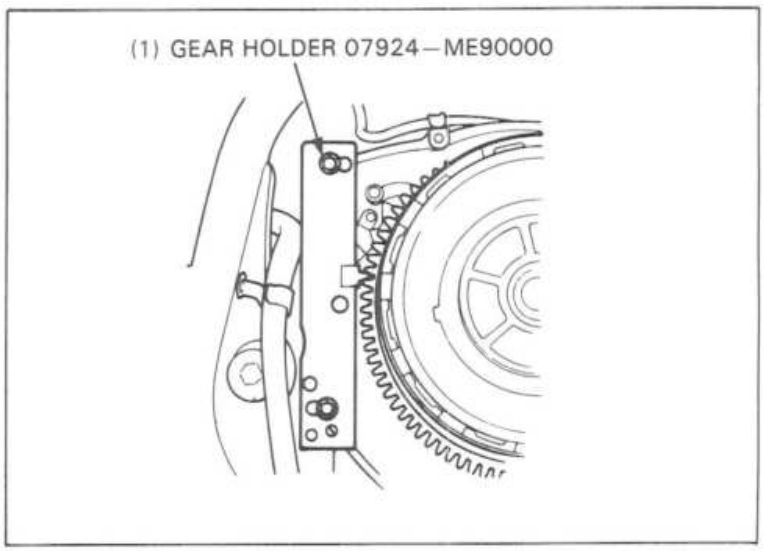
Remove the idler gear by rotating the starter clutch clockwise with a wrench, or by rotating the idler gear clockwise to turn the starter motor shaft counterclockwise.

(1) STARTER IDLER GEAR

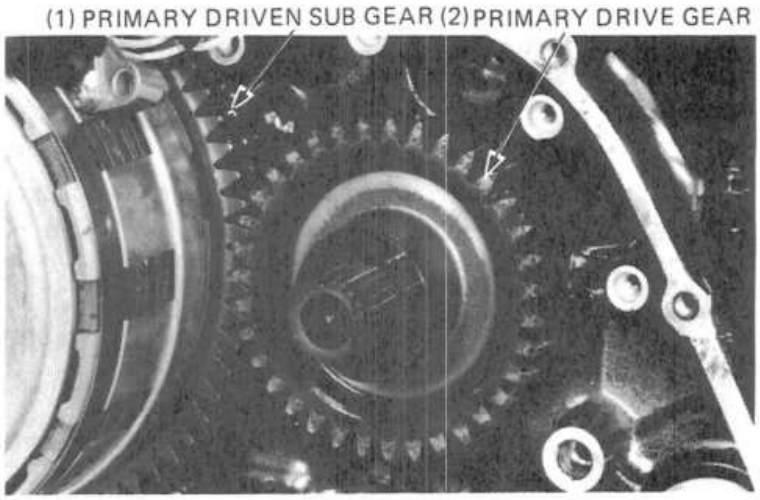


(2) IDLER GEAR SHAFT

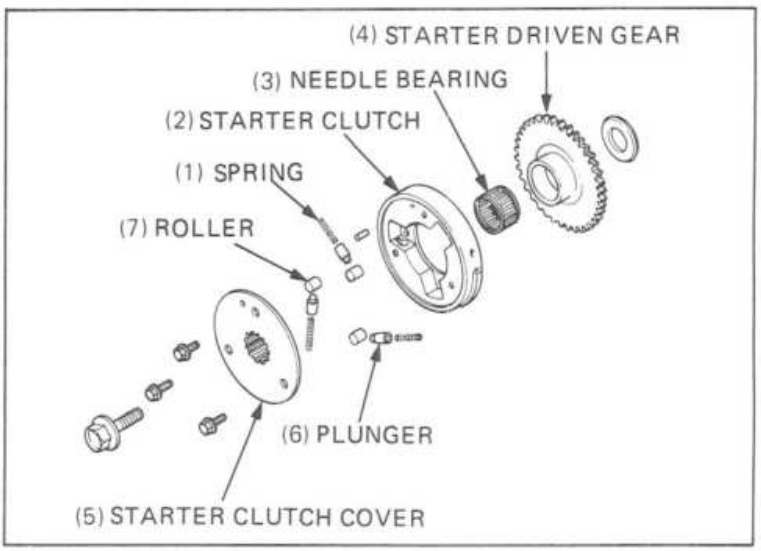
Hold the primary gear with the gear holder and remove the bolt.
Remove the starter clutch.



Shift the primary driven sub gear with a screwdriver to take preload off the primary drive gear and remove the primary drive gear.



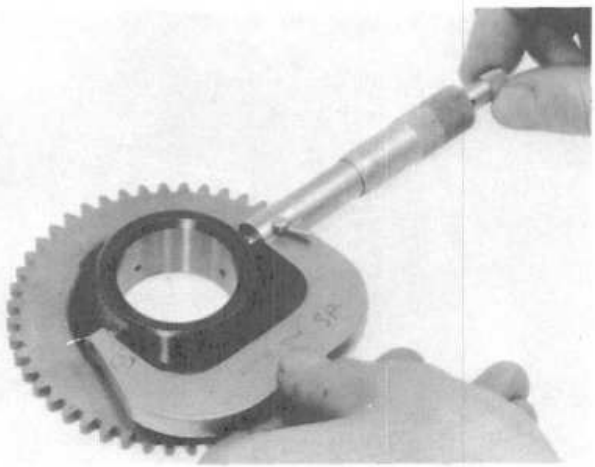
Remove the starter driven gear and needle bearing from the starter clutch.
Inspect the rollers for smooth operation.
Remove the starter clutch cover by removing the three bolts.
Remove the clutch rollers, plungers and springs.
Check the rollers for excessive wear.



STARTER DRIVEN GEAR INSPECTION

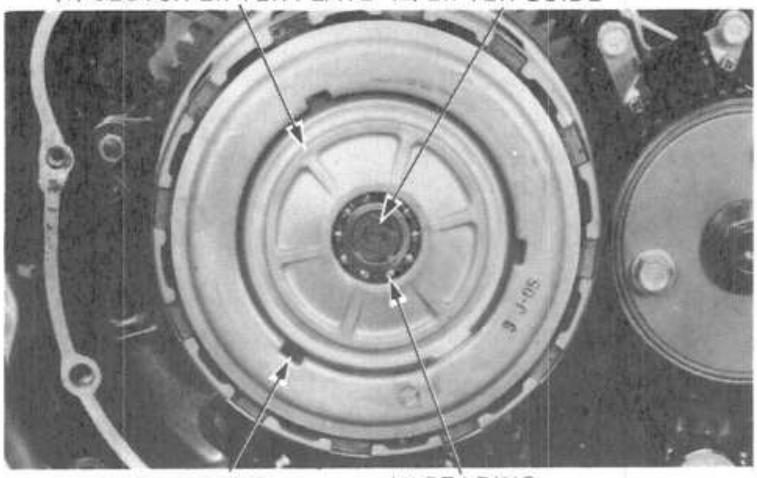
Inspect the driven gear for damage or excessive wear.
Measure the driven gear O.D.

SERVICE LIMIT: 47.16 mm (1.857 in)



CLUTCH DISASSEMBLY

Remove the snap ring, clutch lifter plate, bearing, lifter guide and lifter rod.



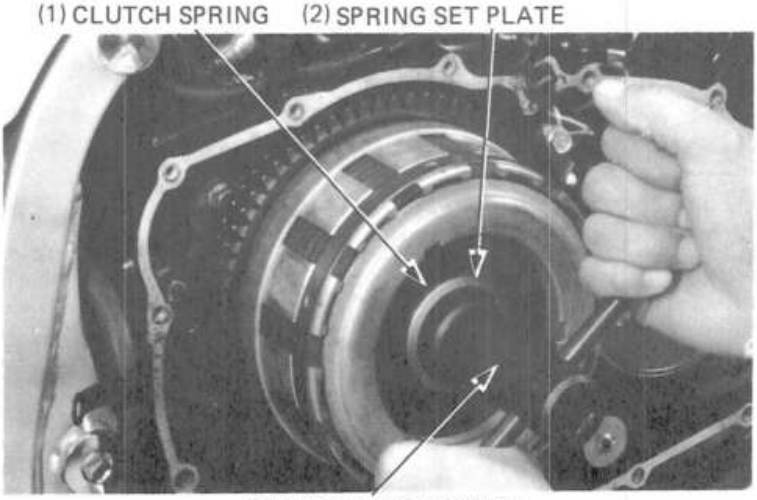
Shift the transmission into 5th gear and apply the rear brake.

NOTE

> If the engine is not in the frame, shift the transmission into gear and use the universal holder (07725–0030000) to hold the drive sprocket.

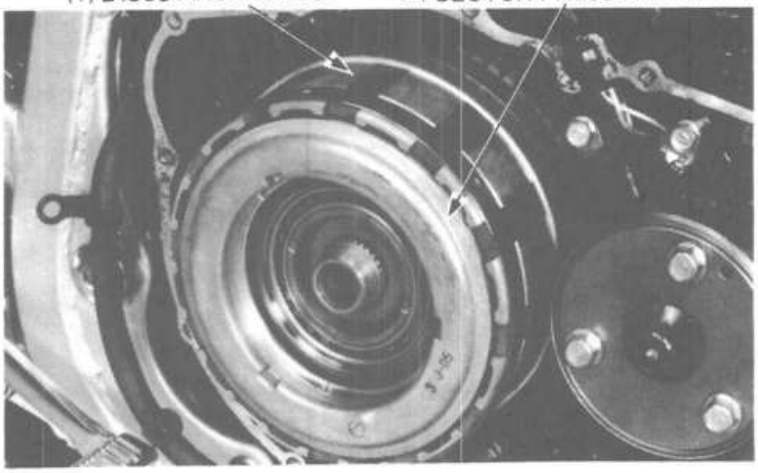
Remove the lock nut and lock washer.

Remove the clutch spring set plate, clutch spring and two washers.

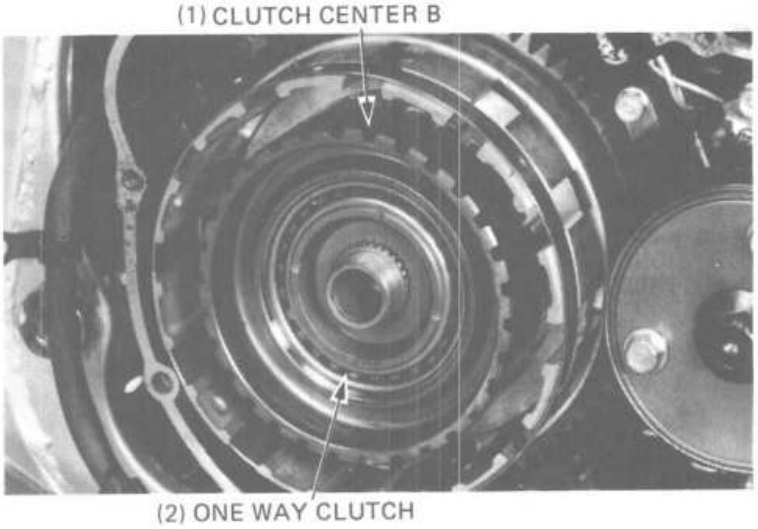


Remove the clutch pressure plate.

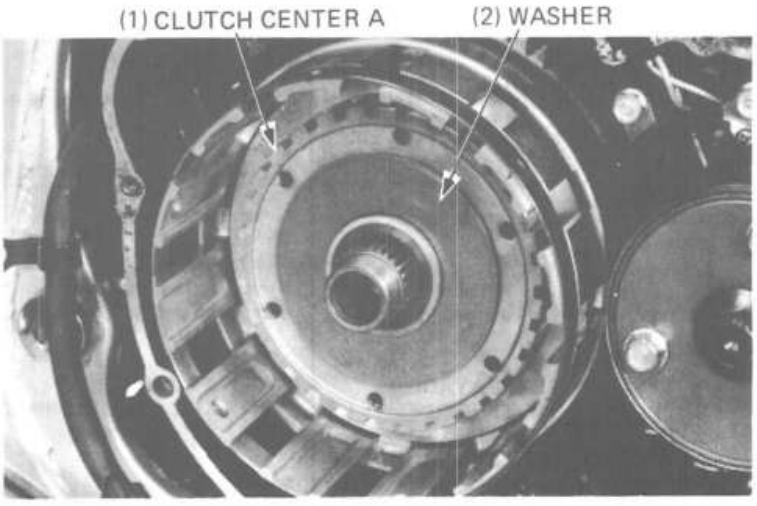
Remove the clutch plates and discs.



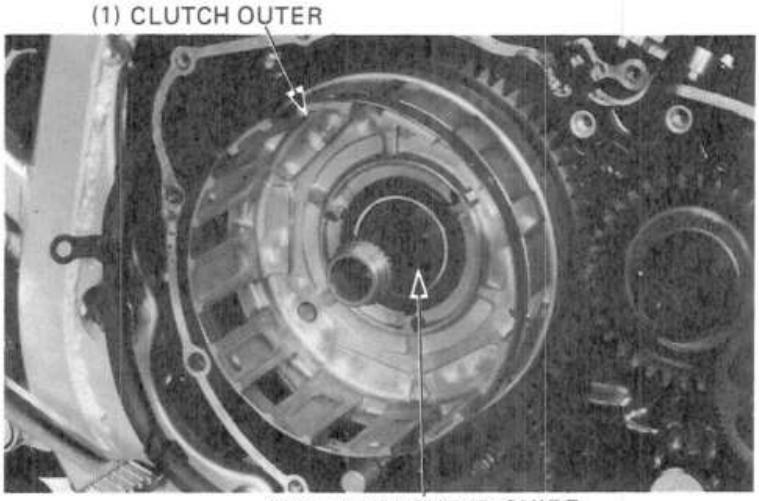
Remove clutch center B and the one-way clutch as an assembly.



Remove clutch center A and washer.
Remove the starter clutch (page 7-10).



Remove the clutch outer and outer guide.



INSPECTION

CLUTCH SPRING

Measure the height of the clutch spring.

SERVICE LIMIT: 4.2 mm (0.165 in)

Replace the spring if it is shorter than the service limit.

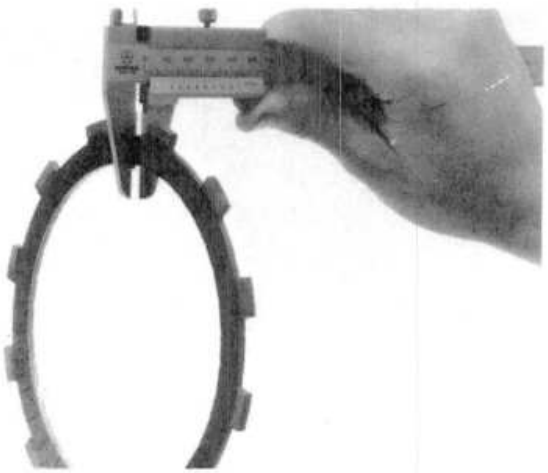


CLUTCH DISC

Replace the clutch discs if they show signs of scoring or discoloration.
Measure the thickness of each disc.

SERVICE LIMIT: 3.1 mm (0.12 in)

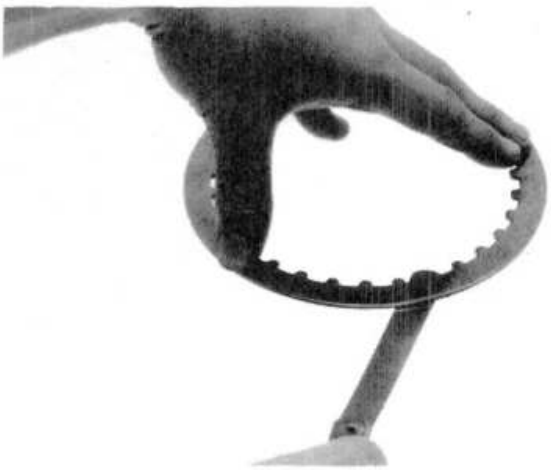
Replace any discs that are thinner than the service limit.



CLUTCH PLATE

Check for plate warpage on a surface plate, using a feeler gauge.

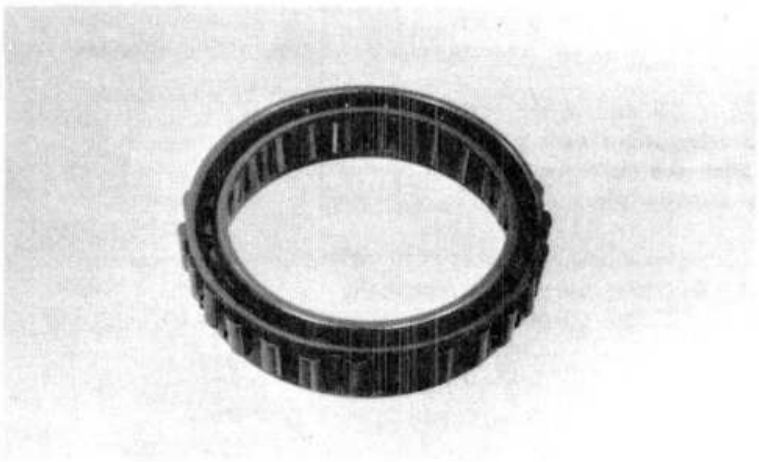
SERVICE LIMIT: 0.30 mm (0.012 in)



ONE WAY CLUTCH INSPECTION

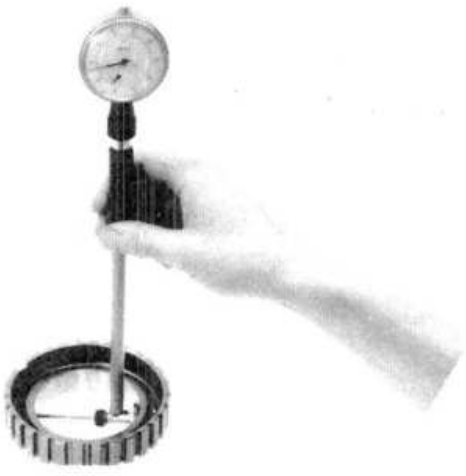
Inspect the one way clutch for smooth operation.

Check the rollers for excessive wear.



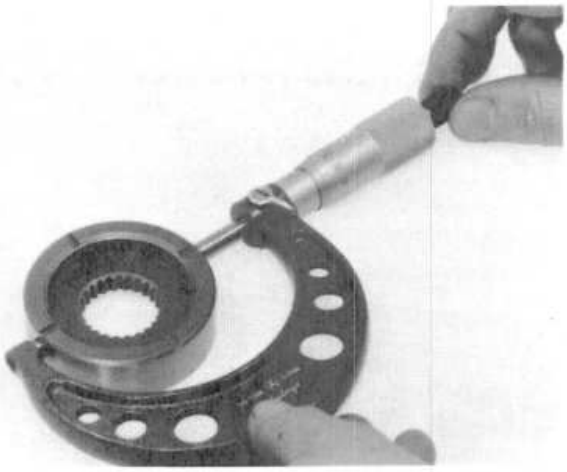
Measure the I.D. of clutch center B.

SERVICE LIMIT: 74.47 mm (2.932 in)



Measure the O.D. of the one way clutch inner.

SERVICE LIMIT: 57.72 mm (2.272 in)

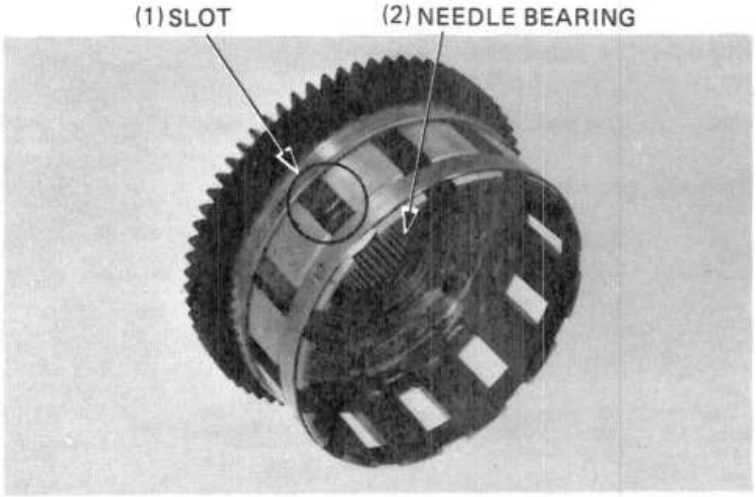


INSPECTION

CLUTCH OUTER

Check the slots in the clutch outer for nicks, cuts or indentations made by the friction discs.
Check the clutch outer needle bearing for damage or excessive play.

If the needle bearing is difficult to remove from the clutch housing, use the following tools:
Driver: 07749–0010000
Attachment, 42 x 47 mm: 07746–0010300
Pilot, 40 mm: 07746–0040900



CLUTCH OUTER GUIDE

Measure the I.D. of the clutch outer guide.

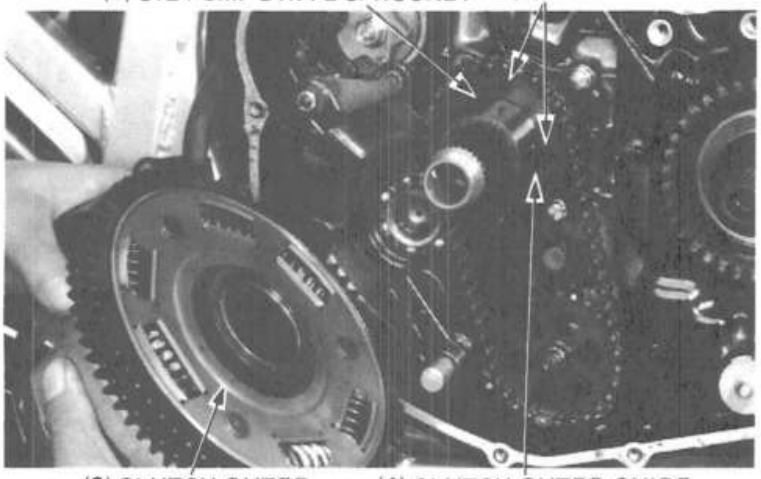
SERVICE LIMIT: 30.08 mm (1.184 in)



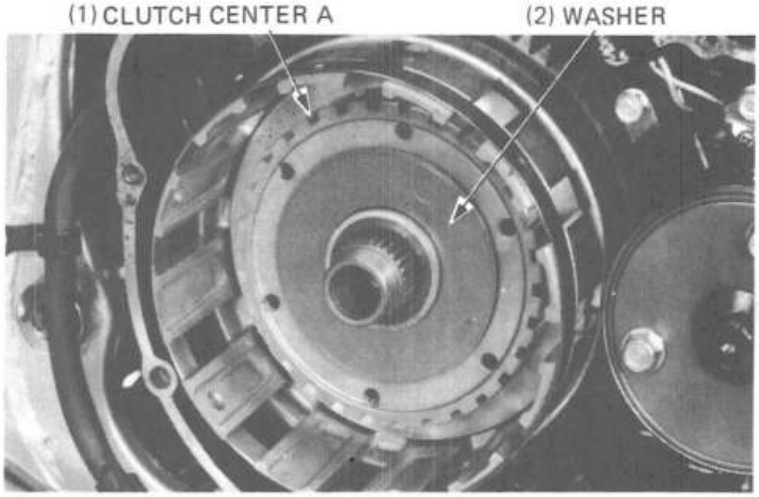
CLUTCH ASSEMBLY

Install the clutch outer guide over the mainshaft.
Install the needle bearing into the clutch outer.

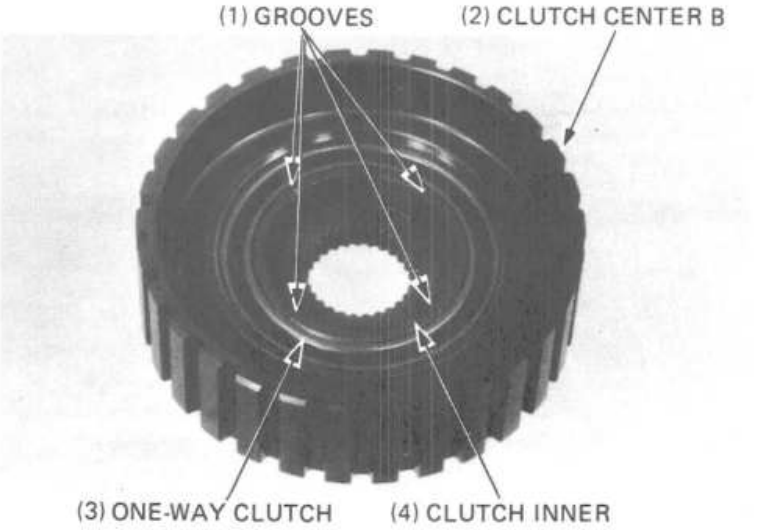
Align the holes in the clutch outer with the pins on the oil pump drive sprocket and install the clutch outer over the guide.



Install clutch center A and the washer.
Install the starter clutch (page 7-20).



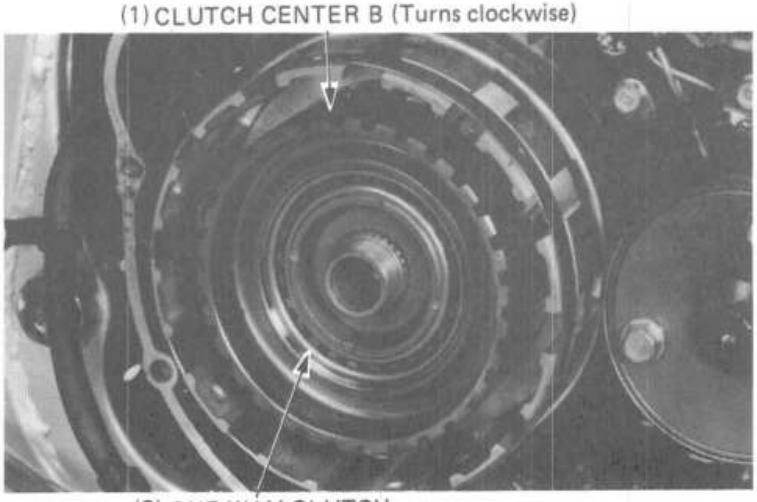
Place the clutch center B with the grooved side facing down.
Install the one-way clutch into the clutch center B with its flanged cage facing up.
Install the clutch inner into the one-way clutch with its grooves facing up. Turn it counterclockwise as you install it.



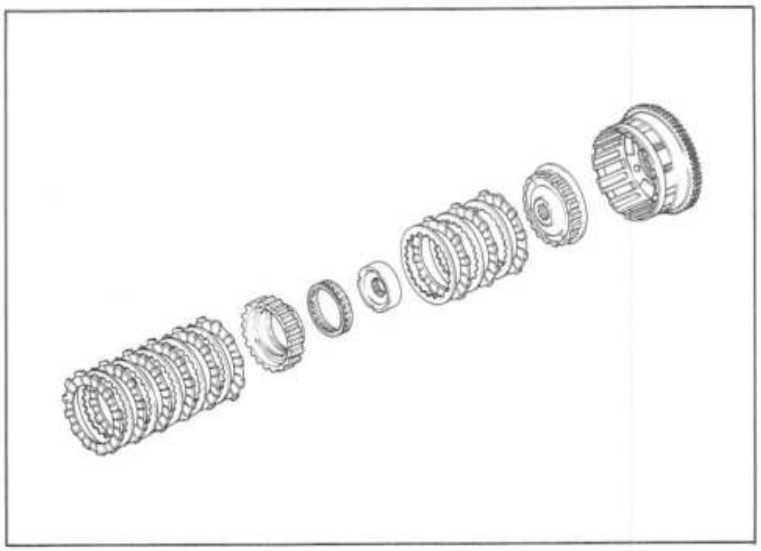
Install the one-way clutch/clutch center B assembly over the mainshaft.

NOTE

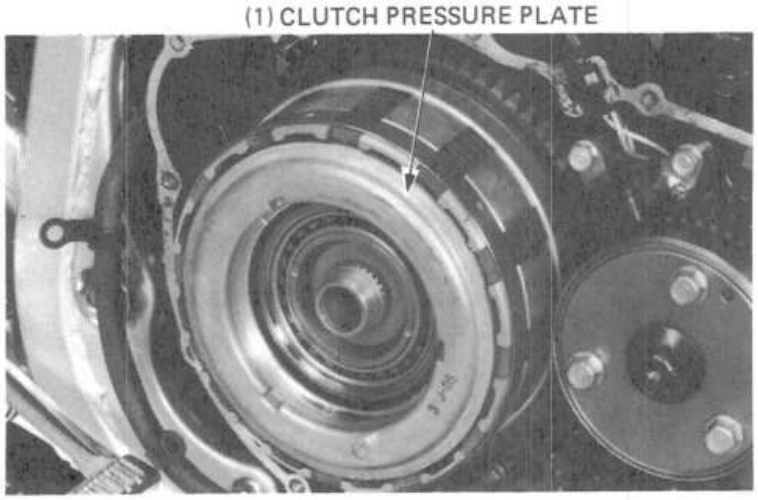
> Make sure the one way clutch assembly is installed correctly by turning the clutch center B. The clutch center should turn clockwise freely and should not turn counterclockwise.



Coat the discs and plates with clean engine oil, and install them.



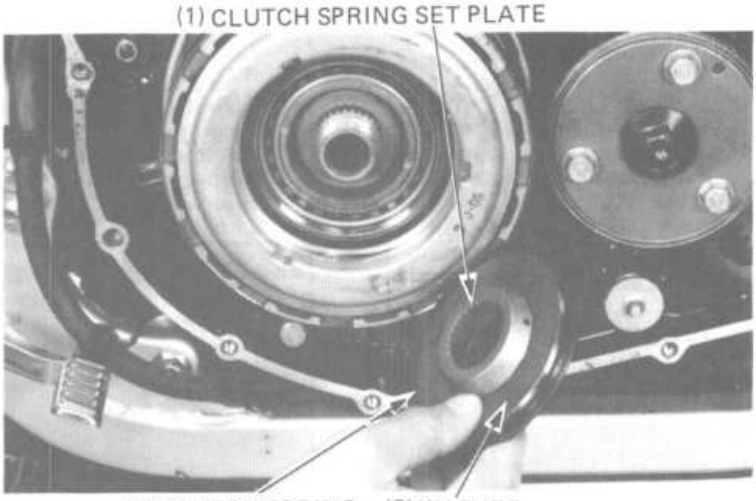
Install the clutch pressure plate.



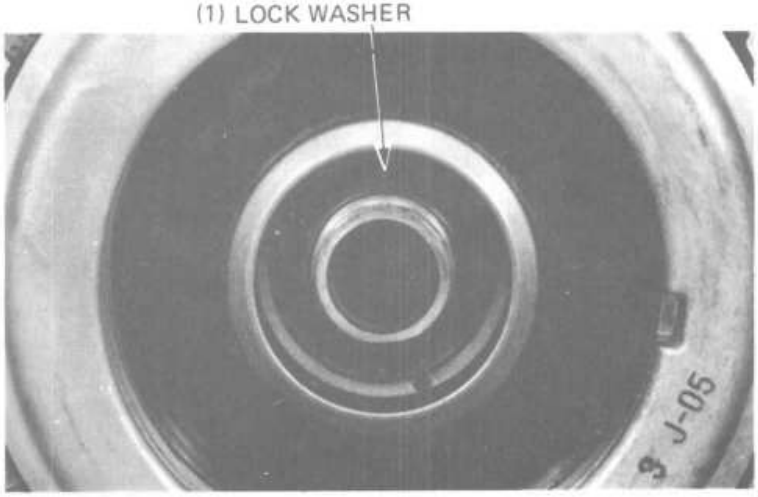
Install the clutch spring set plate, clutch spring, and washer.

NOTE

Install the clutch spring with the dished face towards the inside.



Install the lock washer with its dished face towards the inside.

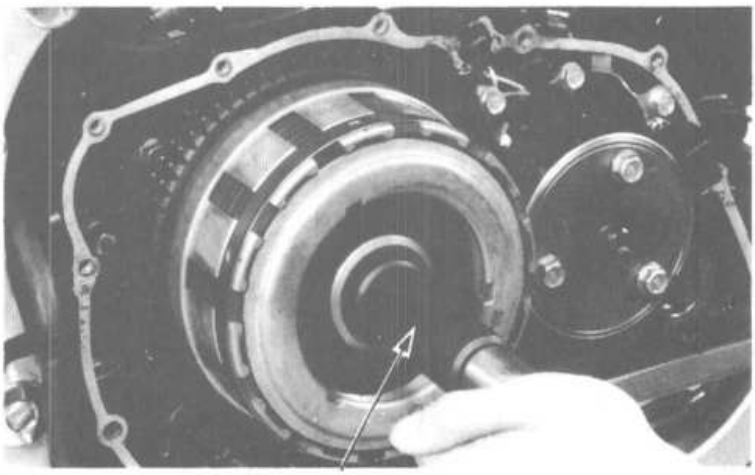


Place the transmission in 5th gear.

NOTE

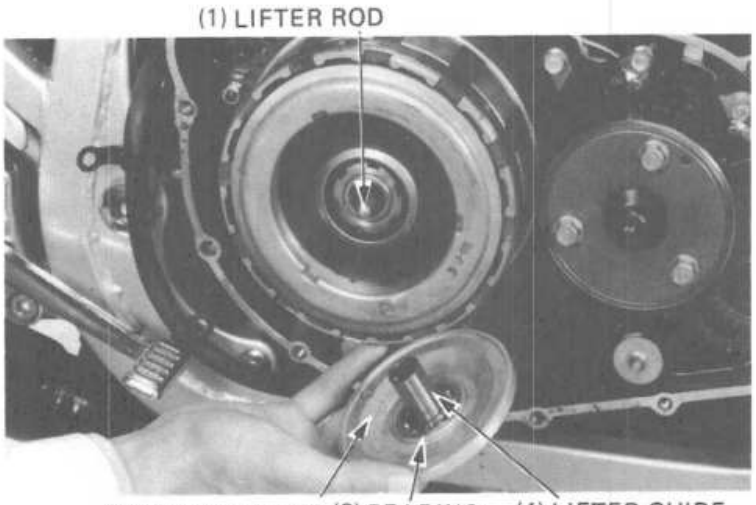
If servicing the clutch with the engine out of the frame, shift the transmission into gear and hold the drive sprocket with the HOLDER 07725–0030000.

TORQUE:
80–90 N·m (8.0–9.0 kg-m, 58–65 ft-lb)

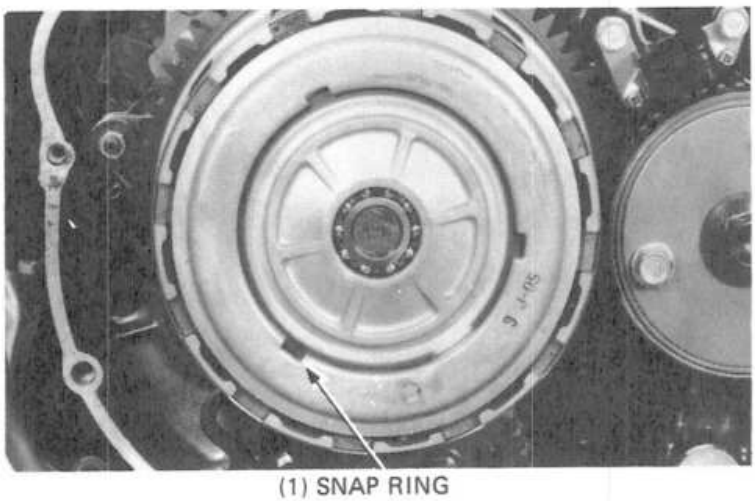


Install the clutch lifted rod.

Install the clutch lifter plate, lifter guide and bearing.



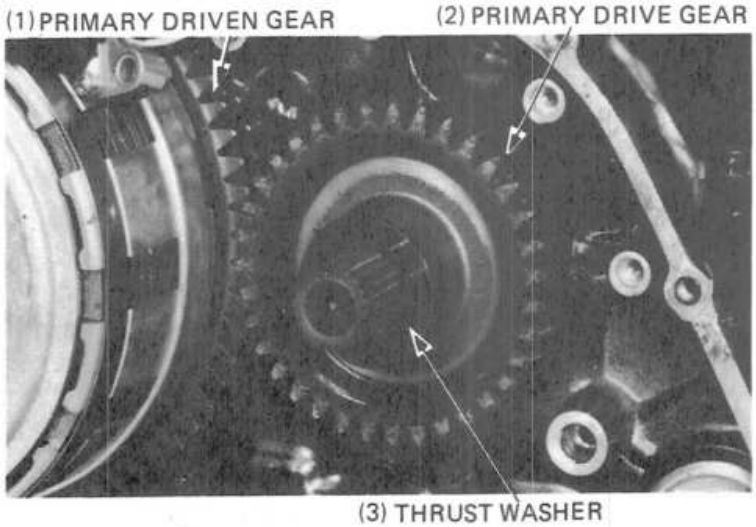
Install the snap ring.



STARTER CLUTCH ASSEMBLY

Install the primary drive gear onto the crankshaft while moving the primary driven gear with a screwdriver.

Install the thrust washer on the crankshaft.

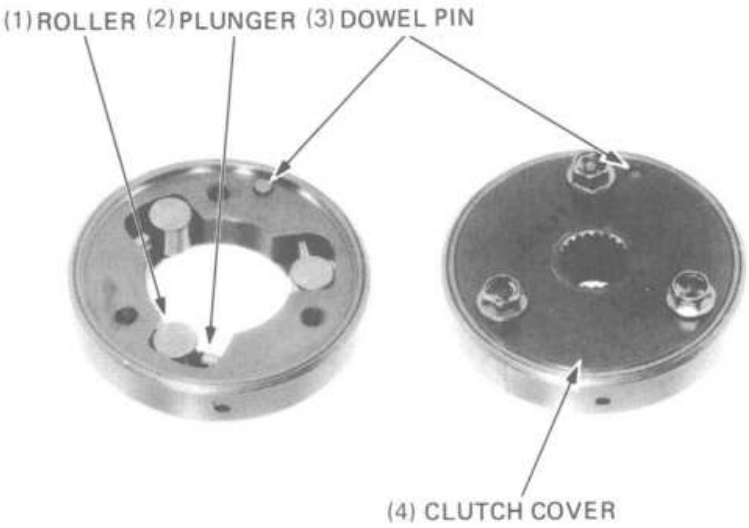


Install the springs, plungers and rollers into the starter clutch.
Install the dowel pin.
Install the starter clutch cover aligning the dowel pin hole with the dowel pin and tighten the bolts.

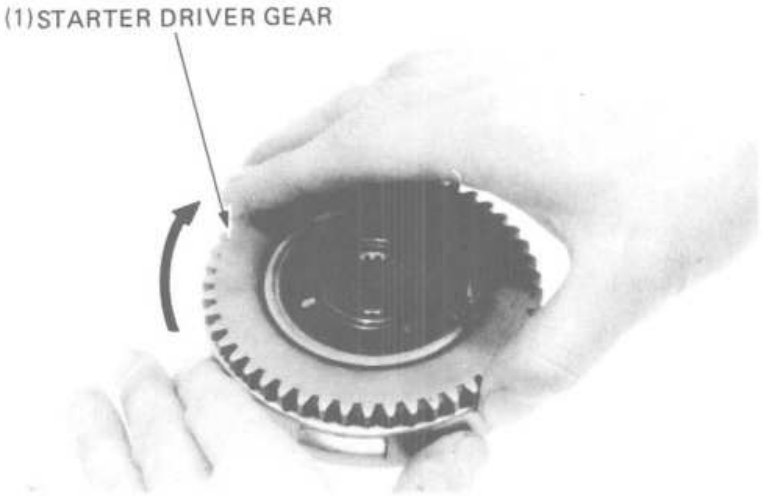
TORQUE: 26–30 N·m (2.6–3.0 kg-m, 19–22 ft-lb)

NOTE

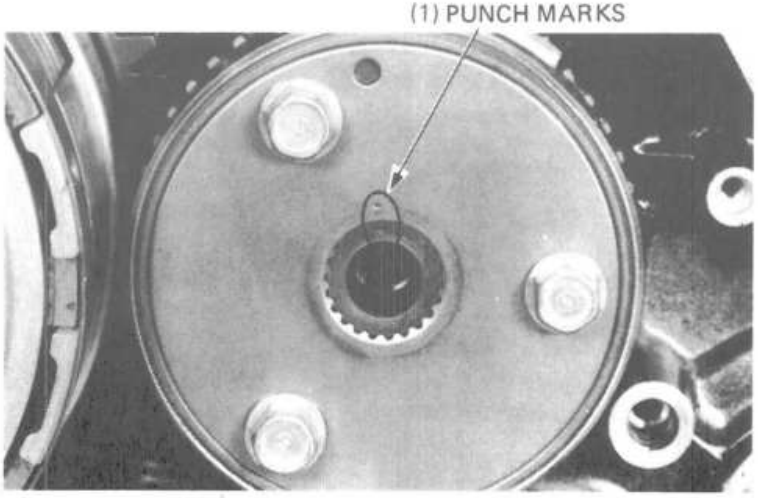
Apply a locking agent to the bolt threads.



Install the starter driven gear by turning it clockwise.

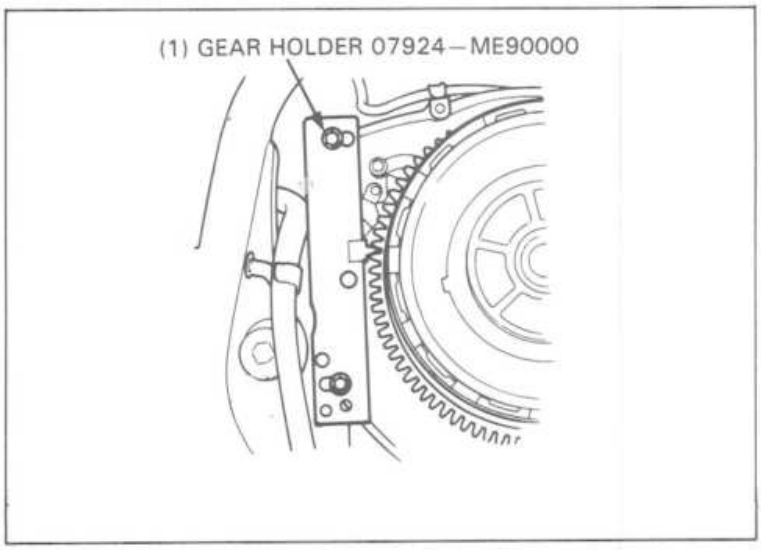


Align the punch marks on the starter clutch and crankshaft and install the starter clutch.

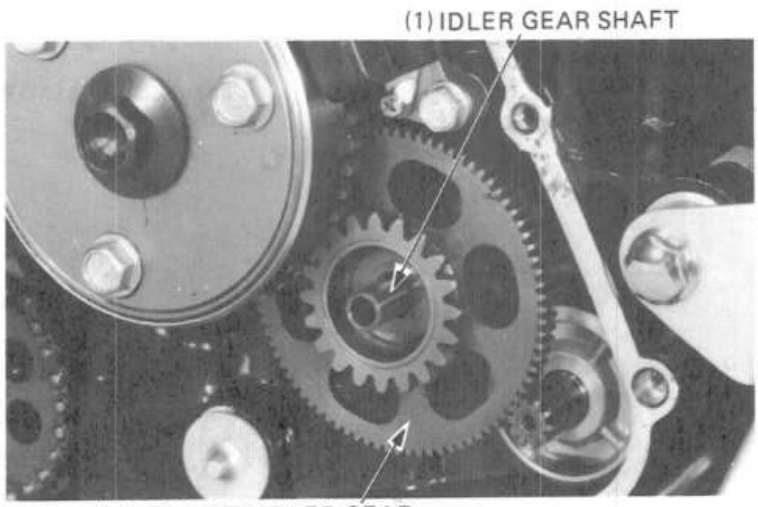


Hold the primary gear with the gear holder (07924–MC70002) and tighten the primary gear bolt.

TORQUE:
85–105 N·m (8.5–10.5 kg-m, 61–76 ft-lb)

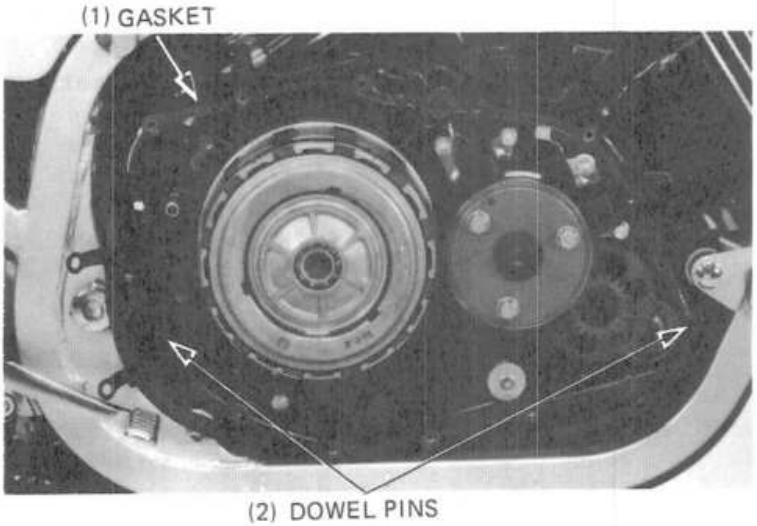


Install the starter idler gear and shaft.

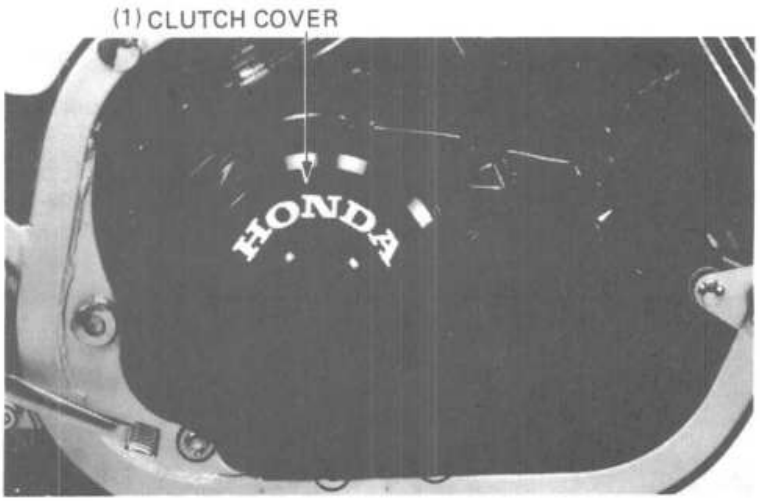


CLUTCH COVER INSTALLATION

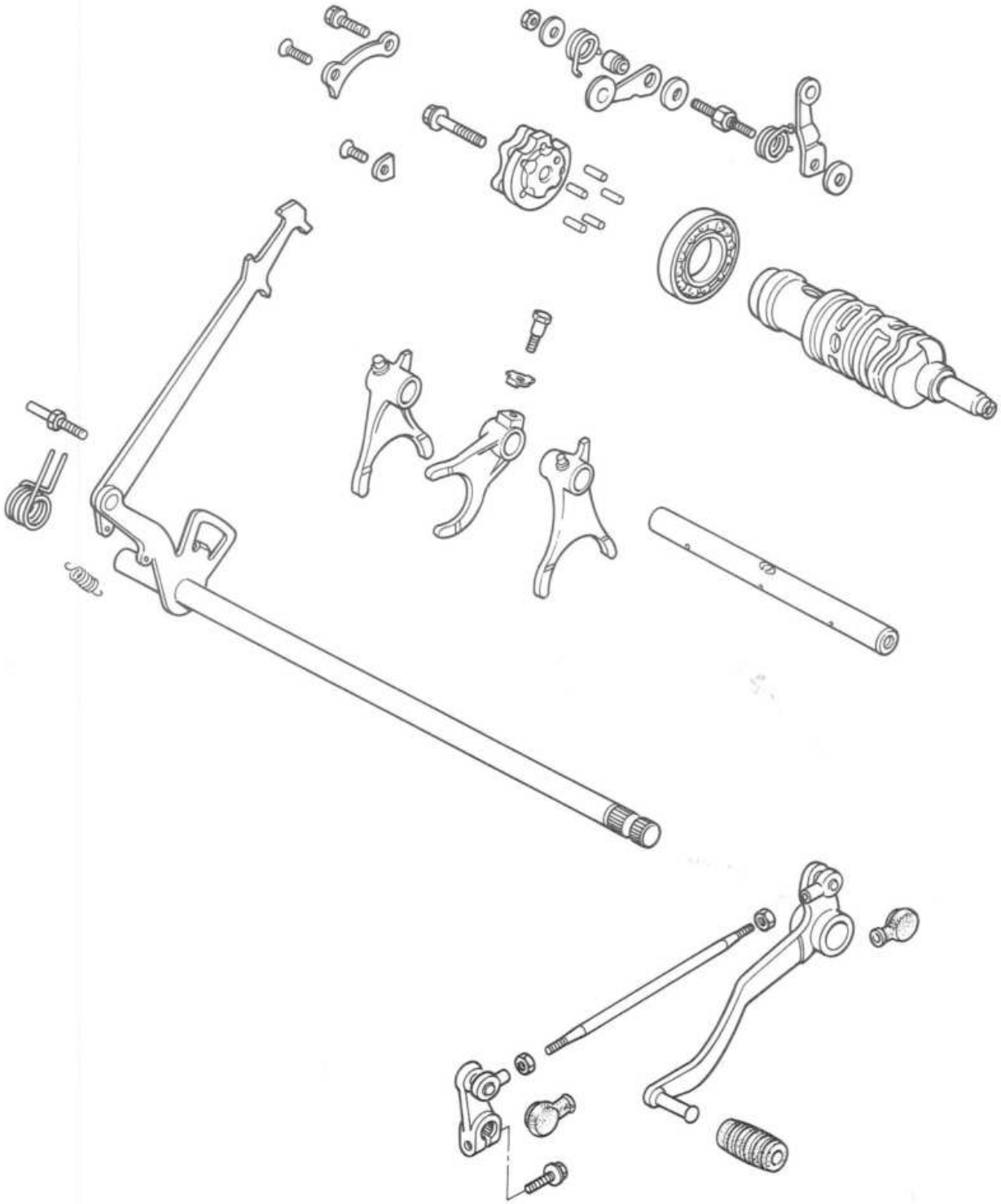
Install the dowel pins and a new gasket.



Install the clutch cover.
Fill the crankcase with oil (page 2-3).



GEARSHIFT LINKAGE



SERVICE INFORMATION	8–1
TROUBLESHOOTING	8–1
GEARSHIFT LINKAGE REMOVAL	8–2
GEARSHIFT LINKAGE INSTALLATION	8–4

SERVICE INFORMATION

GENERAL

- The gearshift spindle and stopper arms can be serviced with the engine in the frame.
- If the shift forks, drum and transmission require servicing, remove the engine and separate the crankcase.

TROUBLESHOOTING

Hard to shift

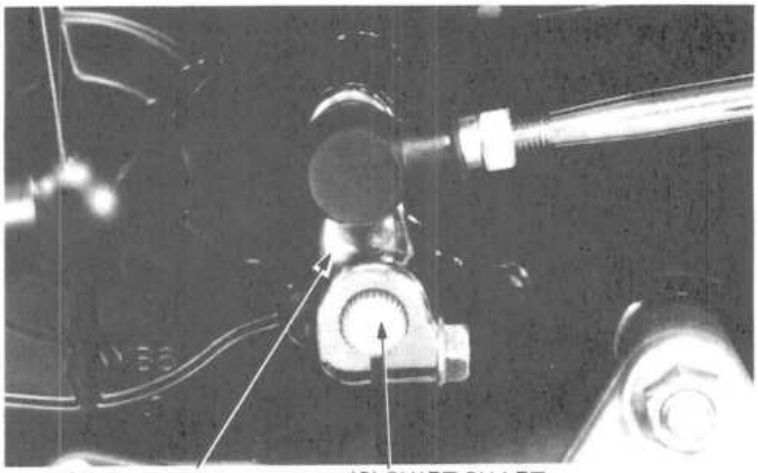
1. Air bubbles in the clutch hydraulic system
2. Shift forks bent
3. Shift claw bent
4. Shift drum cam grooves damaged

Transmission jumps out of gear

1. Gear dogs worn
2. Shift shaft bent
3. Shift drum stopper broken
4. Shift forks bent

GEARSHIFT LINKAGE REMOVAL

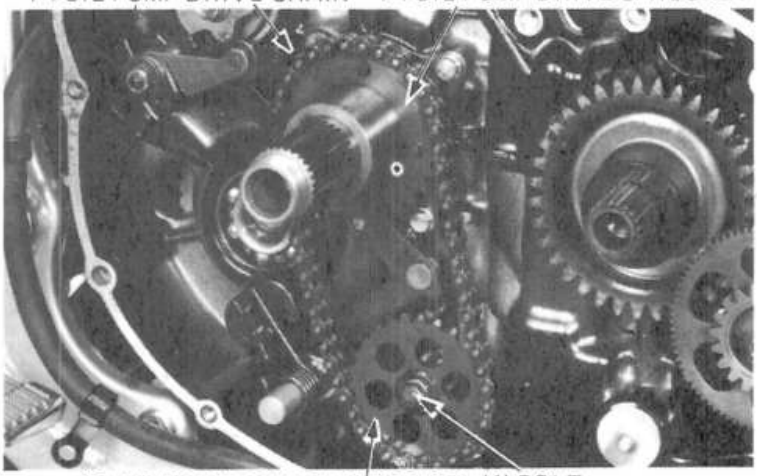
Drain the engine oil (page 2-3).
Remove the gearshift arm from the shift shaft.
Remove the clutch cover and clutch assembly (Section 7).



(1) GEARSHIFT ARM (2) SHIFT SHAFT

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

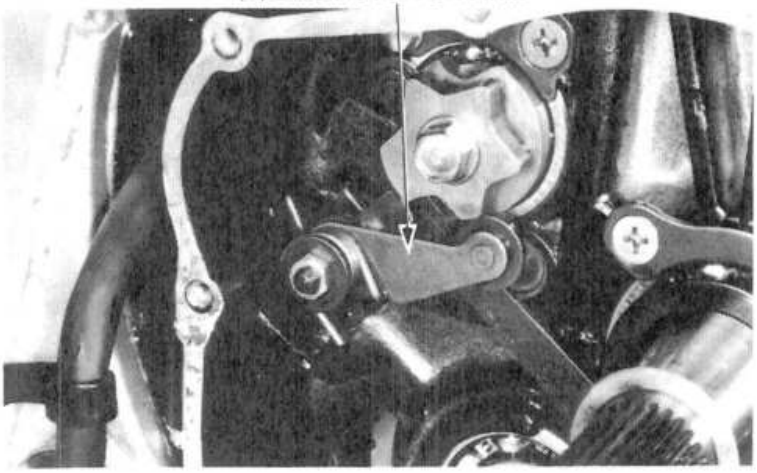
(1) OIL PUMP DRIVE CHAIN (2) OIL PUMP DRIVE SPROCKET



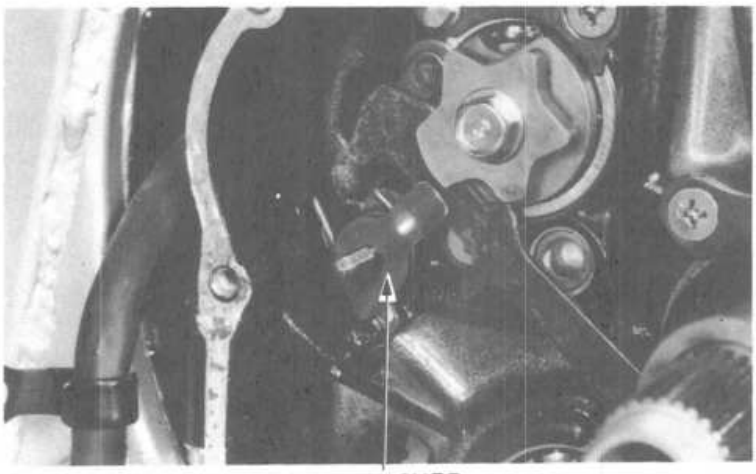
(3) OIL PUMP DRIVEN SPROCKET (4) BOLT

Remove the drum stopper arm nut, washer, spring, collar, and arm.

(1) DRUM STOPPER ARM

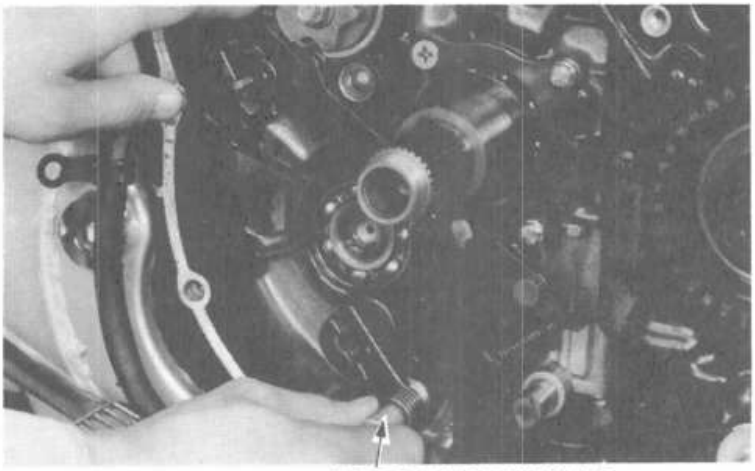


Remove the tab washer.



(1) TAB WASHER

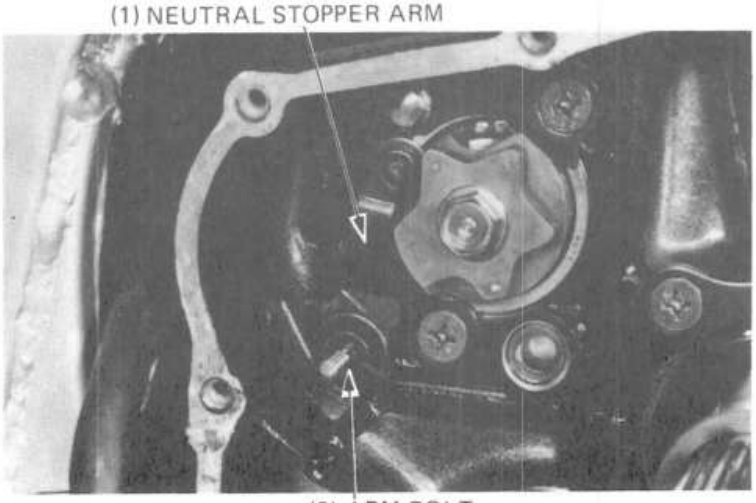
Pull the gearshift spindle assembly out of the crankcase.



(1) GEARSHIFT SPINDLE

Remove the neutral stopper arm bolt, arm and spring and washer.

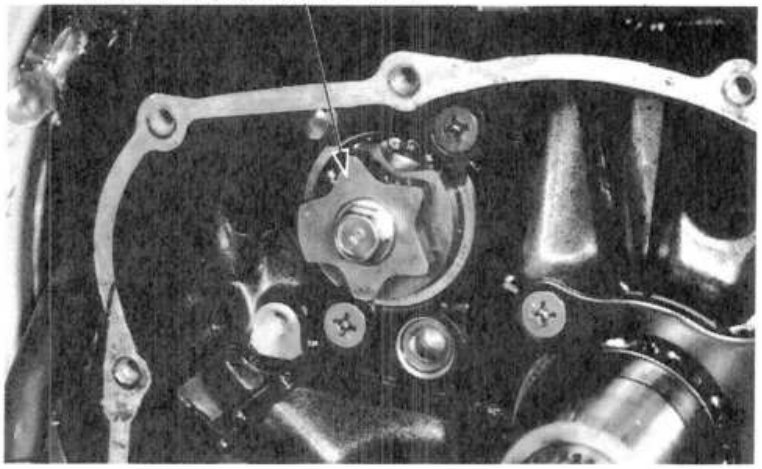
(1) NEUTRAL STOPPER ARM



(2) ARM BOLT

Remove the shift drum cam plate bolt and cam plate.

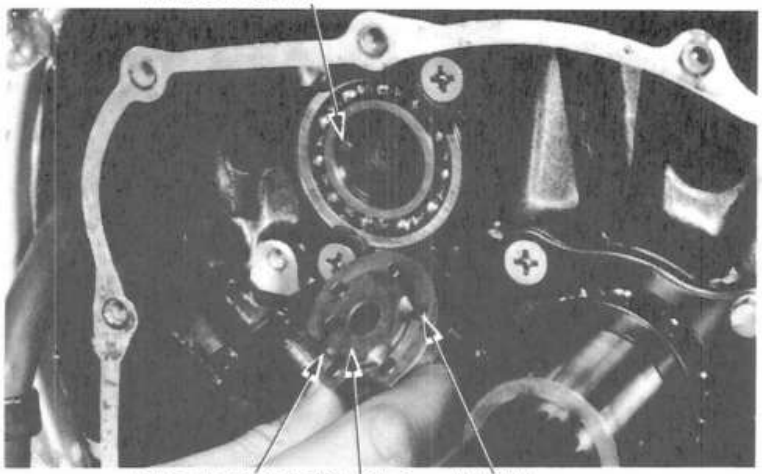
(1) SHIFT DRUM CAM PLATE



GEARSHIFT LINKAGE INSTALLATION

Install the dowel pin in the hole of the shift drum.
Insert the five pins in the holes of the cam plate.
Align the cam plate hole with the dowel pin on the shift drum and install the cam plate.
Tighten the bolt securely.

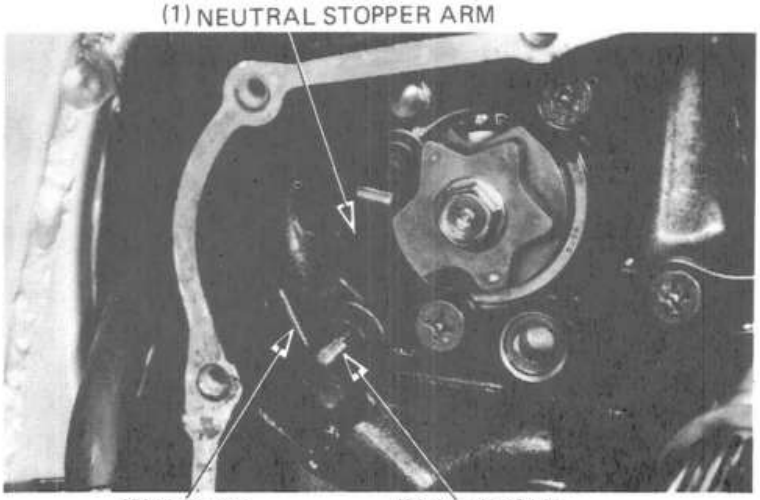
(1) DOWEL PIN



(2) CAM PLATE (3) HOLE (4) PIN

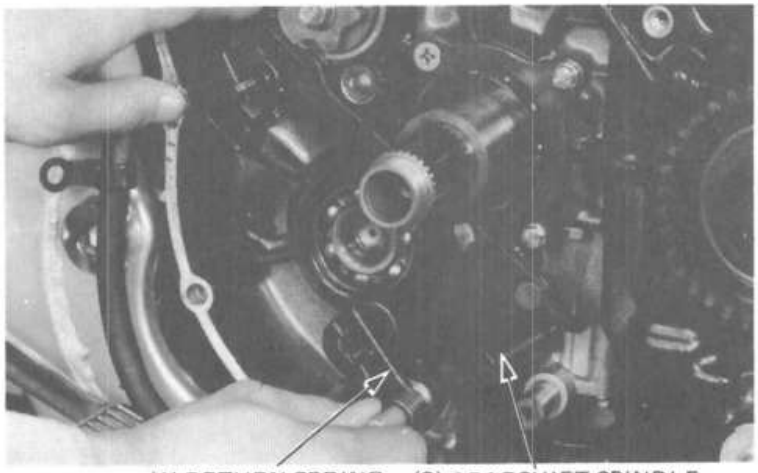
Install the washer, neutral stopper arm, spring and arm bolt.
Tighten the arm bolt securely.

(1) NEUTRAL STOPPER ARM



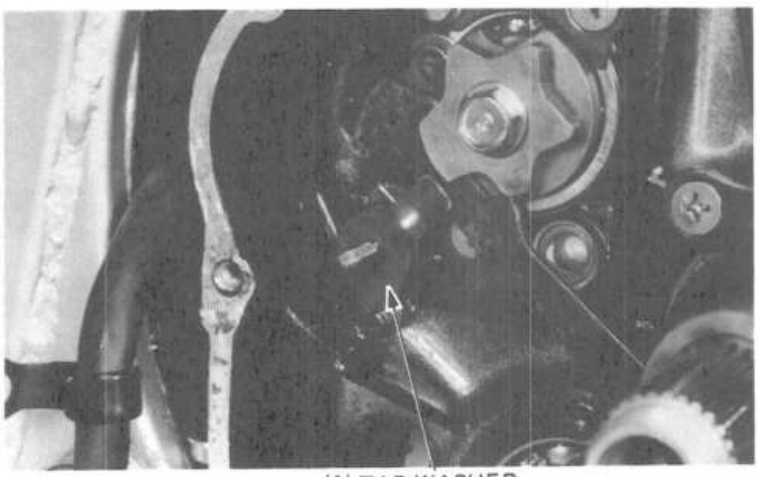
(2) SPRING (3) ARM BOLT

Assemble the gearshift spindle and return spring and install as shown.



(1) RETURN SPRING (2) GEARSHIFT SPINDLE

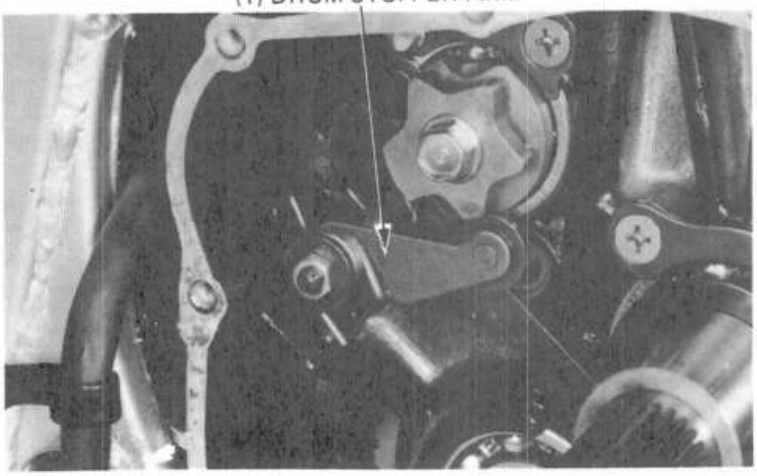
Install the tab washer onto the stopper arm bolt.



(1) TAB WASHER

(1) DRUM STOPPER ARM

Install the drum stopper arm, collar, spring, washer and nut over the arm bolt.
Tighten the nut securely.
Rotate the gearshift spindle and check the linkage for smooth operation.



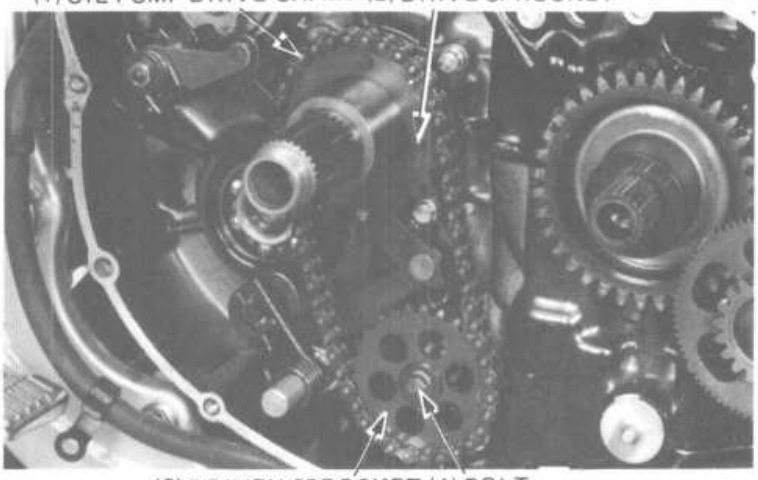
Install the oil pump drive and driven sprockets with drive chain and tighten the driven sprocket bolt securely.

NOTE

> The driven sprocket has an "IN" mark that must face the crankcase.

Install the clutch assembly and cover (section 7).

(1) OIL PUMP DRIVE CHAIN (2) DRIVE SPROCKET

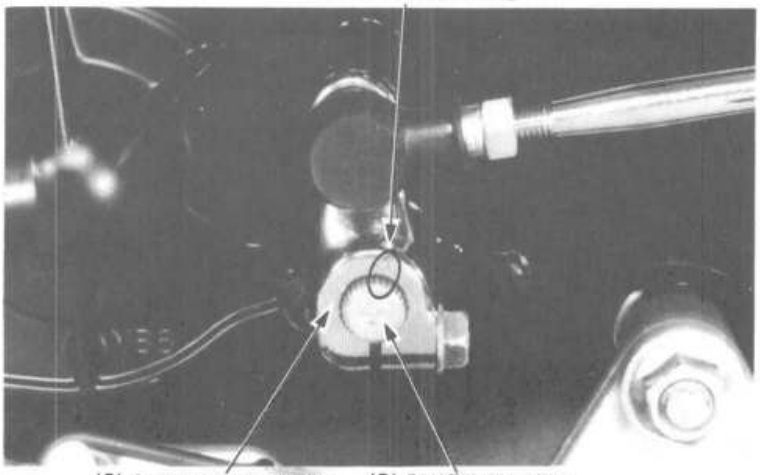


(3) DRIVEN SPROCKET (4) BOLT

Align the punch marks on the gearshift arm and gearshift spindle and install the gearshift arm on the shift shaft.

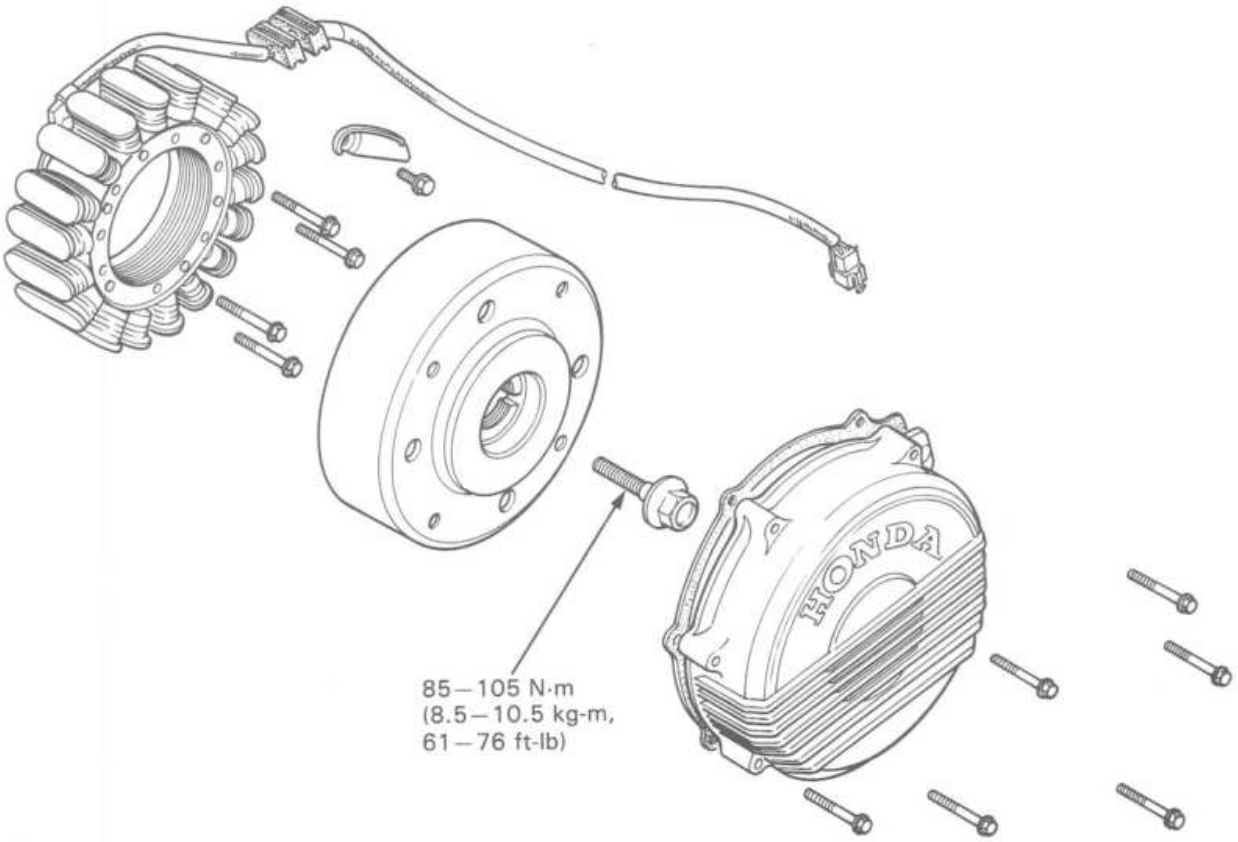
Fill the crankcase with recommended oil (page 2-3).

(1) PUNCH MARKS



(2) GEARSHIFT ARM (3) SHIFT SHAFT

ALTERNATOR


HONDA
85 – 105 N·m
(8.5 – 10.5 kg-m,
61 – 76 ft-lb)

SERVICE INFORMATION	9–1
FLYWHEEL REMOVAL	9–2
STATOR REMOVAL	9–3
STATOR INSTALLATION	9–3
FLYWHEEL INSTALLATION	9–3

SERVICE INFORMATION

GENERAL

- This section covers removal and installation of the alternator.
  Refer to section 18 for troubleshooting and inspection of the alternator.

TORQUE VALUE

Alternator rotor/Flywheel bolt	85—105 N·m (8.5—10.5 kg-m, 61—76 ft-lb)

TOOLS

Common

Flywheel holder	07725–0040000
Rotor puller	07733–0020001

FLYWHEEL REMOVAL

Place a container under the alternator cover to catch engine oil.

Remove the alternator cover.

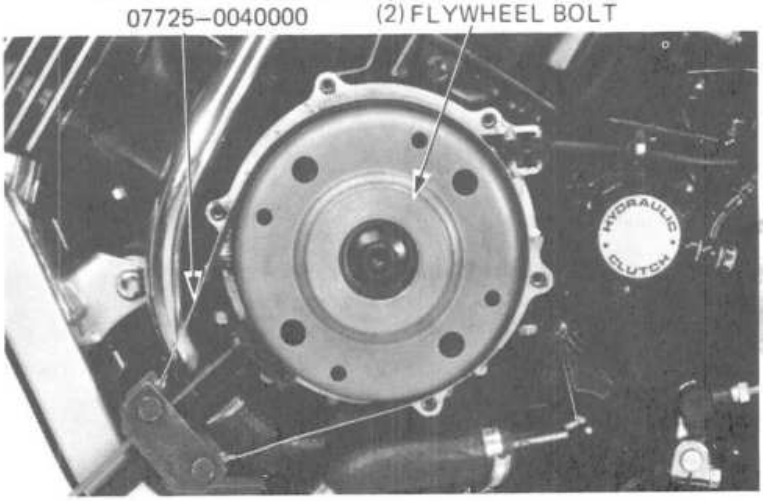
(1) ALTERNATOR COVER



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

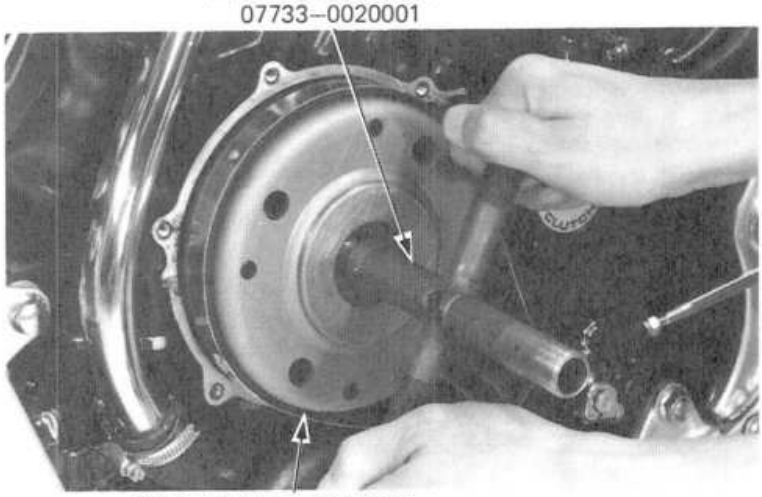
(1) FLYWHEEL HOLDER
07725–0040000

(2) FLYWHEEL BOLT



Remove the flywheel with the rotor puller.
Remove the woodruff key from the crankshaft.

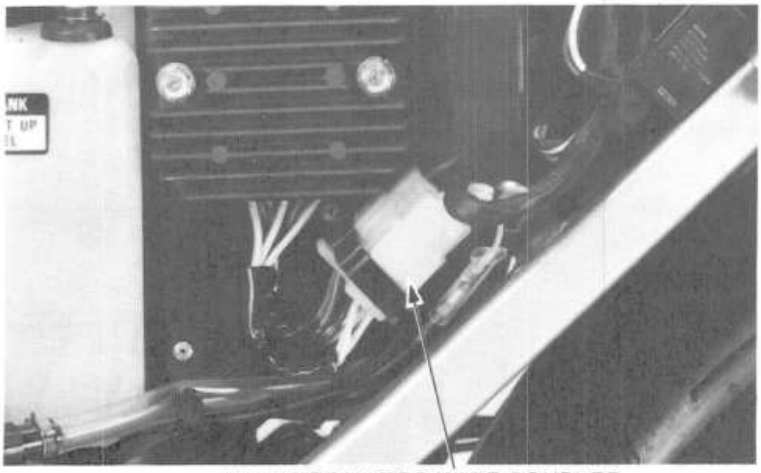
(1) ROTOR PULLER
07733–0020001



(2) FLYWHEEL HOLDER
07725–0040000

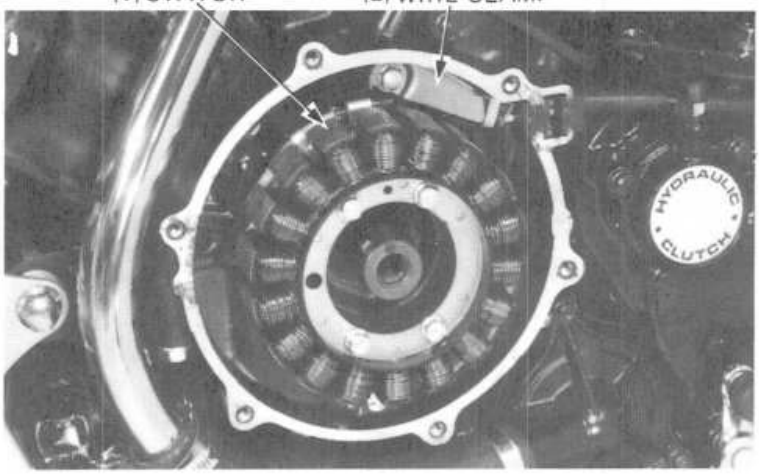
STATOR REMOVAL

Remove the frame left side cover.
Disconnect the alternator wire coupler and free the alternator wire from the clamp.



(1) ALTERNATOR WIRE COUPLER

Remove the stator by removing the bolts and wire clamp.



STATOR INSTALLATION

Install the stator and wire clamp.

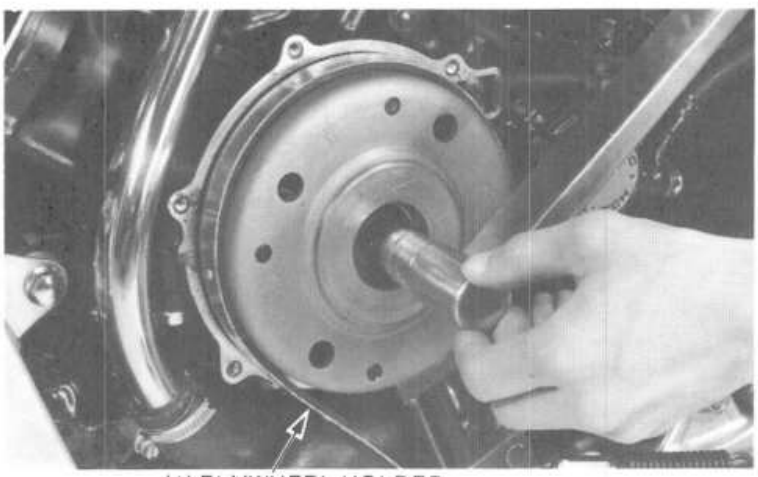
Route the alternator wire properly, secure it with clamp and connect the alternator wire coupler to the main harness.
Install the frame left side cover.

FLYWHEEL INSTALLATION

Install the woodruff key into the crankshaft.
Install the flywheel by aligning its keyway with the key in the crankshaft.
Hold the flywheel with the flywheel holder and torque the flywheel bolt.

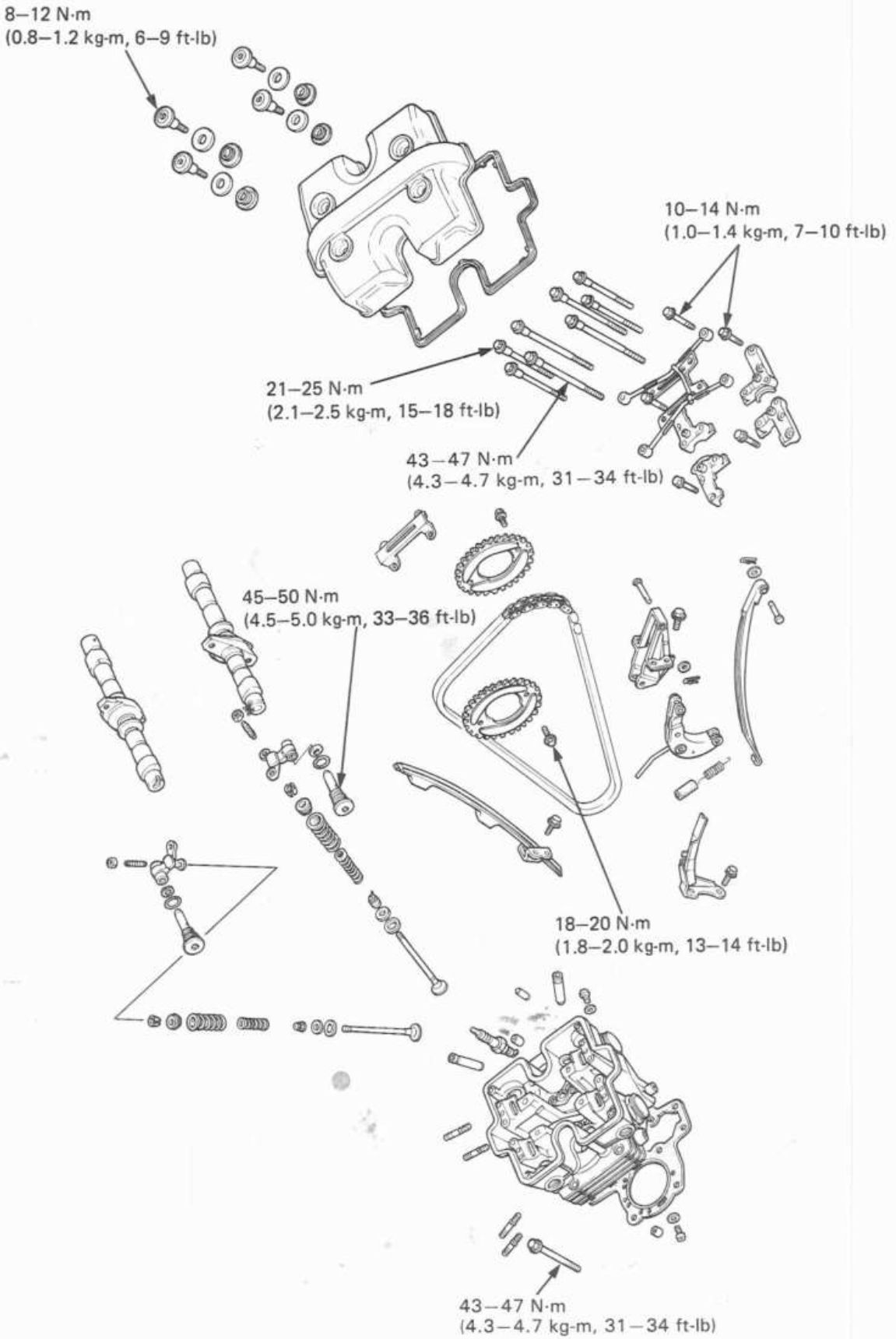
TORQUE: 85–105 N·m
(8.5–10.5 kg-m, 61–76 ft-lb)

Install the alternator cover.
Check engine oil level and add if necessary (page 2-3).



(1) FLYWHEEL HOLDER
07725–0040000

CYLINDER HEAD/VALVE

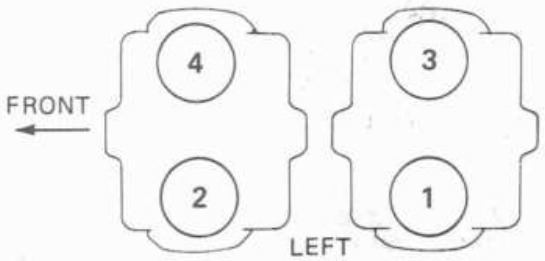

8–12 N·m
(0.8–1.2 kg-m, 6–9 ft-lb)
10–14 N·m
(1.0–1.4 kg-m, 7–10 ft-lb)
21–25 N·m
(2.1–2.5 kg-m, 15–18 ft-lb)
43–47 N·m
(4.3–4.7 kg-m, 31–34 ft-lb)
45–50 N·m
(4.5–5.0 kg-m, 33–36 ft-lb)
18–20 N·m
(1.8–2.0 kg-m, 13–14 ft-lb)
43–47 N·m
(4.3–4.7 kg-m, 31–34 ft-lb)

SERVICE INFORMATION	10–1	VALVE GUIDE REPLACEMENT	10–13
TROUBLESHOOTING	10–2	VALVE SEAT INSPECTION/ REFACING	10–14
CAMSHAFT REMOVAL	10–3	CYLINDER HEAD ASSEMBLY	10–15
CYLINDER HEAD REMOVAL	10–7	CYLINDER HEAD INSTALLATION	10–16
CYLINDER HEAD DISASSEMBLY	10–9	CAMSHAFT INSTALLATION	10–19

SERVICE INFORMATION

GENERAL

- The front cylinder head can be removed with the engine in the frame.
- The rear cylinder head cannot be removed with the engine in the frame; however its camshafts and rocker arms can be serviced with the engine in the frame.
- If the cam sprockets of either front or rear cylinder are removed, the valve timing of both cylinders must be checked during reinstallation.
- Camshaft lubricating oil is fed through the external oil lines. Be sure the oil lines are not clogged.
- During assembly, apply molybdenum disulfide grease to the camshaft holder surfaces to provide initial lubrication.
- The cylinder numbering is given below:



SPECIFICATIONS

			STANDARD	SERVICE LIMIT
Compression pressure			1,300 ± 200 kPa (13 ± 2 kg/cm², 184 ± 28 psi)	–
Camshaft	Cam height	IN	35.459–35.619 mm (1.3960–1.4023 in)	35.40 mm (1.394 in)
		EX	35.459–35.619 mm (1.3960–1.4023 in)	35.40 mm (1.394 in)
	Runout		–	0.03 mm (0.001 in)
	Oil clearance	Center	0.131–0.191 mm (0.0052–0.0075 in)	0.20 mm (0.008 in)
		Both ends	0.027–0.088 mm (0.0011–0.0035 in)	0.10 mm (0.004 in)
Rocker arm	Rocker arm I.D.		12.000–12.018 mm (0.4724–0.4731 in)	12.05 mm (0.474 in)
	Shaft O.D.		11.966–11.984 mm (0.4711–0.4718 in)	11.93 mm (0.470 in)
Valve	Valve stem O.D.	IN	5.475–5.490 mm (0.2156–0.2161 in)	5.47 mm (0.215 in)
		EX	5.455–5.470 mm (0.2148–0.2154 in)	5.44 mm (0.214 in)
	Valve guide I.D.		5.500–5.515 mm (0.2165–0.2171 in)	5.55 mm (0.219 in)
	Stem-to-guide clearance	IN	0.010–0.040 mm (0.0004–0.0016 in)	0.08 mm (0.003 in)
		EX	0.030–0.060 mm (0.0012–0.0024 in)	0.10 mm (0.004 in)
	Valve seat width		1.0 mm (0.04 in)	1.3 mm (0.05 in)

Valve spring	Free length	Inner	39.01 mm (1.536 in)	37.7 mm (1.48 in)
		Outer	44.94 mm (1.769 in)	43.5 mm (1.71 in)
	Preload/length	Inner	5.74–6.94 kg/34.2 mm (12.65–15.30 lb/1.35 in)	5.38 kg/34.2 mm (11.86 lb/1.35 in)
		Outer	14.75–16.97 kg/37.7 mm (32.52–37.41 lb/1.48 in)	14.15 kg/37.7 mm (31.20 lb/1.48 in)
Cylinder head	Warpage		–	0.1 mm (0.004 in)

TORQUE VALUES

Cylinder head cover bolt	8–12 N·m (0.8–1.2 kg-m, 6–9 ft-lb)
Camshaft holder 6 mm bolt	10–14 N·m (1.0–1.4 kg-m, 7–10 ft-lb)
(The camshaft holder bolts in each corner of the cylinder head are longer than the others.)	
Cam chain guide A bolt	21–25 N·m (2.1–2.5 kg-m, 15–18 ft-lb)
Cylinder head 9 mm bolt	43–47 N·m (4.3–4.7 kg-m, 31–34 ft-lb)
Cylinder head 8 mm bolt	21–25 N·m (2.1–2.5 kg-m, 15–18 ft-lb)
Rocker arm shaft	45–50 N·m (4.5–5.0 kg-m, 33–36 ft-lb)
Cam sprocket bolt	18–20 N·m (1.8–2.0 kg-m, 13–14 ft-lb)

TOOLS

Special

Valve guide reamer, 5.5 mm	07984–2000000

Common

Valve guide remover, 5.5 mm	07742–0010100
Valve guide driver	07743–0020000
Valve spring compressor	07757–0010000

TROUBLESHOOTING

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

Low compression

1. Valves
   - Incorrect valve adjustment
   - Burned or bent valves
   - Incorrect valve timing
   - Broken valve spring
2. Cylinder head
   - Leaking or damaged head gasket
   - Warped or cracked cylinder head
3. Cylinder and piston (Refer to Section 12)

Compression too high

1. Excessive carbon build-up on piston or combustion chamber

Excessive noise

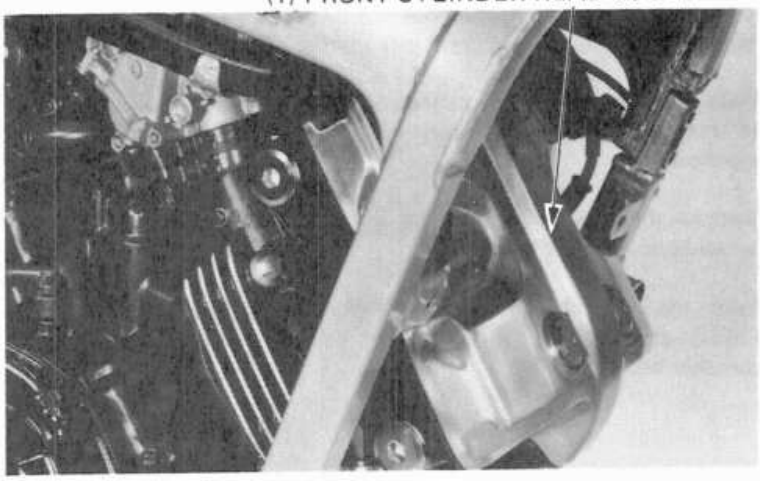
1. Incorrect valve adjustment
2. Sticking valve or broken valve spring
3. Damaged or worn camshaft
4. Loose or worn cam chain
5. Worn or damaged cam chain tensioner
6. Worn cam sprocket teeth
7. Worn rocker arm and/or shaft

CAMSHAFT REMOVAL

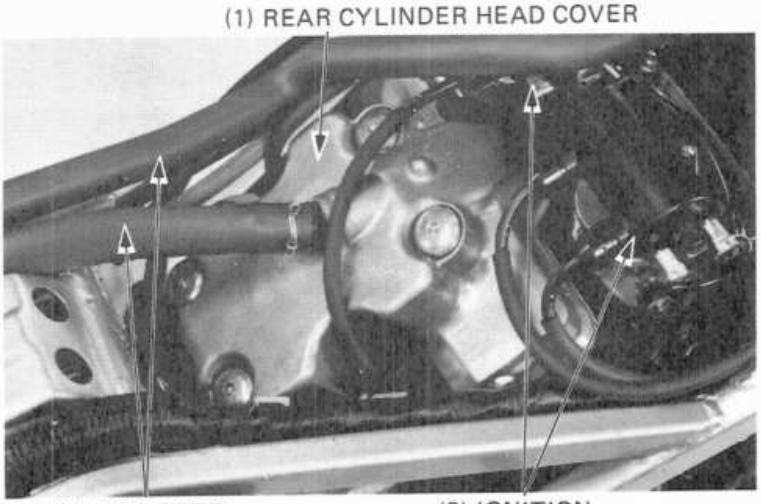
NOTE

> The camshafts can be removed with the engine in the frame.

Drain the coolant and remove the lower radiator.
Remove the front cylinder head cover.



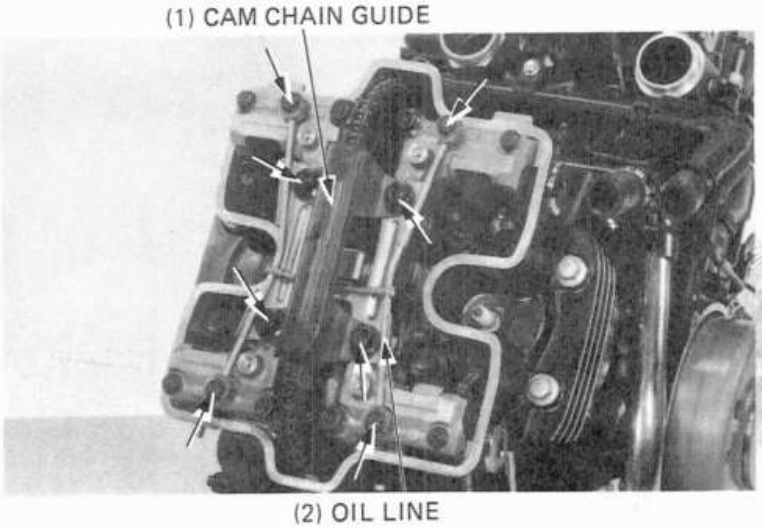
Remove the seat, frame side covers, fuel tank and ignition coils.
Disconnect the crankcase breather tubes from the rear cylinder head cover and air chamber cover.
Remove the rear cylinder head cover.



Remove the oil line and cam chain guide mounting bolts, and the cam chain guide.
Remove the alternator cover and rotate the crankshaft counterclockwise until the cam chain has free play.

Remove the oil line by pulling up the middle of the chain.

Remove the alternator cover.

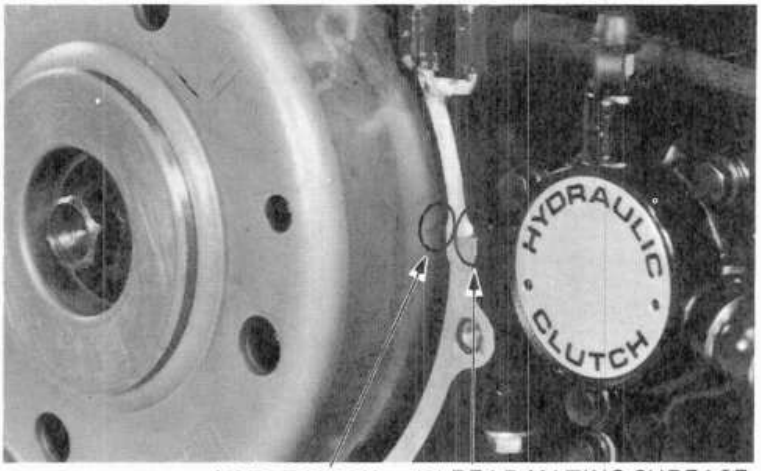


Turn the crankshaft counterclockwise until the T1.3 mark aligns with the rear crankcase mating surfaces.

Place rags or shop towels in the rear cylinder head to prevent parts from being dropped into the crankcase.

Remove the rear cylinder intake and exhaust cam sprocket bolts.

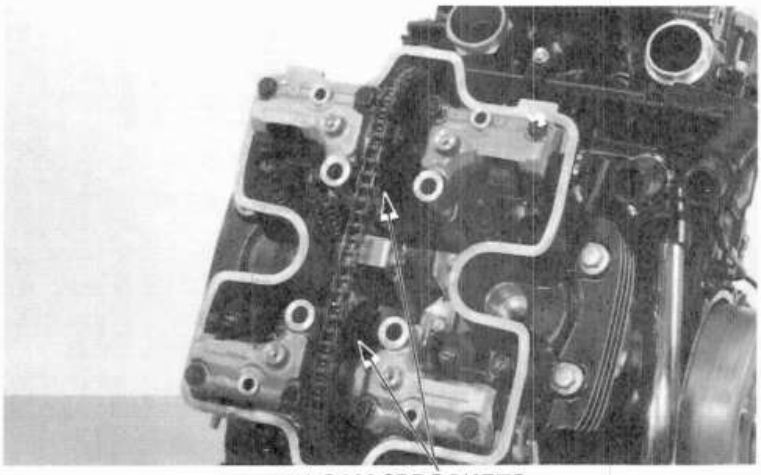
Turn the crankshaft counterclockwise one turn (360°) and remove the other rear cylinder cam sprocket bolts.



(1) T1.3 MARK (2) REAR MATING SURFACE

Turn the crankshaft counterclockwise until the T2.4 mark aligns with the rear crankcase mating surface. Remove the front cylinder intake and exhaust cam sprocket bolts.

Turn the crankshaft counterclockwise one turn (360°) and remove the other cam sprocket bolts.

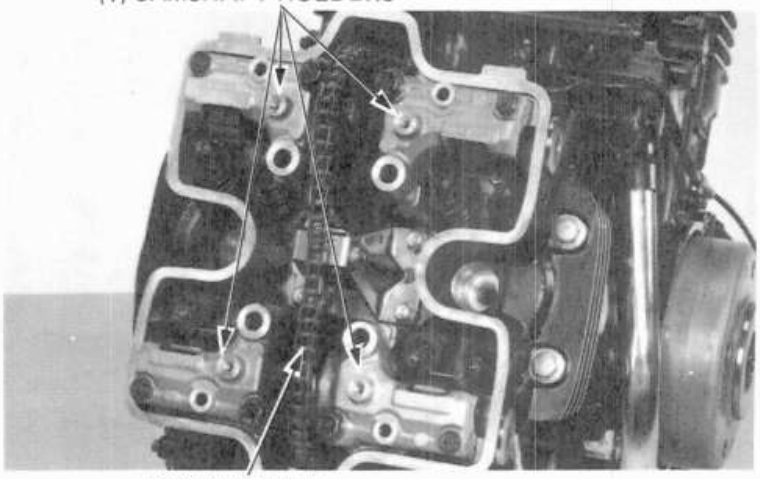


(1) CAM SPROCKETS

Slide the cam sprockets and chains off the camshaft sprocket flange.

Remove the cam chain from the sprockets and remove the camshaft holders. Mark the camshaft holders so that they can be reinstalled in their original locations.

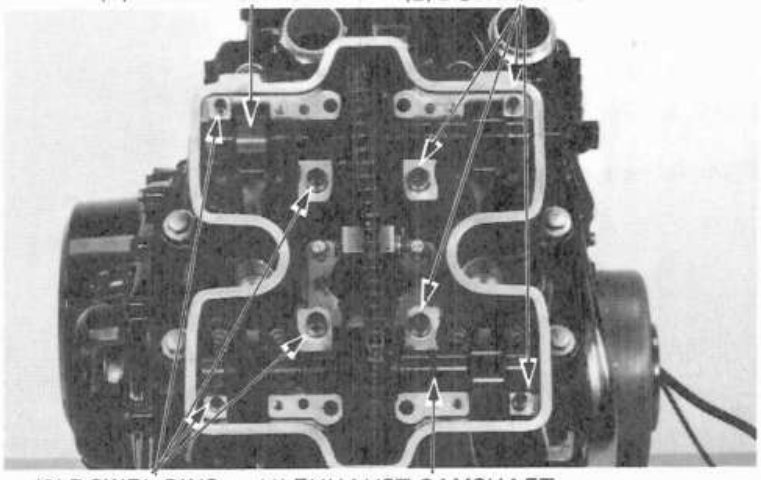
(1) CAMSHAFT HOLDERS



(2) CAM CHAIN

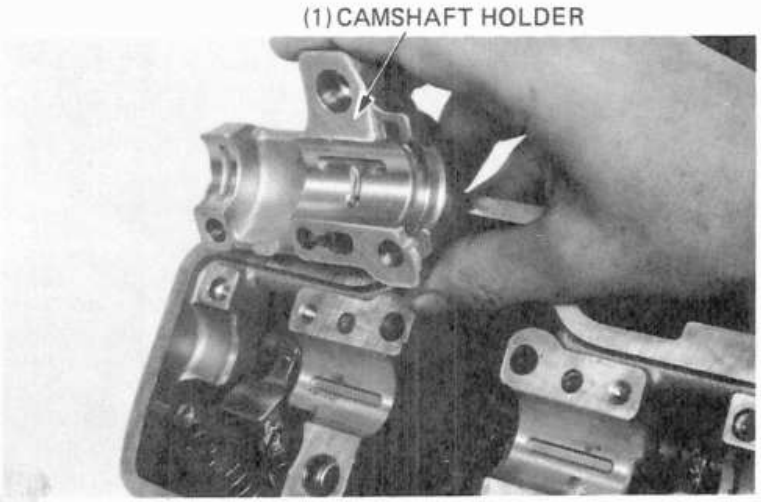
Remove the camshaft holder dowel pins and the intake and exhaust camshaft.

Remove the cam sprockets from the camshafts.



CAMSHAFT/CAM HOLDER INSPECTION

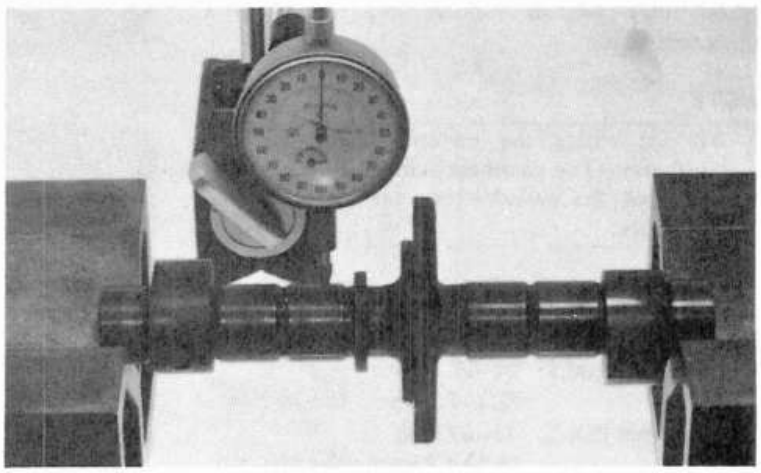
Inspect the camshaft and holder journal surfaces for scoring scraches, or evidence of insufficient lubrication.



CAMSHAFT RUNOUT

Check camshaft runout with a dial indicator. Support both ends of the camshaft with V-blocks. Use 1/2 of the total indicator reading to determine runout.

SERVICE LIMIT: 0.03 mm (0.001 in)

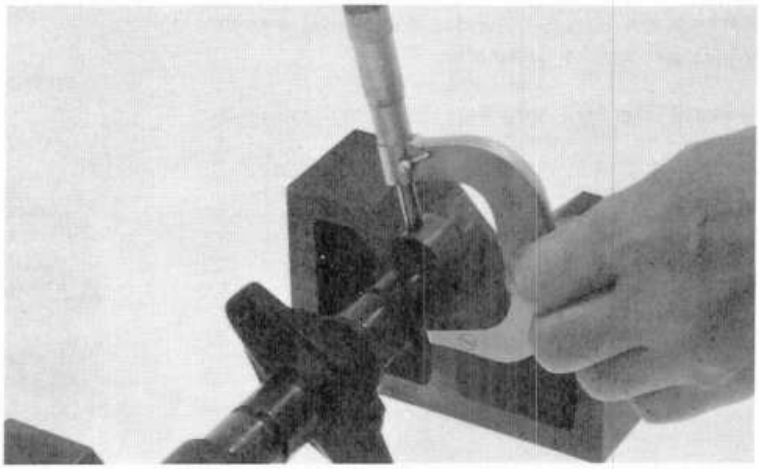


CAM INSPECTION

Using a micrometer, measure each cam lobe.

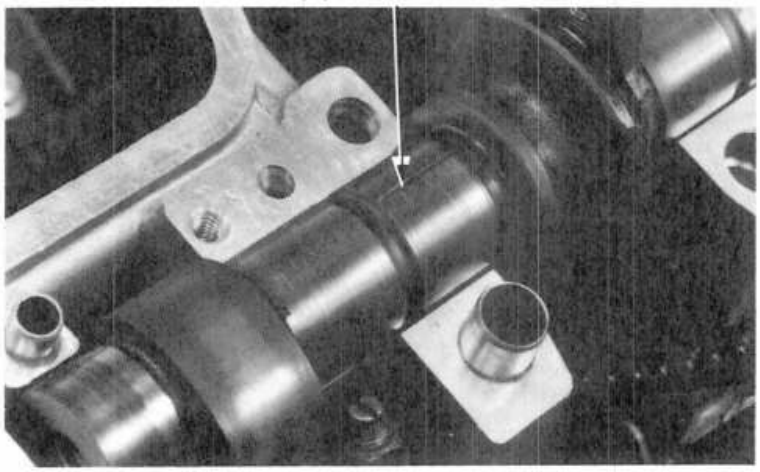
SERVICE LIMITS: IN, EX: 35.40 mm (1.394 in)

Check for wear or damage.



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

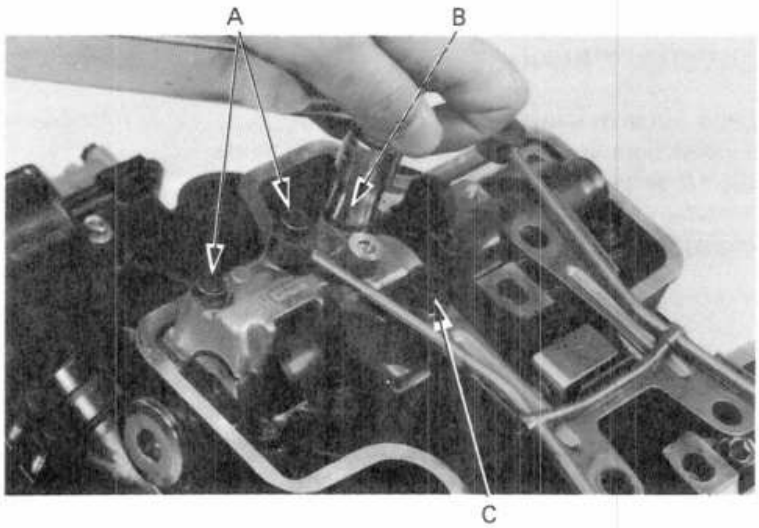
(1) PLASTIGAUGE



Install the camshaft holders and tighten in a crisscross pattern.

NOTE

> Do not rotate the camshaft when using plastigauge. The camshaft holder bolts in each corner of the cylinder head are longer than the others.



TORQUE:

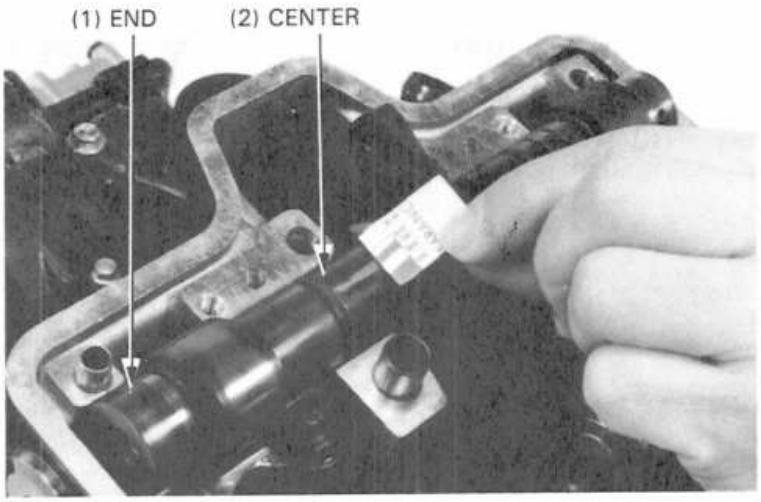
- A: 6 mm BOLT: 10–14 N·m (1.0–1.4 kg-m, 7–10 ft-lb)
- B: 8 mm BOLT: 21–25 N·m (2.1–2.5 kg-m, 15–18 ft-lb)
- C: 9 mm BOLT: 43–47 N·m (4.3–4.7 kg-m, 31–34 ft-lb)

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

SERVICE LIMIT:

CENTER: 0.20 mm (0.008 in)
BOTH ENDS: 0.10 mm (0.004 in)

When the service limits are exceeded, replace the camshaft and recheck the oil clearance.
Replace the cylinder head and camshaft holders if the clearance still exceeds service limits.



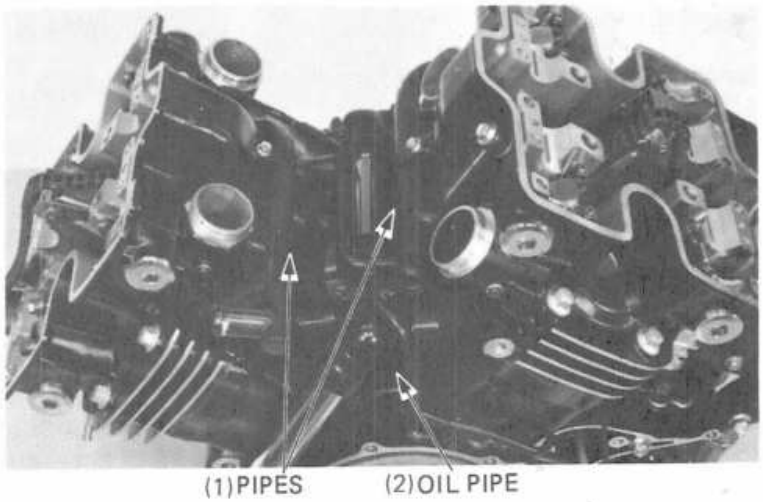
CYLINDER HEAD REMOVAL

NOTE

> The front cylinder head can be removed with the engine installed. But to remove the rear cylinder head, you must remove the engine.

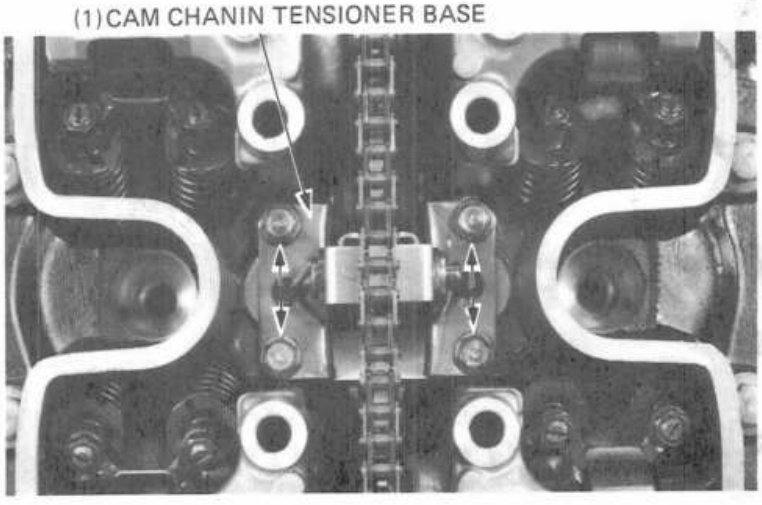
Remove the rear exhaust pipe protector and exhaust pipes.
Remove the water pipes and O-rings.

Remove the oil pipe and sealing washers.

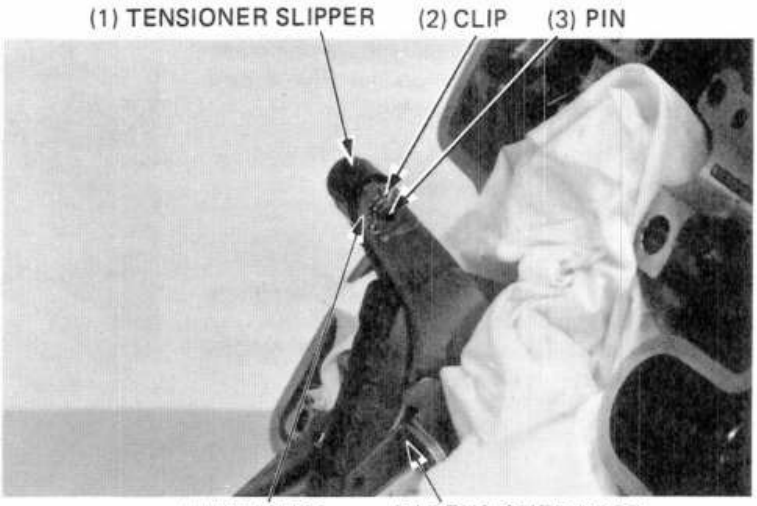


Remove the front and rear cam chain tensioner base mounting bolts.

Pull the cam chain tensioner base up.

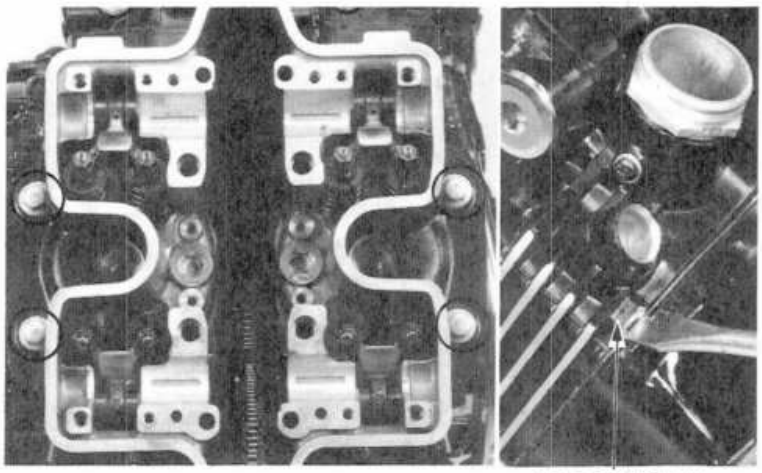


Remove the slipper clip, washer and pin and remove the tensioner base.

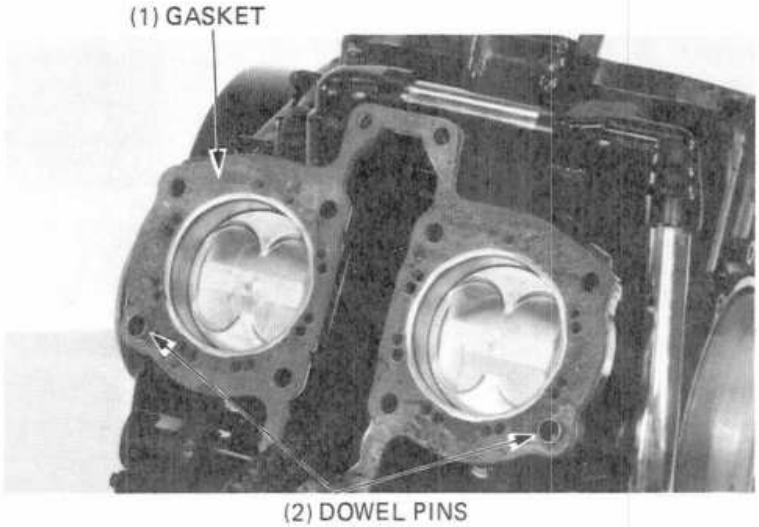


Remove the cylinder head bolts

Remove the cylinder heads using a screw driver at the pry points.



Remove the front and rear cylinder head gaskets and dowel pins.

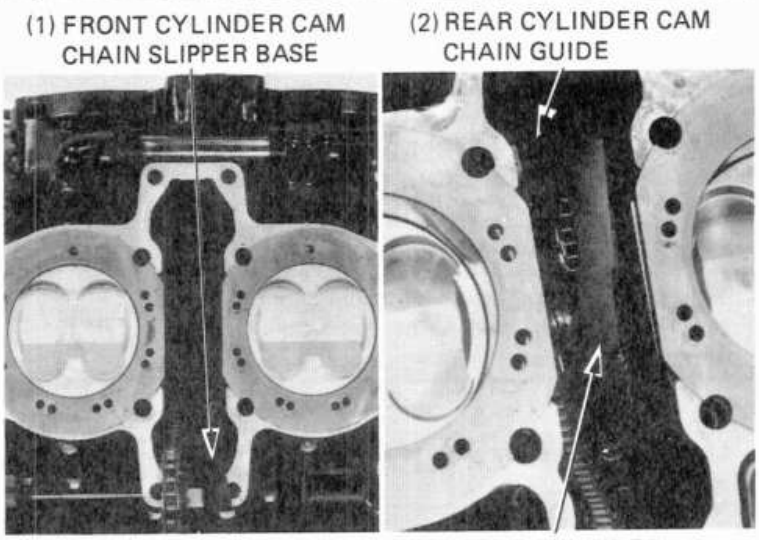


Remove the front cylinder cam chain slipper base, and remove the rear cylinder cam chain guide by removing the clip and washer.

Remove the front cylinder cam chain guide bolts and guide.

NOTE

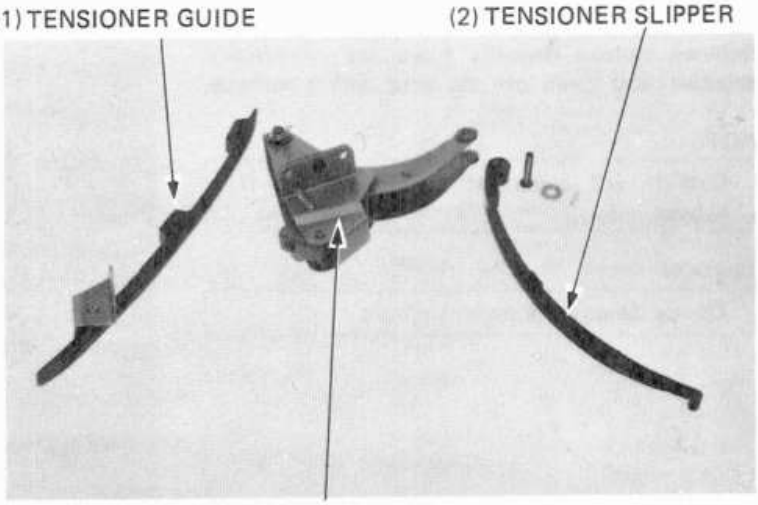
Do not drop the clip, washer and bolts into the crankcase.



CAM CHAIN GUIDE AND CAM CHAIN TENSIONER INSPECTION

Inspect the cam chain guide and tensioner for damage or excessive wear.

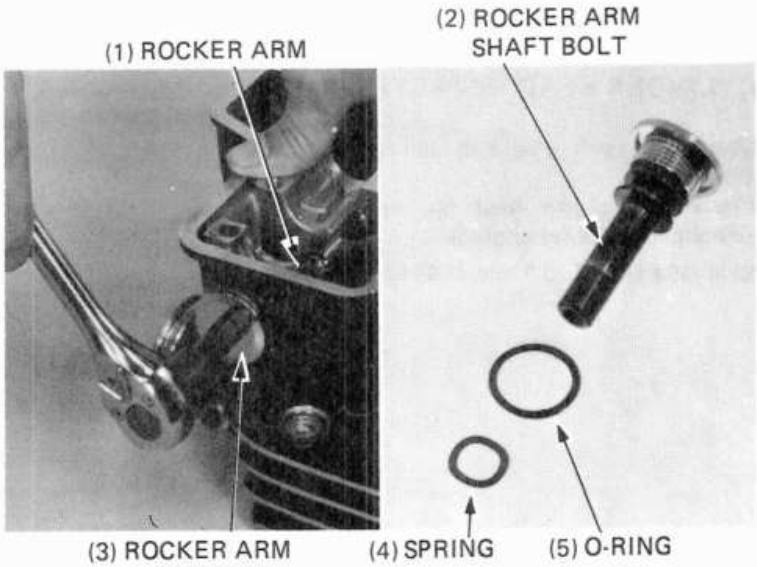
Inspect the cam chain tensioner slipper for damage or excessive wear.
Inspect the spring for good tension, replace if necessary.



CYLINDER HEAD DISASSEMBLY

Remove the rocker arm shaft and rocker arms.

Remove the rocker arm spring and O-ring from the shaft bolt.



To keep the valve spring compressor from interfering with the cylinder head, remove the large retainer from the compressor attachment.

Remove the valve spring cotters, retainers, springs and valves.

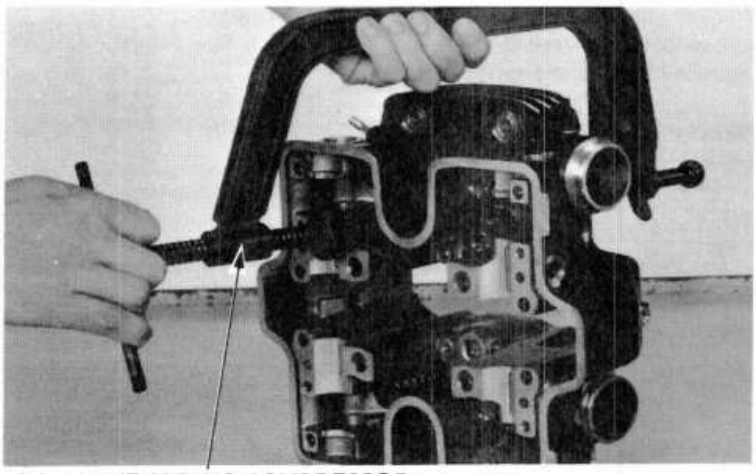
CAUTION

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

NOTE

Mark all disassembled parts to ensure correct reassembly.

Remove the valve stem seals.



(1) VALVE SPRING COMPRESSOR
07757–0010000

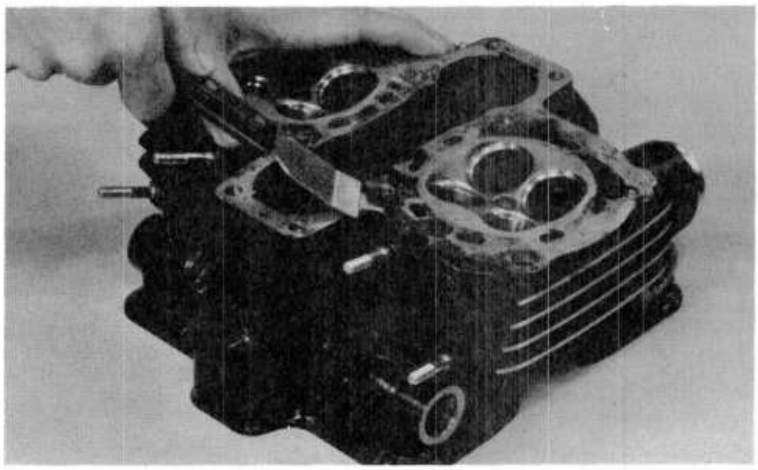
Remove carbon deposits from the combustion chamber and clean off the head gasket surfaces.

NOTE

Gaskets will come off easier if soaked in solvent.

CAUTION

Do not damage the gasket surfaces.

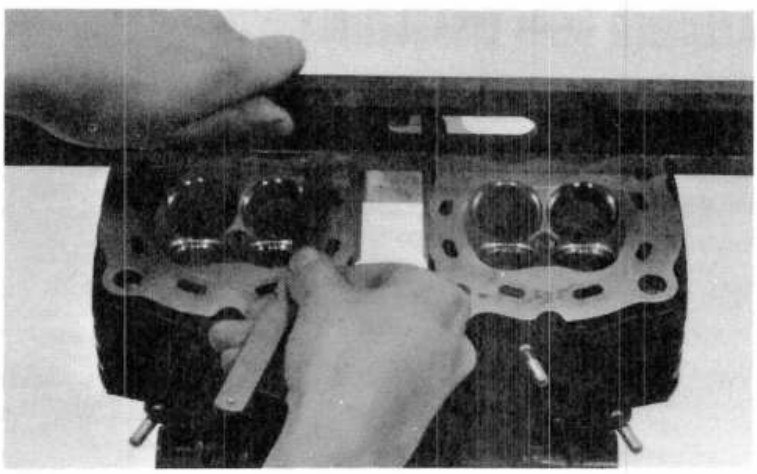


CYLINDER HEAD INSPECTION

Check the spark plug hole and valve areas for cracks.

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

SERVICE LIMIT: 0.1 mm (0.004 in)

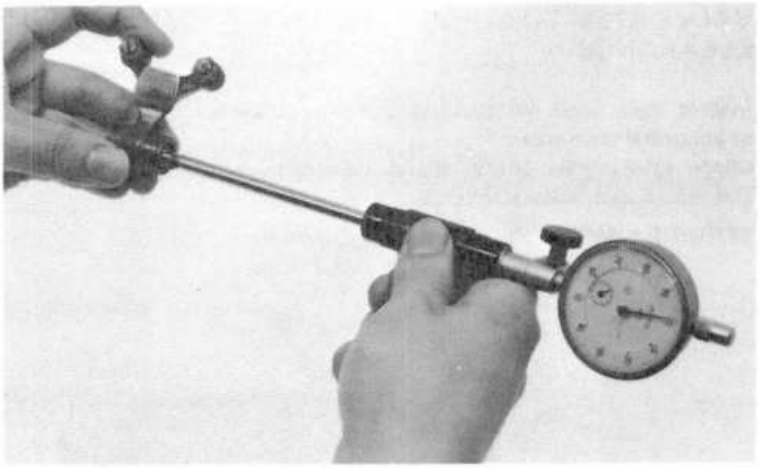


ROCKER ARM INSPECTION

Inspect the rocker arms for wear or damage to the camshaft contact surface or for a clogged oil hole.

Measure the I.D. of each rocker arm.

SERVICE LIMIT: 12.05 mm (0.474 in)



ROCKER ARM SHAFT AND SPRING INSPECTION

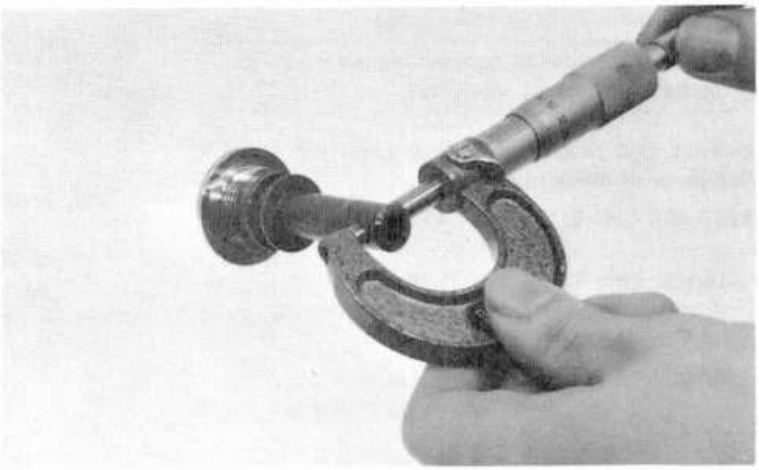
Measure each rocker arm shaft O.D.

SERVICE LIMIT: 11.93 mm (0.470 in)

Inspect the shaft for wear or damage and calculate the shaft to rocker arm clearance.

SERVICE LIMIT: 0.12 mm (0.005 in)

Inspect the rocker arm shaft spring for wear or damage.

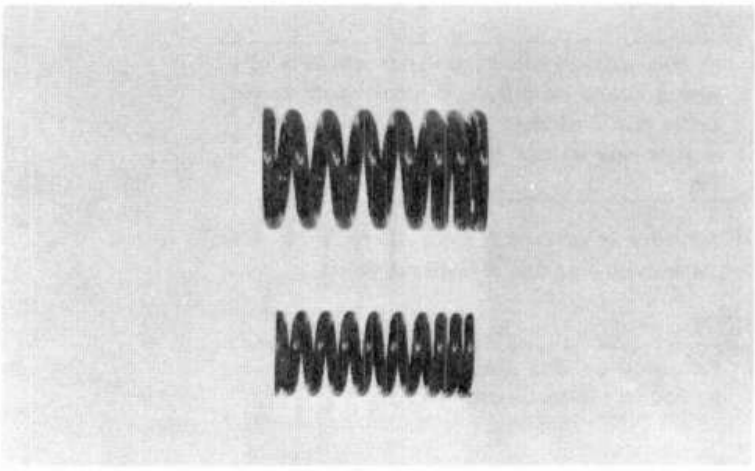


VALVE SPRING INSPECTION

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

SERVICE LIMIT:

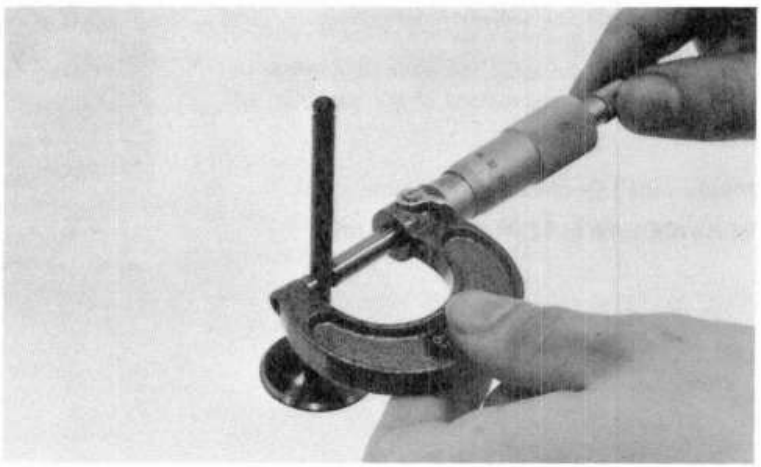
INNER (IN, EX): 37.7 mm (1.48 in)
OUTER (IN, EX): 43.5 mm (1.71 in)



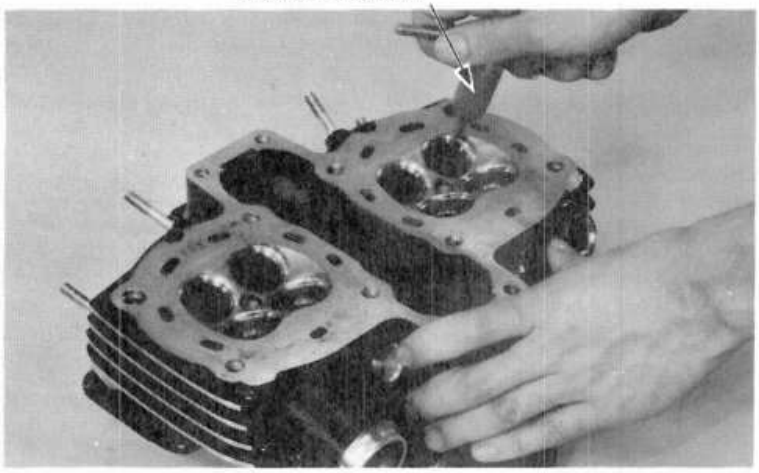
VALVE STEM-TO-GUIDE CLEARANCE

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: 5.44 mm (0.214 in)



(1) VALVE GUIDE REAMER
07984–2000000



NOTE

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

Measure and record each valve guide I.D. using a ball gauge or inside micrometer.

SERVICE LIMIT: 5.55 mm (0.219 in)

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

SERVICE LIMIT: IN: 0.08 mm (0.003 in)
EX: 0.10 mm (0.004 in)

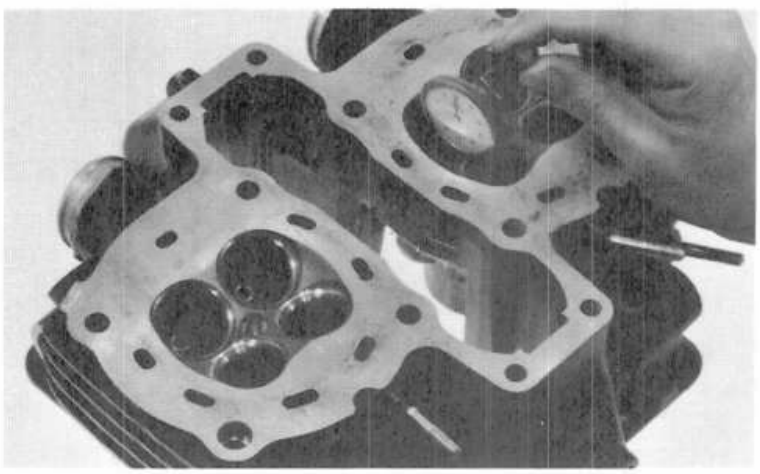
NOTE

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

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

NOTE

Reface the valve seats whenever the valve guides are replaced (page 10-13).



VALVE GUIDE REPLACEMENT

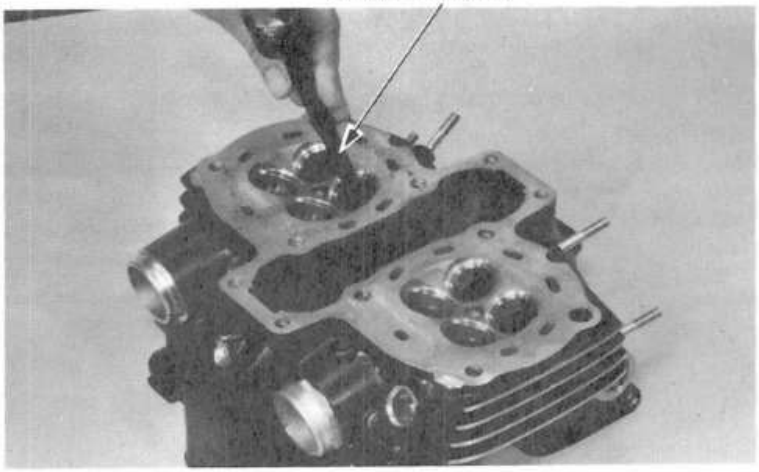
Heat the cylinder head to 100°C (212°F) with a hot plate or oven.

CAUTION

- *Do not use a torch to heat the cylinder; it may cause warping.*
- *To avoid burns, wear heavy gloves when handling the heated cylinder head.*

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

(1) VALVE GUIDE REMOVER, 5.5 mm
07742–0010100

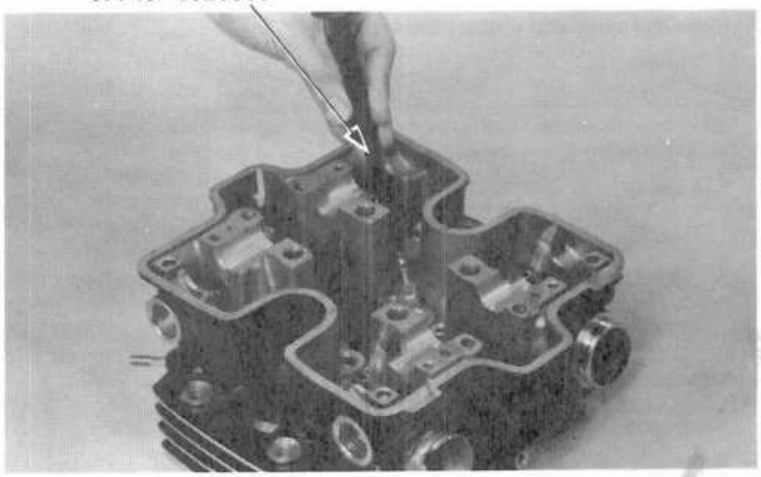


Drive new guides in from the rocker arm side of the cylinder head.

NOTE

Cylinder head heat should still be at 100°C (212°F) for installation of the new guides.

(1) VALVE GUIDE DRIVER
07743–0020000



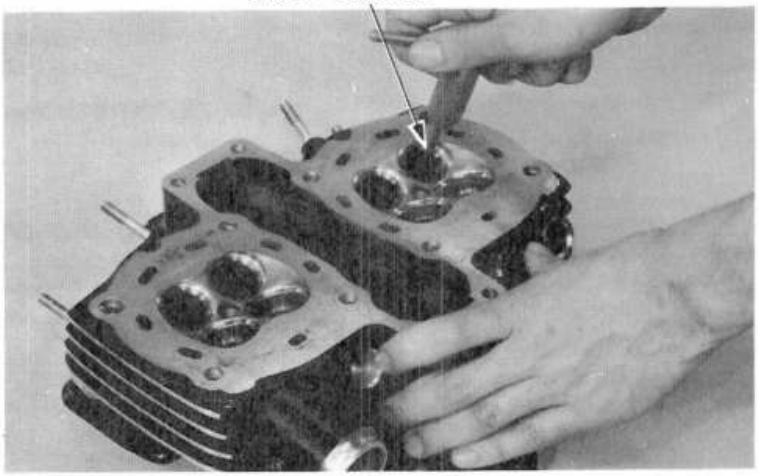
Let the cylinder head cool to room temperature and ream the new valve guides.

NOTE

- Use cutting oil on the reamer during this operation.
- Rotate the reamer in the same direction when inserting and removing.

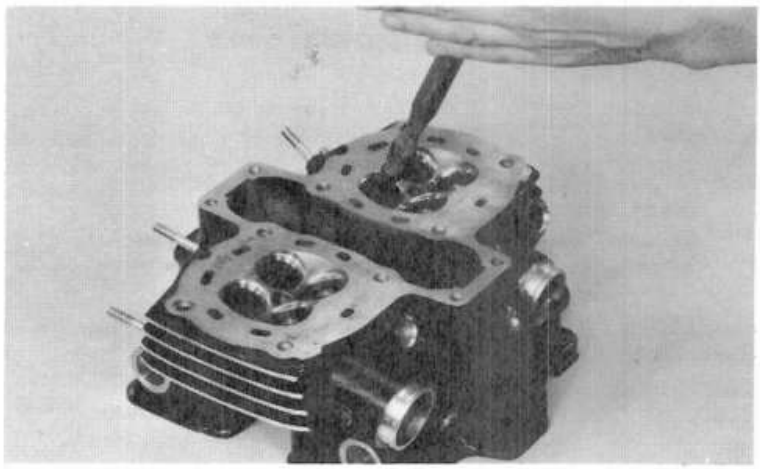
Reface the valve seats (page 10-14) and clean the cylinder head thoroughly to remove any metal particles.

(1) VALVE GUIDE REAMER
07984–2000000



VALVE SEAT INSPECTION/ REFACING

Clean all intake and exhaust valves thoroughly to remove carbon deposits.
Apply a light coating of valve Prussian blue to each valve face. Lap each valve and seat using a rubber hose or other hand-lapping tool.



Remove the valve and inspect the face.

CAUTION

The valves cannot be ground. If the valve face is rough, worn unevenly, or contacts the seat improperly, the valve must be replaced.

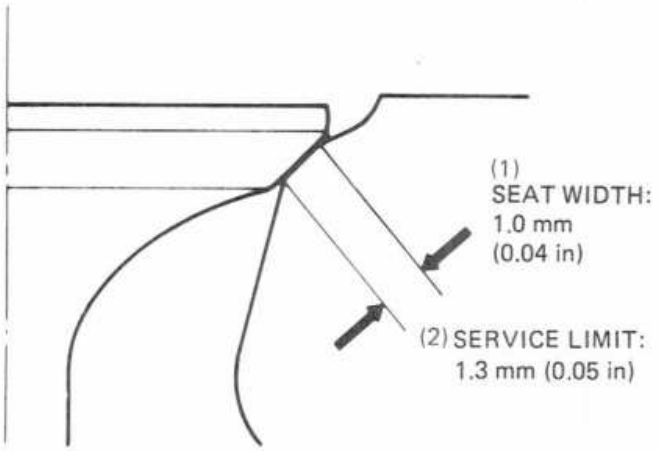
Inspect the valve seat.

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

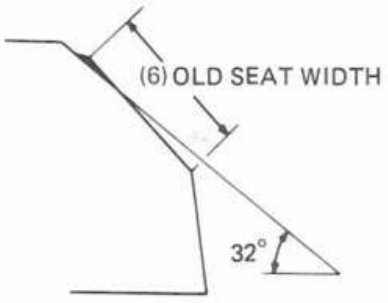
NOTE

Follow the refacer manufacturer's operating instructions.

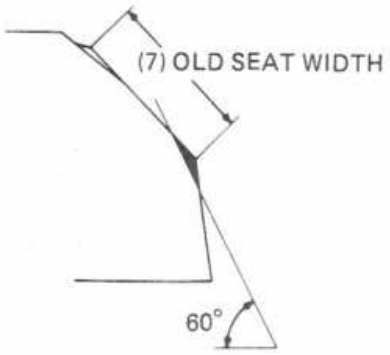
After cutting the seat, apply lapping compound to the valve face, and lap the valve using light pressure.
After lapping, wash any residual compound off the cylinder head and valve.



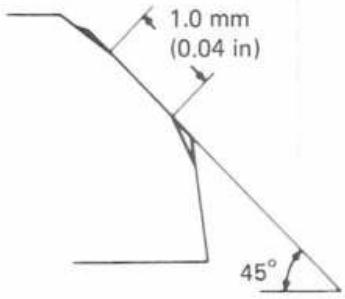
(3) IN: CUTTER 30 mm
EX: CUTTER 30 mm



(4) IN, EX: CUTTER 30 mm



(5) IN: CUTTER 33 mm
EX: CUTTER 29 mm



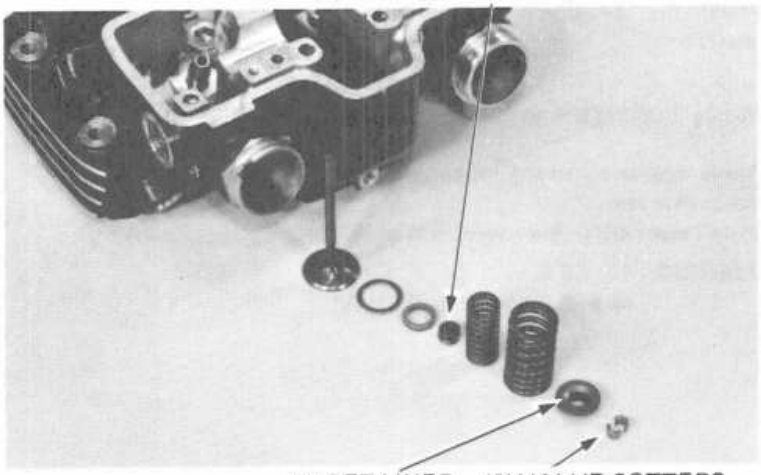
CYLINDER HEAD ASSEMBLY

NOTE

Install new valve stem seals when assembling.

Lubricate each valve stem with molybdenum disulfide grease and insert the valve into the valve guide. To avoid damage to the stem seal, turn the valve slowly when inserting.

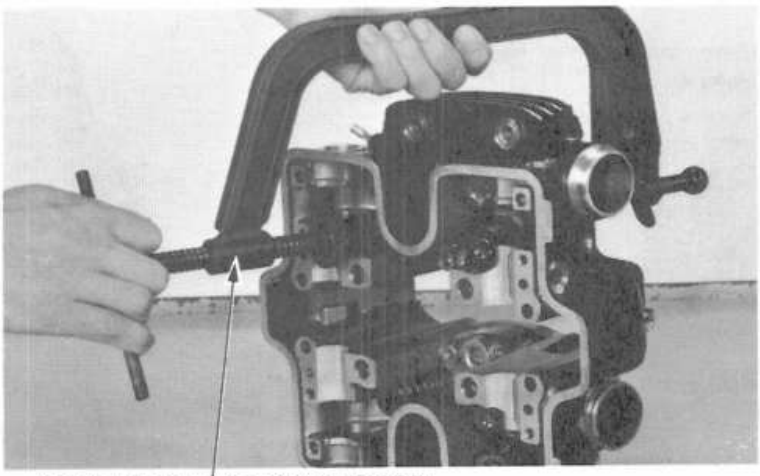
Install the valve springs and retainers. The spring's tightly wound coils should face toward the head.



Install the valve cotters.

CAUTION:

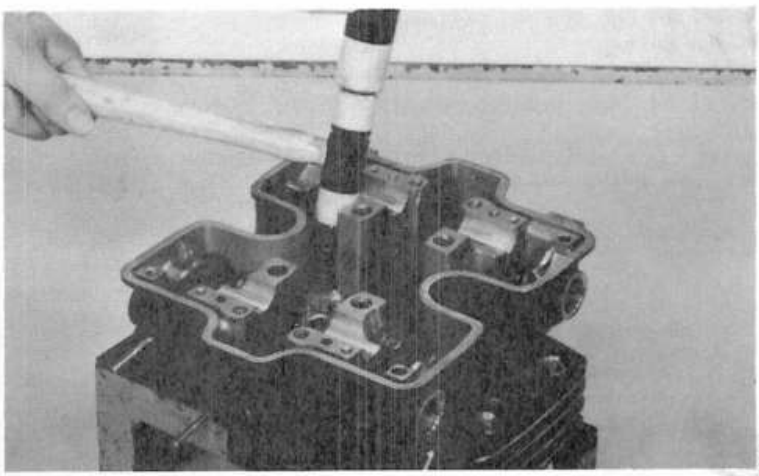
To prevent a loss of tension, do not compress the valve spring more than necessary to install the valve keepers.



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.

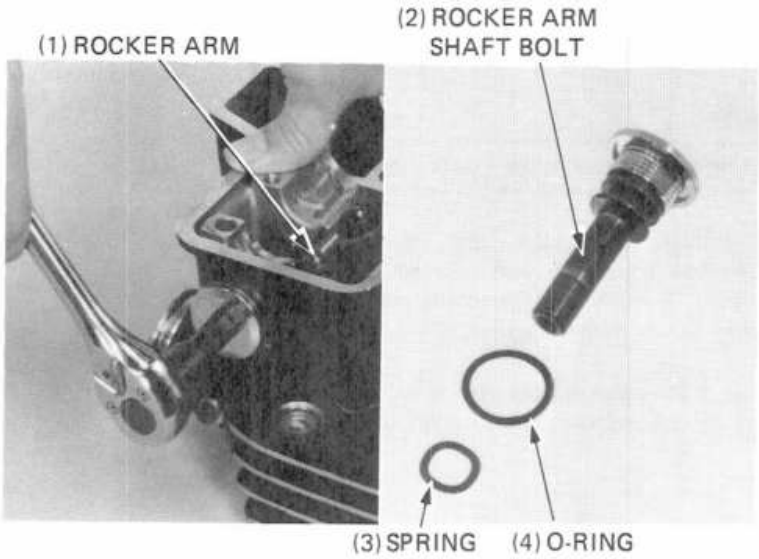


Install the O-ring and spring onto the rocker arm shaft.

Apply LOCTITE® to the rocker arm bolt threads.

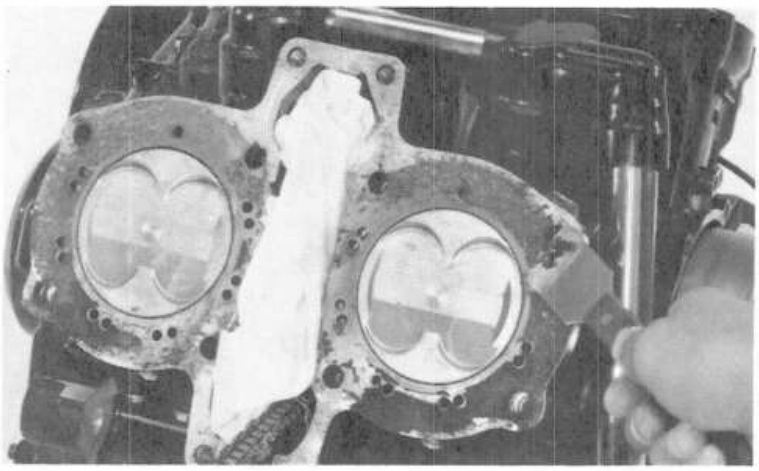
Apply engine oil to the rocker arm shaft and install the rocker arm.
Install and tighten the rocker arm shaft bolt.

TORQUE: 45–50 N·m
(4.5–5.0 kg-m, 33–36 ft-lb)



CYLINDER HEAD INSTALLATION

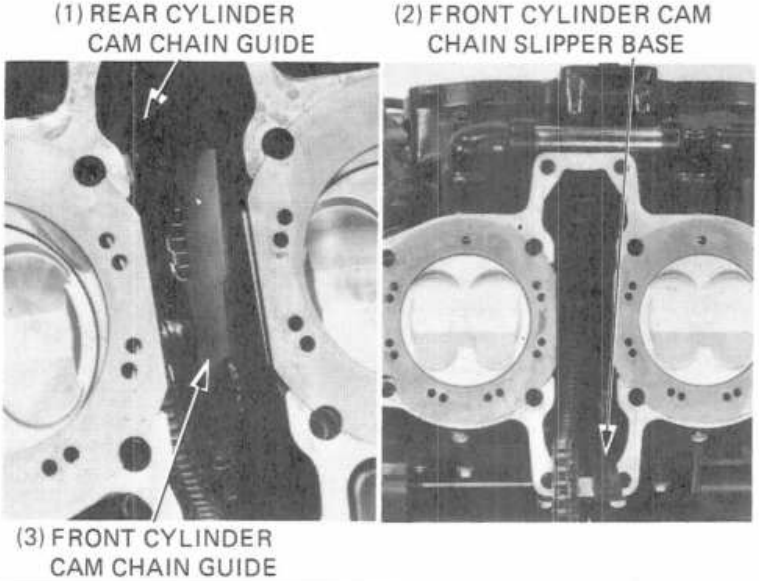
Clean the cylinder head surface of any gasket material.



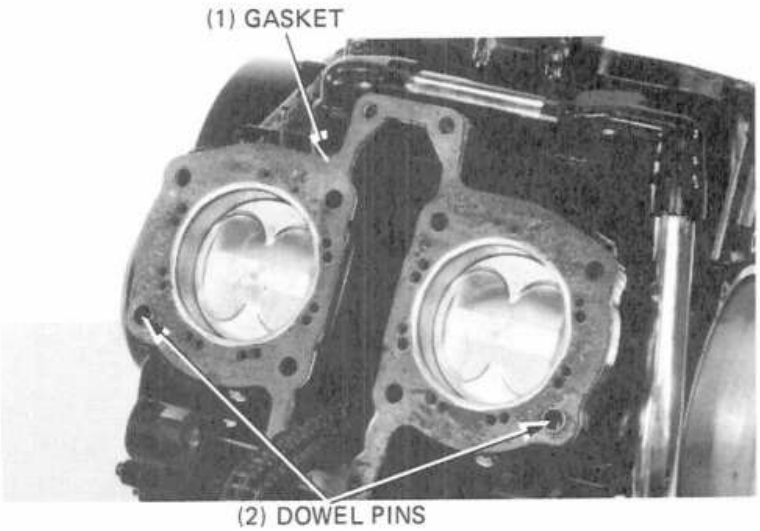
Install the rear cylinder cam chain guide with the washer and clip.
Install the front cylinder cam chain guide.
Install the front cylinder cam chain slipper base.

NOTE

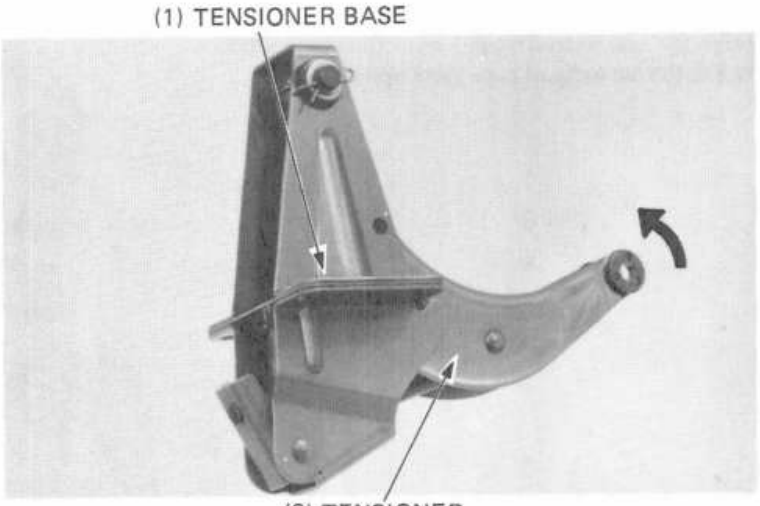
> Be careful not to drop the washer, clip or bolts into the crankcase.



Install the dowel pins and new head gaskets.



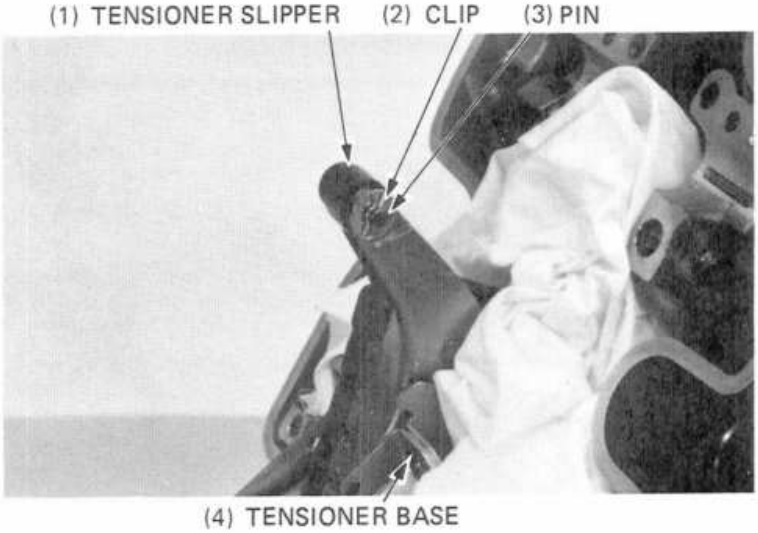
With the cam chain tensioner raised in the direction of the arrow, insert a pin or piece of wire through the hole in the tensioner base and tensioner.



Place the cylinder head on the cylinder.
Pass the cam chain through the cam chain tensioner and install the tensioner slipper as shown.

NOTE

Check that the lower end of the slipper fits in the slipper base correctly.

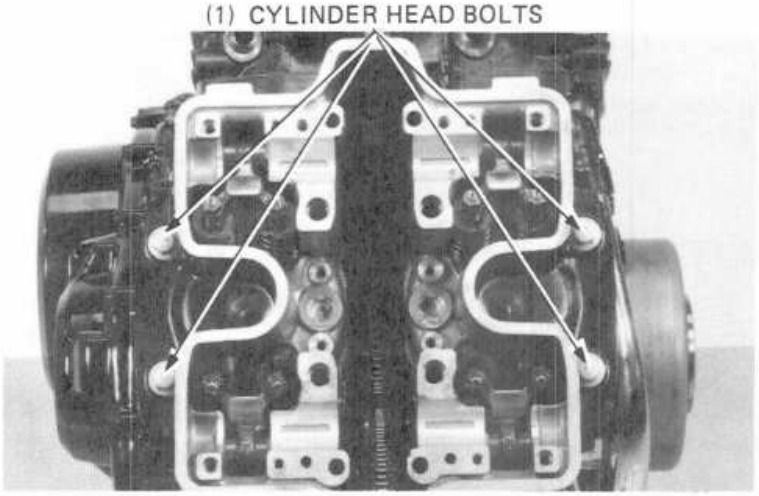


Loosely tighten the cylinder head bolts.

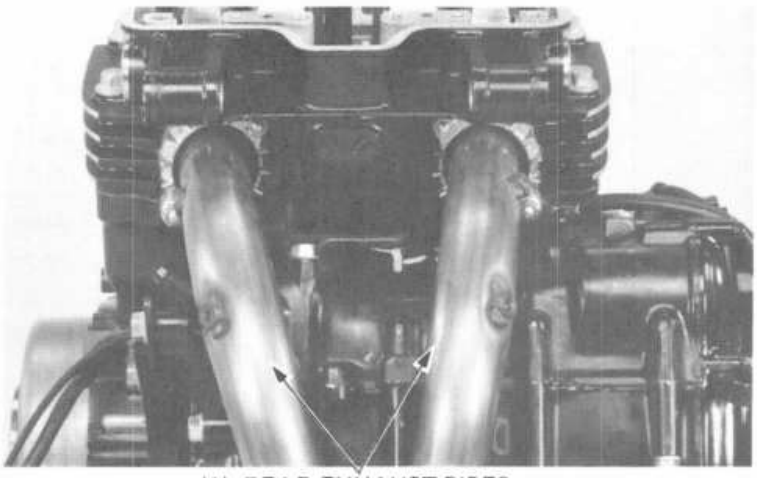
NOTE

Tighten the cylinder head bolts to the specified torque after all cylinder head bolts are installed.

(1) CYLINDER HEAD BOLTS



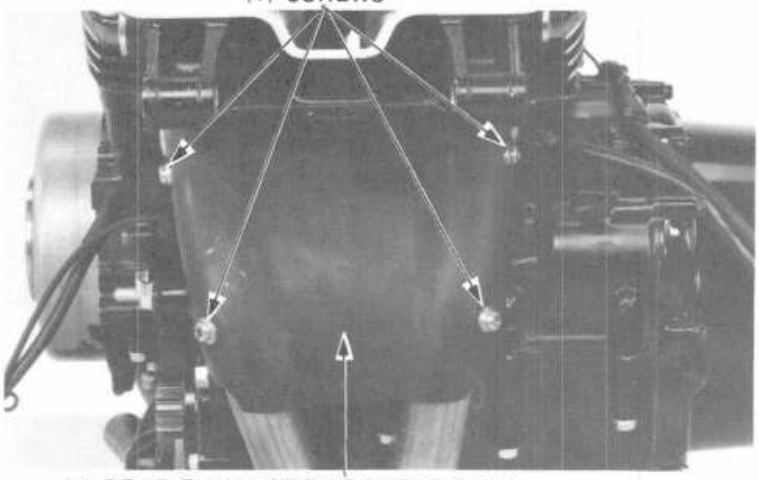
Install the rear exhaust pipes onto the rear cylinder head with new exhaust pipe joint gaskets.



(1) REAR EXHAUST PIPES

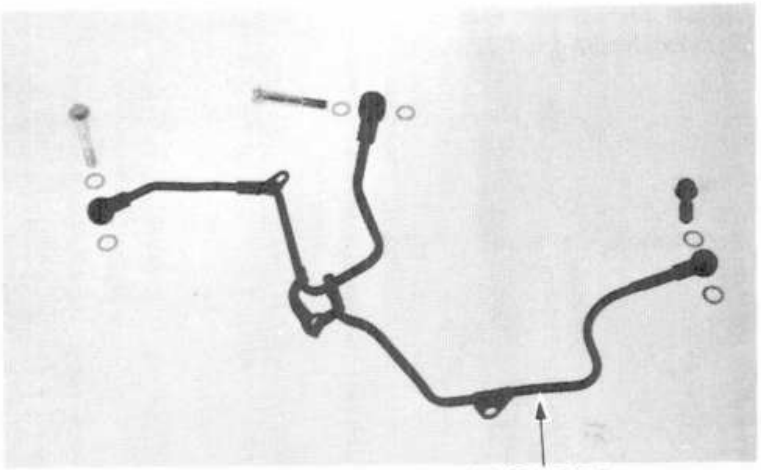
Install the rear exhaust pipe protector using the four screws.

(1) SCREWS



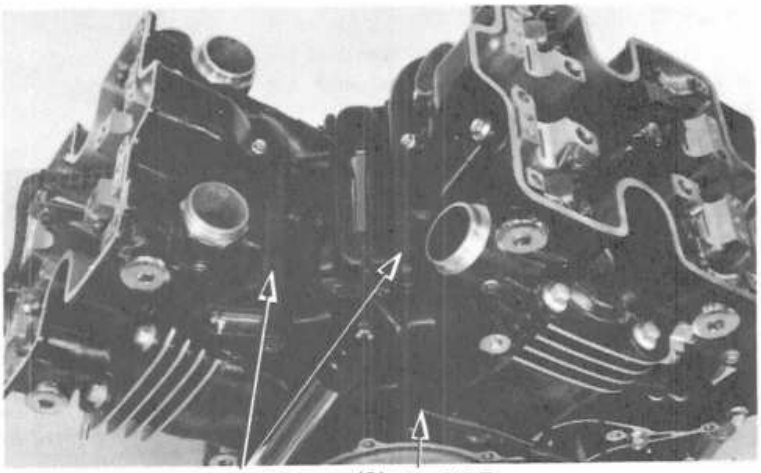
(2) REAR EXHAUST PIPE PROTECTOR

Install the exterior oil pipe with washers onto the cylinder and cylinder head.



(1) OIL PIPE

Install the water pipes and hoses and tighten the hose clamps securely.



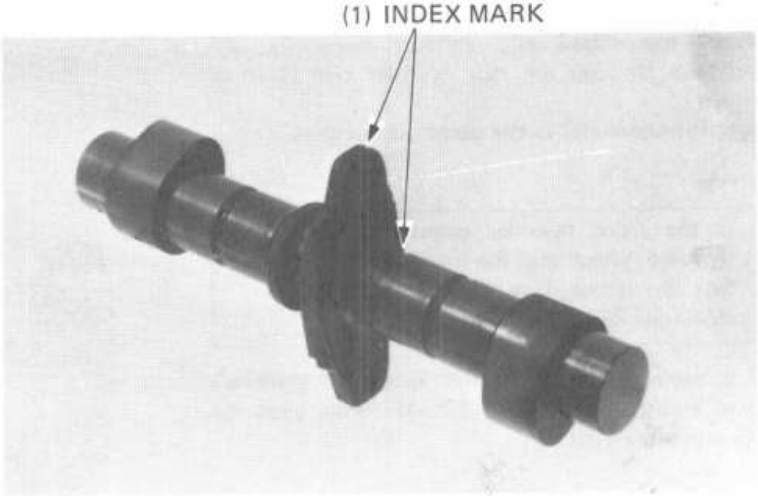
(1) WATER PIPES (2) OIL PIPE

CAMSHAFT INSTALLATION

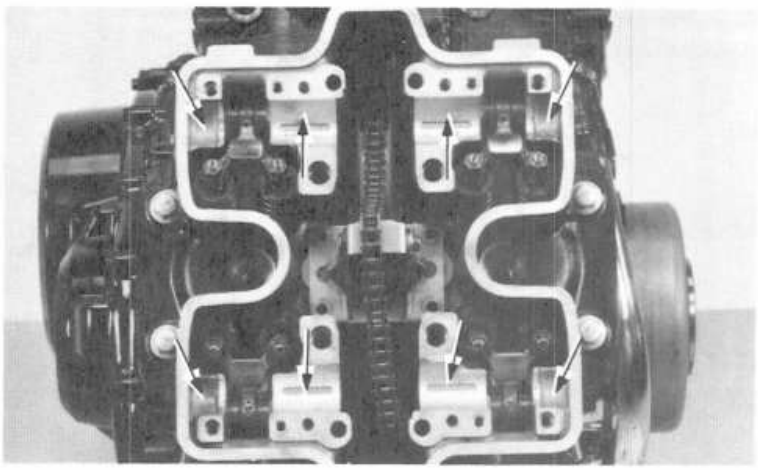
CAUTION

- *Follow this procedure from beginning to end, even if you are only servicing one cylinder head.*
- *Check the camshaft marks so that you install each camshaft in its correct location.*
- *The marks on the camshaft mean:*
  EX RR, ER: Rear cylinder exhaust
  IN RR, IR: Rear cylinder intake
  EX FR, EF: Front cylinder exhaust
  IN FR, IF: Front cylinder intake
- *The camshaft sprockets are interchangeable.*

(1) INDEX MARK



Lubricate the cylinder head cam bearing surfaces with molybdenum disulfide grease.



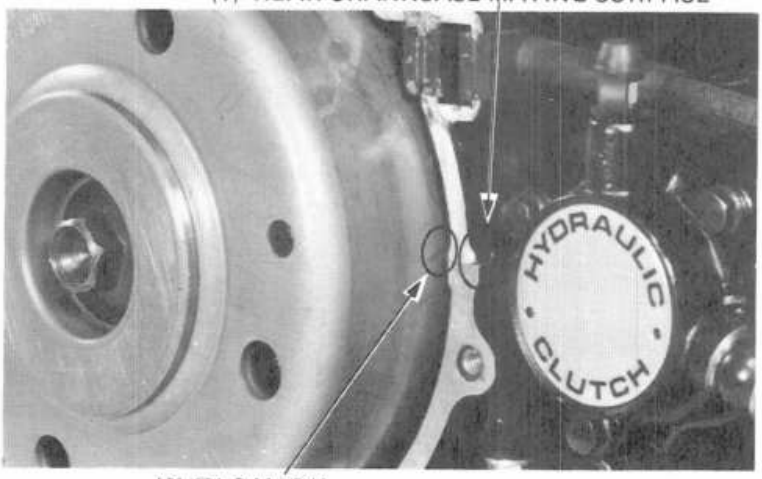
(1) REAR CRANKCASE MATING SURFACE

- Rear Cylinder Camshafts

Turn the crankshaft counterclockwise unti the T1-3 mark on the flywheel rotor aligns with the rear crankcase mating surfaces.

CAUTION

When turning the crankshaft, make sure the cam chains don't jam at the cam chain tensioners or at the crankshaft.



(2) T1-3 MARK

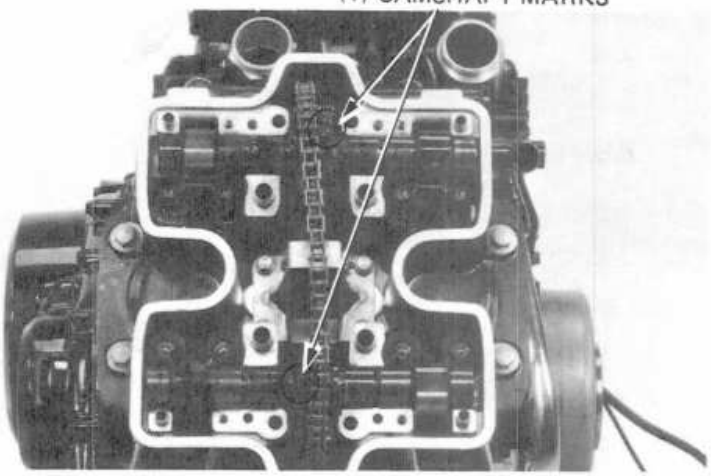
Install the intake and exhaust camshafts and sprockets through the rear cylinder cam chain as shown.
Turn the camshafts so the camshaft marks face up.

(1) CAMSHAFT MARKS

NOTE

If the front cylinder camshafts were not removed, check that the front camshaft marks face up. If not, turn the crankshaft counterclockwise 360 degrees (one turn).

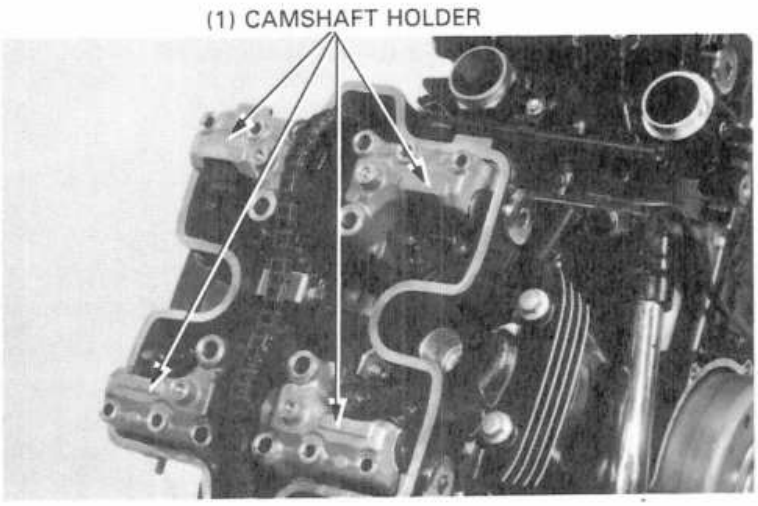
If a valve clearance adjuster keeps the camshaft from seating fully in the cylinder head, back the adjuster out all the way.



CAUTION

If you force a valve open while installing the camshaft holders, you may damage the holers or the camshaft bearing surfaces.

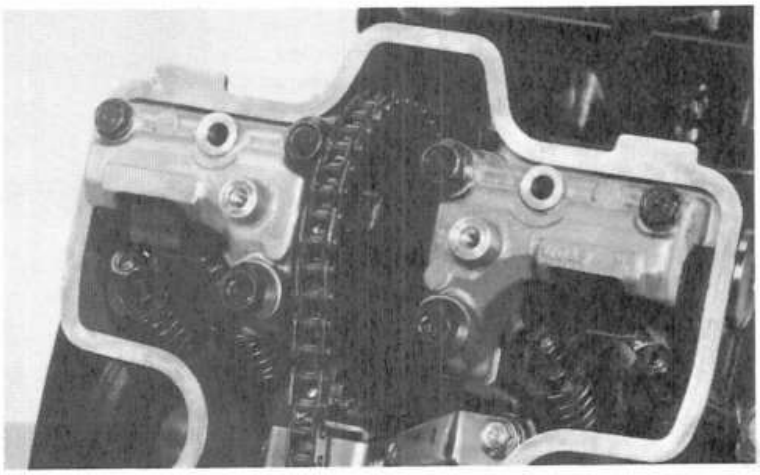
Place the camshaft holders in the same locations noted during removal. The groove in the bottom of the holder must align with the camshaft locating ridge.



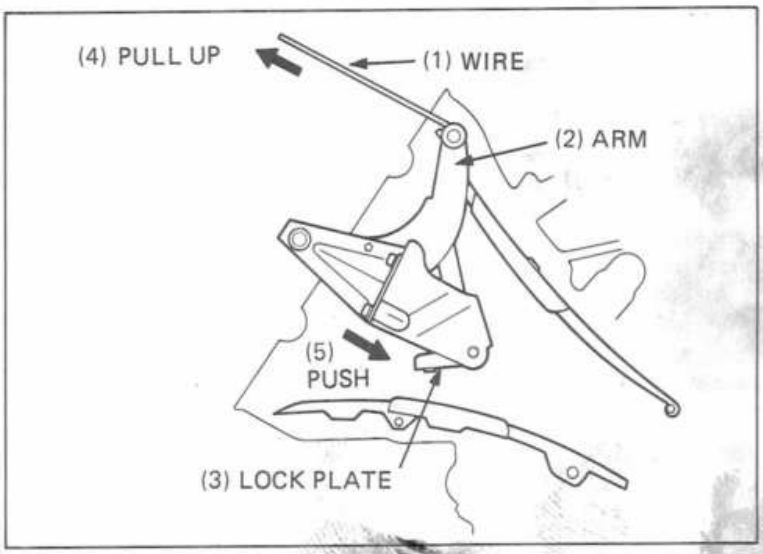
Install the camshaft holder bolts, but do not tighten them yet.

NOTE

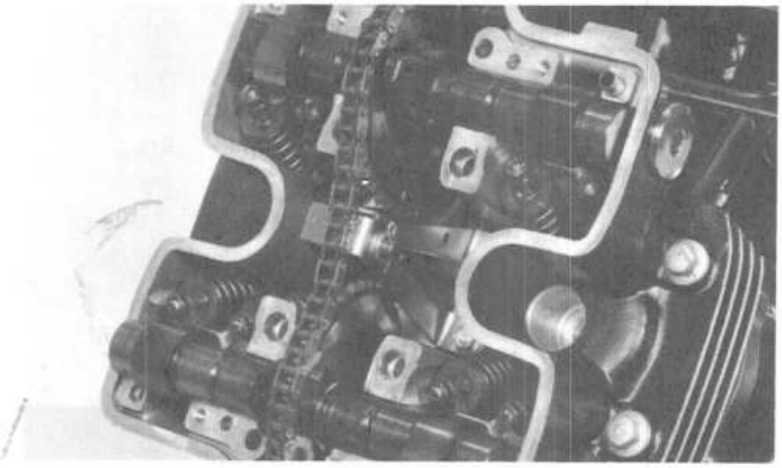
The camshaft holder bolts in each corner of the cylinder head are longer than the others.



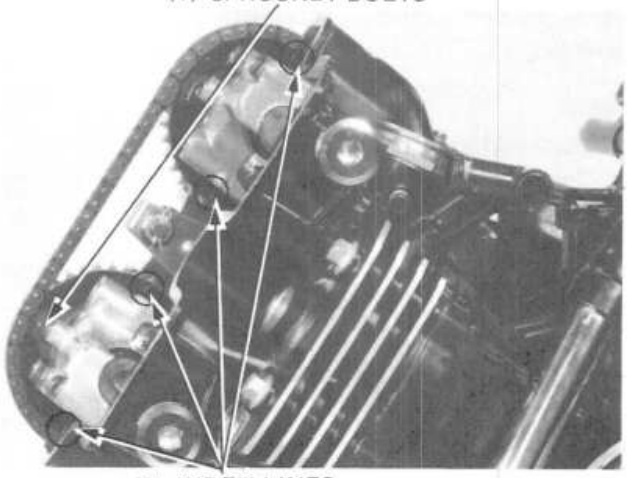
If the cylinders were not removed, lock the cam chain tensioner for minimum tension: push the lock plate down while pulling or prying the tension arm up; hold the arm pin up while you insert a pin or wire through the lock holes.



Check that the camshaft marks are still facing up, then align the sprocket index lines with the top of the rear cylinder head. Place the cam chain on the sprockets.



Slide the sprockets onto the camshaft flanges, and install the sprocket bolts in the exposed holes. Check that the sprocket index lines align at T1-3. Unlock the cam chain tensioner.



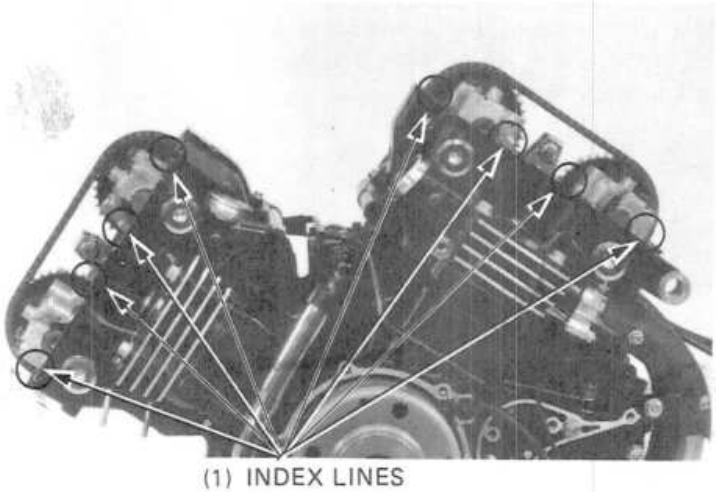
- Valve Timing Inspection

Check the front-to-rear cylinder camshaft timing as follows.

- When the T1-3 mark aligns with the rear crankcase mating surface, the index lines on all cam sprockets should align with the top of the cylinder heads.
- All camshaft marks will either face up or down.

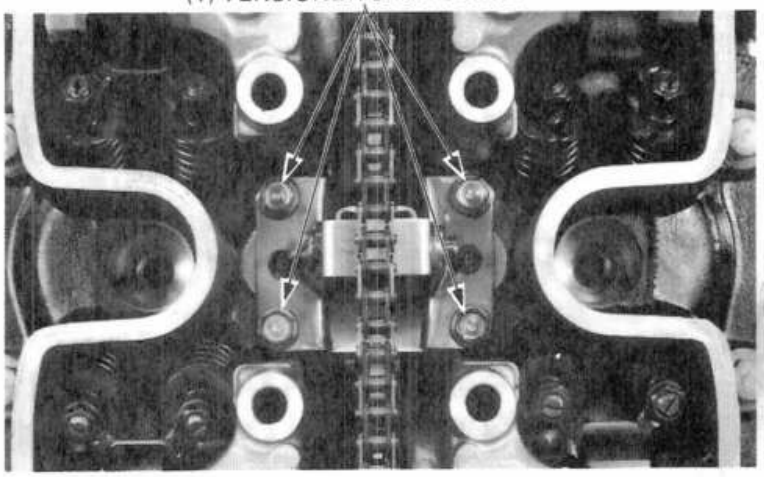
Turn the crankshaft as required to install the remaining sprocket bolts at all four camshafts. Tighten the camshaft sprocket bolts to the specified torque.

TORQUE: 18–20 N·m (1.8–2.0 kg-m, 13–14 ft-lb)



Tighten the tensioner base bolts securely.

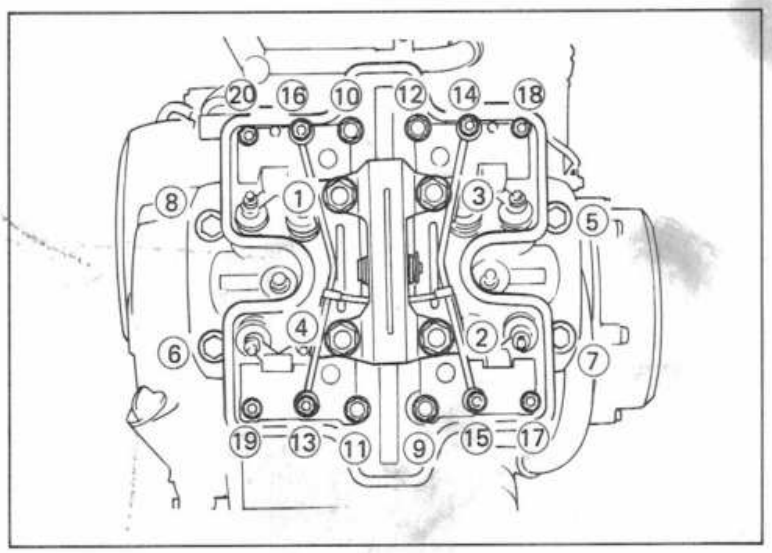
(1) TENSIONER BASE BOLTS



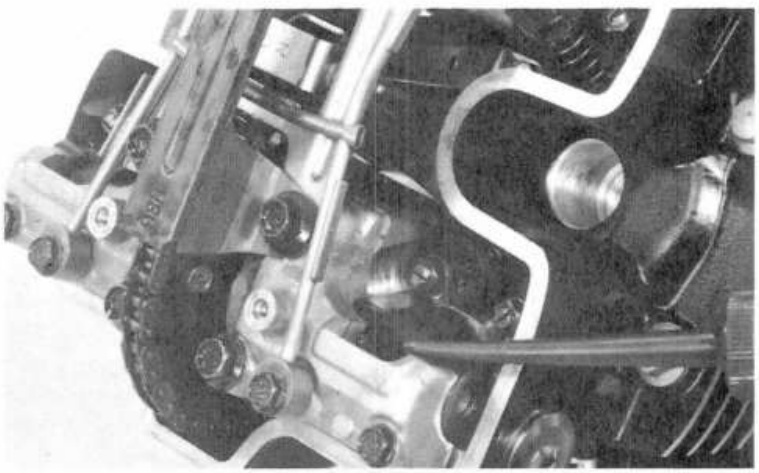
Turn the crankshaft counterclockwise until there is maximum cam chain free play, then install the oil pipes under the cam chain.
Install the cam chain guide on the oil pipe base plate.
Tighten the cylinder head bolts in a criss-cross pattern in 2-3 steps.

TORQUE:

9 mm: 43—47 N·m (4.3—4.7 kg-m, 31—34 ft-lb)
8 mm: 21—25 N·m (2.1—2.5 kg-m, 15—18 ft-lb)
6 mm: 10—14 N·m (1.0—1.4 kg-m, 7—10 ft-lb)



Lubricate the cam lobes with oil.



Adjust the valve clearance (page 3-8).
Install the new cylinder head cover gasket.

NOTE

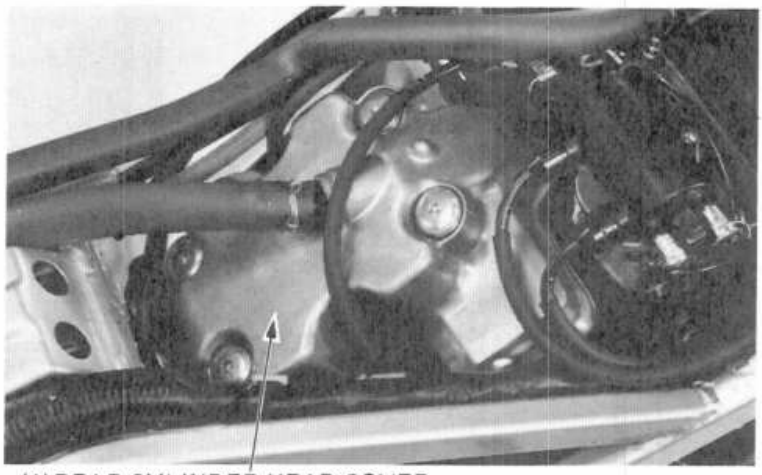
Clean the gasket before applying sealant.

Apply sealant to the cylinder head cover gasket.

Install the cylinder head covers and tighten the cover bolts.

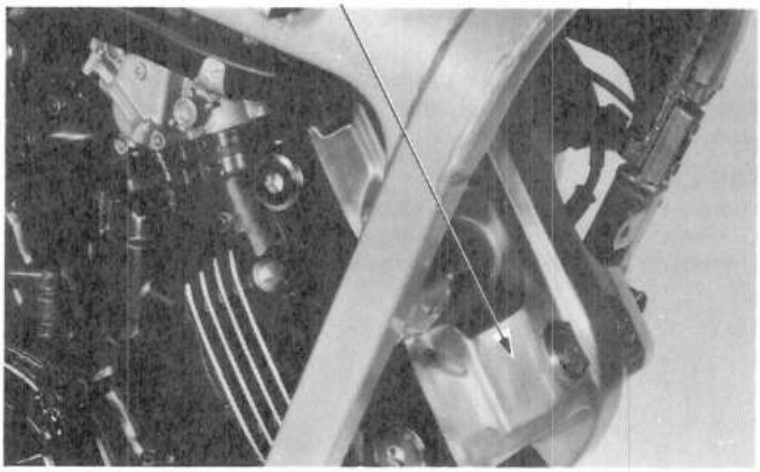
TORQUE: 8–12 N·m (0.8–1.2 kg-m, 6–9 ft-lb)

Install the remaining parts in the reverse order of removal.

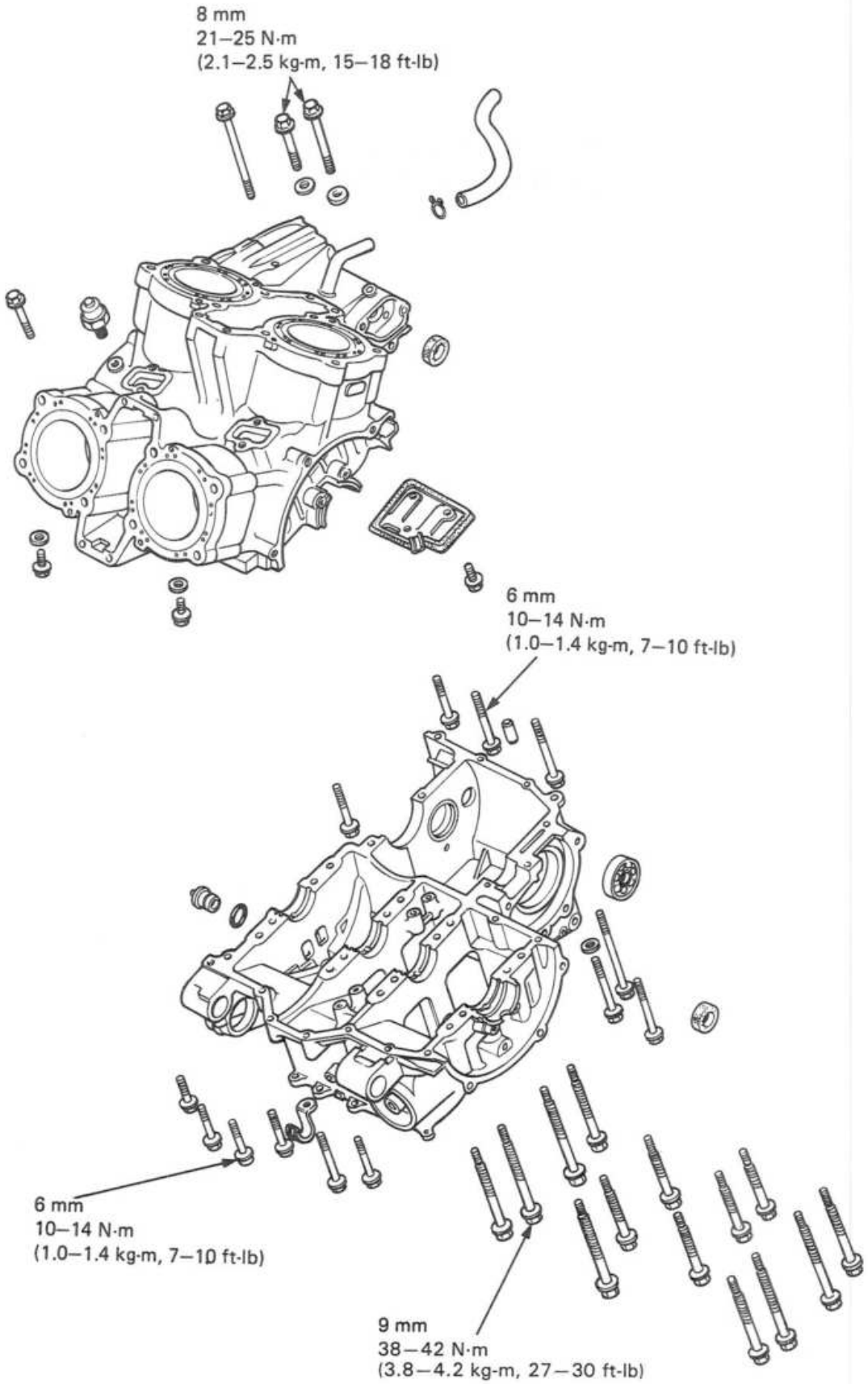


(1) REAR CYLINDER HEAD COVER

(1) FRONT CYLINDER HEAD COVER



CRANKCASE


8 mm
21–25 N·m
(2.1–2.5 kg-m, 15–18 ft-lb)
6 mm
10–14 N·m
(1.0–1.4 kg-m, 7–10 ft-lb)
6 mm
10–14 N·m
(1.0–1.4 kg-m, 7–10 ft-lb)
9 mm
38–42 N·m
(3.8–4.2 kg-m, 27–30 ft-lb)

SERVICE INFORMATION	11–1
CRANKCASE DISASSEMBLY	11–2
CRANKCASE ASSEMBLY	11–3

SERVICE INFORMATION

GENERAL

- To service the pistons, crankshaft, connecting rods and transmission, the crankcase halves must be separated.
- The following parts must be removed before disassembling the crankcase.
  - Oil pan — Refer to section 2
  - Oil pump — Refer to section 2
  - Water pump — Refer to section 6
  - Clutch/starter clutch — Refer to section 7
  - Gearshift linkage — Refer to section 8
  - Alternator — Refer to section 9
  - Cylinder heads — Refer to section 10
  - Starter motor — Refer to section 20
  - Neutral switch — Refer to section 21

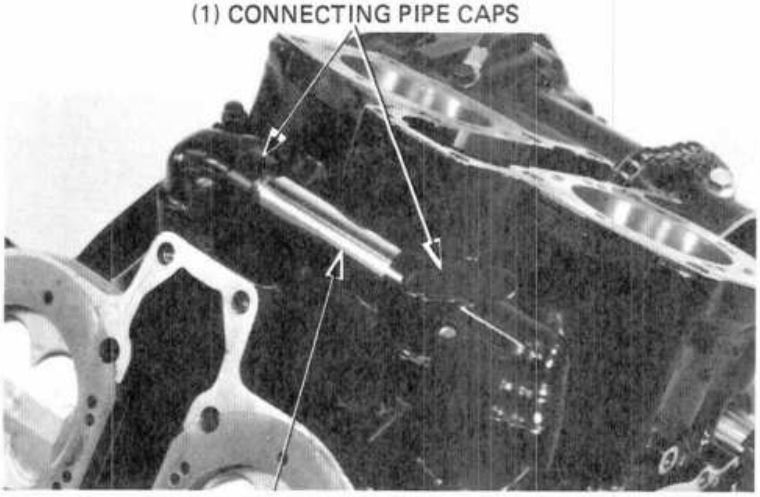
TORQUE VALUES

9 mm bolt:	38–42 N·m (3.8–4.2 kg-m, 27–30 ft-lb)
8 mm bolt:	21–25 N·m (2.1–2.5 kg-m, 15–18 ft-lb)
6 mm bolt:	10–14 N·m (1.0–1.4 kg-m, 7–10 ft-lb)

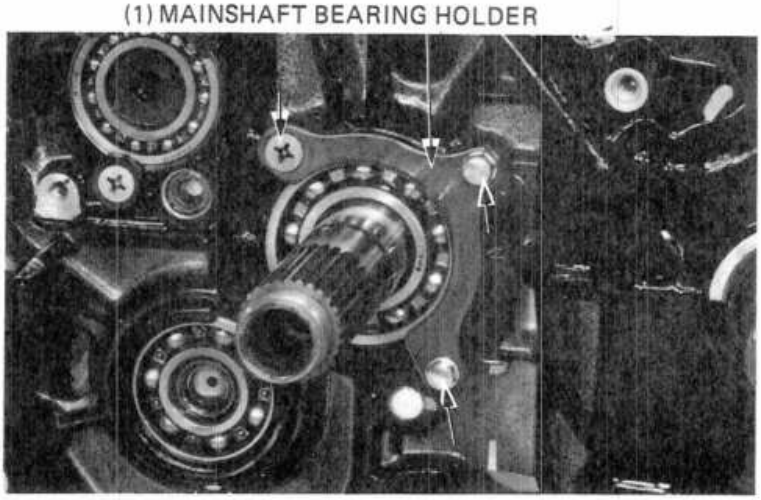
CRANKCASE DISASSEMBLY

Refer to Service Information (page 11-1) for removal of necessary parts before disassembling crankcase.

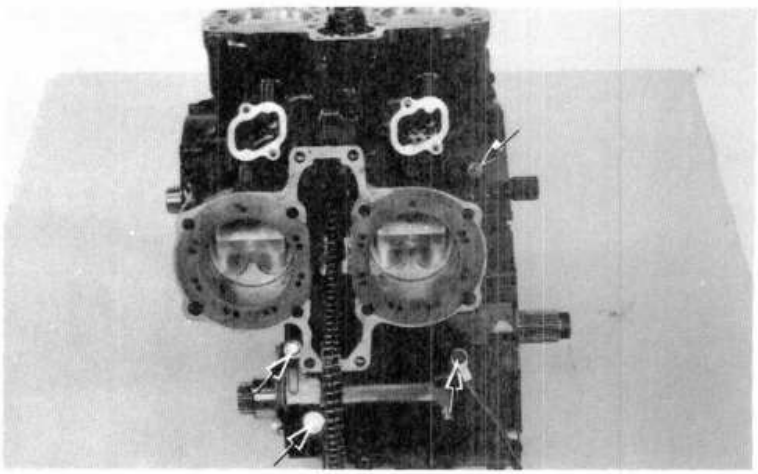
Remove the connecting pipe and caps by removing the bolts.
Remove the O-rings from the caps and pipe.



Remove the mainshaft bearing holder by removing the screw and bolts.



Remove the upper crankcase bolts.



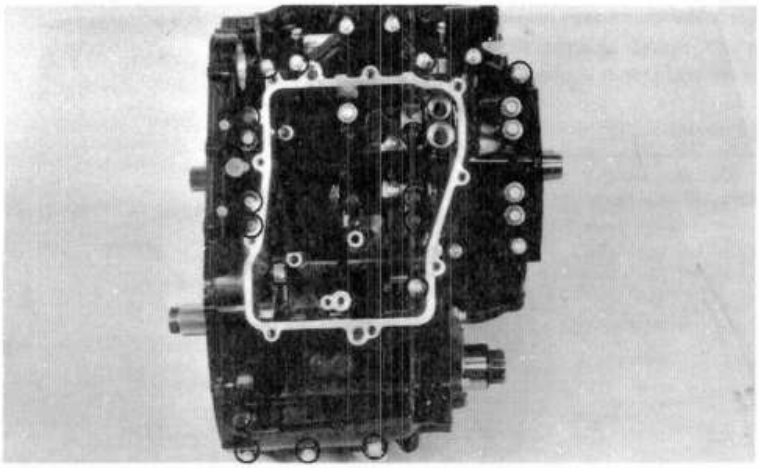
Turn the engine over and remove the lower crankcase bolts.

NOTE

> Remove the bolts in two or more steps and in a crisscross pattern to prevent distorting the crankcase.

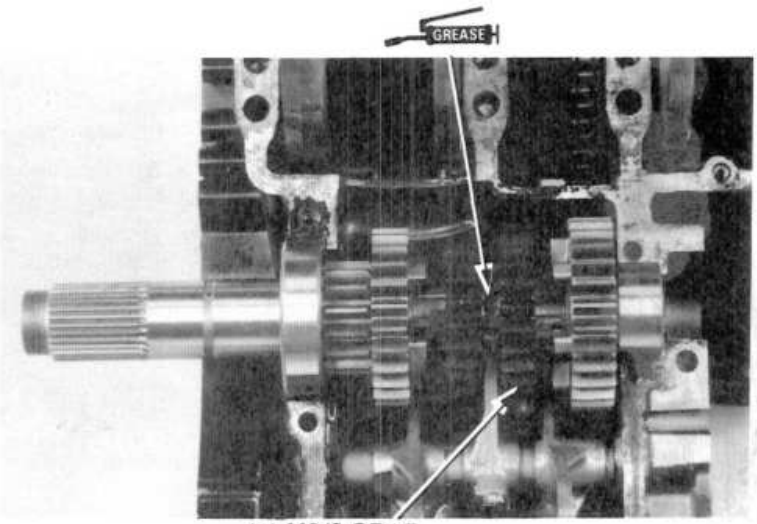
Separate the crankcase.

Remove the following parts:
- Piston and connecting rods (Section 12).
- Crankshaft (Section 12).
- Shift fork and shift drum (Section 13).
- Transmission (Section 13).



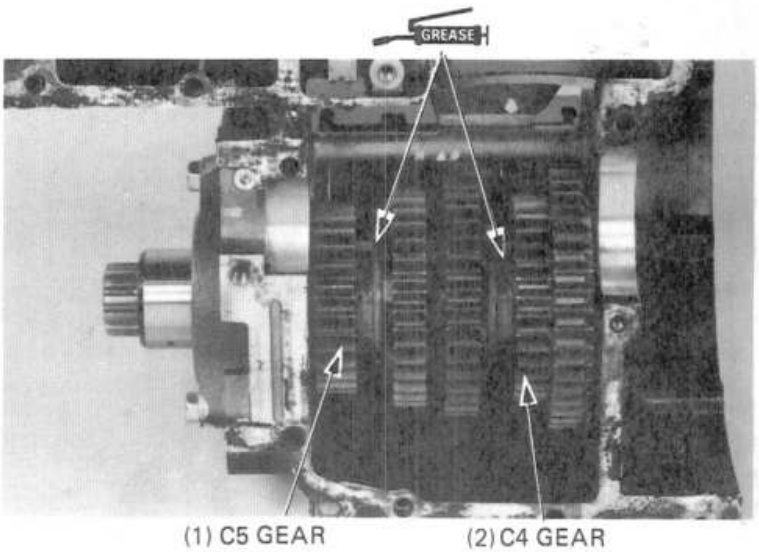
CRANKCASE ASSEMBLY

Install the following parts:
- Shift fork and shift drum (Section 13).
- Transmission (Section 13).
- Crankshaft (Section 12).
- Piston and connecting rods (Section 12).



(1) M2/3 GEAR

Apply molybdenum disulfide grease to the shift fork grooves of the M2/3, C4 and C5 gears.



(1) C5 GEAR (2) C4 GEAR

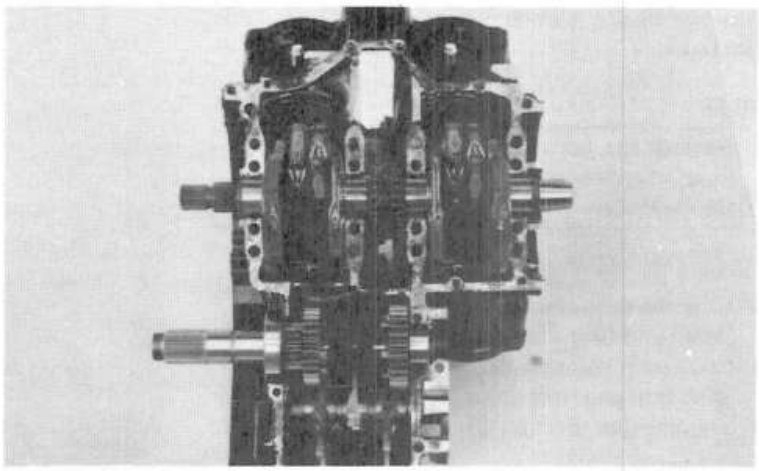
Clean the crankcase mating surfaces.
Apply liquid sealant to the mating surface of the lower and upper crankcase.

CAUTION

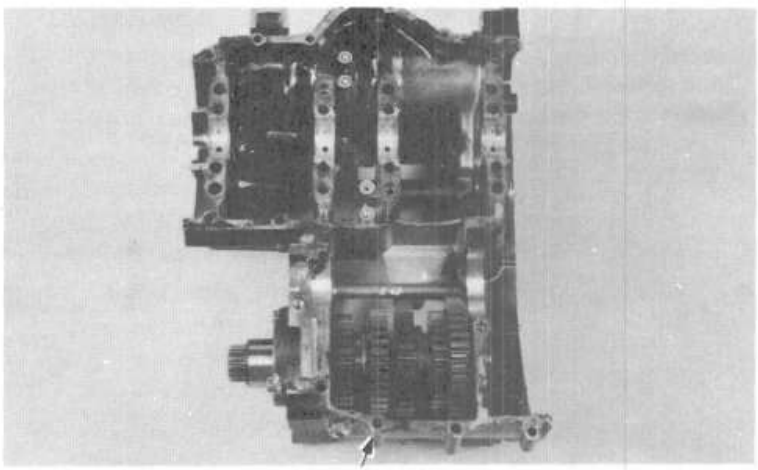
Do not apply sealant to the area near the main bearings.

(1) DO NOT COAT THIS AREA.





Install the dowel pin into the lower crankcase.



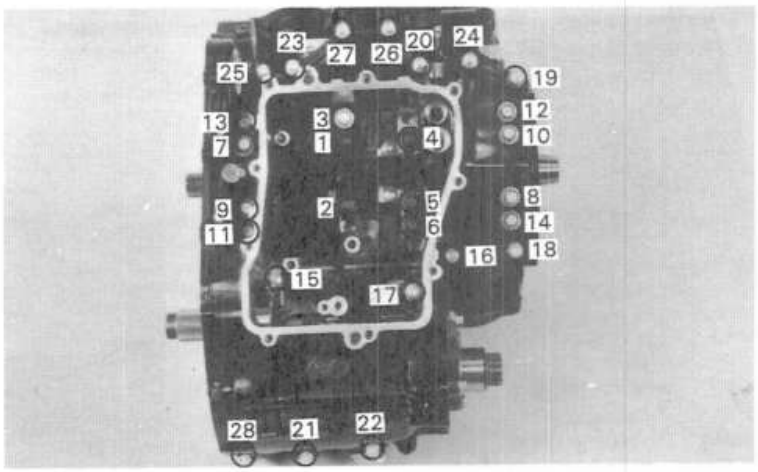
(1) DOWEL PIN

Assemble the crankcase halves, aligning the shift forks with the gears.
Tighten the bolts to the specified torque values in the sequence shown.

TORQUE VALUES:

9 mm bolt: 38–42 N·m
(3.8–4.2 kg-m, 27–30 ft-lb)
8 mm bolt: 21–25 N·m
(2.1–2.5 kg-m, 14–18 ft-lb)
6 mm bolt: 10–14 N·m
(1.0–1.4 kg-m, 7–10 ft-lb)

Tighten the bolts in a crisscross pattern and in 2–3 steps.

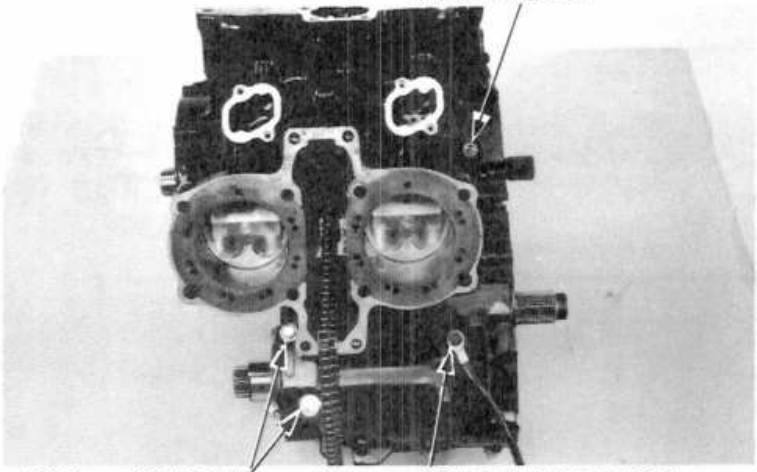


Tighten the upper crankcase bolts to the specified torque in a crisscross pattern and in 2–3 steps.

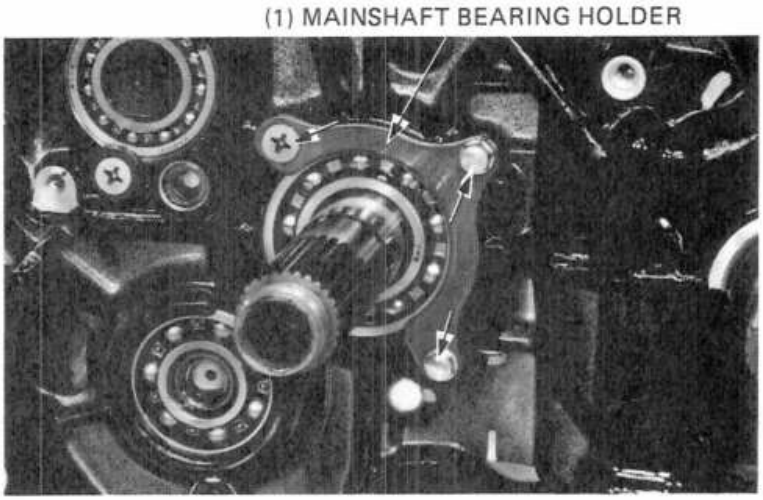
TORQUE: 8 mm: 21–25 N·m
(2.1–2.5 kg-m, 15–18 ft-lb)
6 mm: 10–14 N·m
(1.0–1.4 kg-m, 7–10 ft-lb)

NOTE

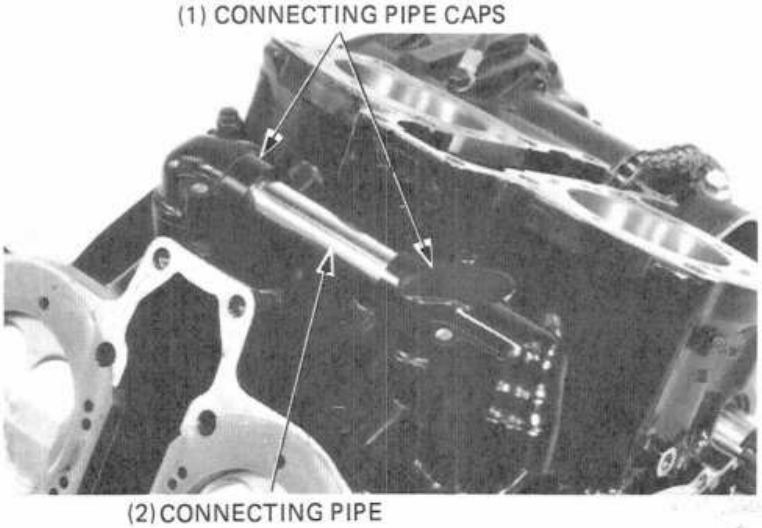
Make sure that the plain washers are under the 8 mm bolt heads and the battery ground cable is under the 6 mm bolt head as shown.



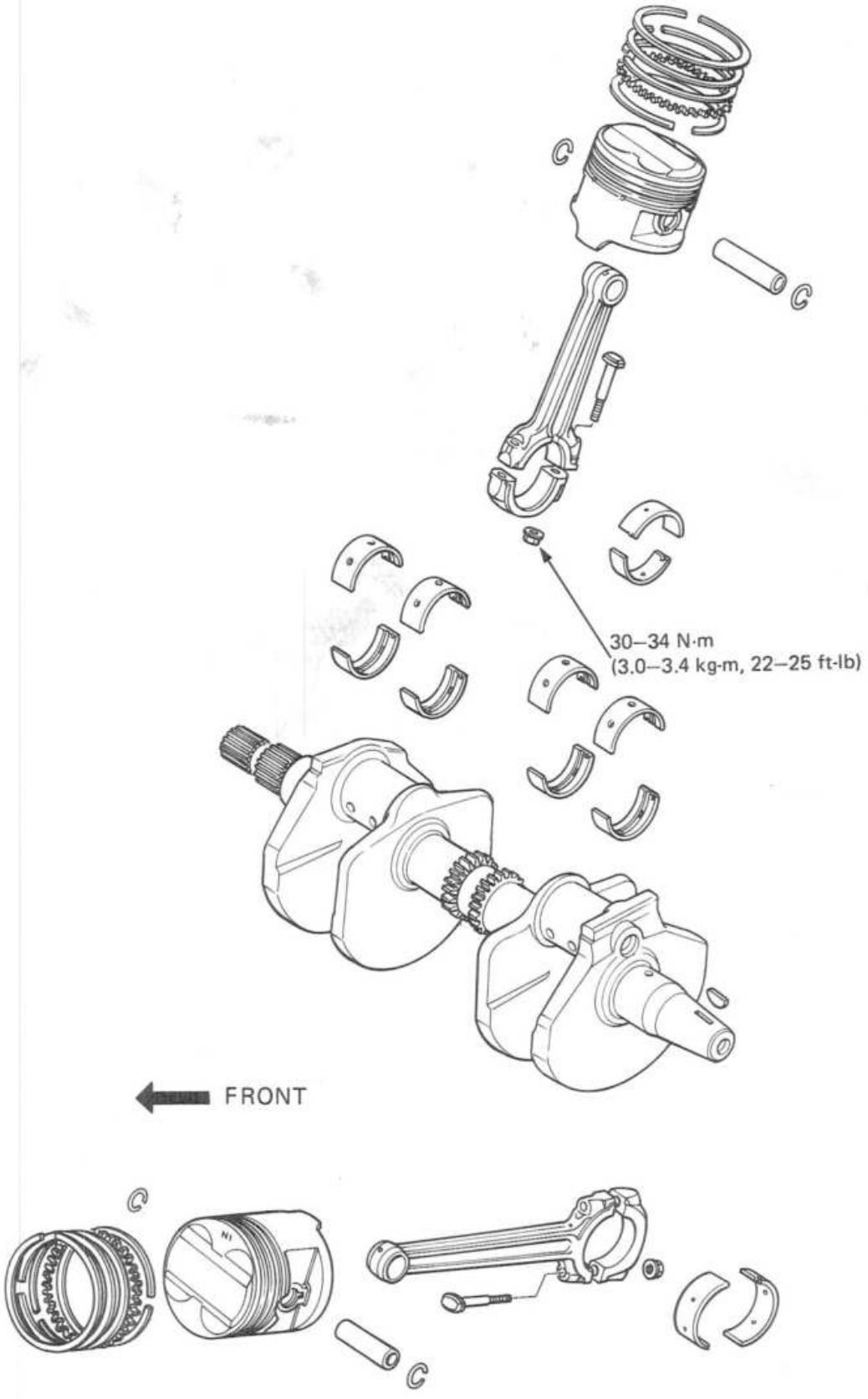
Install the mainshaft bearing holder and tighten the screw and bolts.



Install new O-rings onto the ends of the connecting pipe and assemble the connecting pipe and pipe caps.
Install new O-rings in the grooves of the pipe caps.
Install the pipe caps onto the crankcase and tighten the bolts.



CRANKSHAFT/PISTON


30–34 N·m
(3.0–3.4 kg-m, 22–25 ft-lb)
FRONT

SERVICE INFORMATION	12–1	BEARING INSPECTION	12–8
TROUBLESHOOTING	12–2	BEARING SELECTION	12–10
CONNECTING ROD REMOVAL	12–3	CRANKSHAFT INSTALLATION	12–12
PISTON REMOVAL	12–4	PISTON AND ROD INSTALLATION	12–13
CRANKSHAFT REMOVAL	12–7		

SERVICE INFORMATION

GENERAL

- All bearing inserts are select fit and are identified by color code. Select 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 removing the piston and connecting rod assemblies, clean the top of the cylinder of any carbon deposits.
- For servicing the piston, connecting rod and crankshaft, the crankcase assembly must be separated (Section 11).

SPECIFICATIONS

	ITEM		STANDARD	SERVICE LIMIT
Crankshaft	Connecting rod big end side clearance		0.10–0.30 mm (0.004–0.012 in)	0.40 mm (0.016 in)
	Runout		—	0.03 mm (0.001 in)
	Crankpin oil clearance		0.028–0.052 mm (0.0011–0.0020 in)	0.08 mm (0.003 in)
	Main journal oil clearance		0.020–0.044 mm (0.0008–0.0017 in)	0.08 mm (0.003 in)
Cylinder	I.D.		77.000–77.015 mm (3.0315–3.0321 in)	77.10 mm (3.035 in)
	Taper		—	0.05 mm (0.002 in)
	Out of round		—	0.05 mm (0.002 in)
	Warpage		—	0.10 mm (0.004 in)
Piston	Ring-to-groove clearance	Top	0.015–0.045 mm (0.0006–0.0018 in)	0.10 mm (0.004 in)
		Second	0.015–0.045 mm (0.0006–0.0018 in)	0.10 mm (0.004 in)
	Ring end gap	Top	0.32–0.47 mm (0.013–0.019 in)	0.65 mm (0.026 in)
		Second	0.32–0.47 mm (0.013-0.019 in)	0.65 mm (0.026 in)
		Oil (Side rail)	0.30–0.90 mm (0.012–0.035 in)	1.10 mm (0.043 in)
	Piston O.D.		76.955–76.970 mm (3.0297–3.0303 in)	76.85 mm (3.026 in)
	Piston-to-cylinder clearance		0.03–0.06 mm (0.0012–0.0024 in)	0.10 mm (0.004 in)
	Piston pin bore		20.002–20.008 mm (0.7875–0.7877 in)	20.06 mm (0.790 in)
	Piston pin O.D.		19.994–20.000 mm (0.7872–0.7874 in)	19.98 mm (0.787 in)
	Piston-to-piston pin clearance		0.002–0.014 mm (0.0001–0.0006 in)	0.04 mm (0.002 in)
	Connecting rod small end I.D.		20.016–20.034 mm (0.7880–0.7887 in)	20.08 mm (0.791 in)
	Piston pin-to-connecting rod clearance		0.016–0.040 mm (0.0006–0.0016 in)	0.060 mm (0.0024 in)
Cam chain	Length at 13 kg (29 lb) tension		—	328.9 mm (12.95 in)

TORQUE:

Crankpin: 30–34 N·m (3.0–3.4 kg-m, 22–25 ft-lb)

TROUBLESHOOTING

Excessive noise
1. Crankshaft
   - Worn main bearing
   - Worn rod bearing

2. Piston and Connecting Rod
   - Worn piston or cylinder
   - Worn piston pin or pin hole
   - Worn rod small end

Low compression or uneven compression
1. Worn cylinder or piston ring

Excessive smoke
1. Worn cylinder, piston or piston rings
2. Improperly installed piston rings
3. Damaged piston or cylinder

Overheating
1. Excessive carbon build-up on piston head
2. Blocked or restricted flow of coolant
3. Sticking thermostat

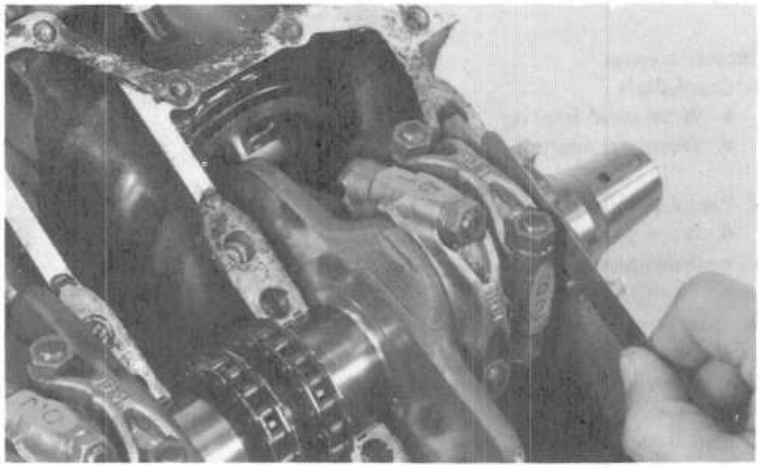
Knocking or abnormal noise
1. Worn pistons and cylinders
2. Excessive carbon build-up on piston head.

CONNECTING ROD REMOVAL

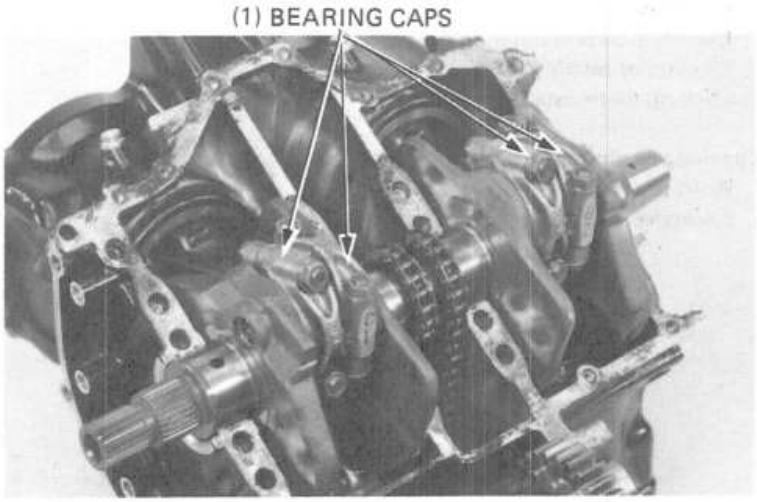
Separate the crankcase assembly (Section 11).

Check the connecting rod side clearance.

SERVICE LIMIT: 0.40 mm (0.016 in)



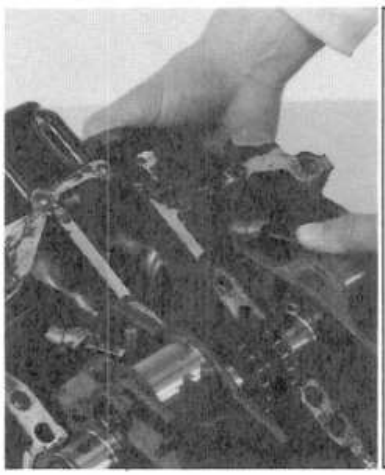
Remove the connecting rod bearing caps and note their locations.

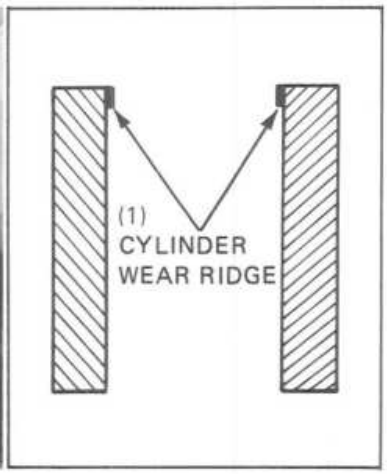


Push the connecting rods and pistons out through the top of the cylinder bores.

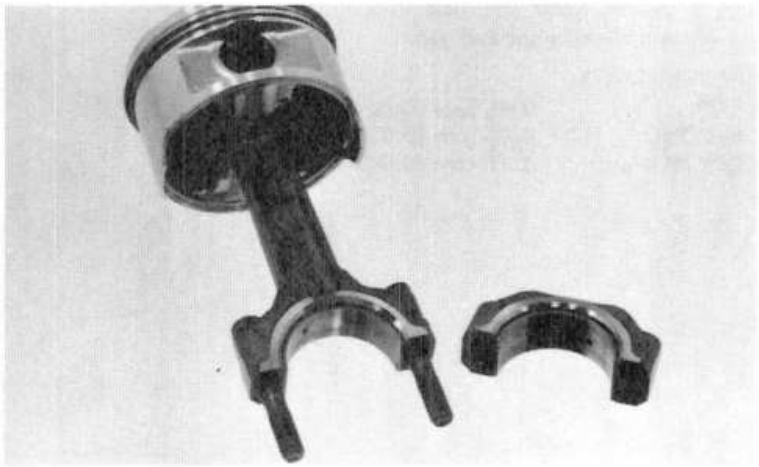
CAUTION

On engines with high mileage, inspect the cylinders for a ridge just above the highest point of ring travel. Any ridge must be removed with an automotive type ridge reamer before removing the pistons to allow the pistons and rings to pass through the cylinder.





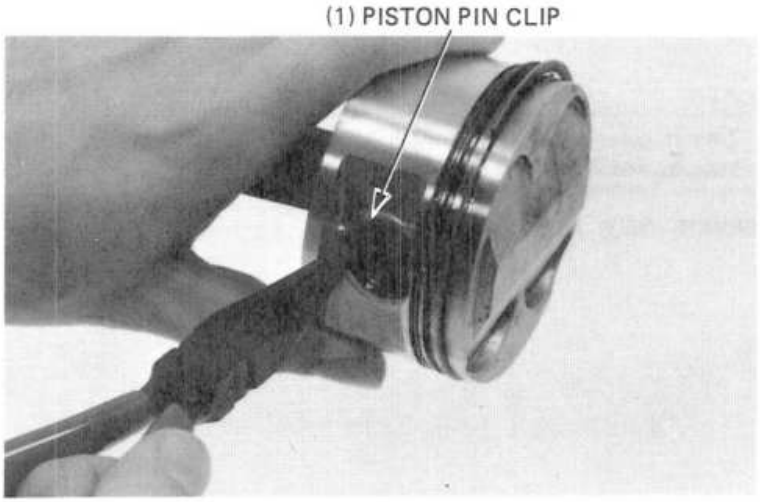
Mark the rods, pistons, bearings and caps as you remove them to indicate the correct cylinder and position on the crankpins.



PISTON REMOVAL

Remove the piston pin clips. Push the piston pin out and remove the piston.

Mark the piston pins to indicate their correct piston position.



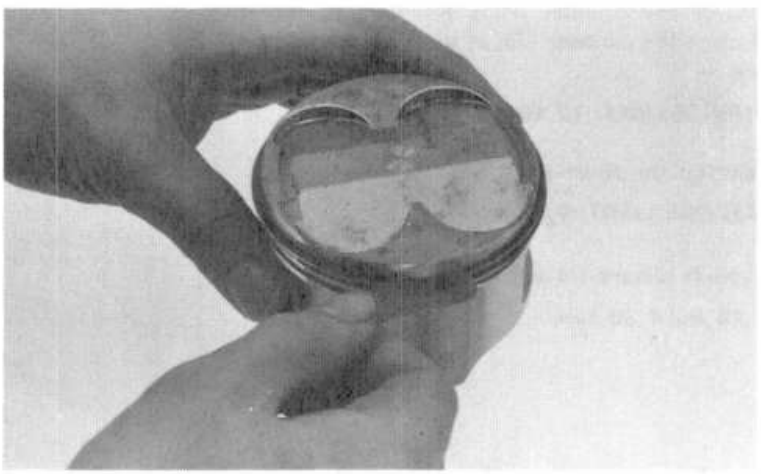
PISTON/PISTON RING INSPECTION

Measure the piston ring-to-groove clearance.

SERVICE LIMIT: 0.10 mm (0.004 in)
(TOP/SECOND)

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

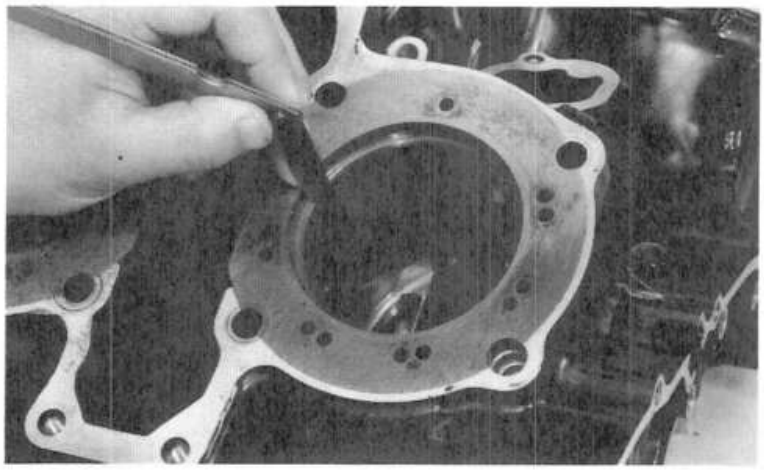
Clean the piston crown, removing all carbon deposits.
Inspect the piston for cracks or other damage and the ring grooves for excessive wear and carbon build-up.



Using a piston, push the ring into the cylinder squarely and measure the end gap.

SERVICE LIMITS:

TOP:	**0.65 mm (0.026 in)**
SECOND:	**0.65 mm (0.026 in)**
OIL (Side rail):	**1.10 mm (0.043 in)**

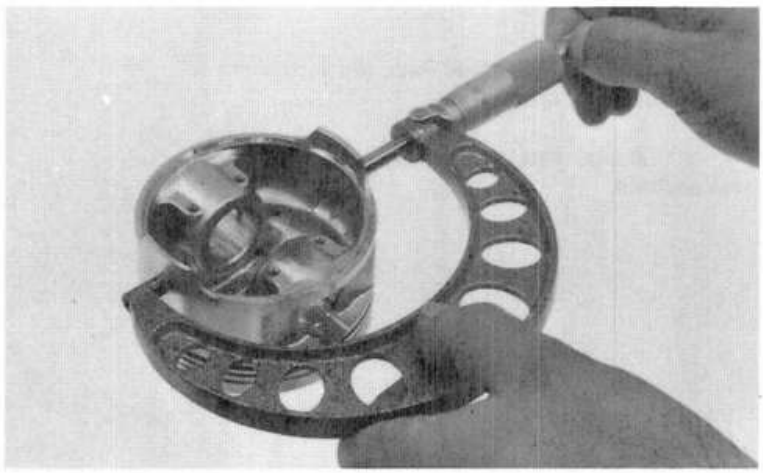


Measure the piston O.D.

NOTE:

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

SERVICE LIMIT: 76.85 mm (3.026 in)



Inspect the cylinder bores for wear or damage. Measure the cylinder I.D. at three levels in X and Y axis.

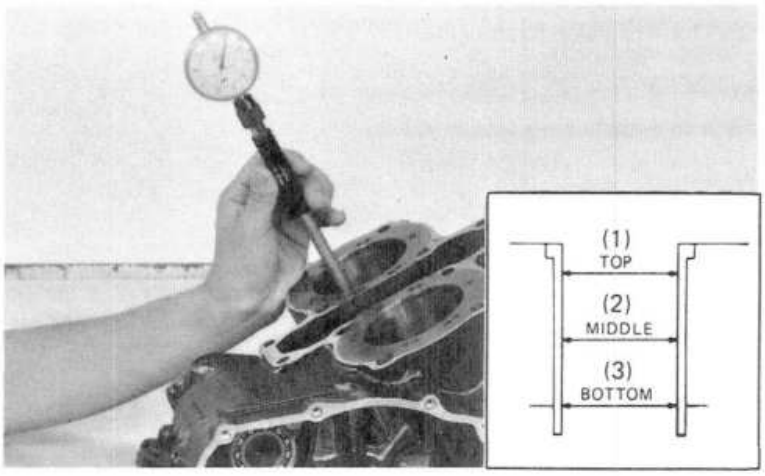
SERVICE LIMIT: 77.10 mm (3.035 in)

Calculate the piston-to-cylinder clearance.

SERVICE LIMIT: 0.10 mm (0.004 in)

Oversize pistons are available in the following sizes:

0.25 and 0.50 mm



Measure each piston pin hole I.D.

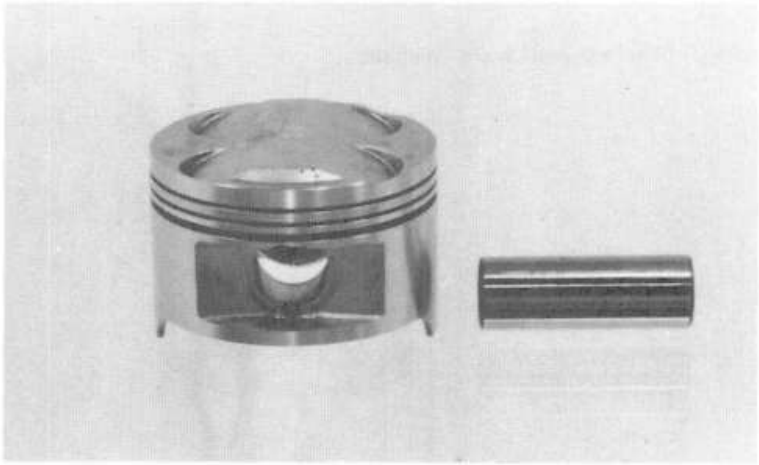
SERVICE LIMIT: 20.06 mm (0.790 in)

Measure each piston pin O.D.

SERVICE LIMIT: 19.98 mm (0.787 in)

Calculate the piston pin-to-piston clearance.

SERVICE LIMIT: 0.04 mm (0.002 in)

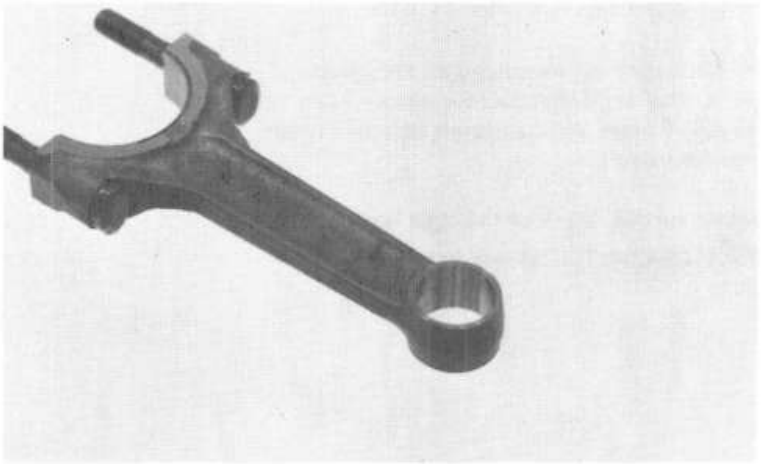


Measure the connecting rod small end I.D. If the reading exceeds the service limit, replace the rod.

SERVICE LIMIT: 20.08 mm (0.791 in)

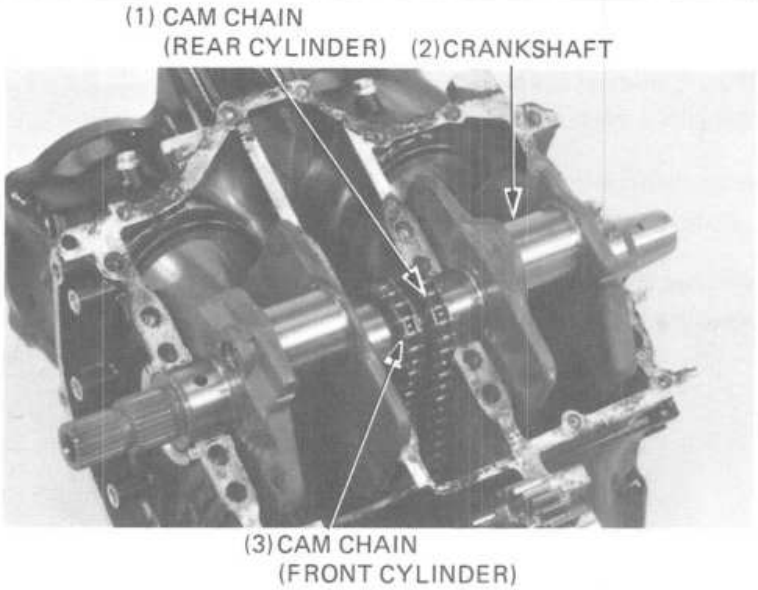
Calculate the piston pin-to-connecting rod clearance.

SERVICE LIMIT: 0.060 mm (0.0024 in)



CRANKSHAFT REMOVAL

Remove the crankshaft and cam chains.

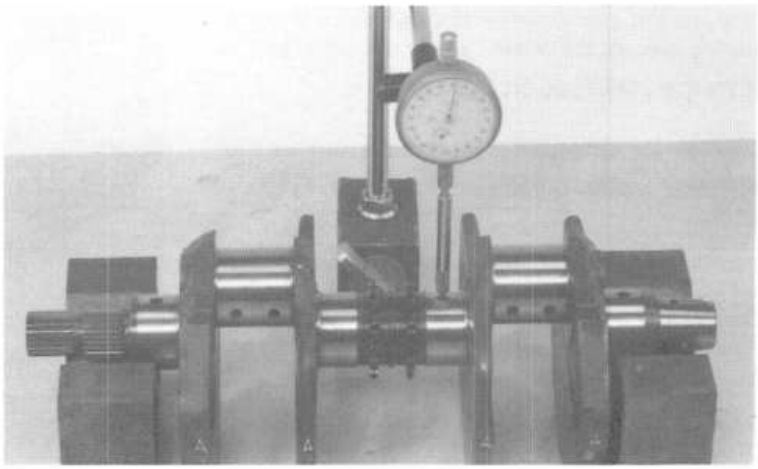


CRANKSHAFT INSPECTION

Set the crankshaft on a stand or Vee blocks.
Set a dial indicator on the center main bearing journal. Rotate the crankshaft two revolutions and read the runout.

Actual runout is 1/2 of the total indicator reading.

SERVICE LIMIT: 0.03 mm (0.001 in)



CAM CHAIN LENGTH INSPECTION

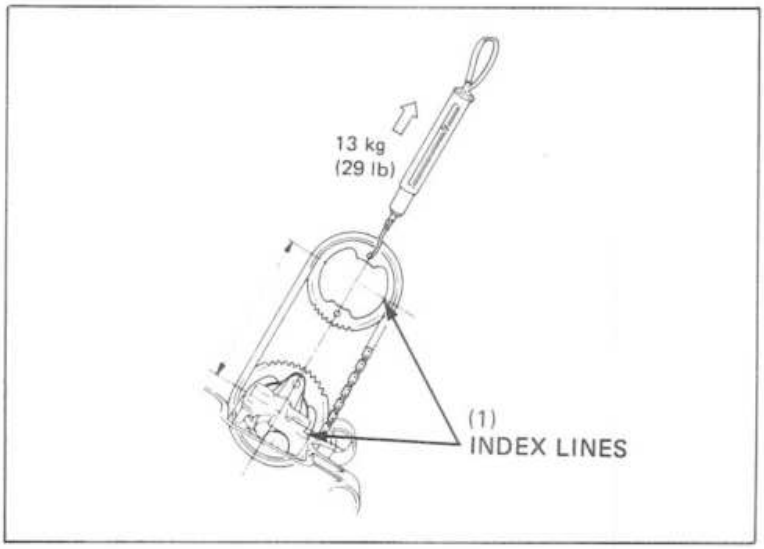
Place the cam chain on the camshaft sprockets with the index lines positioned as indicated.
Secure one camshaft sprocket and apply 13 kg (29 lbs) of tension to the other.
Then measure the distance between the index lines as shown.

SERVICE LIMIT: 328.9 mm (12.95 in)

NOTE

The lidex lines should be parallel to each other.

Replace the cam chain if it is longer than the service limit.



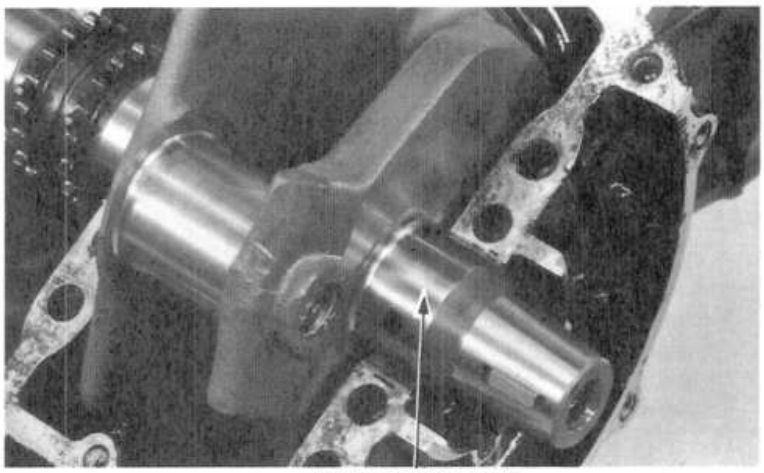
BEARING INSPECTION

MAIN BEARING

Inspect the bearing inserts for unusual wear or damage.
Reinstall the upper crankcase's main bearing inserts, then carefully lower the crankshaft in place.
Wipe all oil from the bearing inserts and journals. Put a piece of plastigauge on each journal.

NOTE

> Do not put the plastigauge over the oil hole in the main bearing journal of the crankshaft.



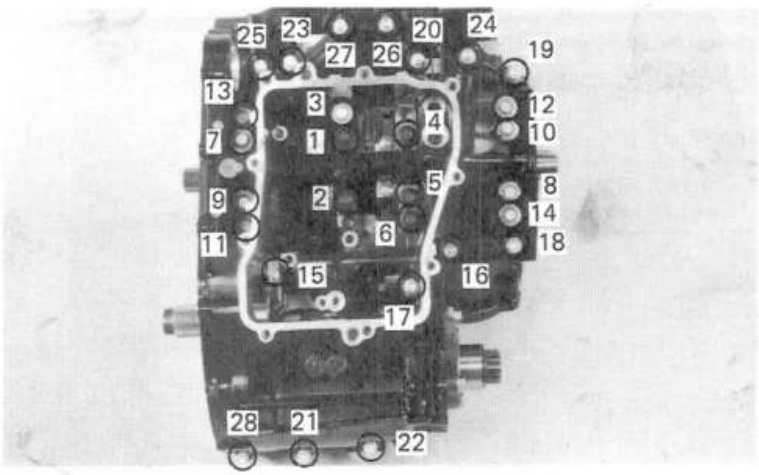
(1) PLASTIGAUGE

Install the main bearings on the correct journals in the lower crankcase, then assemble and tighten the bolts evenly in 2–3 steps in the sequence shown.

TORQUE VALUES:
6 mm bolt: 10–14 N·m (1.0–1.4 kg-m, 7–10 ft-lb)
9 mm bolt: 38–42 N·m (3.8–4.2 kg-m, 27–30 ft-lb)

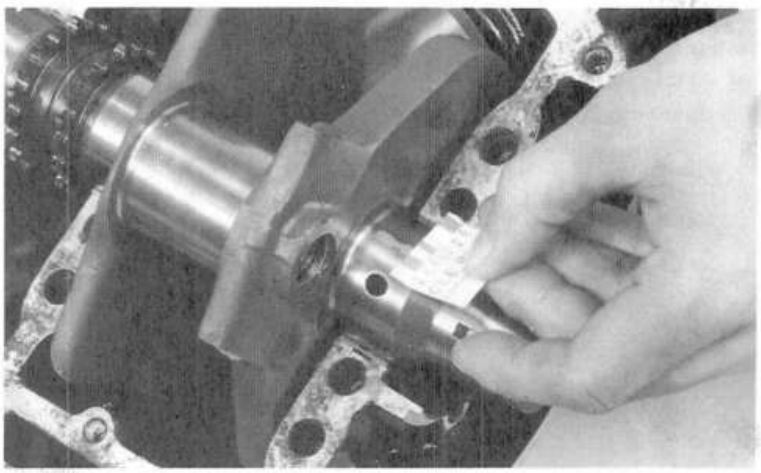
NOTE:

> Do not rotate the crankshaft during inspection.



Remove the lower crankcase and measure the compressed plastigauge on each journal.

OIL CLEARANCE SERVICE LIMIT:
0.08 mm (0.003 in)

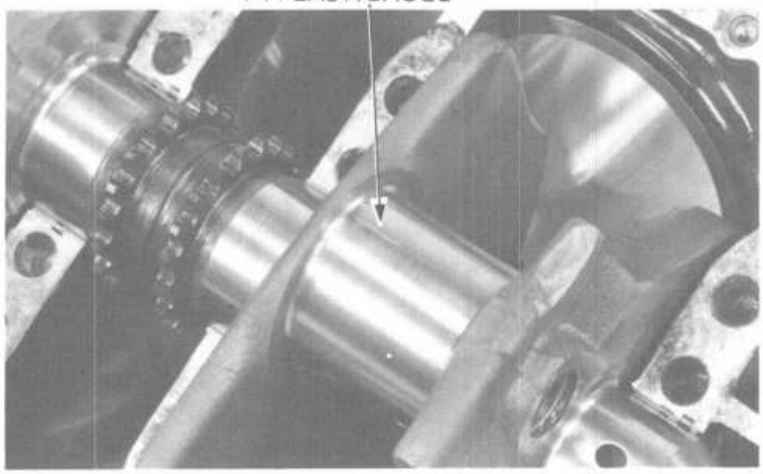


CRANKPIN BEARING

Inspect the bearing inserts for unusual wear or damage.
Wipe all oil from the bearing inserts and crankpins. Put a piece of plastigauge on each crankpin.

NOTE

- Do not put the plastigauge over the oil hole in the crankpin.
- The bearing tabs should face toward the exhaust ports. Remember the front and rear cylinder exhaust ports face opposite directions.

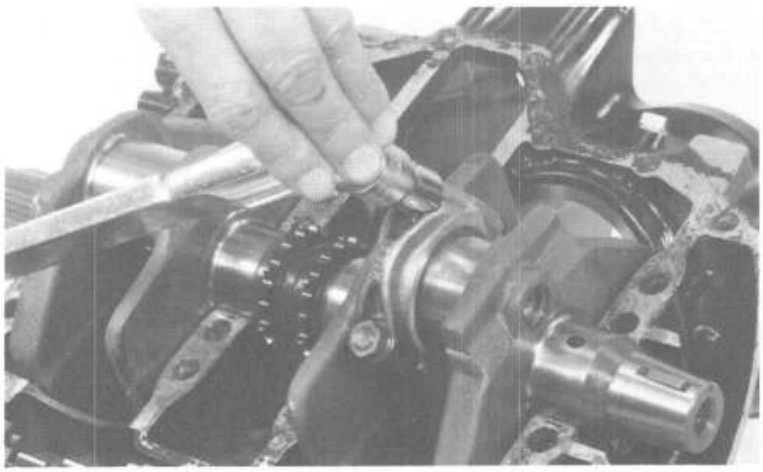


Install the bearing caps and rods on the correct crankpins, and tighten them evenly.

TORQUE: 30–34 N·m (3.0–3.4 kg-m, 22-25 ft-lb)

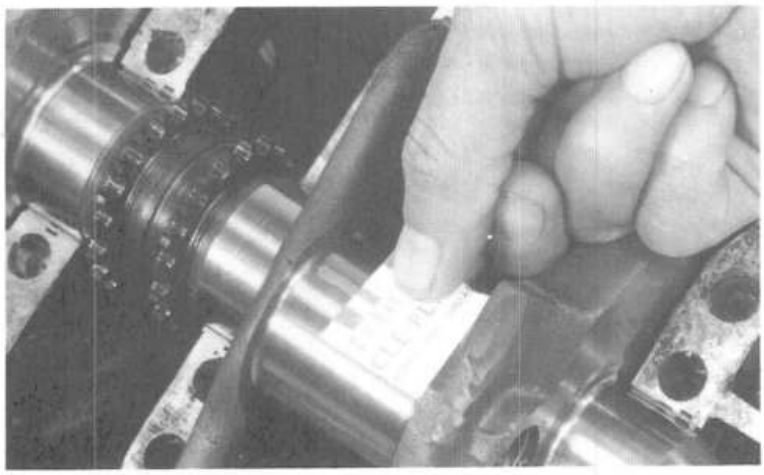
NOTE

Do not rotate the crankshaft during inspection.



Remove the caps and measure the compressed plastigauge on each crankpin.

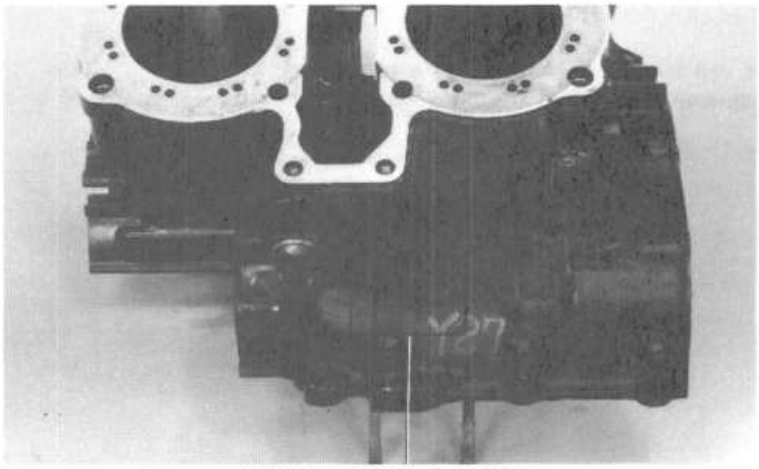
OIL CLEARANCE SERVICE LIMIT:
0.08 mm (0.003 in)



BEARING SELECTION

MAIN BEARING

The code letters (A or B) stamped on the rear portion of the upper crankcase identifies the inside diameter (I.D.) of each main bearing journal, from left-to-right. In this example, the I.D. code for the right main journal is "A".

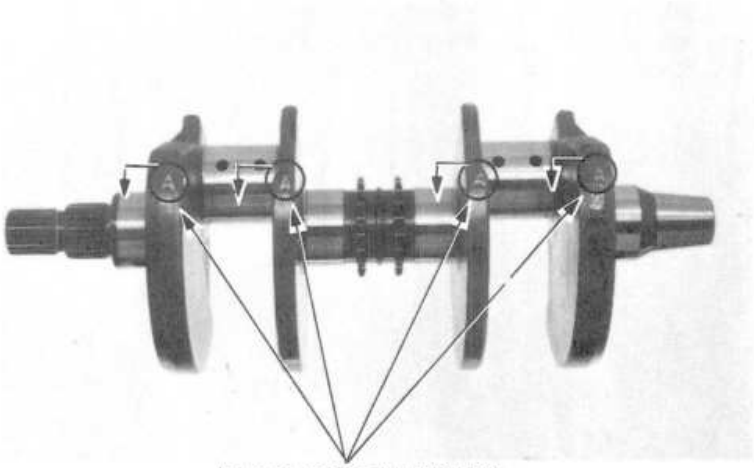


(1) I.D. CODE LETTERS

The code numbers (1 or 2) stamped on each crankshaft counter weight identifies the outside diameter (O.D.) of its main journal.
Crocc reference the crankcase and crank journal codes to select the correct replacement bearing.

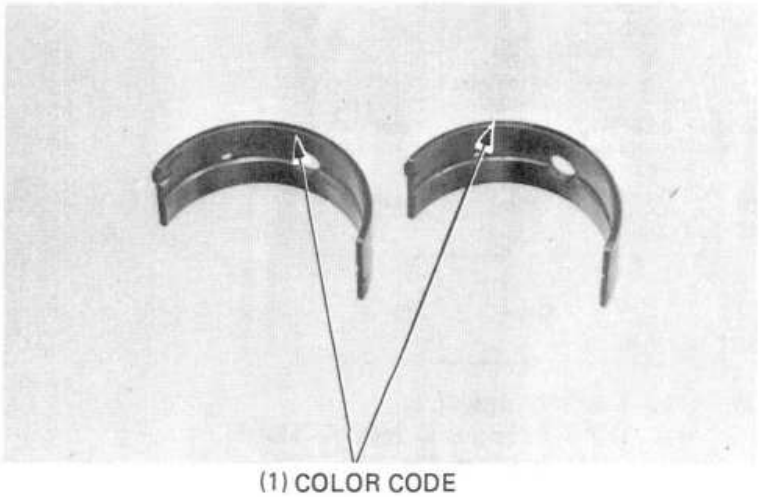
MAIN BEARING SELECTION TABLE

CASE I.D. CODE LETTER / CRANKSHAFT O.D. CODE LETTER		1	2
		37.992–38.000mm (1.4957–1.4961 in)	37.984–37.992mm (1.4954–1.4957 in)
A	41.000–41.008mm (1.6142–1.6145 in)	C (Yellow)	B (Green)
B	41.008–41.016mm (1.6145–1.6148 in)	B (Green)	A (Brown)



(1) O.D. CODE NUMBERS

MAIN BEARING INSERT THICKNESS:
A (Brown) : 1.502–1.506 mm (0.0591–0.0593 in)
B (Green) : 1.498–1.502 mm (0.0590–0.0591 in)
C (Yellow) : 1.494–1.498 mm (0.0588–0.0590 in)

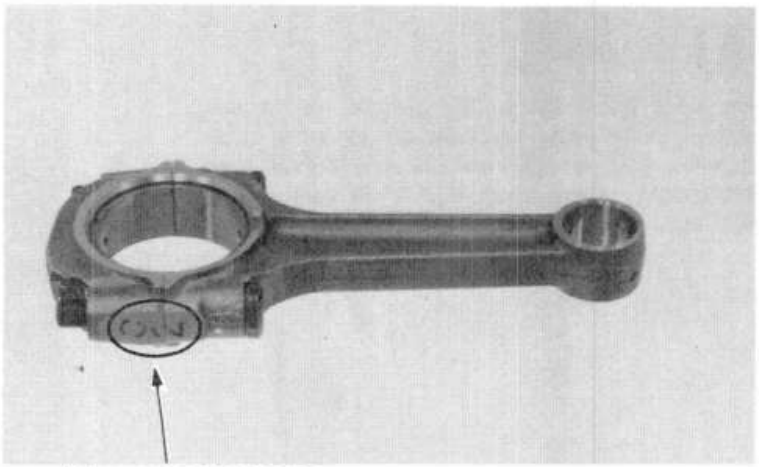


(1) COLOR CODE

CRANKPIN BEARING

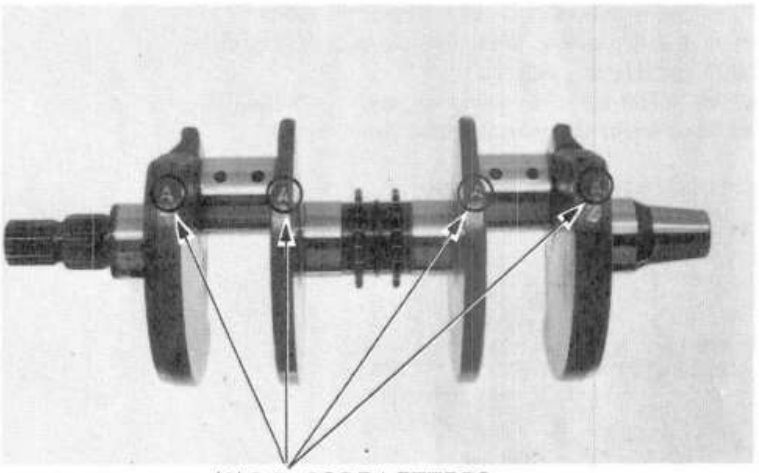
If rod bearing clearance is beyond tolerance, select replacement bearings as follows:

The code numbers (1 or 2) stamped on each connecting rod identifies its inside diameter (I.D.).



(1) I.D. CODE NUMBER

The code letters (A or B) stamped on each crankshaft counter weight identifies the outside diameter (O.D.) of its crankpin.

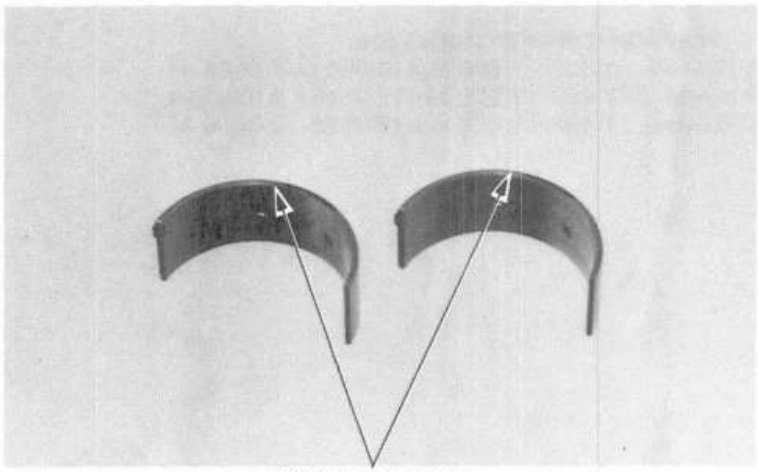


(1) O.D. CODE LETTERS

Cross reference the crankpin and rod codes to select the correct replacement bearing.

CRANKPIN BEARING SELECTION TABLE

ROD I.D. CODE LETTER \ CRANKPIN O.D. CODE LETTER		A	B
		39.992–40.000mm (1.5745–1.5748 in)	39.984–39.992mm (1.5742–1.5745 in)
1	43.000–43.008mm (1.6929–1.6932 in)	Yellow	Green
2	43.008–43.016mm (1.6932–1.6935 in)	Green	Brown



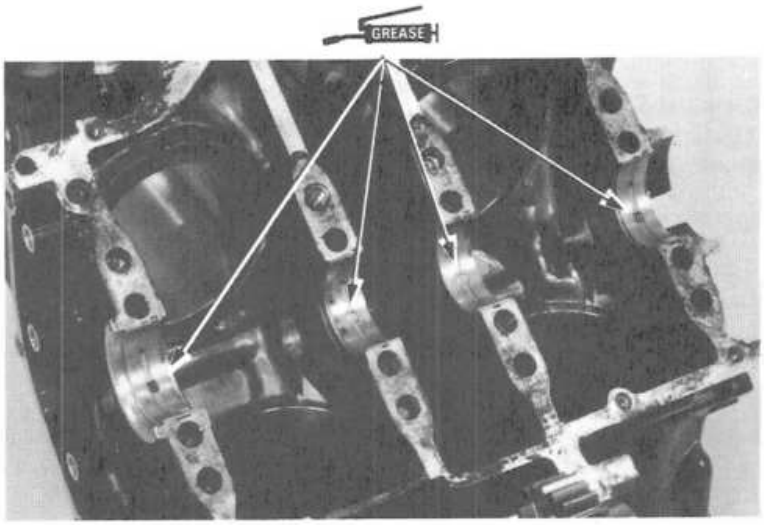
(1) COLOR CODE

BEARING INSERT THICKNESS:

Brown: 1.494–1.498 mm (0.0588–0.0590 in)
Green: 1.490–1.494 mm (0.0587–0.0588 in)
Yellow: 1.486–1.490 mm (0.0585–0.0587 in)

CRANKSHAFT INSTALLATION

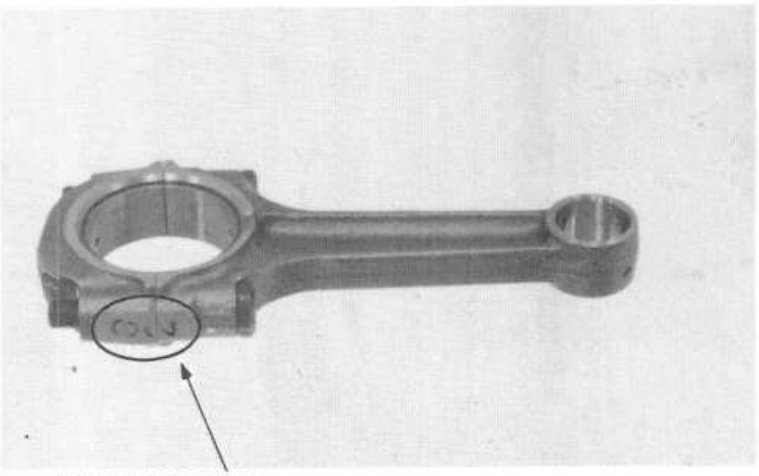
Install the main bearings into the upper crankcase. Apply molybdenum disulfide grease to the upper and lower main bearings.
Install the crankshaft with the cam chains.



The weight code is stamped on the connecting rod by the alphabetical code.
When replacing the connecting rod, perform the weight selection between the No. 1 and 2 connecting rods, or No. 3 and 4 connecting rods in accordance with the selection table.

NOTE:

- It is not necessary to perform the weight selection between the No. 1 and 3, or No. 2 and 4 connecting rods.
- The "o" mark in the table indicates that the matching is possible in the crossed codes.
- The cylinders are arranged in the order of No. 1, 2, 3, 4 from the alternator side.



(1) WEIGHT CODE (ALPHABETICAL CODE)

SELECTION TABLE

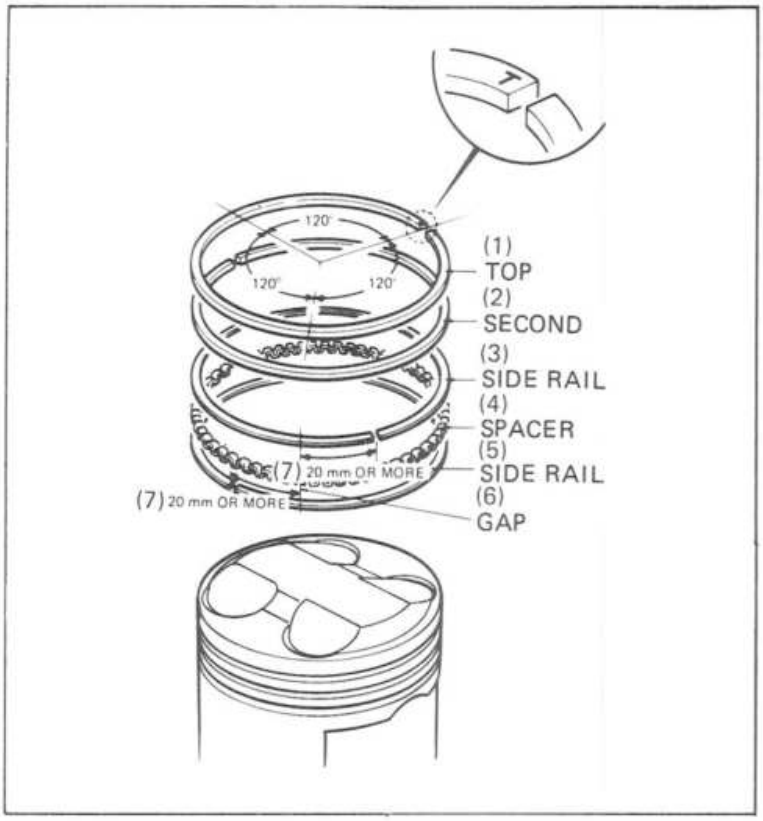
#1, #2 CONNECTING RODS						#3, #4 CONNECTING RODS					
#2 ROD CODE / #1 ROD CODE	A	B	C	D	E	#4 ROD CODE / #3 ROD CODE	A	B	C	D	E
A				○	○	A				○	○
B			○	○	○	B			○	○	○
C		○	○	○		C		○	○	○	○
D	○	○	○			D	○	○	○		
E	○	○				E	○	○			

PISTON AND ROD INSTALLATION

Clean the piston domes, ring lands, and skirts.
Carefully install the pos tion rings onto the piston.
Stagger the ring end gaps as shown.

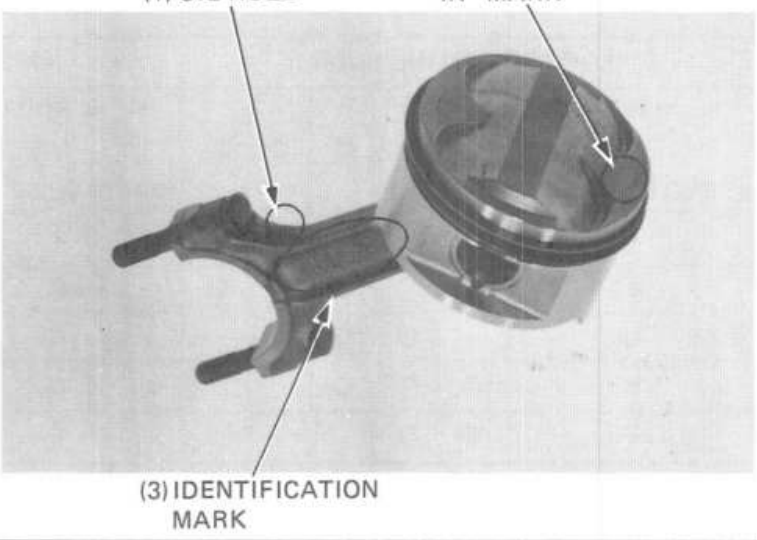
NOTE:

- Be careful not to damage the piston and piston rings during assembly.
- All rings should be installed with the markings facing up.
- After installing the rings they should rotate freely, without sticking.



Coat the rod's small end with molybdenum disulfide grease.

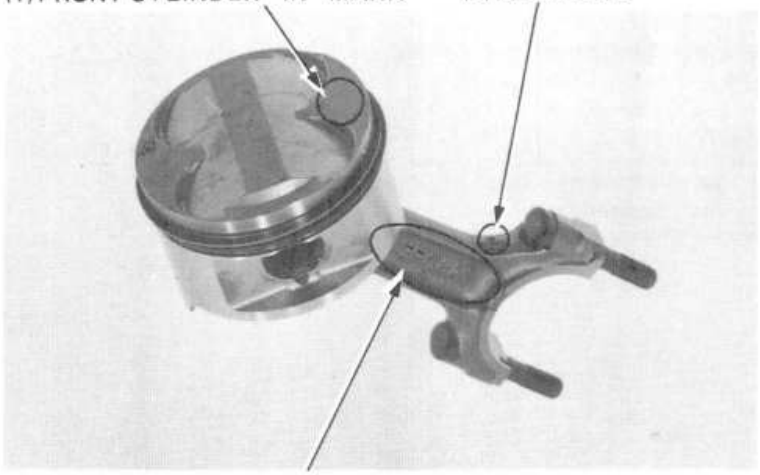
Rear cylinders:
Note that the rear cylinder connecting rods are marked "MB6-R".
Install the pistons on the rear connecting rods so that the intake "IN" mark is facing opposite the oil hole in the rod.



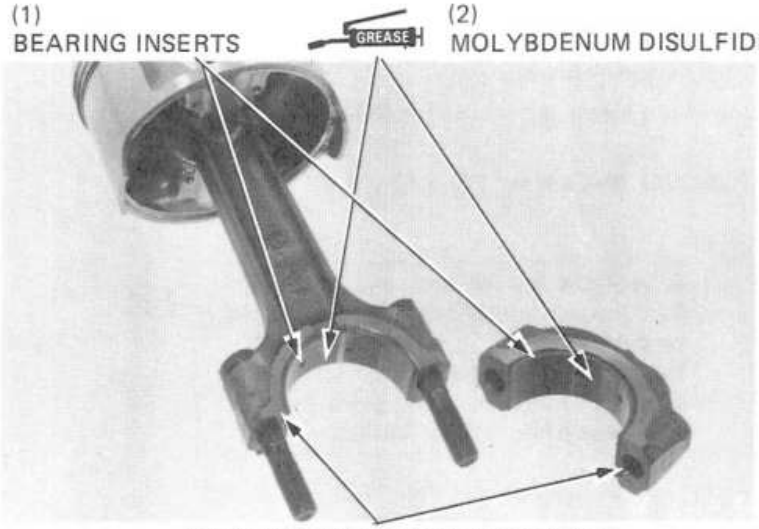
Front cylinders:
Note that the front cylinder connecting rods are marked "MB6-F".
Install the pistons on the front rods so that the intake "IN" mark is facing the same direction as the oil hole in the rod.

NOTE

- Do not interchange the pistons, piston pins or connecting rods.
- Make sure that the piston pin clips are properly seated.



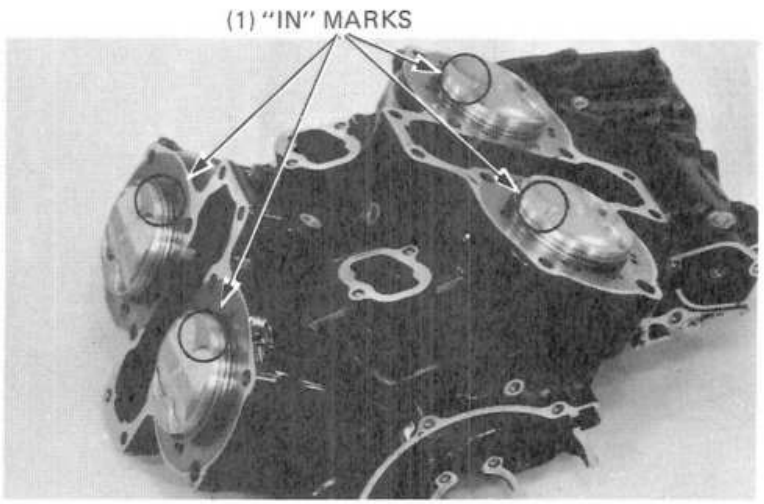
Align the notches on the crankpin bearing inserts with the grooves in the connecting rod and cap and install the inserts.
Apply molybdenum disulfide grease to the crankpin bearings.



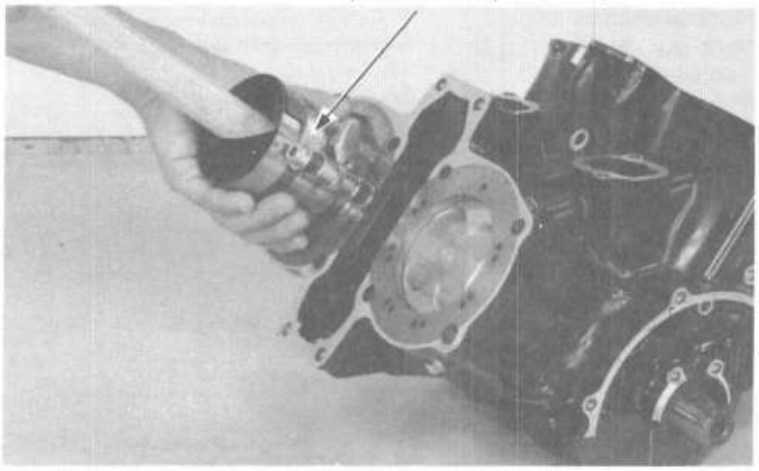
Coat the cylinders, piston rings/grooves and piston with oil. To prevent damaging the crankshaft, slip short sections of rubber hose over the rod bolts before installation.
Install the rod and piston assemblies into the cylinders from the top of the crankcase. Be sure each assembly is returned to its original position as noted during removal.

NOTE

The piston intake "IN" marks should be facing each other as shown.



(1) PISTON RING COMPRESSOR
(Commercially available)



Compress the piston rings with a ring compressor and insert the piston and rod into the cylinder until the rod seats on the crankpin.

NOTE

Be careful not to damage the pistons or rings during assembly.

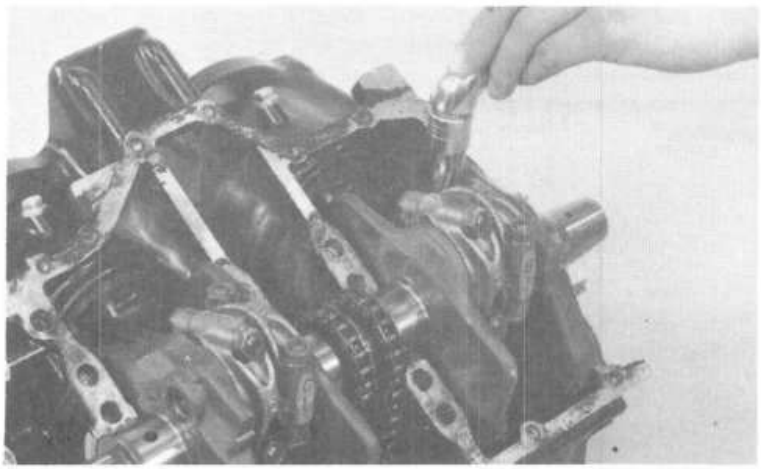
Flip the upper crankcase over.

Install and torque the connecting rod caps.

TORQUE: 30–34 N·m (3.0–3.4 kg-m, 22–25 ft-lb)

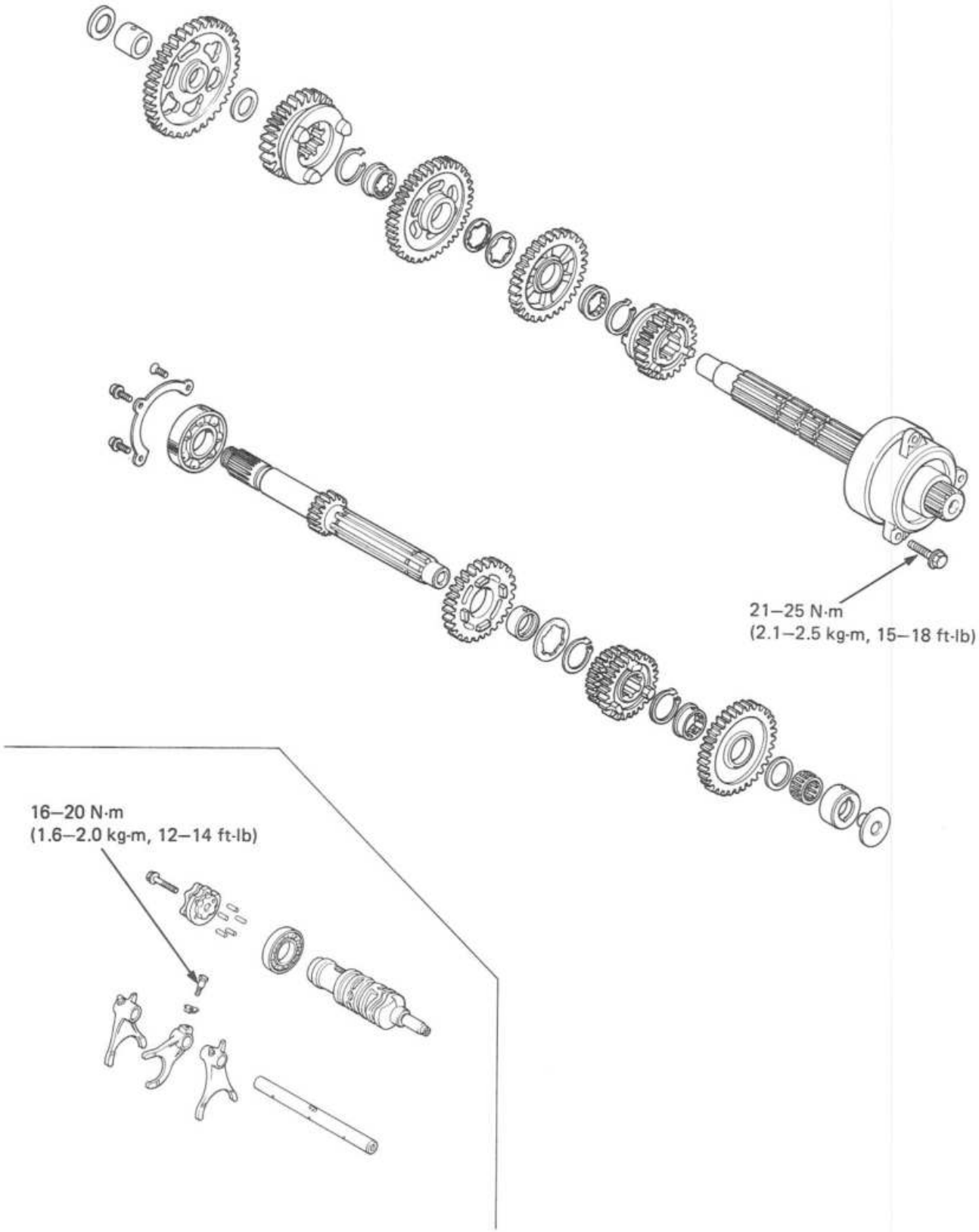
NOTE

- Be sure the bearing caps are installed in their correct location as marked during removal.
- Tighten the nuts in two or more steps.
- After tightening the bolts, check that the rods move freely without binding.



Assemble the crankcase (See page 11-3).

TRANSMISSION


21–25 N·m
(2.1–2.5 kg-m, 15–18 ft-lb)
16–20 N·m
(1.6–2.0 kg-m, 12–14 ft-lb)

SERVICE INFORMATION	13–1
TROUBLESHOOTING	13–2
TRANSMISSION DISASSEMBLY	13–3
SHIFT FORK AND SHIFT DRUM	13–5
TRANSMISSION ASSEMBLY	13–6

SERVICE INFORMATION

GENERAL

- The gearshift linkage can be serviced with the engine in the frame (Section 8).
- For internal transmission repairs, the crankcase must be separated (Section 11).

SPECIFICATIONS

			STANDARD	SERVICE LIMIT
Transmission	Gear I.D.	M4, M5 gear	31.000–31.016 mm (1.2205–1.2211 in)	31.04 mm (1.222 in)
		C1 gear	26.000–26.013 mm (1.0236–1.0241 in)	26.04 mm (1.025 in)
		C2, C3 gear	31.000–31.016 mm (1.2205–1.2211 in)	31.04 mm (1.222 in)
	Gear bushing O.D.	M4, M5 gear	30.950–30.975 mm (1.2185–1.2195 in)	30.94 mm (1.218 in)
		C1 gear	25.959–25.980 mm (1.0220–1.0228 in)	25.94 mm (1.021 in)
		C2, C3 gear	30.950–30.975 mm (1.2185–1.2195 in)	30.93 mm (1.218 in)
	Gear bushing I.D.	M4	27.995–28.016 mm (1.1022–1.1030 in)	28.04 mm (1.104 in)
		C1	22.020–22.041 mm (0.8669–0.8678 in)	22.06 mm (0.869 in)
	Mainshaft O.D. (at M4)		27.977–27.990 mm (1.1015–1.1020 in)	27.92 mm (1.099 in)
	Countershaft O.D. (at C1)		21.979–22.000 mm (0.8653–0.8661 in)	21.96 mm (0.865 in)
	Gear-to-bushing clearance	M4, M5	0.025–0.066 mm (0.0010–0.0026 in)	0.10 mm (0.004 in)
		C1	0.020–0.054 mm (0.0008–0.0021 in)	0.10 mm (0.004 in)
		C2, C3	0.025–0.066 mm (0.0010–0.0026 in)	0.11 mm (0.004 in)
	Bushing-to-shaft clearance	M4	0.005–0.039 mm (0.0002–0.0015 in)	0.06 mm (0.002 in)
		C1	0.020–0.062 mm (0.0008–0.0024 in)	0.10 mm (0.004 in)
Shift fork	Claw thickness		6.43–6.50 mm (0.253–0.256 in)	6.1 mm (0.24 in)
	I.D.	Left and right	14.000–14.021 mm (0.5512–0.5520 in)	14.04 mm (0.553 in)
Fork shaft	O.D.		13.966–13.984 mm (0.5498–0.5505 in)	13.90 mm (0.547 in)

TORQUE VALUES

Countershaft bearing holder	21–25 N·m (2.1–2.5 kg-m, 15–18 ft-lb)
Shift fork center	16–20 N·m (1.6–2.0 kg-m, 12–14 ft-lb)

TOOLS

Special

Driver	07949–3710000

Common

Attachment, 52 x 55 mm	07746–0010400
Driver	07746–0030100
Attachment, 25 mm	07746–0030200

TROUBLESHOOTING

Hard to shift

1. Clutch slave cylinder sticking
2. Shift fork bent
3. Shift shaft bent
4. Shift claw bent
5. Shift drum cam grooves damaged

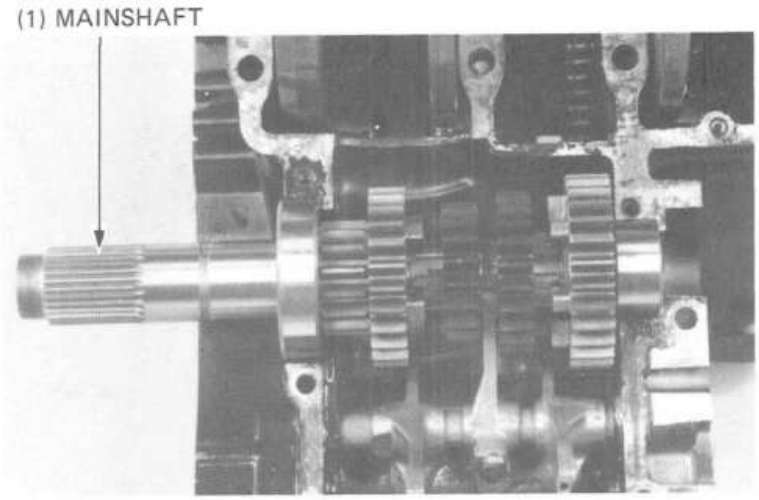
Transmission jumps out of gear

1. Gear dogs worn
2. Shift shaft bent
3. Shift drum stopper broken
4. Shift forks bent

TRANSMISSION DISASSEMBLY

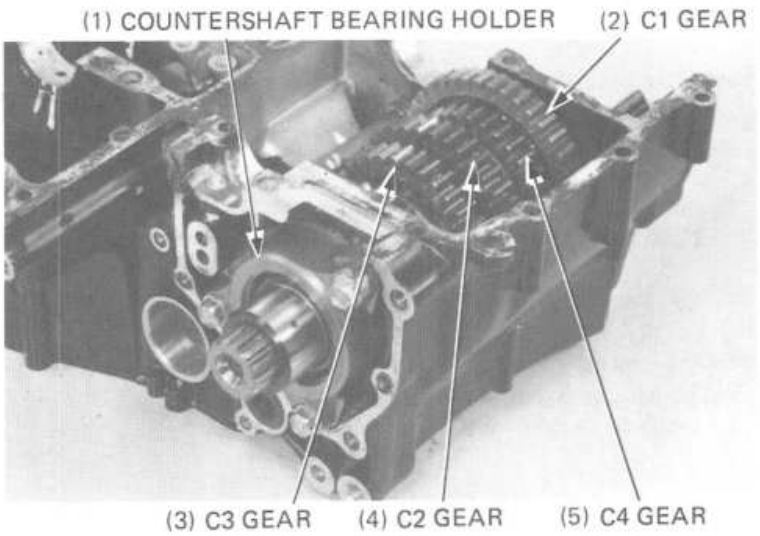
Separate the crankcase (Section 11).
Remove the dowel pins from the crankcase.

Remove the mainshaft.



Remove the countershaft bearing holder bolts.

Pull the countershaft out of the crankcase while removing C1, C4, C2, C3, and the spline washers and bushings.



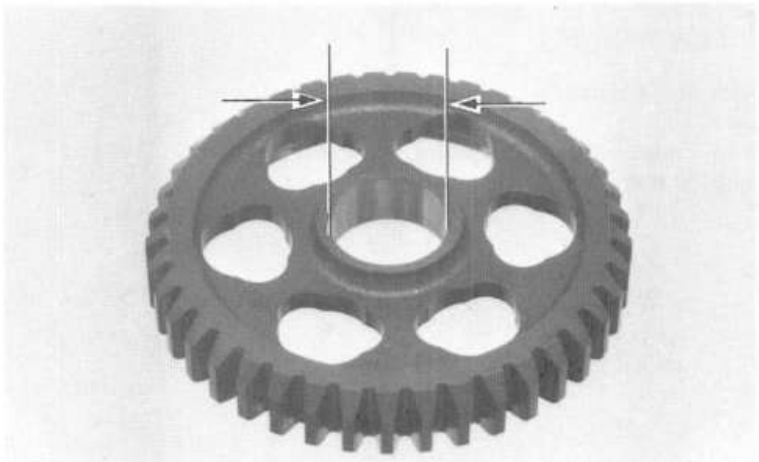
TRANSMISSION INSPECTION

Check gear dogs, dog holes and gear teeth for excessive or abnormal wear, or evidence of insufficient lubrication.

Measure the I.D. of each gear.

SERVICE LIMIT:

M4, M5 gear:	**31.04 mm (1.222 in)**
C1 gear:	**26.04 mm (1.025 in)**
C2, C3 gear:	**31.04 mm (1.222 in)**



Measure the O.D. of the gear bushings.

SERVICE LIMIT:

M4, M5:	**30.94 mm (1.218 in)**
C1:	**25.94 mm (1.021 in)**
C2, C3:	**30.93 mm (1.218 in)**

Calculate the clearance between the gear bushings and the gears.

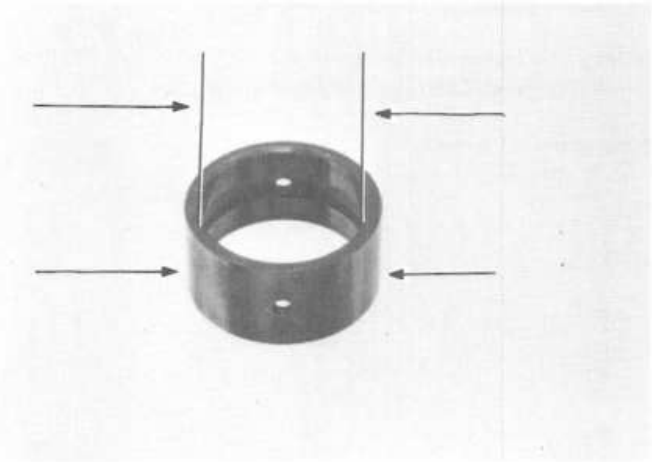
SERVICE LIMIT:

M4, M5:	**0.10 mm (0.004 in)**
C1:	**0.10 mm (0.004 in)**
C2, C3:	**0.11 mm (0.004 in)**

Measure the I.D. of the gear bushings.

SERVICE LIMIT:

M4 gear bushing: 28.04 mm (0.986 in)
C1 gear bushing: 22.06 mm (0.869 in)



Measure the O.D. of the mainshaft and countershaft.

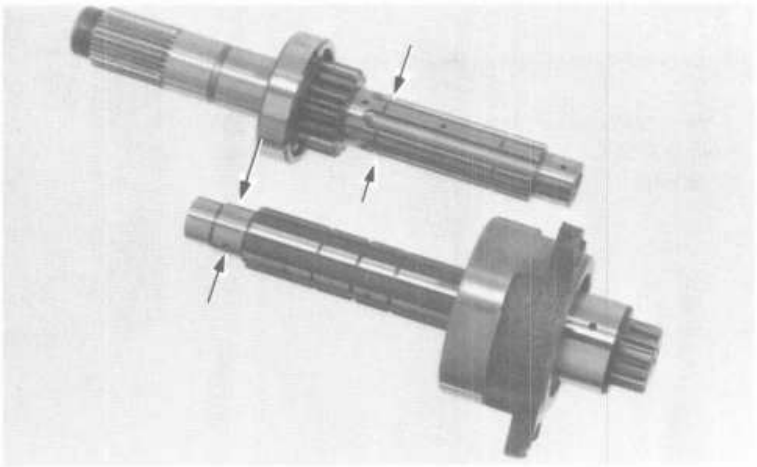
SERVICE LIMIT:

Mainshaft (at M4 bushing):
27.92 mm (0.981 in)
Countershaft (at C1 bushing):
21.96 mm (0.865 in)

Calculate the clearance between the bushing and shaft.

SERVICE LIMIT:

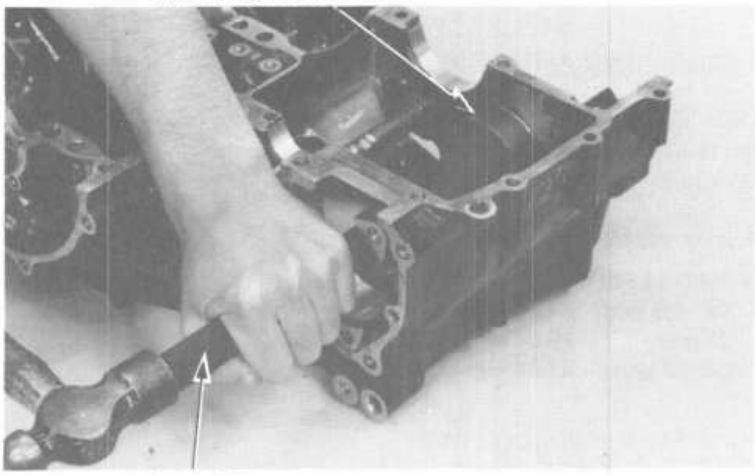
M4 bushing-to-shaft: 0.06 mm (0.002 in)
C1 bushing-to-shaft: 0.10 mm (0.004 in)



(1) ATTACHMENT, 52 x 55 mm
07746–0010400

COUNTERSHAFT BEARING REPLACEMENT

Drive the countershaft bearing out of the lower crankcase.
Drive a new countershaft bearing into the crankcase using the special tools.



(2) DRIVER
07949–3710000

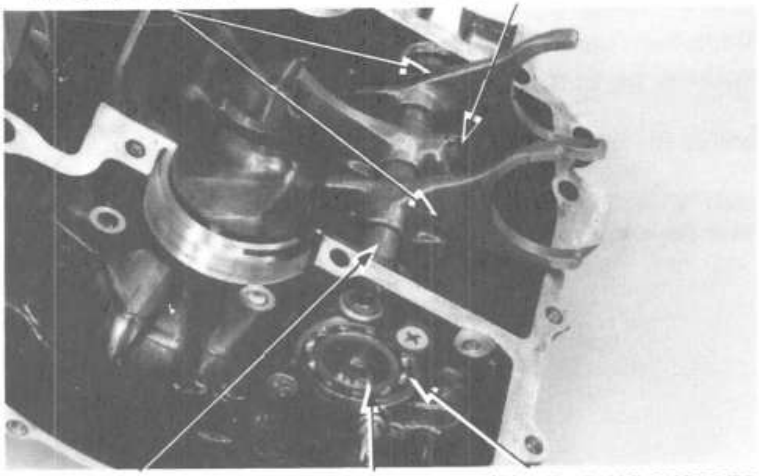
SHIFT FORK AND SHIFT DRUM

REMOVAL

Bend the lock washer tab down and remove the center fork mounting bolt.
Remove the shift fork shaft and shift forks.

Remove the bearing stopper plates.

Remove the shift drum.



GEAR SHIFT DRUM AND SHIFT FORK INSPECTION

Inspect the shift drum end for scoring, scratches, or evidence of insufficient lubrication.
Check the shift drum grooves for damage.

Inspect the shift drum hole and shift fork shaft hole in the upper crankcase for scoring or scratches.

Measure the shift fork shaft O.D. at right and left shift fork surfaces.
Check for scratches, scoring or evidence of insufficient lubrication.

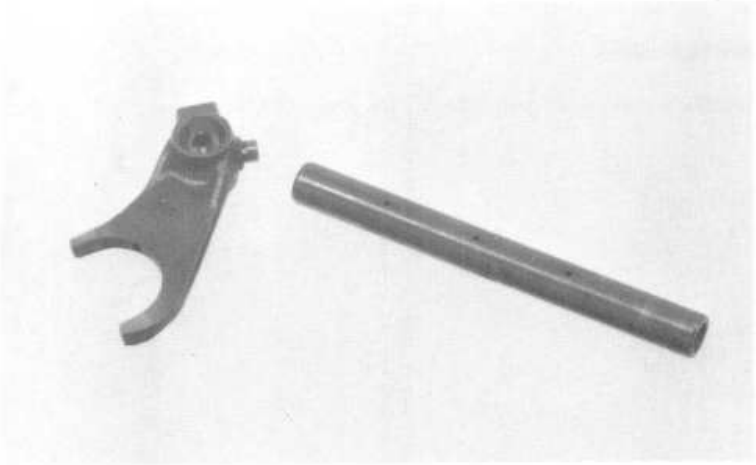
SERVICE LIMIT: 13.90 mm (0.547 in)

Measure the right and left shift fork I.D.

SERVICE LIMITS:
I.D. (right and left fork): 14.04 mm (0.553 in)

Measure the shift fork claw thickness.

SERVICE LIMIT: 6.1 mm (0.24 in)

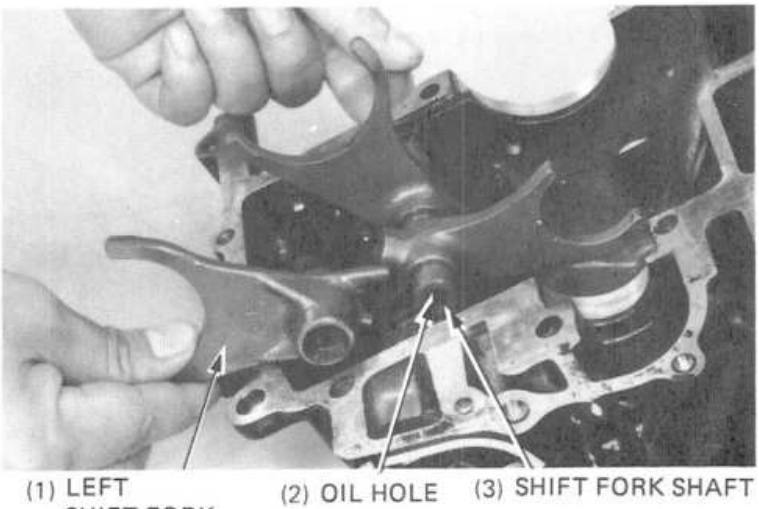


INSTALLATION

Install the shift drum.

Install the shift fork shaft so that the oil hole end is toward the right.

Install the shift forks onto the shaft.

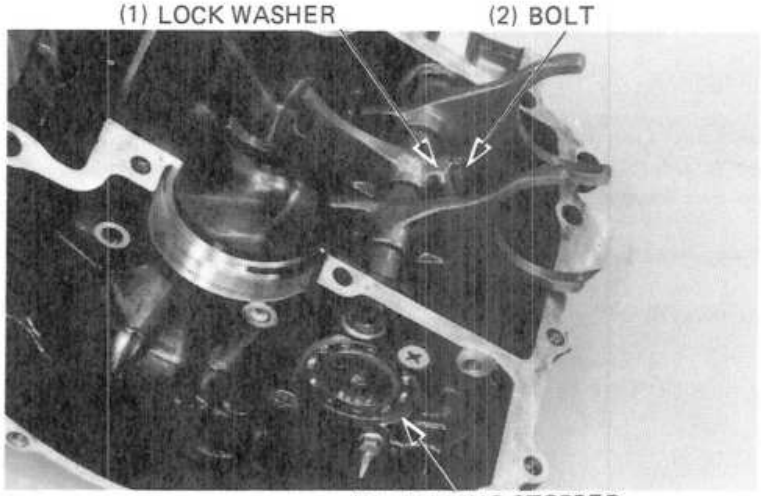


Install a new lock washer and the bolt to the center shift fork and tighten the bolt.

TORQUE: 16–20 N·m (1.6–2.0 kg-m, 12–14 ft-lb)

Bend up the lock washer's tabs.

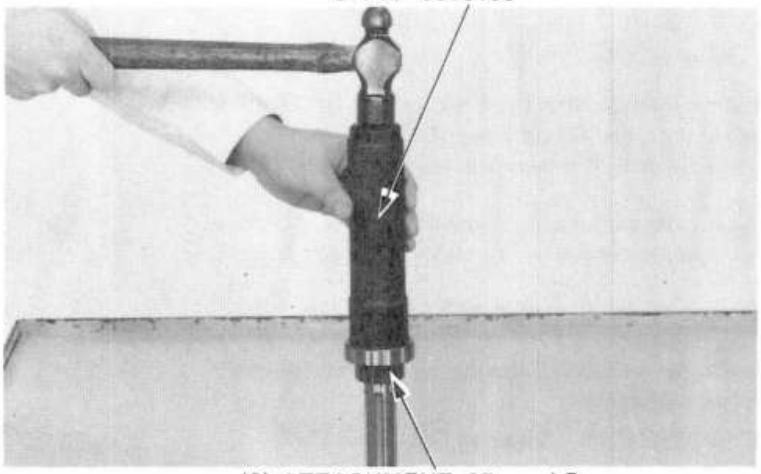
Apply a locking agent to the screw threads and install the bearing stopper plates.



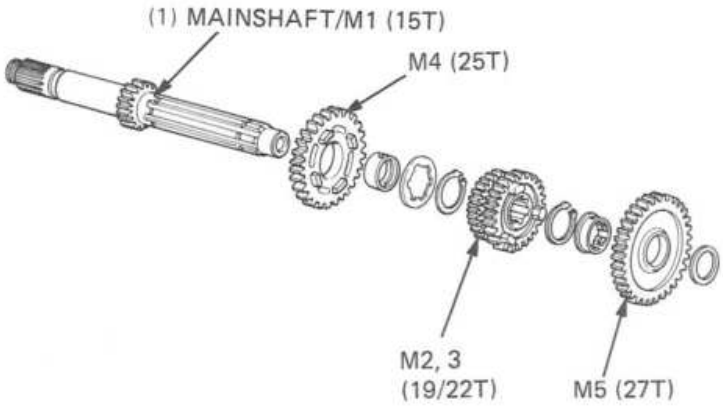
TRANSMISSION ASSEMBLY

MAINSHAFT

Install the mainshaft bearing with the special tools.

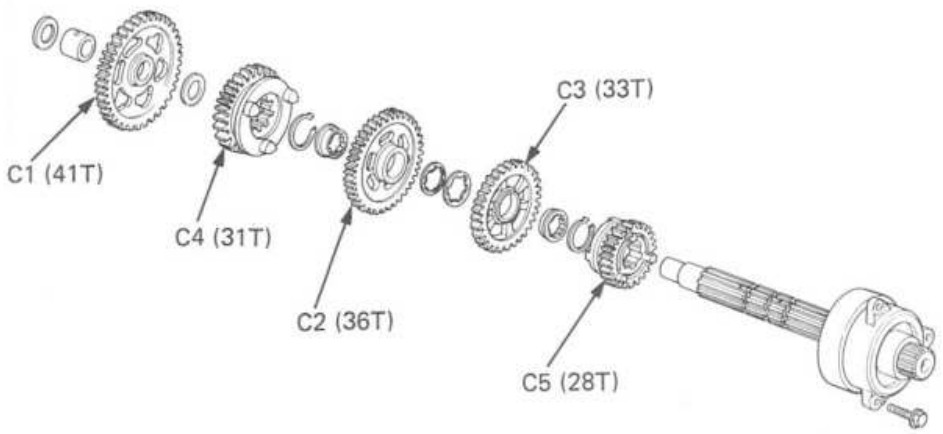


Check the gears for freedom of movement or rotation on the shaft.
Check that the snap rings are seated in the grooves.



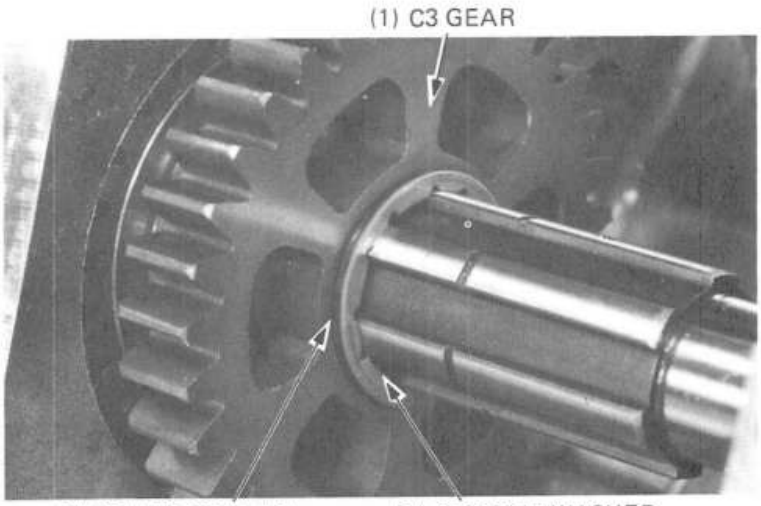
COUNTERSHAFT

Before installing the countershaft in the crankcase, install the C5 gear and snap ring.



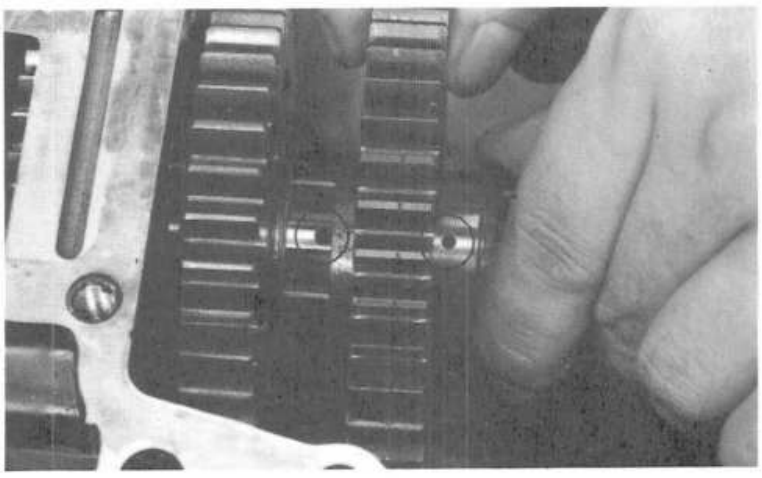
Install the C3 gear and spline collar.
Install the stopper washer while aligning the tab of the stopper washer with the groove in the spline collar.

Assemble the C2, C4 and C1 gears, washers and collars.



CAUTION

Align the oil holes in the splined bushings with the oil holes in the countershaft.

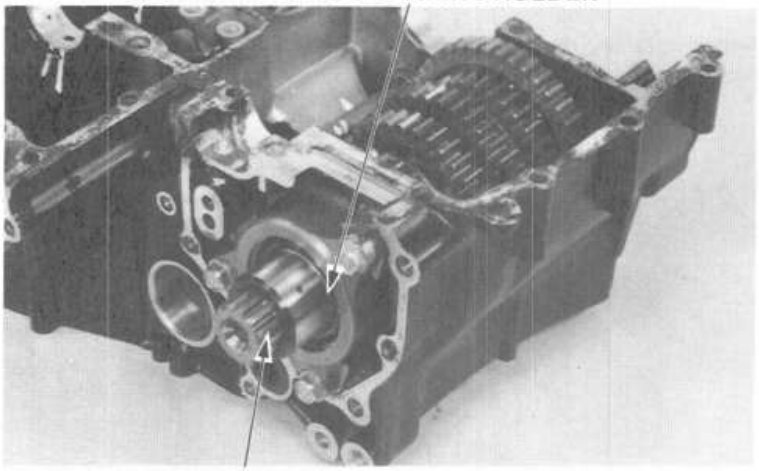


Install the countershaft bearing holder bolts and tighten them.

TORQUE: 21–25 N·m (2.1–2.5 kg-m, 15–18 ft-lb)

Check that the oil orifice is clear.

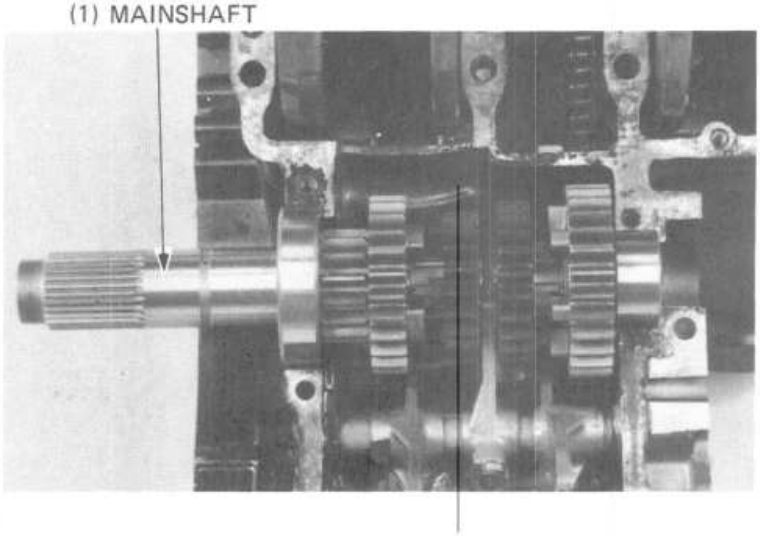
(1) COUNTERSHAFT BEARING HOLDER



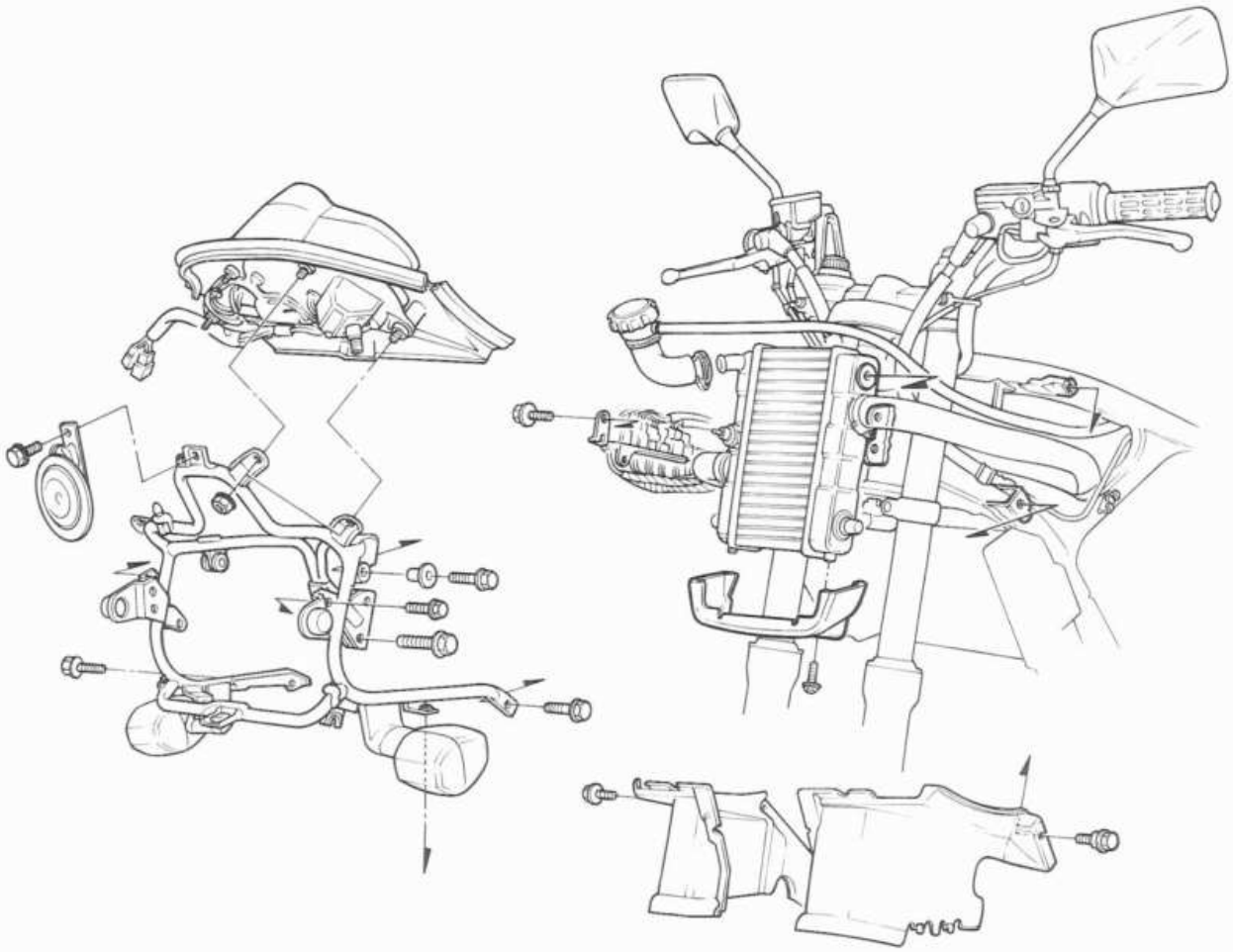
(2) OIL ORIFICE

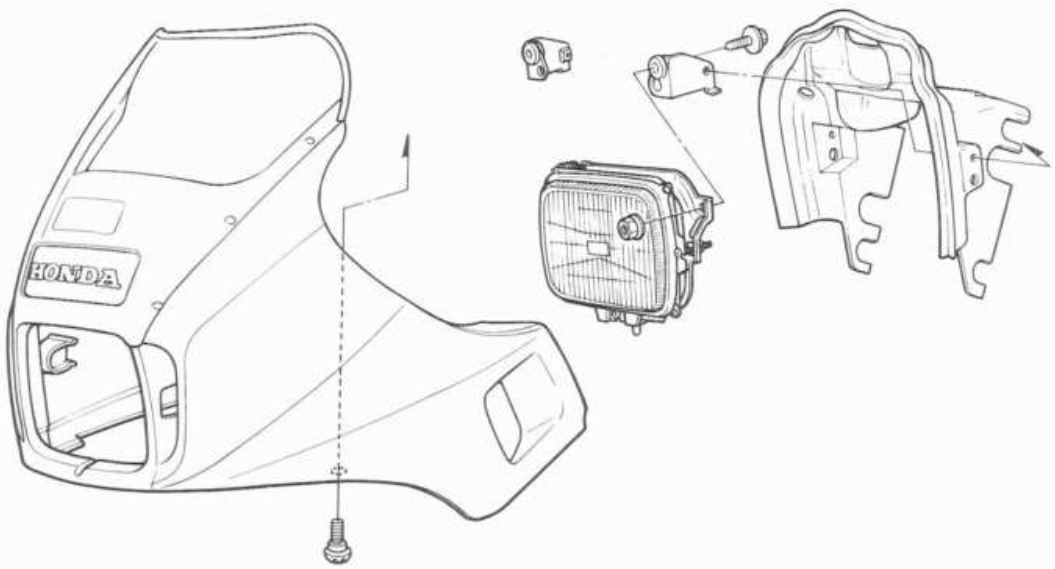
Install the mainshaft, then reassemble the upper and lower crankcase (see Section 11).

(1) MAINSHAFT



FAIRING




HONDA

SERVICE INFORMATION	14–1
LOWER COWL	14–2
FAIRING	14–2
FAIRING BRACKET	14–3

SERVICE INFORMATION

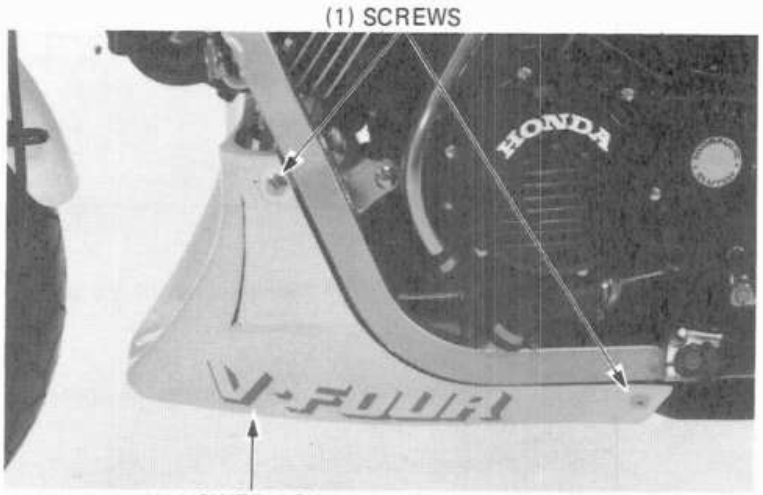
GENERAL

- The fairing bracket can be removed without removing the upper radiator.

LOWER COWL

REMOVAL/INSTALLATION

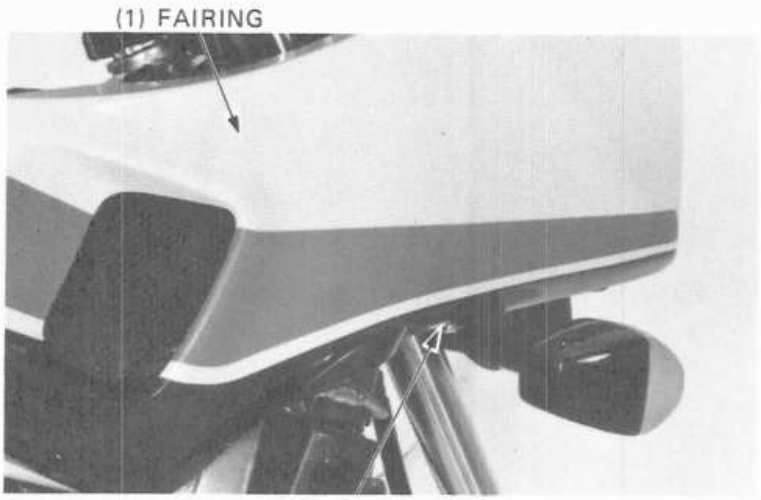
Remove the four lower cowl attaching screws and the lower cowl.
Install the lower cowl in the reverse order of removal.



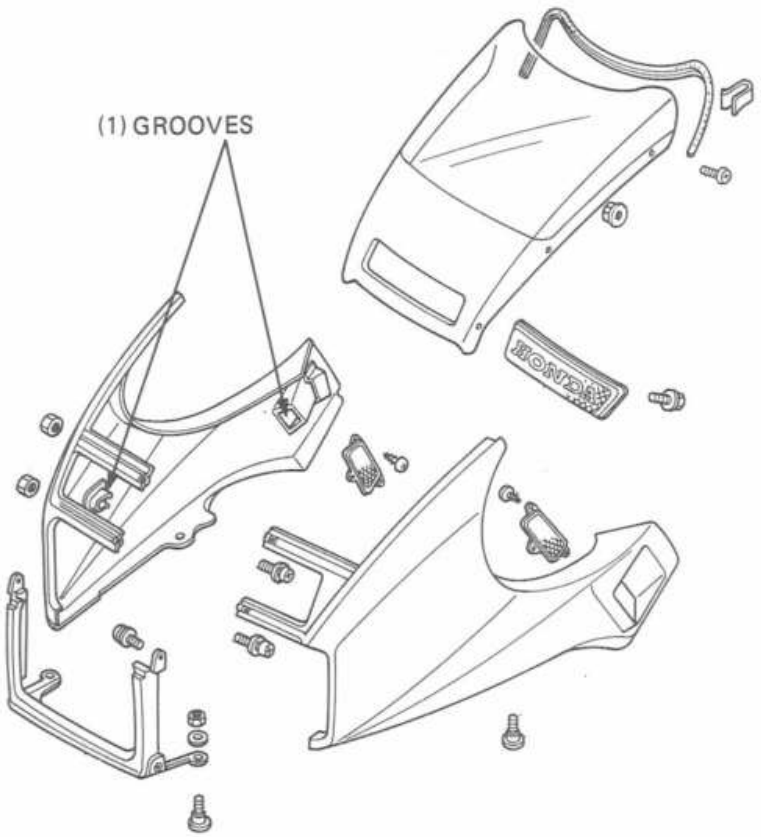
FAIRING

REMOVAL/INSTALLATION

Remove the two fairing mount bolts and fairing.



Install the fairing aligning its grooves with the rubber mounts on the fairing bracket and fuel tank.
Tighten the two fairing mount bolts.



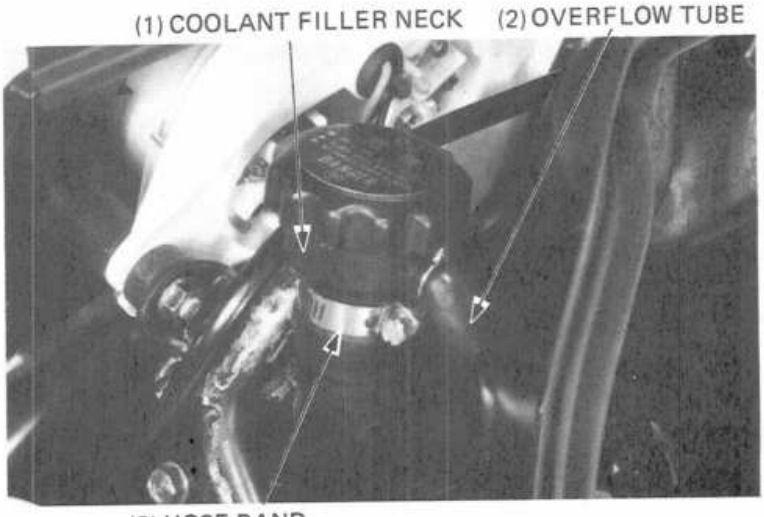
FAIRING BRACKET

REMOVAL

Remove the fairing (page 14-1).
Remove the headlight (page 14-12).

Drain an amount of coolant for filler neck into a clean container by removing the drain bolt on the sub-frame (page 6-3).

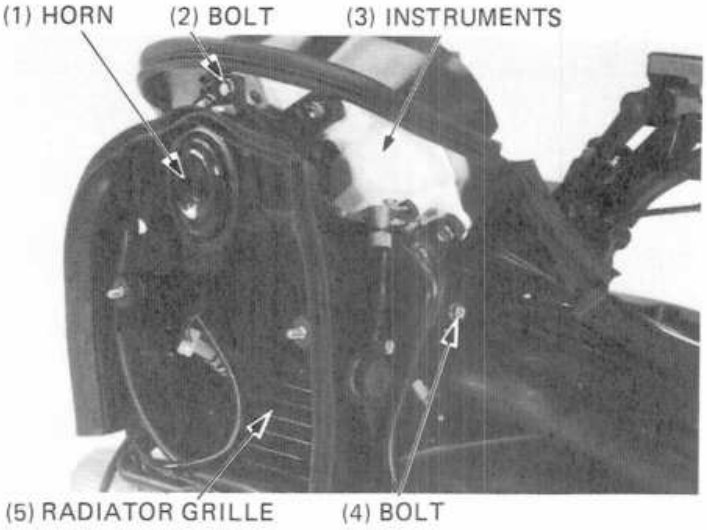
Remove the filler neck from the upper radiator by disconnecting the overflow tube and loosening the hose band.



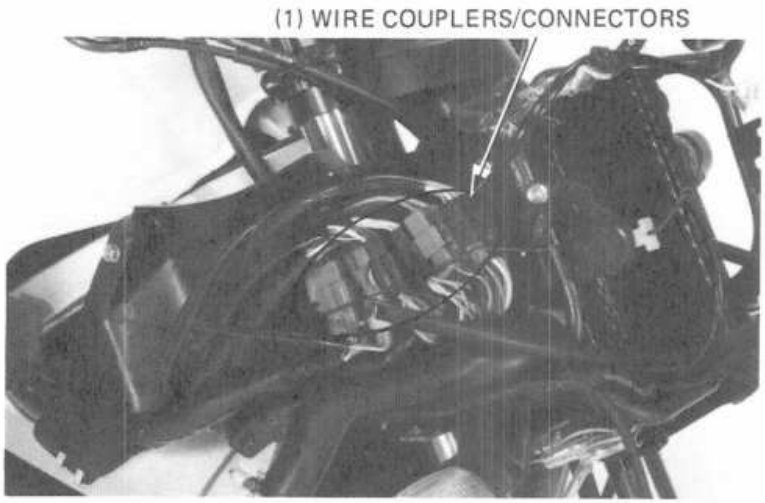
Remove the horn by removing the bolt.

Remove the two radiator grille mount bolts and grille.

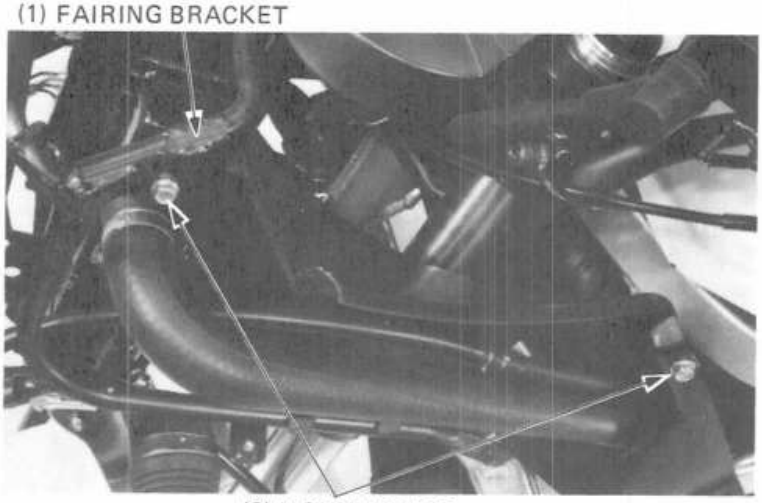
Remove the instruments (page 21-14).



Disconnect all wire couplers and connectors at the fairing bracket.



Remove the fairing bracket mount bolts and bracket from the frame.

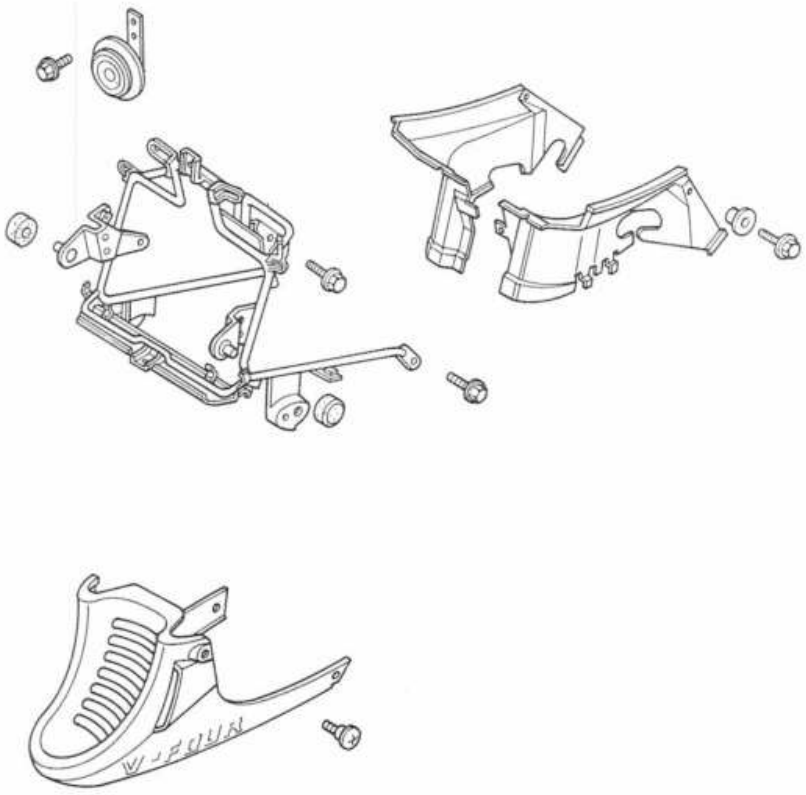


INSTALLATION

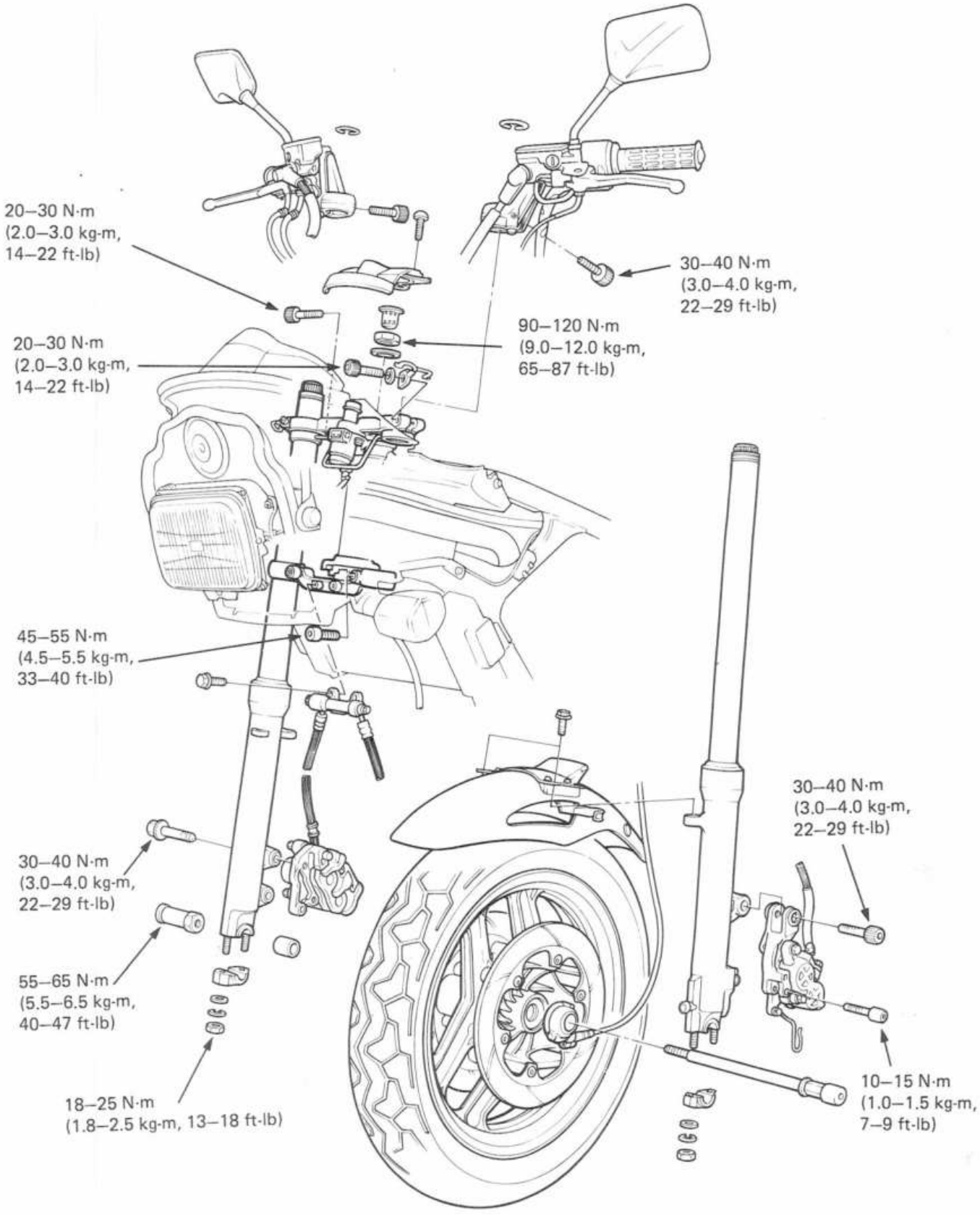
Install the fairing bracket in the reverse order of removal.

NOTE

After installation, fill the filler neck with coolant.



FRONT WHEEL/SUSPENSION


20–30 N·m
(2.0–3.0 kg-m,
14–22 ft-lb)
30–40 N·m
(3.0–4.0 kg-m,
22–29 ft-lb)
90–120 N·m
(9.0–12.0 kg-m,
65–87 ft-lb)
20–30 N·m
(2.0–3.0 kg-m,
14–22 ft-lb)
45–55 N·m
(4.5–5.5 kg-m,
33–40 ft-lb)
30–40 N·m
(3.0–4.0 kg-m,
22–29 ft-lb)
30–40 N·m
(3.0–4.0 kg-m,
22–29 ft-lb)
55–65 N·m
(5.5–6.5 kg-m,
40–47 ft-lb)
18–25 N·m
(1.8–2.5 kg-m, 13–18 ft-lb)
10–15 N·m
(1.0–1.5 kg-m,
7–9 ft-lb)

SERVICE INFORMATION	15–1	FRONT WHEEL	15–7
TROUBLESHOOTING	15–2	FRONT FORKS	15–15
HANDLEBARS	15–3	STEERING STEM	15–28

SERVICE INFORMATION

GENERAL

- A jack or other support is required to support the front of the motorcycle when you are working on the front wheel or fork.

SPECIFICATIONS

		STANDARD	SERVICE LIMIT
Axle shaft runout		–	0.2 mm (0.01 in)
Front wheel rim runout	Radial	–	2.0 mm (0.08 in)
	Axial	–	2.0 mm (0.08 in)
Fork spring free length		413.8 mm (16.29 in)	405.5 mm (15.9 in)
Fork tube runout		–	0.2 mm (0.01 in)
Front fork fluid capacity	Right	380 cc (12.9 US oz, 13.4 Imp)	–
	Left	400 cc (13.5 US oz, 14.1 Imp)	–
Front fork air pressure		0–40 kPa (0–0.4 kg/cm^2, 0–6 psi)	–

TORQUE VALUES

Steering stem nut	90–120 N·m (9.0–12.0 kg-m, 65–87 ft-lb)
Steering bearing adjustment nut	23–27 N·m (2.3–2.7 kg-m, 17–20 ft-lb)
Top bridge pinch bolt	20–30 N·m (2.0–3.0 kg-m, 14–22 ft-lb)
Front axle holder	18–25 N·m (1.8–2.5 kg-m, 13–18 ft-lb)
Front axle nut	55–65 N·m (5.5–6.5 kg-m, 40–47 ft-lb)
Fork top pinch bolts	20–30 N·m (2.0–3.0 kg-m, 14–22 ft-lb)
Fork bottom pinch bolts	45–55 N·m (4.5–5.5 kg-m, 32–40 ft-lb)
Handlebar pinch bolts	30–40 N·m (3.0–4.0 kg-m, 22–29 ft-lb)
Front brake caliper bracket mount bolts	30–40 N·m (3.0–4.0 kg-m, 22–29 ft-lb)
Anti-dive piston pin bolt	10–15 N·m (1.0–1.5 kg-m, 7–9 ft-lb)
Front brake disc	35–40 N·m (3.5–4.0 kg-m, 25–29 ft-lb)
Front fork cap	15–30 N·m (1.5–3.0 kg-m, 11–22 ft-lb)
Front fork socket bolt	15–25 N·m (1.5–2.5 kg-m, 11–18 ft-lb)
Anti-dive case socket bolts	6–9 N·m (0.6–0.9 kg-m, 4–7 ft-lb)

TOOLS

Special

Hex. wrnech, 6 mm	07917–3230000
Snap ring pliers	07914–3230001
Fork seal driver	07947–KA50000
Fork seal driver attachment	07947–KF00100
Steering stem socket	07916–3710100
Bearing race remover	07946–3710500
Ball race remover	07953–4250002
Steering stem driver	07946–MB00000

Common

Driver	07749–0010000
Attachment, 42 x 47 mm	07746–0010300
Pilot, 15 mm	07746–0040300
Lock nut wrench, 30 x 32 mm	07716–0020400
Extension	07716–0020500
Attachment, 52 x 55 mm	07746–0010400
Bearing remover shaft	07746–0050100
Bearing remover head, 15 mm	07746–0050400

TROUBLESHOOTING

Hard steering
1. Steering bearing adjustment nut too tight
2. Faulty steering stem bearings
3. Damaged steering stem bearings
4. Insufficient tire pressure

Steers to one side or does not track straight
1. Bent forks
2. Bent front axle
3. Wheel installed incorrectly

Front wheel wobbling
1. Bent rim
2. Worn front wheel bearings
3. Faulty tire
4. Axle nut tightened improperly

Soft suspension
1. Weak fork springs
2. Insufficient fluid in forks
3. Fork air pressure incorrect

Hard suspension
1. Incorrect fluid weight in forks
2. Fork air pressure incorrect
3. Bent fork tubes
4. Clogged fluid passage
5. Clogged anti-dive orifice

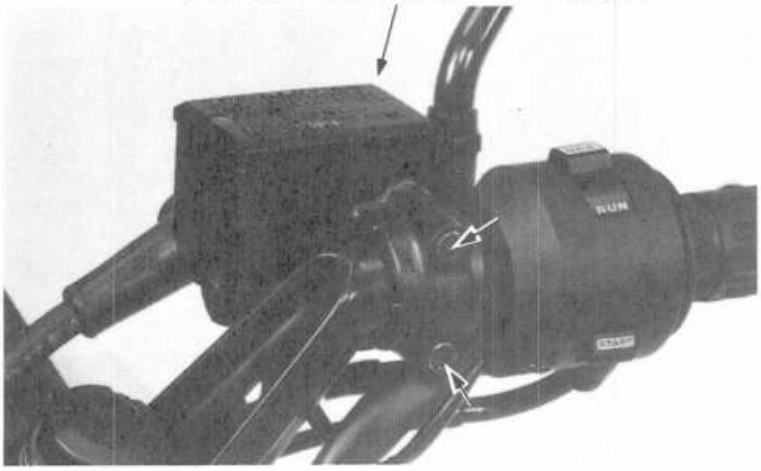
Front suspension noise
1. Worn slider or guide bushings
2. Insufficient fluid in forks
3. Loose front fork fasteners
4. Lack of grease in speedometer gearbox

HANDLEBARS

REMOVAL

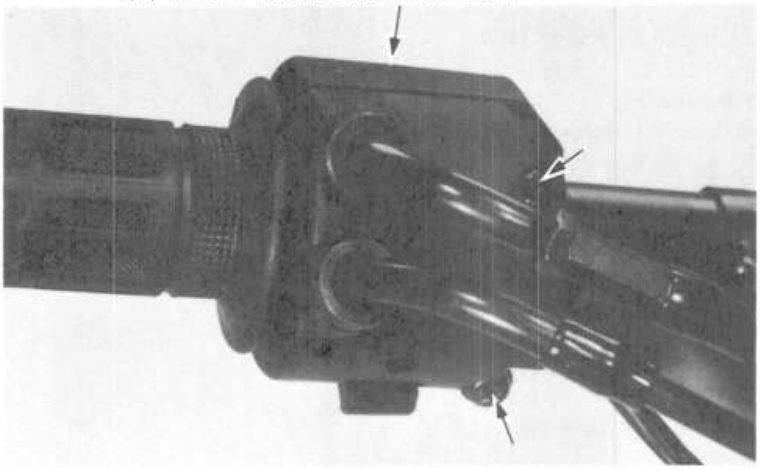
Disconnect the front brake switch wires.
Remove the front brake master cylinder.

(1) FRONT BRAKE MASTER CYLINDER



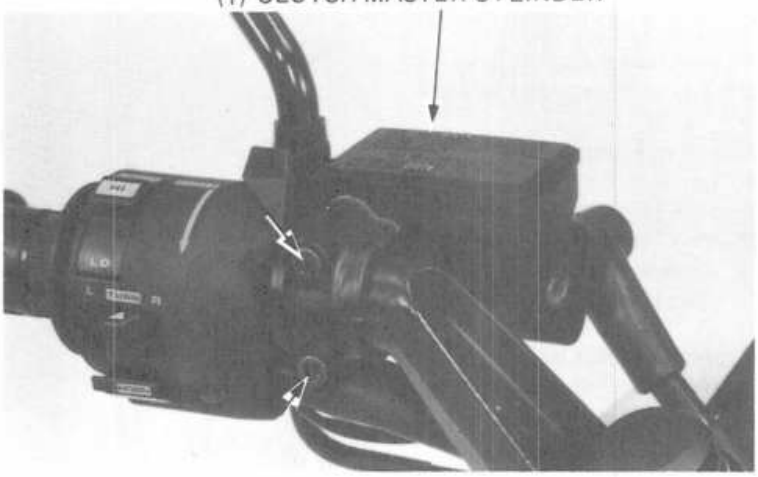
Remove the right handlebar switch.

(1) RIGHT HANDLEBAR SWITCH

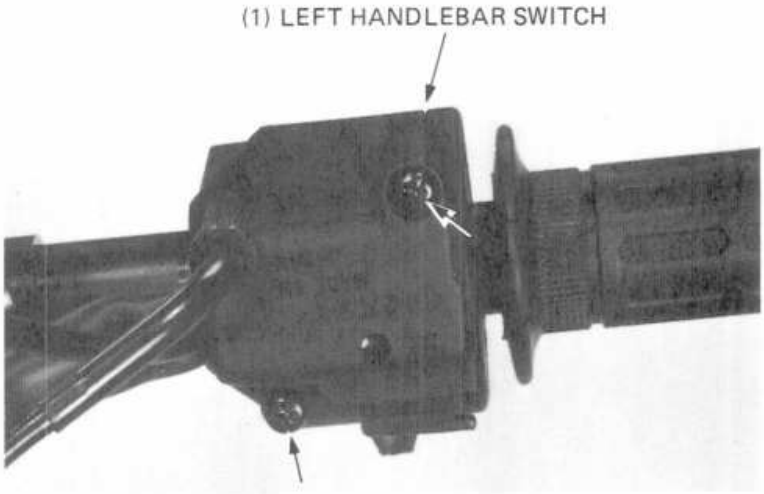


Disconnect the clutch switch wires.
Remove the clutch master cylinder.

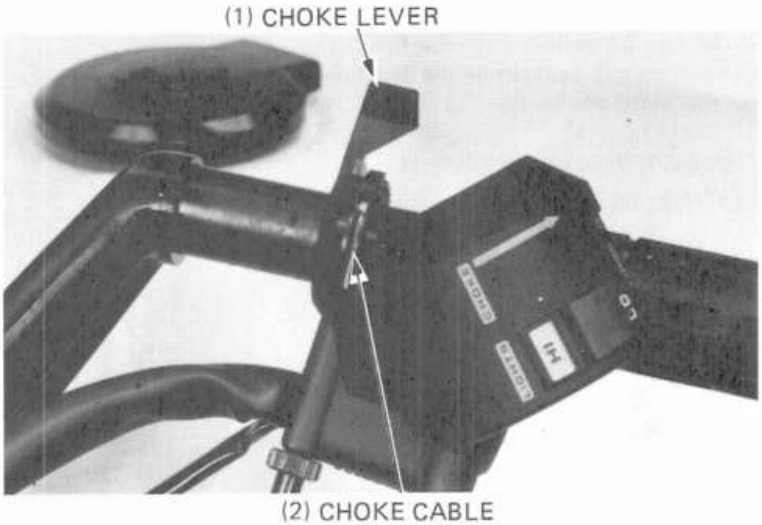
(1) CLUTCH MASTER CYLINDER



Remove the left handlebar switch.



Disconnect the choke cable from the choke lever.

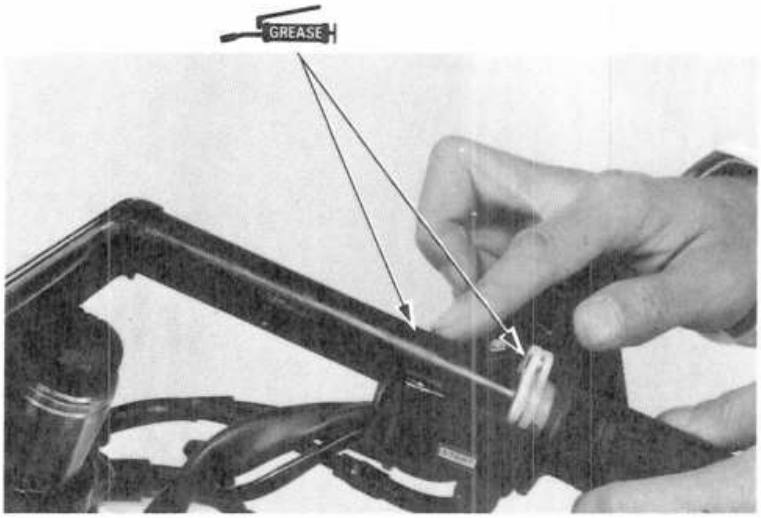


Remove the left and right handlebar retainer rings.
Loosen the left and right handlebar pinch bolts.
Remove the handlebars from the fork tubes.
Remove the throttle grip from the right handlebar.



INSTALLATION

Apply grease to the throttle grip sliding surface and slide the throttle grip over the handlebar.

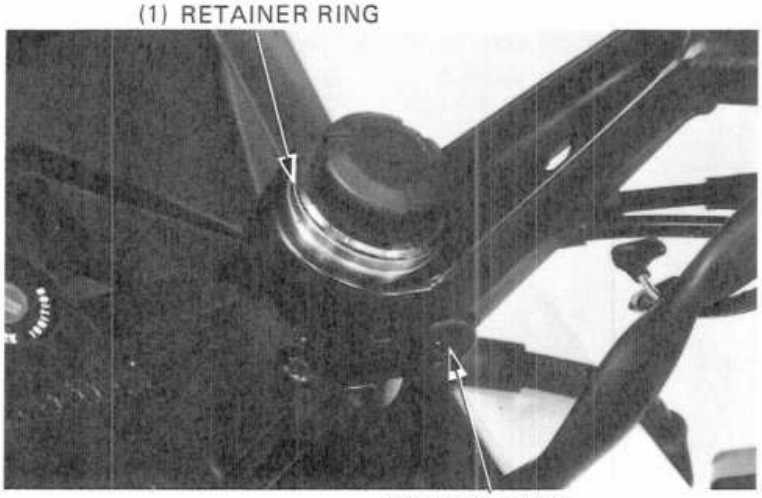


Install the handlebars onto the fork tubes, aligning the pin on the bottom of the handlebar with the cut-out in the top bridge.

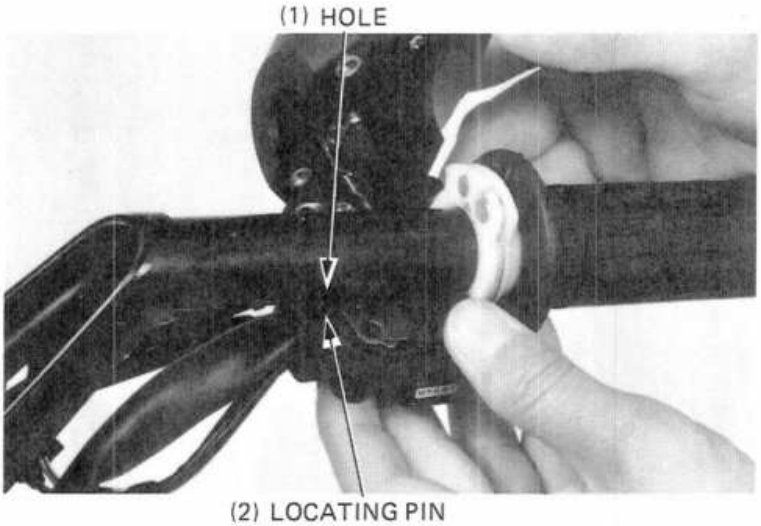
Tighten the handlebar pinch bolts.

TORQUE: 30–40 N·m (3.0–4.0 kg-m, 22–29 ft-lb)

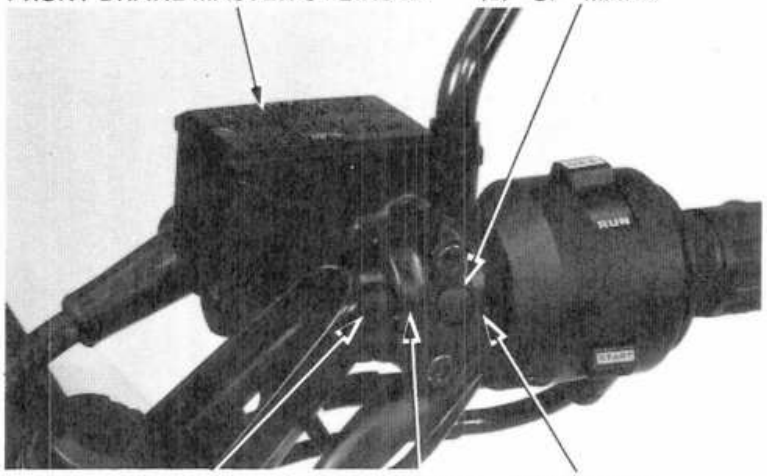
Install the handlebar retainer rings.



Align the right handlebar switch locating pin with the hole in the handlebar and install the right handlebar switch.
Install the top portion of the switch and tighten its screws.
Tighten the forward screw first, then tighten the rear screw.



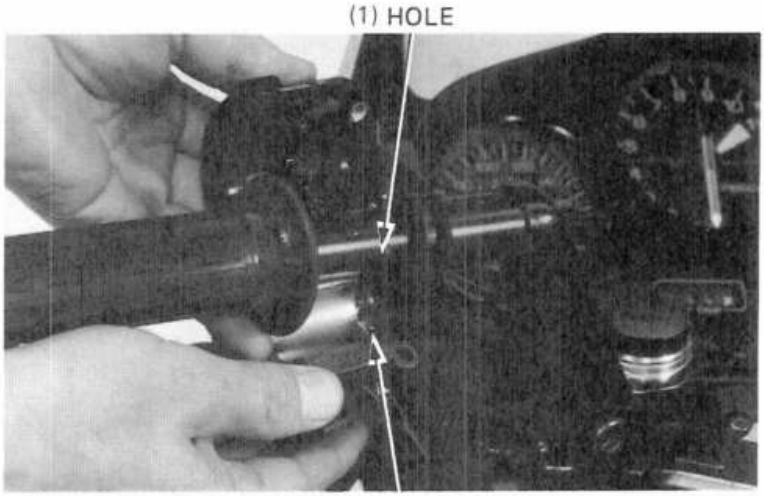
Place the front brake master cylinder on the handlebar and install the master cylinder holder with the "UP" mark facing up.
Align the index mark on the holder with the punch mark on the handlebar, and tighten the upper bolt first then tighten the lower bolt.



Connect the choke cable to the choke lever.

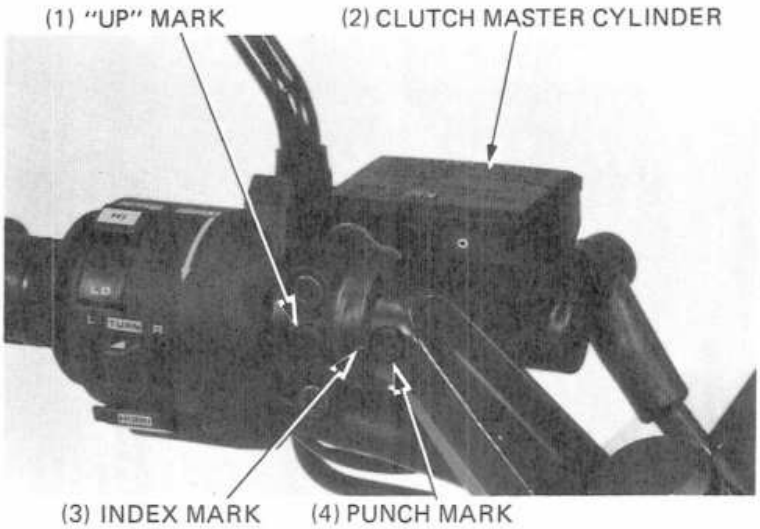
Align the left handlebar switch locating pin with the hole in the handlebar and install the left handlebar switch.

Tighten the upper screw first, then tighten the lower screw.



Place the clutch master cylinder on the handlebar and install the master cylinder holder with the "UP" mark facing up.
Align the index mark on the holder with the punch mark on the handlebar, and tighten the upper bolt.

Connect the clutch switch wires.



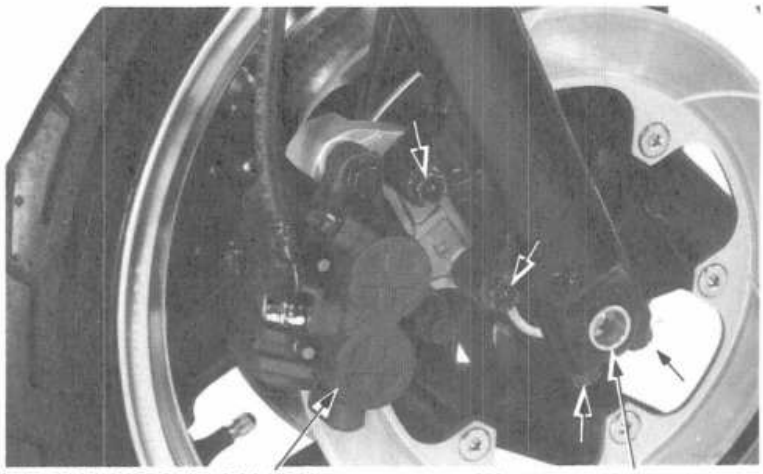
FRONT WHEEL

REMOVAL

Remove the right front brake caliper from the fork leg. Remove the right axle holder.

NOTE

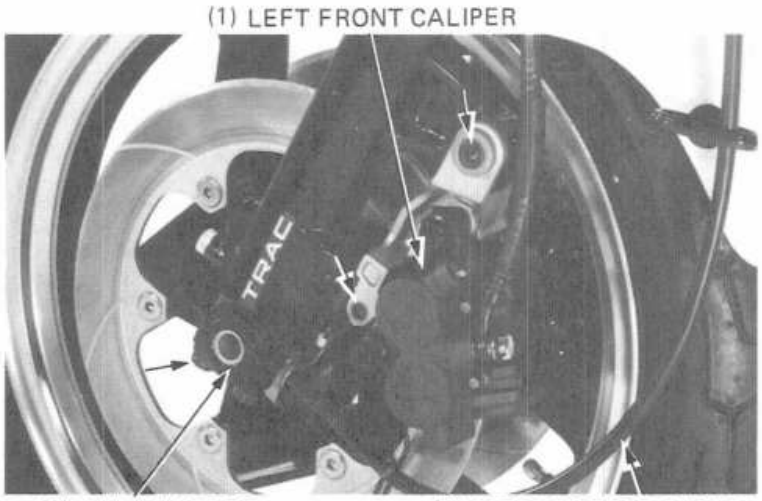
> If you squeeze the front brake lever after the caliper is removed, the caliper piston will move out and make reassembly difficult.



(1) RIGHT FRONT CALIPER (2) AXLE HOLDER

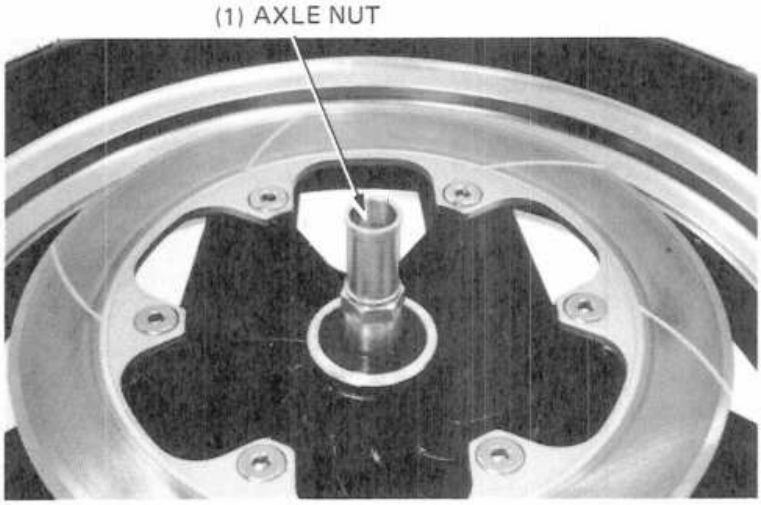
Remove the speedometer cable set screw and disconnect the speedometer cable.
Remove the left front caliper from the fork leg and anti-dive piston case.

Remove the left axle holder.

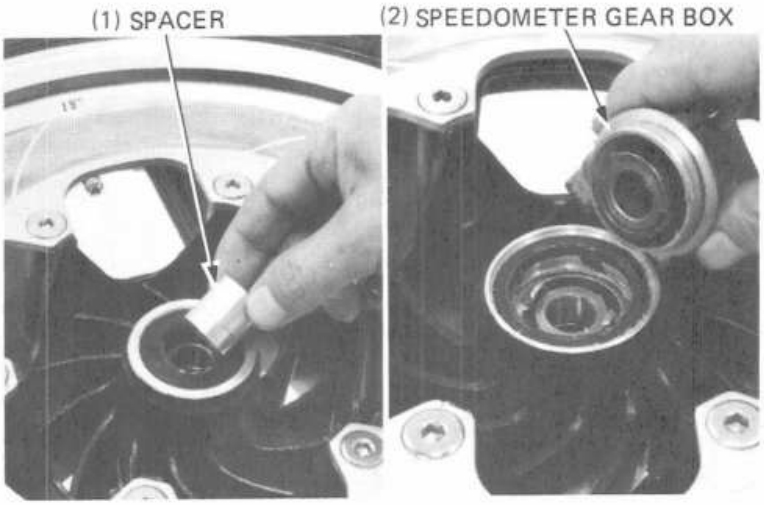


DISASSEMBLY

Remove the front axle nut and axle.

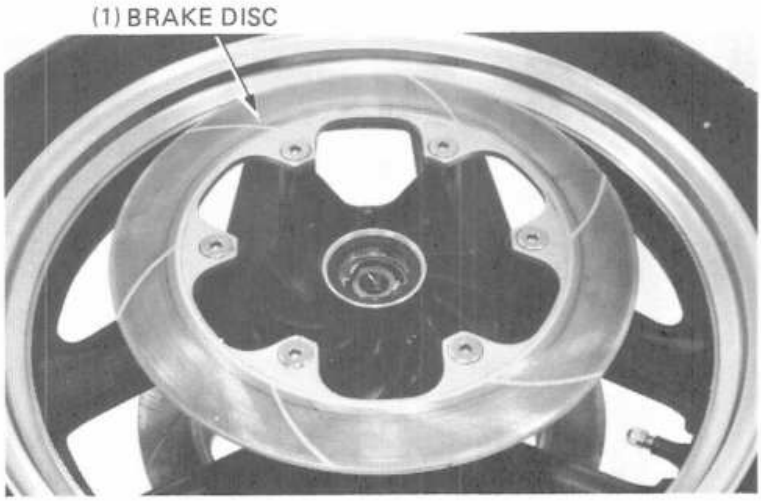


Remove the spacer from the right side.
Remove the speedometer gear box from the left side.



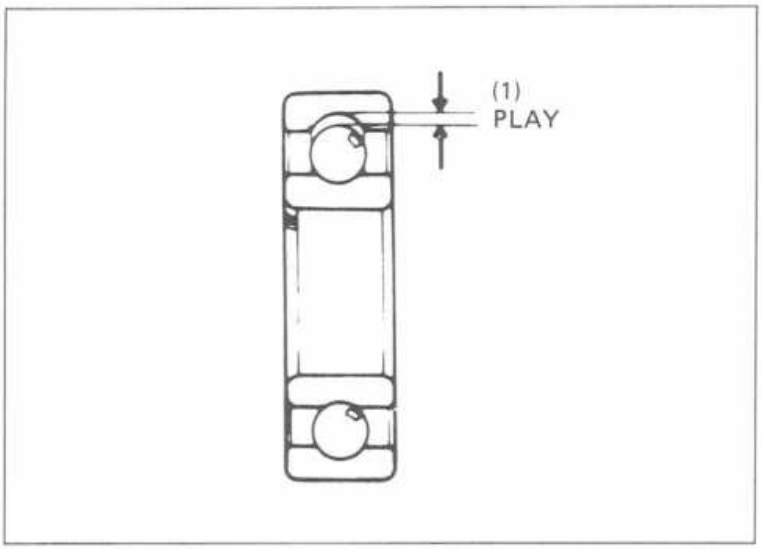
Remove the left and right brake disc mounting bolts and discs.

Remove the dust seal from both sides.
Remove the speedometer ratainer from the left side.



WHEEL BEARING INSPECTION

Check wheel bearing play by placing the wheel in a truing stand and spinning the wheel by hand. Replace the bearings with new ones if they are noisy or have excessive play.



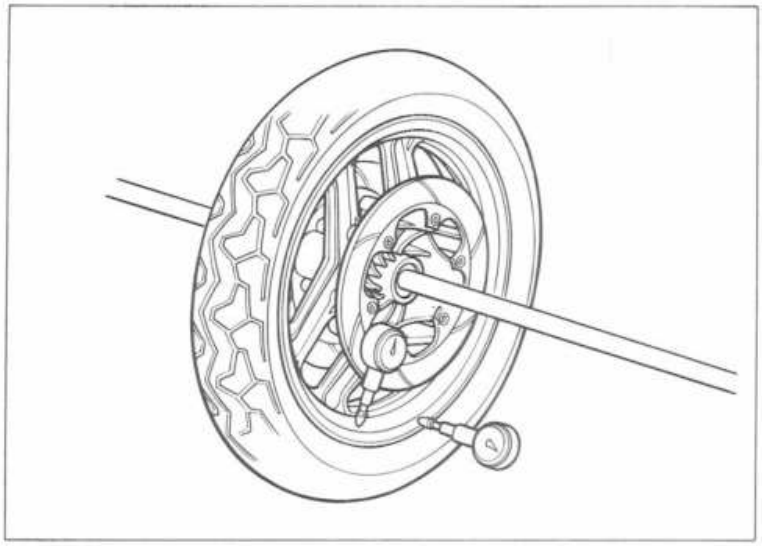
WHEEL INSPECTION

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

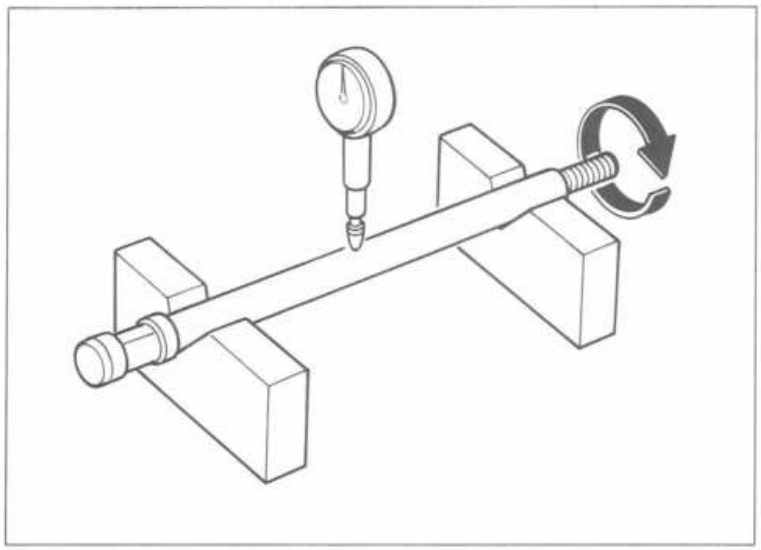
> The wheel cannot be repaired and must be replaced with a new one if the service limits are exceeded.



AXLE INSPECTION

Set the axle in V blocks and measure the runout.

SERVICE LIMIT: 0.2 mm (0.01 in)



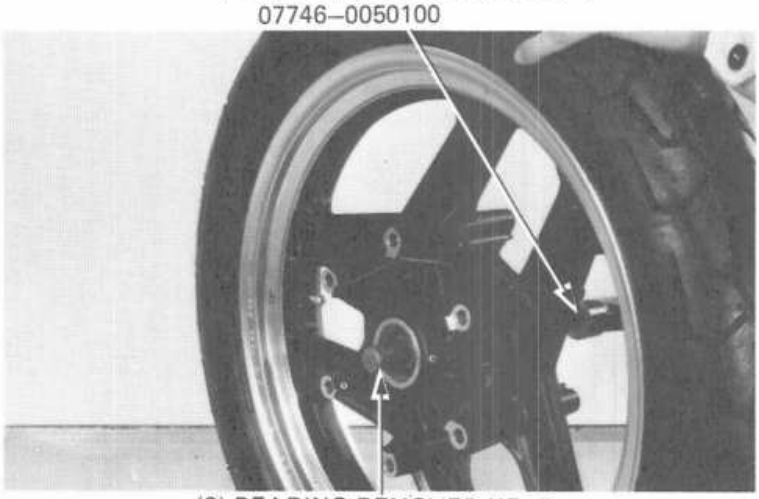
WHEEL BEARING REMOVAL

If the bearing need replacement, remove the bearings and distance collar.

NOTE

> Never reinstall old bearings; once the bearings are removed, they must be replaced with new ones.

(1) BEARING REMOVER SHAFT
07746–0050100

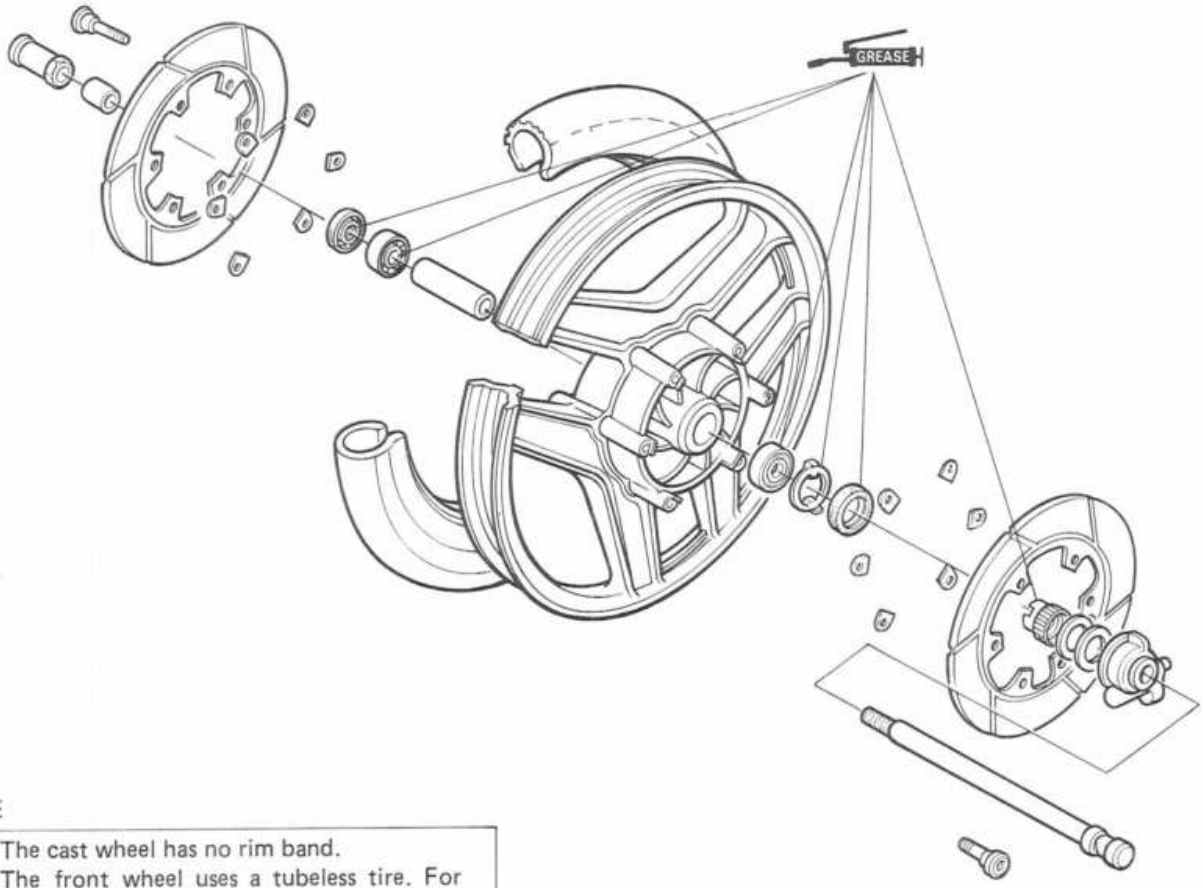


(2) BEARING REMOVER HEAD
07746–0050400

ASSEMBLY

WARNING

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



NOTE

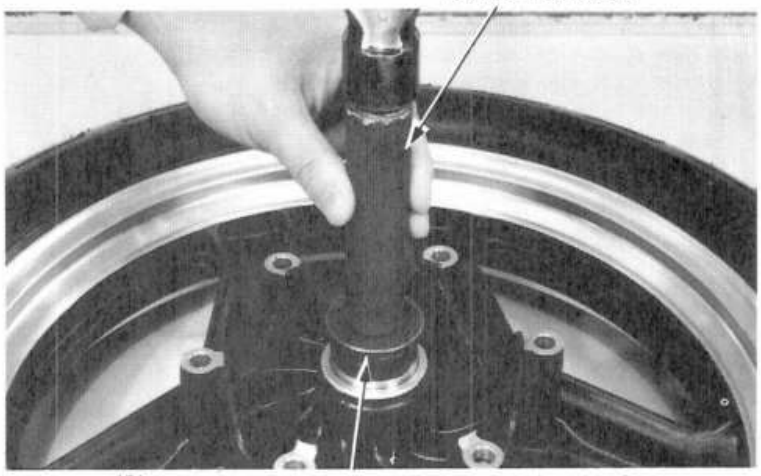
- The cast wheel has no rim band.
- The front wheel uses a tubeless tire. For tubeless tire repair, refer to the Honda Tubeless Tire Manual.

Pack all bearing cavities with grease.
Drive in the right bearing first, sealed side facing out, then press the distance collar into place.

NOTE

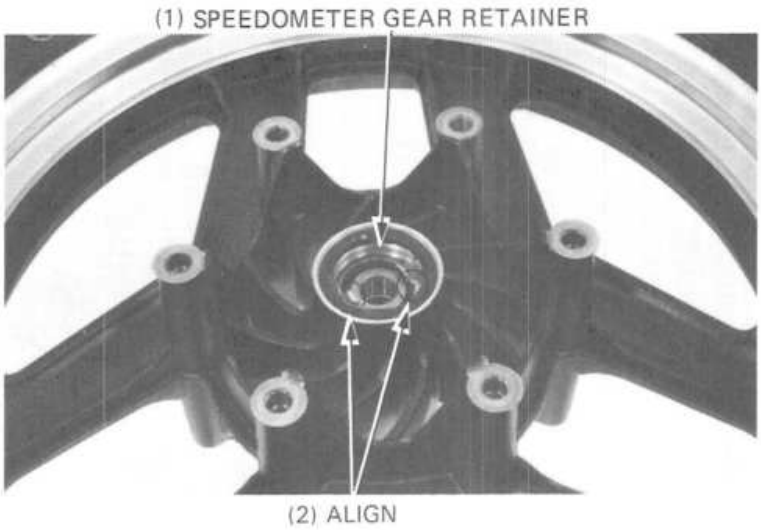
Be certain the distance collar is in position before installing the left bearing.

Drive in the left bearing squarely, making sure that it is fully seated and that the sealed side is facing out.



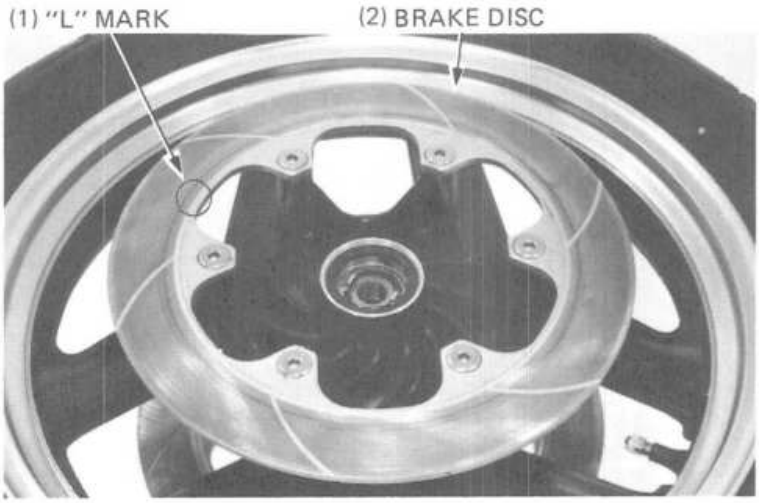
Install the speedometer gear retainer in the left side of the wheel hub, aligning its tangs with the slots in the hub.

Install the left dust seal.



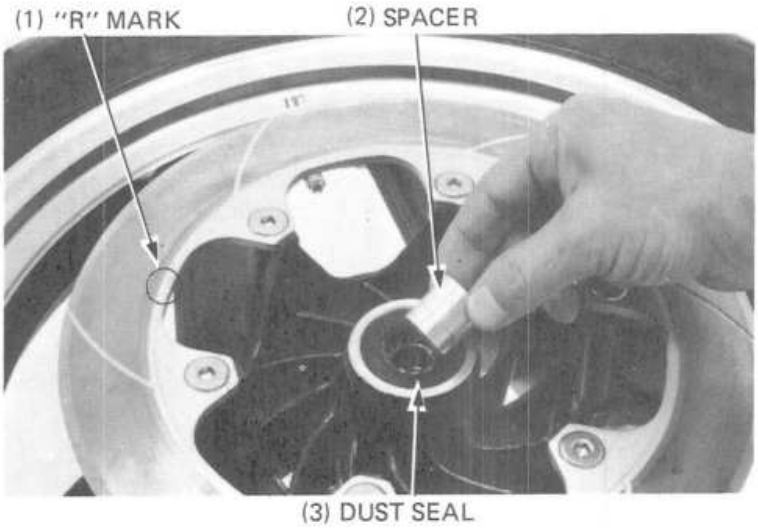
Place new gaskets on the disc mounting flange, then install the left disc with its "L" mark facing out. Tighten the disc mounting bolts.

TORQUE: 35–40 N·m (3.5–4.0 kg-m, 25–29 ft-lb)

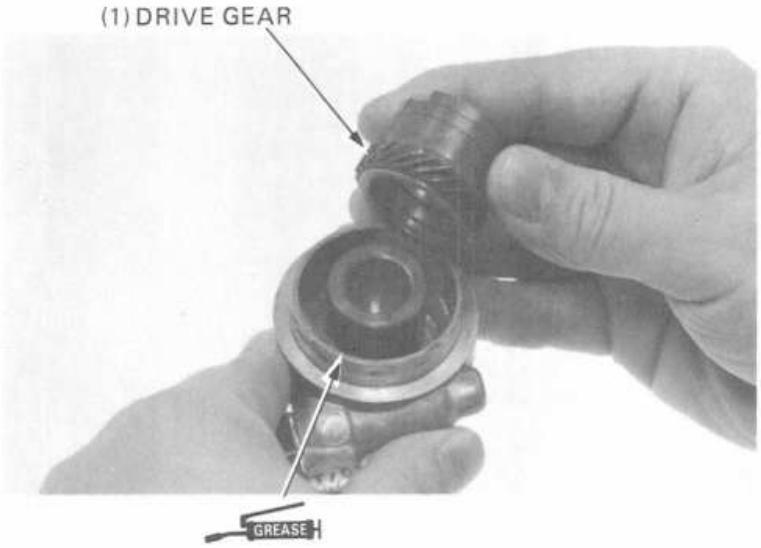


Install the right dust seal.
Place new gaskets on the disc mounting flange, then install the right disc with its "R" mark facing out. Tighten the mounting bolt to the same torque as left side.

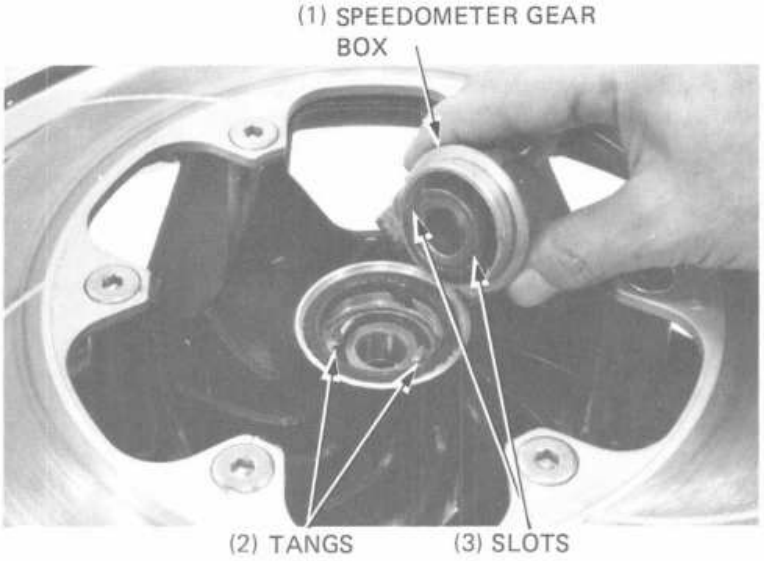
Install the spacer.



Fill the speedometer gearbox with grease and install the plain washer and drive gear.



Install the speedometer gearbox in the wheel hub, aligning the tangs with the slots.



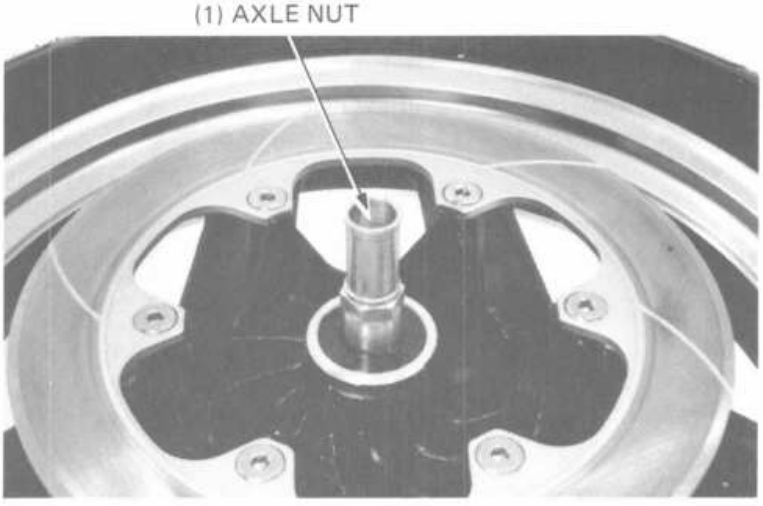
Install the front axle and axle nut. Tighten the axle nut.

TORQUE: 55–65 N·m (5.5–6.5 kg-m, 40–70 ft-lb)

NOTE

> There are flats on the opposite end of the axle, so you can hold the axle while torquing the axle nut.

Clean the brake discs with a high quality degreasing agent.



WHEEL BALANCE

CAUTION

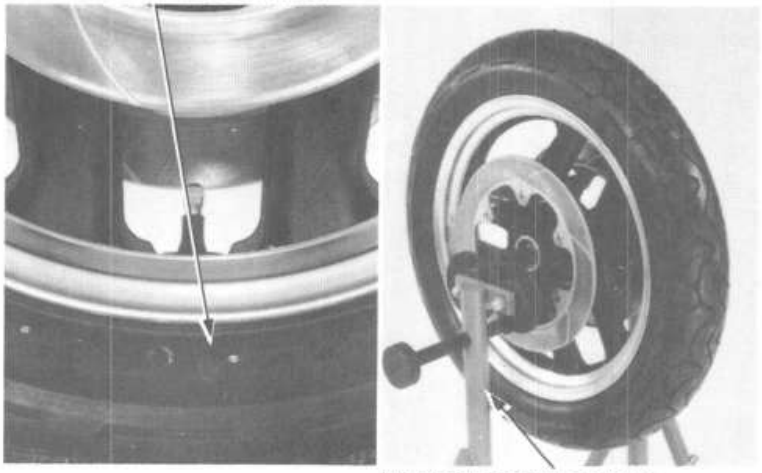
Wheel balance directly affects the stability, handling and overall safety of the motorcycle. Always check balance when the tire has been removed from the rim.

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.

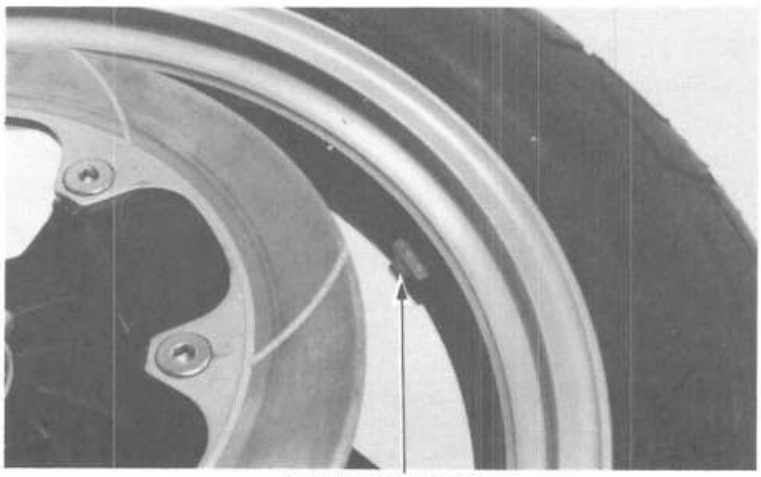
Remove the dust seal and speedometer gearbox from the wheel.
Mount the wheel, tire and brake disc assembly in an inspection stand.
Spin the wheel, allow it to stop, and mark the lowest (heaviest) part of the wheel with chalk. Do this two or three times to verify the heaviest area. If the wheel is balanced, it will not stop consistently in the same position.

(1) TIRE BALANCE MARK



(2) INSPECTION STAND

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 (rear wheel: 70 grams).



(3) WHEEL WEIGHT

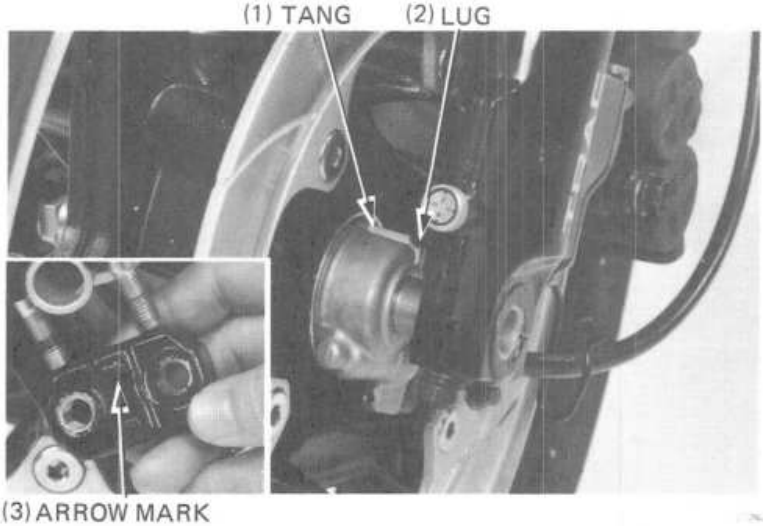
INSTALLATION

Position the wheel between the fork legs.
Lower the engine so the fork legs rest on the top of the axle.

Position the tang on the speedometer gear box against the lug on the left fork leg.

Install the axle holders with the arrow pointing forward.

(1) TANG (2) LUG



(3) ARROW MARK

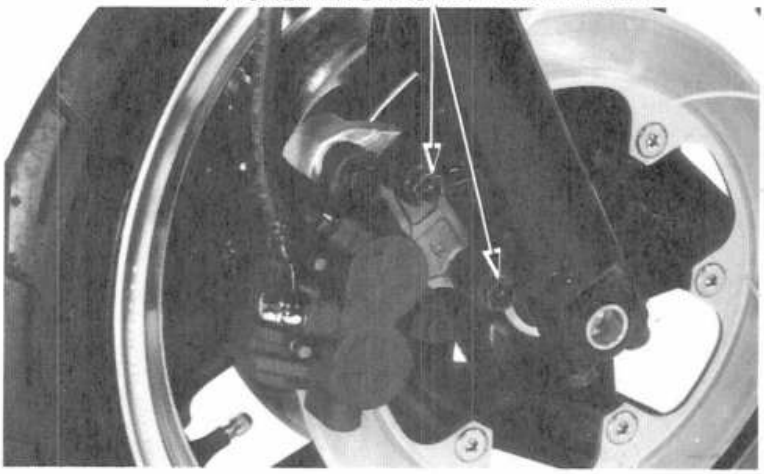
Install the right front caliper and tighten the bracket mount bolts.

TORQUE: 30–40 N·m (3.0–4.0 kg-m, 22–29 ft-lb)

Tighten the right axle holder nuts to the specified torque, starting with the forward nut.

TORQUE: 18–25 N·m (1.8–2.5 kg-m, 13–18 ft-lb)

(1) CALIPER BRACKET MOUNT BOLTS



Install the left front caliper.
Tighten the anti-dive piston pin bolt.

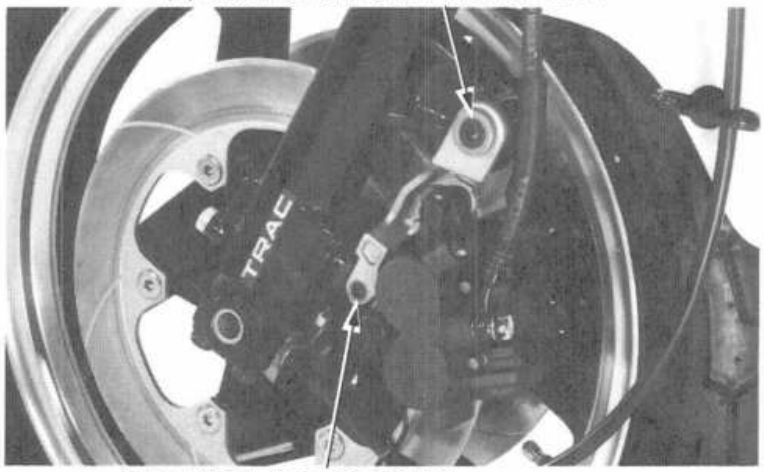
TORQUE: 10–15 N·m (1.0–1.5 kg-m, 7–9 ft-lb)

Tighten the caliper bracket mount bolt.

TORQUE: 30–40 N·m (3.0–4.0 kg-m, 22–29 ft-lb)

Connect the speedometer cable and secure it with the screw.

(1) CALIPER BRACKET MOUNT BOLT

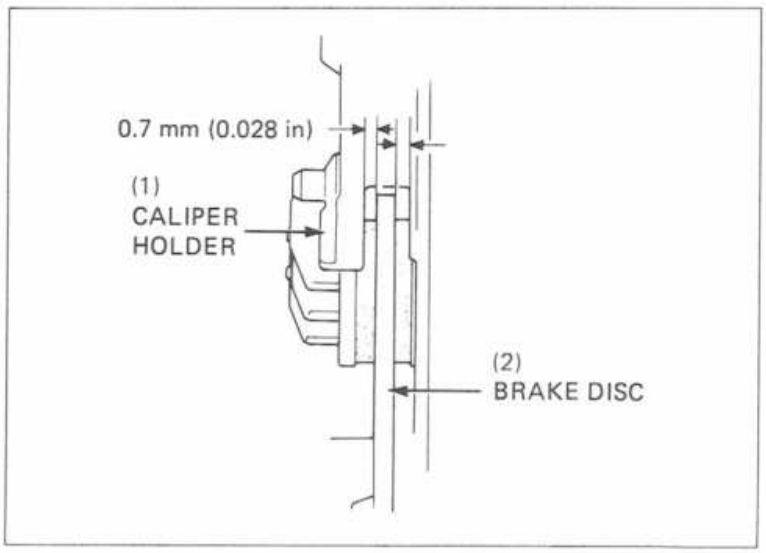


(2) ANTI-DIVE PIVOT BOLT

Measure the clearance between each surface of the left brake disc and the left caliper holder with a 0.7 mm (0.028 in) feeler gauge. If the gauge inserts easily, tighten the forward left axle holder nut to the specified torque, then tighten the rear nut.
If the feeler gauge cannot be inserted easily, pull the left fork out or push it in until the gauge can be inserted.
After installing the wheel, apply the brake several times, then recheck both discs for caliper holder to disc clearance.

WARNING

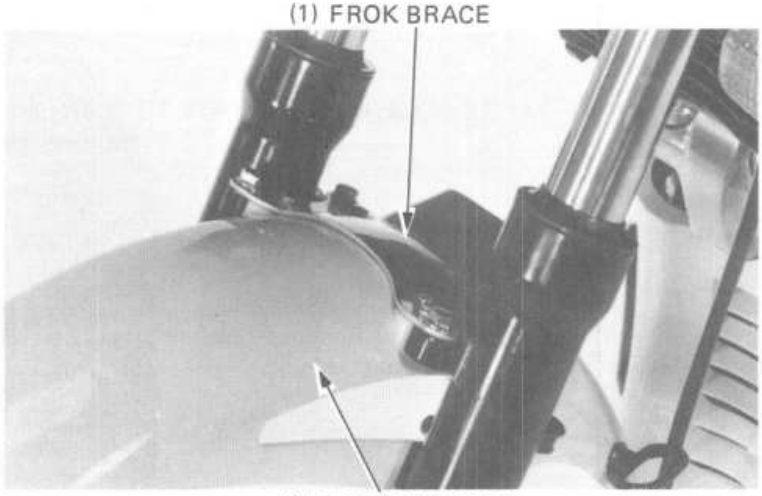
Failure to provide adequate disc to caliper holder clearance may damage the brake disc and impair brake efficiency.



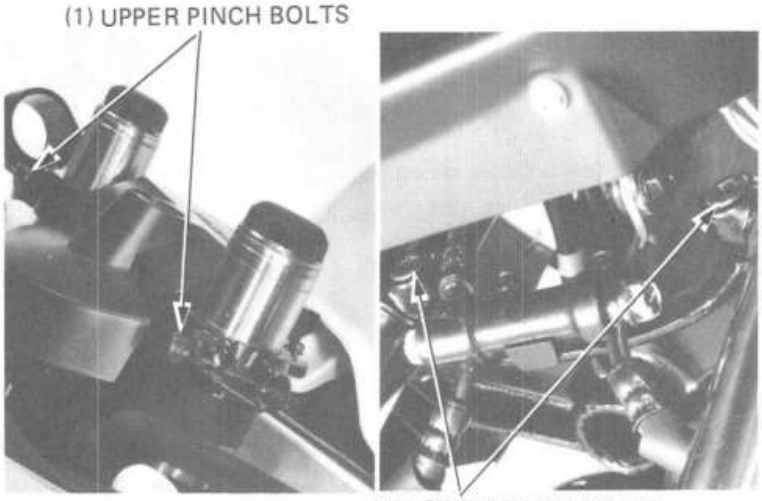
FRONT FORKS

REMOVAL

Remove the following parts:
- fairing.
- headlight.
- instruments.
- handlebars.
- front wheel.
- front fender and fork brace.



Loosen the fork upper and lower pinch bolts.



Pull each fork tube out of the top bridge.

NOTE

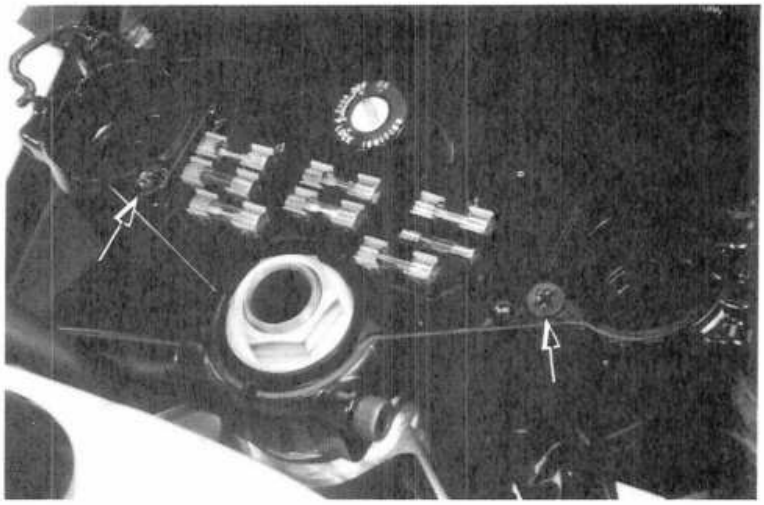
> Because of the friction caused by the air joint O-rings, you'll have to turn the tubes while pulling down.

Remove the fork stop rings

Pull each fork tube out of the for bottom bridge.



If replacement of the joint is necessary, remove the two screws which attach the fork air joint to the top bridge.

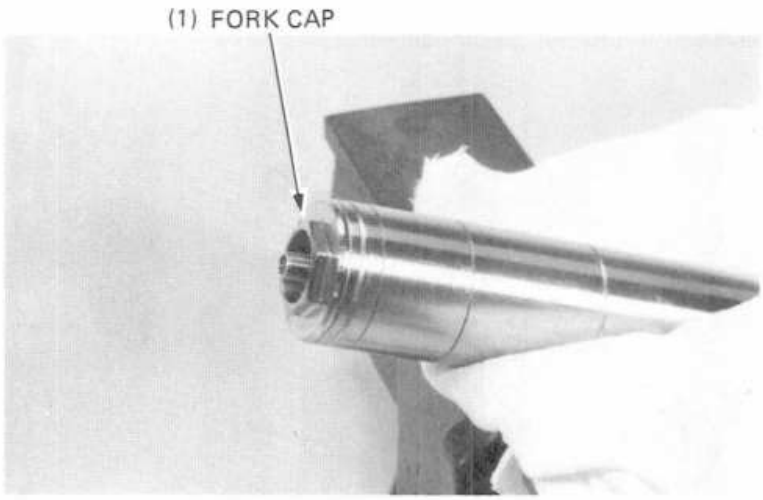


DISASSEMBLY

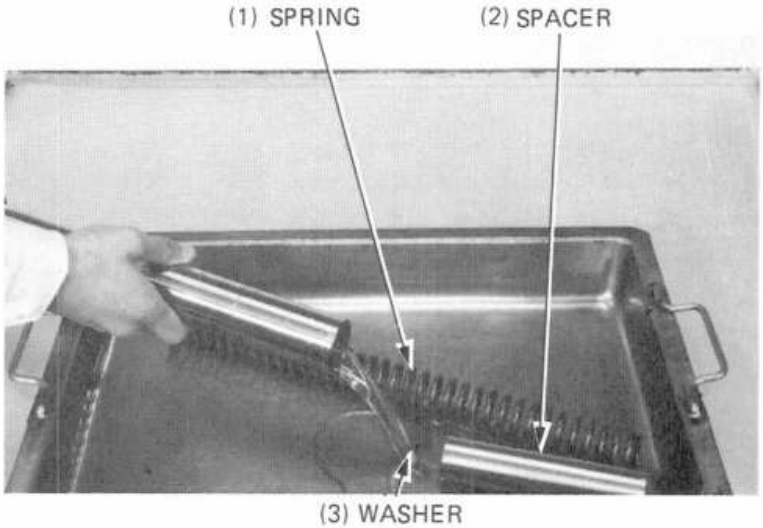
Hold the fork tube in a vise, with soft jaws or shop towel and remove the fork tube cap.

CAUTION

Do not damage the sliding surface.



Remove the fork spring, space and washer.
Drain the fork fluid by pumping the fork up and down several times.



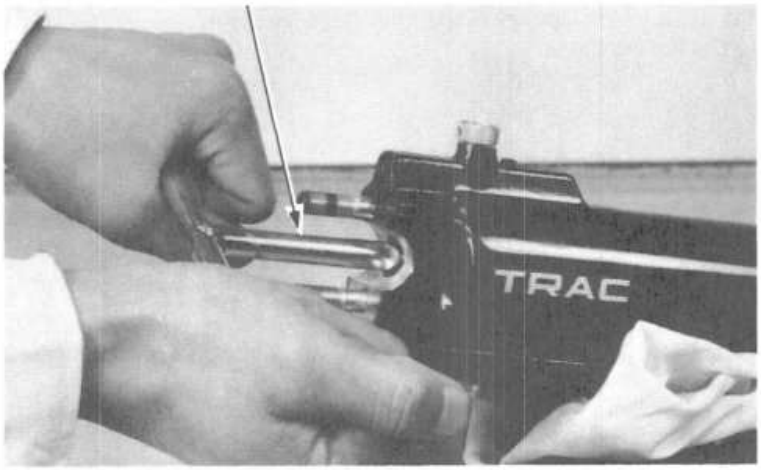
Hold the fork slider in a vise with soft jaws or a shop towel.
Remove the socket bolt with a hex wrench.

NOTE

> Temporarily install the spring and fork cap if difficulty is encountered in removing the socket bolt.

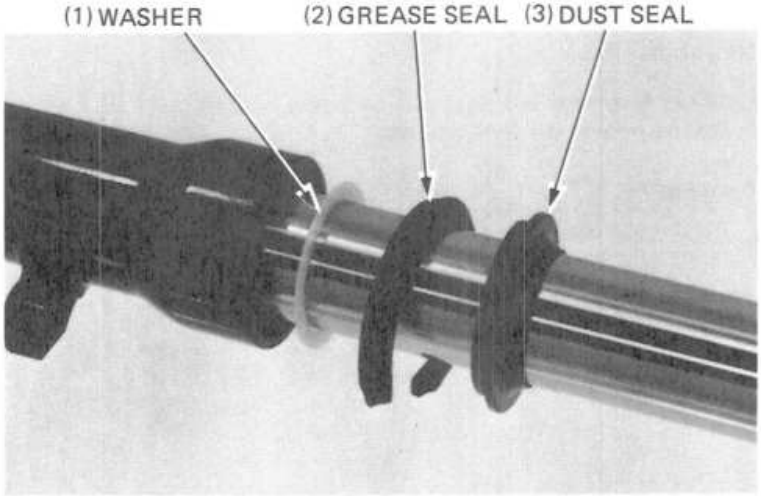
The piston and rebound spring can be removed from the right fork.

(1) HEX WRENCH 6 mm 07917–3230000



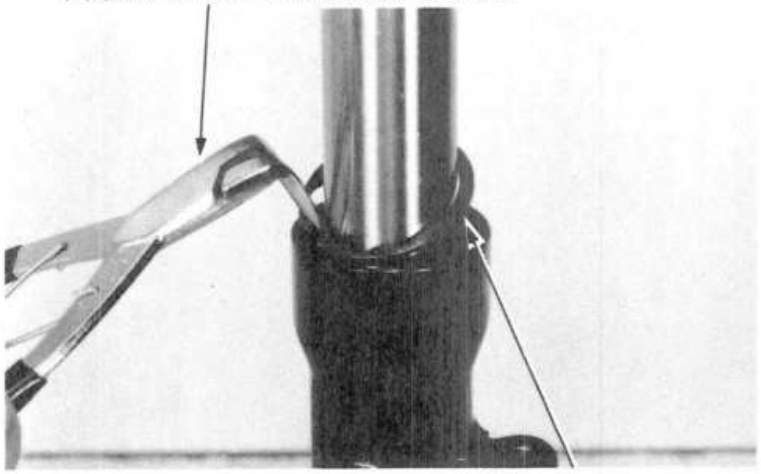
Remove the dust seal, grease seal and washer.

(1) WASHER (2) GREASE SEAL (3) DUST SEAL



Remove the snap ring.

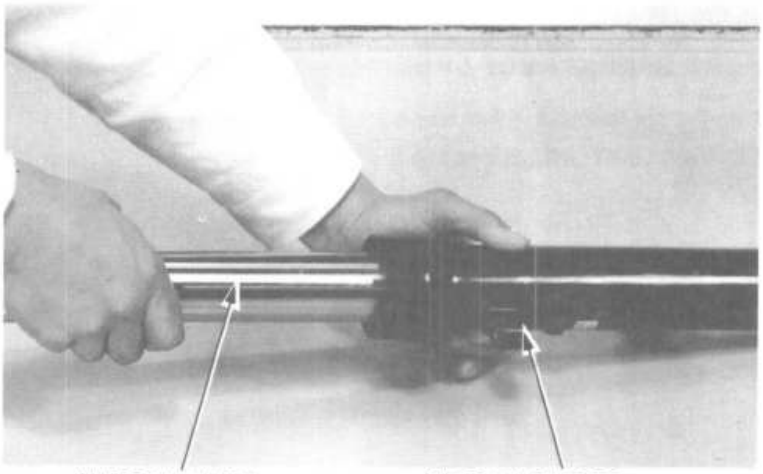
(1) SNAP RING PLIERS 07914–3230001



(2) SNAP RING

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.

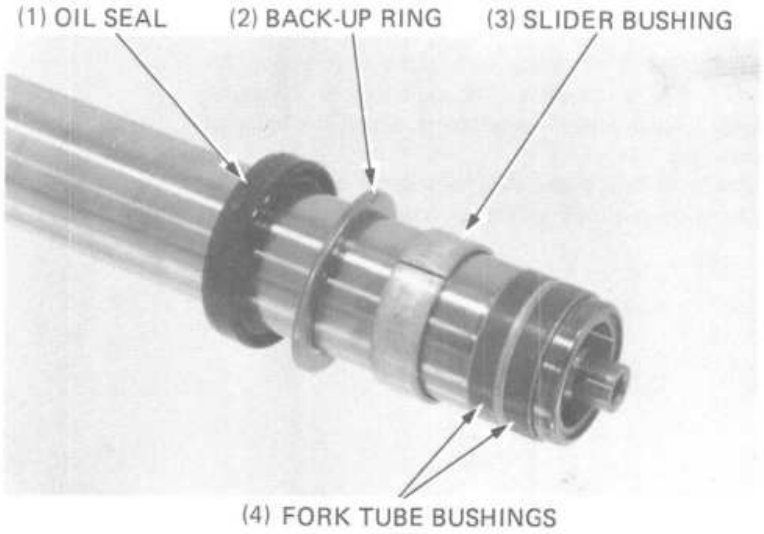
Remove the oil lock piece from inside the slider.



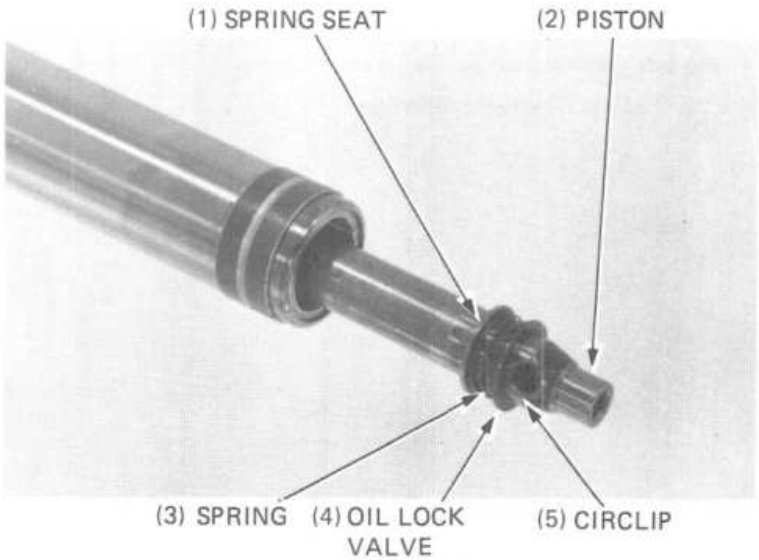
Remove the oil seal, back-up ring and slider bushing from the fork tube.

NOTE

Do not remove the fork tube bushings unless it is necessary to replace it with a new one.



On the left fork, remove the circlip, oil lock valve, spring, and spring seat from the piston.
Remove the piston and rebound spring from the fork tube.

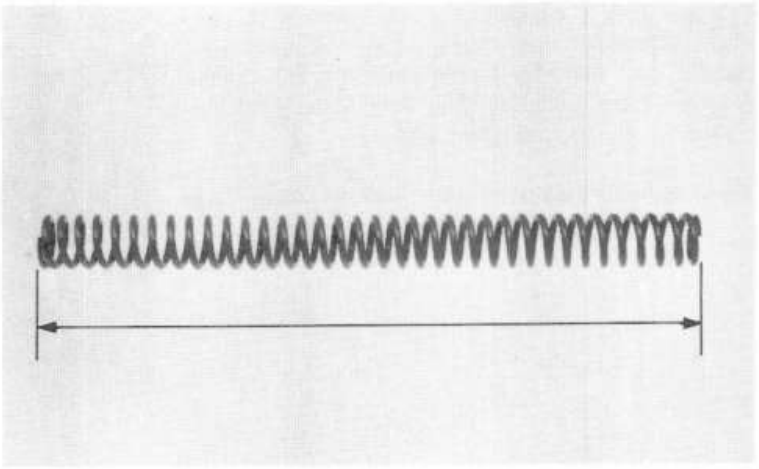


INSPECTION

FORK SPRING FREE LENGTH

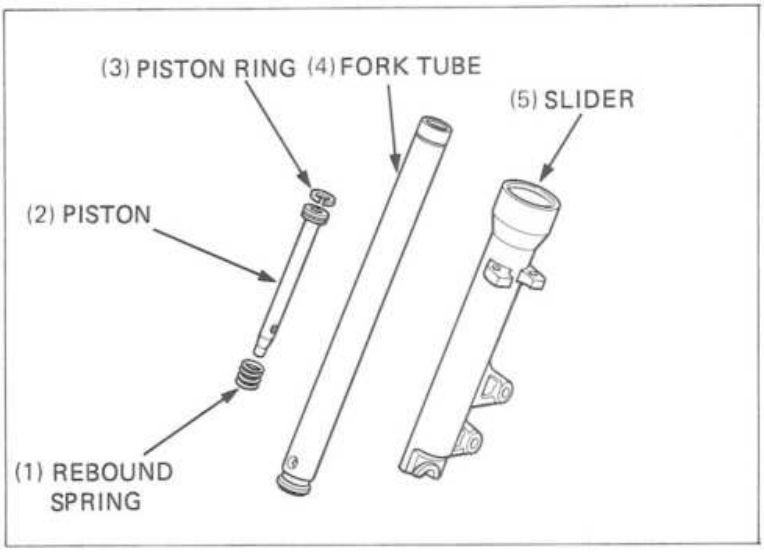
Measure the fork spring free length.

SERVICE LIMIT: 405.5 mm (15.9 in)



FORK TUBE/FORK SLIDER/PISTON

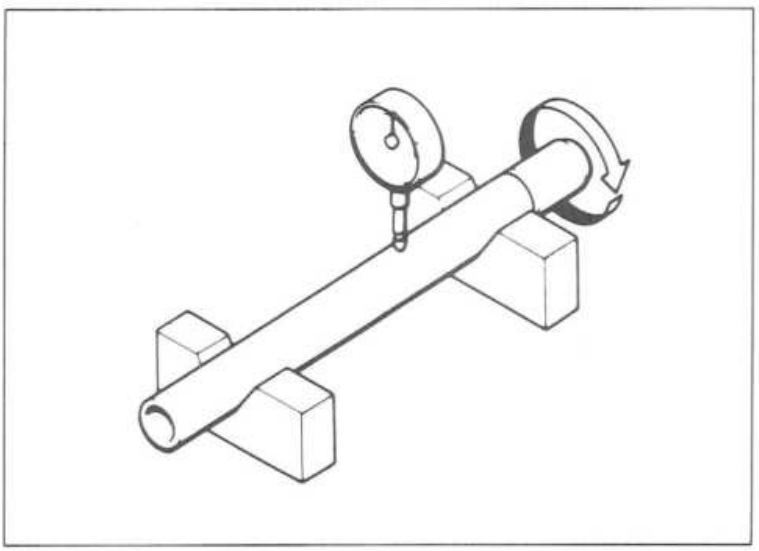
Check the fork tube, fork slider and piston for score marks, scratches, or excessive or abnormal wear. Replace any components which are worn or damaged.
Check the fork piston ring for wear or damage.
Check the rebound spring for fatigue or damage.



FORK TUBE

Set the fork tube in V blocks and check its runout.

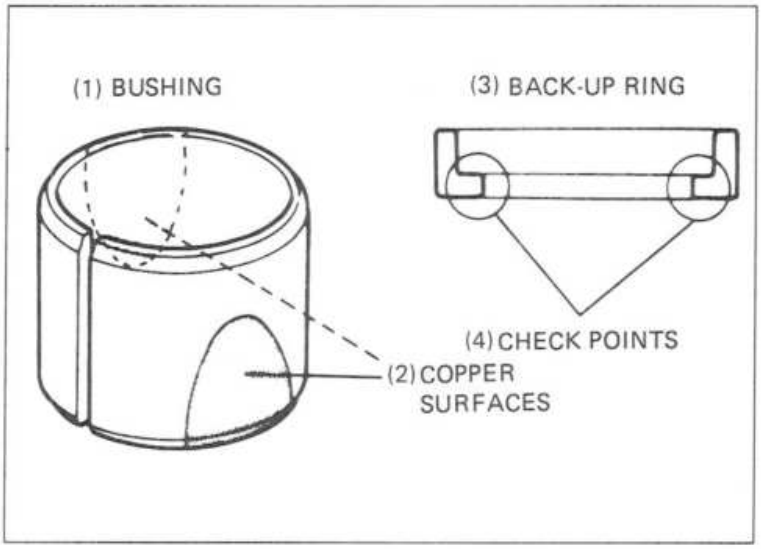
SERVICE LIMIT: 0.20 mm (0.008 in)



BUSHING/BACK-UP RING

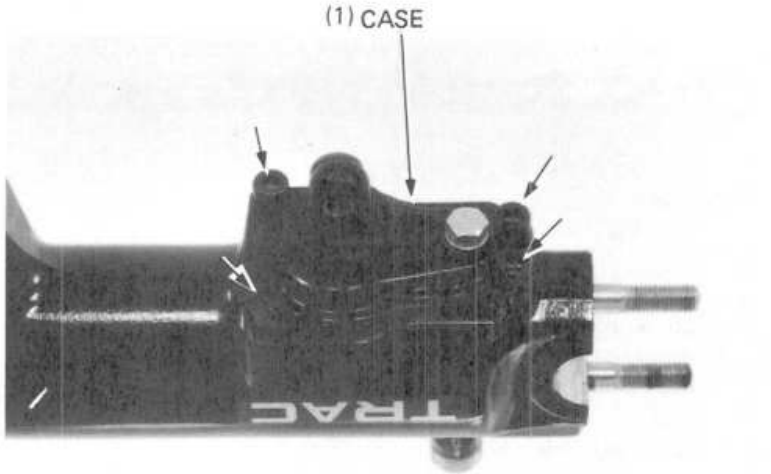
Visually inspect the slider and fork tube bushings. Replace the bushings if there is excessive scoring or scratching, or if the teflon is worn so that the copper surface appears on more than 3/4 of the entire surface.

Check the back-up ring; replace it if there is any distortion at the points shown.



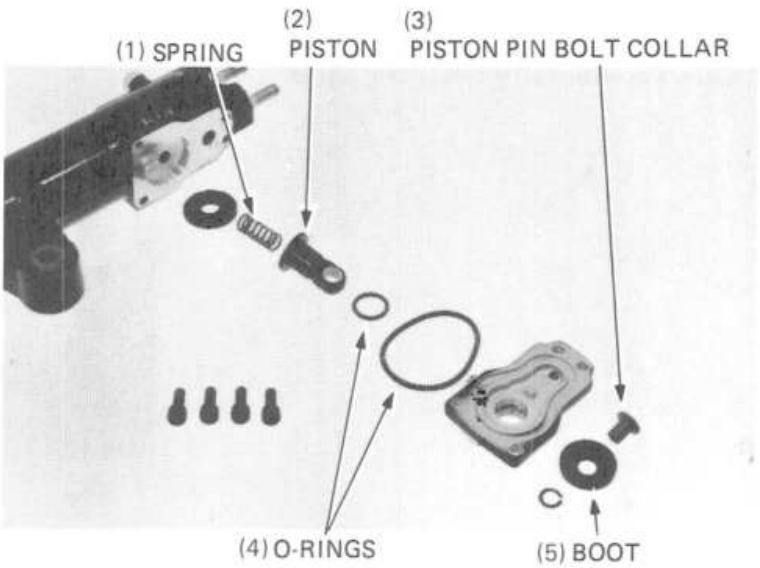
ANTI-DIVE CASE

Remove the four socket bolts and remove the anti-dive case.



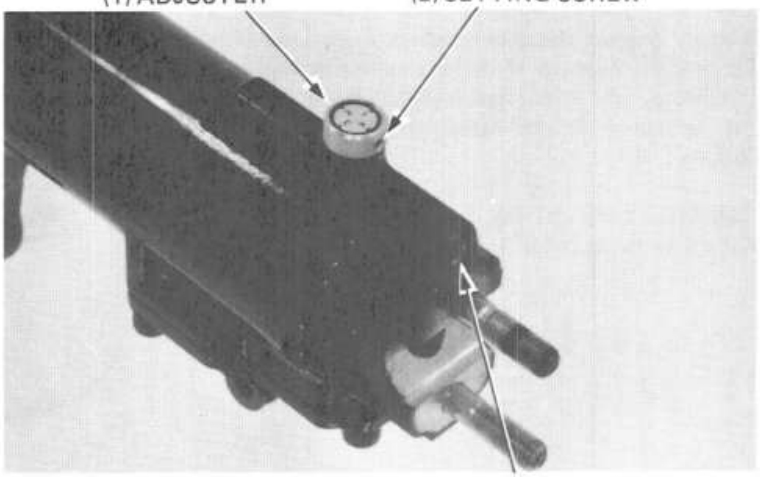
Remove the piston and spring.
Remove the boots, piston pin bolt collar and stop rubber.

Check the spring and pistion for wear or damage.



Remove setting screw, adjuster and orifice.

Remove the check valve setting screw, valve spring and check ball.

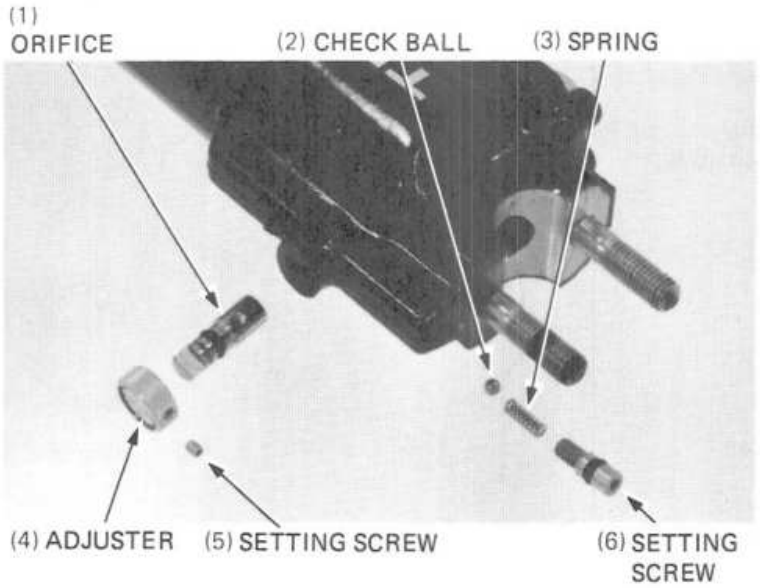


Check the orifice for clogging by applying compressed air. Also check the orifice for damage and replace if necessary.

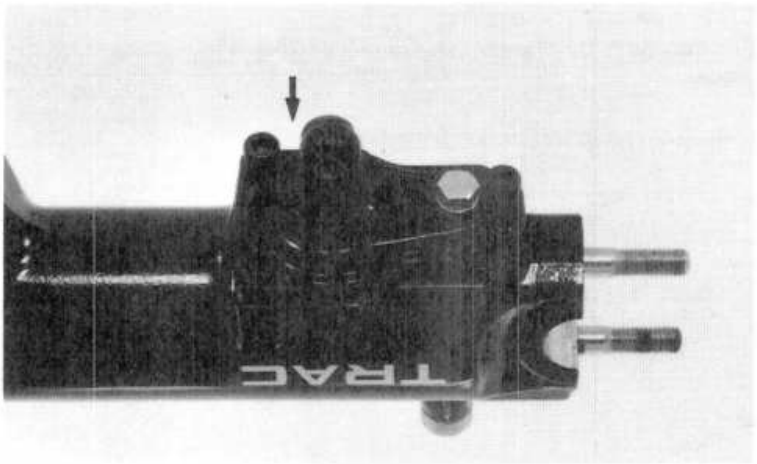
Assemble the anti-dive case in the reverse order of disassembly.

NOTE

- Apply a Thread Lock Agent to the threads of the screws and socket bolts before assembly.
- Apply ATF to the piston and piston O-ring.
- Apply silicone grease to the pivot bolt collar.

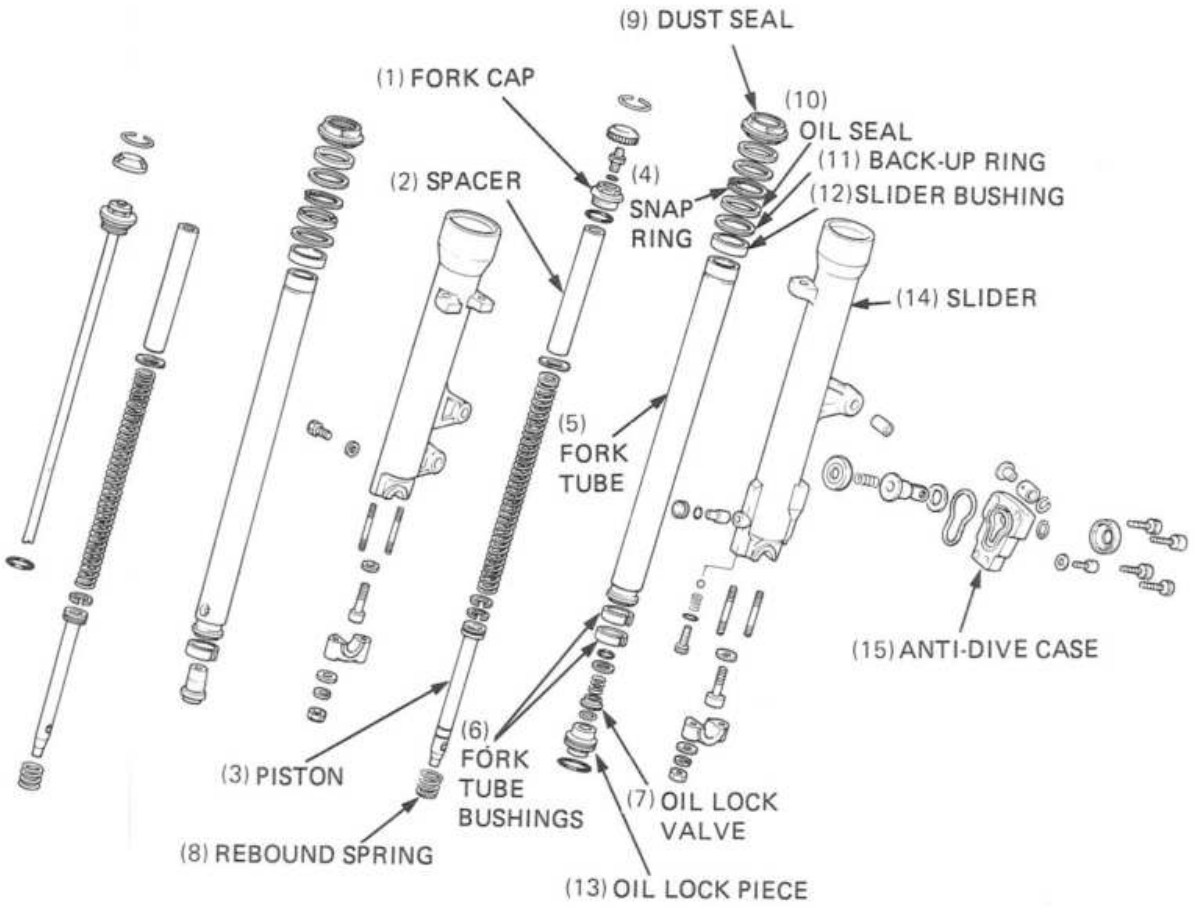


Check the operation of the collar and piston.

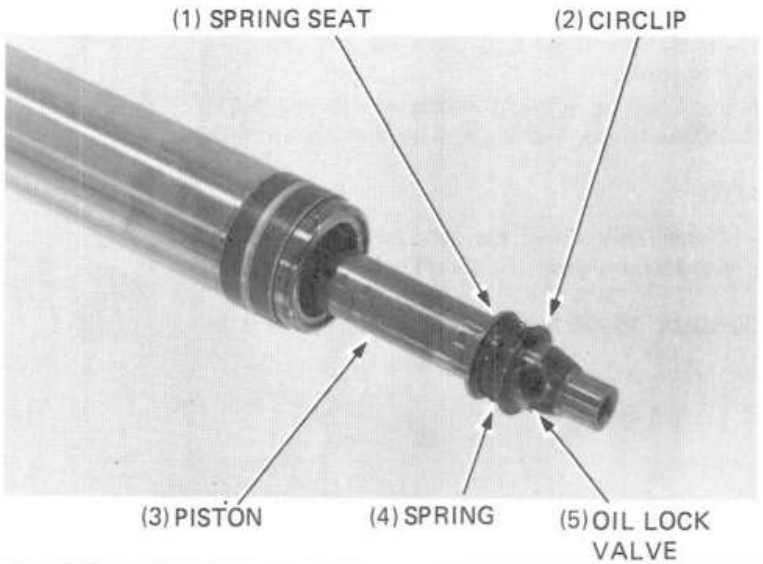


ASSEMBLY

Before assembly, wash all parts with a high flash point or non-flammable solvent and wipe them off completely.



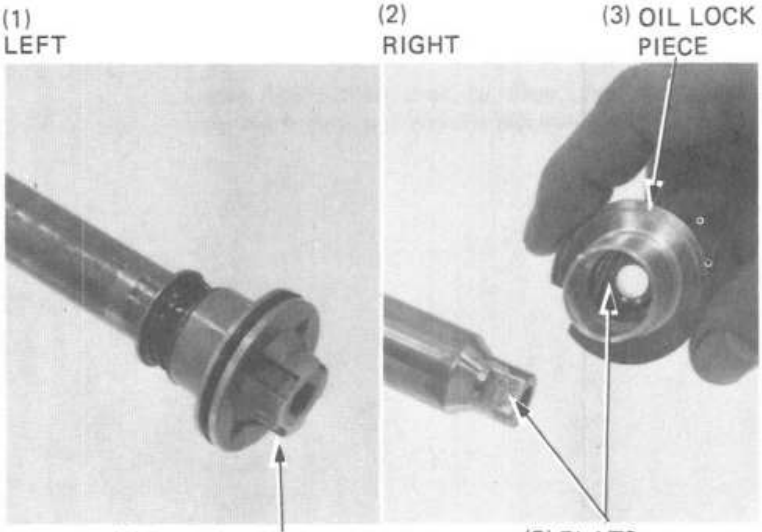
Insert the rebound spring and piston into the fork tube.
On the left fork, install the spring seat, valve spring, oil lock valve and circlip on the piston.



Place the oil lock piece on the end of the piston.

NOTE

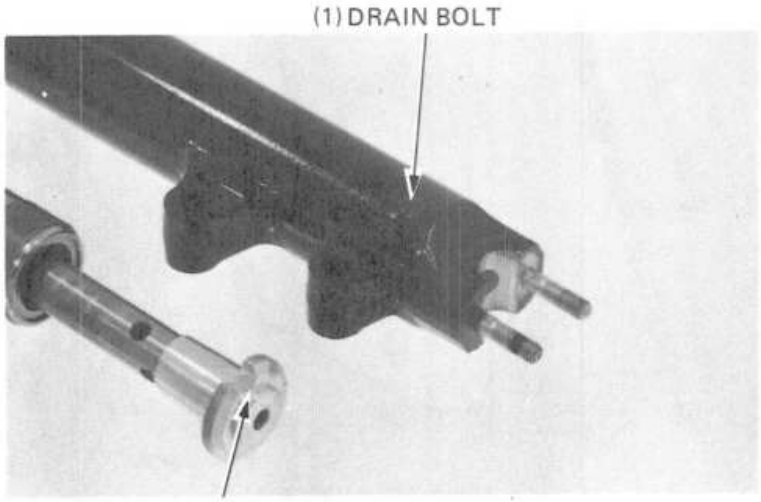
> On the right fork, install the oil lock piece, aligning the flats of the oil lock piece and piston end.



Insert the fork tube into the slider.

NOTE

> On the right fork, align the cutout of the oil lock piece with the drain bolt in the slider.

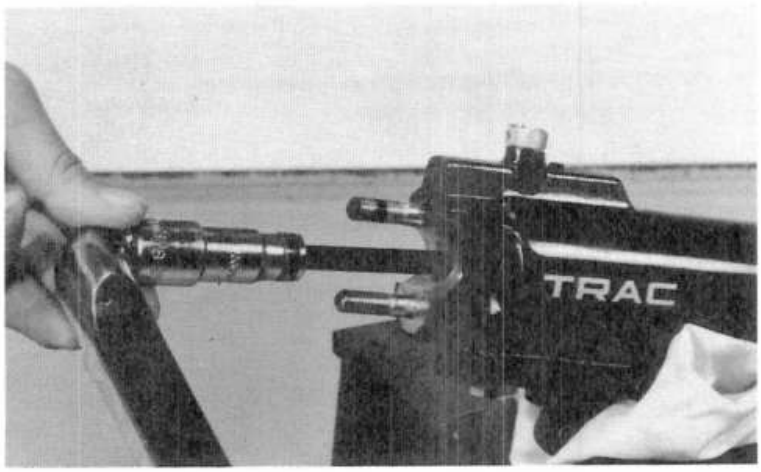


Place the fork slider in a vise with soft jaws or a shop towel.
Apply a locking agent to the socket bolt and thread it into the piston. Tighten with a 6 mm hex wrench.

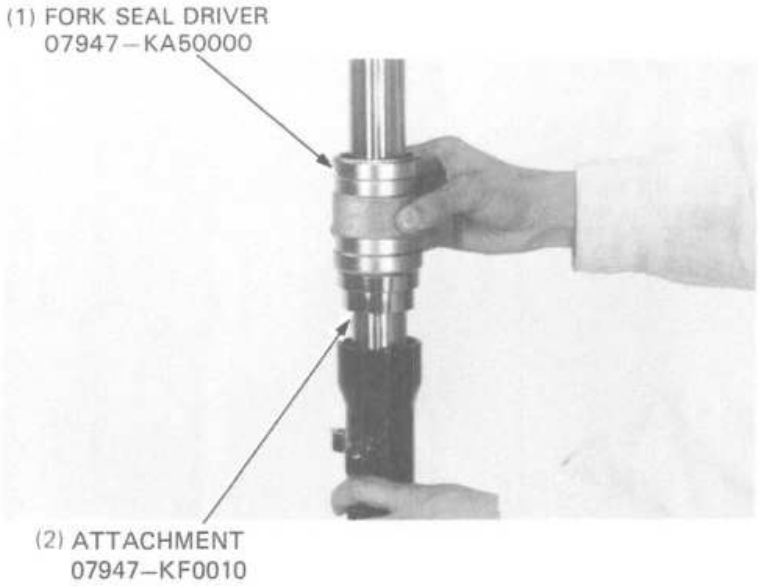
NOTE

> Temporarily install the fork spring and fork cap bolt to tighten the socket bolt.

TORQUE: 15–25 N·m (1.5–2.5 kg-m, 11–18 ft-lb)

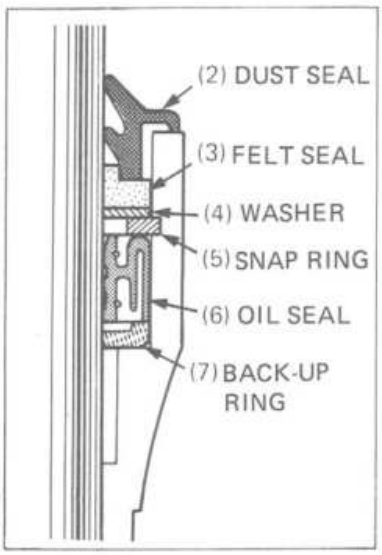


Place the slider bushing over the fork tube and rest it on the slider. Put the back-up ring and an old bushing or equivalent tool on top.
Drive the bushing into place with the seal driver and remove the old bushing or equivalent tool.
Coat a new oil seal with ATF and install it with the seal markings facing up. Drive the seal in with the seal driver.



Install the snap ring with its radiused edge facing down and install the washer, oil felt and dust cover.



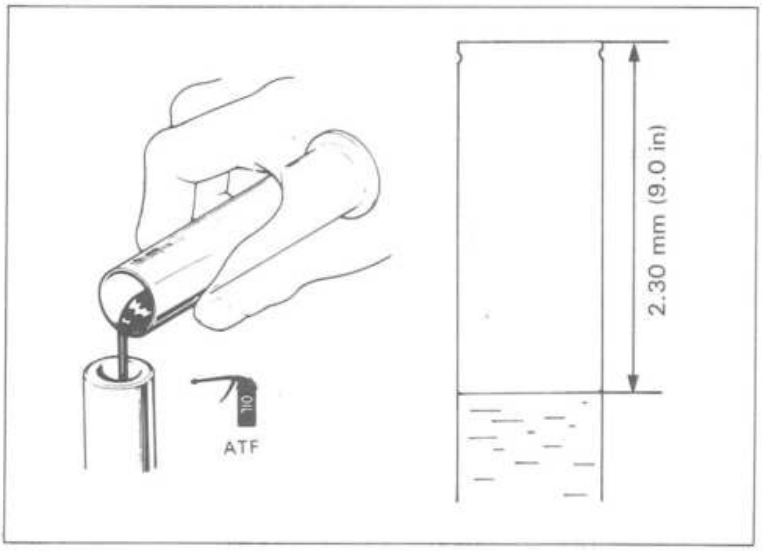


Pour the specified amount of ATF into the fork tube.

CAPACITY:
Right fork: 380 cc (12.9 US oz, 13.4 Imp)
Left fork: 400 cc (13.5 US oz, 14.1 Imp)

Compress the front fork and measure the oil level from the top of the tube.

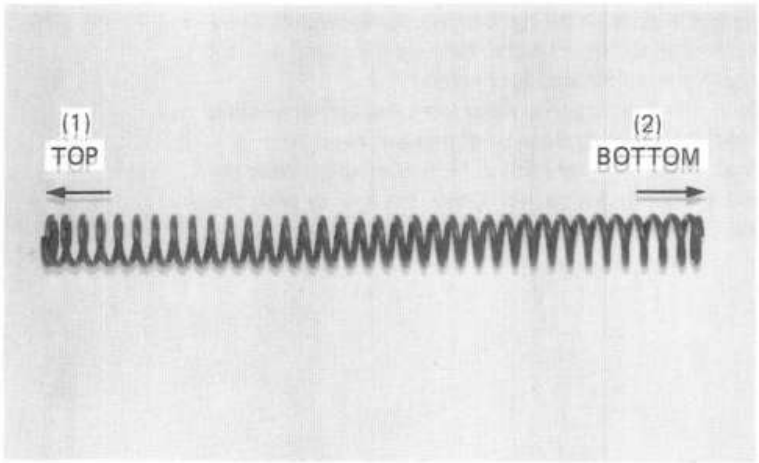
SPECIFIED LEVEL:
Right fork: 230 mm (9.0 in)
Left fork: 230 mm (9.0 in)



Install the fork spring, spring seat and spacer in the fork tube.

NOTE

Note the spring direction; the small coil end must face toward the bottom.

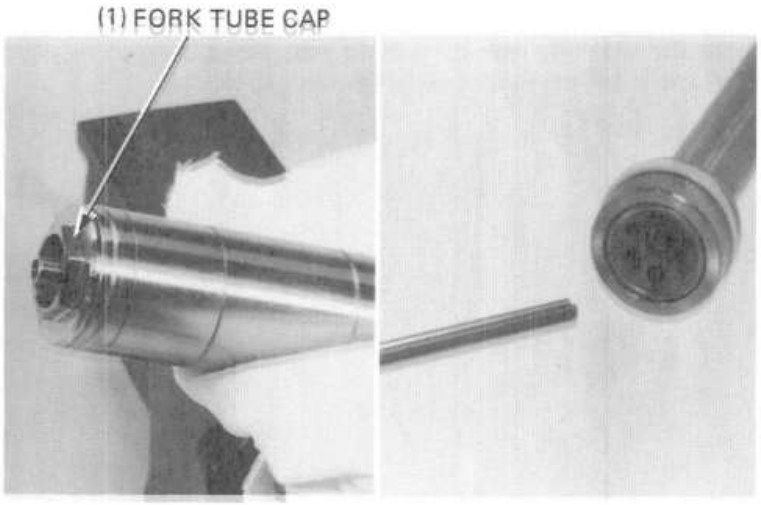


Install and torque the fork tube cap.

NOTE

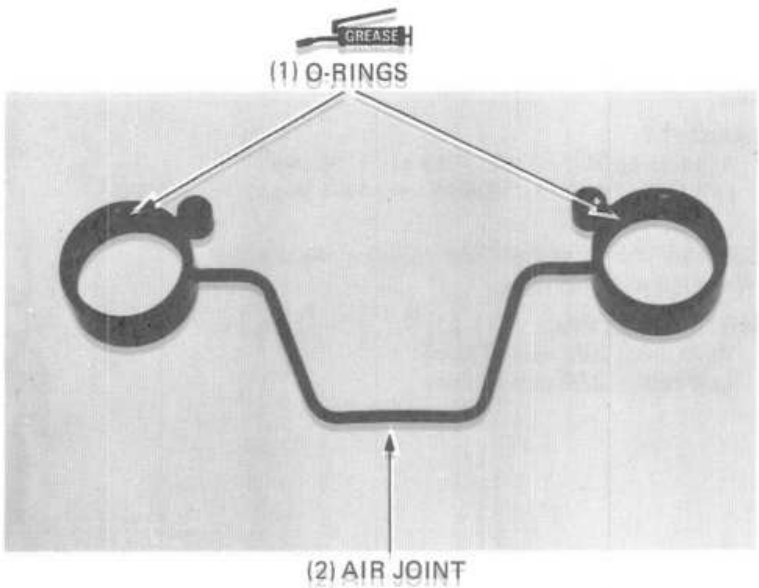
On the right fork, align the cavity on the damping adjuster rod with the flat side in the piston.

TORQUE: 15–30 N·m (1.5–3.0 kg-m, 11–22 ft-lb)



INSTALLATION

Make sure the air joint O-rings are in good condition and apply grease to them.



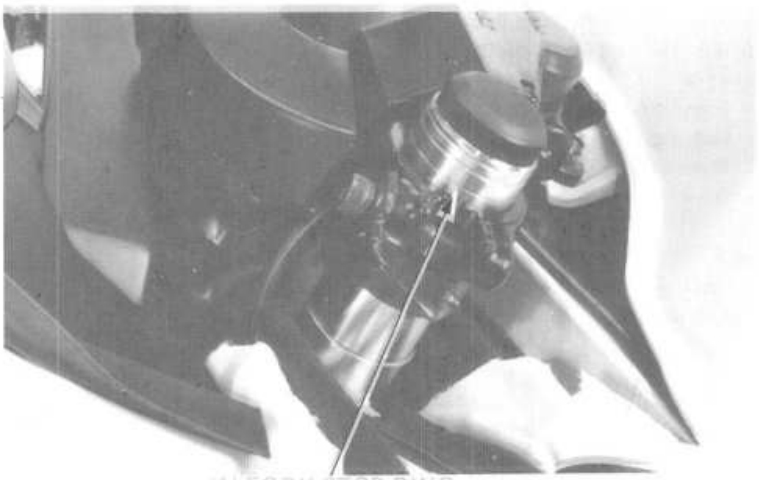
Install the air joint onto the fork top bridge and tighten the two screws.



Install the forks and temporarily tighten the bottom pinch bolts.

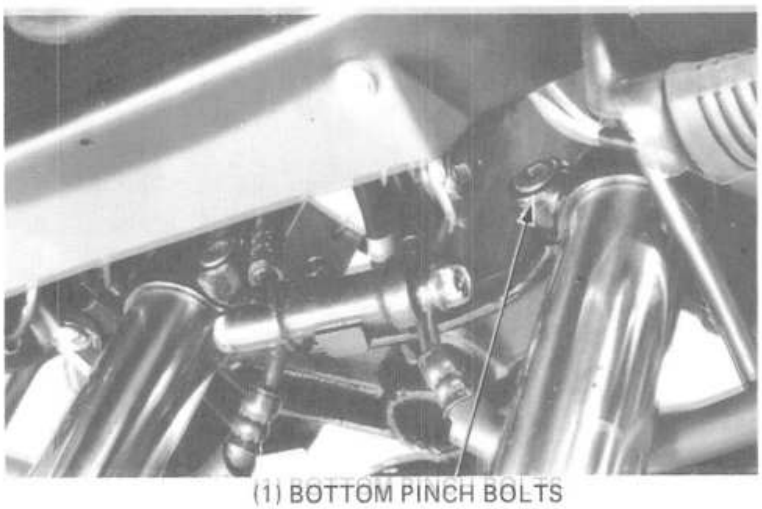
Install the fork stop rings in the grooves in the fork tube.

Push the fork tubes up until the stop rings contact the air joints.



Tighten the bottom pinch bolts.

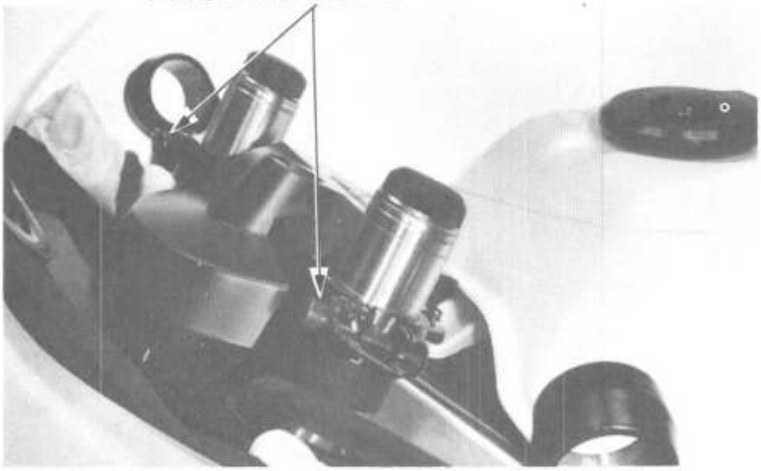
TORQUE: 45–55 N·m (4.5–5.5 kg-m, 33–40 ft-lb)



Tighten the top pinch bolts.

TORQUE: 20–30 N·m (2.0–3.0 kg-m, 14–22 ft-lb)

(1) TOP PINCH BOLTS



Loosely install the fork brace.

Install the removed parts in the reverse order of removal.

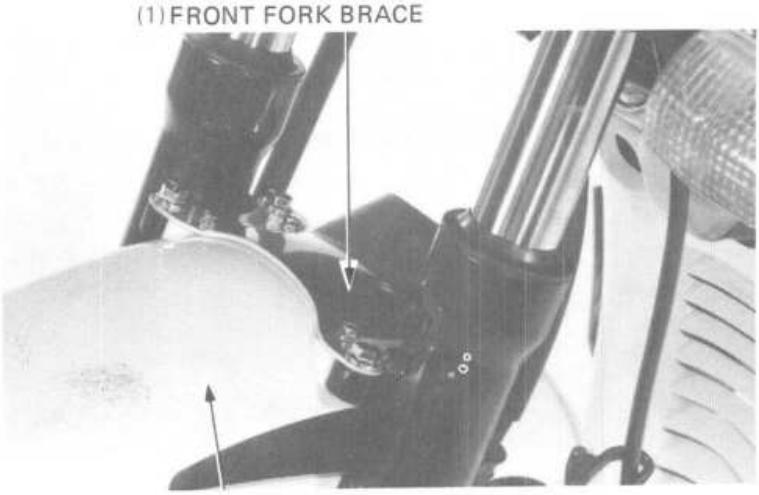
- front fender.
- handlebars.
- front wheel.
- fairing.

With the front brake applied, pump the forks up and down several times.

Tighten the front fork brace mounting bolts.

TORQUE: 24–30 N·m (2.4–3.0 kg-m, 17–22 ft-lb)

(1) FRONT FORK BRACE



(2) FRONT FENDER

Fill the fork tubes with air.

RECOMMENDER PRESSURE:
0–40 kPa (0–0.4 kg/cm^2, 0–6 psi)

CAUTION

- *Use only a hand-operated air pump to fill the fork tubes. Do not use compressed air.*
- *Maximum pressure is 300 kPa (3 kg/cm^2, 43 psi). Do not exceed this or fork tube component damage many occur.*

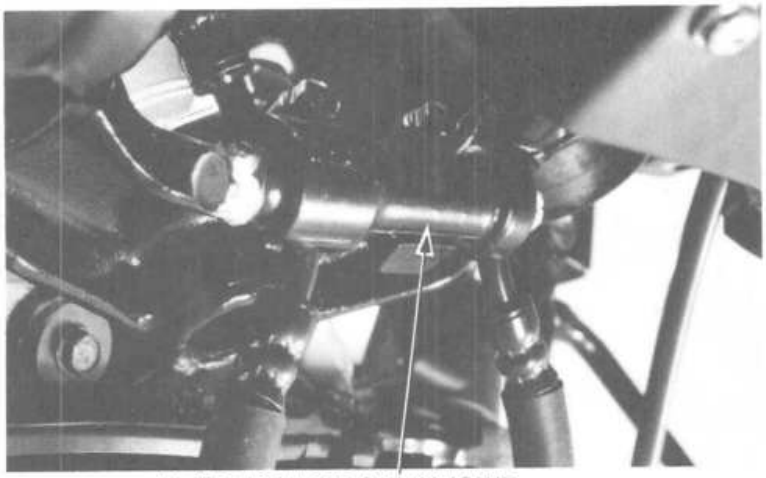
With the front brake applied, pump the forks up and down several times. Place the motorcycle on its center stand. Check the air pressure and adjust if necessary.



STEERING STEM

REMOVAL

Remove the following components.
- fairing.
- fuse box.
- handlebars.
- front wheel.
- brake hose 3-way joint.



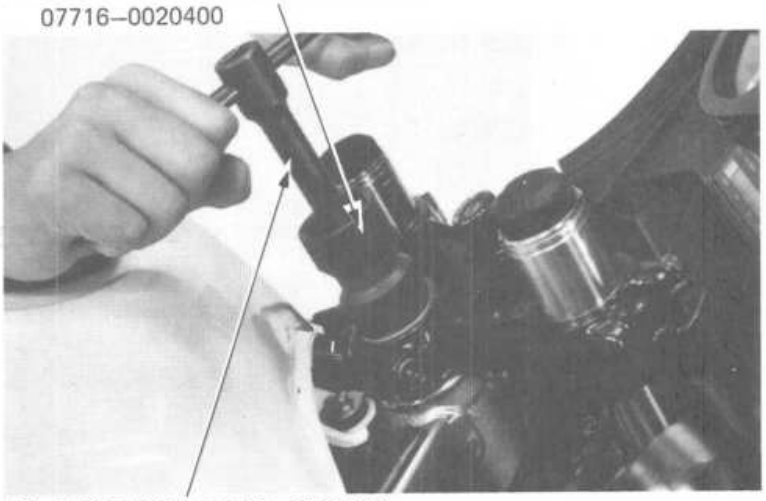
(1) BRAKE HOSE 3-WAY JOINT

Loosen and remove the steering stem nut.

Remove the forks.

Loosen the top bridge pinch bolt and remove the top bridge with the fork air joint.

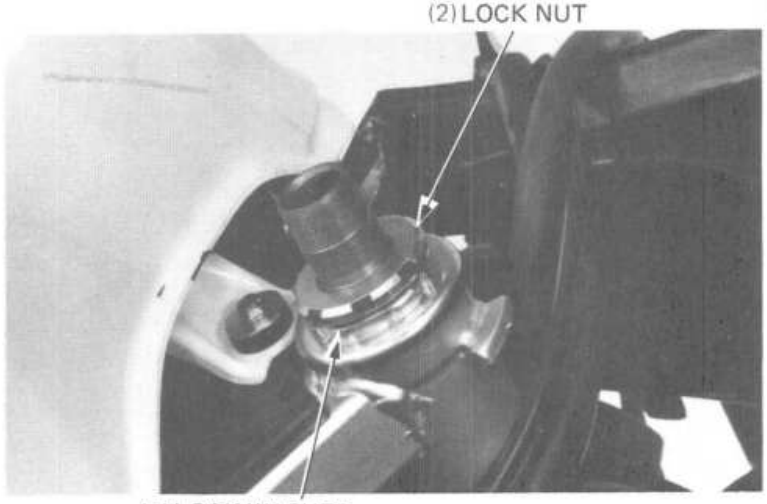
(1) LOCK NUT WRENCH, 30 x 32 mm
07716–0020400



(2) EXTENSION 07716–0020500
OR EQUIVALENT U.S.A.

Straighten the lock washer tabs and remove the lock nut and lock washer.

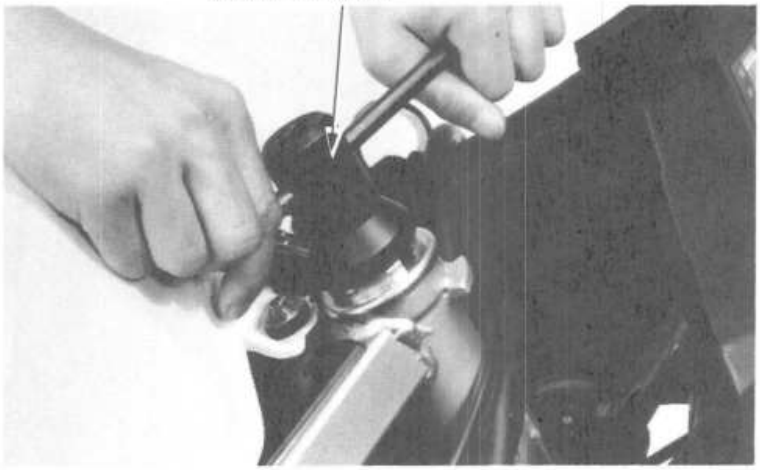
(2) LOCK NUT



(1) LOCK WASHER

Loosen the bearing adjustment nut and remove the steering stem.

(1) STEERING STEM SOCKET
07916–3710100



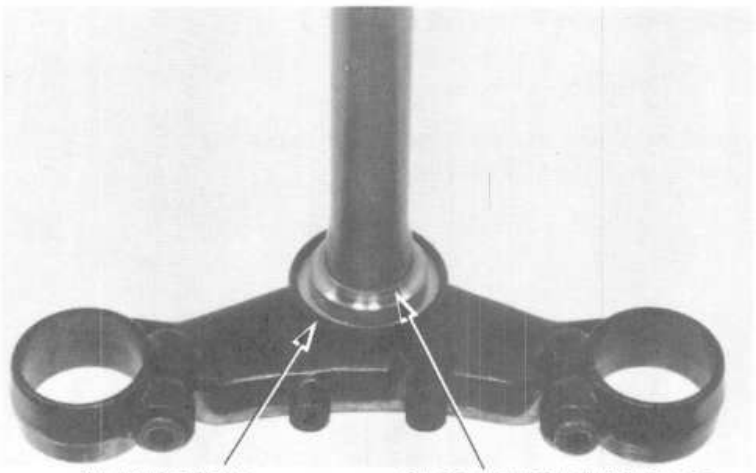
Check the steering stem bearings for damage or wear.

BEARING REPLACEMENT

NOTE

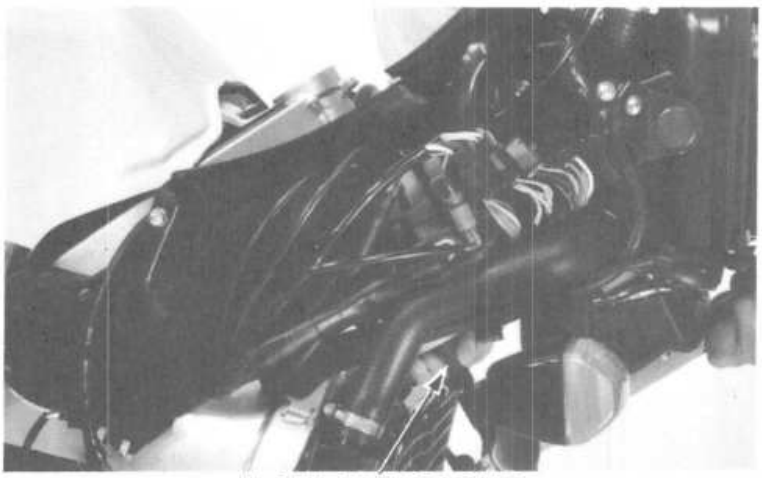
Replace the bearing and bearing race as a set.

Remove the grease retainer.
Remove the bearing inner race and dust seal from the steering stem.



(1) DUST SEAL (2) BEARING INNER RACE

Remove the upper bearing race with the special tool.

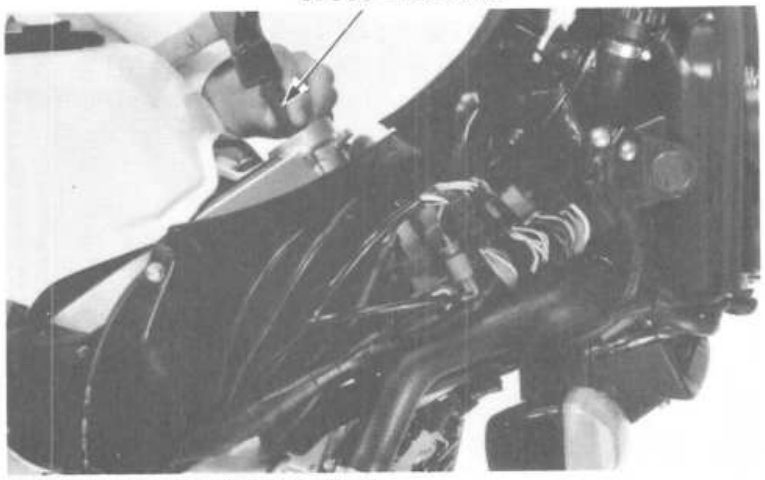


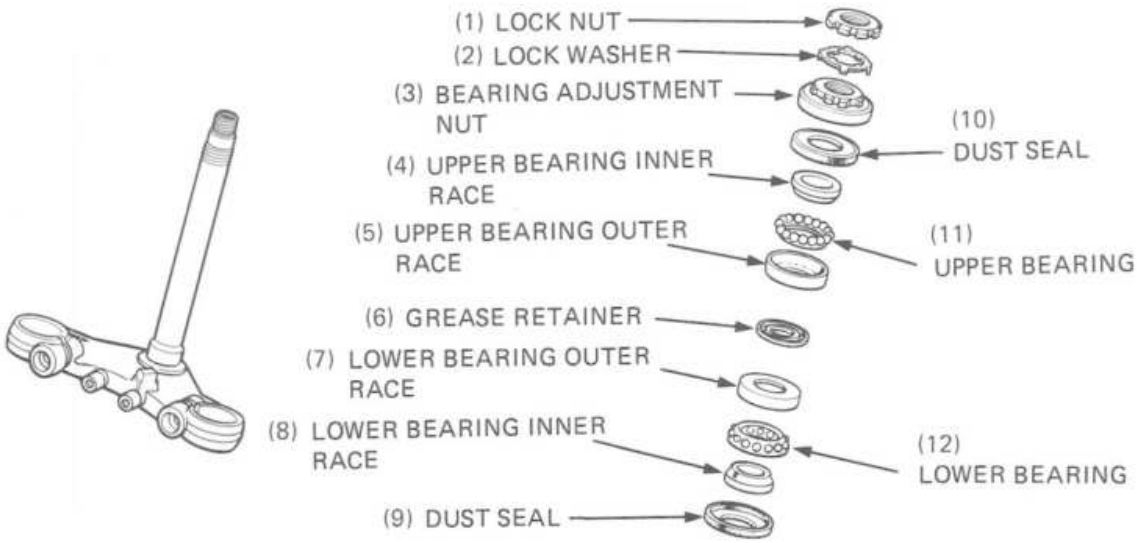
(1) BALL RACE REMOVER
07953–4250002

Remove the lower bearing race with the special tool.

NOTE

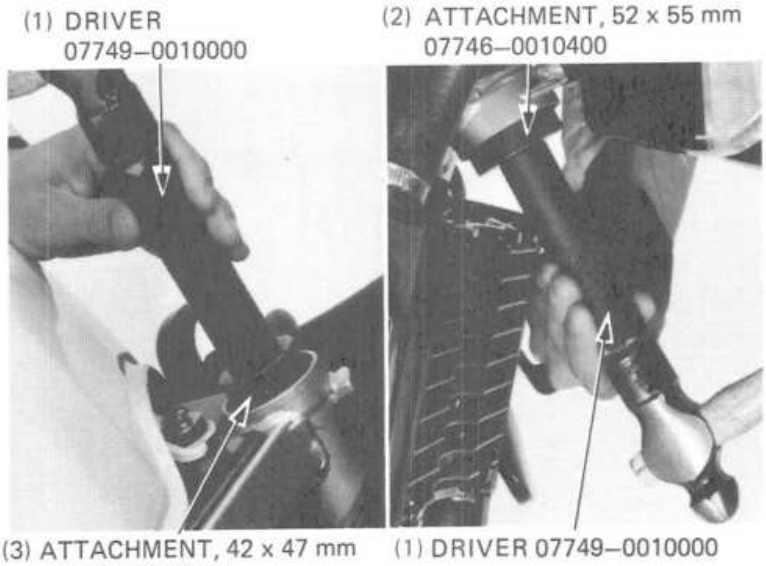
If the motorcycle has been involved in an accident, examine the area around the steering head for cracks.



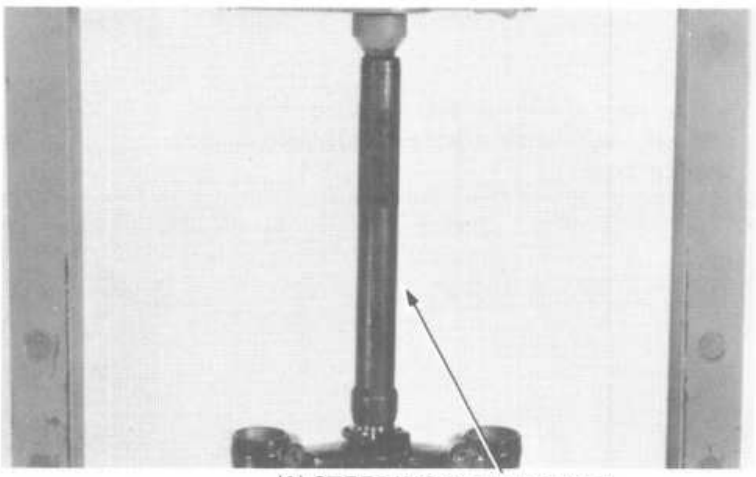


Drive the upper bearing outer race into the steering head.

Drive the lower bearing outer race into the steering head.



Install a dust seal onto the steering stem and press the lower bearing inner race over the stem with the special tool.



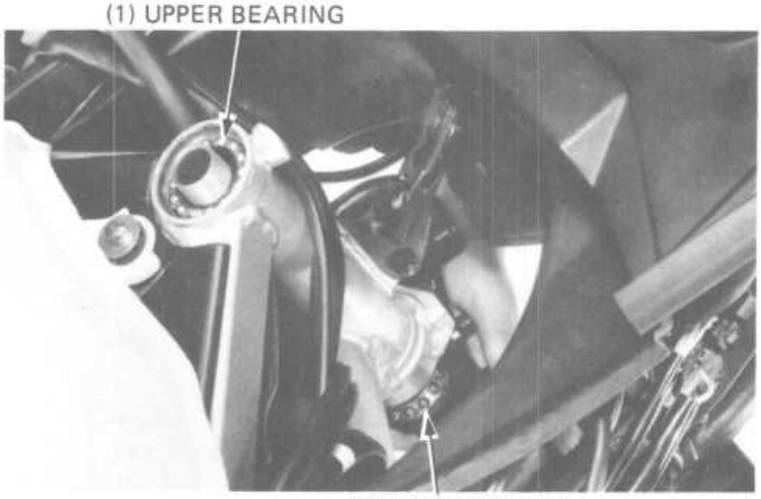
(1) STEERING STEM DRIVER
07946–MB00000

INSTALLATION

Pack the bearing cavities with bearing ease.

Install the lower bearing and grease retainer onto the steering stem, then insert the steering stem into the steering head. Install the upper bearing and inner race.

(1) UPPER BEARING

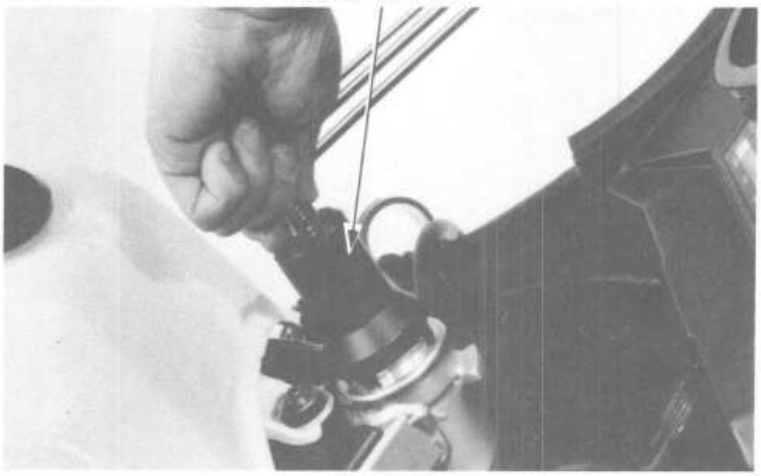


(2) LOWER BEARING

(1) STEERING STEM SOCKET
07916–3710100

Install and tighten the adjusting nut to the specified torque.

TORQUE: 23–27 N·m (2.3–2.7 kg-m, 14–22 ft-lb)



Turn the steering stem lock-to-lock 4–5 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 bearing adjustment nut lock washer.

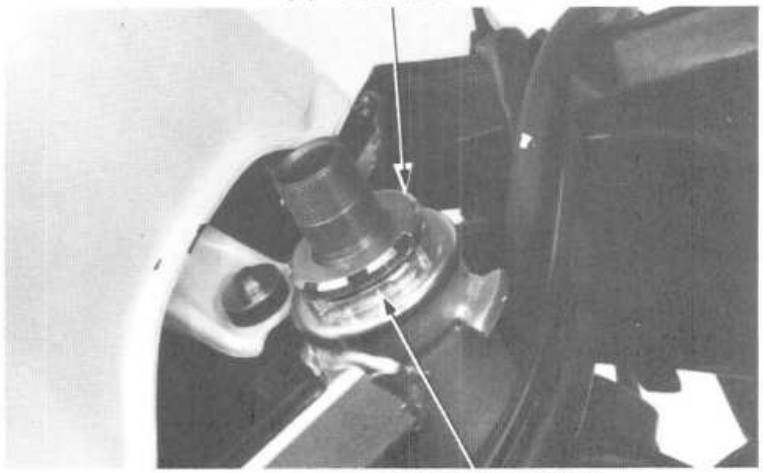
Hand tighten the lock nut.
Hold the adjustment nut and further tighten the lock nut only enough to align its grooves with the lock washer tabs.

NOTE

If the lock nut grooves cannot be easily aligned with the lock washer tabs, remove the nut, turn it over and reinstall it.

Bend two lock washer tabs up into the lock nut grooves.

(1) LOCK NUT



(2) LOCK WASHER

Install the top bridge with the fork air joint.
Install the front forks (page 15-25).
Install and tighten the steering stem nut.

TORQUE: 90–120 N·m (9.0–12.0 kg-m, 65–87 ft-lb)

(1) EXTENSION 07716–0020500



(2) LOCK NUT WRENCH, 30 x 32 mm
07716–0020400

STEERING HEAD BEARING PRELOAD

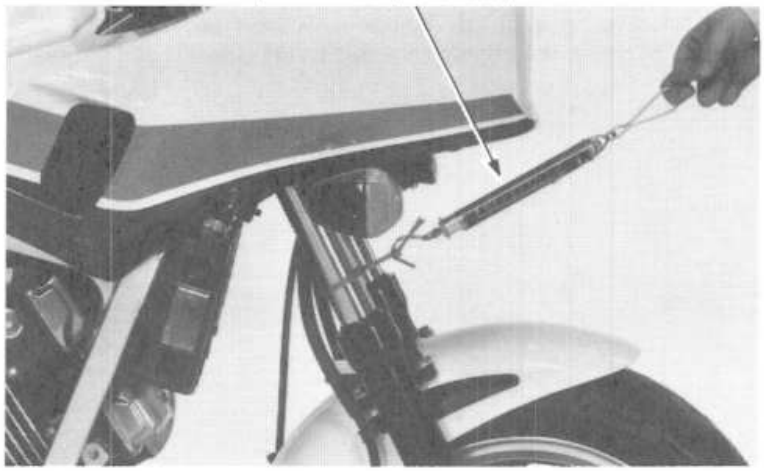
Install the front wheel (page 15-13).
Place a stand under the engine and raise the front wheel off the ground.
Position the steering stem to the straight ahead position.
Hook a spring scale to the fork tube and measure the steering head bearing preload.

NOTE

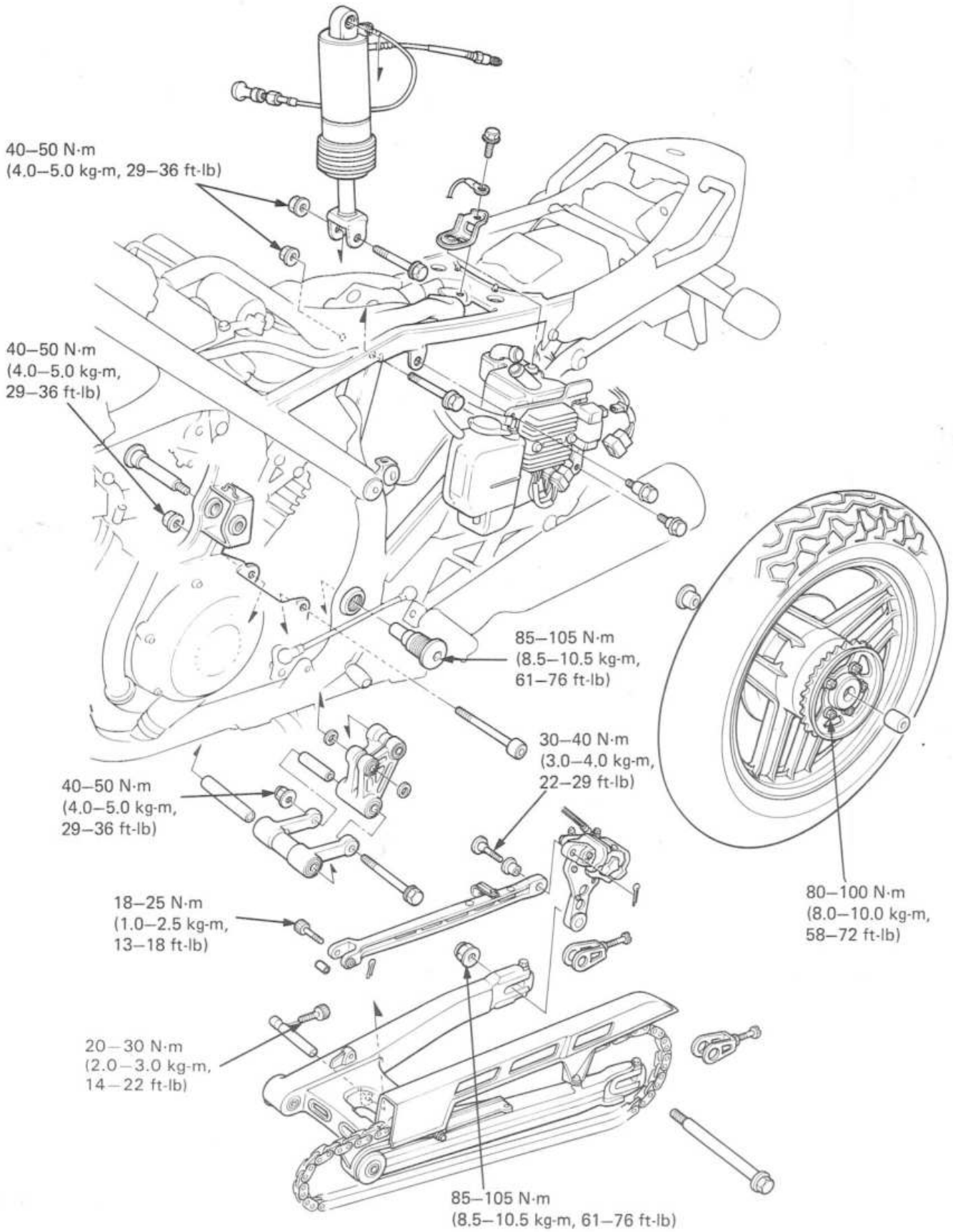
> Make sure that there is no cable and wire harness interference.

The preload should be within 1.0–1.6 kg (2.21–3.53 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.

(1) SPRING SCALE
(commercially available)



REAR WHEEL/SUSPENSION


40–50 N·m
(4.0–5.0 kg-m, 29–36 ft-lb)
40–50 N·m
(4.0–5.0 kg-m,
29–36 ft-lb)
85–105 N·m
(8.5–10.5 kg-m,
61–76 ft-lb)
30–40 N·m
(3.0–4.0 kg-m,
22–29 ft-lb)
40–50 N·m
(4.0–5.0 kg-m,
29–36 ft-lb)
18–25 N·m
(1.0–2.5 kg-m,
13–18 ft-lb)
80–100 N·m
(8.0–10.0 kg-m,
58–72 ft-lb)
20–30 N·m
(2.0–3.0 kg-m,
14–22 ft-lb)
85–105 N·m
(8.5–10.5 kg-m, 61–76 ft-lb)

SERVICE INFORMATION	16–1
TROUBLESHOOTING	16–2
REAR WHEEL	16–3
SHOCK ABSORBER	16–9
SWINGARM	16–15

SERVICE INFORMATION

GENERAL

- The rear wheel uses a tubeless tire. For tubeless tire repairs, refer to the TUBELESS TIRE MANUAL.

SPECIFICATIONS

		STANDARD	SERVICE LIMIT
Axle runout		–	0.2 mm (0.01 in)
Rear wheel rim runout	Radial	–	2.0 mm (0.08 in)
	Axial	–	2.0 mm (0.08 in)
Shock absorber air pressure		0 – 300 kPa (0 – 3.0 kg/cm², 0 – 43 psi)	–

TORQUE VALUES

Shock arm-to-frame bolts		40–50 N·m (4.0–5.0 kg-m, 29–36 ft-lb)
Shock link-to-shock arm bolt		40–50 N·m (4.0–5.0 kg-m, 29–36 ft-lb)
Rear shock absorber mount bolts		40–50 N·m (4.0–5.0 kg-m, 29–36 ft-lb)
Swingarm pinch bolt		20–30 N·m (2.0–3.0 kg-m, 14–22 ft-lb)
Swingarm pivot bolts		85–105 N·m (8.5–10.5 kg-m, 61–76 ft-lb)
Rear brake torque rod	8 mm	18–25 N·m (1.8–2.5 kg-m, 13–18 ft-lb)
	10 mm	30–40 N·m (3.0–4.0 kg-m, 22–29 ft-lb)
Final driven sprocket		80–100 N·m (8.0–10.0 kg-m, 58–72 ft-lb)
Rear brake disc		35–40 N·m (3.5–4.0 kg-m, 25–29 ft-lb)
Rear axle nut		85–105 N·m (8.5–10.5 kg-m, 61–76 ft-lb)

TOOLS

Special

Needle bearing remover	07931 – MA70000
Oil seal driver attachment	07965 – MB00100
Oil seal driver attachment ring	07965 – ME70100
Oil seal driver	07965 – MC70100

Common

Attachment, 32 x 35 mm	07746–0010100
Attachment, 37 x 40 mm	07746–0010200
Attachment, 42 x 47 mm	07746–0010300
Attachment, 52 x 55 mm	07746–0010400
Attachment, 62 x 68 mm	07746–0010500
Pilot, 17 mm	07746–0040400
Pilot, 20 mm	07746–0040500
Pilot, 25 mm	07746–0040600
Driver	07749–0010000
Bearing remover shaft	07746–0050100
Bearing remover head, 20 mm	07746–0050600

TROUBLESHOOTING

Oscillation
1. Bent rim
2. Loose wheel bearings
3. Faulty tire
4. Loose axle
5. Tire pressure incorrect
6. Swingarm bearings worn
7. Worn tires

Soft suspension
1. Weak spring
2. Insufficient fluid in shock absorber
3. Shock absorber air pressure incorrect

Hard suspension
1. Incorrect fluid weight in shock absorber
2. Bent shock absorber
3. Shock absorber air pressure incorrect

Suspension noise
1. Shock case binding
2. Loose fasteners

REAR WHEEL

REMOVAL

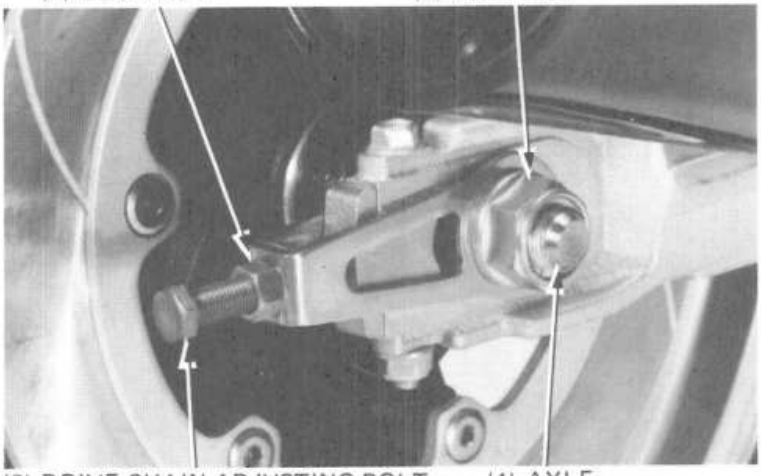
Place the motorcycle on its center stand.
Loosen the drive chain adjusting bolts lock nuts and the adjusting bolts.

Remove the axle nut and axle.

Push the wheel forward and remove the drive chain from the driven sprocket and remove the rear wheel.

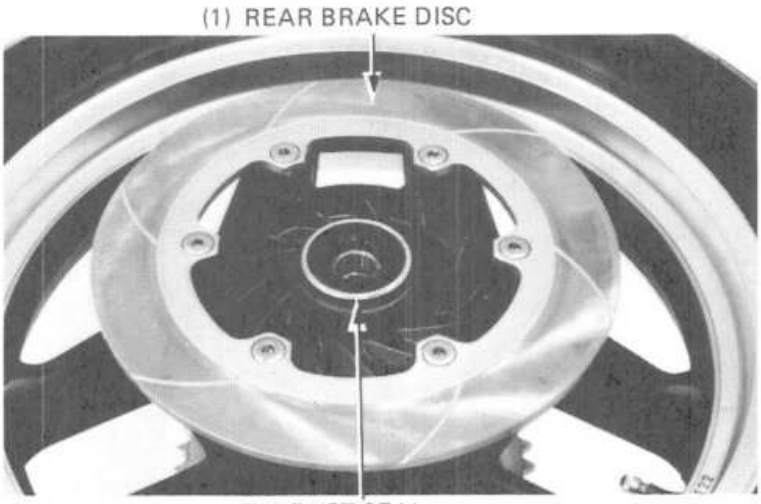
NOTE

> If you depress the brake pedal after the rear wheel is removed the caliper piston will move out and make reassembly difficult.



DISASSEMBLY

Remove the rear brake disc.
Remove the dust seal.

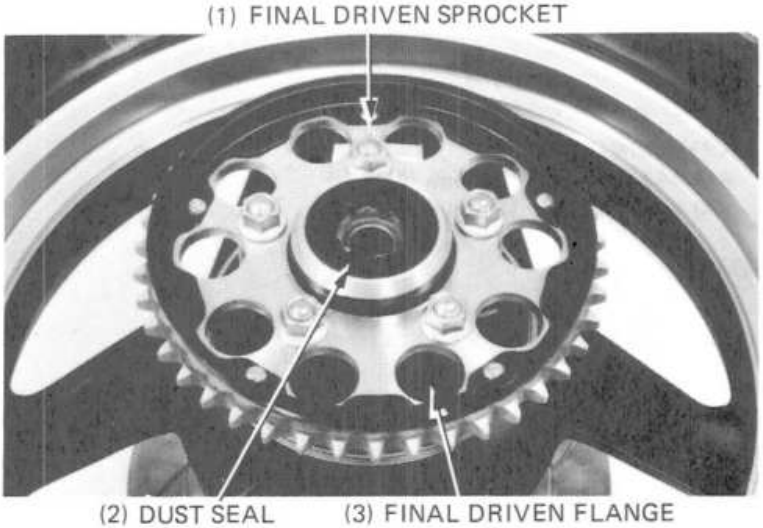


Remove the final driven sprocket and driven flange together.

NOTE

> Do not separate the driven sprocket and flange, unless replacement of the driven sprocket or flange is necessary.

Remove the dust seal from the final driven flange.

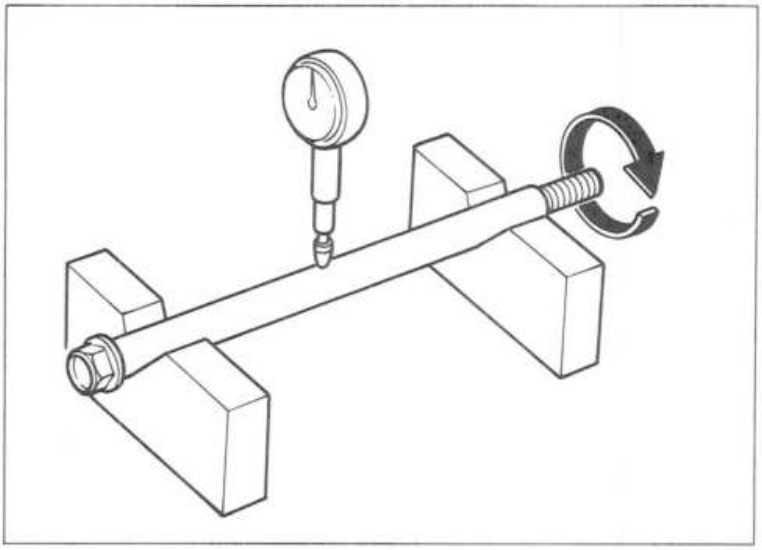


INSPECTION

AXLE

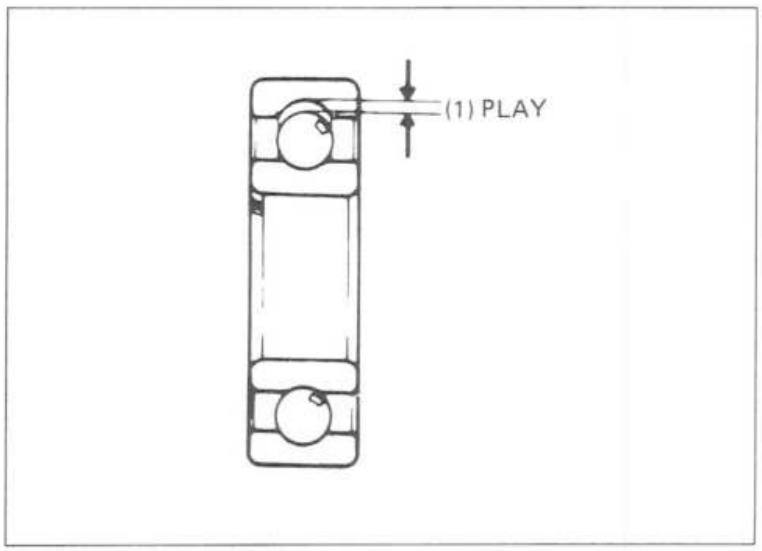
Set the axle in V blocks and read the axle runout with a dial indicator.

SERVICE LIMIT: 0.2 mm (0.01 in)



REAR WHEEL BEARING

Check the wheel bearing play by rotating the wheel by hand. Replace the bearings with new ones if they are noisy or have excessive play.



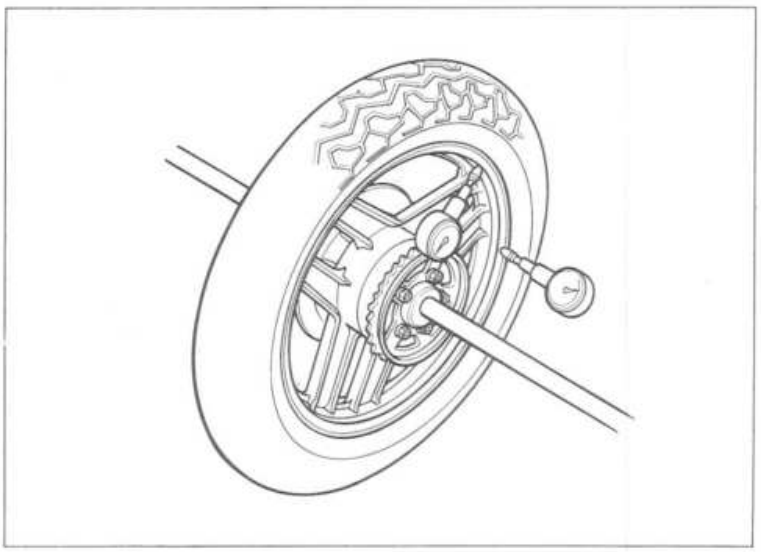
REAR WHEEL RIM RUNOUT

Check the rim for 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 serviced and must be replaced if the above limits are exceeded.

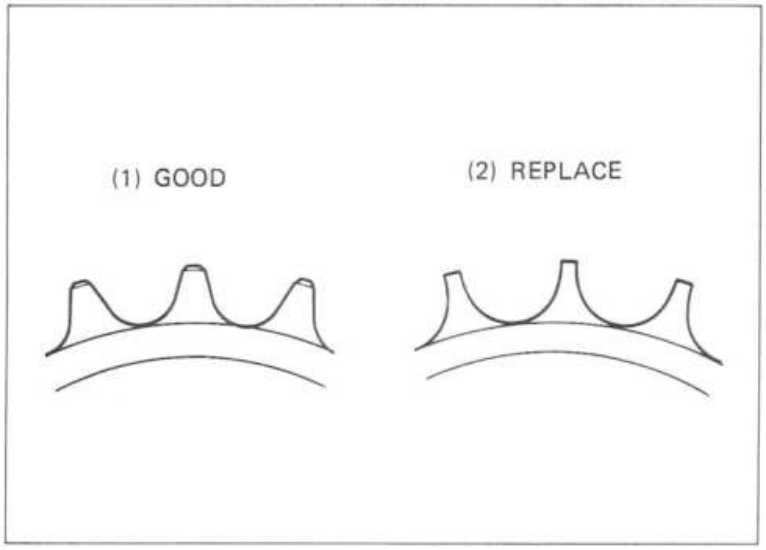


FINAL DRIVEN SPROCKET

Check the condition of the final driven sprocket teeth. Replace the sprocket if worn or distorted.

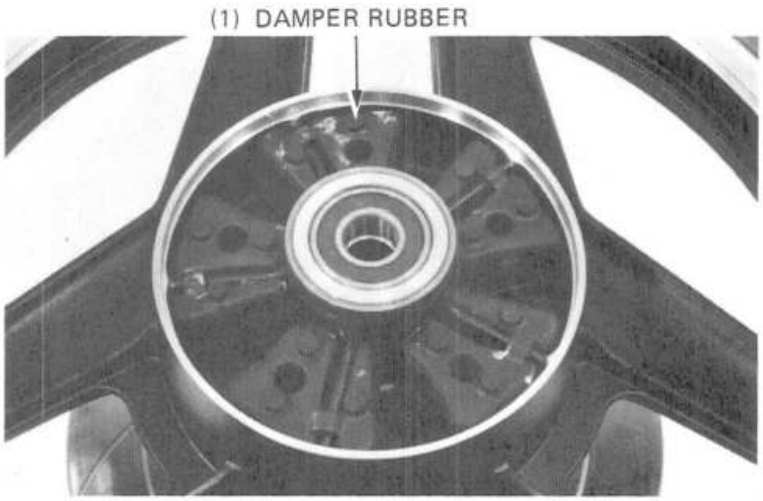
NOTE

If the final driven sprocket requires replacement, inspect the drive chain and drive sprocket.



DAMPER RUBBERS

Replace the damper rubbers if they are damaged or deteriorated.

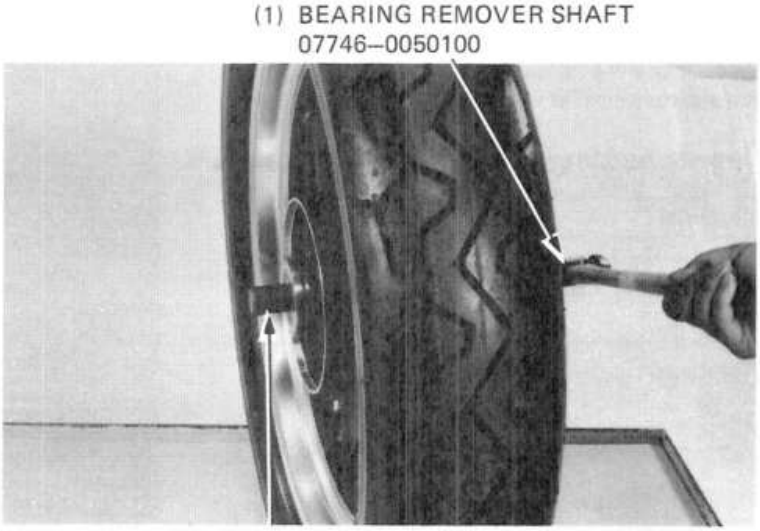


BEARING REPLACEMENT

Remove the wheel bearings.
Drive the driven flange side bearing out.

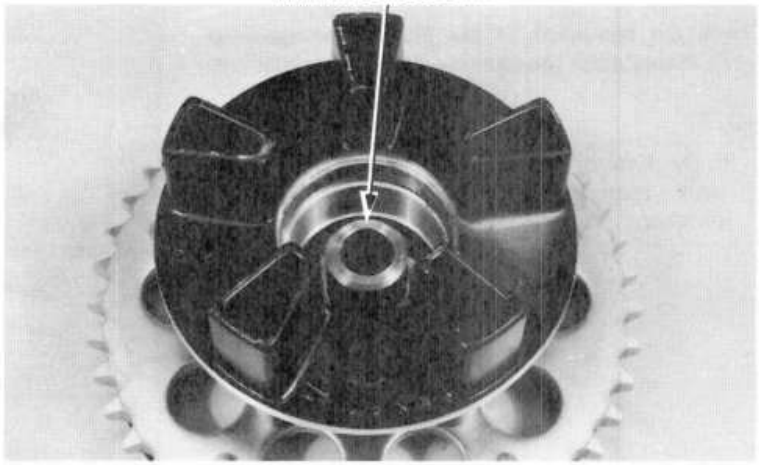
NOTE

Never reinstall old bearings; once the bearings are removed, they must be replaced with new ones.



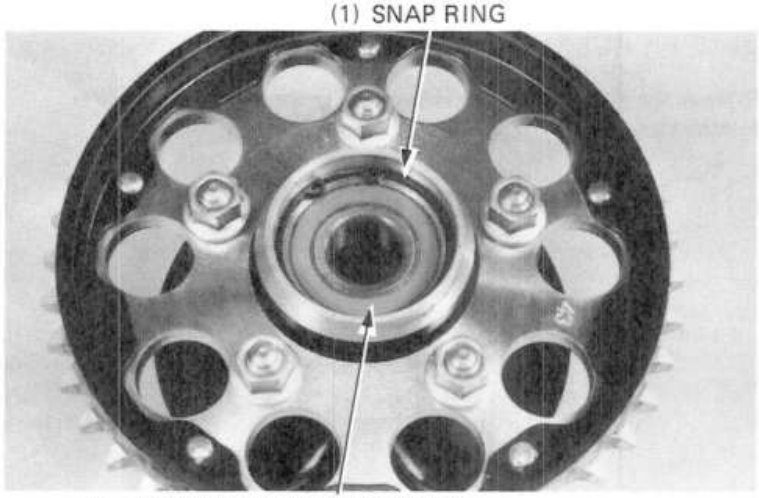
Remove the rear axle sleeve.

(1) AXLE SLEEVE



Remove the snap ring.
Drive the driven flange bearing out.

(1) SNAP RING



(2) DRIVEN FLANGE BEARING

(2) ATTACHMENT, 52 x 55 mm
07746–0010400
PILOT, 20 mm
07746–0040500

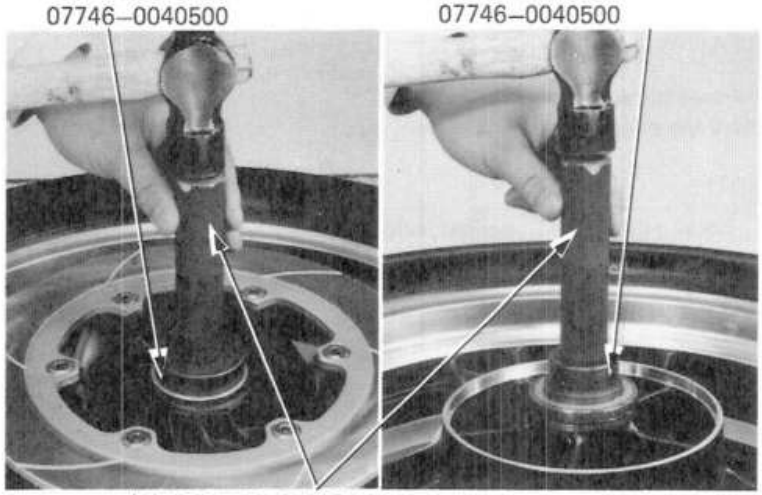
(3) ATTACHMENT, 42 x 47 mm
07746–0010300
PILOT, 20 mm
07746–0040500

Pack all bearing cavities with grease.
Press distance collar into place from the left side.

Drive the right bearing in first, then the left bearing.

CAUTION

Drive the bearings in squarely with the sealed end facing out, making sure they are fully seated.



(1) DRIVER 07749–0010000

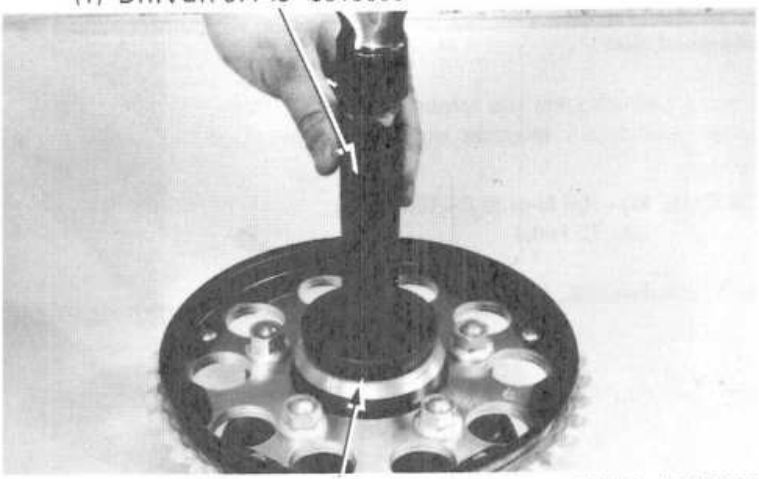
Drive the driven flange bearing in.

DRIVER	07749–0010000
ATTACHMENT, 62 x 68 mm	07746–0010500
PILOT, 25 mm	07746–0040600

CAUTION

Drive the bearings in squarely with the sealed end facing out, making sure they are fully seated.

Install the snap ring and rear axle sleeve.



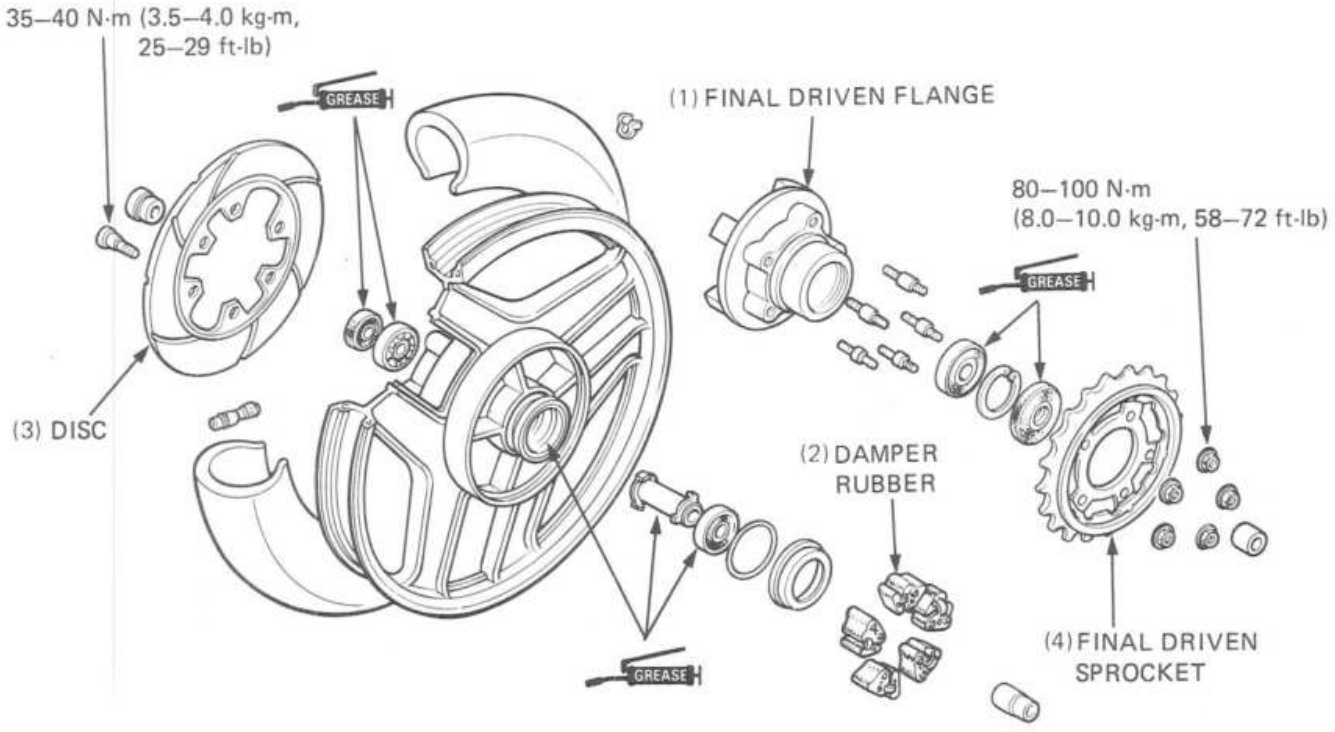
ASSEMBLY

NOTE

The rear wheel uses a tubeless tire. For tubeless tire repairs, refer to the Tubeless Tire Manual.

WARNING

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

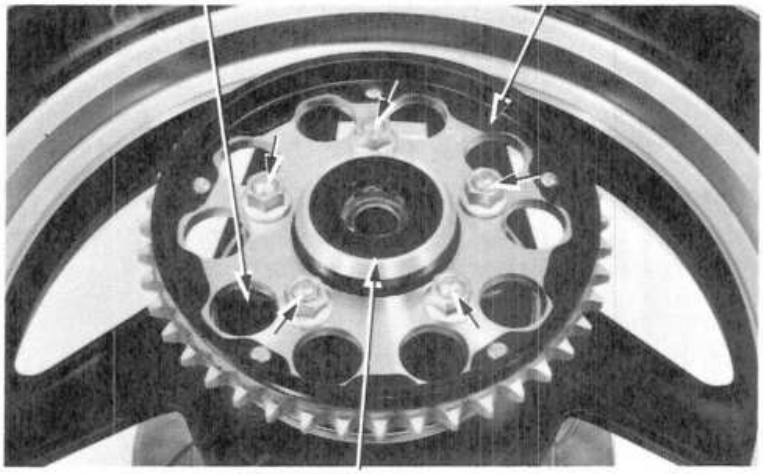


Install the rear axle sleeve, final driven flange and driven sprocket.

If the driven sprocket was removed from the flange, tighten the driven sprocket nuts to the specified torque.

TORQUE: 80–100 N·m (8.0–10.0 kg-m, 58–72 ft-lb)

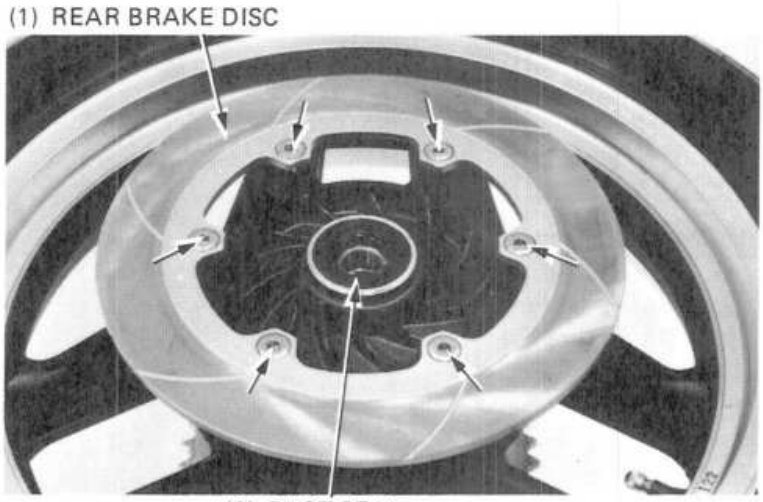
Install the dust seal.



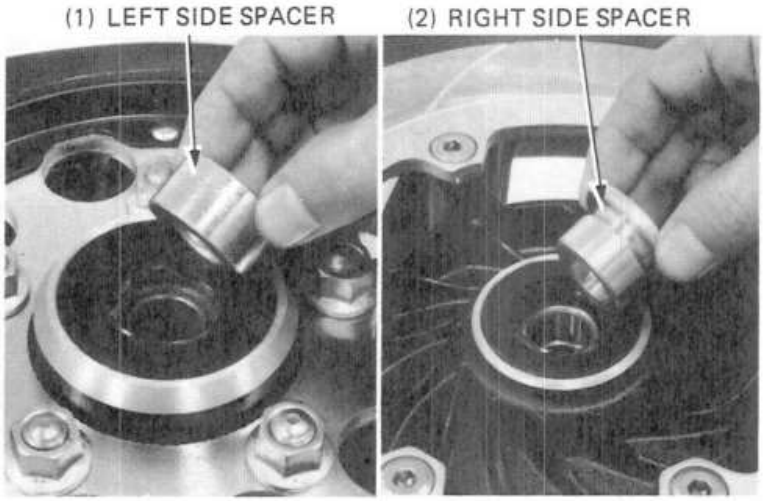
Install the brake disc and tighten the bolts.

TORQUE: 35–40 N·m (3.5–4.0 kg-m, 25–29 ft-lb)

Install the dust seal.



Install the left and right side spacers.



INSTALLATION

Install the rear wheel in the reverse order of removal.

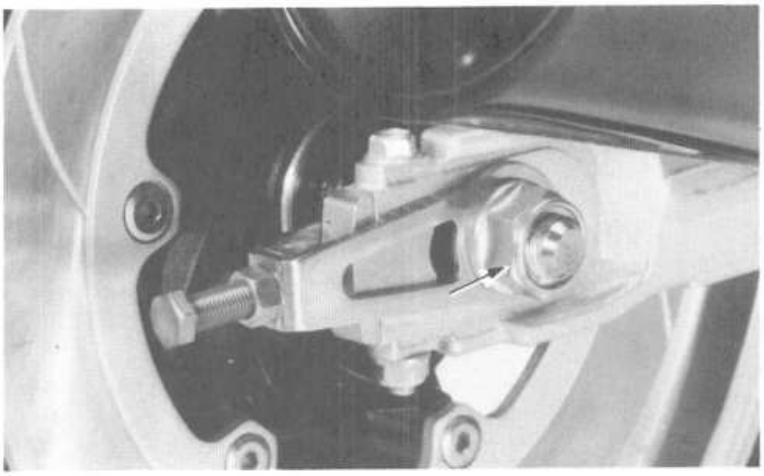
NOTE

- When installing the wheel, carefully fit the brake disc between the brake pads.
- After installing the wheel, apply the brake several times. Then check that the wheel rotates freely. Recheck wheel installation if the brake drags or if the wheel does not rotate freely.

Tighten the rear axle nut.

TORQUE: 85–105 N·m (8.5–10.5 kg-m, 61–76 ft-lb)

Adjust the drive chain slack (page 3-13).



SHOCK ABSORBER

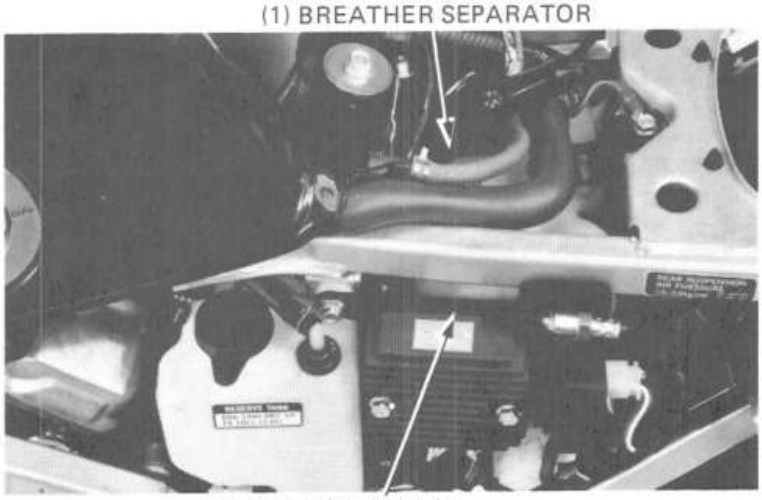
REMOVAL

Place the motorcycle on its center stand.

Remove the seat and left frame side cover.

Remove the breather separator and the electric panel.

(1) BREATHER SEPARATOR

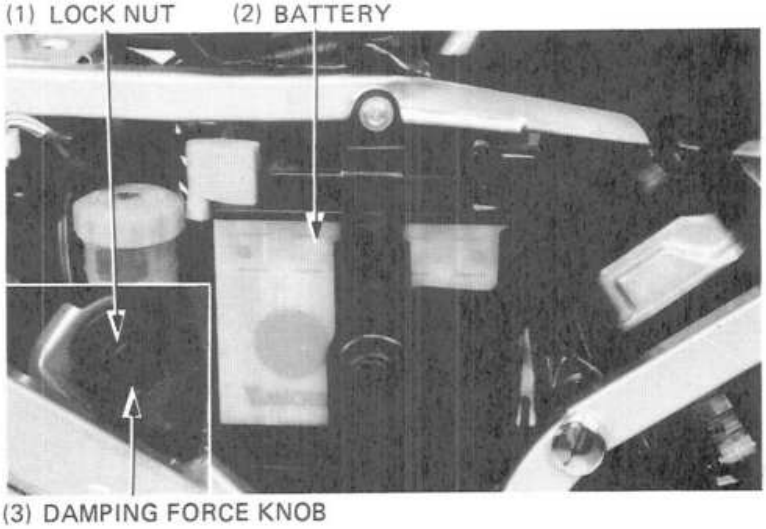


(2) ELECTRIC PANEL

Remove the battery.

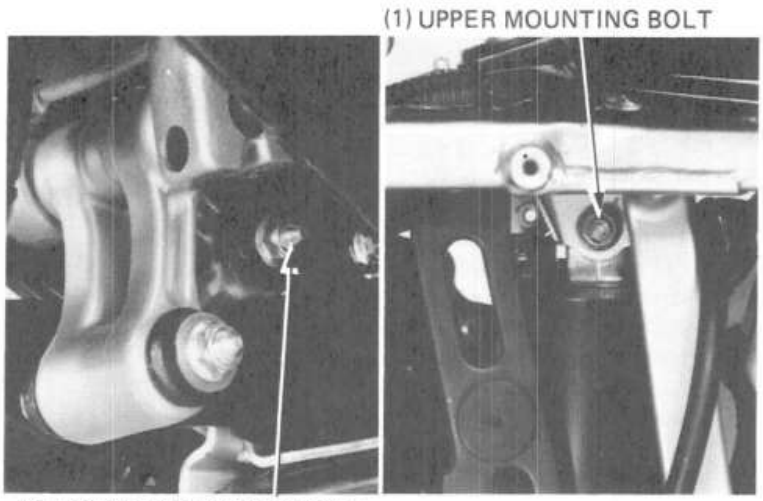
Remove the rear shock absorber damping force knob from the frame by loosening the lock nut.

(1) LOCK NUT (2) BATTERY



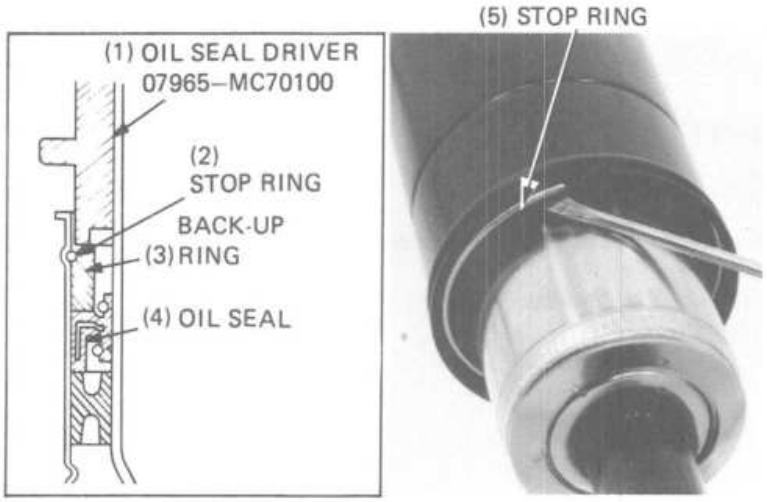
(3) DAMPING FORCE KNOB

Remove the shock absorber lower mounting bolt. Remover the shock absorber upper mounting bolt, tilt the shock absorber rearward and remove it from the frame by pulling it up.

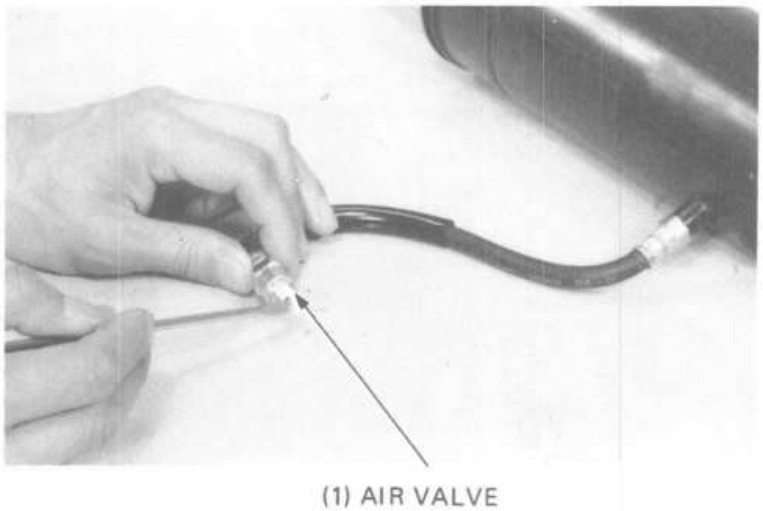


REAR SHOCK ABSORBER OIL SEAL REPLACEMENT

Remove the rear shock absorber (page 16-9).
Remove the boot band and boot.
To remove the stopper ring, press down on the back-up plate and oil seal.
Remove the stopper ring and back-up plate.



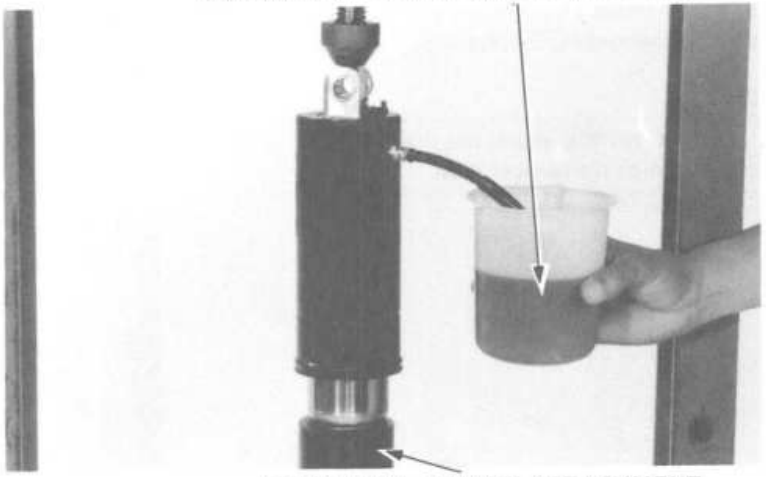
Release air pressure and remove the air valve from the hose.



Place about 300 cm^3 (10.1 oz) of damper oil (ATF or equivalent) in a clean container.
Place the shock absorber in a hydraulic press with an OIL SEAR DRIVER ATTACHMENT positioned as shown.
Place the air hose in the oil and press the shock absorber several times until the damper is filled with the oil.

NOTE

- Do not over-press the shock.
- This shock absorber's store is 42.5 mm (1.67 in).



Place the shock absorber up right in an oil drain pan. Let the shock stand for 5 minutes to allow air to escape.



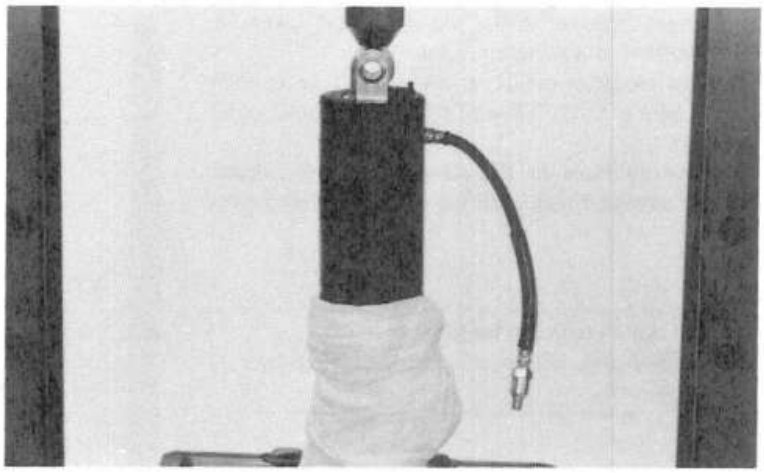
Reinstall the air valve in the air hose.
Place the shock absorber in the hydraulic press using the oil seal driver attachment.
Wrap a shop towel around the shock absorber.
Press the oil seal out by compressing the shock absorber.



Leave the shock absorber for another 5 minutes to let any remaining ATF drain out.

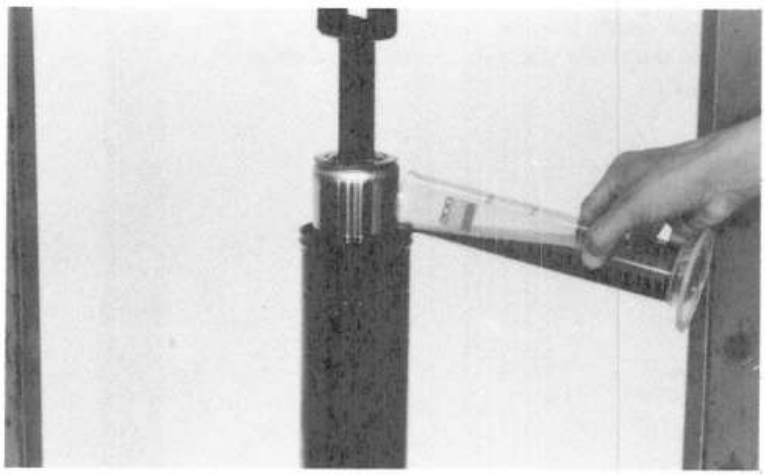
NOTE

Do not tilt the shock absorber or ATF will flow out of the damper case.



Turn the shock absorber upside down as soon as all the ATF has drained from the outer case.
Fill the damper case with the specified amount of ATF.

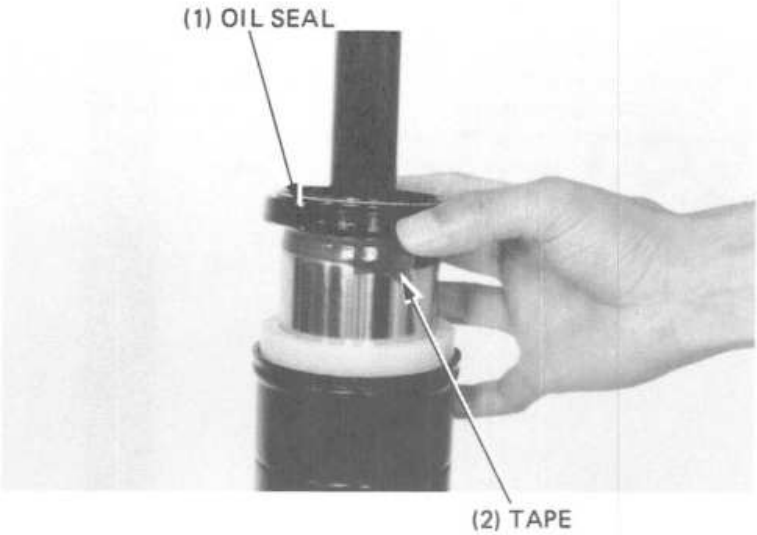
SPECIFIED AMOUNT:
120 cc (4.06 US oz., 3.38 Imp. oz.)



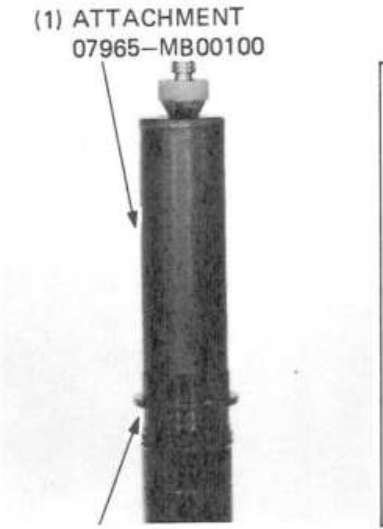
Install the guide bushing into the damper case.
Wrap a piece of tape around the groove at the end of the shock absorber.
Dip the oil seal in damper oil and install it on the damper.

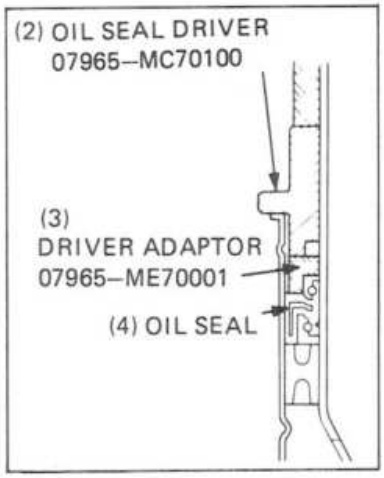
CAUTION

Be careful not to damage the oil seal during installation.



Press the oil seal into the shock absorber with a hydraulic press until the oil seal driver and oil seal driver ring stops at the edge of the outer case.



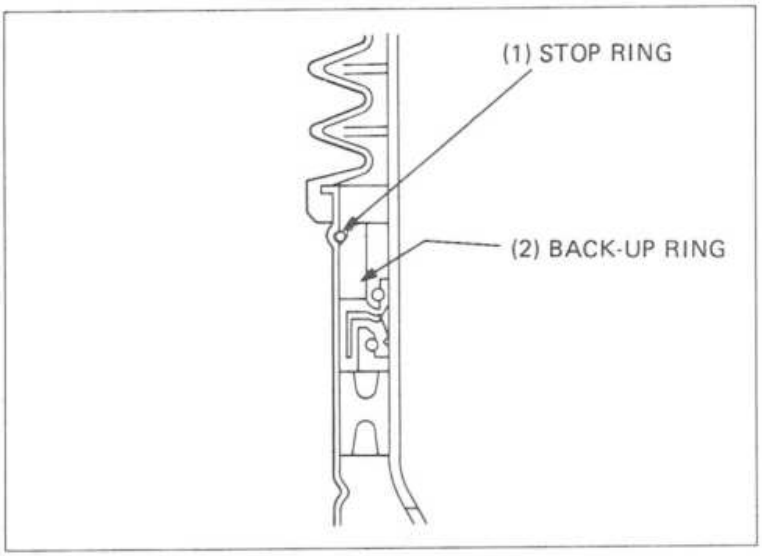


Install the back-up ring.
Install the stop ring, being certain that it is seated in the ring groove in the outer case.

NOTE

Be sure stop ring is seated in the ring groove all the way around.

Install the boot and boot clip.



INSTALLATION

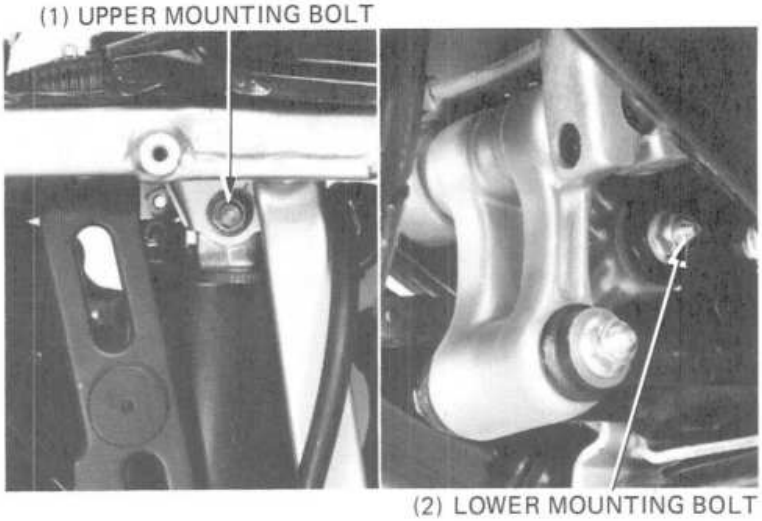
Apply paste grease (containing more than 45% of molybdenum) to the upper mounting bushings.

NOTE

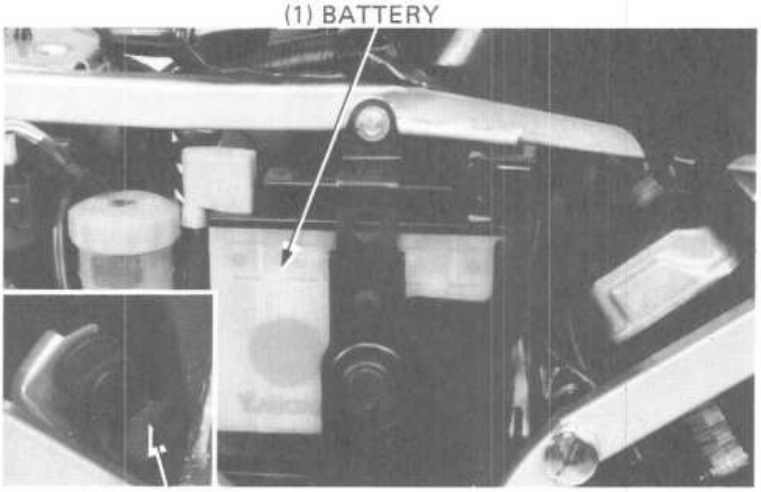
Use paste grease (containing more than 45% of molybdenum) as follows:
* MOLYKOTE G-n PASTE manufactured by Dow Corning, U.S.A.
* Locol Paste manufactured by Sumico Lubricant, Japan.
* Other lubricants of equivalent quality.

Install the shock absorber in the frame and tighten the upper and lower mounting bolts.

TORQUE: 40–50 N·m (4.0–5.0 kg-m, 29–36 ft-lb)



Install the battery.
Install the damping force knob onto the knob bracket on the frame.



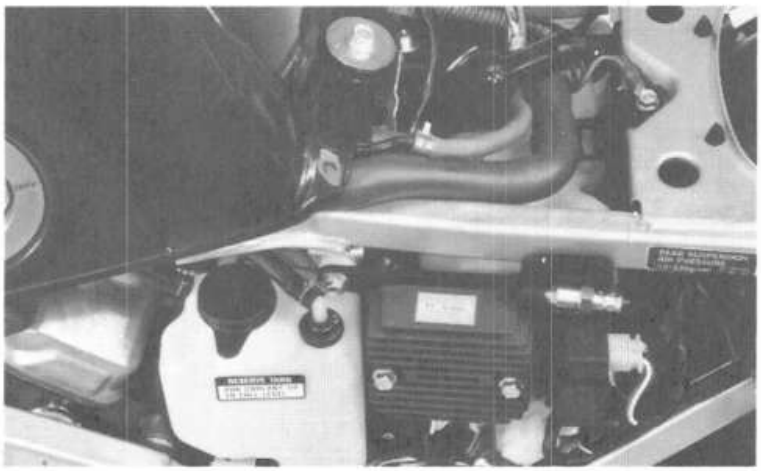
Install the electric panel and crankcase breather separator.

NOTE

Route the wires, hoses and tubes properly (pages 1-9 thru 11).

Install the left frame side cover and seat.

Adjust the air pressure (page 3-18).



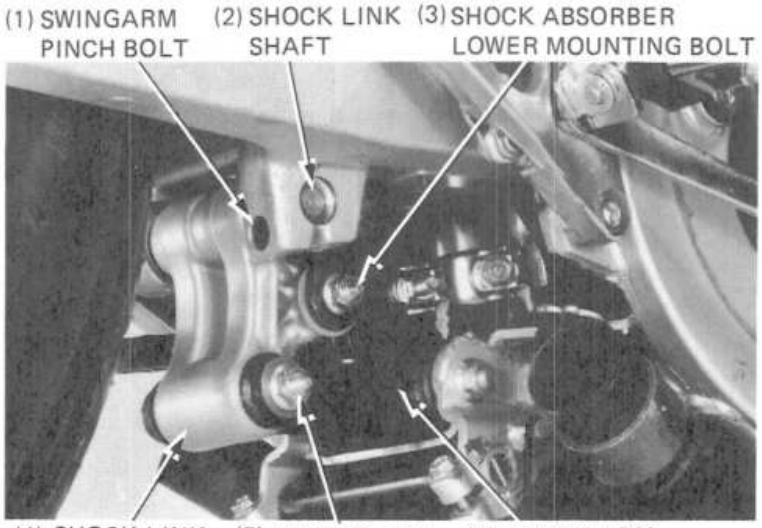
SHOCK ABSORBER LINKAGE

REMOVAL

Remove the left and right mufflers.

Remove the shock link by removing the shock absorber lower mounting bolt, shock link-to-shock arm bolt, swingarm pinch bolt, and shock link shaft.

Remove the shock arms from the frame.

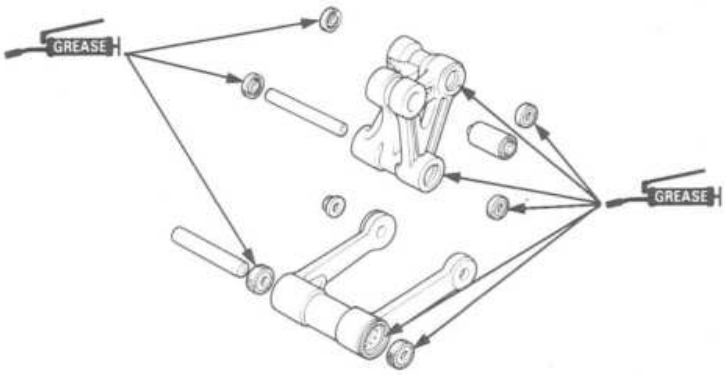


LINKAGE PIVOT INSPECTION

Check the linkage needle bearings and collars for wear or damage.
Inspect the dust seals for damage.
Replace parts as necessary.

SHOCK LINKAGE INSTALLATION

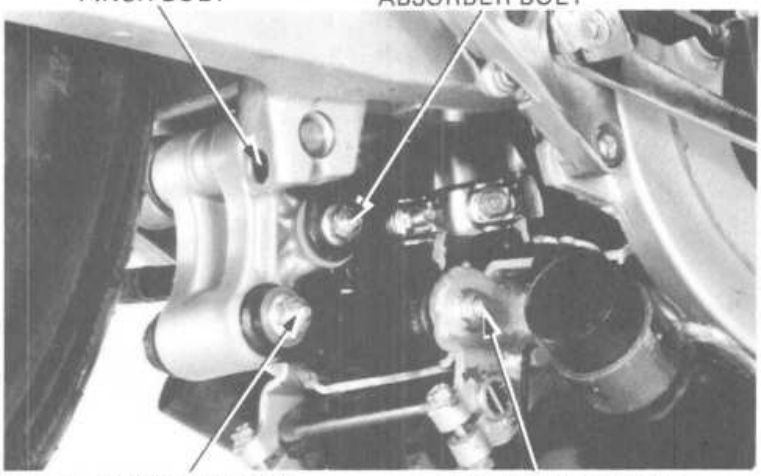
Apply molybdenum disulfide grease to the needle bearings and dust seals.



Install the shock arms and shock link and tighten each bolt in the order listed.

TORQUE:
SHOCK ARM-TO-FRAME:
40–50 N·m (4.0–5.0 kg-m, 29–36 ft-lb)
SHOCK LINK-TO-SHOCK ABSORBER
40–50 N·m (4.0–5.0 kg-m, 29–36 ft-lb)
SHOCK LINK-TO-SHOCK ARM:
40–50 N·m (4.0–5.0 kg-m, 29–36 ft-lb)
SWING ARM PINCH BOLT:
20–30 N·m (2.0–3.0 kg-m, 14–22 ft-lb)

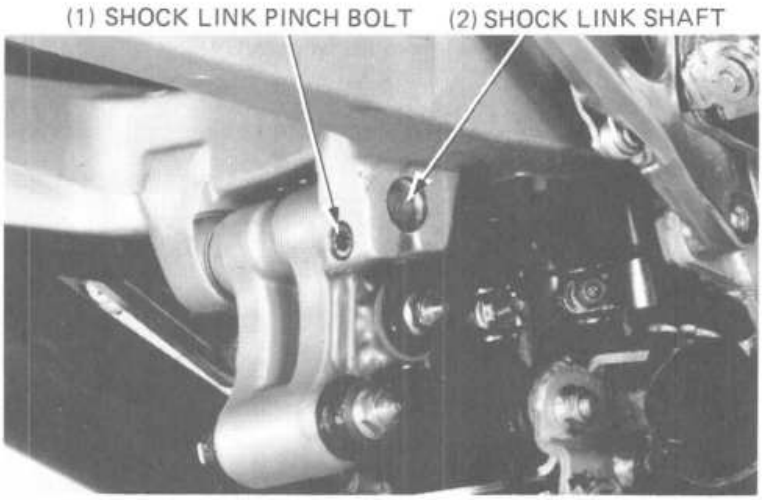
Install the mufflers.



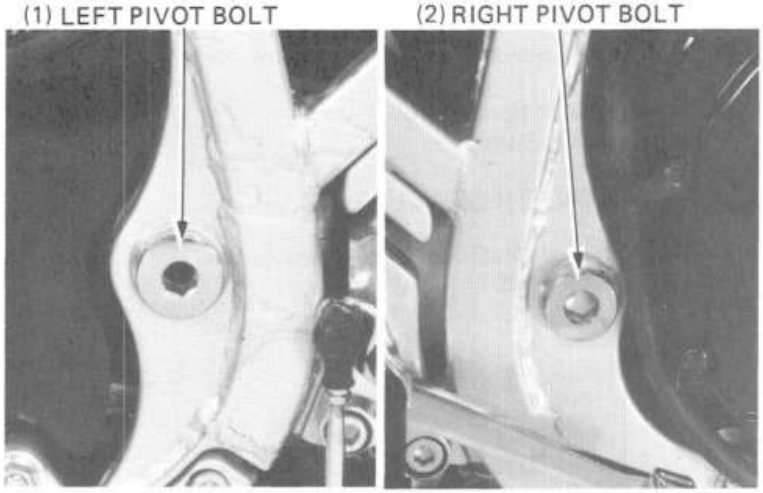
SWING ARM

REMOVAL

Remove the rear wheel (page 16-3).
Remove the right muffler.
Remove the drive chain cover.
Remove the shock link pinch bolt and shock link shaft.

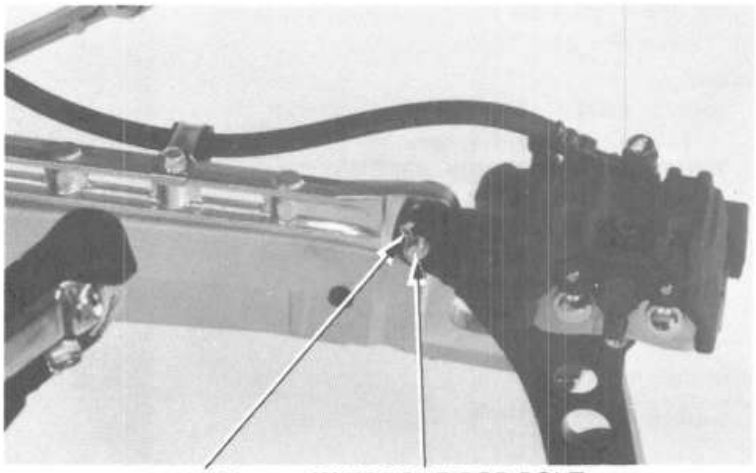


Remove the left and right swing arm pivot bolts.

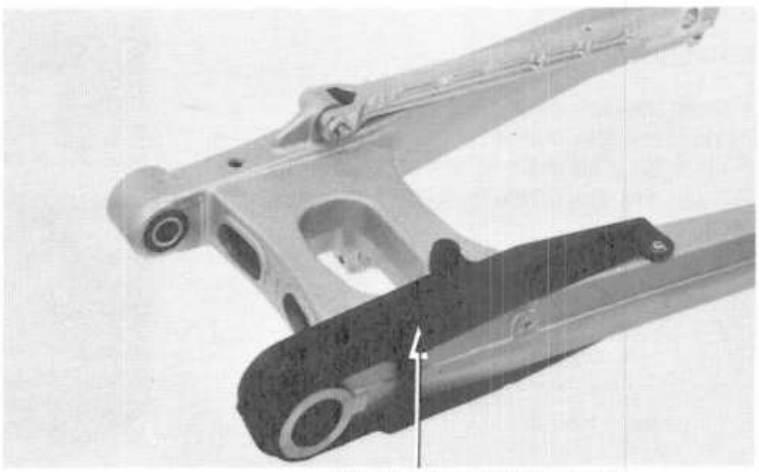


Remove the lock pin from the rear brake torque rod bolt and remove the torque rod bolt.

Remove the swing arm from the frame.

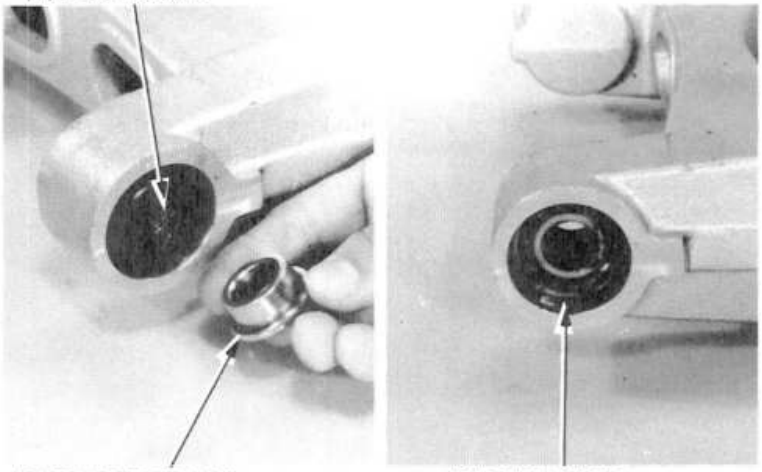


Remove the drive chain slider from the swingarm.

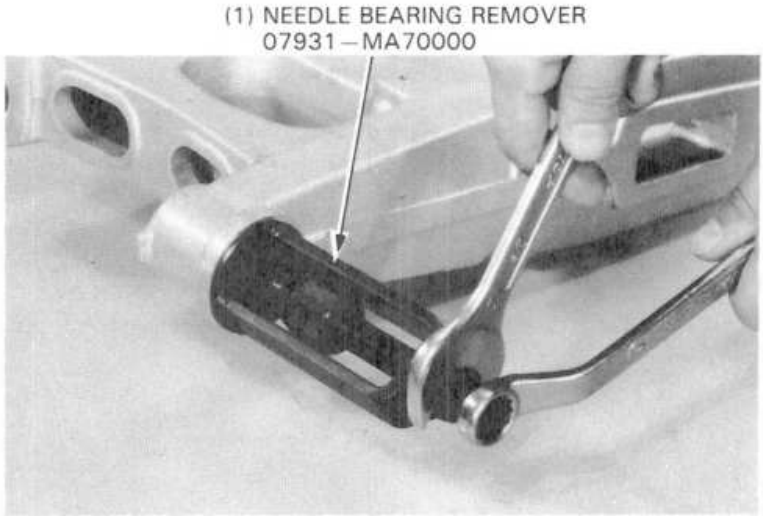


PIVOT BEARING REPLACEMENT

Remove the pivot collar from the swingarm's right pivot. Remove the dust seal.
Remove the snap ring and drive out the right pivot bearings.



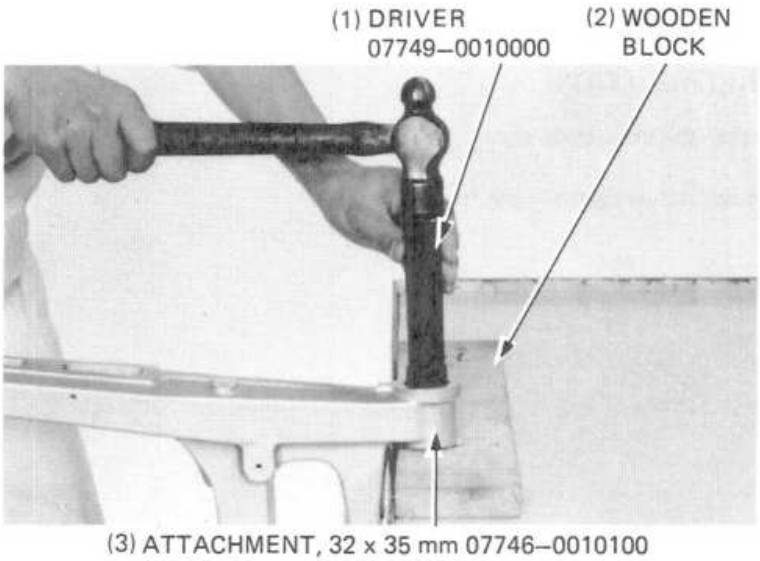
Remove the dust seal from the swingarm's left pivot.
Remove the left pivot needle bearing with the special tool.



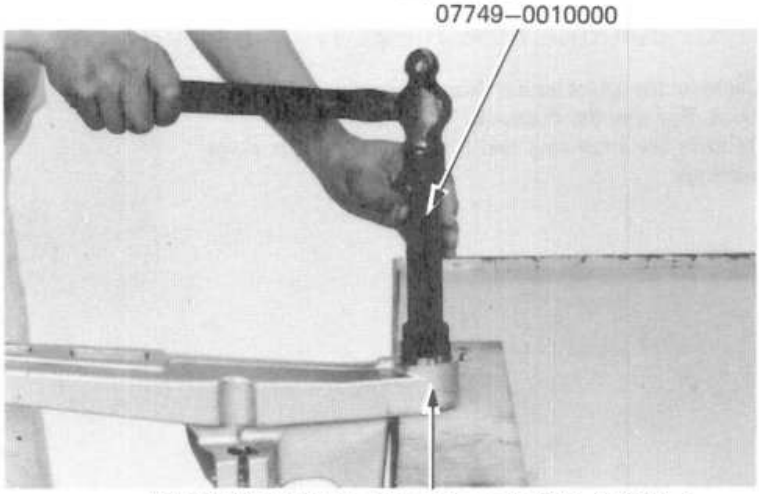
Drive a new needle bearing into the swingarm left pivot.

CAUTION

To prevent swingarm damage, support the swingarm as shown.

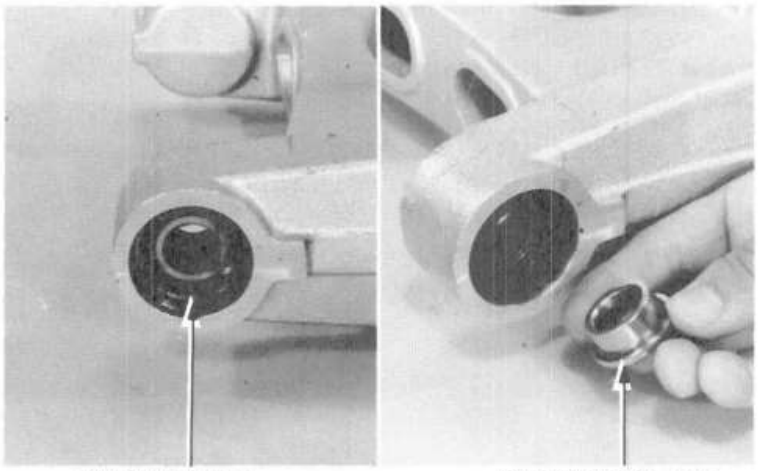


Drive new ball bearings into the swingarm right pivot.



(2) ATTACHMENT, 37 x 40 mm 07746–0010200
PILOT, 17 mm 07746–0040400

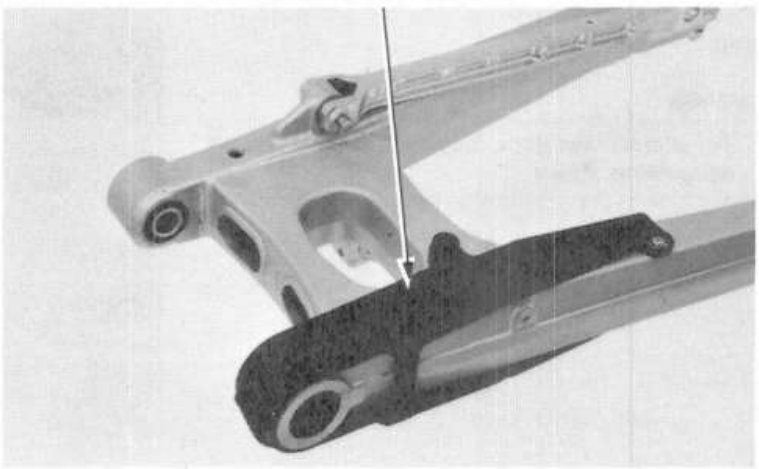
Install the snap ring in the right swingarm pivot.
Install the oil seals both pivots.
Install the pivot collar into the right pivot.



INSTALLATION

Install the drive chain slider.

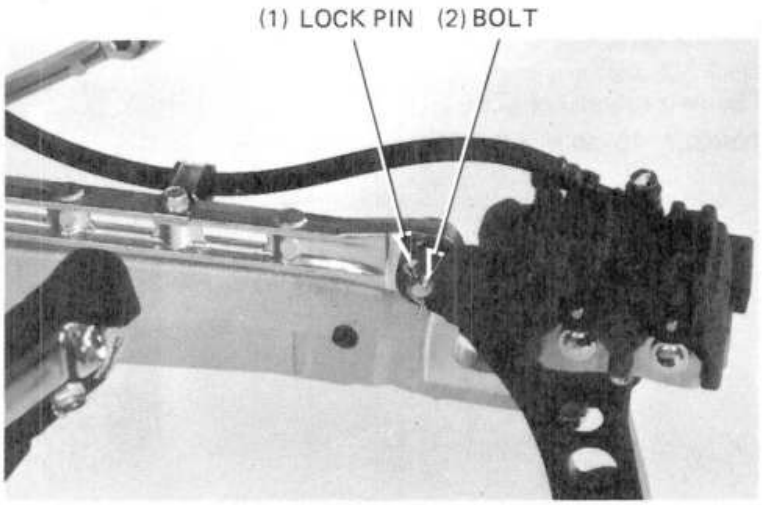
Install the swingarm in the frame.



Make sure that the rear brake torque rod's flanged washer is installed in the swingarm pivot.
Connect the rear brake torque rod to the swingarm and tighten the pivot bolt.

TORQUE: 18–25 N·m (1.8–2.5 kg-m, 13–18 ft.lb)

Secure the bolt with the lock pin.



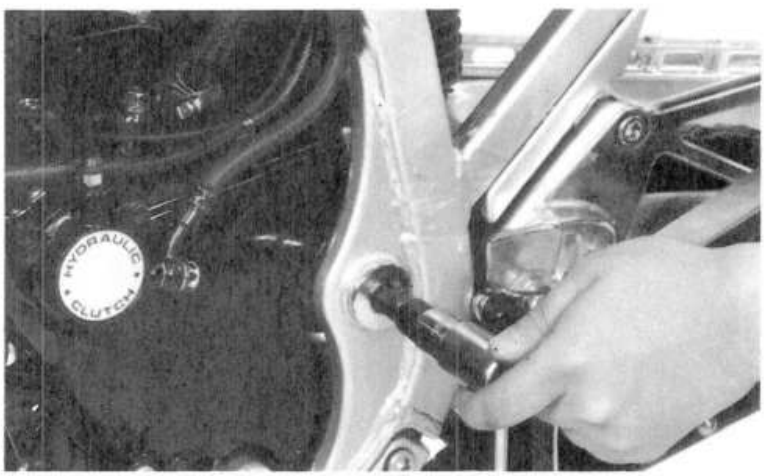
Install the left and right pivot bolts.
Tighten the right pivot bolt.

TORQUE: 85–105 N·m (8.5–10.5 kg-m, 61–76 ft-lb)



Tighten the left pivot bolt.

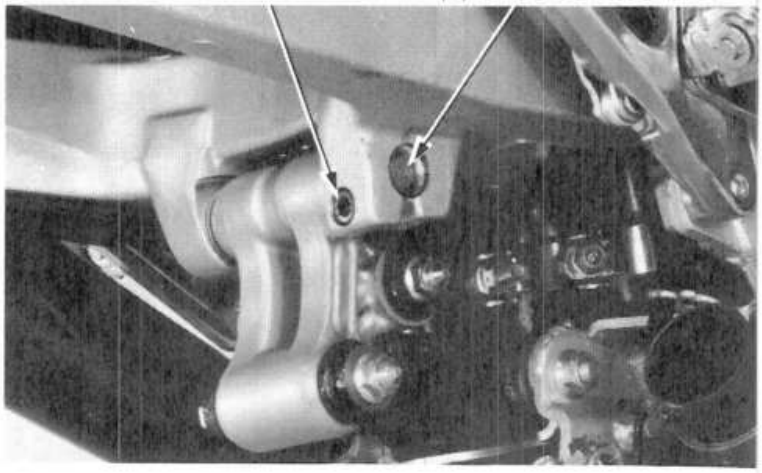
TORQUE: 85–105 N·m (8.5–10.5 kg-m, 61–76 ft-lb)



Connect the swingarm and shock link and install the shock link shaft and shock link pinch bolt.
Tighten the shock link pinch bolt.

TORQUE: 20–30 N·m (2.0–3.0 kg-m, 14–22 ft-lb)

(1) SHOCK LINK PINCH BOLT (2) SHOCK LINK SHAFT

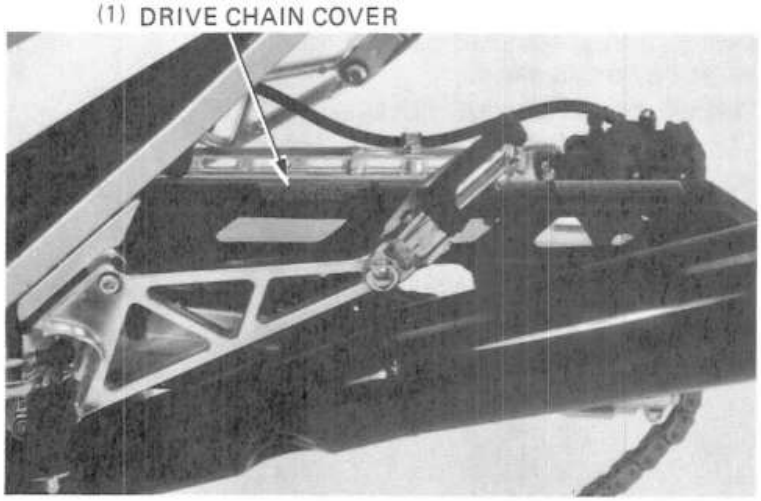


Install the drive chain cover onto the swing arm.

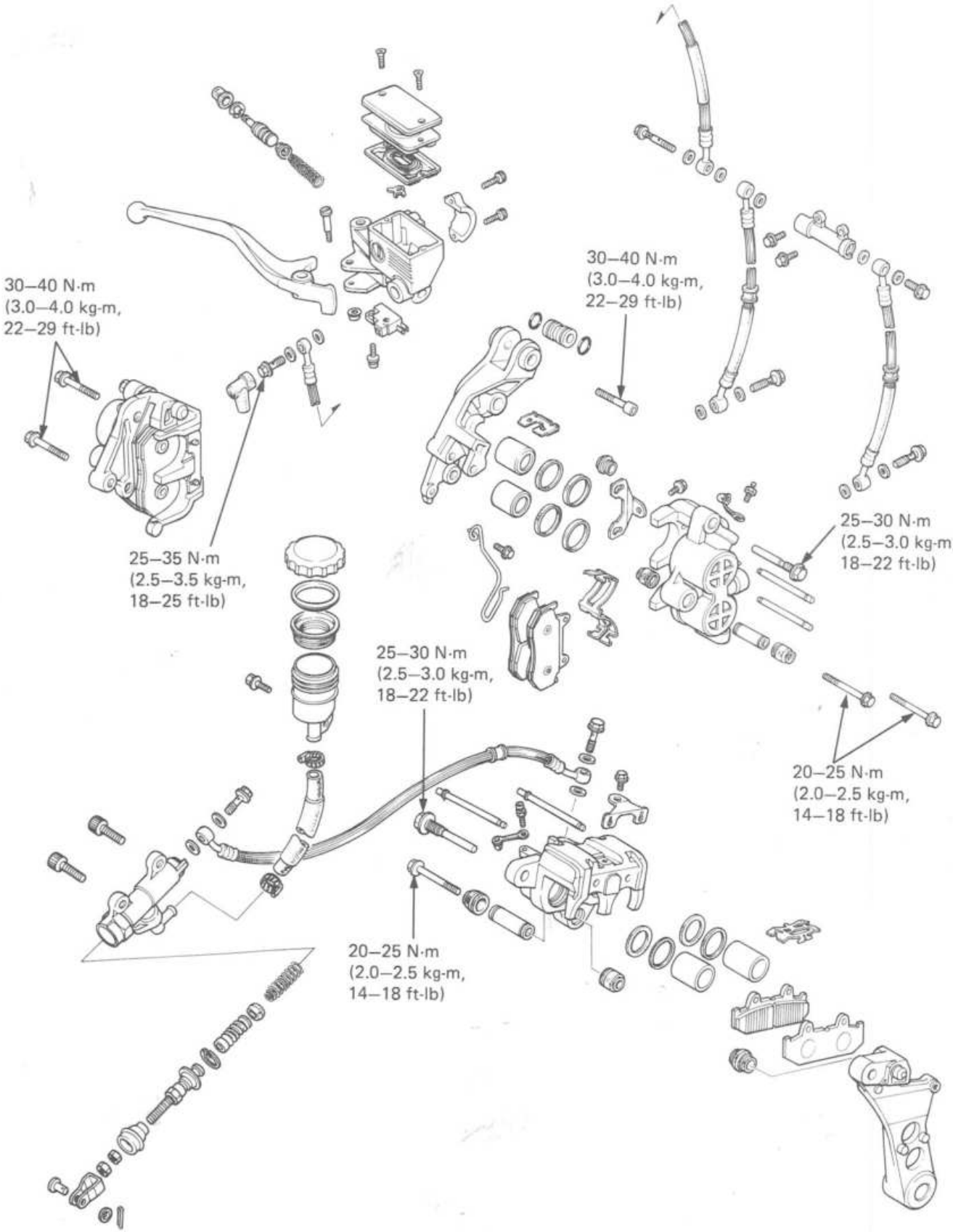
Install the right muffler.

Install the rear wheel (page 16-8).

(1) DRIVE CHAIN COVER



HYDRAULIC BRAKE


30–40 N·m
(3.0–4.0 kg-m,
22–29 ft-lb)
30–40 N·m
(3.0–4.0 kg-m,
22–29 ft-lb)
25–35 N·m
(2.5–3.5 kg-m,
18–25 ft-lb)
25–30 N·m
(2.5–3.0 kg-m,
18–22 ft-lb)
25–30 N·m
(2.5–3.0 kg-m,
18–22 ft-lb)
20–25 N·m
(2.0–2.5 kg-m,
14–18 ft-lb)
20–25 N·m
(2.0–2.5 kg-m,
14–18 ft-lb)

SERVICE INFORMATION	17–1
TROUBLESHOOTING	17–2
BRAKE FLUID REPLACEMENT/AIR BLEEDING	17–3
BRAKE PAD/DISC	17–5
FRONT MASTER CYLINDER	17–8
BRAKE CALIPERS	17–10
REAR MASTER CYLINDER	17–14

SERVICE INFORMATION

GENERAL

- The brake calipers can be removed without disconnecting the hydraulic system.
- Bleed the hydraulic system if it is disassembled or if the brake feels spongy.
- Do not allow foreign material to enter the system when filling the reservoir.
- Avoid spilling brake fluid on painted surfaces or instrument lenses, as severe damage can result.
- Always check brake operation before riding the motorcycle.

SPECIFICATIONS

ITEM	STANDARD	SERVICE LIMIT
Front disc thickness	4.5–5.2 mm (0.177–0.205 in)	4.0 mm (0.157 in)
Front disc runout	–	0.30 mm (0.012 in)
Front master cylinder I.D.	15.870–15.913 mm (0.6248–0.6265 in)	15.925 mm (0.6270 in)
Front master piston O.D.	15.827–15.854 mm (0.6231–0.6242 in)	15.815 mm (0.6226 in)
Front caliper piston O.D.	31.948–31.998 mm (1.2578–1.2598 in)	31.940 mm (1.2575 in)
Front caliper cylinder I.D.	32.030–32.080 mm (1.2610–1.2630 in)	32.090 mm (1.2634 in)
Rear master cylinder I.D.	14.000–14.043 mm (0.5512–0.5529 in)	14.055 mm (0.5533 in)
Rear master piston O.D.	13.957–13.984 mm (0.5495–0.5506 in)	13.945 mm (0.5490 in)
Rear caliper cylinder I.D.	32.030–32.080 mm (1.2610–1.2630 in)	32.090 mm (1.2634 in)
Rear caliper piston O.D.	31.948–31.998 mm (1.2578–1.2598 in)	31.940 mm (1.2575 in)
Rear disc thickness	6.5–7.2 mm (0.256–0.283 in)	6.0 mm (0.236 in)
Rear disc runout	–	0.30 mm (0.012 in)

TORQUE VALUES

Front brake caliper bracket mount bolt (Right)	30–40 N·m (3.0–4.0 kg-m, 22–29 ft-lb)
Front brake caliper bracket mount bolt (Left-upper)	30–40 N·m (3.0–4.0 kg-m, 22–29 ft-lb)
Anti-dive piston pin bolt	10–15 N·m (1.0–1.5 kg-m, 7–11 ft-lb)
Brake caliper mount bolt	20–25 N·m (2.0–2.5 kg-m, 14–18 ft-lb)
Brake caliper pivot bolt	25–30 N·m (2.5–3.0 kg-m, 18–22 ft-lb)
Brake hose oil bolt	25–35 N·m (2.5–3.5 kg-m, 18–25 ft-lb)
Rear brake actuating arm	10–15 N·m (1.0–1.5 kg-m, 7–11 ft-lb)

TOOL

Special

Snap ring pliers	07914–3230001

TROUBLESHOOTING

Brake lever/pedal soft or spongy

1. Air bubbles in hydraulic system
2. Low fluid level
3. Hydraulic system leaking

Brake lever/pedal too hard

1. Sticking piston(s)
2. Clogged hydraulic system
3. Pads glazed or worn excessively

Brake drag

1. Hydraulic system sticking
2. Sticking piston(s)

Brakes grab

1. Pads contaminated
2. Disc or wheel misaligned

Brake chatter or squeal

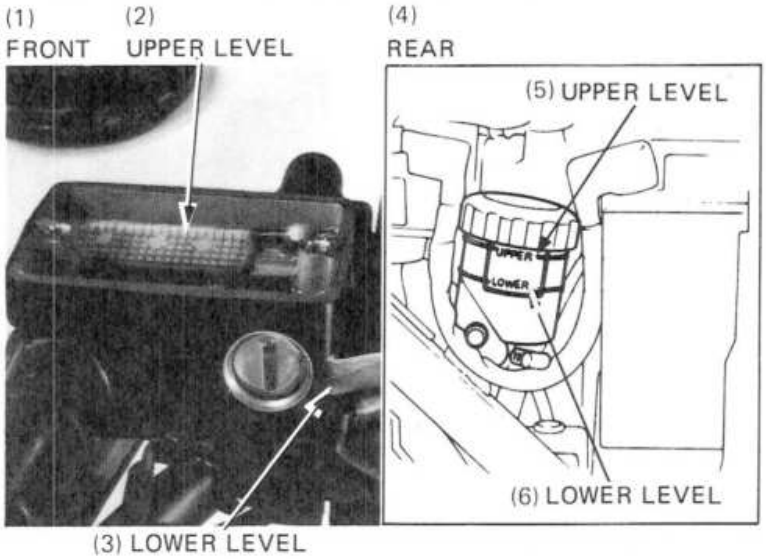
1. Pads contaminated
2. Excessive disc runout
3. Caliper installed incorrectly
4. Disc or wheel misaligned

BRAKE FLUID REPLACEMENT/ AIR BLEEDING

Check the fluid level with the fluid reservoir parallel to the ground.

CAUTION

- *Install the cover on the reservoir whenever operating the brake lever or pedal. Failure to do so will allow brake fluid to squirt out of the reservoir during brake operation.*
- *Avoid spilling fluid on painted surfaces. Place clean shop towels over the fuel tank whenever the system is being serviced.*



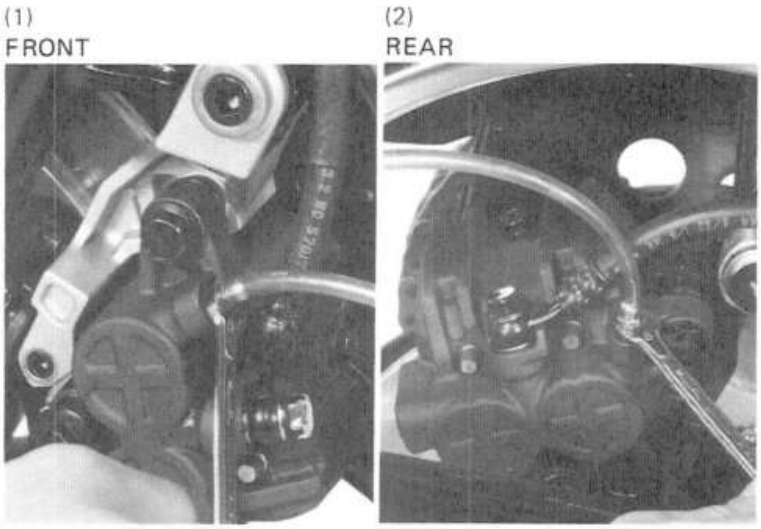
BRAKE FLUID DRAINING

Connect a bleed hose to the bleed valve to avoid spilling fluid.

WARNING

A brake fluid contaminated brake disc or pad reduces stopping power. Discard pads and clean a contaminated disc with a high quality brake degreasing agent.

Loosen the caliper bleed valve and pump the brake lever or pedal.
Stop operating the lever or pedal when fluid stops flowing out of the bleed valve.



BRAKE FLUID FILLING

Fill the reservoir with DOT4 brake fluid from a sealed container.

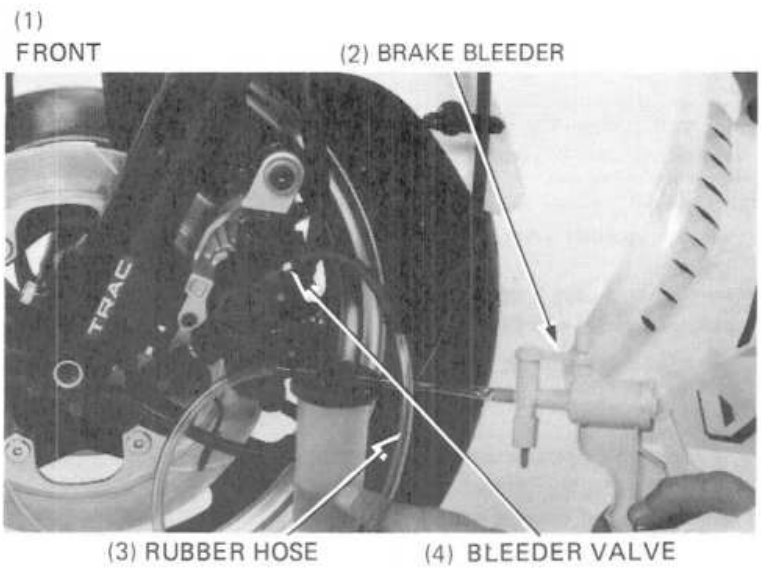
NOTE

- Check the fluid level oftern while bleeding the brakes to prevent air from being pumped into the system.
- When using the Brake Bleeder, follow the manufacturer's instructions.

CAUTION

- *Use only DOT4 brake fluid from a sealed container.*
- *Do not mix brake fluid types and never reuse the contaminated fluid which has been pumped out during brake bleeding, because this will impair the efficiency of the brake system.*

Connect the Brake Bleeder or equivalent to the bleeder valve.



Pump the brake bleeder and loosen the bleeder valve. Add fluid when the fluid level in the master cylinder reservoir is low.
Repeat above procedures until air bubbles do not appear in the plastic hose.

NOTE

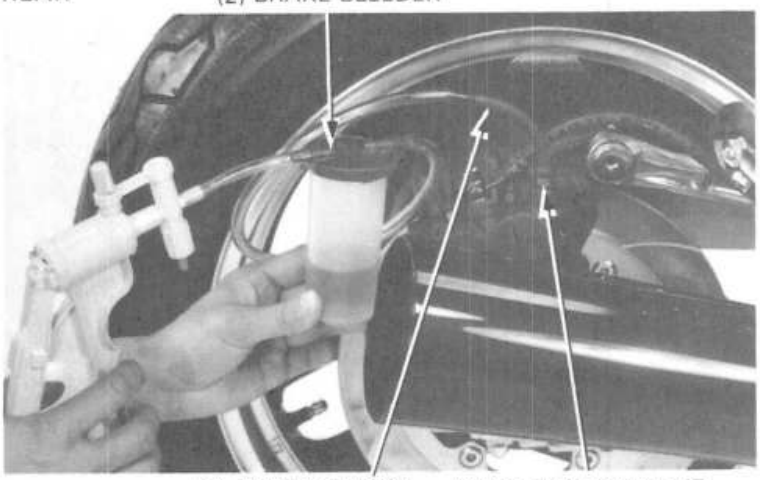
> If air is entering the bleeder from around the bleeder valve threads, seal the threads with teflon tape.

Close the bleeder valve and operate the brake lever or pedal. If it feels spongy, bleed the system by performing the air bleeder procedure.

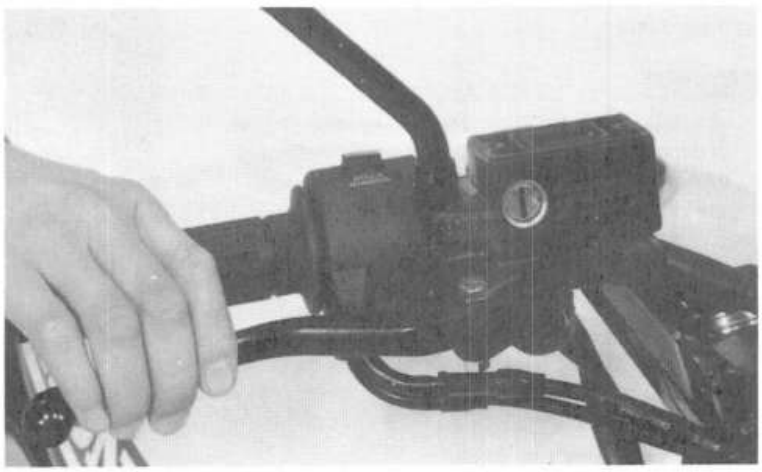
If a Brake Bleeder or equivalent not available, fill the system as follows:

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.

(1) REAR (2) BRAKE BLEEDER



(3) RUBBER HOSE (4) BLEEDER VALVE

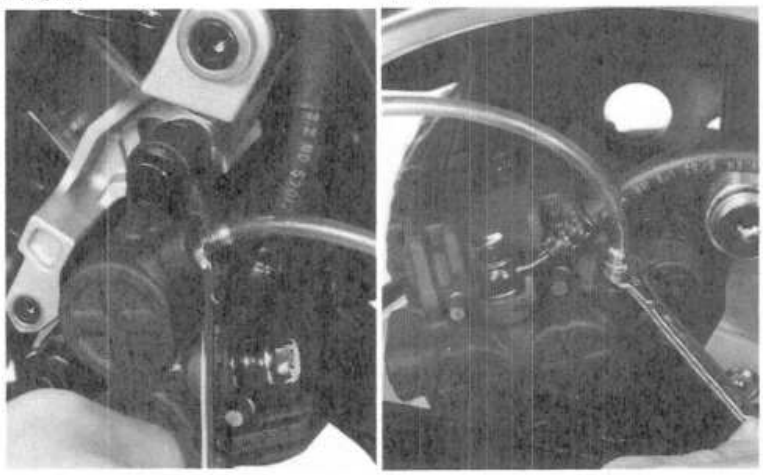


AIR BLEEDING

Bleed the system as follows:

1) Connect a bleeder tube to the bleeder valve.
2) Squeeze the brake lever or depress the brake pedal, open the bleed valve 1/2 turn and then close the valve.

(1) FRONT (2) REAR



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 1 and 2 until bubbles cease to appear in the fluid at the end of the hose.

Fill the fluid reservoir to the upper level mark.

WARNING

> ***A brake fluid contaminated brake disc or pad reduces stopping power. Discard contaminated pads and clean a contaminated disc with a high quality brake degreasing agent.***

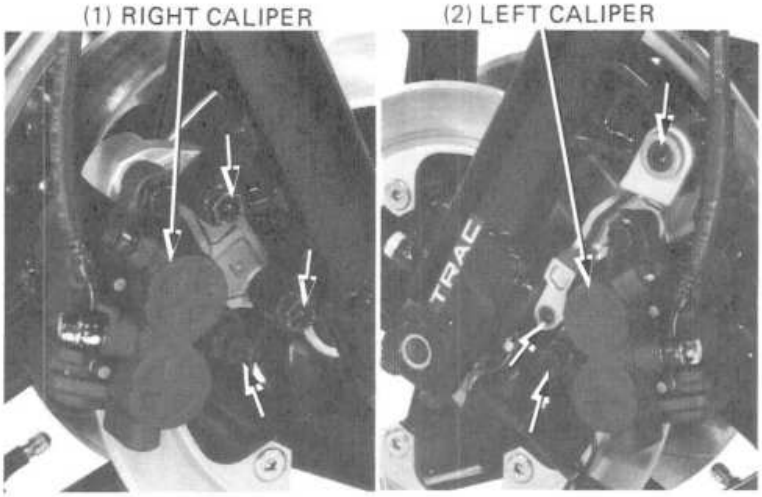
BRAKE PAD/DISC

FRONT PAD REPLACEMENT

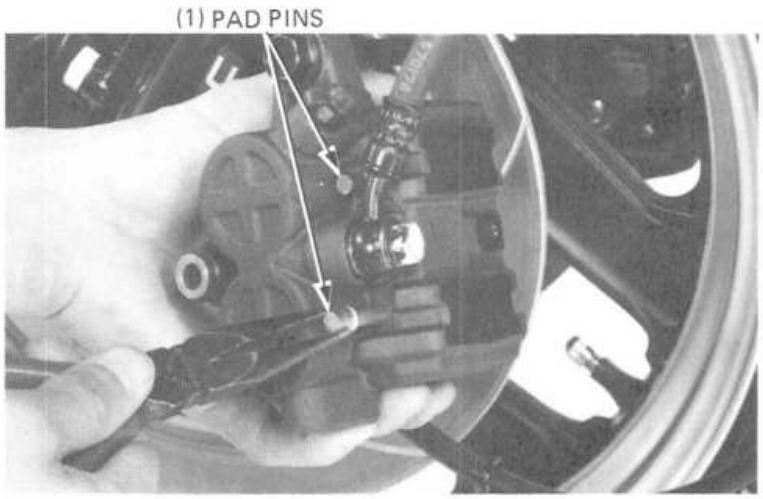
NOTE

> Always replace the brake pads in pairs to assure even disc pressure.

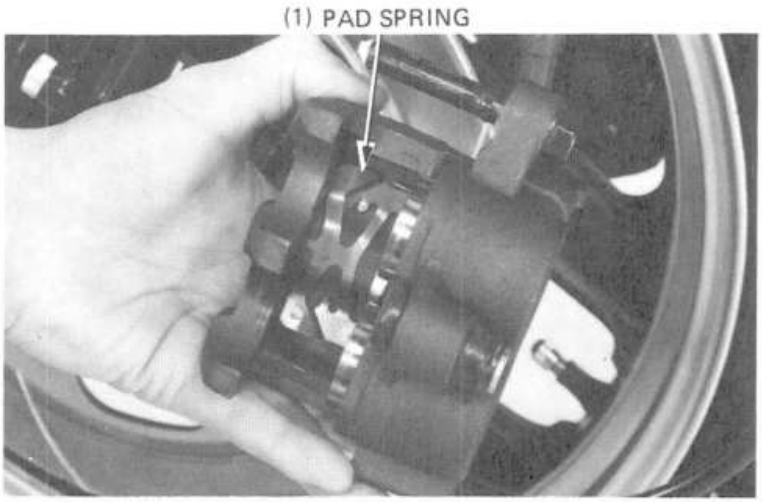
Remove the pad pin retainer bolt.
Right caliper: Remove the caliper bracket mount bolts and caliper mount bolt.
Left caliper: Remove the caliper bracket mount bolt, anti-dive piston pin bolt and caliper mount bolt.
Remove the caliper from the bracket.



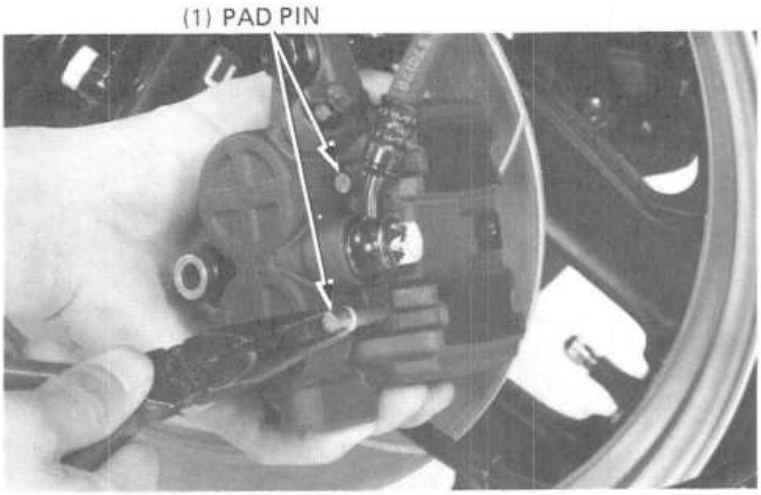
Remove the pad pin retainer and pull the pad pins out of the caliper.
Remove the brake pads.



Position the pad spring in the caliper as shown.
Push the caliper pistons in all the way.

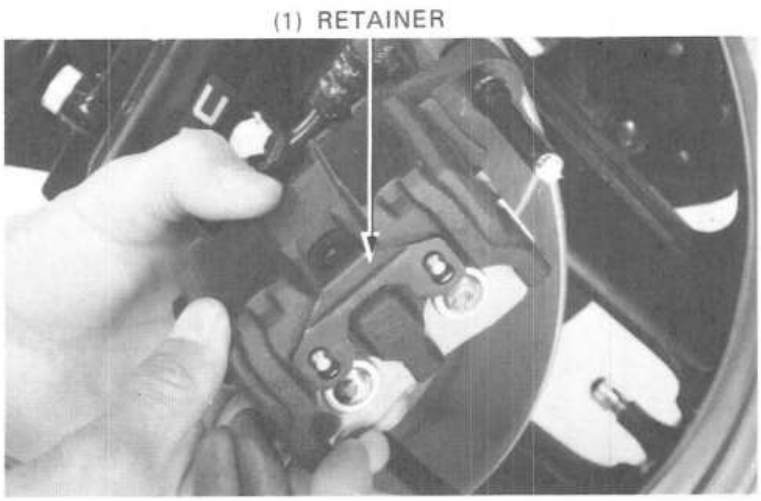


Install the new pads in the caliper.
Install the pad pins, one pad pin first, then install the other pin by pushing the pads against the caliper to depress the pad spring.

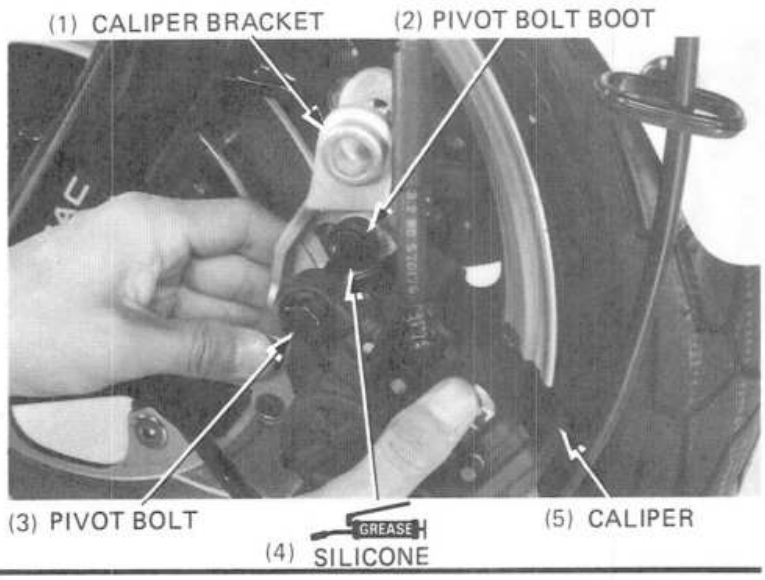


Place the pad pin retainer over the pad pins. Push the retainer down to secure the pins.

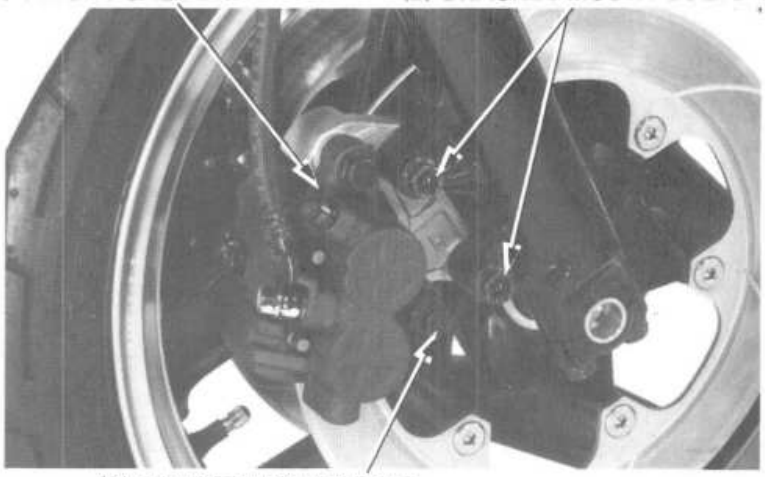
Install the pad pin retainer bolt.



Apply silicone grease to the inside of the pivot bolt boot and pivot bolt and install the caliper onto the bracket.



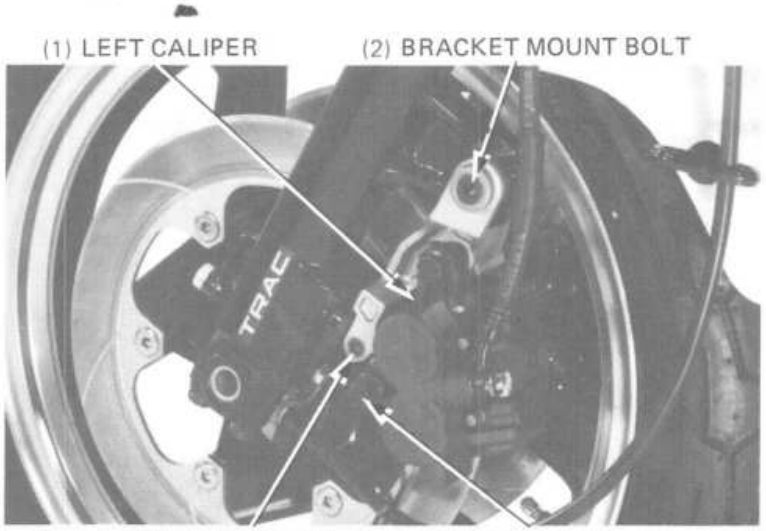
Install the caliper bracket onto the fork leg so the disc is positioned between the pads, being careful not to damage the pads.



Right caliper: Tighten the caliper bracket mount bolts and caliper mount bolt.
Left caliper: Tighten the caliper bracket mount bolt, anti-dive piston pin bolt and caliper mount bolt.

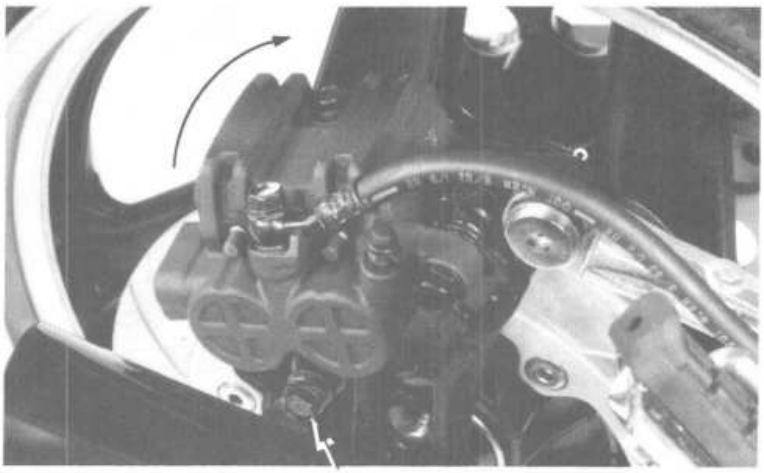
TORQUE:

Caliper bracket mount bolt:
30–40 N·m (3.0–4.0 kg-m, 22–29 ft-lb)
Anti-dive piston pin bolt:
10–15 N·m (1.0–1.5 kg-m, 7–9 ft-lb)
Caliper mount bolt:
20–25 N·m (2.0–2.5 kg-m, 14–18 ft-lb)



REAR BRAKE PAD REPLACEMENT

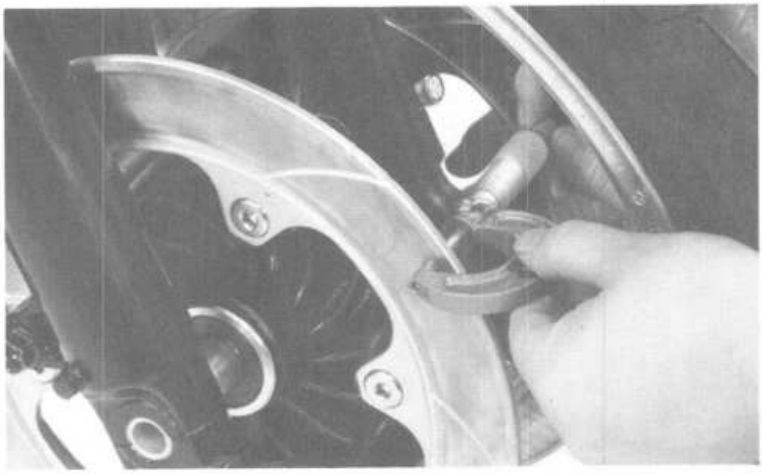
Loosen the caliper mount bolt and remove it from the caliper bracket.
Pivot the caliper up out of the way.
Replace the rear brake pads using the same method as used for front brake pad replacement.



DISC THICKNESS

Measure the thickness of each disc.

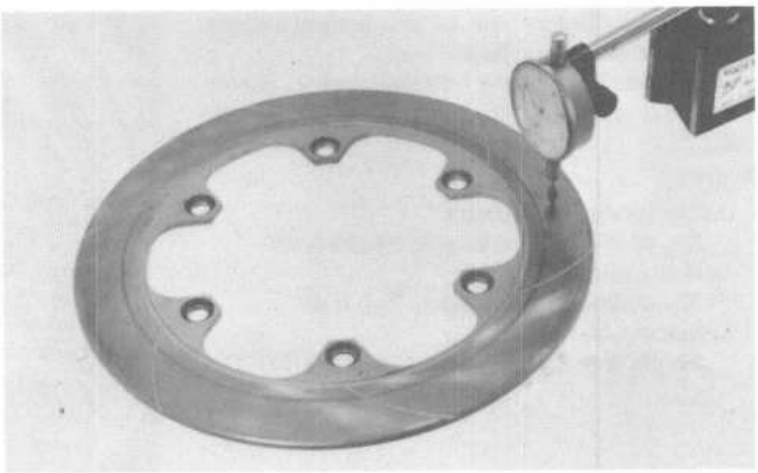
SERVICE LIMIT:
FRONT: 4.0 mm (0.16 in)
REAR: 6.0 mm (0.24 in)



BRAKE DISC WARPAGE

Measure brake disc for warpage.

SERVICE LIMIT: 0.30 mm (0.012 in)



FRONT MASTER CYLINDER

DISASSEMBLY

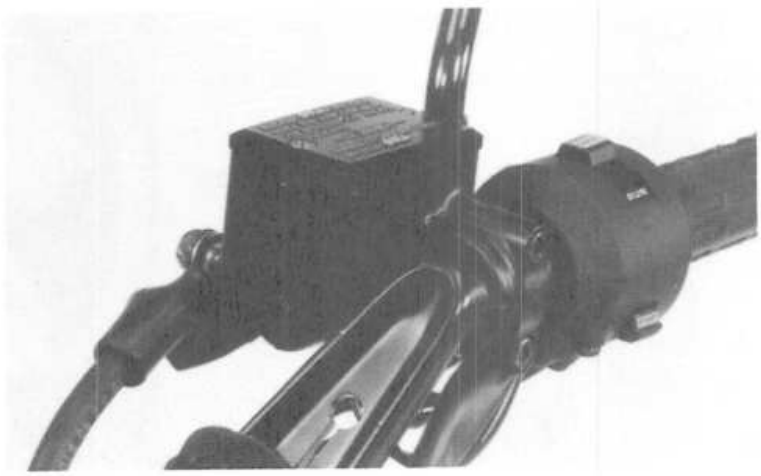
Drain brake fluid from the hydraulic system. Remove the brake lever and rear view mirror from the master cylinder. Disconnect the brake hose.

CAUTION

Avoid spilling brake fluid on painted surfaces. Place a rag over the fuel tank whenever the brake system is being serviced.

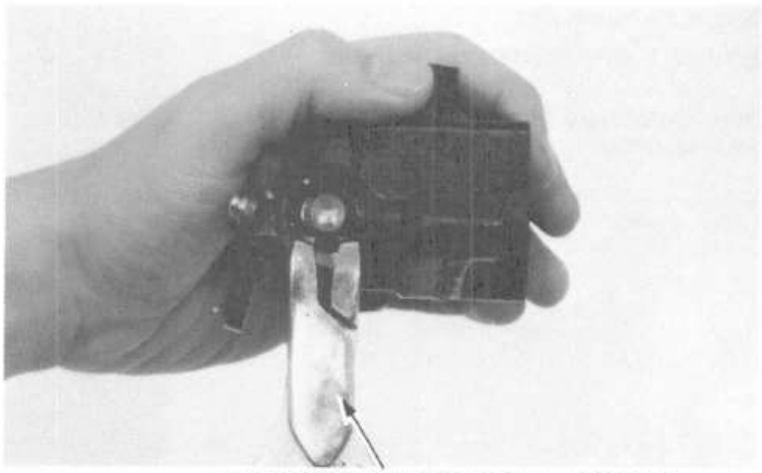
NOTE

When removing the fluid hose bolt, cover the end of the hose to prevent contamination. Secure the hose to prevent fluid from leaking out.



Disconnect the front brake switch wires.
Remove the front brake master cylinder.

Remove the piston boot and the snap ring from the master cylinder body.

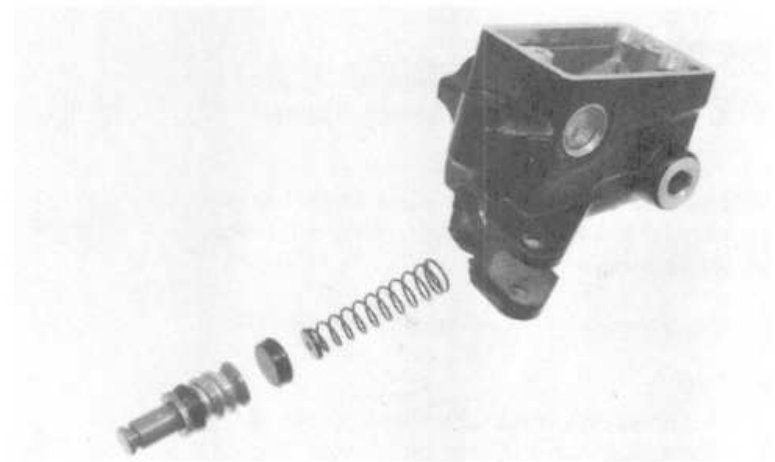


(1) SNAP RING PLIERS 07914–3230001

Remove the secondary cup and piston. Then remove the primary cup and spring.

Remove the brake light switch from the master cylinder body, if necessary.

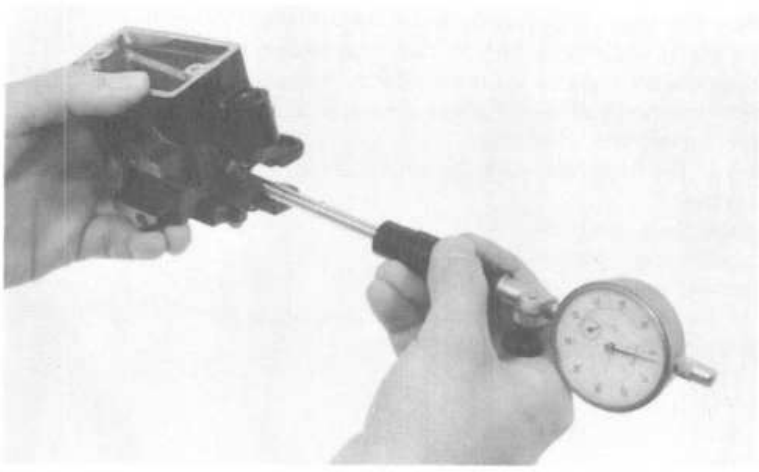
Clean the inside of the master cylinder and reservoir with brake fluid.



INSPECTION

Measure the master cylinder I.D.
Check the master cylinder for scores, scratches or nicks.

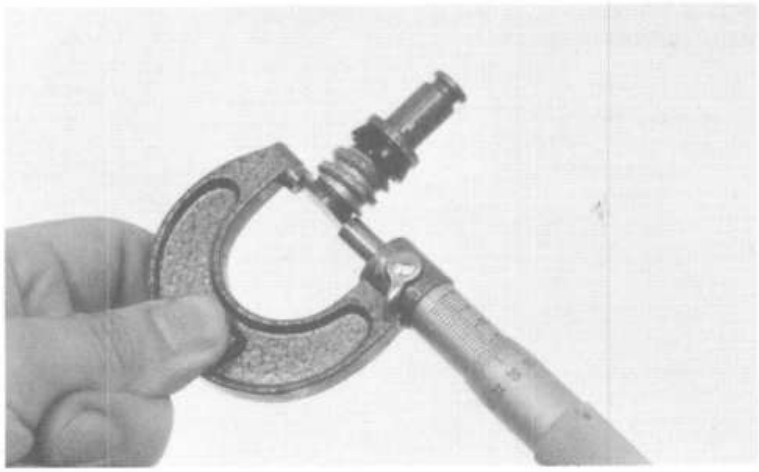
SERVICE LIMIT: 15.925 mm (0.6270 in)



Measure the master piston O.D.

SERVICE LIMIT: 15.815 mm (0.6226 in)

Check the primary and secondary cups for damage before assembly.



ASSEMBLY

CAUTION

Keep the master cylinder piston, cylinder and spring as a set; don't substitute individual parts.

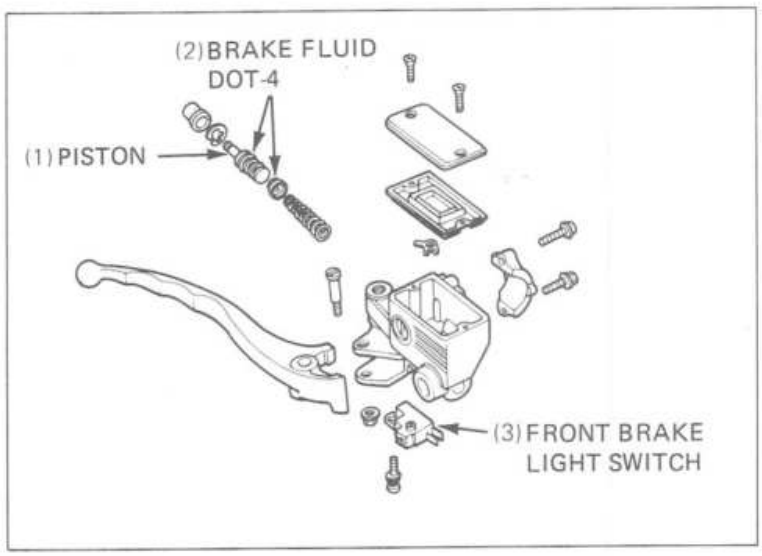
Assemble the master cylinder. Coat all parts with clean brake fluid before assembly. Install the spring and primary cup together.

Dip the piston cup in brake fluid before assembly.

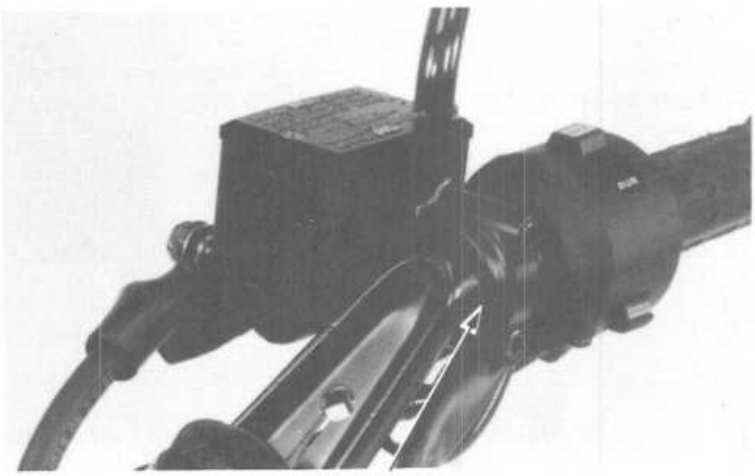
CAUTION

When installing the cups, do not allow the lips to turn inside out and be certain the snap ring is firmly seated in the groove.

Install the piston and snap ring.
Install the boot.



Place the front master cylinder on the handlebar an and install the holder with its "UP" mark facing up. Align the index mark on the holder with the punch mark on the handlebar. Tighten the upper bolt first, then tighten the lower bolt.
Install the fluid hose with the bolt and two sealing washers.
Install the brake lever.
Install the rear view mirror.
Connect the front brake switch wires.
Fill the reservoir to the upper level and bleed the brake system according to page 17-4.



(1) ALIGN

BRAKE CALIPERS

FRONT BRAKE CALIPER REMOVAL

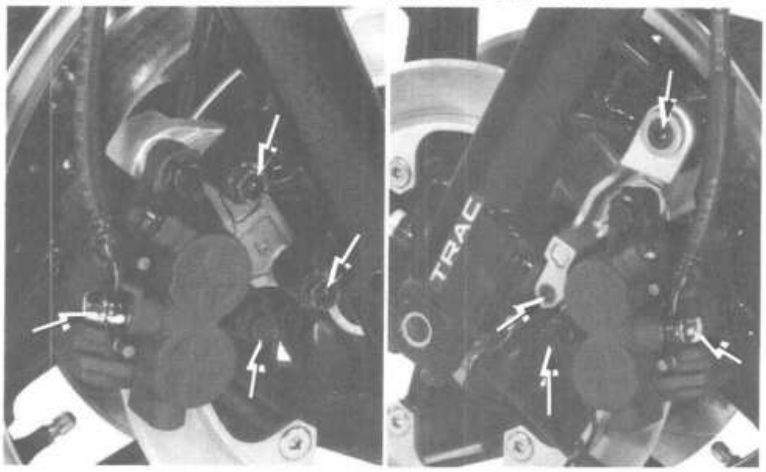
Place a clean container under the caliper and disconnect the brake hose from the caliper.

CAUTION

Avoid spilling brake fluid on painted surfaces.

Right caliper: Remove the caliper bracket mount bolts and caliper mount bolt and remove the caliper from the bracket.
Left caliper: Remove the caliper bracket mount bolt, anti-dive piston pin bolt and caliper mount bolt and remove the caliper from the bracket.

(1) RIGHT CALIPER (2) LEFT CALIPER



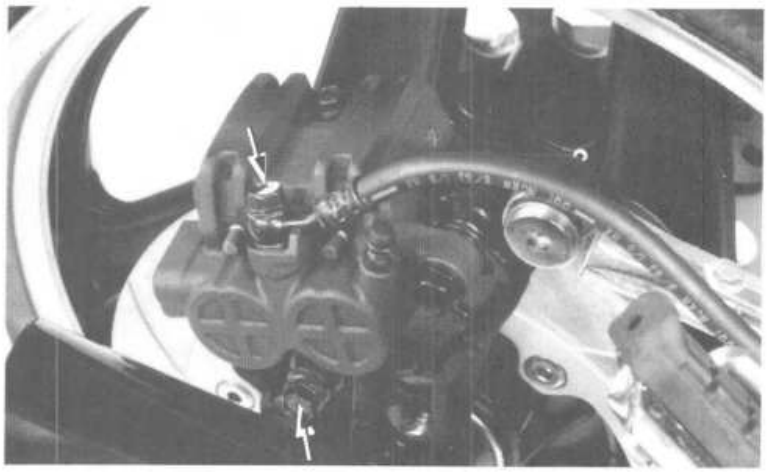
REAR BRAKE CALIPER REMOVAL

Place a clean container under the caliper and disconnect the brake hose from the caliper.

CAUTION

Avoid spilling brake fluid on the painted surfaces to prevent paint damage.

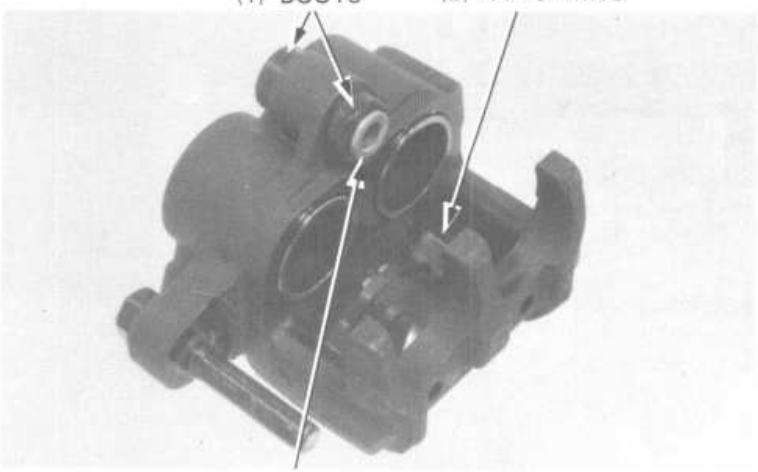
Remove the caliper mount bolt, pivot up and remove the caliper from the bracket.



DISASSEMBLY

Remove the brake pads (page 17-5).
Remove the pad spring.
Remove the caliper pivot collar and boots.
Remove the pistons from the caliper.

(1) BOOTS (2) PAD SPRING



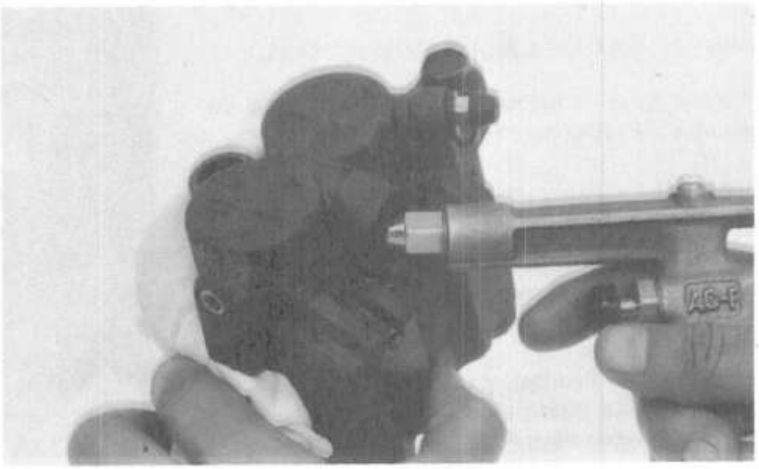
(2) PIVOT COLLAR

If necessary, apply compressed air to the caliper fluid inlet to get the piston out. Place a shop rag under the caliper to cushion the piston when it is forced out. Use the air in short spurts.

WARNING

Do not bring the nozzle too close to the inlet.

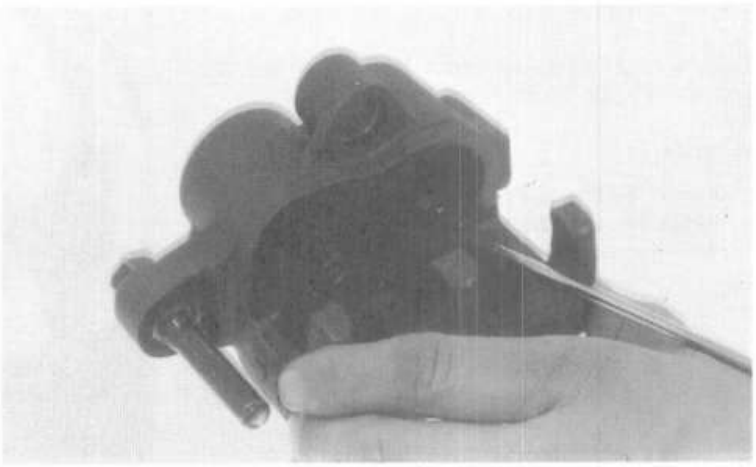
Examine the pistons and cylinders for scoring, scratches or other damage and replace if necessary.



Push the piston seals in and lift them out, then discard them.
Clean the piston seal grooves with brake fluid.

CAUTION

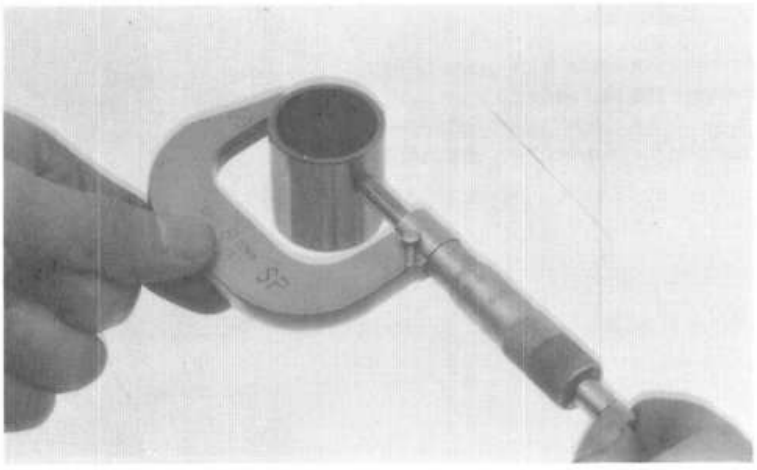
Be careful not to damage the piston sliding surfaces.



PISTON INSPECTION

Check the pistons for scoring, scratches or other damage. Measure the piston diameter with a micrometer.

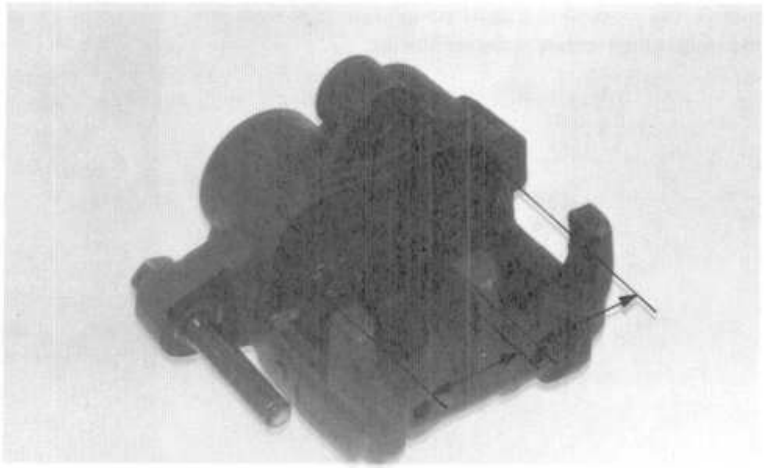
SERVICE LIMIT:
FRONT: 31.940 mm (1.2575 in)
REAR: 31.940 mm (1.2575 in)



CYLINDER INSPECTION

Check the caliper cylinder for scoring, scratches or other damage. Measure the caliper cylinder bore.

SERVICE LIMIT:
FRONT: 32.090 mm (1.2634 in)
REAR: 32.090 mm (1.2634 in)



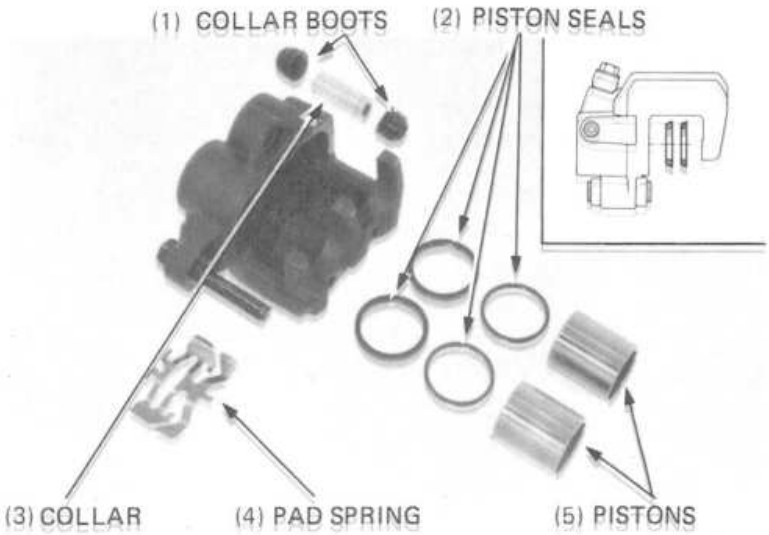
ASSEMBLY

If the collar boots are hardened or deteriorated, replace them with new ones.
The piston seals must be replaced with new ones whenever they are removed. Coat the seals with brake fluid before assembly

NOTE

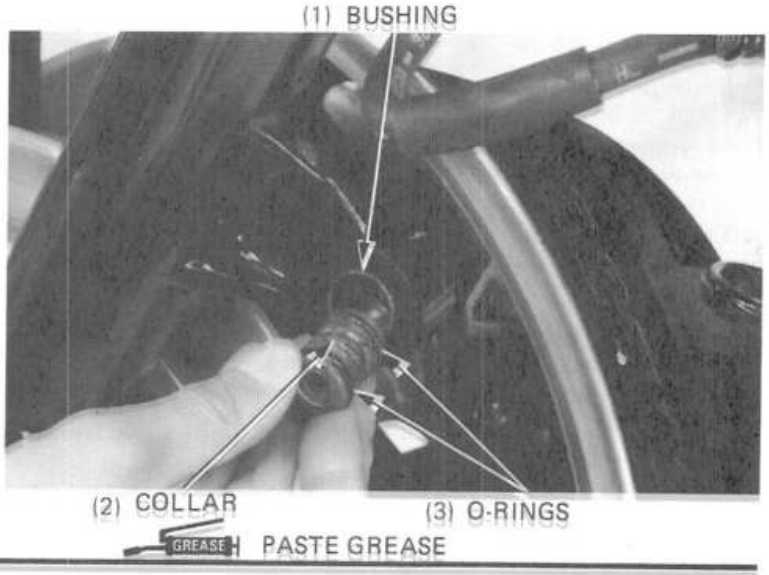
> Install the piston seals with their small diameter ends facing in.

Install the pistons with the dished ends toward the pads.
Apply midium grade of Hi-Temperature silicon grease to the collar and inside of the collar grease.
Install the collar boots and collar making sure that the boots are seated in the collar and caliper grooves properly.
Install the pad spring.
Install the pads (page 17-5).



FRONT BRAKE CALIPER INSTALLATION

Check the left caliper bracket collar, O-rings and bushings for excessive wear or damage, and replace if necessary.
Apply paste grease (page 16-13) to the collar and install it into the bushing.



Install the anti-dive piston collar into the hole in the piston and secure it with the clip.

(1) ANTI-DIVE PISTON

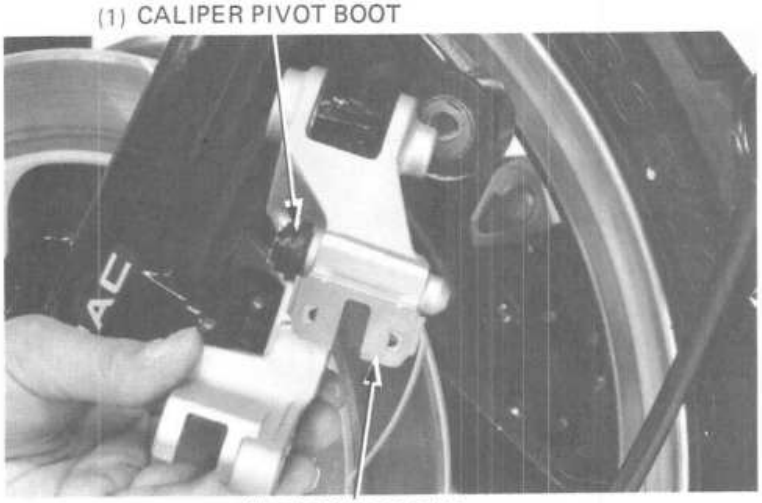


(2) CLIP (3) COLLAR

Make sure that the retainer clip is in position on the caliper bracket.
Inspect the condition of the caliper pivot boot. Apply silicone grease to the caliper pivot bolt.

Assemble the caliper and bracket.

(1) CALIPER PIVOT BOOT



(2) RETAINER CLIP

Install the caliper assembly over the brake disc so that the disc is positioned between the pads.

CAUTION

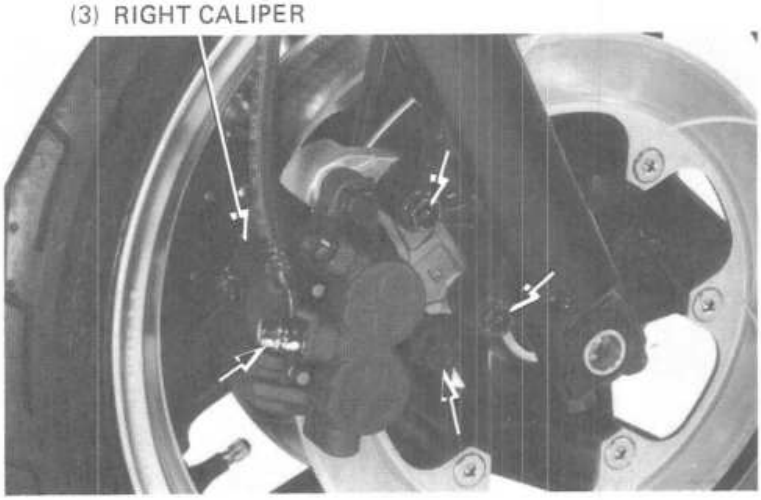
Be careful not to damage the pads.

Right caliper: Tighten the caliper bracket mount bolts and caliper mount bolt.
Left caliper: Tighten the caliper bracket mount bolt, anti-dive piston pin bolt and caliper mount bolt.

TORQUE:

Caliper bracket mount bolt:
30–40 N·m (3.0–4.0 kg-m, 22–29 ft-lb)
Anti-dive piston pin bolt:
10–15 N·m (1.0–1.5 kg-m, 7–9 ft-lb)
Caliper mount bolt:
20–25 N·m (2.0–2.5 kg-m, 14–18 ft-lb)

(3) RIGHT CALIPER

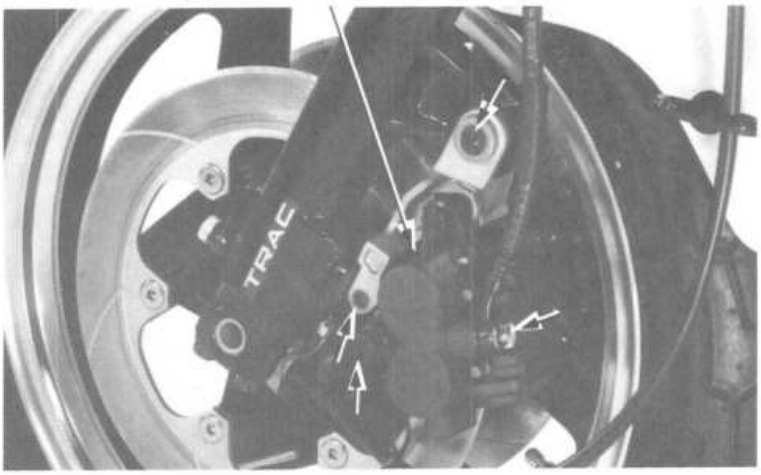


Connect the brake hose to the caliper with the bolt and two sealing washers.

TORQUE: 25–35 N·m (2.5–3.5 kg-m, 18–25 ft-lb)

Fill the brake fluid reservoir and bleed the brake system (page 17-4).

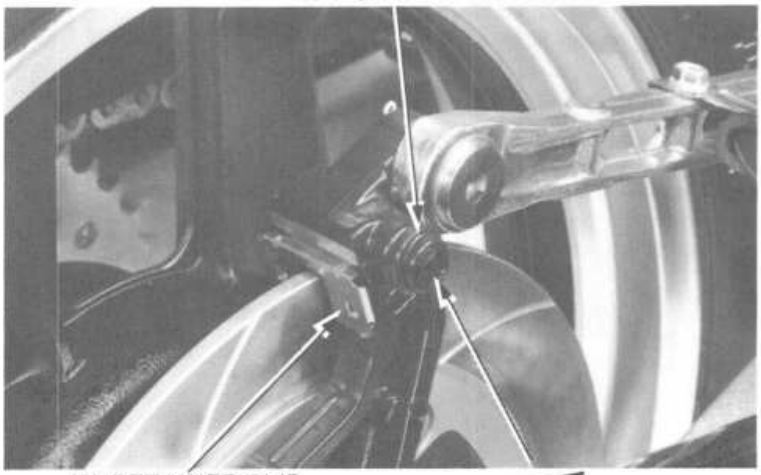
(1) LEFT CALIPER



REAR BRAKE CALIPER INSTALLATION

Make sure that the retainer clip is in position on the caliper bracket.
Inspect the condition of the caliper pivot boot.
Apply silicone grease to the caliper pivot bolt.

(1) CALIPER PIVOT BOOT



(2) RETAINER CLIP

GREASE

(3) SILICONE

Insert the caliper pivot bolt on the caliper into the pivot boot and pivot the caliper assembly over the brake disc so that the disc is positioned between the pads, being careful not to damage the pads.
Install and tighten the caliper mount bolt.

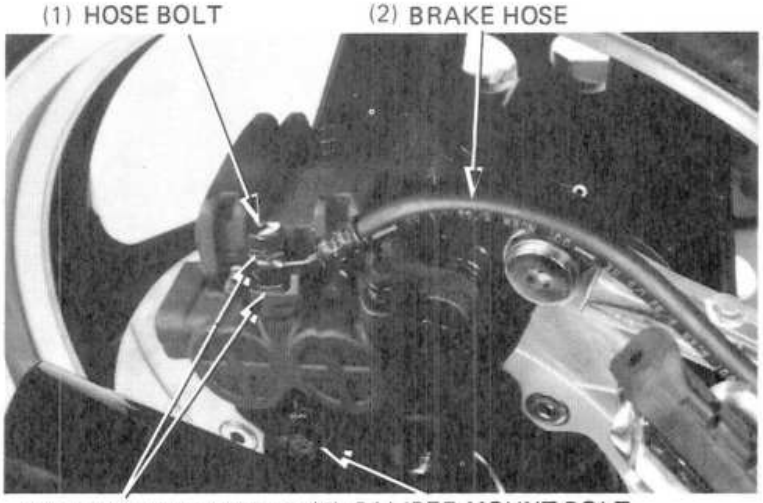
TORQUE: 20–25 N·m (2.0–2.5 kg-m, 14–18 ft-lb)

Connect the brake hose to the caliper with the bolt and two sealing washers.

TORQUE: 25–35 N·m (2.5–3.5 kg-m, 18–25 ft-lb)

Fill the brake fluid reservoir and bleed the rear brake system (page 17-4).

(1) HOSE BOLT (2) BRAKE HOSE



(3) SEALING WASHERS (4) CALIPER MOUNT BOLT

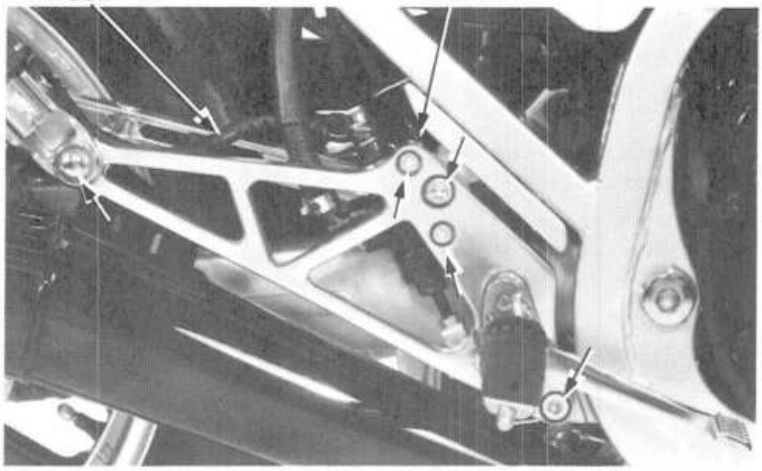
REAR MASTER CYLINDER

REMOVAL

Drain the rear brake hydraulic system (page 17-3).
Remove the brake hose bolt and disconnect the brake hose.

Loosen the rear master cylinder mount bolts.
Remove the right footpeg bracket.

Unhook the rear brake switch spring from the rear brake actuating arm.

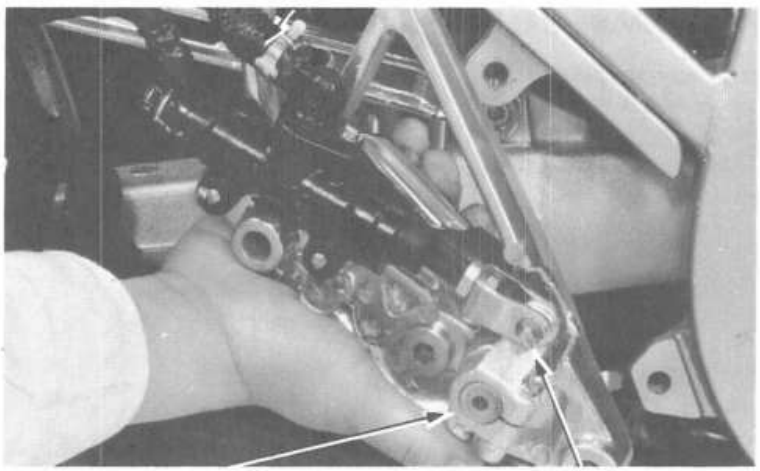


Remove the hose connector screw and disconnect the master cylinder hose.

Remove the rear brake actuating arm bolt and the arm.

Remove the cotter pin, washer and joint pin, and disconnect the brake actuating arm from the master cylinder push rod.

Remove the rear master cylinder from the footpeg bracket.



DISASSEMBLY

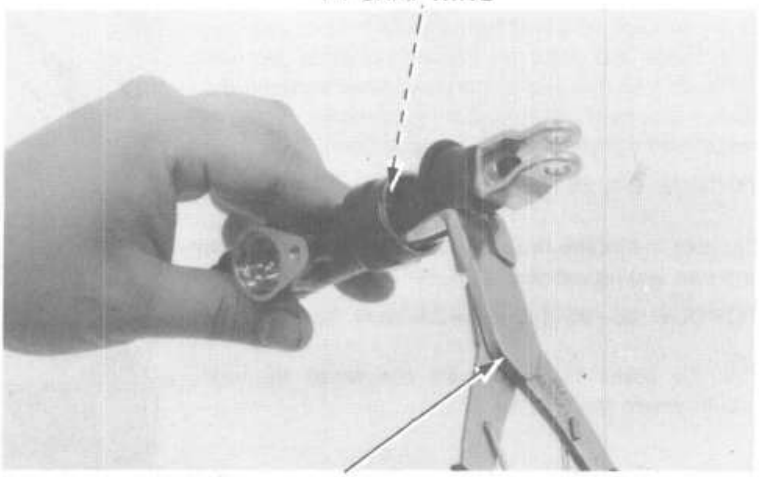
Remove the rubber boot.

Remove the snap ring and push rod from the master cylinder body.

Remove the master piston, primary cup and spring.

It may be necessary to apply a small amount of air pressure to the fluid outlet to remove the master piston and primary cup.

Clean all parts with brake fluid.

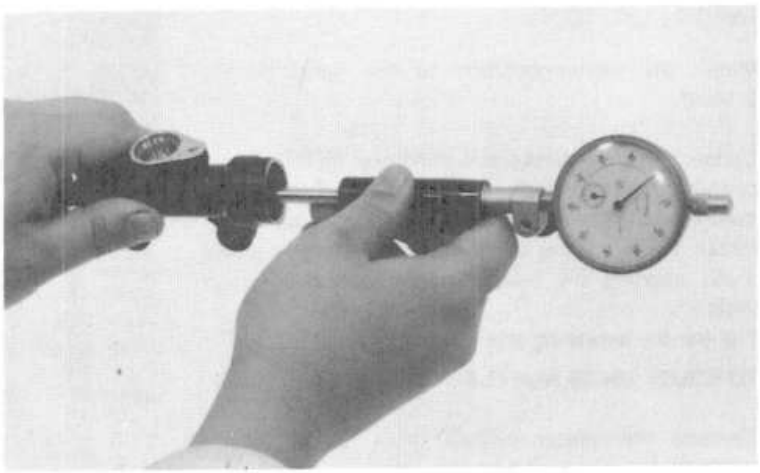


CYLINDER I.D. INSPECTION

Measure the inside diameter of the master cylinder bore.

SERVICE LIMIT: 14.055 mm (0.5533 in)

Check for scores, scratches or nicks.

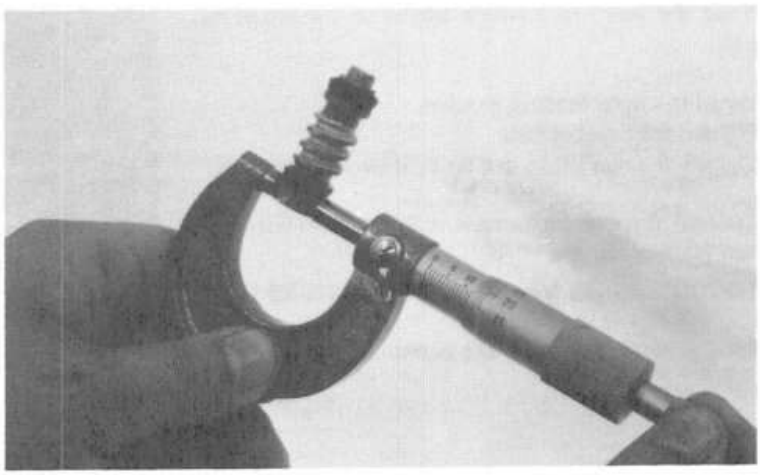


PISTON O.D. INSPECTION

Measure the master piston O.D.

SERVICE LIMIT: 13.945 mm (0.5490 in)

Check the primary cup and piston cup for damage.



ASSEMBLY

CAUTION

Keep the master cylinder piston, cylinder and spring as a set; do not substitute individual parts.

Assemble the master cylinder.
Coat all parts with clean brake fluid.

Dip the piston cup in brake fluid before assembly.

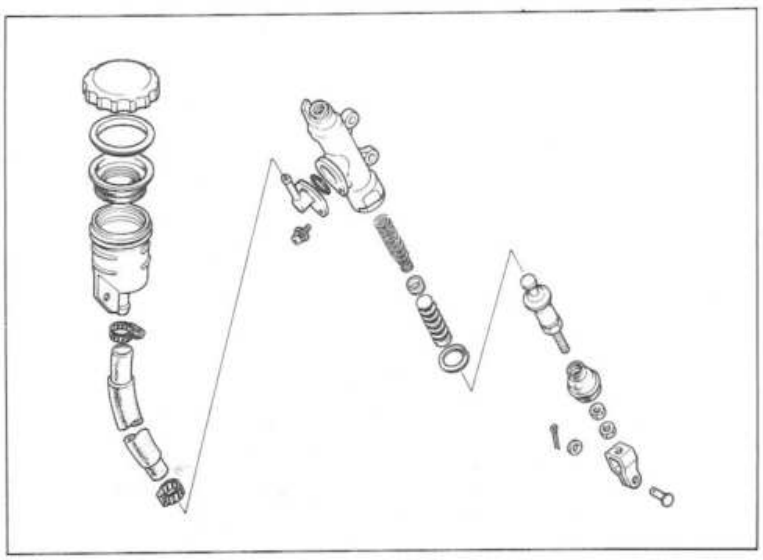
CAUTION

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 primary cup and piston.

Install the push rod and snap ring.

Install the rubber cover.



INSTALLATION

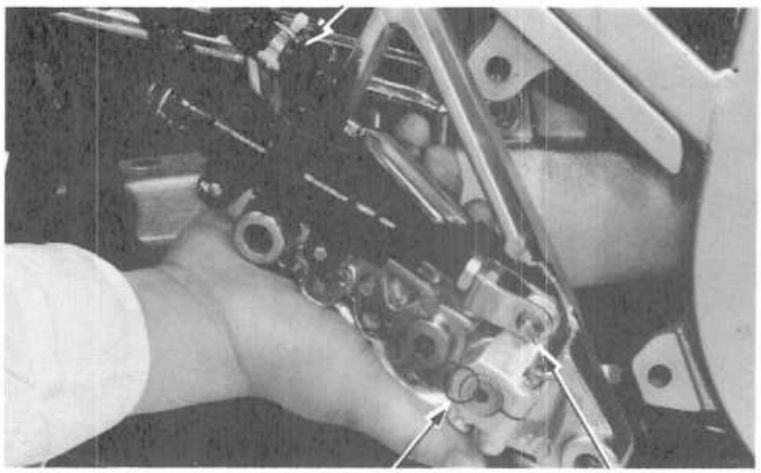
Install the master cylinder to the right footpeg bracket.

Connect the rear brake actuating arm to the master cylinder push rod with the joint pin, and secure the joint pin with the washer and a new cotter pin.
Install the actuating arm onto the rear brake pedal shaft, aligning the punch marks on the arm and shaft.
Tighten the actuating arm bolt.

TORQUE: 10–15 N·m (1.0–1.5 kg-m, 7–11 ft-lb)

Connect the master cylinder hose to the master cylinder with a new O-ring and screw.

(1) MASTER CYLINDER HOSE



(2) PUNCH MARKS (3) COTTER PIN

Hook the rear brake switch spring to the actuating arm.

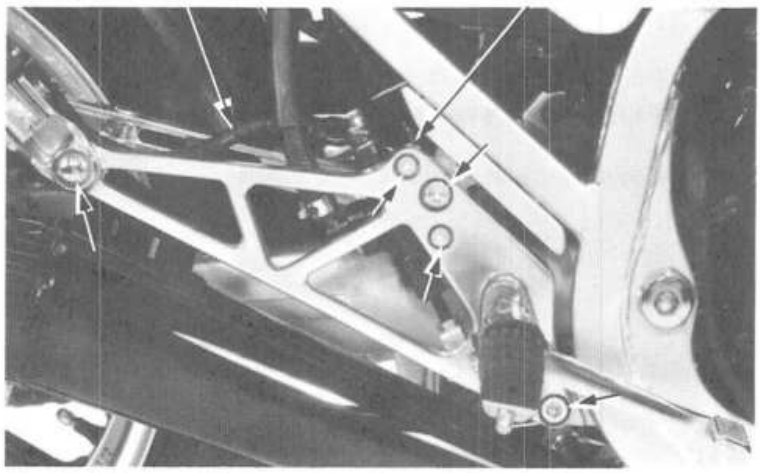
Install the right footpeg bracket.
Tighten the bracket bolt.
Tighten the rear brake master cylinder mount bolts.

Connect the rear brake hose with the fluid bolt and two sealing washers.

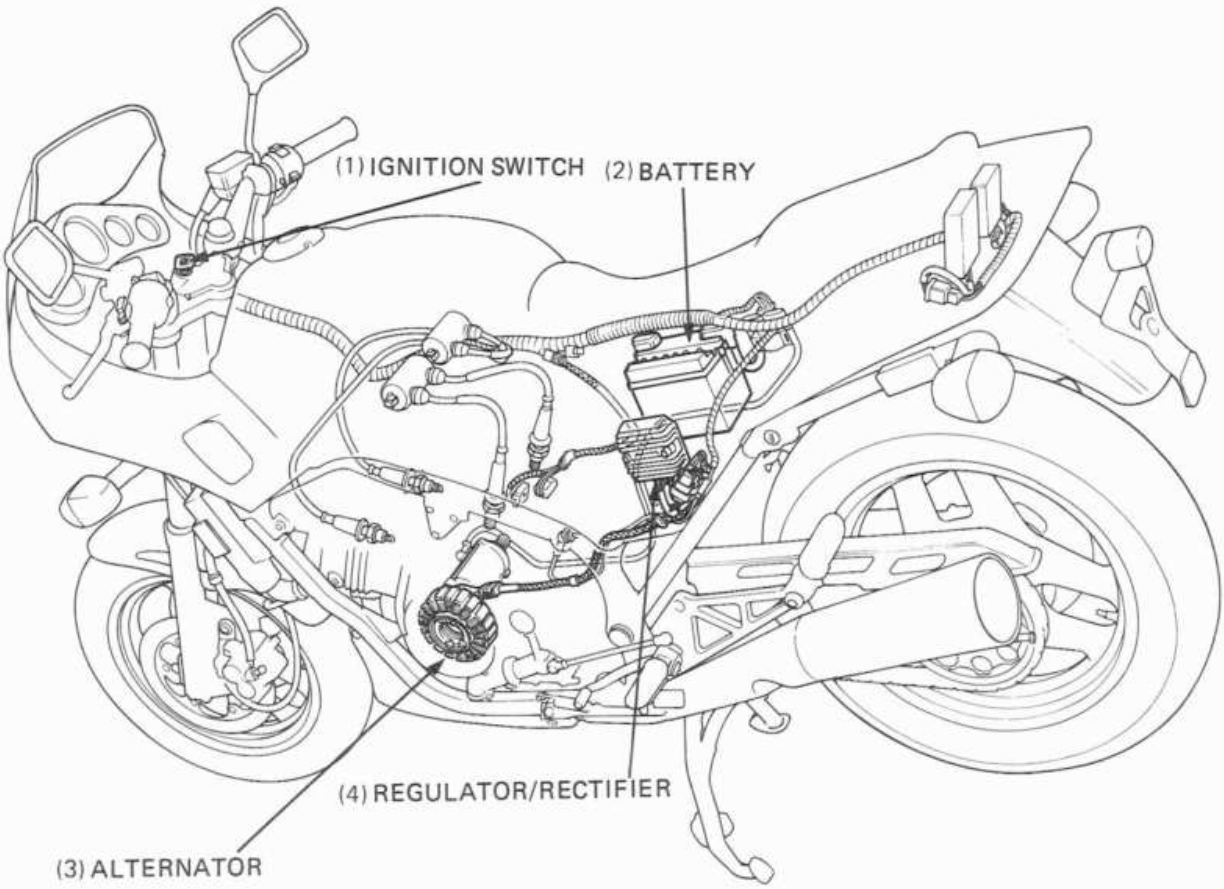
TORQUE: 25–35 N·m (2.5–3.5 kg-m, 18–25 ft-lb)

Fill and bleed the rear brake system (page 17-4).

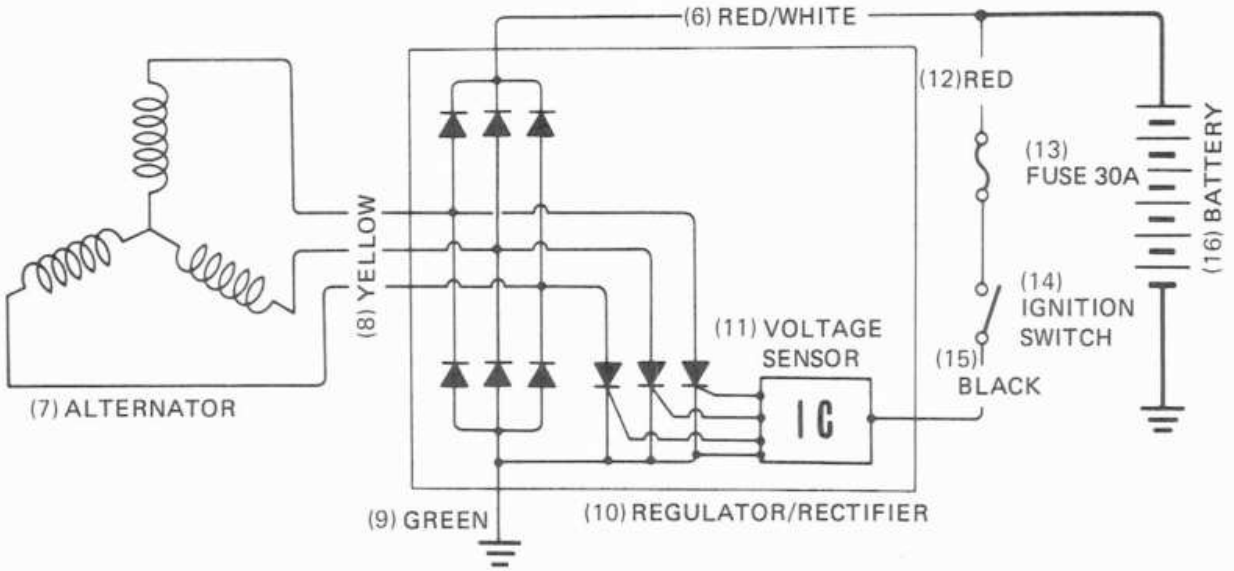
(1) BRAKE HOSE (2) BRAKE SWITCH SPRING



BATTERY/CHARGING SYSTEM



(5) BATTERY/CHARGING SYSTEM



SERVICE INFORMATION	18–1
TROUBLESHOOTING	18–2
BATTERY	18–3
CHARGING SYSTEM	18–4

SERVICE INFORMATION

GENERAL

- Battery fluid level should be checked regularly. Fill with distilled water when necessary.
- Quick charge a battery only in an emergency; slow-charging is preferred.
- Remove the battery from the motorcycle for charging. If the battery must be charged on the motorcycle, disconnect the battery cables.

WARNING

Do not smoke or allow flames near a charging battery. The gas produced by a battery will explode if flames or sparks are brought near.

- All charging system components can be tested on the motorcycle.
- Alternator removal is in Section 9.

SPECIFICATIONS

Battery	Capacity	12V 16AH	
	Specific gravity	1.280/20°C (68°F)	
	Charging rate	1.6 amperes maximum	
Alternator Capacity		1,000 rpm	5,000 rpm
		10.2A min. (No load)	25.0A min. (No load)
Voltage regulator		Transistorized non-adjustable regulator	

TROUBLESHOOTING

No power – key turned on:

1. Dead battery
   - Low fluid level
   - Low specific gravity
   - Charging system failure
2. Disconnected battery cable
3. Main fuse burned out
4. Faulty ignition switch

Low power – key turned on:

1. Weak battery
   - Low fluid level
   - Low specific gravity
   - Charging system failure
2. Loose battery connection

Low power – engine running:

1. Battery undercharged
   - Low fluid level
   - One or more dead cells
2. Charging system failure

Intermittent power:

1. Loose battery connection
2. Loose connection or short circuit charging system
3. Loose connection or short circuit starting system
4. Loose connection or short circuit in ignition system
5. Loose connection or short circuit in lighting system

Charging system failure:

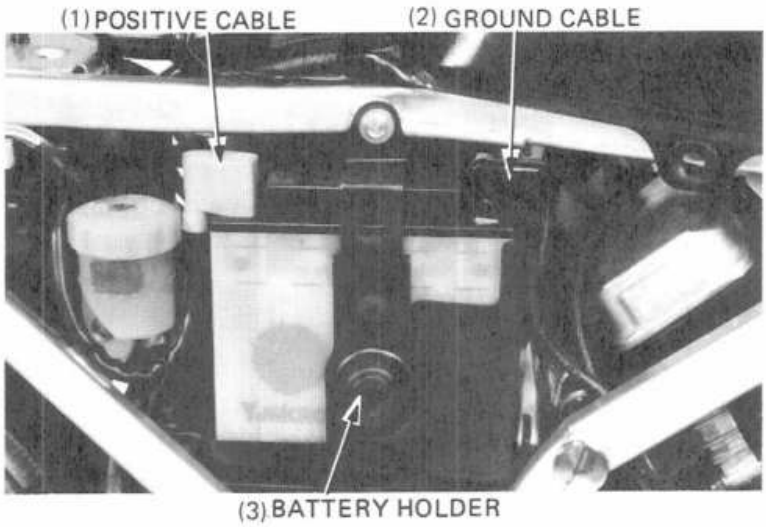
1. Loose, broken or shorted wire or connection
2. Faulty voltage regulator/rectifier
3. Faulty alternator

BATTERY

REMOVAL

Remove the battery holder bolt, then swing the holder out of the way.
Disconnect the negative cable at the battery, then disconnect the positive cable.
Disconnect the battery breather hose from the battery.

Remove the battery.



TESTING SPECIFIC GRAVITY

Test each cell with a hydrometer.

SPECIFIC GRAVITY: 1.270–1.290 (20°C, 68°F)

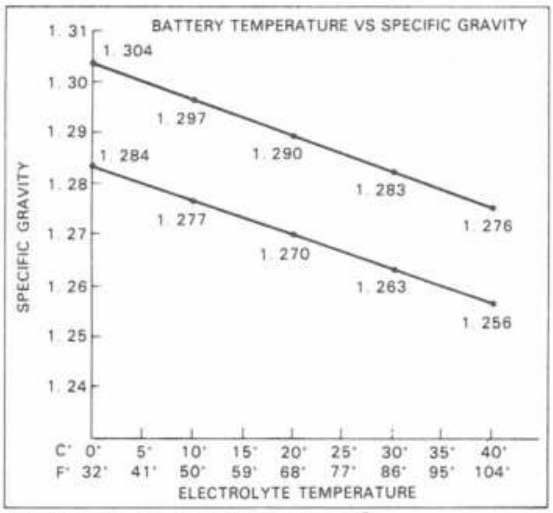
1.270–1.290	Fully charged
Below 1.260	Undercharged

NOTES

- The battery must be recharged if the specific gravity is below 1.230.
- The specific gravity varies with the temperature as shown in the accompanying table.
- Replace the battery if sulfation is evident or if the space below the cell plates is filled with sediment.

WARNING

The battery contains sulfuric acid. Avoid contact with skin, eyes, or clothing.
Antidote: Flush with water and get prompt medical attention.



Specific gravity changes by 0.007 for every 10°C.

CHARGING

Remove the battery cell caps.
Fill the battery cells with distilled water to the upper level line, if necessary.
Connect the charger positive (+) cable to the battery positive (+) terminal.
Connect the charger negative (–) cable to the battery negative (–) terminal.

Charging current: 1,6 amperes max.

Charge the battery until specific gravity is 1.270–1.290 at 20°C (68°F).

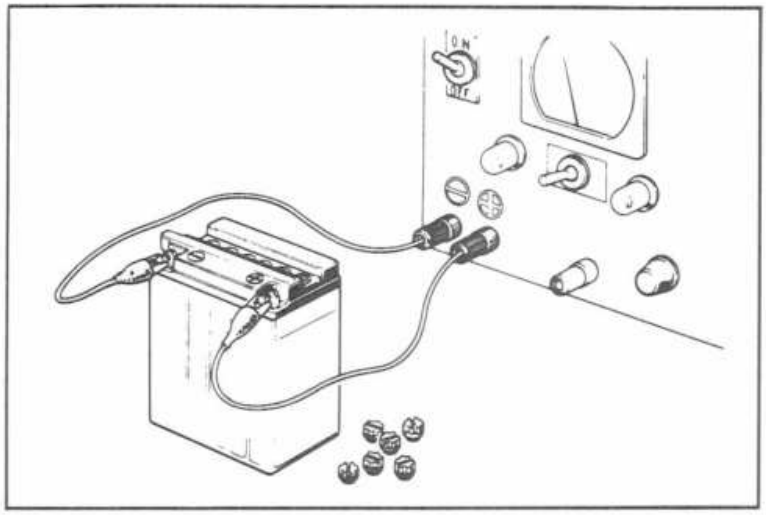
WARNING

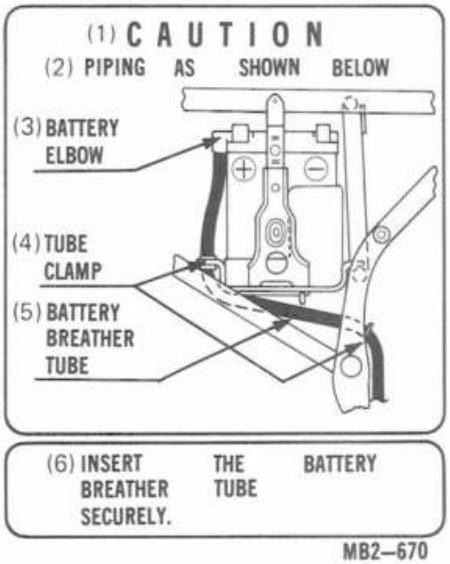
- *Before charging a battery, remove the cap from each cell.*
- *Keep flames and sparks away from a charging battery.*
- *Turn power ON/OFF at the charger, not at the battery terminals to prevent sparks.*
- *Discontinue charging if the electrolyte temperature exceeds 45°C (113°F).*

CAUTION

- *Quick-charging should only be done in an emergency; slow-charging is preferred.*
- *Route the breather tube as shown on the battery caution label.*

After installing the battery, coat the terminals with clean grease.





CHARGING SYSTEM

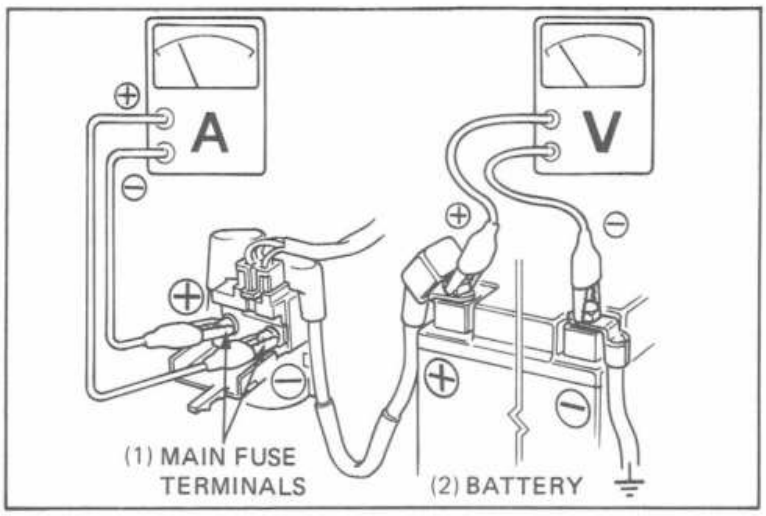
CURRENT TEST

NOTE

Be sure the battery is in good condition before performing this test.

Warm up the engine.
Remove the frame left and right side covers and seat.
coupler.
Disconnect the headlight.
Open the main fuse cover and remove the mainfuse.
Connect a voltmeter and ammeter as shown.
Allow engine to idle.

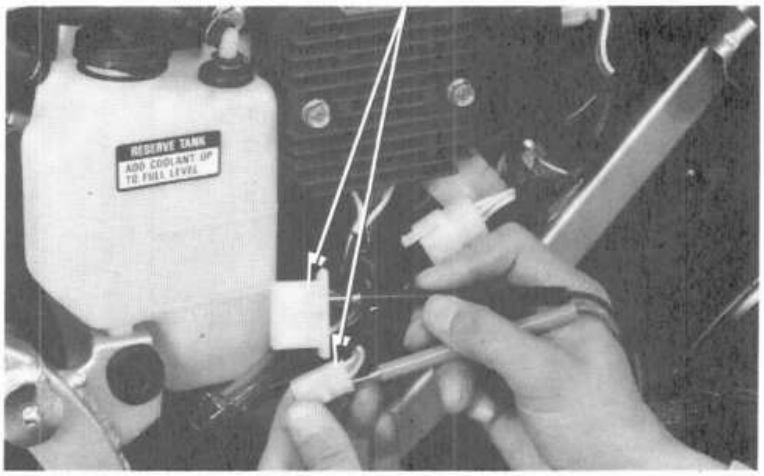
Increase engine speed slowly.
Charging amperage should be a minimum of 10.2 amperes at 1,000 rpm and should be a minimum of 25.0 amperes at 5,000 rpm.
Check the stator (page 18-5) and then the regulator/rectifier (page 18-5), if the charging specifications are not met.



STATOR CONTINUITY TEST

Remove the left side cover.
Disconnect the alternator and regulator/rectifier coupler.
Check for continuity between the leads, and between the leads and ground.
Replace the stator if there is no continuity between the leads, or if there is continuity between the leads and ground.

(1) REGULATOR/RECTIFIER COUPLER



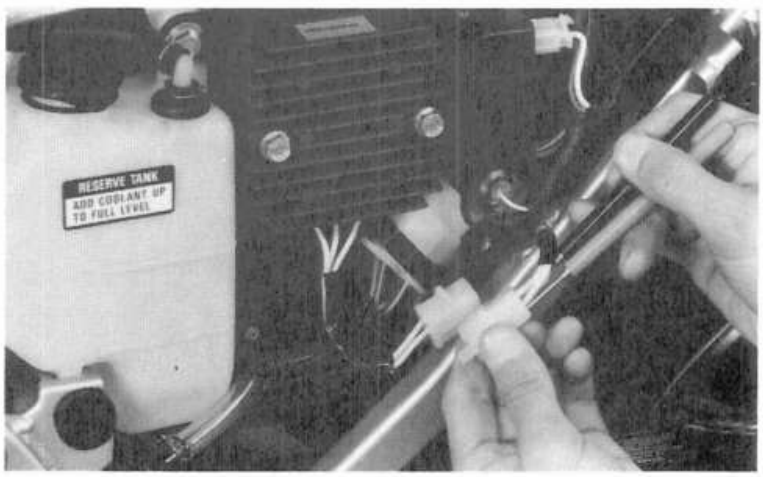
VOLTAGE REGULATOR/RECTIFIER TEST

Remove the left side cover.
Disconnect the regulator/rectifier couplers.

Check for continuity between the leads with an ohmmeter.

NOTE

> The test results shown are for a positive ground ohmmeter and the opposite results will be obtained when a negative ground ohmmeter is used.

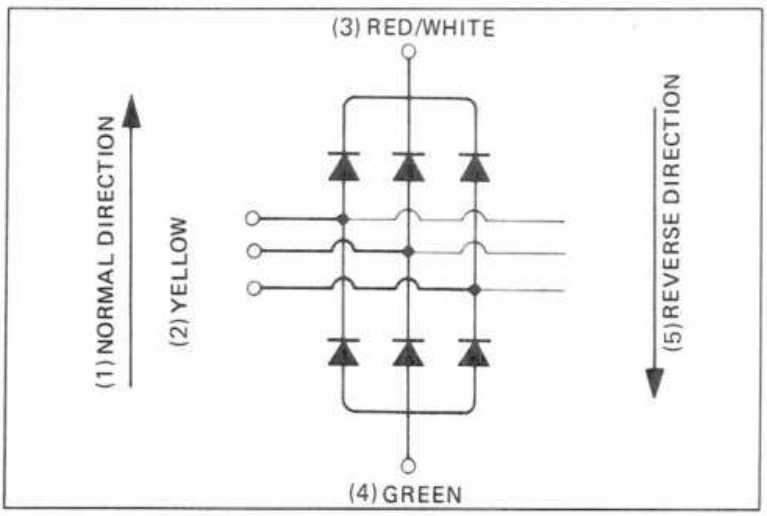


NORMAL DIRECTION: CONTINUITY

	⊕ probe	⊖ probe
I	YELLOW	GREEN
II	RED/WHITE	YELLOW

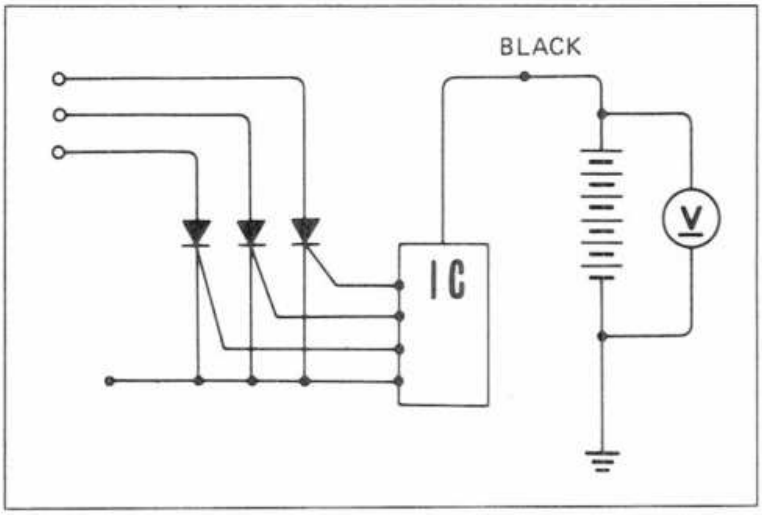
REVERSE DIRECTION: NO CONTINUITY

	⊕ probe	⊖ probe
I	GREEN	YELLOW
II	YELLOW	RED/WHITE

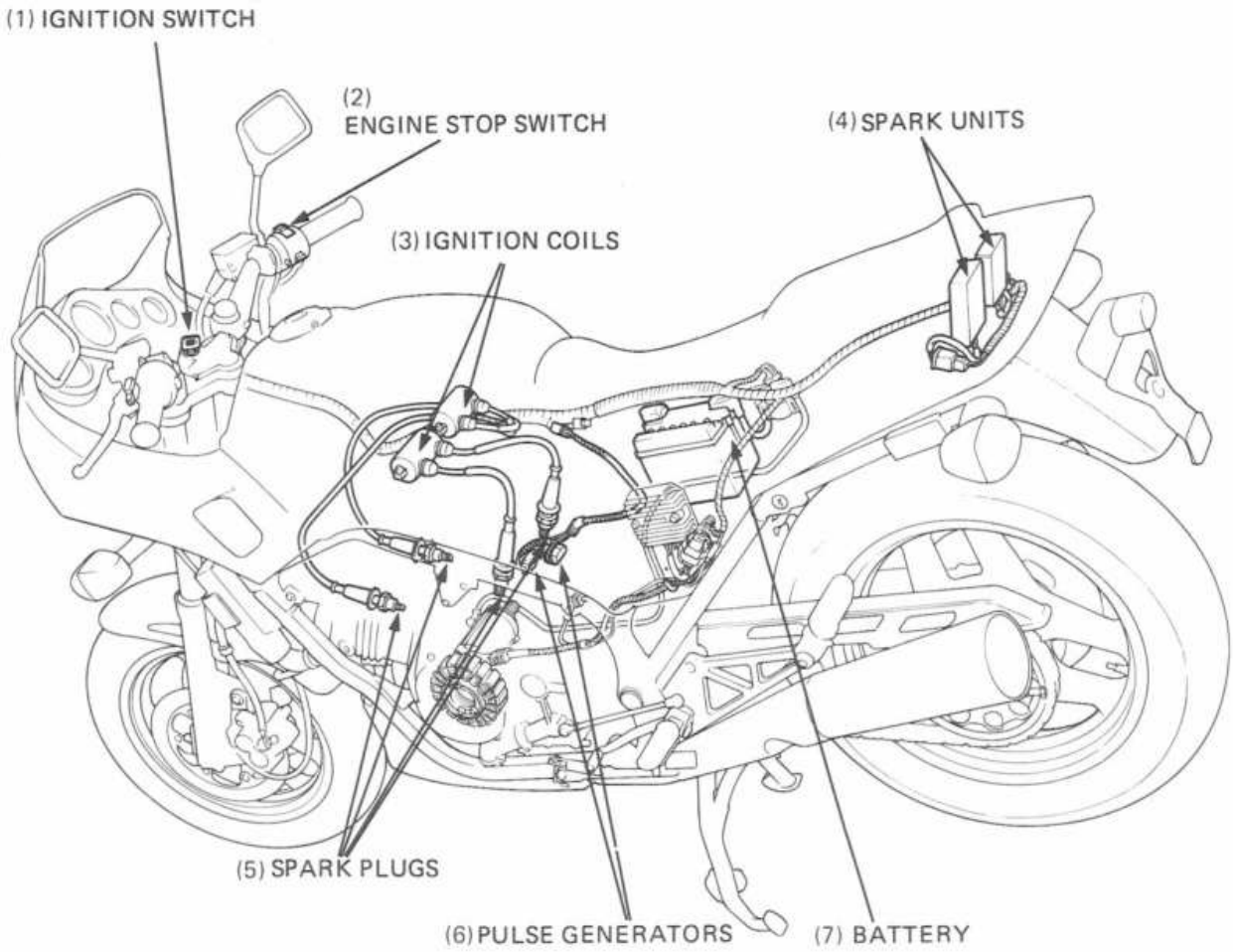


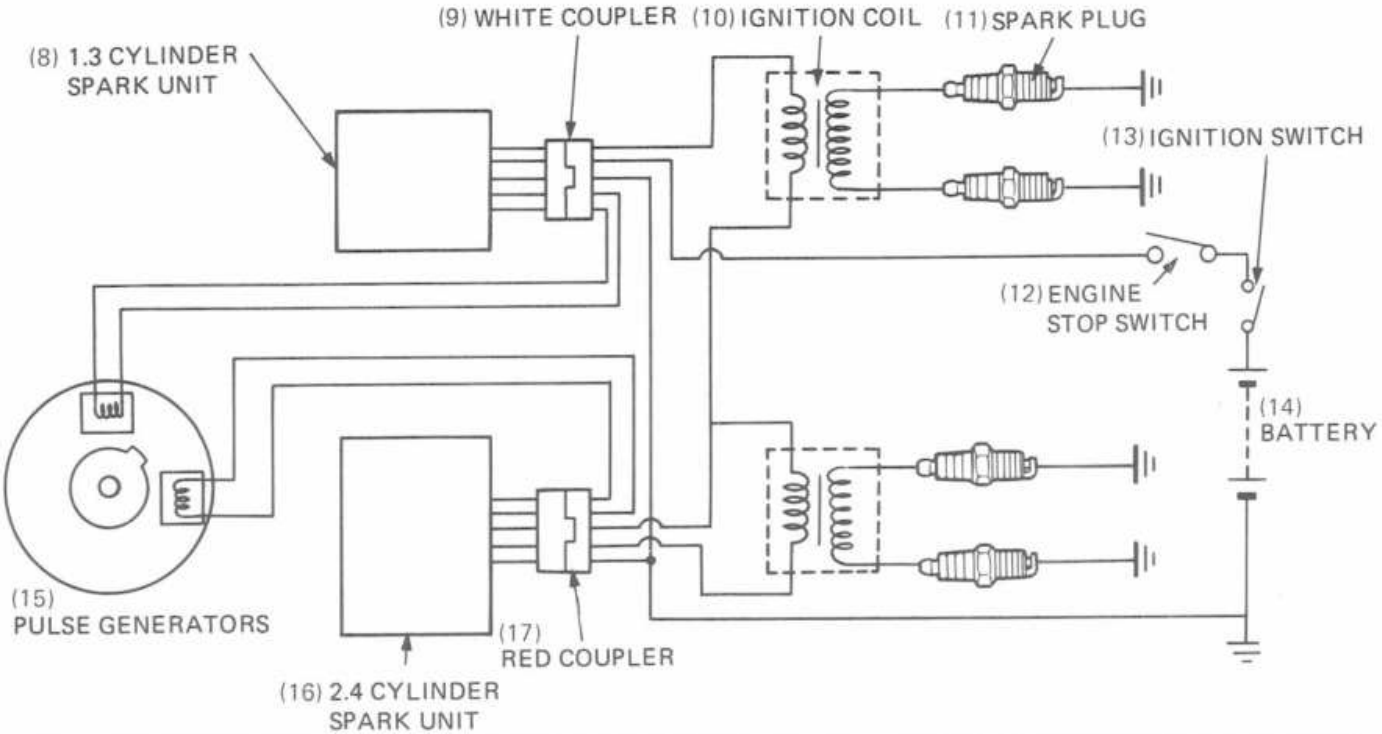
VOLTAGE REGULATOR PERFORMANCE TEST

Connect a voltmeter across the battery.
Check regulator performance with the engine running. The regulator must divert current to ground when battery voltage reaches 14.0 ~ 15.0 V.



IGNITION SYSTEM


(1) IGNITION SWITCH
(2) ENGINE STOP SWITCH
(3) IGNITION COILS
(4) SPARK UNITS
(5) SPARK PLUGS
(6) PULSE GENERATORS
(7) BATTERY


(8) 1.3 CYLINDER SPARK UNIT
(9) WHITE COUPLER
(10) IGNITION COIL
(11) SPARK PLUG
(12) ENGINE STOP SWITCH
(13) IGNITION SWITCH
(14) BATTERY
(15) PULSE GENERATORS
(16) 2.4 CYLINDER SPARK UNIT
(17) RED COUPLER

SERVICE INFORMATION	19–1
TROUBLESHOOTING	19–2
IGNITION COIL	19–3
TRANSISTORIZED IGNITION SYSTEM	19–4
IGNITION TIMING	19–5

SERVICE INFORMATION

GENERAL

- A TRANSISTORIZED IGNITION SYSTEM is used and no adjustments can be made.

SPECIFICATIONS

< >: U

		ND	NGK
Spark plug	Standard	X24EPR-U9 <X24EP-U9>	DPR8EA-9 <DP8EA-9>
	For cold climate Below 5°C (41°F)	X22EPR-U9 <X22EP-U9>	DPR7EA-9 <DP7EA-9>
	For extended high speed driving	X27EPR-U9 <X27EP-U9>	DPR9EA-9 <DP9EA-9>
Spark plug gap		0.8–0.9 mm (0.031–0.035 in)	
Ignition timing		At idle 10°BTDC	
		Full advance 37° BTDC/3,800 rpm	
Pulse generator air gap		0.3–0.9 mm (0.012–0.035 in)	

TOOL

Special

Timing inspection cover	07998–MB40000

TROUBLESHOOTING

The ignition system has two sub-systems; one for the No. 1 and No. 3 cylinders and one for the No. 2 and No. 4 cylinders. Determine which sub-system is faulty, then proceed to the detailed tests below.

Engine cranks but will not start
- Engine stop switch OFF
- No spark at plugs
- Faulty transistorized spark unit
- Faulty pulse generator

No spark at plug
- Engine stop switch OFF
- Poorly connected, broken or shorted wires
  - Between ignition switch and engine stop switch
  - Between spark unit and engine stop switch
  - Between spark unit and ignition coil
  - Between ignition coil and plug
  - Between spark unit and pulse generator
- Faulty ignition coil
- Faulty ignition switch
- Faulty spark unit
- Faulty pulse generator

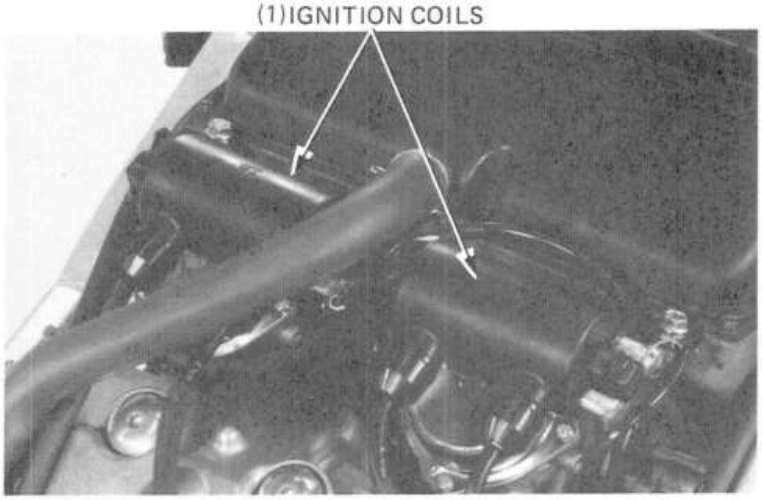
Engine starts but runs poorly
- Ignition primary circuit
  - Faulty ignition coil
  - Loose or bare wire
  - Intermittent short circuit
- Secondary circuit
  - Faulty plug
  - Faulty high tension wire

Timing advance incorrect
- Faulty pulse generator
- Faulty spark unit

IGNITION COIL

Remove the seat and fuel tank.

(1) IGNITION COILS



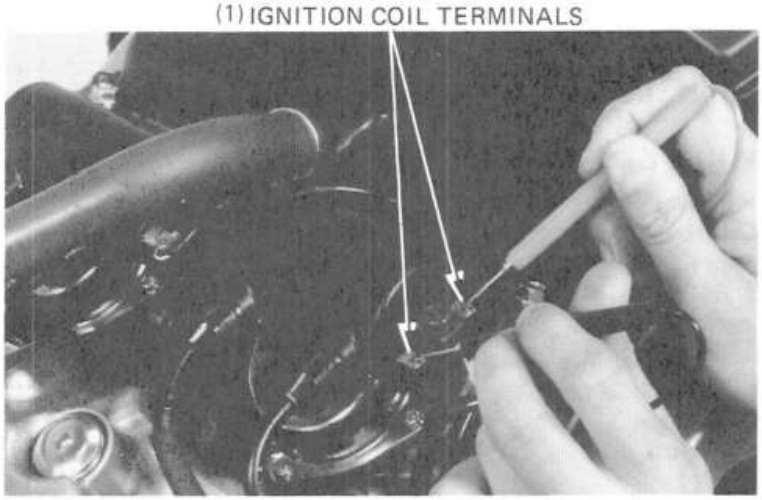
CONTINUITY TEST

Disconnect the coils primary leads.

Measure the primary coil resistance.

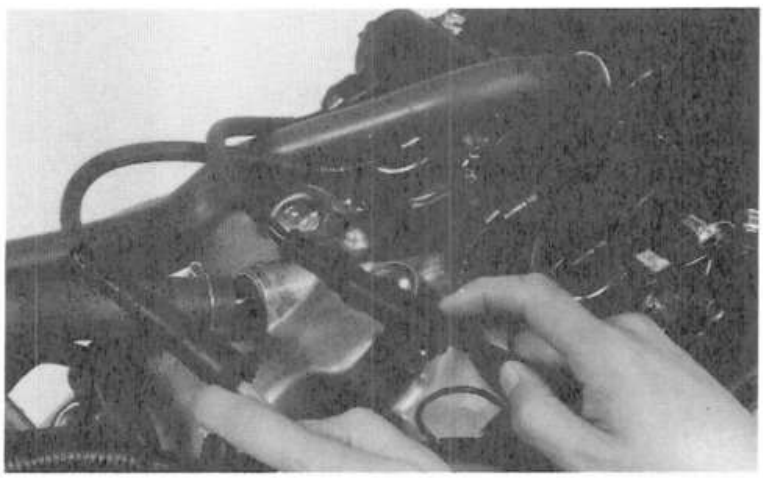
RESISTANCE: 2.8 Ω

(1) IGNITION COIL TERMINALS



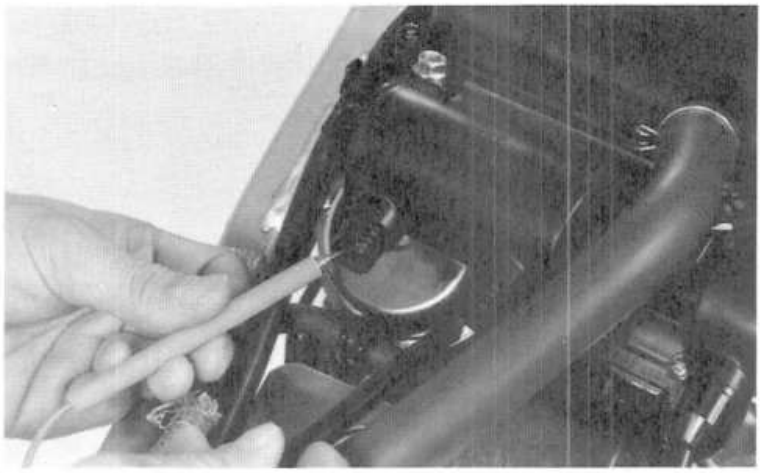
Measure the secondary coil resistance with the spark plug caps in place.

RESISTANCE: 21–28 k Ω



Remove the high tension wire and measure the secondary coil resistance.

RESISTANCE 13.6–15.5 kΩ



TRANSISTORIZED IGNITION SYSTEM

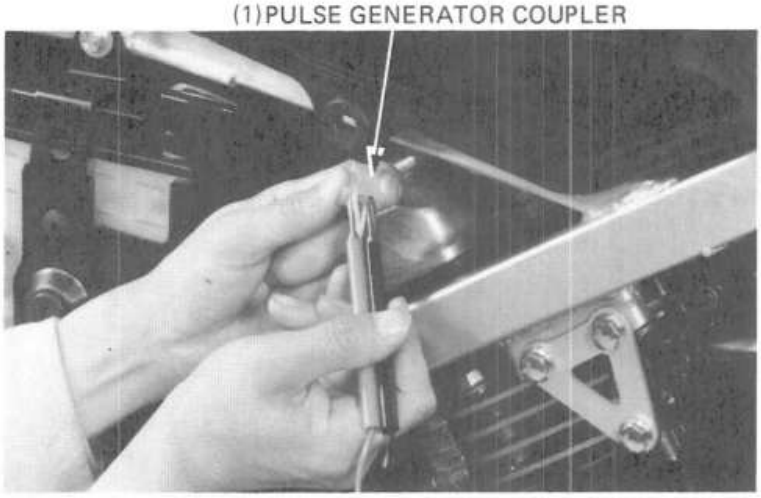
PULSE GENERATOR TEST

Remove the right side cover.
Disconnect the pulse generator coupler and measure the coil resistance.

RESISTANCE: Approximately 480 Ω

Between white/yellow and yellow leads (1,3 cylinders)
Between white/blue and blue leads (2,4 cylinders)

(1) PULSE GENERATOR COUPLER



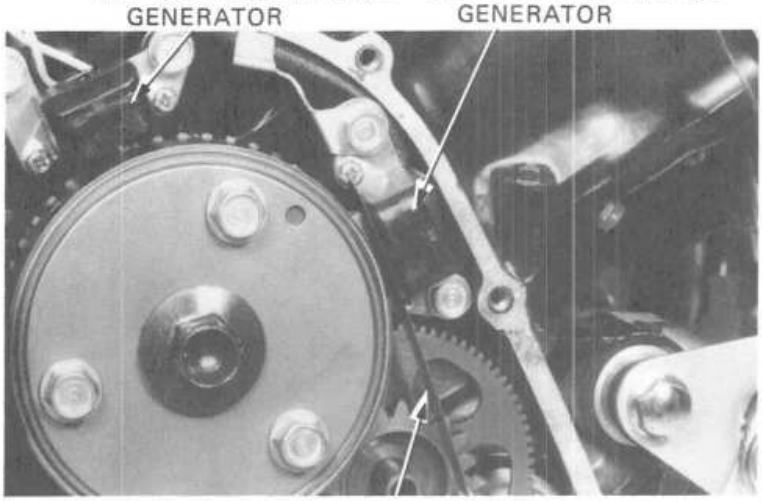
PULSE GENERATOR REPLACEMENT

Remove the clutch cover (page 7-10).
Remove the pulse generator mounting bolts, and pulse generators.
Install new pulse generators.
Measure the air gap between the pulse generator and rotor.

AIR GAP: 0.3–0.9 mm (0.012–0.035 in)

Install the clutch cover (page 7-22).
Recheck the ignition timing (page 19-5).

(1) 1–3 CYLINDER PULSE GENERATOR
(2) 2–4 CYLINDER PULSE GENERATOR

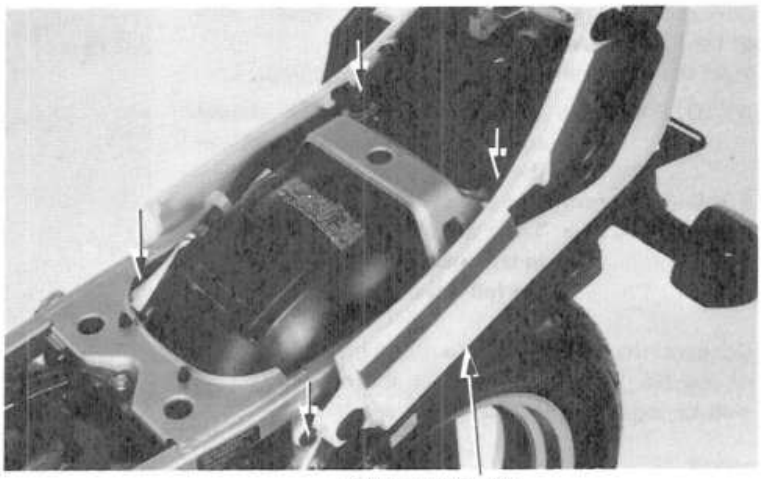


(3) FEELER GAUGE

SPARK UNIT

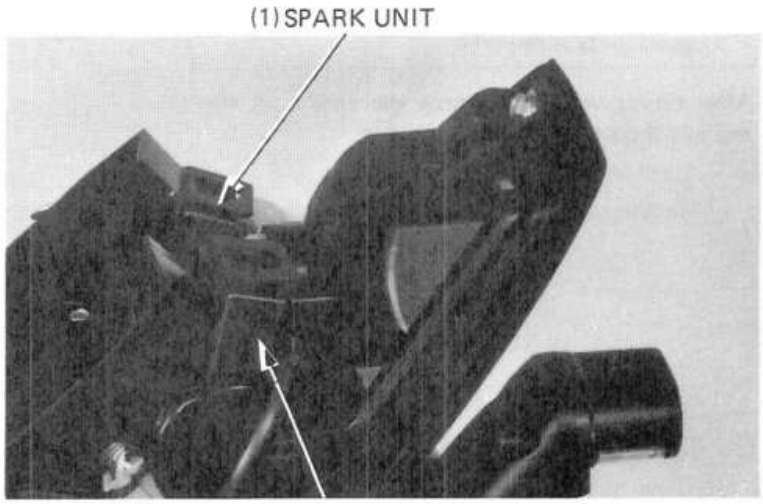
If the pulse generators, ignition coils, and wiring are good, and the ignition timing is not in specification; replace the spark units with new ones and recheck the ignition timing.

Remove the rear cowl by removing the four bolts.



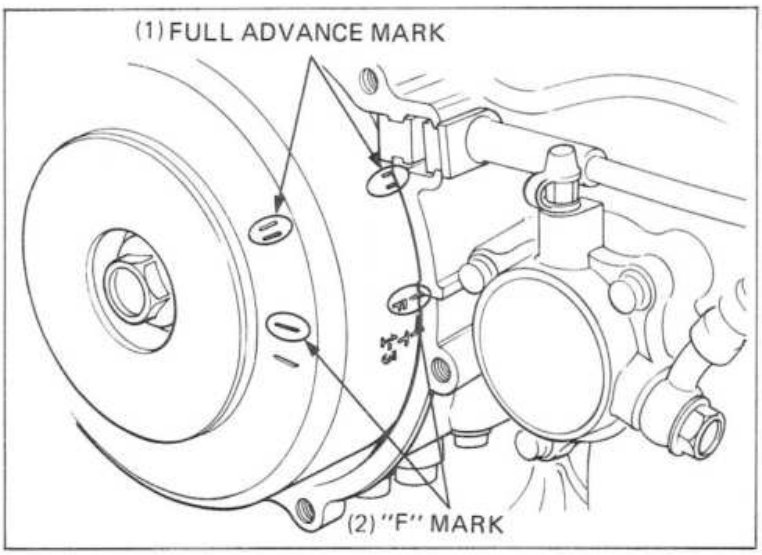
(1) REAR COWL

Replace the spark units with new one.
Install the rear cowl in the reverse order of removal.



IGNITION TIMING

Warm up the engine and remove the alternator cover.
Align the F mark on the flywheel with the rear crankcase mating surface.
Use a felt pen to mark a dark line and "1-3F" in line with the F mark on the end surface of the flywheel.



Install the timing inspection cover.
Connect the timing light to the high tension wire of the No. 1 or No. 3 cylinder.
Start the engine and check the ignition timing.

AT IDLE SPEED: The dark line (1-3F) should align with the index mark on the timing cover.
1,300–1,750 rpm: The advance starts.
3,100–3,500 rpm: The advance ends and the index mark should be between the full advance marks.

Connect the timing light to the high tension wire of the No. 2 or No. 4 cylinder and check the ignition timing for No. 2 and No. 4 cylinders.

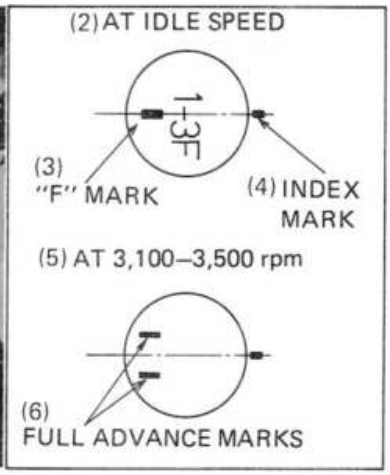
NOTE

> The ignition system is transistorized and cannot be adjusted. If the ignition timing is incorrect, check the spark units and pulse generators.
> Replace parts as required.

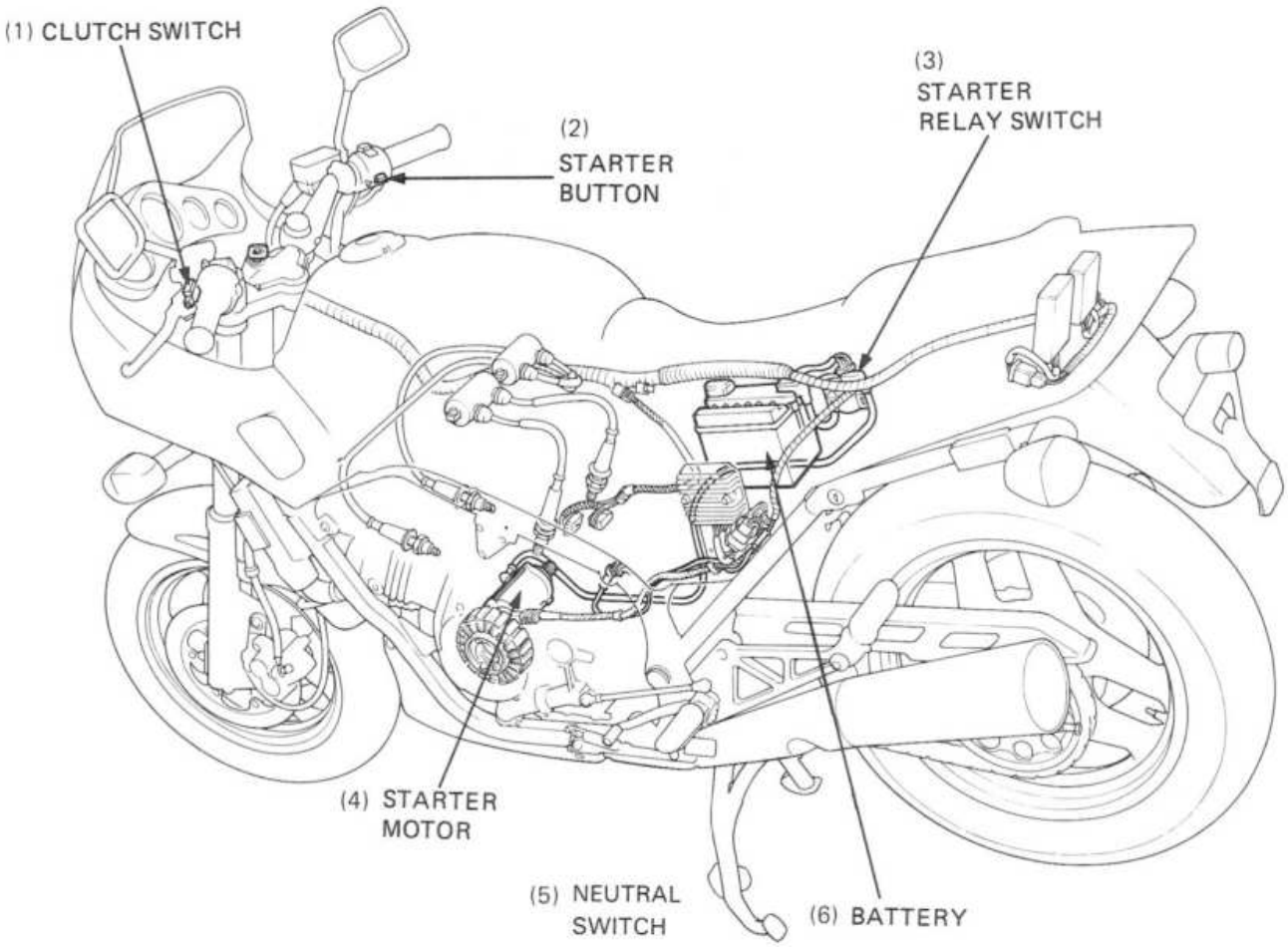
After timing inspection, check the engine oil level and add if necessary.

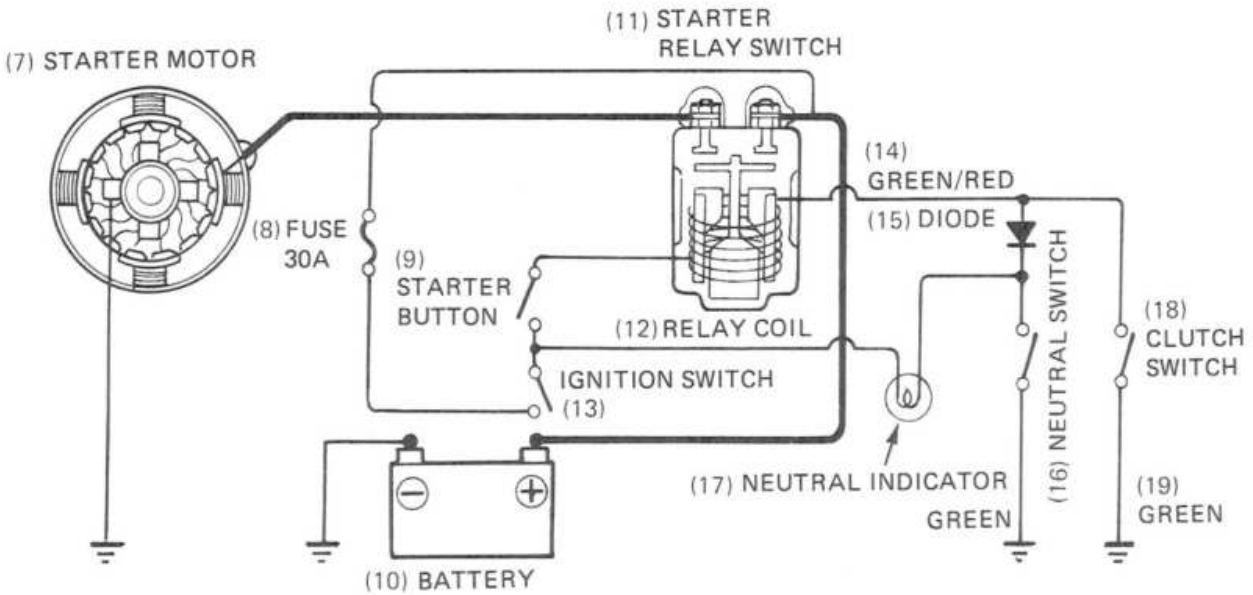
(1) TIMING INSPECTION COVER
07998–MB40000





ELECTRIC STARTER


(1) CLUTCH SWITCH
(2) STARTER BUTTON
(3) STARTER RELAY SWITCH
(4) STARTER MOTOR
(5) NEUTRAL SWITCH
(6) BATTERY


(7) STARTER MOTOR
(8) FUSE 30A
(9) STARTER BUTTON
(10) BATTERY
(11) STARTER RELAY SWITCH
(12) RELAY COIL
IGNITION SWITCH (13)
(14) GREEN/RED
(15) DIODE
(16) NEUTRAL SWITCH
(17) NEUTRAL INDICATOR GREEN
(18) CLUTCH SWITCH
(19) GREEN

SERVICE INFORMATION	20–1
TROUBLESHOOTING	20–1
STARTER MOTOR	20–2
STARTER RELAY SWITCH	20–5
CLUTCH DIODE	20–5

SERVICE INFORMATION

GENERAL

- The starter motor can be removed with the engine in the frame.

SPECIFICATIONS

		STANDARD	SERVICE LIMIT
Starter motor	Brush spring tension	680–920 g (24.0–32.5 oz)	580 g (20.4 oz)
	Brush length	12.0–13.0 mm (0.47–0.51 in)	6.5 mm (0.26 in)

TROUBLESHOOTING

Starter motor will not turn:
1. Battery discharged.
2. Faulty ignition switch.
3. Faulty starter switch.
4. Faulty neutral switch.
5. Faulty starter relay switch.
6. Loose or disconnected wire or cable.
7. Clutch diode open.

Starter motor turns engine slowly
1. Low specific gravity in battery.
2. Excessive resistance in circuit.
3. Binding in starter motor.

Starter motor turns, but engine does not turn:
1. Faulty starter clutch.
2. Faulty starter motor gears.
3. Faulty starter motor or idle gear.

Starter motor and engine turns, but engine does not start
1. Faulty ignition system.
2. Engine problems.
   - Low compression.
   - Fouled spark plugs.

STARTER MOTOR

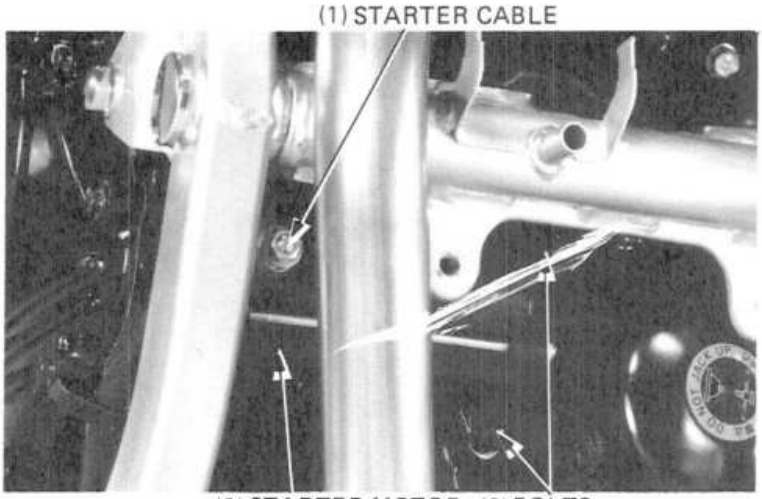
REMOVAL

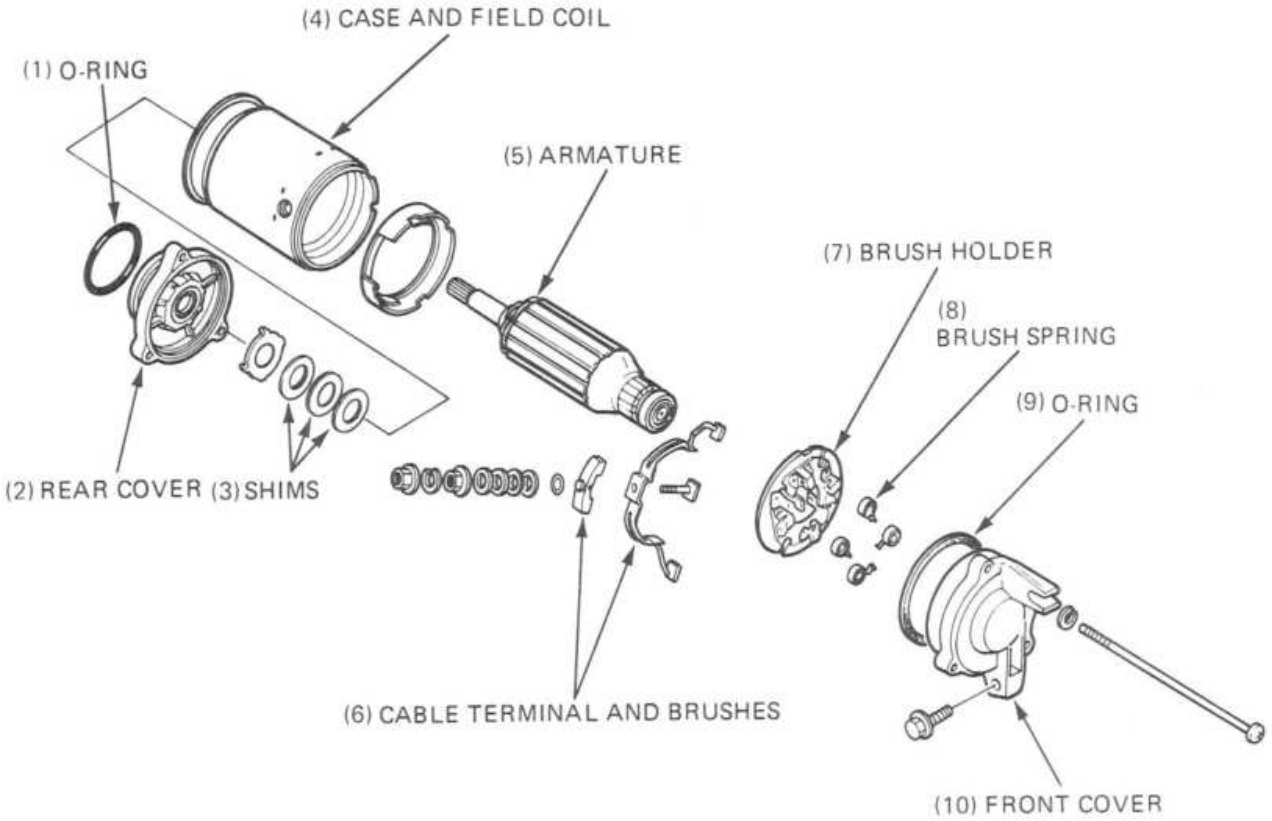
WARNING

With the ignition switch OFF, remove the negative cable at the battery before servicing the starter motor.

Remove the lower radiator (page 6-7).

Disconnect the starter motor cable at the motor. Remove the starter motor mounting bolts, and starter motor.



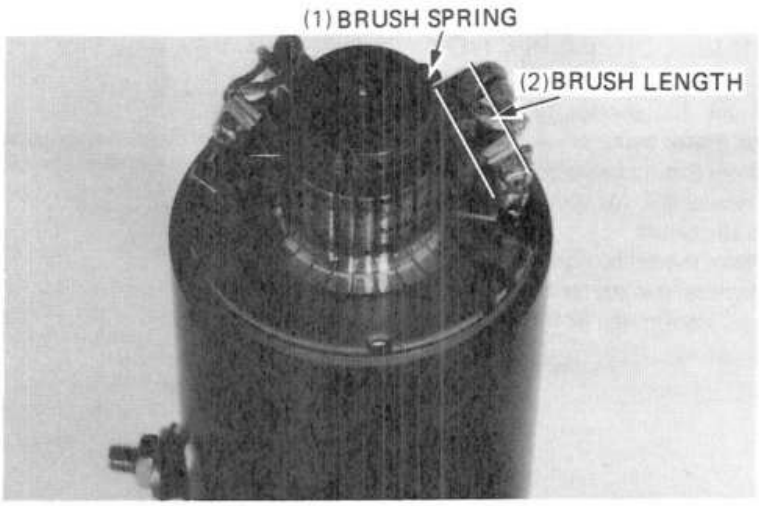


BRUSH INSPECTION

Remove the starter motor case screws.
Inspect the brushes and measure the brush length.
Measure brush spring tension with a spring scale.

SERVICE LIMITS:

Brush length:	**6.5 mm (0.26 in)**
Brush spring tension:	**580 g (20.4 oz)**



COMMUTATOR INSPECTION

Remove the starter motor case.

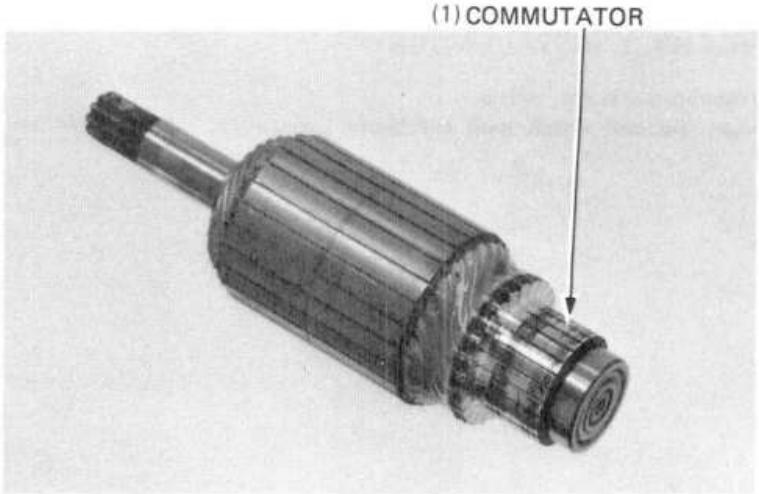
NOTE

Record the location and number of shims.

Inspect the commutator bars for discoloration.
Bars discolored in pairs indicate grounded armature coils.

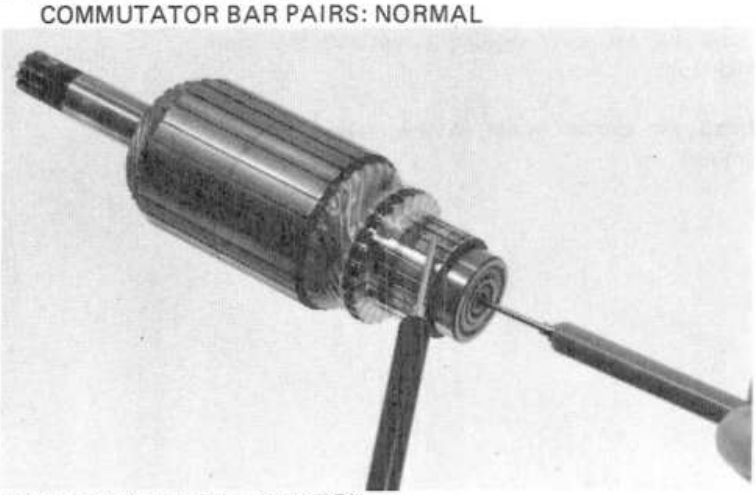
NOTE

Do not use emery or sand paper on the commutator.



Check for continuity between pairs of commutator bars.
There should be continuity.
Also, make a continuity check between individual commutator bars and the armature shaft.
There should be no continuity.

(1) CONTINUITY BETWEEN COMMUTATOR BAR PAIRS: NORMAL

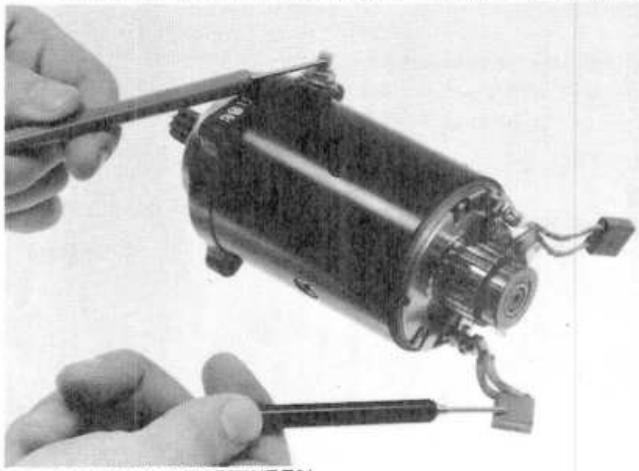


(1) NO CONTINUITY BETWEEN COMMUTATOR BARS AND ARMATURE SHAFT: NORMAL

FIELD COIL INSPECTION

Check for continuity from the cable terminal to the motor case.
There should be no continuity.
Then check for continuity from the cable terminal to the brush.
There should be continuity.
Replace the starter motor if the field coil does not have continuity or if it is shorted to the motor case.

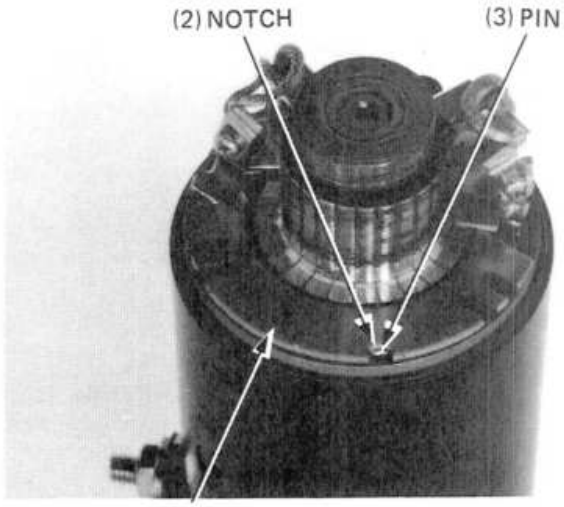
(1) NO CONTINUITY BETWEEN CABLE TERMINAL AND MOTOR CASE: NORMAL



(2) CONTINUITY BETWEEN CABLE TERMINAL AND BRUSH WIRE (INSULATED): NORMAL

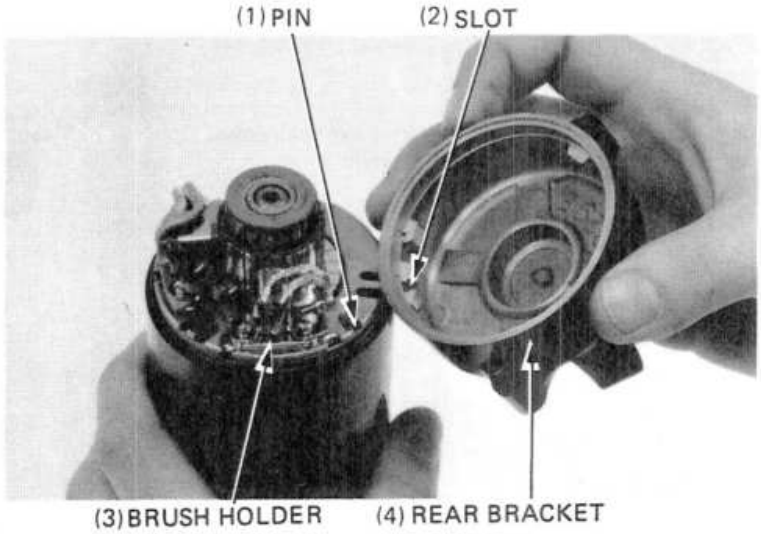
ASSEMBLY/INSTALLATION

Assemble the starter motor.
Align the case notch with the brush holder pin.



Install the rear cover aligning its slot with the brush holder pin.

Install the starter motor in the reverse order of removal.

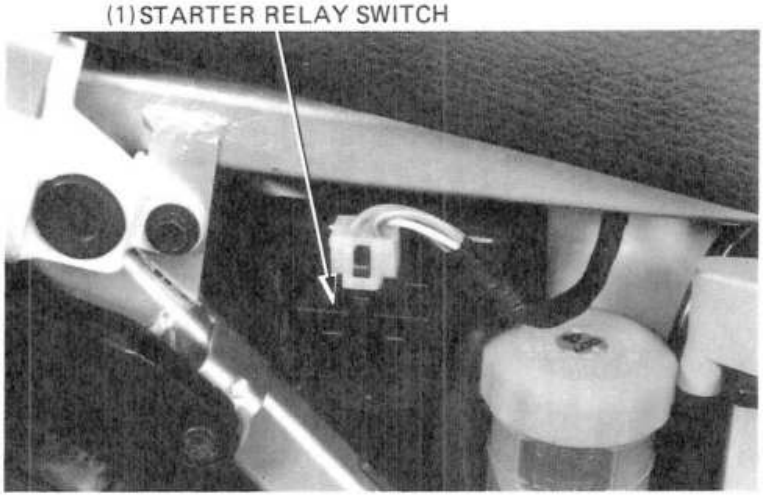


STARTER RELAY SWITCH

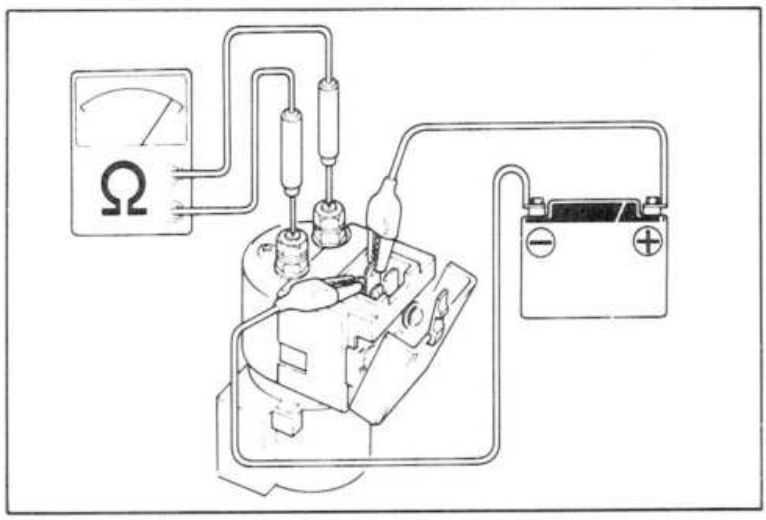
INSPECTION

Depress the starter switch button with the ignition ON.
The coil is normal if the starter relay switch clicks.

(1) STARTER RELAY SWITCH



Connect an ohmmeter to the starter relay switch terminals.
Connect a 12 V battery to the switch cable terminals.
The switch is normal if there is continuity.

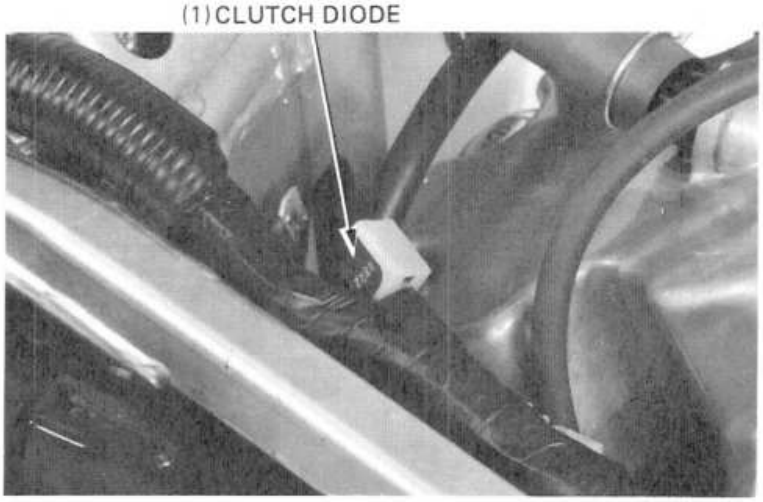


CLUTCH DIODE

REMOVAL

Remove the fuel tank.
Remove the clutch diode from the wire harness.

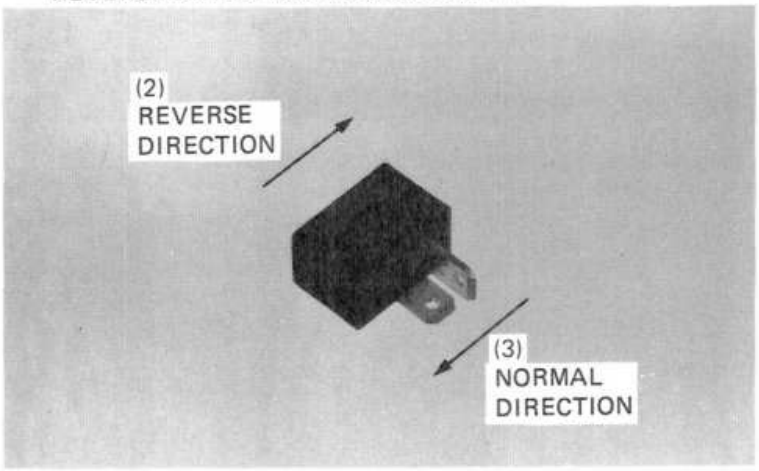
(1) CLUTCH DIODE



INSPECTION

Check for continuity with an ohmmeter.

(1) NORMAL DIRECTION: CONTINUITY
REVERSE DIRECTION: NO CONTINUITY



SERVICE INFORMATION	21–1	THERMOSTATIC SWITCH	21–11
OIL PRESSURE SWITCH	21–2	TEMPERATURE SENSOR	21–11
BRAKE LIGHT SWITCH	21–2	BRAKE AND TAILLIGHT SENSOR	21–12
NEUTRAL SWITCH	21–3	HEADLIGHT	21–12
CLUTCH SWITCH	21–5	INSTRUMENTS	21–14
HANDLEBAR SWITCHES	21–6	TEMPERATURE GAUGE	21–16
IGNITION SWITCH	21–7	TACHOMETER	21–16
FUEL PUMP	21–9	BULB	21–17
FUEL PUMP RELAY	21–9	FUSE HOLDER	21–19
FUEL LEVEL SENSOR	21–10	HORN	21–20

SERVICE INFORMATION

GENERAL

- Some wires have different colored bands around them near the connector. These are connected to other wires which correspond with the band color.
- All plastic plugs have locking tabs that must be released before disconnecting, and must be aligned when reconnecting.
- The following color codes used are indicated throughout this section and on the wiring diagram.

Bu = Blue	G = Green	LG = Light Green	R = Red
Bl = Black	Gr = Grey	O = Orange	W = White
Br = Brown	LB = Light Blue	P = Pink	Y = Yellow

- 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.

OIL PRESSURE SWITCH

Disconnect the oil pressure switch lead and remove the switch.

Check for continuity while applying pressure to the switch.

No continuity: Above 20–40 kPa (0.2–0.4 kg/cm², 2.8–5.7 psi)

Replace the switch if necessary.

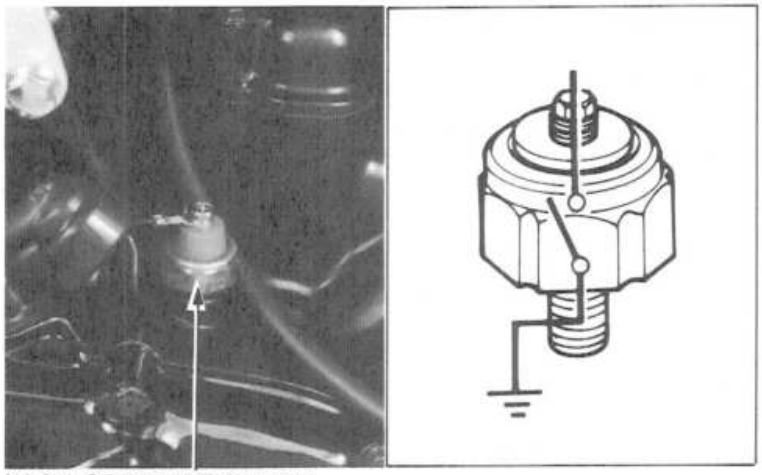
Apply a liquid sealant to the switch threads before installing the switch.

Screw the switch into the crankcase but stop two threads from the bottom. Then tighten it to the specified torque.

TORQUE: 10–14 N·m (1.0–1.4 kg-m, 7–10 ft-lb)

NOTE

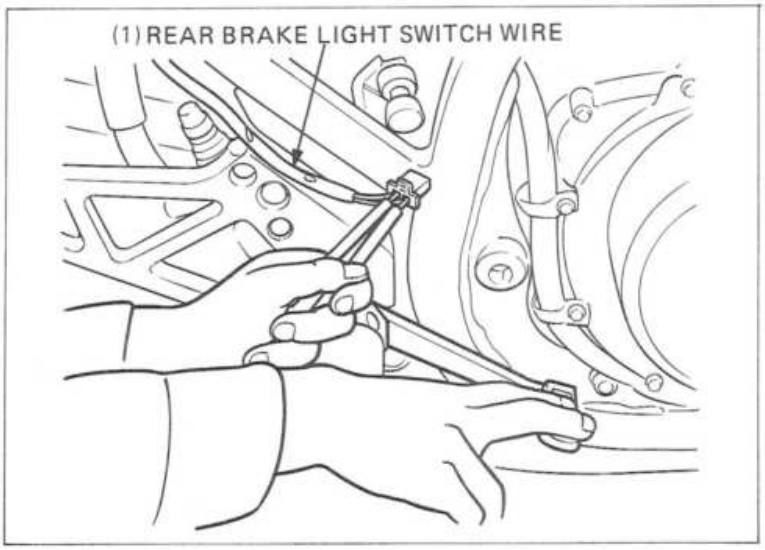
> To prevent crankcase damage, do not over-tighten the switch.



(1) OIL PRESSURE SWITCH

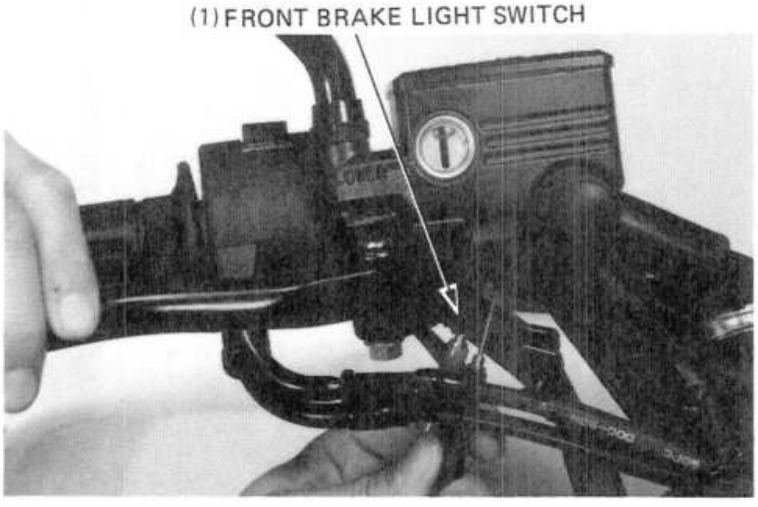
BRAKE LIGHT SWITCH

Check the rear brake light switch for continuity with the rear brake applied.



Check the front brake light switch for continuity with the front brake applied.

Replace the switches if necessary.

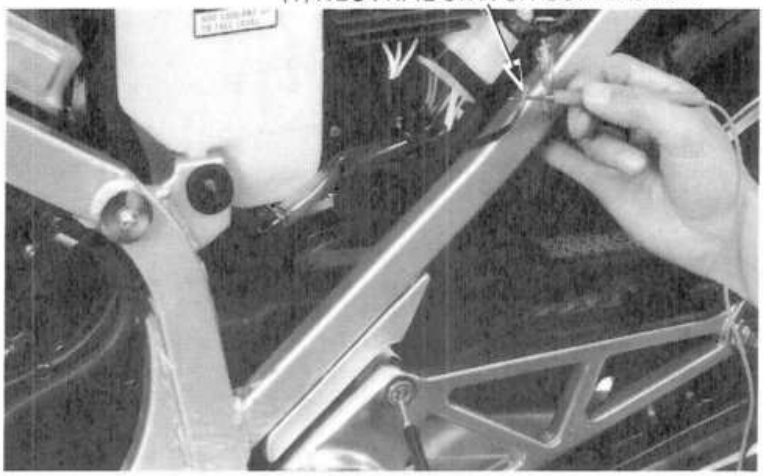


NEUTRAL SWITCH

Remove the left side cover.
Disconnect the neutral switch connector.

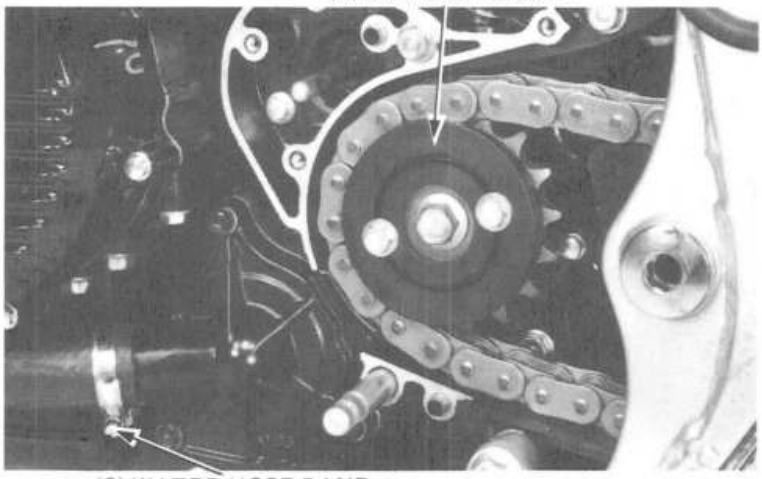
Check the switch for continuity between the switch connector terminal and ground.

There should continuity with the transmission in neutral and no continuity with the transmission in any gear.

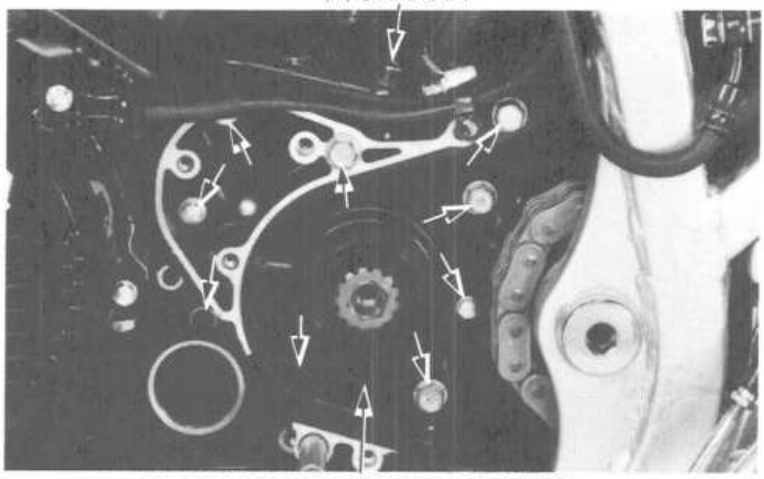


Remove the slave cylinder and drive sprocket cover. (page 6-10)

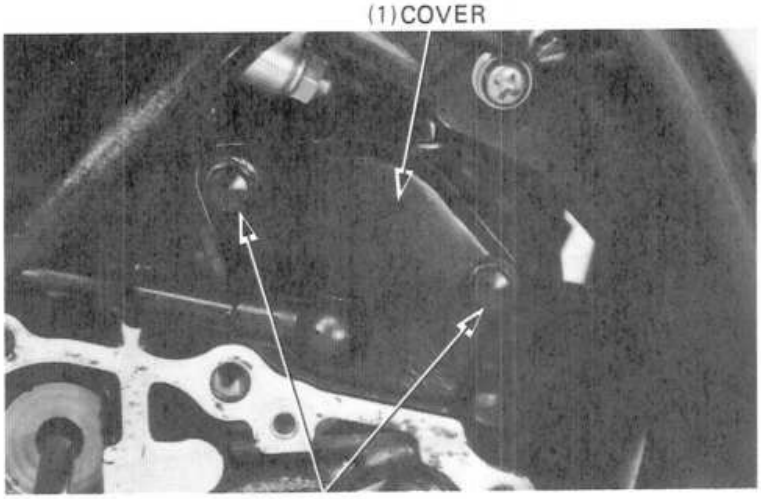
Loosen the water hose band and remove the water pump by removing the mount bolts.
Remove the drive sprocket mount bolt and drive sprocket. (page 5-5)



Remove the oil bolt.
Remove the countershaft bearing cover by removing the mount bolt.



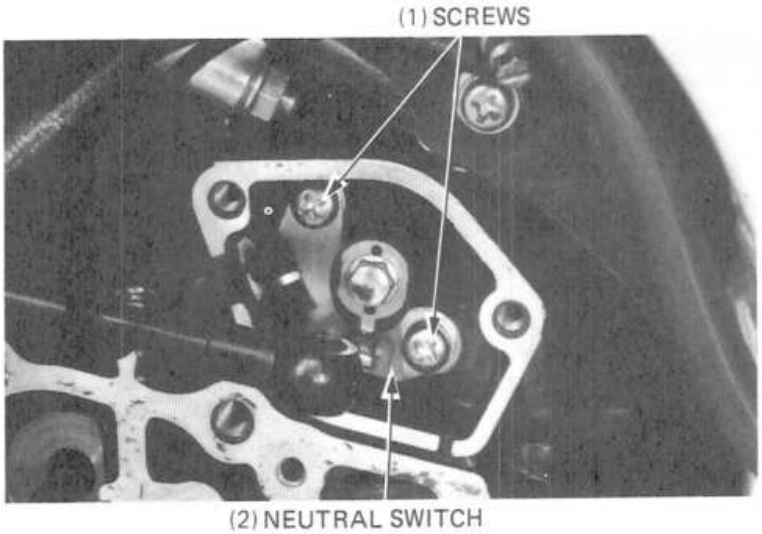
Remove the neutral switch cover bolts and cover.



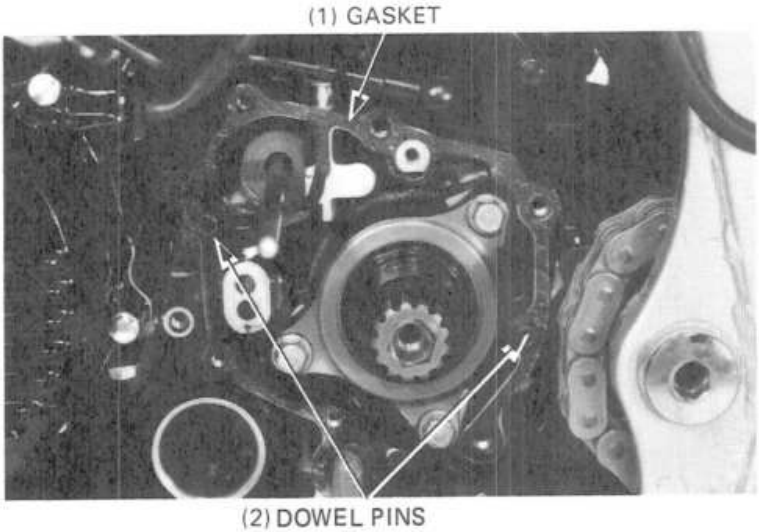
Remove the neutral switch attaching screws and the switch.

INSTALLATION

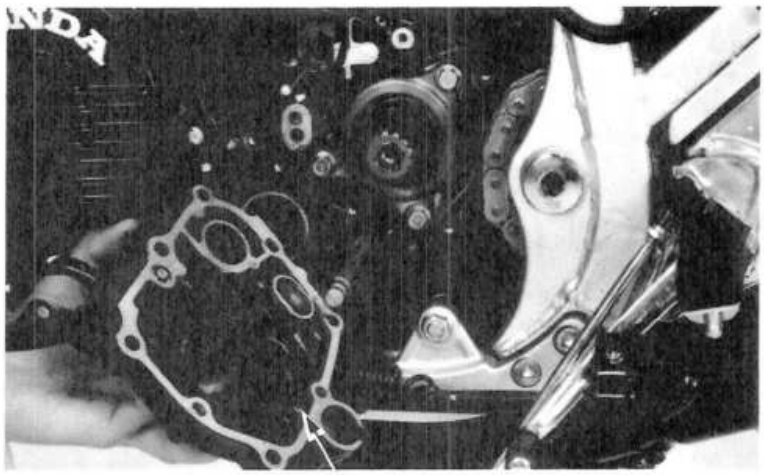
Install the neutral switch.
Install the neutral switch cover with the mount bolts.



Install the new gasket and dowel pins.



Install the countershaft bearing cover.
Tighten the oil bolt.

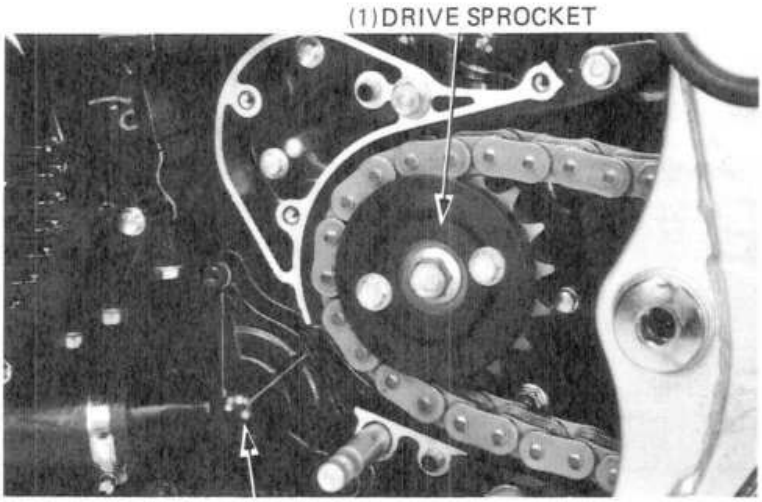


(1) COUNTERSHAFT BEARING COVER

Install the water pump and hose.
Install the drive sprocket and tighten the drive sprocket mount bolt.

TORQUE: 50–54 N·m (5.0–5.4 kg-m, 36–39 ft-lb)

Install the clutch slave cylinder, drive sprocket cover, and gearshift pedal in the reverse order of removal.



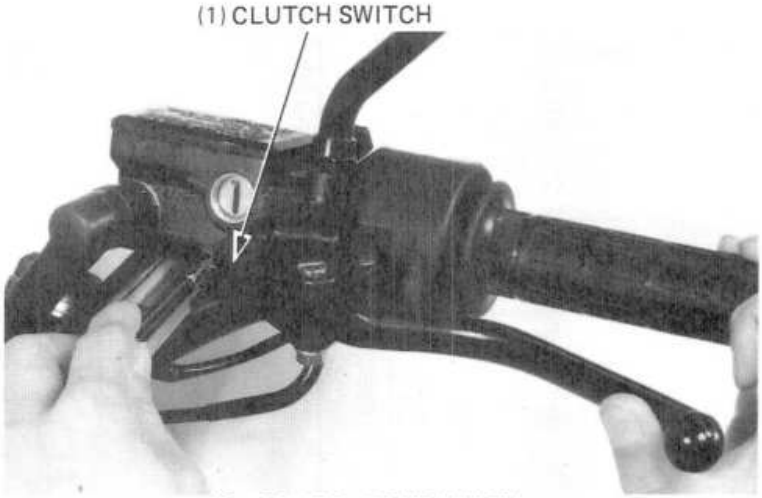
(1) DRIVE SPROCKET

(2) WATER PUMP

CLUTCH SWITCH

Check the clutch switch for continuity with the clutch lever released and applied.

Replace if it faulty.



(1) CLUTCH SWITCH

(2) APPLIED: CONTINUITY
RELEASED: NO CONTINUITY

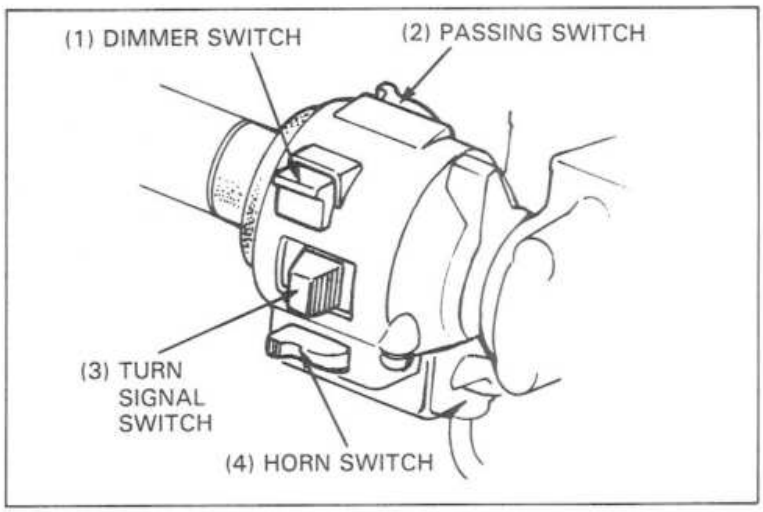
HANDLEBAR SWITCHES

The handlebar cluster switches (lights, turn signals, horn, etc.) must be replaced as assemblies.

Remove the fairing, headlight, and headlight bracket.

Continuity tests for the components of the handlebar cluster switches as follow:

Continuity should exist between the color coded wires in each chart.



LIGHTING SWITCH

COLOR	Br/Bu	Bl/W	Bl/R	Bu/W
●				
P	○——	——○		
H	○——	——○	○——	——○
	BAT_4	TL	BAT_5	HL_1

DIMMER SWITCH

COLOR	Bu/W	W	Bu
Lo	○——	——○	
N	○——	——○	——○
Hi	○——		——○
	HL_2	Lo	Hi

TURN SIGNAL SWITCH

COLOR	Gr	LB	O
R	○——	——○	
N			
L	○——		——○
	W	R	L

HORN SWITCH

COLOR	W/G	LG
FREE		
PUSH	○——	——○
	BAT_3	Ho

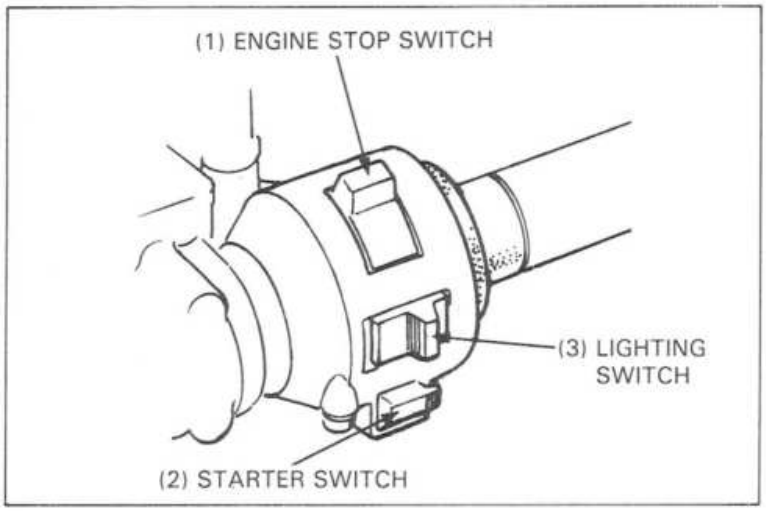
PASSING SWITCH

COLOR	W/G	Bu
FREE		
PUSH	○——	——○
	BAT_3	Hi

STARTER SWITCH

BI to Y/R with button depressed.
No continuity with button released.

COLOR	BI	Y/R
FREE		
PUSH	○	○
	IG	ST



ENGINE STOP SWITCH

BI to BI/W with the switch "RUN" position.
No continuity with "OFF" position.

COLOR	BI	BI/W
OFF		
RUN	○	○
	IG	BAT_2

IGNITION SWITCH

Remove the fairing and headlight. Disconnect the ignition switch coupler.

Check continuity of terminals on the ignition switch coupler in each switch position.

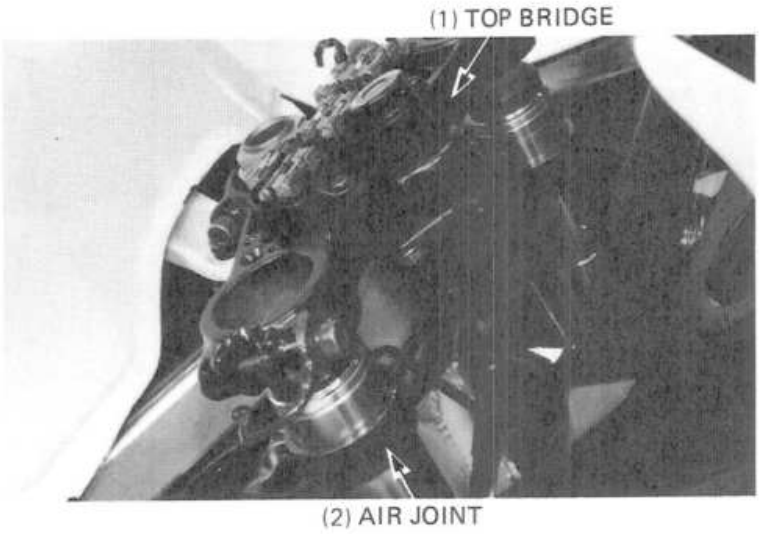
COLOR	R	R/BI	Bu/O	Br/W	Br	Y/BI
OFF						
ON	○	○	○	○	○	
P	○					○
	BAT_1	1G	FAN	TL_1	TL_2	PA

(1) IGNITION SWITCH

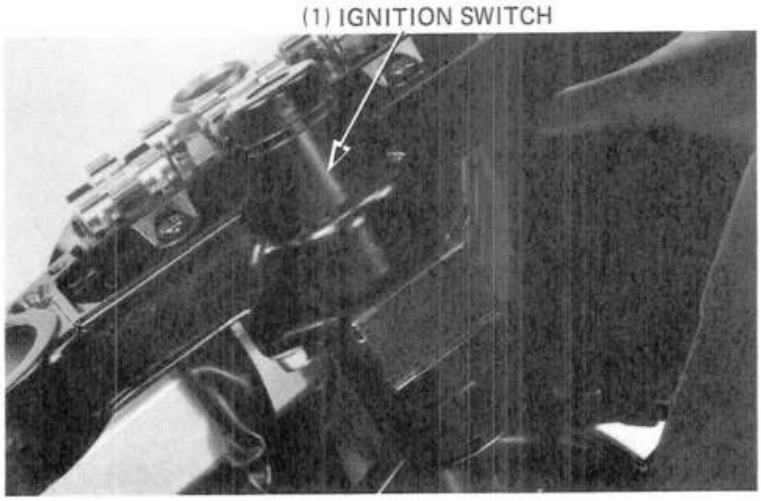


REMOVAL

Remove the fairing.
Pull down the both front forks and air joint from the top bridge. (page 15-15)

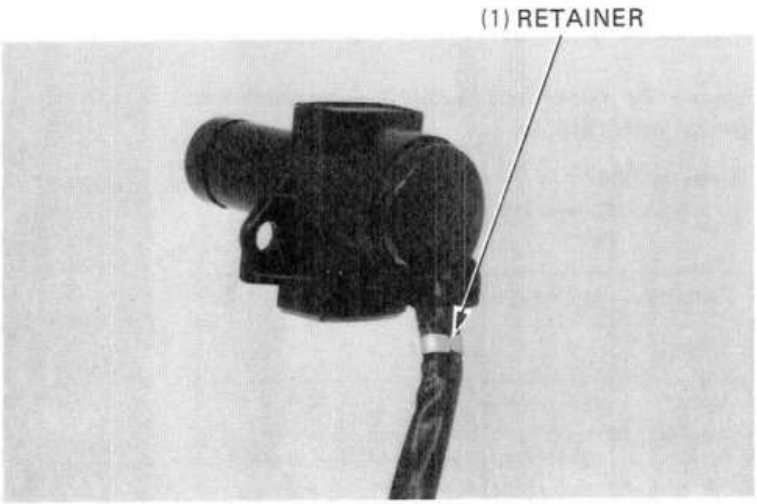


Disconnect the ignition switch coupler.
Remove the two ignition switch mount bolts and ignition switch.



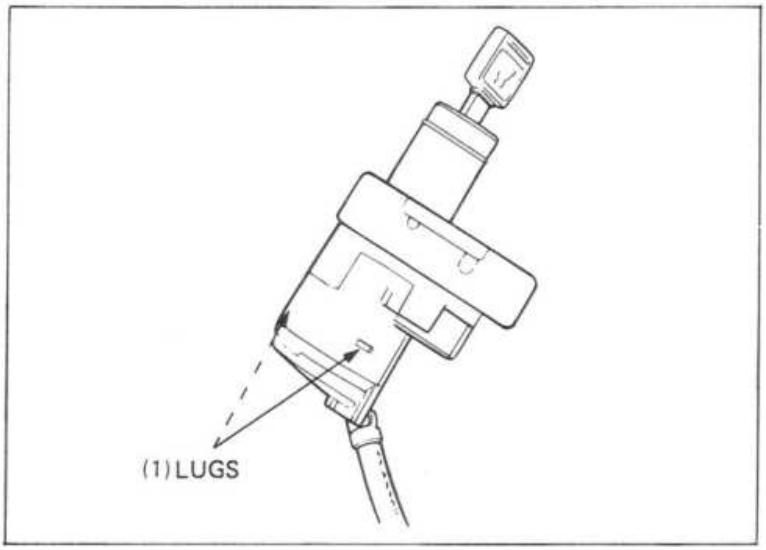
DISASSEMBLY

Pry open the retainer.



Insert the key and turn it so it is part way between the "ON" and "OFF" detent positions.

Push in the lugs, that are locked in the slots then pull the contact base from the switch.
Assemble and install the ignition switch in the reverse order of removal.



FUEL PUMP

Turn the ignition switch off.
Disconnect the fuel pump relay coupler.
Short the white and black wire terminals at the fuel pump relay coupler with a jumper wire.

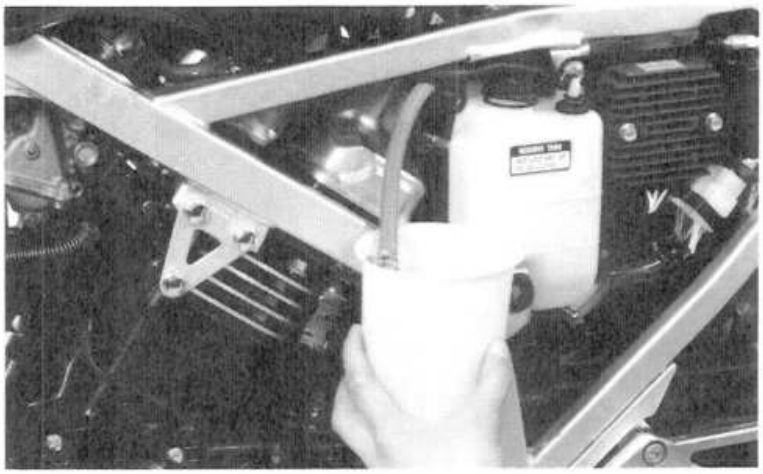
Disconnect the fuel line at the carburetor and hold a graduated beaker under the tube.

WARNING

Do not allow flames or sparks near gasoline.

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:
900 cc (30.4 US oz, 31.7 Imp oz) ± 10%/minute



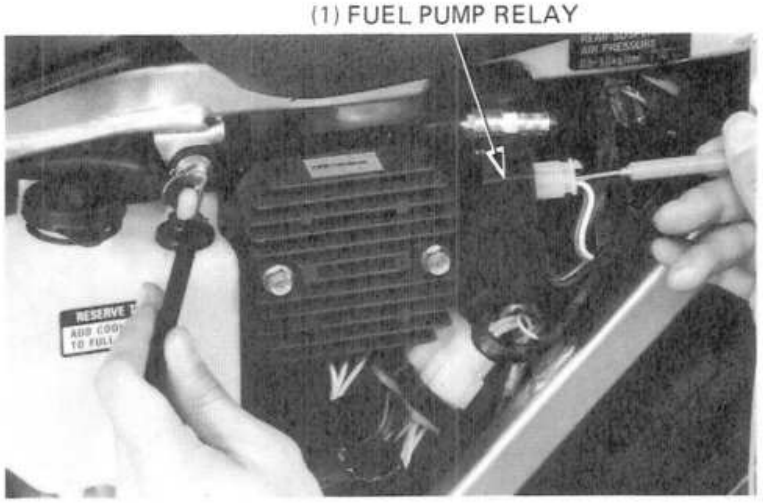
FUEL PUMP RELAY

Remove the left frame side cover.
Turn the ignition switch and engine stop switch ON and check for continuity between the white terminal of the fuel pump relay coupler and ground.
There should be no continuity.

Press the starter button for a moment to turn the crankshaft but do not start the engine. Then, check that there is continuous battery voltage between the white wire terminal of the fuel pump relay coupler and the body ground.

If the relay fails either check, replace it.

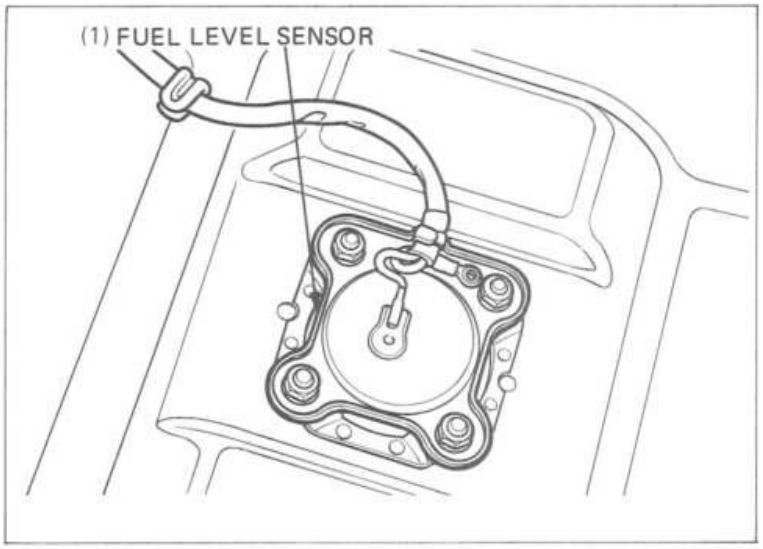
(1) FUEL PUMP RELAY



FUEL LEVEL SENSOR

REMOVAL

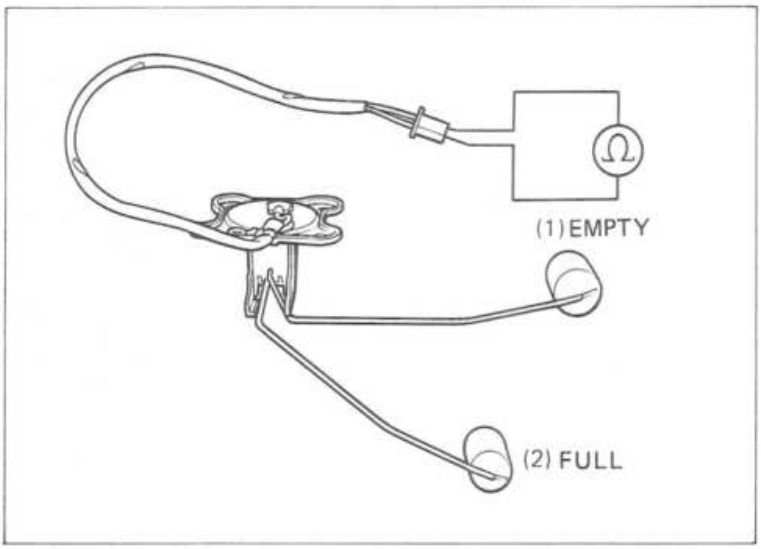
Remove the fuel tank and drain the fuel.
Remove the fuel level sensor attaching nuts and fuel level sensor.



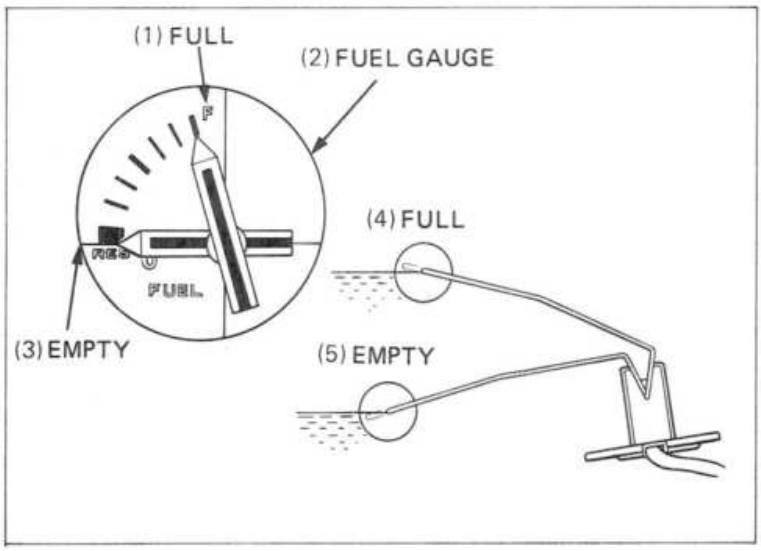
INSPECTION

Measure the resistance of the fuel level sensor in the full and empty float positions.

RESISTANCE: FULL 3.5–9.5 Ω
EMPTY 90–100 Ω

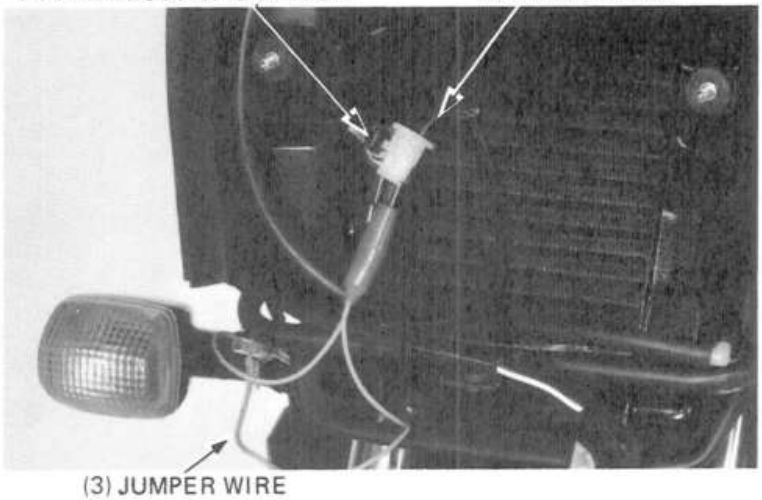


Turn the ignition switch ON.
Connect the fuel level sensor coupler to the wire harness. Move the float to full and empty and check the fuel gauge needle in both positions. If the fuel gauge does not indicate the proper level, replace it with a new one.



THERMOSTATIC SWITCH

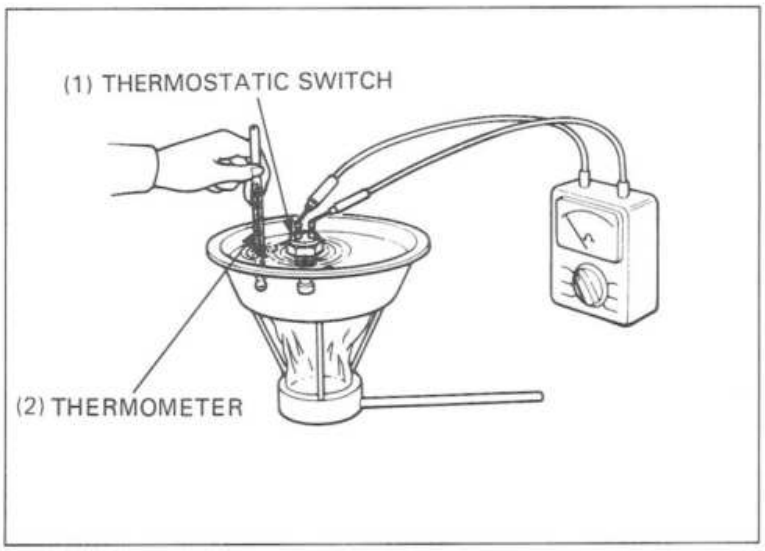
The cooling fan motor is actuated by the thermostatic switch located in lower the radiator.
If the fan motor does not start, disconnect the black and green leads from the thermostatic switch and short them together with a jumper wire as shown.
Turn the ignition switch on.
The cooling fan motor should start running.
If it does not start, check for battery voltage from the black lead (positive) to black/blue (negative) of the fan motor coupler.
If there is no voltage, check for a blown or faulty fuse, loose terminals or connectors, or an open circuit.
If it starts, inspect the fan thermostatic switch as follows:



Suspend the 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 switch continuity with room temperature and gradually raise the coolant temperature. The switch should be continuity (close) at 107–113°C (225–235°F).

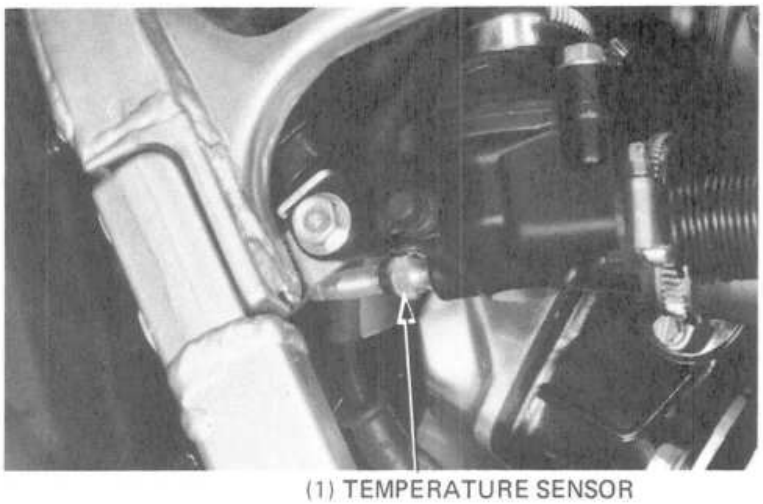
NOTE

- Keep temperature for 3 minutes before testing continuity. A sudden change of temperature will cause error of temperature reading between the thermometer and the switch.
- Do not let the thermometer or switch touch the pan as it will give a fales reading.
- Soak the switch in coolant up to its threads.



TEMPERATURE SENSOR

Disconnect the green/blue wire from the temperature sensor.
Drain the coolant and remove the temperature sensor from the thermostat case.



Suspend the unit in oil over a burner and measure the resistance through the unit as the oil heats up.

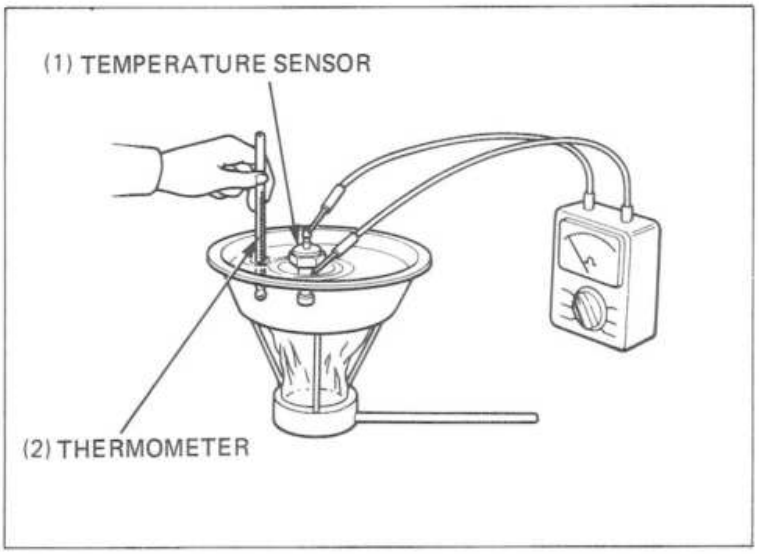
Temperature	60°C	85°C	110°C	120°C
	140°F	185°F	230°F	248°F
Resistance	104.0Ω	43.9Ω	20.3Ω	16.1Ω

WARNING

Wear gloves and eye protection.

NOTE

- Oil must be used as the heated liquid to check operation above 100°C (212°F).
- You'll get false readings if either the thermometer or temprature sensor touches the pan.

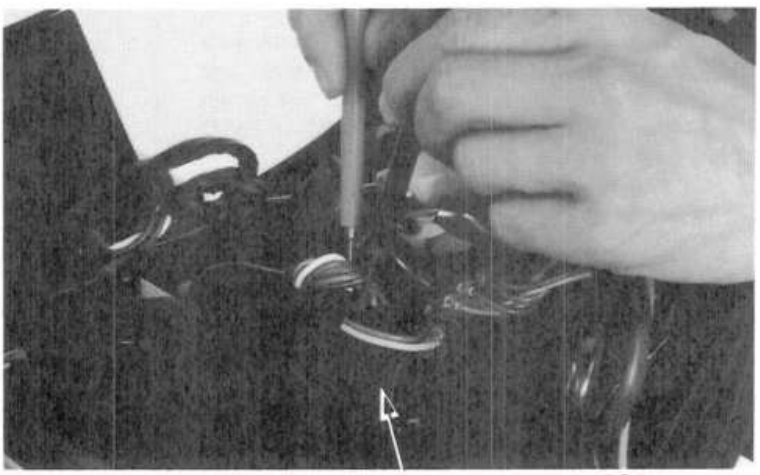


BRAKE AND TAILLIGHT SENSOR

Remove the rear cowl.
Turn the ignition switch on.
Check the source voltage at the black/brown lead. If there is no voltage, check and repair the source circuit.
If there is voltage, measure the voltage at the white/yellow (positive) and green/yellow (negative) wires.

VOLTAGE: 5V

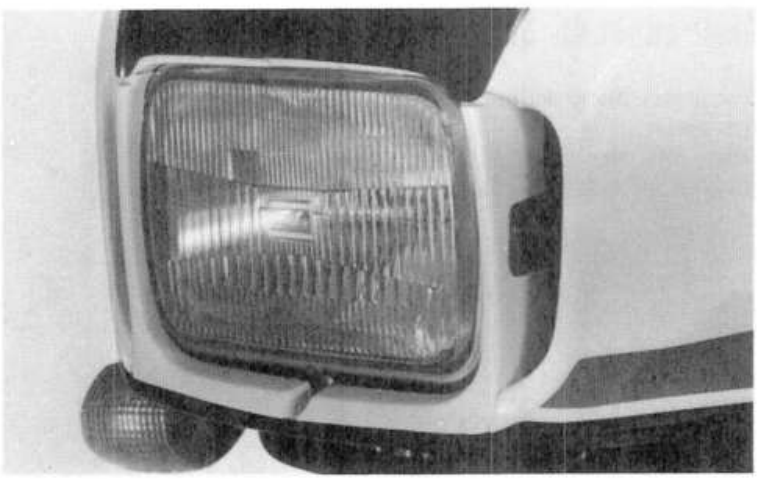
If there is no voltage, replace the sensor unit.


(1) BRAKE AND TAIL LIGHT SENSOR

HEAD LIGHT

REMOVAL/INSTALLATION

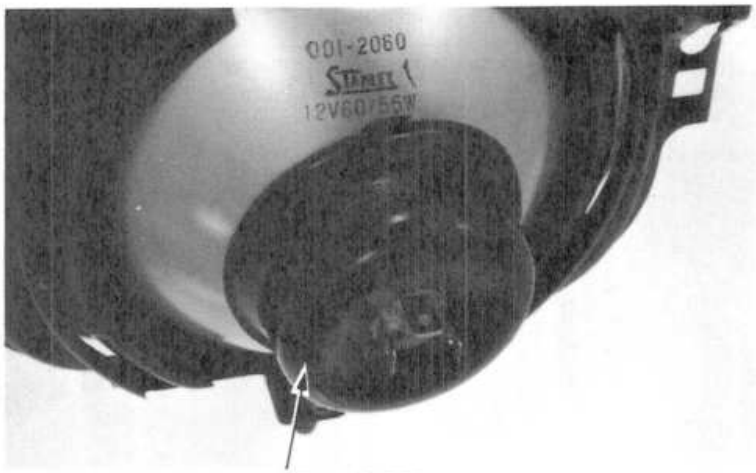
Remove the fairing.



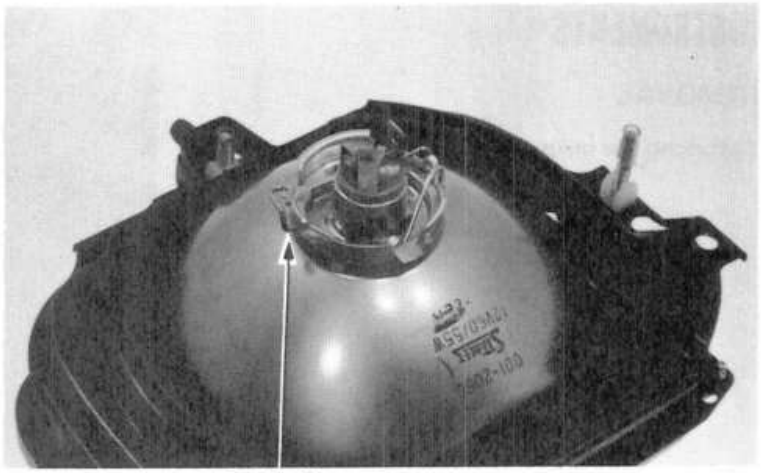
Push the headlight and turn it counterclockwise to remove the headlight with the headlight bracket.



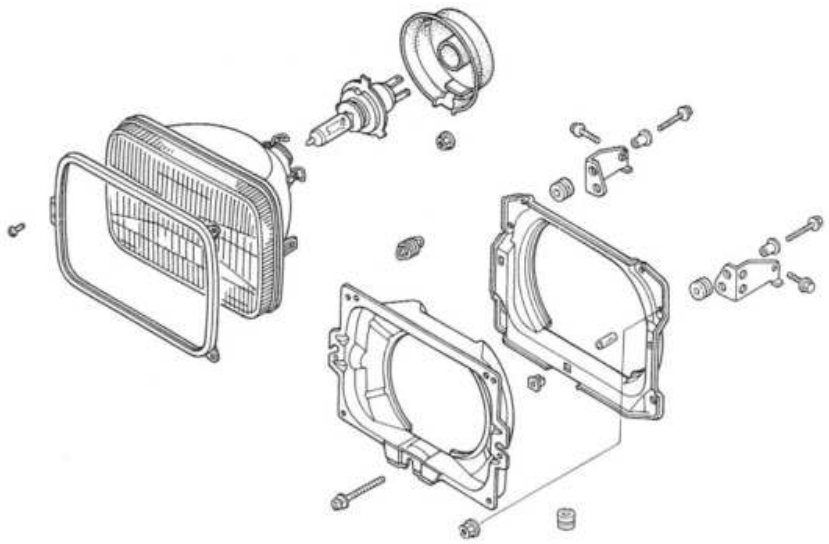
Disconnect the headlight coupler and remove the rubber cover.



Remove the headlight bulb by removing the clip.



INSTALLATION



(1) TOP MARK

NOTE

Install the rubber cover with the top mark facing up.

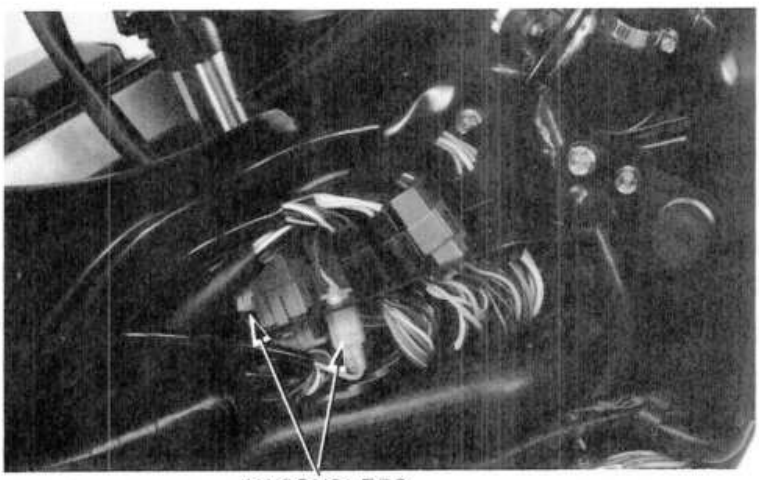
Install in the reverse order of removal.



INSTRUMENTS

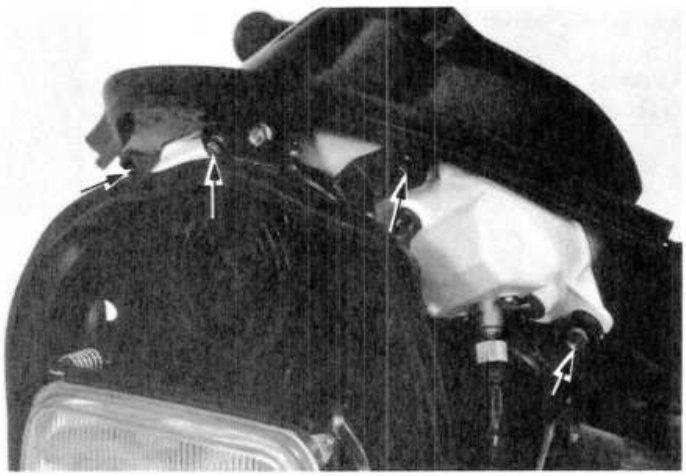
REMOVAL

Disconnect the instruments wire couplers.

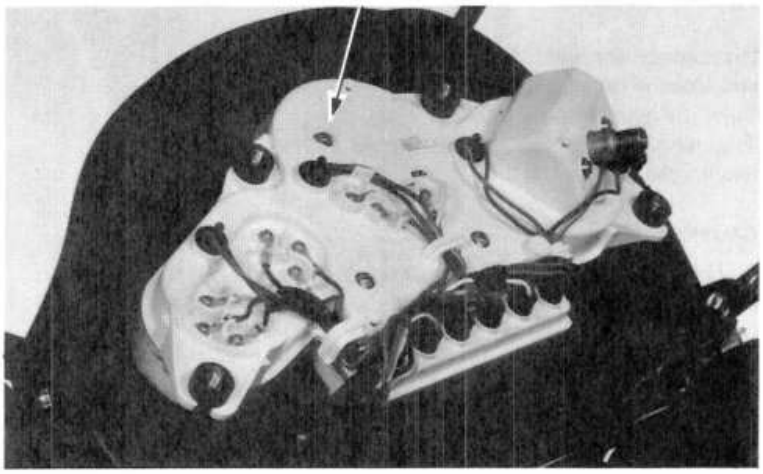


(1) COUPLERS

Remove the four mount nuts and speedometer cable from the instruments.

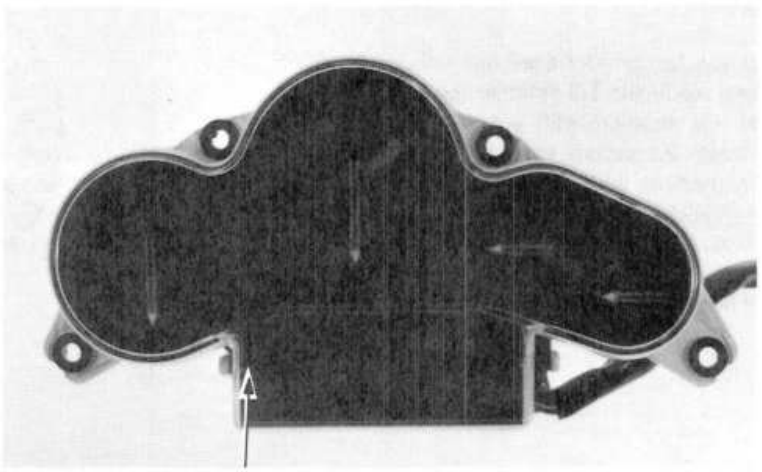


Replace the bulbs.
Pull out the instruments.



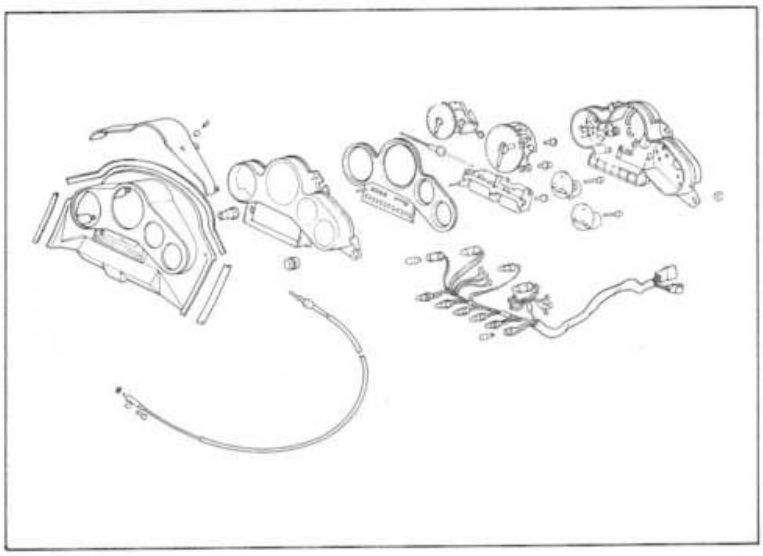
DISASSEMBLY

Remove the trip meter knob.



Remove the screws and remove the instruments.

Assemble and install the instruments in the reverse order of disassemble/removal.

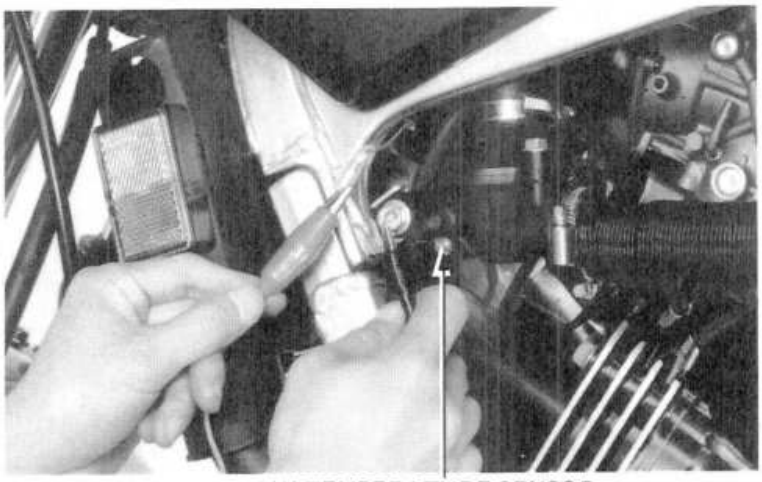


TEMPERATURE GAUGE

Disconnect the wire from the temperature sensor and short it to ground.
Turn the ignition switch to ON.
The temprature gauge needle should move all the way to the H.

CAUTION

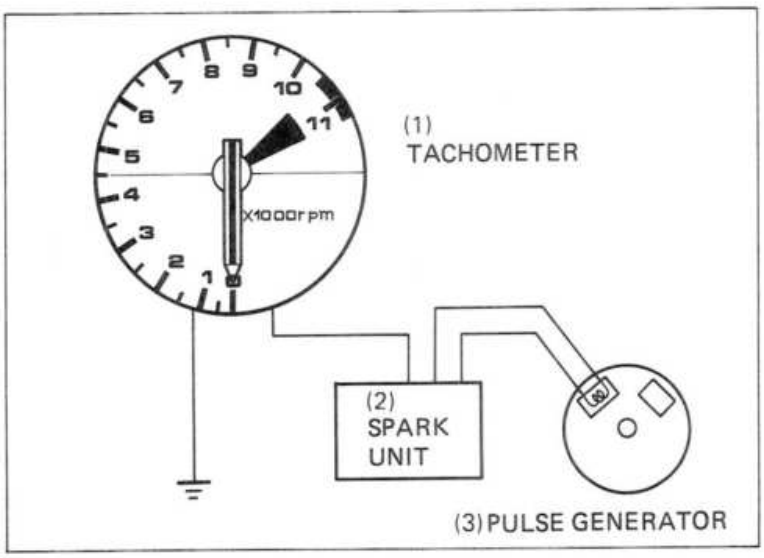
Do not leave the temperature sensor wire grounded for longer than a few seconds or the temperature gauge will be damaged.



(1) TEMPERATURE SENSOR

TACHOMETER

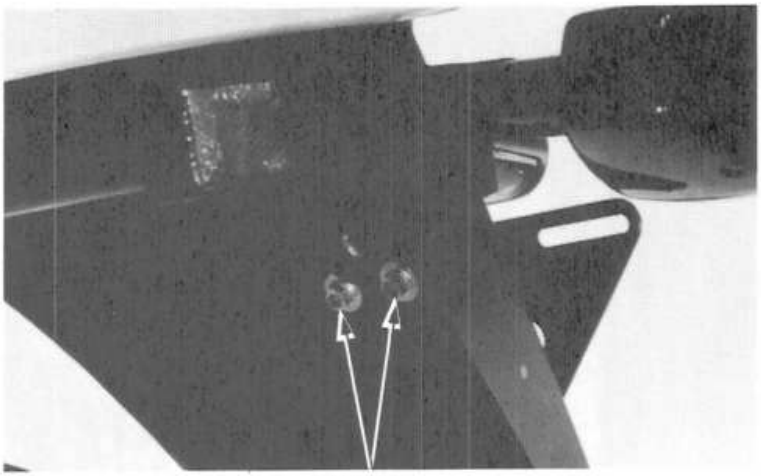
If the tachometer does not indicate properly, check and repair the 1-3 cylinder ignition system.
If the problem still appears, check continuity between the yellow wire terminal of the wire harness instrument coupler and the yellow wire of the 1-3 cylinder ignition coil. Repair or replace wire harness, if necessary.
If there is continuity, replace the tachometer with a new one.



BULB

Licence Plate Light

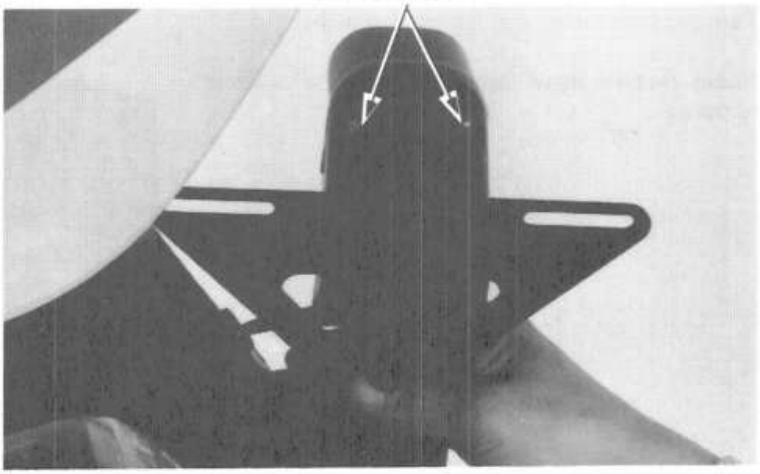
Remove the two licence plate holder mount nuts.



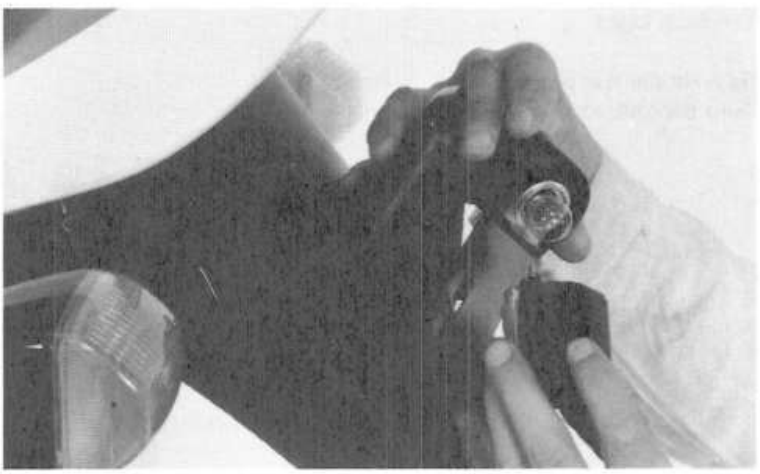
(1) NUTS

Remove the two screws and remove the lens.

(1) SCREWS

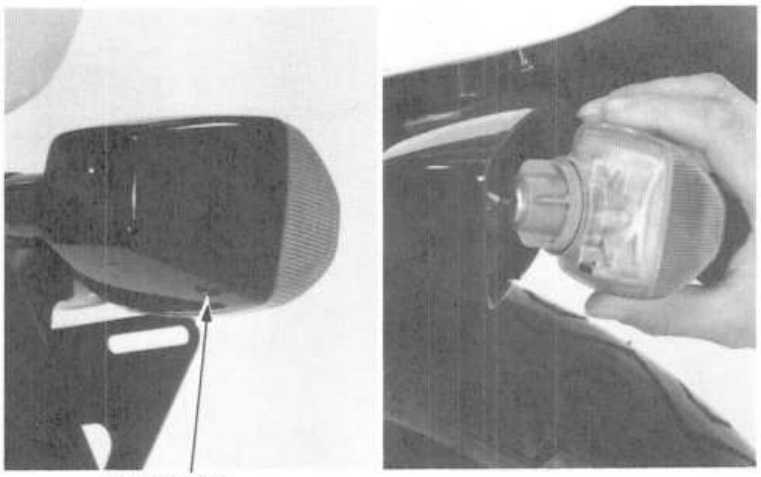


Remove the bulb and install in the reverse order of removal.



Turn Signal Light

Remove the screw and pull out the turn signal light lens.



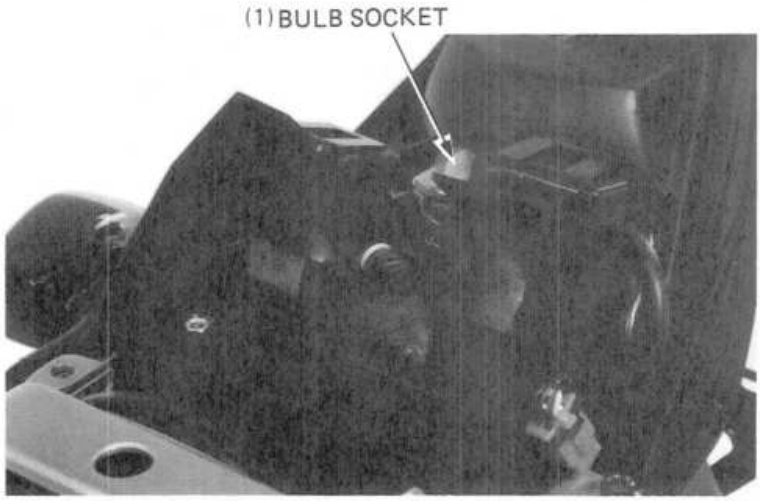
Turn the bulb socket and replace the bulb.

Install theturn signal light in the reverse order of removal.

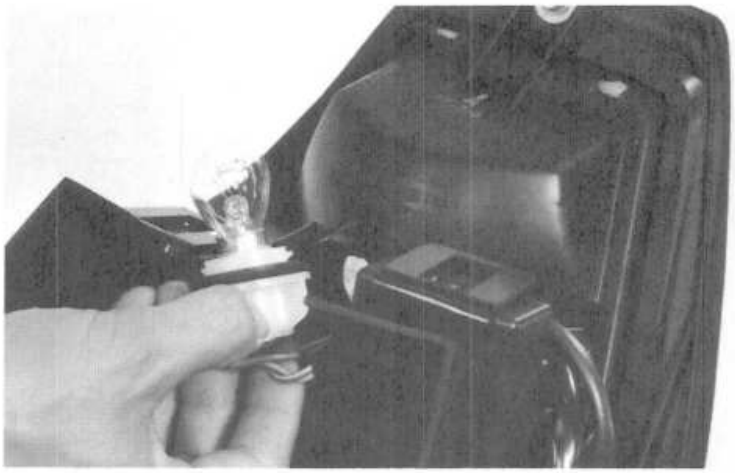


Tail/Stop Light

Remove the rear cowl.
Turn the bulb socket counterclockwise.

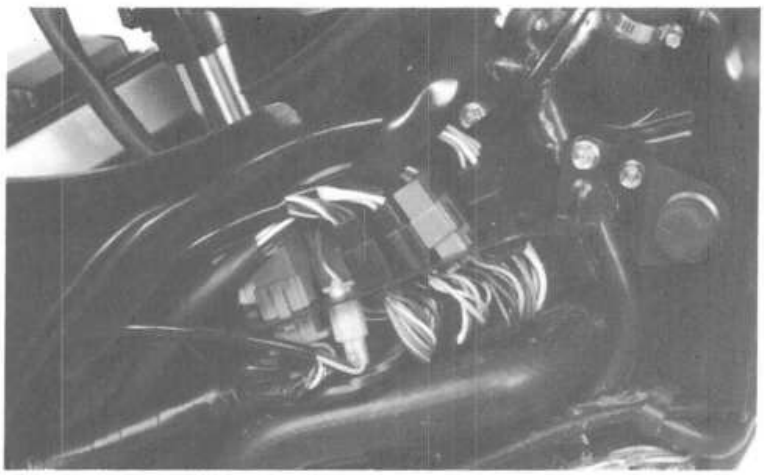


Replace the bulb and install the rear cowl in the reverse order of removal.

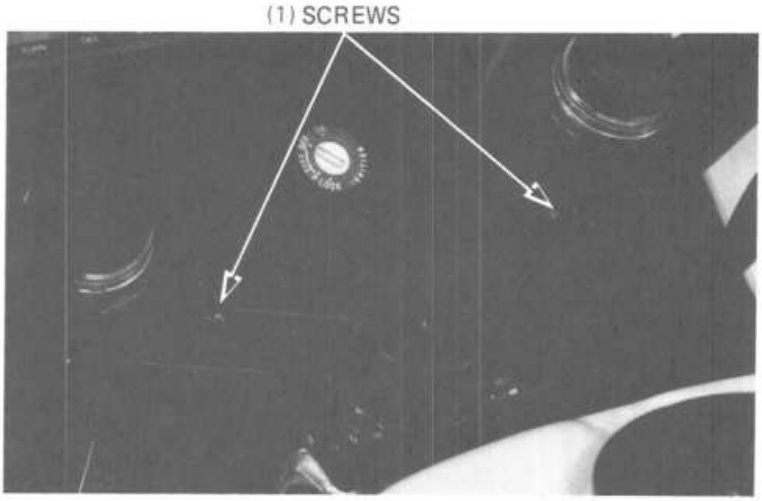


FUSE HOLDER

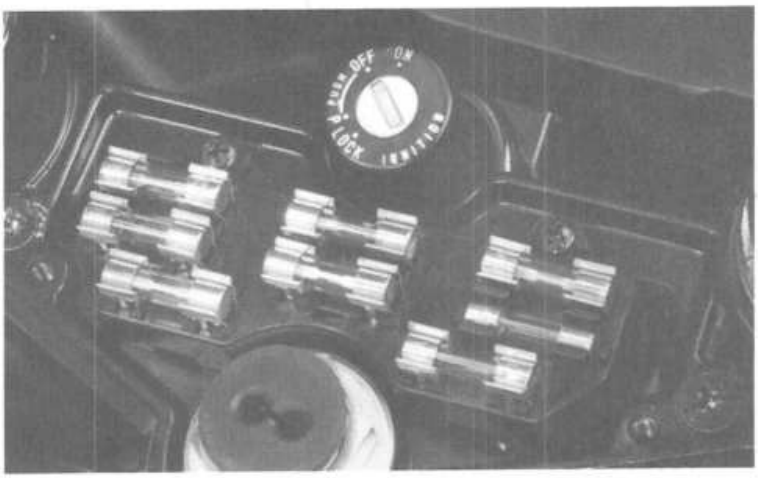
Remove the fairing.
Disconnect the fuse holder couplers (6p red and 4p red).



Remove the two screws from the fuse holder cover.



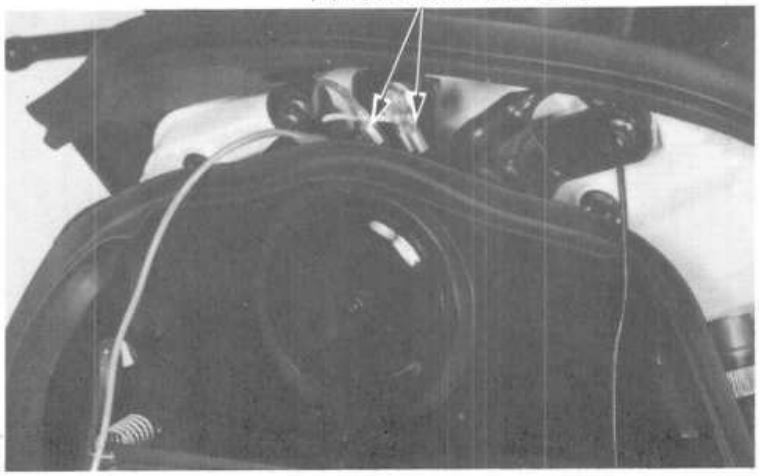
Remove two screws then remove the fuse holder from the top bridge.
Install the fuse holder in the reverse order of removal.



HORN

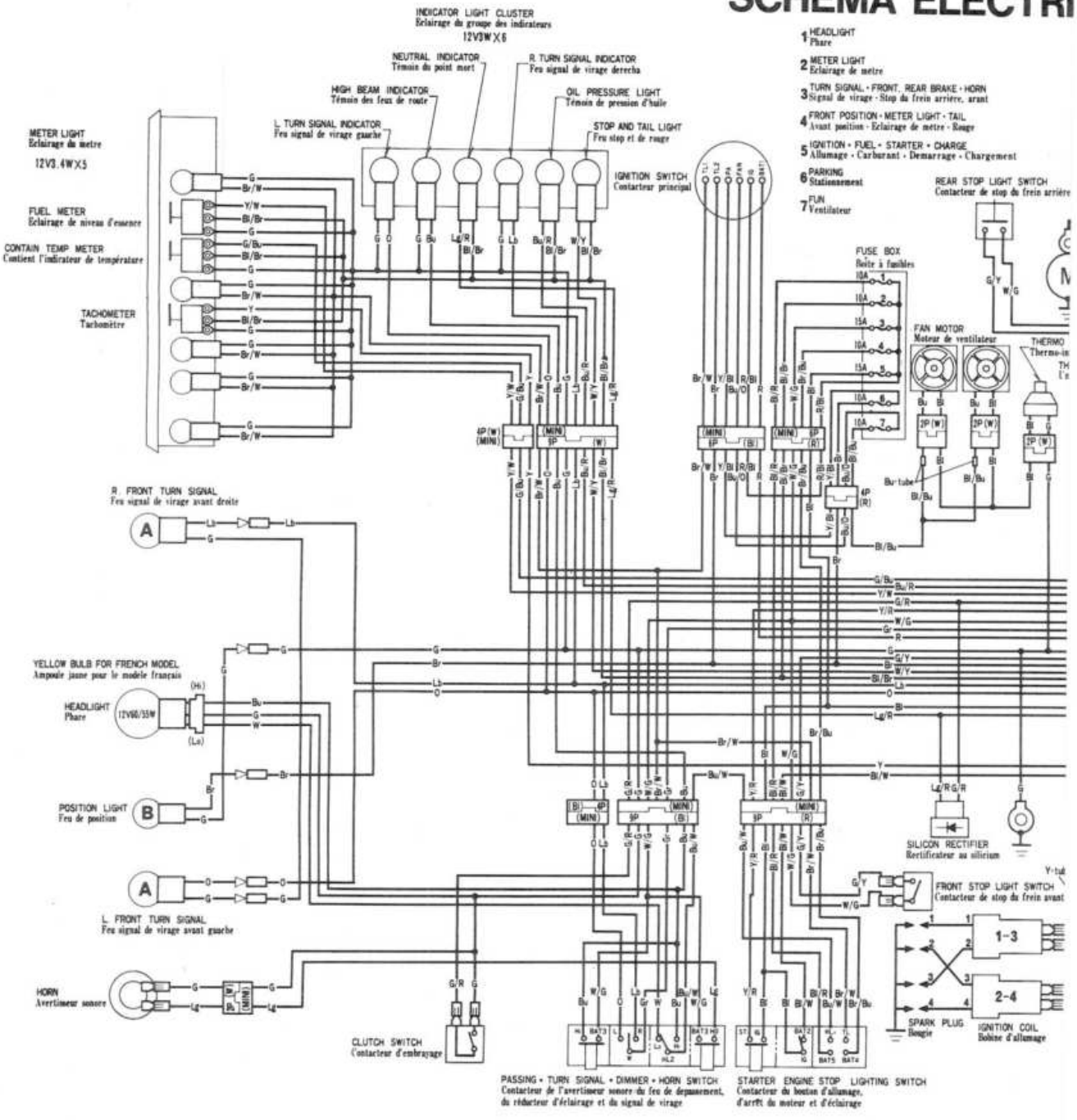
Connect the fully charged 12V battery to the terminals to test the horn.

(1) HORN CONNECTORS



HONDA VF1000F

VF1000F WIRING DIAGRAM
SCHEMA ELECTRI



SWITCH CONTINUITY
Raccordement des contacteurs

IGNITION SWITCH
Contacteur principal

	BAT1	IG	FAN	TL1	TL2	PA
OFF						
ON	○	○	○	○	○	
P	○					○

STARTER SWITCH
Contacteur du bouton d'allumage

	IG	ST
FREE		
PUSH	○	○

ENGINE STOP SWITCH
Contacteur d'arrêt du moteur

	IG	BAT2
OFF		
RUN	○	○

LIGHTING SWITCH
Contacteur d'éclairage

	BAT4	TL	BAT5	HL1
•				
P	○			
H	○	○		

TURN SIGNAL SWITCH
Contacteur de clignotant

	W	R	L
R	○		
N			
L			○

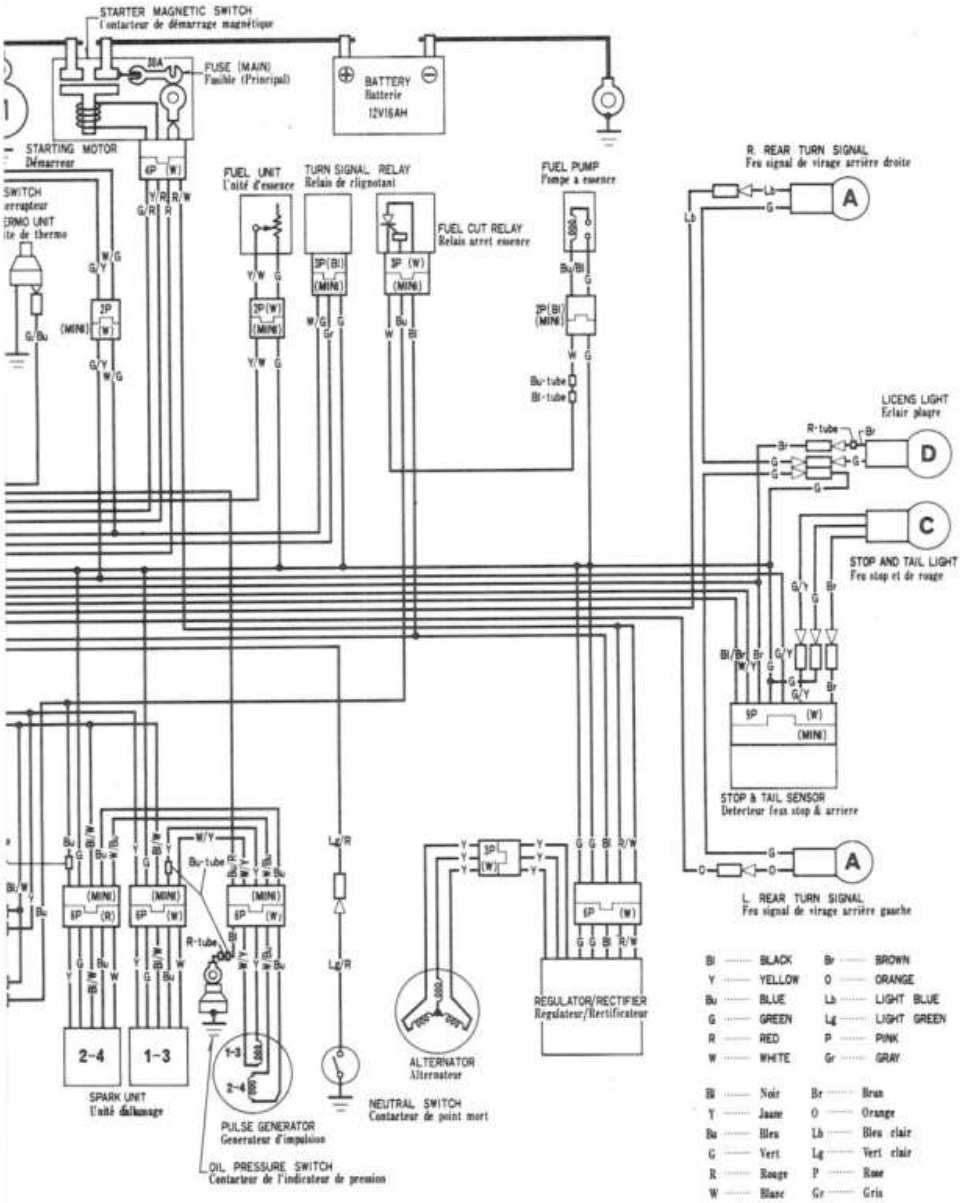
DIMMER SWITCH
Contacteur d'éclairage

	HL2	Lo	Hi
Lo	○		
(N)	○	○	
Hi		○	○

HORN SWITCH
Contacteur de l'avertisseur sonore

	HO	BAT3
FREE		
PUSH	○	○

QUE



Bl	BLACK
Y	YELLOW
Bu	BLUE
G	GREEN
R	RED
W	WHITE
Br	BROWN
O	ORANGE
Lb	LIGHT BLUE
Lg	LIGHT GREEN
P	PINK
Gr	GRAY

Bl	Noir
Y	Jaune
Bu	Bleu
G	Vert
R	Rouge
W	Blanc
Br	Brun
O	Orange
Lb	Bleu clair
Lg	Vert clair
P	Rose
Gr	Gris

PASSING SWITCH
Contacteur du feu de dépassement

	BAT3	Hi
FREE		
PUSH	O	O

	A	B	C	D
DWG. NO	AREA(TYPE) ZON(E(TYPE)	TURN SIGNAL LIGHT Feu signal de virage	POSITION LIGHT Feu de position	STOP AND TAIL Feu stop et de rouge	LICENS LIGHT Eclair plaque
0030Z-MB6-6000	E, ED, F, G	12V21W	12V4W	12V21/5W	12V5W
0030Z-MB6-6500	U	12V23W	12V4W	12V23/8W	12V8W

ENGINE DOES NOT START OR IS HARD TO START	23–1
ENGINE LACKS POWER	23–2
POOR PERFORMANCE AT LOW AND IDLE SPEEDS	23–3
POOR PERFORMANCE AT HIGH SPEED	23–3
POOR HANDLING	23–3

ENGINE DOES NOT START OR IS HARD TO START

		POSSIBLE CAUSE
1. Check fuel flow to carburetor	NOT REACHING CARBURETOR →	(1) Fuel tank empty (2) Clogged fuel line or fuel filter (3) Sticking float valve (4) Faulty fuel pump (5) Faulty fuel pump relay (6) Pinched fuel tank vent hose
REACHING CARBURETOR ↓		
2. Perform a 3-point spark test	WEAK OR NO SPARK →	(1) Faulty spark plugs (2) Fouled spark plugs (3) Faulty spark unit (4) Broken or shorted high tension wires (5) Faulty spark unit (6) Broken or shorted ignition coil (7) Faulty ignition switch (8) Faulty pulse generator
GOOD SPARK ↓		
3. Test cylinder compression	LOW COMPRESSION →	(1) Low battery charge (2) Improper valve clearance (too small) (3) Valve stuck open (4) Worn cylinder and piston rings (5) Damaged cylinder head gasket (6) Seized valve (7) Improper valve timing
COMPRESSION NORMAL ↓		
4. Start by following normal procedure	ENGINE STARTS BUT STOPS →	(1) Improper choke operation (2) Carburetor incorrectly adjusted (3) Intake pipe leaking (4) Improper ignition timing (Spark unit or pulse generator) (5) Fuel contaminated
ENGINE DOES NOT FIRE ↓		
5. Remove and inspect spark plug	WET PLUG →	(1) Carburetor flooded (2) Carburetor choke excessively closed. (3) Cylinder flooded (4) Air cleaner dirty

ENGINE LACKS POWER

		POSSIBLE CAUSE
1. Raise wheels off ground and spin by hand	WHEELS DO NOT SPIN FREELY →	(1) Brake dragging (2) Worn or damaged wheel bearings (3) Wheel bearing needs lubrication (4) Drive chain too tight (5) Rear axle nut excessively tight
WHEEL SPINS FREELY		
2. Check tire pressure	PRESSURE LOW →	(1) Punctured tire (2) Faulty tire valve
PRESSURE NORMAL		
3. Accelerate rapidly from low to second	ENGINE SPEED CHANGED WHEN CLUTCH IS RELEASED →	(1) Clutch slipping (2) Worn clutch disc/plate (3) Warped clutch disc/plate
ENGINE SPEED LOWERED WHEN CLUTCH IS RELEASED		
4. Accelrate lightly	ENGINE SPEED DOES NOT INCREASE →	(1) Carburetor choke closed (2) Clogged air cleaner (3) Restricted fuel flow (4) Clogged muffler (5) Clogged fuel tank vent hole
ENIGNE SPEED INCREASES		
5. Check ignition timing	INCORRECT →	(1) Faulty spark unit (2) Faulty pulse generator
CORRECT		
6. Check valve clearance	INCORRECT →	(1) Improper valve adjustment (2) Worn valve seat
CORRECT		
7. Test cylinder compression	TOO LOW →	(1) Valve stuck open (2) Worn cylinder and piston rings (3) Leaking head gasket (4) Improper valve timing
NORMAL		
8. Check carburetor for clogging	CLOGGED →	(1) Carburetor not serviced frequently enough
NOT CLOGGED		
9. Remove spark plug	FOULED OR DISCOLORED →	(1) Plugs not serviced frequently enough (2) Spark plug with incorrect heat range
NOT FOULED OR DISCOLORED		
10. Check oil level and condition	INCORRECT →	(1) Oil level too high (2) Oil level too low (3) Contaminated oil
CORRECT		
11. Remove cylinder head cover and inspect lubrication	VALVE TRAIN NOT LUBRICATED PROPERLY →	(1) Clogged oil passage (2) Clogged oil control orifice
VALVE TRAIN LUBRICATED PROPERLY		
12. Check for engine overheating	OVERHEATING →	(1) Coolant level low (2) Fan motor not working (fan motor relay faulty) (3) Thermostat stuck closed (4) Excessive carbon build-up in combustion chamber (5) Use of poor quality fuel (6) Clutch slipping
NOT OVERHEATING		
13. Accelerate or run at high speed	ENIGNE KNOCKS →	(1) Worn piston and cylinder (2) Wrong type of fuel (3) Excessive carbon build-up in combustion chamber (4) Ignition timing too advanced (Faulty spark unit)
ENGINE DOES NOT KNOCK		

POOR PERFORMANCE AT LOW AND IDLE SPEEDS

		POSSIBLE CAUSE
1. Check ignition timing and valve clearance	INCORRECT →	(1) Improper valve clearance (2) Improper ignition timing (Faulty spark unit)
CORRECT ↓		
2. Check carburetor pilot screw adjustment	INCORRECT →	See Fuel System Section
CORRECT ↓		
3. Check for leaking intake pipe	LEAKING →	(1) Deteriorated insulator O-ring (2) Loose carburetor
NO LEAK ↓		
4. Perform spark test	WEAK OR INTERMITTENT SPARK →	(1) Faulty, carbon or wet fouled spark plug (2) Faulty spark unit (3) Faulty ignition coil
GOOD SPARK		

POOR PERFORMANCE AT HIGH SPEED

NOTE: Ignition to the No. 2 and No. 4 cylinders is cut-off at 11,300–11,800 rpm to prevent engine damage.

1. Check ignition timing and valve clearance	INCORRECT →	(1) Improper valve clearance (2) Faulty spark unit (3) Faulty pulse generator
CORRECT ↓		
2. Disconnect fuel line at carburetor	FUEL FLOW RESTRICTED →	(1) Fuel tank empty (2) Clogged fuel line (3) Clogged fuel tank breather hole (4) Clogged fuel valve (5) Faulty fuel pump
FUEL FLOWS FREELY ↓		
3. Remove carburetors and check for clogged jets	CLOGGED →	Clean
NO CLOGGED JETS ↓		
4. Check valve timing	INCORRECT →	Cam sprocket not installed properly
CORRECT ↓		
5. Check valve spring tension	WEAK →	Faulty spring
NOT WEAKENED		

POOR HANDLING → Check tire and suspensions pressures

1. If steering is heavy →	(1) Steering stem adjuster nut too tight (2) Damaged steering head bearings
2. If either wheel is wobbling →	(1) Excessive wheel bearing play (2) Bent rim (3) Improperly installed wheel (4) Swingarm pivot bearing excessively worn (5) Bent frame
3. If the motorcycle pulls to one side →	(1) Bent frame (2) Front and rear wheels not aligned (3) Bent front fork (4) Bent swingarm

MEMO