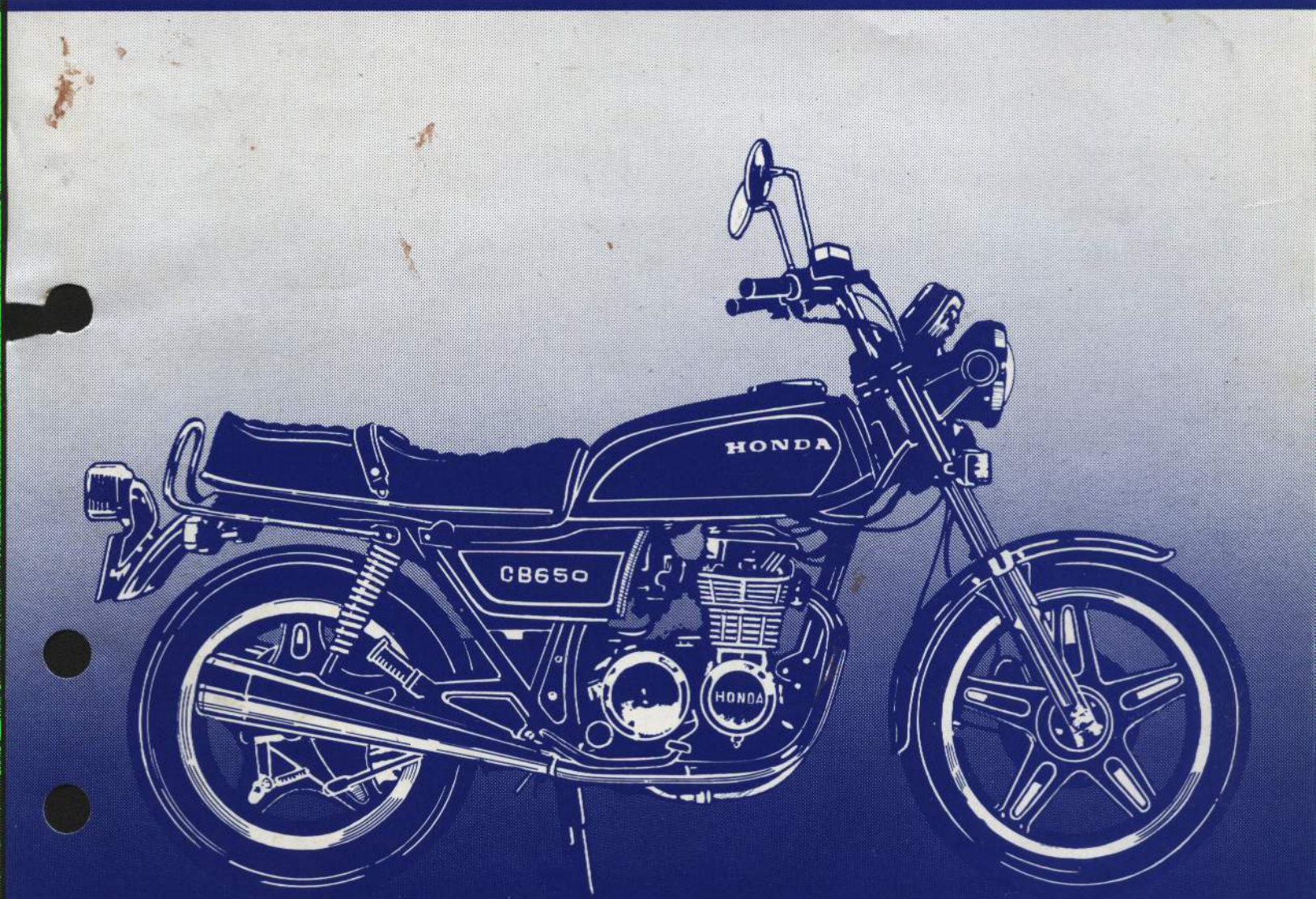
Official

HONDA

SHOP MANUAL

CB650



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HOW TO USE THIS MANUAL

Follow the Maintenance Schedule recommendations (page 1–12) to ensure that the vehicle is in peak operating condition and the emission levels are within the U.S. Environmental Protection Agency standards. Performing the first scheduled maintenance is very important. It compensates for the initial wear that occurs during the break-in period. (USA only)

Sections 1 through 3 apply to the whole motorcycle, while sections 4 through 19 describe parts of the motorcycle, grouped according to component or system.

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 for the section.

If you are not sure of the source of the trouble, go to section 20, TROUBLESHOOTING.

HONDA MOTOR CO., LTD
SERVICE PUBLICATIONS OFFICE

CONTENTS

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HONDA CB650 1. GENERAL INFORMATION

GENERAL SAFETY

WARNING

If the engine must be running to do some work, make sure the area is well-ventilated. NEVER run the engine in 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.*
- *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 to avoid damage and incorrect assembly.
3. Use only metric tools when servicing this motorcycle. Metric bolts, nuts, and screws are not interchangeable with English fasteners.
4. Install new gaskets, O-rings, cotter pins, lock plates, etc. when reassembling.
5. When torquing bolts or nuts, begin with the larger-diameter or inner bolt first, and tighten to the specified torque diagonally in 2–3 steps, unless a particular sequence is specified.
6. Clean parts in non-flamable or light flash point cleaning solvent upon disassembly.
7. Lubricate any sliding surfaces before reassembly.
8. When installing a new oil seal, lubricate the sealing lip with grease. If an oil seal and related parts have been cleaned, lubricate the lip of the oil seal with grease.
9. After reassembly, check all parts for proper installation and operation.

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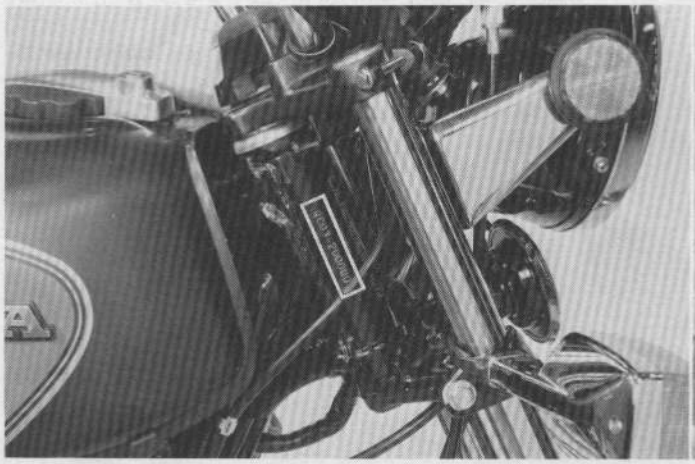
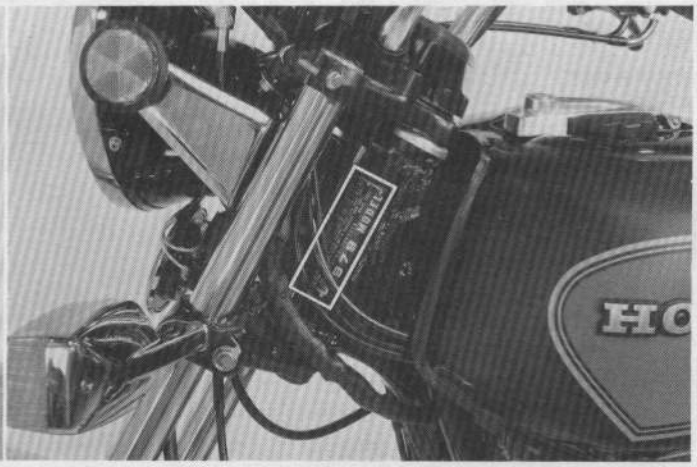
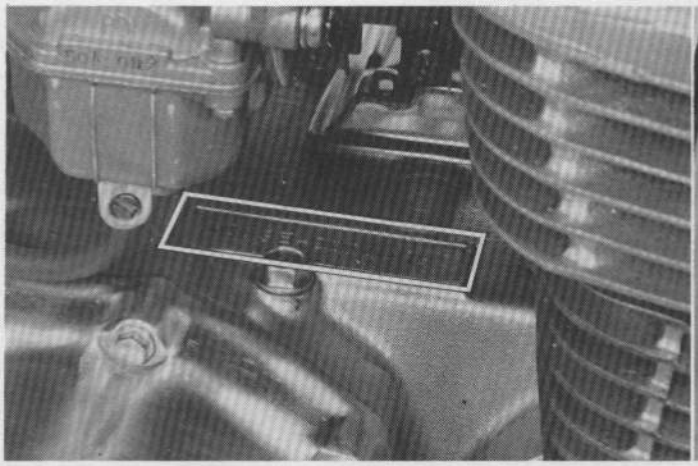
MODEL IDENTIFICATION



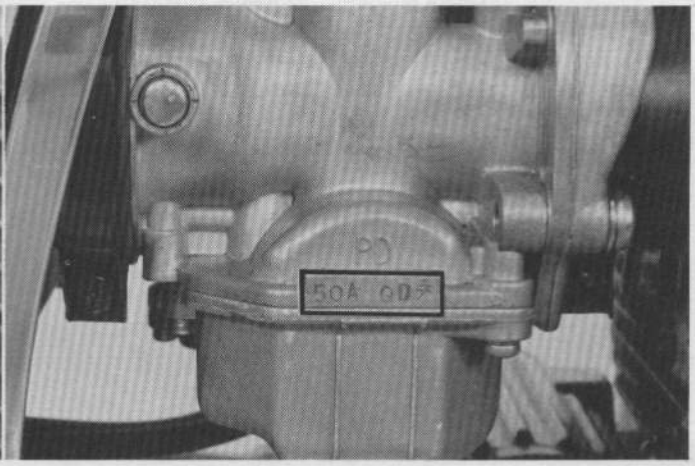
The frame serial number is stamped on the right side of the steering head.



The vehicle identification number (VIN) is on the left side of the steering head.



The engine serial number is stamped on top of the crankcase.



The carburetor identification number is on the right side of the carburetor body.

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SPECIFICATIONS

ITEM				SPECIFICATION
DIMENSIONS	Overall length			2,170 mm (85.4 in)
	Overall width			850 mm (33.5 in)
	Overall height			1,175 mm (46.3 in)
	Wheelbase			1,430 mm (56.3 in)
	Seat height			800 mm (31.5 in)
	Foot peg height			325 mm (12.8 in)
	Ground clearance			160 mm (6.3 in)
	Dry weight			196 kg (431.2 lb)
FRAME	Type			Double cradle
	Front suspension, travel			Telescopic fork 142 mm (5.6 in)
	Rear suspension, travel			Swing arm 77 mm (3.0 in)
	Front tire size			3.50H19 (4PR)
	Rear tire size			4.50H17 (4PR)
	Cold tire pressures	Up to 90 kg (200 lbs) load	Front	2.0 kg/cm^2 (28 psi)
			Rear	2.25 kg/cm^2 (32 psi)
		Up to vehicle capacity load	Front	2.0 kg/cm^2 (28 psi)
			Rear	2.8 kg/cm^2 (40 psi)
	Front brake, lining swept area			Disc brake, 282 cm^2 (43.71 sq in)
	Rear brake, lining swept area			Internal expanding shoes, 218 cm^2 (33.79 sq in)
	Fuel capacity			18 liters (4.8 US gal)
	Fuel reserve capacity			3.5 liters (0.9 US gal)
	Caster angle			27°30′
	Trail			105 mm (4 in)
	Front fork oil capacity			170 cc (5.7 ozs)
				150 cc (5.0 ozs) at draining
ENGINE	Type			Air cooled 4-stroke
	Cylinder configuration			Vertical in-line four
	Bore and stroke			59.8 x 55.8 mm (2.354 x 2.197 in)
	Displacement			627 cc (38.2 cu in)
	Compression ratio			9.0 : 1
	Valve train			Silent chain driven OHC
	Oil capacity			3.5 liters (3.7 US qt)
				3.0 liters (3.2 US qt) after draining
	Lubrication system			Wet sump
	Air filtration			Paper
	Cylinder compression			12.0 ± 2.0 kg/cm^2 (170 ± 28 psi)
	Intake valve	Opens		5° (BTDC) at 1 mm lift, 58° (BTDC) at 0 lift
		Closes		35° (ABDC) at 1 mm lift, 127° (ABDC) at 0 lift
	Exhaust valve	Opens		40° (BBDC) at 1 mm lift, 121° (BBDC) at 0 lift
		Closes		5° (ATDC) at 1 mm lift, 65° (ATDC) at 0 lift
	Valve clearance			IN: 0.05 mm (0.002 in)
				EX: 0.08 mm (0.003 in)
	Engine weight			70 kg (154.4 lb)
	Idle speed			1,050 ± 100 rpm
CARBURETION	Carburetor type			Piston valve, 26 mm (1.0 in)
	Identification number			PD50A
	Pilot screw			Refer to page 4-15
	Float level			12.5 mm (0.50 in)

<table>
<tr><th colspan="2">ITEM</th><th></th></tr>
<tr><td>DRIVE TRAIN</td><td>Clutch</td><td>Wet, multi-plate</td></tr>
<tr><td></td><td>Transmission</td><td>5-speed constant-mesh</td></tr>
<tr><td></td><td>Primary reduction</td><td>2.737</td></tr>
<tr><td></td><td>Gear ratio I</td><td>2.500</td></tr>
<tr><td></td><td>Gear ratio II</td><td>1.722</td></tr>
<tr><td></td><td>Gear ratio III</td><td>1.333</td></tr>
<tr><td></td><td>Gear ratio IV</td><td>1.074</td></tr>
<tr><td></td><td>Gear ratio V</td><td>0.885</td></tr>
<tr><td></td><td>Final reduction</td><td>2.500 (16/40)</td></tr>
<tr><td></td><td>Gear shift pattern</td><td>Left foot operated return system</td></tr>
<tr><td></td><td>Drive chain</td><td>RK50NK or DID 50HDK, 102 links</td></tr>
<tr><td>ELECTRICAL</td><td>Ignition</td><td>Transistorized</td></tr>
<tr><td></td><td>Ignition timing "F-I" mark</td><td>10° BTDC at 1,050 rpm idle</td></tr>
<tr><td></td><td>Full advance</td><td>28°30′ BTDC/2.725 rpm</td></tr>
<tr><td></td><td>Starting system</td><td>Starting motor only</td></tr>
<tr><td></td><td>Generator</td><td>Three phase A.C. generator 0.26 kw/5,000 rpm</td></tr>
<tr><td></td><td>Battery capacity</td><td>12V–12AH</td></tr>
<tr><td></td><td>Spark plug
( ) CANADA model</td><td>
<table>
<tr><th colspan="2">For cold climate below 5°C (41°F)</th><th colspan="2">Standard</th><th colspan="2">For extended high speed driving</th></tr>
<tr><th>ND</th><th>NGK</th><th>ND</th><th>NGK</th><th>ND</th><th>NGK</th></tr>
<tr><td>X22ES-U</td><td>D7EA</td><td>X24ES-U
(X24ESR-U)</td><td>D8EA
(DR8ES-L)</td><td>X27ES-U</td><td>D9EA</td></tr>
</table>
</td></tr>
<tr><td></td><td>Spark plug gap</td><td>0.6–0.7 mm (0.024–0.028 in)</td></tr>
<tr><td></td><td>Firing order</td><td>1–2–4–3</td></tr>
<tr><td></td><td>Fuse</td><td>10A, 30A</td></tr>
<tr><td>LIGHTS</td><td>Headlight (high/low beam)</td><td>65/50W sealed beam</td></tr>
<tr><td></td><td>Tail/stoplight</td><td>3/32 cp SAE NO. 1157</td></tr>
<tr><td></td><td>Turn signal (front/rear)</td><td>32/32 cp SAE NO. F. 1034, R. 1073</td></tr>
<tr><td></td><td>Speedometer</td><td>2 cp SAE NO. 57</td></tr>
<tr><td></td><td>Tachometer</td><td>2 cp SAE NO. 57</td></tr>
<tr><td></td><td>Neutral indicator</td><td>2 cp SAE NO. 57</td></tr>
<tr><td></td><td>Turn signal indicator</td><td>2 cp SAE NO. 57</td></tr>
<tr><td></td><td>High beam indicator</td><td>2 cp SAE NO. 57</td></tr>
</table>

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TORQUE VALUES

ENGINE

Item	Q'ty	Thread Dia mm	Torque kg-m (ft-lb)	Remarks
Breather cover	6	6	0.8–1.2 (6–9)	
Tachometer gear holder	1	6	0.8–1.2 (6–9)	
Cylinder head cover	20	6	0.8–1.2 (6–9)	
Valve adjusting nut	8		1.2–1.6 (9–12)	
Rocker arm shaft cotter pin	4	6	1.0–1.4 (7–10)	
Rocker arm shaft cap bolt	4		0.8–1.2 (6–9)	
Cylinder head bolt	12	8	2.4–3.0 (17–22)	Apply molybdenum disulfied grease to the threads and underside of bolts.
	2	6	1.0–1.4 (7–10)	
Spark plug	4		1.2–1.6 (9–12)	
Cam sprocket	2	7	1.4–1.8 (10–13)	
Cam chain tensioner	2	6	1.0–1.4 (7–10)	
Crankcase	13	8	2.2–2.6 (16–19)	Apply molybdenum disulfied grease to the threads and underside of bolts.
Oil gallery cap	2		1.0–1.4 (7–10)	
A.C. generator	1	10	5.0–6.0 (36–43)	
Spark advancer	1		0.8–1.2 (6–9)	
Connecting rod	8		2.4–2.8 (17–20)	
Starting clutch	3	6	1.2–1.6 (9–12)	Apply locking agent to the threads.
Clutch	1	20	4.7–5.3 (34–38)	
Oil filter case	1		2.7–3.3 (20–24)	
Oil pressure switch	1		1.0–2.0 (7–15)	Apply liquid sealant
Neutral switch rotor	1		0.6–1.0 (4–7)	
Primary chain tensioner	1	6	1.0–1.4 (7–10)	
Primary chain nozzle	1	6	0.8–1.2 (6–9)	
Gearshift return pin	1		2.3–2.7 (17–20)	
Throttle cable adjusting lock nut	2		0.6–0.8 (4–6)	

CHASSIS

Item	Q'ty	Thread Dia mm	Torque kg-m (ft-lb)	Remarks
Steering stem nut	1	24	8.0–12.0 (58–87)	
Steering handlebar	4	8	2.8–3.2 (20–23)	
Front fork top bridge	2	7	0.9–1.3 (7–9)	
Front fork cap bolt	2		2.0–3.0 (15–22)	
Steering stem	2	10	3.0–4.0 (22–29)	
Front axle holder	4	8	1.8–2.5 (13–18)	
Front axle nut	1	12	5.5–6.5 (40–48)	
Front brake disc	5	8	2.7–3.3 (20–24)	UBS
Brake hose bolt	2	10	2.5–3.5 (18–25)	
Front brake caliper carrier	2	10	3.0–4.0 (22–29)	
Front brake caliper A	2	10	3.0–4.0 (22–29)	
Rear axle	1	18	8.0–10.0 (58–72)	
Final driven sprocket	4	12	8.0–10.0 (58–72)	UBS
Swing arm pivot nut	1	14	6.0–7.0 (43–51)	
Rear brake torque link	1	8	1.8–2.5 (13–18)	
Rear shock absorber	4	10	3.0–4.0 (22–29)	
Engine hanger bolt	5	10	3.0–4.0 (22–29)	
	1	12	8.0–10.0 (58–72)	
	8	8	2.6–3.2 (19–23)	
Foot peg	1	10	3.0–4.0 (22–29)	
Gearshift pedal	1	6	0.8–1.2 (6–9)	
Brake fluid reservoir cap	4	4	0.1–0.2 (0.7–1.4)	

Torque specifications listed above are for the most important tightening points. If a torque specification is not listed, follow the standards given below.

STANDARD TORQUE VALUES

Type	Torque kg-m (ft-lb)	Type	Torque kg-m (ft-lb)
5 mm bolt, nut	0.45–0.6 (3.5–4.5)	5 mm screw	0.35–0.5 (2.5–3.6)
6 mm bolt, nut	0.8–1.2 (6–9)	6 mm screw	0.7–1.1 (5–8)
8 mm bolt, nut	1.8–2.5 (13–18)	6 mm flange bolt, nut	1.0–1.4 (7–10)
10 mm bolt, nut	3.0–4.0 (22–29)	8 mm flange bolt, nut	2.4–3.0 (17–22)
12 mm bolt, nut	5.0–6.0 (36–43)	10 mm flange bolt, nut	3.0–4.0 (22–29)

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SPECIAL TOOLS

Tool	Part No.	Q'ty	Ref. page
Valve adjusting wrench	07908–3230000	1	3–6
Spark plug wrench	07909–3000000	1	3–3
Snap ring pliers	07914–3230001	1	15–6
Hex wrench (6 mm)	07917–3230000	1	13–17, 13–20
Sliding hammer shaft	07936–3740100	1	10–3
Sliding hammer weight	07945–3000500	1	10–3
Ball race remover	07953–3330000	1	13–23
Piston ring compressor	07954–3740000	2	7–8
Piston base	07958–2500001	2	7–8
Torx driver bit	07703–0010200	1	11–4, 11–15
Bearing driver attachment	07946–3290000	1	13–24, 14–8
Valve guide reamer	07984–2000000	1	6–11, 6–12
Carburetor throttle wrench	07908–4220100	1	3–10
Carburetor pilot screw wrench	07908–4220201	1	4–15
Cylinder head bolt wrench	07906–3230000	1	6–9, 6–15
Oil pressure gauge attachment	07510–4220100	1	2–3
Bearing driver attachment	07947–6710100	1	11–16, 13–24

COMMON TOOLS

Tool	Part No.	Q'ty	Alternate Tool	Part No.	Ref. Page
Float level gauge	07401–0010000	1			4–5
Retainer wrench (A)	07710–0010100	1	Bearing retainer wrench	07910–2830000	14–4
Retainer wrench (B)	07710–0010200	1	Bearing retainer wrench	07910–3230101	13–12, 13–14
Retainer wrench (C)	07710–0010300	1	Bearing retainer wrench	07910–3930000	14–4,
Retainer wrench body	07710–0010401				13–12, 13–14 14–4
Lock nut wrench socket (30 x 32 mm)	07716–0020400	1			13–22, 13–25
Lock nut wrench socket (26 x 30 mm)	07716–0020202	1			8–3, 8–7,
Extension bar	07716–0020500	1			8–3, 8–7 13–22, 13–25
Universal holder	07725–0010101	1			8–3, 8–7
Valve guide remover (5.5 mm)	07742–0010100	1	Valve guide driver	07942–3290100	6–12
Valve guide driver (B)	07742–0020200	1	Valve guide driver	07942–3290200	6–12
Bearing driver outer (42 x 47)	07746–0010300	1	Bearing driver	07945–3330100	13–14
Bearing driver outer (62 x 68)	07746–0010500	1	Bearing driver	07946–3600000	14–8
Bearing driver handle (C)	07746–0030100	1			11–12
Bearing driver inner (25 mm)	07746–0030200	1			11–12
Bearing driver pilot (15 mm)	07746–0040300	1			13–14
Bearing driver pilot (20 mm)	07746–0040500	1			14–8
Bearing driver pilot (22 mm)	07746–0041000	1			11–16
Bearing driver pilot (25 mm)	07746–0040600	1			14–8
Bearing driver handle (B)	07746–0020100	1			11–16
Rotor puller	07733–0020001	1			16–6
Front fork oil seal driver body	07747–0010100	1			13–21
Front fork oil seal attachment (E)	07747–0010600	1	Fork seal driver	07947–3290000	13–21
Bearing driver handle (A)	07749–0010000	1	Driver handle attachment	07949–6110000	11–16, 13–14, 13–24, 14–8
Valve spring compressor	07757–0010000	1	Valve spring compressor	07957–3290001	6–9, 6–14
Shock absorber compressor	07959–3290001	1			14–10, 14–11
Pin spanner	07702–0010000	1	Pin spanner	07902–2000000	13–22, 13–24

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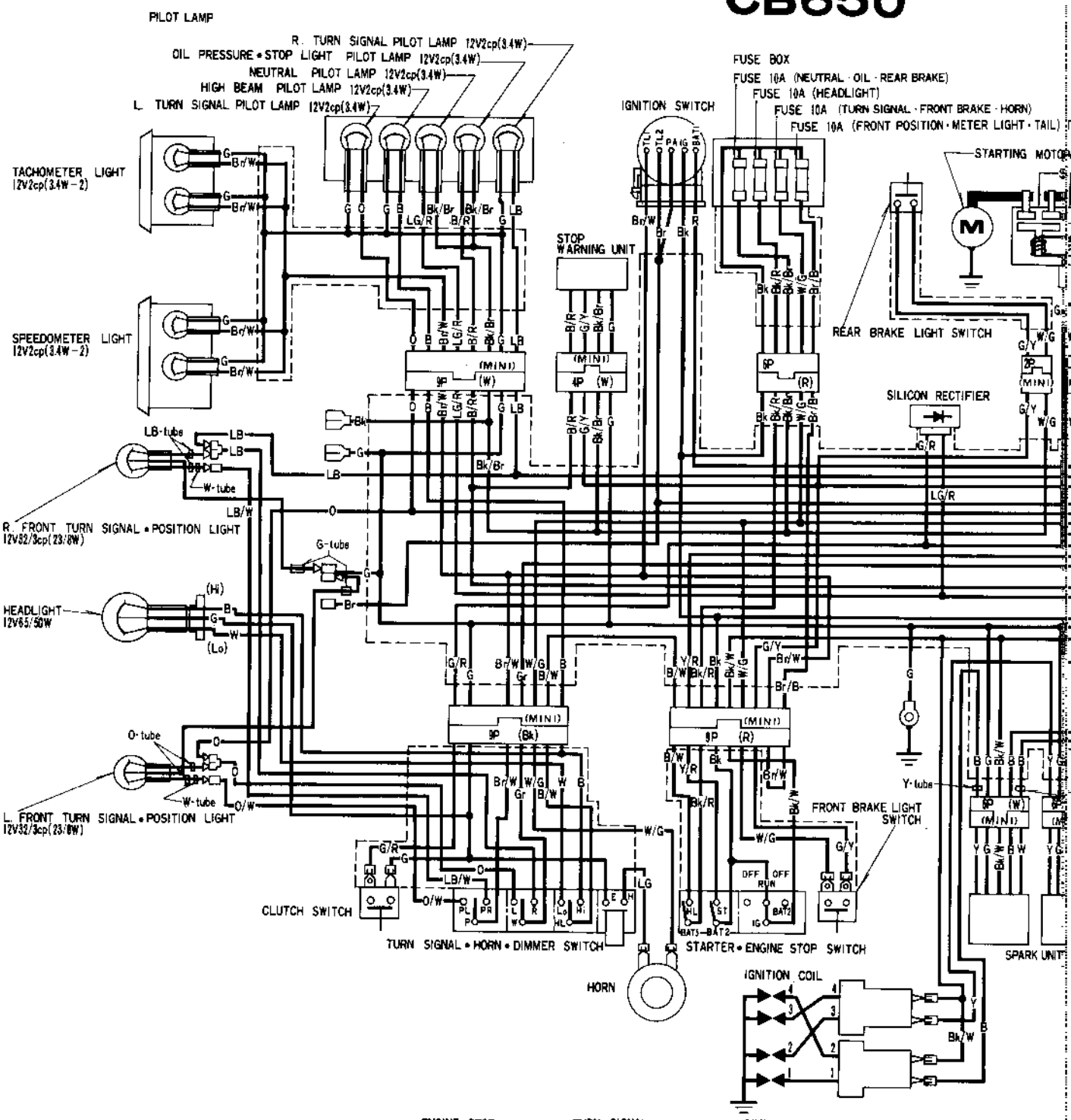
WIRING DIAGRAM



IGNITION SWITCH CONTINUITY

	BAT1	IG	TL1	TL2	P
OFF					
ON	○—○		○—○		
P	○				○

STARTER SWITCH CONTINUITY

	BAT3	HL	BAT2	ST
FREE	○—○			
PUSH			○—○	

ENGINE STOP SWITCH CONTINUITY

	BAT2	IG
OFF		
RUN	○—○	
OFF		

TURN SIGNAL SWITCH CONTINUITY

	W	R	L	P	PR	PL
R	○—○			○—○		
N				○—○		
L	○		○—○	○—○		

DIMMER SWITCH CONTINUITY

	HL	Lo	Hi
Lo	○—○		
(N)	○—○	○—○	
Hi	○		○

HORN SWITCH CONTINUITY

	HO	E
FREE		
PUSH	○—○	

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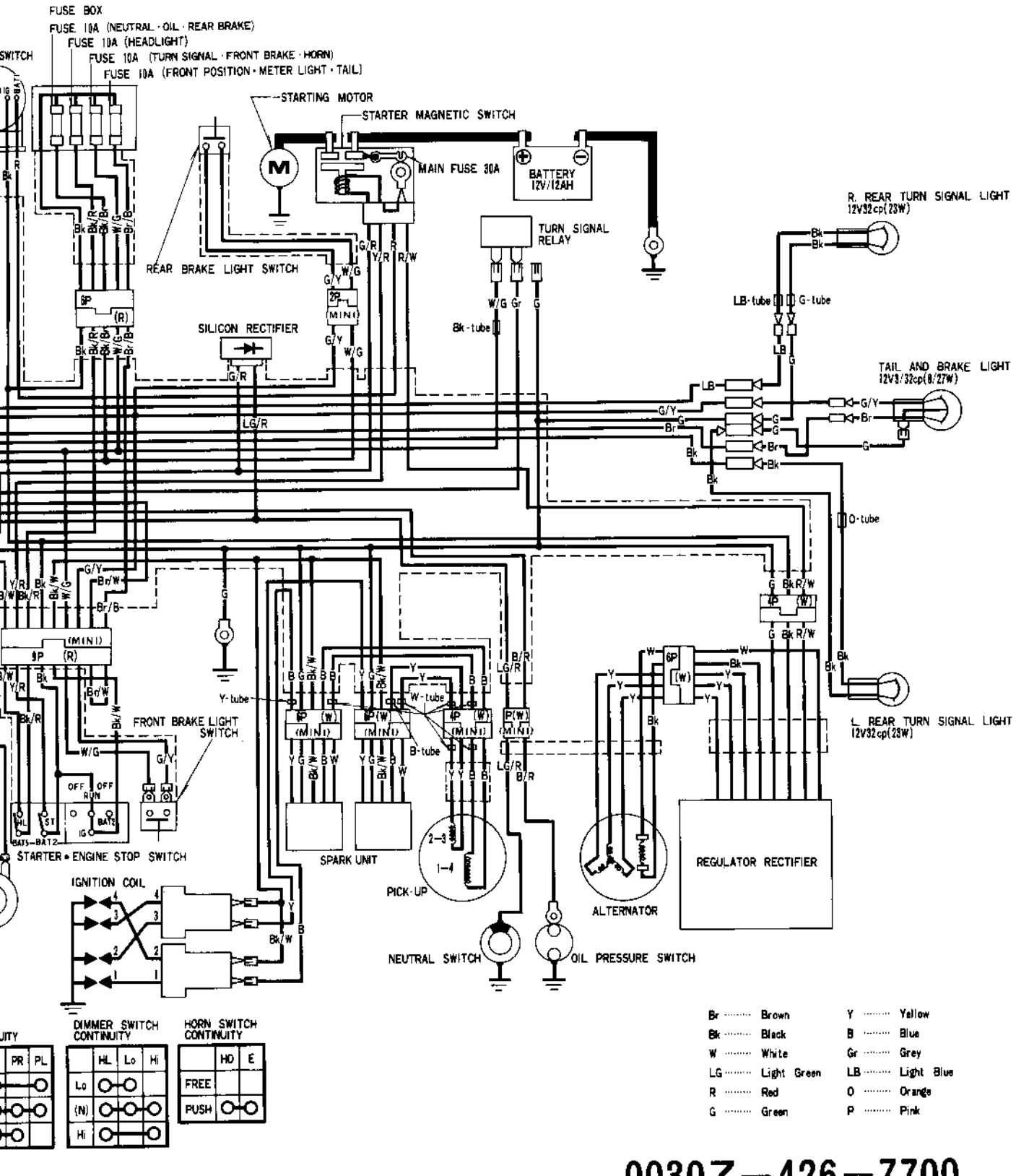

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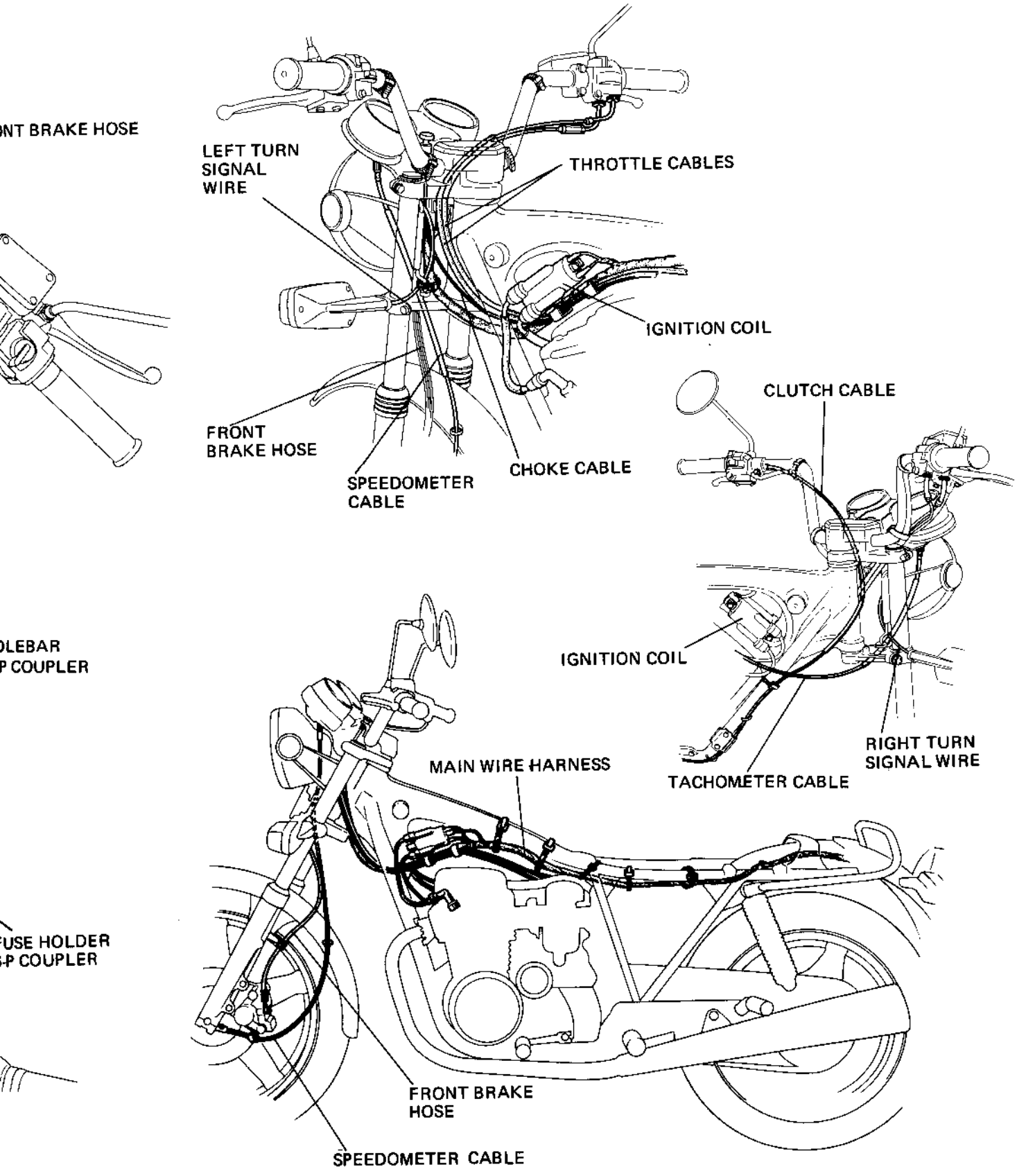
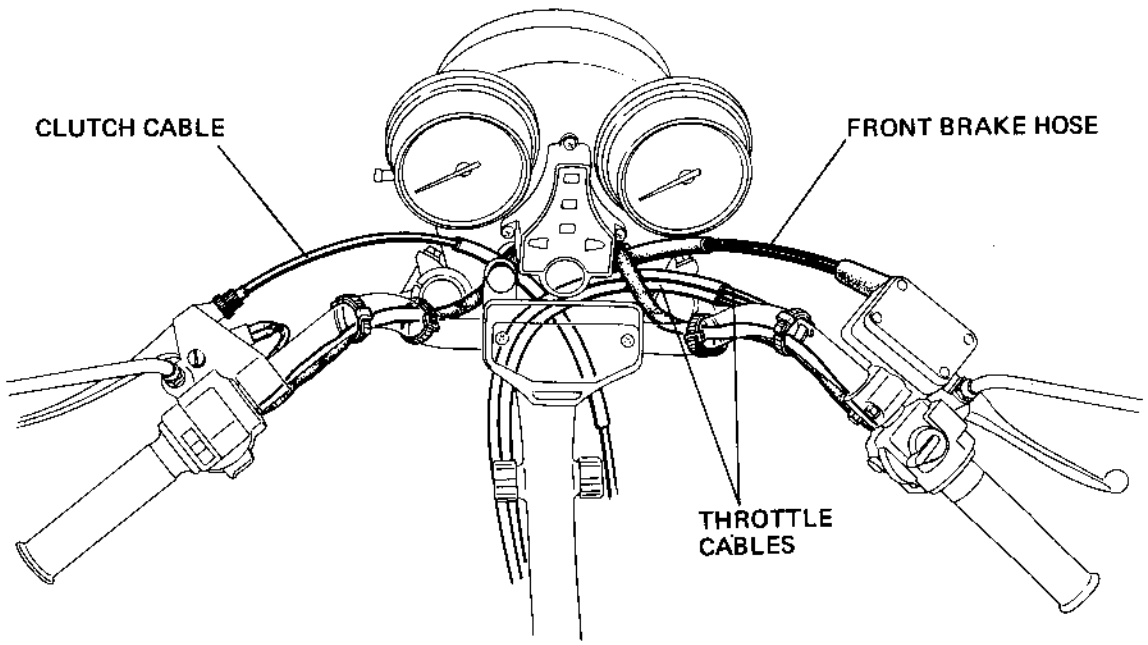
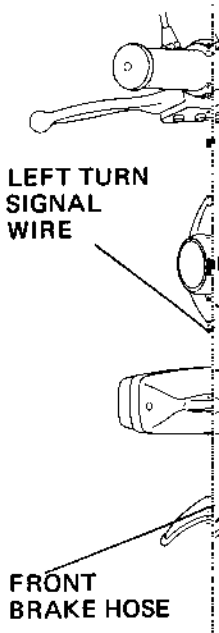
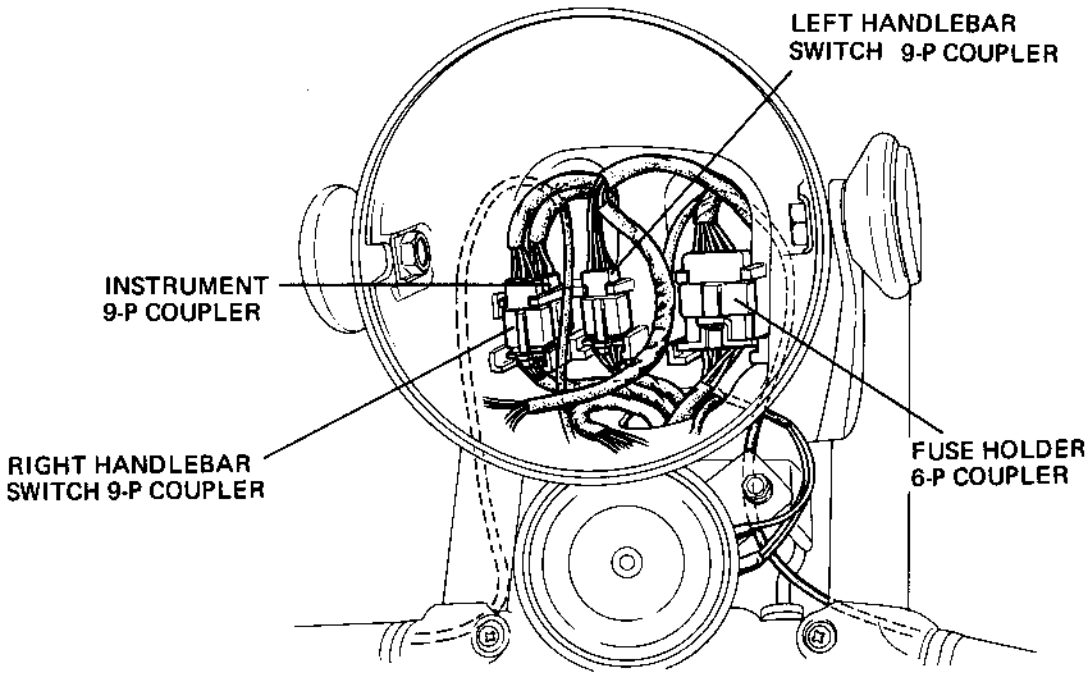
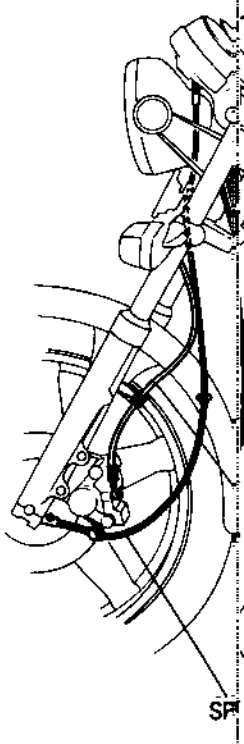


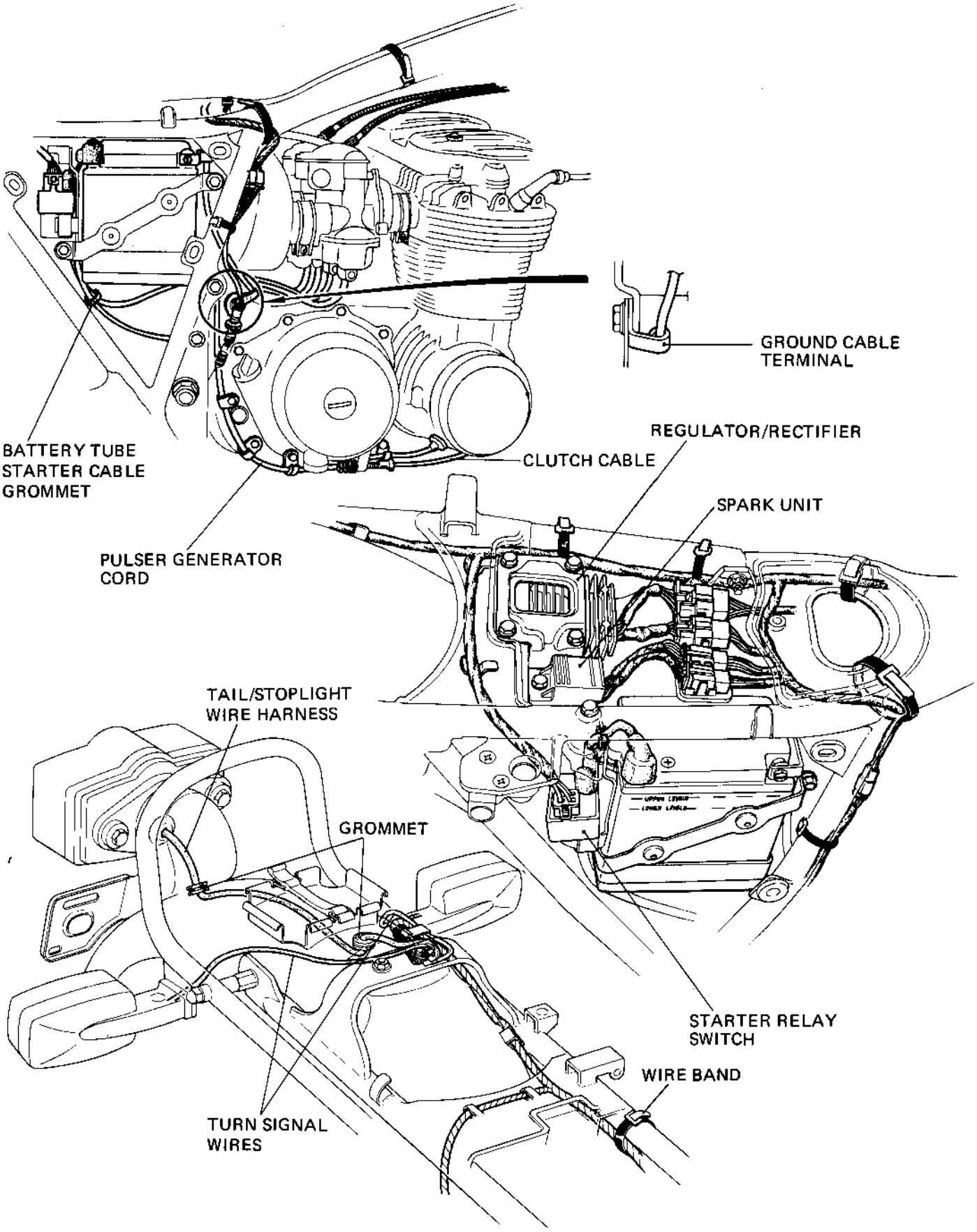
CABLE & HARNESS ROUTING











MAINTENANCE SCHEDULE

Perform the PRE-RIDE INSPECTION in the Owner's Manual at every maintenance period.
I : INSPECT, 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) 600 mi (1,000 km)	4,000 mi (6,400 km)	8,000 mi (12,800 km)	12,000 mi (19,200 km)	16,000 mi (25,600 km)	20,000 mi (32,000 km)	Refer to
EMISSION RELATED ITEMS		ENGINE OIL	YEAR	R	R	R	R	R	R	Page 2- 2
		ENGINE OIL FILTER	YEAR	R	R	R	R	R	R	Page 2- 2
		CRANKCASE BREATHER	NOTE 1		C	C	C	C	C	Page 3- 2
		AIR CLEANER	NOTE 2		C	R	C	R	C	Page 3- 3
	*	FUEL LINES			I	I	I	I	I	Page 3- 3
		SPARK PLUGS			I	R	I	R	I	Page 3- 3
	*	VALVE CLEARANCE		I	I	I	I	I	I	Page 3- 6
	*	CAM CHAIN TENSION		A	A	A	A	A	A	Page 3- 7
	*	THROTTLE OPERATION		I	I	I	I	I	I	Page 3- 7
	*	CARBURETOR-CHOKE			I	I	I	I	I	Page 3- 8
	*	CARBURETOR-SYNCHRONIZE		I	I	I	I	I	I	Page 3- 9
	*	CARBURETOR IDLE SPEED		I	I	I	I	I	I	Page 3-11
NON-EMISSION RELATED ITEMS		DRIVE CHAIN		I, L EVERY 500 mi (800 km)						Page 3-12
		BATTERY	MONTH	I	I	I	I	I	I	Page 3-13
		BRAKE FLUID (FRONT)	MONTH I 2 YEARS R	I	I	I	I	I	I	Page 3-13
		BRAKE PAD/SHOE WEAR		I	I	I	I	I	I	Page 3-14
		BRAKE SYSTEM		I	I	I	I	I	I	Page 3-14
	*	BRAKE LIGHT SWITCH		I	I	I	I	I	I	Page 3-15
	*	HEADLIGHT AIM		I	I	I	I	I	I	Page 3-15
		CLUTCH FREE PLAY		I	I	I	I	I	I	Page 3-16
		SIDE STAND		I	I	I	I	I	I	Page 3-17
	*	SUSPENSION		I	I	I	I	I	I	Page 3-18
	*	NUTS, BOLTS, FASTENERS		I	I	I	I	I	I	Page 3-19
	**	WHEELS		I	I	I	I	I	I	Page 3-19
	**	STEERING HEAD BEARING		I	I	I	I	I	I	Page 3-19

* SHOULD BE SERVICED BY AN AUTHORIZED HONDA DEALER, UNLESS THE OWNER HAS PROPER TOOLS AND SERVICE DATA AND IS MECHANICALLY QUALIFIED.
** IN THE INTEREST OF SAFETY, WE RECOMMEND THESE ITEMS BE SERVICED ONLY BY AN AUTHORIZED HONDA DEALER.
NOTES: (1) SERVICE MORE FREQUENTLY WHEN RIDING IN RAIN OR AT FULL THROTTLE. (U.S.A. ONLY)
(2) SERVICE MORE FREQUENTLY WHEN RIDING IN DUSTY AREAS.
(3) FOR HIGHER ODOMETER READINGS, REPEAT AT THE FREQUENCY INTERVAL ESTABLISHED HERE.

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EMISSION CONTROL SYSTEM (USA only)

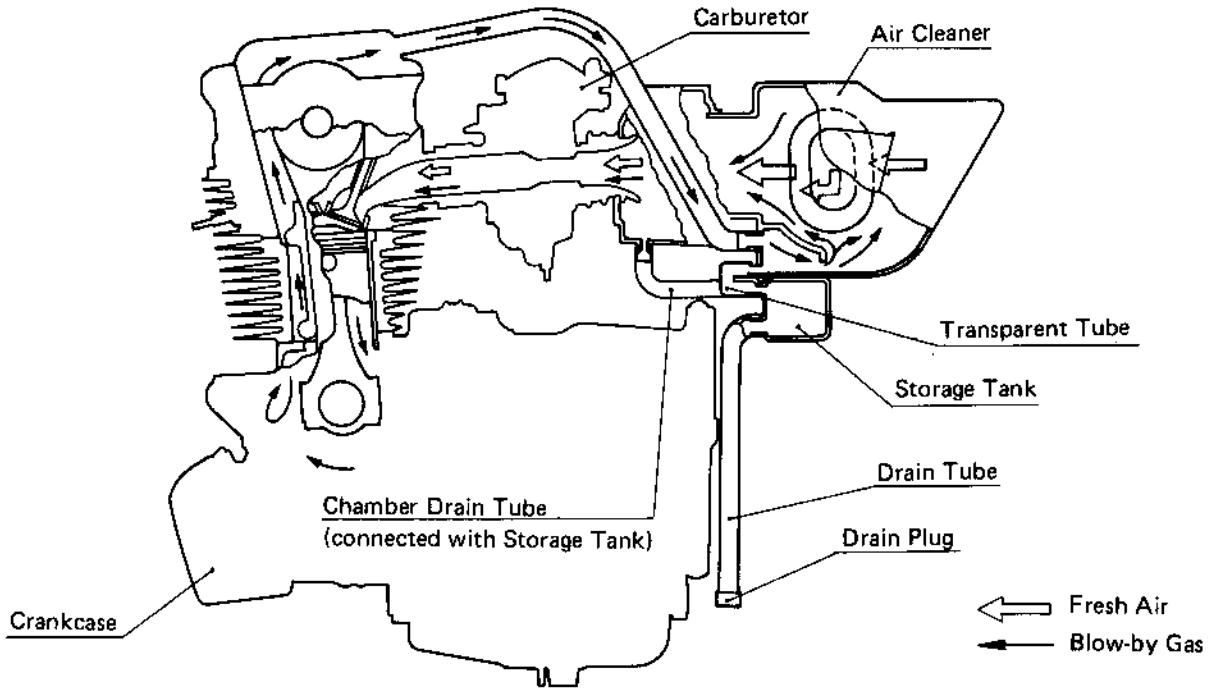
The CB650 is equipped with two Emission Control Systems.

EXHAUST EMISSION CONTROL SYSTEM

The exhaust emission control system is composed of a factory pre-set carburetor.
NO adjustment should be made to the system except the idle speed.

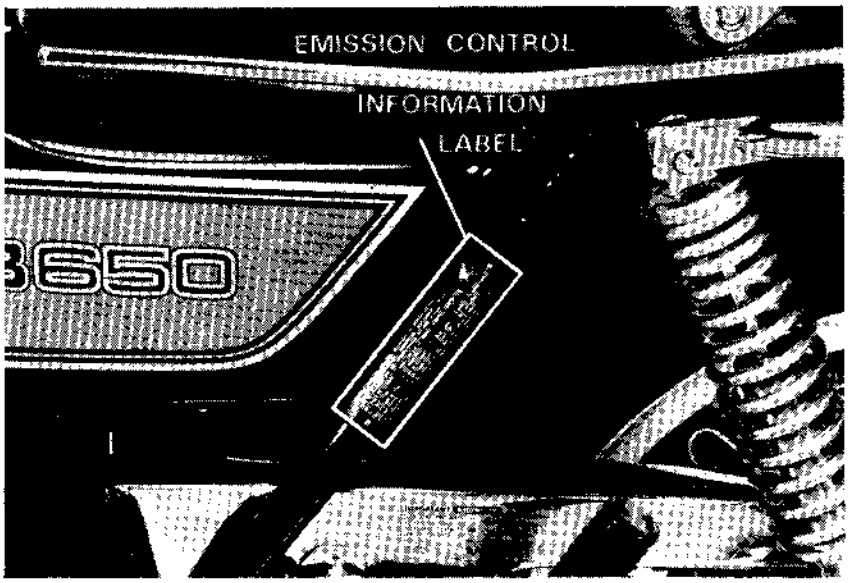
CRANKCASE EMISSION CONTROL SYSTEM

The engine is equipped with a "Closed System" to prevent crankcase emissions from entering the atmosphere.
Blow-by gas is returned to the combustion chamber through the air cleaner and carburetor. Liquids are collected in the storage tank.

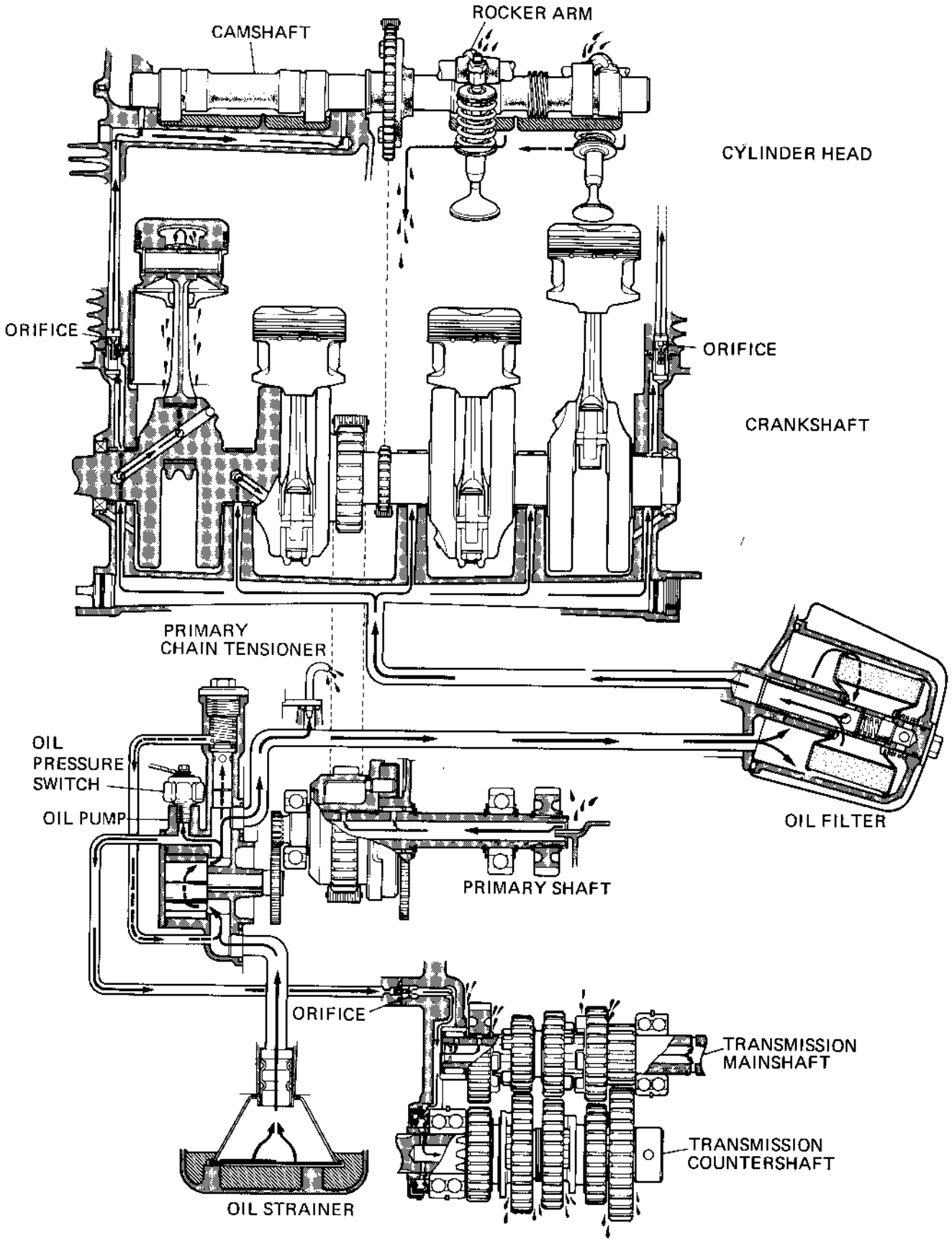


EMISSION CONTROL INFORMATION LABEL

An Emission Control Information Label is located on the frame as shown. It gives basic tune-up specifications.



ENGINE LUBRICATION SYSTEM



Date of Issue: December, 1978

2. LUBRICATION

SERVICE INFORMATION

GENERAL INSTRUCTIONS

The oil strainer and oil pump maintenance and inspection can be accomplished without removing the engine.

SPECIAL TOOL

Oil Pressure Gauge Attachment 07510–4220100

TORQUE VALUES

Oil filter case	2.7–3.3 kg-m (20–24 ft-lb)
Oil pressure switch	1.0–2.0 kg-m (7–15 ft-lb)
Gearshift pedal	0.8–1.2 kg-m (6–9 ft-lb)

SPECIFICATIONS

Oil capacity	Approximately 3.0 liter (3.2 US qt) at oil change 3.5 liter (3.7 US qt) at engine assembly	
Recommended oil	HONDA 4-stroke oil or equivalent General, all temperature Alternates Above 15°C (60°F) −10° to 15°C (15° to 60°F) Above −10°C (15°F) Below 0°C (32°F)	API service classification – SE SAE 10W-40 SAE 30 SAE 20 or 20W SAE 20W-50 SAE 10W
Oil pump delivery	21.3–26.3 liter (22.5–27.8 US qt)/min at 3,000 rpm.	
Oil pressure (at oil pressure switch)	3.8–4.2 kg/cm^2 (54–60 psi) at 3,000 rpm.	

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

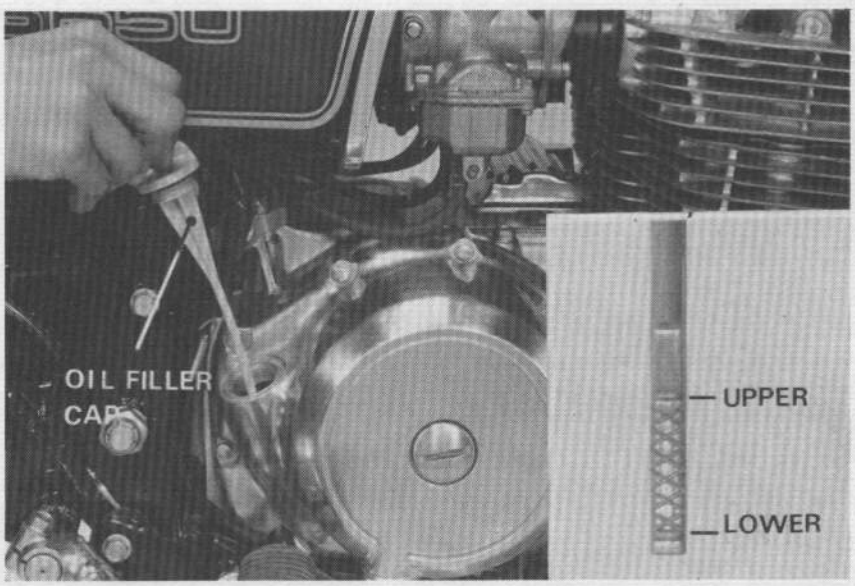
High oil pressure
1. Pressure relief valve stuck open
2. Plugged oil filter, gallery, or metering orifice
3. Incorrect oil being used

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

ENGINE LUBRICATION

ENGINE OIL LEVEL

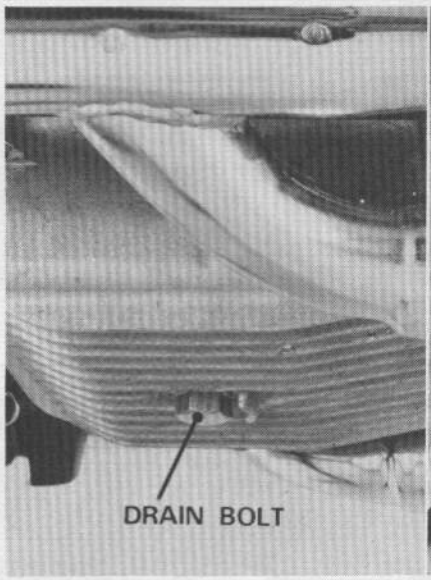
Start the engine and allow it to idle for a few minutes.
Stop the engine and support the motorcycle on the center stand. Wait a few minutes and check the oil level with the filler cap/dipstick. Do not screw in the cap when making this check. If the level is below the lower level on the dipstick, fill to the upper level mark. Check that the oil pressure warning light goes off when the engine starts. If it does not, check the brakelight circuit for a burnt out bulb, short or open circuit. If the brakelights operate properly, check the oil pump operation and/or oil circuit.

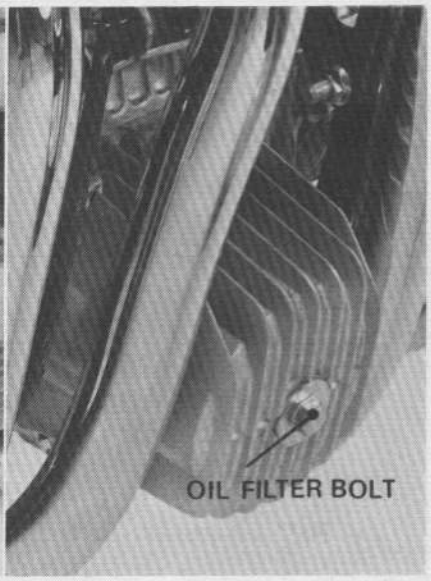


ENGINE OIL & FILTER CHANGE

Warm the engine to normal operating temperature.

Stop the engine.
Place the motorcycle on its center stand.
Place a suitable container under the drain plug and oil filter.
Remove the oil filler cap, drain plug and oil filter bolt and drain the oil.





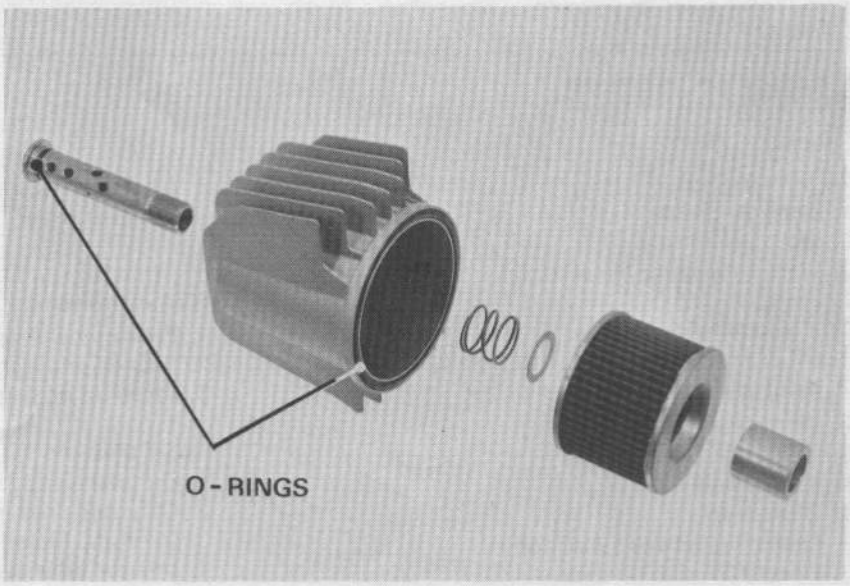
Check that the sealing washer on the drain plug and the O-rings on the oil filter bolt and oil filter are in good condition.

After draining is complete, replace the oil filter and install the oil filter bolt and drain plug.

Fill the crankcase with 3.0 liter (3.2 US qt) of the recommended oil.

Install the oil filler cap.
Start the engine and let it idle for 2-3 minutes. Check the oil level and add the recommended oil to the upper level.

Make sure that there are no oil leaks.



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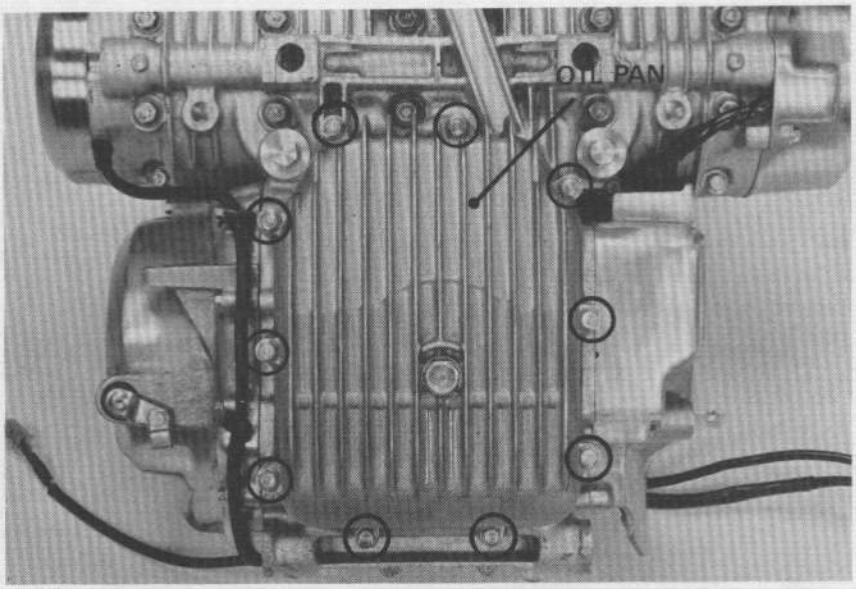
OIL STRAINER CLEANING

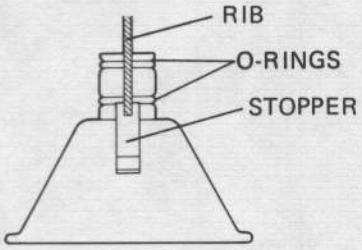
The oil strainer can be removed with the engine mounted in the frame.
Remove the oil filler cap and drain plug. (See Engine Oil & Filter Change, page 2-2.)
Remove the oil pan bolts and oil pan.

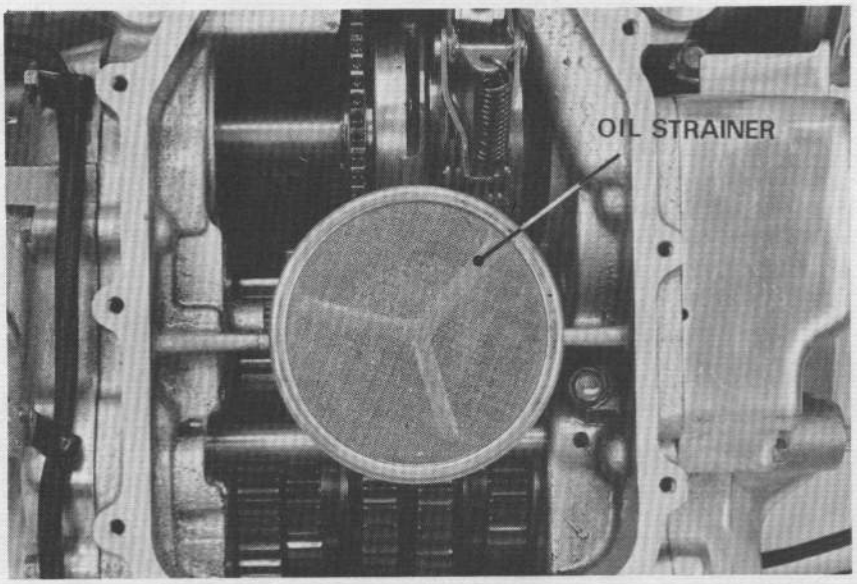


Remove and clean the oil strainer.
Install the oil strainer and oil pan.
Install the oil filter bolt, drain plug and fill the crankcase with the recommended oil. (See Engine Oil & Filter Change, page 2–2.)

NOTE

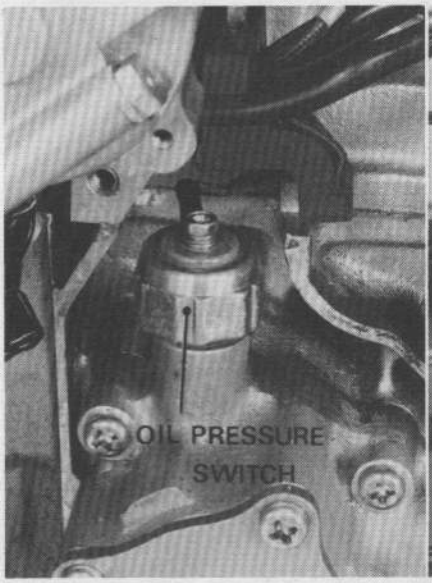
Align the slot in the strainer with the crankcase rib.

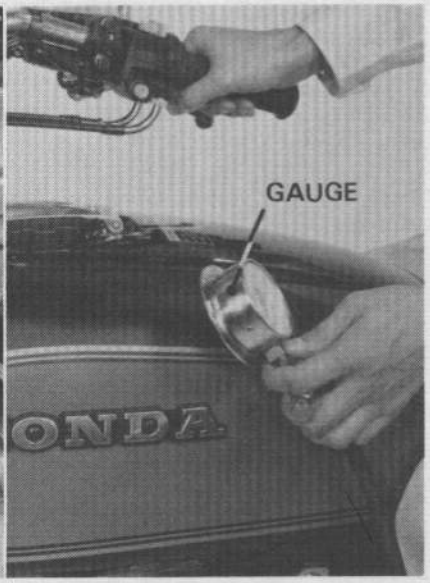




OIL PRESSURE

Warm the engine to normal operating temperature (approximately 80°C, 176°F).
Stop the engine.
Remove the left rear crankcase cover.
Disconnect the oil pressure switch wire.
Remove the oil pressure switch. (page 2-4)
Connect an oil pressure gauge to the pressure switch hole.
Check the oil level.
Start the engine and check the oil pressure at 3,000 rpm.
STANDARD: 3.8–4.2 kg/cm² (54–60 psi) at 3,000 rpm 80°C (176°F)
Stop the engine.
Apply a liquid sealant to the pressure switch threads.
Install the switch and attach the wire.
Start the engine and check that the oil pressure warning light goes out. If the oil pressure warning light stays on, stop the engine immediately and determine the cause. (Page 2–2 Engine Oil Level.)





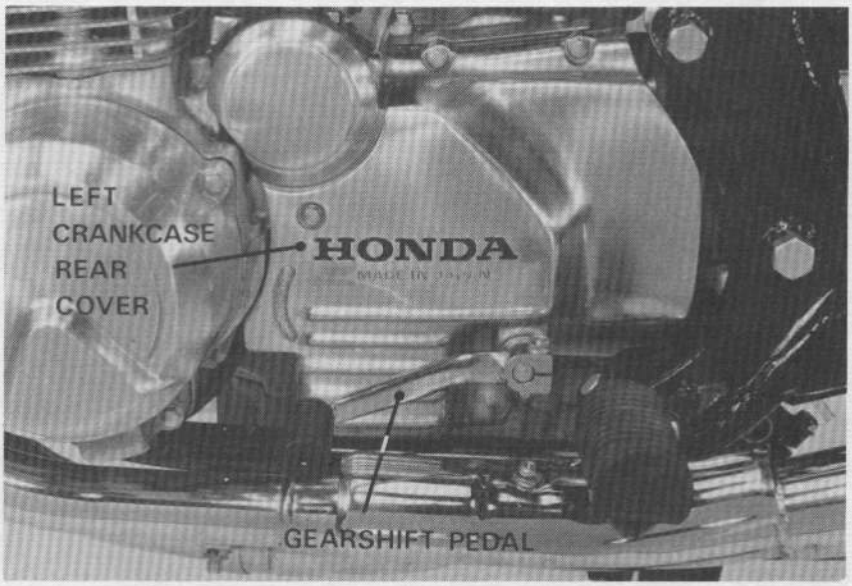
OIL PUMP

OIL PUMP REMOVAL

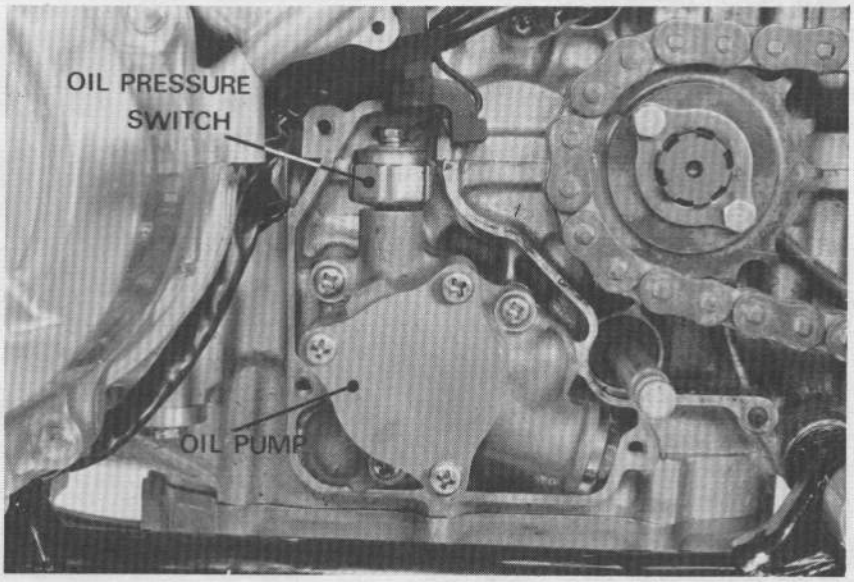
NOTE

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

Remove the oil drain plug and drain the oil from the engine (Page 2–2).
Remove the gearshift arm from the spindle.
Remove the left crankcase rear cover.



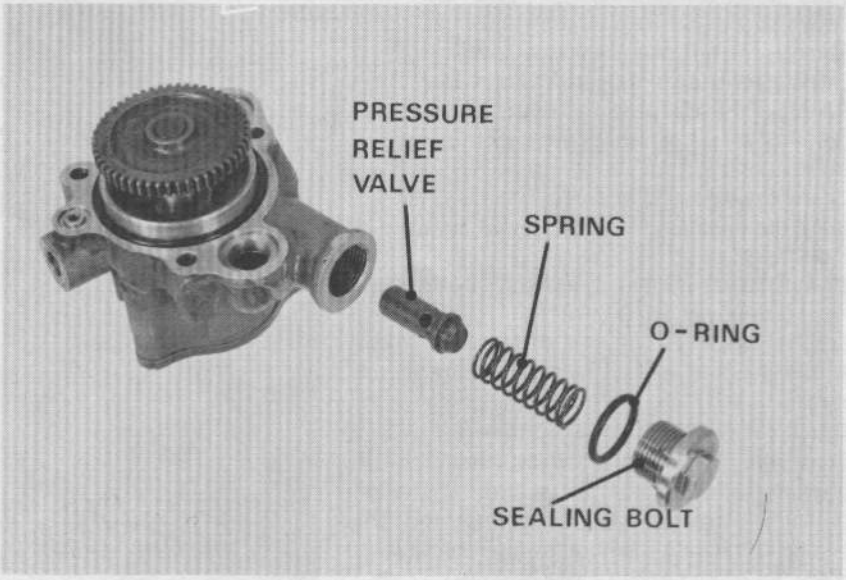
Disconnect the oil pressure switch wire.
Remove the oil pressure switch.
Remove the oil pump.



PRESSURE RELIEF VALVE DISASSEMBLY/ASSEMBLY

Remove the sealing bolt and O-ring.
Remove the pressure relief valve spring and valve.

Check the relief valve, spring and O-ring for damage.
Install the pressure relief valve, spring, O-ring and sealing bolt.



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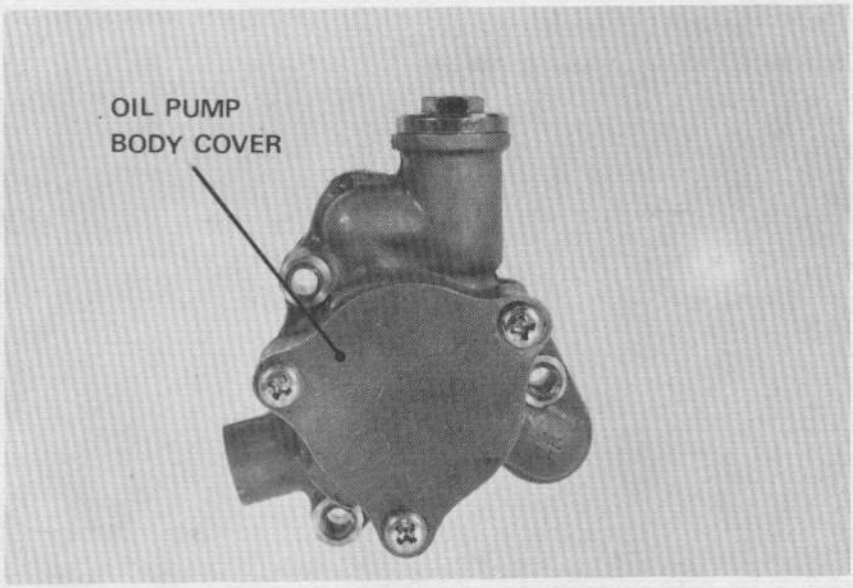
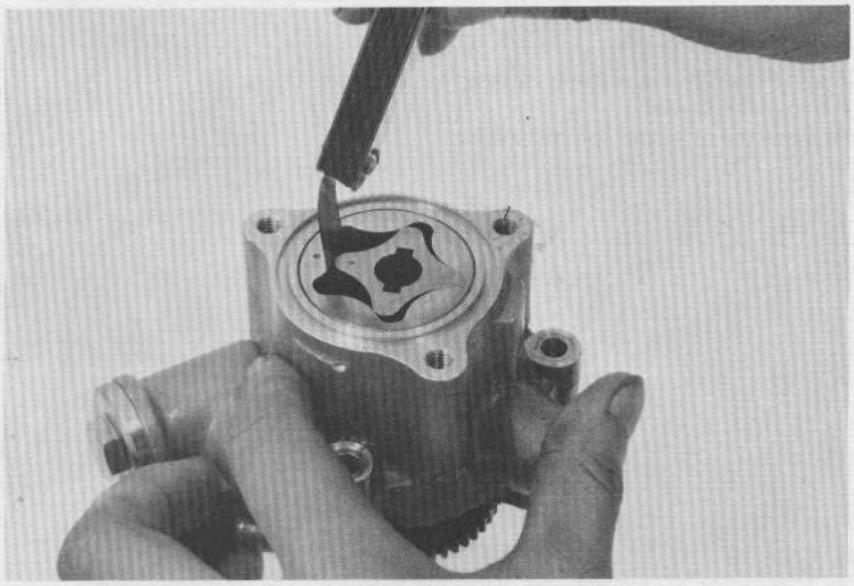
OIL PUMP INSPECTION

Remove the oil pump body cover.



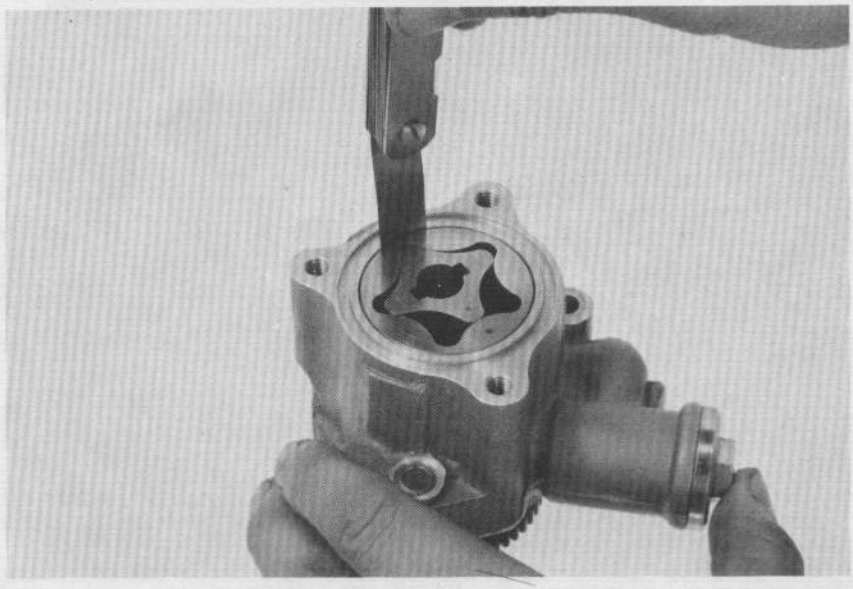
Measure the rotor tip clearance.

SERVICE LIMIT: 0.15 mm (0.006 in)



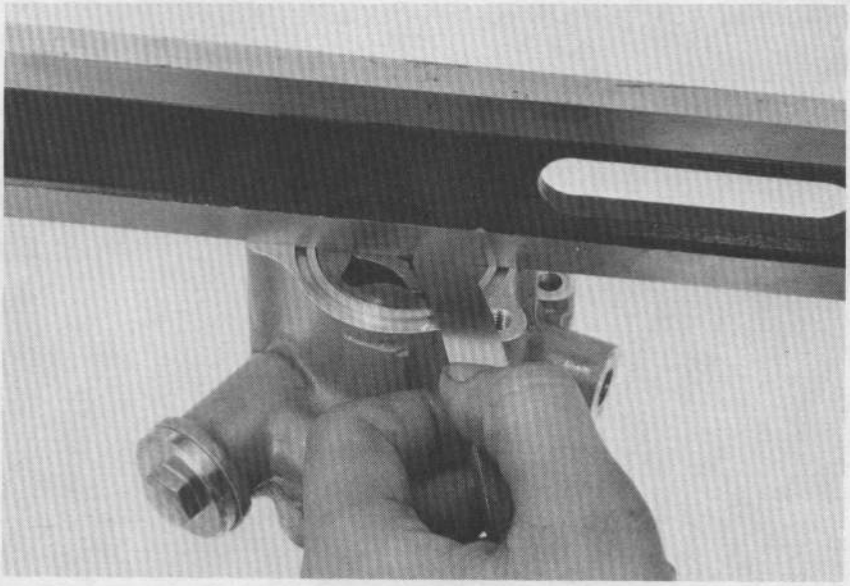
Measure the pump body clearance.

SERVICE LIMIT: 0.35 mm (0.014 in)



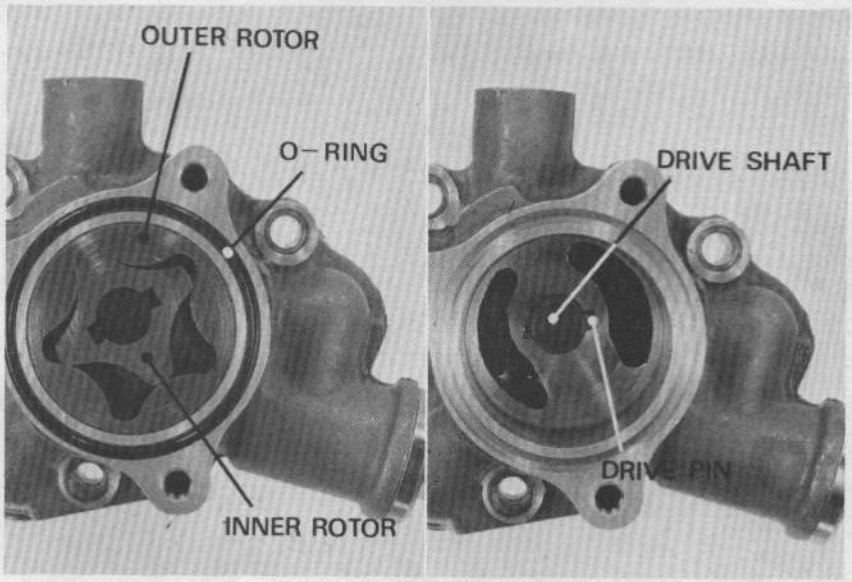
Measure the pump end clearance.

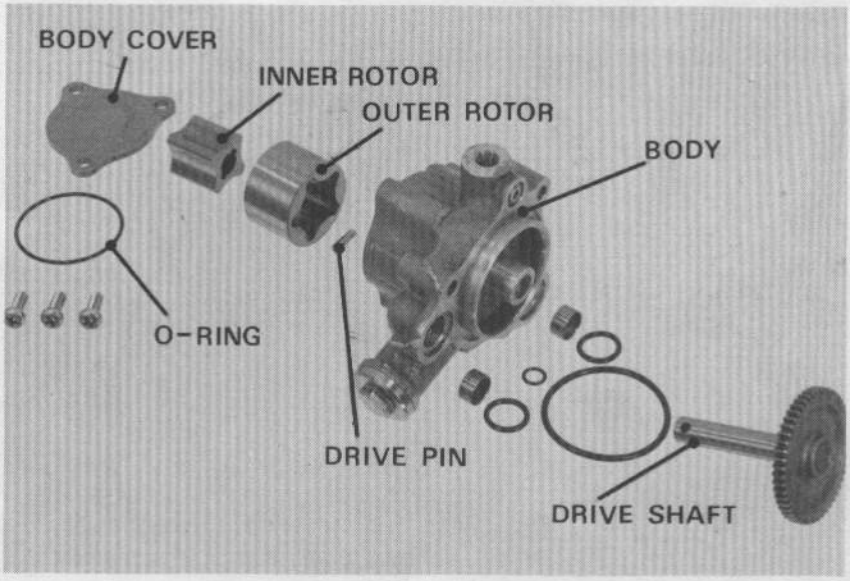
SERVICE LIMIT: 0.1 mm (0.004 in)



OIL PUMP DISASSEMBLY

Remove the inner and outer rotors.
Remove the O-rings.
Remove the drive pin and drive shaft.





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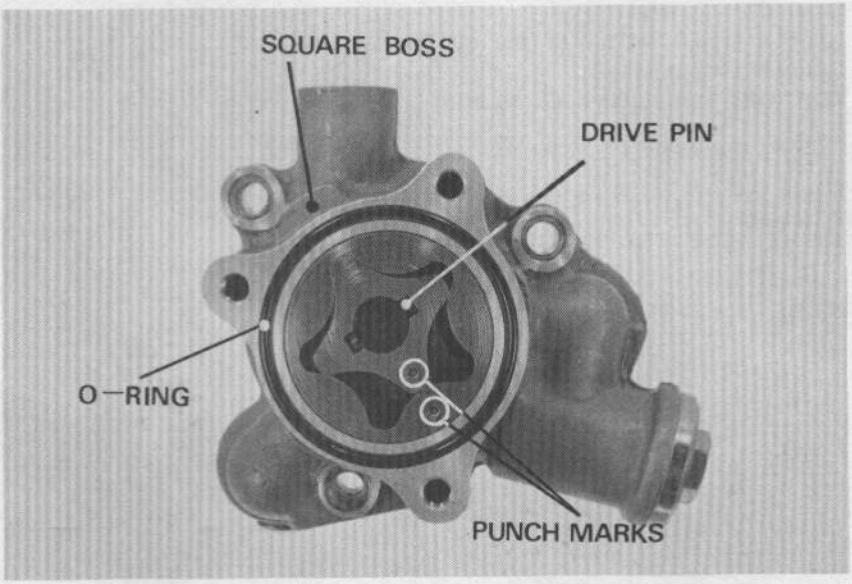
OIL PUMP ASSEMBLY

Insert the drive shaft.
Insert the drive pin into the drive shaft.
Parallel the drive pin with the square boss on the pump body.

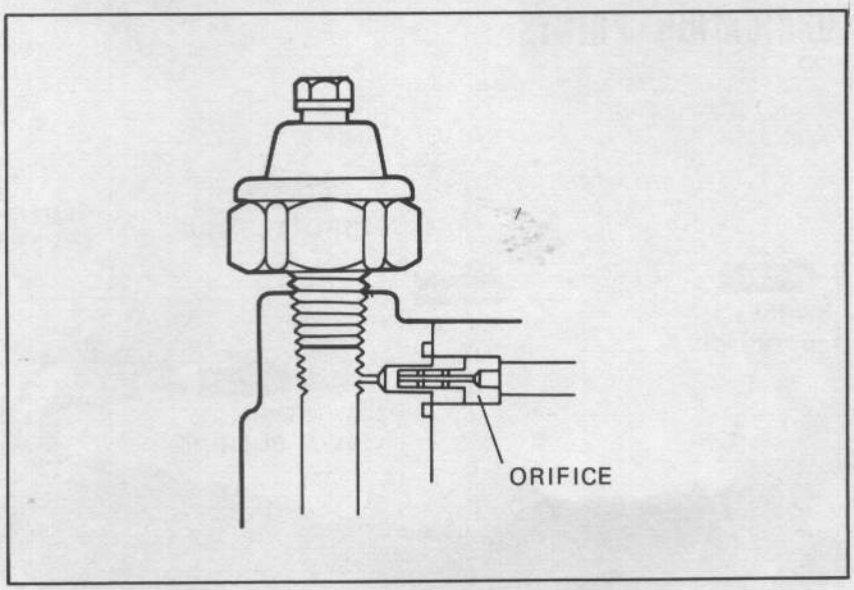
Install the inner and outer rotors aligning their punch marks and the inner rotor with the drive pin.
Install the O-ring in the pump body groove.
Install the pump body cover.



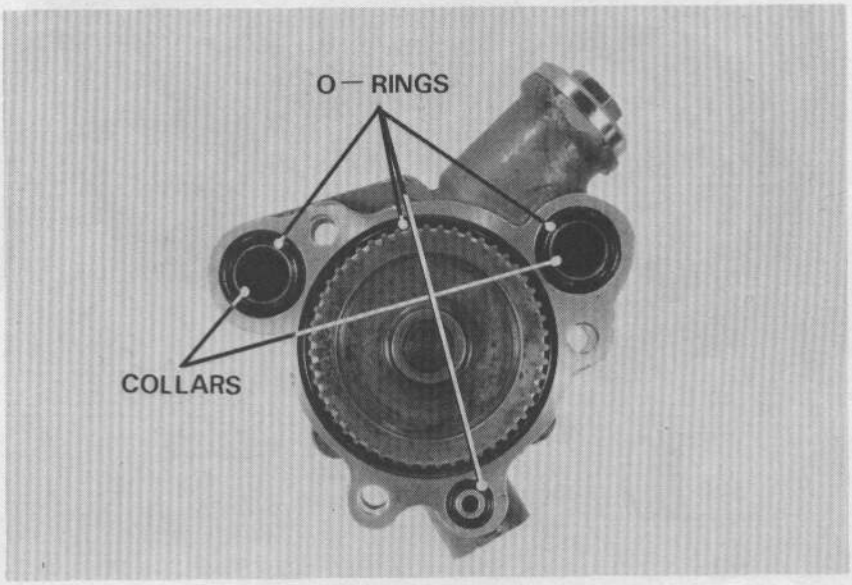
OIL PUMP INSTALLATION

Remove the oil control orifice from the crankcase oil hole and check that it is not clogged.
Install the orifice into the crankcase oil hole.

NOTE
Note the oil control orifice direction.



Install the O-rings and collars.

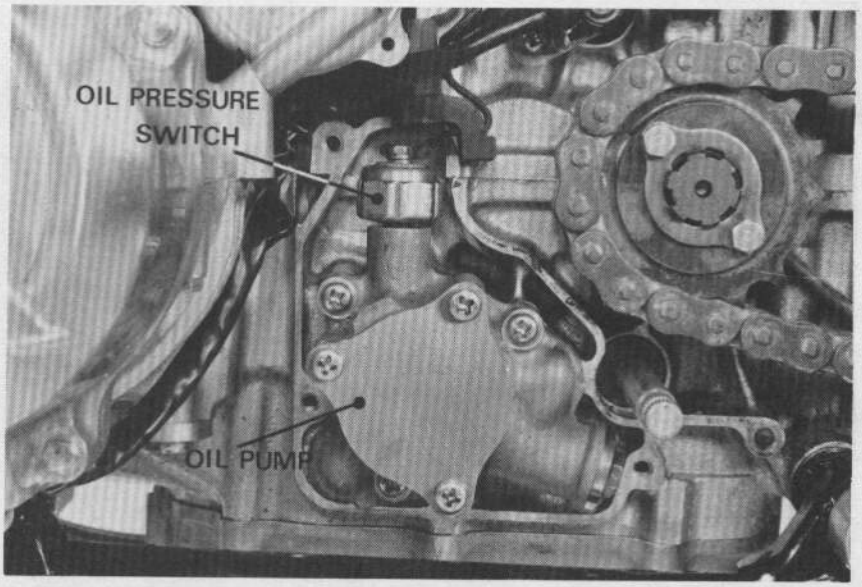


Install the oil pump.
Apply a liquid sealant to the oil pressure switch threads and install.
TORQUE: 1.0–2.0 kg-m (7–15 ft-lb)

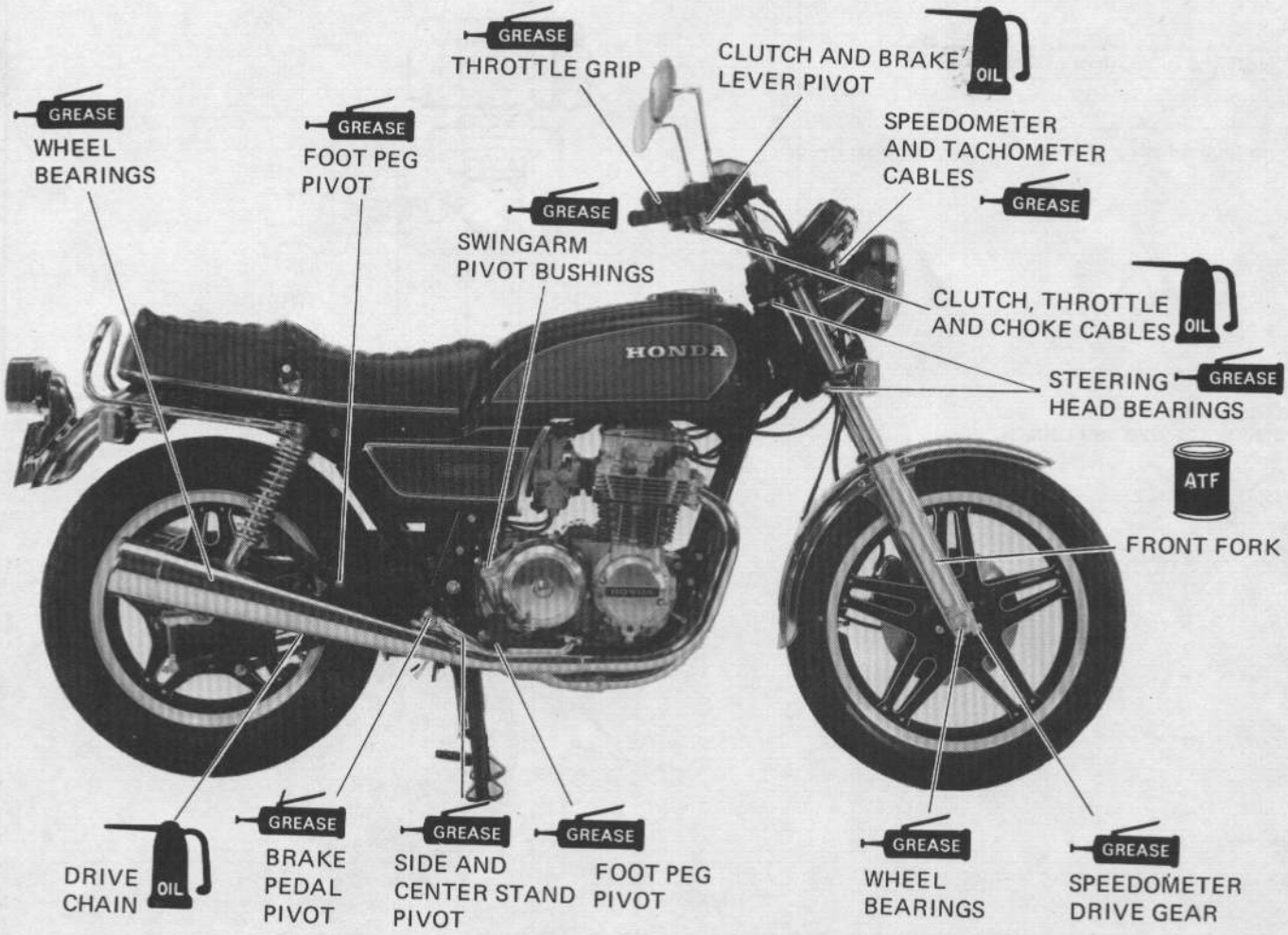
Connect the pressure switch wire.

Install the left crankcase rear cover and gear-shift pedal.

Fill the crankcase with the recommended oil (See Page 2–2).



LUBRICATION POINTS



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3. INSPECTION AND ADJUSTMENT

SERVICE INFORMATION

GENERAL INSTRUCTIONS

- Engine oil level check See page 2–2
- Engine oil change See page 2–2
- Engine oil filter change See page 2–2

SPECIAL TOOLS

Carb. Throttle Wrench	07908–4220100
Vacuum Gauge	07404–0020000 or H/C 20176
Valve Adjusting Wrench	07908–3230000
Spark Plug Wrench	07909–3000000

TORQUE VALUES

Breather cover	0.8–1.2 kg-m (6–9 ft-lb)
Valve adjusting nut	1.2–1.6 kg-m (9–12 ft-lb)
Spark plug	1.2–1.6 kg-m (9–12 ft-lb)
Cam chain tensioner	1.0–1.4 kg-m (7–10 ft-lb)
Oil filter case	2.7–3.3 kg-m (20–24 ft-lb)
Throttle cable adjusting lock nut	0.6–0.8 kg-m (4–6 ft-lb)
Rear axle nut	8.0–10.0 kg-m (58–72 ft-lb)

SPECIFICATIONS

≪ENGINE≫

Spark plug gap 0.6–0.7 mm (0.024–0.028 in)

Spark plug type

(USA model)

Manufacturer \ Usage	For cold climate (below 5°C, 41°F)	Standard	For extended high speed driving
ND	X22ES-U	X24ES-U	X27ES-U
NGK	D7EA	D8EA	D9EA

(CANADA model)
ND X24ESR-U
NGK DR8ES-L

Manufacturer
ND: Nippondenso Co., Ltd.
NGK: NGK Spark Plug Co., Ltd.

Ignition timing		Initial 10° (BTDC)
Valve clearance	IN	0.05 mm (0.002 in)
	EX	0.08 mm (0.003 in)
Idle speed		1,050 ± 100 rpm
Synchronization vacuum		Difference of each cylinder 60 mmHg (2.4 inHg) or less
Compression		12 ± 2 kg/cm² (170 ± 28 psi)

≪CHASSIS≫

Brake pedal free play	20–30 mm (3/4–1-1/4 in)
Drive chain free play	15–25 mm (5/8–1 in)
Clutch free play	10–20 mm (3/8–3/4 in)

Tire

Cold tire pressures Kg/cm² (psi)	Up to 90 kg (200 lb) load	Front 2.0 (28) Rear 2.25 (32)
	Up to vehicle capacity load	Front 2.0 (28) Rear 2.8 (40)
Vehicle capacity load limit	163 kg (360 lbs)	
Tire size	Front 3.50H19–4PR Rear 4.50H17–4PR	
Tire brand	Front BRIDGESTONE MaG. MOPUS-S703 DUNLOP GOLD SEAL F11 Rear BRIDGESTONE SUPER SPEED S21 R2 DUNLOP GOLD SEAL K87 MARK II	

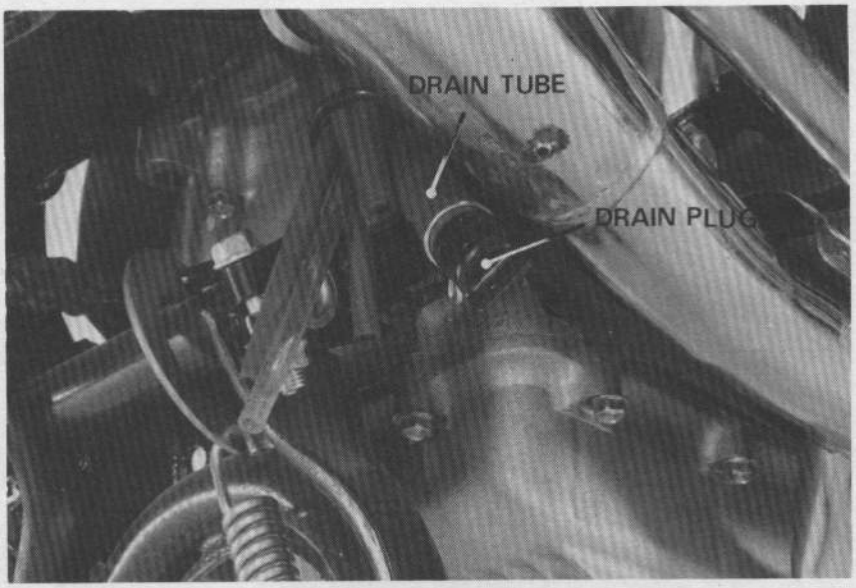
CRANKCASE BREATHER

USA model

Remove the drain plug from the tube and allow deposits to drain.
Install the drain plug.

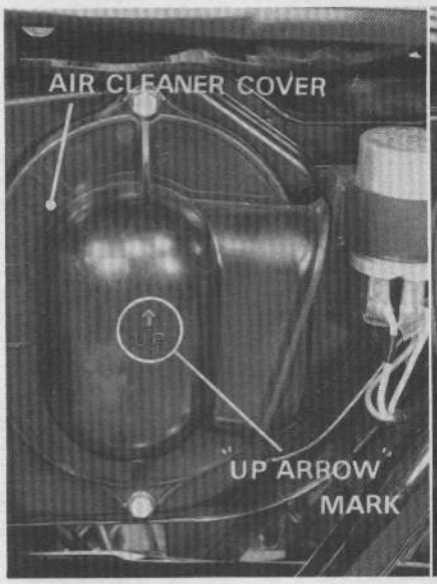
NOTE

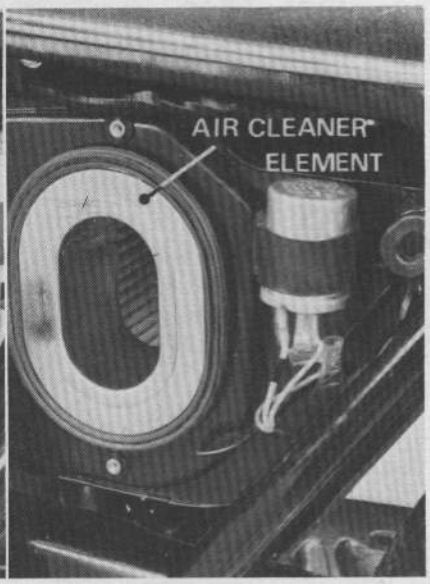
Service more frequently when driven in the rain or at full throttle opening, or when the deposit level can be seen in the transparent section of the drain tube.



AIR CLEANER

Remove the left side cover.
Remove the two air cleaner cover screws and cover.
Remove the element.

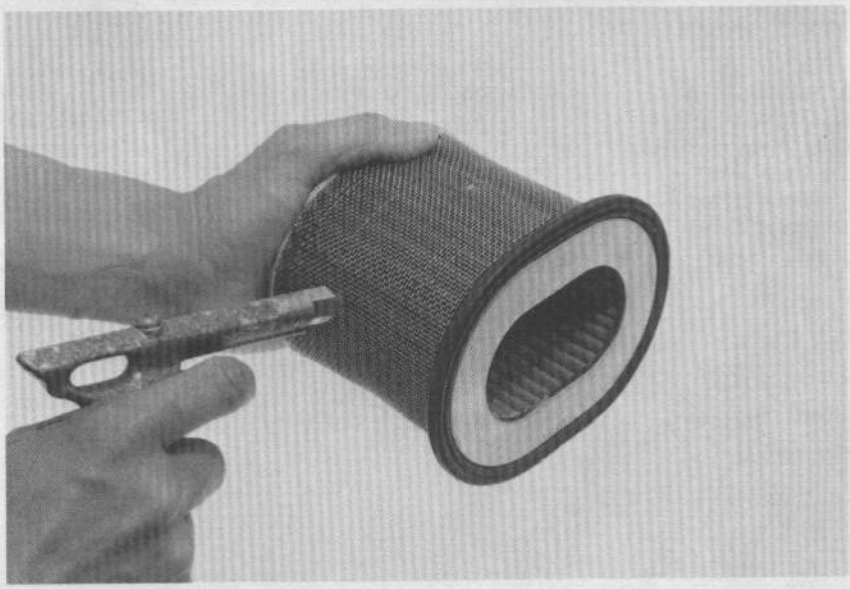




Clean the element by tapping it lightly to loosen dust. Blow away the remaining dust using compressed air from outside the element.
Replace the element if it is excessively dirty, broken or damaged.
Install the element, air cleaner cover and left side cover.

NOTE

Note the "UP Arrow" mark on the air cleaner cover.



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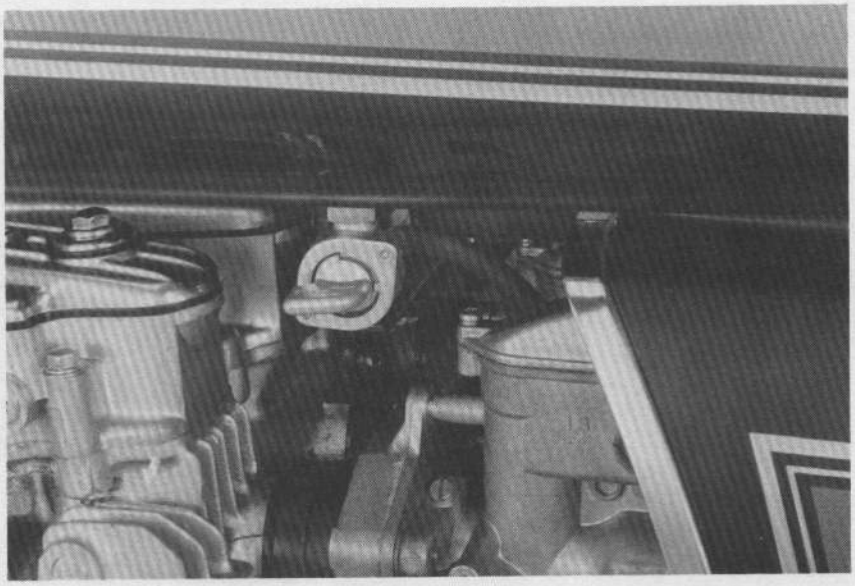
FUEL LINES

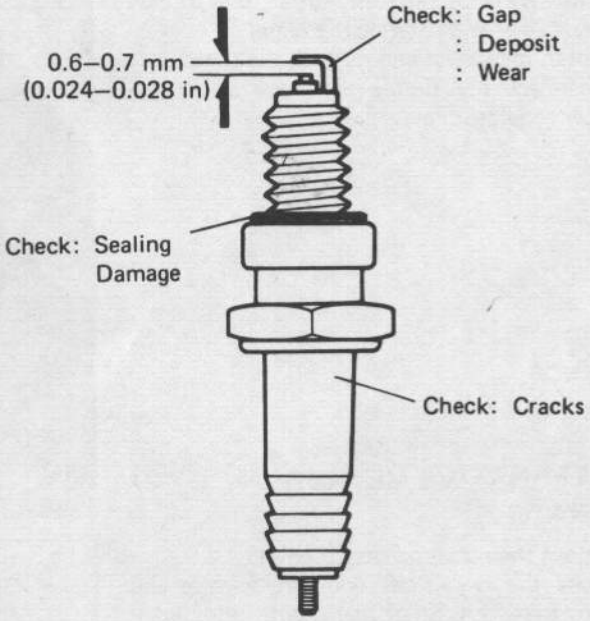
Replace any parts which show deterioration, damage or leakage.



SPARK PLUGS

Disconnect the spark plug caps and remove the spark plugs.
Visually inspect each spark plug. Discard the spark plug if the insulator is cracked or chipped.

Measure the spark plug gap with a wire-type feeler gauge.
Adjust the spark plug gap by bending the side electrode carefully.



SPARK PLUG GAP:
0.6–0.7 mm (0.024–0.028 in.)

RECOMMENDED SPARK PLUG

USA model

For cold climate (Below 5°C, 41°F)		Standard		For extended high speed riding	
ND	NGK	ND	NGK	ND	NGK
X22ES-U	D7EA	X24ES-U	D8EA	X27ES-U	D9EA

CANADA model only
ND X24ESR-U
NGK DR8ES-L

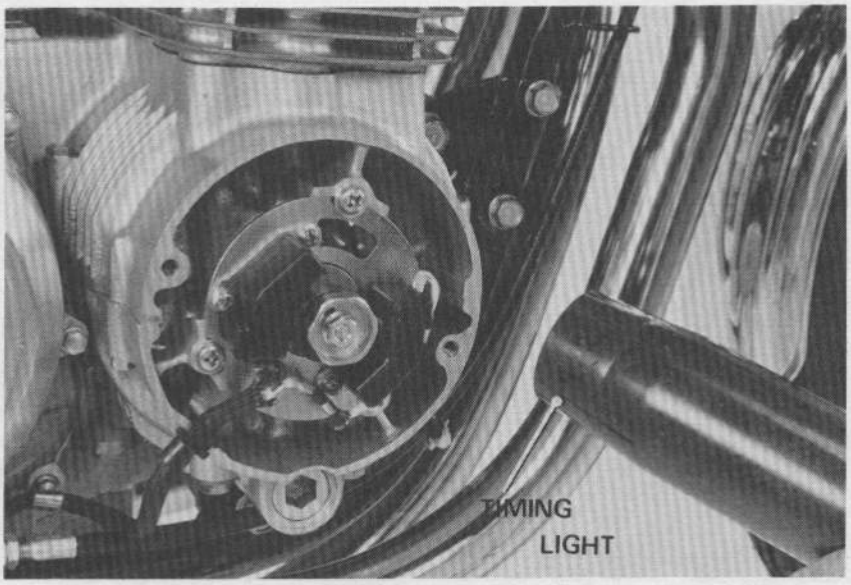
Make sure the sealing washers are in good condition.
Install the spark plugs, tighten them by hand, then tighten them with a spark plug wrench.
Connect the spark plug caps.

IGNITION TIMING

· **DYNAMIC**

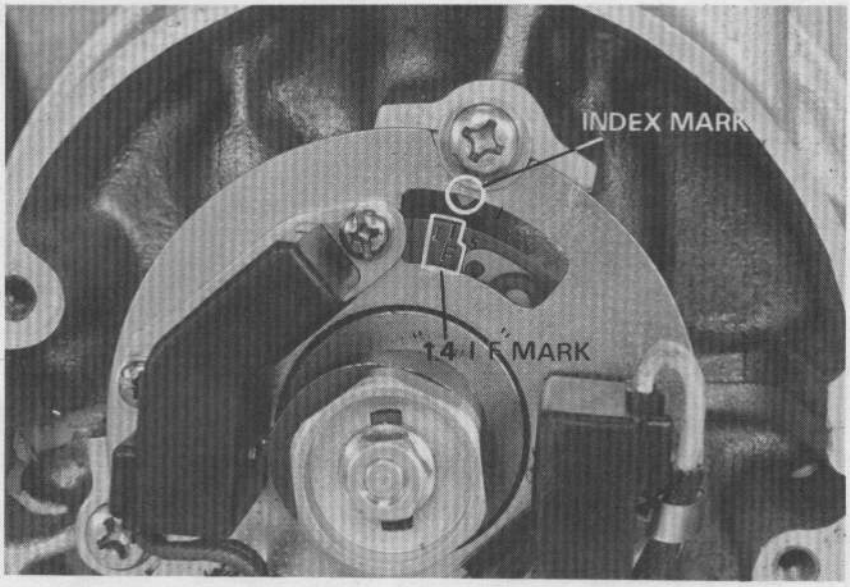
Remove the pulser generator cover.
Connect a stroboscopic timing light to the No. 4 cylinder's high tension cord.
Start the engine and let it idle.
IDLE SPEED: 1,050 ± 100 rpm

Aim the timing light at the timing mark.
The "1.4 F-I" mark should align with the index mark.



ADJUSTMENT

Adjust by loosening the three pulser base plate screws and rotating the plate.
Tighten the screws and recheck the timing.
Disconnect the timing light and install the pulser generator cover.



ALTERNATIVE METHOD

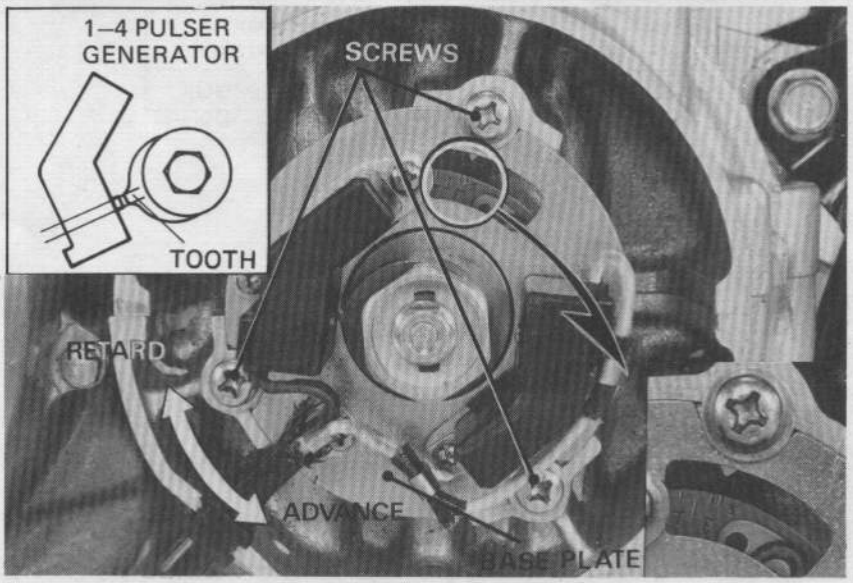
· **STATIC**

Remove the pulser generator cover.
Rotate the crankshaft counterclockwise and align the "1.4 S-F" mark with the index mark.

NOTE

Either No.1 or No.4 piston must be near T.D.C. of the compression stroke at this time.

The timing is correct if the narrow projection of the "1.4" pulser generator aligns with the rotor tooth.



ADJUSTMENT

Loosen the three pulser base plate screws and rotate the plate until aligned as stated above.
Tighten the screws.
Install the pulser generator cover.

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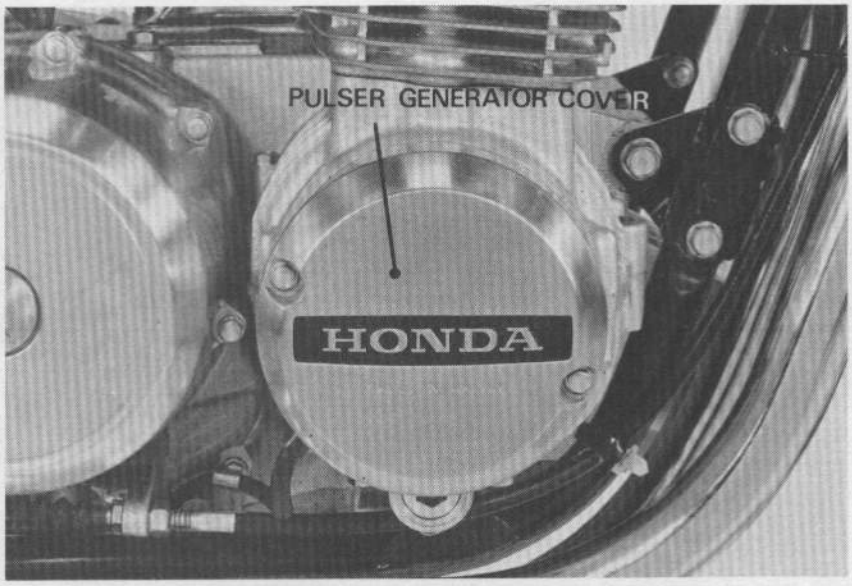
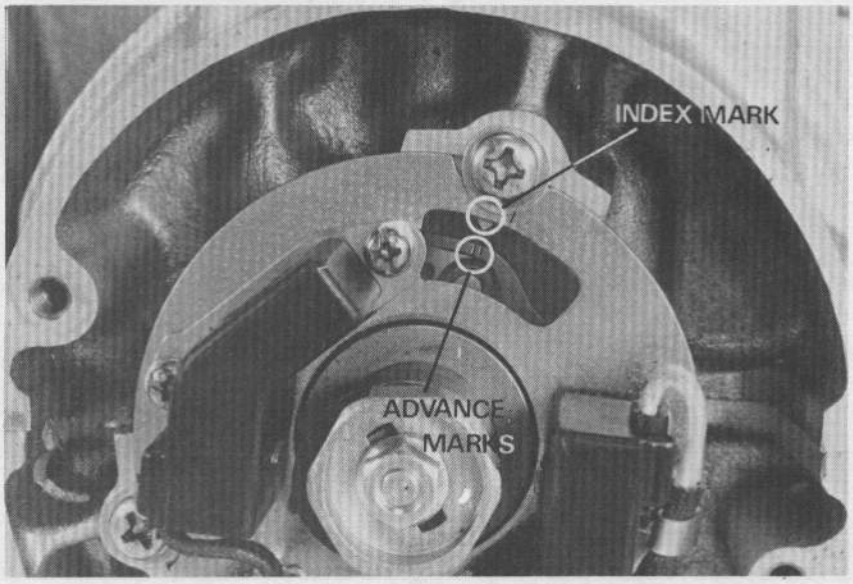
SPARK ADVANCER

Remove the pulser generator cover.
Connect a timing light to the No.4 high tension cord.



Start the engine.
Bring engine speed to 2,725 rpm or above and check that the index mark is between the full advance marks.
Replace the advancer assembly if it is not functioning properly.
Install the pulser generator cover.



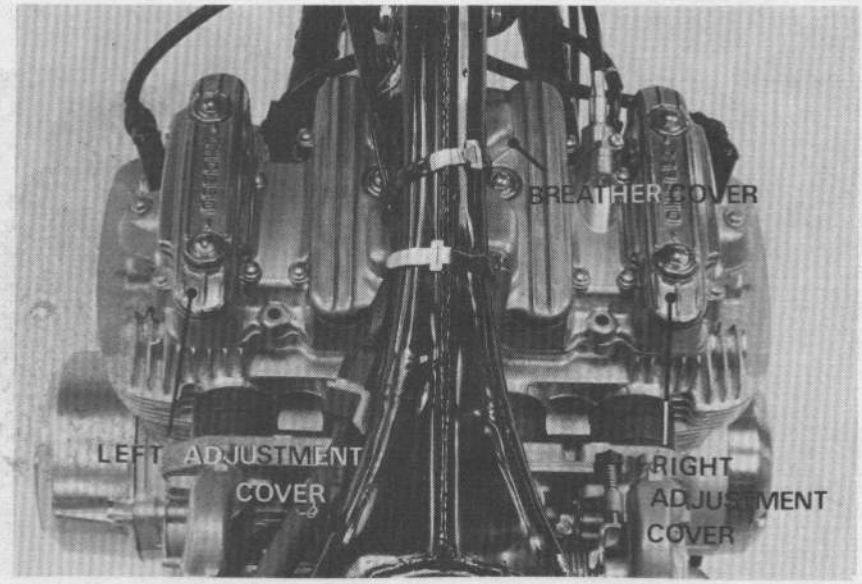
VALVE CLEARANCE

NOTE

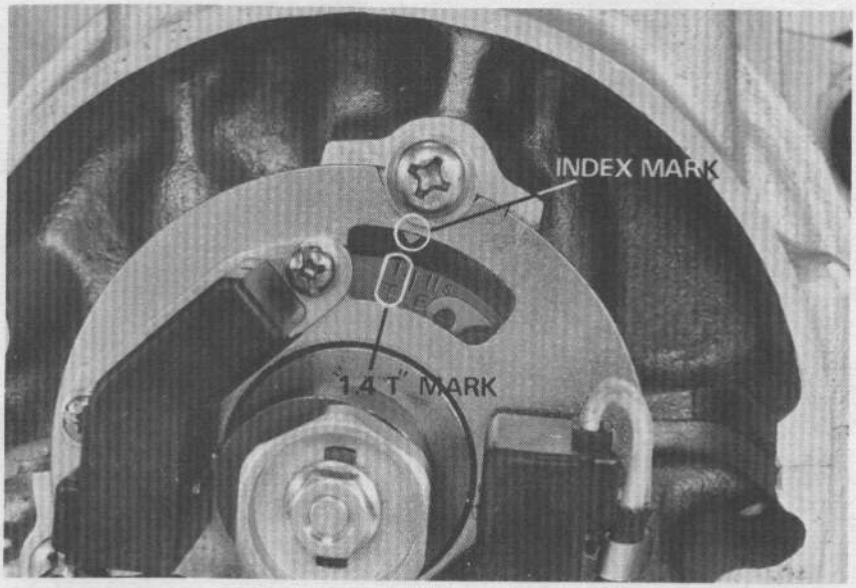
Inspect and adjust the valve clearance while the engine is cold (Below 35° C, 95°F).

Raise the seat.
Turn the fuel valve OFF and remove the fuel line and fuel tank.

Remove the breather tube from the breather cover.
Remove the right and left adjustment covers and breather cover.



Remove the pulser generator cover.
Rotate the crankshaft clockwise and align the "1.4 T" mark with the index mark. Make sure the No.1 piston is at T.D.C. (Top Dead Center) of the compression stroke. (Both No. 1 rocker arms should have free play.)



Measure the valve clearance for the valves marked "●" in the chart below, by inserting a feeler gauge between the camshaft and each rocker arm slipper.

Cylinder No.	1	2	3	4
IN	●	○	●	○
EX	●	●	○	○

VALVE CLEARANCES:
IN: 0.05 mm (0.002 in)
EX: 0.08 mm (0.003 in)

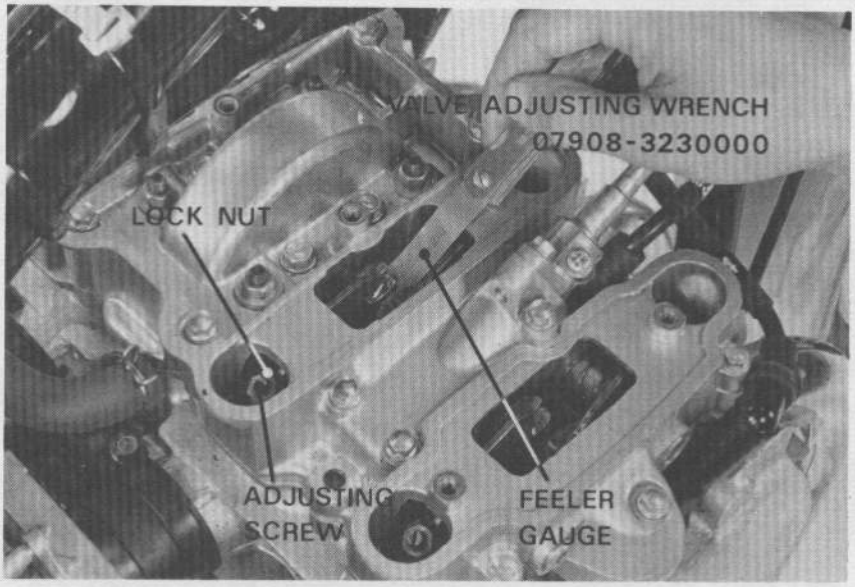
Adjust by loosening the lock nut and turning the adjusting screw until there is a slight drag on the feeler gauge. Hold the adjusting screw and tighten the lock nut.

TORQUE: 1.2–1.6 kg-m (9–12 ft-lb)

Recheck the valve clearance.
Rotate the crankshaft one full turn (360°) clockwise and align the "1.4T" mark with the index mark.

Check and adjust the valve clearance as stated above, for valves marked "○" in the chart.

Install the pulser generator cover, right and left adjustment covers, breather cover, fuel tank and fuel line.



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CAM CHAIN TENSION

NOTE

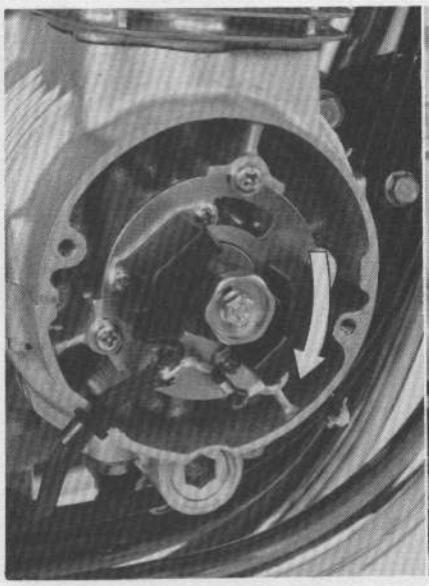
Adjust the cam chain tension with ignition switch off, transmission in neutral and the motorcycle on its center stand.

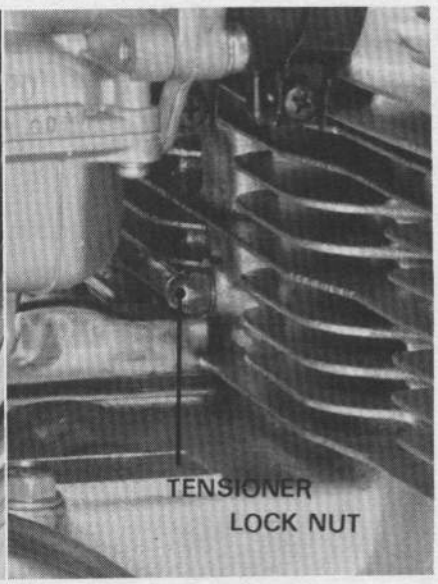
Remove the pulser generator cover.
Loosen the cam chain tensioner lock nut.
Tighten the cam chain lock nut while slowly rotating the crankshaft clockwise.
TORQUE: 1.0–1.4 kg-m (7–10 ft-lb)

NOTE

The tensioner will automatically position itself to provide the correct tension when the lock nut is loosened.

Install the pulser generator cover.





THROTTLE OPERATION

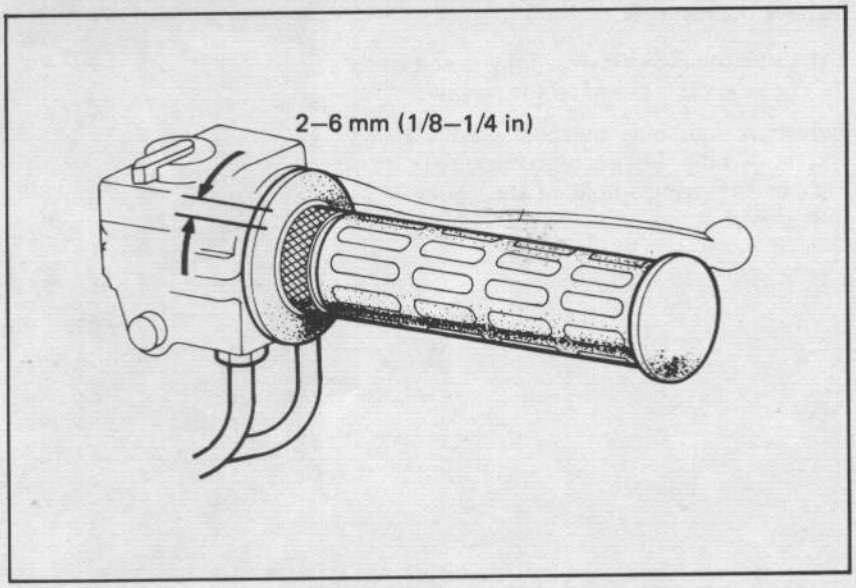
Make sure that there is no deterioration, damage, or kinks in the throttle cable. Check that the throttle grip free play is 2–6 mm (1/8–1/4 in) on the throttle grip flange.

Check for smooth throttle grip full opening and automatic full closing in all steering positions.

NOTE

The accelerator pump may flood the carburetors during this inspection.

Adjust or replace the throttle cable if necessary.
Free play can be adjusted at either end of the throttle cable.



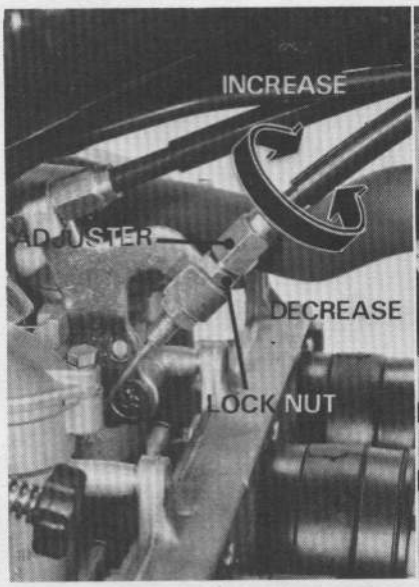
Major adjustments are made at the lower adjuster. To adjust, remove the fuel tank, loosen the grip free play adjuster lock nut and turn the adjuster.

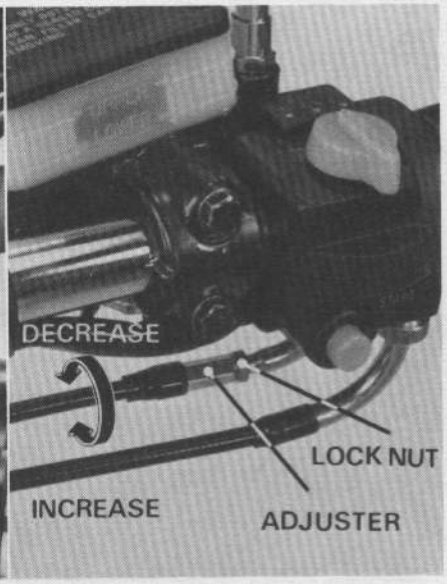
Hold the adjuster and tighten the lock nut.

Minor adjustments are made at the upper adjuster. Adjust by loosening the lock nut and turning the adjuster.

Hold the adjuster and tighten the lock nut.

Recheck the throttle operation.
Replace any damaged parts.



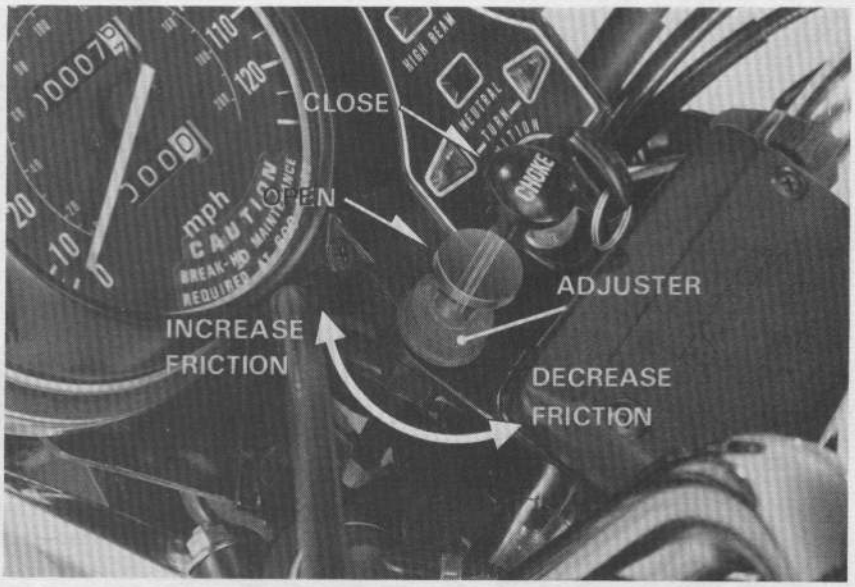


CHOKE MECHANISM

Operate the choke knob and check for choke knob free play and smooth operation of the choke knob, choke lever and choke shaft.

Adjust the choke operating friction by turning the adjuster.

The choke knob must move smoothly and stay where positioned.



Remove the fuel tank.

Make sure the choke lever is fully closed when the choke knob is pulled all the way out.

Adjust by loosening the choke cable clamp and moving the choke cable as required.

Tighten the clamp, holding the choke lever fully closed.

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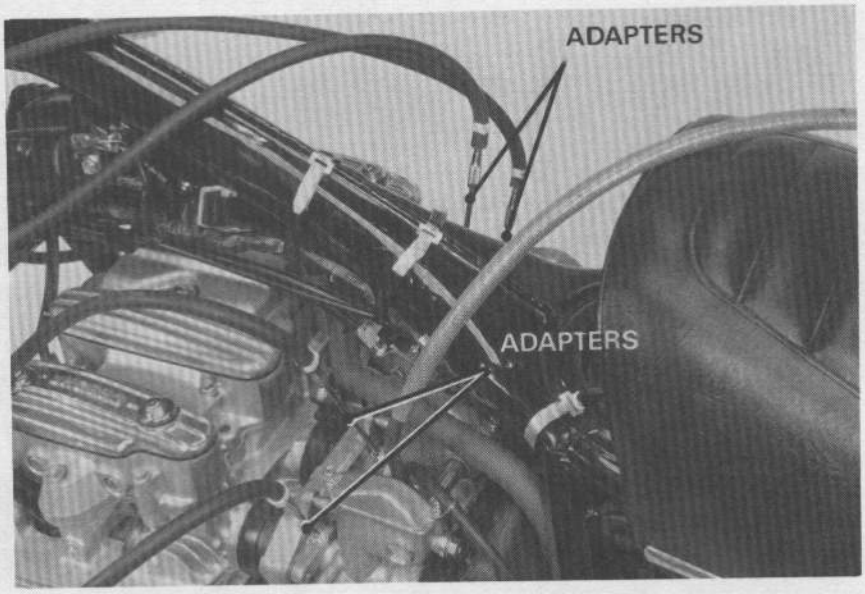
CARBURETOR SYNCHRONIZATION

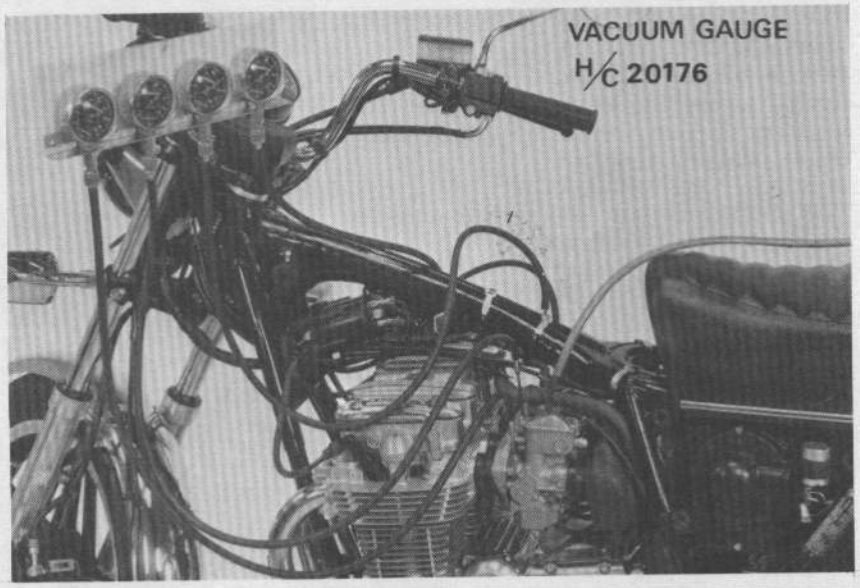
NOTE

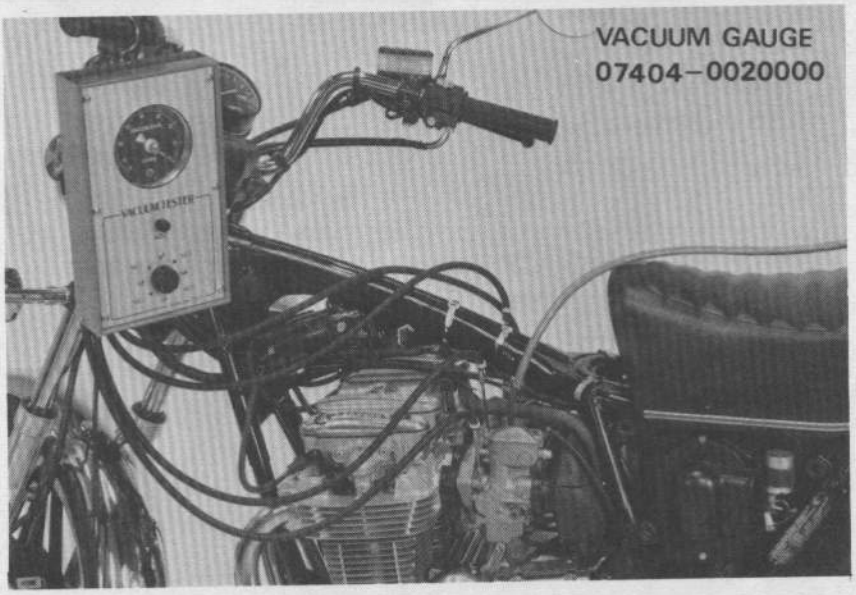
Synchronize the carburetors with the engine at normal operating temperature, transmission in neutral and motorcycle on the center stand.

Remove both side covers and raise the seat.
Turn the fuel valve OFF and remove the fuel line and fuel tank.
Connect a longer full line between the fuel tank and carburetor.

Position the fuel tank higher than normal.
Remove the plugs from the carburetor manifolds and install the vacuum gauge adapters.
Connect the vacuum gauge.







ADJUSTMENT

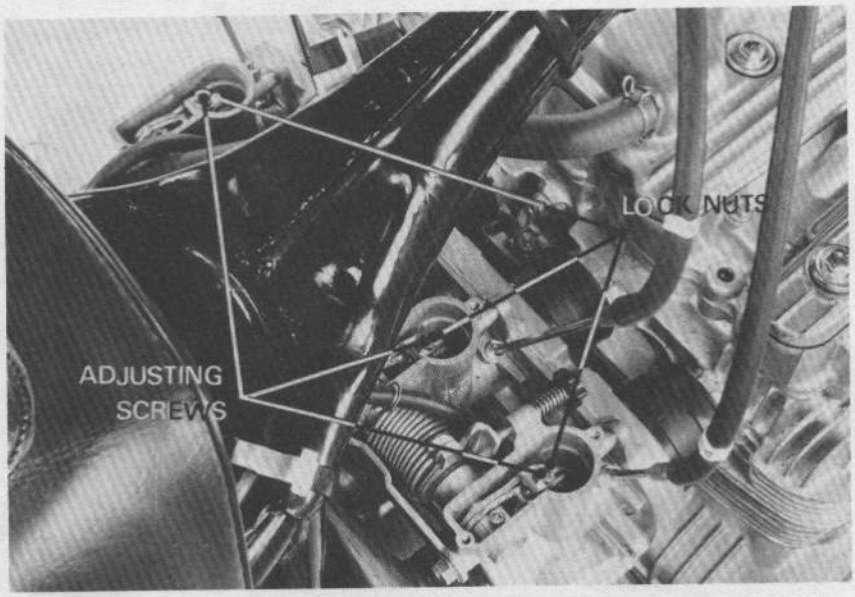
NOTE

The No.2 carburetor cannot be adjusted; it is the base for adjustment of the other carburetors.

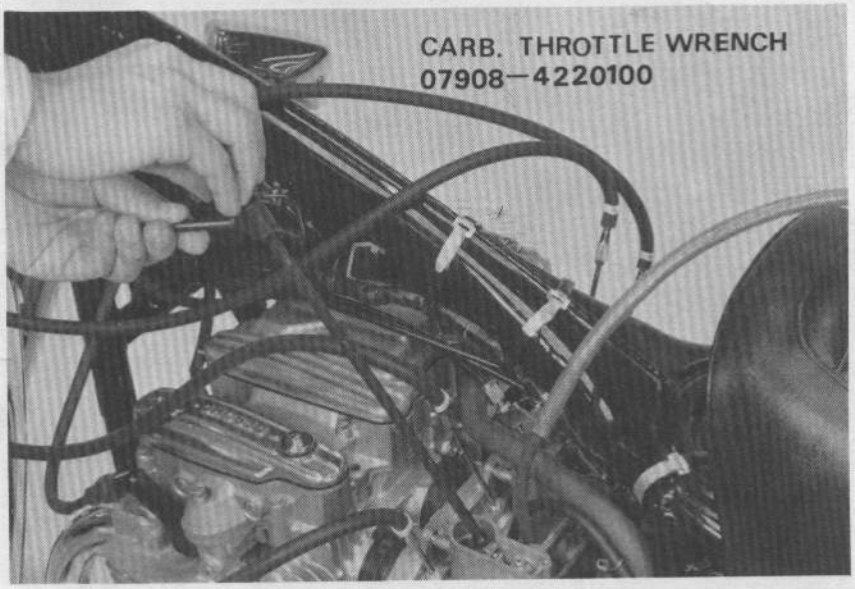
Start the engine and adjust the idle speed.

IDLE SPEED: 1,050 ± 100 rpm

Check that the difference in vacuum readings is 60 mmHg (2.4 inHg) or less.



If the difference in readings is too great, adjust as follows:
Remove the No. 1, 3 and 4 carburetor top covers. Loosen the lock nuts and turn the adjusting screws with the "Carburetor Throttle Wrench" tool.



Tighten the lock nuts and recheck the idle speed and vacuum readings.

Install the carburetor top covers.
Install the carburetor manifold plugs, fuel tank, fuel line and side covers.

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IDLE SPEED

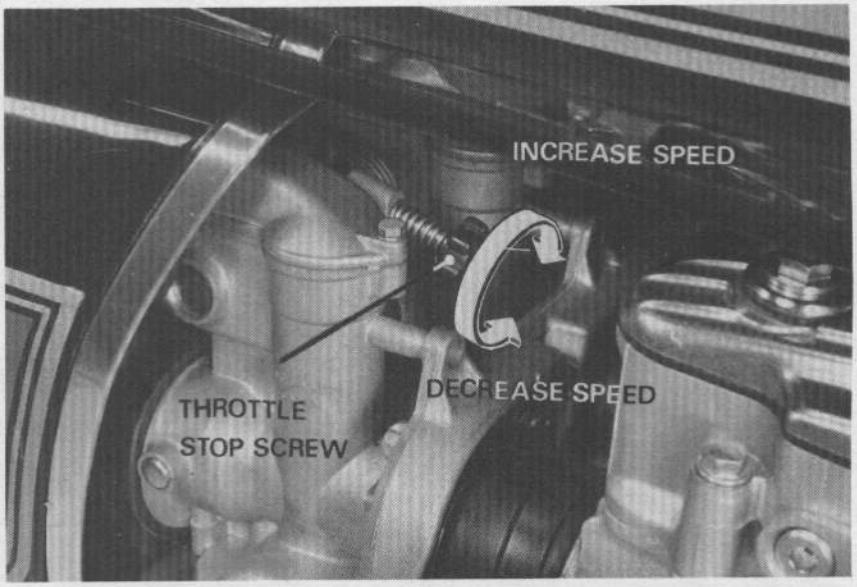
NOTE

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

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

Adjust idle speed with the throttle stop screw.

IDLE SPEED: 1,050 ± 100 rpm



COMPRESSION TEST

Warm up the engine.
Remove all spark plugs.
Insert the compression gauge.

Open the choke and throttle valves fully.
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:
12 ± 2 kg/cm² (170 ±28 psi)

If compression is low, check for the following:

- Leaky valves
- Improper valve clearance
- Leaking cylinder head gasket
- Worn piston/ring/cylinder

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

DRIVE CHAIN

Place the vehicle on its center stand and shift the transmission into neutral.
Turn the ignition switch OFF.

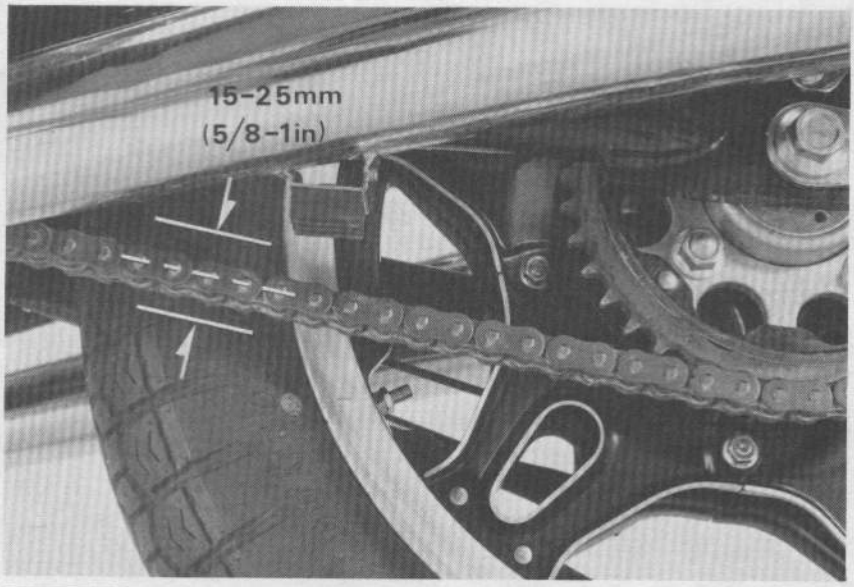
Measure drive chain free play midway between the sprockets on the lower chain run.

FREE PLAY: 15–25 mm (5/8 – 1 in)

CAUTION

Excessive chain free play; 40 mm (1-5/8 in) or more, may damage the frame.

Inspect the drive chain and sprockets for damage and wear. Replace the drive chain if the rollers are damaged or the pins are loose. Replace the sprocket if damaged or excessively worn.



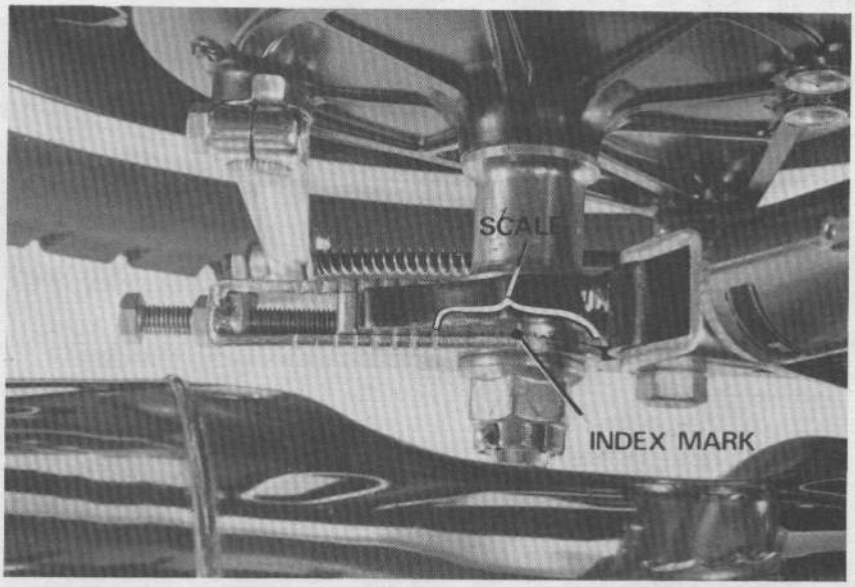
CHAIN REPLACEMENT

NOTE

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

ADJUSTMENT

Remove the rear axle cotter pin and loosen the axle nut.
Loosen the adjuster bolt lock nuts.
Turn the adjuster bolts an equal number of turns to obtain the specified free play.



CAUTION

Be sure that the index mark on the chain adjuster aligns with the same scale reading on both sides.

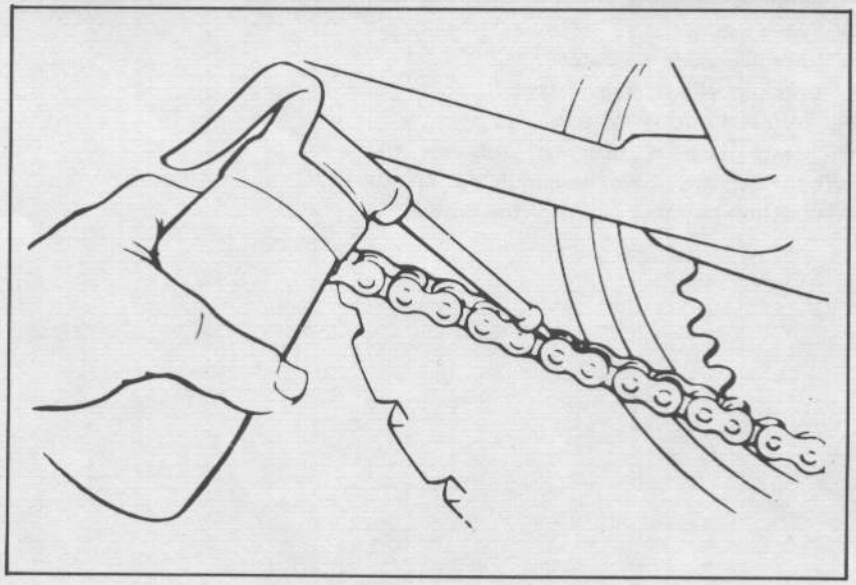
Tighten the adjuster bolt lock nuts.
Tighten the axle nut and install a new cotter pin.

AXLE NUT TORQUE: 8.0–10.0 kg-m (58–72 ft-lb)

Check that the rear wheel rotates freely when turned by hand.

NOTE

After this adjustment, check the rear brake pedal free play and adjust as necessary.



LUBRICATION

Lubricate the drive chain with SAE 80 or 90 gear oil.

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BATTERY

Remove the right side cover.
Check the battery fluid level.

When the fluid level is near the lower level, remove the battery and fill with distilled water to the upper level.

NOTE

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

WARNING

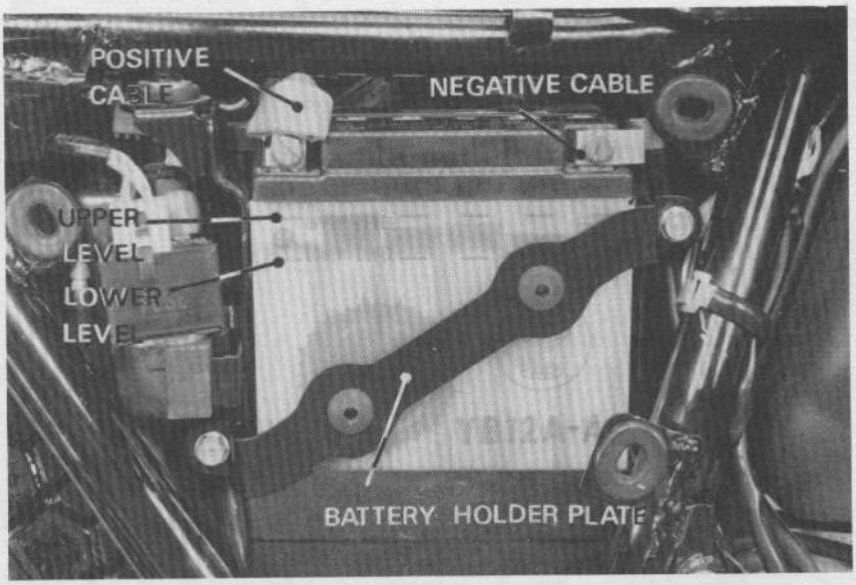
The battery electrolyte contains sulfuric acid. Protect your eyes, skin and clothing. In case of contact, flush thoroughly with water and call a doctor if electrolyte gets in your eyes.

Replace the battery, if sulfation forms or sediment accumulates on the bottom.

BATTERY REMOVAL

Disconnect the ground and positive cables at the battery terminals.
Remove the battery holder plate bolts.

Remove the battery.



BRAKE FLUID

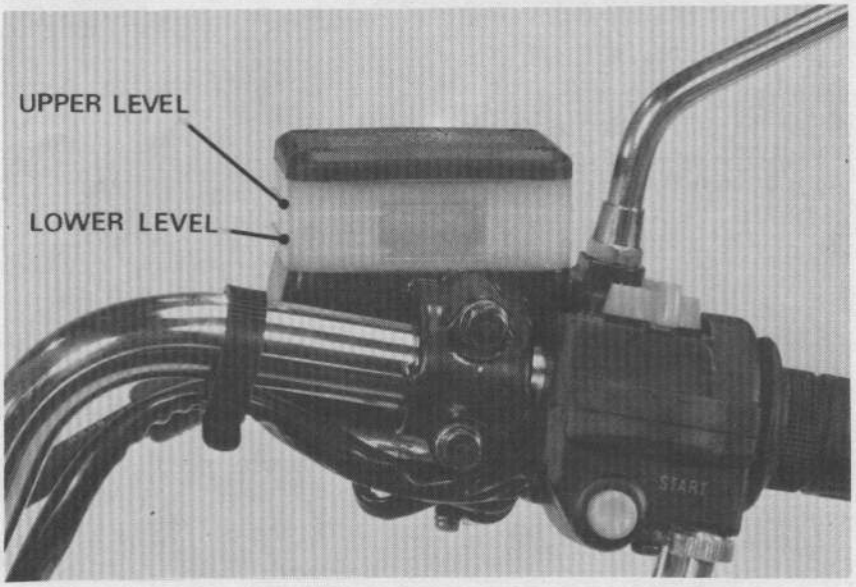
Check the front brake fluid reservoir level.
If the level is near the lower level mark, fill the reservoir with DOT–3 BRAKE FLUID only to the upper level mark. Check the entire system for leaks, if the level is low.

CAUTION

- *Do not remove the reservoir cover until the handlbar has been turned so that the reservoir is level.*
- *Do not operate the brake lever with the cover removed or brake fluid will squirt out.*

NOTE

Use ONLY DOT–3 brake fluid from a sealed container.

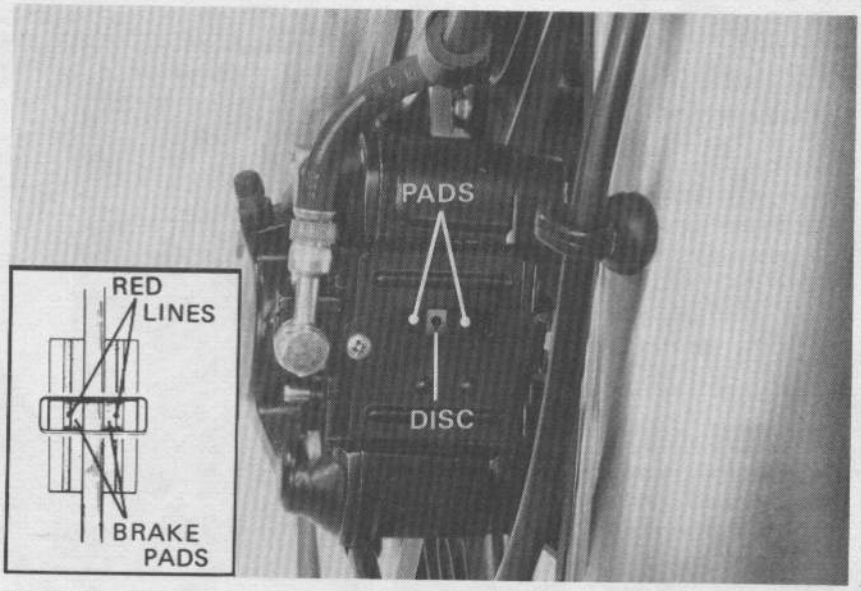


BRAKE PADS/SHOES

BRAKE PAD WEAR

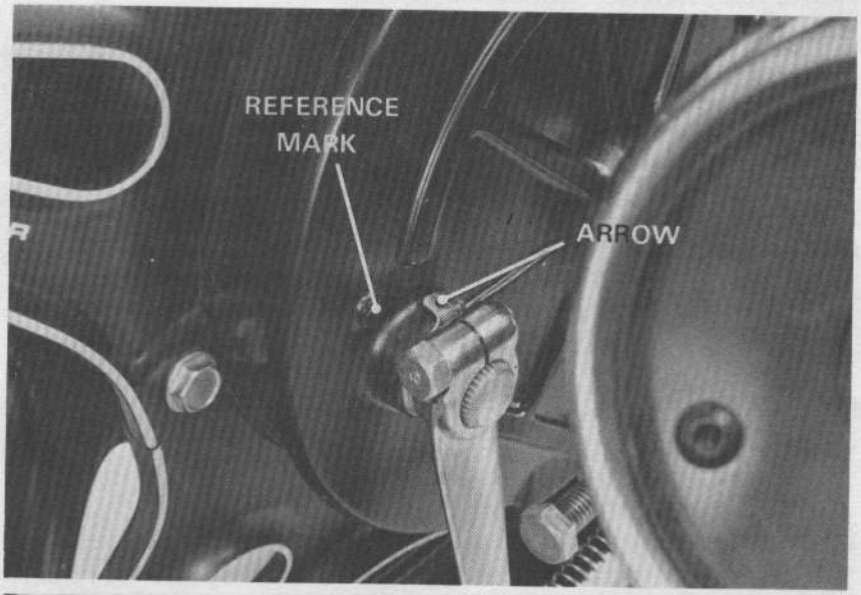
Remove the cap from the caliper and check the brake pad wear.
Replace the brake pads if the red line on the top of the pads reaches the edge of the brake disc (Refer to Section 15).

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



BRAKE SHOE WEAR

Replace the brake shoes if the arrow on the brake arm aligns with the reference mark "▼" when the rear brake is fully applied.



BRAKE SYSTEM

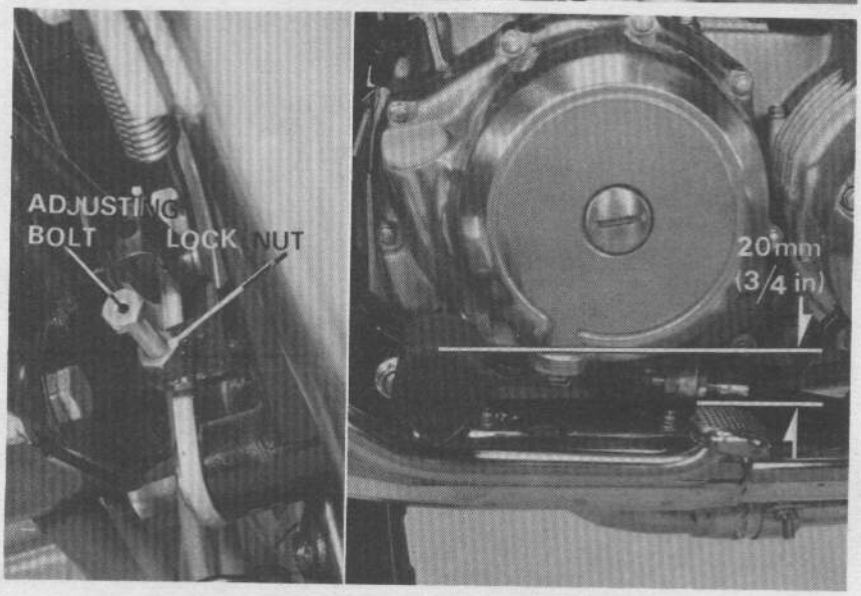
Check that there is no deterioration, damage or leaks in brake lines and fittings.

Check the brake rod for loose connections, excessive play or damage.
Inspect the mounting of the rear brake arm to the brake cam. Make sure the locking bolt is tight and the splines undamaged.
Check that the cotter pins are properly installed.
Replace or repair if necessary.

BRAKE PEDAL HEIGHT

Loosen the lock nut.
Adjust the pedal height so that the distance between the pedal and upper face of the footpeg is 20 mm (3/4 in) by turning the adjusting bolt.

Tighten the lock nut.



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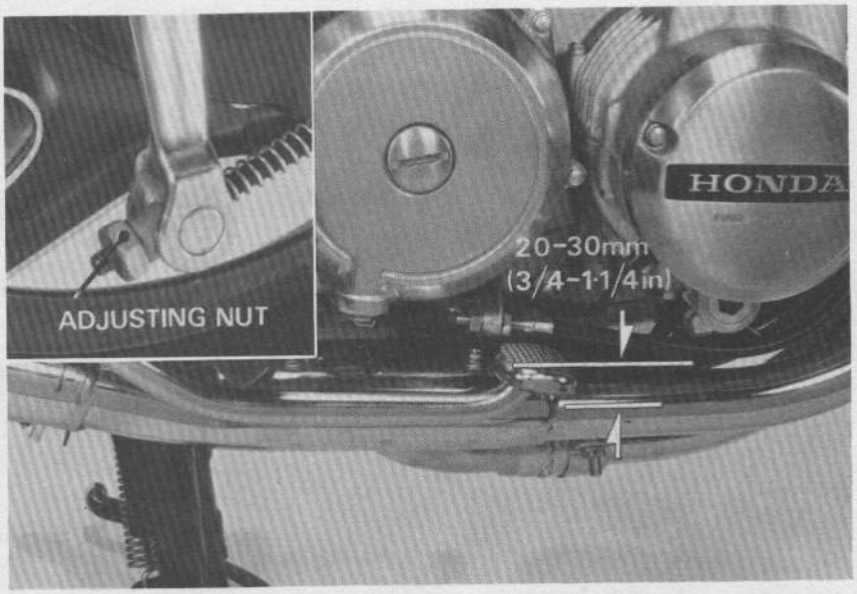
BRAKE PEDAL FREE PLAY

Check the brake pedal free play.

FREE PLAY: 20–30 mm (3/4–1-1/4 in)

Turn the rear brake adjusting nut, if necessary.



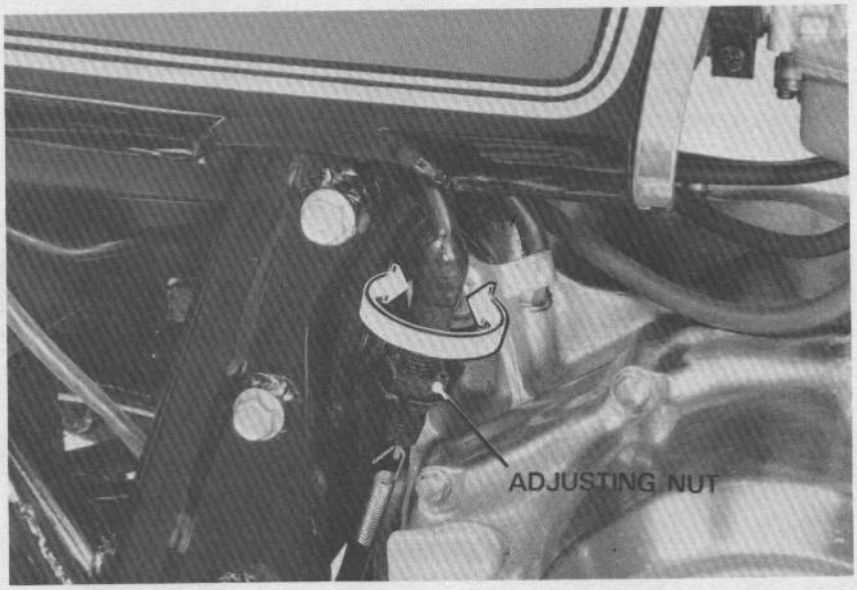
BRAKELIGHT SWITCH

Adjust the brakelight switch so that the brakelight will light when the brake pedal is depressed and the brake begins engagement.

Adjust by turning the switch adjusting nut as shown.

NOTE

- Do not turn the switch body.
- The front brakelight switch can not be adjusted.



HEADLIGHT AIM

Adjust vertically by loosening both headlight case mounting bolts.

Adjust horizontally by turning the adjusting screw on the headlight rim.

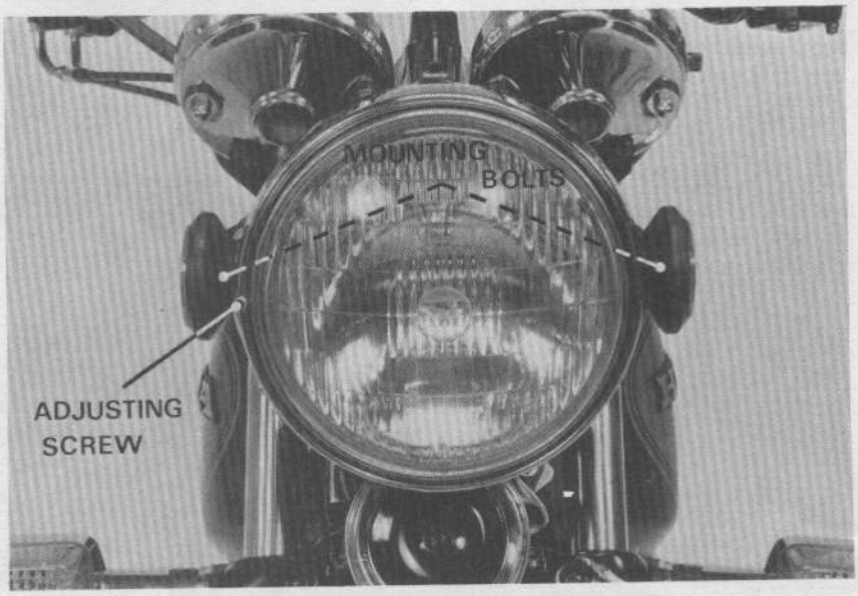
Turn the adjusting screw counterclockwise to direct the beam toward the right side of the rider.

NOTE

Adjust the headlight beam as specified by local and state laws.

WARNING

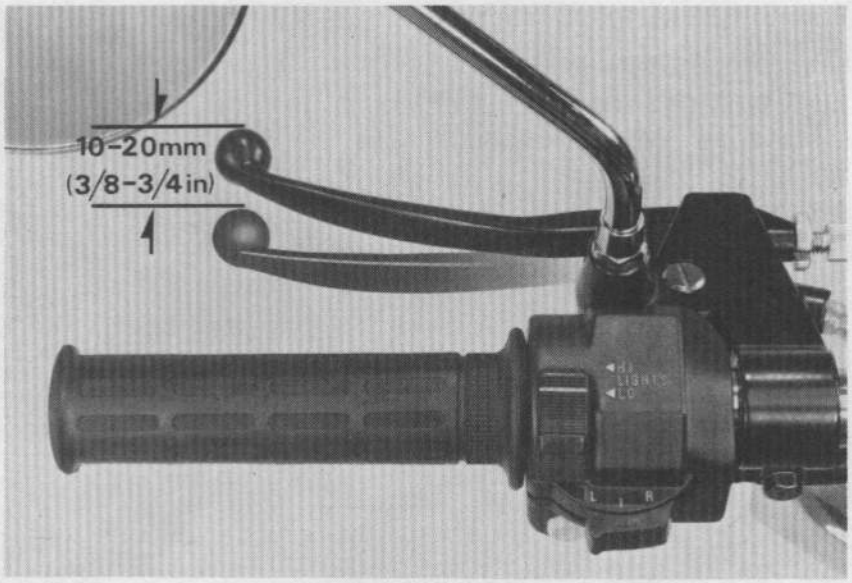
An improperly adjusted headlight may blind oncoming drivers, or it may fail to light the road for a safe distance.



CLUTCH FREE PLAY

Inspect the clutch lever free play at the end of the lever.

FREE PLAY: 10–20 mm (3/8–3/4 in)



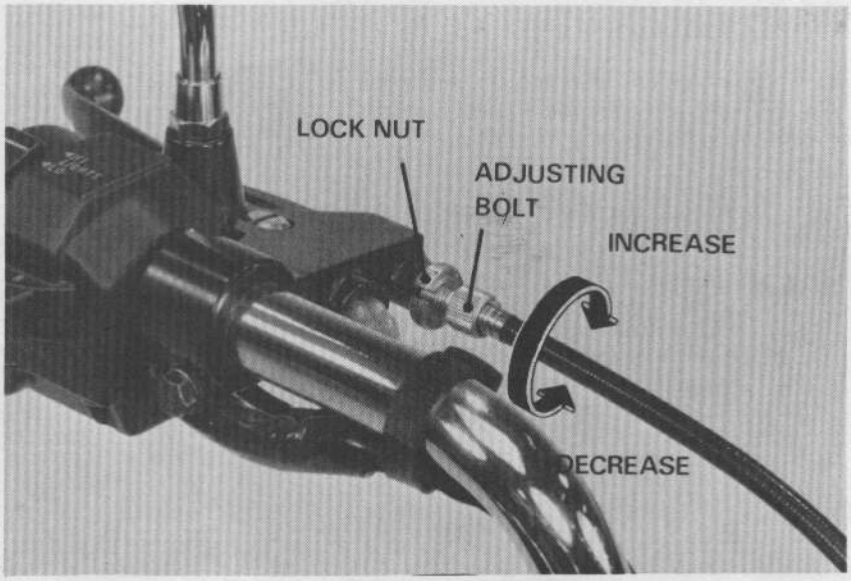
ADJUSTMENT

Loosen the upper adjusting bolt's lock nut and turn the adjusting bolt until the correct free play is obtained.

Tighten the lock nut.

NOTE

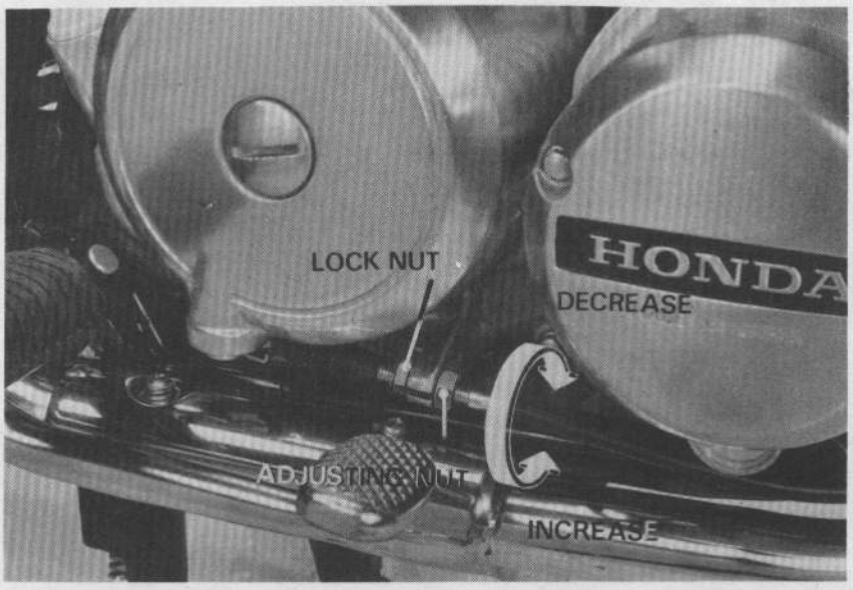
Do not expose the adjusting bolt threads more than 8 mm (5/16 in).



If proper adjustment cannot be made with the clutch lever adjusting bolt, screw the adjusting bolt all the way in.

Adjustment must be made at the clutch housing.

Loosen the lower cable lock nut and turn the adjusting nut all the way out to obtain maximum free play.



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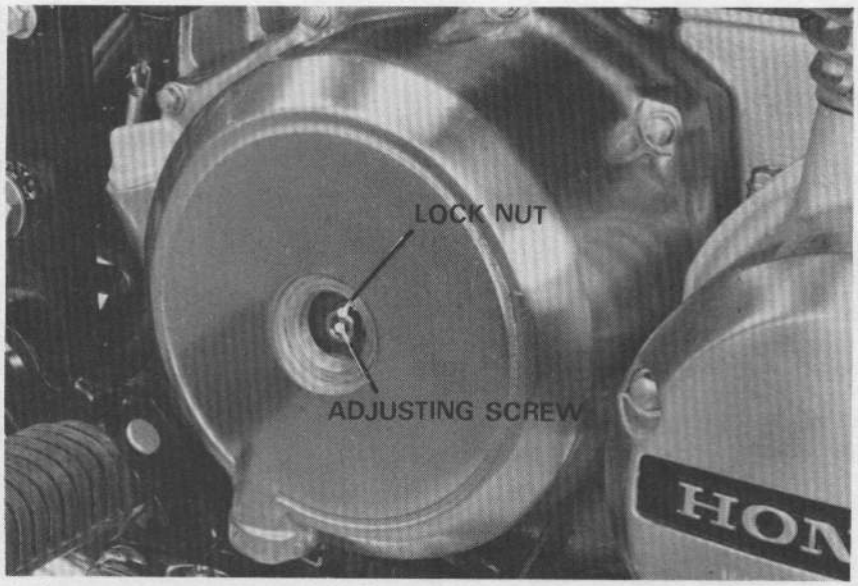
Remove the clutch lifter cap, loosen the clutch lifter lock nut. Then turn the adjusting screw clockwise until a slight resistance is felt. From this position, turn the clutch adjusting screw counterclockwise 3/4 turn, and tighten the lock nut.

Install the lifter cap.

Turn the clutch cable lower adjusting nut so that there is 10–20 mm (3/8 – 3/4 in) of free play at the end of the clutch lever.
Tighten the lock nut.

Make any minor adjustment with the adjusting bolt and lock nut at the clutch level.

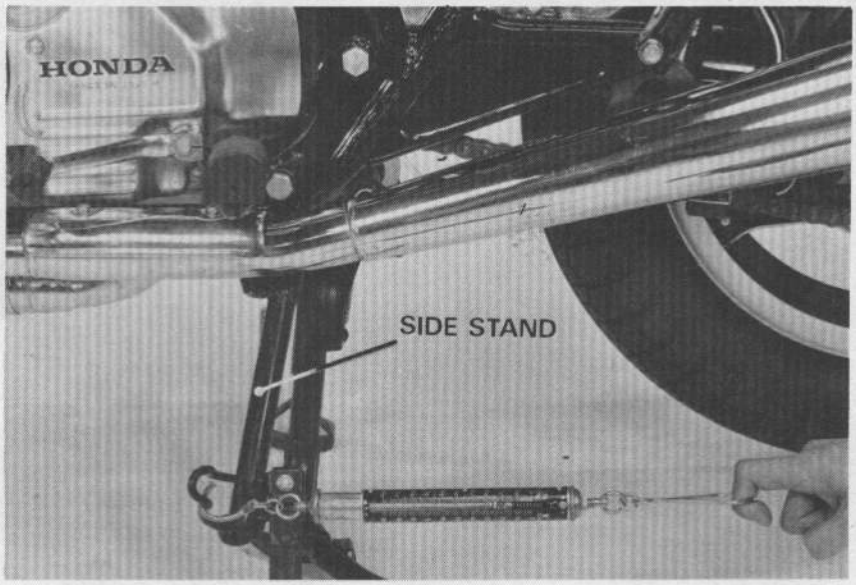
After adjustment, be sure all lock nuts are tightened securely.
Check that the clutch is not slipping and is properly disengaging.



SIDE STAND

Check the side stand spring for damage and loss of tension, and the side stand assembly for freedom of movement and bending.

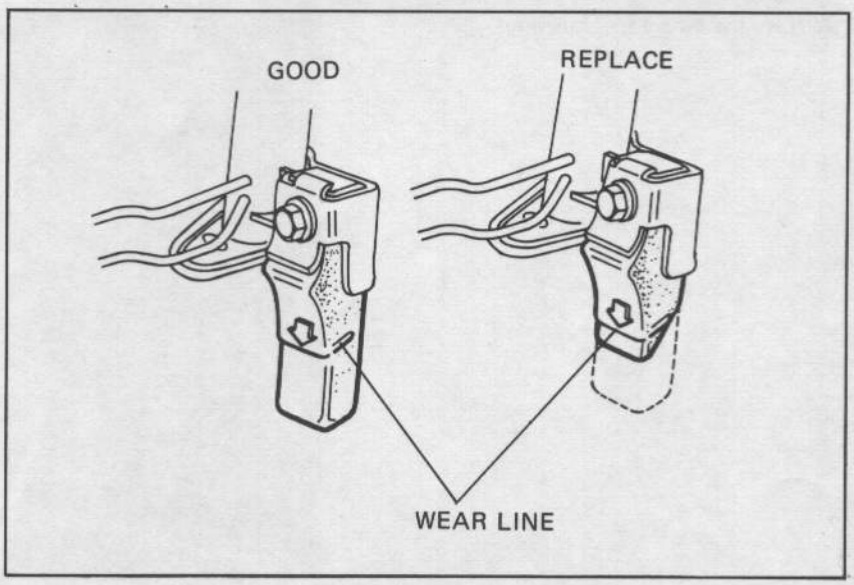
Spring tension should be 1.5–2.5 kg (3.3–5.5 lb) when pulling the side stand lower end with a spring scale.



Check the rubber pad for deterioration or wear.
Replace if any wear exceeds to the wear line as shown.

NOTE

When replacing, use a rubber pad with the mark "OVER 260 lbs ONLY".



SUSPENSION

WARNING

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

FRONT

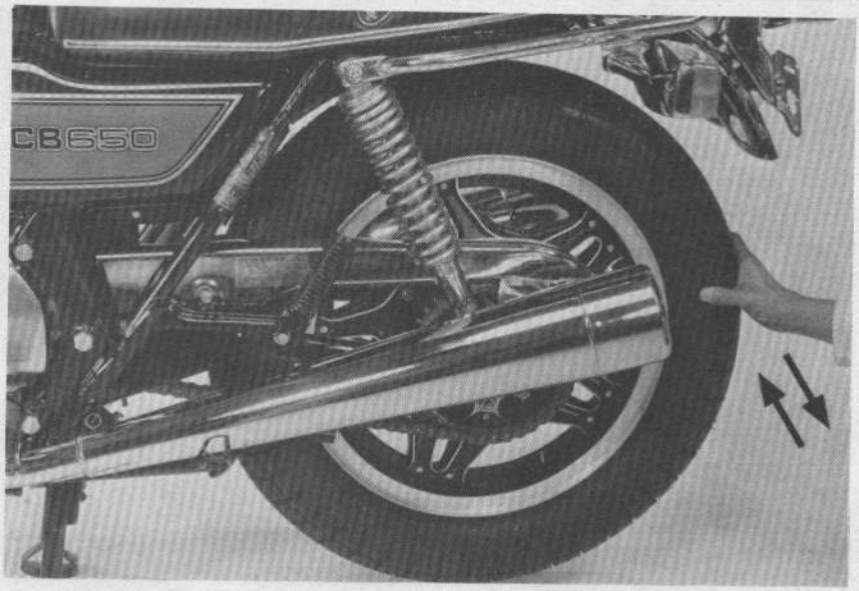
Check the action of the front forks by compressing them several times.
Check the entire fork assembly for leaks or damage.
Replace damaged components which cannot be repaired.
Tighten all nuts and bolts.

REAR

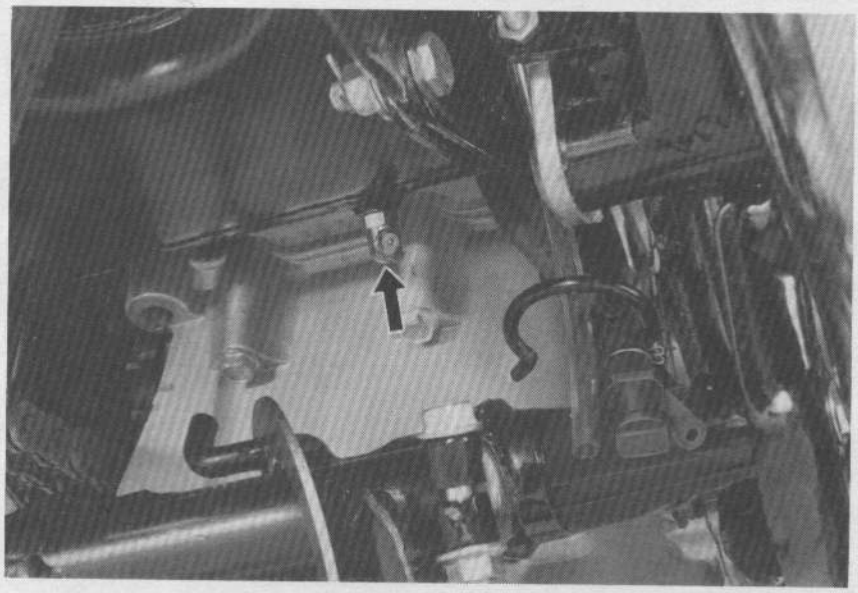
Place the motorcycle on its center stand.
Move the rear wheel sideways with force to see if the swing arm bushings are worn.
Replace if excessively worn.

Check the entire suspension assembly to see if it is securely mounted, and not damaged or distorted.

Tighten all nuts and bolts.



Lubricate the swing arm bushings.



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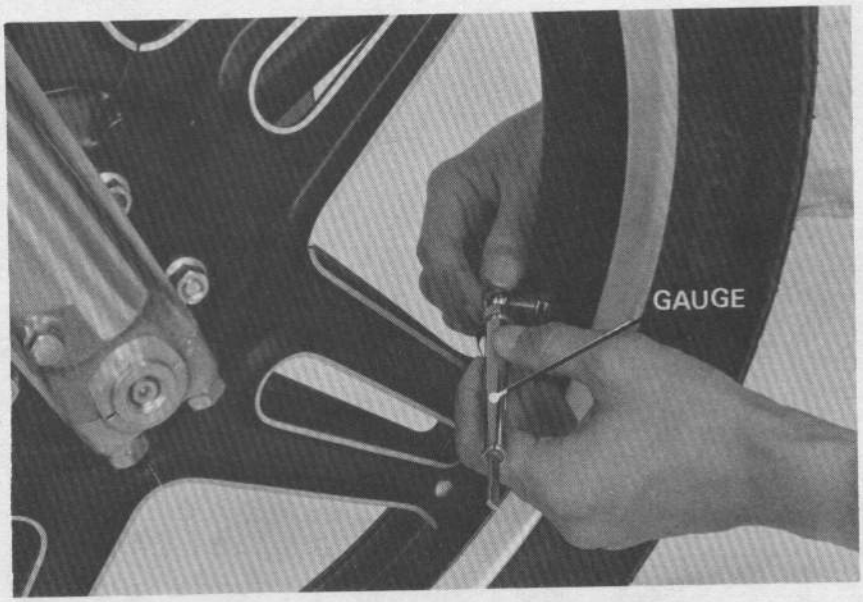
WHEELS

TIRE PRESSURE

NOTE

Tire pressure should be checked when tires are **COLD.**

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



Check the front and rear wheels for trueness.

Measure the tread depth at the center of the tires.
Replace the tires if the tread depth is below minimum.

Minimum tread depth:
Front: 1.5 mm (1/16 in)
Rear: 2.0 mm (3/32 in)

RECOMMENDED TIRE PRESSURE AND TIRE SIZE:

Cold tire pressures Kg/cm² (psi)	Up to 90 kg (200 lb) load	Front 2.0 (28) Rear 2.25 (32)
	Up to vehicle capacity load	Front 2.0 (28) Rear 2.8 (40)
Vehicle capacity load limit	163 kg (360 lbs)	
Tire size	Front 3.50H19–4PR Rear 4.50H17–4PR	
Tire brand	Front BRIDGESTONE MaG. MOPUS-S703 DUNLOP GOLD SEAL F11 Rear BRIDGESTONE SUPER SPEED S21 R2 DUNLOP GOLD SEAL K87 MARK II	

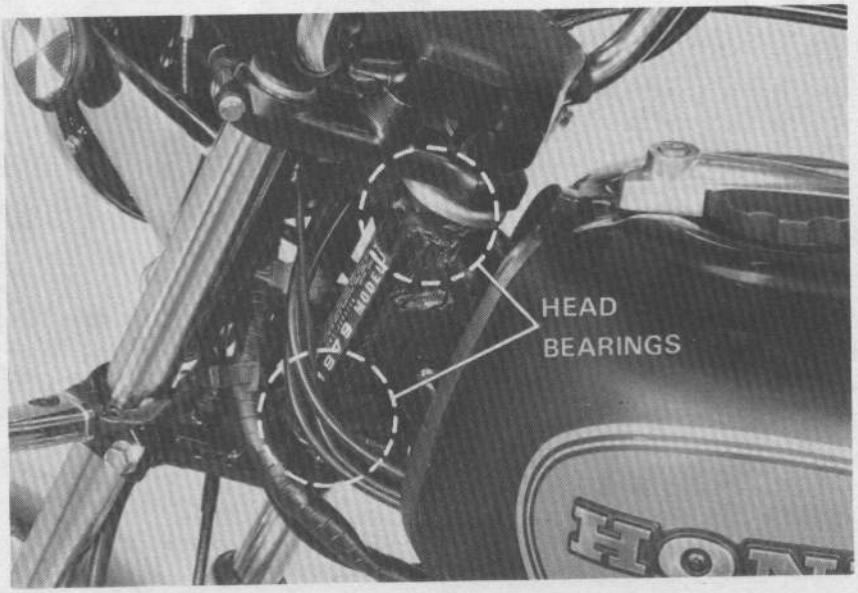
STEERING HEAD BEARINGS

NOTE

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

Raise the front wheel off the ground.
Check that the handlebar rotates freely.

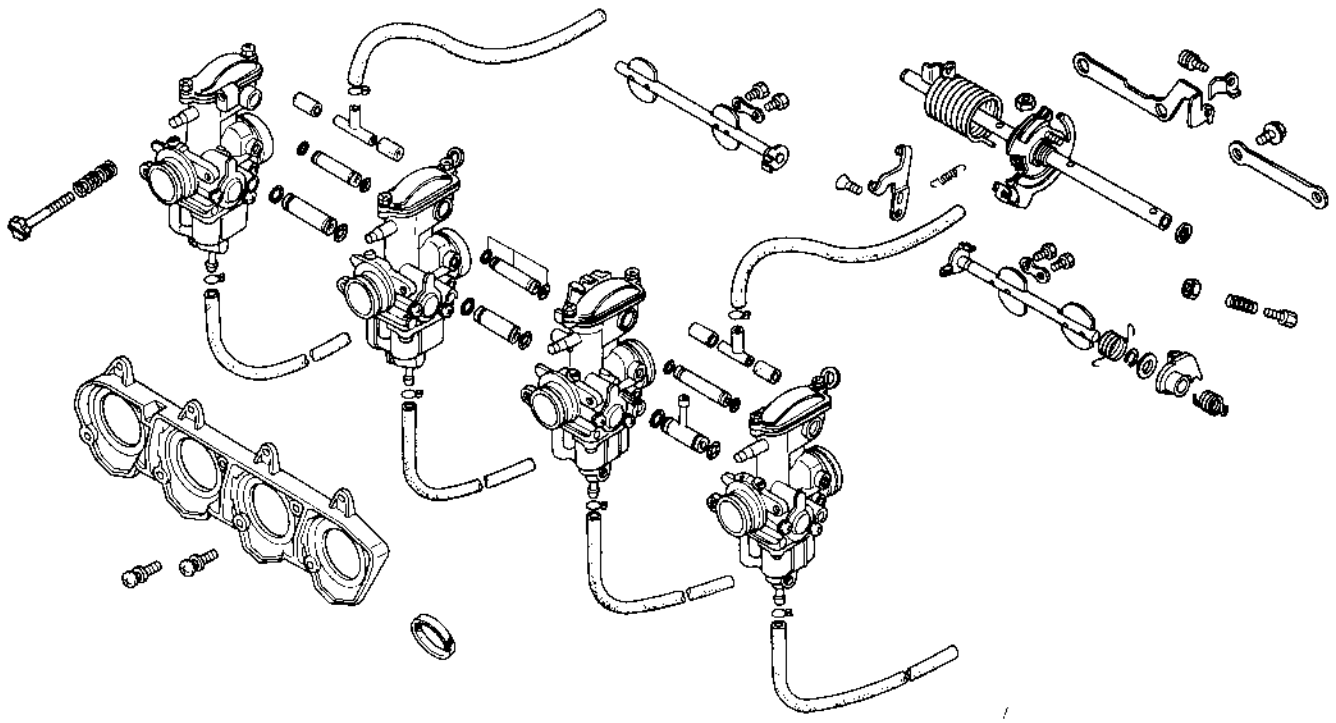
If the handlebar moves unevenly, binds, or has vertical movement, adjust the steering head bearing by turning the steering head adjusting nut with a pin spanner (Page 13–24).

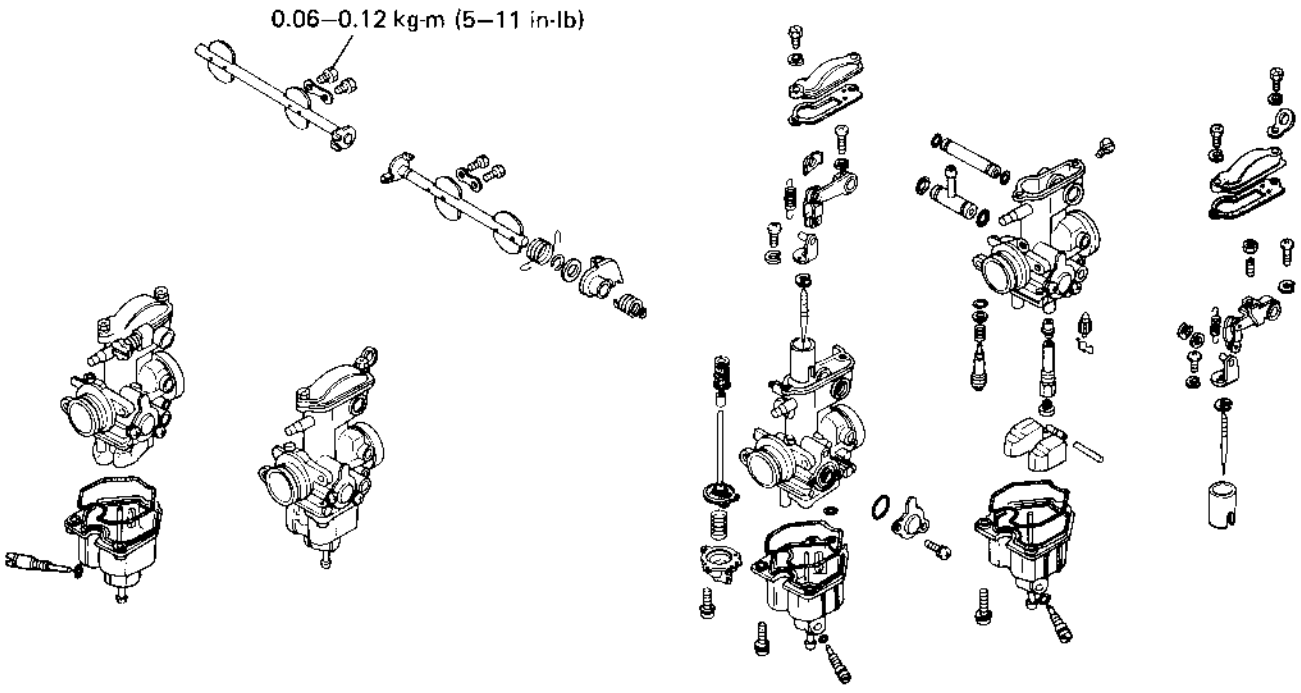


NUTS, BOLTS, FASTENERS

Check that all chassis nuts and bolts are tightened to correct torque values.

Check that all cotter pins and safety clips are in place.





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4. FUEL SYSTEM

SERVICE INFORMATION

GENERAL INSTRUCTIONS

- Use caution when working with gasoline. Always work in a well-ventilated area and away from sparks or flames.
- When disassembling fuel system parts, note the locations of the O-rings. Replace them during assembly.
- The float bowls have drain plugs that can be loosened to drain residual fuel.

SPECIAL TOOLS

Special Tools	
Carburetor Throttle Wrench	07908–4220100
Carburetor Pilot Screw Wrench	07908–4220201
Common Tool	
Float Level Gauge	07401–0010000

TORQUE VALUES

Choke valve	0.06–0.12 kg-m (5–11 in-lb)

SPECIFICATIONS

Venturi dia.	26 mm (1.02 in)
Setting mark	PD50A
Main jet	#90
Float level	12.5 mm (0.50 in)
Idle speed	1,050 ± 100 rpm
Throttle grip free play	2–6 mm (1/8 – 1/4 in)
Fast idle	2,000 ± 700 rpm
Pilot screw opening	See page 4–15

TROUBLESHOOTING

Engine cranks but won't start
1. No fuel in tank
2. No fuel to carburetor
3. Engine flooded with fuel
4. No spark at plug (ignition malfunction)
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. Fast idle speed incorrect
4. Carburetor malfunction
5. Fuel contaminated
6. Intake air leak
7. Idle speed incorrect

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

Misfiring during acceleration
1. Ignition malfunction
2. Faulty accelerator pump

Backfiring
1. Ignition malfunction
2. Carburetor malfunction
3. Faulty accelerator pump

Poor performance (driveability) and poor fuel economy
1. Fuel system clogged
2. Ignition malfunction
3. Faulty accelerator pump

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

Rich mixture
1. Clogged air jets
2. Faulty float valve
3. Float level too high
4. Choke stuck open
5. Dirty air cleaner

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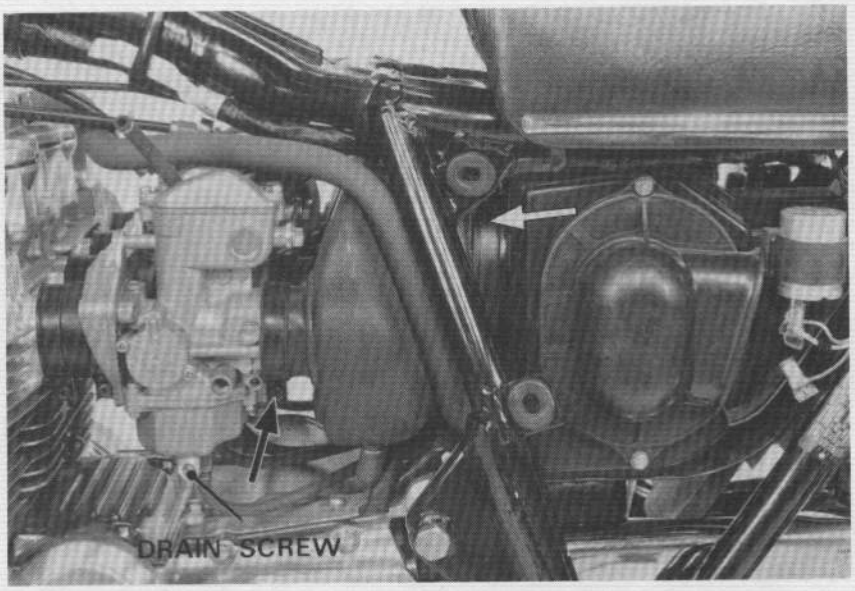
CARBURETOR REMOVAL

Turn the fuel valve OFF and disconnect the fuel line at the carburetor.

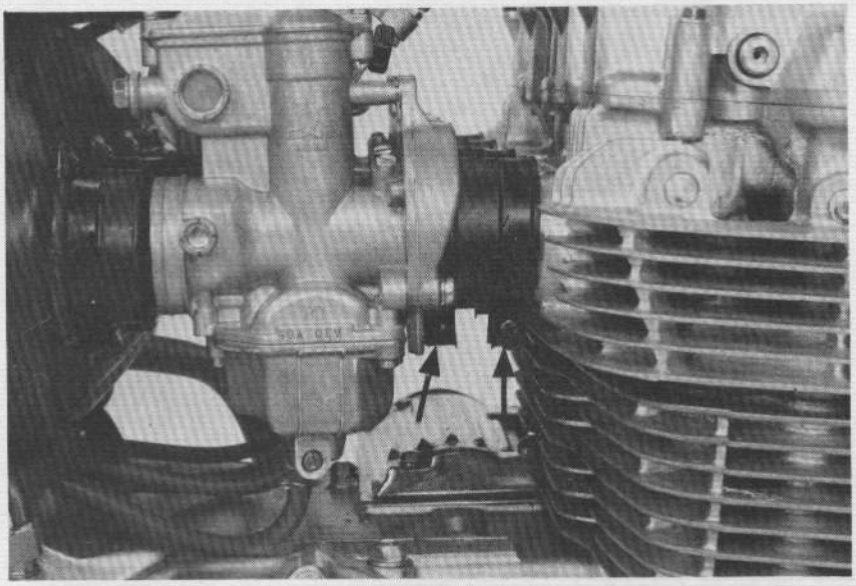
Remove both side covers and raise the seat.
Drain residual fuel by loosening each drain screw.

Loosen the air cleaner-to-chamber band.
Loosen the air cleaner chamber-to-carburetor bands.

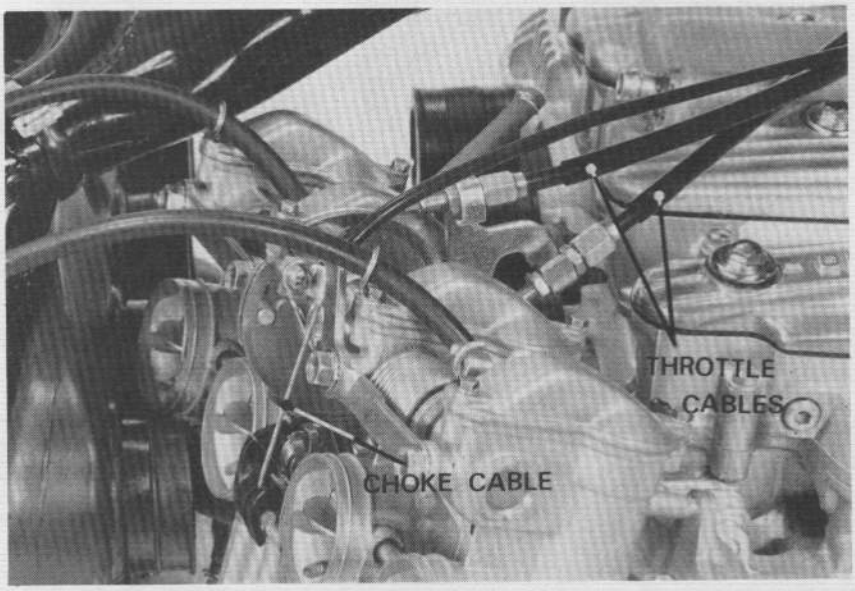
Disconnect the engine breather tube at the breather cover.
Move the air cleaner chamber to the rear.



Loosen the carburetor manifold bands.
Disconnect the carburetor assembly.



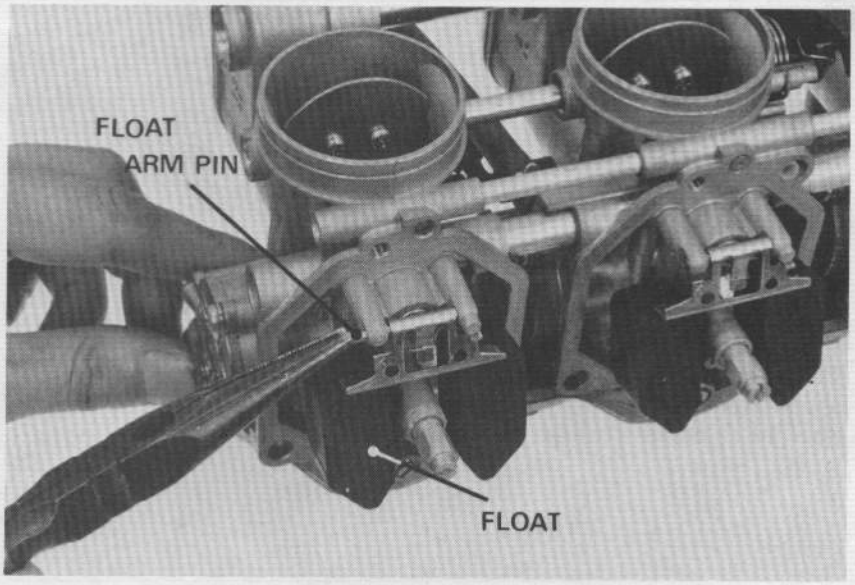
Disconnect the throttle and choke cables.
Remove the carburetor assembly.



FLOAT CHAMBER DISASSEMBLY

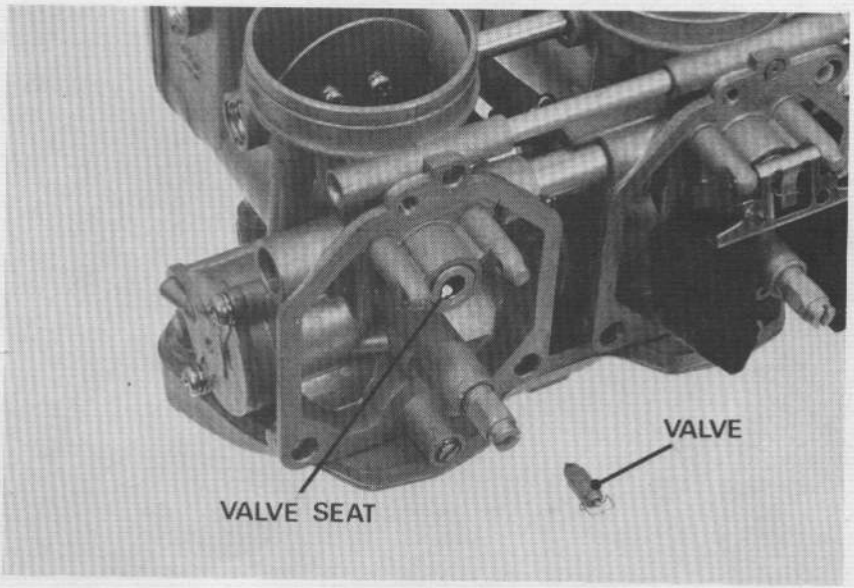
Remove the float chamber body.
Pull out the float arm pin with a pair of pliers.

Remove the float and float valve.



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

Inspect the float valve operation.



Remove the main jet.
Remove the jet needle holder.
Tilt the carburetor to remove the needle jet.

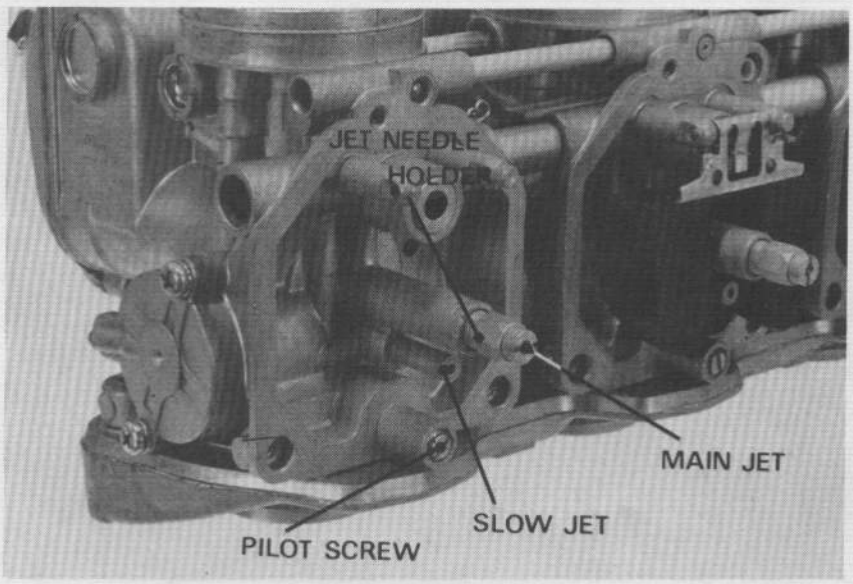
NOTE

The slow air jet cannot be removed. It is a press fit.

Blow out all jets and body passages with compressed air.

NOTE

- If the needle jet is difficult to remove, carefully push the needle jet from the throttle valve side with a soft material after separating the carburetors (Page 4–6).
- Before removing the pilot screws, record the number of turns necessary to make them seat to ensure correct reassembly.
- Do not damage the pilot screw threads when removing the plain washer and O-ring



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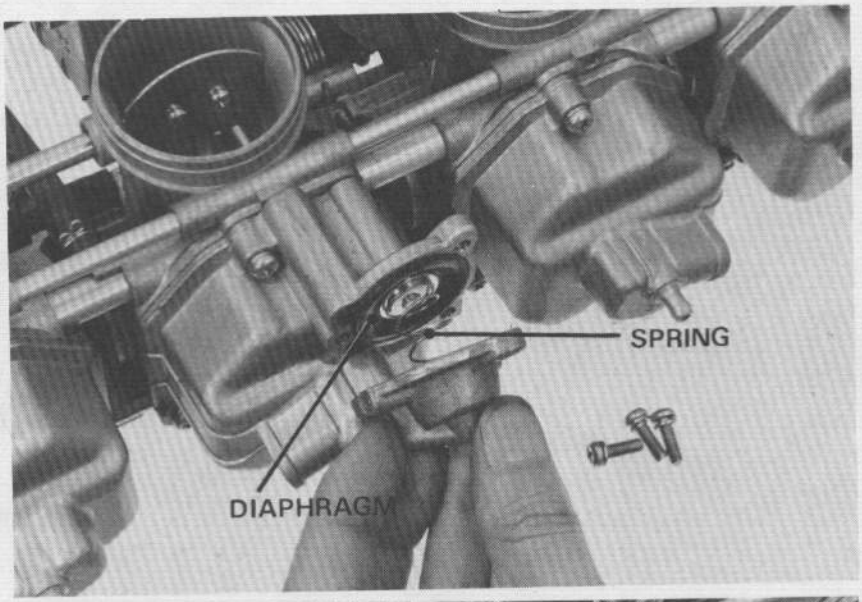
ACCELERATOR PUMP DISASSEMBLY

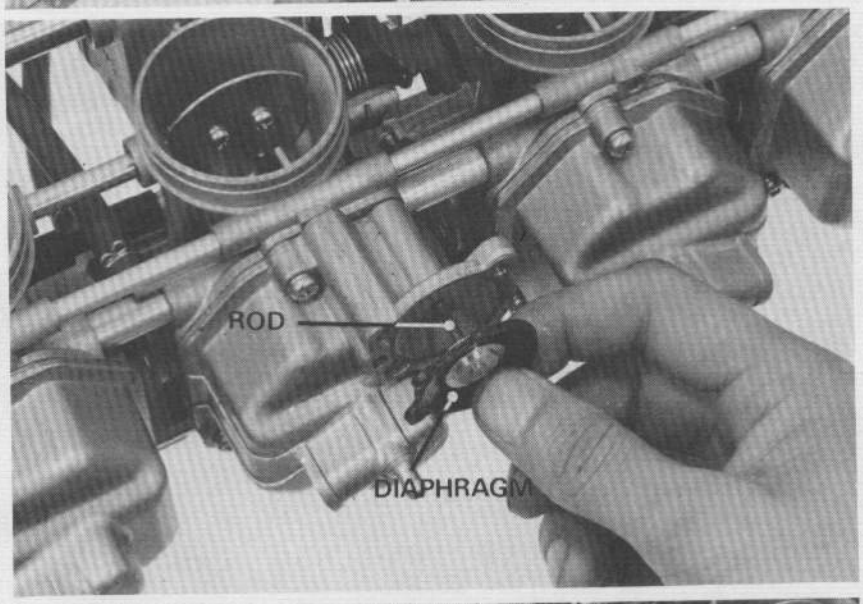
Remove the accelerator pump cover and spring.



Remove the diaphragm.
Inspect the diaphragm for cracks and brittleness.

NOTE

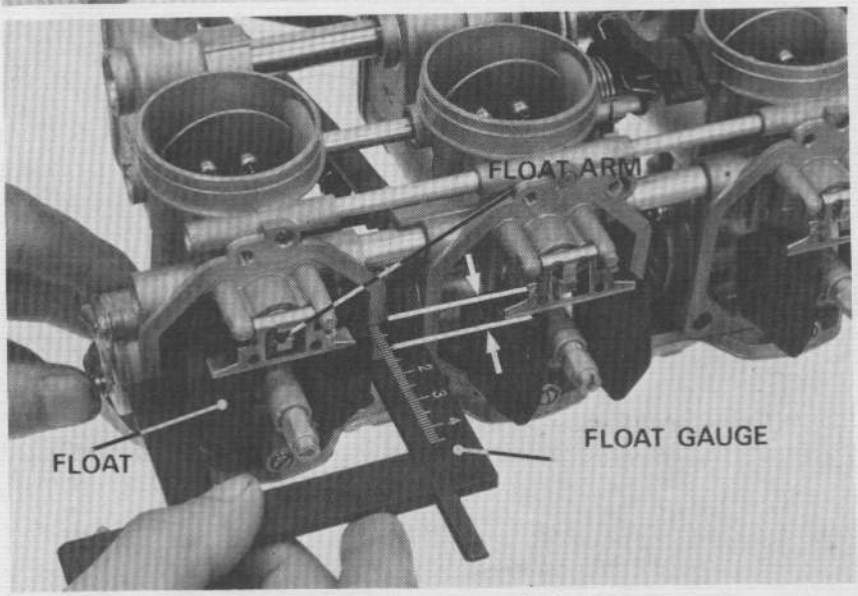
Be sure the accelerator pump rod is not bent.



FLOAT LEVEL ADJUSTMENT

Remove float chambers.
Adjust the float level by bending the float arm carefully until it just contacts the float valve.

FLOAT LEVEL: 12.5 mm (0.50 in)

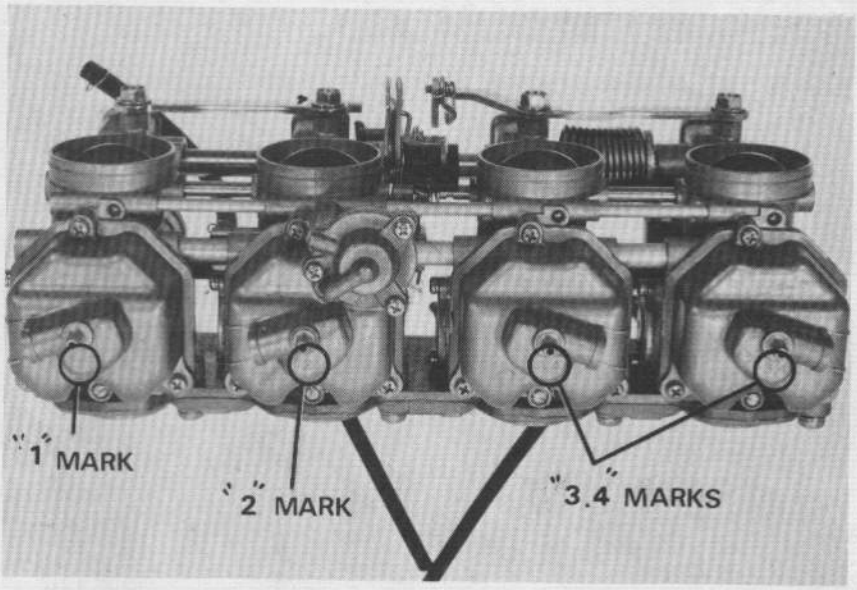


COMPONENT ASSEMBLY

Assemble the accelerator pump and float chamber.

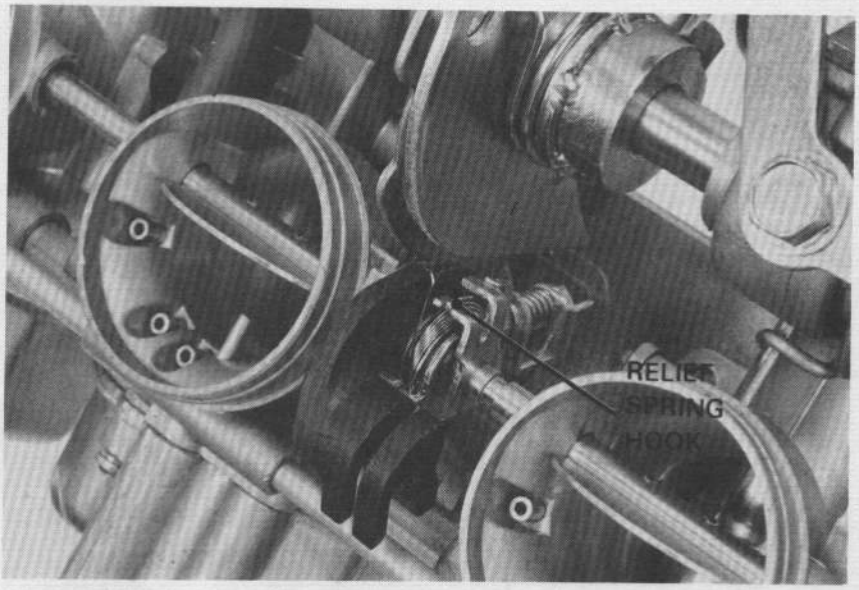
NOTE

Note the carburetor number on the float chamber body.

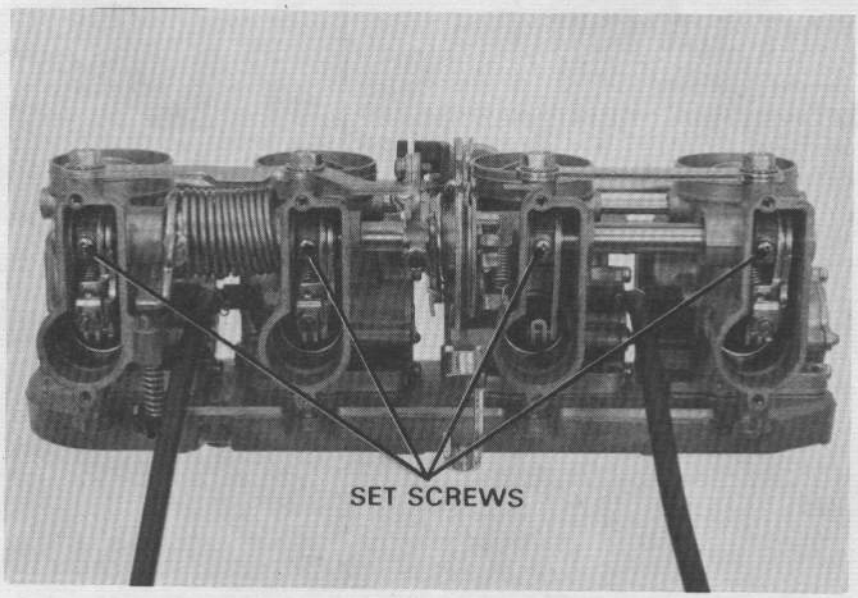


CARBURETOR SEPARATION

Unhook the choke relief spring from the choke shaft arm of the No.3 and No.4 carburetors.



Remove the carburetor top covers.
Remove the throttle link arm set screws.



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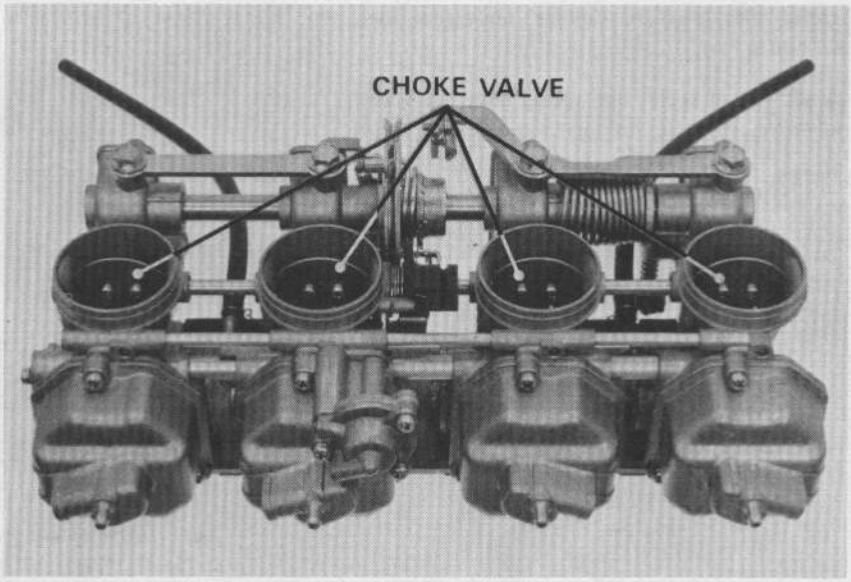
File off the staked ends of the choke valve screws.

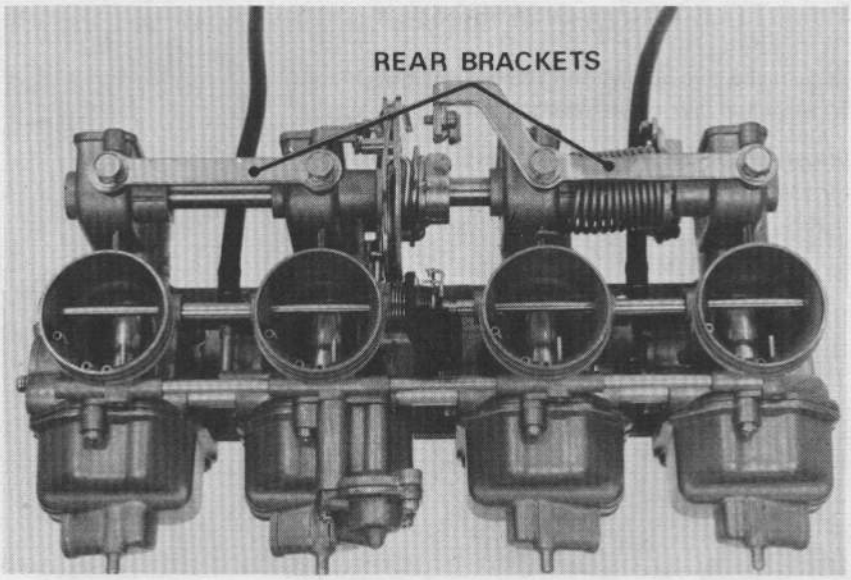
Remove the choke valves and discard the screws.

CAUTION

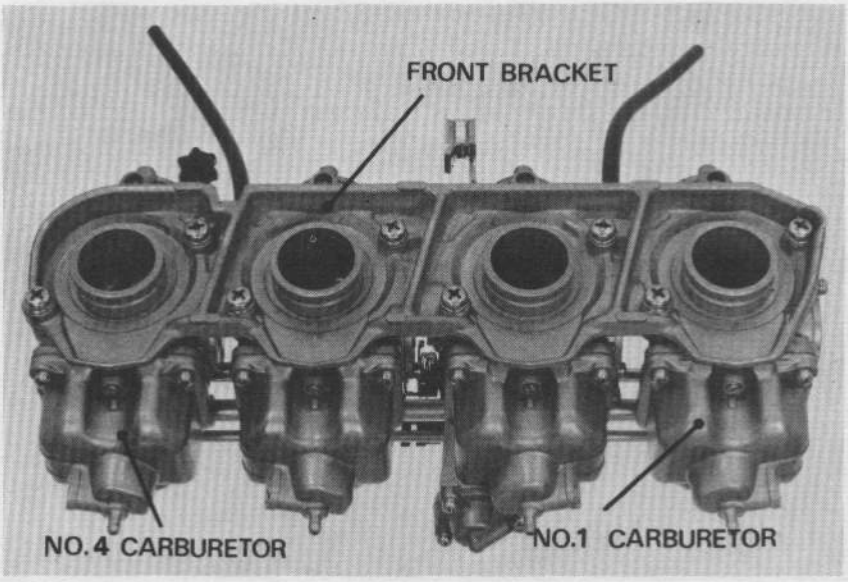
Do not allow the filings to enter the carburetors.



Remove the rear bracket.



Remove the front bracket.



Carefully separate the No.1 and No.4 carburetors.

CAUTION

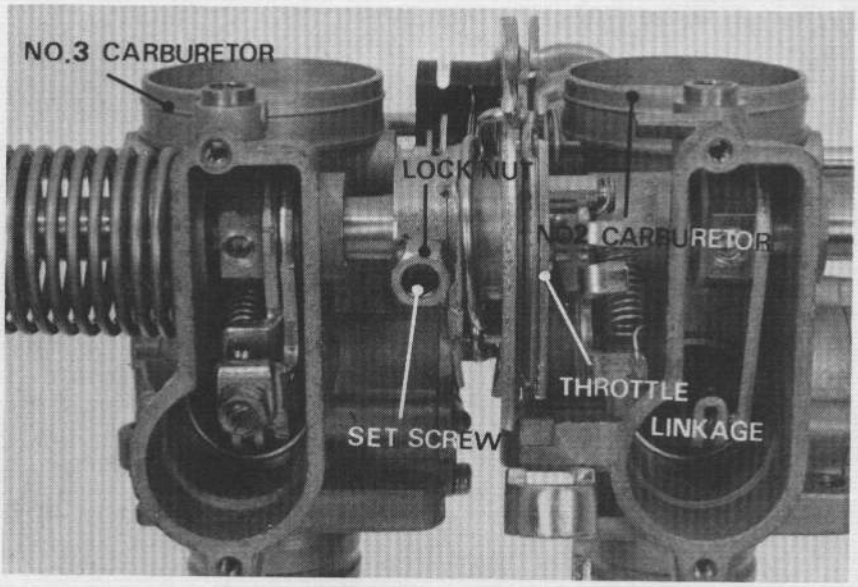
Separate the carburetors horizontally to prevent damage to the fuel and air joint pipes and choke link.

Loosen the throttle linkage set screw lock nut and screw.

Carefully separate the No.2 and No.3 carburetors, throttle linkage and throttle shaft.

CAUTION

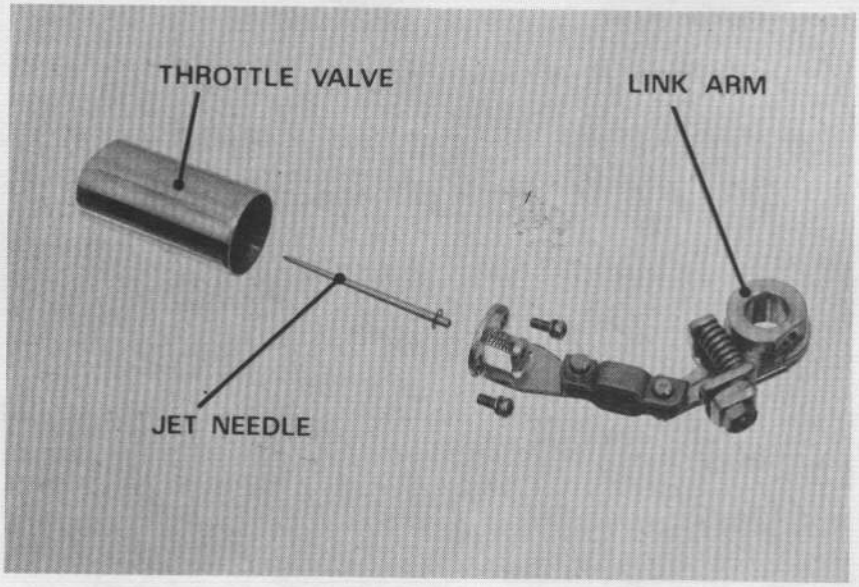
Separate the carburetor horizontally to prevent damage to the fuel and air joint pipes and choke link.



THROTTLE VALVE DISASSEMBLY

Loosen the two screws and remove the throttle valve and jet needle from the link arm.

Inspect the jet needle and throttle valve for wear, damage or scoring.



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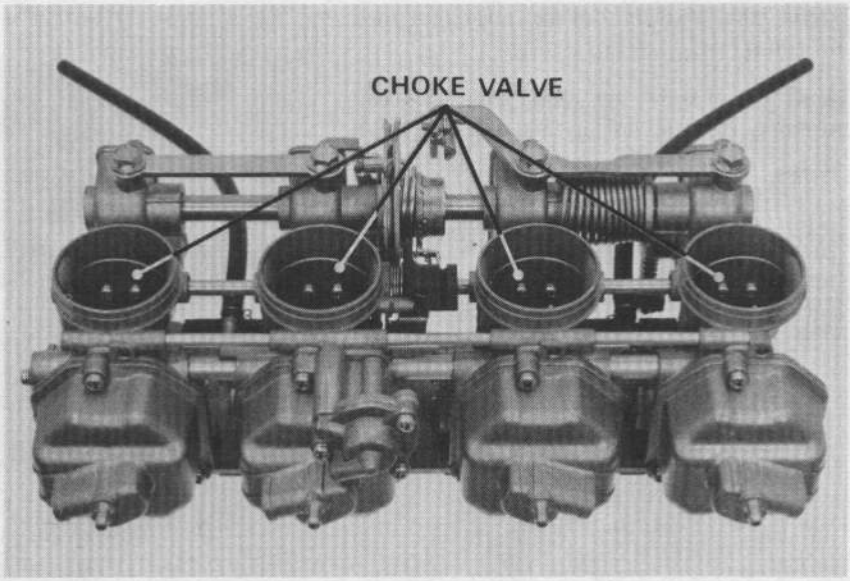
File off the staked ends of the choke valve screws.

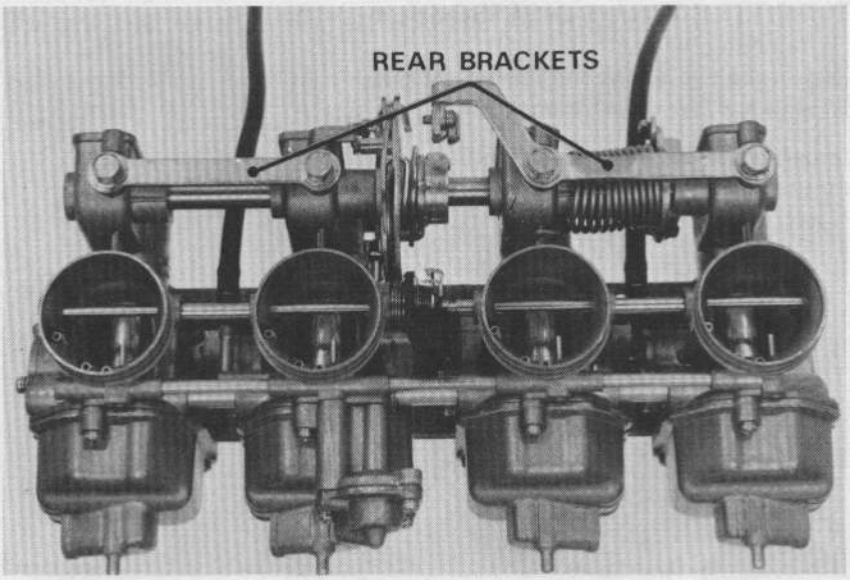
Remove the choke valves and discard the screws.

CAUTION

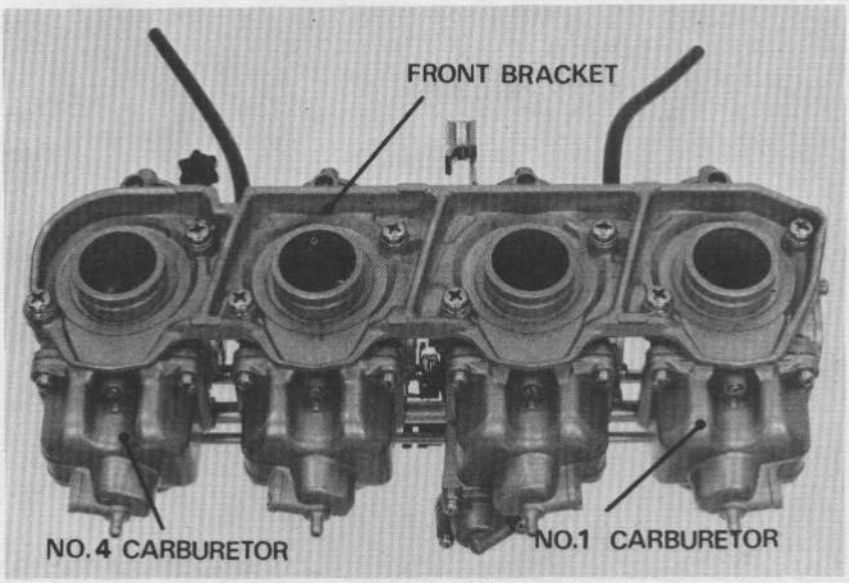
Do not allow the filings to enter the carburetors.



Remove the rear bracket.



Remove the front bracket.



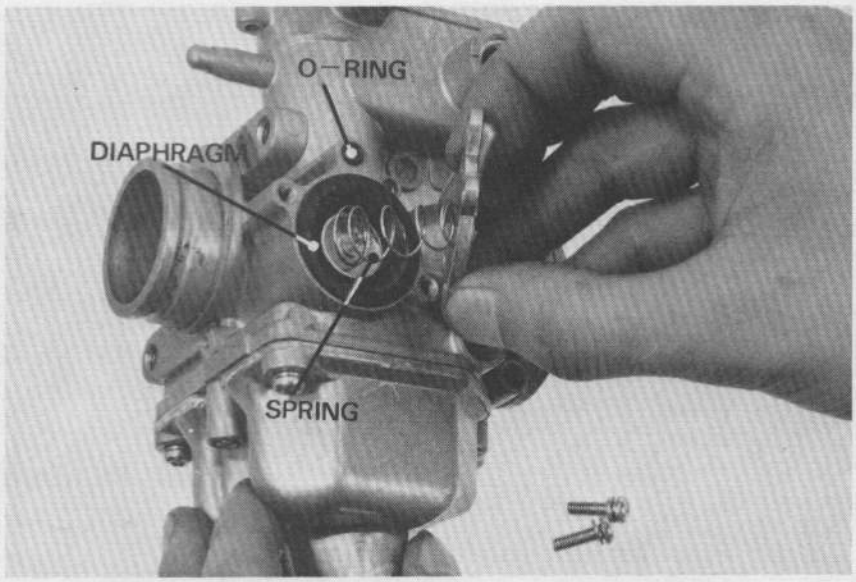
Carefully separate the No.1 and No.4 carburetors.

CAUTION

Separate the carburetors horizontally to prevent damage to the fuel and air joint pipes and choke link.

AIR CUTOFF VALVE

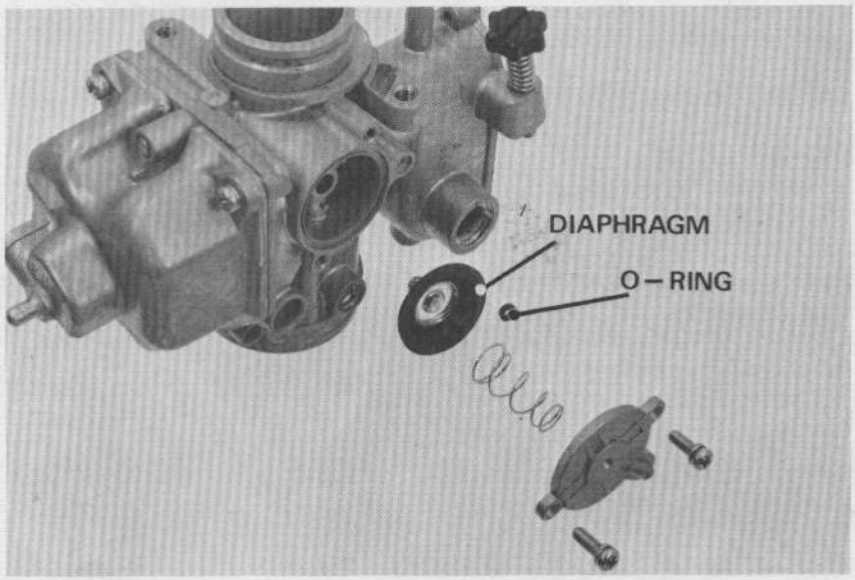
Remove the valve cover and spring.
Remove the diaphragm and O-ring.



Inspect the diaphragm and valve for cracks and brittleness.

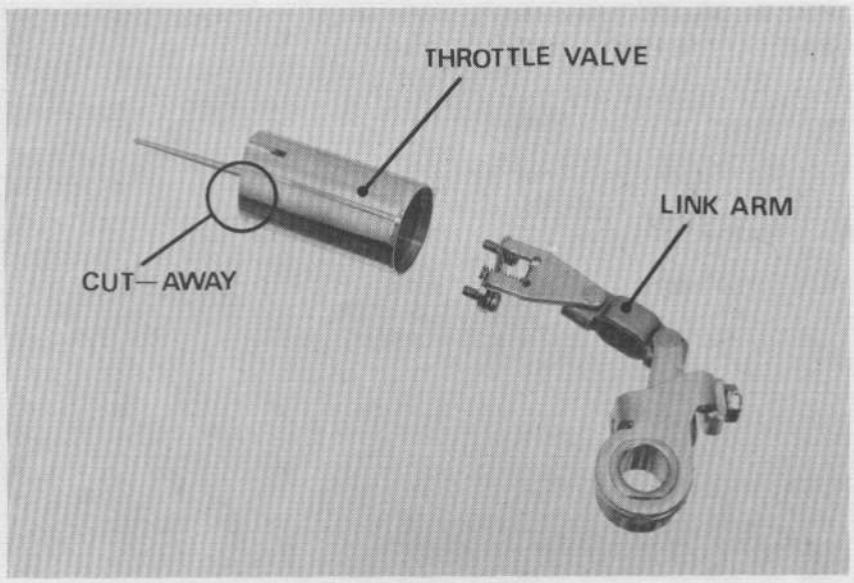
NOTE

When installing the air cutoff valve O-ring, make sure the flat surface is toward the carburetor body.



CARBURETOR ASSEMBLY

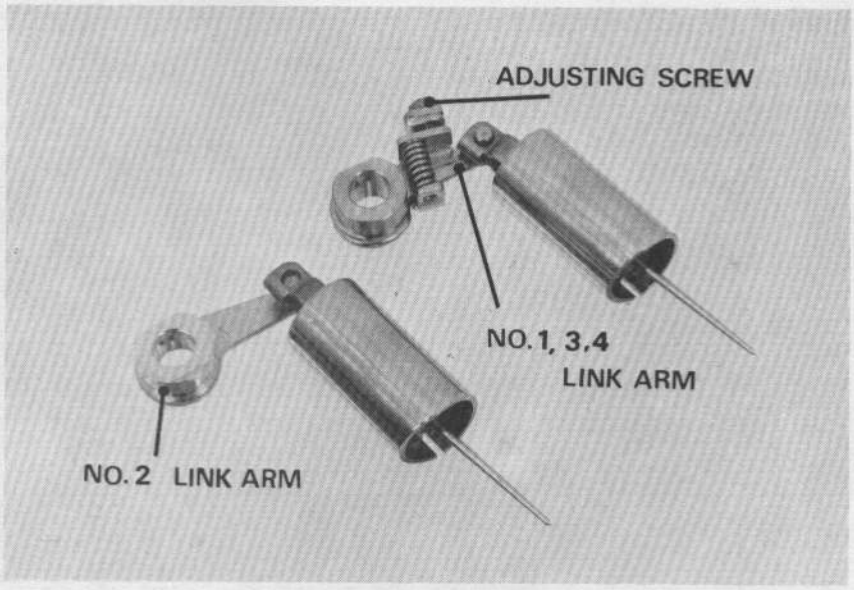
Install the throttle valve to the link arm so that the cut-away is facing the choke valve.



Install the throttle valves in the carburetor bodies.

NOTE

The link arm without an adjusting screw should be installed in the No.2 carburetor.



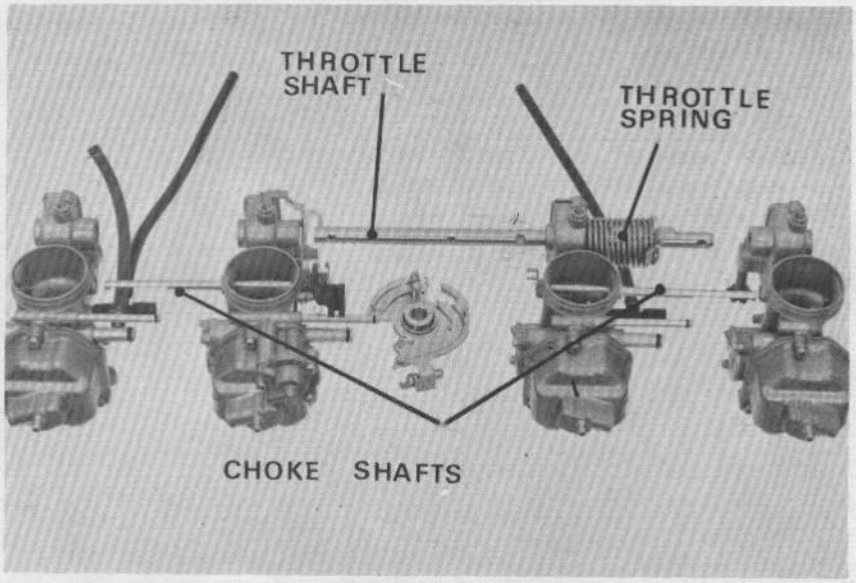
Insert the throttle shaft into the No.3 carburetor through the throttle spring.

Install new O-rings on the fuel joint pipes.

NOTE

Apply a thin coat of oil to the O-rings.

Insert a new choke shaft into the No.2 and No.3 carburetors.

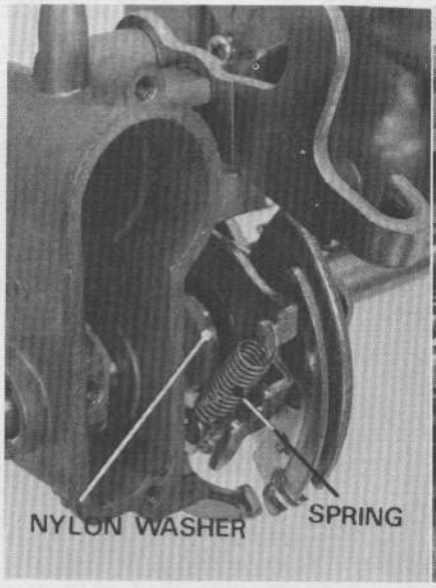


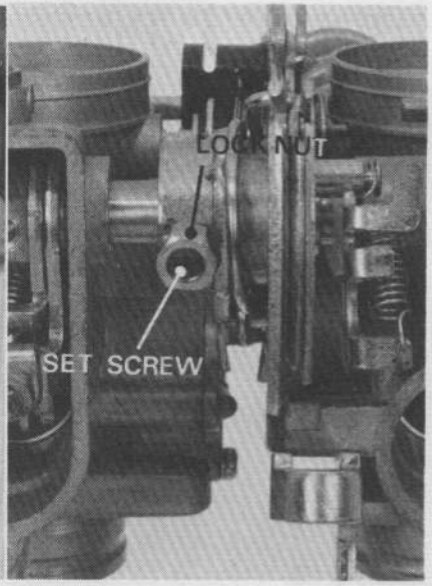
Install the throttle linkage and nylon washer onto the throttle shaft.

Assemble the No.3 and No.2 carburetors, pressing them together carefully.

Align the hole in the throttle shaft with the throttle linkage set screw and tighten the set screw and lock nut.

Install the spring.





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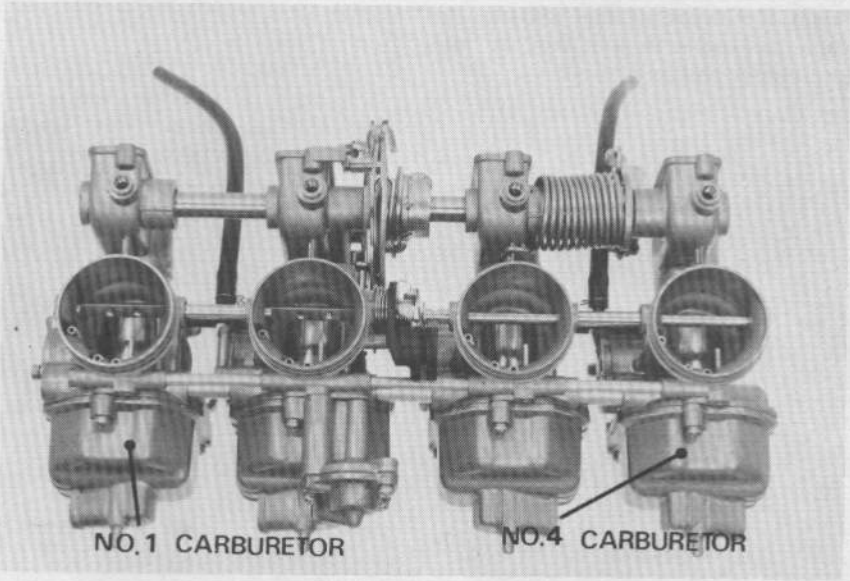
Assemble the No.1 and 4 carburetors to the No.2 and No.3 carburetor assembly, pressing them together carefully.

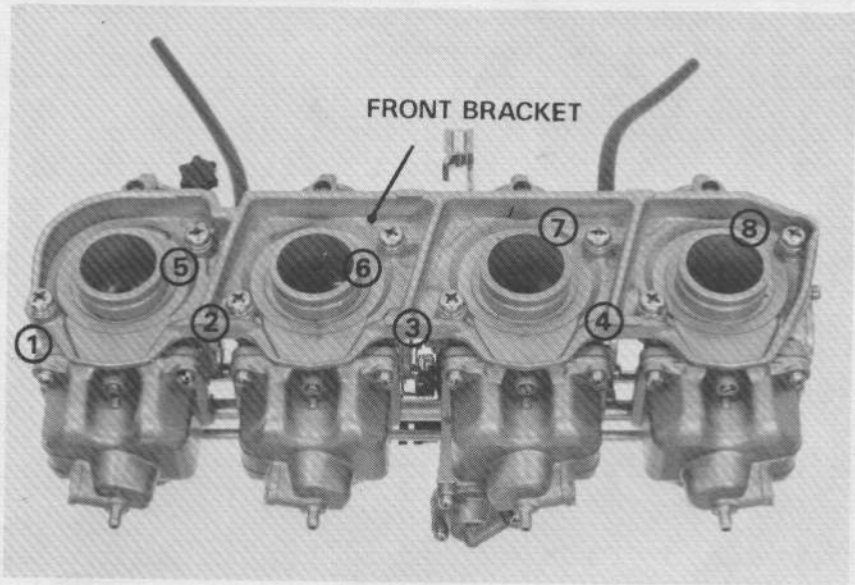


Install the front bracket loosely.

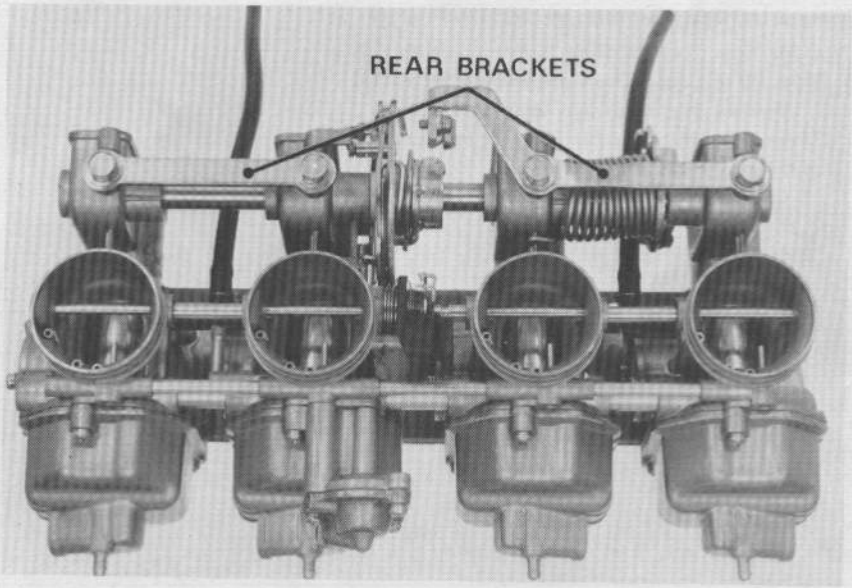
Tighten the screws in the sequence shown in two or more steps to prevent improper carburetor alignment.

NOTE

Check for smooth choke shaft operation. If not smooth, recheck the carburetor alignment.

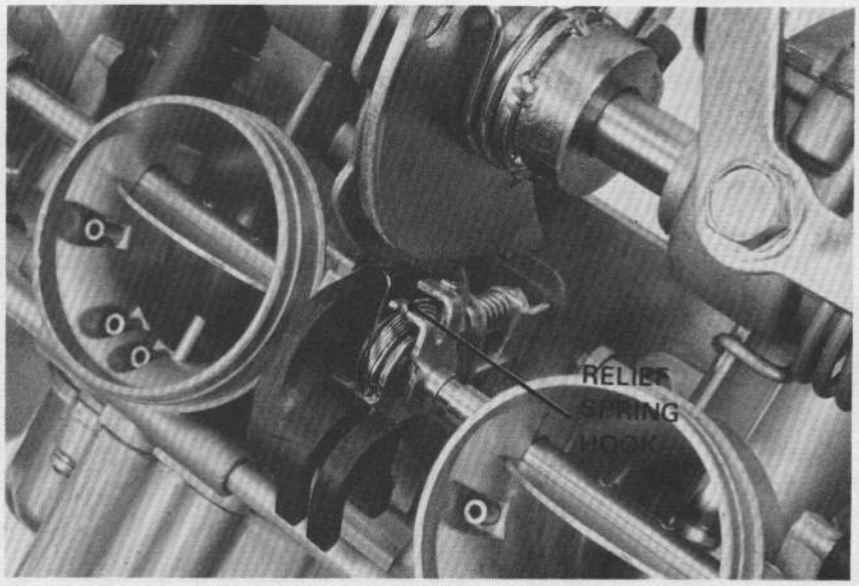


Install the rear bracket.

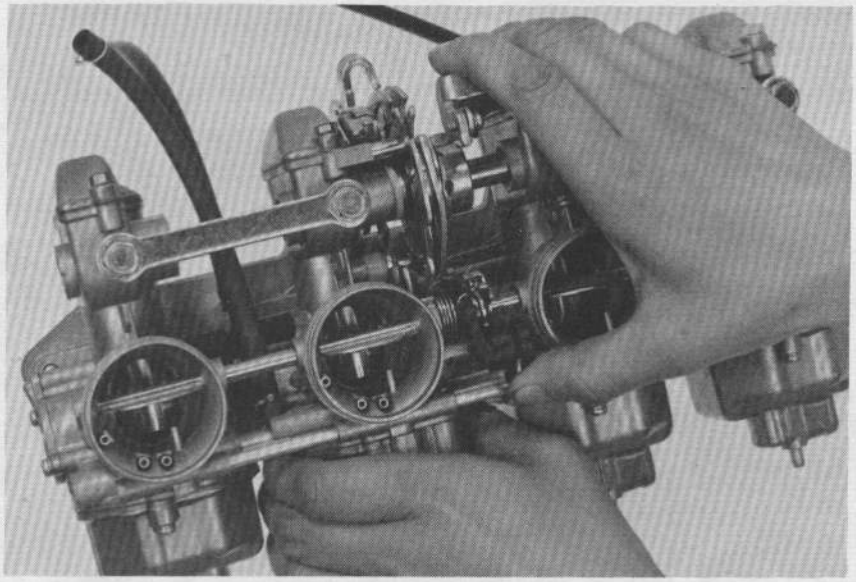


Install the choke valves, but do not tighten the bolts.

Hook the choke relief spring to the choke shaft arm of the No.2 and 3 carburetors.



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

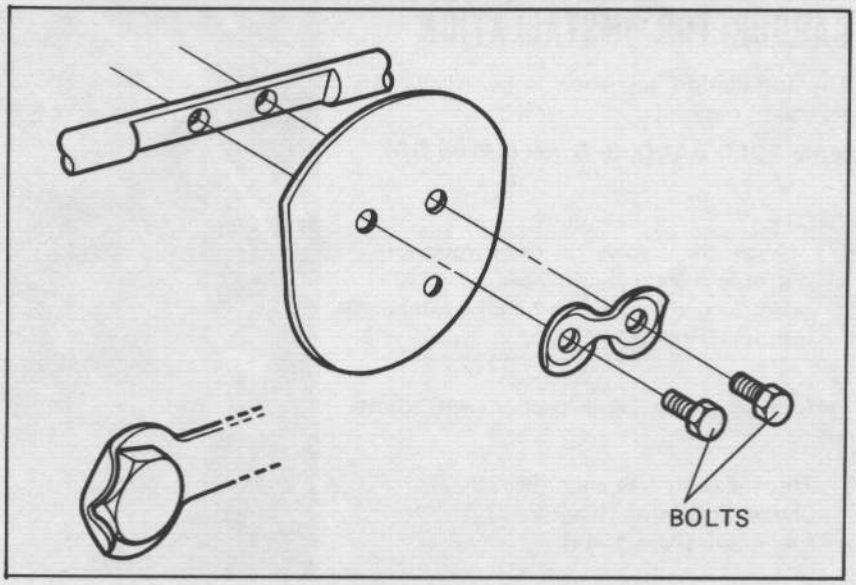


Tighten the choke valve bolts.

TORQUE: 0.06–0.12 kg-m (0.4–0.9 ft-lb, 5–11 in-lb)

Fold the tabs of the lock washer against the bolts.

Recheck the throttle and choke operation.

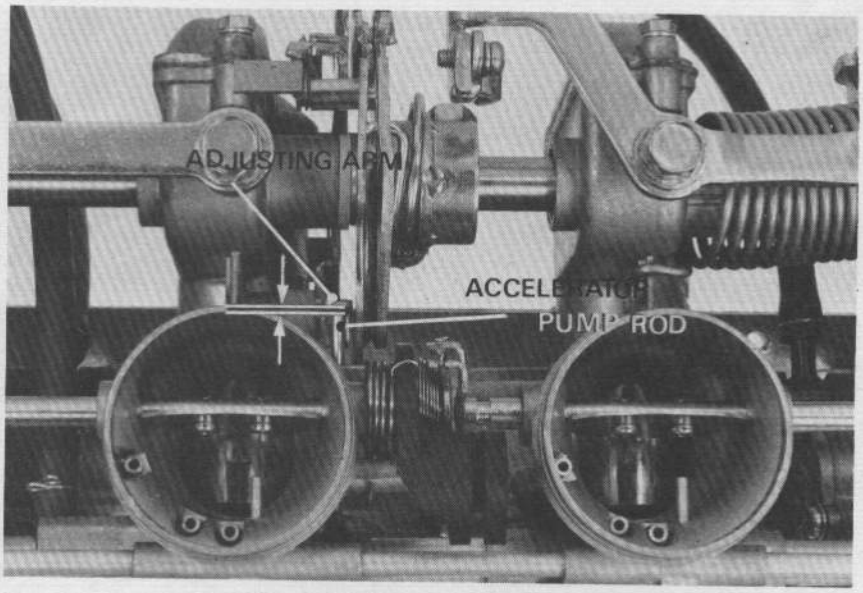


ACCELERATOR PUMP ADJUSTMENT

Measure the clearance between the accelerator pump rod and adjusting arm with the throttle valve closed.

CLEARANCE:
0.4–0.6 mm (0.016–0.024 in)

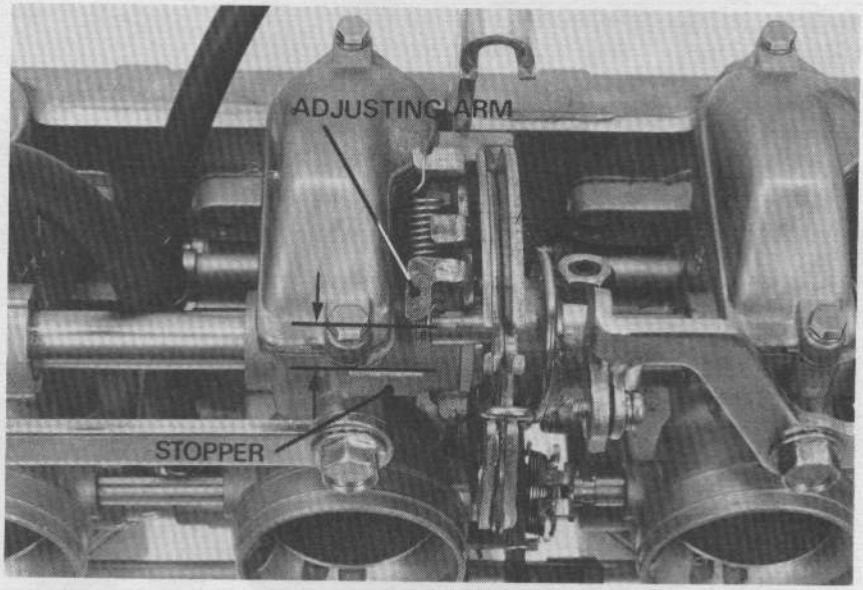
Adjust by bending the adjusting arm.



Measure the clearance between the adjusting arm and stopper on the carburetor body.

CLEARANCE: 8–10 mm (5/16–3/8 in)

Adjust by bending the adjusting arm.



CARBURETOR INSTALLATION

The installation sequence is essentially the reverse of removal.

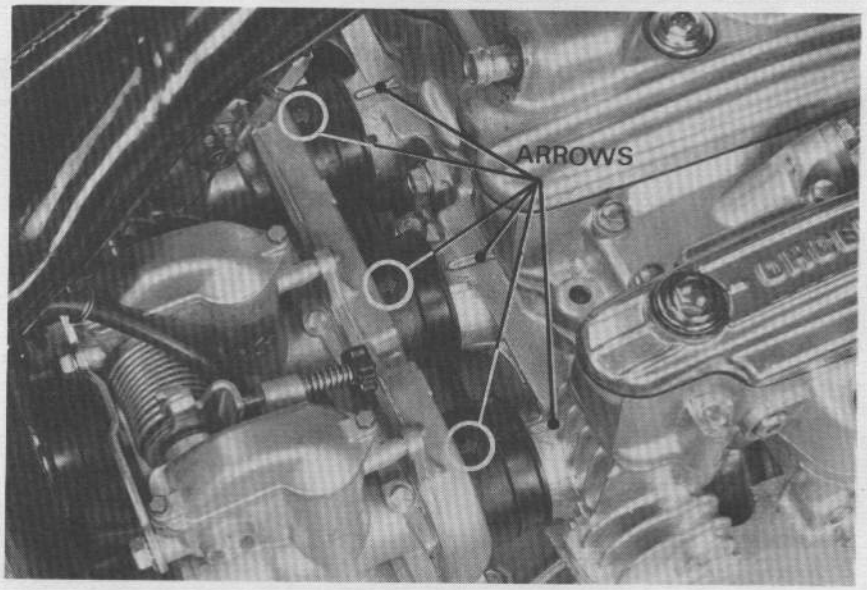
MANIFOLD BAND: 3–5 mm (1/8 in) GAP

NOTE

- Align the arrows on the carburetor manifold and cylinder head.
- Route the throttle and choke cables properly (Page 1–10).

Perform the following inspections and adjustments.

- **Throttle cable free play (Page 3–7)**
- **Choke mechanism (Page 3–8)**
- **Idle speed (Page 3–11)**



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PILOT SCREW ADJUSTMENT

IDLE DROP PROCEDURE

NOTE

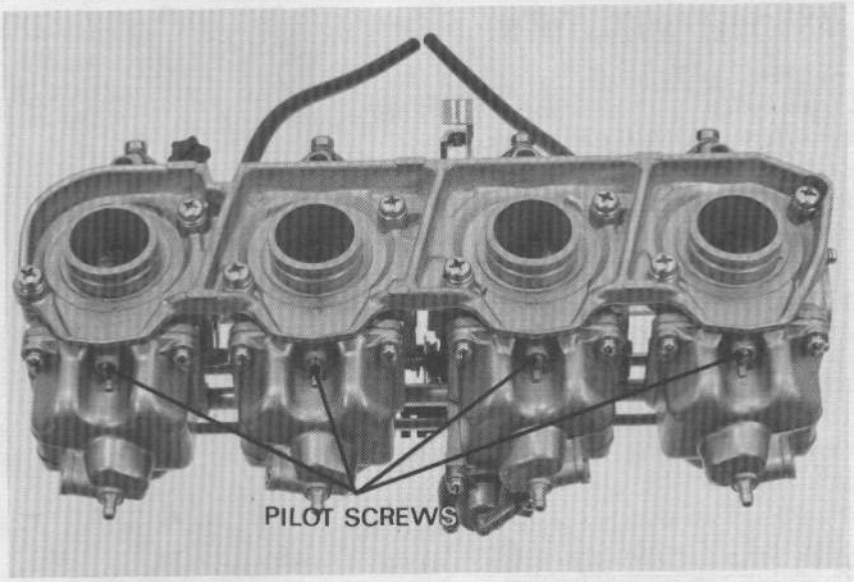
- The pilot screw is factory pre-set and no adjustment is necessary unless the carburetor is overhauled.
- Use a tachometer with graduations of 50 rpm or smaller and that will accurately indicate a 50 rpm change.

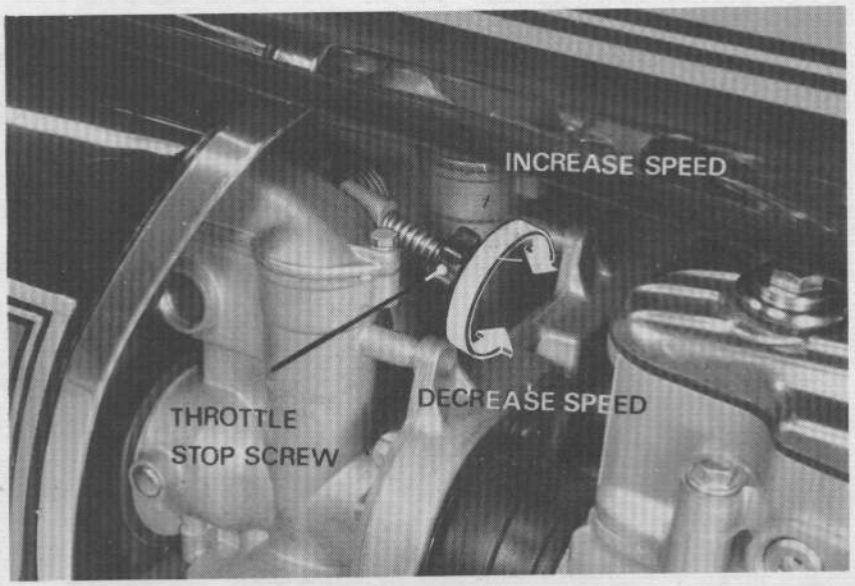
1. Turn the pilot screw clockwise until it seats lightly and back it out to the specification.
   This is a preliminary setting prior to the final pilot screw adjustment.
   PILOT SCREW OPENING: 1-5/8

CAUTION

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

2. Start the engine and warm it up to operating temperature. Stop and go driving for 10 minutes is sufficient.
3. Attach a tachometer.
4. Adjust the idle speed with the throttle stop screw.
   IDLE SPEED: 1,050 ± 100 rpm
5. Turn each pilot screw 1/2 turn out from the initial setting. If engine speed DOES NOT increase by 50 rpm or more, proceed to step 8.
6. Turn the No.1 carburetor pilot screw 1/2 turn out. Repeat for the No.2, 3 and 4 carburetors. When the engine speed does not change by 50 rpm or more, discontinue the 1/2 turn out increments at the No. 4 carburetor. All four pilot screws should now be an equal number of turns out.
7. Adjust the idle speed with the throttle stop screw.
8. Turn the No.1 carburetor pilot screw in until engine speed drops 50 rpm.
9. Turn the No.1 carburetor pilot screw 7/8 turn out from the position obtained in Step 8.
10. Adjust the idle speed with the throttle stop screw.
11. Perform Step 8, 9 and 10 for the No. 2, 3 and 4 carburetor pilot screws.





FAST IDLE ADJUSTMENT

NOTE

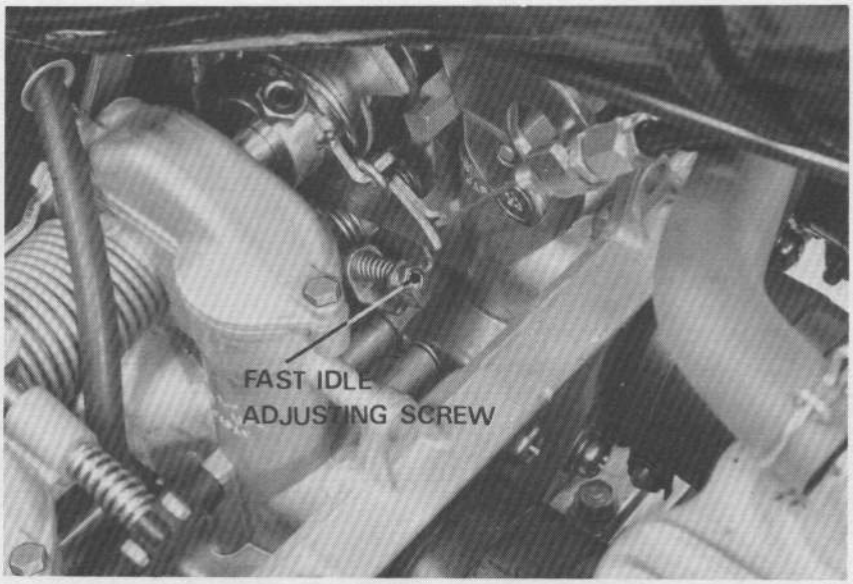
Inspection and adjustment must be performed while the engine is cold.

Pull the choke knob out completely and check that fast idle is within specifications immediately after the engine starts.

FAST IDLE: 2,000 ± 700 rpm (COLD ENGINE)

To adjust, stop the engine, turn the fuel valve OFF, disconnect the fuel line and remove the fuel tank. Turn the fast idle adjusting screw until it touches the cam surface.

Push the choke knob in and turn the adjusting screw in 2-1/2 turns.
Install the fuel tank and fuel line.
Recheck the fast idle.



CHOKE CABLE REPLACEMENT

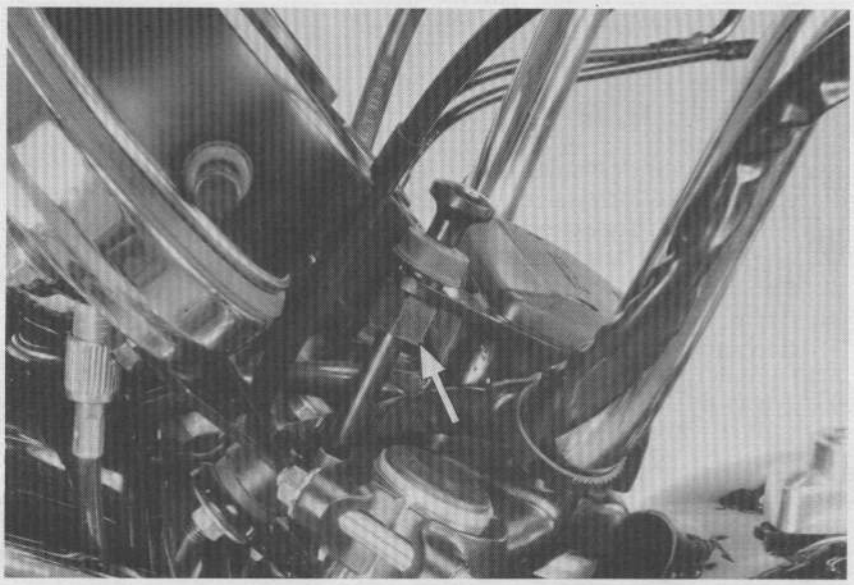
Remove the fuel tank.
Disconnect the choke cable from the lower choke cable bracket.
Remove the cable end from the choke lever.

Remove the choke cable from the choke cable bracket on the handlebar holder.

NOTE

Before removing the cable, tie a string to the cable end. This string can be used as a draw cord when installing a new choke cable.

Install a new choke cable.
Lubricate the choke cable.
After installation, adjust the choke cable (Page 3–8). Refer to Cable Routing (Page 1–10).



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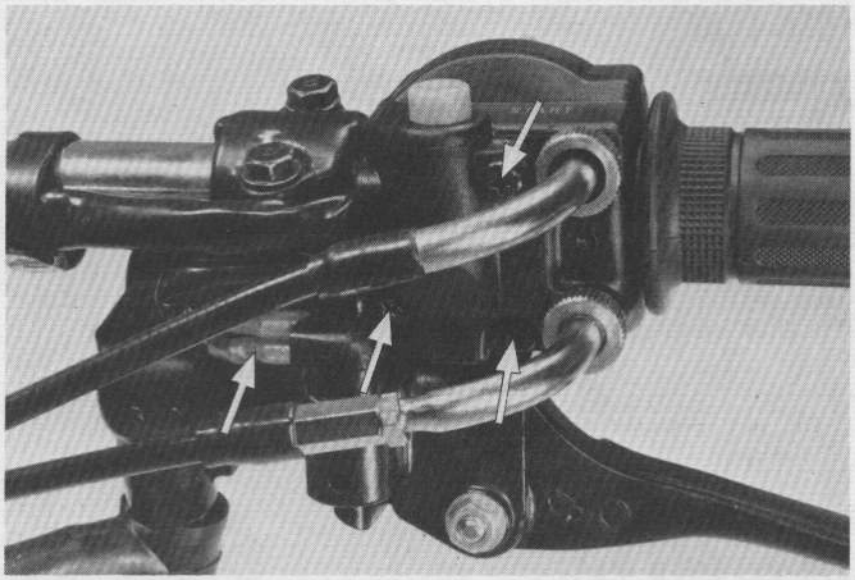
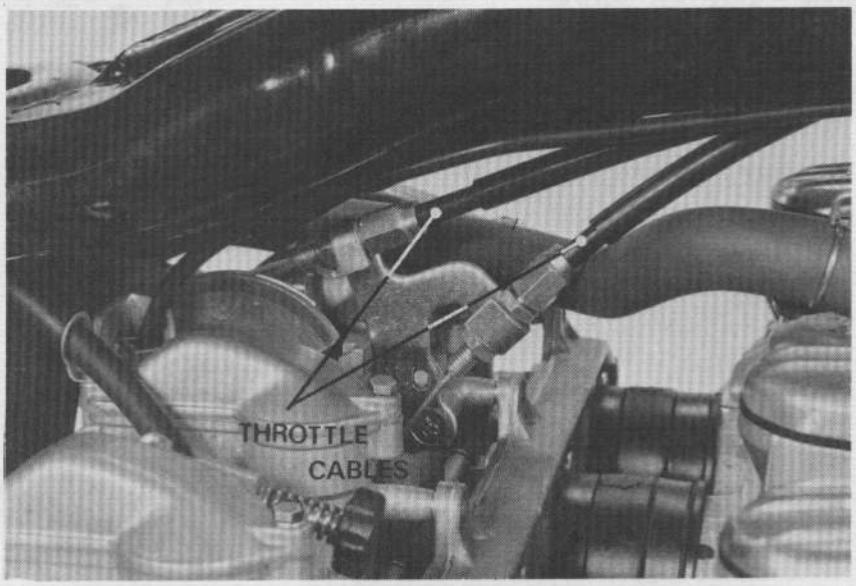
THROTTLE CABLE REPLACEMENT

Remove the fuel tank.
Remove the right handlebar switch/throttle housing.
Remove the throttle cables from the throttle housing.



Remove the throttle cables from the carburetors.
Install a new throttle cable.
Lubricate the throttle cables.
After installation, adjust throttle cable free play (Page 3–7).



FUEL TANK

WARNING

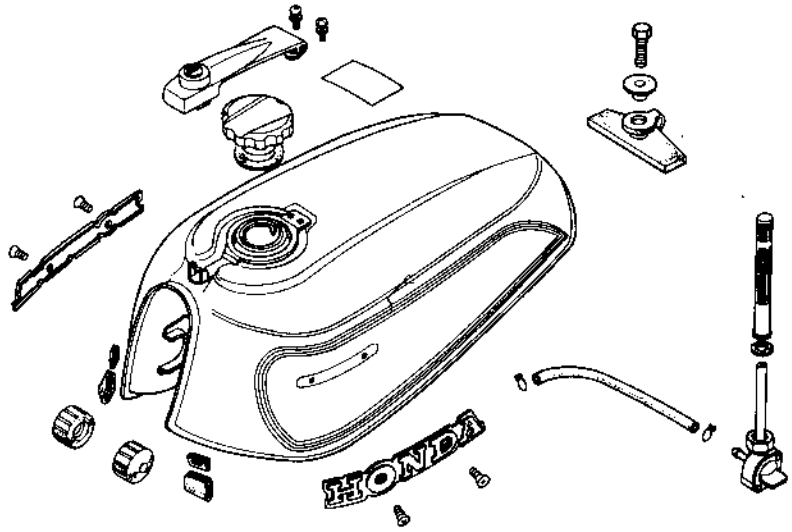
Do not allow flames or sparks near gasoline. Wipe up spilled gasoline at once.

Check the vent hole of the filler cap for blockage.
Check that fuel is flowing out of the fuel valve freely.
If fuel flow is restricted, clean the fuel strainer.

NOTE

Do not overtighten the fuel valve lock nut.

Make sure there are no fuel leaks.



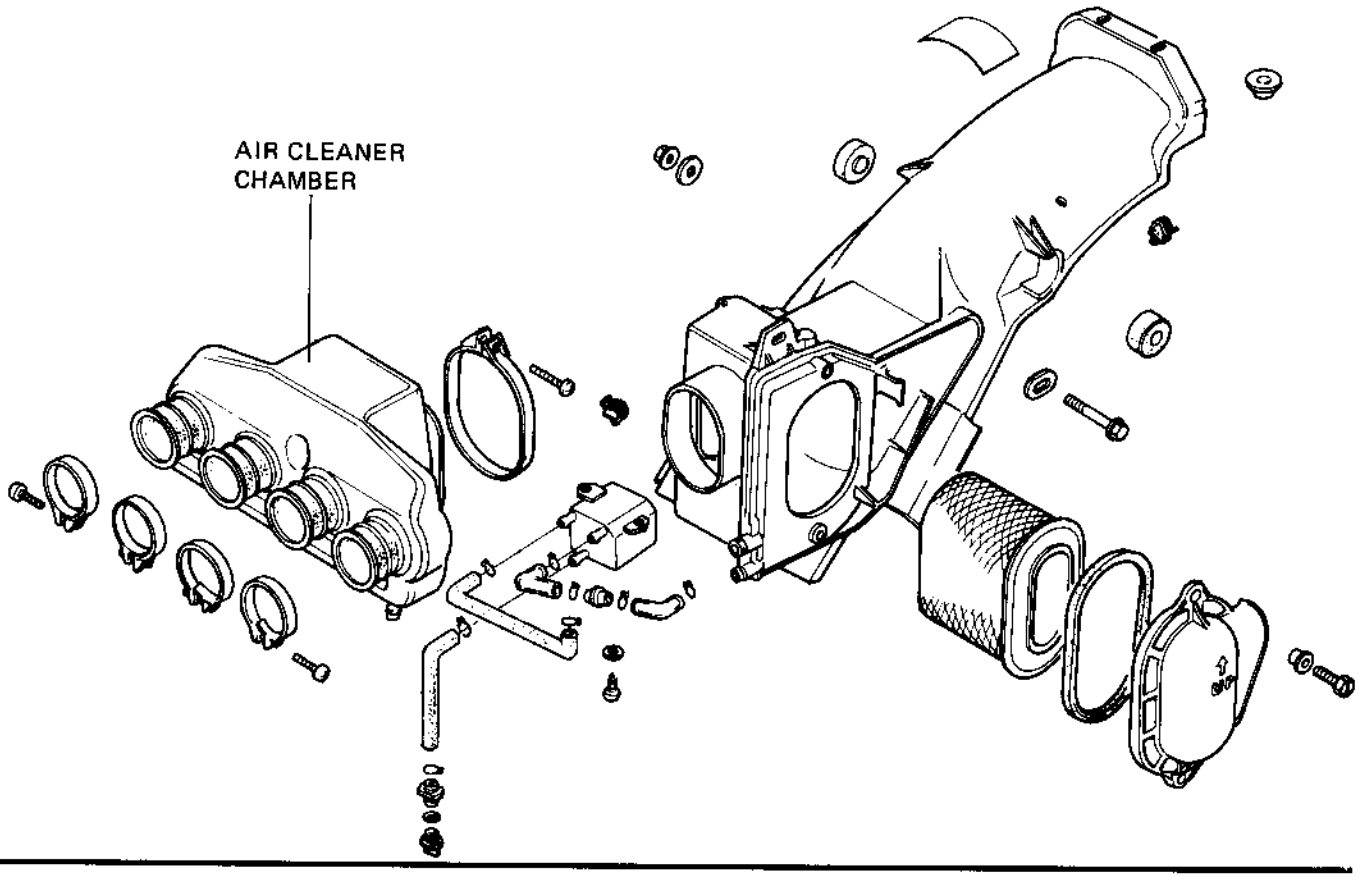
AIR CLEANER CASE

AIR CLEANER CASE/CHAMBER

Check the air cleaner case for deterioration.

CRANKCASE VENTILATION SYSTEM

Check that the breather tube is not restricted.



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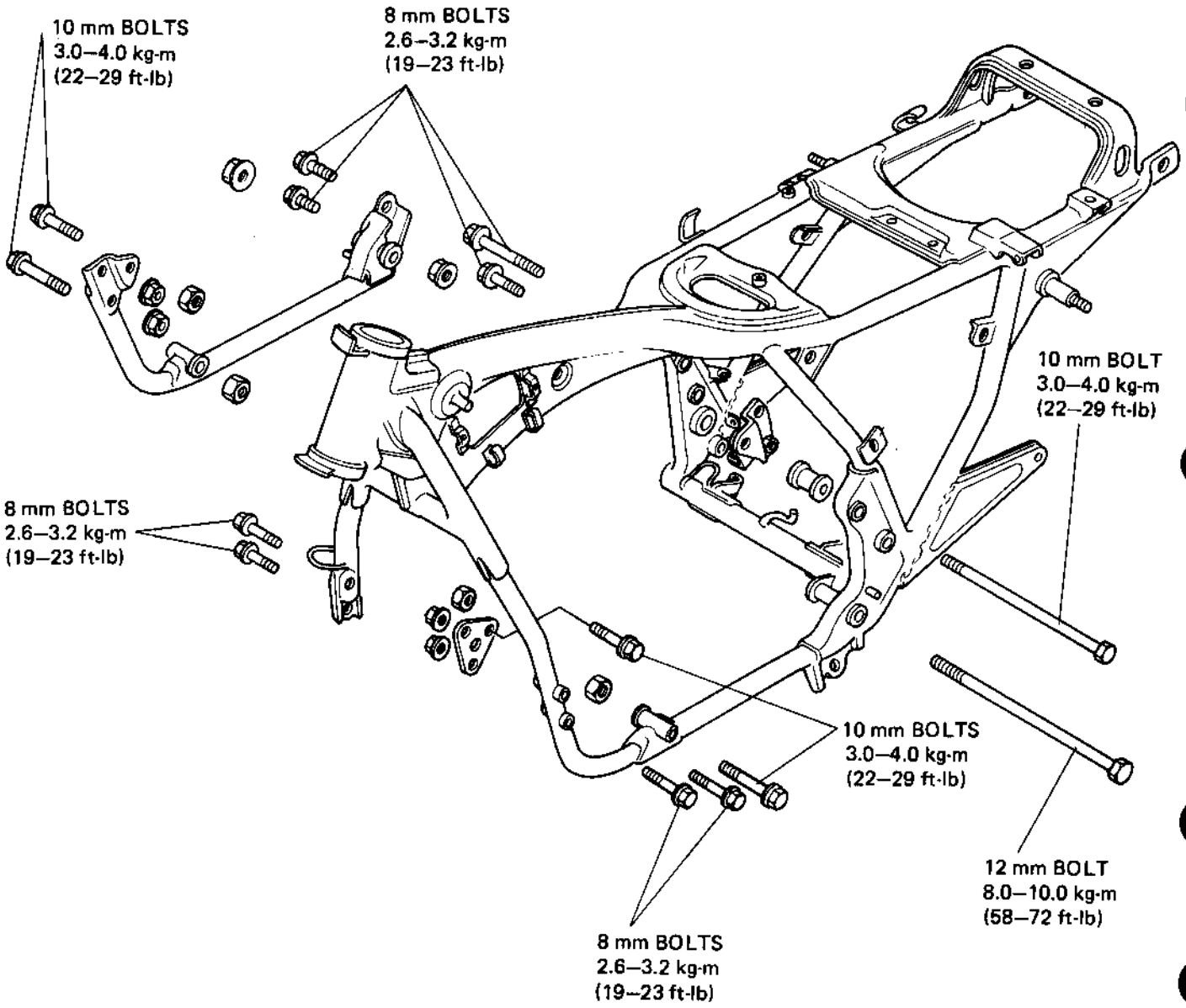

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5. ENGINE REMOVAL/INSTALLATION

SERVICE INFORMATION

GENERAL INSTRUCTIONS

The following parts or components can be serviced with the engine installed in the frame.

- **Clutch**
- **Shift linkage**
- **Camshaft**
- **Carburetor**
- **A. C. generator**
- **Starter motor**
- **Cylinder head**
- **Cylinder**
- **Piston**
- **Cam chain tensioner**
- **Oil pump**

TORQUE VALUES

8 mm bolt	2.6–3.2 kg-m (19–23 ft-lb)
10 mm bolt	3.0–4.0 kg-m (22–29 ft-lb)
12 mm bolt	8.0–10.0 kg-m (58–72 ft-lb)
Rear axle nut	8.0–10.0 kg-m (58–72 ft-lb)
Spark plug	1.2–1.6 kg-m (9–12 ft-lb)
Swing arm pivot	6.0–7.0 kg-m (43–51 ft-lb)

SPECIFICATIONS

Engine dry weight	70 kg	(154.4 lb) approx.
Oil capacity	3.5 lit	(3.7 US qt) at engine assembly
	3.0 lit	(3.2 US qt) at oil change

ENGINE REMOVAL

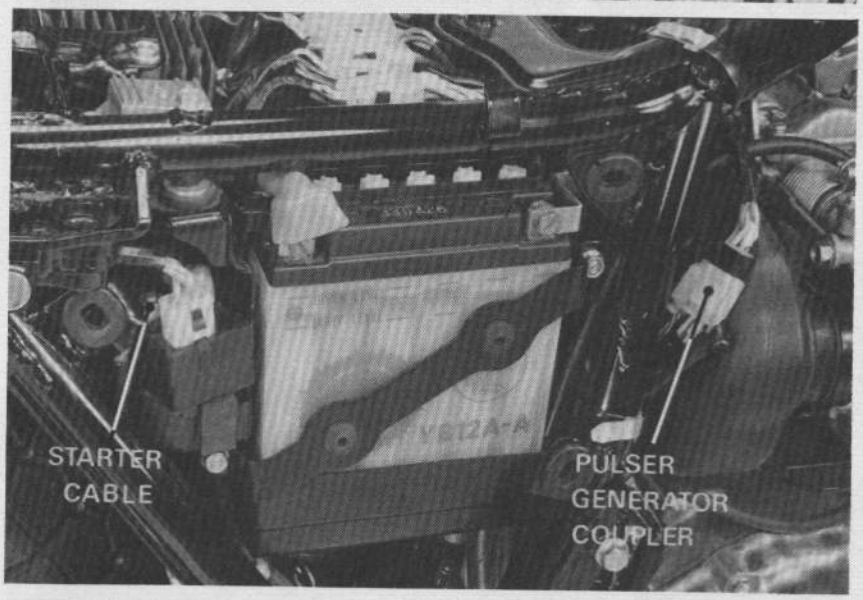
Drain the engine oil (See page 2–2).

Turn the fuel valve OFF.

Raise the seat and remove the fuel tank and both side covers.

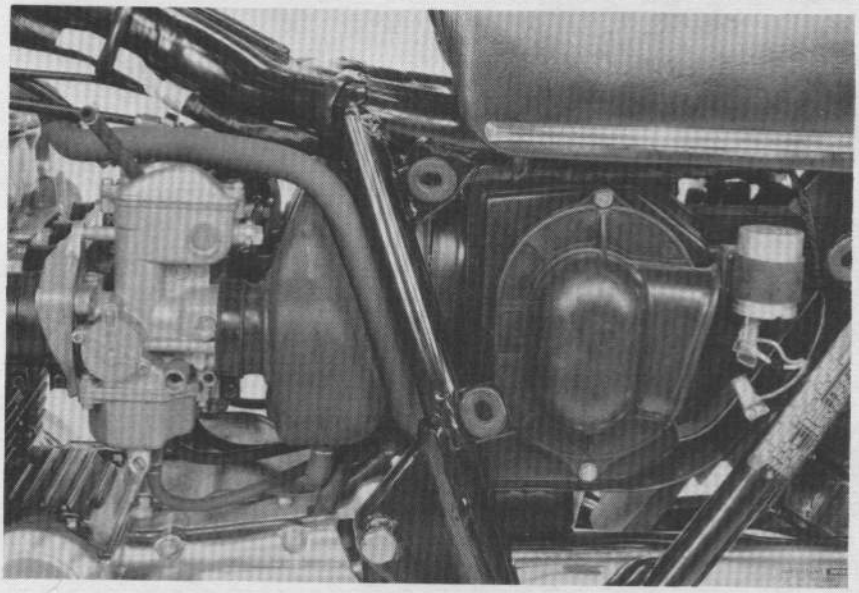
Disconnect the starter cable at the starter relay switch.

Disconnect the pulser generator coupler.



Disconnect the crankcase breather tube from the breather cover.

Remove the carburetor (Page 4–3).



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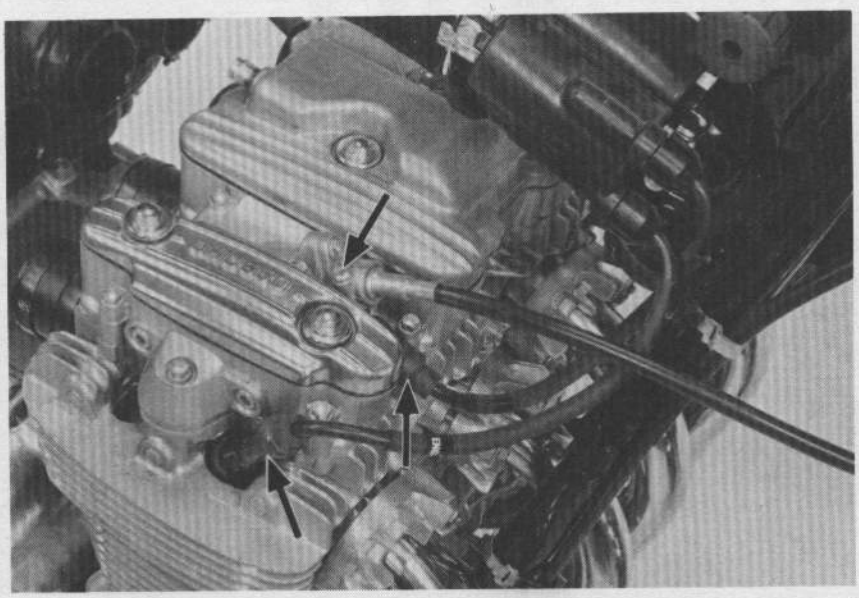
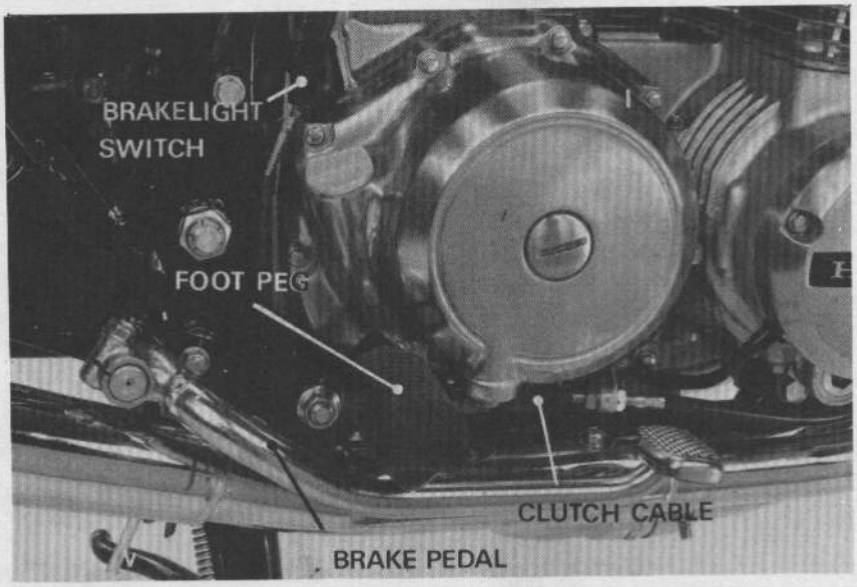
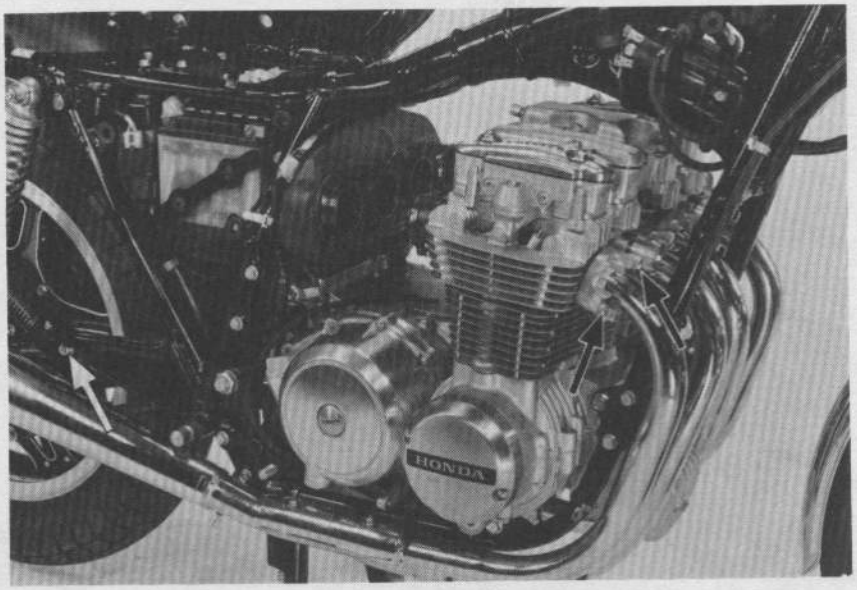
Remove the spark plug caps.
Disconnect the tachometer cable.



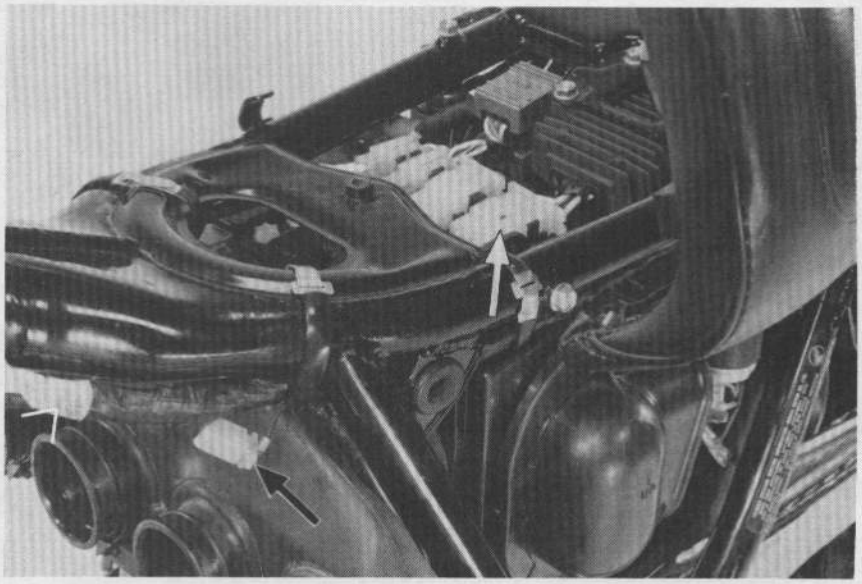
Disconnect the clutch cable at the clutch arm.
Remove the brake pedal.
Remove the right foot peg.
Remove the brakelight switch.



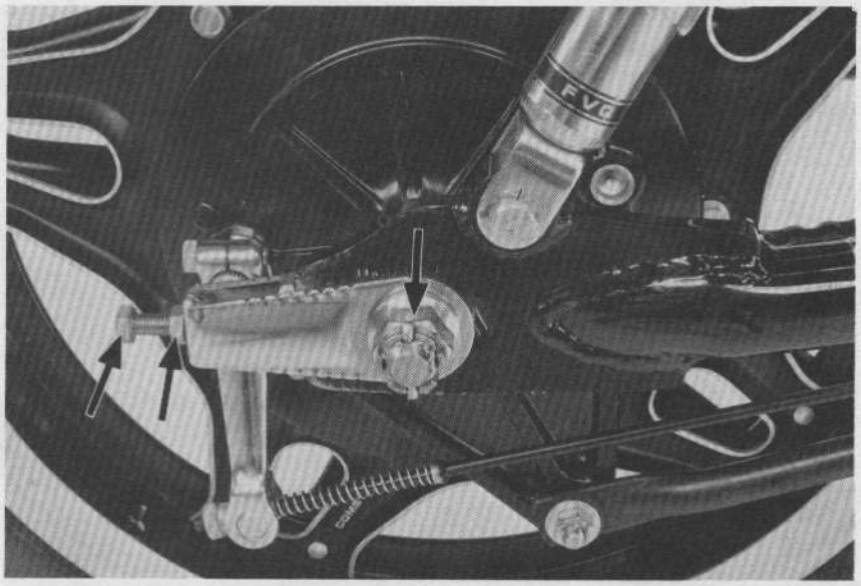
Remove the exhaust system.



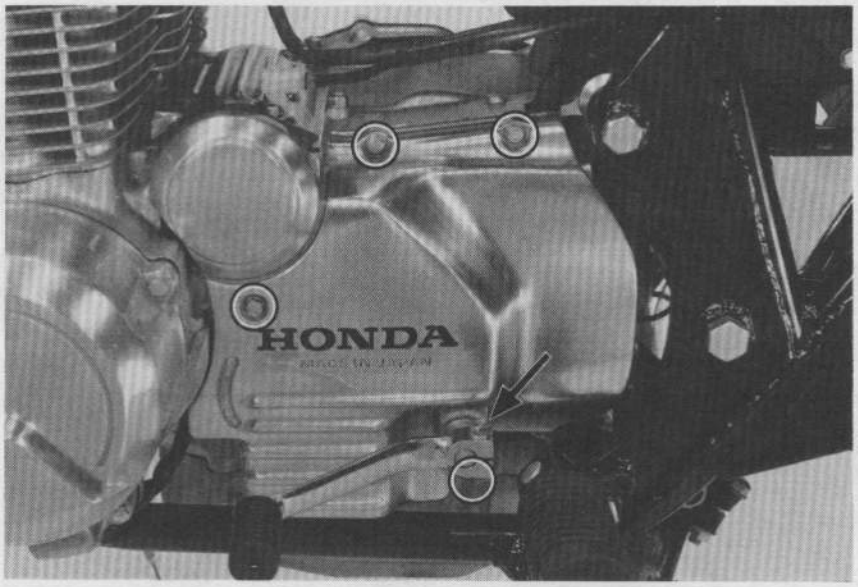
Disconnect the A. C. generator coupler.
Disconnect the neutral and oil pressure switch coupler.



Remove the cotter pin and loosen the rear axle nut.
Loosen both chain adjusters and push the rear wheel forward.



Remove the gearshift pedal.
Remove the left rear crankcase cover.



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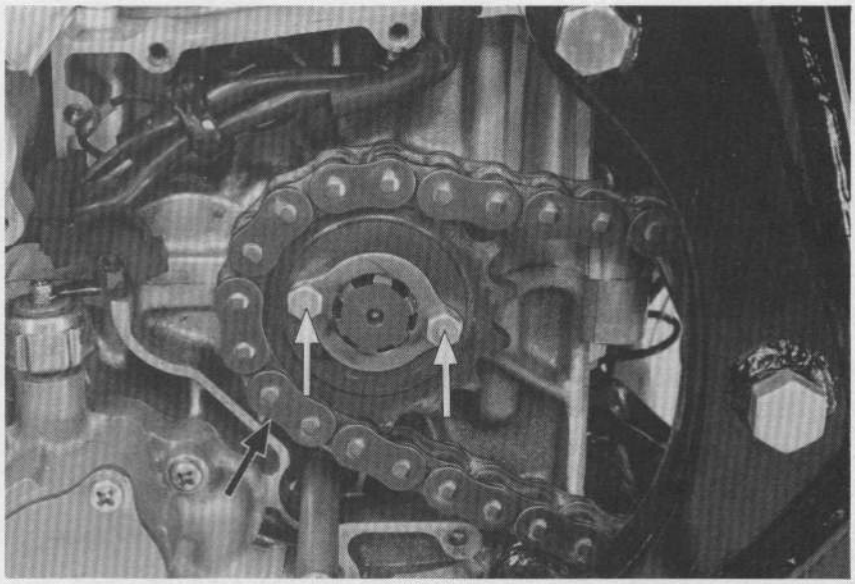
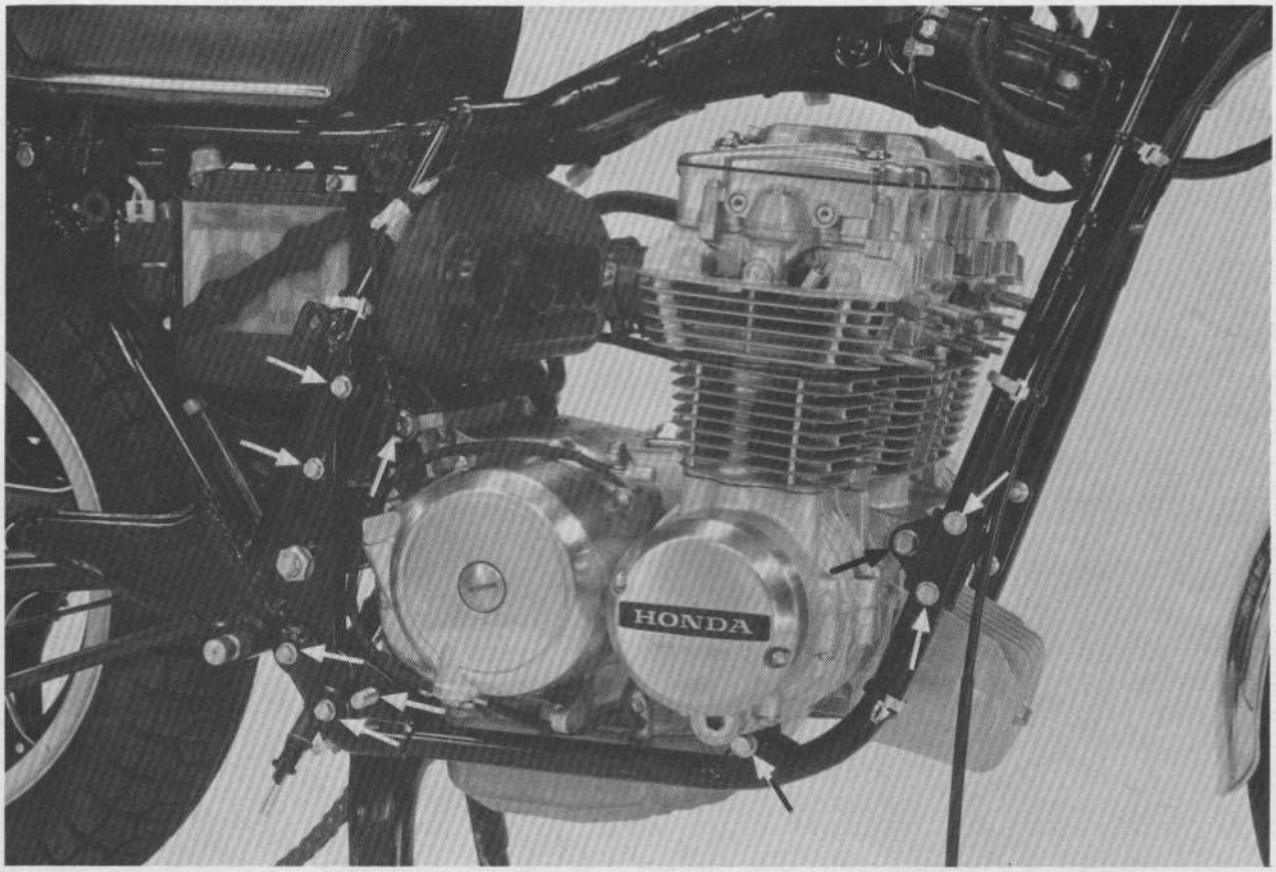
Remove the drive sprocket and drive chain.
Drain the engine oil.
Remove the oil filter.



Place a jack under the engine.
Remove the engine hanger brackets and bolts.
Remove the engine from the right side.



ENGINE INSTALLATION

The installation sequence is essentially the reverse of removal.

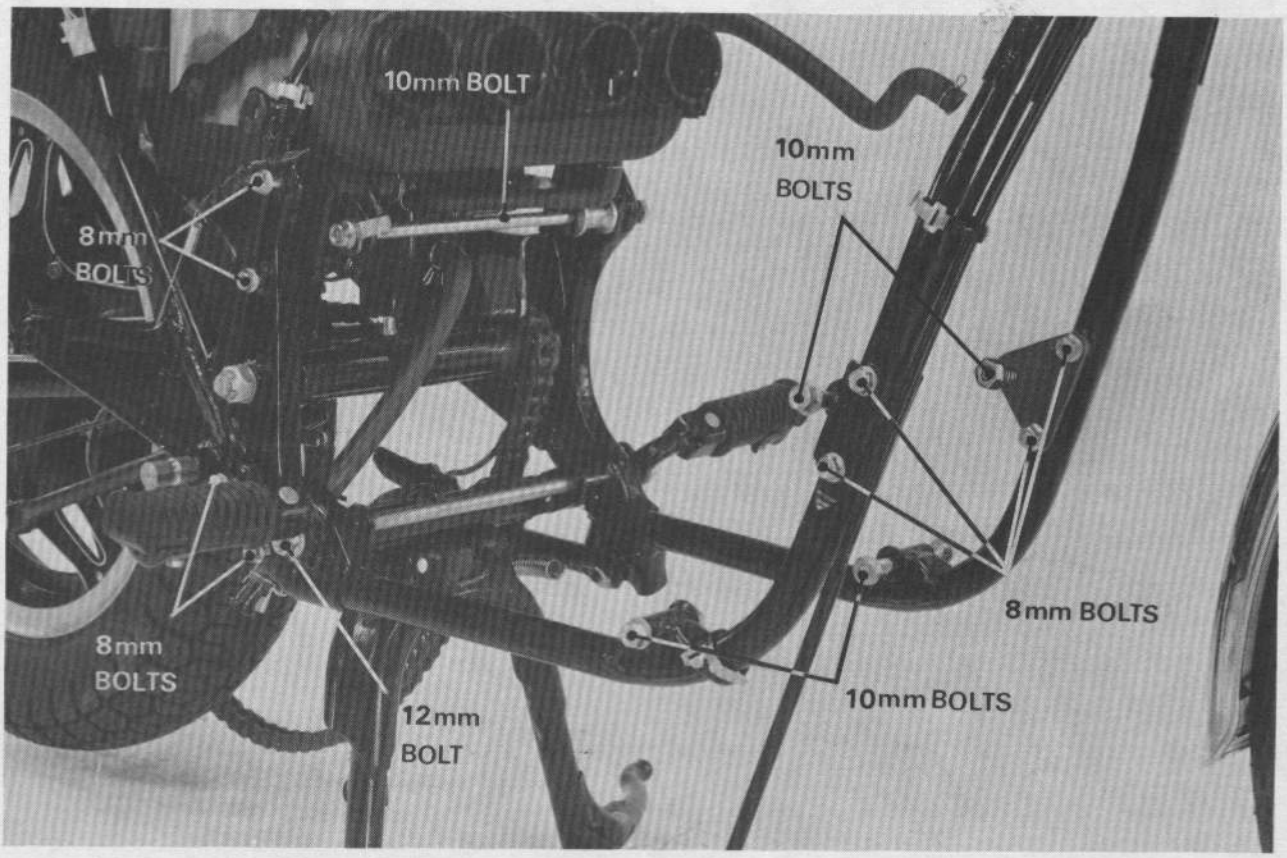
NOTE

- Route the wires and cables properly (Pages 1–10 to 1–11).
- Fill the crankcase to the proper level (Page 2–2).
- Perform the following inspections and adjustments:

Throttle cable free play (Page 3–7)
Clutch lever free play (Page 3–16)
Drive chain free play (Page 3–12)
Choke cable (Page 3–8)
Idle speed (Page 3–11)

TORQUE VALUES:

8 mm flange bolt/nut	2.6–3.2 kg-m (19–23 ft-lb)
10 mm flange bolt/nut	3.0–4.0 kg-m (22–29 ft-lb)
12 mm flange bolt/nut	8.0–10.0 kg-m (58–72 ft-lb)



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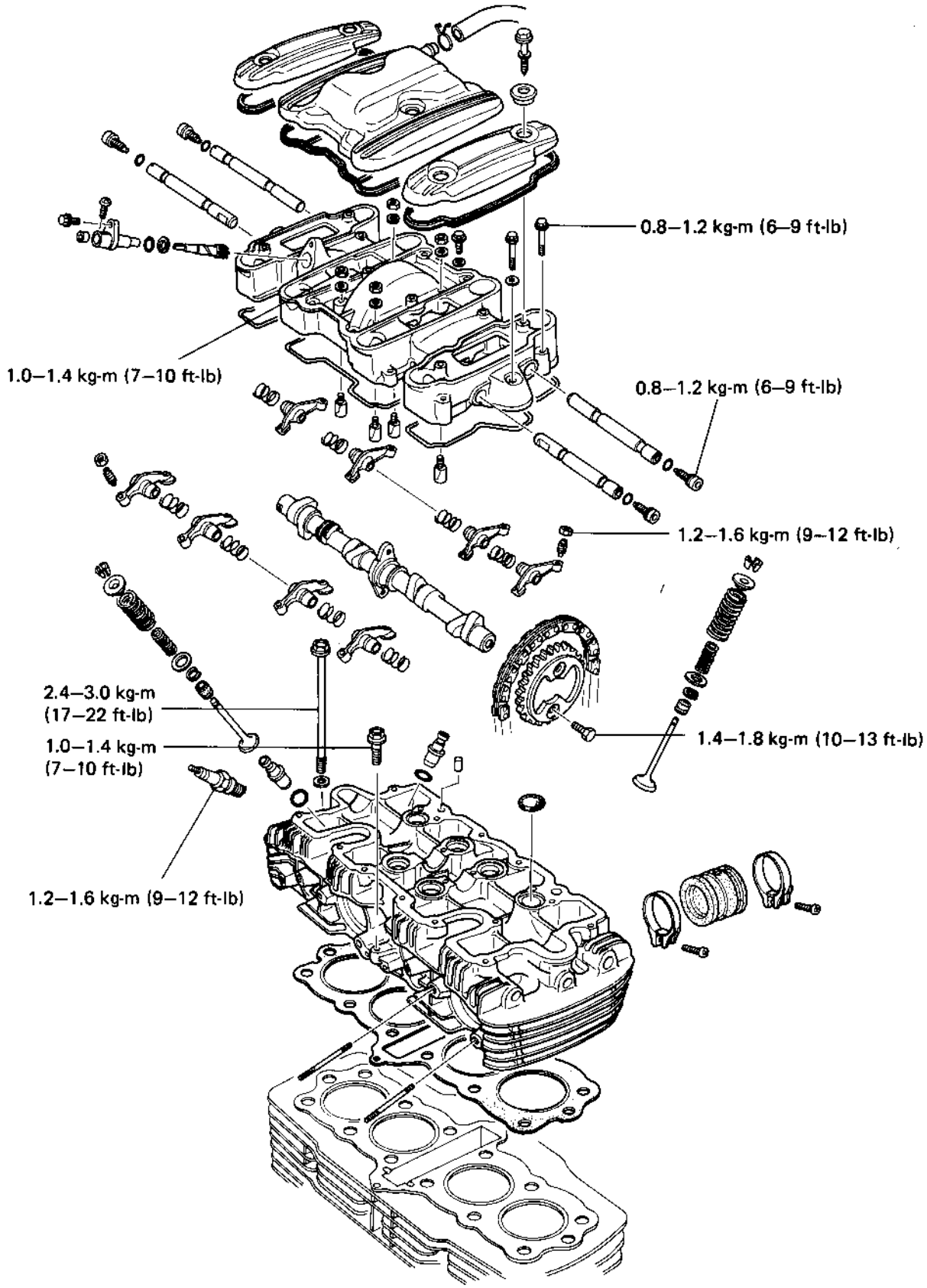

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6. CYLINDER HEAD/VALVE

SERVICE INFORMATION

GENERAL INSTRUCTIONS

- All cylinder head maintenance and inspection can be accomplished without removing the engine.
- During assembly, apply molybdenum disulfide grease to the camshaft bearing to provide initial lubrication.

SPECIAL TOOLS

Special Tools

Valve Guide Reamer	07984–2000000
Cylinder Head Bolt Wrench	07906–3230000

Common Tools

Valve Guide Remover (5.5 mm)	07742–0010100
Valve Guide Driver (B)	07742–0020200
Valve Spring Compressor	07757–0010000

TORQUE VALUES

Cylinder head cover	0.8–1.2 kg-m (6–9 ft-lb)
Valve adjusting nut	1.2–1.6 kg-m (9–12 ft-lb)
Rocker arm shaft cotter pin	1.0–1.4 kg-m (7–10 ft-lb)
Rocker arm shaft cap bolt	0.9–1.2 kg-m (6–9 ft-lb)
Cylinder head bolt: 8 mm	2.4–3.0 kg-m (17–22 ft-lb)
6 mm	1.0–1.4 kg-m (7–10 ft-lb)
Spark plug	1.2–1.6 kg-m (9–12 ft-lb)
Cam sprocket	1.4–1.8 kg-m (10–13 ft-lb)
Cam chain tensioner	1.0–1.4 kg-m (7–10 ft-lb)

SPECIFICATIONS

			STANDARD	SERVICE LIMIT
Compression pressure			12 ± 2 kg/cm² (170 ± 28 psi)	———
Camshaft	Cam height	IN	35.627–35.787 mm (1.4026–1.4089 in)	35.6 mm (1.40 in)
		EX	35.314–35.474 mm (1.3903–1.3966 in)	35.3 mm (1.39 in)
	Runout		———	0.1 mm (0.004 in)
	End clearance		0.035–0.050 mm (0.0013–0.0020 in)	0.1 mm (0.004 in)
	Oil clearance		0.160–0.202 mm (0.0063–0.0080 in)	0.21 mm (0.008 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.		11.973–11.984 mm (0.4714–0.4718 in)	11.94 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)	5.45 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	0.030–0.050 mm (0.0012–0.0020 in)	0.10 mm (0.004 in)
	Valve stem runout		———	0.05 mm (0.002 in)
	Valve length	IN	90.2 mm (3.55 in)	89.7 mm (3.53 in)
		EX	88.7 mm (3.49 in)	88.0 mm (3.47 in)
	Valve seat width		1.2 mm (0.05 in)	1.5 mm (0.06 in)
Valve spring	Free length	Inner	39.2 mm (1.54 in)	37.9 mm (1.49 in)
		Outer	44.8 mm (1.77 in)	43.3 mm (1.70 in)
	Preload /length	Inner	21.85–25.15 kg/25.9 mm (48.17–48.83 lb/1.02 in)	20.8 kg/25.9 mm (45.9 lb/1.02 in)
		Outer	50.22–57.78 kg/30.6 mm (110.7–123.0 lb/1.20 in)	47.2 kg/30.6 mm (1.40 lb/1.20 in)
Cylinder head	Warpage		———	0.25 mm (0.010 in)

TROUBLESHOOTING

Engine top-end problems usually affect engine performance. These can be diagnosed by a compression test, or by tracing noises to the top-end 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 7.)

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

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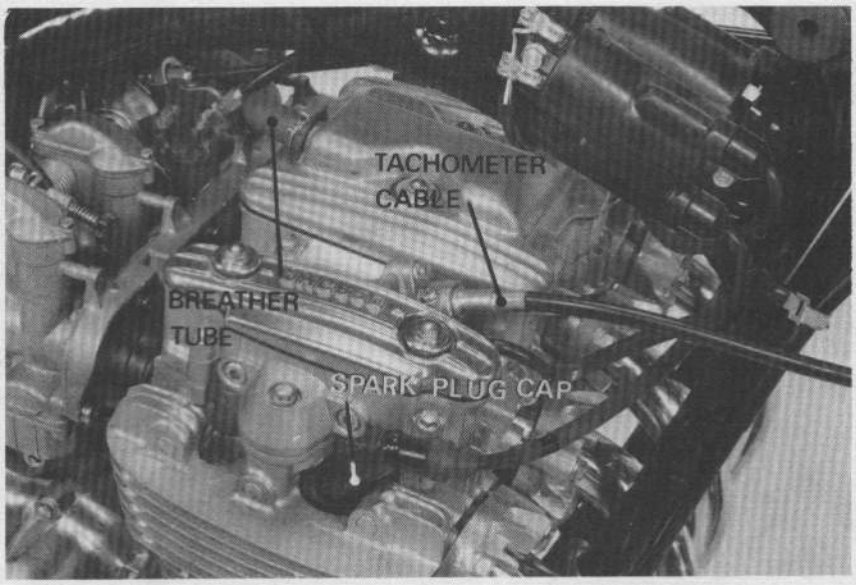
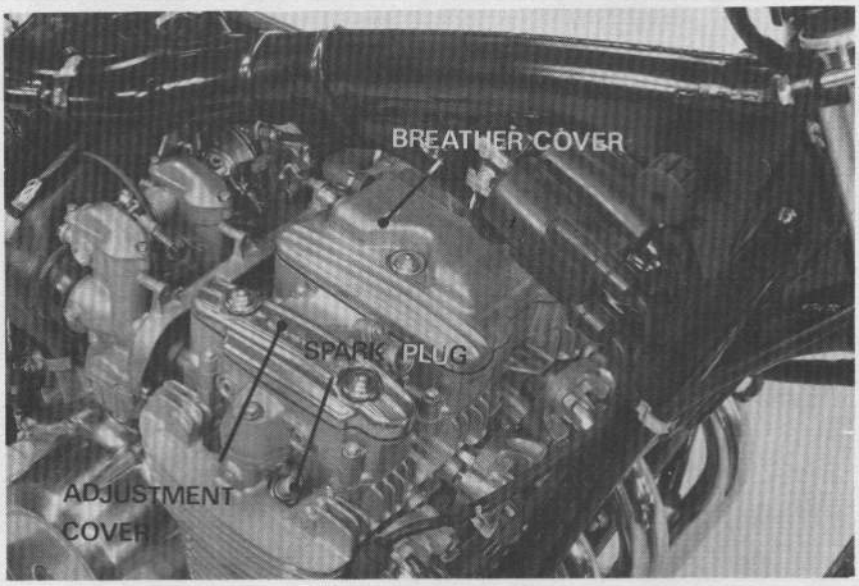
CYLINDER HEAD COVER REMOVAL

Disconnect the tachometer cable.
Disconnect the breather tube.
Remove the spark plug caps.

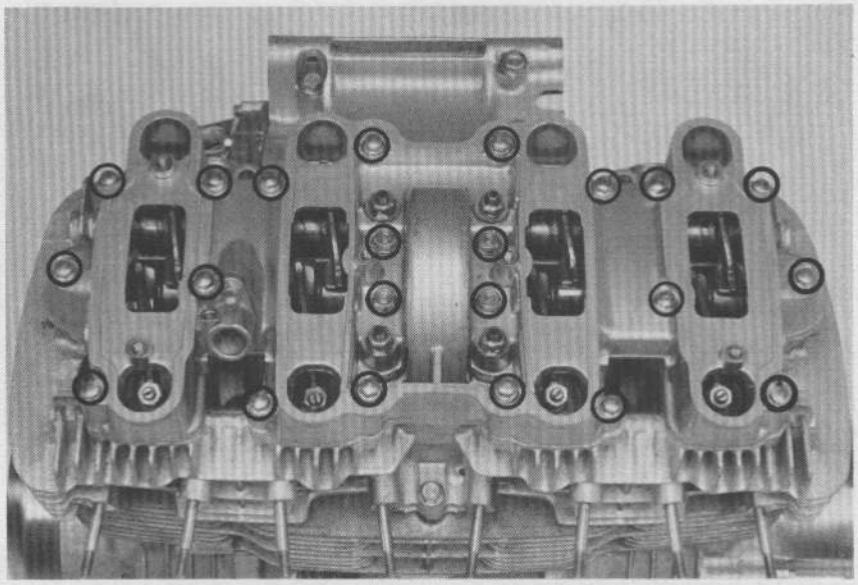


Remove the spark plugs.
Remove the right and left adjustment covers and breather cover.



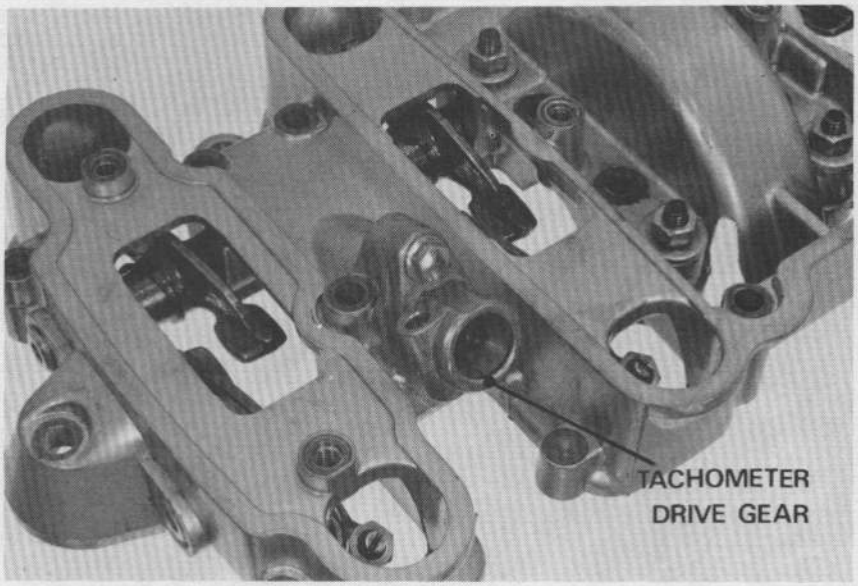
Loosen the cylinder head cover bolts evenly and remove the cylinder head cover.

CAUTION
Remove the bolts in 2–3 steps in a crisscross pattern to prevent warpage.

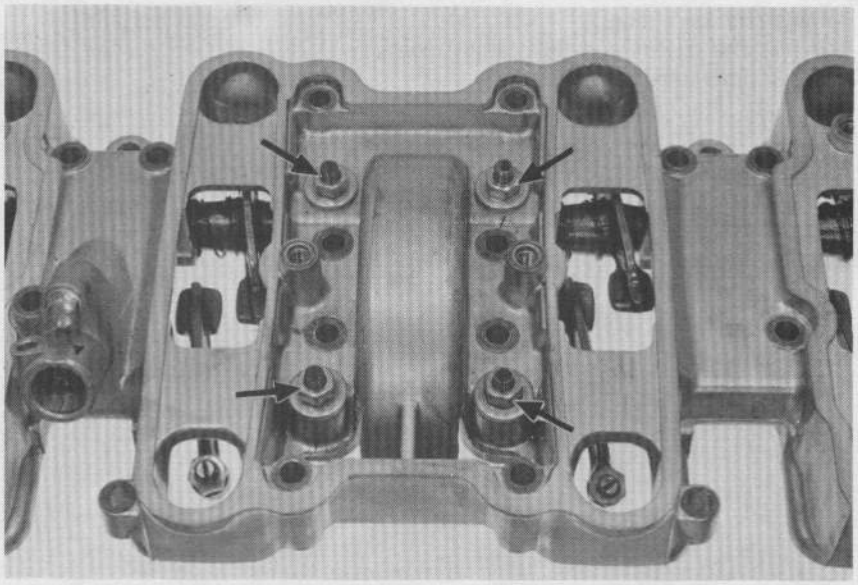


CYLINDER HEAD COVER DISASSEMBLY

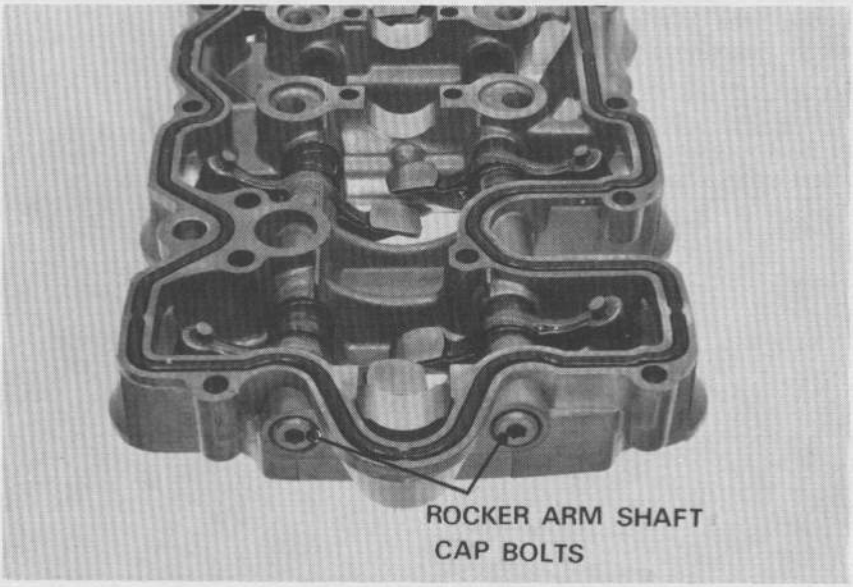
Remove the tachometer drive gear attaching bolt and drive gear.



Remove the rocker arm shaft cotter pin nuts.
Drive the cotter pins out.



Remove the rocker arm shaft cap bolts.



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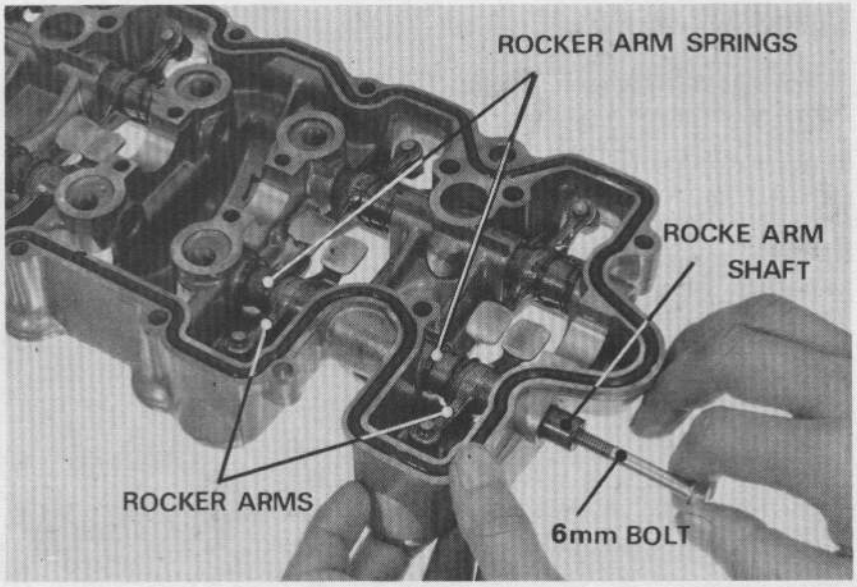
Screw a 6 mm bolt in the rocker arm shaft and pull the rocker arm shaft out.

Remove the rocker arms and springs.

NOTE

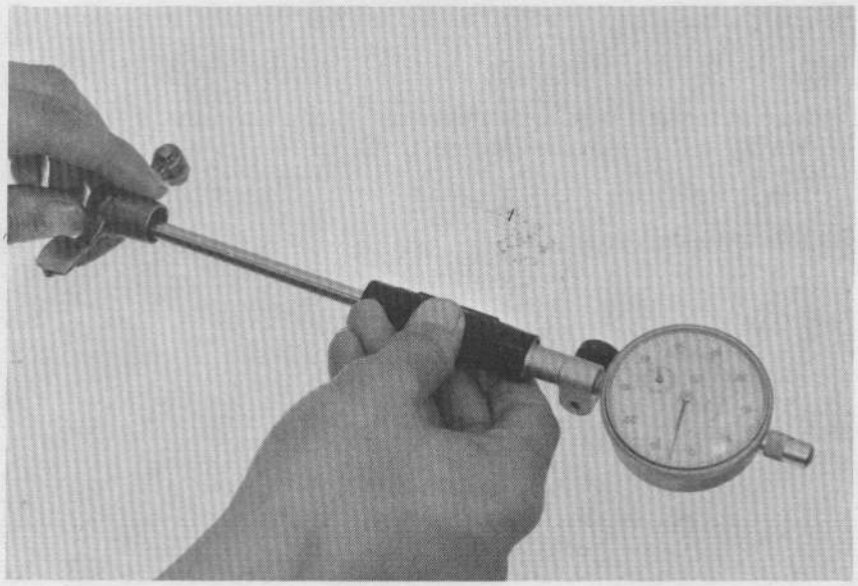
Mark all disassembled parts to ensure correct assembly.



ROCKER ARM BORE I. D. MEASUREMENT

Measure rocker arm bore I. D.

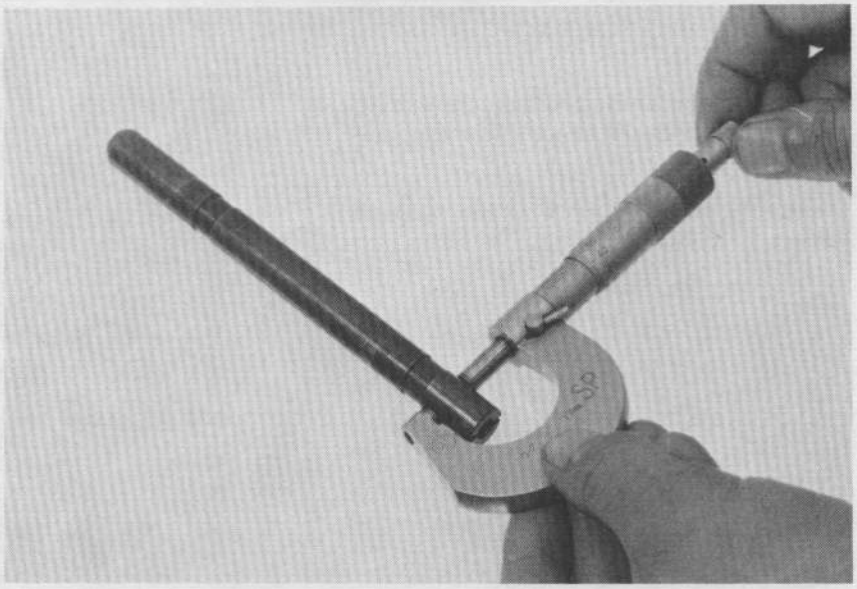
SERVICE LIMIT: 12.05 mm (0.474 in)



ROCKER ARM SHAFT O. D. MEASUREMENT

Measure rocker arm shaft O. D.

SERVICE LIMIT: 11.94 mm (0.470 in)



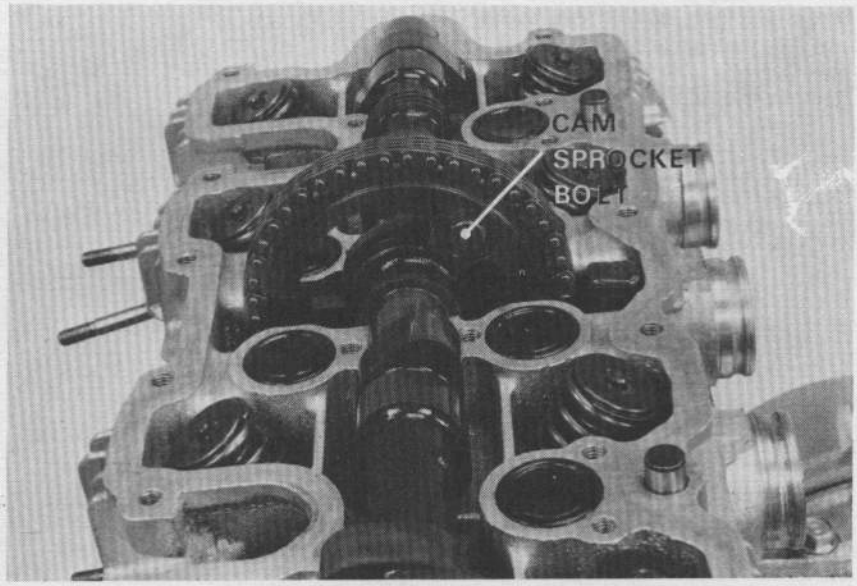
CAMSHAFT REMOVAL

Remove the pulser generator cover.
Remove one cam sprocket bolt.

Turn the crankshaft clockwise and remove the other cam sprocket bolt.

NOTE

Do not allow bolts to fall into the crankcase.

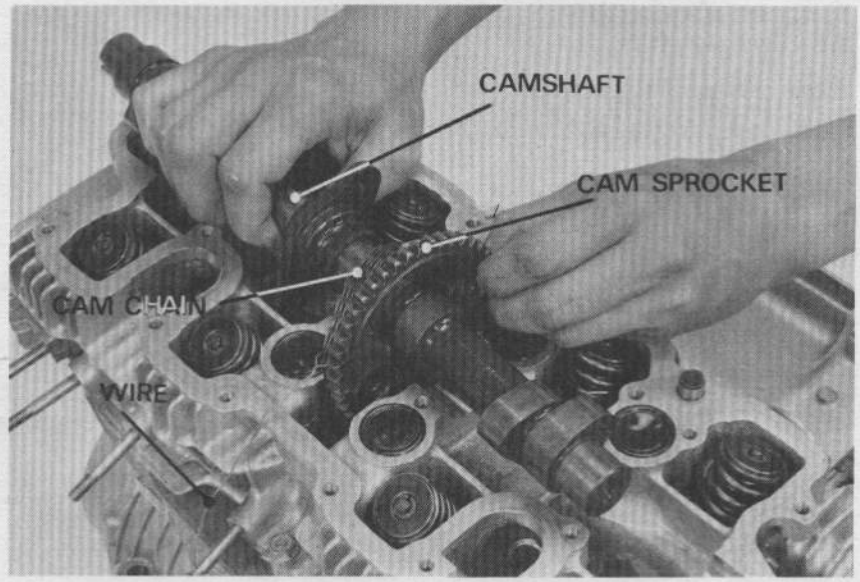


Remove the camshaft.

NOTE

Suspend the cam chain with a piece of wire to keep it from falling into the engine.

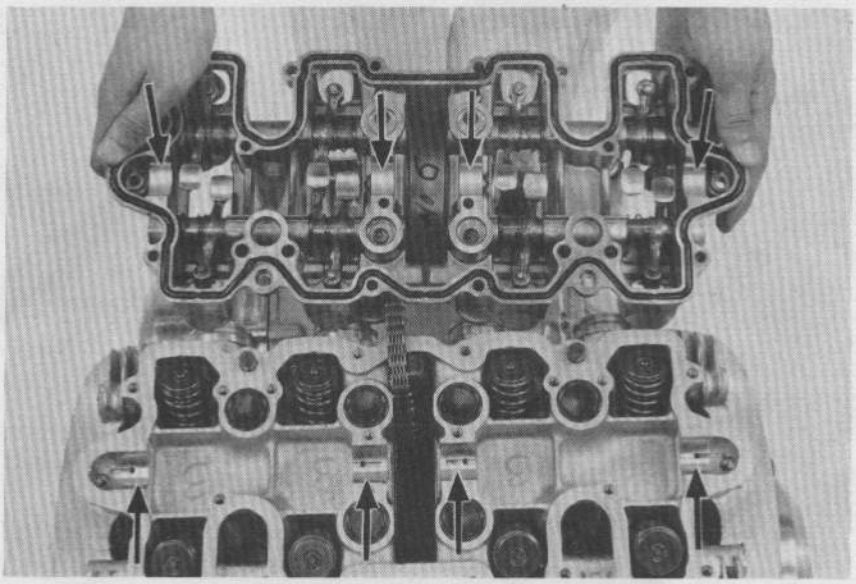
Remove the cam sprocket.



CAM BEARING SURFACE INSPECTION

Inspect the cam bearing surfaces for scoring, scratches, or evidence of insufficient lubrication.

Inspect the bearing surface of the camshaft holders.



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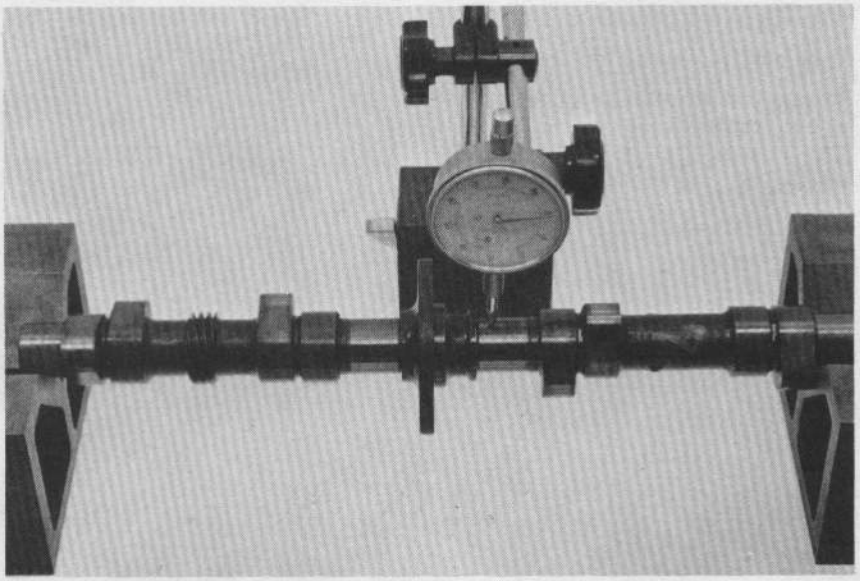
CAMSHAFT RUNOUT

Check the camshaft runout with a dial indicator.
Support both ends of the camshaft with V-blocks.

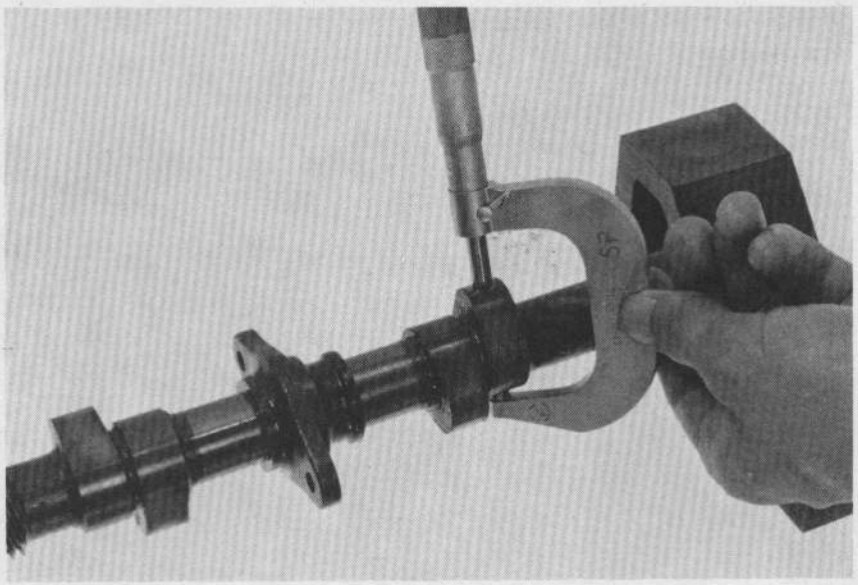
SERVICE LIMIT: 0.1 mm (0.004 in)



CAMSHAFT LOBE INSPECTION

Using a micrometer, measure each cam lobe.
Check for wear or damage.

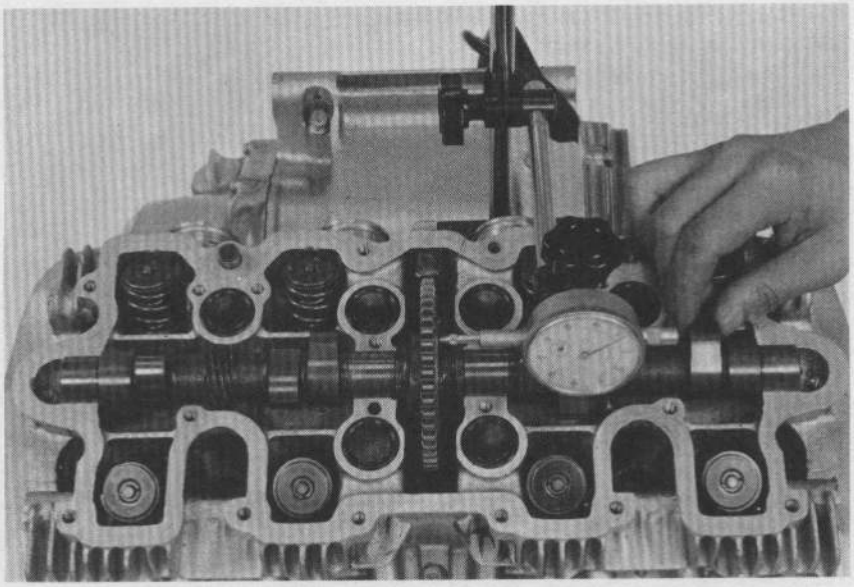
SERVICE LIMITS: IN: 35.6 mm (1.40 in)
EX: 35.3 mm (1.39 in)



CAMSHAFT END CLEARANCE

Using a dial indicator, measure camshaft end clearance.

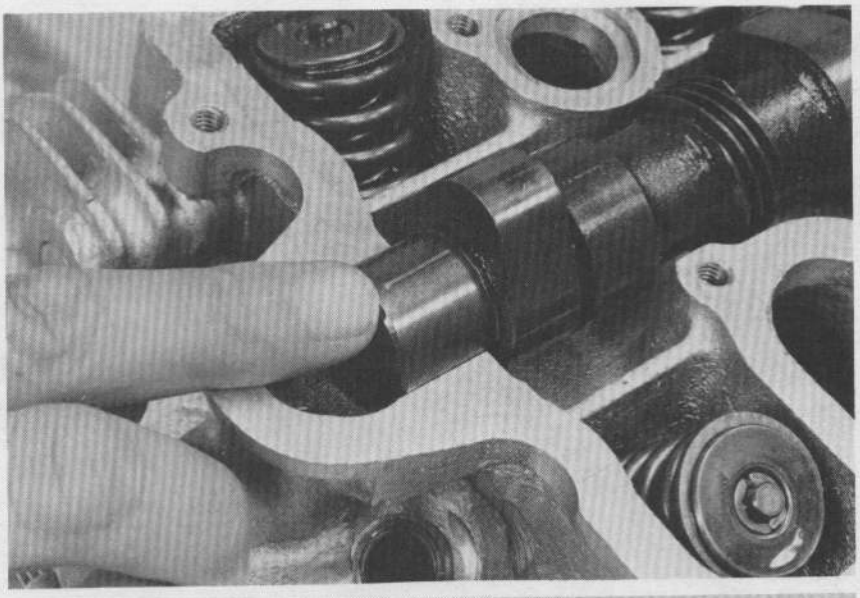
SERVICE LIMIT: 0.1 mm (0.004 in)



CAMSHAFT OIL CLEARANCE

Wipe off any oil from the journals.

Lay a strip of plastigauge lengthwise on top of each camshaft journal.

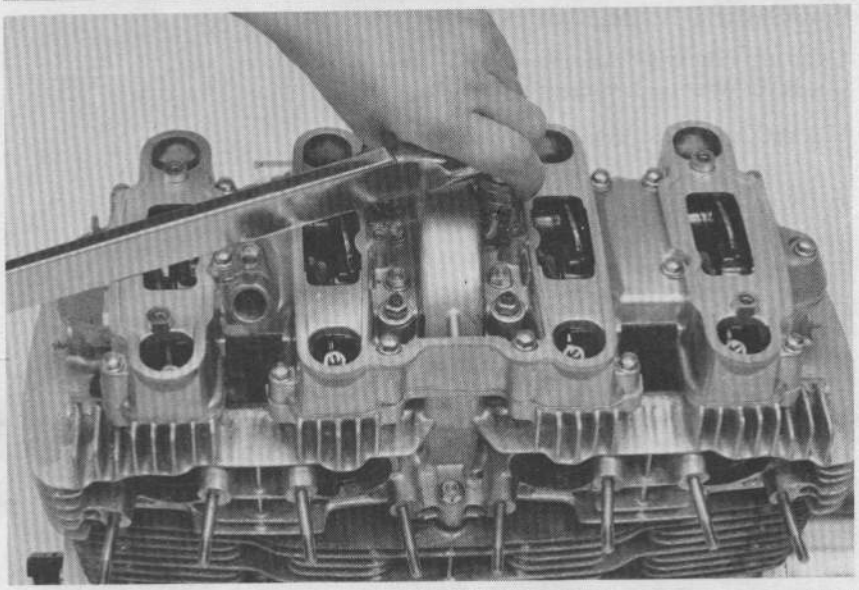


Install the cylinder head cover, and tighten in a crisscross pattern.

NOTE

Do not rotate the camshaft when using plastigauge.

TORQUE: 0.8–1.2 kg-m (6–9 ft-lb)

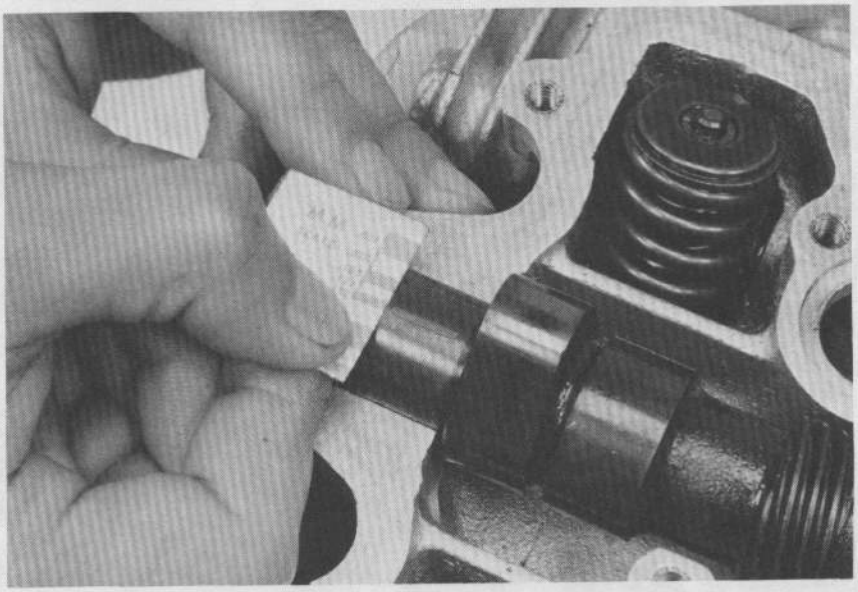


Remove the cylinder head cover and measure the width of each plastigauge. The widest part determines the oil clearance.

SERVICE LIMIT: 0.21 mm (0.008 in)

If the service limits are exceeded, replace the camshaft and recheck the oil clearance.

Replace the cylinder head and cylinder head cover if the clearance still exceeds service limits.



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CYLINDER HEAD REMOVAL

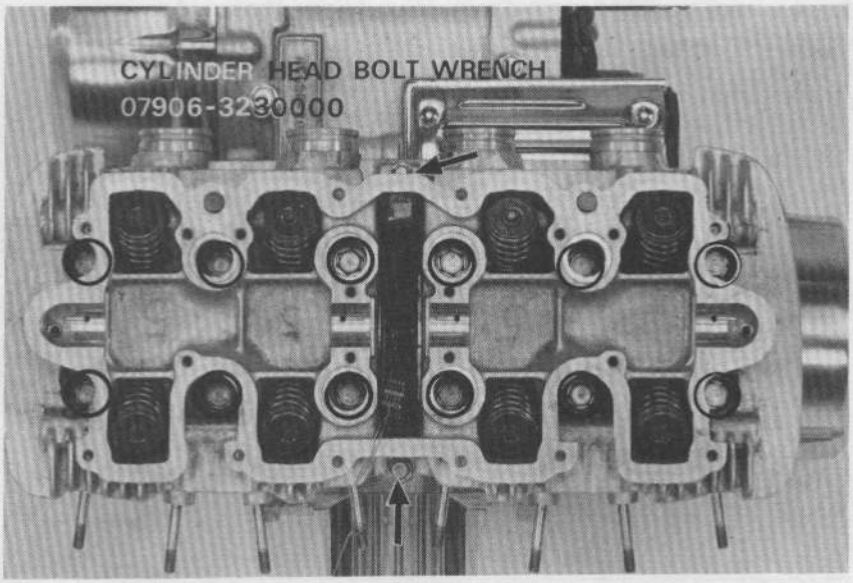
Remove the carburetor assembly (Page 4–2).
Remove the exhaust system (Page 5–3).
Remove the cylinder head cover.
Remove the six rubber seals.

Remove the cam chain tensioner set bolt.
Remove the 14 cylinder head bolts.

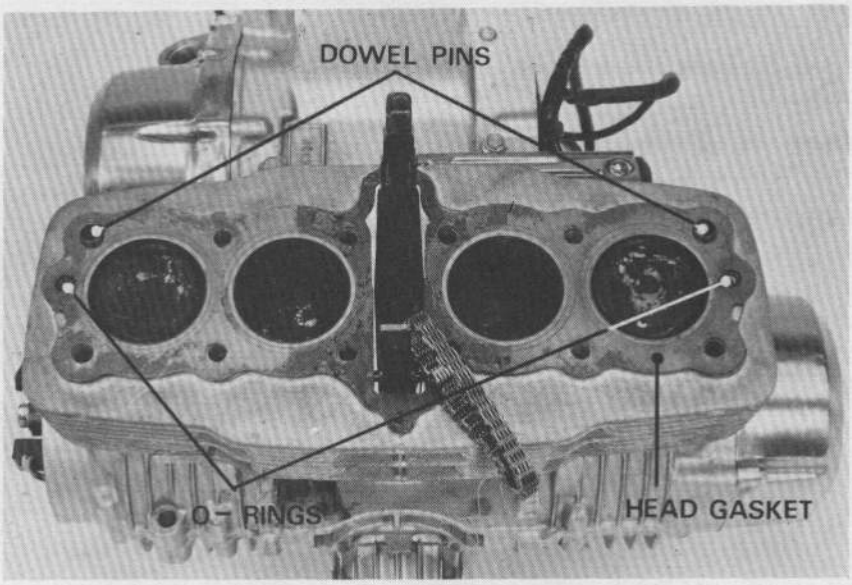
NOTE

Remove the bolts in 2–3 steps in a criss-cross pattern to prevent warpage.

Remove the cylinder head.



Remove the cylinder head gasket, dowel pins and O-rings.



CYLINDER HEAD DISASSEMBLY

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

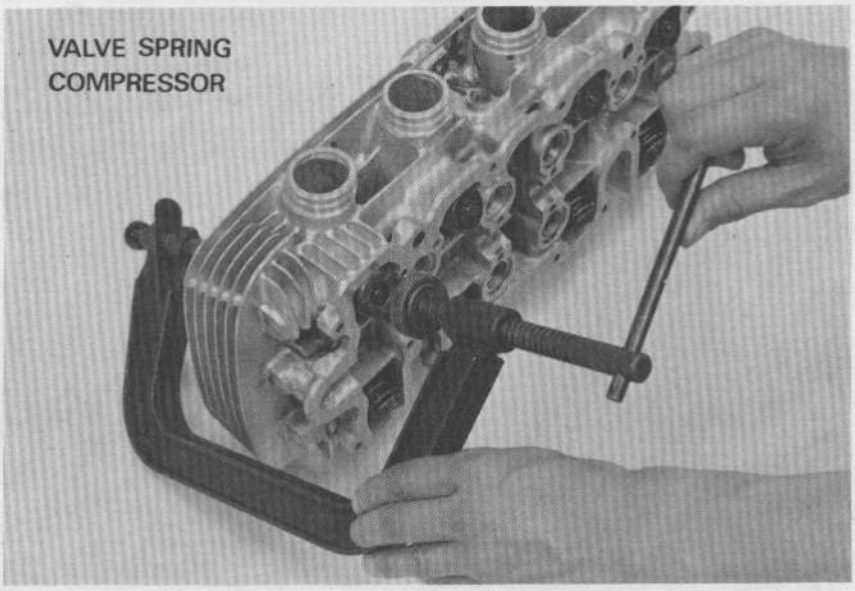
CAUTION

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

NOTE

Mark all disassembled parts to ensure original assembly.

Remove the valve stem seals.

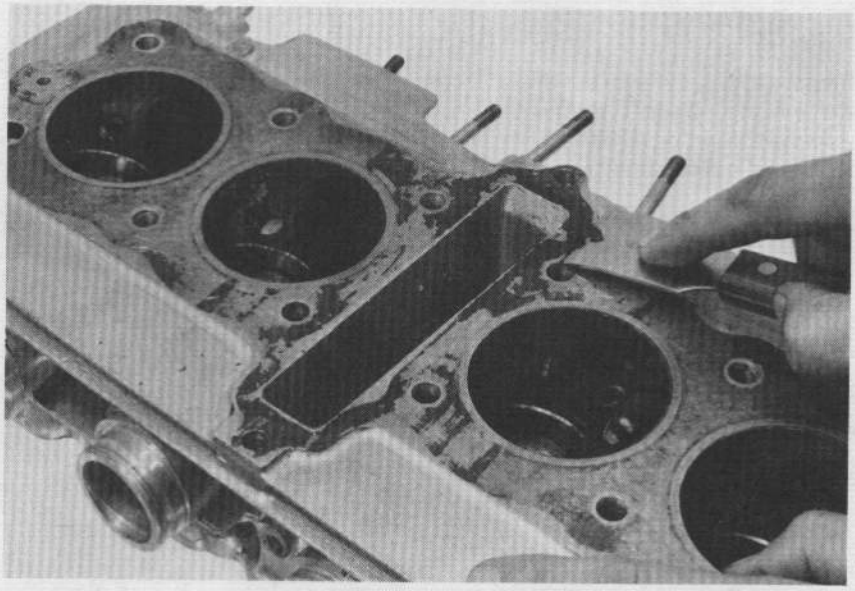


Remove the carbon deposits from the combustion chamber.

Clean off the head gasket surfaces.

NOTE

- Avoid damaging the gasket surfaces.
- The gasket will come off easier if soaked in solvent.

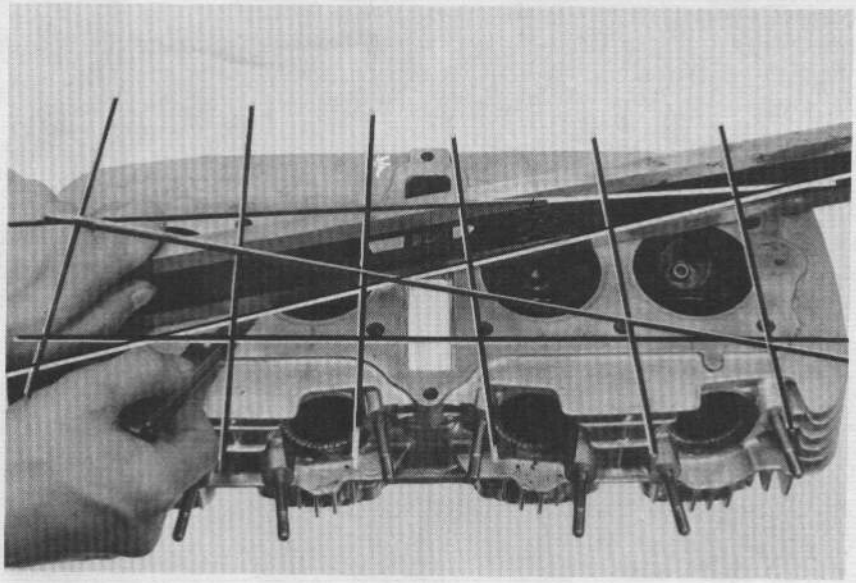


CYLINDER HEAD INSPECTION

Check the spark plug holes and valve areas for cracks.

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

SERVICE LIMIT: 0.25 mm (0.010 in)

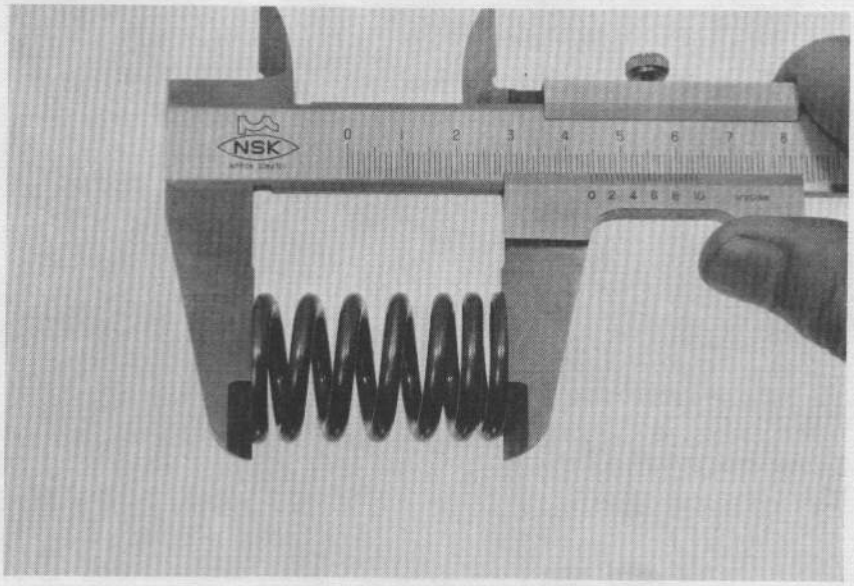


VALVE SPRING FREE LENGTH INSPECTION

Measure the length of the inner and outer valve springs.

SERVICE LIMITS:

Inner:	IN., EX.	37.9 mm (1.49 in)
Outer:	IN., EX.	43.3 mm (1.70 in)



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VALVE STEM-TO-GUIDE CLEARANCE

Inspect each valve for bends, burns, scratches or abnormal stem wear.

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

SERVICE LIMITS:
IN: 5.47 mm (0.215 in)
EX: 5.45 mm (0.214 in)

Measure valve stem runout.

SERVICE LIMIT: 0.05 mm (0.002 in)

Measure the valve length.

SERVICE LIMITS: IN. 89.7 mm (3.53 in)
EX. 88.0 mm (3.47 in)

NOTE

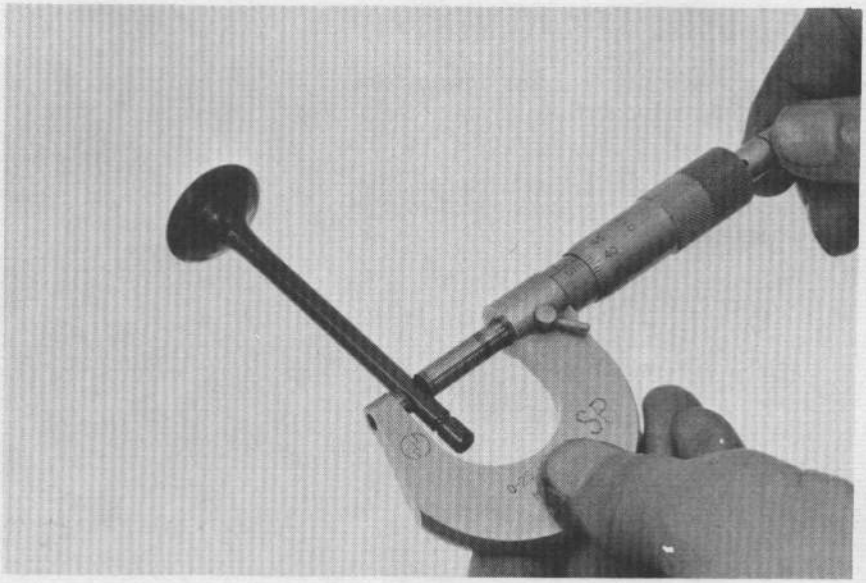
Ream the guides to remove any carbon build-up before checking clearance.

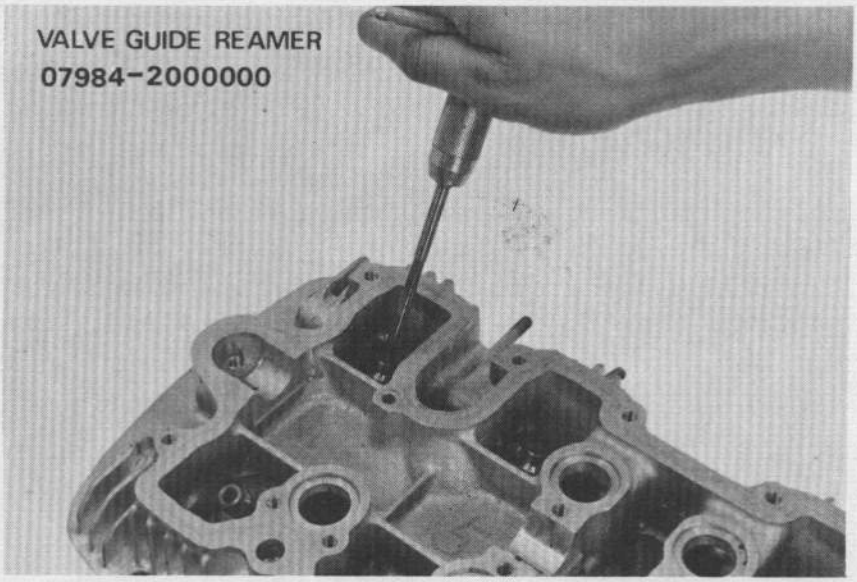
Measure and record each valve guide I. D. using a ball gauge or inside micrometer.

SERVICE LIMITS: IN. 5.55 mm (0.219 in)
EX. 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 LIMITS: IN. 0.08 mm (0.003 in)
EX. 0.10 mm (0.004 in)





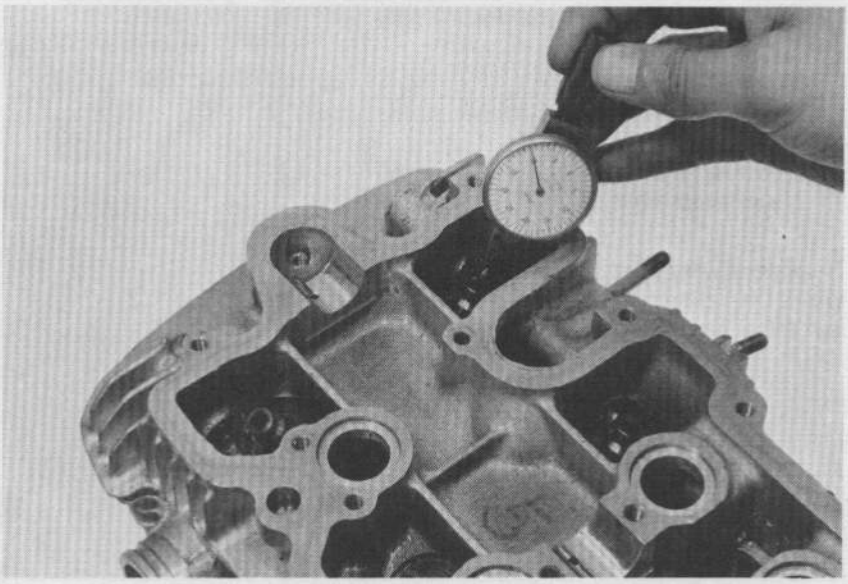
NOTE

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

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

NOTE

Reface the valve seats whenever the valve guides are replaced (Page 6–12).

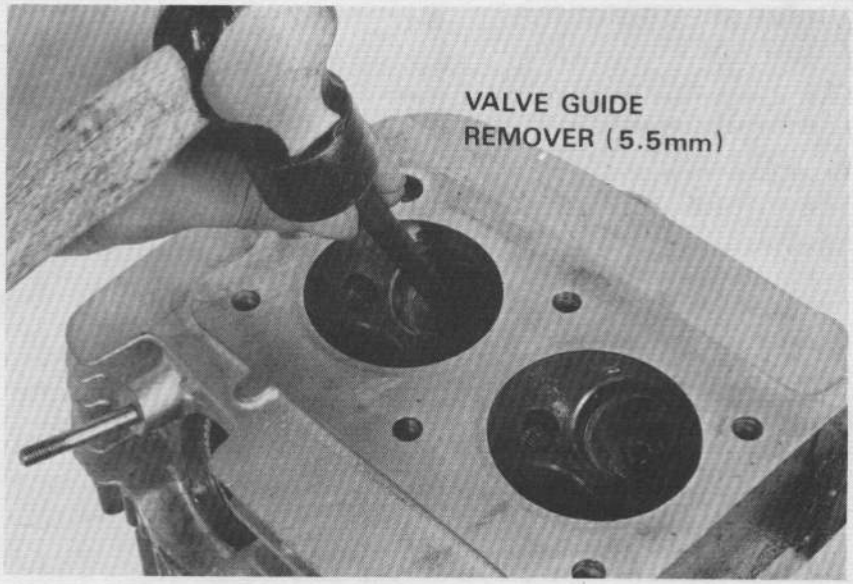


VALVE GUIDE REPLACEMENT

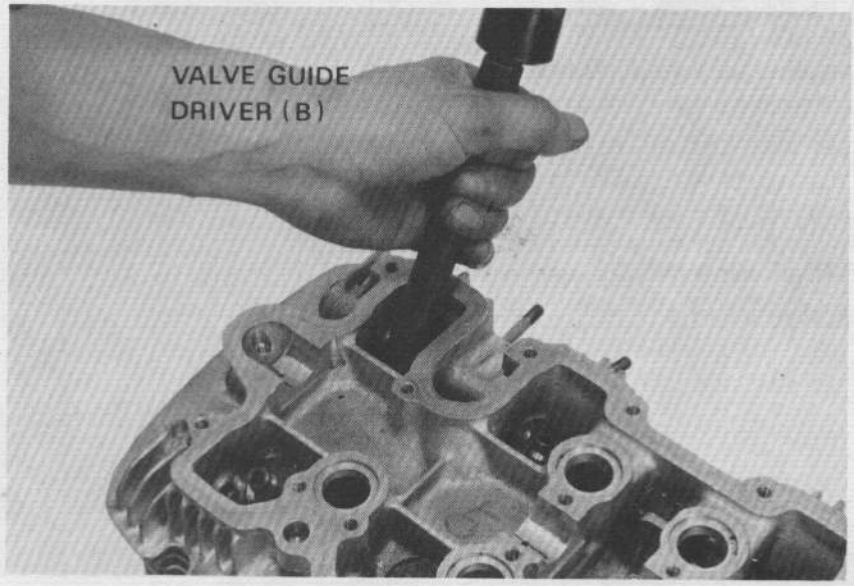
Support the cylinder head and drive out the guide from the valve port.

NOTE

When driving out the valve guide, do not damage the head.



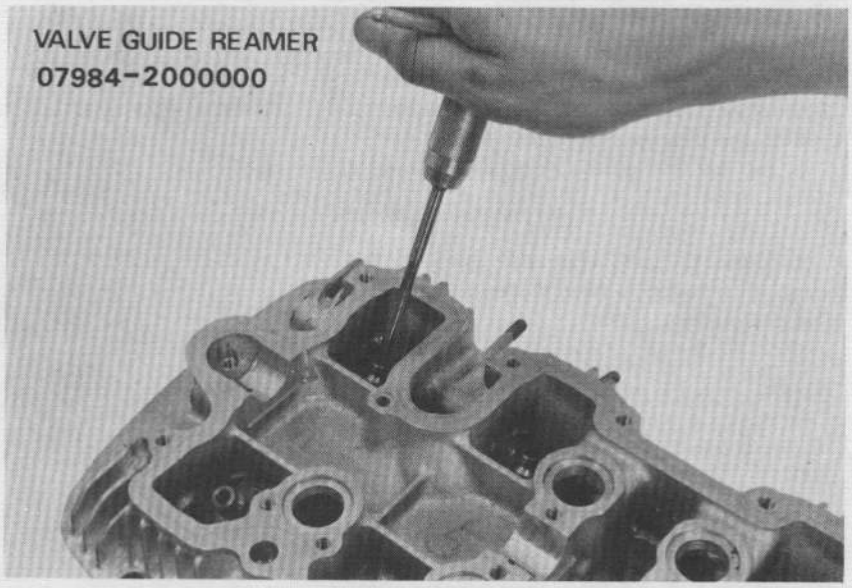
Install an oversize valve guide form the top of the head.



Ream the new valve guide after installation.

NOTE

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



Reface the valve seat. (Page 6–13)
Clean the cylinder head thoroughly to remove any metal particles.

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VALVE SEAT INSPECTION/ REFACING

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

Apply a light coat of valve lapping compound to each valve face. Lap each valve and seat using a rubber hose or other hand-lapping tool.

NOTE

Take care not to allow the compound to get between the valve stem and guide. After lapping, wash out the compound completely and apply a coat of engine oil to the valve face and seat.

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.

Insect the valve seat.

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

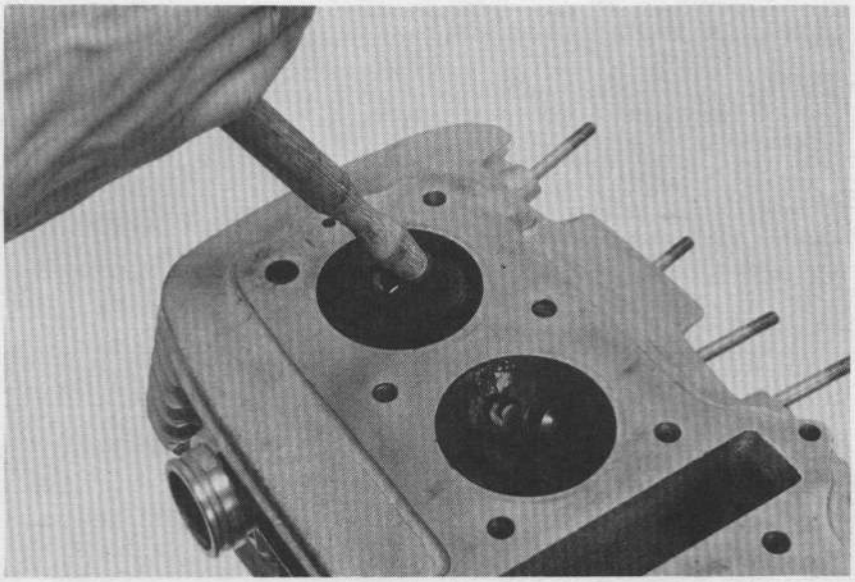
NOTE

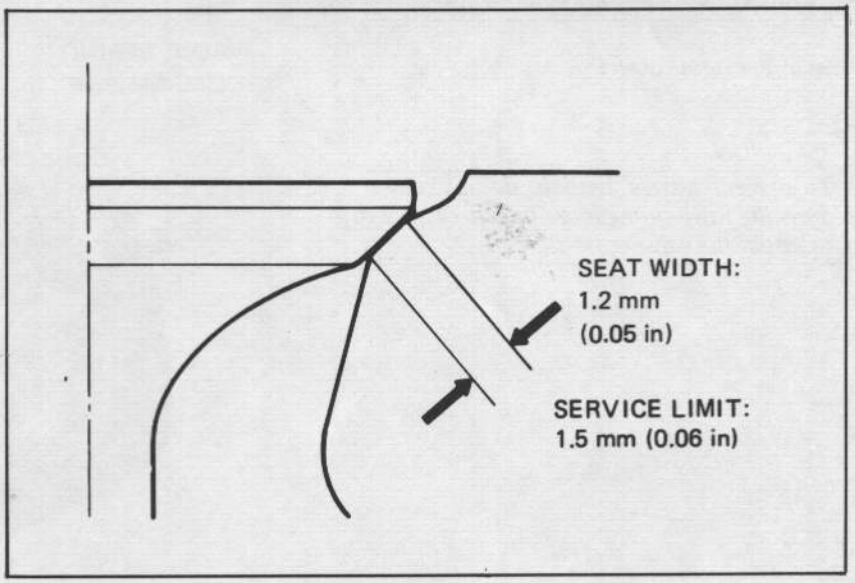
Follow the refacer manufacturer's operating instructions.

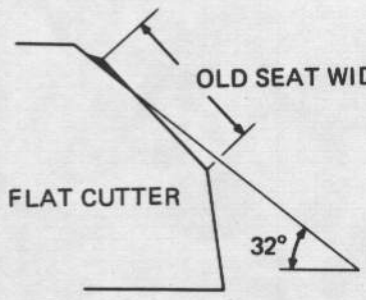
SERVICE LIMIT: 1.5 mm (0.06 in)

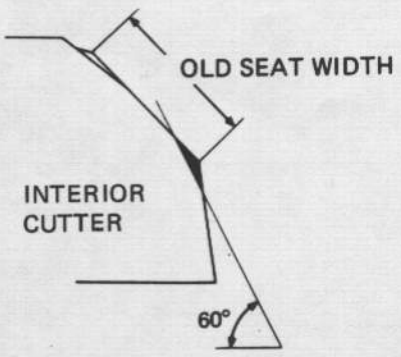
After cutting the seat, apply lapping compound to the valve face, and lap the valve using light pressure.

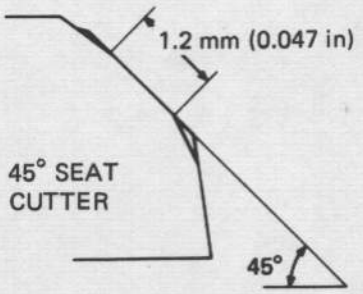
After lapping, wash any residual compound off the cylinder head and valve.











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.

NOTE

To avoid damage to the stem seal, turn the valve slowly when inserting.

Install the valve springs and retainers.

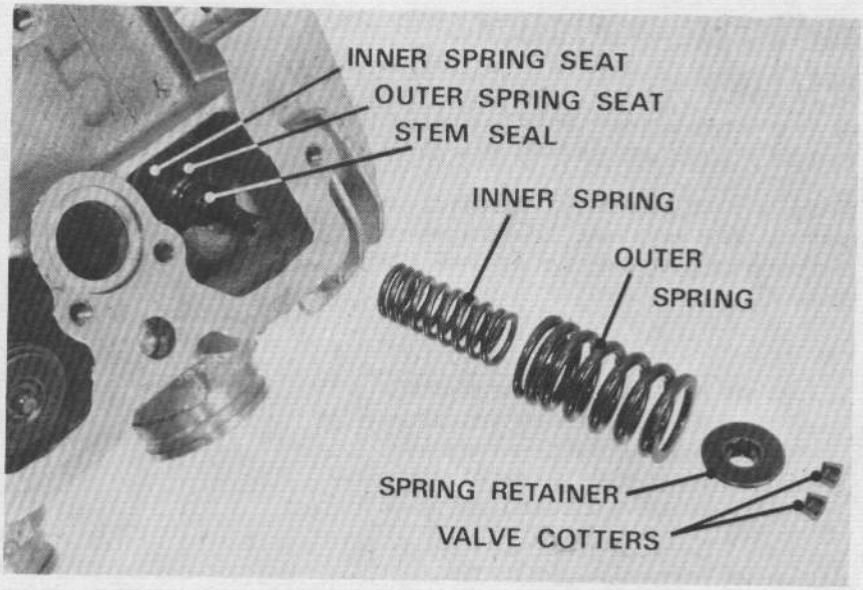
NOTE

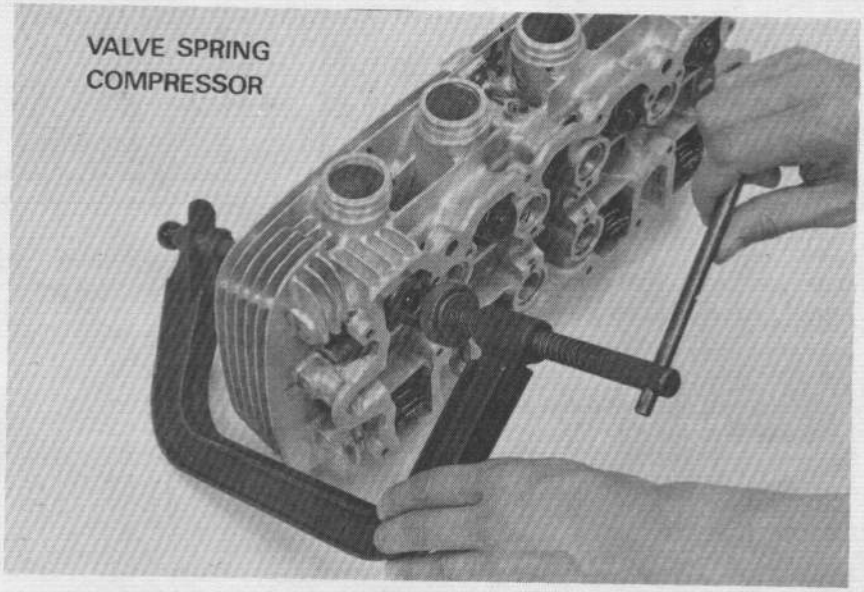
Install the valve springs with the tightly wound coils facing the cylinder head.

Install the valve cotters.

CAUTION

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

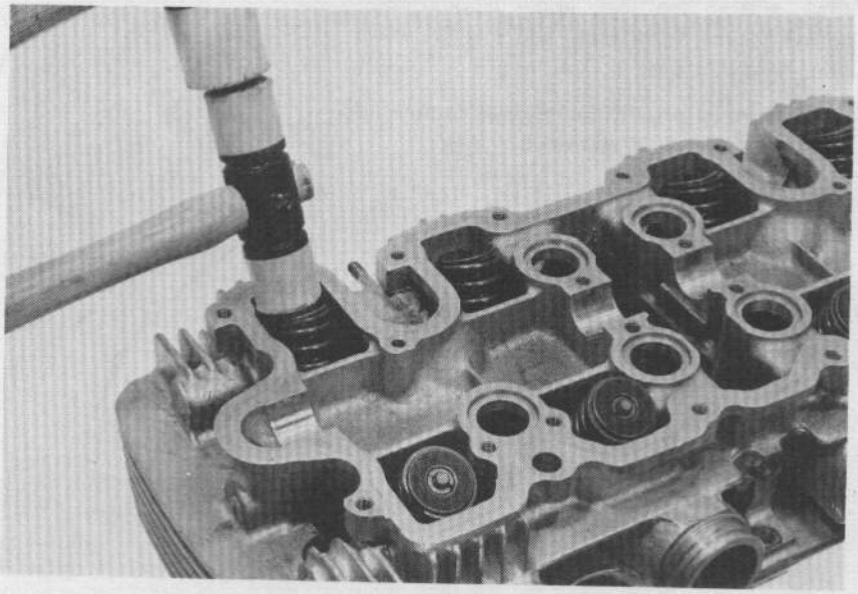




Tap the valve stems gently with a soft hammer to firmly seat the cotters.

NOTE

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



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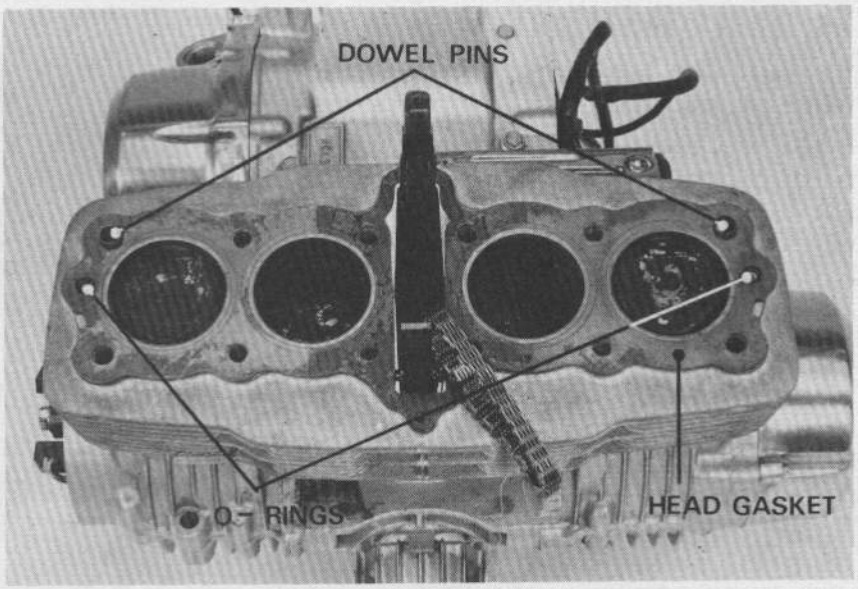
CYLINDER HEAD INSTALLATION

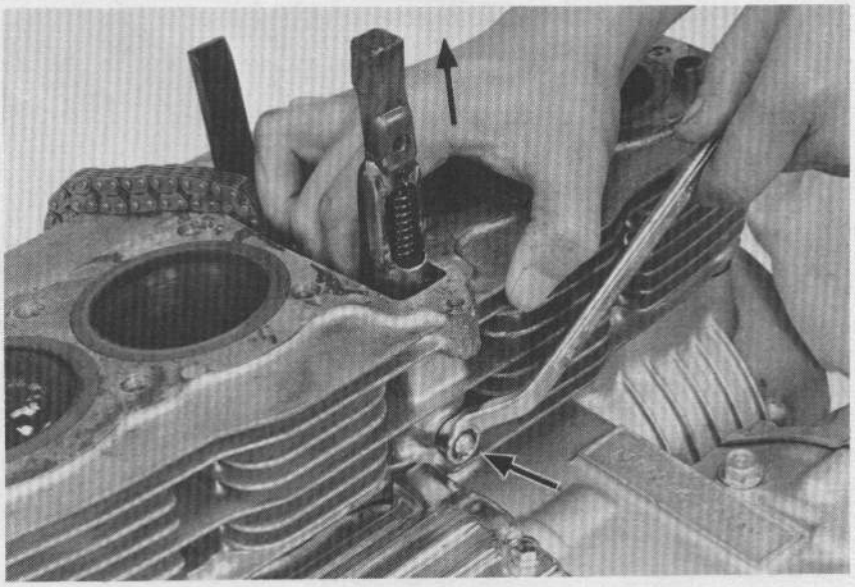
Clean the cylinder head surfaces of any gasket material.

Install the O-rings and dowel pins.
Install a new head gasket.



Loosen the cam chain tensioner lock nut and pull the tensioner up.

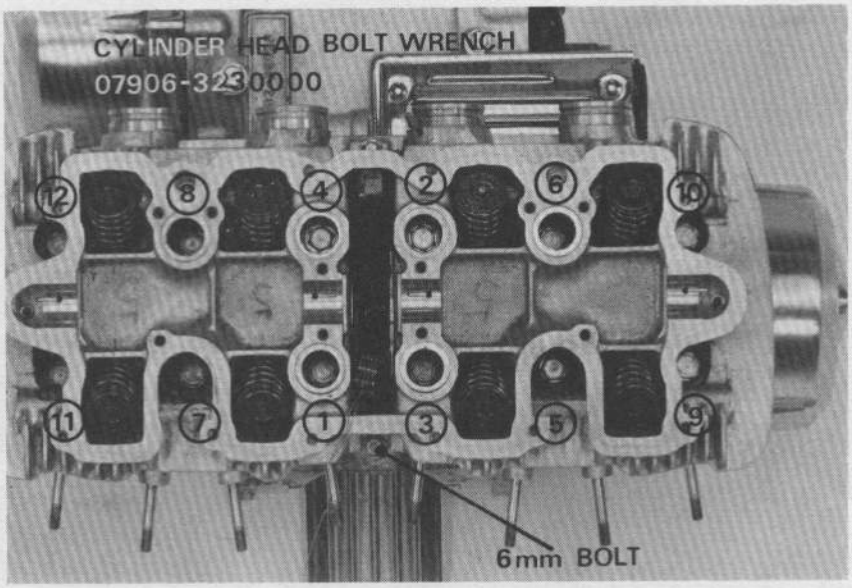
Tighten the lock nut.



Install the cylinder head assembly.

Tighten the cylinder head bolts in the sequence shown.

NOTE
Tighten the bolts in 2–3 steps.



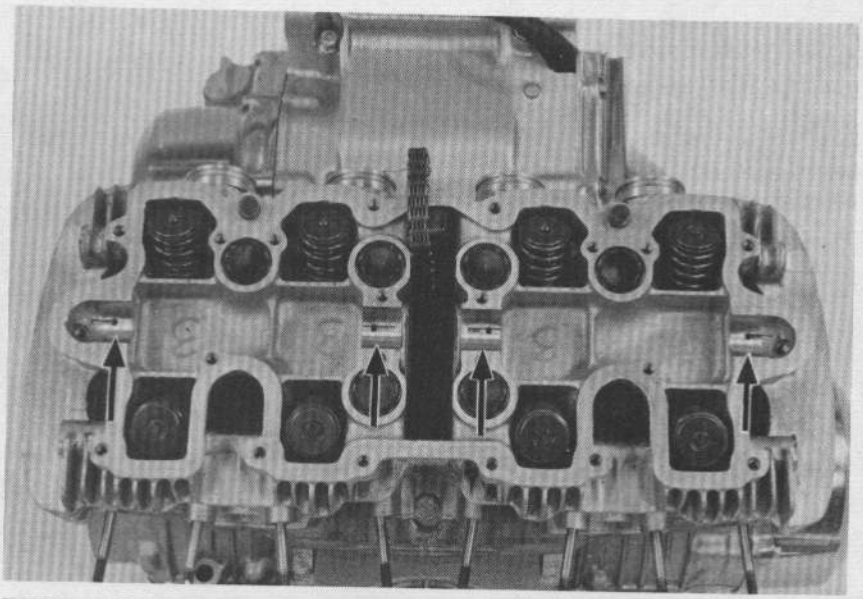
Tighten the 6 mm bolt.

TORQUES:
8 mm bolt: 2.4–3.0 kg-m (17–22 ft-lb)
6 mm bolt: 1.0–1.4 kg-m (7–10 ft-lb)

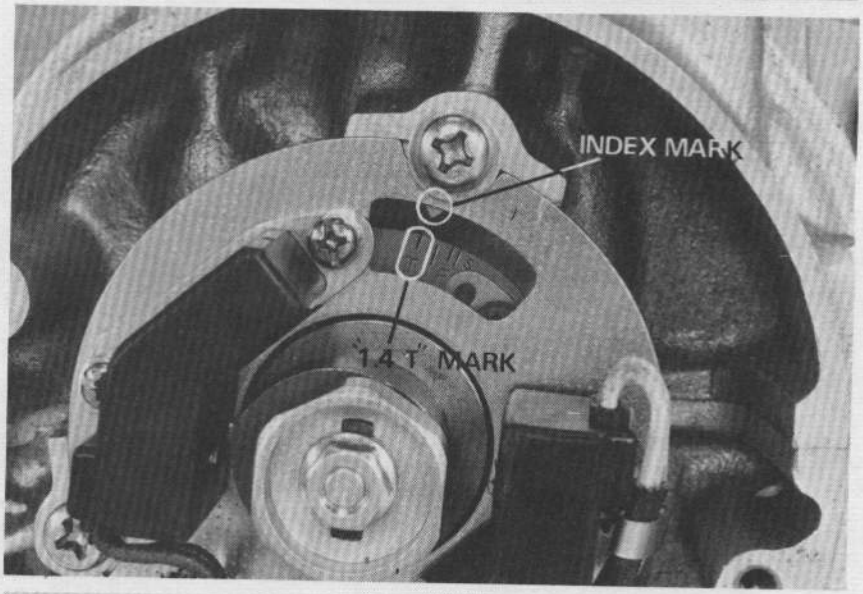
Install the rubber seals.

CAMSHAFT INSTALLATION

Lubricate the camshaft bearings with molybdenum disulfide grease.



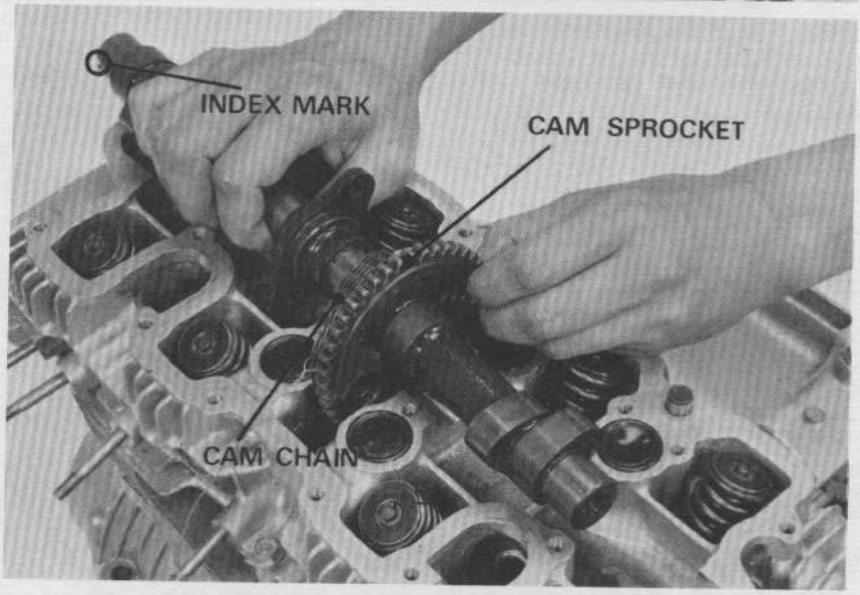
Turn the crankshaft clockwise until the "1.4 T" mark aligns with the index mark.



Place the cam chain over the cam sprocket and install the camshaft.

NOTE

Install the camshaft from the right side with the index mark end facing right.



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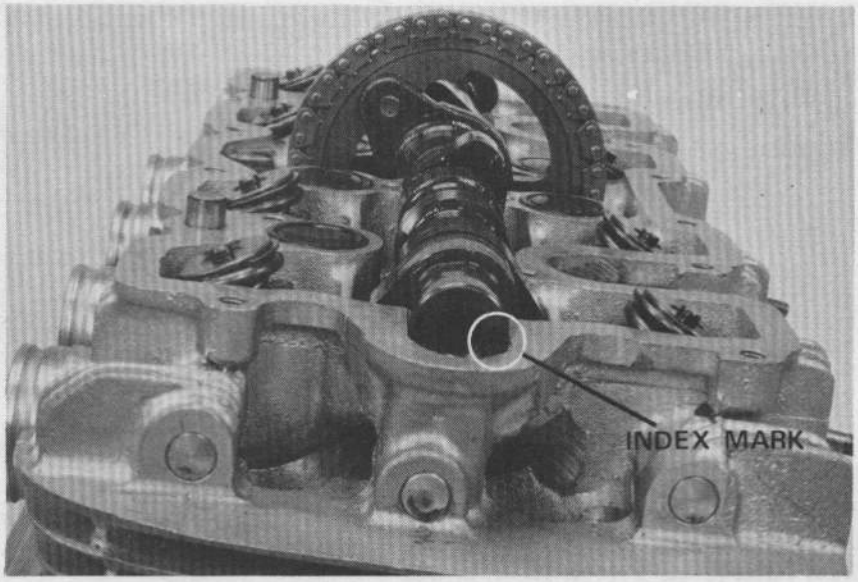
Align the center of the index mark on the camshaft right end with the cylinder head surface.

Align the camshaft sprocket bolts with the camshaft holes. Install the sprocket bolts and tighten to the specified torque.

TORQUE: 1.4–1.8 kg-m (10–13 ft-lb)

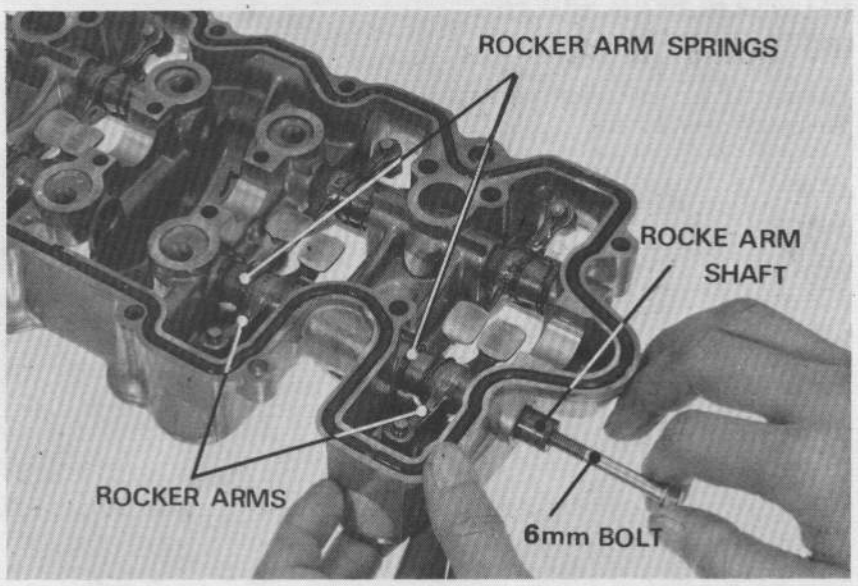


CYLINDER HEAD COVER ASSEMBLY

Install the rocker arms and springs and insert the rocker arm shaft.

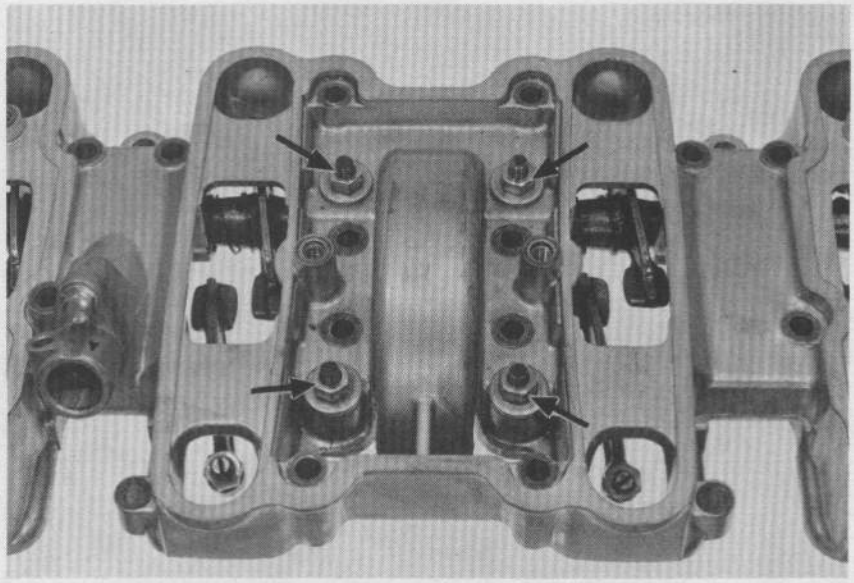
NOTE

- Install the rocker arms and shafts in their original position.
- Install the rocker arm shaft with the thread hole end facing out.



Install the rocker arm shaft cotter pins and tighten the nuts.

TORQUE: 1.0–1.4 kg-m (7–10 ft-lb)

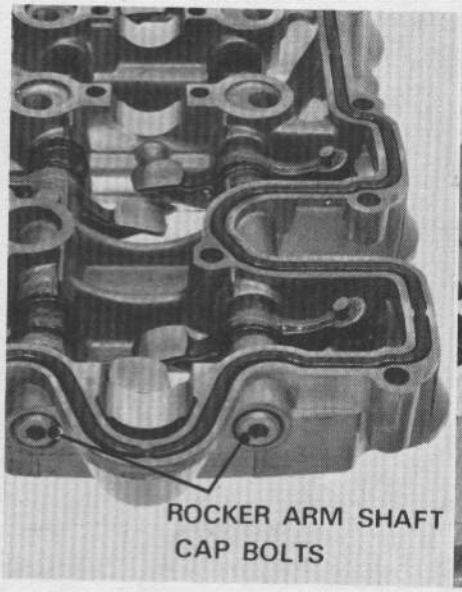


Install the rocker arm shaft cap bolts.

TORQUE: 0.8–1.2 kg-m (6–9 ft-lb)

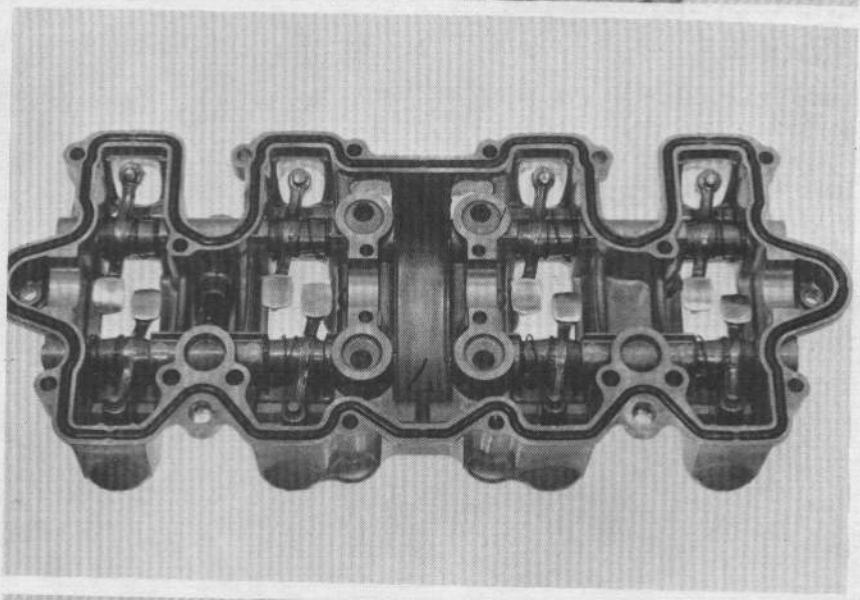
Install the tachometer drive gear.

TORQUE: 0.8–1.2 kg-m (6–9 ft-lb)

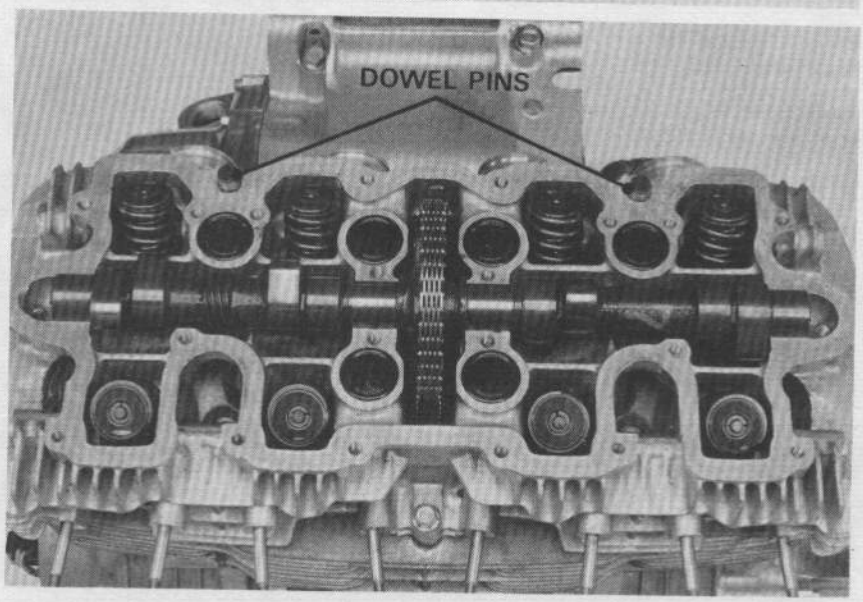


CYLINDER HEAD COVER INSTALLATION

Inspect the cylinder head cover gasket for damage or deterioration.



Install the dowel pins.



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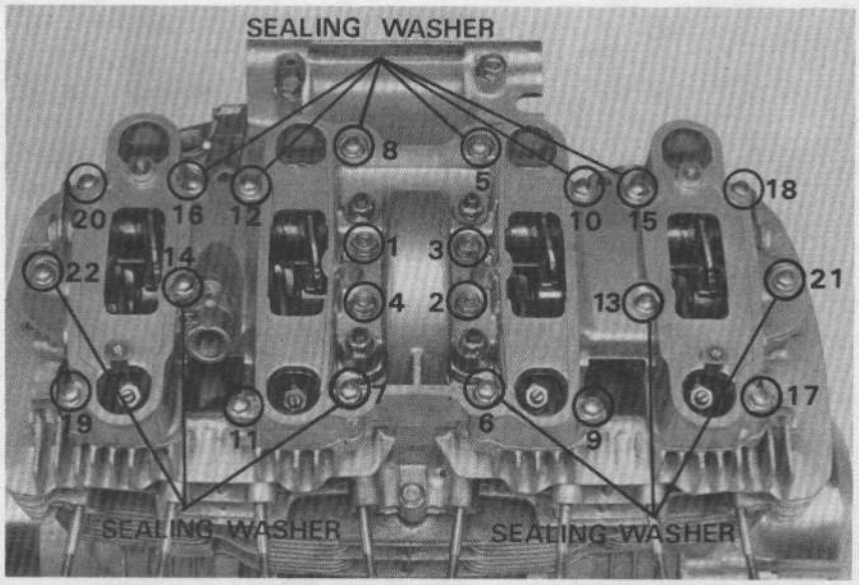
Loosen the valve adjusting screws fully and install the cylinder head cover.

Tighten the cylinder head cover bolts evenly in the sequence shown.

NOTE

Tighten the bolts in 5–6 steps.

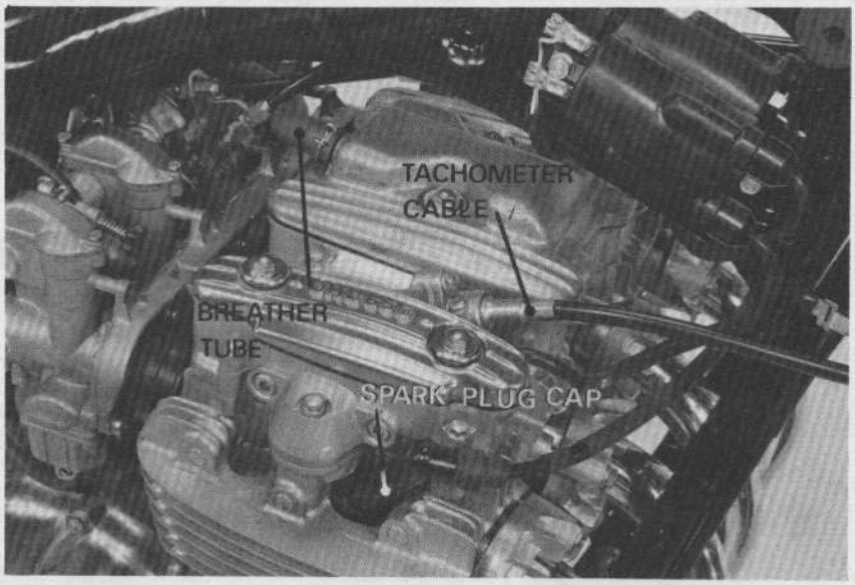
TORQUE: 0.8–1.2 kg-m (6–9 ft-lb)



Adjust valve clearance (Page 3–6).
Install the right and left adjustment covers and breather cover.

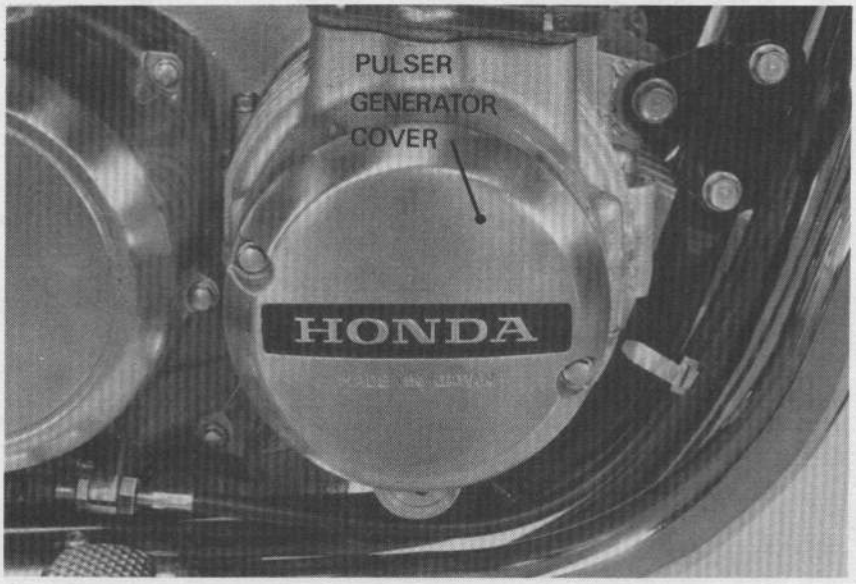
Install the exhaust system. (Page 5–3)
Install the carburetor (Page 4–14).

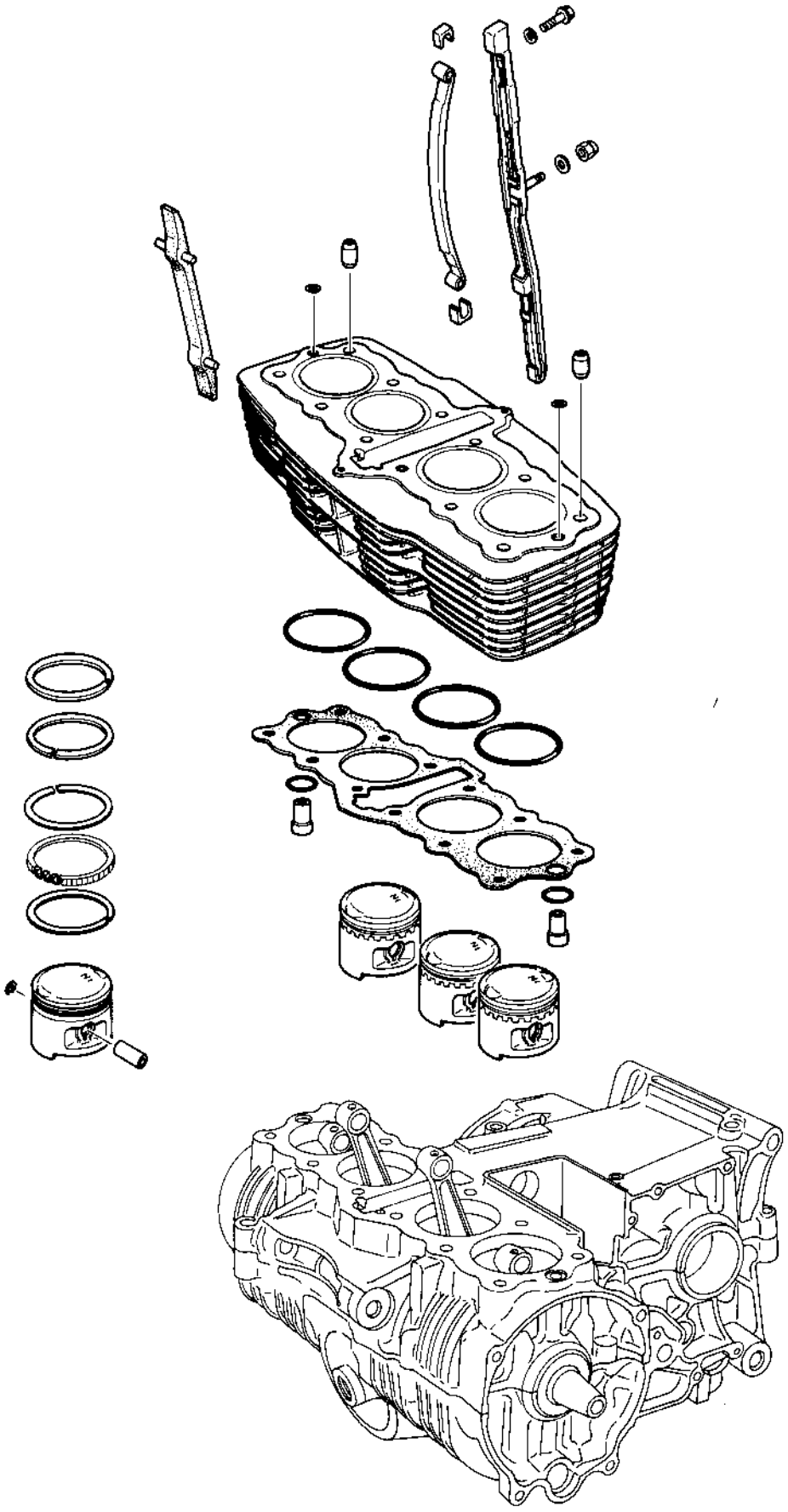
Install the spark plugs.
Install the spark plug caps, tachometer cable and engine breather tube.



Install the pulser generator cover.

Adjust the cam chain tension (Page 3–7).
Adjust throttle cable free play (Page 3–7).





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7. CYLINDER/PISTON

SERVICE INFORMATION

GENERAL INSTRUCTIONS

All cylinder/piston repair and inspection can be accomplished without removing the engine.

SPECIAL TOOLS

Special Tools

Piston Base (2 required)	07958–2500001
Piston Ring Compressor (2 required)	07954–3740000

SPECIFICATIONS

ITEM			STANDARD	SERVICE LIMIT
Cylinder	I. D.		59.800–59.810 mm (2.3543–2.3547 in)	59.90 mm (2.358 in)
	Warpage		————	0.25 mm (0.010 in)
Piston, piston rings and piston pin	Piston ring-to-ring groove clearance	TOP	0.015–0.045 mm (0.0006–0.0018 in)	0.15 mm (0.006 in)
		SECOND	0.015–0.045 mm (0.0006–0.0018 in)	0.15 mm (0.006 in)
	Ring end gap	TOP	0.10–0.30 mm (0.004–0.012 in)	0.7 mm (0.028 in)
		SECOND	0.10–0.30 mm (0.004–0.012 in)	0.7 mm (0.028 in)
		OIL (SIDE RAIL)	0.3–0.9 mm (0.012–0.035 in)	1.1 mm (0.043 in)
	Piston O. D.		59.77–59.79 mm (2.353–2.354 in)	59.65 mm (2.348 in)
	Piston pin bore		15.002–15.008 mm (0.5906–0.5909 in)	15.08 mm (0.594 in)
	Connecting rod small end I. D.		15.016–15.034 mm (0.5912–0.5919 in)	15.07 mm (0.593 in)
	Piston pin O. D.		14.994–15.000 mm (0.5903–0.5906 in)	14.98 mm (0.590 in)
	Piston-to-piston pin clearance		————	0.04 mm (0.002 in)
	Cylinder-to-piston clearance		————	0.10 mm (0.004 in)
Cam chain tensioner spring			81.0 mm/7 kg	81.0 mm/5 kg

TROUBLESHOOTING

Compression low

1. Worn cylinder or piston rings

Excessive smoke

1. Worn cylinder or piston
2. Improper installation of piston rings
3. Scored or scratched piston or cylinder

Overheating

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

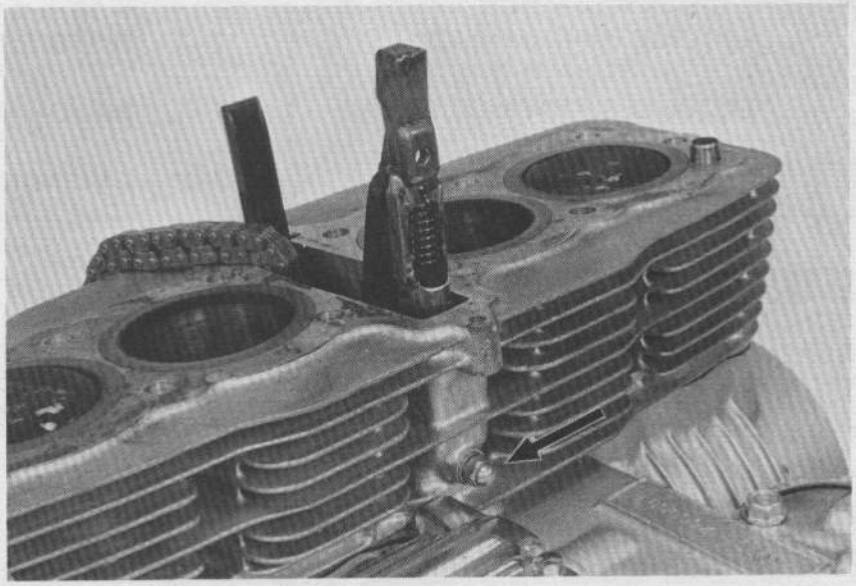
Knocking or abnormal noise

1. Worn piston or cylinder
2. Excessive carbon build-up

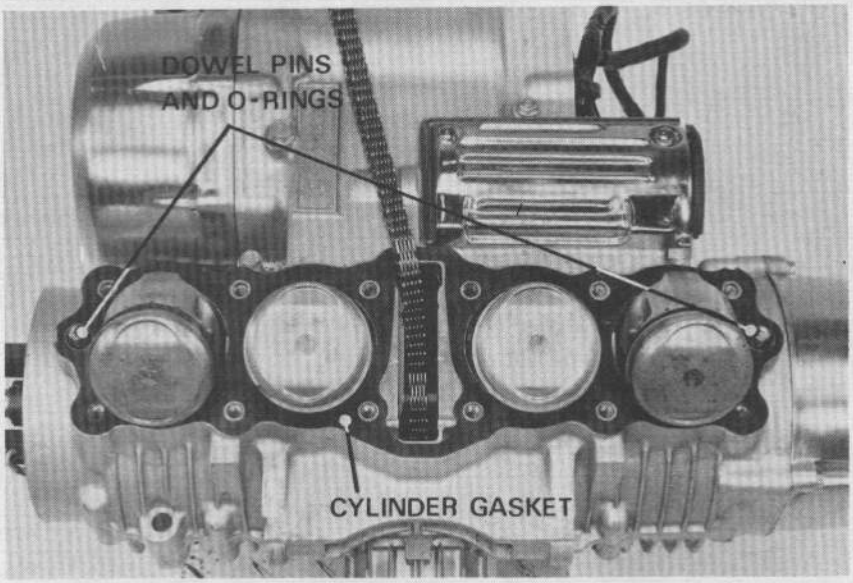
CYLINDER REMOVAL

Remove the cylinder head (Page 6–9).
Remove the cam chain tensioner lock nut.

Remove the cylinder.
Remove the cam chain tensioner and chain guide.



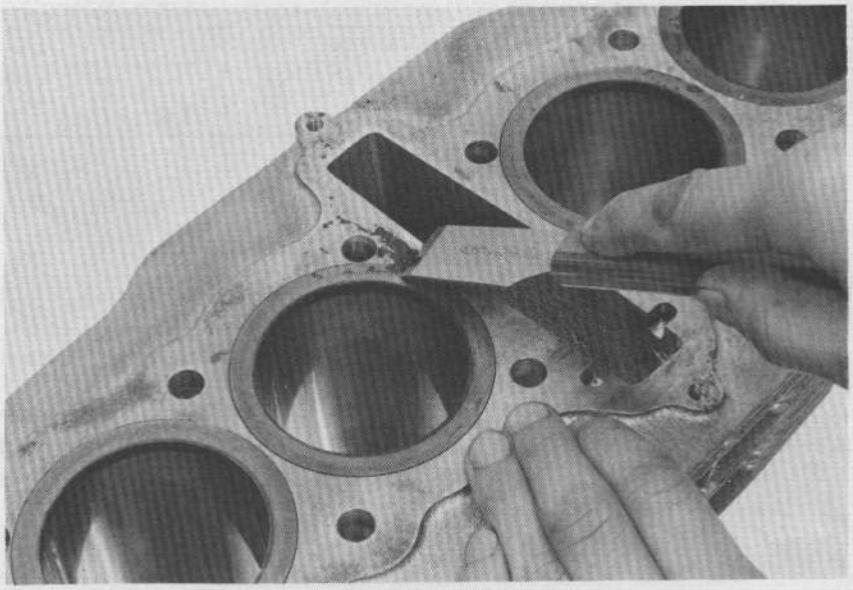
Remove the cylinder gasket, dowel pins and O-rings.



Clean the head gasket surface.

NOTE

- Be careful not to damage the gasket surface.
- The gasket will come off easier if soaked in solvent.



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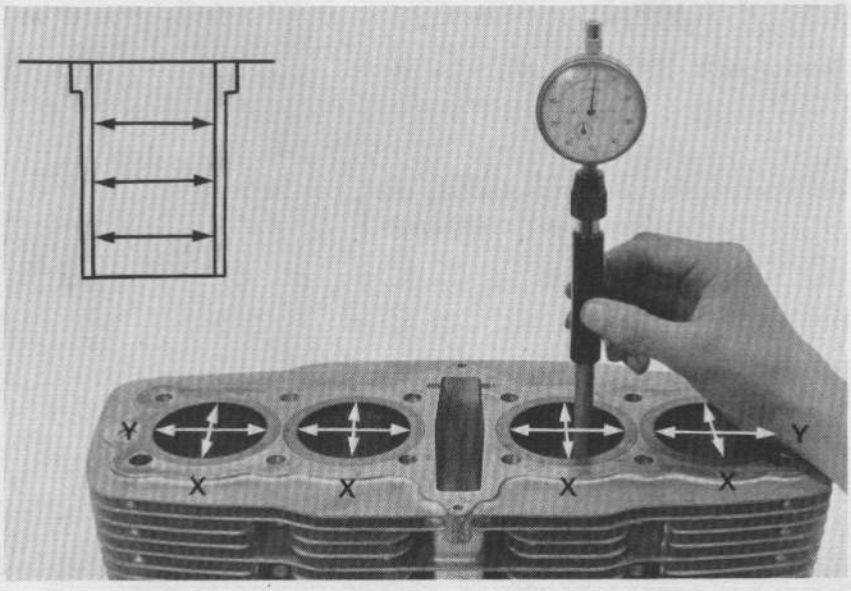
CYLINDER INSPECTION

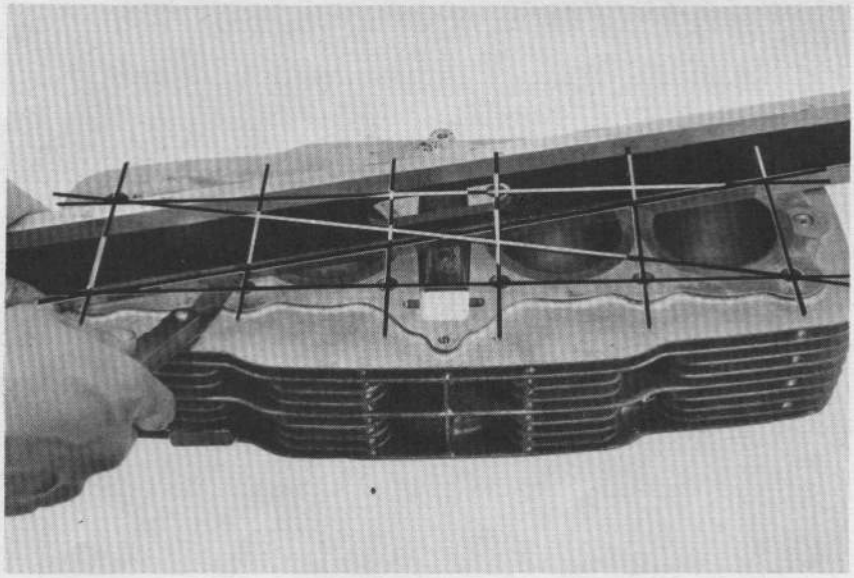
Inspect the cylinder bore for wear or damage. Measure the cylinder I. D. at three levels in X and Y axis.

SERVICE LIMIT: 59.90 mm (2.358 in)



Inspect the top of the cylinders for warpage. Check in an X pattern as shown.

SERVICE LIMIT: 0.25 mm (0.010 in)



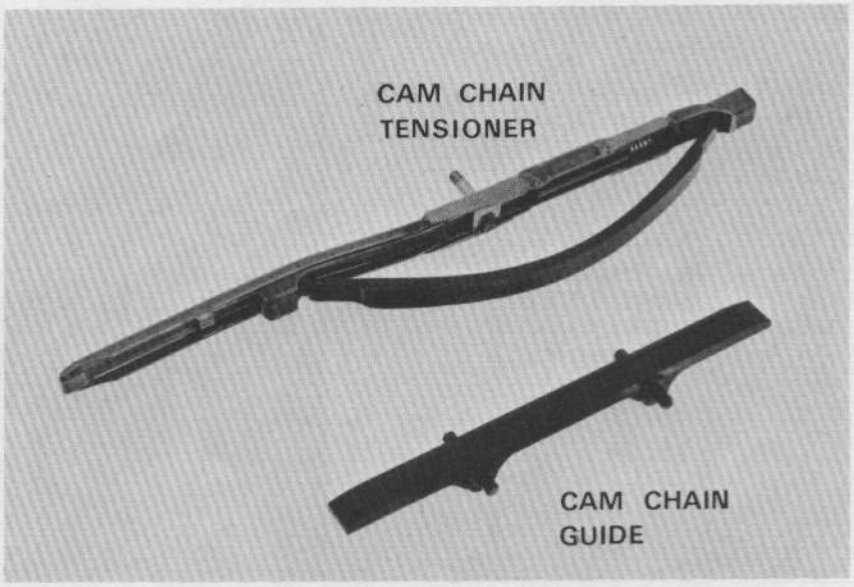
CAM CHAIN TENSIONER INSPECTION

Inspect the slipper of the cam chain tensioner for damage or excessive wear.

Replace the tensioner and guide if the Teflon coating on the slipper is worn out.

Inspect the tension spring for weakness.

SERVICE LIMIT: 81.0 mm/5kg



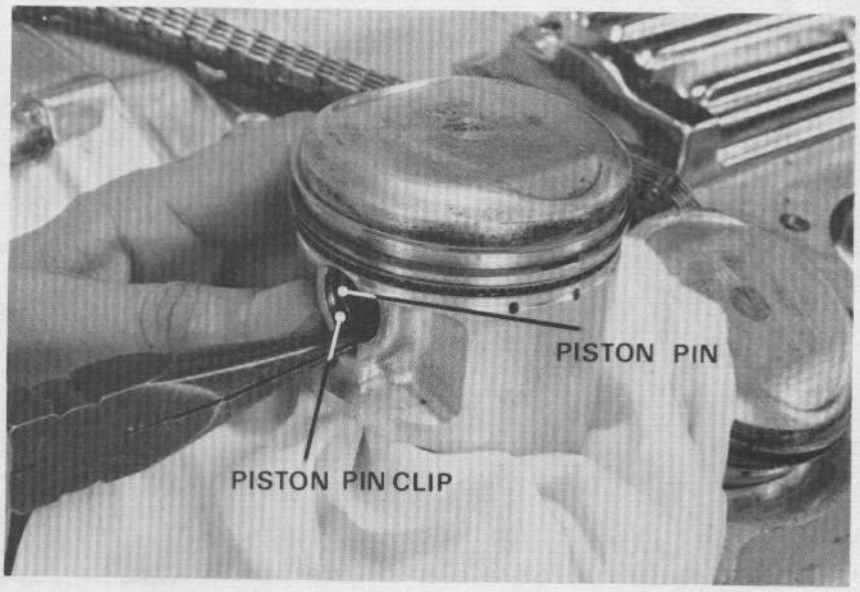
PISTON REMOVAL

Remove each piston pin clip with needle nose pliers.

NOTE

- Do not allow clips to fall into the crankcase. Place a shop towel under the piston.
- Mark the pistons to indicate the cylinder positions.

Press the piston pin out.



PISTON/PISTON RING INSPECTION

Inspect the piston ring-to-groove clearance.

SERVICE LIMITS:

TOP:	**0.15 mm (0.006 in)**
SECOND:	**0.15 mm (0.006 in)**

NOTE

Mark the rings to ensure assembly in their original locations.

Inspect the pistons for damage and cracks and the ring grooves for wear.

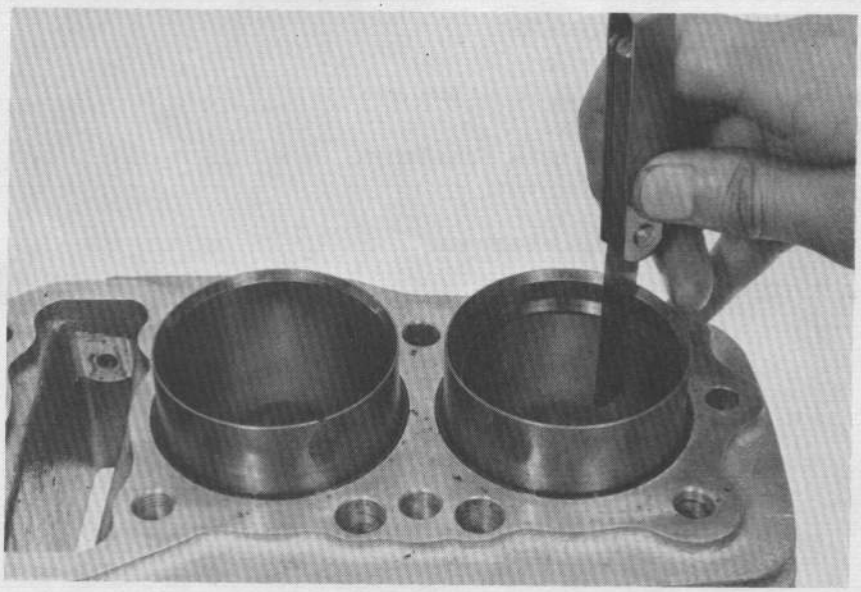
Insert each piston ring into the cylinder, and inspect the end gap.

SERVICE LIMITS:

TOP:	**0.7 mm (0.028 in)**
SECOND:	**0.7 mm (0.028 in)**
OIL (Side Rail)	**1.1 mm (0.043 in)**

STANDARD END GAPS:

TOP:	**0.10–0.30 mm (0.004–0.012 in)**
SECOND:	**0.10–0.30 mm (0.004–0.012 in)**
OIL (Side Rail)	**0.3–0.9 mm (0.012–0.035 in)**



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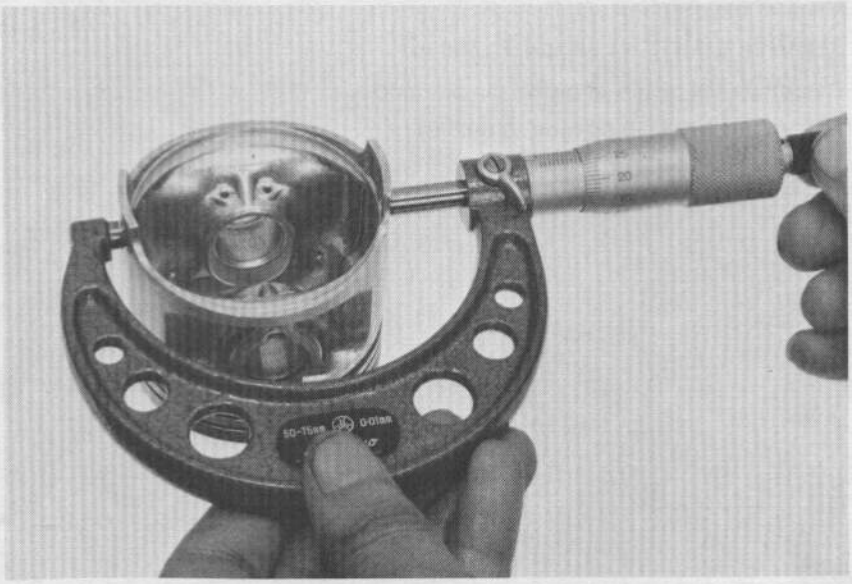
Measure the piston O. D. at the skirt.

SERVICE LIMIT: 59.65 mm (2.348 in)

NOTE

Measurements should be taken 10 mm (0.04 in) from the bottom.

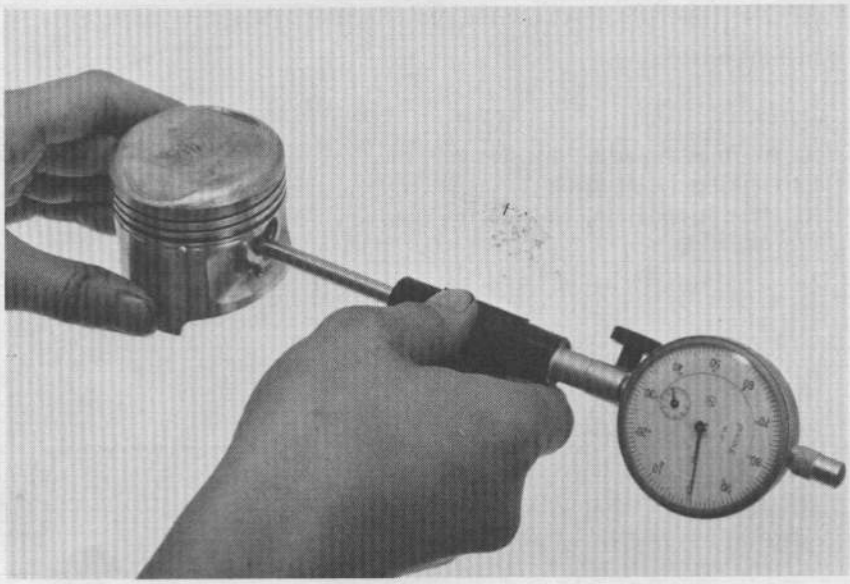


Calculate the cylinder-to-piston clearance.

SERVICE LIMIT: 0.10 mm (0.004 in)

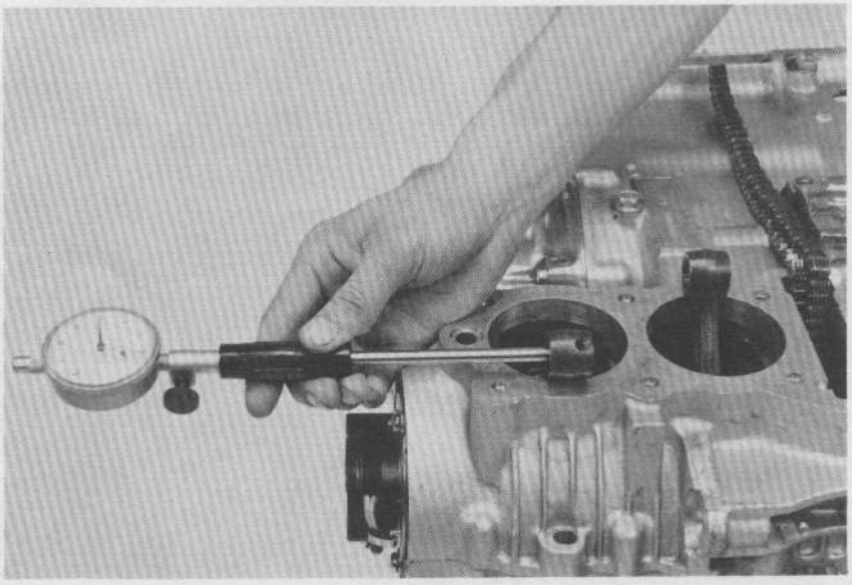
Measure the piston pin hole I. D.

SERVICE LIMIT: 15.08 mm (0.594 in)



Measure the connecting rod small end I. D. (See Section 12 for replacement procedure)

SERVICE LIMIT: 15.07 mm (0.593 in)

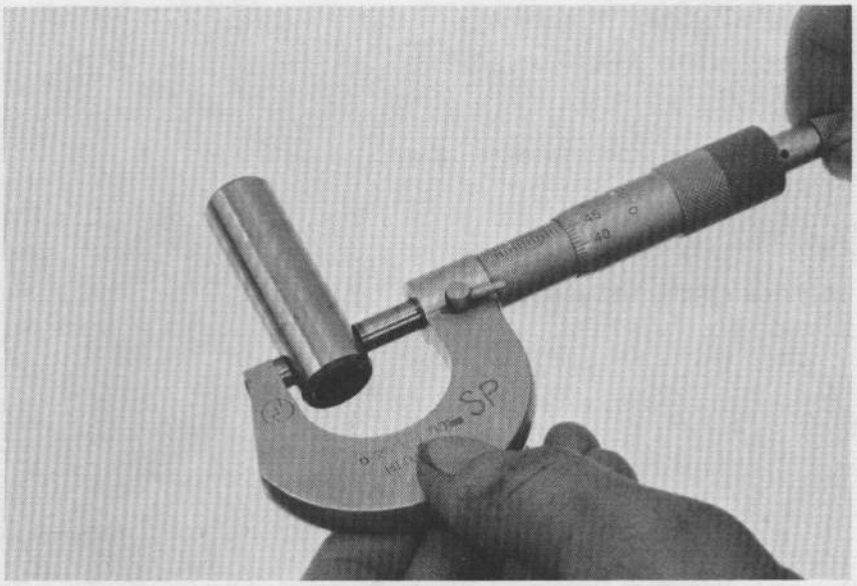


Measure the piston pin O. D.

SERVICE LIMIT: 14.98 mm (0.590 in)

Determine the piston-to-piston pin clearance.

SERVICE LIMIT: 0.04 mm (0.002 in)

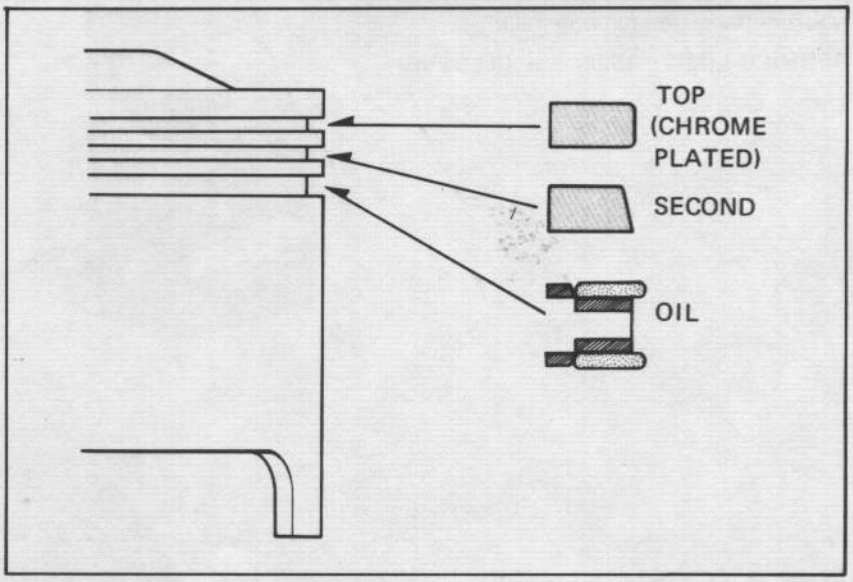


PISTON RING INSTALLATION

Install the piston rings.

NOTE

- All rings should be installed with the markings facing up.
- After installation, be sure the rings rotate freely.



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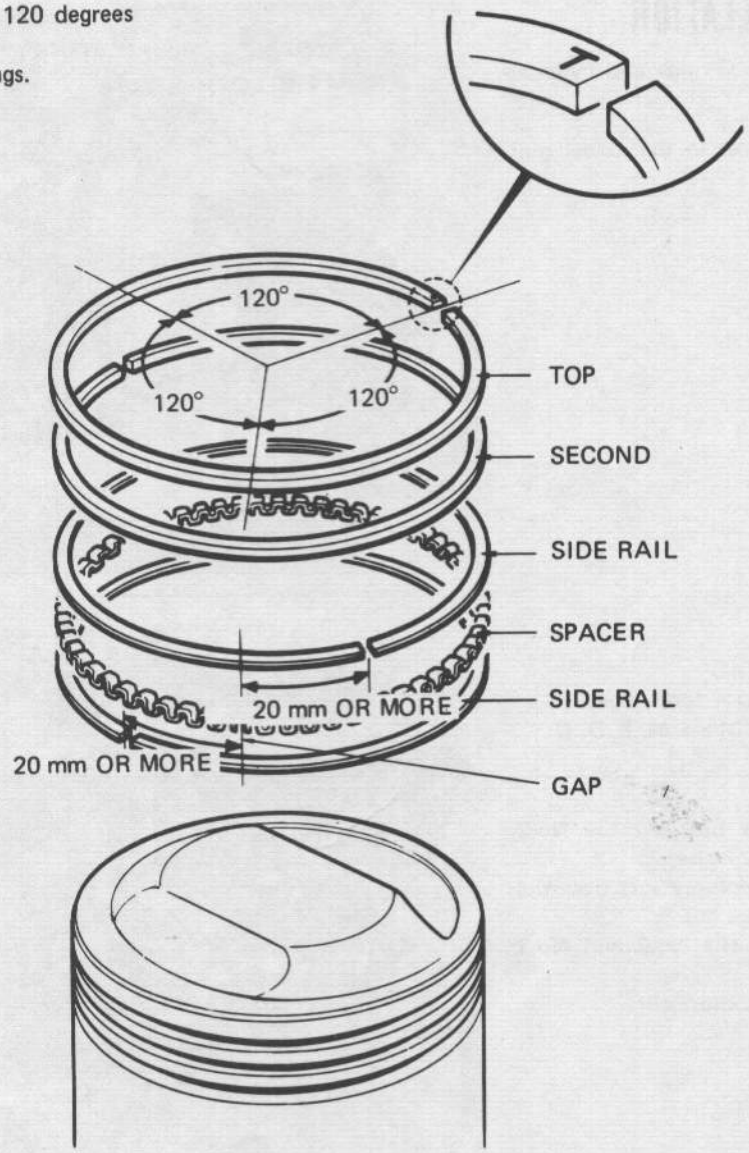
Space the piston ring end gaps 120 degrees apart.
Do not align the gaps in the oil rings.

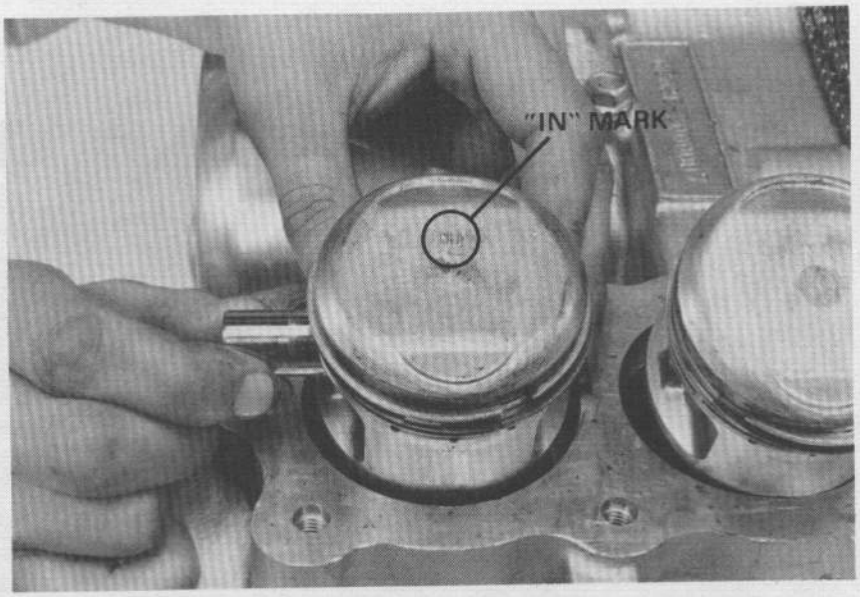


PISTON INSTALLATION

Apply molybdenum disulfide grease to the connecting rod small ends.
Install the pistons, piston pins and clips.

NOTE

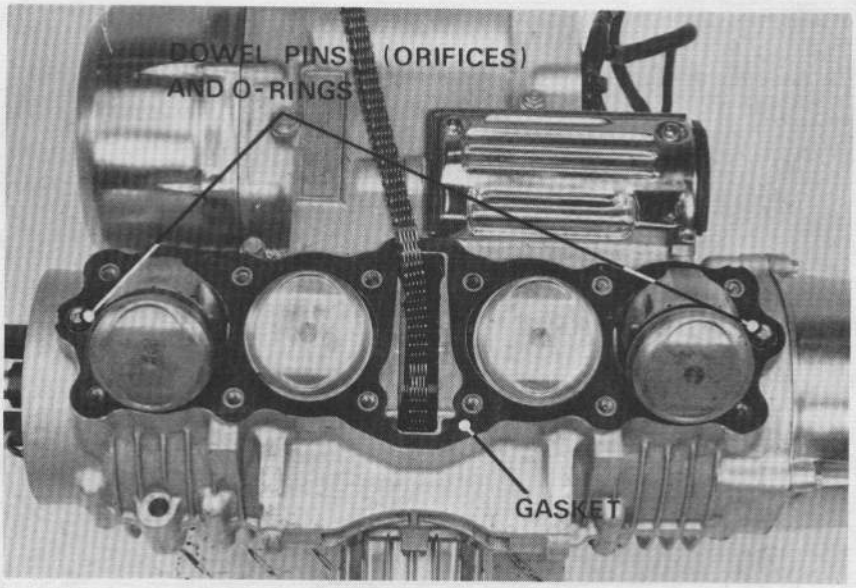
- Position the mark "IN" on the piston to the intake side.
- Install the pistons in their original positions.
- Do not allow piston pin clips to fall into the crankcase.



CYLINDER INSTALLATION

Install the dowel pins, O-rings and cylinder gasket.

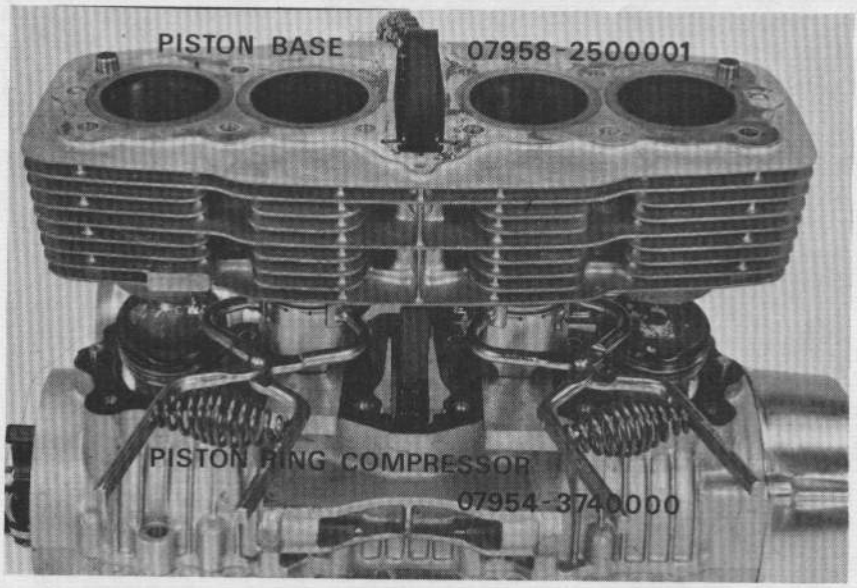
Make sure the oil orifices in the dowel pins are not clogged.



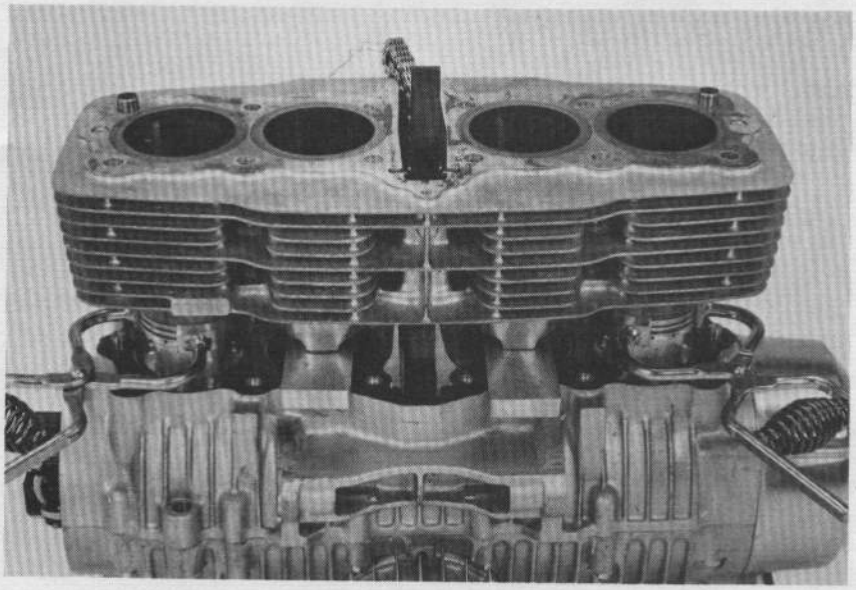
NOTE

Before using the special tools, position the No.2 and No.3 pistons at T. D. C. (Top Dead Center).

Insert the piston bases between the No.2 and No.3 Pistons and crankcase.
Install the piston ring compressors over the No.2 and No.3 piston rings.
Press the cylinder over the No.2 and No.3 piston rings.
Remove the piston ring compressors .



Install the piston ring compressers over the No.1 and No.4 piston rings.
Press the cylinder.
Remove the piston ring compressors and piston bases.



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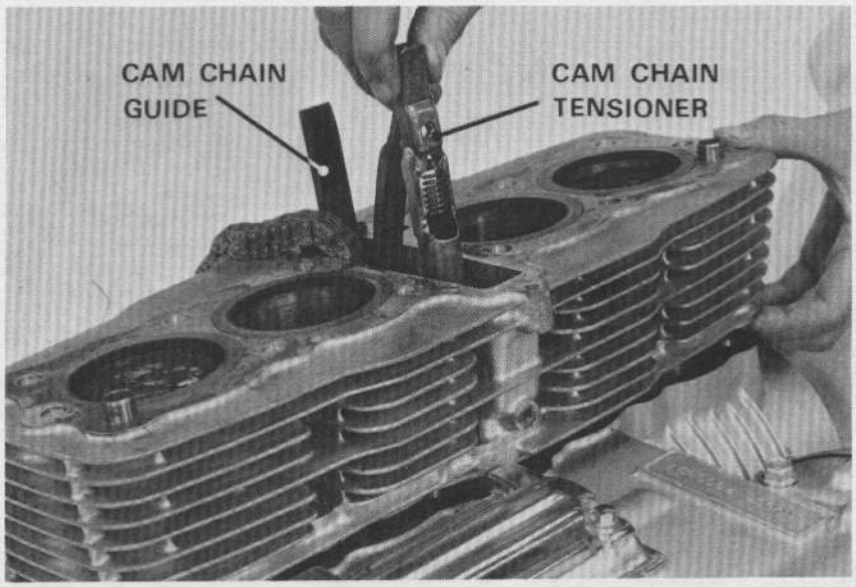
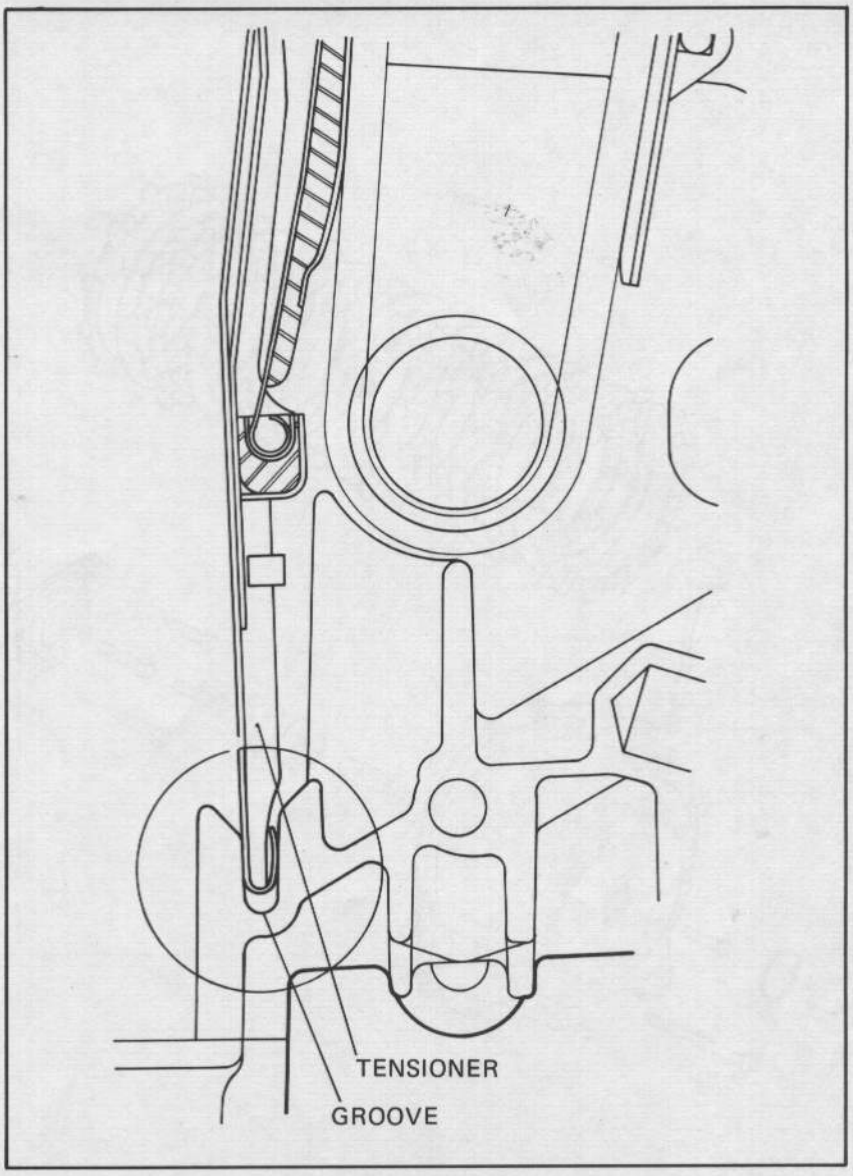
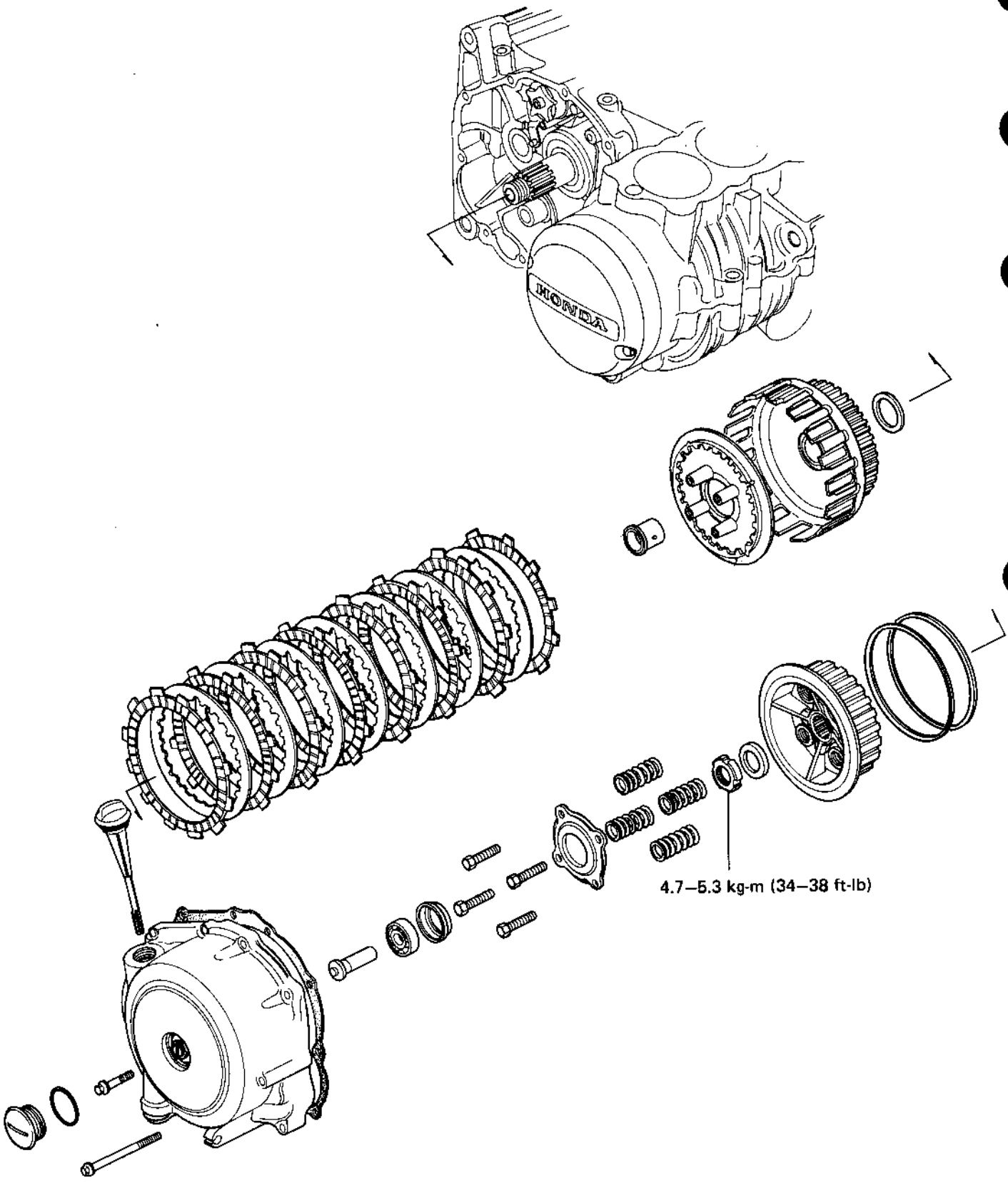
Install the cam chain tensioner and lock nut.



Make sure the tensioner lower end is properly seated in the crankcase groove as shown.





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SERVICE INFORMATION

GENERAL INSTRUCTIONS

This section covers removal and installation of the clutch.
This operation can be accomplished with the engine in the frame.

SPECIAL TOOLS

Common Tools

Universal Holder	07725–0010101
Extension Bar	07716–0020500
Lock Nut Wrench Socket (26 x 30 mm)	07716–0020202

TORQUE VALUES

Clutch lock nut	4.7–5.3 kg-m (34–38 ft-lb)

SPECIFICATIONS

ITEM			STANDARD	SERVICE LIMIT
Clutch	Lever free play (at lever end)		10–20 mm (3/8–3/4 in)	———
	Spring free length		36.8 mm (1.45 in)	35.4 mm (1.39 in)
	Spring preload/length		27.08–29.93 kg/24.1 mm (59.70–65.98 lb/0.95 in)	———
	Disc thickness	A	3.42–3.58 mm (0.135–0.141 in)	3.2 mm (0.13 in)
		B	2.62–2.78 mm (0.103–0.109 in)	2.4 mm (0.09 in)
	Plate warpage		———	0.3 mm (0.012 in)
	Clutch outer I. D.		29.990–30.005 mm (1.1807–1.1813 in)	30.05 mm (1.183 in)
	Clutch outer guide O. D.		29.959–29.980 mm (1.1795–1.1803 in)	29.94 mm (1.179 in)

TROUBLESHOOTING

Clutch

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

Clutch slips

1. No free play
2. Discs worn
3. Springs weak

Clutch will not disengage

1. Too much free play
2. Plates warped

Motorcycle creeps with clutch disengaged

1. Too much free play
2. Plates warped

Excessive lever pressure

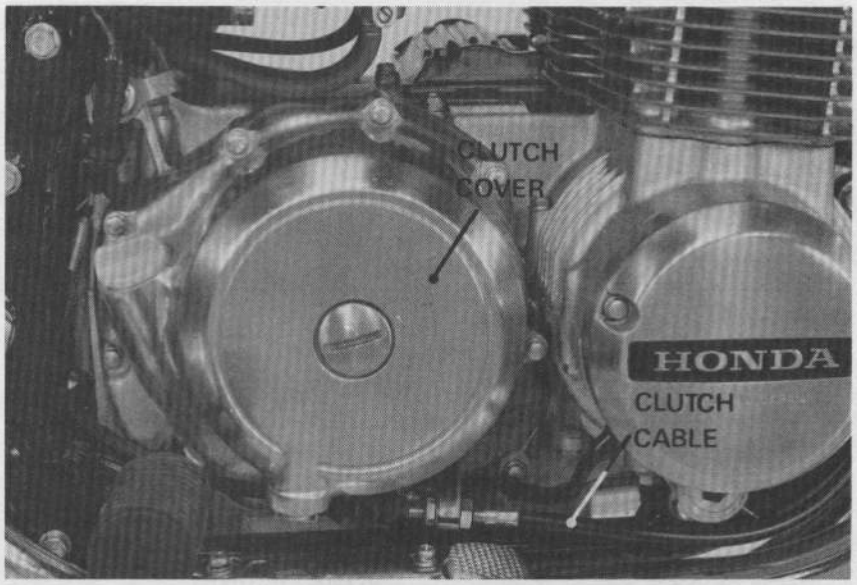
1. Clutch cable kinked, damaged or dirty
2. Lifter mechanism damaged

Clutch operation feels rough

1. Outer drum slots rough

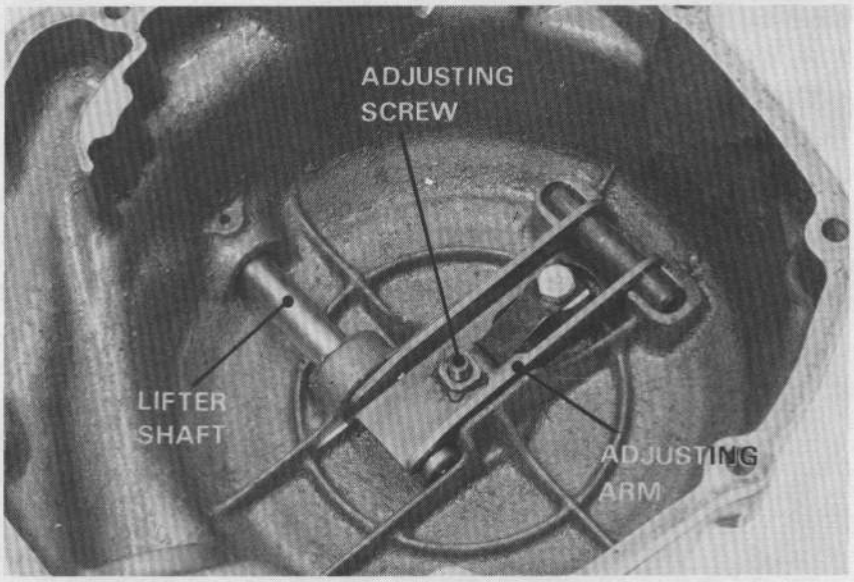
CLUTCH COVER REMOVAL

Drain the engine oil. (Page 2–2)
Remove the right foot peg.
Disconnect the clutch cable at the clutch arm.
Remove the clutch cover.

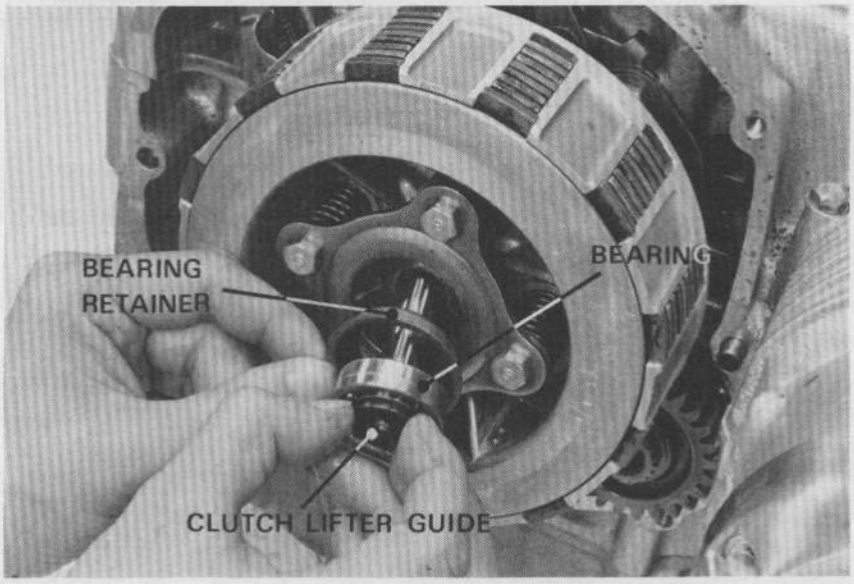


CLUTCH LIFTER REMOVAL

Remove the adjusting screw, adjusting arm and lifter shaft.



Remove the clutch lifter guide, bearing and bearing retainer.



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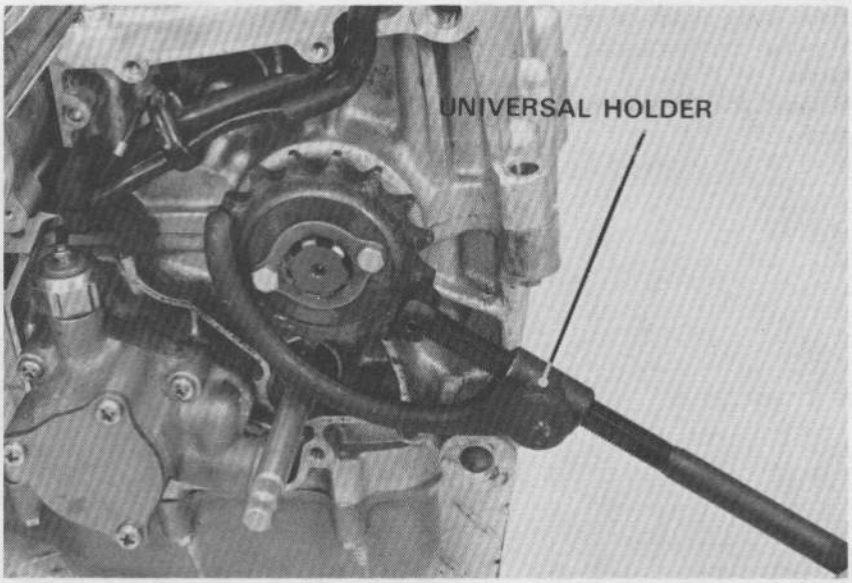
CLUTCH REMOVAL

Use the universal holder if the drive chain is removed.

Shift the transmission into gear to lock the countershaft and mainshaft.

Block the drive sprocket to prevent it from turning.

When servicing the clutch in the frame, shift the transmission into gear, and press the brake pedal to lock the transmission gear shafts.

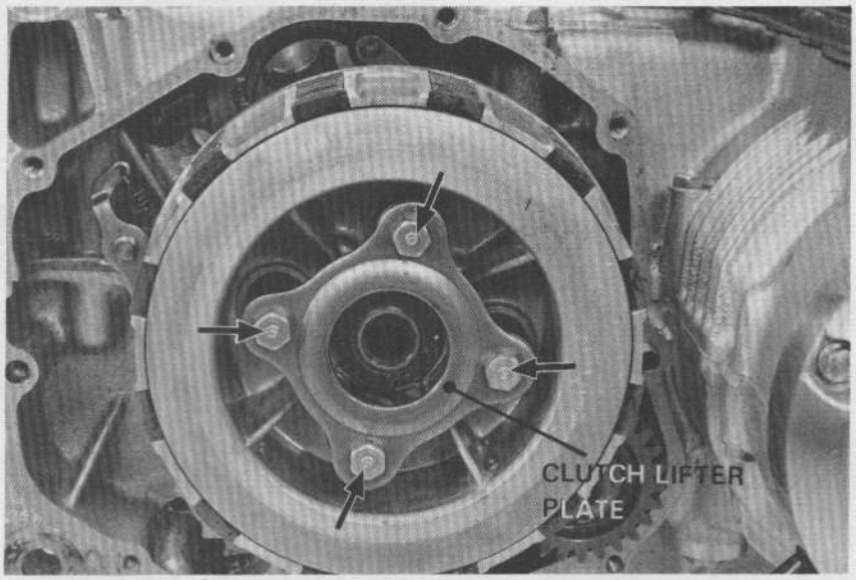


CLUTCH LIFTER PLATE REMOVAL

Remove the bolts, lifter plate and springs.

NOTE

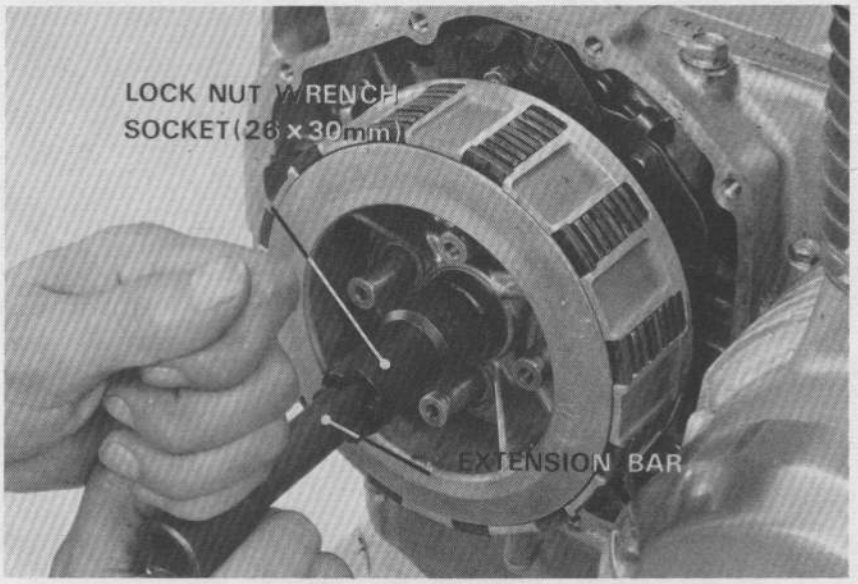
Loosen the bolts in a crisscross pattern in 2-3 steps.



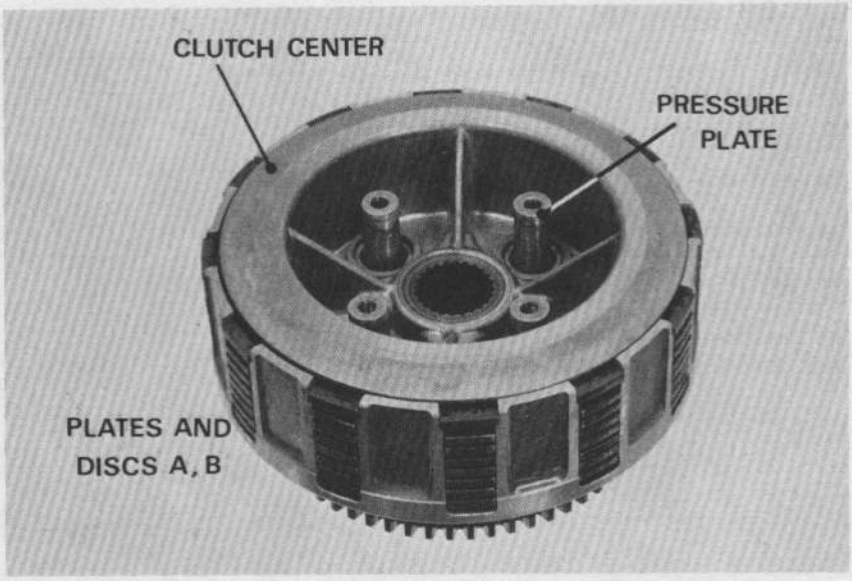
CLUTCH CENTER, PLATES AND DISCS REMOVAL

Attach the lock nut wrench.

Remove the lock nut and lock washer.
Remove the clutch as a unit.



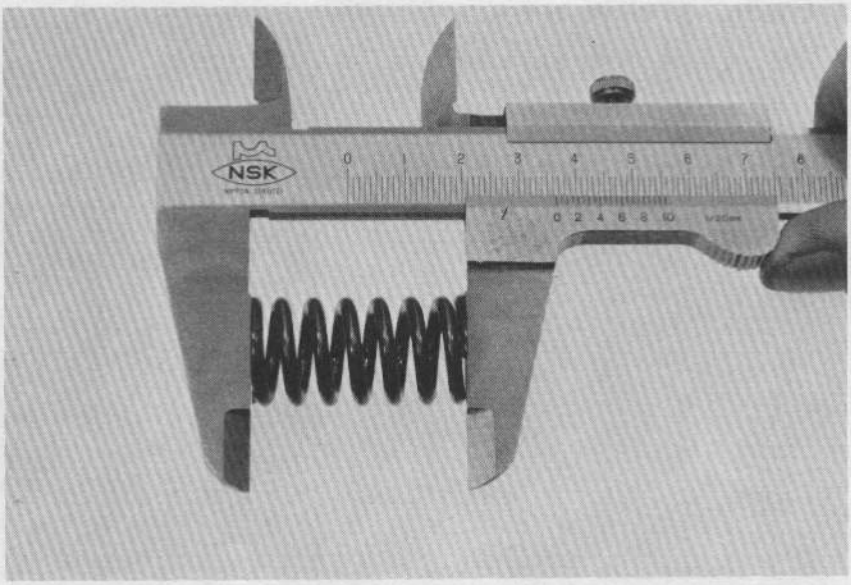
Remove the clutch center.
Remove the disc spring, discs A and B, and plates.
Remove the pressure plate and clutch outer guide.



CLUTCH SPRING INSPECTION

Check spring free length.

SERVICE LIMIT: 35.4 mm (1.39 in)



CLUTCH DISC INSPECTION

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

SERVICE LIMITS:
DISC A: 3.2 mm (0.13 in)
DISC B: 2.4 mm (0.09 in)

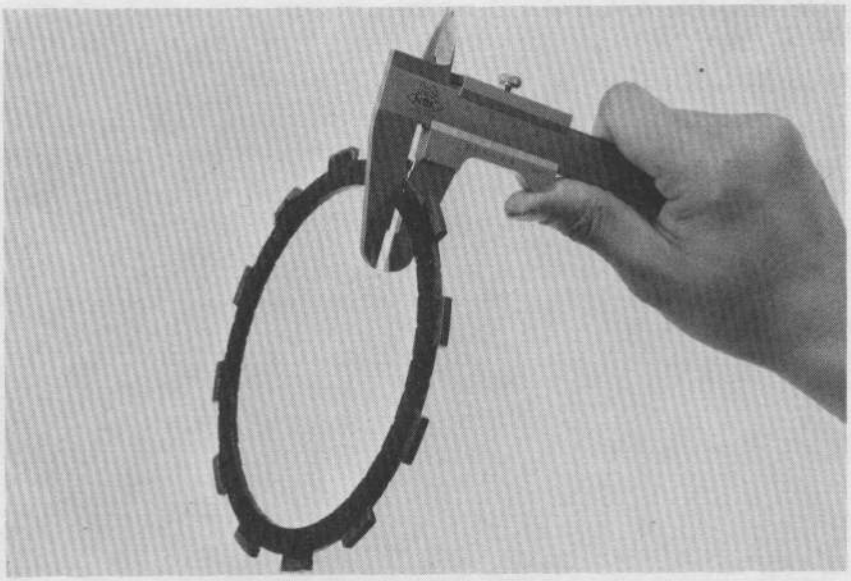


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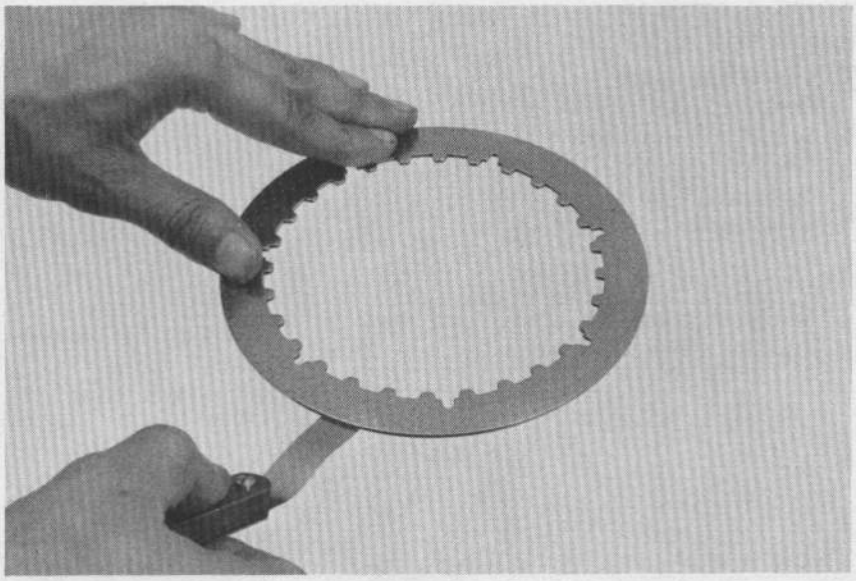
PLATE INSPECTION

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

SERVICE LIMIT: 0.3 mm (0.012 in)

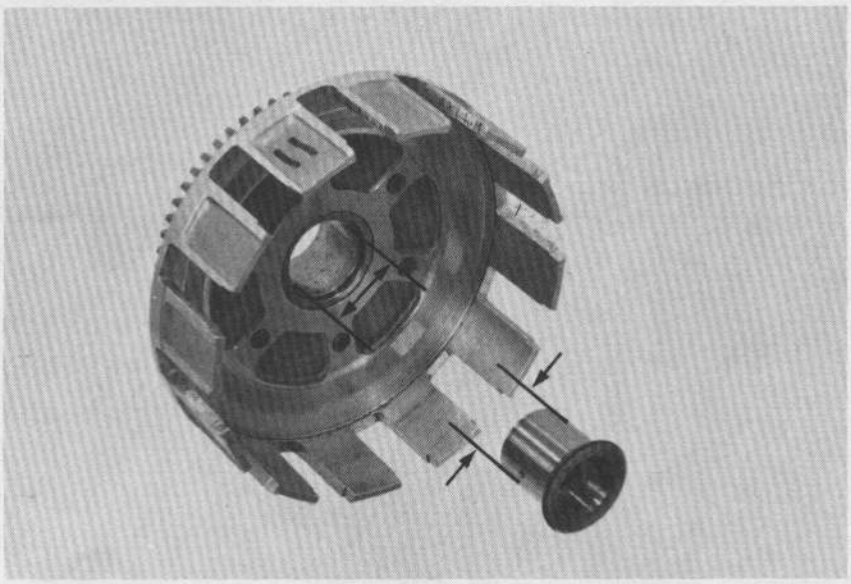


CLUTCH OUTER AND OUTER GUIDE INSPECTION

Check the slots in the outer drum for nicks, cuts or indentations made by the friction discs.

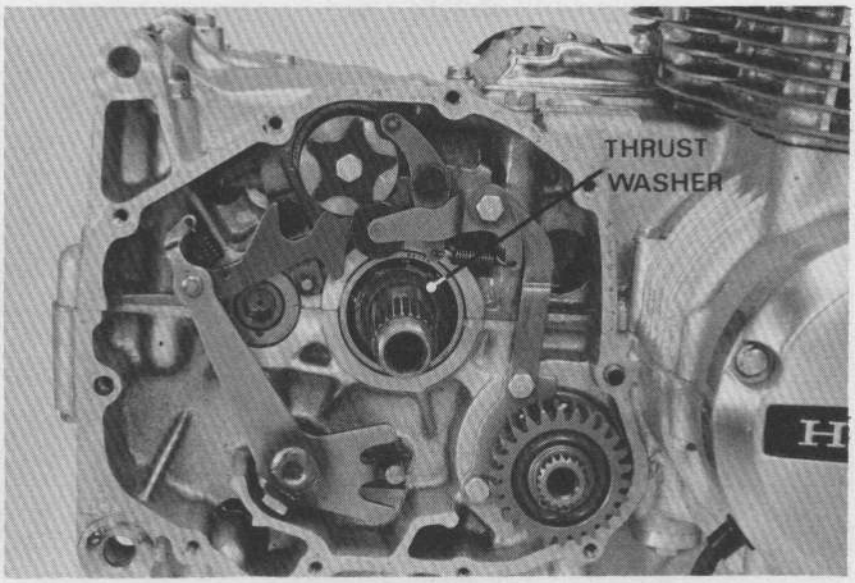
Measure the clutch outer I. D. and outer guide O. D.

SERVICE LIMITS:
I.D.: 30.05 mm (1.183 in)
O.D.: 29.94 mm (1.179 in)



CLUTCH INSTALLATION

Install the thrust washer.

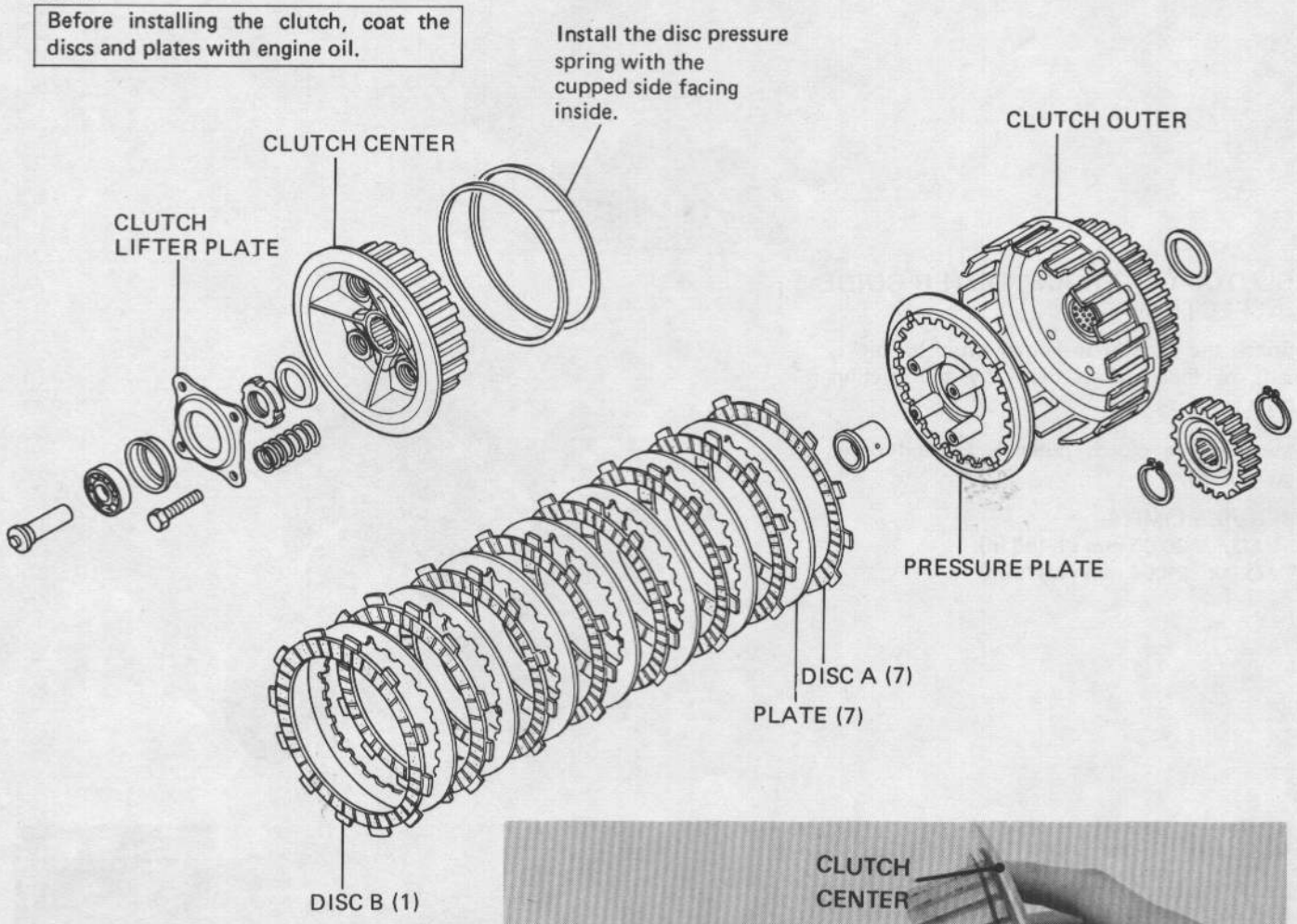


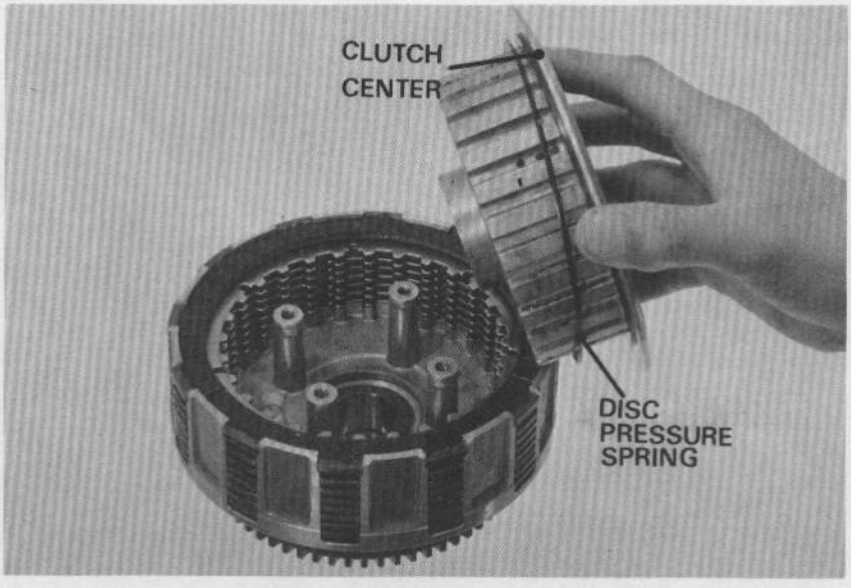
Assemble the clutch outer in the order listed below.

- Clutch outer guide
- Pressure plate
- Discs A (7) and plates (7) alternately
- Disc B
- Disc pressure spring
- Clutch center

NOTE

Before installing the clutch, coat the discs and plates with engine oil.





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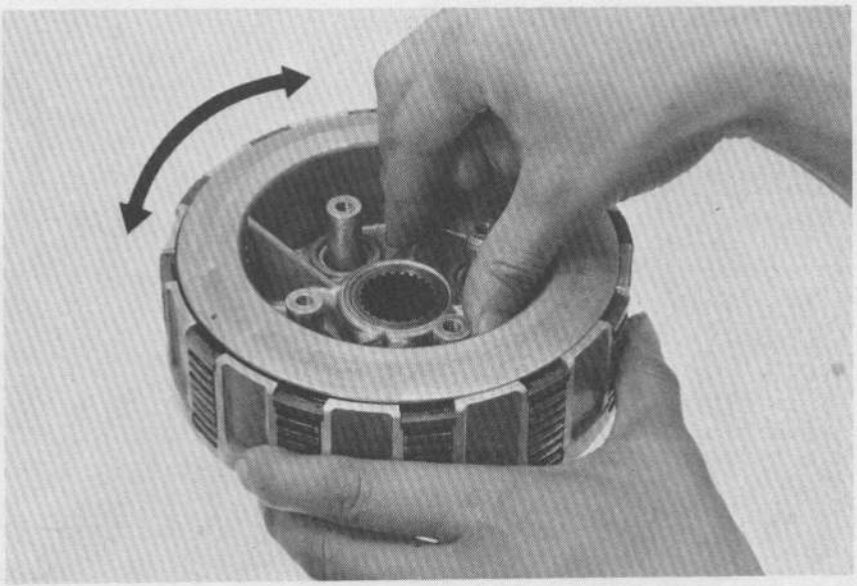
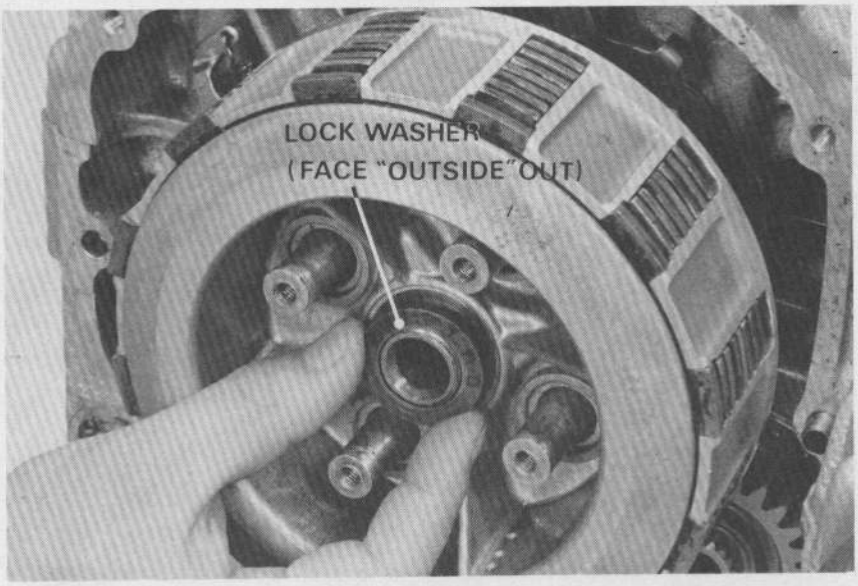
Align the splines by rotating the clutch center.



Install the clutch assembly.
Install the lock washer and lock nut.

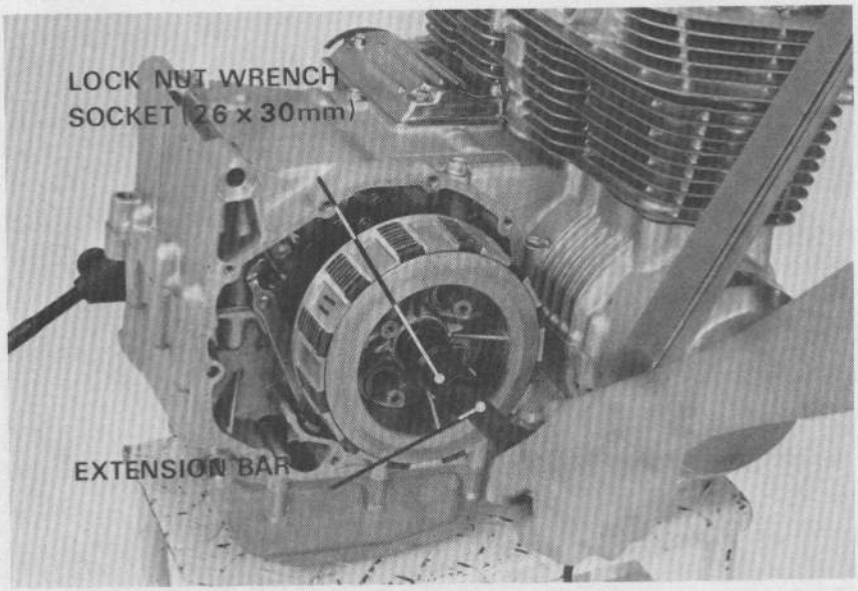
NOTE

Position the mark "OUTSIDE" on the lock washer facing out.



Tighten the lock nut.

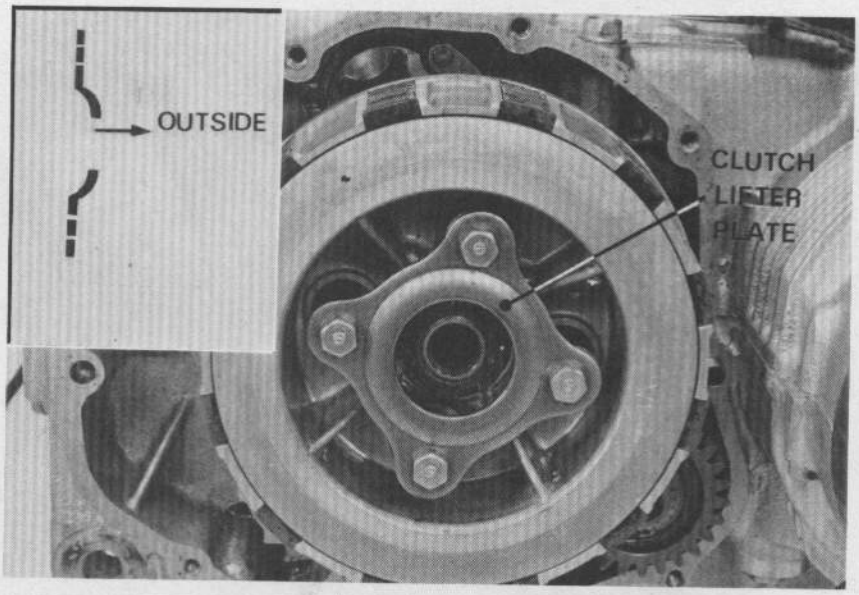
TORQUE: 4.7–5.3 kg-m (34–38 ft-lb)



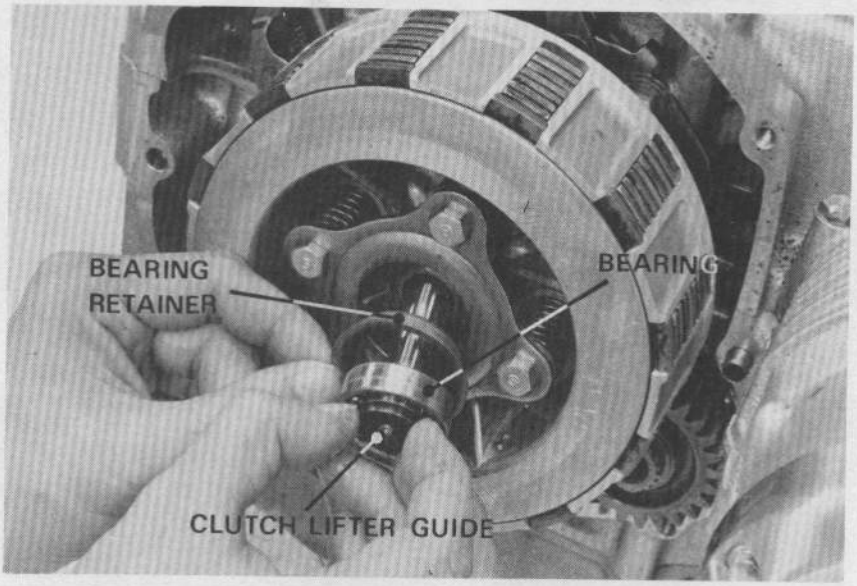
Install the clutch springs and lifter plate. Tighten the bolts.

NOTE

Install the lifter plate with the cupped side facing inside.



Install the bearing retainer, lifter guide and bearing.

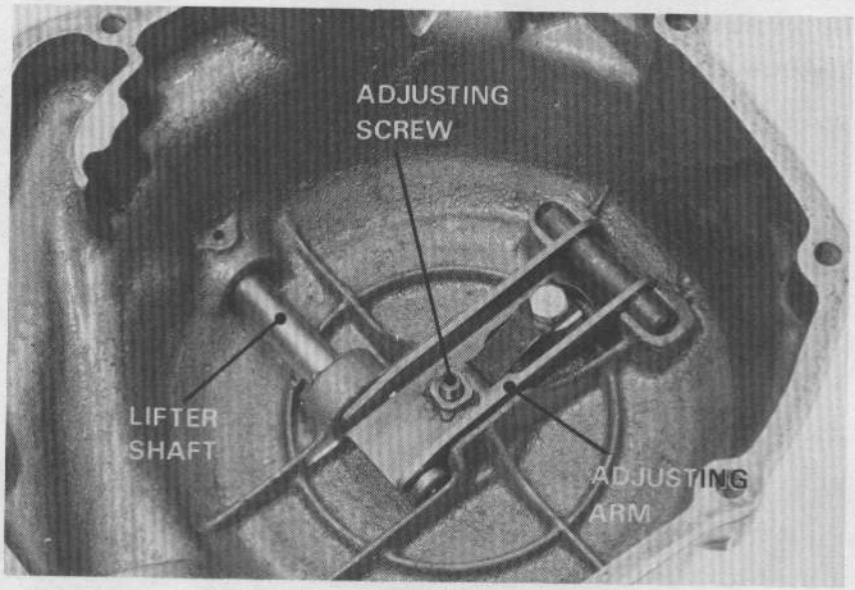


CLUTCH COVER INSTALLATION

Install the lifter shaft, adjusting screw, adjusting arm and spring.

Install the dowel pins and gasket, and then install the clutch cover.
Connect the clutch cable.

Install the right foot page.
TORQUE: 8.0–10.0 kg-m (58–72 ft-lb)
Adjust clutch free play (Page 3–16).



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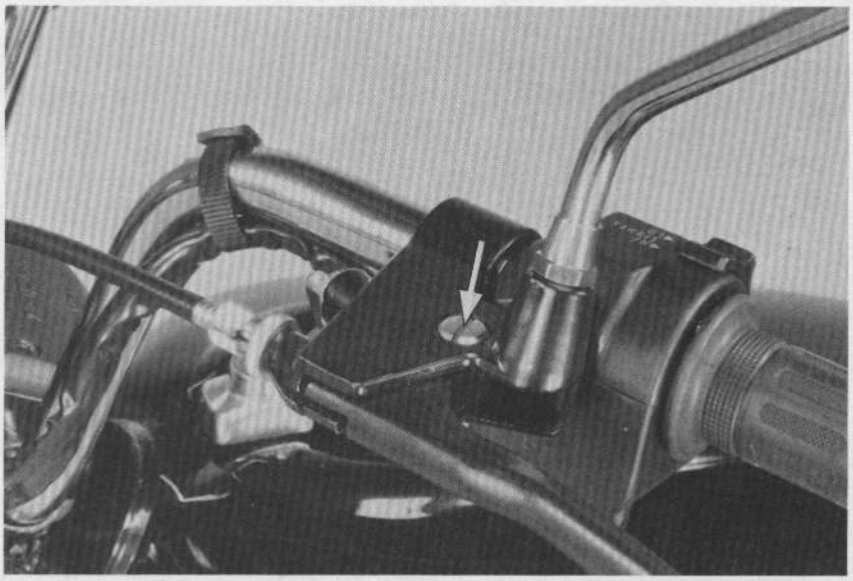
CLUTCH CABLE REPLACEMENT

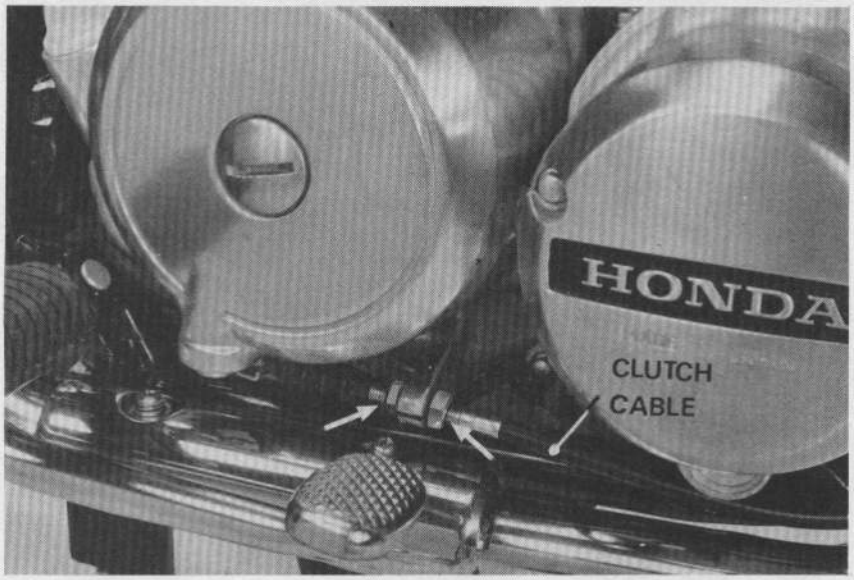
Remove the fuel tank.
Remove the clutch cable from the lever.



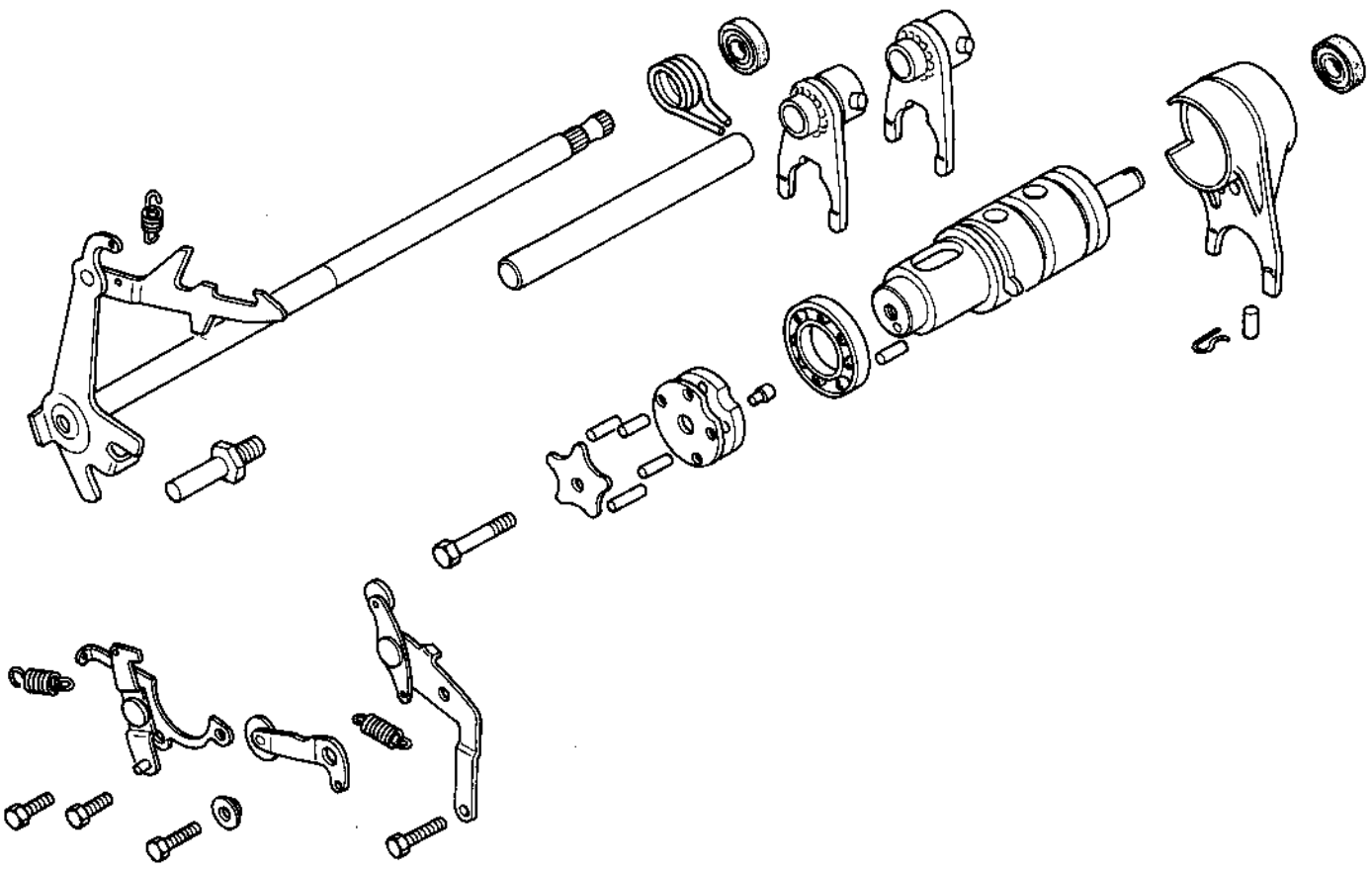
Loosen the clutch adjuster lock nuts and remove the clutch cable from the clutch lever.

NOTE

Before removing the clutch cable, connect a string to the end of the cable so that a new cable can be installed easily by using this string as a draw cord.



Install a new clutch cable.
Lubricate the clutch cable.
After installation, adjust the clutch cable. (Page 3–16).



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9. GEARSHIFT LINKAGE

SERVICE INFORMATION

GENERAL INSTRUCTIONS

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

TORQUE VALUE

Gearshift pedal	0.8–1.2 kg-m (6–9 ft-lb)

TROUBLESHOOTING

Hard to shift

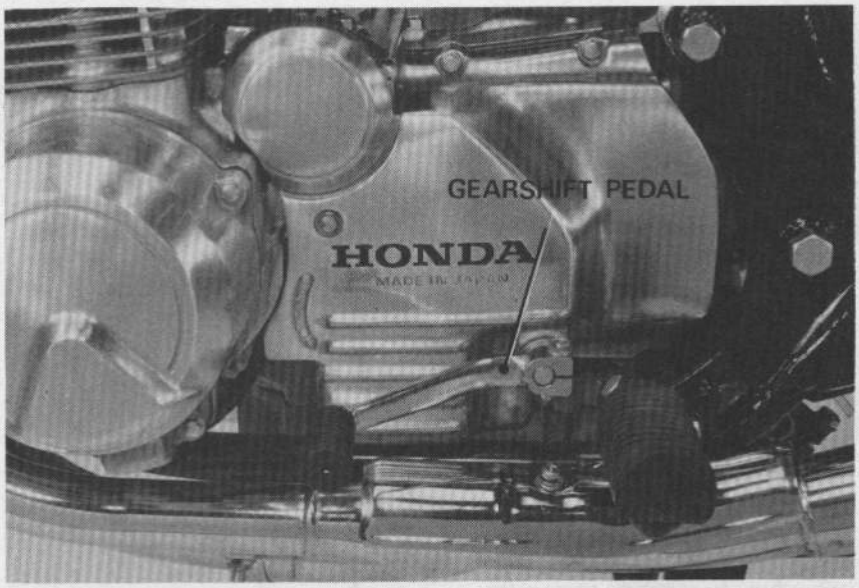
1. Improper clutch adjustment; too much free play
2. Shift forks bent
3. Shift shaft bent
4. Shift claw bent
5. Shift drum cam grooves damaged

Transmission jumps out of gear

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

GEARSHIFT PEDAL REMOVAL

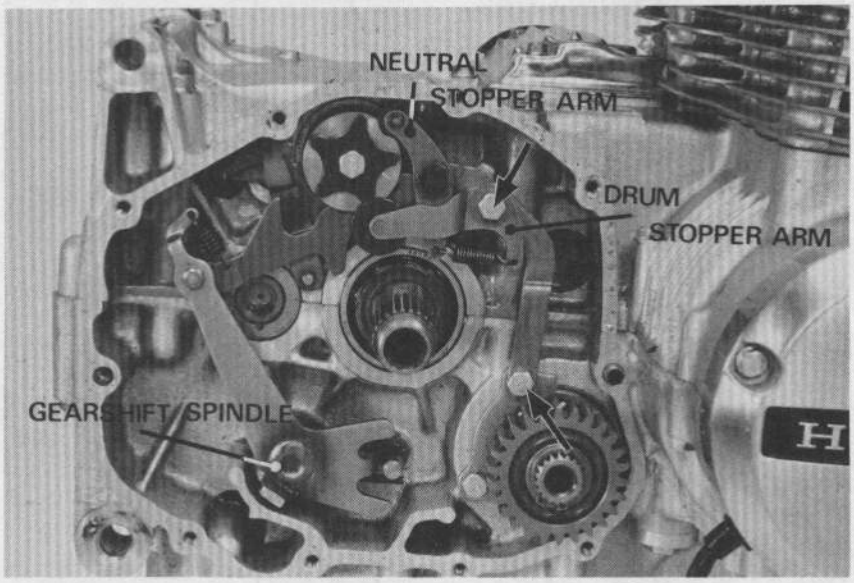
Remove the gearshift pedal bolt and gearshift pedal.



GEARSHIFT LINKAGE REMOVAL

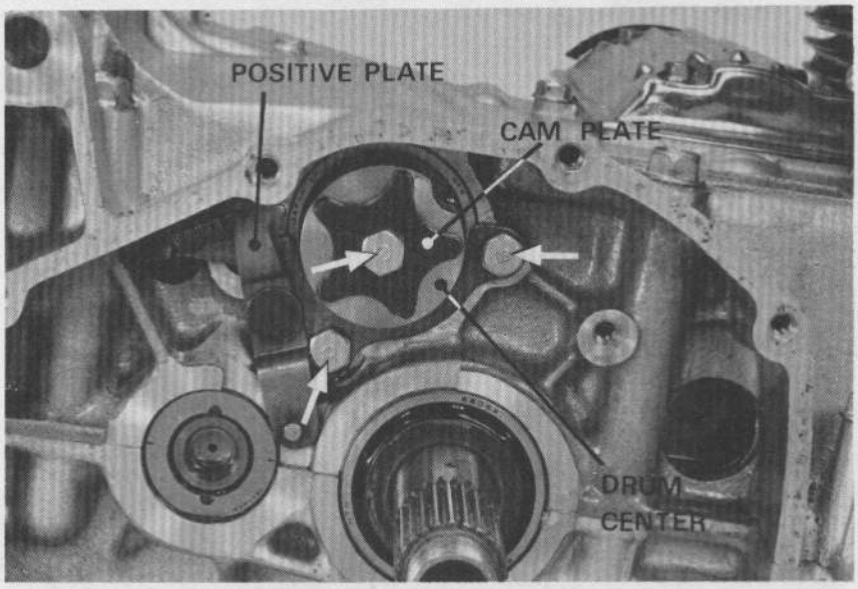
Drain the engine oil (Page 2–2).
Remove the clutch (Seciton 8).

Remove the neutral and drum stopper arm bolts and both arms.
Remove the gearshift spindle assembly.



Remove the positive plate bolts and plate.

Remove the stopper cam plate bolt, cam plate, drum center and drum pins.



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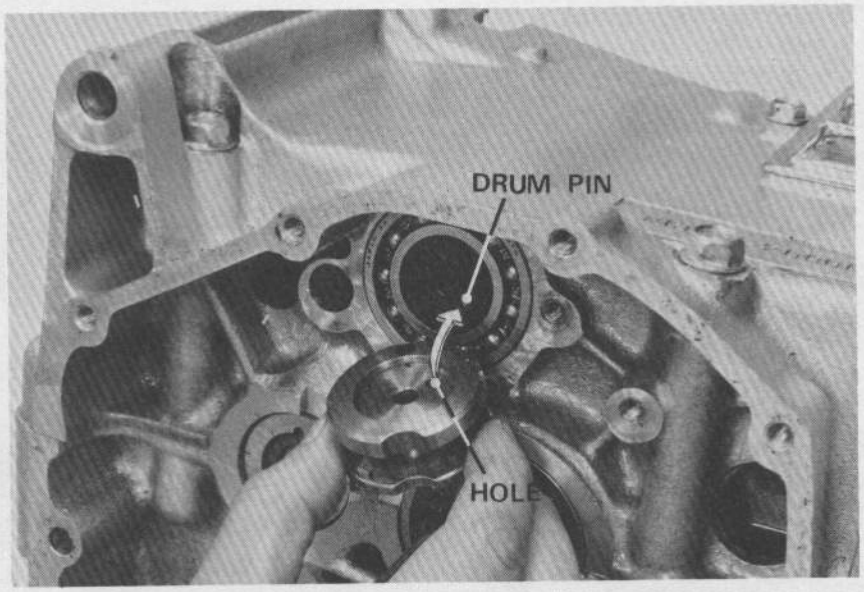
GEARSHIFT LINKAGE INSTALLATION

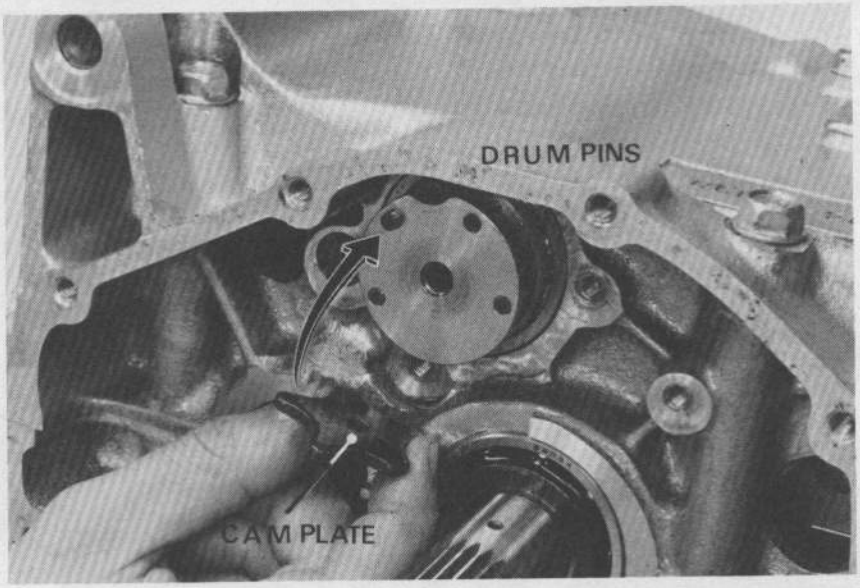
Install the shift drum pin.

Align the hole in the drum center with the drum pin.

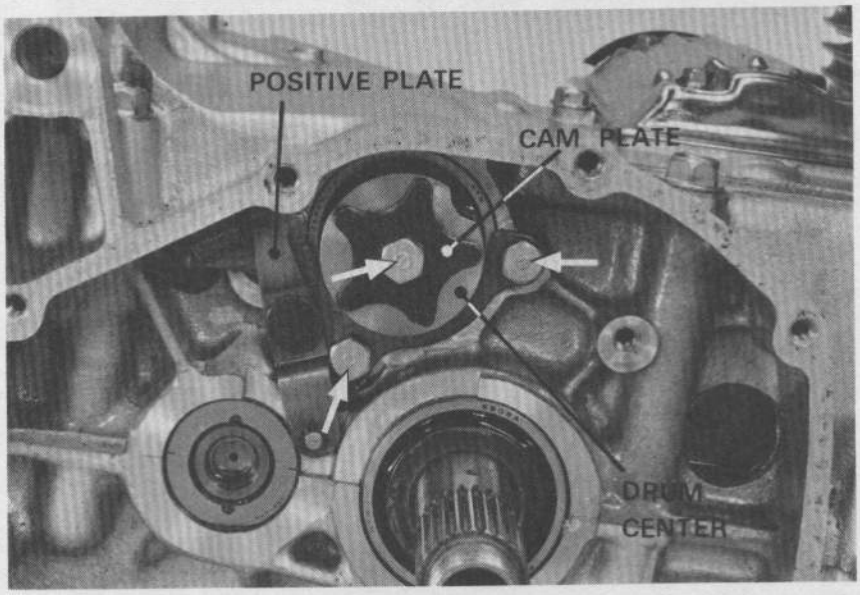


Install the drum plate.
Align the hole in the cam plate with the drum pin.

Tighten the bolt securely.



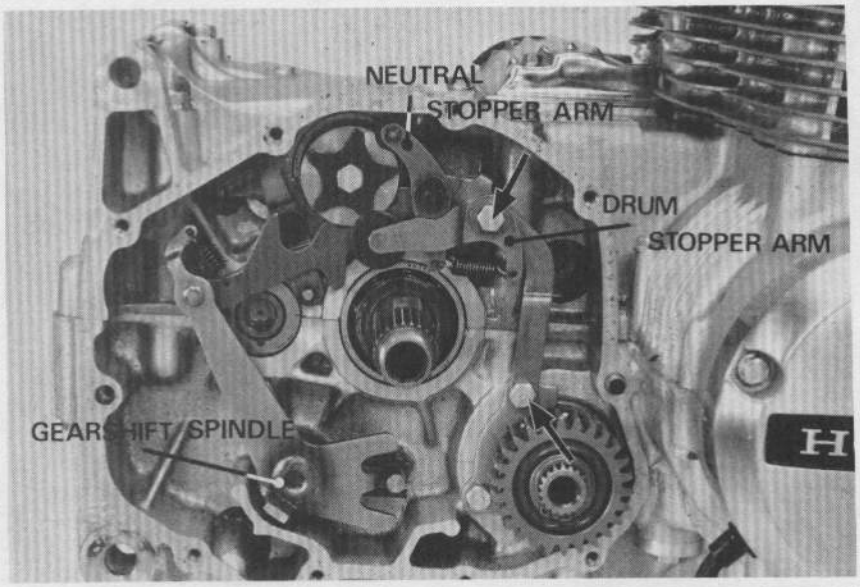
Install the positive plate.



Install the gearshift spindle.
Install the drum and neutral stopper arms.
Install the stopper spring.

Rotate the gearshift spindle and check the linkage for smooth operation.

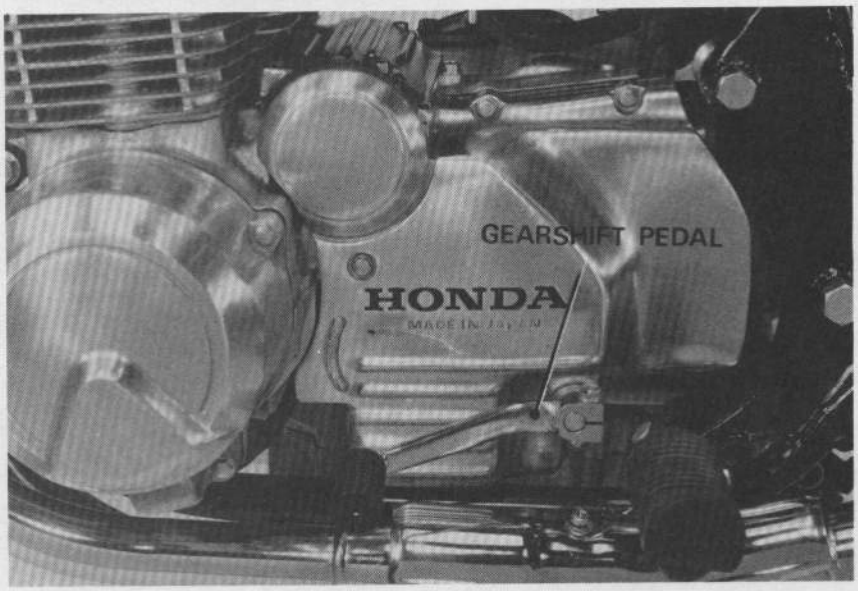
Install the clutch assembly and cover (Section 8).



GEARSHIFT PEDAL INSTALLATION

Install the gearshift pedal as shown.

TORQUE: 0.8–1.2 kg-m (6–9 ft-lb)



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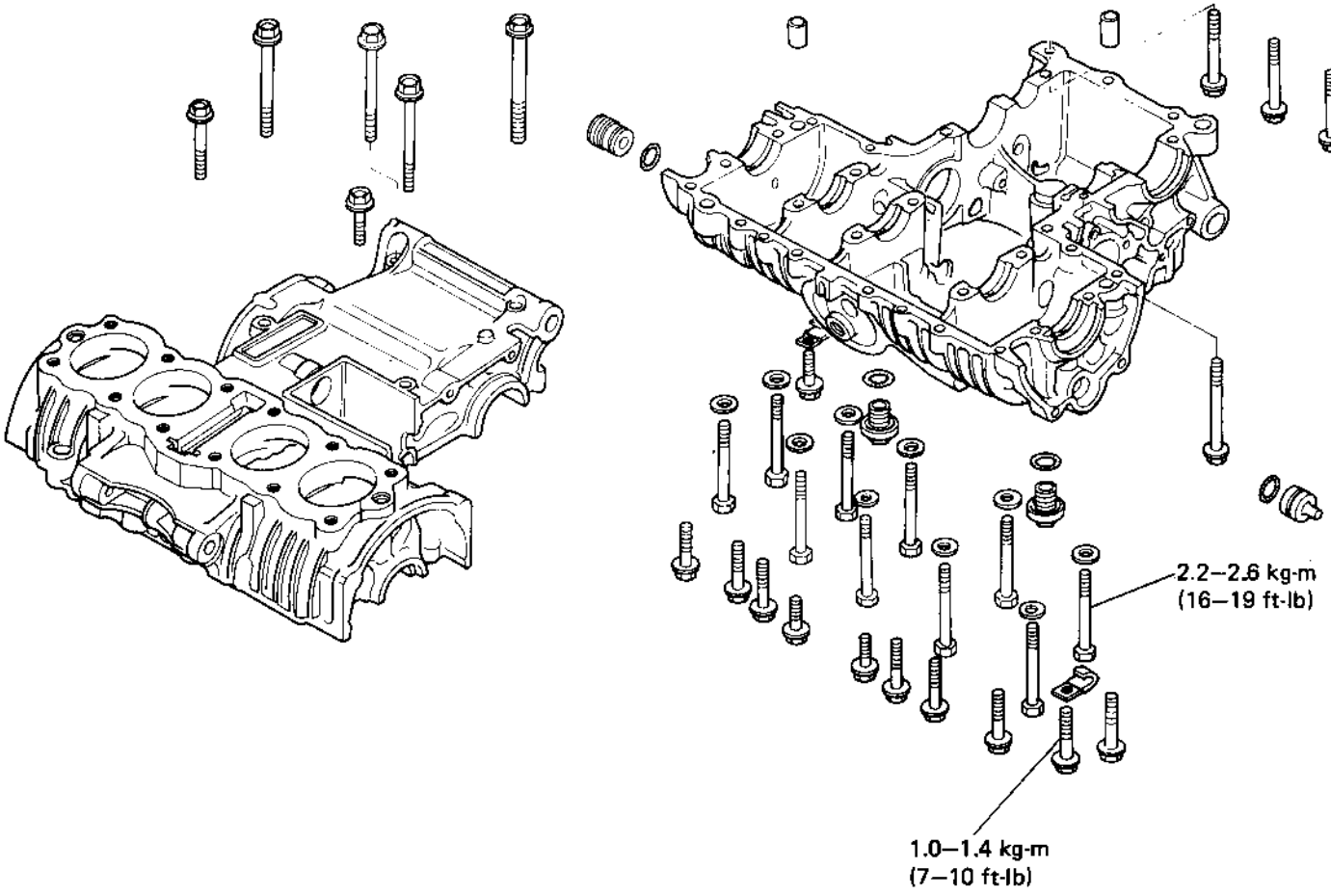

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10. CRANKCASE

SERVICE INFORMATION

GENERAL INSTRUCTIONS

- To repair the crankshaft, connecting rod, primary shaft and transmission including the shift fork and drum, it is necessary to separate the crankcase halves.
- The following parts must be removed before disassembling the crankcase.

To service	Remove
Crankshaft and connecting rod	Cylinder head, cylinder, piston, A. C. generator rotor, clutch, pulser generator, gearshift linkage and oil pump
Transmission/primary shaft	Clutch, gearshift linkage, oil pump and pulser generator

SPECIAL TOOLS

Special tools	
Sliding hammer shaft	07936–3740100
Sliding hammer weight	07945–3000500

TORQUE VALUES

Crankcase 8 mm bolt	2.2–2.6 kg-m (16–19 ft-lb)
Crankcase 6 mm bolt	1.0–1.4 kg-m (7–10 ft-lb)

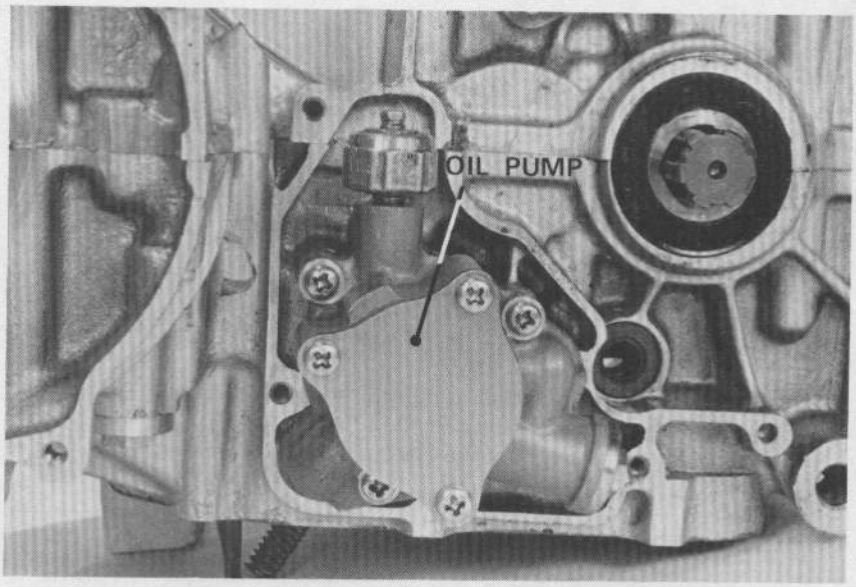
CRANKCASE DISASSEMBLY

Remove the oil filter, oil pan and oil strainer (Section 2).

Remove the cylinder head, cylinders and pistons (Section 6 and 7).
Remove the clutch and gearshift linkage (Section 8 and 9).
Remove the A. C. generator, pulser generator, spark advancer and starting motor (Section 16, 17 and 18).
Remove the oil pump.

NOTE

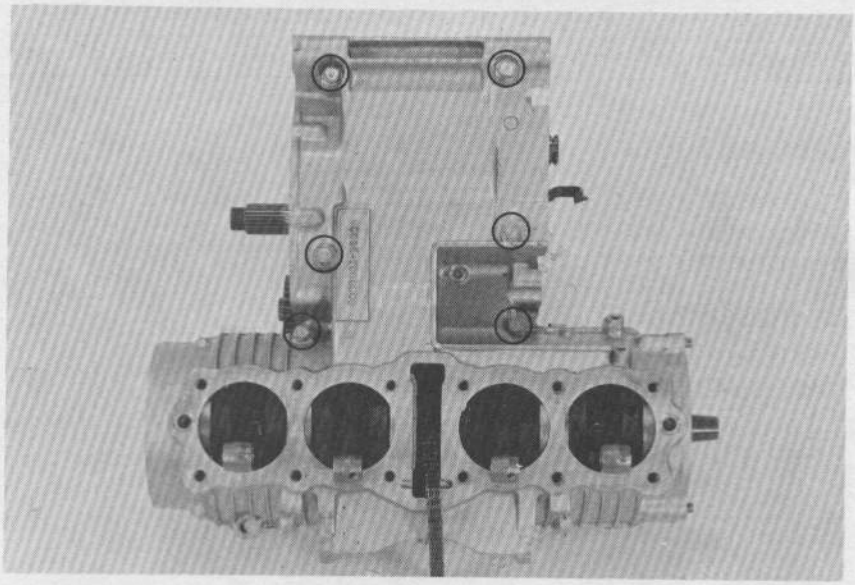
The crankcase can be separated without removing the A. C. generator, starting motor, oil filter, oil pump and oil strainer. However, we recommend removal of these parts, because the transmission gears may be dropped when separating the crankcase.

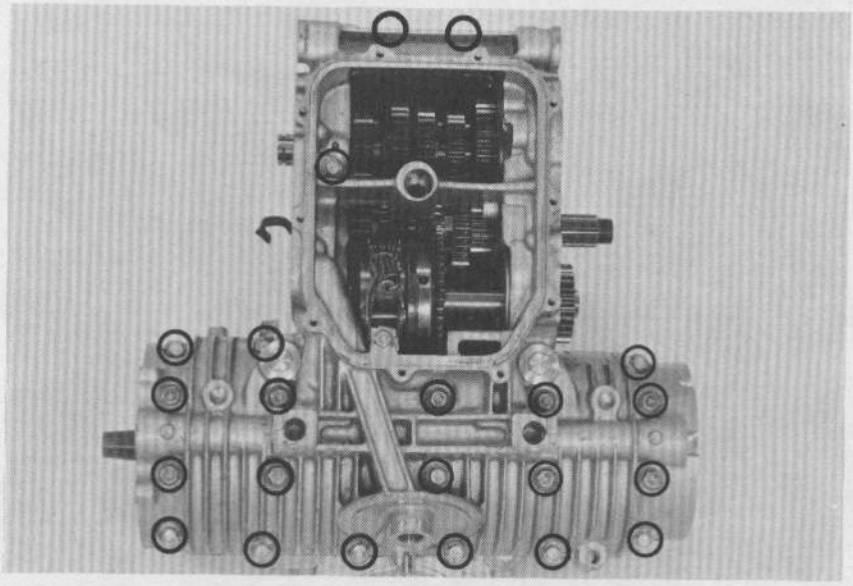


Remove the upper crankcase bolts.
Turn the engine upside down.
Remove the lower crankcase bolts.

NOTE

Remove the bolts in two or more steps and in a crisscross pattern to prevent warpage.





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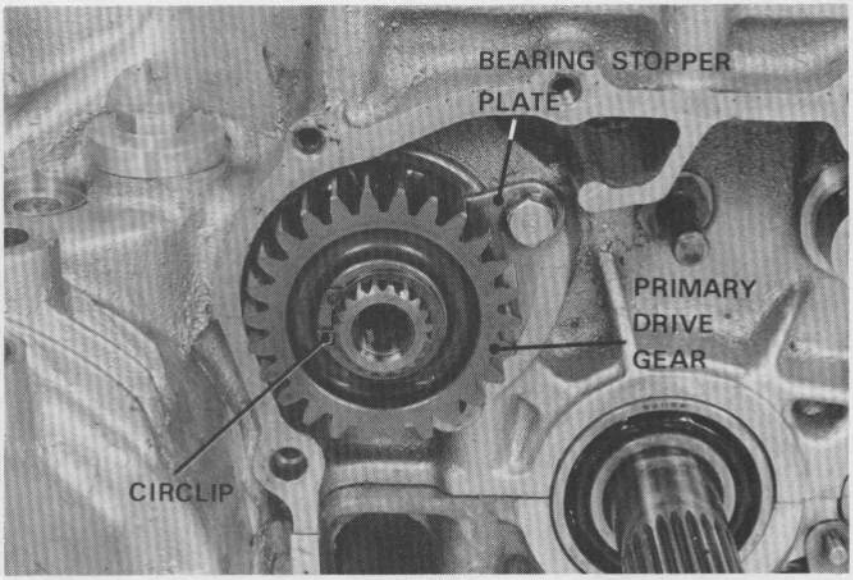
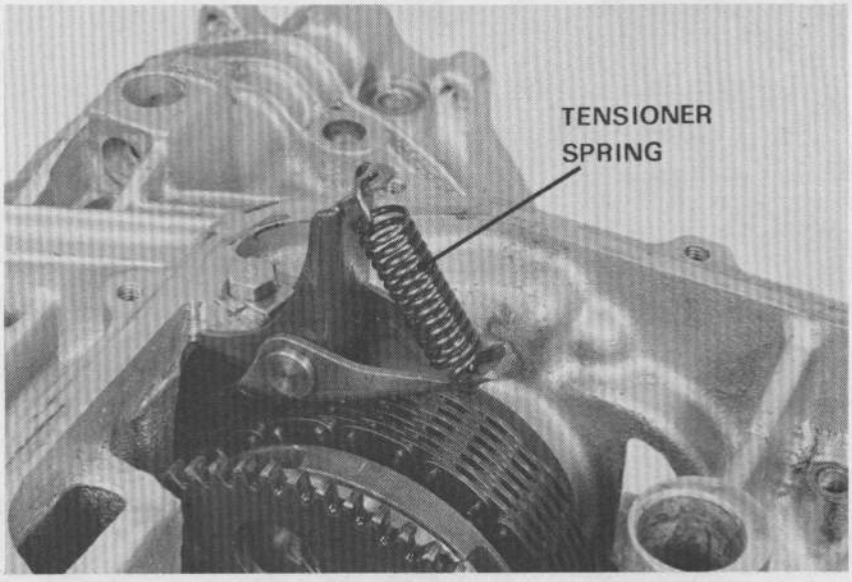
PRIMARY SHAFT REMOVAL

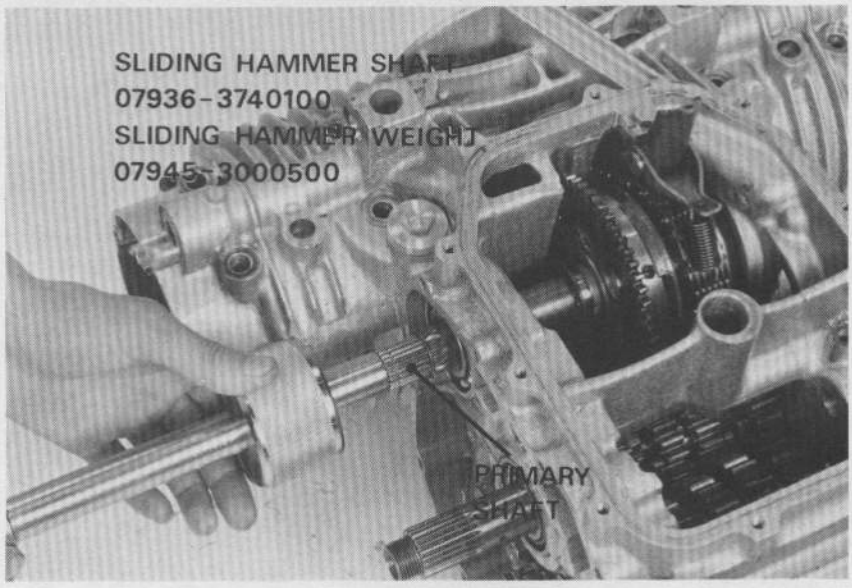
Remove the circlip.
Remove the primary drive gear with a gear puller.
Remove the bearing stopper plate.



Disconnect the primary chain tensioner spring.



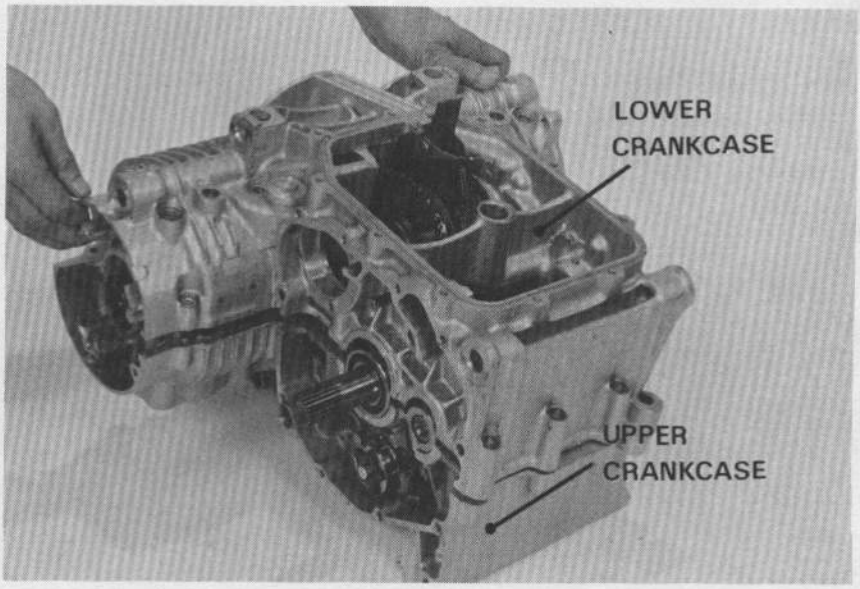
Remove the primary shaft with special tools.

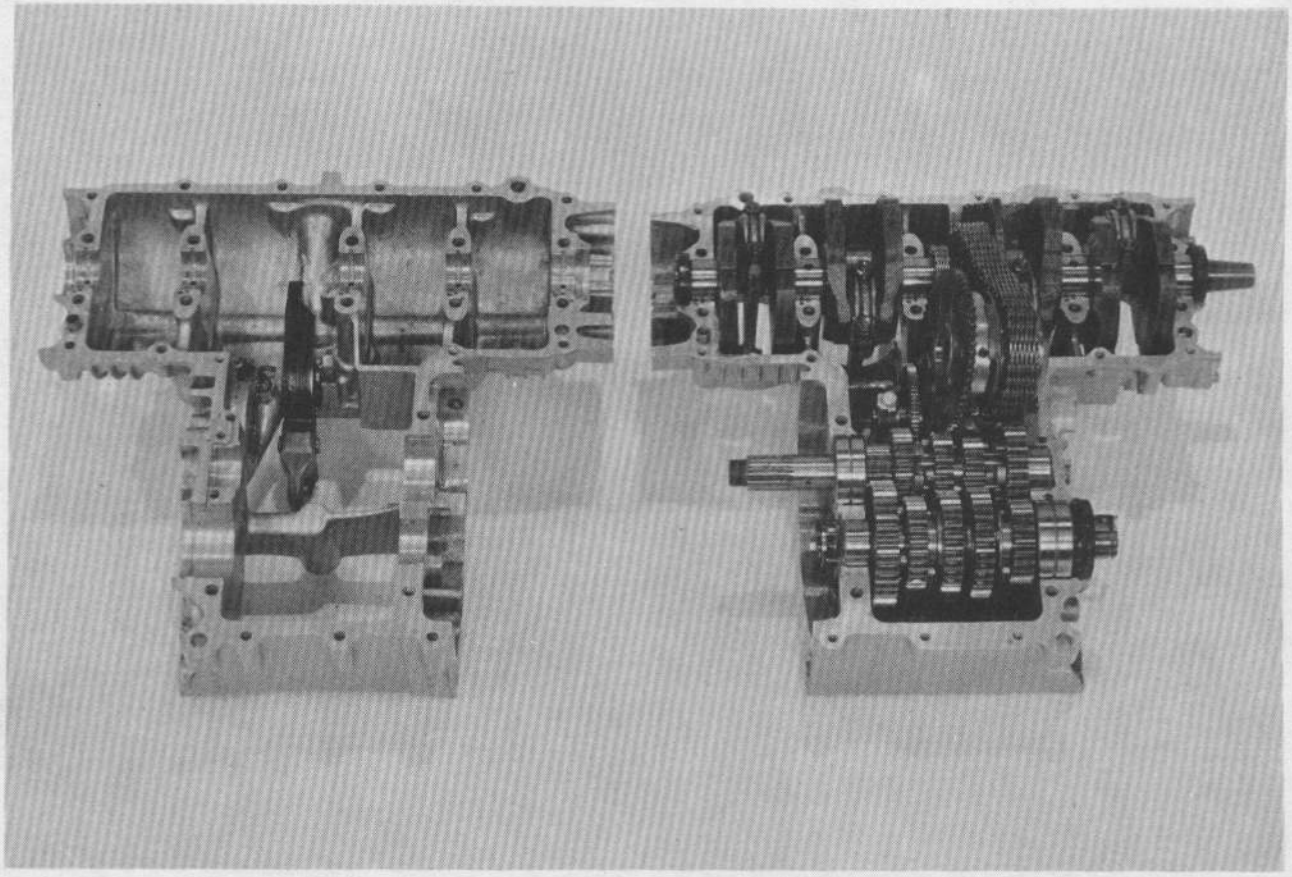


CRANKCASE DISASSEMBLY

Separate the crankcase.

CAUTION
Do not pry between the upper and lower cases.





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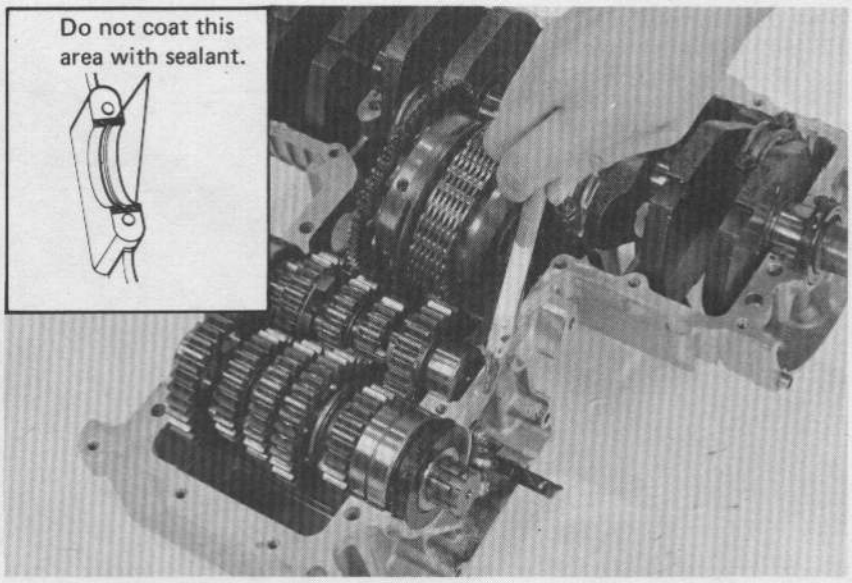
CRANKCASE ASSEMBLY

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

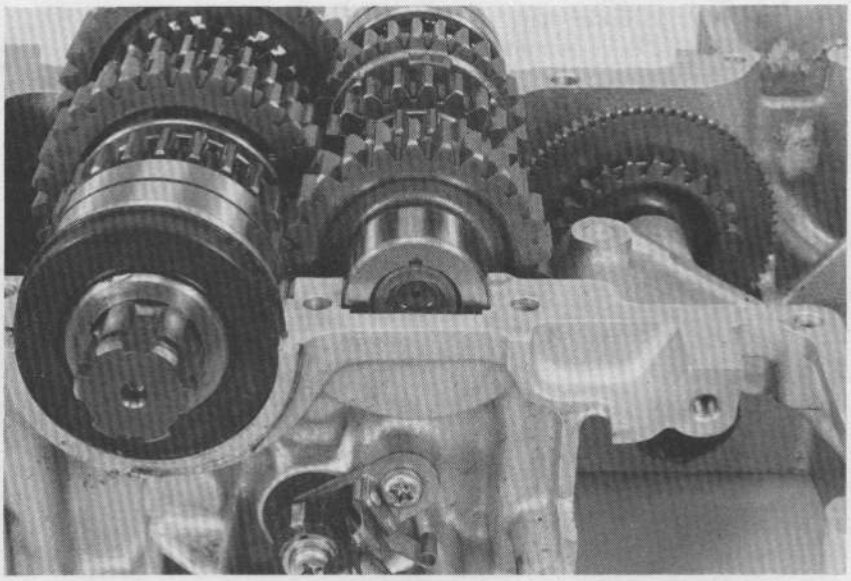
NOTE

Do not apply sealant to the area near the main bearings and oil passages.

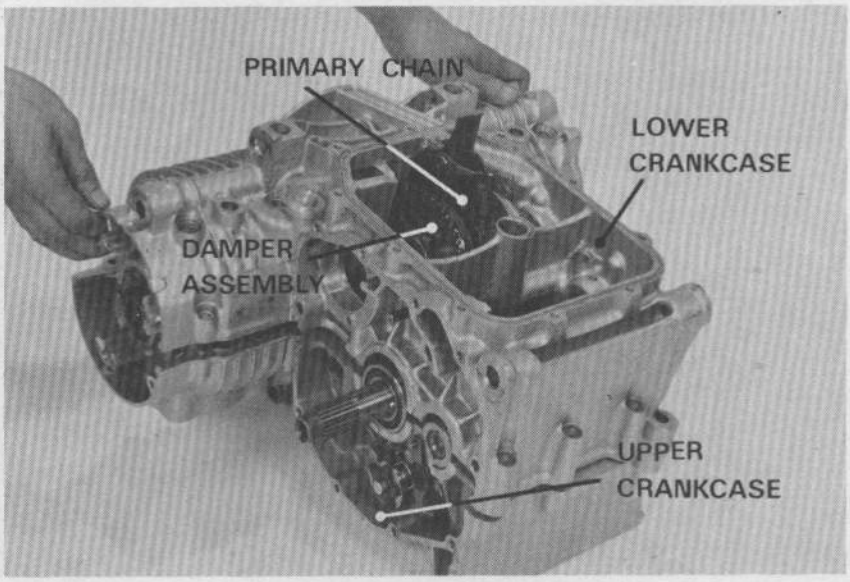
Apply molybdenum disulfide grease to the crankshaft main bearings.



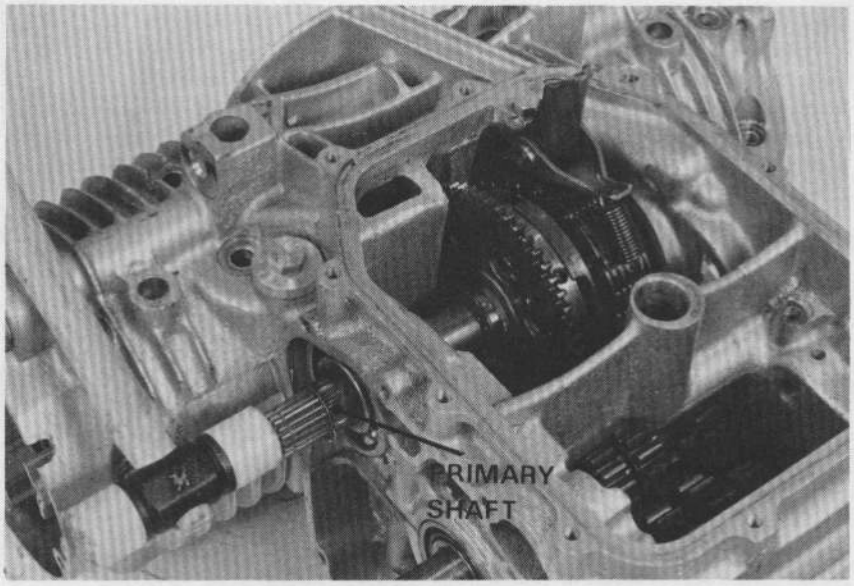
Make sure the transmission bearings and oil seal are properly seated in the upper crankcase.



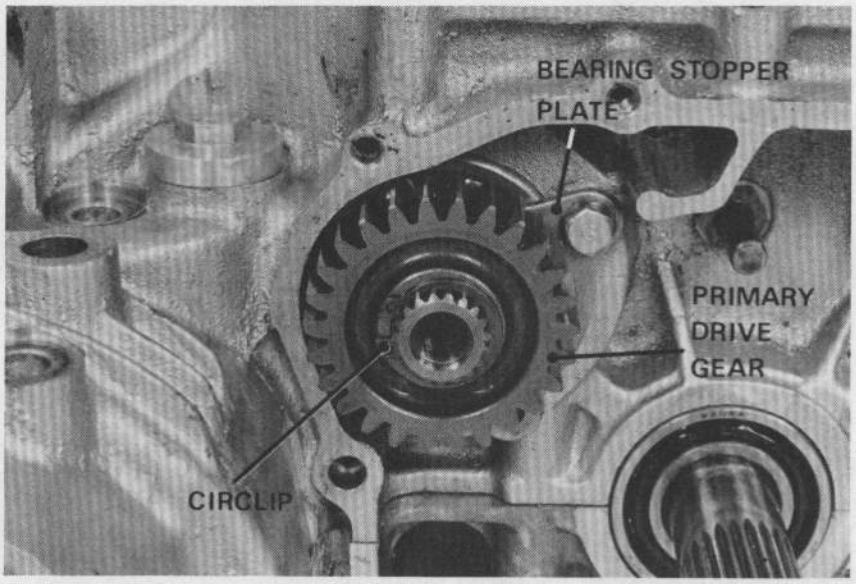
Position the primary chain and damper assembly in the crankcase.
Assemble the crankcase halves.



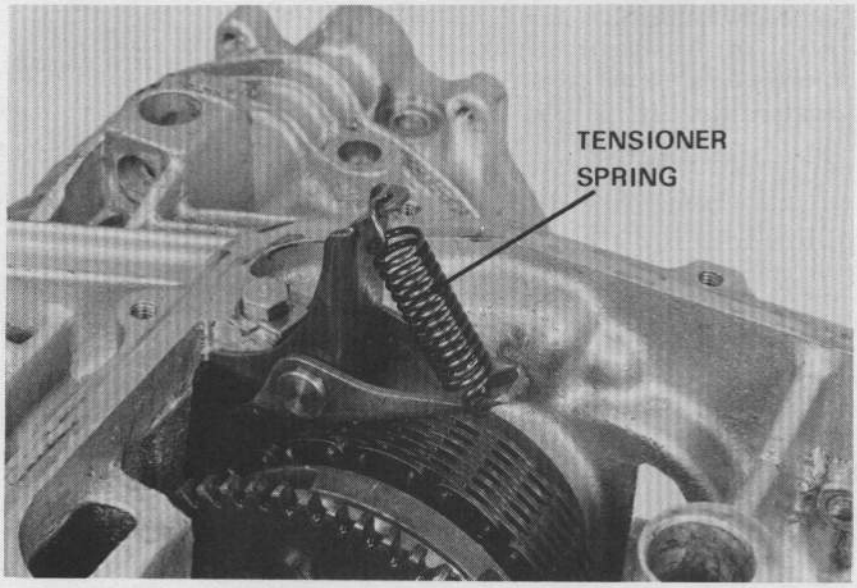
Insert the primary shaft and carefully drive it in with a plastic hammer.



Install the bearing stopper plate.
Install the primary drive gear and circlip.



Connect the tensioner spring.



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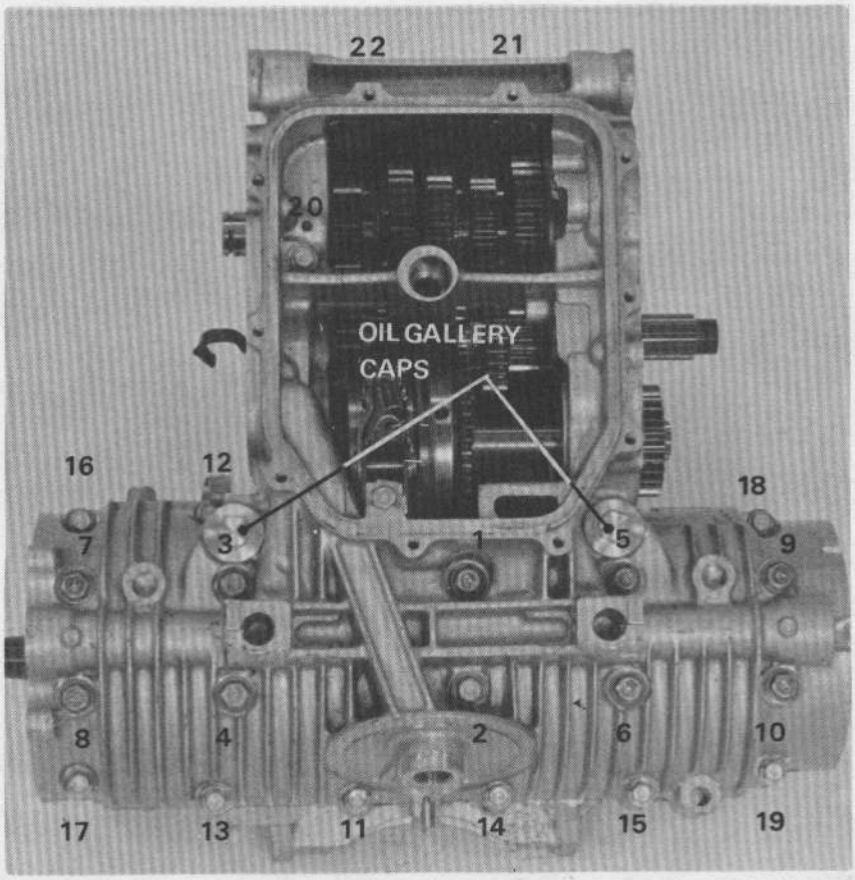
Tighten the bolts to the specified torque values in the sequence shown.

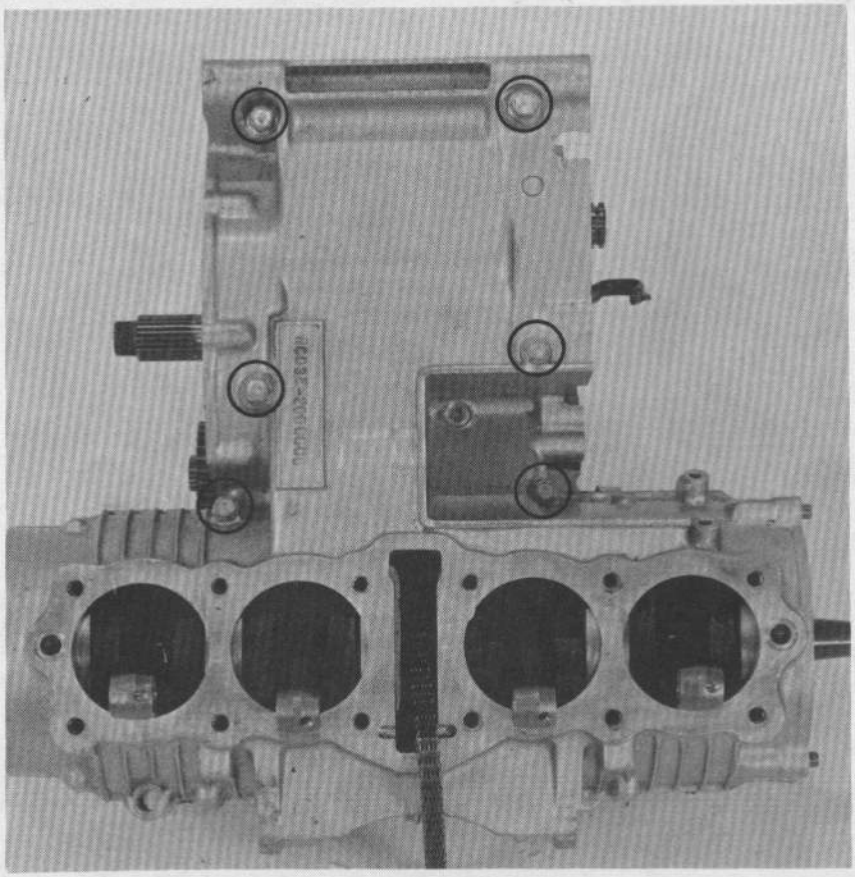
TORQUES:

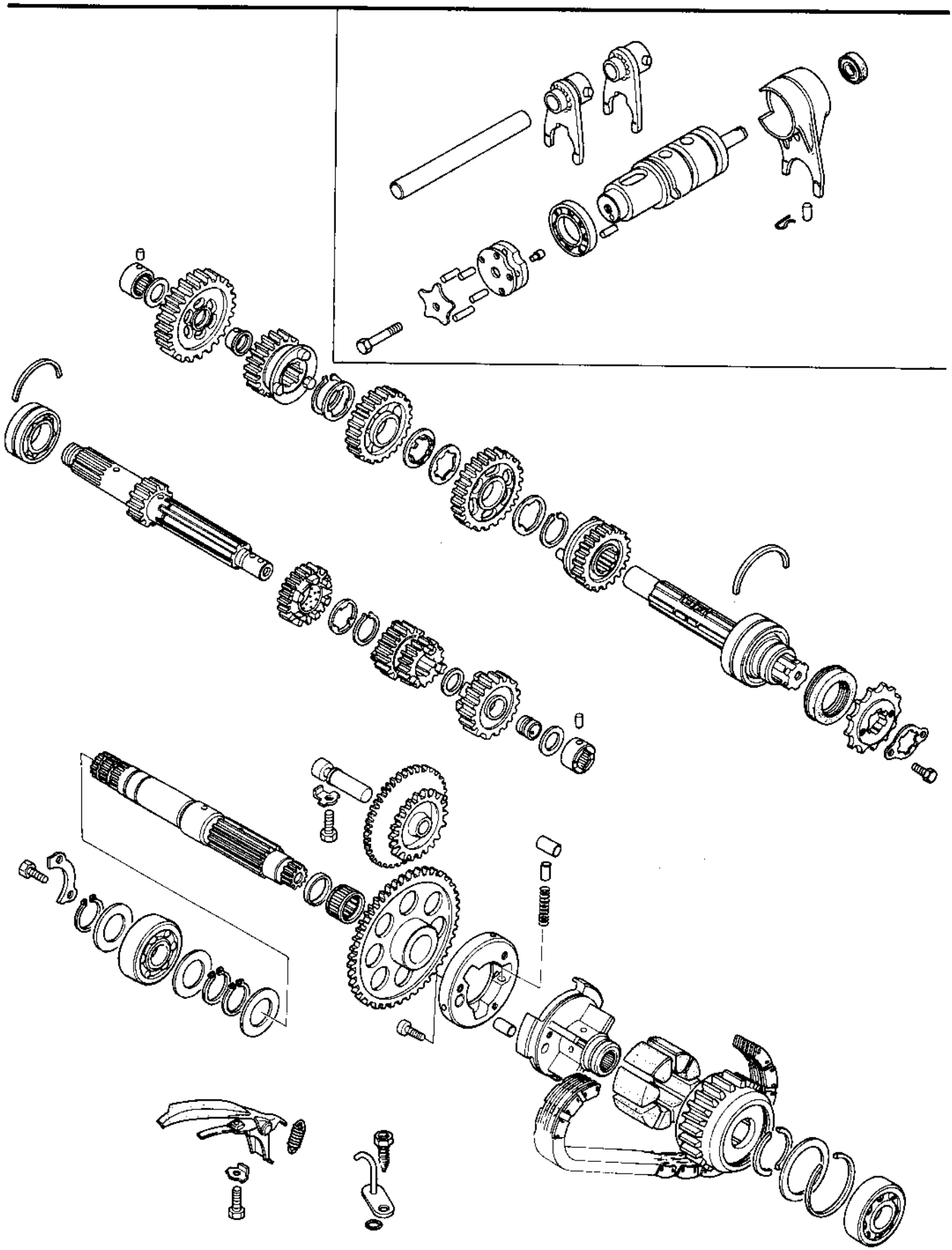
8 mm bolt: 2.2–2.6 kg-m, (16–19 ft-lb)
6 mm bolt: 1.0–1.4 kg-m, (7–10 ft-lb)

NOTE

- Apply molybdenum disulfied grease to the threads and heads of the 10 crankshaft bolts.
- If the oil gallery cap is removed, apply molybdenum disulfied grease to the threads when installing it.







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11. PRIMARY SHAFT/TRANSMISSION

SERVICE INFORMATION

GENERAL INSTRUCTIONS

- The gearshift linkage can be serviced with the engine in the frame.
- For internal transmission repairs, the crankcase must be separated (Refer to Section 10).

SPECIAL TOOLS

Special Tools	
Torx Driver Bit	07703–0010200
Driver attachment	07947–6710100

Common Tools	
Driver Handle (B)	07746–0020100
Driver Handle (C)	07746–0030100
Driver inner (25 mm)	07746–0030200
Driver Handle (A)	07749–0010000
Driver Pilot (22 mm)	07746–0041000

TORQUE VALUES

Neutral switch rotor	0.6–1.0 kg-m (4–7 ft-lb)
Primary chain tensioner	1.0–1.4 kg-m (7–10 ft-lb)
Primary chain nozzle	0.8–1.2 kg-m (6–9 ft-lb)
Starter clutch	1.2–1.6 kg-m (9–12 ft-lb)

SPECIFICATIONS

ITEM			STANDARD	SERVICE LIMIT
Transmission	Backlash	1st, 2nd, 3rd	0.044–0.133 mm (0.0017–0.0052 in)	0.20 mm (0.008 in)
		4th, 5th	0.046–0.140 mm (0.0018–0.0055 in)	0.20 mm (0.008 in)
	Gear I. D.	M4	25.020–25.041 mm (0.9850–0.9859 in)	25.06 mm (0.987 in)
		M5	23.000–23.033 mm (0.9055–0.9068 in)	23.06 mm (0.908 in)
		C1	24.000–24.033 mm (0.9449–0.9462 in)	24.06 mm (0.947 in)
		C2, C3	25.020–25.041 mm (0.9850–0.9859 in)	25.07 mm (0.987 in)
	Gear bushing	M5 O. D.	22.984–22.993 mm (0.9849–0.9052 in)	22.96 mm (0.904 in)
		M5 I. D.	20.010–20.030 mm (0.8665–0.7886 in)	20.07 mm (0.790 in)
		C1 O. D.	23.984–23.993 mm (0.9443–0.9446 in)	23.95 mm (0.943 in)
		C1 I. D.	20.010–20.030 mm (0.8665–0.7886 in)	20.07 mm (0.790 in)

ITEM			STANDARD	SERVICE LIMIT
Transmission	Mainshaft O.D.	at M4	24.959–24.980 mm (0.9826–0.9835 in)	24.93 mm (0.981 in)
		at M5	19.987–20.000 mm (0.7869–0.7874 in)	19.93 mm (0.785 in)
	Countershaft O. D.	at C1	19.987–20.000 mm (0.7869–0.7874 in)	19.93 mm (0.785 in)
		at C2, C3	24.959–24.980 mm (0.9826–0.9835 in)	24.93 mm (0.981 in)
	Gear to bushing or shaft clearance	M4 to shaft	———	0.10 mm (0.004 in)
		M5 to bushing	———	0.10 mm (0.004 in)
		M5 bushing to shaft	———	0.10 mm (0.004 in)
		C1 to bushing	———	0.10 mm (0.004 in)
		C1 bushing to shaft	———	0.10 mm (0.004 in)
		C2 to shaft	———	0.10 mm (0.004 in)
		C3 to shaft	———	0.10 mm (0.004 in)
	End clearance	M5	0.3–0.5 mm (0.012–0.020 in)	———
		C1	0.1–0.3 mm (0.004–0.012 in)	———
Shift fork	Claw thickness		5.93–6.00 mm (0.233–0.236 in)	5.6 mm (0.22 in)
	I. D.	Center	38.000–38.025 mm (1.4961–1.4970 in)	38.075 mm (1.499 in)
		Left and right	13.000–13.018 mm (0.5118–0.5125 in)	13.04 mm (0.513 in)
Fork shaft	O. D.		12.966–12.984 mm (0.5104–0.5112 in)	12.90 mm (0.508 in)
Shift drum	O. D.		37.950–37.975 mm (1.4941–1.4951 in)	37.90 mm (1.492 in)
Electric starter	Drive gear O. D.		41.950–42.200 mm (1.6516–1.6614 in)	41.93 mm (1.650 in)
	Idle gear I. D.		10.000–10.015 mm (0.3937–0.3943 in)	10.04 mm (0.395 in)
	Idle gear shaft O. D.		9.972–9.987 mm (0.3926–0.3932 in)	9.95 mm (0.392 in)
	Idle gear-to-shaft clearance		———	0.1 mm (0.004 in)

TROUBLESHOOTING

Hard to shift

1. Improper clutch adjustment; too much free play
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

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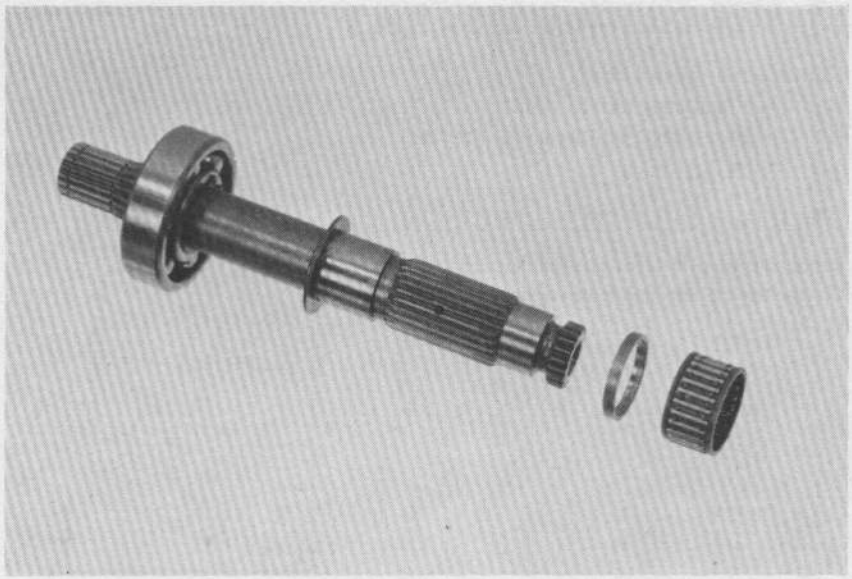
PRIMARY SHAFT DISASSEMBLY

Remove the primary shaft and separate the crankcase (see Section 10).

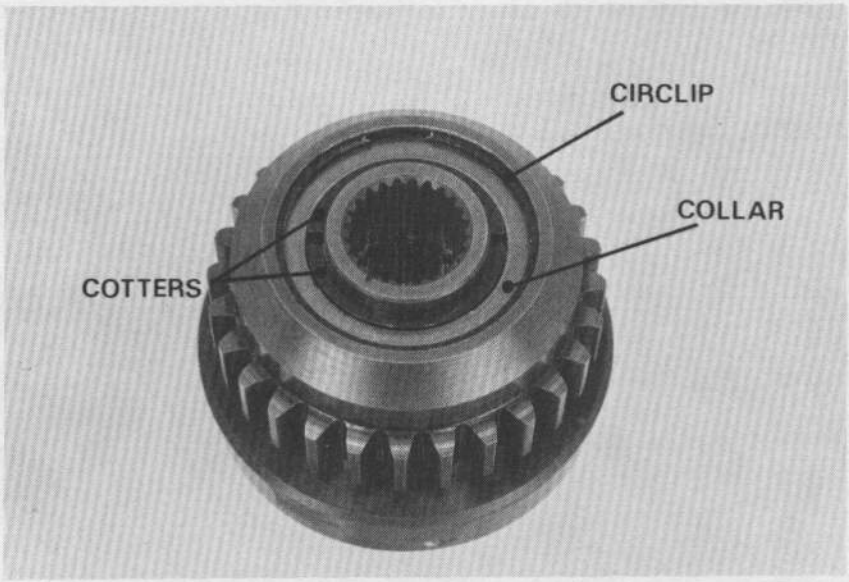


PRIMARY SHAFT INSPECTION

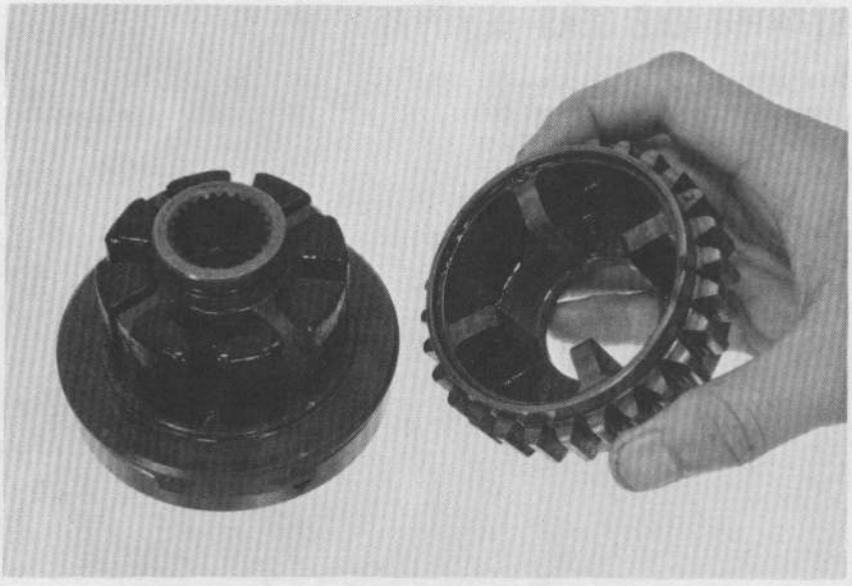
Check for scoring, wear or damage.

DAMPER DISASSEMBLY

Remove the circlip.
Remove the collar and cotters.



Remove the primary driven sprocket and damper rubbers.



DAMPER RUBBER INSPECTION

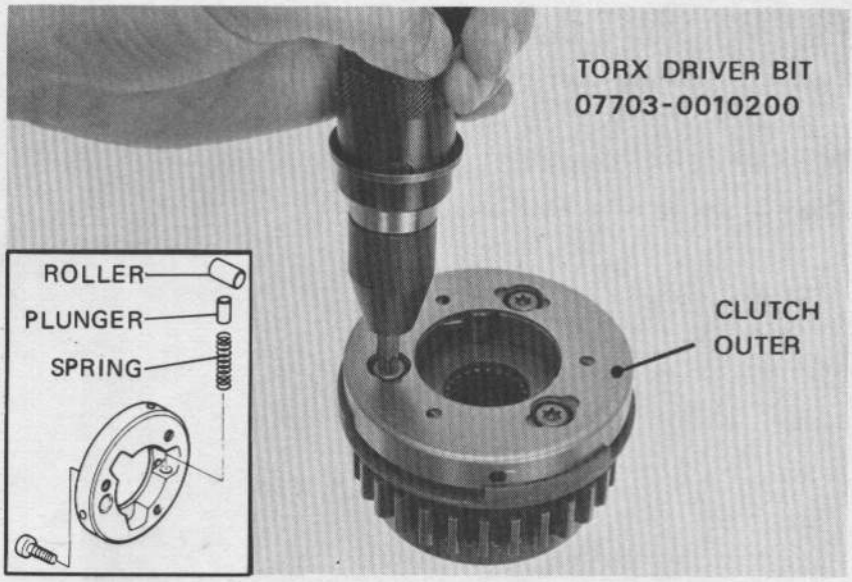
Check for damage or deterioration.

NOTE

Replace dampers as a set.

STARTER CLUTCH DISASSEMBLY

Remove the "torx" bolts.
Remove the starter clutch outer.
Remove the rollers, plungers and springs.



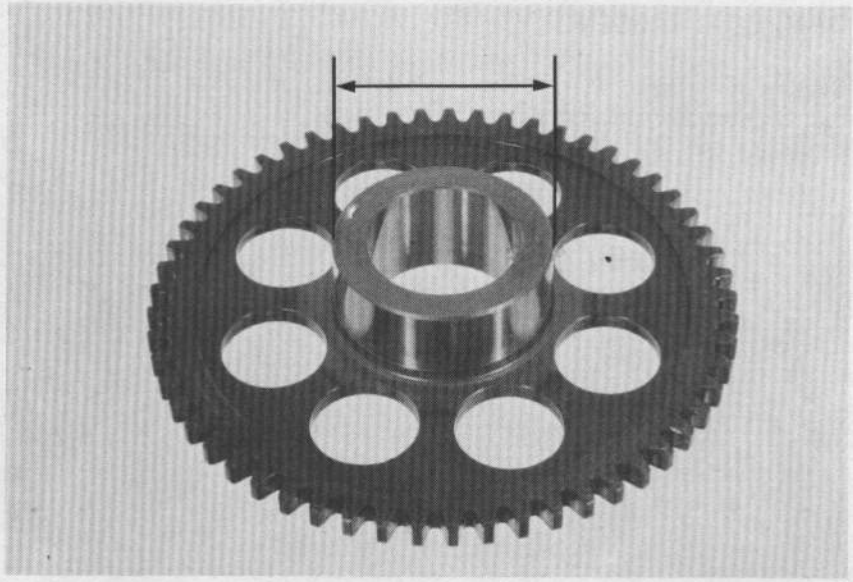
STARTER CLUTCH INSPECTION

Inspect the rollers for smooth operation.
Check the rollers for excessive wear.

Inspect the drive gear for damage or excessive wear.

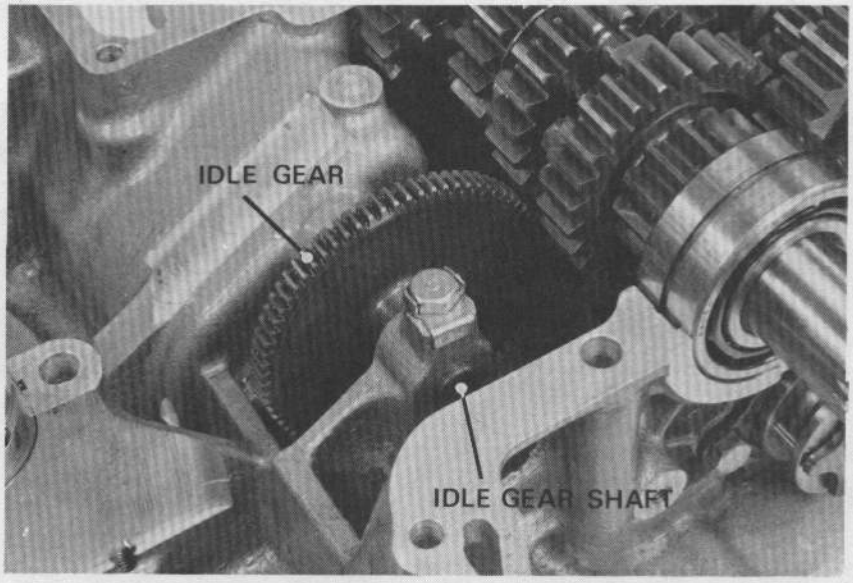
Measure the O. D.

SERVICE LIMIT: 41.93 mm (1.650 in)



STARTER IDLE GEAR REMOVAL

Straighten the set bolt lock washer tabs.
Loosen the starter idle gear set bolt.
Remove the idle gear shaft and gear.



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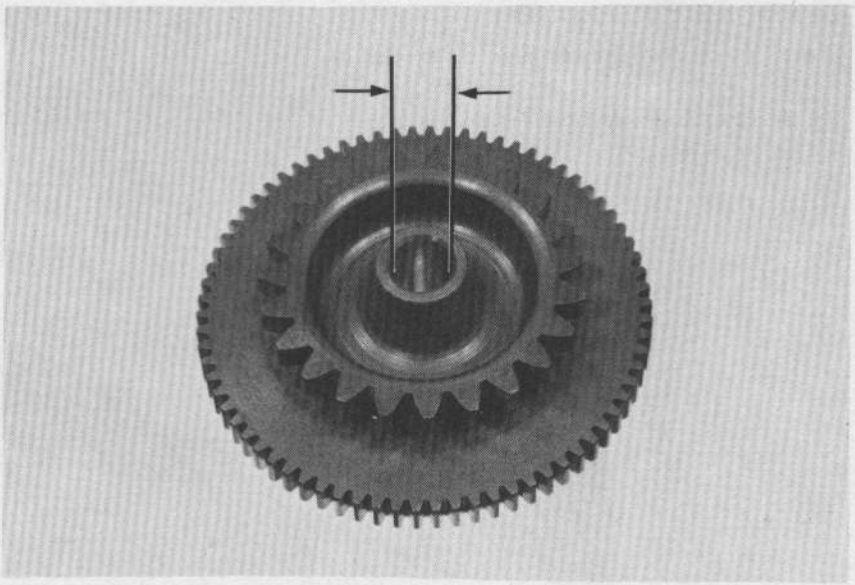
STARTER IDLE GEAR AND SHAFT INSPECTION

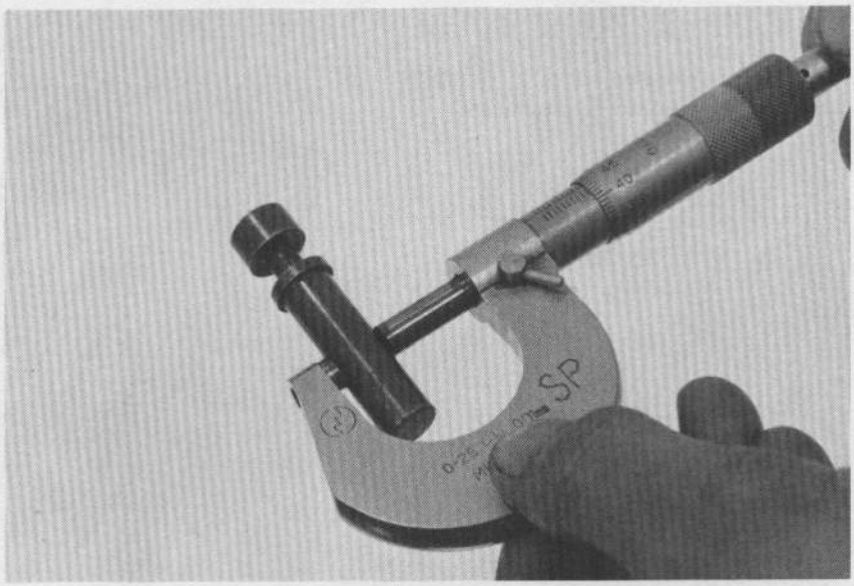
Inspect the idle gear and shaft for damage or excessive wear.
Measure the gear I. D.

SERVICE LIMIT: 10.04 mm (0.395 in)



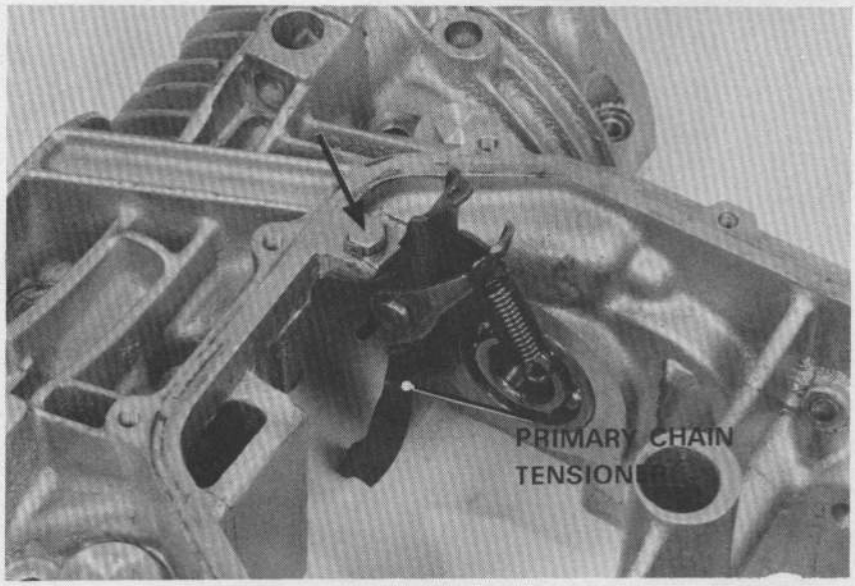
Measure the shaft O. D.

SERVICE LIMIT: 9.95 mm (0.392 in)



PRIMARY CHAIN TENSIONER REMOVAL

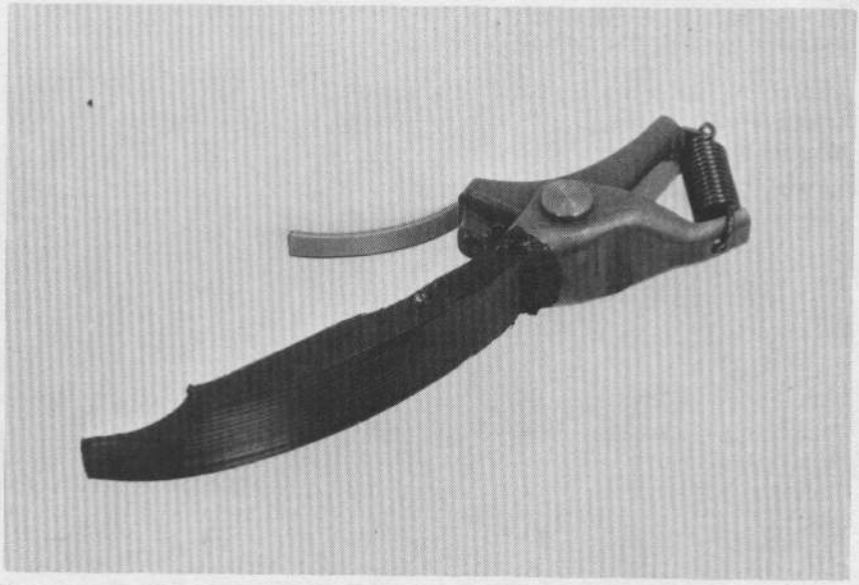
Remove the tensioner bolt and tensioner.



TENSIONER INSPECTION

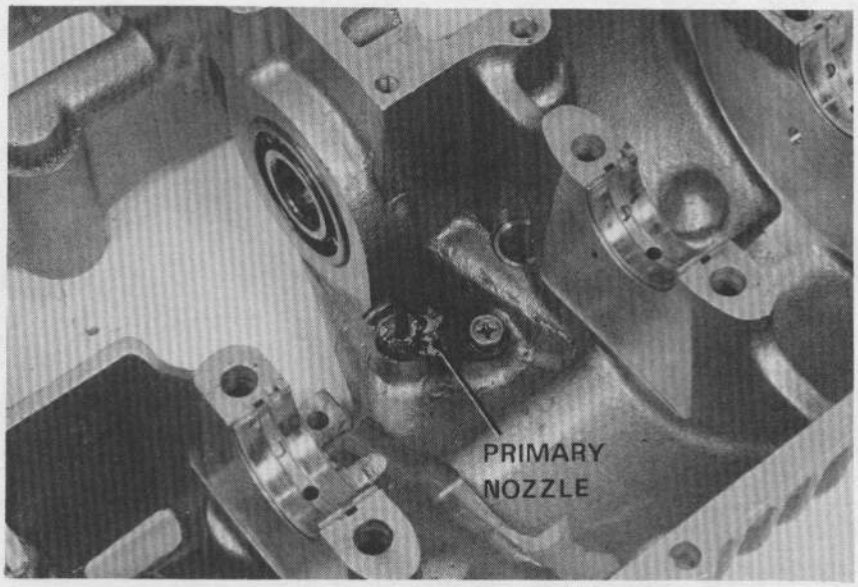
Check the slipper for damage or excessive wear.

Replace the tensioner if the Teflon coating on the slipper is worn out.



PRIMARY NOZZLE REMOVAL

Remove the primary nozzle.
Check that the nozzle is not clogged.



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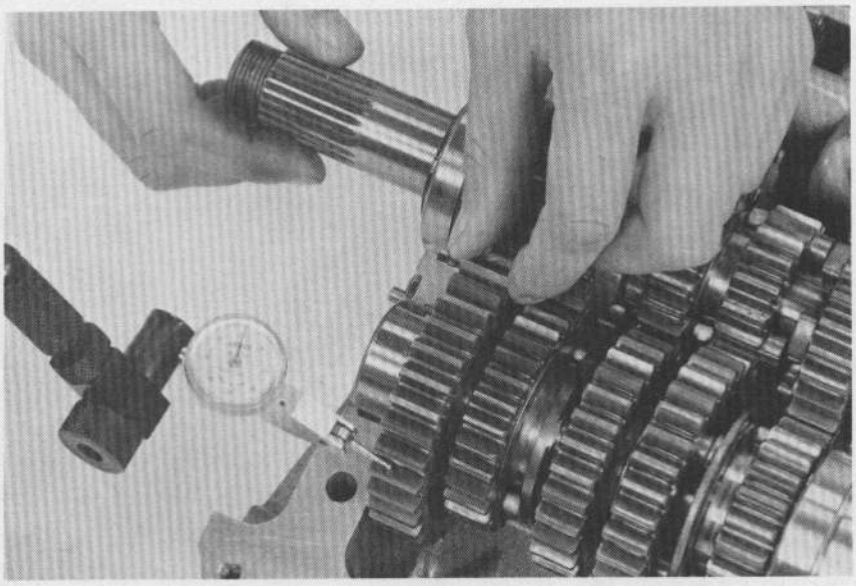
For servicing of the gearshift linkage, see Section 9.

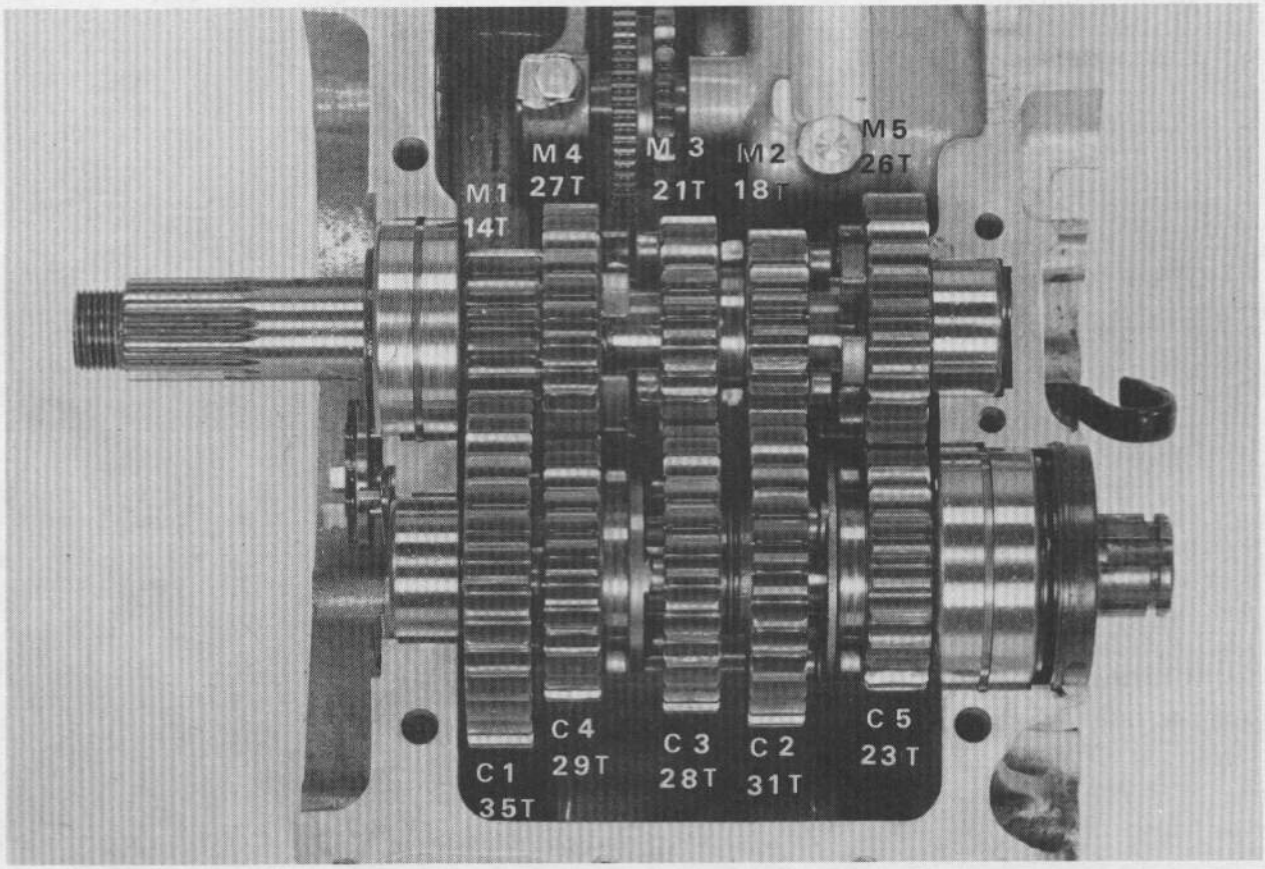


TRANSMISSION DISASSEMBLY

Separate the crankcase (Section 10).
Inspect each gear for backlash.

SERVICE LIMIT: 0.20 mm (0.008 in)

Remove the mainshaft and countershaft.
Remove the dowel pins and bearing set rings from the crankcase.

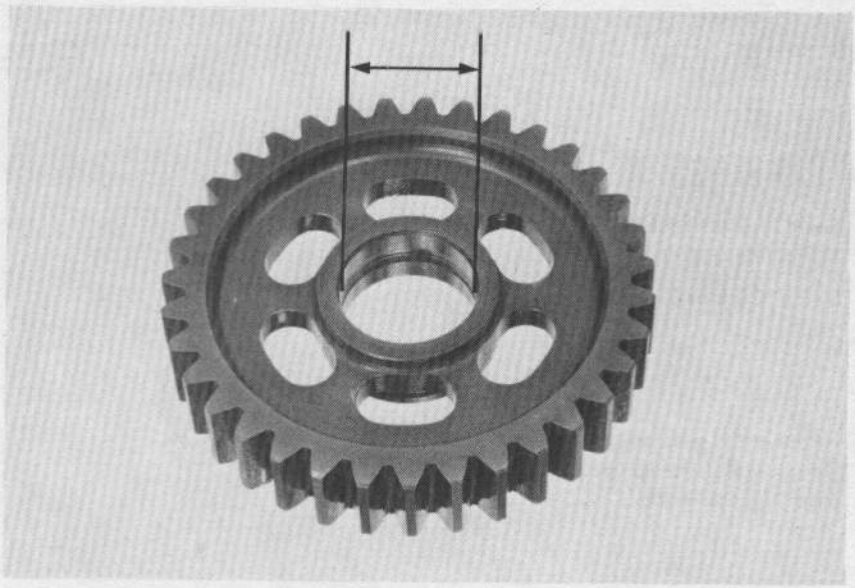


TRANSMISSION INSPECTION

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

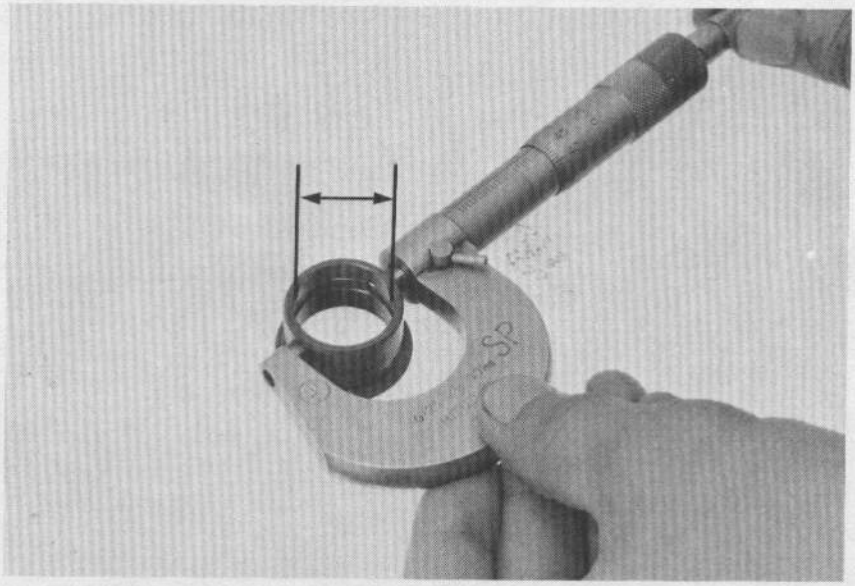
Measure the I. D. of each gear.

SERVICE LIMITS:
M4 gear: 25.06 mm (0.987 in)
M5 gear: 23.06 mm (0.908 in)
C1 gear: 24.06 mm (0.947 in)
C2 gear: 25.07 mm (0.987 in)
C3 gear: 25.07 mm (0.987 in)



Measure the I. D. and O. D. of the gear bushings.

SERVICE LIMITS:
M5 O.D.: 22.96 mm (0.904 in)
M5 I.D.: 20.07 mm (0.790 in)
C1 O.D.: 23.95 mm (0.943 in)
C1 I.D.: 20.07 mm (0.790 in)

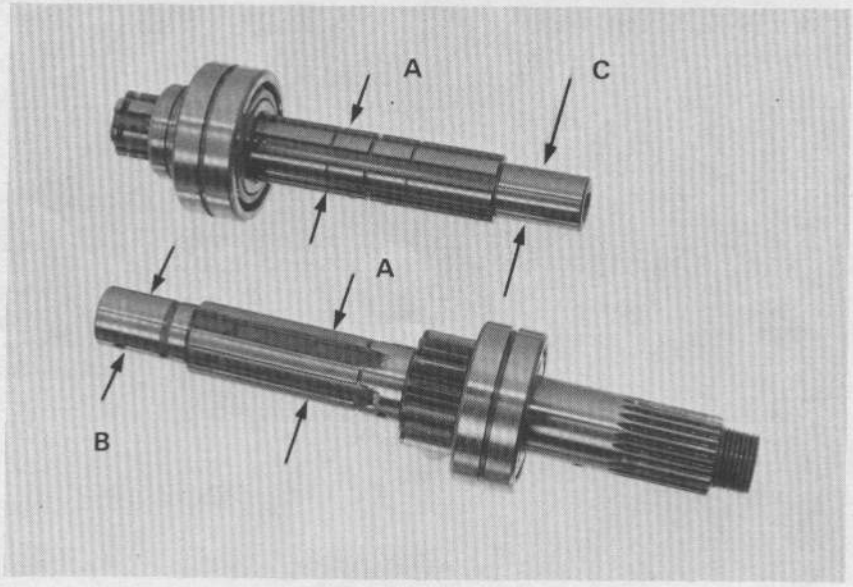


Measure the O. D. of the mainshaft and countershaft.

SERVICE LIMITS:
A: 24.93 mm (0.981 in)
B: 19.93 mm (0.785 in)
C: 19.93 mm (0.785 in)

Calculate the clearance between the gear and gear shaft or bushing.

SERVICE LIMIT: 0.10 mm (0.004 in)



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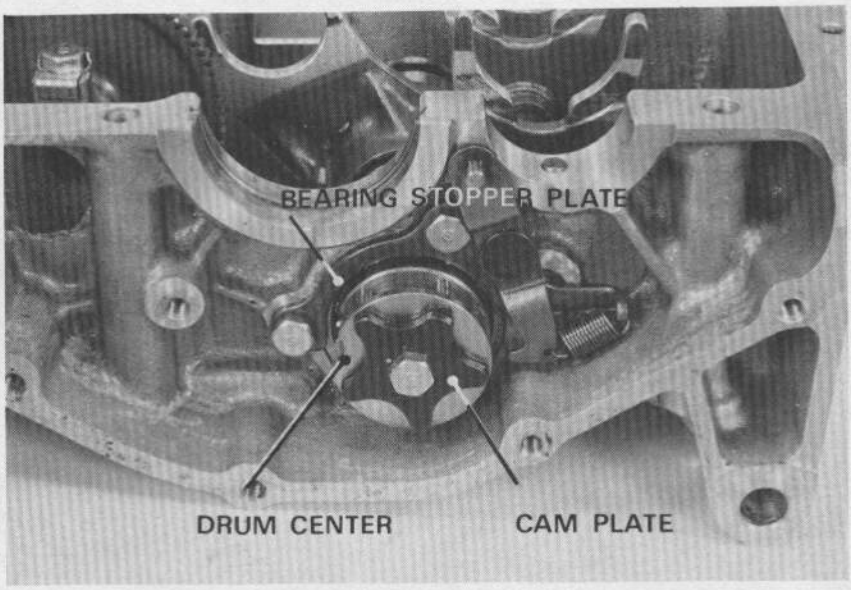
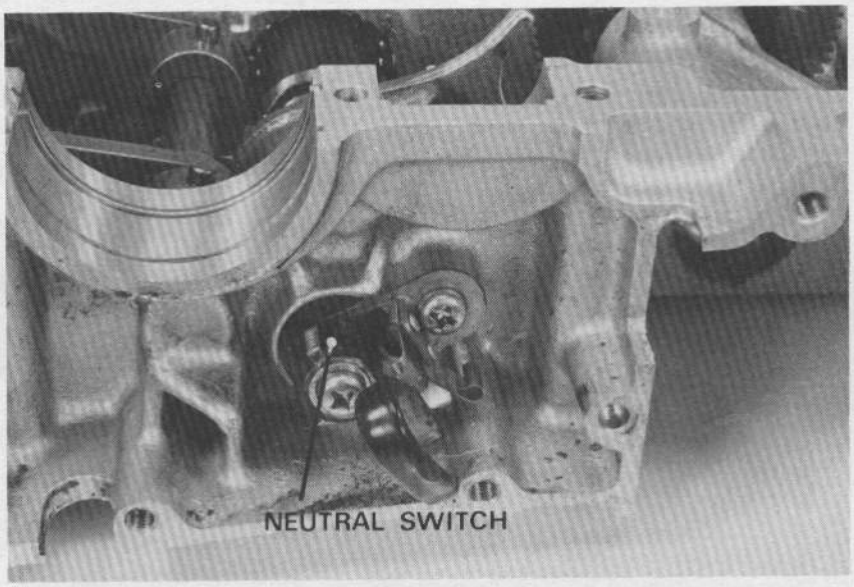
SHIFT FORK AND SHIFT DRUM REMOVAL

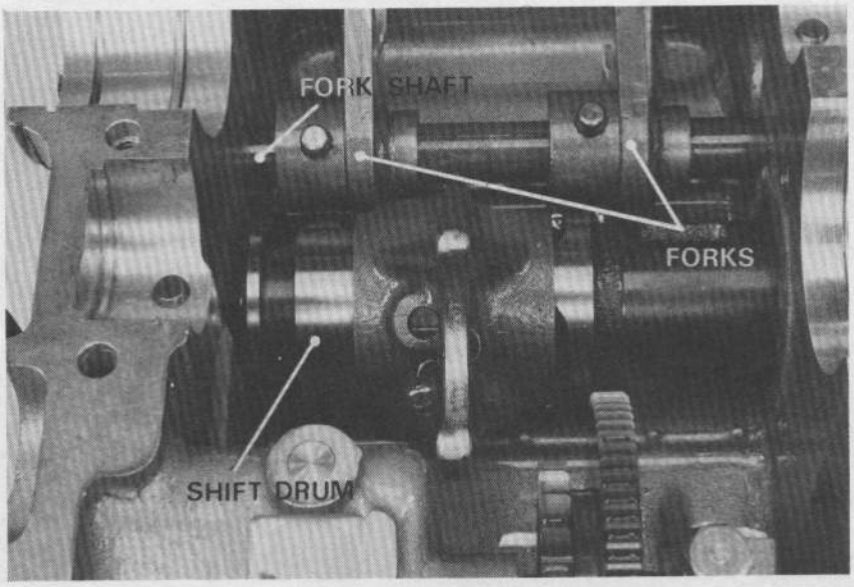
Remove the bearing stopper plate.
Remove the cam plate and shift drum center.



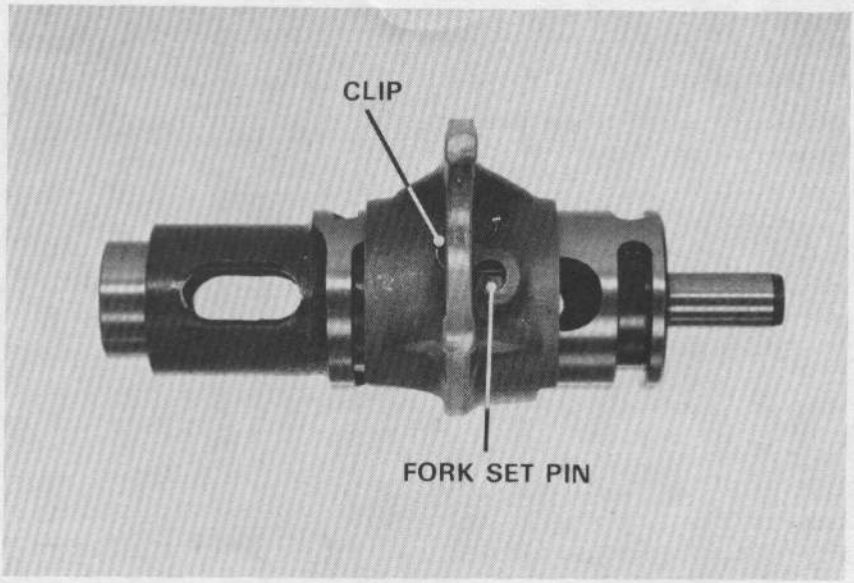
Remove the neutral switch.



Remove the shift fork shaft and forks.
Remove the shift drum and bearing.



Remove the shift fork set pin clip.
Remove the shift fork set pin and fork.

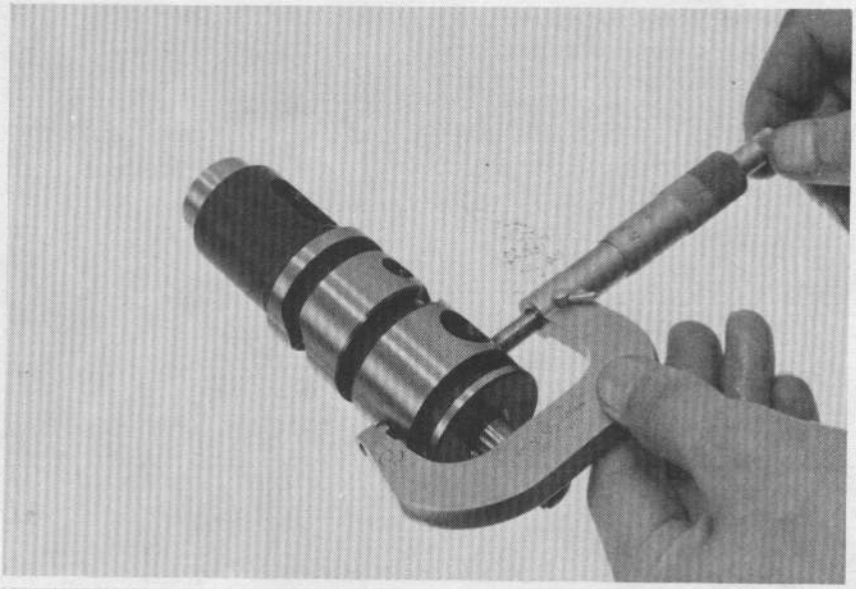


GEARSHIFT DRUM AND SHIFT FORK INSPECTION

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

Check the shift drum groove for damage.
Measure the shift drum O. D.

SERVICE LIMIT: 37.90 mm (1.492 in)

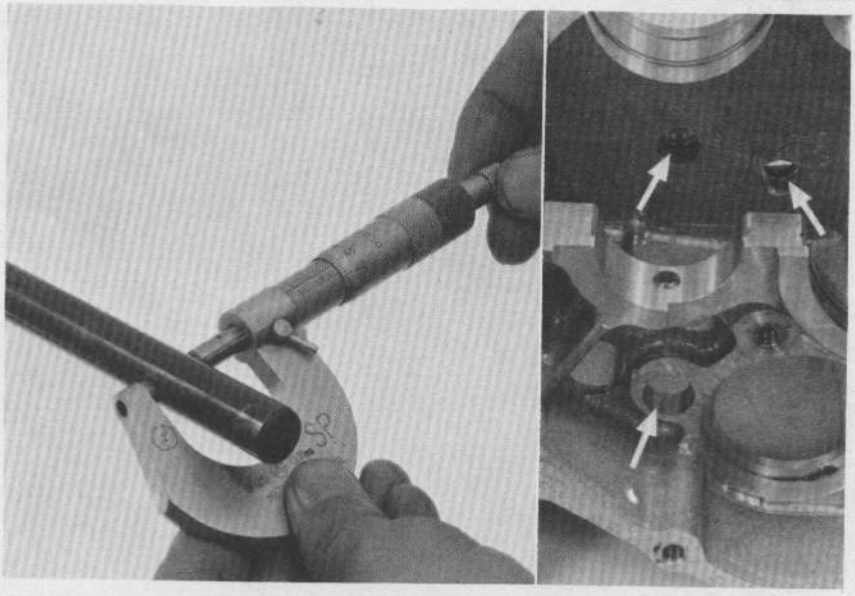


Measure the shift fork shaft O. D.

SERVICE LIMIT: 12.90 mm (0.508 in)

Check for scratches, scoring, or evidence of insufficient lubrication.

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



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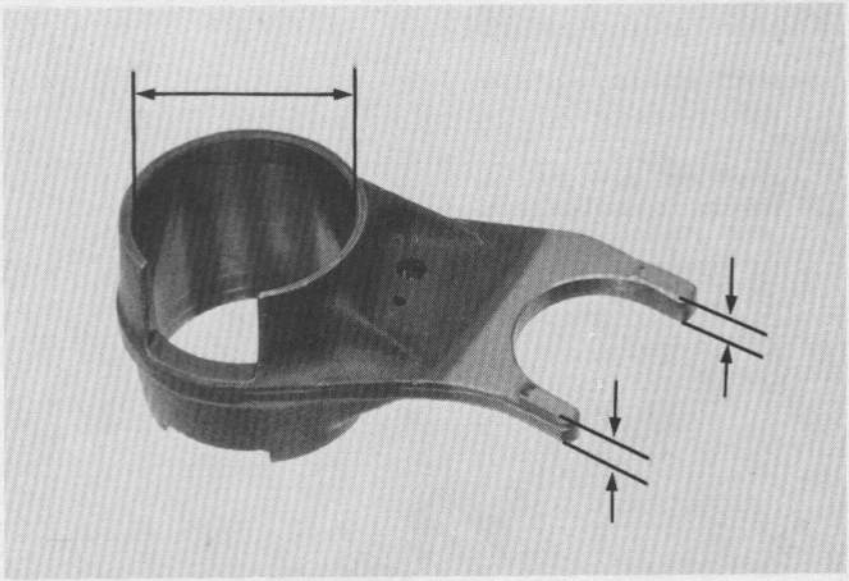
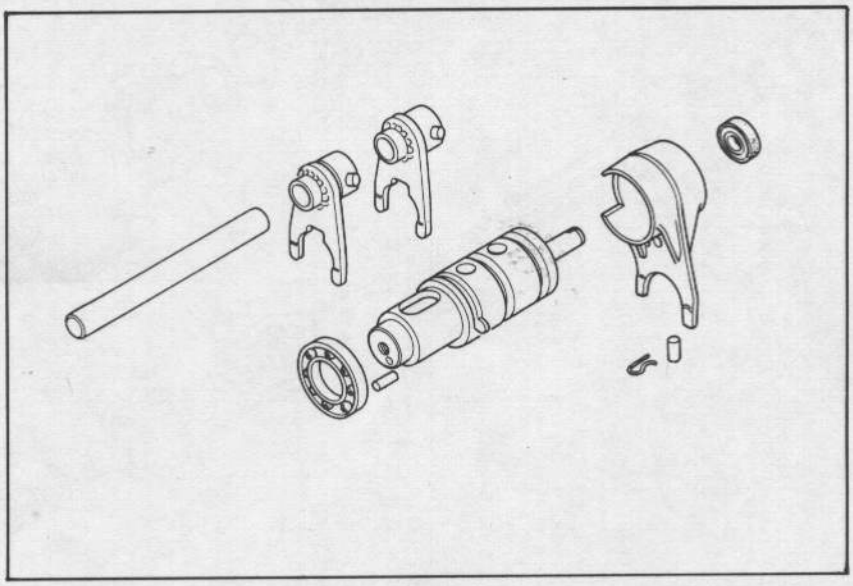
Measure the shift fork I.D. and claw thickness.
SERVICE LIMITS:
I.D. (L AND R): 13.04 mm (0.513 in)
I.D. (CENTER): 38.075 mm (1.499 in)
CLAW THICKNESS: 5.6 mm (0.22 in)

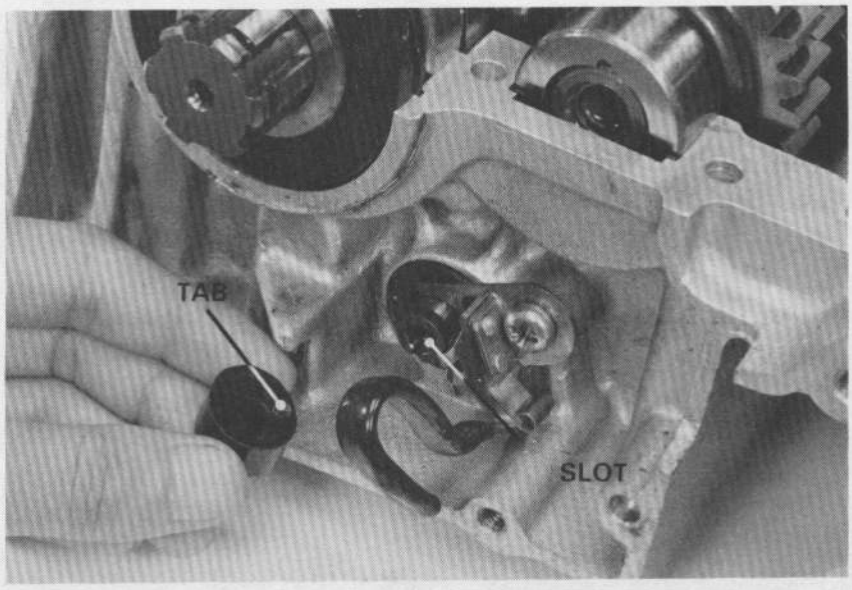


SHIFT DRUM AND SHIFT FORK INSTALLATION

Install the shift drum and shift forks by reversing the removal procedure.



Align the tab on the neutral switch with the slot in the shift drum end.
TORQUE: 0.6–1.0 kg-m (4–7 ft-lb)

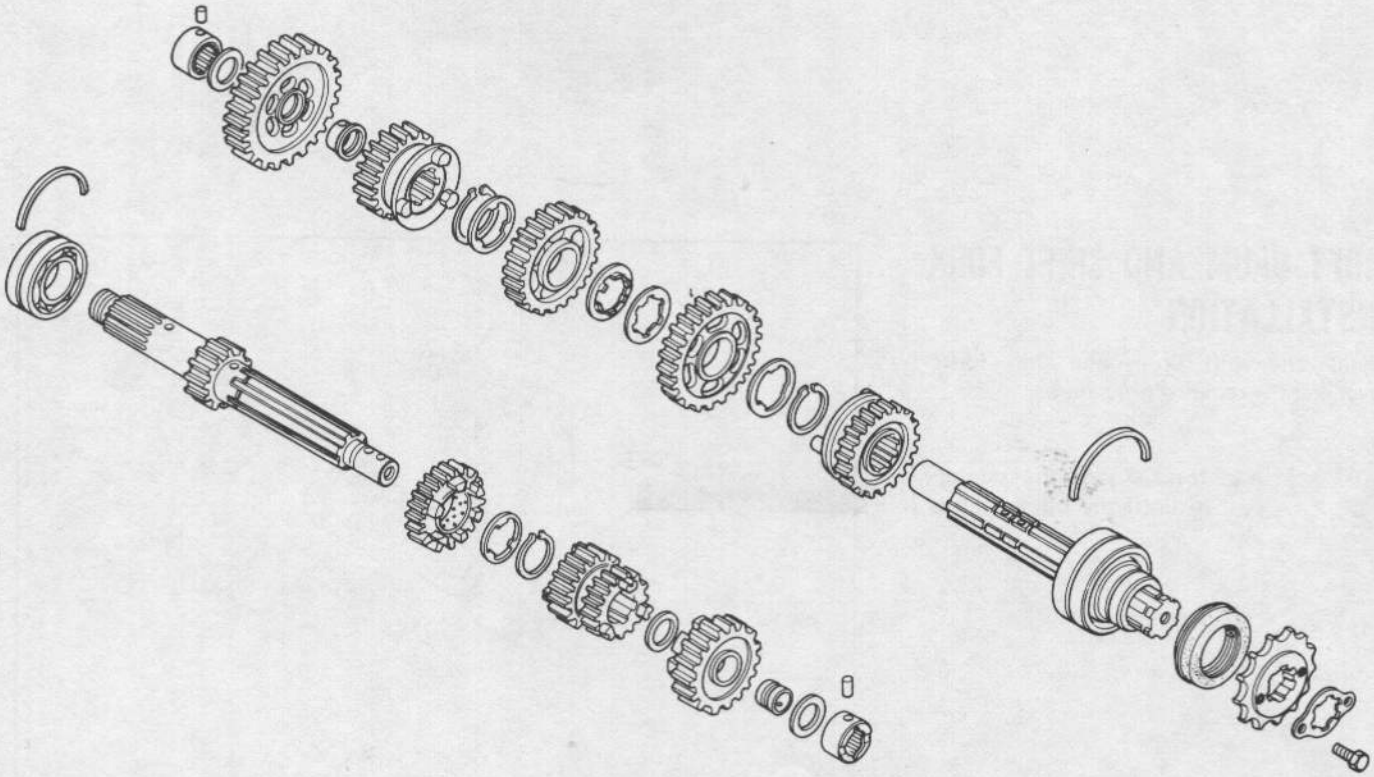


TRANSMISSION ASSEMBLY

Assemble the mainshaft and countershaft.

NOTE

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



NOTE

Install the mainshaft bearing with special tools.

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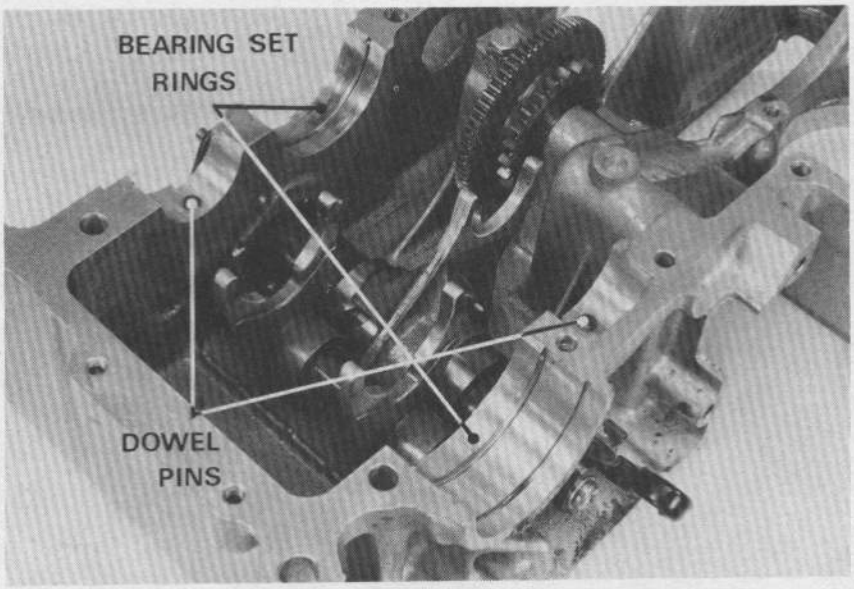
Install the dowel pins and bearing set rings.

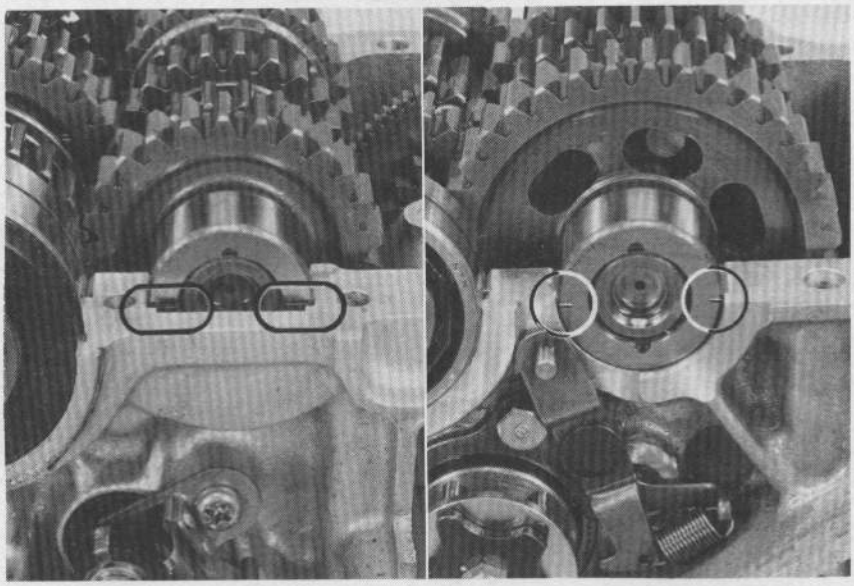


Align the hole in the needle bearings with the dowel pins by aligning the marks flush with the crankcase surface.

Align the ball bearing groove with the bearing set ring.

NOTE

To prevent oil leakage, push the countershaft oil seal in until the oil seal lip is seated completely on the bearing before assembling the lower crankcase.



Assemble the crankcase (Refer to Section 10).

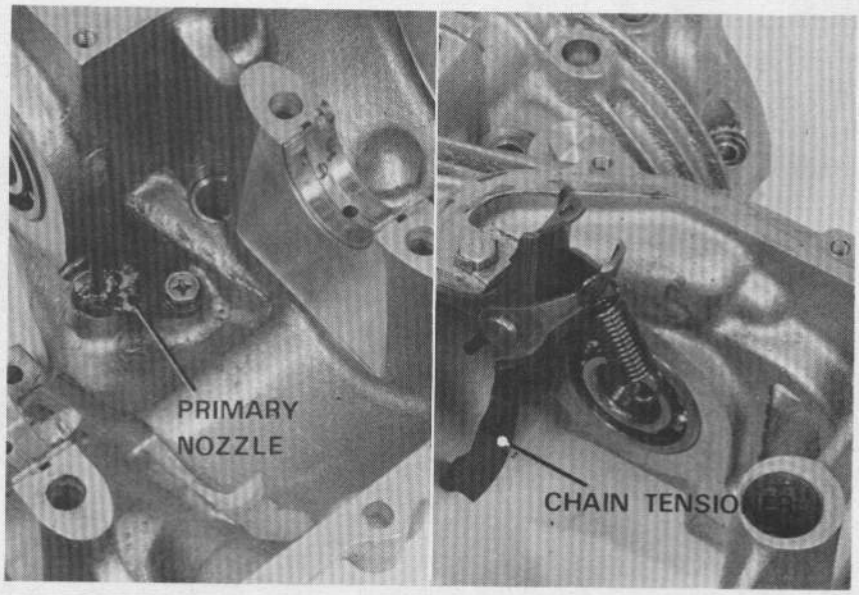
PRIMARY SHAFT ASSEMBLY

Install the primary chain nozzle.

TORQUE: 0.8–1.2 kg-m (6–9 ft-lb)

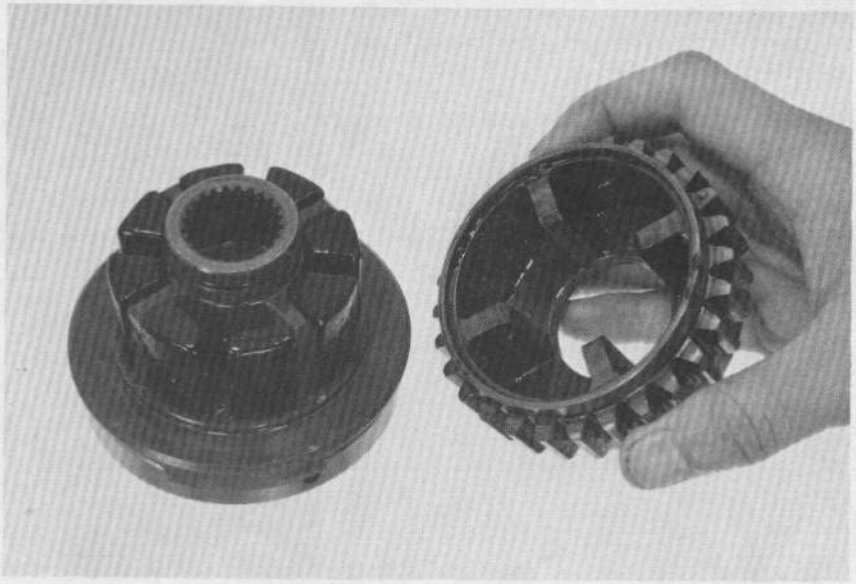
Install the tensioner and tighten the bolt.

TORQUE: 1.0–1.4 kg-m (7–10 ft-lb)

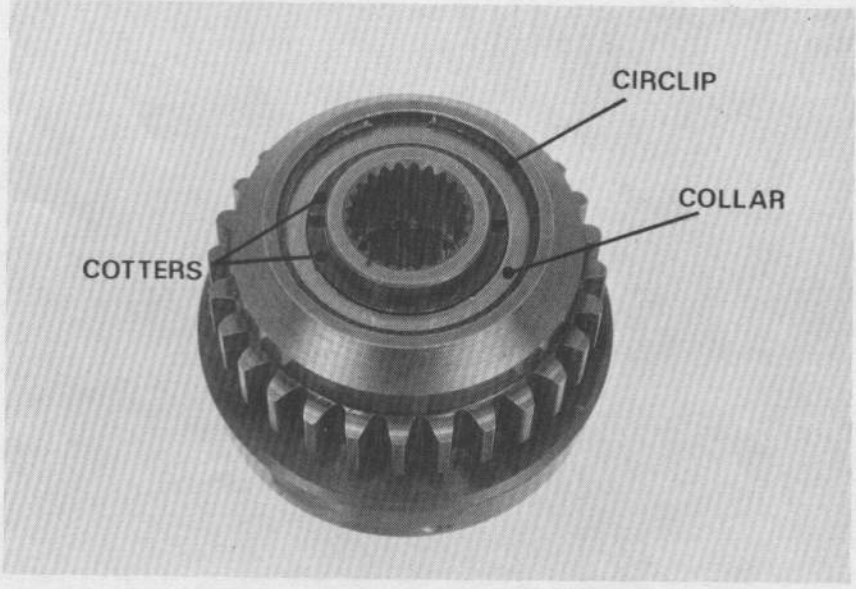


DAMPER ASSEMBLY

Install the damper rubbers.
Install the primary sprocket.



Install the cotters and collar.
Install the circlip.



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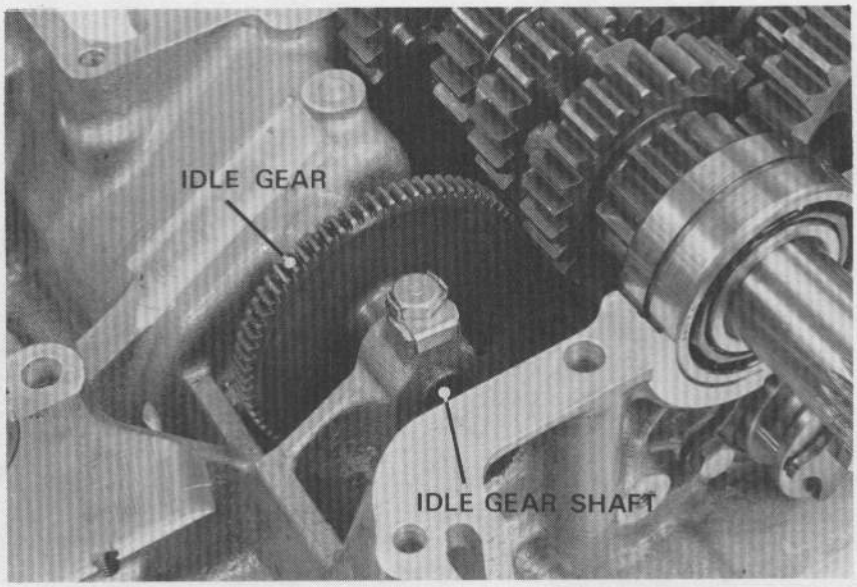
STARTER IDLE GEAR INSTALLATION

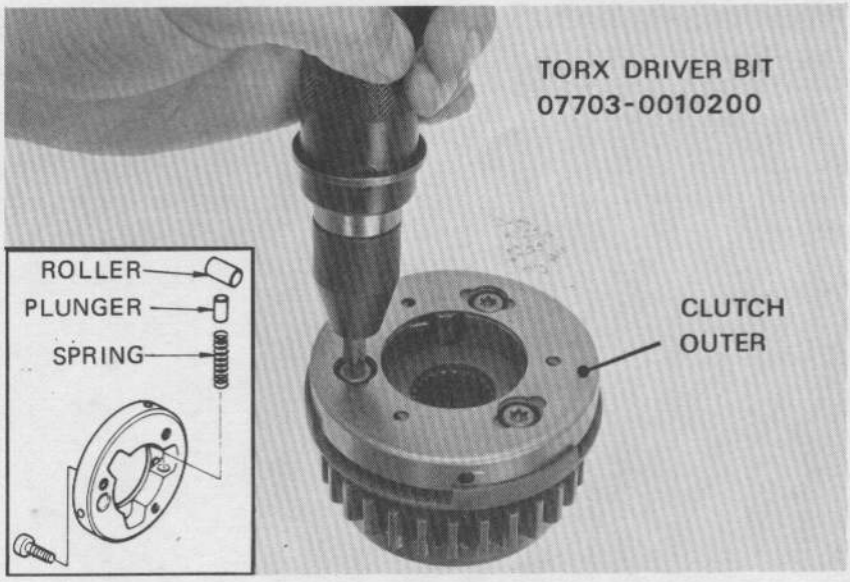
Install the starter idle gear and shaft.
Tighten the bolt and bend the lock washer tabs against the bolt.



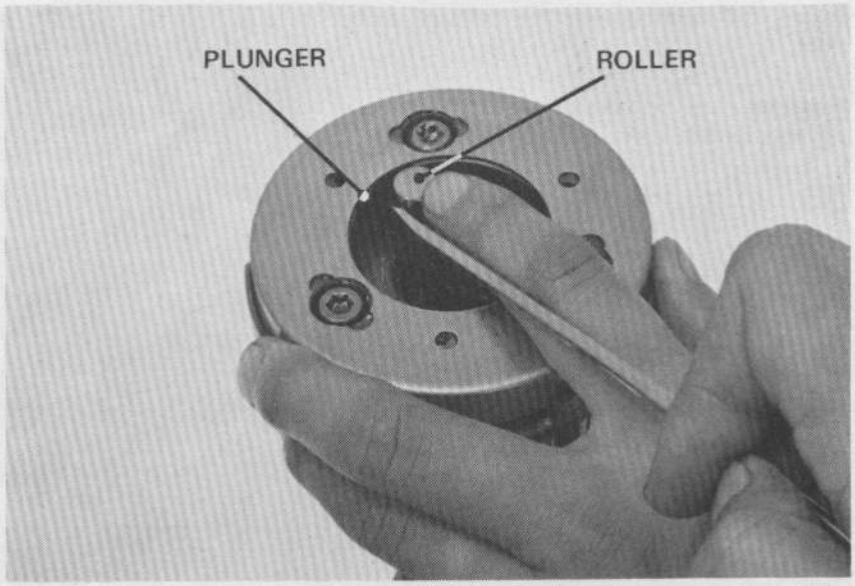
STARTER CLUTCH ASSEMBLY

Install the starter clutch outer.

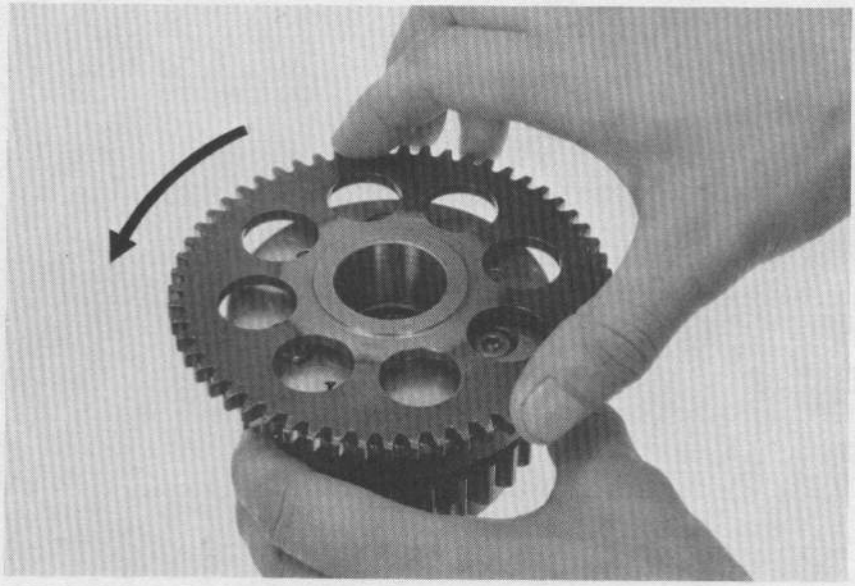
TORQUE: 1.2–1.6 kg-m (9–12 ft-lb)



Install the starter clutch springs, plungers and rollers.

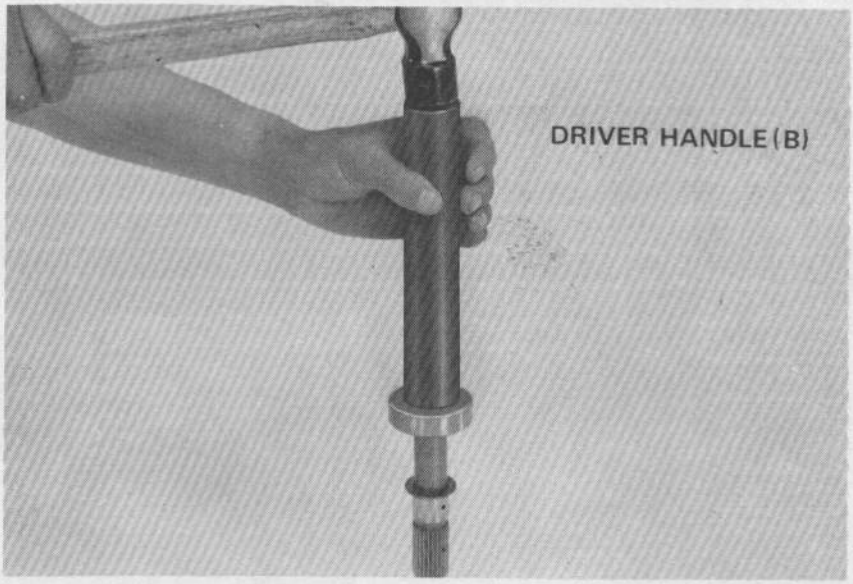


Rotate the starter drive gear counterclockwise while installing it.



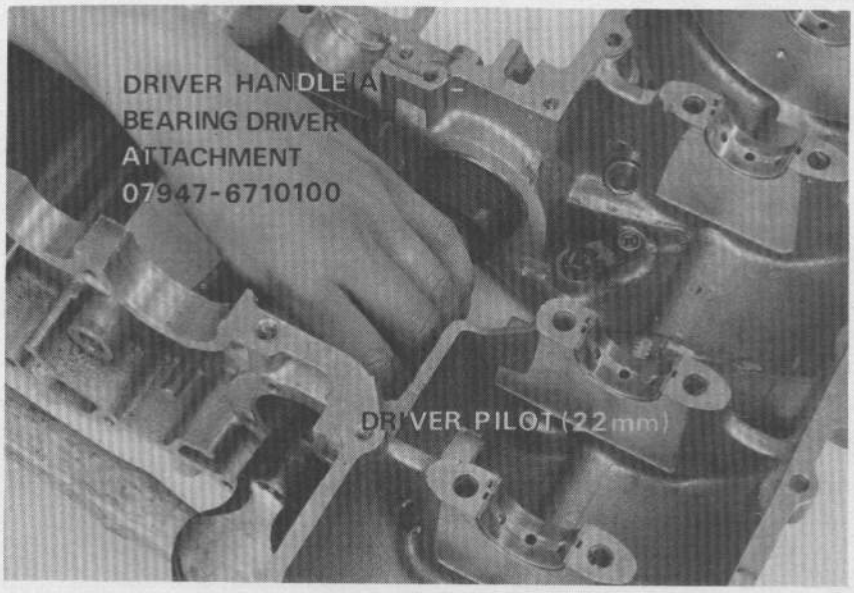
PRIMARY SHAFT ASSEMBLY

Install the bearing onto the primary shaft.



Install the bearing into the primary shaft bore.

Assemble the crankcase and install the primary shaft (Section 10).



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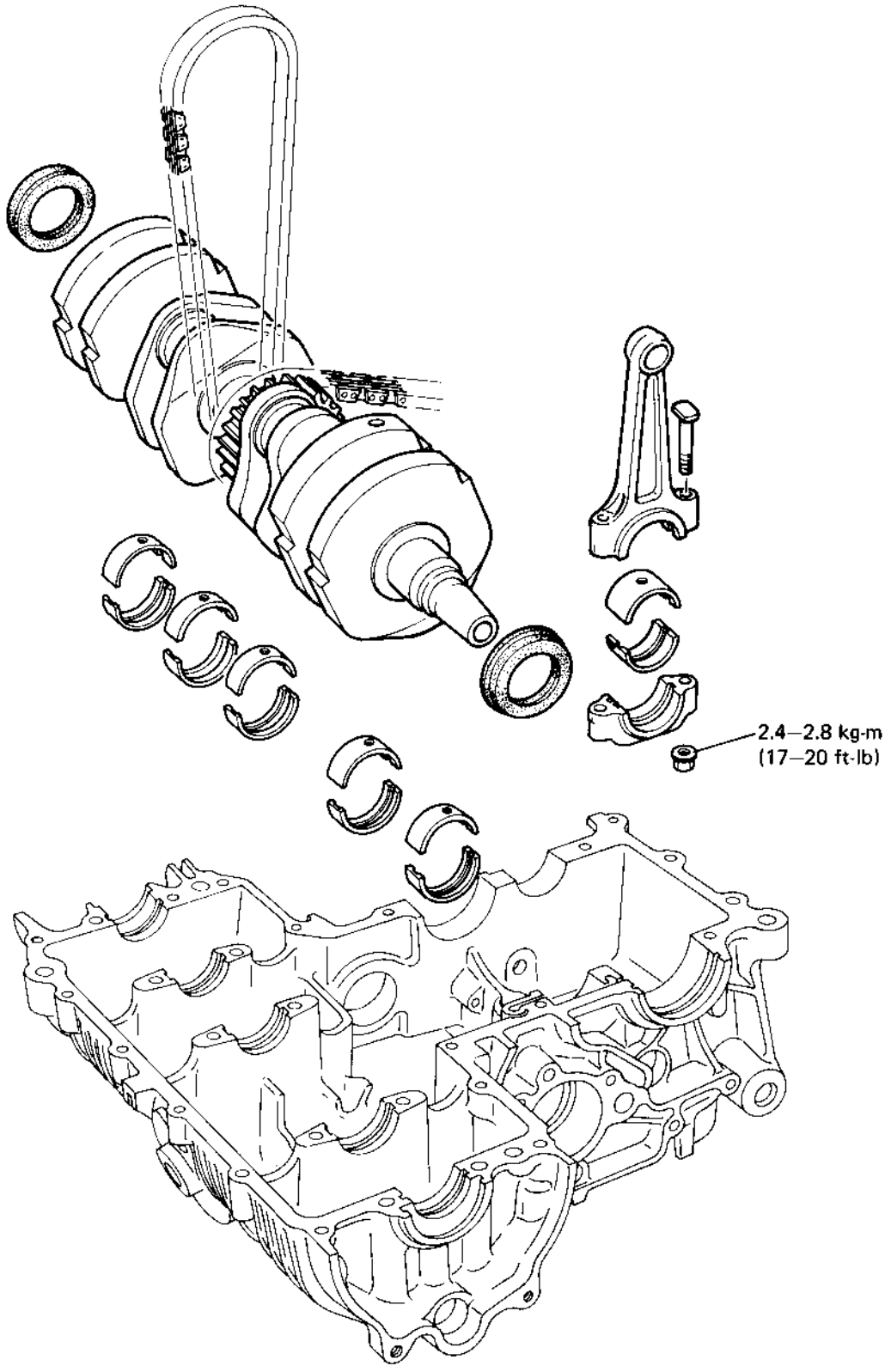

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12. CRANKSHAFT

SERVICE INFORMATION

GENERAL INSTRUCTIONS

- 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.

TORQUE VALUES

Connecting rod	2.4–2.8 kg-m (17–20 ft-lb)
Crankshaft	2.2–2.6 kg-m (16–19 ft-lb)

SPECIFICATIONS

ITEM		STANDARD		SERVICE LIMIT	
Crankshaft	Connecting rod big end side clearance	0.12–0.27 mm	(0.005–0.011 in)	0.35 mm	(0.014 in)
	Runout	———		0.05 mm	(0.002 in)
	Crankpin oil clearance	0.018–0.047 mm	(0.0007–0.0019 in)	0.08 mm	(0.003 in)
	Main journal oil clearance	0.020–0.048 mm	(0.0008–0.0019 in)	0.08 mm	(0.003 in)
Cam chain	Length	184.87–184.90 mm	(7.279–7.280 in)	186.4 mm	(7.34 in)
Primary chain	Length	114.15–114.40 mm	(4.494–4.504 in)	115.5 mm	(4.55 in)

TROUBLESHOOTING

Excessive noise

1. Worn main journal bearing
2. Worn crankpin bearing

CONNECTING ROD REMOVAL

Separate the crankcase (Section 10).

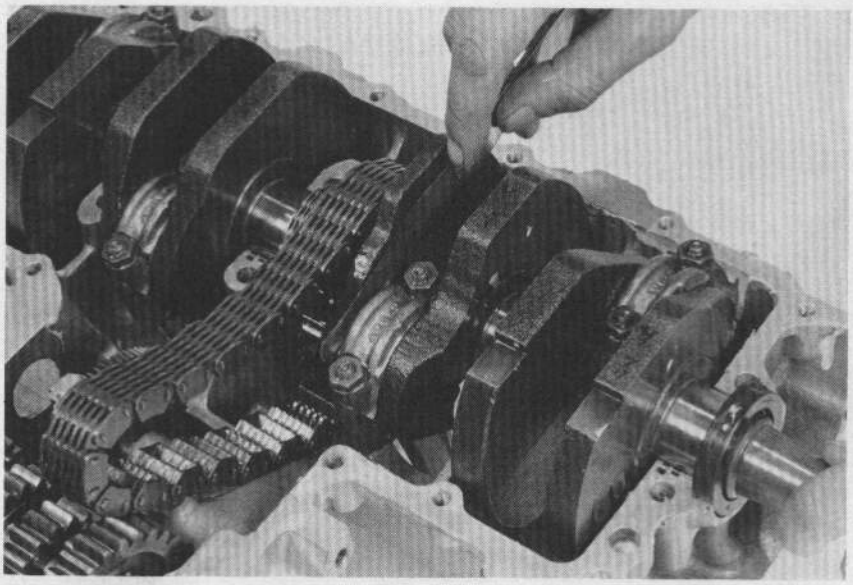
Check the connecting rod side clearance.

SERVICE LIMIT: 0.35 mm (0.014 in)

Remove the bearing caps and rods.

NOTE

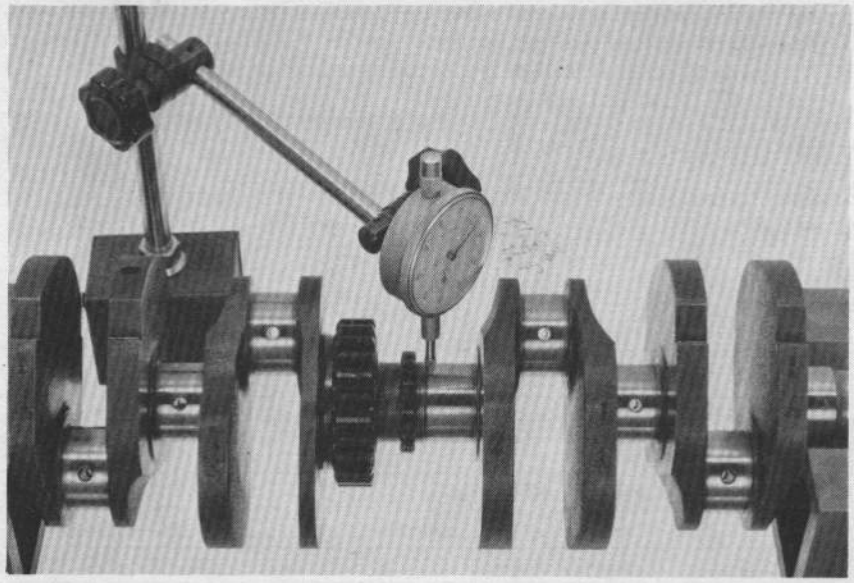
Mark the rods, bearings and bearing caps to indicate cylinder position, for installation.



CRANKSHAFT INSPECTION

Remove the cam chain and primary chain.
Set the crankshaft on a stand or V blocks.
Set a dial indicator on the center main journal.
Rotate the crankshaft two revolutions and check the runout at the center journal.

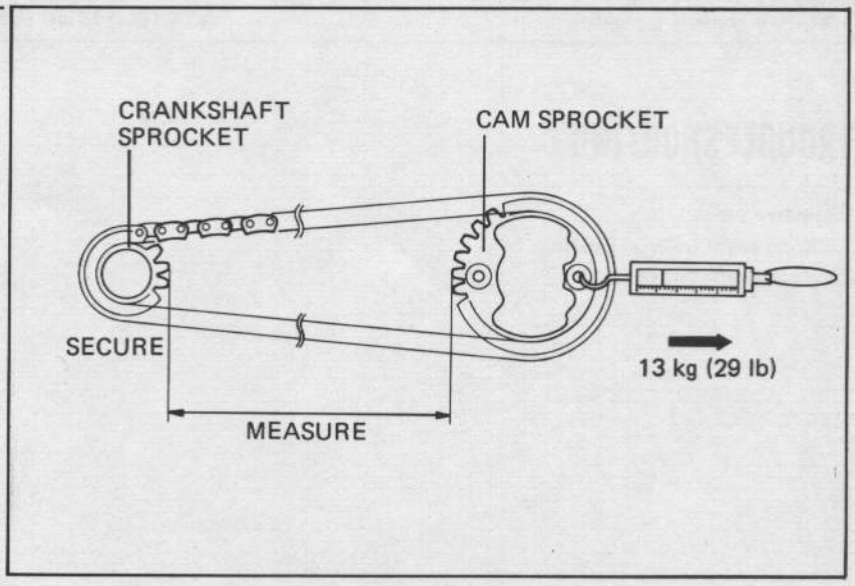
SERVICE LIMIT: 0.05 mm (0.002 in)



CAM CHAIN LENGTH MEASUREMENT

Place the cam chain over the cam and crankshaft sprockets.
Secure one sprocket. Apply 13 kg (29 lb) of tension to the other sprocket with a spring scale.
Measure the chain length as shown.

SERVICE LIMIT: 186.4 mm (7.34 in)



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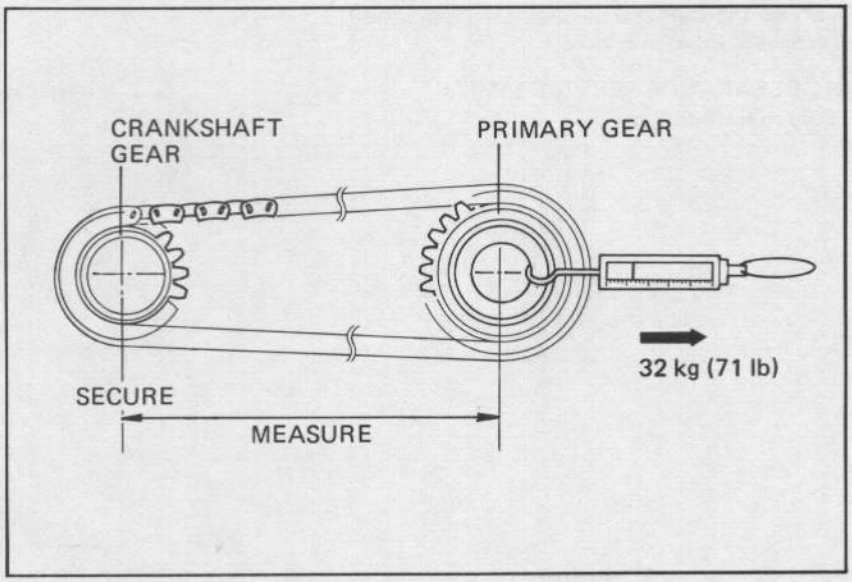
PRIMARY CHAIN LENGTH MEASUREMENT

Place the primary chain over the primary drive and driven gears. Secure one gear.

Apply 32 kg (71 lb) of tension to the other gear with a spring scale. Measure the chain length as shown.

SERVICE LIMIT: 115.5 mm (4.55 in)



BEARING INSPECTION

CONNECTING RODS

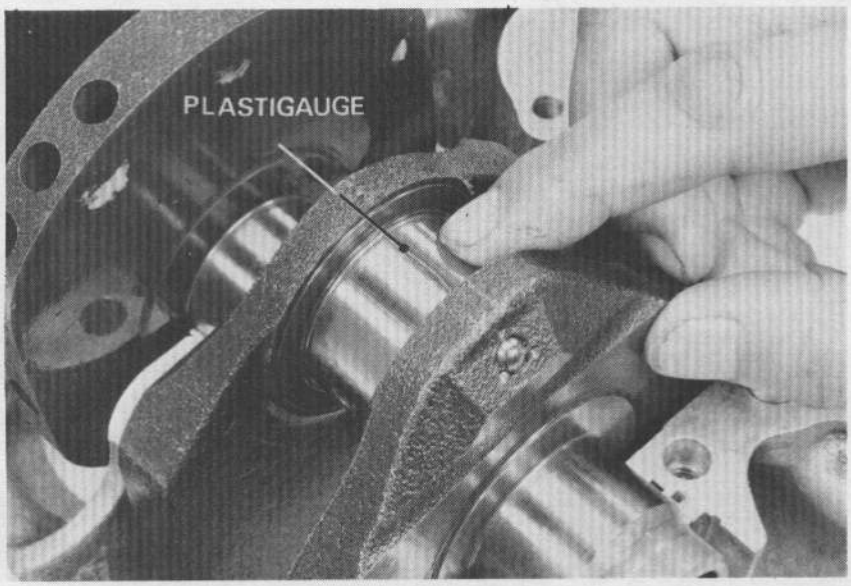
Inspect the bearing inserts for damage or separation.

Clean all oil from the bearing inserts and crankpins.

Put a piece of plastigauge on each crankpin.

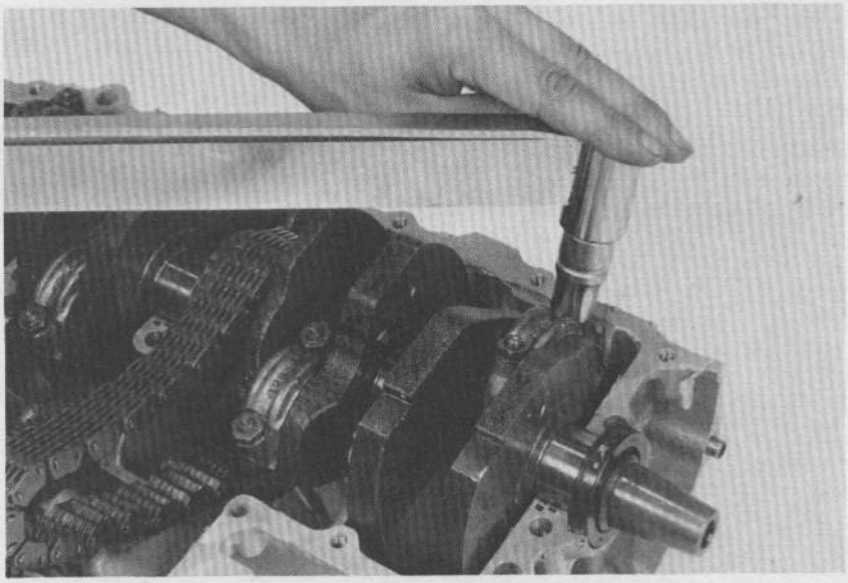
NOTE

Do not rotate the crankshaft during bearing inspection.



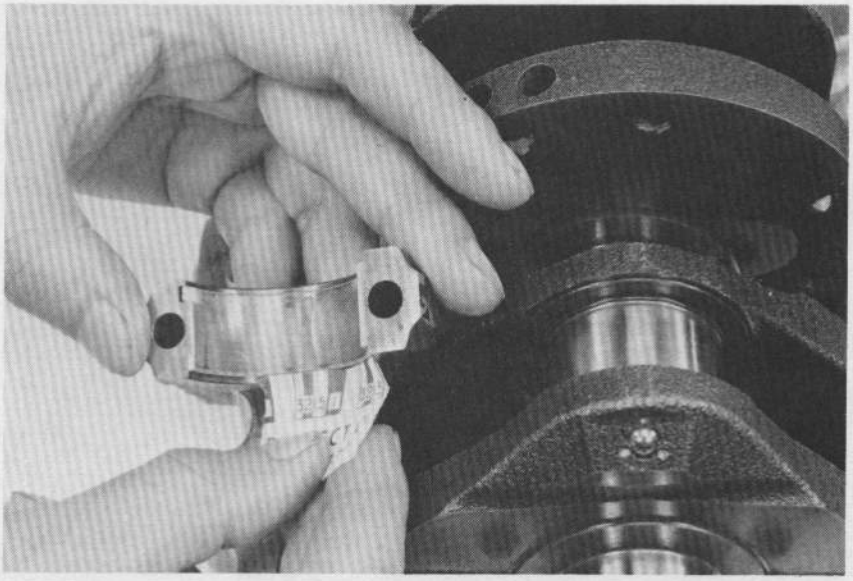
Install the bearing caps and rods on the correct crankpins, and tighten them evenly.

TORQUE: 2.4–2.8 kg-m (17–20 ft-lb)



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

OIL CLEARANCE SERVICE LIMIT:
0.08 mm (0.003 in)



MAIN BEARINGS

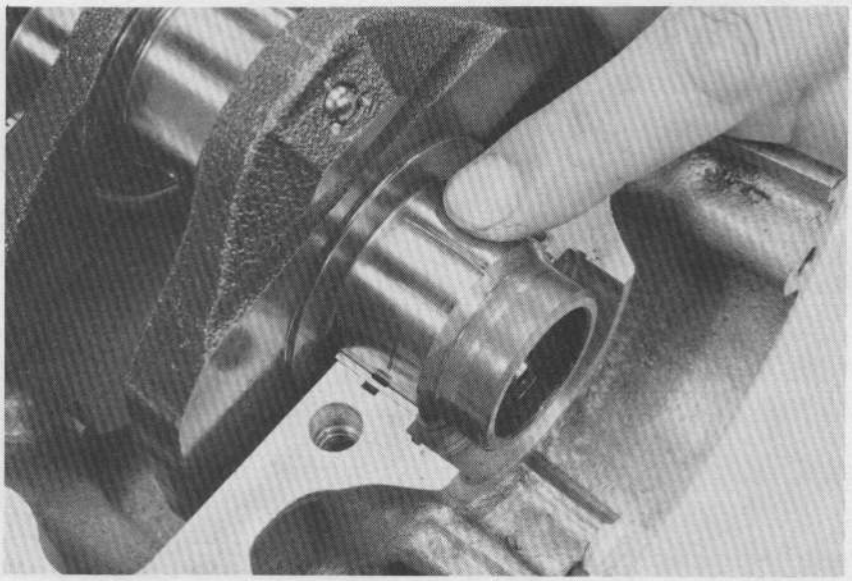
Inspect the bearing inserts for damage or separation.

Clean all oil from the bearing inserts and journals.

Put a piece of plastigauge on each journal, avoiding the oil holes.

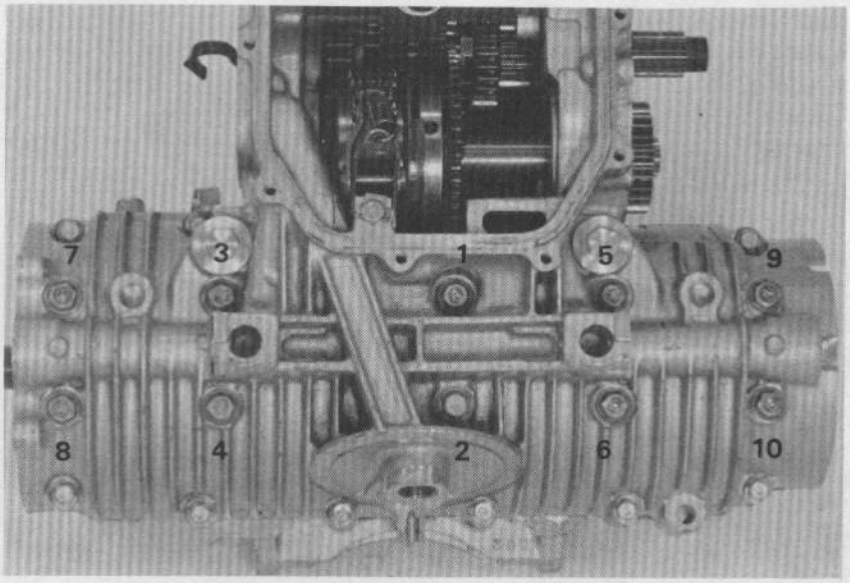
NOTE

Do not rotate the crankshaft during bearing inspection.



Install the main bearings on the correct journals of the upper crankcase. Tighten the bolts evenly in the sequence shown in 2-3 steps.

SPECIFIED TORQUES:
8 mm bolt (Crankshaft)
2.2–2.6 kg-m (16–19 ft-lb)



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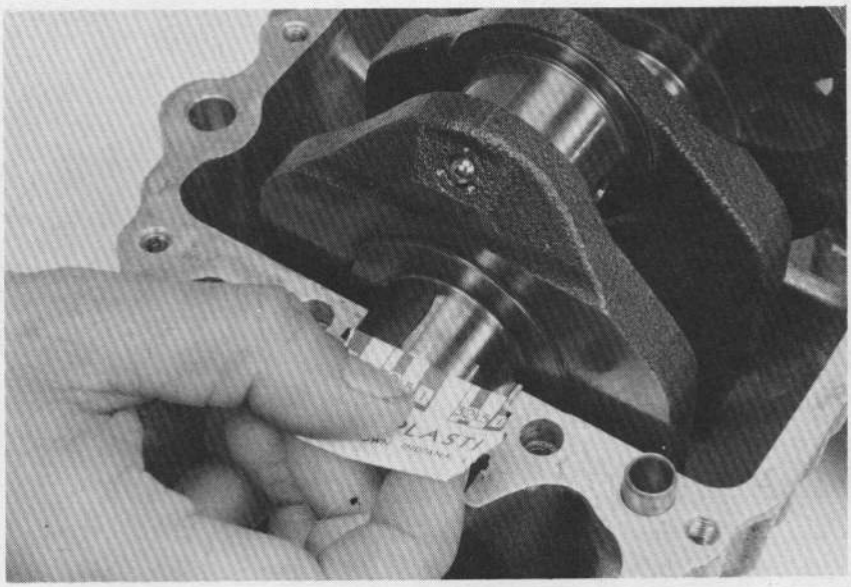
Remove the lower crankcase and measure the compressed plastigauge on each journal.

OIL CLEARANCE SERVICE LIMIT:
0.08 mm (0.003 in)

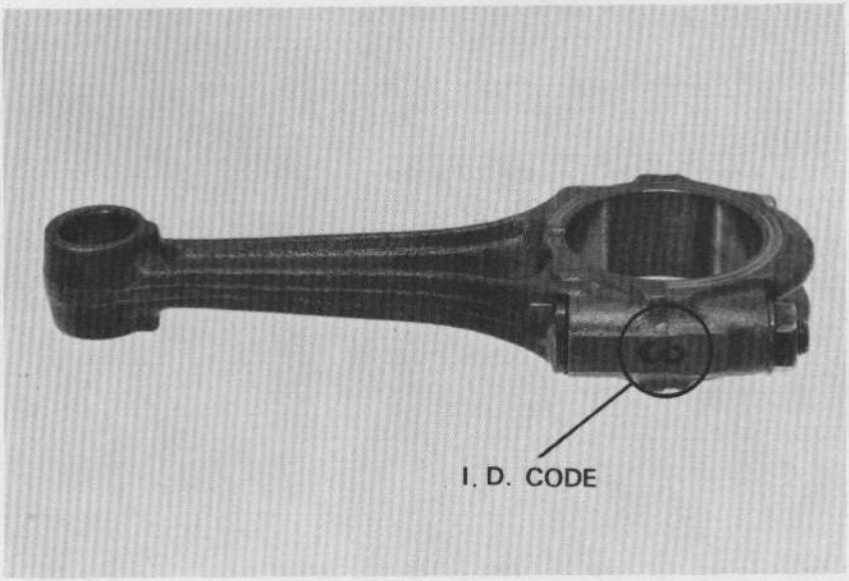


BEARING SELECTION

If rod bearing clearance is greater than the service limit, select replacement bearings as follows:

CONNECTING ROD BEARING INSERTS

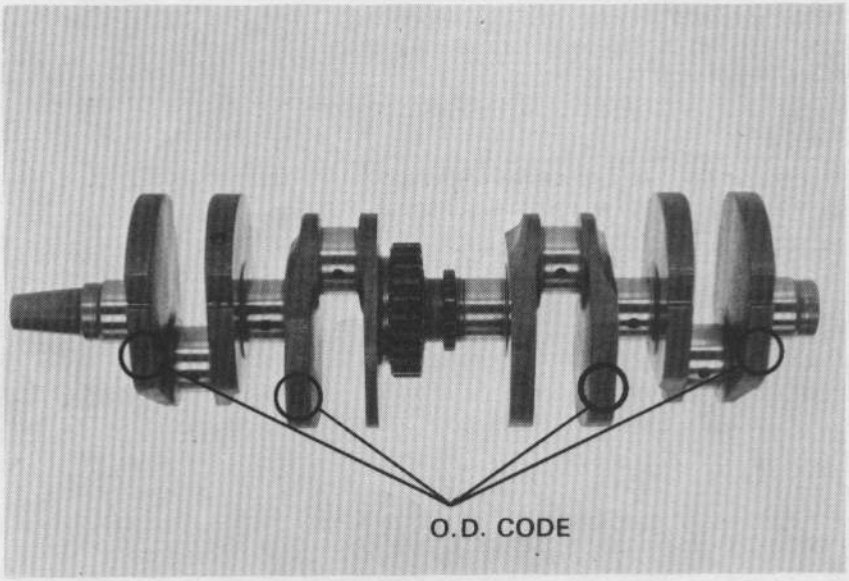
Determine and record the corresponding rod I. D. code number.



Determine and record the corresponding crankpin O. D. code (or measure the crankpin O. D.).

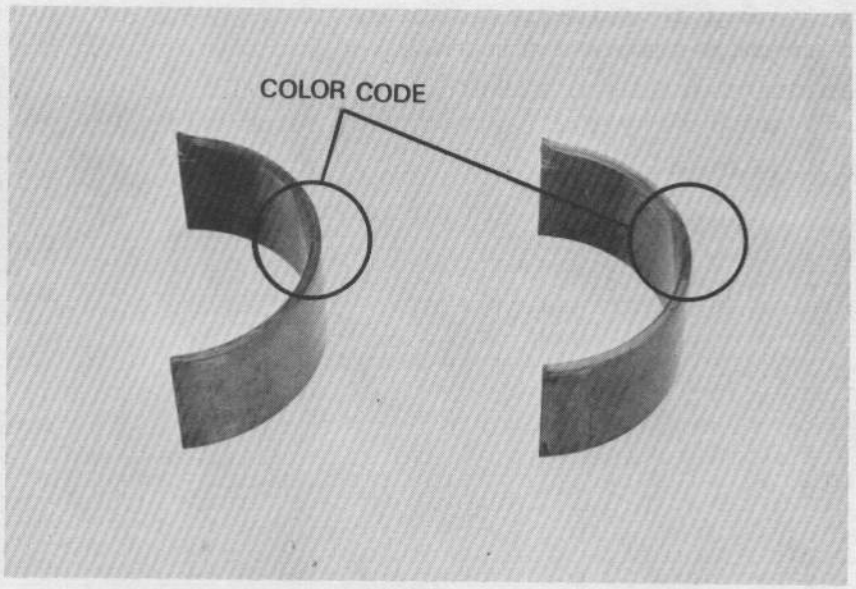
NOTE

The letter A or B on each crankweight is the code for each crankpin O. D.



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

			CRANKPIN O. D. CODE	
			A	B
			34.996–35.006 mm	34.986–34.996 mm
CONNECTING ROD I. D. CODE	1	38.000–38.007 mm	D (Yellow)	C (Green)
	2	38.007–38.014 mm	C (Green)	B (Brown)
	3	38.014–38.021 mm	B (Brown)	A (Black)

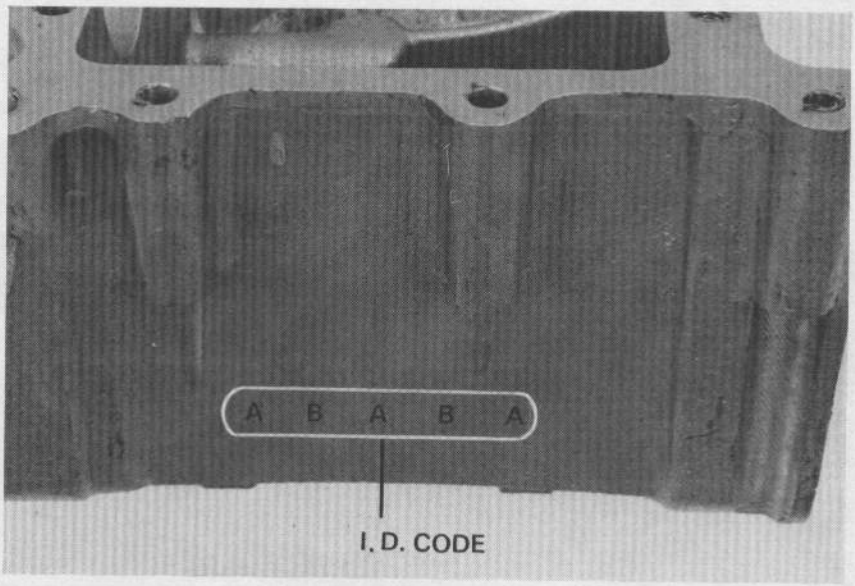


MAIN BEARING

Determine and record crankcase I. D. codes.

NOTE

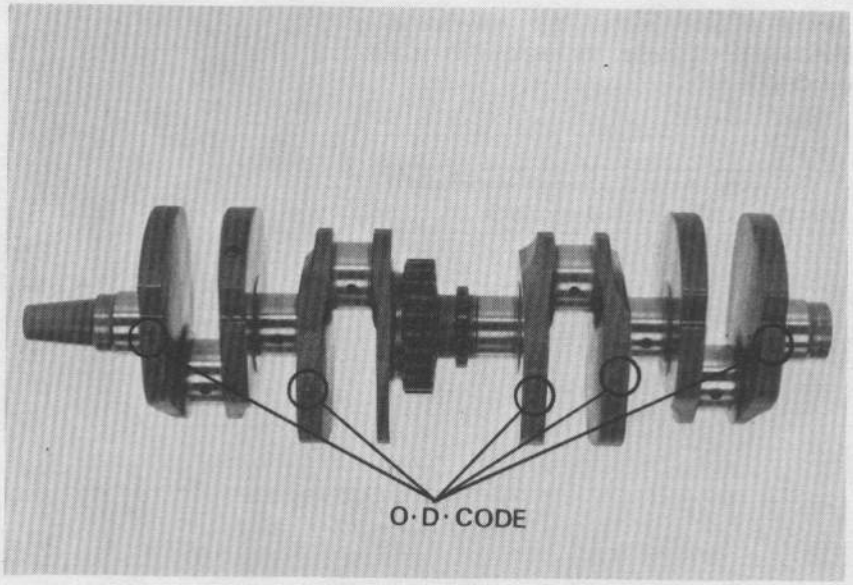
The letter A, B or C on the lower rear crankcase is the code for the main journal I. D. from left to right; I. D. code for the third main journal is A.



Determine and record the corresponding main journal O. D. code (or measure the main journal O. D.).

NOTE

The number 1 or 2 on each crankweight is the code for the adjacent main journal O.D.



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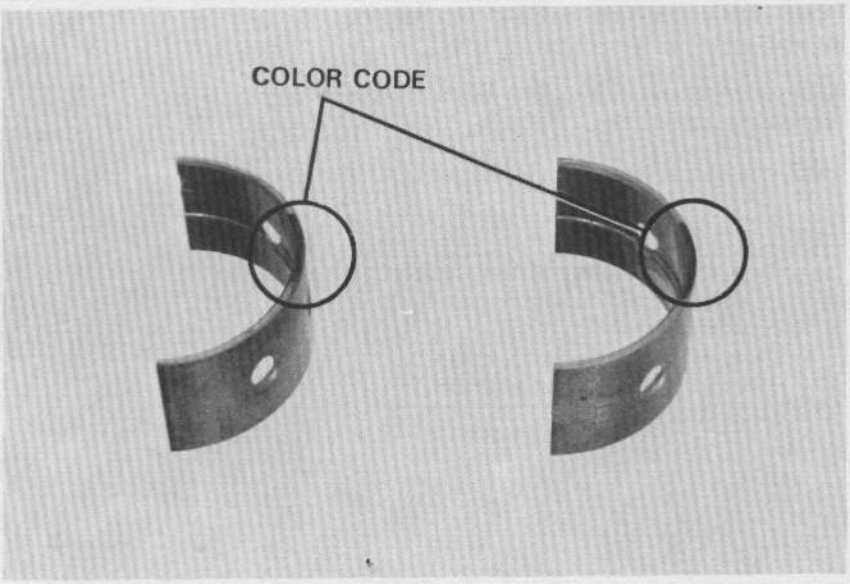
			MAIN JOURNAL O. D. CODE	
			1	2
			32.990–33.000 mm	32.880–32.990 mm
CASE I. D. CODE	A	36.000–36.008 mm	D (Yellow)	C (Green)
	B	36.008–36.016 mm	C (Green)	B (Brown)
	C	36.016–36.024 mm	B (Brown)	A (Black)

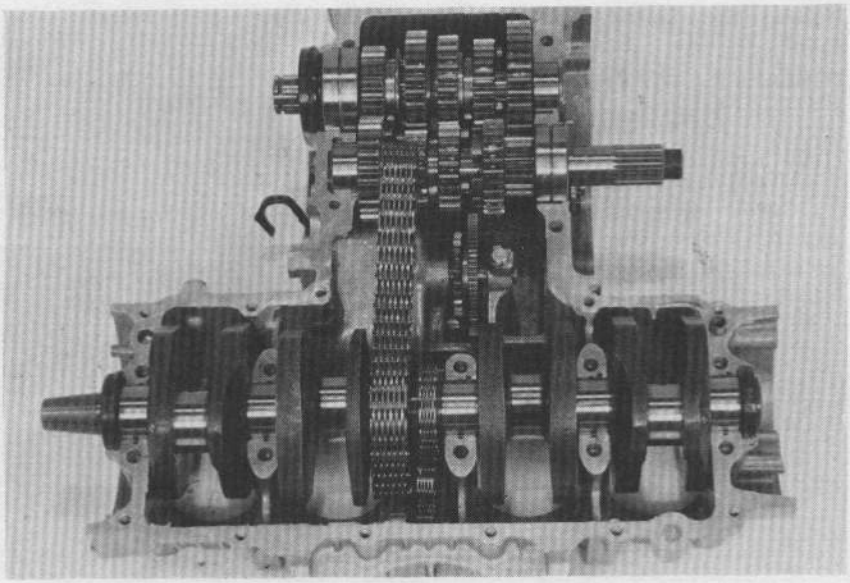


CONNECTING ROD INSTALLATION

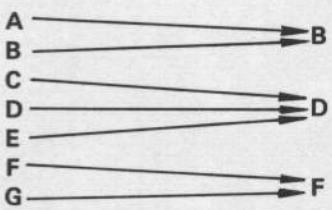
Install the main bearings into the upper crankcase.

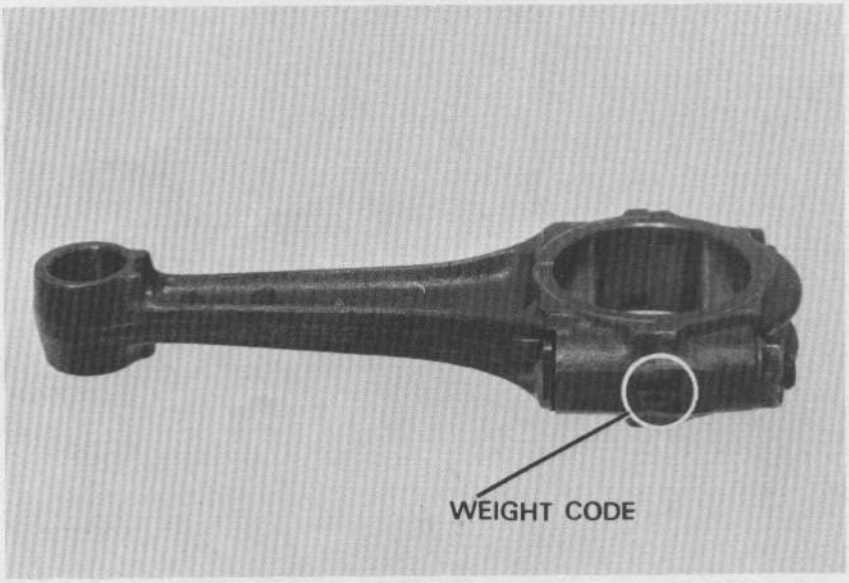
Apply molybdenum disulfide grease to the upper and lower main bearings.

Install the crankshaft with the cam chain and primary chain.



Before installing the connecting rods, make sure that the weight code combination is properly made.





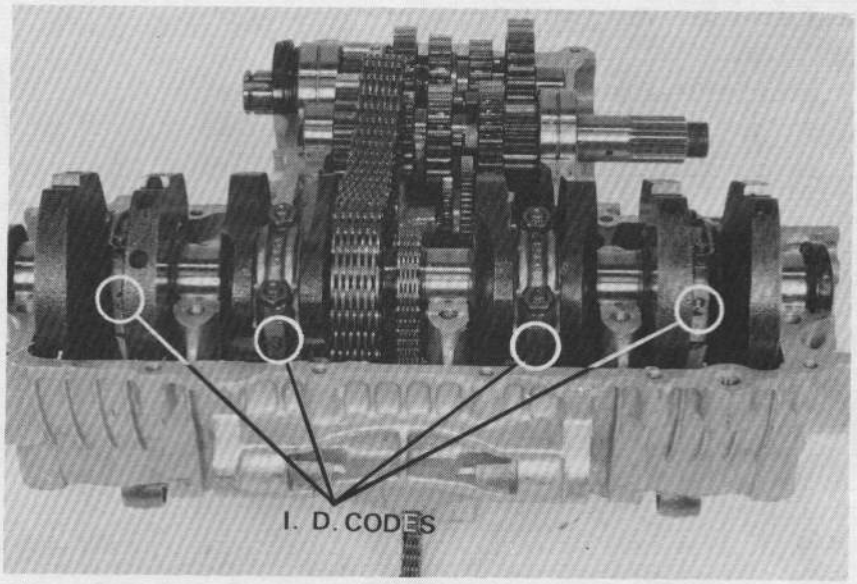
Install the connecting rod and cap bearing inserts.

Apply molybdenum disulfide grease to the connecting rod bearings.

Install the connecting rods and bearing caps.

NOTE

- Be sure connecting rods are installed in their correct position and I. D. code to the front.
- Cross reference the rod and cap I. D. codes to insure original assembly.

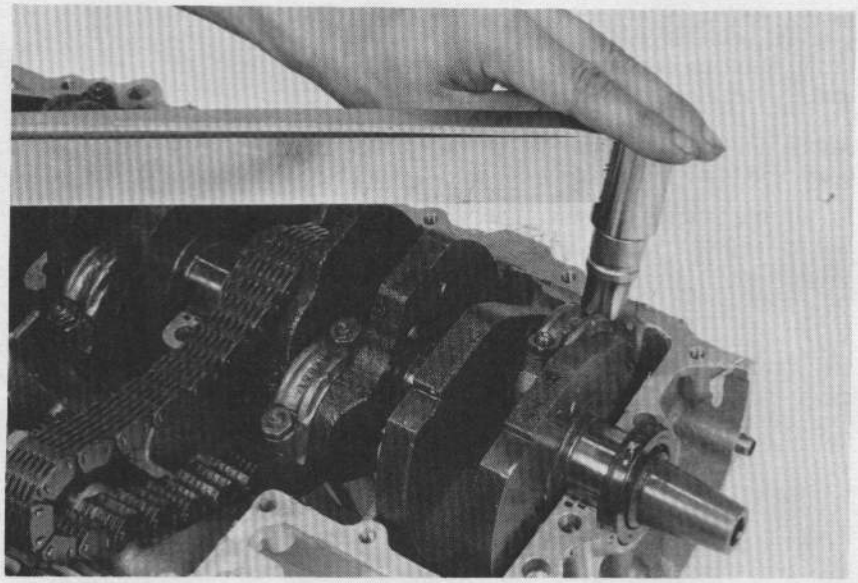


Tighten the connecting rod bearing cap bolts.

TORQUE: 2.4–2.8 kg-m (17–20 ft-lb)

NOTE

- Tighten the rod bearing cap bolts in two or more steps.
- After tightening the bolts, check that the rod moves freely without binding.



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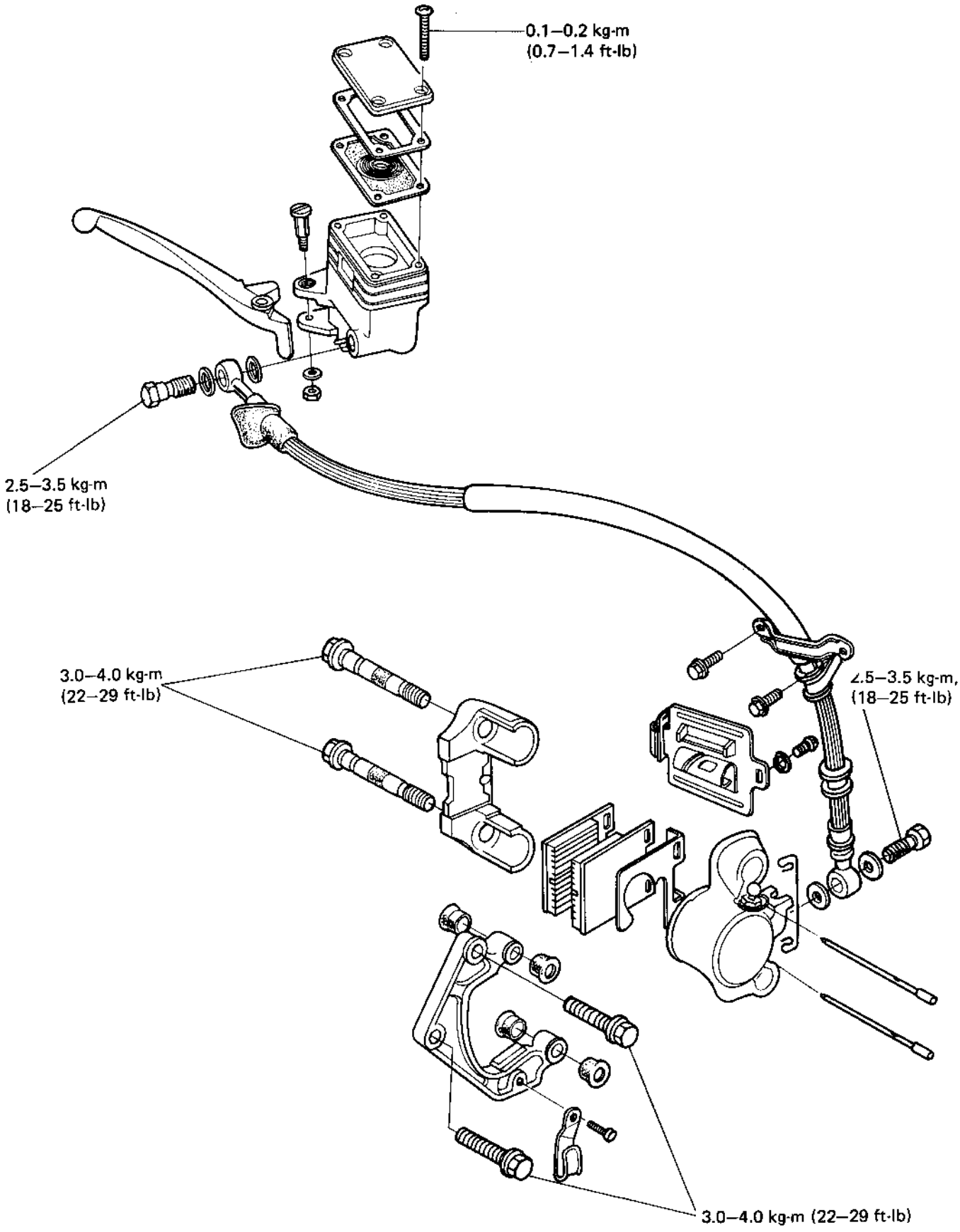

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15. HYDRAULIC BRAKE

SERVICE INFORMATION

GENERAL INFORMATION

- The front brake can be removed without disconnecting the hydraulic system. Once the hydraulic systems have been opened, or if the brakes feel spongy, the system must be bled.
- 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 will result.
- Always check brake operation before riding the motorcycle.

SPECIAL TOOLS

Special tool	
Snap Ring Pliers	07914–3230001

TORQUE VALUES

Brake hose bolt	2.5–3.5 kg-m (18–25 ft-lb)
Front brake caliper carrier	3.0–4.0 kg-m (22–29 ft-lb)
Front brake caliper A	3.0–4.0 kg-m (22–29 ft-lb)

SPECIFICATIONS

ITEM	STANDARD	SERVICE LIMIT
Disc thickness	6.9–7.1 mm (0.27–0.28 in)	6.0 mm (0.24 in)
Disc runout	———	0.3 mm (0.01 in)
Front master cylinder I.D.	14.000–14.043 mm (0.5512–0.5529 in)	14.055 mm (0.5533 in)
Front master piston O.D.	13.957–13.984 mm (0.5495–0.5506 in)	13.945 mm (0.5490 in)
Front caliper piston O.D.	42.772–42.822 mm (1.6839–1.6859 in)	42.765 mm (1.6837 in)
Front caliper cylinder I.D.	42.850–42.950 mm (1.6870–1.6909 in)	42.915 mm (1.6896 in)

TROUBLESHOOTING

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

Brake lever too hard
1. Sticking piston(s)
2. Clogged hydraulic system
3. Pads glazed or worn excessively

Brakes drag
1. Hydraulic system sticking
2. Incorrect adjustment of lever
3. Sticking piston(s)

Brakes grab or pull to one side
1. Pads contaminated
2. Disc or wheel misaligned

Brakes chatter or squeal
1. Pads contaminated
2. Excessive disc runout
3. Caliper installed incorrectly
4. Disc or wheel misaligned

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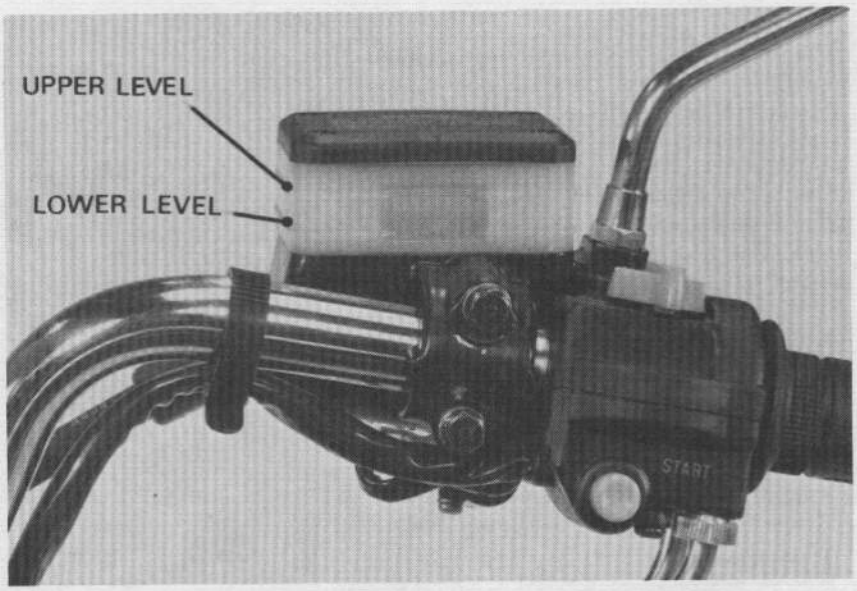
BRAKE FLUID REPLACEMENT/ AIR BLEEDING

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

CAUTION

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

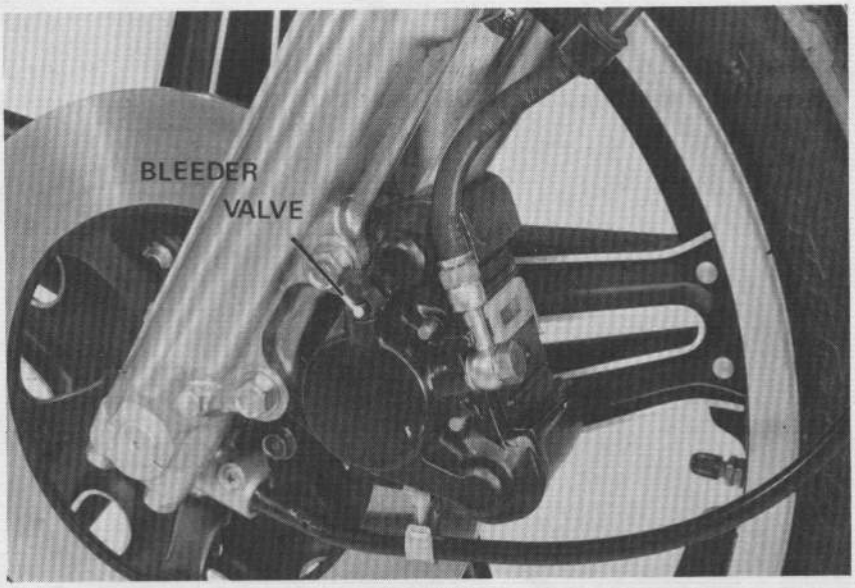


BRAKE FLUID DRAINING

Connect a bleed hose to the bleeder valve.
Loosen the caliper bleeder valve and pump the brake lever.
Stop pumping the lever when on fluid flows out of the bleeder valve.

WARNING

A brake disc or pad contaminated with brake fluid or grease reduces stopping power. Discard contaminated pads and clean the disc with a high quality brake degreasing agent.



BRAKE FLUID FILLING

NOTE

Use ONLY DOT–3 brake fluid from a sealed container.

Close the bleeder valve, fill the reservoir, and install the diaphragm.

AIR BLEEDING

To prevent piston overtravel and brake fluid seepage, keep a 20 mm (3/4 in) space between the lever and the handlebar grip when bleeding the front brake system. Pump up the system pressure until there are no air bubbles in the fluid flowing out of the reservoir small hole and lever resistance is felt.

NOTE

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

NOTE

Never re-use the contaminated fluid which has been pumped out during brake bleeding. This would decrease the efficiency of the brake system.

Squeeze the brake lever, open bleeder valve 1/2 turn and close the bleeder valve.
Release the brake lever slowly and wait several seconds after it reaches the end of its travel.

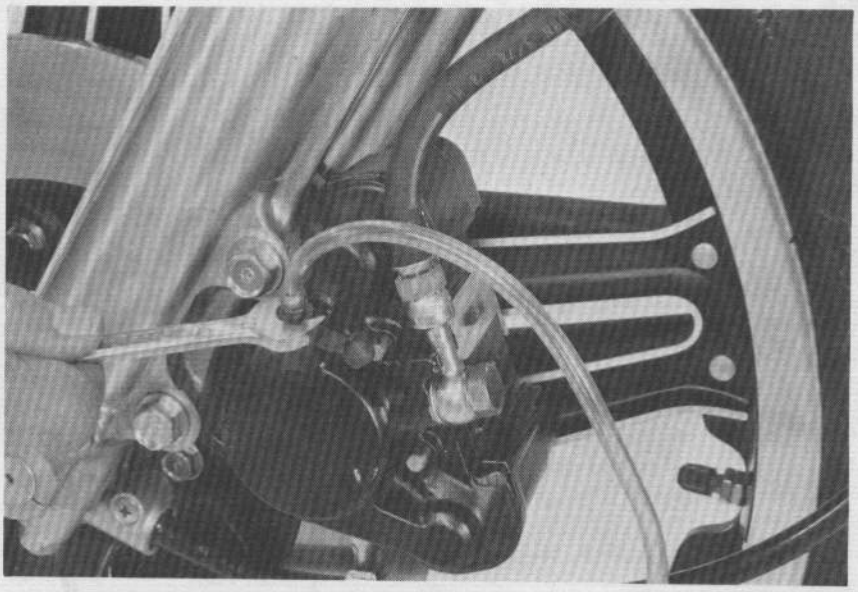
NOTE

Do not release the brake lever until the bleeder valve has been closed.

Repeat the above steps until no bubbles appear in the fluid at the end of the hose.
Fill the fluid reservoir to the upper level mark.

WARNING

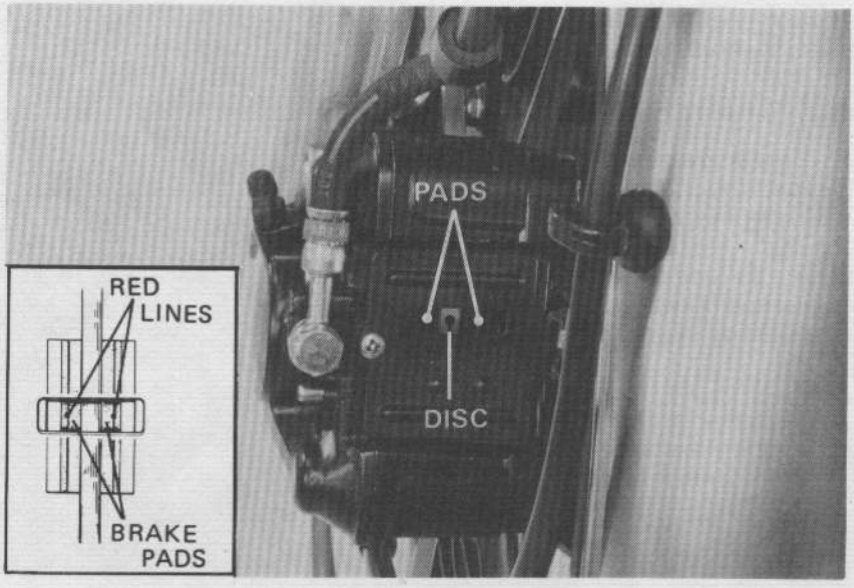
A brake disc or pad contaminated with brake fluid or grease reduces stopping power. Discard contaminated pads and clean the disc with a high quality brake degreasing agent.



BRAKE PAD/DISC

BRAKE PAD WEAR CHECK

Replace the front brake pads if the red line on the top of the pads reaches the edge of the brake disc.



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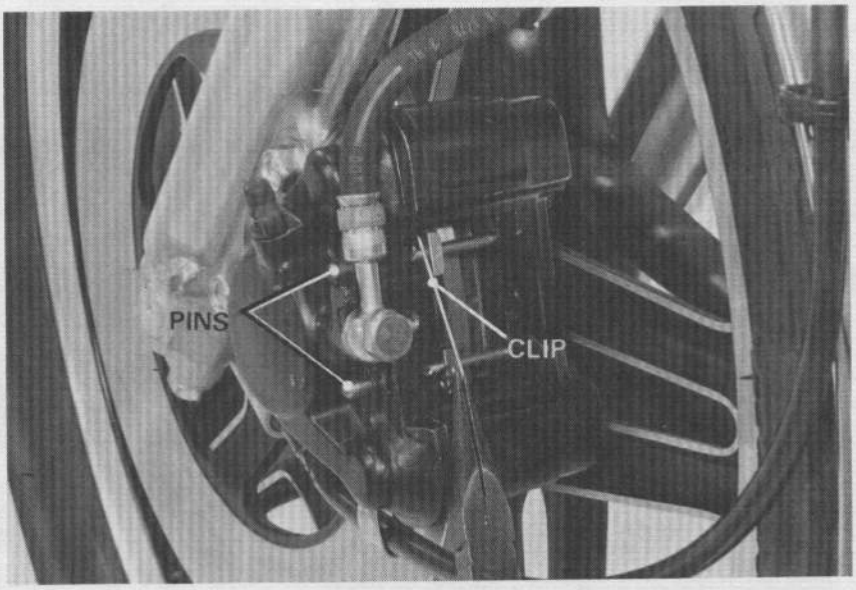
BRAKE PAD REPLACEMENT

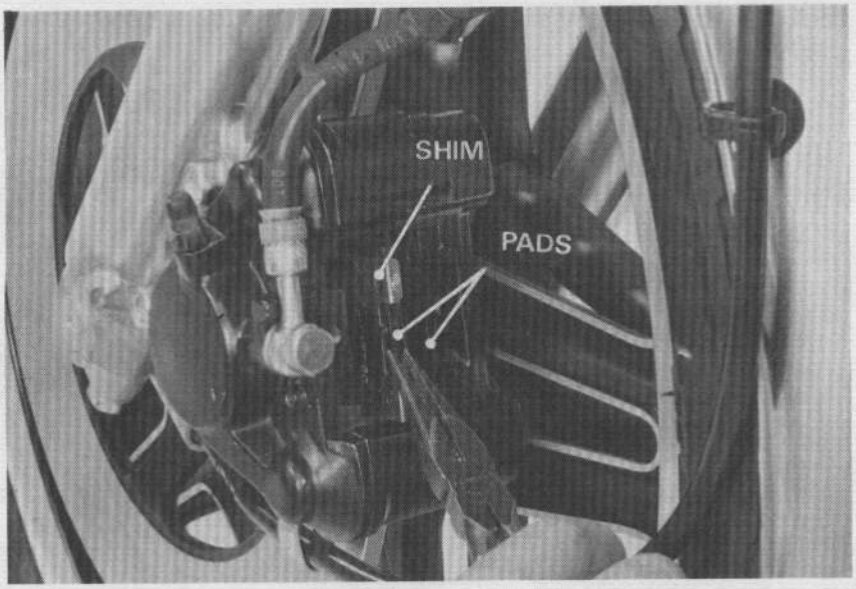
Remove the caliper cover.
Remove the clip.
Push the caliper toward the right and push the piston all the way in to allow installation of new brake pads.
Remove the pins, brake pads and shim.
Apply a coat of silicon grease to both sides of the shim.



Install new brake pads with the shim between the piston and pad.
Install the pins and clip.
Install the caliper cover.

NOTE

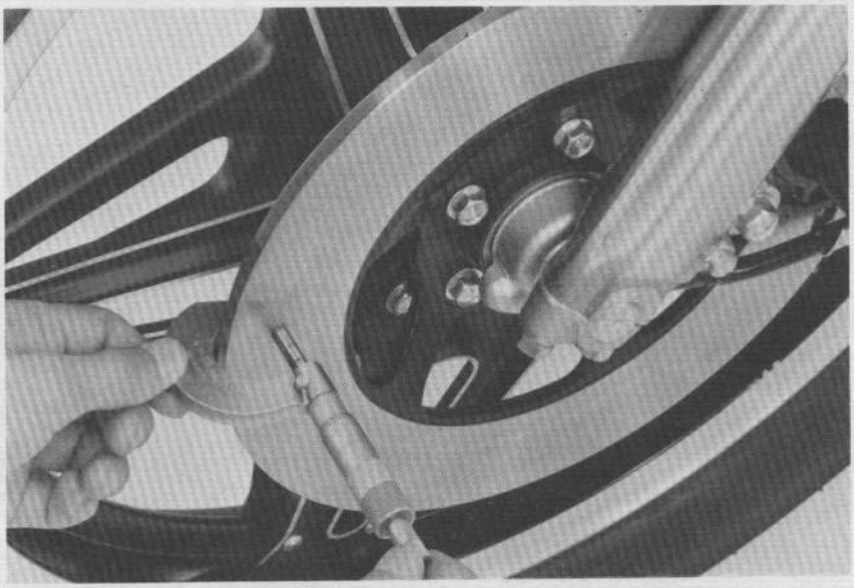
- Always replace the brake pads in pairs to assure even disc pressure.
- Push the piston all the way in.
- Check the brake fluid level in the master cylinder reservoir because new pads will cause the fluid level to rise.



DISC THICKNESS

Measure the disc thickness.

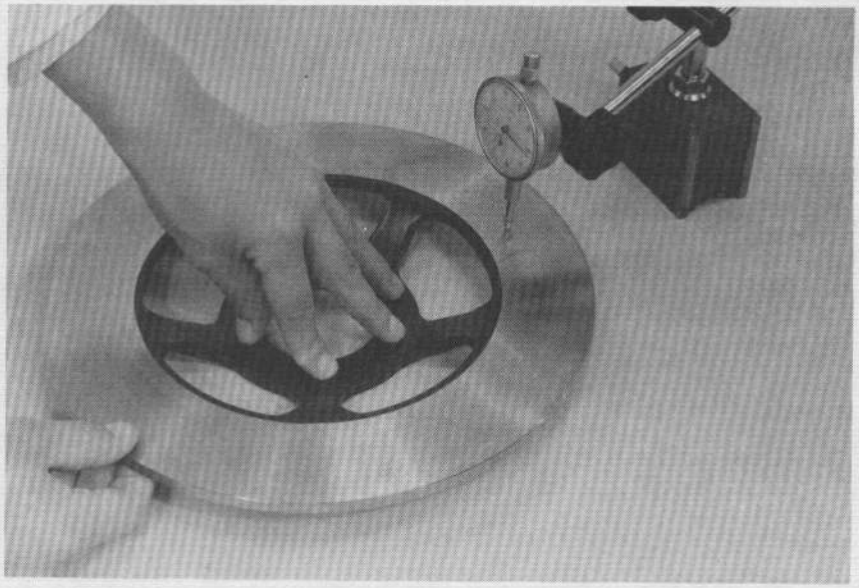
SERVICE LIMIT: 6.0 mm (0.24 in)



BRAKE DISC WARPAGE

Measure brake disc warpage.

SERVICE LIMIT: 0.3 mm (0.01 in)



BRAKE MASTER CYLINDER

BRAKE MASTER CYLINDER DISASSEMBLY

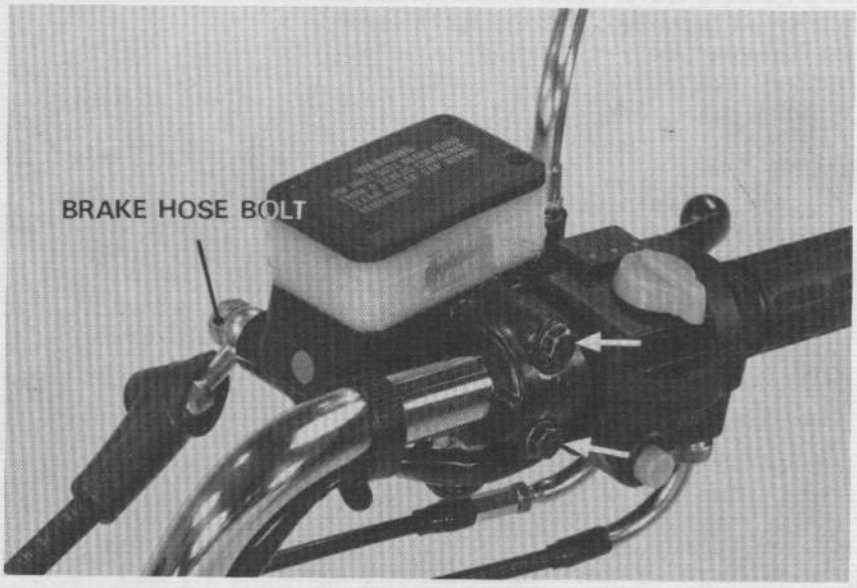
Drain brake fluid from the hydraulic system.
Remove the brake lever and rear view mirror from the master cylinder.
Disconnect the brake hose.

CAUTION

- *Avoid spilling brake fluid on painted surfaces.*
- *Cover the fuel tank whenever the brake system is serviced.*

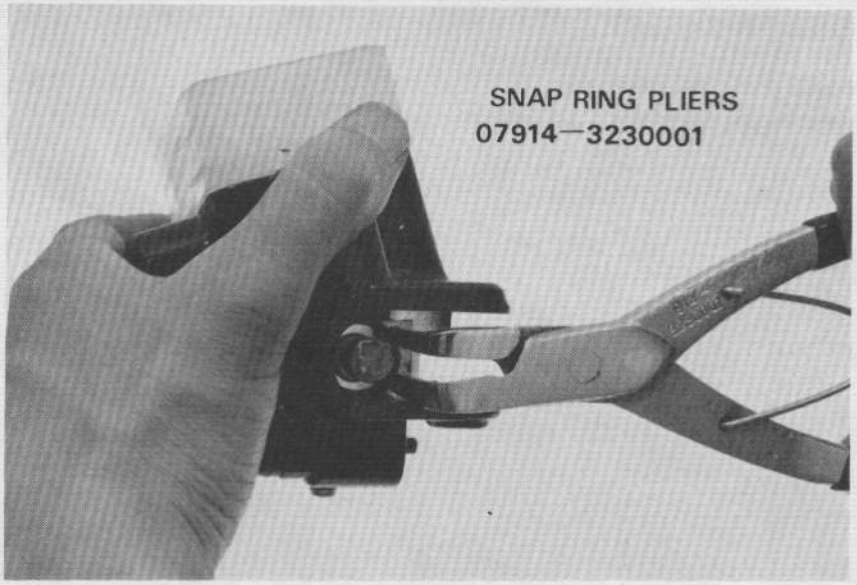
NOTE

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



Remove the two master cylinder attaching bolts.

Remove the boot.
Remove the circlip form the master cylinder body.



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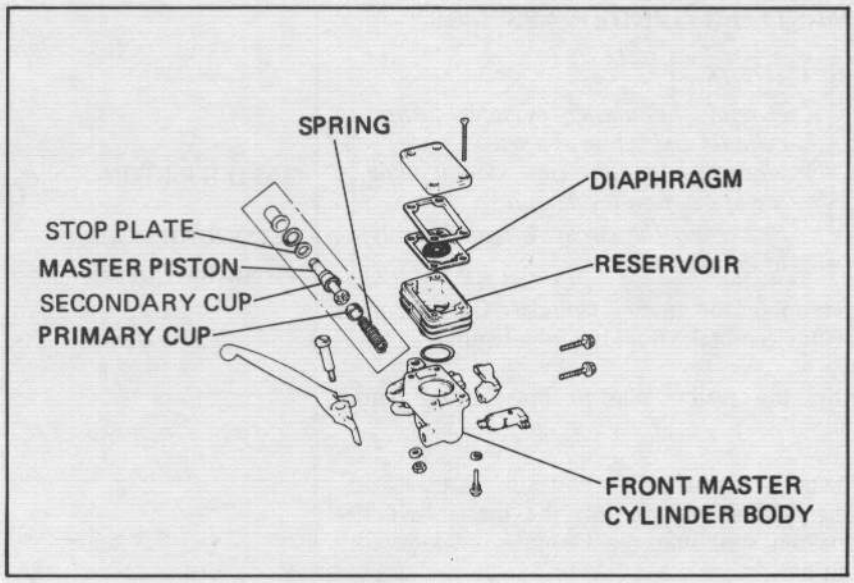
Remove the stop plate, secondary cup and master piston.
Then remove the primary cup and spring.

Remove the brake fluid reservoir from the master cylinder body.

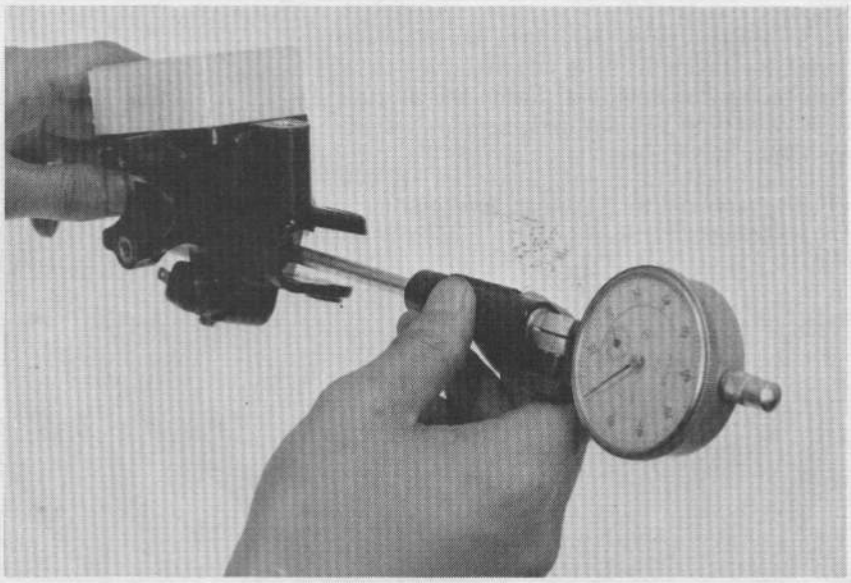
Clean the inside of the master cylinder and reservoir with brake fluid.



MASTER CYLINDER I.D. INSPECTION

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

SERVICE LIMIT: 14.055 mm (0.5533 in)

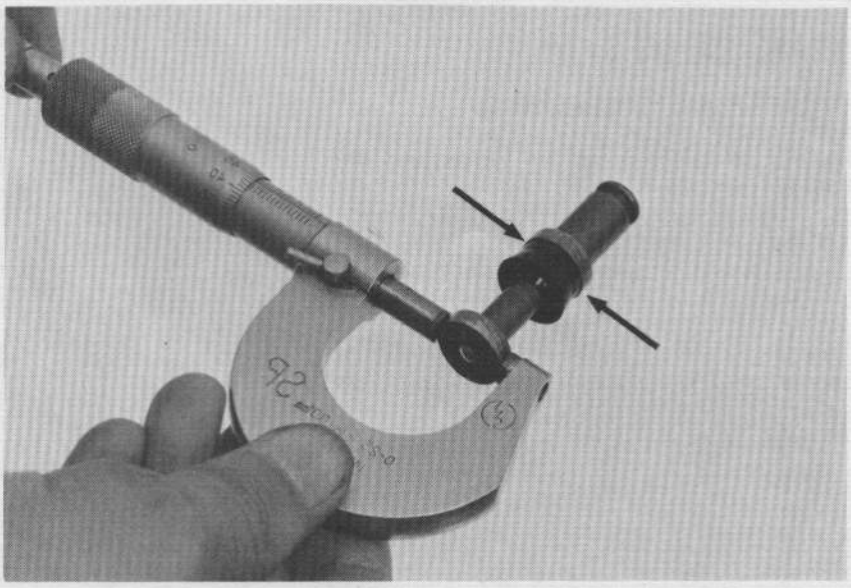


MASTER PISTON O.D. INSPECTION

Measure the master piston O.D.

SERVICE LIMIT: 13.945 mm (0.5490 in)

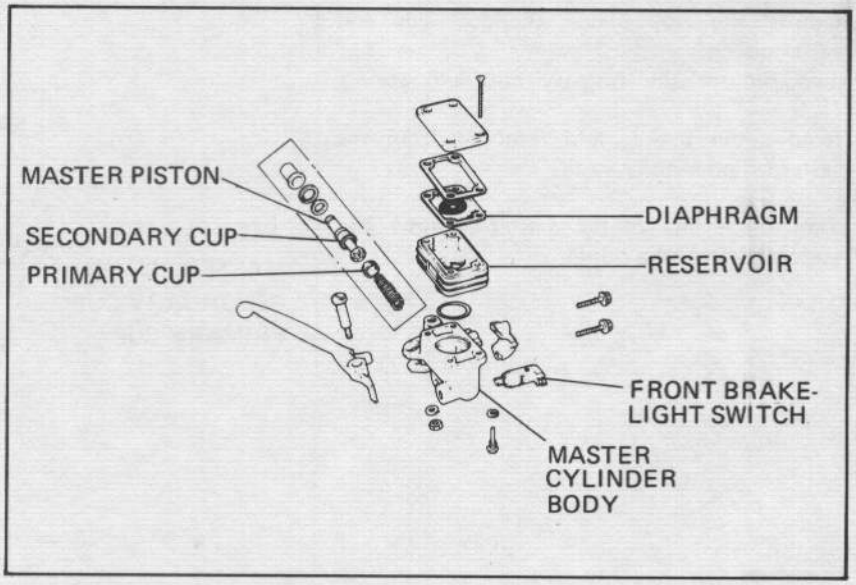
Check the primary cup and secondary cup for damage.



MASTER CYLINDER ASSEMBLY

CAUTION

- *Handle the master cylinder piston, cylinder and spring as a set.*
- *When installing the cups, do not allow the lips to turn inside out.*
- *Be certain the circlip is seated firmly in the groove.*



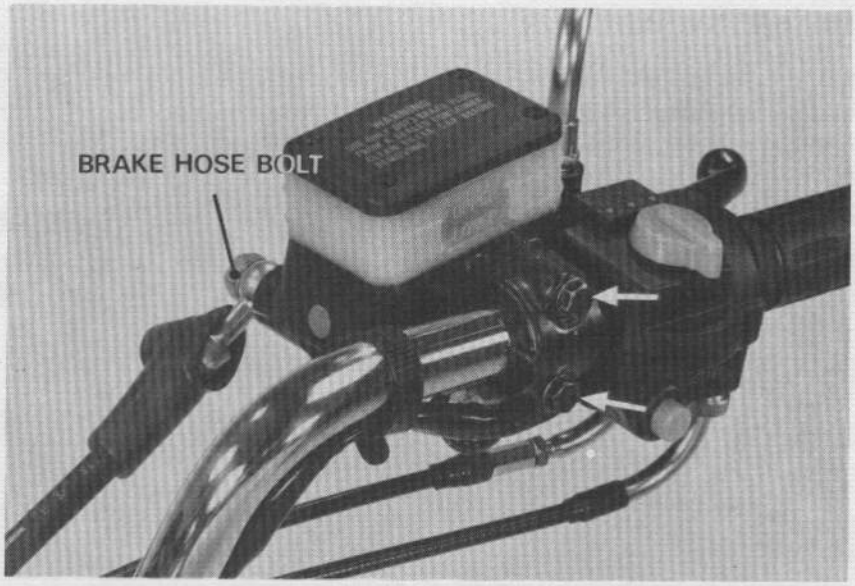
Assemble the master cylinder. Coat all parts with clean brake fluid before assembly.

Dip the piston cup in brake fluid before assembly.

Install the boot, washer and clip.
Install the reservoir on the master cylinder making sure that the O-ring is in good condition.

Place the master cylinder on the handlebar and install the holder and the two mounting bolts. Torque the top bolt first. Install the oil hose with the bolt and its two sealing washers. Install the brake lever.

Fill the reservoir to the upper level and bleed the brake system (Page 15–3).



BRAKE CALIPER

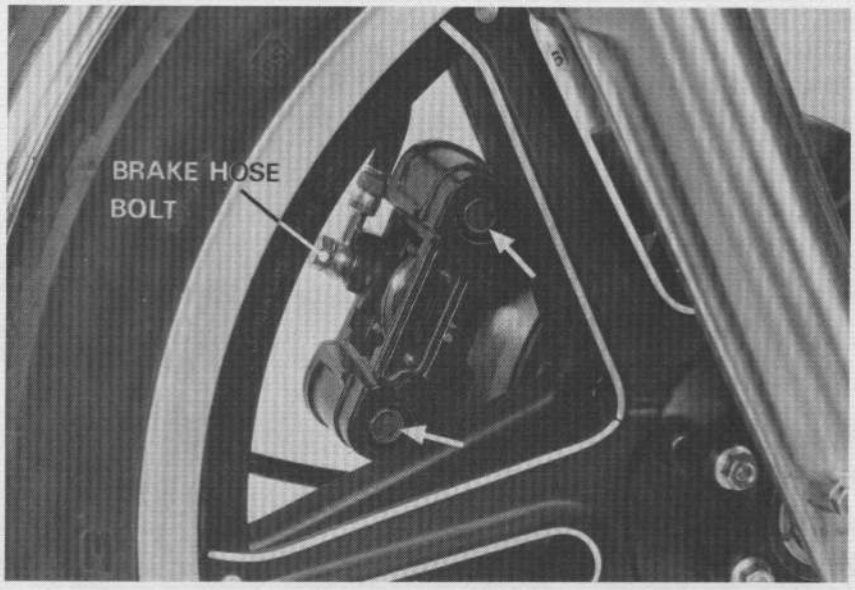
CALIPER A DISASSEMBLY

Place a container under the caliper and disconnect the brake hose bolt.

NOTE

Avoid spilling brake fluid on painted surfaces.

Loosen the two caliper shafts gradually in several steps while pressing them against the caliper.
Remove caliper A.



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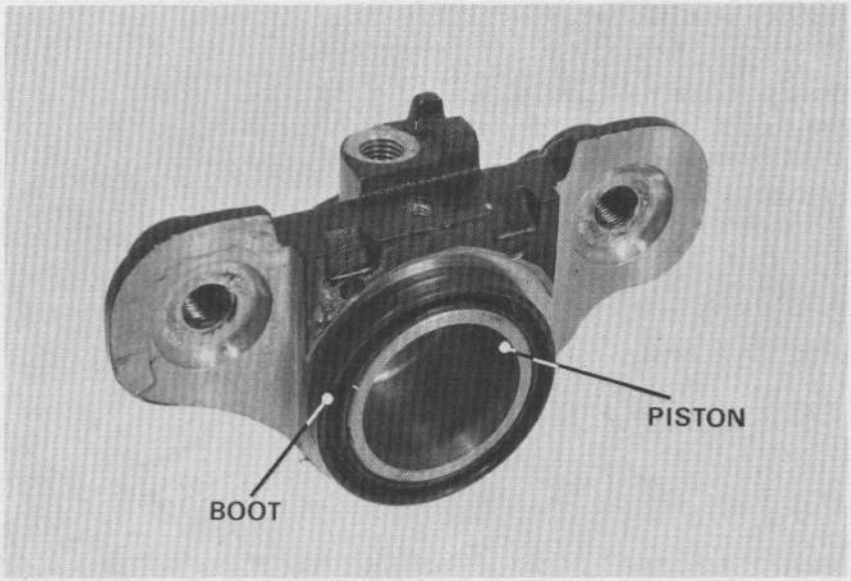
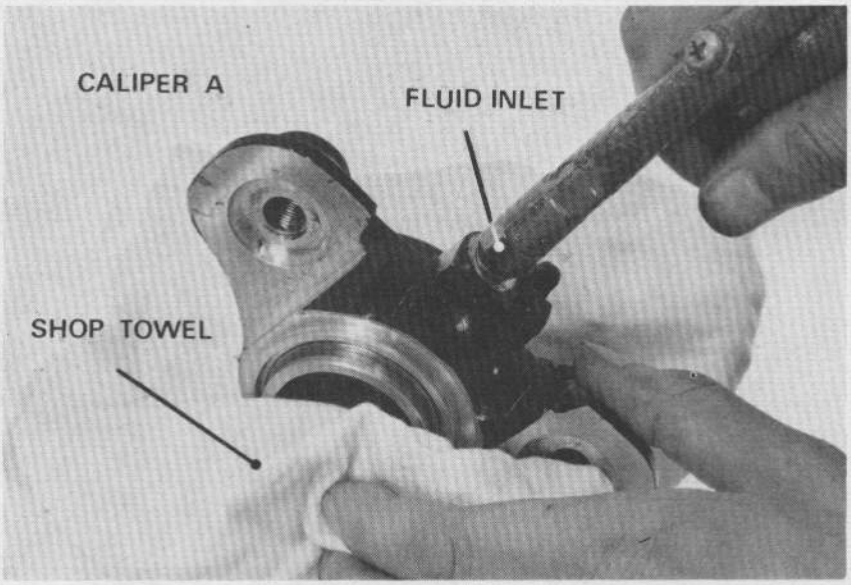
Remove the piston boot.
Inspect the piston boot for damage or deterioration.



Place a shop towel over the piston to control piston removal. Position the caliper with the piston down.
Remove the piston by applying a small amount of air pressure to the fluid inlet.

WARNING
Do not use high pressure air or bring the nozzle too close to the inlet.



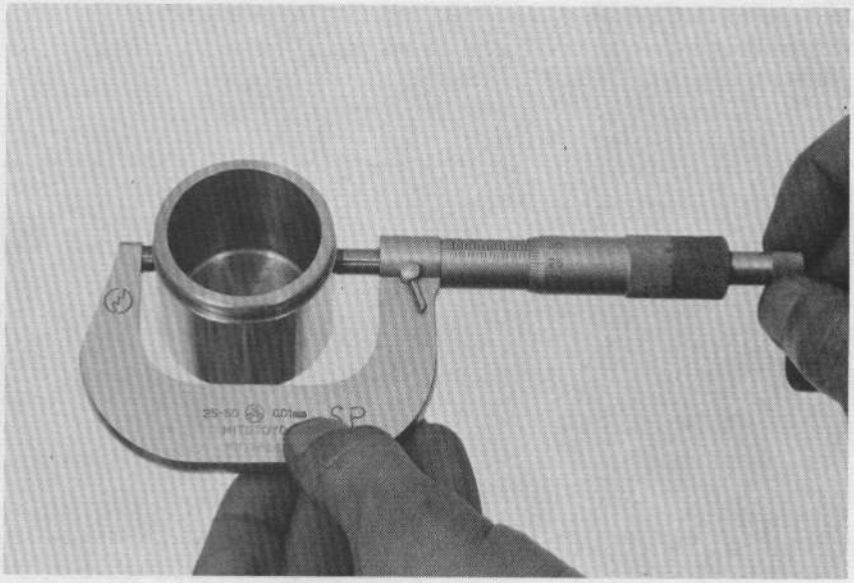
Examine the piston and cylinder for scoring or scratches and replace if necessary.

Remove the oil seal by first pushing it into the cylinder. Then pull it out.
Clean the caliper grooves with brake fluid.

FRONT CALIPER PISTON O.D. INSPECTION

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

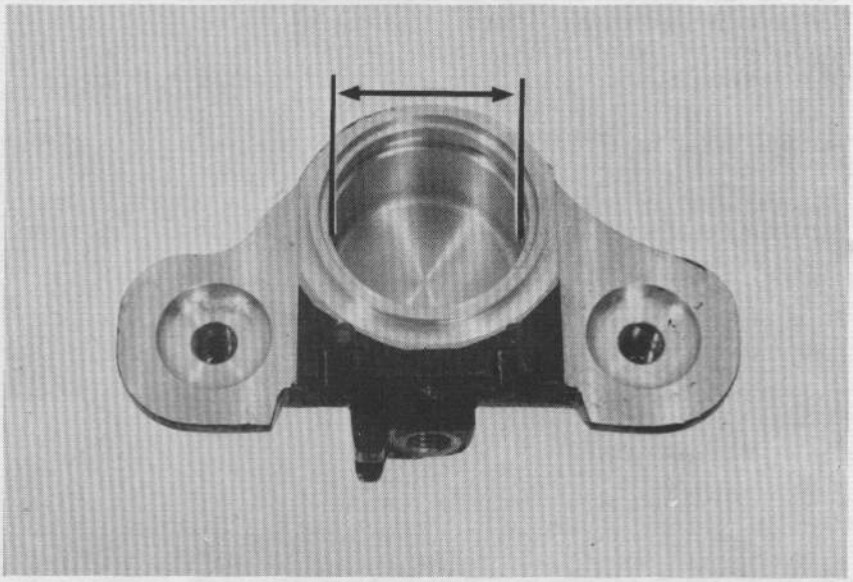
SERVICE LIMIT: 42.765 mm (1.6837 in)



FRONT CALIPER CYLINDER I.D. INSPECTION

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

SERVICE LIMIT: 42.915 mm (1.6896 in)

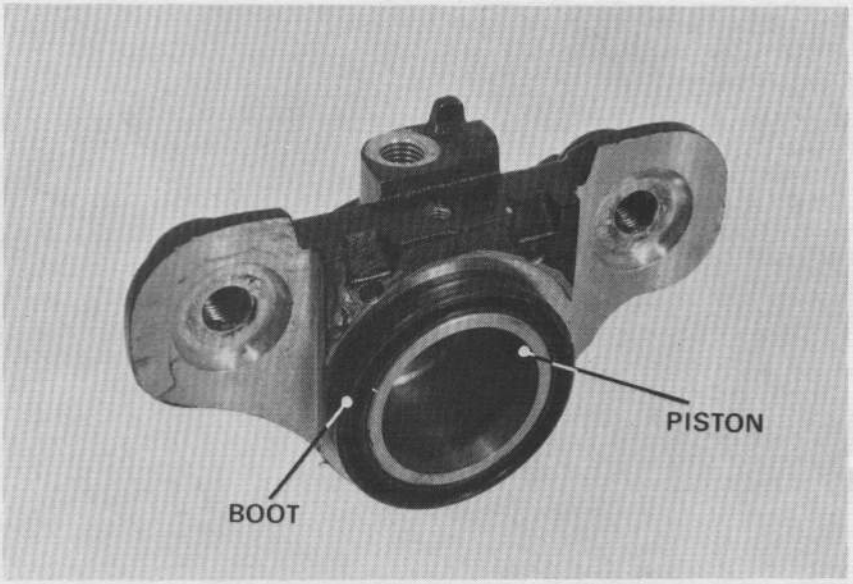


FRONT BRAKE CALIPER ASSEMBLY

WARNING

A brake disc or pad contaminated with brake fluid or grease reduces stopping power. Replace contaminated pads, and clean the disc with a good quality degreasing agent.

Assemble the caliper in the reverse order of disassembly. The oil seal must be replaced with a new one whenever removed. Lubricate the piston and seal with a medium grade of Hi-Temperature Silicone grease or brake fluid before assembly.
Be certain the piston seal is seated in the caliper groove.
Place the piston in the caliper with the boot lip facing out. Install the boot on the piston.



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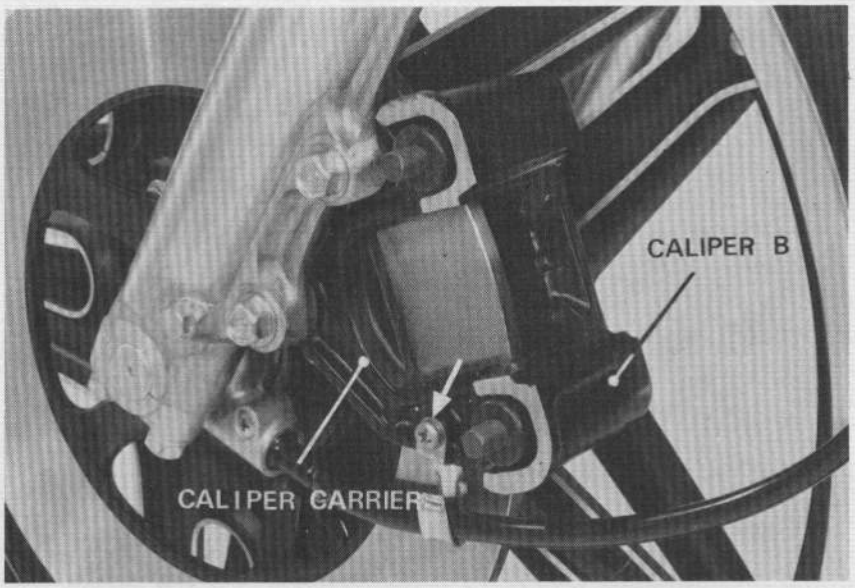
CALIPER CARRIER/CALIPER B DISASSEMBLY

Remove the speedometer cable clamp.
Remove the carrier with caliper B by removing the two bolts.



Remove the caliper shafts from the carrier and caliper B while rotating them by hand. Avoid damaging the boots.

CALIPER CARRIER/CALIPER B ASSEMBLY

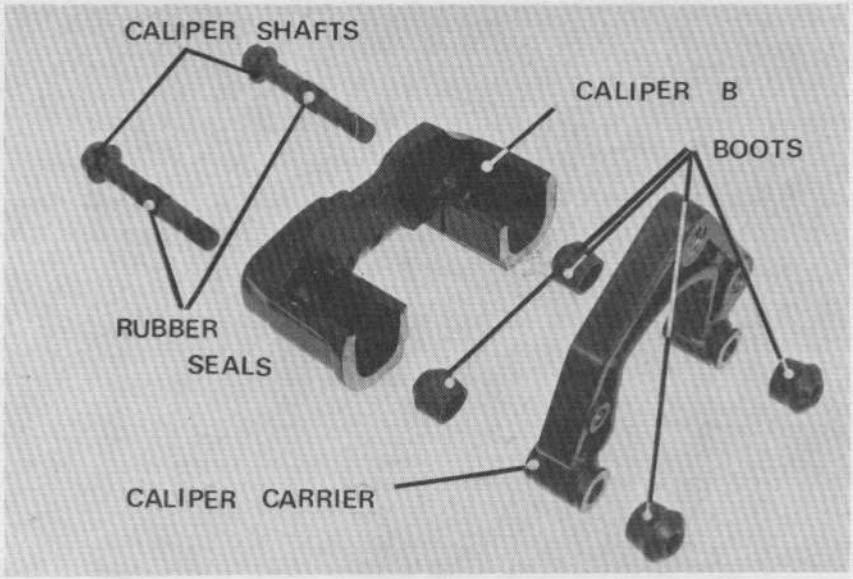
Wash all parts with brake fluid.
Coat the rubber seals with silicon grease or brake fluid and install in the shaft grooves.

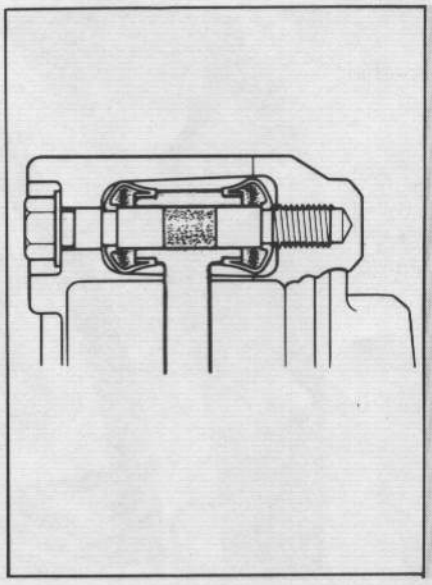
NOTE

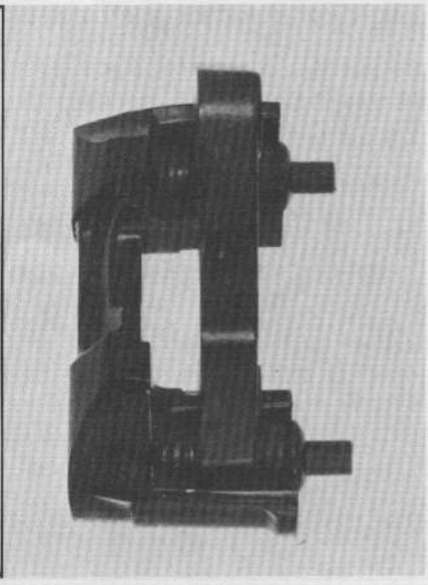
Replace the boots and rubber seals with new ones if damaged.

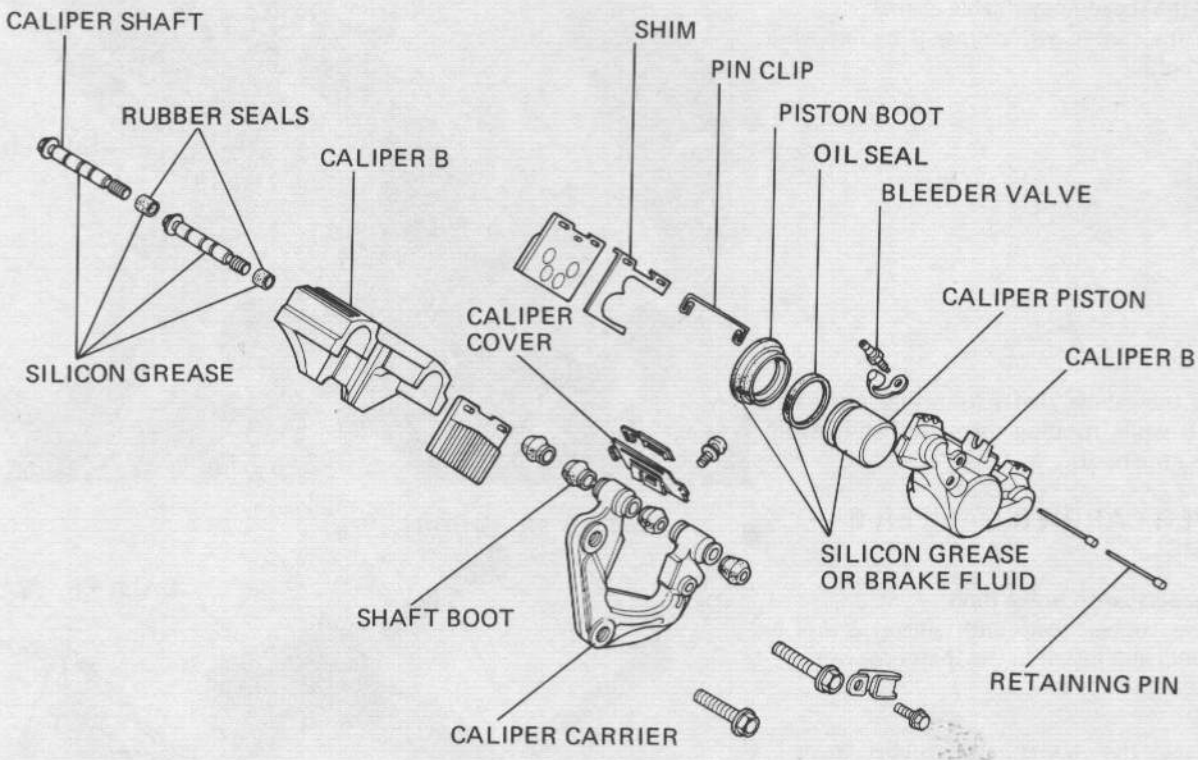
Install the boots on the carrier.
Assemble caliper B and caliper carrier, making sure that the boots are seated in the caliper shaft grooves properly.
Install the carrier on the front fork.

TORQUE: 3.0–4.0 kg-m (22–29 ft-lb)









CALIPER A INSTALLATION

Tighten the caliper shafts evenly while pushing them against caliper B.

NOTE

Tighten the shafts carefully, noting the mating surfaces of caliper A and B.

TORQUE: 3.0–4.0 kg-m (22–29 ft-lb)

Connect the brake hose.
Install the caliper cover.
Fill the brake fluid reservoir and bleed the front brake system. (See page 15–3).

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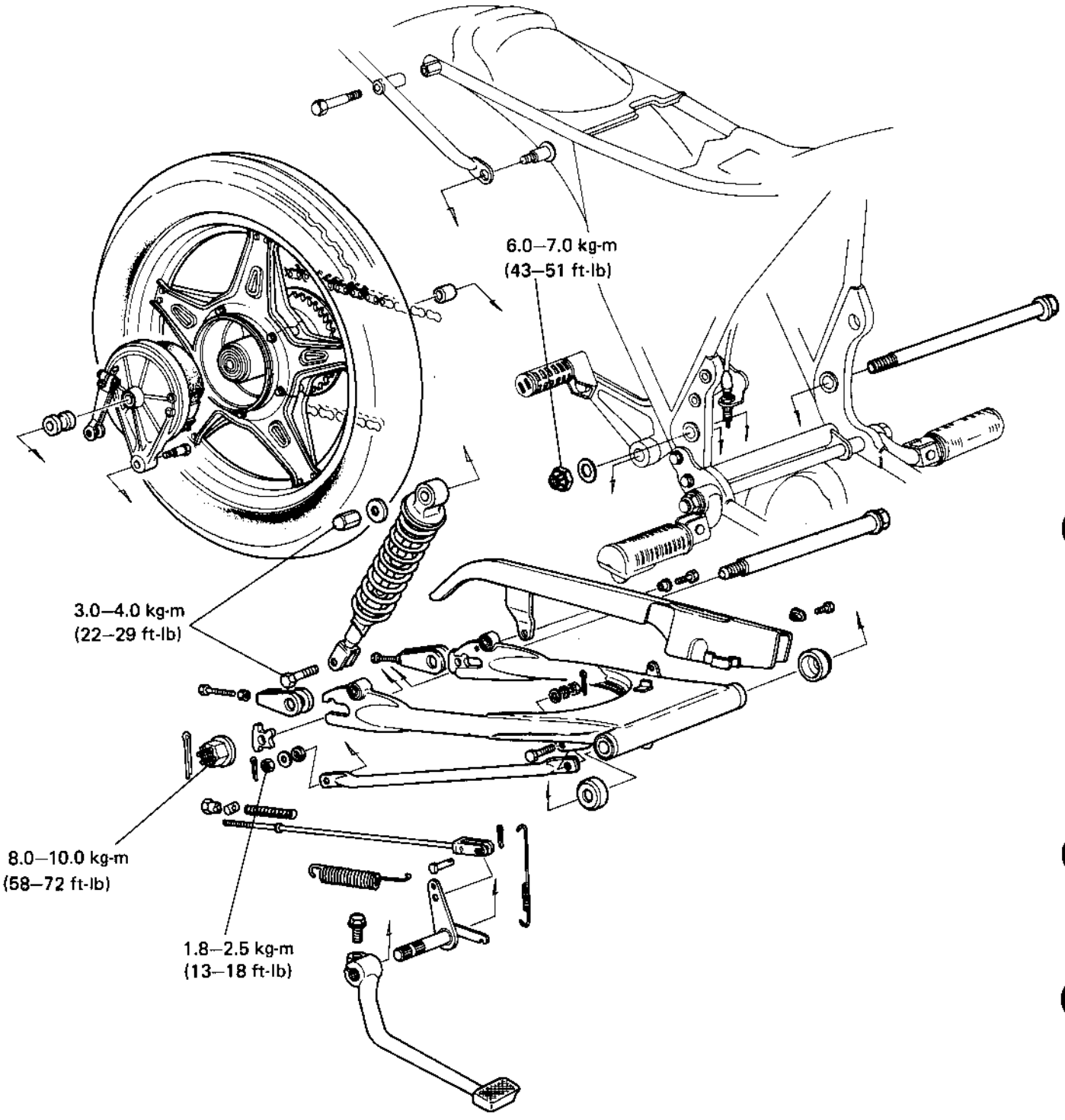

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14. REAR WHEEL/SUSPENSION

SERVICE INFORMATION

GENERAL INSTRUCTIONS

- Do not remove rivets, nuts and pins from the rim, spoke plate and hub.
- Never ride on the rim or try to bend the wheel.
- Avoid damaging the aluminum alloy rim.

SPECIAL TOOLS

Special Tool	
Bearing Driver Attachment	07946–3290000
Common Tools	
Bearing Driver Handle (A)	07749–0010000
Bearing Driver Outer (62 x 68 mm)	07746–0010500
Bearing Driver Pilot (20 mm)	07746–0040500
Bearing Driver Pilot (25 mm)	07746–0040600
Rear Shock Absorber Compressor	07959–3290001
Retainer Wrench Body	07710–0010401
Retainer Wrench (A)	07710–0010100
Retainer Wrench (C)	07710–0010300

TORQUE VALUES

Rear shock absorber	3.0–4.0 kg-m (22–29 ft-lb)
Rear Shock absorber locknut	2.0–3.5 kg-m (15–25 ft-lb)
Driven sprocket	8.0–10.0 kg-m (58–72 ft-lb)
Rear axle	8.0–10.0 kg-m (58–72 ft-lb)
Swing arm pivot bolt	6.0–7.0 kg-m (43–51 ft-lb)
Rear brake torque link	1.8–2.5 kg-m (13–18 ft-lb)

SPECIFICATIONS

ITEM		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 spring free length		224.7 mm (8.8 in)	220.6 mm (8.7 in)
Swing arm bushing	I. D.	21.500–21.552 mm (0.8465–0.8485 in)	21.7 mm (0.854 in)
Swing arm collar	O. D.	21.427–21.460 mm (0.8436–0.8449 in)	21.4 mm (0.843 in)
Rear brake lining thickness		5.0 mm (0.197 in)	2.0 mm (0.08 in)
Rear brake drum I.D.		180–180.3 mm (7.09–7.10 in)	181 mm (7.1 in)

TROUBLESHOOTING

Wobble or vibration
1. Distorted rim
2. Loose wheel bearing
3. Loose or distorted spokes
4. Faulty tire
5. Loose axle
6. Tire pressure incorrect
7. Swing arm bushing worn

Soft suspension
1. Weak spring
2. Shock absorbers improperly adjusted

Hard suspension
1. Shock absorbers improperly adjusted
2. Bent shock absorber

Suspension noise
1. Shock case binding
2. Loose fasteners

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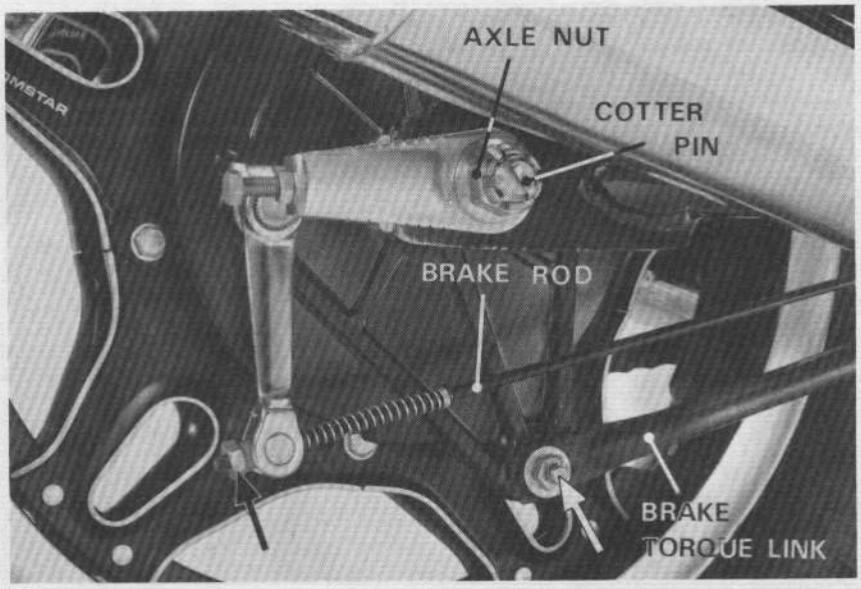
REAR WHEEL

REAR WHEEL REMOVAL

Place the motorcycle on its center stand.
Loosen the drive chain adjuster lock nuts and bolts.
Disconnect the rear brake torque link by removing the cotter pin and nut.

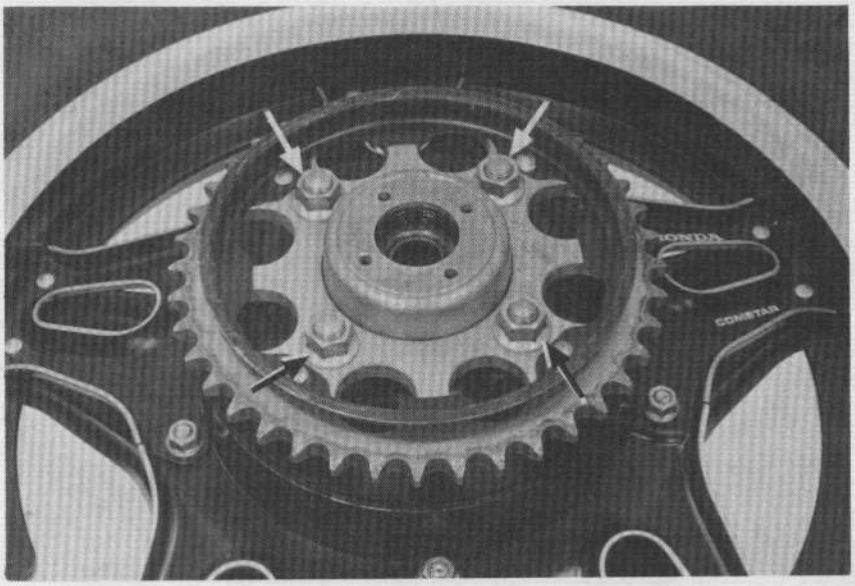
Remove the rear brake adjusting nut and disconnect the brake rod.
Remove the cotter pin from the rear axle and loosen the nut.

Pull the adjusters down, push the wheel forward and remove the drive chain from the drive sprocket.
Remove the axle nut.
Remove the rear axle.
Remove the rear wheel.

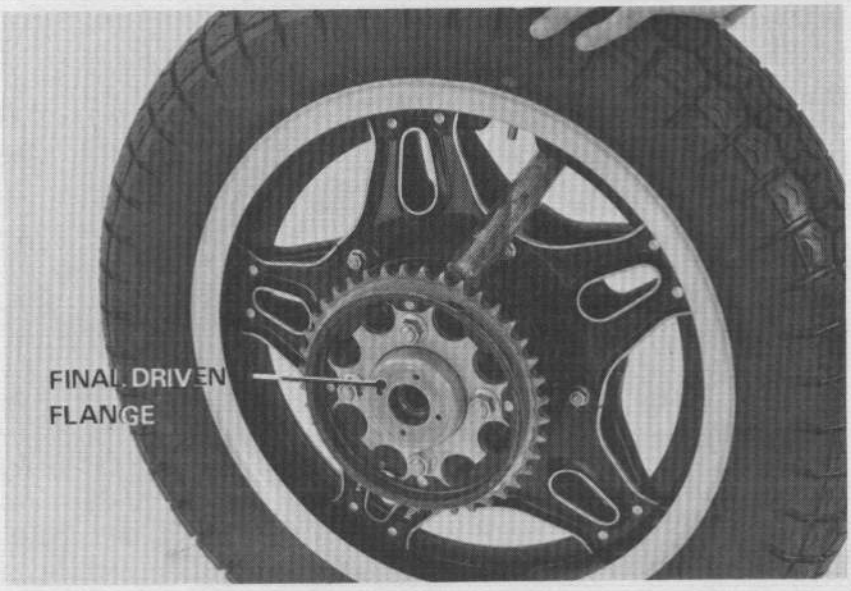


REAR WHEEL DISASSEMBLY

Remove the brake panel.
Loosen the driven sprocket nuts.



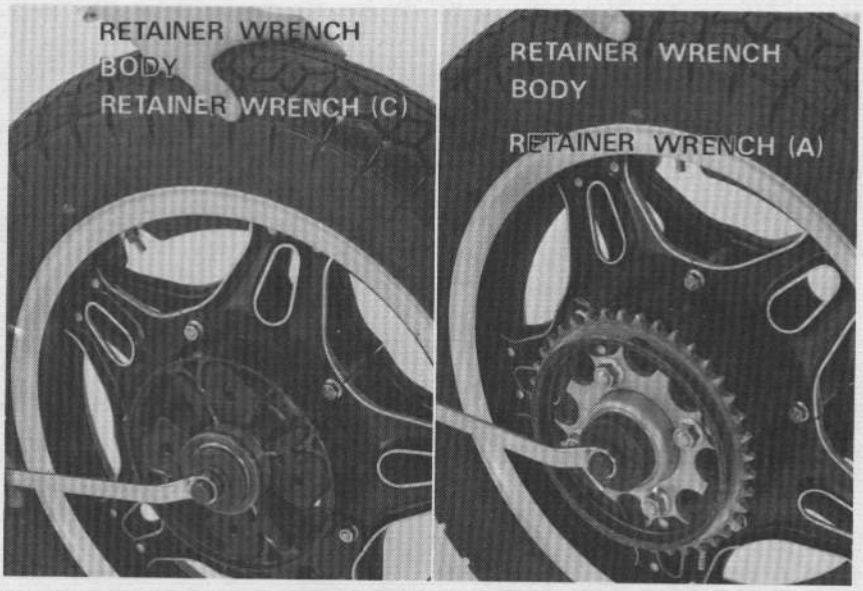
Remove the driven flange from the wheel hub.
Remove the driven sprocket.



Remove the bearing retainer.
Remove the bearings and distance collar from the rear wheel hub.
Remove the bearing from the final driven flange.

NOTE

If the bearings are removed, replace them with new bearings during assembly.

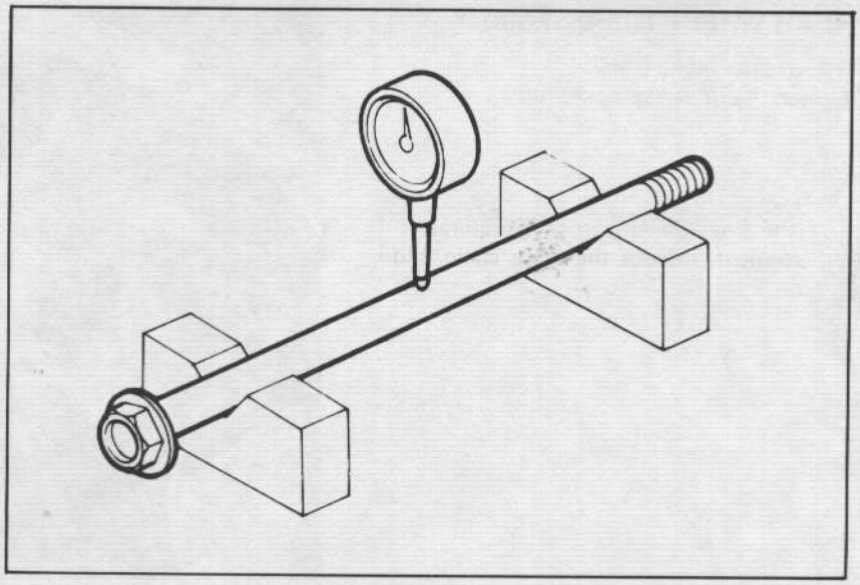


AXLE INSPECTION

Set the axle in V blocks and measure the axle runout with a dial indicator.

The actual runout is 1/2 of TIR (Total Indicator Reading).

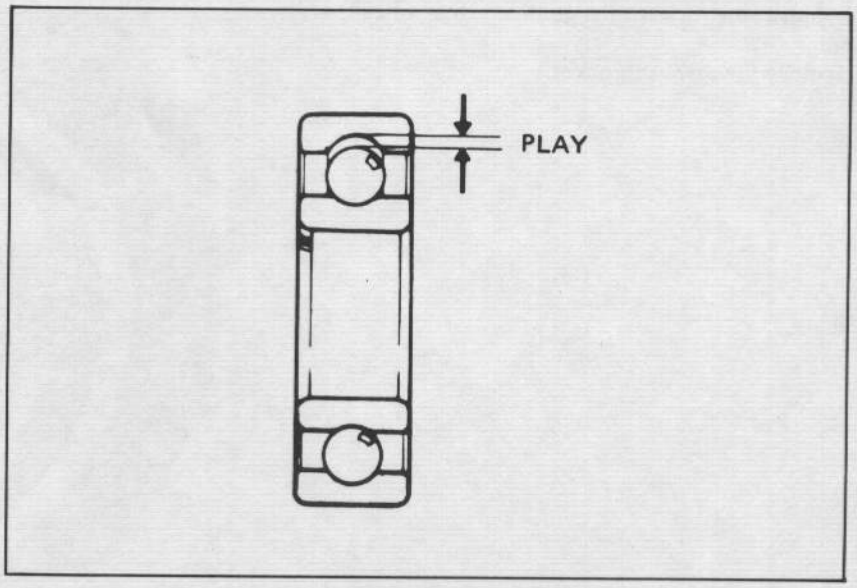
SERVICE LIMIT: 0.2 mm (0.01 in)



REAR WHEEL BEARING PLAY INSPECTION

Check wheel bearing play by rotating the wheel by hand. Replace the bearings with new ones if they are noisy or have excessive play.

SERVICE LIMIT:
HUB BEARING: 0.048 mm (0.0019 in)
DRIVEN FLANGE BEARING:
0.052 mm (0.0020 in)



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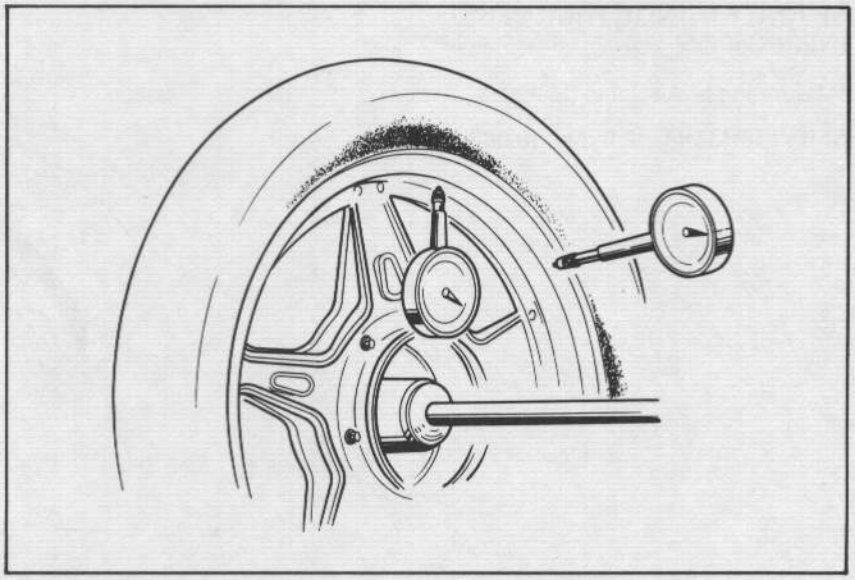
REAR WHEEL RIM RUNOUT INSPECTION

Place the wheel in a truing stand. Spin the wheel slowly and measure the runout with a dial indicator.

SERVICE LIMITS:
RADIAL RUNOUT: 2.0 mm (0.08 in)
AXIAL RUNOUT: 2.0 mm (0.08 in)

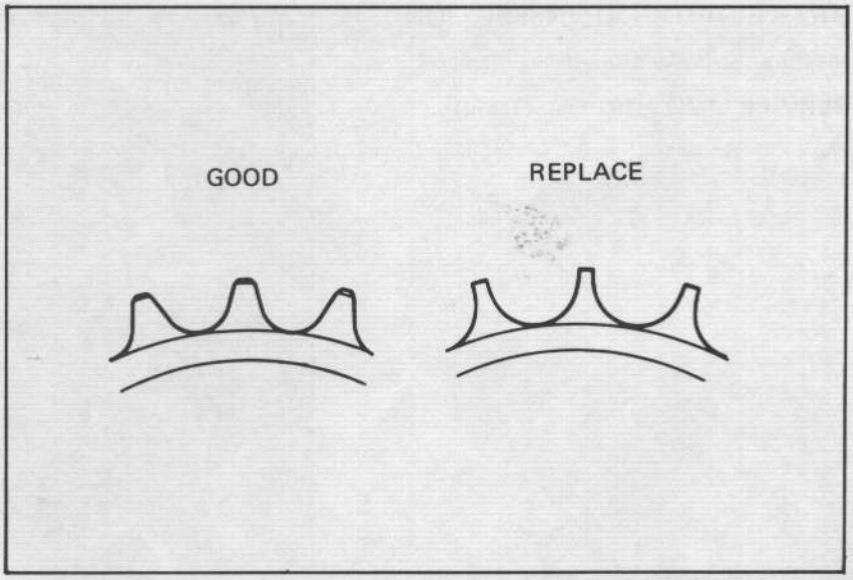


FINAL DRIVEN SPROCKET INSPECTION

Replace the sprocket if worn, bent or damaged.

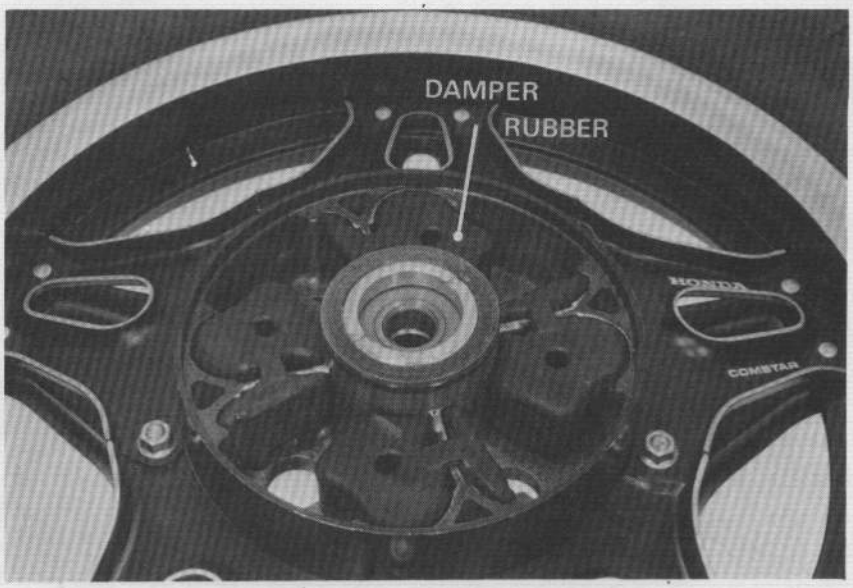
NOTE

If the final driven sprocket requires replacement, inspect the drive chain and driven sprocket (Page 3—12).



DAMPER INSPECTION

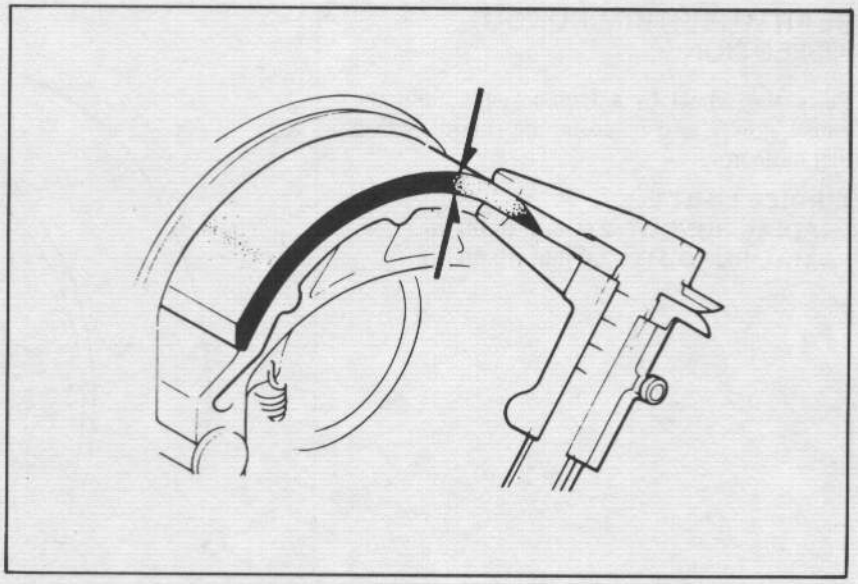
Replace the damper rubbers if they are damaged or deteriorated.



BRAKE LINING THICKNESS INSPECTION

Measure the brake lining thickness.

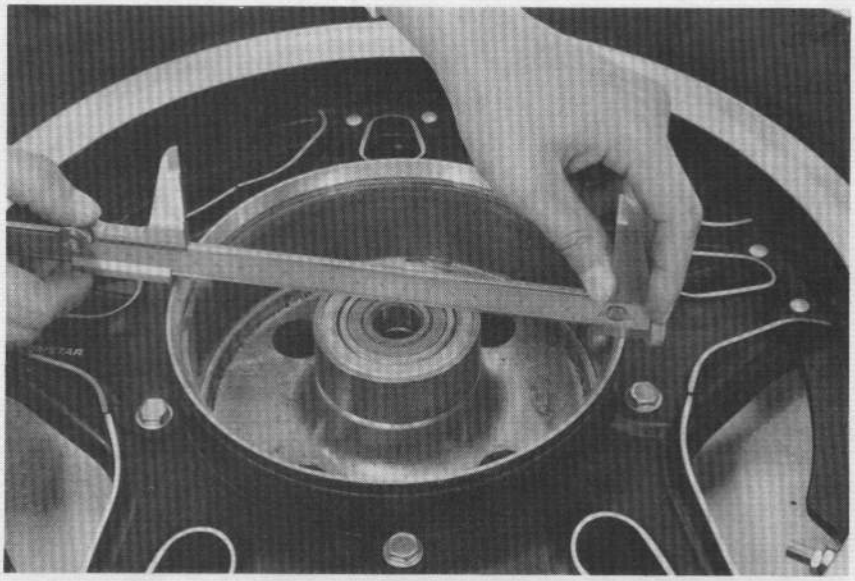
SERVICE LIMIT: 2.0 mm (0.08 in)



BRAKE DRUM I. D. INSPECTION

Measure the brake drum inside diameter.

SERVICE LIMIT: 181 mm (7.1 in)



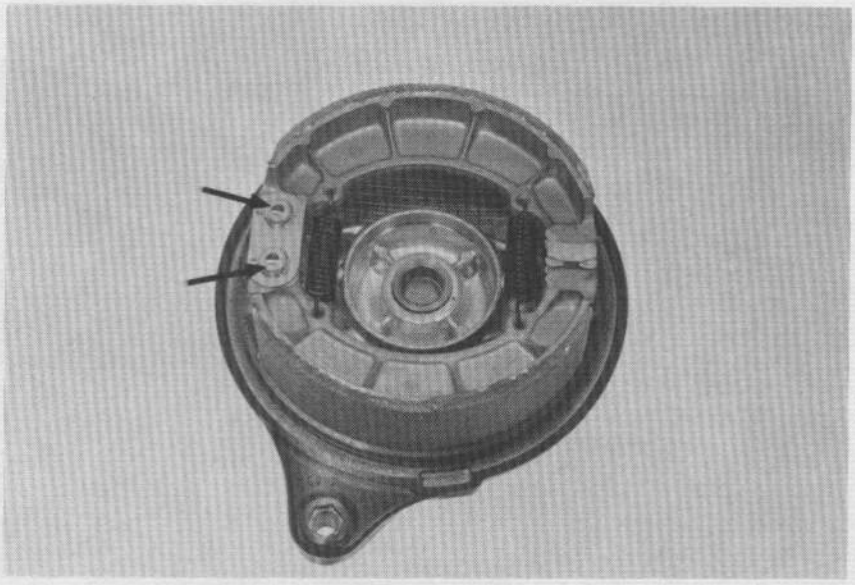
BRAKE SHOE REPLACEMENT

Remove the brake arm.
Remove the cotter pins.
Replace the brake shoes with new ones.

Apply a light coat of grease to the faces of the anchor pins and brake cam and groove in the brake cam.

WARNING

Keep grease off the brake linings. Wipe excess grease off the cam and anchor pins. If grease gets on the brake linings the stopping power will be reduced.



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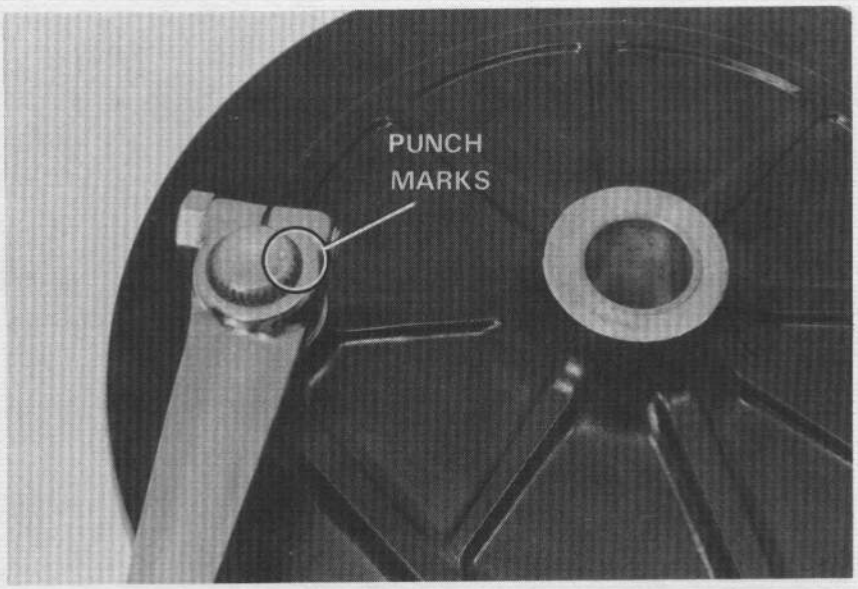
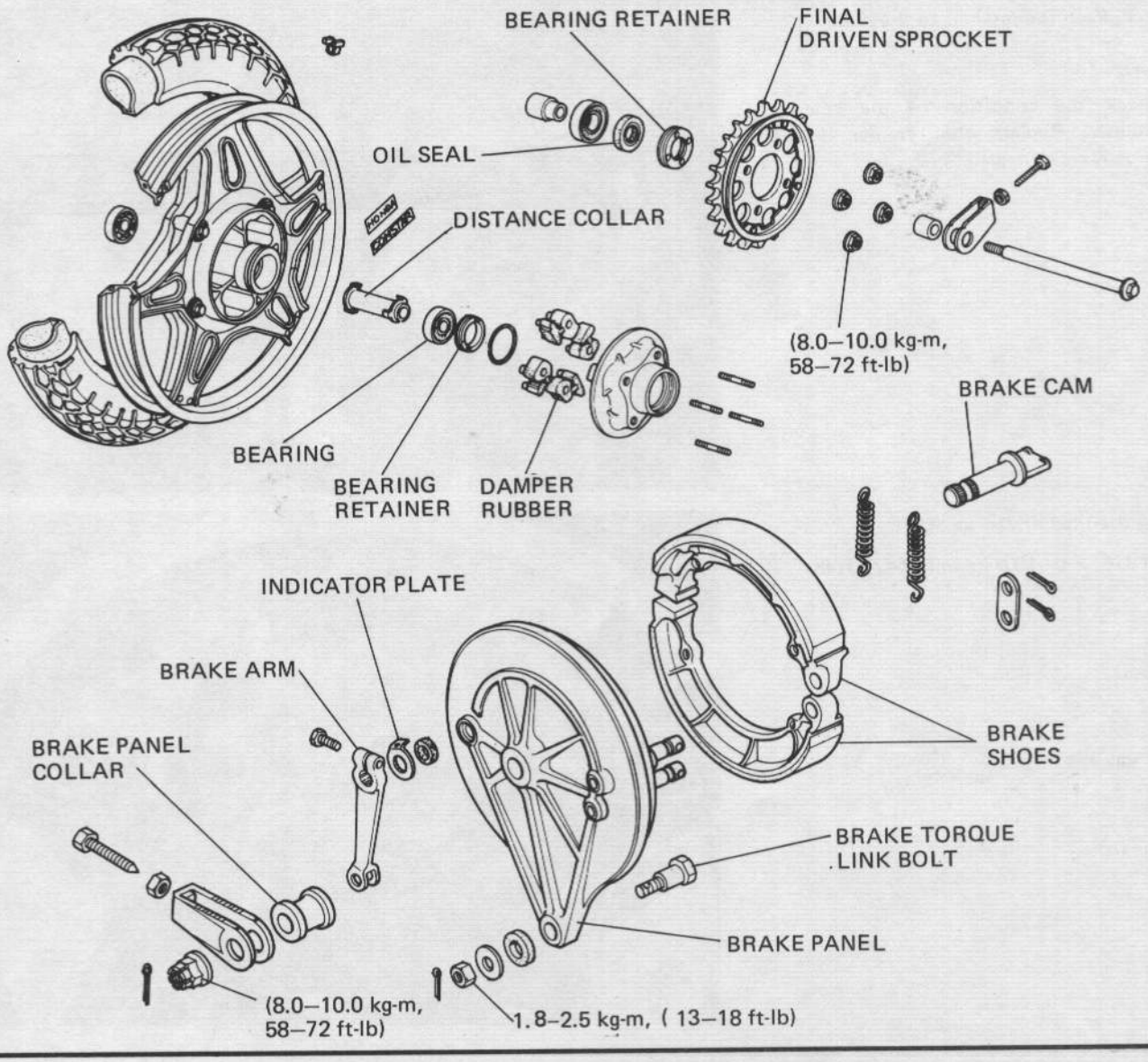
Align the punch marks on the brake cam and brake arm.
Tighten the brake arm bolt.

TORQUE: 2.4–3.0 kg-m (17–22 ft-lb)



REAR WHEEL ASSEMBLY

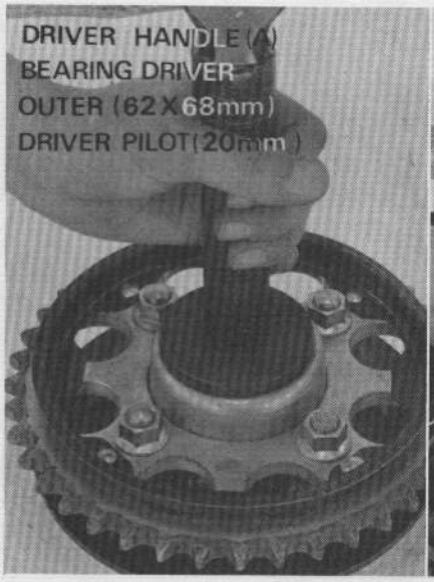


Pack all bearing cavities with bearing grease. Press the distance collar into place from the left side.

Drive the right bearing in first, then the left bearing.

CAUTION

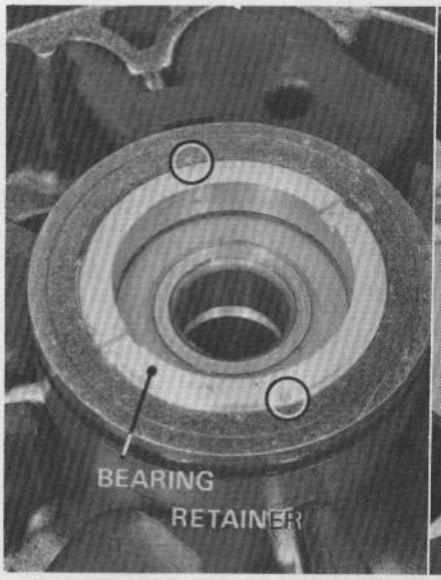
- *Drive the bearing squarely.*
- *Install the bearings with the sealed end facing out, making sure they are fully seated.*

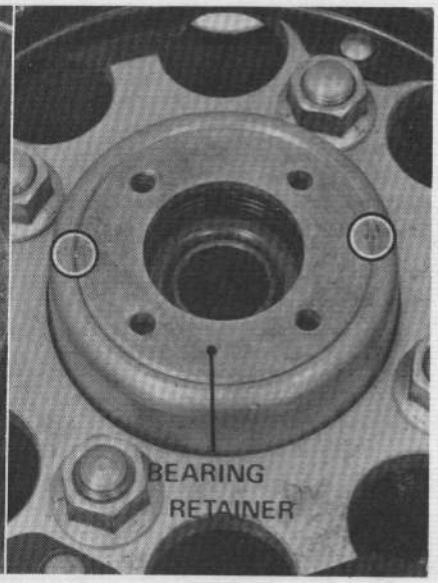


Install the bearing retainer with the retainer wrench. Peen the retainer to the hub.

NOTE

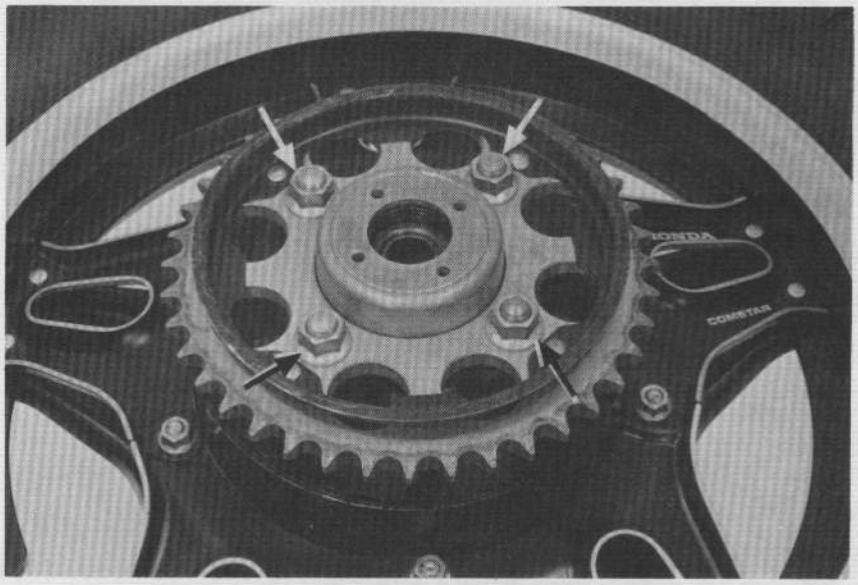
Check the condition of the bearing retainer. Replace the retainer if the threads are damaged.





Install the final driven sprocket.

TORQUE: 8.0–10.0 kg-m (58–72 ft-lb)



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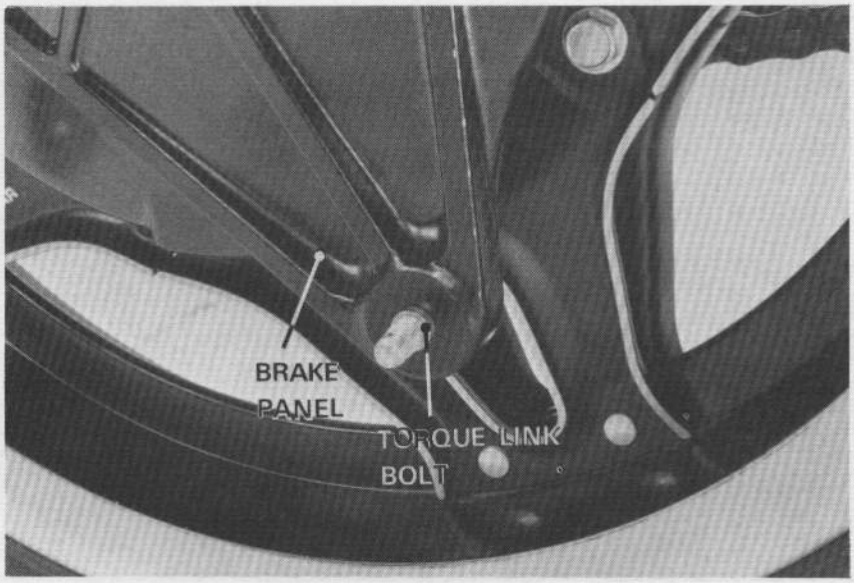
REAR WHEEL INSTALLATION

Install the rear wheel in the reverse order of removal.

NOTE

After installing the wheel, apply the brakes several times, and then check to be sure that the wheel rotates freely. Recheck the installation if the brake drags or wheel does not rotate freely.

Install the brake torque link bolt into the hole in the brake panel before installing the axle shaft.



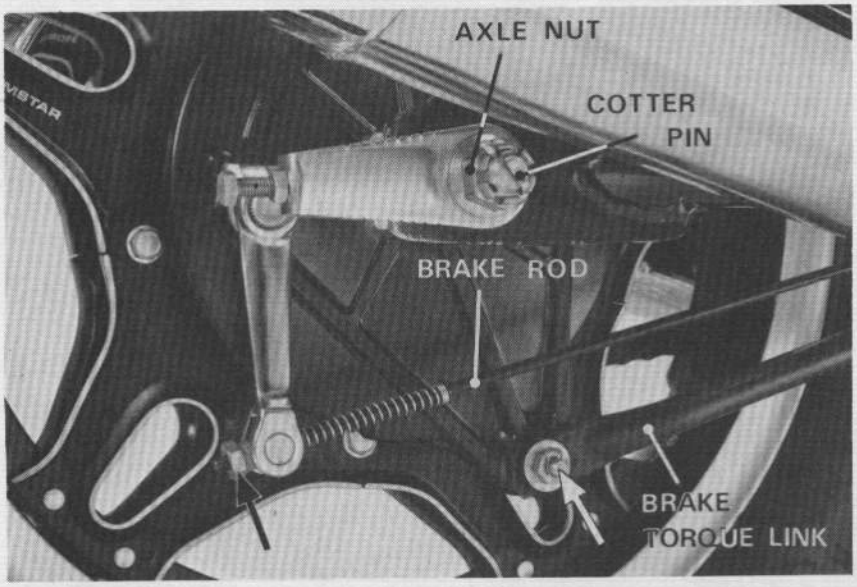
Use a new cotter pin to secure the axle nut.

TORQUE: 8.0–10.0 kg-m (58–72 ft-lb)

Use a new cotter pin to secure the rear brake torque link.

TORQUE: 1.8–2.5 kg-m (13–18 ft-lb)

Adjust drive chain free play (Page 3–12).
Adjust the rear brake (Page 3–14).

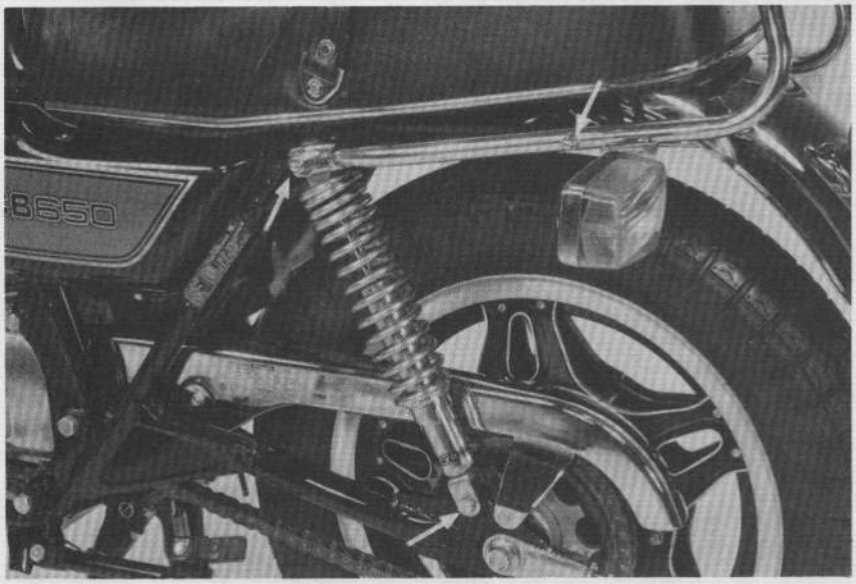


SHOCK ABSORBER

SHOCK ABSORBER REMOVAL

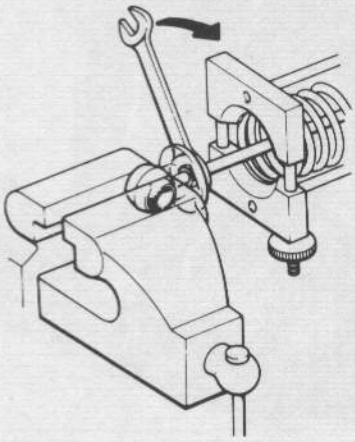
Remove the mufflers.
Remove the rear carrier pipe attaching bolts.

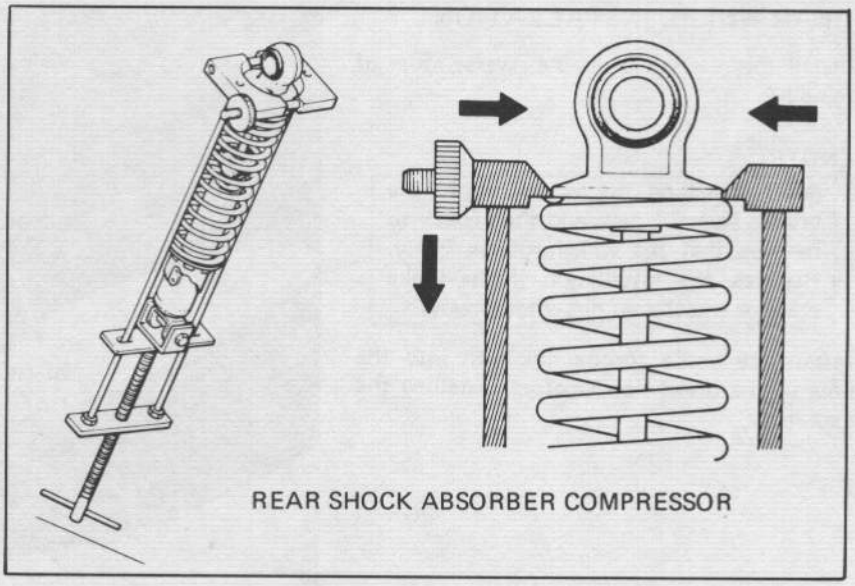
Remove the upper and lower shock absorber mounting bolts and nuts, and remove the shock absorbers.



SHOCK ABSORBER DISASSEMBLY

Compress the spring just enough to remove the lock nut.
Loosen the lock nut and remove the upper mount.



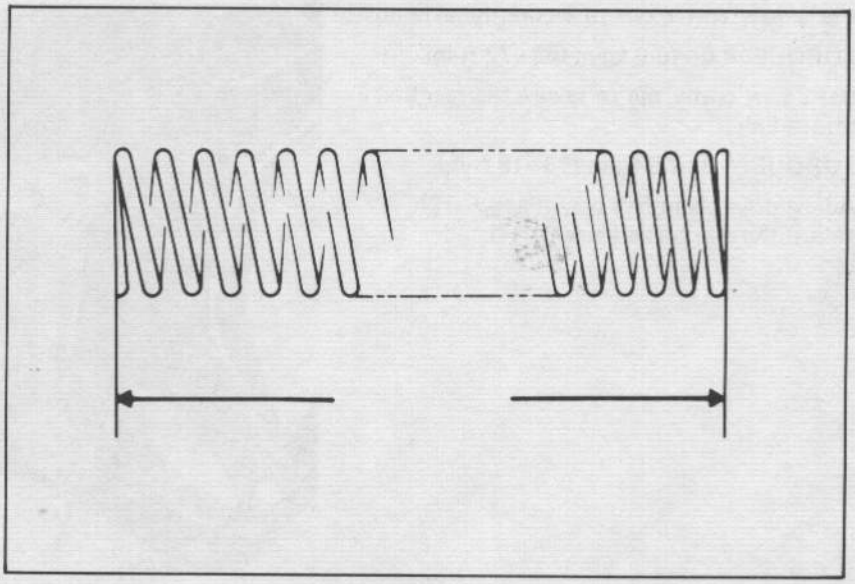


REAR SHOCK ABSORBER COMPRESSOR

SHOCK ABSORBER SPRING FREE LENGTH

Disassemble the unit.
Measure the free length of spring.
Inspect the shock body for oil leaks.

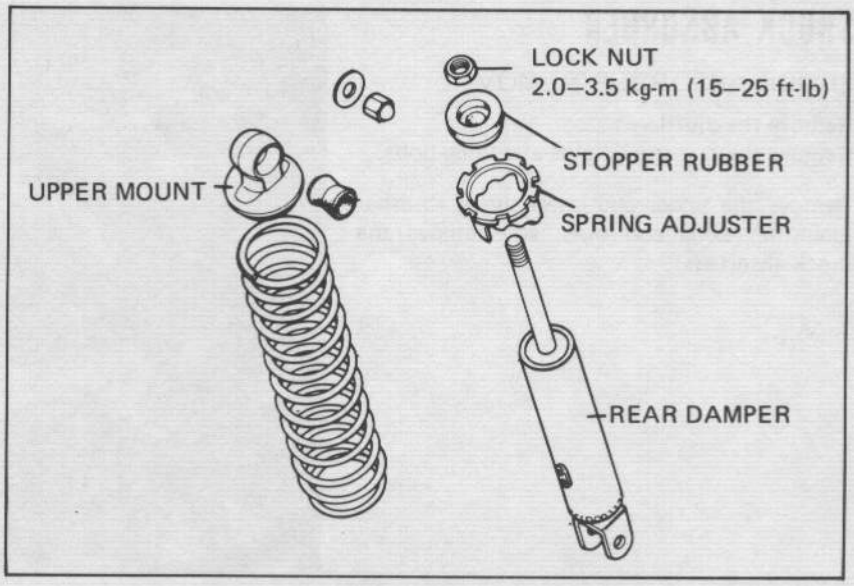
SERVICE LIMIT: 220.6 mm (8.7 in)



SHOCK ABSORBER ASSEMBLY

NOTE

Install the spring with the tight coils at the bottom.



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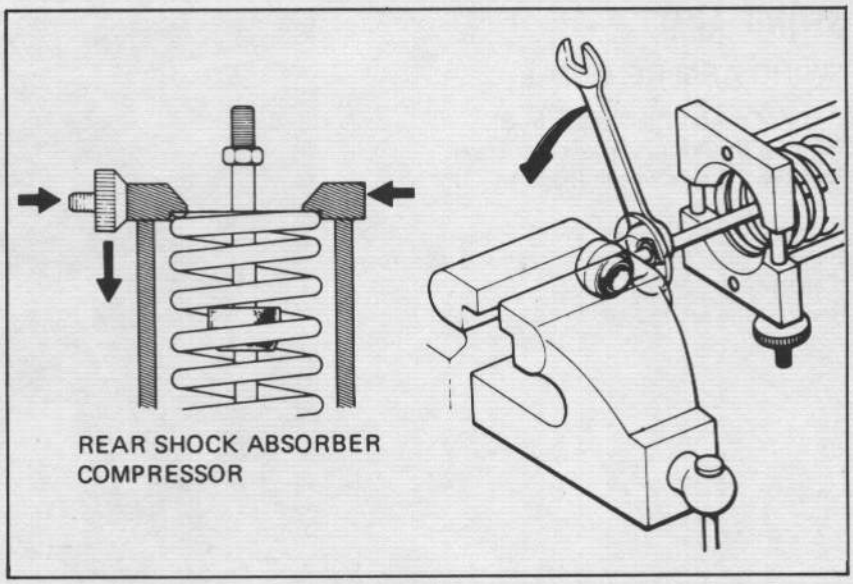
NOTE

Apply a locking agent to the lock nut at time of assembly.

Tighten the lock nut.

TORQUE: 2.0–3.5 kg-m (15–25 ft-lb)



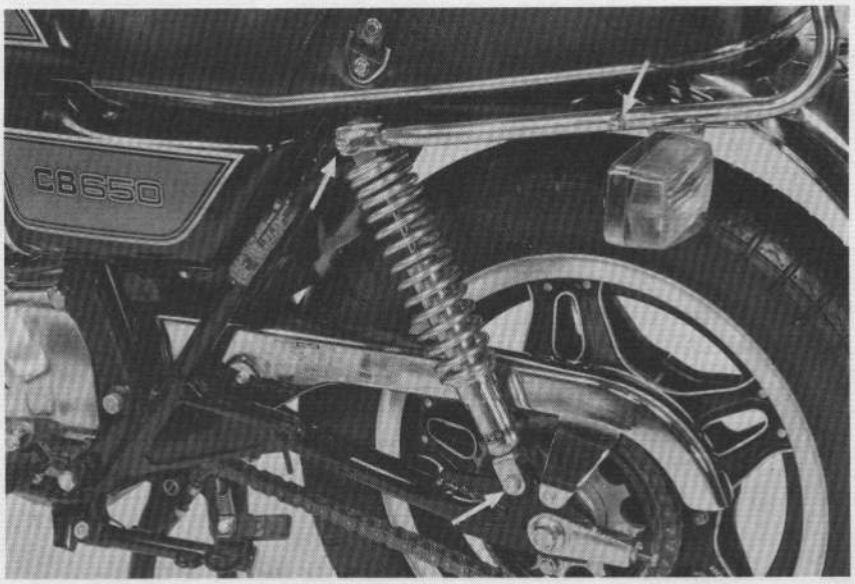
REAR SHOCK ABSORBER COMPRESSOR

SHOCK ABSORBER INSTALLATION

Tighten the shock absorber bolts and nuts.

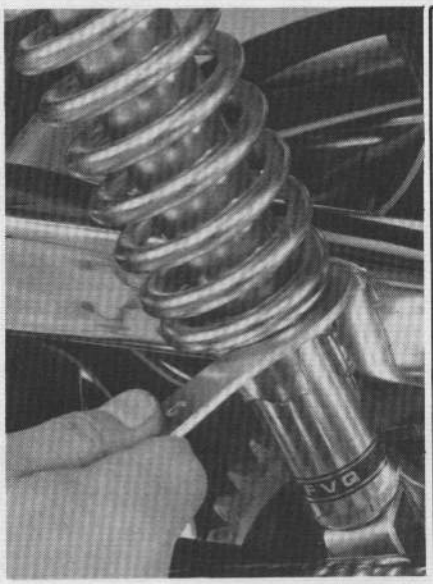
TORQUE: 3.0–4.0 kg-m (22–29 ft-lb)

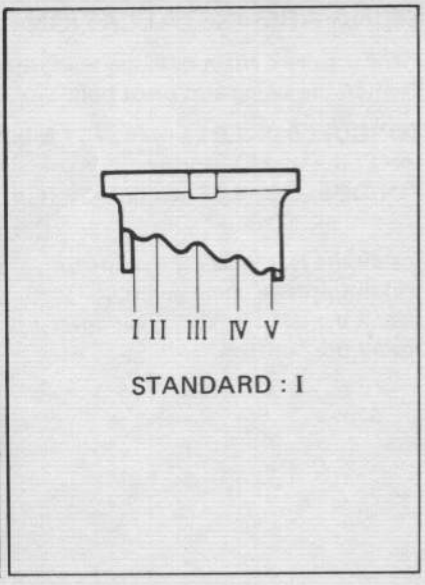
Install the mufflers.



Adjust the right and left absorbers equally with the spring adjuster.

Check shock absorber operation after installation.





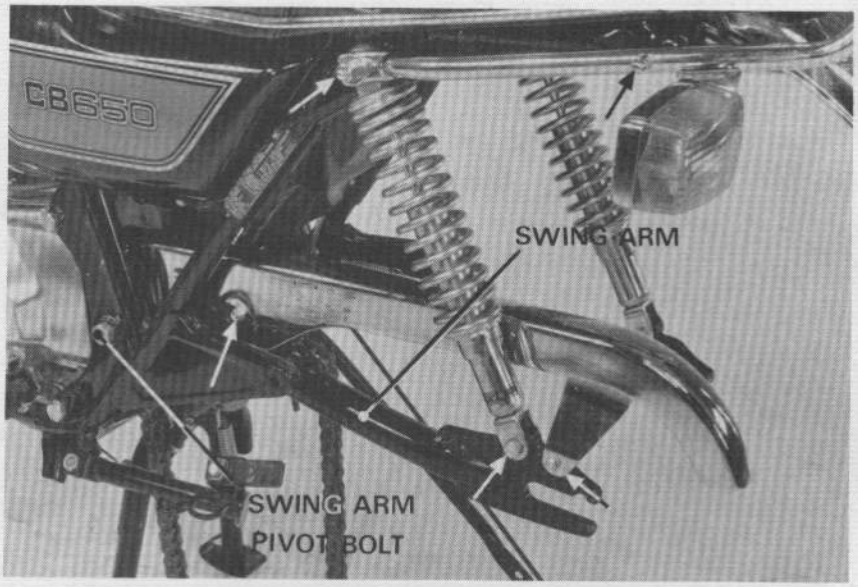
STANDARD : I

SWING ARM

SWING ARM REMOVAL

Remove the mufflers (Page 5–3).
Remove the left crankcase rear cover.
Remove the rear wheel (Page 14–3).

Remove the drive chain guard.
Remove the right and left shock absorbers (Page 14–9).
Remove the swing arm.



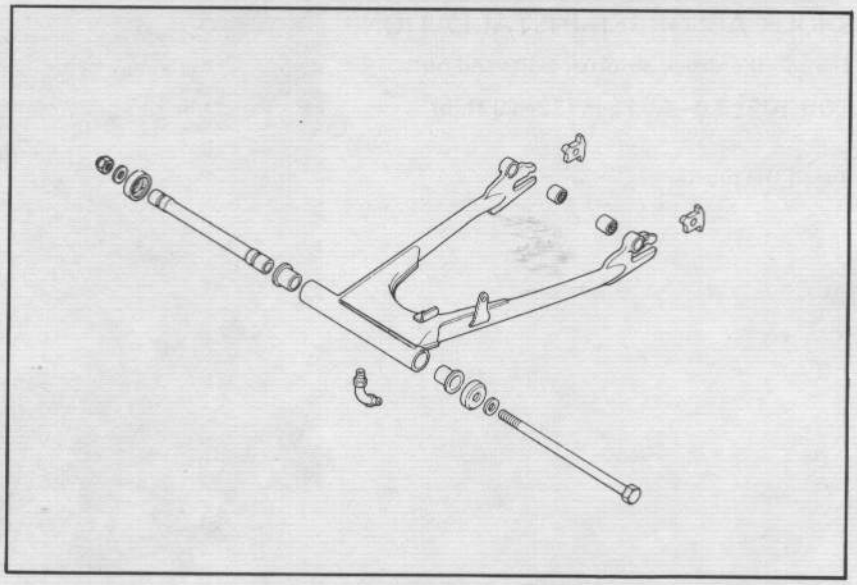
SWING ARM DISASSEMBLY/ ASSEMBLY

NOTE

Drive the bushings into place, with a soft hammer. Make sure that they are not damaged.
Lubricate with grease after installation.

SERVICE LIMITS:

BUSHING I. D.:	**21.7 mm (0.854 in)**
COLLAR O. D.:	**21.4 mm (0.843 in)**

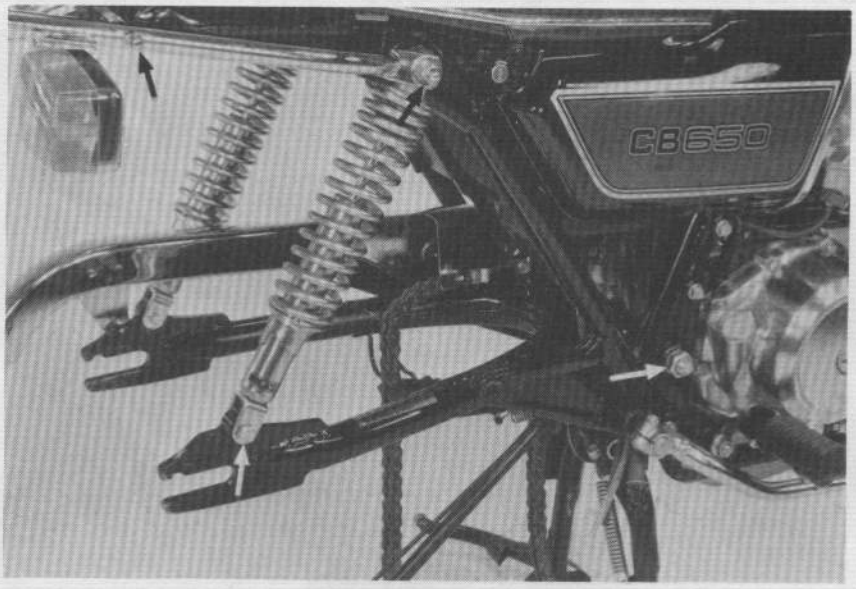


SWING ARM INSTALLATION

Place the drive chain over the swing arm.
Tighten the swing arm pivot bolt.

TORQUE: 6.0–7.0 kg-m (43–51 ft-lb)
Install the shock absorbers.
TORQUE: 3.0–4.0 kg-m (22–29 ft-lb)

Install the rear wheel (Page 14–9).
Install the drive chain guard.
Install the left crankcase rear cover.
Install the mufflers.



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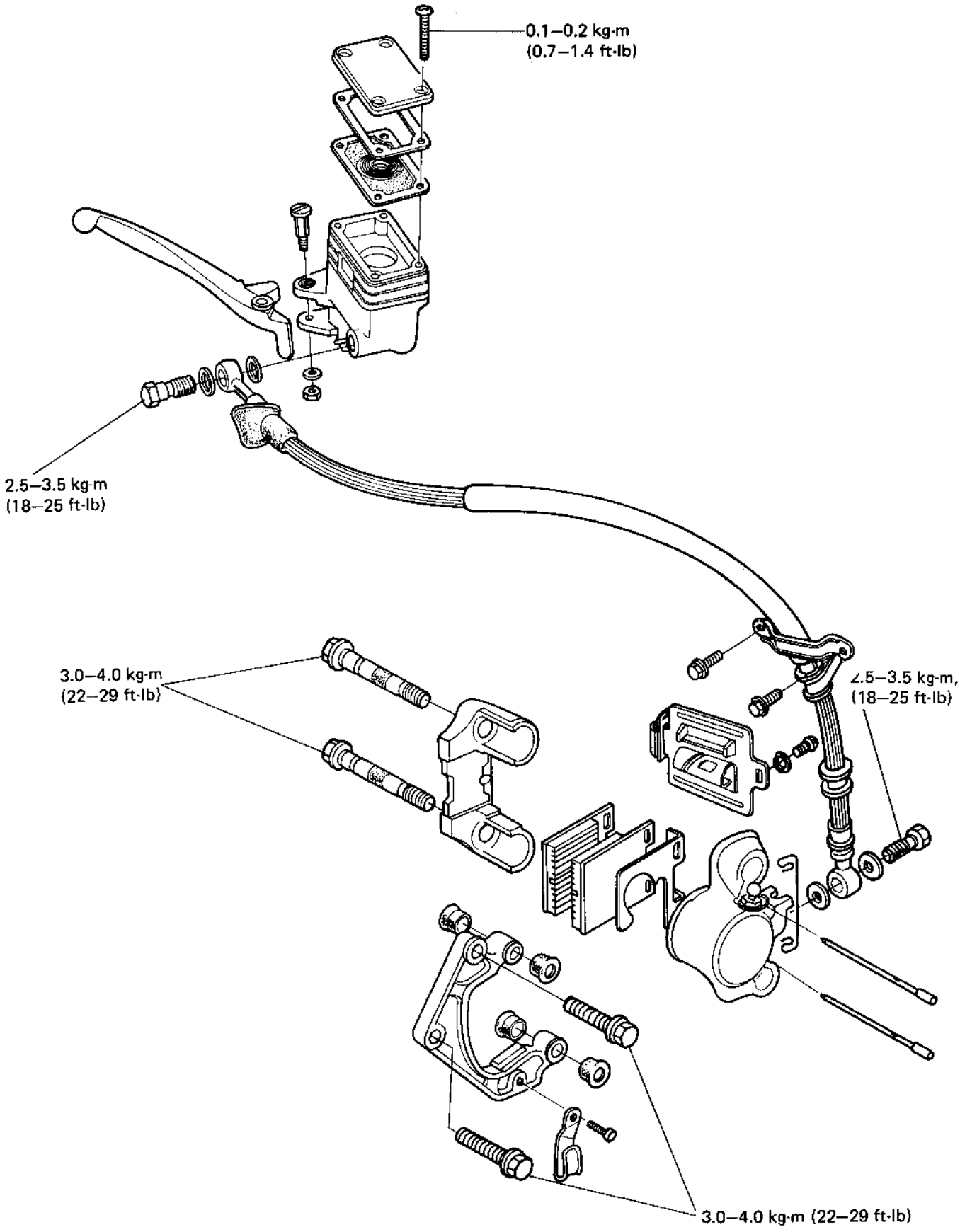

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15. HYDRAULIC BRAKE

SERVICE INFORMATION

GENERAL INFORMATION

- The front brake can be removed without disconnecting the hydraulic system. Once the hydraulic systems have been opened, or if the brakes feel spongy, the system must be bled.
- 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 will result.
- Always check brake operation before riding the motorcycle.

SPECIAL TOOLS

Special tool	
Snap Ring Pliers	07914–3230001

TORQUE VALUES

Brake hose bolt	2.5–3.5 kg-m (18–25 ft-lb)
Front brake caliper carrier	3.0–4.0 kg-m (22–29 ft-lb)
Front brake caliper A	3.0–4.0 kg-m (22–29 ft-lb)

SPECIFICATIONS

ITEM	STANDARD	SERVICE LIMIT
Disc thickness	6.9–7.1 mm (0.27–0.28 in)	6.0 mm (0.24 in)
Disc runout	———	0.3 mm (0.01 in)
Front master cylinder I.D.	14.000–14.043 mm (0.5512–0.5529 in)	14.055 mm (0.5533 in)
Front master piston O.D.	13.957–13.984 mm (0.5495–0.5506 in)	13.945 mm (0.5490 in)
Front caliper piston O.D.	42.772–42.822 mm (1.6839–1.6859 in)	42.765 mm (1.6837 in)
Front caliper cylinder I.D.	42.850–42.950 mm (1.6870–1.6909 in)	42.915 mm (1.6896 in)

TROUBLESHOOTING

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

Brake lever too hard
1. Sticking piston(s)
2. Clogged hydraulic system
3. Pads glazed or worn excessively

Brakes drag
1. Hydraulic system sticking
2. Incorrect adjustment of lever
3. Sticking piston(s)

Brakes grab or pull to one side
1. Pads contaminated
2. Disc or wheel misaligned

Brakes chatter or squeal
1. Pads contaminated
2. Excessive disc runout
3. Caliper installed incorrectly
4. Disc or wheel misaligned

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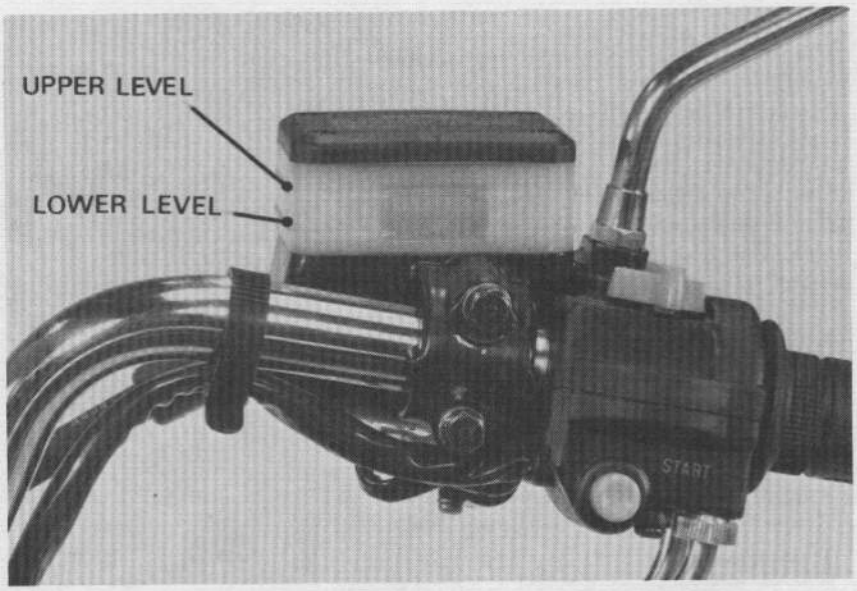
BRAKE FLUID REPLACEMENT/ AIR BLEEDING

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

CAUTION

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

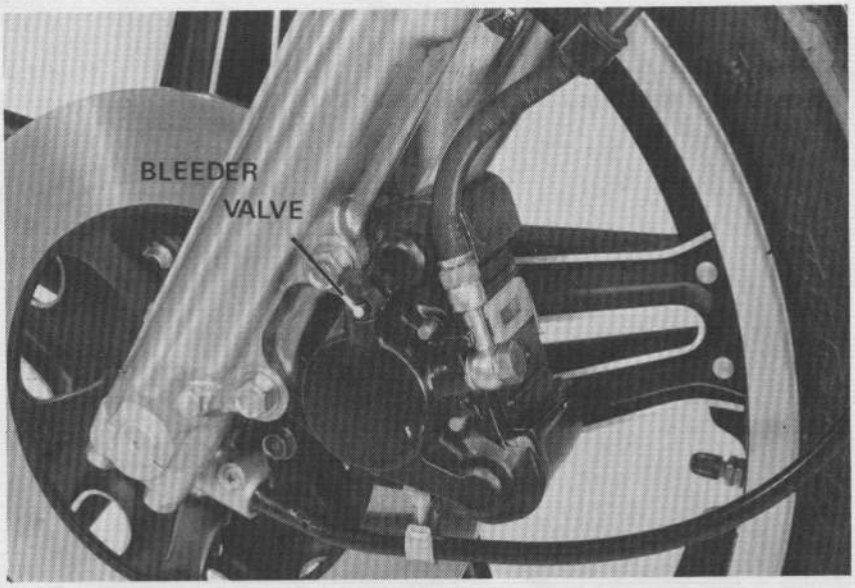


BRAKE FLUID DRAINING

Connect a bleed hose to the bleeder valve.
Loosen the caliper bleeder valve and pump the brake lever.
Stop pumping the lever when on fluid flows out of the bleeder valve.

WARNING

A brake disc or pad contaminated with brake fluid or grease reduces stopping power. Discard contaminated pads and clean the disc with a high quality brake degreasing agent.



BRAKE FLUID FILLING

NOTE

Use ONLY DOT–3 brake fluid from a sealed container.

Close the bleeder valve, fill the reservoir, and install the diaphragm.

AIR BLEEDING

To prevent piston overtravel and brake fluid seepage, keep a 20 mm (3/4 in) space between the lever and the handlebar grip when bleeding the front brake system. Pump up the system pressure until there are no air bubbles in the fluid flowing out of the reservoir small hole and lever resistance is felt.

NOTE

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

NOTE

Never re-use the contaminated fluid which has been pumped out during brake bleeding. This would decrease the efficiency of the brake system.

Squeeze the brake lever, open bleeder valve 1/2 turn and close the bleeder valve.
Release the brake lever slowly and wait several seconds after it reaches the end of its travel.

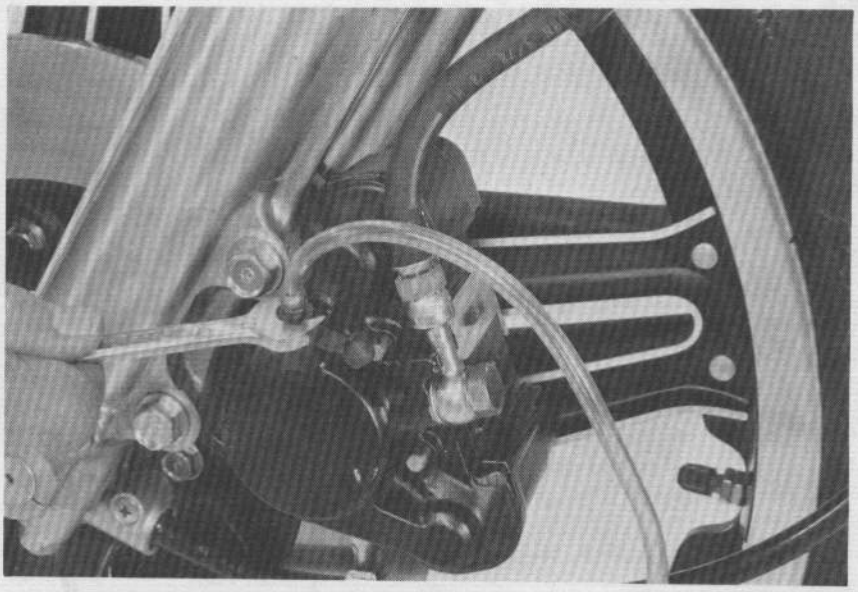
NOTE

Do not release the brake lever until the bleeder valve has been closed.

Repeat the above steps until no bubbles appear in the fluid at the end of the hose.
Fill the fluid reservoir to the upper level mark.

WARNING

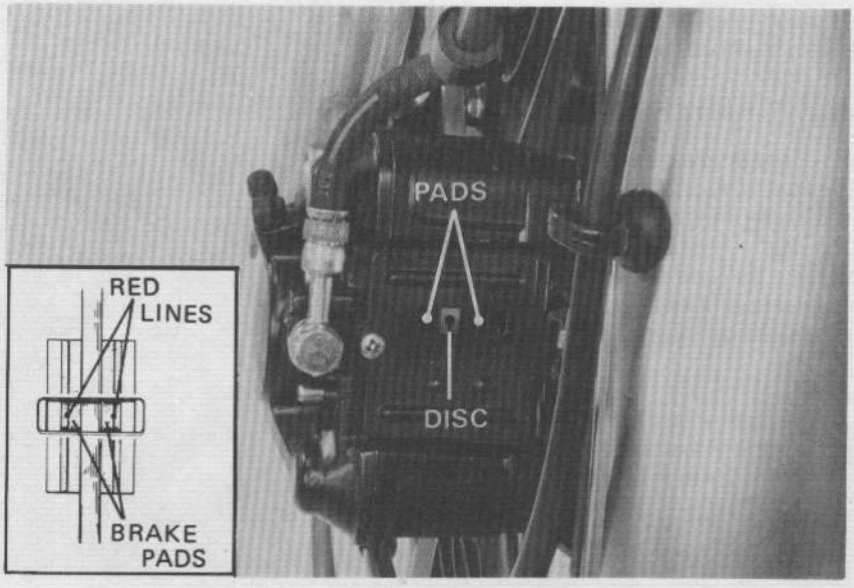
A brake disc or pad contaminated with brake fluid or grease reduces stopping power. Discard contaminated pads and clean the disc with a high quality brake degreasing agent.



BRAKE PAD/DISC

BRAKE PAD WEAR CHECK

Replace the front brake pads if the red line on the top of the pads reaches the edge of the brake disc.



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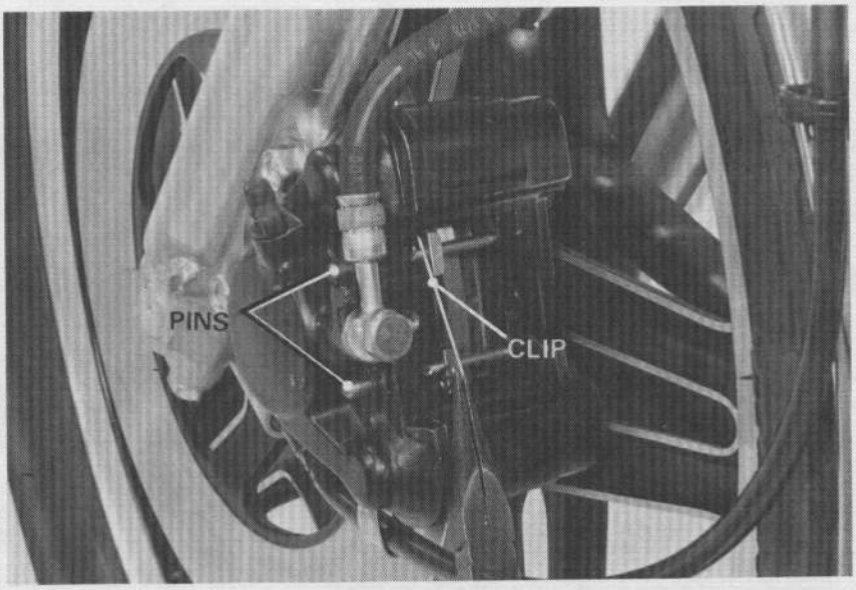
BRAKE PAD REPLACEMENT

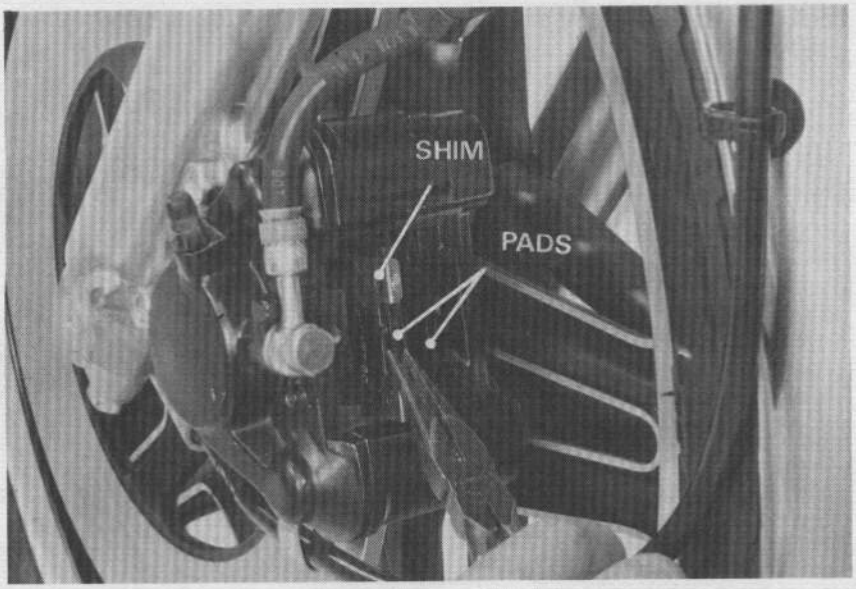
Remove the caliper cover.
Remove the clip.
Push the caliper toward the right and push the piston all the way in to allow installation of new brake pads.
Remove the pins, brake pads and shim.
Apply a coat of silicon grease to both sides of the shim.



Install new brake pads with the shim between the piston and pad.
Install the pins and clip.
Install the caliper cover.

NOTE

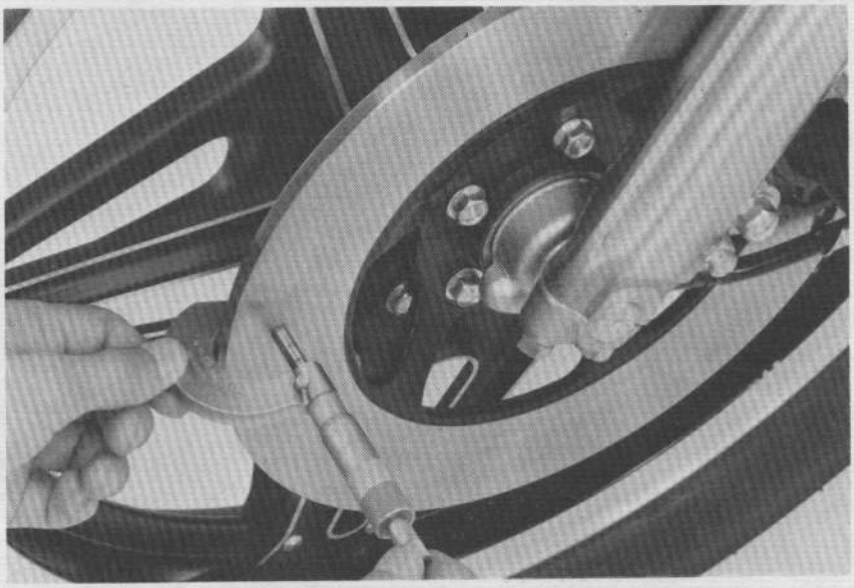
- Always replace the brake pads in pairs to assure even disc pressure.
- Push the piston all the way in.
- Check the brake fluid level in the master cylinder reservoir because new pads will cause the fluid level to rise.



DISC THICKNESS

Measure the disc thickness.

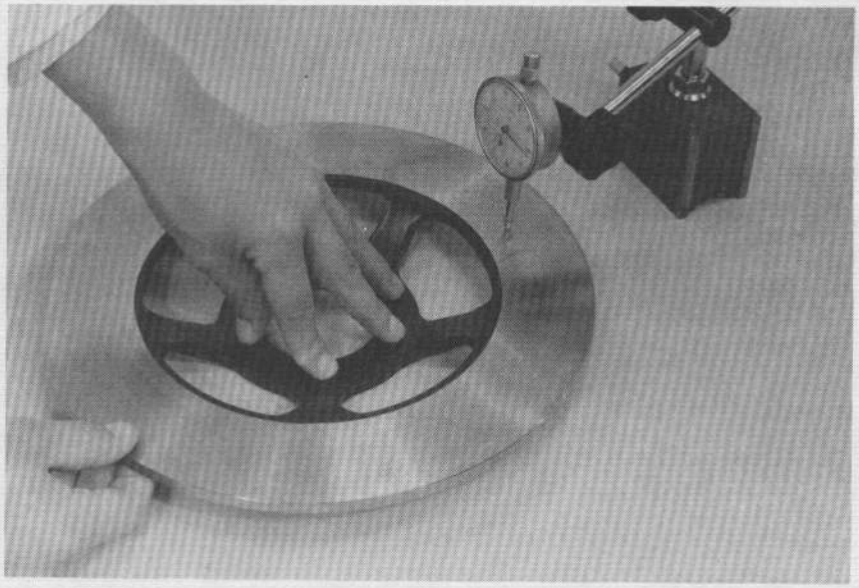
SERVICE LIMIT: 6.0 mm (0.24 in)



BRAKE DISC WARPAGE

Measure brake disc warpage.

SERVICE LIMIT: 0.3 mm (0.01 in)



BRAKE MASTER CYLINDER

BRAKE MASTER CYLINDER DISASSEMBLY

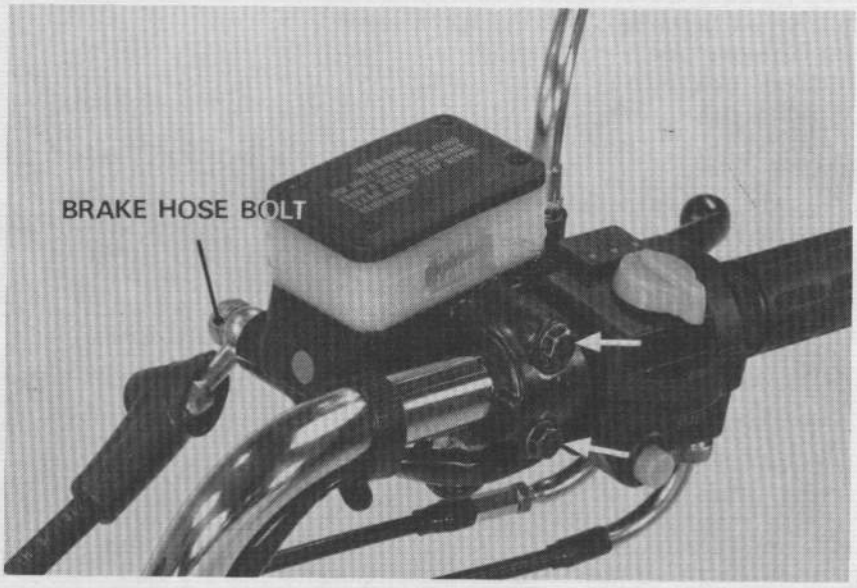
Drain brake fluid from the hydraulic system.
Remove the brake lever and rear view mirror from the master cylinder.
Disconnect the brake hose.

CAUTION

- *Avoid spilling brake fluid on painted surfaces.*
- *Cover the fuel tank whenever the brake system is serviced.*

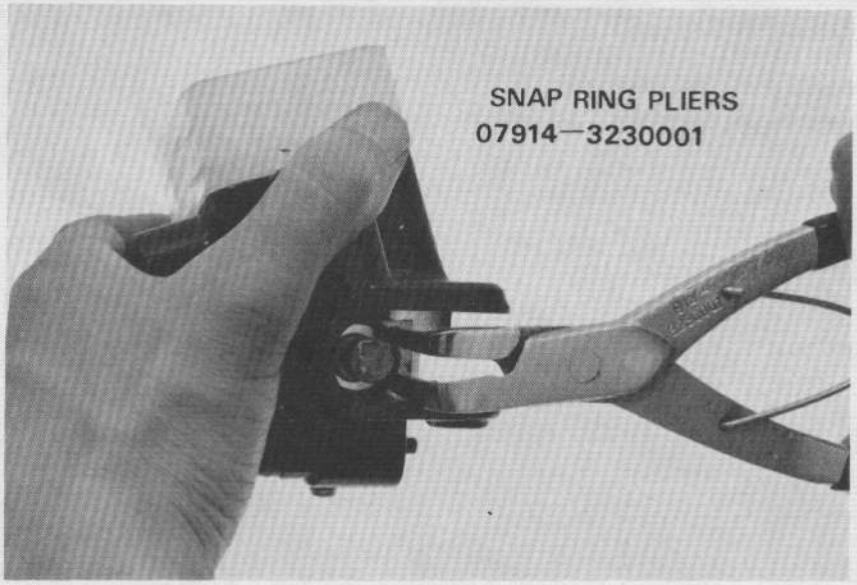
NOTE

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



Remove the two master cylinder attaching bolts.

Remove the boot.
Remove the circlip form the master cylinder body.



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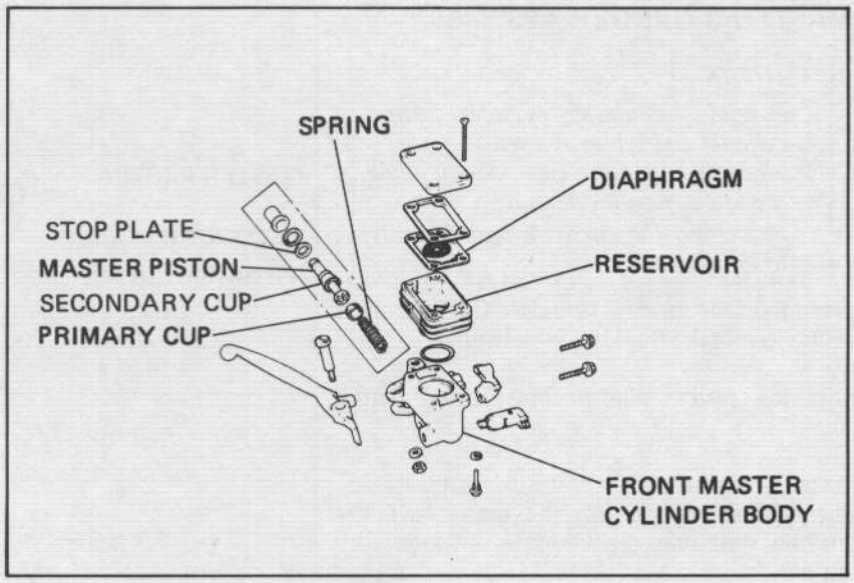
Remove the stop plate, secondary cup and master piston.
Then remove the primary cup and spring.

Remove the brake fluid reservoir from the master cylinder body.

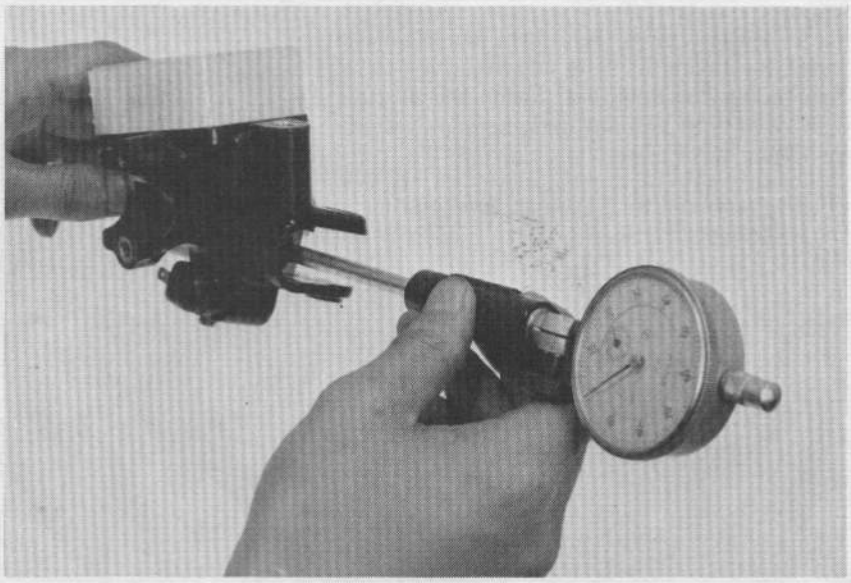
Clean the inside of the master cylinder and reservoir with brake fluid.



MASTER CYLINDER I.D. INSPECTION

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

SERVICE LIMIT: 14.055 mm (0.5533 in)

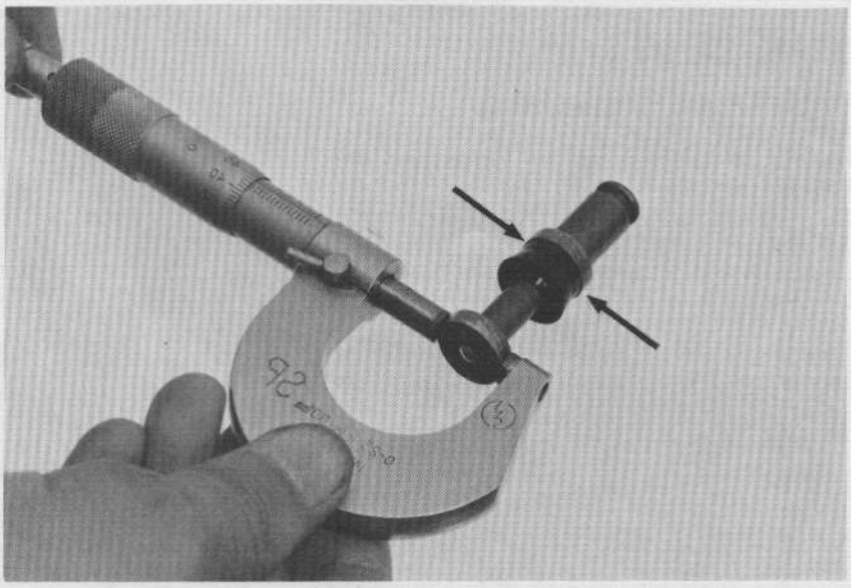


MASTER PISTON O.D. INSPECTION

Measure the master piston O.D.

SERVICE LIMIT: 13.945 mm (0.5490 in)

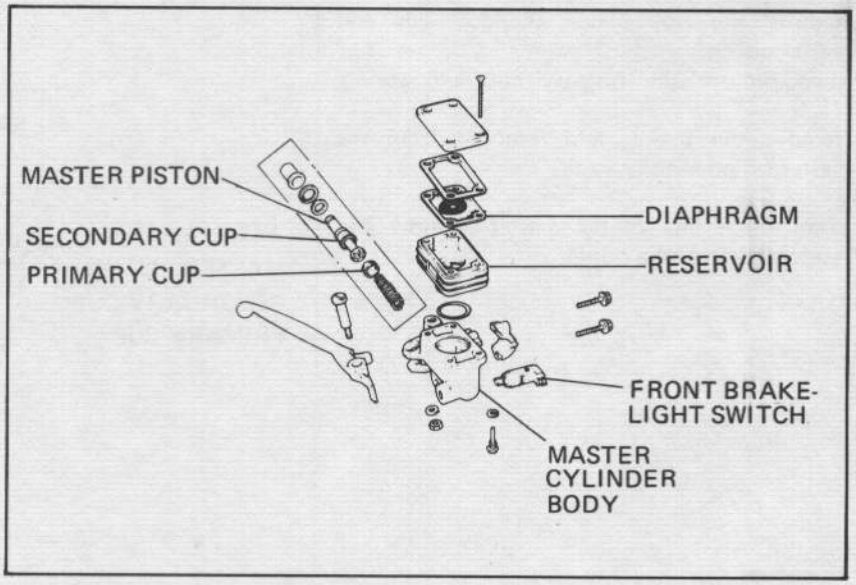
Check the primary cup and secondary cup for damage.



MASTER CYLINDER ASSEMBLY

CAUTION

- *Handle the master cylinder piston, cylinder and spring as a set.*
- *When installing the cups, do not allow the lips to turn inside out.*
- *Be certain the circlip is seated firmly in the groove.*



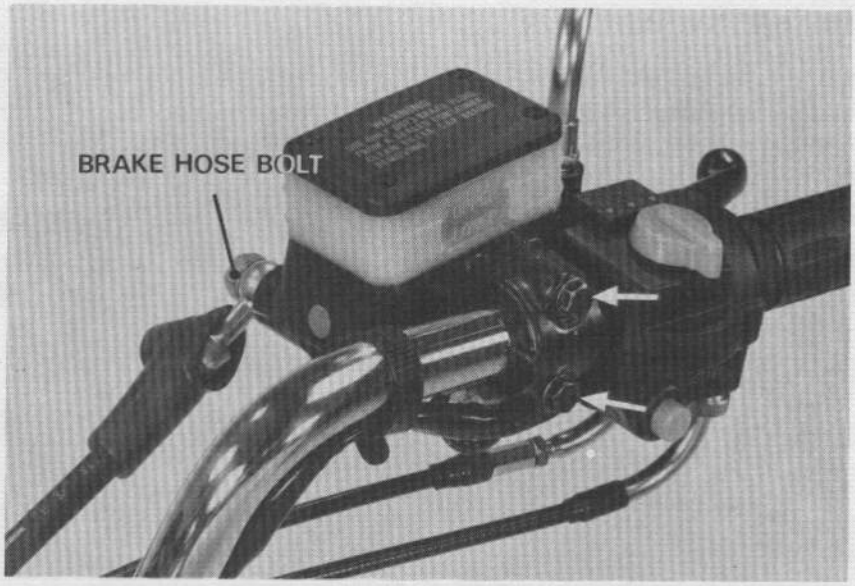
Assemble the master cylinder. Coat all parts with clean brake fluid before assembly.

Dip the piston cup in brake fluid before assembly.

Install the boot, washer and clip.
Install the reservoir on the master cylinder making sure that the O-ring is in good condition.

Place the master cylinder on the handlebar and install the holder and the two mounting bolts. Torque the top bolt first. Install the oil hose with the bolt and its two sealing washers. Install the brake lever.

Fill the reservoir to the upper level and bleed the brake system (Page 15–3).



BRAKE CALIPER

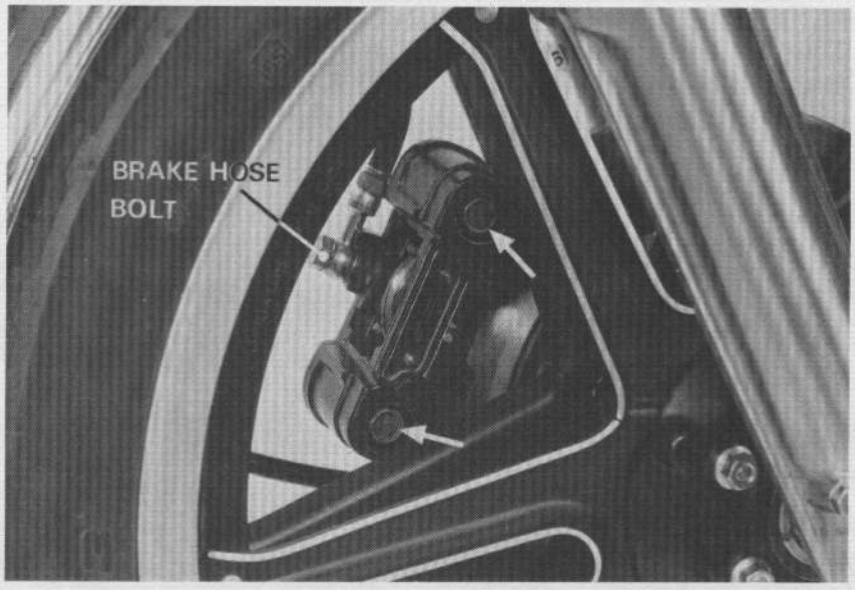
CALIPER A DISASSEMBLY

Place a container under the caliper and disconnect the brake hose bolt.

NOTE

Avoid spilling brake fluid on painted surfaces.

Loosen the two caliper shafts gradually in several steps while pressing them against the caliper.
Remove caliper A.



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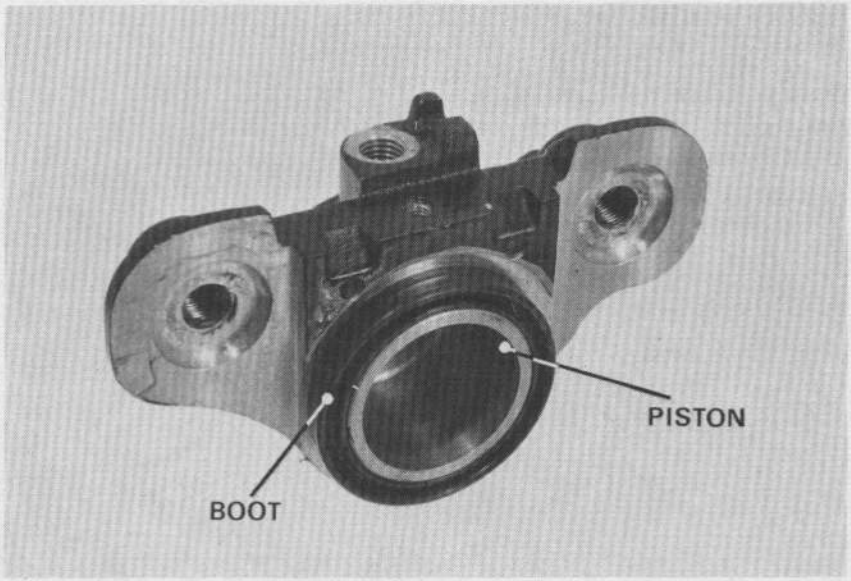
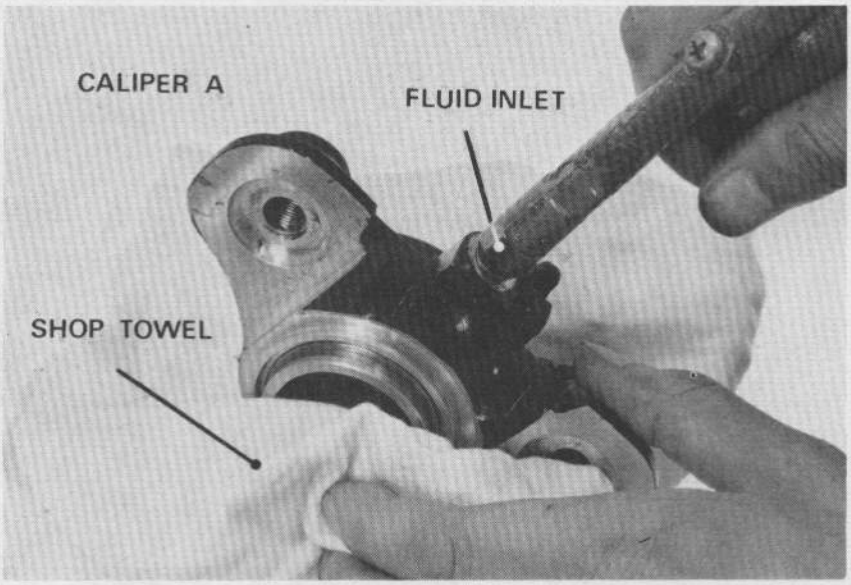
Remove the piston boot.
Inspect the piston boot for damage or deterioration.



Place a shop towel over the piston to control piston removal. Position the caliper with the piston down.
Remove the piston by applying a small amount of air pressure to the fluid inlet.

WARNING
Do not use high pressure air or bring the nozzle too close to the inlet.



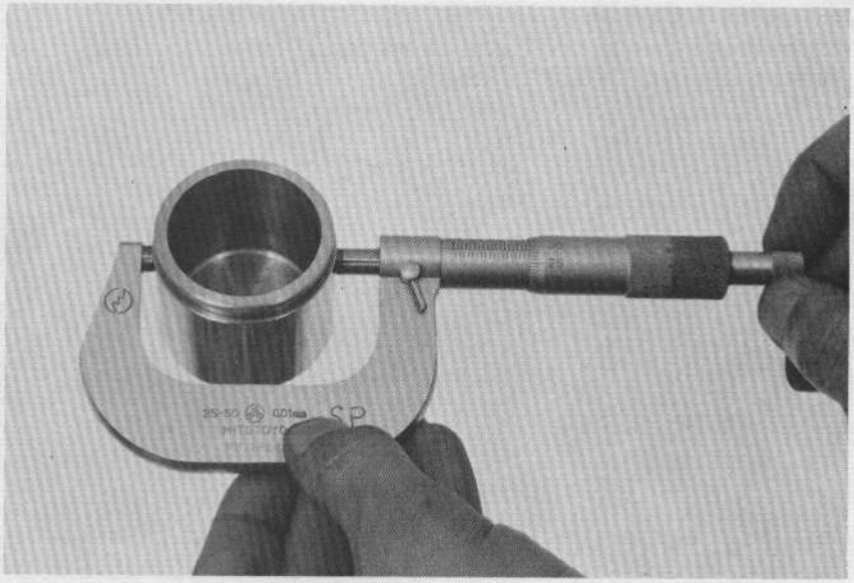
Examine the piston and cylinder for scoring or scratches and replace if necessary.

Remove the oil seal by first pushing it into the cylinder. Then pull it out.
Clean the caliper grooves with brake fluid.

FRONT CALIPER PISTON O.D. INSPECTION

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

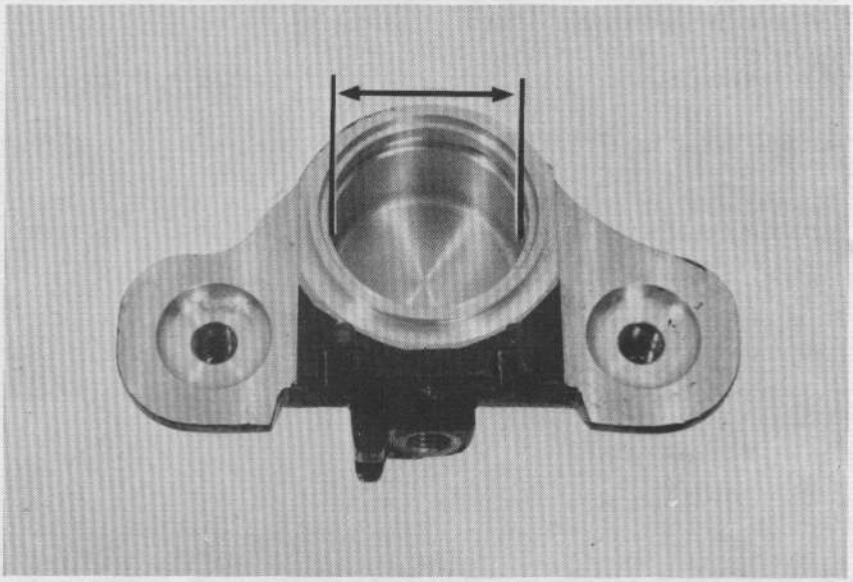
SERVICE LIMIT: 42.765 mm (1.6837 in)



FRONT CALIPER CYLINDER I.D. INSPECTION

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

SERVICE LIMIT: 42.915 mm (1.6896 in)

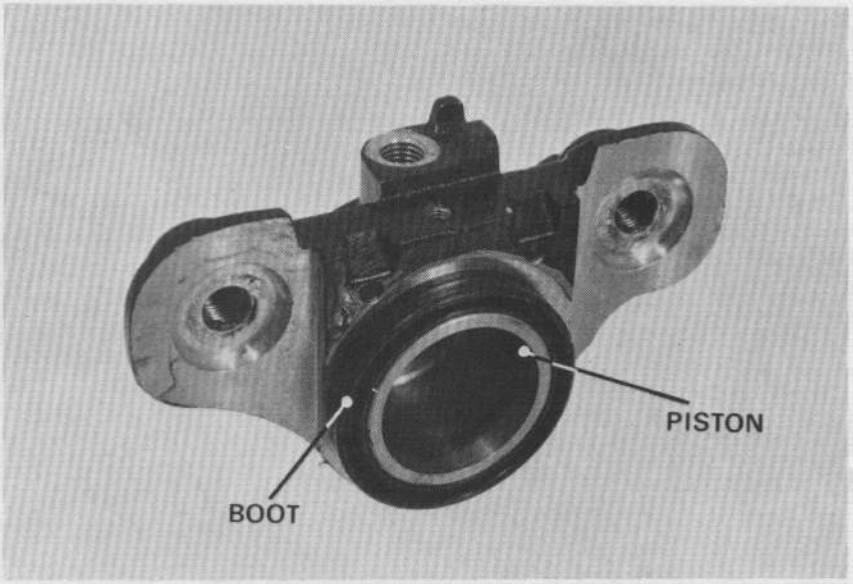


FRONT BRAKE CALIPER ASSEMBLY

WARNING

A brake disc or pad contaminated with brake fluid or grease reduces stopping power. Replace contaminated pads, and clean the disc with a good quality degreasing agent.

Assemble the caliper in the reverse order of disassembly. The oil seal must be replaced with a new one whenever removed. Lubricate the piston and seal with a medium grade of Hi-Temperature Silicone grease or brake fluid before assembly.
Be certain the piston seal is seated in the caliper groove.
Place the piston in the caliper with the boot lip facing out. Install the boot on the piston.



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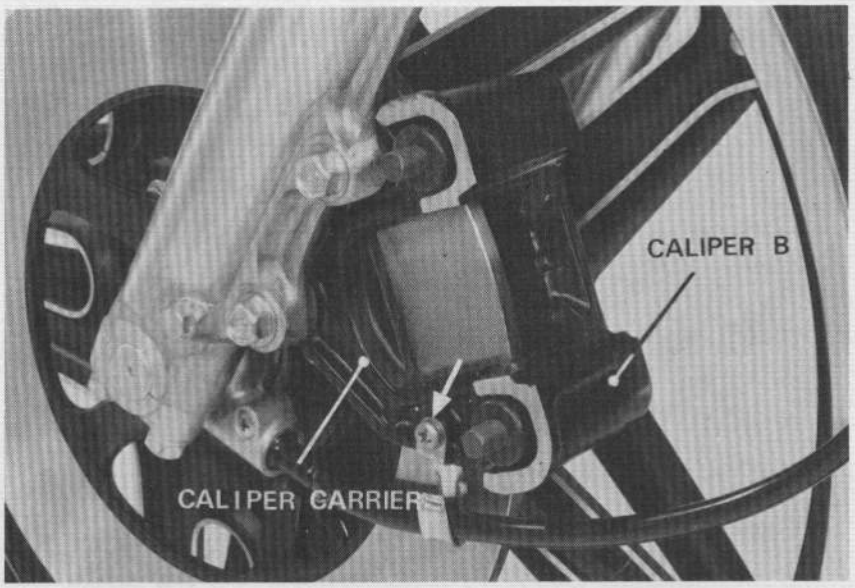
CALIPER CARRIER/CALIPER B DISASSEMBLY

Remove the speedometer cable clamp.
Remove the carrier with caliper B by removing the two bolts.



Remove the caliper shafts from the carrier and caliper B while rotating them by hand. Avoid damaging the boots.

CALIPER CARRIER/CALIPER B ASSEMBLY

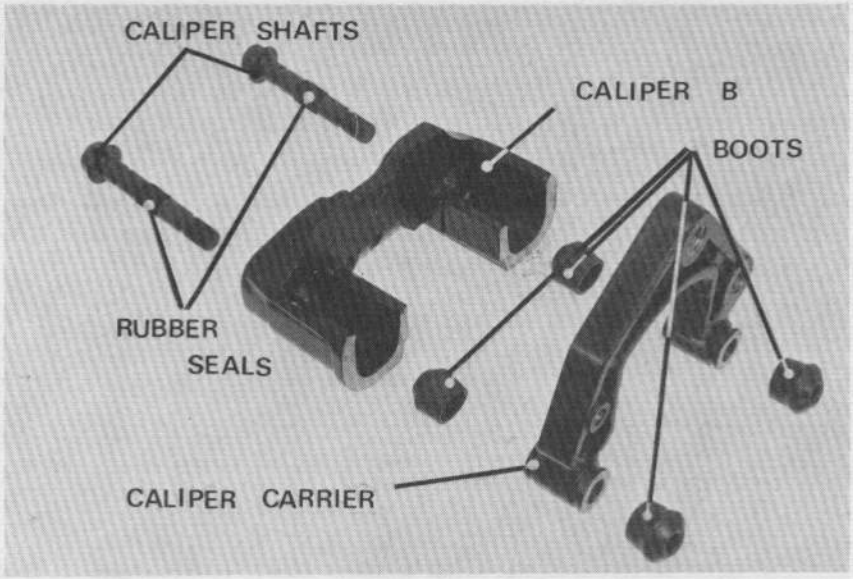
Wash all parts with brake fluid.
Coat the rubber seals with silicon grease or brake fluid and install in the shaft grooves.

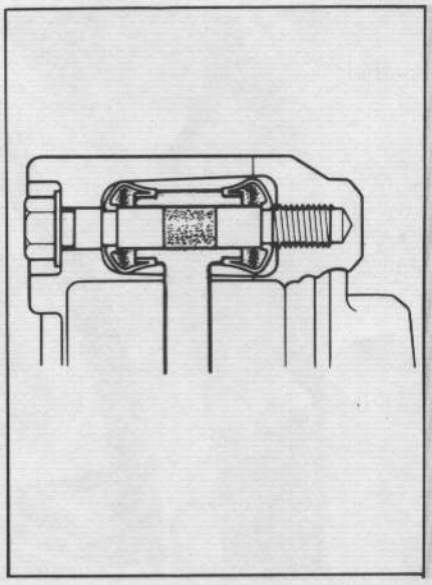
NOTE

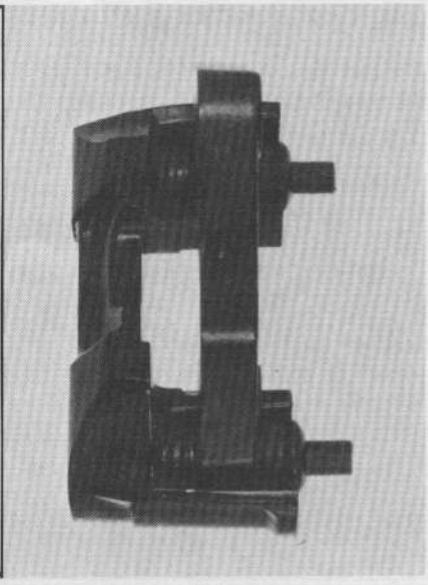
Replace the boots and rubber seals with new ones if damaged.

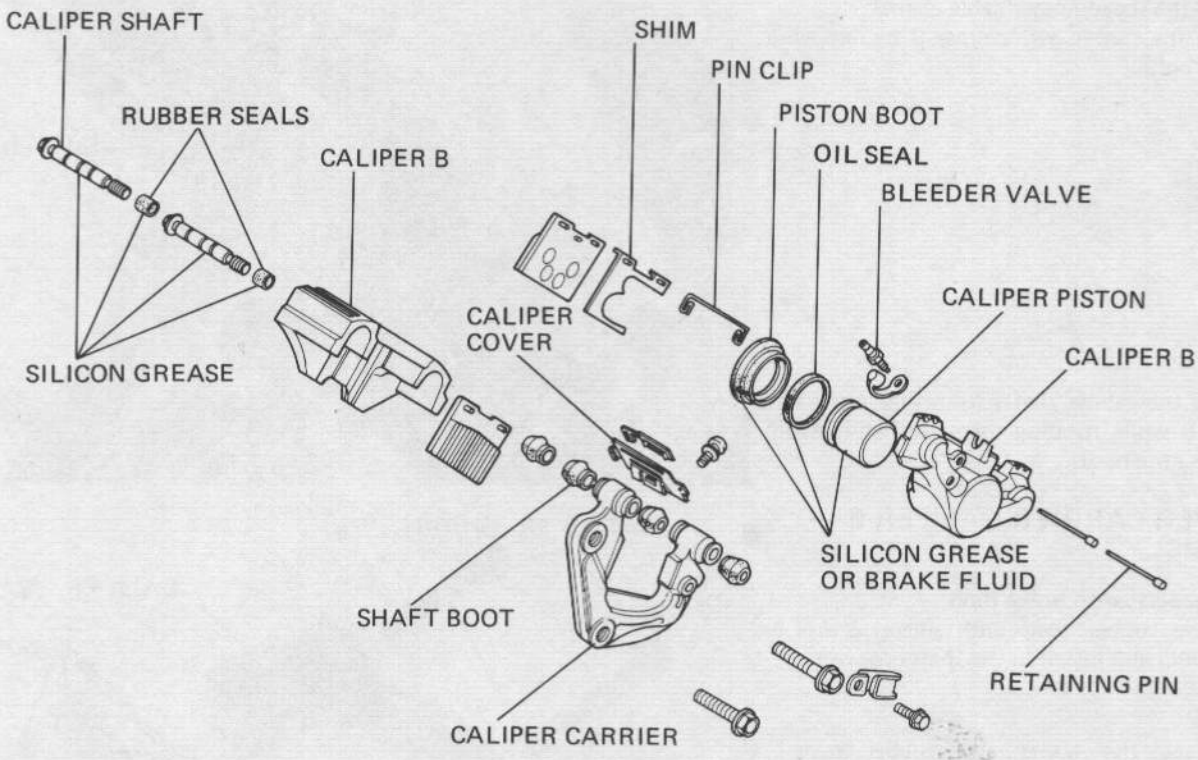
Install the boots on the carrier.
Assemble caliper B and caliper carrier, making sure that the boots are seated in the caliper shaft grooves properly.
Install the carrier on the front fork.

TORQUE: 3.0–4.0 kg-m (22–29 ft-lb)









CALIPER A INSTALLATION

Tighten the caliper shafts evenly while pushing them against caliper B.

NOTE

Tighten the shafts carefully, noting the mating surfaces of caliper A and B.

TORQUE: 3.0–4.0 kg-m (22–29 ft-lb)

Connect the brake hose.
Install the caliper cover.
Fill the brake fluid reservoir and bleed the front brake system. (See page 15–3).

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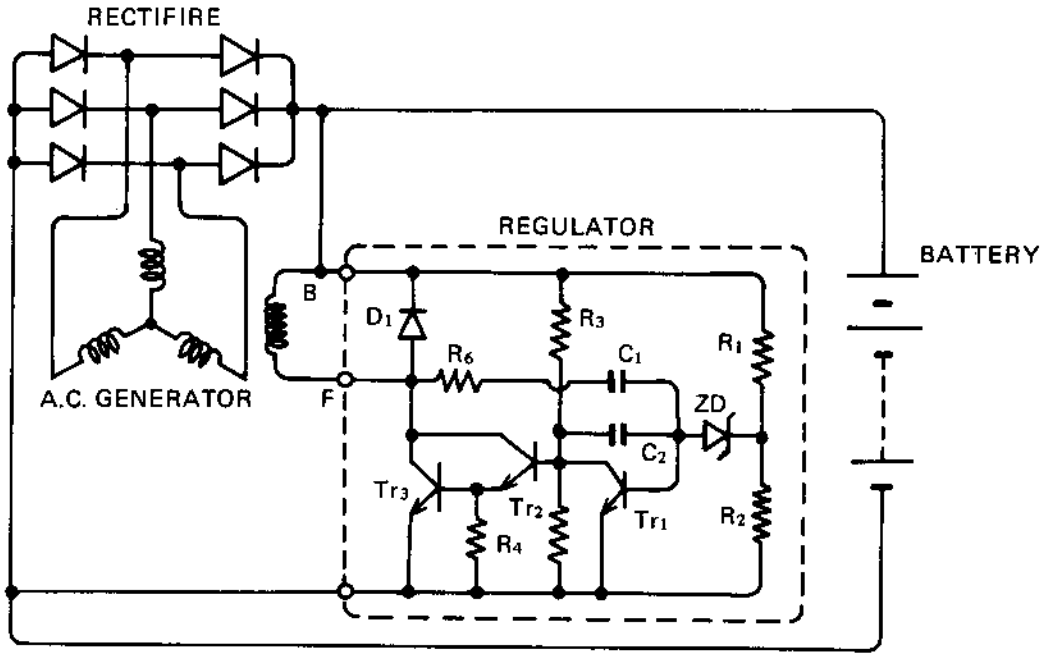
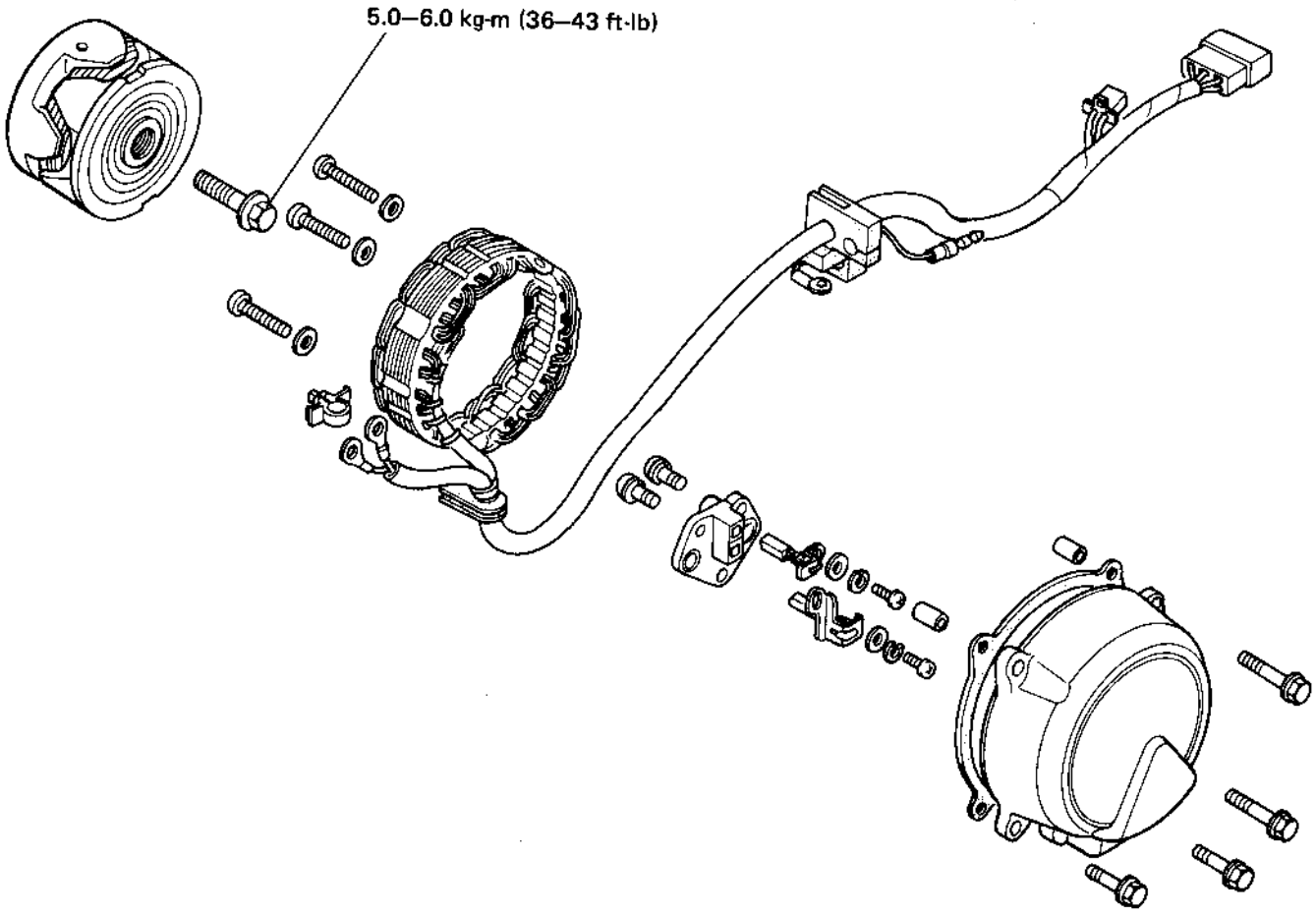


BATTERY/CHARGING SYSTEM



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16. BATTERY/CHARGING SYSTEM

SERVICE INFORMATION

GENERAL INSTRUCTIONS

- Battery fluid level should be checked regularly. Fill with distilled water as necessary.
- Quick charge the 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 have flames near a charging battery. The gas produced by a battery is highly flammable and can explode.

- All charging system components can be tested on the motorcycle.

SPECIAL TOOL

Common tool	
Rotor puller	07733–0020001

TORQUE VALUE

A.C. generatar	5.0–6.0 kg-m (36–43 ft-lb)

SPECIFICATIONS

Battery	Capacity	12V 12 AH	
	Specific gravity	1.270–1.290/20°C (68°F)	
	Charging rate	1.4 amperes maximum	
A.C. generator	Capacity	1,500 rpm	5,000 rpm
		6.5A min.	18A min.
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 charging system connection
3. Loose starting system connection
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
3. Faulty silicon rectifier
4. Faulty A.C. generator

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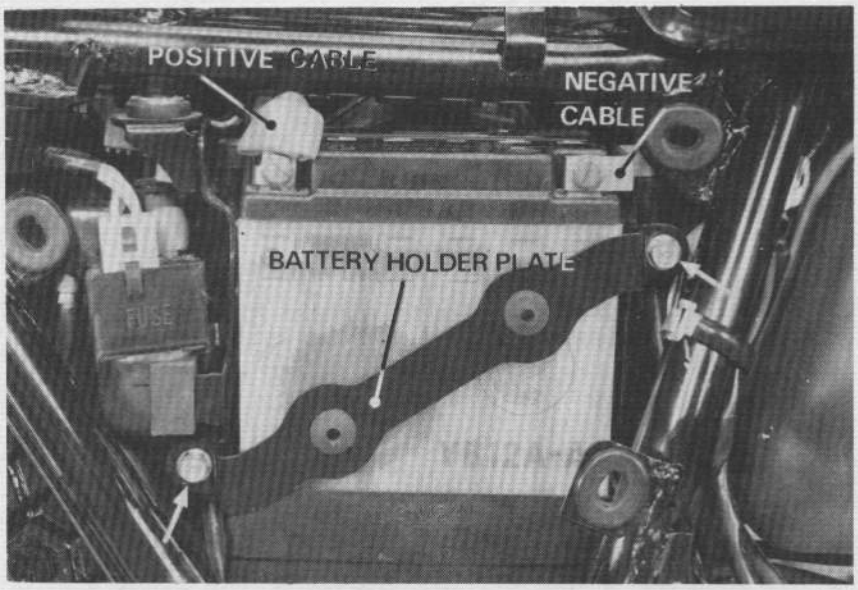
BATTERY

REMOVAL

Remove the right and left side covers.
Disconnect the ground cable at the battery terminal.
Disconnect the positive cable at the starter relay switch terminal.
Remove the battery holder.



TESTING SPECIFIC GRAVITY

Test each cell with a hydrometer.

SPECIFIC GRAVITY:
(20°C, 68°F)

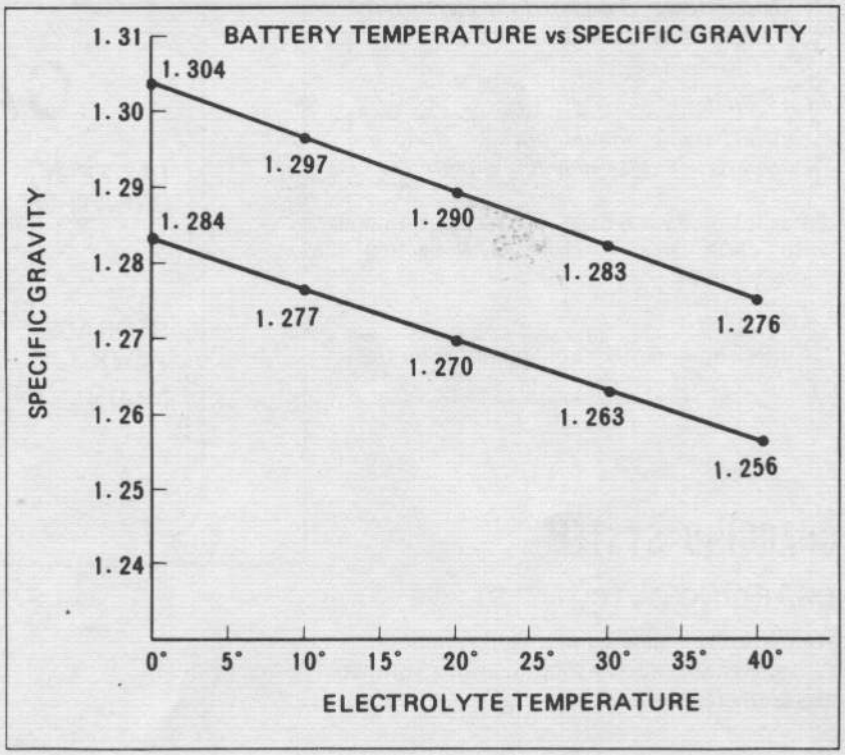
1.270–1.290	Fully charged
Below 1.260	Under charged

NOTE

- The battery must be recharged if the specific gravity is below 1.230.
- The specific gravity varies with the temperature as shown in the 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.



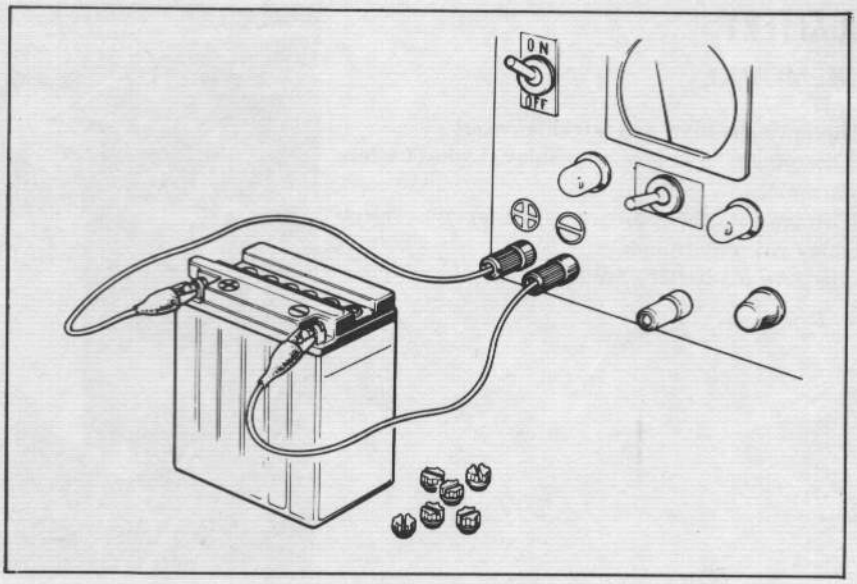
Specific gravity changes by 0.007 for every 10°C.

BATTERY CHARGING

Remove the battery cell caps.
Connect the charger positive (+) cable to the battery positive (+) terminal.
Connect the charger negative (–) cable to the battery negative (–) terminal.

Charging current:
1.4 amperes max.

Charging:
Charge the battery until specific gravity is 1.270–1.290 at 20°C (68°F).



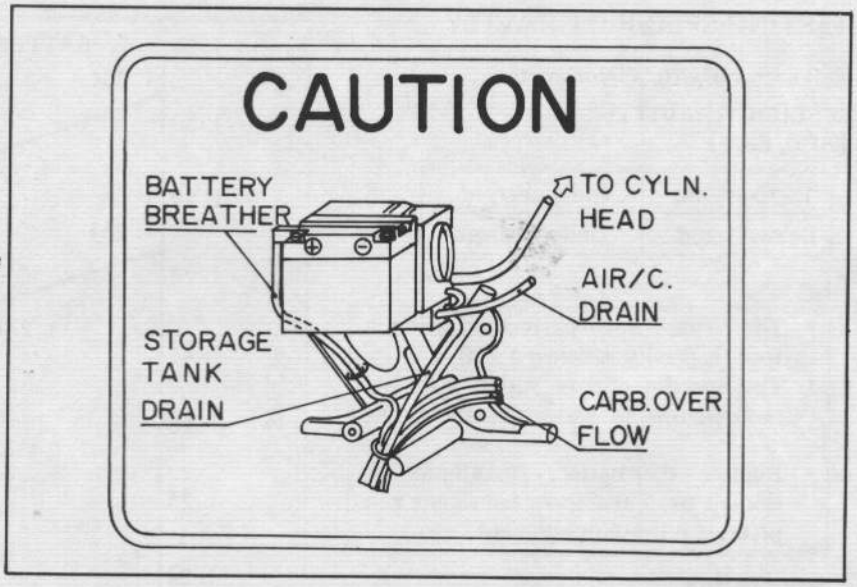
WARNING

- *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.*
- *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.

After installing the battery, coat the terminals with clean grease before re-connecting the battery cables.

CAUTION
Route the breather tube as shown on the battery caution label.

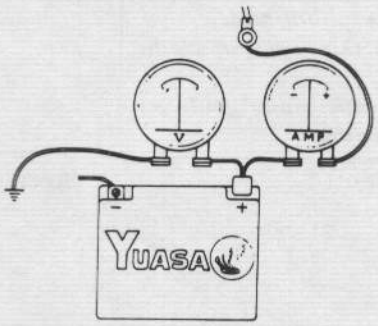


CHARGING SYSTEM

CHARGING OUTPUT TEST

Warm up the engine before taking readings.
Check charging system output with a voltmeter and ammeter.

NOTE
Use a fully charged battery to check the charging system output.



TECHNICAL DATA

MAIN SWITCH	LIGHTING SWITCH	INITIAL CHARGING	AT 5,000 rpm
ON	ON (High beam)	1,650 rpm	0 amperes minimum/14 volts

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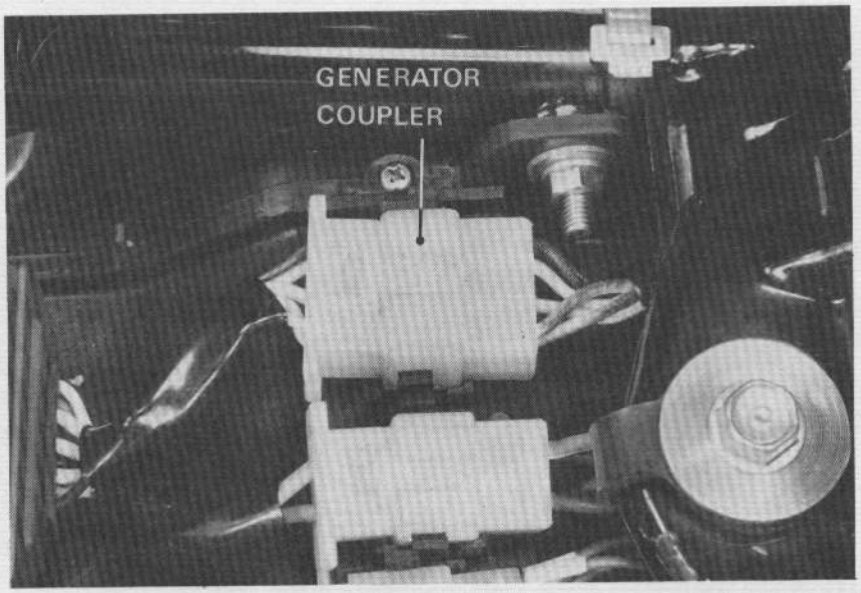
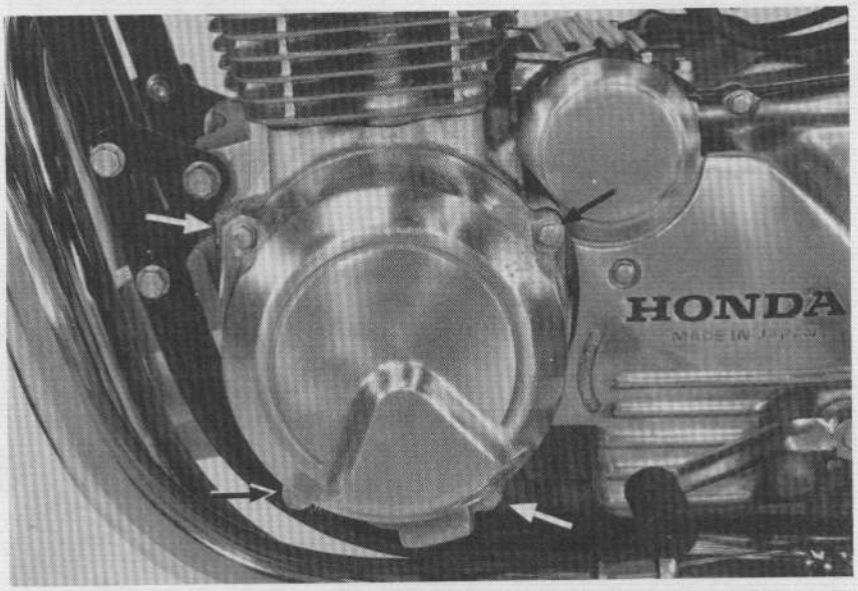
A.C. GENERATOR REMOVAL/ INSTALLATION

Remove the left side cover, raise the seat and disconnect the A.C. generator coupler and neutral and oil pressure switch wire coupler.



Remove three bolts and remove the A.C. generator cover.

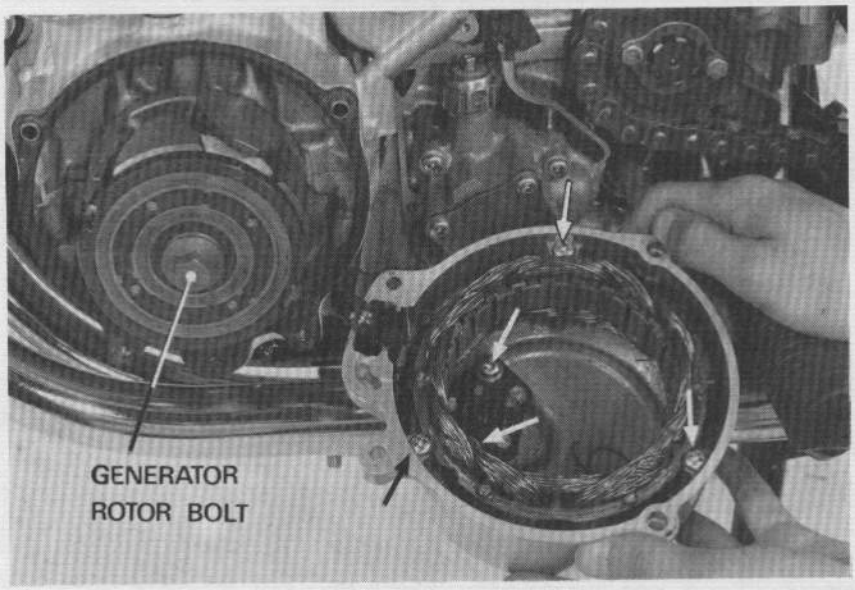
Remove the left crankcase rear cover.



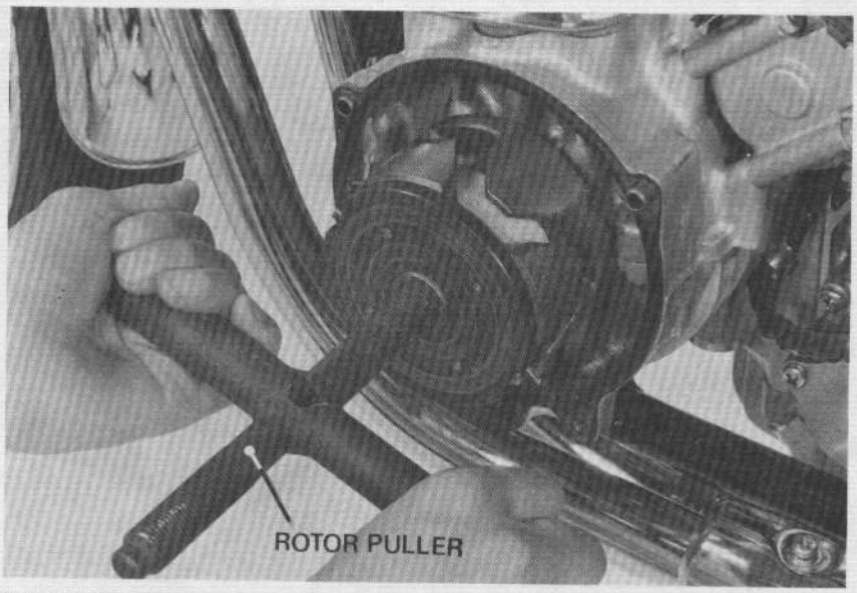
Remote five screws and remove the generator stator with the brush holder.

Shift the transmission into gear and apply the rear brake.

Remove the generator rotor bolt.



Remove the generator rotor while applying the rear brake.

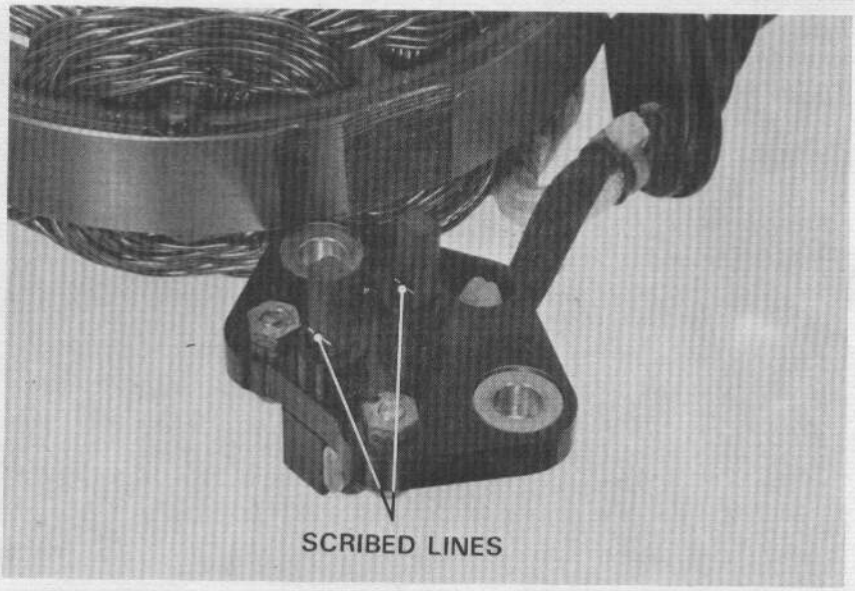


GENERATOR INSPECTION

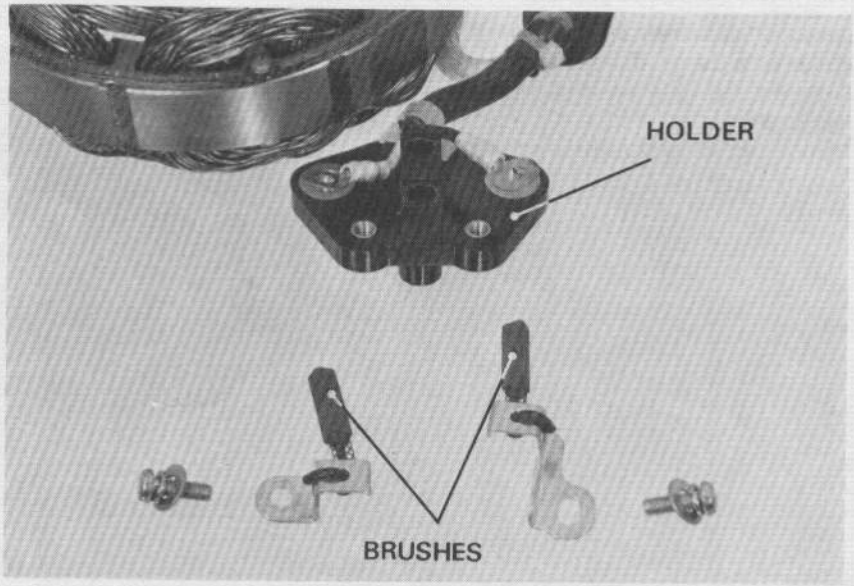
Inspect the length of each brush as shown.

If the brush is worn to the scribed service limit line, replace the brush.

SERVICE LIMIT: Scribed line



Remove and replace the brush with the mounting screws.



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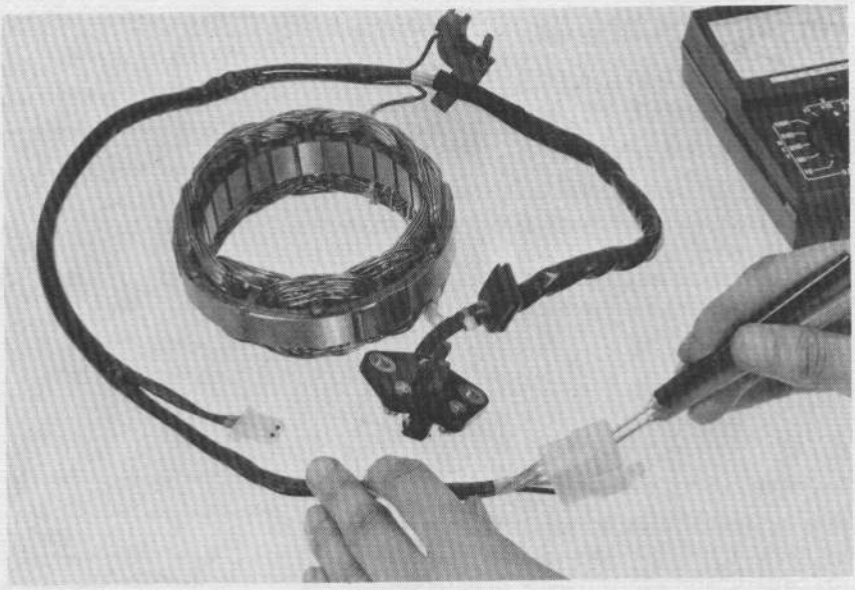
STATOR COIL CONTINUITY TEST

NOTE

It is not necessary to remove the stator to make this test.

Check the yellow leads to the A.C. generator stator for continuity with an ohm meter on the R x 1 scale. Replace the stator if any yellow lead is not continuous with the others, or if any lead has continuity to ground.

SPECIFIED RESISTANCE: 0.41–0.51Ω



INSTALLATION

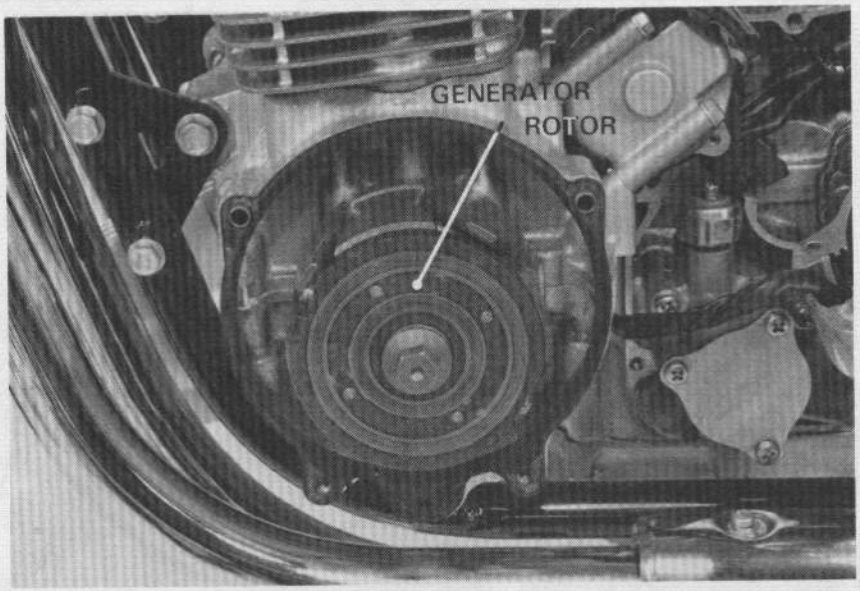
Install the generator rotor.

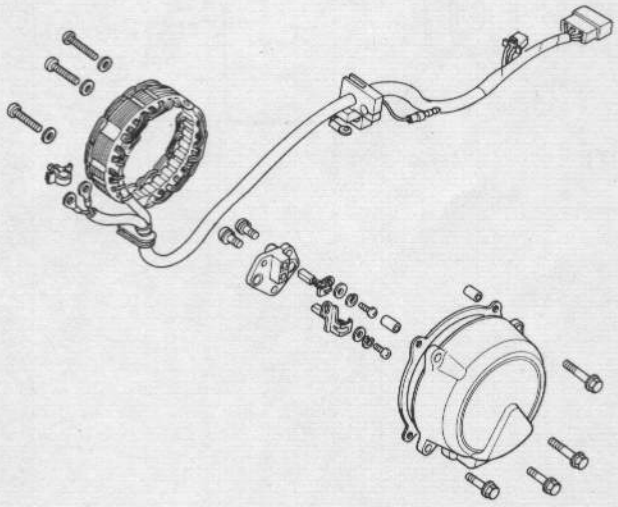
TORQUE: 5.0–6.0 kg-m (36–43 ft-lb)

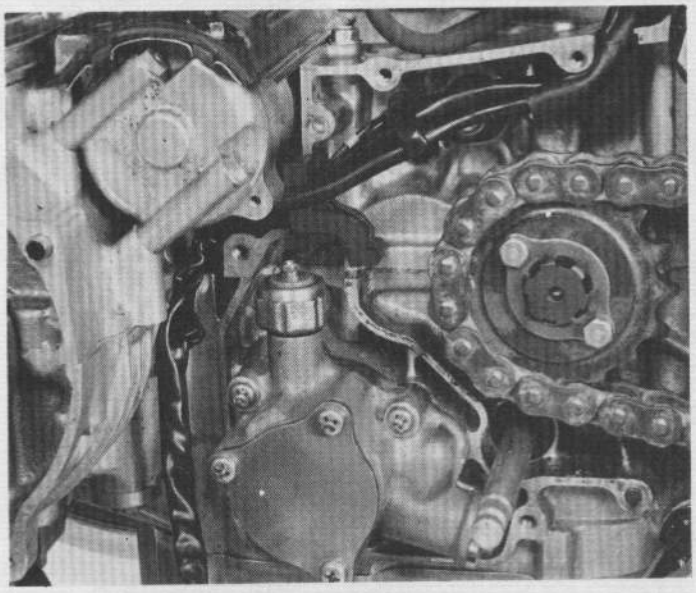
Route the generator leads properly.

CAUTION

Do not use washer to the brush holder mounting screws or the screw head will interfere with the generator rotor.





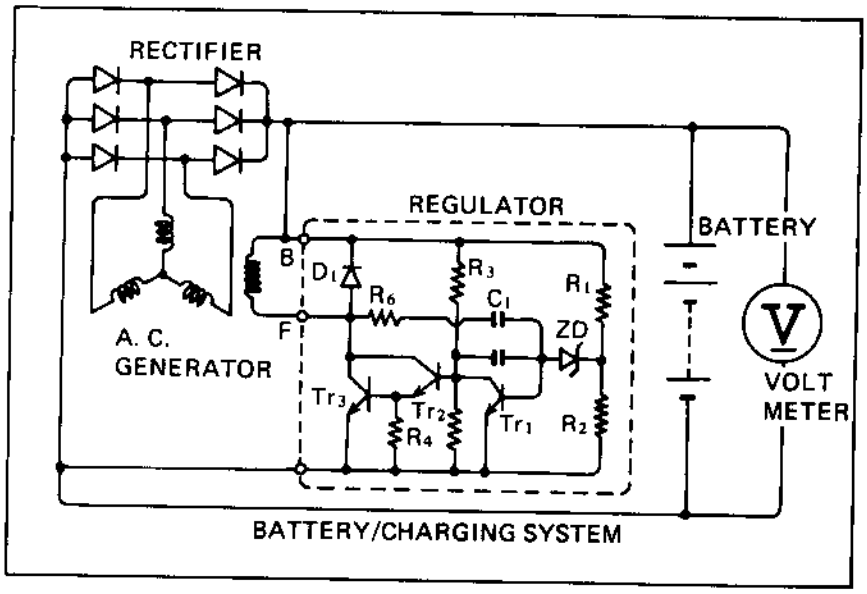


VOLTAGE REGULATOR

VOLTAGE REGULATOR PERFORMANCE TEST

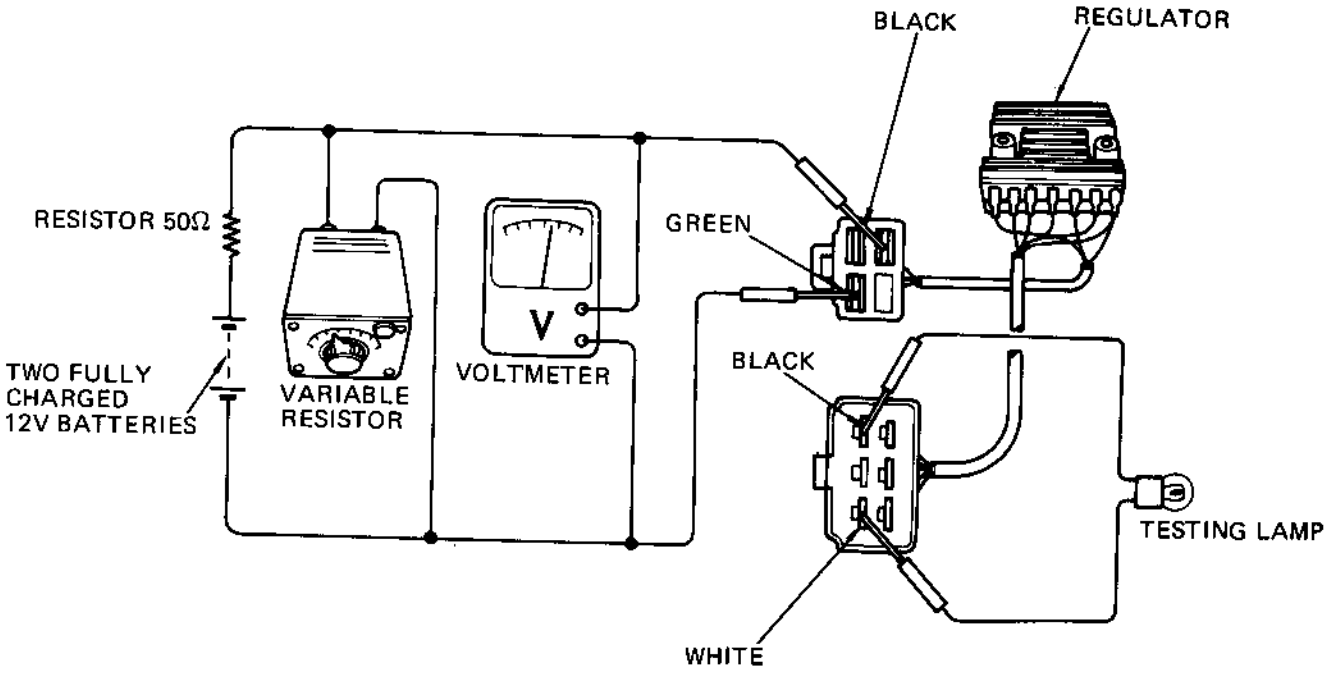
a. Testing with a voltmeter

Connect a voltmeter across the battery.
Check regulator performance with the engine running.
Regulator must cut off the field coil current when battery voltage reaches 14–15V.



b. Testing with a variable resistor

Connect two 12V batteries in series.
Connect a variable resistor (0–100Ω) across the battery with a 50Ω resistor in between.
Test lamp must go out when voltage reaches 14–15V on the voltmeter by adjusting the variable resistor.



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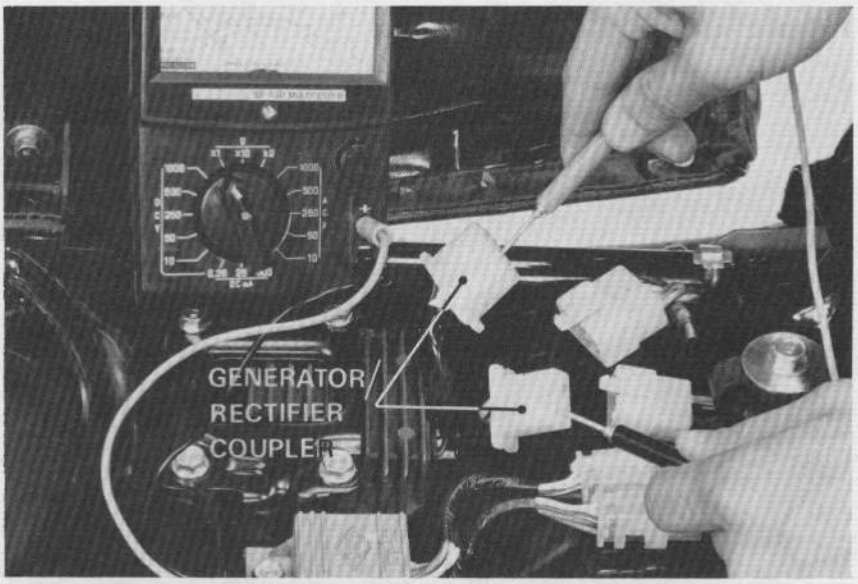
VOLTAGE REGULATOR/ RECTIFIER TEST

Check the resistance between the leads with an ohmmeter.

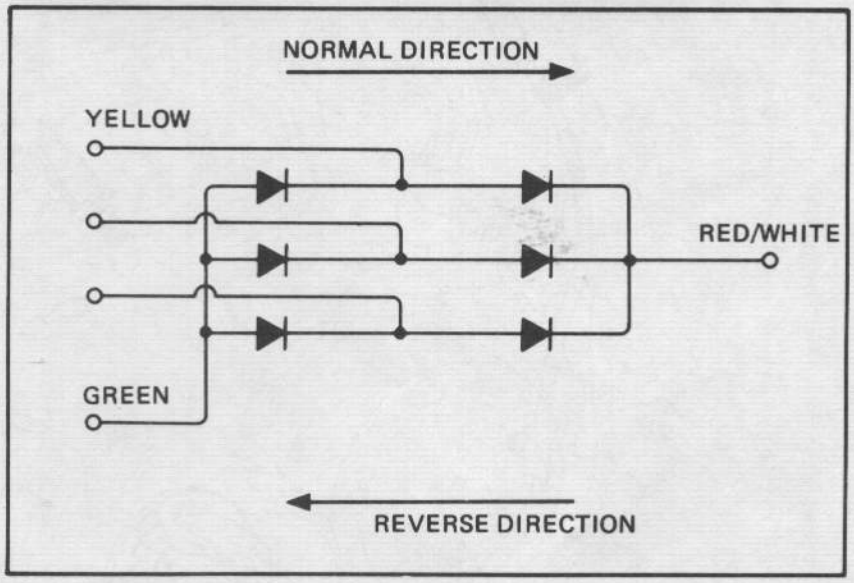


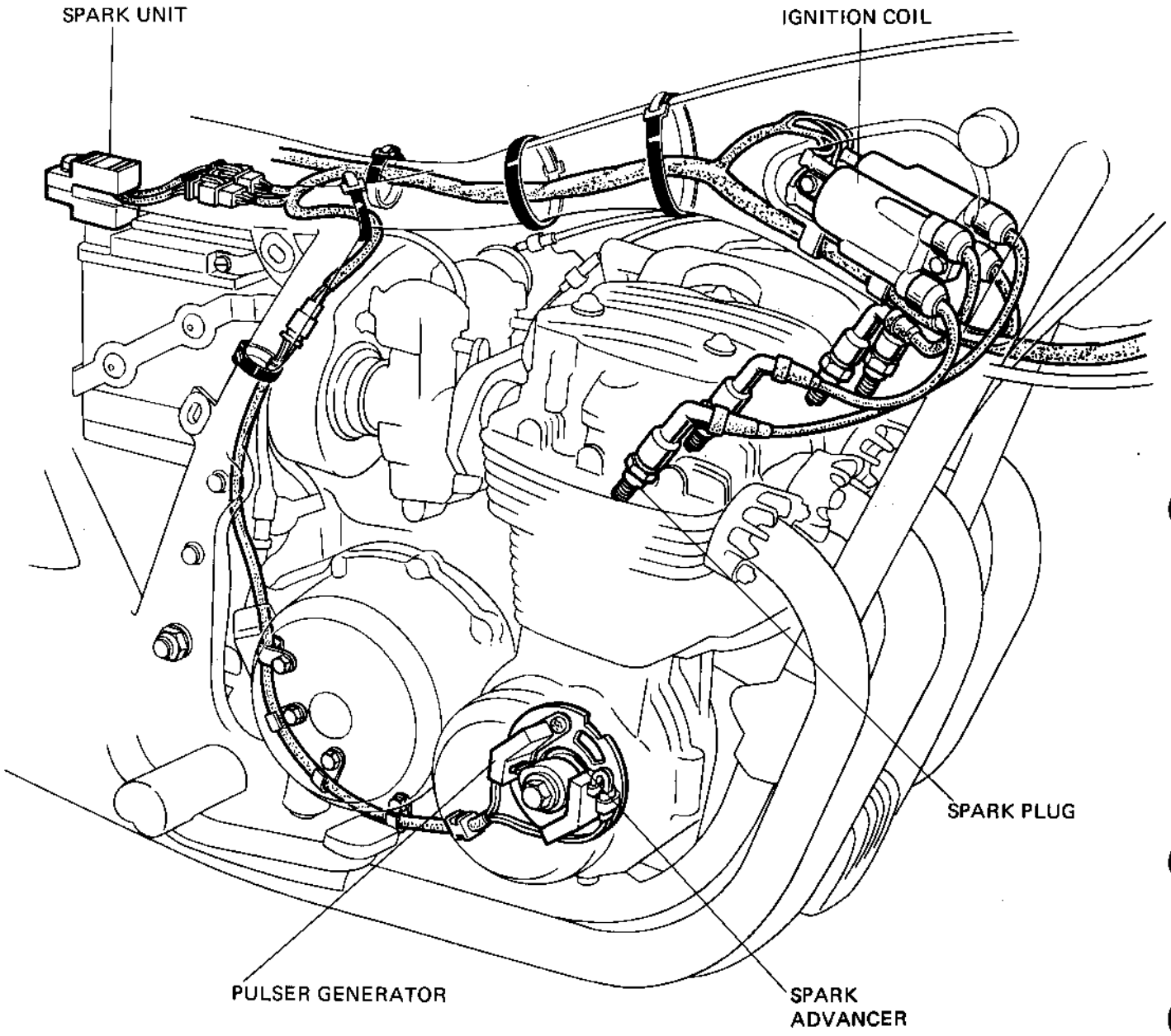
RESISTANCE IN NORMAL DIRECTION:

Green and any yellow:	5–40Ω
Red/white and any yellow:	5–40Ω

RESISTANCE IN REVERSE DIRECTION:

Red/white and any yellow:	2000Ωmin.
Green and any yellow:	2000Ωmin.





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17. IGNITION SYSTEM

SERVICE INFORMATION

GENERAL INSTRUCTIONS

A TRANSISTORIZED IGNITION SYSTEM is used and no adjustments are to be made unless the pulser generator screws are loosened. If these screws are loosened, ignition timing for either the No. 1 or No. 4 cylinder must be adjusted. For spark plug information, see page 3-3.

SPECIFICATIONS

		For cold climate (below 5°C, 41°F)	Standard	For extended high speed riding
Spark plug USA model	ND	X22ES-U	X24ES-U	X27ES-U
	NGK	D7EA	D8EA	D9EA
Spark plug (Canada model)		ND X24ESR-U, NGK DR8ES-L		
Ignition timing		At idle speed	10° (BTDC)	
		Full advance	28°30′ BTDC/2,725 rpm	
Ignition coil		3-point spark test	6 mm (1/4 in) minimum	

TROUBLESHOOTING

NOTE

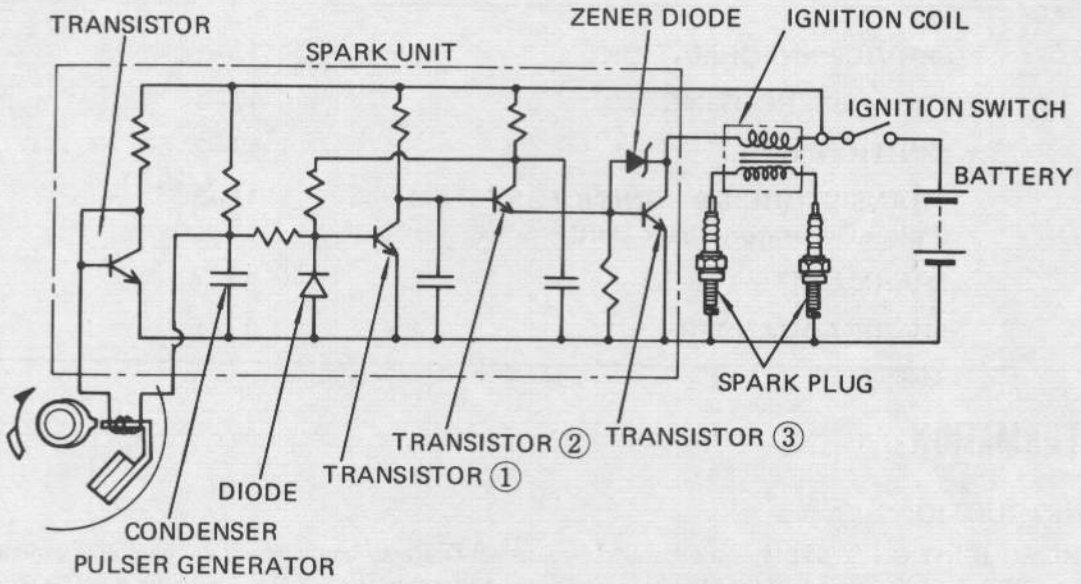
The ignition system has two sub-systems; one for the No. 1 and No. 4 cylinders and one for No. 2 and No. 3 cylinders. Determine which sub-system is faulty, then proceed to the detailed tests below.

Engine cranks but will not start
- Engine stop switch OFF.
- No spark at plugs
- Faulty transistorized spark unit
- Faulty pulser 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 pulser generator
- Faulty ignition coil
- Faulty ignition switch
- Faulty spark unit
- Faulty pulser 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 cord

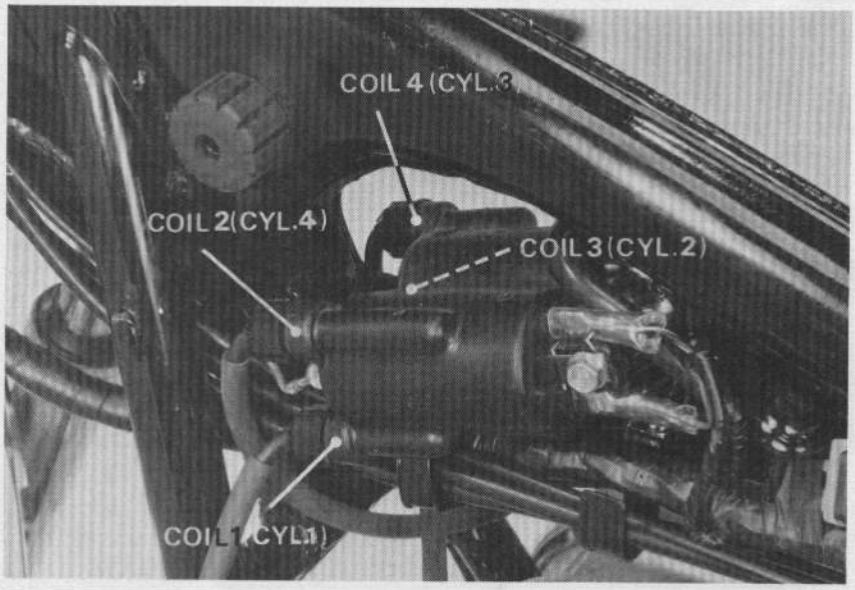
Timing advance incorrect
- Centrifugal advancer faulty



IGNITION COIL

REMOVAL

Remove the fuel tank.
Disconnect the wire leads.
Remove the coils by removing the attaching bolts.



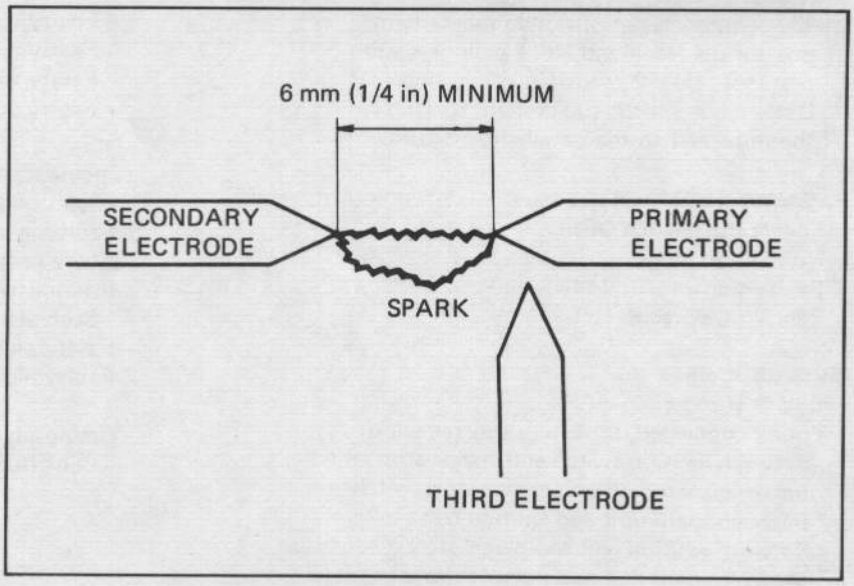
PERFORMANCE TEST

Perform the 3-point spark test with a coil tester.

SERVICE LIMIT: 6 mm (1/4 in) min

NOTE

Follow the coil tester manufacturers instructions.



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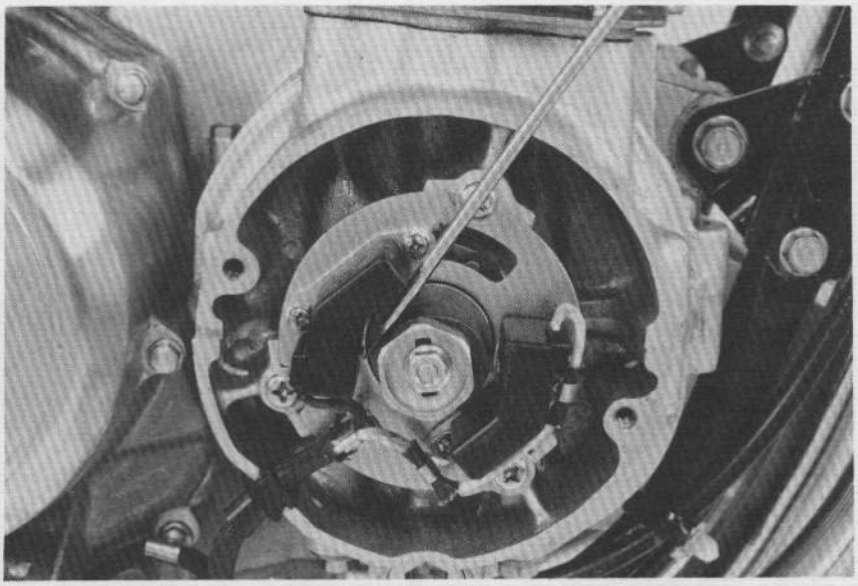
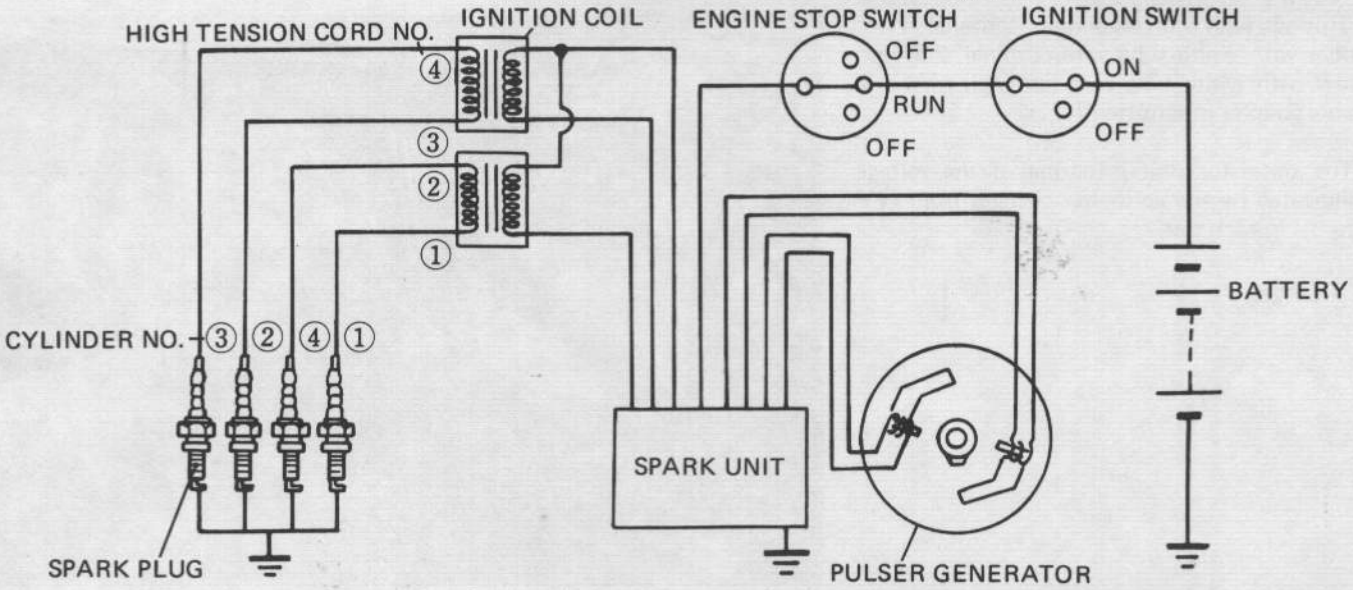
TRANSISTORIZED IGNITION SYSTEM

INSPECTION

System

Disconnect the 1 and 2 plugs.
Hold each plug against any convenient engine ground.
Turn the ignition switch on.
Remove the pulser generator cover.
Touch the end of a screwdriver to one pulser generator steel core.
A good spark to the plug means that the ignition system for that cylinder is in good shape.
Repeat the above for the other pulser.



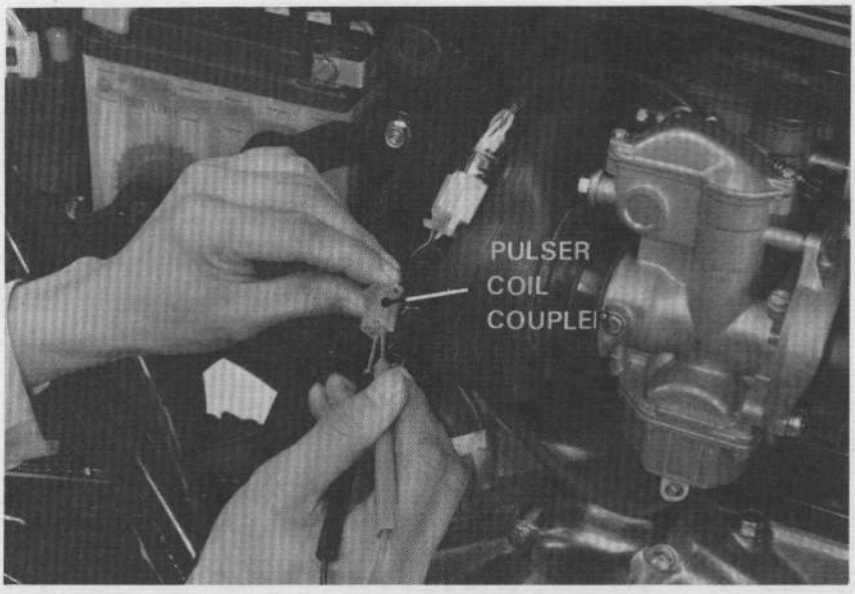


Pulser generator

Measure the coil resistance.

COIL RESISTANCE: 530 ± 50Ω (20°C, 68°F)

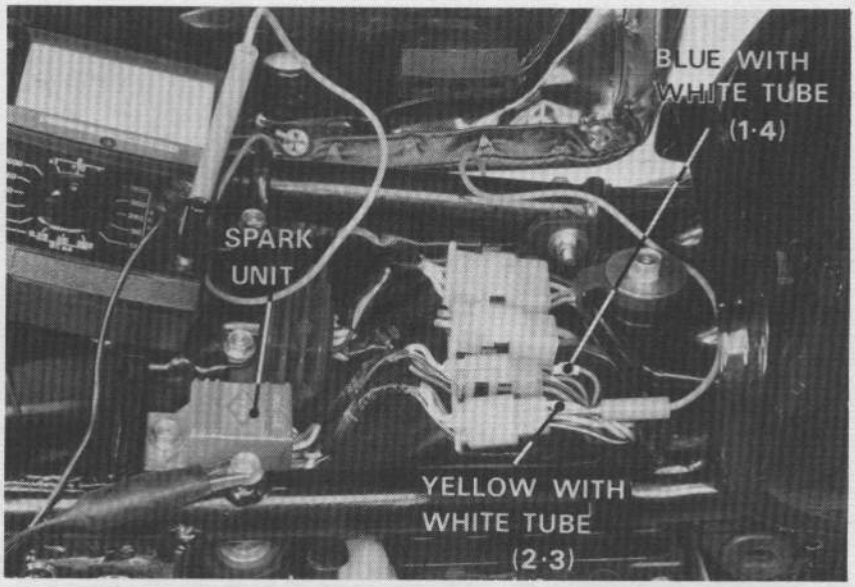
Between yellow with white tube and yellow leads (2.3 cylinders)
Between blue with white tube and blue leads (1.4 cylinders)



SPARK UNIT

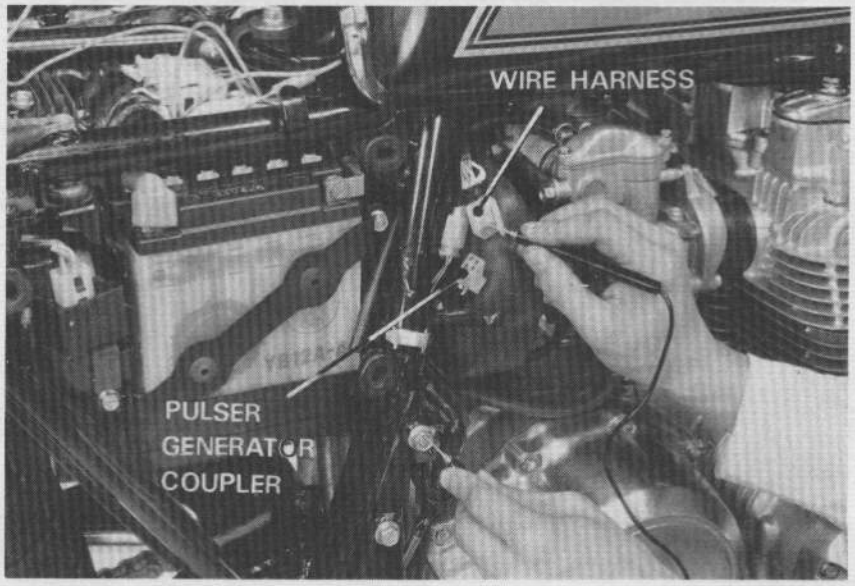
Disconnect the wirings at the pulser generator coupler.

Attach the positive lead of a voltmeter to the blue with yellow tube wire terminal (1.4) or yellow with white tube wire terminal (2.3) of the 6-pole coupler. Attach the negative lead to any convenient ground. Turn the ignition switch on.



Ground each corresponding terminal (1.4: blue with white tube wire terminal, 2.3: yellow with white tube wire terminal) of the 4-pole coupler intermittently.

The transistor unit is normal if the voltage indicated by the voltmeter changes from 12V to 0V in each test.



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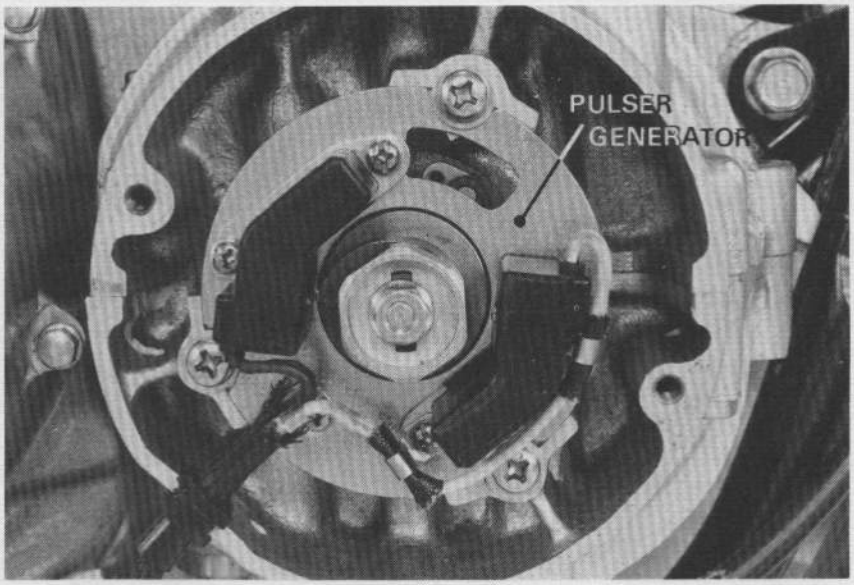
PULSER REPLACEMENT

If pulser replacement is necessary, loosen the three pulser base plate screws.
Replace the pulser generator assembly.
Adjust the ignition timing (Page 3–4).

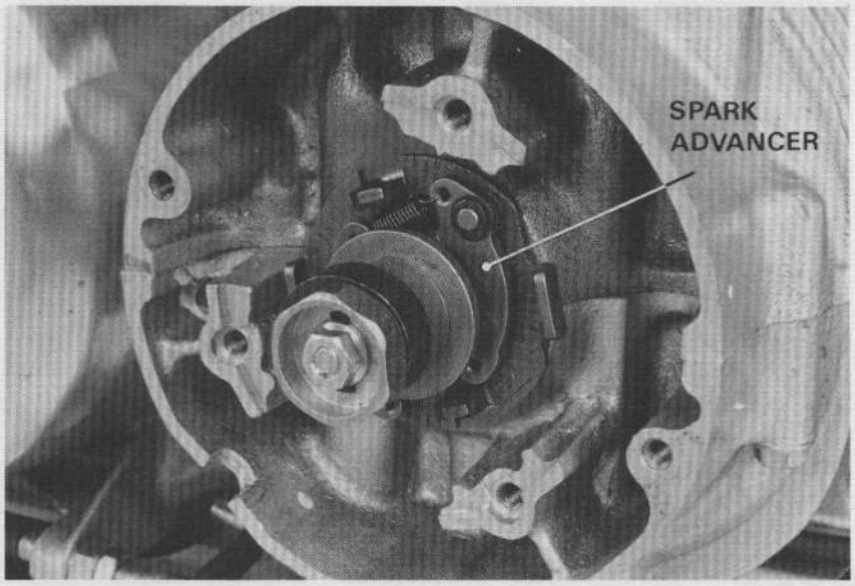


SPARK ADVANCER

For advancer function test, see Page 3–5.
Remove the pulser generator cover.
Remove the pulser generator.

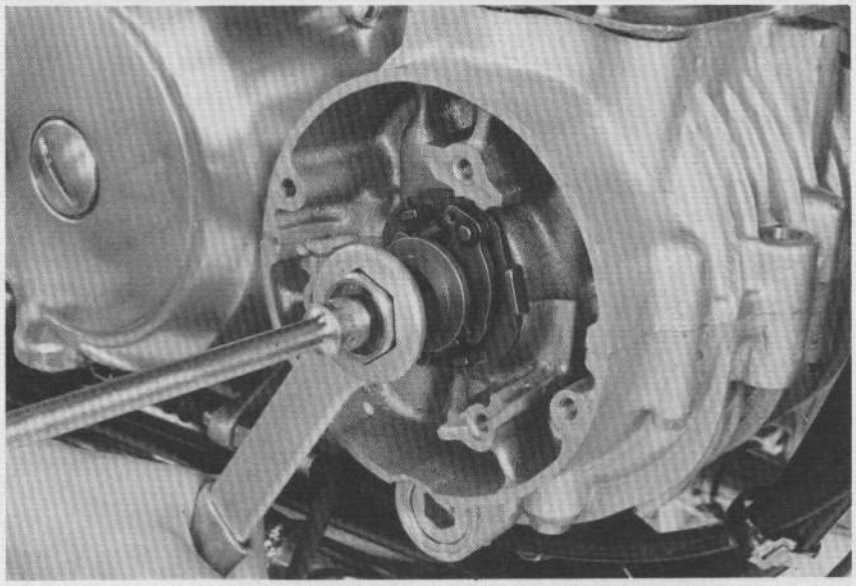
ADVANCER VISUAL INSPECTION

Check the mechanical advancer cam for sticking.
Lubricate the sliding surfaces, and check the spring for loss of tension and advancer pin for excessive.

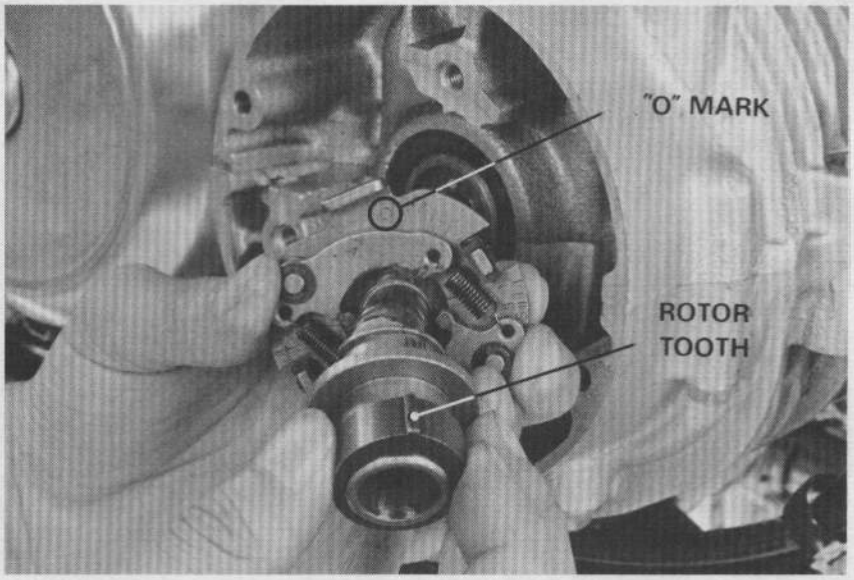


ADVANCER REPLACEMENT

Remove the advancer nut by holding the spacer.
Remove the advancer.



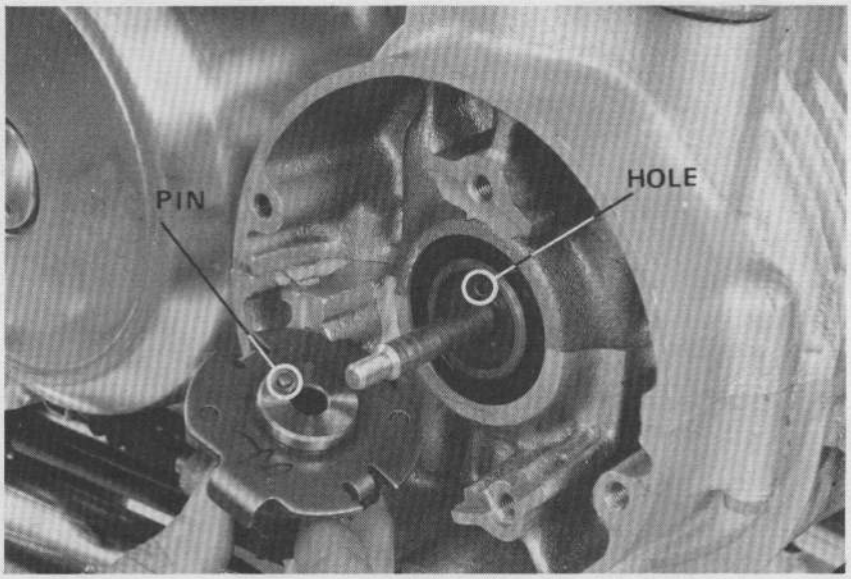
Align the rotor tooth with the "O" mark on the advancer.



Install the advancer.
Align the hole in the advancer with the pin on the crankshaft.
Tighten the nut.

TORQUE: 0.8–1.2 kg-m (6–7 ft-lb)

Install the pulser generator.
Adjust ignition timing (Page 3–4).



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18. ELECTRIC STARTER

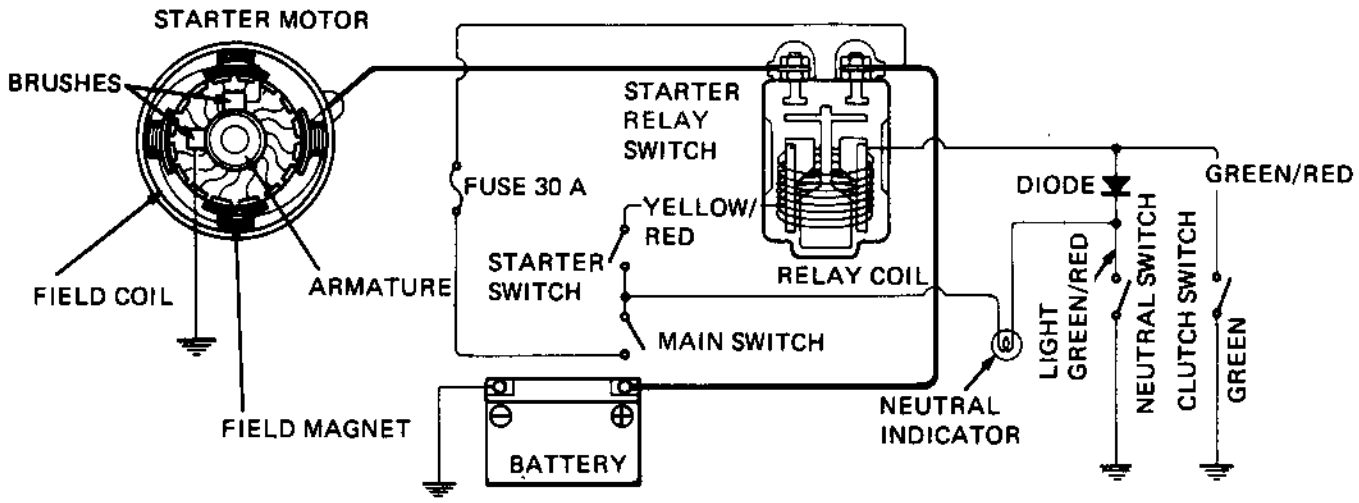
SERVICE INFORMATION

GENERAL INSTRUCTIONS

The starter motor can be removed with the engine in the frame.

SPECIFICATIONS

		STANDARD	SERVICE LIMIT
Starter motor	Brush spring tension	560 g–680g (19.75–23.89 oz)	560 g (19.75 oz)
	Brush length	12.0–13.0 mm (0.47–0.51 in)	7.5 mm (0.3 in)



TROUBLESHOOTING

Starter motor will not turn
- Battery discharged
- Faulty ignition switch
- Faulty starter switch
- Faulty neutral switch
- Faulty starter relay switch
- Loose or disconnected wire or cable
- Neutral diode open

Starter motor turns engine slowly
- Low specific gravity
- Excessive resistance in circuit
- Binding in starter motor

Starter motor turns, but engine does not turn
- Faulty starter clutch
- Faulty starter motor gears
- Faulty starter motor or idle gear

Starter motor and engine turns, but engine does not start
- Faulty ignition system
- Engine problems

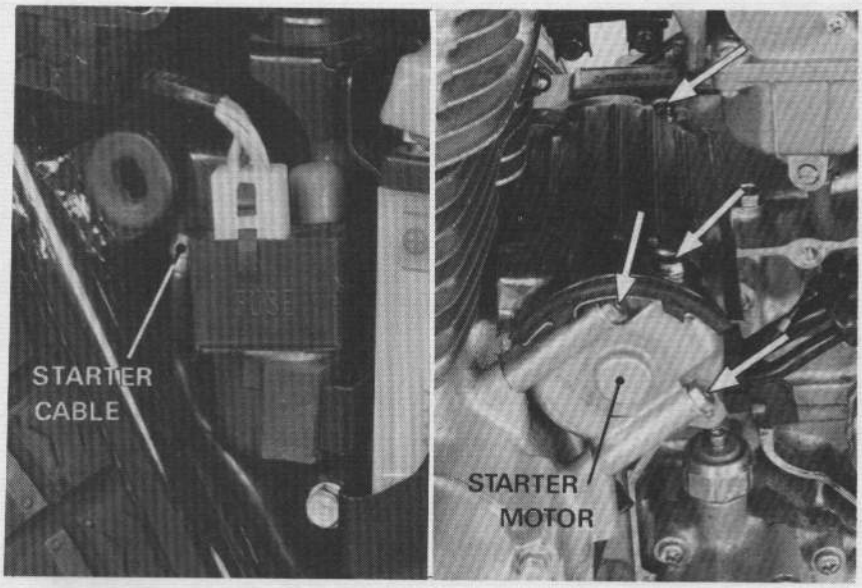
STARTER MOTOR

REMOVAL

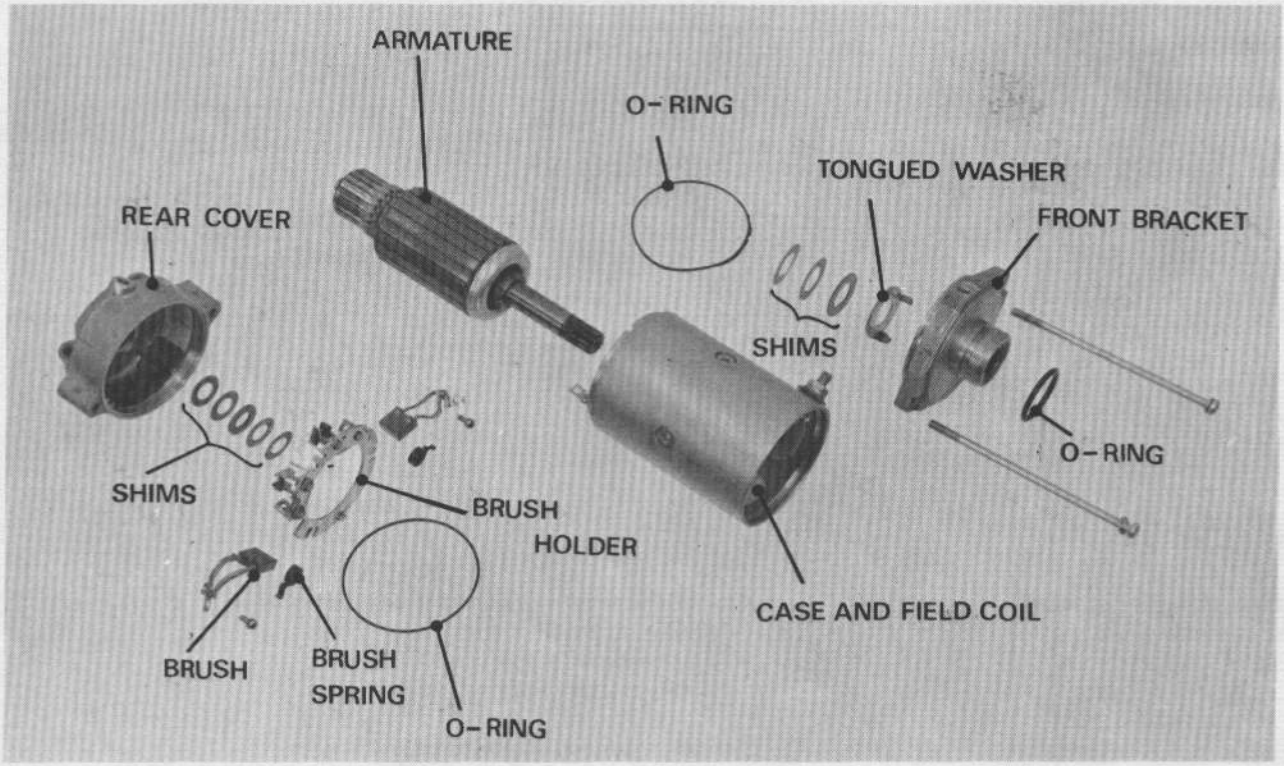
WARNING

With the ignition switch OFF, remove the negative cable at the battery before servicing the starter motor.

Remove the right side cover and disconnect the starter cable at the starter relay switch.



Remove the starter motor cover and starter motor.



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BRUSH INSPECTION

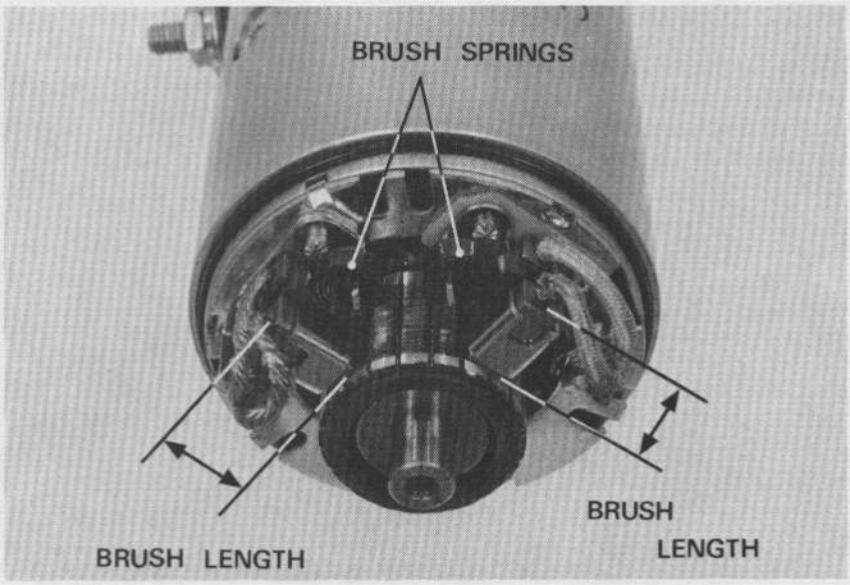
Remove the starter motor case screws.

Inspect the brushes and measure brush length.

Measure brush spring tension with a spring scale.

SERVICE LIMITS:

Brush length:	**7.5 mm (0.30 in)**
Brush spring tension:	**560 g (19.75 oz)**



COMMUTATOR INSPECTION

Remove the starter motor case.

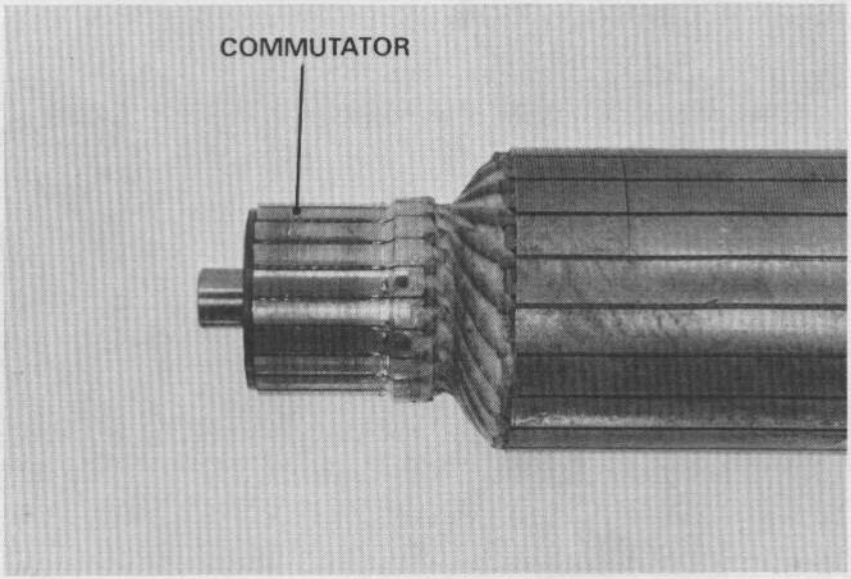
NOTE

Record the location and number of thrust washers.

Inspect the commutator bars for discoloration.
Bars discolored in pairs indicate grounded armature coils.

NOTE

Do not use emery cloth or sand paper on the commutator.



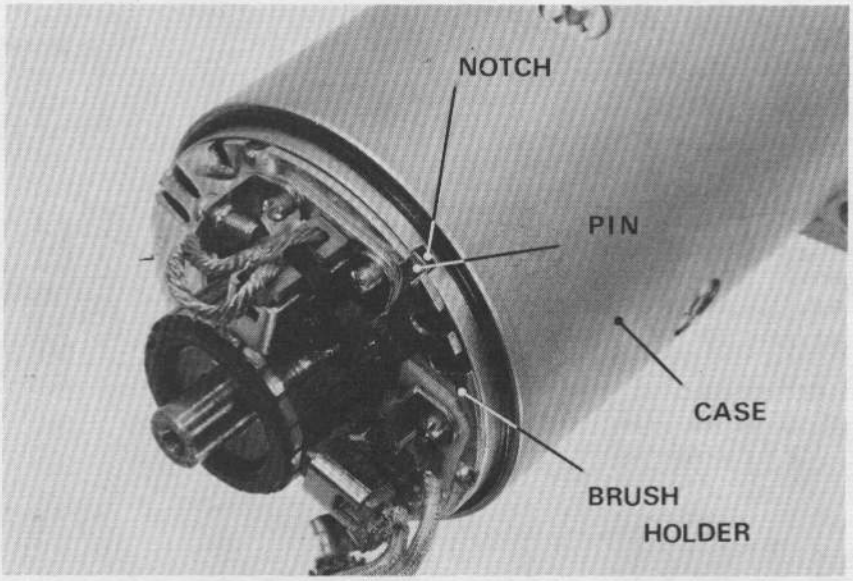
Check for continuity between pairs of commutator bars, and between commutator bars and armature shaft.

FIELD COIL INSPECTION

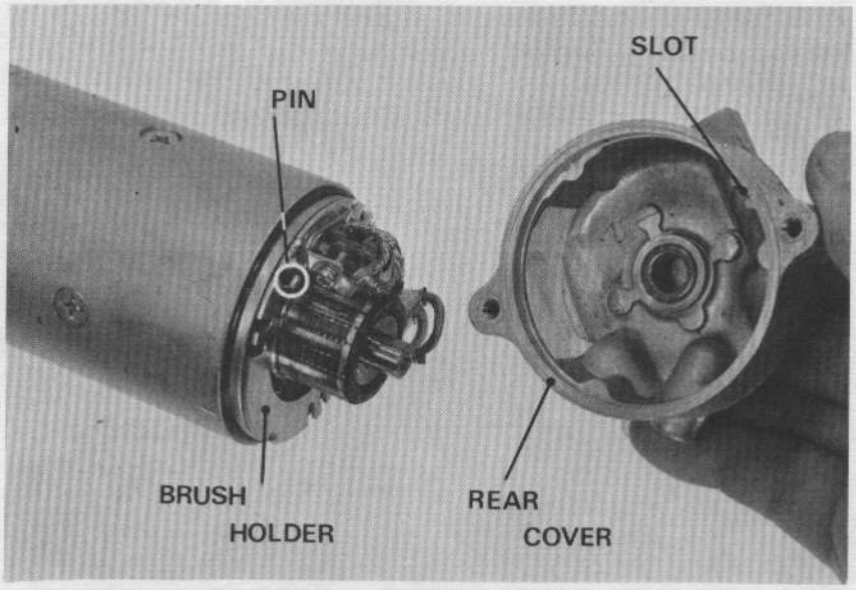
Check for continuity from the cable terminal to the brush wire.
Replace the starter motor if the field coil is not continuous or if it is shorted to the motor case.

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.



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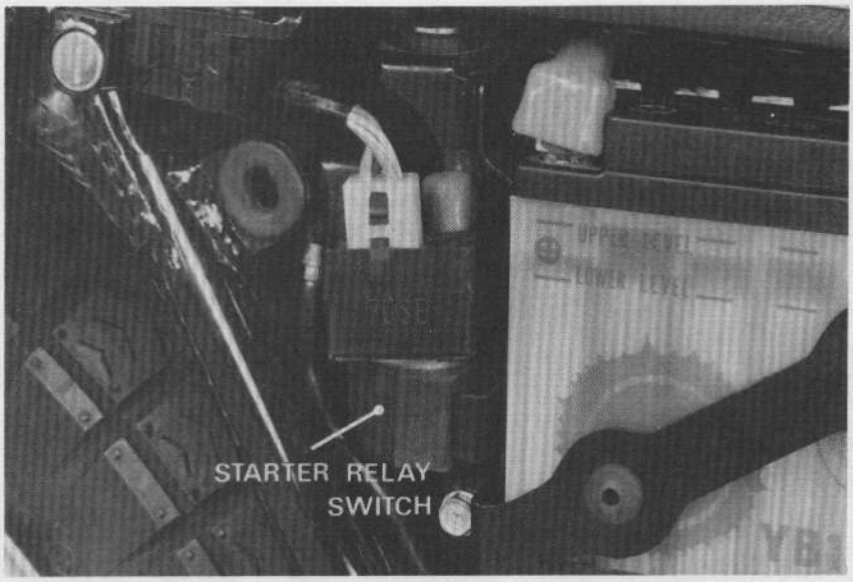
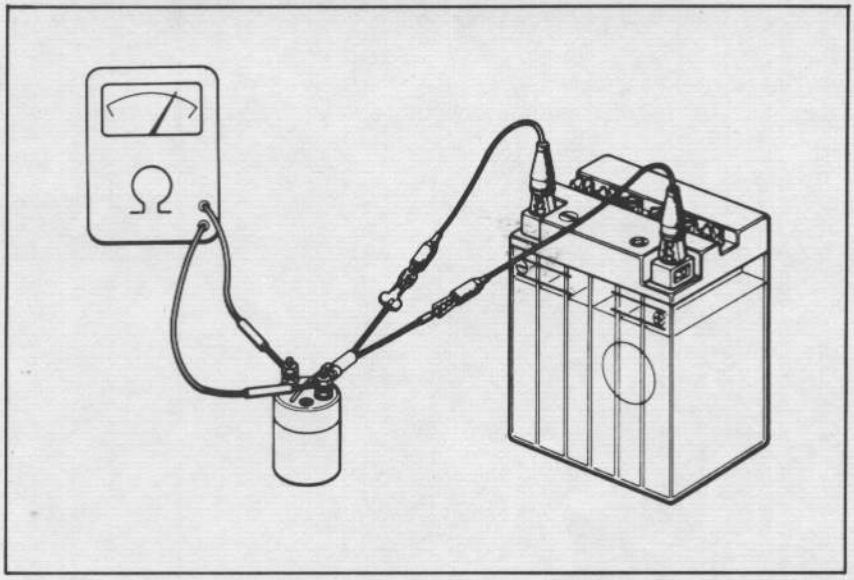
STARTER RELAY SWITCH

INSPECTION

Depress the starter switch button with the ignition ON.
The coil is normal if the starter relay switch clicks.



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.



19. SWITCHES

SERVICE INFORMATION

GENERAL INFORMATIONS

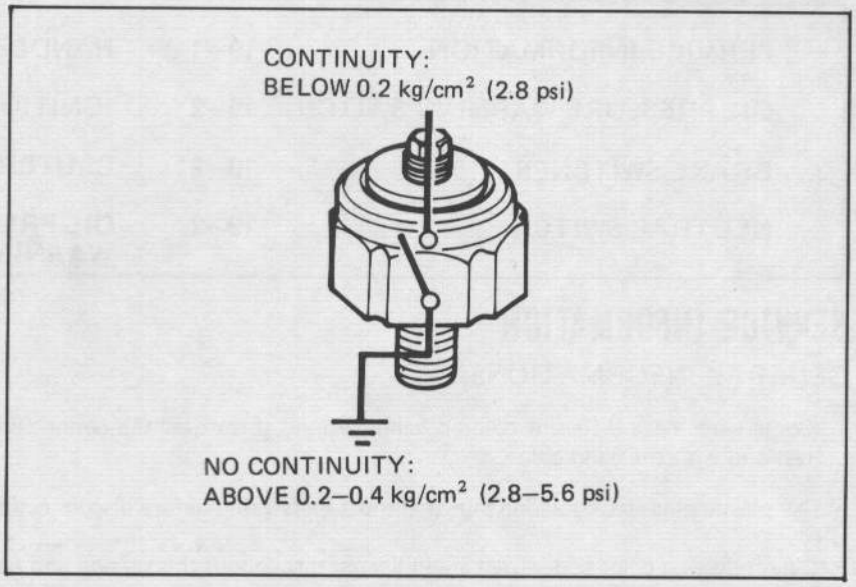
- Some wires have different colored bands around them near the connector. These are connected to other wires which correspond with the band color.
- All plastic plugs have locking tabs that must be released before disconnecting, and must be aligned when reconnecting.
- The following color codes used are indicated throughout this section and on the wiring diagram.

B = Blue		LG = Light Green	
Bk = Black		O = Orange	
Br = Brown		P = Pink	
G = Green		R = Red	
Gr = Grey		W = White	
LB = Light Blue		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, as when there is a specific coil resistance involved, or when checking for high resistance caused by corroded connections.

OIL PRESSURE WARNING SWITCH

Check for continuity while applying pressure to the switch.
Replace the switch if necessary.
Apply a liquid sealant to the switch threads.

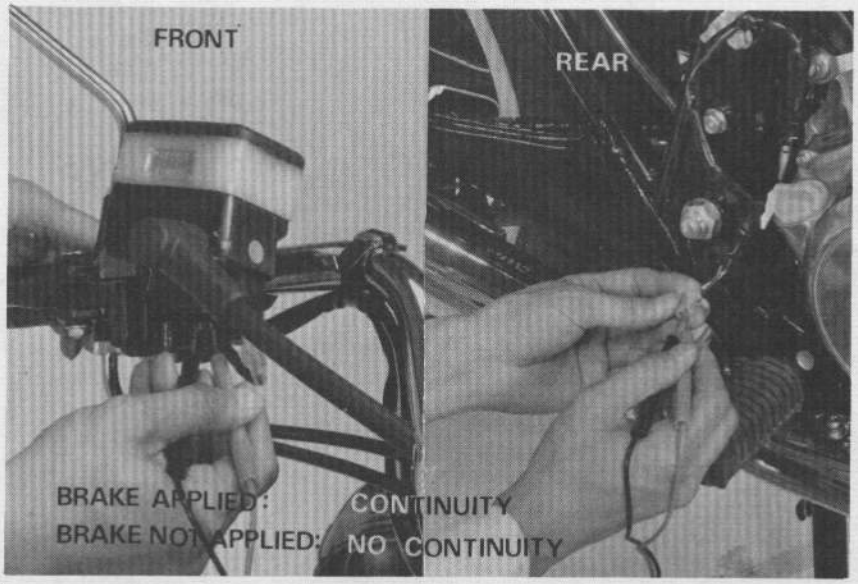


BRAKE SWITCHES

Check the rear brakelight switch for continuity with the rear brake applied.

Check the front brakelight switch for continuity with the front brake applied.

Replace the switches if necessary.

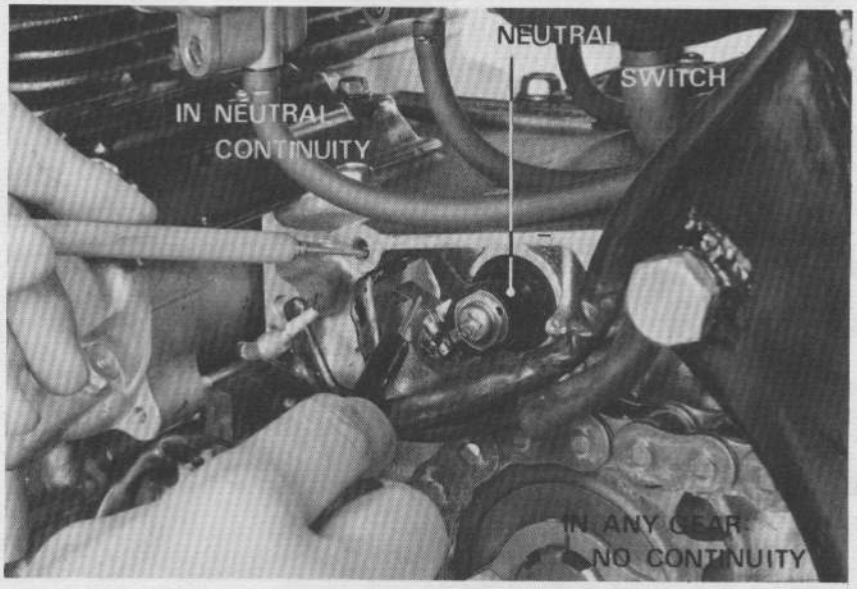


NEUTRAL SWITCH

Remove the foot pegs, gearshift pedal and left rear crankcase cover.

Check the switch for continuity between the switch terminal (wire removed) and ground with the transmission in neutral.
Check again with transmission in any gear.

Replace the neutral switch if necessary.



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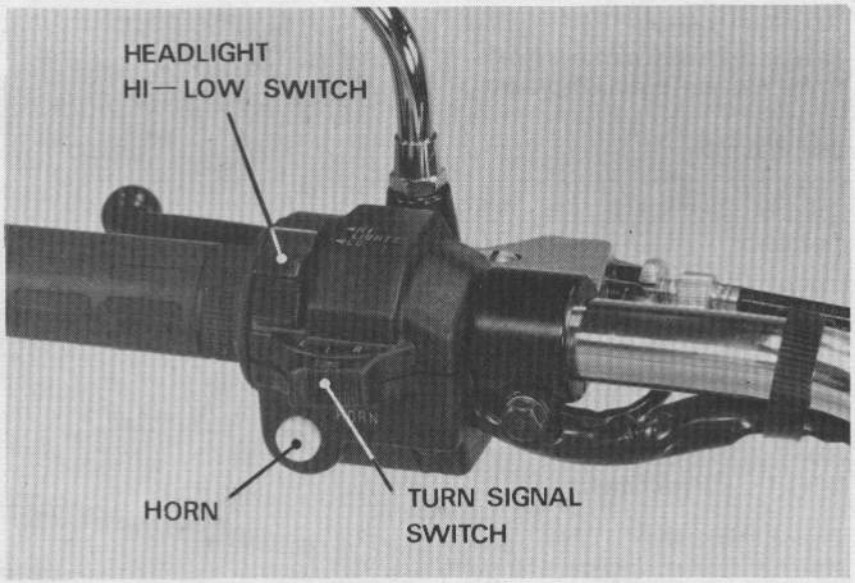
HANDLEBAR SWITCHES

The handlebar cluster switches (lights, turn signals, horn, passing, dimmer start and stop) must be replaced as assemblies.
Continuity tests for the components of the handlebar cluster switches follow:
Continuity should exist between the color coded wires on each chart.



HEADLIGHT HI—LOW SWITCH

HI: B/W to B
MIDDLE (N): B/W to W to B
LO: B/W to W

Headlight Hi—Low Switch

	HL	Hi	Lo
Hi	○	○	
(N)	○	○	○
Lo	○		○
Code color	B/W	B	W

TURN SIGNAL SWITCH

LEFT: Gr to O, Br/W to LB/W
OFF: Br/W to O/W to LB/W
RIGHT: Gr to LB, Br/W to O/W

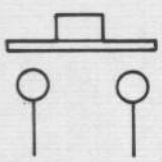
Turn Signal Switch

	W	L	R	P	PL	PR
LEFT	○	○		○		○
OFF				○	○	○
RIGHT	○		○	○	○	
Code color	Gr	O	LB	Br/W	O/W	LB/W

HORN BUTTON

LG to G with button depressed
No continuity with button released

Horn Button

	HO	E
		
Code color	LG	G

STARTER BUTTON

Bk/R to B/W with botton released
Bk to Y/R with button depressed

Starter Button

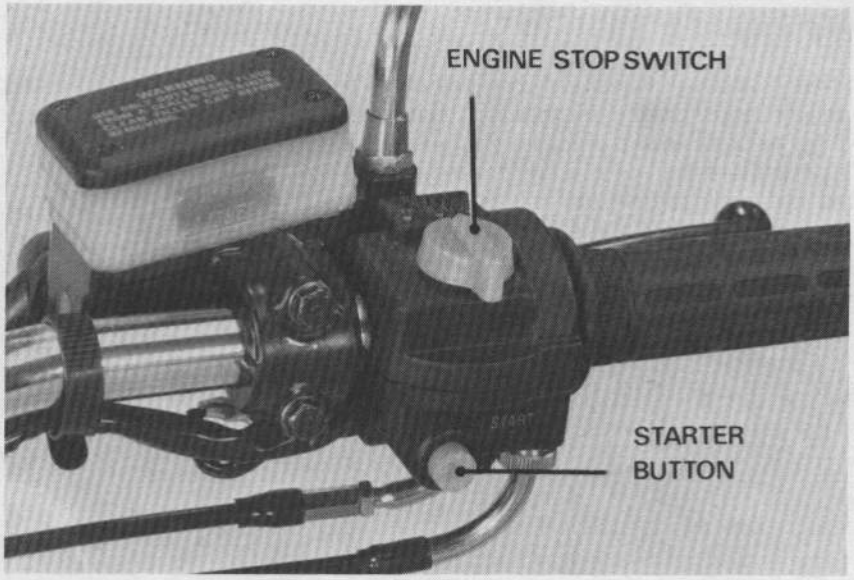
	BAT_5	HL	BAT_2	ST
FREE	○—○			
START			○—○	
Code color	Bk/R	B/W	Bk	Y/R

ENGINE STOP SWITCH

RUN: Bk to Bk/w
OFF: No continuity

Engine Stop Switch

	BAT_2	IG
OFF		
RUN	○—○	
OFF		
Code color	Bk	Bk/W



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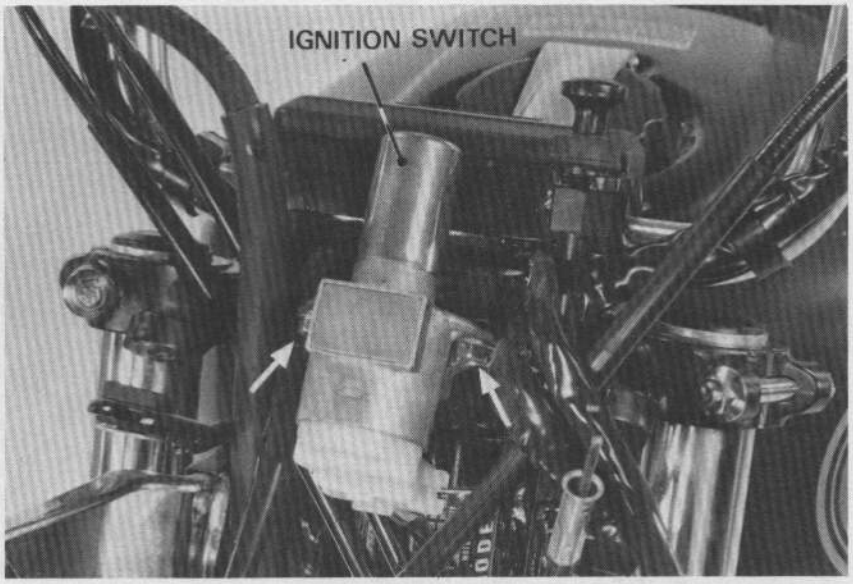
IGNITION SWITCH

Remove the instrument cluster and disconnect the plug.
Remove the ignition switch.

NOTE

Identify the wire colors at the connector. There are no colors on the switch.

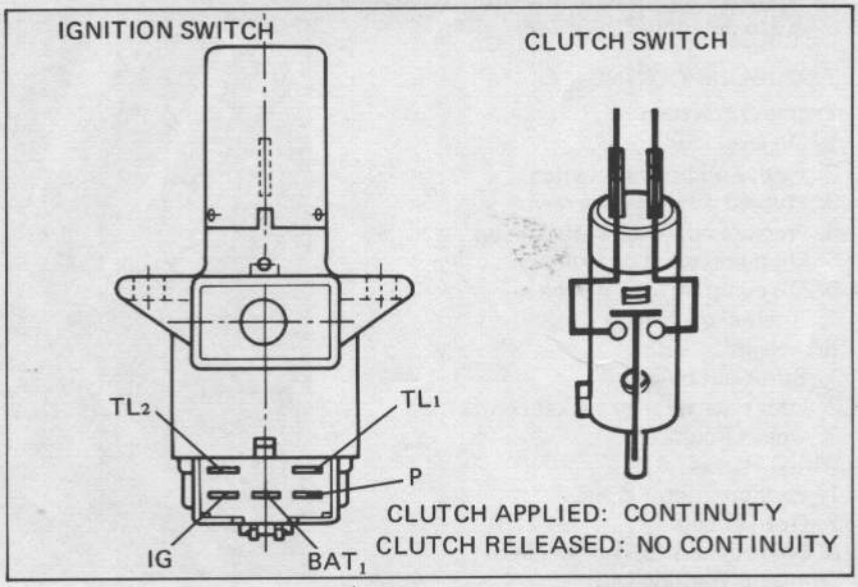


Check continuity of terminals on the ignition switch in each switch position.

SWITCH POSITION

LOCK: **No continuity**
OFF: **No continuity**
ON: **BAT_1 to IG, TL_1 to TL_2**
PARK: **P to BAT_1**

Terminal / Position	P	BAT_1	IG	TL_1	TL_2
P	○—○				
ON		○—○		○—○	
OFF					
LOCK					



CLUTCH SWITCH

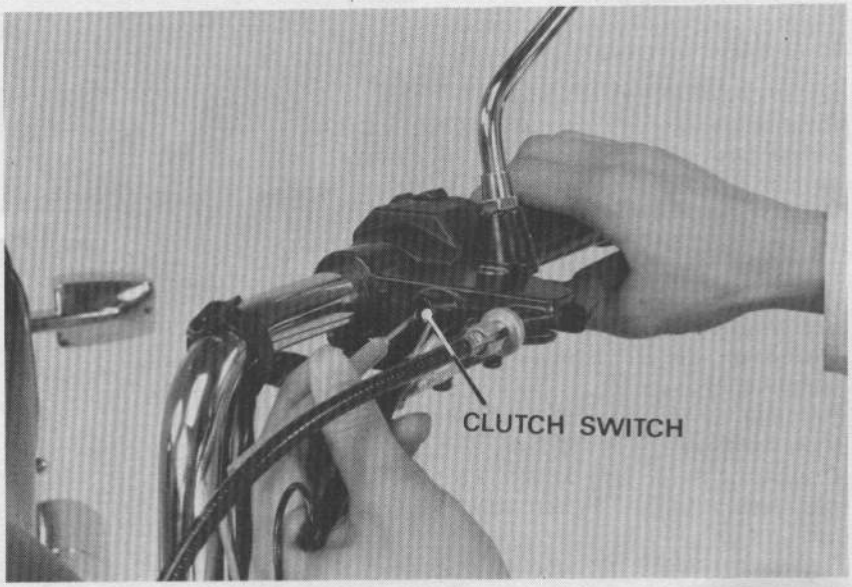
Check continuity of the clutch lever (safety) switch with the clutch released and applied.
Replace if necessary.

REMOVAL

Unplug the wires.
Remove the clutch lever and cable.
Remove the switch.

NOTE

The switch case has a small protrusion that must point toward the handlebar when installed.



OIL PRESSURE/STOPLAMP WARNING LIGHT SYSTEM

SYSTEM TEST

Turn the ignition switch ON.
The OIL/STOPLAMP warning light should go on.
If it does not, follow the troubleshooting below to determine the cause.

TROUBLESHOOTING

1. Burnt out bulb
2. Open circuit (B/R)
3. Burnt out fuse
4. Faulty oil pressure switch

Start the engine.
Check that the OIL/STOPLAMP warning light should go off.
If it does not, follow the troubleshooting below to determine the cause.

TROUBLESHOOTING

Engine Oil System
1. Oil level low
2. Faulty oil pressure switch
3. Plugged oil pick-up screen
4. Pressure relief valve stuck open
5. Oil pump worn or faulty
6. Oil pump drive gear broken
7. Internal oil leakage

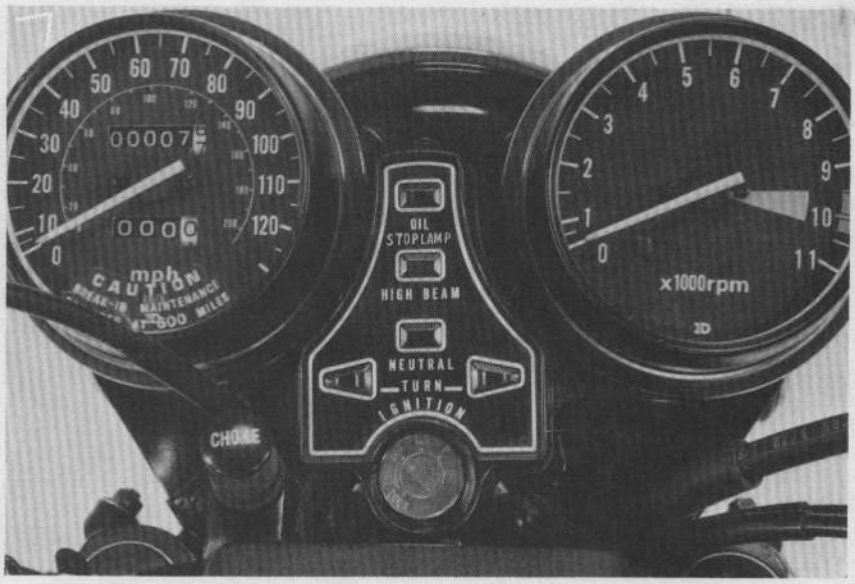
Brakelight
1. Burnt out bulb
2. Poor connector or socket contact
3. Open circuit

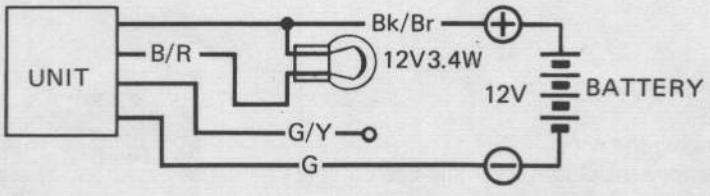
Wiring Harness
1. Poor connector contact
2. Open circuit
3. Short circuit (B/R to Ground)

Stoplamp Warning Unit
1. Internal open circuit (G/Y and G)
2. Internal short circuit (B/R and G)

STOPLAMP WARNING UNIT TEST

Remove the stoplamp warning unit.
Connect the unit Bk/Br wire to the positive terminal of a 12V battery.
Connect the G wire to the negative terminal.
Connect a 12V–3.4W test lamp between the Bk/Br and B/R wire terminals.
Jump the G/Y wire to the G wire. The test lamp should go off.
Disconnect the B/Y and G wire. The test lamp should go on.
Reconnect the G/Y and G wire. The test lamp should stay on.
Disconnect Bk/Br wire from the battery and then reconnect it. The test lamp should go off.
Replace the unit if it does not pass the above test.





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20. TROUBLESHOOTING

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 tube or fuel filter (3) Sticking float valve (4) Clogged fuel tank cap breather hole
REACHING CARBURETOR ↓		
2. Perform 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 A.C. generator (6) Broken or shorted ignition coil (7) Faulty ignition switch (8) Faulty pulser generator
GOOD SPARK ↓		
3. Test cylinder compression	LOW COMPRESSION →	(1) Low battery charge (2) Improper valve clearance (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 FIRES BUT STOPS →	(1) Improper choke operation (2) Carburetor incorrectly adjusted (3) Manifold leaking (4) Improper ignition timing (Spark unit or pulser generator) (5) Incorrect fast idle (6) Fuel contaminated
ENGINE DOES NOT FIRE ↓		
5. Remove and inspect spark plug	WET PLUG →	(1) Carburetor flooded (2) Choke closed (3) Throttle valve open (4) Air cleaner dirty

ENGINE LACKS POWER

1. Raise wheels off ground and spin by hand

   WHEEL SPINS FREELY

2. Check tire pressure

   PRESSURE NORMAL

3. Accelerate rapidly from low to second

   ENGINE SPEED LOWERED WHEN CLUTCH IS RELEASED

4. Accelerate lightly

   ENGINE SPEED INCREASES

5. Check ignition timing

   CORRECT

6. Check valve clearance

   CORRECT

7. Test cylinder compression

   NORMAL

8. Check carburetor for clogging

   NOT CLOGGED

9. Remove spark plug

   NOT FOULED OR DISCOLORED

10. Check oil level and condition

    CORRECT

11. Remove cylinder head cover and inspect lubrication

    VALVE TRAIN LUBRICATED PROPERLY

12. Check for engine overheating

    NOT OVERHEATING

13. Accelerate or run at high speed

    ENGINE DOES NOT KNOCK

	POSSIBLE CAUSE
WHEELS DO NOT SPIN FREELY →	(1) Brake dragging (2) Worn or damaged wheel bearing (3) Wheel bearing needs lubrication (4) Drive chain too tight
PRESSURE LOW →	(1) Punctured tire (2) Faulty tire valve
ENGINE SPEED CHANGED WHEN CLUTCH IS RELEASED →	(1) Clutch slipping (2) Worn clutch disc/plate (3) Warped clutch disc/plate
ENGINE SPEED NOT INCREASED →	(1) Carburetor choke closed (2) Clogged air cleaner (3) Restricted fuel flow (4) Clogged fuel tank breather tube (5) Clogged muffler
INCORRECT →	(1) Faulty spark unit (2) Faulty pulser generator (3) Faulty ignition advancer
INCORRECT →	(1) Improper valve adjustment (2) Worn valve seat
TOO LOW →	(1) Valve stuck open (2) Worn cylinder and piston rings (3) Leaking head gasket (4) Improper valve timing
CLOGGED →	(1) Carburetor not serviced frequently enough
FOULED OR DISCOLORED →	(1) Plugs not serviced frequently enough (2) Spark plug with incorrect heat range
INCORRECT →	(1) Oil level too high (2) Oil level too low (3) Contaminated oil
VALVE TRAIN NOT LUBRICATED PROPERLY →	(1) Clogged oil passage (2) Clogged oil control orifice
OVERHEATING →	(1) Excessive carbon build-up in combustion chamber (2) Use of poor quality fuel (3) Clutch slipping
ENGINE 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 or advaner)

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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 or spark advancer)
CORRECT ↓		
2. Check carburetor low speed circuits	INCORRECT → See Fuel System Section	(1) Clogged passages (2) Float level incorrect
CORRECT ↓		
3. Check for leaking manifold	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) A.C. generator faulty (4) Faulty ignition coil (5) Faulty spark advancer
GOOD SPARK		

POOR PERFORMANCE AT HIGH SPEED

1. Check ignition timing and valve clearance	INCORRECT →	(1) Improper valve clearance (2) Faulty spark unit (3) Faulty pulser generator (4) Faulty spark advancer
CORRECT ↓		
2. Disconnect fuel tube at carburetor	FUEL FLOW RESTRICTED →	(1) Lack of fuel in tank (2) Clogged fuel line (3) Clogged fuel tank breather hole (4) Clogged fuel valve
FUEL FLOWS FREELY ↓		
3. Remove carburetor and check for clogged jet	CLOGGED →	(1) Clean
NO CLOG ↓		
4. Check valve timing	INCORRECT →	(1) Cam sprocket not installed properly
CORRECT ↓		
5. Check valve spring tension	WEAK →	(1) Faulty spring
NOT WEAKENED		

POOR HANDLING → Check tire pressure

1. If steering is heavy →	(1) Steering adjustment nut too tight (2) Damaged steering head bearings
2. If either wheel is wobbling →	(1) Excessive wheel bearing play (2) Distorted rim (3) Improperly installed wheel hub (4) Swing arm pivot bushing excessively worn (5) Distorted frame (6) Improper drive chain tension or adjustment
3. If the motorcycle pulls to one side →	(1) Improperly adjusted shock absorber (2) Front and rear wheels not aligned (3) Bent front fork (4) Bent swing arm