

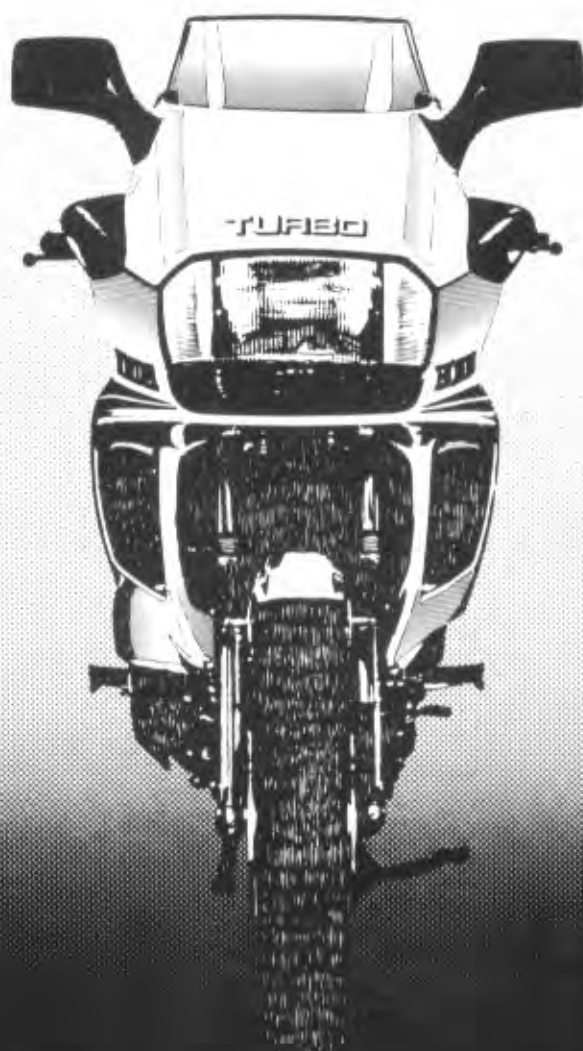
Official

HONDA

SHOP MANUAL

CX500

TURBO



'82

IMPORTANT SAFETY NOTICE

WARNING

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

CAUTION:

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

NOTE:

Gives helpful information.

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



HOW TO USE THIS MANUAL

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

Sections 1 through 3 apply to the whole motorcycle, while sections 4 through 22 describe parts of the motorcycle, grouped according to location.

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

Most sections start with an assembly or system illustration, service information and troubleshooting for the section. The subsequent pages give detailed procedures.

If you are not familiar with this motorcycle, read the TECHNICAL FEATURES in section 23.

If you don't know the source of the trouble, go to section 24, TROUBLESHOOTING.

ALL INFORMATION, ILLUSTRATIONS, DIRECTIONS AND SPECIFICATIONS INCLUDED IN THIS PUBLICATION ARE BASED ON THE LATEST PRODUCT INFORMATION AVAILABLE AT THE TIME OF APPROVAL FOR PRINTING. HONDA MOTOR CO., LTD. RESERVES THE RIGHT TO MAKE CHANGES AT ANY TIME WITHOUT NOTICE AND WITHOUT INCURRING ANY OBLIGATION WHATEVER. NO PART OF THIS PUBLICATION MAY BE REPRODUCED WITHOUT WRITTEN PERMISSION.

HONDA MOTOR CO., LTD.
Service Publications Office

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HONDA
CX500 TURBO

MODEL IDENTIFICATION



BEGINING FRAME NUMBER: JH2PC030*CM000001 ~

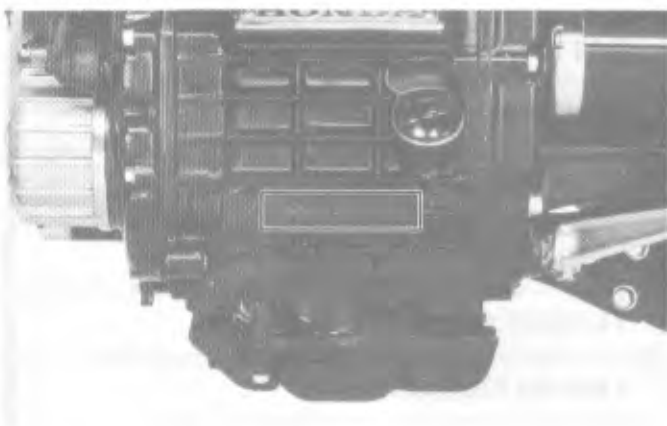
The frame serial number is stamped on the right side of the steering head.



The vehicle identification number is on the left side of the frame.



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





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GENERAL SAFETY

WARNING

If the engine must be running to do some work, make sure the area is well-ventilated. Never run the engine in a closed area. The exhaust contains poisonous carbon monoxide gas.

WARNING

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

WARNING

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

WARNING

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

SERVICE RULES

1. Use genuine HONDA or HONDA-recommended parts and lubricants or their equivalent. Parts that do not meet HONDA's design specifications may damage the motorcycle.
2. Use the special tools designed for this product.
3. Use only metric tools when servicing this motorcycle. Metric bolts, nuts, and screws are not interchangeable with English fasteners. The use of incorrect tools and fasteners may damage the motorcycle.
4. Install new gaskets, O-rings, cotter pins, lock plates, etc. when reassembling.
5. When tightening bolts or nuts, begin with larger-diameter or inner bolts first, and tighten to the specified torque diagonally, unless a particular sequence is specified.
6. Clean parts in cleaning solvent upon disassembly. Lubricate any sliding surfaces before reassembly.
7. After reassembly, check all parts for proper installation and operation.
8. Route all electrical wires as shown on page 1-10 and away from sharp edges and areas where they can be easily pinched between moving parts.



SPECIFICATIONS

Item		
DIMENSIONS	Overall length	2,260 mm (89.0 in)
	Overall width	720 mm (28.3 in)
	Overall height	1,345 mm (53.0 in)
	Wheel base	1,495 mm (58.9 in)
	Seat height	790 mm (31.1 in)
	Ground clearance	150 mm (5.9 in)
	Dry weight	239 kg (527 lbs)
	Curb weight (Wet)	260 kg (573 lbs)
FRAME	Type	Diamond
	F. suspension, travel	Telescopic with TRAC, 130 mm (5.1 in)
	R. suspension, travel	Pro-link Swingarm, 105 mm (4.13 in)
	F. suspension air pressure	80–120 kPa (0.8–1.2 kg/cm ² , 11–17 psi)
	R. suspension air pressure	100–500 kPa (1.0–5.0 kg/cm ² , 14–71 psi)
	Front tire size	3.50H 18–4PR
	Rear tire size	120/90–17 64H
	Cold tire pressures	Up to 90 kg (200 lbs) load
		Front Rear
	Up to vehicle capacity load	Front Rear
		250 kPa (2.5 kg/cm ² , 36 psi) 280 kPa (2.8 kg/cm ² , 40 psi)
ENGINE	F. brake and lining swept area	Double disc, 517 cm ² (80.1 sq in)
	R. brake and lining swept area	Single disc, 283 cm ² (43.9 sq in)
	F. disc efficient diameter	276 mm (10.87 in)
	R. disc efficient diameter	276 mm (10.87 in)
	Caster angle	63°
	Trail length	110 mm (4.3 in)
	Front fork oil capacity	310 cm ³ (10.5 US oz, 8.7 Imp oz) after disassembly
	Rear shock oil capacity	540 cm ³ (18.3 US oz, 15.2 Imp. oz)
	Rear shock air capacity	180 cm ³ (6.1 US oz, 5.1 Imp. oz)
	Type, cylinder arrangement	Liquid cooled, turbocharged 4 stroke OHV, 80° V twin engine
	Engine weight	78 kg (172 lbs)
	Bore and stroke	78 × 52 mm (3.07 × 2.05 in)
	Displacement	497 cm ³ (30.3 cu-in)
	Compression ratio	7.2 : 1
	Cylinder compression	700–1000 kPa (7–10 kg/cm ² , 100–142 psi)
	Valve train	Chain driven camshaft and push rod
	Lubrication system	Forced pressure and wet sump
	Oil capacity	3.5 lit. (3.7 US qt, 3.1 Imp qt) after disassembly 3.0 lit. (3.2 US qt, 2.6 Imp qt) after draining
	Oil type	SAE 10W-40, Service classification SF
	Cooling system capacity	2.1 lit (2.2 US qt, 1.8 Imp qt) after disassembly 1.5 lit (1.6 US qt, 1.3 Imp qt) after draining
	Camshaft	
	Intake valve	Opens 5° BTDC Closes 30° ABDC
	Exhaust valve	Opens 30° BBDC Closes 5° ATDC
	Valve clearance (cold)	IN 0.10 mm (0.004 in) EX 0.12 mm (0.005 in)
	Idle speed	1,100 ± 100 min ⁻¹ (rpm)



Item		
FUEL SYSTEM	Type	Computerized fuel injection
	Fuel pressure	255 kPa (2.55 kg/cm ² , 36.3 psi)
	Fuel pump type	Electric
	Fuel capacity	20 lit. (5.3 U.S. gal., 4.4 Imp. gal.)
	Fuel reserve capacity	5 lit. (1.3 U.S. gal., 1.1 Imp. gal.)
	Fuel type	89 or higher pump octane or 94 RON minimum
DRIVE TRAIN	Clutch type	Wet, multi plate
	Transmission	5 speed constant mesh
	Primary reduction ratio	2.056 (74/36)
	Gear ratio 1st	2.500 (40/16)
	Gear ratio 2nd	1.714 (36/21)
	Gear ratio 3rd	1.280 (32/25)
	Gear ratio 4th	1.036 (29/28)
	Gear ratio 5th	0.867 (26/30)
	Final reduction ratio	3.091 (34/11)
	Gear shift pattern	Left foot operated, 1-N-2-3-4-5
ELECTRICAL	Final gear oil capacity	170 cm ³ (5.7 US oz, 4.8 Imp oz)
	Ignition	Transistorized
	Ignition timing "F" mark	25° BTDC at 1,100 min ⁻¹ (rpm)
	Starting system	Starter motor
	Alternator	Three phase AC generator 12V - 340W/5,000 min ⁻¹ (rpm)
	Battery capacity	12V-14 AH
	Spark plug	
	Standard	DPR8EV-9 (NGK), X24EPR-GU9 (ND)
	For extended high speed riding	DPR9EV-9 (NGK), X27EPR-GU9 (ND)
	For cold climate (Below 5°C, 41°F)	DPR7EV-9 (NGK), X22EPR-GU9 (ND)
LIGHTS	Spark plug gap	0.8-0.9 mm (0.031-0.035 in)
	Fuse	30A (main), 15A (sub)
	Headlight (High/Low)	12V-60/55W H4 bulb (Phillips 12342/99, or equivalent)
	Tail/stoplight	12V-8/27 W (3/32cp, SAE No. 1157)
	Turn signal light	12V-23W (32cp, SAE No. 1073)
	Meter light	12V-3.4W (2cp, SAE No. 158)
	Neutral indicator	12V-3.4W (2cp, SAE No. 158)
	Turn signal indicator	12V-3.4W (2cp, SAE No. 158)
	High beam indicator	12V-3.4W (2cp, SAE No. 158)
	Oil pressure warning light	12V-3.4W (2cp, SAE No. 158)
FUEL SYSTEM	Fuel system warning light	12V-3.4W (2cp, SAE No. 158)
	Fuel reserve warning light	12V-3.4W (2cp, SAE No. 158)
	Position light	12V-4W


GENERAL INFORMATION
TORQUE VALUES
ENGINE

Item	Q'ty	Thread dia. (mm)	Torque		
			N·m	kg·m	ft·lb
Crankshaft cap bolt	7	8	20 - 24	2.0 - 2.4	14 - 17
Connecting rod cap nut	4	8	36 - 40	3.6 - 4.0	26 - 29
Cylinder head bolt	8	12	50 - 60	5.0 - 6.0	36 - 43
Cylinder head bolt	4	8	24 - 30	2.4 - 3.0	17 - 22
Exhaust manifold nut	4	8	20 - 25	2.0 - 2.5	14 - 18
Turbocharger bracket bolt	6	8	20 - 25	2.0 - 2.5	14 - 18
Turbocharger inlet flange nut	3	8	20 - 25	2.0 - 2.5	14 - 18
Flywheel rotor bolt	1	12	80-100	8.0-10.0	58 - 72
Cam sprocket bolt	2	7	16 - 20	1.6 - 2.0	12 - 14
Cam sprocket lock nut	1	20	80-100	8.0-10.0	58 - 72
Primary drive gear bolt	1	12	80 - 95	8.0 - 9.5	58 - 69
Clutch center lock nut	1	20	80-100	8.0-10.0	58 - 72
Transmission holder bolt (6 x 20 mm)	4	6	15 - 20	1.5 - 2.0	11 - 14
Transmission holder bolt (6 x 32 mm)	2	6	10 - 14	1.0 - 1.4	7 - 10
Starting clutch torx bolt	3	8	20 - 25	2.0 - 2.5	14 - 18
Neutral switch	1	8	10 - 14	1.0 - 1.4	7 - 10
Water temperature sending unit	1	8	21 - 25	2.1 - 2.5	15 - 18
Oil pressure switch	1	—	9 - 12	0.9 - 1.2	7 - 9
Water temperature sensor	1	—	21 - 25	2.1 - 2.5	15 - 18
Cam chain tensioner base bolt	1	8	18 - 25	1.8 - 2.5	13 - 18
Valve adjuster lock nut	8	6	15 - 18	1.5 - 1.8	11 - 13
Oil filter bolt	1	12	20 - 25	2.0 - 2.5	14 - 18
Engine oil drain bolt	1	12	15 - 25	1.5 - 2.5	11 - 18
Spark plug	2	12	12 - 18	1.2 - 1.8	9 - 13

FRAME

Item	Q'ty	Thread dia. (mm)	Torque		
			N·m	kg·m	ft·lb
Engine mount bolt	1	12	60 - 80	6.0 - 8.0	43 - 58
Engine mount bolt	5	10	45 - 70	4.5 - 7.0	33 - 51
Front engine hanger nut	2	10	30 - 40	3.0 - 4.0	22 - 29
Front engine hanger bolt	2	10	35 - 45	3.5 - 4.5	25 - 33
Front axle nut	1	23	55 - 65	5.5 - 6.5	40 - 47
Front axle holder nut	4	8	18 - 30	1.8 - 3.0	13 - 22
Front fork pinch bolt	2	7	9 - 15	0.9 - 1.5	7 - 11
Front fork pinch bolt	2	10	40 - 55	4.0 - 5.5	29 - 40
Steering adjustment nut	1	24	18 - 20	1.8 - 2.0	13 - 14
Steering stem nut	1	30	90-120	9.0-12.0	65 - 87
Handlebar holder bolt	4	8	18 - 30	1.8 - 3.0	13 - 22
Rear axle nut	1	16	80-100	8.0-10.0	43 - 72
Rear axle pinch bolt	1	8	20 - 30	2.0 - 3.0	14 - 22



Item	Q'ty	Thread dia. (mm)	Torque		
			N-m	kg-m	ft-lb
Swingarm pivot bolt	1	22	10 - 12	1.0 - 1.2	7 - 9
Swingarm pivot lock nut	1	23	100-130	10.0-13.0	72 - 94
Rear shock absorber mount bolt	2	10	38 - 48	3.8 - 4.8	28 - 35
Pro-link linkage (shock link bolt)	1	10	50 - 65	5.0 - 6.5	36 - 47
(shock arm socket bolt)	2	10	40 - 50	4.0 - 5.0	28 - 36
(linkage connecting bolt)	1	10	50 - 65	5.0 - 6.5	36 - 47
Rear brake stopper arm bolt (front)	1	10	30 - 40	3.0 - 4.0	22 - 29
Rear brake stopper arm nut (front)	1	8	18 - 28	1.8 - 2.8	13 - 20
Rear brake stopper arm bolt (rear)	1	8	18 - 28	1.8 - 2.8	13 - 20
Final drive case nut	3	10	55 - 65	5.5 - 6.5	40 - 47
Drive shaft lock bolt	1	8	18 - 28	1.8 - 2.8	13 - 20
Brake hose joint bolt	7	10	25 - 40	2.5 - 4.0	18 - 29
Front caliper mount bolt (upper)	2	10	35 - 45	3.5 - 4.5	25 - 33
Front caliper mount bolt (lower)	2	8	20 - 25	2.0 - 2.5	14 - 18
Brake caliper pivot bolt	3	12	25 - 30	2.5 - 3.0	18 - 22
Brake caliper bolt	3	8	20 - 25	2.0 - 2.5	14 - 18
Brake caliper bleed valve	3	5	4 - 7	0.4 - 0.7	3 - 5
Fuel hose joint bolt	1	17	35 - 50	3.5 - 5.0	25 - 36
Fuel hose joint nut	1	—	27 - 29	2.7 - 2.9	20 - 21
Fuel valve nut	1	22	20 - 25	2.0 - 2.5	14 - 18
Exhaust pipe joint nut	4	6	8 - 14	0.8 - 1.4	6 - 10
Muffler band bolt	2	8	18 - 28	1.8 - 2.8	13 - 20
Muffler mount bolt	3	10	30 - 40	3.0 - 4.0	22 - 29
Fairing bracket bolt	4	8	20 - 30	2.0 - 3.0	14 - 22
Rear brake pedal bolt	1	8	18 - 28	1.8 - 2.8	13 - 20
Foot peg holder bolt	4	8	20 - 30	2.0 - 3.0	14 - 22
Gearshift pedal	1	6	10 - 15	1.0 - 1.5	7 - 11
Radiator mount bolt	3	8	20 - 30	2.0 - 3.0	14 - 22

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 N-m (kg-m, ft-lb)	Type	Torque N-m (kg-m, ft-lb)
5 mm bolt, nut	4.5-6.0 (0.45-0.6, 3.3-4.3)	5 mm screw	3.5-5.0 (0.35-0.5, 2.5-3.6)
6 mm bolt, nut	8 -12 (0.8-1.2, 6-9)	6 mm screw	7-11 (0.7-1.1, 5-8)
8 mm bolt, nut	18-25 (1.8-2.5, 13-18)	6 mm flange bolt, nut	10-14 (1.0-1.4, 7-10)
10 mm bolt, nut	30-40 (3.0-4.0, 22-29)	8 mm flange bolt, nut	24-30 (2.4-3.0, 17-22)
12 mm bolt, nut	50-60 (5.0-6.0, 36-43)	10 mm flange bolt, nut	30-40 (3.0-4.0, 22-29)



TOOLS

SPECIAL

* : These tools are designed and have not been used before.

DESCRIPTION	NUMBER	REMARKS	REF. SECT.
* Fuel pressure gauge set	07406-0040000		24
* Sensor inspection adapter	07999-MC70000		22, 24
* Piston remover	07941-MC70000		13
* Main bearing dis/assembly tool	07973-MC70000		13
* Oil seal driver	07965-MC70100		16
* Socket wrench, 17 x 27 mm	07907-MC70000	or commercially available in U.S.A.	10, 11
* Gear holder	07924-MC70000	or modified 07924-4150000	9, 11, 13
* Preload inspection tool	07998-MC70000	or 07998-4150000	17
Retainer wrench	07910-4300000		16
Pinion retainer wrench	07910-MA10100	or 07910-4150000	17
Swingarm lock nut wrench	07908-4690001	or KS-HBA-08-469	16
Ring gear retainer wrench	07910-3710000		17
Snap ring pliers	07914-3230001		15, 18
Steering stem socket	07916-3710100		15
Allen wrench, 6 mm	07917-3230000	or commercially available in U.S.A.	15
Clutch center holder	07923-4610000	or 07923-3710000	8
Pinion puller attachment	07934-MA10100	or 07931-4630200	17
Pinion puller catcher	07934-MA10200		17
Crank cap puller	07935-4150000		13
Bearing remover, 20 mm	07936-3710600		12
Bearing remover handle	07936-3710100		12, 16, 17
Bearing remover weight	07936-3710200		12, 16, 17
Bearing remover, 30 mm	07936-8890300		16, 17
Valve guide driver attachment	07943-4150000		7
Race driver attachment	07945-3330300		12, 17
Attachment	07945-3330100		17
Crank cap driver	07945-4150100		12, 13
Mechanical-seal driver attachment	07945-4150400	or 07945-3710200	10
Race remover	07946-3710500		15
Steering stem driver	07946-3710601	or 07946-3710600	15
Attachment	07946-3710701	or 07946-3710700	15
Ring gear dis/assembly tool	07946-3710100		17
Fork seal driver	07947-3710101		15
Driver	07949-3710000		12
Race remover	07953-4250002		16
Seal driver attachment	07965-MA10200		16
Ring gear center guide	07965-4150100		17
O-ring guide	07973-4630200		17
Valve guide reamer	07984-6110000	or 07984-6570100	7
Inspection plug	07999-4150000		3, 20, 24

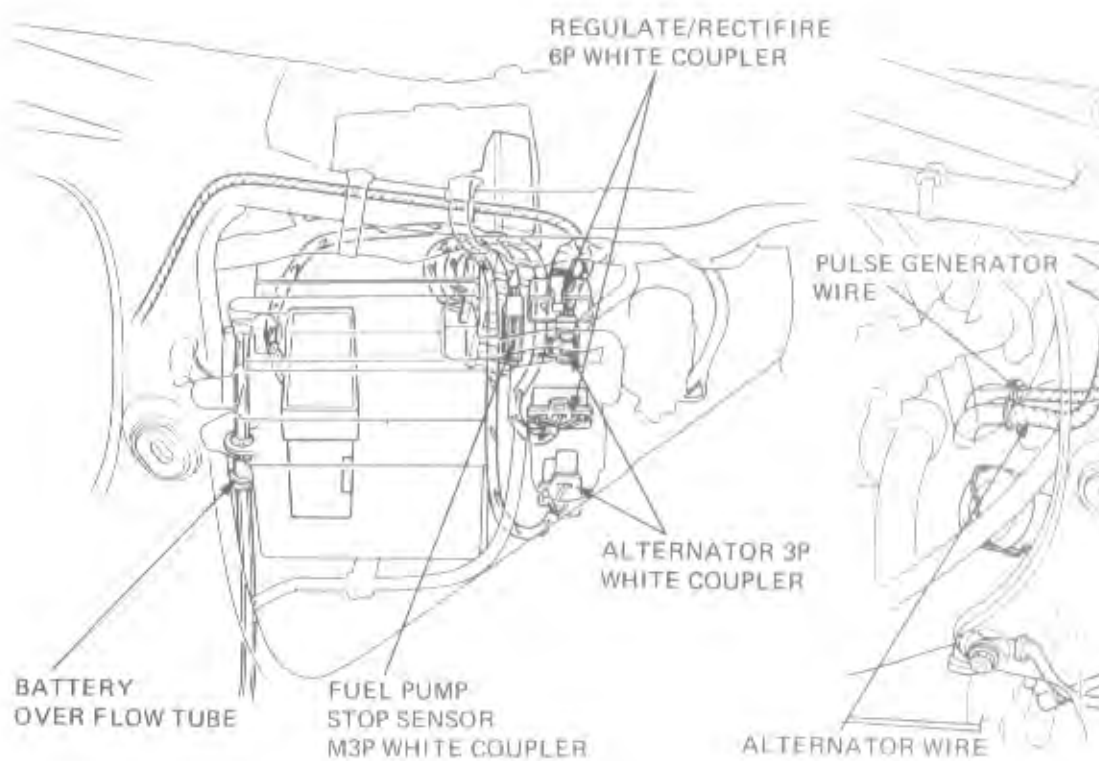
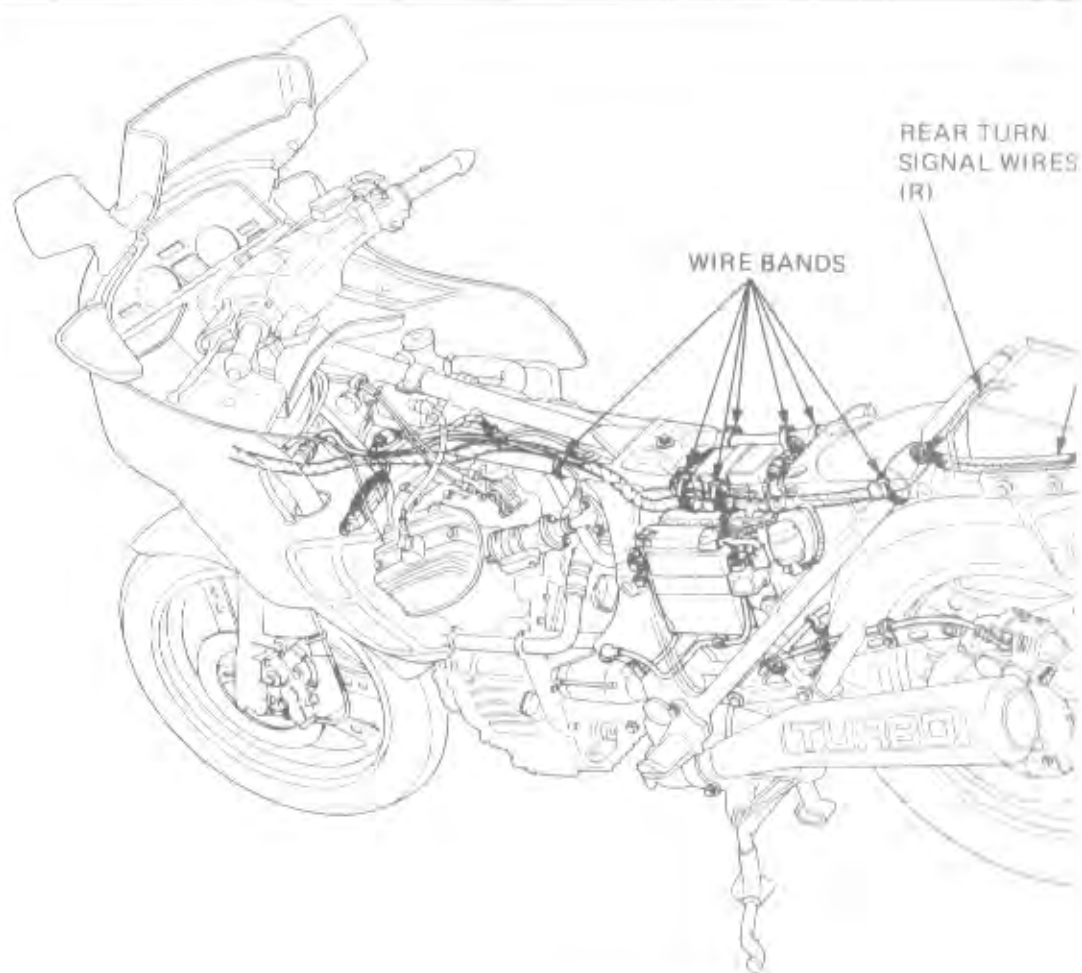

COMMON

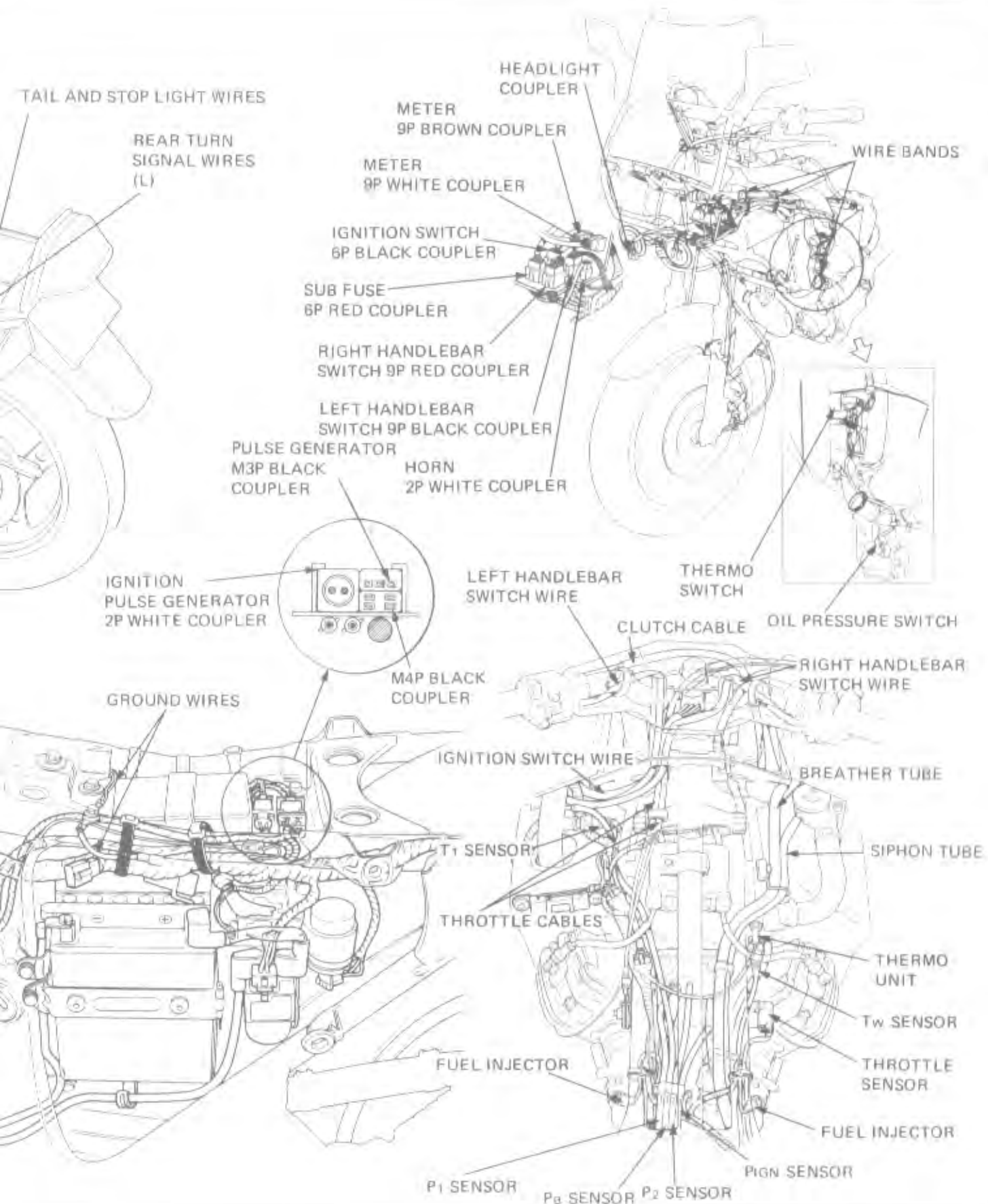
NOTE 1: May be used when pilot not used.

DESCRIPTION	NUMBER	REMARKS	REF. SECT.
Pin spanner	07702-0010000	or M9361-412-099788 (U.S.A. only)	15
Torx driver bit	07703-0010100	or commercially available in U.S.A.	9
Socket bit, 17 mm	07703-0020500		16
Valve adjuster wrench 10 x 12 mm	07708-0030200	} or 07908-3640000	3
Valve adjuster B	07708-0030400		3
Wrench, 26 x 30 mm	07716-0020203	or 07716-0020202	8
Wrench, 30 x 32 mm	07716-0020400	or commercially available in U.S.A.	15
Extension bar	07716-0020500	or commercially available in U.S.A.	8, 9, 15
Rotor puller	07733-0020001	or 07933-3950000	9
Valve guide driver, 6.6 mm	07742-0010200	or 07942-6570100	7
Pin driver, 3.5 mm	07744-0010300	or commercially available in U.S.A.	16
Attachment, 32 x 35 mm	07746-0010100	or 07946-3640000, 07946-6920100	12
Attachment, 37 x 40 mm	07746-0010200		16
Attachment, 42 x 47 mm	07746-0010300	or 07945-3330100	9, 12, 15, 16, 17
Pilot, 15 mm	07746-0040300		15, 16
Pilot, 20 mm	07746-0040500		12
Pilot, 30 mm	07746-0040700		17
Attachment, 52 x 55 mm	07746-0010400	or 07946-3710200	12, 17
Pilot, 25 mm	07746-0040600		12
Attachment, 62 x 68 mm	07746-0010500		12
Pilot, 22 mm	07746-0041000		9
Driver	07749-0010000	or 07949-6110000 (NOTE 1)	9, 12, 15, 16, 17
Valve spring compressor	07757-0010000	or 07957-3290001	7
Pressure/vacuum tester	07406-0050000	or commercially available in U.S.A.	6, 20, 24
Digital circuit tester	07411-0020000	or commercially available in U.S.A.	19, 20, 21, 22, 24



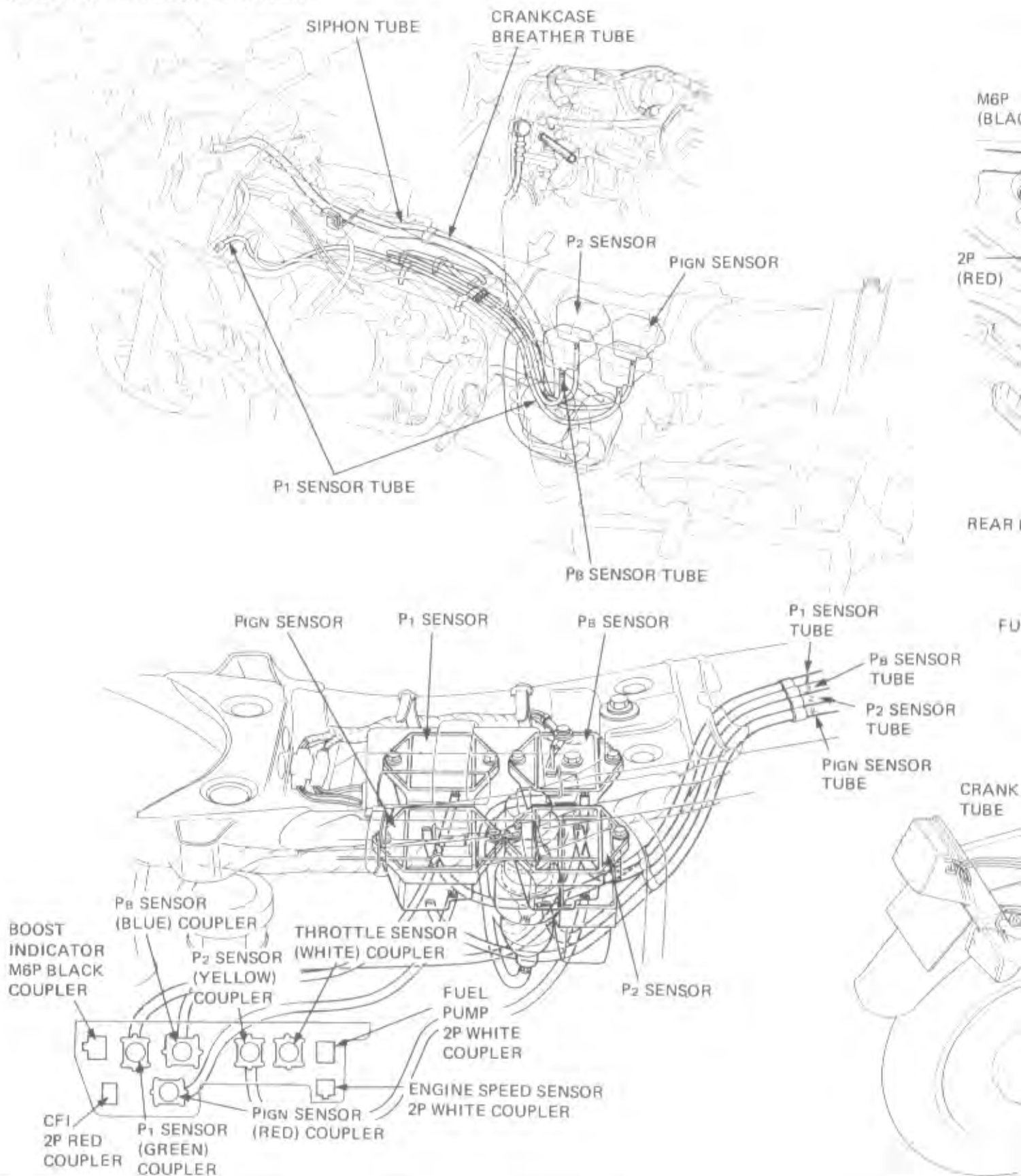
MEMO







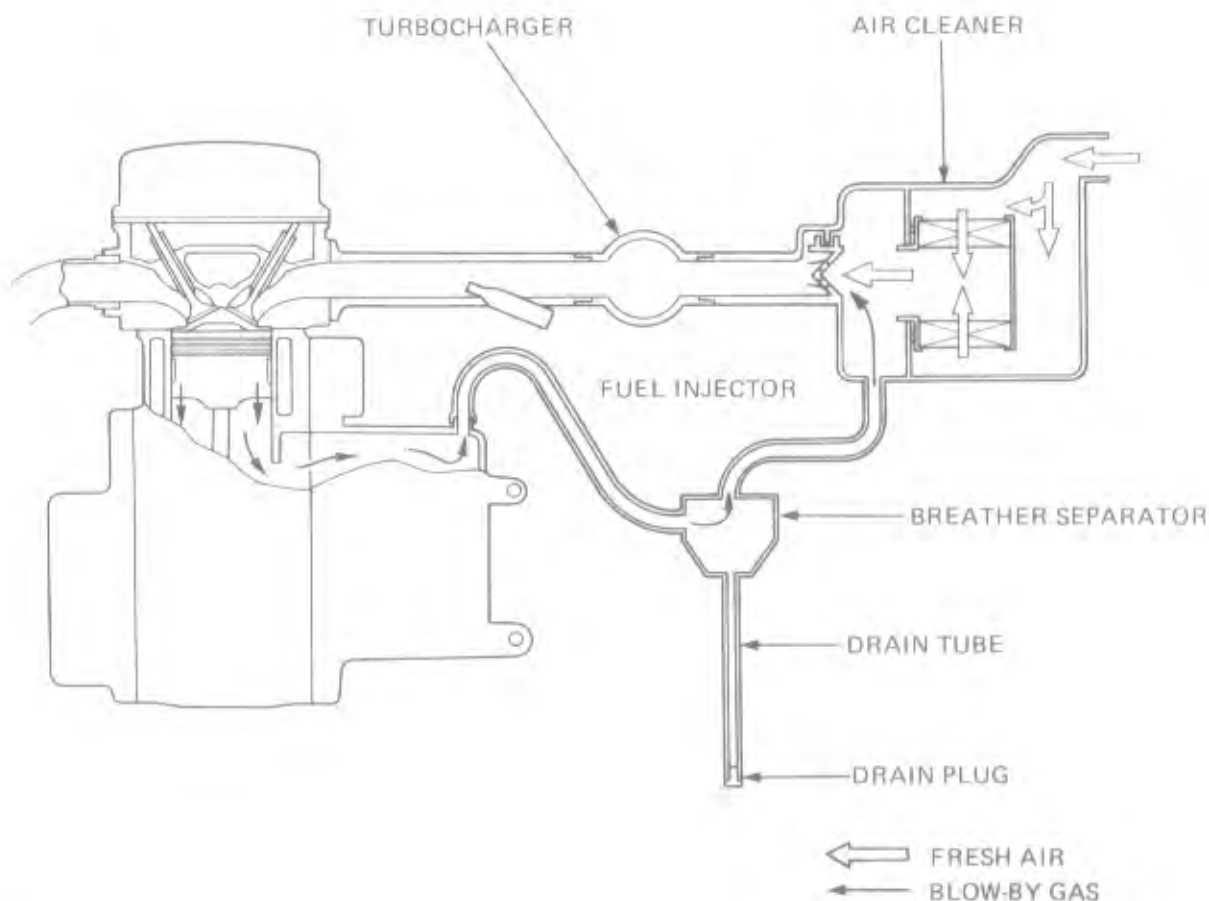
CABLE & HARNESS ROUTING





EMISSION CONTROL SYSTEM

The engine is equipped with the "closed crankcase system" to prevent discharging emission into the atmosphere. Blow-by gas is returned to the combustion chamber through the breather separator, air cleaner and turbocharger.



EMISSION CONTROL INFORMATION LABEL

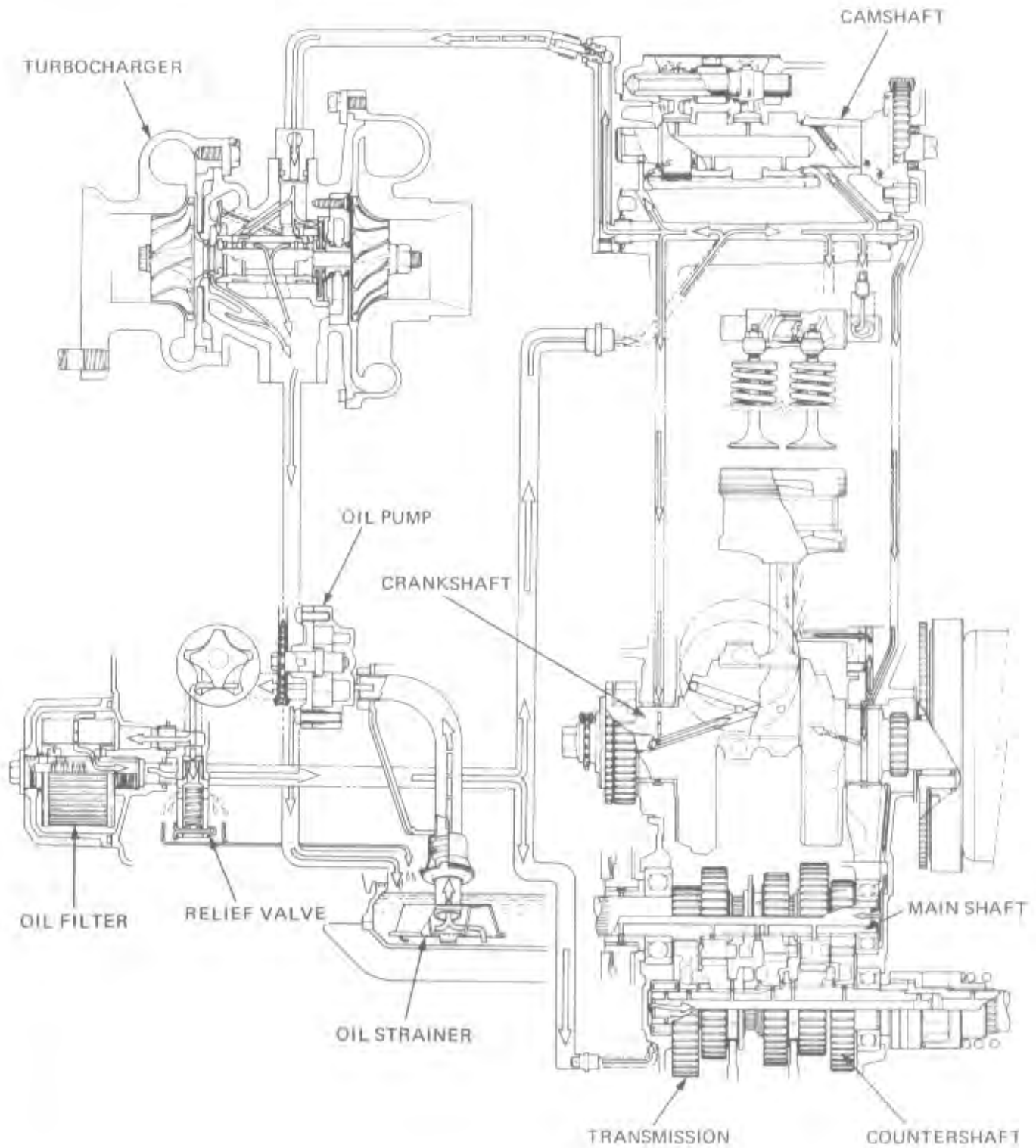
An Emission Control Information Label is located on the frame as shown. It gives basic tune-up specifications.





LUBRICATION

LUBRICATION DIAGRAM





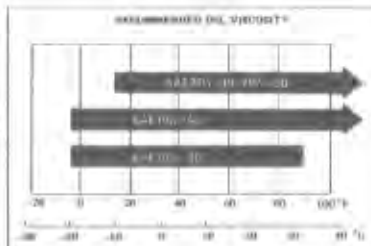
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SERVICE INFORMATION

GENERAL

- Make sure that all oil passages are clean and not clogged before assembly. Do not use different brands of oil in the engine as they may not be compatible.
- Refer to section 8 for maintenance of the oil pump and pressure relief valve.

SPECIFICATIONS

Engine oil	Capacity	3.0 lit (2.6 imp qt, 3.2 US qt) at change 3.5 lit (3.1 imp qt, 3.7 US qt) at disassembly	 Other viscosities shown in the chart may be used when the average temperature in your riding area is within the indicated range.
	Oil recommendation	API service classification: SF Viscosity: SAE 10W-40 (General, all temperature)	
	Oil pump delivery	35 lit (30.8 imp qt, 37.0 US qt) at 3,300 min ⁻¹ (rpm)	
	Oil pressure	500-600 kPa / 4,000 min ⁻¹ (5-6 kg/cm ² / 4,000 rpm, 71.1-85.3 psi / 4,000 rpm)	
Final drive gear oil	Capacity	170 cm ³ (57.5 US oz, 47.9 imp oz)	
	Recommended oil	Hypoid gear oil Above 5°C/41°F SAE 90 Below 5°C/41°F SAE 80	

TORQUE VALUES

Engine oil pressure switch	18-23 N·m (1.8-2.3 kg-m, 13-17 ft-lb)
Oil filter bolt	20-25 N·m (2.0-2.5 kg-m, 14-18 ft-lb)
Engine oil drain bolt	15-25 N·m (1.5-2.5 kg-m, 11-18 ft-lb)

TROUBLESHOOTING

Oil Level Too Low:

- Normal oil consumption
- External oil leaks
- Worn piston rings

Oil Contamination

- Oil or filter not changed often enough
- Faulty head gasket

Low Oil Pressure

- Faulty warning light switch
- Pressure relief valve stuck open
- Plugged oil pick-up screen
- Oil pump worn

High Oil Pressure:

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

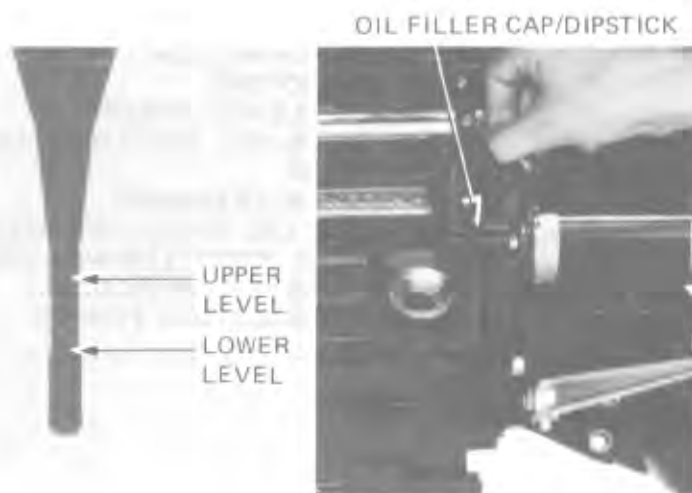
No Oil Pressure

- Oil level too low
- Oil pump drive chain broken
- Faulty oil pump



ENGINE OIL LEVEL CHECK

Place the motorcycle on its center stand. 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 mark on the dipstick, fill to the upper level mark with the recommended oil.



ENGINE OIL & OIL FILTER CHANGE

NOTE

Change engine oil with the engine at normal operating temperature and vehicle on its center stand to assure complete and rapid draining.

Remove the oil filler cap.

Remove the drain plug to drain oil from the engine.

NOTE

Crank the engine for 2–3 seconds to drain any residual oil.

Screw out the oil filter bolt and remove the oil filter element from the oil filter case. Check operation of the bypass valve in the oil filter bolt. Make sure that the O-rings on the filter bolt and the oil filter cover are not damaged and are in good condition.

Install a new oil filter element and retighten the oil filter bolt.

Torque the oil filter bolt.

TORQUE: 20–25 N·m
(2.0–2.5 kg·m, 14–18 ft·lb)

Check the sealing washer on the drain plug is in good condition and reinstall the drain plug.

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

Fill the engine with 3.0 liters (3.2 U.S. qt) of recommended oil.

RECOMMENDED OIL

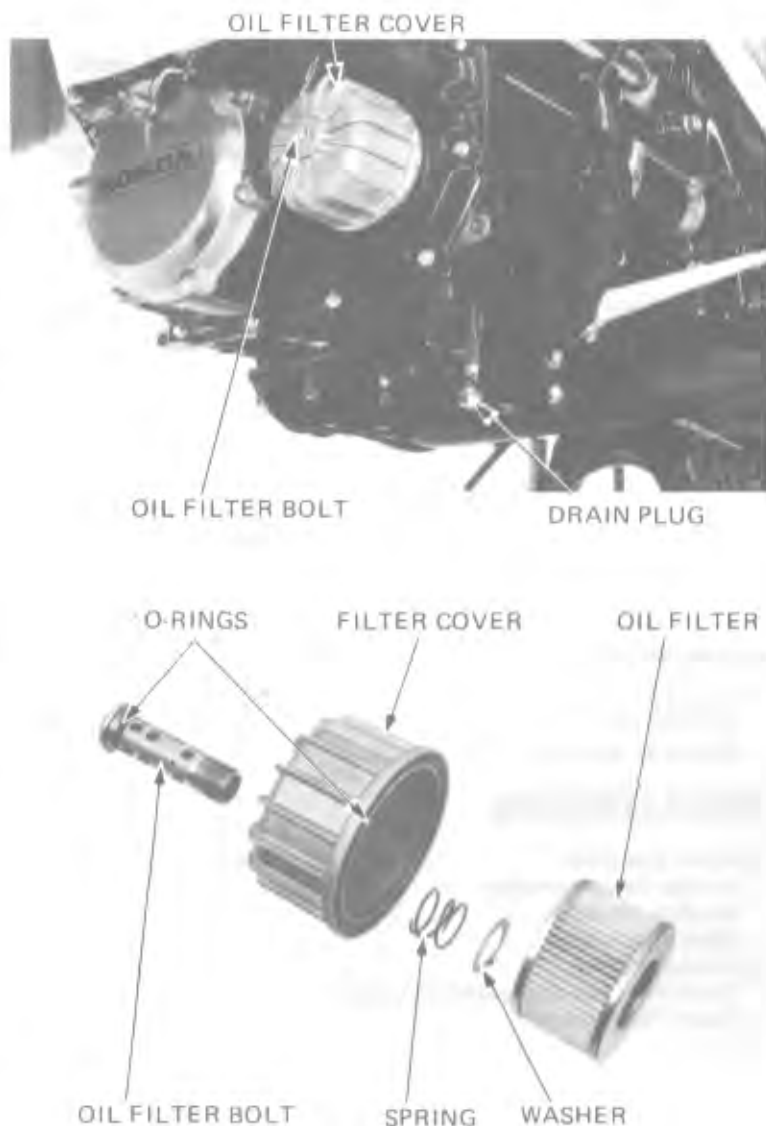
API Service Classification: SF

General, all temperature: SAE 10W-40

Install the oil filler cap/dipstick.

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

Stop the engine, make sure that the oil level is at the upper level mark, and make sure there are no oil leaks.





OIL PRESSURE

Remove the wire from the oil pressure switch.
Remove the oil pressure switch and connect the oil pressure adapter.

NOTE

Apply vinyl tape to the oil pressure switch threads to keep them clean. So the case threads are not damaged during reinstallation.

Warm the engine up to normal operating temperature and check the pressure at 1,100 min⁻¹ (rpm).

STANDARD: 155 kPa (1.55 kg/cm², 22 psi)

CAUTION:

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.

NOTE

Before installing the pressure switch, apply a liquid sealant or seal tape to the thread.

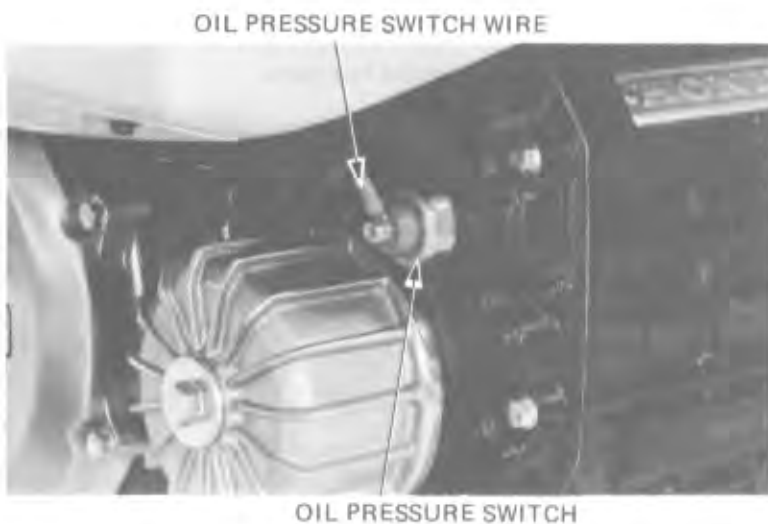
Reinstall the oil pressure switch.

TORQUE: 9–12 N·m
(0.9–1.2 kg·m, 7–9 ft·lb)

CAUTION:

Do not tighten the switch over 25 N·m (2.5 kg·m, 18 ft·lb) or the case may crack because of the switch's tapered thread.

Connect the pressure switch wire.
Place the dust cover over the switch.



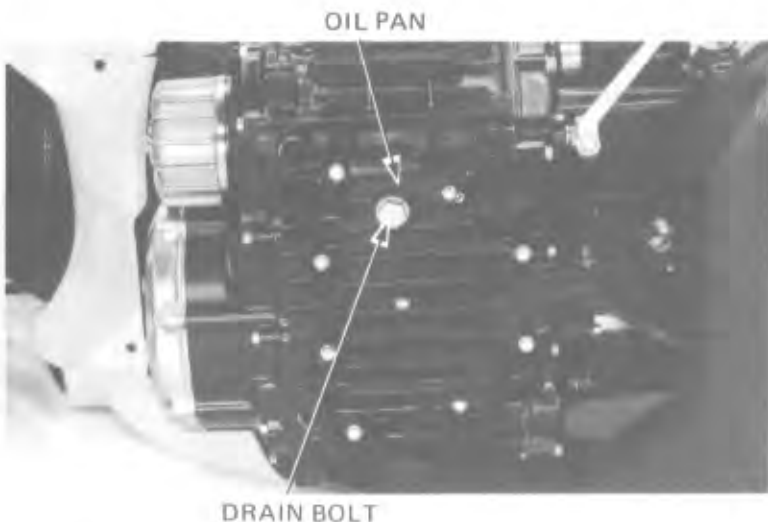
OIL STRAINER CLEANING

Drain the engine oil.
Remove the oil pan by removing the five, 6 mm bolts.

NOTE

Loosen the bolts in an X pattern in two or more steps.

Remove the oil strainer from the engine case.





LUBRICATION

Separate the oil pan halves by removing the four bolts.

Clean the oil strainer screen and oil pan halves thoroughly.



Inspect the O-rings for damage or deterioration. Replace if necessary.

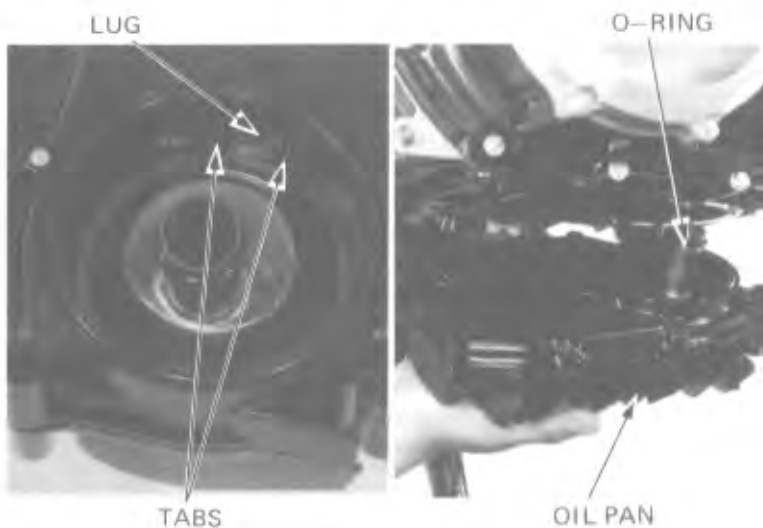
Assemble the oil pan halves with the four bolts.

Install the strainer in the oil pan.

NOTE

Align the tabs of the strainer body with the lug in the oil pan.

Install the oil pan on the engine case, inserting the end of the strainer into the oil pump inlet.



FINAL GEAR OIL CHECK/REPLACEMENT

OIL LEVEL CHECK

Place the motorcycle on its center stand.

Remove the oil filler cap.

Check that the final gear case is filled up to the lower edge of the oil filler hole.

NOTE

If the level is low, check for leaks. Pour fresh oil through the oil filler opening until it reaches the lower edge of the opening.





OIL REPLACEMENT

Remove the oil filler cap.

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

Reinstall the drain bolt securely.

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

OIL CAPACITY: 170 cm³ (47.9 Imp oz)
(57.5 US oz)

RECOMMENDED OIL: HYPOID GEAR OIL
SAE 90 (Above 5°C/41°F)
SAE 80 (Below 5°C/41°F)



DRIVE SHAFT JOINT

Apply approx. 18gr. (20 cm³, 1.2 cu-in) lithium-based MULTIPURPOSE NLGI No. 2 (with molybdenum disulfide-MoS₂-additive) GREASE through the drive shaft joint grease fitting.

NOTE

Use lithium-based MULTIPURPOSE grease with MoS₂-additive as follows:

- MOLYKOTE® BR2-S manufactured by Dow Corning, U.S.A.
- MULTIPURPOSE M-2 manufactured by Mitsubishi Oil, Japan.
- Other lubricants of equivalent quality.



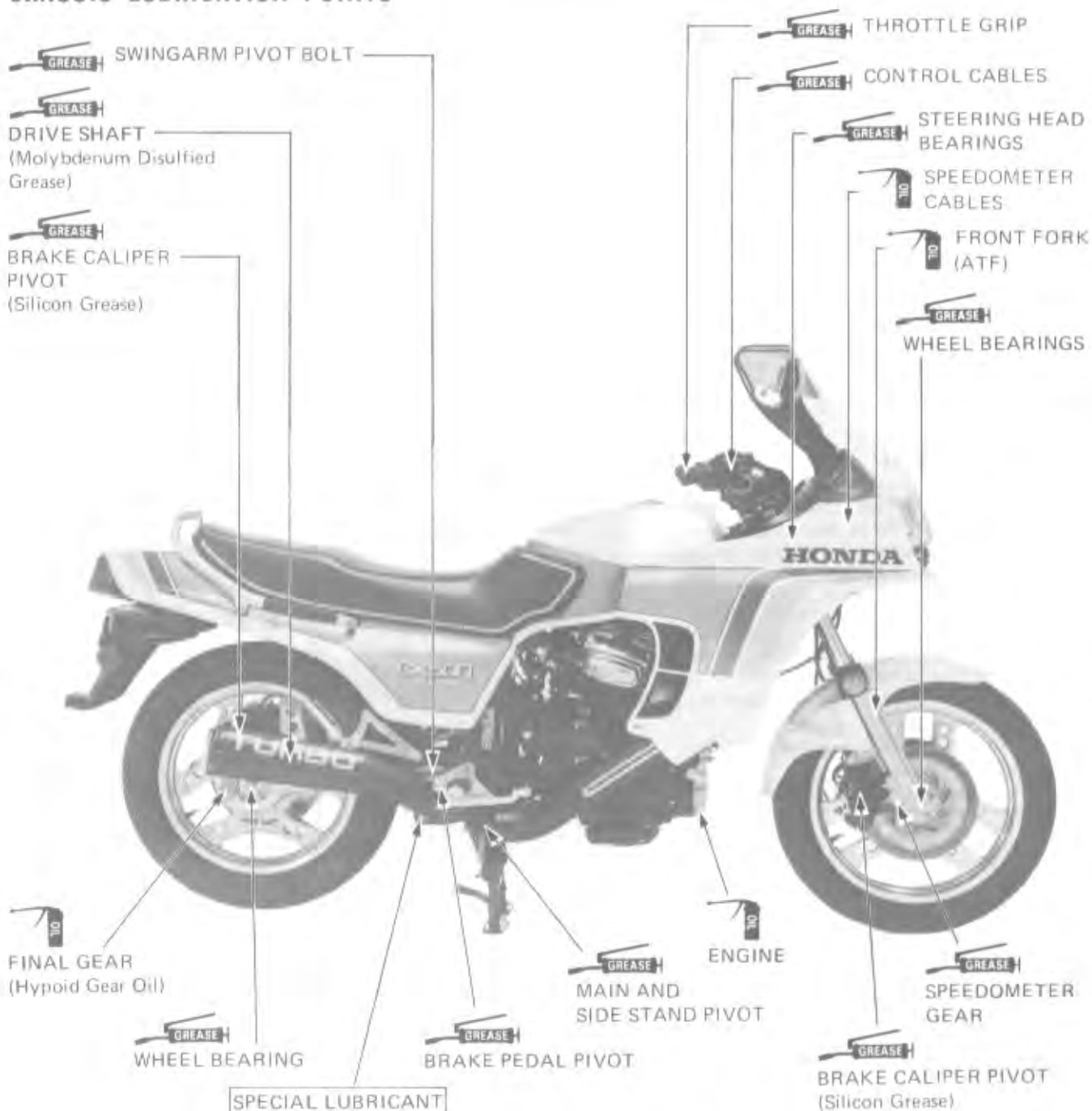
CONTROL CABLE LUBRICATION

Periodically, disconnect the throttle and clutch cables at their upper ends.

Thoroughly lubricate the cables and their pivot points with a commercially available cable lubricant.



CHASSIS LUBRICATION POINTS



- SHOCK ABSORBER UPPER MOUNT BUSHINGS (See page 16-14)
- SUSPENSION LINKAGE PIVOTS (See page 16-24)



SERVICE INFORMATION	3-1	< CHASSIS >	
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SERVICE INFORMATION

GENERAL

- Refer to section 2, LUBRICATION for details of the following items:

Engine oil
 Engine oil filter
 Front drive gear oil
 Drive shaft joint

SPECIFICATIONS

Engine

Spark plug: Recommended spark plug

	For cold climate (Below 5°C, 41°F)	Standard	For extended high speed riding
NGK	DPR7EV-9	DPR8EV-9	DPR9EV-9
ND	X22EPR-GU9	X24EPR-GU9	X27EPR-GU9

Spark plug gap:	0.8–0.9 mm (0.031–0.035 in)
Valve clearance	IN: 0.10 mm (0.004 in)
	EX: 0.12 mm (0.005 in)
Throttle grip free play:	2–4 mm (1/8–1/6 in)
Idle speed:	1,100 ± 100 min ⁻¹ (rpm)
Cylinder compression:	700–1,000 kPa (7.0–10.0 kg/cm ² , 100–142 psi)
Clutch free play:	10–20 mm (3/8–3/4 in)



MAINTENANCE

Chassis

Rear brake pedal free play: 20–30 mm (3/4 – 1-1/4 in)

Tires

Tire size		Front	Rear
		3.50H 18–4 PR	120/90–17 64H
Cold tire pressures kPa (kg/cm ² , psi)	Up to 90 kg (200 lbs) load	250 (2.5, 36)	250 (2.5, 36)
	90 kg (200 lbs) load to vehicle capacity load	250 (2.5, 36)	280 (2.8, 40)
Tire brand	BRIDGESTONE	L303	G510
	DUNLOP	F11	K527

Suspension air pressure: Front 80–120 kPa (0.8–1.2 kg/cm², 11–17 psi)
 Rear 100–500 kPa (1 – 5 kg/cm², 14–71 psi)

TOOLS

Special

Inspection plug : 07999–4150000
 Vacuum gauge tester : 07404–002000
 Gauge attachment A : 07510–3000100

Common

Valve adjusting wrench 10 x 12 mm : 07708–0030200 – Commercially available in U.S.A.
 Valve adjuster B : 07708–0030400 or 89201-200-000 or 07908-GB40000



MAINTENANCE SCHEDULE

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

I: INSPECT AND CLEAN, ADJUST, LUBRICATE, OR REPLACE IF NECESSARY.

C: CLEAN

R: REPLACE

A: ADJUST

L: LUBRICATE

ITEM			FREQUENCY	WHICHEVER COMES FIRST ↓	ODOMETER READING (NOTE 3)								REFER TO PAGE
					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)	24,000 mi (38,400 km)		
					EVERY								
EMISSION RELATED ITEMS	*	FUEL LINES					I		I		I	3-4	
	*	FUEL STRAINER									R	3-4	
	*	THROTTLE OPERATION		I		I		I		I		3-5	
		AIR CLEANER	NOTE 1		C	C	C	C	C	C	C	3-6	
		CRANKCASE BREATHER	NOTE 2		C	C	C	C	C	C	C	3-7	
		SPARK PLUGS		REPLACE EVERY 2,000 mi (3,200 km)								3-7	
	*	VALVE CLEARANCE		I	I	I		I		I		3-8	
		ENGINE OIL	YEAR	R	REPLACE EVERY 2,000 mi (3,200 km)							2-2	
		ENGINE OIL FILTER	YEAR	R	R	R	R	R	R	R	R	2-2	
	*	ENGINE IDLE SPEED		I	I	I	I	I	I	I	I	3-10	
		RADIATOR COOLANT				I		I		**R		3-10	
	*	RADIATOR CORE				I		I		I		3-10	
	*	HOSES & CONNECTIONS COOLING SYSTEM		I		I		I		I		3-11	
NON-EMISSION RELATED ITEMS		DRIVE SHAFT JOINT				L		L		L		2-5	
		FINAL DRIVE LUBRICANT				I		I		R		2-4	
		BATTERY	MONTH	I	I	I	I	I	I	I	I	3-11	
		BRAKE FLUID	MONTH 2 YEARS *R	I	I	I	I	I	I	I	*R	3-11	
		BRAKE PAD WEAR			I	I	I	I	I	I	I	3-12	
		BRAKE SYSTEM			I		I		I		I	3-12	
	*	BRAKE LIGHT SWITCH			I		I		I		I	3-12	
	*	HEADLIGHT AIM			I		I		I		I	3-13	
		CLUTCH			I	I	I	I	I	I	I	3-13	
		SIDE STAND				I		I		I		3-15	
	*	SUSPENSION			I		I		I		I	3-15	
	*	NUTS, BOLTS, FASTENERS			I		I		I		I	3-17	
	**	WHEELS			I		I		I		I	3-17	
	**	STEERING HEAD BEARINGS			I		I		I		I	3-18	

* 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 DUSTY AREAS.

2. SERVICE MORE FREQUENTLY WHEN RIDING IN RAIN OR AT FULL THROTTLE.

3. FOR HIGHER ODOMETER READINGS, REPEAT AT THE FREQUENCY INTERVAL ESTABLISHED HERE.

FUEL LINES

Make sure that the fuel lines and connections are not deteriorated, damaged or leaking. Replace any parts which have signs of deterioration, damage or leakage.

FUEL STRAINER

WARNING

Gasoline is flammable and explosive under certain conditions. Keep flames and sparks away from your work area.



Remove the fuel tank and battery.
Remove the four bolts attaching the battery box and push the battery box down all the way.

WARNING

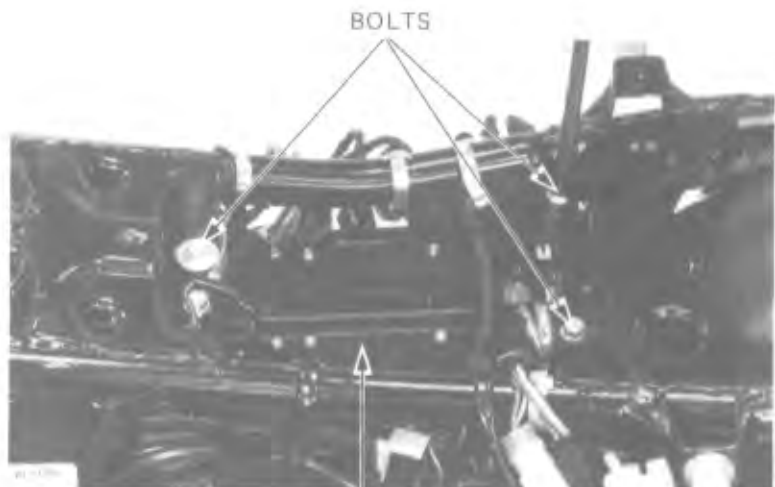
Do not turn the ignition switch on after removing the fuel tank. Failure to do so causes fuel to squirt out of the fuel return hose causing a fire danger.

Remove the strap and pull the ignition control unit out toward the left. Loosen the three wire clamps to aid in moving the bracket. Do not disconnect the connectors and tubes.



BOLTS BATTERY BOX BOLTS

Remove the three bolts attaching the sensor bracket and shift the bracket toward the right.



SENSOR BRACKET

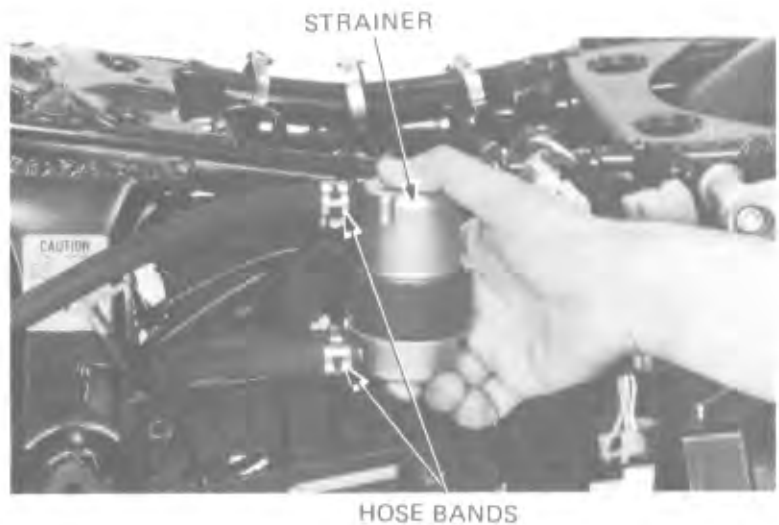


Free the fuel strainer from the frame bracket and pull it out from the left side.

Remove the fuel hoses from the strainer by removing the hose bands.

WARNING

Gasoline is flammable and is explosive under certain conditions. Do not smoke or allow flames or sparks near the work area.



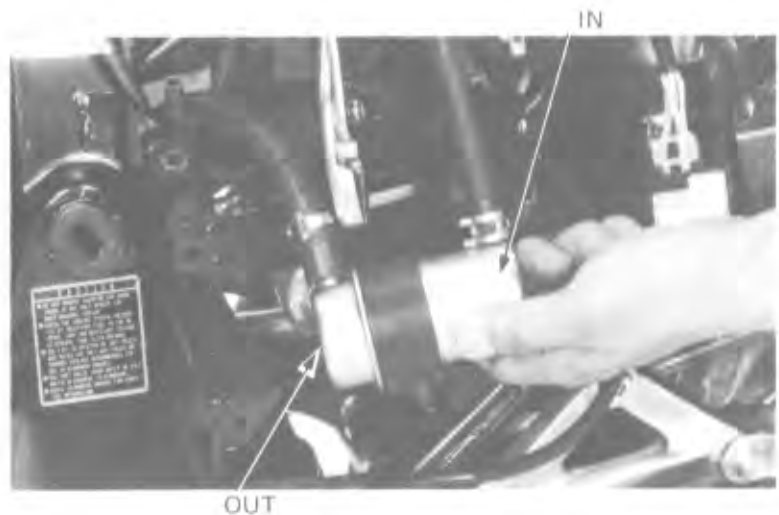
Install a new fuel strainer in the reverse order of removal.

NOTE

- Connect the fuel inlet tube to the IN end of the strainer.
- Install the strainer with the OUT end (outlet side) facing up.

Check the following items after installing the fuel strainer:

- Fuel leaks
- Collapsed, restricted or pinched fuel hoses
- Routing of sensor wires and tubes



THROTTLE OPERATION

Check that there is no deterioration, damage, or kinks in the throttle cables, and that the throttle grip free play is 2–4 mm (1/8–1/6 in) on the outer edge of the throttle grip flange.

Check for smooth throttle grip rotation from fully closed to fully open positions at all steering positions.

Lubricate the cables if throttle operation is not smooth.

Check that the throttle grip automatically returns from the fully open to the full closed position when released.

Adjust or replace, if necessary.

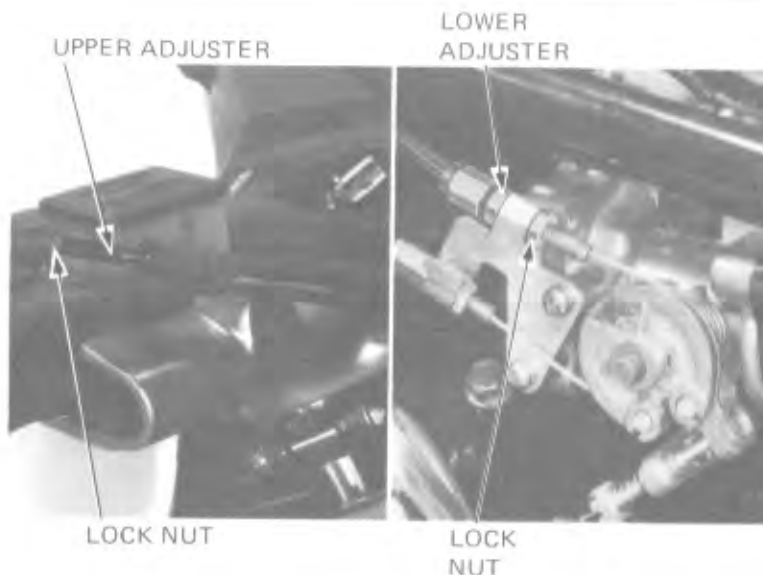




Throttle grip free play can be adjusted at either end of the throttle PULL cable. Major adjustments must be made at the lower adjuster, after removing the fuel tank. Adjust by loosening the adjuster lock nut and turning the adjuster. Tighten the lock nut. Minor adjustments must be made at the upper adjuster.

Install the fuel tank.

Recheck throttle operation.

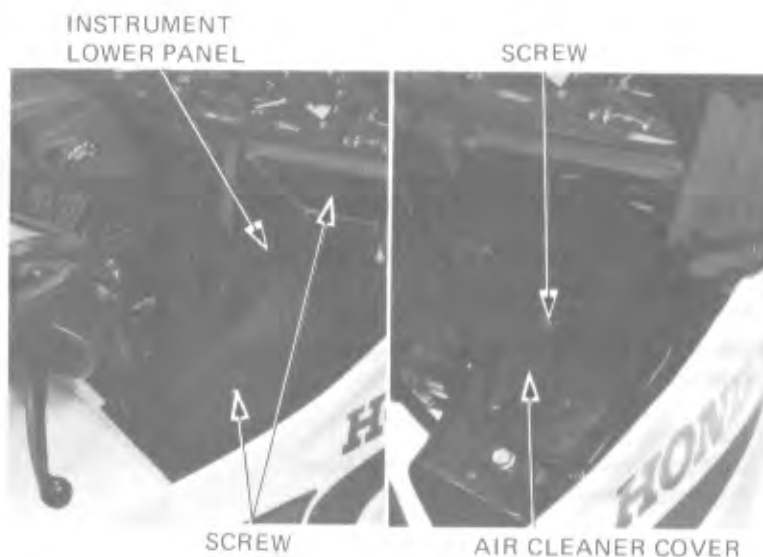


AIR CLEANER

Turn the handlebar to the right and remove the lower right instrument panel screws and panel.

Remove the air cleaner cover screw, cover and rubber seal.

Remove the air cleaner element.



Remove the air cleaner retaining plate screw, plate and the air cleaner element.





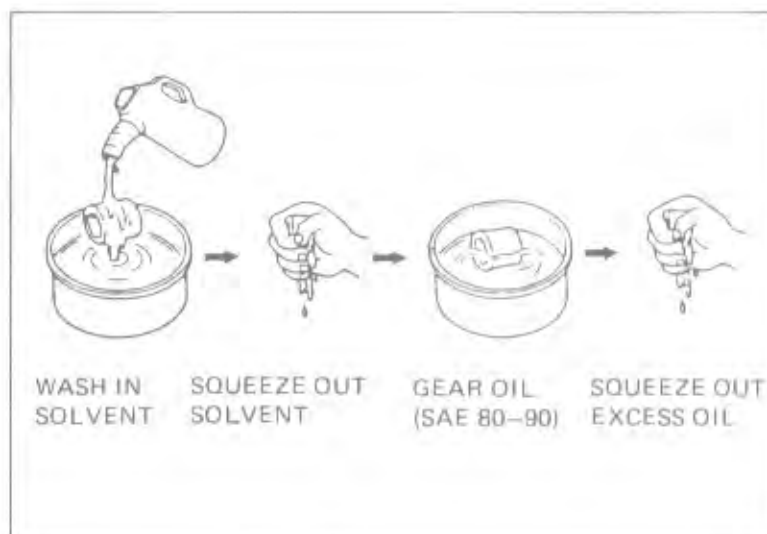
Remove the air cleaner element from its holder.

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

Soak the element in gear oil (SAE 80–90) and squeeze out excess.

Reinstall the air cleaner element on its holder and apply a light coating of grease to the sealing edge of the element.

Reinstall the remaining parts in the reverse order of disassembly.



CRANKCASE BREATHER

Remove the plug from the drain tube to drain deposits.

Install the drain plug.

NOTE

Service more frequently when the motorcycle is ridden in rain, or if the deposit level can be seen in the transparent section of the drain tubes.



SPARK PLUGS

WARNING

Do not operate the starter with the spark plugs removed, or fuel will be forced out causing a fire hazard.

RECOMMENDED SPARK PLUG:

	NGK	ND
Standard	DPR8EV-9	X24EPR-GU9
High speed riding	DPR9EV-9	X27EPR-GU9
Cold climate	DPR7EV-9	X22EPR-GU9



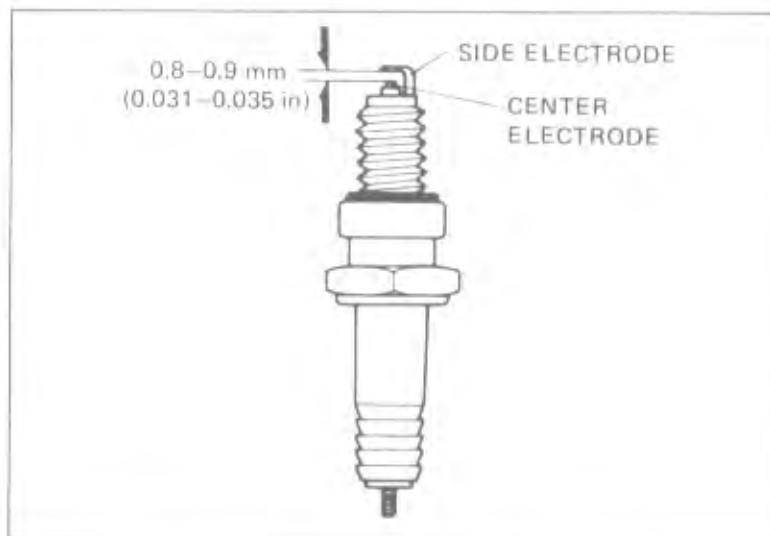
MAINTENANCE

Disconnect the spark plug caps.
Clean any dirt from around the spark plug base.
Remove the spark plugs.
Measure the new spark plug gaps using a wire-type feeler gauge.

SPARK PLUG GAP:

0.8–0.9 mm (0.031–0.035 in)

Adjust by bending the side electrode carefully.
With the plug washer attached, thread the spark plugs in by hand to prevent crossthreading.
Tighten the spark plugs another 1/2 turn with a spark plug wrench to compress the plug washer.
Connect the spark plug caps.



VALVE CLEARANCE

NOTE

This inspection and adjustment must be performed while the engine is cold (below 35°C, 95°F).

Remove the fuel tank (Section 4) and timing inspection hole cap.
Disconnect the spark plug caps and remove the cylinder head covers.



Remove the radiator screen.
Remove the lower fairing.

Remove the crankshaft hole cap from the engine front cover.





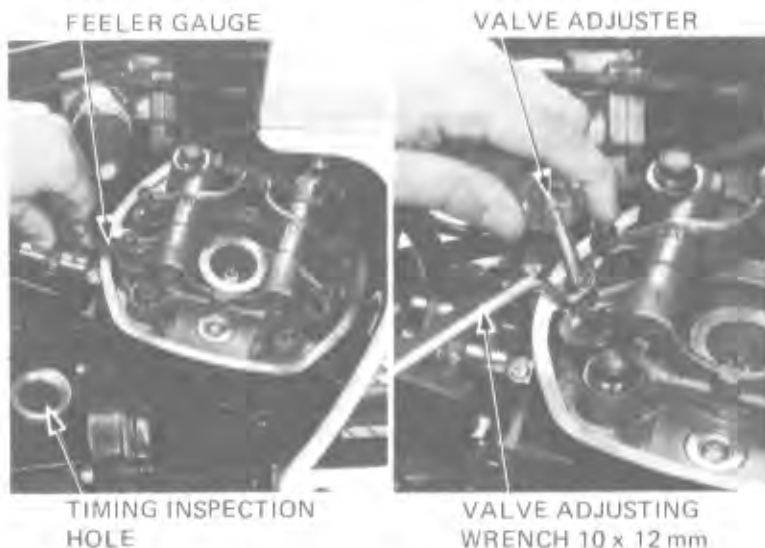
Turn the crankshaft clockwise and align the "TR" mark on the flywheel with the index mark. The right cylinder must be T.D.C. of the compression stroke.

Check the intake and exhaust valve clearance of the right cylinder by inserting a feeler gauge between the clearance adjusting screw and valve stem.

VALVE CLEARANCE

IN: 0.10 mm (0.004 in)

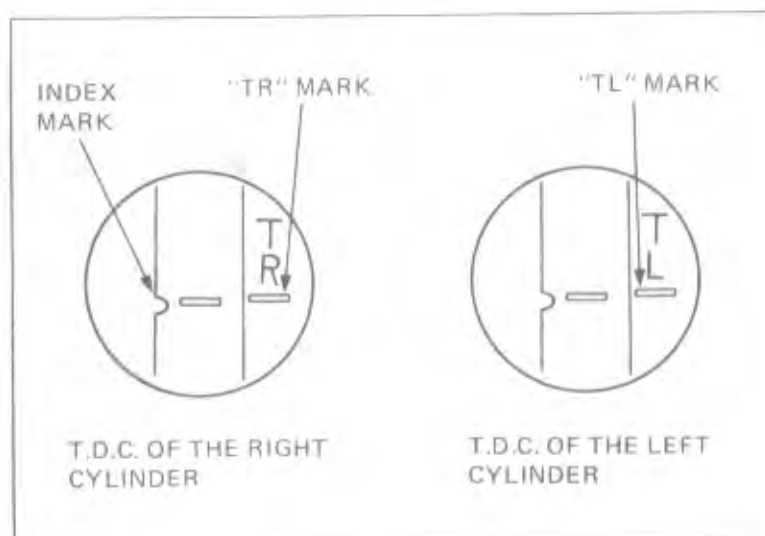
EX: 0.12 mm (0.005 in)



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

Turn the crankshaft clockwise and align the "TL" mark on the rotor with the index mark. The left cylinder must be at T.D.C. of the compression stroke.

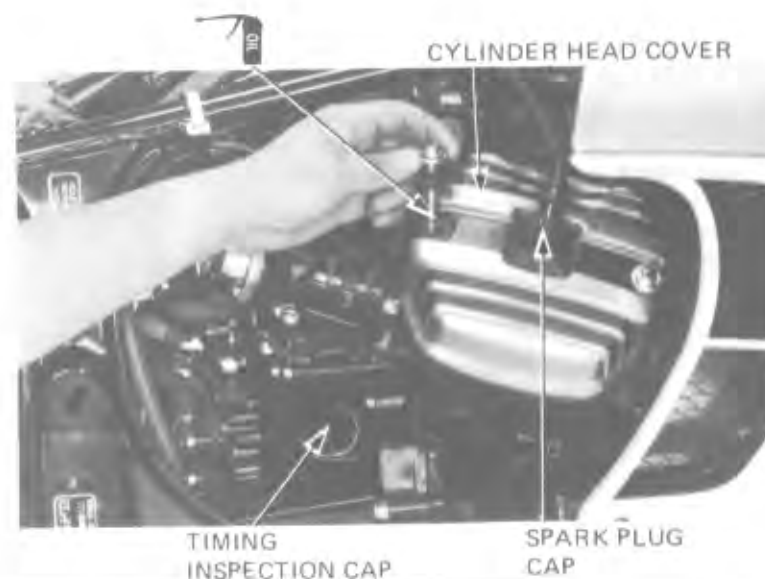
Check the intake and exhaust valve clearance of the left cylinder as described for the right cylinder.



Install the removed parts in the reverse order of disassembly.

NOTE

Coat the cylinder head cover bolt rubbers with oil before tightening.





ENGINE IDLE SPEED

NOTE

- Inspect and adjust engine idle speed after all other engine adjustments are within specifications.
- The engine must be warm for accurate idle inspection and adjustment. Ten minutes of stop and go driving is sufficient, or when the temperature gauge needle is within the wide white line.

Warm up the engine, place the transmission in neutral and the motorcycle on its center stand. Adjust idle speed with the throttle stop screw.

IDLE SPEED: $1,100 \pm 100 \text{ min}^{-1}$ (rpm)

CAUTION

Do not loosen the stop screw lock nut.

THROTTLE STOP SCREW



RADIATOR COOLANT

Check the coolant level of the reserve tank with the engine running at normal operating temperature. The level should be between the "FULL" and "LOW" level lines.

If necessary, remove the reserve tank cap and fill to the "FULL" level line and install the cap.

RESERVE TANK CAP



"FULL" MARK

"LOW" MARK

RADIATOR CORE

Check the air passages for clogging or damage. Straighten bent fins.

Remove insects, mud or any obstruction with compressed air or low water pressure.

Replace the radiator if the air flow is restricted over more than 20% of the radiator's core surface.





HOSES & CONNECTIONS COOLING SYSTEM

Remove the fuel tank.

Inspect the hoses for cracks or deterioration, and replace if necessary.

Check the hose clamps, and tighten if necessary.

WATER HOSES



BATTERY

Remove the left side cover.

Inspect the battery electrolyte level.

When the electrolyte level nears the lower level mark, fill with distilled water to the upper level mark.

If sulfation forms on the battery walls or sediments (paste) accumulate on the bottom of the battery, replace the battery.

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 get immediate medical attention if electrolyte gets in your eyes.

UPPER LEVEL LINE



LOWER LEVEL LINE

BRAKE FLUID

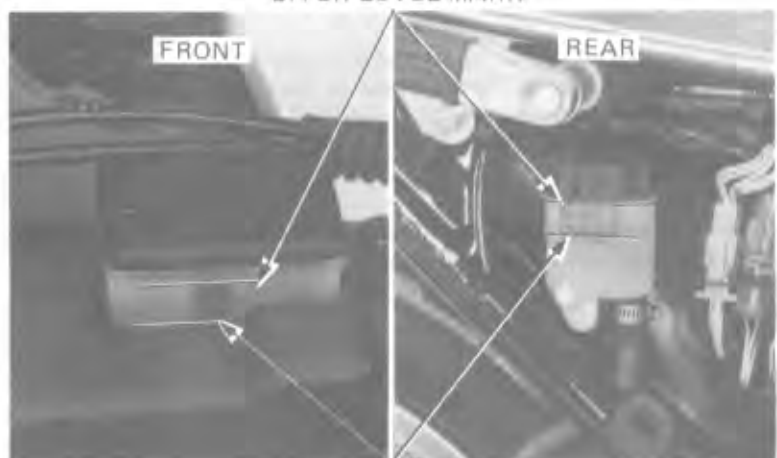
Check the front and rear brake fluid reservoir level. If the level nears the lower level mark, fill the reservoir with SAE J1703 or DOT -3 BRAKE FLUID to the upper level mark.

Check the entire system for leaks, if the level is low.

CAUTION

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

UPPER LEVEL MARK



LOWER LEVEL MARK



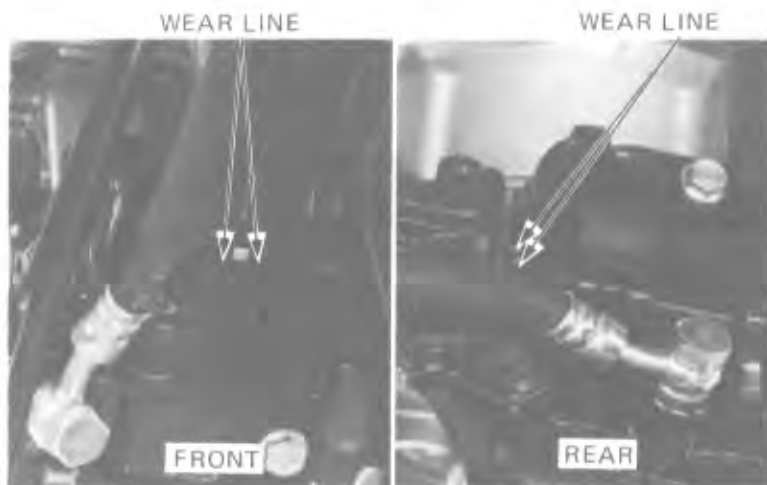
BRAKE PAD WEAR

Check the front brake pads for excessive wear through the brake caliper inspection hole. Check the rear brake pads after removing the dust cover.

Replace the brake pads if the wear line on the pads reaches the edge of the brake disc.

CAUTION

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



BRAKE SYSTEM

BRAKE SYSTEM HOSE

Make sure that the brake hose is not deteriorated and check the entire brake system for leaks.

BRAKE PEDAL HEIGHT

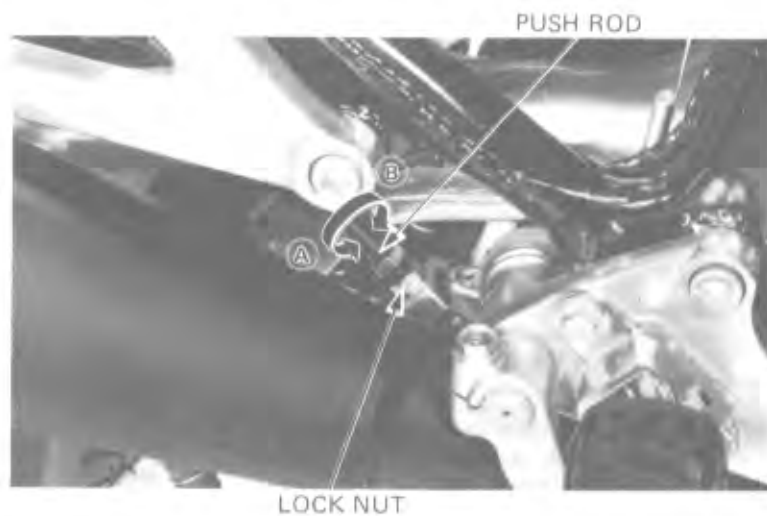
Loosen the lock nut and turn the push rod until the correct pedal height is obtained.

Turning the push rod in direction A decreases the pedal. Turn the push rod in direction B to raise the pedal.

Retighten the lock nut.

NOTE

After adjusting the brake pedal height, check the rear brakelight switch and adjust if necessary.

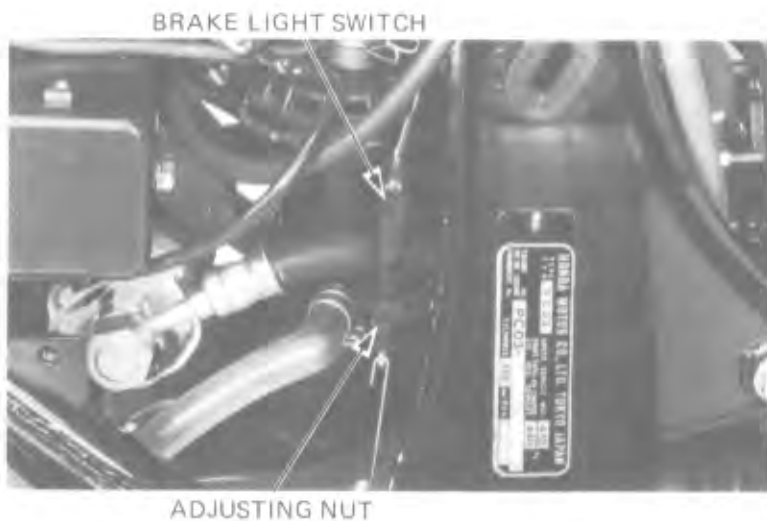


BRAKE LIGHT SWITCH

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

Adjust by turning the switch adjusting nut. Do not turn the switch body.

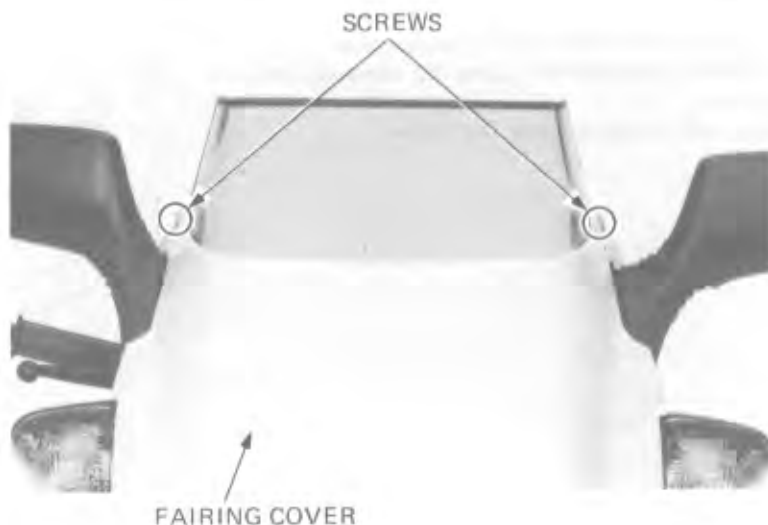
Perform brake light switch adjustment after adjusting brake pedal play and pedal height.





HEADLIGHT AIM

Open the fairing cover by removing the two screws. Remove the two screws at the top of the fairing cover and tilt it forward.



To adjust vertical aim, turn the right adjuster. To adjust horizontal aim, turn the left adjuster.

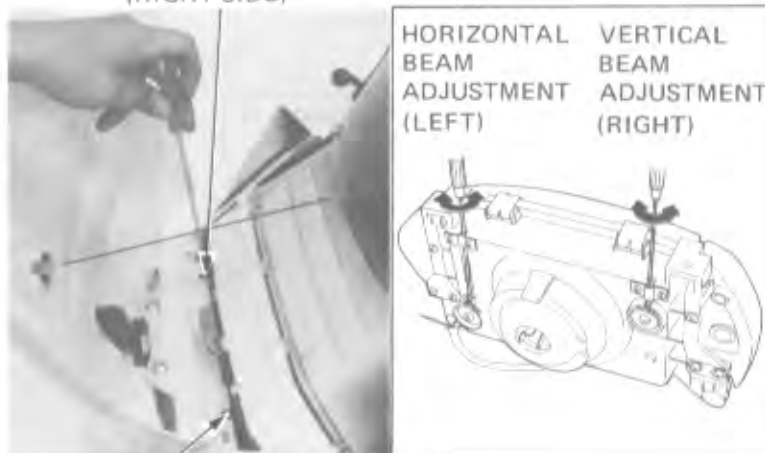
NOTE

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

WARNING

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

VERTICAL BEAM ADJUSTER (RIGHT SIDE)

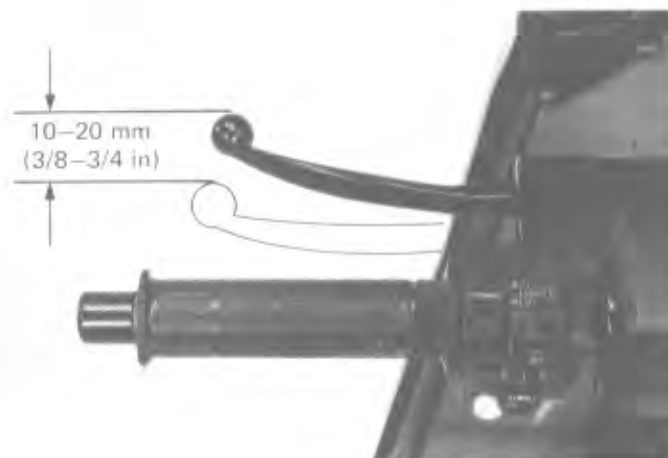


HORIZONTAL BEAM ADJUSTER (LEFT SIDE)

CLUTCH

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

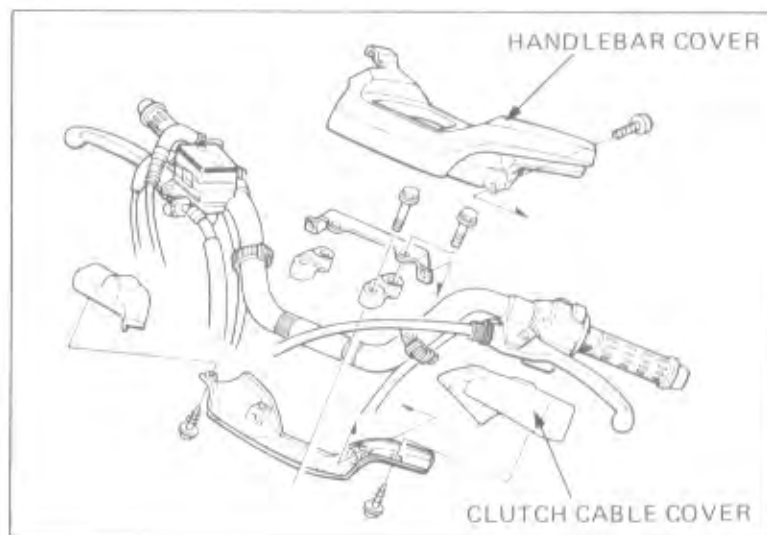
FREE PLAY: 10–20 mm (3/8–3/4 in)





MAINTENANCE

Minor adjustments can be made with the clutch cable adjuster located on the clutch lever.
Remove the handlebar cover by removing the four screws.
Remove the clutch cable dust cover.

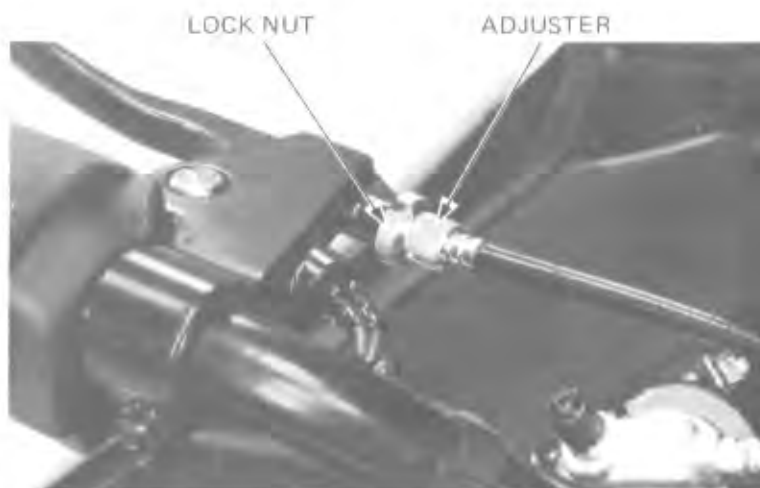


Loosen the lock nut and turn the adjuster.

NOTE

Do not allow the threads at the adjuster to come out by more than 8 mm (0.3 in).

Reinstall the clutch cable dust cover and handlebar covers.
Recheck the clutch operation.



Major adjustments are made of the lower end of the cable at the clutch front engine cover:
Turn the adjuster on the clutch lever all the way in after removing the cable dust cover and loosening the lock nut.
Loosen the lower cable lock nut and turn the adjusting nut to obtain the correct clutch lever free play.
Tighten the lock nut.

WARNING

The exhaust system can be very hot if the engine has been run. Use care not to touch the exhaust system to prevent burns.





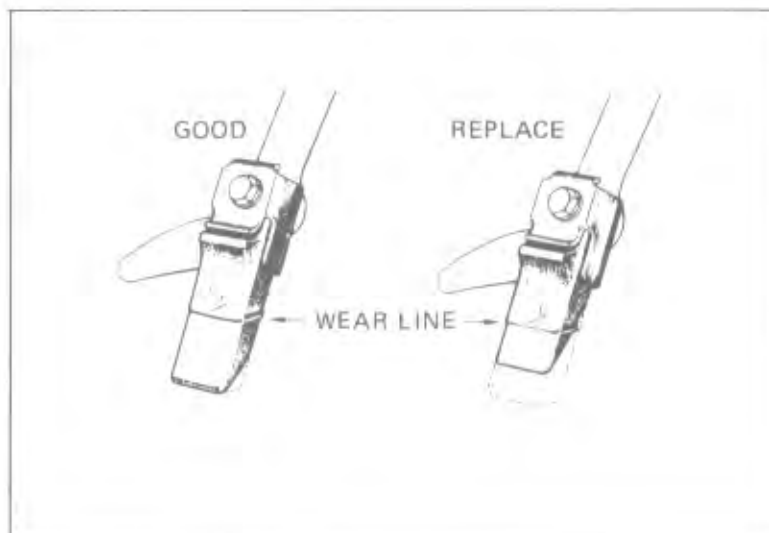
SIDE STAND

Check the rubber pad for deterioration or wear. Replace if any wear extends to the wear line as shown. Check the side stand spring for damage and loss of tension, and the side stand assembly for freedom of movement and damage.

Spring tension is correct if the measurements fall within 2–3 kg (4.4–6.6 lb), when pulling the side stand lower and with a spring scale.

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 front suspension nuts and bolts.



Check the front fork air pressure when the front forks are cold.

Place the vehicle on its center stand.

Remove the handlebar cover (Page 3-14).

Remove the valve cap and measure the front fork air pressure.

FRONT FORK AIR PRESSURE:

80–120 kPa (0.8–1.2 kg/cm², 11–17 psi)





ANTI DIVE SYSTEM (TRAC) INSPECTION

Check operation of the anti dive system at each adjuster position by riding the motorcycle and applying the brakes.

CAUTION

Make sure that the adjusters are at the same location on both sides.

WARNING

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

Inspect and if necessary, repair the system (Refer to Section 14).



ADJUSTER

REAR

Place the motorcycle on its center stand.
 Move the rear wheel sideways with force to see if the swingarm bearings are worn.
 Replace if excessively worn.
 Check the shock absorber for leaks or damage.
 Tighten all rear suspension nuts and bolts.



Remove the right side cover.
 Remove the valve cap and measure the rear shock absorber air pressure.

REAR SHOCK ABSORBER AIR PRESSURE:
 100–500 kPa (1–5 kg/cm², 15–70 psi)

NOTE

Check the air pressure when the rear shock absorber is cold.



AIR VALVE

VALVE CAP



NUTS, BOLTS, FASTENERS

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

Check all cotter pins and safety clips.

WHEELS

NOTE

Tire pressure should be checked when tires are COLD.

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

RECOMMENDED TIRE PRESSURE AND TIRE SIZE:

		Front	Rear
Tire size		3.50H18-4PR	120/90-17 64H
Cold tire pressures kPa (kg/cm ² , psi)	Up to 90 kg (200 lbs) load	250 (2.5, 36)	250 (2.5, 36)
	90 kg (200 lbs) load to vehicle capacity load	250 (2.5, 36)	280 (2.8, 40)
Tire brand	BRIDGE-STONE	L303	G510
	DUNLOP	F11	K527



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 reaches the following limit.

Minimum tread depth:

Front: 1.5 mm (1/16 in)

Rear: 2.0 mm (3/32 in)



STEERING HEAD BEARINGS

NOTE

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

Raise the front wheel off the ground.

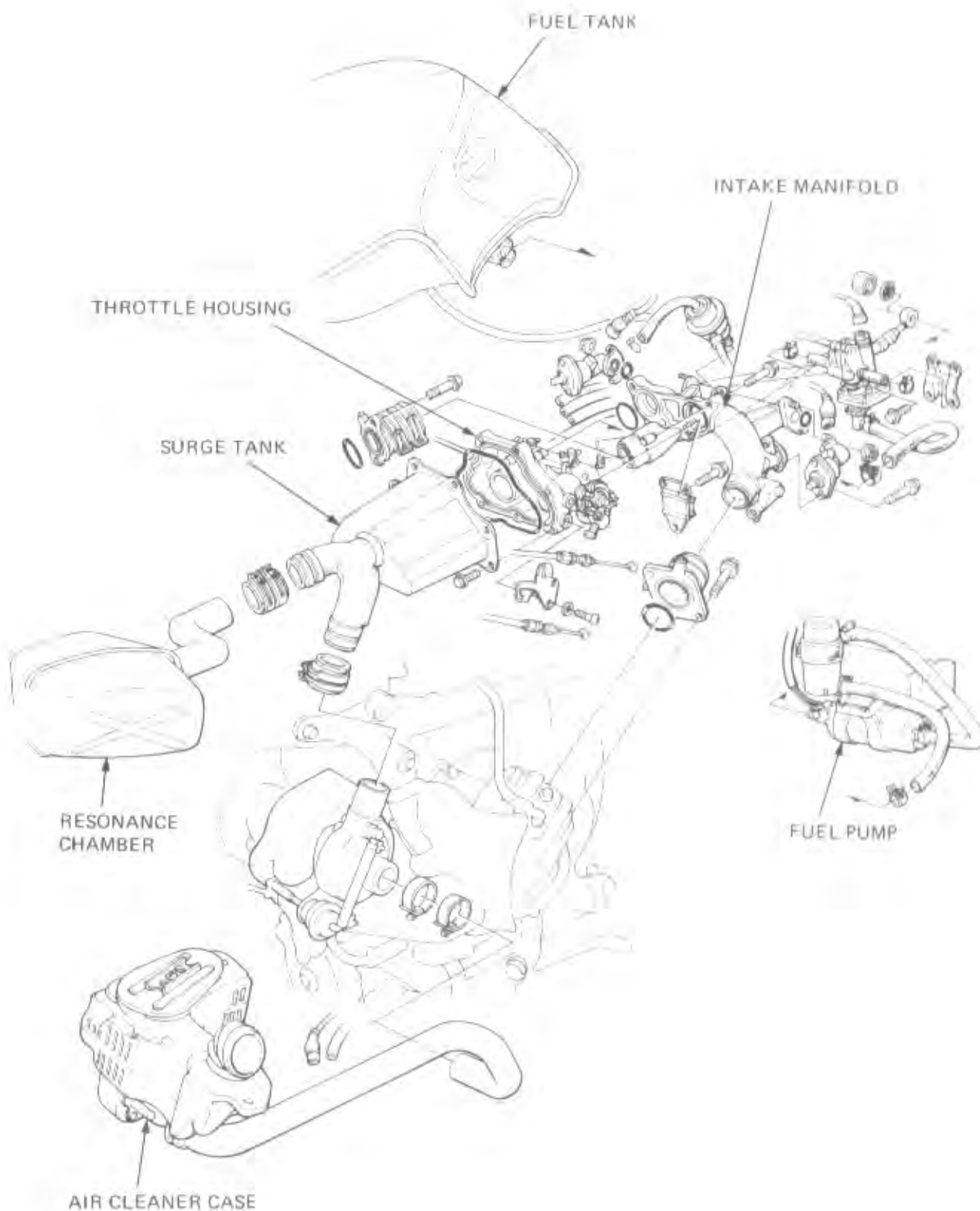
Check that the handlebar rotates freely from side to side.

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





MEMO





SERVICE INFORMATION	4-1	FUEL PUMP	4-9
PART LOCATIONS	4-2	ENGINE SPEED SENSOR	4-11
INTAKE MANIFOLD REMOVAL	4-3	PRESSURE SENSORS	4-13
SURGE TANK	4-6	FUEL TANK	4-15
C.F.I. COMPUTER	4-8	AIR CLEANER CASE/REED VALVE	4-17

SERVICE INFORMATION

GENERAL

WARNING

- The fuel system must be serviced with the ignition switch OFF and battery ground cable disconnected from the battery.
- The fuel lines are pressurized. Shield eyes and place a rag or shop towel around lines and fittings when disconnecting a line or disassembling a fuel part. Wipe up spilled gasoline at once.
- Use caution when working with gasoline. Always work in a well-ventilated area and away from sparks or open flames.
- If fuel gets in your eyes: Flush with water and get prompt medical attention.

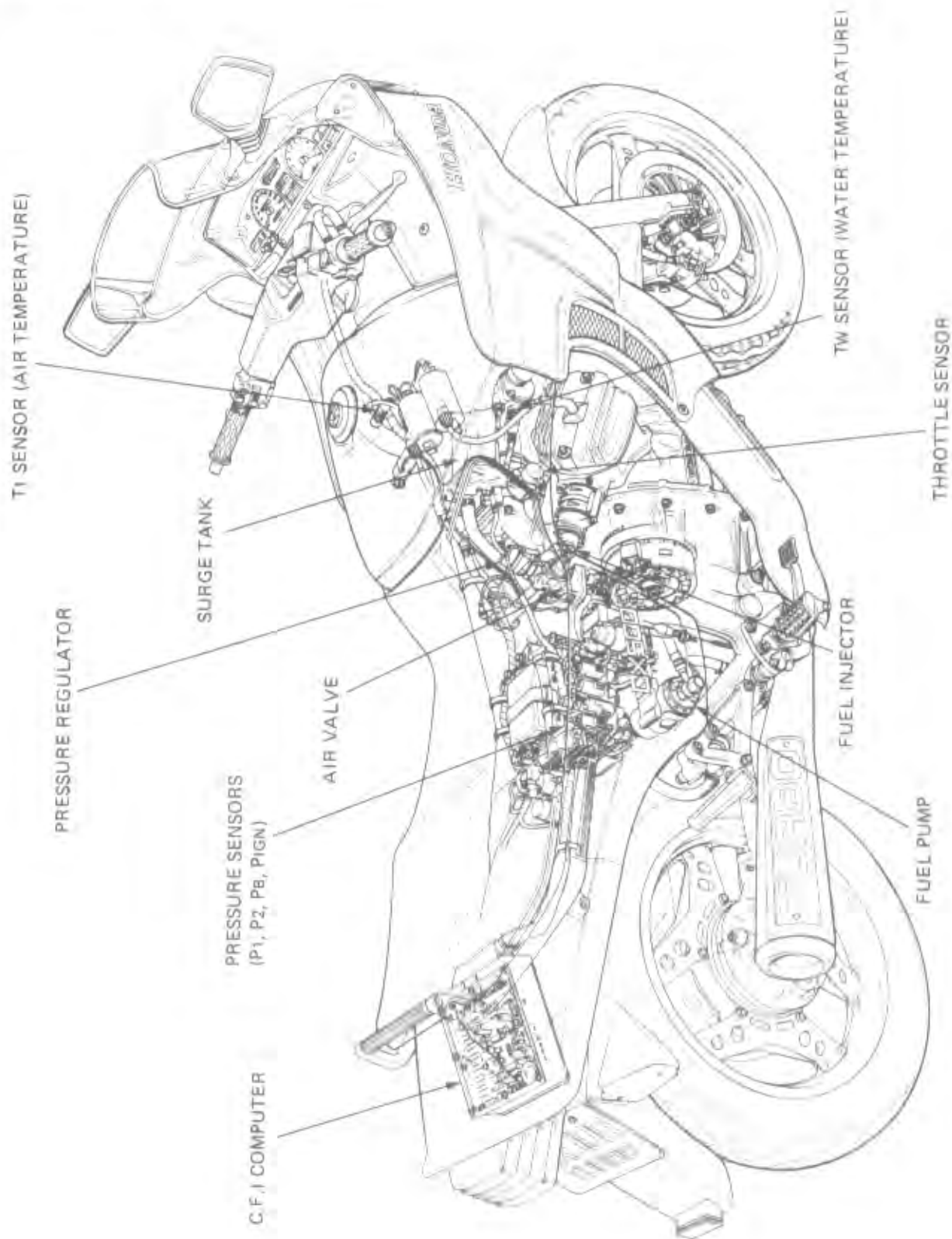
- When disassembling fuel system parts, note the locations of the O-rings. Replace them with new ones on reassembly.
- Do not let foreign particles enter the fuel lines as they will clog the fuel injectors. Wash all removed parts thoroughly before they can be reassembled.
- After reassembling, make sure that the tubes are not pinched or collapsed. Also check that there are no leaking parts.
- Use special care when connecting the battery cables not to reverse battery polarity. Remove the battery whenever charging is necessary. Turn the ignition switch OFF when disconnecting and connecting the battery cables.
- Keep water away from the CFI computer and components, since this may affect their performances.
- Keep connectors dry to prevent electrical shorts, especially the T₁, T₂ and injector sensor wire couplers which have steel rings. When disconnecting the connector, care should be taken not to deform the steel rings. If the steel ring is deformed, replace with new one. Connect the electrical connectors and couplers securely, there should be an audible click when reconnected.
- See Section 24 Troubleshooting for inspection and adjustment of the fuel system.

TORQUE VALUES

Fuel hose joint bolt	35-50 N·m (3.5-5.0 kg-m, 25-36 ft-lb)
Fuel hose joint nut	27-29 N·m (2.7-2.9 kg-m, 20-21 ft-lb)
Pressure regulator	30-40 N·m (3.0-4.0 kg-m, 22-29 ft-lb)
Fuel injector holder	3.5-5.0 N·m (0.35-0.5 kg-m, 2.5-3.6 ft-lb)
Fuel valve nut	20-25 N·m (2.0-2.5 kg-m, 14-18 ft-lb)



PART LOCATIONS





INTAKE MANIFOLD REMOVAL

Turn the ignition switch OFF.
Remove the seat and fuel tank.
Disconnect the battery ground cable from the negative (–) terminal of the battery.



Wrap a shop towel around the fuel line and fitting.
Loosen the fuel line check plug from the banjo bolt slowly to drain the line and prevent gasoline from squirting out.

WARNING

The fuel lines are pressurized. Wear eye protection when working on the fuel system. If gasoline gets in your eyes, wash with water and get prompt medical attention.



Disconnect the air valve coupler.





Remove the air bypass hose.
Disconnect the left fuel injector coupler.
Remove the connecting tubes from the air valve by removing the tube bands.



AIR BYPASS HOSE



FUEL INJECTOR COUPLER

CONNECTING TUBE

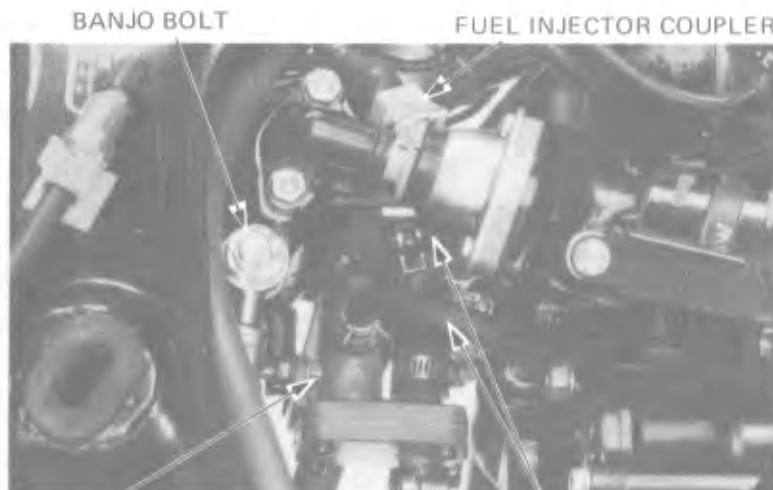
Remove the fuel line banjo bolt at the manifold.

NOTE

Replace the sealing washers with new ones whenever the banjo bolt is removed.

Cover the fuel inlet port with tape.

Disconnect the right fuel injector coupler.
Remove the water pump bypass tubes. Remove the 6 mm bolts attaching the air valve bracket.
Remove the air valve.



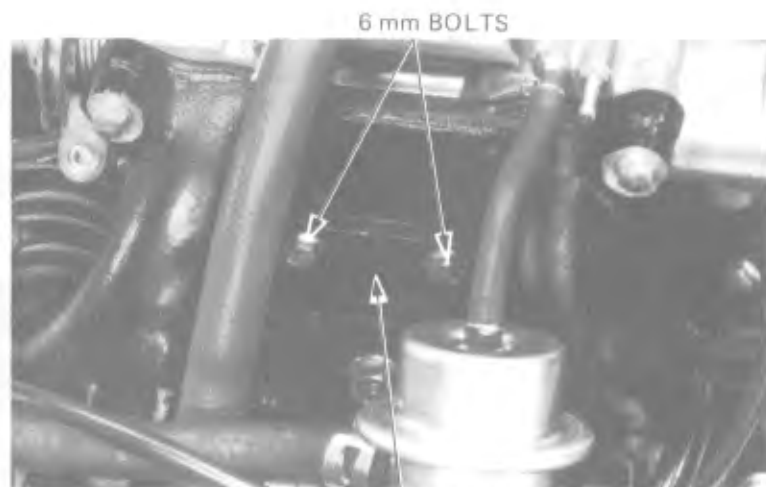
BANJO BOLT

FUEL INJECTOR COUPLER

6 mm BOLT

WATER PUMP BYPASS TUBES

Remove the four, 6 mm manifold bolts.
Remove the throttle housing mounting bracket.

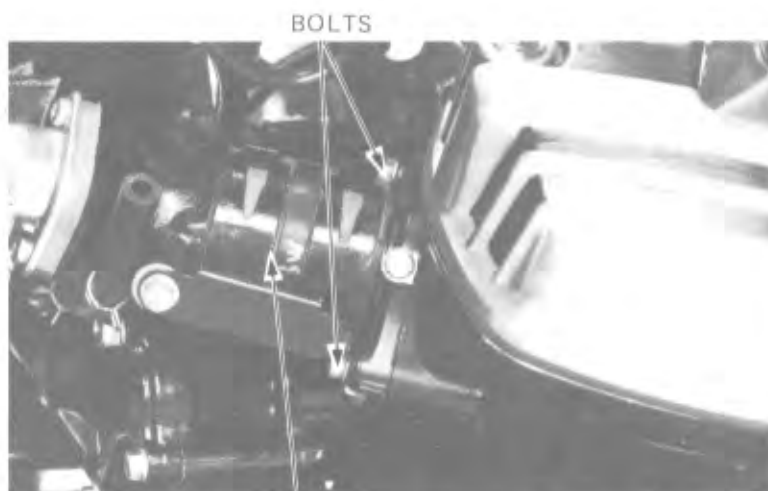


6 mm BOLTS

MOUNTING BRACKET



Unscrew the four bolts from the right and left inlet pipe joints.



INLET PIPE JOINT

Remove the right inlet pipe joint by loosening the bands.



INLET PIPE JOINT

Remove the intake manifold from the right side.
Inspect the intake manifold for cracks or damage.



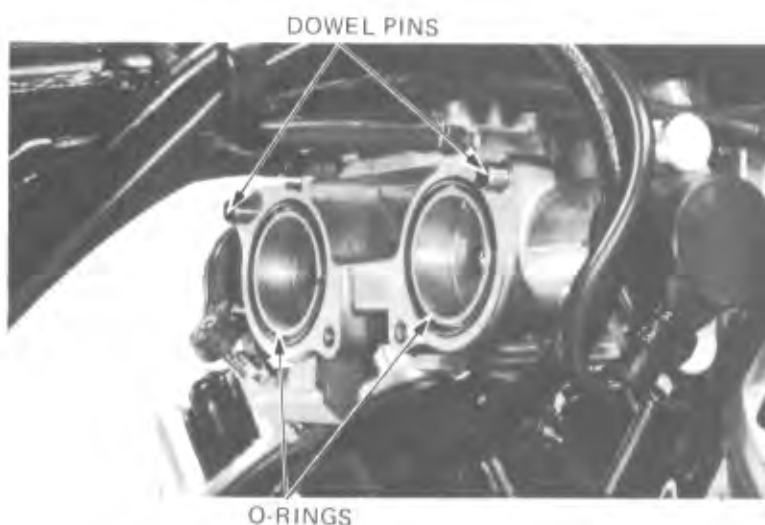


INSTALLATION

The installation sequence is essentially the reverse order of removal.

Be sure the dowel pins and new O-rings are in place before installation.

Be sure the injector's manifold mating surface is clean and apply Lock Tite® 515 or Three Bond® 1215 between the injector assembly and intake manifold surfaces.



SURGE TANK

REMOVAL

Remove the engine (Section 5).

Remove the resonance chamber.

Remove the four intake pipe joint bolts.

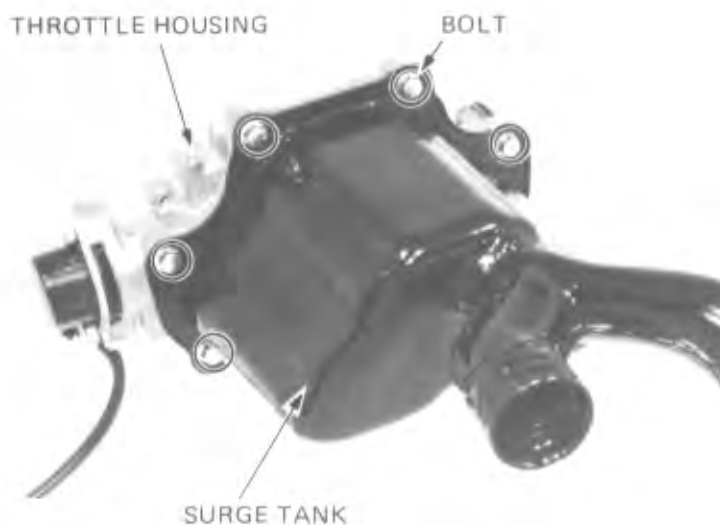
Remove the throttle housing mount bracket.

Remove the surge tank from the turbocharger connecting joint by loosening the band.

Remove the intake manifold.



Remove the bolts attaching the surge tank to the throttle housing and separate them.





Clean the interior of the throttle housing.

Check operation of the throttle valves by rotating the throttle drum by hand.

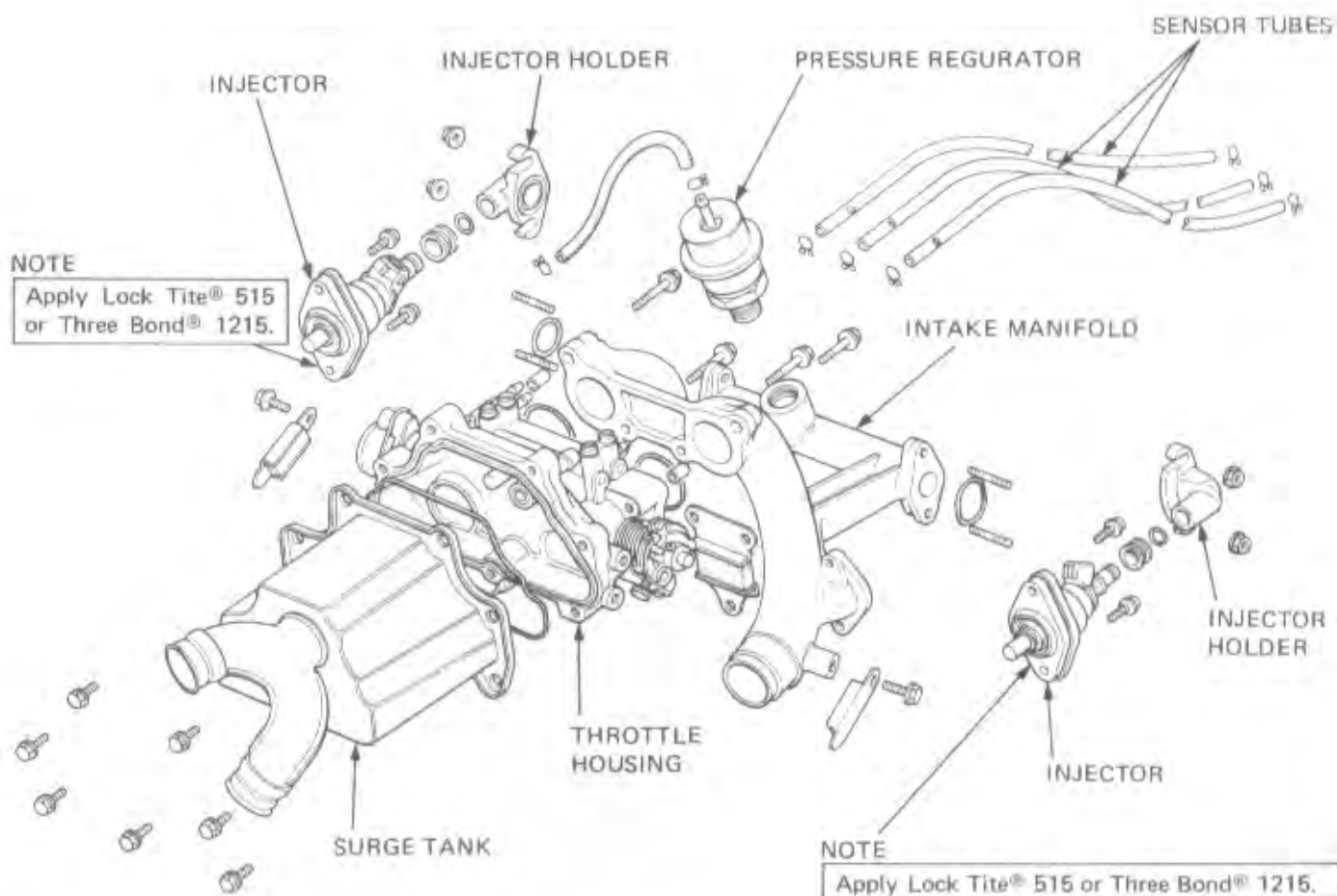
CAUTION

Do not disassemble the throttle sensor.



INSTALLATION

The installation sequence is essentially the reverse order of removal.

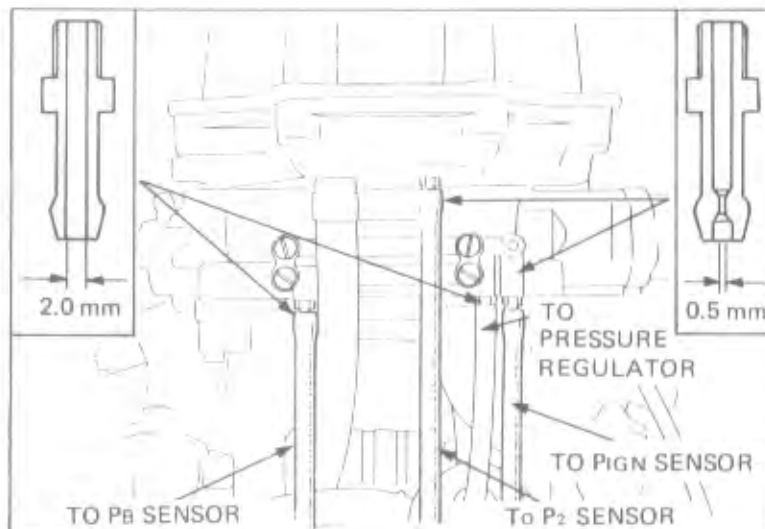




FUEL SYSTEM

Before installing the vacuum tube orifice, check the inside diameter.

If the orifice is installed incorrectly, the drivability will be affected adversely.



C.F.I. COMPUTER (Electronic Control Unit)

REMOVAL

Remove the seat.

Disconnect the E.C.U. coupler from the wire harness coupler by releasing the locking pawl as shown.

Remove the E.C.U.

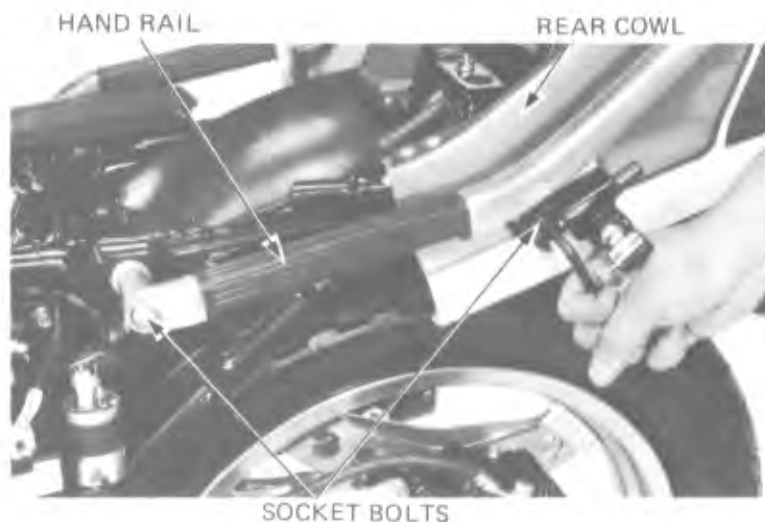
NOTE

Do not disassemble the electronic control unit.



Remove the handrail by removing the four socket bolts.

Remove the rear cowl.





INSTALLATION

After connecting the wire harness coupler to the E.C.U. coupler, make sure that the locking pawls are engaged securely.

NOTE

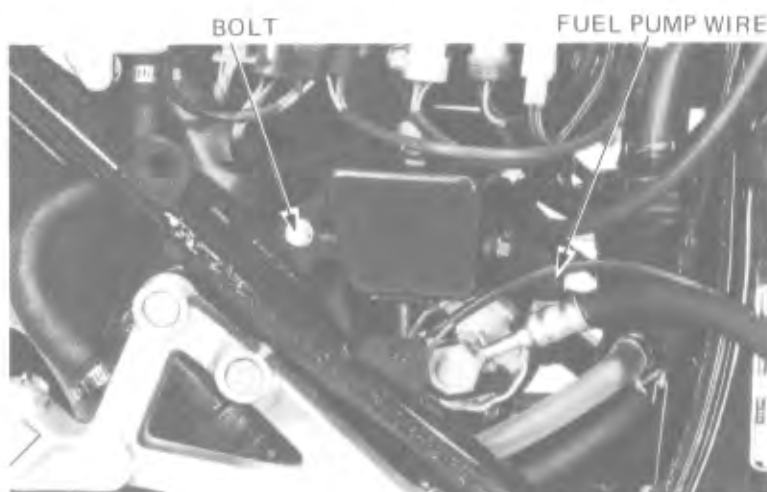
Make sure that the coupler terminals are clean and in good condition.



FUEL PUMP

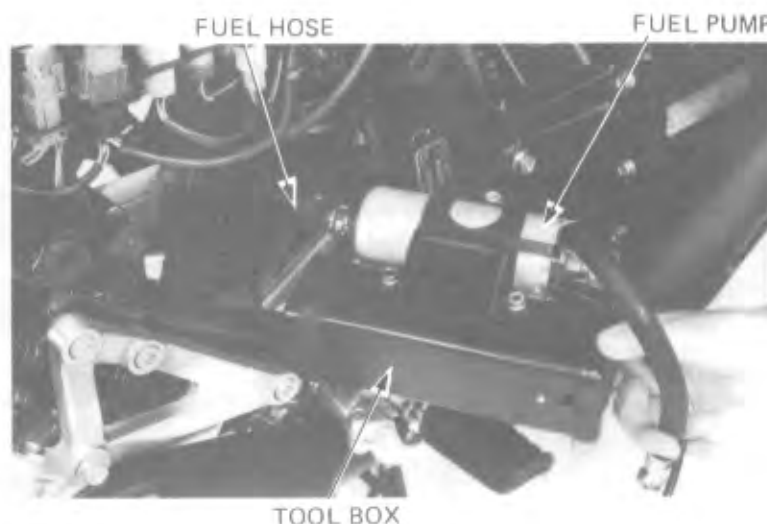
REMOVAL

Turn the ignition switch OFF.
Remove the right side cover and remove the banjo bolt.
Disconnect the fuel pump wire coupler.
Remove the tool box mount bolt.



Remove the fuel pump from the tool box by removing the attaching nuts.

Disconnect the fuel lines from the fuel pump.

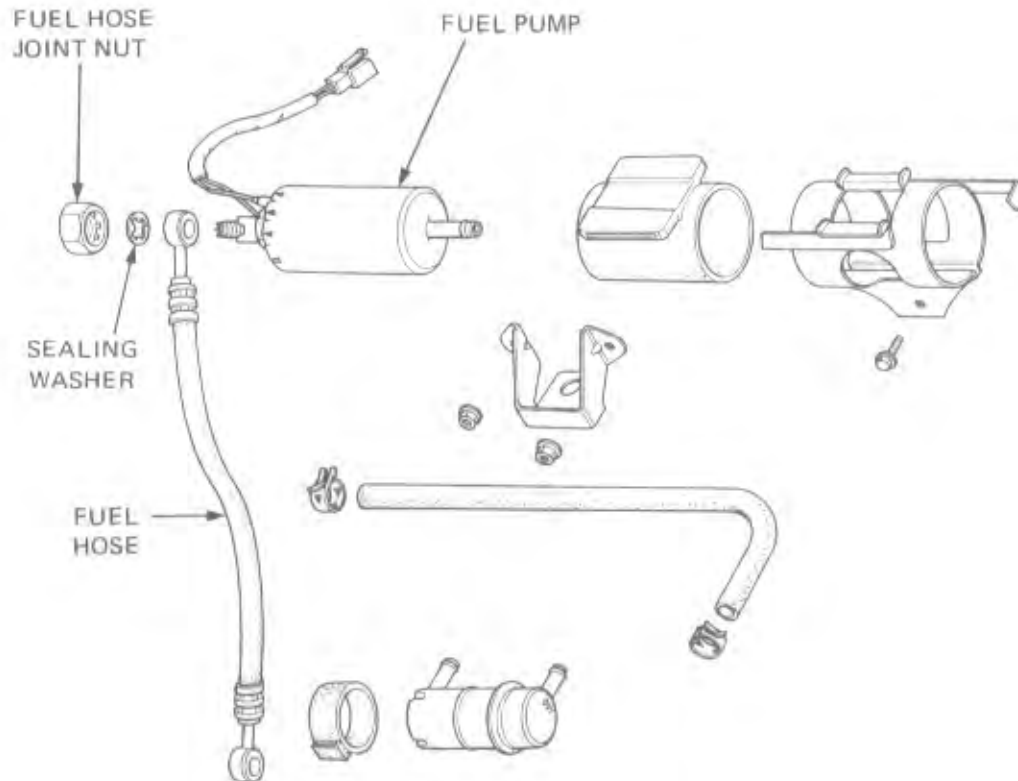




FUEL SYSTEM

INSTALLATION

The remaining installation sequence is essentially the reverse order of removal except as noted.



NOTE

- Attach the fuel hose to the fuel pump at a 15–20° angle above the fuel pump fitting.
- After installation, make sure that the fuel hoses are not pinched or collapsed.
- Also check that there are no leaking parts.
- Make sure there is sufficient clearance between the fuel line and rear stop light switch bracket.
- Use new sealing washers.





ENGINE SPEED SENSOR (NE)

REMOVAL

NOTE

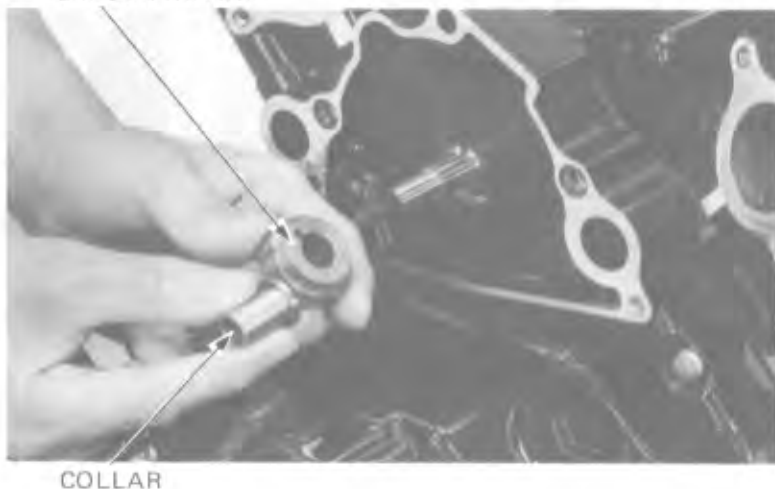
Engine speed sensor service can be made with the engine in the frame.

Drain the engine coolant (Section 10).
Remove the water pipe and joint hose.



Remove the water pump cover (Section 10).
Remove the collar and speed sensor rotor from the camshaft.

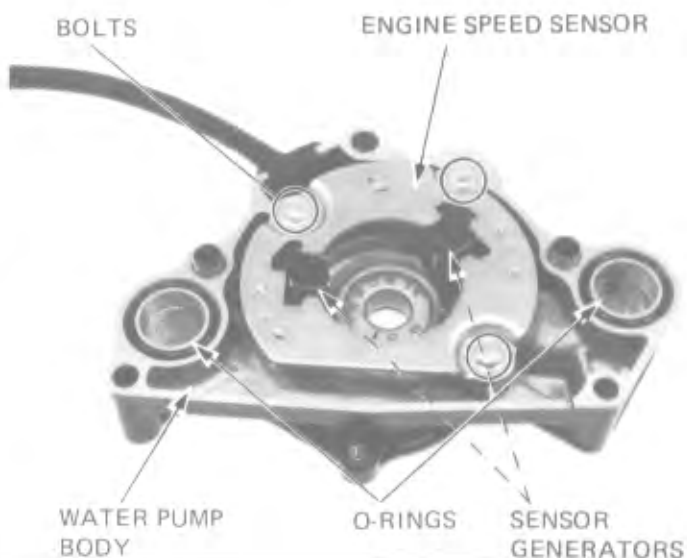
SENSOR ROTOR



Remove the engine speed sensor from the water pump body by removing three bolts.
Remove the O-rings.

NOTE

Do not remove the sensor generators from its base.

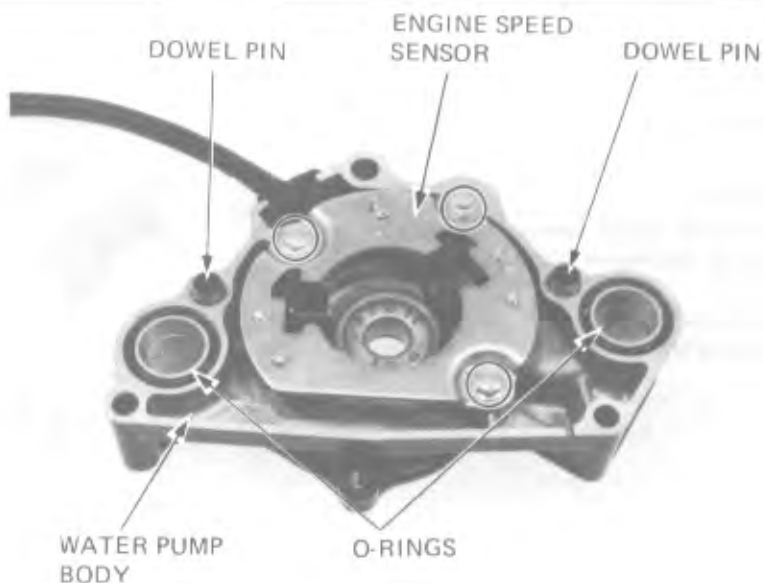




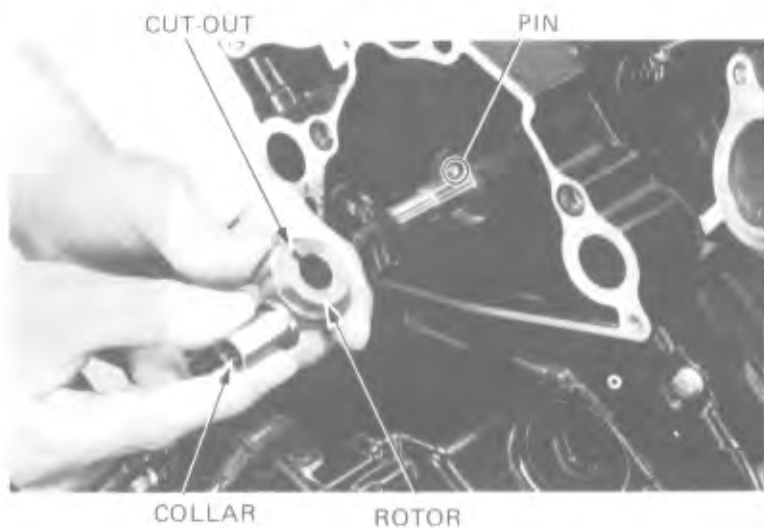
FUEL SYSTEM

INSTALLATION

Install the dowel pins, new O-rings and engine speed sensor into the water pump cover.



Align the cut-out in the engine speed rotor with the pin on the camshaft and install it. Install the collar on the camshaft.



Install the water pump (Section 10).
Install the water pipe and joint hose.
Fill the radiator with coolant (Section 10).

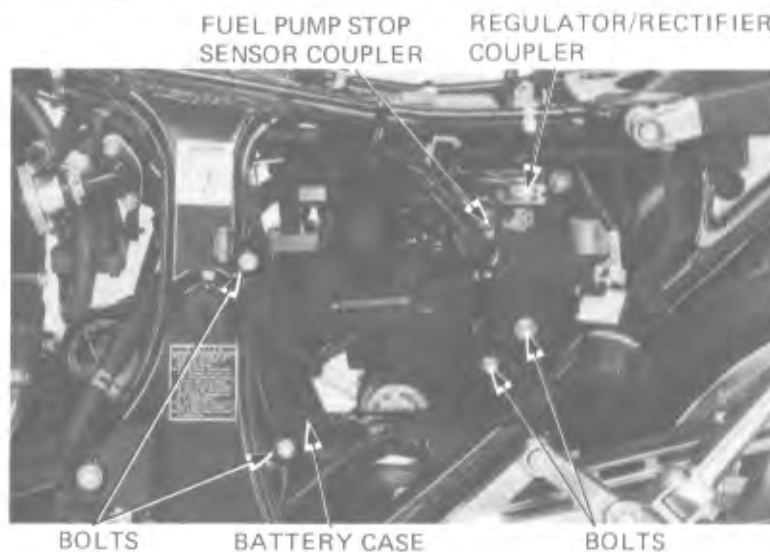




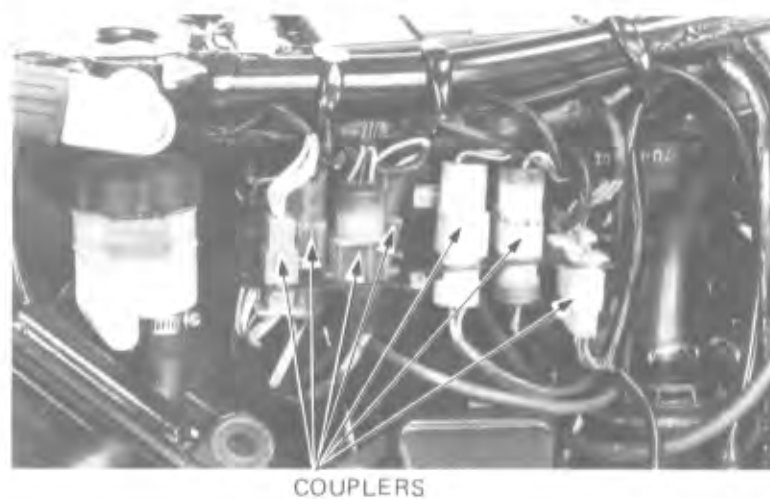
PRESSURE SENSORS

REMOVAL

Remove the battery and battery case.
Disconnect the regulator/rectifier coupler and fuel pump stop sensor coupler.
Remove the ignition control unit.



Disconnect all sensor couplers.



Remove the sensor bracket mounting bolts.



FUEL PUMP STOP SENSOR

Pb SENSOR

P1 SENSOR

P2 SENSOR

PIGN SENSOR

REGURATOR/RECTIFIER



FUEL TANK

REMOVAL

Turn the ignition switch off.

Remove the side covers and seat.

Disconnect the fuel pump coupler, located under the right side cover.

Disconnect the fuel lines from the fuel valve.

WARNING

The fuel pump coupler must be disconnected to prevent gasoline from being pumped out of the fuel hoses if the ignition switch is turned on and causing a fire hazard.

Disconnect the fuel gauge sensor coupler from the main wire harness.

Remove the fuel tank mounting bolt and remove the fuel tank being careful not to damage the fuel gauge wires and coupler.

WARNING

Gasoline is flammable and is explosive under certain conditions. Do not smoke or allow flames or sparks near the work area while draining fuel.

FUEL STRAINER

Drain the fuel tank.

Remove the fuel valve by loosening the lock nut.

NOTE

Hold the fuel valve body while turning the lock nut.

Remove the fuel strainer screen.

Blow dust and sediment off the screen with compressed air.

Check the O-ring for deterioration or damage and replace it with a new one if necessary.

FUEL GAUGE SENSOR

Remove the four fuel gauge sensor nuts and sensor.

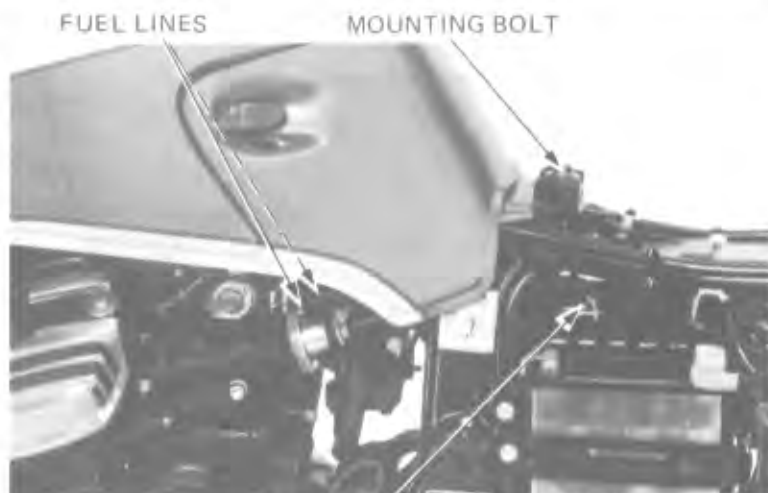
NOTE

Do not bend the float arm.

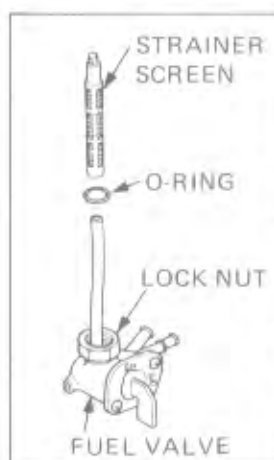
Check the o-ring for deterioration or damage and replace it with a new one if necessary.

INSTALLATION

Installation is essentially the reverse of removal.



FUEL GAUGE SENSOR COUPLER



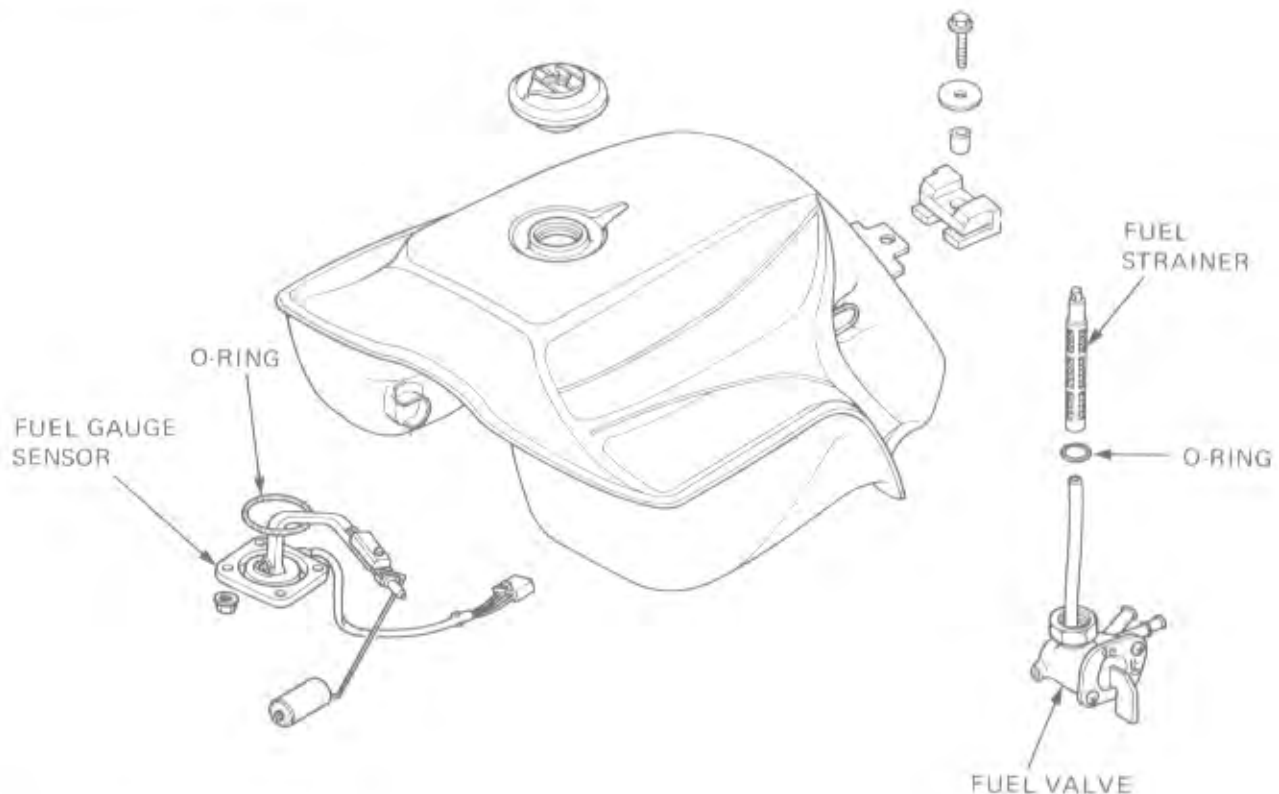
O-RING



FUEL SYSTEM

FUEL TANK ASSEMBLY

Assembly is the reverse order of disassembly.



NOTE

- After installation, check the operation of the fuel valve. Also make sure that there are no leaks.
- Hold the fuel valve while turning the fuel valve retaining nut.
- Do not bend the float arm.

Connect the fuel lines to the fuel valve and set the hose bands securely.

Connect the fuel gauge sensor coupler to the main wire harness.

NOTE

Be sure the fuel gauge wires are routed and secured correctly.

Reconnect the fuel pump coupler.
Install the fuel tank mounting bolt.
Install the seat and side covers.



FUEL GAUGE SENSOR COUPLER



AIR CLEANER CASE/REED VALVE

REMOVAL

Remove the fairing, instruments and fairing bracket as described in section 14.

FAIRING BRACKET



Remove the three air cleaner case mounting bolts and remove the inlet duct from the air cleaner case.

AIR CLEANER CASE INLET DUCT



MOUNTING BOLTS

Remove the reed valve chamber from the air cleaner case by removing screws. Then remove the air cleaner case.

REED VALVE CHAMBER

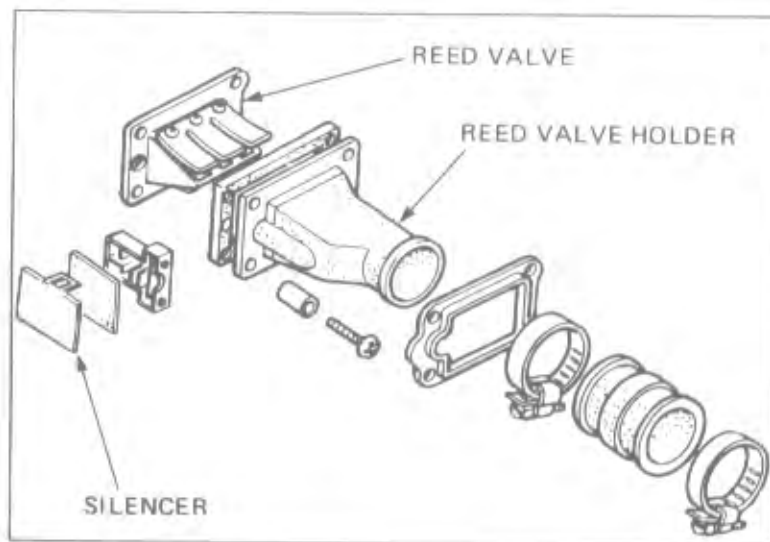


SCREWS



FUEL SYSTEM

Disassemble the reed valve chamber.
Remove the reed valve and silencer from the reed valve chamber.



Check the reeds for damage or fatigue and replace if necessary.

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

CAUTION

Do not disassemble or bend the reed stopper as this may cause improper engine performance. The reed valve must not be disassembled. If the stopper, reed or seat is defective, replace it as a unit.

REED STOPPER



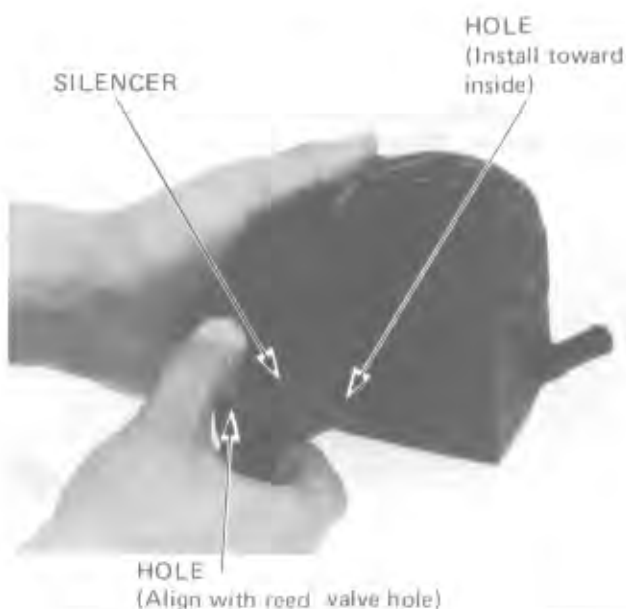
REED

INSTALLATION

Assemble the reed valve chamber:

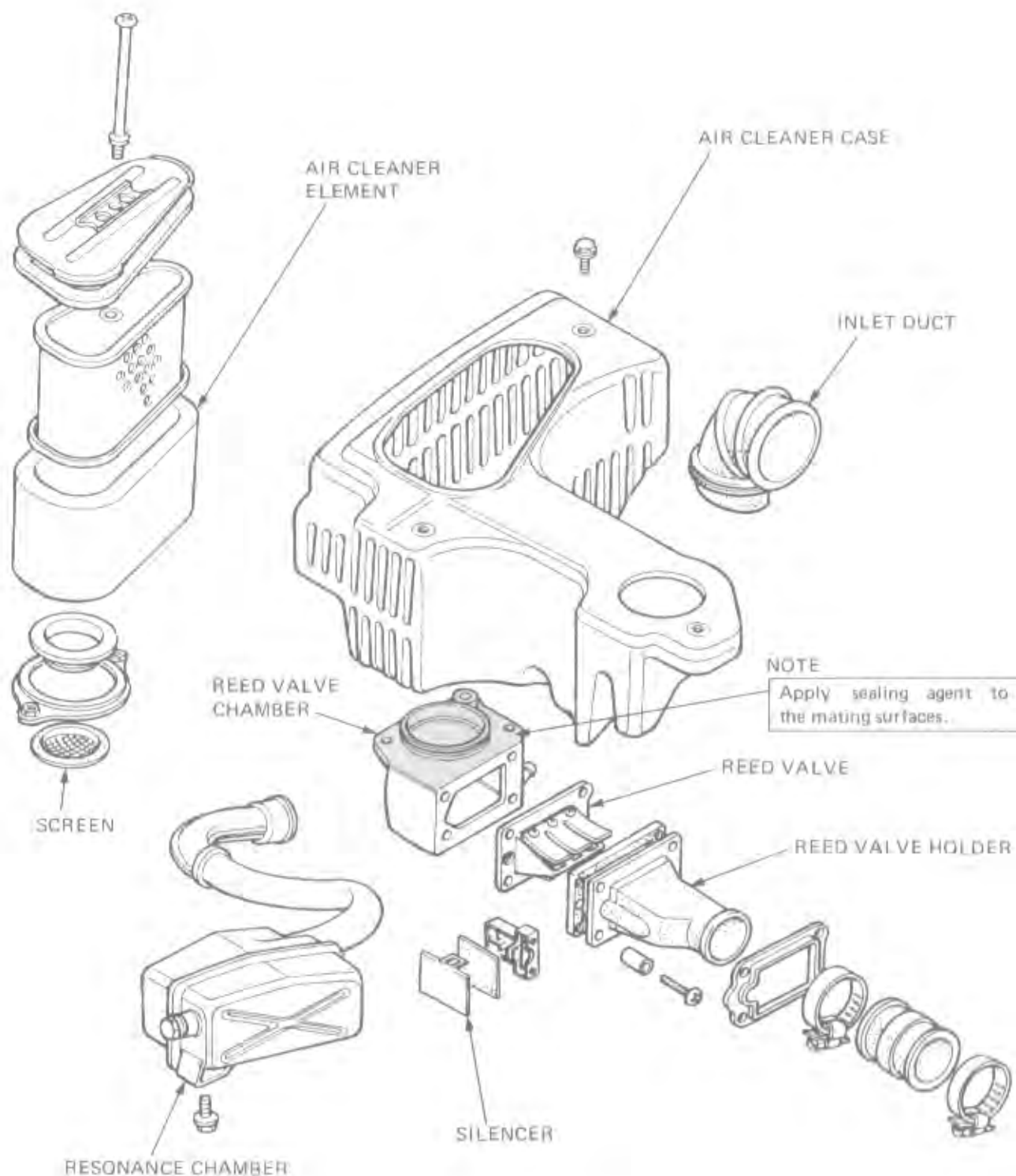
Install the reed valve with the hole at the side aligned with the hole in the silencer.

Install with the hole in the silencer toward the inside.



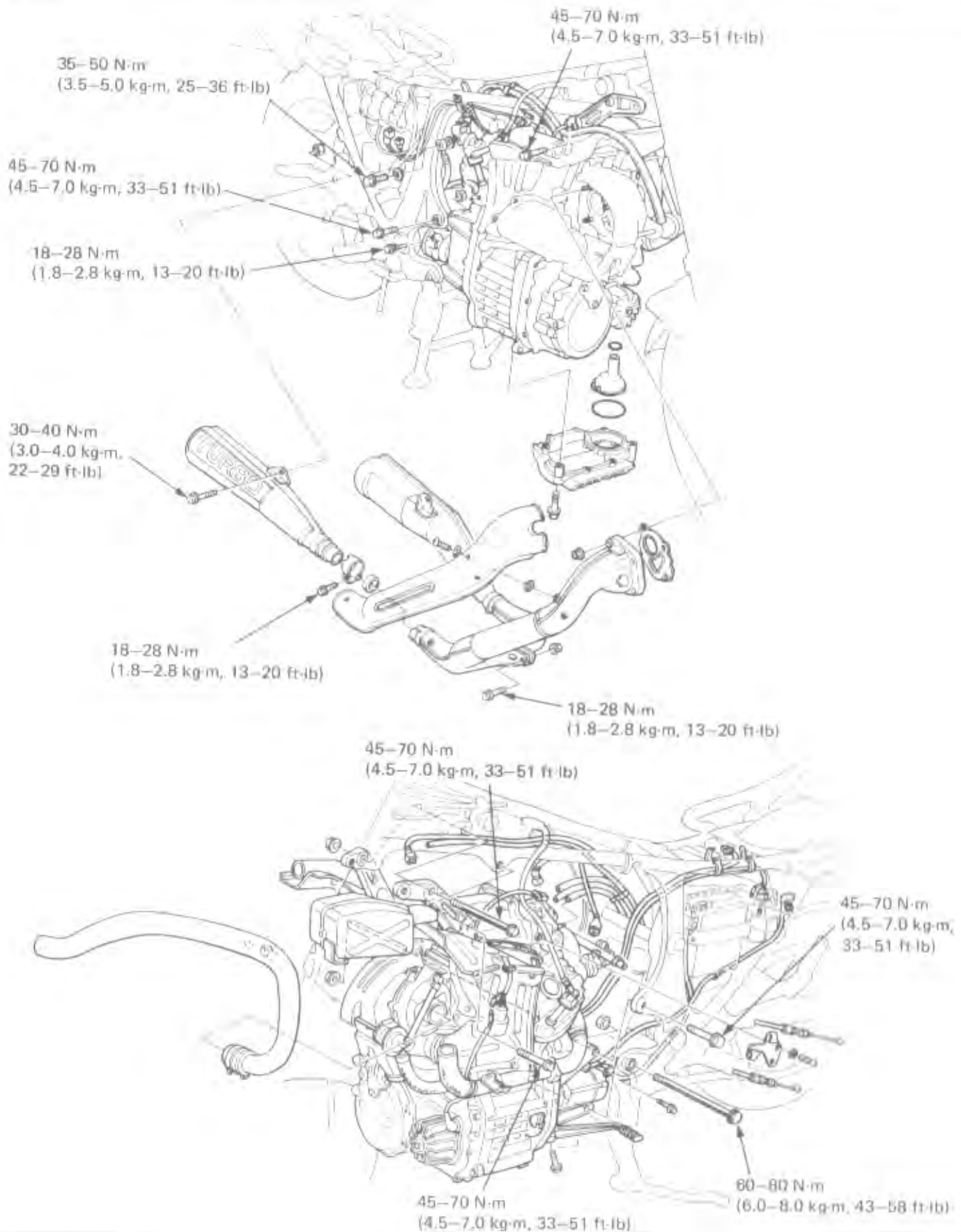


Installation sequence is essentially the reverse order of removal.





ENGINE REMOVAL/INSTALLATION





SERVICE INFORMATION	5-1
ENGINE REMOVAL	5-2
ENGINE INSTALLATION	5-7

SERVICE INFORMATION

GENERAL

WARNING

Keep flames and sparks away from your work area.

- Parts requiring engine removal for servicing:
 - Crankshaft and pistons
 - Connecting rods
 - Camshaft
 - Flywheel and starting clutch
 - Gearshift spindle
 - Transmission
- Remove and install the engine with a hydraulic jack to support its weight.
- Drain the engine oil before removing the engine if the front or rear cover is to be removed.
- For cooling system removal and installation, see Section 10, Cooling System.

SPECIFICATIONS

Engine oil capacity	3.0 lit (2.6 Imp qt, 3.2 US qt) at draining 3.5 lit (3.1 Imp qt, 3.7 US qt) at disassembly
Engine oil recommendation	See page 2-1
Coolant capacity (Radiator and engine)	2.1 lit (1.8 Imp qt, 2.2 US qt) at draining

TORQUE VALUES

Front engine hanger bolt	35-45 N·m (3.5-4.5 kg-m, 26-33 ft-lb)
Front engine hanger nut	30-40 N·m (3.0-4.0 kg-m, 22-29 ft-lb)
Front engine mount bolt (10 mm)	45-70 N·m (4.5-7.0 kg-m, 33-51 ft-lb)
Rear engine mount bolt (10 mm)	45-70 N·m (4.5-7.0 kg-m, 33-51 ft-lb)
(12 mm)	60-80 N·m (6.0-8.0 kg-m, 43-58 ft-lb)
Final drive shaft lock bolt	18-28 N·m (1.8-2.8 kg-m, 13-20 ft-lb)
Muffler mount bolt	30-40 N·m (3.0-4.0 kg-m, 22-29 ft-lb)
Power chamber bolt	18-28 N·m (1.8-2.8 kg-m, 13-20 ft-lb)
Muffler band bolt	18-28 N·m (1.8-2.8 kg-m, 13-20 ft-lb)



ENGINE REMOVAL/INSTALLATION

ENGINE REMOVAL

Remove the fuel tank.

Remove the fairing and fairing bracket as described in Section 14.

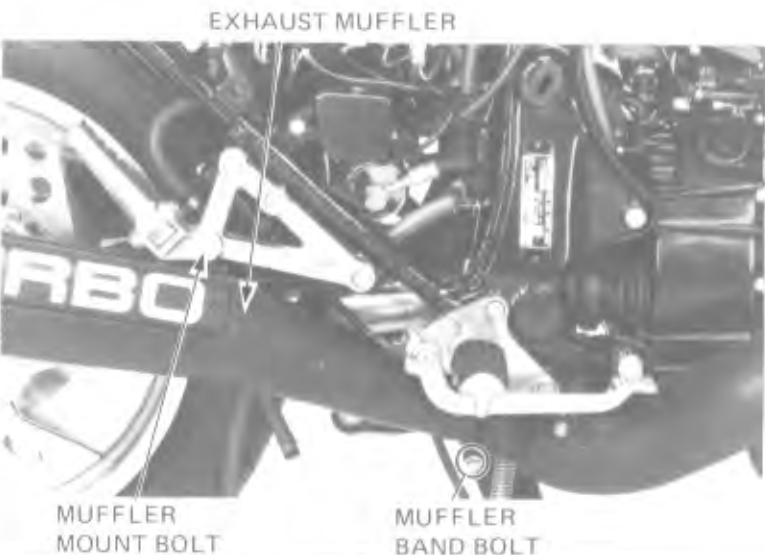
Drain the coolant from the radiator and remove the radiator (Section 10).



Remove the muffler protector.

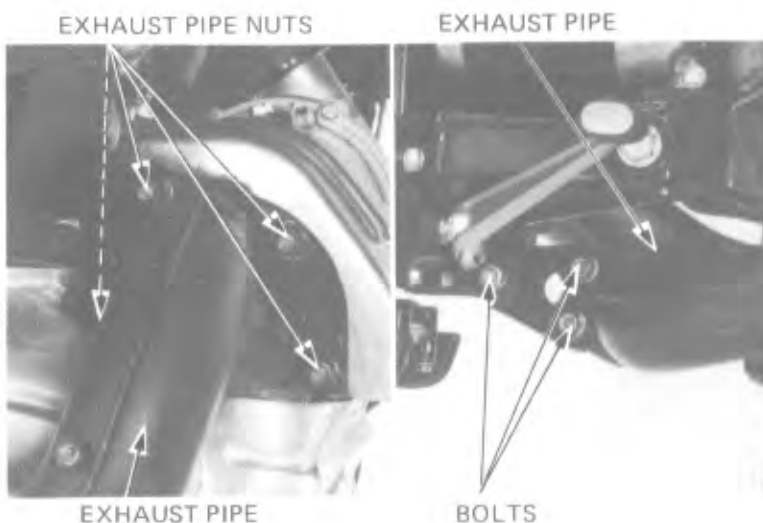


Remove the right and left exhaust mufflers.





Remove the four exhaust pipe nuts and three exhaust pipe hanger bracket bolts. Remove the exhaust pipe.

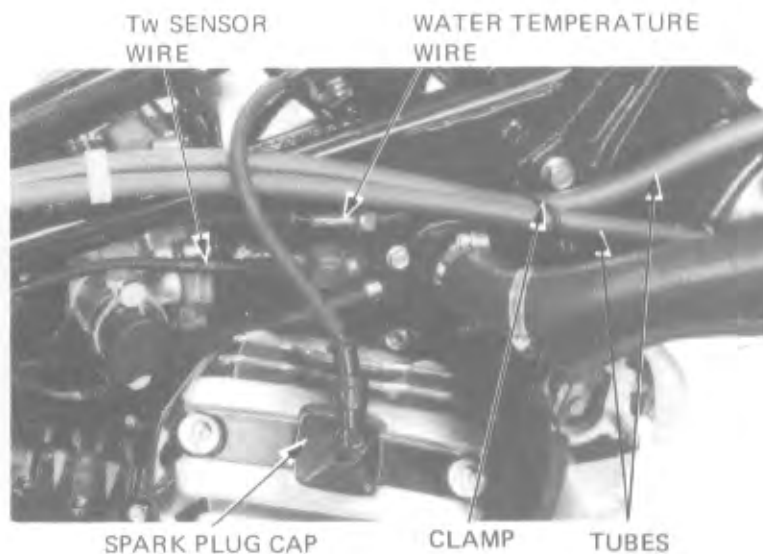


Drain the engine oil from the oil pan and remove the oil pan.



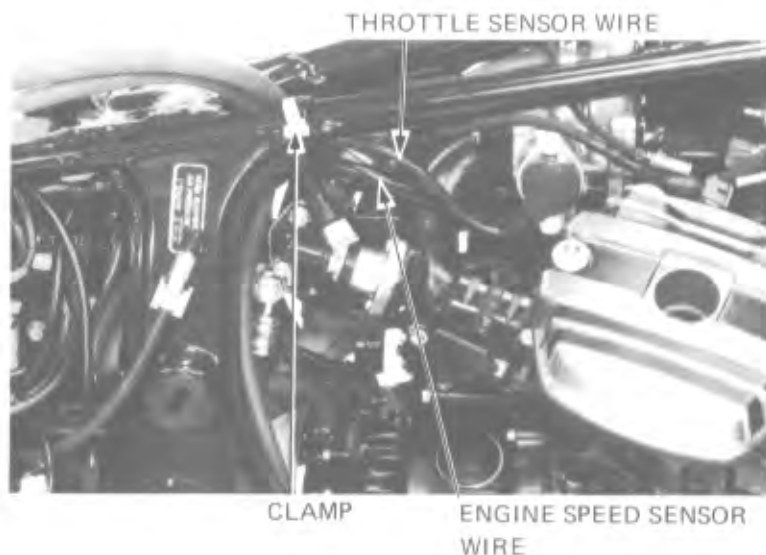
Remove the spark plug caps from the spark plugs. Pull the crankcase breather and coolant siphon tubes back out of the tube clamp on the front right engine mount bracket.

Disconnect the TW sensor and water temperature switch wire from the thermostat cover.





Remove the clamp attaching the throttle and engine speed sensor wires to the frame and disconnect the sensors at the sensor holder on the right of the motorcycle.



Disconnect the right and left fuel injector couplers.

Wrap a shop towel around the fuel line and banjo bolt fitting.

Loosen the banjo bolt slowly to prevent fuel from squirting out.

Cover the fuel inlet port with a tape.

Disconnect the crankcase breather tube from the engine case.



Remove the drive shaft lock bolt.





Remove the pressure tubes from the throttle housing and air intake pipe.

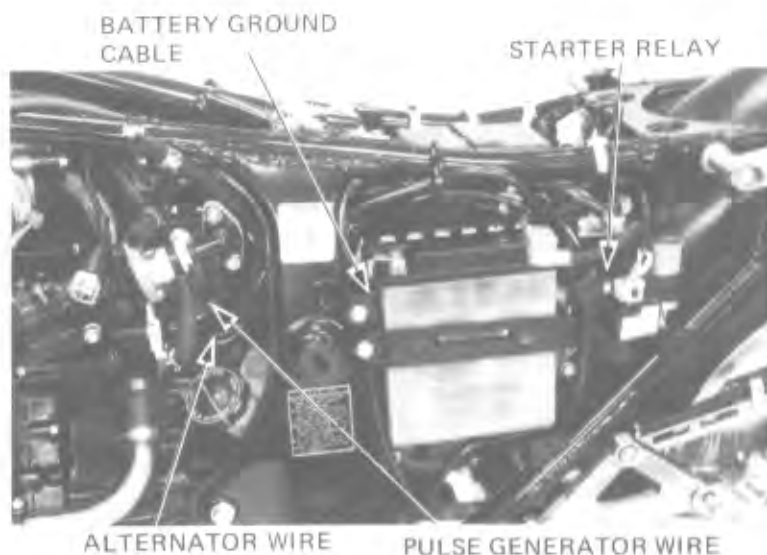
Disconnect the air valve sensor coupler at the air valve.



Disconnect the battery ground cable from the starter motor.

Remove the starter wires from the starter relay.

Remove the wire clamp and disconnect the alternator and pulse generator wire couplers behind the starter relay bracket.



Remove the two screws attaching the throttle cable bracket to the throttle housing; remove the throttle cables with the cable bracket.

Disconnect the resistor coupler.

Remove the T1 sensor coupler at the air intake pipe.

Disconnect the oil pressure switch wire connector.





ENGINE REMOVAL/INSTALLATION

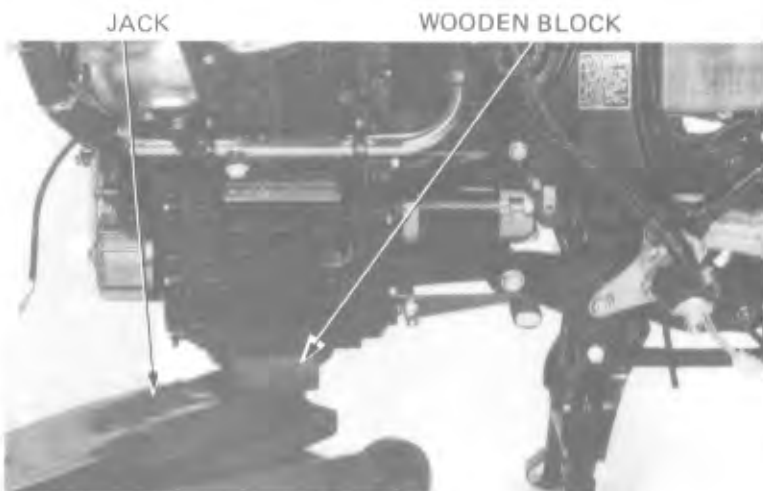
Remove the air intake pipe.
Remove the three front engine mount bolts and a nut.



Place a jack with a wooden block on it under the engine.

NOTE

The wooden block is used to prevent damage to the oil pan mating surface of the engine.



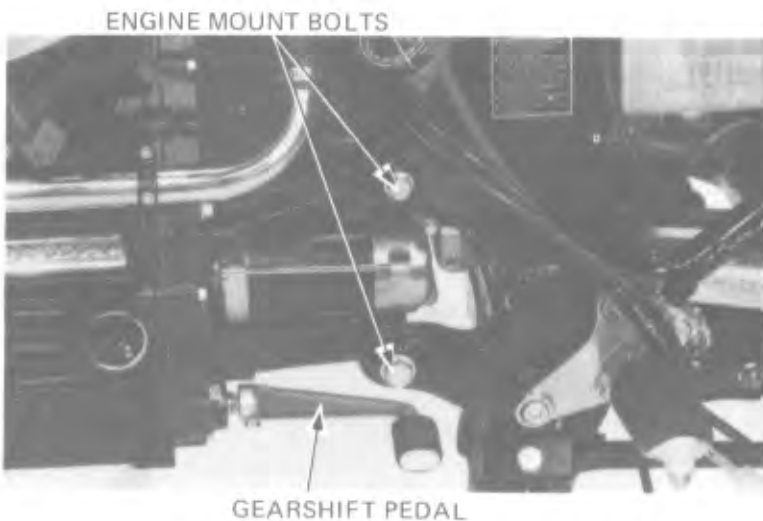
Remove the gearshift pedal.
Remove the three rear engine mount bolts and nuts.

Disengage the final shaft from the U-joint assembly by adjusting the jack height and moving the engine forward.

Remove the engine from the frame.

CAUTION

Jack height must be continuously adjusted during engine removal and installation to prevent damage to mounting bolt threads, wire harness and cables.





ENGINE INSTALLATION

The installation sequence is essentially the reverse order of removal.

Place the transmission into gear.

Raise the engine with a jack and align the drive shaft with the final shaft.

Slide the final shaft into the U-joint assembly by moving the engine backward.

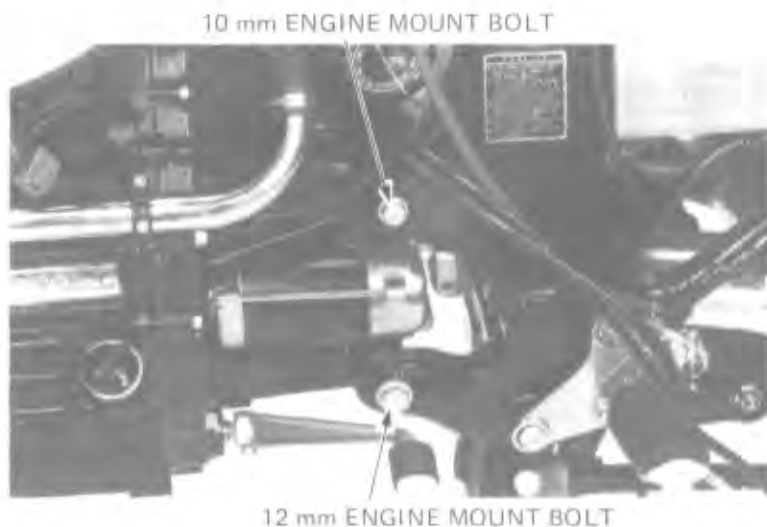
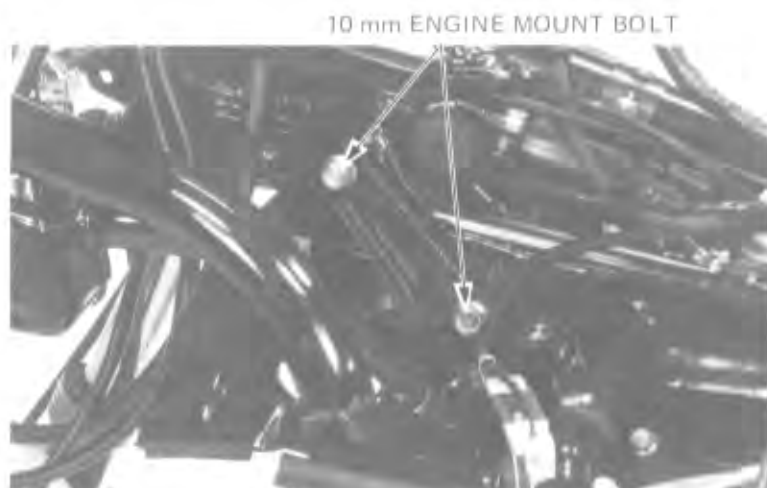
NOTE

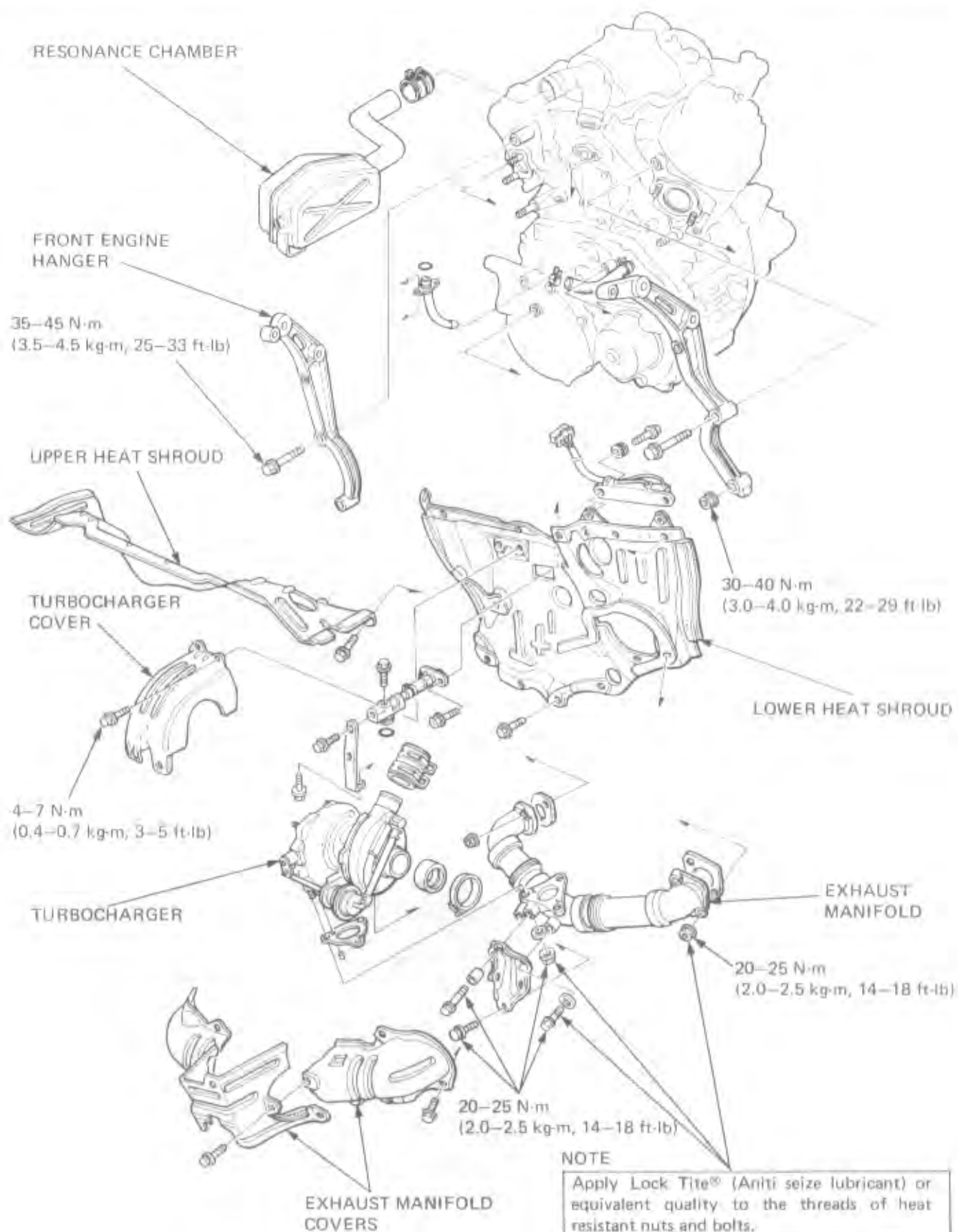
- Make sure that the final drive splines are exposed 5–6 mm from the end of the U-joint.
- Lubricate the final shaft splines with lithium-based multipurpose grease NLGI No. 2 (MoS₂ additive) before installation.
- Align the mounting surfaces carefully to prevent from damage to mounting bolt threads, wire harness and cables.
- Route the wires, tubes and cables properly (Section 1).
- The Ti, Tw and injector sensor wire harness couplers have steel rings. These couplers must be kept dry. If an audible click is not heard when connecting the couplers they must be repaired.
- Fill the engine with the recommended oil and coolant.
- Perform the following inspections and adjustments:
 - Clutch free play (Section 3).
 - Engine oil level (Section 2).
 - Radiator coolant (Section 3).
 - Tube routing (Section 1).

Tighten the engine mount bolts and drive shaft lock bolt.

TORQUE:

- 10 mm bolt:** 45–70 N·m
(4.5–7.0 kg·m, 33–51 ft·lb)
- 12 mm bolt:** 60–80 N·m
(6.0–8.0 kg·m, 43–58 ft·lb)
- Drive Shaft lock bolt:** 18–25 N·m
(1.8–2.5 kg·m, 13–20 ft·lb)







SERVICE INFORMATION	6-1
TROUBLESHOOTING	6-1
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TURBOCHARGER REMOVAL	6-3
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TURBOCHARGER INSTALLATION	6-7

SERVICE INFORMATION

GENERAL

- The turbocharger must be serviced while it is COLD.
- To prevent loss of oil, cover the oil inlet and return line holes with tape after the lines have been disconnected. This is also important to prevent entry of dust and dirt into the turbocharger. Fill the lubricating system of a new turbocharger with clean engine oil, or refill the old turbocharger if there is any loss of oil during removal.
- Do not attempt to remove carbon from the turbine vanes as such practice may impair the balance of the rotor assembly.
- Do not hang the turbocharger by the wastegate actuator rod to prevent damage to the actuator body during removal and installation. If the rod is bent the turbocharger assembly must be replaced.
- Use the heat resistant bolts and nuts whenever so specified.
- Do not attempt to disassemble the turbocharger. Always replace it as a unit. Before installing a new turbocharger, make sure that there are no foreign particles in the intake and exhaust systems, particularly when replacement is required due to a broken turbine or compressor.
- The turbocharger can be serviced with the engine mounted in the frame.
- Do not lay the turbocharger on its side to prevent oil from accumulating in the compressor passage. Keep the turbocharger upright.

SPECIFICATIONS

Charging pressure control	Waste-gate valve		
Rotor bearing	Full-floating		
Charging pressure	120 kPa (883 mmHg, 1.2 kg/cm ² , 17.1 psi) at 8,000 min ⁻¹ (rpm)	Waste gate valve (Lift/pressure)	2.0 mm (0.08 in)/130–138 kPa (980–1,040 mmHg, 1.33–1.41 kg/cm ² , 18.9–20.1 psi)
		Compression ratio (cylinder)	7.2 : 1

TORQUE VALUES

Engine hanger bolt (10 mm)	35–45 N·m (3.5–4.5 kg-m, 25–33 ft-lb)
Engine hanger nut (10 mm)	30–40 N·m (3.0–4.0 kg-m, 22–29 ft-lb)
Exhaust manifold nut (8 mm)	20–25 N·m (2.0–2.5 kg-m, 14–18 ft-lb)
Turbocharger mounting bracket bolt (8 mm)	20–25 N·m (2.0–2.5 kg-m, 14–18 ft-lb)
Heat cover bolt (6 mm)	4–7 N·m (0.4–0.7 kg-m, 3–5 ft-lb)

TOOL

Special

Combination Pressure/Vacuum tester

07406–0050000 or commercially available in U.S.A.

TROUBLESHOOTING

Engine lacks power/poor acceleration

- Turbine/compressor seized
- Waste gate valve stuck open
- Exhaust gas leak

White smoke

- Faulty rotor oil seal

Abnormal noise

- Damaged turbine shaft bearing
- Turbine/compressor binding with housing
- Foreign matter

Knocking

- Waste gate stuck closed

Turbine/compressor does not rotate

- Seized turbine shaft bearing
 - Clogged oil control orifice
 - Lack of oil in oil pan/deteriorated oil
 - Rotor out of balance

Waste gate not operated properly

- Faulty actuator
- Bent actuator rod
- Deformed waste gate or foreign matter stuck between gate and seat
- Broken actuator control pipe



TURBOCHARGER INSPECTION

TURBINE SPEED

Remove the fairing (See Section 14).

Remove the exhaust pipe (See Section 5).

Spin the turbine wheel by hand to make sure that it turns freely.

Replace the turbocharger as an assembly if the turbine does not rotate at all or rotates sluggishly.

CAUTION

If the turbine shaft seizes, check the engine oil level, oil type and oil passages for blockage. Be sure to determine and correct the cause of the seized shaft before installing a new turbocharger.



WASTE-GATE VALVE

Remove the radiator screen and lower portion of fairing, (Section 14).

Loosen the turbocharger heat cover lower bolt 3-4 turns. Bend a small paper clip to point at the waste gate actuator rod.

Wrap a piece of tape around the rod and mark it where the clip points.

Disconnect the pressure hose from the actuator.

Apply a pressure of 130–138 kPa (980–1,040 mmHg, 1.33–1.41 kg/cm², 18.9–20.1 psi) to the pressure pipe with a pressure tester and mark the tape at the point the clip is at.

Measure the distance between the marks.

The actuator is normal if the rod is moved 2.0 mm (0.08 in).

Replace the turbocharger as an assembly if the actuator is faulty.

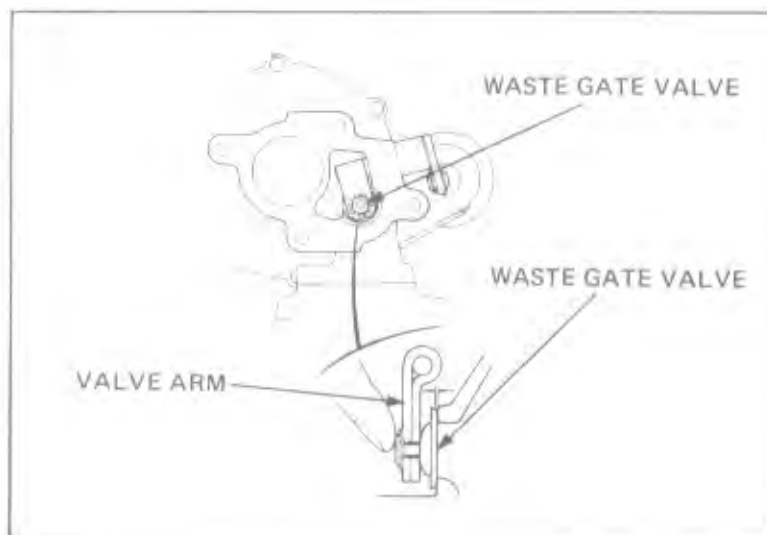
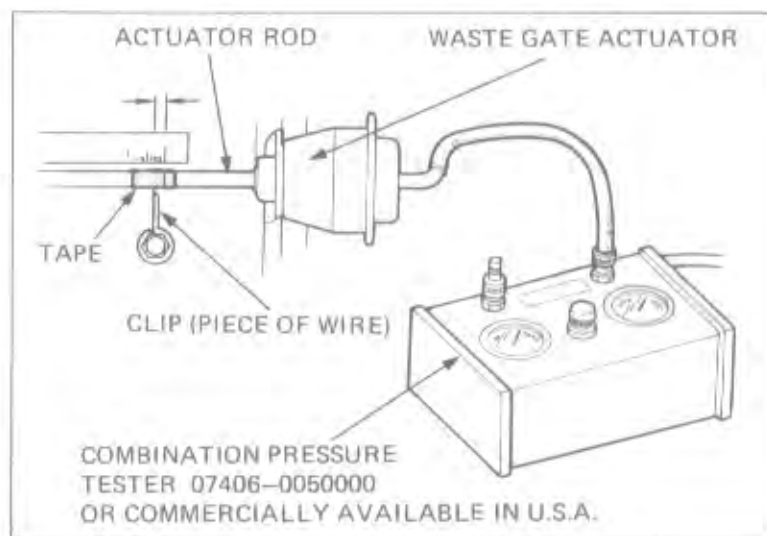
NOTE

Do not remove the actuator. It is not serviceable.

Remove the fairing bracket, (Section 14).

Remove the radiator, (Section 10).

Check the waste-gate valve for proper seating. Replace the turbocharger if the valve does not seat properly, or if there is play in the valve and valve arm.





TURBOCHARGER REMOVAL

Remove the following parts before removing the turbocharger:

- Fairing assembly (See Section 14).
- Fairing bracket (See Section 14).
- Radiator (See Section 10).
- Muffler/exhaust pipe (See Section 5).

NOTE

The turbocharger can be removed and installed with the engine mounted in the frame.

Remove the turbocharger heat cover bolts and cover.

TURBOCHARGER HEAT COVER



Remove the right and left exhaust manifold heat cover bolts and covers.

RIGHT EXHAUST MANIFOLD HEAT COVER



LEFT EXHAUST MANIFOLD HEAT COVER

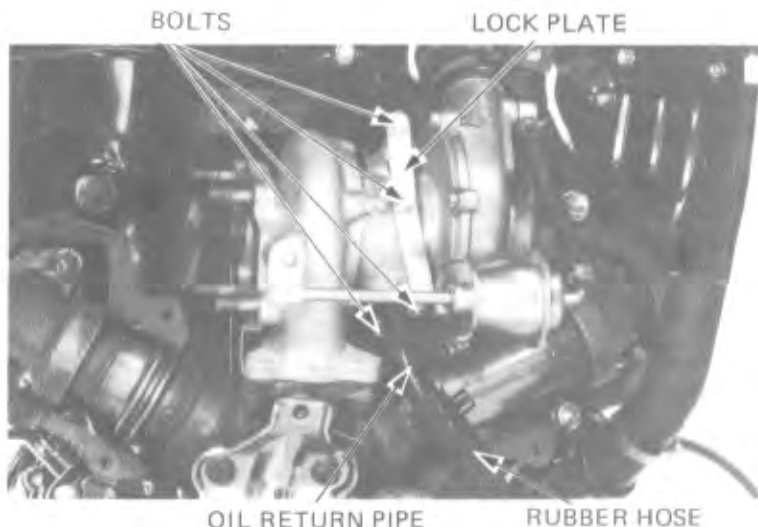




Remove the rubber hose from the oil return pipe by loosening the spring clamp.

Pull the oil return pipe from the turbocharger center housing by removing the four bolts and a pipe joint lock plate.

Cover the end of the return pipe with tape.

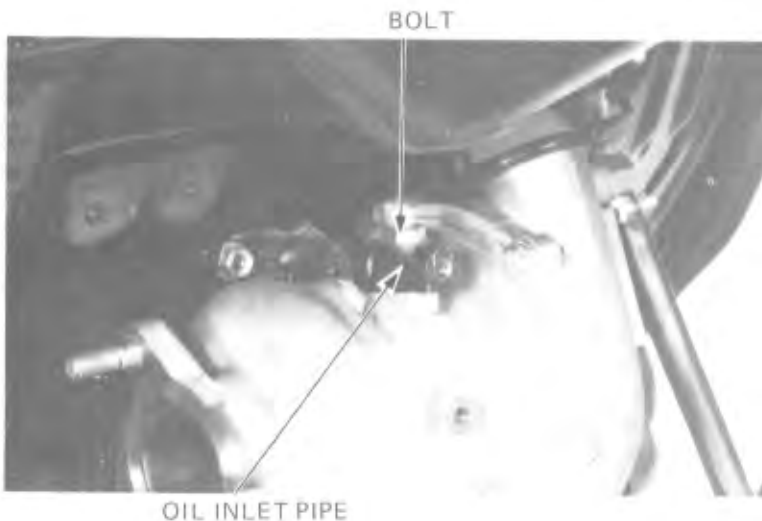


Remove the oil inlet pipe joint carefully from the center housing by removing the bolt.

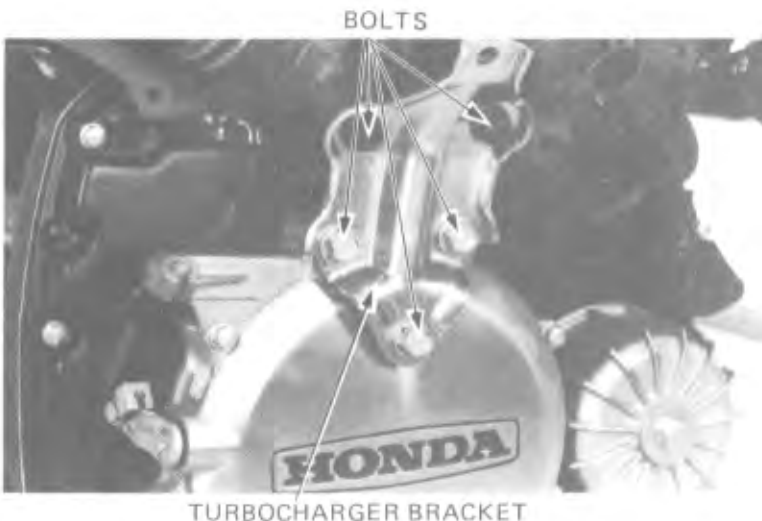
Cover the oil inlet and outlet holes with a tape.

NOTE

- Pull the oil inlet pipe straight upward without bending to prevent from damage.
- To prevent loss of oil from the center housing, cover the hole with a tape.



Remove the turbocharger bracket bolts and bracket.





Remove the right and left exhaust manifold nuts.



Remove the exhaust manifold from the cylinder head with the turbocharger while loosening the spring clamp on the air joint pipe as shown.

NOTE

- Do not pry between the manifold and exhaust port.
- Replace the gasket after removing.
- Avoid damaging the waste gate control actuator.

CAUTION

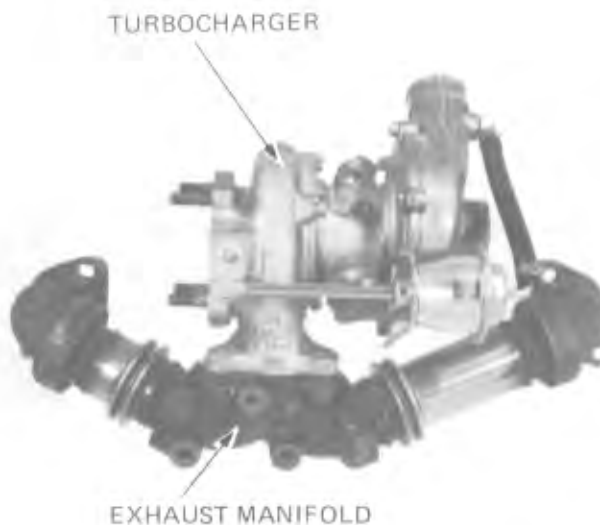
Do not bend the actuator rod. The turbocharger assembly must be replaced if it is bent.



Remove the exhaust manifold from the turbocharger.

CAUTION

Do not disassemble the turbocharger. It is not serviceable.



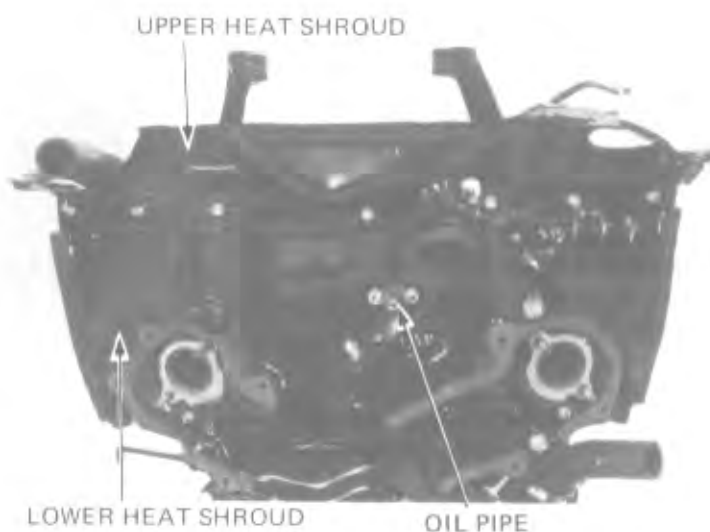


Check the exhaust manifold and turbocharger for distortion, cracks or damage.



OIL CONTROL ORIFICE

Remove the upper and lower heat shrouds.
Disconnect the oil pipe from the camshaft holder.



Blow the orifice open in the oil pipe joint and oil pipe with a compressed air.
Check the O-ring for condition.

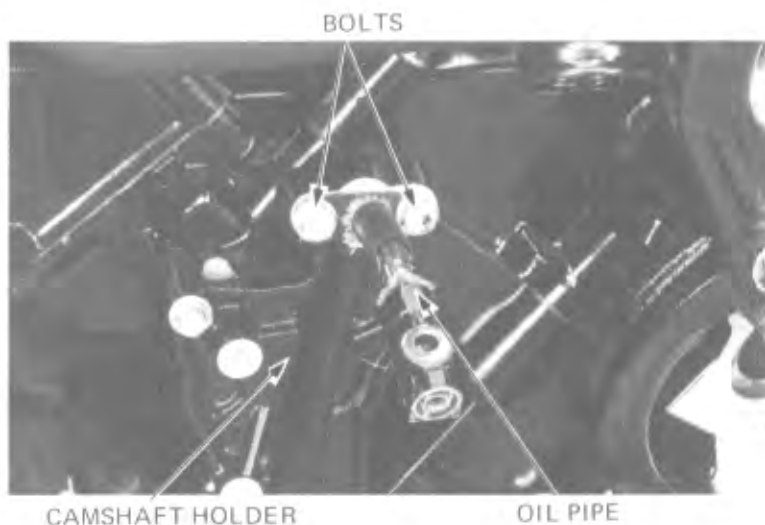
CAUTION

Do not use a piece of wire in an attempt to clean the orifice as this may enlarge the orifice.

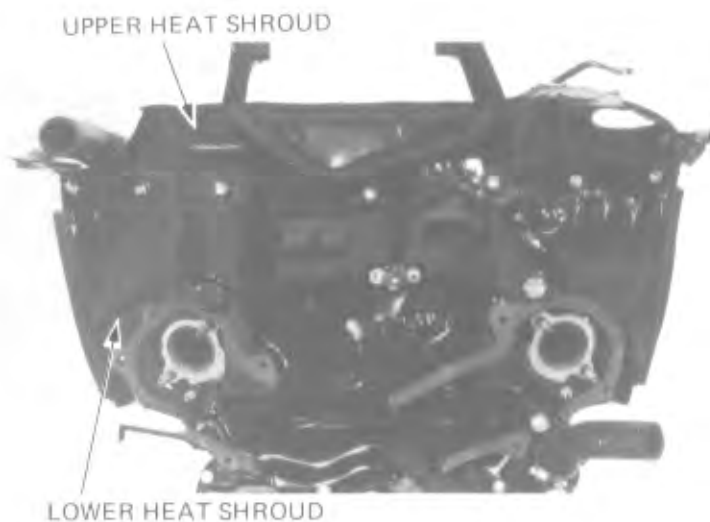




Install the O-ring and connect the oil pipe to the camshaft holder.



Install the upper and lower heat shrouds.



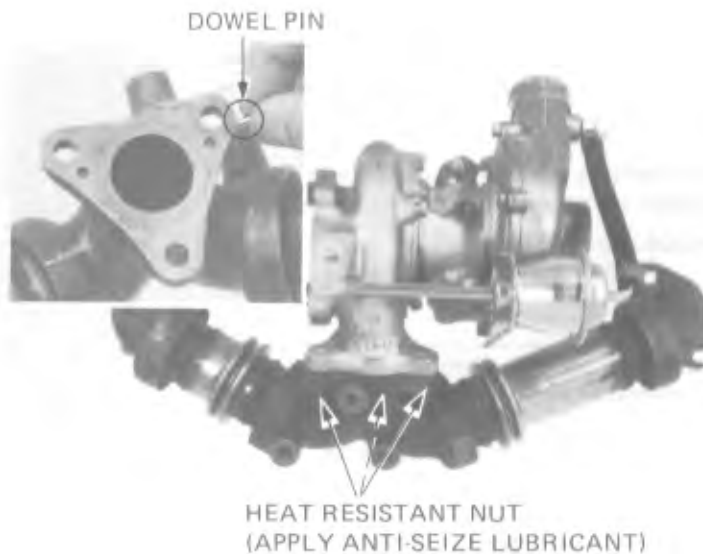
TURBOCHARGER INSTALLATION

NOTE

Apply Lock Tite® (Anti-seize Lubricant) or equivalent quality to the threads of the heat resistant nuts and bolts before installing.

Install the dowel pins.
Install the exhaust manifold on the turbocharger using the heat resistant nuts. Tighten the nuts to the specified torque.

TORQUE: 20–25 N·m
(2.0–2.5 kg·m, 14–18 ft·lb)



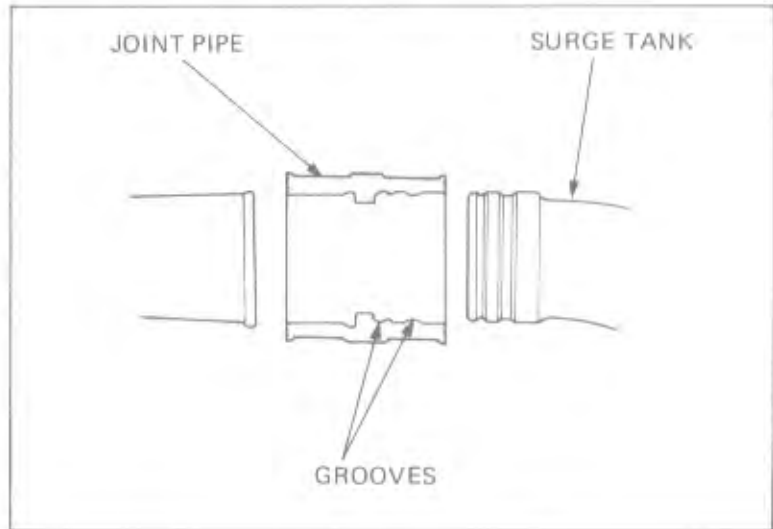


TURBOCHARGER

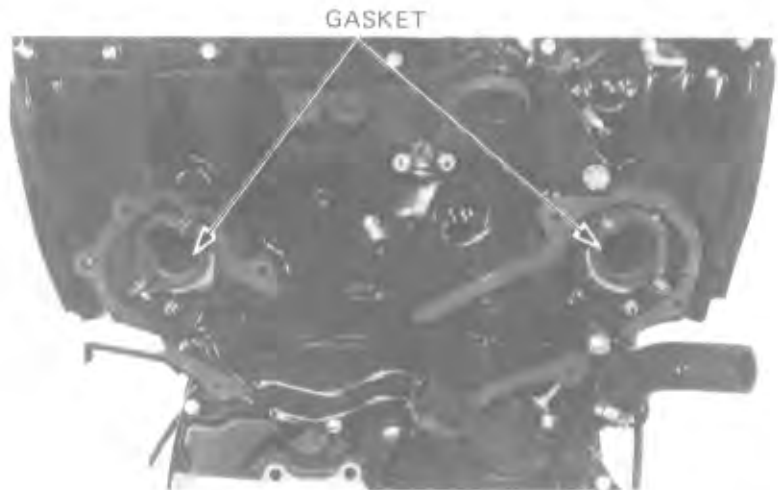
Install the joint pipe between compressor and tank.

NOTE

- Check that the "UP" mark and corrugated end (inside) of the compressor connecting hose is facing up.
- To facilitate installation, slide the spring bands toward the center away from the hose end.
- Install the connecting hose with the inner grooves on the surge tank side.



Install the gaskets on the right and left exhaust ports.



Position the exhaust manifold on the cylinder head, aligning the compressor outlet with the connecting hose.

Install the exhaust manifold using the heat resistant nuts. Tighten the nuts to the specified torque.

TORQUE: 20–25 N·m
(2.0–2.5 kg·m, 14–18 ft·lb)

NOTE

Do not hammer the corrugated sections of the manifold as they are easily damaged.

Slide the spring bands over the connection.





CAUTION

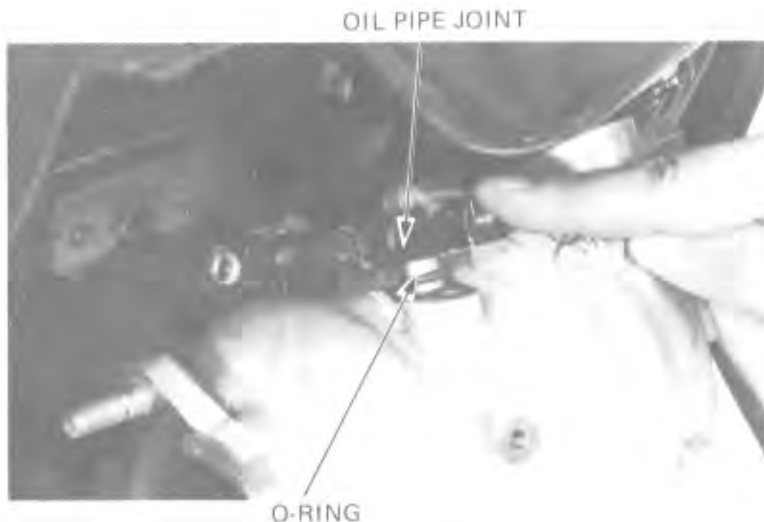
Fill the turbocharger with clean engine oil, or refill the old turbocharger if there is any loss of oil during removal.

Remove the tape from the oil inlet hole in the turbocharger.

Check the O-ring in the oil pipe joint for condition, and connect the oil pipe to the turbocharger.

NOTE

Replace the O-ring if it is damaged or deteriorated.



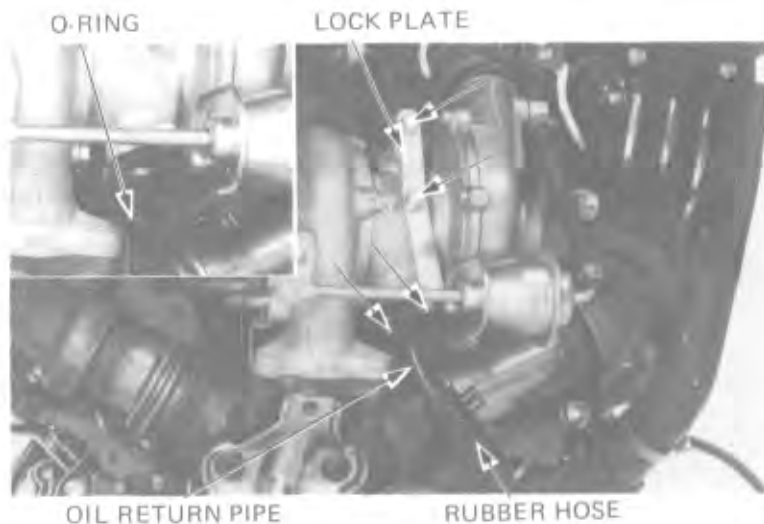
Install the exhaust manifold heat covers.
Remove the tape from the oil outlet hole.

Check the O-ring in the return pipe, and position the pipe on the turbocharger, and attach it using the five bolts and lock plate. Tighten the bolts starting with the lower bolts.

NOTE

Replace the O-ring if it is damaged or deteriorated.

Connect the rubber hose to the return pipe.



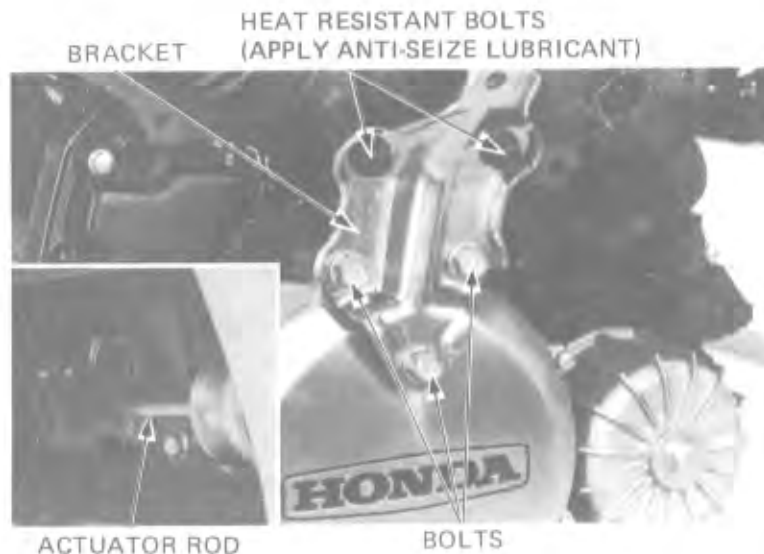
Install the turbocharger heat cover making sure the waste-gate actuator rod will not contact when the rod moves.

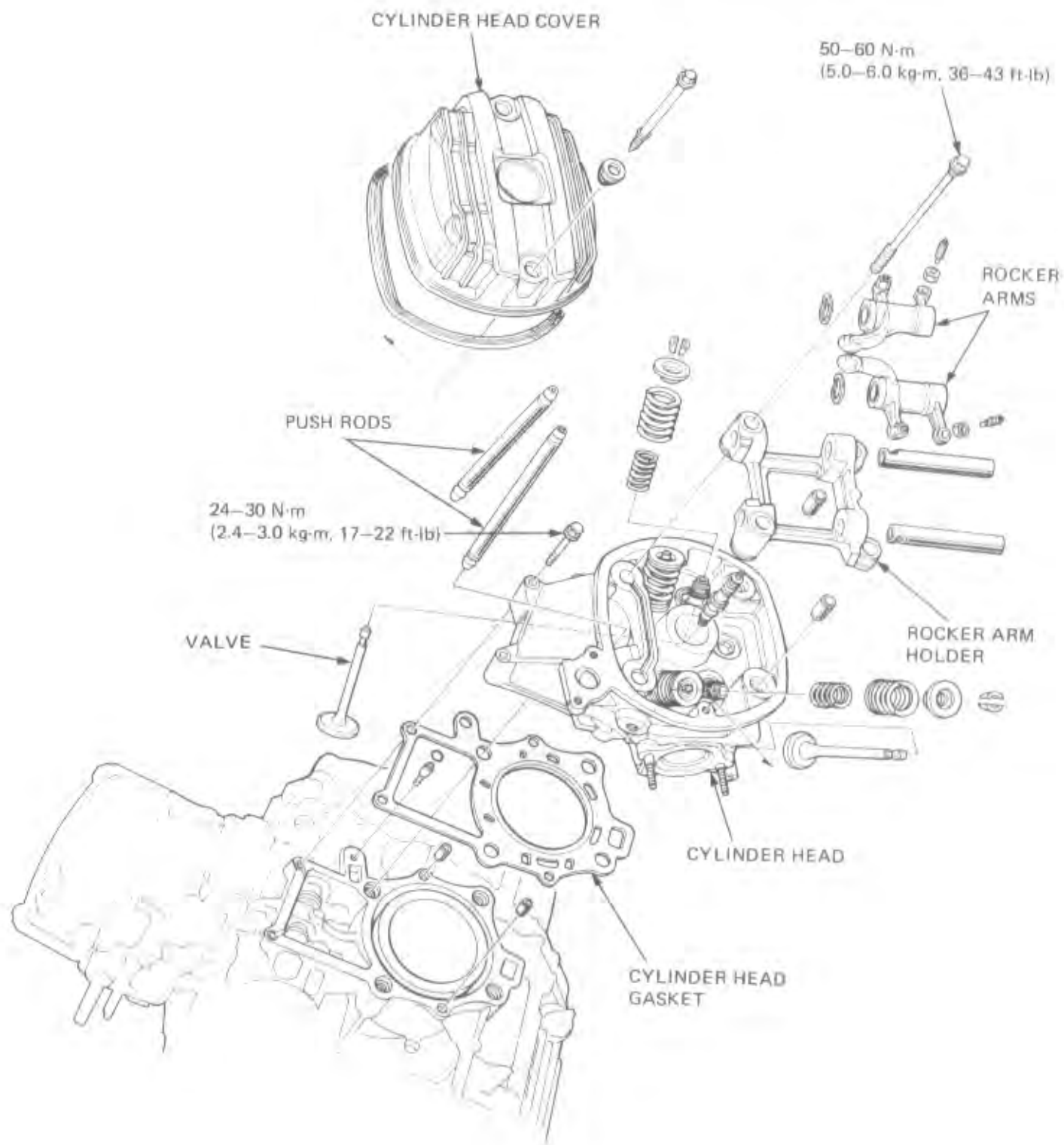
Install the turbocharger bracket on the exhaust manifold with the heat resistant bolts.

Install the turbocharger bracket on the clutch cover.

Tighten the bolts to the specified torque.

TORQUE: 20–25 N·m
(2.0–2.5 kg·m, 14–18 ft·lb)







SERVICE INFORMATION	7- 1	VALVE SEAT INSPECTION	
TROUBLESHOOTING	7- 2	AND GRINDING	7- 9
ROCKER ARM/CYLINDER HEAD REMOVAL	7- 3	CYLINDER HEAD ASSEMBLY	7-12
CYLINDER HEAD DISASSEMBLY	7- 6	ROCKER ARM ASSEMBLY	7-13
VALVE GUIDE REPLACEMENT	7- 8	CYLINDER HEAD/ROCKER ARM INSTALLATION	7-13

SERVICE INFORMATION

GENERAL

- All cylinder head maintenance and inspection can be done with the engine in the frame. Before removing the cylinder heads, it is necessary to drain coolant from the cylinder water jackets by removing the drain bolts.
- The engine must be cool before removing the cylinder heads.
- Before assembly, blow open all oil and water passages with compressed air.
- Refer to the Section 6 for removal of the turbocharger.

SPECIFICATIONS

Unit: mm (in)

Item			Standard	Service Limit
Cylinder compression (cold)			700-1,000 kPa/800 min ⁻¹ (rpm) (7-10 kg/cm ² , 100-142 psi)	
Rocker arms	Shafts and holders	Rocker arm I.D.	15.000-15.018 (0.5906-0.5913)	15.04 (0.592)
		Rocker arm shaft O.D.	14.966-14.984 (0.5892-0.5899)	14.95 (0.589)
		Rocker arm holder I.D.	14.978-15.006 (0.5901-0.5908)	15.03 (0.592)
Valve springs	Free length	Outer (IN/EX)	50.40 (1.984)	48.5 (1.91)
		Inner (IN/EX)	52.90 (2.083)	51.0 (2.01)
	Preload/Length	Outer (IN/EX)	28.5 kg/39.9 mm (61.7 lbs/1.571 in)	26.5 kg/39.9 mm (58.4 lbs/1.571 in)
		Inner (IN/EX)	13.9 kg/37.9 mm (30.6 lbs/1.492 in)	12.9 kg/37.9 mm (28.4 lbs/1.492 in)
Valves and valve guides	Stem O.D.	(IN)	6.580-6.590 (0.2591-0.2594)	6.54 (0.258)
		(EX)	6.550-6.560 (0.2579-0.2583)	6.54 (0.258)
	Guide I.D.	(IN)	6.600-6.620 (0.2598-0.2606)	6.70 (0.264)
		(EX)	6.600-6.620 (0.2598-0.2606)	6.70 (0.264)
	Stem-to-guide clearance	(IN)	0.010-0.040 (0.0004-0.0016)	0.10 (0.040)
		(EX)	0.040-0.070 (0.0016-0.0027)	0.10 (0.040)
Cylinder heads	Valve seat width		1.1-1.3 (0.04-0.05)	2.0 (0.08)
	Warpage			0.10 (0.040)



CYLINDER HEAD/VALVE

TORQUE VALUES

Cylinder head bolt (12 mm)	50–60 N·m (5.0–6.0 kg-m, 36–43 ft-lb)
Cylinder head bolt (8 mm)	24–30 N·m (2.4–3.0 kg-m, 17–22 ft-lb)
Front engine mount bolt (10 mm)	45–70 N·m (4.5–7.0 kg-m, 33–51 ft-lb)
Front engine hanger nut	30–40 N·m (3.0–4.0 kg-m, 22–29 ft-lb)
Front engine hanger bolt	35–45 N·m (3.5–4.5 kg-m, 25–32 ft-lb)

TOOLS

Special

Valve guide driver attachment (IN/EX)	07943–4150000
Valve guide reamer (IN/EX)	07984–6110000 or 07984–6570100

Common

Valve spring compressor	07757–0010000 or 07957–3290001
Valve guide remover (6.6 mm) (IN/EX)	07742–0010200 or 07942–6570100
Seat cutter 29 mm	07780–0010300
Seat cutter 35 mm	07780–0010400
Flat cutter 30 mm	07780–0012300
Interior cutter 30 mm	07780–0014000
Cutter holder 6.6 mm	07781–0010200

TROUBLESHOOTING

Engine top-end problems are usually performance related which can be diagnosed by a compression test; or are noises which can usually be traced to the top-end with a sounding rod or stethoscope.

Low or Uneven Compression

- Valve
 - Incorrect valve clearance
 - Burned or bent valves
 - Broken valve spring
 - Incorrect valve timing
 - Sticking valve
- Cylinder head
 - Leaking or damaged head gasket
 - Warped or cracked cylinder head
 - Cylinder and piston

High Compression

- Excessive carbon build-up on piston crown or in combustion chamber

Excessive Noise

- Incorrect valve adjustment
- Sticking valve or broken valve spring
- Damaged rocker arm or camshaft
- Bent push rod

Contaminated Engine Oil or Coolant

- Leaking head gasket



ROCKER ARM/CYLINDER HEAD REMOVAL

NOTE

Rocker arm can be removed without removing the fairing.

Remove the following parts before removing the cylinder head:

- Radiator (Section 10)
- Turbocharger (Section 6)
- Exhaust pipe (Section 6)

Remove the upper heat shroud, heat cover, front engine hangers, and resonance chamber.

Remove the fuel injection unit.

Remove the thermostat housing and water hose.

Remove the cylinder drain bolts and drain the coolant.

Coolant capacity (drain): 1.5 liters
(1.6 US qt, 1.3 Imp qt)

Remove the crankshaft hole cap and timing inspection cap.

Bring the piston to T.D.C. of the compression stroke by turning the crankshaft.

NOTE

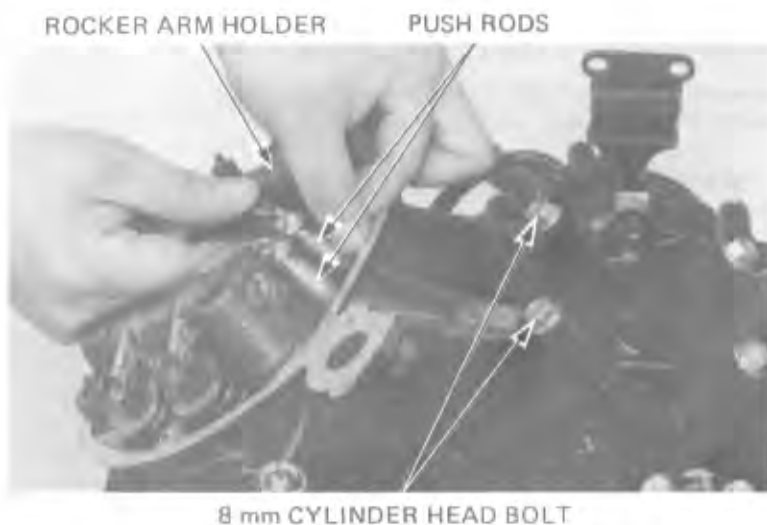
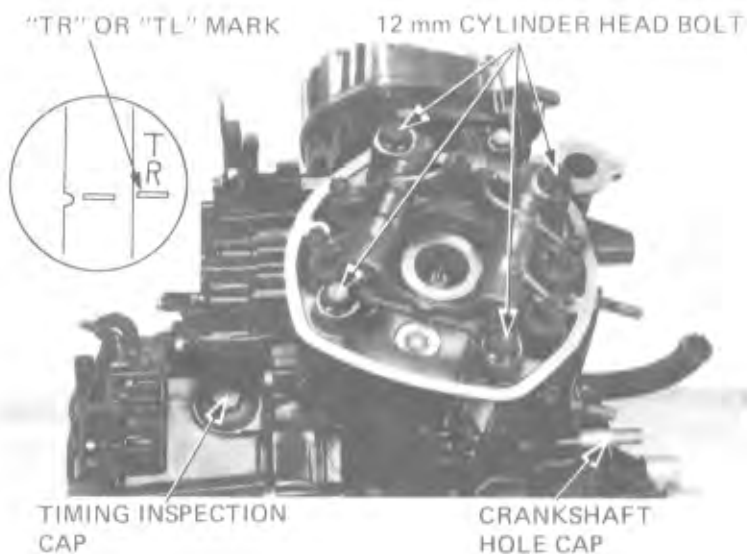
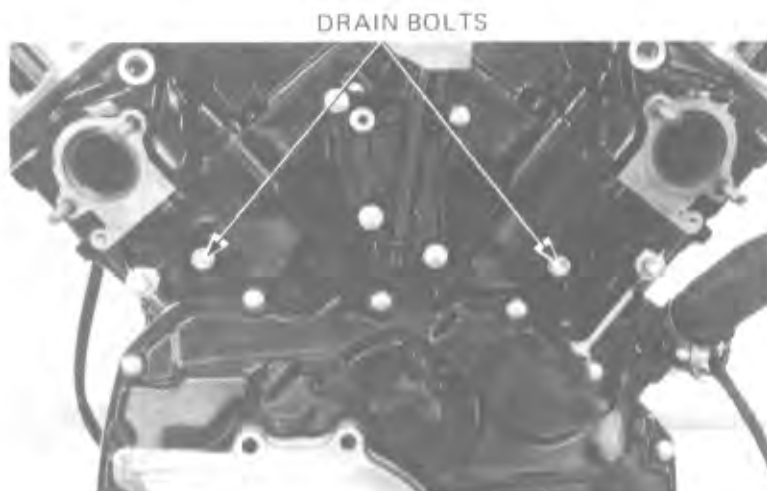
- Align the index mark with the "TR" mark for the right cylinder.
- Align the index mark with the "TL" mark for the left cylinder.

Loosen the 12 mm cylinder head bolts in a criss-cross pattern in two or more steps.

Remove the rocker arm holder assembly, push rods and dowel pins.

Remove the 8 mm cylinder head bolts.

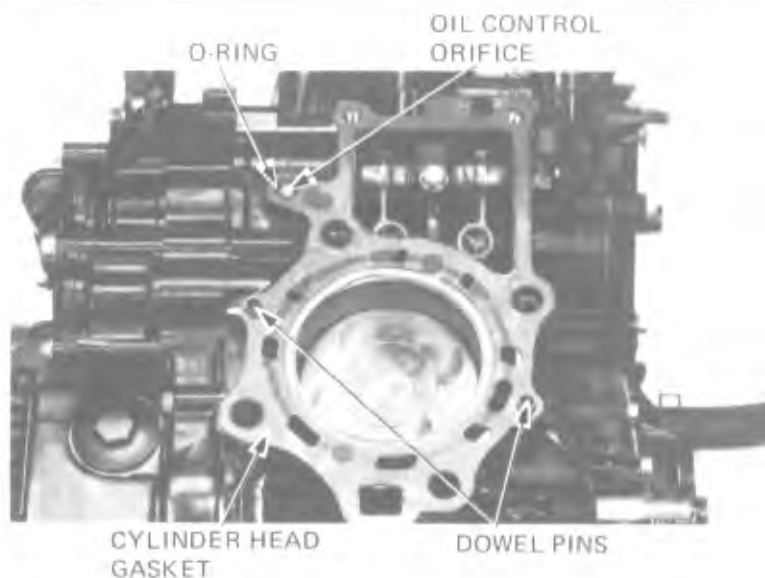
Remove the cylinder head.





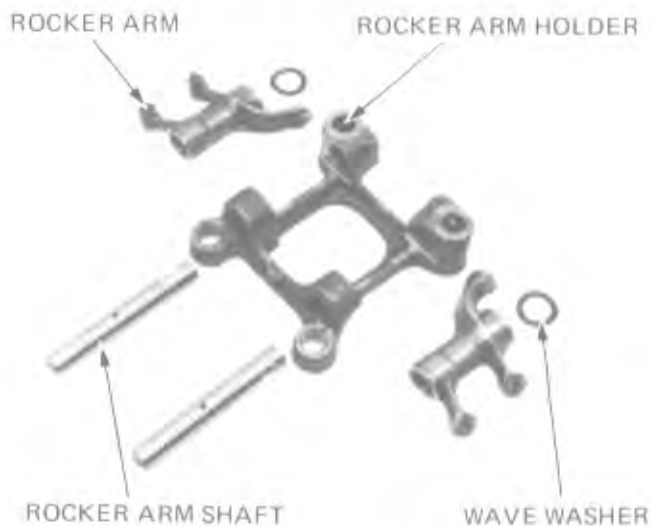
CYLINDER HEAD/VALVE

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



ROCKER ARM HOLDER DISASSEMBLY

Withdraw the rocker arm shafts and remove the rocker arms and wave washers.



ROCKER ARM SHAFT INSPECTION

Measure the O.D. of each rocker arm shaft. Examine each shaft for damage, scoring, or nicks.

SERVICE LIMIT: 14.95 mm (0.589 in)





ROCKER ARM HOLDER INSPECTION

Measure each rocker arm holder I.D.

SERVICE LIMIT: 15.03 mm (0.592 in)



ROCKER ARM INSPECTION

Inspect each rocker arm for scoring, damage, or clogged oil holes. Measure the arm I.D. of each rocker.

If a rocker arm shows wear or damage to the adjusting screw or push rod contact faces, inspect the push rods and stem contact faces for scoring, scratches, or evidence of insufficient lubrication. Inspect the push rods for wear, damage and trueness.

SERVICE LIMIT: 15.04 mm (0.592 in)





CYLINDER HEAD/VALVE

CYLINDER HEAD DISASSEMBLY

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

NOTE

- Do not compress the valve springs more than necessary to remove the cotters.
- Mark all parts to ensure original assembly.

VALVE SPRING COMPRESSOR
(07757-0010000 or 07957-3290001)



Remove carbon deposits from the combustion chamber.

Remove any gasket material from the head surfaces.

NOTE

- Do not damage the gasket surfaces.
- Avoid dropping gasket material into the jackets or oil passages.
- Gaskets will come off easier if soaked with solvent.



INSPECTION

• CYLINDER HEAD

Check the spark plug hole and valve areas carefully for cracks.

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

SERVICE LIMIT: 0.10 mm (0.040 in)

NOTE

Check for warpage in an X pattern.





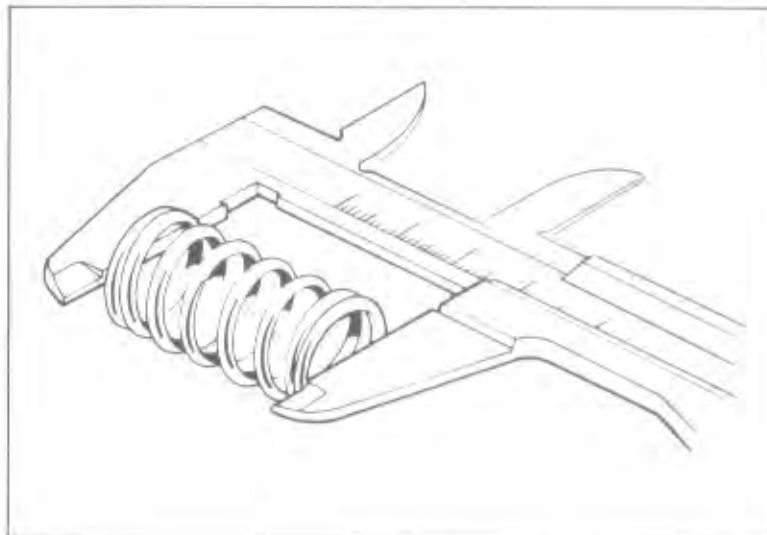
- VALVE SPRINGS

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

SERVICE LIMITS:

INNER, IN/EX: 51.0 mm (2.01 in)

OUTER, IN/EX: 48.5 mm (1.91 in)

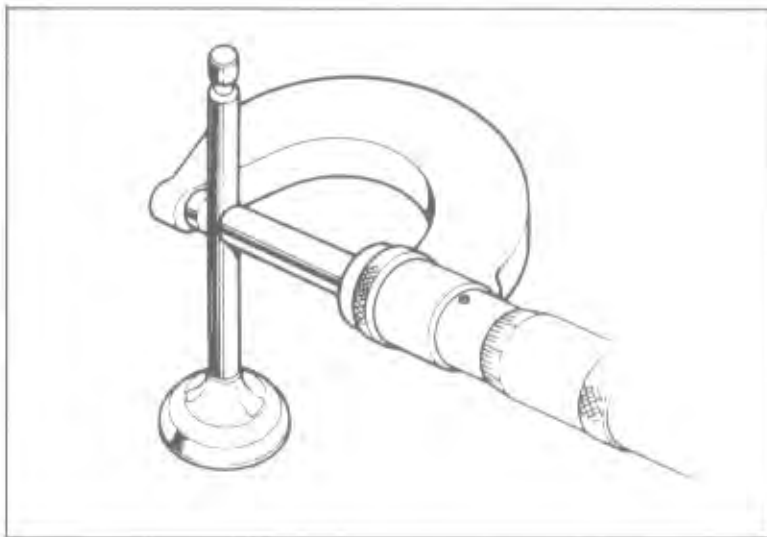


- VALVES

Clean the valves and inspect for trueness, burring, scoring, or abnormal stem end wear.
Check the valve movement in the guide.
Measure and record each valve stem O.D.

SERVICE LIMIT:

IN/EX: 6.54 mm (0.258 in)



- VALVE GUIDES

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

VALVE GUIDE REAMER
(07984-6110000 or 07984-6570100)





CYLINDER HEAD/VALVE

• STEM-TO-GUIDE CLEARANCE

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

SERVICE LIMIT:

IN/EX: 6.70 mm (0.264 in)

Calculate the stem to guide clearance.

SERVICE LIMIT:

IN/EX: 0.10 mm (0.040 in)

NOTE

If the stem to guide clearance exceeds the service limit, determine if a new guide with standard dimensions would bring the clearance within tolerance.

If so, replace guides as necessary and ream to fit.

VALVE GUIDE REPLACEMENT

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

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

Place the Attachment on the Valve Guide Remover. Drive the guides into place from the top of the head.

NOTE

The valve guide attachment must be used to position the valve guide correctly.



VALVE GUIDE DRIVER
(07742-0010200 or 07942-6570100)



VALVE GUIDE DRIVER
(07742-0010200 or 07942-6570100)



ATTACHMENT (07934-4150000)



VALVE GUIDE REAMER
(07984-6110000 or 07984-6570100)

Ream the new valve guides after installation.

NOTE

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



VALVE SEAT INSPECTION AND GRINDING

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

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

Remove and inspect each valve.

CAUTION

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

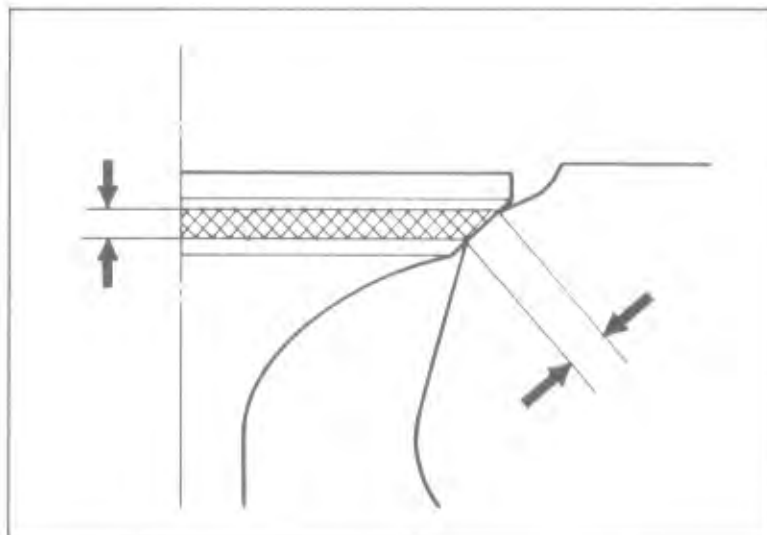


Inspect the width of each valve seat.

STANDARD: 1.1–1.3 mm (0.04–0.05 in)

SERVICE LIMIT: 2.0 mm (0.08 in)

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





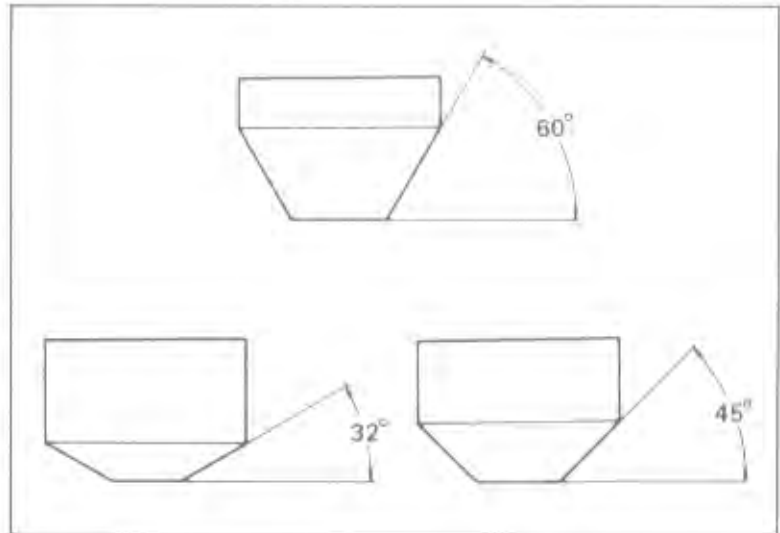
CYLINDER HEAD/VALVE

VALVE SEAT CUTTERS

HONDA VALVE SEAT CUTTERS, grinder or equivalent valve seat refacing equipment are recommended to correct a worn valve seat.

NOTE

- Follow the refacer manufacturer's operating instructions.



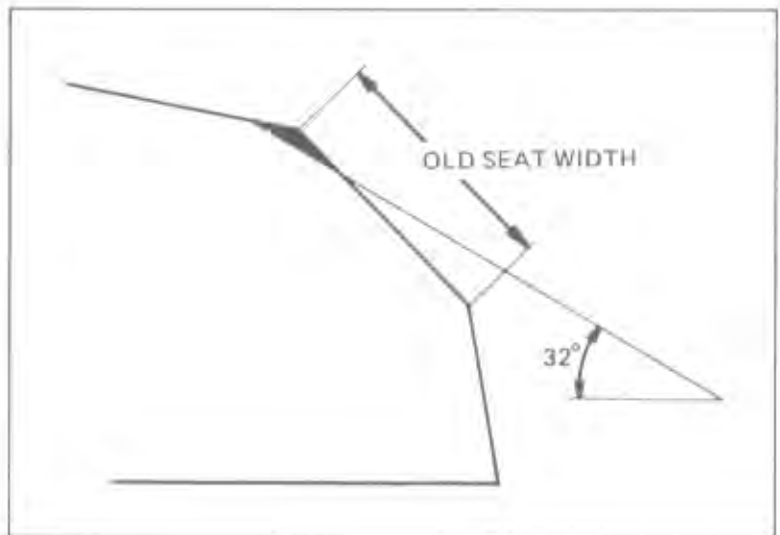
VALVE SEAT REFACING

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

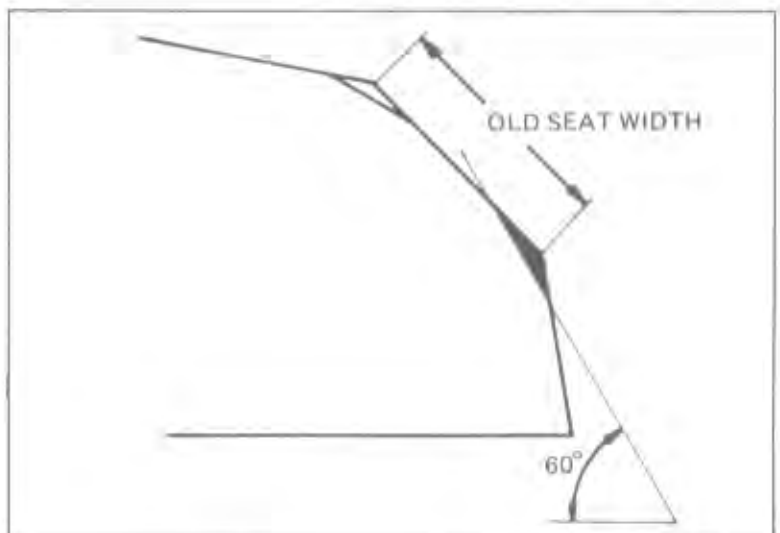
NOTE

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

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



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

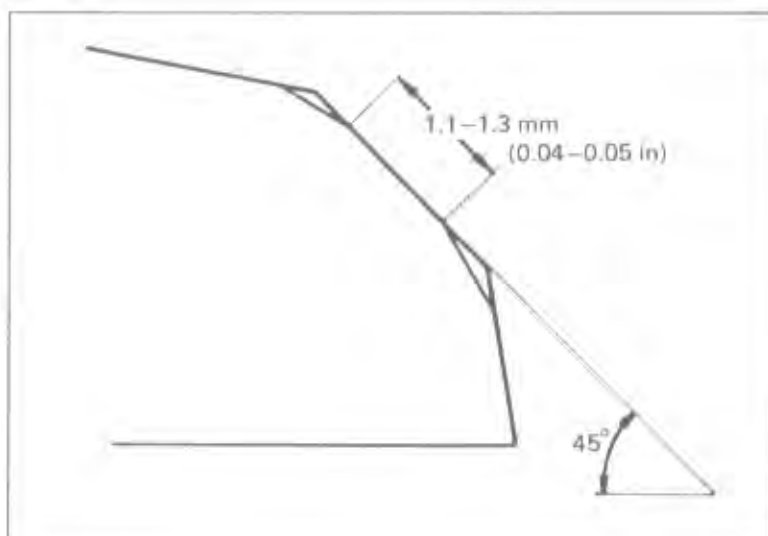




Install a 45 degree finish cutter and cut the seat to the proper width.

NOTE

Make sure that all pitting and irregularities are removed. Refinish if necessary.

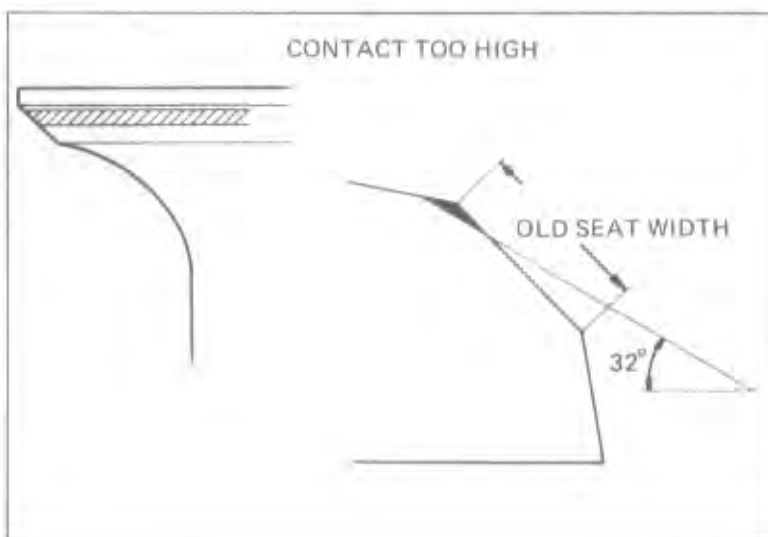


Apply a thin coating of Prussian Blue to the valve seat.
Press the valve through the valve guide and onto the seat to make a clear pattern.

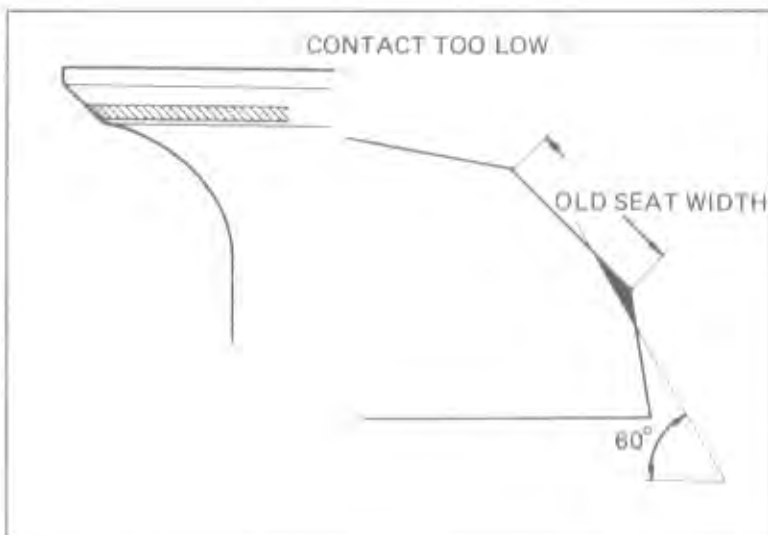
NOTE

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

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



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





CYLINDER HEAD/VALVE

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

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

NOTE

Do not allow lapping compound to enter the guides.



CYLINDER HEAD ASSEMBLY

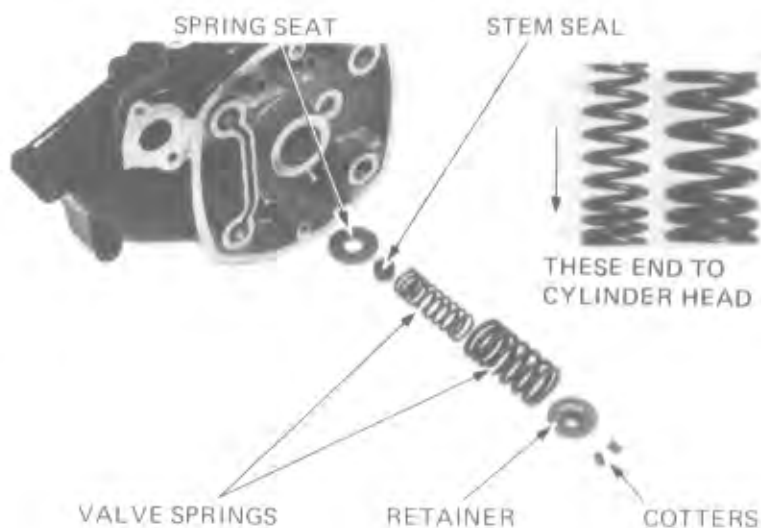
Install the valve stem seals and spring seats.

Lubricate the valve stems with oil, and insert the valves into the guides.

Install the valve springs and retainers.

NOTE

- Install the valve springs with the tightly wound coils facing the head.
- Replace the stem seals with new ones whenever the valves are disassembled.



VALVE SPRING COMPRESSOR
(07757-0010000 or 07957-3290001)

Install the valve cotters.

CAUTION

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





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 damage.

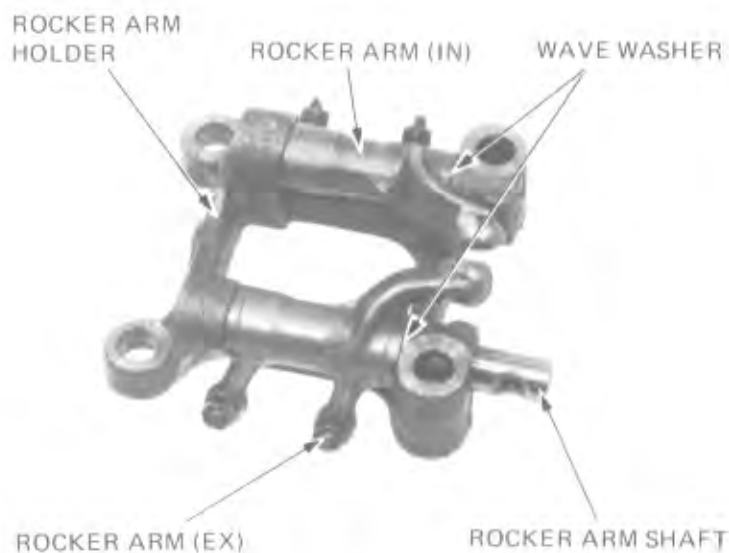


ROCKER ARM ASSEMBLY

Assemble the rocker arms, shafts and wave washers.

NOTE

- Note the rocker arm shaft direction.
- Apply oil to each shaft before assembly.
- Do not interchange the IN and EX rocker arm shafts.



CYLINDER HEAD/ROCKER ARM INSTALLATION

Clean the cylinder surfaces of all gasket material.

NOTE

Do not damage the gasket surfaces.



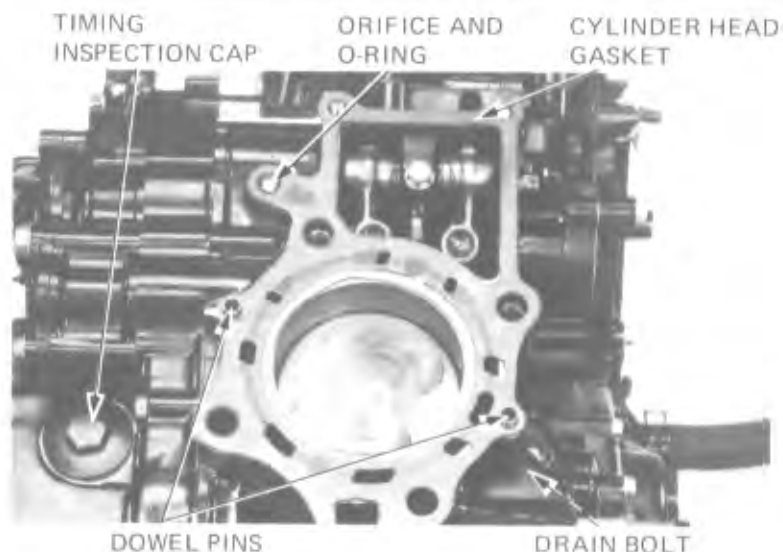


CYLINDER HEAD/VALVE

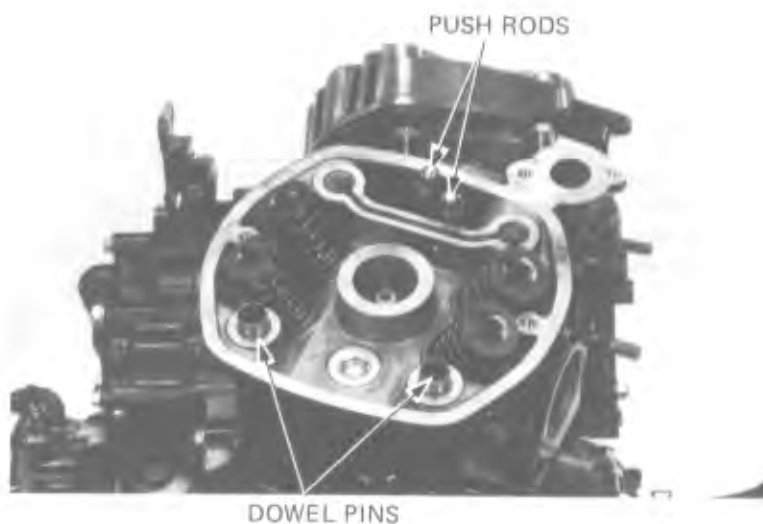
Install the O-rings and cylinder base dowel pins. Coat the cylinder and head surfaces with liquid sealer, and install the head gasket. Make sure that the oil orifices are not obstructed by the gaskets. Install the cylinder drain bolts. Remove the timing inspection cap. Check the timing mark to be certain that the cylinder to be serviced is at TDC on the compression stroke.

NOTE

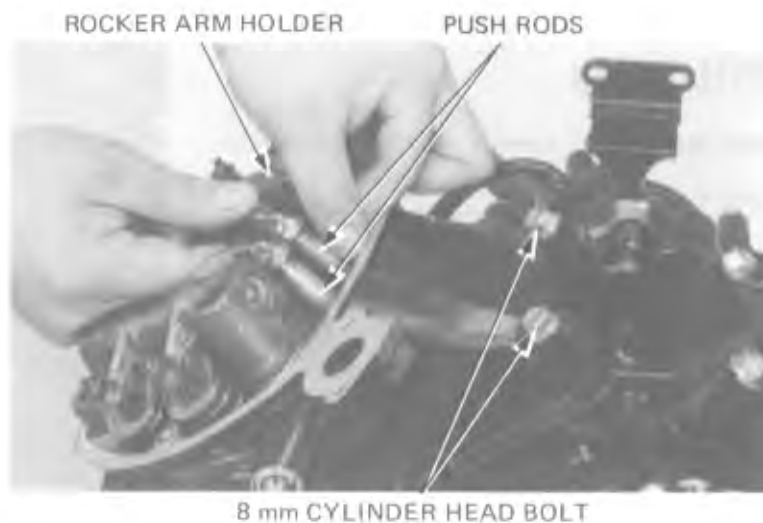
- Align the index mark with the "TR" mark for the right cylinder.
- Align the index mark with the "TL" mark for the left cylinder.



Install each cylinder head. Install the cylinder head dowel pins. Apply Multipurpose NLGI No. 2 (MoS₂ additive) Grease to the end of each push rod and install the push rods into the rocker arm retainers.



Install the rocker arm holder assembly. Align the rocker arms with the push rods. Install the 8 mm cylinder head bolts.





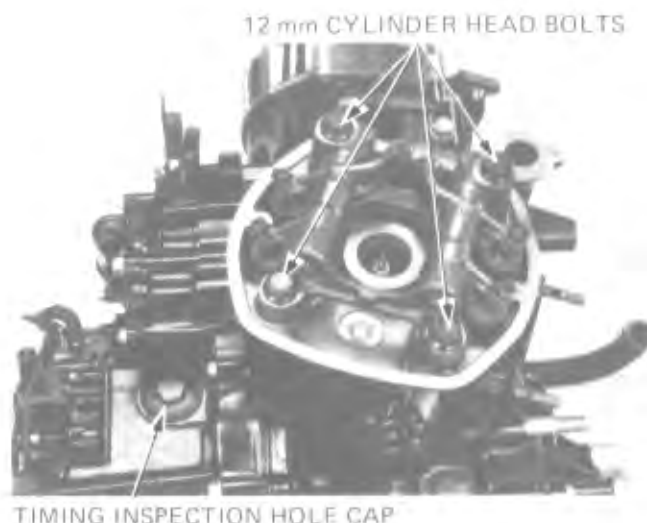
Tighten the cylinder head bolts in 2–3 steps in a crisscross pattern.

TORQUE:

12 mm bolt: 50–60 N·m
(5.0–6.0 kg·m, 36–43 ft·lb)

8 mm bolt: 24–30 N·m
(2.4–3.0 kg·m, 17–22 ft·lb)

Check the valve clearance (Section 3) and adjust if necessary.



Install the cylinder head cover.
Connect the water joint pipes from the thermostat housing to the cylinder heads.

NOTE

Make sure that the O-rings are not deteriorated or damaged.

Install the fuel injection unit and connect the water bypass tubes.



Install the intake manifold and the surge tank.
Install the front engine hangers.

TORQUE:

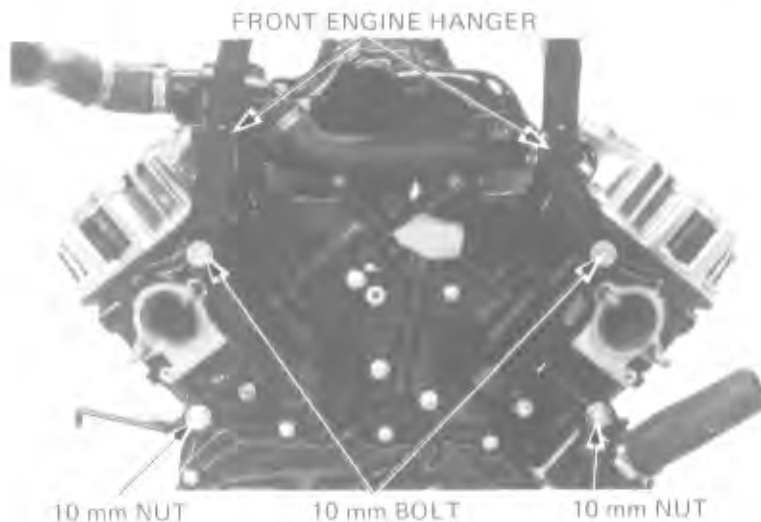
10 mm bolt: 35–45 N·m
(3.5–4.5 kg·m, 25–33 ft·lb)

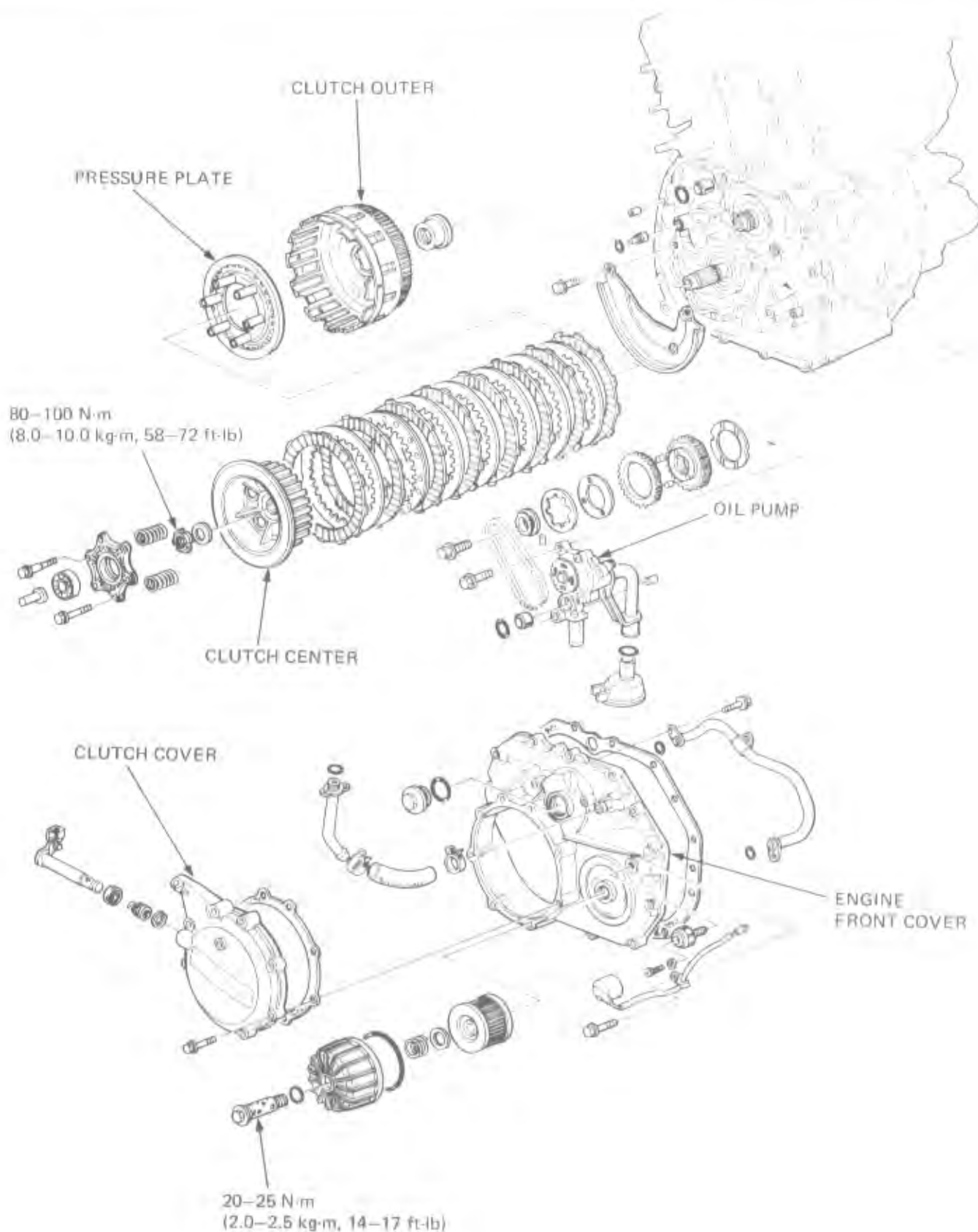
10 mm nut: 30–40 N·m
(3.0–4.0 kg·m, 22–29 ft·lb)

Install the heat shrouds and the turbocharger in the reverse order of removal.

Install the radiator.

Install the fairing bracket and the fairing assembly.







SERVICE INFORMATION	8- 1
TROUBLESHOOTING	8- 1
CLUTCH REMOVAL	8- 2
CLUTCH INSTALLATION	8- 5
OIL PUMP REMOVAL	8- 9
OIL PUMP INSTALLATION	8-12

SERVICE INFORMATION

GENERAL

- Clutch discs, plates "A" and "B", clutch center, and clutch plates can be serviced by removing the clutch cover.
- To service the oil pump, it is necessary to remove the fairing, fairing bracket, heat shroud, turbocharger, radiator and transmission cover.
- All these operations can be done with the engine in the frame.

SPECIFICATIONS

Unit: mm (in)

Item			Standard	Service Limit
Clutch	Lever free play (at lever end)		10–20 (3/8–3/4)	—
	Clutch spring	Free length	35.5 (1.40)	34.0 (1.34)
		Tension/length	19.0–21.0 kg/25 mm (41.9–46.3 lbs/0.98 in) 17.0 kg/25 mm (37.5 lbs/0.98 in)	
	Disc thickness	A	3.42–3.58 (0.13–0.14)	3.10 (0.122)
		B		
	Plate warpage	A	0.10 (0.004)	0.20 (0.008)
		B	0.10 (0.004)	0.20 (0.008)
	Clutch outer I.D.		32.000–32.025 (1.2598–1.2608)	32.09 (1.263)
Outer guide O.D.		31.954–31.970 (1.258–1.259)	31.90 (1.256)	
Oil pump	Inner-to-outer rotor clearance		—	0.10 (0.004)
	Outer rotor-to-body clearance		0.10–0.20 (0.004–0.008)	0.35 (0.014)
	Rotor-to-body clearance		0.02–0.08 (0.0008–0.003)	0.10 (0.004)
Oil pressure relief valve pressure			500–600 kPa (5.0–6.0 kg/cm ² , 71–85 psi)	—

TOOLS

Special

Clutch center holder

07923-4610000 or 07923-3710000

Common

Lock nut socket wrench, 26 x 30 mm

07716-0020203 or 07716-0020200

Extension

07716-0020500 Commercially available in U.S.A.

TROUBLESHOOTING

Oil Pump

- Refer to page 2-1 for oil pump troubleshooting.

Clutch

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

Clutch Slips When Accelerating

- No free play
- Discs worn
- Springs weak

Clutch Will Not Disengage

- Too much free play
- Plates warped

Clutch Chatters or Rattles

- Worn clutch outer and disc splines

Motorcycle Creeps with Clutch Disengaged

- Too much free play
- Plates warped

Excessive Lever Pressure

- Clutch cable kinked, damaged or dirty
- Lifter mechanism damaged

Clutch Operation Feels Rough

- Outer drum slots rough
- Disc plate wave spring weak or damaged



CLUTCH REMOVAL

Remove the following before removing the clutch cover.

- radiator screen.
- fairing lower cover (Section 14).
- turbocharger bracket six bolts and collar.

TURBOCHARGER BRACKET



NOTE

Squeeze the clutch lever to aid in removal of the clutch cover.

Remove the clutch cover and gasket.
 Disconnect the clutch cable from the clutch lifter lever.

CLUTCH COVER



BOLTS

CLUTCH LIFTER PLATE REMOVAL

Remove the six bolts including the two dowel bolts and clutch lifter plate.

NOTE

Loosen the bolts in an X pattern in two or more steps.

Remove the clutch springs.

MARKS



DOWEL BOLTS

LIFTER PLATE



CLUTCH REMOVAL

Attach the Clutch Center Holder on to the pressure plate boss with three bolts.

NOTE

Tighten the bolts finger tight.

CAUTION

Damage to the pressure plate will occur, if the clutch center holder is not attached with 3 bolts.

Remove the lock nut and lock washers using a 26 mm lock nut socket wrench.

LOCK NUT SOCKET WRENCH, 26 x 30 mm
(07716-002023 or 07716-002022)



CLUTCH CENTER HOLDER
(07923-3710000 or
07923-4610000)

EXTENSION
(07716-0020500 Commercially
available in U.S.A.)

Remove the pressure plate, discs "A" and "B", disc plate, and clutch center as a unit.

CLUTCH CENTER



Remove the clutch outer and clutch outer guide.

CLUTCH OUTER



CLUTCH OUTER GUIDE

**INSPECTION****• CLUTCH DISC**

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

Measure the disc thickness.

SERVICE LIMITS:

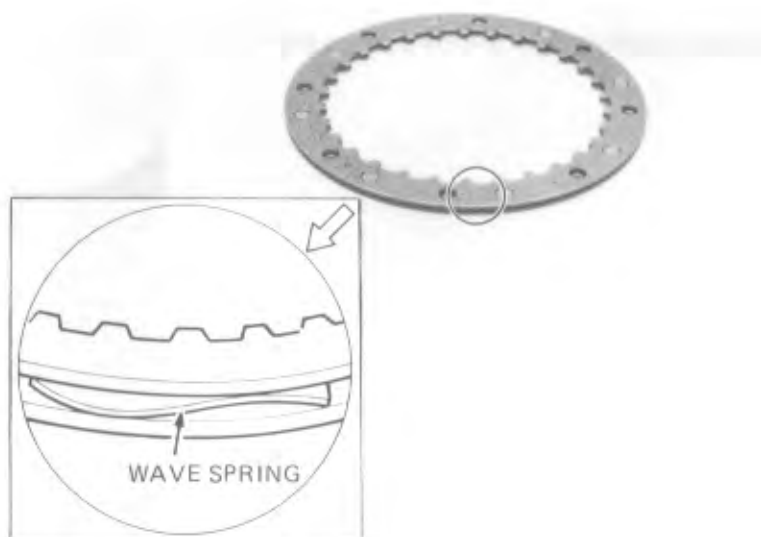
Disc A and B: 3.10 mm (0.122 in)

**• CLUTCH PLATE**

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

**• CLUTCH PLATE B**

Check the wave spring for damage.





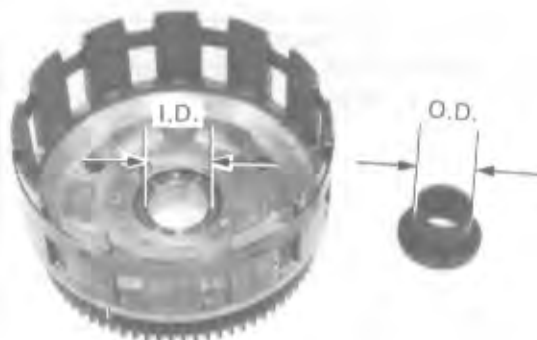
- **CLUTCH OUTER AND OUTER GUIDE**

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

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

SERVICE LIMITS:

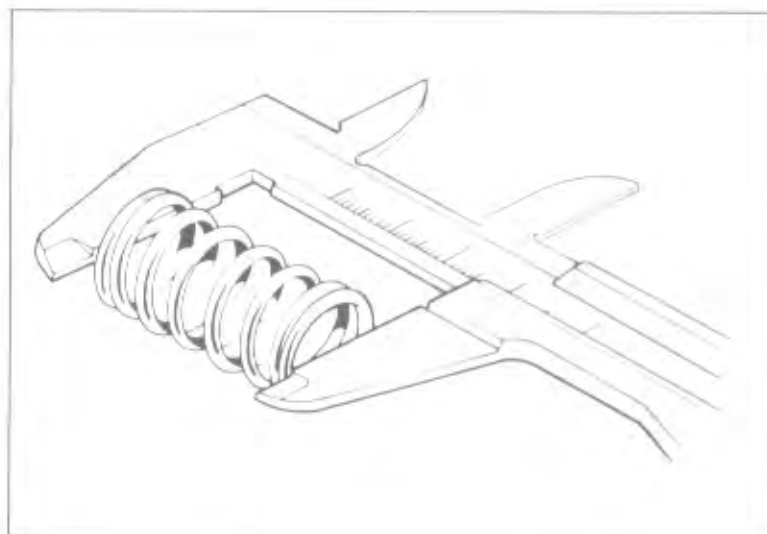
Outer	I.D:	32.09 mm (1.263 in)
Guide	O.D:	31.90 mm (1.256 in)



- **CLUTCH SPRING**

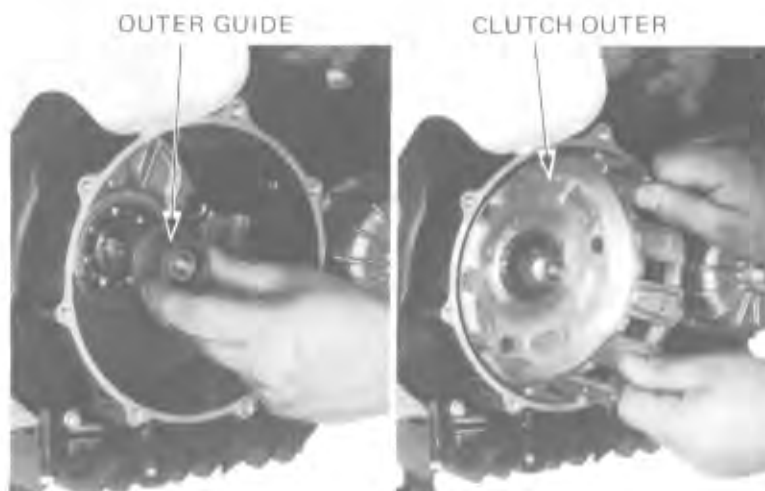
Measure the spring free length.

SERVICE LIMIT: 34.0 mm (1.34 in)



CLUTCH INSTALLATION

Slide the clutch outer guide onto the transmission mainshaft.





CLUTCH/OIL PUMP

Install the clutch outer.

NOTE

Before installing the clutch outer, align the primary gear teeth with the sub gear teeth for engagement with the clutch outer gear.

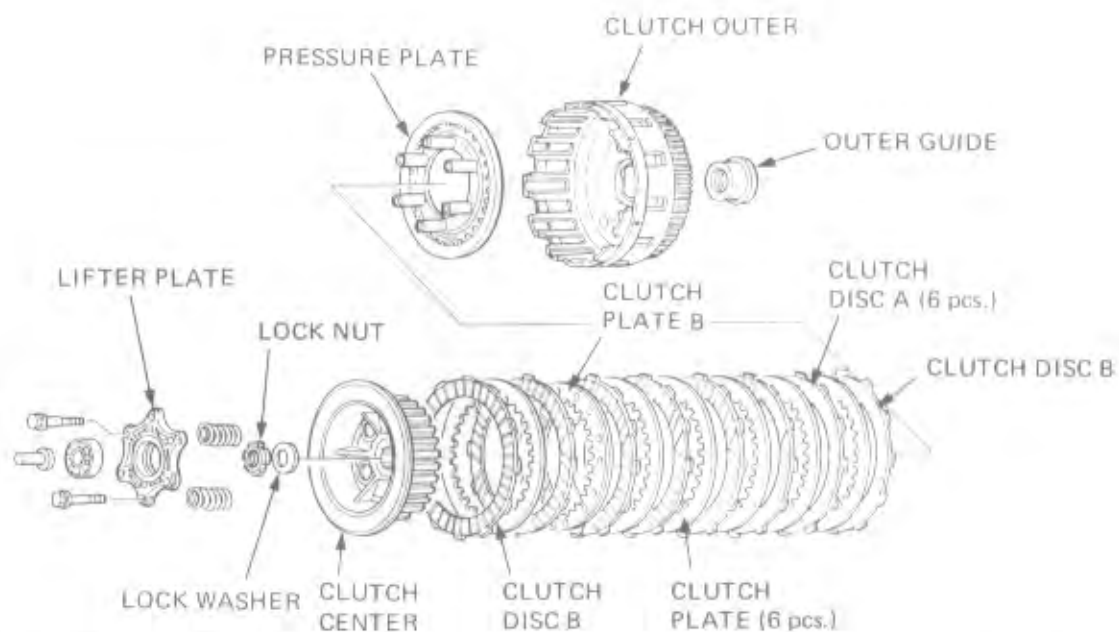
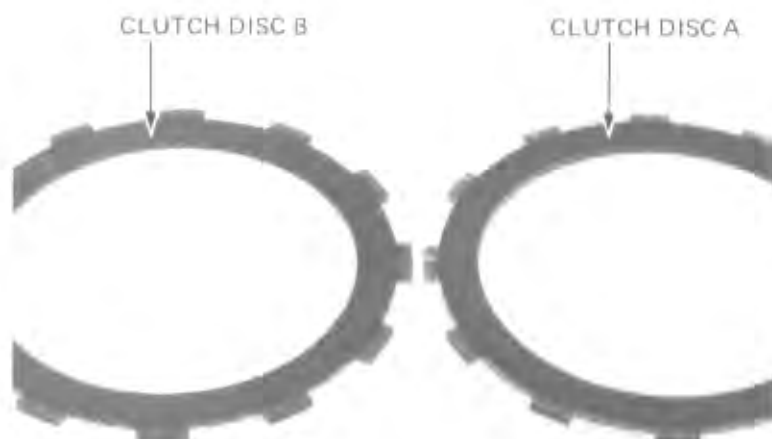


Position the pressure plate into the clutch outer.
Install the clutch plates and discs in the clutch outer as shown.

Clutch disc B's are the first and last disc's installed.

NOTE

The difference between clutch disc B and the other disc is their groove direction.





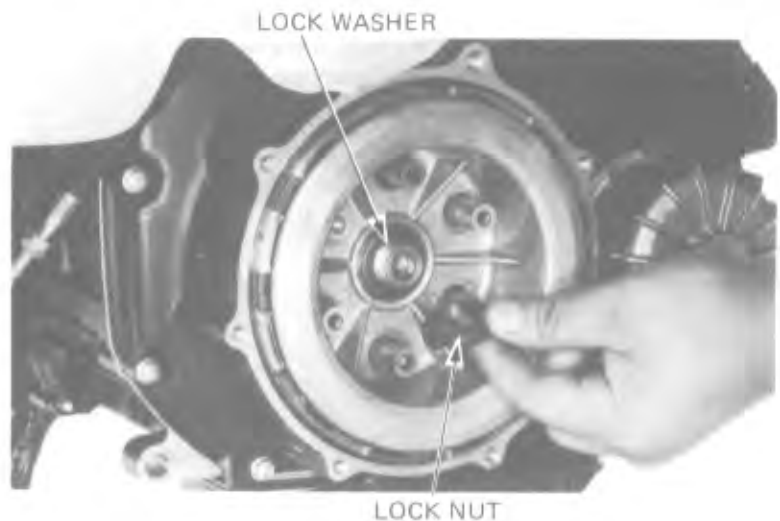
Install the clutch center, aligning the splines by rotating the clutch center.



Install the clutch on the mainshaft.
Install the lock washer and lock nut.

NOTE

- Install the lock washer with the mark "OUTSIDE" facing out.
- Install the lock nut with the flat end facing out.



Attach the Clutch Center Holder with three bolts to the pressure plate boss to prevent it from turning. Tighten the lock nut.

TORQUE: 80–100 N·m
(8.0–10.0 kg-m, 58–72 ft-lb)

LOCK NUT WRENCH 26 x 30 mm
(07716-0020200 or 07716-0020203)

EXTENSION



CLUTCH CENTER HOLDER
(07923-3710000 or 07923-4610000)



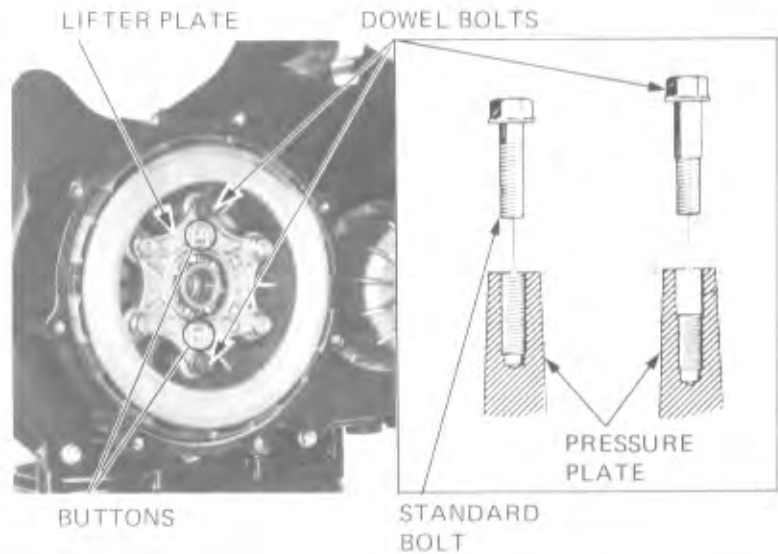
CLUTCH/OIL PUMP

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

NOTE

- Insert the two dowel bolts through the two lifter holes marked with small cast-in buttons.
- Tighten the bolts evenly in 2–3 steps using a crisscross pattern.
- Align the dowel bolt holes in the lifter plate with the dowel bolt holes in the pressure plate.

Install the clutch cover gasket.



Rotate the clutch lever to align the hole in the lever with the hole in the clutch cover and insert the lifter piece.



Connect the clutch cable.
Install the clutch cover.
Install the turbocharger bracket (Section 6).
Adjust the clutch, (Section 3).





OIL PUMP REMOVAL

Remove the following parts before removing the engine front cover:

- Fairing assembly
- Fairing bracket
- Radiator
- Exhaust pipe
- Muffler
- Heat insulators
- Oil pipe
- Turbocharger and bracket

Drain the oil from the engine.
Disconnect the oil pressure switch wire.
Disconnect the clutch cable and remove the engine front cover.

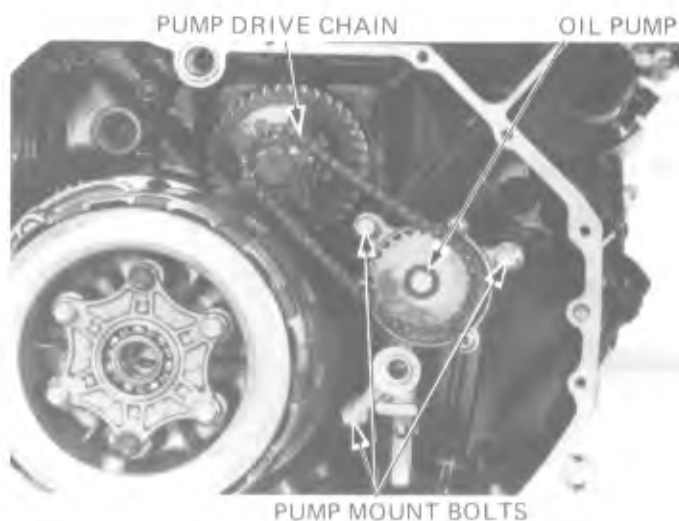


Remove the dowel pins, collars, O-rings and gasket.



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

Remove the three oil pump mount bolts and remove the oil pump with the pump drive chain.





CLUTCH/OIL PUMP

OIL PUMP DISASSEMBLY

Remove the pressure relief valve and oil strainer.
Inspect the strainer and clean with solvent.

STRAINER

OIL PRESSURE RELIEF
VALVE

Remove the sprocket.
Remove the pump cover, thrust washer, pump shaft,
and driving pin.
Remove the inner and outer rotors.

OUTER ROTOR

INNER ROTOR

PUMP SHAFT

PIN

THRUST WASHER

PUMP COVER

OIL PUMP INSPECTION

Measure pump tip clearance.

SERVICE LIMIT: 0.10 mm (0.004 in)





Measure the pump body clearance.

SERVICE LIMIT: 0.35 mm (0.014 in)



Measure the pump end clearance with a straight edge and feeler gauge.

SERVICE LIMIT: 0.10 mm (0.004 in)



RELIEF VALVE INSPECTION

Remove the valve as an assembly and check its operation. If the valve does not operate properly, disassemble it and check for a stuck valve or weak spring. Replace the relief valve as a unit if the spring or plunger is damaged.

NOTE

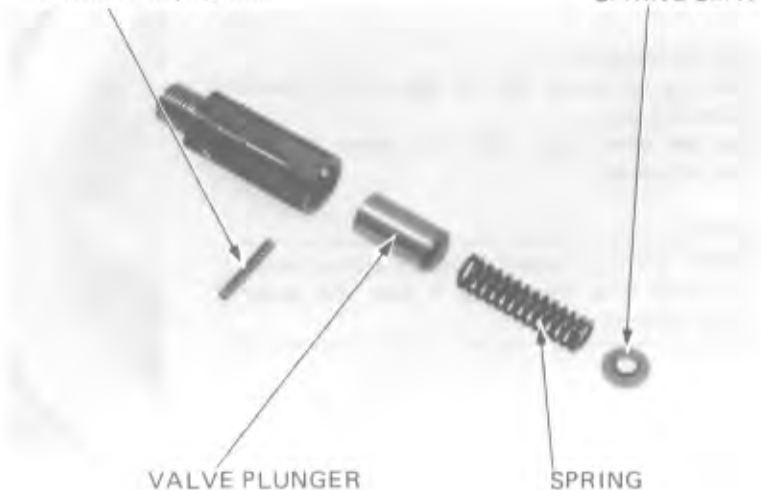
Use a Pin driver 07744-0010200 to remove and install the spring pin.

SPRING PIN, 3.0 mm

SPRING SEAT

VALVE PLUNGER

SPRING





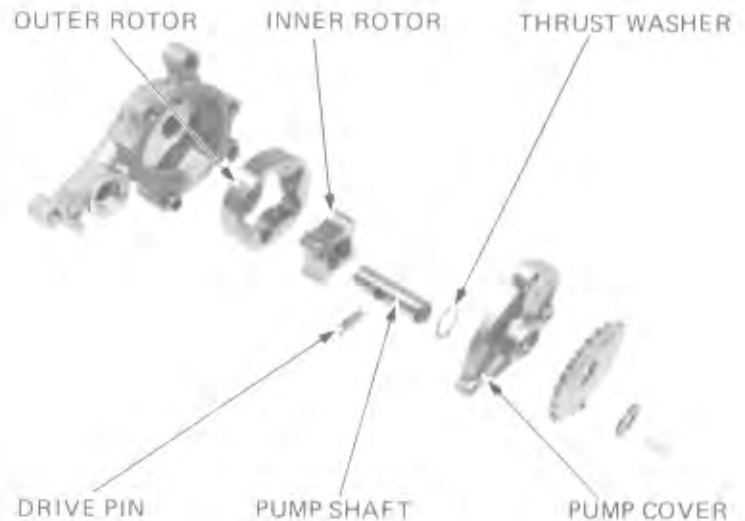
CLUTCH/OIL PUMP

OIL PUMP ASSEMBLY

Insert the outer and inner rotors into the pump body.

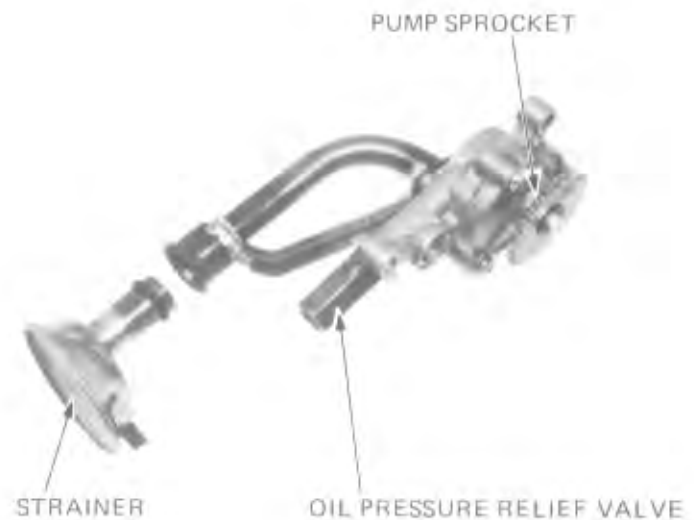
Slide the drive pin into the pump shaft, and install the shaft.

Install the thrust washer and pump cover.



Install the oil strainer.

Install the oil pressure relief valve and pump sprocket. Do not tighten at this time.



OIL PUMP INSTALLATION

Install the dowel pin.

Install the oil pump. Do not tighten the mounting bolts at this time.

Place the drive chain over the pump drive and driven sprockets.

NOTE

Place the drive chain over the pump driven sprocket first then place it over the pump drive sprocket.





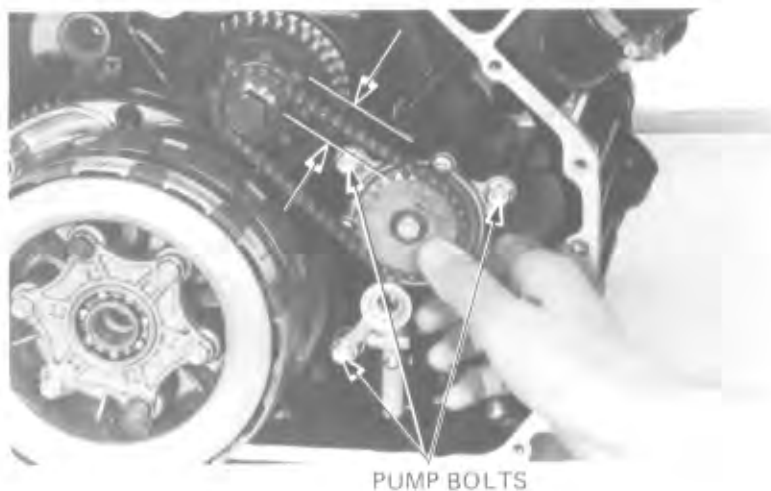
Adjust the chain free play by rotating the pump right or left, then torque the pump bolts.

FREE PLAY: 2.0–3.5 mm (0.08–0.14 in)

Tighten the three pump bolts.

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

Tighten the pump sprocket bolt and relief valve.

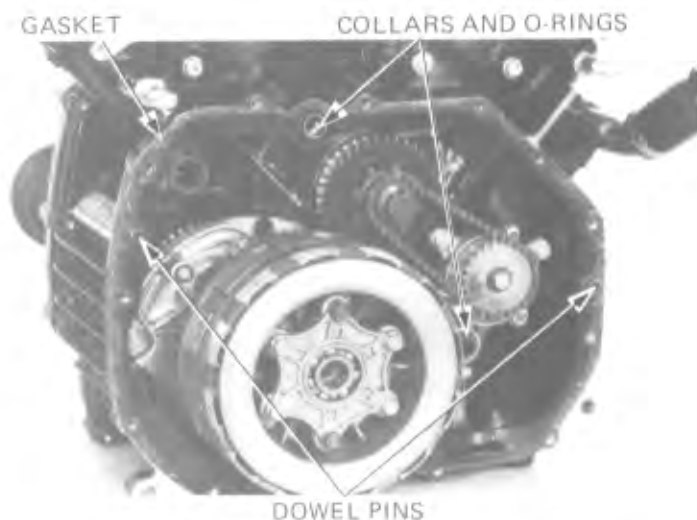


Recheck the oil pump drive chain free play.

FREE PLAY: 2.0–3.5 mm (0.08–0.14 in)

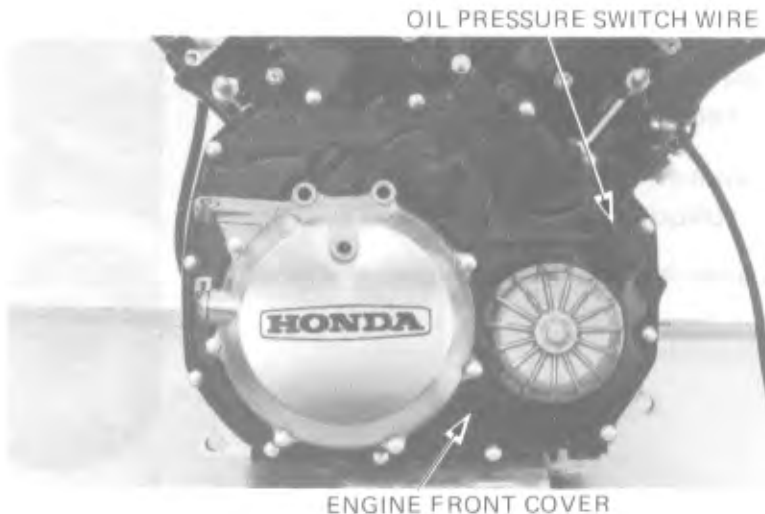


Install the dowel pins, collars, O-rings and gasket.



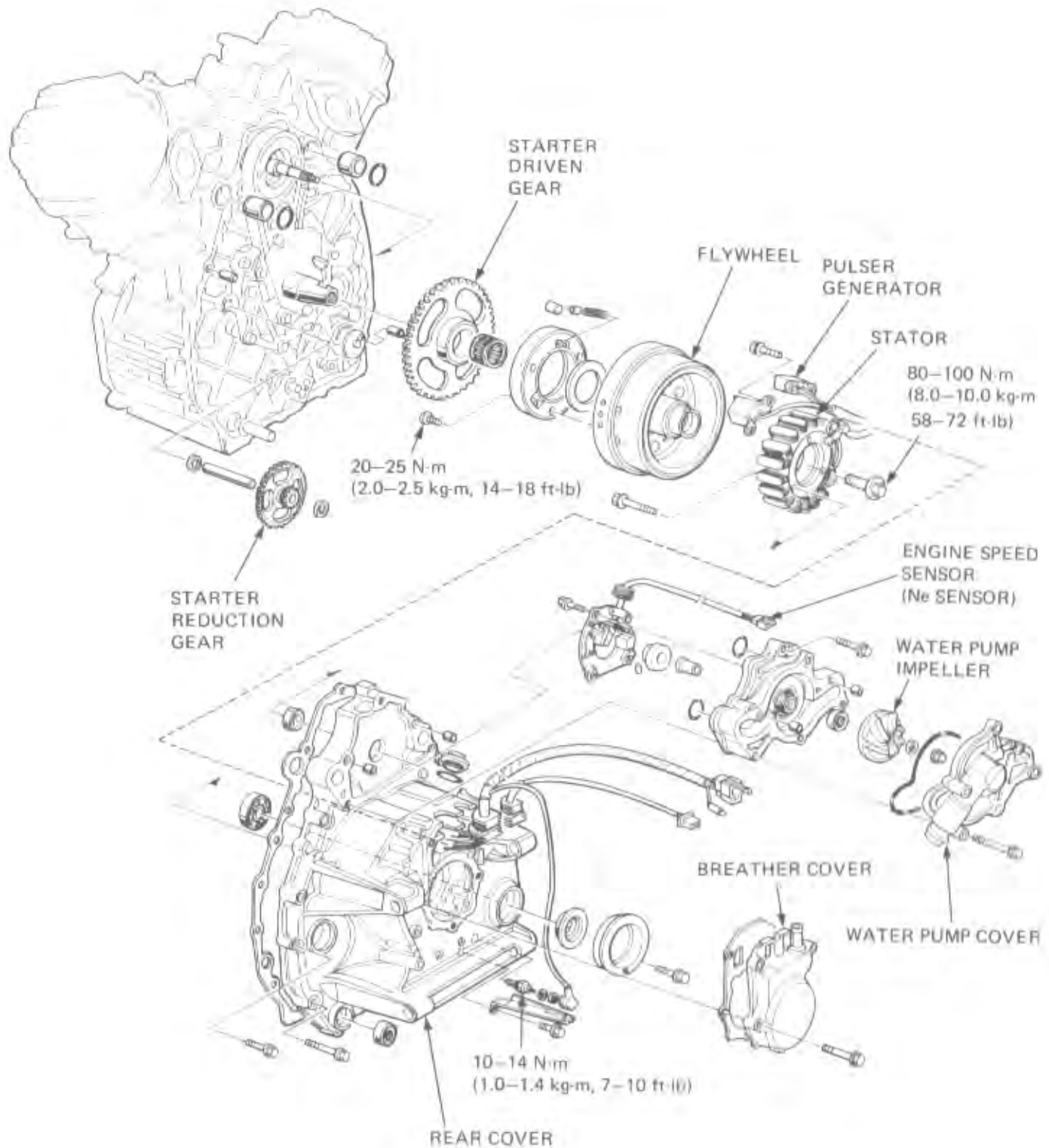


Install the engine front cover and connect the oil pressure switch wire.





MEMO





SERVICE INFORMATION	9-1	STARTER CLUTCH OUTER INSTALLATION	9-7
ENGINE REAR COVER REMOVAL	9-2	FLYWHEEL INSTALLATION	9-8
FLYWHEEL REMOVAL	9-4	ENGINE REAR COVER INSTALLATION	9-8
STARTER CLUTCH OUTER REMOVAL	9-6		

SERVICE INFORMATION

GENERAL

- To inspect and adjust the pulse generator, see Section 20, Ignition System.
- Be sure to adjust the ignition timing whenever the engine rear cover is removed.
- The starter motor, water pump impeller and engine speed sensor can be serviced with the engine installed in the frame.
- Take care not to cut the alternator and stator wires and wire harnesses when removing or installing parts.
- For alternator inspection, see Section 19, Battery Charging System.

TORQUE VALUES

Alternator rotor bolt	80-100 N·m (8.0-10.0 kg·m, 58-72 ft·lb)
Starter clutch torx bolt	20-25 N·m (2.0-2.5 kg·m, 14-18 ft·lb)

TOOLS

Special

Gear holder	07924-MC70000 or modified 07924-4150000 (See page 9-4)
Torx driver bit (T40)	07703-0010100 commercially available in U.S.A.

Common

Flywheel puller	07733-0020001 or 07933-3950000
Driver	07749-0010000
Pilot, 22 mm	07746-0041000
Attachment, 42 x 47 mm	07746-0010300



ENGINE REAR COVER REMOVAL

Drain the engine oil.

Remove the engine from the frame (Section 5).

Remove the gearshift pedal.

Remove the water pipe holders, water pipe and water pipe joint.



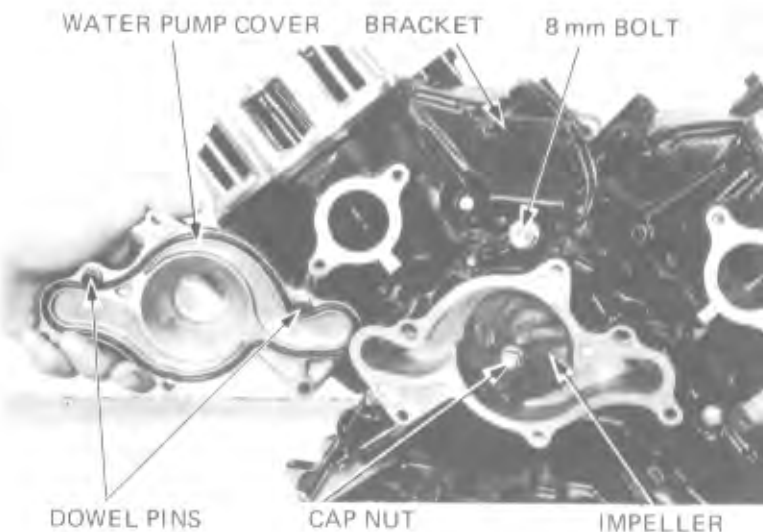
WATER PIPE HOLDERS

WATER PIPE JOINT

Remove the water pump cover and dowel pins.

Remove the cap nut, copper washer and impeller.

Remove the water pump body and throttle housing bracket by removing the 8 mm bolt.



WATER PUMP COVER

BRACKET

8 mm BOLT

DOWEL PINS

CAP NUT

IMPELLER

Remove the impeller collar, sensor rotor and dowel pin from the camshaft.



CAMSHAFT

DOWEL PIN

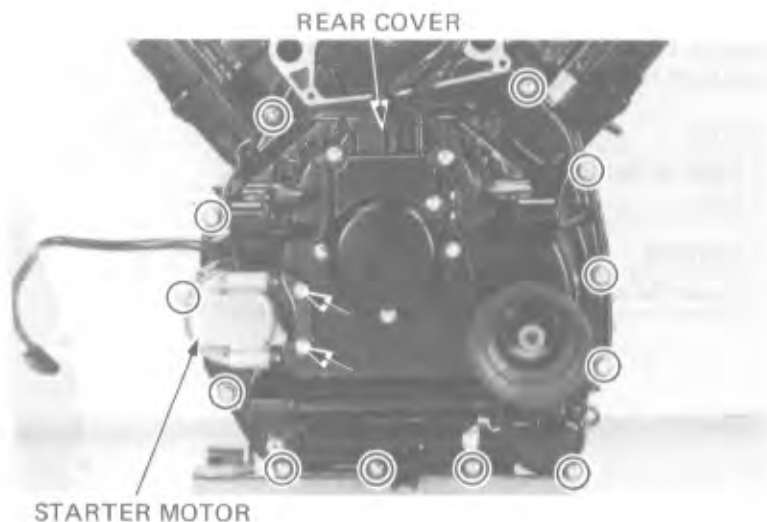
SENSOR ROTOR

COLLAR

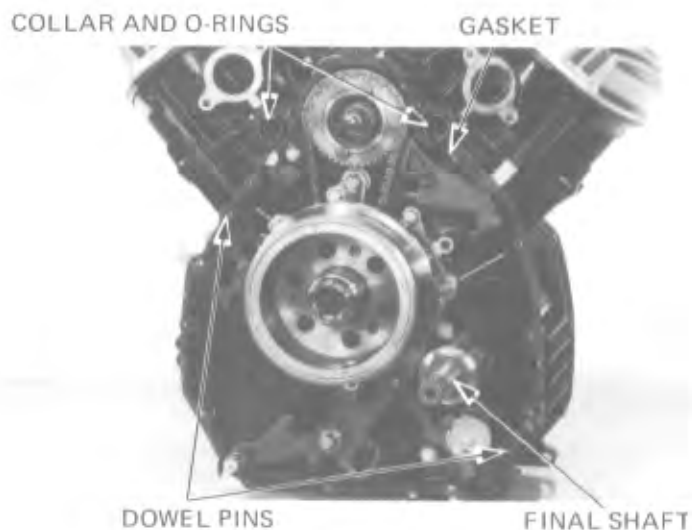


ENGINE REAR COVER REMOVAL/ DISASSEMBLY

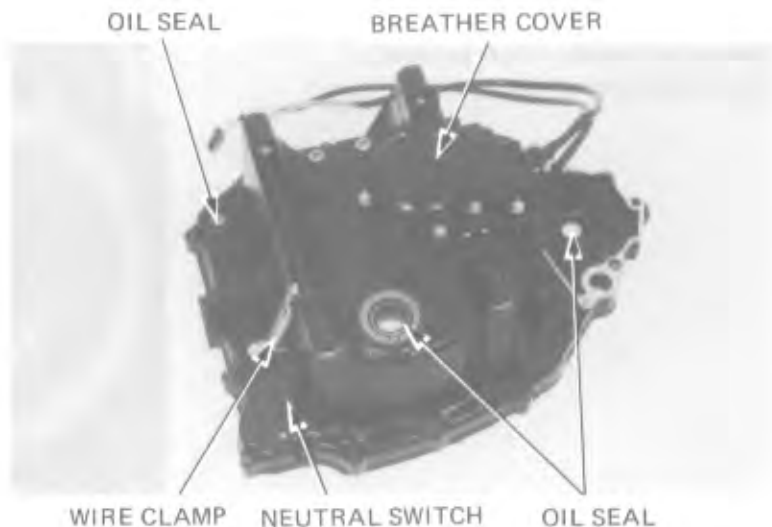
Remove the starter motor.
Remove the rear cover.



Remove the collars, O-rings, dowel pins, and gasket.
Remove the final shaft.



Remove the camshaft oil seal.
Remove the final shaft and shift spindle oil seals.
Remove the neutral wire clamp and disconnect it from the neutral switch.
Remove the neutral switch and sealing washer.
Remove the breather cover and plate.





ALTERNATOR/FLYWHEEL/REAR COVER

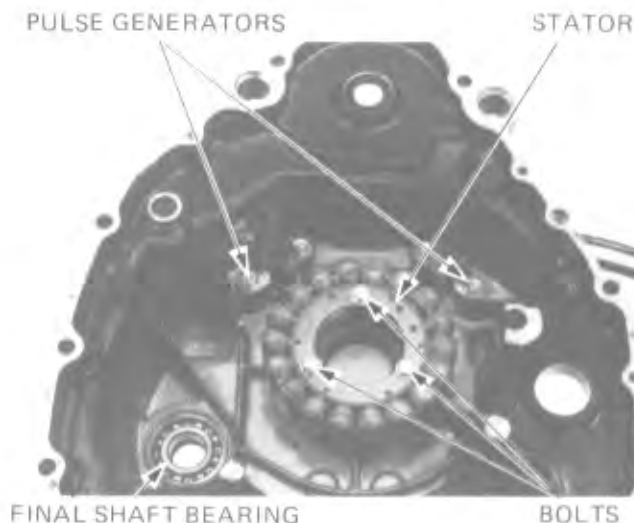
Remove the alternator stator, pulse generators, and final shaft bearing.

NOTE

Refer to Section 22 for neutral switch inspection.

CAUTION

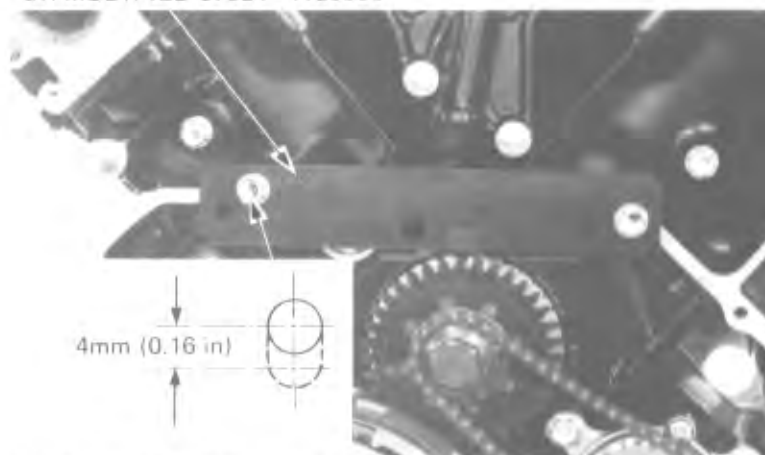
Be careful not to damage the stator coil.



FLYWHEEL REMOVAL

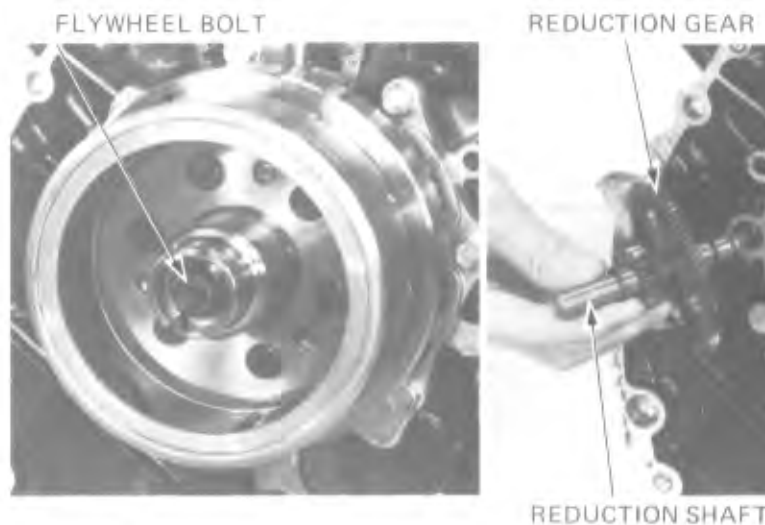
Remove the front engine cover, (Section 8).
Attach the Gear Holder to the primary drive gear.

GEAR HOLDER 07924-MC7000
OR MODIFIED 07924-4150000



MODIFY THE 07924-4150000
AS SHOWN.

Remove the reduction shaft and gear.
Remove the flywheel bolt.





Remove the flywheel, using the Flywheel Puller.

NOTE

The starter clutch rollers may fall out when the flywheel is removed.



FLYWHEEL PULLER, 20 mm 07933-3950000
OR 07733-0020001

Remove the starter driven gear.

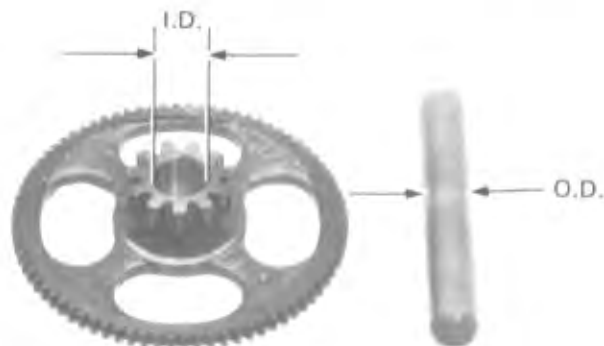
STARTER DRIVEN GEAR



**STARTER REDUCTION GEAR
INSPECTION**

Inspect the reduction gear teeth for damage.
Measure the reduction gear I.D.
Measure the reduction gear shaft O.D.
Calculate the gear to shaft clearance.

SERVICE LIMIT: 0.20 mm (0.008 in)





ALTERNATOR/FLYWHEEL/REAR COVER

STARTER DRIVE GEAR INSPECTION

Check the drive gear for damage, excessive wear, indentations or other faults. Measure the gear I.D.

SERVICE LIMIT: 37.10 mm (1.461 in)



STARTER CLUTCH OUTER REMOVAL

Remove the starter clutch rollers, springs and plunger.

Remove the torx bolts.



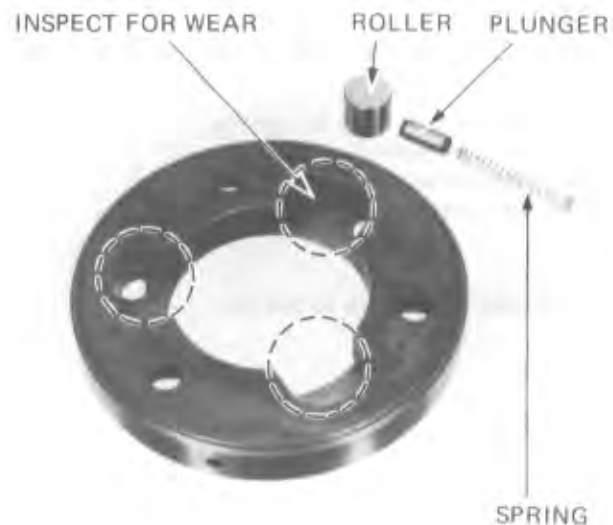
STARTER CLUTCH OUTER INSPECTION

Inspect the rollers for freedom of movement in their grooves.

Inspect the each roller and replace it if it is worn or damaged.

Inspect the clutch outer for damaged or worn roller surfaces.

Examine the springs and plungers for distortion or excessive wear.





STARTER CLUTCH OUTER INSTALLATION

Slide the clutch outer into the flywheel, aligning the holes with the dowel pins in the flywheel. Install and torque the torx bolts.

NOTE

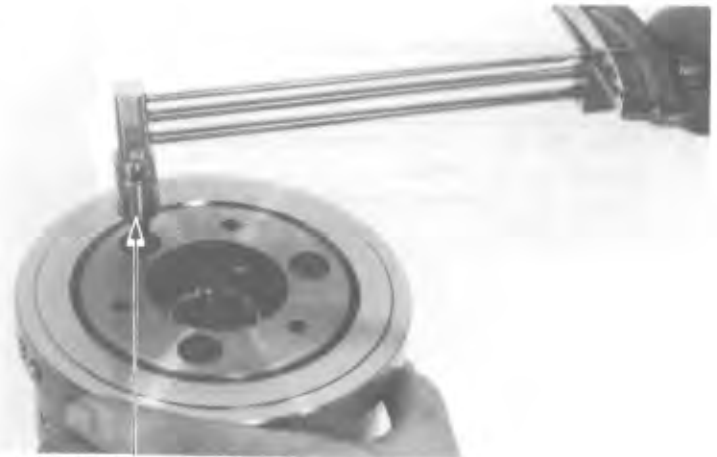
Replace used torx bolts.

TORQUE: 18–25 N·m

(1.8–2.5 kg·m, 13–18 ft·lb)

NOTE

Coat the threads and undersides of the TORX bolts with a locking agent prior to installation.



TORX DRIVER BIT T40
(COMMERCIALLY AVAILABLE IN U.S.A.)

Slide the spring into the plunger and install in the clutch outer.
Position the roller into place while holding the plunger with a screwdriver as shown.

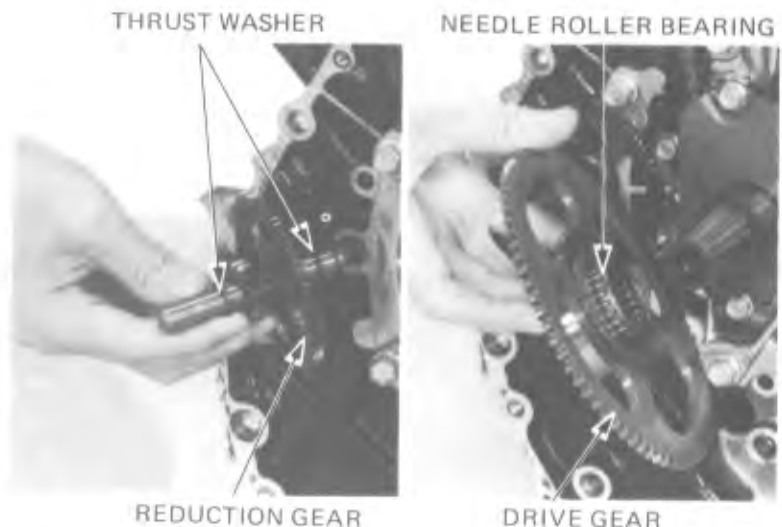


Install the reduction shaft, thrust washers and reduction gear.

NOTE

Use two thrust washers, one on each side of the reduction gear.

Install the needle roller bearing in the drive gear.
Install the starter drive gear onto the crankshaft.





ALTERNATOR/FLYWHEEL/REAR COVER

FLYWHEEL INSTALLATION

Install the flywheel onto the crankshaft.

NOTE

- Align the key in the crankshaft with the keyway in the flywheel.
- Rotate the flywheel counterclockwise to aid installation.



Install and tighten the flywheel bolt.

TORQUE: 90–105 N·m
(9.0–10.5 kg·m, 65–76 ft·lb)

Remove the Gear Holder from the primary drive gear.

Install the front engine cover.



ENGINE REAR COVER INSTALLATION

ASSEMBLY

The assembly sequence is essentially the reverse of disassembly.

NOTE

Drive the final shaft bearing in until it seats.



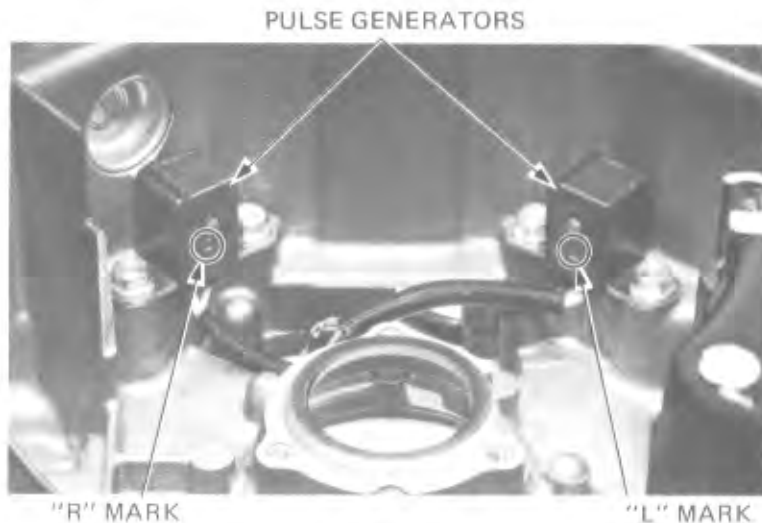
ATTACHMENT, 42 x 47mm 07746-0010300
AND PILOT, 22mm 07746-0041000



PULSE GENERATOR INSTALLATION

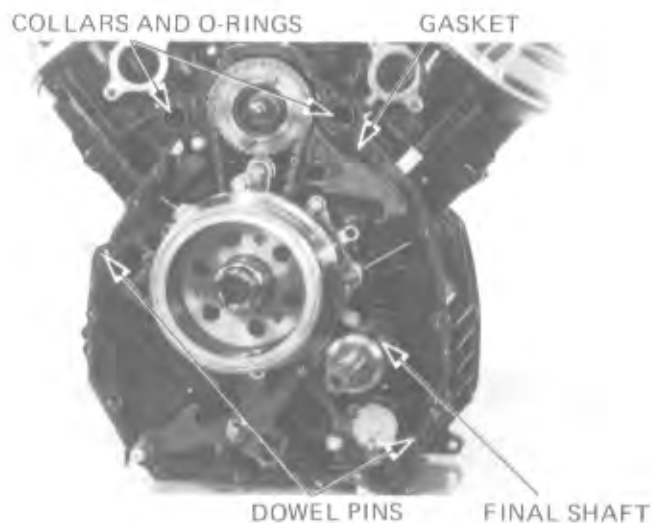
Note the R and L on the pulse generators and install the generators in the correct positions.

Install the alternator stator.



Install the final shaft.

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



Install the engine rear cover and tighten the bolts.

NOTE

Avoid damaging the gearshift spindle oil seal.

TORQUE: 6 mm bolts

8–12 N·m (0.8–1.2 kg-m, 6–9 ft-lb)

8 mm bolts

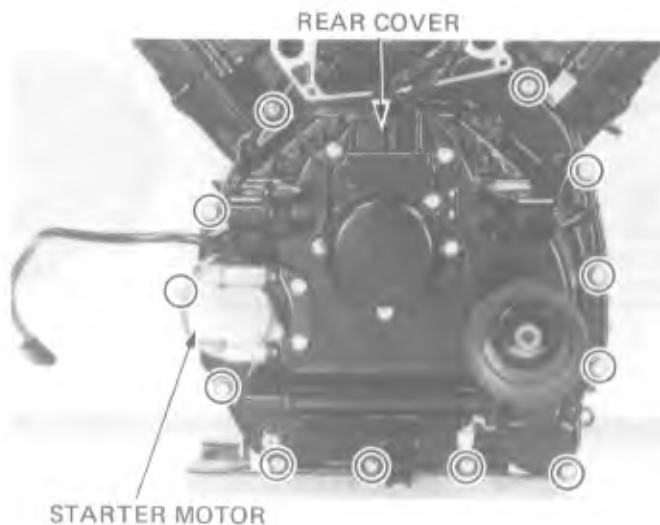
18–25 N·m

(1.8–2.5 kg-m, 13–18 ft-lb)

Install the starter motor.

NOTE

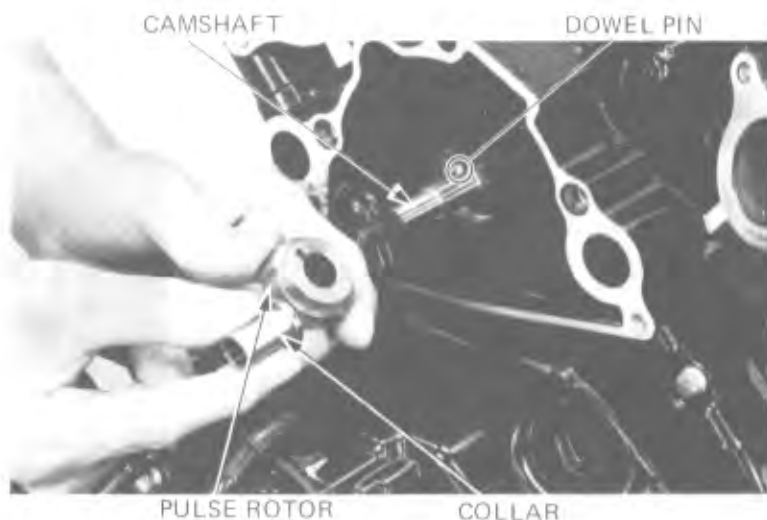
- Align the starter drive gear with the reduction gear before tightening the cover.
- Tighten the rear cover bolts in a crisscross pattern.



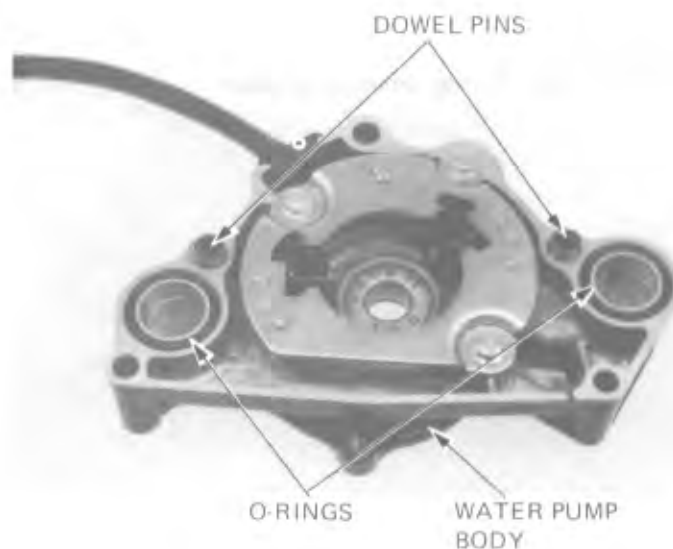


ALTERNATOR/FLYWHEEL/REAR COVER

Install the dowel pin in the camshaft.
Install the pulse rotor, aligning the cutout with the camshaft dowel pin.
Install the impeller collar.



Install the dowel pins and O-rings on the water pump body.
Install the water pump body on the engine rear cover.

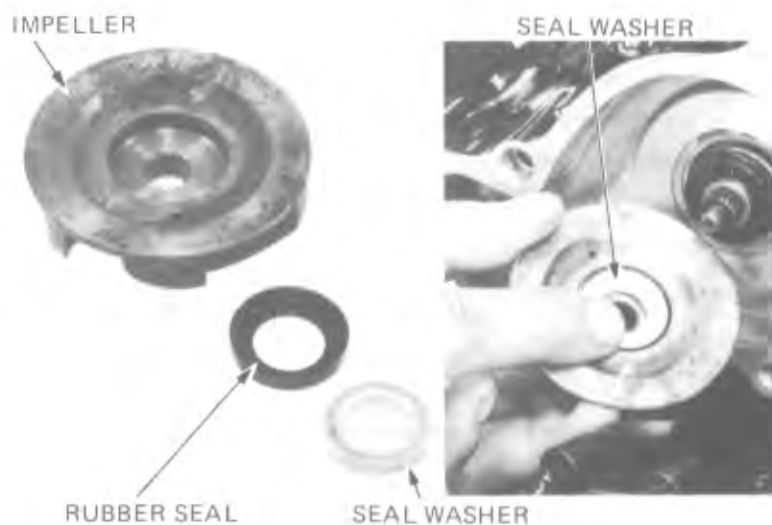


WATER PUMP INSTALLATION

Place the rubber seal and washer into the impeller and apply soapy water to the sliding surfaces.

NOTE

- Dip the rubber seal in soapy water to facilitate installation.
- Check that the rubber seal is positioned properly.



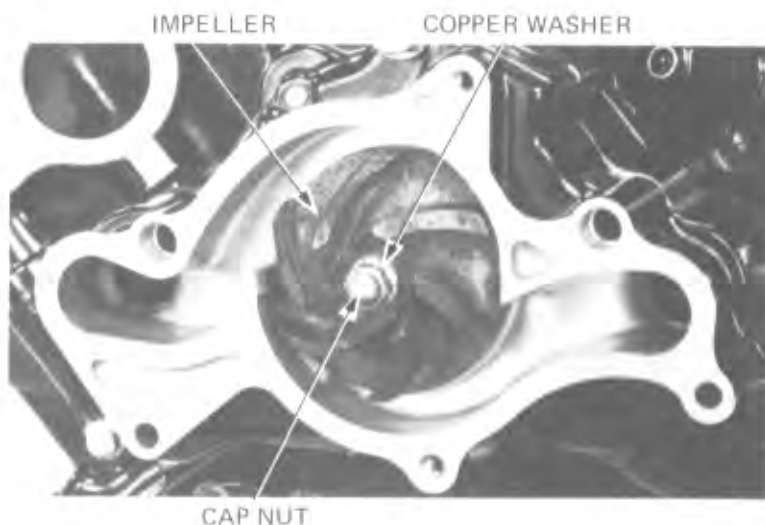


Install the impeller, copper washer and cap nut on the camshaft end.

Tighten the cap nut.

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

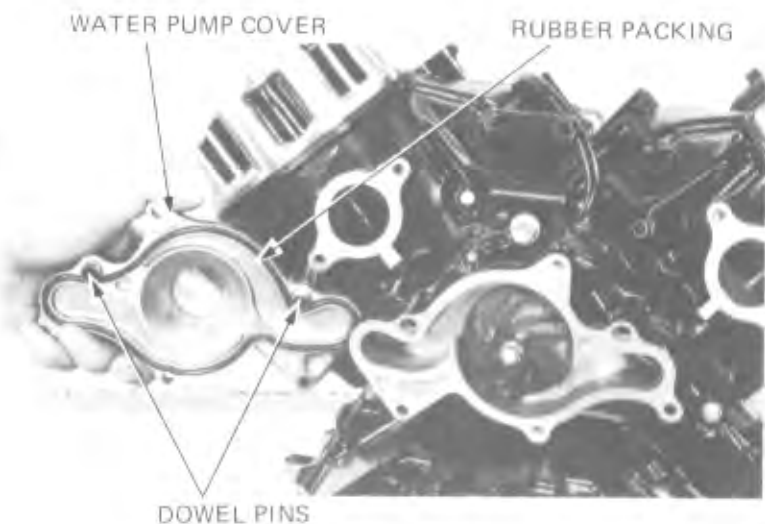
Rotate the crankshaft to make sure that the pump turns freely without binding.



Check the pump cover rubber packing for deterioration or damage and replace if necessary.

Install the dowel pin in the cover and install the cover.

Install the intake manifold bracket.



Tighten the pump cover bolts.

TORQUE:

6 mm bolts:

8–12 N·m (0.8–1.2 kg·m, 6–9 ft·lb)

8 mm bolts:

18–25 N·m (1.8–2.5 kg·m, 13–18 ft·lb)





ALTERNATOR/FLYWHEEL/REAR COVER

Connect the water pipe and joint pipe to the water pump cover.

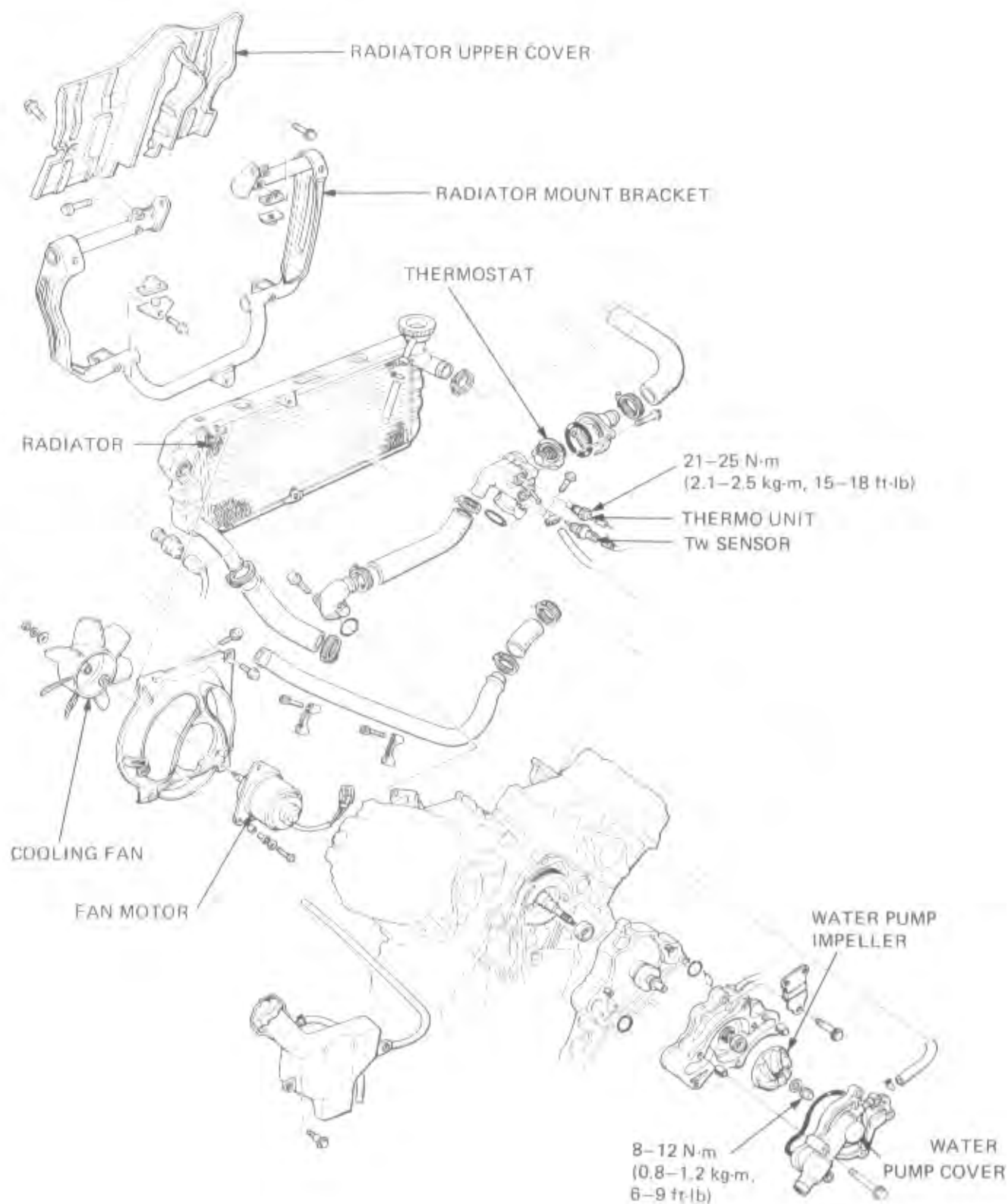


WATER PIPE HOLDERS

WATER PIPE JOINT



MEMO





SERVICE INFORMATION	10-1	RADIATOR REMOVAL	10-5
TROUBLESHOOTING	10-1	COOLING FAN AND MOTOR	10-6
INSPECTION	10-2	THERMOSTAT INSTALLATION	10-7
COOLANT REPLACEMENT	10-3	RADIATOR INSTALLATION	10-7
THERMOSTAT REMOVAL	10-3	WATER PUMP	10-8

SERVICE INFORMATION

GENERAL INSTRUCTIONS

- To service the water pump seal, it is necessary to remove the rear engine cover. All the other cooling system services can be made with the engine in the frame.
- Do not remove the radiator cap when the engine is hot. The coolant is under pressure and severe scalding could result. The engine must be cool before servicing the cooling system.
- Avoid spilling coolant on painted surfaces.
- After servicing the system, check for leaks with a cooling system tester.

SPECIFICATIONS

Radiator cap relief pressure	0.75 – 1.05 kg/cm ² (10.7 – 14.9 psi)
Freezing point (Hydrometer test):	55% Distilled water + 45% ethylene glycol: –32°C (–25°F) 50% Distilled water + 50% ethylene glycol: –37°C (–34°F) 45% Distilled water + 55% ethylene glycol: –44.5°C (–48°F)
Coolant capacity: Radiator and engine Reserve tank Total system	1.9 liters (2.0 US qt, 1.7 Imp qt) 0.2 liters (0.21 US qt, 0.18 Imp qt) 2.1 liters (2.2 US qt, 1.8 Imp qt)
Thermostat	Begins to open: 80° to 84°C (176° to 183°F) Fully open: 93° to 97°C (199° to 205°F) Valve lift: Minimum of 8 mm at 95°C (0.315 in at 203°F)
Boiling point (with 50–50 mixture):	Unpressurized: 107.7°C (226°F) Cap on, pressurized: 125.6°C (258°F)

10

TORQUE VALUE

Water pump impeller nut	8–12 N·m (0.8–1.2 kg-m, 6–9 ft-lb)
-------------------------	------------------------------------

TOOLS

Special

Bearing driver attachment	07945–3330300
Mechanical seal driver attachment	07945–4150400 or 07945–3710200
Socket wrench, 17 x 27 mm	07907–MC70000 or 07907–4150000

TROUBLESHOOTING

Engine Temperature Too High

- Faulty temperature gauge or gauge sensor
- Thermostat stuck closed
- Faulty radiator cap
- Insufficient coolant
- Passages blocked in radiator, hoses, or water jacket
- Fan blades bent

Engine Temperature Too Low

- Faulty temperature gauge or gauge sensor
- Thermostat stuck open

Coolant Leaks

- Faulty pump oil seal
- Deteriorated O-rings
- Radiator hose damaged



INSPECTION

COOLANT

Test the coolant mixture with an antifreeze tester. For minimum corrosion protection, a 50–50% solution of ethylene glycol and distilled water is recommended.



RADIATOR CAP

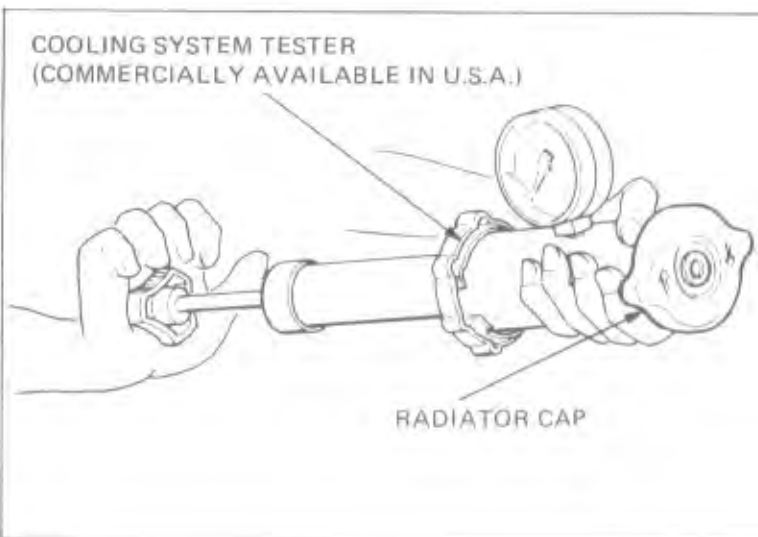
Pressure test the radiator cap. Replace the radiator cap if it does not hold pressure, or if relief pressure is too high or too low. It must hold specified pressure for at least six seconds.

NOTE

Before installing the cap on the tester, moisten the sealing surfaces.

RADIATOR CAP RELIEF PRESSURE:

75–105 kPa (0.75–1.05 kg/cm², 551–772 mmHg, 10.7–14.9 psi)

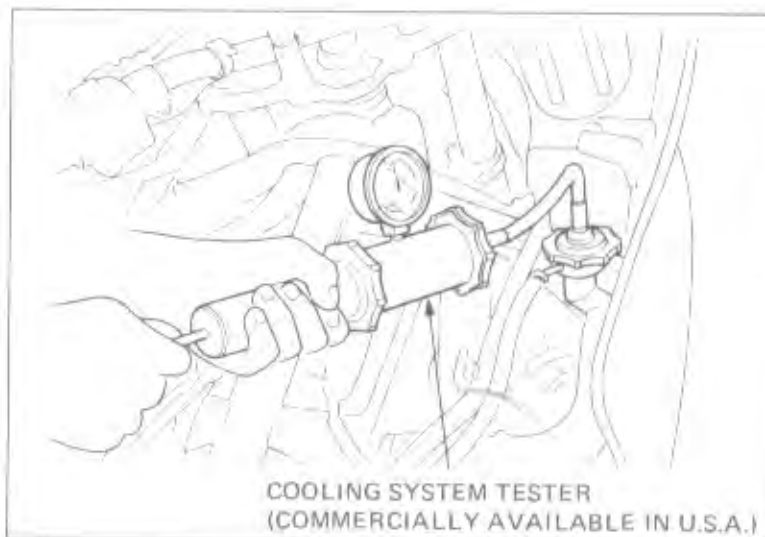


Pressurize the radiator, engine and hoses, and check for leaks.

CAUTION

Excessive pressure can damage the radiator. Do not exceed 105 kPa (1.05 kg/cm², 772 mm Hg, 14.9 psi).

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



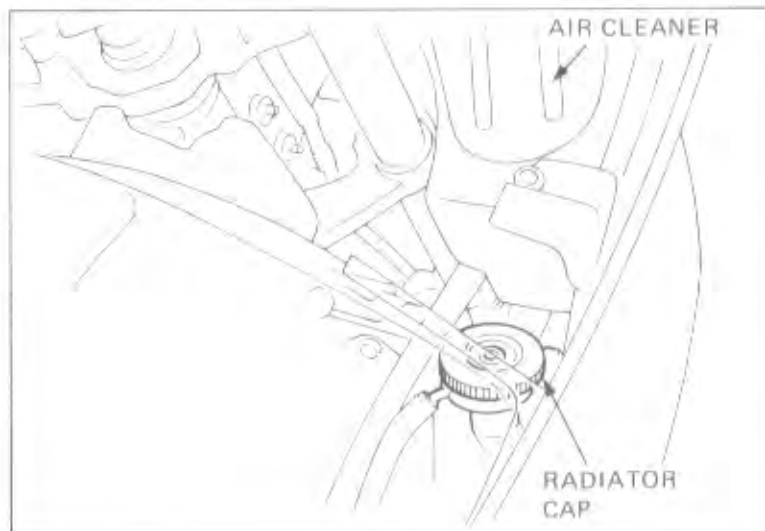


COOLANT REPLACEMENT

WARNING

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

Remove the fairing right lid.
Remove the seat and fuel tank.
Remove the radiator cap.



Remove the drain plug, and drain the coolant (about 1.5 liters, 1.6 US qt/1.3 Imp qt).

Replace the drain plug.

CAUTION

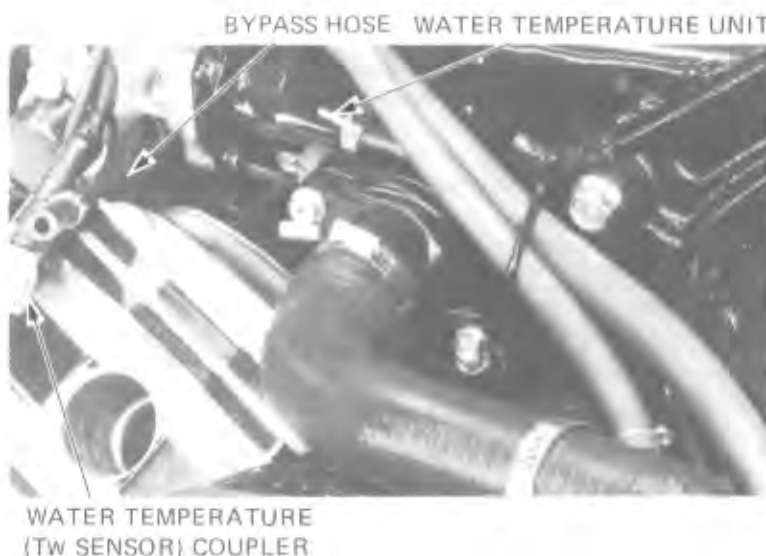
Do not overtighten the drain plug.

Fill the system with a 50–50 mixture of distilled water and ethylene glycol.



THERMOSTAT REMOVAL

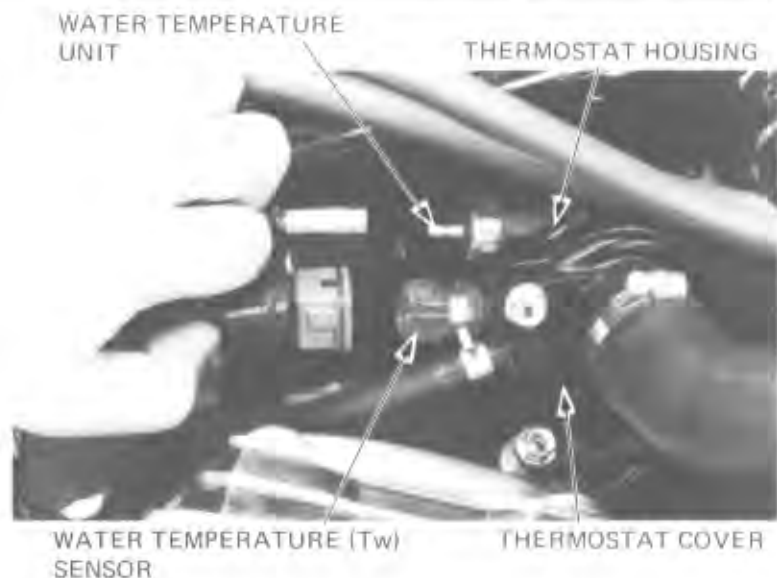
Remove the fairing.
Remove the seat and fuel tank.
Remove the coolant drain plug, and drain the coolant.
Disconnect the bypass hose.
Disconnect the temperature unit wire and water temperature (Tw) sensor coupler.





COOLING SYSTEM

Remove the two bolts and separate the thermostat cover and thermostat housing.
Take out the thermostat.
Remove the water temperature unit.
Remove the water temperature (Tw) sensor if necessary.
See Section 24 for Tw sensor inspection.



TEMPERATURE UNIT INSPECTION

Suspend the unit in oil and measure the resistance through the unit as the oil heats up.

Temperature	60°C	85°C	110°C	120°C
	140°F	185°F	230°F	248°F
Resistance	104.0Ω	43.9Ω	20.3Ω	16.1Ω

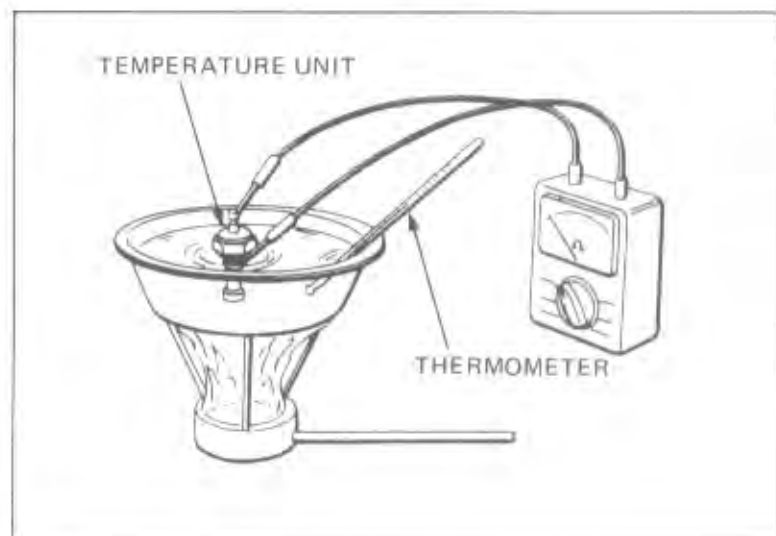
Do not let the unit or thermometer touch the pan or false readings will result.

WARNING

Wear gloves and eye protection.

NOTE

Oil must be used as the heated liquid to check operation above 100°C (212°F).



Temperature gauge inspection, (Section 22).

THERMOSTAT INSPECTION

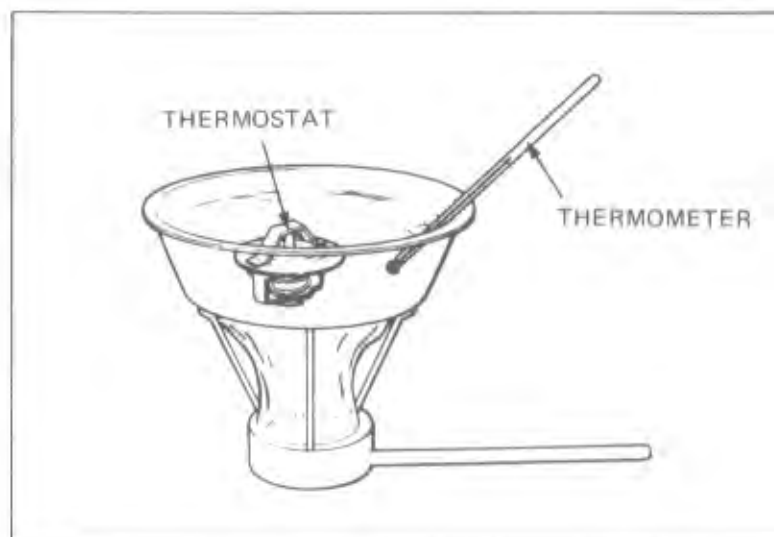
Visually inspect the thermostat for damage.
Suspend the thermostat in hot water to check operation.
Do not let the thermostat or thermometer touch the pan or false readings will result.

Technical Data

Starts to open	80° to 84°C (176° – 183°F)
Fully open	95°C (203°F)
Valve lift	8 mm (0.31 in) minimum

NOTE

- Replace thermostat if valve stays open at room temperature, or if it responds at temperatures other than those specified.
- Valve lift must be checked by applying heat for five minutes.





RADIATOR REMOVAL

Remove the fairing bracket, (Section 14).
Drain the coolant from the radiator.
Remove the radiator upper cover.



DRAIN PLUG



RADIATOR
UPPER COVER



MOUNTING SCREWS

Loosen the upper and lower radiator hose bands.
Remove the right and left upper mounting bolts.
Disconnect the electric fan motor coupler and fan motor switch coupler.
Disconnect the siphon tube from the radiator.



SIPHON
TUBE



UPPER HOSE BAND



FAN MOTOR
COUPLER



LOWER HOSE BAND

Remove the lower mounting bolt and collar and pull the radiator and disconnect the radiator hoses from the radiator.

CAUTION

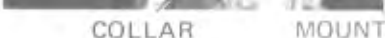
Do not damage the radiator fins.

NOTE

Remove the clutch cable, then remove the radiator.



RADIATOR BRACKET



COLLAR



MOUNTING BOLT



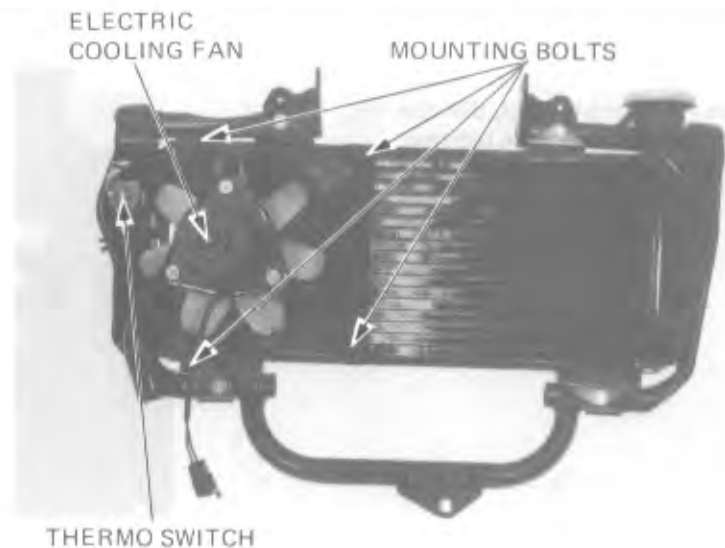
COOLING SYSTEM

COOLING FAN AND MOTOR

REMOVAL

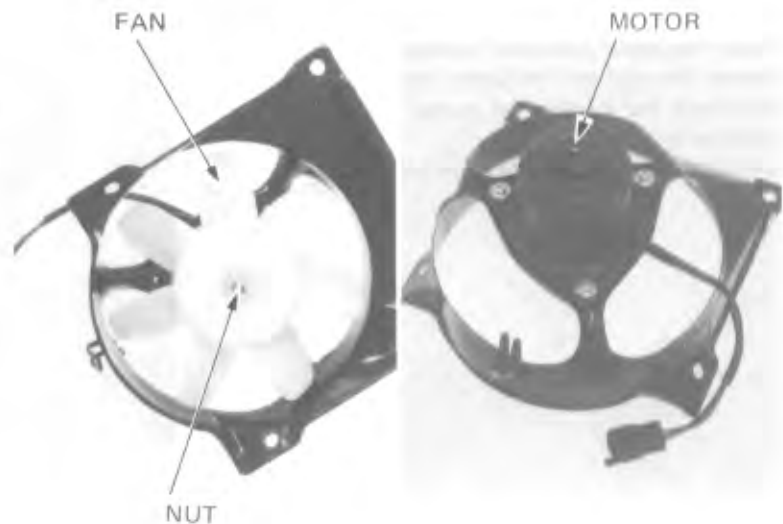
Remove the fan and motor mounting bolts and the fan and motor.

Remove the thermo switch using the special tool Socket Wrench 17 x 27 mm 07907-MC70000 or 07907-4150000 or commercially available in U.S.A.



Remove the fan from the motor by removing the nut and the washers.

Remove the three mounting screws and remove the fan motor from the fan shroud.



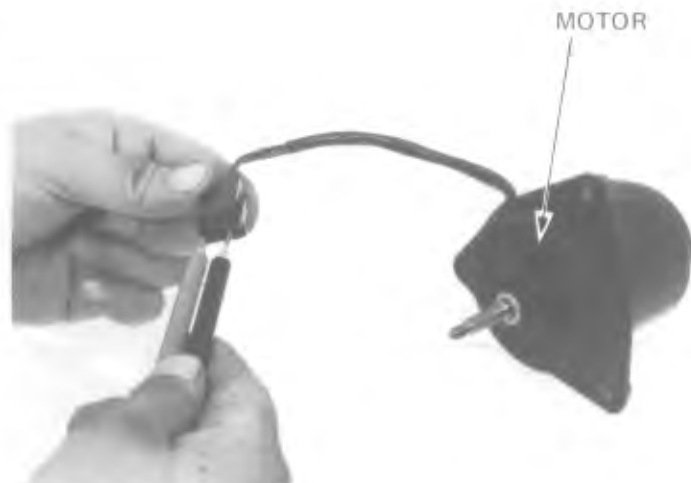
Check the motor for operation using a 12V battery. It should run smoothly.

INSTALLATION

Install the fan motor in the reverse order of removal.

NOTE

When installing the fan, install the plain washer and align the shaft with the impeller hole.





THERMOSTAT INSTALLATION

Insert the thermostat into the thermostat case.
Install a new O-ring on the thermostat case and attach the thermostat cover.
Install the temperature unit and slide a new O-ring onto the thermostat case.

NOTE

- Check that the O-rings are not dislodged.
- Make sure that the thermostat is installed properly in the case.



RADIATOR INSTALLATION

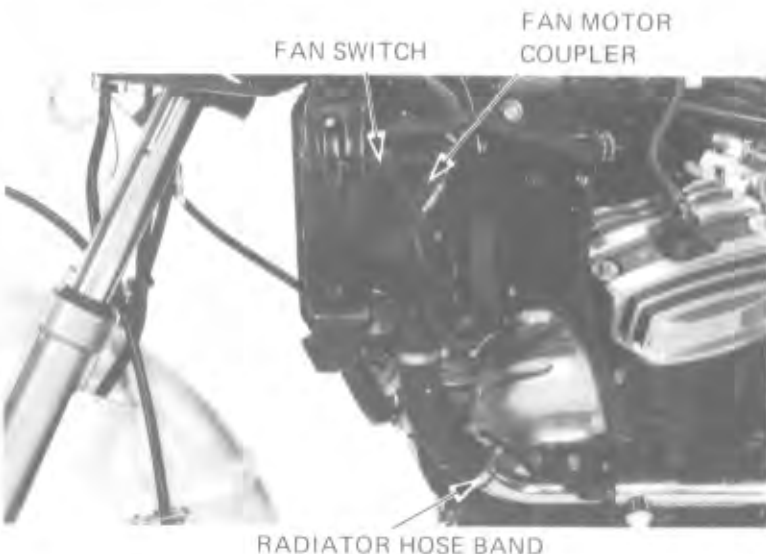
Connect the radiator upper hose to the radiator and connect the siphon tube.

Install the radiator upper mount bolts.



Connect the radiator lower hose.
Connect the cooling fan switch and water pressure switch wires.
Clamp the wires as shown.

Tighten the upper and lower hose bands securely.





COOLING SYSTEM

Install the radiator lower mount with the collar and 8 mm bolts.

Connect the clutch cable and adjust clutch lever free play.

Tighten the upper and lower mount bolts.

**TORQUE: 20–30 N·m (2.0–3.0 kg·m,
14–22 ft·lb)**



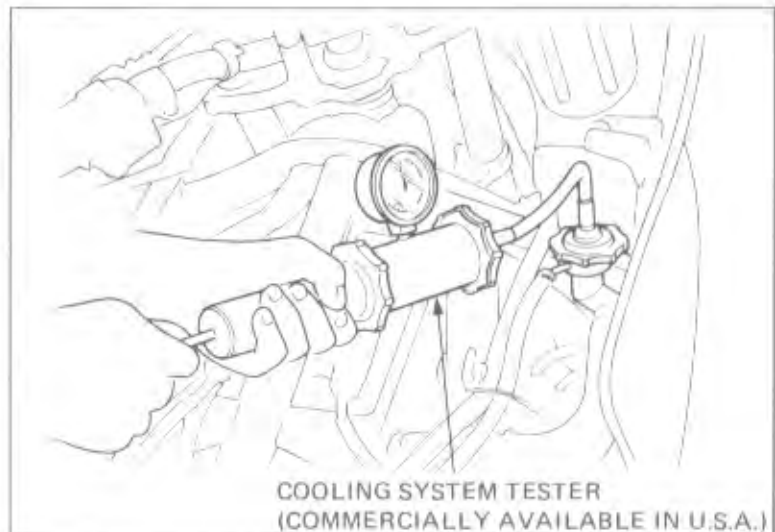
Fill the system with a 50–50 mixture of distilled water and ethylene glycol.

Bleed air from the radiator.

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

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

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



CAUTION

*Excessive pressure can damage the radiator.
Do not exceed 105 kPa (1.05 kg/cm², 14.9 psi).*

WATER PUMP

REMOVAL

Remove the water pump cover.

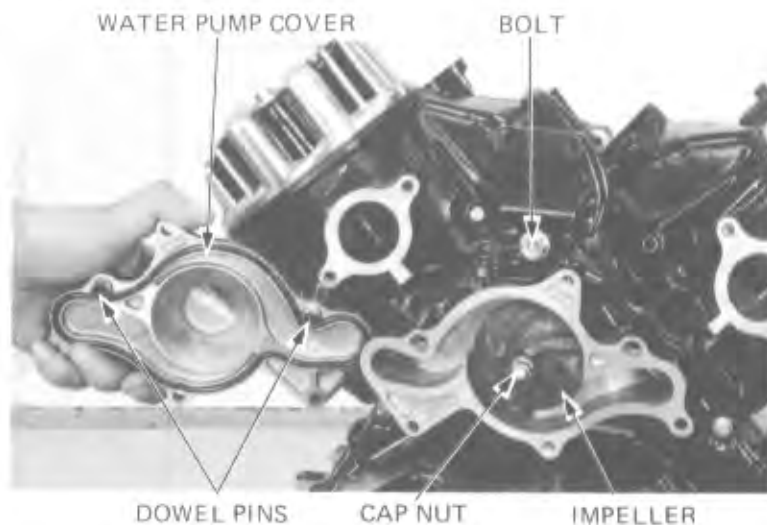
NOTE

The water pump body can be removed and installed with the engine mounted in the frame.

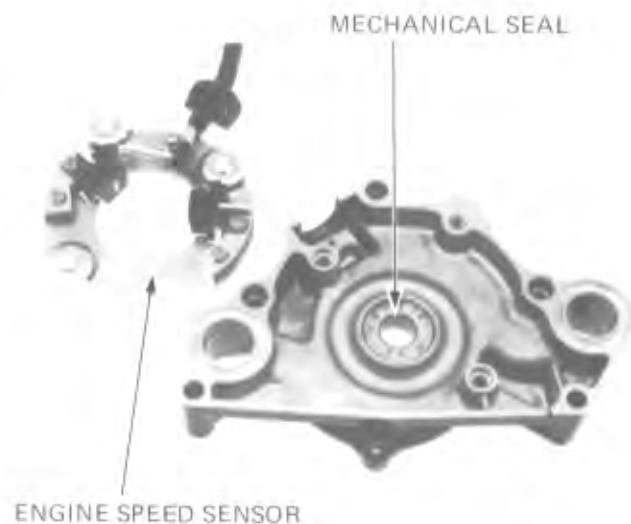




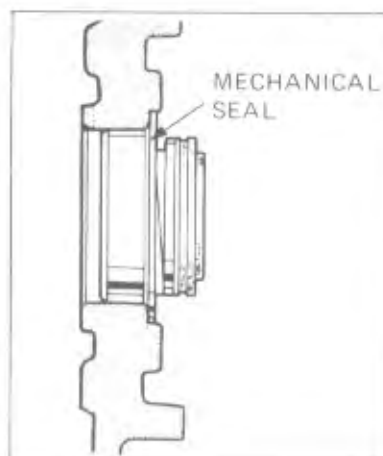
Remove the dowel pins.
Remove the cap nut, copper washer and impeller.
Remove the water pump body and throttle housing bracket by removing the 8 mm bolt.



Remove the engine speed sensor's base from the water pump body.
Drive the mechanical seal out from the inside being careful not to damage the water pump body.



Apply a thin coat of liquid sealant to the outer edge of the mechanical seal.





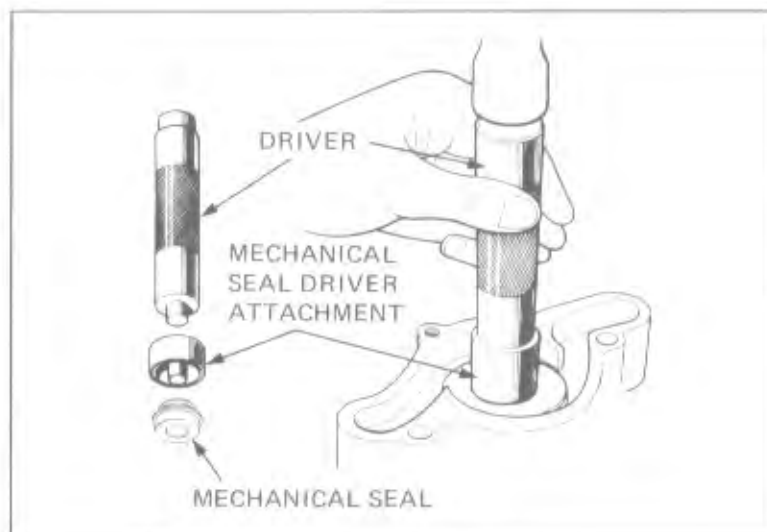
COOLING SYSTEM

Drive the mechanical seal into position in the rear cover with the mechanical seal driver attachment and driver.

NOTE

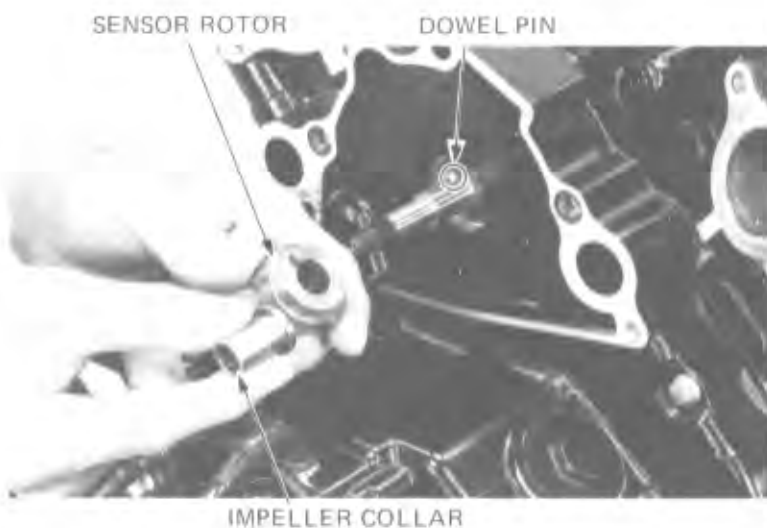
- Assemble the driver as follows:
Install the seal driver attachment to the driver. Place the mechanical seal into the attachment and hold it in place.
- Drive in the seal squarely.

Install the rear cover.

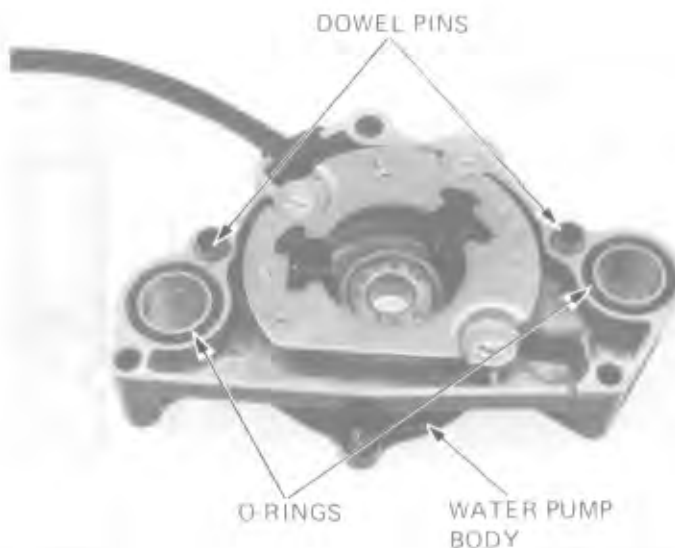


INSTALLATION

Install the dowel pin into the camshaft.
Align the sensor rotor groove with the dowel pin in the camshaft and install the sensor rotor.
Install the impeller collar on the camshaft.



Install the engine speed sensor's base on the water pump body.
Install the dowel pins and O-rings on the water pump body.
Install the water pump body.

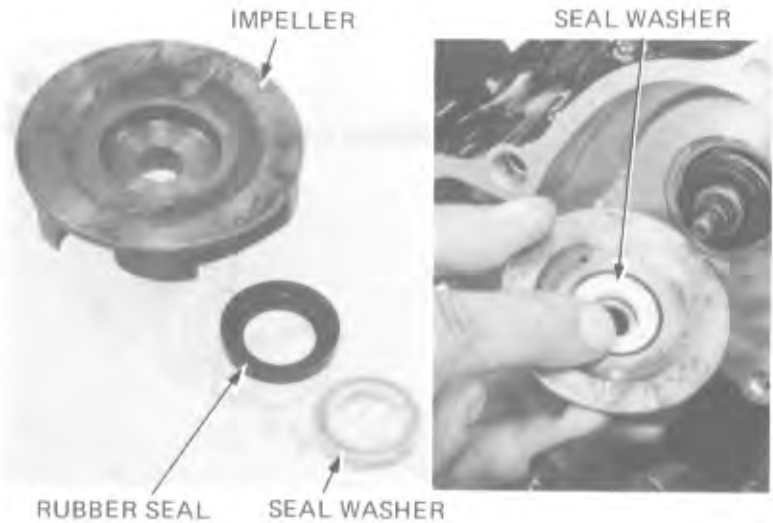




Install the water pump body on the engine rear cover.
Place the rubber seal and washer into the impeller and apply soapy water to the sliding surfaces.

NOTE

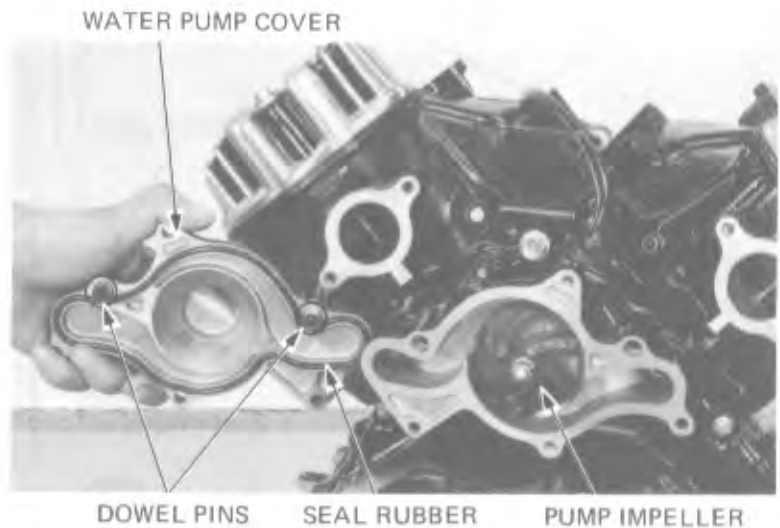
- Dip the rubber seal in soapy water to facilitate installation.
- Check that the rubber seal is positioned properly.



Install the water pump body, throttle housing bracket, and 8 mm bolt.
Install the impeller, copper washer and cap nut.
Tighten cap nut to specified torque.

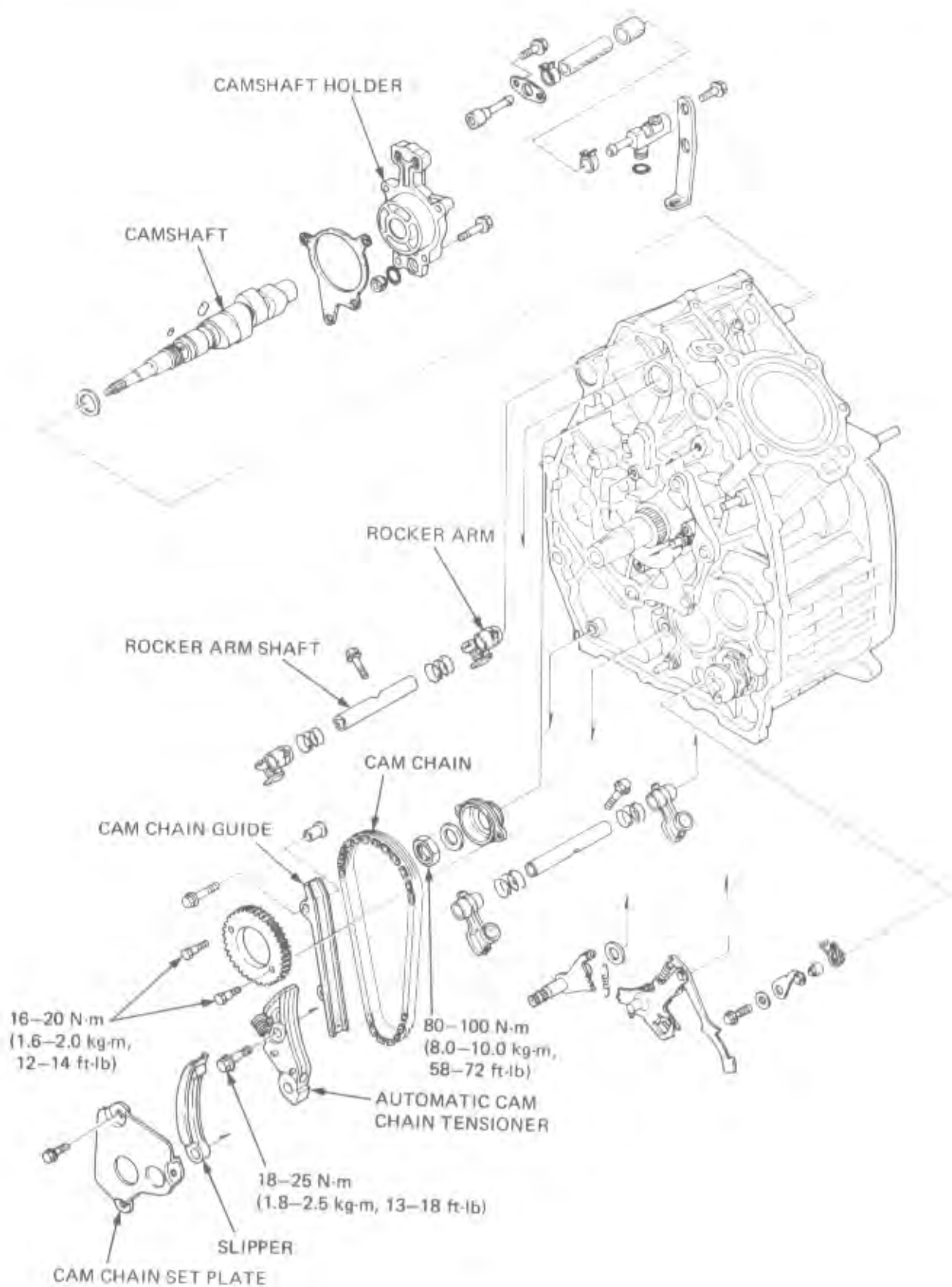
TORQUE: 8–12 N·m (0.8–1.2 kg-m, 6–9 ft-lb)

Install the dowel pins and the seal rubber on the water pump cover.



Install the water pump cover.







SERVICE INFORMATION	11-1
TROUBLESHOOTING	11-1
CAM CHAIN REMOVAL	11-2
CAMSHAFT REMOVAL	11-3
ROCKER ARM REMOVAL/INSTALLATION	11-5
CAMSHAFT INSTALLATION	11-7
VALVE TIMING ADJUSTMENT	11-8

SERVICE INFORMATION

GENERAL

- Camshaft lubricating oil is fed from the oil filter to the front bearing through an oil control orifice located in the engine case, and to the rear bearing through an oil control orifice in the camshaft rear holder.
- Be sure these orifices are not clogged and that the O-rings and dowel pins are in place before assembling the engine.
- Before assembling the camshaft, lubricate the bearings with engine oil and pour 100 cc of engine oil into the engine block oil pockets to provide initial lubrication.

SPECIFICATIONS

Unit: mm (in)

Item			Standard	Service Limit
Camshaft	Cam height	IN	36.656 (1.4431)	35.678 (1.4046)
		EX	36.645 (1.4427)	35.667 (1.4042)
	Journal O.D.	Front	21.959–21.980 (0.8645–0.8654)	21.91 (0.853)
		Rear	25.959–25.980 (1.0220–1.0228)	25.91 (1.020)
Camshaft holder I.D.			22.000–22.021 (0.8661–0.8670)	22.05 (0.868)
Camshaft bearing I.D.			26.000–26.021 (1.0236–1.0244)	26.17 (1.030)
Rocker arms and shafts	Arm I.D.		14.000–14.011 (0.5512–0.5516)	14.03 (0.552)
	Shaft O.D.		13.966–13.984 (0.5498–0.5506)	13.95 (0.549)

TORQUE VALUES

Camshaft lock nut	80 – 100 N·m (8.0 – 10.0 kg-m, 58 – 72 ft-lb)
Cam sprocket bolt	16 – 20 N·m (1.6 – 2.0 kg-m, 12 – 14 ft-lb)
Cam chain tensioner set bolt	18 – 25 N·m (1.8 – 2.5 kg-m, 13 – 18 ft-lb)

TOOLS

Special

Gear holder	07924–MC70000 or modified 07924–4150000
Lock nut socket wrench 17 x 27 mm	07907–MC70000

TROUBLESHOOTING

Excessive Noise

- Incorrect valve adjustment
- Worn or damaged rocker arms or camshaft
- Worn or damaged cam chain tensioner or cam chain guide
- Worn cam sprocket teeth
- Worn camshaft holder



CAM CHAIN REMOVAL

Remove the following:

- fairing assembly (Section 14).
- engine (Section 5).
- engine rear cover (Section 9).
- starter reduction gear, flywheel and starter drive gear, (Section 9).

Remove the chain guide set plate bolts.

Remove the chain guide set plate.



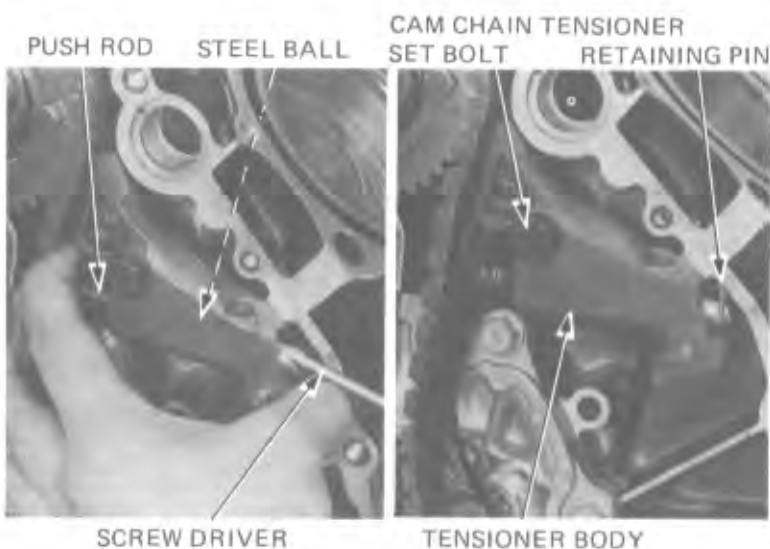
Remove the cam chain tensioner by compressing the push rod while pressing in the steel ball with a flat-end screwdriver as shown.

Hold the push rod by inserting the retaining pin through push rod to tensioner base.

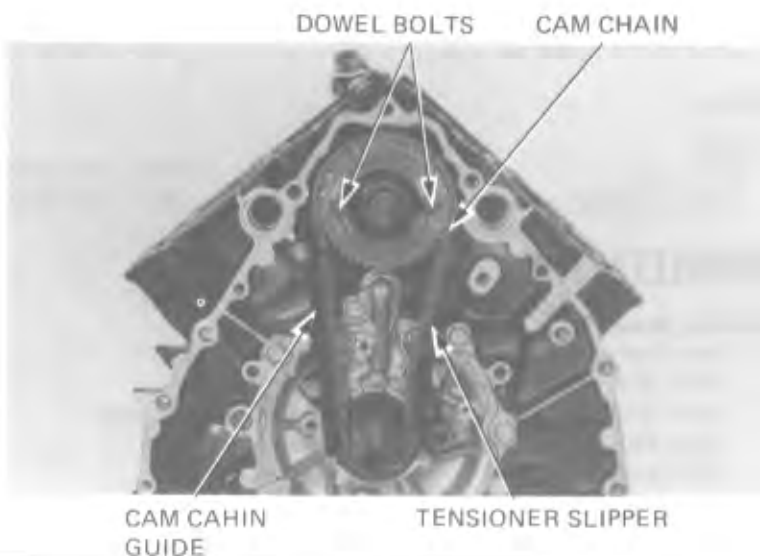
Remove the cam chain tensioner set bolt and tensioner.

CAUTION

The set bolt has a special thread pitch. Do not use any other bolt in its place.



Remove the cam chain guide and tensioner slipper. Remove the cam sprocket dowel bolts, cam sprocket and cam chain.





CAMSHAFT REMOVAL

Remove the cylinder heads (Section 7).
Temporarily install the cam sprocket.
Hold the cam sprocket with a Gear Holder 07924—MC70000 to prevent it from turning.
Loosen the lock nut and remove the cam sprocket and cam sprocket boss.

GEAR HOLDER 07924—MC70000 or 07924—4150000

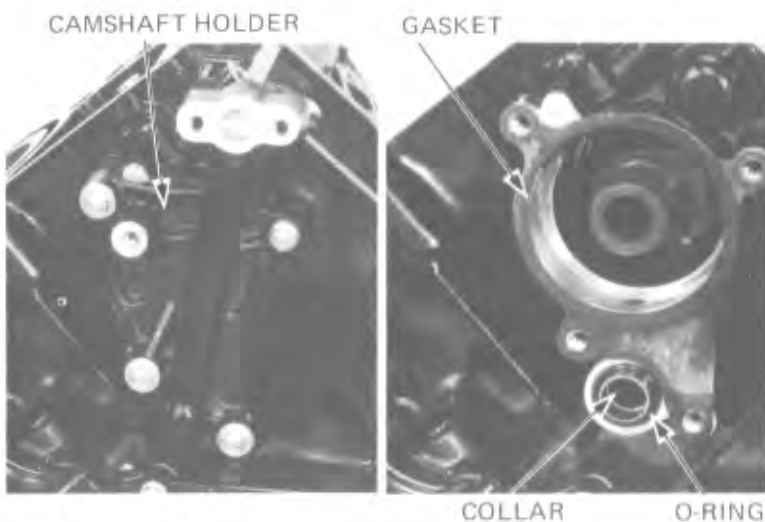


LOCK NUT SOCKET
WRENCH, 17 x 27 mm 07907—MC70000

Remove the camshaft holder from the engine case.
Remove the dowel pin, O-ring and gasket from the engine case.

NOTE

A 15 mm dowel pin and O-ring are used at the rear side of the camshaft holder.



Remove the camshaft with the thrust washer from the front.





INSPECTION

● CAMSHAFT

Measure the O.D. of each camshaft bearing journal.

SERVICE LIMITS:

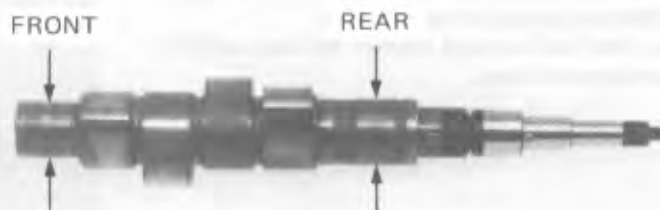
FRONT: 21.91 mm (0.853 in)

REAR: 25.91 mm (1.020 in)

Calculate the journal and bearing clearance.

SERVICE LIMIT: 0.26 mm (0.01 in)

Inspect the worm gear for wear or damage.



Measure the height of each cam lobe.
Inspect the lobes for wear or damage.

SERVICE LIMITS:

IN: 35.678 mm (1.4046 in)

EX: 35.667 mm (1.4042 in)



● CAMSHAFT HOLDER

Measure the camshaft holder I.D. as shown.

SERVICE LIMIT: 22.05 mm (0.868 in)





- CAMSHAFT BEARING

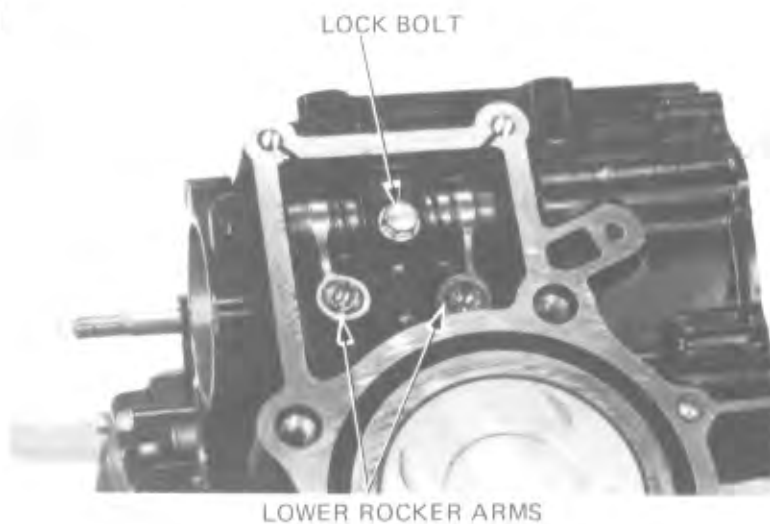
Measure the bearing I.D.

SERVICE LIMIT: 26.17 mm (1.030 in)

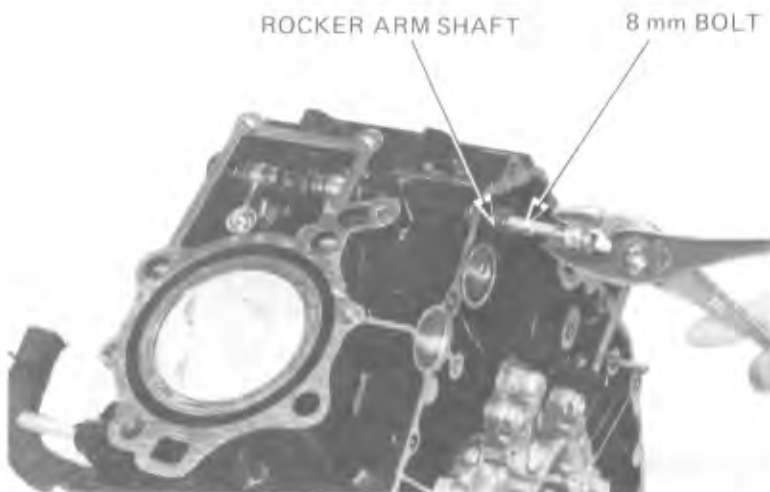


ROCKER ARM REMOVAL/INSTALLATION

Remove the rocker arm shaft lock bolts.



Screw an 8 mm bolt into each rocker arm shaft and remove the rocker arm shafts by pulling on the bolt. Remove the rocker arms and thrust springs.





CAMSHAFT/CAMCHAIN

ROCKER ARM INSPECTION

Inspect the rocker arms for wear or damage to the camshaft contact surfaces, or clogged oil holes. Measure the I.D. of each rocker arm.

SERVICE LIMIT: 14.03 mm (0.552 in)



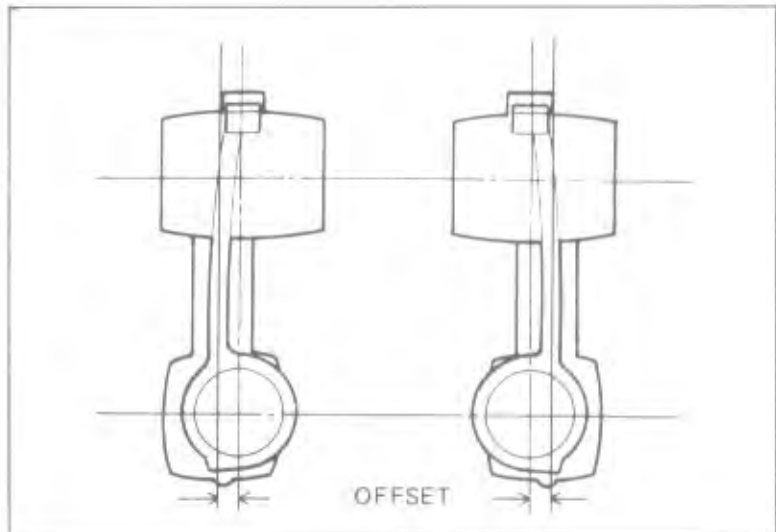
ROCKER ARM SHAFT INSPECTION

Measure each rocker arm shaft O.D.

SERVICE LIMIT: 13.95 mm (0.549 in)

Inspect each rocker arm shaft for wear or damage.

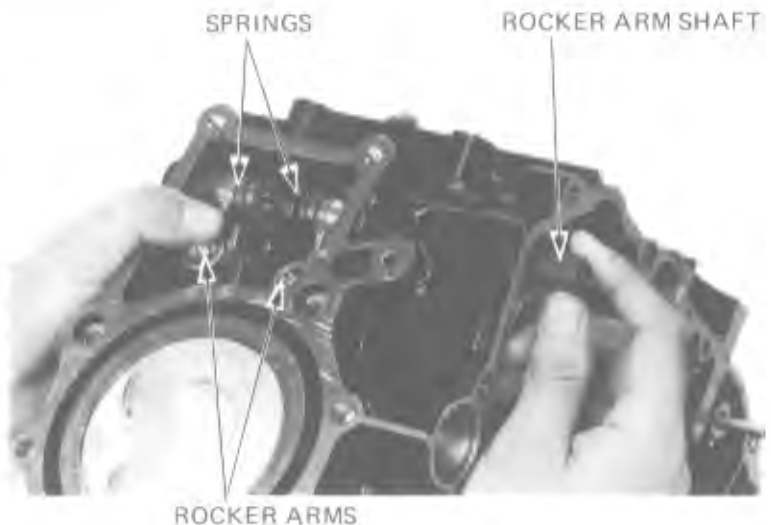
Install the rocker arms with the offset toward the inside.



Install the rocker arms and thrust springs in the cylinder block, and then insert the rocker arm shafts.

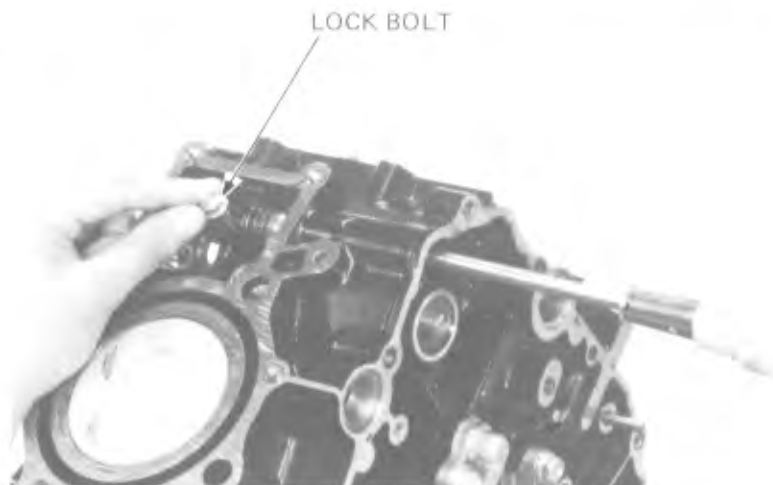
NOTE

- Lubricate the rocker arm shafts with engine oil before installation.
- Install each rocker arm shaft with the threaded end facing the rear (cam sprocket side).
- Install the thrust springs on the inside of the rocker arms.





Rotate the rocker arm shaft with a screwdriver to align with the lock bolt hole. Install the lock bolt.

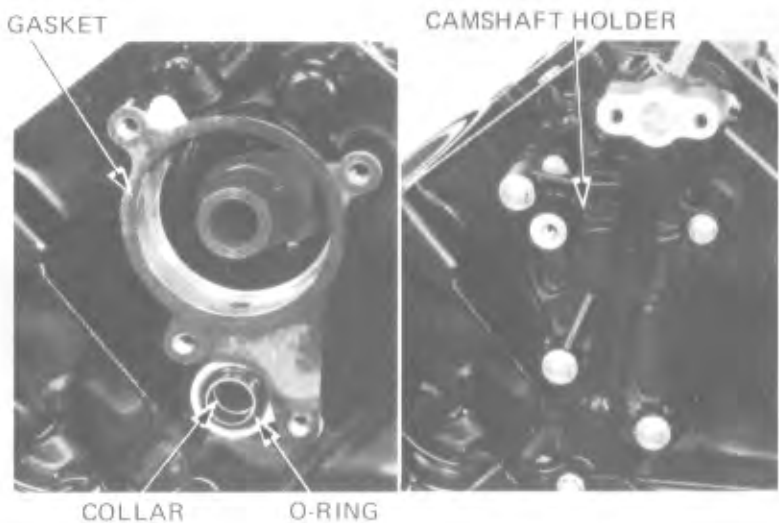


CAMSHAFT INSTALLATION

Lubricate the camshaft journals with Multipurpose NLGI No. 2 Grease (MoS₂ additive).
Install the camshaft thrust washer on the camshaft and insert the camshaft from the front.



Install the camshaft holder gasket, O-ring, and collar.
Install the camshaft holder.



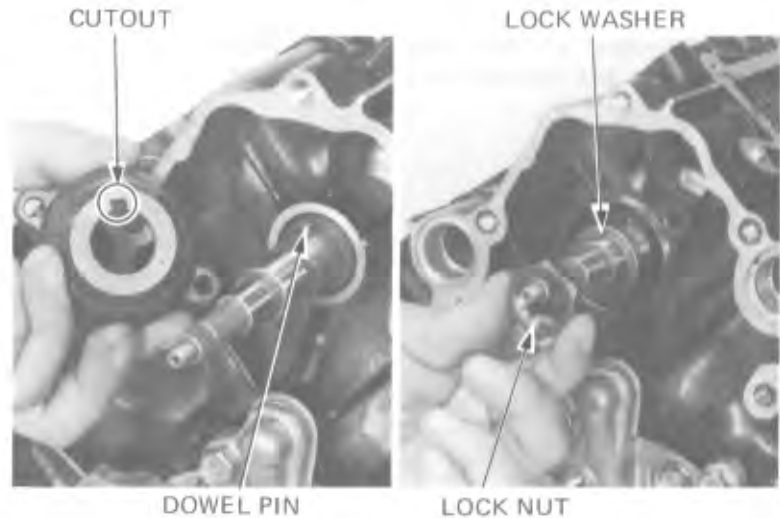


CAMSHAFT/CAM CHAIN

Install the cam sprocket boss, aligning the cutout with the camshaft dowel pin. Install the lock nut and lock washer and tighten the lock nut temporarily.

NOTE

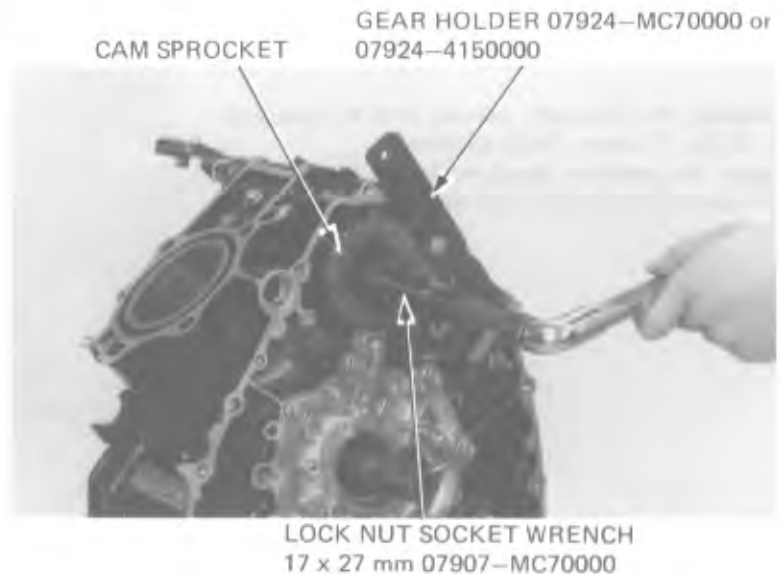
Install the lock washer with the mark "OUT-SIDE" facing out.



Install the cam sprocket and hand tighten the bolts. Hold the cam sprocket with the Gear Holder and tighten the lock nut.

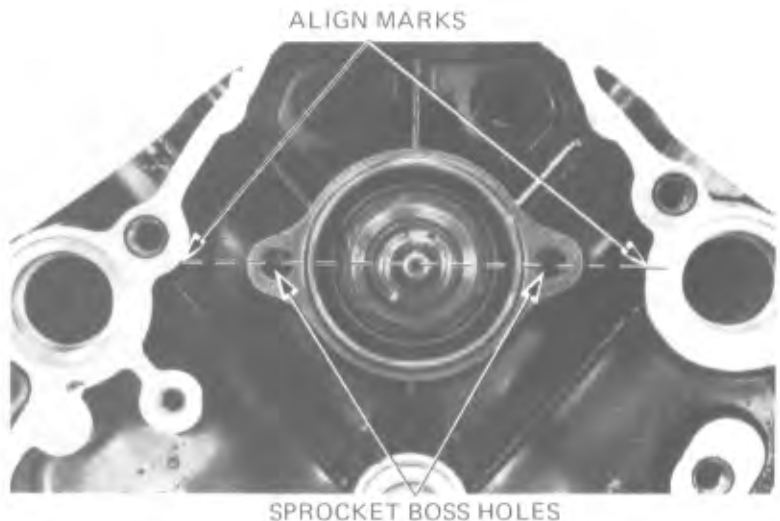
**TORQUE: 80–100 N·m (8.0–10.0 kg·m,
58–72 ft·lb)**

Remove the cam sprocket.



VALVE TIMING ADJUSTMENT

Align the holes in the cam sprocket boss with the aligning marks on the engine block.





Place the cam chain over the bottom sprocket.
Place the cam sprocket into the chain and onto the cam sprocket boss.
Install the cam sprocket bolts.



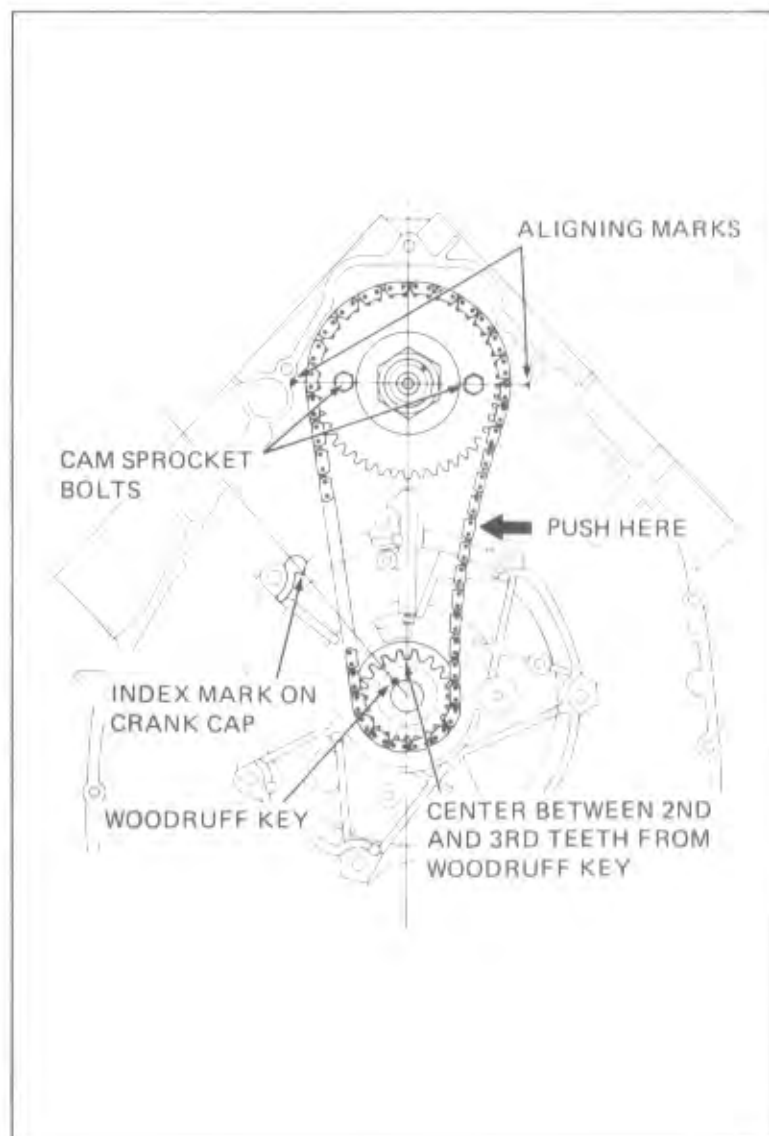
Rotate the crankshaft to bring the left piston to TDC.

The valve timing is correct when:

- The cam sprocket bolts are in line with the aligning marks on the engine block.
- The flywheel woodruff key aligns with the index mark on the crankshaft cap.

NOTE

When inspecting the valve timing, push the cam chain from the right side so the tensioner-side of the chain is pulled taut.





CAMSHAFT/CAM CHAIN

Hold the camshaft with the Lock Nut Socket Wrench.

Torque the cam sprocket bolts.

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

CAM SPROCKET BOLTS



LOCK NUT SOCKET WRENCH, 17 x 27 mm
07907-MC70000

AUTOMATIC CAM CHAIN TENSIONER INSTALLATION

Install the cam chain guide and tensioner slipper.

CAM CHAIN



CAM CHAIN GUIDE

SLIPPER

Install the cam chain tensioner.
Install and torque the tensioner set bolt.

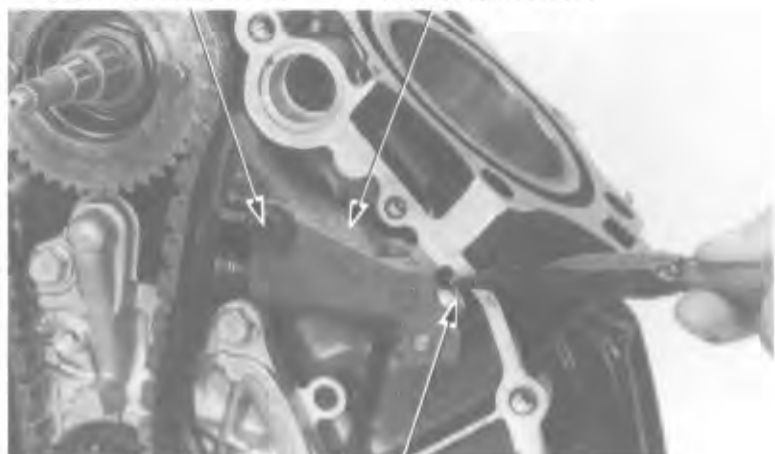
TORQUE: 18–25 N·m (1.8–2.5 kg·m, 13-18 ft·lb)

CAUTION

*Be sure to use the correct set bolt.
Failure to use the special bolt will ruin the
thread hole in the engine case.*

Remove the previous installed push rod retaining pin, the tensioner will give tension to the cam chain automatically.

TENSIONER SET BOLT TENSIONER BODY



RETAINING PIN



Make sure that the push rod moves smoothly by pressing the steel ball in.

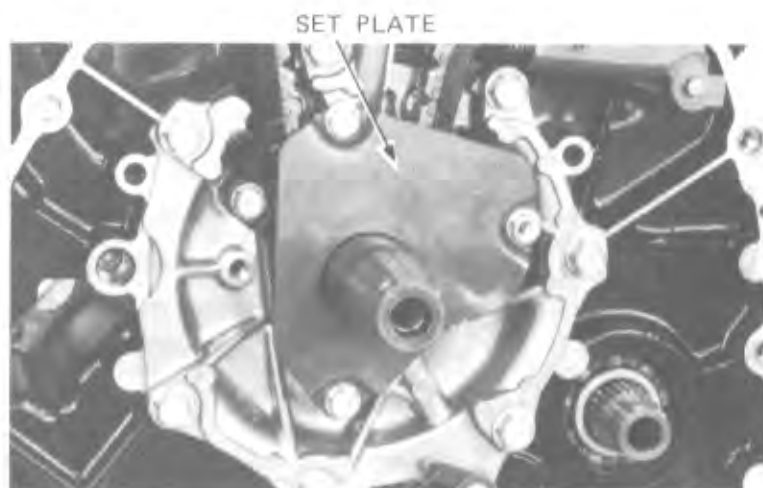


PUSH ROD

STEEL BALL

Install the set plate
Torque the 6 mm bolts.

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

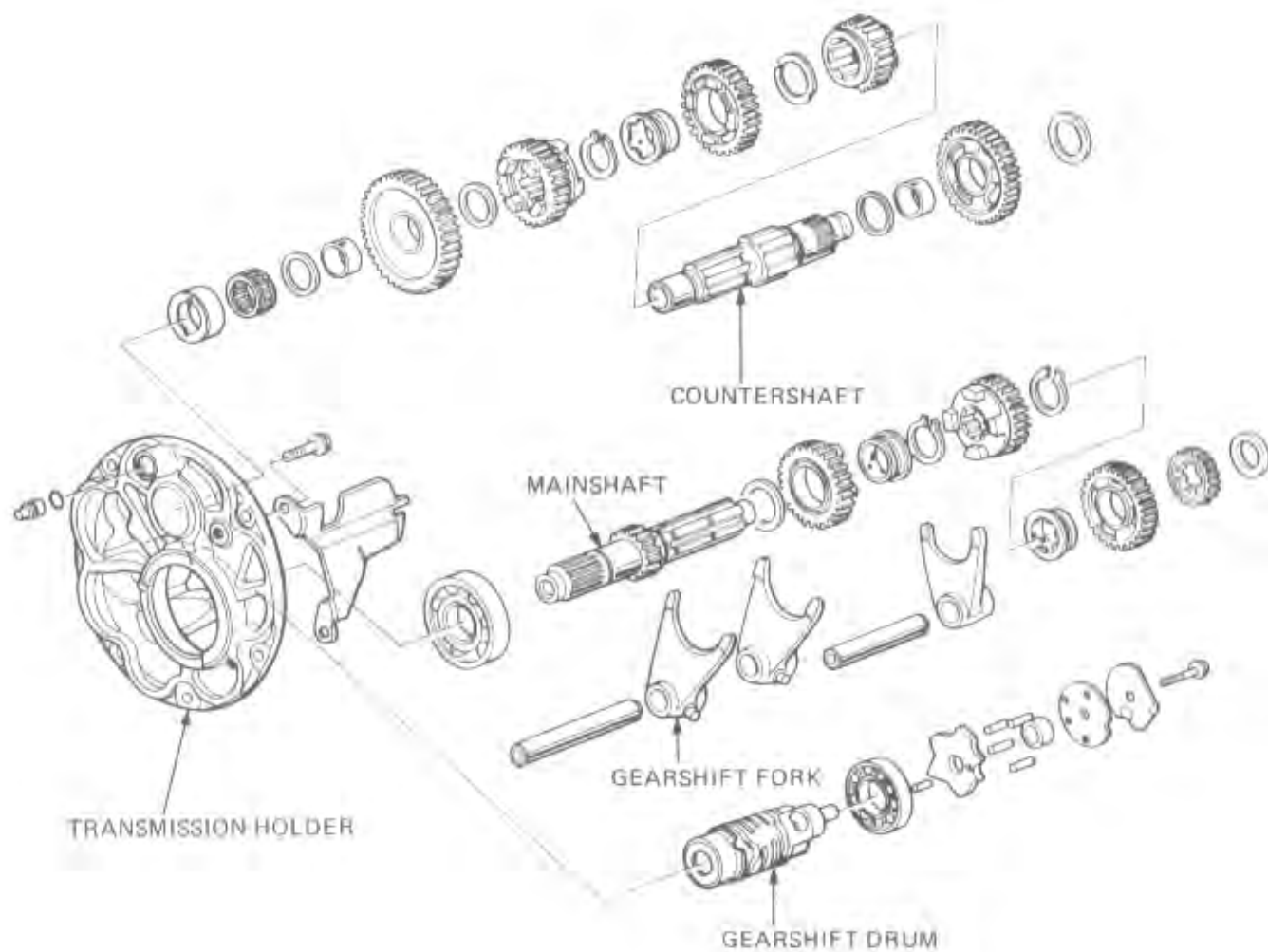


SET PLATE

Pour about 100 cc of engine oil into the oil pockets of the engine block.
Install the flywheel, (Section 9) and the cylinder head, (Section 7).
Adjust the valve clearance, (Section 3).
Install the engine, (Section 5).
Add the specified amount of engine oil, (Section 2).



ENGINE OIL





SERVICE INFORMATION	12- 1	FINAL SHAFT ASSEMBLY	12- 4
TROUBLESHOOTING	12- 2	TRANSMISSION DISASSEMBLY	12- 4
GEARSHIFT LINKAGE REMOVAL	12- 3	TRANSMISSION ASSEMBLY	12-10
FINAL SHAFT DISASSEMBLY	12- 3	GEARSHIFT LINKAGE INSTALLATION	12-16

SERVICE INFORMATION

GENERAL

- Place all removed parts in parts racks in order, so they can be put back in their original places.
- Before reassembling, lubricate the M4 and M5 gears with Multipurpose NLG1 No. 2 Grease (MoS2 additive) or an equivalent.
- Apply engine oil to the other gears.
- To service the transmission, it is necessary to remove the engine from the frame.

SPECIFICATIONS

Unit: mm (in)

Item			Standard	Service Limit
Transmission	M4 and M5 gear	I.D.	29.020 – 29.041 (1.1425 – 1.1433)	29.10 (1.146)
		Bushing O.D.	28.979 – 29.000 (1.1409 – 1.1417)	28.95 (1.140)
	C1 gear	I.D.	24.020 – 24.041 (0.9457 – 0.9465)	24.10 (0.949)
	C1 gear bushing	O.D.	23.984 – 24.005 (0.9443 – 0.9451)	23.95 (0.943)
		I.D.	20.020 – 20.041 (0.7882 – 0.7890)	20.06 (0.790)
	C2 gear	I.D.	31.025 – 31.050 (1.2215 – 1.2224)	31.10 (1.224)
	C2 gear bushing	O.D.	30.985 – 31.010 (1.2199 – 1.2209)	30.95 (1.219)
		I.D.	27.500 – 27.521 (1.0827 – 1.0835)	27.54 (1.084)
	C3 gear	I.D.	29.020 – 29.041 (1.1425 – 1.1433)	29.10 (1.148)
		Bushing O.D.	28.979 – 29.000 (1.1409 – 1.1417)	28.95 (1.140)
	Countershaft O.D.	at C1	19.987 – 20.000 (0.7869 – 0.7874)	19.96 (0.786)
		at C2	27.459 – 27.480 (1.0811 – 1.0819)	27.44 (0.1080)
	Gear-to-bushing clearance		—	0.15 (0.006)
	Bushing-to-shaft clearance		—	0.10 (0.004)
Shift fork	Claw thickness		5.93 – 6.00 (0.233 – 0.236)	5.50 (0.217)
	I.D.		13.000 – 13.018 (0.5118 – 0.5125)	13.05 (0.514)
Fork shaft	O.D.		12.966 – 12.984 (0.5105 – 0.5112)	12.95 (0.510)
Final shaft	Damper spring free length		68.9 (2.71)	64.2 (2.53)



TRANSMISSION

TOOLS

Special

Crank cap driver	07945-4150100		
Bearing remover 20 mm	07936-3710600	} Bearing remover set	07936-3710000
Bearing remover handle	07936-3710100		
Bearing remover weight	07936-3710200		
Driver	07949-3710000		

Common

Attachment, 42 x 47 mm	07746-0010300 or 07945-3330100
Driver	07749-0010000
Attachment, 52 x 55 mm	07746-0010400 or 07946-3710200 or 07945-3330300
Pilot, 25 mm	07746-0040600
Attachment, 62 x 68 mm	07746-0010500
Pilot, 20 mm	07746-0040500
Attachment, 32 x 35 mm	07746-0010100 or 07946-3640000 or 07946-6920100

TROUBLESHOOTING

Hard to Shift

- Improper clutch adjustment: too much free play
- Shift forks bent
- Shift shaft bent
- Shift fork claw bent
- Shift drum cam grooves damaged
- Shift guide pin damaged

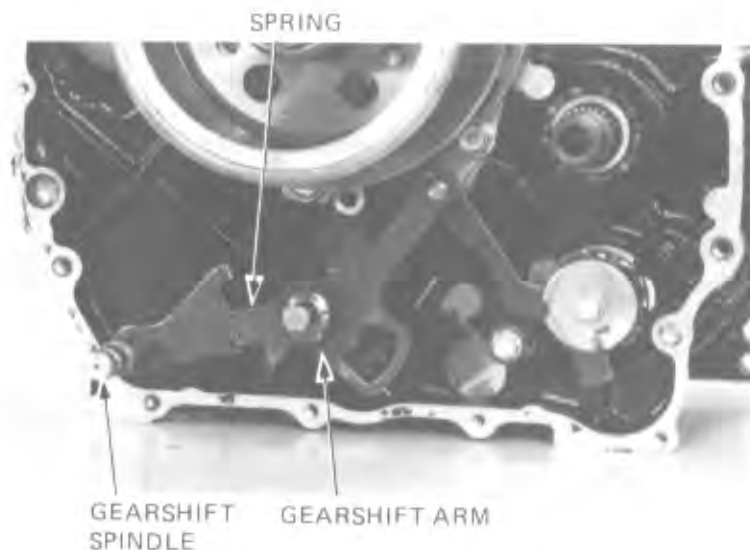
Transmission Jumps Out of Gear

- Gear dogs worn
- Shift shaft bent
- Shift drum stopper broken
- Shift forks bent



GEARSHIFT LINKAGE REMOVAL

Remove the engine (Section 5).
Remove the engine front cover (Section 8).
Remove the rear cover (Section 9).
Remove the final shaft.
Remove the gearshift spindle and shift spring.
Remove the gearshift arm.

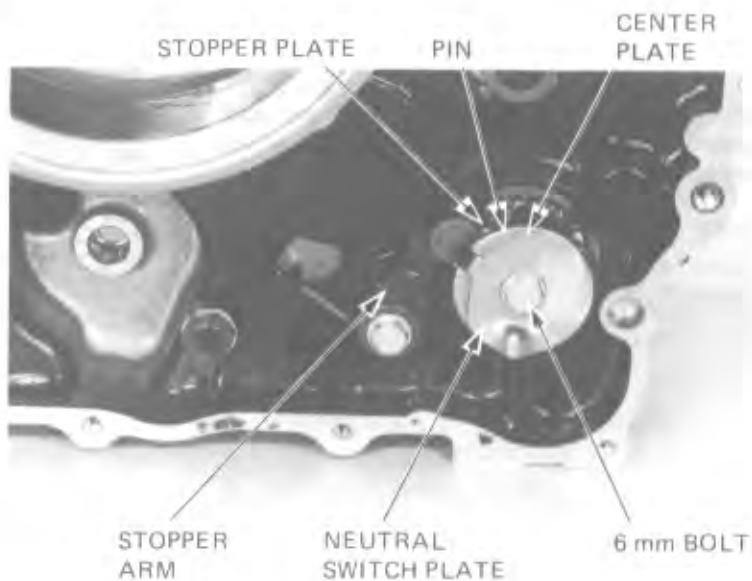


Remove the shift drum stopper bolt.
Remove the shift drum stopper.
Remove the neutral switch plate, shift drum stopper plate, gearshift drum pin, and collar.

NOTE

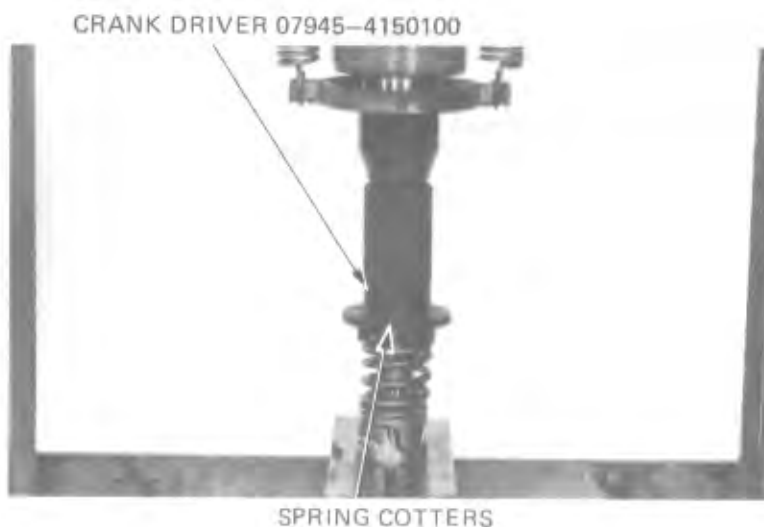
Do not disassemble the shift drum plates and pin except when replacement is necessary.

Check all removed parts for wear or damage.



FINAL SHAFT DISASSEMBLY

Compress the spring with a press and Crank Cap Driver and remove the spring cotters.
Remove the spring retainer, damper lifter and cam from the shaft.



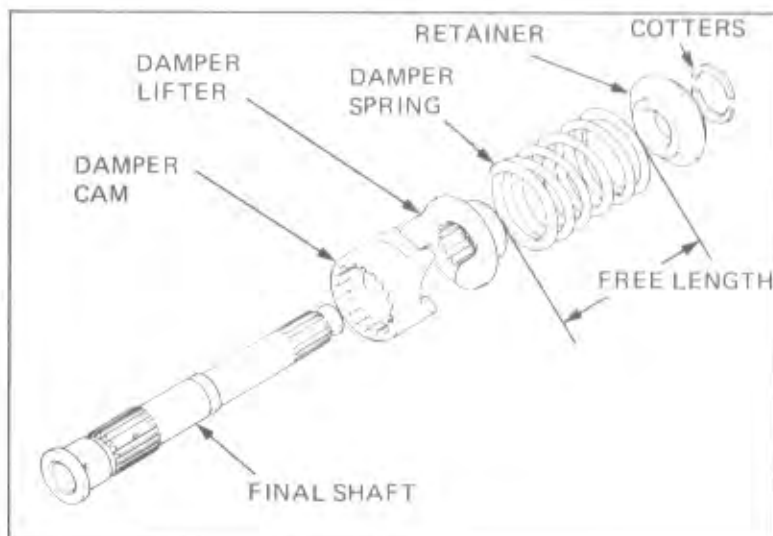


TRANSMISSION

Measure the damper spring free length.

SERVICE LIMIT: 64.2 mm (2.53 in)

Inspect the damper lifter, shaft, and retainer for wear or damage.



FINAL SHAFT ASSEMBLY

Slide the lifter, spring and retainer over the shaft. Compress the spring in the Crank Cap Driver and install the spring cotters.

NOTE

Make sure that the cotters are properly seated.



TRANSMISSION DISASSEMBLY

Remove the engine front cover and remove the clutch as an assembly, (Section 8).

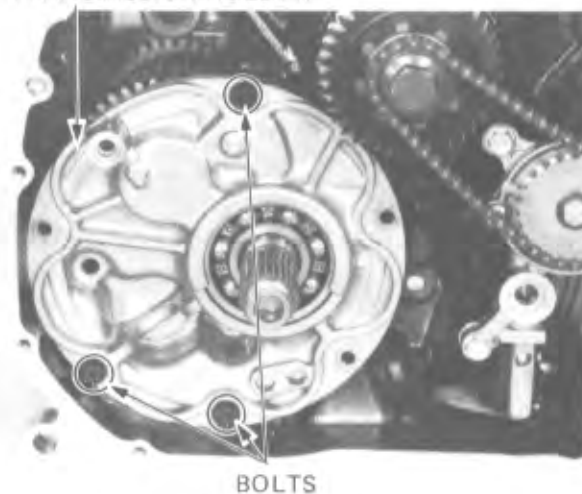
Remove the oil separator, oil control orifice and O-ring.





Remove the transmission holder bolts.

TRANSMISSION HOLDER



Align the projection on the shift drum stopper plate with the cutout in the engine case by rotating the shift drum.

STOPPER PLATE



Put the right position at TDC by positioning the TR mark on the flywheel 45° towards the right side of the engine.

Drive the ends of the countershaft and shift drum carefully and evenly with a soft hammer until the transmission holder is clear of the engine case.

"TR" MARK

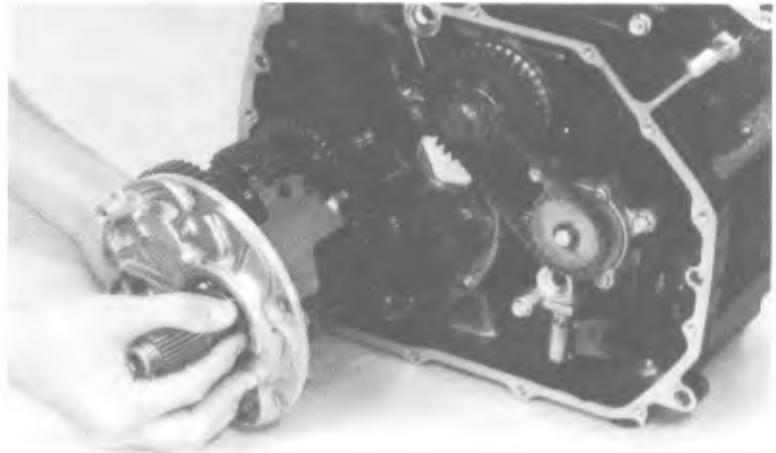
COUNTERSHAFT



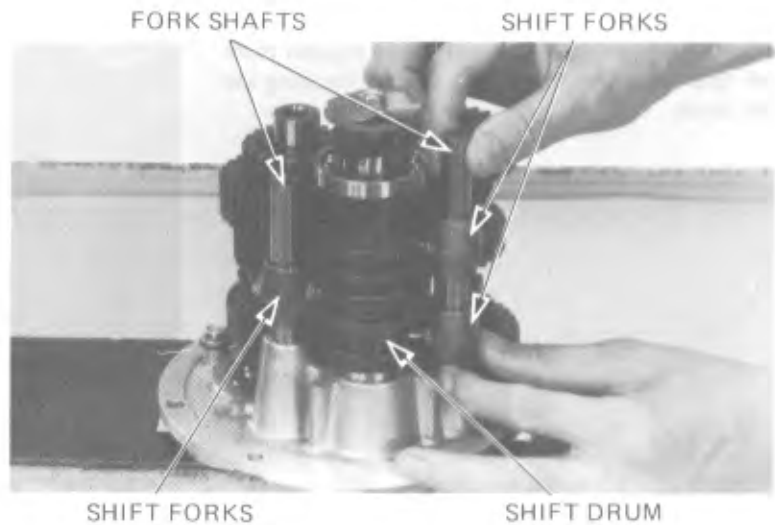


TRANSMISSION

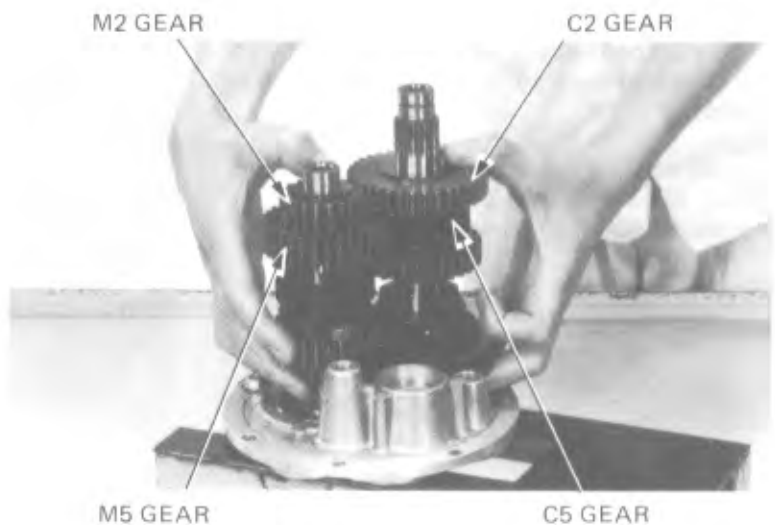
Remove the transmission assembly from the engine case.



Remove the shift fork shafts.
Remove the shift forks and shift drum.



Remove 2nd and 5th gears from the countershaft and mainshaft.





Remove the countershaft 1st, 3rd and 4th gears and washers by removing the countershaft.



Thread the clutch lock nut onto the end of the mainshaft to prevent damage to the end.
Remove the mainshaft by lightly tapping on the end with a soft hammer.
Remove the gears by prying off the snap ring.



Inspect each holder bearing for wear or damage. They should rotate smoothly and be free of play or rattle.
Remove the bearing from the transmission holder.





TRANSMISSION

Remove the mainshaft and countershaft bearings and oil guide plate from the engine case.

NOTE

Bearings should be replaced if removed from case.

TOOLS

BEARING REMOVER, 20 mm
07936-3710600
BEARING REMOVER HANDLE
07936-3710100
BEARING REMOVER WEIGHT
07936-3710200

COUNTERSHAFT BEARING MAINSHAFT BEARING



TRANSMISSION INSPECTION

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

Examine the gear dogs and slots for evidence of abnormal wear.

Measure each gear I.D. If any gear exceeds the service limit, that gear must be replaced.

SERVICE LIMITS:

M4 and M5 GEARS	29.10 mm (1.146 in)
C1 GEAR	24.10 mm (0.949 in)
C2 GEAR	31.10 mm (1.224 in)
C3 and C4 GEARS	29.10 mm (1.146 in)

I.D.



Measure the countershaft gear bushing I.D. and O.D.

SERVICE LIMITS:

C1	O.D:	23.95 mm (0.943 in)
	I.D:	20.06 mm (0.790 in)
C2	O.D:	30.95 mm (1.219 in)
	I.D:	27.54 mm (1.084 in)





Measure and record the O.D. of the countershaft at the locations shown.

SERVICE LIMITS:

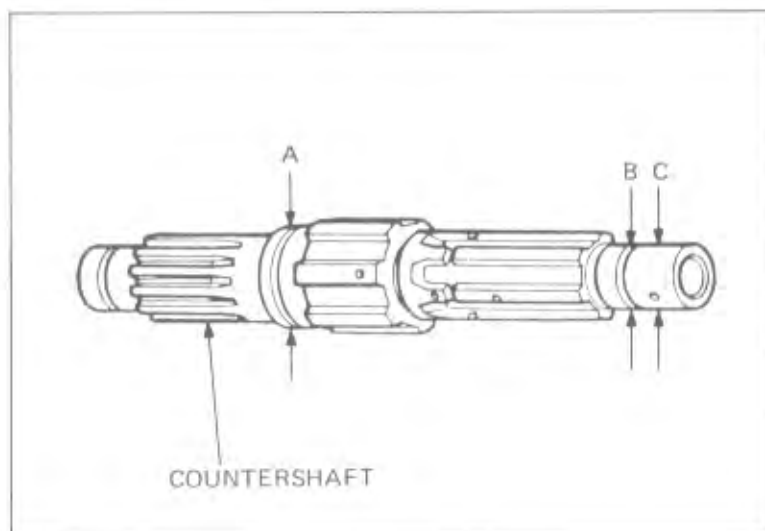
A (C2): 27.44 mm (1.080 in)

B (C1): 19.96 mm (0.786 in)

C (Bearing): 19.96 mm (0.786 in)

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

SERVICE LIMIT: 0.15 mm (0.006 in)



Measure the shift fork I.D.

SERVICE LIMIT: 13.05 mm (0.514 in)

Measure the shift fork shaft O.D.

SERVICE LIMIT: 12.95 mm (0.510 in)

Measure the shift fork claw thickness.

SERVICE LIMIT: 5.50 mm (0.217 in)



Measure the transmission holder I.D.

SERVICE LIMIT: 35.06 mm (1.380 in)





TRANSMISSION ASSEMBLY

Install the oil guide plate in the mainshaft bearing hole.

OIL GUIDE PLATE



Install the mainshaft and countershaft bearings into the case.

TOOLS

MAINSHAFT BEARING

- Attachment, 42 x 47 mm 07746-0010300
- Driver 07749-0010000 or 07949-3710000

COUNTERSHAFT BEARING

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



Drive the countershaft needle bearing outer race into the transmission holder.

Insert the needle bearing into the outer race.

Drive the mainshaft bearing into the transmission holder.

NOTE

Support the transmission holder above the workbench to prevent damaging it.

TOOLS

MAINSHAFT BEARING

- Attachment, 62 x 68 mm 07746-0010500
- Pilot, 25 mm 07746-0040600
- Driver 07749-0010000

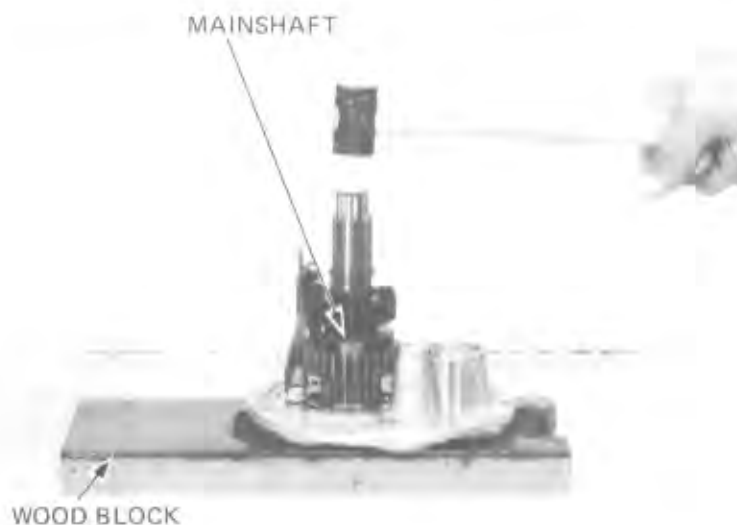
COUNTERSHAFT BEARING

- Attachment, 32 x 35 mm 07746-0010000
- Pilot, 20 mm 07746-0040500
- Driver 07749-0010000





Drive the mainshaft into the mainshaft bearing.



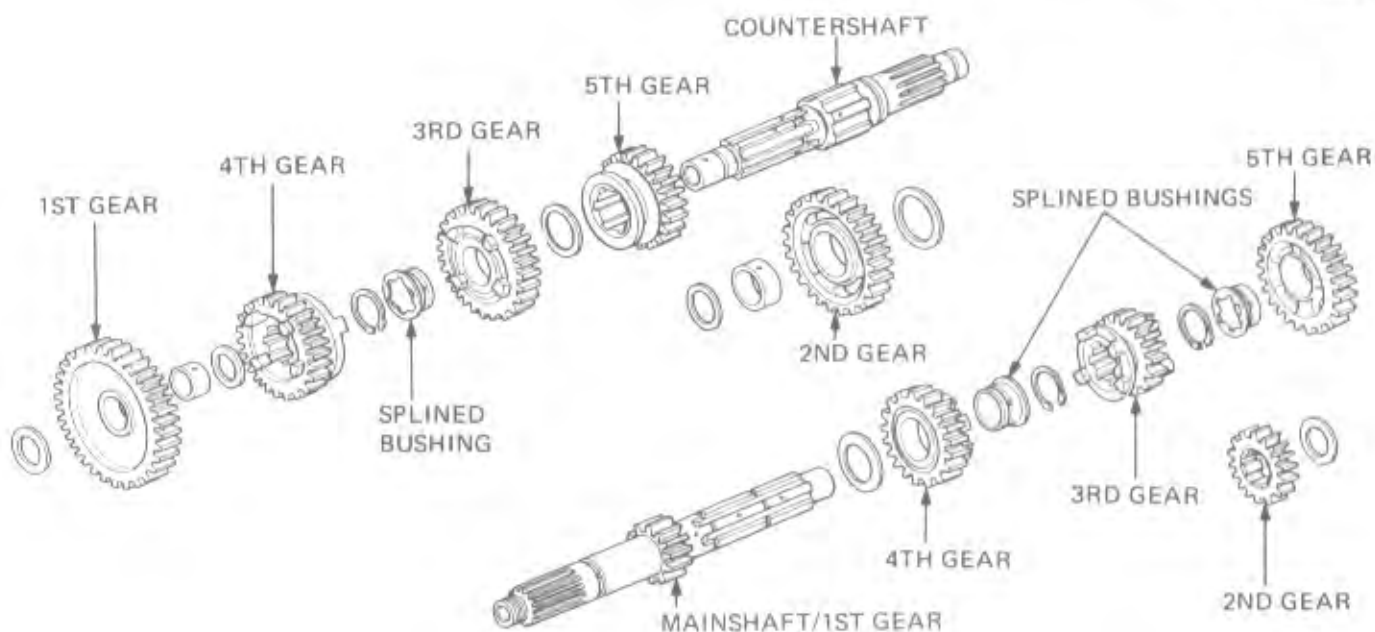
Assemble the mainshaft and countershaft as described in the illustration shown below.

NOTE

Lubricate the sliding faces of the gears with engine oil.

CAUTION

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





Install the mainshaft 3rd and 4th gears onto the mainshaft.



Place the countershaft low gear, washer and 4th gear over the needle bearing outer race.



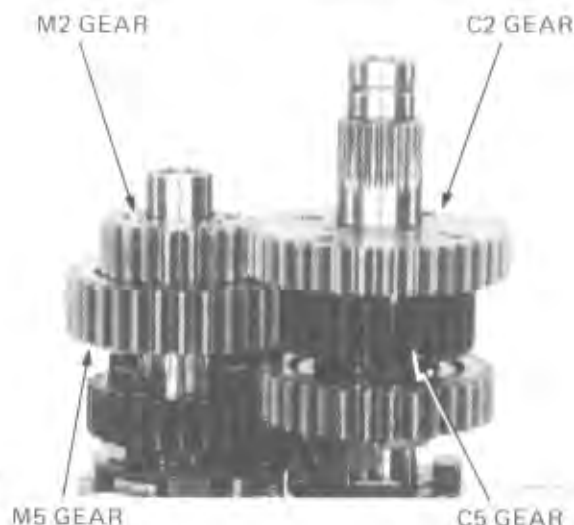
Install 3rd gear and the splined bushing onto the countershaft.

Install the countershaft and 3rd gear assembly through 4th and 1st gears and into the needle bearing.





Slide the 5th and 2nd gears onto the countershaft and mainshaft.
Check the engagement of the gears on the countershaft and mainshaft.

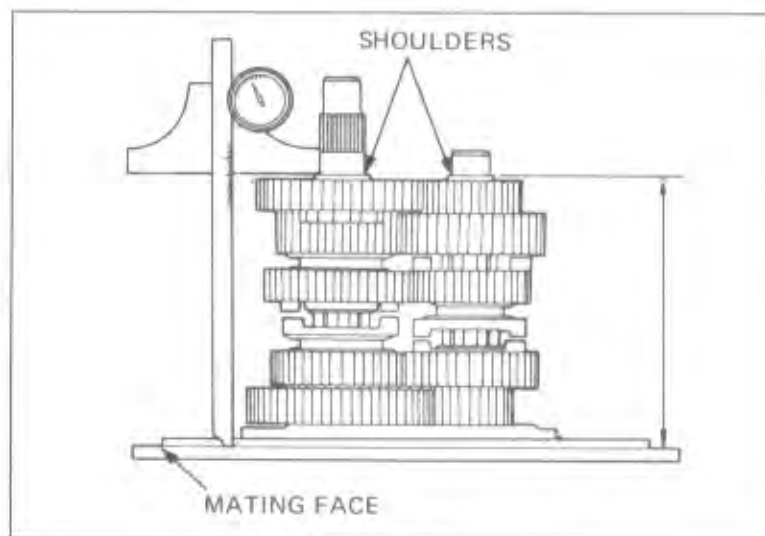


If the engine case, transmission holder, mainshaft, countershaft, or transmission bearing is to be replaced, measure the distance between the shoulder of the mainshaft (or countershaft) and engine case mating face of the transmission holder.

Record the distance on the mainshaft as X .
Record the distance on the countershaft as y .

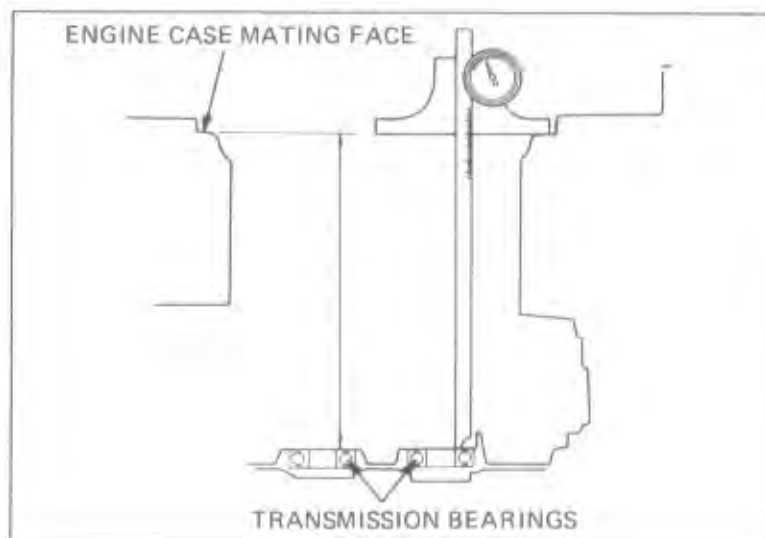
NOTE

Place the removed thrust washers on both 2nd gears when no gears or bearings are replaced.



Then, measure the distance between the end of the engine case bearing inner race and holder mating face of the engine case.

Record the distance on the mainshaft as X' .
Record the distance on the countershaft as y' .





TRANSMISSION

Select the correct thickness of washer from the table shown below by cross-referencing x , x' and y , y' .

MAINSHAFT (20 mm thrust washer)

Unit: mm (in)

Distance x Distance x'	117.20– 117.27 (4.614– 4.617)	117.28– 117.37 (4.617– 4.621)	117.38– 117.50 (4.621– 4.626)
115.80–115.87 (4.559–4.562)	B 1.10 (0.043)	C 1.20 (0.047)	D 1.40 (0.051)
115.88–115.97 (4.562–4.566)	A 1.00 (0.040)	B 1.10 (0.043)	C 1.20 (0.047)
115.98–116.10 (4.566–4.571)	A 1.00 (0.040)	A 1.00 (0.040)	B 1.10 (0.043)

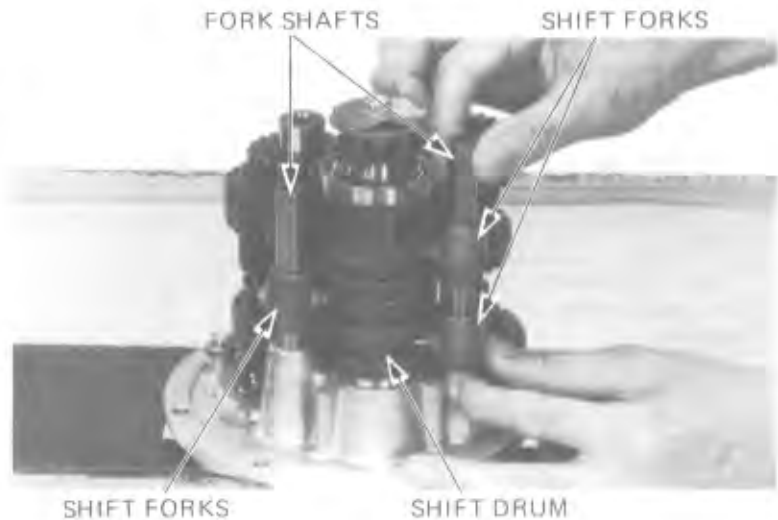
Place the washers selected on the mainshaft and countershaft 2nd gears.

COUNTERSHAFT (25 mm thrust washer)

Unit: mm (in)

Distance y Distance y'	118.05– 118.12 (4.648– 4.650)	118.13– 118.25 (4.651– 4.656)
115.75–115.97 (4.557–4.566)	C 1.75 (0.069)	D 1.90 (0.075)
115.98–116.12 (4.566–4.572)	B 1.60 (0.063)	C 1.75 (0.069)
116.13–116.27 (4.572–4.578)	A 1.50 (0.059)	B 1.60 (0.063)
116.28–116.45 (4.578–4.585)	A 1.50 (0.059)	A 1.50 (0.059)

Install the shift drum.
Engage the shift forks with the gears and shift drum groove.
Install the shift fork shafts.



Install the dowel pins.
Place the transmission in neutral and insert the transmission assembly into the engine case.

NOTE

Align the projection on the shift drum with the cutout in the engine case.



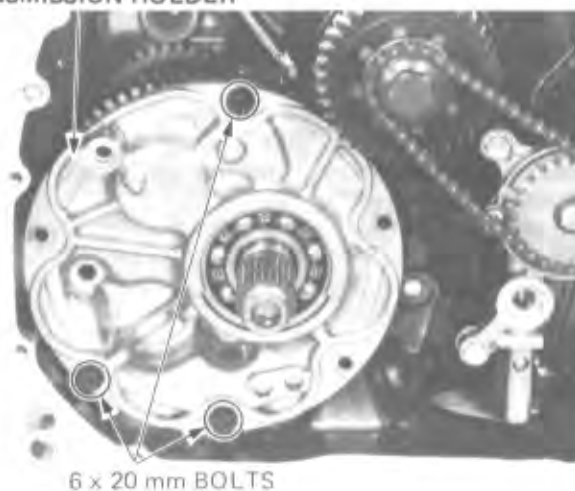


Press the transmission holder into place while rotating the mainshaft and torque the holder bolts.

TORQUE:

6 x 20 mm bolt: 15–20 N·m
(1.5–2.0 kg-m, 11–14 ft-lb)

TRANSMISSION HOLDER



Install the oil control orifice and O-ring.
Install the oil separator.

TORQUE:

6 x 20 mm bolt: 15–20 N·m
(1.5–2.0 kg-m, 11–14 ft-lb)
6 x 32 mm bolt: 10–14 N·m
(1.0–1.4 kg-m, 7–10 ft-lb)

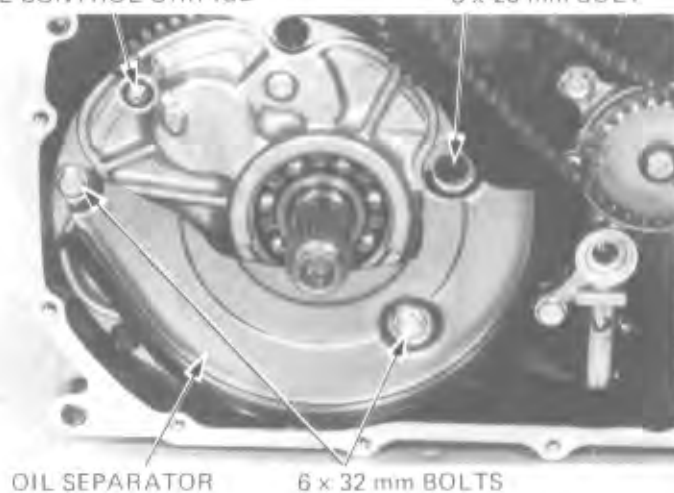
NOTE

After tightening the bolts, make sure that the shafts rotate freely.

Install the clutch assembly, (Section 8).
Install the engine front cover, (Section 8).

OIL CONTROL ORIFICE

6 x 20 mm BOLT





GEARSHIFT LINKAGE INSTALLATION

Install the shift drum cam plate, pin, collar, center plate, and point plate.

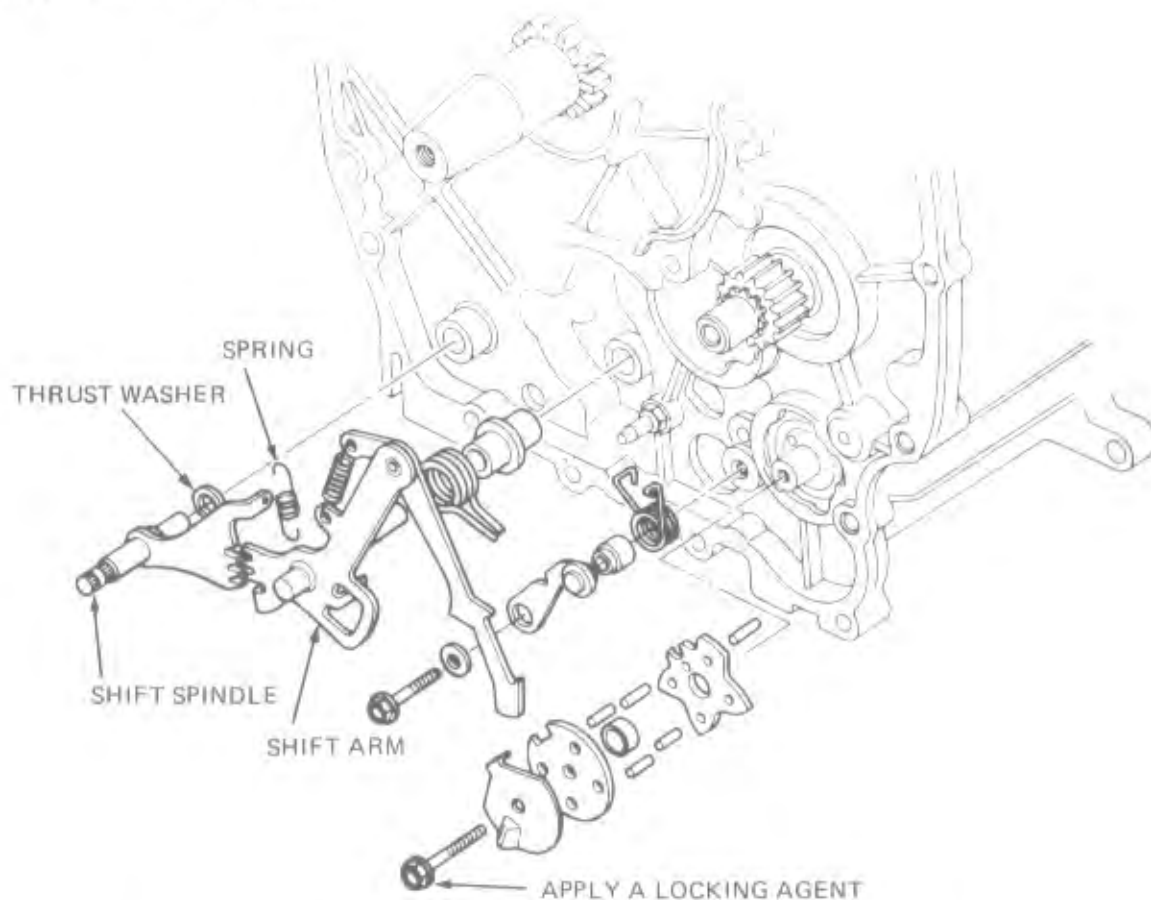
Install the gearshift arm and shift spindle.

Install the spring on the shift arm and shift spindle.

Rotate the shift drum to neutral and install the drum stopper cam plate.

Apply a locking agent and tighten the 6 mm bolt.

Attach the stopper spring hook onto the case.



Install the final shaft and install the rear cover (Section 9).

NOTE

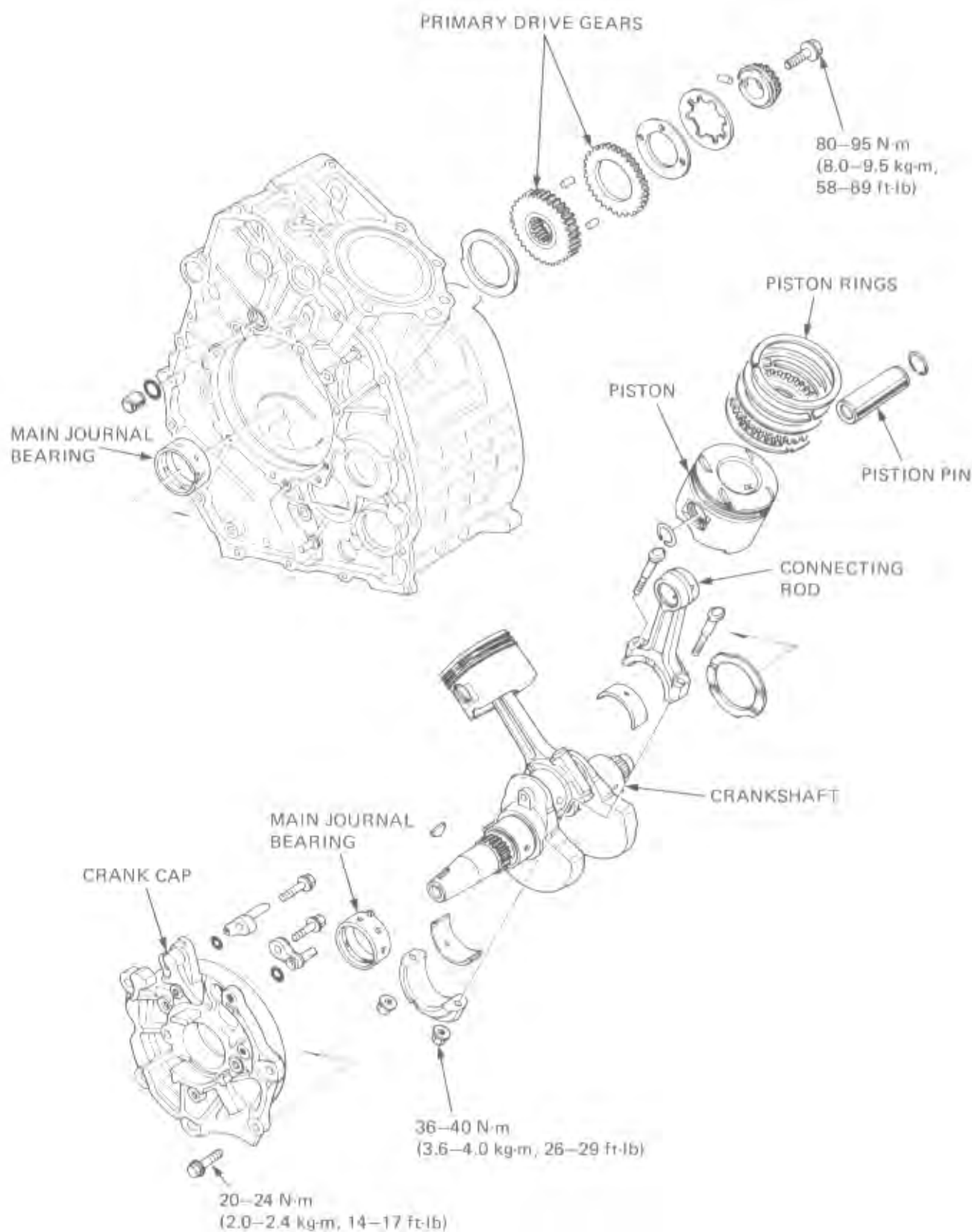
After installing the rear cover, install the gearshift pedal and check its operation.



FINAL SHAFT



MEMO





SERVICE INFORMATION	13-1	MAIN JOURNAL BEARING REPLACEMENT	13-11
TROUBLESHOOTING	13-2	CRANKSHAFT INSTALLATION	13-14
CONNECTING ROD REMOVAL	13-3	PISTON INSTALLATION	13-17
PISTON REMOVAL	13-4	CONNECTING ROD INSTALLATION	13-18
CYLINDER INSPECTION	13-5	CYLINDER COMPRESSION	13-19
CRANKSHAFT REMOVAL	13-6		
BEARING INSPECTION/SELECTION	13-8		

SERVICE INFORMATION

GENERAL

- All bearing inserts are a select fit and are identified by color codes. Select replacement bearings from the color code tables.
- After installing new bearings, recheck them with plastigauge.
- Before removing the piston and connecting rod assemblies, clean the top of the cylinder.
- The right piston can be serviced by removing the oil pump and transmission cover. To service the left piston, it is necessary to remove the transmission.
- Apply molybdenum disulfide grease to the journals, crankpins and bearings during assembly.

SPECIFICATIONS

Unit: mm (in)

Item			Standard	Service Limit
Crankshaft	Main journal oil clearance		0.020-0.060 (0.0008-0.0023)	0.085 (0.0033)
	Crankpin oil clearance		0.028-0.052 (0.0011-0.0020)	0.085 (0.0033)
	Connecting rod side clearance		0.150-0.350 (0.0059-0.014)	0.50 (0.020)
Cylinder	I.D.		78.000-78.015 (3.0709-3.0715)	78.10 (3.075)
	Warpage		—	0.10 (0.004)
Piston ring	Ring-to-groove clearance	Top	0.015-0.045 (0.0006-0.0018)	0.10 (0.004)
		Second	0.015-0.045 (0.0006-0.0018)	0.10 (0.004)
	Ring end gap	Top	0.15-0.35 (0.006-0.014)	0.60 (0.024)
		Second	0.15-0.35 (0.006-0.014)	0.60 (0.024)
		Oil (side rail)	0.30-0.90 (0.012-0.035)	1.10 (0.043)
Piston/ Piston pin	Piston O.D.		77.955-77.975 (3.0691-3.0699)	77.860 (3.0653)
	Piston pin bore		22.002-22.008 (0.8662-0.8665)	22.040 (0.8677)
	Piston pin O.D.		21.994-22.000 (0.8659-0.8661)	21.984 (0.8655)
	Small end I.D.		22.020-22.041 (0.8669-0.8678)	22.068 (0.8688)
	Piston-to-cylinder clearance		—	0.10 (0.004)

TORQUE VALUES

Crankshaft cap bolt	20-24 N·m (2.0-2.4 kg-m, 14-17 ft-lb)
Connecting rod cap nut	36-40 N·m (3.6-4.0 kg-m, 26-29 ft-lb)
Primary drive gear bolt	80-95 N·m (8.0-9.5 kg-m, 58-69 ft-lb)

**TOOLS****Special**

Gear holder	07924—MC70000 or modified 07924—4150000
Piston remover	07941—MC70000
Crank cap puller	07935—4150000
Crank cap driver	07945—4150100
Main bearing dis/assembly tool	07973—MC70000

TROUBLESHOOTING**Excessive Noise**

- Crankshaft
 - Worn main bearing
 - Worn rod bearing
- Piston and connecting rod
 - Worn piston or cylinder
 - Worn piston pin or pin hole
 - Worn rod small end

Low Compression or Uneven Compression

- Worn cylinder or piston ring

Excessive Smoke

- Worn cylinder, piston or piston rings
- Improperly installed piston rings
- Damaged piston or cylinder

Overheating

- Excessive carbon build-up on piston head
- Blocked or restricted flow of coolant
- Sticking thermostat

Knocking or Abnormal Noise

- Worn pistons and cylinders
- Excessive carbon build-up on piston head



CONNECTING ROD REMOVAL

Remove the following:

- cylinder head, (Section 7).
- oil pump, (Section 8).
- transmission, (Section 12).

Scrape all deposits from the top of the cylinder.

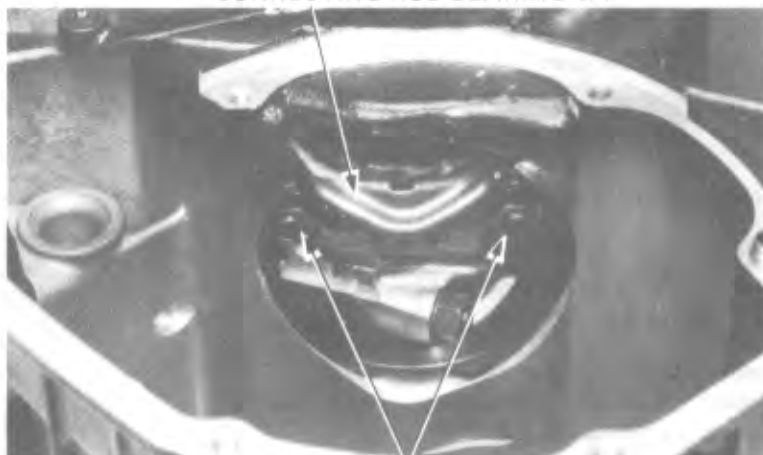


Turn the crankshaft so that the piston to be removed is at BDC. (Bottom Dead Center).
Remove the bearing cap.

NOTE

- Mark the bearing caps and rods to indicate cylinder position.
- Remove the left side cap from the transmission side. Work through the hole on the oil pump side to remove the right side cap.

CONNECTING ROD BEARING CAP



BEARING CAP NUTS

Turn the crankshaft so that the piston is at TDC.
Place the Piston Remover over the rod bolts, and push the piston and rod assembly out.



PISTON REMOVER 07941-MC70000



PISTON REMOVAL

Remove the piston pin clip and piston pin.

NOTE

Mark the pins and rods to indicate the piston position.



PISTON INSPECTION

Measure the ring-to-groove clearance.

SERVICE LIMIT:

TOP/SECOND : 0.10 mm (0.004 in)

Remove the piston rings.

NOTE

Mark the rings so they can be assembled in their original position.



Clean and inspect the piston crown.
Inspect the piston for damage, check the ring grooves for excessive wear.

Insert each piston ring into the cylinder and measure the ring end gap.

SERVICE LIMITS:

TOP/SECOND: 0.60 mm (0.024 in)

OIL (SIDE RAIL) : 1.10 mm (0.043 in)

NOTE

To measure the gap, use a piston to push the ring squarely into the cylinder.

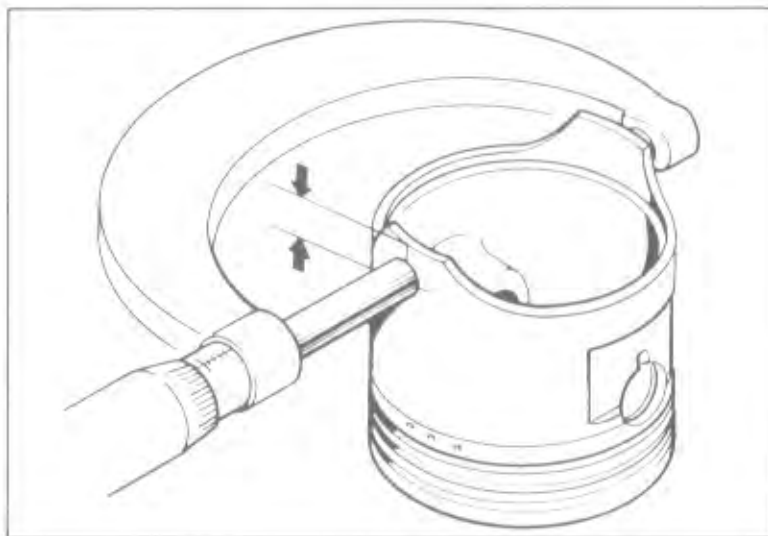




Measure each piston 10 mm (0.40 in) from the bottom of the piston and 90° to the piston pin hole.

SERVICE LIMIT: 77.860 mm (3.0653 in)

If the pistons show wear beyond limits, replacement is necessary.



CYLINDER INSPECTION

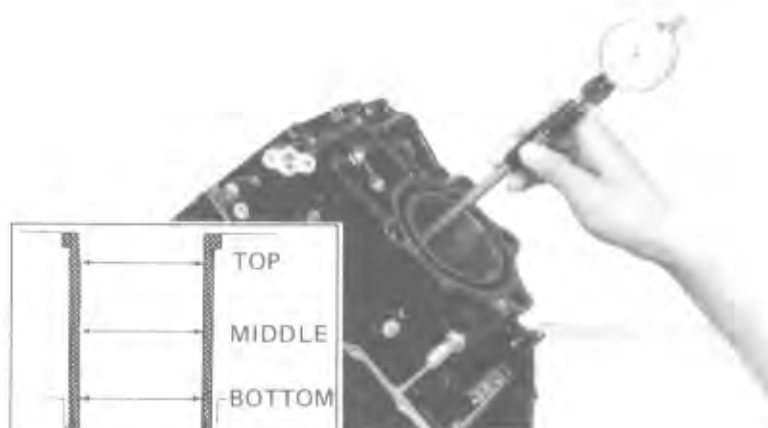
Measure the cylinder I.D.

SERVICE LIMIT: 78.10 mm (3.075 in)

Calculate the piston to cylinder clearance.

SERVICE LIMIT: 0.10 mm (0.004 in)

Oversize pistons are available in standard and 0.25 and 0.50 mm overbore sizes.



Measure each piston pin bore.

SERVICE LIMIT: 22.040 mm (0.8677 in)



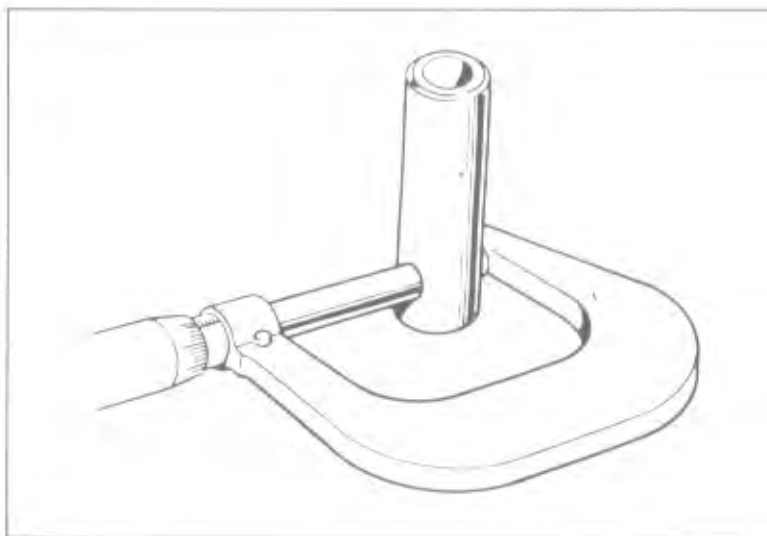


Measure each piston pin O.D.

SERVICE LIMIT: 21.984 mm (0.8655)

Calculate the piston pin to piston clearance.

SERVICE LIMIT: 0.05 mm (0.002 in)



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

SERVICE LIMIT: 22.068 mm (0.8688 in)



CRANKSHAFT REMOVAL

Hold the primary drive gear with a Gear Holder. Remove the primary drive gear bolt and the oil pump sprocket, disc spring, side plate, sub gear and primary gear.

NOTE

Mark the sub gear and side plate so that they will face the correct direction during re-assembly.

GEAR HOLDER 07924-MC70000 or
MODIFIED 07924-4150000



PRIMARY DRIVE GEAR



Remove the flywheel and cam chain (Section 11).
Remove the crankshaft holder cap bolts.

NOTE

Before removing the crankshaft, wrap the splines of the primary gear and timing sprocket with vinyl tape to prevent damage to them.



Attach the Crank Cap Puller to the front of the engine.

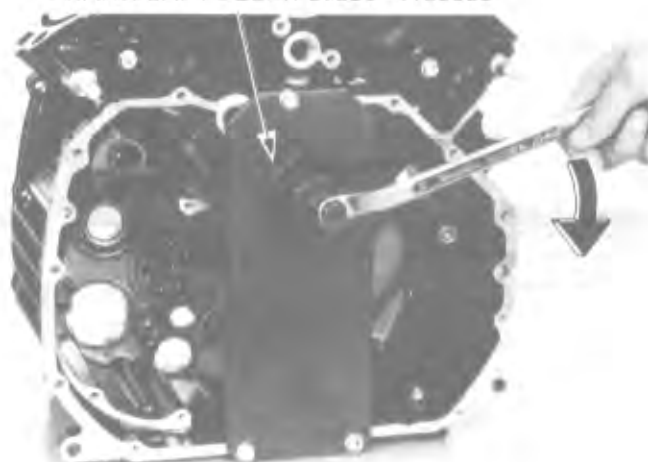
Press the crankshaft out by screwing in the Crank Cap Puller.

Hold the crankshaft to prevent from falling.

CAUTION

Do not damage the bearing when removing the crankshaft.

CRANK CAP PULLER 07935-4150000



ROD SIDE CLEARANCE INSPECTION

Install each connecting rod and bearing cap in its original position and torque to specifications.

TORQUE: 36–40 N·m
(3.6–4.0 kg-m, 26–29 ft-lb)

NOTE

Torque the cap bolts evenly in 2–3 steps.

Measure the rod side clearance with a feeler gauge.

SERVICE LIMIT: 0.50 mm (0.020 in)





BEARING INSPECTION/SELECTION

CRANKPIN

Inspect each bearing insert for separation or other damage.

Put the connecting rod inserts in each rod and rod cap.

Place a plastigauge strip across each rod crankpin avoiding the oil hole.



Install each connecting rod and bearing cap in their original positions and torque to specification evenly in 2-3 steps.

TORQUE: 36–40 N·m
(3.6–4.0 kg-m, 26–29 ft-lb)

NOTE

Do not rotate the crankshaft during the inspection.



Remove the caps and measure the width of the compressed plastigauge.

SERVICE LIMIT: 0.085 mm (0.0033 in)

NOTE

The widest thickness determines the oil clearance.





ROD BEARING SELECTION

Determine and record each connecting rod I.D. code number.

Determine and record the crankpin O.D. code letters.

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

ROD BEARING SELECTION

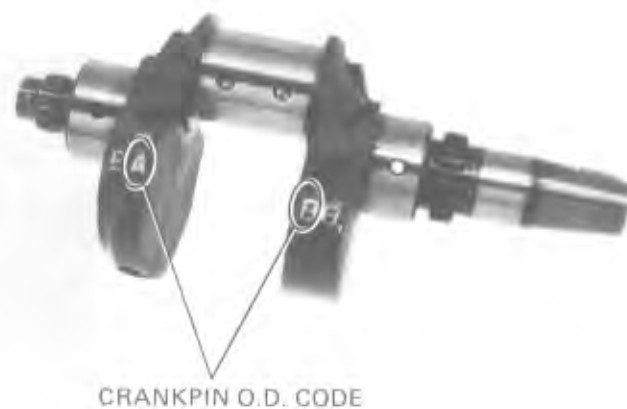
CRANKPIN SIZE CODE LETTER	A	B	C	
	42.982— 42.990 mm (1.6922— 1.6925 in)	42.974— 42.982 mm (1.6919— 1.6922 in)	42.966— 42.974 mm (1.6916— 1.6919 in)	
CON- NECTING ROD I.D. CODE NUMBER	COLOR IDENTIFICATION			
1	46.000— 46.008 mm (1.8110— 1.8113 in)	PINK	YELLOW	GREEN
2	46.008— 46.016 mm (1.8113— 1.8116 in)	YELLOW	GREEN	BROWN
3	46.016— 46.024 mm (1.8116— 1.820 in)	GREEN	BROWN	BLACK

ROD BEARING SIZES

COLOR	BEARING THICKNESS
BLACK	1.503 – 1.507 mm
BROWN	1.499 – 1.503 mm
GREEN	1.495 – 1.499 mm
YELLOW	1.491 – 1.495 mm
PINK	1.487 – 1.491 mm

NOTE

After fitting new bearing inserts, they should be rechecked with plastigauge.





MAIN JOURNAL

Measure and record each journal's O.D.



MAIN JOURNAL

Measure and record the engine case and crankshaft bearing I.D.'s.
Calculate the journal to bearing clearance.

SERVICE LIMIT: 0.085 mm (0.0033 in)



Measure the crankshaft cap bearing I.D and calculate the journal to bearing clearance.

SERVICE LIMIT: 0.085 mm (0.0033 in)



CRANKSHAFT CAP



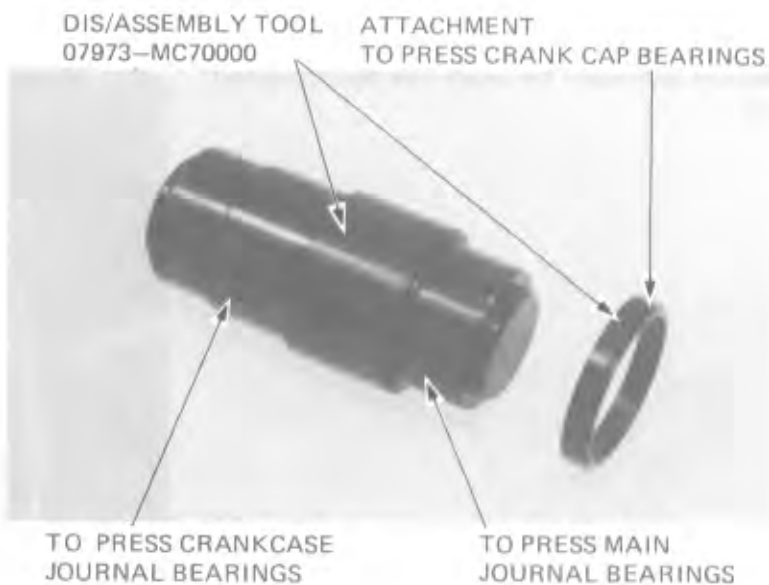
MAIN JOURNAL BEARING REPLACEMENT

REMOVAL

Press the bearing out with a hydraulic press and Main Bearing Dis/assembly Tool use the end with the "R" mark.

CAUTION

To prevent engine case damage, always use a hydraulic press and bearing removal tool to remove bearings.



Press the bearings out of the crankshaft cap bearing support with a hydraulic press and bearing removal tool. Use the tool end with the "R" mark.

CAUTION

To prevent crankshaft cap damage, always use a hydraulic press and bearing removal tool to remove bearings.





SELECTION

Determine and record the main journal O.D. codes.



MAIN JOURNAL O.D. CODES

Measure and record the engine case bearing support I.D.



Measure the crankshaft cap bearing support I.D.

Cross reference the bearing support I.D. and crank journal codes to determine the replacement bearing color.





MAIN BEARING SELECTION

	MAIN JOURNAL SIZE CODES	
	A	B
CRANKCASE/CAP BEARING SUPPORT I.D.	BEARING IDENTIFICATION COLOR	
46.030–46.040 mm (1.8122–1.8126 in)	BROWN	BLACK
46.020–46.030 mm (1.8118–1.8122 in)	BLACK	BLUE

JOURNAL BEARING SIZES

COLOR	THICKNESS
BROWN	1.989–1.999 mm (0.0783–0.0787 in)
BLACK	1.994–2.004 mm (0.0785–0.0789 in)
BLUE	1.999–2.009 mm (0.0787–0.0791 in)

INSTALLATION

Apply engine oil or molybdenum disulfide grease to the bearing outer surface.

Align the tab of each bearing insert with the holder cap groove and press the bearings into place. Use the end of the tool with the "P" mark.

NOTE

Draw two lines on the outside of the bearings to match the tab to aid in bearing alignment.

CAUTION

Be careful not to damage the bearings, when press fitting them.

Lubricate the outer surface of each bearing with engine oil or molybdenum disulfide grease.

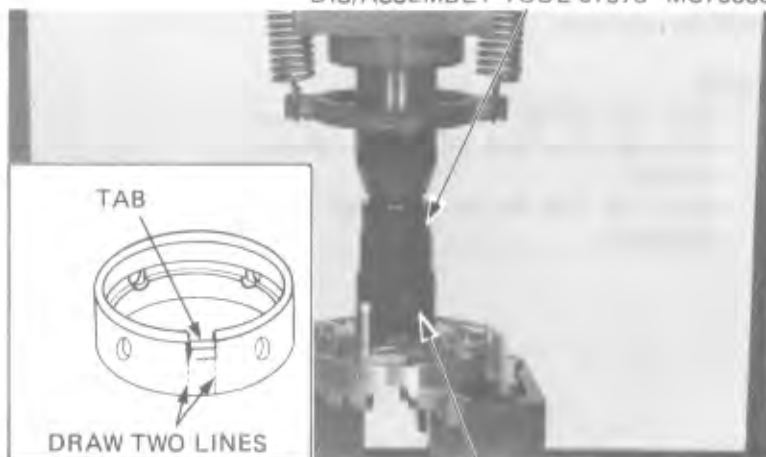
Align the tab of each bearing insert with the crankcase bearing support groove and press the bearings into place. Use the end of the tool with the "P" mark.

CAUTION

Be careful not to damage the bearings, when press fitting them.

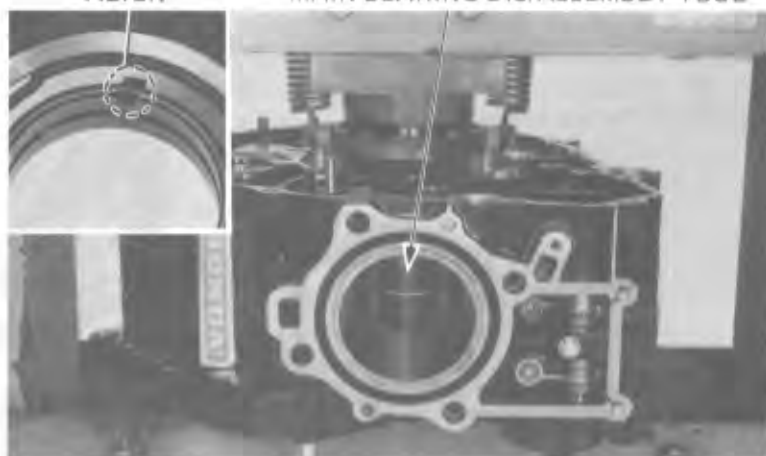


DIS/ASSEMBLY TOOL 07973–MC70000



ALIGN

MAIN BEARING DIS/ASSEMBLY TOOL



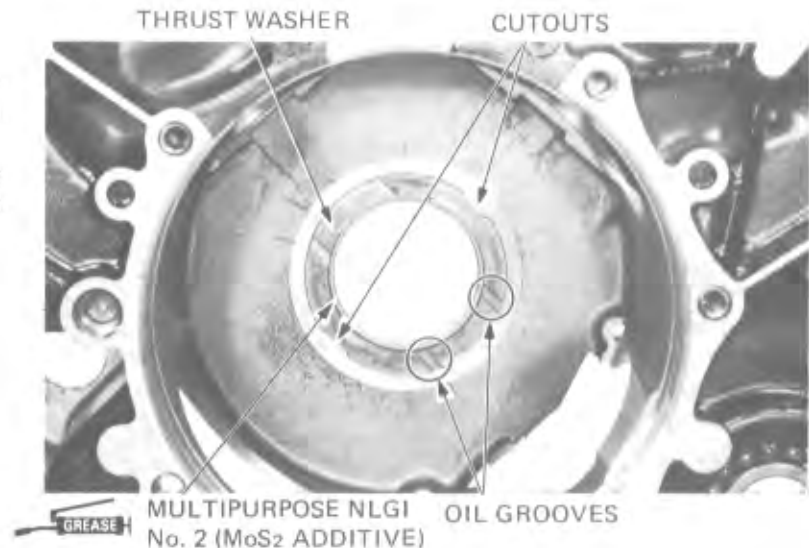


CRANKSHAFT/PISTON

CRANKSHAFT INSTALLATION

Lubricate the journal bearing of the engine case with Multipurpose NLGI No. 2 (MoS₂ additive) Grease.

Install the thrust washer on the engine case bearing with the oil grooves facing the rear and cutouts aligned with the lugs on the engine case.



Install the crankshaft.

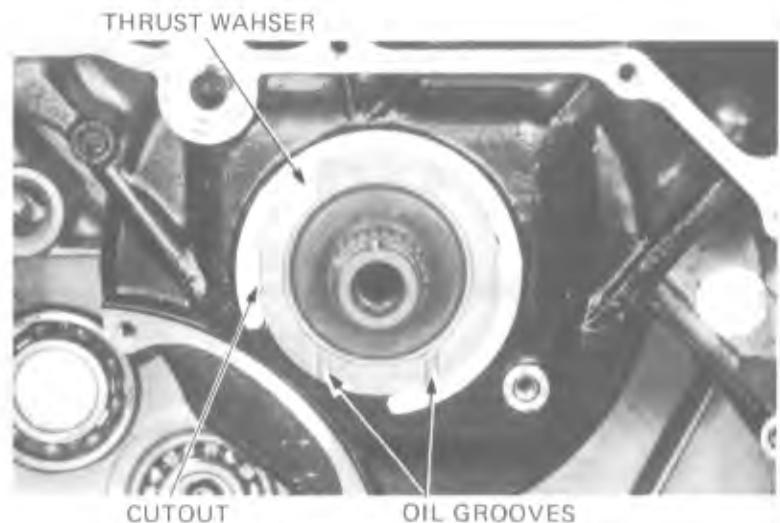
NOTE

- Wrap the splines of the crankshaft and timing gear area with vinyl tape to prevent damage.
- Make sure that the thrust washer is not displaced.



Remove the vinyl tape from the splines.

Install the thrust washer on the engine case bearing with the oil grooves facing the front and cutouts aligned with the lugs on the engine case.



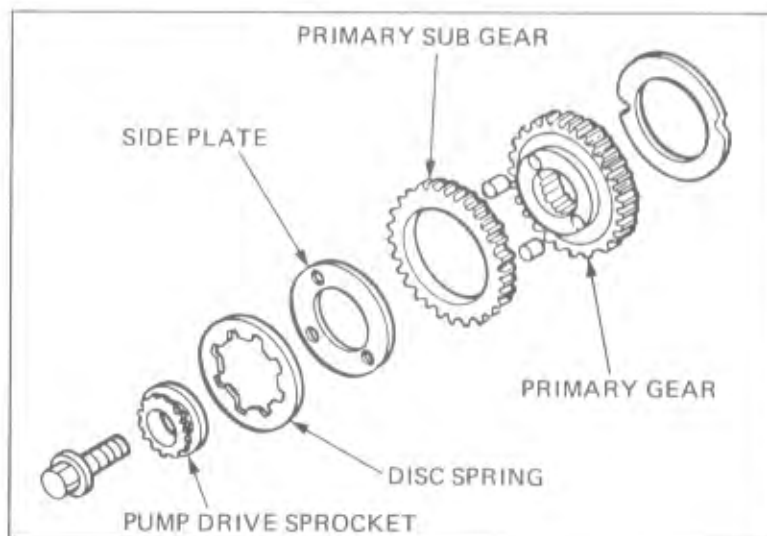


Install the primary gear and primary sub gear on the crankshaft.

Install the side plate with the holes aligned with the dowel pins on the primary gear.

Install the oil pump drive sprocket and disc spring on the crankshaft aligning the cutout in the pump drive gear with the dowel pin on the crankshaft.

Install the primary drive gear bolt and tighten it loosely.



MULTIPURPOSE NLGI
No. 2 (MoS₂ ADDITIVE)

O-RING AND COLLAR

Lubricate the main journal bearing of the crank cap with Multipurpose NLGI No. 2 (MoS₂ additive) Grease.

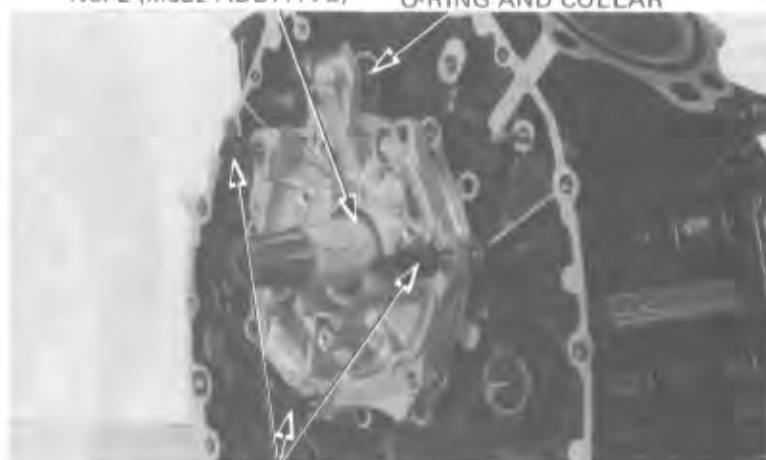
Install the O-ring and collar.

Install the crankshaft holder cap.

Install the guide bolts in the crankshaft holder cap as shown.

NOTE

Screw in the guide bolts so that the cap is not tilted.



GUIDE BOLTS

Drive the crankshaft holder cap into place with a hammer and driver.



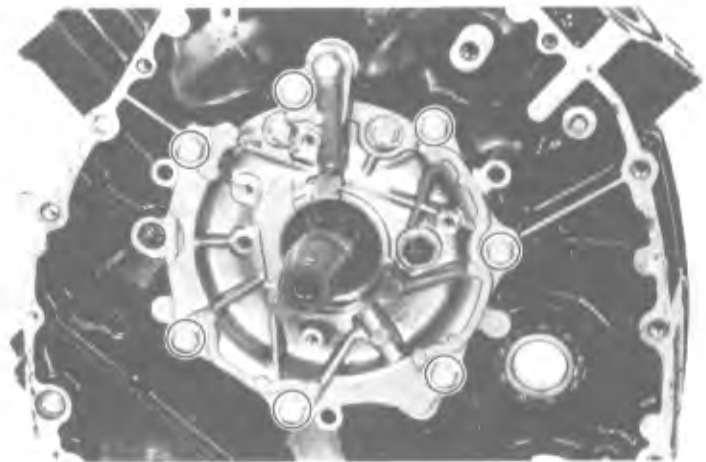
CRANK CAP DRIVER



CRANKSHAFT/PISTON

Tighten the crank cap bolts in a crisscross pattern.

TORQUE: 20–24 N·m
(2.0–2.4 kg-m, 14–17 ft-lb)



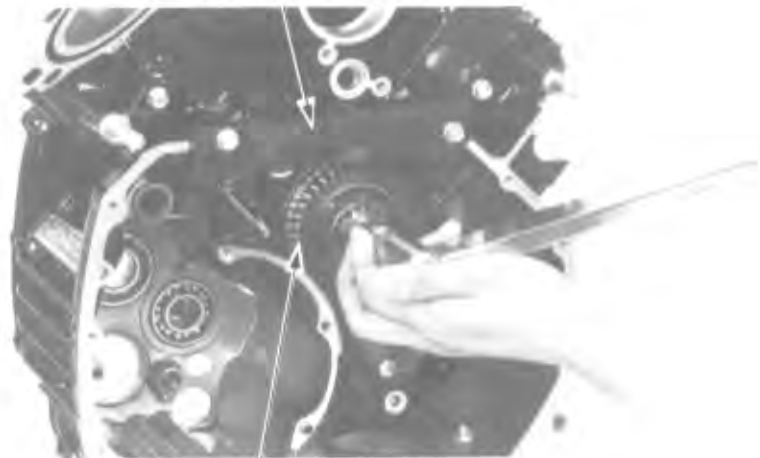
Install the Drive Gear Holder to prevent the drive gear from turning.

Torque the primary drive gear bolt.

TORQUE: 80–95 N·m
(8.0–9.5 kg-m, 58–69 ft-lb)

Turn the crankshaft to make sure it freely.

DRIVE GEAR HOLDER 07924-MC70000 or
MODIFIED 07924-4150000



PRIMARY DRIVE GEAR



PISTON INSTALLATION

Clean the piston domes, ring lands, and side faces. Carefully install the piston rings.

NOTE

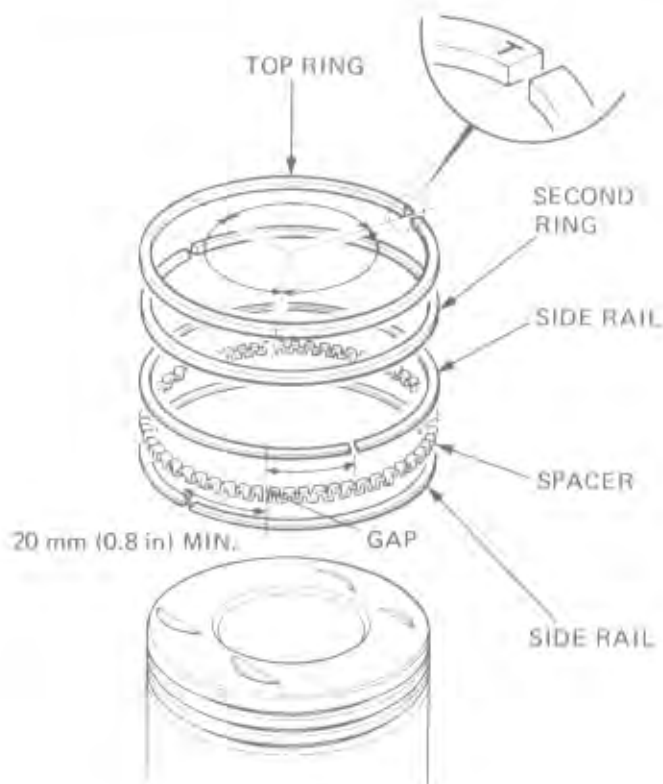
- Do not damage the pistons and piston rings during assembly.
- All rings should be installed with the markings facing up.
- Space the piston ring end gaps 120 degrees apart, avoiding the piston pin and thrust sides.
- Do not align the gaps in the oil rings.
- After installing the rings they should be free to rotate in the grooves.



TOP RING



SECOND RING

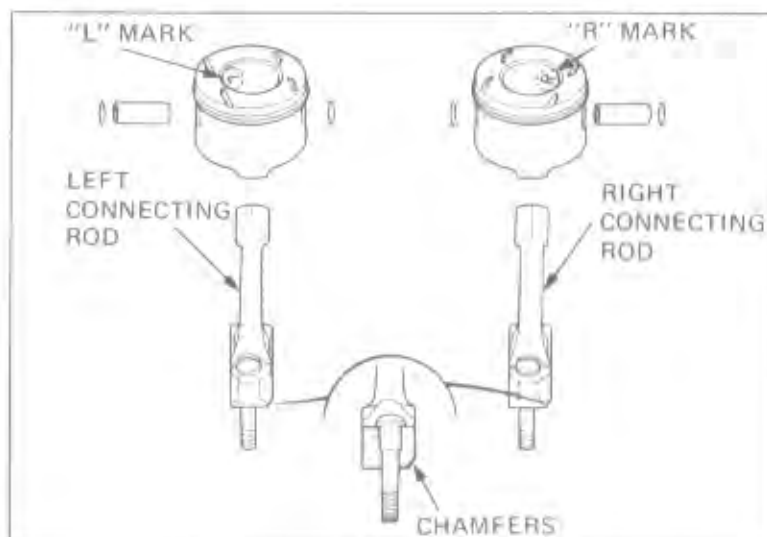


Coat the rod small end with molybdenum disulfide grease.

Assemble the pistons and connecting rods with the piston pins and new piston pin clips as shown.

NOTE

- Do not interchange the pistons, piston pins and connecting rods.
- Make sure that the piston pin clips are properly seated.
- Assemble the pistons and connecting rods, noting the direction of the chamfers on the connecting rod caps.
- Lubricate the piston pin with engine oil before assemble.





CRANKSHAFT/PISTON

CONNECTING ROD INSTALLATION

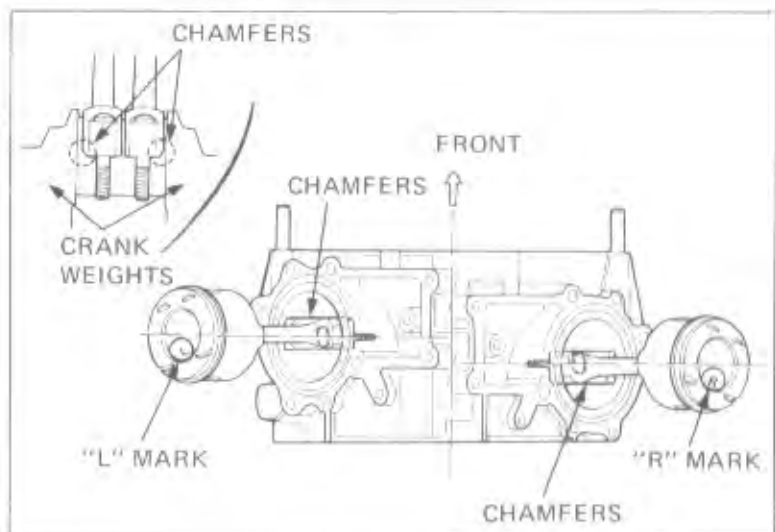
Lubricate the rod bearings with Multipurpose NLGI No.2 (MoS₂ additive) Grease.
Clean the connecting rod cap bolts and apply engine oil to the bolt thread.



Install the rod assemblies into the cylinders from the top of the engine case.

NOTE

- Before installation, make sure that the chamfers on the big ends are facing the crank weights as shown.
- The rod assemblies should be installed with the "R" and "L" markings to the rear.
- Install the piston with the "R" mark on the right cylinder and piston with the "L" mark on the left cylinder.



Lubricate the piston and piston ring with engine oil.
Bring the crankshaft to TDC.
Compress the piston rings with the piston slider and insert the piston into the cylinder.
Insert the piston into the cylinder, aligning the rod big end with the crankpin.

NOTE

Be careful to damage the pistons or rings during assembly.

PISTON SLIDER COMMERCIALLY AVAILABLE IN U.S.A.





Coat the connecting rod cap nuts with clean engine oil and install the connecting rod caps. Torque the connecting rod cap nuts evenly in 2-3 steps.

TORQUE: 36–40 N·m
(3.6–4.0 kg·m, 26–29 ft·lb)

Turn the crankshaft to make sure the rods rotate freely without binding.

NOTE

Be sure the connecting rod bearing caps are installed in their original location.



CONNECTING ROD BEARING CAP

CYLINDER COMPRESSION

Warm up the engine to operating temperature. Stop the engine. Disconnect one spark plug caps and remove that spark plug.

WARNING

The fuel lines are pressurized. Remove only one spark plug at a time to prevent gasoline from being forced out the empty spark plug hole and creating a fire hazard. If gasoline gets in your eyes, wash out with water and get prompt medical attention.

Insert the compression gauge. Open the throttle valves fully. Crank the engine with the starter motor with the engine stop switch OFF until the gauge needle stops rising.

NOTE

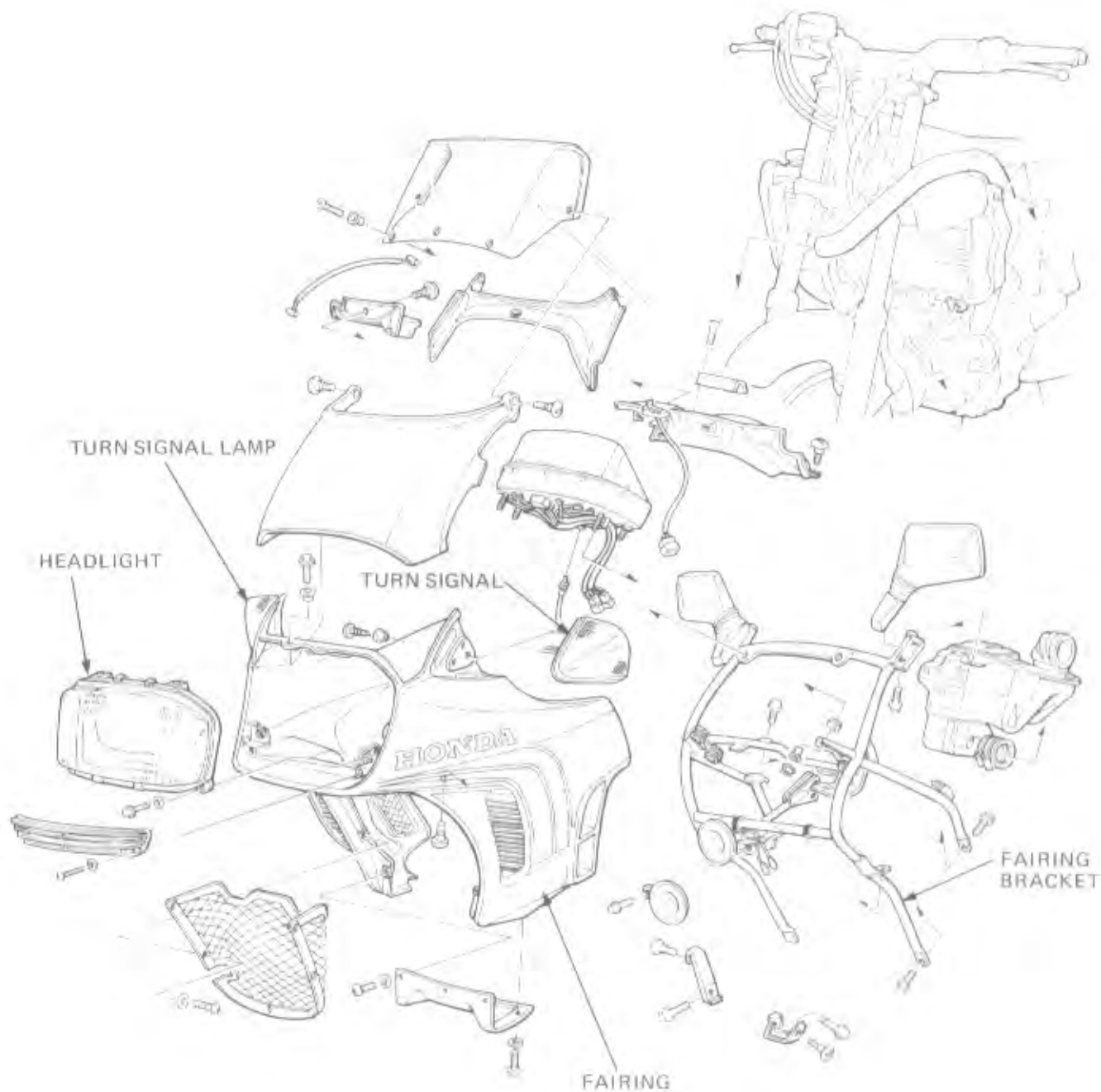
The maximum reading is usually reached within 4–7 seconds.



COMPRESSION PRESSURE:

700–1,000 kPa (7.0–10.0 kg/cm², 99.5–142 psi)

Reinstall the spark plug and cap. Repeat the test for the other cylinder.





SERVICE INFORMATION	14- 1
FAIRING REMOVAL	14- 2
FRONT END DISASSEMBLY	14- 4
FAIRING DISASSEMBLY	14- 7
METER REMOVAL	14- 8
BULB REPLACEMENT	14-10
FAIRING ASSEMBLY	14-10
FAIRING INSTALLATION	14-11

SERVICE INFORMATION

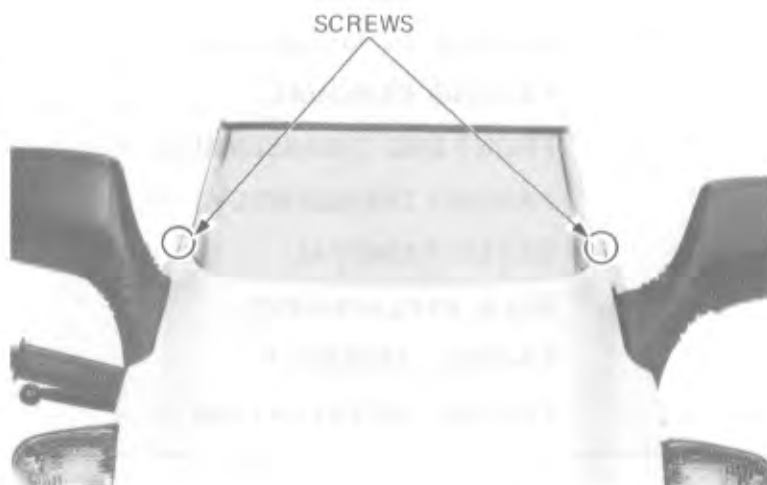
GENERAL

- For cable and harness routing refer to Section 1.
- Refer to section 20 for Wiring Diagram.

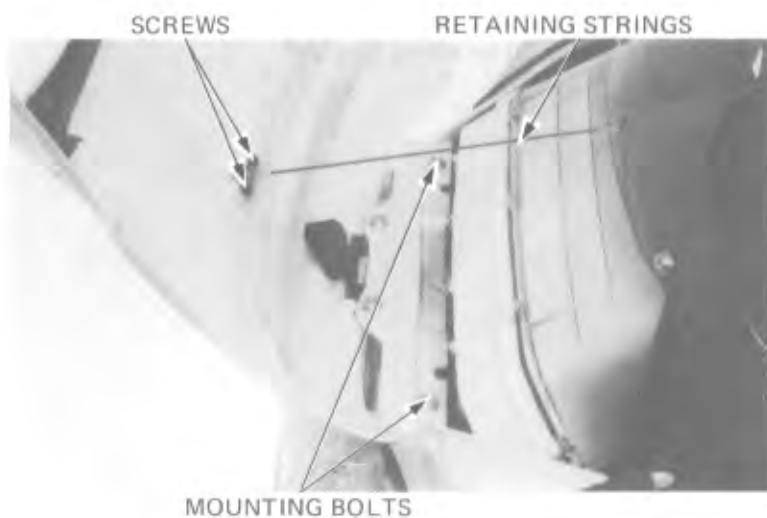


FAIRING REMOVAL

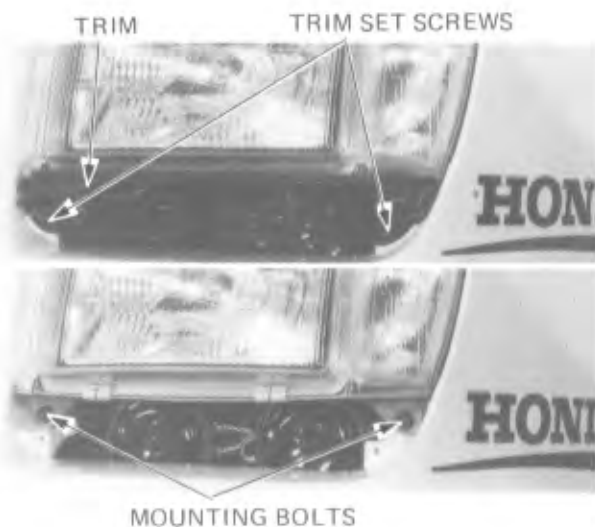
Open the fairing cover by unscrewing the top two screws and pulling the cover forward.



Remove the headlight mounting bolts and collars inside the fairing.
Remove the fairing cover retaining string by loosening the two screws at the cover.



Remove the trim from under the headlight.
Remove the headlight mounting bolts and collars and pull the headlight out of the fairing.
Disconnect the headlight coupler and running light wires; remove the headlight.



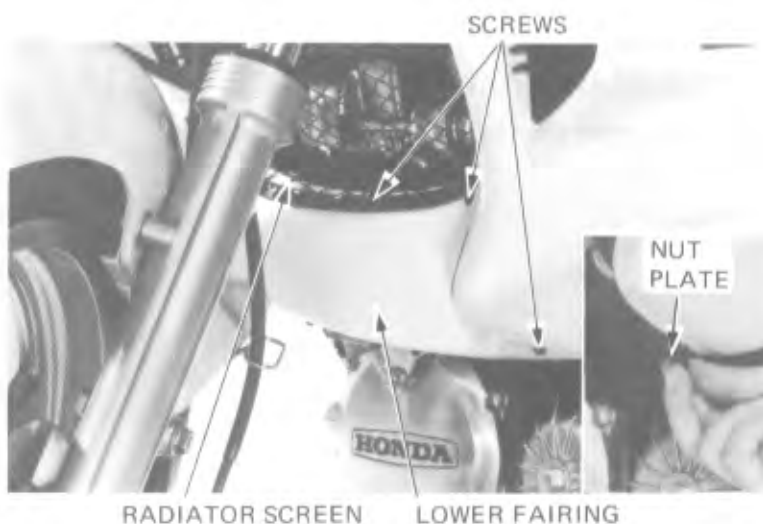


Disconnect the front turn signal wires inside the fairing.

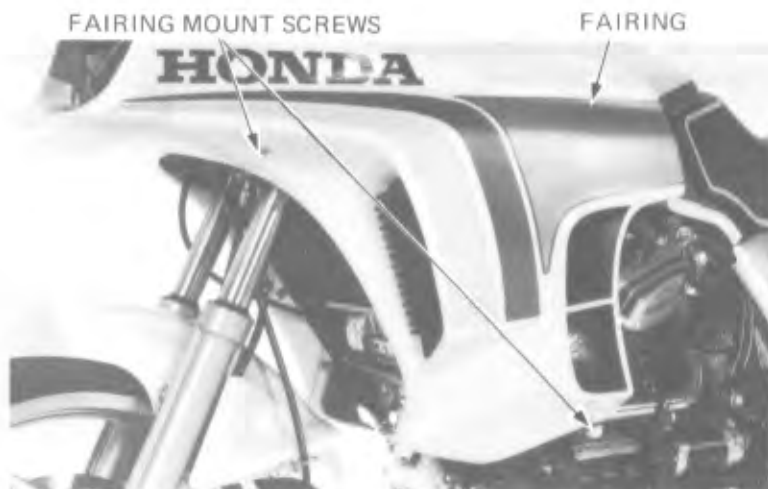
FRONT TURN SIGNAL WIRES



Remove the radiator screen and lower fairing by removing the screws. Remove the nutplates from the edge of the fairing as they may gouge the front forks and front fender when removing the fairing.



Remove the four fairing mounting screws.





FAIRING/INSTRUMENTS

Remove the fairing from the fairing bracket.

NOTE

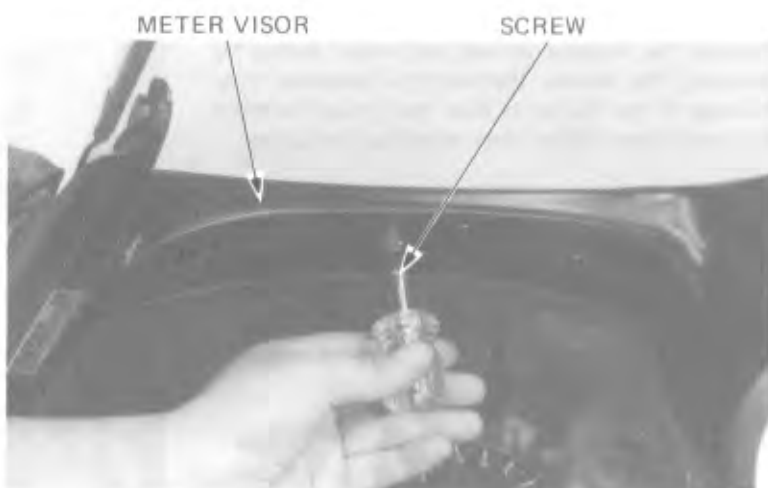
Put tapes on both bottom edges of the fairing or the front forklegs and the front fender, to prevent them from damages when remove the fairing.



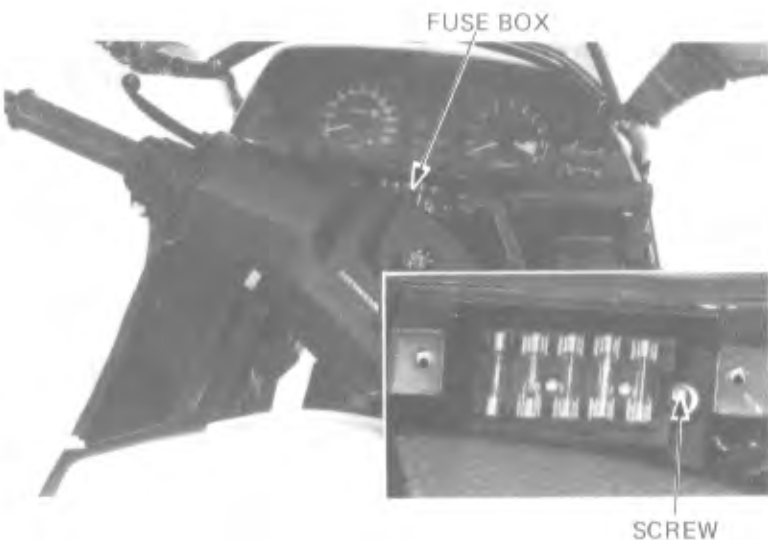
FRONT END DISASSEMBLY

FAIRING BRACKET REMOVAL

Remove the meter visor by removing the attaching screw.



Remove the two screws attaching the fuse box cover to the left/center dashboard.



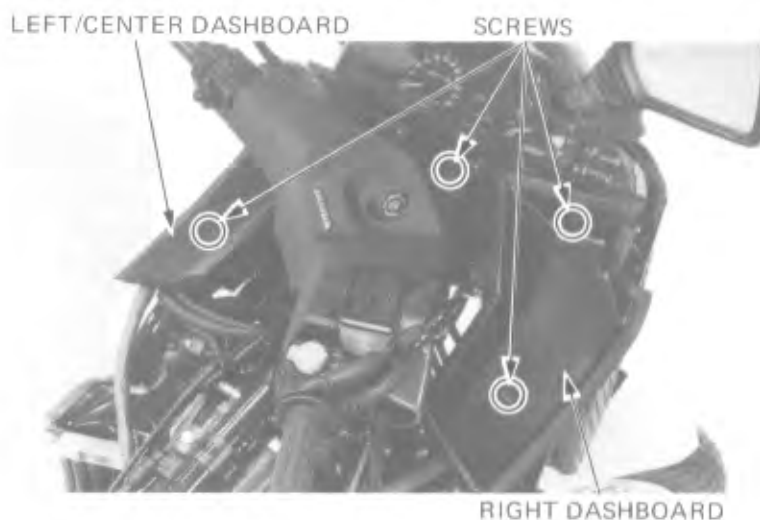


Remove the fuse box coupler (black).



Remove the right dashboard by removing the two screws.

Remove the left/center dashboard with fuse box by moving two screws.

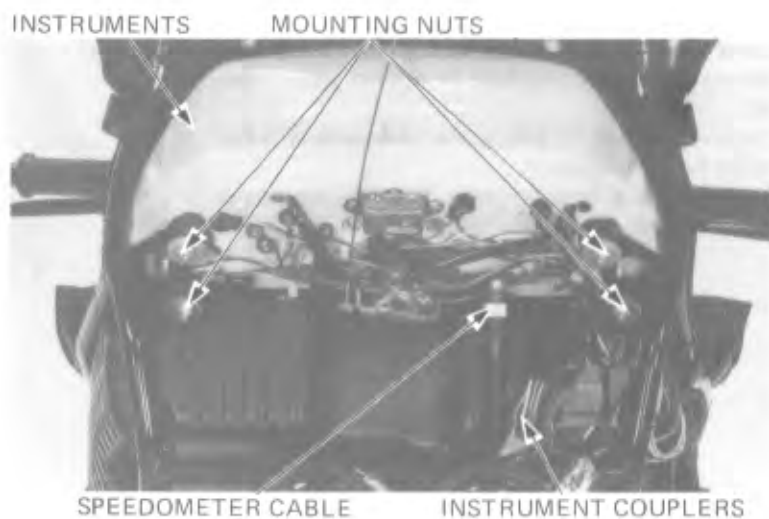


Disconnect the instruments couplers and speedometer cable.

Remove the four instruments mounting nuts to remove the instruments from the fairing bracket.

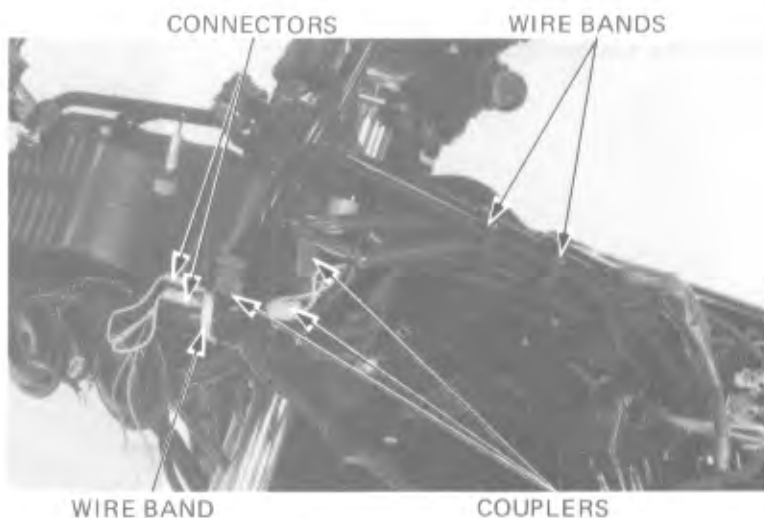
NOTE

The instruments should not be placed upside down because damper oil inside the speedometer will leak if placed upside down.





Remove the three wire bands.
Disconnect all connectors and couplers.



Remove the air cleaner case mounting bolts.



Loosen the air cleaner connecting tube bands and remove the connecting tube from reed valve chamber.
Remove the bolt attaching the resonance chamber to the fairing bracket.
Disconnect the breather tube from the reed valve chamber.

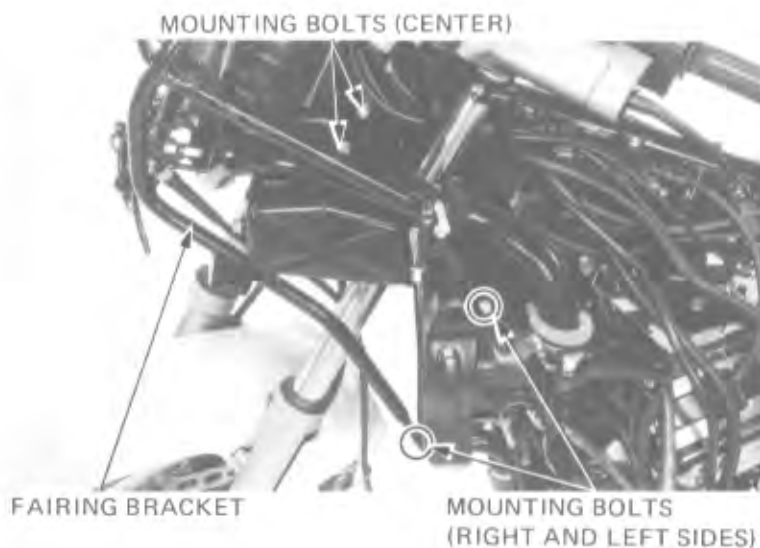




Remove the six bolts attaching the fairing bracket to the frame (two on the right, center and left sides) and remove the fairing bracket.

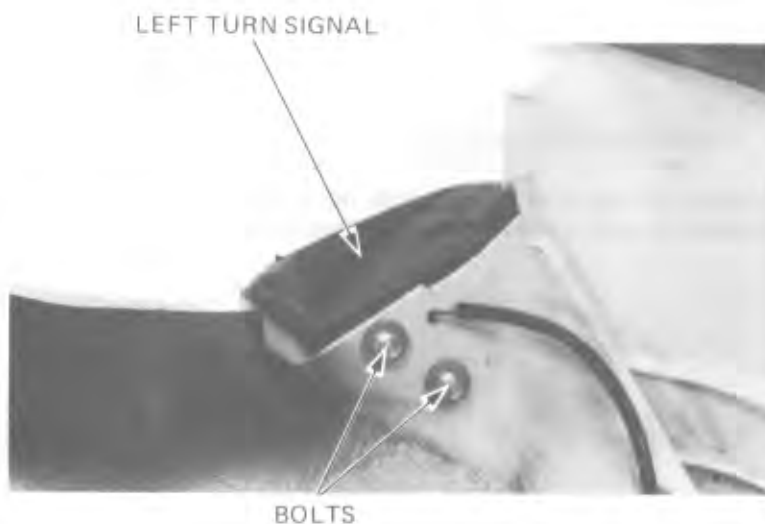
NOTE

Avoid damaging the windshield and the radiator fins.

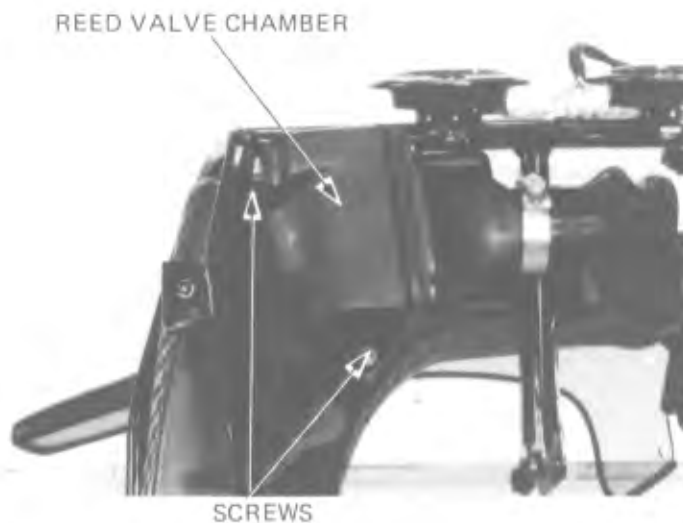


FAIRING DISASSEMBLY

Remove the bolts and right and left turn signals.



Disassemble the reed valve chamber by unscrewing four screws.





FAIRING/INSTRUMENTS

Remove the air cleaner case from the fairing bracket.



AIR CLEANER CASE

Remove the windshield by removing the two screws.

NOTE

Avoid damaging the windshield.

Remove the rear view mirrors from the brackets.
Remove the bolts and horns from the horn bracket.



METER REMOVAL

Remove the meter visor by removing nine screws.

Unscrew the two clock adjustment knob set screws.
Remove the front cover.



ADJUSTMENT KNOB



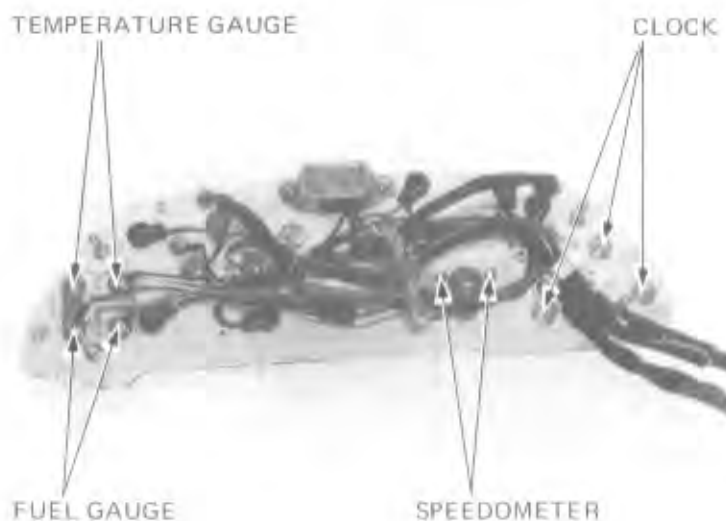
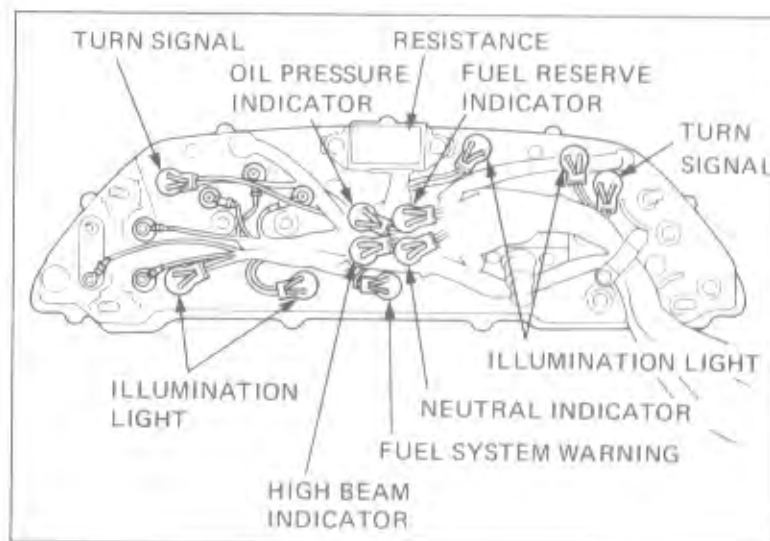
FRONT

Remove the screws indicated to remove the instruments, and replace as necessary.



REAR

Remove the screws indicated to remove the meters and gauges, and replace as necessary.

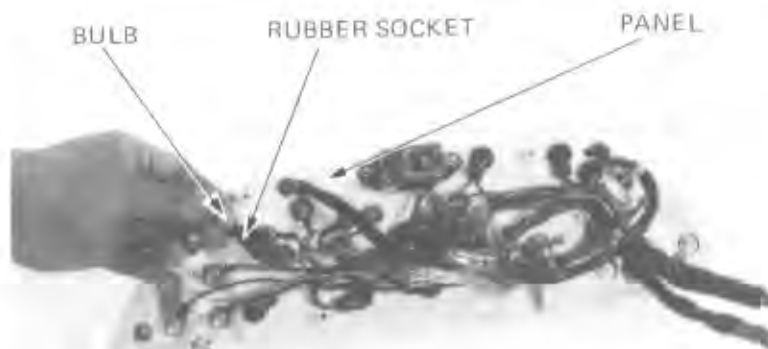




FAIRING/INSTRUMENTS

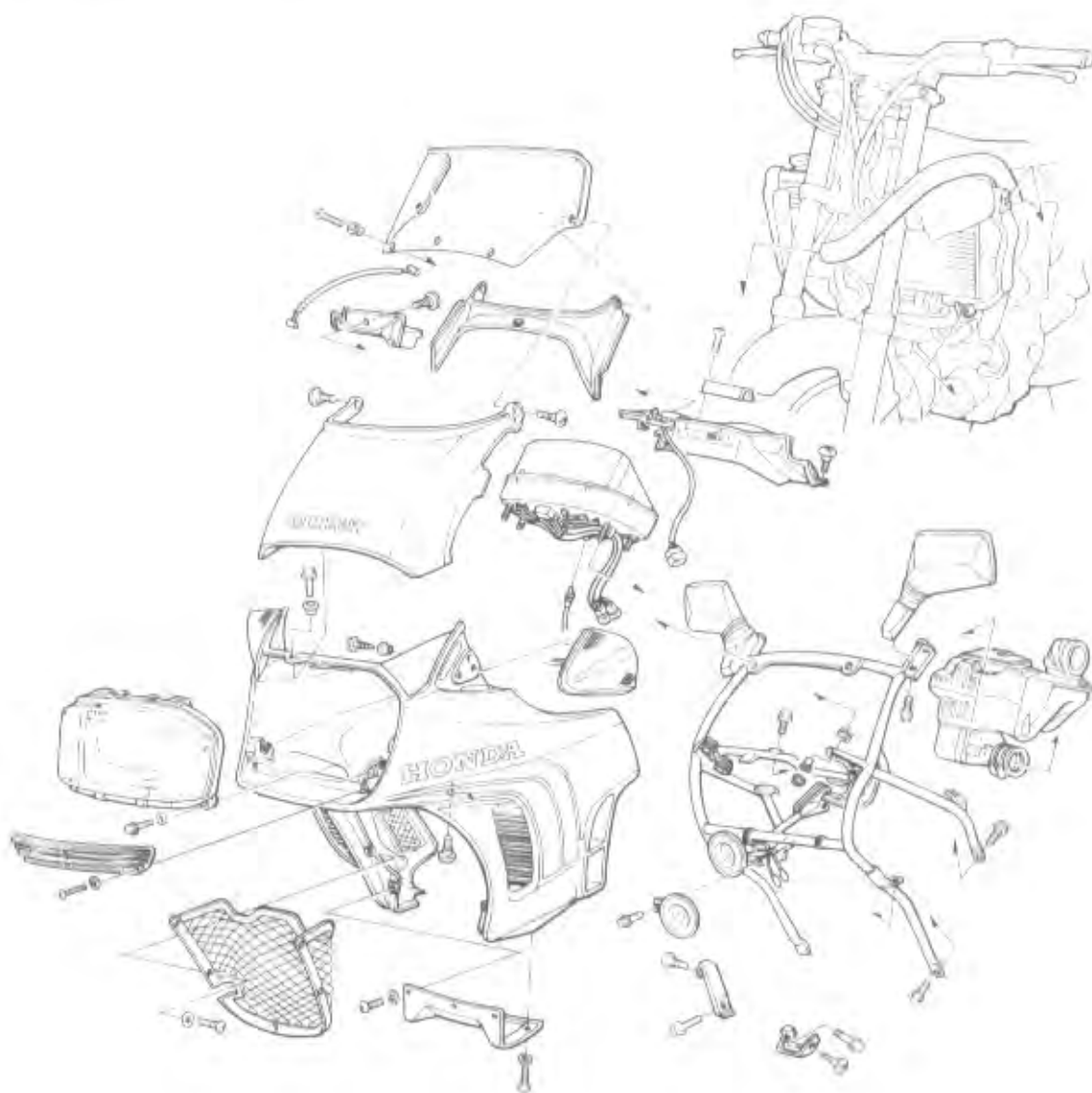
BULB REPLACEMENT

To replace a bulb, pull the rubber socket out of the panel. The bulb can be removed by pulling it straight out from the socket without turning.



FAIRING ASSEMBLY

Assemble the fairing in the reverse order of disassembly.





FAIRING INSTALLATION

Install the fairing in the reverse order of removal.
Some installation notices as listed below:

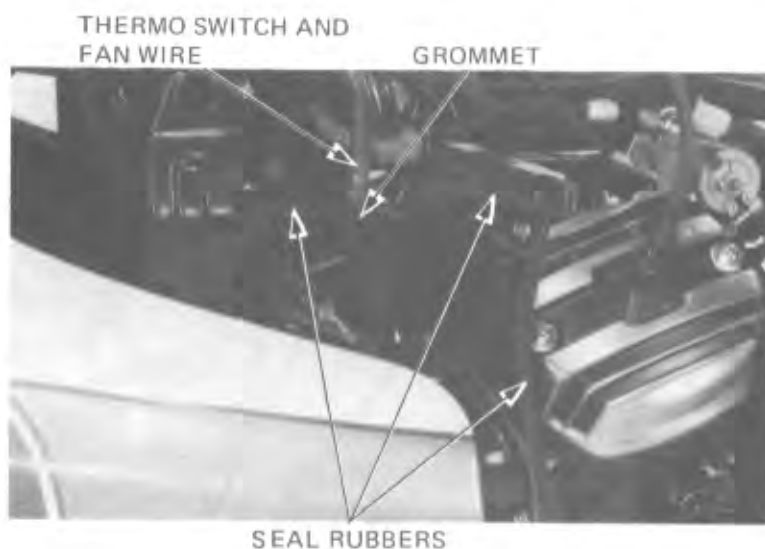
NOTE

Be careful not to damage the fairing, the front fender and the front forkleg when installing it to the bracket.



NOTE

- Check the thermo switch and fan wires to be sure they are securely connected before installing the fairing. They may have been unintentionally disconnected during removal of the fairing. Check them again after the fairing is installed.
- Check the each seal rubbers to be sure they are securely installed after the fairing is installed.



NOTE

Route the right and left turn signal wires through inside of the fairing bracket before installing the fairing as shown.





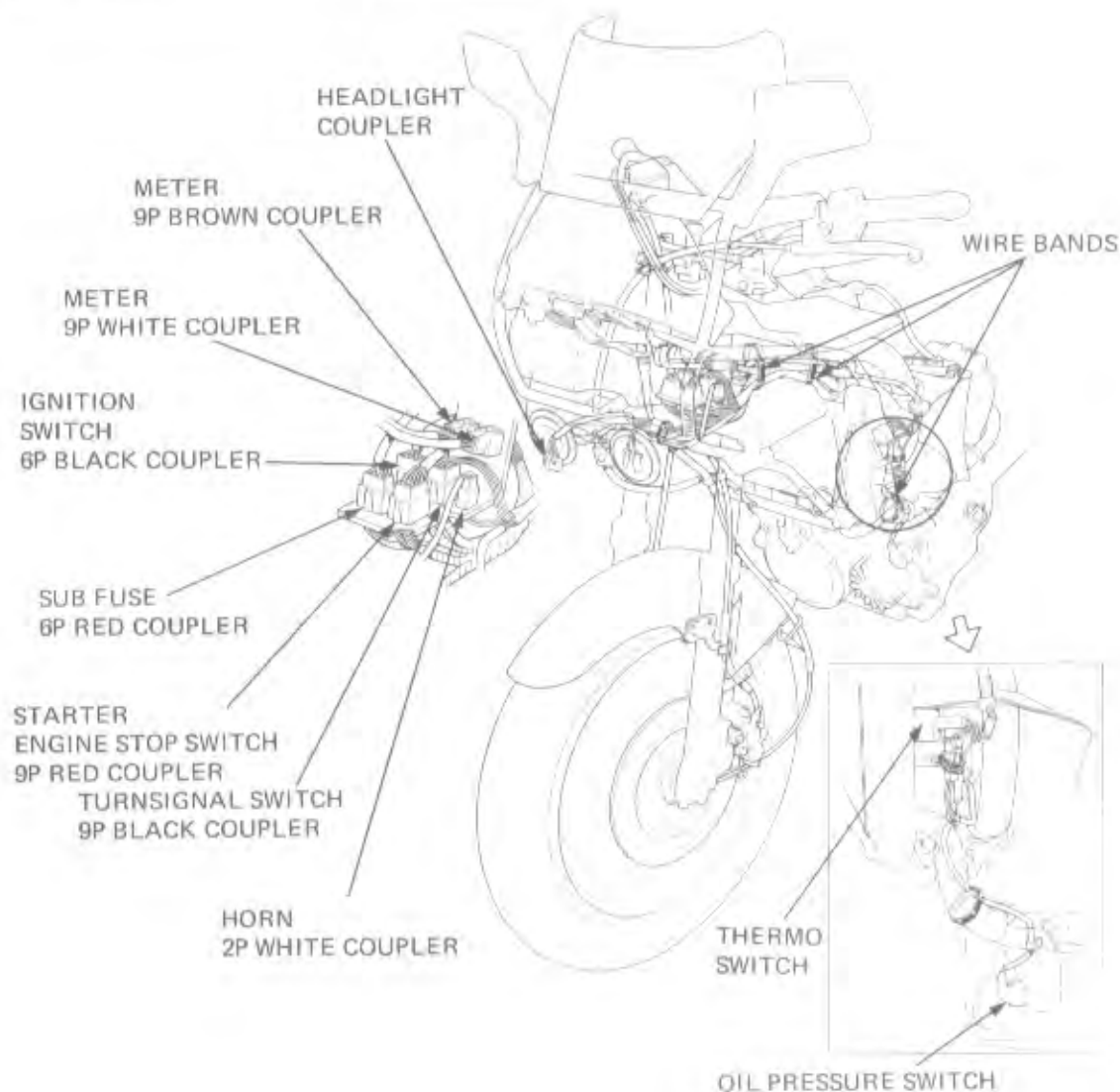
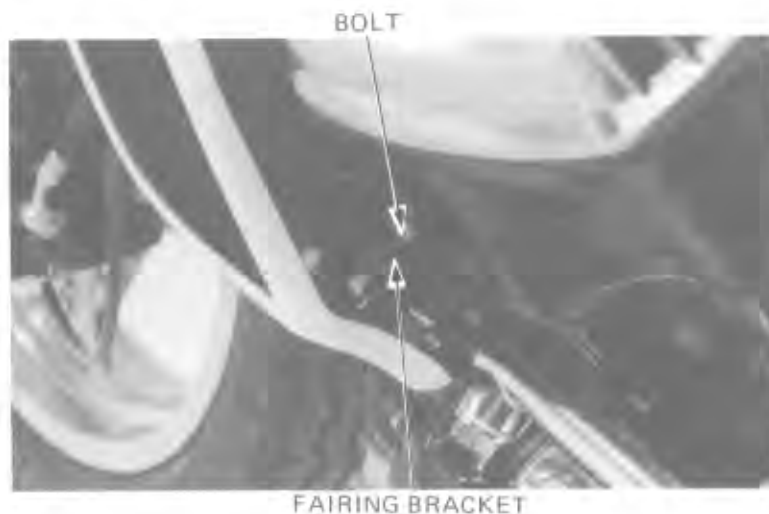
FAIRING/INSTRUMENTS

NOTE

Loosen the right and left fairing side bracket bolts, if the fairing mount screws can not be aligned the fairing holes with the threads of the bracket. Tighten the bracket bolts securely after the fairing is installed.

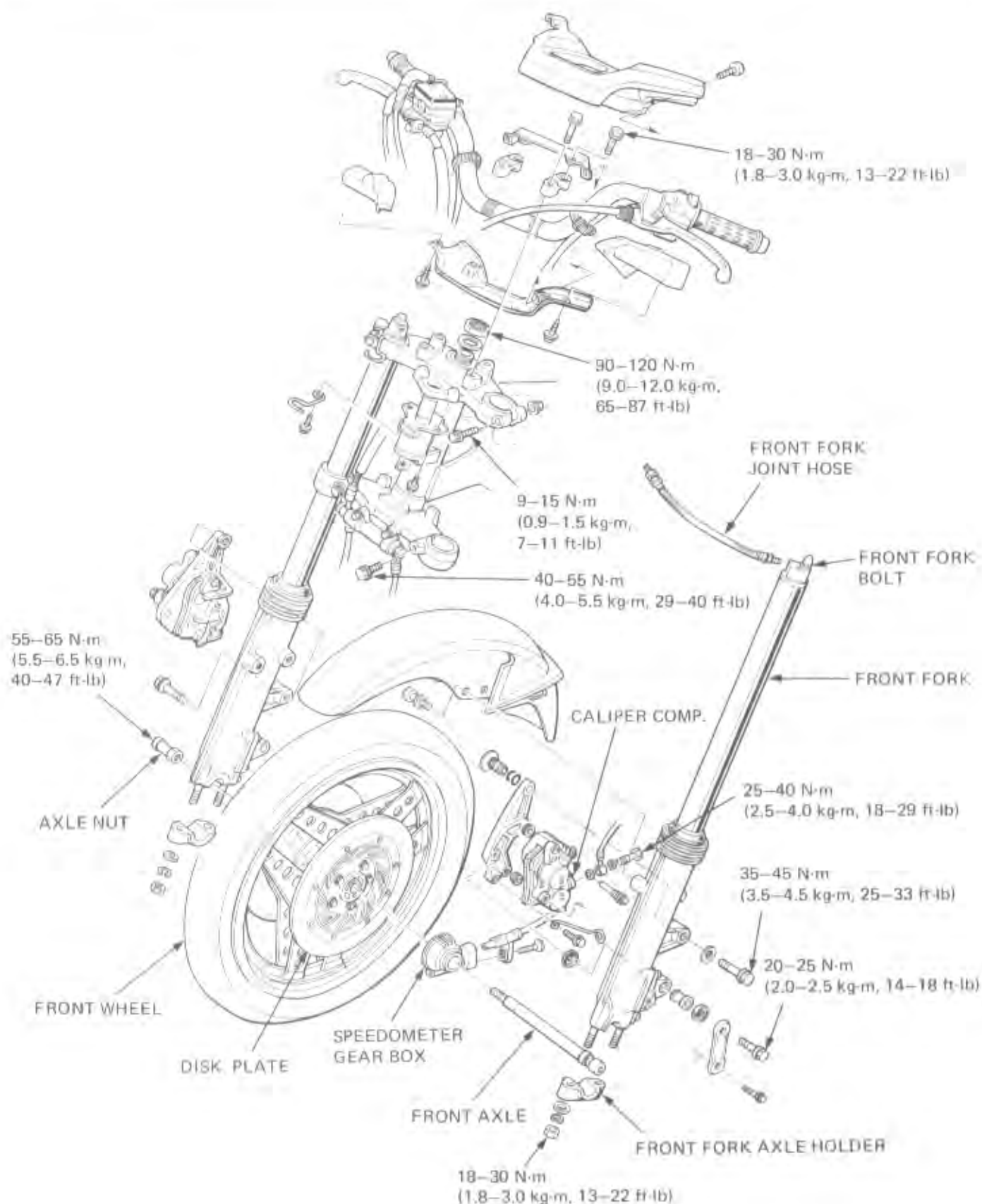
NOTE

Be sure all fairing couplers and wire connections are secure and that all wires are routed to prevent them from being pinched. Pay special attention to the turn signal wires, they are most susceptible to being pinched.





MEMO





15. FRONT WHEEL/SUSPENSION/STEERING

SERVICE INFORMATION	15-1	FRONT WHEEL	15-6
TROUBLESHOOTING	15-2	FRONT FORK	15-12
HANDLEBARS	15-3	STEERING STEM	15-24

SERVICE INFORMATION

GENERAL

- A jack or other support is required to support the motorcycle.
- COMSTAR[®] wheels are not serviceable. If either the spokes, rim or hub are damaged the entire wheel must be replaced.
- Tubeless tire removal, repair and remounting procedures are covered in the Tubeless Tire Manual.
- Check the fork tube bushing, slider bushing and back-up ring for damage after disassembling the front fork and replace if necessary.

SPECIFICATIONS

Unit : mm (in)

Item		Standard	Service Limit
Axle runout		—	0.20 (0.008)
Front wheel rim runout	Radial	—	2.0 (0.08)
	Axial	—	2.0 (0.08)
Front fork spring free length		469.1 (18.47)	455 (17.9)
Front fork tube runout		—	0.20 (0.008)
Front fork oil capacity		310 cc (10.5 US oz, 8.7 Imp oz)	—
Fork air pressure		80–120 kPa (0.8–1.2 kg/cm ² , 11–17psi)	—

TORQUE VALUES

Handlebar holder bolt	18–30 N·m (1.8–3.0 kg·m, 13–22 ft·lb)
Fork pinch bolt (upper)	9–15 N·m (0.9–1.5 kg·m, 7–11 ft·lb)
(lower)	40–55 N·m (4.0–5.5 kg·m, 29–40 ft·lb)
Front axle nut	55–65 N·m (5.5–6.5 kg·m, 40–47 ft·lb)
Steering stem nut	90–120 N·m (9.0–12.0 kg·m, 65–87 ft·lb)
Steering adjustment nut	18–20 N·m (1.8–2.0 kg·m, 13–14 ft·lb)
Front axle holder nut	18–30 N·m (1.8–3.0 kg·m, 13–22 ft·lb)
Caliper mount bolt (upper)	35–45 N·m (3.5–4.5 kg·m, 25–33 ft·lb)
Caliper mount bolt (lower)	20–25 N·m (2.0–2.5 kg·m, 14–18 ft·lb)
Caliper bolt	20–25 N·m (2.0–2.5 kg·m, 14–18 ft·lb)
Caliper pivot bolt	35–40 N·m (3.5–4.0 kg·m, 25–29 ft·lb)
Brake hose union bolt	25–40 N·m (2.5–4.0 kg·m, 18–29 ft·lb)



FRONT WHEEL/SUSPENSION/STEERING

TOOLS

Special

Circlip pliers	07914-3230001
Fork oil seal driver	07947-3710101
Race remover	07953-4250002
Steering stem driver	07946-3710600 or 07946-3710601
Attachment	07946-3710700 or 07946-3710701
Race remover	07946-3710500
Steering stem socket	07916-3710100
Hex wrench, 6 mm	07917-3710100

Common

Socket wrench, 30 x 32 mm	07716-0020400
Extension	07716-0020500 or commercially available in U.S.A.
Attachment, 42 x 47 mm	07746-0010300
Pilot, 15 mm	07746-0040300
Driver	07749-0010000
Pin spanner	07702-0010000 or M9341-412-099788 (U.S.A. only)

TROUBLESHOOTING

Hard Steering

- Steering stem nut too tight
- Faulty steering stem bearings
- Damaged steering stem ball race and/or cone race
- Insufficient tire pressure

Steers to One Side or Does Not Track Straight

- Bent forks
- Bent frame
- Forks installed incorrectly
- Axle installed incorrectly
- Bent swingarm
- Wheel installed incorrectly

Front Wheel Wobbling or Vibration

- Loose axle (front or rear)
- Loose wheel bearings
- Loose steering stem nut or bearings
- Loose lock nut(s) on swingarm pivot bolt
- Unbalanced tire and wheel
- Bent wheel
- Excessive lateral runout in wheel
- Bent forks
- Bent swingarm
- Bent or cracked frame
- Loose engine mounts

Soft Suspension

- Weak fork springs
- Insufficient fluid in front forks
- Insufficient fork air pressure

Hard Suspension

- Incorrect fluid weight in front forks
- Clogged fork hydraulic passage
- Bent fork tubes
- Slider binding
- Too much air pressure
- Clogged anti-dive orifice

Front Suspension Noise

- Slider binding
- Insufficient fluid in forks
- Loose front fork fasteners
- Steering stem nut loose
- Broken parts in forks



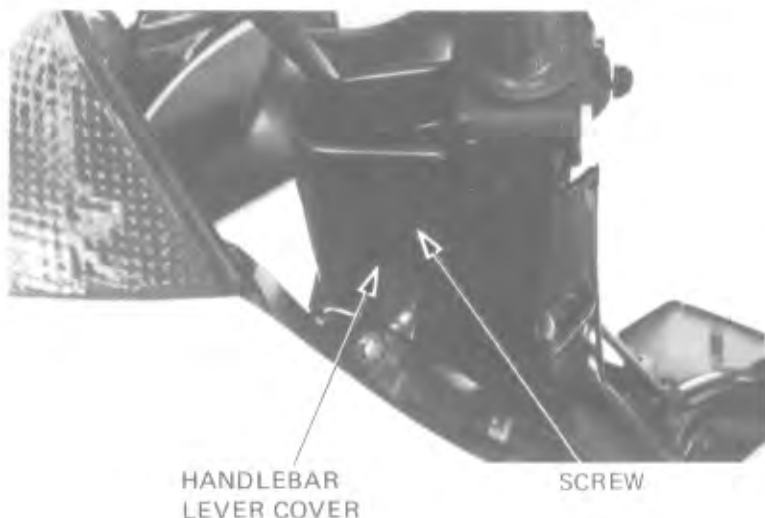
HANDLEBARS

REMOVAL

Remove handlebar upper cover screws and cover.



Remove right and left handlebar lever cover screws and lower covers.



Disconnect the front brake stoplight switch wires and remove the master cylinder.

NOTE

Do not loosen the brake hose unless necessary.

WARNING

- After removing the master cylinder, keep it level. Do not tilt the master cylinder, or turn it upside down to prevent air from entering the brake hose.
- Do not hang the master cylinder by the brake hose.





Loosen the three screws attaching the right handlebar switch housing and remove it.
Disconnect the clutch cable.
Remove the three screws holding the left handlebar switch housing and the housing.
Remove the wire bands, left grip and the clutch lever holder.



Remove the four upper holder bolts, upper holders and cover bracket.
Remove the handlebars.



INSTALLATION

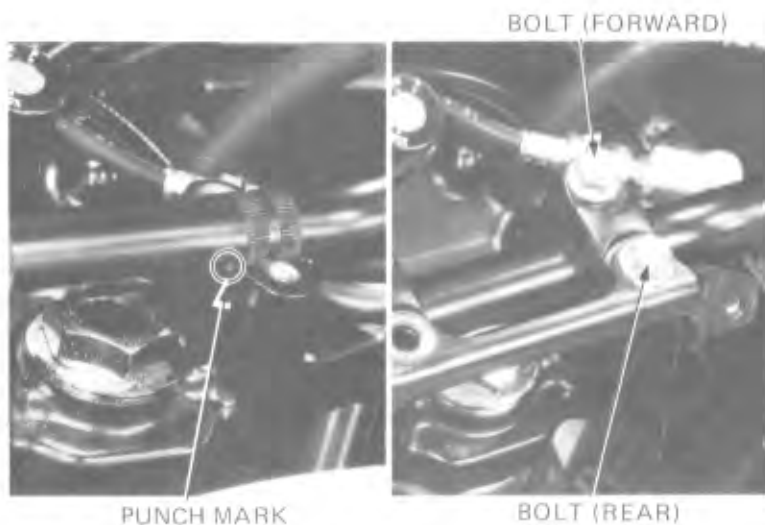
Installation of the handlebars is essentially the reverse order of removal.

NOTE

Coat the throttle grip area of the handlebar with grease.

Align the punch mark on the handlebar with the split of the upper holder and fork bridge.
Tighten the forward bolts first, then tighten the rear bolt.

TORQUE: 25–35 N·m
(2.5–3.5 kg·m, 18–25 ft·lb)



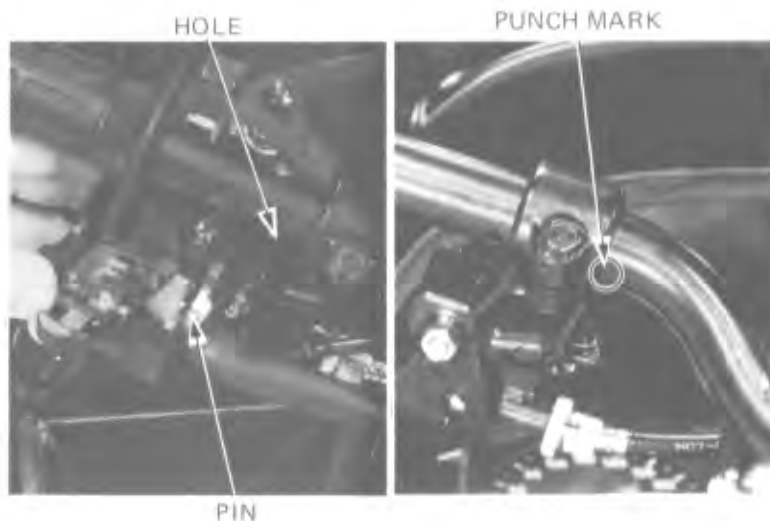


Insert the pin on the bottom half of each switch assembly into the hole in the handlebar. Tighten the forward screws first, then tighten the rear screws to the same torque.

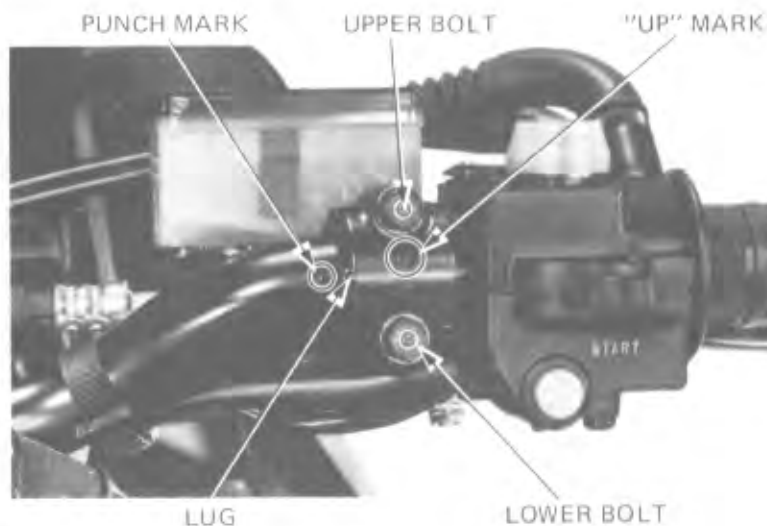
CAUTION

Make sure the wire harness is not pinched between the switch assembly and the handlebar.

Position the clutch lever holder so the gap aligns with the punch mark on the handlebar and tighten the bolt securely.



Position the master cylinder on the handlebar. Loosely install the holder with the "UP" mark facing upward using the two bolts. Align the lug on the holder with the punch mark on the handlebar. Tighten the upper bolt first, then tighten the lower bolt. Apply contact cement to the left handlebar grip and push it into place.



Install the right and left handlebar lever covers and lower cover and tighten the screws securely.





Install the handlebar upper cover with the two screws.



FRONT WHEEL

REMOVAL

Raise the front wheel off the ground by placing a block or safety stand under the engine.

NOTE

Avoid damaging the finned surfaces of the oil pan.

Disconnect the speedometer cable from the speedometer gearbox.

Remove the right and left calipers by removing the caliper bolts.

CAUTION

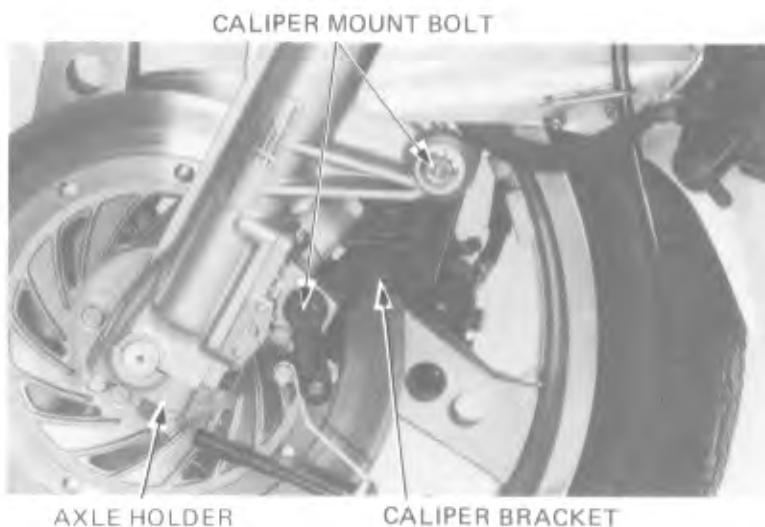
*Support the caliper assembly so that it does not hang from the brake hose.
Do not twist the brake hose.*

Remove the left caliper bracket by removing the caliper mount bolts. Support the caliper so that it does not hang by the brake hose.

Remove the axle holders.
Remove the front wheel.

NOTE

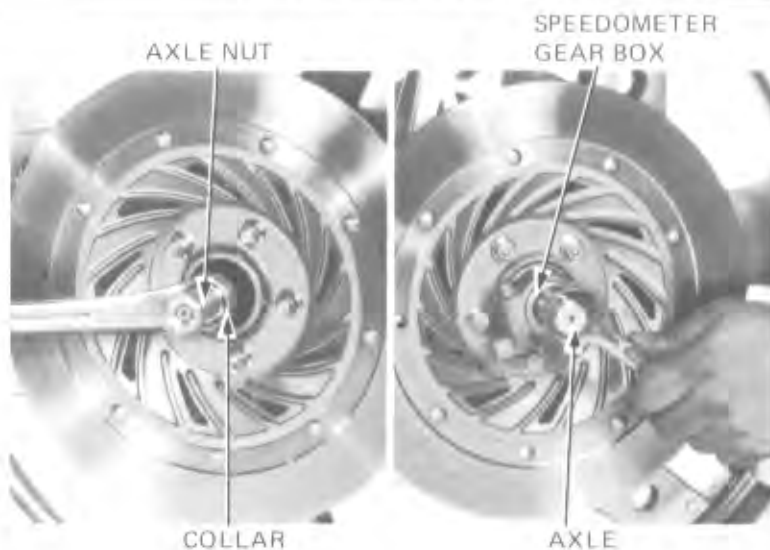
Do not depress the brake lever when the wheel is off the motorcycle.





DISASSEMBLY

Remove the axle nut, speedometer gear box, axle and collar.



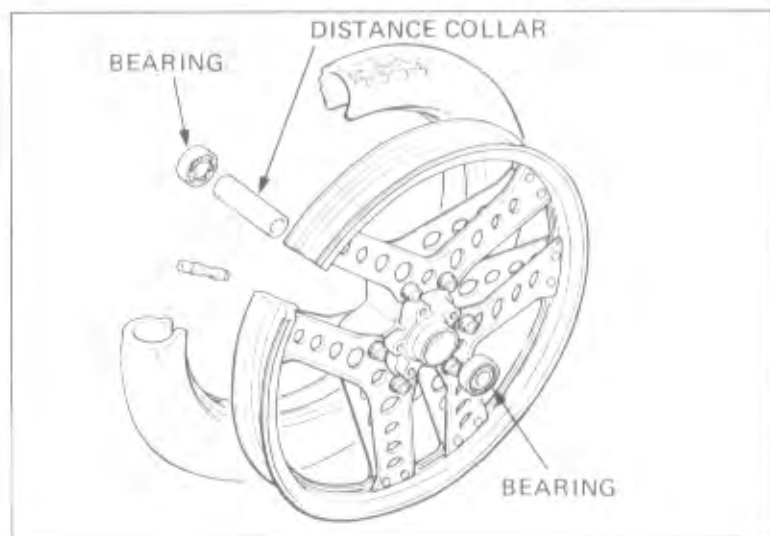
Remove the disc bolts, discs and dust seals.



Remove the bearings and the distance collar from the hub.

NOTE

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





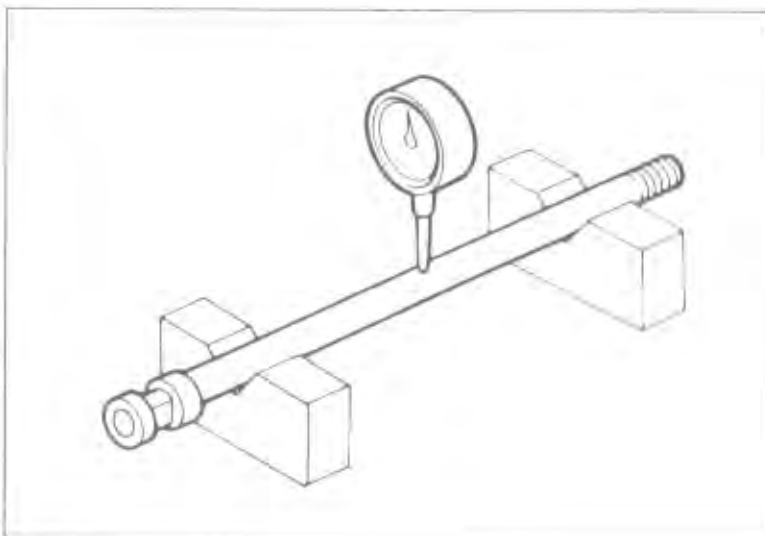
FRONT WHEEL/SUSPENSION/STEERING

INSPECTION

• AXLE

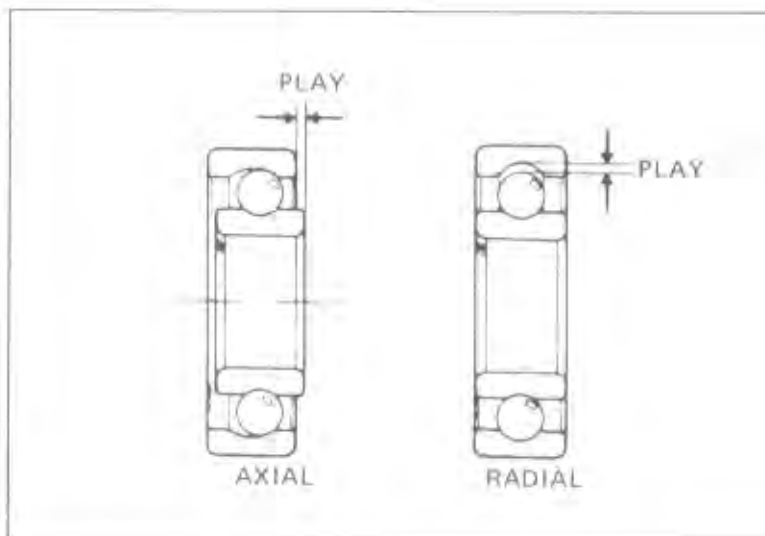
Set the axle in V blocks and measure the runout. The actual runout is 1/2 of the total indicator reading.

SERVICE LIMIT: 0.2 mm (0.01 in)



• WHEEL BEARING

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



• WHEEL

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

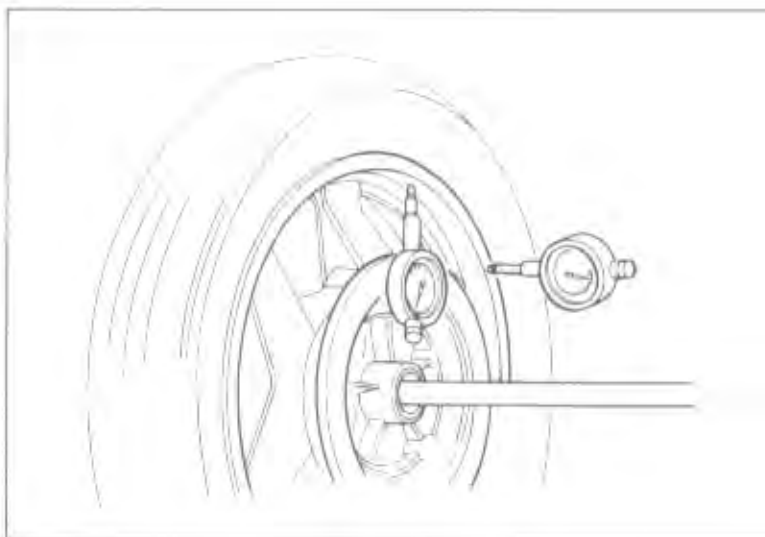
SERVICE LIMITS:

RADIAL RUNOUT: 2.0 mm (0.08 in)

AXIAL RUNOUT: 2.0 mm (0.08 in)

NOTE

The COMSTAR WHEEL cannot be repaired and must be replaced if the service limits are exceeded.





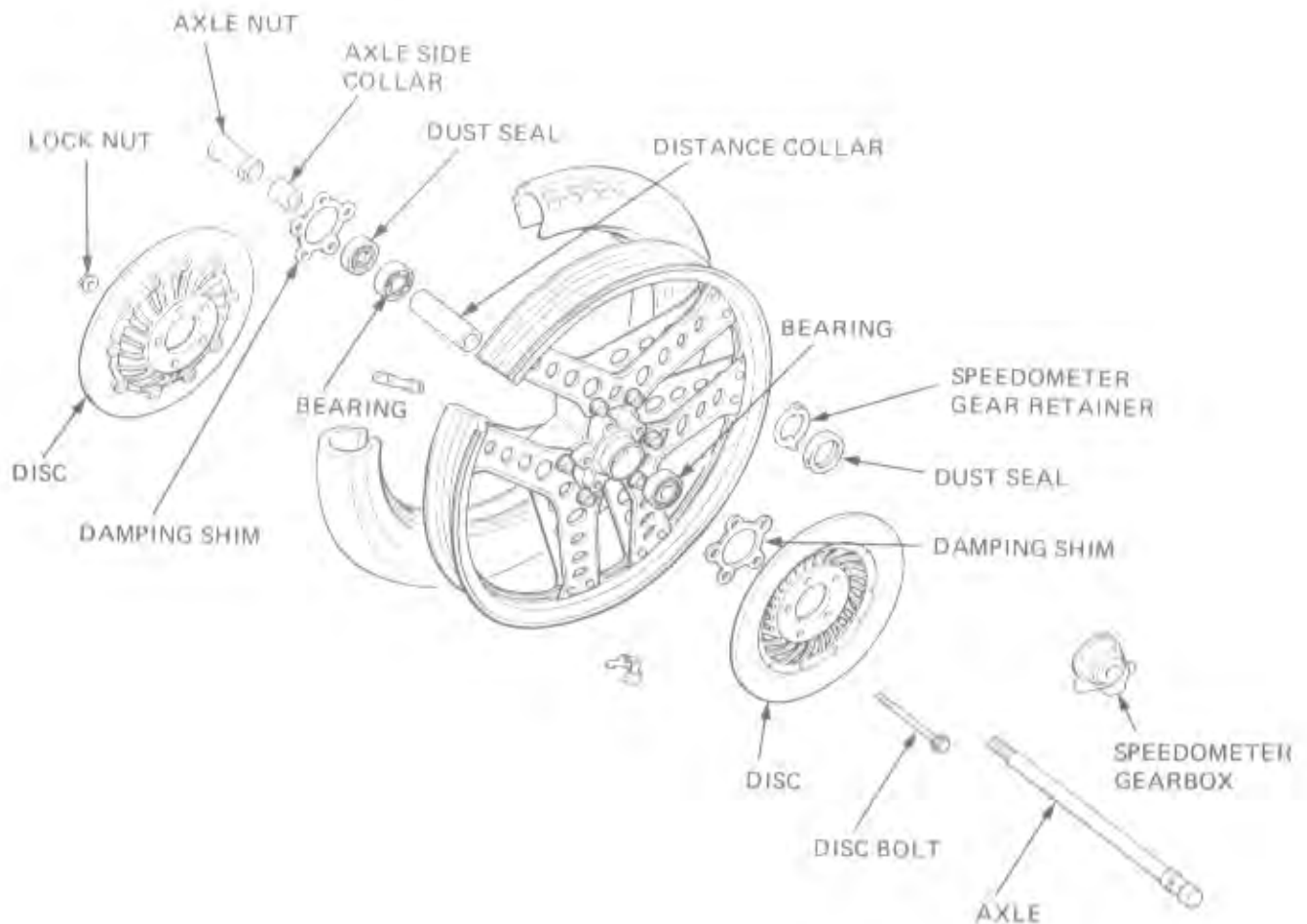
ASSEMBLY

WARNING

Do not get grease on the brake disc or braking power will be eliminated.

NOTE

- The COMSTAR WHEEL does not have a rim band.
- Install the bearings with the closed end facing out.





Install the discs, disc bolts and nuts.

TORQUE: 27–33 N·m
(2.7–3.3 kg-m, 20–24 ft-lb)



Pack all bearing cavities with grease.
Drive in the right bearing first.
Press the distance collar into place.

NOTE

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

Drive in the left bearing.

NOTE

Drive the bearing squarely. Make sure that it is fully seated and that the sealed side is facing out.



ATTACHMENT, 42 x 47 mm 07746-0010300
AND PILOT, 15 mm 07746-0040300

Lubricate the dust seal lip with grease.
Install the dust seal and collar in the hub.

NOTE

The spoke plate bolts and nuts require no retightening since they are secured with lock pins. Do not remove the pins.

CAUTION

Remove all the grease from around the outside of the dust seal.





Install the speedometer gear retainer in the hub from the left side.

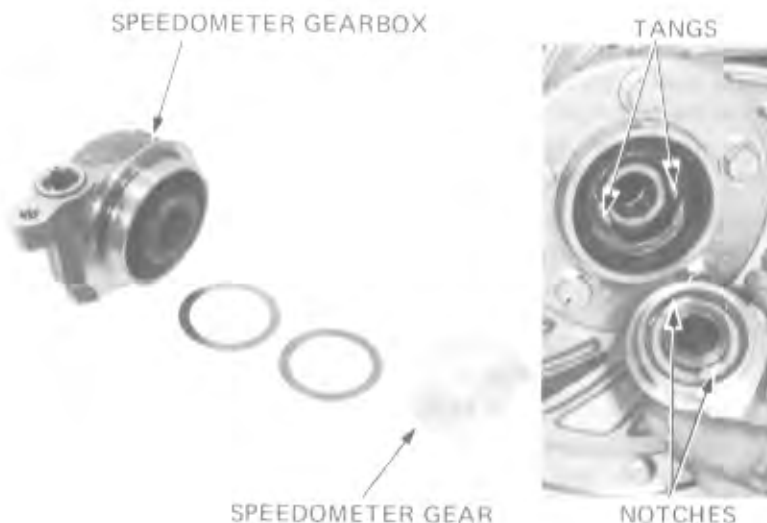
Lubricate the dust seal lip and install.

Disassemble the speedometer gear box and lubricate the gears and sliding surfaces.

Install the speedometer gear in the wheel hub, aligning the gear box notches with the tangs in the retainer.

CAUTION

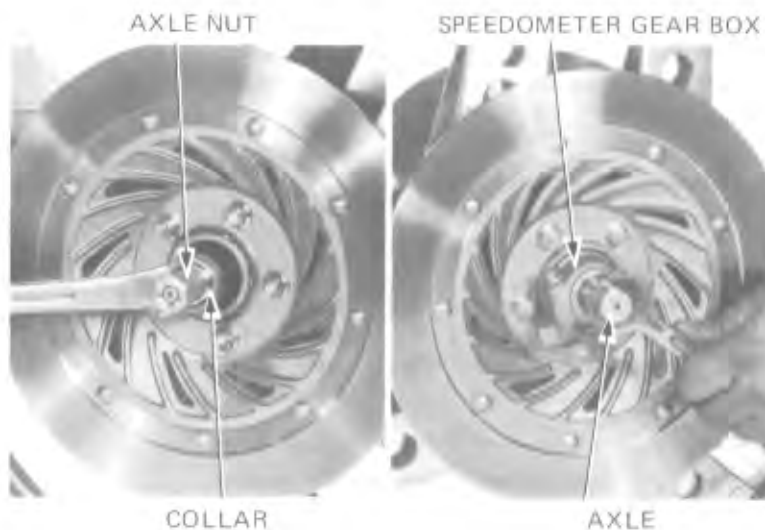
Remove all the grease around the outside of the oil seal.



Install the axle and axle nut, then tighten the axle nut.

TORQUE: 55–65 N·m
(5.5–6.5 kg-m, 40–47 ft-lb)

Clean the brake discs with a high quality degreasing agent.



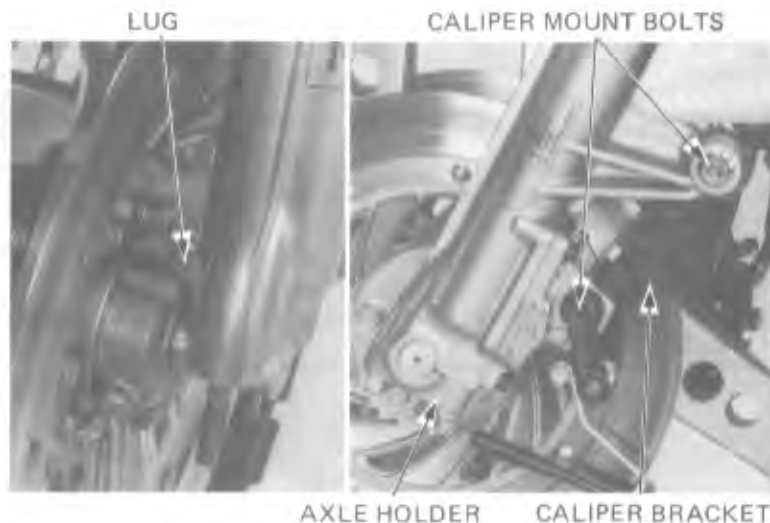
INSTALLATION

Position the front wheel between the fork legs and lower the forks onto the axle. Be sure that the slot on the speedometer gear is in the lug on the left fork leg.

Install the axle holders.

Tighten the axle holders nuts loosely.

Install the left caliper bracket.





Fit the removed calipers over the discs, taking care not to damage the brake pads.
Install the caliper bolts.

TORQUE: 20–25 N·m
(2.0–2.5 kg·m, 14–18 ft·lb)

Tighten the caliper mount bolts.

TORQUE VALUES:

Upper bolt: 35–45 N·m
(3.5–4.5 kg·m, 25–33 ft·lb)

Lower bolt: 20–25 N·m
(2.0–2.5 kg·m, 14–18 ft·lb)

Measure the clearance between each surface of the left brake disc and the left brake caliper with a 0.70 mm (0.028 in) feeler gauge.

If the feeler gauge cannot be inserted easily, move the left fork out or in until the gauge can be inserted.

Tighten the axle holder forward nuts to the specified torque first, then tighten the rear nuts to the same torque.

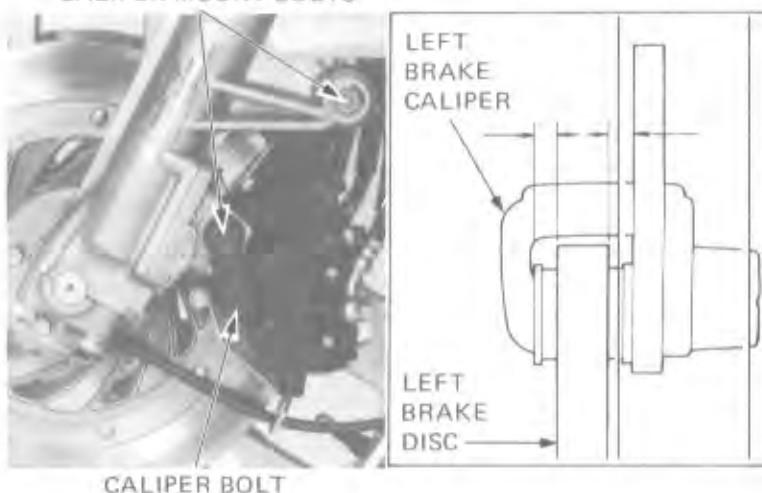
TORQUE: 18–25 N·m
(1.8–2.5 kg·m, 13–18 ft·lb)

CAUTION

After installing the wheel, apply the brakes several times and recheck the clearance on both sides. Failure to provide clearance will damage the brake discs and affect braking efficiency.

Connect the speedometer cable to the speedometer gearbox.

CALIPER MOUNT BOLTS



SPEEDOMETER CABLE



FRONT FORK

REMOVAL

Remove the front wheel.
Remove the front fender.
Remove the brake caliper brackets by unscrewing the caliper mount bolts.

NOTE

Do not loosen the brake hose unless necessary.

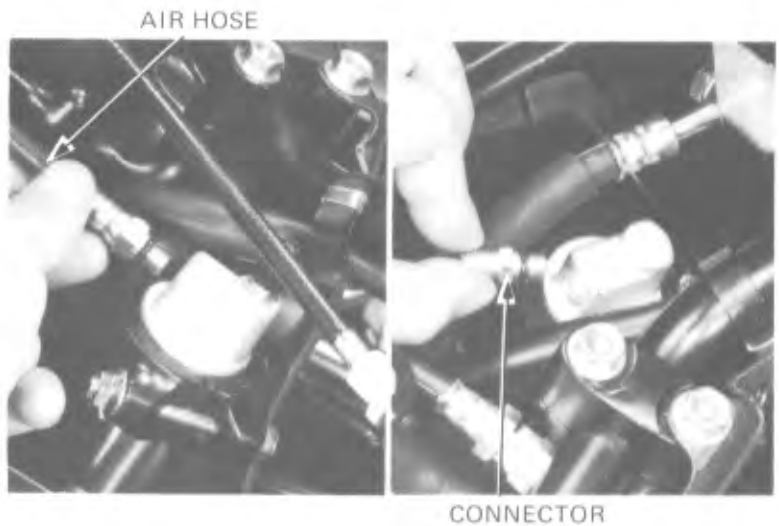




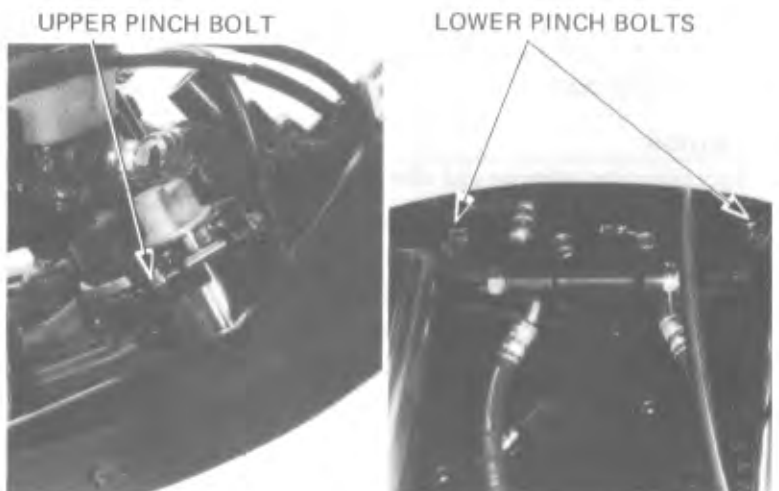
Remove the handlebar upper and lower covers.



Release air pressure and disconnect the air hose from the right fork connector.
Remove the connector from the right fork cap bolt.
Remove the air hose from the left fork cap bolt.



Loosen the fork pinch bolts and remove the fork tubes. Pull and twist them by hand if necessary.





DISASSEMBLY

Hold the fork tube in a vise.
Remove the fork cap bolt.

CAUTION

Do not damage or bend the sliding surface.

WARNING

Use care when loosening the bolt or the spring will pop out.

FORK CAP BOLT



Remove the fork spacer and spring.
Pour out any remaining fork fluid by pumping the fork up and down several times.



Hold the fork slider in a vise with soft jaws.
Remove the hex bolt.

CAUTION

Excessive vise pressure can damage the fork slider.

NOTE

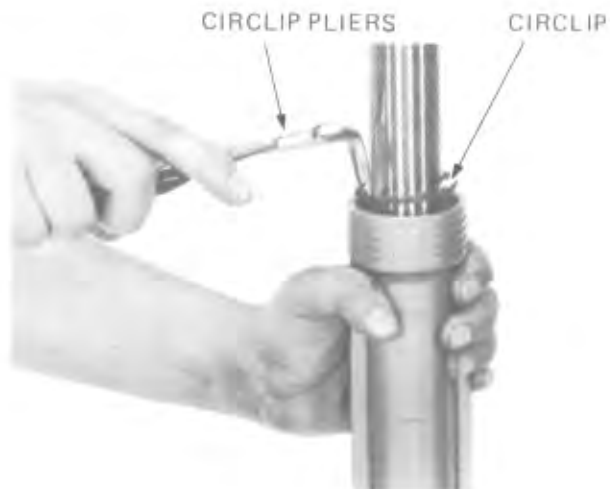
Temporarily install the spring and fork bolt if difficulty is encountered in removing the hex bolt.

HEX WRENCH, 6 mm 07917-3230000





Remove the dust seal and circlip.

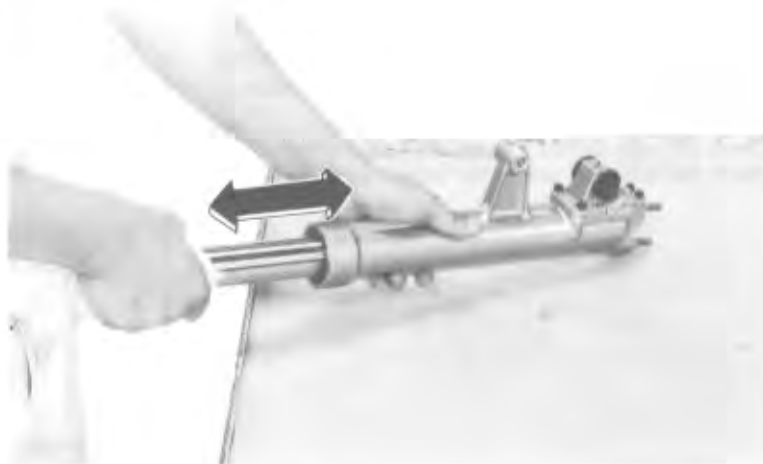


Remove the fork tube from the slider by pumping it in and out several times.

NOTE

The slider bushing causes resistance and the fork tube bushing must force it out.

Remove the oil lock piece from the fork slider.



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

NOTE

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

Remove the circlip, spring and washers from the piston.

Remove the piston from the fork tube and the oil lock piece from the slider.





FRONT WHEEL/SUSPENSION/STEERING

INSPECTION

• FRONT FORK SPRING FREE LENGTH

Measure the fork spring free length.

SERVICE LIMIT: 455 mm (17.9 in)

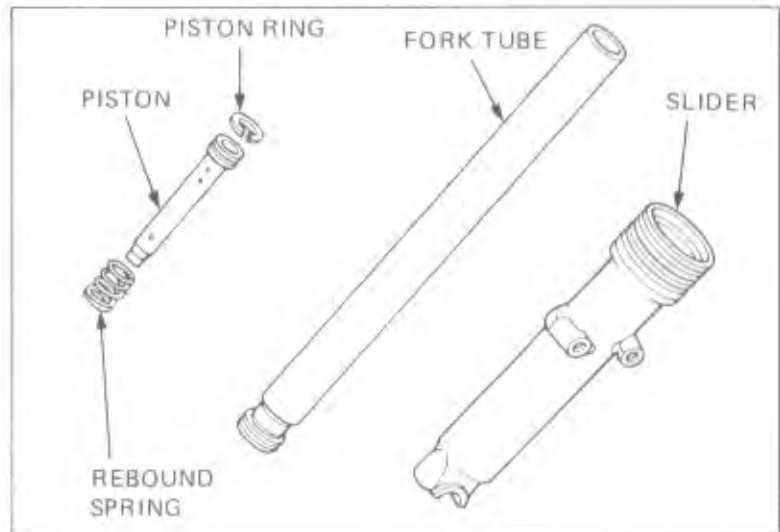


• FORK TUBE/FORK SLIDER/PISTON

Check the fork tubes, fork sliders and pistons for score marks, scratches, or excessive or abnormal wear. Replace any components which are worn or damaged.

Check the fork piston ring for wear or damage.

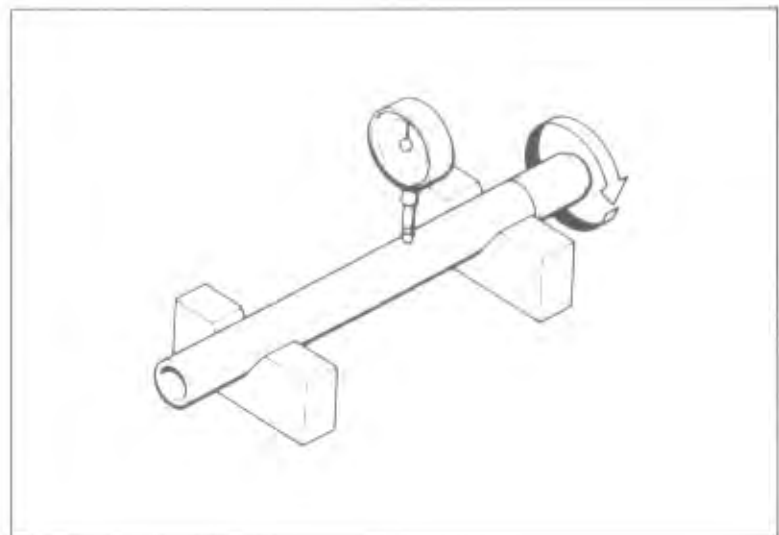
Check the rebound spring for fatigue or damage.



• FORK TUBE

Set the fork tube in V blocks and read the runout. Take 1/2 the total indicator reading to determine the actual runout.

SERVICE LIMIT: 0.20 mm (0.008 in)

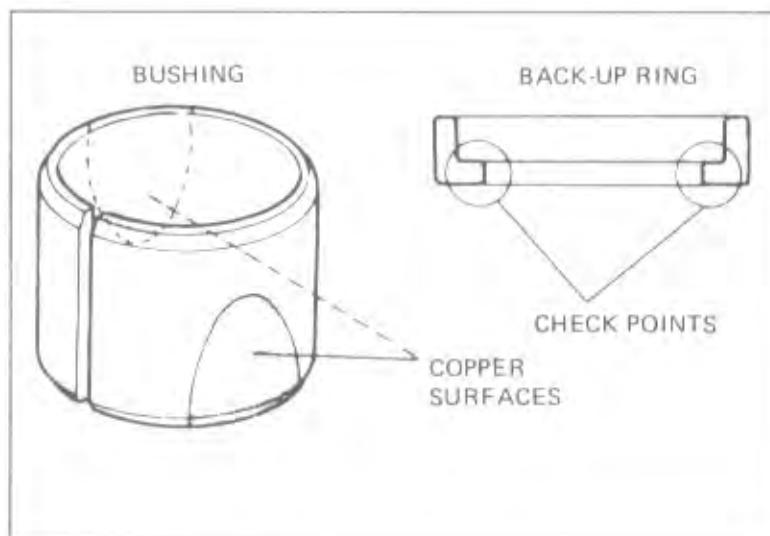




• **BUSHING/BACK-UP RING**

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

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



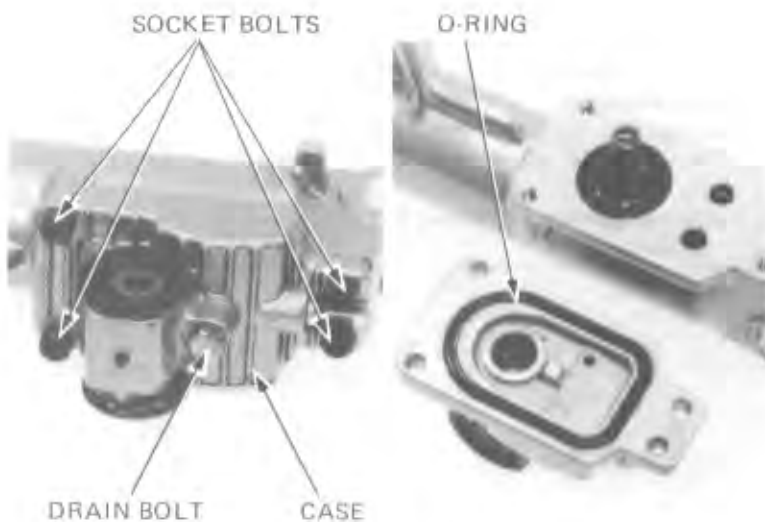
ANTI DIVE CASE

• **REMOVAL**

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

NOTE

- Drain the oil before servicing the anti dive system.
- Place the steel ball and spring in a parts rack so they are not lost.

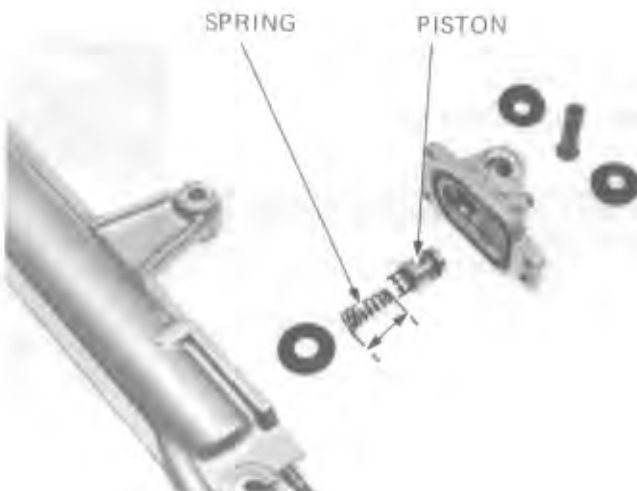


• **INSPECTION**

Check the spring and piston for wear or damage.

Check the orifice for clogging by applying compressed air.

Check for damage to the orifice.





• **ASSEMBLY**

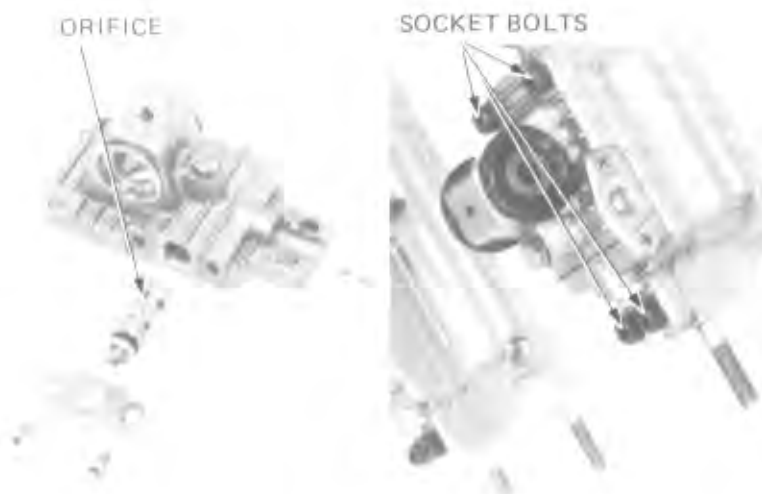
Assemble removed parts and install the assembly in the bottom of the case.

Tighten the socket bolts to the specified torque.

TORQUE: 6–9 N·m
(0.6–0.9 kg·m, 4.3–6.5 ft·lb)

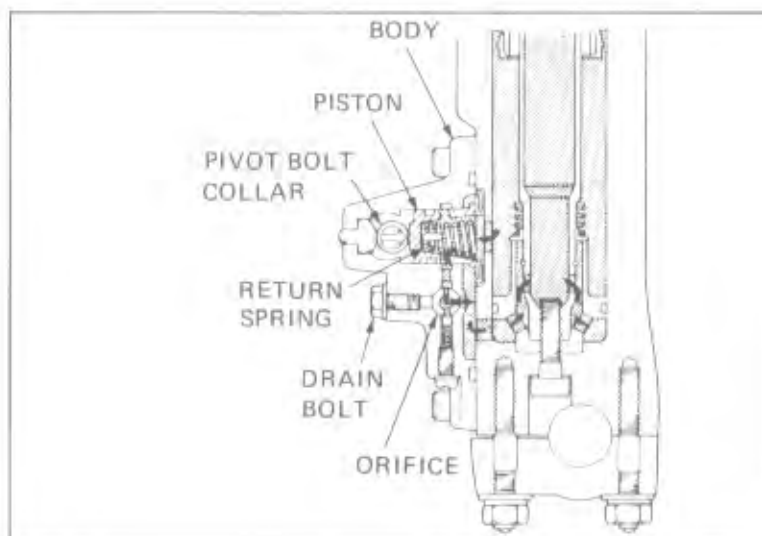
NOTE

Apply locking agent to the threads of the screws and socket bolts before assembly.



NOTE

- Lubricate the O-ring and piston with A.T.F. (automatic transmission fluid) before assembly.
- Check that the piston moves freely.
- Apply silicone grease to the sliding faces of the collar.
- Do not damage the sealing lips of the seal rubbers.



Check operation of the collar piston. They should move the specified distance.

STANDARD: 2.5 mm (0.01 in)

NOTE

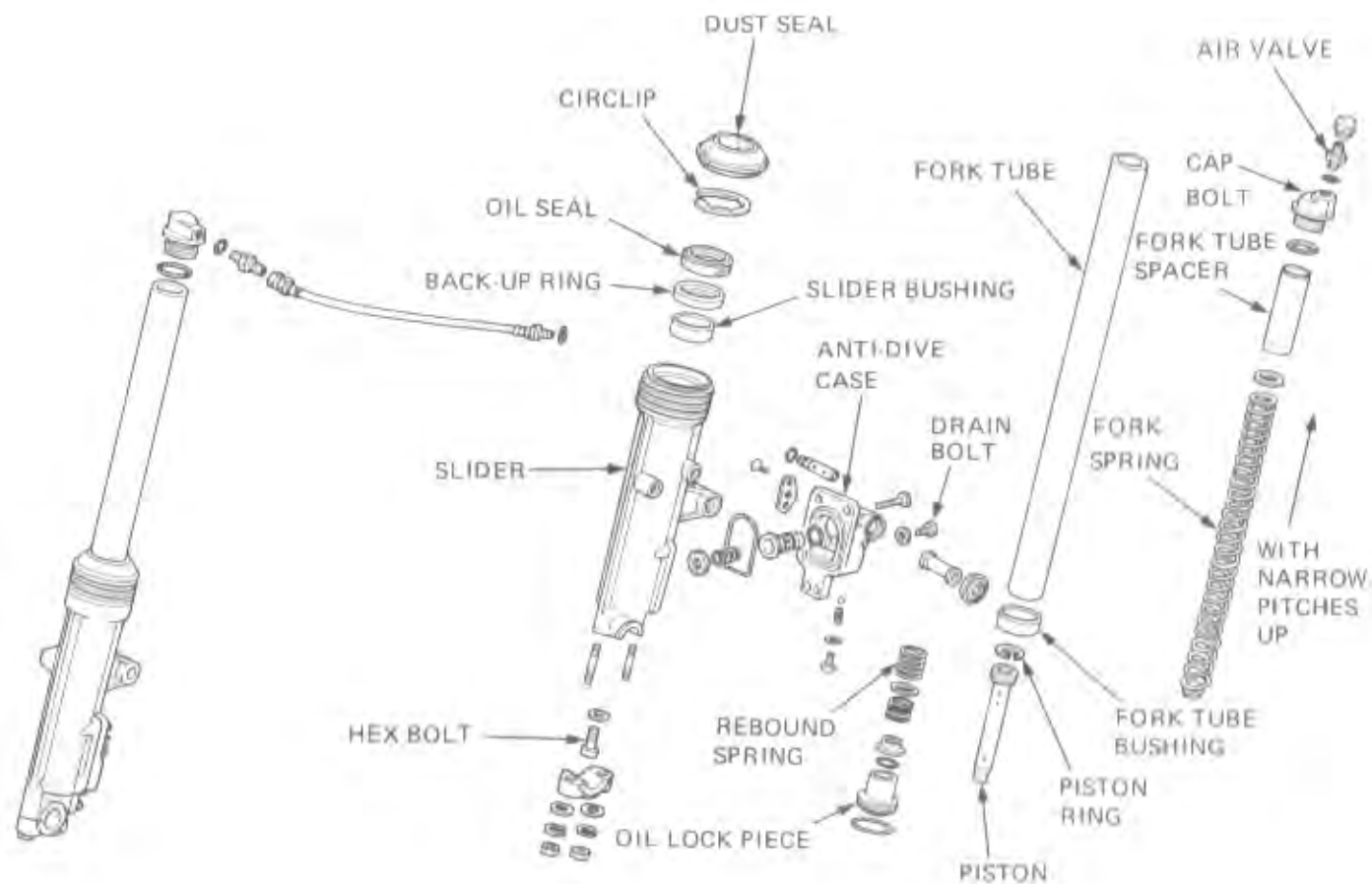
Adjust the right and left damping adjusters to the same position.





ASSEMBLY

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





FRONT WHEEL/SUSPENSION/STEERING

Install a new bushing on the fork tube if necessary.
Place the rebound spring and piston into the fork tube.

Place the oil lock piece on the end of the piston and insert the fork tube into the slider.



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

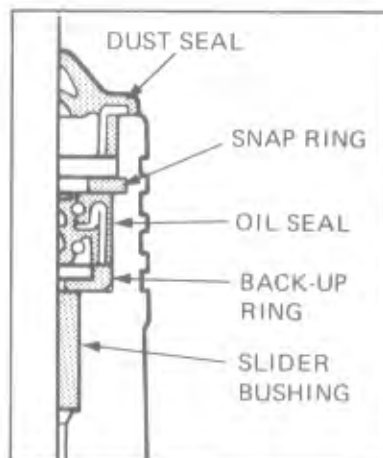
NOTE

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

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



Place the slider bushing over the fork tube and rest it on the slider. Put the back-up ring and an old bushing or equivalent tool on top.
Drive the bushing into place with the seal driver.
Remove the old bushing.



FORK SEAL DRIVER
07947-3710101





Check the groove and top edge of the fork tube for burrs or scratches.

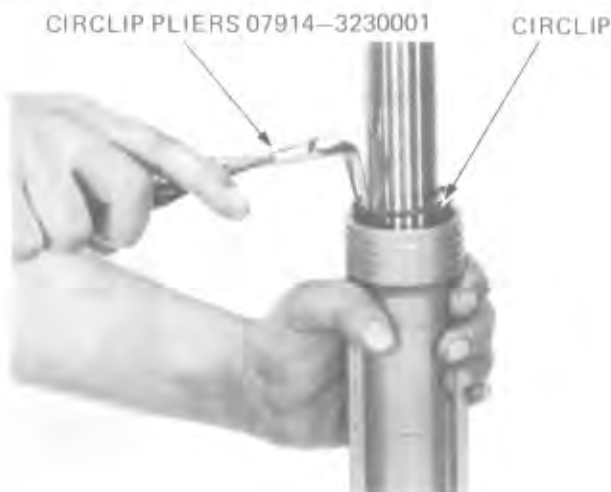
Wrap the fork tube groove or top edge with vinyl tape to prevent damage to the oil seal lip, during installation.

Install the back-up ring.

Coat a new oil seal with ATF and install it with the seal mark facing up.

Drive the oil seal in with the seal driver with fork seal driver.

Install the circlip and dust seal.



Pour the specified amount of ATF into the fork tube.

CAPACITY: 310 cc (10.5 US oz, 8.7 Imp oz)

NOTE

Be sure the oil level is the same in both fork tubes.



Wipe all oil from the fork springs and install them into the fork tubes with the narrow coils toward the top.

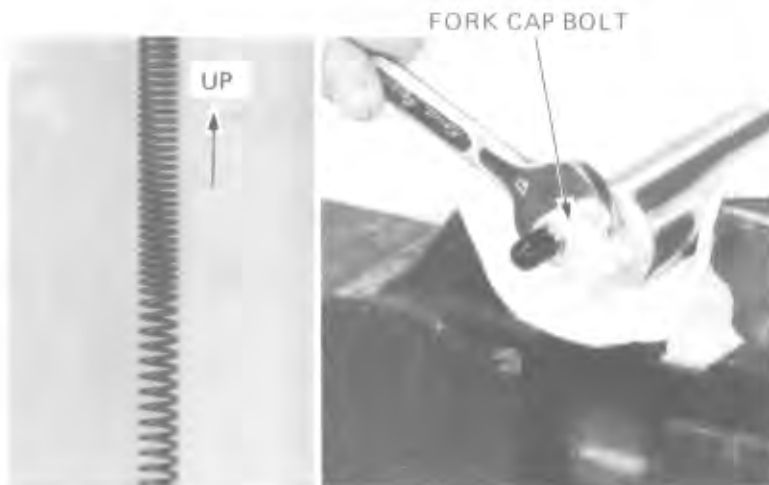
Install the fork spring spacers.

Install and torque the fork cap bolt.

TORQUE: 15–30 N·m
(1.5–3.0 kg-m, 11–22 ft-lb)

CAUTION

Be careful not to cross-thread the fork cap bolts.





FRONT WHEEL/SUSPENSION/STEERING

INSTALLATION

Install the fork tubes in the fork bridge and steering stem.

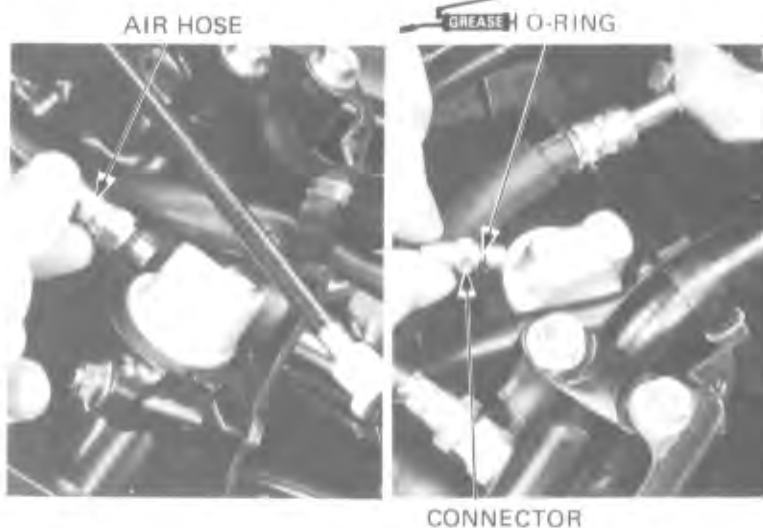
Tighten the fork tube pinch bolts loosely.



Apply grease to a new O-ring and install the air hose into the left fork cap bolt.

Apply grease to a new O-ring and install the connector into the right fork cap bolt.

TORQUE: 4–7 N·m
(0.4–0.7 kg-m, 3–5 ft-lb)

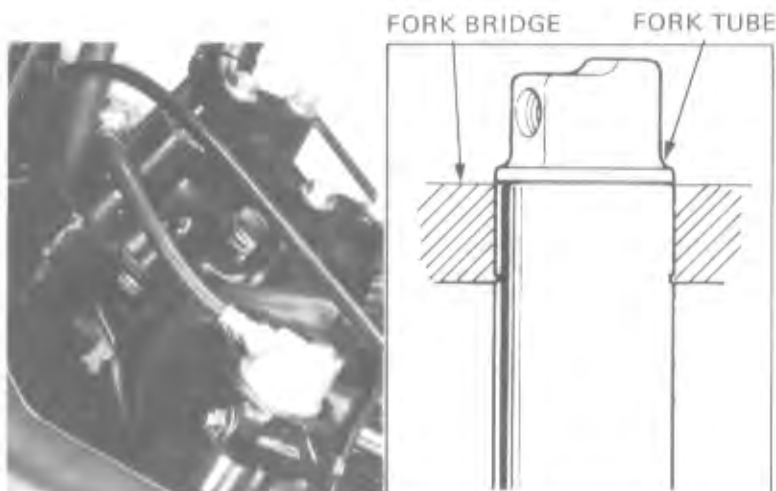


Loosen the fork tube pinch bolts.

Turn the fork tubes so that the air hose has a natural curve. Attach the air hose to the connector and tighten the hose joint nut.

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

Align the top surface of each fork tube with the top surface of the fork bridge.



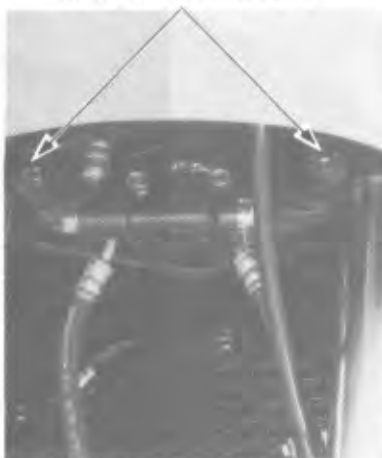


Tighten the fork tube pinch bolts.

TORQUE VALUES:

- UPPER:** 9–15 N·m
(0.9–1.5 kg·m, 7–11 ft·lb)
- LOWER:** 30–40 N·m
(3.0–4.0 kg·m, 22–29 ft·lb)

LOWER PINCH BOLTS



UPPER PINCH BOLT



Secure the brake hoses to the clamps on the front fender.

Install the front fender.

Install the front brake calipers and front wheel (Page 15-11).

TORQUE VALUES:

- UPPER:** 35–45 N·m
(3.5–4.5 kg·m, 25–33 ft·lb)
- LOWER:** 20–25 N·m
(2.0–2.5 kg·m, 14–18 ft·lb)

FRONT FENDER



CALIPER MOUNTING BOLTS

Make sure all weight is off the front wheel, and add air to the forks.

RECOMMENDED PRESSURE:

80–120 kPa (0.8–1.2 kg/cm², 11–17 psi)

CAUTION

Use a low-volume, low-pressure pump to charge the forks preferably a hand pump. Excessive pressure can damage the fork tube components.

With the front brake applied, pump the front forks up and down several times. Recheck the air pressure and adjust if necessary.

Install the handlebar upper and lower covers.

AIR VALVE





STEERING STEM

STEERING STEM REMOVAL

Remove the handlebar.
Remove the air hose.



Remove the steering stem nut and the fork top bridge.
Loosen the upper and the lower front fork pinch bolts and remove the front forks.

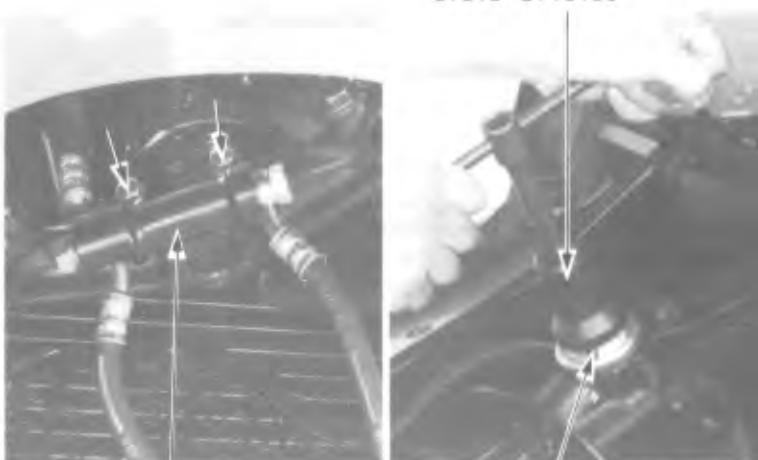
EXTENSION BAR 07716-0020500 or
COMMERCIALLY AVAILABLE IN U.S.A.



SOCKET WRENCH, 30 x 32 mm 07716-0020400 or
COMMERCIALLY AVAILABLE IN U.S.A.

STEERING STEM SOCKET
07916-3710100

Remove the front brake three-way joint mounting bolts.
Straighten the tab of the lock washer and remove the top thread nut.
Remove the steering stem adjuster nut.



THREE-WAY JOINT

ADJUSTER NUT



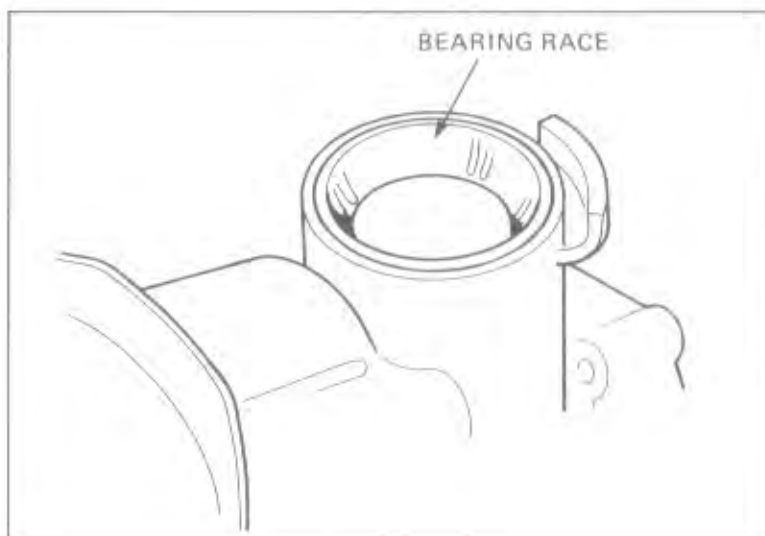
Remove the upper roller bearing.
Remove the steering stem and lower bearing.

ROLLER BEARING



BEARING INSPECTION

Check the upper and lower bearing race surfaces for wear or damage and replace if necessary.



BOTTOM BEARING REPLACEMENT

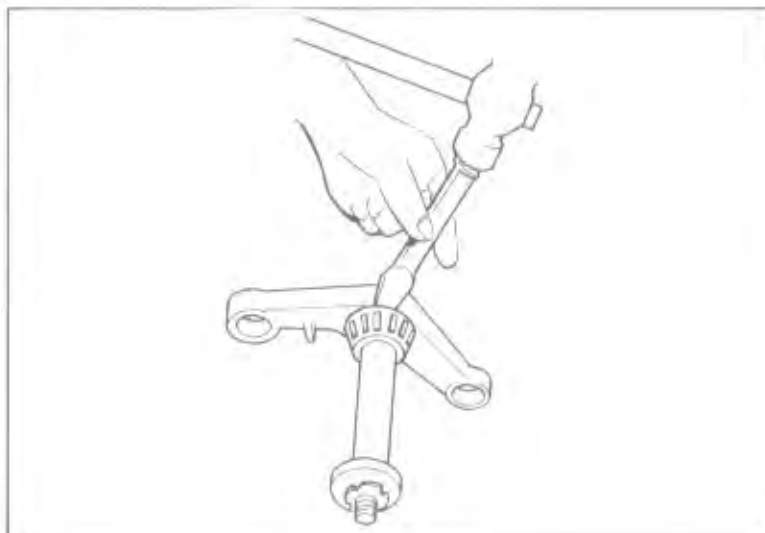
NOTE

Always replace the bearing and race as a set.

Remove the bottom bearing with a hammer and a drift.

NOTE

- Install the bearing holder, outer race and adjustment nut on the top end of the steering stem to prevent damage to the threads.
- The bearing will be damaged during removal and will require replacement.



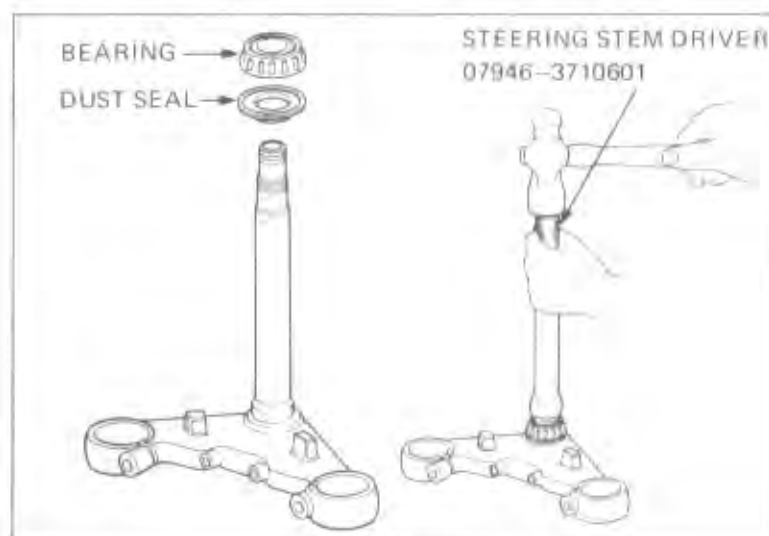


FRONT WHEEL/SUSPENSION/STEERING

Install a new dust seal and drive a new bearing into place.

NOTE

Replace the dust seal and bearing whenever they are removed from the steering stem.



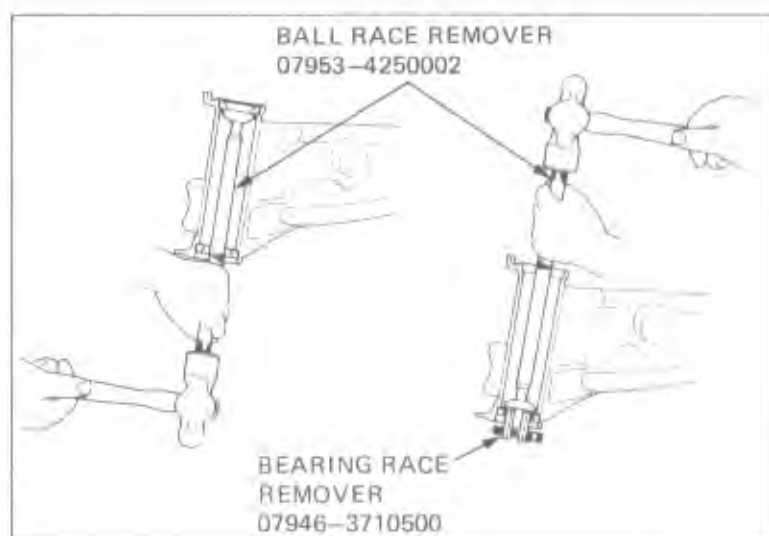
BEARING RACE REPLACEMENT

Inspect the top and bottom races and replace if worn or damaged.

Drive out the top race and then the bottom race.

NOTE

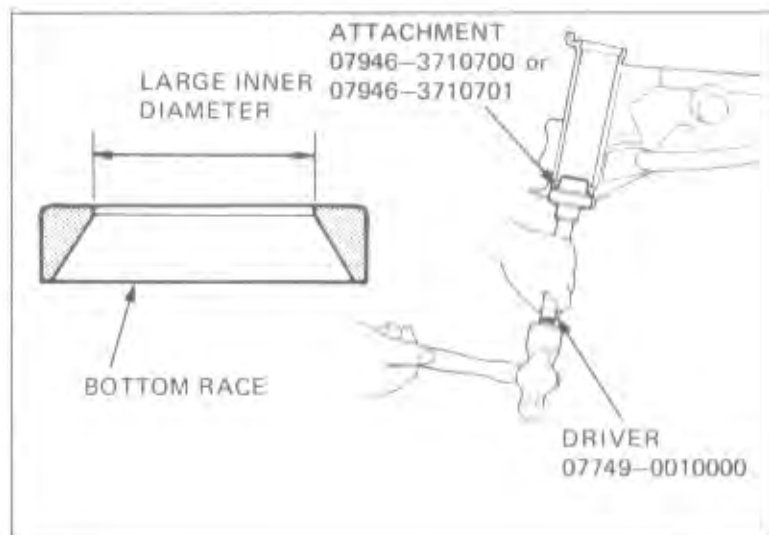
Always remove the top race before driving out the bottom race.



Install a new bottom race.

NOTE

- The bottom race has a larger I.D. than the top race. Be sure to install the races in their proper places.
- Drive the races in squarely until they seats.

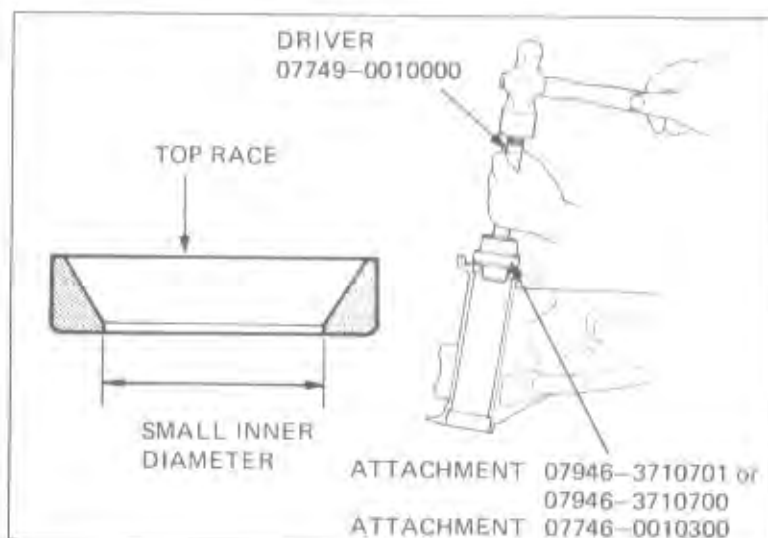




Install a new top race first with attachment 07946-3710701 or 07946-3710700.
Then use attachment 07746-0010300 or old race to new race until it seats.

NOTE

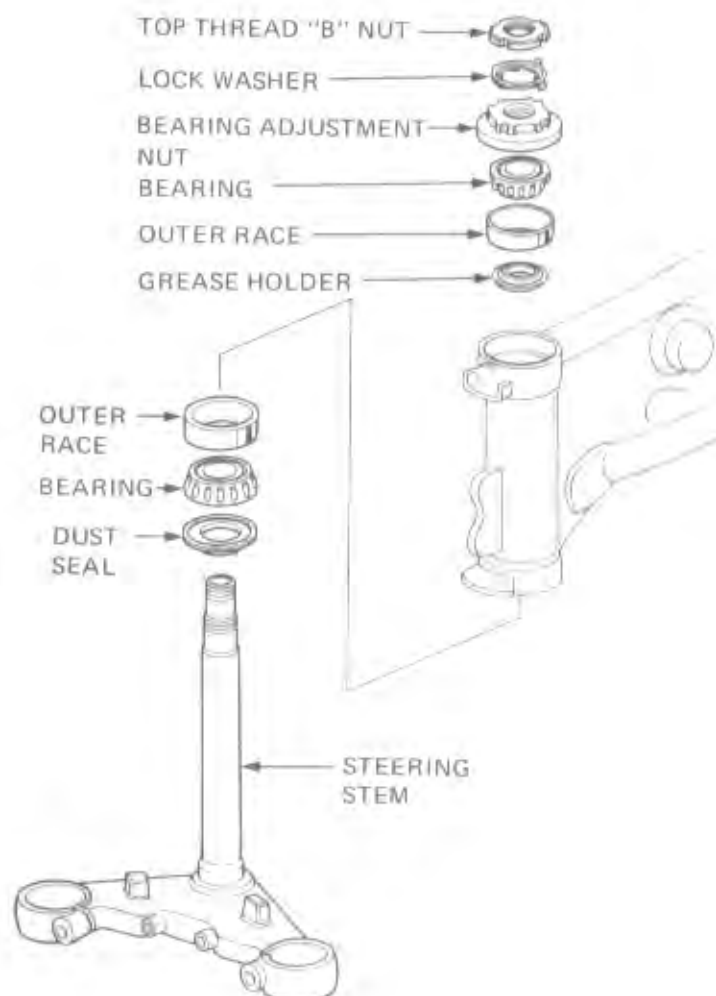
Drive the races in squarely until they seat.



STEERING STEM INSTALLATION

Grease the outer races and install the bearings and races.

Grease the lower bearing and install it.





FRONT WHEEL/SUSPENSION/STEERING

Clean the upper and lower bearings thoroughly. Thread the bearing adjustment nut and top thread "B" nut onto the steering stem to make sure that they turn smoothly and will not bind. Remove the top thread "B" nut and adjustment nut. Clean the steering stem and adjustment nut threads. Remove all dirt and burrs and pack all bearing cavities with bearing grease. Insert the steering stem into the steering head pipe. Install the upper bearing holder and bearing.



Install and tighten the adjustment nut.

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

Turn the steering stem lock-to-lock 5 times to seat the bearings.

Repeat the bearing tightening and steering stem turning sequence twice.

If the nut does not tighten after turning the steering stem the first or second time, remove the nut and inspect it and the steering stem threads for dirt or burrs.

WARNING

If the top thread nut is too loose, handlebar oscillation may be experienced. If too tight, cornering instability and excessive noise during braking will be experienced.

Install a new lock washer on the bearing adjustment nut.

STEERING STEM SOCKET
07916–3710100



LOCK WASHER TABS



BEARING
ADJUSTMENT NUT

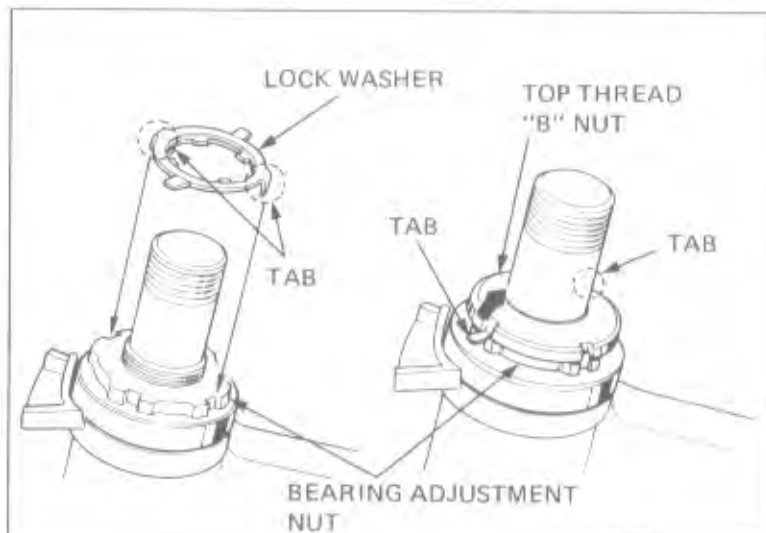


Hand tighten the top thread "B" nut. Hold the adjustment nut and hand tighten the "B" nut only to align its grooves with the lock washer tabs.

NOTE

If the top thread "B" nut grooves cannot be easily aligned with the lock washer tabs, remove the nut, turn it over and reinstall.

Bend the other two lock washer tabs up into the top thread "B" nut grooves.



TOP BRIDGE INSTALLATION

Install the front fork legs.
Temporarily hold the front fork legs by tightening the fork pinch bolts.
Tighten the steering stem nut.

TORQUE: 90–120 N·m
(9.0–12.0 kg·m, 65–87 ft·lb)

Tighten the lower fork pinch bolts.

TORQUE: 40–55 N·m
(4.0–5.5 kg·m, 29–40 ft·lb)

Tighten the upper fork pinch bolts.

TORQUE: 9–15 N·m
(0.9–1.5 kg·m, 7–11 ft·lb)

Check that the steering stem turns freely and there is no steering stem vertical movement.

Install the fork air hose.
Install the fork tubes so that the top of each fork is flush with the upper face of the fork top bridge.
Install the removed parts in the reverse order of removal.

Install the following:

Front fender
Front wheel
Handlebars

EXTENSION BAR: 07716-0020500 or
COMMERCIALLY AVAILABLE IN U.S.A.



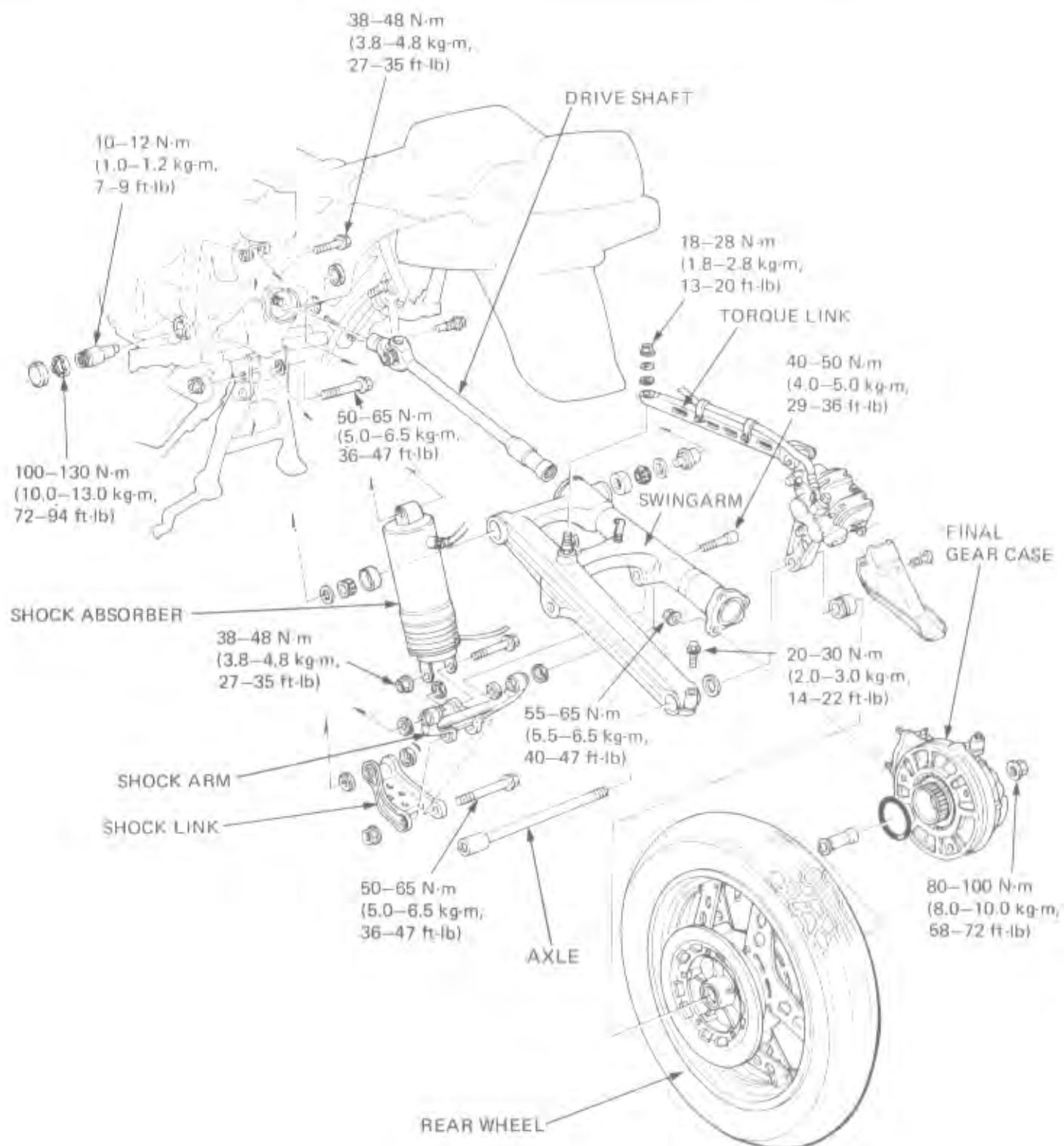
SOCKET WRENCH, 30 x 32 mm 07716-0020400



FORK AIR HOSE



REAR WHEEL/SUSPENSION





SERVICE INFORMATION	16- 1
TROUBLESHOOTING	16- 2
REAR WHEEL/REAR BRAKE	16- 3
SHOCK ABSORBER	16- 9
SWINGARM/DRIVESHAFT	16-15
SUSPENSION LINKAGE	16-23

SERVICE INFORMATION

GENERAL

- COMSTAR wheels are not serviceable. If either the spokes, rim or hub are damaged the entire wheel must be replaced.
- Tubeless tire removal, repair and remounting procedures are covered in the Tubeless Tire Manual.
- Before installing the rear wheel, apply MULTIPURPOSE NLGI No. 2 Grease (MoS₂ Molybdenum disulfide additive) to the final driven flange and splines on the final drive shaft.
- Take care not to damage the body when removing and installing the shock absorber.

WARNING

Use only genuine Honda replacement rear suspension linkage and shock absorber pivot/mount bolts. Others may not have adequate strength. Note the installation direction of the bolts.

SPECIFICATIONS

Item		Standard	Service Limit
Axle runout		—	0.2 mm (0.008 in)
Rear wheel runout	Radial	—	2.0 mm (0.08 in)
	Axial	—	2.0 mm (0.08 in)
Rear shock absorber oil capacity		540 cc (15.2 Imp oz, 18.3 US oz)	—
Rear shock absorber air pressure		100 – 500 kPa (1.0–5.0 kg/cm ² , 14–70 psi)	—



REAR WHEEL/SUSPENSION

TORQUE VALUES

Shock absorber mount bolts	38–48 N·m (3.8–4.8 kg-m, 27–35 ft-lb)
Suspension linkage pivot bolt	50–65 N·m (5.0–6.5 kg-m, 36–47 ft-lb)
Shock arm socket bolt	40–50 N·m (4.0–5.0 kg-m, 29–36 ft-lb)
Rear axle nut	80–100 N·m (8.0–10.0 kg-m, 58–72 ft-lb)
Rear axle pinch bolt	20–30 N·m (2.0–3.0 kg-m, 14–22 ft-lb)
Swingarm pivot bolt	9–12 N·m (0.9–1.2 kg-m, 7–9 ft-lb)
Swingarm pivot lock nut	100–130 N·m (10.0–13.0 kg, 72–94 ft-lb)
Final gear case nut	55–65 N·m (5.5–6.5 kg-m, 40–47 ft-lb)
Drive shaft lock nut	18–28 N·m (1.8–2.8 kg-m, 13–20 ft-lb)
Brake stopper arm bolt/nut	15–25 N·m (1.5–2.5 kg-m, 11–18 ft-lb)
Rear brake pedal bolt	10–15 N·m (1.0–1.5 kg-m, 7–11 ft-lb)

TOOLS

Special

Oil seal driver
 Driver attachment
 Swingarm lock nut wrench

Bearing remover, 30 mm
 Bearing remover handle
 Bearing remover weight
 Retainer wrench

07965–MC70100
 07965–MA10200
 07908–4690001
 or KS–HBA–469–08
 (U.S.A. only)
 07936–8890300
 07936–3710100
 07936–3710200
 07910–4300000

Common

Socket bit, 17 mm
 Attachment, 42 x 47 mm
 Pilot, 15 mm
 Pin driver, 3.5 mm
 Attachment, 37 x 40 mm
 Driver

07703–0020500-commercially
 in available U.S.A.
 07746–0010300
 07746–0040300
 07744–0010300-commercially
 available U.S.A.
 07746–0010200
 07749–0010000

TROUBLESHOOTING

Wobble or Vibration

- Bent rim
- Loose wheel bearings
- Loose or bent spokes
- Faulty tire
- Loose axle

Soft Suspension

- Weak spring
- Shock absorbers improperly adjusted
- Weak rear damper

Hard Suspension

- Shock absorbers improperly adjusted

Suspension Noise

- Shock case binding
- Loose fasteners



REAR WHEEL/REAR BRAKE

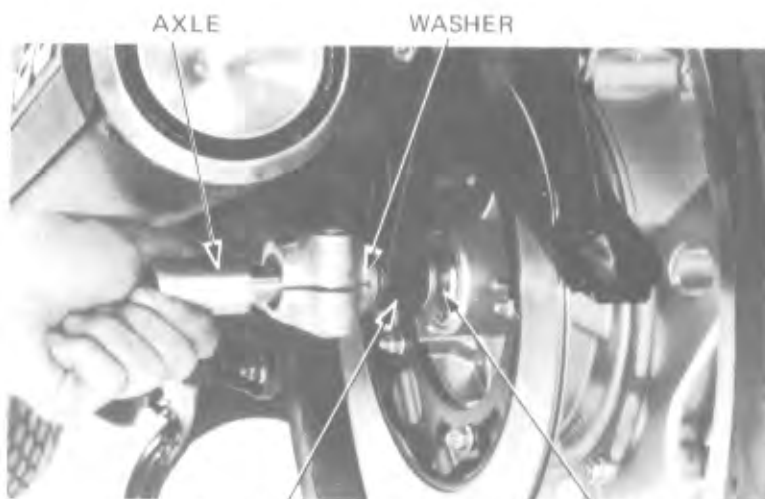
REAR WHEEL REMOVAL

Place the motorcycle on its center stand.
Place a wood block under the rear tire to support the wheel.
Loosen the axle nut.
Remove the three nuts attaching the swingarm to the final gear case.



AXLE NUT

Remove the axle pinch bolt.
Remove the rear axle.



BRAKE CALIPER BRACKET

COLLAR

Turn the rear brake caliper up and pull the brake torque link outward to allow removal of the rear wheel.



REAR BRAKE CALIPER



Remove the final gear case and the wheel.

CAUTION

Do not lay the final gear case over. The gear oil may flow out of the breather.

NOTE

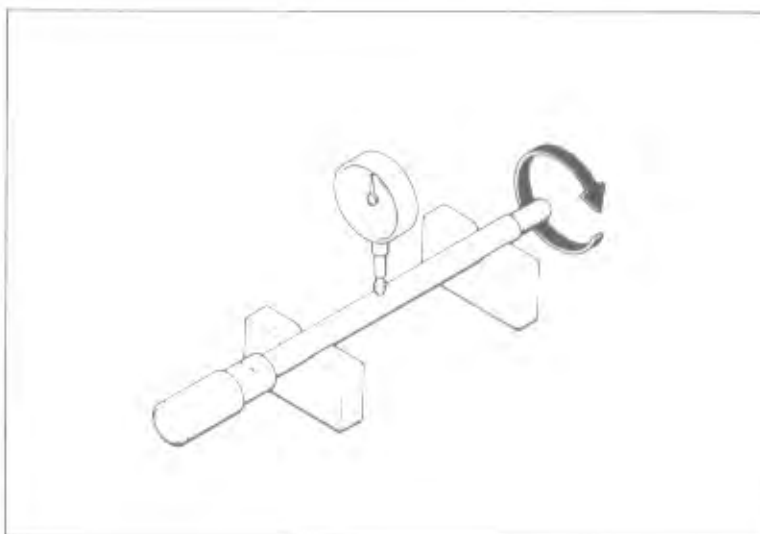
Do not depress the brake pedal while the wheel is off the motorcycle.



AXLE INSPECTION

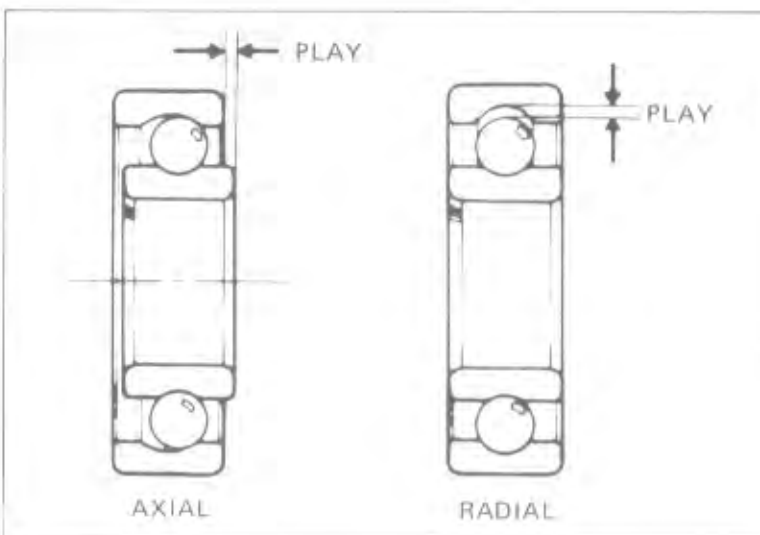
Set the axle shaft in V-blocks and measure the runout. The actual runout is 1/2 of the total indicator reading.

SERVICE LIMIT: 0.20 mm (0.008 in)



REAR WHEEL BEARING INSPECTION

Rotate the rear wheel bearings by hand. Replace the wheel bearings with new ones if they are noisy or have excessive play.





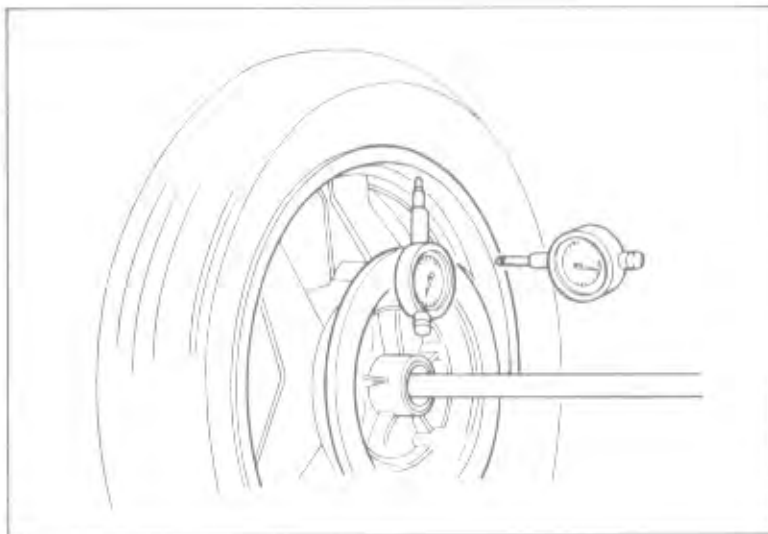
REAR WHEEL RIM RUNOUT INSPECTION

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

SERVICE LIMITS:

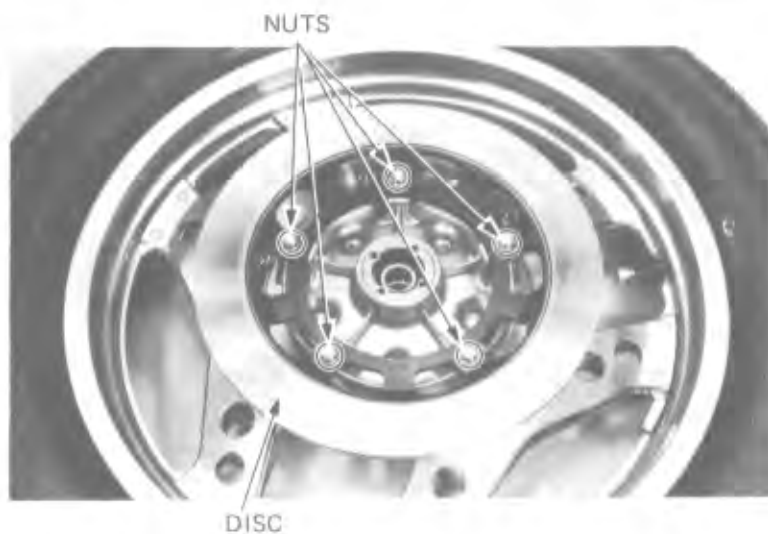
RADIAL RUNOUT: 2.0 mm (0.08 in)

AXIAL RUNOUT: 2.0 mm (0.08 in)



REAR WHEEL DISASSEMBLY

Remove the rear brake discs.



Remove the bearing retainer with the Retainer Wrench and Remove the final driven flange.



RETAINER WRENCH 07910-4300000



REAR WHEEL/SUSPENSION

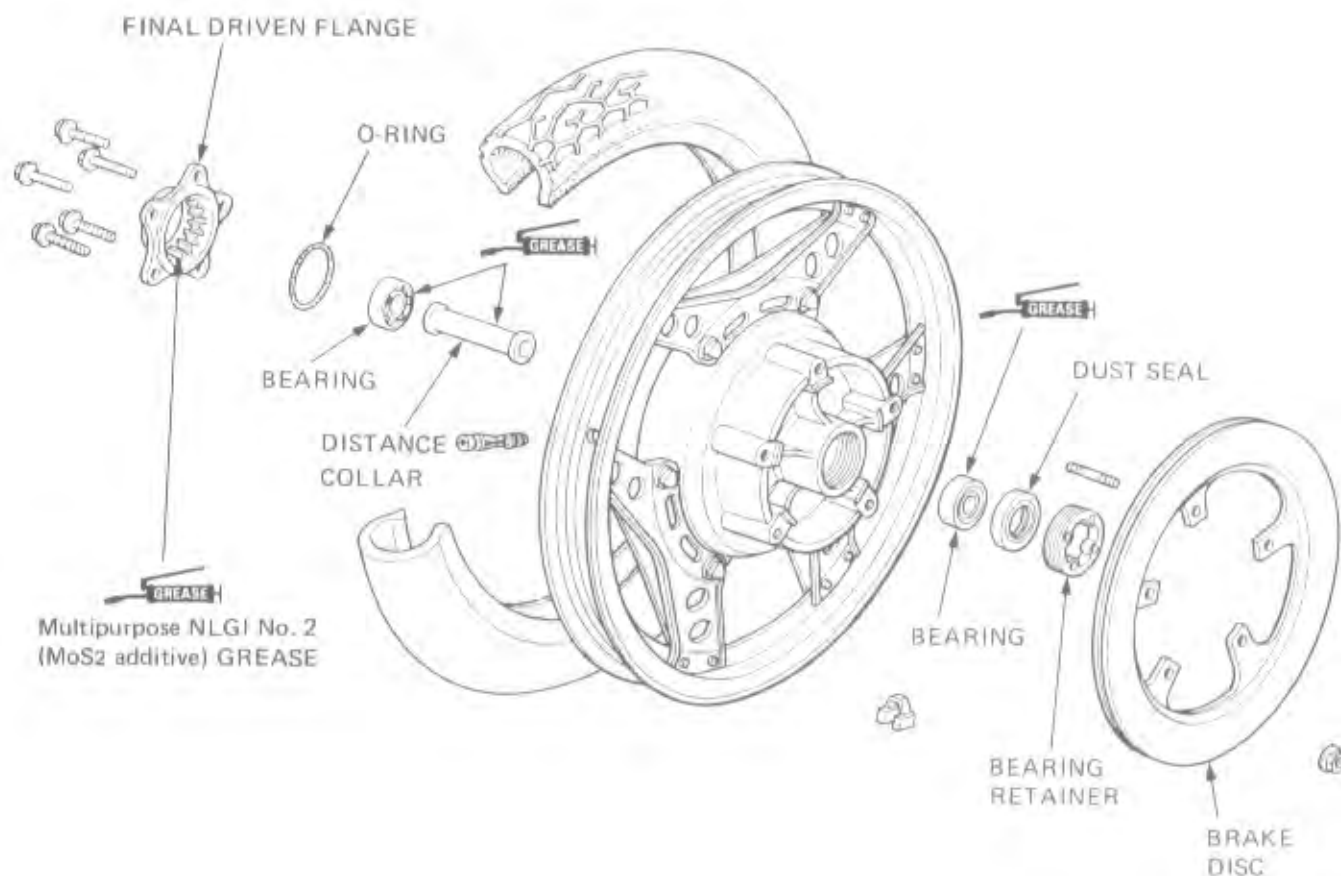
Remove the bearings and distance collar from the rear wheel hub.

NOTE

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



REAR WHEEL ASSEMBLY





Pack all bearing cavities with grease and drive in the bearing with a bearing driver.
Drive the left (retainer side) bearing in first.

CAUTION

Drive the bearings in squarely with the sealed end facing out, making sure they are fully seated.



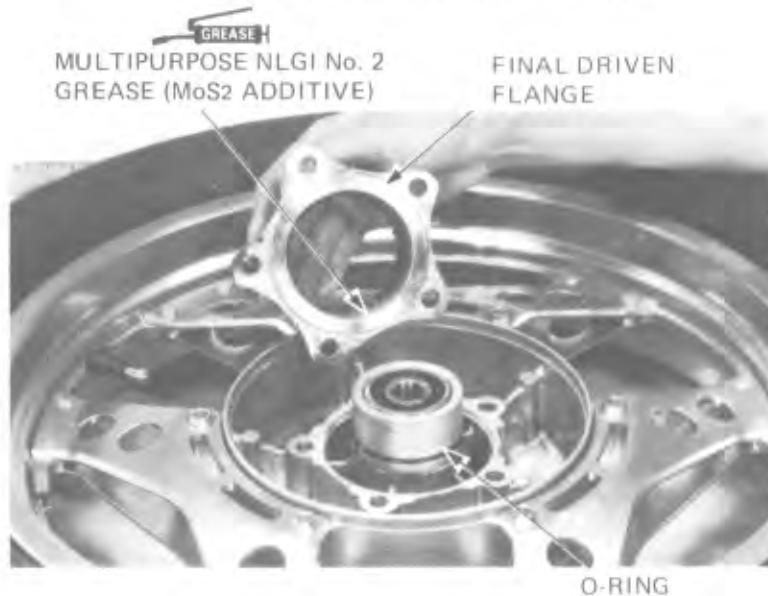
Install the dust seal.
Install the bearing retainer with the Retainer Wrench as shown.
Peen the retainer to the hub.

NOTE

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



Install the O-ring. Lubricate the splines of the final drive flange and the O-ring with lithium-based Multipurpose NLGI No. 2 Grease (MoS₂ additive).





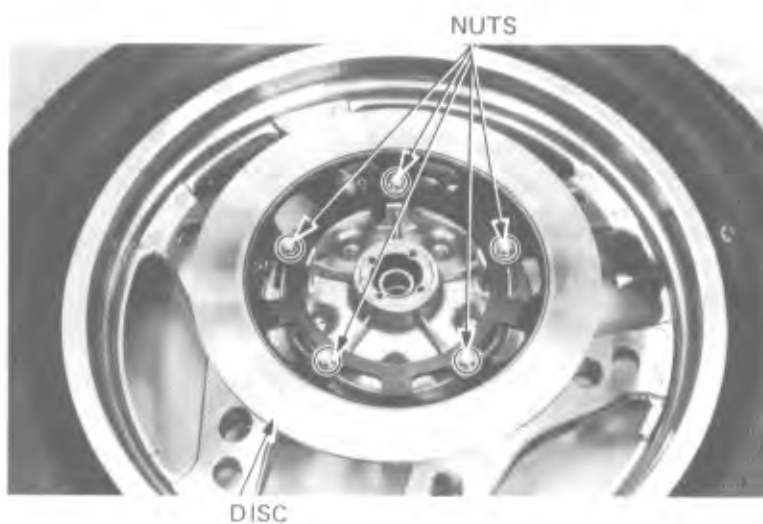
Install the final drive flange and torque the bolts.

TORQUE: 40–50 N·m
(4.0–5.0 kg-m, 29–36 ft-lb)



Install the rear brake disc.

TORQUE: 10–12 N·m
(1.0–1.2 kg-m, 7–9 ft-lb)



MULTIPURPOSE NLGI No. 2 GREASE
(MoS₂ ADDITIVE)

REAR WHEEL INSTALLATION

Apply Multipurpose NLGI No. 2 Grease (MoS₂ additive) to the final driven flange spline of the rear wheel and ring gear.

Insert the distance collar into the final gear case and install the case on the rear wheel.

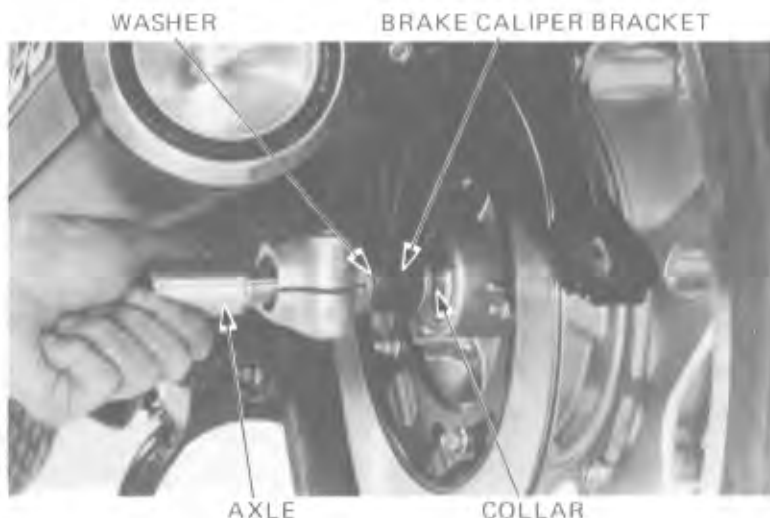




Install the rear wheel with the final gear case. Fit the final drive gear case splines into the drive-shaft end and loosely install the gear case nuts. Place a wood block under the wheel to support it. Insert the rear axle through the swingarm, washer, brake caliper bracket, collar and rear wheel.

Torque the gear case nuts to specification.

TORQUE: 55–65 N·m
(5.5–6.5 kg-m, 40–47 ft-lb)

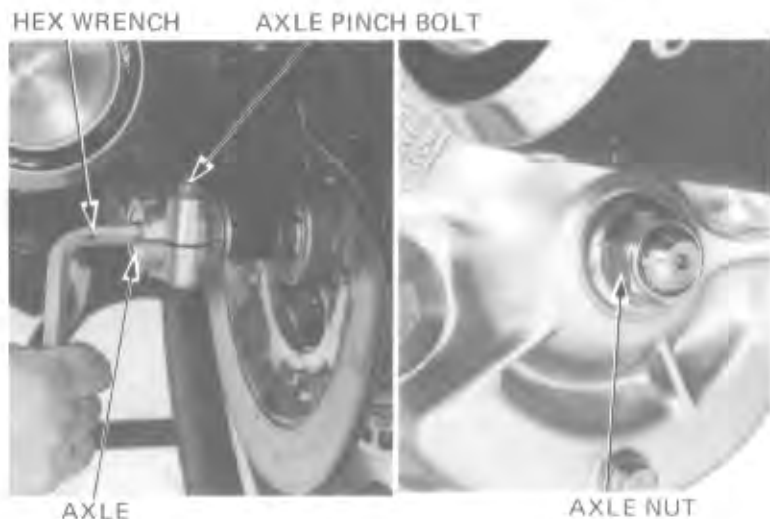


Install and Tighten the axle nut while holding the left axle end with a hex wrench.

TORQUE: 80–100 N·m
(8.0–10.0 kg-m, 58–72 ft-lb)

Tighten the axle pinch bolt.

TORQUE: 20–30 N·m
(2.0–3.0 kg-m, 14–22 ft-lb)



SHOCK ABSORBER

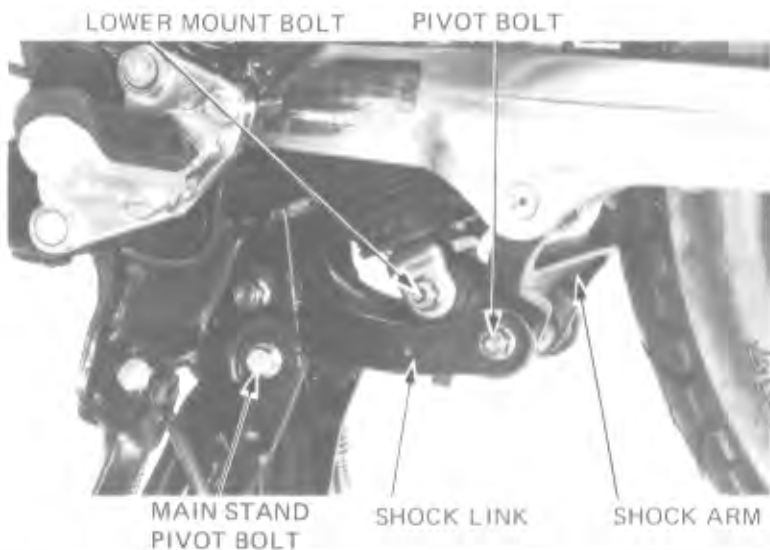
REMOVAL

Place the motorcycle on the center stand. Remove the pivot bolt connecting the shock arm to the shock link. Loosen the main stand pivot bolts (left and right). Unscrew them just enough to allow the shock link to fall free.

WARNING

If you unscrew the pivot bolts all the way, the mainstand will come off and the motorcycle will fall down.

Push down on the shock link.



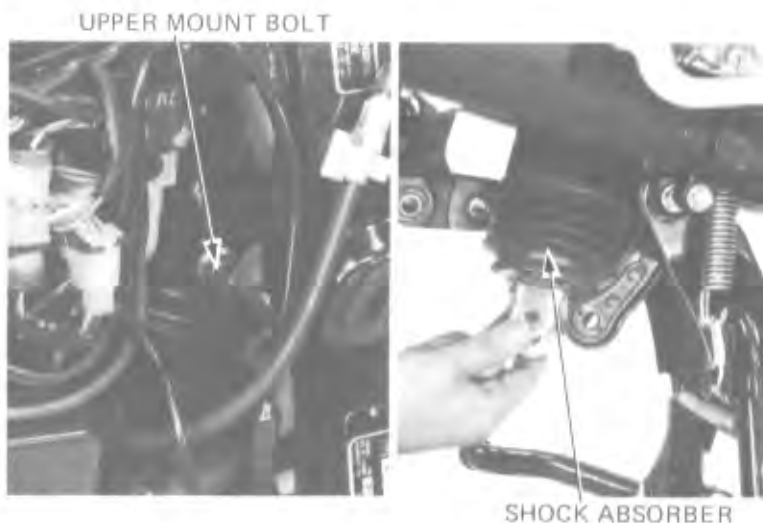


Remove the crankcase breather separator.
Disconnect the air hose from the hose clamp and remove the shock absorber upper mount bolt.

NOTE

Hold the shock absorber up to prevent it from falling.

Remove the shock absorber.

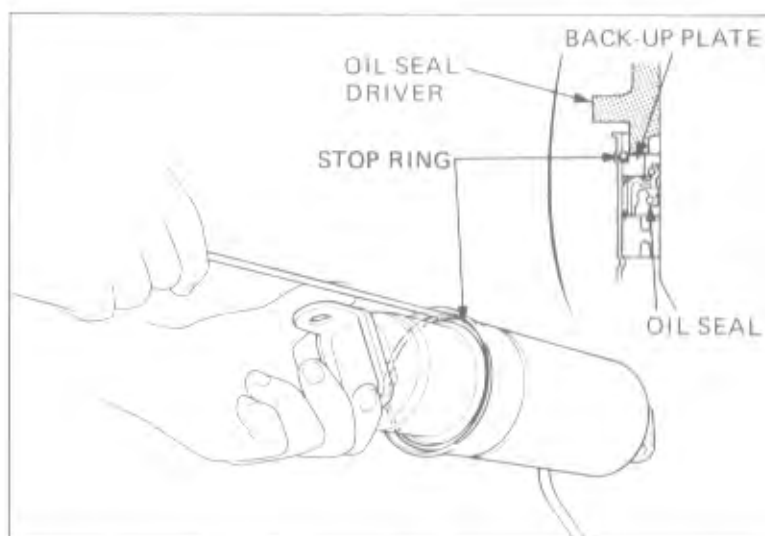


OIL SEAL REPLACEMENT

Release air pressure and remove the air valve from the hose.

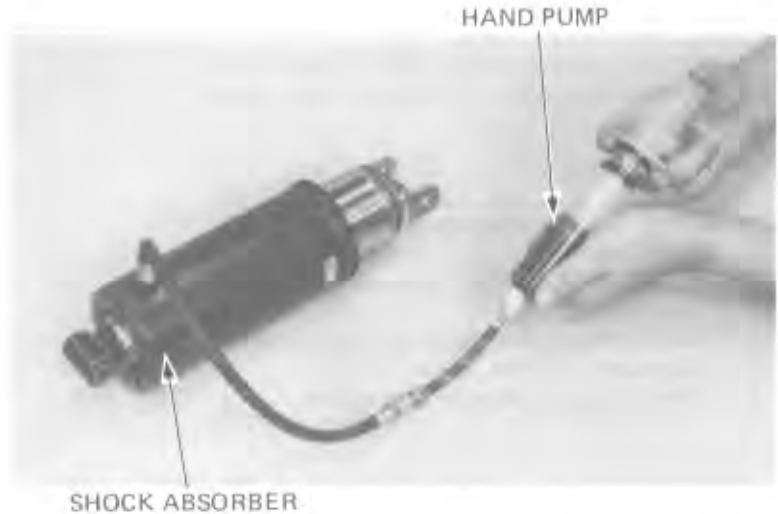


Remove the boot band and boot.
To remove the stop ring, press down on the back-up plate and oil seal.
Then remove the stop ring and back-up plate.





Remove the core from the air valve. Attach a hand pump filled with ATF and pump the ATF into the shock until the shock is full. The pump will be very hard to operate when the shock is full. Remove the pump and install the valve core.



Place the Oil Seal Driver on the oil seal. Place the shock absorber in the hydraulic press using a V-block on the base of the press. Press the oil seal out by compressing the shock absorber.

CAUTION

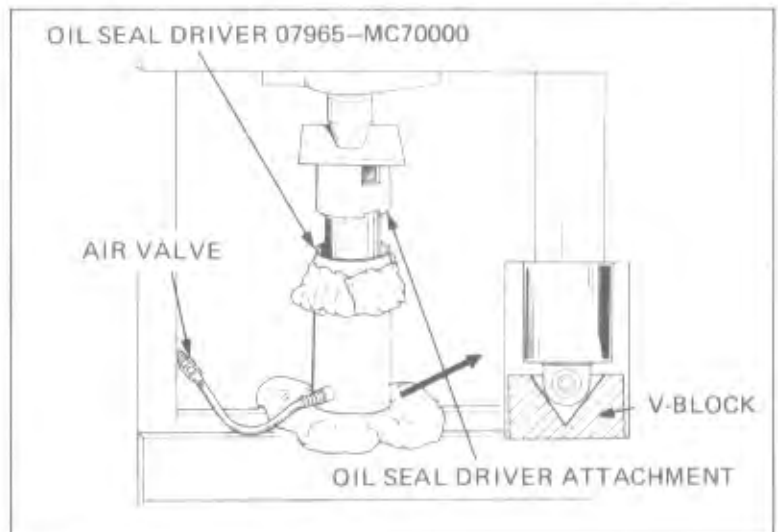
Spill as little ATF as possible to prevent air from entering the shock. Air in the shock will cause the damping to be too soft.

NOTE

The oil seal can not be pressed out if there is air in the ATF.

CAUTION

Place the shock absorber in the hydraulic press on its clevis, not on its case.





REAR WHEEL/SUSPENSION

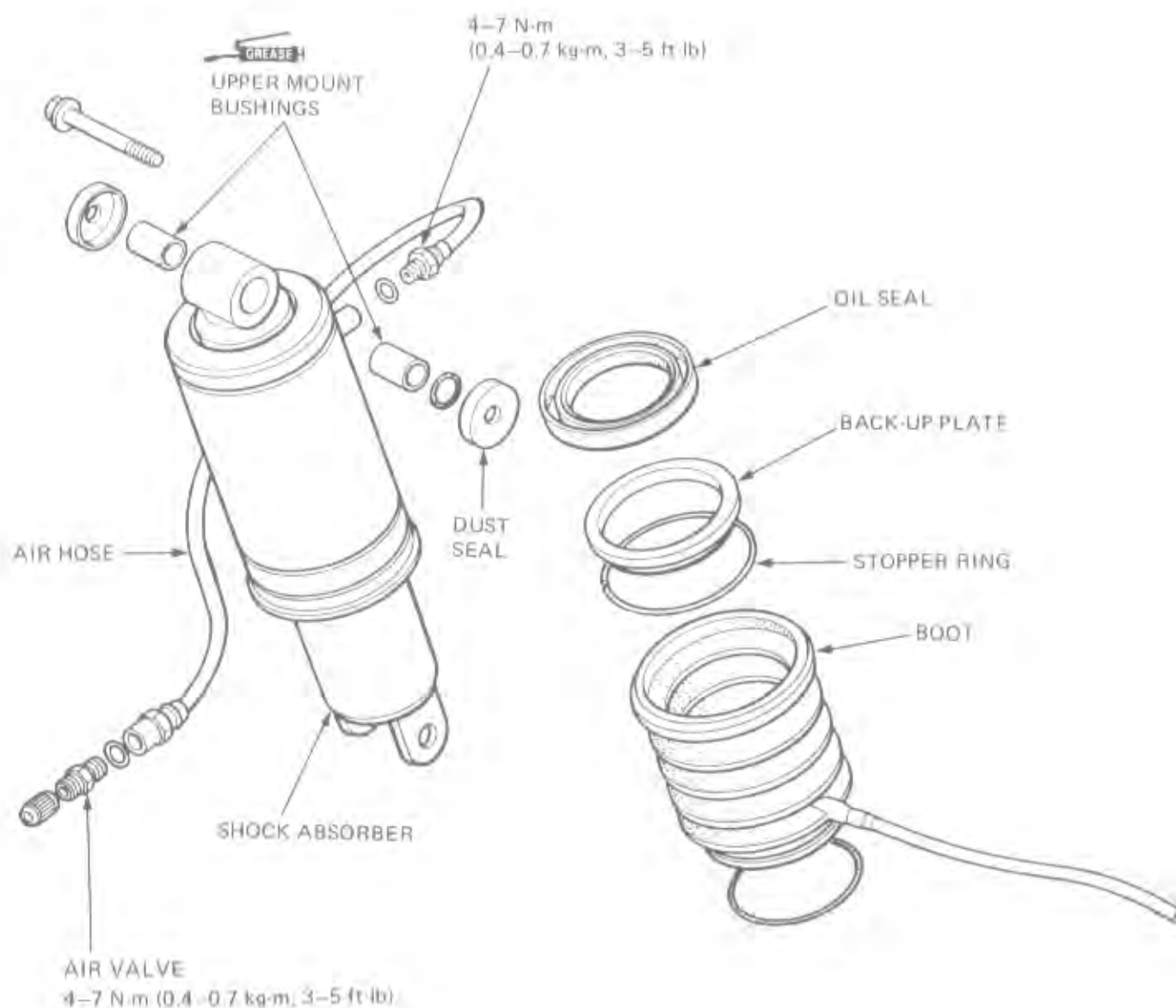
SHOCK ABSORBER ASSEMBLY

Apply molybdenum disulfide (MoS₂) paste (containing more than 45% of MoS₂) to the upper mount bushings.

NOTE

Use MoS₂ paste (containing more than 45% of MoS₂) as follows:

- Molykote® G-n Paste manufactured by Dow Corning U.S.A.
- Rocol Paste manufactured by Sumico Lubricant Co., LTD., Japan.
- Other lubricants of equivalent quality.





Fill the shock absorber with damper oil (ATF or equivalent).

Wrap a piece of tape around the groove at the end of the shock absorber.

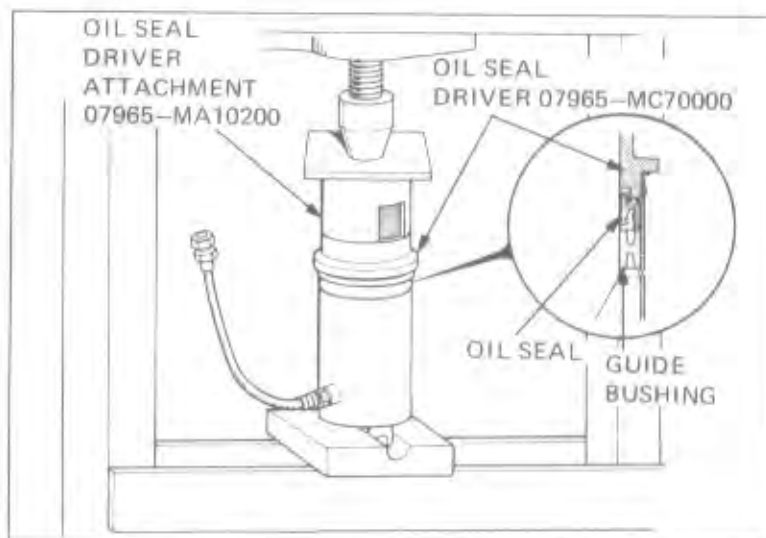
Dip the oil seal in ATF and install it on the damper.

CAUTION

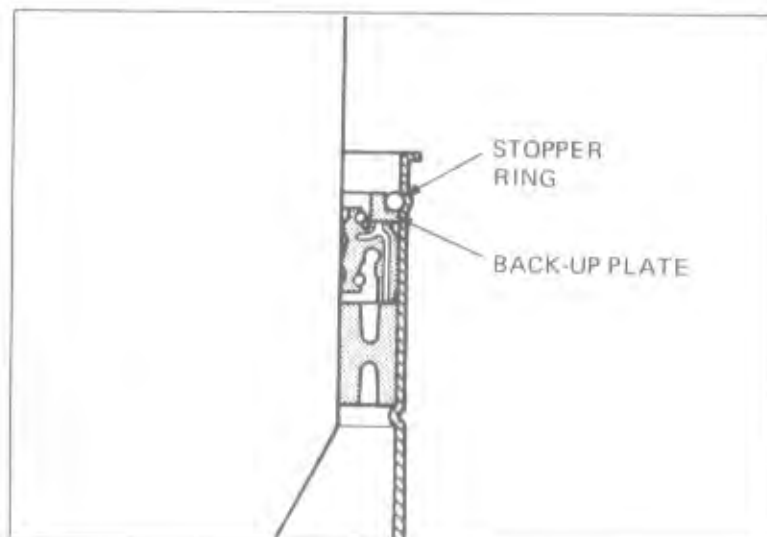
Be careful not to damage the oil seal during installation.



Press the oil seal in the shock absorber with a hydraulic press until the oil seal driver stops at the edge of the outer case.



Install the back-up plate and stopper ring.





REAR WHEEL/SUSPENSION

Remove the core from the air valve and fill the shock absorber with ATF. (Page 16-11)

CAUTION

Make sure that the damper is completely empty of air.

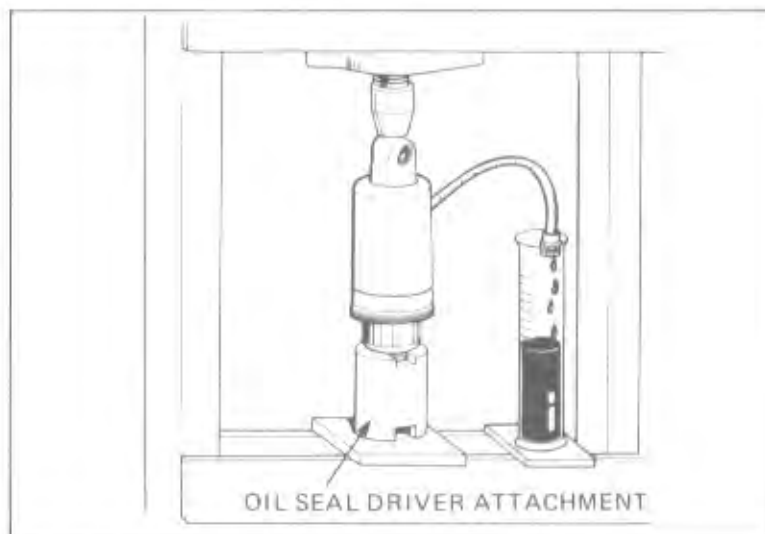
Drain 180 cm³ (6.1 oz) of ATF from the shock, by compressing the shock absorber slowly.

DRAIN: 180 cm³ (6.1 oz)

Reinstall the valve core into the air valve.

Remove the shock absorber from the hydraulic press.

Install the boot and boot clip.



Apply molybdenum disulfide (MoS₂) paste (containing more than 45% of MoS₂) to the upper mount bushings.

NOTE

- Use MoS₂ paste (containing more than 45% of MoS₂) as follows:
 - *Molykote® G-n Paste manufactured by Dow Corning U.S.A.
 - *Rocol Paste manufactured by Sumico Lubricant Co., Ltd., Japan.
 - *Other lubricants of equivalent quality.
- Do not damage the shock absorber body.

Install and tighten the upper mount bolt.

TORQUE: 38–48 N·m
(3.8–4.8 kg·m, 28–35 ft·lb)

Install the crankcase breather separator.

Lubricate the linkage pivots with MoS₂ paste (containing more than 45% of MoS₂).

Install the shock arm and shock link.

Tighten the lower mount bolt.

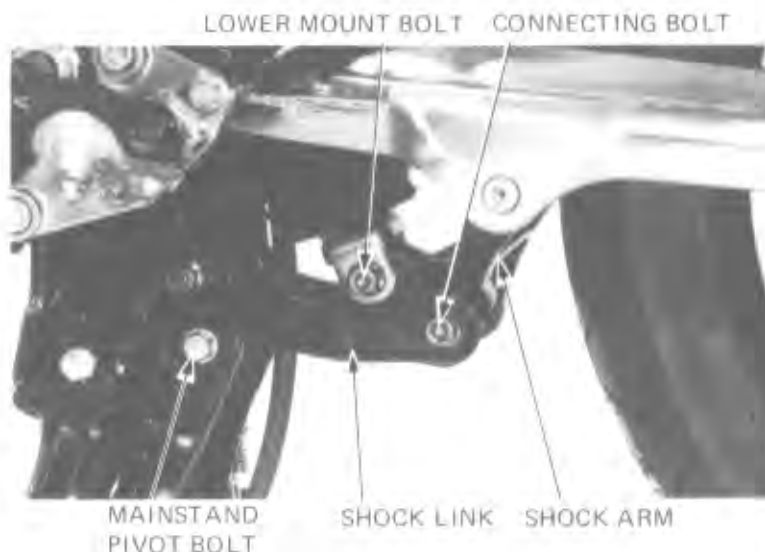
TORQUE: 38–48 N·m
(3.8–4.8 kg·m, 28–35 ft·lb)

Install the shock arm-to-shock link connecting bolt.

TORQUE: 50–65 N·m
(5.0–6.5 kg·m, 36–47 ft·lb)

Tighten the mainstand pivot bolts.

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





Make sure all weight is off the rear wheel, and add air to the shock absorber.

RECOMMENDED PRESSURE:

100–500 kPa (1.0–5.0 kg/cm², 14–70 psi)



SWINGARM/DRIVESHAFT

REMOVAL

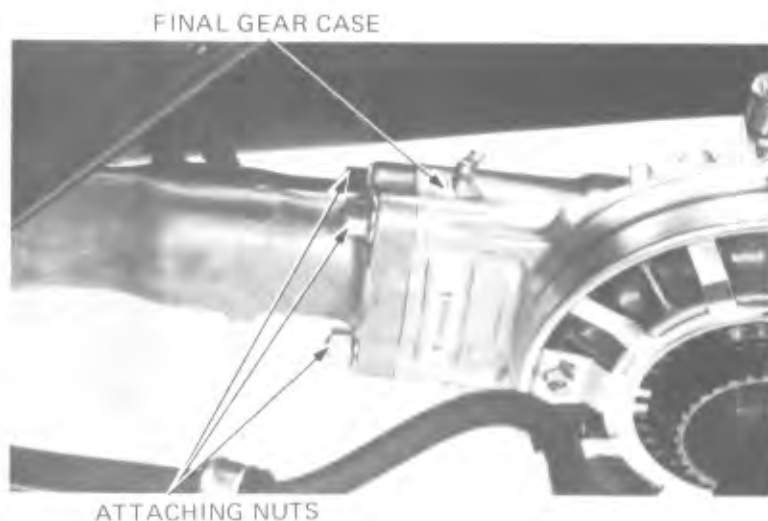
Remove the rear wheel.

Remove the final gear case (Section 17).

Remove the bolt connecting the shock arm to the shock link (page 16-9).

CAUTION

Pump grease into the final gear case through the grease fitting whenever the drive shaft is removed from the engine.



Slide the boot forward and remove the drive shaft lock bolt.





REAR WHEEL/SUSPENSION

LOCK NUT WRENCH

07908-4690001 or KS-HBA-469-08 (U.S.A. only)

PIVOT BOLT

Loosen the swingarm pivot lock nut and bolt.



SOCKET BIT, 17 mm 07703-0020500
or COMMERCIALY AVAILABLE IN U.S.A.

Remove the two hose clamp and torque link.
Remove the rear shock absorber (page 16-9).



Remove the swingarm pivot lock nut and bolt.
Remove the swingarm.





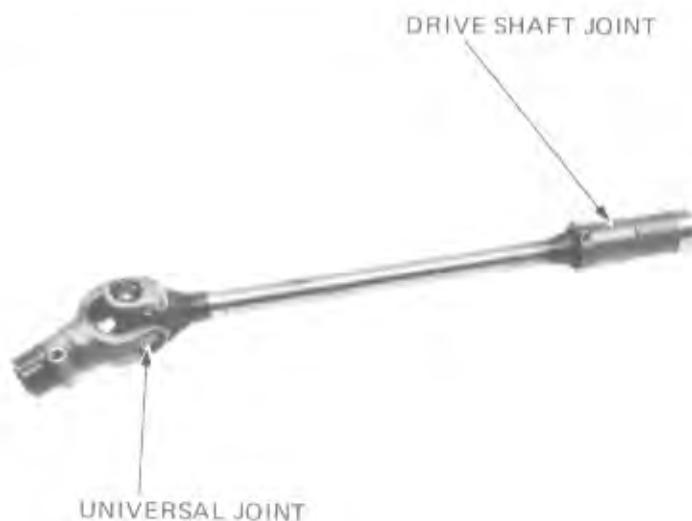
DRIVE SHAFT INSPECTION

Remove the drive shaft from the swingarm.

Inspect the drive shaft and drive shaft joint splines for wear and damage.

Inspect the universal joint. There should be no play in the bearings. Rotate the shaft and joint in opposite directions.

If there is any evidence of side play, the shaft must be replaced.



Drive out the spring pin.

Separate the drive shaft joint from the drive shaft.



Lubricate the splines with Multipurpose NLGI No. 2 Grease (MoS₂ additive).

Assemble the drive shaft and drive shaft joint and drive in the spring pin.

NOTE

The spring pin should be recessed in the drive shaft joint.





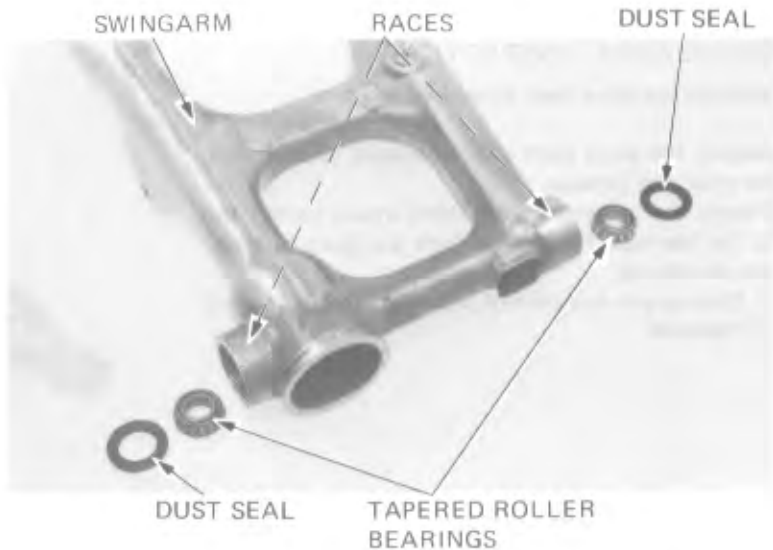
REAR WHEEL/SUSPENSION

PIVOT BEARING REPLACEMENT

Inspect the tapered roller bearings and races for damage and wear.

NOTE

Always replace pivot bearings in pairs.



Remove the outer races with the bearing remover.
Remove the grease holder.

BEARING REMOVER, 30 mm 07936-8890300



Remove the cap and lightly tap the pivot bearing holder to drive it out.

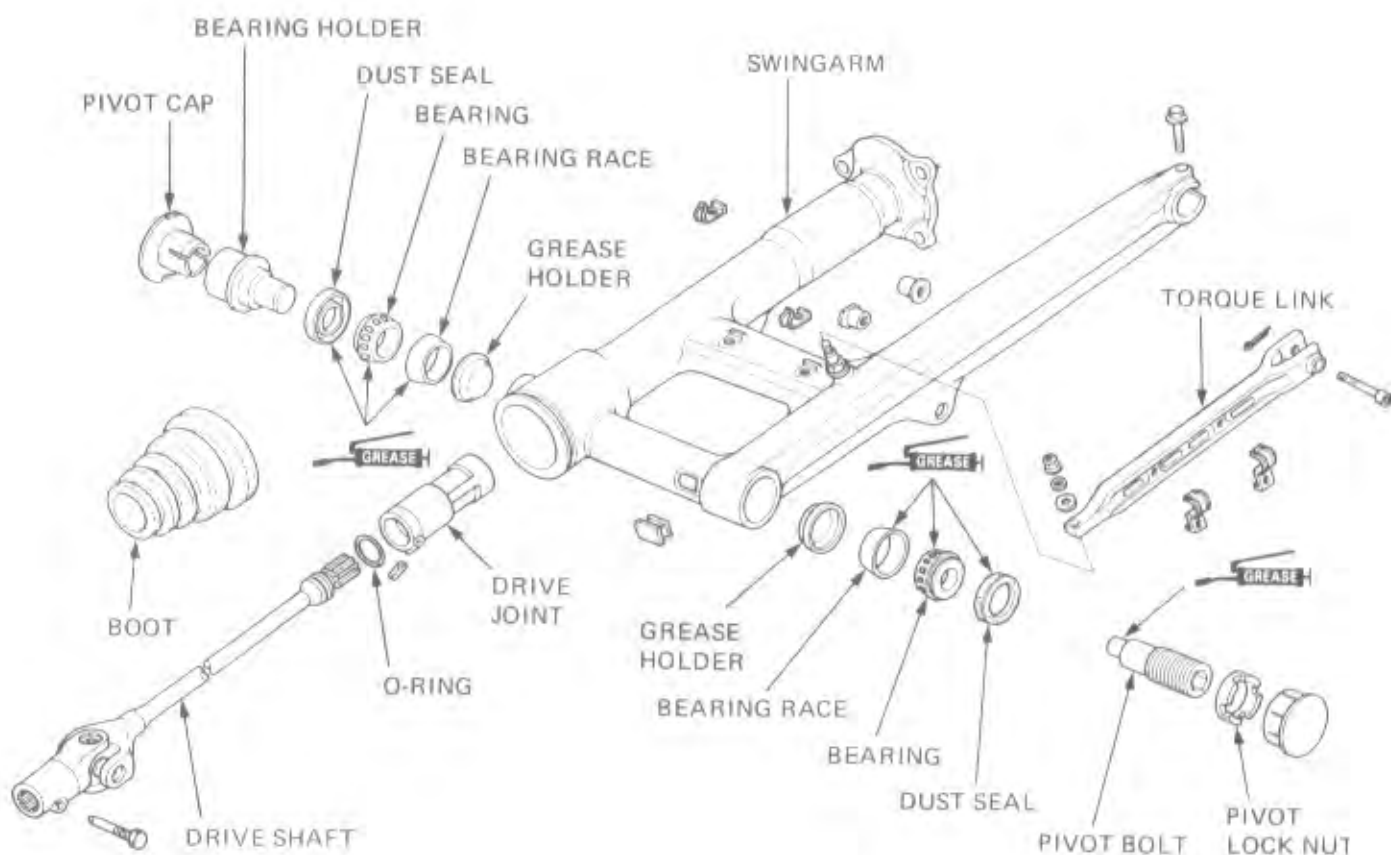
CAUTION

The pivot bearing holder is easily damaged, so use care when removing it.

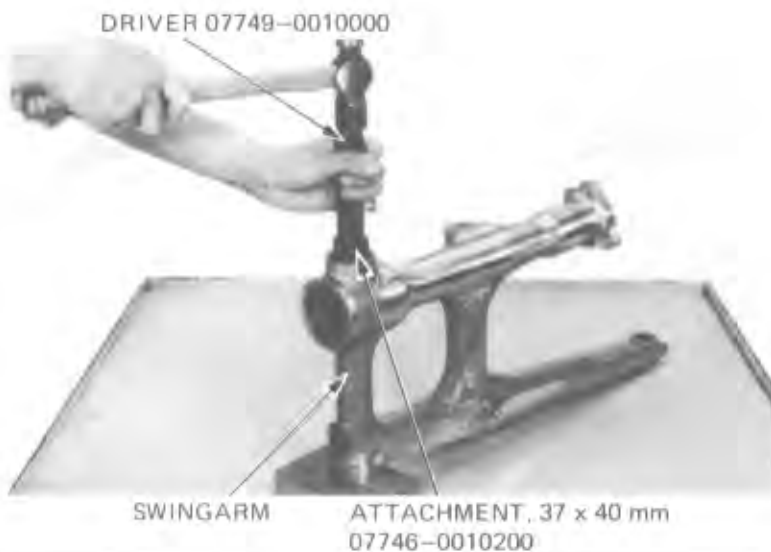




Pack all bearing cavities with grease and grease the oil seal lip.



Install the grease holder.
Drive the new bearing races squarely into the swingarm.



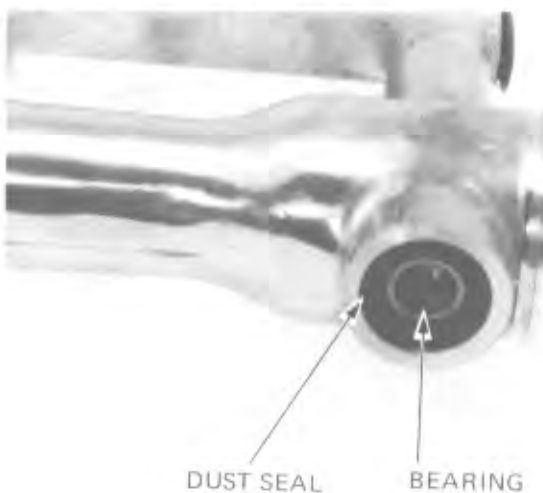


REAR WHEEL/SUSPENSION

Install the bearing holder so that the end is seated against the frame body.



Install the bearings and dust seal into the swingarm.



SWINGARM INSTALLATION

Install the drive shaft into the swingarm.
Install the swingarm on the pivot bearing holder from the right side.





Apply grease to the tip of the pivot bolt and loosely install it.

NOTE

Make sure that the end of the pivot bolt is inserted into the bearing inner.

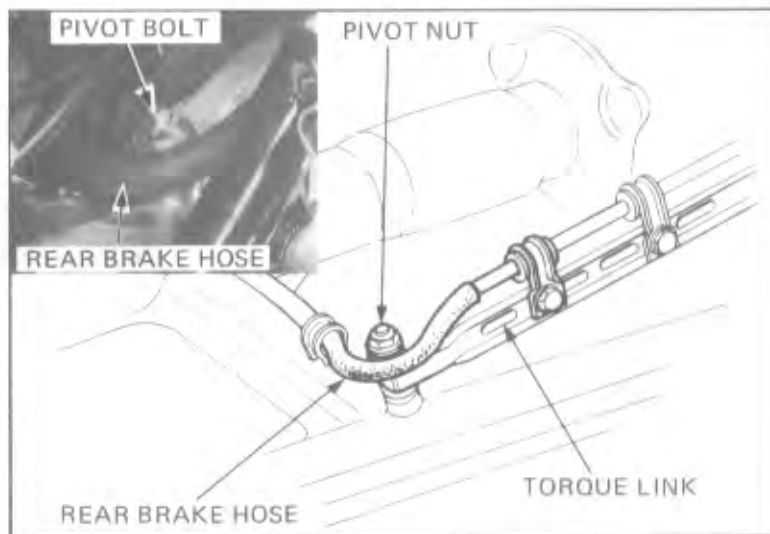
Install the brake torque link.
Install the brake hose clamps.



Route the rear brake hose on top of the torque link and clamp in place.

WARNING

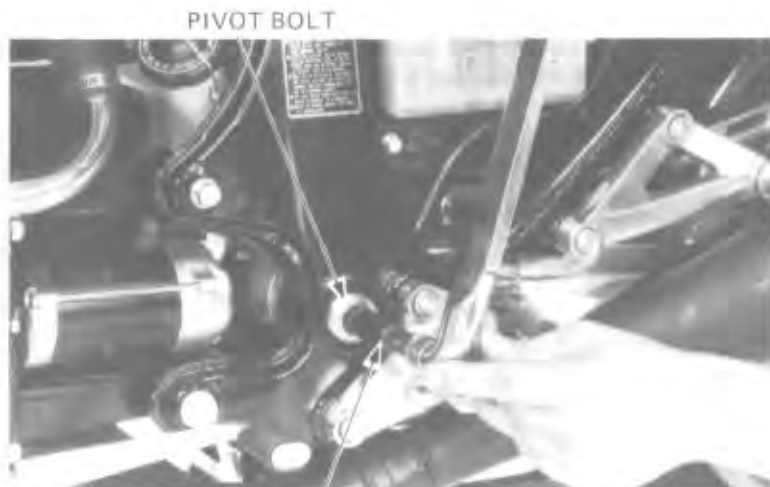
Be sure the rear brake hose does not contact the torque link pivot and nut.



Tighten the pivot bolt to the specified torque.

TORQUE: 10–12 N·m
(1.0–1.2 kg-m, 7–9 ft-lb)

Move the swingarm up and down several times to seat the bearings with the pivot bolt then retighten the pivot bolt to the specified torque.



SOCKET BIT, 17 mm 07703-0020500 or
COMMERCIALY AVAILABLE IN U.S.A.



LOCK NUT WRENCH 07908-4690001

Install the pivot lock nut on the pivot bolt.
Hold the pivot bolt and tighten the pivot lock nut to a torque wrench reading of 90–115 N·m (9.0–11.5 kg·m, 65–83 ft·lb).

NOTE

Because the lock nut wrench increases the torque wrench's leverage, the torque actually applied to the lock nut is the specified torque value – 100–130 N·m (10.0–13.0 kg·m, 72–94 ft·lb).

Install the pivot caps.



SOCKET BIT, 17 mm 07703-0020500 or
COMMERCIALLY AVAILABLE IN U.S.A.

Lubricate the drive shaft splines with Multipurpose NLGI No. 2 Grease (MoS₂ additive).

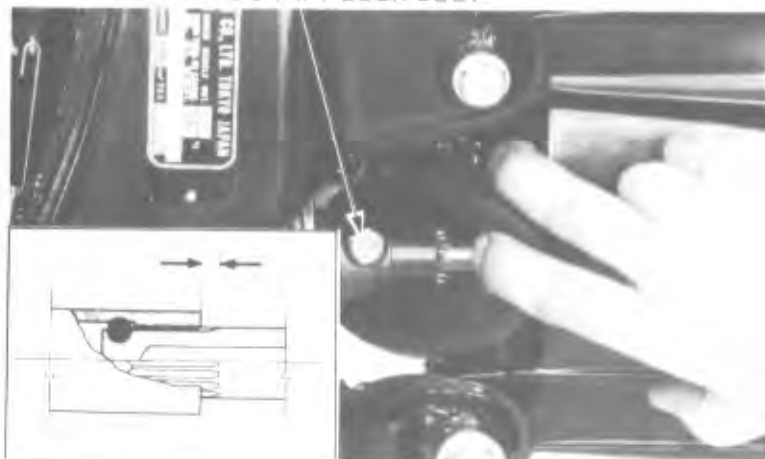
Attach the drive shaft and torque the lock bolt.

TORQUE: 18–28 N·m
(1.8–2.8 kg·m, 13–20 ft·lb)

WARNING

Check that the final shaft does not have more than 10 mm of the final shaft splines showing.

DRIVE SHAFT LOCK BOLT



Install the rear shock absorber (page 16-14).
Install the final gear case and rear wheel (page 16-8).

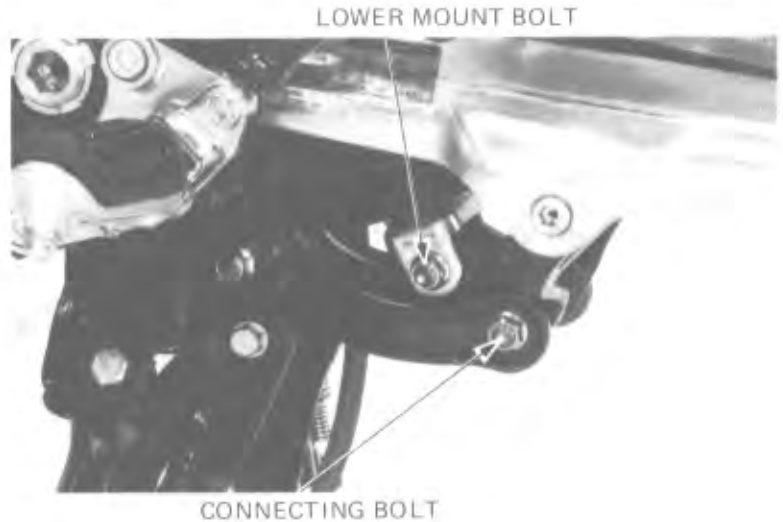




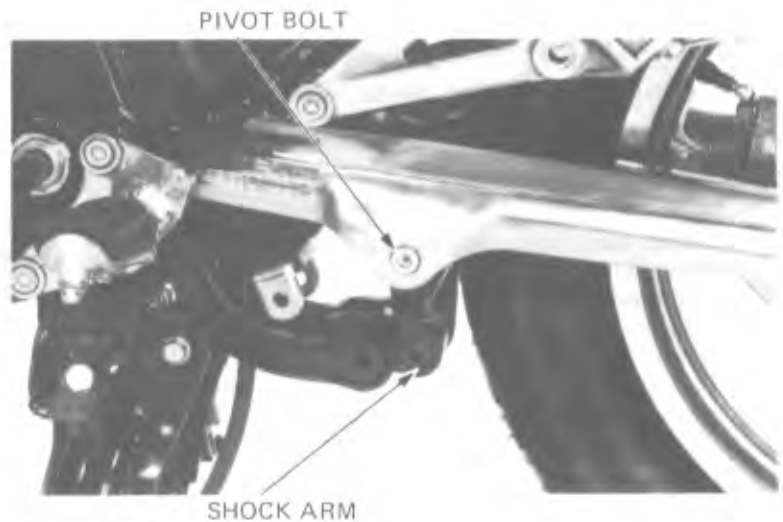
SUSPENSION LINKAGE

REMOVAL

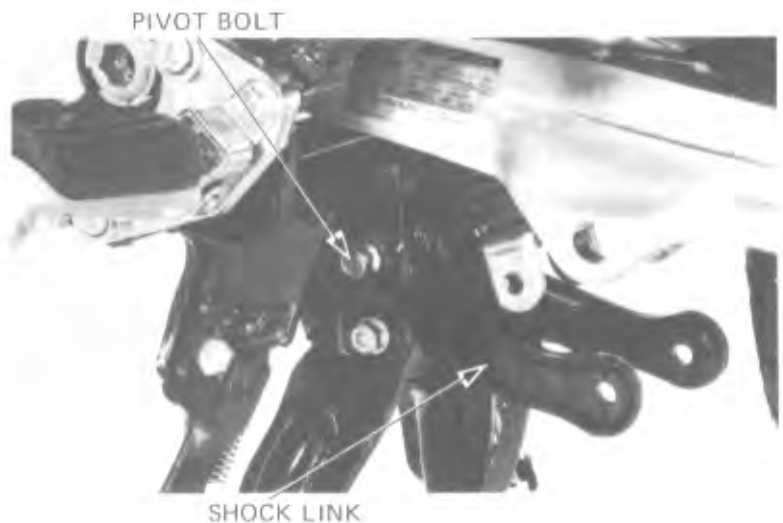
Remove the muffler.
Remove the rear shock absorber lower mount bolt.
Remove the bolt connecting the shock arm to the shock link.



Remove the pivot bolts attaching the shock arm to the swingarm.



Remove the shock link by removing the pivot bolt.





REAR WHEEL/SUSPENSION

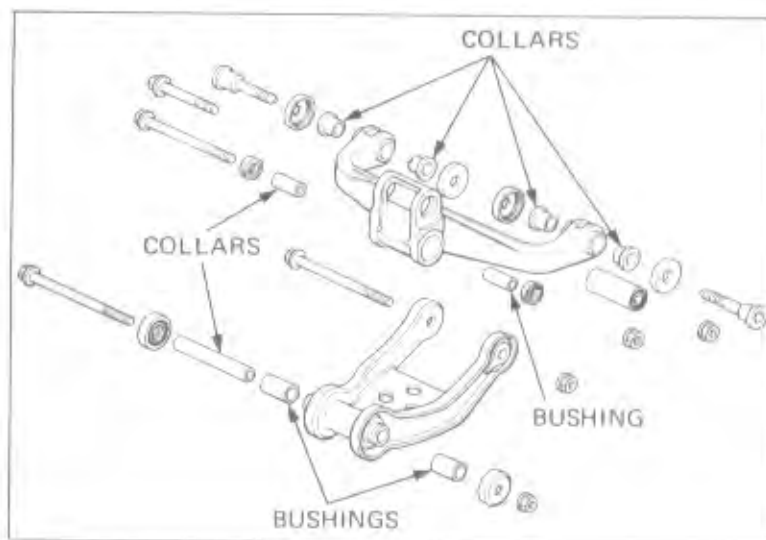
INSPECTION

Inspect the outside surface of the collars and the inside of the bushings.

Replace them if they have score marks, scratches, or excessive or abnormal wear.

NOTE

The bushings and shock arm nuts are press-fitted. Do not remove the bushings and shock arm nuts unless they have to be replaced.



INSTALLATION

Apply molybdenum disulfide (MoS₂) paste (containing more than 45% of MoS₂) to the insides of the bushings and dust seal lips.

NOTE

Use MoS₂ paste (containing more than 45% of MoS₂) as follows:

- Molykote® G-n Paste manufactured by Dow Corning U.S.A.
- Rocol Paste manufactured by Sumico Lubricant Co., LTD., Japan.
- Other lubricants of equivalent quality.



Install the collars and dust seals making sure that the sealing lips seat properly.

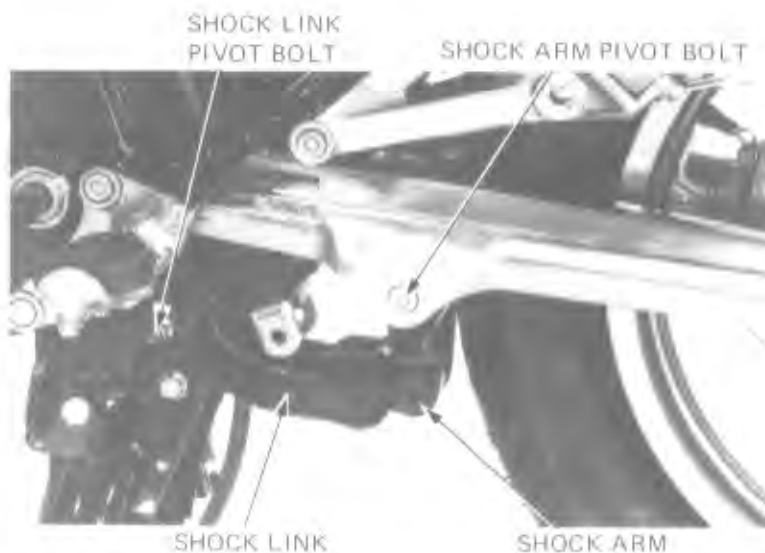
Attach the shock link onto the frame and torque the pivot bolt.

TORQUE: 50–65 N·m
(5.0–6.5 kg·m, 36–47 ft·lb)

Install the shock arm to the swingarm and torque the pivot bolts.

TORQUE: 40–50 N·m
(4.0–5.0 kg·m, 29–36 ft·lb)

Check the shock link and arm operation by moving them.





Install the shock absorber lower mount to the shock arm and torque the mount bolt.

TORQUE: 38–48 N·m
(3.8–4.8 kg·m, 27–35 ft-lb)

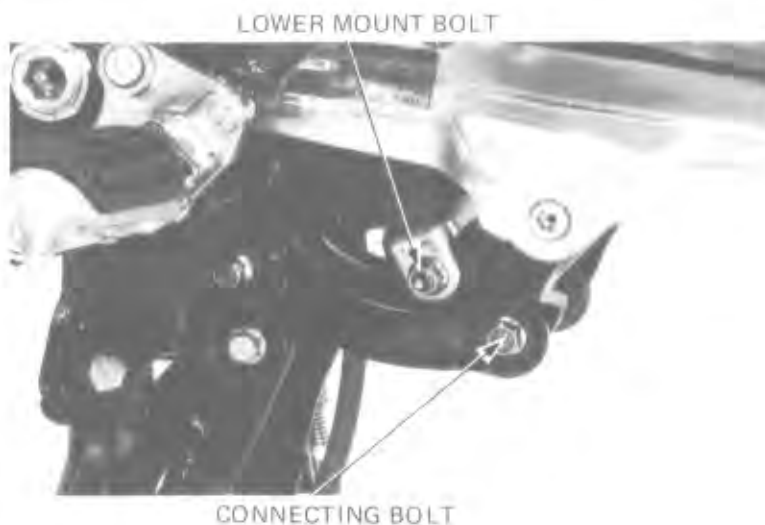
Connect the shock arm to the shock link and torque the connecting bolt.

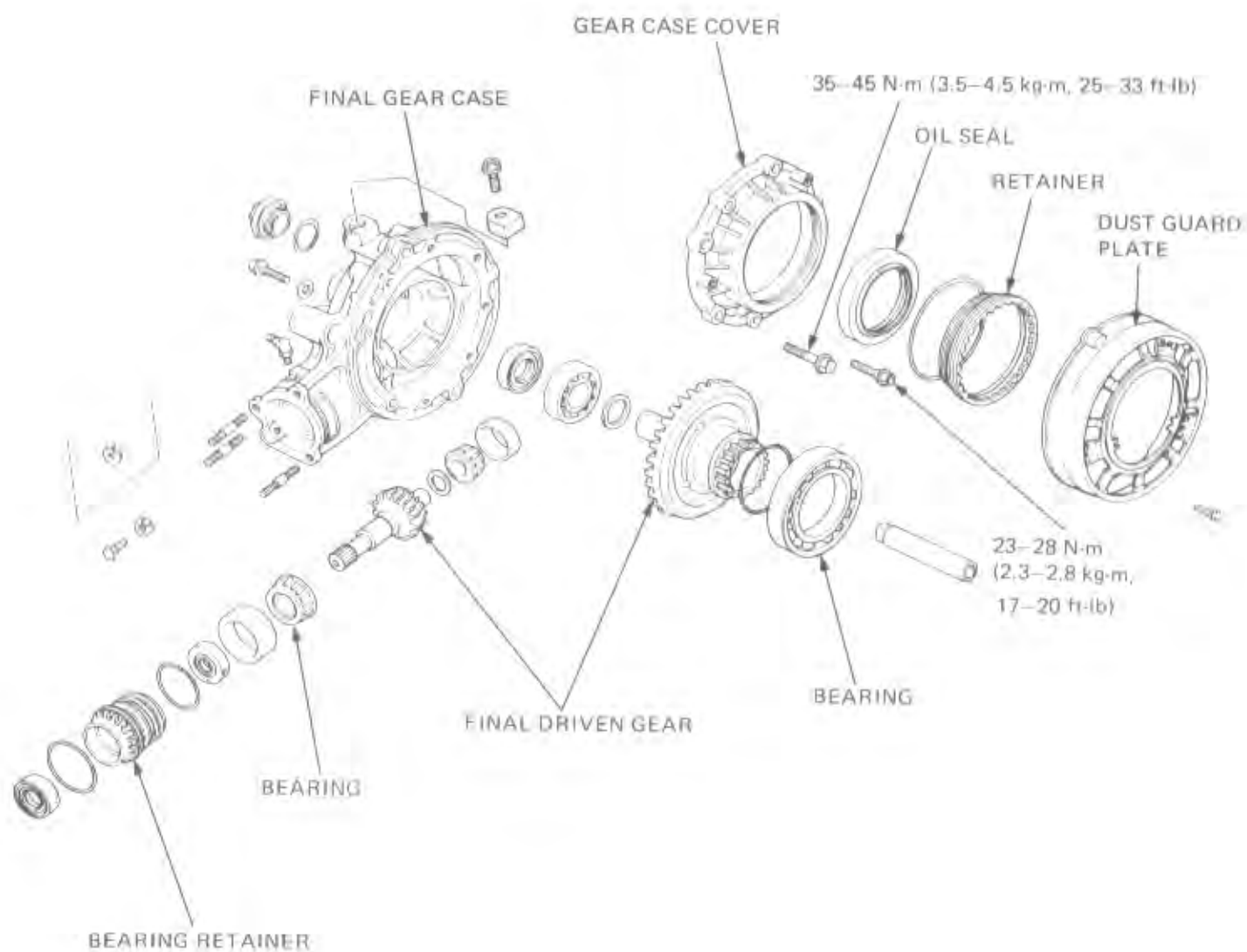
TORQUE: 50–65 N·m
(5.0–6.5 kg·m, 36–47 ft-lb)

Install the muffler.

NOTE

Check that the rear shock absorber upper mount rubber bushing and shock arm lower mount bushing are not twisted.







SERVICE INFORMATION	17-1	PINION GEAR RETAINER	17- 7
TROUBLESHOOTING	17-2	PRELOAD INSPECTION AND	
FINAL DRIVE GEAR CASE	17-3	ADJUSTMENT	17- 9
BACKLASH INSPECTION	17-3	GEAR TOOTH CONTACT PATTERN	17-14
OIL SEAL REPLACEMENT	17-4	FINAL GEAR CASE INSTALLATION	17-16
BREATHING SYSTEM MAINTENANCE	17-7		

SERVICE INFORMATION

GENERAL

The final drive gear assembly must be removed for:

- Backlash inspection
- Pinion gear and assembly preloads inspection
- Oil seal, bearing and O-ring replacement.

SPECIFICATIONS

		Standard	Service Limit
Final gear oil	Capacity	160 – 180 cc (4.5 – 5.0 Imp oz, 5.4 – 6.1 US ozs)	—
	Recommended oil	Hypoid-gear oil API, GL-5 Above 5°C/41°F SAE #90 Below 5°C/41°F SAE #80	—
Backlash		0.08 – 0.18 mm (0.003 – 0.077 in)	0.25 mm (0.010 in)
Backlash difference		—	0.10 mm (0.004 in)
Pinion gear preload		0.4 – 0.5 N·m (4.0 – 5.0 kg-cm, 3.48 – 4.32 in-lb)	—
Assembly preload		0.6 – 0.9 N·m (6.0 – 9.0 kg-cm, 5.16 – 7.80 in-lb)	—

TORQUE VALUES

Final gear case cover 10 mm bolt:	35–45 N·m (3.5–4.5 kg-m, 25–33 ft-lb)
8 mm bolt:	23–28 N·m (2.3–2.8 kg-m, 17–20 ft-lb)
Final gear case nut	55–65 N·m (5.5–6.5 kg-m, 40–47 ft-lb)
Drain bolt	10–14 N·m (1.0–1.4 kg-m, 7–10 ft-lb)
Filler cap	10–14 N·m (1.0–1.4 kg-m, 7–10 ft-lb)
Rear axle nut	80–100 N·m (8.0–10.0 kg-m, 58–72 ft-lb)
Axle pinch bolt	20–30 N·m (2.0–3.0 kg-m, 14–22 ft-lb)



FINAL DRIVE

TOOLS

SPECIAL

Ring gear retainer wrench	07910-3710000	
Ring gear dis/assembly tool	07965-3710100	
Ring gear center guide	07965-4150100	
Bearing remover, 30 mm	07936-8890300	} 07936-8890100
Bearing remover handle	07936-3710100	
Bearing remover weight	07936-3710200	
Pinion gear retainer wrench	07910-4150000 or 07910-MA10100	
Attachment	07945-3330100	
Attachment	07945-3330300	
O-ring guide	07973-4630200	
Pre-load inspection tool	07998-4150000 (U.S.A. only)	
Pre-load inspection tool	07998-MC70000	
Pre-load inspection tool attachment	GN-AHM-98-MC7 (U.S.A. only)	
Pinion gear puller	07934-MA10100	} (07931-4630200 (U.S.A. only) or GN-AHM-34-MC7 (U.S.A. only)
Pinion gear puller attachment	07934-MA10200	

Common

Driver	07749-0010000
Attachment, 42 x 47 mm	07746-0010300
Attachment, 52 x 55 mm	07746-0010400
Pilot, 30 mm	07746-0040700

TROUBLESHOOTING

Rear Wheel Will Not Rotate Freely

- Rear brake dragging
- Damaged wheel bearing
- Damaged ring and pinion gear bearings
- Bent rear axle
- Bent swingarm
- Excessive final gear assembly preload

Excessive Noise

- Worn or scored ring gear shaft and driven flange
- Scored driven flange and wheel hub
- Worn or scored drive pinion and splines
- Worn pinion and ring gears
- Excessive backlash between pinion and ring gear
- Oil level too low

Oil Leak

- Clogged hub breather
- Oil level too high
- Seals damaged

Final Drive Gear Noise

- Oil level too low
- Excessive backlash
- Drive shaft splines damaged or worn
- Insufficient lubricant



FINAL DRIVE GEAR CASE

REMOVAL

Place the motorcycle on its center stand.
Remove the final gear case attaching nuts and remove the final gear case from the swingarm.
Remove the rear wheel, (Section 16) and the distance collar.

Drain the final gear case oil if disassembling the gear case.



BACKLASH INSPECTION

Place the final gear case in a vise.

CAUTION

Do not excessively tighten the drive hub in the vise.

Install the preload inspection tool to hold the pinion gear securely.

Set up a dial indicator on the ring gear teeth.

Remove the oil filler cap.

Set a horizontal type dial indicator on the ring gear through the oil filler hole.

Rotate the ring gear until gear slack is taken up and turn the ring gear back and forth to read backlash.

Standard: 0.08–0.18 mm (0.003–0.071 in)

Service Limit: 0.25 mm (0.010 in)

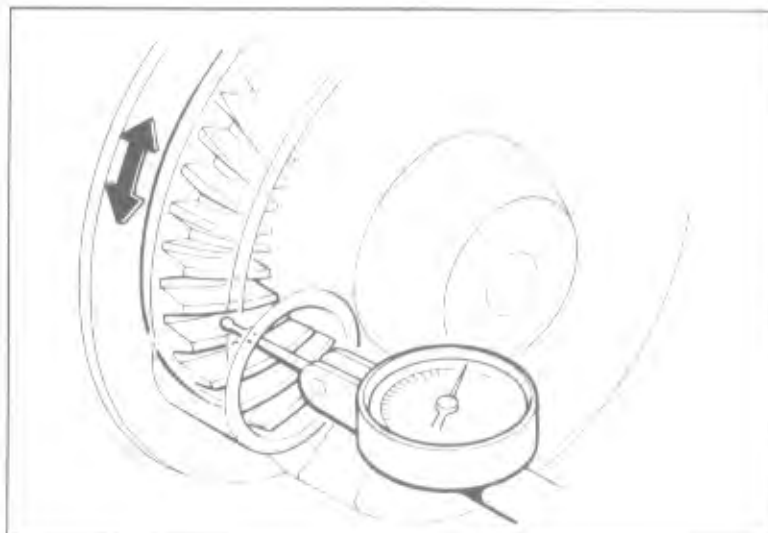


Remove the preload inspection tool and dial indicator. Turn the ring gear 120° and measure backlash. Repeat this procedure once more. Compare the difference between the three measurements.

Difference of Measurement

Service Limit: 0.10 mm (0.004 in)

If backlash is excessive, check the pinion gear preload and final gear assembly preload (page 17-13). If preload is correct the final drive and pinion gears are worn and the final drive assembly must be replaced.



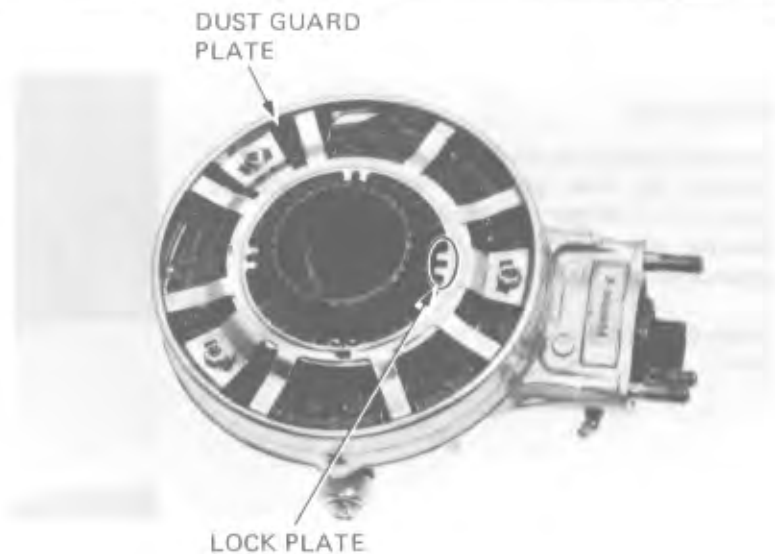


FINAL DRIVE

OIL SEAL REPLACEMENT

RING GEAR OIL SEAL

Straighten the tabs of the lock plates and remove the dust guard plate.



Remove the ring gear bearing retainer with the retainer wrench.

Remove the O-ring from the retainer.

Inspect the oil seal and if the lip is worn or damaged, or if the spring band is distorted, replace the oil seal.



Remove the oil seal from the retainer.

Coat the outer edges of the new seals with gear oil and press them into the retainer.

Coat the new O-ring with gear oil and install it. Install the ring gear bearing retainer being careful not to fold or damage the oil seal lips.

NOTE

After installing the ring gear bearing preload retainer, do the following:

- Final gear assembly preload check.
- Backlash inspection.





GEAR CASE OIL SEAL REPLACEMENT

Loosen the ring gear bearing preload retainer 5 notches with the retainer wrench.
Remove the eight gear case bolts and lift the cover from the gear case.



Inspect the ring gear oil seal for leaks.
Replace the seal if the lip is damaged or if the spring band is distorted. If replacement is necessary, it is necessary to remove the ring gear bearing.

NOTE

Drive the oil seal in squarely.

CAUTION

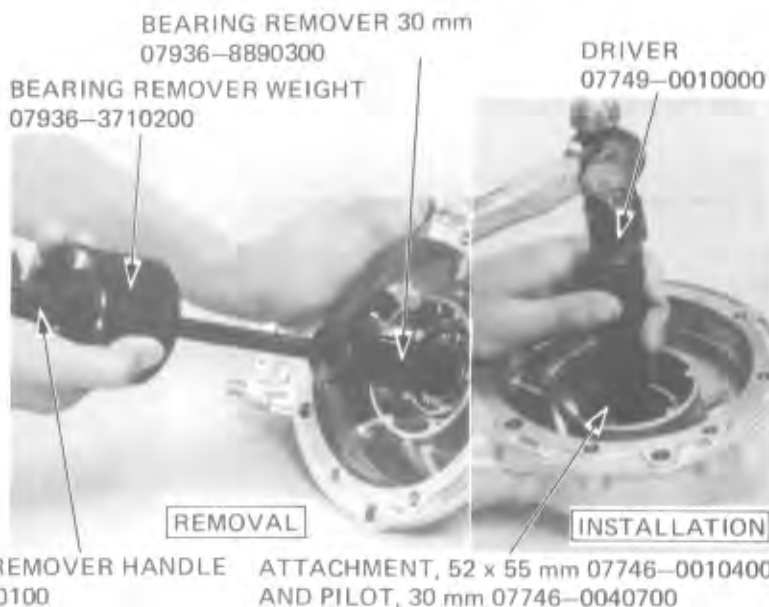
Heat the gear case evenly when removing the ring gear bearing race.



Inspect the bearing for smooth operation spinning it by hand. Replace the bearing with a new one if it is noisy or has excessive play.

NOTE

- Drive the bearing in squarely.
- After replacing the bearing, check gear backlash, tooth contact and final gear assembly preload.





FINAL DRIVE

RING GEAR BEARING REPLACEMENT

Separate the left case cover from the ring gear and bearing by tapping it lightly with a plastic hammer to avoid damaging the parts.



Inspect the bearing for smooth operation by spinning it by hand.

Replace the bearing if it is noisy or has excessive play.

Install the four special pins, included with 07965-3710100.

Remove the center guide from the Dis/assembly tool and use center guide number 07965-4150100 in it's place.

Press the bearing off.

RING GEAR
DIS/ASSEMBLY TOOL A
07965-3710100

RING GEAR CENTER GUIDE
07965-4150100



SPECIAL PINS (4)
(INCLUDED WITH 07965-3710100)

RING GEAR
DIS/ASSEMBLY TOOL A
07965-3710100

RING GEAR CENTER
GUIDE
07965-4150100



Install the ring gear bearing on the ring gear.

NOTE

Drive the bearing on until it seats properly.



BREATHER SYSTEM MAINTENANCE

Check the breather hole for clogging. Clean if necessary.

Clean around and inside of the breather cap.



PINION GEAR RETAINER

REMOVAL

Remove the pinion gear retainer lock washer.



Remove the retainer.





FINAL DRIVE

OIL SEAL/O-RING REPLACEMENT

Inspect the retainer oil seal. Replace the seal if the lip is worn or damaged, or if the spring band is distorted.

Replace the O-rings with new ones.



Fill the new oil seal groove with Multipurpose NLGI No. 2 (MoS₂ additive) Grease and install the oil seal into the retainer.

Coat the new O-rings with Multipurpose NLGI No. 2 Grease and install them onto the retainer.



INSTALLATION

Set the O-ring guide into the gear case cutout.



O-RING GUIDE 07973-4630200



Push the retainer into place with the retainer wrench until the oil seal guide is contacted.

CAUTION:

- Be careful not to damage the O-rings.
- The retainer has very fine threads, so be careful not to cross-thread it.

Remove the oil seal guide.

Thread the retainer into the case by hand. Turn the pinion shaft intermittently. Stop tightening the retainer when pinion shaft rotating resistance is felt. Do not overtighten the retainer.

Remove the O-ring guide.

NOTE

- If the retainer is overtightened, it will cause excessive preload.
- A high amount of resistance is normal because of the O-rings.

PRELOAD INSPECTION AND ADJUSTMENT

PINION GEAR

Wrap the wire around the tool groove and attach a spring scale. Measure the preload force needed to turn the pinion shaft in the normal direction of rotation.

Pinion Gear Preload:

Force: 800–1,000 g (1.76–2.2 lbs)
Torque: 0.4–0.5 N·m
(4.0–5.0 kg·cm, 3.48–4.32 in·lb)

NOTE

- If measurements are not consistent, rotate the pinion gear 50–60 turns, then check preload.
- Force required to begin movement may exceed preload specifications.

PINION RETAINER



PINION GEAR RETAINER WRENCH
07910-4150000 or 07910-MA10100



PINION SHAFT

PRELOAD INSPECTION TOOL
07998-4150000 (U.S.A. only)
or 07998-MC70000



ATTACHMENT GN-AHM-98-MC7 (U.S.A. only)



If preload is insufficient, remove the preload inspection tool, then install pinion gear retainer wrench and tighten the retainer.

Recheck the pinion gear preload.

PINION GEAR RETAINER WRENCH
07910-4150000 or 07910-MA10100

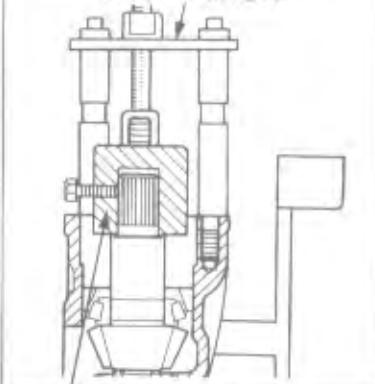


If preload is excessive, remove the preload inspection tool, then install the pinion gear retainer wrench and remove the retainer.

Pull up on the pinion shaft with the special tools, then recheck pinion preload.

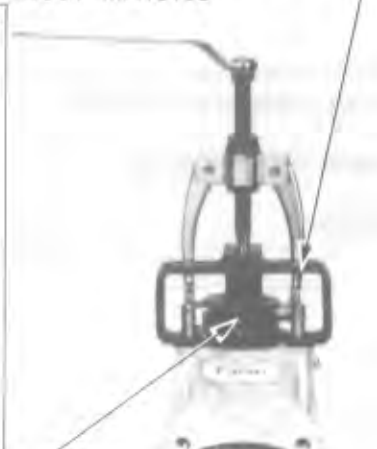
U.S.A. ONLY

PINION GEAR PULLER
07931-4630200



PINION GEAR PULLER
ATTACHMENT
GN-AMH-34-MC7

PINION PULLER ATTACHMENT
07934-MA10100



PINION GEAR
PULLER ATTACHMENT
07934-MA10200

Install the retainer lock tab.

NOTE

The lock tabs are available in two types.
Be sure to use the proper type of lock tab
that fits correctly.

LOCK WASHER



RETAINER LOCK TABS



RING GEAR INSTALLATION

Clean all sealing material off the mating surfaces of the gear case and cover.

NOTE

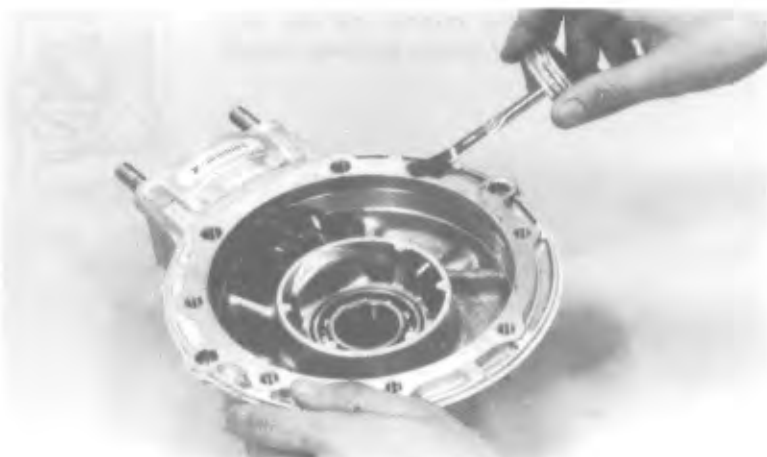
- Do not allow dust and dirt to enter the gear case.
- Do not damage the mating surfaces of the gear case and cover.



Clean the gear case cover mating surface with an oil stone.



Apply liquid sealant to the mating surfaces of the gear case and cover.





Apply a thin coating of Prussian Blue to the pinion gear teeth for gear tooth contact pattern check, prior to installing the ring gear.

Place the shim on the ring gear, if it was removed. Install the ring gear assembly, being careful not to damage or fold the oil seal lips.

NOTE

Do not allow the left gear case cover to tilt during installation or the prussian blue will reading.



Place the gear case cover onto the final gear case. Tighten the cover bolts in 2-3 steps until the left gear case cover touches the gear case. Torque the bolts in a criss cross pattern in two or more steps.

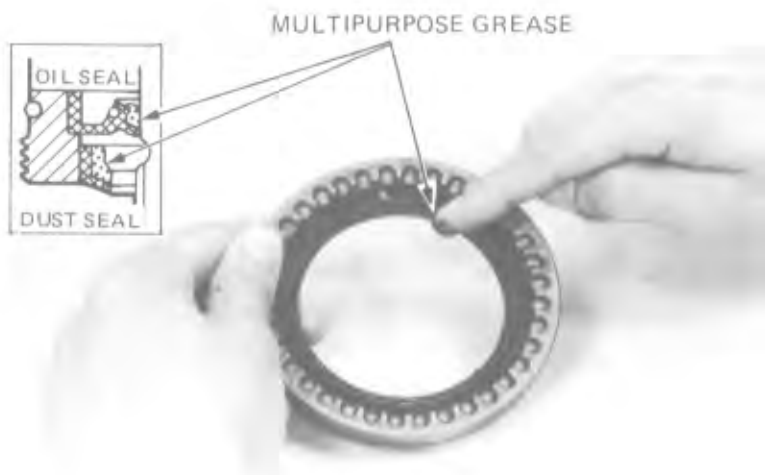
TORQUE VALUES:

8 mm bolt: 23–28 N·m
(2.3–2.8 kg-m, 17–20 ft-lb)

10 mm bolt: 35–45 N·m
(3.5–4.5 kg-m, 25–33 ft-lb)



Fill the ring gear bearing retainer oil seal with Multipurpose NLGI No. 2 (MoS₂ additive) Grease.





Install the ring gear retainer onto the gear case cover.

Before the retainer bottoms against the bearing, measure the torque (T) to overcome the friction caused by the O-ring.

Then tighten the retainer to $T + 40 \text{ N}\cdot\text{m}$ (4.0 kg-m, 29 ft-lb) and back off. Retighten to $T + 10 \text{ N}\cdot\text{m}$ (1.0 kg-m, 7 ft-lb).

NOTE

After assembling the final gear case, perform the following operations:

- Backlash inspection
- Final gear preload check.
- Final gear tooth contact pattern check.



**FINAL GEAR ASSEMBLY PRELOAD
INSPECTION AND ADJUSTMENT**

NOTE

Use this inspection and adjustment whenever the ring gear retainer is removed, or if final gear assembly preload is being checked.

Install the preload inspection tool.

Attach a spring scale to the wire. Measure the preload force needed to run the pinion shaft in the normal direction of rotation.

FINAL GEAR ASSEMBLY PRELOAD:

Force: 1,200–1,800g (2.65–3.97 lbs)

Torque: 0.6–0.9 N·m

(6.0–9.0 kg-cm, 5.16–7.80 in-lbs)

PRELOAD INSPECTION TOOL
07998-MC70000 or 07998-4150000 (U.S.A. only)



ATTACHMENT (U.S.A. only)

If the preload exceeds specifications, remove the ring gear and check the pinion gear preload.

If the pinion gear preload is within specifications, install the ring gear and ring gear retainer and adjust the final gear assembly preload by tightening the retainer.

NOTE

- Tighten the retainer gradually while measuring the preload.
- Loosen the ring gear retainer and turn the pinion gear several times, if preload is excessive.



GEAR TOOTH CONTACT PATTERN

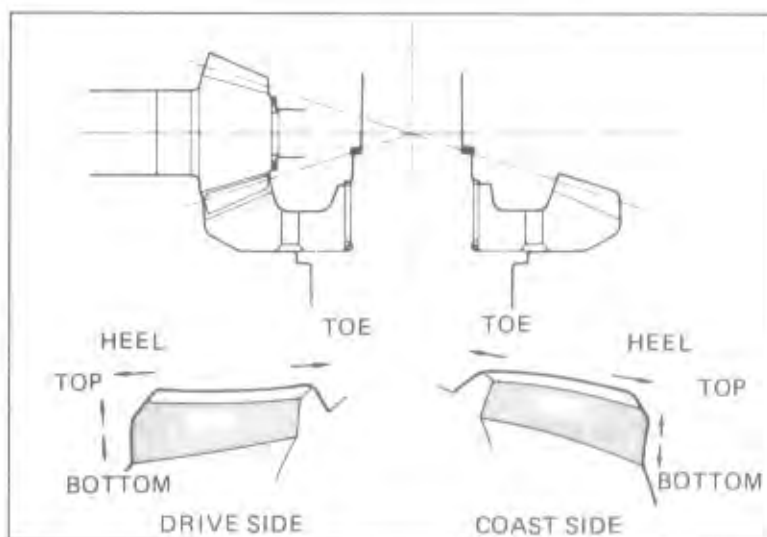
CHECK AND ADJUSTMENT

Remove the oil filler cap from the final gear case. Check the gear tooth contact pattern by rotating the ring gear several times in the normal direction of rotation. The gear tooth contact pattern is indicated by Prussian Blue applied to the pinion before assembly.

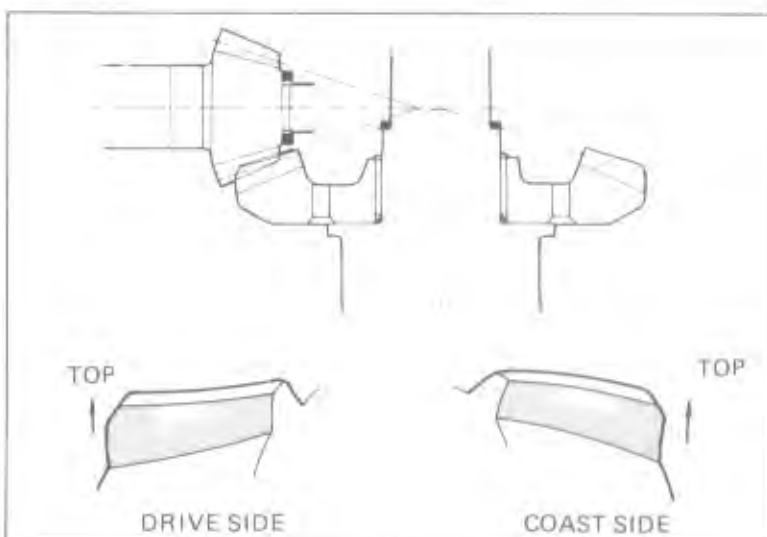


Contact is normal if the Prussian Blue is transferred to the approximate center of each tooth flank slightly extending toward the toe side.

If the patterns are not correct, adjust contact by replacing the pinion shim. (The ring gear shim affects the contact patterns very little).



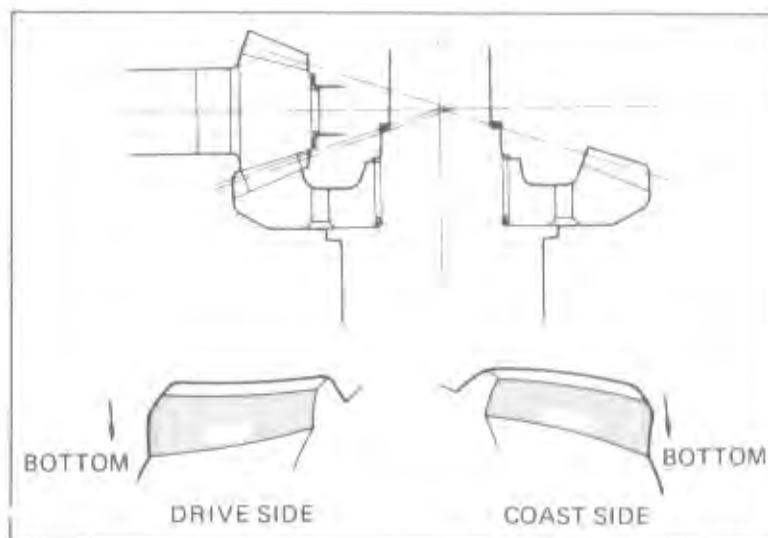
The pattern will be too high on both the drive and coast sides if the shim is too thick. Use a thinner shim to correct the pattern.





The pattern will be too low on both the drive and coast sides if the shim is too thin.

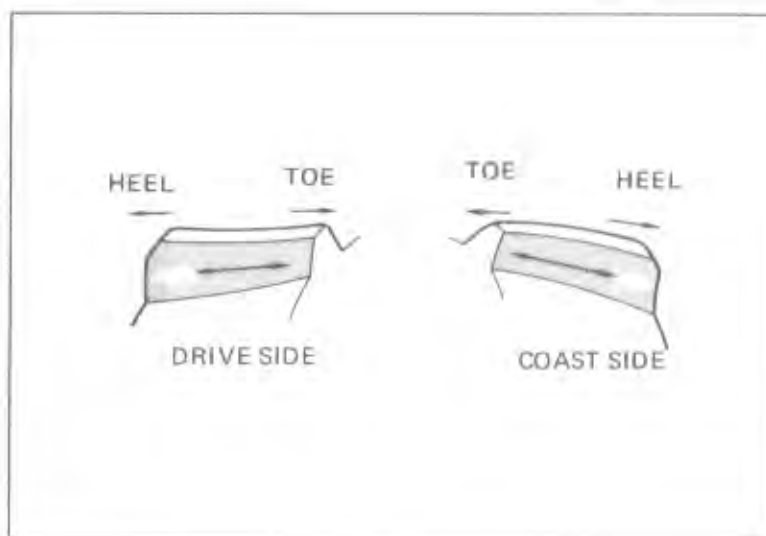
Use a thicker shim to correct the pattern.



The pattern will be shifted toward the toe or heel on both sides if the bearings are not installed squarely. Reinstall the bearings to correct the pattern.

NOTE

Use of a worn pinion on a new ring gear or a worn ring gear on a new pinion can cause an improper contact pattern.



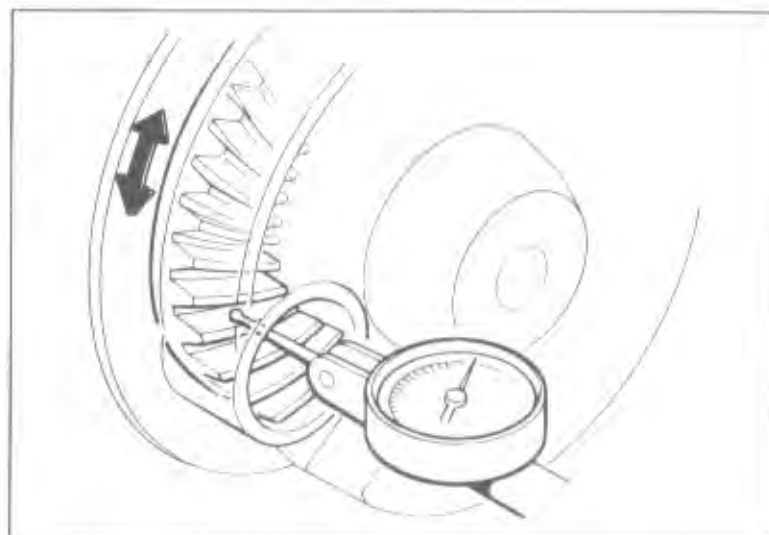
BACKLASH INSPECTION AND ADJUSTMENT

Measure the backlash.

If the backlash is excessive, replace the ring gear shim with a thinner one. If the backlash is too small, replace the ring gear shim with a thicker one.

NOTE

Backlash adjustment should be made with the ring gear shim as the pinion shim affects backlash only slightly.





FINAL DRIVE

Install the dust guard plate and torque the bolts. Bend the tabs of the lock plates up to prevent the bolts from being turned out during operation. Bend one of the four ring gear bearing retainer lock tabs.



FINAL GEAR CASE INSTALLATION

Lubricate the splines of the drive shaft and pinion gear shaft with Multipurpose NLGI No. 2 (MoS₂ additive) Grease, and engage.



MULTIPURPOSE NLGI
No.2 (MoS₂ ADDITIVE)

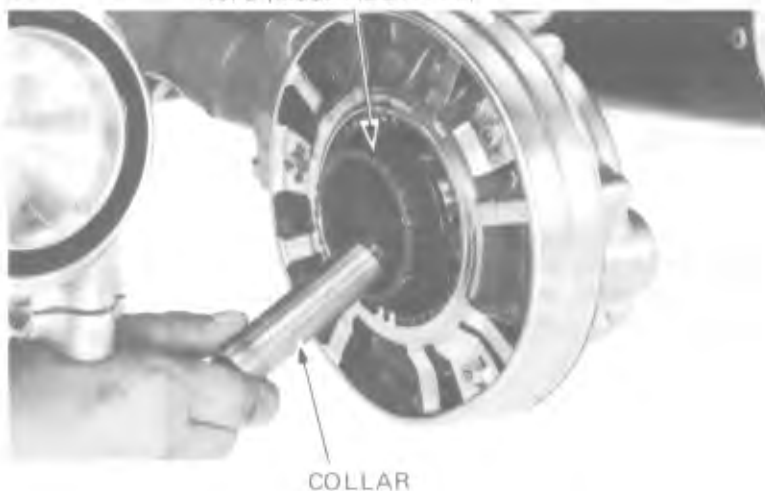


MULTIPURPOSE NLGI
No. 2 (MoS₂ ADDITIVE)

Insert the distance collar into the ring gear shaft.

Apply Multipurpose NLGI No. 2 (MoS₂ additive) GREASE to the splines of the rear wheel and ring gear shaft.

Install the gear case on the rear wheel.





Install the rear wheel (Section 16).

Tighten the final gear case nuts.

TORQUE: 55–65 N·m (5.5–6.5 kg-m,
40–47 ft-lb)

Tighten the axle nut.

TORQUE: 80–100 N·m (8.0–10.0 kg-m,
43–72 ft-lb)

Tighten the axle pinch bolt.

TORQUE: 20–30 N·m (2.0–3.0 kg-m,
14–22 ft-lb)



PINION GEAR LUBRICATION

Pump lithium-based MULTIPURPOSE NLGI No. 2 (molybdenum disulfide additive) GREASE through the grease fitting (Page 2-5).



FILLING FINAL GEAR CASE

Place the motorcycle on its center stand.
Make sure that the drain bolt is tightened and remove the oil filler cap.
Pour the specified amount of recommended oil up to the filler neck.

RECOMMENDED OIL: HYPOID GEAR OIL

Over 5° C: SAE 90

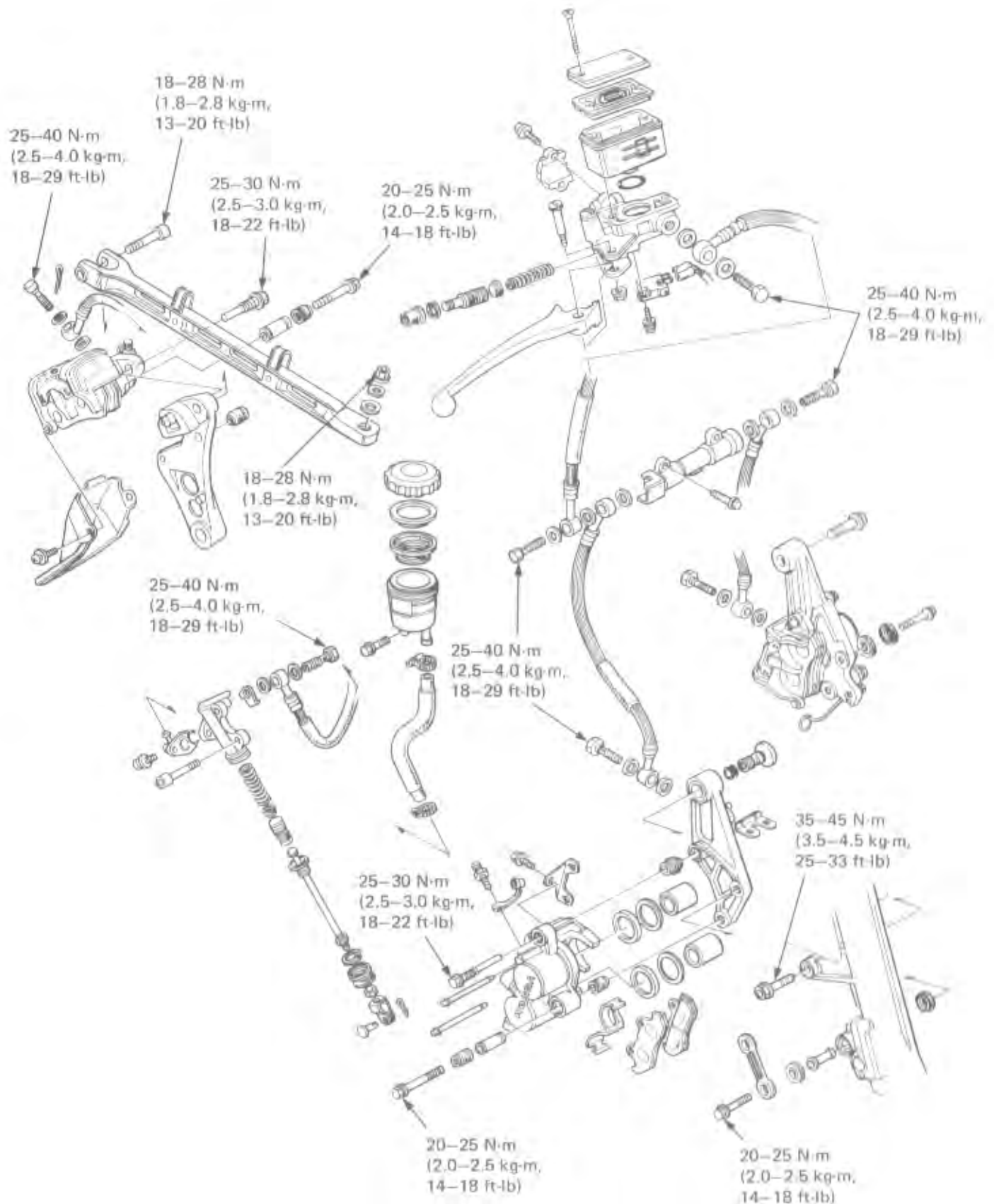
Below 5° C: SAE 80

OIL CAPACITY: 160–180 cc
(4.5–5.1 Imp oz,
5.4–6.1 US oz)





HYDRAULIC DISC BRAKE





SERVICE INFORMATION	18-1	BRAKE PADS/DISC	18- 4
TROUBLESHOOTING	18-1	BRAKE MASTER CYLINDERS	18- 7
BRAKE FLUID REPLACEMENT/ AIR BLEEDING	18-2	BRAKE CALIPERS	18-12
		BRAKE PEDAL SHAFT	18-16

SERVICE INFORMATION

GENERAL

- 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.
- Replace the sealing washers whenever the brake hose bolt is removed.

SPECIFICATIONS

Unit: mm (in)

Item		Standard	Service limit
Disc thickness	FRONT	4.9-5.1 (0.19-0.20)	4.0 (0.16)
	REAR	6.9-7.1 (0.27-0.28)	6.0 (0.24)
Disc runout		—	0.3 (0.01)
Master cylinder I.D.	FRONT	15.870-15.913 (0.6248-0.6265)	15.925 (0.6270)
	REAR	14.000-14.043 (0.5512-0.5529)	14.055 (0.5533)
Master piston O.D.	FRONT	15.827-15.854 (0.6231-0.6242)	13.945 (0.5490)
	REAR	13.957-13.984 (0.5495-0.5506)	13.945 (0.5490)
Caliper piston O.D.	FRONT	30.148-30.198 (1.1869-1.1889)	30.140 (1.1866)
	REAR		
Caliper cylinder I.D.	FRONT	30.230-30.280 (1.1901-1.1921)	30.290 (1.1925)
	REAR		

TORQUE VALUES

Brake hose bolt	25-40 N·m (2.5-4.0 kg·m, 18-29 ft·lb)
Front brake caliper mount bolt (Upper)	35-45 N·m (3.5-4.5 kg·m, 26-33 ft·lb)
Front brake caliper mount bolt (Lower)	20-25 N·m (2.0-2.5 kg·m, 14-18 ft·lb)
Front brake caliper pivot bolt	25-30 N·m (2.5-3.0 kg·m, 18-22 ft·lb)
Front brake caliper bolt	20-25 N·m (2.0-2.5 kg·m, 14-18 ft·lb)
Rear brake caliper mount bolt	20-25 N·m (2.0-2.5 kg·m, 14-18 ft·lb)
Rear brake caliper pivot bolt	25-30 N·m (2.5-3.0 kg·m, 18-22 ft·lb)
Rear brake stopper arm bolt (front)	30-40 N·m (3.0-4.0 kg·m, 22-29 ft·lb)
Rear brake stopper arm nut (front)	18-28 N·m (1.8-2.8 kg·m, 13-20 ft·lb)
Rear brake stopper arm bolt (rear)	18-28 N·m (1.8-2.8 kg·m, 13-20 ft·lb)

TOOL

Special

Snap Ring Pliers

07914-3230001

TROUBLESHOOTING

Poor Brake Performance

- Air bubbles in hydraulic system
- Worn brake pads
- Pads dirty or glazed
- Hydraulic system leaking



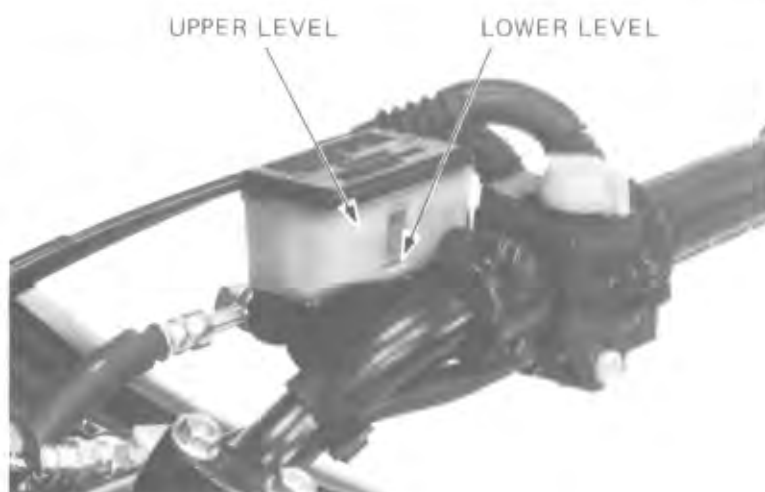
HYDRAULIC DISC BRAKE

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 bleed valve.
Loosen the caliper bleed valve and pump the brake lever (or pedal).
Stop pumping the lever (or pedal) when no more fluid flows out of the bleed 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 bleed 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 handlebar grip and lever when bleeding the front brake system. Pump up the system pressure with the lever (or pedal) until there are no air bubbles in the fluid flowing out of the reservoir small hole and lever (or pedal) resistance is felt.

NOTE

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

Use only DOT 3 brake fluid from a sealed container. Do not mix brake fluid types and never re-use the contaminated fluid which has been pumped out during brake bleeding, because this will impair the efficiency of the brake system.

- (1) Squeeze the brake lever (or depress the brake pedal), open the bleeder valve 1/2 turn then close the valve.

NOTE

Do not release the brake lever (or pedal) until the bleeder valve has been closed again.

- (2) Release the brake lever (or pedal) slowly and wait several seconds after it reaches the end of its travel.

Repeat the above steps (1) and (2) until bubbles cease to appear in the fluid at the caliper bleeder valve.

Fill the fluid reservoir to the upper level mark.

WARNING

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



TORQUE: 40–70 kg-cm (35–61 in-lb)



TORQUE: 40–70 kg-cm (35–61 in-lb)



HYDRAULIC DISC BRAKE

BRAKE PADS/DISCS

PAD REPLACEMENT

NOTE

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

Remove the caliper bolt the caliper up out of the way.

FRONT BRAKE CALIPER



CALIPER MOUNT BOLT

REAR BRAKE CALIPER



CALIPER MOUNT BOLTS

Remove the retainer bolt and the pad pin retainer.
Pull the pad pins out of the caliper.
Remove the brake pads.

RETAINER BOLT



RETAINER



PAD PINS

ANTI-RATTLE SPRING

Position the anti-rattle spring in the caliper as shown.





Install the new pads in the caliper.
Install one of the pad pins.
Then install the second pin by pushing the pad against the caliper to depress the anti-rattle spring.



PAD PINS

Slide the pad pin retainer over the pad pins through the larger side of the slots in the retainer, to secure the pad pins.
Install the pad pin retainer bolt.



RETAINER BOLT

RETAINER

Push the piston all the way in to allow installation of new brake pads.

NOTE

Check the brake fluid level in the brake master cylinder reservoir as this operation causes the level to rise.





HYDRAULIC DISC BRAKE

Pivot the caliper down so the brake disc is positioned between the pads, making sure not to damage the pads.

Install the caliper bolt and tighten it.

TORQUE: 20–25 N·m (2.0–2.5 kg-m,
14–18 ft-lb)

FRONT BRAKE
CALIPER



CALIPER BOLT

REAR BRAKE
CALIPER



CALIPER BOLT

BRAKE DISC THICKNESS

Measure the brake disc thickness.

SERVICE LIMIT:

FRONT: 4.0 mm (0.16 in)
REAR: 6.0 mm (0.24 in)



BRAKE DISC WARPAGE

Measure the brake disc warpage.

SERVICE LIMIT: 0.30 mm (0.012 in)





BRAKE MASTER CYLINDERS

FRONT MASTER CYLINDER DISASSEMBLY

Drain the brake fluid from the hydraulic system and remove the brake hose bolt to disconnect the brake hose.

CAUTION

*Avoid spilling brake fluid on painted surfaces.
Place a rag over the fuel tank and instruments
whenever the brake system is serviced.*

Remove the handlebar upper and lower covers and brake lever.

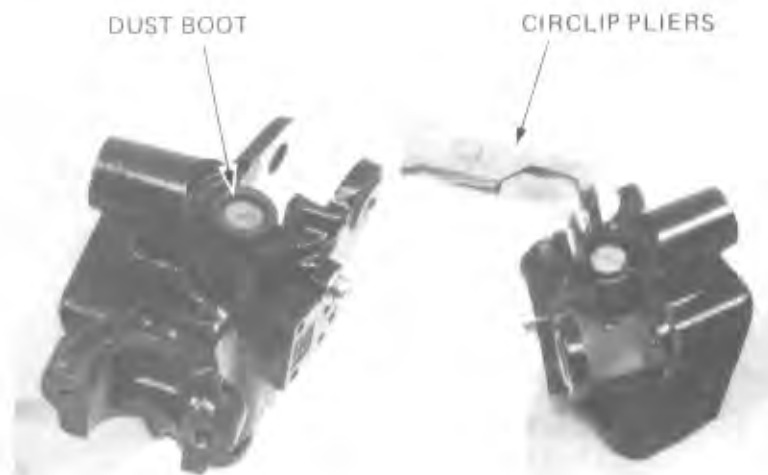
Disconnect the stoplight switch wires.

Remove the master cylinder.

Remove the dust boot.

Remove the circlip.

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



FRONT MASTER CYLINDER I.D. INSPECTION

Measure the master piston bore I.D.

SERVICE LIMIT:

14.055 mm (0.5533 in)

Check for scores, scratches, nicks or other damage.





HYDRAULIC DISC BRAKE

FRONT MASTER PISTON O.D. INSPECTION

Measure the master cylinder piston O.D.

SERVICE LIMIT:

13.945 mm (0.5490 in)



FRONT MASTER CYLINDER ASSEMBLY

CAUTION

Replace the master cylinder piston, cylinder and spring as a set.

Dip the piston cup in brake fluid or coat with silicone grease before assembly.

Install the master cylinder on the handlebar. (Section 15).

Connect the brake hose to the master cylinder. It should be at an angle 25–30° down to the master cylinder. Install the brake lever.

Tighten the brake hose bolt.

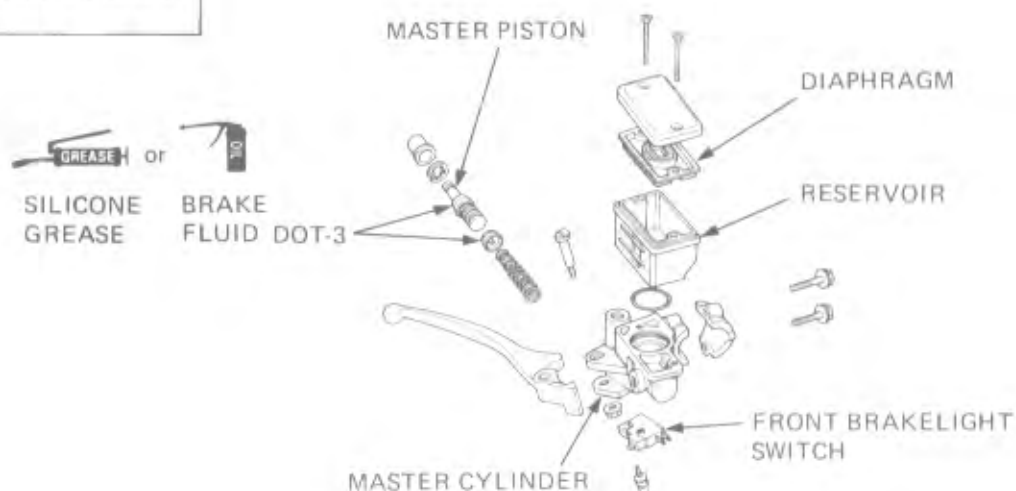
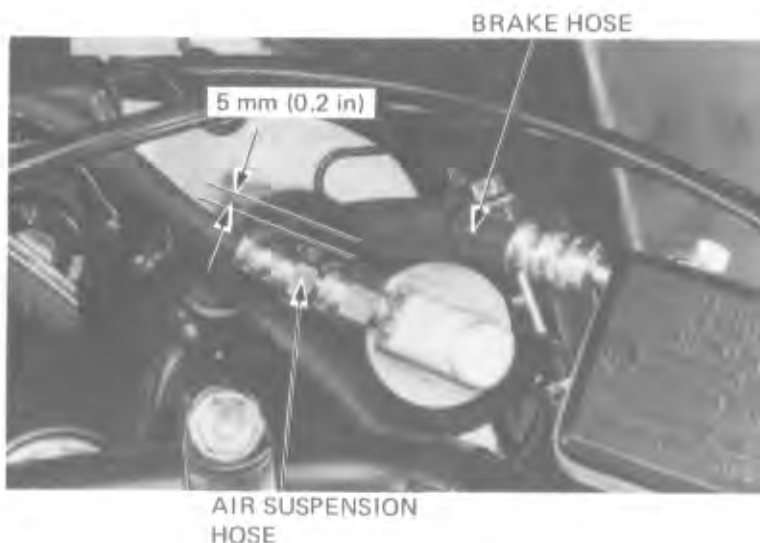
TORQUE: 25–40 N·m

(2.5–4.0 kg-m, 18–29 ft-lb)

Bleed the front brake system, (Section 3).

CAUTION

There must be 5 mm (0.2 in) between the brake hose and front air suspension hose to prevent chafing of the hoses.





REAR MASTER CYLINDER DISASSEMBLY

Remove the right side cover.
Place a clean drip pan under the brake line.
Disconnect the brake line on the back of the
master cylinder.

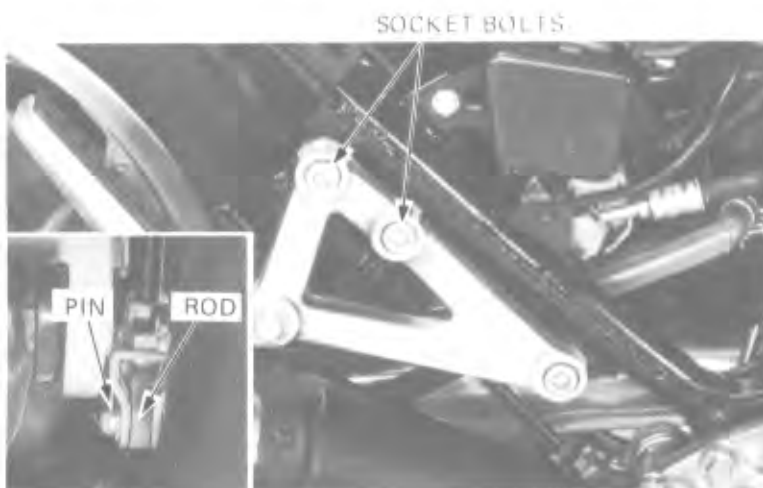
CAUTION

Avoid spilling brake fluid on painted surfaces.



BRAKE LINE

Remove the pin from the rod eye and remove the
two socket bolts.



Remove the rubber cover.
Remove the circlip and pull the rod from the
master cylinder body.

WARNING

*Beware that the piston rod will pop out when
removing the circlip.*



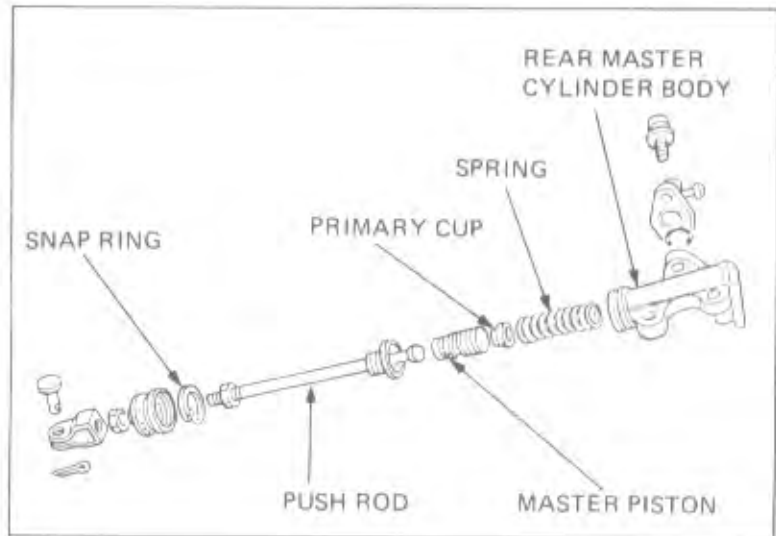


HYDRAULIC DISC BRAKE

Remove the master piston, primary cup and spring.

It may be necessary to apply a small amount of air pressure to the fluid outlet to remove the master piston and primary cup.

Clean all parts with brake fluid.



INSPECTION

- REAR MASTER CYLINDER I.D.

Measure the inside diameter of the master cylinder bore.

SERVICE LIMIT: 14.06 mm (0.554 in)

Check for scores, scratches or nicks.



- REAR MASTER CYLINDER PISTON O.D.

Measure the master cylinder piston O.D.

SERVICE LIMIT: 13.945 mm (0.549 in)

Check the primary cup and secondary cup for damage before assembly.

MASTER CYLINDER PISTON





REAR MASTER CYLINDER ASSEMBLY

NOTE

Handle the master cylinder piston, cylinder and spring as a set.

Assemble the master cylinder.

Coat all parts with clean brake fluid.

Dip the piston cup in brake fluid before assembly.

CAUTION

When installing the cups, do not allow the lips to turn inside out. Be certain the snap ring is seated firmly in the groove.

Install the primary cup and piston.

Install the push rod and circlip.

Install the boot, nut and rod eye.

NOTE

Be sure that the boot is installed in the groove.

Install the master cylinder on the master cylinder bracket.

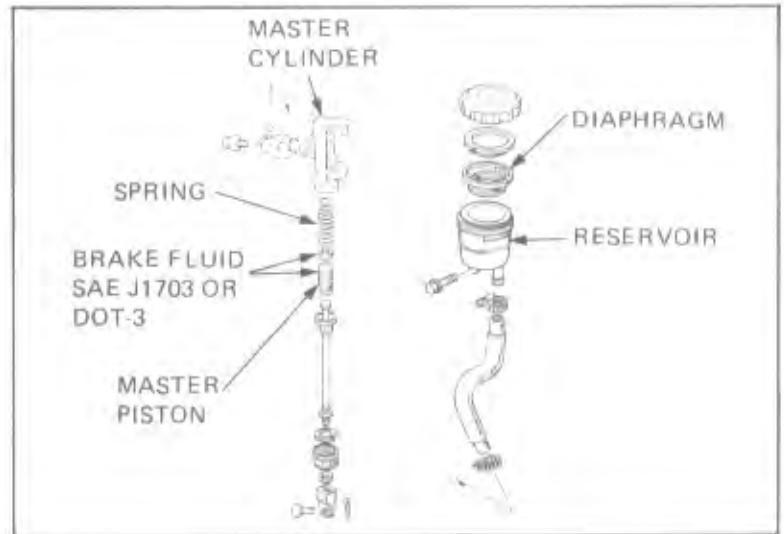
TORQUE: 30–40 N·m
(3.0–4.0 kg-m, 22–29 ft-lb)

Connect the brake hose and brake rod.

Tighten the brake hose bolt.

TORQUE: 25–40 N·m
(2.5–4.0 kg-m 18–29 ft-lb)

Bleed the brake hydraulic system after assembly, (Page 18-2).



BRAKE LINE



BRAKE CALIPERS

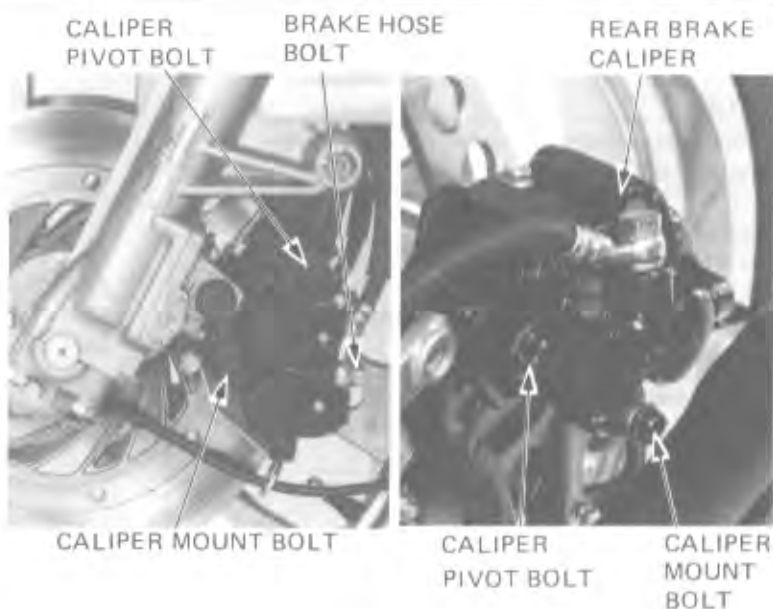
REMOVAL

Drain the brake hydraulic system.
 Remove the brake hose bolt and disconnect the brake hose.

NOTE

Avoid spilling brake fluid on painted surfaces, front forks and disc plate.

To remove the brake caliper, remove the caliper pivot bolt and mount bolt.



DISASSEMBLY

Remove the pads and anti-rattle spring.
 Remove the caliper pivot collar and boots.



Position the caliper with the piston down and apply small squirts of air pressure to the fluid inlet.

WARNING

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

NOTE

Place a shop towel over the pistons to prevent the pistons from becoming projectiles.

Examine the pistons and cylinders for scoring, scratches or other damage, and replace if necessary.





Push the oil seals in and then lift them out.
Clean the oil seal grooves with brake fluid.

CAUTION

Do not damage the piston sliding surfaces.



INSPECTION

• PISTON O.D.

Check the piston for scoring, scratches or other faults. Measure the piston diameter with a micrometer.

SERVICE LIMIT:

FRONT } 30.140 mm (1.1866 in)
REAR }



• CYLINDER I.D.

Check the caliper cylinder for scoring, scratches or other faults. Measure the caliper cylinder bore.

SERVICE LIMIT:

FRONT } 30.290 mm (1.1925 in)
REAR }





HYDRAULIC DISC BRAKE

ASSEMBLY

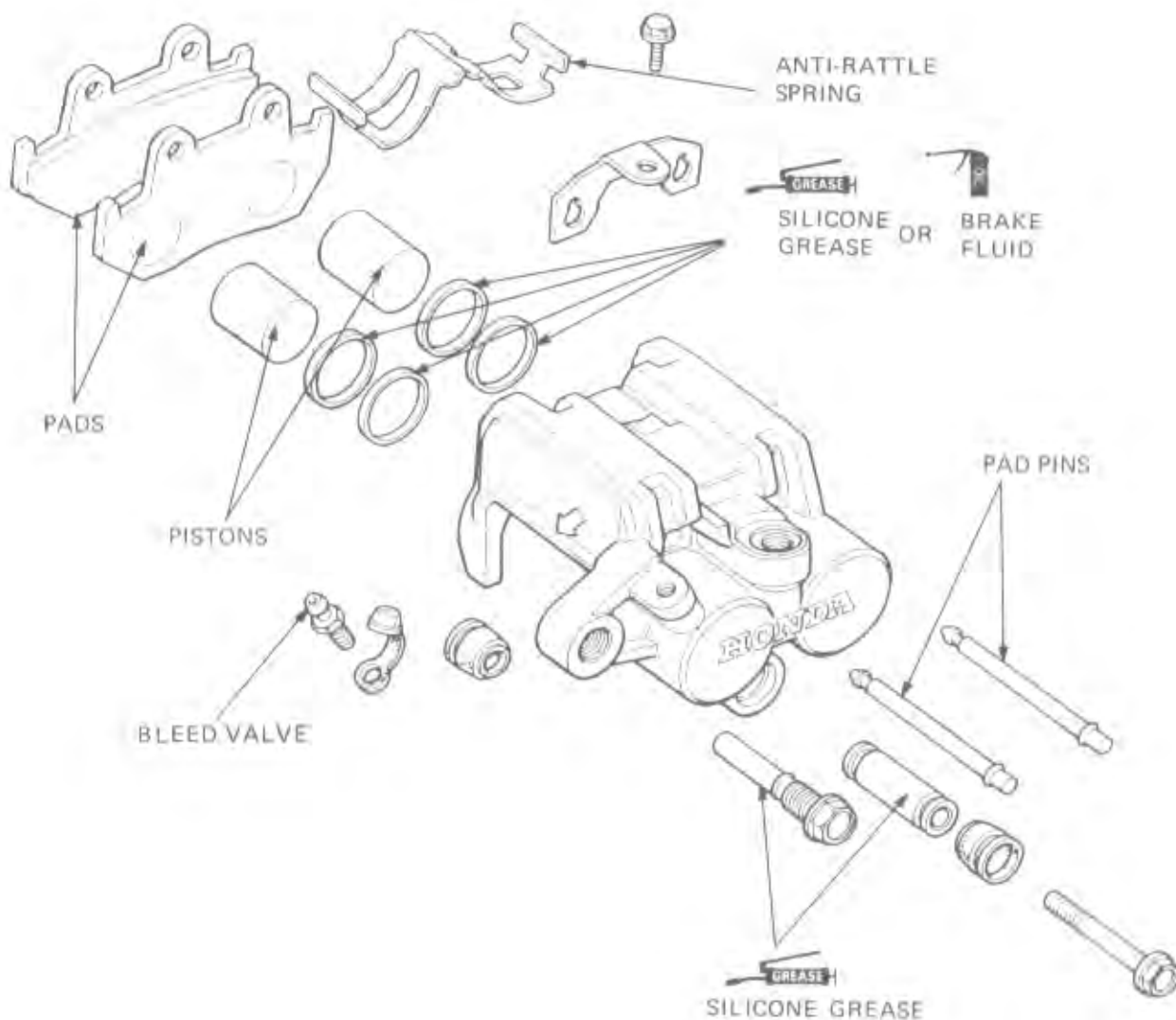
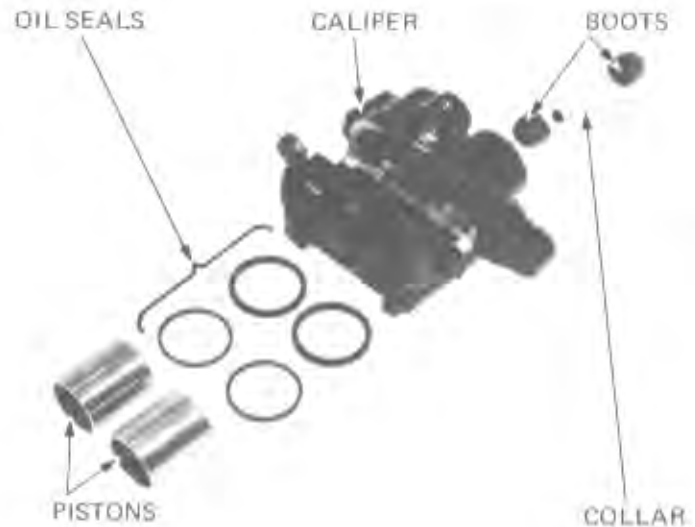
The oil seals must be replaced whenever the caliper is disassembled.

Coat the oil seals with silicone grease or brake fluid before assembly.

Install the pistons with the dished ends toward the pad side.

Install the boots and collar making sure that the boots are seated in the collar and caliper grooves properly.

Install the anti-rattle spring and the pads.





FRONT CALIPER BRACKET REMOVAL

Remove the caliper mount bolts and remove the caliper bracket from the fork leg.



INSTALLATION

Inspect the condition of the caliper pivot bolt boots.

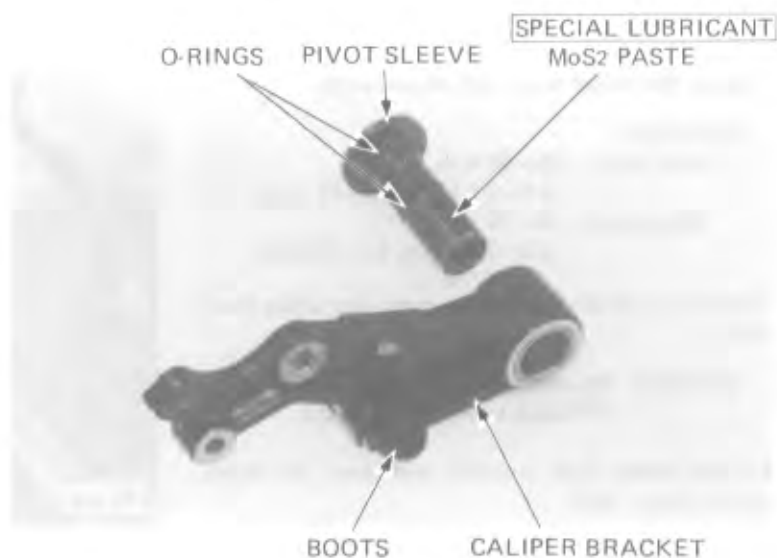
Check the O-rings for damage.

Apply molybdenum disulfide (MoS₂) paste (containing more than 45% of MoS₂) to the pivot sleeve.

NOTE

Use MoS₂ paste (containing more than 45% of MoS₂) as follows:

- Molykote® G-n Paste manufactured by Dow Corning U.S.A.
- Rocol Paste manufactured by Sumico Lubricant Co., LTD., Japan.
- Other lubricants of equivalent quality.



Install the caliper bracket to the fork leg.





HYDRAULIC DISC BRAKE

Apply silicon grease to the caliper bolt and collar. Install the caliper assembly over the brake disc so that the disc is positioned between the pads.

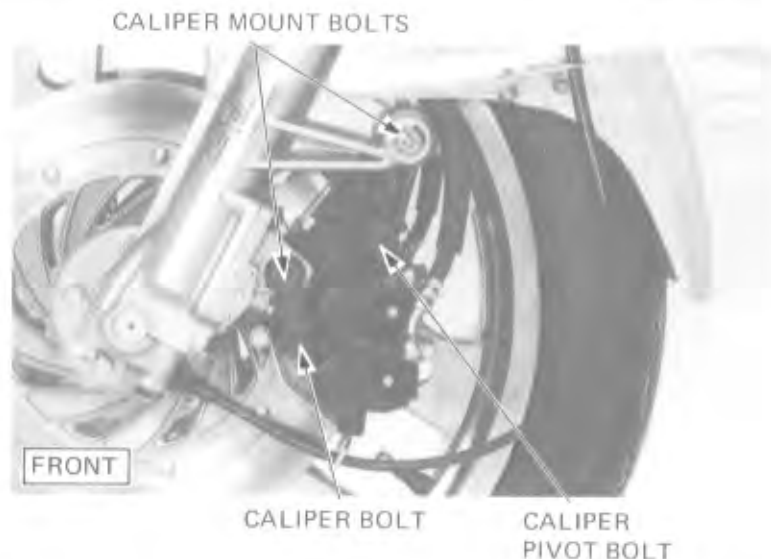
CAUTION

Be careful not to damage the pads.

Tighten the caliper mount bolts.

TORQUE

- Upper: 35–45 N·m
(3.5–4.5 kg-m, 25–33 ft-lb)
Lower: 20–25 N·m
(2.0–2.5 kg-m, 14–18 ft-lb)



Tighten the caliper pivot and mount bolts.

TORQUE:

- Pivot bolt : 25–30 N·m
(2.5–3.0 kg-m, 18–22 ft-lb)
Mount bolt: 20–25 N·m
(2.0–2.5 kg-m, 14–18 ft-lb)

Connect the brake hose and tighten the brake hose bolt.

- TORQUE: 25–40 N·m
(2.5–4.0 kg-m, 18–29 ft-lb)

Fill the brake fluid reservoir and bleed the brake system (page 18-2).



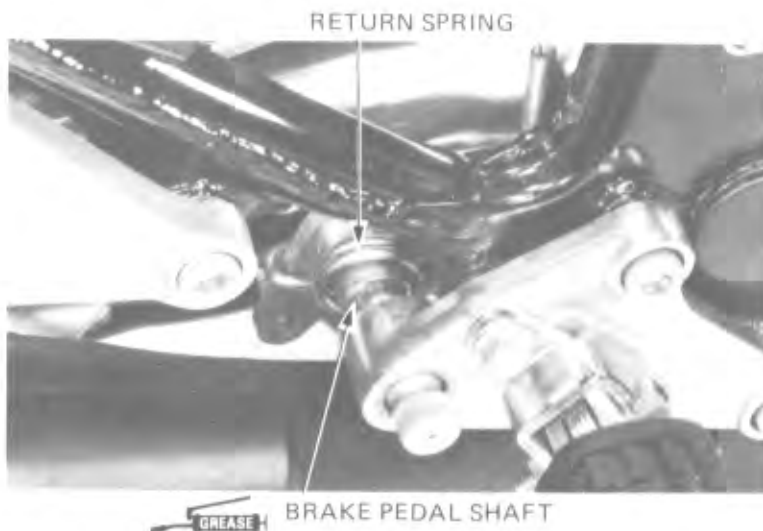
BRAKE PEDAL SHAFT

Remove the master cylinder mount bolts and remove the push rod pin.
Remove the rear brakelight switch spring.
Remove the rear brake pedal and shaft.



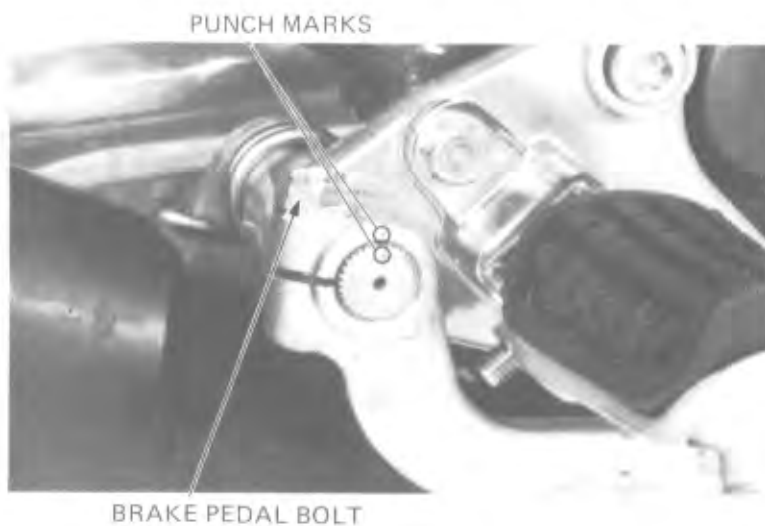


Apply grease to the brake pedal shaft.
Install the brake return spring as shown.



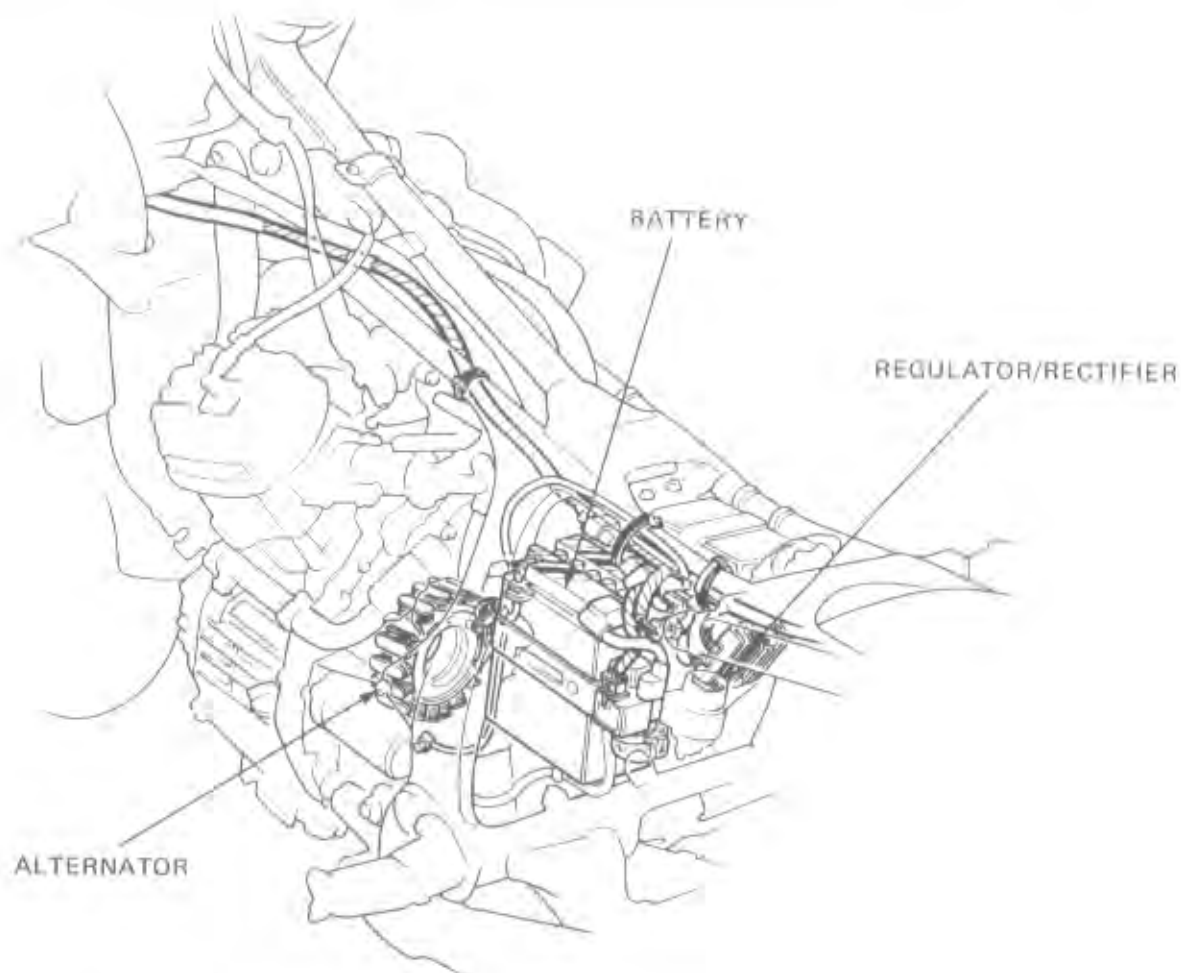
Install the brake pedal aligning the punch marks as shown.
Tighten the brake pedal bolt.

TORQUE: 18–28 N·m (1.8–2.8 kg-m,
13–20 ft-lb)

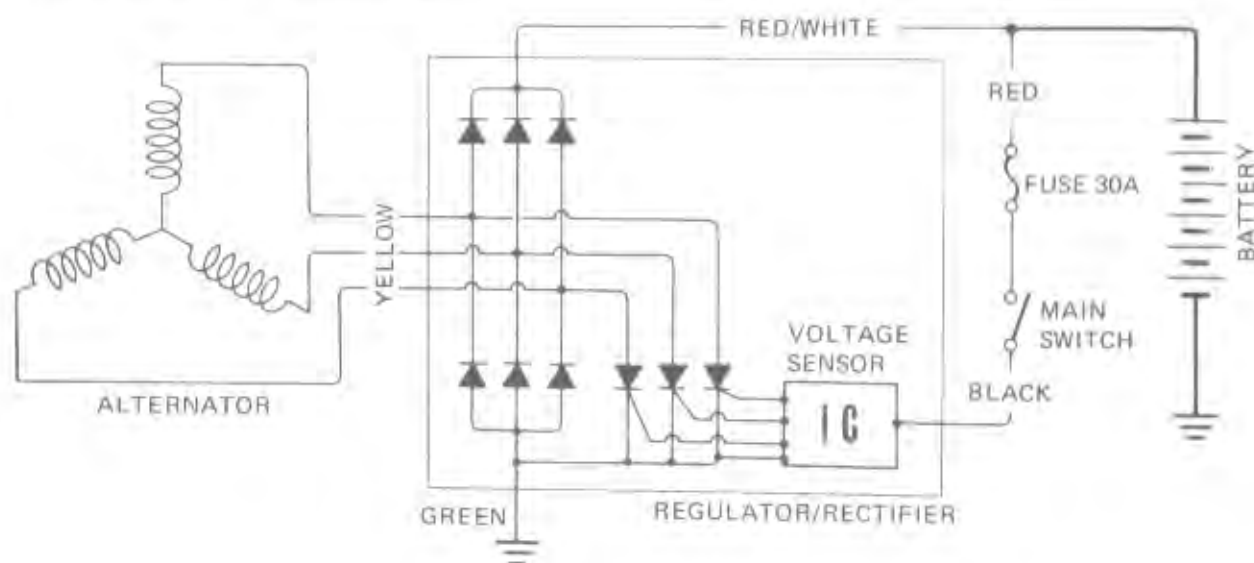




BATTERY/CHARGING SYSTEM



BATTERY CHARGING DIAGRAM





SERVICE INFORMATION	19-1
TROUBLESHOOTING	19-1
BATTERY	19-2
CHARGING SYSTEM	19-3

SERVICE INFORMATION

GENERAL

- The 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 hydrogen gas produced by a battery is highly flammable and can explode.

- For Alternator removal and installation, refer to Section 9.
- All charging system components can be tested on the motorcycle.

SPECIFICATIONS

Battery	Capacity	12V, 14 ampere-hours
	Specific gravity	1.28/20°C (68°F)
	Charging rate	1.4 amperes maximum (20°C, 68°F)
Alternator	Capacity	24 amperes minimum/5,000 rpm (14 volts)
Voltage regulator	Type	Transistorized, non-adjustable

TROUBLESHOOTING

No power — key turned on:

- Dead battery
 - Low fluid level
 - Low specific gravity
 - Charging system failure
- Disconnected battery cable
- Main fuse burned out
- Faulty ignition switch

Low power — key turned On:

- Weak battery
 - Low fluid level
 - Low specific gravity
 - Charging system failure
- Loose battery connection

Low power — engine running:

- Battery undercharged
 - Low fluid level
 - One or more dead cells
- Charging system failure

Intermittent power:

- Loose battery connection
- Loose charging system connection
- Loose starting system connection
- Loose connection or short circuit in ignition system
- Loose connection or short circuit in lighting system

Charging system failure:

- Loose, broken, or shorted wire or connection
- Faulty voltage regulator
- Faulty silicone rectifier
- Faulty alternator



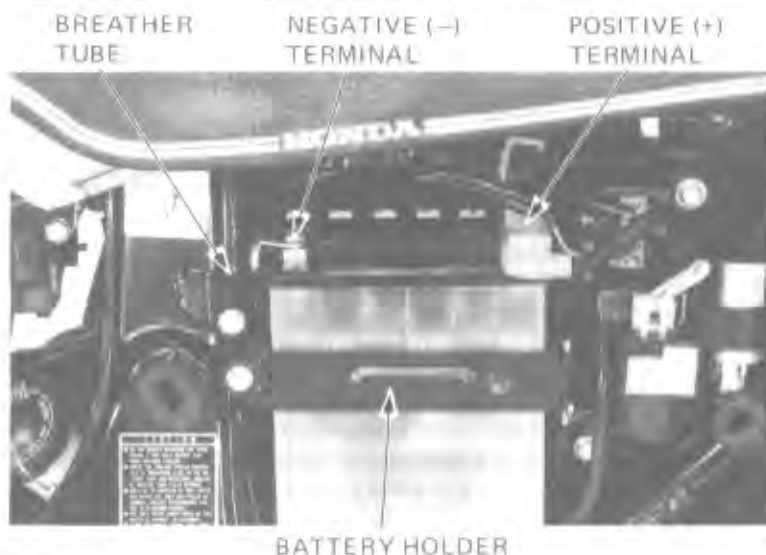
BATTERY/CHARGING SYSTEM

BATTERY

REMOVAL

Disconnect the ground cable and remove the battery holder.

Disconnect the positive (+) cable at the battery. Disconnect the battery breather tube, and remove the battery.



TESTING SPECIFIC GRAVITY

Test each cell with a hydrometer.

SPECIFIC GRAVITY: (20° C, 68° F)

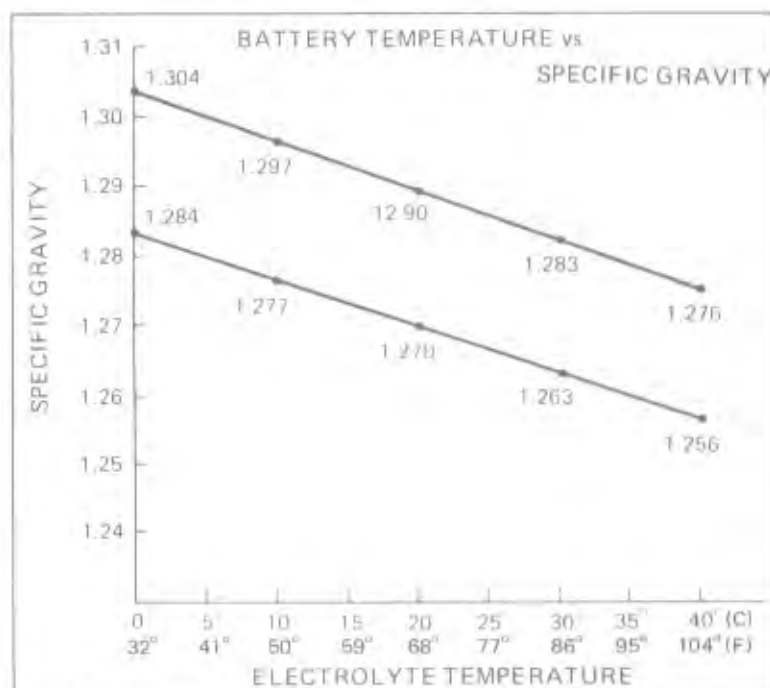
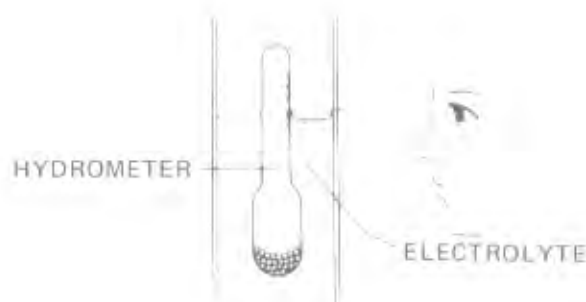
1.27-1.29	Fully charged
Below 1.26	Under charged

NOTE

- The battery must be recharged if the specific gravity is below 1.23.
- 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 1.27-1.29 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).

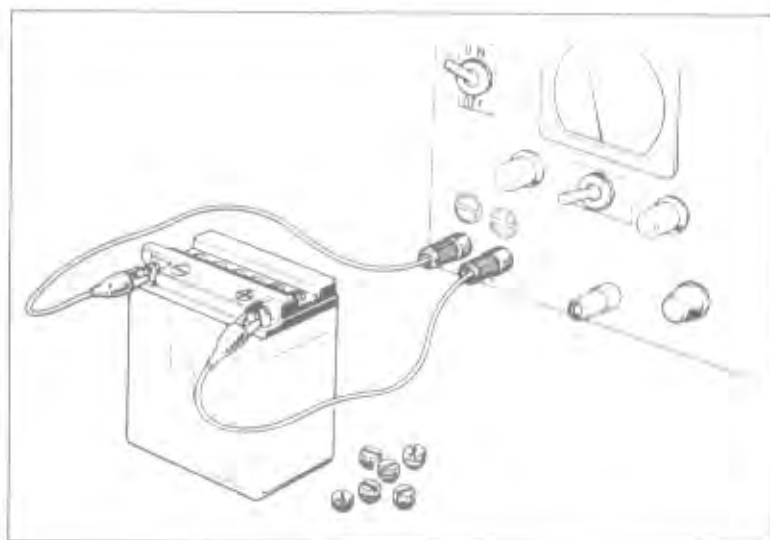
CAUTION

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 the engine up to operating temperature before taking readings.

Disconnect the main fuse coupler.

Open the main fuse cover and remove the main fuse, then reconnect the coupler.

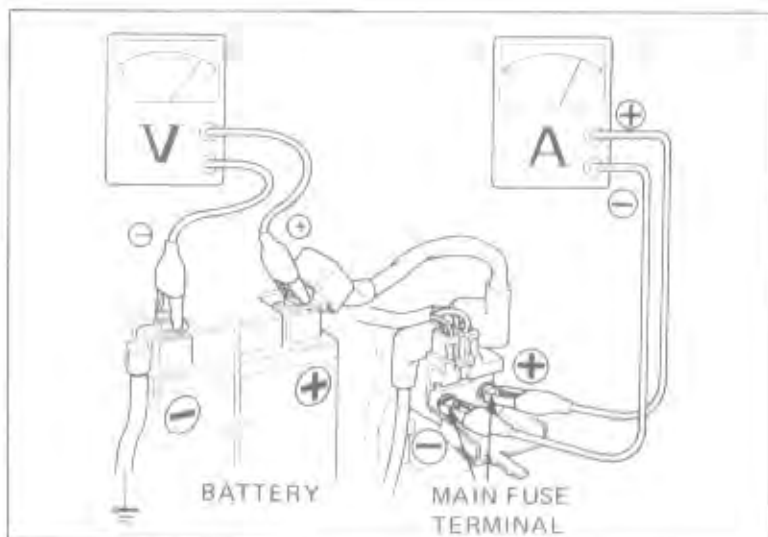
Connect a voltmeter and ammeter as shown.

NOTE

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

TECHNICAL DATA:

MAIN SWITCH	LIGHT-ING SWITCH	INITIAL CHARGING RPM	CHARGING AT 5,000 rpm
ON	ON (High beam)	1,200 min (1 rpm)	(5 amperes minimum/14.0 volts)



**BATTERY/CHARGING SYSTEM****STATOR COIL CONTINUITY TEST**

Check the yellow leads to the alternator stator for continuity with each other. Replace the stator if any yellow lead is not continuous with the others, or if any lead has continuity to ground. Alternator removal is covered in section 9.

**VOLTAGE REGULATOR/
RECTIFIER TEST**

Check the resistances between the leads with an ohmmeter.

**NORMAL DIRECTION: CONTINUITY**

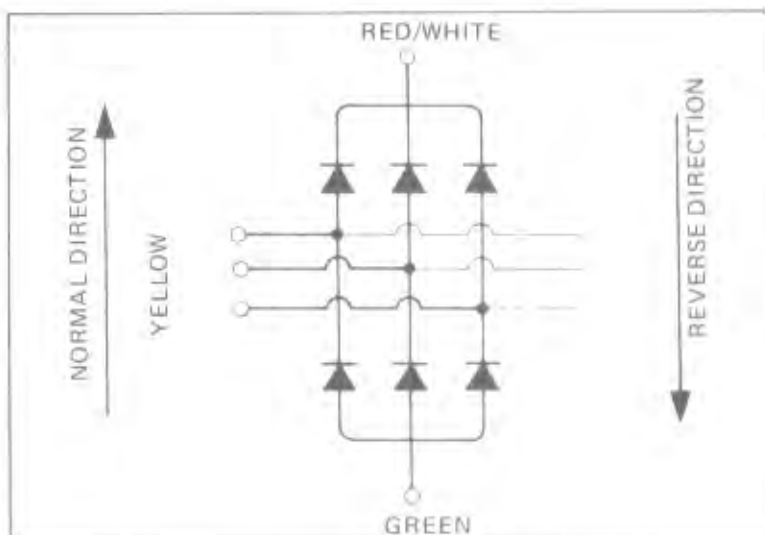
	⊕ probe	⊖ probe
I	YELLOW	GREEN
II	RED/WHITE	YELLOW

REVERSE DIRECTION: NO CONTINUITY

	⊕ probe	⊖ probe
I	GREEN	YELLOW
II	YELLOW	RED/WHITE

NOTE

The test results shown are for a positive ground ohmmeter and the opposite results will be obtained when a negative ground ohmmeter is used.





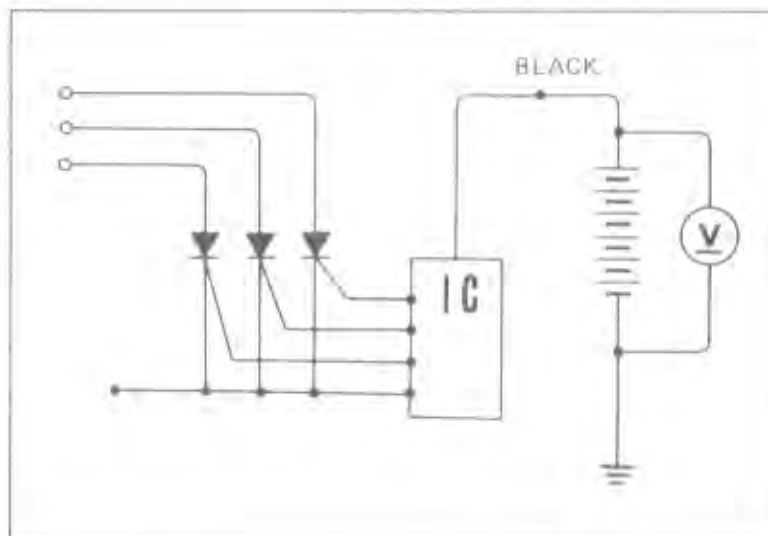
VOLTAGE REGULATOR PERFORMANCE TEST

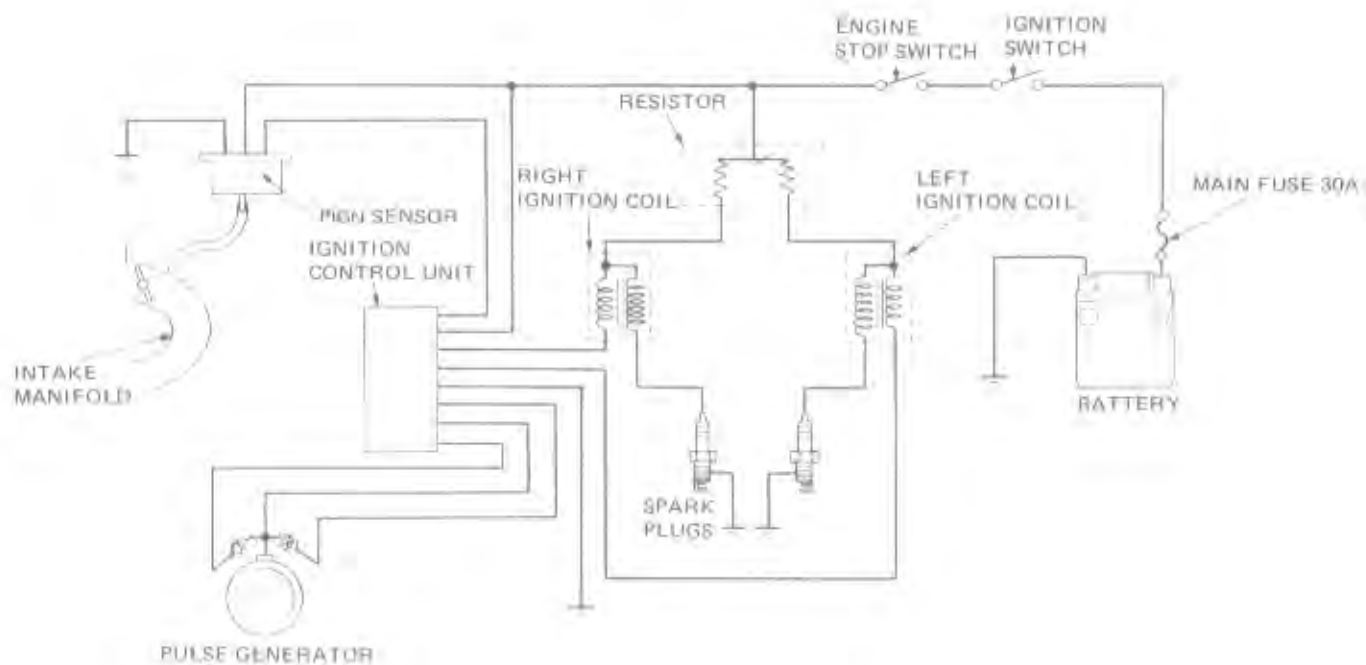
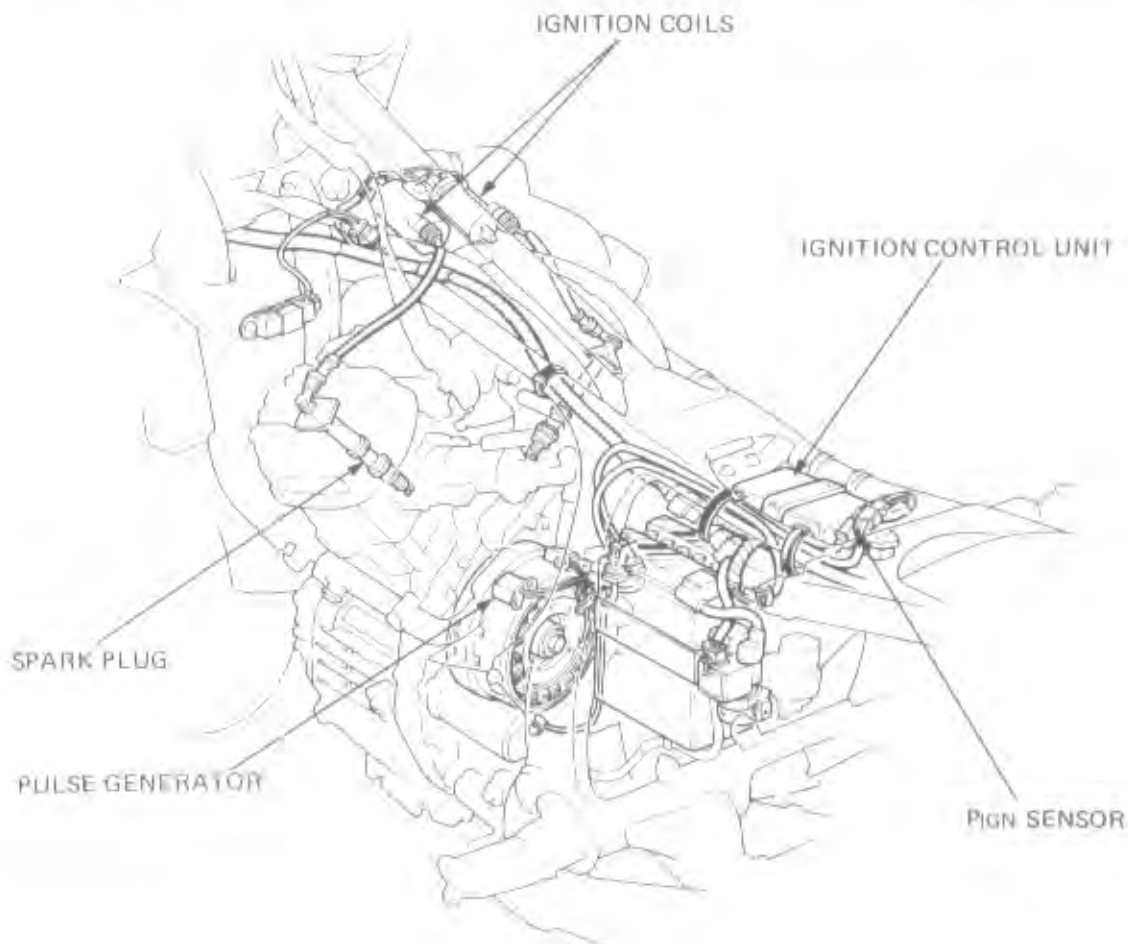
Test with a voltmeter.

Connect a voltmeter across the battery.

Check regulator performance with the engine running.

Regulator must divert current to ground when battery voltage reaches 14.0 – 15.0 V.







SERVICE INFORMATION	20-1
TROUBLESHOOTING	20-1
IGNITION COIL	20-2
PULSE GENERATOR INSPECTION	20-3
IGNITION TIMING INSPECTION	20-4

SERVICE INFORMATION

GENERAL

- The TRANSISTORIZED IGNITION SYSTEM requires no adjustments.
- Do not bend or collapse the PIGN sensor vacuum tube.
- For spark plug information, see Section 3.

SPECIFICATIONS

RECOMMENDED SPARK PLUGS

	For cold climate (Below 5° F, 41° F)	Standard	For extended high speed riding
NGK	DPR7EV-9	DPR8EV-9	DPR9EV-9
ND	X22EPR-GU9	X24EPR-GU9	X27EPR-GU9

Spark plug gap: 0.8–0.9 mm (0.031–0.035 in)
 Ignition FI mark: 25° BTDC
 Ignition full advance marks: 45°–48° BTDC
 Ignition coil 3-point spark test: 10 mm (0.4 in) minimum
 Ignition primary coil resistance: 1.1–1.7Ω
 Ignition secondary coil resistance: 14–21KΩ
 Pulse generator coil resistance: 100 Ω

TOOLS

Special

Inspection plug 07999-4150000

Common

Pressure/Vacuum tester 07406-0050000 or Commercially available in U.S.A.

TROUBLESHOOTING

Engine cranks but will not start

- Engine stop switch OFF
- No spark at plugs
- Faulty ignition control unit
- Faulty pulse generator

No spark at plug

- Engine stop switch OFF
- Poorly connected, broken or shorted wires
 - Between ignition switch and engine stop switch
 - Between ignition control unit and engine stop switch
 - Between ignition control unit and ignition coil
 - Between ignition coil and plug
 - Between ignition control unit and pulse generator
- Faulty ignition coil
- Faulty ignition switch
- Faulty ignition control unit
- Faulty pulse generator

Engine starts but runs poorly

- Ignition primary circuit
 - Faulty ignition coil
 - Loose or bare wire
 - Intermittent short circuit
- Secondary circuit
 - Faulty plug
 - Faulty high tension wire

Timing advance incorrect

- Faulty PIGN sensor
- Broken or restricted PIGN sensor vacuum tube
- Faulty ignition control unit

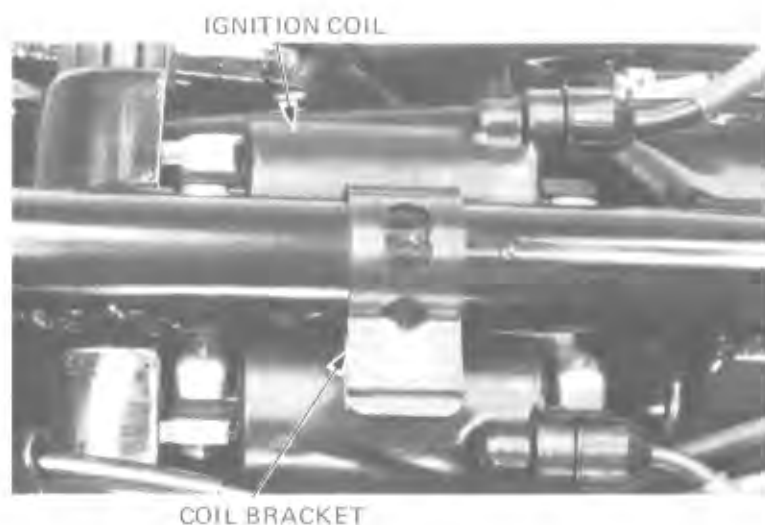


IGNITION SYSTEM

IGNITION COIL

REMOVAL

Remove the fuel tank.
Disconnect the ignition coil wires.
Remove the coil bracket by removing the attaching bolts.



INSPECTION

• PERFORMANCE TEST

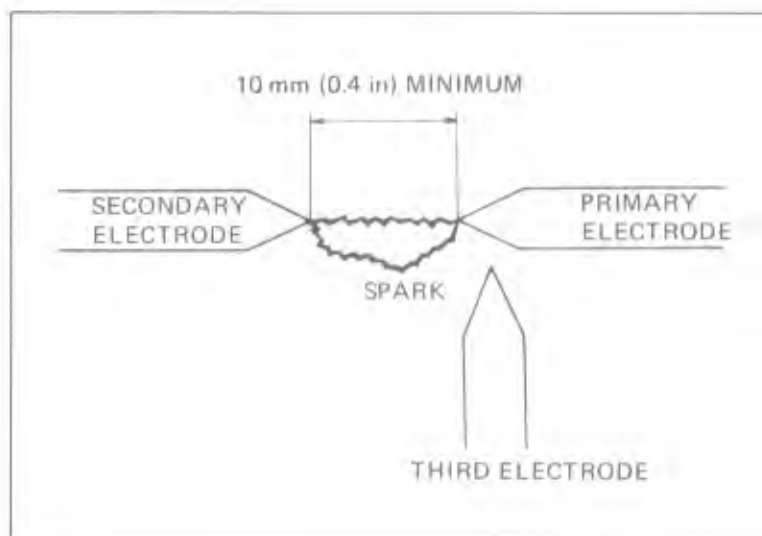
(Testing with a coil tester)

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

SERVICE LIMIT: 10 mm (0.4 in) min.

NOTE

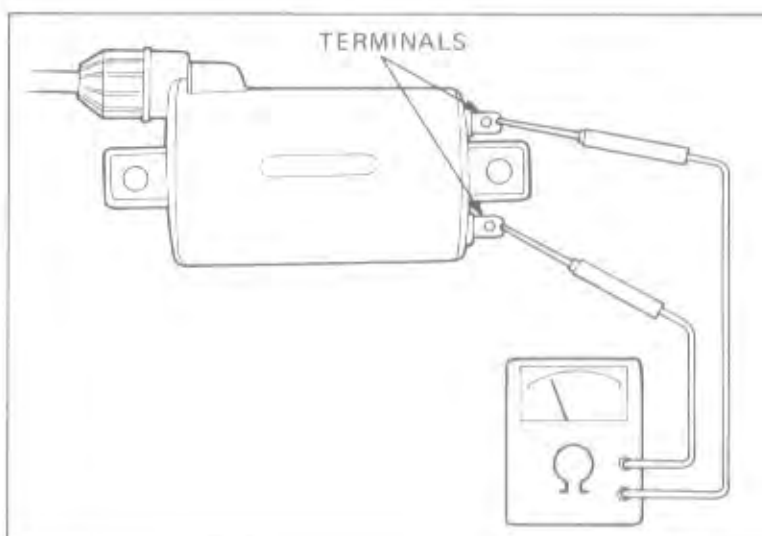
Follow the coil tester manufacturer's instructions.



• PRIMARY COIL

Check the resistance between the terminals with an ohmmeter as shown.

STANDARD RESISTANCE: 1.1–1.7 Ω





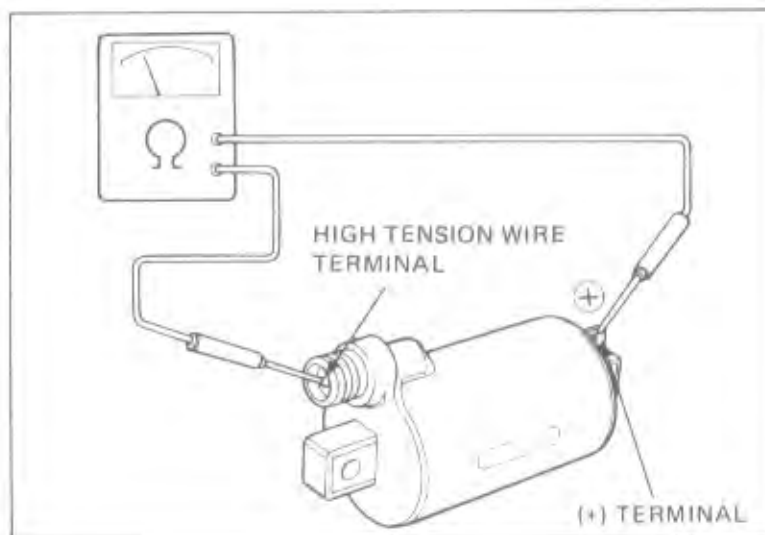
• **SECONDARY COIL**

Remove the high tension wire.
Measure the resistance between the positive (+) and high tension terminals.

STANDARD RESISTANCE: 14–21K Ω

Replace the ignition coil if the readings do not fall within the specifications.

Check the high tension wire for a cracked, frayed or deteriorated insulator and replace if necessary.

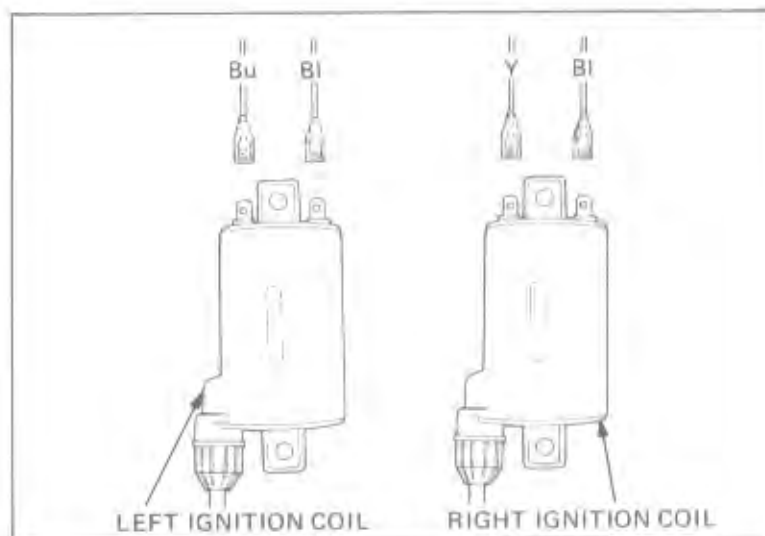


• **IGNITION COIL**

Install the ignition coil in the reverse order of removal.

NOTE

Check that the wires are connected to the ignition coil terminals properly.



PULSE GENERATOR INSPECTION

Disconnect the 3-P coupler of the spark unit.
Measure the resistances between the Y and W terminals (right cylinder coil), and BU and W terminals (left cylinder coil).

STANDARD RESISTANCE:
85–115 Ω AT 20°C (68°F)





IGNITION TIMING INSPECTION

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

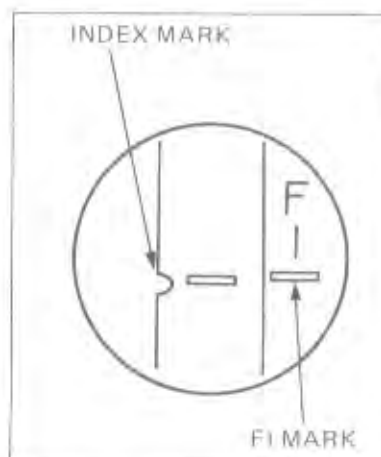
Remove the timing hole cap and attach a timing inspection plug.

Connect a stroboscopic timing light to the right cylinder.

Start the engine and let it idle.

IDLE SPEED: $1,100 \pm 100 \text{ min}^{-1}$ (rpm)

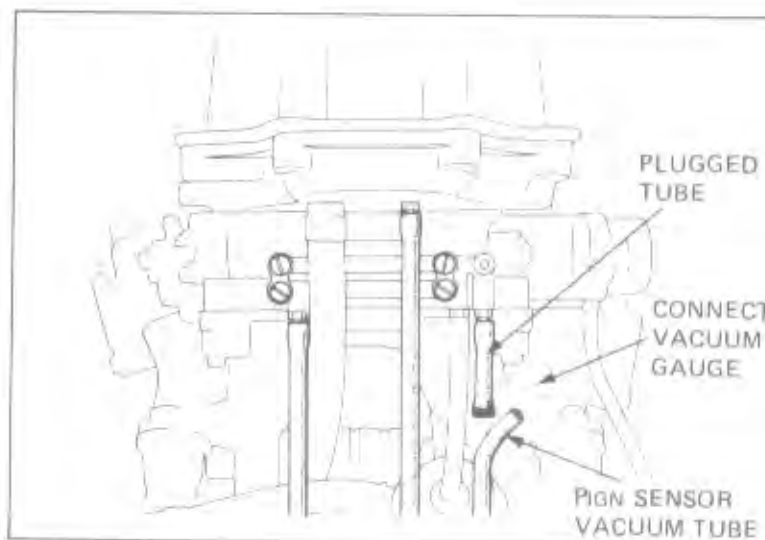
Aim the timing light at the timing mark, the "FI" mark should align with the index mark.



Stop the engine and remove the right side cover. Remove the P2 sensor connector from bracket to get it out of the way of the PIGN sensor on re-connect it. Remove the PIGN sensor vacuum tube from the engine side.

Connect a vacuum pump to the PIGN sensor vacuum tube.

Attach a plugged tube to the engine side.



WARNING

Remember the following when performing this test:

- Fuel is sprayed from the injector with sufficient force to penetrate your eyes. Keep your face well away from the spark plug hole when the existing plug is used to perform this test.
- Keep away from open flames or sparks.
- Purge the cylinder of remaining gasoline by cranking several times with the engine stop switch and fuel valve OFF.
- Do not remove the spark plugs from the cylinder heads, using a spare plug to make the test.



Start the engine and let it run at 2,000–2,500 min^{-1} (rpm) with the throttle stop screw.

Aim the timing light at the index mark.

- The "FI" mark should be below the index mark when negative pressure is not applied to the vacuum tube.
- The "FI" mark should move down and disappear when negative pressure is applied to the vacuum tube gradually.
- The "FI" mark should align with the index mark when 41–68 kPa (0.41–0.68 kg/cm^2 , 0.50–0.83 psi) pressure is applied at 2,000–2,500 min^{-1} (rpm).
- Disconnect the vacuum tester and adjust engine speed to $1,100 \pm 100 \text{ min}^{-1}$ (rpm); the "FI" mark should align with the index mark.

Check the PIGN sensor (Page 24-16) if the timing is incorrect. If the PIGN sensor is in good condition, replace the ignition control unit.

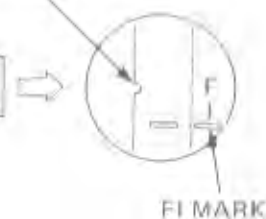
PIGN SENSOR



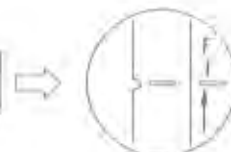
COMBINATION VACUUM/
PRESSURE TESTER
07406-0050000 or
commercially available
in U.S.A.

INDEX MARK

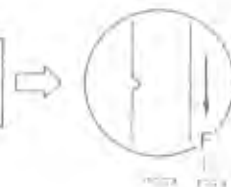
NO VACUUM
APPLIED

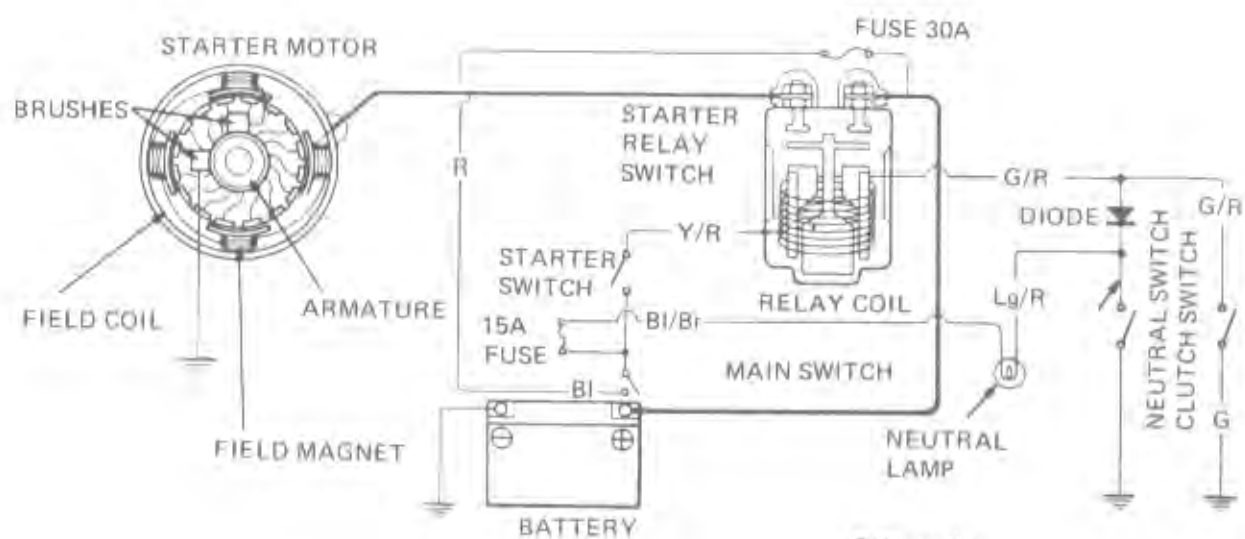
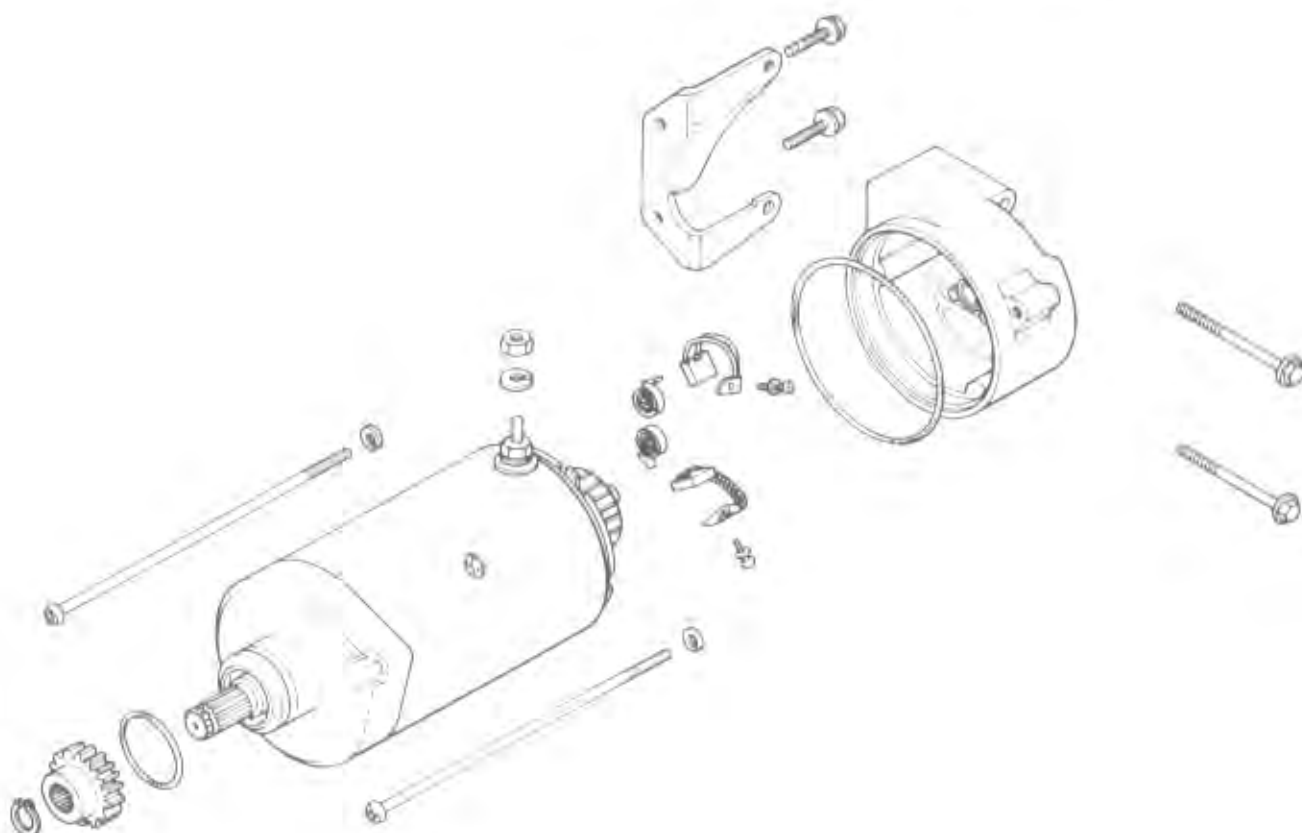


PRESSURE
APPLIED



NEGATIVE
PRESSURE
APPLIED





Color code:

R = Red

Y/R = Yellow/Red

G/R = Green/Red

Br = Brown

Lg/R = Light green/Red.

G = Green

Bl = Black



SERVICE INFORMATION	21-1
TROUBLESHOOTING	21-1
STARTER MOTOR	21-2
STARTER RELAY SWITCH	21-4
SILICONE RECTIFIER	21-4

SERVICE INFORMATION

GENERAL

The starter motor can be removed with the engine in the frame. See Section 9 for starter clutch repairs.

SPECIFICATIONS

Item		Standard	Service Limit
Starter motor	Brush spring tension	560 – 680 g	450 g
	Brush length	12 – 13 mm (0.47 – 0.51 in)	6 mm (0.24 in)

TROUBLESHOOTING

Starter Motor Will Not Turn:

- Dead battery
- Faulty ignition switch
- Faulty starter switch
- Faulty neutral switch
- Faulty starter relay switch
- Loose or disconnected wire or cable
- Neutral diode open
- Faulty clutch switch

Starter Motor Turns Engine Slowly:

- Low battery
- 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 Turn, But Engine Does Not Start:

- Faulty ignition system
- Engine problems, see engine related sections
- Faulty engine stop switch



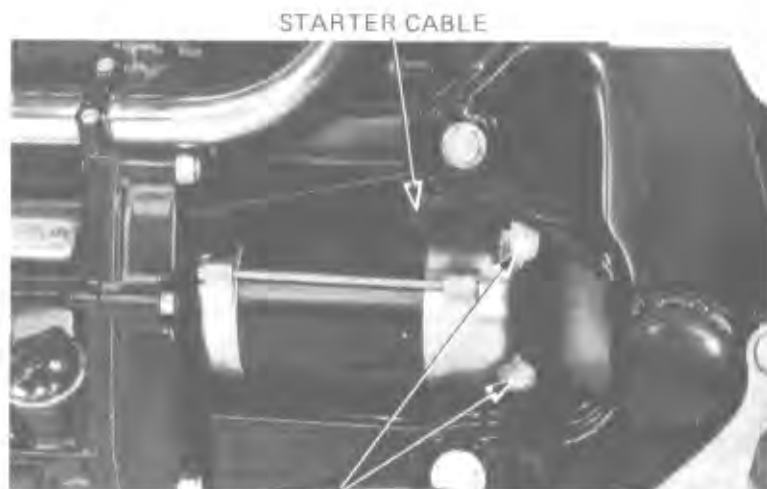
STARTER MOTOR

REMOVAL

WARNING

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

Remove the starter mounting bolts and pull the motor out of the engine case.
Disconnect the starter cable.



MOUNTING BOLTS

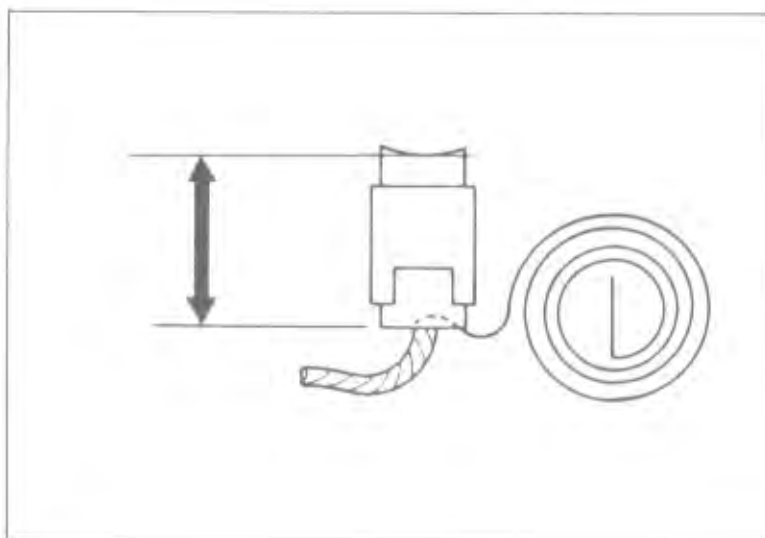
BRUSH INSPECTION

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: 6 mm (0.24 in)

Brush spring tension: 450 g



COMMUTATOR INSPECTION

Remove the case.

NOTE

Record the location and number of the thrust washers.

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

NOTE

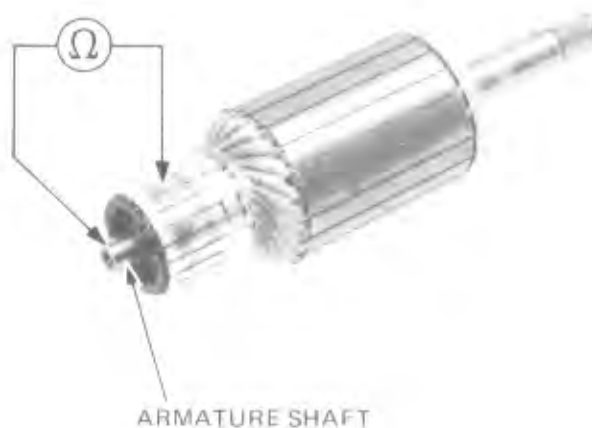
Do not use emery or sand paper on the commutator.





Check for continuity between pairs of commutator bars, and no continuity between commutator bars and armature shaft.

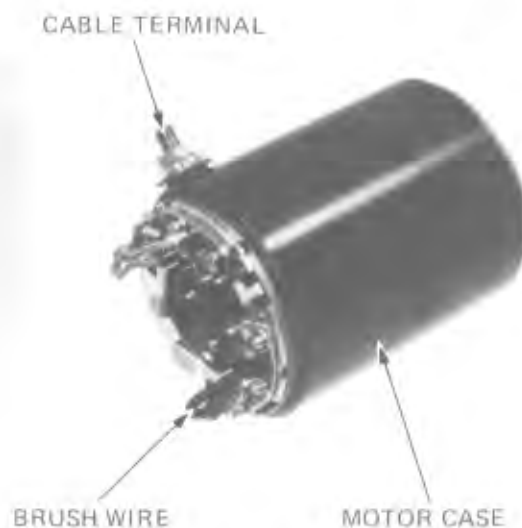
Replace starter motor if armature coils are open, or shorted to armature shaft.



FIELD COIL INSPECTION

Check for continuity from the cable terminal to the motor case and 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

Align the punch mark on the case with the punch mark on the cover.

Assemble the starter motor.

Connect the starter motor cable.

Install the starter motor on the engine.





STARTER SYSTEM

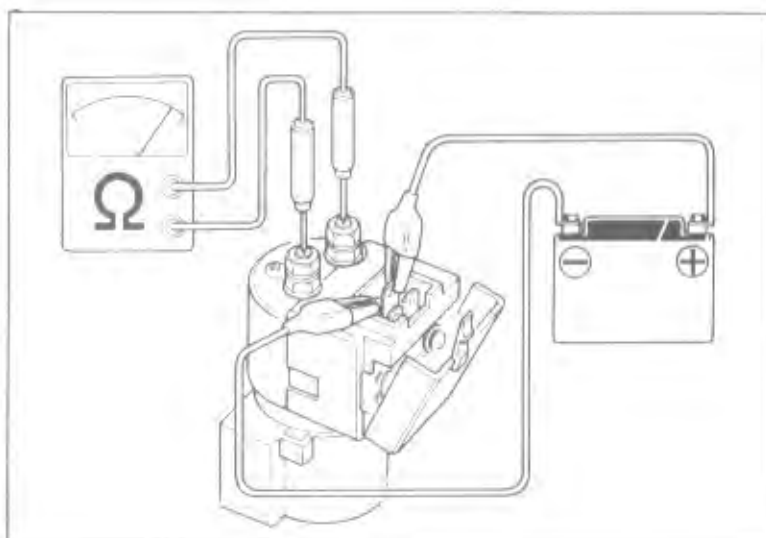
STARTER RELAY SWITCH

INSPECTION

To test if the switch primary coil is normal, depress the switch button. The coil is normal if the switch clicks into position.

Connect an ohmmeter and 12V battery to the starter relay switch as shown.

The switch is normal if there is continuity.



SILICONE RECTIFIER

INSPECTION

Remove the left side cover and remove the silicone rectifier from the wire harness. Check for continuity with an ohmmeter.

NORMAL DIRECTION: CONTINUITY

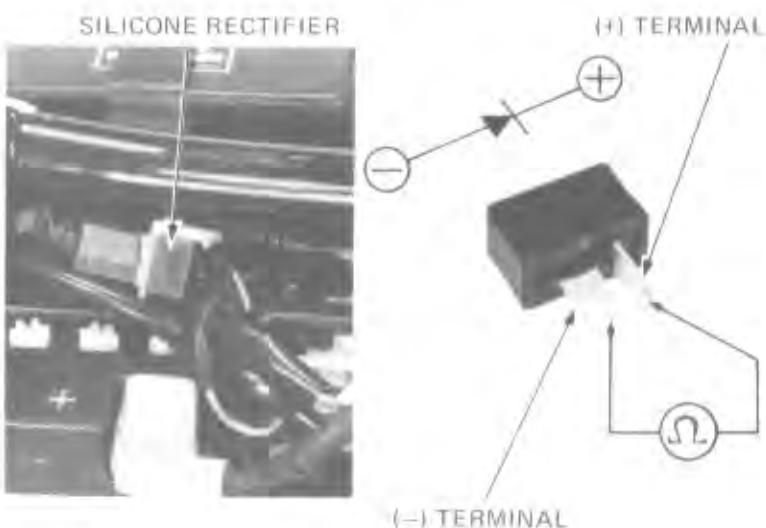
- ⊕ probe: Light green/Red (+)
- ⊖ probe: Green/Red (-)

REVERSE DIRECTION: NO CONTINUITY

- ⊕ probe: Green/Red (-)
- ⊖ probe: Light green/Red (+)

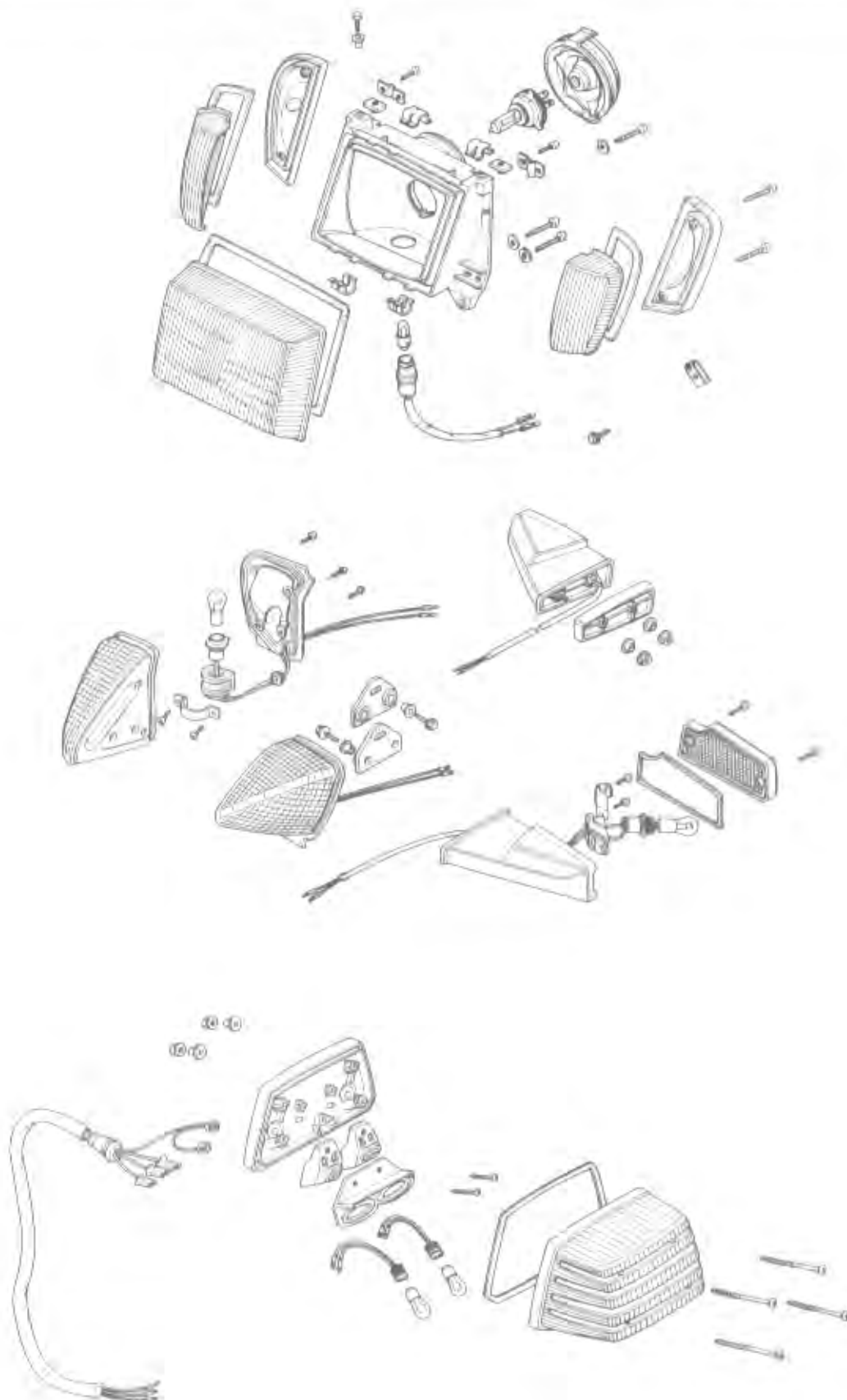
NOTE

The test chart is for a positive ground ohmmeter. The test results will be reversed if a negative ground ohmmeter is used.





MEMO





SERVICE INFORMATION	22-1	IGNITION SWITCH	22- 7
BULB REPLACEMENT	22-2	TEMPERATURE GAUGE	22- 9
OIL PRESSURE WARNING SWITCH	22-3	FUEL GAUGE	22-10
BRAKE SWITCHES	22-4	BOOST INDICATOR	22-11
NEUTRAL SWITCH	22-4	FUEL PUMP STOP SENSOR	22-12
HANDLEBAR SWITCHES	22-4	FUEL AND MAIN RELAYS	22-13
CLUTCH SWITCH	22-7	WIRING DIAGRAM	22-15

SERVICE INFORMATION

GENERAL

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

Bu = Blue	G = Green	Lg = Light Green	R = Red
Bl = Black	Gr = Grey	O = Orange	W = White
Br = Brown	Lb = Light Blue	P = Pink	Y = Yellow

- To isolate an electrical failure, check the continuity of the electrical path through the part. A continuity check can usually be made without removing the part from the motorcycle. Simply disconnect the wires and connect a continuity tester or volt ohmmeter to the terminals or connections.
- A continuity tester is useful when checking to find out whether or not there is an electrical connection between the two points. An ohmmeter is needed to measure the resistance of a circuit, as when there is a specific coil resistance involved, or when checking for high resistance by corroded connections.
- Do not turn the ignition switch ON once the fuel tank is removed to prevent fuel from squirting out of the fuel line.
- For inspection of the low fuel warning lamp, refer to page 22-10.

TOOLS

Special

Inspection adapter
Digital circuit tester

07999-MC70000
07411-0020000 or commercially available in U.S.A.

BULB REPLACEMENT

HEADLIGHT

Remove the headlight, (Section 14) and bulb cover.

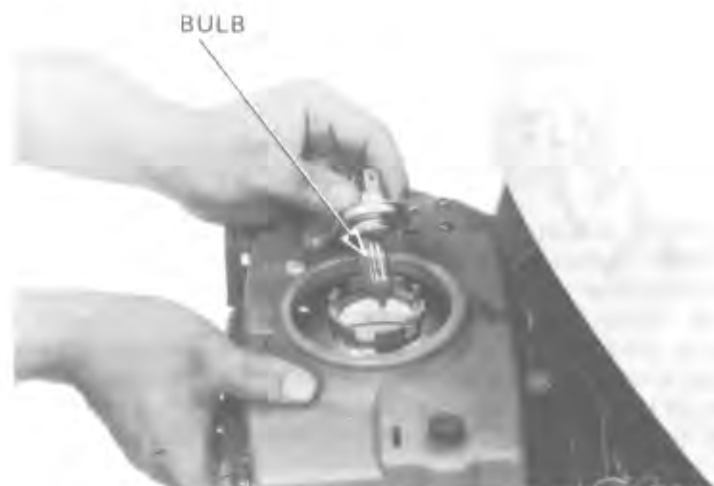


Remove the headlight bulb.

CAUTION

Wear clean gloves when installing the halogen bulb. If you touch the bulb with your bare hands, clean it with a cloth moistened with alcohol to prevent its early failure.

Install in reverse order of removal.



FRONT TURN SIGNALS

Remove the front turn signals from the base plates by removing the three screws for each.

Remove the bulbs from the base plates.

The installation sequence is essentially the reverse order of removal.

CAUTION

Do not overtighten the lens mounting screws to prevent cracking the lens.



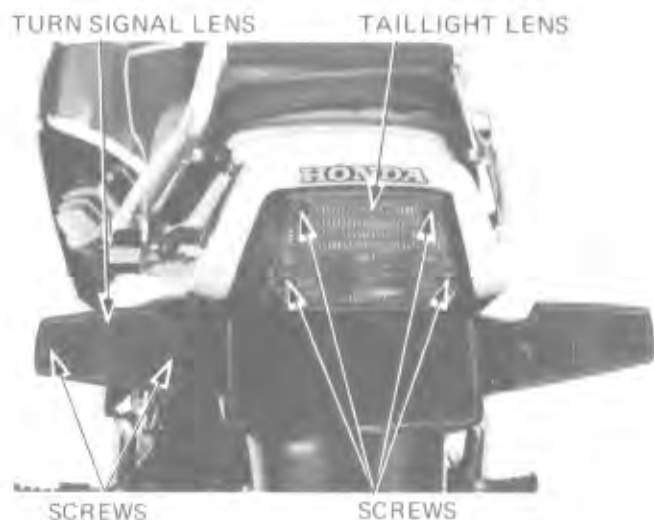


REAR TURN SIGNAL AND TAILLIGHT

Remove the lens to remove the bulb.

CAUTION

Do not overtighten the lens mounting screws to prevent cracking the lens.



INSTRUMENT BULB

Open the fairing cover and remove the headlight. Reaching from behind the instrument panel, remove the bulb.



OIL PRESSURE WARNING SWITCH

Check for continuity while applying pressure to the switch.

Continuity: Below 20kPa (0.2kg/cm², 2.8 psi)

No continuity: Above 20–40 kPa
(0.2–0.4 kg/cm², 2.8–5.6 psi)

Replace the switch if necessary.
Apply a liquid sealant to the switch threads.



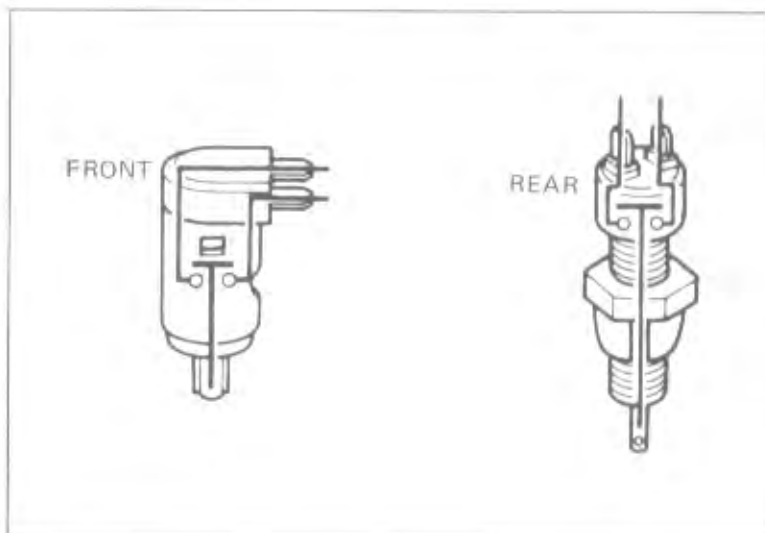


BRAKE LIGHT SWITCHES

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

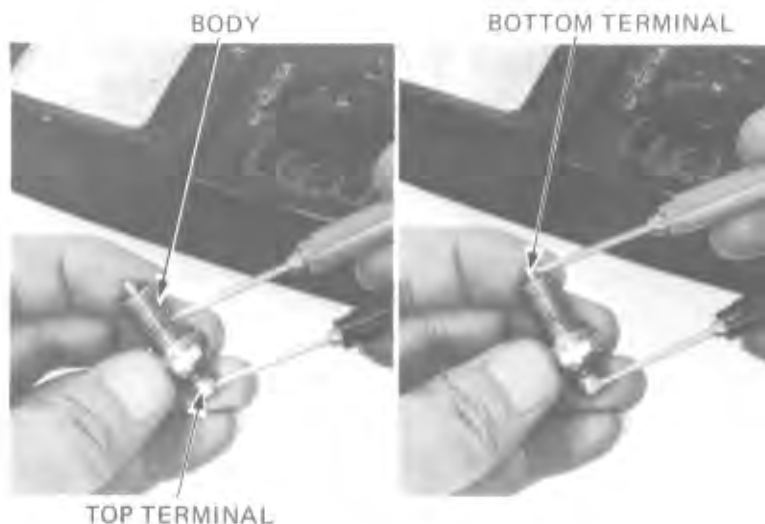
NOTE

Refer to page 9-3 for neutral switch removal.

Check for shorts between the top terminal and body ground. Replace the switch if there is continuity.

Check the neutral switch for continuity between the top and bottom terminals. The switch is normal if there is continuity.

Inspect the neutral switch wire.

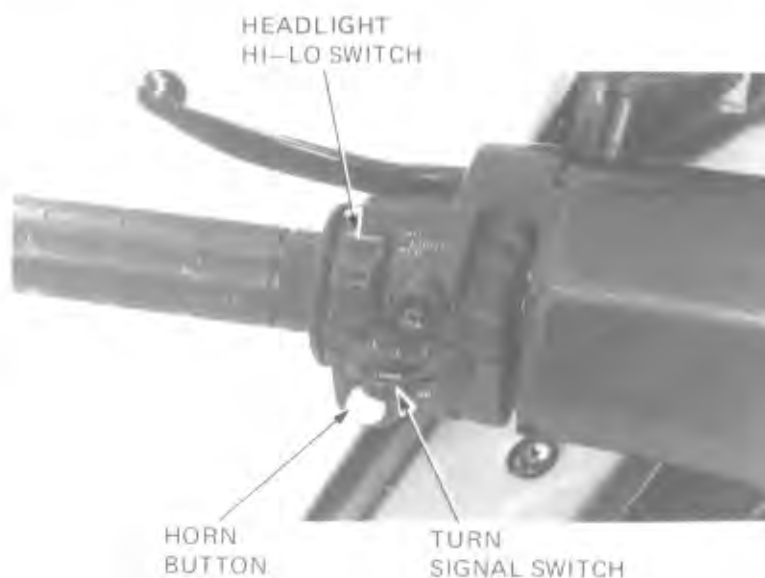


HANDLEBAR SWITCHES

The handlebar cluster switches (lights, turn signals, horn) 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: Bu/W to Bu
MIDDLE(N): Bu/W to W to Bu
LO: Bu/W to W

Headlight Hi - Low Switch

	HL	Hi	Lo
HI			
(N)			
Lo			
Color code	Bu/W	Bu	W

TURN SIGNAL SWITCH

LEFT: Gr to O
OFF: No continuity
RIGHT: Gr to Lb

Turn Signal Switch

	W	L	R
LEFT			
OFF			
RIGHT			
Color code	Gr	O	Lb

HORN BUTTON

Lg to G with button depressed.
No continuity with button released.

Horn Button

	Ho	E
Color code	Lg	G

ENGINE STOP SWITCH



STARTER BUTTON

STARTER BUTTON

BI to Y/R with button depressed

Starter Button

	BAT2	ST
FREE		
START		
Color code	BI	Y/R

ENGINE STOP SWITCH

RUN: BI to BI/W
OFF: No continuity

Engine Stop Switch

	BAT2	IG
OFF		
RUN		
OFF		
Color code	BI	BI/W



CLUTCH SWITCH

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

CLUTCH APPLIED: CONTINUITY

CLUTCH RELEASED: NO CONTINUITY

REMOVAL

Unplug the wires and 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.



IGNITION SWITCH

Remove the handlebar cover.

Disconnect the coupler and remove the ignition switch.

NOTE

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



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

SWITCH POSITION

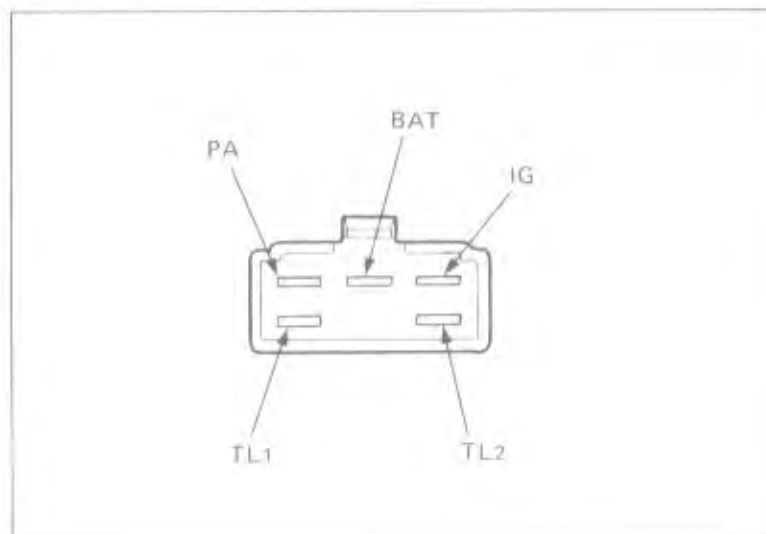
ON: BAT to IG, TL1 to TL2

OFF: No continuity

P. LOCK: BAT to PA

LOCK: No continuity

CODE	PA	BAT	IG	TL1	TL2
ON		○—○	○—○	○—○	
OFF					
P. LOCK	○—○				
LOCK					
Color code	Br	R	Bl	Br/W	Br



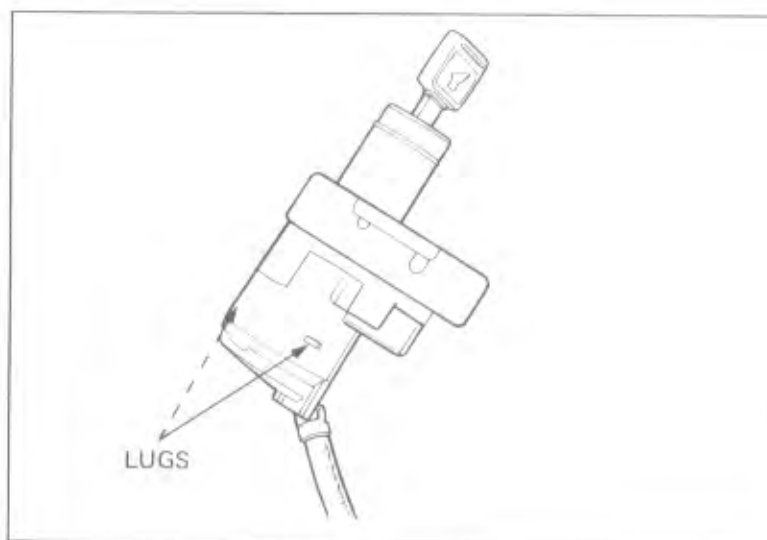


IGNITION SWITCH DISASSEMBLY

Insert the key and position it in the middle of "ON" and "OFF" positions.



Push the lugs from the slots and remove the contact base.
Assemble in the reverse order of removal.





TEMPERATURE GAUGE

INSPECTION

Connect a tested sensor and instrument as shown to the gauge to be tested.

CAUTION

The temperature gauge operates on 7 volts. Do not apply 12 volts directly to the gauge.

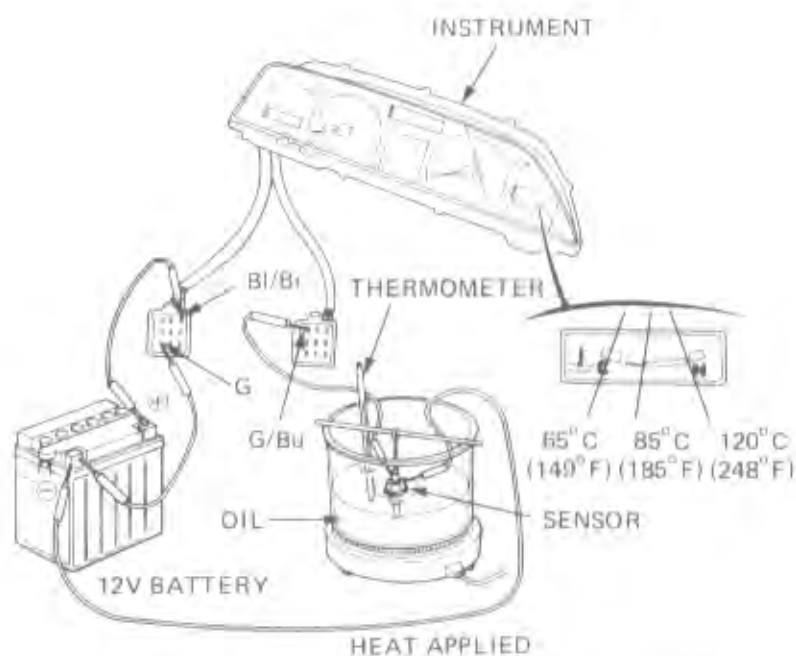
Suspend the sensor in a pan of oil.

Do not let the sensor or thermometer touch the pan or false readings will result.

Compare the gauge readings to the thermometer readings as the oil heats.

NOTE

Refer to page 10-4 for temperature unit inspection.

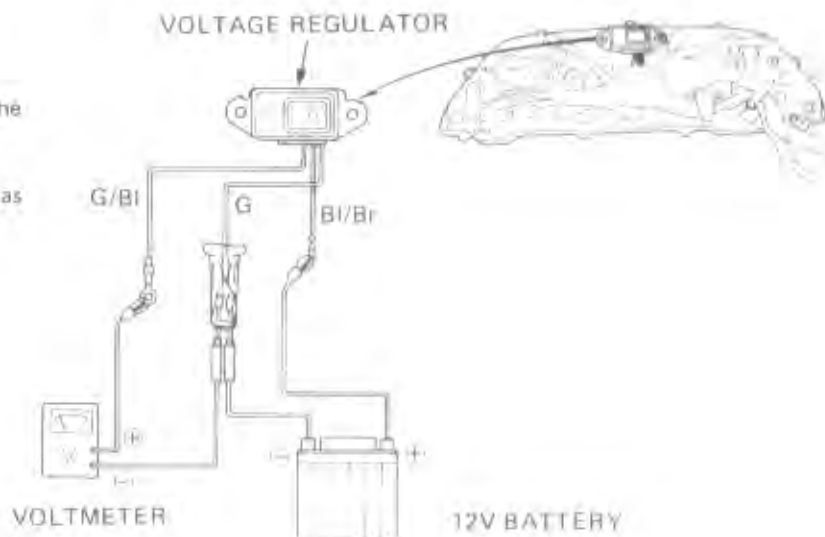


AUXILIARY VOLTAGE REGULATOR INSPECTION

Remove the auxiliary voltage regulator from the rear of the instrument.

Test the regulator with a battery and voltmeter as shown.

Regulator output voltage should be 7 Volts.





FUEL GAUGE

FUNCTION TEST

Place the motorcycle on its center stand.
Remove the seat and fuel tank.

Remove the fuel valve. Turn the fuel tank upside down to drain the remaining fuel thoroughly.

Refer to Page 4-14, for removal of the fuel valve.

WARNING

Keep gasoline away from open flames or sparks. Wipe up spilled gasoline at once.

Reinstall the fuel valve and fill the fuel tank with the specified amount of fuel, making sure that the gauge pointer registers properly.

Remove the headlight and disconnect the instrument couplers.

CAUTION

The fuel gauge operates on 7 volts. Do not apply 12 volts directly to the gauge.

Measure the resistances between the Bu/W and G terminals using a tester as shown.

Position	E	1/2	F
Amount	5 lit (1.3 US gal) (1.1 Imp gal)	13 lit (3.4 US gal) (2.8 Imp gal)	17 lit (4.4 US gal) (3.7 Imp gal)
Resistance	71-75 Ω	34-39 Ω	10-15 Ω

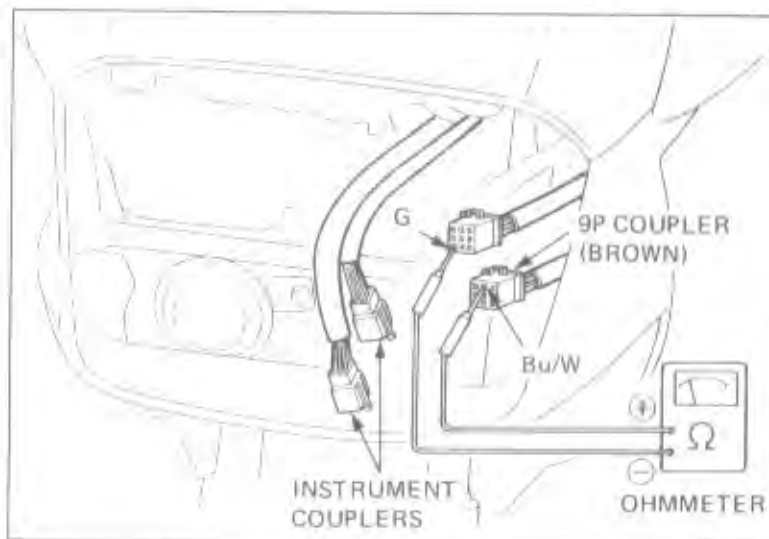
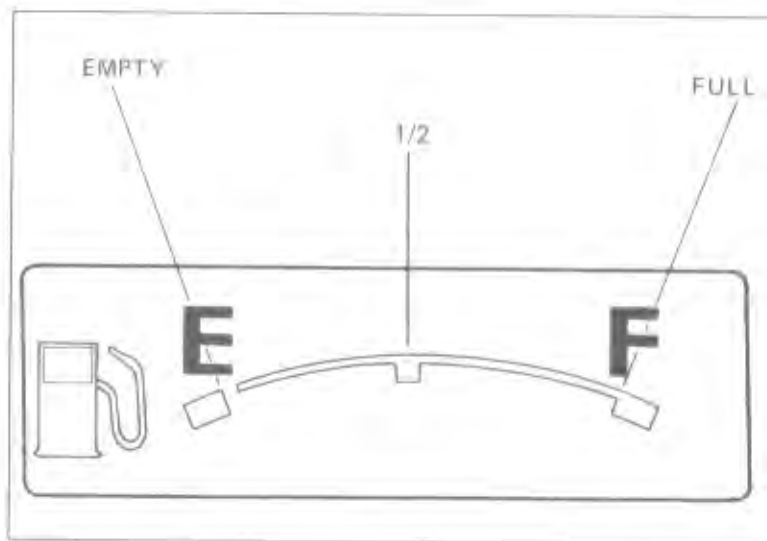
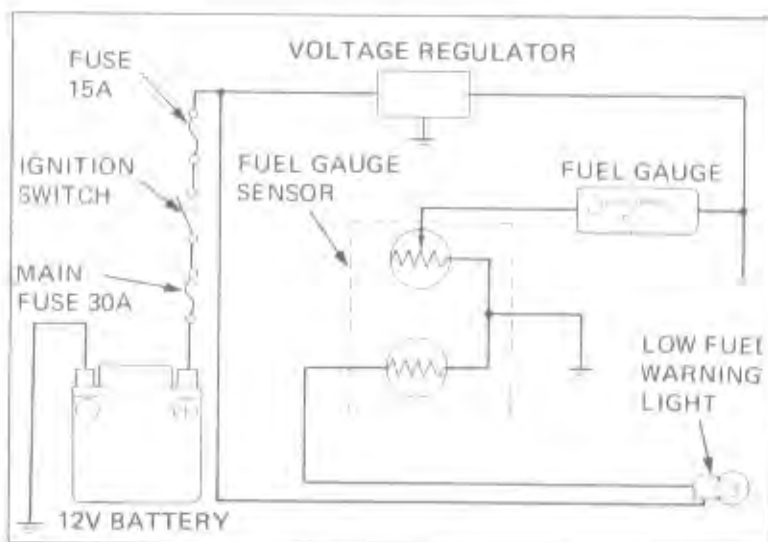
NOTE

- Connect the instrument couplers and turn the ignition switch ON before checking the pointer indications.
- Turn the ignition switch OFF before measuring the resistances.

Replace the fuel gauge as an assembly when the pointer indications are abnormal, even if the resistances are correct.

Remove the sensor and replace with a new one if the resistances are not correct.

Refer to Page 4-14 for removal of the fuel gauge sensor.





LOW FUEL WARNING LIGHT

Place the motorcycle on its center stand.

Check that the low fuel warning light comes on within 30 seconds after the ignition switch has been turned ON with the amount of fuel in the fuel tank below 4.0 liters (1.06 US gal, 0.88 Imp gal).

NOTE

The light will not go on immediately after the ignition switch is turned ON.

If the light does not go on within 30 seconds, check for blown fuse or bulb, loose connector or open circuit in the wire harness.

Replace the sensor if the above procedure indicates nothing wrong.

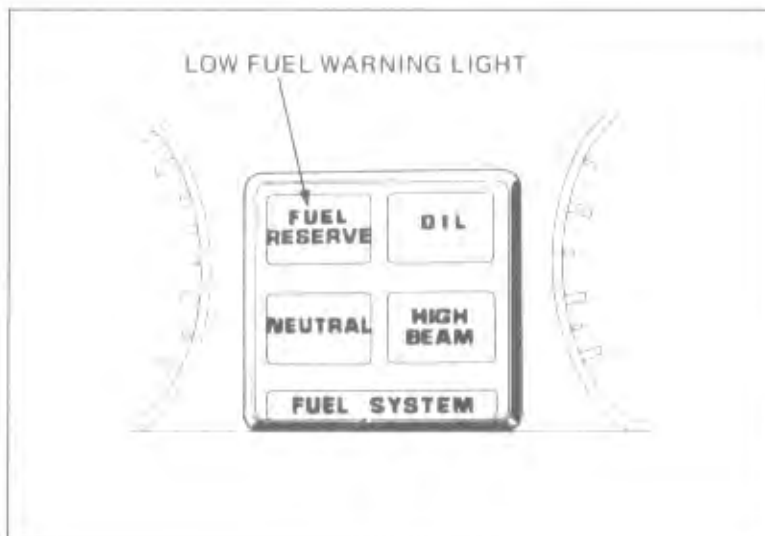
Check that the low fuel warning light will not light when the ignition switch is turned ON with the amount of fuel in the fuel tank above 6.5 liters (1.72 US gal, 1.43 Imp gal).

If the warning light goes on, check for a short circuit in the wire harness or coupler.

Replace the sensor if nothing wrong is indicated.

NOTE

Refer to Page 4-14 for removal of fuel gauge sensor.



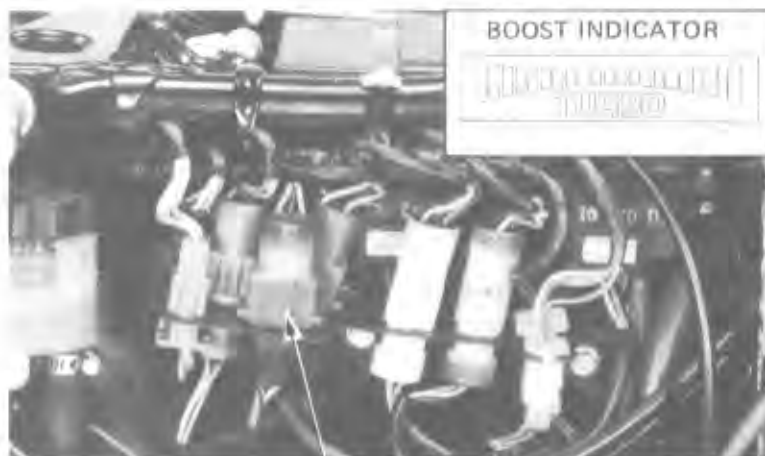
BOOST INDICATOR

FUNCTION TEST

Remove the left side cover.

Disconnect the PIGN sensor coupler (red).

Check that the boost indicator warning lamp goes on when the ignition switch is turned ON.



PIGN SENSOR COUPLER (RED)



LIGHT/SWITCHES/METERS

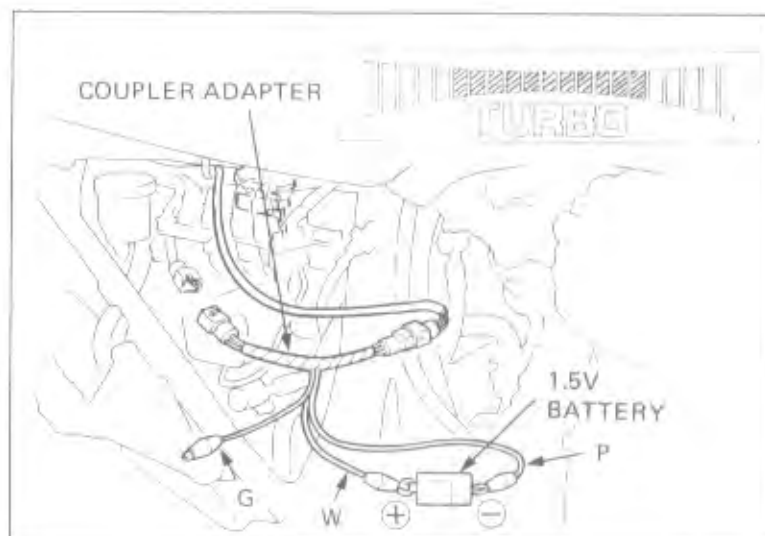
INSPECTION

Start the engine and make a visual inspection of the boost indicator's operation; Snap the throttle open, if segments 1-5 light up the indicator is correct. If not perform the inspection below.



Stop the engine. Connect a 1.5 V dry battery between the W(+) and P(-) terminals of the adapter. Turn on the ignition switch.

The boost indicator is correct if segments 0 - 5 light up.

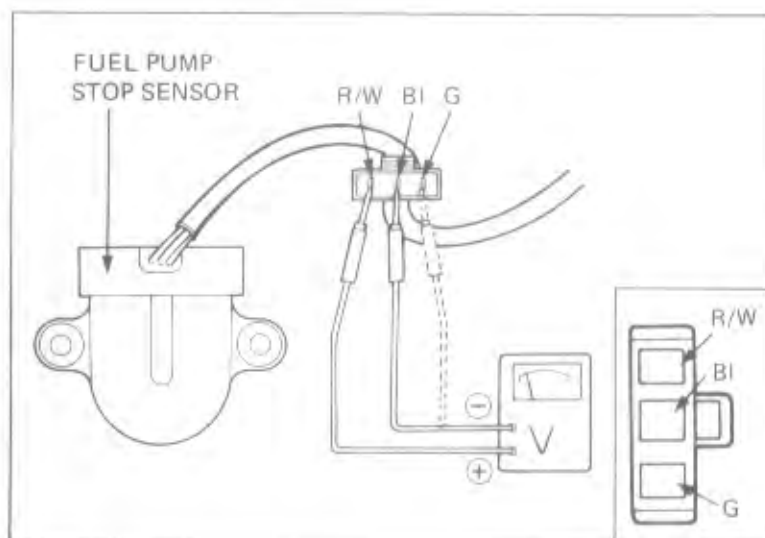


FUEL PUMP STOP SENSOR

INSPECTION

Turn the ignition switch ON and measure the voltage across the terminals of the fuel pump stop sensor without disconnect the coupler.

Terminals ⊕ - ⊖	Standard Voltage
R/W - G	0 - 1 V
BI - G	10 - 14 V

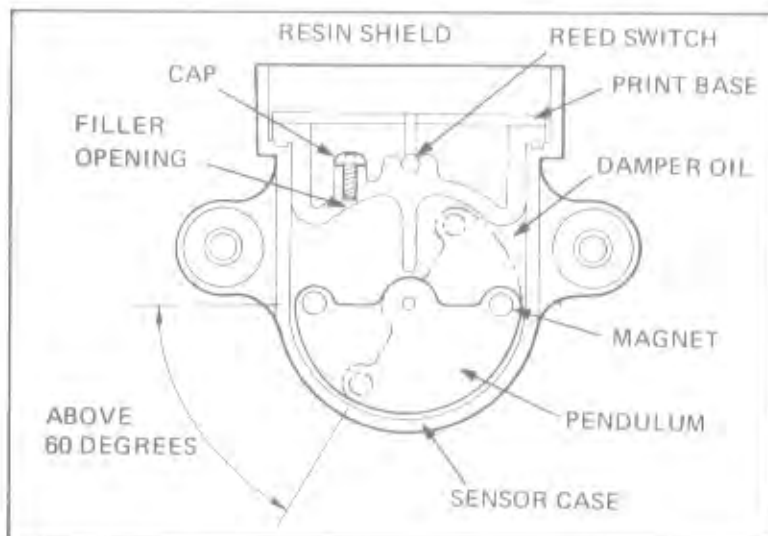




FUNCTION TEST

Remove the fuel pump stop sensor. (Page 4-13).

Re-connect the tubes and wires except the PB sensor coupler (blue).



Set a protractor on the sensor as shown so that the angle of the sensor is indicated by a pendulum.

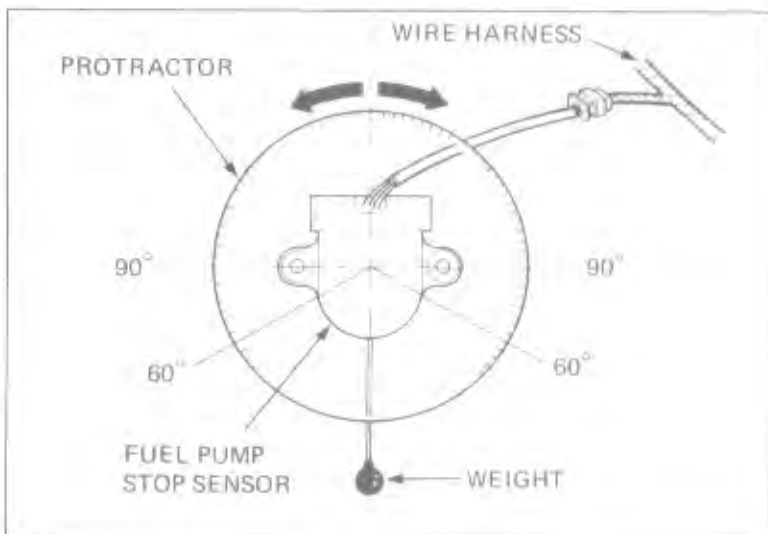
Reconnect the sensor connector to the wire harness.

Let the low fuel warning light go on by turning the ignition switch ON. Rotate the sensor right and left.

The sensor is normal if the warning light goes OFF when turned 50° – 70° in both directions.

Replace the sensor if the light goes off before 50° – 70° .

If the light does not go OFF, check for loose connector or an open circuit in the wire harness. If there is no loose connector or open circuit, then check the relay.



Replace the sensor if the relay is OK.
Install the sensor correctly.

FUEL AND MAIN RELAYS

MAIN RELAY REMOVAL

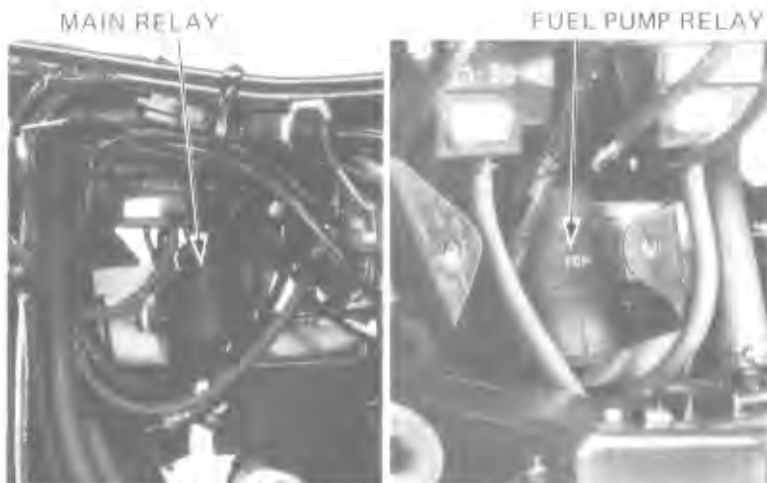
Remove the battery and battery bracket.
Remove the relay from the bracket.

FUEL RELAY REMOVAL

Remove the coupler holder by removing two bolts.
Remove the relay from the bracket.

NOTE

- The main relay is located on the right side.
- The fuel pump relay is located on the left side.





LIGHT/SWITCHES/METERS

Disconnect the main and fuel pump relays from their respective couplers.

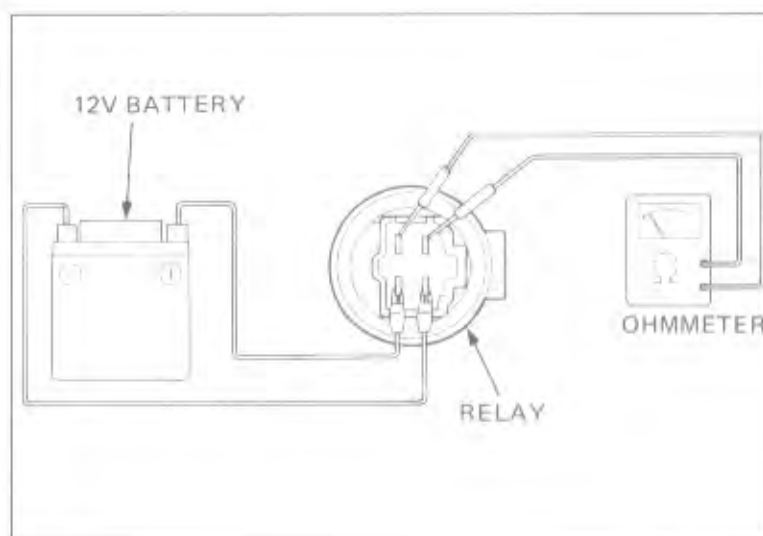
NOTE

- The main relay has BLACK, RED, BLACK/WHITE and RED/WHITE wires. The fuel pump relay has BLACK wire, a RED, a BROWN and BROWN/BLACK wire.
- The main and fuel pump wires are similar in construction except for the wire colors. Be careful not to mix them up.



Connect a fully charged 12 V battery and an ohmmeter to the relay terminals as shown.

The relay is normal if there is continuity when voltage is applied.





HONDA
CX500 TURBO

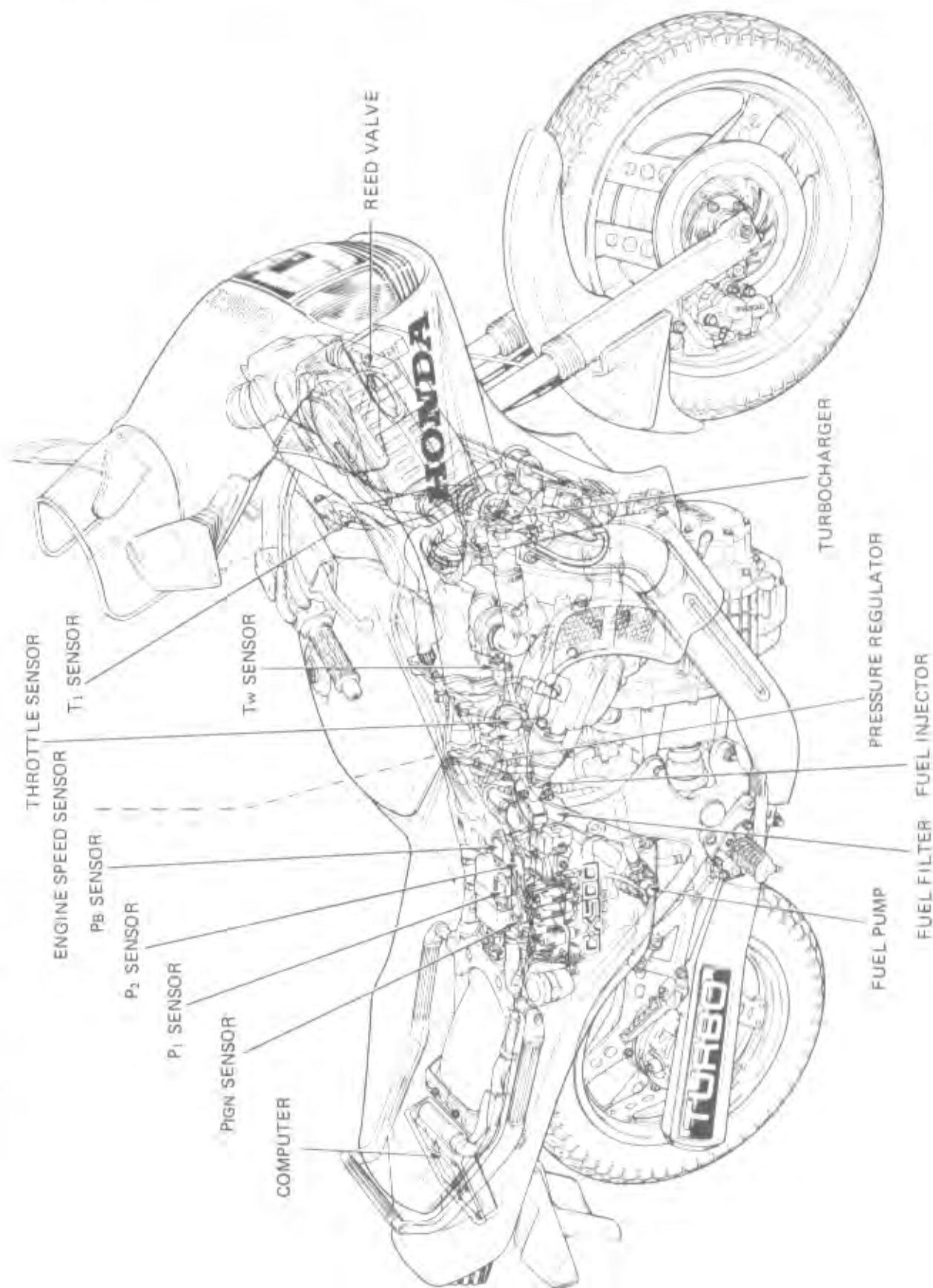
MEMO



MEMO



COMPUTERIZED FUEL INJECTION SYSTEM





TURBOCHARGER	23- 2
COMPUTERIZED FUEL INJECTION (CFI) SYSTEM	23- 5
AUTOMATIC CAM CHAIN TENSIONER	23- 9
AUTOMATIC FUEL PUMP SHUT-OFF SYSTEM	23-10
TRAC FRONT SUSPENSION	23-11
TRANSISTORIZED IGNITION SYSTEM	23-12
PRO-LINK REAR SUSPENSION	23-13
FAIRING	23-15

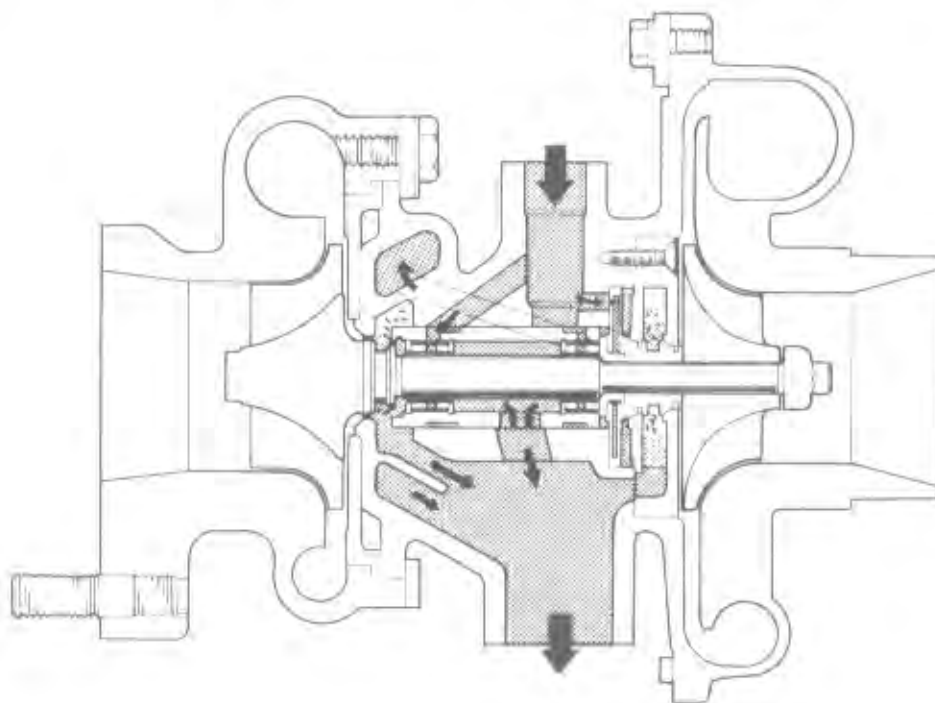


TURBOCHARGER

Refer to the Turbocharger - Computerized Fuel Injection System Manual for further details.

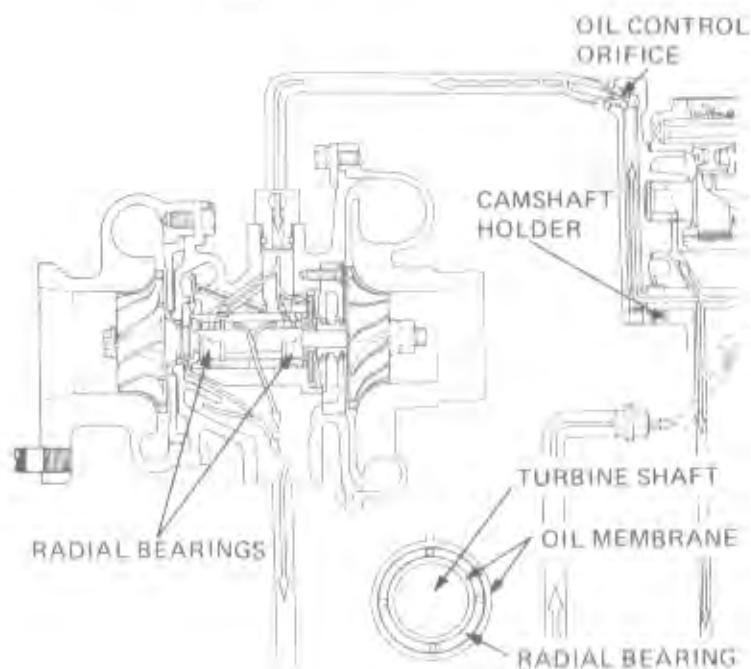
WORKING PRINCIPLE OF TURBOCHARGER

In the naturally aspirated engine, about 40% of the energy generated from fuel combustion is discharged into the atmosphere as heat in the exhaust gas. A turbocharger utilizes a portion of this energy to drive the turbine and the compressor which are attached to the same shaft. The compressor increases the pressure of the engine intake air which enables the engine to effectively use a greater mixture of air and fuel. This produces an increase in power output over the naturally-aspirated engine.



LUBRICATION SYSTEM

The turbocharger uses floating radial bearings to support its rotor which must rotate at 180,000 rpm under the extreme condition. Since the bearings are not held rigidly but are free to rotate on layers of oil in the housings, the design reduces relative movement between the bearing and turbine shaft to permit lower-friction rotation. Less vibration is also transmitted from the turbine shaft to the housing, contributing to quiet operation of the unit. The bearings gain lubrication by oil which is sent under pressure from the engine's lubrication system.

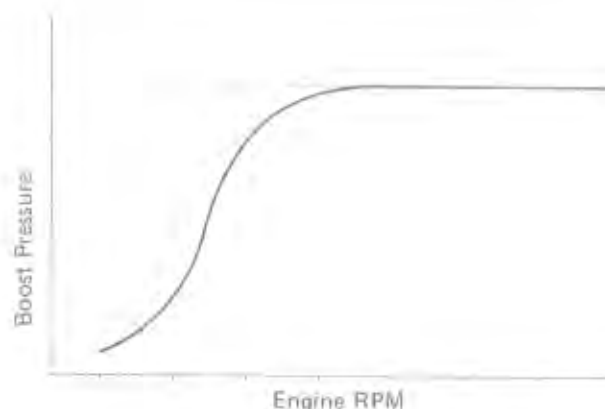




BOOST PRESSURE CONTROL

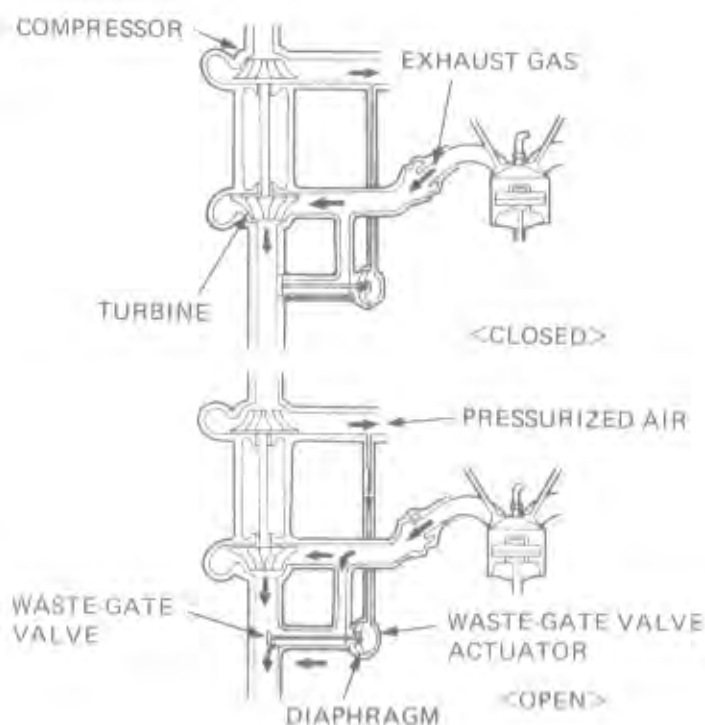
Boost pressure is increased as the engine picks up speed, causing knocking or other problems if boost becomes excessive.

The turbocharger uses a waste-gate control which, when engine speed increases, acts to maintain desired turbocharger speed by directing excess exhaust gas around rather than through the turbine. As engine speed decreases so that the boost is low, the waste-gate remains closed, allowing all of the exhaust gasses to go through the turbine. When engine speed increases, the waste-gate opens, routing excess exhaust gas through a bypass into the exhaust pipe.



Increased rate of air flow to an engine means higher heat stress and greater loads on engine parts. On the CX500 TURBO, an oil jet nozzle supplies additional oil to the pistons so long as the engine is in rotation. Heat is isolated not only at the turbine and "hot-ends" of the turbocharger components but also at the turbocharger itself by use of heat covers and a heat shroud for protection and maximum heat convection.

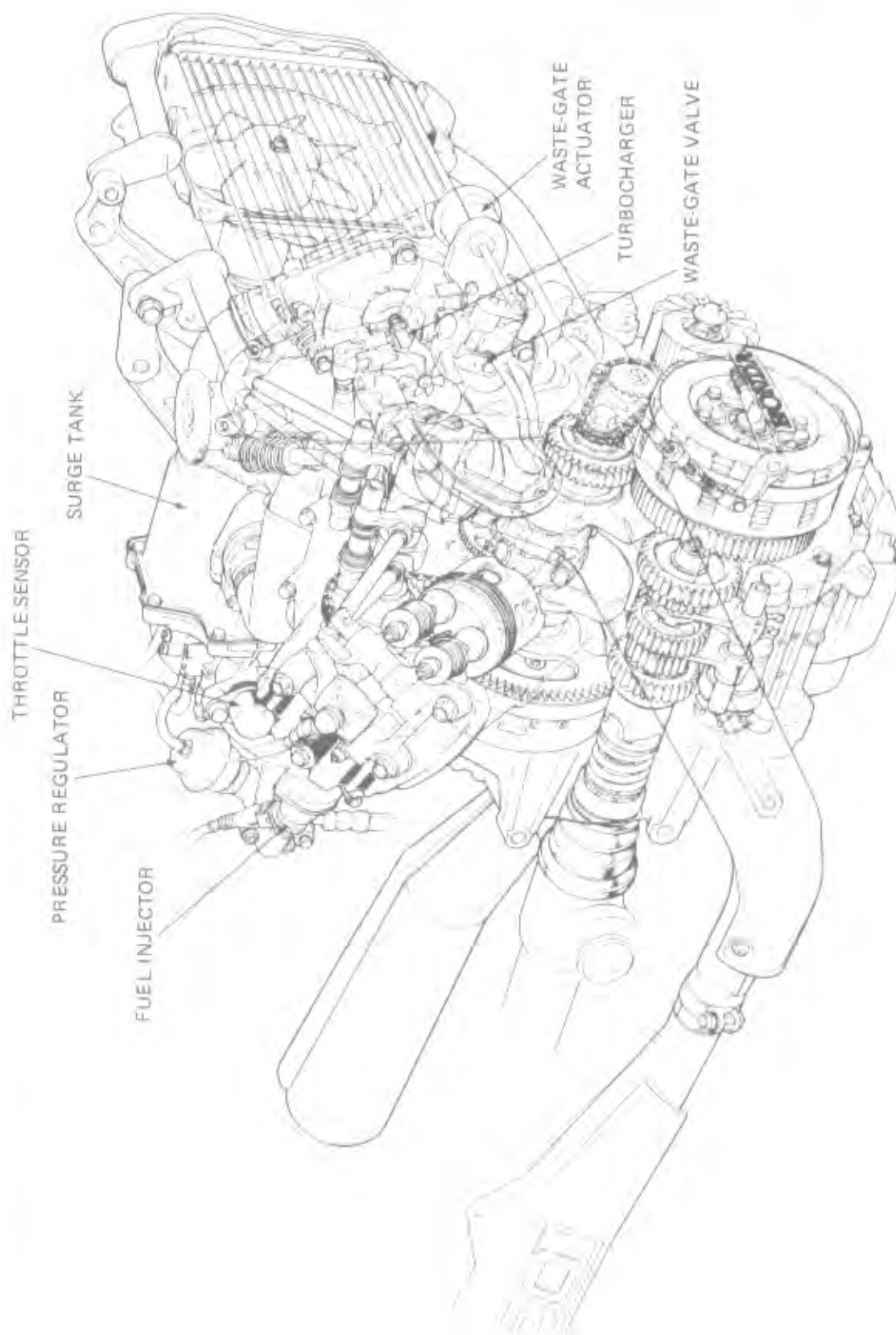
The parts are also designed to withstand the greater stresses encountered by this engine.



ADVANTAGES OF THE TURBO-CHARGED ENGINE

- Engine power output can be increased without increasing the engine speed or displacement.
- Engine weight and volume per horsepower can be reduced.
- Fuel efficiency is increased by utilizing exhaust energy to improve performance.
- Fuel economy can be increased through use of smaller engines for the same applications.
- Engine exhaust noise is lowered.





ENGINE CUT-AWAY



COMPUTERIZED FUEL INJECTION SYSTEM

In naturally aspirated engines, the operation of the carburetor is dependent upon the vacuum at the venturi in the carburetor air horn. The turbocharger assists the vacuum by raising the pressure of the incoming air by having the carburetor mounted ahead of its compressor due to consistent pressure in the manifold.

However, such an installation would not be acceptable where precision control of the fuel supply in response to the manifold pressure is required. Over-fueling or fuel collected in the manifold or compressor is a frequent cause of malfunctions associated with such a design.

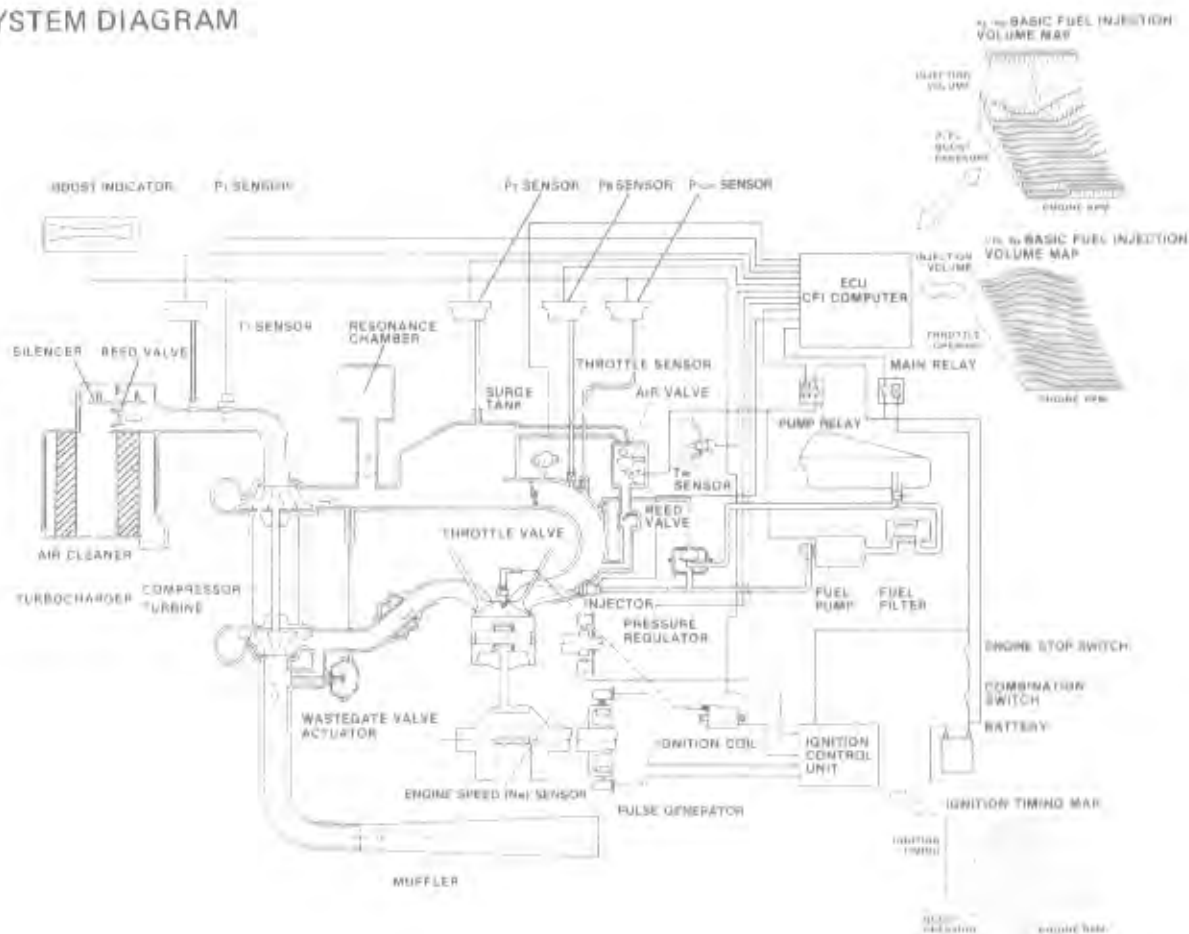
The CX500 TURBO uses a computerized fuel injection system which provides an extremely accurate control of the air-fuel mixture in the manifold under all operating conditions.

COMPUTERIZED FUEL INJECTION SYSTEM

The system consists of the following three sub systems:

System	Function	Related parts
Air intake system	Controls flow of air drawn into cylinder	Air cleaner, silencer, reed valve, resonance chamber, surge tank, throttle valve, air valve
Fuel system	Controls flow of fuel	Fuel filter, fuel pump, injector, pressure regulator.
Electronic control system	Controls amount of fuel to be injected through injector	Pressure sensors P1, P2 and Pa, throttle sensor, water temperature sensor Tw, intake air temperature sensor T1, engine speed sensor, micro computer

CFI SYSTEM DIAGRAM





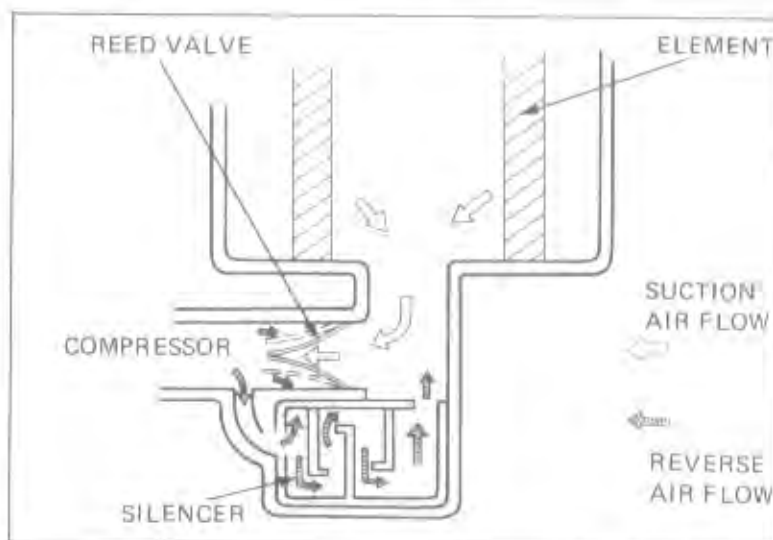
TECHNICAL FEATURES

AIR INTAKE SYSTEM

• Air cleaner

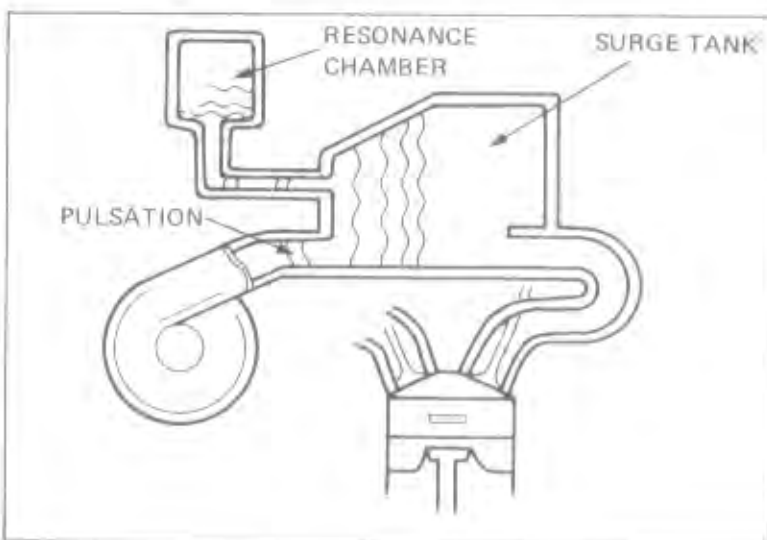
The air cleaner case contains a reed valve and a silencer. When engine compression is used as a braking device at high rpm, the incoming air flow is reversed. The reed valve prevents the sudden reversed air flow from making excessive noise by blocking the air flow, causing it to go into a silencer.

The reed valve, under such a condition, forces the air to flow through the silencer, quieting noises caused by the air flow.



• Surge tank

Since the intake air flow is intermittent, there will be some degree of pulsation in the air flowing into the compressor. If it were not for the surge tank, compressor surging or imbalance in the intake efficiency between the cylinders would result. The surge tank acts as a damper to smooth out pulsating columns of air, ensuring optimum breathing under all speeds and loads of the engine.



• Resonance chamber

In any two-cylinder engine, the air in the surge tank and intake manifold will give a resonant response at a certain speed. The resonance chamber effectively absorbs this resonance without increasing the size of the surge tank.

• Throttle valve

The throttle valves are a conventional butterflies controlling the amount of air reaching the cylinders.

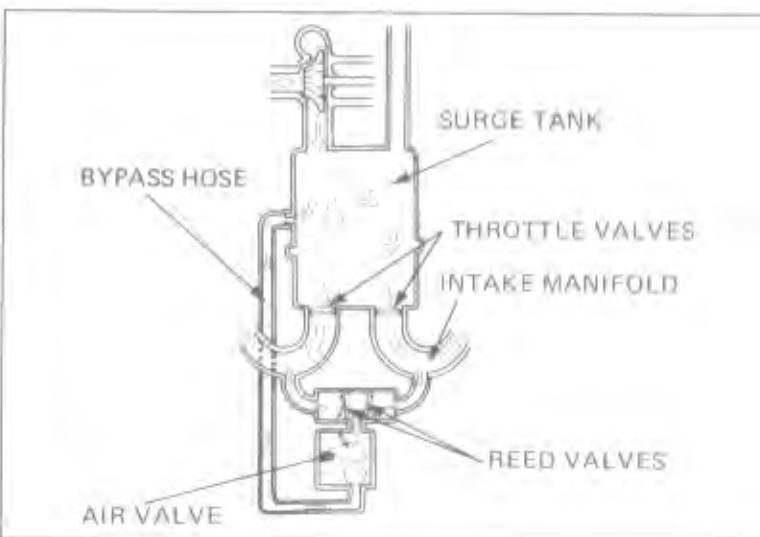
• Air valve

To warm up the engine, it is necessary to idle the engine somewhat faster than normal.

This is accomplished by allowing air to flow directly to the intake manifold through an air valve bypassing the throttle valves. The air-fuel ratio is determined by a micro computer.

As the engine is warmed up, the air valve is closed by the action of a bimetal; the engine runs at normal idle speed.

A pair of reed valves prevents the flow of air between the right and left manifold.





FUEL SYSTEM

The fuel system delivers the proper amount of fuel into the intake manifold in response to the manifold pressure. A micro computer provides an extremely accurate control of the air-fuel mixture in the manifold under all operating conditions.

- **Fuel filter**

The fuel injector is a very precision component and its performance can be impaired easily when dirt is stuck between the nozzle and seat. The filter traps even the finest dust particles which are present in the fuel.

- **Fuel pump**

The pump delivers fuel to the injector after the fuel has passed through the fuel filter. A pressure-relief valve prevents abnormal pressure from being attained within the system due to clogged or restricted fuel flow.

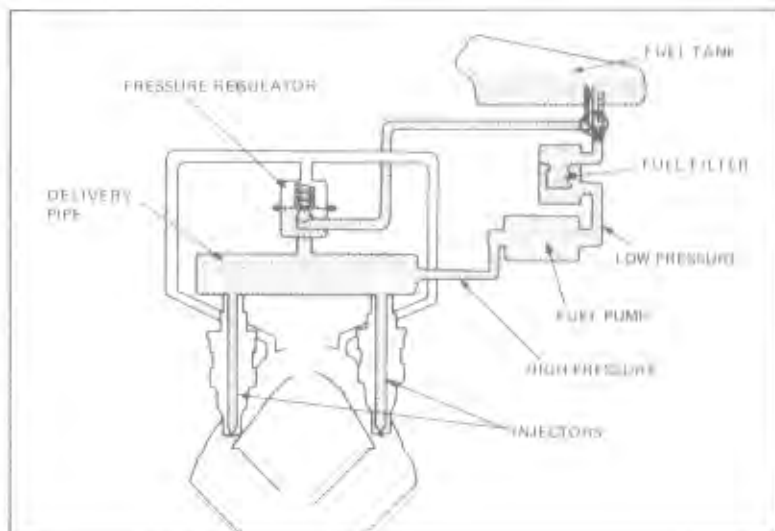
- **Pressure regulator**

The principle function of the pressure regulator is to maintain higher pressure in relation to the manifold pressure. This ensures optimum fuel injection regardless of changes in manifold pressure. Excess fuel is returned into the fuel tank through a return pipe.

- **Injector**

The injector contains a solenoid which is actuated from a micro computer.

Since the lift of the plunger, hence, the needle valve, is constant, the amount of fuel injected is regulated by the duration of time during which the solenoid is energized.





TECHNICAL FEATURES

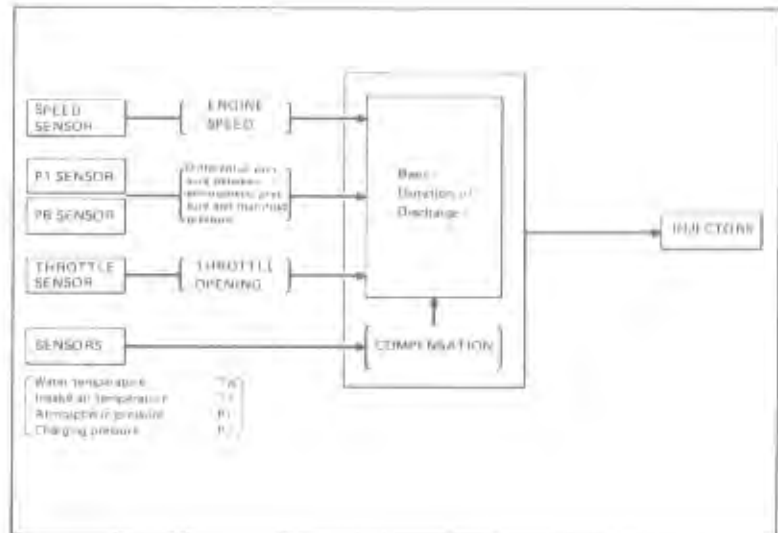
• Computer

The computer serves as a master electronic control that determines the duration the injectors must inject fuel. It contains two memories for read-out of the Basic Discharge Duration, each in a 3-dimensional map. The desired Basic Discharge Duration is read out either by the Engine Speed and Throttle Opening, or by the Engine Speed and Boost Pressure, depending upon how the throttle valves are opened. The Basic Discharge Duration read out is further acted upon by information sent from the various sensors to determine the Final Discharge Duration for each injector.

The unit also includes some Fail-Safe functions and a Self-Diagnosis program with a series of LEDs on the side of the computer box.

Should a problem occur in a system or component, the LED(s) lights up allowing the mechanic to trace the problem to its source.

A warning light on the instrument panel also lights, warning the rider that there is an abnormality in a system or component.



CONTROL CIRCUITS

Other controls associated with the fuel injection system are described below:

Sensors

	Name	Function
Basic Sensors	P2 (boost) sensor	Detects manifold pressure and sends electrical signals to micro computer.
	P1 (atmospheric pressure) sensor	Detects atmospheric pressure and sends signals to micro computer.
	Throttle sensor	Detects throttle opening and sends signals to micro computer.
	Engine speed sensor	Detects predetermined crankshaft angular positions for both cylinders and sends signals to the micro computer. Micro computer determines crankshaft speed and commands fuel injection.
Pressure Sensors	P1 (atmospheric pressure) sensor	Detects atmospheric pressure and sends signals to micro computer.
	P2 (charging pressure) sensor	Detects charging pressure and sends electrical signal to micro computer.
Temperature Sensors	T1 (intake air temperature) sensor	Detects air temperature and feeds information to micro computer (as signals of resistances).
	TW (water temperature) sensor	Detects coolant temperature and feeds signals to micro computer (as signals of resistances).



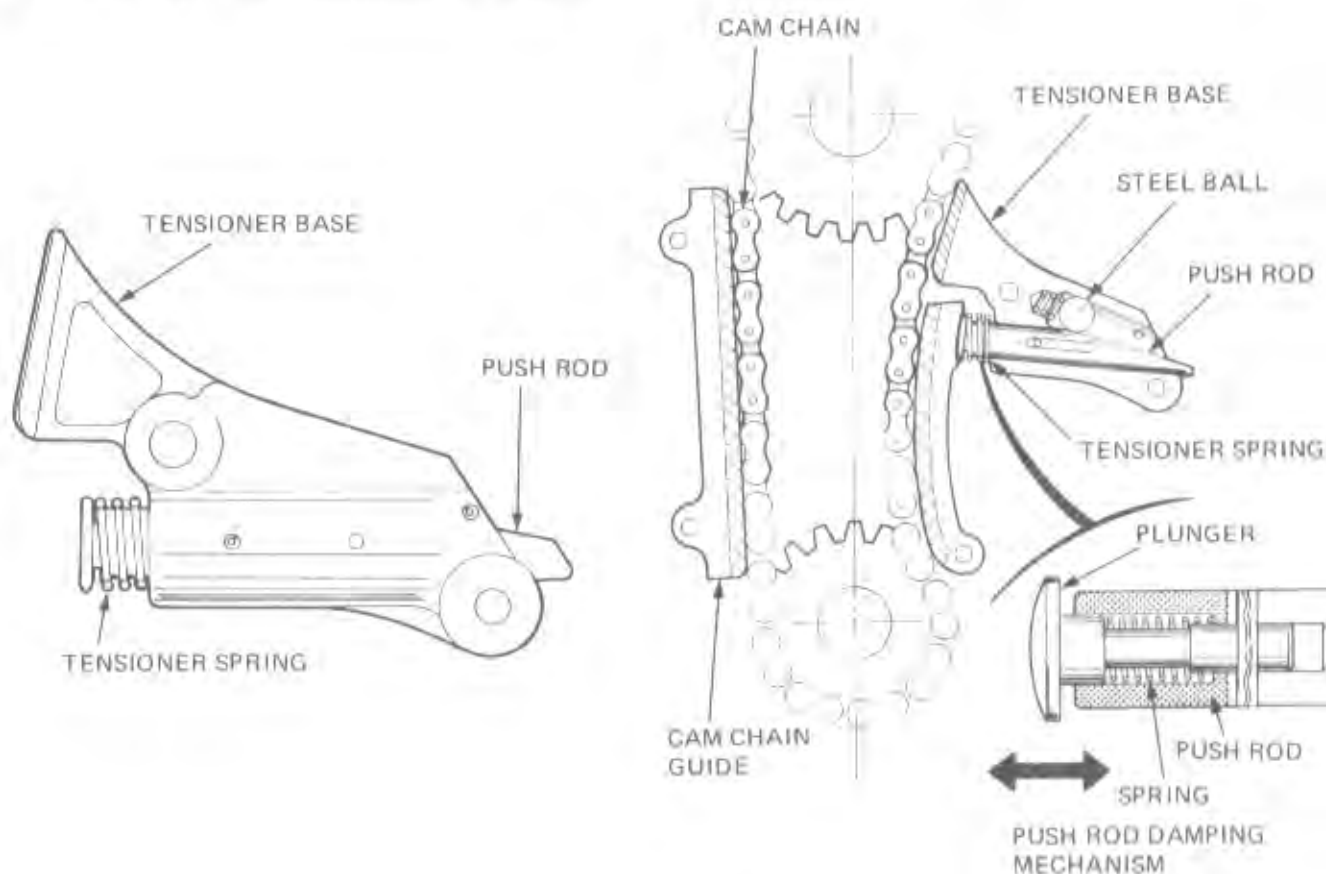
AUTOMATIC CAM CHAIN TENSIONER

GENERAL

The motorcycle is equipped with an automatic cam chain tensioner to compensate for chain wear, eliminating periodic adjustment and maintenance service.

Construction

The unit consists of a spring-loaded steel ball and push rod having a damper at its end. The damper is comprised of a plunger that is also spring loaded within the push rod as shown.



OPERATION

1. A push rod is placed between the chain guide and a steel ball. The steel ball is held against the wedge end of the push rod, keeping the push rod from being pushed back by the chain guide. The damper absorbs minor chain lash when the cam chain is driven by the sprockets.
2. As the chain slackens, the steel ball forces the push rod towards the chain guide until an equilibrium is reached between it and the chain guide, causing the tensioner to adjust itself to take up any cam chain.



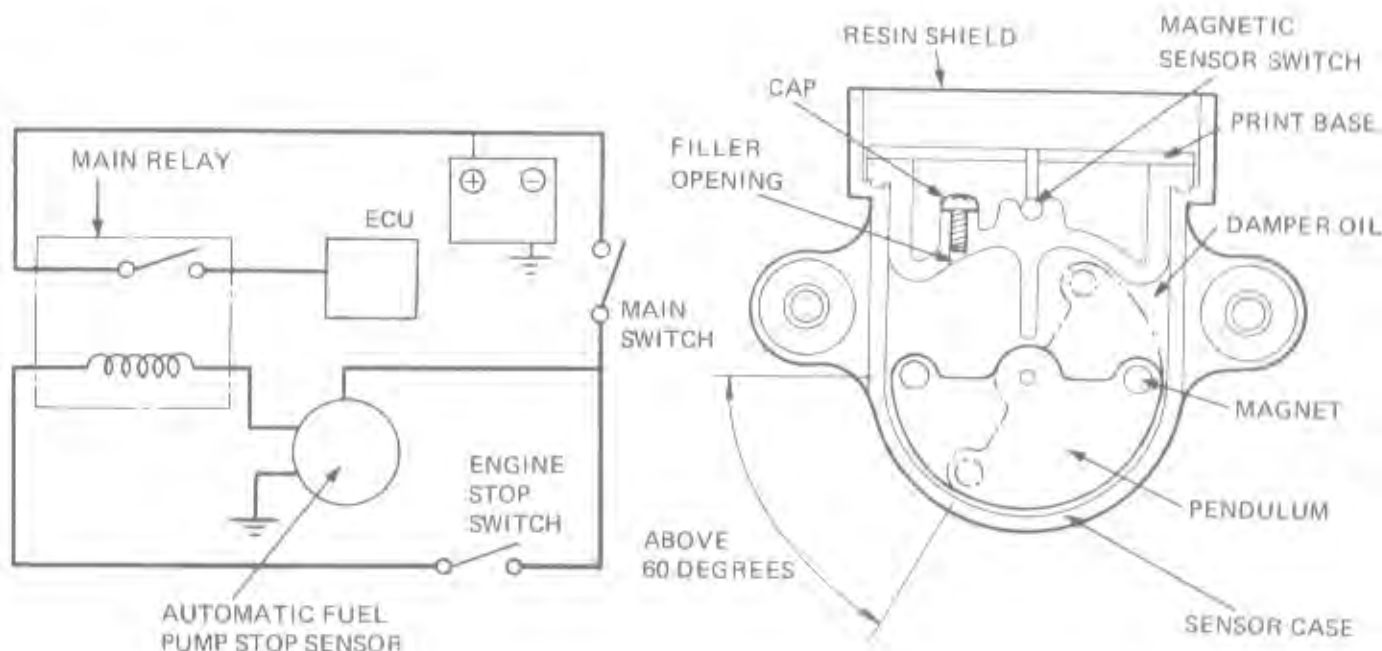
AUTOMATIC FUEL PUMP SHUT-OFF SYSTEM

GENERAL

The fuel pump is automatically shut-off by a special shut-off device if the motorcycle is leaned over on its side more than 60 degrees.

CONSTRUCTION AND FUNCTION

The unit consists of a reed switch, printed circuitry, pendulum and housing tilted with oil as a damper. In operation, as the motorcycle is leaned over, the pendulum is also swung. When the angle exceeds 60°, the magnetic sensor switch is turned on by a magnet; the supply of fuel to the fuel system is then shut off.



When rounding a corner, the force of gravity will work on the motorcycle vertically, having no bearing upon the operation of the automatic switch (and also on the ignition system).

To release the switch, turn the ignition switch OFF and then back ON before attempting to re-start the engine.

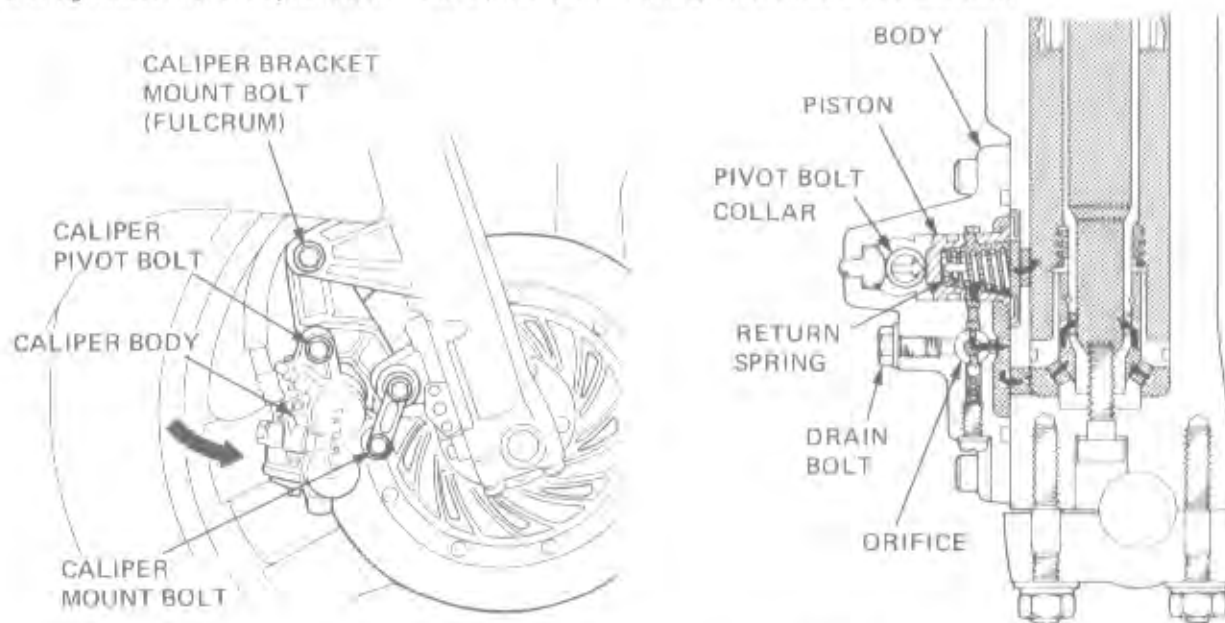
(In the manual engine stop switch, the fuel and ignition systems are shut off).



TRAC FRONT SUSPENSION (Torque Reactive Anti-dive Control)

GENERAL

This motorcycle has an anti-dive front suspension system with four-way adjustability to provide the desired ride under various braking conditions. The system consists of a piston, return spring, oil control orifice and body.

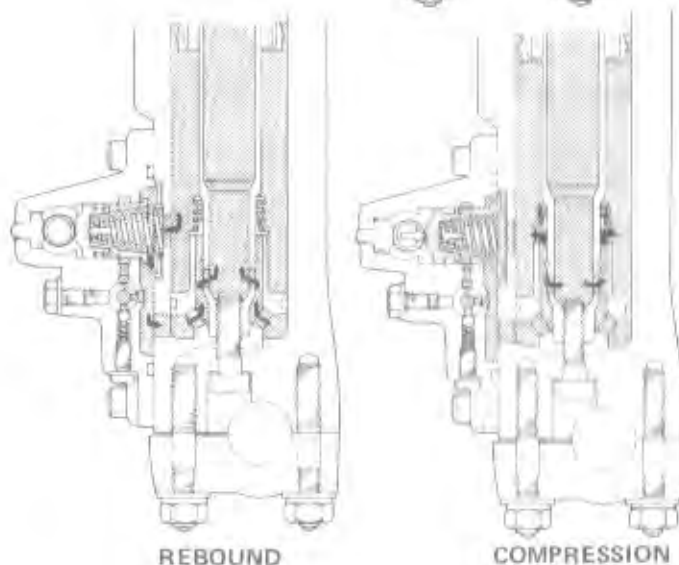


OPERATION

When the motorcycle is slowed or stopped, the brake disc is squeezed by the brake pads, causing the brake caliper to pivot on its bracket mounting bolt.

This movement causes the pivot bolt to push the piston in, uncovering the oil control orifice.

Since the orifice has four oil passages of different diameters, the desired damping can be selected by turning it. Always adjust the right and left to the same position.



Front Suspension Adjustment Chart

POSITION	DAMPING EFFECT
1	SOFT
2	STANDARD
3	FIRM
4	EXTRA FIRM



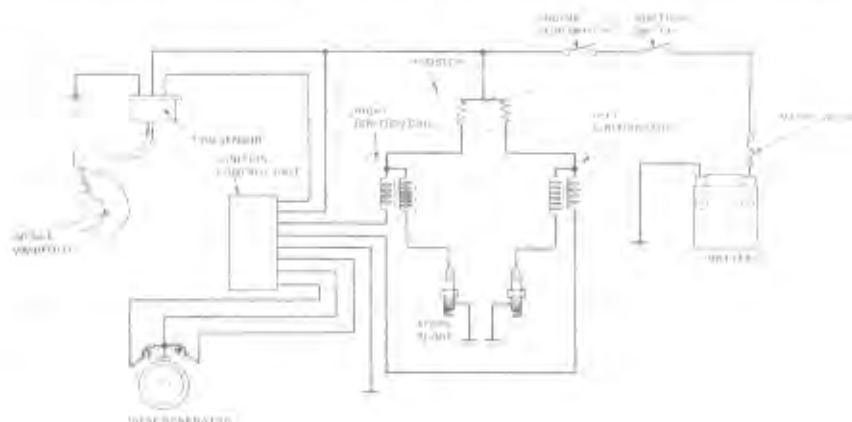


TECHNICAL FEATURES

TRANSISTORIZED IGNITION SYSTEM

ELECTRONIC SPARK ADVANCE CONTROL

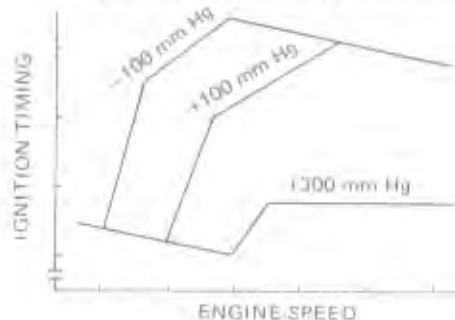
The ignition system consists of a pulse generator, PIGN sensor, ignition control unit, ignition coil, and resistor.



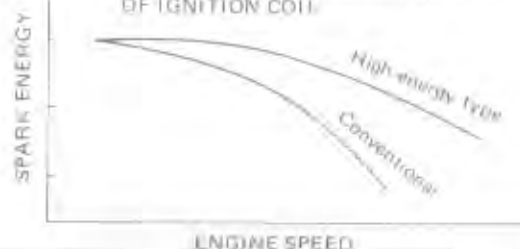
Components	Description
Pulse generator	Converts engine speed into pulse signals and transmits them to ignition control.
PIGN sensor	Converts manifold pressure into electrical signals and transmits them to ignition control unit.
Ignition control unit	Receives information from pulse generator and PIGN sensor, determines correct ignition timing, and supplies currents to ignition primary circuit.
Ignition coil	Sets up battery voltage to high voltage required to make current jump across spark plug electrode.
Resistor	Prevents ignition noises from interfering with CFI computer.

Turbocharging with variable load and speed requires control of spark advance with one additional element, manifold pressure. In this system, the amount of advance is decreased as the manifold pressure is increased, thus eliminating the possibility of engine knock.

SPARK ADVANCE CHARACTERISTICS



SPARK ENERGY CHARACTERISTICS OF IGNITION COIL



HIGH ENERGY IGNITION SYSTEM

In turbocharged spark-ignited engine, it is more difficult for the spark to jump the plug gap because of the higher cylinder compression. The ignition system used on the CX500T is a high-energy type that is designed especially for high compression and high speed operation, ensuring strong sparks throughout the entire speed and load of the engine.



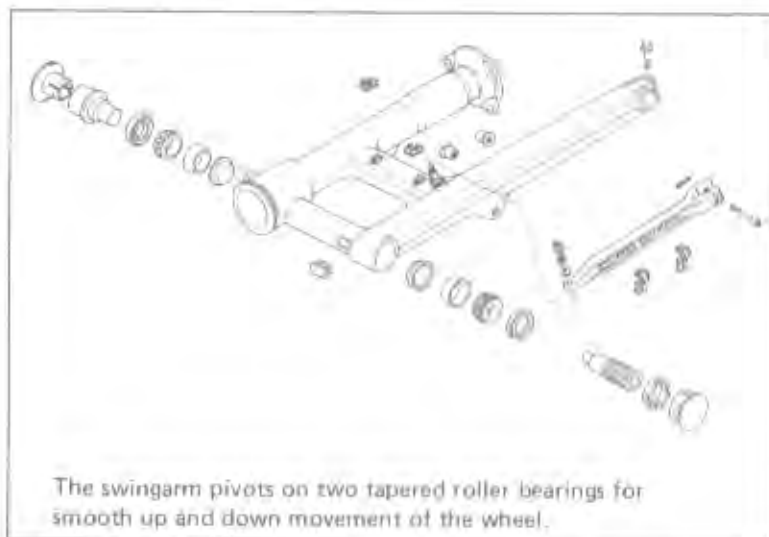
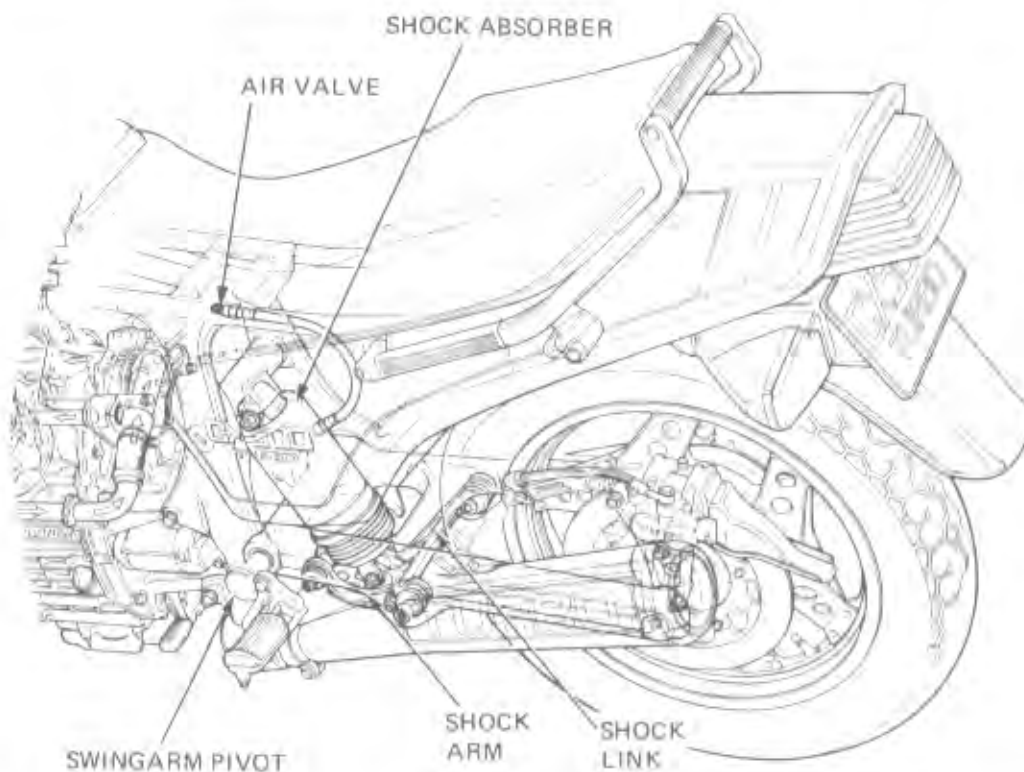
PRO-LINK REAR SUSPENSION

GENERAL

The Pro-Link suspension system is a single shock absorber connected to the swingarm and the lower frame with a shock arm and shock link. The shock absorber and linkage are located in front of the rear tire.

The carefully designed pivoting shock arm and shock link, combined with the shock's matched spring and damping rates, provide what is known as a "progressively rising rate" suspension. This provides relatively soft springing and damping during initial wheel travel and increasing spring and damping rates to meet increasing wheel travel with greater resistance.

This "progressively rising rate" enables the rear wheel to transfer more power to the ground, giving the rider greater comfort as well as the best possible control over rough roads.



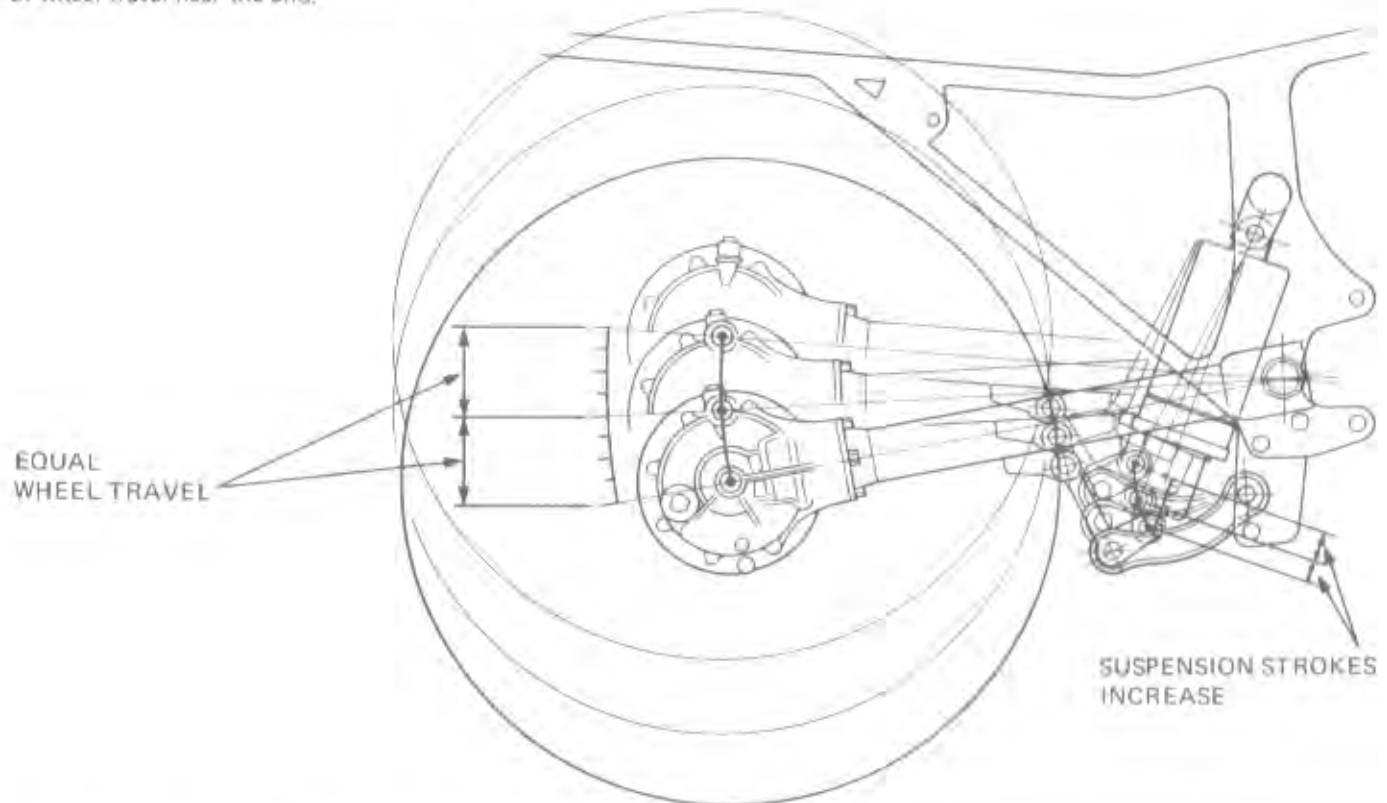


TECHNICAL FEATURES

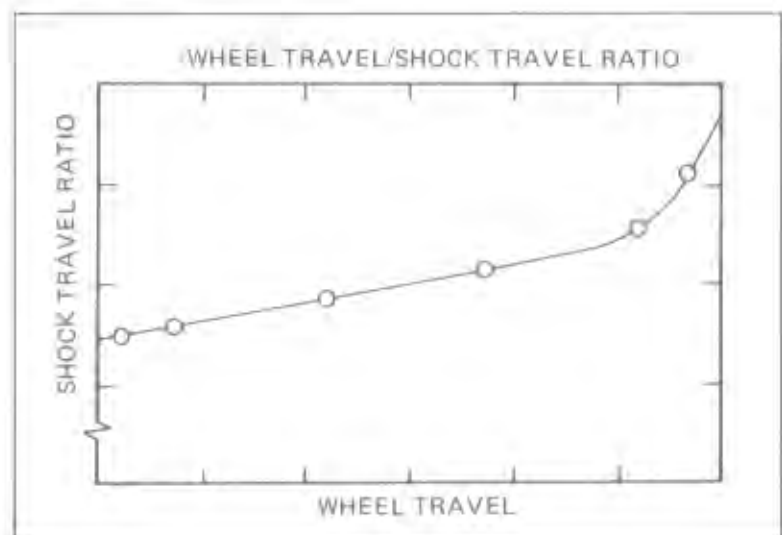
OPERATION

As the wheel and swingarm are driven up by bumps, the shock absorber is compressed by the shock arm which is held in a precise arc by the shock link. As wheel travel increases the shock arm rises above the swingarm proportionately increasing absorber compression (more shock rod travel per unit of rear wheel travel).

This provides the progressive rise rate; the shock absorber moves only about one-fourth of wheel travel at the beginning and moves about one-third of wheel travel near the end.



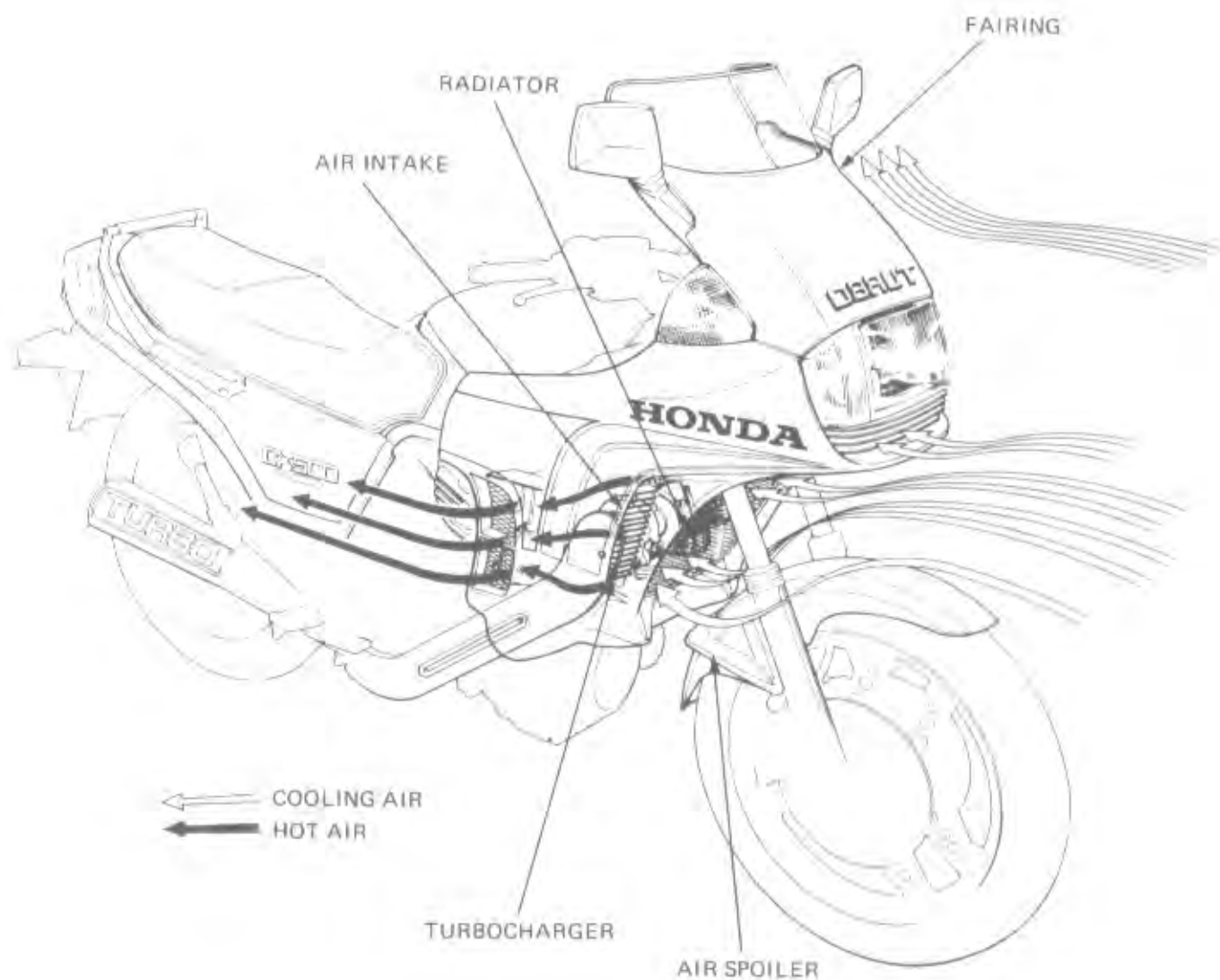
This graph shows the wheel travel/shock travel ratio through the entire stroke of a CX500 TURBO Pro-Link system.



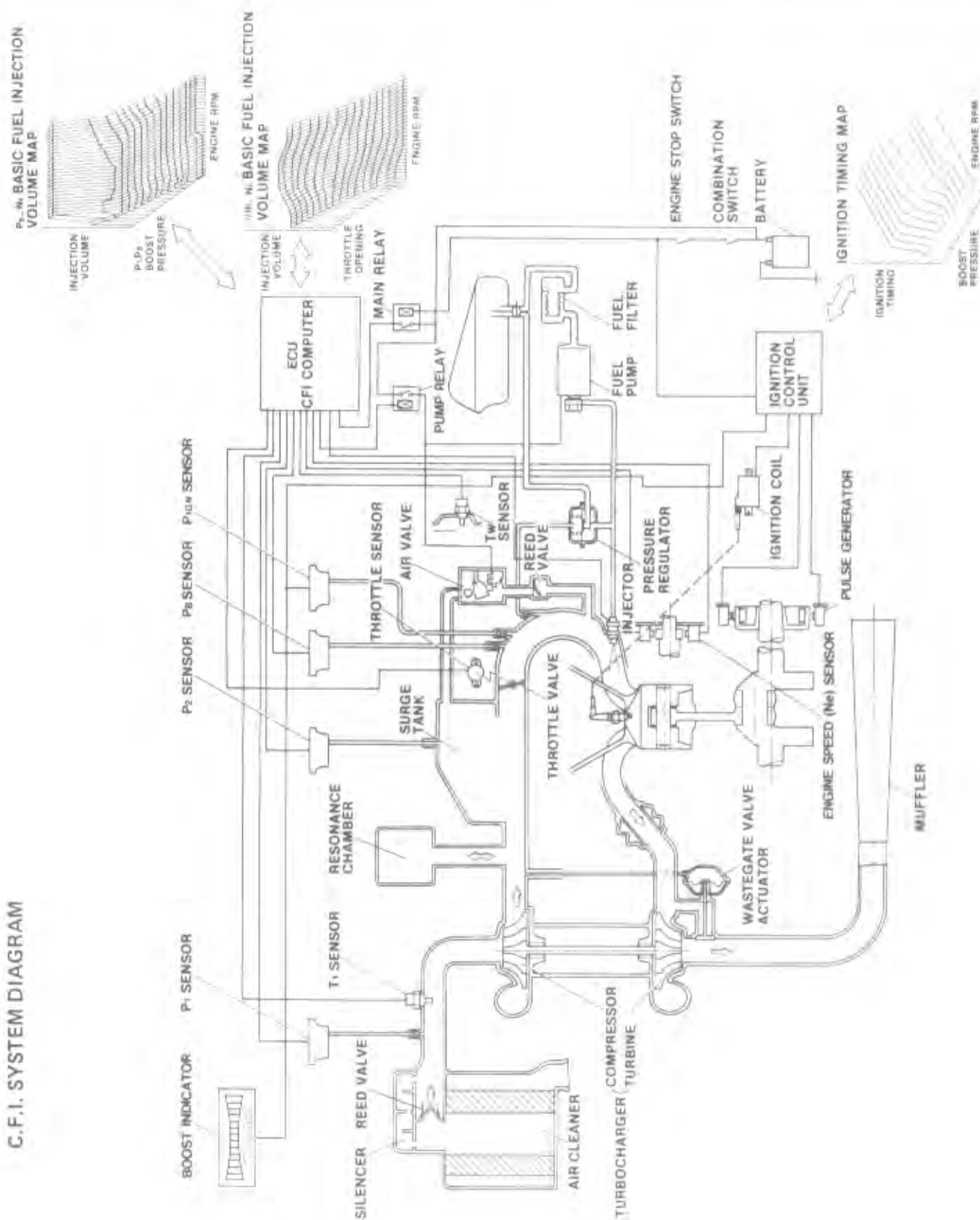


FAIRING

In addition to being used as an ordinary windshield screen, the fairing serves to direct a positive flow of air through the radiator for optimum engine cooling. The rider is also protected from the heat of the turbocharger by the fairing.



C.F.I. SYSTEM DIAGRAM





QUICK REFERENCE CHART	24- 2
SELF-DIAGNOSIS SYSTEM	24- 3
TRoubleshooting CHARTS	24- 4
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TOOLS

Special

Inspection adapter 07999-MC70000

Common

Fuel pressure gauge 07406-0040000
Combination pressure/vacuum tester 07406-0050000 or individual testers are commercially available in U.S.A.
Digital circuit tester 07411-0020000 or commercially available in U.S.A.
Vacuum gauge 07404-0020000 or commercially available in U.S.A.

SPECIFICATIONS

Fuel pressure (differential pressure from manifold pressure) at idle	225 kPa (2.25 kg/cm ² , 32 psi)
Fuel pump relief pressure	600 kPa (6.0 kg/cm ² , 85 psi) maximum
Fuel pump delivery volume	1.5 lit/min (0.4 US gal/min, 0.33 Imp gal) minimum
Fuel injector solenoid resistance	1.5 - 1.9 Ω
Fuel pump delivery pressure	255 kPa (2.55 kg/cm ² , 36.3 psi)



QUICK REFERENCE CHART

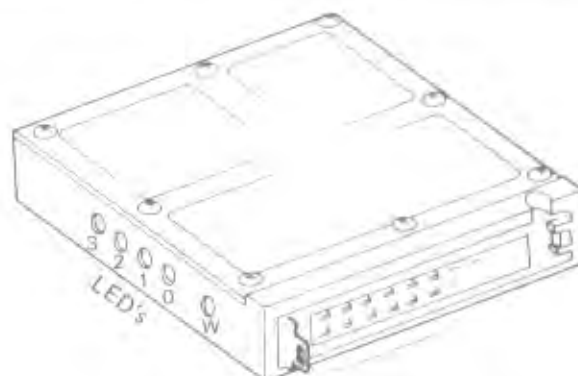
● Most probable cause
 ○ Other possible cause

System	Symptom	Faulty part																Ref. page
		Hard starting (cold)	Hard starting (hot)	Erratic or poor idling	Engine stalling	Poor acceleration/lack of power	Poor performance drivability	Excessive fuel consumption	Afterfire	Misfire	Knocking	Overheating	Poor engine braking	Abnormal noise	Excessive white smoke	Excessive black smoke	Boost indicator	
FUEL SYSTEM	1. Fuel pressure	●	●	●	●	●	○	●	●	●						●		24-15
	2. Fuel leak	○	○	○	○	○	○	○	○	○								
	3. Gasoline (octane rating)										●							
	4. Fuel valve	○	○	○	○	○	○	○	○	○								
	5. Fuel filter	○	○	○	○	○	○	○	○	○								
	6. Fuel pressure regulator	●	●	○	○	○	○	○	○	○								
CFI SYSTEM	1. Fuel pump (confirm by operating noise)	●	●		○													
	2. Injector (confirm by "click")	●	●	○	○	○			○						○			24-15
	3. Air valve/reed valve	○		●						●		○				○		24-22
	4. Throttle sensor					○	●	●								○		
	5. PB sensor	○	○	●	●	○	●	●	●	○						○		
	6. P1 sensor			○														24-16
	7. P2 sensor					○	○	○										
	8. T1 sensor			○					○	○								
	9. TW sensor	○		○												●		24-17
	10. Engine speed sensors	○	○	○	○		○	○	○									24-18
	11. Wire connectors	●	●	●	●	●	●	○	○	○						○		
	12. Tubing	○	●	●	●	●	●	○	○	○						○		
	13. ECU unit	●	●	○	○	○		○	○							○		
	14. Throttle valves (PB synch)			●	○			○	○	●								
IGNITION CONTROL SYSTEM	1. Spark plugs	●	●	●	●	●	●	●	●	●	●					●		
	2. High tension wire	○	○	○	○	○	○											
	3. PIGN sensor	○	○	○	○	○	○											
	4. PIG sensor	○	○	○	○	●	○	○	○	●	●	○					○	24-16
	5. Ignition control unit	○	○	○	○	●	○	○	○	●	●	○						
	6. Wire connectors	●	●	○	○	●	●	●	○	●	●	○					○	○
	7. Battery	○	○	○														
	8. IG resistor	○	○															
	9. Plug gap	○	○	●	○	○	○	○	○	○								
ENGINE/TURBOCHARGER	1. Secondary air leak			●	●	●	●			●				●				○
	2. Deformed air suction components					○	○											
	3. Leaky exhaust parts					○								●				
	4. Distorted exhaust components					○												
	5. Cylinder compression	○	○	○	○	○					○							
	6. Foreign matter in T/C unit					○								●				
	7. Waste-gate					●	○											●
	8. Valve clearance	○	○	○	○	○	○	●	○	○								
	9. Insulator (fuel settled)				○					●						○		
	10. T/C bearing oil leak														●			
	11. Worn piston/rings/cylinder														●			
	12. Worn valve stems/guides/seals					○		○			●							
FRAME	1. Brake dragging					○		●										
	2. Coolant level										●							
	3. Air cleaner reed valve						○						●					
	4. Boost indicator																●	24-21
Ref. page		24-4		24-7		24-6	24-8		24-9	24-10	24-11		24-12		24-13	24-21		



SELF-DIAGNOSIS SYSTEM

The memory loaded into the computer storage includes some fail-safe functions and a self-diagnosis program with a series of LED's on the side of the computer housing. When a problem occurs in a system or component, the LED(s) for that system or component lights up allowing the mechanic to trace the problem to its source.



Electronic Control Unit

● : On ● : Blinking ○ : Off

No.	LED's (abnormality)	Troubleshooting		Fail-safe Functions
1	3 2 1 0 W ○ ○ ○ ● ●	PB sensor	• Open circuit • Shorted signal wire	BASIC DISCHARGE DURATION is determined by ENGINE SPEED and THROTTLE OPENING without regard to PB pressure. (Note 2)
2	○ ○ ● ○ ●	P2 sensor	• Open circuit • Shorted signal wire • Faulty waste gate	P2 is fixed to 760mmHg
3	○ ○ ● ● ●	Throttle sensor (θTH)	• Open circuit • Shorted signal wire	BASIC DISCHARGE DURATION is determined by ENGINE SPEED and PB pressure without regard to throttle opening. (Note 2)
4	○ ● ○ ○ ●	P1 sensor	• Open circuit • Shorted signal wire	P1 is fixed at 760mmHg.
5	○ ● ○ ● ●	Intake air temp sensor (Ti)	• Open circuit • Shorted signal	Ti is fixed at 25°C (77°F)
6	○ ● ● ○ ●	Water temp sensor (Tw)	• Open circuit • Shorted signal wire	Tw is fixed at 80°C (176°F)
7	○ ● ● ● ●	Injector (left)	• Open or short circuit	Fuel pump is stopped.
8	● ○ ○ ○ ●	Injector (right)		
9	● ○ ○ ● ●	Engine speed sensor	• Open circuit • Shorted signal wire	If one sensor fails, injection continues on timing for the remaining sensor.
10	● ○ ● ○ ●	P2 sensor	• Disconnected piping	
11	○ ○ ○ ○ ●	Computer	• Internal fault	

NOTE: 1) The system also includes an LED self-checking function. LED "W" and fuel system warning light should remain ON for about 2 seconds immediately after the ignition switch is turned on.

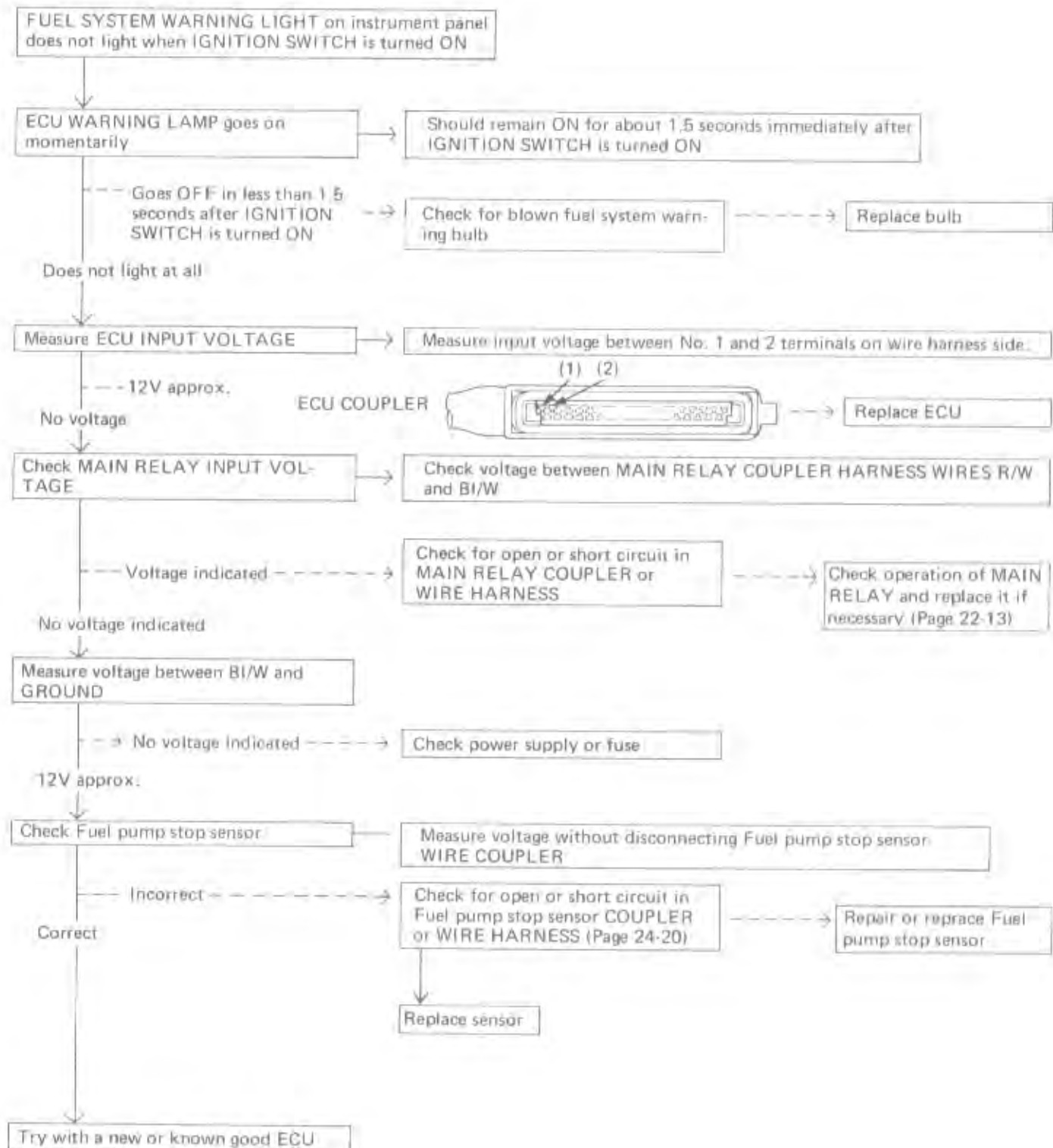
2) Fixed injection volume takes place when PB and THROTTLE sensors are both faulty at the same time.



TROUBLESHOOTING CHARTS

A. PRELIMINARY INSPECTIONS

1. FUEL SYSTEM WARNING LIGHT





2. ENGINE DOES NOT START OR IS HARD TO START

Check the following items before using this chart.

- 1) Fuel level
- 2) Fuel valve on
- 3) Ignition switch on
- 4) Fuel pump stop sensor ON
- 5) Starting motor is in good order
- 6) That crankshaft is turned by starting motor
- 7) Spark plug condition

WARNING

Observe the following when performing the spark test:

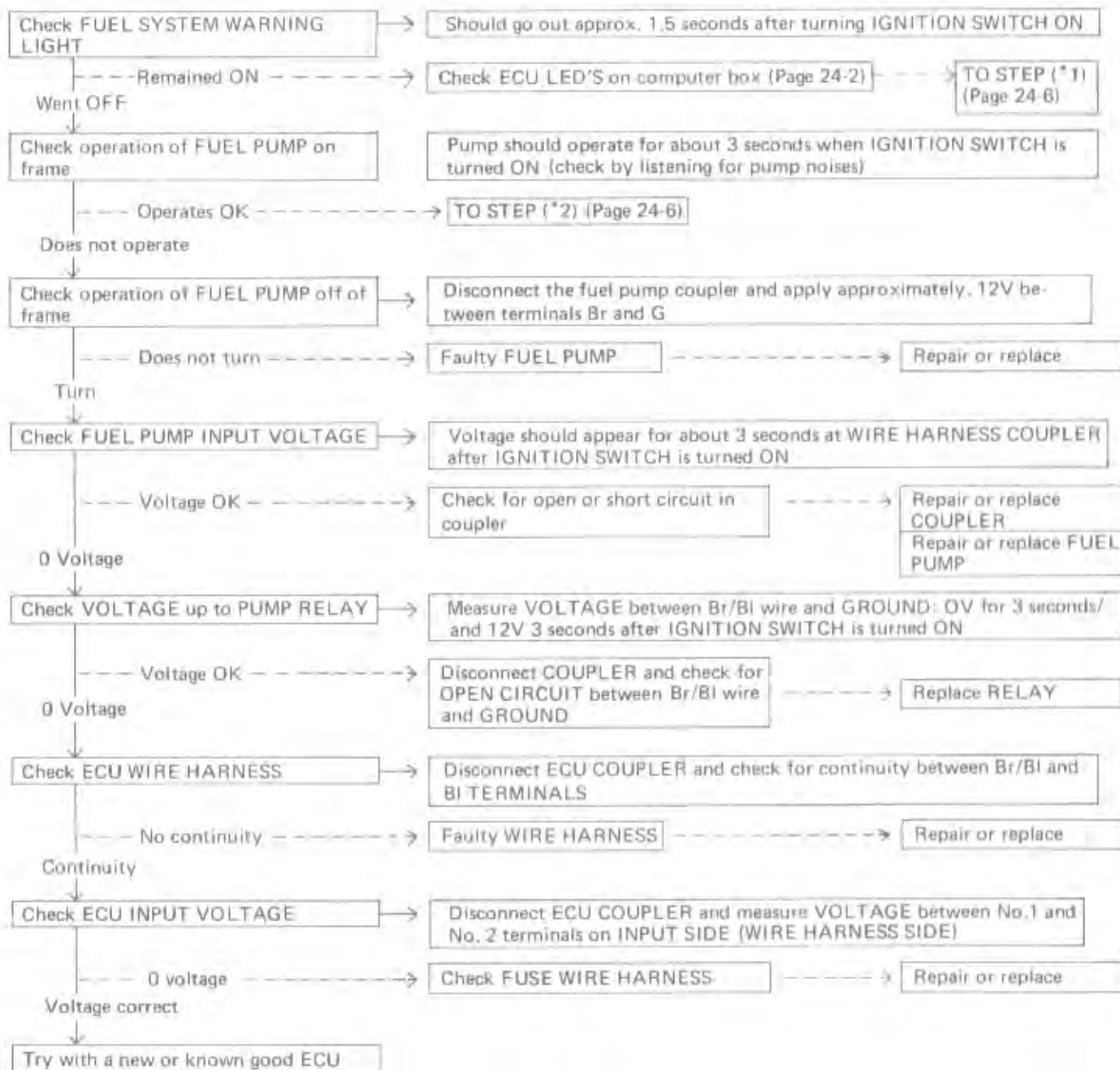
- Fuel is sprayed from the injector at sufficient speed to penetrate your eyes. Keep your face well away from the spark plug hole when the existing plug is used to perform this test. If possible, do not remove the spark plug but use a spare spark plug instead when troubleshooting.

WARNING

- Keep away from open flames or sparks away from the work area.

WARNING

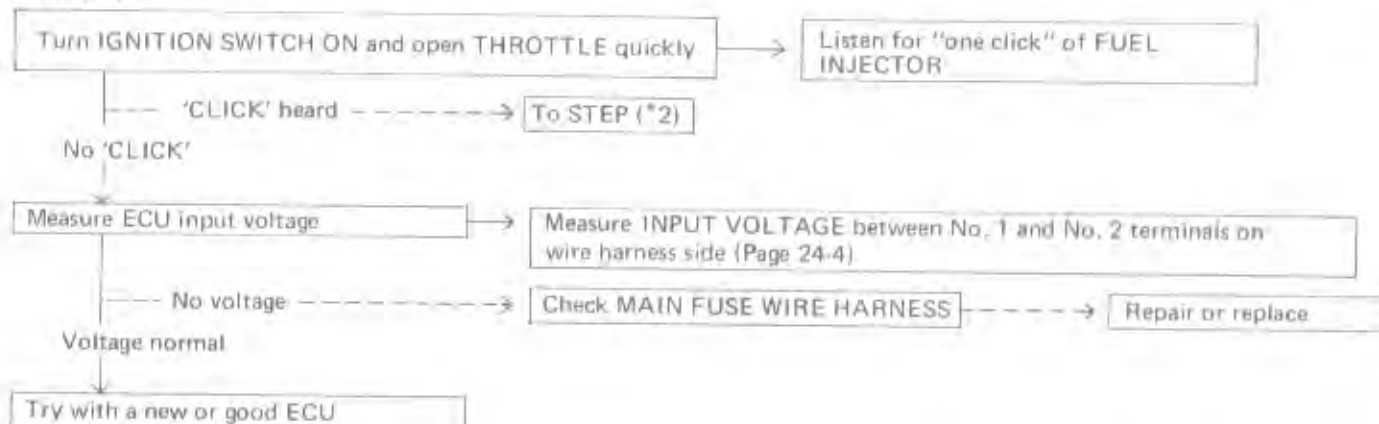
- Purge the cylinder of the residual gasoline by cranking 2 to 3 seconds with the engine stop switch and fuel valve OFF.





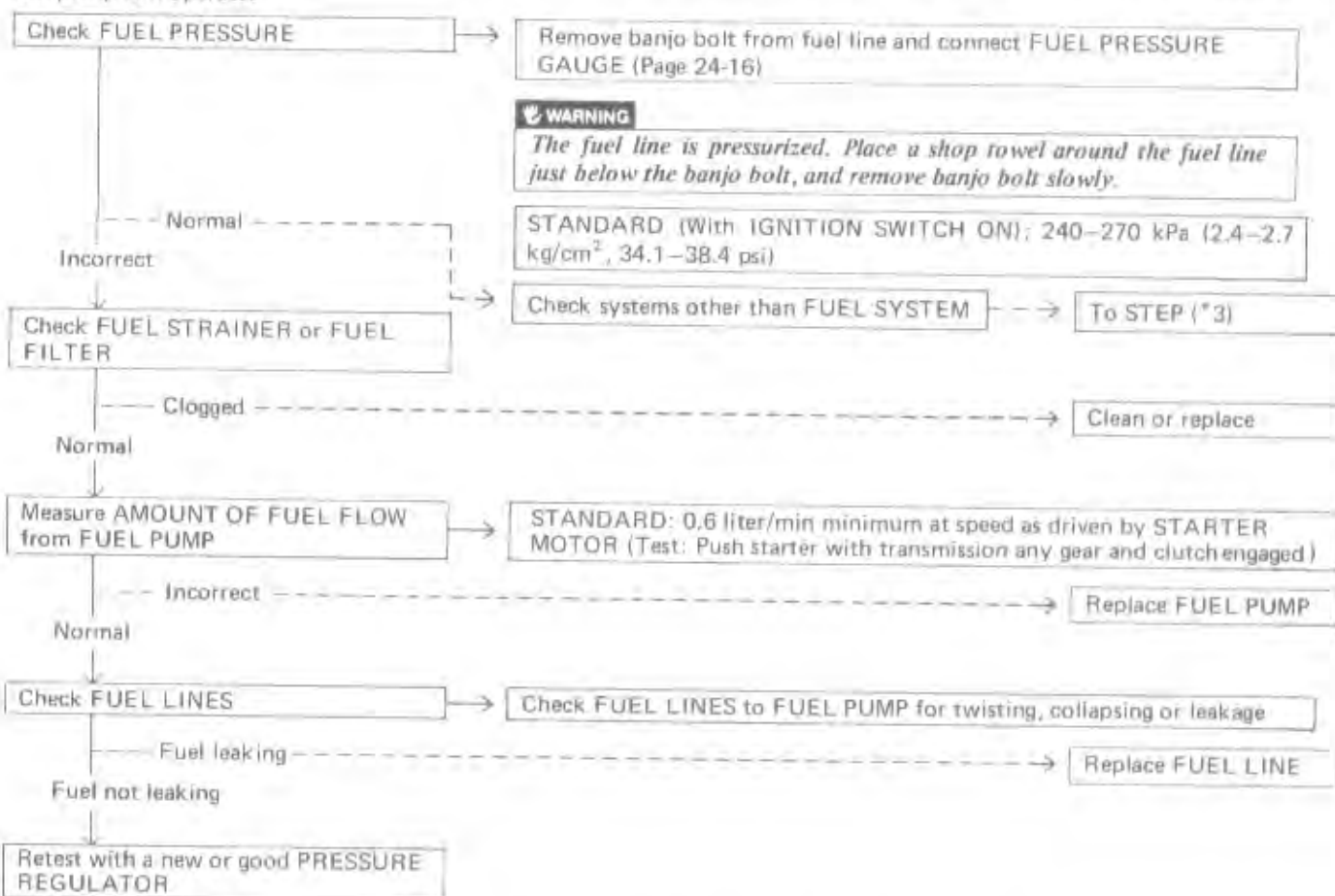
TROUBLESHOOTING

STEP (*1)

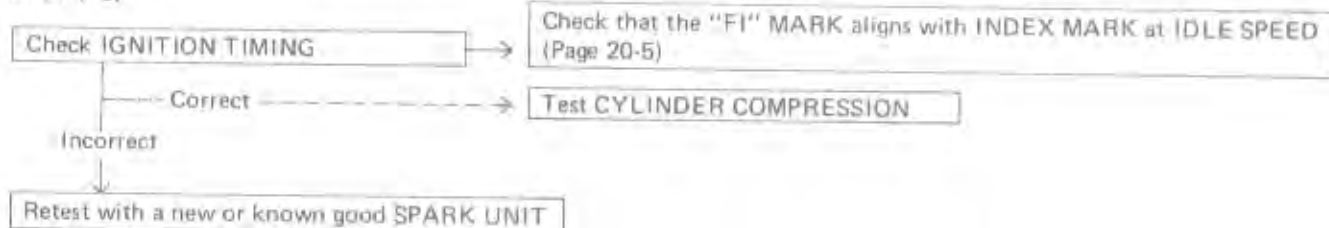


STEP (*2)

Engage transmission with clutch lever out, and push the starter button. This way the starter motor will not engage but the fuel pump will operate.



STEP (*3)

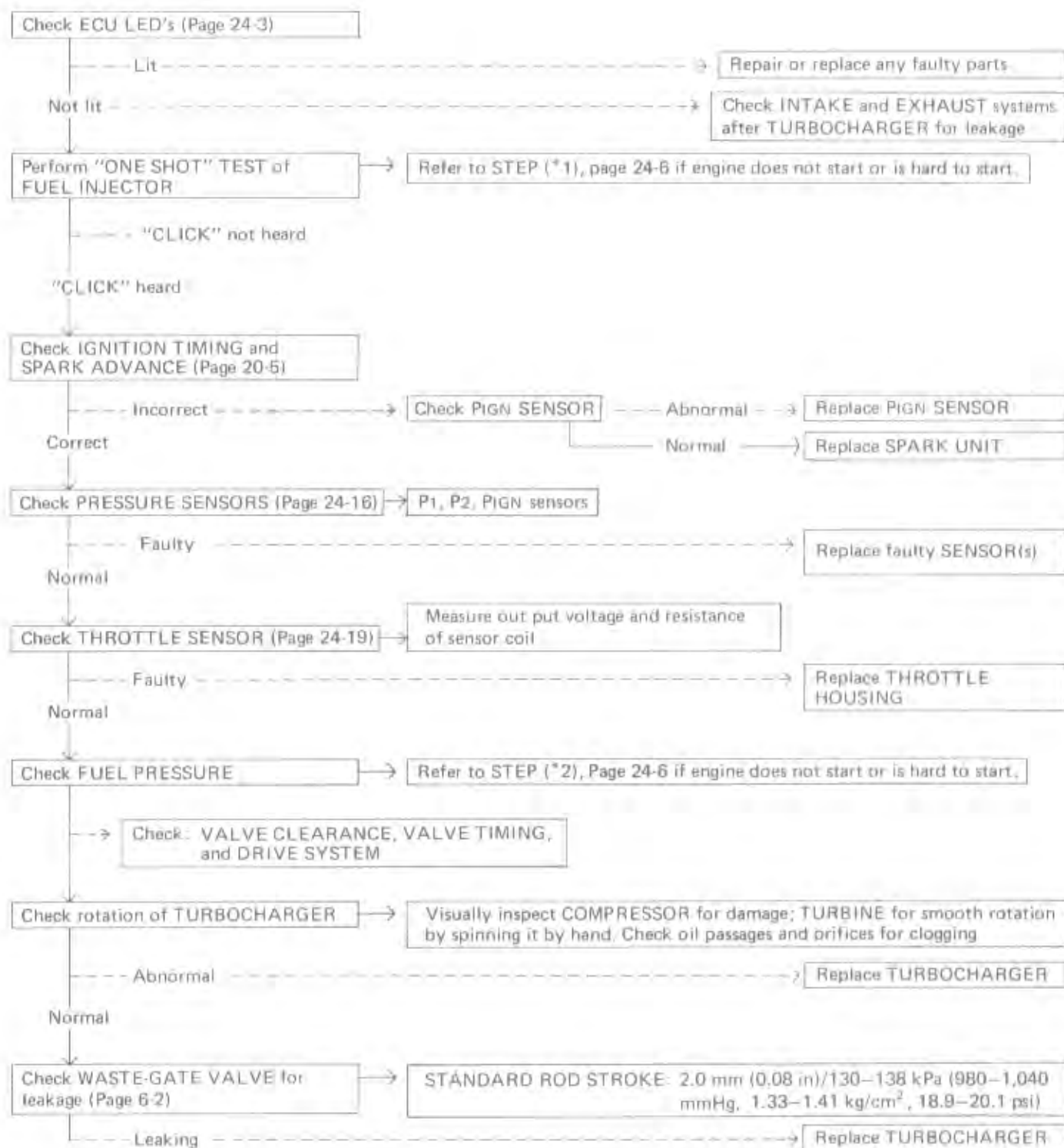




3. LOSS OF POWER/POOR ACCELERATION

Check the following items before using this chart.

- 1) Fouled or clogged air cleaner
- 2) Tire pressure
- 3) Brake dragging
- 4) Spark plugs
- 5) Cylinder compression

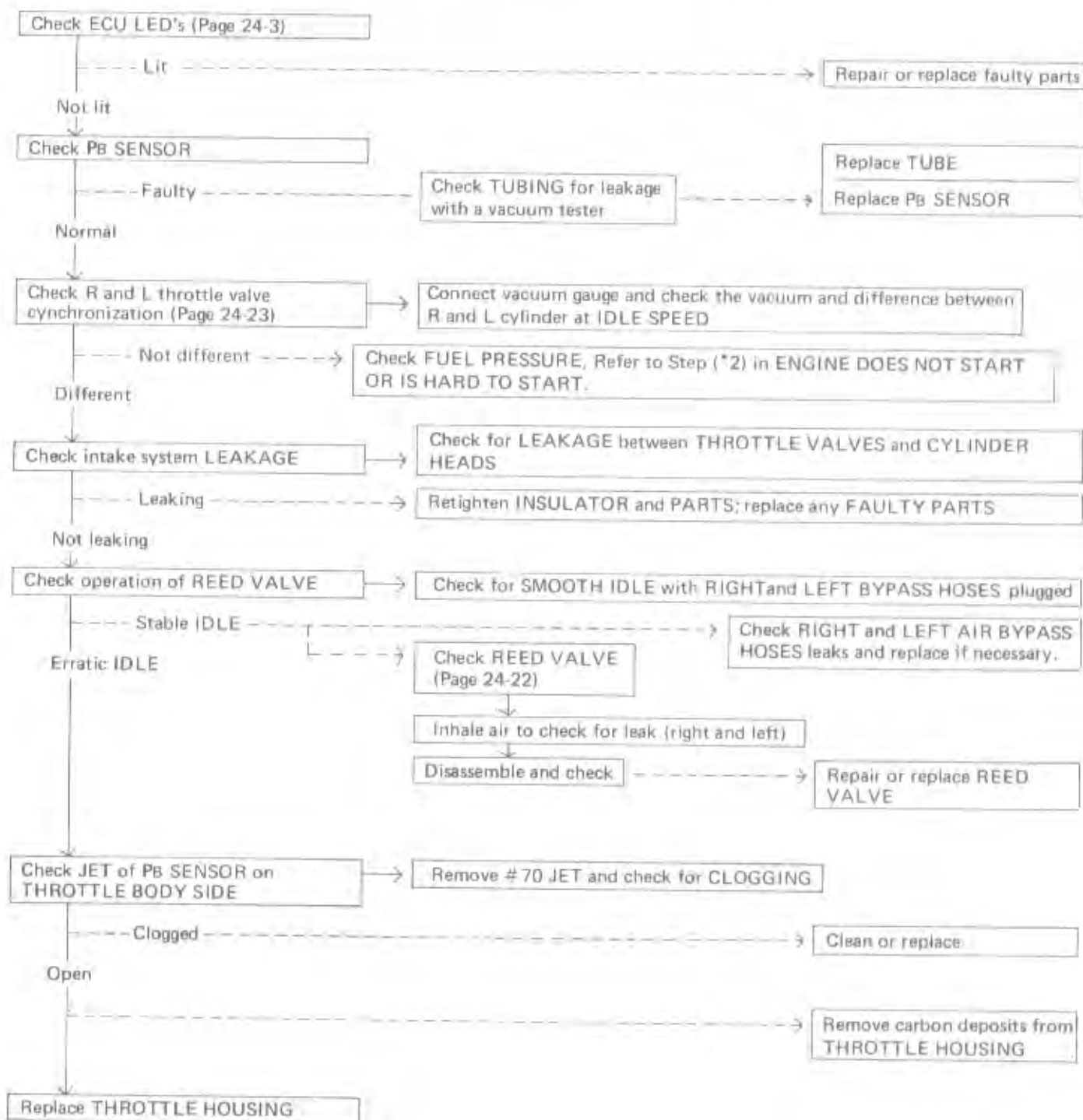




4. POOR PERFORMANCE AT LOW AND IDLE SPEEDS

Check the following items before using this chart. Check air valve if fast idle is erratic.

- | | |
|----------------------------------|--|
| 1) Spark plugs | 4) Fouled or clogged air cleaner |
| 2) Idle speed | 5) Loose battery terminals |
| 3) Compression (valve clearance) | 6) Poorly connected ground (engine side) |

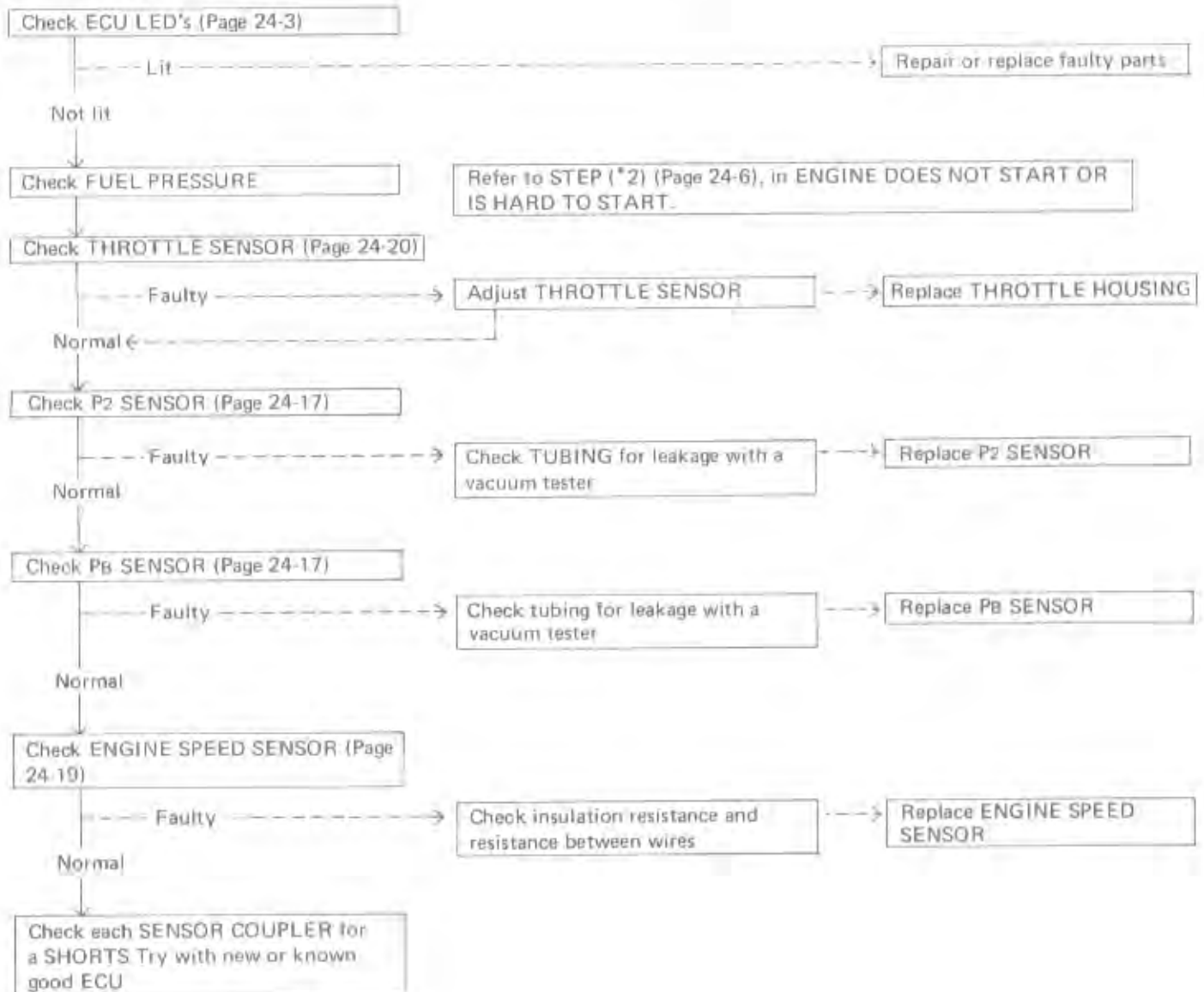




5. POOR PERFORMANCE AT MEDIUM AND HIGH SPEEDS

Check the following items before using this chart.

- | | |
|------------------------|----------------------------|
| 1) Clogged air cleaner | 3) Routing of sensor tubes |
| 2) Spark plugs | 4) Loose battery terminals |
| | 5) Poorly connected ground |



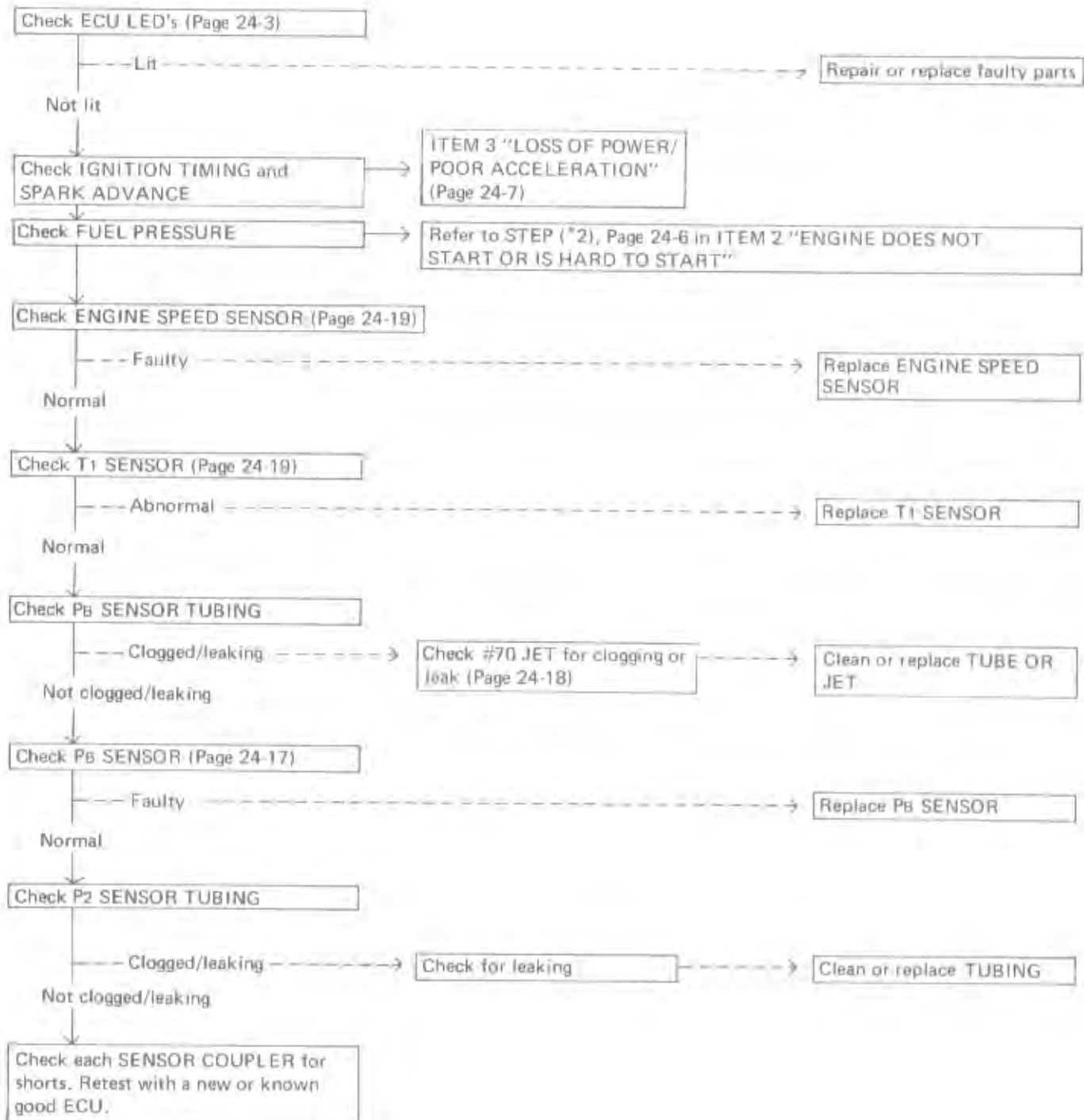


TROUBLESHOOTING

6. AFTERFIRE

Check the following items before using this charts.

- 1) Spark plugs
- 2) Valve clearance



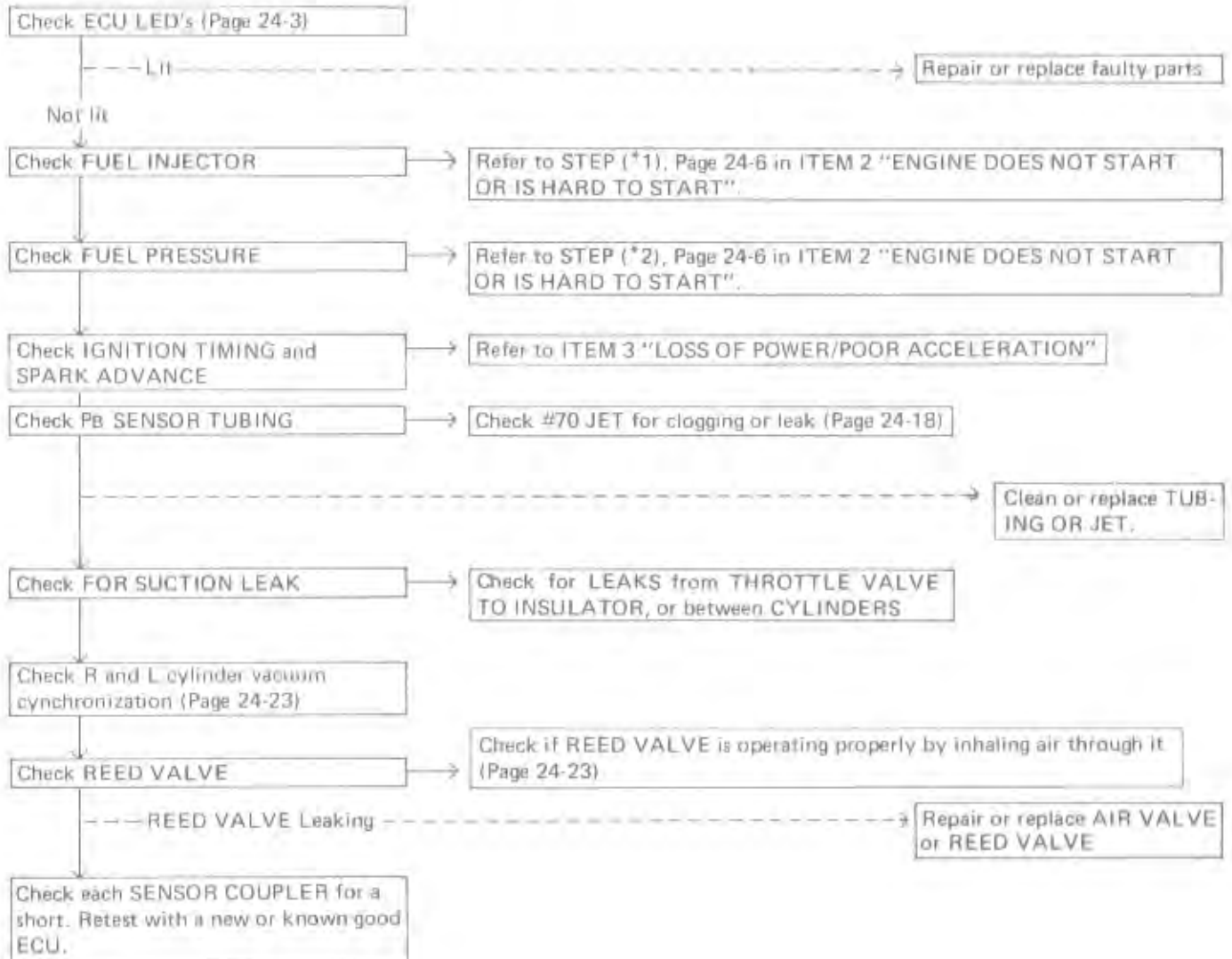


7: BACKFIRE

Check the following item before using this chart.

1) Spark plugs

SPECIFIED SPARK PLUGS: DPR8EV-9 (NGK)
X24EPR-GU9 (ND)



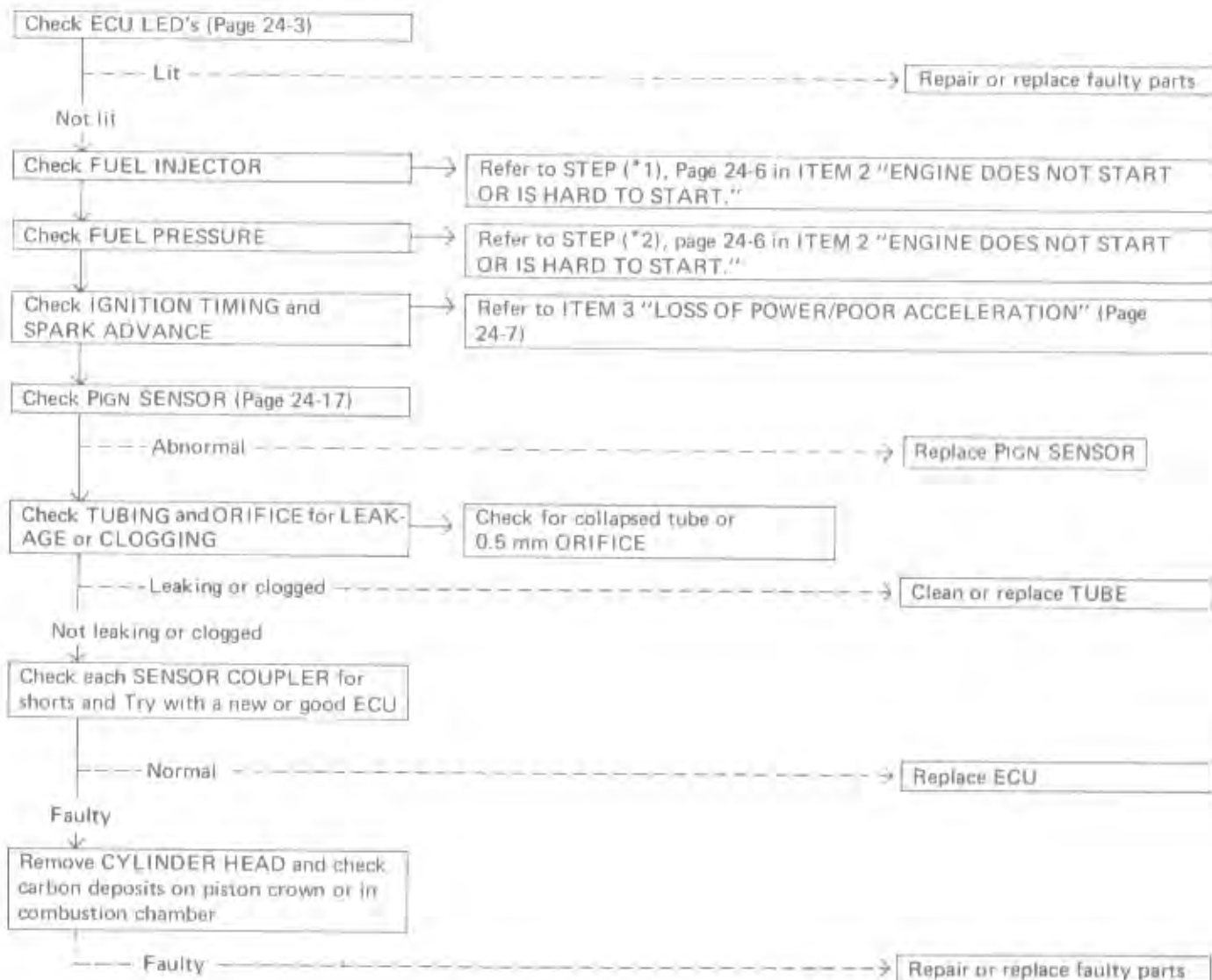


TROUBLESHOOTING

8. KNOCKING

Check the following items before using this chart.

- 1) OCTANE RATING of fuel: 89 or higher pump octane or 94 RON minimum
- 2) Spark plugs

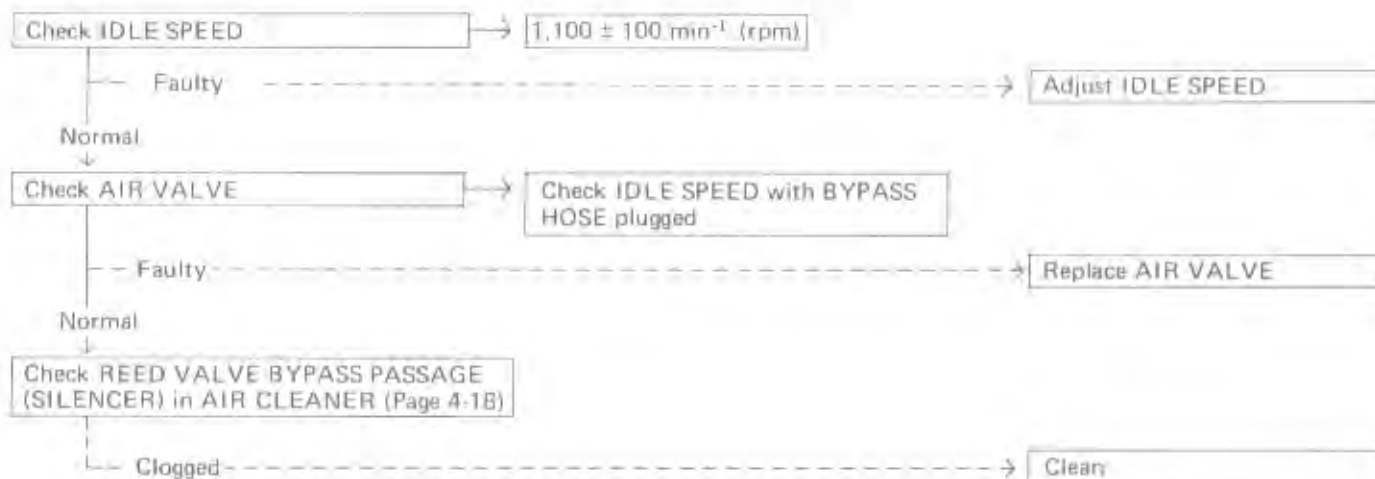




9. POOR ENGINE BRAKING

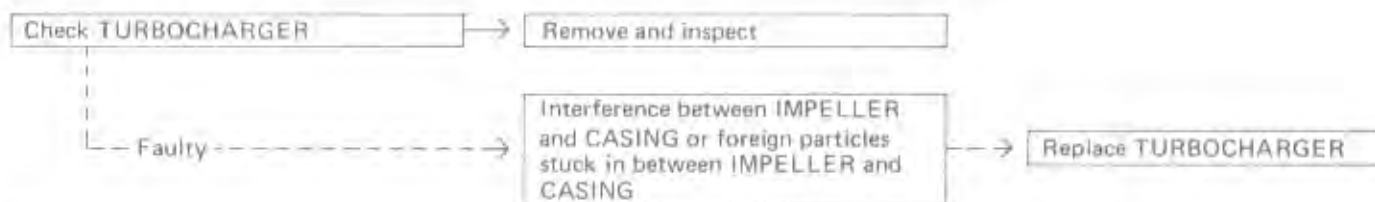
Check the following item before using this chart:

- 1) Engine is operating temperature.
 - Cooling fan is operating
 - Oil temperature is above 60°C



10. ABNORMAL NOISE

Check tube joints and connections in suction system for leakage, before using this chart.



NOTE

Noises during deceleration:

- Suction Air leakage between TURBOCHARGER and AIR CLEANER
- Faulty REED VALVE

Other noises

- Interference between IMPELLER and CASING

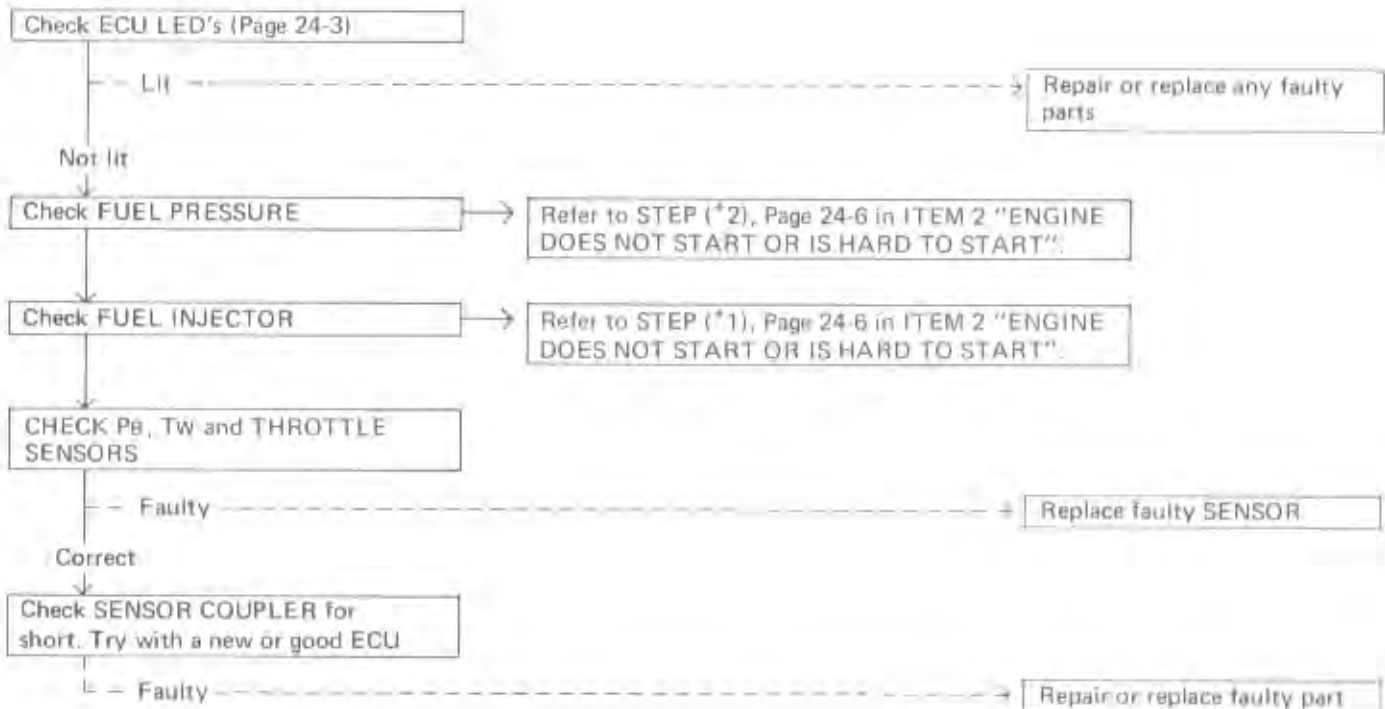


TRUOBLESHOOTING

11. EXCESSIVE BLACK SMOKE

Check the following items before using this chart:

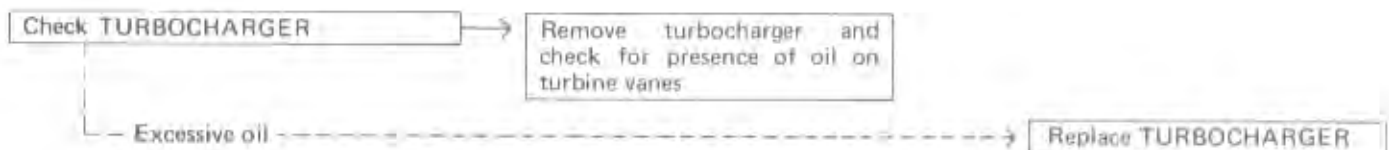
- 1) Engine is at operating temperature.
- 2) Spark plug condition



12. EXCESSIVE WHITE SMOKE

Check the following items before inspecting:

- 1) Oil level
- 2) Spark plug condition





13. TURBOCHARGER WARNING LAMP GOES ON WHILE RUNNING





B. SYSTEM INSPECTIONS/ SPECIFICATIONS

1. FUEL PRESSURE

With the engine stopped, turn the ignition switch ON. The fuel pump is normal if it is operated for about 3 seconds as indicated by operating noise. To recheck the fuel pressure, turn the ignition switch OFF.

NOTE

Fuel pressure can be felt by pinching the fuel return hose between your fingers.

Place a shop towel around the fuel line and remove the check plug from the banjo bolt slowly.

WARNING

The fuel line is pressurized. Be sure to place a shop towel around the fuel line, and remove the check plug from the banjo bolt slowly.

Attach the pressure gauge (No. 07406-0040000) to the banjo bolt fitting. Measure the fuel pressure.

STANDARD:

Ignition switch ON with engine stopped:

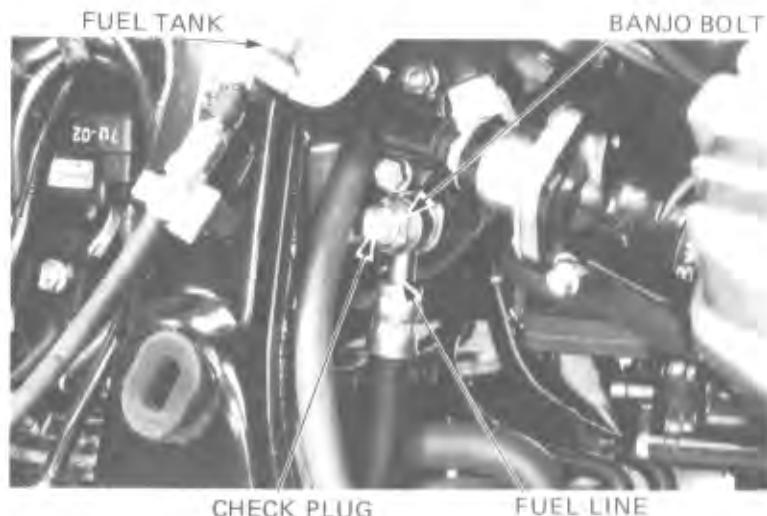
240–270 kPa (2.4–2.7 kg/cm², 34–38 psi)

Idle:

200–240 kPa (2.0–2.4 kg/cm², 28–34 psi)

CAUTION

Replace the aluminum washer with a new one whenever it is removed.



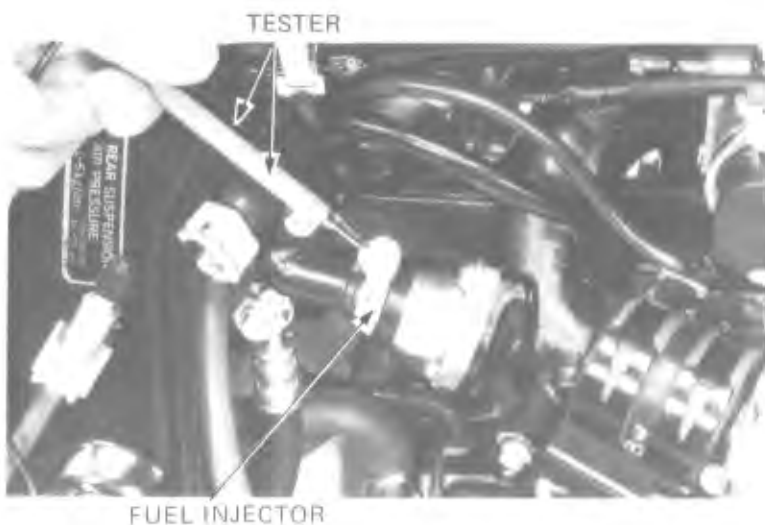
2. FUEL INJECTOR

With the engine stopped and ignition switch turned ON, check the coupler for continuity by observing the ECU LED's.

With the engine stopped and ignition switch turned ON, listen for plunger noise by opening the throttle quickly.

Turn ignition switch off. Disconnect the injector coupler and measure the resistance between the terminals as shown.

STANDARD: 1.0–3.0 Ω





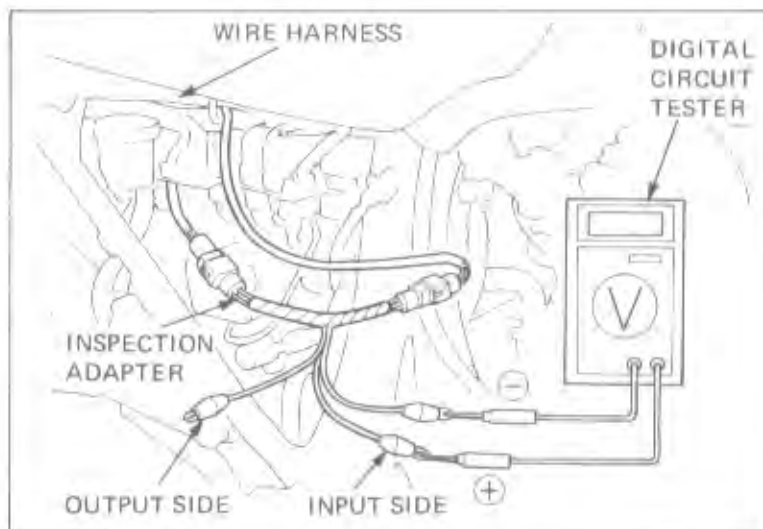
3. PRESSURE SENSORS

With the ignition switch ON, check for loose, open or shorted wires or coupler by observing the LED's on the ECU.

Check for leaky, restricted or blocked hoses or tubing.

Measure the output of each sensor with a digital circuit tester. (No. 07411-0020000)

- Use the special inspection adapter (No. 07999-MC70000)
- Measure the input voltage.
- Measure the output voltage.



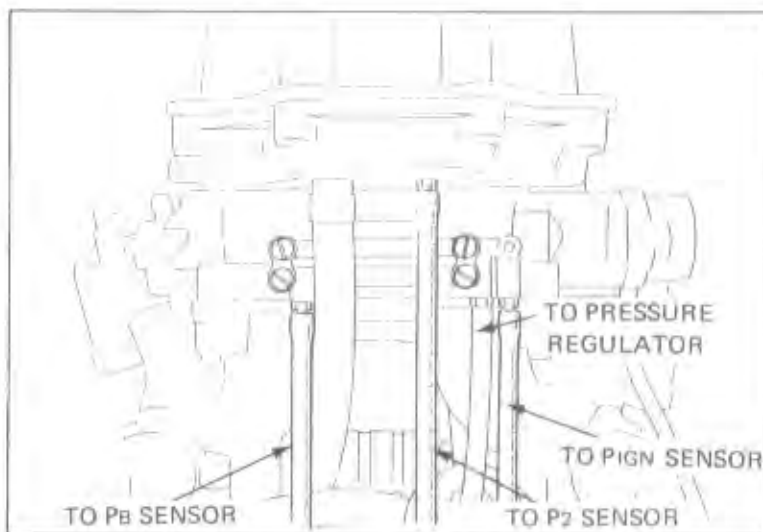
DYNAMIC TEST

Sensor	Input voltage Between P (+) and G (-)	Output voltage Between W (+) and G (-)	
		Ignition ON (Engine stopped)	Idle
P1	4.75 - 5.25	3.13 - 3.73	-
P2	4.75 - 5.25	1.09 - 1.29	-
PB	4.75 - 5.25	3.13 - 3.73	2.0 - 3.0

CAUTION

Be sure to note the polarity and test wire changes in the test chart below to prevent damaging the ECU.

Sensor	Between G (+) and P (-)	Between W (+) and P (-)	
		Ignition ON (Engine stopped)	Idle
PIGN	Above 8V	1.09 - 1.29	0.43 - 0.83



STATIC TEST

NOTE

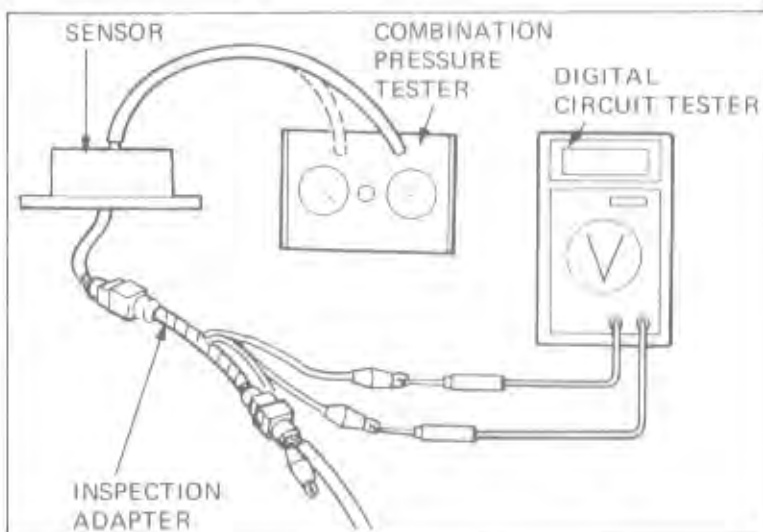
Be sure battery is fully charged before starting static test.

Remove the fuel tank, (section 4).

Disconnect the fuel pump wire couplers located under the right side cover.

WARNING

The fuel pump coupler must be disconnected to prevent gasoline from being pumped out of the fuel hoses if the ignition switch is turned on and causing a fire hazard.





TROUBLESHOOTING

Connect the combination pressure tester (No. 07406-0050000) or a hand vacuum pump (or a pressure pump) to the sensor as shown. Connect the inspection adapter (No. 07999-MC70000) to a digital circuit tester. (No. 07411-0020000).

With the engine stopped and ignition switch ON, measure the input/output voltages for each sensor as shown in the test charts.

Output Voltages:

Sensor	Pressure kPa (kg/cm, psi, mmHg)	Standard (V)	Inspection Adapter probes	
P ₁ (Green coupler)	(-) 47 (0.47, 6.68, 345) (-) 8 (0.08, 1.14, 59)	1.6 - 2.0 2.9 - 3.5	⊕ W	⊖ G
P ₂ (Yellow coupler)	(-) 34 (0.34, 4.83, 250) (+) 100 (1.00, 14.22, 735)	0.4 - 0.6 2.9 - 3.5	⊖ W	⊖ G
P _B (P ₃) (Blue coupler)	(-) 47 (0.47, 6.68, 345) (-) 8 (0.08, 1.14, 59)	1.6 - 2.0 2.9 - 3.5	⊕ W	⊖ G
PiGN (P ₄) (Red coupler)	(-) 34 (0.34, 4.83, 250) (+) 100 (1.00, 14.22, 735)	0.4 - 0.6 2.9 - 3.5	⊕ W	⊖ P

Input Voltage:

Sensor	Standard (V)	Inspection Adapter probes	
P ₁ , P ₂ , P _B	4.75 - 5.25	⊕ P	⊖ G
PiGN	Above 8.0	⊕ G	⊖ P

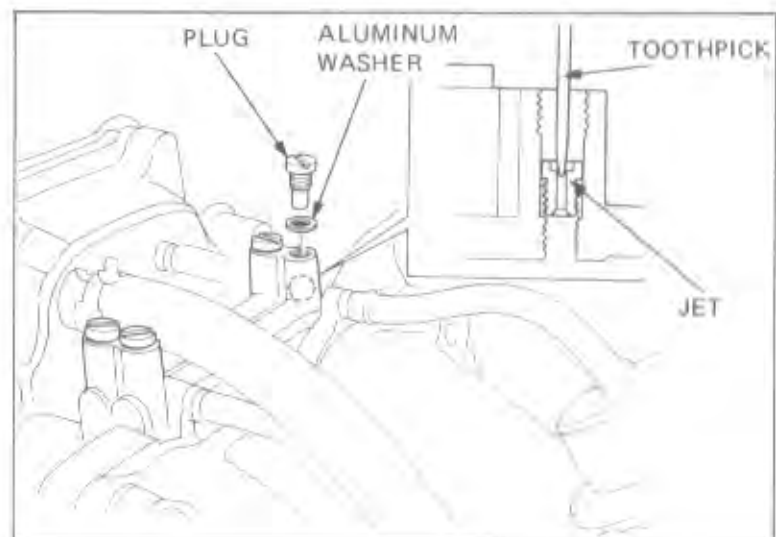
Check for a clogged jet:

- Remove the plug.
- Loosen the jet and lift it out with a toothpick.
- Blow each jet open with compressed air.

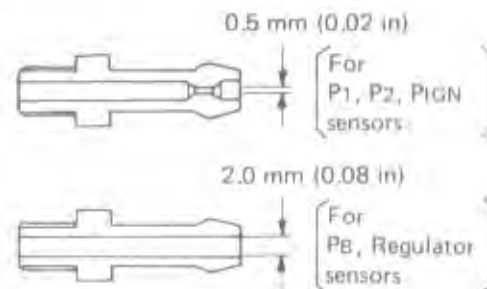
Sensor	
P _B , Reg PiGN, P ₁ , P ₂	#70 Jet 0.5 mm Orifice

NOTE

Replace aluminum washers with new ones whenever they are removed.



ORIFICES



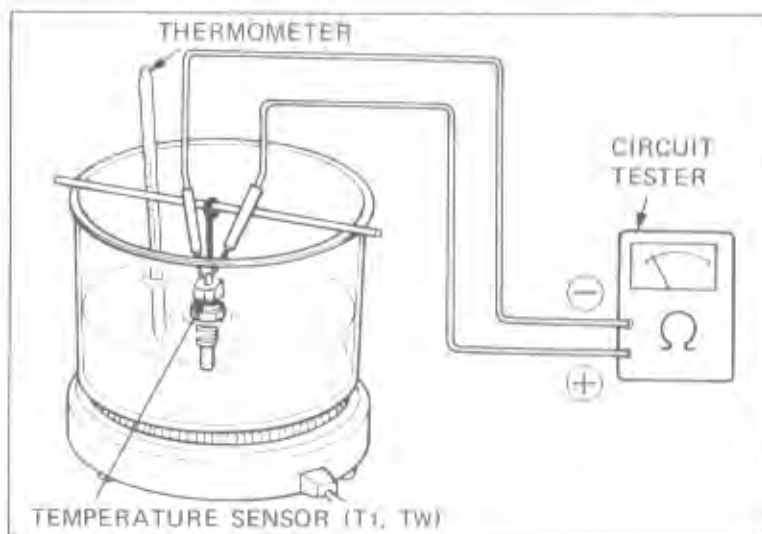


4. TEMPERATURE SENSORS (T₁, T_W)

With the engine stopped and ignition switch ON, check for loose, open or shorted wires or connectors by observing the ECU LED's.

Measure resistances between the terminals:

Water Temperature °C (°F)	Resistance (KΩ)
20 (68)	2-3
80 (176)	0.2-0.4



5. ENGINE SPEED SENSOR (NE)

With the engine stopped and ignition switch ON, check for loose, open or shorted wires or connector by observing the ECU LED's.

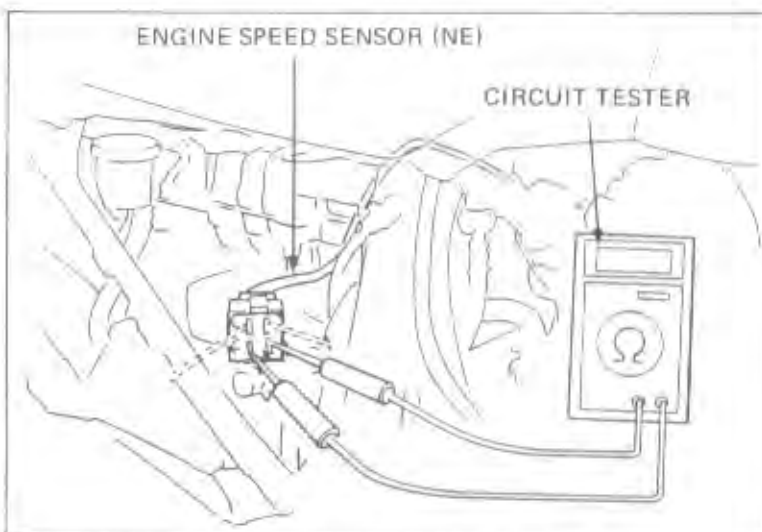
Disconnect the coupler and measure resistances between the terminals.

STANDARD:

Bu-Bu/W | 00-250 Ω
Y-Y/W

Measure resistance between either terminal and ground.

STANDARD: ∞ Ω



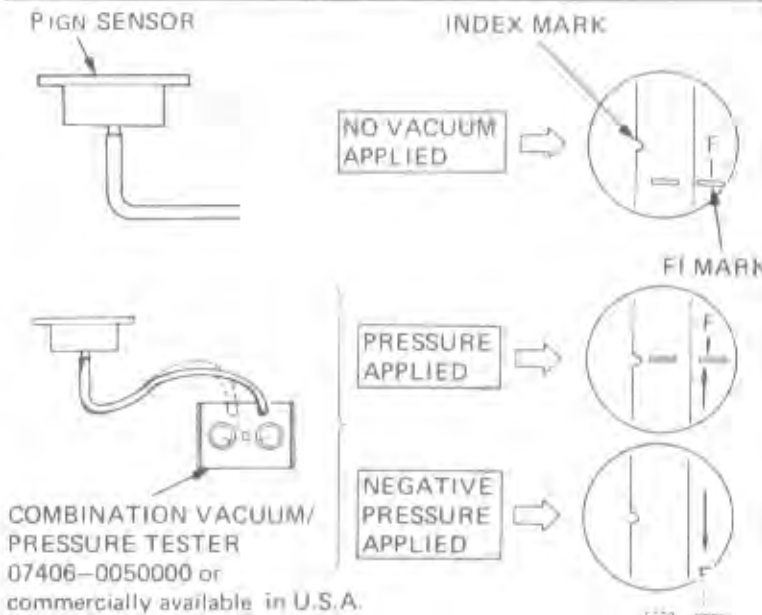
6. SPARK ADVANCE

Start the engine and let it run at 2,000-2,500 min⁻¹ (rpm) with the throttle stop screw.

Aim the timing light at the index mark:

- The "FI" mark should be below the index mark when negative pressure is not applied to the vacuum tube.
- The "FI" mark should move down and disappear when negative pressure is applied to the vacuum tube gradually.
- The "FI" mark should align with the index mark when 41-68 kPa (0.41-0.68 kg/cm², 0.50-0.83 psi) pressure is applied at 2,000-2,500 min⁻¹ (rpm).
- Disconnect the vacuum tester and adjust engine speed to 1,100 ± 100 min⁻¹ (rpm); the "FI" mark should align with the index mark.

Check the PIGN sensor (Section 24) if the timing is incorrect. If the PIGN sensor is in good condition, replace the ignition control unit.



COMBINATION VACUUM/
PRESSURE TESTER
07406-0050000 or
commercially available in U.S.A.



TROUBLESHOOTING

7. THROTTLE SENSOR

With the engine stopped and ignition switch ON, check for loose, open or shorted wires or connectors by observing the ECU LED's.

Remove the fuel tank.

Remove the throttle sensor coupler and attach a inspection adapter (No. 07999-MC70000) to the sensor and connect the tester probes to the adapter leads as follows:

Input side: Negative probe to G, and positive probe to P.

Output side: Negative probe to G, and positive probe to W.

Measure the input voltage:

STANDARD: 4.75–5.25V

Loosen the idle adjustment screw until it lightly contacts the throttle lever and install a 2.9 mm (0.114 in) feeler gauge between the throttle lever and stop screw.

NOTE

Be careful not to put feeler gauge between throttle lever protrusion and stop screw.

CAUTION

- Do not loosen the idle stopper screw lock nut.
- It is important to use a 2.9 mm (0.114 in) feeler gauge only.

Measure the output voltage with 2V scale:

STANDARD:

0.665–0.685V (with a 2.9 mm (0.114 in) feeler gauge inserted between the throttle lever and stop screw)

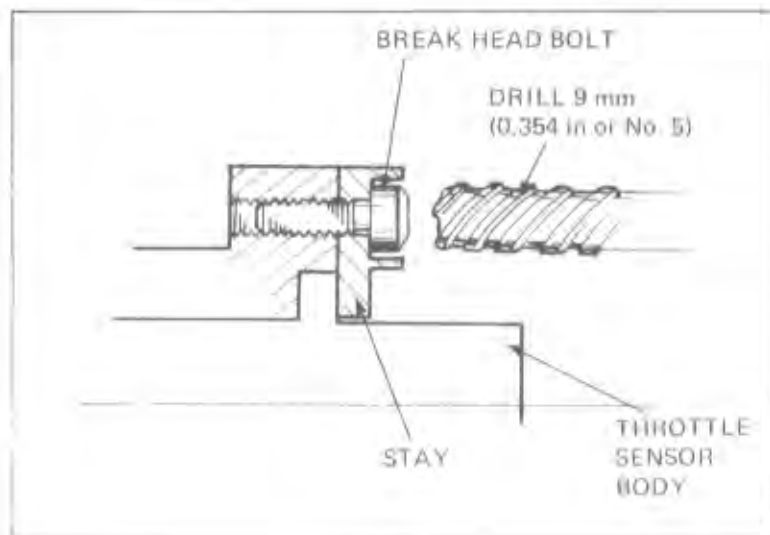
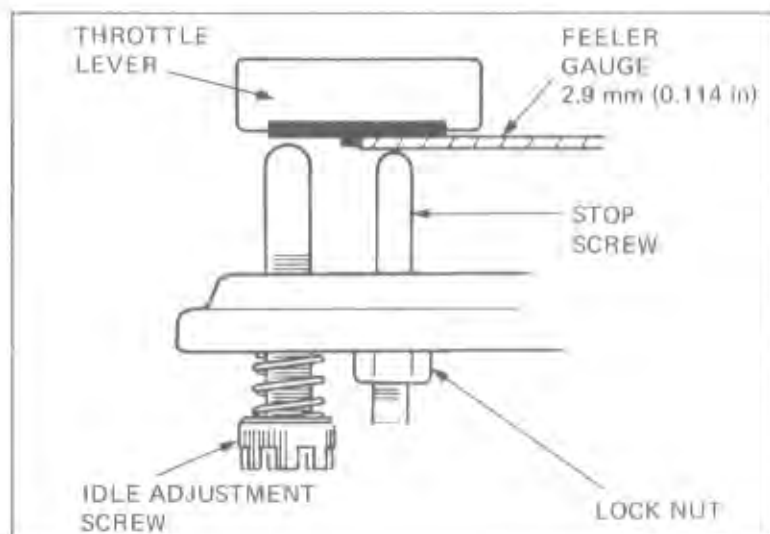
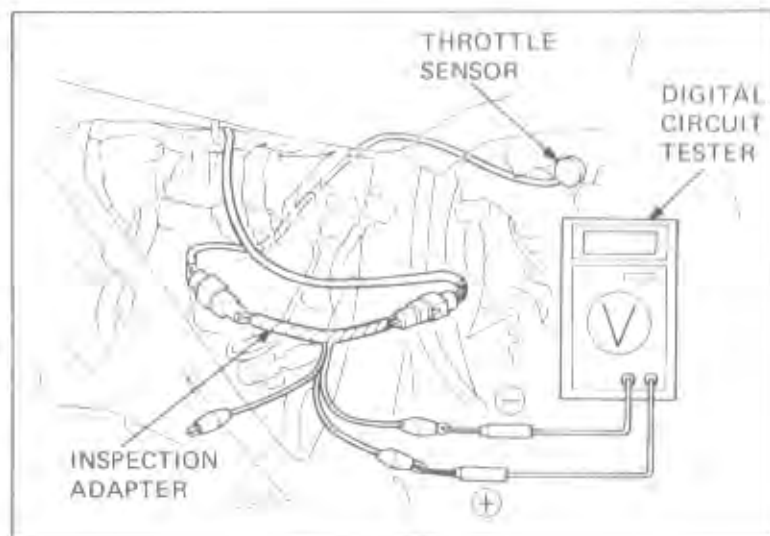
Turn the ignition switch off, disconnect the coupler on the wire harness side and measure the resistance between the terminals on the input side.

Between P and G: 4–6 K Ω

To adjust, drill out the mounting bolts bolt with a 9 mm (0.354 in or No. 5) drill bit to loosen the bracket; then, remove the bolt. Install a new break-head bolt but do not break the head off at this time.

Rotate the throttle sensor right or left so that the output voltage is 0.665–0.685V as in previous step.

Rev the engine up lightly and recheck the voltage. Break the head off the bolt.



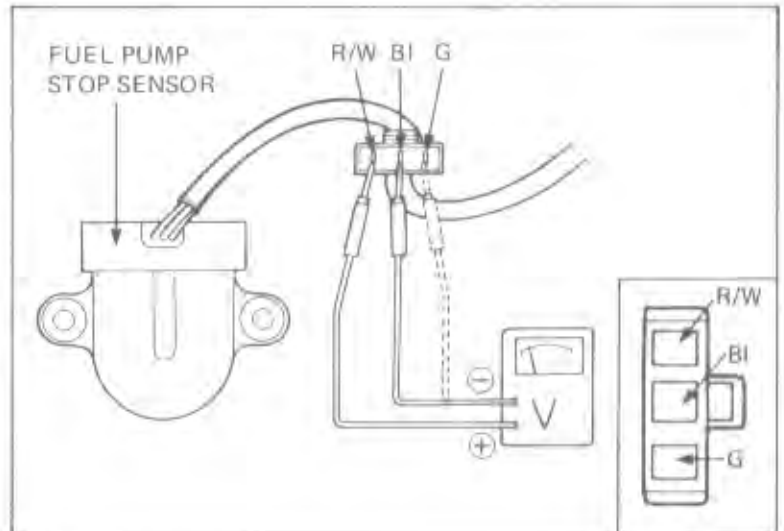


8. FUEL PUMP STOP SENSOR

< On-frame >

With the ignition switch ON, measure the voltages between the terminals without disconnect the coupler.

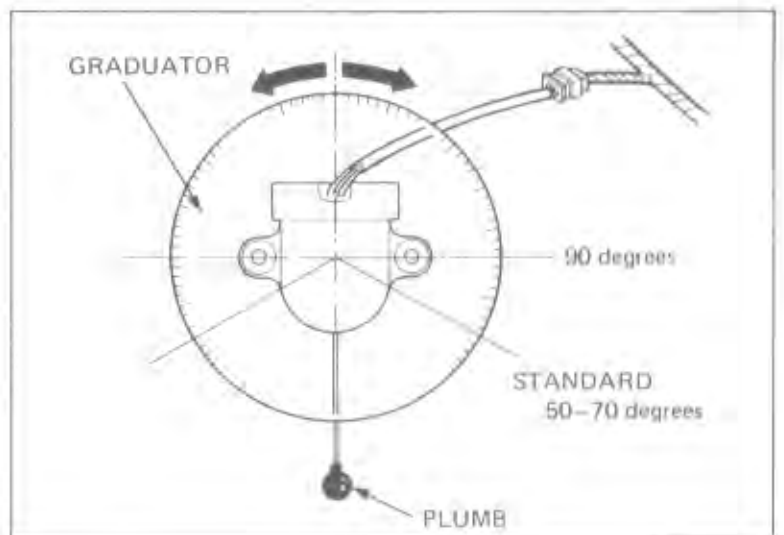
Cord color		STANDARD
⊕ Probe	⊖ Probe	
R/W	G	0 - 1V
Bl	G	10 - 14V



< Off-frame >

Disconnect the PB sensor coupler.
Turn the ignition switch ON. Check that the FUEL SYSTEM WARNING LAMP stays on.
Attach a graduator and plumb to the unit as shown.
Find the angle at which the FUEL SYSTEM WARNING LAMP goes off by rotating the unit clockwise.
Do the same in the opposite direction.

STANDARD: 50° - 70°





TROUBLESHOOTING

9. BOOST INDICATOR

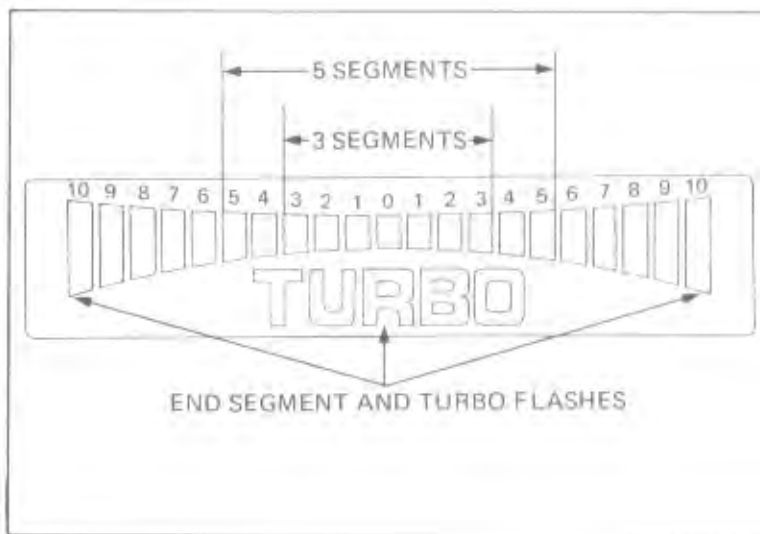
Remove the PIGN sensor tube and connect Pressure/vacuum tester (07406-0050000 or commercially available in U.S.A.).

Turn the ignition switch on.

Check the boost indicator segments operation by applying vacuum or pressure to the PIGN sensor.

STANDARD SPECIFICATION:

SEGMENTS	VACUUM OR PRESSURE (Normal atmosphere = 760 mm Hg)			
	mm Hg abs.	kPa	kg/cm ²	psi
3	690-690	23.1-9.5	-0.23-0.01	-3.27-0.14
4	640-740	-16.3-0.27	-0.16-0.03	-2.36-0.43
5	770-670	1.3-14.9	0.03-0.15	0.14-2.13
7 (Reference)	1,150	156	1.56	22.2
9 (Reference)	1,520	202	2.02	29.4



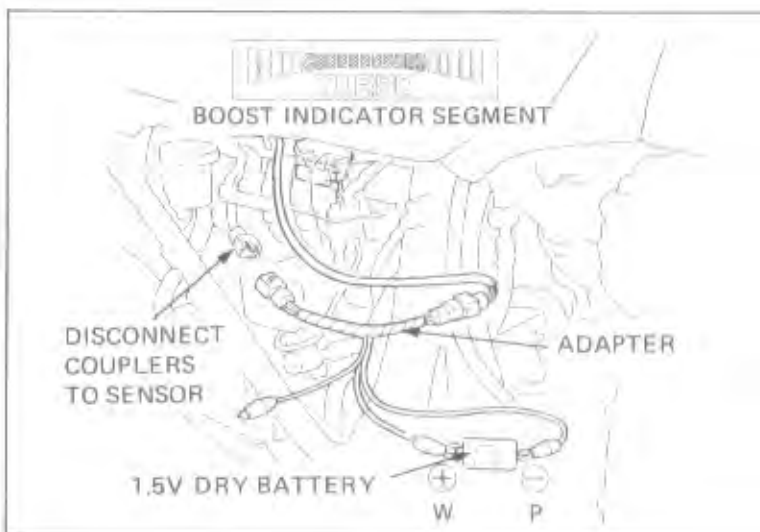
With the engine stopped, disconnect the adapter coupler on the sensor side.

Connect a 1.5V dry battery to the W and P terminals of the adapter as shown.

Then turn the ignition switch ON.

STANDARD: Segment 0 - 5 should be lit
1.5V is applied.

Segment 0 - 8 should be lit
3.0V is applied.



10. WASTE GATE VALVE

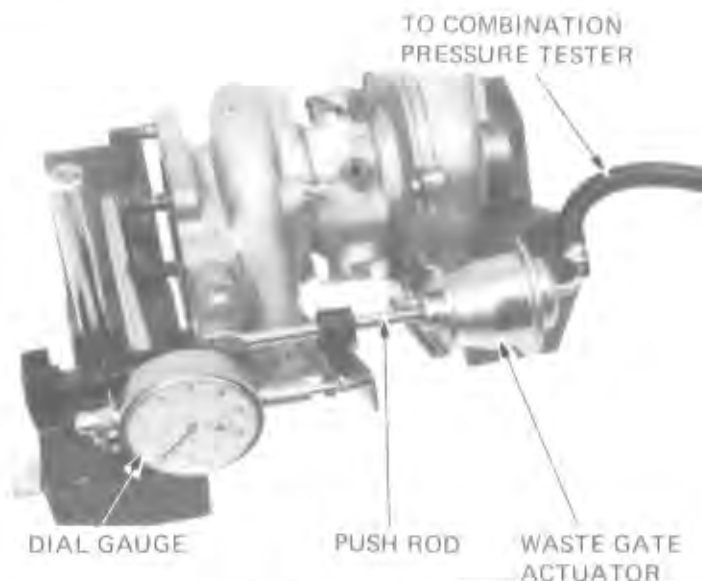
< OFF-frame >

Remove the turbocharger.

Set a dial gauge with its needle resting against the end of the waste gate push rod as shown.

Measure the movement of the push rod by applying pressure to the waste gate actuator with a pressure tester.

STANDARD: 2.0 mm (0.08 in)
at pressure: 130-138 kPa (980-1,040 mmHg,
1.33-1.41 kg/cm² 18.9-20.1 psi)





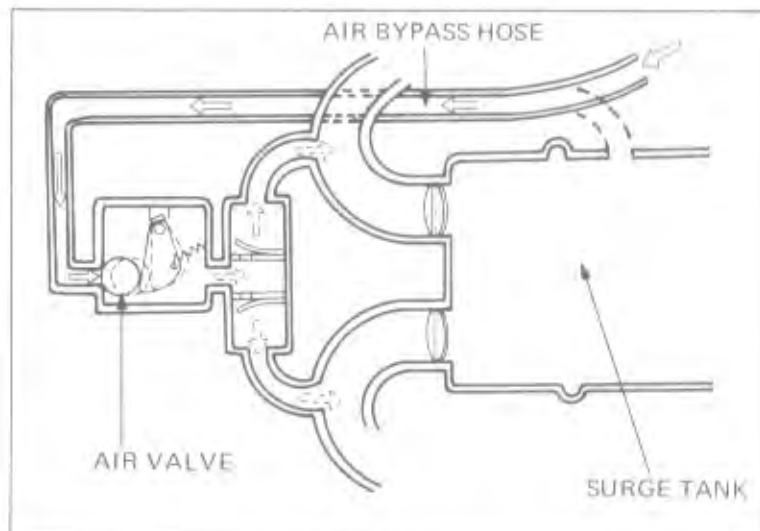
11. AIR VALVE

< Warm engine >

Disconnect the bypass hose and check for continuity through the air valve. The valve is normal if there exists no continuity.

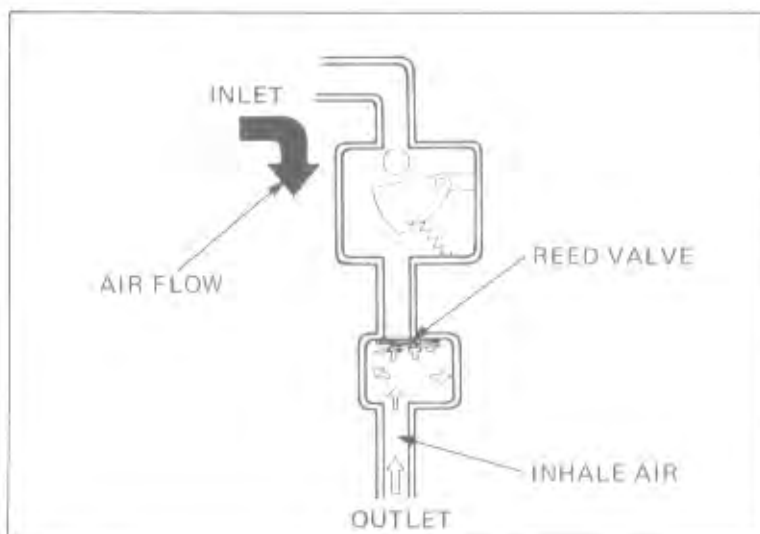
< Cold engine >

Check for continuity through the bypass hose by inhaling air. The valve is correct if there is continuity.



12. REED VALVE

Check the reed valve for damage or breakage.
Check for leaks by inhaling air through the outlet.



13. THROTTLE VALVE SYNCHRONIZATION INSPECTION

NOTE

This inspection is performed with engine at normal operating temperature, transmission in neutral, and vehicle on center stand.

Remove the plugs from the inlet pipe joints and install the adapters.

Connect the vacuum gauge (07404-0020000 or commercially available in U.S.A.).

Start the engine and adjust the idle speed to $1,100 \pm 100 \text{ min}^{-1}$ (rpm). Check the vacuum and difference between right and left cylinder.

STANDARD:

VACUUM: -200 mmHg (560 mmHg abs)

DIFFERENCE: BELOW 30 mmHg





HONDA
CX500 TURBO

TROUBLESHOOTING
