## **HOW TO USE THIS MANUAL**

This service manual describes the service procedures for the CBR900RR.

Follow the Maintenance Schedule (Section 3) recommendations to ensure that the vehicle is in peak operating condition.

Performing the first scheduled maintenance is very important. It compensates for the initial wear that occurs during the break-in period.

Sections 1 and 3 apply to the whole motorcycle. Section 2 illustrates procedures for removal/installation of components that may be required to perform service described in the following sections.

Section 4 through 19 describe parts of the motorcycle, grouped according to location.

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

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

If you don't know the source of the trouble, go to section 21 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. THIS MANUAL IS WRITTEN FOR PERSONS WHO HAVE ACQUIRED BASIC KNOWLEDGE OF MAINTENANCE ON HONDA MOTORCYCLES, MOTOR SCOOTERS OR ATVS.

HONDA MOTOR CO., LTD. SERVICE PUBLICATION OFFICE

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## IMPORTANT SAFETY NOTICE

**A** WARNING

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

CAUTION:

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

NOTE:

Gives helpful information.

Detailed descriptions of standard workshop procedures, safety principles and service operations are not included. It is important to note that this manual contains some warnings and cautions against some specific service methods which could cause **PERSONAL INJURY** to service personnel or could damage a vehicle or render it unsafe. Please understand that those warnings could not cover all conceivable ways in which service, whether or not recommended by Honda, might be done or of the possibly 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 methods or tools selected.

#### **TYPE CODE**

· Throughout this manual, the following abbreviations are used to identify individual model.

CODE	AREA TYPE	CODE	AREA TYPE
ED	EUROPEAN DIRECT SALES	AR	AUSTRIA
E	U.K.	IT	ITALY
G	GERMANY	SD	SWEDEN
F	FRANCE	ND	NORTH EUROPE
SW	SWITZERLAND	U	AUSTRALIA



# **Shop Manual News**

## Motorcycle

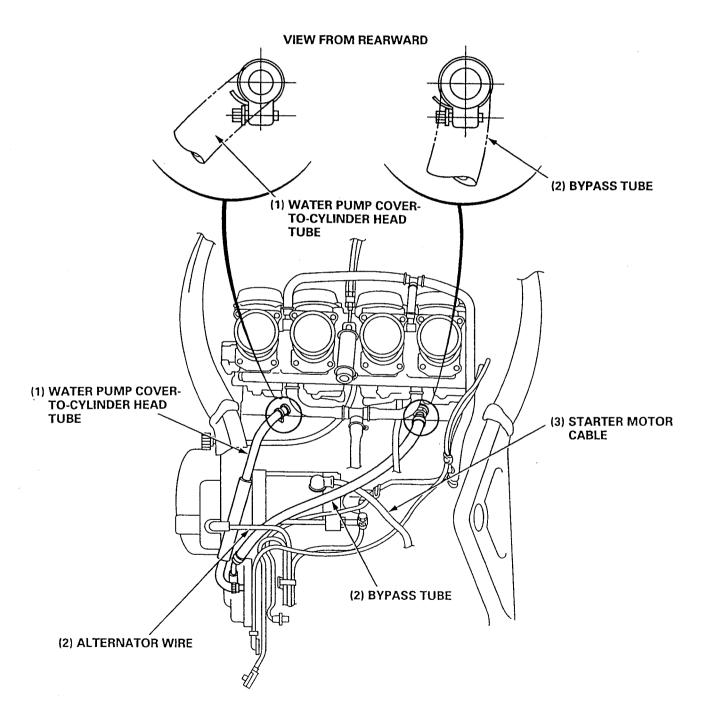
**Previous Information for CBR900RR** 

News Number 97-2-001 Issue Date Apr. 1997

If your motorcycle is equipped bypass tube from water pump cover-to-cylinder head, refer to following information and specification.

Refer to CBR900RR Shop Manual (62MAS00, 63MAS00, 64MAS00, 69MAS00), not included in this Shop Manual News.

### WIRING DIAGRAM



## HONDA CBR900RR

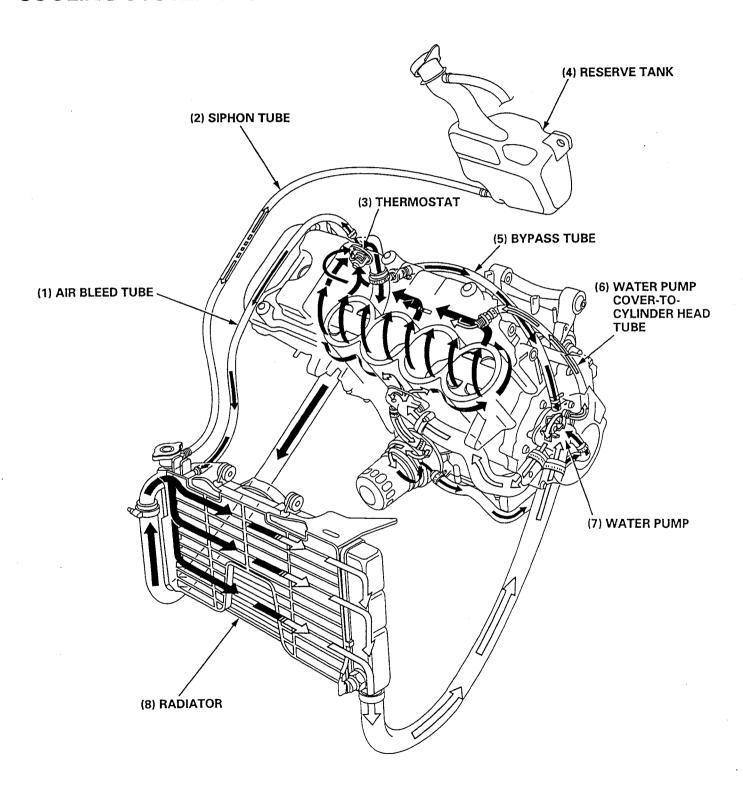
# **Shop Manual News**

Motorcycle

**Previous Information for CBR900RR** 

News Number 97-2-001 Issue Date Apr. 1997

## **COOLING SYSTEM FLOW PATTERN**



## HONDA CBR900RR

# **Shop Manual News**

Motorcycle

News Number 97-2-001 Issue Date Apr. 1997

### **Previous Information for CBR900RR**

### **WATER PUMP**

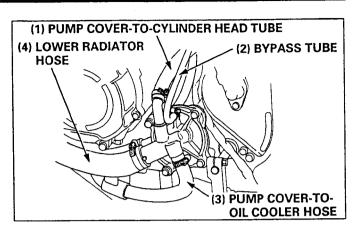
#### **REMOVAL**

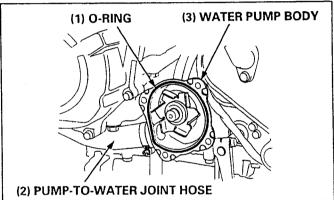
Disconnect the following:

- Water pump cover-to-cylinder head tube
- Bypass tube
- Water pump cover-to-oil cooler hose
- Lower radiator hose

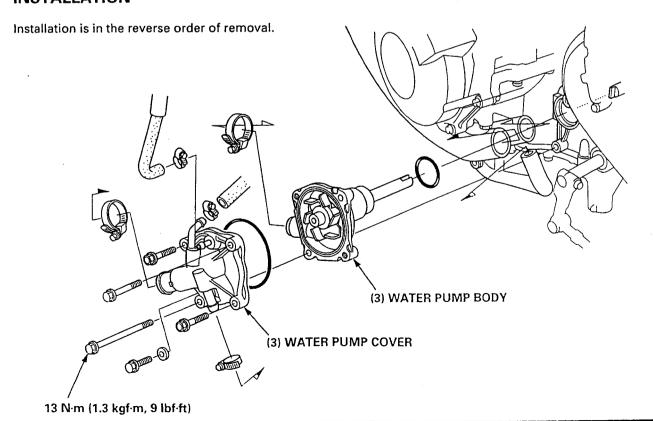
Remove the two SH bolts, two flange bolts and water pump cover.

Remove the O-ring from the water pump body. Disconnect the water pump-to-water joint hose and remove the water pump body from the crankcase.





#### INSTALLATION



3 of 4



# **Shop Manual News**

Motorcycle

News Number 97-2-001 Issue Date Apr. 1997

### **Previous Information for CBR900RR**

## CYLINDER HEAD REMOVAL

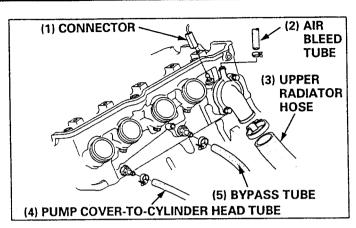
Remove the camshaft (page 8-3).

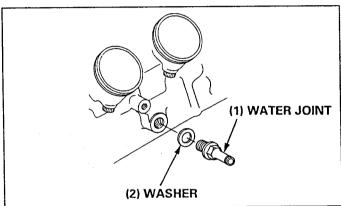
Disconnect the coolant temperature sensor connector. Remove the air bleed tube and upper radiator hose from the thermostat housing cover (page 6-5). Disconnect the water pump cover-to-cylinder head tube and bypass tube from the cylinder head.

Follow the remaining procedure on page 8-9. Installation is in the reverse order of removal.

If the water joint for bypass tube is removed, install and tighten the water joint to the specified torque.

TORQUE: 29 N·m (3.0 kgf·m, 22 lbf·ft)





#### 1

## 1. GENERAL INFORMATION

GENERAL SAFETY	1-1	TORQUE VALUES	1-13
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## **GENERAL SAFETY**

#### **CARBON MONOXIDE**

If the engine must be running to do some work, make sure the area is well ventilated. Never run the engine in an enclosed area.

#### **A** WARNING

 The exhaust contains poisonous carbon monoxide gas that can cause loss of consciousness and may lead to death.

Run the engine in an open area or with an exhaust evacuation system in an enclosed area.

#### **GASOLINE**

Work in a well ventilated area. Keep cigarettes, flames or sparks away from the work area or where gasoline is stored.

#### **A** WARNING

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

#### **HOT COMPONENTS**

#### **A** WARNING

 Engine and exhaust system parts become very hot and remain hot for some time after the engine is run. Wear insulated gloves or wait until the engine and exhaust system have cooled before handling these parts.

#### **USED ENGINE OIL**

#### **A** WARNING

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

#### **BRAKE DUST**

Never use an air hose or dry brush to clean the brake assemblies.

#### **A** WARNING

 Inhaled asbestos fibers have been found to cause respiratory disease and cancer.

#### **BRAKE FLUID**

#### **CAUTION**

 Spilling fluid on painted, plastic or rubber parts will damage them. Place a clean shop towel over these parts whenever the system is serviced. KEEP OUT OF REACH OF CHILDREN.

#### **BATTERY HYDROGEN GAS & ELECTROLYTE**

#### **A** WARNING

- The battery gives off explosive gases; keep sparks, flames and cigarettes away. Provide adequate ventilation when charging.
- The battery contains sulfuric acid (electrolyte). Contact with skin or eyes may cause severe burns. Wear protective clothing and a face shield.
  - If electrolyte gets on your skin, flush with water.
  - If electrolyte gets in your eyes, flush with water for at least 15 minutes and call a physician immediately.
- · Electrolyte is poisonous.
  - If swallowed, drink large quantities of water or milk and follow with milk of magnesia or vegetable oil and call a physician. KEEP OUT OF REACH OF CHILDREN.

### **SERVICE RULES**

- 1. Use genuine HONDA or HONDA-recommended parts and lubricants or their equivalents. Parts that don't meet HONDA's design specifications may cause damage to the motorcycle.
- 2. Use the special tools designed for this product to avoid damage and incorrect assembly.
- 3. Use only metric tools when servicing the motorcycle. Metric bolts, nuts and screws are not interchangeable with English festeners.
- 4. Install new gaskets, O-rings, cotter pins, and lock plates when reassembling.
- 5. When tightening bolts or nuts, begin with the larger diameter or inner bolt first. Then tighten to the specified torque diagonally in incremental steps unless a particular sequence is specified.
- 6. Clean parts in cleaning solvent upon disassembly. Lubricate any sliding surfaces before reassembly.
- 7. After reassembly, check all parts for proper installation and operation.
- 8. Route all electrical wires as show on pages 1-21 through 1-31, Cable and Harness Routing.

## **MODEL IDENTIFICATION**

## **SPECIFICATIONS**

- GENERAL	ITEM	SPECIFICATIONS
DIMENSIONS	Overall length	
	G, AR, SW, SD, ND type	2,135 mm (84.1 in)
	F, IT, E, U, ED type	2,030 mm (79.9 in)
	Overall width	675 mm (26.6 in)
	Overall height	1,130 mm (44.5 in)
	Wheelbase	1,405 mm (55.3 in)
	Seat height	810 mm (31.9 in)
	Footpeg height	380 mm (15.0 in)
	Ground clearance	140 mm (5.5 in)
	Dry weight	
	Except SW, AR type	183 kg (403 lbs)
	SW, AR type	184 kg (406 lbs)
	Curb weight	
	Except SW, AR type	205 kg (454 lbs)
	SW, AR type	206 kg (454 lbs)
	Maximum weight capacity	
	Except SW, AR type	186 kg (410 lbs)
	SW, AR type	185 kg (408 lbs)
FRAME	Frame type	Diamond
	Front suspension	Telescopic fork
	Front wheel travel	110 mm (4.3 in)
	Rear suspension	Swingarm
	Rear wheel travel	125 mm (4.9 in)
	Rear damper	Nitrogen gas filled damper, with reserve tank
	Front tire size	130/70 ZR 16
	Rear tire size	180/55 ZR 17
	Tire brand	
	Bridgestone	Front: BT56F RADIAL/Rear: BT56R RADIAL G
	Michelin	Front: TX15/Rear: TX25
	Front brake	Hydraulic double disc brake
	Rear brake	Hydraulic single disc brake
	Caster angle	24°
	Trail length	90 mm (3.5 in)
	Fuel tank capacity	18.0 liter (4.76 US gal, 3.96 lmp gal)
	Fuel tank reserve capacity	3.5 liter (0.92 US gal, 0.77 Imp gal)
ENGINE	Bore and stroke	71.0 x 58.0 mm (2.80 x 2.28 in)
ENGINE		919 cm <sup>3</sup> (56.1 cu-in)
	Displacement Compression ratio	11.0:1
	Valve train	Chain drive and DOHC
		15° BTDC
	Intake valve opens closes	35° ABDC
		39° BBDC
	Exhaust valve opens closes	11° ATDC
	1	Forced pressure and wet sump
	Lubrication system	Trochoid
	Oil pump type	Liquid cooled
	Cooling system	Paper filter
	Air filtration	
	Crankshaft type	Unit type
	Engine dry weight	66 0 kg /147 5 lbs\
	Except SW, AR type	66.9 kg (147.5 lbs)
	SW, AR type	68.2 kg (150.4 lbs)
	Cylinder arrangement	Four cylinder, inline

GENERAL (Cont'd)				
ITEM			SPECIFICATIONS	
CARBURETOR	Carburetor type Throttle bore		CV (Constant Velocity) type, with flat valve 38 mm (1.5 in)	
DRIVE TRAIN	Clutch system Clutch operation system Transmission Primary reduction Final reduction Gear ratio  Gearshift pattern	1st 2nd 3rd 4th 5th 6th	Multi-plate, wet Mechanical type Constant mesh, 6-speed 1.520 (76/50) 2.625 (42/16) 2.727 (30/11) 1.933 (29/15) 1.600 (24/15) 1.400 (28/20) 1.263 (24/19) 1.167 (21/18) Left foot operated return system, 1 - N - 2 - 3 - 4 - 5 - 6	
ELECTRICAL	Ignition system Starting system Charging system Regulator/rectifier Lighting system		Full transistor digital ignition Electric starter motor Triple phase output alternator SCR shorted/triple phase, full wave rectification Battery	

Unit: mm (in)

- LUBRICATION SYSTEM ————————————————————————————————————				
	ITEM	STANDARD	SERVICE LIMIT	
Engine oil capacity	At draining	3.5 liter (3.7 US qt, 3.1 Imp qt)		
	At disassembly	4.4 liter (4.6 US qt, 3.9 lmp qt)		
	At oil filter change	3.6 liter (3.8 US qt, 3.2 lmp qt)		
Recommended engine oil		HONDA 4-stroke oil or equivalent motor oil API service classification SE, SF or SG Viscosity: SAE 10W – 40	GG	
Oil pressure at oil pressure switch		490 kPa (5.0 kgf/cm², 71 psi) at 6,000 min <sup>-1</sup> (rpm)/(80°C/176°F)		
Oil pump rotor	Tip clearance	0.15 - 0.22 (0.006 - 0.009)	0.20 (0.008)	
	Body clearance	0.15 - 0.22 (0.006 - 0.009)	0.35 (0.014)	
	Side clearance	0.02 - 0.07 (0.001 - 0.003)	0.10 (0.004)	

ΙΤ	EM	SPECIFICATIONS	
Carburetor identification	E, ED, IT, U, ND type	VP88A	
number	G type	VP88C	
	F type	VP88F	
	SD type	VP88G	
	SW type	VP8AA	
	AR type	VP8AB	
Main jet	E, ED, IT, U, ND type	#115 (See page 5-11)	
	G, SW, AR type	No. 1, 4: #115/No. 2, 3: #118	
	F type	#118	
	SD type	No. 1, 4: #118/No. 2, 3: #120	
Slow jet		#40	
Jet needle number	E, ED, IT, U, ND, G, SD type	No. 1, 4: J5FZ/No. 2, 3: J5FY	
	F, AR type	No. 1, 4: J5FB/No. 2, 3: J5FA	
	SW type	J5FC	
Pilot screw initial opening	E, ED, IT, U, ND, F, SD type	3 turns out	
	G type	2-1/2 turns out	
	SW, AR type	2-3/4 turns out	
Float level		13.7 mm (0.54 in)	
Idle speed	Except SW, AR type	1,100 ± 100 min <sup>-1</sup> (rpm)	
	SW, AR type	1,100 ± 50 min <sup>-1</sup> (rpm)	
Throttle grip free play		2 – 6 mm (1/12 – 1/4 in)	

COOL	DIAL	CVCT	CER/
CUUL	IIVE -	5 Y 5	I FIVI

ITEM		SPECIFICATIONS	
Coolant capacity	Radiator and engine	2.77 liter (2.93 US qt, 2.44 lmp qt)	
	Reserve tank	0.45 liter (0.476 US qt, 0.396 Imp qt)	
Radiator cap relief pressure		108 - 137 kPa (1.1 - 1.4 kgf/cm², 16 - 20 psi)	
Thermostat	Begin to open	80 – 84°C (176 – 183°F)	
	Fully open	95°C (203°F)	
	Valve lift	8 mm (0.3 in) minimum	

Unit: mm (in)

CYLINDER HEAD/VALVESUnit: mm (i					
ITEM				STANDARD	SERVICE LIMIT
Cylinder compression				1,177 kPa (12.0 kgf/cm², 171 psi) at 500 – 600 min <sup>-1</sup> (rpm)	
Cylinder head v	varpage				0.10 (0.004)
Valve,	Valve clearance		IN	0.13 – 0.19 (0.005 – 0.007)	
valve guide			EX	0.19 - 0.25 (0.007 - 0.010)	
	Valve stem 0	).D.	IN	4.475 – 4.490 (0.1762 – 0.1768)	4.465 (0.1758)
			EX	4.465 – 4.480 (0.1758 – 0.1764)	4.455 (0.1754)
	Valve guide I.D.		IN	4.500 – 4.512 (0.1772 – 0.1776)	4.540 (0.1787)
			EX	4.500 – 4.512 (0.1772 – 0.1776)	4.540 (0.1787)
	Stem-to-guide clearance		IN	0.010 - 0.037 (0.0004 - 0.0015)	
			EX	0.020 - 0.047 (0.0008 - 0.0019)	
	Valve guide projection above cylinder head		IN	14.60 – 14.80 (0.575 – 0.583)	
			EX	14.80 - 15.00 (0.583 - 0.591)	<del></del>
	Valve seat wi	dth	IN/EX	0.90 – 1.10 (0.035 – 0.043)	1.5 (0.06)
Valve spring	Inner		IN/EX	35.77 (1.408)	34.07 (1.341)
free length	Outer		IN/EX	39.69 (1.563)	37.79 (1.488)
Valve lifter	Valve lifter O.D.		IN/EX	25.978 – 25.993 (1.0228 – 1.0233)	25.97 (1.022)
	Valve lifter bore I.D.		IN/EX	26.010 - 26.026 (1.0240 - 1.0246)	26.04 (1.025)
Camshaft	Cam lobe	Except F, SW,	IN	36.040 - 36.280 (1.4189 - 1.4283)	36.01 (1.418)
	height	AR type	EX	35.800 – 36.040 (1.4094 – 1.4189)	35.77 (1.408)
		F type	IN	33.240 – 33.480 (1.3087 – 1.3181)	33.21 (1.307)
	SW,		EX	35.100 – 35.340 (1.3819 – 1.3913)	35.07 (1.381)
		SW, AR type	IN	34.940 – 35.180 (1.3756 – 1.3850)	34.91 (1.374)
			EX	35.100 – 35.340 (1.3819 – 1.3913)	35.07 (1.381)
	Runout				0.05 (0.002)
	Oil clearance			0.020 - 0.062 (0.0008 - 0.0024)	0.10 (0.004)
	On clearance				

CLUTCH/GEARSHIFT LINKAGE					
ITEM			STANDARD	SERVICE LIMIT	
Clutch lever fre	ee play		10 – 20 (3/8 – 3/4)		
Clutch spring f	ree length		50.2 (1.98)	49.2 (1.93)	
Clutch disc thic	kness		2.62 - 2.78 (0.103 - 0.109)	2.3 (0.09)	
Clutch plate wa	arpage			0.30 (0.012)	
Clutch outer gu	uide	I.D.	24.9935 – 25.0035 (0.98399 – 0.98451)	25.016 (0.9849)	
		O.D.	34.975 – 34.991 (1.3770 – 1.3776)	34.965 (1.3766)	
Mainshaft O.D	at clutch outer guide		24.980 – 24.993 (0.9835 – 0.9840)	24.96 (0.983)	
Shift fork,	Fork I.D.	I.D.	12.000 - 12.021 (0.4724 - 0.4733)	12.03 (0.474)	
fork shaft		Claw thickness	5.93 - 6.00 (0.233 - 0.236)	5.9 (0.23)	
	Fork shaft O.D.	·	11.957 - 11.968 (0.4707 - 0.4712)	11.95 (0.470)	

- CBANKCA		Unit: mm (in)		
- CRANKCASE/PISTON/CYLINDER ITEM			STANDARD	SERVICE LIMIT
Cylinder	I.D.		71.000 – 71.015 (2.7953 – 2.7963)	71.10 (2.795)
	Out of round			0.10 (0.004)
	Taper			0.10 (0.004)
	Warpage			0.05 (0.002)
Piston, piston	Piston mark direction	1	"IN" mark facing toward the intake side	
rings	Piston O.D.		70.965 – 70.985 (2.7939 – 2.7947)	70.90 (2.791)
	Piston O. D. measurement point		15 mm (0.6 in) from bottom of skirt	
	Piston pin bore I.D.		17.002 - 17.008 (0.6694 - 0.6696)	17.03 (0.670)
	Piston pin O.D.		16.993 – 17.000 (0.6690 – 0.6693)	16.98 (0.669)
	Piston-to-piston pin clearance		0.002 - 0.015 (0.0001 - 0.0006)	
	Piston ring-to-ring groove clearance	Тор	0.030 - 0.065 (0.0012 - 0.0026)	0.08 (0.003)
		Second	0.015 - 0.045 (0.0006 - 0.0018)	0.07 (0.003)
	Piston ring end gap	Тор	0.28 - 0.38 (0.011 - 0.015)	0.5 (0.02)
		Second	0.40 - 0.55 (0.016 - 0.022)	0.7 (0.03)
		Oil (side rail)	0.2 - 0.7 (0.01 - 0.03)	0.9 (0.04)
Cylinder-to-piston clearance		0.015 - 0.050 (0.0006 - 0.0020)		
Connecting rod small end I.D.		17.016 – 17.034 (0.6699 – 0.6706)	17.04 (0.671)	
Connecting roo	Connecting rod-to-piston pin clearance		0.016 - 0.041 (0.0006 - 0.0016)	
Crankpin oil cle	earance		0.030 - 0.052 (0.0012 - 0.0020)	0.06 (0.002)

- CRANKSH	AFT/TRANSMISS		Unit: mm (in	
ITEM		STANDARD	SERVICE LIMIT	
Crankshaft	Side clearance		0.05 - 0.20 (0.002 - 0.008)	0.30 (0.012)
	Runout			0.30 (0.012)
	Main journal oil clea	arance	0.017 - 0.035 (0.0007 - 0.0014)	0.04 (0.002)
Transmission	Gear I.D.	M5, 6	28.000 – 28.021 (1.1024 – 1.1032)	28.04 (1.104)
		C1	24.000 – 24.021 (0.9449 – 0.9457)	24.04 (0.946)
		C2, 3, 4	31.000 – 31.025 (1.2205 – 1.2215)	31.04 (1.222)
	Bushing O.D.	M5, 6	27.959 – 27.980 (1.1007 – 1.1016)	27.94 (1.100)
		C2	30.955 – 30.980 (1.2187 – 1.2197)	30.93 (1.218)
		C3, 4	30.950 – 30.975 (1.2185 – 1.2195)	30.93 (1.218)
	Bushing I.D.	M5	24.985 – 25.006 (0.9837 – 0.9845)	25.02 (0.985)
		C2	27.985 – 28.006 (1.1018 – 1.1026)	28.02 (1.103)
	Gear-to-bushing clearance	M5, 6	0.020 - 0.062 (0.0008 - 0.0024)	0.10 (0.004)
		C2	0.020 - 0.070 (0.0008 - 0.0028)	0.11 (0.004)
		C3, 4	0.025 - 0.075 (0.0010 - 0.0030)	0.11 (0.004)
	Mainshaft O.D.	M5	24.967 – 24.980 (0.9830 – 0.9835)	24.96 (0.983)
		Clutch outer guide	24.980 – 24.993 (0.9835 – 0.9840)	24.96 (0.983)
	Countershaft O.D.	C2	27.967 – 27.980 (1.1011 – 1.1016)	27.96 (1.101)
	Bushing-to-shaft	M5	0.005 - 0.039 (0.0002 - 0.0015)	0.08 (0.003)
	clearance	C2	0.005 - 0.039 (0.0002 - 0.0015)	0.08 (0.003)

- FRONT WHEEL/S	SUSPENSION/STEERING —	Unit: mm		
ITEM Minimum tire tread depth		STANDARD	1.5 (0.06)	
Cold tire pressure	Driver only	250 kPa (2.50 kgf/cm², 36 psi)		
	Driver and passenger	250 kPa (2.50 kgf/cm², 36 psi)		
Axle runout	-		0.20 (0.008)	
Wheel rim runout	Radial		2.0 (0.08)	
	Axial		2.0 (0.08)	
Fork	Spring free length	248.2 (9.77)	243.2 (9.57)	
	Spring direction	With the tapered end facing down	<del> </del>	
	Tube runout		0.20 (0.008)	
	Recommended fork fluid	Fork fluid		
	Fluid level	114 ± 4 (4.5 ± 0.2)		
	Fluid capacity	561 ± 2.5 cm <sup>3</sup> (19.0 ± 0.02 US oz, 19.7 ± 0.09 Imp oz)		
	Pre-load adjuster setting	12 mm (0.5 in) from top of fork cap	<u></u> -	
	Rebound adjuster setting	1 turn from full hard		
	Compression adjuster setting	1 turn from full hard		
Steering head bearing p	reload	1.0 – 1.5 kgf (2.2 – 3.3 lbf)		

- REAR WHEEL/SU		Unit: mm (ir	
1127111 1111222,00	ITEM	STANDARD	SERVICE LIMIT
Minimum tire tread dep	oth		2.0 (0.08)
Cold tire pressure	Driver only	290 kPa (2.90 kgf/cm², 42 psi)	
	Driver and passenger	290 kPa (2.90 kgf/cm², 42 psi)	
Axle runout			0.20 (0.008)
Wheel rim runout	Radial		2.0 (0.08)
	Axial		2.0 (0.08)
Shock absorber	Spring free length	172.6 (6.80)	169.1 (6.66)
	Spring direction	With the tapered end facing up	
	Pre-load adjuster setting	2nd position	
	Rebound adjuster setting	1 turn from full hard	
	Compression adjuster setting	1 turn from full hard	<del></del>

		mm	/: \
117	ııT.	mm	t i n i

DIIAC	JLIC BRAKE TIEM		STANDARD	SERVICE LIMIT
Front	Specified brake f	uid	DOT 4	
	Brake disc thickn	ess	4.5 (0.18)	3.5 (0.14)
	Brake disc runou			0.30 (0.012)
	Master cylinder I.	D.	14.000 - 14.043 (0.5512 - 0.5529)	14.055 (0.5533)
	Master piston O.I	D	13.957 - 13.984 (0.5495 - 0.5506)	13.945 (0.5490)
	Caliper cylinder	Α	30.230 - 30.280 (1.1902 - 1.1921)	30.29 (1.193)
	I.D.	В	27.000 – 27.050 (1.0630 – 1.0650)	27.06 (1.065)
	Caliper piston	Α	30.148 – 30.198 (1.1869 – 1.1889)	30.140 (1.1866)
	O.D.	В	26.935 – 26.968 (1.0604 – 1.0617)	26.927 (1.0610)
Rear	Specified brake fl	uid	DOT 4	
	Brake disc thickne	ess	5.0 (0.20)	4.0 (0.16)
	Brake disc runout			0.30 (0.012)
	Master cylinder I.	D.	15.870 - 15.913 (0.6248 - 0.6265)	15.925 (0.6270)
	Master piston O.I	).	15.827 - 15.854 (0.6231 - 0.6242)	15.815 (0.6226)
	Caliper cylinder I.	D.	38.18 – 38.23 (1.503 – 1.505)	38.24 (1.506)
	Caliper piston O.I	Э.	38.115 – 38.148 (1.5006 – 1.5019)	38.107 (1.5003)

	ITEM		SPECIFICATIONS
Battery	Capacity Current leakage		12V – 8 Ah
			0.1 mA max.
	Voltage (20°C/68°F)	Fully charged	13.0 – 13.2 V
		Needs charging	Below 12.3 V
	Charging current	Normal	0.9 A/5 – 10 h
		Quick	4.0 A/0.5 h
Alternator	Capacity		384 W/5,000 min <sup>-1</sup> (rpm)
Charging coil resis		tance (20°C/68°F)	0.1 – 0.3 Ω
Regulator/recti	fier regulated voltage		13.5 – 15.5 V/5,000 min <sup>-1</sup> (rpm)

- IGNITION SYSTEM						
ITEM		SPECIFICATIONS				
Spark plug		NGK	NIPPONDENSO			
	Standard	CR9EH 9	U27FER 9			
	Optional	CR8EH 9	U24FER 9			
Spark plug gap		0.80 – 0.90 mm (0.031 – 0.035 in)				
Ignition coil peak	voltage	100 V minimum				
Ignition pulse generator peak voltage		0.7 V minimum				
Ignition timing	"F" mark	10° BTDC at idle				

Unit: mm (in)

ELECTRIC STARTER	STANDARD	SERVICE LIMIT
Starter motor brush length	12.0 – 13.0 (0.47 – 0.51)	4.5 (0.18)

	ERS/SWITCHES -		SPECIFICATIONS	
Bulbs	Headlight	Except U type	12 V – 60/55 W x 2	
	(High/low beam)	U type	12 V – 45/45 W x 2	
	Position light		12 V – 5 W	
	Brake/tail light		12 V – 21/5 W × 2	
	Front turn signal lig	ht	12 V – 21 W	
	Rear turn signal light		12 V – 21 W	
	Instrument light		12 V – 1.7 W x 4	
	Turn signal indicate	or	12 V – 1.7 W x 2	
	High beam indicate	r	12 V – 1.7 W	
	Neutral indicator		12 V – 1.7 W	
	Oil pressure indicat	or	12 V – 1.7 W	
	Side stand indicato	r	12 V – 1.7 W	
Fuse	Main fuse		30 A	
	Sub fuse		10 A x 4, 20 A x 1	
Fan motor switch	Start to close (ON)		98 – 102°C (208 – 216°F)	
	Stop to open		93 – 97°C (199 – 207°F)	
Coolant temperatu	re sensor resistance	(20°C/68°F)	45 – 60 Ω	

## **TORQUE VALUES**

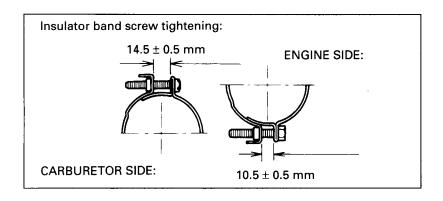
FASTENER TYPE	TORQUE N·m (kgf·m, lbf·ft)	FASTENER TYPE	TORQUE N·m (kgf·m, lbf·ft)
5 mm hex bolt and nut	5 (0.5, 3.6)	5 mm screw	4 (0.4, 2.9)
6 mm hex bolt and nut	10 (1.0, 7)	6 mm screw	9 (0.9, 6.5)
8 mm hex bolt and nut	22 (2.2, 16)	6 mm flange bolt (8 mm head)	9 (0.9, 6.5)
10 mm hex bolt and nut	34 (3.5, 25)	6 mm flange bolt (10 mm head) and nut	12 (1.2, 9)
12 mm hex bolt and nut	54 (5.5, 40)	8 mm flange bolt and nut	26 (2.7, 20)
		10 mm flange bolt and nut	39 (4.0, 29)

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

NOTES: 1. Apply sealant to the threads.

- 2. Apply a locking agent to the threads.
- 3. Apply molybdenum disulfide oil to the threads and flange surface.
- 4. Apply grease to the threads.
- 5. Stake.
- 6. Apply oil to the threads and flange surface.
- 7. Apply clean engine oil to the O-ring.
- 8. U-nut.
- 9. ALOC bolt: replace with a new one.

- ENGINEITEM	α'τγ	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
MAINTENANCE:				
Crankshaft hole cap	1	45	18 (1.8, 13)	NOTE 4
Spark plug	4	10	12 (1.2, 9)	
LUBRICATION SYSTEM:				
Oil drain bolt	1	12	29 (3.0, 22)	
Oil filter cartridge	1	20	10 (1.0, 7)	NOTE 6, 7
Oil pump driven sprocket bolt	1	6	15 (1.5, 11)	NOTE 2
Oil cooler boss	1	20	64 (6.5, 47)	NOTE 2
COOLING SYSTEM:				
Water pump coverbolt	3	6	13 (1.3, 9)	
Coolant temperature sensor	1	PT1/8	10 (1.0, 7)	NOTE 1
FUEL SYSTEM:			*	
Carburetor assembly bolt, 5 mm	1	5	5 (0.5, 3.6)	
6 mm	1	6	10 (1.0, 7)	
Vacuum plug for synchronization	3	5	3.0 (0.30, 2.2)	
Boost joint for fuel valve	1	5	2.5 (0.25, 1.8)	
Carburetor insulator band screw	8	5		See below



- ENGINE (Cont'd)ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
ENGINE MOUNTING:				
Drive sprocket bolt	1	10	54 (5.5, 40)	
CYLINDER HEAD/VALVES:				
Breather plate flange bolt	3	6	12 (1.2, 9)	NOTE 2
Cylinder head stud bolt	8	8	25 (2.6, 19)	1
Cylinder head cover special bolt	6	6	10 (1.0, 7)	
Camshaft holder flange bolt	10	6	12 (1.2, 9)	
Cylinder head socket bolt	10	9	47 (4.8, 35)	NOTE 6
Cam sprocket bolt	4	7	20 (2.0, 14)	NOTE 2
Cam chain tensioner lifter mounting bolt	2	6	12 (1.2, 9)	
Air bleed tube joint	1	10	25 (2.5, 18)	
CLUTCH/GEARSHIFT LINKAGE:				
Right crankcase cover SH bolt	7	6	12 (1.2, 9)	
Clutch center lock nut	1	22	127 (13.0, 94)	NOTE 5, 6
Gearshift pedal spring stopper	1	8	23 (2.3, 17)	•
Shift drum center bolt	1	8	23 (2.3, 17)	NOTE 2
Shift drum bearing set plate bolt	2	6	12 (1.2, 9)	NOTE 2
ALTERNATOR/STARTER CLUTCH:				
Left crankcase cover SH bolt	10	6	12 (1.2, 9)	
Flywheel flange bolt	1	10	103 (10.5, 76)	NOTE 6
Stator mounting socket bolt	4	6	12 (1.2, 9)	
Starter one-way clutch socket bolt	6	6	16 (1.6, 12)	NOTE 2
CRANKCASE/PISTON/CYLINDER:				
Crankcase bolt, 10 mm	1	10	39 (4.0, 29)	
9 mm	10	9	27 (2.8, 20)	NOTE 6
8 mm	2	8	25 (2.5, 18)	
6 mm	18	6	12 (1.2, 9)	
Connecting rod nut	8	8	33 (3.4, 25)	NOTE 6
Lower crankcase sealing bolt, 20 mm	1	20	29 (3.0, 22)	NOTE 2
18 mm	1	18	44 (4.5, 33)	NOTE 2
CRANKSHAFT/TRANSMISSION:				
Mainshaft bearing set plate bolt	2	6	12 (1.2, 9)	NOTE 2
IGNITION SYSTEM:				
Ignition pulse generator cover SH bolt	8	6	12 (1.2, 9)	NOTE 1
Ignition pulse generator rotor special bolt	1	10	59 (6.0, 43)	
LIGHTS/METERS/SWITCHES:				
Neutral switch	1	10	12 (1.2, 9)	
Oil pressure switch	1	PT1/8	12 (1.2, 9)	NOTE 1

FRAME THREAD DIA. TORQUE				
ITEM	Q'TY	(mm)	N·m (kgf·m, lbf·ft)	REMARKS
FRAME/BODY PANELS/EXHAUST SYSTEM:				
Upper cowl stay mounting bolt	2	8	26 (2.7, 20)	
Front fender mounting bolt	8	6	5 (0.5, 3.6)	
Exhaust pipe joint nut	8	7	12 (1.2, 9)	
Muffler mounting bolt/nut	2	8	25 (2.6, 19)	
Step holder mounting bolt	4	8	26 (2.7, 20)	1
Footpeg mounting bolt	1	10	44 (4.5, 33)	NOTE 9
Bank sensor	2	8	10 (1.0, 7)	
FUEL SYSTEM:				
Fuel valve	1	22	34 (3.5, 25)	
Sub-air cleaner mounting bolt	1	6	7 (0.7, 5.1)	
COOLING SYSTEM:				
Fan motor nut	1	5	2.5 (0.25, 1.8)	NOTE 2
Fan motor switch	1	PT1/8	18 (1.8, 13)	NOTE 1

FRAME (Cont'd) ITEM	QTY	THREAD DIA.	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
ENGINE MOUNTING:				
Left engine hanger bolt	2	10	39 (4.0, 29)	
Right engine hanger bolt	1	10	44 (4.5, 33)	
Engine hanger bolt (Rear/upper)	1	10	39 (4.0, 29)	
(Rear/lower)	1 1	10	39 (4.0, 29)	
Engine hanger adjusting bolt	i	22	11 (1.1, 8)	
Engine hanger adjusting bolt lock nut	1	22	54 (5.5, 40)	
Engine hanger plate bolt	4	8	26 (2.7, 20)	
FRONT WHEEL/SUSPENSION/STEERING:	<b>T</b>		20 (2.7, 20)	
Steering stem nut	1	24	103 (10.5, 76) —	See page 13-28
Top thread A	i	26	103 (10.5, 70)	See page 13-20
Top thread B	i i	26		
Fork top bridge pinch bolt	2	8	23 (2.3, 17)	
Fork bottom bridge pinch bolt	2	10	49 (5.0, 36)	
Front axle bolt	1	14		
Front axle bolt	4		59 (6.0, 43)	
Front brake disc mounting bolt	12	8	22 (2.2, 16)	NOTEO
Fork cap	2	6	20 (2.0, 14)	NOTE 9
Fork socket bolt	2	42	23 (2.3, 17)	NOTE
REAR WHEEL/SUSPENSION:	2	8	20 (2.0, 14)	NOTE 2
Rear axle nut	1	10	00.40 5.00	
	1	18	93 (9.5, 69)	NOTEO
Rear brake disc mounting bolt Driven sprocket nut	4	8	42 (4.3, 31)	NOTE 9
Rear shock absorber upper mounting nut	5	12	108 (11.0, 80)	NOTE 8
	1	10	44 (4.5, 33)	NOTE 8
Shock arm plate nut Shock link nut	2	10	44 (4.5, 33)	NOTE 8
	2	10	44 (4.5, 33)	NOTE 8
Swingarm pivot adjusting bolt	1	30	15 (1.5, 11)	See page 14-22
Swingarm pivot lock nut	1	30	64 (6.5, 47)	
Swingarm pivot nut	1	18	93 (9.5, 69)	NOTE 8
Drive chain slider bolt	2	6	9 (0.9, 6.5)	
HYDRAULIC BRAKE:				
Front brake caliper mounting bolt	4	8	30 (3.1, 22)	NOTE 9
Front brake pipe mounting bolt	2	10	17 (1.7, 12)	
Front brake caliper assembly torx bolt	8	8	32 (3.3, 24)	NOTE 2
Front oil cup mounting nut	1 1	6	6 (0.6, 4.3)	NOTE 9
Brake lever pivot bolt	1	6	1 (0.1, 0.7)	
Brake lever pivot nut	1	6	6 (0.6, 4.3)	
Brake hose oil bolt	5	10	34 (3.5, 25)	
Pad pin	3	10	18 (1.8, 13)	
Pad pin plug	3	10	2.5 (0.25, 1.8)	
Brake caliper bleeder	3	8	6 (0.6, 4.3)	
Rear brake hose guide bolt	1	6	12 (1.2, 9)	
Rear master cylinder joint nut	1	8	18 (1.8, 13)	
Rear master cylinder hose joint screw	1	4	1.5 (0.15, 1.1)	
Rear brake caliper pin bolt	1	12	27 (2.8, 20)	
Rear brake caliper bolt	1	8	23 (2.3, 17)	
Rear caliper clamp bolt	1	6	9 (0.9, 6.5)	NOTE 9
LIGHTS/METERS/SWITCHES:				
Side stand mounting bolt	1	10	10 (1.0, 7)	
Side stand lock nut	1	10	29 (3.0, 22)	
Side stand switch mounting bolt	1	6	10 (1.0, 7)	NOTE 9
Side stand bracket bolt	2	10	44 (4.5, 33)	NOTE 9
Ignition switch mounting bolt	2	8	25 (2.5, 18)	NOTE 2

## **TOOLS**

NOTES: 1. Equivalent commercially available.

2. Alternative tool.

3. Newly provided tool.

DESCRIPTION	TOOL NUMBER	REMARKS	REF. SEC.
Carburetor float level gauge	07401 – 0010000		5
Oil pressure gauge	07506 – 3000000		4
Oil pressure gauge attachment	07510 – 4220100		4
Clutch center holder	07724 – 0050002		9
Flywheel holder	07725 – 0040000	NOTE 1	10
Rotor puller	07733 – 0020001		10
Adjustable valve guide driver	07743 - 0020000		8
Attachment, 37 x 40 mm	07746 - 0010200		9, 14
Attachment, 42 x 47 mm	07746 - 0010300		9, 13, 14
Attachment, 52 x 55 mm	07746 - 0010400		14
Attachment, 24 x 26 mm	07746 - 0010700		14
Driver B	07746 - 0030100		12
Inner driver, 25 mm	07746 - 0030200		12
Pilot, 17 mm	07746 - 0040400		14
Pilot, 20 mm	07746 - 0040500		13, 14
Pilot, 35 mm	07746 - 0040800		9
Pilot, 28 mm	07746 - 0041100		14
Bearing remover shaft	07746 - 0050100		13, 14
Bearing remover head, 20 mm	07746 - 0050600		13, 14
Driver	07749 - 0010000		9, 13, 14
Valve spring compressor	07757 - 0010000		8
Valve seat cutter	0,70, 00,000	NOTE 1	8
Seat cutter, 27.5 mm (45° IN/EX)	07780 – 0010200	11012	
Flat cutter, 30 mm (32° IN)	07780 - 0012200		
Flat cutter, 27 mm (32° EX)	07780 - 0013300		
Interior cutter, 30 mm (60° IN/EX)	07780 - 0014000		
Cutter holder, 4.5 mm	07781 - 0010600		
Pilot screw wrench	07908 – 4220201	NOTE 2	5
I HOL SCIEW WIEHCH	07300 - 4220201	07908 – 4730001	
Pivot adjusting wrench	07908 – 4690003	07300 4730001	14
Snap ring pliers	07914 – 3230001		15
Steering stem socket	07916 - 3710101		13
Bearing remover set	07936 - 3710001		14
— Remover handle	07936 - 3710100		17
Remover handle Remover set	07936 - 3710600		
Remover set Remover weight	07741 - 0010201		
Ball race remover set	07946 – KM90001		13
	07946 - KM90100		10
— Driver attachment, A	07946 - KM90200		
— Driver attachment, B	07946 - KM90300		
— Driver shaft assembly	07946 - KM90401		
— Bearing remover, A	07946 - KM90500		
— Bearing remover, B			
— Assembly base	07946 – KM90600		13
Steering stem driver	07946 – MB00000		14
Driver shaft	07946 – MJ00100		8
Valve spring compressor attachment	07959 – KM30101		12
Driver shaft	07964 - MB00200		14
Pin driver	07GMD - KT80100		
Shock absorber compressor	07GME - 0010000		14
Imspection adaptor	07GMJ – ML80100		17
Oil filter wrench	07HAA - PJ70100		4

DESCRIPTION	TOOL NUMBER	REMARKS	REF. SEC.
Peak voltage adaptor	07HGJ – 0020100	NOTE 2: Imrie diagnostic tester (model 625)	17
Lock nut wrench	07HMA – MR70200	(**************************************	7
Needle bearing remover	07HMC - MR70100		14
Valve guide driver	07HMD - ML00101		8
Tappet hole protector	07HMG - MR70002		8
Valve guide reamer, 4.5 mm	07HMH - ML00101		8
Drive chain tool set	07HMH - MR10103		3
Pilot screw wrench	07KMA – MN90100	NOTE 2: 07KMA – MS60101 with 07PMA – MZ20110	5
Oil seal driver	07KMD - KZ30100		13
Needle bearing remover	07LMC - KV30100	NOTE 3	14
Shock absorber compressor attachment	07NME - MY70100		14
Compression gauge attachment	07RMJ - MY50100		8
Analog tester (SANWA)	SP – 15D		16, 17, 18, 19
Analog tester (KOWA)	TH – 5H		16, 17, 18, 19

## **LUBRICATION & SEAL POINTS**

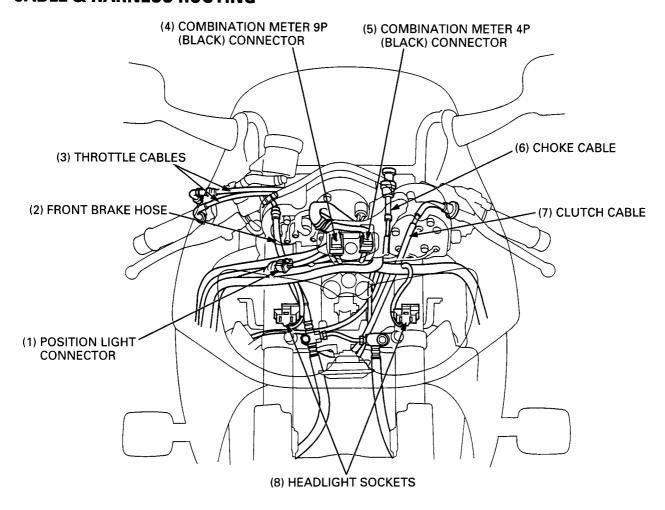
- ENGINELOCATION	MATERIAL	REMARKS
Crankcase mating surface	Liquid sealant (Three Bond 1207B or equivalent)	
10 – 15 mm 10 – 15 mm		10 – 15 mm
Oil pan mating surface		
Ignition pulse generator cover bolt threads (marked "△")		Coating width: 6.5 ± 1 mm
Oil pressure switch threads		
Do not apply to the thread head.  3 – 4 mm  (0.1 – 0.2 in)		
Thermo unit threads		

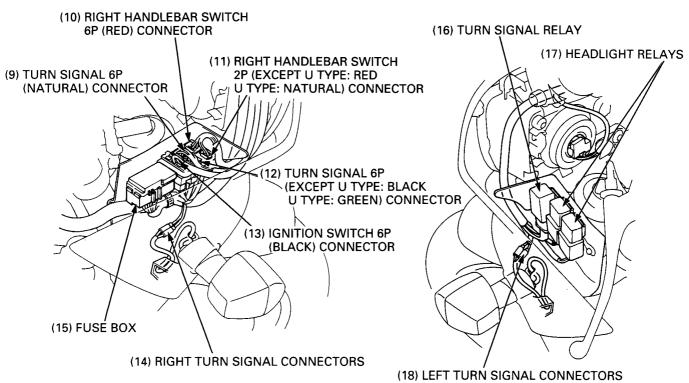
LOCATION	MATERIAL	REMARKS
Cylinder head semi-circular cut-out	Sealant	
5 – 10 mm		
5 – 10 mm		
Cylinder head bolt threads and seating surface	Molybdenum disulfide	
Camshaft lobes/journals	oil (a mixture of 1/2	
/alve lifter outer sliding surface	engine oil and 1/2	
/alve stem (valve guide sliding surface)	molybdenum disulfide	
Connecting rod small end	grease)	
Piston pin sliding surface Main journal bearing surface		
Connecting rod bearing surface		
Crankshaft journals		
M3/4, C5, C6 shifter gear (shift fork grooves)		
10 x 44 mm pin outer surface		
rimary drive gear and sub gear sliding surface		
1 1 1 1		
APPLY AREA		
\frac{\frac{1}{2}}{2}		
APPLY AREA 🔲 (		
lutch outer needle bearing		
iston ring sliding area	Engine oil	
lain journal 9 mm bolt threads and seating surface		
after removing anti-rust oil additive)		
ylinder head special bolt (after removing anti-rust il additive)		
ii additive) bil strainer packing		
on strainer packing Oil cooler center bolt threads and seating surface		
Dil filter cartridge threads and O-ring		
lywheel bolt threads and seating surface		
tarter one-way clutch sliding surface		
onnecting rod nut threads		
lutch center lock nut threads		
lutch disc surface ach gear teeth and rotating surface		
ach bearing		
ach O-ring		
other rotating area and sliding surface		
rankshaft hole cap threads	Multi-purpose grease	
ach oil seal lips		

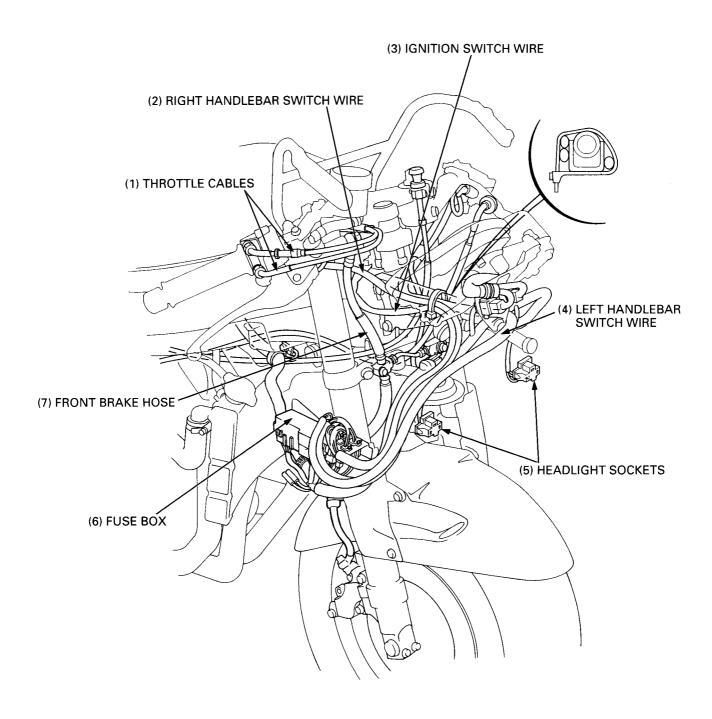
- ENGINE (Cont'd)	MATERIAL	REMARKS
Cylinder head sealing bolt threads Cylinder head cover breather joint threads Lower crankcase sealing bolt threads Starter one-way clutch outer bolt threads Oil pump driven sprocket bolt threads Shift drum set plate bolt threads Shift drum center bolt threads Mainshaft bearing set plate bolt threads Cam sprocket bolt threads Cylinder head cover breather plate bolt threads Air suction valve tightening bolt threads	Locking agent	Coating width: 6.5 ± 1 mm

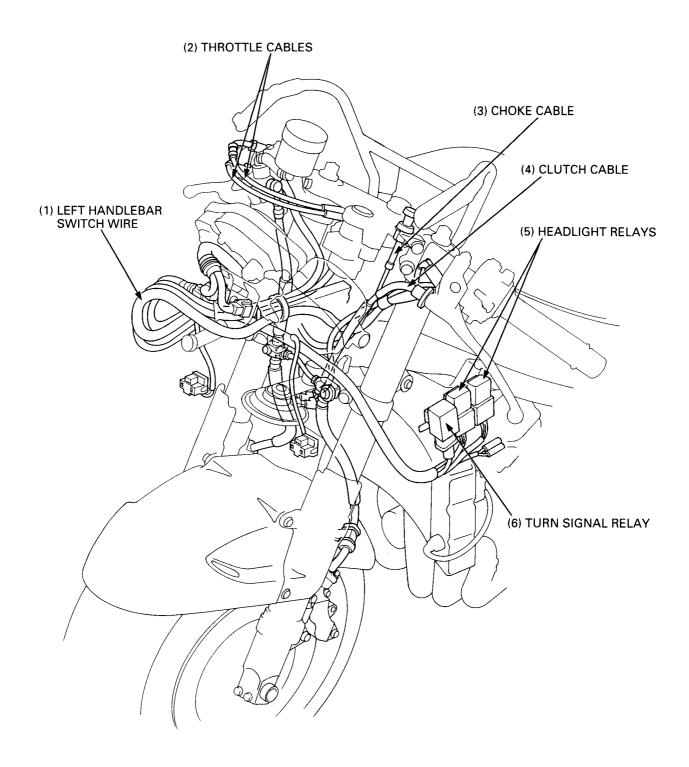
- FRAMELOCATION	MATERIAL	REMARKS
Steering head bearing sliding surface Steering head dust seal lips Swingarm pivot bearing Swingarm pivot dust seal lips Wheel dust seal lips Rear wheel side collar inner surface Shock absorber needle bearing Shock absorber dust seal lips Shock link needle bearing Shock link needle bearing Shock link dust seal lips Footpeg sliding area Passenger footpeg sliding area Rear brake pedal pivot sliding area Throttle pipe sliding area Clutch lever pivot Pillion seat catch hook Pillion seat pivot Gearshift pedal link pivot Gearshift pedal link tie-rod ball joints	Multi-purpose grease	
Throttle pipe cable end area Side stand pivot surface	Molybdenum disulfide grease	
Shock absorber spring adjuster cam surface	Molybdenum paste	
Steering stem top threads Driven sprocket nut threads and seating surface Throttle cable casing inner Choke cable casing inner Clutch cable casing inner Brake pipe joint threads	Engine oil	
Brake master cylinder cups Brake caliper piston seals	DOT 4 brake fluid	
Brake caliper dust seals Front brake lever pivot and piston tips Rear master cylinder boot inside and push rod tips Brake caliper slide pin surface	Silicone grease	
Front brake caliper assembly torx bolt threads Fork socket bolt threads	Locking agent	
Handle grip rubber inside	Honda Bond A	
Fork cap O-ring Fork oil seal lips	Fork fluid	

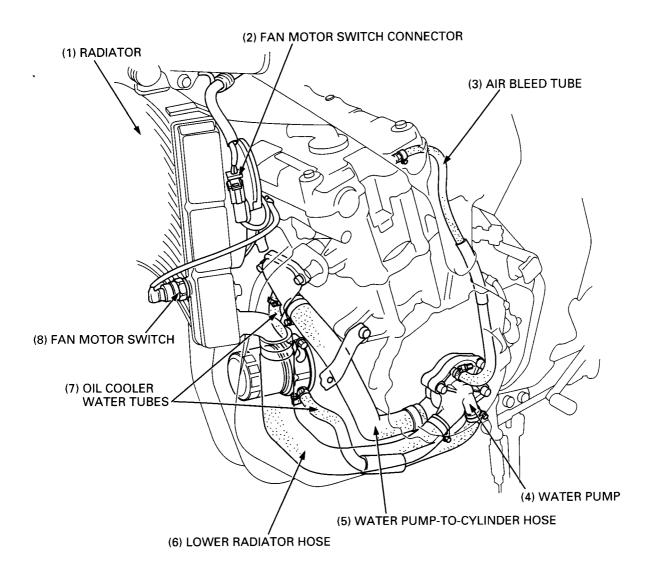
## **CABLE & HARNESS ROUTING**

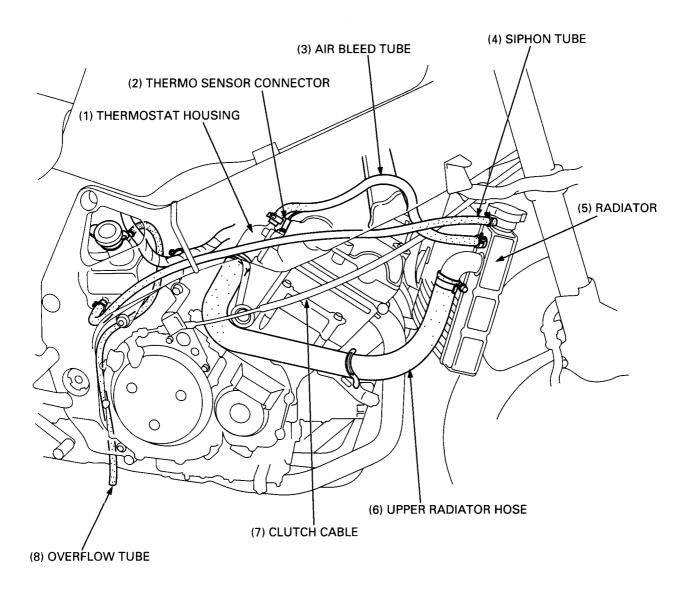


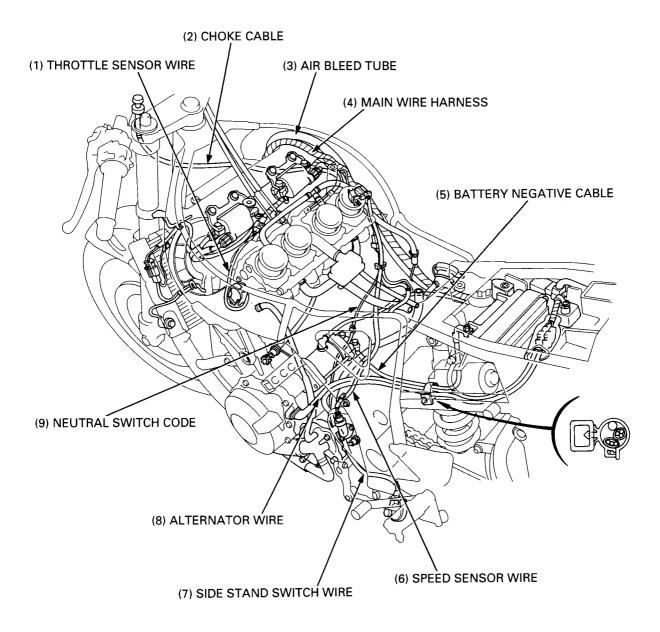


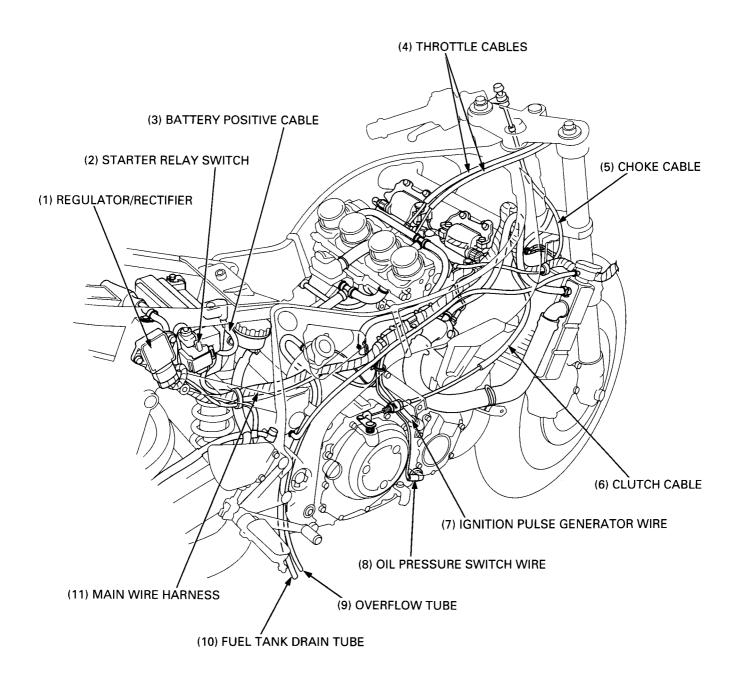


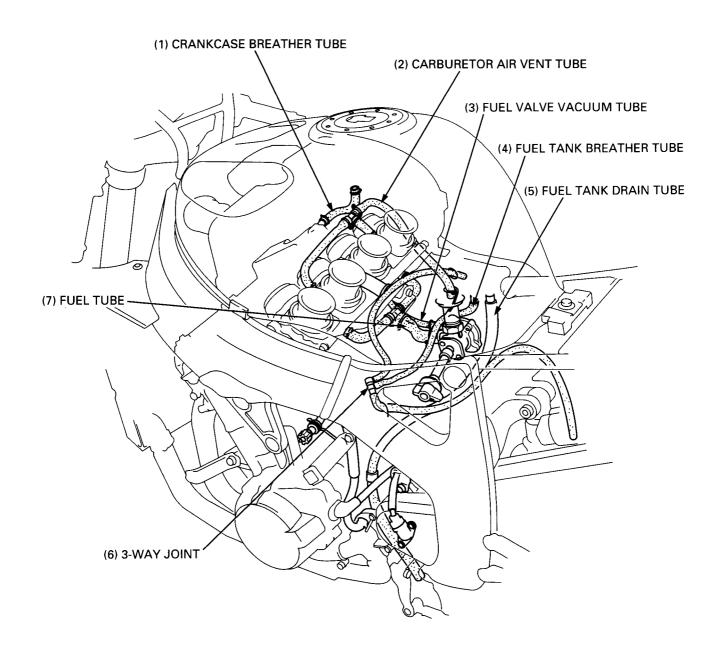


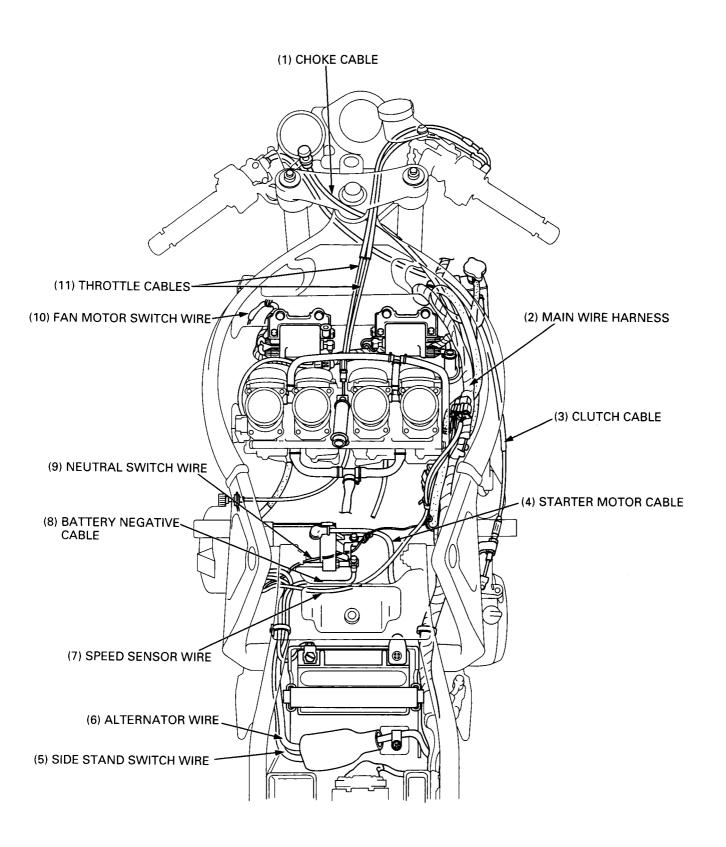


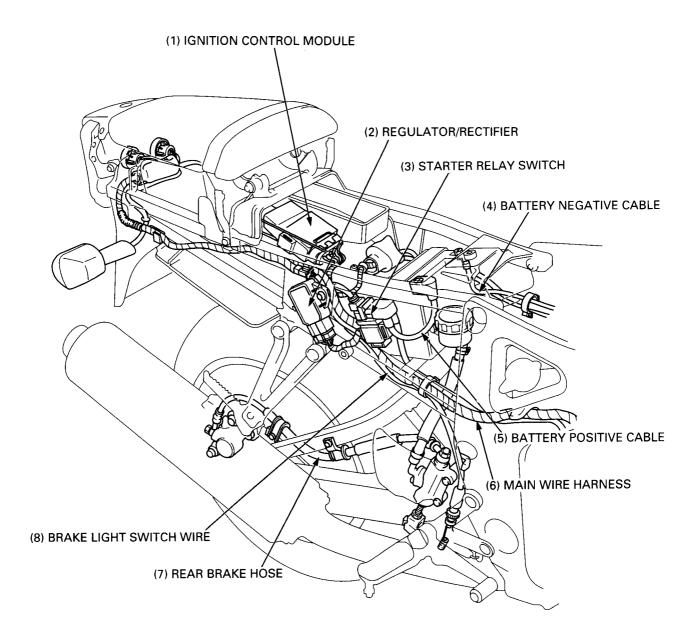




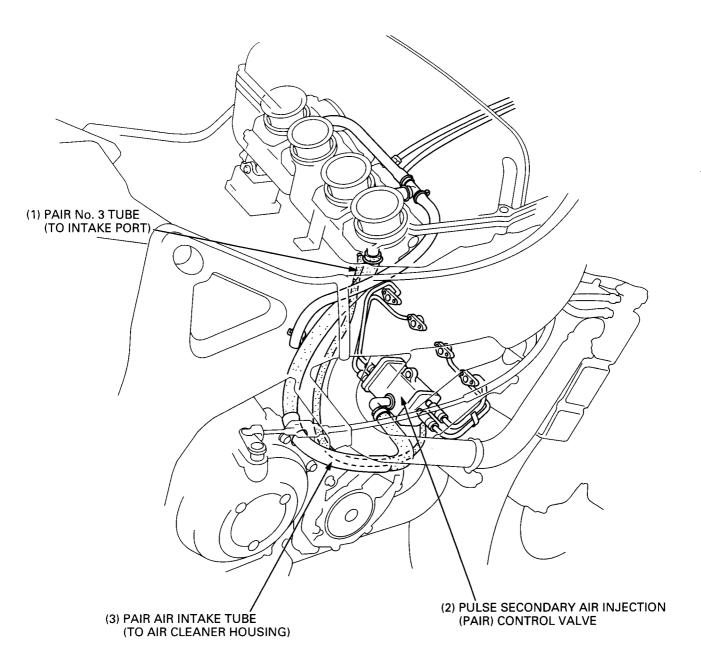




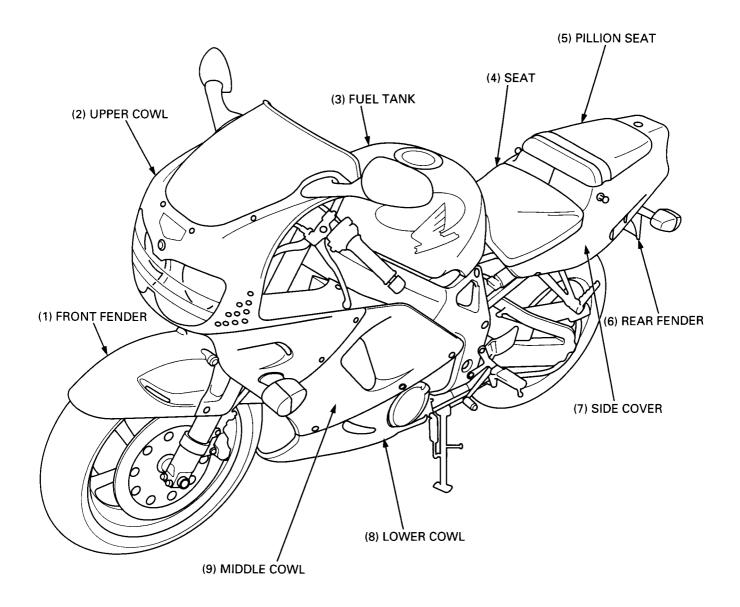




## SECONDARY AIR SUPPLY SYSTEM ROUTING (SW, AR TYPE)



## **BODY PANEL LOCATIONS**



## 2

## 2. FRAME/BODY PANELS/EXHAUST SYSTEM

BODY PANEL LOCATIONS	2-0	UPPER COWL	2-7
SERVICE INFORMATION	2-1	FRONT FENDER	2-13
TROUBLESHOOTING	2-1	REAR FENDER	2-14
SEAT/FUEL TANK	2-2	SEAT RAIL	2-15
PILLION SEAT/SIDE COVER	2-3	MUFFLER/EXHAUST PIPE	2-16
MIDDLE/LOWER COWL	2-6		

## **SERVICE INFORMATION**

#### **GENERAL**

#### **A** WARNING

- Gasoline is extremely flammable and is explosive under certain condition. KEEP OUT OF REACH OF CHILDREN.
- Serious burns may result if the exhaust system is not allowed to cool before components are removed or serviced.
- Work in a well ventilated area. Smoking or allowing flames or sparks in the work area or where gasoline is stored can cause a fire or explosion.
- This section covers removal and installation of the body panels, fuel tank and exhaust system.
- · Always replace the exhaust pipe gaskets after removing the exhaust pipe from the engine.
- When installing the exhaust system, loosely install all of the exhaust pipe fasteners. Always tighten the exhaust clamps first, then tighten the mounting fasteners. If you tighten the mounting fasteners first, the exhaust pipe may not seat properly.

26 Nem /2.7 kafem 20 lbf-ft\

· Always inspect the exhaust system for leaks after installation.

#### **TORQUE VALUES**

opper cowr stay mounting boil	20 NAII (2.7 Kgiaii, 20 ibiaii)	
Front fender mounting bolt	5 N·m (0.5 kgf·m, 3.6 lbf·ft)	
Exhaust pipe joint nut	12 N·m (1.2 kgf·m, 9 lbf·ft)	
Muffler mounting bolt/nut	25 N·m (2.6 kgf·m, 19 lbf·ft)	
Step holder mounting bolt	26 N·m (2.7 kgf·m, 20 lbf·ft)	
Footpeg mounting bolt	44 N·m (4.5 kgf·m, 33 lbf·ft)	ALOC bolt
Bank sensor	10 N·m (1.0 kgf·m, 7 lbf·ft)	
Side stand bracket bolt	44 N·m (4.5 kgf·m, 33 lbf·ft)	ALOC bolt

## **TROUBLESHOOTING**

Unper cowl stay mounting bolt

#### **Excessive exhaust noise**

- Broken exhaust system
- · Exhaust gas leak

#### Poor performance

- Deformed exhaust system
- Exhaust gas leak
- Clogged muffler

## **SEAT/FUEL TANK**

#### **REMOVAL**

Remove the two seat mounting bolts behind the seat.

Slide the seat back and then off.

#### **A** WARNING

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

#### NOTE

 Before disconnecting the fuel tube, turn the fuel valve lever OFF.

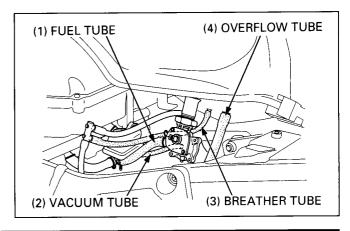
Turn the fuel valve OFF.

Remove the screw and fuel valve lever.

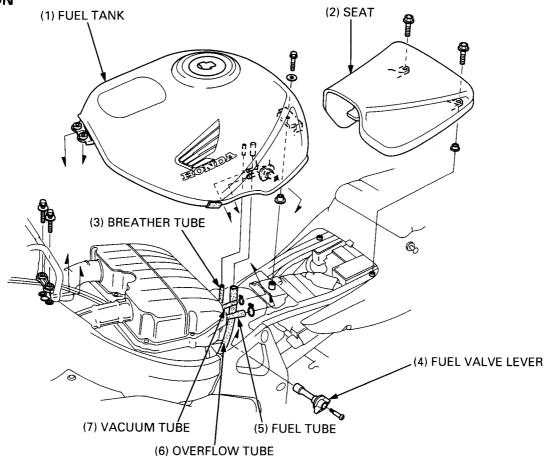
Remove the fuel tank rear mounting bolt, washer and collar. Remove the fuel tank front mounting bolts and washers.

Disconnect the fuel tube and vacuum tube from the fuel valve.

Disconnect the breather tube and overflow tube from the fuel tank, then remove the fuel tank.



#### **INSTALLATION**



Installation is in the reverse order of removal.

#### NOTE

- Make sure the seat setting collars are in place.
- After fuel tank installation, turn the fuel valve ON and make sure there is no fuel leaks.

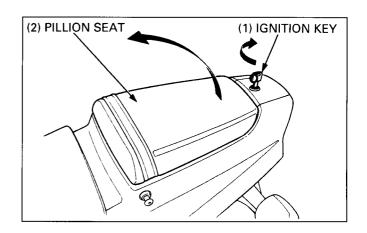
Align the seat hook with the frame bracket and install the seat.

Install and tighten the seat mounting bolts.

## **PILLION SEAT/SIDE COVER**

#### **REMOVAL**

Open the pillion seat using the ignition key.



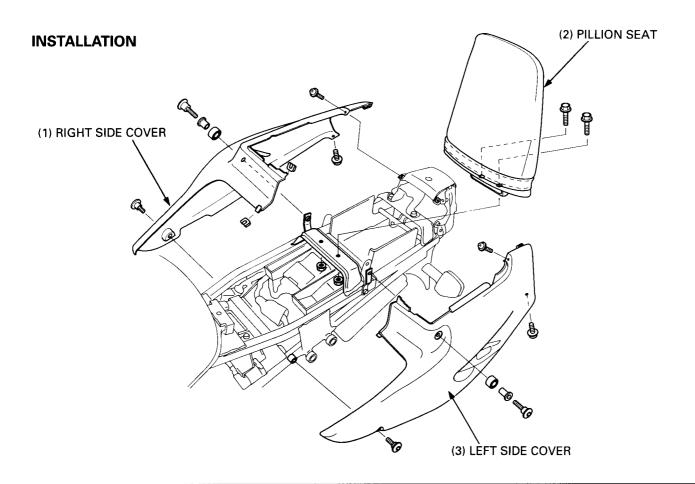
# FRAME/BODY PANELS/EXHAUST SYSTEM Remove the two mounting bolts, nuts and pillion seat assembly. Open the pillion seat using the ignition key (page 2-3). Remove the two joint clips. Remove the following: - Screws — Special bolt - Side cover setting bolt — Setting collar - Setting spacer

Separate and remove the side cover.

Remove the screws and rear cowl.

Remove the two bolts and remove the tail/brake light assembly from the rear fender.

Disconnect the tail/brake light 3P (Natural) connector and remove the tail/brake light assembly.



## FRAME/BODY PANELS/EXHAUST SYSTEM



 At installation, align the hooks between the side cover and rear cowl.

## MIDDLE/LOWER COWL

#### **REMOVAL**

Remove the trim clip.

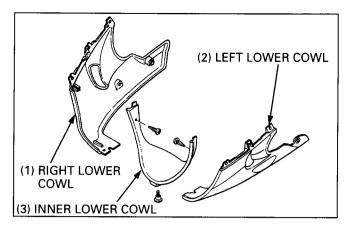
Turn the quick fasteners counterclockwise and release the fasteners.

Remove the middle cowl.

Remove the six special bolts and lower cowl.

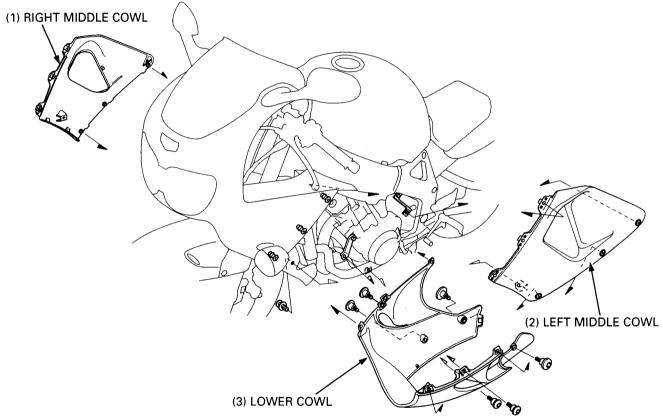
#### NOTE

 During removal and installation, support the lower cowl securely. Remove the screws and special bolt, then separate the lower cowl.



#### **INSTALLATION**

Installation is in the reverse order of removal.



## **UPPER COWL**

#### **REARVIEW MIRROR REMOVAL**

Remove the rearview mirror pivot boot.

Remove the following:

- SH bolts/nuts
- Rearview mirror
- Mirror plate
- Rubber cushion

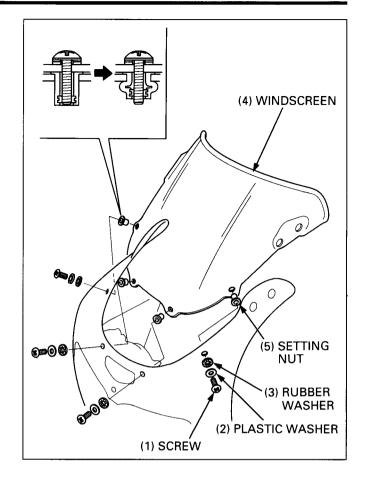
## FRAME/BODY PANELS/EXHAUST SYSTEM

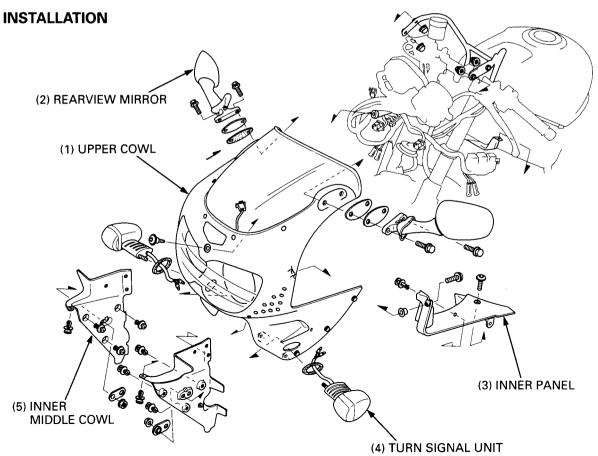
UPPER COWL REMOVAL
Remove the both middle cowl (page 2-6).
Remove the trim clip, special bolts, collar and right upper cowl inner panel.
Remove the trim clip and release the connector holder from
the upper cowl. Disconnect the right turn signal connectors.
Remove the trim clip, special bolts, collar and left upper cowl inner panel.
Remove the trim clip and release the relay holder bracket from the upper cowl.
Disconnect the right turn signal connectors.

Disconnect the position light connector.
Release the retaining tabs and remove the headlight sockets.
Remove the setting bolt and remove the upper cowl forward.
NOTE
Refer to page 19-5 for headlight unit removal/installation.
Remove the nut, setting plate and turn signal unit.
Remove the trim clips and inner middle cowl.

#### WINDSCREEN REPLACEMENT

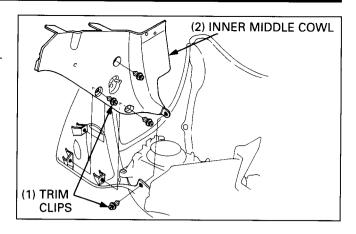
Remove the screws, plastic washers and rubber washers. Remove the windscreen and setting nuts.



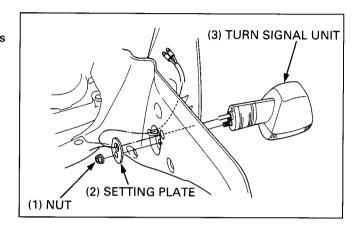


#### **UPPER COWL INSTALLATION**

Install the inner middle cowl and secure it with the trim clips.



Install the turn signal unit, set plate and nut. Route the turn signal wire into the inner middle cowl as shown.



Install the upper cowl aligning the bosses on the headlight unit with the rubber grommets on the upper cowl stay.

#### NOTE

- Route the wire harness into the upper cowl properly (page 1-21).
- Be careful not to pinch the position light wire between the upper cowl and cowl stay.

Install and tighten the setting bolt.

#### FRAME/BODY PANELS/EXHAUST SYSTEM

Connect the turn signal connectors.

Install the relay holder aligning its boss with the groove in the inner middle cowl as shown.

Secure the holder with the trim clip.

Install the connector holder using the same procedure.

Install the upper cowl inner panel and secure it with the trim clip.

Install and tighten the special bolts.

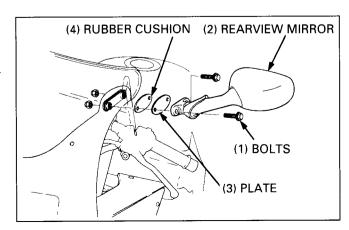
#### NOTE

· Before installation, install the collar onto the inner panel.

#### REARVIEW MIRROR INSTALLATION

Set the rubber cushion, mirror plate and rearview mirror. Install the bolts and nuts, then tighten the nuts while holding the bolts.

Install the rubber boot securely.



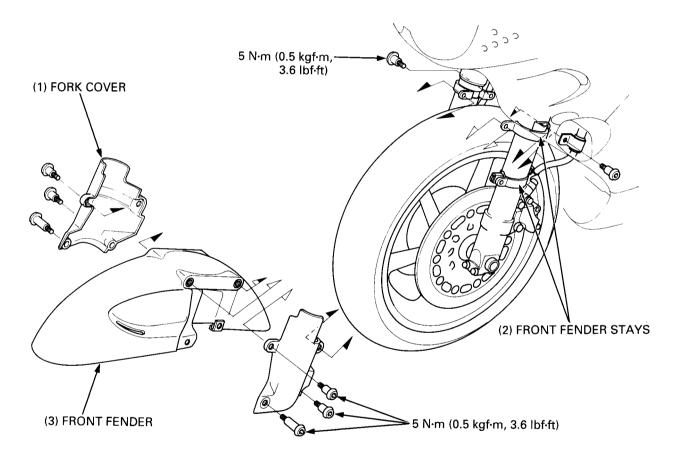
## **FRONT FENDER**

#### **REMOVAL**

Remove the special bolts, brake hose clamps and fork covers.

Remove the front fender forward.

#### **INSTALLATION**



Installation is in the reverse order of removal.

#### NOTE

- · Install the front fender stays and brackets as shown.
- Install the long bolts into the front lower side.

#### TORQUE:

Front fender mounting bolt: 5 N·m (0.5 kgf·m, 3.6 lbf·ft)

## **REAR FENDER**

#### **REMOVAL**

Remove the side cover (page 2-3). Remove the battery (page 16-5).

Remove the rear shock absorber reserve tank band. Remove the reserve tank from the rear fender groove.

Disconnect the following:

- Side stand switch connector
- Alternator connector

Remove the ICM (ignition control module). Remove the wire harness clamp screw.

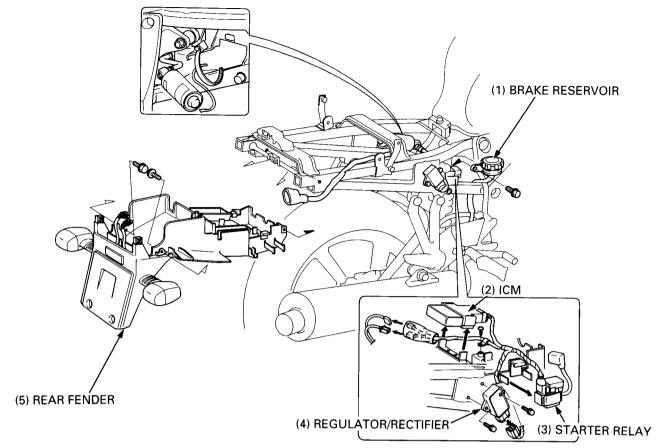
Remove the bolts, nuts and regulator/rectifier. Disconnect the regulator/rectifier connector.

Remove the starter relay switch and release the wire harness from the rear fender.

Remove the bolt and rear brake reservoir.

Disconnect the turn signal light connectors. Remove the rear fender mounting bolts and rear fender.

#### **INSTALLATION**



Install the rear fender into the seat rail, while aligning the front groove of the rear fender with the sub-frame.

#### NOTE

 While installing the rear fender, route the wire harness properly (page 1-21).

Install and tighten the rear fender mounting bolts.

Install the removed parts in the reverse order of removal.

## **SEAT RAIL**

#### **REMOVAL**

Remove the rear fender (page 2-14).

Release the harness wire clamp.

#### FRAME/BODY PANELS/EXHAUST SYSTEM

Remove the following:

- Muffler mounting bolt/nut
- Plain washer
- Collar

Remove the seat rail mounting bolts, nuts and seat rail.

#### **INSTALLATION**

Install the seat rail in the reverse order of removal.

#### NOTE

· Route the wire harness properly and clamp it.

## **MUFFLER/EXHAUST PIPE**

#### **REMOVAL**

#### **A** WARNING

• Do not service the exhaust system while it is hot.

Remove the exhaust pipe/muffler mounting bolts.

Remove the following:

- Muffler mounting bolt/nut
- Washer
- Collar
- Rubber bushing
- --- Muffler
- Muffler gasket

Remove the middle/lower cowl (page 2-6).

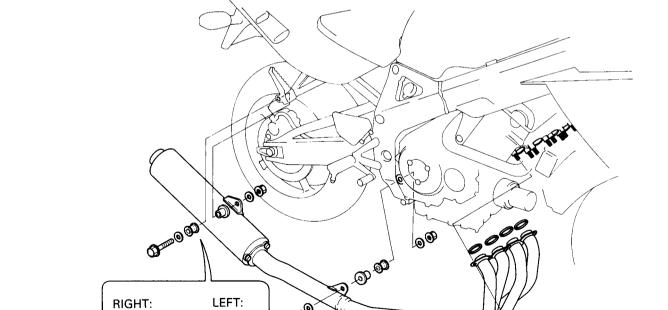
Remove the exhaust pipe joint nuts.

#### Remove the following:

- Exhaust pipe mounting bolt/nut
- Washer
- Collar
- --- Rubber bushing

**INSTALLATION** 

- Exhaust pipe
- Exhaust pipe gaskets



12 N·m (1.2 kgf·m, 9 lbf·ft)

## FRAME/BODY PANELS/EXHAUST SYSTEM

Install the exhaust pipe and muffler, temporarily tighten the all mounting bolts and nuts.

#### NOTE

 Always replace the exhaust pipe and muffler gaskets with new ones.

First tighten the exhaust pipe joint nuts to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Tighten the muffler/exhaust pipe mounting bolts.

Tighten the muffler/exhaust pipe mounting nut to the specified torque.

TORQUE: 25 N·m (2.6 kgf·m, 19 lbf·ft)

Install the middle/lower cowl (page 2-6).

## 3. MAINTENANCE

SERVICE INFORMATION	3-1	DRIVE CHAIN	3-17
MAINTENANCE SCHEDULE	3-3	DRIVE CHAIN SLIDER	3-21
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ENGINE OIL/OIL FILTER	3-11	SIDE STAND	3-25
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RADIATOR COOLANT	3-15	WHEELS/TIRES	3-28
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## **SERVICE INFORMATION**

#### **GENERAL**

#### **A** WARNING

- Gasoline is extremely flammable and is explosive under certain conditions. Work in a well ventilated area. Smoking or allowing flames or sparks in the work area or where the gasoline is stored can cause a fire or explosion.
- If the engine must be running to do some work, make sure the area is well ventilated. Never run the engine in an enclosed area. The exhaust contains poisonous carbon monoxide gas that may cause loss of consciousness and may lead to death.
- · Place the motorcycle on a level ground before starting any work.

#### **SPECIFICATIONS**

ITEM		SPECIFICATIONS					
Throttle grip free p	olay	2 – 6 mm (1/12 – 1/4 in)					
Spark plug		NGK	NIPPONDENSO				
	Standard	CR9EH 9	U27FER 9				
	Optional	CR8EH 9	U24FER 9				
Spark plug gap		0.80 – 0.90 mm (0.031 – 0.035 in)					
Valve clearance IN		0.13 – 0.19 mm (0.005 – 0.0	07 in)				
	EX	0.19 – 0.25 mm (0.007 – 0.010 in)					

ITEM			SPECIFICATIONS					
Engine oil capacity At draining		V	3.5 liter (3.7 US qt, 3.0 lmp qt)					
	At disassembly		4.4 liter (4.6 US qt, 3.9 lmp qt)					
	At oil filter change		3.6 liter (3.8 US qt, 3.2 lmp qt)					
Recommended engine oil			HONDA 4-stroke oil or equivalent motor oil API service classification SE, SF or SG Viscosity: SAE 10W – 40					
Engine idle speed	Except SW, AR type		1,100 ± 100 min <sup>-1</sup> (rpm)					
	SW, AR type		1,100 ± 50 min <sup>-1</sup> (rpm)					
Drive chain slack			30 – 40 mm (1-1/8 – 1-1/2 in)					
Recommended brake	e fluid		DOT 4					
Clutch lever free play	/		10 – 20 mm (3/8 – 3/4 in)					
Tire size		Front	130/70 – ZR16					
		Rear	180/55 – ZR17					
Tire brand	Bridgestone	Front	BT56F RADIAL					
		Rear	BT56R RADIAL G					
	Michelin	Front	TX15					
		Rear	TX25					
Tire air pressure	Driver only	Front	250 kPa (2.50 kgf/cm², 36 psi)					
		Rear	290 kPa (2.90 kgf/cm², 42 psi)					
	Driver and passenger	Front	250 kPa (2.50 kgf/cm², 36 psi)					
		Rear	290 kPa (2.90 kgf/cm², 42 psi)					
Tire minimum tread	depth	Front	1.5 mm (0.06 in)					
		Rear	2.0 mm (0.08 in)					

#### **TORQUE VALUES**

Crankshaft hole cap

Spark plug

Oil drain bolt

Oil filter cartridge

Vacuum plug for synchronization

Rear axle nut

18 N·m (1.8 kgf·m, 13 lbf·ft)

12 N·m (1.2 kgf·m, 9 lbf·ft)

29 N·m (3.0 kgf·m, 22 lbf·ft)

10 N·m (1.0 kgf·m, 7 lbf·ft)

3.0 N·m (0.30 kgf·m, 2.2 lbf·ft)

93 N·m (9.5 kgf·m, 69 lbf·ft)

#### **TOOLS**

Oil filter wrench 07HAA – PJ70100 Drive chain tool set 07HMH – MR10103

## **MAINTENANCE SCHEDULE**

Perform the Pre-ride inspection in the Owner's Manual at each scheduled maintenance period.

l: Inspect and Clean, Adjust, Lubricate or Replace if necessary. C: Clean. R: Replace. A: Adjust. L: Lubricate.

The following items require some mechanical knowledge. Certain items (particularly those marked \* and \*\*) may require more technical information and tools. Consult their authorized HONDA dealer.

	FREQUENCY WHICHEVER 🖒 ODOMETER READING (NOTE 1)										
		COMES FIRST	X1,000 km	1	6	12	18	24	30	36 REFER	
			X1,000 mi	0.6	4	8	12	16	20	24	TO PAGE
ITE	EM		MONTHS		6	12	18	24	30	36	
*	FUEL LINE			•		ı		1		ı	3-4
*	THROTTLE OPERATION					I		ı		ı	3-4
*	CARBURETOR CHOKE					ı		ı		ı	3-5
*	AIR CLEANER	NOTE 2					R			R	3-5
	SPARK PLUG					1		R		1	3-5
*	VALVE CLEARANCE							ı			3-7
	ENGINE OIL			R		R		R		R	3-11
	ENGINE OIL FILTER			R		R		R		R	3-11
*	CARBURETOR SYNCHRONIZATION	,,				ł		1		-	3-13
*	ENGINE IDLE SPEED			ı	1	ı	ı	ı	ı	I	3-15
	RADIATOR COOLANT	NOTE 3				I		1		R	3-15
*	COOLING SYSTEM					1		I		I	3-16
*	SECONDARY AIR SUPPLY SYSTEM	NOTE 4				Ī		1		1	3-16
	DRIVE CHAIN				EVER'	Y 1,00	0 km	(600 n	ni) I, L		3-17
	DRIVE CHAIN SLIDER					I		I		ı	3-21
	BRAKE FLUID	NOTE 3			ı	ı	R	ı	ı	R	3-21
	BRAKE PAD WEAR				_	I	ı	1	1	1	3-22
	BRAKE SYSTEM			ı		I		I		ı	3-22
*	BRAKE LIGHT SWITCH					1		I		ı	3-23
*	HEADLIGHT AIM					1		Ι		ı	3-23
	CLUTCH SYSTEM			ı	I	I	ı	I	ı	ı	3-24
	SIDE STAND					1		1		1	3-25
*	SUSPENSION					1		1		ı	3-25
*	NUTS, BOLTS, FASTENERS			ı		ı		ı		ı	3-27
**	WHEELS/TIRES					ı		ı		ı	3-28
**	STEERING HEAD BEARING			ļ		1		ŀ		ı	3-28

<sup>\*</sup> Should be serviced by an authorized HONDA dealer, unless the owner has proper tools and service data and is mechanically qualified.

NOTES: 1. At higher odometer reading, repeat at the frequency interval established here.

- 2. Service more frequently when riding in unusually wet or dusty areas.
- 3. Replace every 2 years, or at indicated odometer interval, whichever comes first. Replacement requires mechanical skill.
- 4. Switzerland type only.

<sup>\*\*</sup> In the interest of safety, we recommend these items be serviced only by an authorized HONDA dealer.

## **FUEL LINE**

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

Also check the fuel valve vacuum tube for damage. Replace the vacuum if necessary.

## THROTTLE OPERATION

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

Check the throttle cables and replace them if they are deteriorated, kinked or damaged.

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

Measure the free play at the throttle grip flange.

FREE PLAY: 2 - 6 mm (1/12 - 1/4 in)

Throttle grip free play can be adjusted at either end of the throttle cable.

Minor adjustment are made with the upper adjuster. Remove the dust cover from the adjuster. Adjust the free play by loosening the lock nut and turning the adjuster.

Major adjustments are made with the lower adjuster.

Remove the air cleaner housing (page 5-4).

Adjust the free play loosening the lock nut and turning the adjuster.

After adjustment, tighten the lock nut securely.

Recheck the throttle operation.

Replace any damaged parts, if necessary.

## **CARBURETOR CHOKE**

The choke system uses a fuel enrichment circuit controlled by a starting enrichment (SE) valve.

The SE valve opens the enrichment circuit via a cable when the choke knob on the top bridge is pulled up.

Check for smooth choke knob operation and lubricate the choke cable if required.

Inspect the cable for cracks which could allow moisture to enter.

Replace the cable if necessary.

## **AIR CLEANER**

Remove the fuel tank (page 2-2).

Remove the nine screws and air cleaner housing cover.

Remove and discard the air cleaner element in accordance with the maintenance schedule.

Also replace the air cleaner element any time it is excessively dirty or damage.

Install the removed parts in the reverse order of removal.

## **SPARK PLUG**

Remove the middle cowl (page 2-6).

Disconnect the spark plug caps.

#### NOTE

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

#### **MAINTENANCE**

Remove the spark plug using a equipped spark plug wrench or an equivalent.

Inspect or replace as described in the maintenance schedule

#### INSPECTION

Check the following and replace if necessary (recommended spark plug: page 3-1)

- · Insulator for damage
- · Electrodes for wear
- Burning condition, coloration;
  - dark to light brown indicates good condition.
  - excessive lightness indicates malfunctioning ignition system or lean mixture.
  - wet or black sooty deposit indicates over-rich mixture.



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

Check the gap between the center and side electrodes with a wire-type feeler gauge.

If necessary, adjust the gap by bending the side electrode carefully.

SPARK PLUG GAP: 0.80 - 0.90 mm (0.031 - 0.035 in)

#### **CAUTION**

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

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

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

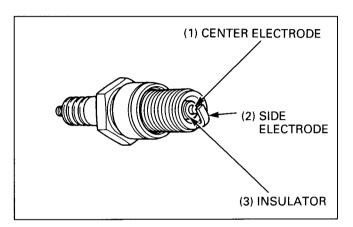
#### REPLACING A SPARK PLUG

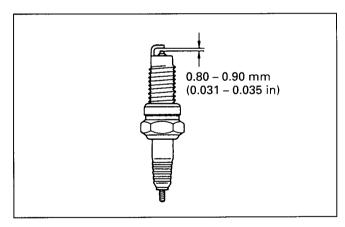
Set the plug gap to specification with a wire-type feeler gauge (see above).

#### **CAUTION**

Do not overtighten the spark plug.

Install and hand tighten the new spark plug, then tighten it about 1/2 of a turn after the sealing washer contacts the seat of the plug hole.





## **VALVE CLEARANCE**

#### **INSPECTION**

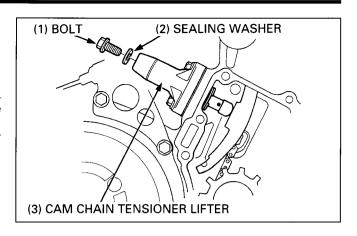
#### NOTE

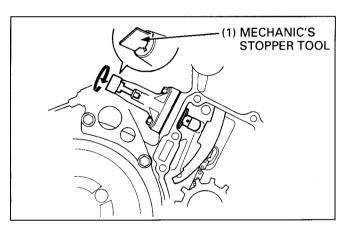
 Inspect and adjust the valve clearance while the engine is cold (below 35°C/95°F).

Remove the middle/lower cowl (page 2-6). Remove the cylinder head cover (page 8-4).

Remove the cam chain tensioner lifter sealing bolt and washer.

Turn the cam chain tensioner lifter shaft fully and secure it using the mechanic's tensioner stopper tool (page 8-6).





Remove the crankshaft hole cap and O-ring.

Turn the crankshaft clockwise, align the "T" mark on the ignition pulse generator rotor with the index mark on the ignition pulse generator rotor cover.

#### **MAINTENANCE**

The timing marks ("IN" and "EX") on the cam sprockets must be flush with the cylinder head surface and facing outward as shown.

If the timing marks on the cam sprocket facing inward, turn the crankshaft clockwise one full turn (360°) and realign the timing marks with the cylinder head surface so they are facing outward.

Insert the feeler gauge between the valve lifter and the cam lobe.

Check the valve clearance for the No. 1 and No. 3 cylinder intake valves using a feeler gauge.

VALVE CLEARANCE: IN: 0.13 - 0.19 mm (0.005 - 0.007 in)

#### NOTE

• Record the clearance for each valve for reference in shim selection if adjustment is required.

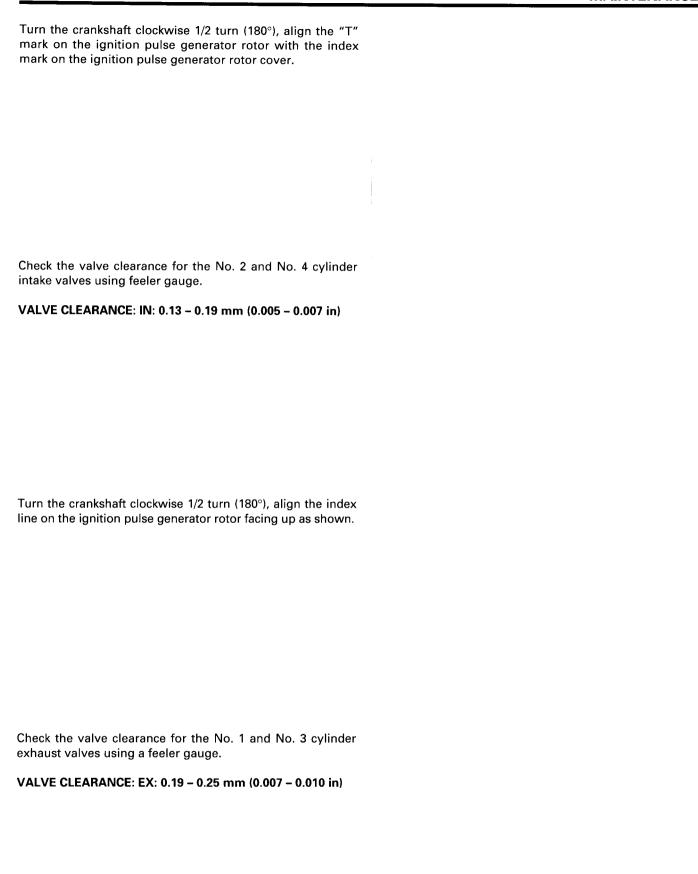
Turn the crankshaft clockwise 1/2 turn ( $180^{\circ}$ ), align the index line on the ignition pulse generator rotor so that it is facing up as shown.

Check the valve clearance for the No. 2 and No. 4 cylinder exhaust valves using a feeler gauge.

VALVE CLEARANCE: EX: 0.19 - 0.25 mm (0.007 - 0.010 in)

#### NOTE

 Record the clearance for each valve for reference in shim selection if adjustment is required.



#### **ADJUSTMENT**

Remove the camshaft (page 8-5). Remove the valve lifters and shims.

#### NOTE

- Shim may stick to the inside of the valve lifter. Do not allow the shims to fall into the crankcase.
- Mark all valve lifters and shims to ensure correct reassembly in their original locations.
- The valve lifter can be easily removed with a valve lapping tool or magnet.
- The shims can be easily removed with a tweezers or magnet.

Clean the valve shim contact area in the valve lifter with compressed air.

Measure the shim thickness and record it.

#### NOTE

 Sixty-five different thickness shims are available from the thinnest 1.200 mm thickness shim to the thickest 2.800 mm thickness shim in intervals of 0.025 mm.

Calculate the new shim thickness using the equation below.

$$A = (B - C) + D$$

- A: New shim thickness
- B: Recorded valve clearance
- C: Specified valve clearance
- D: Old shim thickness

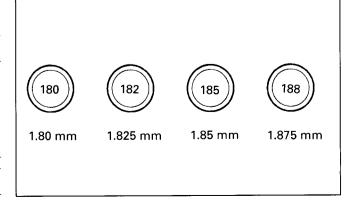
#### NOTE

- Make sure of the correct shim thickness by measuring the shim by micrometer.
- Reface the valve seat if carbon deposit result in a calculated dimension of over 2.800 mm.

Install the newly selected shim on the valve retainer. Apply molybdenum disulfide oil to the valve lifters. Install the valve lifters into the valve lifter holes.

#### NOTE

Install the shims and valve lifters in their original locations.

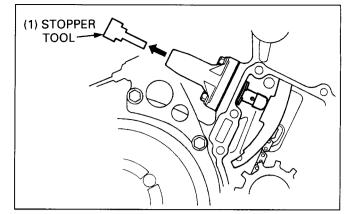


Install the camshaft (page 8-20).

Rotate the camshafts by rotating the crankshaft clockwise several times.

Recheck the valve clearance.

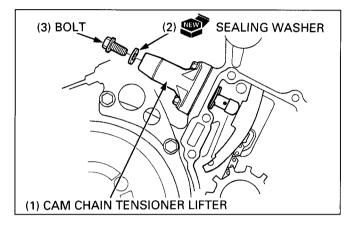
Remove the cam chain tensioner stopper tool.



Install the new sealing washer and cam chain tensioner sealing bolt.

Tighten the bolt securely.

Install the removed parts in the reverse order of removal.



## **ENGINE OIL/OIL FILTER**

#### **OIL LEVEL INSPECTION**

Place the motorcycle on level ground. Check the oil level through the inspection window.

If the oil level is below or near the lower level line, remove the oil filler cap and add the recommended oil up to the upper level.

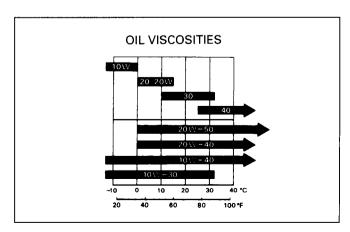
#### RECOMMENDED ENGINE OIL:

HONDA 4-stroke oil or equivalent motor oil API service classification: SE, SF or SG Viscosity: 10 W – 40

#### NOTE

 Other viscosities shown in the chart may be used when the average temperature in your riding area is within the indicated range.

Reinstall the filler cap.



#### **ENGINE OIL & FILTER CHANGE**

#### **A** WARNING

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

Warm up the engine.

#### NOTE

 Change the engine oil with the engine warm and the motorcycle on level ground to assure complete draining.

Remove the lower cowl (page 2-6).

Stop the engine and remove the oil filler cap and drain bolt. Drain the oil completely.

#### **CAUTION**

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

Remove and discard the oil filter cartridge using the special tool.

TOOL:

Oil filter wrench

07HAA - PJ70100

Check that the sealing washer on the drain bolt is in good condition, and replace if necessary.

Install and tighten the drain bolt.

TORQUE: 29 N·m (3.0 kgf·m, 22 lbf·ft)

Apply oil to the new oil filter O-ring.

Install the new oil filter and tighten it to the specified torque.

TOOL:

Oil filter wrench

07HAA - PJ70100

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Fill the crankcase with recommended engine oil.

#### **OIL CAPACITY:**

3.5 liter (3.7 US qt, 3.0 Imp qt) at draining 3.6 liter (3.8 US qt, 3.2 Imp qt) at oil filter change

Install the oil filler cap.

Start the engine and let it idle for 2 to 3 minutes. Stop the engine and check that the oil level is at the upper level line in the inspection window.

Make sure there are no oil leaks.

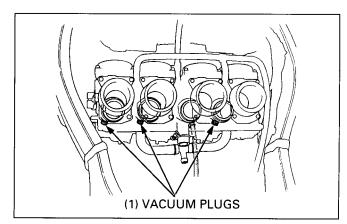
## CARBURETOR SYNCHRONIZATION

#### NOTE

 Synchronize the carburetors with the engine at normal operating temperature, transmission is in neutral and the motorcycle supported securely on a level surface.

Remove the fuel tank and middle cowl (Section 2).

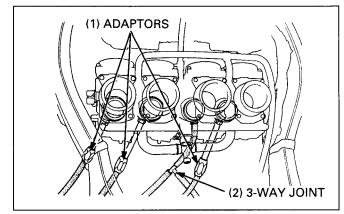
Remove the vacuum plugs from the engine intake ports.



#### **MAINTENANCE**

Screw the adaptors in the intake ports.
Install the 3-way joint to the fuel valve vacuum tube.
Connect the fuel tube and vacuum tube to the fuel tank.

Connect the vacuum gauge tubes to the adaptors and 3-way joint.



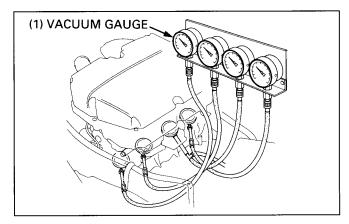
Start the engine and adjust the idle speed by turning the throttle stop screw.

IDLE SPEED: Except SW, AR type: 1,100 ± 100 min<sup>-1</sup> (rpm) SW, AR type: 1,100 ± 50 min<sup>-1</sup> (rpm)

Check the each carburetor intake vacuum pressure is within 20 mm (0.8 in) Hg of the base carburetor.

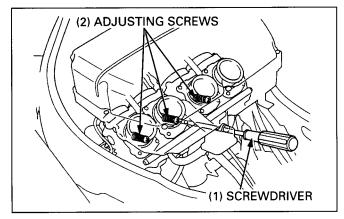
#### NOTE

- The No. 3 carburetor cannot be adjusted; it is the base carburetor.
- The No. 3 cylinder intake vacuum pressure is the base vacuum pressure.



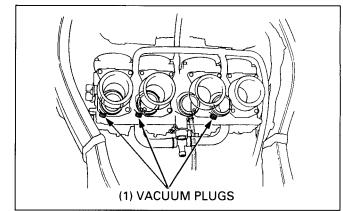
Synchronize to specification by turning the adjusting screw with the phillips screwdriver as shown.

Recheck the idle speed and each cylinder intake vacuum pressure so it is within 20 mm (0.8 in) Hg of the base carburetor reading after snapping the throttle grip 3 – 4 times.



Remove the vacuum gauge tubes.

Install the vacuum plugs into the intake ports, and tighten them securely.



## **ENGINE IDLE SPEED**

#### **A** WARNING

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

#### NOTE

- Inspect and adjust the idle speed after all other engine maintenance items have been performed and are within specifications.
- The engine must be warm for accurate idle speed inspection and adjustment.

Warm up the engine for about ten minutes.

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

IDLE SPEED: Except SW, AR type:  $1,100 \pm 100 \text{ min}^{-1}$  (rpm) SW, AR type:  $1,100 \pm 50 \text{ min}^{-1}$  (rpm)

## **RADIATOR COOLANT**

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

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

#### **MAINTENANCE**

If necessary remove the reserve tank cap and fill to the "UPPER" level line with 50/50 mixture of distilled water and antifreeze.

Reinstall the cap.

## **COOLING SYSTEM**

Remove the middle and lower cowl (page 2-6).

Check the radiator air passages for clogging or damage. Straighten bend fins, and remove insects, mud or other obstructions with compressed air or low water pressure. Replace the radiator if the air flow is restricted over more than 20% of the radiating surface.

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

Check the tightness of all hose clamps and fasteners.

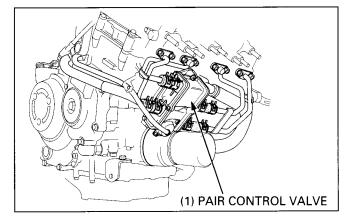
## SECONDARY AIR SUPPLY SYSTEM (SW, AR TYPE)

#### NOTE

 The secondary air supply system introduces filtered air into exhaust gases in the exhaust port. The secondary air is drawn into the exhaust port whenever there is negative pressure pulse in the exhaust system. This charged secondary air promotes burning of the unburned exhaust gases and changes a considerable amount of hydrocarbons and carbon monoxide into relatively harmless carbon dioxide and water.

Remove the fuel tank and lower cowl (Section 2).

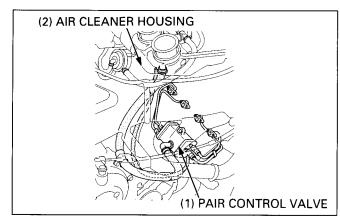
Check the air injection hoses and pipes between the pulse secondary air injection (PAIR) control valve and exhaust port for deterioration, damage or loose connections. Make sure that the hoses are not cracked.



#### NOTE

 If the hoses show any signs of heat damage, inspect the PAIR check valve in the PAIR control valve for damage.

Check the air suction hose between the air filter, air chamber and PAIR control valve for deterioration, damage or loose connections. Make sure that the hoses are not kinked, pinched or cracked.



# **DRIVE CHAIN**

# DRIVE CHAIN SLACK INSPECTION

# **A** WARNING

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

Turn the ignition switch OFF, place the motorcycle on its side stand and shift the transmission into neutral.

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

CHAIN SLACK: 30 - 40 mm (1-1/8 - 1-1/2 in)

#### CAUTION

 Excessive chain slack, 40 mm (1-1/2 in) or more, may damage the frame.

Lubricate the drive chain with drive chain lubricant designed specifically for use with O-ring chains. Wipe off the excess chain lube.

#### **ADJUSTMENT**

Loosen the rear axle nut.

Turn both adjusting bolts until the correct drive chain slack is obtained.

Make sure the index marks on the both adjusters are aligned with the rear end of the swingarm.

Tighten the rear axle nut to the specified torque.

### TORQUE: 93 N·m (9.5 kgf·m, 69 lbf·ft)

Recheck the drive chain slack and free wheel rotation.

Lubricate the drive chain with drive chain lubricant designed specifically for use with O-ring chains. Wipe off the excess chain lube.

Check the drive chain wear indicator label attached on the left drive chain adjuster.

If the red zone of the indicator label reaches the end of the swingarm, replace the drive chain with a new one (page 3-19).

### **CLEANING AND LUBRICATION**

Clean the chain with non-flammable or high flash point solvent and wipe it dry.

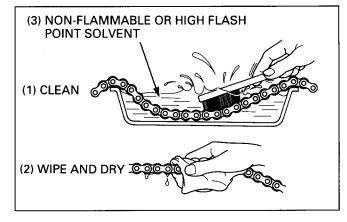
Be sure the chain has dried completely before lubricating.

Inspect the drive chain for possible damage or wear.

Replace any chain that has damaged rollers, loose fitting links, or otherwise appears unserviceable.

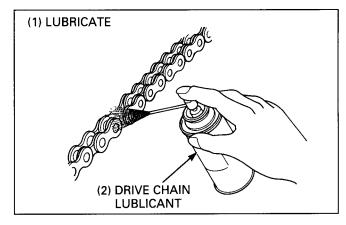
Installing a new chain on badly worn sprockets will cause the new chain to wear quickly.

Inspect and replace sprocket as necessary.



Lubricate the drive chain with commercially available drive chain lubricant designed specifically for use on O-ring chains.

Wipe off the excess chain lubricant.

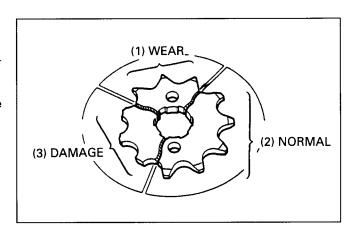


# SPROCKETS INSPECTION

Inspect the drive and driven sprocket teeth for wear or damage, replace if necessary.

Never use a new drive chain on worn sprockets.

Both chain and sprockets must be in good condition, or the new replacement chain will wear rapidly.



Check the attaching bolts and nuts on the drive and driven sprockets.

If any are loose, torque them.

### **REPLACEMENT**

This motorcycle uses a drive chain with a staked master link.

Loosen the drive chain (page 3-17). Assemble the special tool as shown.

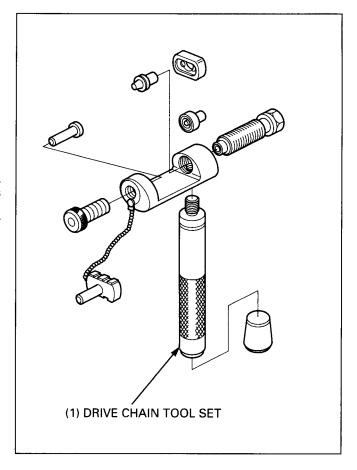
TOOL:

Drive chain tool set

07HMH - MR10103

#### NOTE

When using the special tool, follow the manufacturer's instruction.



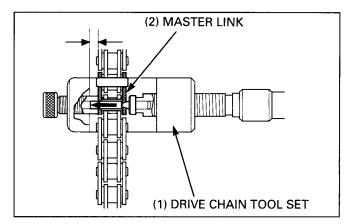
Locate the crimped pin ends of the master link from the outside of the chain, and remove the link with the drive chain tool set.

TOOL:

Drive chain tool set

07HMH - MR10103

Remove the drive chain.



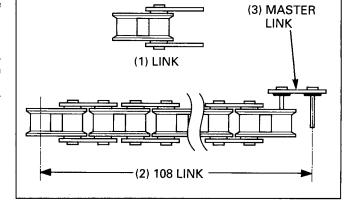
Remove the excess drive chain links from the new drive chain with the drive chain tool set.

#### NOTE

 Include the master link when you count the drive chain links.

STANDARD LINKS: 108 links REPLACEMENT CHAIN: DID: 525HV•GC&B – 108ZB

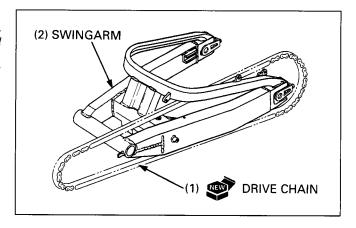
RK: GB525ROZ1



#### **CAUTION**

 Never reuse the oil drive chain, master link, master link plate and O-rings.

Install the new drive chain into the swingarm as shown.



Assemble the new master link, O-rings and plate.

#### **CAUTION**

Insert the master link from the inside of the drive chain, and install
the plate with the identification mark facing the outside.

Assemble and set the drive chain tool set.

#### TOOL:

Drive chain tool set

07HMH - MR10103

Make sure that the master link pins are installed properly. Measure the master link pin length projected from the plate.

STANDARD LENGTH: DID: 1.15 – 1.55 mm (0.045 – 0.061 in) RK: 1.20 – 1.40 mm (0.047 – 0.055 in)

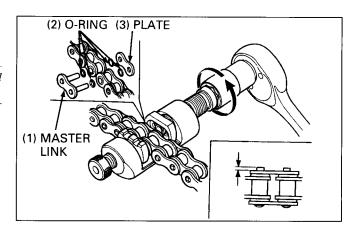
Stake the master link pins.

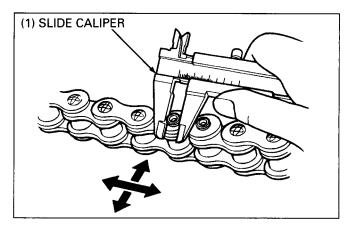
Make sure that the pins are staked properly by measuring the diameter of the staked area using a slide caliper.

# DIAMETER OF THE STAKED AREA:

DID: 5.5 – 5.8 mm (0.22 – 0.23 in) RK: 5.49 – 5.94 mm (0.216 – 0.233 in)

the diameter of the staked area using a slide caliper.



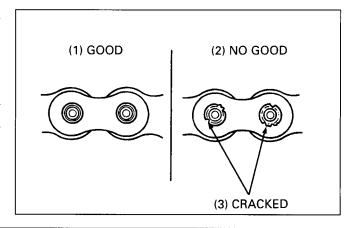


After staking, check the staked area of the master link for cracks.

If there is any cracking, replace the master link, O-rings and plate.

### **CAUTION**

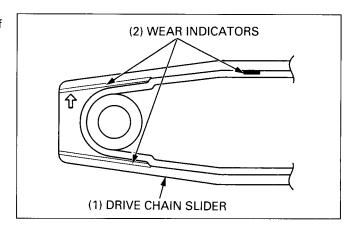
• A drive chain with a clip-type master link must not be used.



# **DRIVE CHAIN SLIDER**

Remove the bolts, drive sprocket cover and guide plate.

Inspect the drive chain slider for excessive wear or damage. If it is worn to the wear indicator, replace the drive chain slider.



# **BRAKE FLUID**

#### **CAUTION**

- Do not mix different types of fluid, as they are not compatible with each other.
- Do not allow foreign material to enter the system when filling the reservoir
- Avoid spilling fluid on painted, plastic or rubber parts, Place a rag over these parts whenever the system is serviced.

#### NOTE

- When the fluid level is low, check the brake pads for wear (see next page). A low fluid level may be due to wear of the brake pads. If the brake pads are worn, the caliper piston is pushed out, and this accounts for a low reservoir level.
- If the brake pads are not worn and the fluid level is low, check entire system for leaks (see next page).

# FRONT BRAKE

Turn the handlebar to the left so that the reservoir is level and check the front brake reservoir level.

If the level is near the lower level line, check the brake pad wear (see next page).

#### **REAR BRAKE**

Place the motorcycle on a level surface, and support it upright position.

Check the rear brake fluid reservoir level.

If the level is near the lower level line, check the brake pad wear (see next page).

# **BRAKE PAD WEAR**

### FRONT BRAKE PADS

Remove the brake pad covers.

Check the brake pad for wear. Replace the brake pads if either pad is worn to the bottom of wear limit groove.

Refer to page 15-5 for brake pad replacement.

# **REAR BRAKE PADS**

Check the brake pad for wear. Replace the brake pads if either pad is worn to the bottom of wear limit groove.

Refer to page 15-6 for brake pad replacement.

# **BRAKE SYSTEM**

### **INSPECTION**

Firmly apply the brake lever or pedal, and check that no air has entered the system.

If the lever or pedal feels soft or spongy when operated, bleed the air from the system.

Inspect the brake hose and fittings for deterioration, cracks and signs of leakage.

Tighten any loose fittings.

Replace hoses and fittings as required.

Refer to page 15-3 for brake bleeding procedures.

# **BRAKE LEVER ADJUSTMENT**

The distance between the top of the brake lever and the grip can be adjusted by turning the adjuster.

DIRECTION A: Brake lever further away from the grip DIRECTION B: Brake lever closer to the grip

#### **CAUTION**

 Align the allowance on the brake lever with the index mark on the adjuster.

#### **BRAKE PEDAL HEIGHT ADJUSTMENT**

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

# **BRAKE LIGHT SWITCH**

#### NOTE

The front brake light switch does not require adjustment.

Adjust the brake light switch so that the brake light comes on just prior to the brake actually being engaged.

If the light fails to come on, adjust the switch so that the light comes on at the proper time.

Hold the switch body and turn the adjuster. Do not turn the switch body.

# **HEADLIGHT AIM**

#### **A** WARNING

 An improperly adjusted headlight may blind on-coming drivers, or it may fall to light the road for a safe distance.

#### NOTE

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

Place the motorcycle on a level surface.

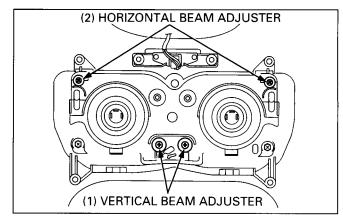
Adjust the headlight beam vertically by turning the vertical beam adjusting screws.

A clockwise rotation moves the beam up.

### **MAINTENANCE**

Horizontally beam adjustment are made using the horizontal beam adjusting screws.

A clockwise rotation moves the beam toward the right side of the rider.



# **CLUTCH SYSTEM**

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

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

Minor adjustment are made with the upper adjuster at the clutch !ever.

Loosen the lock nut and turn the adjuster.

### **CAUTION**

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

If the adjuster is threaded out near its limit and the correct free play cannot be obtained, turn the adjuster all the way in and back out one turn.

Tighten the lock nut and make a major adjustment as described below.

Major adjustment is performed at the clutch arm.

Loosen the lock nut and turn the adjusting nut to adjust free play.

Hold the adjusting nut securely while tightening the lock nut.

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

# SIDE STAND

Support the motorcycle on a level surface.

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

Check the side stand ignition cut-off system:

- Sit astride the motorcycle and raise the side stand.
- Start the engine with the transmission in neutral, then shift the transmission into gear, with the clutch lever squeezed.
- Move the side stand full down.
- The engine should stop as the side stand is lowered.

If there is a problem with the system, check the side stand switch (section 19).

# **SUSPENSION**

# **A** WARNING

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

### FRONT SUSPENSION INSPECTION

Check the action of the forks by operating the front brakes and compressing the front suspension several times. Check the entire assembly for signs of leaks, damage or loose fasteners.

Replace damaged components which cannot be repaired. Tighten all nuts and bolts.

Refer to section 13 for fork service.

#### FRONT SUSPENSION ADJUSTMENT

#### NOTE

To adjust both sides equally, set the right and left damping adjusters to the same position.

### **SPRING PRE-LOAD ADJUSTER**

Spring pre-load can be adjusted by turning the adjuster.

DIRECTION A: Increase the spring pre-load DIRECTION B: Decrease the spring pre-load

#### PRE-LOAD ADJUSTER STANDARD POSITION:

12 mm (0.5 in) from top of fork cap

#### **COMPRESSION AND REBOUND DAMPING ADJUSTERS**

#### **CAUTION**

- Always start on full hard when adjusting the damping.
- Do not turn the adjuster screws more than the given positions or the adjusters may be damaged.
- Be sure that the rebound and compression adjusters are firmly located in a detent, and not between positions.

The compression and rebound damping can be adjusted by turning the adjusters.

DIRECTION H: Increase the damping force DIRECTION S: Decrease the damping force

Turn the compression adjuster clockwise until it stops, then turn the adjuster counterclockwise.

### COMPRESSION ADJUSTER STANDARD POSITION: 1 turn out from full hard

Turn the rebound adjuster clockwise until it stops, then turn the adjuster counterclockwise.

# REBOUND ADJUSTER STANDARD POSITION: 1 turn out from full hard

### **REAR SUSPENSION INSPECTION**

Support the motorcycle securely and raise the rear wheel off the ground.

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

Replace the bearings if any looseness is noted.

Check the action of the shock absorber by compressing it several times.

Check the entire shock absorber assembly for signs of leaks, damage or loose fasteners.

Replace damaged components which cannot be repaired. Tighten all nuts and bolts.

righten an hats and boits.

Refer to section 14 for shock absorber service.

### **REAR SUSPENSION ADJUSTMENT**

#### SPRING PRE-LOAD ADJUSTER

Spring pre-load can be adjusted by turning the adjuster using a pin spanner.

DIRECTION A: Increase the spring pre-load DIRECTION B: Decrease the spring pre-load

PRE-LOAD ADJUSTER STANDARD POSITION: 2nd groove on the adjuster

#### **COMPRESSION AND REBOUND DAMPING ADJUSTERS**

#### **CAUTION**

- Always start on full hard when adjusting the damping.
- Do not turn the adjuster screws more than the given positions or the adjusters may be damaged.

The compression and rebound damping can be adjusted by turning the adjusters.

DIRECTION H: Increase the damping force DIRECTION S: Decrease the damping force

Turn the compression adjuster clockwise until it stops, then turn the adjuster counterclockwise.

### COMPRESSION ADJUSTER STANDARD POSITION: 1 turn out from full hard

Turn the rebound adjuster clockwise until it stops, then turn the adjuster counterclockwise.

# REBOUND ADJUSTER STANDARD POSITION:

1 turn out from full hard

# **NUTS, BOLTS, FASTENERS**

Check that all chassis nuts and bolts are tightened to their correct torque values (page 1-13).

Check that all safety clips, hose clamps and cable stays are in place and properly secured.

# WHEELS/TIRES

#### NOTE

 Tire pressure should be checked when the tires are COLD.

#### **RECOMMENDED TIRE PRESSURE AND TIRE SIZE:**

		FRONT	REAR
Tire pressure kPa (kgf/cm², psi)		250 (2.50, 36)	290 (2.90, 42)
Tire size		130/70 – ZR16	180/55 – ZR17
Tire brand	Bridgestone	BT56F RADIAL	BT56R RADIAL G
	Michelin	TX15	TX25

Check the tires for cuts, embedded nails, or other damage. Check the front and rear wheels for trueness (refer to section 13 and 14).

Measure the tread depth at the center of the tires. Replace the tires when the tread depth reaches the following limits.

#### **MINIMUM TREAD DEPTH:**

FRONT: 1.5 mm (0.06 in) REAR: 2.0 mm (0.08 in)

# STEERING HEAD BEARINGS

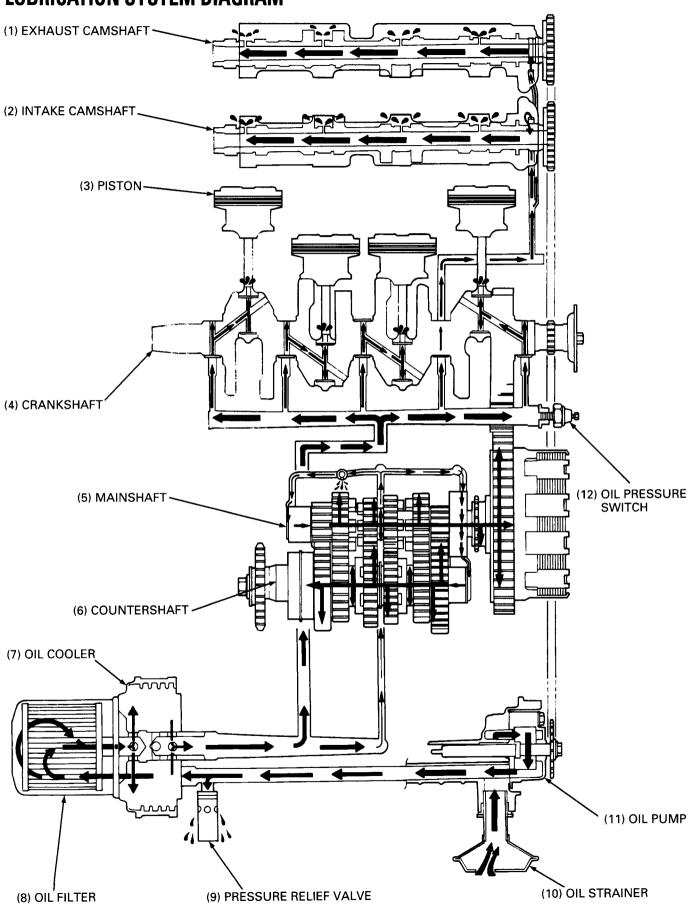
### NOTE

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

Support the motorcycle securely and raise the front wheel off the ground.

Check that the handlebar moves freely from side to side. If the handlebar moves unevenly, binds, or has vertical movement, inspect the steering head bearings (Section 13).

# **LUBRICATION SYSTEM DIAGRAM**



# 4

# 4. LUBRICATION SYSTEM

LUBRICATION SYSTEM DIAGRAM	4-0	OIL STRAINER/PRESSURE RELIEF	
SERVICE INFORMATION	4-1	VALVE	4-4
TROUBLESHOOTING	4-2	OIL PUMP	4-6
OIL PRESSURE INSPECTION	4-3	OIL COOLER	4-10

# SERVICE INFORMATION

### **GENERAL**

# **A** WARNING

- If the engine must be running to do some work, make sure the area is well-ventilated. Never run the engine in an enclosed area. The exhaust contains poisonous carbon monoxide gas that may cause loss of consciousness and may lead to death. Run the engine in an open area or with an exhaust evacuation system in an enclosed area.
- Used engine oil may cause skin cancer if repeatedly left in contact with the skin for prolonged periods. Although this is unlikely unless
  you handle used oil on a daily basis, it is still advisable to thoroughly wash your hands with soap and water as soon as possible after
  handling used oil.
- The oil pump can be serviced with the engine installed in the frame.
- The service procedures in this section must be performed with the engine oil drained.
- · When removing and installing the oil pump, use care not to allow dust or dirt to enter the engine.
- If any portion of the oil pump is worn beyond the specified service limits, replace the oil pump as an assembly.
- · After the oil pump has been installed, check that there are no oil leaks and that oil pressure is correct.

### **SPECIFICATIONS**

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT	
Engine oil capacity	At draining	3.5 liter (3.7 US qt, 3.1 lmp qt)		
	At disassembly	4.4 liter (4.6 US qt, 3.9 lmp qt)		
	At oil filter change	3.6 liter (3.8 US qt, 3.2 lmp qt)		
Recommended engine oil		Honda 4-stroke oil or equivalent motor oil API service classification SE, SF or SG Viscosity: SAE 10W – 40		
Oil pressure at oil pressure switch		490 kPa (5.0 kgf/cm², 71 psi) at 6,000 min <sup>-1</sup> (rpm)/(80°C/176°F)		
Oil pump rotor	Tip clearance	0.15 - 0.22 (0.006 - 0.009)	0.20 (0.008)	
	Body clearance	0.15 - 0.22 (0.006 - 0.009)	0.35 (0.014)	
	Side clearance	0.02 – 0.07 (0.001 – 0.003)	0.10 (0.004)	

### **TORQUE VALUES**

Oil drain bolt	29 N·m (3.0 kgf·m, 22 lbf·ft)	
Oil filter cartridge	10 N·m (1.0 kgf·m, 7 lbf·ft)	Apply oil to the new O-ring
Oil pump driven sprocket bolt	15 N·m (1.5 kgf·m, 11 lbf·ft)	Apply a locking agent to the threads
Oil cooler boss	64 N·m (6.5 kgf·m, 47 lbf·ft)	Apply a locking agent to the threads
Oil pressure switch	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply sealant to the threads

#### **TOOLS**

Oil pressure gauge	07506 – 3000000
Oil pressure gauge attachment	07510 – 4220100
Oil filter wrench	07HAA PJ70100

# **TROUBLESHOOTING**

### Engine oil level too low

- · Oil consumption
- External oil leak
- · Worn piston ring or incorrect piston ring installation
- Worn valve guide or seal

# Low or no oil pressure

- · Clogged oil orifice
- · Incorrect oil being used

### No oil pressure

- · Oil level too low
- · Oil pump drive sprocket broken
- · Oil pump damaged (pump shaft)
- · Internal oil leak

### Low oil pressure

- Clogged oil strainer screen
- · Oil pump worn or damaged
- · Internal oil leak
- · Incorrect oil being used
- · Low oil level

### High oil pressure

- · Plugged oil filter, gallery, or metering orifice
- · Incorrect oil being used

# **OIL PRESSURE INSPECTION**

#### NOTE

 If the oil pressure indicator light remains on a few seconds, check the indicator system before checking the oil pressure.

Check the oil level (page 3-11).

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

Stop the engine and disconnect the oil pressure switch wire connector from the switch.

Remove the oil pressure switch and connect an oil pressure gauge and attachment to the switch hole.

#### TOOLS:

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

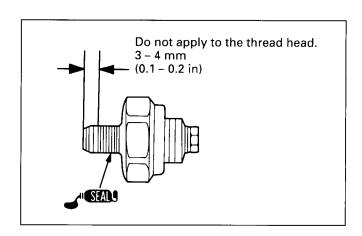
Start the engine and increase the rpm to 6,000 min<sup>-1</sup> (rpm) and read the oil pressure.

#### OIL PRESSURE:

490 kPa (5.0 kgf/cm², 71 psi) at 6,000 min<sup>-1</sup> (rpm)/ (80°C/176°F)

Stop the engine and remove the tools.

Apply sealant to the threads of the oil pressure switch.



Install and tighten it to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

#### CAUTION

To prevent crankcase damage, do not overtighten the switch.

Connect the oil pressure switch connector.

# **OIL STRAINER/PRESSURE RELIEF VALVE**

# **REMOVAL**

Drain the engine oil (page 3-12).
Remove the exhaust pipe (page 2-16).

Remove the oil pan flange bolts and oil pan.

Remove the pressure relief valve and O-ring.

Remove the oil strainer and gasket.

Clean the oil strainer screen.

# INSPECTION

Check the operation of the pressure relief valve by pushing on the piston.

Disassemble the relief valve by removing the snap ring.

Inspect the piston for wear, sticking or damage. Inspect the spring for weakness or damage.

Assemble the relief valve in the reverse order of disassembly.

# **INSTALLATION**

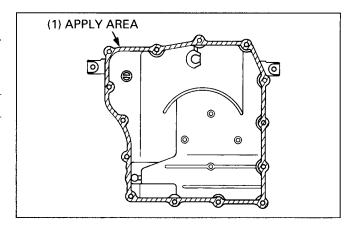
Apply oil to the new gasket and install it onto the oil strainer. Install the oil strainer into the crankcase while aligning its boss with the groove in the crankcase.

Apply oil to the new O-ring and install it onto the relief valve. Install the relief valve into the crankcase.

Clean the oil pan mating surface thoroughly. Apply Three Bond 1207B or an equivalent to the mating surface.

# **CAUTION**

• Do not apply sealant more than necessary.



Install the oil pan and tighten the flange bolts in a crisscross pattern in 2-3 steps.

Install the exhaust pipe (page 2-17).
Fill the crankcase with recommended oil (page 3-13).

#### NOTE

• After installation, check that there are no oil leaks.

# **LUBRICATION SYSTEM**

# **OIL PUMP**

# **REMOVAL**

Remove the clutch assembly (page 9-4).

Remove the oil pump driven sprocket bolt/washer.

Remove the following:

- Oil pump driven sprocket
- Oil pump drive chain
- Oil pump drive sprocket
- Drive sprocket collar

Remove the flange bolts and oil pump assembly.

### **DISASSEMBLY**

### NOTE

 If any portion of the oil pump is worn beyond the specified service limit, replace the oil pump as an assembly.

Remove the bolt, oil pump cover and dowel pin.

Remove the thrust washer and drive pin. Disassemble the oil pump.

# **INSPECTION**

Temporarily install the oil pump shaft. Install the outer and inner rotors into the oil pump body.

Measure the tip clearance.

SERVICE LIMIT: 0.20 mm (0.008 in)

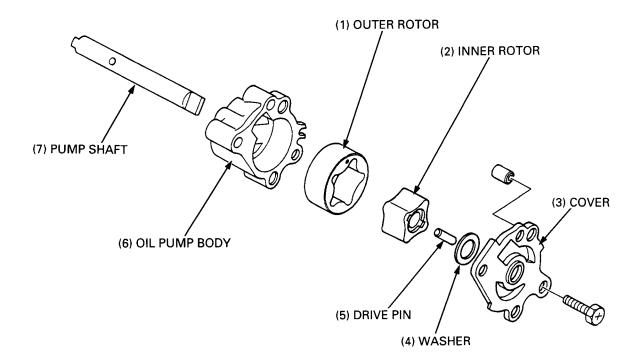
Measure the pump body clearance.

SERVICE LIMIT: 0.35 mm (0.014 in)

Measure the side clearance using a straight edge and feeler gauge.

SERVICE LIMIT: 0.10 mm (0.004 in)

# **ASSEMBLY**



Install the outer and inner rotors into the oil pump body. Install the oil pump shaft through the oil pump body and inner rotor.

Install the drive pin into the hole in the pump shaft and align the pin with the groove in the inner rotor as shown.

Install the thrust washer.

Install the dowel pin and oil pump cover, then tighten the cover bolt securely.
INSTALLATION
Install the oil pump into the crankcase while aligning the pump shaft lug with the water pump shaft groove.
Install and tighten the three flange bolt securely.
Apply oil to the oil pump drive sprocket collar, drive sprocket and drive chain.
Install the following:  — Drive sprocket collar  — Oil pump drive sprocket  — Oil pump drive chain  — Oil pump driven sprocket

# **LUBRICATION SYSTEM**

Install the oil pump driven sprocket with its "OUT" mark facing outward.

Apply a locking agent to the oil pump driven sprocket bolt threads.

Install and tighten the driven sprocket bolt/washer to the specified torque.

TORQUE: 15 N·m (1.5 kgf·m, 11 lbf·ft)

Install the clutch assembly (page 9-8).

# **OIL COOLER**

# **REMOVAL**

Drain the engine oil (page 3-12). Remove the oil filter cartridge (page 3-12). Drain the coolant (page 6-4).

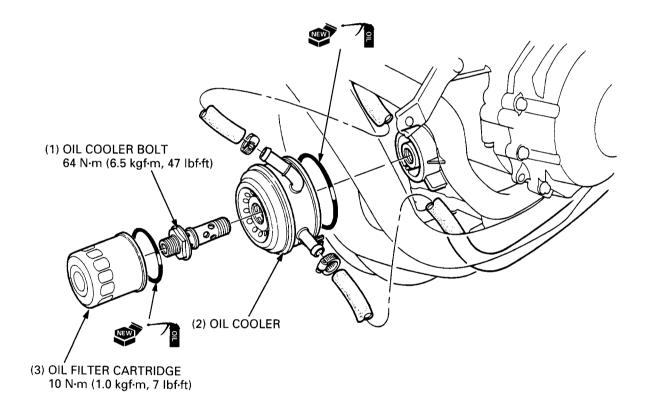
Disconnect the coolant tubes from the oil cooler.

Remove the oil cooler bolt. Remove the oil cooler and O-ring.

# **INSPECTION**

Check the oil cooler for leakage or damage.

# **INSTALLATION**



Apply oil to the new O-ring and install it onto the oil cooler. Install the oil cooler aligning its guide groove with the boss on the crankcase.

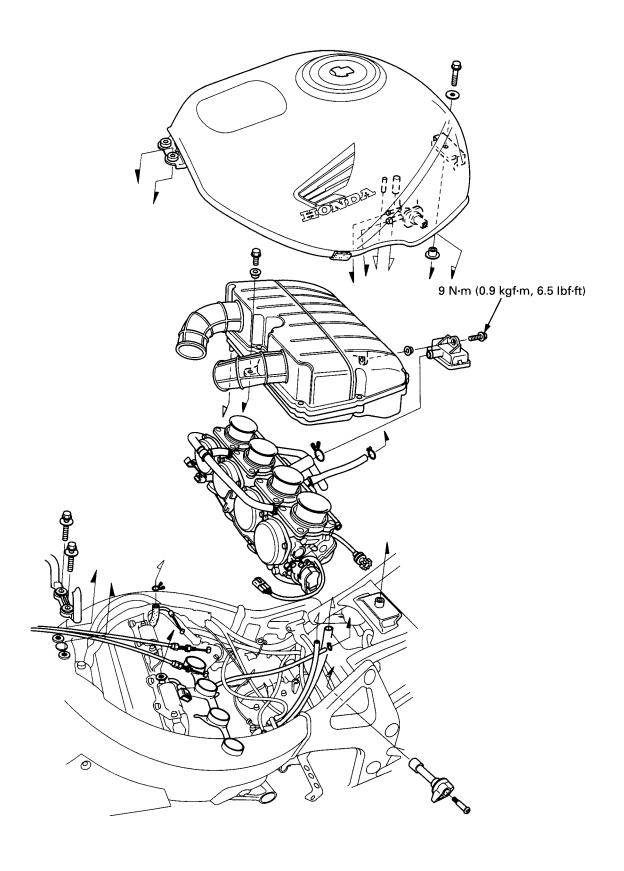
# **LUBRICATION SYSTEM**

Apply a locking agent to the oil cooler bolt threads. Install and tighten the oil cooler bolt to the specified torque.

TORQUE: 64 N·m (6.5 kgf·m, 47 lbf·ft)

Connect the coolant tubes and secure them with the clamps.

Install the oil filter cartridge (page 3-13). Fill the crankcase with recommended engine oil (page 3-13). Fill the cooling system (page 6-4).



# **5. FUEL SYSTEM**

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	5-3 5-4 5-5 5-6 5-7	5-3 CARBURETOR INSTALLATION 5-4 PILOT SCREW ADJUSTMENT 5-5 SECONDARY AIR SUPPLY SYSTEM (SW, AR TYPE) 5-7 FUEL VALVE

# **SERVICE INFORMATION**

#### **GENERAL**

# **A** WARNING

- Gasoline is extremely flammable and is explosive under certain condition. KEEP OUT OF REACH OF CHILDREN.
- Bending or twisting the control cables will impair smooth operation and could cause the cables to stick or bind, resulting in loss of vehicle control.
- Work in a well ventilated area. Smoking or allowing flames or sparks in the work area or where gasoline is stored can cause a fire or explosion.

#### **CAUTION**

- Be sure to remove the diaphragms before cleaning air and fuel passages with compressed air. The diaphragms might be damaged.
- Refer to section 2 for fuel tank removal and installation.
- When disassembling fuel system parts, note the location of the O-rings. Replace them with new ones on reassembly.
- Before disassembling the carburetor, place the suitable container under the carburetor drain tube, loosen the bolt and drain the carburetor.
- After removing the carburetor, wrap the intake ports of the engine with a shop towel or cover it with a piece of tape
  to prevent any foreign material from dropping into the engine.
- The vacuum chamber and float chamber can be serviced with the carburetors assembled.

#### NOTE

 If the vehicle is to be stored for more than one month, drain the float bowls. Fuel left in the float bowls may cause clogged jets resulting in hard starting or poor driveability. 5

### **SPECIFICATIONS**

ITEM		SPECIFICATIONS
Carburetor identification number	E, ED, IT, U, ND type	VP88A
	G type	VP88C
	F type	VP88F
	SD type	VP88G
	SW type	VP8AA
	AR type	VP8AB
Main jet	E, ED, IT, U, ND type	#115 (See page 5-11)
	G, SW, AR type	No. 1, 4: #115/No. 2, 3: #118
	F type	#118
	SD type	No. 1, 4: #118/No. 2, 3: #120
Slow jet		#40
Jet needle number	E, ED, IT, U, ND, G, SD type	No. 1, 4: J5FZ/No. 2, 3: J5FY
	F, AR type	No. 1, 4: J5FB/No. 2, 3: J5FA
	SW type	J5FC
Pilot screw initial opening	E, ED, IT, U, ND, F, SD type	3 turns out
	G type	2-1/2 turns out
	SW, AR type	2-3/4 turns out
Float level		13.7 mm (0.54 in)
Idle speed	Except SW, AR type	1,100 ± 100 min <sup>-1</sup> (rpm)
	SW, AR type	1,100 ± 50 min <sup>-1</sup> (rpm)
Throttle grip free play		2 – 6 mm (1/12 – 1/4 in)

# **TORQUE VALUES**

Carburetor assembly bolt, 5 mm

6 mm

Vacuum plug for synchronization Boost joint for auto fuel valve

Fuel valve

Sub-air cleaner mounting bolt

5 N·m (0.5 kgf·m, 3.6 lbf·ft) 10 N·m (1.0 kgf·m, 7 lbf·ft)

3.0 N·m (0.30 kgf·m, 2.2 lbf·ft) 2.5 N·m (0.25 kgf·m, 1.8 lbf·ft)

34 N·m (3.5 kgf·m, 25 lbf·ft) 7 N·m (0.7 kgf·m, 5.1 lbf·ft)

# **TOOLS**

Carburetor float level gauge

Pilot screw wrench (Except SW, AR type)

(SW, AR type)

07401 - 0010000

07908 - 4220201 or 07908 - 4730001

07KMA - MN90100 or 07KMA - MS60101 with 07PMA - MZ20110

# **TROUBLESHOOTING**

### Engine won't to start

- Too much fuel getting to the engine
  - Air cleaner clogged
  - Flooded carburetors
- Intake air leak
- Fuel contaminated/deteriorated
- · No fuel to carburetor
  - Fuel strainer clogged
  - Fuel tube clogged
  - Fuel valve vacuum tube clogged
  - Disconnected fuel valve vacuum tube
  - Float level misadjusted
  - Fuel tank breather tube clogged

#### Lean mixture

- · Fuel jets clogged
- Float valve faulty
- · Float level too low
- · Fuel line restricted
- Carburetor air vent tube clogged
- Intake air leak
- Throttle valve faulty
- · Vacuum piston faulty

#### Rich mixture

- Starting enrichment valve in ON position
- Float valve faulty
- Float level too high
- · Air jets clogged
- · Air cleaner element contaminated
- · Flooded carburetor

### Engine stall, hard to start, rough idling

- · Fuel line restricted
- · Ignition malfunction
- · Fuel mixture too lean/rich
- · Fuel contaminated/deteriorated
- · Intake air leak
- Idle speed misadjusted
- · Float level misadjusted
- · Fuel tank breather tube clogged
- Pilot screw misadjusted
- · Slow circuit or starting enrichment circuit clogged
- Emission control system is malfunction (SW, AR type)

# Afterburn when engine braking is used

- · Lean mixture in slow circuit
- Air cut-off valve malfunction
- · Emission control system is malfunction
  - Secondary air supply system faulty
  - Loose, disconnected or deteriorated hoses of the emission control system

### Backfiring or misfiring during acceleration

- · Ignition system malfunction
- · Fuel mixture too lean

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

- Fuel system clogged
- Ignition system malfunction
- Emission control system is malfunction
  - Secondary air supply system faulty
  - Loose, disconnected or deteriorated hoses of the emission control system

# **AIR CLEANER HOUSING**

# **REMOVAL**

NO.	ΤE
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· Refer to page 3-5 for air cleaner element replacement.

Remove the fuel tank (page 2-2).

Disconnect the sub-air cleaner housing air tube. Remove the bolt and sub-air cleaner housing.

Disconnect the crankcase breather tube from the air cleaner housing.

Loosen the carburetor connecting tube band screws.

Remove the bolt and air cleaner housing. Remove the collar.

# **INSTALLATION**

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

# **CARBURETOR REMOVAL**

# **A** WARNING

Gasoline is extremely flammable and is explosive under certain conditions.

Remove the air cleaner housing (page 5-4).

Remove the throttle stop screw from the bracket.

Disconnect the throttle sensor connector.

Loosen the screw and disconnect the choke cable from the carburetor.

Remove the throttle cables from the cable holder and disconnect the throttle cables from the throttle drum.

Remove the air vent tube from the guide.

Loosen the engine side insulator band screws and remove the carburetor assembly.

### NOTE

- After removing the carburetor assembly, do not place it up side down or the air intake might be deformed.
- Seal the cylinder head intake ports with a shop towel or cover it with piece of tape to prevent any foreign material from dropping into the engine.

# **CARBURETOR SEPARATION**

#### **NOTE**

 The vacuum chamber and float chamber can be serviced without separating the carburetors.

Loosen the screws and remove the insulators. Disconnect the fuel tubes from the fuel joint. Disconnect the air vent tubes and sub-air cleaner tube.

### NOTE

 If is not necessary to remove the throttle sensor from the carburetor body.

If necessary, remove the screws and throttle sensor from the carburetor body.

Remove the starting enrichment valve arm screws and washers.

Remove the starting enrichment valve arm, thrust spring and plastic collars.

Loosen and remove the carburetor connecting nuts.

### NOTE

· Loosen the nuts gradually and alternately.

Remove the choke cable holder.

Separate the No. 3/4 carburetors from the No. 1/2 carburetors.

#### Remove the following:

- No. 2 carburetor synchronization spring
- 3-way air joint pipe/O-rings
- Dowel pin (5 mm bolt side)
- Distance collared dowel pin (6 mm bolt side)

Separate the No. 1 carburetor from the No. 2 carburetor.

#### Remove the following:

- No. 1 carburetor synchronization spring
- Thrust spring
- Air joint rubber pipe
- Air vent joint pipe/O-rings
- 3-way fuel joint pipe/O-rings
- Dowel pin (5 mm bolt side)
- Dowel pin (6 mm bolt side)

Separate the No. 3 carburetor from the No. 4 carburetor.

# Remove the following:

- No. 4 carburetor synchronization spring
- Thrust spring
- Air joint rubber pipe
- Air vent joint pipe/O-rings
- 3-way fuel joint pipe/O-rings
- Dowel pin (5 mm bolt side)
- Dowel pin (6 mm bolt side)

# CARBURETOR DISASSEMBLY

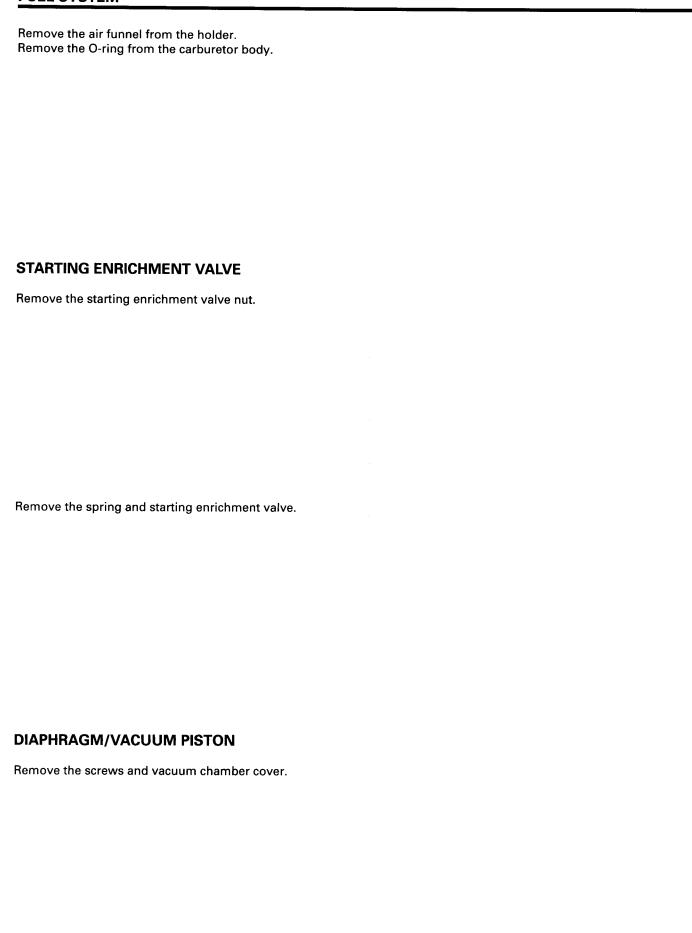
#### NOTE

 Note the location of the each carburetor parts so they can be back in their original locations.

#### **AIR FUNNEL**

Remove the screws and air funnel holder.

# **FUEL SYSTEM**



Remove the diaphragm spring and diaphragm/vacuum piston from the carburetor body.	
Temporarily install a 4 mm screw (example; vacuum chamber screw) into the jet needle holder. Pull the screw and remove the jet needle holder.	
CAUTION	
<ul> <li>Be careful not to damage the diaphragm.</li> <li>Do not remove the jet needle holder by pushing the jet needle.</li> </ul>	and the second s
Remove the spring, jet needle and washer from the vacuum piston.	
FLOAT AND JETS	
Remove the screws and float chamber.	

#### **FUEL SYSTEM**

Remove the float pin, float and float valve.

Inspect the float for deformation or damage.

Inspect the float valve seat for scores, scratches, clogging and damage.

Check the tip of the float valve, where it contacts the valve seat for stepped wear or contamination.

Replace the valve if the tip is worn or contaminated

Check the operation of the float valve.

Remove the following:

- Main jet
- Needle jet holder
- Slow jet

Turn the pilot screw in and record the number of turns it takes before it seats lightly.

Remove the pilot screw, spring, washer and O-ring.

### **CAUTION**

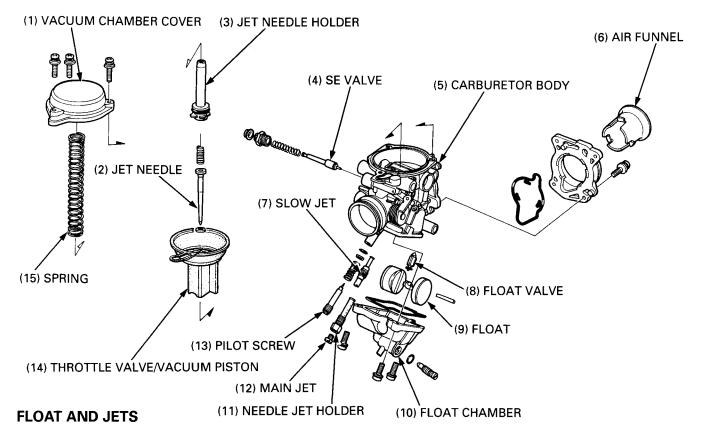
• Damage to the pilot screw seat will occur if the pilot screw is tightened against the seat.

Inspect each jet for wear or damage and replace if necessary.

Clean the fuel strainer in the float valve seat using the compressed air from the float valve seat side.

Blow open each air and fuel passages in the carburetor body with compressed air.

### **CARBURETOR ASSEMBLY**



Install the following:

- Slow jet
- Needle jet holder
- Main jet

#### **CAUTION**

- E, ED, IT, U, ND type: Install the punch marked main jets into the No. 2 and No. 3 carburetors.
- Handle all jets with care. They can easily be scored or scratched.

Install the pilot screw and return it to its original position as noted during removal.

Perform pilot screw adjustment if a new pilot screw is installed (page 5-20).

#### **FUEL SYSTEM**

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

#### **FLOAT LEVEL INSPECTION**

With the float valve seated and the float arm just touching the valve, measure the float level with the special tool as shown.

FLOAT LEVEL: 13.7 mm (0.54 in)

TOOL

Carburetor float level gauge 07401 - 0010000

The float cannot be adjusted.

Replace the float assembly if the float level is out of specification.

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

Install and tighten the three float chamber screws.

#### **DIAPHRAGM/VACUUM PISTON**

Check the condition of the O-ring on the jet needle holder, replace if necessary.

Apply oil to the O-ring.

Install the washer, jet needle, spring into the vacuum piston.

Press the jet needle holder into the vacuum piston until you feel a clicks indicating the O-ring is seated into the groove in the vacuum piston.

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

Hold the vacuum piston up to almost full open so the diaphragm is not pinched by the chamber cover.

Install the chamber cover with the spring, being careful not to damage the spring.

Install and tighten the vacuum chamber cover screws.

#### **CAUTION**

• Do not pinch the diaphragm under the chamber cover.

#### STARTING ENRICHMENT VALVE

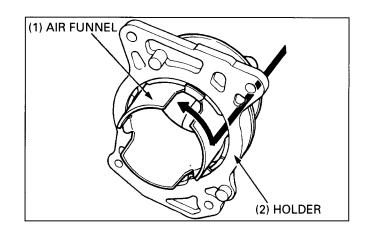
Install the starting enrichment valve and spring.

#### **FUEL SYSTEM**

Install the starting enrichment valve nut and tighten it securely.

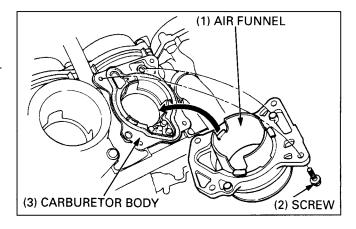
#### **AIR FUNNEL**

Install the air funnel into the holder as shown.



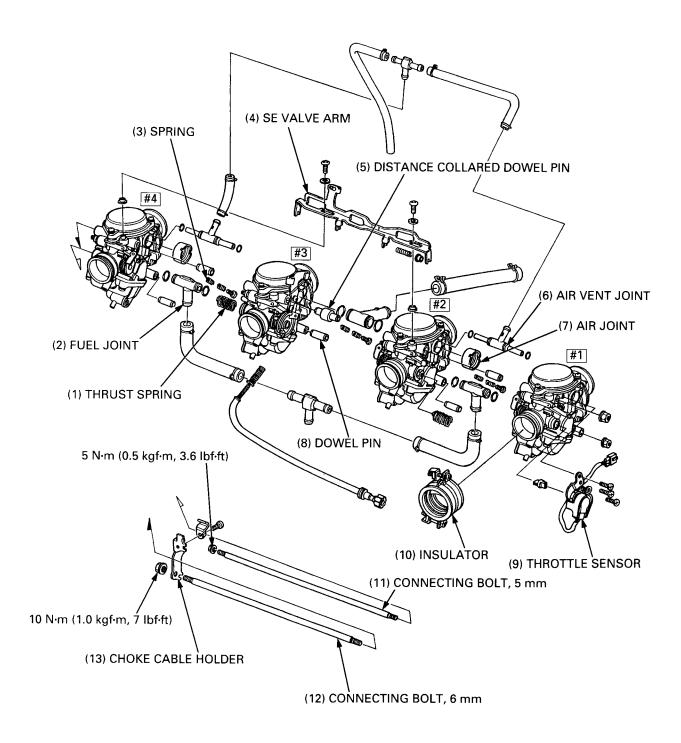
Check the O-ring is in good condition, replace if necessary. Install the O-ring into the groove of the carburetor body.

Align the cut-out on the air funnel with the groove in the carburetor body, then install the air funnel/holder.



Install and tighten the holder screws.

### **CARBURETOR COMBINATION**



#### **FUEL SYSTEM**

#### NOTE

· Always replace the O-ring with new ones.

#### Install the following:

- Dowel pin (5 mm bolt side)
- Dowel pin (6 mm bolt side)
- 3-way fuel joint pipe/new O-rings
- Air vent joint pipe/new O-rings
- Air joint rubber pipe
- Thrust spring
- No. 4 carburetor synchronization spring

Assemble the No. 3 and the No. 4 carburetors.

#### Install the following:

- Dowel pin (5 mm bolt side)
- Dowel pin (6 mm bolt side)
- 3-way fuel joint pipe/new O-rings
- Air vent joint pipe/new O-rings
- Air joint rubber pipe
- Thrust spring
- No. 1 carburetor synchronization spring

Assemble the No. 1 and the No. 2 carburetors.

#### Install the following:

- Dowel pin (5 mm bolt side)
- Distance collared dowel pin (6 mm bolt side)
- 3-way air joint pipe/O-rings
- No. 2 carburetor synchronization spring

Assemble the No. 3/4 and the No. 1/2 carburetors.

Install the 5 mm and 6 mm carburetor connecting bolts through the carburetors.

Set the choke cable holder and install the nuts, but do not tighten them yet.

#### NOTE

 Before tightening the carburetor connecting nuts, check there is no clearance between each of the carburetor joints.

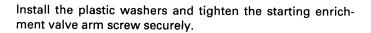
Tighten the each connecting nuts gradually and alternately, be sure the bolt thread projections are equal height.

Hold the nut and tighten the nut on other side to the specified torque.

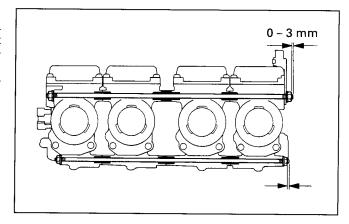
TORQUE: 5 mm nut: 5 N·m (0.5 kgf·m, 3.6 lbf·ft) 6 mm nut: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Install the plastic collars onto the No. 2 and No. 4 carburetor bodys.

Set the thrust spring and install the starting enrichment valve arm aligning its ends with the starting enrichment valve heads.



Install the throttle sensor aligning its groove with the boss on the throttle shaft.





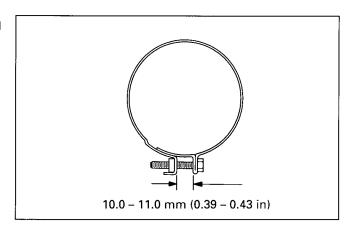
### **CARBURETOR INSTALLATION**

Coat the inside of the carburetor insulators with clean engine oil for ease of installation.

Install the carburetor assembly onto the cylinder head.

Adjust the insulator band angle as shown.

Tighten the engine side insulator screws so that the band ends clearance is 10.0 – 11.0 mm (0.39 – 0.43 in).



Connect the throttle cable ends to the throttle drum and install the throttle cables onto the cable holder.

Connect the choke cable end to the starting enrichment valve arm and tighten the screw.

Connect the throttle sensor connector.

Install the air vent tube into the guide.

Install the throttle stop screw into the guide.

Install the removed parts in the reverse order of removal

### PILOT SCREW ADJUSTMENT

#### **IDLE DROP PROCEDURE**

#### A WARNING

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

#### **NOTE**

- Make sure the carburetor synchronization is within specification before pilot screw adjustment (page 3-13).
- The pilot screws are factory pre-set. Adjustment is not necessary unless the carburetors are overhauled or new pilot screws are installed.
- Then engine must be warm for accurate adjustment. Ten minutes of stop-and-go riding is sufficient.
- Use a tachometer with graduations of 50 min<sup>-1</sup> (rpm) or smaller that will accurately indicate 50 min<sup>-1</sup> (rpm) change.
- Turn the pilot screw clockwise until it seats lightly, and then back it out to the specification given.

#### CAUTION

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

#### TOOLS:

(Except SW, AR type) 07908 - 4220201 or

07908 - 4730001

(SW, AR type) 07KMA – MN90100 or

07KMA - MS60101 with 07PMA - MZ20110

#### **INITIAL OPENING:**

E, ED, IT, U, ND, F, SD type: 3 turns out
G type: 2-1/2 turns out
SW, AR type: 2-3/4 turns out

- 2. Warm the engine up to operating temperature.
- 3. Stop the engine and connect a tachometer according to the tachometer manufacturer's instructions.
- Start the engine and adjust the idle speed with the throttle stop screw.

IDLE SPEED: Except SW, AR type:  $1,100 \pm 100 \text{ min}^{-1} \text{ (rpm)}$ SW, AR type:  $1,100 \pm 50 \text{ min}^{-1} \text{ (rpm)}$ 

- Turn the No. 3 pilot screw in or out slowly to obtain the highest engine speed.
- 6. Perform step 5 for all the carburetor pilot screws.
- Lightly open the throttle 2 3 times, adjust the idle speed with the throttle stop screw.

- 8. Turn the No. 3 carburetor pilot screw in gradually until the engine speed drops 50 min<sup>-1</sup> (rpm).
- 9. Adjust the idle speed with the throttle stop screw.
- 10. Turn the No. 3 carburetor pilot screw in until the engine speed drops 50 min<sup>-1</sup> (rpm).
- 11. Then turn the No. 3 pilot screw counterclockwise to the final opening from the position in step 10.

#### FINAL OPENING:

Except G, SW, SD type: 1 turn G, SW type: 1/2 turn

Perform steps 10 and 11 for the No. 1, 2 and 4 carburetor pilot screws.

# SECONDARY AIR SUPPLY SYSTEM (SW, AR TYPE)

#### SYSTEM INSPECTION

Start the engine and warm it up to normal operating temperature

Remove the air cleaner element (page 3-5).

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

If the ports are carbon fouled, check the pulse secondary air injection (PAIR) control valve.

Disconnect the air cleaner housing-to-PAIR control valve tube (No. 15) from the air cleaner housing.

Disconnect the PAIR control valve vacuum tube from the control valve and plug it to keep air from entering.

Connect the vacuum pump to the PAIR control valve.

#### TOOL:

#### VACUUM PUMP

#### Commercially available

Start the engine and open the throttle slightly to be certain that air is sucked in through the No. 15 vacuum tube. If the air is not drawn in, check the No. 15 tube for clogging.

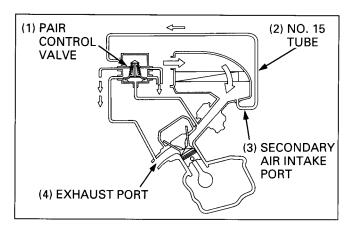
With the engine running, gradually apply vacuum to the PAIR control valve.

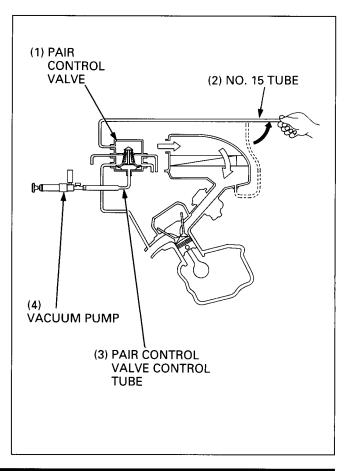
Check that the air intake port stops drawing air, and that the vacuum does not bleed.

#### SPECIFIED VACUUM: 40 mmHg

If the air drawn in, or if the specified vacuum is not maintained, install a new PAIR control valve.

If afterburn occurs on deceleration, even when the secondary air supply system is normal, check the air cut-off valve.





### **FUEL VALVE**

#### **FUEL AUTO VALVE INSPECTION**

Remove the fuel tank (page 2-2).

Connect the fuel tube to the fuel valve and place the suitable gasoline container under the fuel tube.

Turn the fuel valve on.

If the fuel comes out of the fuel tube, replace the diaphragm.

Connect a commercially available vacuum pump to the diaphragm vacuum outlet.

Fuel should flow out from the fuel tube when vacuum is applied.

If fuel flow is restricted, replace the diaphragm.

#### **DIAPHRAGM REPLACEMENT**

Drain the fuel from the fuel tank.

Remove the four screws and diaphragm assembly.

Replace the diaphragm cover, spring, diaphragms, spacer and retainers as a set.

Install the diaphragm assembly so that the air vent pipe of the spacer and the vacuum pipe of the cover facing to the same direction as the fuel pipe of the fuel valve body.

#### **FUEL STRAINER CLEANING**

Drain the fuel from the fuel tank.

Loosen the fuel valve lock nut and remove the fuel valve assembly.

Remove the fuel strainer and O-ring. Clean the fuel strainer with compressed air.

Install the fuel valve and tighten the lock nut to the specified torque.

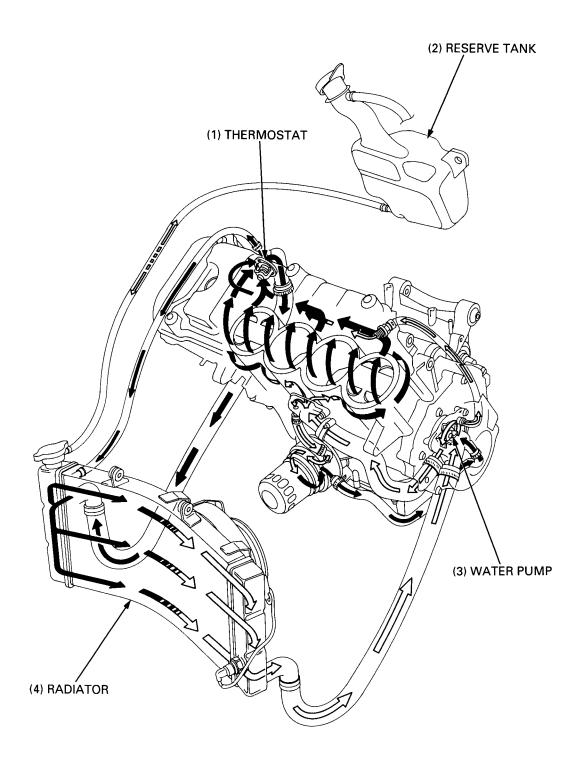
#### TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

#### NOTE

· Do not overtighten the lock nut.

Fill the fuel tank and make sure there are no fuel leaks.

## **SYSTEM FLOW PATTERN**



6-0	THERMOSTAT	6-5
6-1	RADIATOR	6-7
6-2	WATER PUMP	6-10
6-3	RADIATOR RESERVE TANK	6-12
6-4		
	6-1 6-2 6-3	6-1 RADIATOR 6-2 WATER PUMP 6-3 RADIATOR RESERVE TANK

### SERVICE INFORMATION

#### **GENERAL**

#### **A** WARNING

- Wait until the engine is cool before slowly removing the radiator cap. Removing the cap while the engine is hot and the coolant is under pressure may cause serious scalding.
- Radiator coolant is toxic. Keep it away from eyes, mouth, skin and clothes.
  - If any coolant gets in your eyes, rinse them with water and consult a doctor immediately.
  - If any coolant in swallowed, induce vomiting, gargle and consult a physician immediately.
- If any coolant gets on your skin or clothes, rince thoroughly with plenty of water.
- KEEP OUT OF REACH OF CHILDREN.
- Use only distilled water and ethylene glycol the cooling system. A 50 50 mixture is recommended for maximum corrosion protection. Do not use alcol-based antifreeze.
- Add cooling system at the reserve tank. Do not remove the radiator cap except to refill or drain the system.
- · All cooling system services can be done with the engine in the frame.
- Avoid spilling coolant on painted surfaces.
- After servicing the system, check for leaks with a cooling system tester.
- Refer to section 19 for fan motor switch and coolant temperature sensor inspection.

#### **SPECIFICATIONS**

	ITEM	SPECIFICATIONS
Coolant capacity	Radiator and engine	2.77 liter (2.93 US qt, 2.44 lmp qt)
	Reserve tank	0.45 liter (0.476 US qt, 0.396 lmp qt)
Radiator cap relief pres	ssure	108 – 137 kPa (1.1 – 1.4 kgf/cm², 16 – 20 psi)
Thermostat	Begin to open	80 – 84°C (176 – 183°F)
	Fully open	95°C (203°F)
	Valve lift	8 mm (0.3 in) minimum

#### **TORQUE VALUES**

Fan motor switch

Water pump cover bolt Coolant temperature sensor Fan motor nut 13 N·m (1.3 kgf·m, 9 lbf·ft) 10 N·m (1.0 kgf·m, 7 lbf·ft)

2.5 N·m (0.25 kgf·m, 1.8 lbf·ft) 18 N·m (1.8 kgf·m, 13 lbf·ft) Apply a locking agent to the threads Apply sealant to the threads

6-1

### **TROUBLESHOOTING**

#### Engine temperature too high

- · Faulty radiator cap
- · Insufficient coolant
- · Passages blocked in radiator, hoses or water jacket
- Air in system
- Faulty water pump
- · Thermostat stuck closed
- Faulty temperature gauge or coolant temperature sensor
- Faulty cooling fan motor
- · Faulty fan motor switch

#### Engine temperature too low

- Faulty temperature gauge or coolant temperature sensor
- · Thermostat stuck open
- Faulty cooling fan motor switch

#### **Coolant leak**

- Faulty water pump mechanical seal
- · Deteriorated O-rings
- Damaged or deteriorated gasket
- Loose hose connection or clamp
- Damaged or deteriorated hose
- Faulty radiator cap

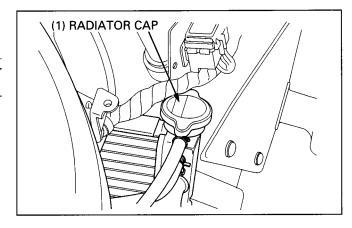
### SYSTEM TESTING

#### **A** WARNING

 The engine must be cool before removing the radiator cap, or severe scalding may result.

#### **COOLANT (HYDROMETER TEST)**

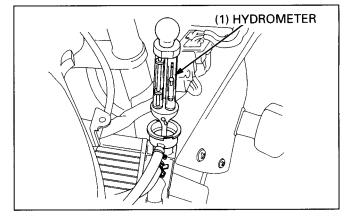
Remove the radiator cap.



Test the coolant mixture with a hydrometer.

For maximum corrosion protection, a 50 – 50% solution of ethylene glycol and distilled water is recommended (page 6-4).

Look for contamination and replace the coolant if necessary.



#### RADIATOR CAP/SYSTEM PRESSURE INSPECTION

Remove the radiator cap (see above).

#### NOTE

Before installing the cap in the tester, wet the sealing surfaces.

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 6 seconds.

#### **RADIATOR CAP RELIEF PRESSURE:**

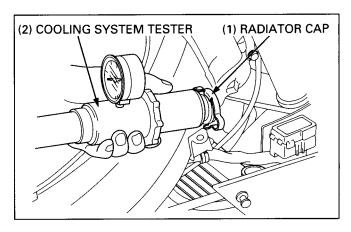
108 - 137 kPa (1.1 - 1.4 kgf/cm<sup>2</sup>, 16 - 20 psi)

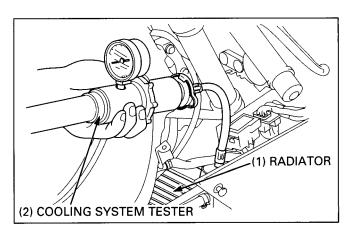
Pressure the radiator, engine and hoses, and check for leaks.

#### **CAUTION**

• Excessive pressure can damage the cooling system components. Do not exceed 137 kPa (1.4 kgf/cm², 20 psi).

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





### **COOLANT REPLACEMENT**

#### **PREPARATION**

#### **A** WARNING

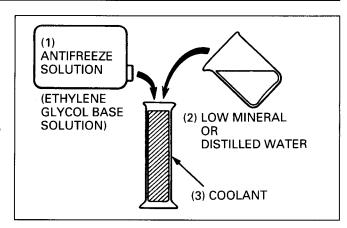
- Radiator coolant is toxic. Keep it away from eyes, mouth, skin and clothes.
  - If any coolant gets in your eyes, rinse them with water and consult a doctor immediately.
  - If any coolant in swallowed, induce vomiting, gargle and consult a physician immediately.
  - If any coolant gets on your skin on clothes, rinse thoroughly with plenty of water.
- KEEP OUT OF REACH OF CHILDREN.

#### NOTE

- The effectiveness of coolant decreases with the accumulation of rust or if there is a change in the mixing proportion during usage. Therefore, for best performance change the coolant regularly as specified in the maintenance schedule.
- · Mix only distilled, low mineral water with the antifreeze.

#### **RECOMMENDED MIXTURE:**

50 - 50 (Distilled water and antifreeze)



#### REPLACEMENT/AIR BLEEDING

#### **A** WARNING

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

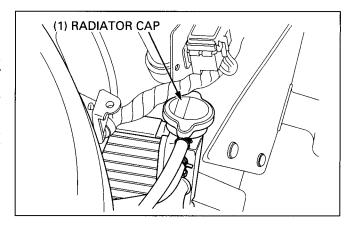
#### NOTE

 When filling the system or reserve tank with a coolant (checking coolant level), place the motorcycle in a vertical position on a flat, level surface.

Remove the radiator cap.

Remove the drain bolt on the water pump cover and drain the system coolant.

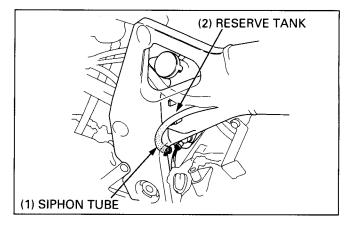
Reinstall the drain bolt with the new sealing washer.



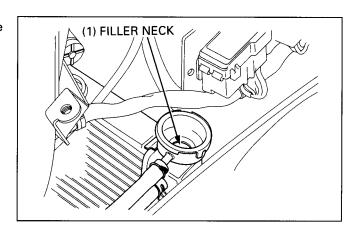
Remove the radiator reserve tank mounting bolt (page 6-12).

Disconnect the siphon tube and drain the reserve tank coolant. Empty the coolant and rinse the inside of the reserve tank with water.

Reinstall the radiator reserve tank and tighten the bolt (page 6-13).



Fill the system with the recommended coolant through the filler opening up to filler neck.



Remove the radiator reserve tank cap and fill the reserve tank to the upper level line.

Bleed air from the system as follow:

- 1. Shift the transmission into neutral. Start the engine and let it idle for 2 3 minutes.
- 2. Snap the throttle 3 4 times to bleed air from the system.
- 3. Stop the engine and add coolant up to the proper level if necessary. Reinstall the radiator cap.
- 4. Check the level of coolant in the reserve tank and fill to the upper level if it is low.

### **THERMOSTAT**

#### **REMOVAL**

Drain the coolant (page 6-4). Remove the carburetor (page 5-5).

Disconnect the upper radiator hose and air bleed tube from the thermostat housing.

Remove the bolts and thermostat housing cover.

#### **COOLING SYSTEM**

Remove the O-ring and thermostat.

#### **INSPECTION**

#### **A** WARNING

- Wear insulated gloves and adequate eye protection
- Keep flammable materials away from the electric heating element.

Visually inspect the thermostat for damage.

Heat the water with an electric heating element to operating temperature for 5 minutes.

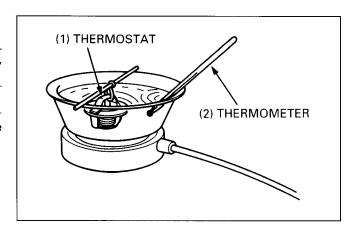
Suspend the thermostat in heated water to check its operation.

#### NOTE

 Do not let the thermostat or thermometer touch the pan, or you will get false reading.

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

THERMOSTAT BEGIN TO OPEN:  $80-84~^{\circ}\text{C}$  (176 – 183 °F) VALVE LIFT: 8~mm (0.3 in) minimum at 95 °C (203 °F)



#### **INSTALLATION**

Install the thermostat into the cylinder head with its hole facing upward.

Install a new O-ring into the groove of the thermostat housing cover.

Install and tighten the housing cover bolts.

Connect the radiator upper hose and air bleed tube to the housing cover.

Fill the system with recommended coolant and bleed the air (page 6-5).

Install the carburetor (page 5-19).

### **RADIATOR**

#### **REMOVAL**

Drain the coolant (page 6-4).
Remove the middle and lower cowls (Section 2)

Disconnect the siphon tube and air bleed tube from the radiator

Disconnect the upper radiator hose.

Disconnect the fan motor switch connector.

Disconnect the lower radiator hose.

Remove the upper and lower radiator mounting bolts, collars and radiator assembly.

#### **CAUTION**

• Be careful not to damage the radiator core.

#### **DISASSEMBLY**

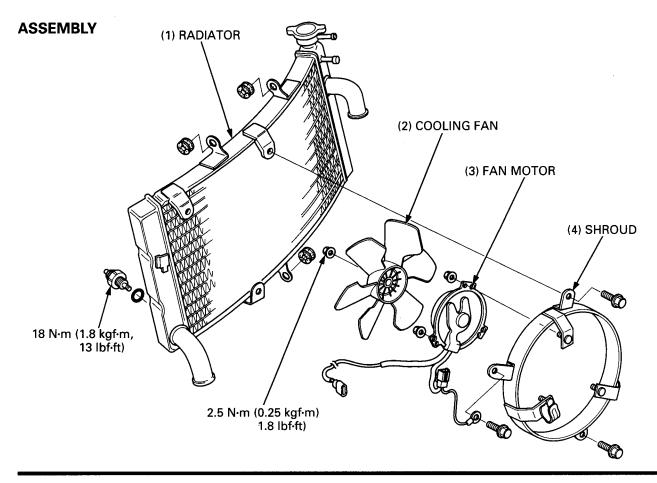
Disconnect the fan motor switch connector and release the cord from the clamps.

Remove the three SH bolts, ground eyelet and fan motor/shroud assembly.

Remove the nut and cooling fan.

Remove the nuts and fan motor.

For fan motor switch information, refer to page 19-14.



Install the fan motor onto the shroud and tighten the nuts.	
Install the cooling fan onto the fan motor shaft by aligning the flat surfaces.	
Apply a locking agent to the cooling fan nut threads. Install the tighten the nut to the specified torque.	
TORQUE: 2.5 N·m (0.25 kgf·m, 1.8 lbf·ft)	
Install the fan motor/shroud assembly onto the radiator. Route the fan motor switch cord and ground eyelet properly. Install and tighten the SH bolts.	
Connect the fan motor switch cord to the fan motor switch and clamp it as shown.	

#### **COOLING SYSTEM**

#### **INSTALLATION**

#### **CAUTION**

• Be careful not to damage the radiator core.

Install the radiator aligning its grommet with the boss on the frame.

Install the upper and lower mounting collars and bolts. Tighten the bolts securely.

Connect the fan motor connector.

Connect the lower radiator hose.

Connect the upper radiator hose.

Connect the siphon tube and air bleed tube to the radiator.

Fill the system with recommended coolant (page 6-5). Install the middle and lower cowls (Section 2).

### **WATER PUMP**

#### **MECHANICAL SEAL INSPECTION**

Inspect the telltale hole for signs of coolant leakage. If there is leakage, the mechanical seal is defective and replace the water pump as an assembly.

#### **REMOVAL**

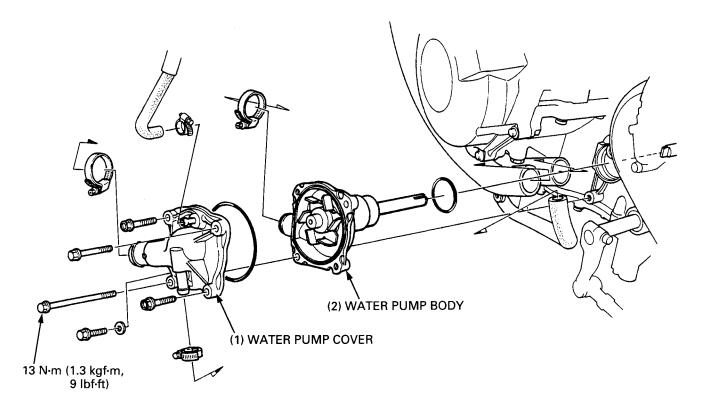
Disconnect the following:

- Water pump-to-cylinder head hose
- Water pump-to-oil cooler hose
- Lower radiator hose

Remove the two SH bolts, two flange bolts and water pump cover.

Remove the O-ring from the water pump body. Disconnect the water pump-to-water joint hose and remove the water pump body from the crankcase.

#### INSTALLATION



#### **COOLING SYSTEM**

Apply engine oil to a new O-ring and install it onto the stepped portion of the water pump.

Install the water pump into the crankcase while aligning the water pump shaft groove with the oil pump shaft end.

Connect the water pump-to-water joint hose and tighten the clamp screw.

Align the mounting bolt holes in the water pump and crankcase and make sure the water pump is securely installed.

Install a new O-ring into the groove in the water pump.

Install the water pump cover and tighten the four bolts to the specified torque.

TORQUE: 13 N·m (1.3 kgf·m, 9 lbf·ft)

Connect the following:

- Lower radiator hose
- Water pump-to-oil cooler hose
- Water pump-to-cylinder head hose

### **RADIATOR RESERVE TANK**

#### **REMOVAL**

Remove the shock absorber (page 14-9).

Remove the radiator reserve tank mounting bolt.

Release the bosses from the frame hole and slit, then remove the radiator reserve tank from the frame.

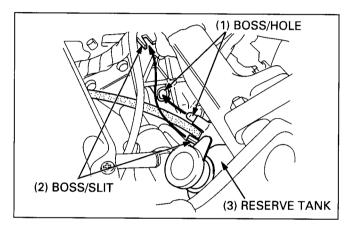
Disconnect the overflow tube and siphon tube. Drain the coolant from the reserve tank.

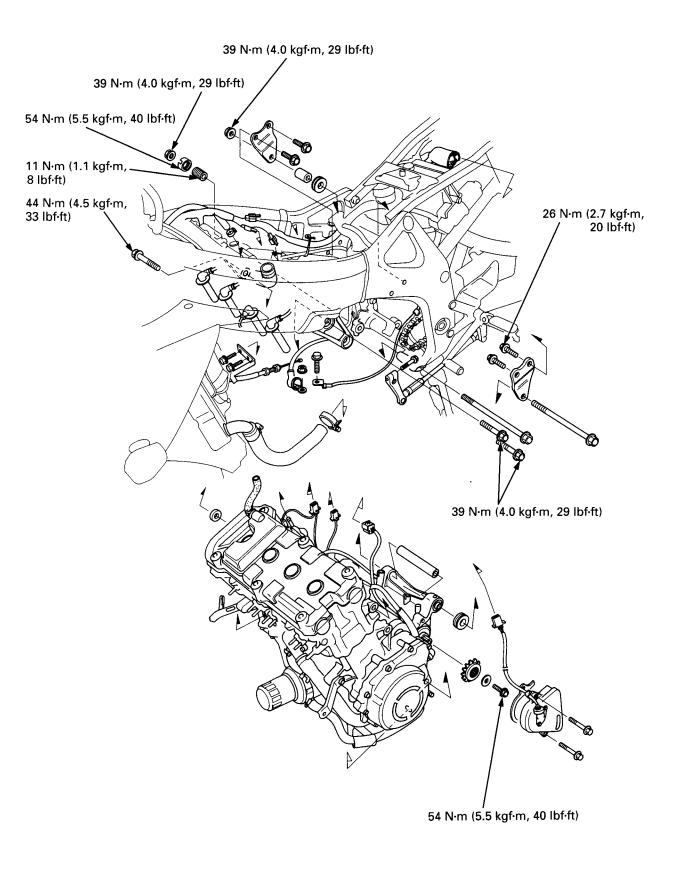
#### **INSTALLATION**

Installation is in the reverse order of removal.

#### NOTE

 Install the radiator reserve tank aligning its bosses with the frame hole and slit.





### 5

# 7. ENGINE REMOVAL/INSTALLATION

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

### SERVICE INFORMATION

#### **GENERAL**

· During engine removal and installation, support the motorcycle using a safety stand or hoist.

#### **CAUTION**

- Do not use the oil filter as a jacking point.
- · The following components can be serviced with the engine installed in the frame.
  - Alternator (Section 10)
  - -- Clutch (Section 9)
  - Cylinder head/valves (Section 8)
  - Gearshift linkage (Section 9)
  - Oil cooler (Section 4)
  - Oil pump (Section 4)
  - Shift forks/shift drum (Section 9)
  - Water pump (Section 6)
- · The following components require engine removal for service.
  - Crankshaft/transmission (Section 12)
  - Piston/cylinder (Section 11)

#### **SPECIFICATIONS**

	ITEM	SPECIFICATIONS
Engine dry weight	Except SW, AR type	66.9 kg (147.5 lbs)
	SW, AR type	68.2 kg (150.4 lbs)
Coolant capacity Radiator and engine		2.77 liter (2.93 US qt, 2.44 Imp qt)
Engine oil capacity	At disassembly	4.4 liter (3.8 US qt, 3.9 lmp qt)

#### **TORQUE VALUES**

Left engine hanger bolt	39 N·m (4.0 kgf·m, 29 lbf·ft)
Right engine hanger bolt	44 N·m (4.5 kgf·m, 33 lbf·ft)
Engine hanger bolt (Rear/upper)	39 N·m (4.0 kgf·m, 29 lbf·ft)
(Rear/lower)	39 N·m (4.0 kgf·m, 29 lbf·ft)
Engine hanger adjusting bolt	11 N·m (1.1 kgf·m, 8 lbf·ft)
Engine hanger adjusting bolt lock nut	54 N·m (5.5 kgf·m, 40 lbf·ft)
Engine hanger plate bolt	26 N·m (2.7 kgf·m, 20 lbf·ft)
Drive sprocket bolt	54 N·m (5.5 kgf·m, 40 lbf·ft)

#### **TOOLS**

Lock nut wrench 07HMA – MR70200

### **ENGINE REMOVAL**

Remove	the	follow	ring:

- Middle and lower cowl (Section 2)
- Fuel tank (page 2-2)
- Exhaust system (page 2-12)
- Carburetor (page 5-5)

Disconnect the alternator 3P connector and side stand switch connector.

Release the alternator and side stand switch wires from the clamp.

Disconnect the following connector:

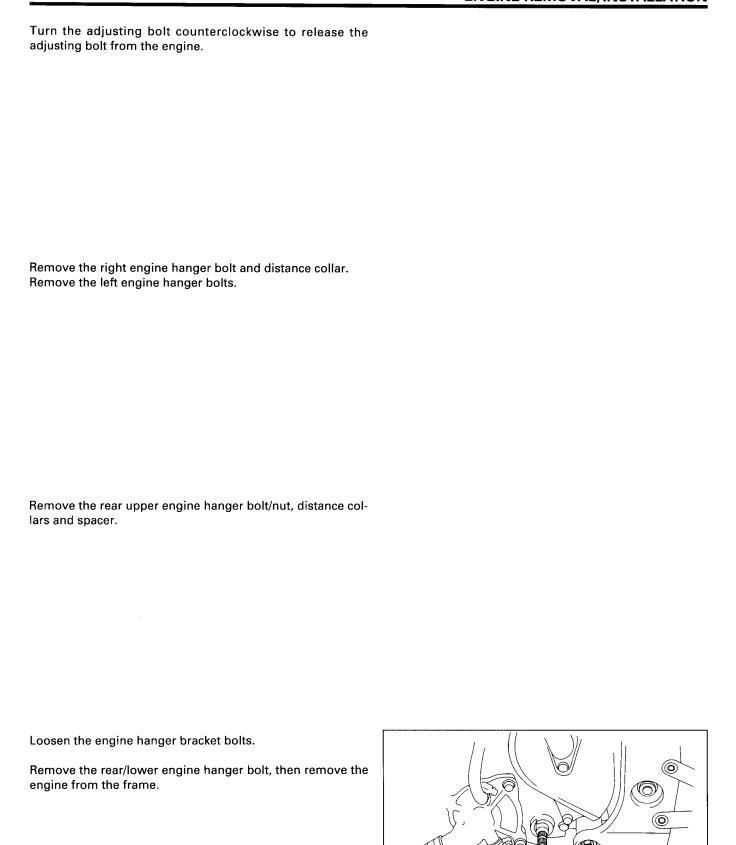
- Ignition pulse generator 2P (Black) connector
- Speed sensor 3P (Black) connector
- Oil pressure switch/neutral switch/thermo sensor 3P (Black) connector

Disconnect the air bleed tube and upper radiator hose from the thermostat housing cover.

Disconnect the spark plug caps.

Remove the bolt and starter motor ground cable. Remove the nut and starter motor cable.
Remove the clutch cable from the holder and lifter arm.
Remove the radiator lower bracket bolts.
Disconnect the lower radiator hose from the water pump
cover.  Remove the bolt and gearshift pedal link.





(1) ENGINE HANGER BOLT (REAR/LOWER)

### **ENGINE REMOVAL/INSTALLATION**

### **ENGINE INSTALLATION**

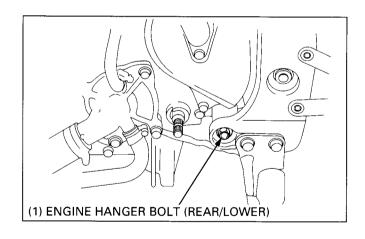
If the engine hanger plates are removed, install the hanger plates and loosely install the bolts.

#### NOTE

· Note the direction of the hanger bolts.

Install the engine into the frame.

Install the rear/lower engine hanger bolt.



Install the rear upper engine hanger bolt with the distance collars and spacers.

Install the	distance collar and right engine hanger bolt.
	left engine hanger bolts.

#### **CAUTION**

• Install the right and left front engine hanger bolts in their proper locations. Improper installation will damage the cylinder head.

Tighten the engine hanger adjusting bolt to the specified torque.

TORQUE: 11 N·m (1.1 kgf·m, 8 lbf·ft)

Hold the adjusting bolt and tighten the adjusting bolt lock nut to the specified torque.

TOOL:

Lock nut wrench

07HMA - MR70200

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

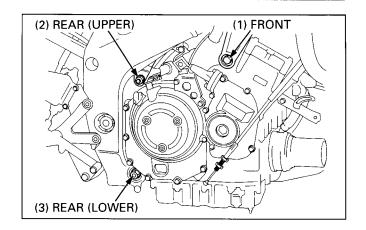
Install the rear lower engine hanger nut.

#### **ENGINE REMOVAL/INSTALLATION**

Tighten all engine hanger bolts to the specified torque.

#### TORQUE:

Front (right): 44 N·m (4.5 kgf·m, 33 lbf·ft) Front (left): 39 N·m (4.0 kgf·m, 29 lbf·ft) Rear (upper): 39 N·m (4.0 kgf·m, 29 lbf·ft) Rear (lower): 39 N·m (4.0 kgf·m, 29 lbf·ft)



Install the drive sprocket with its "16T" mark facing outward. Install the washer and tighten the bolt to the specified torque.

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

Install the guide plate and drive sprocket cover and tighten the SH bolts.

Install the gearshift pedal link aligning the punch marks. Tighten the bolt securely.

Connect the lower radiator hose and tighten the clamp screw.

#### **ENGINE REMOVAL/INSTALLATION**

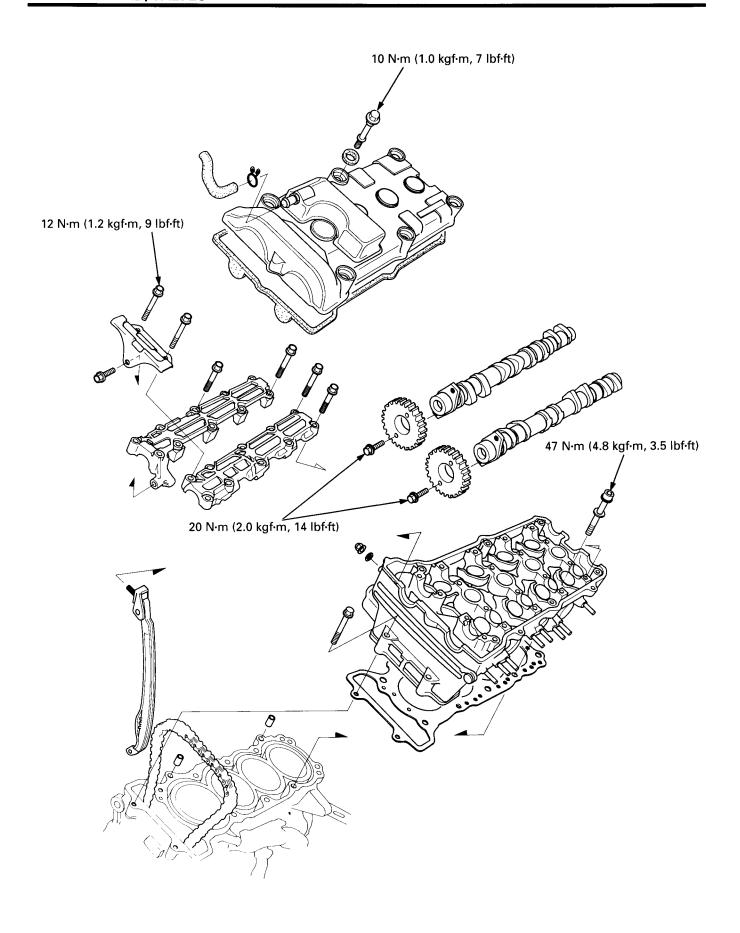
Connect the following connector:

- Ignition pulse generator 2P (Black) connector
- Speed sensor 3P (Black) connector
- Oil pressure switch/neutral switch/thermo sensor 3P (Black) connector

Connect the upper radiator hose and air bleed tube to the thermostat housing cover.

Connect the alternator 3P connector and side stand switch connector.

Install the removed parts in the reverse order of removal.



Ω_1	VALVE SEAT INSPECTION!	
	REFACING	8-15
	CYLINDER HEAD ASSEMBLY	8-17
	CYLINDER HEAD INSTALLATION	8-19
		8-20
		0-20
8-9	INSTALLATION	8-24
8-10	CAM CHAIN TENSIONER LIFTER	8-25
8-11		
8-14		
	8-11	REFACING  8-4 CYLINDER HEAD ASSEMBLY  8-4 CYLINDER HEAD INSTALLATION  CAMSHAFT INSTALLATION  CYLINDER HEAD COVER INSTALLATION  CAM CHAIN TENSIONER LIFTER  8-11

## **SERVICE INFORMATION**

#### **GENERAL**

- · This section covers service of the cylinder head, valves and camshaft.
- The cylinder head, valves and camshaft services can be done with the engine installed in the frame.
- When disassembling, mark and store the disassembled parts to ensure that they are reinstalled in their original locations.
- Clean all disassembled parts with cleaning solvent and dry them by blowing them off with compressed air before inspection.
- Camshaft lubricating oil is fed through oil passages in the cylinder head. Clean the oil passages before assembling cylinder head.
- · Be careful no to damage the mating surfaces when removing the cylinder head cover and cylinder head.

#### **SPECIFICATIONS**

Unit: mm (in)

Cylinder compression		STANDARD	SERVICE LIMIT	
		1,177 kPa (12.0 kgf/cm², 171 psi) at 500 – 600 min <sup>-1</sup> (rpm)		
Cylinder head	warpage			0.10 (0.004)
Valve, valve	Valve clearance	IN	0.13 - 0.19 (0.005 - 0.007)	
guide		EX	0.19 - 0.25 (0.007 - 0.010)	
	Valve stem O.D.	IN	4.475 – 4.490 (0.1762 – 0.1768)	4.465 (0.1758)
		EX	4.465 - 4.480 (0.1758 - 0.1764)	4.455 (0.1754)
	Valve guide I.D.	IN	4.500 – 4.512 (0.1772 – 0.1776)	4.540 (0.1787)
Stem-to-guide clearance  Valve guide projection above cylinder head  Valve seat width		EX	4.500 – 4.512 (0.1772 – 0.1776)	4.540 (0.1787)
	IN	0.010 - 0.037 (0.0004 - 0.0015)		
	EX	0.020 - 0.047 (0.0008 - 0.0019)		
		IN	14.60 – 14.80 (0.575 – 0.583)	
	cylinder head	EX	14.80 – 15.00 (0.583 – 0.591)	
	Valve seat width	IN/EX	0.90 - 1.10 (0.035 - 0.043)	1.5 (0.06)
Valve spring	Inner	IN/EX	35.77 (1.408)	34.07 (1.341)
free length	Outer	IN/EX	39.69 (1.563)	37.79 (1.488)
Valve lifter	Valve lifter O.D.	IN/EX	25.978 – 25.993 (1.0228 – 1.0233)	25.97 (1.022)
	Valve lifter bore I.D.	IN/EX	26.010 - 26.026 (1.0240 - 1.0246)	26.04 (1.025)

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT		
Camshaft	Camshaft Cam lobe height Except F, SW, AR type  F Type	Except F, SW,	IN	36.040 - 36.280 (1.4189 - 1.4283)	36.01 (1.418)
		AR type	EX	35.800 - 36.040 (1.4094 - 1.4189)	35.77 (1.408)
		IN	33.240 – 33.480 (1.3087 – 1.3181)	33.21 (1.307)	
			EX	35.100 – 35.340 (1.3819 – 1.3913)	35.07 (1.381)
		SW, AR type	IN	34.940 – 35.180 (1.3756 – 1.3850)	34.91 (1.374)
	EX	35.100 – 35.340 (1.3819 – 1.3913)	35.07 (1.381)		
	Runout			<del></del>	0.05 (0.002)
Oil clearance		0.020 - 0.062 (0.0008 - 0.0024)	0.10 (0.004)		

#### **TORQUE VALUES**

Breather plate flange bolt 12 N·m (1.2 kgf·m, 9 lbf·ft) Apply a locking agent to the threads Cylinder head stud bolt 25 N·m (2.6 kgf·m, 19 lbf·ft) Cylinder head cover special bolt 10 N·m (1.0 kgf·m, 7 lbf·ft) Camshaft holder flange bolt 12 N·m (1.2 kgf·m, 9 lbf·ft) Cylinder head socket bolt 47 N·m (4.8 kgf·m, 35 lbf·ft) Apply oil to the threads Cam sprocket bolt 20 N·m (2.0 kgf·m, 14 lbf·ft) Apply a locking agent to the threads Cam chain tensioner lifter mounting bolt 12 N·m (1.2 kgf·m, 9 lbf·ft) Air bleed tube joint 25 N·m (2.5 kgf·m, 18 lbf·ft)

#### **TOOLS**

Compression gauge attachment 07RMJ - MY50100 Valve spring compressor 07757 - 0010000 Valve spring compressor attachment 07959 - KM30101 Tappet hole protector 07HMG - MR70002 Valve guide driver 07HMD - ML00101 Adjustable valve guide driver 07743 - 0020000Valve guide reamer, 4.5 mm 07HMH - ML00101 Valve seat cutters these are commercially available Seat cutter, 27.5 mm (45° IN/EX) 07780 - 0010200 Flat cutter, 30 mm (32° IN) 07780 - 0012200 Flat cutter, 27 mm (32° EX) 07780 - 0013300Interior cutter, 30 mm (60° IN/EX) 07780 - 0014000 Cutter holder, 4.5 mm 07781 - 0010600

## **TROUBLESHOOTING**

- Engine top-end problems usually affect engine performance. These problem can be diagnosed by a compression test
  or by tracing engine noises to the top-end with a sounding rod stethoscope.
- If the performance is poor at low speeds, check for white smoke in the crankcase breather tube. If the tube is smoky, check for a seized piston ring (Section 9).

## Compression too low, hard staring or poor performance at low speed

- Valves:
  - Incorrect valve adjustment
  - Burned or bent valve
  - Incorrect valve timing
  - Broken valve spring
  - Uneven valve seating
- · Cylinder head:
  - Leaking or damaged head gasket
  - Warped or cracked cylinder head
- Worn cylinder, piston or piston rings (Section 9)

#### Compression too high, overheating or knocking

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

#### **Excessive smoke**

- · Cylinder head:
  - Worn valve stem or valve guide
  - Damaged stem seal
- · Worn cylinder, piston or piston rings (Section 9)

#### **Excessive noise**

- Cylinder head:
  - Incorrect valve adjustment
  - Sticking valve or broken valve spring
  - Damaged or worn camshaft
  - Loose or worn cam chain
  - Worn or damaged cam chain tensioner
  - Worn cam sprocket teeth
- Worn cylinder, piston or piston rings (Section 9)

#### Rough idle

· Low cylinder compression

## CYLINDER COMPRESSION TEST

#### **A** WARNING

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

Warm up the engine to normal operating temperature. Stop the engine and remove the all spark plug caps and remove the one spark plug at a time.

#### NOTE

 To measure the cylinder compression of each cylinder, remove only one plug at a time.

Install a compression gauge.

#### TOOL:

#### Compression gauge attachment 07RMJ - MY50100

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

#### NOTE

 To avoid discharging the battery, do not operate the starter motor for more than seven seconds.

#### Compression pressure:

1,177 kPa (12.0 kgf/cm<sup>2</sup>, 171 psi) at 500 - 600 min<sup>-1</sup> (rpm)

Low compression can be caused by:

- Blown cylinder head gasket
- Improper valve adjustment
- Valve leakage
- Worn piston ring or cylinder

High compression can be caused by:

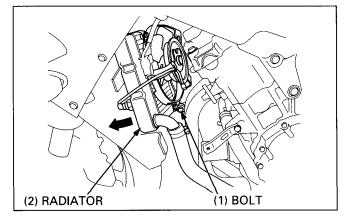
Carbon deposits in combustion chamber or on piston head

## CYLINDER HEAD COVER REMOVAL

Remove the following:

- Fuel tank (page 2-2)
- Middle/lower cowl (page 2-6)
- Air cleaner housing (page 5-4)
- Ignition coil assembly (page 17-6)

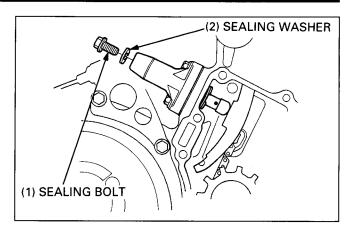
Remove the radiator lower mounting bolt and move the radiator forward.



Disconnect the breather tube from the cylinder head cover.	
Remove the following:  — Special bolts	
— Washers	
<ul><li>— Cylinder head cover</li><li>— Packing</li></ul>	
CAMSHAFT REMOVAL	
Remove the cylinder head cover (page 8-4).	
Remove the crankshaft hole cap and O-ring.	
Turn the crankshaft clockwise, align the "T" mark on the ignition pulse generator rotor with the index mark on the	
ignition pulse generator rotor cover.	
Make sure the No. 1 piston is at TDC (Top Dead Center) on the compression stroke.	

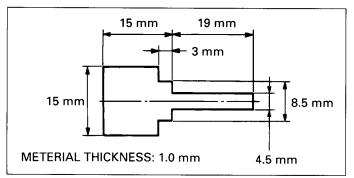
Remove the bolts and air deflector.

Remove the cam chain tensioner lifter sealing bolt and sealing washer.



Turn the tensioner lifter shaft fully in (clockwise) and secure it using the stopper tool.

This tool can easily be made from a thin (1 mm thickness) piece of steel.



If you plan to replace the camshaft and/or cam sprocket, loosen the cam sprocket bolts as follow:

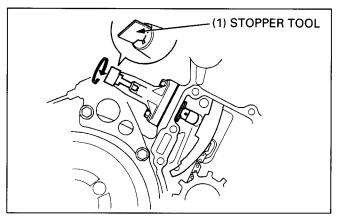
#### NOTE

- It is not necessary to remove the cam sprocket from the camshaft except when replacing the camshaft and/or cam sprocket.
- Remove the cam sprocket bolt from intake and exhaust camshafts.

#### NOTE

- Be careful not to drop the cam sprocket bolts into the crankcase.
- Turn the crankshaft one full turn (360°), remove the other cam sprocket bolt from the camshafts.
- Remove the cam sprocket from the camshaft.

Remove the cam chain guide B bolt.



Loosen and remove the camshaft holder bolts, then remove the cam chain guide B, camshaft holders and camshafts.

#### **CAUTION**

 From outside to inside, loosen the bolts in a crisscross pattern in several steps or the camshaft holder might break.

#### NOTE

- Suspend the cam chain with a piece of wire to prevent the chain from falling into the crankcase.
- It is not necessary to remove the dowel pins from the camshaft holders.

Remove the valve lifters and shims.

#### NOTE

- · Be careful not to damage the valve lifter bore.
- Shim may stick to the inside of the valve lifter. Do not allow the shims to fall into the crankcase.
- Mark all valve lifters and shims to ensure correct reassembly in their original locations.
- The valve lifter can be easily removed with a valve lapping too or magnet.
- The shims can be easily removed with a tweezers or magnet.

#### **INSPECTION**

#### **CAMSHAFT HOLDER**

Inspect the bearing surface of the camshaft holder for scoring, scratches, or evidence of insufficient lubrication. Inspect the oil orifices of the holders for clogging.

#### **CAMSHAFT RUNOUT**

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

SERVICE LIMIT: 0.10 mm (0.004 in)

#### **CAM LOBE HEIGHT**

Using a micrometer, measure each cam lobe height.

#### **SERVICE LIMITS:**

IN: Except F, SW, AR type: 36.01 mm (1.418 in)
F type: 33.21 mm (1.307 in)
SW, AR type: 34.91 mm (1.374 in)
EX: Except F, SW, AR type: 35.77 mm (1.408 in)
F, SW, AR type: 35.07 mm (1.381 in)

#### **CAMSHAFT OIL CLEARANCE**

Wipe any oil from the journals of the camshaft, cylinder head and camshaft holders.

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

Install the camshaft holders and tighten the bolts in a criss-cross pattern in 2 –3 steps.

#### NOTE

Do not rotate the camshaft when using plastigauge.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Remove the camshaft holders and measure the width of each plastigauge.

The widest thickness determines the oil clearance.

#### SERVICE LIMIT: 0.10 mm (0.004 in)

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

Replace the cylinder head and camshaft holders as a set if the clearance still exceeds the service limit.

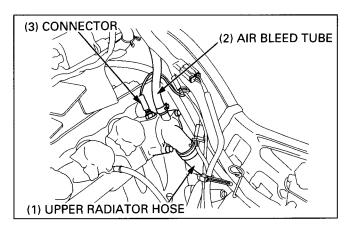
#### **CAM CHAIN GUIDE B**

Inspect the cam chain guide for wear or damage.

## CYLINDER HEAD REMOVAL

Remove the camshaft (page 8-3).

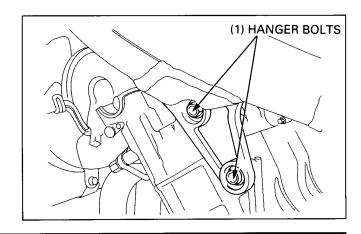
Disconnect the coolant temperature sensor connector. Remove the air bleed tube and upper radiator hose from the thermostat housing cover (page 6-5).

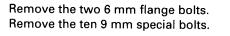


Remove the cam chain tensioner mounting cap nut and sealing washer.

Remove the cam chain tensioner.

Remove the engine hanger bolts and collar.







 Loosen the 9 mm special bolts in a crisscross pattern in 2 – 3 steps.

Remove the cylinder head.

Remove the dowel pins and cylinder head gasket.

Remove the ignition pulse generator rotor cover (page 17-7).

Remove the bolt, cam chain guide and collar.

## **CYLINDER HEAD DISASSEMBLY**

Remove the spark plugs from the cylinder head.

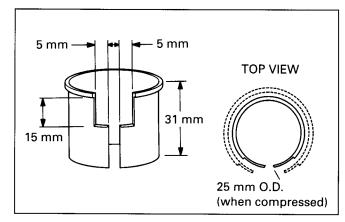
Install the tappet hole protector into the valve lifter bore.

TOOL:

Tappet hole protector

07HMG - MR70002

An equivalent tool can easily be made from a plastic 35 mm film container as shown.



Remove the valve spring cotters using the special tools as shown.

#### TOOLS:

Valve spring compressor Valve spring compressor attachment 07959 - KM30101

07757 - 0010000

#### **CAUTION**

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

#### Remove the following:

- Spring retainer
- Outer and inner valve springs
- Valve
- Stem seal
- Inner and outer valve spring seats

#### NOTE

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

## CYLINDER HEAD INSPECTION

#### **CYLINDER HEAD**

Remove carbon deposits from the combustion chambers. Check the spark plug hole and valve areas for cracks.

#### NOTE

Avoid damaging the gasket surface.

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

SERVICE LIMIT: 0.10 mm (0.004 in)

#### **CAM CHAIN TENSIONER/CAM CHAIN GUIDE**

Inspect the cam chain tensioner and guide for excessive wear or damage, replace if necessary.

#### **VALVE SPRING**

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

**SERVICE LIMITS:** 

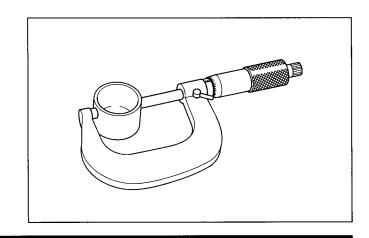
Inner: 34.07 mm (1.341 in) Outer: 37.79 mm (1.488 in)

Replace the springs if they are shorter than the service limits.

#### **VALVE LIFTER**

Inspect each valve lifter for scratches or abnormal wear. Measure the each valve lifter O.D.

**SERVICE LIMIT: 25.97 mm (1.022 in)** 

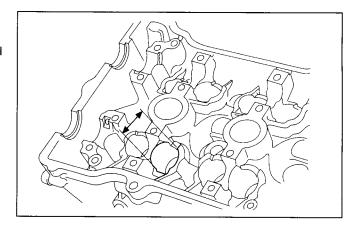


#### **VALVE LIFTER BORE**

Inspect each valve lifter bore for scratches or abnormal wear

Measure the each valve lifter bore I.D.

**SERVICE LIMIT: 26.04 mm (1.025 in)** 



#### **VALVE/VALVE GUIDE**

Inspect each valve for bending, burning or abnormal stem wear.

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

#### SERVICE LIMITS:

IN: 4.465 mm (0.1758 in) EX: 4.455 mm (0.1754 in)

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

Insert the reamer from the combustion chamber side of the head and always rotate the reamer clockwise.

#### TOOL:

Valve guide reamer, 4.5 mm 07HMH - ML00101

Measure and record each valve guide I.D.

**SERVICE LIMIT: IN/EX: 4.540 mm (0.1787 in)** 

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

#### STANDARDS:

IN: 0.010 - 0.037 mm (0.0004 - 0.0015 in) EX: 0.020 - 0.047 mm (0.0008 - 0.0019 in)

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

If the stem-to-guide clearance out of standards with new guides also, replace the valves and guides.

#### NOTE

 Reface the valve seats whenever the valve guides are replaced (page 8-15).

## VALVE GUIDE REPLACEMENT

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

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

#### **A** WARNING

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

#### **CAUTION**

Do not use a torch to heat the cyulinder head; it may cause warping.

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

TOOL:

Valve guide driver

07HMD - ML00101

Adjust the tool setting depth with a pair of vernier calipers as shown.

DEPTH: IN: 14.60 - 14.80 mm (0.575 - 0.583 in)

EX: 14.80 - 15.00 mm (0.583 - 0.591 in)

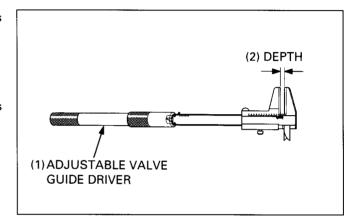
TOOL:

Adjustable valve guide driver

07743 - 0020000

Drive in the guide from the top of the head.

Let the cylinder head cool to room temperature.



Ream the new valve guide after installation.

Insert the reamer from the combustion chamber side of the head and also always rotate the reamer clockwise.

TOOL:

Valve guide reamer, 4.5 mm

07HMH - ML00101

NOTE

· Use cutting oil on the reamer during this operation.

Clean the cylinder head thoroughly to remove any metal parti-

Reface the valve seat (see next page).

## **VALVE SEAT INSPECTION/REFACING**

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

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

Remove and inspect the valves.

#### **CAUTION**

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

Inspect the width of each valve seat.

STANDARD: 0.90 - 1.10 mm (0.035 - 0.043 in) SERVICE LIMIT: 1.5 mm (0.06 in)

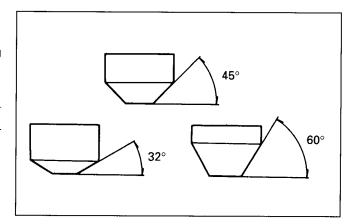
If the seat is too wide, too narrow or has low spots, the seat must be ground.

#### **VALVE SEAT REFACING**

Valve seat cutters/grinders or equivalent valve seat refacing equipment are recommended to correct worn valve seats.

#### NOTE

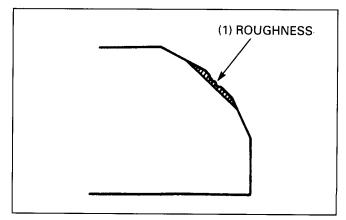
Follow the refacing manufacture's operating instructions.



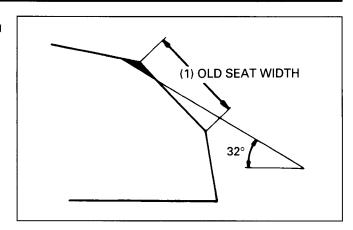
Use a 45 degrees cutter to remove any roughness or irregularities from the seat.

#### NOTE

 Reface the seat with a 45 degrees cutter whenever a valve guide is replaced.

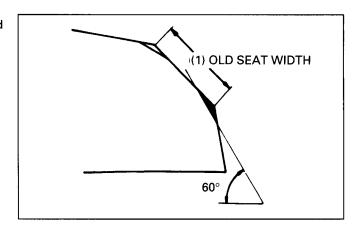


Use a 32 degrees cutter to remove the 1/4 of the existing valve seat material.



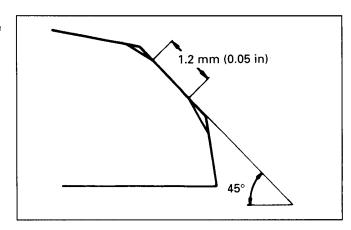
Use a 60 degrees cutter to remove the bottom 1/4 of the old seat.

Remove the cutter and inspect the area you have refaced.



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

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

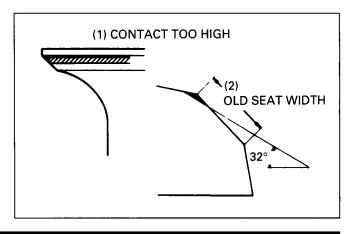


Apply a thin coating of Prussian Blue to the valve seat. Press the valve through the valve guide and onto the seat to make a clear pattern.

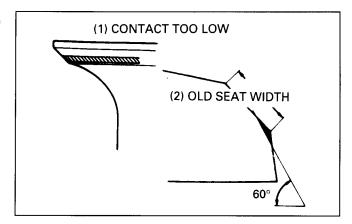
#### NOTE

 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 degrees flat cutter.



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



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

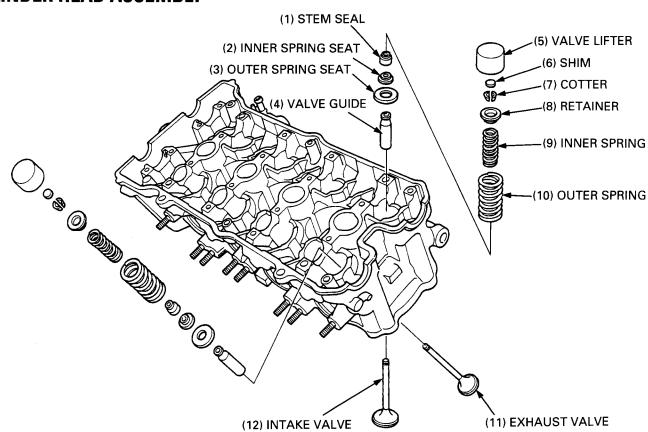
After cutting the seat, apply lapping compound to the valve face, and lap the valve using light pressure.

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



Clean the cylinder head assembly with solvent and blow through all oil passages with compressed air.

Install the inner and outer valve spring seats. Install the new stem seals.

#### NOTE

• The intake stem seal has identification projection on the outer surface. Install each stem seal in their proper position.

Lubricate the valve stems with molybdenum disulfide oil and insert the valve into the valve guide.

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

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

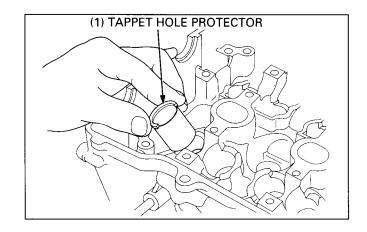
Install the valve spring retainer.

Install the tappet hole protector into the valve lifter bore.

TOOL:

Tappet hole protector

07HMG - MR70002



Install the valve cotters using the special tool as shown. To prevent loss of tension, do not compress the valve spring more than necessary.

TOOL:

Valve spring compressor 07757 - 0010000 Valve spring compressor attachment 07959 - KM30101 Tap the valve stems gently with two plastic hammers as shown to seat the cotters firmly.

#### **CAUTION**

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

## CYLINDER HEAD INSTALLATION

Install the collar onto the cam chain guide pivot. Install the cam chain guide and tighten the bolt.

Install the ignition pulse generator rotor cover (page 17-9).

Install the dowel pins and a new cylinder head gasket as shown.

Install the cylinder head.

Apply oil to the threads and seating surface of the 9 mm special bolts/washers and install them. Install the two 6 mm flange bolts.

Tighten the 9 mm special bolts in a crisscross pattern in 2 – 3 steps to the specified torque.

TORQUE: 47 N·m (4.8 kgf·m, 35 lbf·ft)

Tighten the 6 mm flange bolts.

Install the engine hanger collar and bolts.

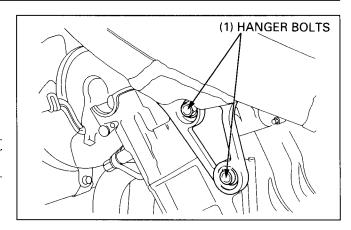
Tighten the hanger bolts to the specified torque.

TORQUE:

RIGHT: 44 N·m (4.5 kgf·m, 33 lbf·ft) LEFT: 39 N·m (4.0 kgf·m, 29 lbf·ft)

#### **CAUTION**

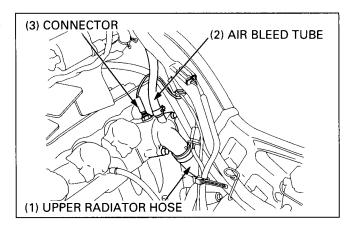
 Install the right and left front engine hanger bolts in their proper locations. Improper installation will damage the cylinder head.



Install the cam chain tensioner into the cylinder head. Install the new sealing washer and tighten the nut.

Connect the upper radiator hose and air bleed tube to the themostat housing cover.

Connect the coolant temperature sensor connector.



## **CAMSHAFT INSTALLATION**

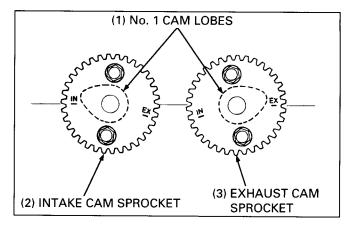
Apply molybdenum disulfide oil to the outer surface of the each valve lifter.

Install the shims and valve lifters into the valve lifter bores.

If the cam sprockets are removed, install the cam sprockets onto the camshafts.

#### NOTE

- Install the intake cam sprocket with the timing mark (IN) facing outward and the No.1 cam lobes facing up and out as shown.
- Install the exhaust cam sprocket with the timing mark (EX) facing outward and the No. 1 cam lobes facing up and out as shown.



Clean and apply a locking agent to the cam sprocket bolt threads.

Temporarily install the cam sprocket bolts.

Turn the crankshaft clockwise and align the "T" mark on the ignition pulse generator rotor with the index mark on the ignition pulse generator rotor cover.

Apply molybdenum disulfide oil to the camshaft journals of the cylinder head and camshaft holder.

Install the cam chain over the cam sprockets and then install the intake and exhaust camshafts.

#### NOTE

- Install the each camshaft to the correct locations with the identification marks.
  - "IN": Intake camshaft
  - "EX": Exhaust camshaft
- Make sure that the timing marks on the cam sprockets are facing outward and flush with the cylinder head upper surface as shown.

Install the camshaft holders onto the camshafts.

#### NOTE

- Install the each camshaft holder to the correct locations with the identification marks.
  - "IN": Intake camshaft holder
  - "EX": Exhaust camshaft holder

Temporarily install the eighteen holder bolts until the cam holders lightly contact the cylinder head surface.

#### **CAUTION**

• Tightening the camshaft holder bolts on only one-side might cause a camshaft holder to break.

Install the cam chain guide B, cam chain guide mounting bolt and remaining camshaft holder bolts.

While pushing the cam chain guide B to the direction of the camshaft holder, temporarily tighten the holder bolts.

Tighten all camshaft holder bolts in the numerical order casted on the camshaft holder.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

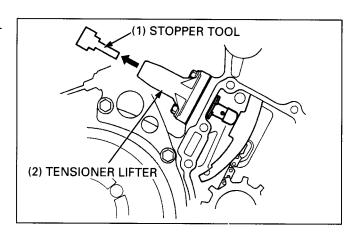
In case the cam sprockets were removed, tighten the cam sprocket bolts to the specified torque.

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

Turn the crankshaft clockwise one full turn (360°) and tighten the other cam sprocket bolts.

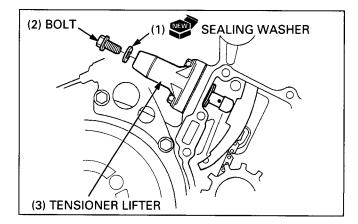
Tighten the cam chain guide B bolt.

Remove the stopper tool from the cam chain tensioner lifter.



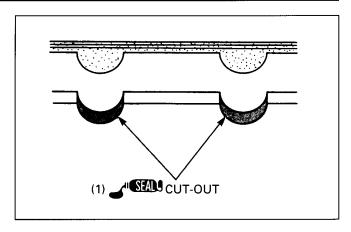
Install a new sealing washer and tighten the sealing bolt.

Recheck the valve timing.



## **CYLINDER HEAD COVER INSTALLATION**

Apply sealant to the cylinder head semi-circular cut-outs as shown.



Install the cylinder head packing into the groove of the cylinder head cover.

Install the cylinder head cover onto the cylinder head. Install the washers with their "UP" mark facing up.

Install and tighten the cylinder head cover special bolts to the specified torque.

#### NOTE

Tighten the "△" marked side bolts first.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Connect the breather tube.

Install the air deflector and tighten the bolts.

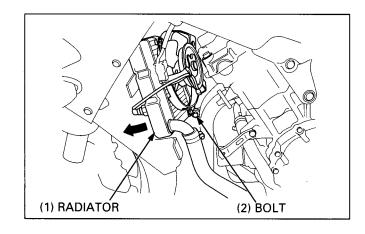
#### NOTE

• While install the air deflector, route the main wire harness and air bleed tube properly as shown.

Install and tighten the radiator lower mounting bolt.

Install the following:

- Ignition coil assembly (page 17-6)
- Air cleaner housing (page 5-4)
- Middle/lower cowl (page 2-6)
- Fuel tank (page 2-2)

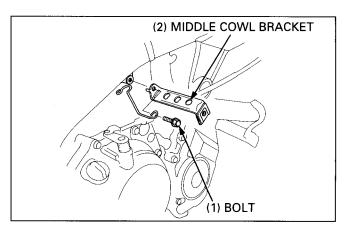


# CAM CHAIN TENSIONER LIFTER

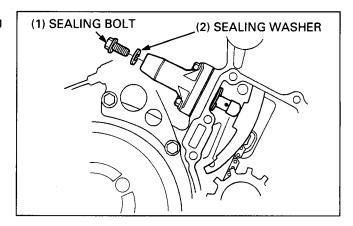
#### **REMOVAL**

Remove the right middle cowl (page 2-6).

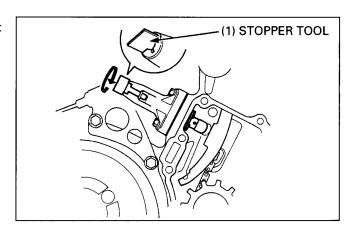
Remove the bolt and right middle cowl bracket.



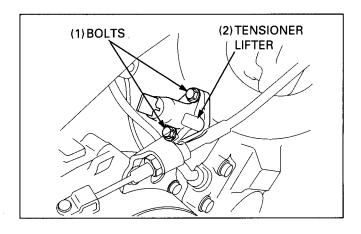
Remove the cam chain tensioner sealing bolt and sealing washer.



Turn the tensioner shaft fully in (clockwise) and secure it using the stopper tool to prevent damaging the cam chain. See page 8-6 for detail of the tool.



Remove the bolts and cam chain tensioner lifter. Remove the gasket.

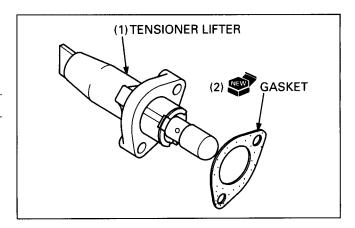


#### **INSTALLATION**

Install the new gasket onto the cam chain tensioner lifter.

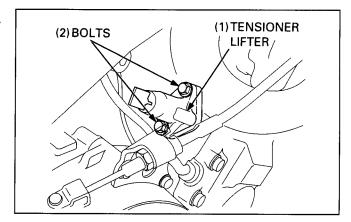
#### NOTE

Note the direction of the gasket.



Install the cam chain tensioner lifter into the crankcase, tighten the mounting bolts to the specified torque.

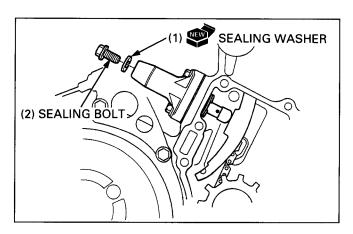
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

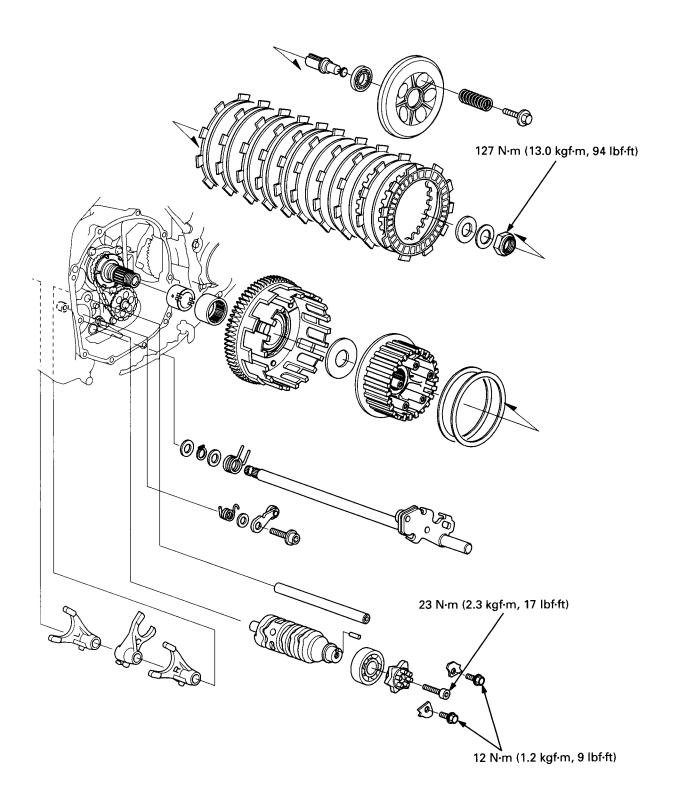


Remove the stopper tool.

Install a new sealing washer and tighten the sealing bolt securely.

Install the removed parts in the reverse order of removal.





## 9. CLUTCH/GEARSHIFT LINKAGE

SERVICE INFORMATION	9-1	CLUTCH	9-4
TROUBLESHOOTING	9-2	GEARSHIFT LINKAGE	9-11
RIGHT CRANKCASE COVER REMOVAL	9-3	RIGHT CRANKCASE COVER INSTALLATION	9-16

## **SERVICE INFORMATION**

#### **GENERAL**

- This section covers service of the clutch, gearshift linkage, shift drum and shift forks. All service can be done with the
  engine installed in the frame.
- Transmission oil viscosity and level have an effect on clutch disengagement. When the clutch does not disengage or the motorcycle creeps with clutch disengaged, inspect the transmission oil level before servicing the clutch system.

#### **SPECIFICATIONS**

Unit: mm (in)

	ITEM		TEM STANDARD	
Clutch lever free	play		10 – 20 (3/8 – 3/4)	
Clutch spring free	elength		50.2 (1.98)	49.2 (1.93)
Clutch disc thickn	ess		2.62 – 2.78 (0.103 – 0.109)	2.3 (0.09)
Clutch plate warp	Clutch plate warpage			0.30 (0.012)
Clutch outer guide		I.D.	24.9935 – 25.0035 (0.98399 – 0.98451)	25.016 (0.9849)
		O.D.	34.975 – 34.991 (1.3770 – 1.3776)	34.965 (1.3766)
Mainshaft O.D. at	Mainshaft O.D. at clutch outer guide		24.980 – 24.993 (0.9835 – 0.9840)	24.96 (0.983)
Shift fork, fork Fork shaft	Fork	1.D.	12.000 - 12.021 (0.4724 - 0.4733)	12.03 (0.474)
		Claw thickness	5.93 - 6.00 (0.233 - 0.236)	5.9 (0.23)
L	Fork shaft O.D.		11.957 – 11.968 (0.4707 – 0.4712)	11.95 (0.470)

#### **TORQUE VALUES**

Right crankcase cover SH bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	
Clutch center lock nut	127 N·m (13.0 kgf·m, 94 lbf·ft)	Apply oil to the threads
		Stake the nut
Gearshift pedal spring stopper	23 N·m (2.3 kgf·m, 17 lbf·ft)	
Shift drum center bolt	23 N·m (2.3 kgf·m, 17 lbf·ft)	Apply a locking agent to the threads
Shift drum bearing set plate bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply a locking agent to the threads
TOOLS		

#### TOOLS

Clutch center holder	07724 - 0050002
Driver	07749 - 0010000
Attachment, 37 x 40 mm	07746 - 0010200
Attachment, 42 x 47 mm	07746 - 0010300
Pilot, 35 mm	07746 - 0040800

## **TROUBLESHOOTING**

#### Hard to shift

- · Incorrect clutch adjustment
- · Improper oil viscosity
- · Bent shift fork
- · Bent shift fork shaft
- · Bent fork claw
- · Damaged shift drum cam groove
- · Loose stopper plate bolt
- Damaged stopper plate and pin
- Damaged gearshift spindle

#### Transmission jumps out of gear

- · Worn shift drum stopper arm
- · Weak or broken shift arm return spring
- · Loose stopper plate bolt
- · Bent shift fork shaft
- · Damaged shift drum cam groove
- · Damaged or bent shift forks
- · Worn gear engagement dogs or slots

#### Gearshift pedal will not return

- Weak or broken gearshift spindle return spring
- · Bent gearshift spindle

#### Clutch lever too hard to pull in

- · Damaged, kinked or dirty clutch cable
- · Damaged clutch lifter mechanism
- · Faulty clutch lifter bearing
- · Clutch lifter piece installed improperly

#### Clutch slips when accelerating

- · Incorrect clutch adjustment
- · Worn clutch disc
- · Weak clutch springs
- Transmission oil mixed with molybdenum or graphite additive

#### Motorcycle creeps with the engine idling

- · Incorrect clutch adjustment
- · Clutch plate warped
- · Loose clutch lock nut
- · Oil level too high
- · Improper oil viscosity
- · Damaged clutch lifter mechanism
- · Clutch lifter piece installed improperly

RIGHT CRANKCASE COVER REMOVAL
Drain the engine oil (page 3-12).
Remove the clutch cable holder SH bolts and clutch cable holder, then disconnect the clutch cable from the clutch arm.
Remove the right crankcase cover SH bolts and right crankcase cover.
Remove the gasket and dowel pins.
Temere the gusket und dower pins.
CLUTCH LIFTER INSPECTION
Remove the clutch lifter arm, return spring and washer.
Check the return spring for fatigue or damage. Check the clutch lifter arm shaft for wear or bending.

### **CLUTCH/GEARSHIFT LINKAGE**



Hold the clutch center with the remove the lock nut.	ne clutch center holder, the	n	
TOOL: Clutch center holder	07724 - 0050002		
Discard the lock nut.			
Remove the lock washer, thrus	it washer and clutch center.		
Remove the washer.			
riemove the washer.			
Remove the ignition pulse gene	erator rotor cover (page 17-7)		
Align the primary drive gear an driver as shown. Pull out the clutch outer and ou		ı	

### **CLUTCH/GEARSHIFT LINKAGE**

#### **INSPECTION**

#### Clutch lifter bearing

Turn the inner race of the lifter bearing with your finger. The bearing should turn smoothly and freely without excessive play.

If necessary replace the bearing.

#### Clutch spring

Measure the clutch spring free length.

SERVICE LIMIT: 49.2 mm (1.93 in)

#### **Clutch center**

Check the grooves of the clutch center for damage or wear caused by the clutch plates.
Replace if necessary.

#### Clutch disc

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

Measure the disc thickness of each disc.

SERVICE LIMIT: 2.3 mm (0.09 in)

#### Clutch plate

Check each disc plate for warpage on a surface plate using a feeler gauge.

SERVICE LIMIT: 0.30 mm (0.012 in)

#### Clutch outer/clutch outer guide

Check the slots of the clutch outer for damage or wear caused by the clutch discs.
Replace if necessary.

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

SERVICE LIMITS: O.D.: 34.965 mm (1.3766 in)

I.D.: 25.016 mm (0.9849 in)

#### Mainshaft

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

SERVICE LIMIT: 24.96 mm (0.983 in)

#### Judder spring/spring seat

Check the spring and seat for damage or warpage.

#### CLUTCH OUTER NEEDLE BEARING REPLACE-MENT

Press the needle bearing out of the clutch outer using the special tools.

#### TOOLS:

 Driver
 07749 – 0010000

 Attachment, 37 x 40 mm
 07746 – 0010200

 Pilot, 35 mm
 07746 – 0040800

Press a new needle bearing into the clutch outer so that the casing of the needle bearing is flush with the inner edge of the clutch outer as shown.

#### NOTE

 Press the needle bearing into the clutch outer with the marked side facing up.

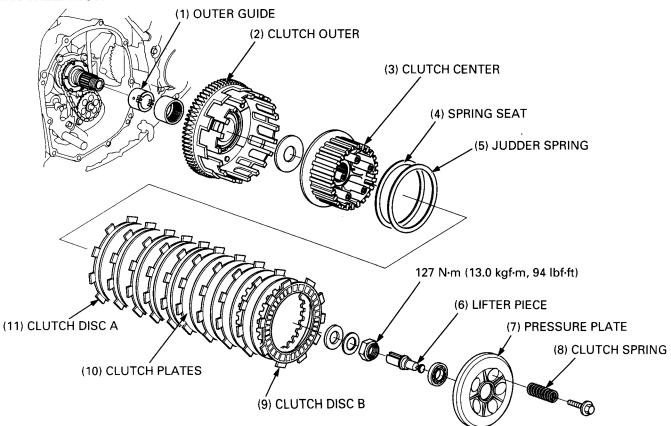
#### TOOLS:

 Driver
 07749 – 0010000

 Attachment, 42 x 47 mm
 07746 – 0010300

 Pilot, 35 mm
 07746 – 0040800

#### INSTALLATION



Install the clutch outer guide onto the mainshaft.	
Align the primary drive gear and sub-gear teeth with a screw driver as shown.	
Install the clutch outer.	
Install the washer onto the clutch outer.	
Install the clutch center.	
Install the thrust washer. Install the lock washer with its "OUT MM4" mark facing out.	

#### **CLUTCH/GEARSHIFT LINKAGE**

Install the new lock nut.

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

TOOL:

Clutch center holder

07724 - 0050002

TORQUE: 127 N·m (13.0 kgf·m, 94 lbf·ft)

Stake lock nut into the mainshaft groove with a punch.

Coat the clutch discs, plates with clean engine oil.

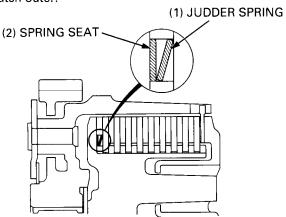
Install the spring seat and judder spring onto the clutch center as shown.

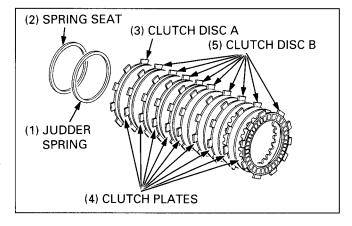
Install the clutch disc A (larger I.D. disc) into the clutch outer.

Stack the clutch discs and plates alternately.

#### NOTE

- · Note the direction of the judder spring.
- Install the outer clutch disc B in the shallow slot on the clutch outer.





install the litter bearing into the pressure plate.
Install the clutch lifter piece into the mainshaft. Install the pressure plate.
Install the clutch springs and flange bolts. Tighten the bolts in a crisscross pattern in 2-3 steps.
Install the right crakcase cover (page 9-16).
GEARSHIFT LINKAGE
CLANSIII I LINKAGL
GEARSHIFT LINKAGE REMOVAL
Remove the following:  — Right crankcase cover (page 9-3)  — Clutch assembly (page 9-4)
Remove the bolt and gearshift pedal link.

Pull the gearshift spindle assembly and thrust washer out of

the crankcase.

CLUTCH/GEARSHIFT LINKAGE
Remove the following:  — Stopper arm bolt  — Stopper arm  — Return spring  — Washer  — Socket bolt  — Gearshift cam  — Dowel pin
GEARSHIFT LINKAGE INSPECTION
Check the gearshift sprindle for wear, damage or bending. Check the return spring for fatigue or damage.
SHIFT DRUM/SHIFT FORK REMOVAL
Remove the gearshift linkage (page 9-11).
Remove the bolts and shift drum bearing set plates.
Remove the shift fork shaft and shift forks.

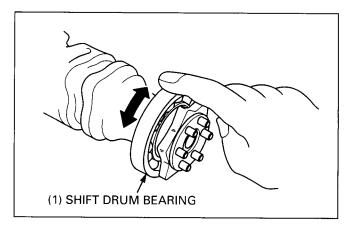
	OEOTOTI/GEAROITI I ERNAG
Remove the shift drum bearing and shift drum.	
SHIFT DRUM/SHIFT FORK INSPECTION	
Check the shift fork and fork shaft for wear or damage.	
Measure the I.D. of the shift fork.	
SERVICE LIMIT: 12.03 mm (0.474 in)	
Measure the shift fork claw thickness.	
SERVICE LIMIT: 5.9 mm (0.23 in)	
M	
Measure the O.D. of the shift fork shaft.	
SERVICE LIMIT: 11.95 mm (0.470 in)	
Inspect the shift drum grooves for wear or damage.	

## **CLUTCH/GEARSHIFT LINKAGE**

Turn the outer race of the shift drum bearing with your finger.

The bearing should turn smoothly and freely without excessive play.

If necessary replace the bearing.



### SHIFT DRUM/SHIFT FORK INSTALLATION

Install the shift drum and shift drum bearing

#### NOTE

- · The shift forks have location marks.
  - "R" for right
  - "C" for center
  - "L" for left

Apply molybdenum disulfide oil to shifter fork groove of the shift gears.

Install the shift forks on the transmission.

Install the shift fork shaft.

#### NOTE

Face the shift fork identification marks to the rightward.

Install the bearing set plates with their "OUT" marks facing out.

Apply a locking agent to the threads of the set plate bolts. Install and tighten the set plate bolts to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Install the gearshift linkage (see below).

#### **GEARSHIFT LINKAGE INSTALLATION**

Install the following:

- --- Washer
- Return spring
- Stopper arm

Tighten the stopper arm bolt.

Install the dowel pin onto the shift drum. Install the gearshift cam while holding the stopper arm using a screwdriver as shown.

Apply a locking agent to the gearshift cam socket bolt threads.

Install and tighten the socket bolt to the specified torque.

TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)

### **CLUTCH/GEARSHIFT LINKAGE**

Install the thrust washer and gearshift spindle assembly into the crankcase while aligning the spring ends with the crankcase stopper pin.

Install the gearshift pedal link aligning its slit with the punch mark on the gearshift spindle. Install and tighten the pinch bolt.

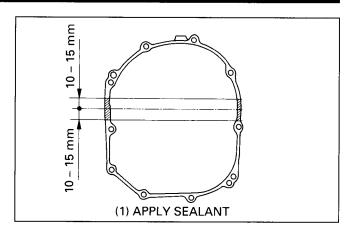
# RIGHT CRANKCASE COVER INSTALLATION

Install the following:

- Dust seal
- --- Washer
- Return spring
- Clutch lifter arm

#### NOTE

 Hook the return spring end onto the right crankcase cover. Apply a sealant to the mating surfaces of the crankase as shown.



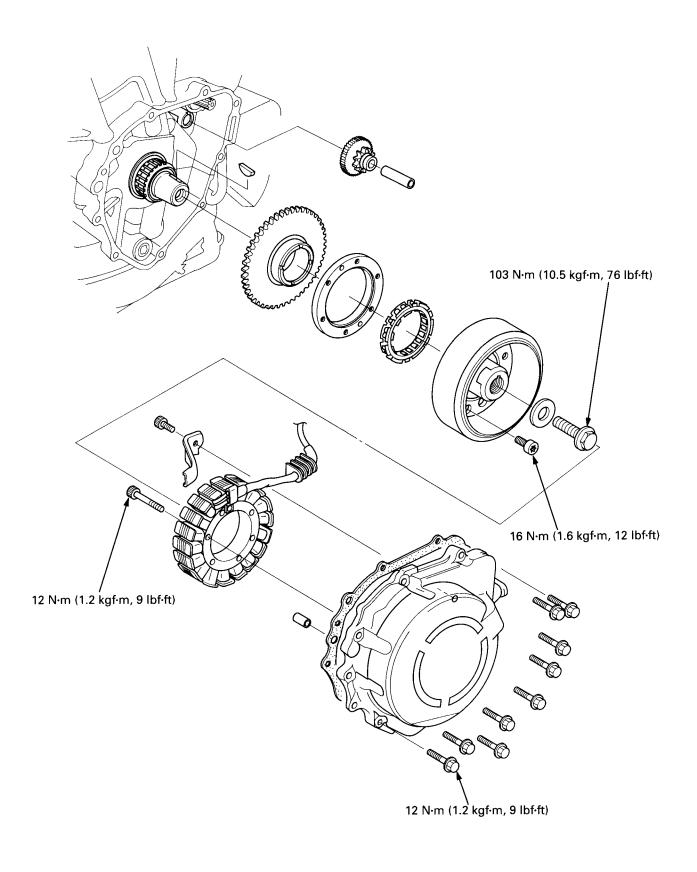
Install the dowel pins and new gasket.

Install the right crankcase cover.

Connect the clutch cable to the clutch lifter arm and set the bracket, then install and tighten the right crankcase cover bolts to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Pour the recommended engine oil (page 3-12).



## 10

# 10. ALTERNATOR/STARTER CLUTCH

SERVICE INFORMATION	10-1	FLYWHEEL REMOVAL	10-4
TROUBLESHOOTING	10-1	STARTER CLUTCH	10-5
ALTERNATOR COVER REMOVAL	10-2	FLYWHEEL INSTALLATION	10-7
STATOR	10-3	ALTERNATOR COVER INSTALLATION	10-8

# **SERVICE INFORMATION**

#### **GENERAL**

- This section covers service of the alternator, flywheel and starter clutch. All service can be done with the engine installed in the frame.
- Refer to section 16 for alternator stator inspection.

#### **SPECIFICATIONS**

Unit: mm (in)

ITEM	STANDARD	SERVICE LIMIT
Starter driven gear boss O.D.	51.699 - 51.718 (2.0354 - 2.0361)	51.684 (2.0348)

#### **TORQUE VALUES**

Left crankcase cover SH bolt

Flywheel bolt

Stator mounting socket bolt

Starter one-way clutch socket bolt

12 N·m (1.2 kgf·m, 9 lbf·ft)

103 N·m (10.5 kgf·m, 76 lbf·ft) Apply oil to the threads

12 N·m (1.2 kgf·m, 9 lbf·ft)

16 N·m (1.6 kgf·m, 12 lbf·ft)

Apply a locking agent to the threads

#### **TOOLS**

Flywheel holder Rotor puller 07725 - 0040000 07733 - 0020001

## **TROUBLESHOOTING**

#### Engine does not turn

- · Faulty starter clutch
- · Damaged idle gear/shaft

#### **ALTERNATOR/STARTER CLUTCH**

## **ALTERNATOR COVER REMOVAL**

Remove the seat and middle/lower cowl (Section 2).

Disconnect the alternator 3P (White) connector.

Release the alternator wire from the wire clamp.

Remove the alternator cover SH bolts and alternator cover.

#### **CAUTION**

• The alternator cover (stator) is magnetically attached to the flywheel, be careful during removal.

#### NOTE

 The engine oil will run out when the alternator cover is removed. Set a clean oil pan under the engine and add the recommended oil to the specified level after installation.

Remove the gasket and dowel pin.

# **STATOR**

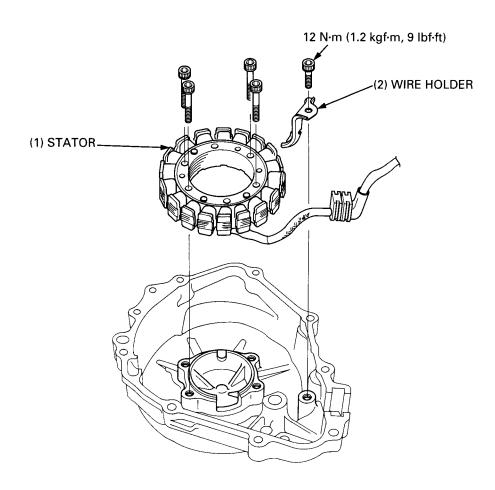
#### **REMOVAL**

Remove the alternator wire grommet from the alternator cover.

Remove the socket bolt and stator wire holder.

Remove the socket bolts and stator.

#### **INSTALLATION**



Install the stator into the alternator cover.

Apply sealant to the wire grommet, then install the wire grommet into the alternator groove securely.

Install and tighten the socket bolts to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Install the wire holder and tighten the socket bolt.

**FLYWHEEL REMOVAL** Remove the alternator cover (page 10-2). Hold the flywheel using the flywheel holder, then remove the flywheel bolt. TOOL: Flywheel holder 07725 - 0040000 Remove the washer. Remove the flywheel using the special tool. TOOL: **Rotor puller** 07733 - 0020001 Remove the woodruff key. Remove the starter idle gear shaft and idle gear.

## STARTER CLUTCH

#### **INSPECTION**

Check the operation of the one-way clutch by turning the driven gear.

You should be able to turn the driven gear counterclockwise smoothly, but the gear should not turn clockwise.

#### **DISASSEMBLY**

Remove the starter driven gear by turning it counterclockwise.

Hold the flywheel with a flywheel holder, and remove the starter clutch mounting torx bolts.

TOOL:

Flywheel holder

07725 - 0040000

Remove the starter one-way clutch assembly.

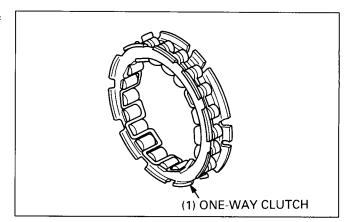
#### INSPECTION

Check the starter driven gear for abnormal wear or damage.

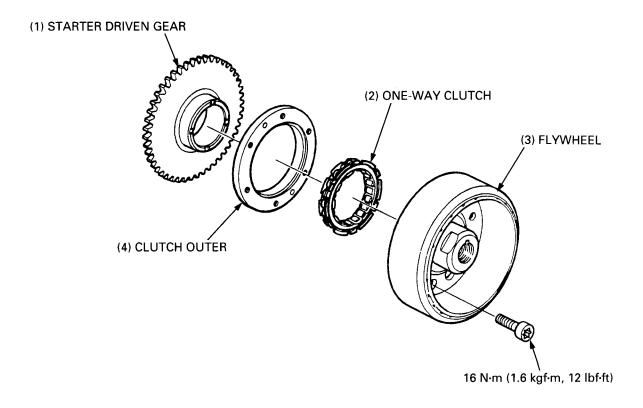
Measure the starter driven gear boss O.D.

SERVICE LIMIT: 51.684 mm (2.0348 in)

Check the one-way clutch for wear or damage and replace if necessary.



#### **ASSEMBLY**



Apply oil to the starter one-way clutch. Install the one-way clutch into the clutch outer with the flange side facing in.

Install the starter one-way clutch assembly onto the flywheel.

Apply a locking agent to the starter clutch outer mounting bolt threads.

Hold the flywheel with a flywheel holder, and tighten the starter clutch mounting torx bolts.

TOOL:

Flywheel holder

07725 - 0040000

TORQUE: 16 N·m (1.6 kgf·m, 12 lbf·ft)

Install the starter driven gear into the one-way clutch.

Recheck the one-way clutch operation.

You should be able to turn the driven gear counterclockwise smoothly, but the gear should not turn clockwise.

## **FLYWHEEL INSTALLATION**

Apply oil to the starter idle gear and gear shaft, and install them.

Clean any oil from the crankshaft taper. Install the woodruff key on the crankshaft.

#### ALTERNATOR/STARTER CLUTCH

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

Apply oil to the flywheel bolt threads and seating surface. Install the washer and flywheel bolt.

Hold the flywheel using the flywheel holder, then tighten the bolt to the specified torque.

TOOL:

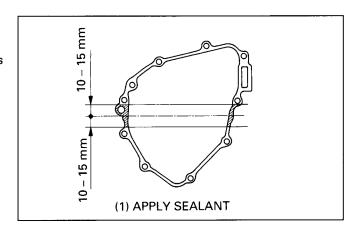
Flywheel holder

07725 - 0040000

TORQUE: 103 N·m (10.5 kgf·m, 76 lbf·ft)

## **ALTERNATOR COVER INSTALLATION**

Apply sealant to the mating surface of the crankcase as shown.



Install the dowel pin and new gasket.

Install the alternator cover.

#### **CAUTION**

• The alternator cover (stator) is magnetically attached to the flywheel, be careful during installation.

Install and tighten the SH bolts to the specified torque.

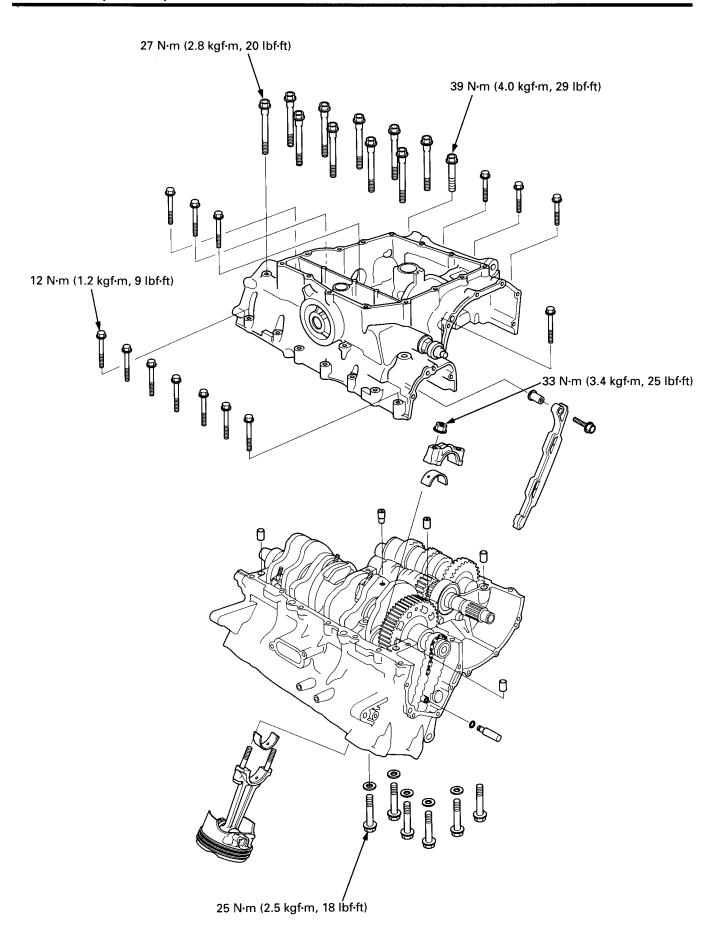
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Route the alternator wire properly (page 1-21).

Clamp the alternator wire with a wire clamp.

Connect the alternator 3P (White) connector.

Add the recommended oil up to proper level (page 3-12). Install the seat, lower and middle cowl (Section 2).



## 11

# 11. CRANKCASE/PISTON/CYLINDER

SERVICE INFORMATION	11-1	PISTON/CONNECTING ROD	11-4
TROUBLESHOOTING	11-2	CRANKCASE COMBINATION	11-12
CRANKCASE SEPARATION	11-3		

## SERVICE INFORMATION

#### **GENERAL**

- This section covers crankcase separation for service of the crankshaft and piston.
- The following parts must be removed before separating the crankcase.
  - Alternator/flywheel (Section 10)
  - Clutch/gearshift linkage (Section 9)
  - Cylinder head (Section 8)
  - Engine (Section 6)
  - Oil pump (Section 4)
- · Mark and store the disassemble parts to ensure that they are installed in their original locations.
- Mark and store the bearing inserts to be sure of their correct locations for reassembly. If the inserts are improperly
  installed, they will block the oil hole, causing insufficient lubrication and eventual engine seizure.
- The connecting rod bearing inserts are select fit and are identified by color codes. Select replacement bearings from
  the code tables. After installing new bearings, recheck them with plastigauge to verify clearance. Apply molybdenum
  disulfide oil to the crank pin during assembly.

#### **SPECIFICATIONS**

Unit: mm (in)

			SERVICE LIMIT	
	I I EIVI			
Cylinder	I.D.		71.000 – 71.015 (2.7953 – 2.7963)	71.10 (2.795)
	Out of round			0.10 (0.004)
	Taper			0.10 (0.004)
	Warpage			0.05 (0.002)
Piston, piston	Piston mark direction		"IN" mark facing toward the intake side	
rings	Piston O.D.		70.965 – 70.985 (2.7939 – 2.7947)	70.90 (2.791)
	Piston O.D. measurer	nent point	15 mm (0.6 in) from bottom of skirt	
	Piston pin bore I.D.		17.002 – 17.008 (0.6694 – 0.6696)	17.03 (0.670)
	Piston pin O.D.		16.993 – 17.000 (0.6690 – 0.6693)	16.98 (0.669)
	Piston-to-piston pin clearance		0.002 - 0.015 (0.0001 - 0.0006)	
	Piston ring-to-ring	Тор	0.030 - 0.065 (0.0012 - 0.0026)	0.08 (0.003)
	groove clearance	Second	0.015 - 0.045 (0.0006 - 0.0018)	0.07 (0.003)
	Piston ring end gap	Тор	0.28 - 0.38 (0.011 - 0.015)	0.5 (0.02)
		Second	0.40 - 0.55 (0.016 - 0.022)	0.7 (0.03)
		Oil (side rail)	0.2 – 0.7 (0.01 – 0.03)	0.9 (0.04)
Cylinder-to-piston clearance		0.015 - 0.050 (0.0006 - 0.0020)		
Connecting rod small end I.D.		17.016 – 17.034 (0.6699 – 0.6706)	17.04 (0.671)	
Connecting rod-to-piston pin clearance		0.016 - 0.041 (0.0006 - 0.0016)		
Crankpin oil cle	earance		0.030 - 0.052 (0.0012 - 0.0020)	0.06 (0.002)

#### **TORQUE VALUES**

Crankcase bolt, 10 mm	39 N·m (4.0 kgf·m, 29 lbf·ft)	
9 mm	27 N·m (2.8 kgf·m, 20 lbf·ft)	Apply oil to the threads
8 mm	25 N·m (2.5 kgf·m, 18 lbf·ft)	
6 mm	12 N·m (1.2 kgf·m, 9 lbf·ft)	
Connecting rod nut	33 N·m (3.4 kgf·m, 25 lbf·ft)	Apply oil to the threads
Lower crankcase sealing bolt, 20 mm	29 N·m (3.0 kgf·m, 22 lbf·ft)	Apply a locking agent to the threads
18 mm	44 N·m (4.5 kgf·m, 33 lbf·ft)	Apply a locking agent to the threads

## TROUBLESHOOTING

# Cylinder compression is too low, or engine is hard to start

- · Blown cylinder head gasket
- Worn, stuck or broken piston ring
- · Worn or damaged cylinder or piston
- · Bent valve, or bent and deteriorated valve seat

# Cylinder compression is too high, or engine overheats or knocks

Carbon deposites on the cylinder head and/or piston crown

#### **Piston sounds**

- · Worn cylinder, piston and/or piston ring
- · Worn piston pin hole and piston pin
- · Worn connecting rod small end

#### **Excessive smoke**

- · Worn, stuck or broken piston ring
- · Worn valve stem seal

#### **Excessive noise**

- · Worn connecting rod big end bearing
- · Bent connecting rod
- · Worn crankshaft main journal bearing
- · Worn transmission bearing

#### **Engine vibration**

· Excessive crankshaft runout

# **CRANKCASE SEPARATION**

N	Ο.	TE



# PISTON/CONNECTING ROD

#### PISTON/CONNECTING ROD REMOVAL

#### **CAUTION**

 Do not interchange the bearing inserts. They must be installed in their original locations or the correct bearing oil clearance may not be obtained causing engine damage.

#### NOTE

 Mark all pats during removal so they can be replaced in their original locations.

Remove the cap nuts and connecting rod bearing cap.

Remove the piston/connecting rod assembly from the top of the cylinder.

#### **PISTON REMOVAL**

Remove the piston pin clip with pliers. Press the piston pin out of the piston and remove the piston from the connecting rod.

#### PISTON DISASSEMBLY

Remove the piston rings.

#### NOTE

Do not damage the piston rings during removal.

Remove any carbon deposits from the piston ring grooves, using an old piston ring as shown.

#### **PISTON INSPECTION**

Temporarily install the piston rings to their proper position with the mark facing up.

Measure the piston ring-to-ring groove clearance with the rings pushed into the grooves.

#### **SERVICE LIMITS:**

Top: 0.08 mm (0.003 in) Second: 0.07 mm (0.003 in)

Inspect the piston for wear or damage.

Insert the piston ring squarely into the bottom of the cylinder and measure the ring end gap.

#### NOTE

 Push the rings into the cylinder with the top of the piston to be sure they are squarely in the cylinder.

#### **SERVICE LIMITS:**

Top: 0.5 mm (0.02 in) Second: 0.7 mm (0.03 in) Oil (side rail): 0.9 mm (0.04 in)

Measure the diameter of the piston at 15 mm (0.6 in) from the bottom and 90 degrees to the piston pin hole.

**SERVICE LIMIT: 70.90 mm (2.791 in)** 

#### CRANKCASE/PISTON/CYLINDER

Measure the piston pin bore.

**SERVICE LIMIT: 17.03 mm (0.670 in)** 

Measure the O.D. of the piston pin.

**SERVICE LIMIT: 16.98 mm (0.669 in)** 

Calculate the piston-to-piston pin clearance.

STANDARD: 0.002 - 0.015 mm (0.0001 - 0.0006 in)

#### CYLINDER INSPECTION

Inspect the top of the cylinder for warpage.

SERVICE LIMIT: 0.05 mm (0.002 in)

Inspect the cylinder bore for wear or damage.

Measure the cylinder I.D. in X and Y axis at three levels.

Take the maximum reading to determine the cylinder wear.

**SERVICE LIMIT: 71.10 mm (2.795 in)** 

Calculate the piston-to-cylinder clearance. Take a maximum reading to determine the clearance. Refer to page 11-5 for measurement of the piston O.D.

STANDARD: 0.015 - 0.050 mm (0.0006 - 0.0020 in)

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

#### **SERVICE LIMITS:**

Taper: 0.10 mm (0.004 in) Out of round: 0.10 mm (0.004 in)

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

The following oversize pistons are available:

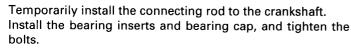
0.50 mm (0.020 in) 1.00 mm (0.039 in)

The piston to cylinder clearance for the oversize piston must be: 0.015 – 0.050 mm (0.0006 – 0.0020 in).

#### **CONNECTING ROD INSPECTION**

Measure the connecting rod small end I.D.

**SERVICE LIMIT: 17.04 mm (0.671 in)** 



Measure the connecting rod side clearance.

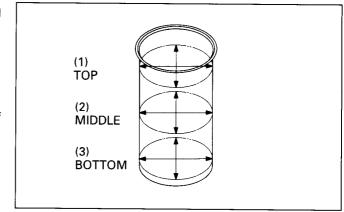
SERVICE LIMIT: 0.30 mm (0.012 in)

#### **CRANKPIN BEARING INSPECTION**

Wipe all oil from the bearing inserts and crankpins. Put a piece of plastigauge on each crankpin.

#### NOTE

- Do not put the plastigauge over the oil hole in the crankpin.
- Do not rotate the crankshaft during inspection.



#### CRANKCASE/PISTON/CYLINDER

Install the bearing caps and connecting rods on a correct crankpins, and tighten the cap nuts to the specified torque.

TORQUE: 33 N·m (3.4 kgf·m, 25 lbf·ft)

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

SERVICE LIMIT: 0.06 mm (0.002 in)

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

#### **CRANKPIN BEARING SELECTION**

Record the connecting rod I.D. code number (1, 2 or 3) or measure the I.D. with the bearing cap installed without bearing inserts.

If you are replacing the crankshaft, record the corresponding crankpin O.D. code number (A, B or C)

#### NOTE

 Numbers (A, B or C) on the crank weight are the codes for the crankpin O.D.s starting from the left.

If you are reusing the crankshaft, measure the crankpin O.D. with the micrometer.

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

#### **BEARING THICKNESS:**

A (Blue): Thick

B (Black):

C (Brown)

D (Green) ▼ E (Yellow) Thin

**CRANKPIN BEARING SELECTION TABLE** 

			CONNECTING ROD I.D. CODE LETTER			
			1	2	3	
			39.000 – 39.006 mm (1.5354 – 1.5357 in)	39.006 – 39.012 mm (1.5357 – 1.5359 in)	39.012 – 39.018 mm (1.5359 – 1.5361 in)	
CRANKPIN O.D. CODE LETTER	А	36.497 – 36.503 mm (1.4369 – 1.4371 in)	E (Yellow)	D (Green)	C (Brown)	
	В	36.491 – 36.497 mm (1.4367 – 1.4369 in)	D (Green)	C (Brown)	B (Black)	
	С	36.485 – 36.491 mm (1.4364 – 1.4367 in)	C (Brown)	B (Black)	A (Blue)	

#### **CONNECTING ROD SELECTION**

The weight code stamped on the connecting rod in an alphabetical code.

Be sure to use the connecting rods having the same weight code.

#### **CAUTION**

• If a connecting rod having the different weight code is to be used, be sure that the difference in weight (code) is held within a single weight selection.

Install the bearing inserts into the connecting rod and bearing cap.

#### NOTE

 Align the oil hole between the connecting rod and bearing, and also align the bearing tabs with the groove in the connecting rod and bearing cap.

#### **PISTON ASSEMBLY**

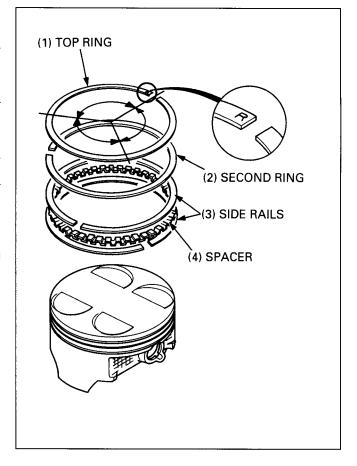
Clean the piston ring grooves thoroughly and install the piston rings.

#### NOTE

- · Apply oil to the piston rings.
- · Avoid piston and piston ring damage during installation.
- · Install the piston rings with the marking (R) facing up.
- Do not mix the top and second rings; the top ring is narrower than the second ring in width.

Space the piston ring end gaps 180 degrees apart. Do not align the gaps in the oil rings (side rails).

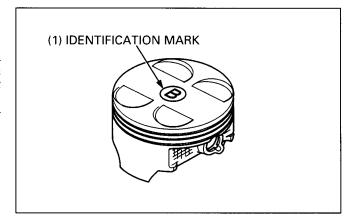
After installation, the rings should rotate freely in the ring grooves.



#### **PISTON INSTALLATION**

#### **CAUTION**

• The No. 2 and No. 3 pistons are marked "B" on the piston crown as shown. Never install the "B" pistons into the No. 1 and No. 4 cylinders.



Apply molybdenum disulfide oil to the connecting rod small

Assemble the piston and connecting rod.

#### NOTE

 Install the connecting rod with its oil hole side facing the "IN" mark on the piston crown.

(1) PISTON RING COMPRESSOR

Apply oil to the piston pin outer surface. Install the piston pin, and secure it using a new piston pin clips.

#### NOTE

 Do not align the piston pin clips end gap with the piston cut-out.

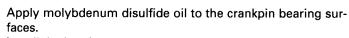
Install the piston/connecting rod assembly into the cylinder using a commercially available piston ring compressor tool.

#### **CAUTION**

- While installing the piston, being careful not to damage the top surface of the cylinder, especially around the cylinder bore.
- Be careful not to damage the cylinder sleeve and crankpin with the connecting rod bolt threads.

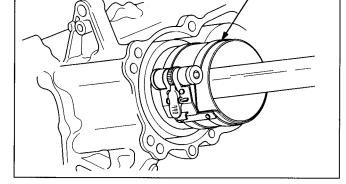
#### NOTE

Install the piston/connecting rod assembly with the piston "IN" mark facing to the intake side.



Install the bearing cap.

Apply oil to the connecting rod nut threads and seating surfaces.

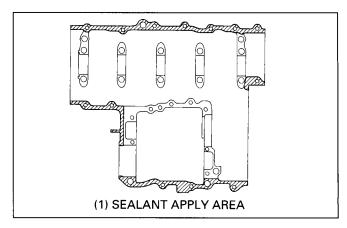


Install the nut and tighten the nuts gradually and alternately.

TORQUE: 33 N·m (3.4 kgf·m, 25 lbf·ft)

## CRANKCASE COMBINATION

Apply a light coating but through coating of liquid sealant to the crankcase mating surface except to the main bearing journal bolt (lower crankcase bolt, 9 mm) area and the oil passage area as shown.



Install the three dowel pins.
Install the oil orifice A and B into the crankcase properly.

#### NOTE

- Install the oil orifice A with its smaller oil hole side facing the lower crankcase.
- Install the oil orifice B aligning its cut-out with the upper crankcase groove and oil hole facing to the rear.

Clean the crankcase 9 mm bolts thoroughly with solvent and blow them dry.

Apply clean engine oil to the 9 mm bolt threads and seating surface and install them.

Loosely install all the lower crankcase bolts. Make sure the upper and lower crankcase are seated securely.

From the inside to outside, tighten the lower crankcase 9 mm bolts in a crisscross pattern in 2 – 3 steps.

TORQUE: 27 N·m (2.8 kgf·m, 20 lbf·ft)

Tighten the 10 mm bolt, and then the 6 mm bolts.

TORQUE: 10 mm bolt: 39 N·m (4.0 kgf·m, 29 lbf·ft) 6 mm bolt: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Install the upper crankcase bolts and sealing washers.

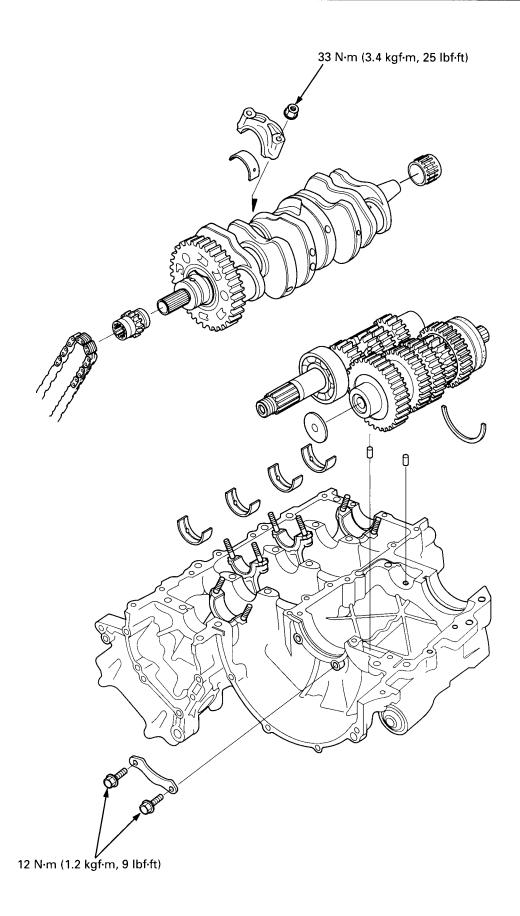
#### NOTE

The sealing washer locations are indicated on the upper crankcase using the "Δ" mark.

TORQUE: 8 mm bolt: 25 N·m (2.5 kgf·m, 18 lbf·ft) 6 mm bolt: 12 N·m (1.2 kgf·m, 9 lbf·ft)

11-12

Install the new O-ring and sealing plug.



# 12

# 12. CRANKSHAFT/TRANSMISSION

SERVICE INFORMATION	12-1	CRANKSHAFT	12-3
TROUBLESHOOTING	12-2	TRANSMISSION	12-9

# **SERVICE INFORMATION**

# **GENERAL**

- The crankcase must be separated to service the crankshaft and transmission. Refer to section 11 for crankcase separation/assembly.
- Be careful not to damage the crankshaft main journal and journal bearing while removing or installing the crankshaft.
- · Mark and store the disassemble parts to ensure that they are installed in their original locations.
- Mark and store the bearing inserts to be sure of their correct locations for reassembly. If the inserts are improperly
  installed, they will block the oil hole, causing insufficient lubrication and eventual engine seizure.
- The main journal bearing inserts are select fit and are identified by color codes. Select replacement bearings from the
  code tables. After installing new bearings, recheck them with plastigauge to verify clearance. Apply molybdenum
  disulfide oil to the main journal during assembly.

# **SPECIFICATIONS**

Unit: mm (in)

	ITEM		STANDARD	SERVICE LIMIT
Crankshaft	Side clearance		0.05 - 0.20 (0.002 - 0.008)	0.30 (0.012)
	Runout			0.30 (0.012)
	Main journal oil cle	arance	0.017 - 0.035 (0.0007 - 0.0014)	0.04 (0.002)
Transmission	Gear I.D.	M5, 6	28.000 – 28.021 (1.1024 – 1.1032)	28.04 (1.104)
		C1	24.000 – 24.021 (0.9449 – 0.9457)	24.04 (0.946)
		C2, 3, 4	31.000 – 31.025 (1.2205 – 1.2215)	31.04 (1.222)
	Bushing O.D.	M5, 6	27.959 – 27.980 (1.1007 – 1.1016)	27.94 (1.100)
	Bushing I.D.	C2	30.955 – 30.980 (1.2187 – 1.2197)	30.93 (1.218)
		C3, 4	30.950 – 30.975 (1.2185 – 1.2195)	30.93 (1.218)
		M5	24.985 – 25.006 (0.9837 – 0.9845)	25.02 (0.985)
		C2	27.985 – 28.006 (1.1018 – 1.1026)	28.02 (1.103)
	Gear-to-bushing	M5, 6	0.020 - 0.062 (0.0008 - 0.0024)	0.10 (0.004)
	clearance	C2	0.020 - 0.070 (0.0008 - 0.0028)	0.11 (0.004)
		C3, 4	0.025 - 0.075 (0.0010 - 0.0030)	0.11 (0.004)
	Mainshaft O.D.	M5	24.967 – 24.980 (0.9830 – 0.9835)	24.96 (0.983)
		Clutch outer guide	24.980 – 24.993 (0.9835 – 0.9840)	24.96 (0.983)
	Countershaft O.D.	C2	27.967 – 27.980 (1.1011 – 1.1016)	27.96 (1.101)
	Bushing-to-shaft	M5	0.005 - 0.039 (0.0002 - 0.0015)	0.08 (0.003)
	clearance	C2	0.005 - 0.039 (0.0002 - 0.0015)	0.08 (0.003)

# **CRANKSHAFT/TRANSMISSION**

# **TORQUE VALUES**

Connecting rod nut Mainshaft bearing set plate bolt 33 N·m (3.4 kgf·m, 25 lbf·ft) 12 N·m (1.2 kgf·m, 9 lbf·ft) Apply oil to the threads and seating surface Apply a locking agent to the threads

**TOOLS** 

Driver B Inner driver, 25 mm Driver shaft 07746 - 0030100 07746 - 0030200 07964 - MB00200

# **TROUBLESHOOTING**

#### **Excessive noise**

- · Worn connecting rod big end bearing
- · Bent connecting rod
- Worn crankshaft main journal bearing
- · Worn transmission bearing

# Hard to shift

- · Improper clutch operation
- · Incorrect transmission oil weight
- Incorrect clutch adjustment
- Bent shift fork
- Bent fork shaft
- Bent fork claw
- · Damaged shift drum cam groove
- · Bent shift spindle

# Transmission jumps out of gear

- · Worn gear dogs and slots
- · Bent fork shaft
- Broken shift drum stopper
- Worn or bent shift forks
- · Broken shift linkage return spring

# **Engine vibration**

· Excessive crankshaft runout

# **CRANKSHAFT**

REMOVAL
Separate the crankcase halves (page 11-3).
Remove the cam chain and timing sprocket.
Remove the connecting rod bearing cap nuts and bearing caps.
•
CAUTION
Before removal, position all the pistons at TDC (Top Dead Center)
to prevent damaging the crankpin with the connecting rod bolt threads.
threads.
threads.
threads.
threads.
threads.
Remove the crankshaft.
Remove the crankshaft.
Remove the crankshaft.

# **CRANKSHAFT/TRANSMISSION**

# PRIMARY DRIVE SUB-GEAR REMOVAL

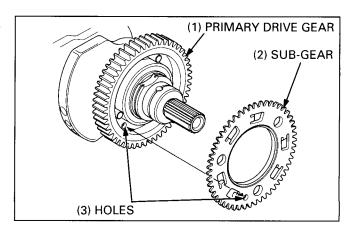
Remove the special snap ring and friction spring.

Remove the primary drive sub-gear, collar and springs.

# PRIMARY DRIVE SUB-GEAR INSTALLATION

Install the collar with its groove side facing in.

Install the primary drive sub-gear onto the primary drive gear, aligning the holes between the gear.

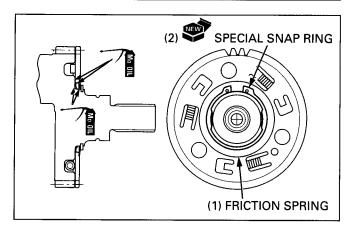


Apply molybdenum disulfide oil to the area shown in the illustration.

Install the friction spring and new special snap ring.

# **CAUTION**

- You must be use the new special snap ring. Using a snap ring other than specified or reusing the snap ring can cause severe engine damage.
- Install the new special snap ring with its large tab facing to the right and the chamfered side facing in.
- Make sure the new special snap ring end gap is aligned with the right angle of the crankshaft cut-outs as shown.



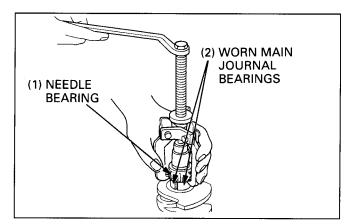
Install the springs into the primary drive gear as shown.

# STARTER CLUTCH NEEDLE BEARING REPLACEMENT

Remove the needle bearing with a commercially available universal bearing puller.

# **CAUTION**

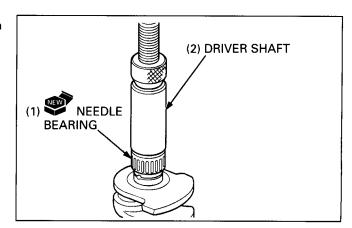
• To protect the crankshaft main journal from the bearing puller claws, cover the main journal properly; worn main journal bearings are usable as protectors.



Press a new needle bearing onto the crankshaft using a hydraulic press and special tool.

TOOL: Driver shaft

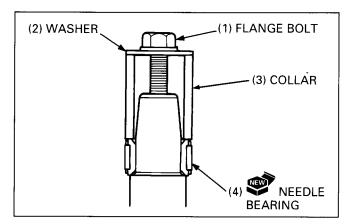
07964 - MB00200



# **CRANKSHAFT/TRANSMISSION**

If the special tool is not available, prepare the suitable collar, washer and 8 mm flange bolt (example; flywheel bolt) for the bearing installation.

Assemble the above items, and screw the bolt gradually, then install the new needle bearing.



# INSPECTION

# **CRANKSHAFT RUNOUT**

Hold the crankshaft both end.

Set a dial indicator on the center main journal of the crankshaft.

Rotate the crankshaft two revolutions and read runout at the center journal.

SERVICE LIMIT: 0.30 mm (0.012 in)

# MAIN JOURNAL BEARING

Inspect the main journal bearing inserts for damage or separation.

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

# NOTE

- Do not put the plastigauge over the oil hole in the main bearing journal of the crankshaft.
- Do not rotate the crankshaft during inspection.

Assemble the crankcase halves. Tighten the 9 mm bolts to the specified torque.

TORQUE: 27 N·m (2.8 kgf·m, 20 lbf·ft)

Remove the 9 mm bolts and lower crankcase. Measure the compressed plastigauge on each journal.

SERVICE LIMIT: 0.04 mm (0.002 in)

If main bearing clearance is beyond tolerance, select a replacement bearing.

# MAIN JOURNAL BEARING SELECTION

Record the crankcase I.D. letters from the pad on the left side of the upper crankcase as shown.

# NOTE

 The letters (A, B or C) on the upper crankcase are the codes for the journal I.D.s from left to right.

Record the corresponding main journal O.D. code numbers from the crank weight.

# NOTE

 The numbers (1, 2 or 3) on the crank weight are the codes for the main journal O.D.s from left to right.

Cross reference the case and journal codes to determine the replacement bearing color codes.

# **CRANKSHAFT/TRANSMISSION**

**BEARING THICKNESS:** 

A (Black): Thick

B (Blown): C (Green):

D (Yellow): ▼ E (Pink): Thin

# **CAUTION**

• After selecting new bearings, recheck the clearance with plastigauge. Incorrect clearance can cause severe engine damage.

# MAIN JOURNAL BEARING SELECTION TABLE

			CRANKCASE I.D. CODE LETTER			
			Α	В	С	
			37.000 – 37.006 mm (1.4566 – 1.4569 in)	37.006 – 37.012 mm (1.4569 – 1.4572 in)	37.012 – 37.018 mm (1.4572 – 1.4574 in)	
	1	34.000 – 34.006 mm (1.3386 – 1.3388 in)	E (Pink)	D (Yellow)	C (Green)	
CRANKSHAFT O.D. CODE LETTER	2	33.994 – 34.000 mm (1.3383 – 1.3386 in)	D (Yellow)	C (Green)	B (Brown)	
	3	33.988 – 33.994 mm (1.3381 – 1.3383 in)	C (Green)	B (Brown)	A (Black)	

# **INSTALLATION**

Install the main journal bearings into the upper and lower crankcase.

# NOTE

 The bearing tabs should be aligned with the grooves in the case.

Apply molybdenum disulfide oil to the upper and lower main journal bearings.

Install the crankshaft.

# **CAUTION**

 Before installation, position all the pistons at TDC (Top Dead Center) to prevent damaging the crankpin with the connecting rod threads. Install the connecting rod bearing caps.

Apply oil to the connecting rod nut threads and seating surfaces.

Install and tighten the nuts gradually and alternately.

TORQUE: 33 N·m (3.4 kgf·m, 25 lbf·ft)

Install the timing sprocket aligning the wide teeth between the crankshaft and sprocket. Install the cam chain.

Assemble the upper and lower crankcase (page 11-12).

# **TRANSMISSION**

# **REMOVAL/DISASSEMBLY**

Separate the crankcase halves (page 11-3).

Remove the bolts and mainshaft bearing set plate.

Remove the mainshaft and countershaft assembly.

Remove the orifice plate from the countershaft.

# **CRANKSHAFT/TRANSMISSION**

Remove the countershaft bearing set ring and dowel pins.

Disassemble the mainshaft and countershaft.

Check the gear dogs, dog holes and teeth for abnormal wear or lack of lubrication.

Measure the I.D. of each gear.

# **SERVICE LIMITS:**

M5, M6: 28.04 mm (1.104 in) C1: 24.04 mm (0.946 in) C2, C3, C4: 31.04 mm (1.222 in)

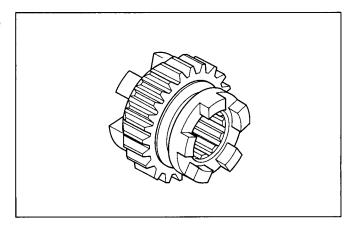
Measure the I.D. and O.D. of each gear bushing.

# **SERVICE LIMITS:**

O.D.: M5, M6: 27.94 mm (1.100 in) C2: 30.93 mm (1.218 in) C3, C4: 30.93 mm (1.218 in) I.D.: M5: 25.02 mm (0.985 in)

C2: 28.02 mm (1.103 in)

Check the shift fork groove of the shifter gear for excessive wear or damage.



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

# **SERVICE LIMITS:**

24.96 mm (0.983 in)

Clutch outer guide: 24.96 mm (0.983 in)

C2:

27.96 mm (1.101 in)

# **BEARING REPLACEMENT**

#### NOTE

· Do not try to remove the countershaft bearing from the shaft. If the bearing is worn or damaged, replace the countershaft as an assembly.

Turn the outer race of each bearing with your finger. The bearings turn smoothly and quietly. Also check that the bearing inner race fits tightly on the shaft.

Remove and discard the mainshaft bearing, if the race does not turn smoothly, quietly, or loosely fits on the mainshaft. Replace the countershaft, collar, bearing as an assembly, if the race does not turn smoothly, quietly, or loosely fits on the countershaft.

Press out the mainshaft from the bearing using a hydraulic press.

Install a new mainshaft bearing onto the mainshaft by pressing the mainshaft bearing inner race using the special tool.

TOOLS:

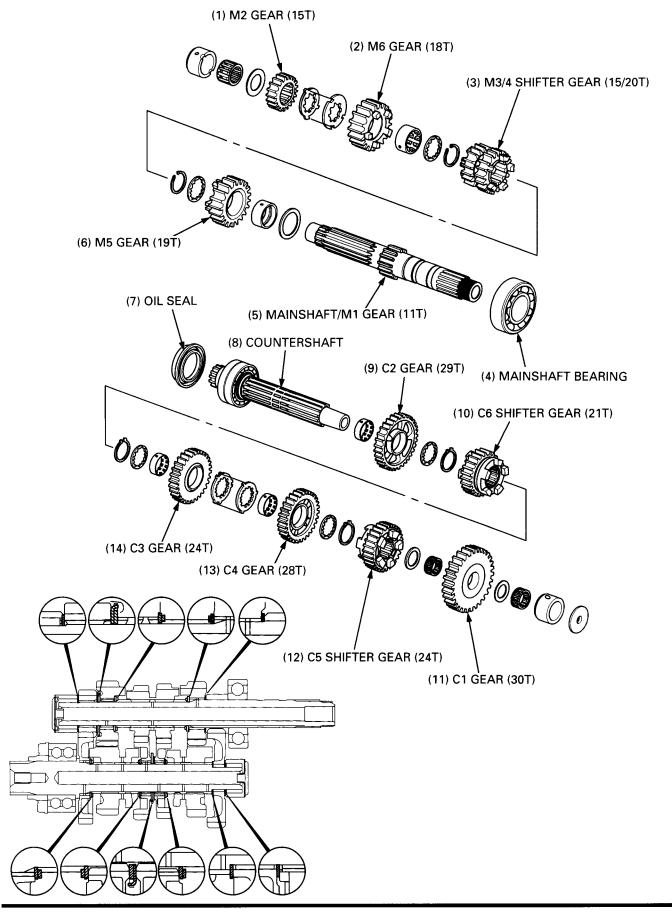
**Driver B** 

07746 - 0030100

Inner driver, 25 mm

07746 - 0030200

# **ASSEMBLY**



Assemble the transmission gear and shafts.

Coat each gear with clean engine oil and check for smooth movement.

Apply molybdenum disulfide oil to the shift fork grooves in the M3/4, C5 and C6 gear.

# **INSTALLATION**

Install the dowel pins on the upper crankcase holes. Install the set ring into the groove of the crankcase.

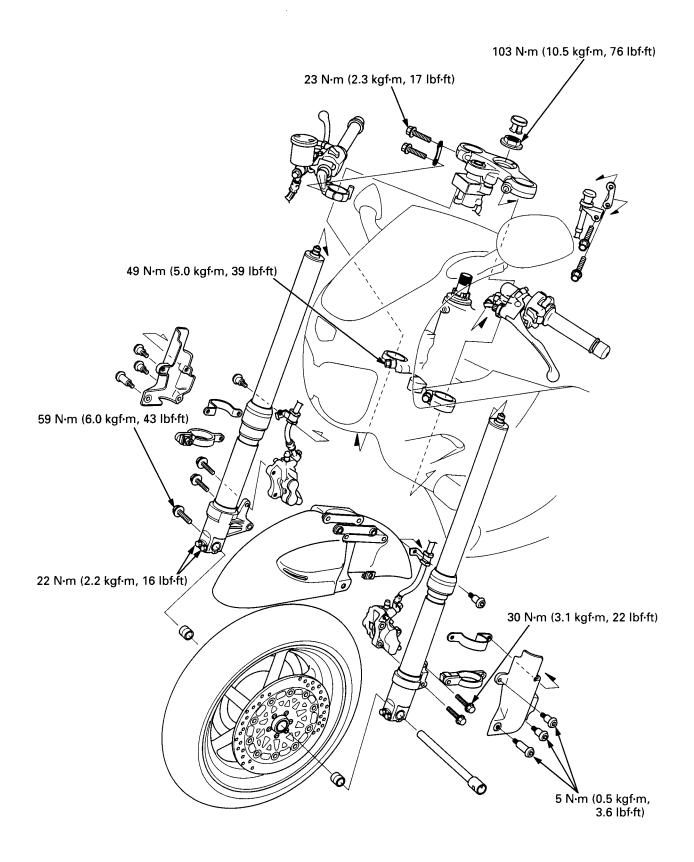
Install the mainshaft and countershaft by aligning the countershaft bearing groove with the set ring on the crankcase, and aligning the bearing cap holes with the dowel pins.

Apply a locking agent to the mainshaft bearing set plate bolt threads.

Install the mainshaft bearing set plate with its "OUT SIDE" mark facing out and tighten the bolts to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Assemble the crankcase (page 11-12).



# 12

# 13. FRONT WHEEL/SUSPENSION/STEERING

SERVICE INFORMATION	13-1	FRONT WHEEL	13-8
TROUBLESHOOTING	13-2	FORK	13-14
HANDLEBARS	13-3	STEERING STEM	13-23

# **SERVICE INFORMATION**

# **GENERAL**

# **A** 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.
- When servicing the front wheel, fork or steering stem, support the motorcycle using a safety stand or hoist.
- · Refer to section 15 for brake system information.
- Use only tires marked "TUBELESS" and tubeless valves on rim marked "TUBELESS TIRE APPLICABLE".

# **SPECIFICATIONS**

Unit: mm (in)

ITEM .		STANDARD	SERVICE LIMIT	
Minimum tire tread d	epth		1.5 (0.06)	
Cold tire pressure	Driver only	250 kPa (2.50 kgf/cm², 36 psi)		
	Driver and passenger	250 kPa (2.50 kgf/cm², 36 psi)		
Axle runout			0.20 (0.008)	
Wheel rim runout	Radial		2.0 (0.08)	
	Axial		2.0 (0.08)	
Fork	Spring free length	248.2 (9.77)	243.2 (9.57)	
	Spring direction	With the tapered end facing down		
	Tube runout		0.20 (0.008)	
	Recommended fork fluid	Fork fluid		
	Fluid level	114 ± 4 (4.5 ± 0.2)		
	Fluid capacity	561 ± 2.5 cm <sup>3</sup> (19.0 ± 0.02 US oz, 19.7 ± 0.09 Imp oz)		
	Pre-load adjuster setting	12 mm (0.5 in) from top of fork cap		
	Rebound adjuster setting	1 turn from full hard		
	Compression adjuster setting	1 turn from full hard		
Steering head bearing preload		1.0 – 1.5 kg (2.2 – 3.3 lbs)		

# **TORQUE VALUES**

Steering stem nut	103 N·m (10.5 kgf·m, 76 lbf·ft)	
Top thread A	See page 13-28	
Top thread B	See page 13-28	
Fork top bridge pinch bolt	23 N·m (2.3 kgf·m, 17 lbf·ft)	
Fork bottom bridge pinch bolt	49 N·m (5.0 kgf·m, 36 lbf·ft)	
Front axle bolt	59 N·m (6.0 kgf·m, 43 lbf·ft)	
Front axle holder bolt	22 N·m (2.2 kgf·m, 16 lbf·ft)	
Front brake disc mounting bolt	20 N·m (2.0 kgf·m, 14 lbf·ft)	ALOC bolt
Fork cap	23 N·m (2.3 kgf·m, 17 lbf·ft)	
Fork socket bolt	20 N·m (2.0 kgf·m, 14 lbf·ft)	Apply a loci

Apply a locking agent to the threads

# **TOOLS**

Steering stem socket 07916 - 3710101 Ball race remover set 07946 - KM90001 Driver attachment, A 07946 - KM90100 Driver attachment, B 07946 - KM90200 - Driver shaft assembly 07946 - KM90300 - Bearing remover, A 07946 - KM90401 - Bearing remover, B 07946 - KM90500 Assembly base 07946 - KM90600 Steering stem driver 07946 - MB00000 Oil seal driver 07KMD - KZ30100 Driver 07749 - 0010000Attachment, 42 x 47 mm 07746 - 0010300 Pilot, 20 mm 07746 - 0040500Bearing remover shaft 07746 - 0050100 Bearing remover head, 20 mm 07746 - 0050600

# TROUBLESHOOTING

# Hard steering

- · Faulty or damaged steering head bearings
- Insufficient tire pressure
- · Steering head bearing adjustment nut too tight

# Steers to one side or does not track straight

- · Unevenly adjusted right and left fork legs
- Bent fork
- Bent axle
- Wheel installed incorrectly
- · Faulty steering head bearings
- Bent frame
- · Worn wheel bearing
- · Worn swingarm pivot components

# Front wheel wobbling

- Bent rim
- Worn front wheel bearings
- · Faulty tire
- Unbalanced tire and wheel

### Wheel turns hard

- · Faulty wheel bearing
- Bent front axle
- · Brake drag

# Soft suspension

- · Insufficient fluid in fork
- Weak fork springs
- · Tire pressure too low

# Hard suspension

- · Incorrect fluid weight
- · Bent fork tubes
- · Clogged fork fluid passage

# Front suspension noisy

- · Insufficient fluid in fork
- · Loose fork fasteners

# **HANDLEBARS**





# **INSTALLATION**

Temporarily install the handlebars onto the fork pipes. Install the top bridge and tighten the steering stem nut to the specified torque.

TORQUE: 103 N·m (10.3 kgf·m, 76 lbf·ft)

Align the stopper on the handlebar boss with the groove in the top bridge.

Install the following:

- Holder brackets
- Choke cable holder
- Top bridge pinch bolts
- Handlebar pinch bolts

Tighten the top bridge pinch bolts to the specified torque.

TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)

Tighten the handlebar pinch bolts.

Install the steering stem nut cap.

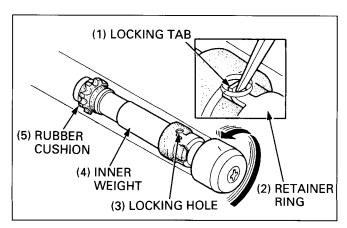
# HANDLEBAR WEIGHT REPLACEMENT

Remove the grip from the handlebar.

Straighten the weight retainer tab by the screwdriver or punch. Temporarily install the grip end and screw, then remove the handlebar weight by turning the grip end.

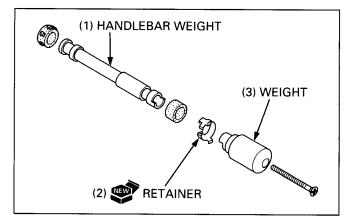
# NOTE

 Apply lubricant splay (CRC 5-56 or an equivalent) through the tab hooking hole to the rubber for easy removal

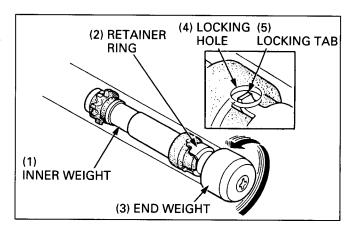


Remove the grip end front the handlebar weight. Discard the retainer.

Install the new retainer onto the handlebar weight.
Install the grip end onto the handlebar weight aligning its boss with the slot in the handlebar weight.
Install a new mounting screw.



Insert the handlebar weight assembly into the handlebar. Turn the handlebar weight and hook the retainer tab with the hole in the handlebar.

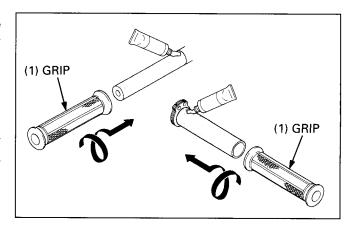


Apply Honda Bond A or an equivalent to the inside of the grip and to the clean surfaces of the left handlebar and throttle grip.

Wait 3 – 5 minutes and install the grip. Rotate the grip for even application of the adhesive.

# NOTE

Allow the adhesive to dry for an hour before using.



Install the left handlebar switch aligning its locating pin with the hole in the handlebar.

Tighten the forward screw first, then the rear screw.
Install the clutch lever bracket assembly aligning the end of the bracket with the punch mark on the handlebar. Install the clutch lever bracket holder with the "UP" mark facing up. Tighten the upper bolt first, then the lower bolt.
Connect the clutch switch wires.
Apply grease to the sliding surface of the throttle pipe. Install the throttle pipe on the right handlebar.
Apply grease to the throttle cable ends. Connect the throttle cables to the throttle pipe.
Install the right handlebar switch/throttle housing aligning its locating pin with the hole in the handlebar.

Tighten the upper screw first, then the lower screw.

Install the master cylinder aligning the end of the master cylinder with the punch mark on the handlebar. Install the master cylinder holder with the "UP" mark facing up.

Tighten the upper bolt first, then the lower bolt.

Connect the brake switch wires.

Install the grip end and tighten the new mounting screw.

# FRONT WHEEL

# **REMOVAL**

# **A** 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.

Support the motorcycle securely using a safety stand or a hoist.

Remove the mounting bolts and brake calipers.

# **CAUTION**

 Support the brake caliper with a piece of wire so that it does not hang from the brake hose. Do not twist the brake hose.

# NOTE

 Do not operate the brake lever after the brake calipers are removed.



# 13-9

# Wheel bearing

Turn the inner race of each bearing with your finger.
The bearings should turn smoothly and quietly.
Also check that the bearing outer race fits tightly in the hub.

Remove and discard the bearings if they do not turn smoothly, quietly, or if they fit loosely in the hub.

# NOTE

Replace the bearings in pairs.

Install the new bearings into the hub using the special tools (page 13-12).

# (1) WHEEL BEARING

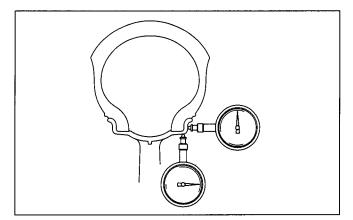
# Wheel rim runout

Check the rim runout by placing the wheel in a turning stand. Spin the wheel by hand, and read the runout using a dial indicator.

Actual runout is 1/2 the total indicator reading.

# **SERVICE LIMITS:**

Radial: 2.0 mm (0.08 in) Axial: 2.0 mm (0.08 in)



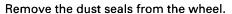
### Wheel balance

# **CAUTION**

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

# NOTE

- For optimum balance, the tire balance mark (a paint dot on the side wall) must be located next to the valve stem.
   Remount the tire if necessary.
- · Note the rotating direction marks on the wheel and tire.

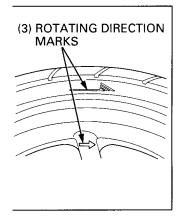


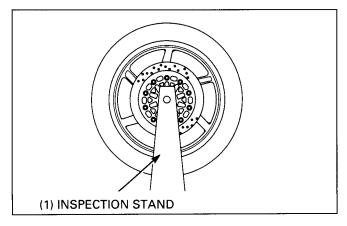
Mount the wheel, tire and brake discs assembly in an inspection stand.

Spin the wheel, allow it to stop, and mark the lowest (heaviest) point of the wheel with a chalk.

Do this two or three times to verify the heaviest area. If the wheel is balanced, it will not stop consistently in the same position.

To balance the wheel, install wheel weights on the highest side of the rim, the side opposite the chalk marks. Add just enough weight so the wheel will no longer stop in the same position when it is spun. Do not add more than 60 grams to the wheel.





# **DISASSEMBLY**

Remove the bolts and brake discs. Remove the dust seals.

Install the bearing remover head into the bearing.

From the opposite side install the bearing remover shaft and drive the bearing out of the wheel hub.

Remove the distance collar and drive out the other bearing.

# TOOLS:

Bearing remover head, 20 mm 07746 - 0050600 Bearing remover shaft 07746 - 0050100

# ASSEMBLY 20 N·m (2.0 kgfm, 14 lbfft) (2) RIGHT WHEEL BEARING (3) DISTANCE COLLAR (4) LEFT DUST SEAL (6) LEFT WHEEL BEARING

# **CAUTION**

 Never install the old bearings, once the bearings has been removed, the bearing must be replaced with new ones.

Drive in a new right bearing squarely.

Install the distance collar, then drive in the left bearing.

TOOLS:

 Driver
 07749 – 0010000

 Attachment, 42 x 47 mm
 07746 – 0010300

 Pilot, 20 mm
 07746 – 0040500

# **A** WARNING

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

Install the brake discs on the wheel hub.

# NOTE

 Align the rotating direction marks between the disc and wheel.

Install and tighten the new mounting bolts to the specified torque.

TORQUE: 20 N·m (2.0 kgf·m, 14 lbf·ft)

Apply grease to the dust seal lips, then install the dust seals into the wheel hub.

# **INSTALLATION**

Install the side collars.

Install the front wheel between the fork legs.

Apply thin layer of grease to the front axle surface. Install the front axle from the left side.

Hold the	axle	and	tighten	the	axle	bolt	to	the	specifi	ed
orque.										

TORQUE: 59 N·m (6.0 kgf·m, 43 lbf·ft)

Tighten the right axle pinch bolts to the specified torque.

TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)

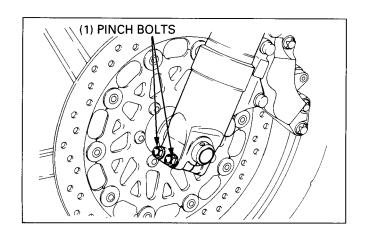
Install the brake calipers and tighten the new mounting bolts to the specified torque.

TORQUE: 30 N·m (3.1 kgf·m, 22 lbf·ft)

With the front brake applied, pump the fork up and down several times to seat the axle and check brake operation.

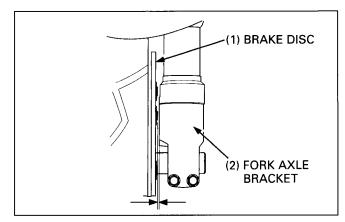
Tighten the left axle pinch bolts to the specified torque.

TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)



Check the clearance between the brake disc and fork axle bracket on each side after installation.

The clearance should be at least 0.7 mm (0.03 in).



# **FORK**

# **REMOVAL**

Remove the front wheel (page 13-8).

Remove the bolts, fork covers, front fender and stays.

Loosen the top bridge pinch bolt and handlebar pinch bolt. When the fork leg will be disassembled, loosen the fork cap, but do not remove it yet.

Loosen the fork bottom pinch bolt and remove the fork tube from the fork top bridge, handlebar and steering stem.

# **CAUTION**

Keep the master cylinder upright.

# **DISASSEMBLY**

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Be careful not to scratch the fork tube or damage the dust seal.

Turn the pre-load adjuster counterclockwise fully to loosen the spring pressure.

Remove the fork cap from the fork tube.

Hold the rebound damping adjuster with a 14 mm spanner, then loosen and remove the fork cap from the damper rod.

# CAUTION

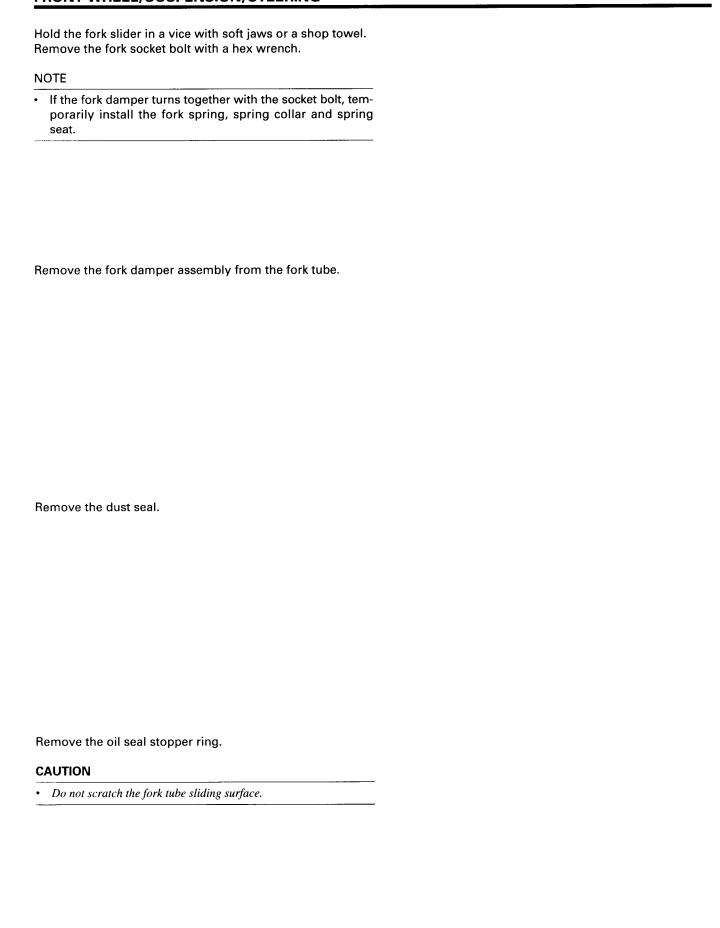
 Do not remove the rebound damping adjuster from the damper rod, or fork damping force will be change.

Pushing the spring collar down, and remove the spring seat.

Remove the following:

- Spring joint plate
- Spring collar
- Spring joint plate
- Fork spring

Pour out the fork fluid by pumping the fork tube up and down several times.



Pull the fork tube out until resistance from the slider bush-
ing is felt. Then move it in and out, tapping the bushing
lightly until the fork tube separates from the fork slider.
The slider bushing will be forced out by the fork tube bush-
ing.

Remove the oil lock piece and O-ring 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 compression adjuster from the fork slider.

# **INSPECTION**

# Fork spring

Measure the fork spring free length.

SERVICE LIMIT: 243.2 mm (9.57 in)

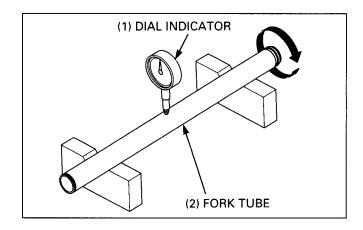
# Fork tube/slider/piston

Check the fork tube, fork slider, and fork damper for score marks, scratches, or excessive or abnormal wear. Check the rebound spring for fatigue or damage.

Replace any components which are worn or damage.

Place the fork tube in V-block and measure the runout. Actual runout is 1/2 the total indicator reading.

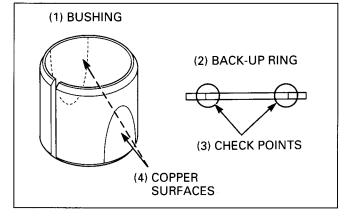
SERVICE LIMIT: 0.20 mm (0.008 in)



# Fork tube bushing

Visually inspect the slider and for 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.

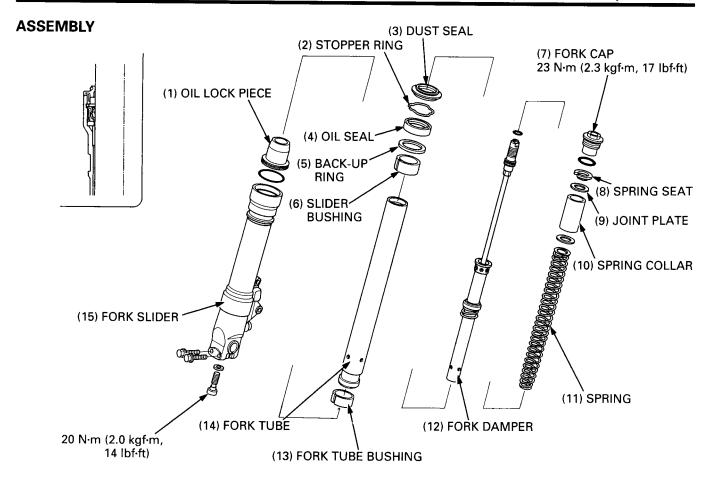
Check the back-up ring; replace it if there is any distortion at the points shown.



# Compression adjuster

Check the needle of the compression adjuster for wear or damage.

Replace the compression adjuster if necessary.



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

Apply fork fluid to the new O-ring and install it onto the compression adjuster.

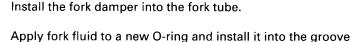
Install the compression adjuster into the fork slider and tighten it.

Install a new fork tube bushing if the bushing has been removed.

Install the slider bushing, back-up ring and a new oil seal.

# NOTE

Install the oil seal with its marked side facing up.



of the oil lock piece.
Install the oil lock piece onto the fork damper end.

Install the fork tube into the fork slider.

Hold the fork slider in a vise with soft jaws or a shop towel. Apply a locking agent to the fork socket bolt threads. Install the socket bolt with a new sealing washer, then tighten the bolt to the specified torque.

# NOTE

 If the fork damper turns together with the socket bolt, temporarily install the fork spring, spring collar and spring seat.

TORQUE: 20 N·m (2.0 kgf·m, 14 lbf·ft)

Drive the oil seal in using the special tools.

TOOL:

Oil seal driver

07KMD - KZ30100

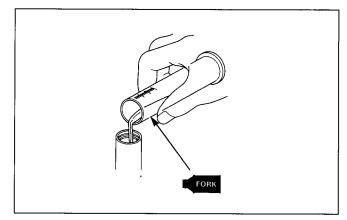
Install the stopper ring into the fork slider groove securely.

Install the dust seal.

Pour the specified amount of recommended fork fluid into the fork tube.

RECOMMENDED FORK FLUID: Fork Fluid FORK FLUID CAPACITY: 561  $\pm$  2.5 cm³ (19.0  $\pm$  0.02 US oz, 19.7  $\pm$  0.09 Imp oz)

Pump the damper rod several times until the fork fluid flow out from the oil hole on the rebound damping adjuster.

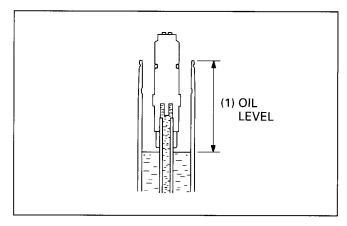


Measure the oil level from the top of the fork tube while compressing the tube all the way after stroking the fork tube slowly more than 5 times and the damper rod more than 10 times as well.

# NOTE

• Be sure the oil level is the same in the both fork.

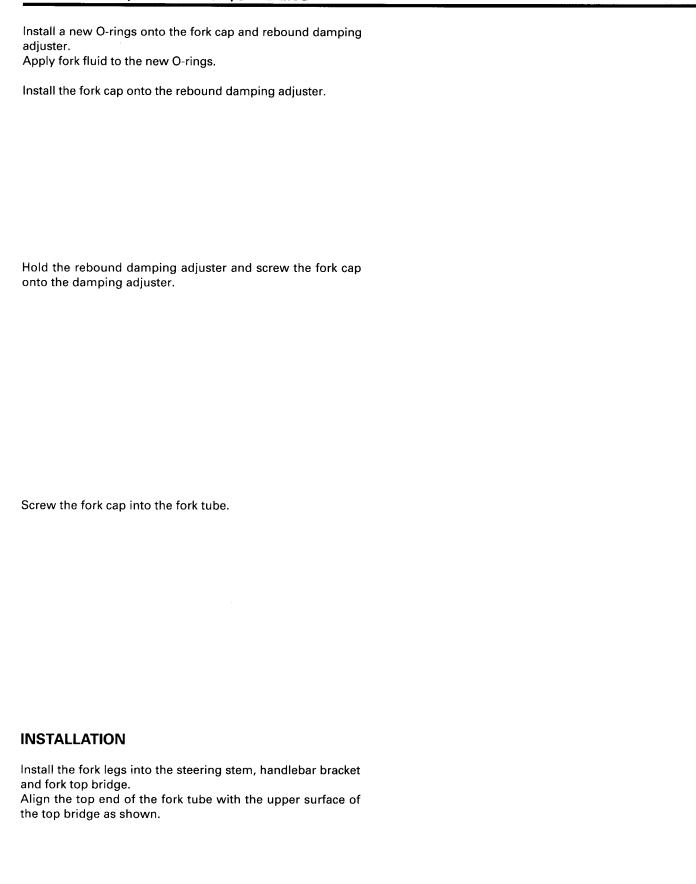
FORK OIL LEVEL: 114  $\pm$  4 mm (4.5  $\pm$  0.2 in)



Pull the fork tube and damper rod up and install the fork spring with the tapered end facing down.

Install the spring joint plate, spring collar and spring joint plate. Push the spring collar down and install the spring seat.

# FRONT WHEEL/SUSPENSION/STEERING



Tighten the bottom bridge pinch bolt to the specified torque.

TORQUE: 49 N·m (5.0 kgf·m, 36 lbf·ft)

Tighten the fork cap to the specified torque if it was removed.

TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)

Tighten the top bridge pinch bolt to the specified torque.

TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)

Tighten the handlebar pinch bolt.

Install the front fender stay onto the fork, then install the front fender and fork cover (page 2-13).

TORQUE: 5 N·m (0.5 kgf·m, 3.6 lbf·ft)

Install the front wheel (page 13-12).

# **STEERING STEM**

# **REMOVAL**

Remove the front wheel (page 13-8). Remove the front fender (page 2-13).

Remove the bolts and front brake hose joint. Remove the bolt and horn unit.

# FRONT WHEEL/SUSPENSION/STEERING Remove the steering stem nut cap.

Loosen the steering stem nut. Remove the fork legs (page 13-14). Remove the stem nut and the top bridge. Bend the tabs of the lock washer straight. Remove the lock nut and lock washer.

Remove the steering stem bearing adjusting nut using the special tool.

TOOL:

Steering stem socket

07916 - 3710101

# Remove the following:

- Dust seal
- Upper bearing inner race
- Upper bearing
- Steering stem
- Lower bearing

# **BEARING REPLACEMENT**

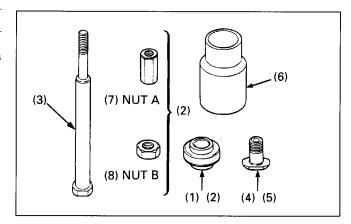
## NOTE

Always replace the bearings and races as a set.

Replace the races using the Ball Race Remover Set as described in the following procedure.

#### TOOLS:

Ball race remover set	07946 – KM90001
— Driver attachment, A (1)	07946 - KM90100
— Driver attachment, B (2)	07946 - KM90200
— Driver shaft assembly (3)	07946 - KM90300
— Bearing remover, A (4)	07946 - KM90401
— Bearing remover, B (5)	07946 - KM90500
- Assembly base (6)	07946 - KM90600



Install the ball race remover into the head pipe as shown.

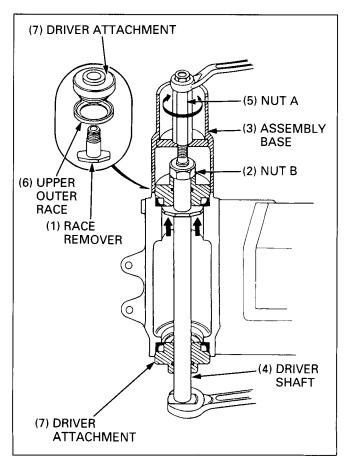
Align the bearing remover A with the groove in the steering head.

Lightly tighten the nut B with a wrench.

## NOTE

Note the installation direction of the assembly base

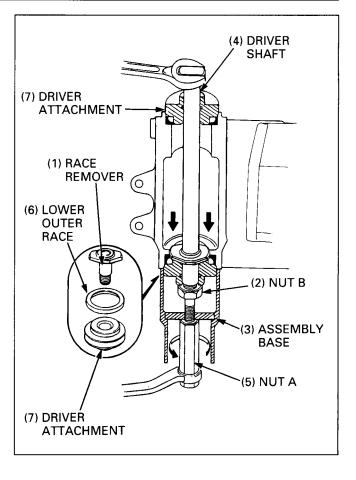
Holding the driver shaft with a wrench, turn the nut A gradually to remove the upper outer race.



# FRONT WHEEL/SUSPENSION/STEERING

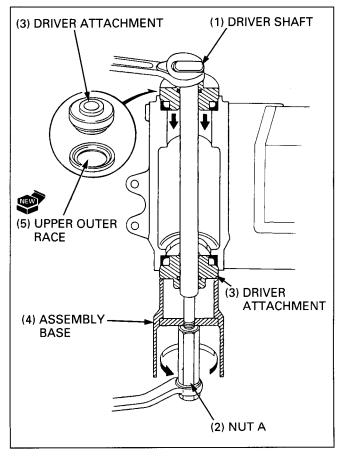
Install the ball race remover B as shown and remove the lower outer race using the same procedure as for the upper outer race.

Align the bearing remover with the groove in the steering head.



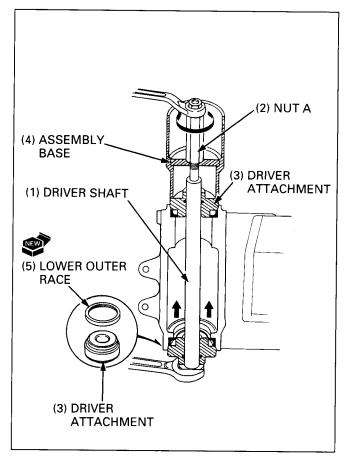
Install a new upper outer race and the ball race remover as shown.

Hold the driver shaft with a wrench, turn the nut A gradually until the groove in the driver attachment A aligns with the upper end of the steering head to install the upper outer race.



Install a new lower outer race and the ball race remover as shown.

Holding the driver shaft with a wrench, turn the nut A gradually until the groove in the driver attachment B aligns with the upper end of the steering head to install the lower outer race.



Temporarily install the steering stem nut onto the stem to prevent the threads from being damaged when removing the lower bearing inner race from the stem.

Remove the lower bearing inner race with a chisel or equivalent tool, being careful not to damage the stem.

Remove the dust seal.

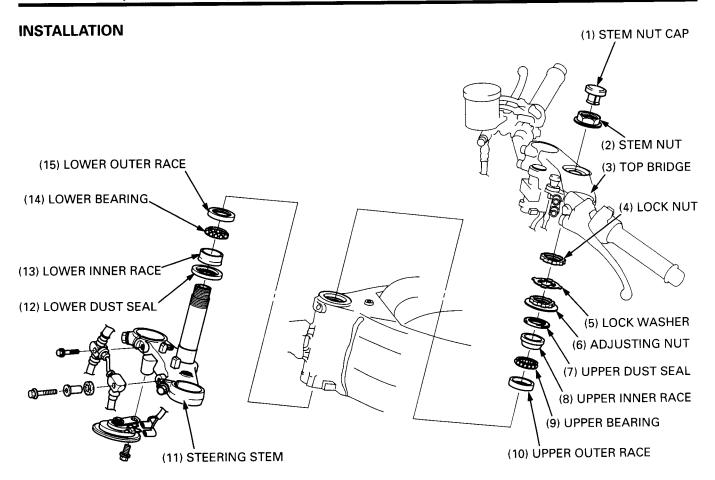
Apply grease to new dust seal lips and install it over the steering stem.

Install a new lower bearing inner race using a special tool and a hydraulic press.

TOOL:

Steering stem driver

07946 - MB00000



Apply grease to upper and lower bearings and bearing races.

Install the lower bearing onto the steering stem. Insert the steering stem into the steering head pipe.

Install upper bearing, inner race and dust seal.

Apply oil to the bearing adjustment nut threads. Install and tighten the stem bearing adjusting nut to the initial torque.

TOOL:

Steering stem socket 07916 -

07916 - 3710101

TORQUE: 30 N·m (3.1 kgf·m, 22 lbf·ft)

Move the steering stem right and left, lock-to-lock, five times to seat the bearings.

Make sure that the steering stem moves smoothly, without play or binding; then loosen the bearing adjusting nut.

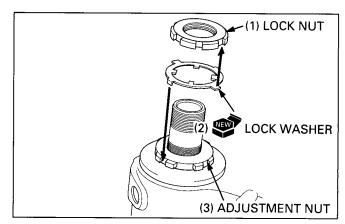
Retighten the bearing adjusting nut to the specified torque.

# TORQUE: 25 N·m (2.5 kgf·m, 18 lbf·ft)

Recheck that the steering stem moves smoothly without play or binding.

Install the new lock washer onto the steering stem.

Align the tabs of the lock washer with the grooves in the adjustment nut and bend two opposite tabs (shorter) down into the adjustment nut groove.



Install and finger tighten the lock nut. Hold the lock nut and further tighten the lock nut within 1/4 turn (90°) enough to align its grooves with the lock washer tabs.

Bend the lock washer tabs up into the lock nut groove.

# FRONT WHEEL/SUSPENSION/STEERING

Install the top bridge.

Install the fork legs (page 13-22).

Install the steering stem nut.

Tighten the steering stem nut to the specified torque.

TORQUE: 103 N·m (10.5 kgf·m, 76 lbf·ft)

Install the steering stem nut cap.

Install the front fender (page 2-13). Install the front wheel (page 13-12).

Install the horn unit and tighten the bolt. Install the front brake pipe joint and collar. Install and tighten the mounting bolts.

# STEERING HEAD BEARING PRE-LOAD

Remove the upper cowl (page 2-7).

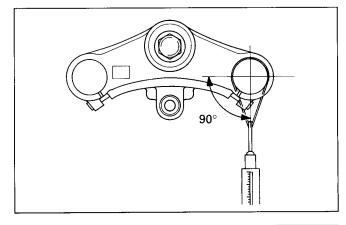
Support the motorcycle using a safety stand or hoist and raise the front wheel off the ground.

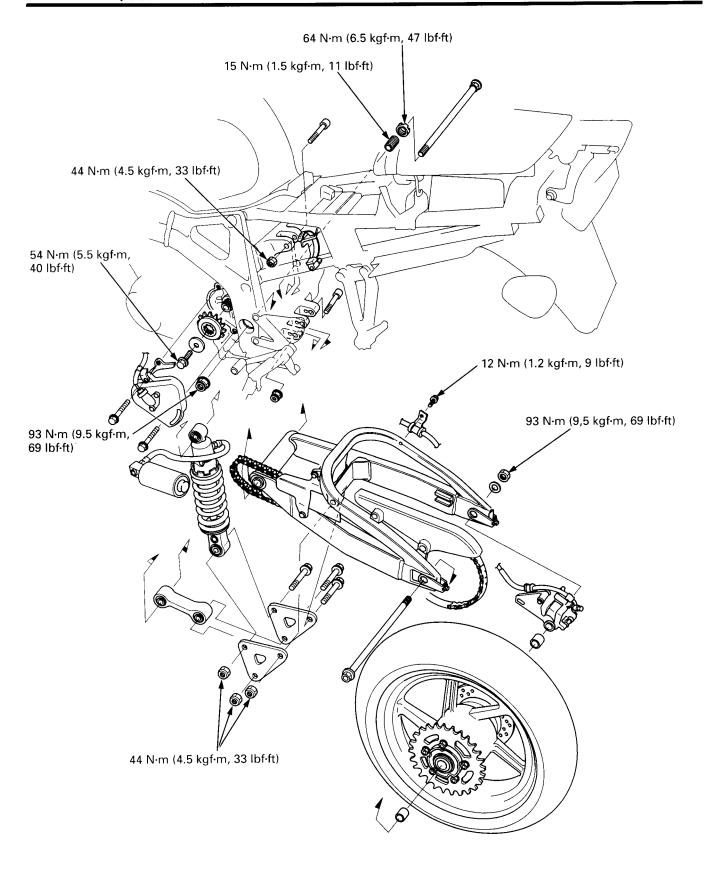
Position the steering stem to the straight ahead position. Hook a spring scale to the fork tube and measure the steering head bearing pre-load.

#### NOTE

Make sure that there is no cable or wire harness interference.

The pre-load should be within 1.0 - 1.5 kgf (2.2 - 3.3 lbf). If the reading do not fall within the limits, lower the front wheel on the ground and adjust the steering bearing adjusting nut.





# 14

# 14. REAR WHEEL/SUSPENSION

SERVICE INFORMATION	14-1	SHOCK ABSORBER	14-9
TROUBLESHOOTING	14-2	SUSPENSION LINKAGE	14-14
REAR WHEEL	14-3	SWINGARM	14-16

# **SERVICE INFORMATION**

# **GENERAL**

# A WARNING

- A contaminated brake disc or pad reduces stopping power. Discard contaminated pads and clean a contaminated disc with a high quality brake degreesing agent.
- The shock absorber contains nitrogen under high pressure. Do not allow fire or heat near the shock absorber.
- Before disposal of the shock absorber, release the nitrogen (page 14-11).
- · When servicing the rear wheel, support the motorcycle using a safety stand or hoist.
- · Refer to section 15 for brake system information.
- Use only tires marked "TUBELESS" and tubeless valves on rim marked "TUBELESS TIRE APPLICABLE".
- · Use genuine Honda replacement bolts and nuts for all suspension pivot and mounting point.

## **SPECIFICATIONS**

Unit: mm (in)

ITEM  Minimum tire tread depth		STANDARD	<b>SERVICE LIMIT</b> 2.0 (0.08)	
Cold tire pressure	Driver only	290 kPa (2.90 kgf/cm², 42 psi)		
	Driver and passenger	290 kPa (2.90 kgf/cm², 42 psi)		
Axle runout			0.20 (0.008)	
Wheel rim runout	Radial		2.0 (0.08)	
	Axial		2.0 (0.08)	
Shock absorber	Spring free length	172.6 (6.80)	169.1 (6.66)	
	Spring direction	With the tapered end facing up		
	Pre-load adjuster setting	2nd position		
	Rebound adjuster setting	1 turn from full hard		
	Compression adjuster setting	1 turn from full hard		

## **TORQUE VALUES**

Rear axle nut	93 N·m (9.5 kgf·m, 69 lbf·ft)	
Rear brake disc mounting bolt	42 N·m (4.3 kgf·m, 31 lbf·ft)	ALOC bolt
Driven sprocket nut	108 N·m (11.0 kgf·m, 80 lbf·ft)	U-nut
Shock absorber upper mounting nut	44 N·m (4.5 kgf·m, 33 lbf·ft)	U-nut
Shock arm plate nut	44 N·m (4.5 kgf·m, 33 lbf·ft)	U-nut
Shock link nut	44 N·m (4.5 kgf·m, 33 lbf·ft)	U-nut
Swingarm pivot adjusting bolt	15 N⋅m (1.5 kgf⋅m, 11 lbf⋅ft)	
Swingarm pivot lock nut	64 N·m (6.5 kgf·m, 47 lbf·ft)	
Swingarm pivot nut	93 N·m (9.5 kgf·m, 69 lbf·ft)	
Drive chain slider bolt	9 N·m (0.9 kgf·m, 6.5 lbf·ft)	
Drive sprocket bolt	54 N·m (5.5 kgf·m, 40 lbf·ft)	
Rear brake hose mounting bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	

# **TOOLS**

# **TROUBLESHOOTING**

# Soft suspension

- · Weak shock absorber spring
- Incorrect suspension adjustment
- Oil leakage from damper unit
- · Tire pressure too low

## Hard suspension

- · Damaged shock absorber mounting bearing
- Bent damper rod
- · Damaged swingarm pivot bearings
- · Bent swingarm pivot
- · Incorrect suspension adjustment
- · Tire pressure too high

# Steers to one side or does not track straight

- Bent rear axle
- Axle alignment/chain adjustment not equal on both sides

# Rear wheel wobbling

- · Bent rim
- · Worn rear wheel bearings
- · Faulty tire
- · Unbalanced tire and wheel
- · Tire pressure too low
- Faulty swingarm pivot bearings

# **REAR WHEEL**

# **REMOVAL**

Support the motorcycle securely using a hoist or equivalent.

Remove the axle nut and washer.

Push the rear wheel forward.

Derail the drive chain from the driven sprocket.

Remove the axle from the left side and remove the rear wheel.

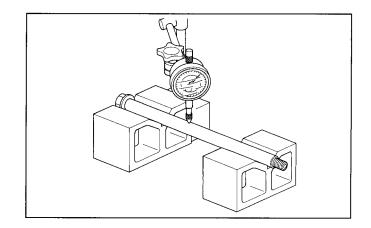
Remove the side collars.

# **INSPECTION**

## Axle

Place the axle in V-blocks and measure the runout. Actual runout is 1/2 the total indicator reading.

SERVICE LIMIT: 0.20 mm (0.008 in)



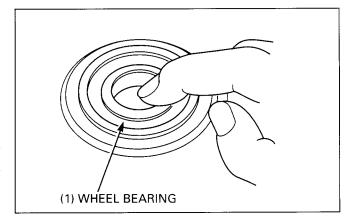
#### Wheel bearing

Turn the inner race of each bearing with your finger. Bearings should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the hub.

Remove and discard the bearings if the races do not turn smoothly and quietly, or if they fit loosely in the hub.

## NOTE

Replace the wheel bearings in pairs.

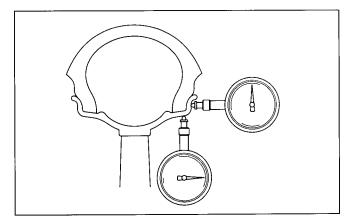


#### Wheel rim runout

Check the rim runout by placing the wheel in a turning stand. Spin the wheel slowly and read the runout using a dial indicator.

Actual runout is 1/2 the total indicator reading.

SERVICE LIMITS: Radial: 2.0 mm (0.08 in) Axial: 2.0 mm (0.08 in)



#### **Driven sprocket**

Check the condition of the final driven sprocket teeth. Replace the sprocket if worn or damaged.

#### NOTE

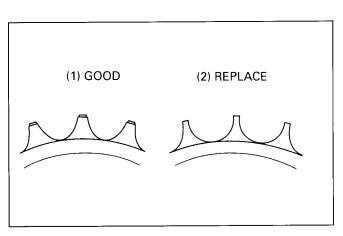
- If the final driven sprocket requires replacement, inspect the drive chain and drive sprocket.
- Never install a new drive chain on a worn sprocket or a worn chain on new sprockets. Both chain and sprocket must be in good condition or the replacement chain or sprocket will wear rapidly.

#### Wheel balance

See page 13-10 for wheel balance.

# **DISASSEMBLY**

Remove the bolts and brake disc. Remove the right dust seal.



Remove the driven flange assembly from the left wheel hub.
NOTE
<ul> <li>If you will be disassemble the driven flange, loosen the driven sprocket nuts before removing the driven flange from the wheel hub.</li> </ul>
Remove the wheel damper rubbers. Remove the O-ring.
<b>Driven flange bearing removal</b> Loosen the driven sprocket nuts.
Remove the driven flange from the wheel hub, then remove the driven sprocket nuts and sprocket.
Remove the dust seal.
Remove the driven flange collar.
Drive out the driven flange bearing.

## Wheel bearing removal

Install the bearing remover head into the bearing.

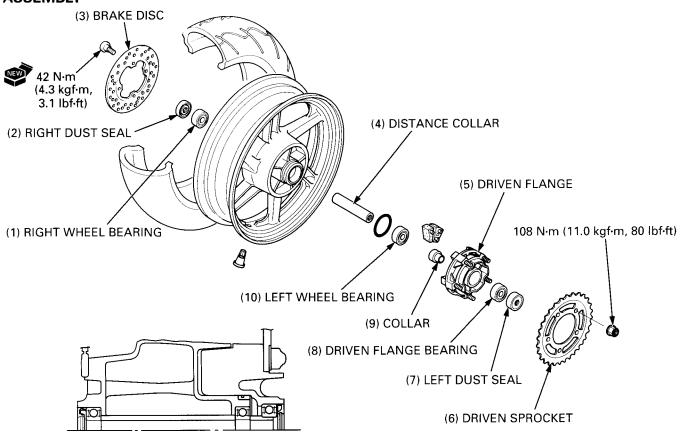
From the opposite side install the bearing remover shaft and drive the bearing out of the wheel hub.

Remove the distance collar and drive out the other bearing.

#### TOOLS:

Bearing remover head, 20 mm 07746 - 0050600 Bearing remover shaft 07746 - 0050100

# **ASSEMBLY**



## Wheel bearing installation

#### CAUTION

 Never install the old bearings, once the bearings has been removed, the bearing must be replaced with new ones.

Drive in a new right bearing squarely.

Install the distance collar, then drive in the left side bearing.

# TOOLS:

 Driver
 07749 – 0010000

 Attachment, 42 x 47 mm
 07746 – 0010300

 Pilot, 20 mm
 07746 – 0040500

## Driven flange bearing installation

Drive the new driven flange bearing into the driven flange using the special tools.

## TOOLS:

 Driver
 07749 - 0010000

 Attachment, 52 x 55 mm
 07746 - 0010400

 Pilot, 20 mm
 07746 - 0040500

Install the driven flange collar.

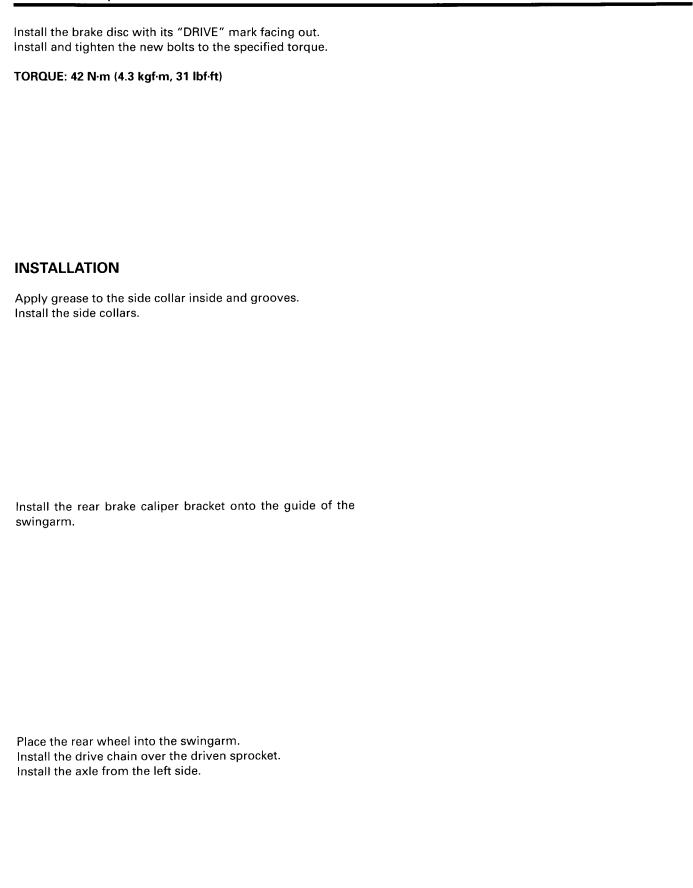
Install the wheel damper rubbers into the wheel hub.

Apply oil to the new O-ring and install it into the groove of the wheel hub.

Install the driven flange assembly into the left wheel hub. If the driven sprocket was removed, install the driven sprocket and tighten the nuts.

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

Apply grease to the dust seal lips, then install it into the driven flange.



Install the washer and loosely install the axle nut.

Adjust the drive chain slack (page 3-17).

Tighten the axle nut to the specified torque.

TORQUE: 93 N·m (9.5 kgf·m, 69 lbf·ft)

# **SHOCK ABSORBER**

# **REMOVAL**

Support the motorcycle securely using a hoist or equivalent.

Remove the side covers (page 2-3).

Remove the reserve tank band.

Remove the upper and lower mounting bolts and shock absorber.

# **DISASSEMBLY**

# NOTE

Make sure the spring adjuster is set to the softest position before disassemble the shock absorber.

Install the shock absorber compressor and attachment onto the shock absorber as shown.

#### TOOLS:

Shock absorber compressor 07GME – 0010000 Shock absorber compressor attachment

07NME - MY70100

Turn the compressor screw and compress the spring.

Remove the spring seat stoppers. Remove the special tools and remove the spring seat, spring and spring adjuster.

## **INSPECTION**

Visually inspect the damper unit for damage.

Check for the:

- Damper rod for bend or damage
- Damper unit for deformation or oil leaks
- Bump rubber for wear or damage

Inspect all the other parts for wear or damage.

Measure the spring free length.

SERVICE LIMIT: 169.1 mm (6.66 in)

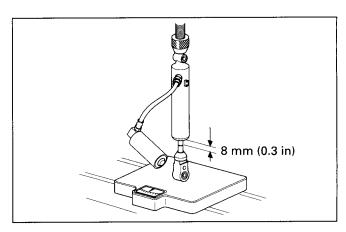
Mark the 8 mm (0.3 in) position as shown of the damper rod.

Place the damper rod on a scale and measure the force required to compress the damper to the 8 mm (0.3 in).

COMPRESSION FORCE: 15.4 - 20.0 kg (34.0 - 44.1 lbs)

If the force required is less than 14.9 kg (32.8 lbs), gas is leaking.

Examine the damper rod and replace the damper unit if it is bent or scored.



#### SHOCK ABSORBER DISPOSAL PROCEDURE

Center punch the reservoir tank end to mark the drilling point.

Wrap the damper unit inside a plastic bag.

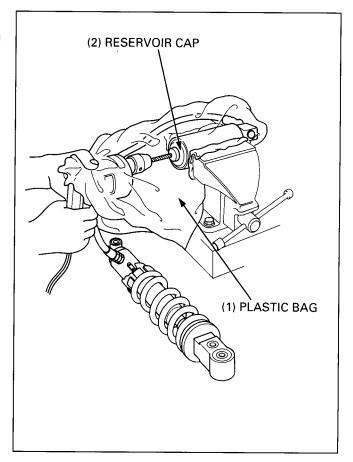
Support the reservoir tank in a vise as shown.

Through the open end of the bag, insert a drill motor with a sharp 2-3 mm (5/64 - 1/8 in) drill bit.

#### **A** WARNING

- Do not use a dull drill bit which could cause a build-up of excessive heat and pressure inside the damper, leading to explosion and severe personal injury.
- The shock absorber contains nitrogen gas and oil under high pressure. Do not drill any farther down the damper case than the measurement given above, or you may drill into the oil chamber; oil escaping under high pressure may cause serious personal injury.
- Always wear eye protection to avoid getting metal shaving in your eyes when the gas pressure is released. The plastic bag is only intended to shield you from the escaping gas.

Hold the bag around the drill motor and briefly run the drill motor inside the bag; this will inflate the bag with air from the motor and help keep the bag from getting caught in the bit when you start.



#### LOWER JOINT NEEDLE BEARING REPLACEMENT

Remove the pivot collar and dust seals.

Set the damper in a hydraulic press.

## **CAUTION**

Place the damper with the rebound damping adjuster facing up.

Press the needle bearing out from the lower joint.

TOOL:

Pin driver

07GMD - KT80100

Pack a new needle bearing with multi-purpose grease. Press the needle bearing into the lower joint so that the needle bearing casing is lower 8 mm (0.3 in) below the end of the lower joint as shown.

# TOOLS:

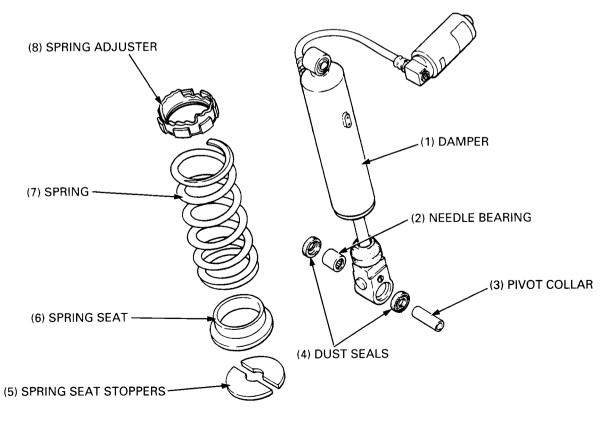
 Driver
 07749 - 0010000

 Attachment, 24 x 26 mm
 07746 - 0010700

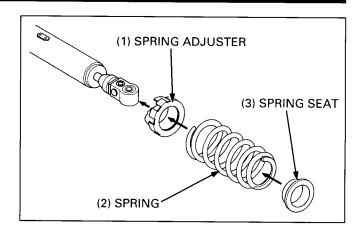
 Pilot, 17 mm
 07746 - 0040400

Apply grease to the dust seal lips. Install the dust seals and pivot collar.

# **ASSEMBLY**



Install the spring adjuster onto the damper unit. Install the spring with its tapered end facing up. Install the spring seat.

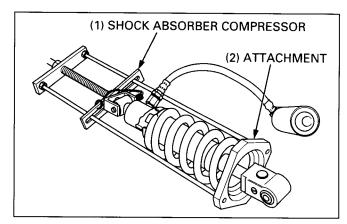


Install the shock absorber compressor and attachment onto the shock absorber as shown.

# TOOLS:

Shock absorber compressor 07GME – 0010000 Shock absorber compressor attachment 07NME – MY70100

Turn the compressor screw and compress the spring.



Install the spring seat stoppers securely.

Remove the tools.

## INSTALLATION

Install the shock absorber into the frame with the rebound damping adjuster facing to the right.
Route the reservoir hose properly.

Install and tighten the upper and lower mounting bolts/nuts to the specified torque.

TORQUE: 44 N·m (4.5 kgf·m, 33 lbf·ft)

Position the reservoir as shown and secure it with a band.

# **SUSPENSION LINKAGE**

# **REMOVAL/DISASSEMBLY**

Support the motorcycle securely using a hoist or equivalent.

Remove the exhaust pipe (page 2-15).

Remove the exhaust pipe mounting collar and rubber.

#### Remove the following:

- Shock absorber lower mounting bolt/nut
- Shock arm plate bolt/nut (shock link side)
- Shock arm plate bolt/nut (swingarm side)
- Shock arm plates
- Shock link socket bolt/nut
- Shock link

Remove the pivot collars and dust seals from the shock link.

# **INSPECTION**

Check the dust seals and collars for wear, damage or fatigue.

Check the needle bearings for damage or loose fit.

If the needle bearings are damaged, replace them.

## SHOCK LINK NEEDLE BEARING REPLACEMENT

Press the needle bearing out of the shock link using special tools and a hydraulic press.

TOOL: Pin driver

07GMD - KT80100

Pack the new needle bearing with multi-purpose grease. Press the new needle bearing into the shock link so that the needle bearing surface is lower 5.2-5.7 mm (0.20-0.22 in) from the end of the shock link surface.

#### NOTE

 Press the needle bearing into the shock link with the marked side facing out.

#### TOOLS:

 Driver
 07749 - 0010000

 Attachment, 24 x 26 mm
 07746 - 0010700

 Pilot, 17 mm
 07746 - 0040400

Apply grease to the dust seal lips, then install the dust seals and pivot collars.

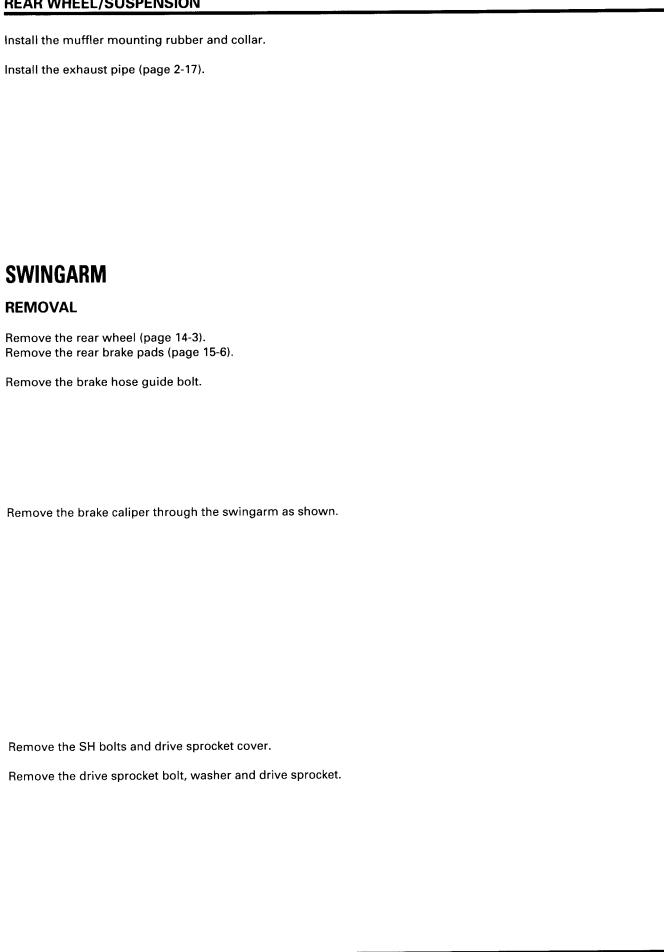
# **INSTALLATION**

Install the following:

- Shock link
- Shock link socket bolt/nut
- Shock arm plates with their "FR" mark facing to the front
- Shock arm plate bolt/nut (swingarm side)
- Shock arm plate bolt/nut (shock link side)
- Shock absorber lower mounting bolt/nut

Tighten the all nut to the specified torque.

TORQUE: 44 N·m (4.5 kgf·m, 33 lbf·ft)



Remove the shock absorber lower mounting bolt/nut. Remove the shock arm plate bolt/nut (swingarm side).

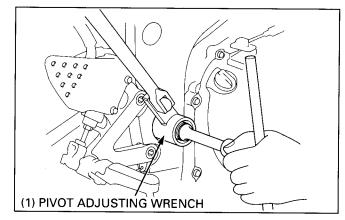
Remove the swingarm pivot nut.

Remove the swingarm pivot lock nut while holding the pivot bolt.

# TOOL:

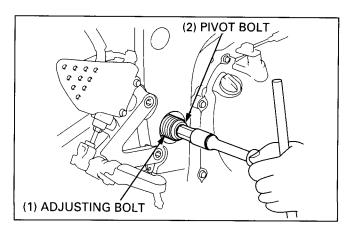
Pivot adjusting wrench

07908 - 4690003



Loosen the swingarm adjusting bolt by turning the pivot bolt.

Remove the pivot bolt and swingarm.



# **DISASSEMBLY/INSPECTION**

Remove	the	foll	lowina:

- Front drive chain cover
- Drive chain cover
- Drive chain slider
- Drive chain adjusters

Check the drive chain slider for wear or damage.

Remove the pivot collar and dust seals from the swingarm pivot.

Check the dust seals and collar for damage or fatigue.

Turn the inner race of right pivot bearings with your finger. Bearings should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the hub.

Remove and discard the bearings if the races do not turn smoothly and quietly, or if they fit loosely in the pivot.

Remove the pivot collar and dust seals from the shock link pivot.

Check the dust seals and collar for damage or fatigue.

Check the needle bearing for damage.

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г		<i>,</i> $_{\mathrm{U}}$	DEM	niivo	ncrl	ALEIV	

Remove the snap ring.

Remove the right pivot bearings (radial ball bearings) from the swingarm pivot using the special tools.

# TOOLS:

Bearing remover set	07936 – 3710001
— Remover handle	07936 - 3710100
— Remover set	07936 - 3710600
— Sliding weight	07741 - 0010201

Remove the distance collar.

Press the left pivot bearing (needle bearing) out of the swingarm pivot using the special tools.

TOOLS:

Needle bearing remover 07HMC - MR70100 Driver shaft 07946 - MJ00100

Press a new left pivot bearing (needle bearing) into the swingarm pivot so that the needle bearing surface is lower 4.0 mm (0.16 in) from the end of the swingarm pivot surface.

#### NOTE

 Press the needle bearing into the swingarm with the marked side facing out.

# TOOLS:

 Driver
 07749 – 0010000

 Attachment, 37 x 40 mm
 07746 – 0010200

 Pilot, 28 mm
 07746 – 0041100

Install the distance collar.

Press new right pivot bearings (radial ball bearing) into the swingarm pivot one at a time.

# TOOLS:

 Driver
 07749 - 0010000

 Attachment, 37 x 40 mm
 07746 - 0010200

 Pilot, 20 mm
 07746 - 0040500

Install the snap ring into the swingarm pivot groove securely.

#### SHOCK LINK PIVOT BEARING REPLACEMENT

Remove the needle bearing out of the shock link using special tool.

TOOL:

Needle bearing remover

07LMC - KV30100

Pack a new needle bearing with multi-purpose grease. Install a new needle bearing into the shock link so that the needle bearing surface is lower 5.5 – 6.0 mm (0.22 – 0.24 in) from the end of the shock link surface.

## NOTE

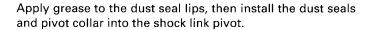
 Press the needle bearing into the shock link with the marked side facing out.

#### TOOL:

Needle bearing remover

07LMC - KV30100

# **ASSEMBLY** (1) RIGHT DUST SEAL (13) DRIVE CHAIN COVER B (2) SNAP RING (3) COLLAR (4) DUST SEALS / (5) RIGHT BEARINGS (6) DISTANCE COLLAR (7) NEEDLE BEARING (8) LEFT NEEDLE BEARING (9) LEFT DUST SEAL (12) DRIVE CHAIN COVER A (10) PIVOT COLLAR 9 N·m (0.9 kgf·m, 6.5 lbf·ft) (11) DRIVE CHAIN SLIDER 5.5 - 6.0 mm (0.22 - 0.24 in)



Apply grease to the dust seal lips, then install the dust seals and pivot collar into the swingarm pivot.

Install the drive chain slider.

Apply a locking agent to the drive chain slider bolt threads. Install the collars and bolts, then tighten the bolts to the specified torque.

# TORQUE: 9 N·m (0.9 kgf·m, 6.5 lbf·ft)

Install the following:

- Drive chain adjusters
- Drive chain cover
- Front drive chain cover

Install the drive chain (page 3-19).

# **INSTALLATION**

Install the swingarm adjusting bolt. Be sure that the tip of the bolt does not protrude inward.

# NOTE

 If the end of the adjusting bolt does protrude, it will not be possible to install the swingarm. Apply thin coat of grease to the swingarm pivot bolt surface. Install the swingarm and pivot bolt.

Turn the swingarm pivot adjusting bolt completely in by hand. Push the pivot bolts hex shank into the adjusting bolts socket head.

Tighten the swingarm pivot adjusting bolt with the pivot bolt.

TORQUE: 15 N·m (1.5 kgf·m, 11 lbf·ft)

Install and tighten the swingarm pivot adjusting bolt lock nut fully by hand, then tighten the lock nut to the specified torque while holding the pivot bolt.

TOOL:

Pivot adjusting wrench 07908 – 4690003

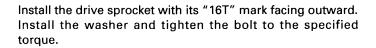
TORQUE: 64 N·m (6.5 kgf·m, 47 lbf·ft)

Tighten the swingarm pivot nut to the specified torque.

TORQUE: 93 N·m (9.5 kgf·m, 69 lbf·ft)

Install and tighten the shock arm plate bolt/nut (swingarm side) and sock abosrber lower mounting bolt/nut to the specified torque.

TORQUE: 44 N·m (4.5 kgf·m, 33 lbf·ft)



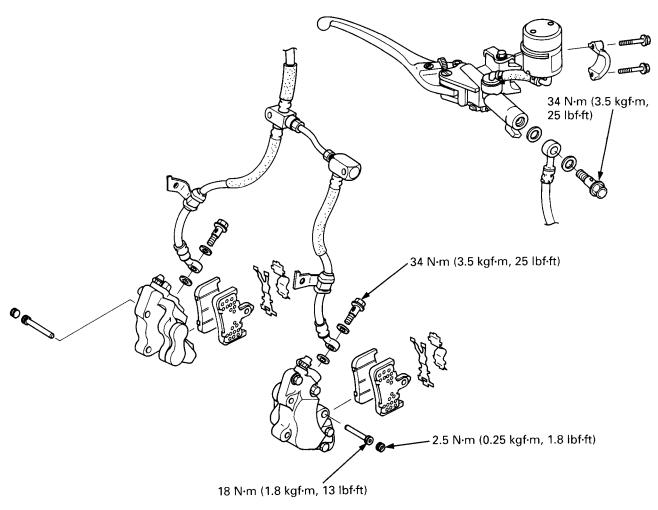
# TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

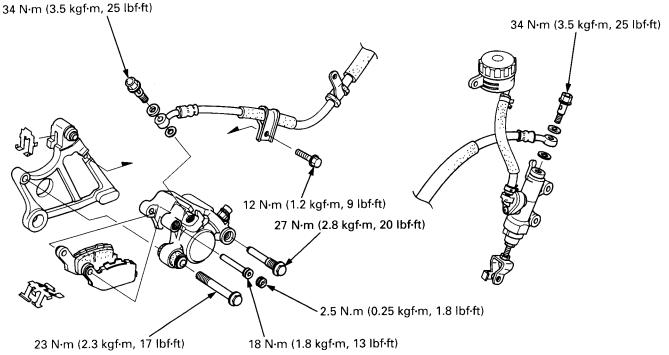
Install the guide plate and drive sprocket cover and tighten the SH bolts.

Install the brake caliper into the swingarm as shown.

Route the brake hose properly, tighten the brake hose guide bolt.

Install the rear brake pads (page 15-6). Install the rear wheel (page 14-8).





# 7

# **15. HYDRAULIC BRAKE**

45.4		
15-1	REAR MASTER CYLINDER	15-12
15-2	FRONT BRAKE CALIPER	15-16
	REAR BRAKE CALIPER	15-19
15-3	RRAKE PEDAL	15-23
15-5	DIANETEDAL	15-25
15-8		
	15-3 15-5	15-2 FRONT BRAKE CALIPER REAR BRAKE CALIPER 15-3 BRAKE PEDAL 15-5

# **SERVICE INFORMATION**

## **GENERAL**

# A 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.
- Spilled brake fluid will severely damage instrument lenses and painted surfaces. It is also harmful to some rubber parts. Be careful whenever you remove the reservoir cap; make sure the front reservoir is horizontal first.
- Never allow contaminates (dirt, water, etc.) to get into an open reservoir.
- Once the hydraulic system has been opened, or if the brake feels spongy, the system must be bled.
- Always use fresh DOT 4 brake fluid from a sealed container when servicing the system. Do not mix different types of fluid they may not be compatible.
- Always check brake operation before riding the motorcycle.

# **SPECIFICATIONS**

Unit: mm (in)

	ITEM		STANDARD	SERVICE LIMIT
Front	Specified brake fluid	DOT 4		
	Brake disc thickness		4.5 (0.18)	3.5 (0.14)
	Brake disc runout			0.30 (0.012)
	Master cylinder I.D.		14.000 - 14.043 (0.5512 - 0.5529)	14.055 (0.5533)
	Master piston O.D.	-	13.957 – 13.984 (0.5495 – 0.5506)	13.945 (0.5490)
	Caliper cylinder I.D.	Α	30.230 – 30.280 (1.1902 – 1.1921)	30.29 (1.193)
		В	27.000 – 27.050 (1.0630 – 1.0650)	27.06 (1.065)
	Caliper piston O.D.	Α	30.148 - 30.198 (1.1869 - 1.1889)	30.140 (1.1866)
		В	26.935 – 26.968 (1.0604 – 1.0617)	26.927 (1.0610)
Rear	Specified brake fluid		DOT 4	
	Brake disc thickness		5.0 (0.20)	4.0 (0.16)
	Brake disc runout			0.30 (0.012)
	Master cylinder I.D.		15.870 - 15.913 (0.6248 - 0.6265)	15.925 (0.6270)
	Master piston O.D.		15.827 - 15.854 (0.6231 - 0.6242)	15.815 (0.6226)
	Caliper cylinder I.D.		38.18 – 38.23 (1.503 – 1.505)	38.24 (1.506)
	Caliper piston O.D.		38.115 – 38.148 (1.5006 – 1.5019)	38.107 (1.5003)

#### **TORQUE VALUES**

Front brake caliper mounting bolt Front brake pipe mounting bolt Front brake caliper assembly torx bolt Front oil cup mounting nut Brake lever pivot bolt Brake lever pivot nut Brake hose oil bolt Pad pin Pad pin plug Brake caliper bleeder Rear brake hose guide bolt Rear master cylinder joint nut Rear master cylinder hose joint screw Rear brake caliper pin bolt Rear brake caliper bolt Rear caliper clamp bolt Step holder mounting bolt Footpeg mounting bolt

30 N·m (3.1 kgf·m, 22 lbf·ft) 17 N·m (1.7 kgf·m, 12 lbf·ft) 32 N·m (3.3 kgf·m, 24 lbf·ft) 6 N·m (0.6 kgf·m, 4.3 lbf·ft) 1 N·m (0.1 kgf·m, 0.7 lbf·ft) 6 N·m (0.6 kgf·m, 4.3 lbf·ft) 34 N·m (3.5 kgf·m, 25 lbf·ft) 18 N·m (1.8 kgf·m, 13 lbf·ft) 2.5 N·m (0.25 kgf·m, 1.8 lbf·ft) 6 N·m (0.6 kgf·m, 4.3 lbf·ft) 12 N·m (1.2 kgf·m, 9 lbf·ft) 18 N·m (1.8 kgf·m, 13 lbf·ft) 1.5 N·m (0.15 kgf·m, 1.1 lbf·ft) 27 N·m (2.8 kgf·m, 20 lbf·ft) 23 N·m (2.3 kgf·m, 17 lbf·ft) 9 N·m (0.9 kgf·m, 6.5 lbf·ft) 26 N·m (2.7 kgf·m, 20 lbf·ft) 44 N·m (4.5 kgf·m, 33 lbf·ft)

Apply a locking agent to the threads

ALOC bolt

ALOC bolt

ALOC bolt

ALOC bolt

### **TOOL**

Snap ring pliers

07914 - 3230001

# TROUBLESHOOTING

# Brake lever/pedal soft or spongy

- Air in hydraulic system
- · Leaking hydraulic system
- Contaminated brake pad/disc
- Worn caliper piston seal
- · Worn master cylinder piston cups
- Worn brake pad/disc
- Contaminated caliper
- · Caliper not sliding properly (rear)
- Low brake fluid level
- Clogged fluid passage
- Warped/deformed brake disc
- Sticking/worn caliper piston
- Sticking/worn master cylinder piston
- Contaminated master cylinder
- Bent brake lever/pedal

#### Brake lever/pedal hard

- · Clogged/restricted brake system
- Sticking/worn caliper piston
- Caliper not sliding properly
- Clogged/restricted fluid passage
- Worn caliper piston seal
- Sticking/worn master cylinder piston
- Bent brake lever/pedal

### Brake grab or pull to one side

- Contaminated brake pad/disc
- Misaligned wheel
- Clogged/restricted brake hose joint
- Warped/deformed brake disc
- · Caliper not sliding properly

#### **Brake drag**

- Contaminated brake pad/disc
- Misaligned wheel
- Worn brake pad/disc
- Warped/deformed brake disc
- · Caliper not sliding properly

# BRAKE FLUID REPLACEMENT/AIR BLEEDING

### **A** WARNING

A contaminated brake disc or pad reduces stopping power.

Discard contaminated pads and clean a contaminated disc with a high quality brake degreasing agent.

#### **CAUTION**

- Do not allow foreign material to enter the system when filling the reservoir.
- Avoid spilling fluid on painted, plastic, or rubber parts. Place a rag over these parts whenever the system is serviced.

#### **BRAKE FLUID DRAINING**

For the front brake, turn the handlebar to the left until the reservoir is parallel to the ground, before removing the reservoir cap.

For the rear brake, remove the reservoir cap.

Connect a bleed hose to the caliper bleed valve.

Loosen the bleed valve and pump the brake lever or pedal.

Stop pumping the lever when no more fluid flows out of the bleed valve.

### **BRAKE FLUID FILLING**

Fill the reservoir with DOT 4 brake fluid from a sealed container.

#### **CAUTION**

- Use only DOT 4 brake fluid from a sealed container.
- Do not mix different types of fluid. There are not compatible.

Connect a commercially available brake bleeder to the bleed valve.

Pump the brake bleeder and loosen the bleed valve, adding fluid when the fluid level in the master cylinder reservoir is low.

#### NOTE

- Check the fluid level often while bleeding the brakes to prevent air from being pumped into the system.
- When using a brake bleeding tool, follow the manufacturer's operating instructions.

Repeat the previous step procedures until air bubbles do not appear in the plastic hose.

#### NOTE

- If air is entering the bleeder from around the bleed valve threads, seal the threads with teflon tape.
- If a brake bleeder is not available, fill the master cylinder and operate the brake lever or pedal to fill the system.

Close the bleed valve. Next, perform the available BLEED-ING procedure.

#### **BRAKE BLEEDING**

Connect a clear bleed hose to the bleed valve. Pump up the system pressure with the lever or pedal until there are no air bubbles in the fluid flowing out of the master cylinder and lever resistance is felt.

1. Squeeze the brake lever or push the brake pedal, open the bleed valve 1/2 turn and then close the valve.

#### NOTE

- Do not release the brake lever or pedal until the bleed valve has been closed.
- 2. Release the brake lever or pedal until the bleed valve has been closed.

Repeat steps 1 and 2 until bubbles cease to appear in the fluid coming out of the bleed valve.

Tighten the bleed valve.

TORQUE: 6 N·m (0.6 kgf·m, 4.3 lbf·ft)

Fill the fluid reservoir to the upper level.

Reinstall the diaphragm and diaphragm plate.

On the front brake, install the reservoir cap, and tighten the screws.

On the rear brake, install the reservoir cap securely.

# **BRAKE PAD/DISC**

# FRONT BRAKE PAD REPLACEMENT

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

Remove the brake pad cover.
Remove the pad pin plug and loosen the pad pin.
Remove the bolts and brake caliper.

Push the caliper pistons 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.

Remove the pad pin, pad spring and brake pads.

Clean the inside of the caliper especially around the caliper pistons.

Install the new brake pads.

Install the pad spring aligning its tabs with the grooves in the caliper as shown.

Push the pad spring, then install the pad pin.

Install the brake caliper to the fork leg so the disc is positioned between the pads.

#### **CAUTION**

Be careful not to damage the pads.

Install and tighten the new brake caliper mounting bolts.

TORQUE: 30 N·m (3.1 kgf·m, 22 lbf·ft)

Tighten the pad pin.

TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)

Install and tighten the pad pin plug.

TORQUE: 2.5 N·m (0.25 kgf·m, 1.8 lbf·ft)

# REAR BRAKE PAD REPLACEMENT

### NOTE

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

Push the caliper pistons all the way in by pushing the caliper body inward 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.

Remove the caliper bracket bolt.
Pivot the caliper up. Remove the pad pin and brake pads.
Make sure the brake pad spring is in place. Install the new brake pads.
Lower the caliper while pushing the pads against the pad spring so that the pad ends are positioned onto the retainer on the caliper bracket.
Install and tighten the caliper bracket bolt.
TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)
Tighten the pad pin.
TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)

Remove the pad pin plug and loosen the pad pin.

Install and tighten the pad pin plug.

TORQUE: 2.5 N·m (0.25 kgf·m, 1.8 lbf·ft)

#### **BRAKE DISC INSPECTION**

Visually inspect the brake disc for damage or crack.

Measure the brake disc thickness with a micrometer.

SERVICE LIMITS: FRONT: 3.5 mm (0.14 in) REAR: 4.0 mm (0.16 in)

Replace the brake disc if the smallest measurement is less than the service limit.

Measure the brake disc warpage with a dial indicator.

SERVICE LIMIT: 0.30 mm (0.012 in)

Check the wheel bearings for excessive play, if the warpage exceeds the service limit.

Replace the brake disc if the wheel bearings are normal.

# FRONT MASTER CYLINDER

#### **REMOVAL**

Drain the front hydraulic system (page 15-3).

Disconnect the brake light switch wire connectors. Remove the brake hose oil bolt, sealing washers and brake hose eyelet.

#### **CAUTION**

 Avoid spilling fluid on painted, plastic, or rubber parts. Place a rag over these parts whenever the system is serviced.

Remove the bolts from the m remove the master cylinder asse	aster cylinder holder and mbly.	
DISASSEMBLY		
Remove the pivot bolt/nut ane be	ake lever assembly.	
Remove the dust cover and snap Remove the bolt and brake rese der.	ring. voir from the master cylin-	
Damas and the same of the state		
Remove the screw and brake ligh	t switch.	
Remove the boot.		
Remove the snap ring from the the special tool as shown.	naster cylinder body using	
TOOL: Snap ring pliers	07914 – 3230001	
Remove the master piston and sp	ring.	
Clean the inside of the cylinder fluid.	and reservoir with brake	

# **INSPECTION**

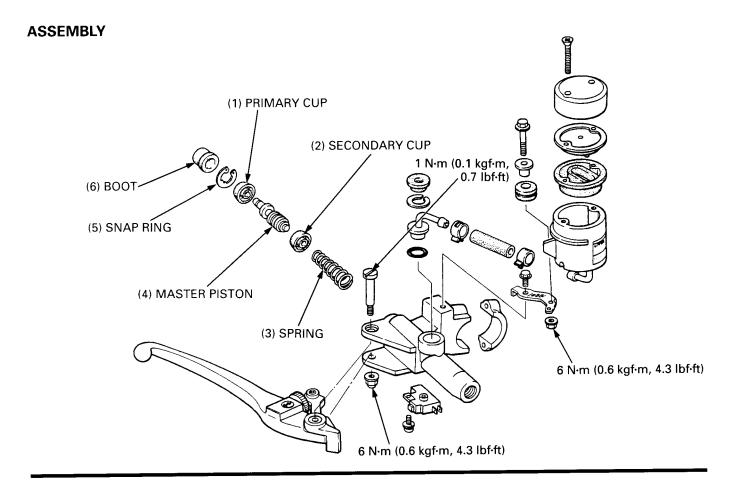
Check the piston boot, primary cup and secondary cup for fatigue or damage.

Check the master cylinder and piston for abnormal scratches. Measure the master cylinder I.D.

SERVICE LIMIT: 14.055 mm (0.5533 in)

Measure the master cylinder piston O.D.

SERVICE LIMIT: 13.945 mm (0.5490 in)



#### **CAUTION**

 Keep the piston, cups, spring, snap ring and boot as a set; do not substitute individual parts.

Coat all parts with clean brake fluid before assembly. Dip the piston in brake fluid.

Install the spring to the piston.

Install the piston assembly into the master cylinder.

#### **CAUTION**

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

Install the snap ring.

#### **CAUTION**

Be certain the snap ring is firmly seated in the groove.

#### TOOL:

Snap ring pliers

07914 - 3230001

Install the boot.

Install the brake light switch and tighten the screw.

Install the master cylinder reservoir joint into the master cylinder and secure the joint with a snap ring. Install the dust cover.

Install and tighten the reservoir mounting bolt.

Install the brake lever assembly, tighten the pivot bolt.

TORQUE: 1 N·m (0.1 kgf·m, 0.7 lbf·ft)

Hold the pivot bolt and tighten the pivot nut.

TORQUE: 6 N·m (0.6 kgf·m, 4.3 lbf·ft)

Place the master cylinder assembly on the handlebar. Align the end of the master cylinder with the punch mark on the handlebar.

Install the master cylinder holder with the "UP" mark facing up.

Tighten the upper bolt first, then the lower bolt.

Install the brake hose eyelet with the oil bolt and new sealing washers.

Adjust the brake hose angle, then tighten the oil bolt to the specified torque.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

Connect the brake light switch wire connectors.

Fill the reservoir to the upper level and bleed the brake system (page 15-3).

# **REAR MASTER CYLINDER**

# **REMOVAL**

Drain the rear hydraulic system (page 15-3).

Remove and discard the brake pedal joint cotter pin. Remove the joint pin.

Remove the bolt and rear brake reservoir from the frame.

Remove the brake hose oil bolt, sealing washers and brake hose

#### **CAUTION**

 Avoid spilling fluid on painted, plastic, or rubber parts. Place a rag over these parts whenever the system is serviced.

Remove the bolts, step guard and master cylinder assembly.

# **DISASSEMBLY**

Remove the screw and reservoir hole joint from the master cylinder.

Remove the boot.

Remove the snap ring from the master cylinder body using the special tool as shown.

TOOL:

Snap ring pliers

07914 - 3230001

Remove the push rod, master piston and spring.

Clean the inside of the cylinder with brake fluid.

### **INSPECTION**

Check the piston boot, primary cup and secondary cup for fatigue or damage.

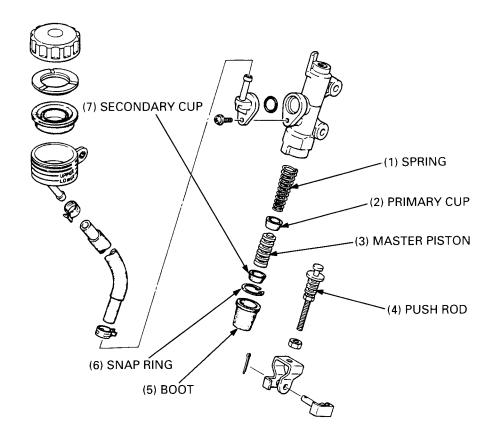
Check the master cylinder and piston for abnormal scratches. Measure the master cylinder I.D.

SERVICE LIMIT: 15.925 mm (0.6270 in)

Measure the master cylinder piston O.D.

**SERVICE LIMIT: 15.815 mm (0.6226 in)** 

# **ASSEMBLY**



#### **CAUTION**

 Keep the piston, cups, spring, snap ring and boot as a set; do not substitute individual parts.

Coat all parts with clean brake fluid before assembly. Dip the piston in brake fluid.

Install the spring to the piston.

Install the piston assembly.

Apply grease to the piston contact area of the push rod.

### **CAUTION**

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

Install the push rod into the master cylinder. Install the snap ring.

#### **CAUTION**

• Be certain the snap ring is firmly seated in the groove.

# TOOL:

**Snap ring pliers** 

07914 - 3230001

Install the boot.

Apply brake fluid to a new O-ring and install it onto the reservoir joint.

Install the reservoir joint into the master cylinder.

Install and tighten the screw.

TORQUE: 1.5 N·m (0.15 kgf·m, 1.1 lbf·ft)

# **INSTALLATION**

Place the master cylinder onto the frame. Install the step guard and tighten the bolts.

Install the brake hose with the oil bolt and new sealing washers.

Push the eyelet joint against the stopper, then tighten the oil bolt to the specified torque.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

Install and tighten the brake reservoir mounting bolt.

Connect the brake pedal to the push rod lower joint. Install the joint pin and secure it with a new cotter pin.

Fill the reservoir to the upper level and bleed the brake system (page 15-3).

# FRONT BRAKE CALIPER

# **REMOVAL**

Drain the front brake hydraulic system (page 15-3).

Remove the oil bolt, sealing washers and brake hose eyelet ioint.

Remove the caliper mounting bolts and the brake pads (page 15-5).

#### **CAUTION**

• Avoid spilling fluid on painted, plastic, or rubber parts. Place a rag over these parts whenever the system is serviced.

#### DISASSEMBLY

Install corrugated cardboard or soft wood sheet between the pistons.

Apply small squirts of air pressure to the fluid inlet to remove the pistons.

# **A** WARNING

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

Remove	the	four	caliper	assembly	bolts	and	separate	the
caliper h	alve	s.					•	

# Remove the following:

- Joint seals
- Caliper piston A
- Caliper piston B

# NOTE

· Mark the pistons to ensure correct reassembly.

Push the dust seals and piston seals in and lift them out.

# **CAUTION**

Be careful not to damage the piston sliding surface.

Clean the seal grooves with clean brake fluid.

# **INSPECTION**

Check the caliper cylinder for scoring or other damage.

Measure the caliper cylinder I.D.

**SERVICE LIMITS: A: 30.29 mm (1.193 in)** 

B: 27.06 mm (1.065 in)

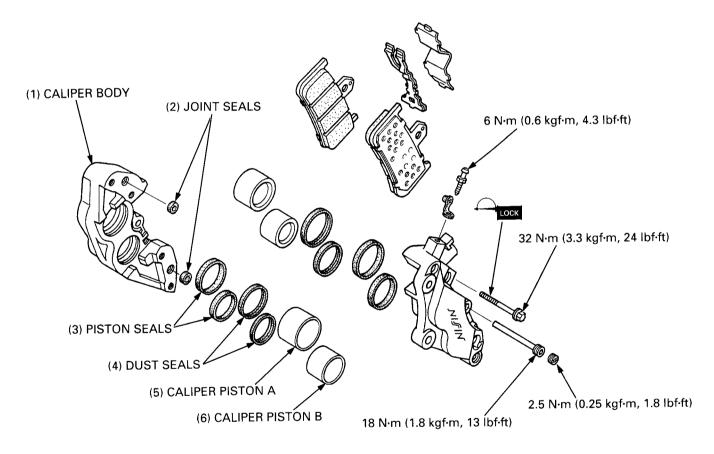
Check the caliper pistons for scratches, scoring or other damage.

Measure the caliper piston O.D.

SERVICE LIMITS: A: 30.140 mm (1.1866 in)

B: 26.927 mm (1.0610 in)

# **ASSEMBLY**



Coat the new piston seals with clean brake fluid. Coat the new dust seals with silicone grease.

Install the piston and dust seal into the groove of the caliper body.

Coat the caliper pistons with clean brake fluid and install them into the caliper cylinder with their opening ends toward the pad. Install the joint seals into the fluid passage on caliper.

Apply a locking agent to the threads of the caliper assembly bolts.

Assemble the caliper halves and install and tighten the caliper assembly bolts.

TORQUE: 32 N·m (3.3 kgf·m, 24 lbf·ft)

# **INSTALLATION**

Install the brake pads and caliper onto the fork leg (page 15-5).

Install and tighten the new caliper mounting bolts.

TORQUE: 30 N·m (3.1 kgf·m, 22 lbf·ft)

Install the brake hose eyelet to the caliper body with two new sealing washers and oil bolt.

Push the brake hose eyelet to the stopper on the caliper, then tighten the oil bolt to the specified torque.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

Fill and bleed the front brake hydraulic system (page 15-3).

# **REAR BRAKE CALIPER**

#### **REMOVAL**

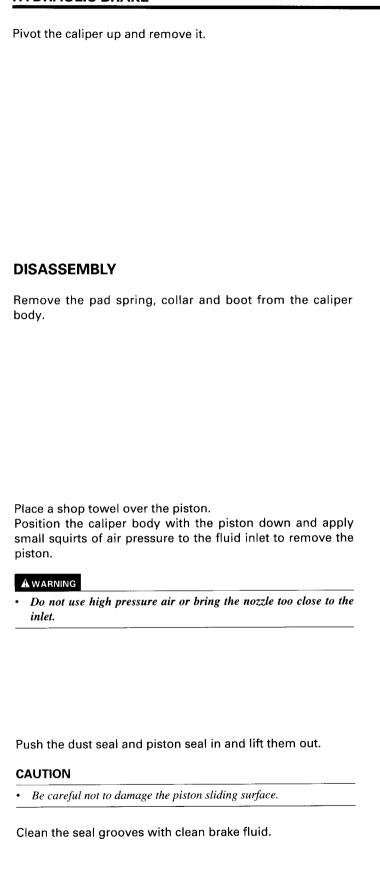
Drain the rear brake hydraulic system (page 15-3).

Remove the oil bolt, sealing washers and brake hose eyelet joint.

#### **CAUTION**

 Avoid spilling fluid on painted, plastic, or rubber parts. Place a rag over these parts whenever the system is serviced.

Remove the caliper bracket bolts and the brake pads (page 15-6).



# **INSPECTION**

Check the caliper cylinder for scoring or other damage.

Measure the caliper cylinder I.D.

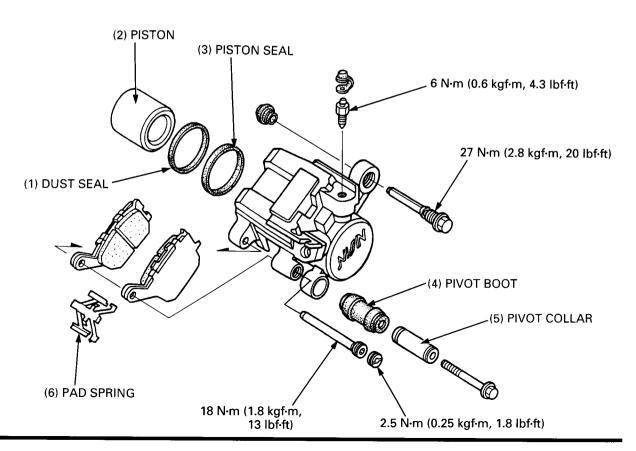
**SERVICE LIMIT: 38.24 mm (1.506 in)** 

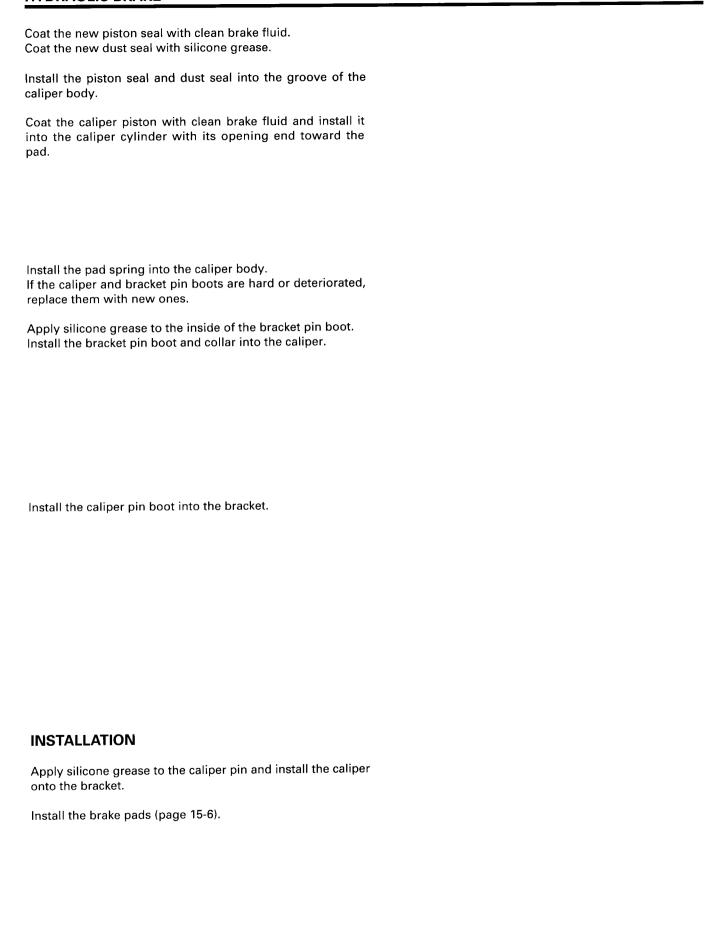
Check the caliper pistons for scratches, scoring or other damage.

Measure the caliper piston O.D.

SERVICE LIMIT: 38.107 mm (1.5003 in)

# **ASSEMBLY**





Install and tighten the caliper bracket bolt to the specified torque.

# TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)

Install the brake hose eyelet to the caliper body with two new sealing washers and oil bolt. Push the brake hose eyelet to the stopper on the caliper, then tighten the oil bolt to the specified torque.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

Fill and bleed the rear brake hydraulic system (page 15-3).

# **BRAKE PEDAL**

# **REMOVAL**

Remove and discard the brake pedal joint cotter pin. Remove the joint pin.

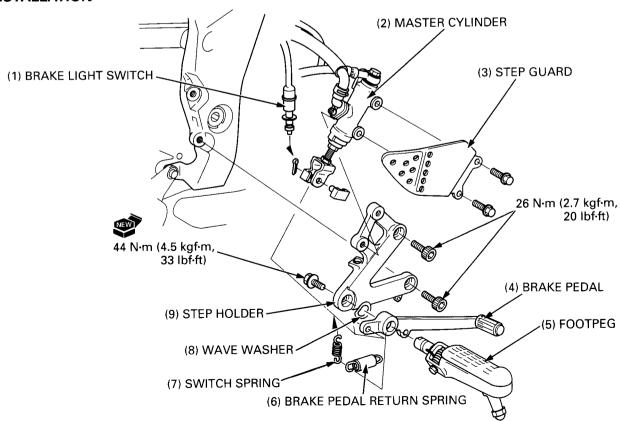
Remove the bolts, step guard and master cylinder assembly.

Remove the socket bolts and right step holder assembly.

Unhook the return spring and remove the brake light switch from the step holder.
Unhook the brake pedal return spring.

Remove the footpeg mounting bolt, footpeg, brake pedal and wave washer.

# **INSTALLATION**



Apply grease to the sliding surface of the brake pedal and footpeg.

Assemble the brake pedal, right footpeg and wave washer.

Install the right footpeg assembly onto the step holder aligning the cut-outs between the footpeg and holder.

Install a new footpeg mounting bolt and tighten it to the specified torque.

TORQUE: 44 N·m (4.5 kgf·m, 33 lbf·ft)

Hook the brake pedal return spring. Install the brake light switch and hook the switch spring.

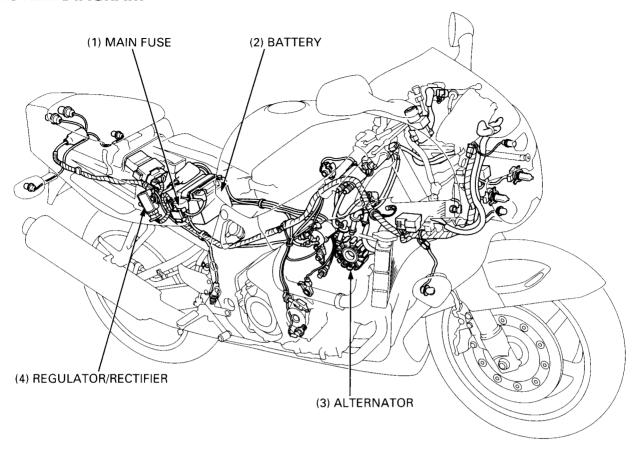
Install the right step holder assembly onto the frame. Install and tighten the right step holder socket bolts to the specified torque.

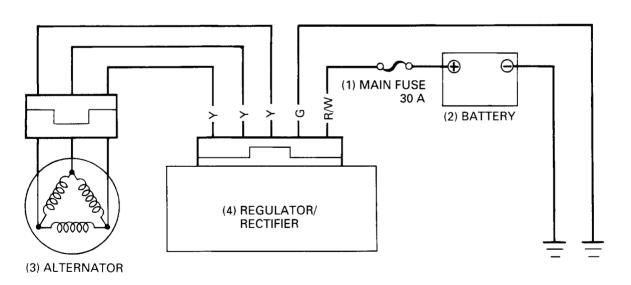
TORQUE: 26 N·m (2.7 kgf·m, 20 lbf·ft)

Install the master cylinder and step guard, then tighten the mounting bolts.

**HYDRAULIC BRAKE** Connect the brake pedal to the push rod lower joint. Install the joint pin and secure it with a new cotter pin.

# **SYSTEM DIAGRAM**





Y .......... YELLOW
G ........ GREEN
R ....... RED
W ....... WHITE

# 16

# **16. BATTERY/CHARGING SYSTEM**

SYSTEM DIAGRAM	16-0	CHARGING SYSTEM INSPECTION	16-6
SERVICE INFORMATION TROUBLESHOOTING	16-1 16-3	ALTERNATOR CHARGING COIL REGULATOR/RECTIFIER	16-8 16-8
BATTERY	16-5	,	

# SERVICE INFORMATION

### **GENERAL**

#### **A** WARNING

- The battery gives off explosive gases; keep sparks, flames and cigarettes away. Provide adequate ventilation when charging.
- The battery contains sulfuric acid (electrolyte). Contact with skin or eyes may cause severe burns. Wear protective clothing and a face shield.
  - If electrolyte gets on your skin, flush with water.
  - If electrolyte gets in your eyes, flush with water for at least 15 minutes and call a physician.
- Electrolyte is poisonous.
  - If swallowed, drink large quantities of water or milk and follow with milk of magnesia or vegetable oil and call a physician.
- KEEP OUT OF REACH OF CHILDREN.
- Always turn off the ignition switch before disconnecting any electrical component.

#### **CAUTION**

- Some electrical components may be damaged if terminals or connectors are connected or disconnected while the ignition switch is ON
  and current is present.
- For extended storage, remove the battery, give it a full charge, and store it in a cool, dry space. For maximum service
  life, charge the stored battery every two weeks.
- For a battery remaining in a stored motorcycle, disconnect the negative battery cable from the battery terminal.

#### NOTE

· The maintenance free battery must be replaced when it reaches the end of its service life.

#### **CAUTION**

- The battery caps should not be removed. Attempting to remove the sealing caps from the cells may damage the battery.
- The battery can be damaged if over charged or undercharged, or if left to discharge for long period. These same conditions contribute to shorting the "life span" of the battery. Even under normal use, the performance of the battery deteriorates after 2 3 years.
- Battery voltage may recover after battery charging, but under heavy load, battery voltage will drop quickly and eventually die out. For this reason, the charging system is often suspected to be the problem. Battery overcharge often results from problems in the battery itself, which may appear to be an overcharge symptom. If one of the battery cells is shorted and battery voltage does not increase, the regulator/rectifier supplies excess voltage to the battery. Under these conditions, the electrolyte level goes down quickly.
- Before troubleshooting the charging system, check for proper use and maintenance of the battery. Check if the battery is frequently under heavy load, such as having the headlight and taillight ON for long periods of time without riding the motorcycle.
- The battery will self-discharge when the motorcycle is not in use. For this reason, charge the battery every two weeks
  to prevent sulfation from forming.
- Filling a new battery with electrolyte will produce some voltage, but in order to achieve its maximum performance, always charge the battery. Also, the battery life is lengthened when it is initial-charged.
- When checking the charging system, always follow the steps in the troubleshooting flow chart (page 16-3).

# **BATTERY/CHARGING SYSTEM**

#### **Battery charging**

This model comes with a maintenance-free (MF) battery. Remember the following about MF batteries.

- Use only the electrolyte that comes with the battery
- Use all of the electrolyte
- Seal the battery properly
- Never open the seals again

#### **CAUTION**

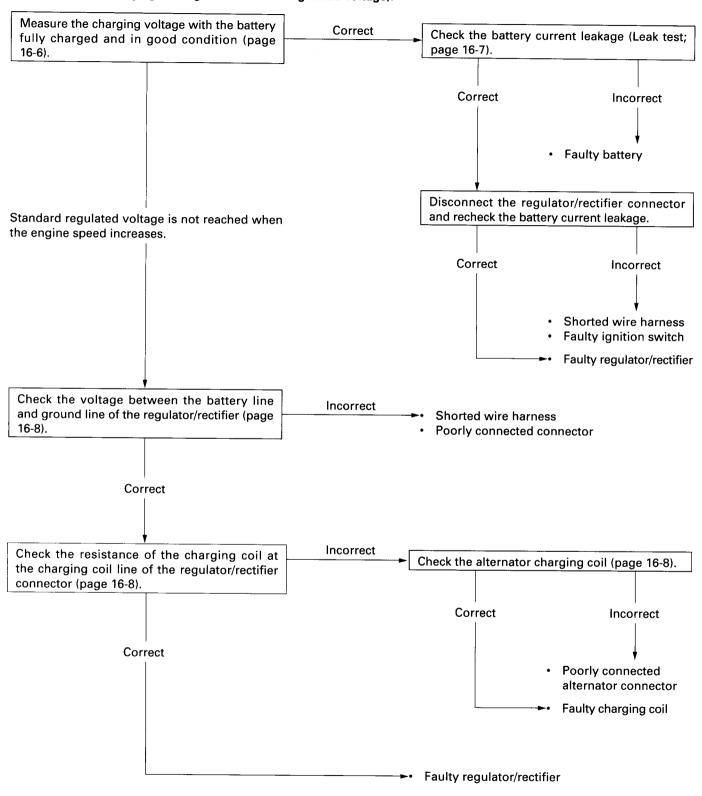
• For battery charging, do not exceed the charging current and time specified on the battery. Use of excessive current or charging time may damage the battery.

# **SPECIFICATIONS**

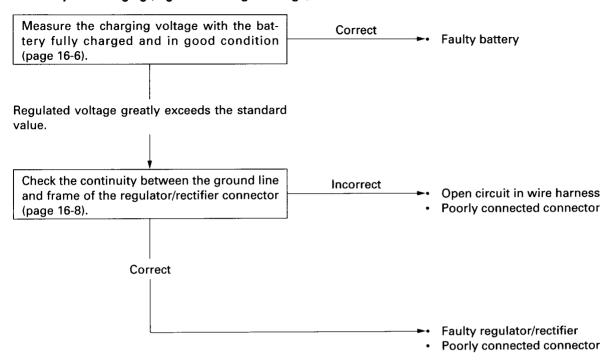
ITEM			SPECIFICATIONS
Battery	Capacity Current leakage		12 V – 8 Ah
			0.1 mA max.
	Voltage	Fully charged	13.0 – 13.2 V
(20°C/68°F)	Needs charging	Below 12.3 V	
	Charging current	Normal	0.9 A/5 – 10 h
		Quick	4.0 A/0.5 h
Alternator	Capacity		384 W/5,000 min <sup>-1</sup> (rpm)
Charging coil resis		stance (20°C/68°F)	0.1 – 0.3 Ω
Regulator/rectifier regulated voltage			13.5 – 15.5 V/5,000 min <sup>-1</sup> (rpm)

# **TROUBLESHOOTING**

# 1. Battery undercharging (Voltage not raised to regulated voltage).



# 2. Battery overcharging (regulated voltage too high).



# **BATTERY**

# **REMOVAL**

Remove the seat (page 2-2).

Remove the battery holder band.

Disconnect the negative cable and then the positive cable, and remove the battery.

#### **INSTALLATION**

Install the battery in the reverse order of removal with the proper wiring as shown.

#### NOTE

 Connect the positive terminal first and then the negative cable.

After installing the battery, coat the terminals with clean grease.

Reinstall the removed parts.

### VOLTAGE INSPECTION

Measure the battery voltage using a digital multimeter.

VOLTAGE: Fully charged: 13.0 - 13.2 V

Under charged: Below 12.3 V

TOOL:

Digital multimeter

Commercially available

# **BATTERY CHARGING**

#### **A** WARNING

- The battery gives off explosive gases; keep sparks, flames, and cigarettes away. Provide adequate ventilation when charging.
- Turn power ON/OFF at the charger, not at the battery terminal.

Remove the battery.

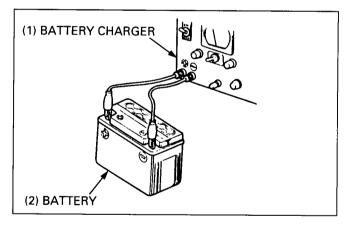
Connect the charger positive (+) cable to the battery positive (+) terminal.

Connect the charger negative (-) cable to the battery negative (-) terminal.

	Normal	Quick
Charging current	0.9 A	4.0 A
Charging time	5 – 10 hours	0.5 hour

#### **CAUTION**

- Quick-charging should only be done in an emergency; slow charging is preferred.
- For battery charging, do not exceed the charging current and time specified on the battery. Using excessive current or extending the charging time may damage the battery.



# **CHARGING SYSTEM INSPECTION**

#### NOTE

- When inspecting the charging system, check the system components and lines step-by-step according to the troubleshooting on page 16-3.
- Measuring circuits with a large capacity that exceeds the capacity of the tester may cause damage to the tester.
   Before starting each test, set the tester at the high capacity range first, then gradually down to low capacity ranges until you have the correct range so you do not damage the tester.
- When measuring small capacity circuits, keep the ignition switch off. If the switch is suddenly turned on during a test, the tester fuse may blow.

# REGULATED VOLTAGE INSPECTION

#### **A** WARNING

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

#### NOTE

Be sure the battery is in good condition before performing this test.

Warm up the engine to normal operating temperature. Stop the engine, and connect the multimeter as shown.

#### **CAUTION**

- To prevent short, make absolutely certain which are the positive and negative terminals or cable.
- Do not disconnect the battery or any cable in the charging system without first switching off the ignition switch. Failure to follow this precaution can damage the tester or electrical components.

#### Restart the engine.

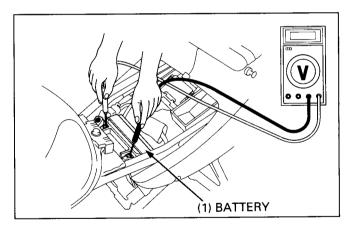
With the headlight ON (Hi beam), measure the voltage on the multimeter when the engine runs at 5,000 min<sup>-1</sup> (rpm).

#### Standard: 13.0 - 15.5 V at 5,000 min-1 (rpm)

The battery is normal if voltage reads the regulated voltage on the multimeter.

#### NOTE

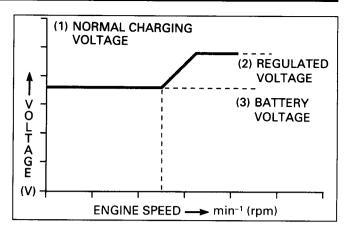
 The speed at which voltage starts to rise cannot be checked as it varies with the temperature and loads of the generator.

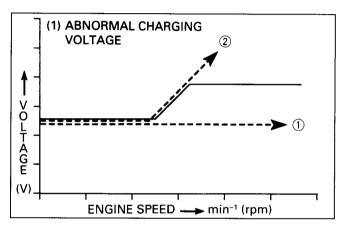


A frequently discharged battery is an indication that it is deteriorated even if it proves normal in the regulated voltage inspection.

The charging circuit may be abnormal if any of the following symptoms is encountered.

- 1. Voltage not raised to regulated voltage (page 16-4)
  - Open or short circuit in the charging system wire harness or poorly connected connector.
  - Open or short of the alternator.
  - · Faulty regulator/rectifier.
- 2. Regulated voltage too high (page 16-5)
  - Poorly grounded voltage regulator/rectifier.
  - · Faulty battery.
  - Faulty regulator/rectifier.





# **CURRENT LEAKAGE INSPECTION**

Turn the ignition switch off and disconnect the battery negative cable from the battery.

Connect the ammeter (+) probe to the ground cable and the ammeter (-) probe to the battery (-) terminal.

With the ignition switch off, check for current leakage.

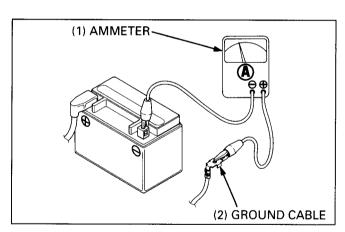
#### NOTE

- When measuring current using a tester, set it to a high range, and then bring the range down to an appropriate level. Current flow higher than the range selected may blow out the fuse in the tester.
- While measuring current, do not turn the ignition on.
   A sudden surge of current may blow out the fuse in the tester.

# SPECIFIED CURRENT LEAKAGE: 1 mA max.

If current leakage exceeds the specified value, a shorted circuit is likely.

Locate the short by disconnecting connections one by one and measuring the current.



# **ALTERNATOR CHARGING COIL**

#### NOTE

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

# INSPECTION

Remove the seat (page 2-2).

Disconnect the regulator/rectifier (alternator) 3P connector.

Check the resistance between all three Yellow terminals.

STANDARD:  $0.1 - 0.3 \Omega$  (at  $20^{\circ}$ C/68°F)

Check for continuity between all three Yellow terminals and Ground.

There should be no continuity.

Replace the alternator stator if readings are far beyond the standard, or if any wire has continuity to ground.
Refer to section 10 for stator removal.

# REGULATOR/RECTIFIER

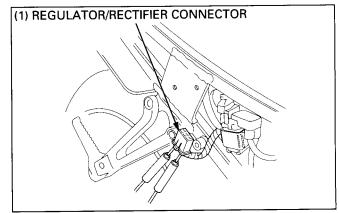
# SYSTEM INSPECTION

Remove the right side cover (page 2-6).

Remove the regulator/rectifier mounting bolts/nuts and disconnect the regulator/rectifier connector, and check it for loose contact or corroded terminals.

If the regulated voltage reading (see page 16-6) is out of the specification, measure the voltage between connector terminals (wire harness side) as follows:

ltem	Terminal	Specification
Battery charging line	Red/White (+) and ground (-)	Battery voltage should register
Charging coil line	Yellow and Yellow	0.1 – 0.3 Ω (at 20°C/68°F)
Ground line	Green and ground	Continuity should exist

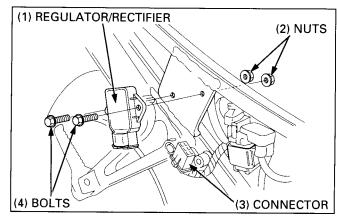


If all components of the charging system are normal and there are no loose connections at the regulator/rectifier connectors, replace the regulator/rectifier unit.

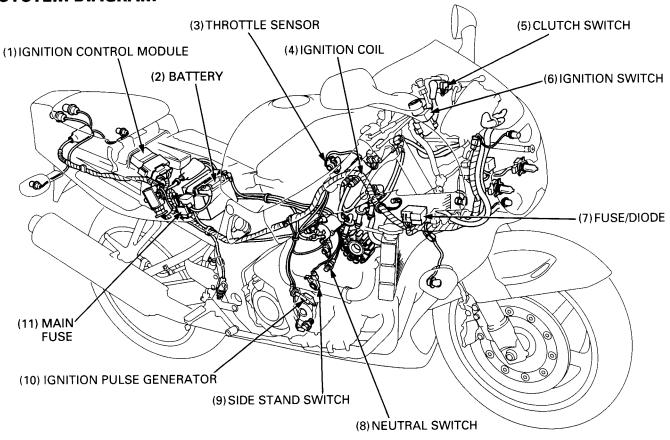
# **REMOVAL/INSTALLATION**

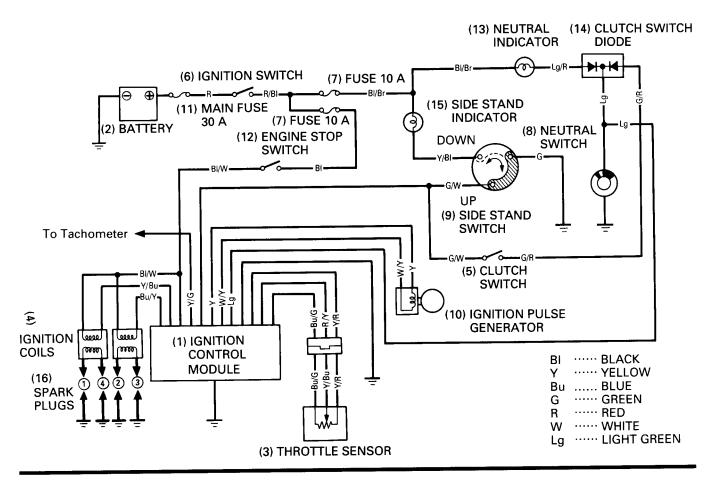
Remove the regulator/rectifier unit mounting bolts and nuts. Disconnect the connector and remove the regulator/rectifier unit.

Install the regulator/rectifier unit in the reverse order of removal.



# SYSTEM DIAGRAM





### 17

# 17. IGNITION SYSTEM

SYSTEM DIAGRAM	17-0	IGNITION COIL	17-6
SERVICE INFORMATION	17-1	<b>IGNITION PULSE GENERATOR</b>	17-7
TROUBLESHOOTING	17-3	THROTTLE SENSOR	17-10
IGNITION SYSTEM INSPECTION	17-4	IGNITION TIMING	17-11

### SERVICE INFORMATION

#### **GENERAL**

#### A WARNING

If the engine must be running to do some work, make sure the area is well ventilated. Never run the engine in an enclosed area.

The exhaust contains poisonous carbon monoxide gas that may cause loss of consciousness and may lead to death.

#### **CAUTION**

- Some electrical components may be damaged if terminals or connectors are connected or disconnected while the ignition switch is ON and current is present.
- · When servicing the ignition system, always follow the steps in the troubleshooting sequence on page 17-3.
- The ignition timing does not normally need to be adjusted since the Ignition Control Module (ICM) is factory preset.
- The Ignition Control Module (ICM), may be damaged if dropped. Also if the connector is disconnected when current
  is flowing, the excessive voltage may damage the module. Always turn off the ignition switch before servicing.
- A faulty ignition system is often related to poor connections. Check those connections before proceeding. Make sure
  the battery is adequately charged. Using the starter motor with a weak battery results in a slower engine cranking
  speed as well as no spark at the spark at the spark plug.
- Use spark plug of the correct heat range. Using spark plug with an incorrect heat range can damage the engine.

#### **SPECIFICATIONS**

	ITEM	SPECIF	ICATIONS
Spark plug		NGK	NIPPONDENSO
	Standard	CR9EH 9	U27FER 9
	Optional	CR8EH 9	U24FER 9
Spark plug gap		0.80 – 0.90 mm	(0.031 – 0.035 in)
Ignition coil pea	ik voltage	100 V r	minimum
Ignition pulse g	enerator peak voltage	0.7 V r	ninimum
Ignition timing	"F" mark	10* BTI	DC at idle

#### **IGNITION SYSTEM**

#### **TORQUE VALUES**

Crankshaft hole cap

Spark plug

Ignition pulse generator rotor special bolt

Ignition pulse generator cover SH bolt

18 N·m (1.8 kgf·m, 13 lbf·ft)

12 N·m (1.2 kgf·m, 9 lbf·ft)

59 N·m (6.0 kgf·m, 43 lbf·ft)

12 N·m (1.2 kgf·m, 9 lbf·ft)

Apply grease to the threads

Apply sealant to the threads (2 places)

#### **TOOLS**

Imrie diagnostic tester (model 625) or

Peak voltage adaptor

07HGJ - 0020100 with

Commercially available digital multimeter (impedance 10 MΩ/DCV mini-

mum)

### **TROUBLESHOOTING**

- · Inspect the following before diagnosing the system.
  - Faulty spark plug
  - Loose spark plug cap or spark plug wire connection
  - Water got into the spark plug cap (leaking the ignition coil secondary voltage)
- If there is no spark at either cylinders, temporarily exchange the ignition coil with the other good one and perform the spark test. If there is spark, the exchanged ignition coil is faulty.
- "Initial voltage" of the ignition primary coil is the battery voltage with the ignition switch ON and engine stop switch
  at RUN (The engine is not cranked by the starter motor).

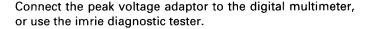
#### No spark at all plugs

Unusual condition		Probable cause (Check in numerical order)	
Ignition coil primary voltage	No initial voltage with ignition and engine stop switches ON. (Other electrical components are normal)	<ol> <li>Faulty engine stop switch.</li> <li>An open circuit in Black/White wire between the ignition coil and engine stop switch.</li> <li>Faulty ICM (in case when the initial voltage is normal while disconnecting ICM connector.</li> </ol>	
	Initial voltage is normal, but it drops down to 2 – 4 V while cranking the engine.	<ol> <li>Incorrect peak voltage adaptor connections.</li> <li>Undercharged battery.</li> <li>No voltage between the Black/White (+) and Body ground (-) at the ICM multi-connector or loosen ICM connection.</li> <li>An open circuit or loose connection in Green wire.</li> <li>An open circuit or loose connection in Yellow/Blue and Blue/Yellow wires between the ignition coils and ICM.</li> <li>Short circuit in ignition primary coil.</li> <li>Faulty side stand switch or neutral switch.</li> <li>An open circuit or loose connection in No. 7 related circuit wires.</li> <li>Side stand switch line: Green/White wire.</li> <li>Neutral switch line: Light Green and Light Green/Red wire.</li> <li>Faulty ignition pulse generator (measure the peak voltage).</li> <li>Faulty ICM (in case when above No. 1 – 9 are normal).</li> </ol>	
	Initial voltage is normal, but no peak voltage while cranking the engine.	Faulty peak voltage adaptor connections.     Faulty peak voltage adaptor.     Faulty ICM (in case when above No. 1, 2 are normal).	
	Initial voltage is normal, but peak voltage is lower than standard value.	<ol> <li>The multimeter impedance is too low; below 10 MΩ/DCV.</li> <li>Cranking speed is too low (battery under-charged).</li> <li>The sampling timing of the tester and measured pulse were not synchronised (system is normal if measured voltage is over the standard voltage at least once).</li> <li>Faulty ICM (in case when above No. 1 – 3 are normal).</li> </ol>	
	Initial and peak voltage are normal, but does not spark.	Faulty spark plug or leaking ignition coil secondary current ampere.     Faulty ignition coil.	
Ignition pulse generator	Peak voltage is lower than standard value.	<ol> <li>The multimeter impedance is too low; below 10 MΩ/DCV.</li> <li>Cranking speed is too low (battery under charged).</li> <li>The sampling timing of the tester and measured pulse were not synchronised (system is normal if measured voltage is over the standard voltage at least once).</li> <li>Faulty ICM (in case when above No. 1 – 3 are normal).</li> </ol>	
	No peak voltage.	<ol> <li>Faulty peak voltage adaptor.</li> <li>Faulty ignition pulse generator.</li> </ol>	

### **IGNITION SYSTEM INSPECTION**

#### NOTE

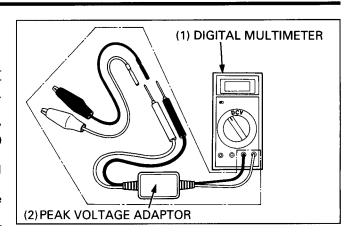
- If there are no spark at all plugs, check all connections for loose or poor contact before measuring each peak voltage.
- Use recommended digital multimeter or commercially available digital multimeter with an impedance of 10 M $\Omega$ /DCV minimum.
- The display value differs depending upon the internal impedance of the multimeter.
- If using Imrie diagnostic tester (model 625), follow the manufacturer's instructions.



#### TOOLS:

Imrie diagnostic tester (model 625) or

Peak voltage adaptor 07HGJ – 0020100 with Commercially available digital multimeter (impedance 10  $M\Omega/DCV$  minimum)



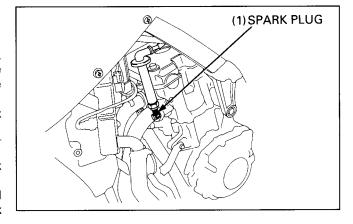
#### **IGNITION COIL PRIMARY PEAK VOLTAGE**

#### NOTE

- Check all system connections before inspection. If the system is disconnected, incorrect peak voltage might be measured.
- Check cylinder compression and check that the spark plugs are installed correctly.

Shift the transmission into neutral, disconnect the all spark plug caps from the spark plugs.

Connect a good known spark plugs to spark plug caps and ground the spark plugs to the cylinder as done in a spark test.



With the ignition coil primary wire connected, connect the peak voltage adaptor or Imrie tester to the ignition coil.

#### **CONNECTION:**

No. 1/4 coil: Black/White terminal (+) – Body ground (-) No. 2/3 coil: Blue/Yellow terminal (+) – Body ground (-)

Turn the ignition switch "ON" and engine stop switch to "RUN".

Check for initial voltage at this time.

The battery voltage should be measured.

If the initial voltage is not measured, check power supply circuit referring the troubleshooting (page 17-3).

Crank the engine with the starter motor and read ignition coil primary peak voltage.

#### **PEAK VOLTAGE: 100 V minimum**

#### **A** WARNING

Avoid touching the spark plugs and tester probes to prevent electric shock.

If the peak voltage is abnormal, check an open circuit or poorly connected connectors in Yellow/Blue and Black/White wires.

If not defects are found in the harness, refer to the trouble-shooting chart on page 17-3.

### **IGNITION PULSE GENERATOR PEAK VOLTAGE**

#### NOTE

 Check cylinder compression and check that the spark plugs are installed correctly.

Remove the seat (page 2-2).

Disconnect the multi-connector from the ICM.

Connect the peak voltage adaptor or Imrie tester probes to the connector terminals of the wire harness side.

#### TOOLS:

Imrie diagnostic tester (model 625) or

Peak voltage adaptor

07HGJ - 0020100 with

Commercially available digital multimeter (impedance 10 M $\Omega$ /

#### **CONNECTION:**

DCV minimum)

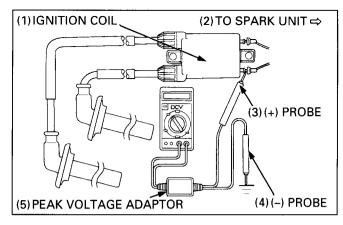
Yellow terminal (+) - White/Yellow (-)

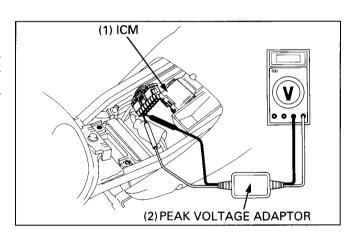
Crank the engine with the starter motor and read the peak voltage.

#### **PEAK VOLTAGE: 0.7 V minimum**

#### **A** WARNING

 Avoid touching the spark plugs and tester probes to prevent electric shock.





#### **IGNITION SYSTEM**

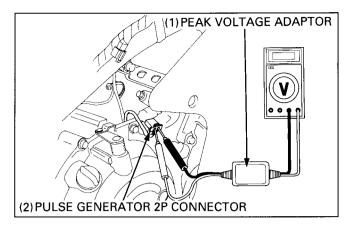
If the peak voltage measured at ICM multi-connector is abnormal, measure the peak voltage at the pulse generator connector.

Remove the fuel tank (page 2-2).

Disconnect the ignition pulse generator 2P (Black) connector and connect the tester probes to the terminal (Yellow and White/Yellow).

In the same manner as at the ICM connector, measure the peak voltage and compare it to the voltage measured at the ICM connector.

- If the peak voltage measured at the ICM is abnormal and the one measured at the ignition pulse generator is normal, the wire harness has an open circuit or loose connection.
- If both peak voltages measure are abnormal, check each item in the troubleshooting chart. If all items are normal, the ignition pulse generator is faulty. See section 10 for ignition pulse generator replacement.



### **IGNITION COIL**

#### REMOVAL/INSTALLATION

Remove the following:

- Air cleaner housing (page 5-4)
- Middle cowl (page 2-6)

Disconnect the spark plug caps from the plugs.

Disconnect the primary wires from the ignition coils. Remove the bolts and ignition coils.

Installation is in the reverse order of removal.

# **IGNITION PULSE GENERATOR**

### **REMOVAL**

Remove the following:  — Fuel tank (page 2-2)  — Middle/lower cowl (page 2-6)
Disconnect the ignition pulse generator 2P (Black) connector.
Release the wire from the wire clamp.
Remove the SH bolts and ignition pulse generator rotor cover.
Remove the gasket and dowel pins.
Remove the wire grommet from the cover. Remove the bolts and ignition pulse generator.

#### **IGNITION SYSTEM**

Shift the transmission into 6th gear and apply rear brake. Remove the ignition pulse generator rotor bolt.

#### NOTE

 If the engine is out of frame, remove the alternator cover (page 10-2) and hold the flywheel with the flywheel holder (07725 – 0040000), then remove the bolt.

#### **INSTALLATION**

Install the ignition pulse generator rotor aligning it wide groove with the wide teeth of the crankshaft.

Install the washer and rotor bolt. Shift the transmission into 6th gear and apply rear brake. Tighten the ignition pulse generator rotor bolt.

#### NOTE

 If the engine is out of frame, remove the alternator cover (page 10-2) and hold the flywheel with the flywheel holder (07725 – 0040000), then tighten the bolt.

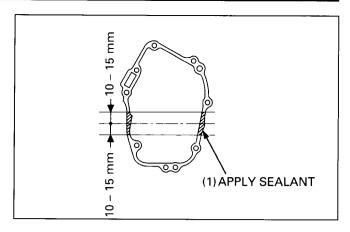
TORQUE: 59 N·m (6.0 kgf·m, 43 lbf·ft)

Install the ignition pulse generator into the cover.

Apply sealant to the wire grommet, then install it into the groove of the cover.

Install and tighten the ignition pulse generator bolts.

Apply liquid sealant to the mating surface of the crankcase as shown.



Install the dowel pins and a new gasket.

Apply sealant to the threads of the two bolts indicated by " $\Delta$ " mark on the cover.

Install the ignition pulse generator rotor cover and tighten the SH bolt to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Route the ignition pulse generator wire properly, connect the 2P (Black) connector. Clamp the wire with the band.

Install the removed parts in the reverse order of removal.

### THROTTLE SENSOR

#### INSPECTION

Remove the air cleaner housing (page 5-4).

Disconnect the throttle sensor 3P connector.

Check the connector for loose or corroded terminals.

Connect the inspection adaptor between the throttle sensor connectors.

TOOL:

Inspection adaptor

08GMJ - ML80100

#### INPUT VOLTAGE INSPECTION

Turn the ignition switch ON.

Measure and record the input voltage at the inspection adaptor terminals using a digital multimeter.

#### **CONNECTION:**

Red clip (+) - Green clip (-) Standard: 4.5 - 5.5 V

If the measurement is out of specification, check the following:

- Loose connection of the ICM multi-connector
- Open circuit in wire harness

#### **OUTPUT VOLTAGE INSPECTION**

Set a digital multimeter to the inspection adaptor terminals.

#### **CONNECTION:**

White clip (+) - Green clip (-)

Turn the ignition switch ON and measure and record the output voltage with the throttle fully open.

Compare the measurement to the result of the following calculation.

Measured input voltage X 0.824 = Vo

The sensor is normal if the measurement output voltage value is within Vo  $\pm\,10\%$ 

Turn the throttle stop screw counterclockwise fully, and measure and record the output voltage with the throttle fully closed.

Compare the measurement to the result of the following calculation.

#### Measured input voltage X 0.1 = Vc

The sensor is normal if the measurement output voltage value is within  $Vc \pm 10\%$ .

Using an analog meter, check that the needle of the voltmeter swings slowly when the throttle is opened gradually.

#### **CONTINUITY INSPECTION**

Disconnect the ICM multi-connector and throttle sensor 3P connector.

Check for continuity between the ICM and throttle sensor.

If there is no continuity, check the open or short circuit in wire harness.

### **IGNITION TIMING**

#### **A** WARNING

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

#### NOTE

· Read the instruction for timing light operating.

Warm up the engine.

Stop the engine and remove the crankshaft hole cap.

Connect the timing light to the No. 1 spark plug wire.

Start the engine and let it idle.

IDLE SPEED: Except SW, AR type:  $1,100 \pm 100 \text{ min}^{-1}$  (rpm) SW, AR type:  $1,100 \pm 50 \text{ min}^{-1}$  (rpm)

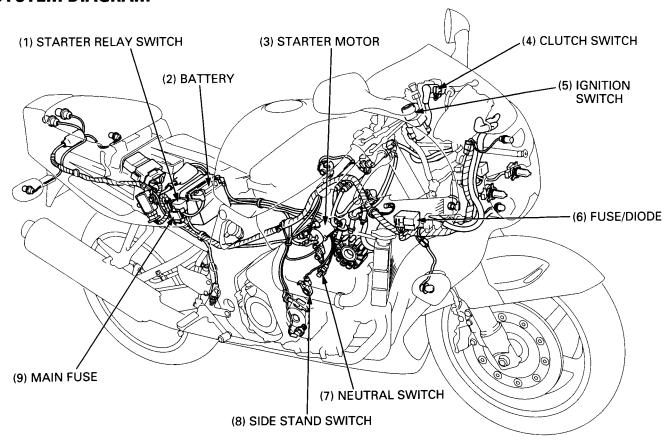
The ignition timing is correct if the "F" mark (three punch marks) aligns with the index mark on the ignition pulse generator rotor cover.

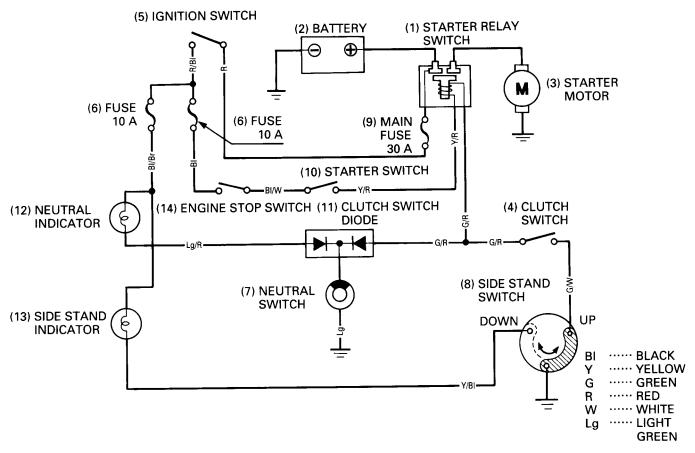
Increase the engine speed by turning the throttle stop screw and make sure the "F" mark begins to move counterclockwise when the engine speed at approximately 1,600 min<sup>-1</sup> (rpm).

### **IGNITION SYSTEM**

Check the O-ring is in good condition, replace if necessary. Apply oil to the O-ring and install and tighten the timing hole cap.

### **SYSTEM DIAGRAM**





# **18. ELECTRIC STATER**

SYSTEM DIAGRAM SERVICE INFORMATION	18-0 18-1	STARTER MOTOR STARTER RELAY SWITCH	18-4 18-10
TROUBLESHOOTING	18-2	DIODE	18-11

### **SERVICE INFORMATION**

#### **GENERAL**

- The starter motor can be removed with the engine in the frame.
- For the starter drive and driven gear removal/installation, see section 10.

#### **SPECIFICATION**

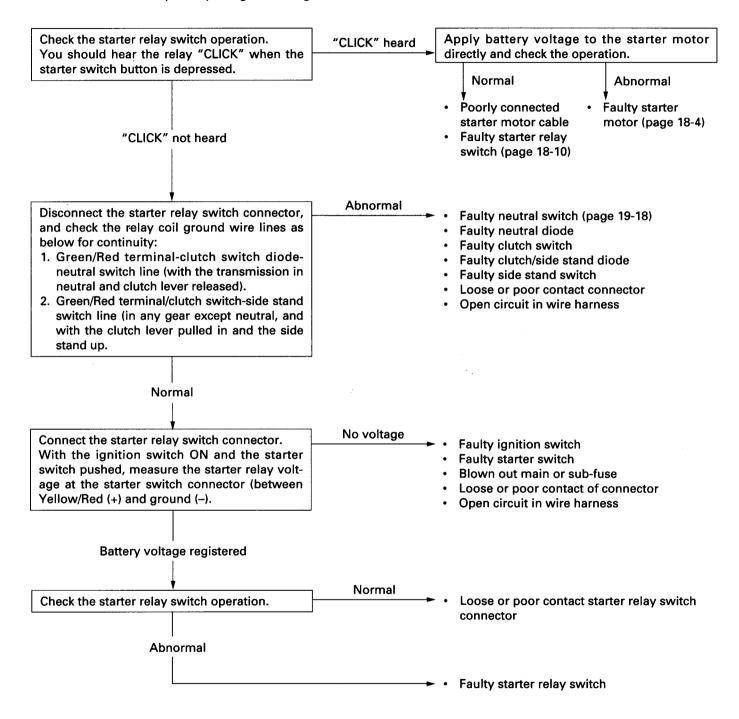
Unit: mm (in)

ITEM	STANDARD	SERVICE LIMIT
Starter motor brush length	12.0 – 13.0 (0.47 – 0.51)	4.5 (0.18)

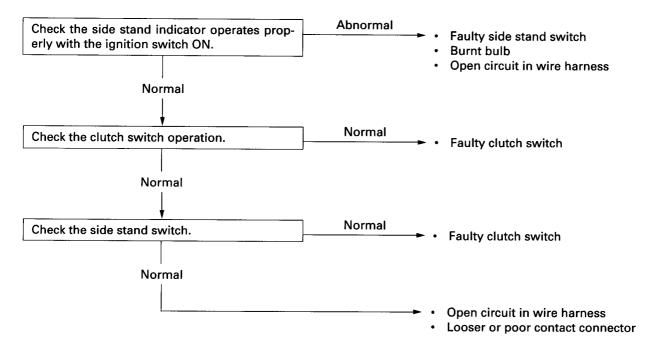
### TROUBLESHOOTING

#### Starter motor does not turn

- · Check for a blown out main or sub fuses before servicing.
- · Make sure the battery is fully charged and in good condition.



The starter motor turns when the transmission is in neutral, but does not turn with the transmission in any position except neutral, with the side stand up and the clutch lever pulled in.



#### Stater motor turns engine slowly

- Low battery voltage
- · Poorly connected battery terminal cable
- Poorly connected starter motor cable
- · Faulty starter motor
- · Poor connected battery ground cable

#### Starter motor turns, but engine does not turn

- Starter motor is running backwards
  - Case assembled improperly
  - Terminals connected improperly
- Faulty starter clutch
- · Damaged or faulty starter drive gear

#### Starter relay switch "Clicks", but engine does not turn over

· Crankshaft does not turn due to engine problems

### **STARTER MOTOR**

#### **REMOVAL**

#### **A** WARNING

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

Remove the fuel tank (page 2-2).

Remove the nut and the starter motor cable from the starter motor.

Remove the starter motor mounting bolts, ground wire, wire clamp.

Pull the starter motor out of the crankcase.

#### **DISASSEMBLY**

#### NOTE

Record the location and number of shims.

Remove the following:

- Starter motor case bolts

- Rear cover assembly
- Seal ring
- Shims

_	Front	cover	assembly	
---	-------	-------	----------	--

- Seal ring
- Lock washer
- Insulated washer
- Shims
- Armature

#### **INSPECTION**

Check for continuity between the cable terminal and the brush wire (the indigo colored wire or the insulated brush holder).

There should be continuity.

Check for continuity between the motor case and the cable terminal.

There should be no continuity.

Inspect the brushes for damage and measure the brush length.

SERVICE LIMIT: 4.5 mm (0.18 in)

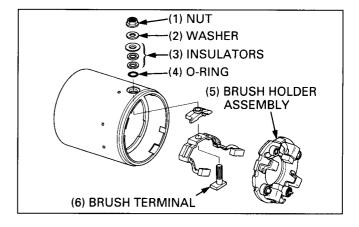
#### **ELECTRIC STARTER**

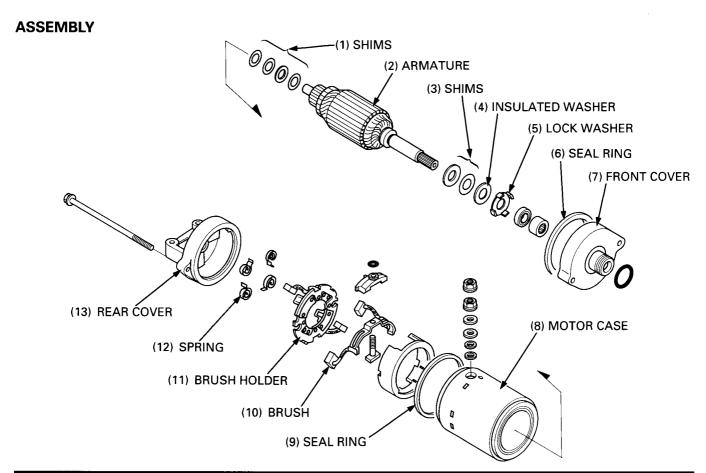
LLLOTRIC STARTER	
Check the bushing of the rear cover for wear or damage.	
Check the front cover oil seal for fatigue or other damage. Check the needle bearing for damage.	
Inspect the commutator bars for discoloration.  Bars discolored in pairs indicate grounded armature coils, in which case the starter motor must be replaced.	
NOTE	
Do not use emery or sand paper on the commutator.	
Check for continuity between individual commutator bars; there should be continuity.	

Also, check for continuity between individual commutator bars and the armature shaft; there should be no continuity.

#### Remove the following:

- --- Nut
- Washer
- Insulators
- O-ring
- Brush holder assembly
- Brush/terminal





### **ELECTRIC STARTER**

Set the brushes on the brush holder. Install the brush holder onto the motor case.

#### NOTE

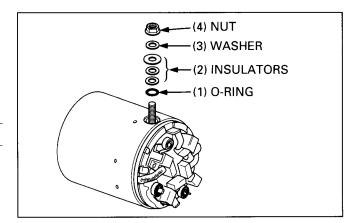
 Align the terminal holder plate boss with the groove of the motor case.

Install the following:

- O-ring
- Insulators
- -- Washer
- -- Nut

#### NOTE

Install the insulators properly as noted during removal.



Install the armature in the motor case.

Install the shims on the armature shaft.

#### NOTE

· Install the shims properly as noted during removal.

Install the insulated washer and lock washer on the armature shaft.

Install the seal ring onto the motor case.

Install the seal ring on the motor case. Install the shims on the armature shaft.

#### NOTE

· Install the shims properly as noted during removal.

Assemble the motor case and rear cover, aligning the brush holder boss with the groove in the rear cover.

Install the front cover to the motor case.  Make sure the index lines are aligned.
Install and tighten the case bolts securely.
INSTALLATION
Apply clean engine oil to the new O-ring. Install a new O-ring onto the starter motor boss.
Install the starter motor into the crankcase.
Route the starter motor cable and ground cable. Install the cables and wire clamp, then tighten the bolts and nut securely.

### STARTER RELAY SWITCH

#### **OPERATION INSPECTION**

Remove the right side cover (page 2-3).

Shift the transmission into neutral.

Turn the ignition switch ON and depress the starter switch button.

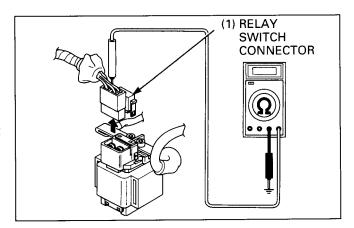
The coil is normal if the starter relay switch clicks.

If the switch "CLICK" is not heard, inspect the relay switch using the procedure below.

#### GROUND LINE INSPECTION

Disconnect the relay connector.

Check for continuity between the Green/Red wire and ground. If there is continuity when the transmission is in neutral or when the clutch is disengaged and the side stand switch is up, the ground circuit is normal (In neutral, there is a slight resistance due to the diode).

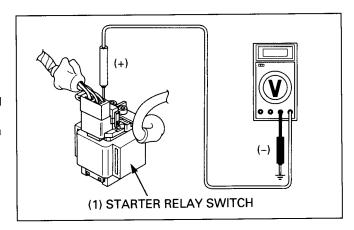


#### **VOLTAGE INSPECTION**

Connect the starter relay switch connector. Shift the transmission into neutral.

Measure the voltage between the Yellow/Red wire (+) and ground at the starter relay switch connector.

There should be battery voltage only when the starter switch button is depressed with the ignition switch is ON.



#### **CONTINUITY INSPECTION**

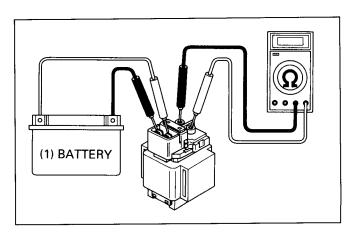
Disconnect the starter relay connector and cables.

Connect an ohmmeter to the starter relay switch large terminals

Connect a fully charged 12 V battery to the starter relay switch connector terminals (Yellow/Red and Green/Red).

Check for continuity between the starter relay switch terminals.

There should be continuity while 12 V battery is connected to the starter relay switch connector terminals and should be no continuity when the battery is disconnected.



### **DIODE**

### **REMOVAL**

Remove right upper cowl inner cover (page 2-8).

Open the fuse box and remove the diode.

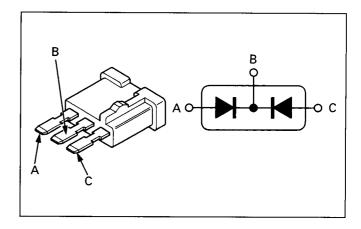
#### **INSPECTION**

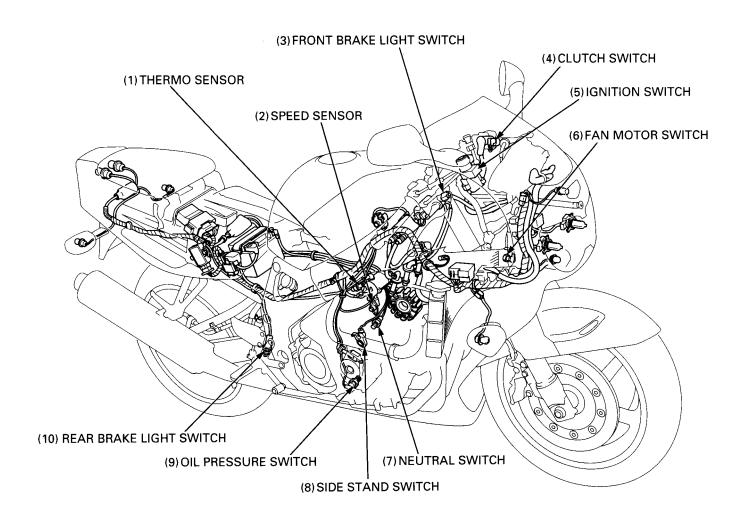
Check for continuity with an ohmmeter.

Normal direction: Continuity Reverse direction: No continuity

#### **INSTALLATION**

Install the diodes in the reverse order of removal.





# 19. LIGHTS/METERS/SWITCHES

COOLANT TEMPERATURE GAUGE/ SENSOR	19-12	TURN SIGNAL RELAY	19-20
TACHOMETER	19-12	HORN	19-20
SPEEDOMETER/SPEED SENSOR	19-10	SIDE STAND SWITCH	19-19
COMBINATION METER	19-7	NEUTRAL SWITCH	19-18
TAIL/BRAKE LIGHT	19-7	CLUTCH SWITCH	19-18
TURN SIGNAL	19-6	BRAKE LIGHT SWITCH	19-18
POSITION LIGHT	19-5	HANDLEBAR SWITCH	19-17
HEADLIGHT	19-4	IGNITION SWITCH	19-16
TROUBLESHOOTING	19-3	OIL PRESSURE SWITCH	19-15
SERVICE INFORMATION	19-1	COOLING FAN MOTOR SWITCH	19-14

### **SERVICE INFORMATION**

#### **GENERAL**

#### **A** WARNING

- A halogen headlight bulb becomes very hot while the headlight is ON, and remain hot for a while after it is turned OFF. Be sure to let it cool down before servicing.
- Use an electric heating element to heat the water/coolant mixture for the fan motor switch inspection. Keep all flammable materials away from the electric heating element. Wear protective clothing, insulated gloves and eye protection.
- Note the following when replacing the halogen headlight bulb.
  - Wear clean gloves while replacing the bulb. Do not put finger prints on the headlight bulb, as they may create hot spots on the bulb and cause is to fail.
  - If you touch the bulb with your bare hands, clean it with a cloth moistened with alcohol to prevent its early failure.
  - Be sure to install the dust cover after replacing the bulb.
- Check the battery condition before performing any inspection that requires proper battery voltage.
- · A continuity test can be made with the switches installed on the motorcycle.
- The following color codes are used throughout this section.

Bu =	Blue
BI =	Black

G = Green

Lg = Light Green

R = Red

Br = Brown

Gr = Gray Lb = Light Blue O = Orange P = Pink W = White Y = Yellow

### LIGHTS/METERS/SWITCHES

### **SPECIFICATIONS**

ITEM			SPECIFICATION
Bulbs	Headlight	Except U type	12 V – 60/55 W x 2
	(high/low beam)	U type	12 V – 45/45 W x 2
	Position light		12 V – 5 W
	Brake/tail light		12 V – 21/5 W x 2
	Front turn signal ligi	nt	12 V – 21 W
	Rear turn signal ligh	t	12 V – 21 W
	Instrument light		12 V – 1.7 W x 4
	Turn signal indicator  High beam indicator  Neutral indicator  Oil pressure indicator  Side stand indicator		12 V – 1.7 W x 2
			12 V – 1.7 W
			12 V – 1.7 W
			12 V – 1.7 W
			12 V – 1.7 W
Fuse	se Main fuse		30 A
	Sub fuse		10 A x 4, 20 A x 1
Fan motor	r Start to close (ON)		98 – 102°C (208 – 216°F)
switch	switch Stop to open		93 – 97°C (199 – 207°F)
Coolant temp	Coolant temperature sensor resistance (20°C/68°F)		45 – 60 Ω

### **TORQUE VALUES**

Side stand mounting bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	
Side stand lock nut	29 N·m (3.0 kgf·m, 22 lbf·ft)	
Side stand switch mounting bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	ALOC bolt
Side stand bracket bolt	44 N·m (4.5 kgf·m, 33 lbf·ft)	ALOC bolt
Ignition switch mounting bolt	25 N·m (2.5 kgf·m, 18 lbf·ft)	Apply a locking agent to the threads
Coolant temperature sensor	10 N·m (1.0 kgf·m, 7 lbf·ft)	Apply sealant to the threads
Neutral switch	12 N·m (1.2 kgf·m, 9 lbf·ft)	
Oil pressure switch	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply sealant to the threads
•		

### **TROUBLESHOOTING**

#### SPEED SENSOR/SPEEDOMETER

The odometer/trip meter operate normally, but the speedometer does not operate

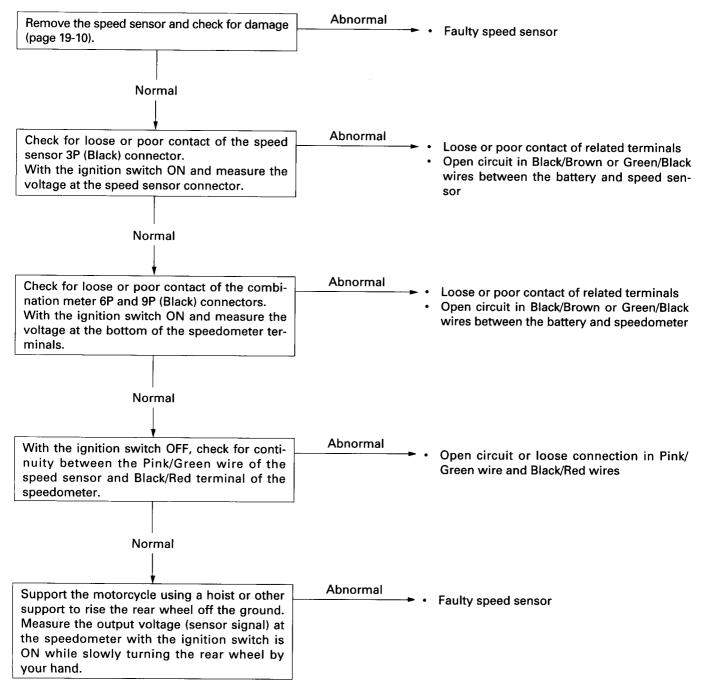
· Faulty speedometer

The speedometer operate normally, but the odometer/trip meter does not operate

· Faulty odometer/trip meter

#### The speedometer operate is abnormal

- · Check for the following before diagnosing.
  - Blown main or sub fuses
  - Loose or corroded terminals of the connectors
  - Discharged battery



### **HEADLIGHT**

#### **BULB REPLACEMENT**

#### **A** WARNING

• A halogen headlight bulb becomes very hot while the headlight is ON, and remain hot for a while after it is turned OFF. Be sure to let it cool down before servicing.

Push the retaining tabs and remove the headlight bulb sockets.

Remove the dust cover.

Unhook the bulb retainer and remove the headlight bulb.

#### **CAUTION**

• Avoid touching halogen headlight bulbs. Finger prints can create hot spots that cause a bulb to break.

If you touche the bulb with your bare hands, clean it with cloth moistened with denatured alcohol to prevent early bulb failure.

Install a new bulb aligning its tabs with the groove in the headlight unit.

Install the dust cover tightly against the headlight with the "TOP" mark facing up.

Connect the headlight sockets.

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	-17	$\cdot \cdot$		/	$\Delta E_{E}$	AIIUI

nemove the upper cowl (page 2-7).	

Remove the four screws and headlight unit.

Installation is in the reverse order of removal.

### **POSITION LIGHT**

#### **BULB REPLACEMENT**

Remove the screws and position light bulb lens.

Remove the bulb form the socket and replace it.

Install the position bulb lens in the reverse order of removal.

### **REMOVAL/INSTALLATION**

Remove the upper cowl (page 2-7).

Remove the screws and position light unit.

Installation is in the reverse order of removal.

## **TURN SIGNAL**

#### **BULB REPLACEMENT**

Remove the screw and turn signal lens.

While pushing in, turn the bulb counterclockwise to remove it and replace with a new one.

Install the turn signal light lens in the reverse order of removal.

#### **REMOVAL/INSTALLATION**

For front turn signal unit removal, remove the inner covers (page 2-9).

For rear turn signal removal, remove the side covers (page 2-3).

Disconnect the turn signal connectors.

Remove the nut and setting plate.

Release the turn signal wire and remove the turn signal unit.

Install the turn signal unit in the reverse order of removal.

#### NOTE

Route the turn signal wire properly (page 1-21).

### **TAIL/BRAKE LIGHT**

#### **BULB REPLACEMENT**

Open the pillion seat using the ignition key.

Remove the tail/brake light socket by turning it counterclockwise.

While pushing in, turn the bulb counterclockwise to remove it and replace with a new one.

Install the tail/brake light lens in the reverse order of removal.

Refer to page 2-5 for tail/brake light unit removal/installation.

### **COMBINATION METER**

#### **REMOVAL**

Remove the three combination meter mounting bolts.

Disconnect the combination meter 3P (Black) and 9P (Black) connectors.

Remove the combination meter assembly.

#### LIGHTS/METERS/SWITCHES

#### **BULB REPLACEMENT**

Pull the indicator lamp socket out of the combination meter. Remove the bulb from the socket and replace it with a new one.

#### **DISASSEMBLY**

Remove the screw and trip meter knob.

Remove the six self-tapping screws, wire clamp and upper case.

Remove the screw/washers, then remove the speedometer, tachometer and coolant temperature meter.

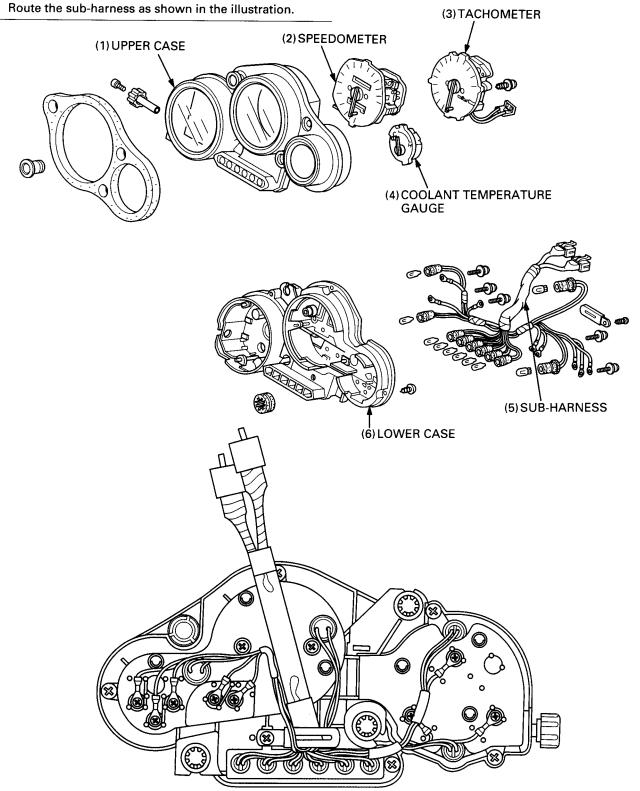
Remove the bulb sockets and combination meter sub-harness.

#### **ASSEMBLY**

Assemble the combination meter in the reverse order of removal.

#### NOTE

Connect the terminals and install the sockets are according to the color codes indicated on the lower case.



#### LIGHTS/METERS/SWITCHES

#### INSTALLATION

Install the combination meter in the reverse order of removal.

#### NOTE

• Route the combination meter wire properly (page 1-21).

### SPEEDOMETER/SPEED SENSOR

#### SENSOR INSPECTION

Remove the bolts and speed sensor.

Check the speed sensor for damage. Check the speed sensor for smooth operation. If the speed sensor does not turn smoothly, replace with a new one.

#### **OUTPUT SIGNAL INSPECTION**

Remove the upper cowl (page 2-7).

Turn the ignition switch ON.

Measure the voltage at the combination meter terminals with the ignition switch is ON while slowly turning the rear wheel by hand.

CONNECTION: Black/Red (+) - Green/Black (-)

STANDARD: Repeat 0 to 5 V

If the measurement is out of specification, inspect the open circuit in wire harness.

#### **WIRE HARNESS INSPECTION**

Remove the fuel tank (page 2-2).

Disconnect the speed sensor 3P connector. Turn the ignition switch is ON and measure the voltage at the 3P connector wire harness side.

CONNECTION: Black/Brown (+) - Green/Black (-)

STANDARD: Battery voltage

If there is no voltage, replace or repair the wire harness.

#### **REMOVAL/INSTALLATION**

Remove the fuel tank (page 2-2).

Disconnect the speed sensor 3P connector.

Remove the bolts and speed sensor.

#### NOTE

 Release the sensor wire from the wire clamp on the drive sprocket cover.

Install the speed sensor in the reverse order of removal.

#### NOTE

 Align the hexiagonal portion of the speed sensor with the drive sprocket bolt head.

### **TACHOMETER**

#### **INSPECTION**

Remove the combination meter from the bracket (page 19-7).

Check for loose or poor contact terminals of the tachometer.

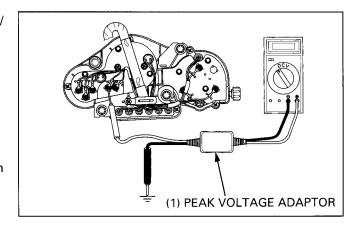
Connect the peak voltage adaptor to the tachometer Black/ Yellow terminal and ground.

CONNECTION: Black/Yellow (+) and Ground (-)

Start the engine and measure the tachometer input voltage.

**PEAK VOLTAGE: 10.5 V minimum** 

If the value is normal, replace the tachometer. If the measured value is below 10.5 V, replace the ignition control module (ICM).



If the value is 0 V, perform the following: Remove the seat (page 2-2) and disconnect the ICM multiconnector.

Check for continuity between the tachometer terminal and the ICM multi-connector Black/Yellow terminals. If there is no continuity, check the wire harness for an open circuit.

If there is continuity, replace the tachometer unit.

For tachometer replacement, see 19-7; combination meter disassembly and assembly.

# **COOLANT TEMPERATURE GAUGE/SENSOR**

#### **INSPECTION**

Remove the fuel tank (page 2-2).

Disconnect the thermo sensor wire connector from the sensor.

Ground the thermo sensor wire with a jumper wire.

Turn the ignition switch ON and check the coolant temperature gauge.

Disconnect the thermo sensor wire connector from the ground immediately if the gauge needls moves fully to H.

#### CAUTION

• Immediately disconnect the sensor wire connector from the ground when the needle moves to H (hot) to prevent damage to the gauge.

If the needle moves, check the thermo sensor unit.

If the needle does not move, check for voltage between the sensor wire connector and ground.

If the voltage is measured, faulty coolant temperature gauge unit.

If there is no voltage, check for voltage between the Black/ Brown and Green/Blue wire terminals.

If there is no voltage, faulty coolant temperature gauge unit. If the voltage is measured, check the wire harness.

#### THERMO SENSOR UNIT INSPECTION

#### **A** WARNING

- Wear insulated gloves and adequate eye protection.
- Keep flammable materials away from the electric heating element.

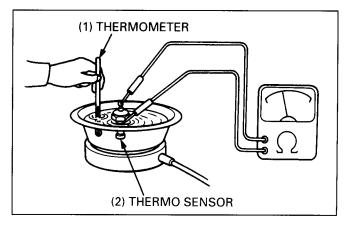
Drain the coolant (page 6-3).

Disconnect the wire connector from the coolant temperature sensor and remove the sensor.

Suspend the thermo sensor in a pan of coolant (50 – 50 mixture) over the electric heating element and measure the resistance through the sensor as the coolant heats up.

#### NOTE

- Soak the thermo sensor in coolant up to its threads with at least 40 mm (1.57 in) from the bottom of the pan to the bottom of the sensor.
- Keep temperature constant for 3 minutes before testing.
   A sudden change of temperature will result in incorrect readings. Do not let the thermometer or thermo sensor touch the pan.



#### LIGHTS/METERS/SWITCHES

Temperature	80°C (68°F)	120°C (248°F)
Resistance	45 – 60 Ω	10 – 20 Ω

Replace the sensor if it is out of specifications by more than 10% at any temperature listed.

Apply sealant to the thermo sensor threads. Do not apply sealant to the sensor head.

Install and tighten the thermo sensor.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Connect the thermo sensor connector.

Fill the system and bleed the air (page 6-4).

### **COOLING FAN MOTOR SWITCH**

#### **INSPECTION**

Check for blown fuse before inspection.

#### Fan motor does not stop

Turn the ignition switch OFF, disconnect the connector from the fan motor switch and turn the ignition switch ON again.

If the fan motor does not stop, check for a shorted wire between the fan motor and switch.

If the fan motor stops, replace the fan motor switch.

#### Fan motor does not start

Before testing, warm up the engine to operating temperature.

Disconnect the connector from the fan motor switch and ground the connector to the body with a jumper wire. Turn the ignition switch ON and check the fan motor.

If the motor starts, check the connection at the fan motor switch terminal.

It is OK, replace the fan motor switch.

If the motor does not start, check for voltage between the fan motor switch connector and ground.

If battery voltage is measured, replace fan motor.

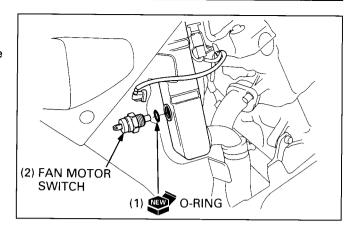
If there is no battery voltage, check for poor connection of the connector or broken wire harness.

#### **REMOVAL/INSTALLATION**

Disconnect the fan motor switch connector and remove the switch.

Install a new O-ring onto the fan motor switch. Install and tighten the fan motor switch.

TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)



### **OIL PRESSURE SWITCH**

#### **INSPECTION**

If the oil pressure warning indicator stays on while the engine running, check the engine oil level before inspection.

Make sure that the oil pressure warning indicator come on with the ignition switch ON.

If the indicator does not come on, inspect as follow: Remove the middle/lower cowl (page 2-6).

Remove the dust cover.

Remove the screw and oil pressure switch terminal.

Short the oil pressure switch wire terminal with the ground using a jumper wire.

The oil pressure warning indicator comes on with the ignition switch is ON.

If the light does not comes on, check the sub-fuse (10 A) and wires for a loose connection or an open circuit.

Start the engine and make sure that the light goes out. If the light does not go out, check the oil pressure (page 4-3). If the oil pressure is normal, replace the oil pressure switch (page 4-3).

# **IGNITION SWITCH**

#### **INSPECTION**

Remove the right inner cover (page 2-8).

Disconnect the ignition switch wire 6P (Black) connectors.

Check for continuity between the wire terminals of the ignition switch connector in each switch position.

Continuity should exist between the color coded wires as follows:

#### **IGNITION SWITCH**

	FAN	IG	BAT1	KEY
ON	0	<u> </u>		KEY ON
OFF				KEY OFF
LOCK				KEY OFF LOCK PIN
COLOR	Bu/O	R/BI	R	

#### **REMOVAL/INSTALLATION**

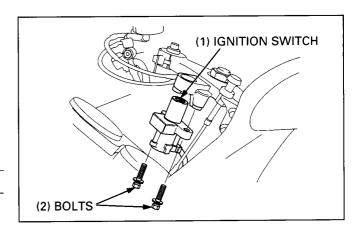
Disconnect the ignition switch wire 6P (Black) connector. Remove the wire clamp.

Remove the bolts and ignition switch.

Install the ignition switch in the reverse order of removal.

#### NOTE

Apply a locking agent to the mounting bolt threads.



# **HANDLEBAR SWITCHES**

Disconnect the handlebar switch connectors.

Check for continuity between the wire terminals of the handlebar switch connector.

Continuity should exist between the color coded wire terminals as follows:

# ENGINE STOP SWITCH (U type)

ENGINE STOP SWITC	Ή
Except U type)	

	IG	BAT2
OFF		
RUN	0	0
COLOR	BI	BI/W

	IG	BAT2
OFF		
RUN	0	0
COLOR	BI/W	BI

# STARTER SWITCH (Except U type)

# STARTER SWITCH (U type)

	ST	BAT2
FREE		
PUSH	0	0
COLOR	Y/R	BI/W

	ST	BAT2	BAT5	HL
FREE			0-	$\bigcirc$
PUSH	0	0		
COLOR	BI/W	Y/R	Bu/W	B/R

#### **TURN SIGNAL SWITCH**

#### **DIMMER SWITCH (U type)**

# DIMMER SWITCH (Except U type)

	W	R	L
R	0	-0	
N			
L	0—		-0
COLOR	GR	SB	0

	HL	Lo	Hi
Lo	0	-0	
(N)	0	-0-	0
Hi	0		0
COLOR	Bu/W	W	Bu

	HL	Lo	Hi
Lo	0—	0	
(N)	0	<del></del>	0
Hi	$\circ$		_
COLOR	BI/R	W	Bu

#### LIGHTING SWITCH (Except U type)

# PASSING SWITCH (Except U type)

HODN	SWITCH

	ВАТ3	TL	BAT4	HL
•				
Р	0	0		
Н	0	<u> </u>	0—	0
COLOR	BI/Br	BR	B/R	

телери и тури,			
	BAT4	Hi	
FREE			
PUSH	0-	9	
COLOR	BI/R	Bu	

	Но	BAT3
FREE		
PUSH	0	0
COLOR	Bu/G	BI

### **BRAKE LIGHT SWITCH**

#### **FRONT**

Disconnect the front brake light switch connectors.

There should be continuity with the brake lever applied, and there should be no continuity with the brake lever is released.

#### **REAR**

Remove the seat (page 2-2).

Disconnect the rear brake light switch connector and check for continuity between the terminals.

There should be continuity with the brake pedal applied, and there should be no continuity with the brake pedal is released.

# **CLUTCH SWITCH**

Disconnect the clutch switch connectors.

There should be continuity with the clutch lever applied, and there should be no continuity with the clutch lever is released.

## **NEUTRAL SWITCH**

Remove the fuel tank (page 2-2).

Disconnect the neutral switch connector.

Shift the transmission into neutral and check for continuity between the Light Green wire terminal and ground.

There should continuity with the transmission is in neutral, and not continuity when the transmission is into gear.

# **SIDE STAND SWITCH**

#### **INSPECTION**

Remove the seat (page 2-2).

Disconnect the side stand switch 3P (Green) connector.

Check for continuity between the wire terminals of the side stand switch connector.

Continuity should exist between the color coded wire terminals as follows:

	G/W	Y/BI	G
Side stand down		0	— O
Side stand up	0		

#### **REMOVAL**

Disconnect the side stand switch 3P (Green) connector.

Remove the bolt and side stand switch.

#### **INSTALLATION**

Install the side stand switch aligning the switch pin with the side stand hole and the switch groove with the return spring holding pin.

Secure the side stand switch with a new bolt.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

### **HORN**

Disconnect the wire connectors from the horn.

Connect the 12 V battery to the horn terminal directly. The horn is normal if it sounds when the 12 V battery is connected across the horn terminals.

### **TURN SIGNAL RELAY**

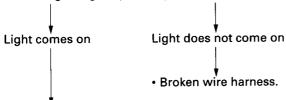
#### **INSPECTION**

Check the following:

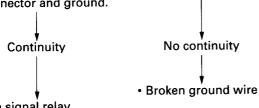
- Battery condition
- Burned out bulb or non-specified wattage
- Burned fuse
- Ignition switch and turn signal switch function
- Loose connectors

If above items all normal, check the following: Disconnect the turn signal connectors from the relay.

1. Short the black and gray terminals of the turn signal relay connector with a jumper wire. Start the engine and check the turn signal light by turning the switch ON.



2. Check for continuity between the green terminal of the relay connector and ground.



- Faulty turn signal relay.
- · Poor connection of the connector.

BROWN

PINK

GRAY

BRUN

ROSE

GRIS

ORANGE

BLEU CLAIR

LIGHT GREEN

COOLANT TEMPERATURE GAUGE

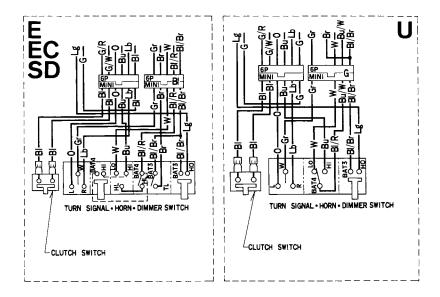
KUHLMITTEL-TEMPERATURANZE:GER

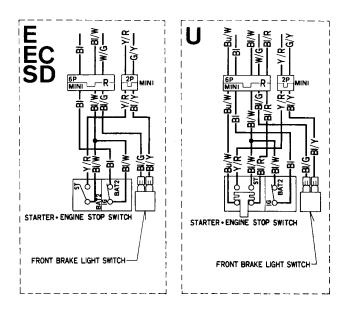
/ HEADLIGHT . PASSING

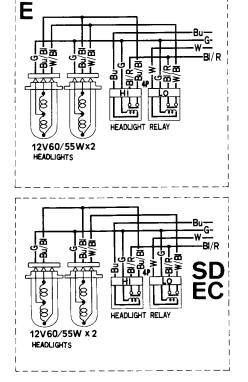
SCHEINWERFER • ÜBERHOL

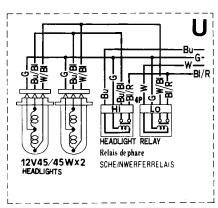
Phare - Depassement

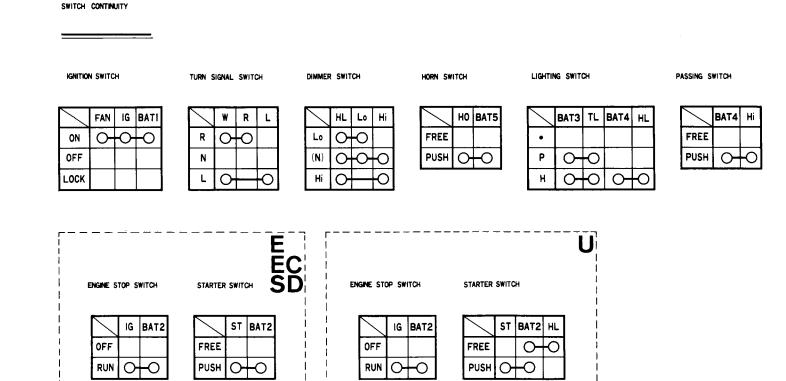
A 20A











# 21. TROUBLESHOOTING

Possible cause

Improper valve timing

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POOR PERFORMANCE AT LOW AND IDLE SPEED	21-3		

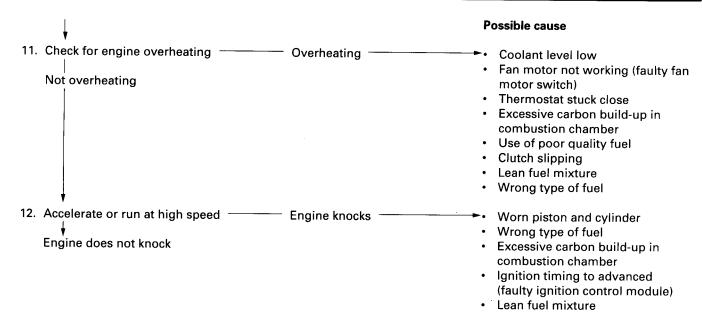
# **ENGINE DOES NOT START OR IS HARD TO START**

#### 1. Check the fuel flow to carburetor — Not reaching carburetor Clogged fuel line and filter · Pinched fuel valve vacuum tube Reaching carburetor · Clogged fuel tank breather 2. Perform a spark test ----- Weak or no spark Faulty spark plug Fouled spark plug Good spark · Faulty ignition control module · Broken or shorted spark plug wire Faulty ignition switch Faulty ignition pulse generator Faulty engine stop switch Loose or disconnected ignition system wires 3. Remove and inspect spark plugs — Wet Plug Flooded carburetor SE valve ON position Good Throttle valve open · Air cleaner dirty 4. Start by following normal procedure - Engine starts but Improper choke operation stops Carburetor incorrectly adjusted Engine does not start Intake pipe leaking Improper ignition timing (Faulty ignition coil or ignition pulse generator) · Fuel contaminated 5. Test cylinder compression - Low Compression Valve clearance too small Valve stuck open · Worn cylinder and piston ring · Damaged cylinder head gasket Seized valve

# **ENGINE LACKS POWER**

#### Possible cause

		•	
1.	Raise wheel off the ground and spin by hand	Wheels do not spin freely	Brake dragging Worn or damaged wheel bearing
	Wheel pins freely		
2.	Check tire pressure	Pressure low	Faulty tire valve Punctured tire
	Pressure normal		
3.	Accelerate rapidly from low to second		Clutch slipping Worn clutch discs/plates
	Engine speed reduced when clutch is released	clutch is released •	Warped clutch discs/plates Weak clutch spring Additive in engine oil
4.	Accelerate lightly	Engine speed does not increase	SE valve ON position Clogged air cleaner
	Engine speed increase	•	Restricted fuel flow Clogged muffler Pinched fuel tank breather
5.	Check ignition timing	Incorrect	Faulty ignition control module Faulty ignition pulse generator
	Correct		Tauty ignition pulse generates
6.	Test cylinder compression	Incorrect	Valve stuck open Worn cylinder and piston rings
	Normal	•	Leaking head gasket Improper valve timing
7.		Clogged	Carburetor not serviced frequently enough
	Not clogged		
8.	Remove spark plugs	Fouled or discolored	Plugs not serviced frequently enough
	Not fouled or discolored	•	Spark plugs are the incorrect heat range
9.	Check oil level and condition	Incorrect	Oil level too high Oil level too low
	Correct	•	Contaminated oil
10.	Remove cylinder head cover and inspect lubrication	Valve train not lubricated properly	Clogged oil passage Clogged oil control orifice
	Valve train lubricated properly		



# POOR PERFORMANCE AT LOW AND IDLE SPEED

	Р	ossible cause
Check carburetor pilot screw     adjustment	Incorrect	See section 5
Correct		
2. Check for leaking intake pipe  No leak	Leaking	Loose insulator clamps Damaged insulator
3. Perform spark test  Good spark	•	Faulty carbon or wet fouled spark plug Faulty ignition control module Faulty ignition coil Broken or shorted spark plug wire Faulty engine stop switch Faulty ignition pulse generator Faulty ignition switch Loose or disconnected ignition system wires
4. Check ignition timing	Incorrect	Improper ignition timing (faulty ignition control module)

# **POOR PERFORMANCE AT HIGH SPEED**

#### Possible cause

Possible cause

1. Disconnect fuel tube at carburetor and pump the vacuum line    Fuel flows freely	Fuel flow restricted ———	<ul> <li>Clogged fuel line</li> <li>Clogged fuel tank breather</li> <li>Faulty fuel vavle</li> <li>Clogged fuel filter</li> </ul>
Remove the carburetor and check for clogging	Clogged	——►• Clean
Not clogged		
3. Check valve timing	Incorrect -	Cam sprocket not installed properly
Correct		
4. Check ignition timing Correct	Incorrect	<ul><li>Faulty ignition control module</li><li>Faulty ignition pulse generator</li></ul>
5. Check valve spring  Not weak	Weak	Faulty spring

## **POOR HANDLING**

#### Steering stem adjusting nut too 1. If steering is heavy -Damaged steering head bearings Excessive wheel bearing play 2. If either wheel is wobbling -• Bent rim · Improper installed wheel hub Swingarm pivot bearing excessively worn Bent frame Faulty shock absorber 3. If the motorcycle pulled to one side -· Front and rear wheel not aligned · Bent fork · Bent swingarm · Bent axle

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# 22. CBR900RR ADDENDUM

## **HOW TO USE THIS MANUAL**

This addendum contains information for the CBR900RR (W).

Refer to the CBR900RR Shop Manual (62MAS00) and Addendum (62MAS00Z) for service procedures and data not included in this addendum.

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HONDA MOTOR CO., LTD.
SERVICE PUBLICATION OFFICE

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### **IMPORTANT SAFETY NOTICE**

**A** WARNING

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

**CAUTION:** 

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

NOTE:

Gives helpful information.

Detailed descriptions of standard workshop procedures, safety principles and service operations are not included. It is important to note that this manual contains some warnings and cautions against some specific service methods which could cause **PERSONAL INJURY** to service personnel or could damage a vehicle or render it unsafe. Please understand that those warnings could not cover all conceivable ways in which service, whether or not recommended by Honda, might be done or of the possibly 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 methods or tools selected.

#### **TYPE CODE**

· Throughout this manual, the following abbreviations are used to identify individual model.

CODE	AREA TYPE	CODE	AREA TYPE
ED	EUROPEAN DIRECT SALES	AR	AUSTRIA
E	U.K.	U	AUSTRALIA
G	GERMANY	ND	NORTH EUROPE
F	FRANCE	MX	MEXICO
SW	SWITZERLAND	BR	BRAZIL
SD	SWEDEN	SI	SINGAPORE

# **MODEL IDENTIFICATION**

- (1) The frame serial number is stamped on the right side of the steering head.
- (2) The engine serial number is stamped on the right side of the upper crankcase

- (3) The carburetor identification numbers are stamped on the intake side of the carburetor body as shown.
- (4) The color label is attached as shown. When ordering color-coded parts, always specify the designated color code.

# **SPECIFICATIONS**

	ITEM	SPECIFICATIONS
DIMENSIONS	Overall length	
	G, AR, SW, SD, ND type	2,135 mm (84.1 in)
	F, E, U, ED type	2,040 mm (80.3 in)
	BR, MX, SI type	2,055 mm (80.9 in)
	Overall width	685 mm (27.0 in)
	Overall height	1,135 mm (44.7 in)
	Wheelbase	1,100 11111 (1111 111)
	Except MX, SI type	1,405 mm (55.3 in)
	MX, SI type	1,400 mm (55.1 in)
	Seat height	810 mm (31.9 in)
	Footpeg height	383 mm (15.1 in)
	Ground clearance	140 mm (5.5 in)
	1	140 mm (5.5 m)
	Dry weight	400 L = (007 H =)
	Except SW, AR type	180 kg (397 lbs)
	SW, AR type	181 kg (399 lbs)
	Curb weight	
	Except AR, SW, MX, SI type	202 kg (445 lbs)
	AR, SW, MX, SI type	203 kg (448 lbs)
	Maximum weight capacity	
	Except SW, AR, MX, SI type	189 kg (417 lbs)
	SW, AR type	188 kg (415 lbs)
	MX, SI type	160 kg (353 lbs)
FRAME	Frame type	Diamond
INAME	Front suspension	Telescopic fork
	Front wheel travel	110 mm (4.3 in)
		Swingarm
	Rear suspension	125 mm (4.9 in)
	Rear wheel travel	
	Rear damper	Nitrogen gas filled damper, with reserve tank
	Front tire size	130/70 ZR 16 (61 W)
	Rear tire size	180/55 ZR 17 (73 W)
	Tire brand	E DEFECT DADIALID DEFECT DADIAL C
	Bridgestone	Front: BT56F RADIAL/Rear: BT56R RADIAL G
	Michelin	Front: TX15/Rear: TX25
	Front brake	Hydraulic double disc brake
	Rear brake	Hydraulic single disc brake
	Caster angle	24°
	Trail length	95 mm (3.7 in)
	Fuel tank capacity	18.0 liter (4.76 US gal, 3.96 lmp gal)
	Fuel tank reserve capacity	3.5 liter (0.92 US gal, 0.77 lmp gal)
ENGINE	Bore and stroke	71.0 x 58.0 mm (2.80 x 2.28 in)
LINGINE	Displacement	919 cm³ (56.1 cu-in)
	Compression ratio	11.1:1
	Valve train	Chain drive and DOHC
		)
	Intake valve opens	15° BTDC Except 0° BTDC AR,
	closes	35° ABDC   AR, SW 37° ABDC   SW
	Exhaust valve opens	39° BBDC   type 40° BBDC   type
	closes	11° ATDC ) 0° ATDC )
	Lubrication system	Forced pressure and wet sump
	Oil pump type	Trochoid
	Cooling system	Liquid cooled
	Air filtration	Paper filter
	Crankshaft type	Unit type
	Engine dry weight	
	Except SW, AR type	66.3 kg (146.2 lbs)
	SW, AR type	67.6 kg (149.1 lbs)
	Cylinder arrangement	Four cylinder, inline

ITEM		SPECIFICATIONS	
CARBURETOR	Carburetor type Throttle bore		CV (Constant Velocity) type, with flat valve 38 mm (1.5 in)
DRIVE TRAIN	Clutch system Clutch operation system Transmission Primary reduction Final reduction Except MX, SI type MX, SI type Gear ratio  Gearshift pattern	1st 2nd 3rd 4th 5th 6th	Multi-plate, wet Mechanical type Constant mesh, 6-speed 1.520 (76/50)  2.625 (42/16) 2.687 (43/16) 2.769 (36/13) 2.000 (26/13) 1.600 (24/15) 1.368 (26/19) 1.227 (27/22) 1.130 (26/23) Left foot operated return system, 1 – N – 2 – 3 – 4 – 5 – 6
ELECTRICAL	Ignition system Starting system Charging system Regulator/rectifier Lighting system		Full transistor digital ignition Electric starter motor Triple phase output alternator SCR shorted/triple phase, full wave rectification Battery

Unit: mm (in)

_ LUBRICATION SYSTEM ITEM		STANDARD	SERVICE LIMIT
Engine oil capacity	At draining	3.5 liter (3.7 US qt, 3.1 Imp qt)	
	At disassembly	4.4 liter (4.6 US qt, 3.9 lmp qt)	
	At oil filter change	3.6 liter (3.8 US qt, 3.2 lmp qt)	
Recommended engine o	il	HONDA 4-stroke oil or equivalent motor oil API service classification SE, SF or SG Viscosity: SAE 10W – 40	
Oil pressure at oil pressure switch		490 kPa (5.0 kgf/cm², 71 psi) at 6,000 min <sup>-1</sup> (rpm)/(80°C/176°F)	
Oil pump rotor	Tip clearance	0.15 - 0.22 (0.006 - 0.009)	0.20 (0.008)
	Body clearance	0.15 - 0.22 (0.006 - 0.009)	0.35 (0.014)
	Side clearance	0.02 - 0.07 (0.001 - 0.003)	0.10 (0.004)

IT	ЕМ	SPECIFICATIONS		
Carburetor identification	E, ED, F, SD, U type	VP8CA		
number	G, ND type	VP8CC		
	SW type	VP8EB		
	AR type	VP8	EA	
	MX type	VP8	CD	
	BR type	VP8	CE	
	SI type	VP8	СВ	
Main jet		#1:	20	
Slow jet	Except SW type	#40		
SW type		#38		
Jet needle number		No. 1, 4	No. 2, 3	
	E, ED, U, G, F, SD, ND, MX, BR type	J5FS J5FR		
	SW type	J5FC	J5FC	
	AR type	J5FB	J5FA	
	SI type	J5FH	J5DD	
Pilot screw initial opening	E, ED, U, F, SD, MX, BR type	2 turns out		
	AR, G, ND type	1-3/4 turns out		
	SW type	1-7/8 turns out		
SI type		1-5/8 turns out		
Float level		13.7 mm (0.54 in)		
Idle speed	AR type	1,200 ± 100	min <sup>-1</sup> (rpm)	
	SW type	1,200 ± 50 r	min <sup>-1</sup> (rpm)	
	Except AR, SW type	1,100 ± 100	min <sup>-1</sup> (rpm)	
Throttle grip free play		2 – 6 mm (1/12 – 1/4 in)		

#### NOTE

<sup>•</sup> As the compression spring is very long, it will jump out of the carburetor when the cover is removed.

	ITEM		SPECIFICATIONS	
Coolant capacity	Radiator and	l engine	2.64 liter (2.79 US qt, 2.32 lmp qt)	
	Reserve tank		0.35 liter (0.370 US qt, 0.310 lmp qt)	
Radiator cap relief pressure			107.9 kPa (7.1 kgf/cm², 2.16 psi)	
Thermostat	Begin to open	MX, BR, SI type	80 – 84°C (176 – 183°F)	
		Except MX, BR, SI type	73 – 77°C (156 – 165°F)	
	Fully open	MX, BR, SI type	95°C (203°F)	
		Except MX, BR, SI type	90°C (192°F)	
	Valve lift		8 mm (0.3 in) minimum	

ITEM				STANDARD	SERVICE LIMIT
Cylinder compr	ession			1,27 kPa (13.0 kgf/cm², 185 psi) at 350 min <sup>-1</sup> (rpm)	
Cylinder head v	varpage				0.10 (0.004)
Valve, valve guide	Valve clearance	е	IN	0.13 – 0.19 (0.005 – 0.007)	
			EX	0.22 - 0.28 (0.009 - 0.011)	
	Valve stem O.D.		IN	4.475 – 4.490 (0.1762 – 0.1768)	4.465 (0.1758)
			EX	4.465 – 4.480 (0.1758 – 0.1764)	4.455 (0.1754)
	Valve guide I.D.		IN	4.500 - 4.512 (0.1772 - 0.1776)	4.540 (0.1787)
			EX	4.500 – 4.512 (0.1772 – 0.1776)	4.540 (0.1787)
	Stem-to-guide clearance		IN	0.010 - 0.037 (0.0004 - 0.0015)	
			EX	0.020 - 0.047 (0.0008 - 0.0019)	
		Valve guide projection above		14.60 – 14.80 (0.575 – 0.583)	
	cylinder head		EX	14.80 - 15.00 (0.583 - 0.591)	-
	Valve seat wid	th	IN/EX	0.90 – 1.10 (0.035 – 0.043)	1.5 (0.06)
Valve spring free length Valve lifter	Inner		IN/EX	35.77 (1.408)	34.07 (1.341)
	Outer		IN/EX	39.69 (1.563)	37.79 (1.488)
	Valve lifter O.D.		IN/EX	25.978 – 25.993 (1.0228 – 1.0233)	25.97 (1.022)
	Valve lifter bore I.D.		IN/EX	26.010 – 26.026 (1.0240 – 1.0246)	26.04 (1.025)
Camshaft	Cam lobe height	Except F, SW, AR type	IN	36.040 - 36.280 (1.4189 - 1.4283)	36.01 (1.418)
			EX	35.800 – 36.040 (1.4094 – 1.4189)	35.77 (1.408)
		F type	IN	33.240 – 33.480 (1.3087 – 1.3181)	33.21 (1.307)
			EX	35.100 – 35.340 (1.3819 – 1.3913)	35.07 (1.381)
		SW, AR type	IN	34.940 – 35.180 (1.3756 – 1.3850)	34.91 (1.374)
			EX	35.100 – 35.340 (1.3819 – 1.3913)	35.07 (1.381)
	Runout				0.05 (0.002)
	Oil clearance	-		0.020 - 0.062 (0.0008 - 0.0024)	0.10 (0.004)

CUITCH/C	SEARCHIET I INK	AGE		Unit: mm (in
CLUTCH/GEARSHIFT LINKAGE ITEM		STANDARD	SERVICE LIMIT	
Clutch lever free play		10 – 20 (3/8 – 3/4)		
Clutch spring f	ree length		48.8 (1.92)	47.4 (1.87)
Clutch disc thickness		2.92 – 3.08 (0.11 – 0.12)	2.60 (0.102)	
Clutch plate warpage			0.30 (0.012)	
Clutch outer guide		I.D.	24.9935 – 25.0035 (0.98399 – 0.98451)	25.016 (0.9849)
		O.D.	34.975 – 34.991 (1.3770 – 1.3776)	34.965 (1.3766)
Mainshaft O.D. at clutch outer guide		24.980 – 24.993 (0.9835 – 0.9840)	24.96 (0.983)	
Shift fork,	Fork	I.D.	12.000 - 12.021 (0.4724 - 0.4733)	12.03 (0.474)
fork shaft		Claw thickness	5.93 - 6.00 (0.233 - 0.236)	5.9 (0.23)
	Fork shaft O.D.		11.957 – 11.968 (0.4707 – 0.4712)	11.95 (0.470)

_ ALTERNATOR/STARTER CLUTCH —		Unit: mm (in)
iTEM	STANDARD	SERVICE LIMIT
Starter driven gear boss O.D.	51.699 - 51.718 (2.0354 - 2.0361)	51.684 (2.0348)

- CBANKCAS	SE/PISTON/CYLIN	DFR		Unit: mm (ir
ITEM		STANDARD	SERVICE LIMIT	
Cylinder	I.D.		71.000 - 71.015 (2.7953 - 2.7963)	71.10 (2.795)
	Out of round			0.10 (0.004)
	Taper			0.10 (0.004)
	Warpage			0.05 (0.002)
Piston, piston	Piston mark direction	)	"IN" mark facing toward the intake side	
rings	Piston O.D.		70.965 – 70.985 (2.7939 – 2.7947)	70.90 (2.791)
	Piston O. D. measurement point		15 mm (0.6 in) from bottom of skirt	<del></del>
	Piston pin bore I.D.		17.002 - 17.008 (0.6694 - 0.6696)	17.03 (0.670)
	Piston pin O.D.		16.993 – 17.000 (0.6690 – 0.6693)	16.98 (0.669)
	Piston-to-piston pin clearance		0.002 - 0.015 (0.0001 - 0.0006)	
	Piston ring-to-ring groove clearance	Тор	0.030 - 0.065 (0.0012 - 0.0026)	0.08 (0.003)
		Second	0.015 - 0.045 (0.0006 - 0.0018)	0.07 (0.003)
	Piston ring end gap	Тор	0.28 - 0.38 (0.011 - 0.015)	0.5 (0.02)
		Second	0.40 - 0.55 (0.016 - 0.022)	0.7 (0.03)
		Oil (side rail)	0.2 – 0.7 (0.01 – 0.03)	0.9 (0.04)
Cylinder-to-piston clearance		0.015 - 0.050 (0.0006 - 0.0020)		
Connecting roo	small end I.D.	***	17.016 – 17.034 (0.6699 – 0.6706)	17.04 (0.671)
Connecting roo	d-to-piston pin clearanc	e	0.016 - 0.041 (0.0006 - 0.0016)	
Crankpin oil cle	earance		0.030 - 0.052 (0.0012 - 0.0020)	0.06 (0.002)

#### **CAUTION:**

Be careful not to damage the cylinder sleeve and crankpin with the connecting rod bolt threads.

Office Hilling Aller	Uı	nit:	mm	(in)
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- CRANKSHAFT/TRANSMISSION		STANDARD	SERVICE LIMIT	
Crankshaft	Side clearance Runout Main journal oil clearance		0.05 - 0.20 (0.002 - 0.008)	0.30 (0.012)
				0.30 (0.012)
			0.017 - 0.035 (0.0007 - 0.0014)	0.05 (0.002)
Transmission	Gear I.D.	M5, 6	28.000 – 28.021 (1.1024 – 1.1032)	28.04 (1.104)
		C1	24.000 – 24.021 (0.9449 – 0.9457)	24.04 (0.946)
		C2, 3, 4	31.000 – 31.025 (1.2205 – 1.2215)	31.04 (1.222)
	Bushing O.D.	M5, 6	27.959 – 27.980 (1.1007 – 1.1016)	27.94 (1.100)
		C2	30.955 – 30.980 (1.2187 – 1.2197)	30.93 (1.218)
		C3, 4	30.950 – 30.975 (1.2185 – 1.2195)	30.93 (1.218)
	Bushing I.D.	M5	24.985 – 25.006 (0.9837 – 0.9845)	25.02 (0.985)
		C2	27.985 – 28.006 (1.1018 – 1.1026)	28.02 (1.103)
	Gear-to-bushing	M5, 6	0.020 - 0.062 (0.0008 - 0.0024)	0.10 (0.004)
	clearance	C2	0.020 - 0.070 (0.0008 - 0.0028)	0.11 (0.004)
		C3, 4	0.025 - 0.075 (0.0010 - 0.0030)	0.11 (0.004)
	Mainshaft O.D.	M5	24.967 – 24.980 (0.9830 – 0.9835)	24.96 (0.983)
		Clutch outer guide	24.980 – 24.993 (0.9835 – 0.9840)	24.96 (0.983)
	Countershaft O.D.	C2	27.967 – 27.980 (1.1011 – 1.1016)	27.96 (1.101)
	Bushing-to-shaft	M5	0.005 - 0.039 (0.0002 - 0.0015)	0.08 (0.003)
	clearance	C2	0.005 - 0.039 (0.0002 - 0.0015)	0.08 (0.003)

- FRONT WHEEL/S	SUSPENSION/STEERING —	Unit: mm (i		
•	ITEM	STANDARD	SERVICE LIMIT	
Minimum tire tread dep	oth		1.5 (0.06)	
Cold tire pressure	Driver only	250 kPa (2.50 kgf/cm², 36 psi)		
	Driver and passenger	250 kPa (2.50 kgf/cm², 36 psi)		
Axle runout			0.20 (0.008)	
Wheel rim runout	Radial		2.0 (0.08)	
	Axial		2.0 (0.08)	
Fork	Spring free length	250.2 (9.85)	245.2 (9.65)	
	Spring direction	With the tapered end facing down		
	Tube runout		0.20 (0.008)	
	Recommended fork fluid	Fork fluid		
	Fluid level	114 ± 4 (4.5 ± 0.2)		
	Fluid capacity	$540 \pm 2.5 \text{ cm}^3$ (18.3 ± 0.02 US oz, 19.0 ± 0.09 Imp oz)		
	Pre-load adjuster setting	12 mm (0.5 in) from top of fork cap		
	Rebound adjuster setting	1 turn from full hard		
	Compression adjuster setting	15 turn from full hard		
Steering head bearing p	reload	1.0 – 1.5 kgf (2.2 – 3.3 lbf)		

- REAR WHEEL/SU	ISPENSION —			Unit: mm (in)
	ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread de	oth			2.0 (0.08)
Cold tire pressure	Driver only		290 kPa (2.90 kgf/cm², 42 psi)	
	Driver and passenger		290 kPa (2.90 kgf/cm², 42 psi)	
Axle runout				0.20 (0.008)
Wheel rim runout	Radial			2.0 (0.08)
	Axial			2.0 (0.08)
Shock absorber	Spring free length		167.7 (6.60)	164.3 (6.47)
	Spring direction		With the tapered end facing up	
	Pre-load adjuster setting		3rd position	
	Rebound adjuster setting		1 turn from full hard	
	Compression adjuster setting		1 turn from full hard	
Drive chain	Size/link	DID	DID525HV GC&B – 120ZB	
		RK	RKGB525R0Z1 – 120LJF	
	Slack		30 - 40 (1.2 - 1.6)	50 (1.97)

Unit: mm (in)

— HYDRAU	JLIC BRAKE ———			Onic min (iii
	ITEM		STANDARD	SERVICE LIMIT
Front	Specified brake fl	uid	DOT 4	
	Brake disc thickne	ess	4.5 (0.18)	3.5 (0.14)
	Brake disc runout			0.30 (0.012)
	Master cylinder I.	D.	15.870 – 15.913 (0.6248 – 0.6265)	15.925 (0.627)
	Master piston O.D	).	15.827 - 15.854 (0.6231 - 0.6242)	15.815 (0.623)
	Caliper cylinder I.D. Caliper piston O.D.	Α	32.03 – 32.08 (1.261 – 1.263)	
		В	33.96 – 34.01 (1.337 – 1.339)	
		Α	31.965 – 31.998 (1.2585 – 1.2598)	
		В	33.895 – 33.928 (1.3344 – 1.3357)	
Rear	Specified brake fl	uid	DOT 4	
	Brake disc thickness		5.0 (0.20)	4.0 (0.16)
	Brake disc runout			0.30 (0.012)
	Master cylinder I.D.		15.870 – 15.913 (0.6248 – 0.6265)	15.925 (0.6270)
	Master piston O.D.		15.827 - 15.854 (0.6231 - 0.6242)	15.815 (0.6226)
	Caliper cylinder I.	D.	38.18 – 38.23 (1.503 – 1.505)	38.24 (1.506)
	Caliper piston O.I	).	38.115 – 38.148 (1.5006 – 1.5019)	38.107 (1.5003)

- BATTERY/	CHARGING SYSTEN ITEM	<i></i>	SPECIFICATIONS
Battery	Capacity Current leakage		12V – 8 Ah
			0.1 mA max.
	Voltage (20°C/68°F) Charging current	Fully charged	13.0 – 13.2 V
		Needs charging	Below 12.3 V
		Normal	0.9 A/5 – 10 h
		Quick	4.0 A/0.5 h
Alternator	Capacity		384 W/5,000 min <sup>-1</sup> (rpm)
	Charging coil resistance (20°C/68°F)		0.1 – 0.3 Ω
Regulator/recti	fier regulated voltage		13.5 – 15.5 V/5,000 min <sup>-1</sup> (rpm)

- IGNITION SYSTEM		SPECIF	FICATIONS
Spark plug		NGK	NIPPONDENSO
	Standard	CR9EH 9	U27FER 9
	Optional	CR8EH 9	U24FER 9
Spark plug gap		0.80 – 0.90 mn	n (0.031 – 0.035 in)
Ignition coil peak voltage		100 V	minimum
Ignition pulse generator peak voltage		0.7 V	minimum
Ignition timing	"F" mark	10° B7	TDC at idle

- ELECTRIC STARTER		Unit: mm (in)
ITEM	STANDARD	SERVICE LIMIT
Starter motor brush length	12.0 – 13.0 (0.47 – 0.51)	4.5 (0.18)

- LIGHTS/METERS/SWITCHES			SPECIFICATIONS	
Bulbs	Headlight	Except U, BR, SI type	12 V – 60/55 W x 2	
	(High/low beam)	U, BR, SI type	12 V – 45/45 W x 2	
	Position light		12 V – 5 W	
	Brake/tail light		12 V – 21/5 W x 2	
	Front turn signal light		12 V – 21 W	
	Rear turn signal light		12 V – 21 W	
	Instrument light		12 V – 1.1 W x 2	
	Turn signal indica	tor	12 V – 1.1 W x 2	
	High beam indica	tor	12 V – 1.1 W	
	Neutral indicator		12 V – 1.1 W	
	Oil pressure indic	ator	12 V – 1.1 W	
	Coolant temperat	ure gauge light	12 V – 1.1 W	
Fuse	Main fuse		30 A	
	Sub fuse		10 A x 4, 20 A x 1	
Fan motor	Start to close (ON	)	98 – 102°C (208 – 216°F)	
switch	Stop to open		93 – 97°C (199 – 207°F)	
Coolant temp	erature sensor resist	ance (20°C/68°F)	45 – 60 Ω	

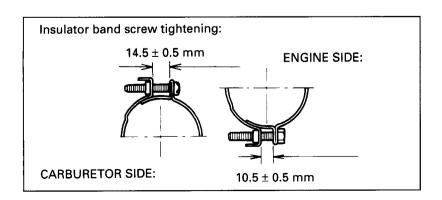
# **TORQUE VALUES**

FASTENER TYPE	TORQUE N·m (kgf·m, lbf·ft)	FASTENER TYPE	TORQUE N·m (kgf·m, lbf·ft)
5 mm hex bolt and nut	5 (0.5, 3.6)	5 mm screw	4 (0.4, 2.9)
6 mm hex bolt and nut	10 (1.0, 7)	6 mm screw and flange bolt (SH type)	9 (0.9, 6.5)
8 mm hex bolt and nut	22 (2.2, 16)	6 mm flange bolt (8 mm head)	9 (0.9, 6.5)
10 mm hex bolt and nut	34 (3.5, 25)	6 mm flange bolt (10 mm head) and nut	12 (1.2, 9)
12 mm hex bolt and nut	54 (5.5, 40)	8 mm flange bolt and nut	26 (2.7, 20)
		10 mm flange bolt and nut	39 (4.0, 29)

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

- NOTES: 1. Apply sealant to the threads.
  - 2. Apply a locking agent to the threads.
  - 3. Apply molybdenum disulfide oil to the threads and flange surface.
  - 4. Apply grease to the threads.
  - 5. Stake.
  - 6. Apply oil to the threads and flange surface.
  - 7. Apply clean engine oil to the O-ring.
  - 8. U-nut.
  - 9. ALOC bolt: replace with a new one.

- ENGINE -				1
ITEM	QTY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
MAINTENANCE:				
Crankshaft hole cap	1	45	18 (1.8, 13)	NOTE 4
Spark plug	4	10	12 (1.2, 9)	
LUBRICATION SYSTEM:				
Oil drain bolt	1	12	30 (3.1, 22)	
Oil filter cartridge	1	20	10 (1.0, 7)	NOTE 6, 7
Oil pump driven sprocket bolt	1	6	15 (1.5, 11)	NOTE 2
Oil cooler boss	1	20	64 (6.5, 47)	NOTE 2
COOLING SYSTEM:				
Water pump cover bolt	3	6	13 (1.3, 9)	
Thermo sensor	1	PT1/8	10 (1.0, 7)	NOTE 1
FUEL SYSTEM:				
Carburetor assembly bolt, 5 mm	1	5	5 (0.5, 3.6)	
6 mm	1	6	10 (1.0, 7)	
Vacuum plug for synchronization	3	5	3.0 (0.30, 2.2)	
Boost joint for fuel valve	1	5	2.5 (0.25, 1.8)	
Carburetor insulator band screw	8	5		See below



- ENGINE (Cont'd)	QTY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
ENGINE MOUNTING:				
Drive sprocket bolt	1	10	54 (5.5, 40)	
CYLINDER HEAD/VALVES:			, , , , , , , , , , , , , , , , , , , ,	
Breather plate flange bolt	3	6	12 (1.2, 9)	NOTE 2
Cylinder head stud bolt	8	8	25 (2.6, 19)	
Cylinder head cover special bolt	6	6	10 (1.0, 7)	
Camshaft holder flange bolt	10	6	12 (1.2, 9)	
Cylinder head socket bolt	10	9	48 (4.8, 35)	NOTE 6
Cam sprocket bolt	4	7	20 (2.0, 14)	NOTE 2
Cam chain tensioner lifter mounting bolt	2	6	12 (1.2, 9)	
Air bleed tube joint	1	10	25 (2.5, 18)	
CLUTCH/GEARSHIFT LINKAGE:				
Right crankcase cover SH bolt	7	6	12 (1.2, 9)	
Clutch center lock nut	1	22	128 (13.1, 94.8)	NOTE 5, 6
Gearshift pedal spring stopper	1	8	22 (2.2, 16)	ĺ
Shift drum center bolt	1	8	23 (2.3, 17)	NOTE 2
Shift drum bearing set plate bolt	2	6	12 (1.2, 9)	NOTE 2
ALTERNATOR/STARTER CLUTCH:				
Left crankcase cover SH bolt	10	6	12 (1.2, 9)	
Flywheel flange bolt	1	10	93 (9.5, 69)	NOTE 6
Stator mounting socket bolt	4	6	12 (1.2, 9)	
Starter one-way clutch socket bolt	6	6	16 (1.6, 12)	NOTE 2
CRANKCASE/PISTON/CYLINDER:				
Crankcase bolt, 10 mm	1	10	39 (4.0, 29)	
9 mm	10	9	35 (3.6, 26)	NOTE 6
8 mm	2	8	24 (2.4, 17)	
6 mm	18	6	12 (1.2, 9)	
Connecting rod nut	8	8	34 (3.5, 25)	NOTE 6
Lower crankcase sealing bolt, 20 mm	1	20	29 (3.0, 22)	NOTE 2
18 mm	1	18	44 (4.5, 33)	NOTE 2
CRANKSHAFT/TRANSMISSION:				
Mainshaft bearing set plate bolt	2	6	12 (1.2, 9)	NOTE 2
IGNITION SYSTEM:				
Ignition pulse generator cover SH bolt	8	6	12 (1.2, 9)	NOTE 1
Ignition pulse generator rotor special bolt	1	10	59 (6.0, 43)	
LIGHTS/METERS/SWITCHES:				
Neutral switch	1	10	12 (1.2, 9)	
Oil pressure switch	1	PT1/8	12 (1.2, 9)	NOTE 1

FRAME ITEM	QΉY	THREAD DIA. (mm)	TORQUE Nm (kgfm, lbfft)	REMARKS
FRAME/BODY PANELS/EXHAUST SYSTEM:				
Upper cowl stay mounting bolt	2	8	26 (2.7, 20)	
Front fender mounting bolt	8	6	5 (0.5, 3.6)	
Exhaust pipe joint nut	8	7	12 (1.2, 8.7)	
Muffler mounting bolt/nut	2	8	25 (2.5, 18)	
Step holder mounting bolt	4	8	26 (2.7, 20)	
Footpeg mounting bolt	1	10	44 (4.5, 33)	NOTE 9
Handlebar weight screw	2	6	10 (1.0, 7)	
Bank sensor	2	8	10 (1.0, 7)	
FUEL SYSTEM:				
Fuel valve	1	22	34 (3.5, 25)	
Sub-air cleaner mounting bolt	1	6	7 (0.7, 5.1)	
COOLING SYSTEM:				
Fan motor nut	1	5	2.5 (0.25, 1.8)	NOTE 2
Fan motor switch	1	PT1/8	18 (1.8, 13)	NOTE 1

FRAME (Cont'd) ITEM	Q'TY	THREAD DIA.	TORQUE N-m (kgf-m, lbf-ft)	REMARKS
ENGINE MOUNTING:		, ,		
Left engine hanger bolt	2	10	20 (4.0.20)	
Right engine hanger bolt	1	10	39 (4.0, 29)	
Engine hanger bolt (Rear/upper)	ŀ		44 (4.5, 33)	
(Rear/lower)	1	10	39 (4.0, 29)	
	1	10	39 (4.0, 29)	
Engine hanger adjusting bolt	1	22	11 (1.1, 8)	
Engine hanger adjusting bolt lock nut	1	22	54 (5.5, 40)	
Engine hanger plate bolt	4	8	26 (2.7, 20)	
FRONT WHEEL/SUSPENSION/STEERING:			100 (1000)	
Steering stem nut	1	24	103 (10.5, 76)	See page 13-28
Top thread A	1	26	25 (2.5, 18)	
Top thread B	1	26		
Fork top bridge pinch bolt	2	8	22 (2.2, 16)	
Fork bottom bridge pinch bolt	4	8	27 (2.8, 20)	
Front axle bolt	1	14	59 (6.0, 43)	
Front axle holder bolt	4	8	22 (2.2, 16)	
Front brake disc mounting bolt	12	6	20 (2.0, 14)	NOTE 9
Fork cap	2	42	22 (2.2, 16)	
Fork socket bolt	2	10	34 (3.5, 25)	NOTE 2
REAR WHEEL/SUSPENSION:				
Rear axle nut	1	18	93 (9.5, 69)	
Rear brake disc mounting bolt	4	8	42 (4.3, 31)	NOTE 9
Driven sprocket nut	5	12	108 (11.0, 80)	NOTE 8
Rear shock absorber upper mounting nut	1	10	44 (4.5, 33)	NOTE 8
Shock arm plate nut	2	10	44 (4.5, 33)	NOTE 8
Shock link nut	2	10	44 (4.5, 33)	NOTE 8
Swingarm pivot adjusting bolt	1	30	15 (1.5, 11)	See page 14-22
Swingarm pivot lock nut	i	30	64 (6.5, 47)	000 pago 14 22
Swingarm pivot nut	li	18	93 (9.5, 69)	NOTE 8
Drive chain slider bolt	2	6	9 (0.9, 6.5)	NOIL
HYDRAULIC BRAKE:			3 (0.3, 0.3)	
Front brake caliper mounting bolt	4	8	30 (3.1, 22)	NOTE 9
Front brake camper mounting bolt Front brake pipe mounting bolt	2	10		NOTES
Front brake pipe mounting boit Front brake caliper assembly torx bolt	8		17 (1.7, 12)	NOTE 2
		8	23 (2.3, 17)	NOTE 2
Front oil cup mounting nut	1	6	6 (0.6, 4.3)	NOTE 9
Brake lever pivot bolt	1	6	1 (0.1, 0.7)	
Brake lever pivot nut	1 1	6	6 (0.6, 4.3)	
Brake hose oil bolt	5	10	34 (3.5, 25)	
Pad pin	5	10	18 (1.8, 13)	
Pad pin plug	1	10	2.4 (0.24, 1.7)	
Brake caliper bleeder	3	8	6 (0.6, 4.3)	
Rear brake hose guide bolt	1	6	12 (1.2, 9)	
Rear master cylinder joint nut	1	8	18 (1.8, 13)	
Rear master cylinder hose joint screw	1	4	1.5 (0.15, 1.1)	
Rear brake caliper pin bolt	1	12	27 (2.8, 20)	
Rear brake caliper bolt	1	8	22 (2.2, 16)	
Rear caliper clamp bolt	1	6	9 (0.9, 6.5)	NOTE 9
LIGHTS/METERS/SWITCHES:				
Side stand mounting bolt	1	10	10 (1.0, 7)	
Side stand lock nut	1	10	29 (3.0, 22)	
Side stand switch mounting bolt	1	6	10 (1.0, 7)	NOTE 9
Side stand bracket bolt	2	10	44 (4.5, 33)	NOTE 9
Ignition switch mounting bolt	2	8	24 (2.4, 17)	NOTE 2

# **TOOLS**

NOTES: 1. Equivalent commercially available.

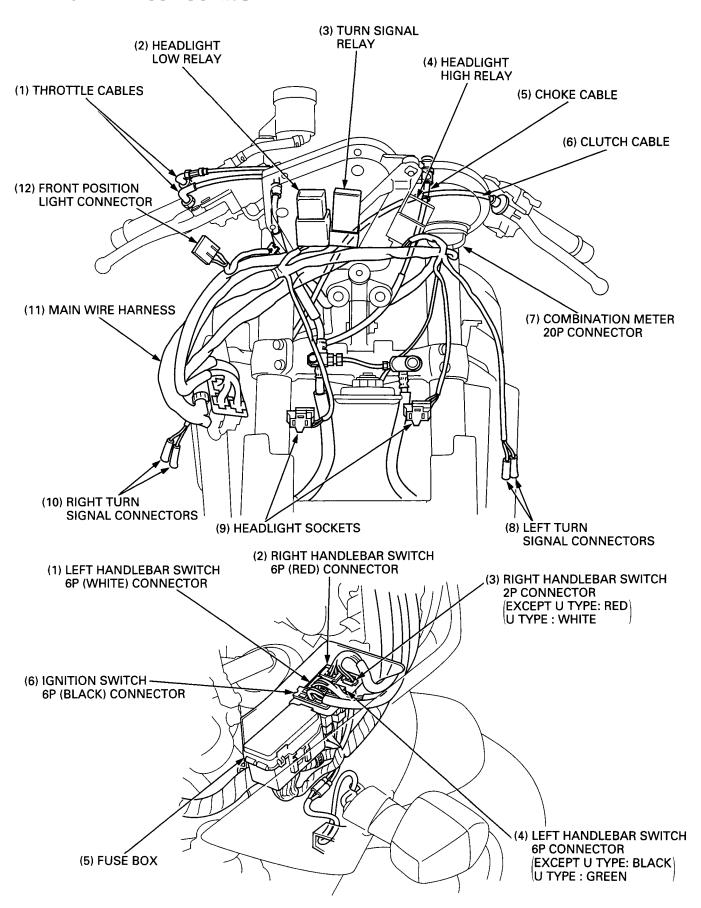
2. Alternative tool.

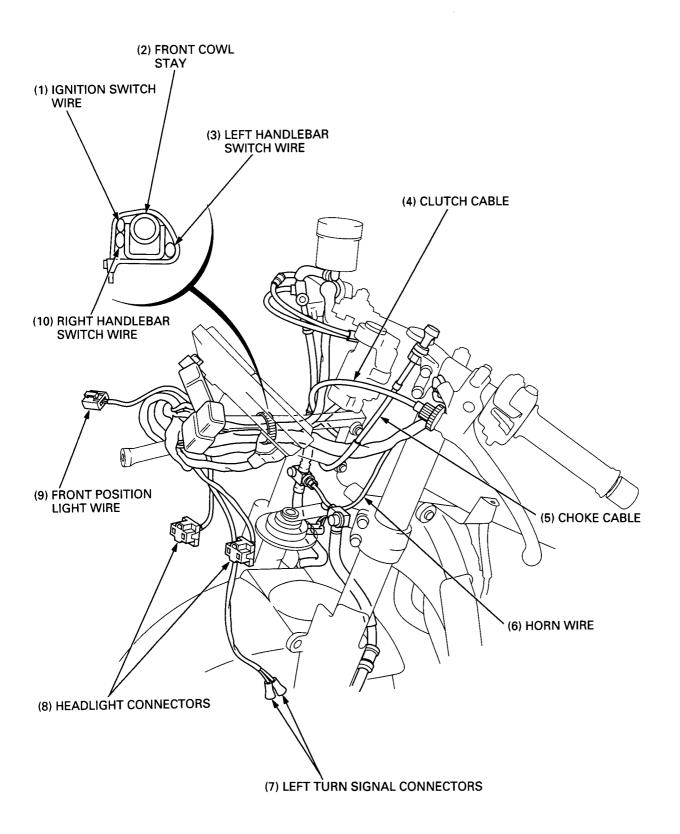
3. Newly provided tool.

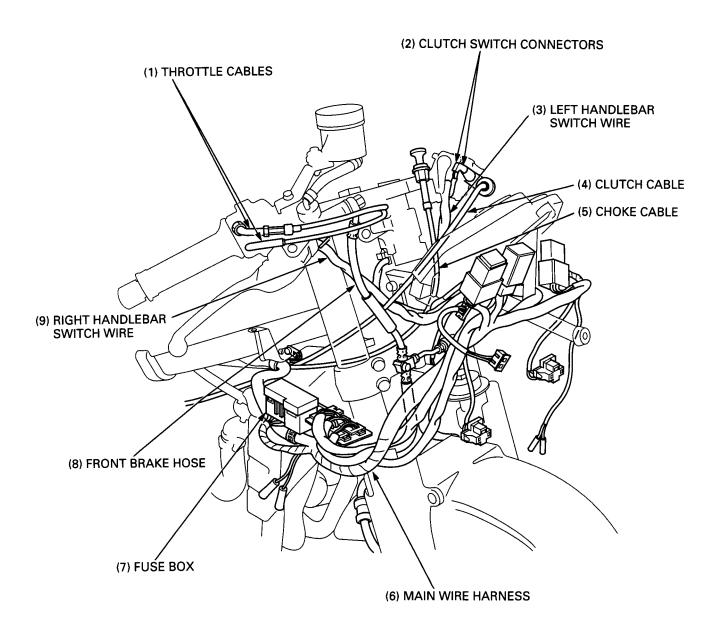
DESCRIPTION	TOOL NUMBER	REMARKS	REF. SEC.
Carburetor float level gauge	07401 - 0010000		5
Oil pressure gauge	07506 – 3000000	NOTE 1	4
Oil pressure gauge attachment	07406 - 0030000	NOTE 1	4
Clutch center holder	07724 – 0050002	NOTE 1	9
Flywheel holder	07725 – 0040000	NOTE 1	10
Rotor puller	07733 – 0020001	NOTE 2 07933 - 3950000	10
Adjustable valve guide driver	07743 – 0020000		8
Attachment, 32 x 35 mm	07746 – 0010100		
Attachment, 37 x 40 mm	07746 – 0010200		9, 14
Attachment, 42 x 47 mm	07746 – 0010300		9, 13, 14
Attachment, 52 x 55 mm	07746 – 0010400		14
Attachment, 24 x 26 mm	07746 - 0010700		14
Driver B	07746 - 0030100		12
Inner driver, 25 mm	07746 - 0030200		12
Pilot, 17 mm	07746 - 0040400		14
Pilot, 20 mm	07746 - 0040500		13, 14
Pilot, 35 mm	07746 - 0040800		9
Pilot, 28 mm	07746 - 0041100		14
Bearing remover shaft	07746 - 0050100		13, 14
Bearing remover head, 20 mm	07746 - 0050600		13, 14
Driver	07749 - 0010000		9, 13, 14
Valve spring compressor	07757 - 0010000		8
Valve seat cutter	07737 0010000	NOTE 1	8
Seat cutter, 27.5 mm (45° IN/EX)	07780 - 0010200	140121	0
Flat cutter, 30 mm (32° IN)	07780 - 0010200		
Flat cutter, 30 mm (32° EX)	07780 - 0012200		
Interior cutter, 30 mm (60° IN/EX)	07780 - 0013300		
Cutter holder, 4.5 mm	07781 - 0010600		
Pilot screw wrench	07908 - 4220201	07908 – 4730001	5
Pivot adjusting wrench	07908 - 4690003	07300 - 4730001	14
Snap ring pliers	07914 - SA50001	NOTE 1 07914 – 3230001	15
Steering stem socket	07916 – 3710101	14012 107314 - 3230001	13
Bearing remover set	07936 - 3710001		14
— Remover handle	07936 - 3710100		'7
— Remover head 20 mm	07936 - 3710600		
	07741 - 0010201	07936 – 3710200	
— Remover weight	07741 - 0010201 07946 - KM90001	0/930 = 3/10200	13
Ball race remover set	07946 - KM90100		13
— Driver attachment, A	07946 - KM90200		
— Driver attachment, B			
— Driver shaft assembly	07946 – KM90300 07946 – KM90401		
— Bearing remover, A			
— Bearing remover, B	07946 - KM90500		
— Assembly base	07946 – KM90600 07946 – MB00000		13
Steering stem driver			14
Driver shaft	07946 - MJ00100		
Valve spring compressor attachment	07959 – KM30101		8
Driver shaft	07964 - MB00200		12
Pin driver	07GMD - KT80100		14
Shock absorber compressor	07GME - 0010000		14
Inspection adaptor	07GMJ – ML80100		17 3
Oil filter wrench	07HAA - PJ70100		3

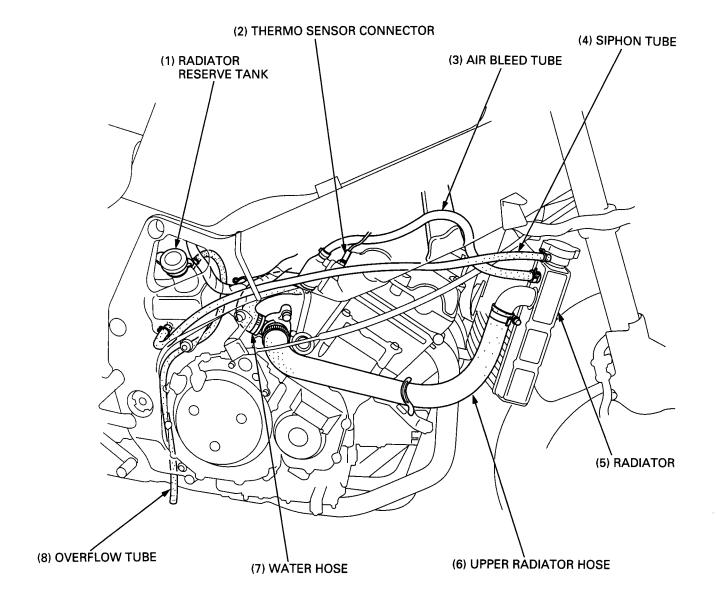
DESCRIPTION	TOOL NUMBER	REMARKS	REF. SEC.
Peak voltage adaptor	07HGJ - 0020100	NOTE 2: Imrie diagnostic tester (model 625)	17
Lock nut wrench	07HMA - MR70200	,	7
Needle bearing remover	07HMC - MR70100		14
Valve guide driver	07HMD - ML00101		8
Tappet hole protector	07HMG - MR70002		8
Valve guide reamer, 4.5 mm	07HMH - ML00101	NOTE 2	8
Drive chain tool set	07HMH - MR10103	NOTE 2	3
Pilot screw wrench	07KMA – MN90100	NOTE 2: 07KMA – MS60101 with 07PMA – MZ20110	5
Oil seal driver	07KMD - KZ30100		13
Needle bearing remover	07LMC - KV30100	NOTE 2	14
Shock absorber compressor attachment	07NME - MY70100		14
Compression gauge attachment	07RMJ - MY50100	NOTE 1	8
Analog tester (SANWA)	SP - 15D		16, 17, 18, 19
Analog tester (KOWA)	TH - 5H		16, 17, 18, 19

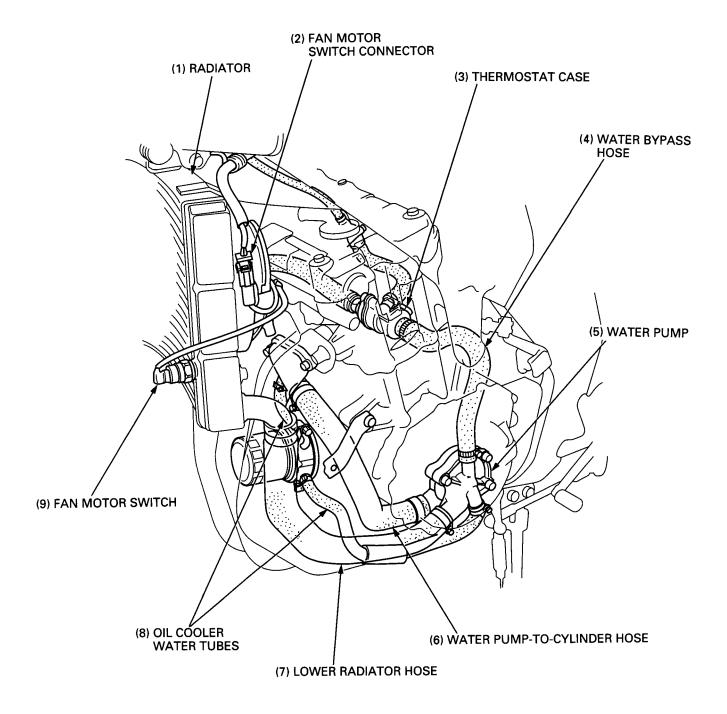
## **CABLE & HARNESS ROUTING**

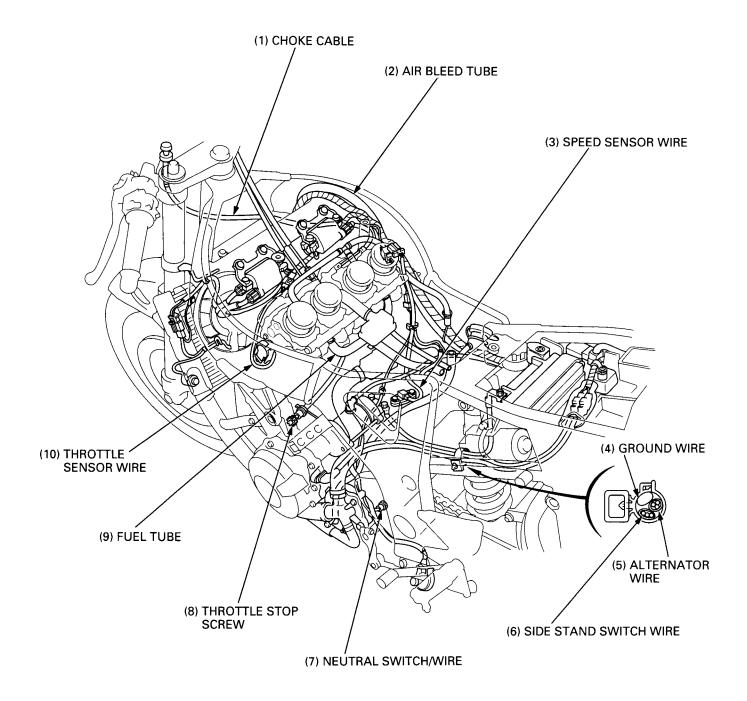


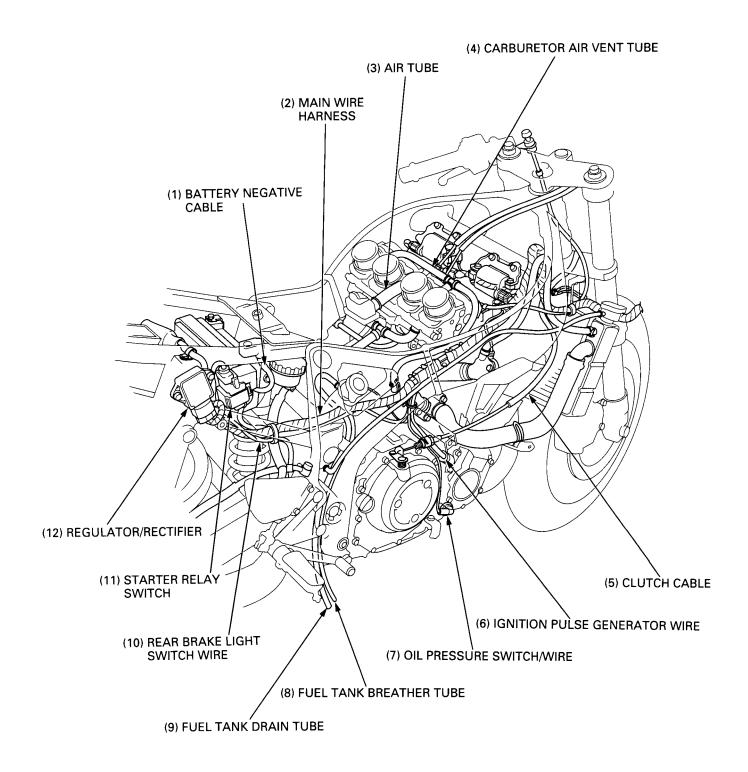


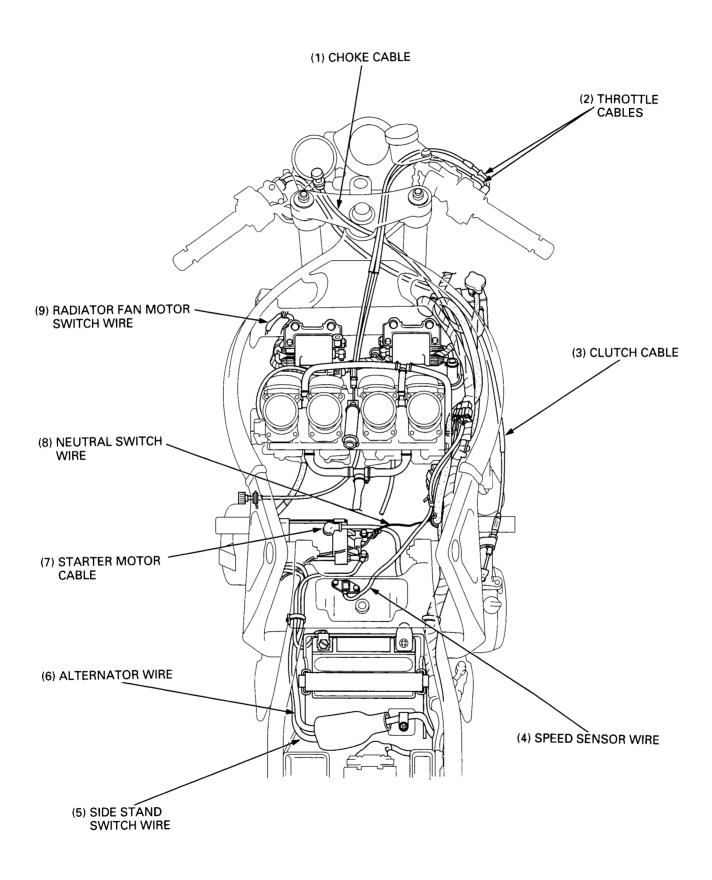












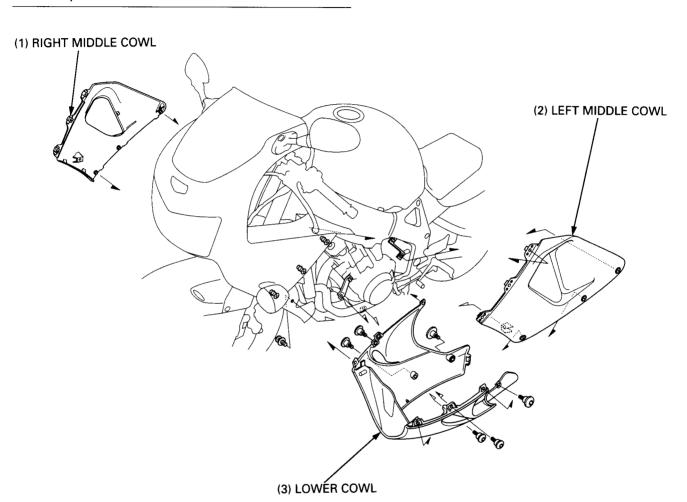
## MIDDLE/LOWER COWL

#### **REMOVAL/INSTALLATION**

Installation is in the reverse order of removal.

#### NOTE

During removal and installation, support the lower cowl securely.

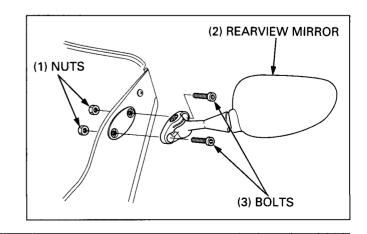


## **UPPER COWL**

#### **REARVIEW MIRROR REMOVAL**

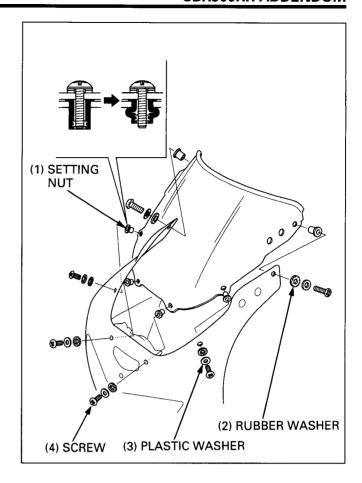
Remove the following:

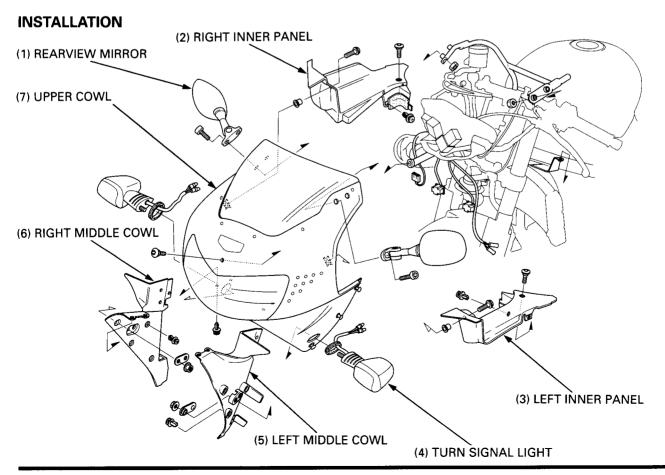
- Bolts/nuts
- Rearview mirror



#### WINDSCREEN REPLACEMENT

Remove the screws, plastic washers and rubber washers. Remove the windscreen and setting nuts.





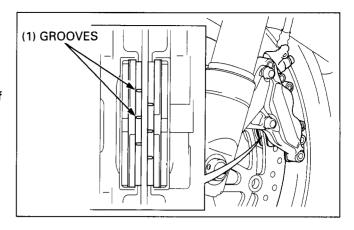
## **BRAKE PAD WEAR**

#### FRONT BRAKE PADS

Check the brake pad for wear.

Replace the brake pads if either pad is worn to the bottom of wear limit groove.

Refer to page 22-37 for brake pad replacement.



### **HEADLIGHT AIM**

#### **A** WARNING

 An improperly adjusted headlight may blind on-coming drivers, or it may fall to light the road for a safe distance.

#### NOTE

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

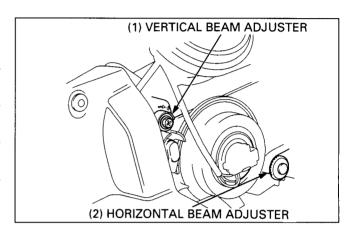
Place the motorcycle on a level surface.

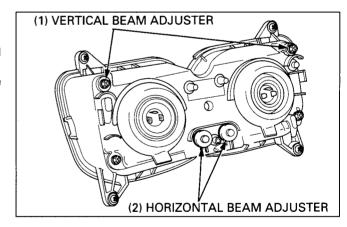
Adjust the headlight beam vertically by turning the vertical beam adjusting screws.

A clockwise rotation moves the beam up.

Horizontally beam adjustment are made using the horizontal beam adjusting screws.

A clockwise rotation moves the beam toward the right side of the rider.





## **PILOT SCREW ADJUSTMENT**

#### **IDLE DROP PROCEDURE**

#### **A** WARNING

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

#### NOTE

- Make sure the carburetor synchronization is within specification before pilot screw adjustment (page 3-13).
- The pilot screws are factory pre-set. Adjustment is not necessary unless the carburetors are overhauled or new pilot screws are installed.
- Then engine must be warm for accurate adjustment. Ten minutes of stop-and-go riding is sufficient.
- Use a tachometer with graduations of 50 min<sup>-1</sup> (rpm) or smaller that will accurately indicate 50 min<sup>-1</sup> (rpm) change.
- 1. Turn the pilot screw clockwise until it seats lightly, and then back it out to the specification given.

#### **CAUTION**

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

#### TOOLS:

(Except SW, AR type)

07908 - 4220201 or 07908 - 4730001 07KMA - MN90100 or

(SW, AR type)

07KMA - MS60101 with 07PMA - MZ20110

#### **INITIAL OPENING:**

E, ED, U, ND, F, SD, BR, MX type: 2 turns out

AR, ND, G type:

1-3/4 turns out

SW type:

1-7/8 turns out

SI type:

1-5/8 turns out

- 2. Warm the engine up to operating temperature.
- 3. Stop the engine and connect a tachometer according to the tachometer manufacturer's instructions.
- 4. Start the engine and adjust the idle speed with the throttle stop screw.

IDLE SPEED: Except SW, AR type: 1,100 ± 100 min<sup>-1</sup> (rpm)

SW type:

 $1.200 \pm 50 \text{ min}^{-1} \text{ (rpm)}$ 

AR type:

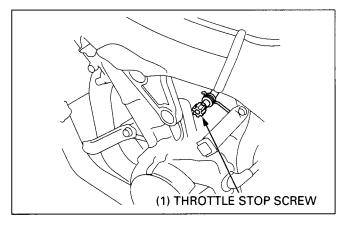
1,200 ± 100 min<sup>-1</sup> (rpm)

- 5. Turn the No. 3 pilot screw in or out slowly to obtain the highest engine speed.
- 6. Perform step 5 for all the carburetor pilot screws.
- 7. Lightly open the throttle 2 3 times, adjust the idle speed with the throttle stop screw.
- 8. Turn the No. 3 carburetor pilot screw in gradually until the engine speed drops 50 min<sup>-1</sup> (rpm).
- 9. Adjust the idle speed with the throttle stop screw.
- 10. Turn the No. 3 carburetor pilot screw in until the engine speed drops 50 min-1 (rpm).
- 11. Then turn the No. 3 pilot screw counterclockwise to the final opening from the position in step 10.

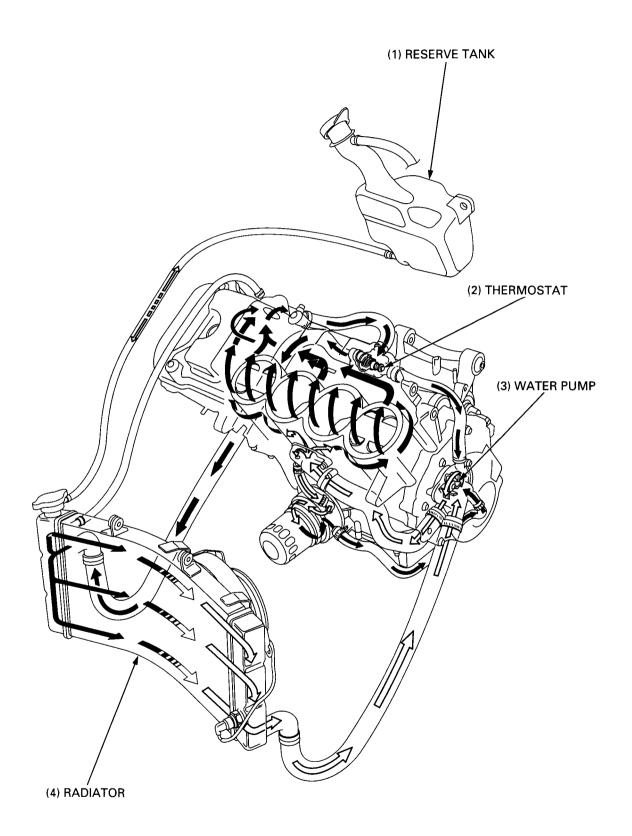
#### **FINAL OPENING:**

Except G, ND, SW, SI type: 1 turn G, ND, SW type: 1/2 turn SI type: 3/4 turn

12. Perform steps 10 and 11 for the No. 1, 2 and 4 carburetor pilot screws.



# **COOLING SYSTEM FLOW PATTERN**



## **THERMOSTAT**

#### **REMOVAL**

#### **A** WARNING

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

Drain the coolant (section 5).

Remove the fuel tank.

Disconnect the upper radiator hose from the thermostat cover.

Remove the bolts and thermostat case cover.

Remove the O-ring and thermostat.

#### **INSPECTION**

#### **A** WARNING

- · Wear insulated gloves and adequate eye protection
- Keep flammable materials away from the electric heating element.

Visually inspect the thermostat for damage.

Heat the water with an electric heating element to operating temperature for 5 minutes.

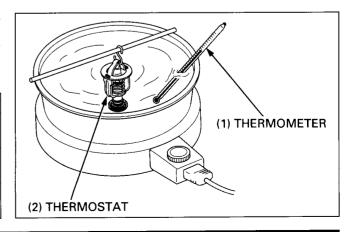
Suspend the thermostat in heated water to check its operation.

#### NOTE

 Do not let the thermostat or thermometer touch the pan, or you will get false reading.

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

THERMOSTAT	MX, BR, SI type	80 – 84°C (176 – 183°F)
BEGIN TO OPEN	Except MX, BR, SI type	73 – 77°C (156 – 165°F)
VALVE LIFT	MX, BR, SI type	8 mm (0.3 in) mini- mum at 95°C (203°F)
	Except MX, BR, SI type	8 mm (0.3 in) mini- mum at 90°C (192°F)



#### **CBR900RR ADDENDUM**

#### **INSTALLATION**

Install the thermostat into the thermostat case with its hole facing upward.

Install a new O-ring into the groove of the thermostat case cover.

Install and tighten the thermostat cover bolts. Connect the upper radiator hose to the thermostat cover.

Fill the system with recommended coolant and bleed the air (page 6-5).
Install the fuel tank.

## **WATER PUMP**

#### **MECHANICAL SEAL INSPECTION**

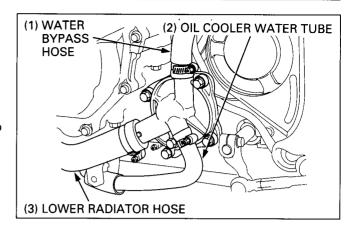
Inspect the telltale hole for signs of coolant leakage. If there is leakage, the mechanical seal is defective and replace the water pump as an assembly.

#### **REMOVAL**

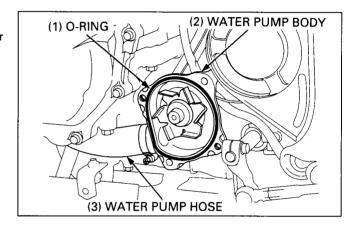
Disconnect the following:

- Water bypass hose
- Oil cooler water tube
- Lower radiator hose

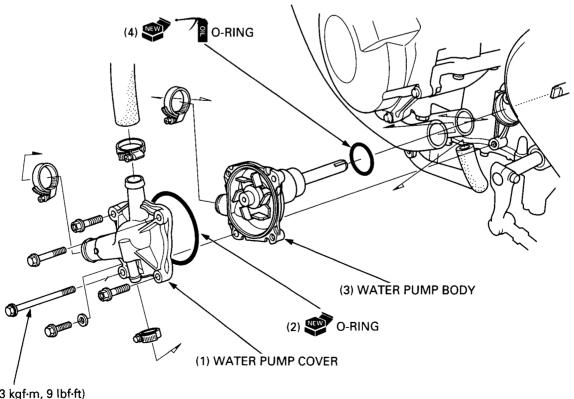
Remove the two SH bolts, two flange bolts and water pump cover.



Remove the O-ring from the water pump body. Disconnect the water pump hose and remove the water pump body from the crankcase.



#### **INSTALLATION**

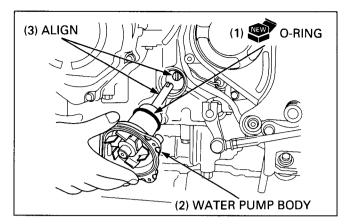


13 N·m (1.3 kgf·m, 9 lbf·ft)

#### **CBR900RR ADDENDUM**

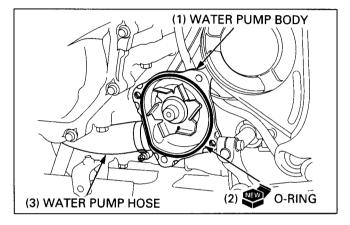
Apply engine oil to a new O-ring and install it onto the stepped portion of the water pump.

Install the water pump into the crankcase while aligning the water pump shaft groove with the oil pump shaft end.



Connect the water pump hose and tighten the clamp screw. Align the mounting bolt holes in the water pump and crankcase and make sure the water pump is securely installed.

Install a new O-ring into the groove in the water pump.

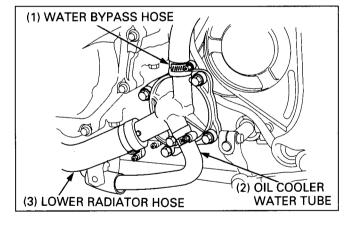


Install the water pump cover and tighten the four bolts to the specified torque.

#### TORQUE: 13 N·m (1.3 kgf·m, 9 lbf·ft)

Connect the following:

- Lower radiator hose
- Oil cooler water tube
- Water bypass hose



## **ENGINE INSTALLATION**

#### **CAUTION**

 Be sure to tighten all engine mounting fasteners to the specified torque in the specified sequence described below.

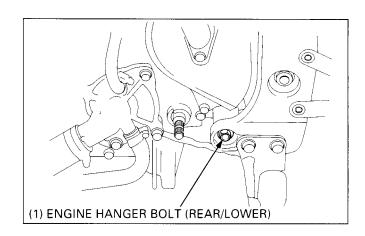
If the engine hanger plates are removed, install the hanger plates and loosely install the bolts.

#### NOTE

· Note the direction of the hanger bolts.

Install the engine into the frame.

Install the rear/lower engine hanger bolt.



Install the rear upper engine hanger bolt with the distance collars and spacers.

#### NOTE

• Install the rear/lower engine hanger bolt from the lefthand side of the engine.

#### **CBR900RR ADDENDUM**

Install the distance collar and right engine hanger bolt. Install the left engine hanger bolts.

#### **CAUTION**

• Install the right and left front engine hanger bolts in their proper locations. Improper installation will damage the cylinder head.

1. Tighten the engine hanger adjusting bolt to the specified torque.

TORQUE: 11 N·m (1.1 kgf·m, 8 lbf·ft)

#### NOTE

 Check that there is no clearance between the frame and the lefthand side of the engine.

2. Hold the adjusting bolt and tighten the adjusting bolt lock nut to the specified torque using.

TOOL:

Lock nut wrench

07HMA - MR70200

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

3. Tighten the rear lower engine hanger nut to specified torque.

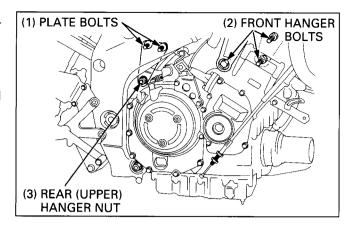
TORQUE: 39 N·m (4.0 kgf·m, 20 lbf·ft)

4. Tighten the rear upper engine hanger bolt to the specified torque.

TORQUE: 39 N·m (4.0 kgf·m, 29 lbf·ft)

5. Tighten the engine hanger plats bolt to the specified torque.

TORQUE: 26 N·m (2.7 kgf·m, 20 lbf·ft)



6. Tighten the front left hanger bolts to the specified torque.

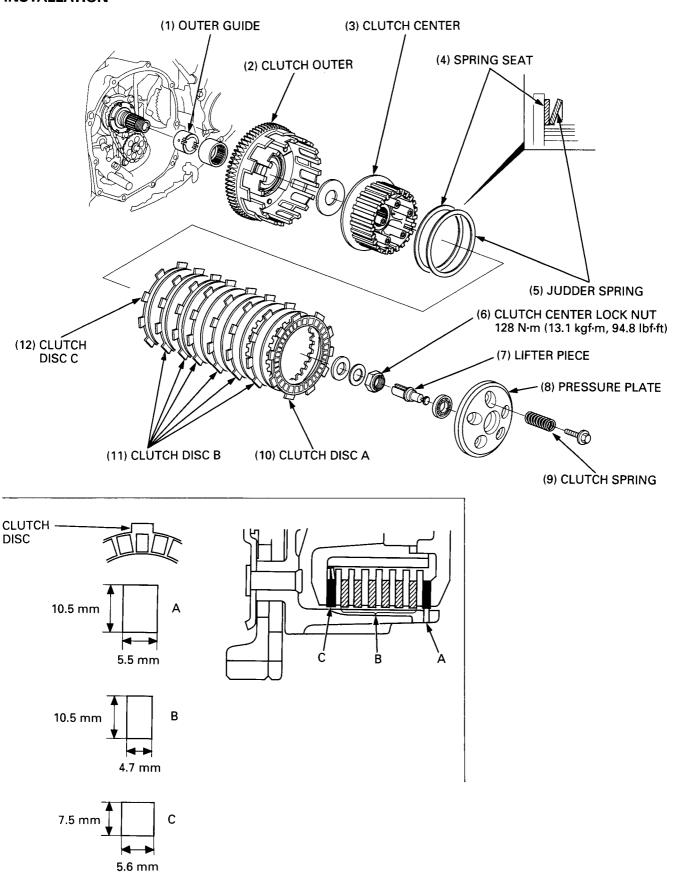
TORQUE: 39 N·m (4.0 kgf·m, 29 lbf·ft)

7. Tighten the front right hanger bolt to the specified torque.

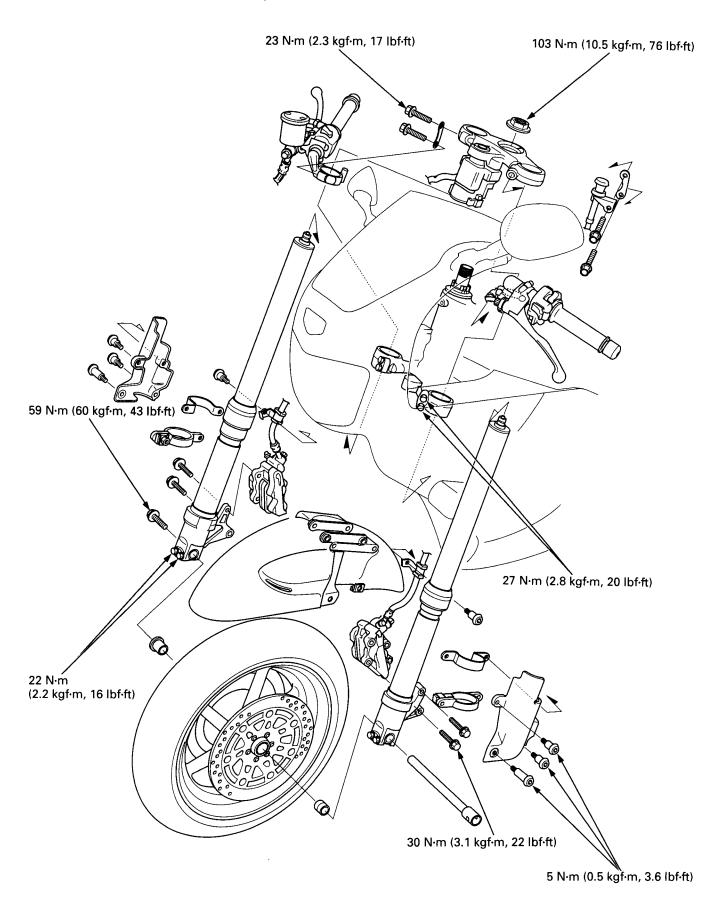
TORQUE: 44 N·m (4.5 kgf·m, 33 lbf·ft)

## **CLUTCH**

#### **INSTALLATION**



# FRONT WHEEL/SUSPENSION/STEERING



#### **CBR900RR ADDENDUM**

## **FORK**

#### **REMOVAL**

Remove the front wheel (page 13-8).

Remove the bolts, fork covers, front fender and stays.

Loosen the top bridge pinch bolt and handlebar pinch bolt. When the fork leg will be disassembled, loosen the fork cap, but do not remove it yet.

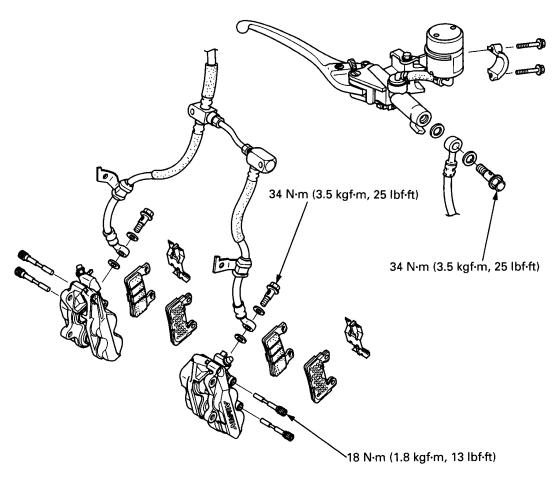
Loosen th fork bottom pinch bolts and remove the fork tube from the fork top bridge, handlebar and steering stem.

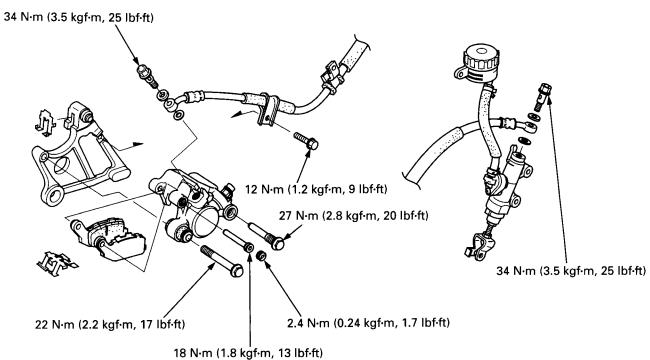
#### **CAUTION**

· Keep the master cylinder upright

Install in the reverse order of removal.

## **HYDRAULIC BRAKE**





## **BRAKE PAD/DISC**

#### FRONT BRAKE PAD REPLACEMENT

#### **À** WARNING

 After the brake pad replacement, check the brake operation by applying the brake lever.

#### NOTE

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

Remove the brake pad pins. Remove the pad pin spring.

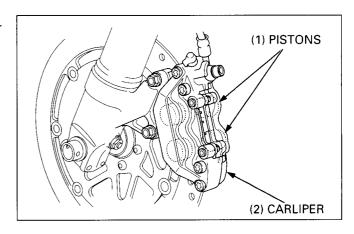
Push the caliper pistons all the way in to allow installation of new brake pads.

#### NOTE

 Check the brake fluid level in the brake master cylinder reservoir as this operation causes the level to rise.

Remove the brake pads.

Clean the inside of the caliper especially around the caliper pistons.



Install the new brake pads.

Install the pad spring aligning its tabs with the groove in the caliper and install the lower pad pin as shown.

Then install the upper pad pin by pushing the pad spring tab to facilitate installation of it.

#### **CAUTION**

 Be sure to install the pad spring so that the "UP" mark on it faces upward.

#### NOTE

 Be sure to install the lower pad pin before installing the upper pad pin.

Tighten the new brake caliper mounting bolts.

TORQUE: 30 N·m (3.1 kgf·m, 22 lbf·ft)

Tighten the pad pins.

TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)

## FRONT BRAKE CALIPER

#### **REMOVAL**

Drain the front brake hydraulic system (page 15-3).

Remove the oil bolt, sealing washers and brake hose eyelet joint.

Remove the caliper mounting bolts.

Remove the brake pads (page 22-40).

#### **CAUTION**

 Avoid spilling fluid on painted, plastic, or rubber parts. Place a rag over these parts whenever the system is serviced.

#### DISASSEMBLY

Install corrugated cardboard or soft wood sheet between the pistons.

Apply small squirts of air pressure to the fluid inlet to remove the pistons.

#### **A** WARNING

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

#### **CBR900RR ADDENDUM**

Remove	the	four	caliper	assembly	bolts	and	separate	the
caliper h	alve	s.						

Remove the following:

- Joint seal
- Caliper piston A
- Caliper piston B

#### NOTE

· Mark the pistons to ensure correct reassembly.

Push the dust seals and piston seals in and lift them out.

#### **CAUTION**

• Be careful not to damage the piston sliding surface.

Clean the seal grooves with clean brake fluid.

#### **INSPECTION**

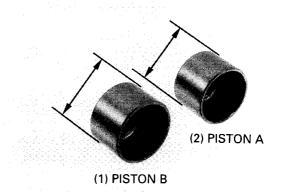
Check the caliper cylinder for scoring or other damage.

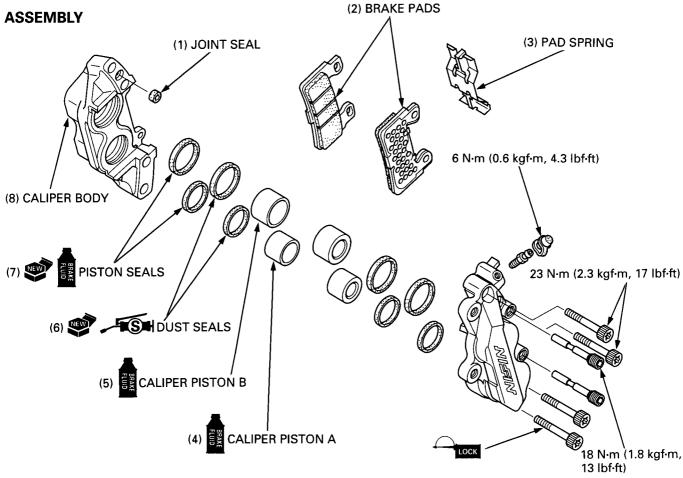
Measure the caliper cylinder I.D.

STANDARD: A: 32.03 – 32.08 mm (1.261 – 1.263 in) B: 33.96 – 34.01 mm (1.337 – 1.339 in) Check the caliper pistons for scratches, scoring or other damage.

Measure the caliper piston O.D.

STANDARD: A: 31.965 - 31.998 mm (1.2585 - 1.2598 in) B: 33.895 - 33.928 mm (1.3344 - 1.3357 in)

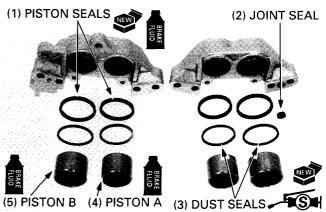




Coat the new piston seals with clean brake fluid. Coat the new dust seals with silicone grease.

Install the piston and dust seal into the groove of the caliper body.

Coat the caliper pistons with clean brake fluid and install them into the caliper cylinder with their opening ends toward the pad.



#### **CBR900RR ADDENDUM**

Install the joint seal into the fluid passage on caliper.

Apply a locking agent to the threads of the caliper assembly bolts.

Assemble the caliper halves and install and tighten the caliper assembly bolts.

TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)

#### **INSTALLATION**

Install the brake pads and caliper onto the fork leg (page 22-40).

Install and tighten the new caliper mounting bolts.

TORQUE: 30 N·m (3.1 kgf·m, 22 lbf·ft)

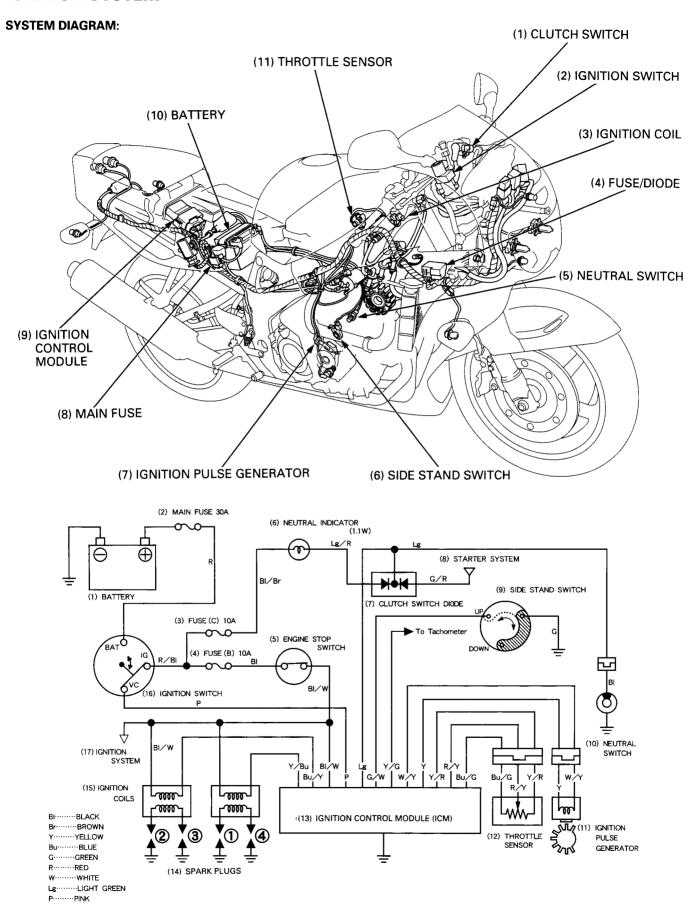
Install the brake hose eyelet to the caliper body with two new sealing washers and oil bolt.

Push the brake hose eyelet to the stopper on the caliper, then tighten the oil bolt to the specified torque.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

Fill and bleed the front brake hydraulic system (page 15-3).

## **IGNITION SYSTEM**



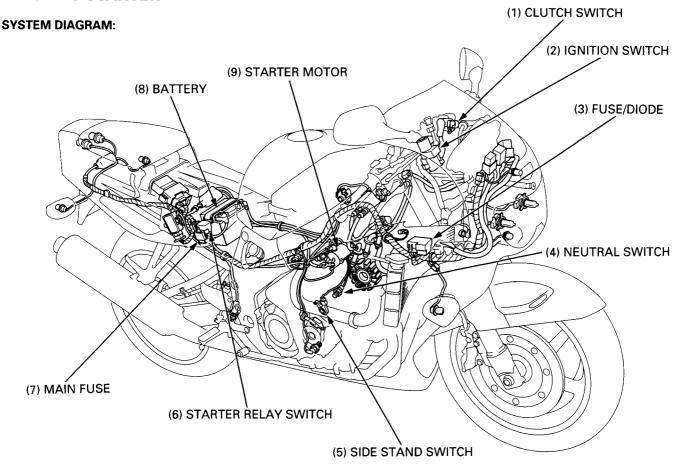
## **TROUBLESHOOTING**

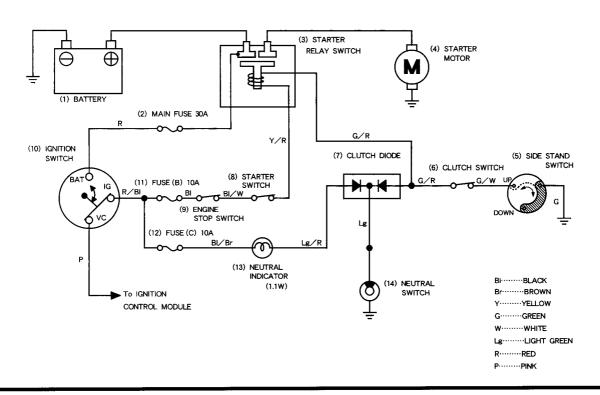
- · Inspect the following before diagnosing the system.
  - Faulty spark plug
  - Loose spark plug cap or spark plug wire connection
  - Water got into the spark plug cap (leaking the ignition coil secondary voltage)
- If there is no spark at either cylinders, temporarily exchange the ignition coil with the other good one and perform the spark test. If there is spark, the exchanged ignition coil is faulty.
- "Initial voltage" of the ignition primary coil is the battery voltage with the ignition switch ON and engine stop switch at RUN (The engine is not cranked by the starter motor).

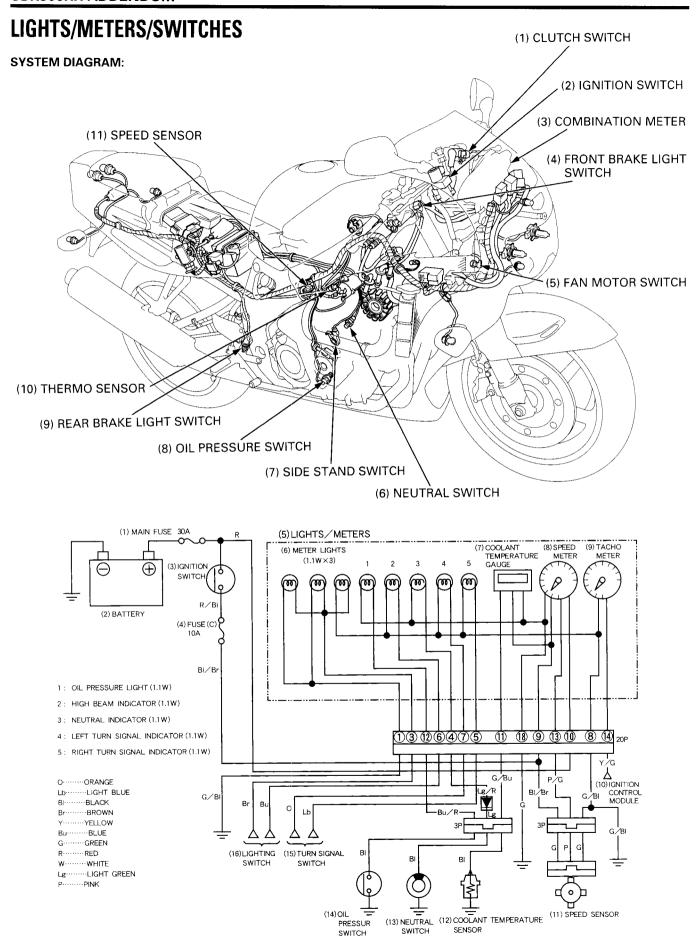
#### No spark at all plugs

	Unusual condition	Probable cause (Check in numerical order)
Ignition coil primary voltage	No initial voltage with ignition and engine stop switches ON. (Other electrical components are normal)	<ol> <li>Faulty engine stop switch.</li> <li>An open circuit in Black/White wire between the ignition coil and engine stop switch.</li> <li>Faulty ICM (in case when the initial voltage is normal while disconnecting ICM connector.</li> </ol>
	Initial voltage is normal, but it drops down to 2 – 4 V while cranking the engine.	<ol> <li>Incorrect peak voltage adaptor connections.</li> <li>Undercharged battery.</li> <li>No voltage between the Black/White (+) and Body ground (-) at the ICM multi-connector or loosen ICM connection.</li> <li>An open circuit or loose connection in Green wire.</li> <li>An open circuit or loose connection in Yellow/Blue and Blue/Yellow wires between the ignition coils and ICM.</li> <li>Short circuit in ignition primary coil.</li> <li>Faulty side stand switch or neutral switch.</li> <li>An open circuit or loose connection in No. 7 related circuit wires.</li> <li>Side stand switch line: Green/White wire.</li> <li>Neutral switch line: Light Green and Light Green/Red wire.</li> <li>Faulty ignition pulse generator (measure the peak voltage).</li> <li>Faulty ICM (in case when above No. 1 – 9 are normal).</li> </ol>
	Initial voltage is normal, but no peak voltage while cranking the engine.	Faulty peak voltage adaptor connections.     Faulty peak voltage adaptor.     Faulty ICM (in case when above No. 1, 2 are normal).
	Initial voltage is normal, but peak voltage is lower than standard value.	<ol> <li>The multimeter impedance is too low; below 10 MΩ/DCV.</li> <li>Cranking speed is too low (battery under-charged).</li> <li>The sampling timing of the tester and measured pulse were not synchronised (system is normal if measured voltage is over the standard voltage at least once).</li> <li>Faulty ICM (in case when above No. 1 – 3 are normal).</li> </ol>
	Initial and peak voltage are normal, but does not spark.	Faulty spark plug or leaking ignition coil secondary current ampere.     Faulty ignition coil.
lgnition pulse generator	Peak voltage is lower than standard value.	<ol> <li>The multimeter impedance is too low; below 10 MΩ/DCV.</li> <li>Cranking speed is too low (battery under charged).</li> <li>The sampling timing of the tester and measured pulse were not synchronised (system is normal if measured voltage is over the standard voltage at least once).</li> <li>Faulty ICM (in case when above No. 1 – 3 are normal).</li> </ol>
	No peak voltage.	<ol> <li>Faulty peak voltage adaptor.</li> <li>Faulty ignition pulse generator.</li> </ol>
Ignition switch	There is a continuity between Black and Pink terminals in either of the directions.	<ol> <li>Faulty ignition switch.</li> <li>Specified tester is not used.</li> </ol>
	There is no continuity between Black and Pink terminals in either of the directions.	<ol> <li>Blown fuse (B) 10 A.</li> <li>Faulty engine stop switch.</li> <li>Faulty ignition switch.</li> <li>Specified tester is not used.</li> </ol>

## **ELECTRIC STARTER**







## **TROUBLESHOOTING**

#### SPEED SENSOR/SPEEDOMETER

The odometer/trip meter operate normally, but the speedometer does not operate

· Faulty speedometer or printed circuit board.

#### The speedometer operate normally, but the odometer/trip meter does not operate

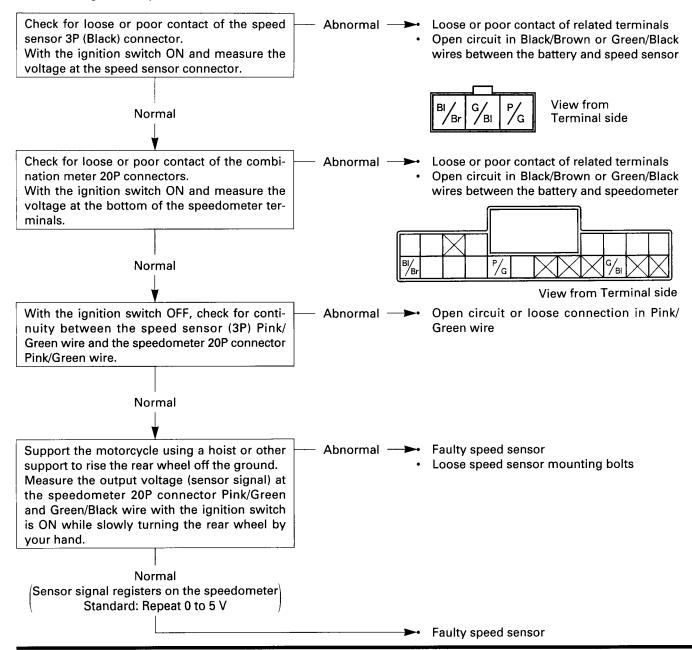
· Faulty odometer/trip meter or printed circuit board.

#### NOTE

The odometer/trip meter does not operate at under 12 V battery voltage.

#### The speedometer operate is abnormal

- · Check for the following before diagnosing.
  - Blown main or sub fuses
  - Loose or corroded terminals of the connectors
  - Discharged battery



## **HEADLIGHTS/POSITION LIGHT**

Remove the upper cowl (page 22-25).

#### Headlights:

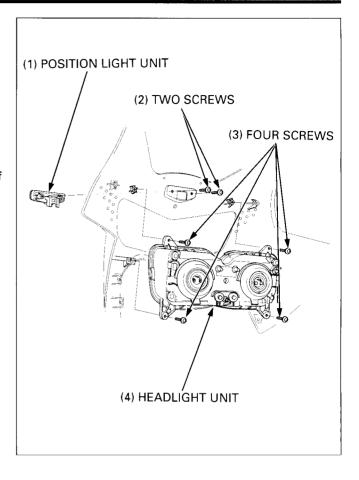
Remove the four screws and headlight unit.

#### **Position Light:**

Remove the two screws and position light unit.

Install the headlights/position light in the revers order of removal.

Adjust the headlight aim (page 22-26).



## **COMBINATION METER**

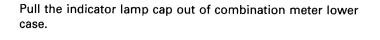
#### **REMOVAL**

Remove the mounting bolt.
Pull out the combination meter.

Push the connector lock pin and disconnect the 20P connector from combination meter.

Remove the combination meter.

#### **BULB REPLACEMENT**



Turn the bulb socket 45° counterclockwise, remove it from the lower case, then replace the bulb.

#### **DISASSEMBLY**

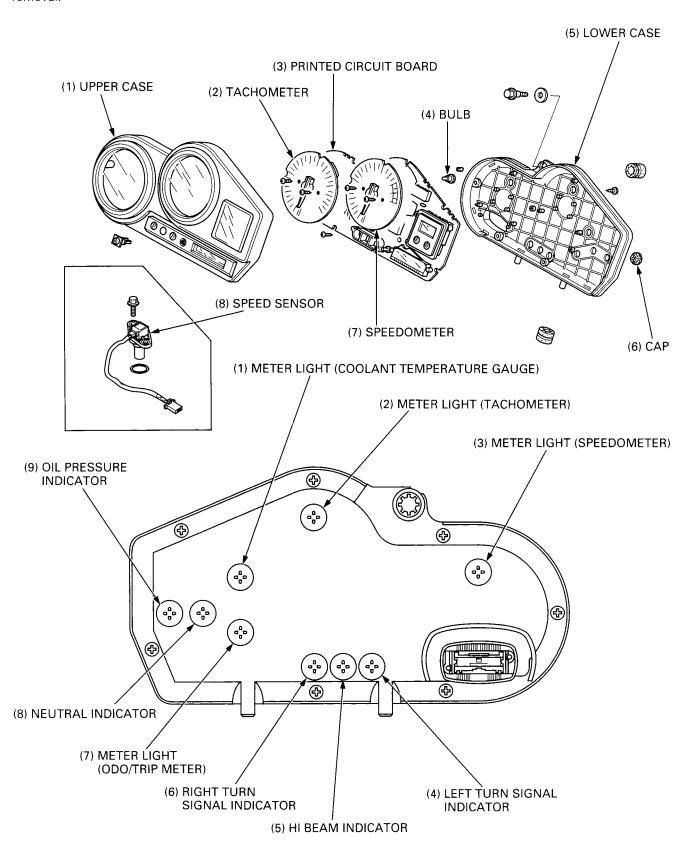
Remove the screws.
Remove the combination upper case.

Remove the speedometer, tachometer and printed circuit board from the lower case.

Remove the bulb sockets from the printed circuit board (page 22-52).

#### **ASSEMBLY**

Assemble the combination meter in the reverse order of removal



#### **INSTALLATION**

Install the combination meter in the reverse order of removal.

## SPEEDOMETER/SPEED SENSOR

#### **SENSOR INSPECTION**

Remove the fuel tank (page 2-2).

Remove the bolts and speed sensor.

Check the speed sensor for damage.

Remove the combination meter.

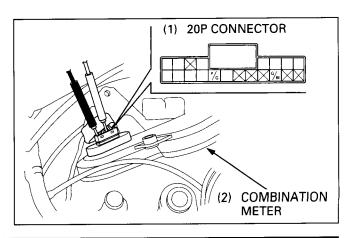
Support the motorcycle using a hoist or other support to rise the rear wheel off the ground.

Turn the ignition switch ON.

Measure the voltage at the combination meter 20P connector with the ignition switch is ON while slowly turning the rear wheel by hand.

CONNECTION: Pink/Green (+) - Green/Black (-) STANDARD: Repeat 0 to 5 V

If the measurement is out of specification, inspect the open circuit in wire harness.



#### **CBR900RR ADDENDUM**

#### **WIRE HARNESS INSPECTION**

Remove the fuel tank (page 2-2).

Disconnect the speed sensor 3P (BLACK) connector. Turn the ignition switch is ON and measure the voltage at the 3P connector wire harness side.

CONNECTION: Black/Brown (+) - Green/Black (-)

STANDARD: Battery voltage

If there is no voltage, replace or repair the wire harness.

#### **REMOVAL/INSTALLATION**

Remove the fuel tank (page 2-2).

Disconnect the speed sensor 3P connector.

Remove the bolts and speed sensor.

Install the speed sensor in the reverse order of removal.

## **TACHOMETER**

#### **INSPECTION**

Remove the combination meter mounting bolt from the meter (page 22-50).

Check for loose or poor contact 20P connector of the combination meter.

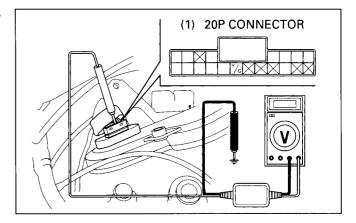
Connect the peak voltage adaptor to the tachometer Black/ Yellow terminal and ground.

CONNECTION: Yellow/Green (+) and Ground (-)

Start the engine and measure the tachometer input voltage.

**PEAK VOLTAGE: 10.5 V minimum** 

If the value is normal, replace the tachometer. If the measured value is below 10.5 V, replace the ignition control module (ICM).



If the value is 0 V, perform the following: Remove the seat (page 2-2) and disconnect the ICM 16P connector.

Check for continuity between the tachometer terminal and the ICM 16P connector Yellow/Green terminals. If there is no continuity, check the wire harness for an open circuit.

If there is continuity, replace the tachometer unit.

For tachometer replacement, (page 22-52) combination meter disassembly and assembly.

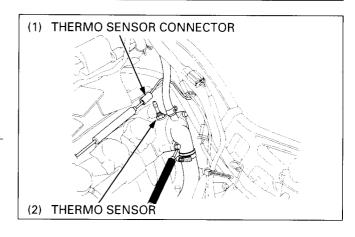
## COOLANT TEMPERATURE GAUGE/ THERMO SENSOR

#### INSPECTION

Remove the fuel tank (page 2-2).

Disconnect the thermo sensor wire connector from the sensor.

Ground the thermo sensor wire with a jumper wire.



Turn the ignition switch ON and check the coolant temperature gauge.

Disconnect the thermo sensor wire connector from the ground immediately if the gauge needls moves fully to H.

#### **CAUTION**

• Immediately disconnect the sensor wire connector from the ground when the needle moves to H (hot) to prevent damage to the gauge.

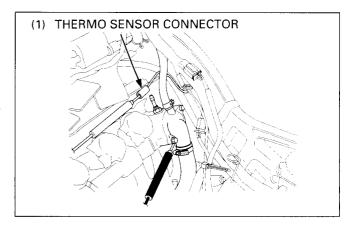
If the needle moves, check the thermo sensor unit.

If the needle does not move, check for voltage between the sensor wire connector and ground.

If the voltage is measured, faulty coolant temperature gauge unit.

If there is no voltage, check for voltage between the Black/ Brown and Green/Blue wire terminals.

If there is no voltage, faulty coolant temperature gauge unit. If the voltage is measured, check the wire harness.



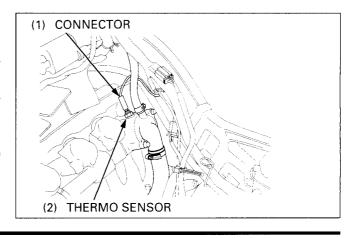
#### THERMO SENSOR UNIT INSPECTION

#### **A** WARNING

- · Wear insulated gloves and adequate eye protection.
- · Keep flammable materials away from the electric heating element.

Drain the coolant (page 6-3).

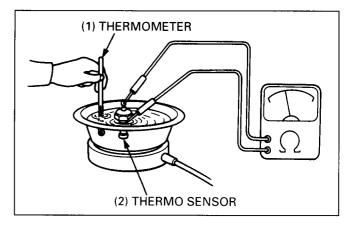
Disconnect the wire connector from the coolant temperature sensor and remove the sensor.



Suspend the thermo sensor in a pan of coolant (50 - 50 mixture) over the electric heating element and measure the resistance through the sensor as the coolant heats up.

#### NOTE

- Soak the thermo sensor in coolant up to its threads with at least 40 mm (1.57 in) from the bottom of the pan to the bottom of the sensor.
- Keep temperature constant for 3 minutes before testing.
   A sudden change of temperature will result in incorrect readings. Do not let the thermometer or thermo sensor touch the pan.



Temperature	80°C (68°F)	120°C (248°F)
Resistance	2,500 – 3,100 Ω	600 – 750 Ω

Replace the sensor if it is out of specifications by more than 10% at any temperature listed.

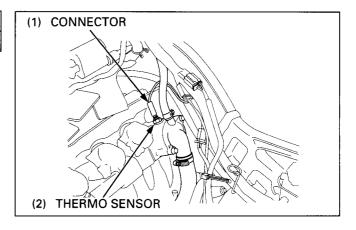
Apply sealant to the thermo sensor threads. Do not apply sealant to the sensor head.

Install and tighten the thermo sensor.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Connect the thermo sensor connector.

Fill the system and bleed the air (page 6-4).



## **IGNITION SWITCH**

#### **INSPECTION**

Remove the right inner panel (page 22-25).

Disconnect the ignition switch wire 6P (Black) connectors.

Check for continuity between the wire terminals of the ignition switch connector in each switch position.

Continuity should exist between the color coded wires as follows:

	BAT	FAN	IG	S	KEY
ON	0-	<del>-</del> 0-	<del>-</del> 0		KEY ON
OFF			0		KEY OFF
LOCK			0		KEY OFF LOCK PIN
COLOR	R	Bu/O	R/BI	Р	

#### NOTE

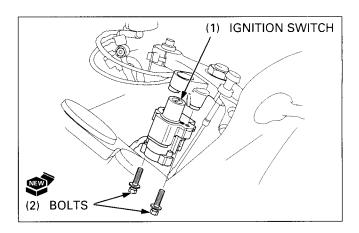
- · Use the analog multimeter.
- If there is a continuity in either direction between the Red/Black terminal and the Pink terminal with the ignition switch ON, the ignition switch is OK.

#### **REMOVAL/INSTALLATION**

Disconnect the ignition switch wire 6P (Black) connector. Remove the wire clamp.

Remove the bolts and ignition switch.

Install the ignition switch in the reverse order of removal.



## **HANDLEBAR SWITCHES**

Disconnect the handlebar switch connectors.

Check for continuity between the wire terminals of the handlebar switch connector.

Continuity should exist between the color coded wire terminals as follows:

# ENGINE STOP SWITCH (U, SI, BR type)

# OFF RUN O OCOLOR BI BI/W

#### (Except U, SI, BR type)

	IG	BAT2
OFF		
RUN	0	-0
COLOR	BI/W	BI

#### STARTER SWITCH

(Except U, SI, BR type)

(U, S	I, BR	typ	e)
-------	-------	-----	----

	ST	BAT2
FREE		
PUSH	0	-0
COLOR	Y/R	BI/W

	BAT2	ST	BAT5	HL
FREE			0-	0
PUSH	0_	9		
COLOR	BI/W	Y/R	Bu/W	BI/R

#### **TURN SIGNAL SWITCH**

(SI, BR type)

	W	R	L	BAT3	PR	PL
R	0—	0	 	0		-0
N				0-		-0
L	0		0	0-	-0	
COLOR	Gr	Lb	0	BI/Br	Lb/W	O/W

#### DIMMER SWITCH (Except U, SI, BR type) (U, SI, BR type)

	BAT4	HL	Lo	Hi
Lo	0	$\overline{}$	9	
(N)	0-	$\overline{}$	$\overline{}$	9
Hi	0-	0		
COLOR	BI/R		W	Bu
L	l .			

(о, о., о., туро,					
	HL	Lo	Hi		
Lo	$\bigcirc$	-0			
(N)	0	<del>-</del> 0-	9		
Hi	0		9		
COLOR	(Bu/W) BI/R	W	Bu		

#### LIGHTING SWITCH (Except U, SI, BR type)

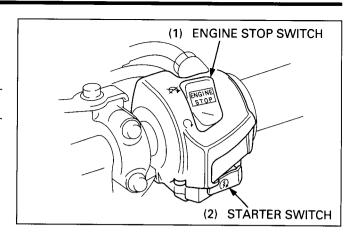
	ват3	TL	BAT4	HL
•				
P	0	9		
Н	0	9	0	<del>-</del>
COLOR	BI/Br	Br	BI/R	

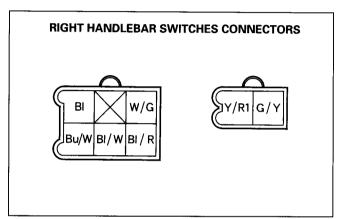
#### PASSING SWITCH (Except U, SI, BR type)

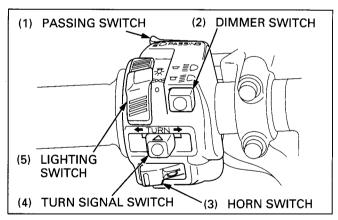
	BAT4	Hi
FREE		
PUSH	0	<u> </u>
COLOR	BI/R	Bu

#### **HORN SWITCH**

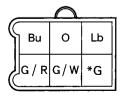
	Но	ВАТ3
FREE		
PUSH	0	
COLOR	Lg	BI/Br

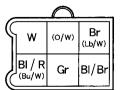








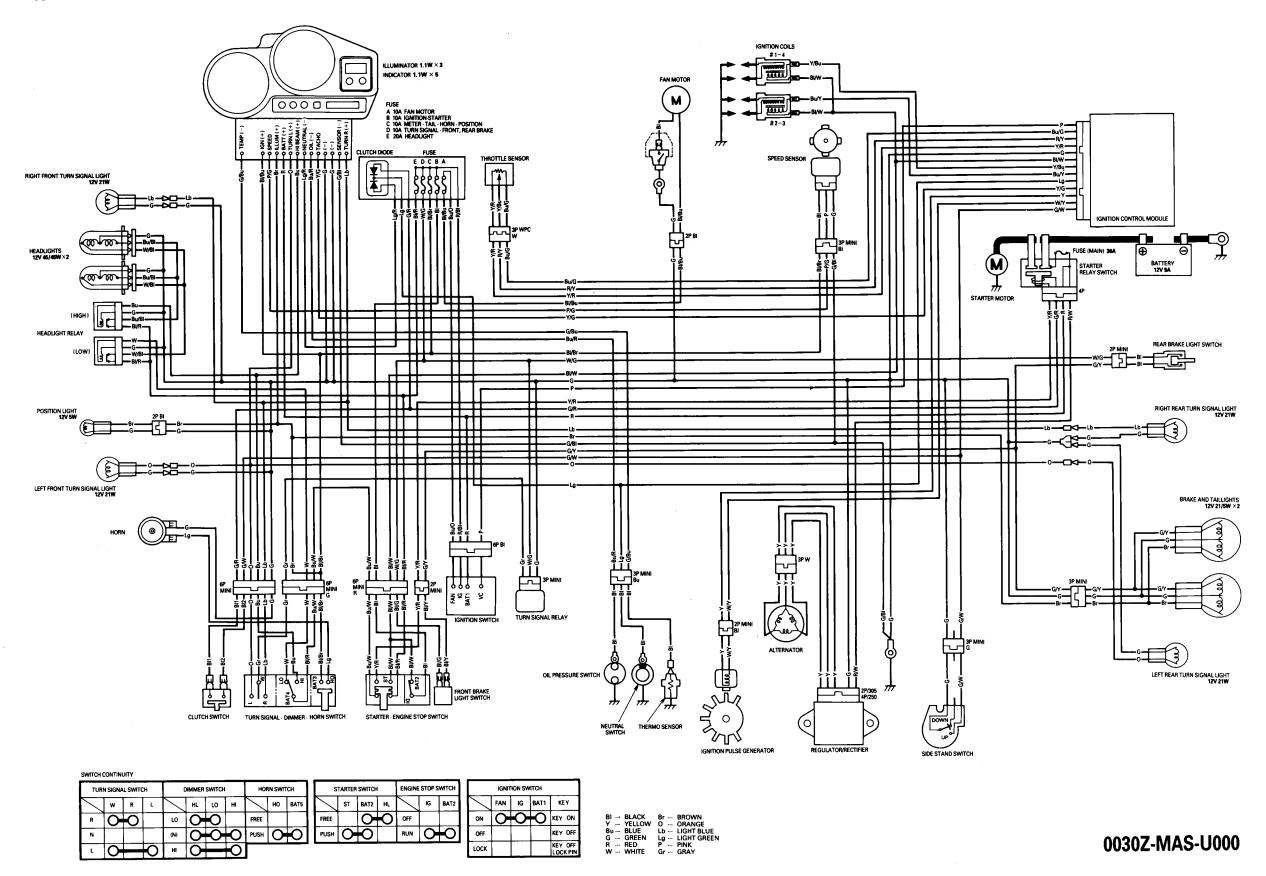




( ): SI, BR type

\*: Via Ho terminal

## U type:



# To print chapters, click on the printer icon and fill in the page range.

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